numatics®

G3 Series
DeviceLogix
Technical Manual

TDG3DLTM1-0EN 01/10
Subject to change without notice

www.numatics.com/g3

EMERSON. Industrial Automation

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About DeviceLogix

Overview

DeviceNet is a serial communication protocol used to network industrial devices to eliminate labor intensive and expensive point to point wiring schemes. It is based on the CAN (Controller Area Network) protocol. Allen Bradley originally developed DeviceNet, but it is now supported by a multitude of manufacturers.

The ODVA (Open DeviceNet Vendor Association) is an independent organization that governs the DeviceNet specification and oversees conformance testing for products, which will be used in a DeviceNet system.

DeviceNet uses a powered 4-wire (plus shield) network and can have up to 64 nodes. The protocol can transfer a maximum of 8 bytes of data per node cycle with three selectable communication (baud) rates of 125 Kbps, 250 Kbps, or 500 Kbps. Maximum distance is depended upon baud rate and cable media type. Refer to the section below for details.

More information about DeviceNet and ODVA can be obtained from the ODVA web site www.odva.org

G3 DeviceNet Features

Features	*Description*
DeviceNet Spec. Supported	Designed to DeviceNet Specification Revision 2.0
Bus Topology	Straight with restricted drops; trunk line-drop line configuration
Baud Rates Supported	125 Kbps, 250 Kbps and 500 Kbps and Auto baud
Duplicate address detection	If duplicate address detected on power up, duplicates will not progress to run mode
Error Correction	Yes, if error detected, sender is requested to repeat the message
Address Setting	Via graphic display, software, or optional Manual Configuration Module (MCM)
Termination Resistor (external)	A 121 ohms, 1%, ¼ Watt resistor is required at each end of the trunk line
ADR support	Auto-Device Replacement is supported when the MCM is not present
Connection Types Supported	Polled, Cyclic, Change of State (COS) or Combinations

Cabling and Drop Line Lengths (as defined by DeviceNet specification)

Maximum Main Trunk Cable Length

Baud Rate	*Thick Trunk Cable*	*Thin Trunk Cable*	*Flat Trunk Cable*
125 Kbps	1640 ft (500 m)	328 ft (100 m)	1246 ft (380 m)
250 Kbps	820 ft (250 m)	328 ft (100 m)	656 ft (200 m)
500 Kbps	328 ft (100 m)	328 ft (100 m)	246 ft (75 m)

Maximum Drop Line Cable Length

Baud Rate	*Maximum Drop Length*	*Cumulative Drop Length*
125 Kbps	20 ft (6 m)	512 ft (156 m)
250 Kbps	20 ft (6 m)	256 ft (78 m)
500 Kbps	20 ft (6 m)	128 ft (39 m)

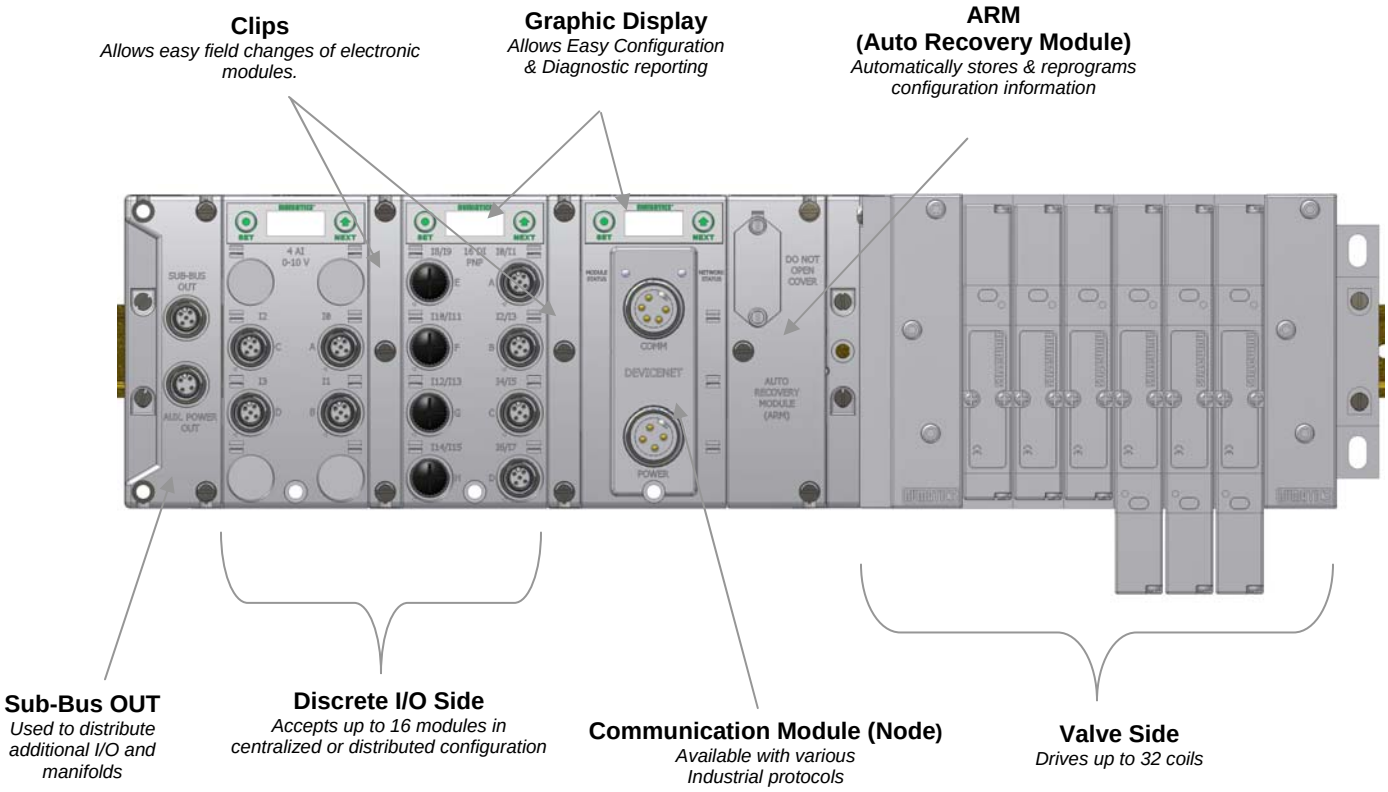
G3 Introduction

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.

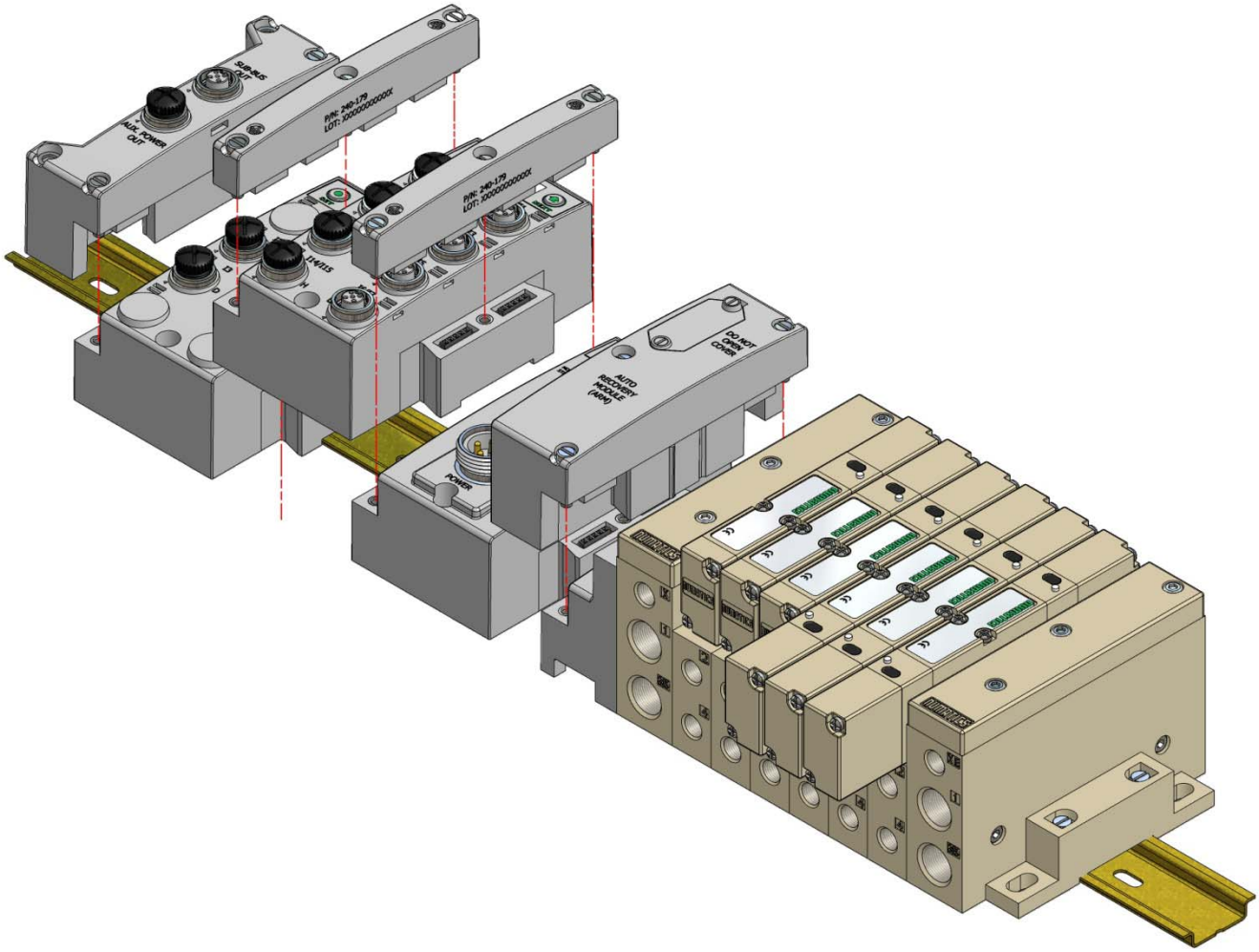
This manual details specific information for configuring and commissioning the Numatics G3 Series product line. For more information relating to pneumatic valving and valve manifold assemblies, please refer to the Numatics *In Control* Catalog at www.numatics.com.



G3 Electronics Modularity

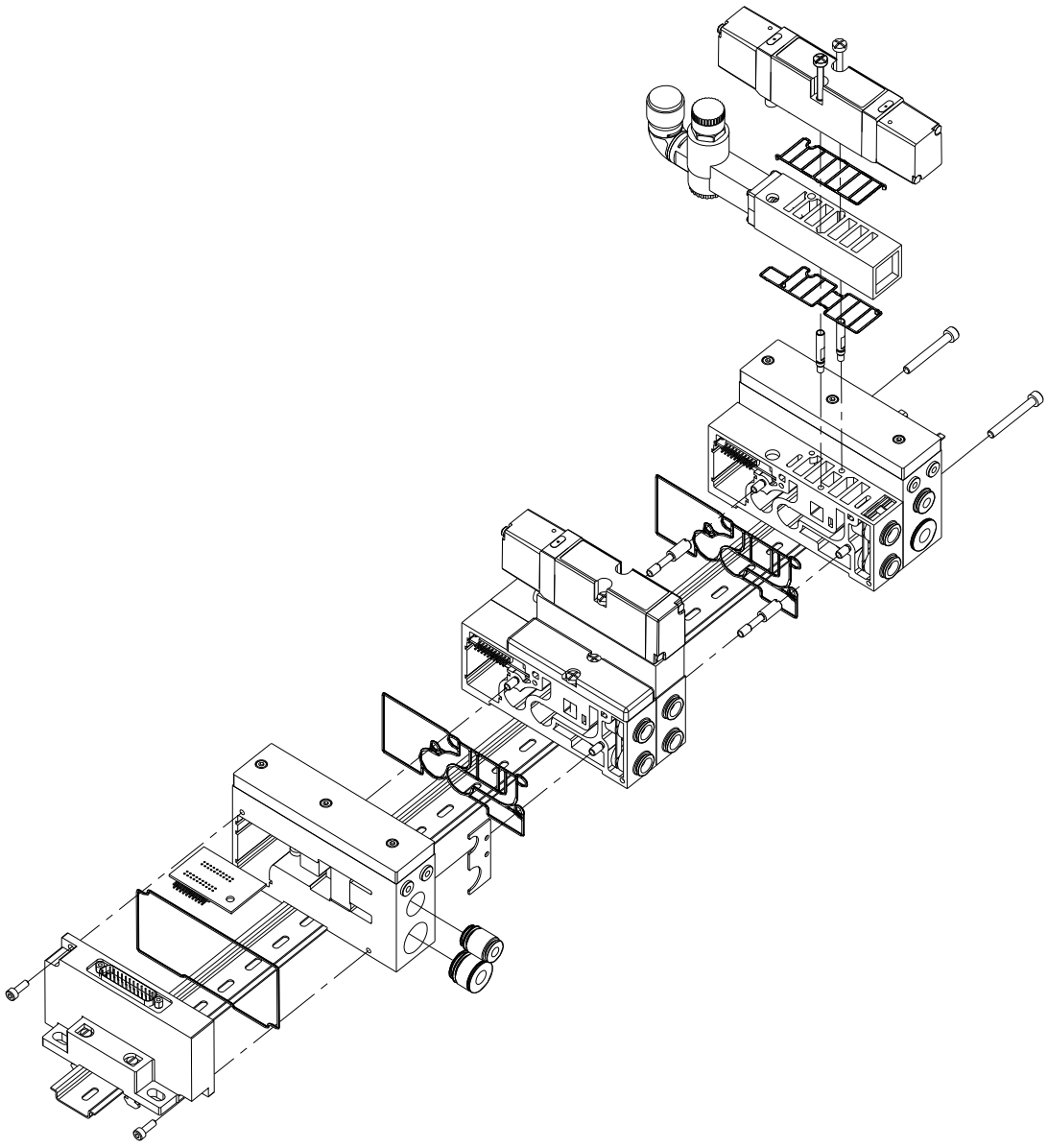
Discrete I/O

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

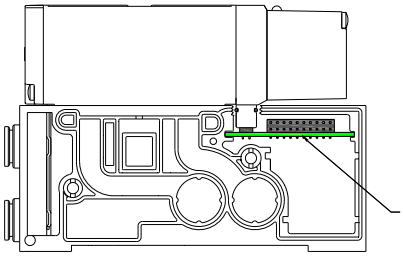
The pneumatic valve manifold with internal circuit board technology is also modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards), which allow internal connection from solenoid coils to output drivers without the use of wires). This allows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



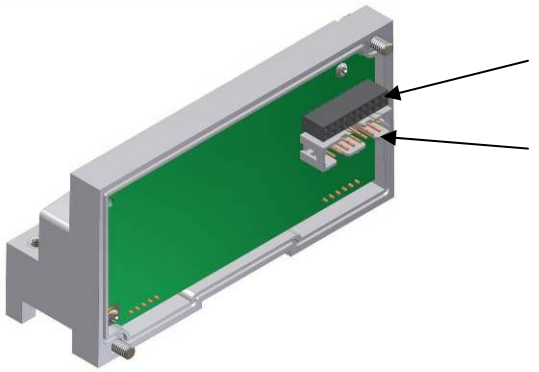
Manifold Connectors

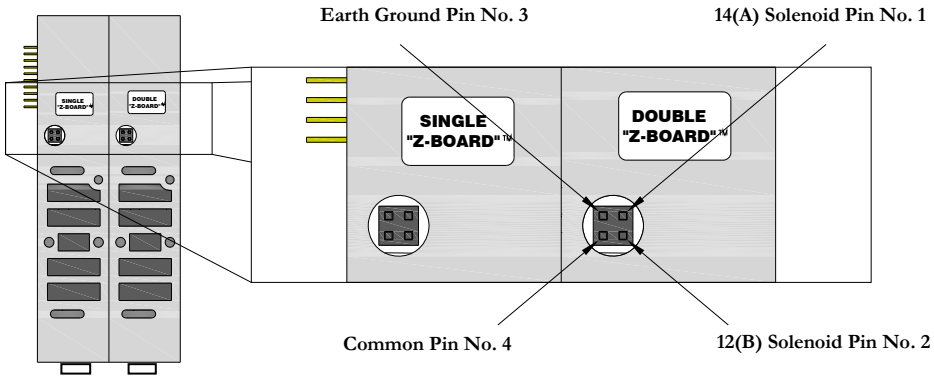
Solenoid Coil Connections using Z-Board™ Technology for 2005/2012/2035 valve series

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 module. 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



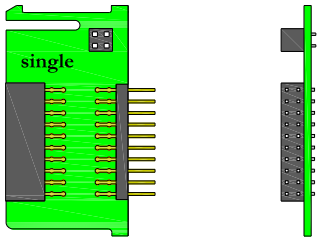
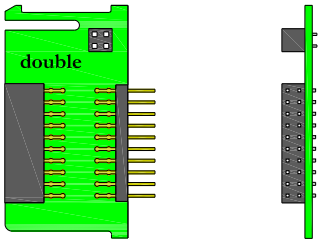
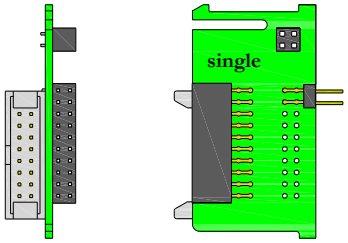
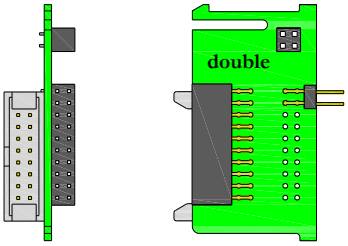


NOTE!

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.

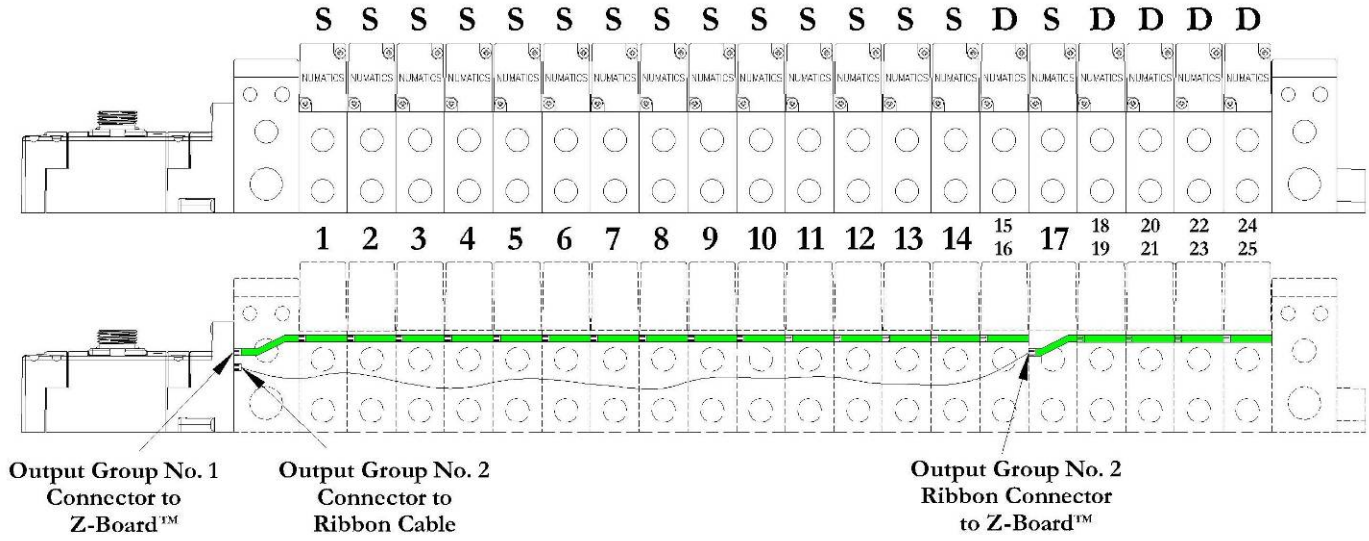
Single Z-Board™	*Double Z-Board™*
	
Ribbon Connection Single Z-Board™	***Ribbon Connection Double Z-Board™***
	

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 ™



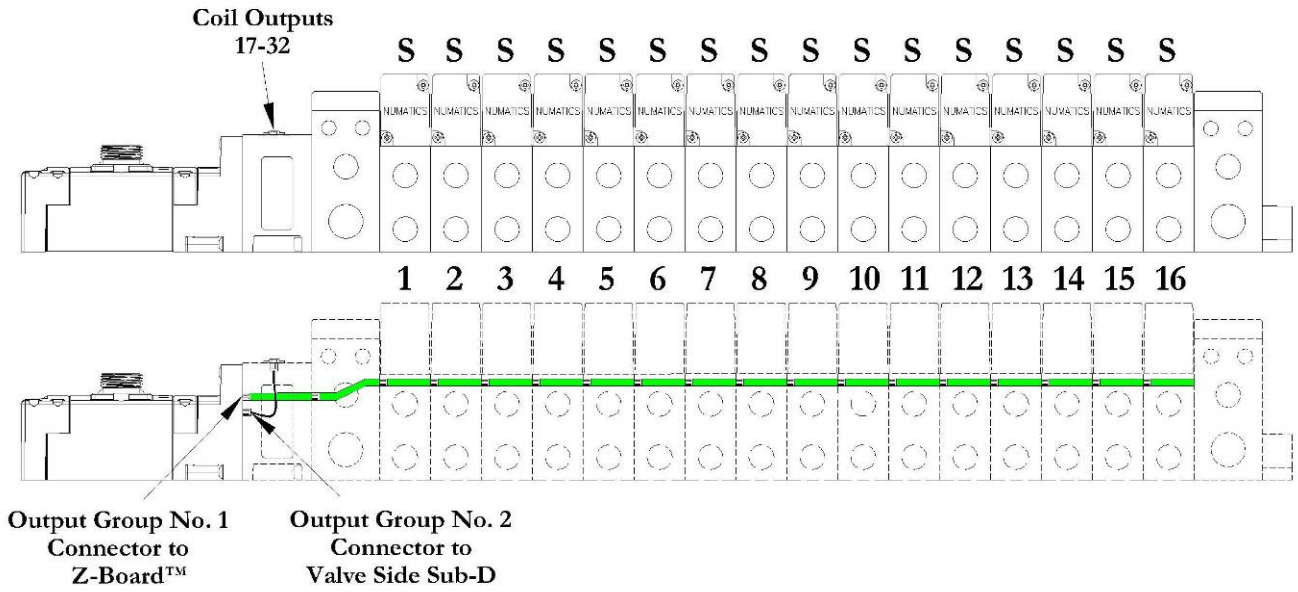
Output Word	0																1															
Output Byte	0								1								2								3							
Output Bit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solenoid Coil Output No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	n/a						

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 (Node)

DeviceLogix Communication Module

DeviceLogix is a Rockwell Automation technology that allows a DeviceNet node to be programmed to execute a sequence independently from the control for the main PLC/IPC. A DeviceLogix enabled DeviceNet node can be used in conjunction with a standard DeviceNet network, providing simple distributed control functionality. Additionally it can be used in a standalone application, without a network connection or PLC/IPC, to sequence pneumatic valves and control I/O. Numatics has integrated this licensed technology into its DeviceNet compatible valve manifold series, which combine the functionality of a modular pneumatic valve system with integrated I/O.

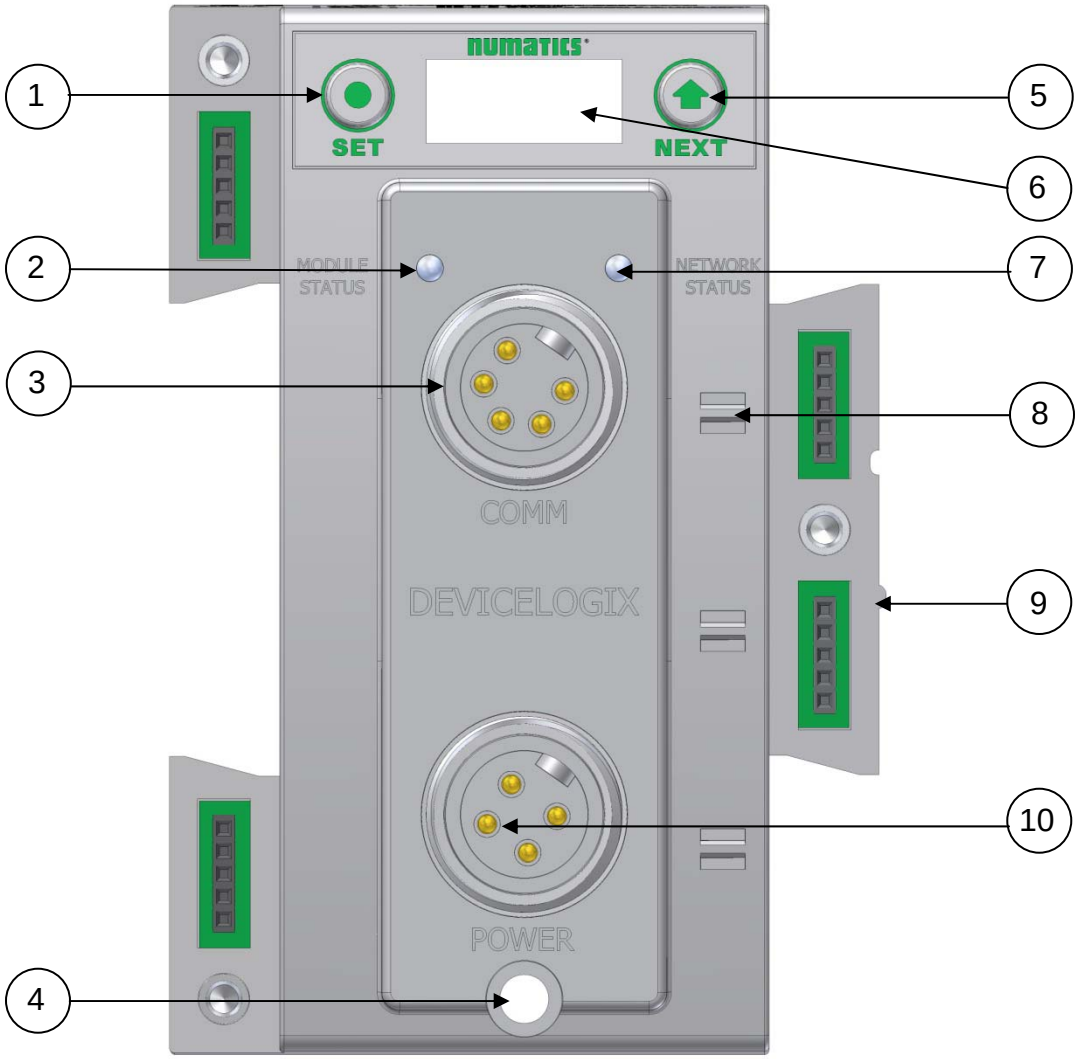
Programming of the DeviceLogix enabled node is done with industry standard DeviceNet commissioning software too RSNetWorx for DeviceNet from Rockwell Automation. The programming software features an easily understandable graphics environment where the users can simply "drag and drop" logic function blocks onto a page and interconnect them to develop the required sentence, or ladder logic programming can be used to develop a sequence. The programmed sequence is downloaded to the node via standard DeviceNet communication connection, thus multiple nodes can be programmed on the same network.

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	*Part Number*
DeviceLogix Communication module	240-293

Communication Module Description

Detail No.	Description
1	"Set" Button – used to navigate through user menus and to set parameters
2	Module Status LED
3	5 Pin MINI Male 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

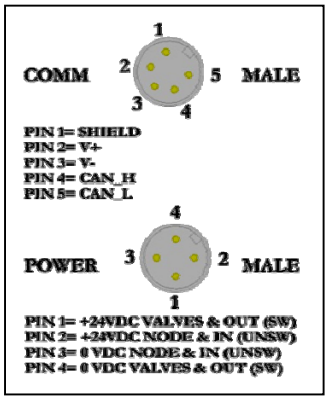
Industry standard 7/8" MINI connectors are used for communication and power.
The DeviceNet communication connector is a single keyway 5 pin male connector.
The Power connector is a single keyway 4 pin male connector.

DeviceNet Communication Connector Pin-Out

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

Power Connector with CENELEC Style 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 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 Voltage used to power outputs (valve coils and discrete outputs) SW



ATTENTION

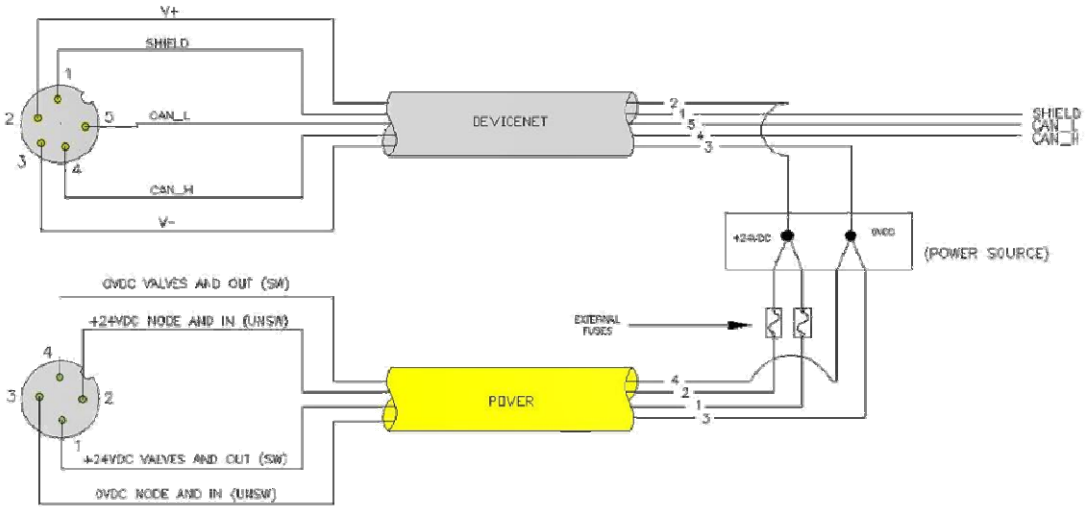
- *Power common (0 VDC) pins 3 and 4 are isolated from each other to allow separate (isolated) power supply connection if required. However, they can be tied together if a single common, non-isolated, application is preferred.*
- *The draw of the +24VDC Valves and Outputs and +24VDC Node and Inputs pins cannot exceed 8 Amps, at any given moment in time.*
- *The Node and Inputs pins supplies power to the node electronics. These pins must be powered at all times for communication node to be functional.*

Electrical Connections

Standard Power Connector Wiring Diagram Examples

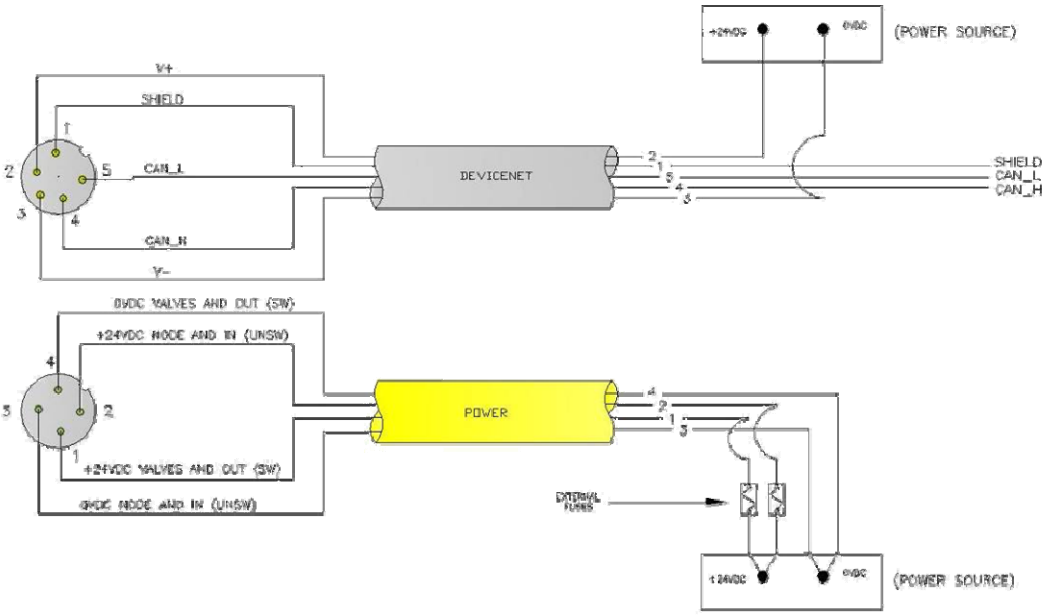
Single Power Supply Example (Non-isolated commons)

Male connector view



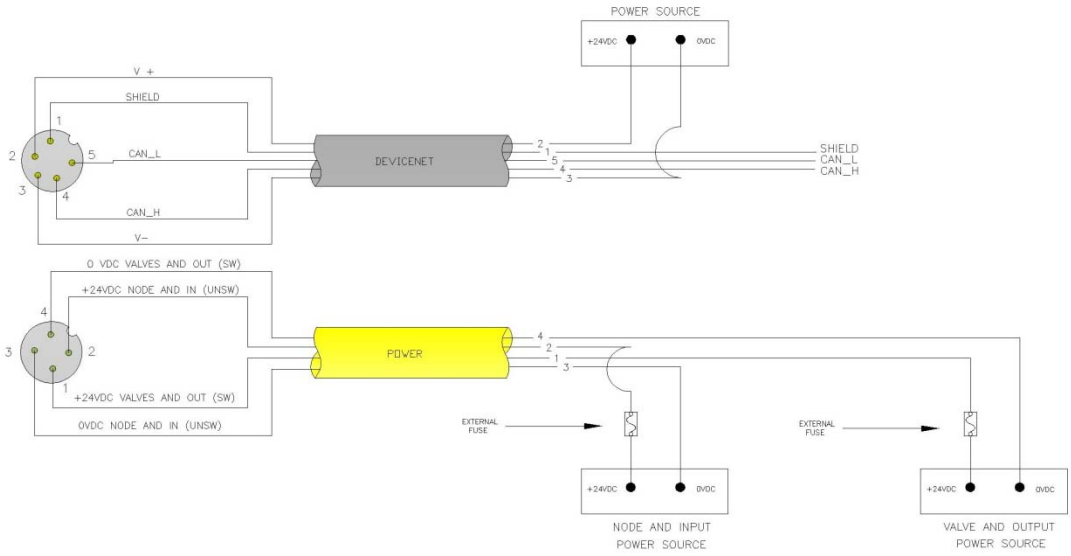
Separate Power Supply Example (Non-isolated commons)

Male connector view



Separate Power Supply Example (Isolated commons)

Male connector view



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.*

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 Aux. power connector pins.
- 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 (4 Amps if using distribution).
- 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) DeviceNet Network Current =	24 VDC	+/- 10%	.006 A	0.144 W	.070 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 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	=	.070 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

- *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 Module and Network Status LEDs indicate the state of the unit. There are two LEDs on the G3 DeviceLogix node. The LEDs functions are described in the table below.

LED Name	*Color*	*Status*	*Description*
NETWORK STATUS	Off	OFF	*Stand Alone* – Network cable is not connected to node. Normal Operation *Networked* - Device is not on-line; Bus power not applied; Physical problem with network; Improper baud rate.
	Green	ON	Normal operation. Device is on-line and has established a connection.
		FLASHING	Device is on-line but has no established connections.
	Red	ON	The device has detected a bus error that has rendered it incapable of communicating on the network; Duplicate MAC ID; "Bus Off" condition; Physical problem with network.
		FLASHING	Communication failure – one or more I/O connections have timed out.
MODULE STATUS	Off	OFF	Critical hardware fault. Microprocessor is not running.
	Green	ON	Normal operation. The device is operating properly.
		FLASHING	Network power is absent.
	Green / Red	FLASHING	Module is in self-test mode. Cycle power to end self-test mode.

Output / Short Circuit Protection Diagnostic Status Bits

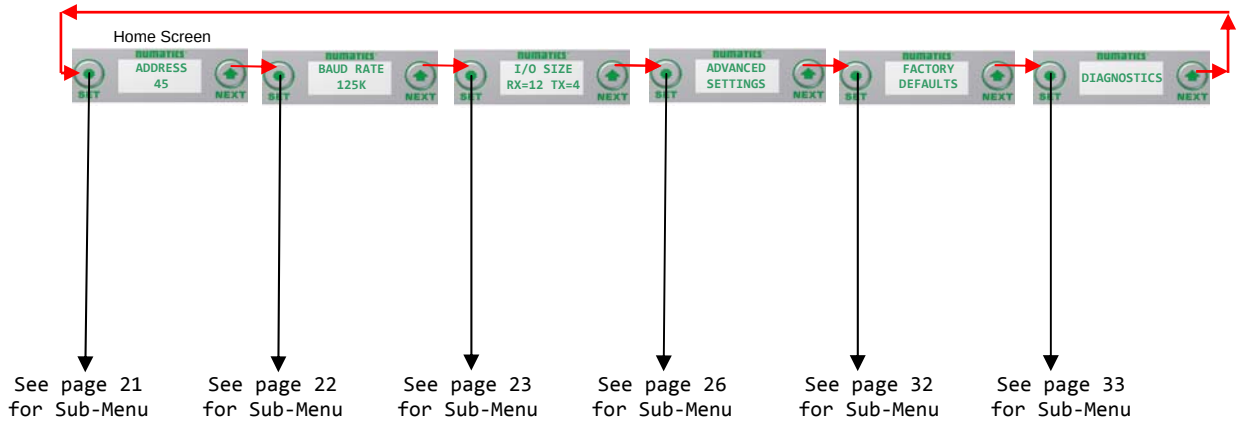
Diagnostic Status Bit Action during Fault Condition

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 DeviceLogix 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!***



Network Address Sub-Menu

Steps to Set Address

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

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

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

4. Press the NEXT button to select **Y**es or **N**o to accept the 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.

   Press the SET button to confirm your choice.

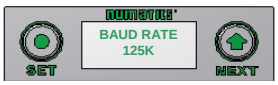
5. Press the NEXT button to select either NOW or LATER.
   a. Selecting NOW will cause the node to reset and apply the new setting.
   b. Selecting LATER will cause the new Address to be saved in temporary memory to allow you to make additional parameter changes before the node is reset. However, you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

   Press the SET button to confirm your choice.

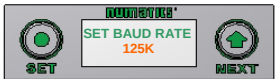
- ***Only addresses 0- 63 are valid.***
- ***Address 0 is typically reserved for the master (i.e. PLC. IPC, etc…)***
- ***Address 62 is typically reserved for network programming devices (i.e. Rockwell 1770-KFD).***
- ***Address 63 is reserved for new replacement devices.***
- ***Address 63 is the Factory Default node address.***

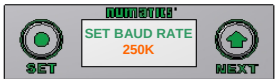
Baud Rate Sub-Menu

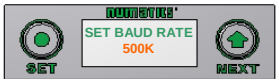
Steps to Set Baud Rate



1. Press the SET button to enter the BAUD RATE sub-menu.







2. Press the NEXT button to scroll through the choices for the baud rate of the node:
   a. 125K
   b. 250K
   c. 500K
   d. AUTOBAUD (Factory Default)
   e. RETURN (this will return you to the top of BAUD RATE menu)

   Press the SET button to confirm your choice.

3. Press the NEXT button to select **Y**es or **N**o to accept the baud rate shown on the display..
   a. Selecting **N**o will bring you back to the main Baud Rate menu.
   b. Selecting **Y**es will take you to the following SAVE SETTINGS menu.

   Press the SET button to confirm your choice

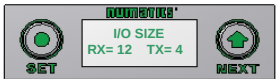
Saved Setting Steps

4. Press the NEXT button to select either NOW or LATER.
   a. Selecting NOW will cause the node to reset and apply the new setting.
   b. Selecting LATER will cause the new Baud Rate to be saved in temporary memory 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.

- ***Node must be set to the same baud rate as the network master (i.e. PLC scanner, controller's communication module, etc…)***
- ***More than one device (slave) on the network is required for AUTOBAUD to function.***

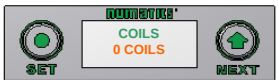
I/O Size - Coils Sub-Menu

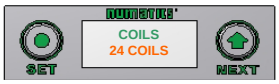


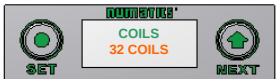
I/O Size Steps

1. Press the SET button to enter the I/O SIZE sub-menu.

2. Press the SET button to enter the I/O ALLOC COILS menu.







3. Press the NEXT button to scroll through the choices for the number of allocated valve coils:
   a. 0 COILS
   b. 8 COILS
   c. 16 COILS
   d. 24 COILS
   e. 32 COILS (Factory Default)
   f. RETURN (this will return you to the I/O ALLOC menu)

   Press the SET button to confirm your choice.

4. Press the NEXT button to select **Y**es or **N**o to accept the number of allocated coils shown.
   a. Selecting **N**o will bring you back to the main I/O ALLOC menu.
   b. Selecting **Y**es will take you to the following saved settings menu.

   Press the SET button to confirm your choice.

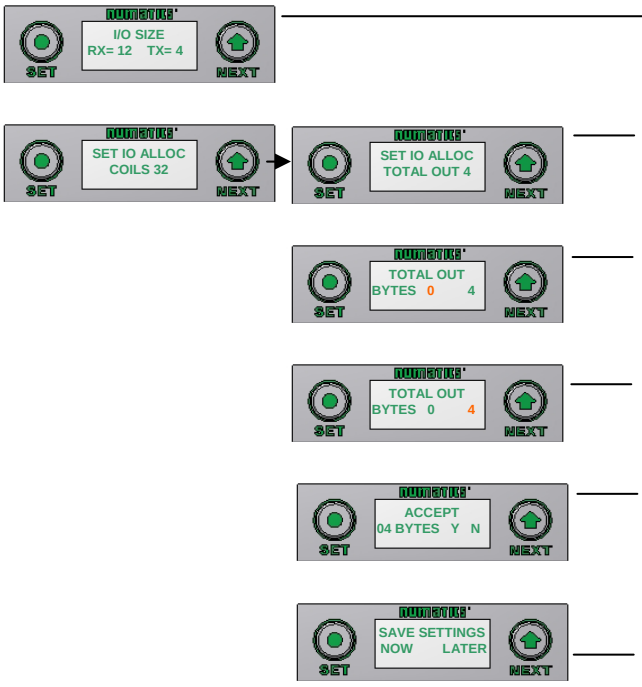
Save Setting Steps

5. Press the NEXT button to select either NOW or LATER.
   a. Selecting NOW will cause the node to reset and apply the new setting.
   b. Selecting LATER will cause the new Coil Allocation 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.

- ***Choose the appropriate number of valve coils to optimize the number of I/O bytes allocated for the manifold.***
- ***Optimizing number of coils may cause extra coil output not to be allocated for future expansion. Thus, adding valves in the future would require this parameter to be adjusted.***

I/O Size - Allocation Menu



I/O Allocation Steps

1. Press the SET button to enter the I/O SIZE sub-menu.
2. Press the NEXT button to scroll to the I/O ALLOC TOTAL OUT menu.
3. Press the SET button to enter the I/O ALLOC TOTAL OUT menu.
4. Press the NEXT button to scroll through the choices for the tens digit of the total output size.
   Press the SET button to confirm the tens digit and move into the ones digit selection.
5. Press the NEXT button to scroll through the choices for the ones digit of the total output size.
   Press the SET button to confirm the ones digit.
6. Press the NEXT button to select **Y**es or **N**o to accept the number of outputs shown.
   a. Selecting **N**o will bring you back to the main I/O ALLOC menu.
   b. Selecting **Y**es will take you to the following saved settings menu.

   Press the SET button to confirm your choice.

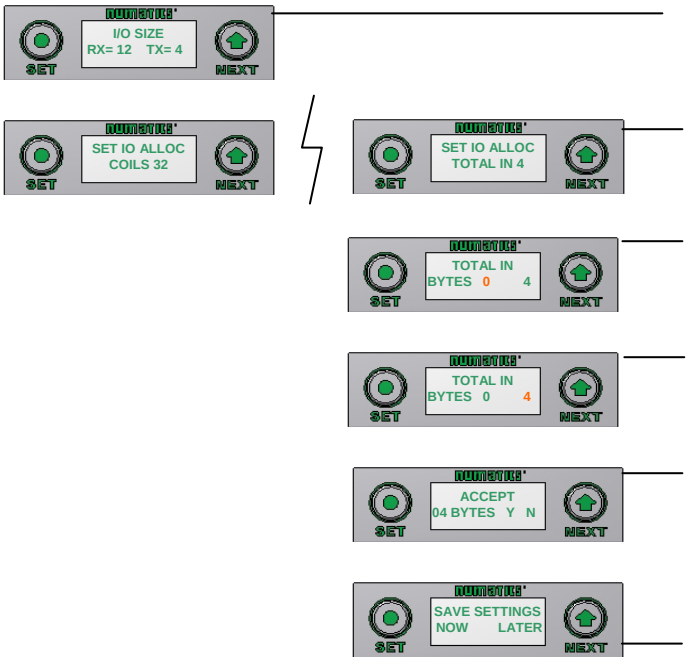
Save Setting Steps

7. 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 Total Output size 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

- ***Setting this value will turn off the default condition in the manifold of Auto Configuring its total I/O size based on installed modules.***
- ***This value will allow you to set a preset I/O size for the manifold configuration regardless of modules installed as long the value is greater than the actual physical configuration.***

I/O Size - Allocation Sub-Menu Cont.



I/O Allocation Steps

1. Press the SET button to enter the I/O SIZE sub-menu.
2. Press the NEXT button to scroll to the I/O ALLOC TOTAL IN menu.
3. Press the SET button to enter the I/O ALLOC TOTAL IN menu.
4. Press the NEXT button to scroll through the choices for the tens digit of the total input size.
   Press the SET button to confirm the tens digit and move into the ones digit selection.
5. Press the NEXT button to scroll through the choices for the ones digit of the total input size.
   Press the SET button to confirm the ones digit.
6. Press the NEXT button to select **Y**es or **N**o to accept the number of input bytes shown.
   a. Selecting **N**o will bring you back to the main I/O ALLOC menu.
   b. Selecting **Y**es will take you to the following saved settings menu.

   Press the SET button to confirm your choice.

Save Setting Steps

7. 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 Total Input size 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.

Advanced Settings - I/O Diag. Menu

I/O Status Steps

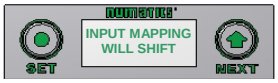
1. Press the SET button to enter the ADVANCED SETTINGS sub-menu.

2. Press the SET button to enter the CONFIG MENU / DIAG. STATUS.

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

4. Press 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 DIAG. STATUS menu)

   Press the SET button to confirm your choice.



5. Press NEXT to confirm the warning message.

6. 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.

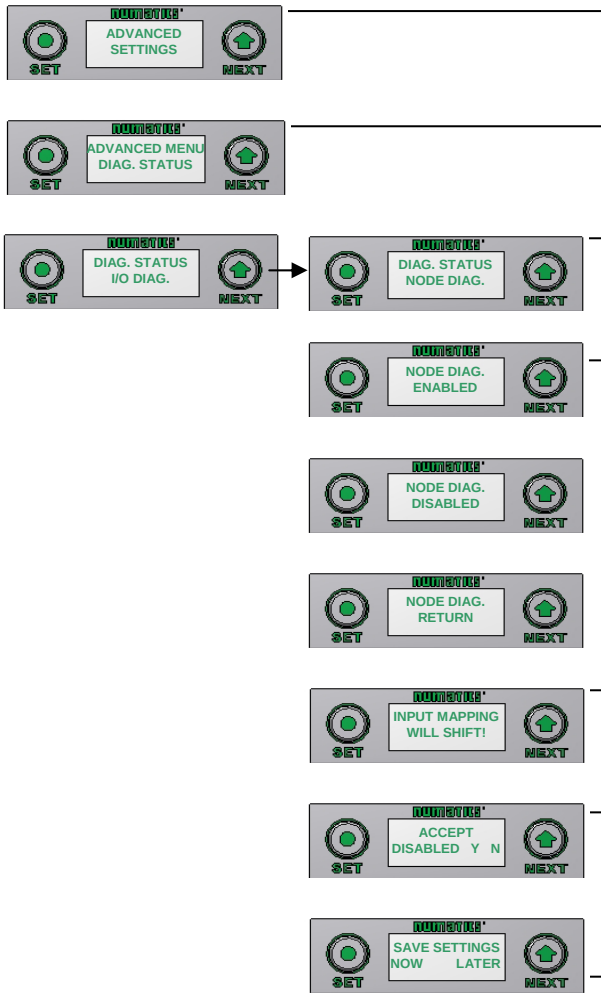
Save Settings Steps

7. 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

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

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

3. Press the NEXT button to scroll to the DIAG. STATUS / NODE DIAG. menu.
   Press the SET button to enter the DIAG. STATUS / NODE DIAG. menu.

4. Press the NEXT button to scroll the choices to enable/disable the I/O status.
   a. ENABLED (Factory Default)
   b. DISABLED
   c. RETURN (this will return you to the DIAG. STATUS menu)

   Press the SET button to confirm your choice.

5. Press Next to confirm the warning message.

6. 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.

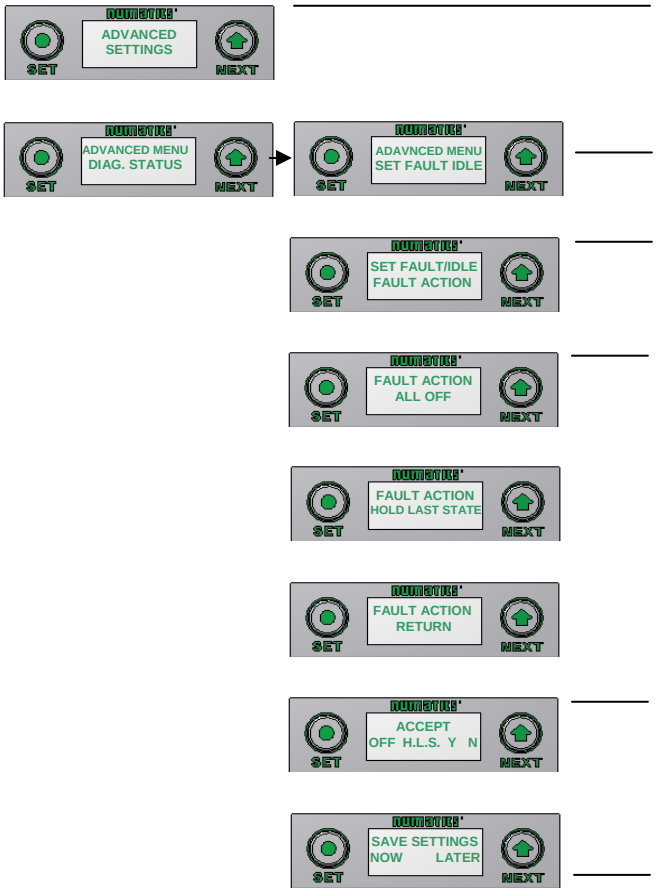
Save Settings Steps

7. 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.

- *See page 77 for more details.*

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. Press the NEXT button to scroll the choices for the desired output action during a fault state.
   a. ALL 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.
6. 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

7. 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 63 for more details.*
- *Factory Default is "ALL OFF"*

Advanced Settings - Idle Action

Idle Action Settings

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

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

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

4. Press the NEXT button to scroll the choices for the desired output action during an idle state.

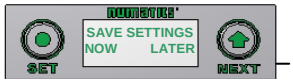
   a. ALL OFF (Factory Default)
   b. HOLD LAST STATE
   c. RETURN (this will return you to the SET FAULT/IDLE menu)

   Press the SET button to confirm your choice.

5. 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 FAULT/IDLE 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

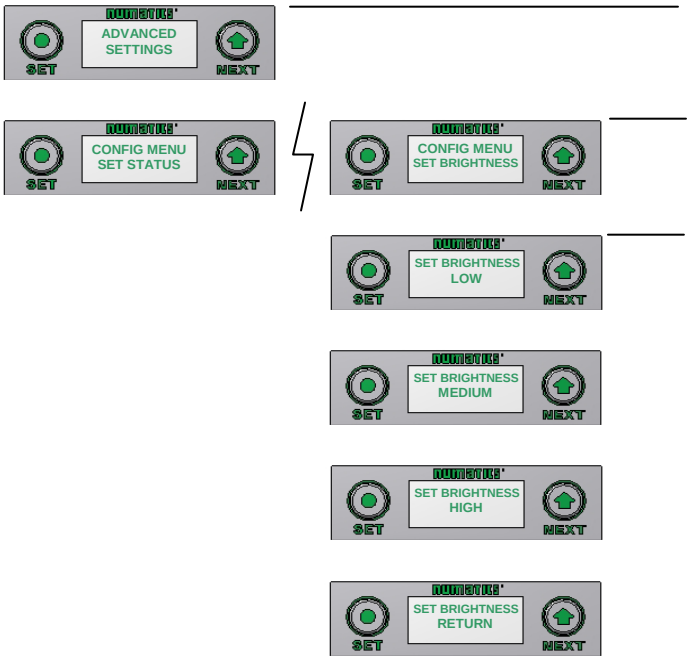


6. Press the NEXT button to select either NOW or LATER.
   a. Selecting NOW will cause the node to reset and apply the new setting.
   b. Selecting LATER will cause the new IDLE ACTION selection to be saved in memory, you must Accept the saved changes before your next power cycle otherwise they will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

   Press the SET button to confirm your choice.

- ***See page 64 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.

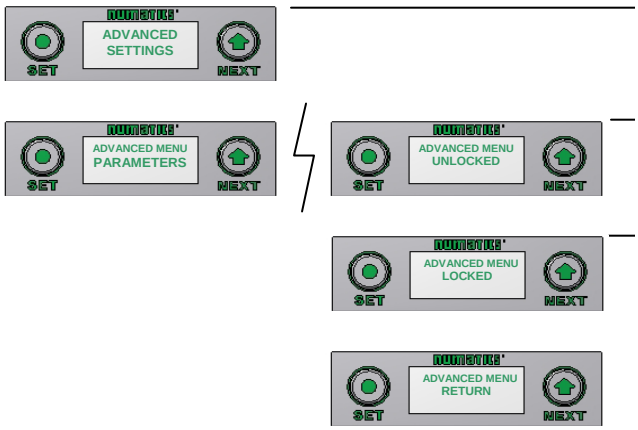
3. Press the NEXT button to scroll the choices for the desired brightness of the LCD display for all modules on the G3 system.

   a. LOW
   b. MEDIUM Factory Default)
   c. HIGH
   d. RETURN (this will return you to the SET FAULT/IDLE menu)

   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.***

Advanced Settings - Parameters



Parameter Settings

1. Press the SET button to enter the ADVANCED SETTINGS menu.
2. Press the NEXT button to scroll to the ADVANCED MENU / PARAMETERS.
3. Press the SET button to enter the ADVANCED MENU / PARAMETERS.
4. Press the NEXT button to scroll the choices for the desired brightness of the LCD display for all modules on the G3 system.
   a. UNLOCKED (Factory Default)
   b. LOCKED
   c. RETURN (this will return you to the ADVANCED SETTINGS menu)

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

- ***This feature will allow you to lock the display. No parameters can be set through the display while in the "LOCKED" mode.***

Factory Defaults

Factory Default Settings

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

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

   Press the SET button to confirm your choice.

FACTORY DEFAULT SETTINGS	
Description	***Default***
Node Address	**63**
Baud Rate	**Auto-Baud enabled**
Valve Side Output Bytes	**4 Bytes (32 Allocated Valve Coil Outputs)**
Rx/Tx Values	**Self-Configuring**
Diagnostic Word	**Enabled**
Parameters	**Unlocked**
I/O Diagnostic Status	**Enabled**
Fault Action	**Reset to All Off**
Idle Action	**Reset to All Off**
Brightness	**Medium**
Comm. Status Override	**Disabled**
Network Status Override	**Disabled**

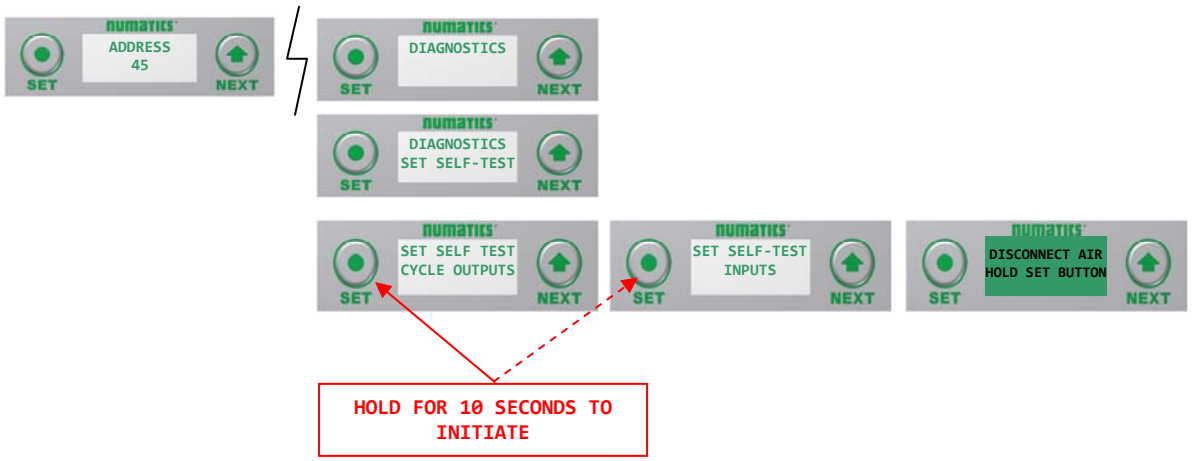
Diagnostics - Self Test Mode

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.

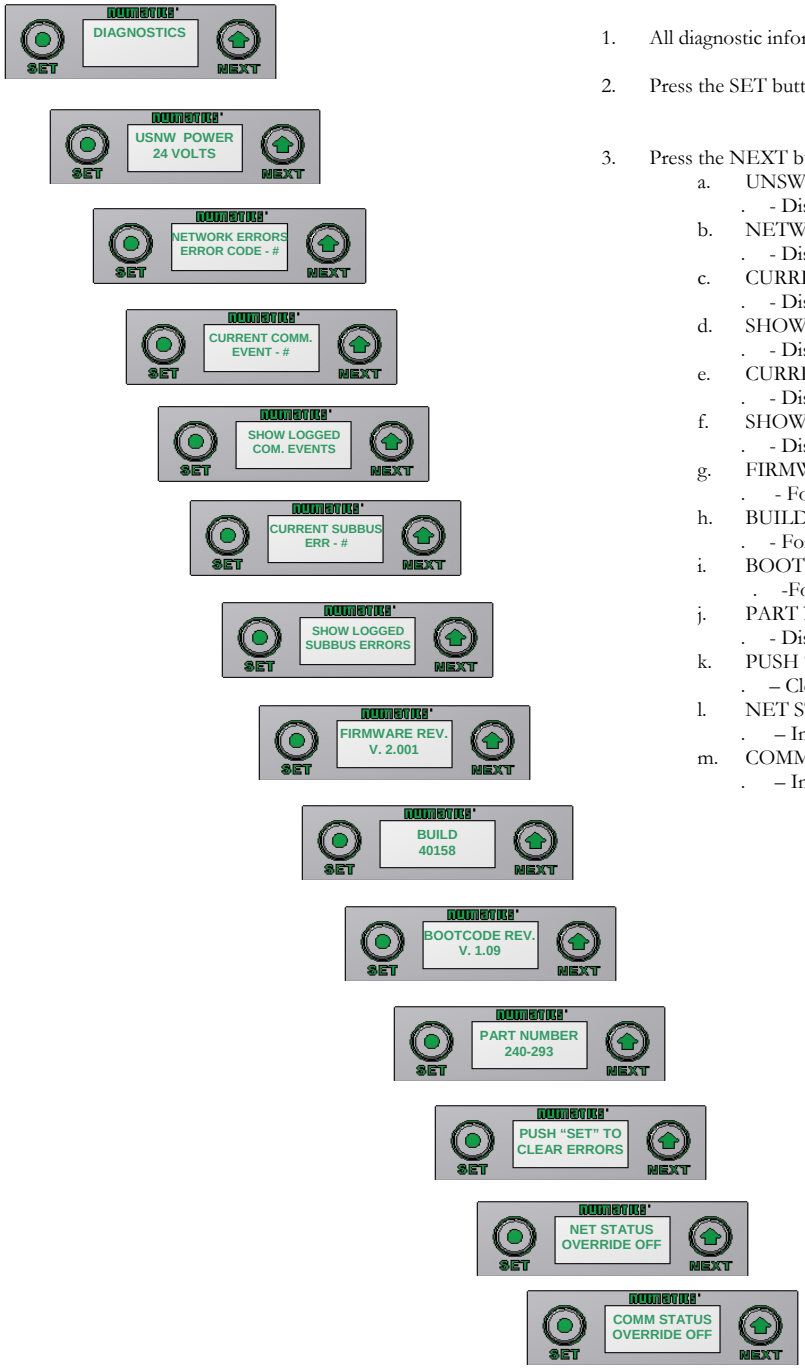
Similar "local" self tests are available on all output modules types. This "local" self test function allows any output module to be tested without affecting any other output module.
NOTE: The number of Valve outputs that are tested are affected by the I/O size settings.

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

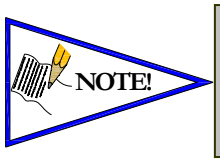
1) **Disconnect Air and Communication from the manifold!**
2) Select the desired test mode using the graphic display. (See example below)
3) Starting at the Home Screen, navigate the menus by selecting the NEXT button until the **DIAGNOSTICS** menu is shown.
4) Select the SET button to access the **DIAGNOSTICS** 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
      . - Displays voltage level of unswitched power (Node & Inputs)
   b. NETWORK ERRORS - ERROR CODE
      . - Displays fieldbus network errors
   c. CURRENT COMM. EVENT NUMBER
      . - Displays
   d. SHOW LOGGED COMM. EVENTS
      . - Displays log of network errors
   e. CURRENT SUBBUS ERROR
      . - Displays sub bus errors
   f. SHOW LOGGED SUBBUS ERRORS
      . - Displays log of sub bus errors
   g. FIRMWARE REV.
      . - For service personnel
   h. BUILD
      . - For service personnel
   i. BOOTCODE REV.
      . -For service personnel
   j. PART NUMBER
      . - Displays replacement part number of module
   k. PUSH "SET TO CLEAR ERRORS
      . – Clears the errors stored in memory
   l. NET STATUS OVERRIDE
      . – Indicates condition of the parameter
   m. COMM STATUS OVERRIDE
      . – Indicates condition of the parameter



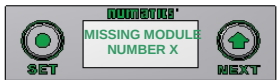
- **The UNSW POWER screen indicates the voltage level present on the UNSW (Node & Input) power pins (Pin No. 2 and 3) of the main power connector.**
- **A voltage level less than 19 volts will generate an error screen and an associated diagnostic bit (see 'Diagnostic' section for more details).**

Error Messages

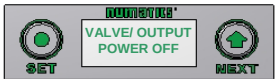
The following are automatic error messages that are displayed when specific faults occur during operation:

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

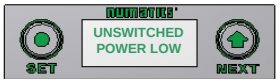
Displayed when a short circuit condition is detected on a valve coil



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

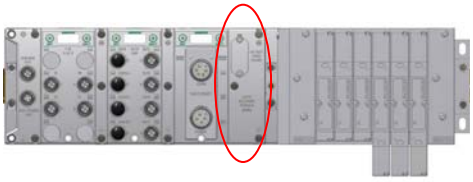


Displayed when +24 VDC on Pin No. 1 & 4 (Valves and Outputs) is not present or below 22 VDC



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

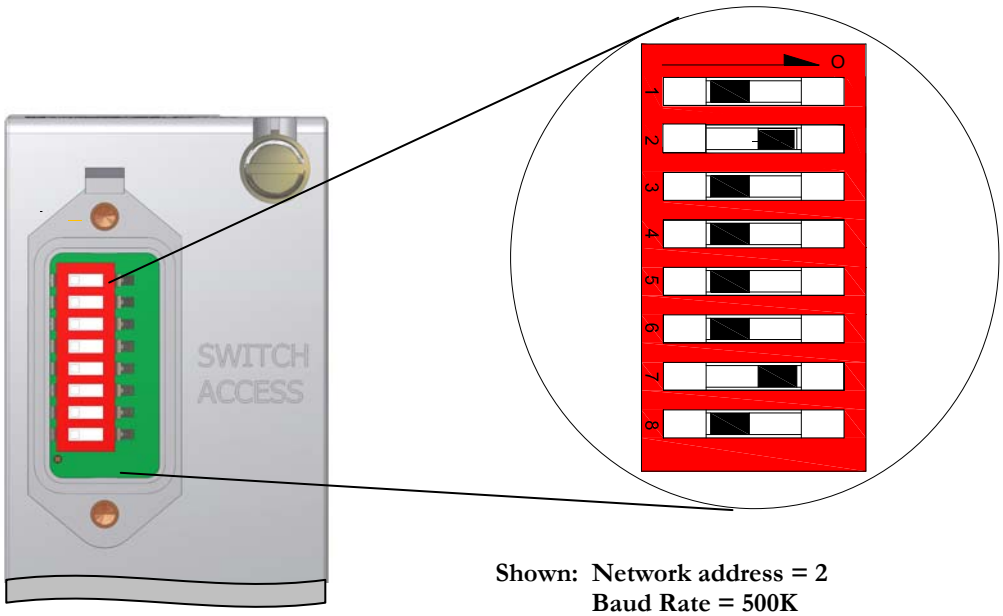
MCM – Manual Configuration Module (Optional)



The MCM is an optional module that is installed between the node and the valve adapter module and allows the user to manually set, via DIP switches, the node address and baud rate 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



Shown: Network address = 2
Baud Rate = 500K

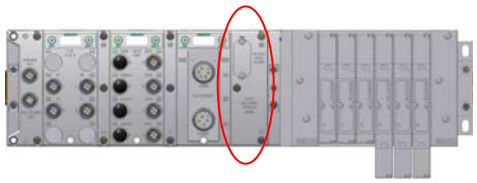
Network Address:

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*	*Address Value (Decimal)*
OFF	OFF	OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	OFF	ON	ON	3
OFF	OFF	OFF	ON	OFF	OFF	4
ON	ON	ON	OFF	OFF	OFF	56
ON	ON	ON	ON	OFF	ON	61
ON	ON	ON	ON	ON	OFF	62
ON	ON	ON	ON	ON	ON	63

Baud Rate:

SW-7	*SW-8*	*Baud Rate*
Off	Off	125K
Off	On	250K
On	Off	500K
On	On	Auto-Baud

ARM – Auto Recovery Module (Optional)



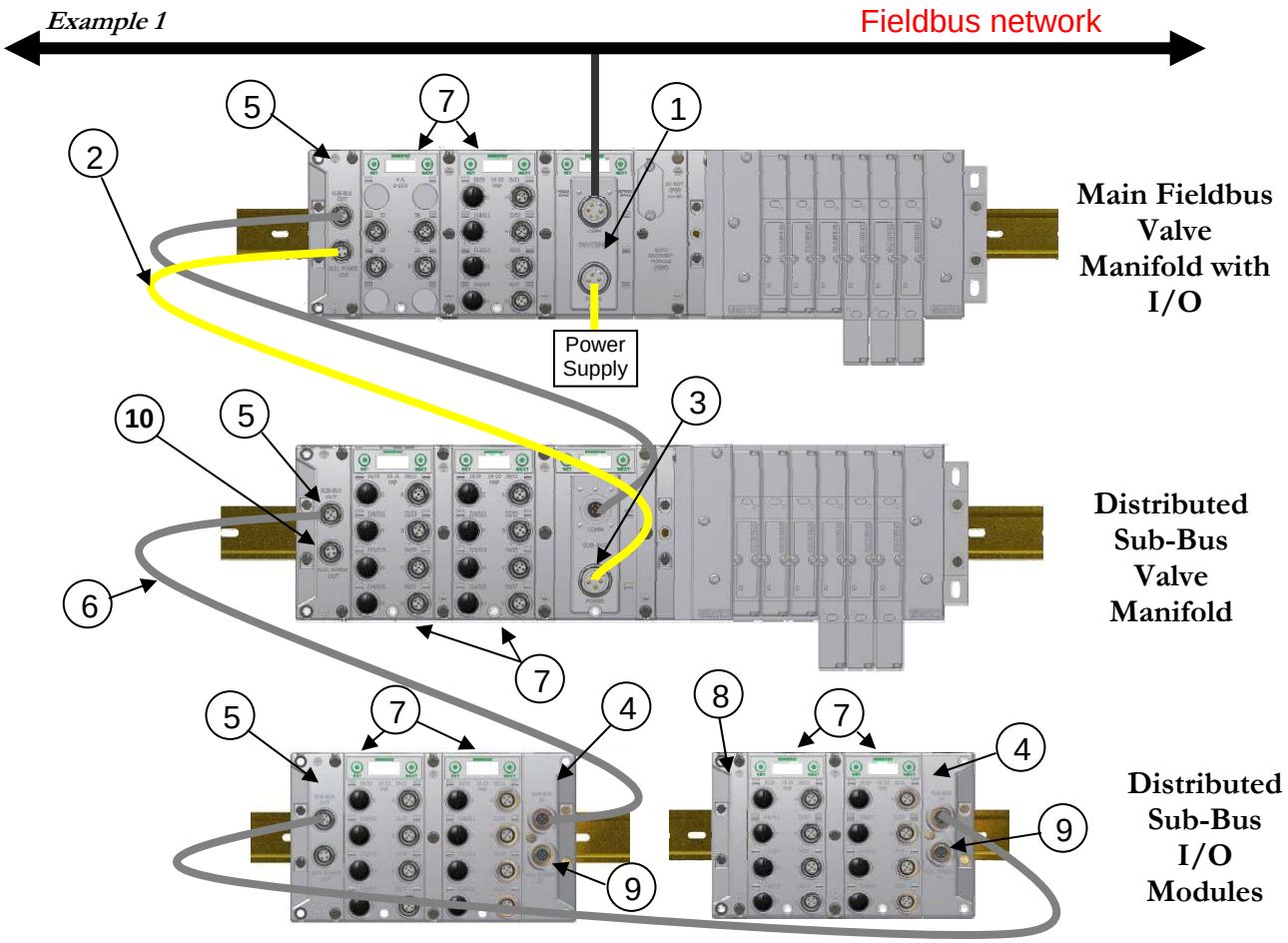
The Auto Recovery Module (ARM) is an optional memory module that is installed between the node and the valve adapter module and is used to preserve the manifold configuration settings even during catastrophic failure. During the power-up process it reads the configuration of the manifold, including any 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.



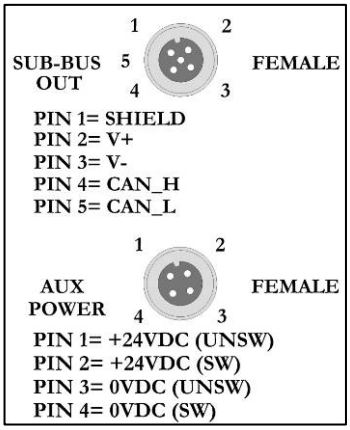
Detail No.	Description
1	Main Communication Module (Node)
2	Sub-Bus Power Cable (Can be connected to separate power supply for isolated power control)
3	Distributed Sub-Bus Valve Module
4	Sub-Bus IN module
5	Sub-Bus OUT module
6	Sub-Bus Communication Cable
7	I/O Modules
8	Terminator Module (Used to terminate sub-bus)
9	Aux. Power IN (Used to augment Input power and/or supply power to Output modules)
10	Aux. Power OUT (Can be used to supply power to distributed modules)

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 convenient 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



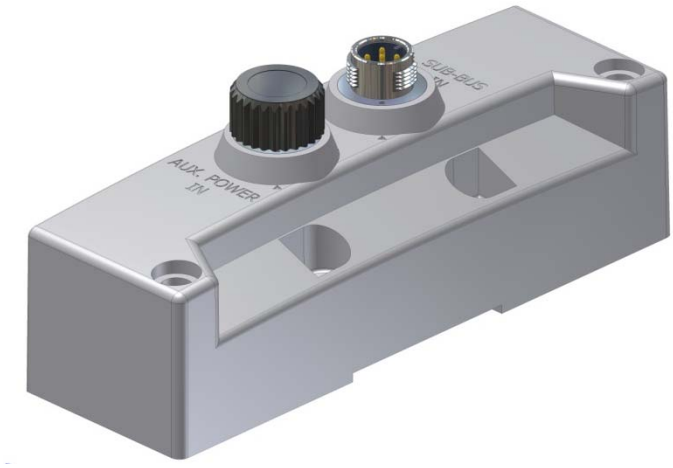
Sub-Bus IN Modules

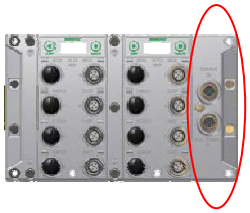
- Used to distribute I/O assemblies that do not have valves
  - Must be installed to the right of the I/O modules.

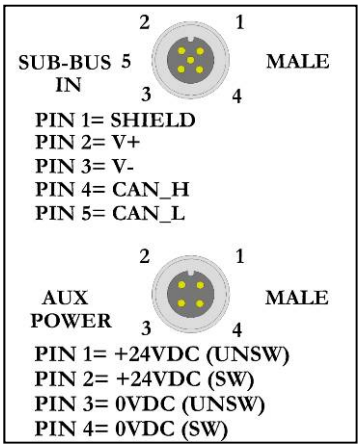
- SUB-BUS IN - 5 pin M12 male communication connector.
  - Must be connected to the Sub-Bus Out connector of the previous assembly
  - Carries 24 VDC power for electronics of module

- 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 Sub-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



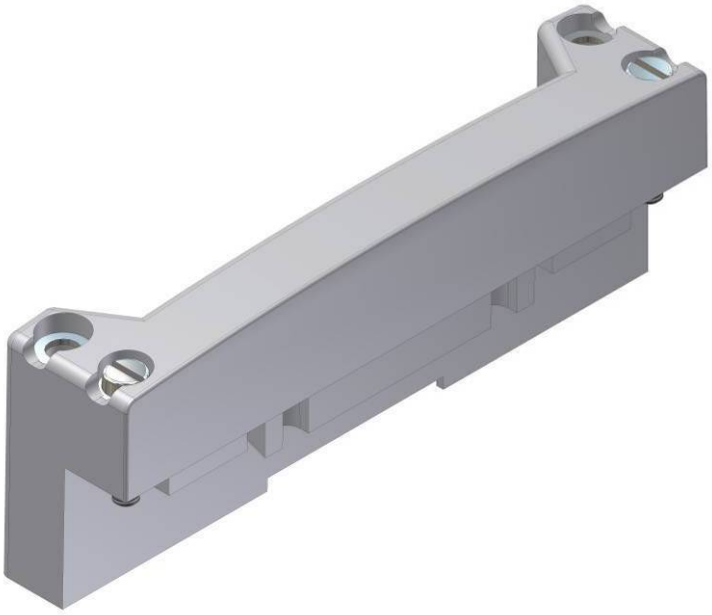


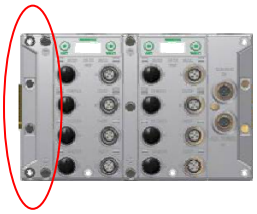


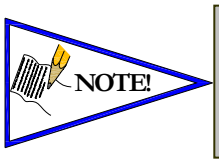
Terminator Module

- 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





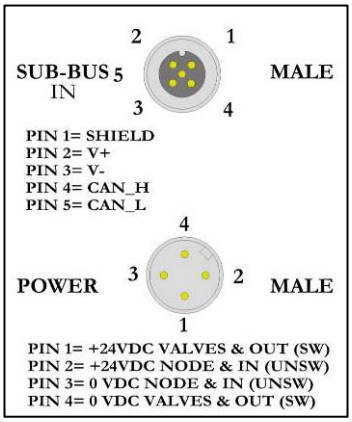


The terminator module is required to be installed in the G3 system for proper operation

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 accept discrete I/O module to allow a Sub-Bus Valve manifold with I/O

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

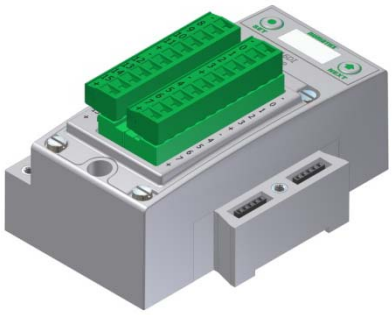


Digital I/O Modules

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.

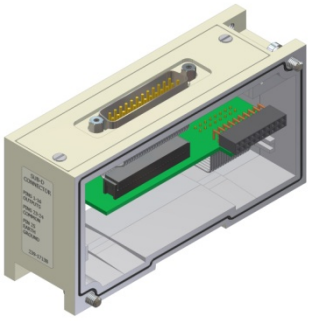
Input Module Types



Output Module Types

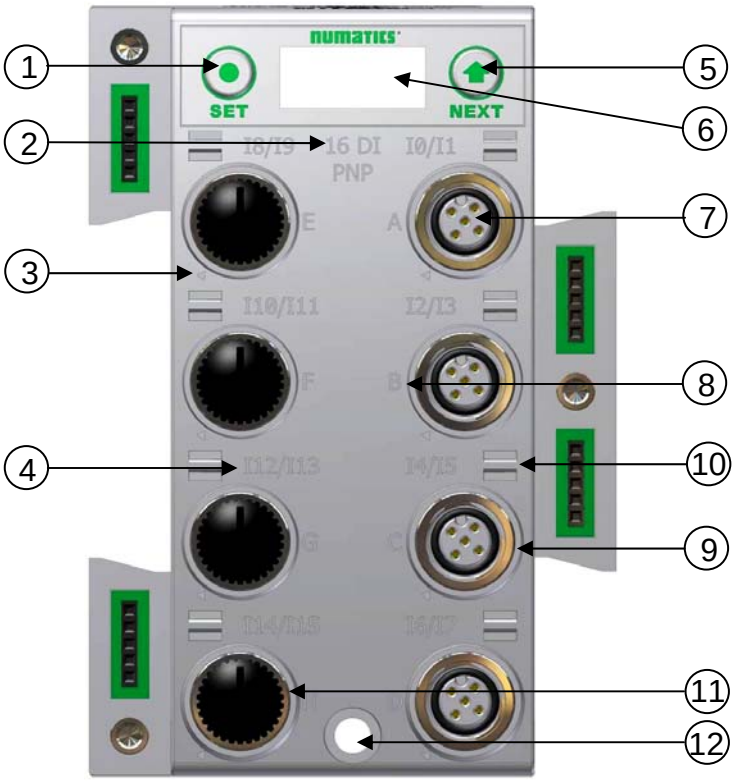
Input/Output Module Types

Valve Side Output Module Types



I/O Module Descriptions & Menus

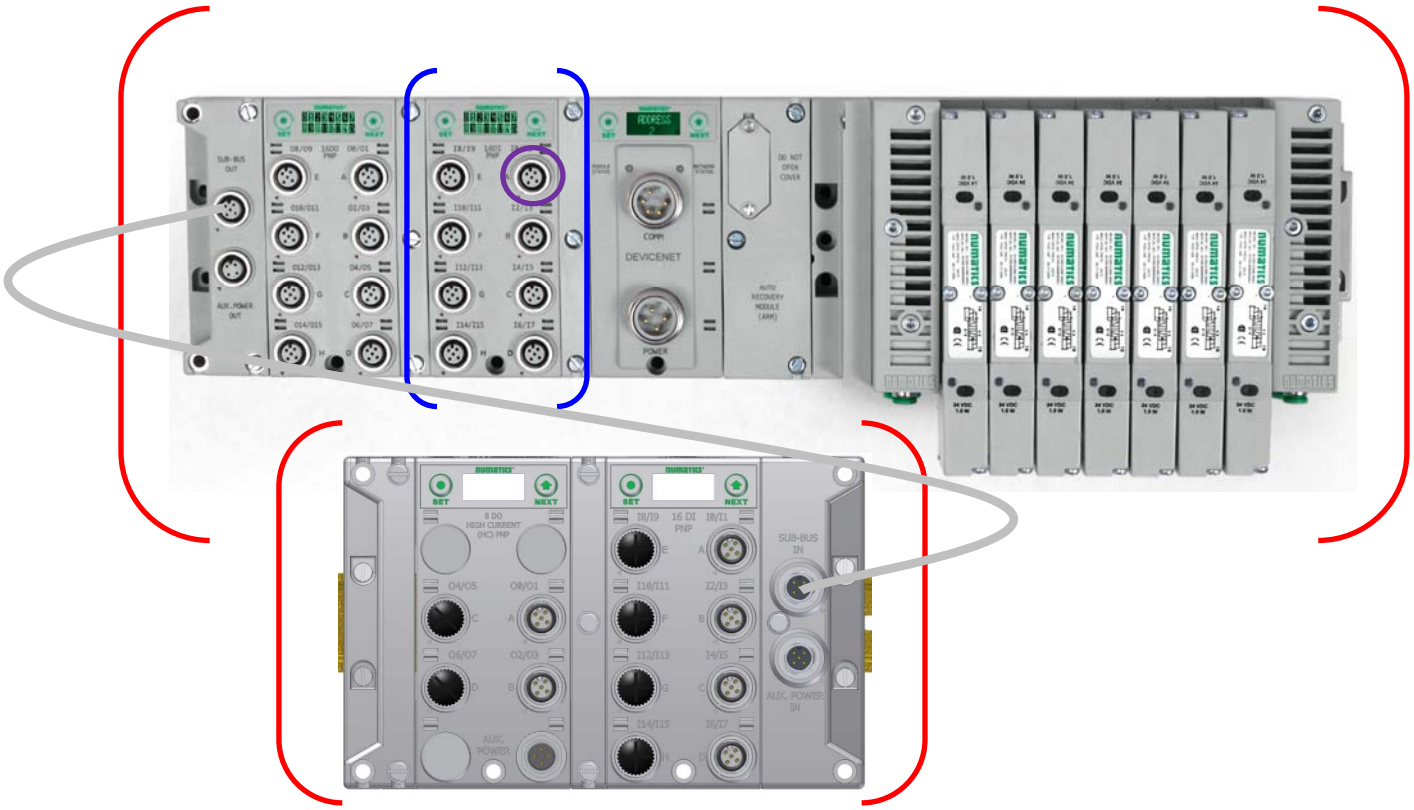
Detail No.	Description
1	"Set" Button – used to navigate through user menus and set parameters
2	Module Function (I/O Type)
3	Alignment arrow for SPEEDCON connector
4	Bit Designation for I/O
5	"Next" Button – used to navigate through user menus and set parameters
6	Graphic Display
7	5 Pin M12 female 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

I/O Module Technical Data

Module No.	Description	Connector Type	Current Limitation for Module	Current Limitation for connector	Current Limitation for physical manifold assembly
240-203	16 PNP Inputs	Terminal Strip	1.2A	.30A for each +24VDC terminal	4A for +24 Valves and Outputs 4A for +24 Node and Inputs
240-204	16 NPN Inputs	Terminal Strip	1.2A	.30A for each +24VDC terminal	
240-205	16 PNP Inputs	M12	1.2A	.15A (Pin 1 to Pin 3)	
240-206	8 PNP Inputs	M12	1.2A	.15A (Pin 1 to Pin 3)	
240-207	16 PNP Outputs	M12	1.2A	.50A (Pin 3 to Pin 2/4)	
240-208	8 PNP Outputs	M12	1.2A	.50A (Pin 3 to Pin 2/4)	
240-209	16 NPN Inputs	M12	1.2A	.15A (Pin 1 to Pin 3)	
240-210	8 NPN Inputs	M12	1.2A	.15A (Pin 1 to Pin 3)	
240-211	8 PNP Input and 8 PNP Outputs	M12	1.2A	.50A / output connector (Pin 3 to Pin 2/4) .15A / input connector (Pin 1 to Pin 3)	
240-300	8 High Current Outputs	M12	8A (From Aux. Power Conn.)	2.0A / output connector (1.0A Pin 3 to Pin 2) (1.0A Pin 3 to Pin 4)	N/A

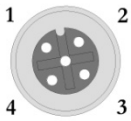


Digital Input Modules

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



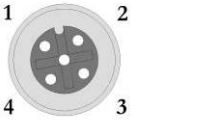
FEMALE

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

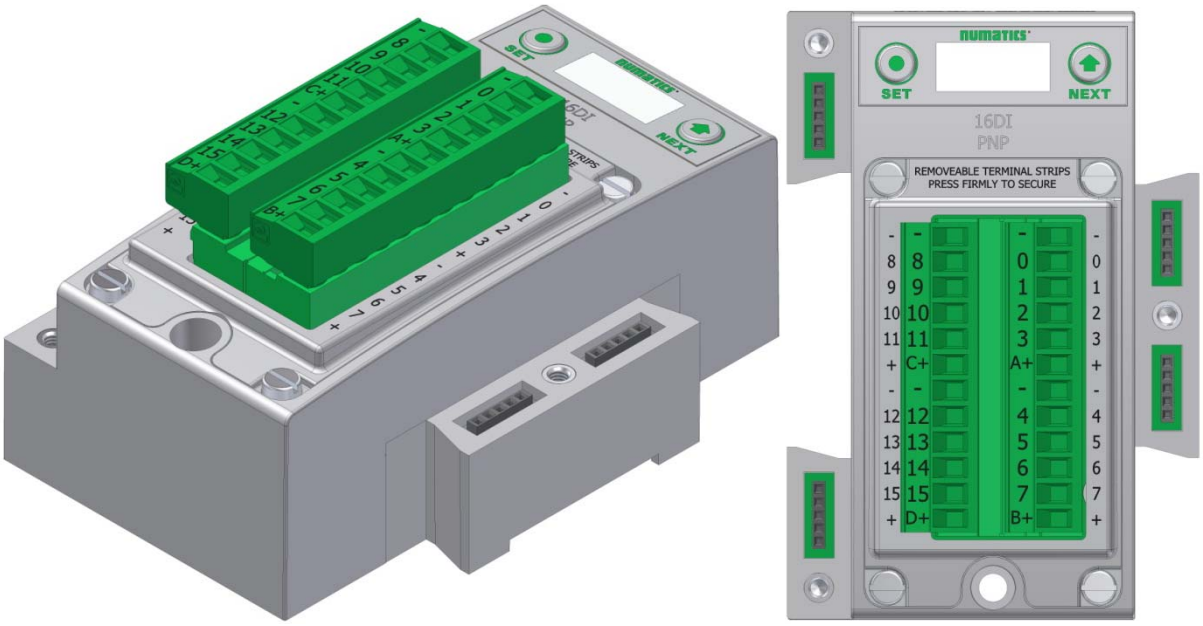
PIN 1= +24VDC (UNSW)
PIN 2= INPUT 2
PIN 3= 0VDC (UNSW)
PIN 4= INPUT 1

Sixteen Digital Inputs – Terminal Strip Modules

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

Module Part No.	*I/O Type*	*Short Circuit Protection (SCP)*	*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 D+	SCP Status 1 = Fault C+	SCP Status 1 = Fault B+	SCP Status 1 = Fault A+

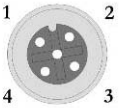


Digital Output Modules

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



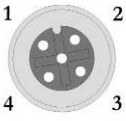
FEMALE

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



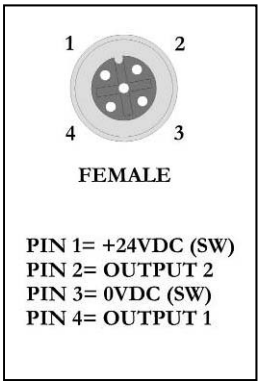
FEMALE

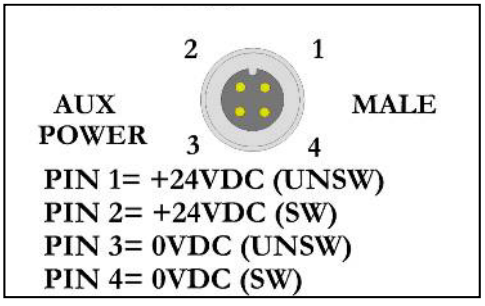
PIN 1= +24VDC (SW)
PIN 2= OUTPUT 2
PIN 3= 0VDC (SW)
PIN 4= OUTPUT 1

Two Digital High Current Outputs per Connector - M12 Female Modules

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*
240-300	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



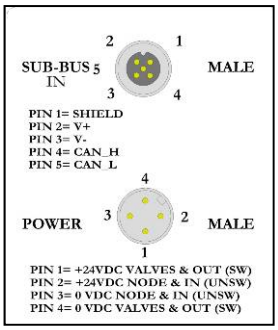


Sub-Bus Valve Module

Used to control a distributed valve manifold through the Sub-Bus. See page 43 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 (Required)	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 (Required)	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 (Required)	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 - M12 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	Output 6 Status	Output 5 Status	Output 4 Status	Output 3 Status	Output 2 Status	Output 1 Status	Output 0 Status

FEMALE

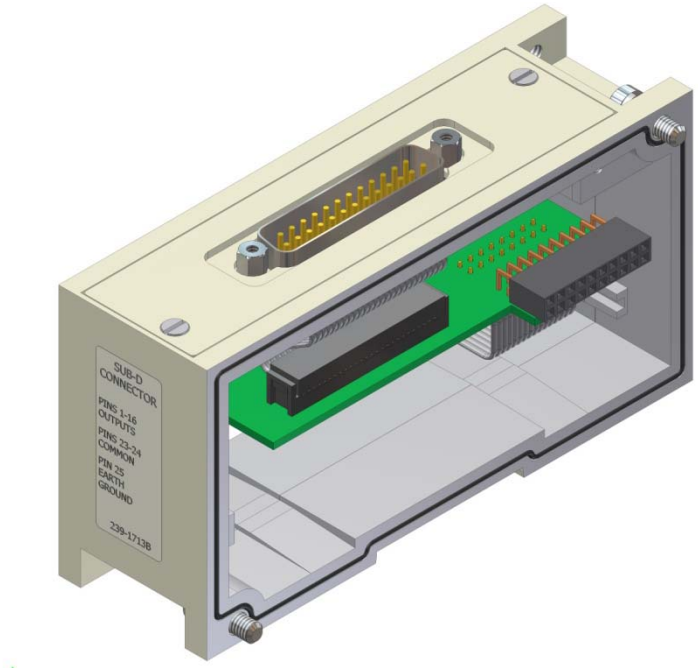
CONNECTORS E, F, G, & H	CONNECTORS A, B, C, & D
PIN 1= +24VDC (SW)	PIN 1= +24VDC (UNSW)
PIN 2= OUTPUT 2	PIN 2= INPUT 2
PIN 3= 0VDC (SW)	PIN 3= 0VDC (UNSW)
PIN 4= OUTPUT 1	PIN 4= INPUT 1

Valve Side Digital Output Modules

The valve side output module is used to distribute available valve side output points via a Sub-D connector (i.e. when a Sub-D valve manifold is located away from the rest of the electronics). This module goes to the right of the G3 valve adapter. 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 modules allow the user to control and/or read analog devices using an analog signal. These modules are available in two analog signal types: 0-10 V and 4-20 mA, and are available in two different I/O configurations: 2 analog input channels/ 2 analog outputs channels (2AI/2AO) or 4 analog input channels (4AI).

4 Channel I/O - M12 Female Modules

Specifications

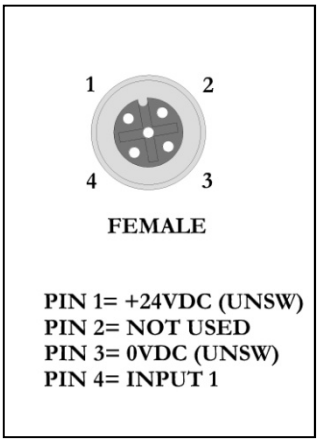
- Input Resolution: 16 bit (65,536 Counts)
- Output Resolution: 16 bit (65,536 Counts)
- Settling Time: 3 ms Max
- Absolute Precision: ≤ 1.0% of Signal
- Voltage Input Impedance: 0-10VDC – 40K Ohms
- Current Input Impedance: 250 Ohms
- Input Cutoff Frequency: 100 Hz

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			

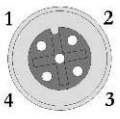
Input Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X (Required)	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1 (LSB)
X+1 (Required)	Input No. 1 (MSB)	Input No. 1	Input No. 1	Input No. 1	Input No. 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



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+4 (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+5 (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

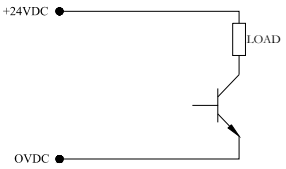
I/O Module(s) Wiring Diagrams

NPN/PNP Definitions

There is confusion between NPN, PNP, Sinking and Sourcing terminologies. Basically, if one is using sensors that provide a 24 VDC signal to the input module then a PNP input module type will be required. If one is using a sensor that supplies a 0 VDC signal to the input module then an NPN input module type will be required.

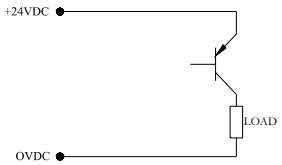
NPN Descriptions

- Sinking
- Switching Negative
- Positive Common



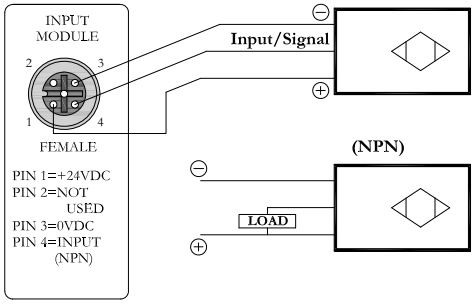
PNP Descriptions

- Sourcing
- Switching Positive
- Negative Common

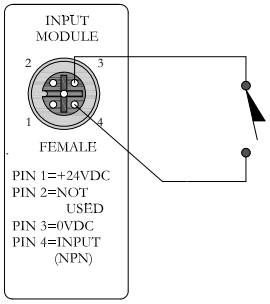


NPN (Sinking) Input Connection

Electronic Sensor Type

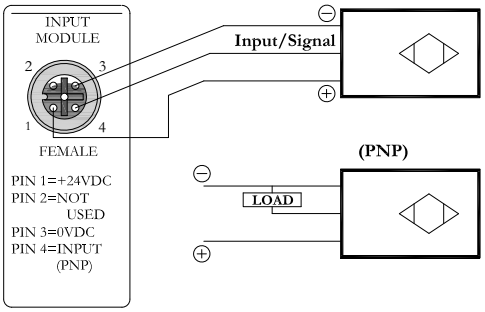


Mechanical Sensor Type

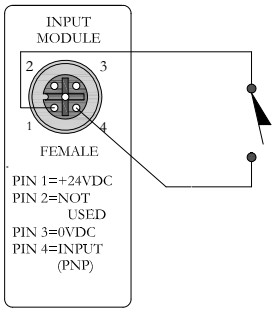


PNP (Sourcing) Input Connection

Electronic Sensor Type

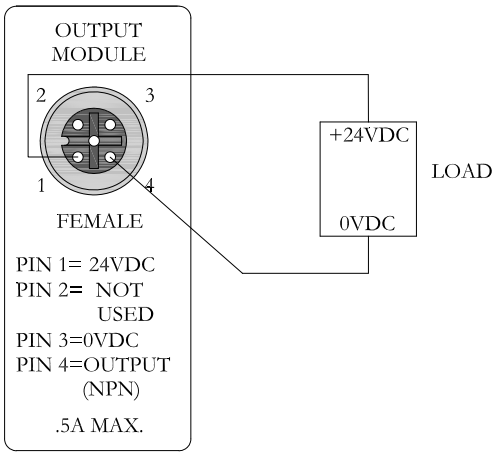


Mechanical Sensor Type

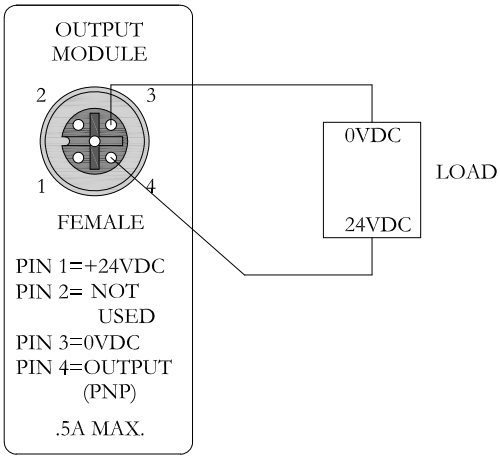


I/O Module(s) Wiring Diagrams Continued

NPN (Sinking) Output Connection



PNP (Sourcing) Output Connection



DeviceNet Configuration and Mapping

EDS File

The EDS file contains configuration information required to establish communication to a node on a DeviceNet network. EDS files are available on the Numatics, Inc., website at www.numatics.com/fieldbus.

I/O Message Types

The Numatics, Inc. G3 series DeviceNet communication node supports 3 different I/O message types. Below are brief definitions for the supported types:

Polled

The poll command is an I/O message that is transmitted by the Master. A Poll Command is directed towards a single, specific Slave (point to point). A Master must transmit a separate Poll Command Message for each one of its Slaves that is to be polled. The slave can respond with an I/O Message that is transmitted back to the Master.

Cyclic

The Cyclic message is transmitted by either the Master or the Slave. An Acknowledge Message may be returned in response to this message. The message is sent based on the value of a cyclic timer, which is set by the user.

Change of State

The Change of State message is transmitted by either the Master or the Slave. An Acknowledge Message may be returned in response to this message. The message is sent whenever a change of state occurs (i.e. an input changes from "On" to "Off").

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 are descriptions of these device parameters. All of these configurable parameters can be adjusted using appropriate DeviceNet configuration software (i.e. RSNetWorx, DeviceNet Manager, etc…), selecting the appropriate parameters in the node's graphic display screen, or by initiating the explicit messaging function. The network address parameter can also be adjusted using the optional Manual Configuration Module (MCM) see page 36.

		Settable Via		
Parameter Name	*Description*	*Display*	*Software*	*MCM*
MAC ID	Node address	√	√	√
Baud Rate	Network speed	√	√	√
Autobaud	Enables/Disables Autobaud setting	√	√	√
Diagnostic Word	Enables/Disables the diagnostic Input word	√	√	X
I/O Allocation Coils	Allocates how many valve output points are mapped (0, 8, 16, 24, 32)	√	X	X
I/O Allocation Inputs	Allows a fixed value to be set for the number of Input Bytes allocated for the assembly	√	X	X
I/O Allocation Output	Allows a fixed value to be set for the number of Output Bytes allocated for the assembly	√	X	X
I/O Diagnostic Status	Allocates I/O diagnostic status bits	√	√	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
Network Status Override		√	√	X
Communication Status Override		√	√	X

Explicit Messaging

			Explicit Message Information (values in decimal)			
Name	*Description*	*MCM Settings*	*Class*	*Instance*	*Attribute*	*Data*
MAC ID	Node address	SW 1-6	3	1	1	0 - 63
Baud Rate	Network speed	SW 7-8	3	1	2	0 = 125K 1 = 250K 2 = 500K
Autobaud	Enables/Disables Autobaud setting	SW 7-8	15	3	1	0 = Enabled 1 = Disabled
Assembly Parameter	Allocates how many valve output drivers are mapped (0, 8, 16, 24 or 32 outputs)	N/A	4	100	3	0 = 0 bytes 1 = 1 byte 2 = 2 bytes 3 = 3 bytes 4 = 4 bytes
I/O Diagnostic Status	Enables/Disables I/O diagnostic status bits	N/A	15	5	1	0 = Enabled 1 = Disable
Diagnostic Word	Enables/Disables the diagnostic Input word	N/A	15	4	1	0 = Enabled 1 = Disable
MCM	Indicates whether the MCM module is installed or not.	N/A	15	6	1	Read only
Valve Driver Part Number	Valve Driver part number	N/A	15	7	1	Read only
I/O part number	Part numbers of all I/O modules installed	N/A	15	8-22	1	Read only
I/O serial number	Serial numbers of all I/O modules installed	N/A	15	23-37	1	Read only
Output Idle Action Attribute	Determines whether to use idle value attribute or hold last state	N/A	9	1	7	0 = Outputs off 1 = Hold Last State
Output Fault Action Attribute	Determines whether to use idle value attribute or hold last state	N/A	9	1	5	0 = Outputs off 1 = Hold Last State

Explicit messages provide multi-purpose, point-to-point communication paths between two devices. These messages use the typical request/response-oriented network communication to perform node configuration and problem diagnosis. Explicit messages typically use low priority identifiers and contain the specific meaning of the message as part of the data field; including the service to be performed and the specific object attribute address. Each explicit message uses a four level address scheme; Node Address (MAC ID), Object Class Identifier, Instance, Attribute and Data. Explicit messaging requires appropriate DeviceNet configuration software (i.e. RSNetWorx, DeviceNet Manager, etc…). It can also be used via control program (ladder logic, function block, etc…)

Changing Configurable Parameter Example

Change "Assembly Parameter" Setting of node

1. Using appropriate DeviceNet configuration software (i.e. Rockwell's RSNetWorx for DeviceNet or similar) select the "Class Instance editor"
2. Select the appropriate node's address (MAC ID), select service "Set Single Attribute" (code 10 hex), Insert "4" in the Class section (value from table); Instance "1" (value from table), Attribute "1" (value from table) and desired Data 0 or 1 or 2 or 4 (value from table).

Function Block

Numatics' DeviceLogix nodes integrate all four types of function blocks; Boolean, Bi-stable, Counter and Timers. A maximum of 72 function blocks, in any combination, can be used to develop a program sequence.

Boolean	*Bistable*	*Counter*	*Timer*
AND	SRL (SR-Latch)	UPC (up counter)	OND (on delay timer)
OR	RSL (RS-Latch)	UPD (up and down counter)	OFD (off delay timer)
XOR (exclusive OR)			PUL (pulse timer)
NOT			
NAND (negative output AND)			
NOR (negative output OR)			
XNO (negative output exclusive OR)			

Ladder Components

Numatics DeviceNet/DeviceLogix nodes also have the ability to be programmed using the ladder editor in RSNetWorx. The ladder editor still integrates Latches, Counters and Timers, but instead of Boolean logic blocks, it uses ladder rungs and branches. Also, instead of a maximum function block number; there is a maximum amount of memory available for use. A percentage will appear in the message window below the ladder editor window indicating how much memory the user still is allowed.

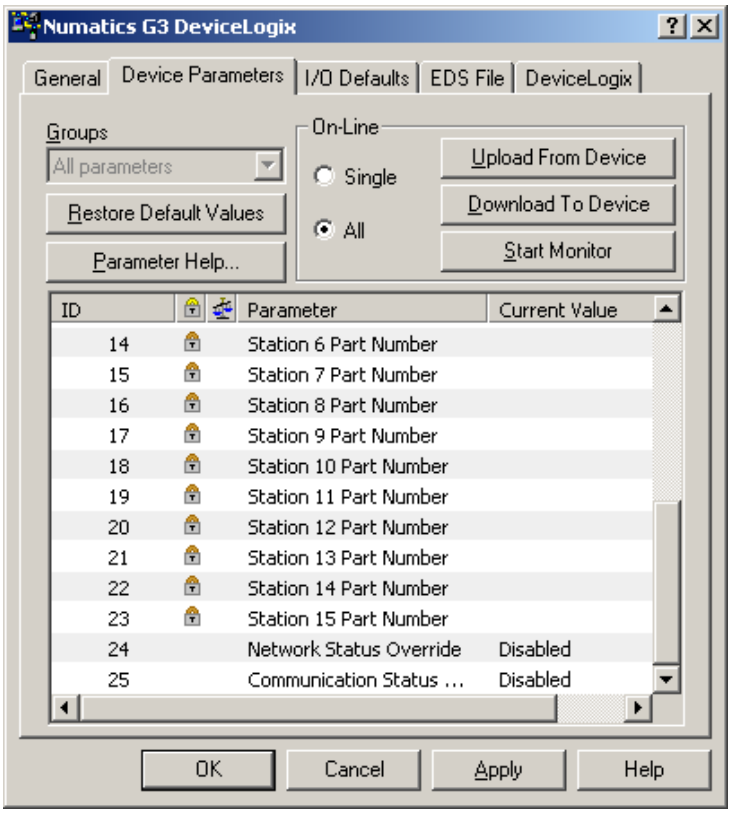
Latch	*Counter*	*Timer*
SRL (SR-Latch)	UPC (up counter)	OND (on delay timer)
RSL (RS-Latch)	UPD (up and down counter)	OFD (off delay timer)
		PUL (pulse timer)

Stand-Alone Versus Networked Functionality

The Numatics DeviceLogix communication node can be used as a stand-alone programmable device or as part of a DeviceNet network. Using the RSNetWorx™ for DeviceNet software, different settings must be enabled or disabled to configure these options.

Stand-Alone Settings

To configure your Numatics DeviceLogix manifold to function as a stand-alone node, enable both the *"Network Status Override" and "Comm. Status Override"*.



Network/Communication Settings

The following table describes the behaviors that occur when the Network Status Override and Communication Status Override attributes are disabled. The user may have the DeviceLogix node begin local logic mode in cases where a network signal is lost. This is configured by enabling *"Communication Status Override"* and *"Network Status Override"*.

Network/Communication Settings DISABLED Chart

Attribute	*Network LED Status*	*Event*	*Behavior*
Network Status Override (Disabled)	Off	The manifold is powered up without a network connection	The manifold is put into an inoperable state and all Outputs remain off.
	Red	Duplicate Mac ID error	
	Flashing Red	The manifold has lost the I/O connection.	The manifold output values are updated based on the Output Fault Action and Fault Value attributes.
Communication Status Override (Disabled)	Green	An Idle is received (still on network, but the PLC is not sending data to it. For example, the key on the PLC is turned into program mode)	The manifold output values are updated based on the Output Idle Action and Idle Value attributes.
	Flashing Green	Communications not established (module not online) - OR - The manifold is online but there is no data being sent between a master and itself	The manifold outputs remain in the available state until an I/O connection is established.
	Flashing Red	The manifold has lost the I/O connection.	The manifold output values are updated based on the Output Fault Action and Fault Value attributes.

- *The manifold can ALWAYS be controlled by local logic when the Network Status and Communication Status overrides are ENABLED.*

Communication Fault/Idle Mode Parameter

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

The user, through the graphic display or software, 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:

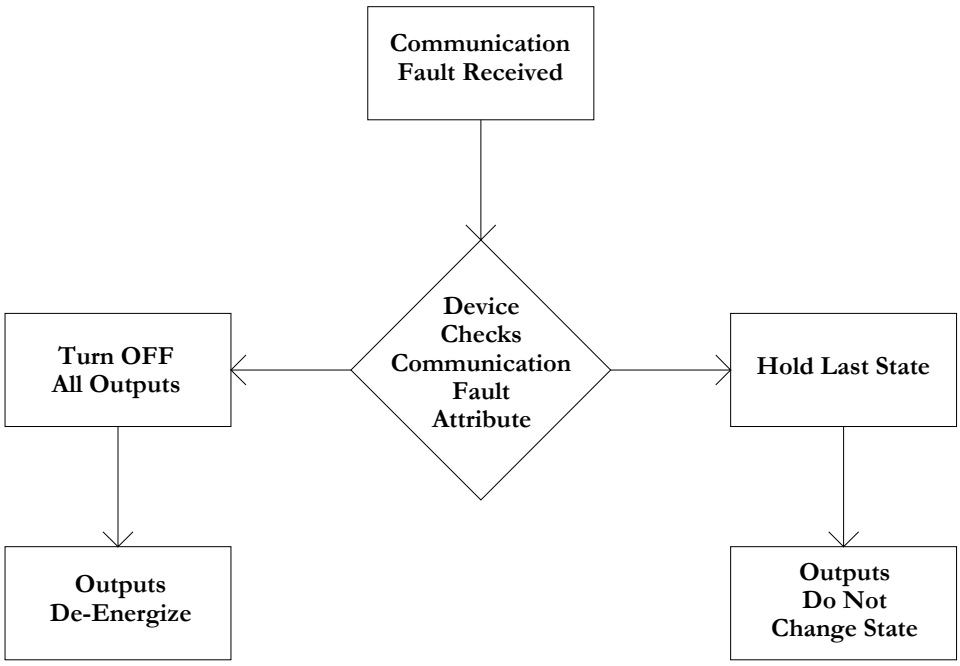
1. Hold Last State of Outputs
2. Turn Off All Outputs

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.



DeviceNet Mapping

I/O Sizes - Rx/Tx

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 configurable. See the following table:

Selection	Outputs Bytes	Inputs Bytes
0 Coils	0	0
8 Solenoid Coils	1	1
16 Solenoid Coils	2	2
24 Solenoid Coils	3	3
32 Solenoid Coils (factory default)	4	4

Please refer to page 23 for further details.

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 69 will allow accurate sizing of the I/O data.

Manifold and I/O Data Sizing Worksheet

Step	
1	: Choose corresponding ***Rx*** and ***Tx*** values based a chosen **"*Valve Side Output Options*"** and place the values in the boxes labeled, "Valve Side 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 (including distributed modules) and place sum of the corresponding input bytes and output bytes in the boxes labeled, "Discrete Side Byte Requirements" at the bottom of the page.
3	: Add the input bytes and output bytes values from the boxes labeled "Discrete Side Byte Requirements" and "Valve Side Byte Requirements" and place total in the boxes labeled "Total I/O (***Rx/Tx***) Bytes for Manifold. This is the total input and output byte count values required for the configured manifold (total ***Rx/Tx*** values).

Valve Side

Step	*Valve Side Output Options (selected on node)*		*Input Bytes (Rx)*		*Output Bytes (Tx)*
			Status Enabled	*Status Disabled*	
1	0 Coils		0	0	0
	Up to 8 Solenoid Coils		1	0	1
	Up to 16 Solenoid Coils		2	0	2
	Up to 24 Solenoid Coils		3	0	3
	Up to 32 Solenoid Coils (factory default)		4	0	4

Digital Modules

Step	*Module Part Number*	*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 M12	3	2	0
	240-206/210	8 Inputs - 8 x M12	2	1	0
	240-207	16 Outputs - 8 x M12	2	0	2
	240-208	8 Outputs - 8 x M12	1	0	1
	240-211	8 Inputs / 8 Outputs - 8 x M12	3	1	1
	240-241	Distributed Sub-Bus Valve & I/O Module	4	0	4
	240-300	8 Outputs – 4 x M12	1	0	1

Analog Modules

Step	*Module Part Number*	*Description*	*Input Bytes (Rx)*		*Output Bytes (Tx)*
			Status Enabled	*Status Disabled*	
2	240-212/214	4 Inputs – 4 x M12	10	8	0
	240-213/215	2 Inputs/ 2 Outputs – 4 x M12	6	4	4

Total Input/Output Size Calculation

Step	*Module Position (includes distributed modules)*	*Module Part Number*	*Input Bytes (Rx)*	*Output Bytes (Tx)*
2	1st			
	2nd			
	3rd			
	4th			
	5th			
	6th			
	7th			
	8th			
	9th			
	10th			
	11th			
	12th			
	13th			
	14th			
	15th			
	16th			
		Discrete Side Byte Requirements:		
		Optional Diagnostic Word:	2	0
1		Valve Side Byte Requirements:		
3		Total I/O (***Rx/Tx***) 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 adjustable from 0 to 4 bytes, with 4 bytes (32 bits) as the factory default.

3) Each solenoid coil output has an associated status input bit (refer to the section labeled, "Output Short Circuit Protection", on page 19 for functional details). The solenoid coil status input size can be adjusted from 0 to 4 bytes, with 4 input bytes (32 bits) as the factory default.

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

Example No. 1

Assumed Settings

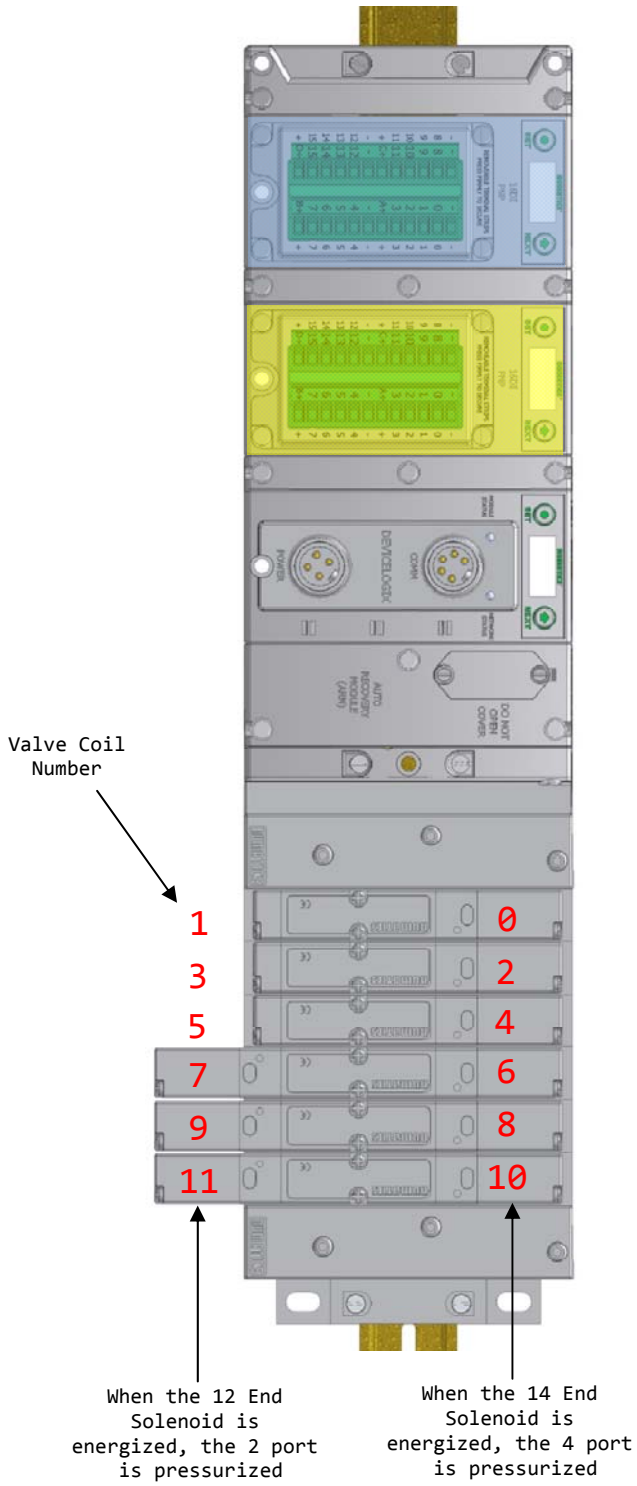
- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled
- 16 coils are allocated

Manifold I/O Configuration

Pos No.	*Module Type*	*Part No.*	*In*	*Out*
			Bytes	
1	16I PNP	240-203	3	0
2	16I PNP	240-213	3	0
	Diagnostic Word		2	0
	Network I/O		1	1
	Local Valve Size		2	2
		Total:	11	3

How to Order

Qty	*Part Number*
1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3DL102R0G32
2	240-203
	ASSEMBLED



DeviceLogix (Logic Editor) I/O Mapping Table Example Continued

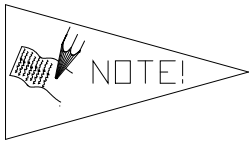
Discrete Output Table							
Output 0	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Output 7
Valve Coil No. 1	Valve Coil No. 2	Valve Coil No. 3	Valve Coil No. 4	Valve Coil No. 5	Valve Coil No. 6	Valve Coil No. 7	Valve Coil No. 8
Output 8	Output 9	Output 10	Output 11	Output 12	Output 13	Output 14	Output 15
Valve Coil No. 9	Valve Coil No. 10	Valve Coil No. 11	Valve Coil No. 12	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved

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

Network Output Table							
Output 0	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Output 7
Network Output No. 0	Network Output No. 1	Network Output No. 2	Network Output No. 3	Network Output No. 4	Network Output No. 5	Network Output No. 6	Network Output No. 7

Network Input Table							
Input 0	Output 1	Input 2	Input 3	Input 4	Input 5	Input 6	Input 7
Network Input No. 0	Network Input No. 1	Network Input No. 2	Network Input No. 3	Network Input No. 4	Network Input No. 5	Network Input No. 6	Network Input No. 7

Fault Input Table (Status Input Bits)							
Fault Input 0	Fault Input 1	Fault Input 2	Fault Input 3	Fault Input 4	Fault Input 5	Fault Input 6	Fault Input 7
Coil No. 1 Status	Coil No. 2 Status	Coil No. 3 Status	Coil No. 4 Status	Coil No. 5 Status	Coil No. 6 Status	Coil No. 7 Status	Coil No. 8 Status
Fault Input 8	Fault Input 9	Fault Input 10	Fault Input 11	Fault Input 12	Fault Input 13	Fault Input 14	Fault Input 15
Coil No. 9 Status	Coil No. 10 Status	Coil No. 11 Status	Coil No. 12 Status	Coil No. 13 Status	Coil No. 14 Status	Coil No. 15 Status	Coil No. 16 Status



The "Network Outputs" are data coming from the communications node and reported to the Master Input Data file. The "Network Inputs" are data coming from the Master Output Data file to the communications node. They are used for handshaking communication between master (scanner) and slave (node) if DeviceLogix is used on a DeviceNet network.

DeviceNet I/O Mapping Table Example Continued

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	Network Input No. 7	Network Input No. 6	Network Input No. 5	Network Input No. 4	Network Input No. 3	Network Input No. 2	Network Input No. 1	Network Input No. 0

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	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
5	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
6 (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
7	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
8	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
9 (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
10	Network Output No. 7	Network Output No. 6	Network Output No. 5	Network Output No. 4	Network Output No. 3	Network Output No. 2	Network Output No. 1	Network Output No. 0

- *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*
- *The number of Outputs Bytes Allocated for valve coils may be optimized and set to 0, 8, 16, 24 or 32 coils. (32 coils is the factory default setting.)*

Example No. 2

Assumed Settings

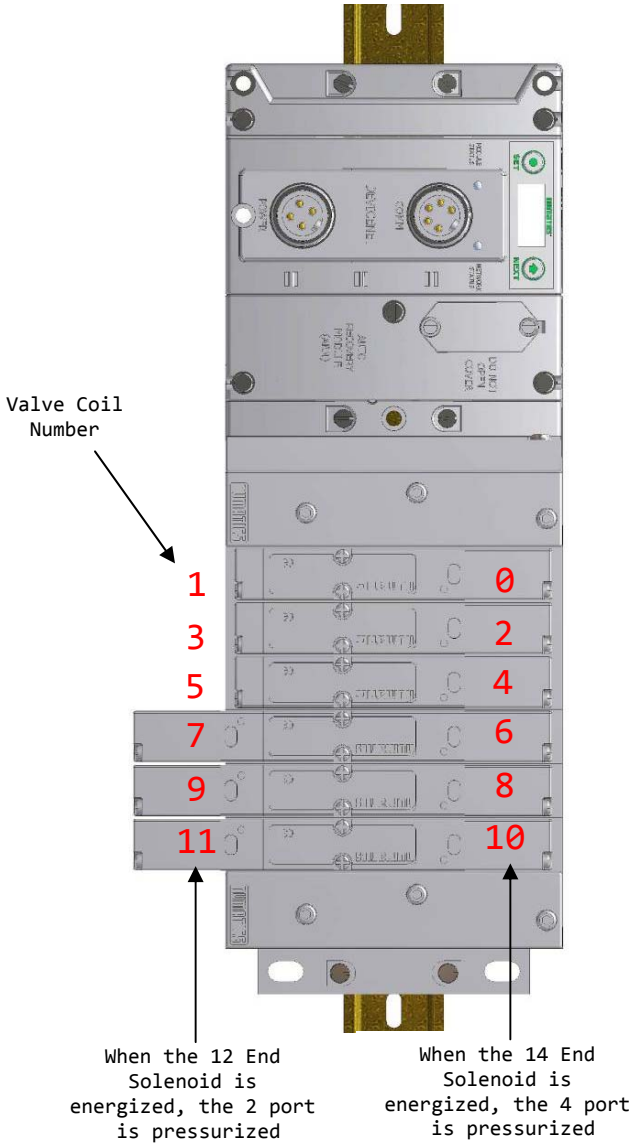
- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled
- 32 coils are allocated.

Manifold I/O Configuration

Pos. No.	*Module Type*	*Part No.*	*In*	*Out*
			Bytes	
		Diagnostic Word	2	0
		Network I/O	1	1
		Local Valve Size:	4	4
		Total:	7	5

How to Order

Qty	*Part Number*
1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3DL100R0G32
	ASSEMBLED



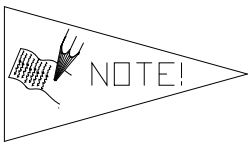
DeviceLogix (Logic Editor) I/O Mapping Table Example Continued

Discrete Output Table							
Output 0	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Output 7
Valve Coil No. 1	Valve Coil No. 2	Valve Coil No. 3	Valve Coil No. 4	Valve Coil No. 5	Valve Coil No. 6	Valve Coil No. 7	Valve Coil No. 8
Output 8	Output 9	Output 10	Output 11	Output 12	Output 13	Output 14	Output 15
Valve Coil No. 9	Valve Coil No. 10	Valve Coil No. 11	Valve Coil No. 12	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved
Output 16	Output 17	Output 18	Output 19	Output 20	Output 21	Output 22	Output 23
Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved
Output 24	Output 25	Output 26	Output 27	Output 28	Output 29	Output 30	Output 31
Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved	Allocated & Reserved

Network Output Table							
Output 0	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Output 7
Network Output No. 0	Network Output No. 1	Network Output No. 2	Network Output No. 3	Network Output No. 4	Network Output No. 5	Network Output No. 6	Network Output No. 7

Network Input Table							
Input 0	Output 1	Input 2	Input 3	Input 4	Input 5	Input 6	Input 7
Network Input No. 0	Network Input No. 1	Network Input No. 2	Network Input No. 3	Network Input No. 4	Network Input No. 5	Network Input No. 6	Network Input No. 7

Fault Input Table (Status Input Bits)							
Fault Input 0	Fault Input 1	Fault Input 2	Fault Input 3	Fault Input 4	Fault Input 5	Fault Input 6	Fault Input 7
Coil No. 1 Status	Coil No. 2 Status	Coil No. 3 Status	Coil No. 4 Status	Coil No. 5 Status	Coil No. 6 Status	Coil No. 7 Status	Coil No. 8 Status
Fault Input 8	Fault Input 9	Fault Input 10	Fault Input 11	Fault Input 12	Fault Input 13	Fault Input 14	Fault Input 15
Coil No. 9 Status	Coil No. 10 Status	Coil No. 11 Status	Coil No. 12 Status	Coil No. 13 Status	Coil No. 14 Status	Coil No. 15 Status	Coil No. 16 Status



The "Network Outputs" are data coming from the communications node and reported to the Master Input Data file. The "Network Inputs" are data coming from the Master Output Data file to the communications node. They are used for handshaking communication between master (scanner) and slave (node) if DeviceLogix is used on a DeviceNet network.

DeviceNet I/O Mapping Table Example Continued

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 (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
3 (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
4	Network Input No. 7	Network Input No. 6	Network Input No. 5	Network Input No. 4	Network Input No. 3	Network Input No. 2	Network Input No. 1	Network Input No. 0

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	Network Output No. 7	Network Output No. 6	Network Output No. 5	Network Output No. 4	Network Output No. 3	Network Output No. 2	Network Output No. 1	Network Output No. 0

- *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*
- *The number of Outputs Bytes Allocated for valve coils may be optimized and set to 0, 8, 16, 24 or 32 coils (32 coils is the factory default setting).*

Diagnostic Word

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

Byte 0 (Communication Status)

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

Byte 0, Bit 1 Un-switched Power Status = Bit is high when node / input power is below 19VDC

Byte 0, Bit 2 Sub-Bus Error = Bit is high when there is an error on the sub-bus; see "Byte 1" of diagnostic word for description.

Byte 0, Bit 3 Sub-Bus Short Circuit = A short circuit has been detected across the Sub-Bus

Diagnostic Word Cont.

Byte 1 (Sub-Bus Status)

Module Address

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
0	0	0	0	0	No error
0	0	0	0	1	Communication Module
0	0	0	1	0	I/O module No. 1
0	0	0	1	1	I/O module No. 2
0	0	1	0	0	I/O module No. 3
0	0	1	0	1	I/O module No. 4
0	0	1	1	0	I/O module No. 5
0	0	1	1	1	I/O module No. 6
0	1	0	0	0	I/O module No. 7
0	1	0	0	1	I/O module No. 8
0	1	0	1	0	I/O module No. 9
0	1	0	1	1	I/O module No. 10
0	1	1	0	0	I/O module No. 11
0	1	1	0	1	I/O module No. 12
0	1	1	1	0	I/O module No. 13
0	1	1	1	1	I/O module No. 14
1	0	0	0	0	I/O module No. 15
1	0	0	0	1	I/O module No. 16
1	0	0	1	1	Communication Valve driver
1	0	1	0	0	ARM
1	0	1	0	1	MCM
X	X	X	X	X	N/A

Sub-Bus Errors

Error Code	Bit 7	Bit 6	Bit 5
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

Error Code 0 = No Errors
Error Code 1 = Lost communications between I/O module and communications module
Error Code 2 = Valve / Output power is below 19VDC
Error Code 3...7 = not defined / reserved

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 17 for additional fuse sizing information.
Spike Suppression	Output spike suppression is internally provided for both discrete and valve outputs.
Discrete Outputs (NPN (Sinking) or PNP (Sourcing))	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 46°C)

Factory Default Settings

FACTORY DEFAULT SETTINGS	
Description	*Default*
Node Address	63
Baud Rate	Auto-Baud enabled
Valve Side Output Bytes	4 Bytes (32 Allocated Valve Coil Outputs)
Rx/Tx Values	Self-Configuring
Diagnostic Word	Enabled
Parameters	Unlocked
I/O Diagnostic Status	Enabled
Fault Action	Reset to All Off
Idle Action	Reset to All Off
Brightness	Medium
Comm. Status Override	Disabled
Network Status Override	Disabled

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 68 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.

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 67	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
ADR	Auto-Device Replacement is a feature (enabled by Allen Bradley scanners) that consists of Configuration Recovery and Auto-Address Recovery. Configuration Recovery (CF) refers to the scanner's ability to store a device's configuration. Auto-Address Recovery (AAR) refers to the ability of the scanner to change a device's node address from 63 to that desired by the scanner. Please refer to Allen Bradley's Release Notes No. 1747-5.8-RN1 for additional information.
Assembly parameter	A Numatics' term describing a user definable parameter that allows user to allocate the number of valve output drivers. A 0, 8, 16, 24, 32 option is available and is helpful if there are I/O memory constraints in the PLC.
Auto-Baud	A technology that enables the communication node to automatically set its own baud rate to match the DeviceNet scanners' baud rate.
Bit	Smallest unit of digital information either a "0" or "1".
Bit mapping	Chart showing which bit is connected to which physical input or output point.
Byte	8 bits (1/2 word).
CAN_H	Controller Area Network – High; Communication Line.
CAN_L	Controller Area Network – Low; Communication Line.
CANBUS	Serial communication BUS network based on CAN protocol.
Change of State	I/O message type in which either the expiration of the transmission timer or a change in input state triggers data production.
Comm. Fault	One or more of the I/O connections have timed out.
Cyclic	I/O message type in which data production is triggered by the expiration of the transmission timer.
DeviceNet Manager	Allen-Bradley's DeviceNet configuration software.
Discrete I / O	The Inputs / Outputs that are available via the "Discrete I/O" side of manifold.
EDS file	Electronic Data Sheet. A text file, which contains specific product information, definitions of product capabilities and configurable parameters necessary for operation on a DeviceNet network.
EDS Stub file	An abridged version of the EDS file, which contains only the minimum information necessary to make the product functional on a DeviceNet network.
Ground	This term is used to indicate an earth ground.
Group 2	DeviceNet message group applicable to Numatics' Serial/Bus products.
I/O	Any combination of Inputs and Outputs.
Idle	A zero (0) length poll message (i.e.: scanner in program mode).
MAC ID	Media Access Connection Identification (00-63) – Node (network drop) address.
MCM	Manual Configuration Module. A module that allows MAC ID, baud rates and other configurable parameters to be set manually via DIP switches and rotary switches. Not required if software configuration is used.
NEMA	National Electrical Manufacturers Association.
ODVA	Open DeviceNet Vendor Association (www.odva.org)
Polled	I/O message type in which the devise consumes I/O data from its master and produces I/O data when the master requests it.
RS NetWorx	Allen-Bradley's DeviceNet configuration software.

Glossary of Terms Continued

Term	Description
Rx/Tx	Rx = Consumed byte size; analogous to Input byte size. Tx = Produced byte size; analogous to Output byte size.
Sinking (NPN)	Method of connecting electrical circuits in which the zero (0) volt DC side is switched and the common is positive
SCP	Short Circuit Protection
Sourcing (PNP)	Method of connecting electrical circuits in which the positive side is switched and the common is zero (0) volts DC.
Status Input bit	A bit in the input table that reports the health of a corresponding output. Indicates short circuit or open coil (load) diagnostics
Word	2 Bytes (16 bits)
Z-Board™	Circuit board installed in the valve sub-base which electrically connects the valve solenoid to the electrical /electronics interface. Available in single or double solenoid versions.

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