numatics®

G3 Series
PROFINET™
Technical Manual

PROFI® INDUSTRIAL ETHERNET NET

EMERSON.
Industrial Automation

TDG3PNTM1-6EN 03/16
Subject to change without notice

www.numatics.com/g3

Conditions for use of this product

(1) Numatics G3 Manifold ("the PRODUCT") shall be used in conditions;
i) Where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident.

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

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

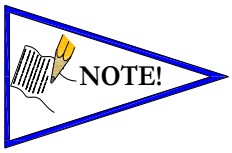
Numatics Incorporated shall have no responsibility or liability including but not limited to any and all responsibility or liability based on contract, warranty, tort, product liability for any injury or death to persons, loss or damage to property caused by the product that are operated or used in application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

Safety precautions

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

CAUTION

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



Note symbol indicates important information regarding equipment installation and setup

Electrical installation and operational guidelines

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

1. About PROFINET

1.1 Overview

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

PI is the largest fieldbus organization and it is the umbrella organization responsible for both PROFIBUS and PROFINET technologies.

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

More information about PROFINET and PI can be obtained from the PI web site http://us.profibus.com/

1.2 G3 PROFINET Features

Features	*Description*
Spec. Supported	Designed to PROFINET Specification
Bus Topology	Star, Linear and Ring
Baud Rates Supported	10/100 Mbps and Autobaud
CE	CE Compliant
Address Setting	Web Page Configuration, Graphical Display or optional Manual
Duplex	Half and Full supported
Conformance Tested	Tested by PI for conformance according to IEC 61158 / IEC 61784

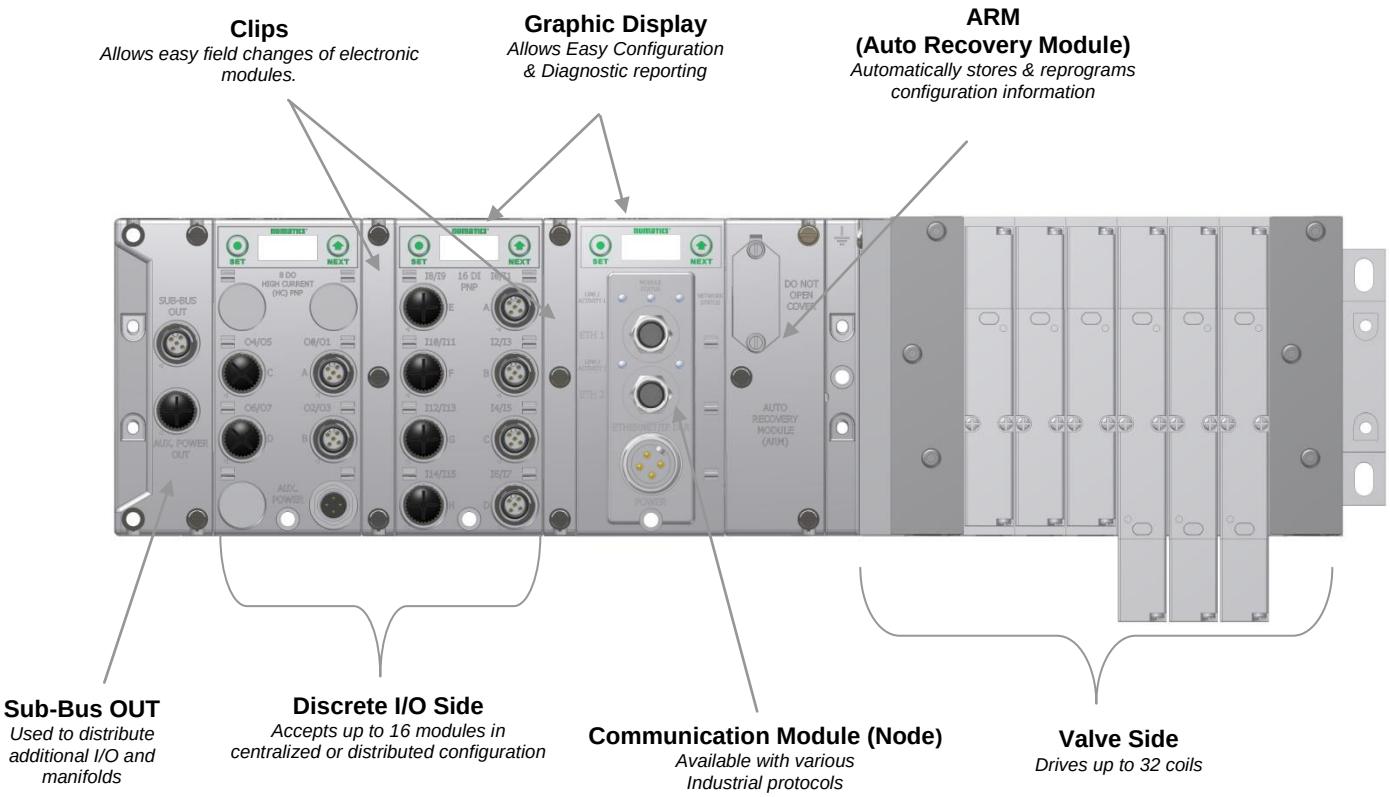
2. G3 Introduction

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.

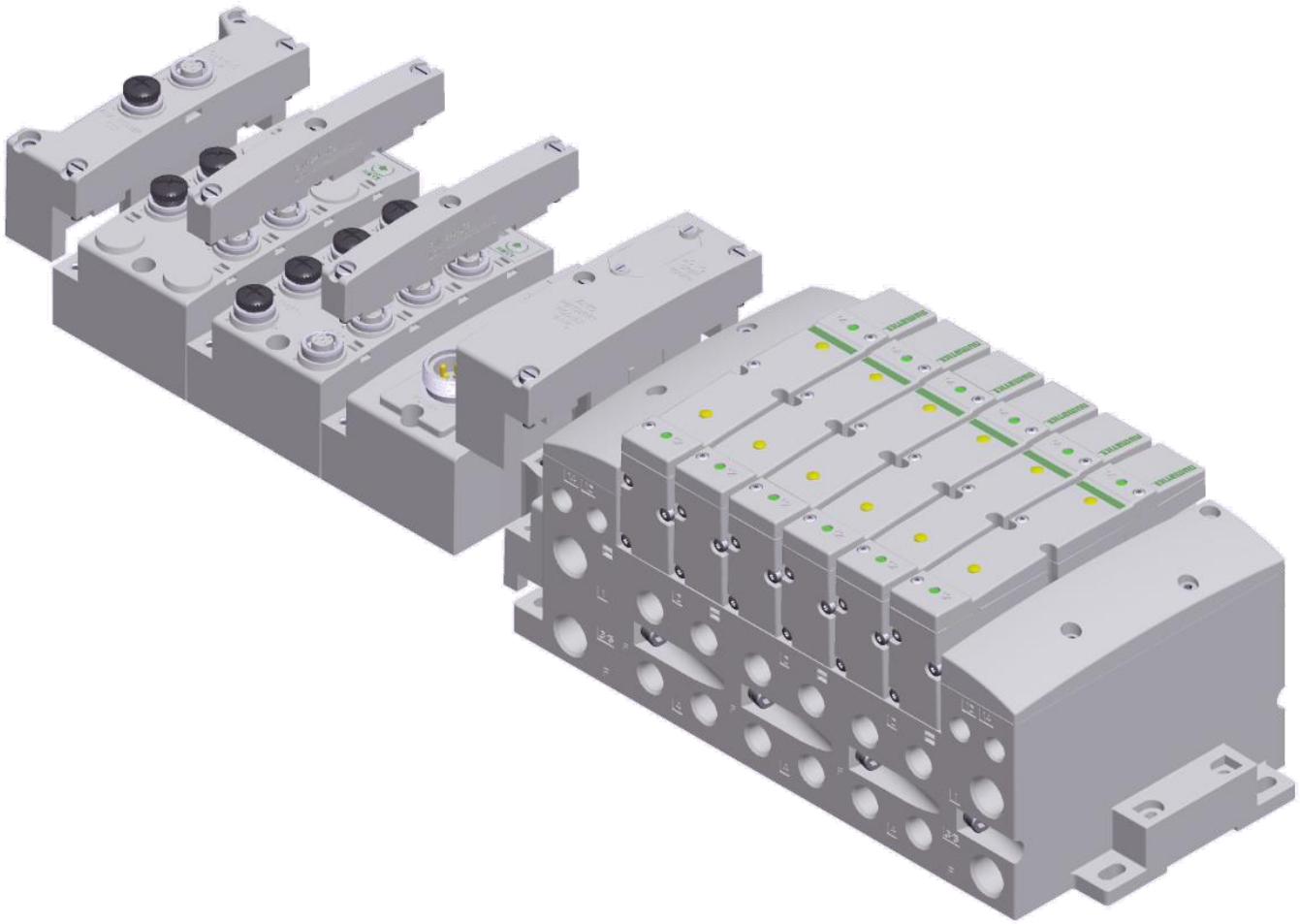
Various discrete modules with integrated graphic display are available. They include digital I/O, analog I/O, and specialty modules which cover various application needs. Pin-outs for all connectors are labeled on the side of the respective modules and are also detailed in the module section of this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

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



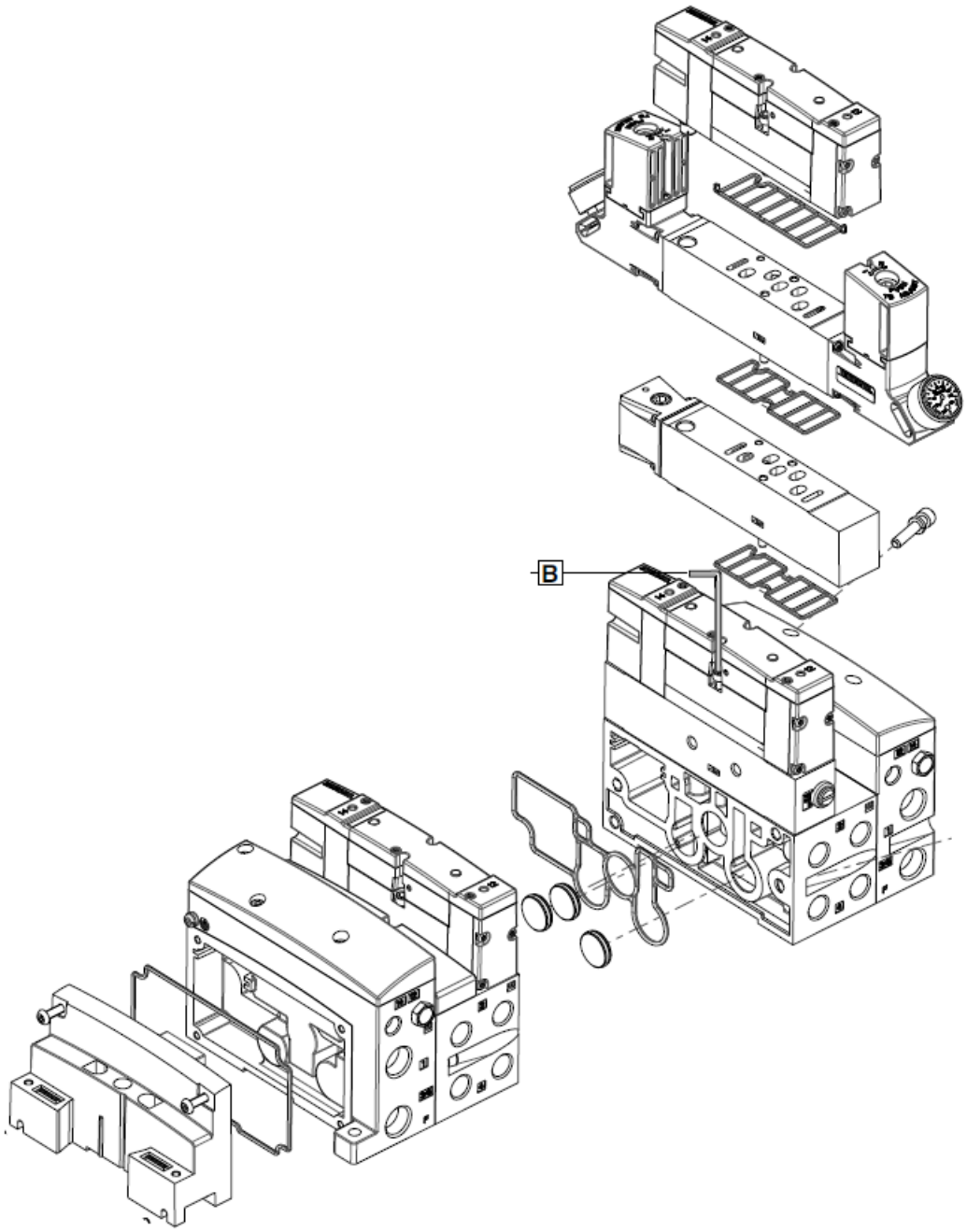
2.1 G3 Electronics Modularity

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 for easy assembly and field changes.



2.2 500 Series Pneumatic Valve Manifold

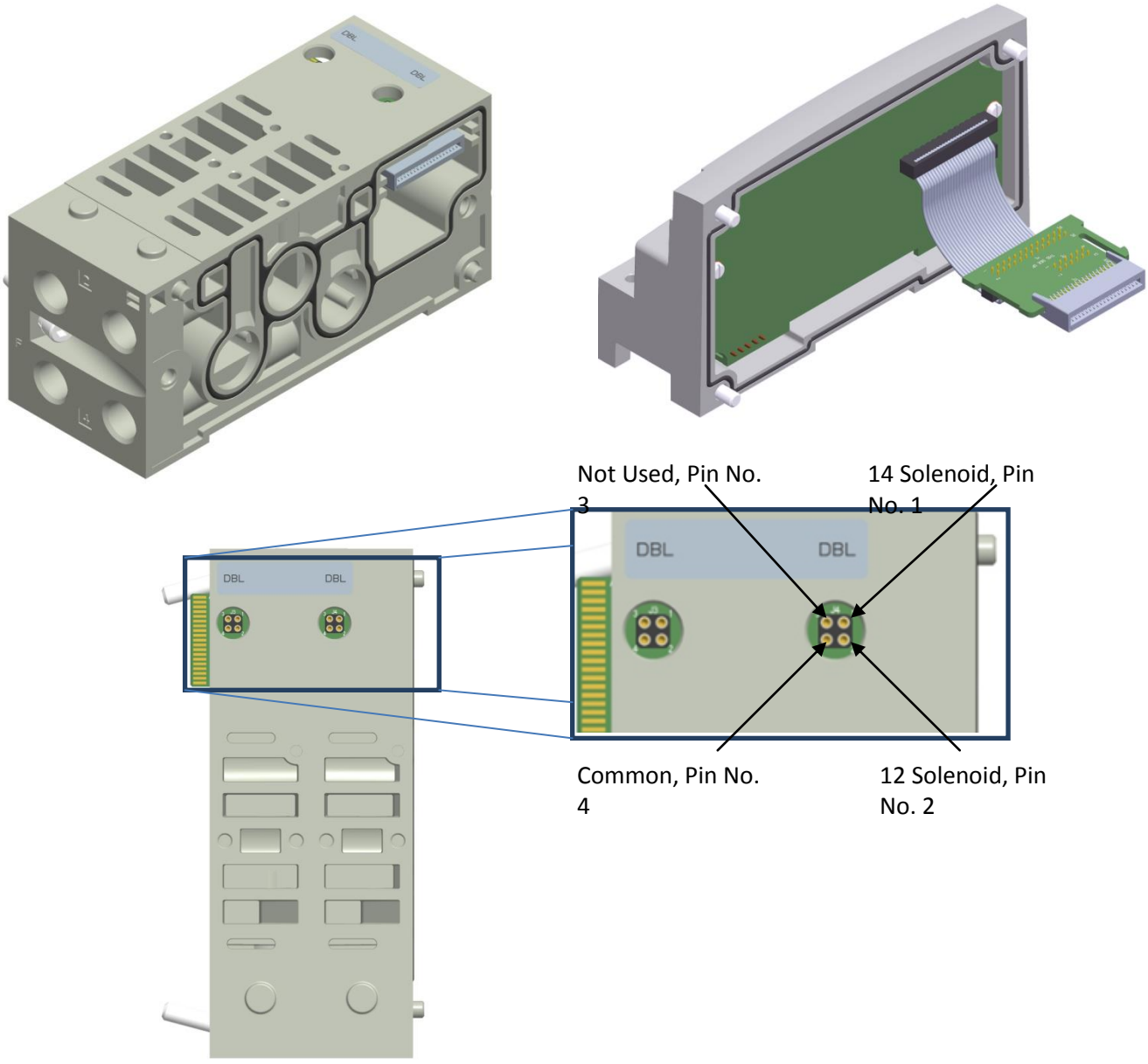
The pneumatic valve manifold with internal circuit board technology is also modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards), which allow internal connection from solenoid coils to output drivers without the use of wires). This allows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



2.3 500 Series Manifold Stations

Solenoid Coil Connections using Z-Board™ Technology for 50x valve series

Z-Board™ plug together technology connects all valve solenoids to the valve coil output driver board, located in the valve adapter. There is a maximum of 32 coil outputs available on the complete manifold assemblies. The 32 available outputs are accessed on the 501 series valves utilizing 4 station manifolds and on the 502 and 503 series utilizing 2 station manifolds.



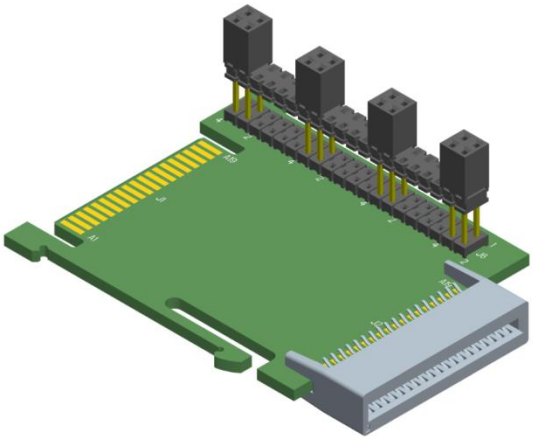
NOTE!

A single solenoid valve's coil designated as the "14"

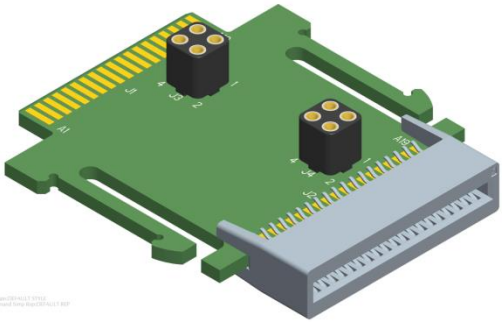
2.4 500 Series Z-Board™ Connectors

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

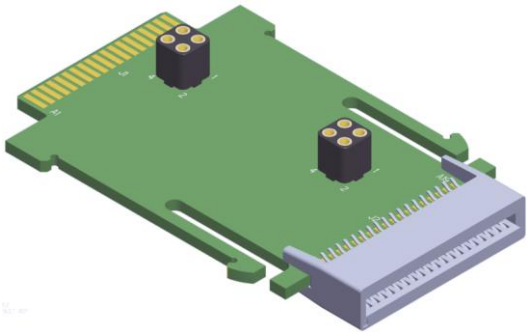
501 Series



502 Series

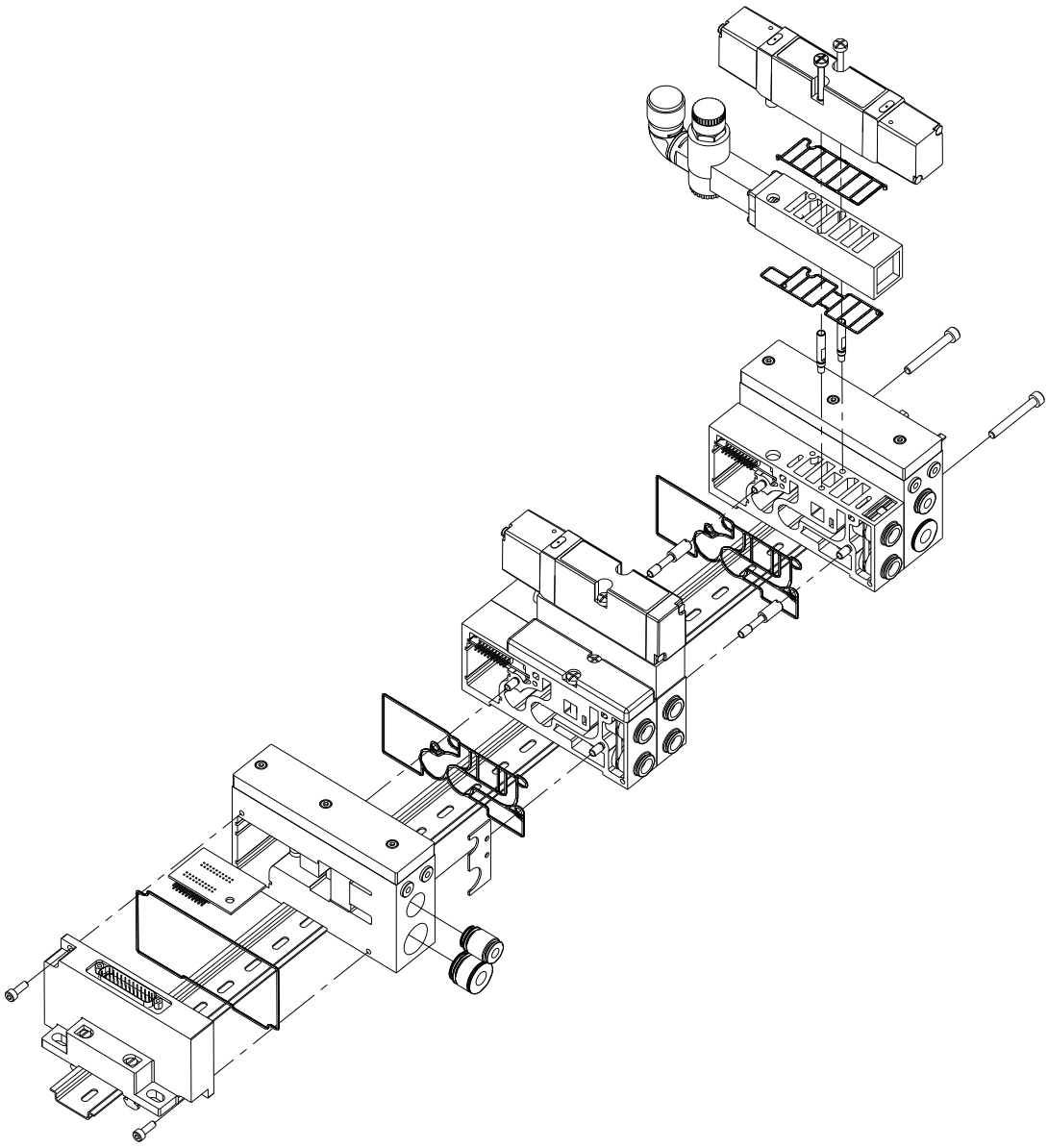


503 Series



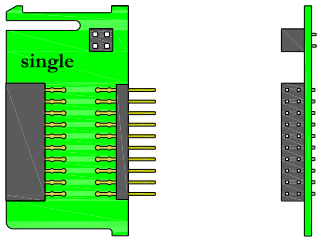
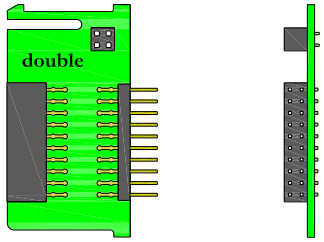
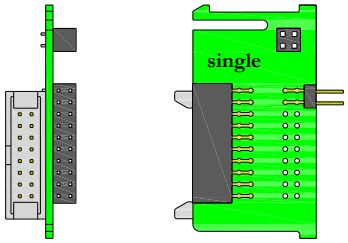
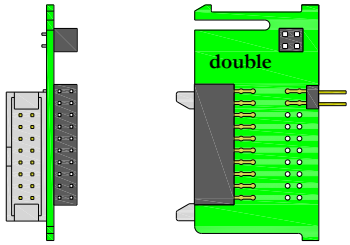
2.5 2000 Series Pneumatic Valve Manifold

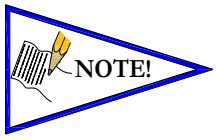
The pneumatic valve manifold with internal circuit board technology is also modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards), which allow internal connection from solenoid coils to output drivers without the use of wires). This allows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



2.6 2000 Series 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™***
	

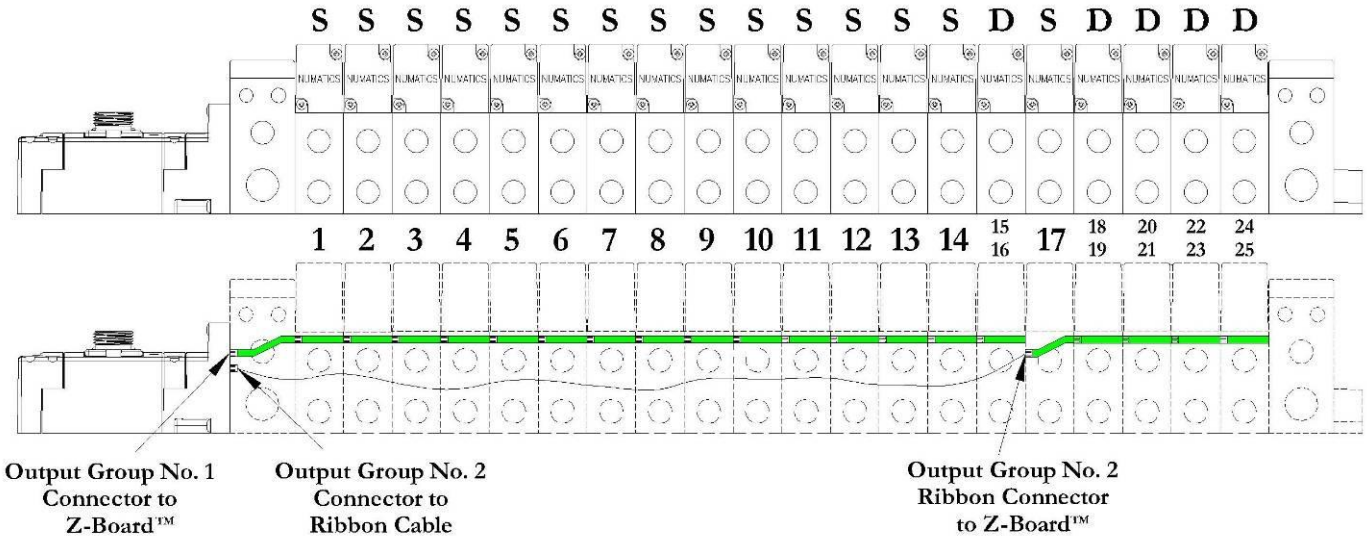


The 17th solenoid (output group No. 2's first bit) must be accessed via either the valve side Sub-D output module or a ribbon connector type Z-board.

2.7 2000 Series Z-Board™ and Ribbon Cable Example

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

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



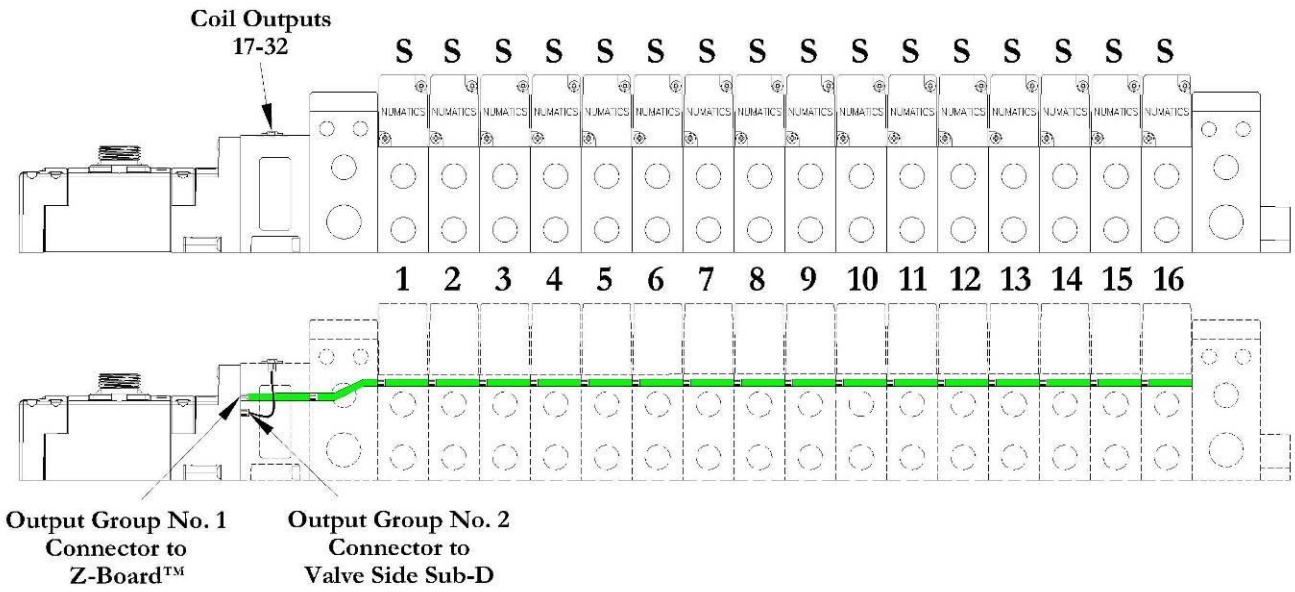
Output Word	0								1							
Output Byte	0								1							
Output Bit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Solenoid Coil Output No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

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

2.8 2000 Series Z-Board™ with Valve Side Sub-D Example

If sixteen (16) single solenoid valves are connected directly to the communication node via 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							
Output Bit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Solenoid Coil Output No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Output Word	1															
Output Byte	2								3							
Output Bit No.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solenoid Coil Output No.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

3. Communication Module

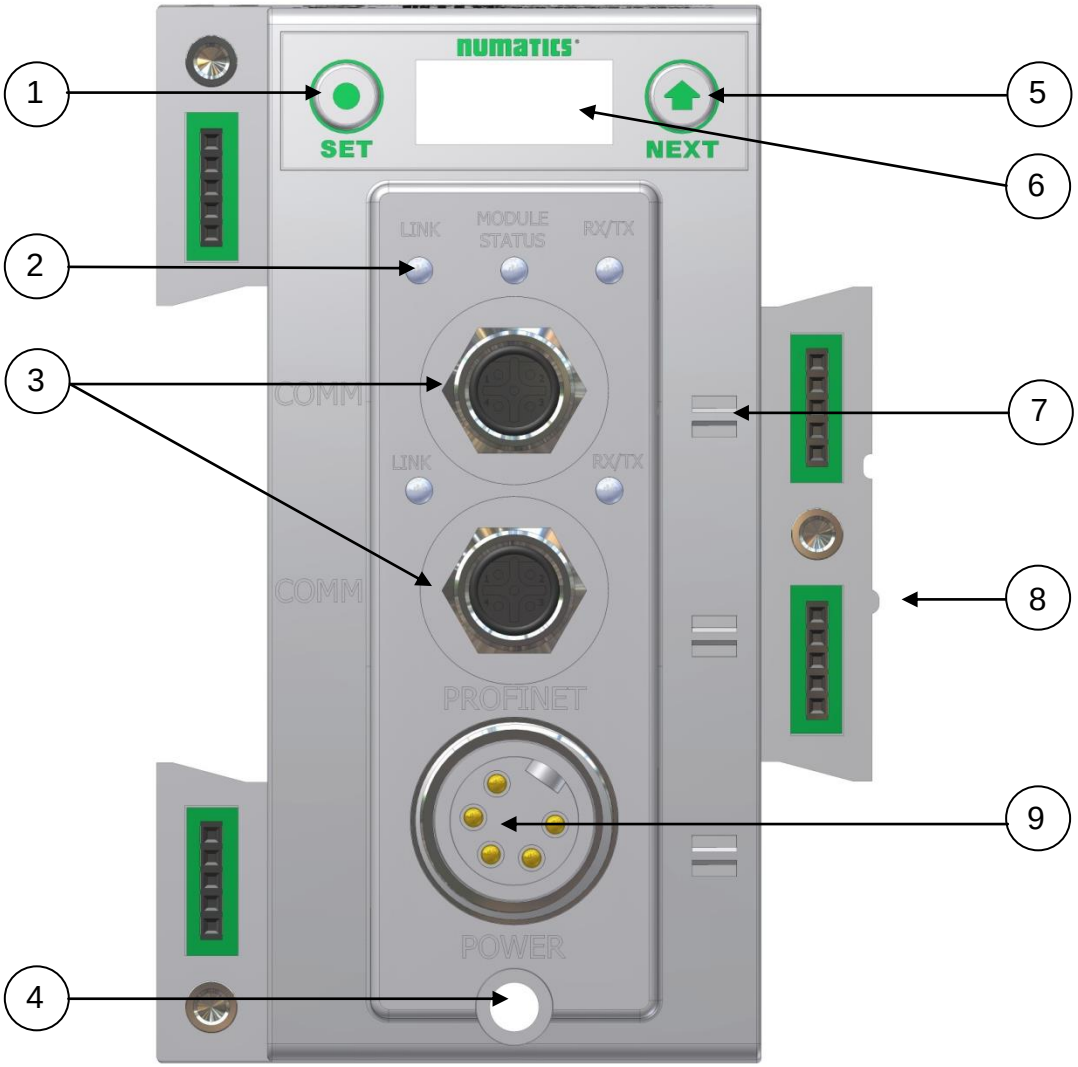
3.1 PROFINET Communication Module (Node)

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

Communication Module Kit Part Number	
PROFINET Communication module	**240-240**

3.2 Communication Module Description

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



3.3 Connector Pin-Outs

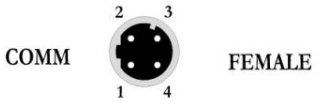
Industry standard connectors are used for communication and auxiliary power.
The communication connectors are a D-coded keyway 4 pin female M12 connector.
The Power connector is a single keyway 5 pin male 7/8" MINI connector.

Communication Connector Pin-Out

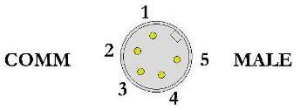
Pin No.	*Function*	*Description*
1	TD+	Positive Transmit Line
2	RD+	Positive Receive Line
3	TD-	Negative Transmit Line
4	RD-	Negative Receive Line

Power Connector Pin-Out

Pin No.	*Function*	*Description*
1	0 VDC Common (Valves and Outputs)	0 VDC Voltage used to power outputs (valve coils and discrete outputs) SW
2	0 VDC Common (Node and Inputs)	0 VDC Voltage used to power discrete inputs and node electronics UNSW
3	Earth Ground	Protective Earth
4	+24 VDC (Node and Inputs)	Voltage used to power discrete inputs and node electronics UNSW
5	+24 VDC (Valves and Outputs)	Voltage used to power outputs (valve coils and discrete outputs) SW



PIN 1= TX +
PIN 2= RX +
PIN 3= TX -
PIN 4= RX -



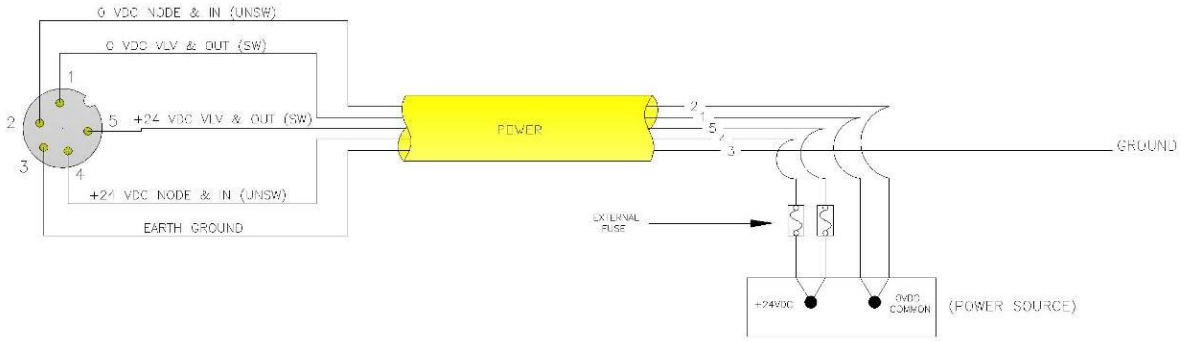
PIN 1= 0 VDC VALVES & OUT (SW)
PIN 2= 0 VDC NODE & IN (UNSW)
PIN 3= EARTH GROUND
PIN 4= +24 VDC NODE & IN (UNSW)
PIN 5= +24 VDC VALVES & OUT (SW)

- *Power common (0 VDC) pins 1 and 2 are isolated from each other to allow separate (isolated) power supply connection if required. However, they can be tied together if a single common, non-isolated, application is preferred.*
- *The combined draw of the +24VDC Valves and Outputs and +24VDC Node and Inputs pins cannot exceed 8 Amps, at any given moment in time.*
- *The Node and Inputs pin supplies power to the node electronics. This pin must be powered at all times for communication node to be functional.*
- *To be connected to Class 2 power source only"*

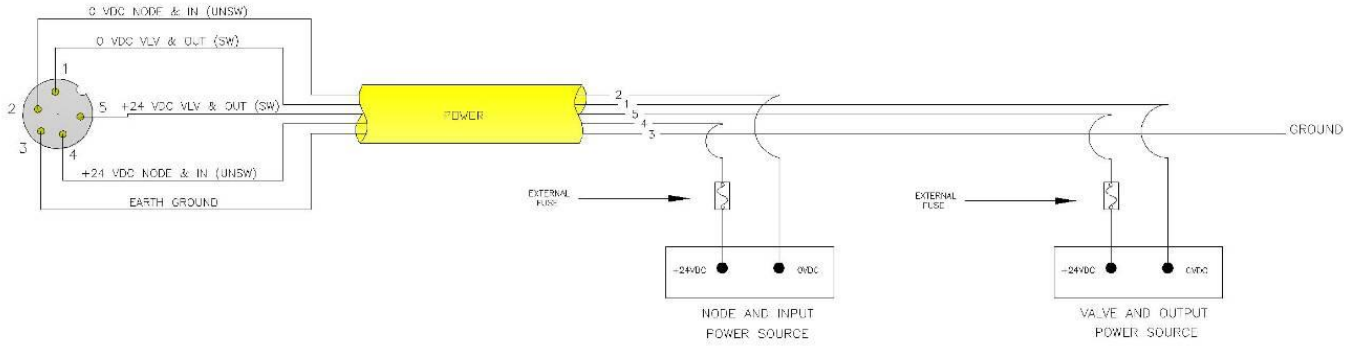
3.4 Electrical Connections

Power Connector Wiring Diagram

Power Supply Example (Non-isolated commons)



Power Supply Example (Isolated commons)



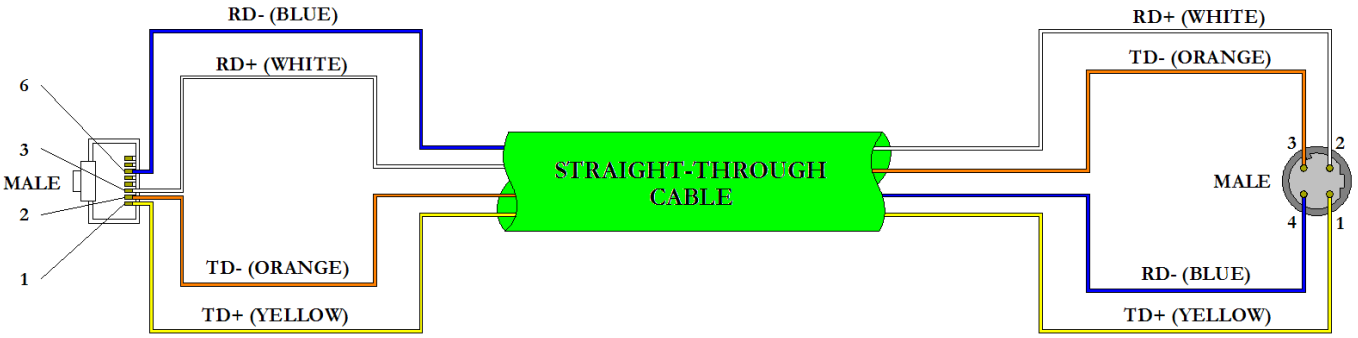
ATTENTION

- ***Please see page 17 for external fuse sizing guide.***
- ***When using molded connector power cables, <u>Do Not</u> rely on wire colors for Pin-Out. <u>Always use pin number references.</u>***
- ***Class 2 Device Wiring Only – Do Not Reclassify and Install as Class 1, 3 or Power and Lighting Wiring.***
- ***Wire connections shall be rated suitable for the wire size (lead and building wiring) employed.***
- ***SYSTEM MAXIMUM MODULES: Up to 16 I/O modules (units) can be connected to 1 Communication Module not including any Sub-Bus and Miscellaneous modules, or equivalent.***
- ***CLASS 2 WIRING; All filed wiring shall be suitable for class 1, Electric Light and Power, or Class 2, Class 3 wiring are routed separately and secured to maintain separation between 1) Class 2 wiring and all other class wiring, and 2) limited energy circuit conductors from unlimited energy circuit conductors.***
- ***MULTIPLE CLASS 2 POWER SOURCES: When Interconnects, class 2 sources shall be Listed and rated suitable for parallel interconnection.***

3.5 Ethernet Straight-Through Cabling Diagrams

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

RJ45 to M12 D Coded Cable



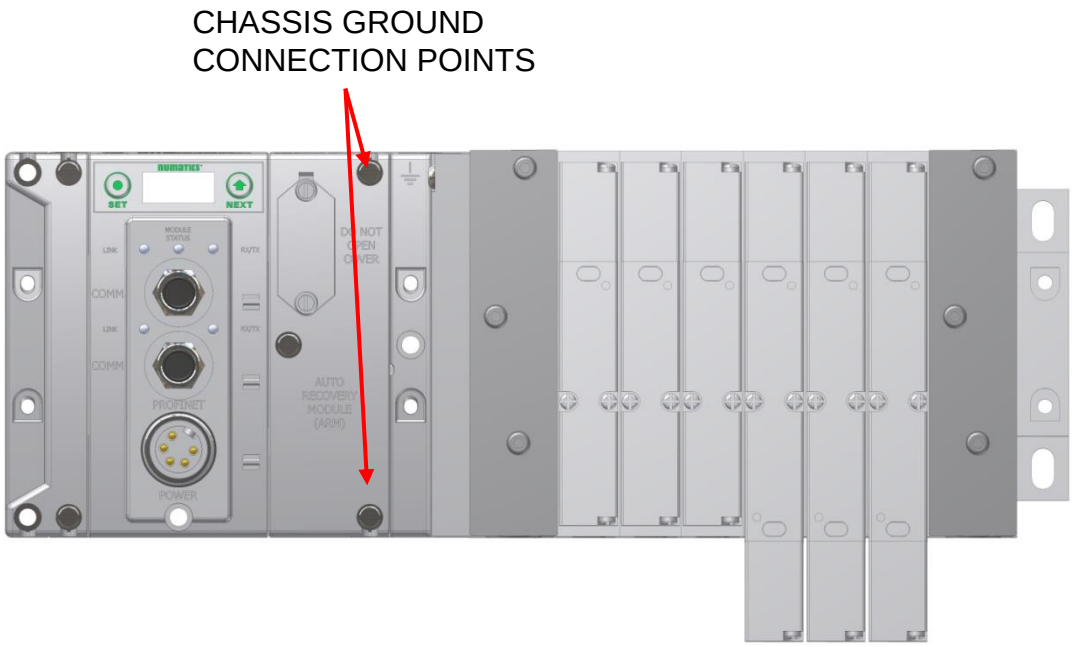
M12 D Coded to M12 D Coded Cable

Description			Color		Pin Number	
PROFINET	Ethernet		Star Quad	2-Pair	RJ45	M12
TD+	TX+	Transmit Data +	YELLOW	WHITE / ORANGE	1	1
TD-	TX-	Transmit Data -	ORANGE	ORANGE	2	3
RD+	RX+	Receive Data +	WHITE	WHITE / GREEN	3	2
RD-	RX-	Receive Data -	BLUE	GREEN	6	4

- ***RJ45 shown as T-568B standard.***

3.6 Ground Wiring

All Numatics Inc. communication nodes should be grounded during the installation process. These grounding guidelines can be found in National Electrical code IEC 60204-1 or EN 60204-1.



ATTENTION

- *Proper grounding will alleviate and prevent many intermittent problems with network communication.*
- *When grounding to a machine frame, please ensure that the machine frame itself is already properly grounded.*
- *Better grounding can be achieved when larger diameter (lower gauge) wire is used.*

3.7 Power Consumption

Power Connection

Pin No.	*Function*	*Description*
1	0 VDC Common (Valves and Outputs)	0 VDC Voltage used to power outputs (valve coils and discrete outputs) SW
2	0 VDC Common (Node and Inputs)	0 VDC Voltage used to power discrete inputs and node electronics UNSW
3	Earth Ground	Protective Earth
4	+24 VDC (Node and Inputs)	Voltage used to power discrete inputs and node electronics UNSW
5	+24 VDC (Valves and Outputs)	Voltage used to power outputs (valve coils and discrete outputs) SW

Power Rating

- **For maximum supply current capability please refer to page** Error! Bookmark not defined..
- **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 & 5*		*+24VDC (Node and Inputs) Pins 2 & 4*	
			Current	*Power*	*Current*	*Power*
Solenoid Valve Coil 503 (Each)	24 VDC	+10%/-15%	0.07 A	1.70 W	0 A	0 W
Solenoid Valve Coil 2002 (Each)	24 VDC	+10%/-15%	0.02 A	0.48 W	0 A	0 W
Solenoid Valve Coil 2005 (Each)	24 VDC	+10%/-15%	0.06 A	1.44 W	0 A	0 W
Solenoid Valve Coil 2012 (Each)	24 VDC	+10%/-15%	0.11 A	2.64 W	0 A	0 W
Solenoid Valve Coil 2035 (Each)	24 VDC	+10%/-15%	0.11 A	2.64 W	0 A	0 W
Solenoid Valve Coil ISO - SPA	24 VDC	+10%/-15%	0.17 A	4.08 W	0 A	0 W
Valve Adapter (Driver)	24 VDC	+/- 10%	0.13 A	3.12 W	0.01 A	0.24 W
Discrete Digital Input Module	24 VDC	+/- 10%	0.01 A	0.24 W	0.05 A*	1.20 W*
Discrete Digital Output Module	24 VDC	+/- 10%	0.05 A	1.20 W	0.06 A*	1.44 W*
Discrete Digital I/O Module	24 VDC	+/- 10%	0.03 A	0.72 W	0.08 A*	1.92 W*
Discrete Analog Input Module (V & C)	24 VDC	+/- 10%	0.01 A	0.24 W	0.07 A*	1.68 W*
Discrete Analog I/O Module (V & C)	24 VDC	+/- 10%	0.01 A	0.24 W	0.06 A*	1.44 W*
Communication Module (Node)	24 VDC	+/- 10%	0 A	0 W	0.08 A*	1.92 W*
Sub-Bus Valve Module	24 VDC	+/- 10%	0 A	0 W	0.03 A*	0.72 W*
Auto Recovery Module (ARM)	24 VDC	+/- 10%	0 A	0 W	0.02 A	0.48 W
Manual Configuration Module (MCM)	24 VDC	+/- 10%	0 A	0 W	0.01 A	0.24 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.*

3.8 Recommended External Fuses

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

External Fuse Sizing Chart

Power Consumption - Power Connector Pin for Valves and Outputs		
Description		***Current***
Number of Solenoid Valve Coils Energized Simultaneously		
___ X 0.167 A (ISO - SPA Series)	=	_____Amps
___ X 0.105 A (2012 and 2035 Series)	=	_____Amps
___ X 0.056 A (2005 Series)	=	_____Amps
___ X 0.021 A (2002 Series)	=	_____Amps
		+
Total load current drawn by simultaneously energized Discrete Outputs	=	_____Amps
		+
Number of I/O modules installed ___ X 0.023 A	=	_____Amps
		+
Valve Adapters (219-828) installed ___ X 0.134 A	=	_____Amps
		+
Communication Node Power Consumption	=	.006 Amps
		+
Total:		_____Amps
Surge Compensation:	X	1.25
Suggested External +24 VDC (Valves and Outputs) Fuse Value:		_____Amps

Power Consumption – Power Connector Pin for Node and Inputs		
Description		***Current***
Communication Node Power Consumption	=	.091 Amps
		+
Total load current drawn by Sensor Devices from Discrete Inputs source	=	_____Amps
		+
Number of I/O modules installed ___ X 0.075 A	=	_____Amps
		+
Total:		_____Amps
Surge Compensation:	X	1.25
Suggested External Pin +24 VDC (Node and Inputs) Fuse Value:		_____Amps

*Factory Default Settings

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

3.9 Diagnostics

Communication Module LED Functions

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

LED Name	*Color*	*Status*	*Description*
MODULE STATUS	Red	ON	Major fault. A major internal error has been detected.
	Off	OFF	No error detected.
	Green	FLASHING	Self -Test Mode.
RX/TX	Off	OFF	No Profinet connection established with PLC
	Amber	FLASHING	Profinet connection established with PLC
LINK	Off	OFF	No Ethernet connection is detected
	Green	ON	The module is connected to an Ethernet network

3.10 Output Short Circuit Protection

Status Bit Action During Fault Condition

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

4. G3 Graphic Display

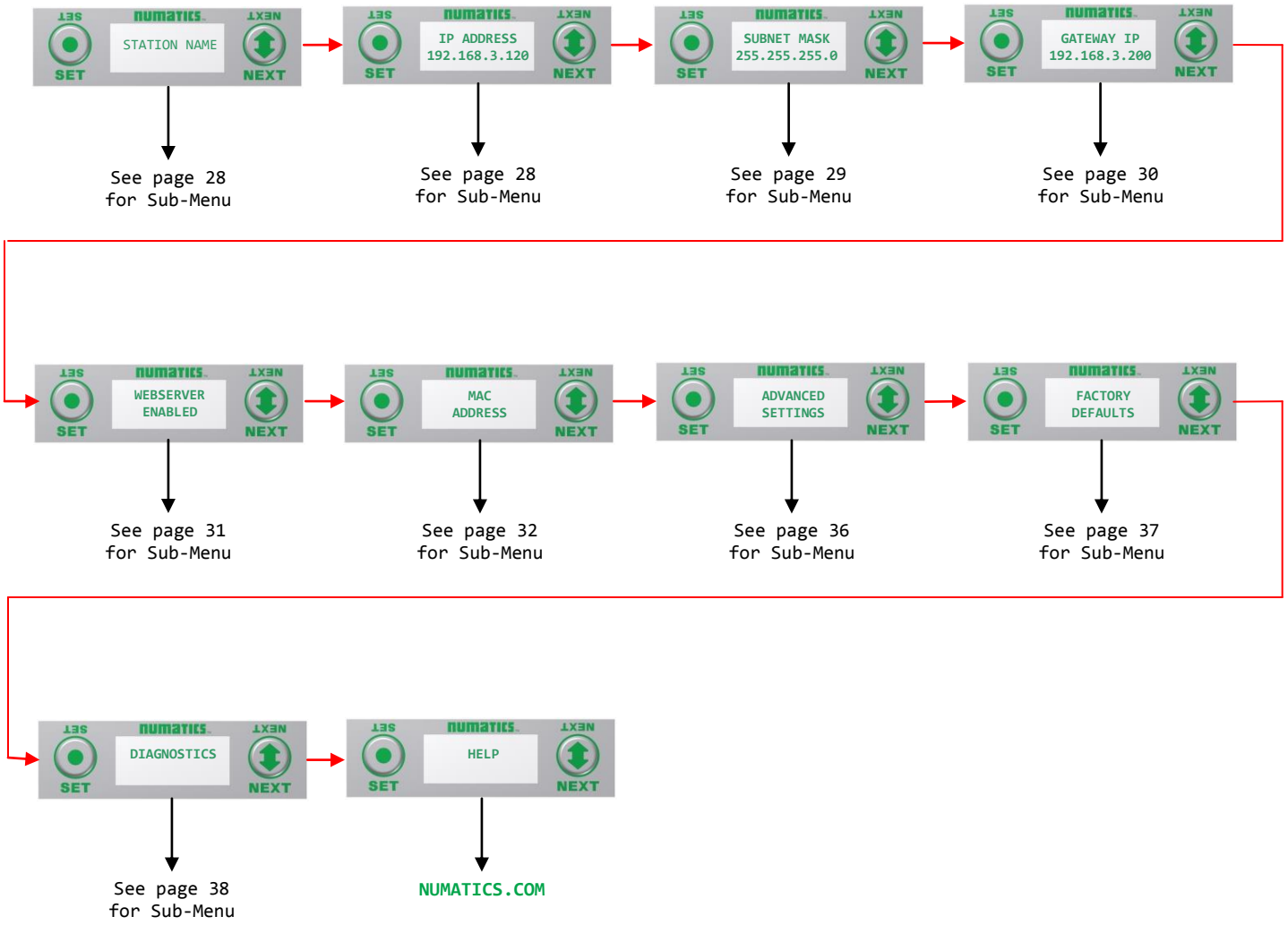
The G3 Communication and I/O modules have an integrated graphic display that may be used to configure the parameters of the modules as well as showing diagnostic information.

The following graphic displays represent the main menu selections of the G3 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: WHEN A NETWORK I/O CONNECTION IS ESTABLISHED MANUAL CHANGES TO NODE PARAMETERS ARE NOT ALLOWED!***

4.1 Main Menu Structure

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 GSD file parameters.

NOTE: When a network I/O connection is established manual changes to node parameters are not allowed!



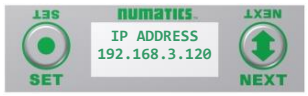
- ***When a network I/O connection is established manual changes to node parameters are not allowed!***

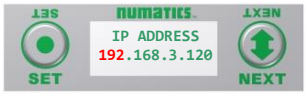
4.2 Station Name

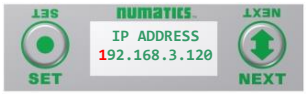
Station Name

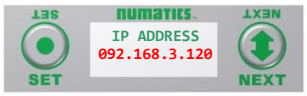
1 The Station Name is addressed through the PLC. It is a text string that describes the function of the station in the application.

4.3 IP Address









Steps to Set IP Address

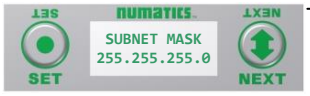
1. Press the SET button to enter the IP ADDRESS sub-menu.
2. Press the NEXT button to select the octet that you would like to change.
   Press the SET button to change the value.
3. Press the SET button to scroll through the hundred, tens and ones digits of the octet.
   Press the NEXT button to scroll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

   Press the SET button to confirm your choice.

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

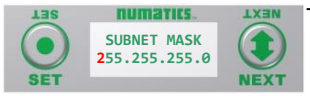
4.4 Subnet Mask

Steps to Set Subnet Mask



1. Press the SET button to enter the Subnet Mask sub-menu.

2. Press the NEXT button to select the octet that you would like to change.
   Press the SET button to change the value.



3. Press the SET button to scroll through the hundred, tens and ones digits of the octet.
   Press the NEXT button to scroll through the valid digits (0-9).
   Press the SET button to advance through the octet.
   Press the NEXT button to advance to the next octet, scroll pass the fourth octet to accept the entire Subnet Mask

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

5. Press the NEXT button to select **Y**es or **N**o to accept the Subnet Mask shown on the display..
   c. Selecting **N**o will bring you back to the main Subnet Mask menu.
   d. Selecting **Y**es will take you to the following SAVE SETTINGS menu

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

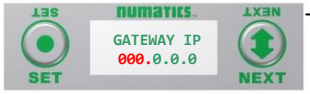
   Press the SET button to confirm your choice.

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

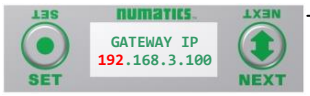
4.5 Gateway IP

Steps to Set Gateway IP

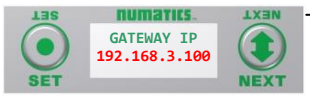
1. Press the SET button to enter the Gateway IP sub-menu.



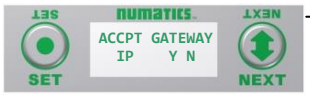
2. Press the NEXT button to select the octet that you would like to change.
   Press the SET button to change the value.



3. Press the SET button to scroll through the hundred, tens and ones digits of the octet.
   Press the NEXT button to scroll through the valid digits (0-9).
   Press the SET button to advance through the octet.
   Press the NEXT button to advance to the next octet, scroll pass the fourth octet to accept the entire Subnet Mask



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



5. Press the NEXT button to select **Y**es or **N**o to accept the Subnet Mask shown on the display.
   e. Selecting **N**o will bring you back to the main Subnet Mask menu.
   f. Selecting **Y**es will take you to the following SAVE SETTINGS menu

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

   Press the SET button to confirm your choice.

- ***Factory default Gateway IP is 0.0.0.0***

4.6 Web-Server

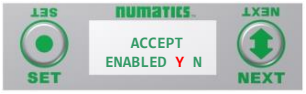
This will allow the enabling/disabling of the G3 Web Server.

Web-Server Steps

1. Press the SET button to enter the Web-Server sub-menu.

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

   Press the SET button to confirm your choice.



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

   Press the SET button to confirm your choice.

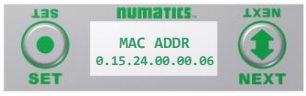
Apply Changes Steps

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

   Press the SET button to confirm your choice.

- *Factory default setting for WEB-SERVER is enabled.*

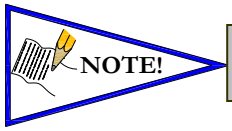
4.7 MAC Address



MAC (Machine Access Control) Address

1. The MAC Address is a fixed unique value that cannot be edited.

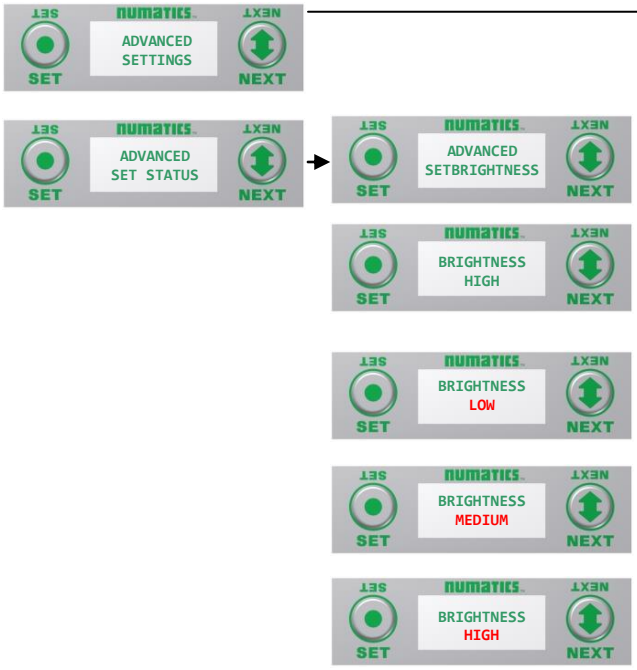
The actual MAC ADDR has an extra leading zero. The actual number in the example shown is 00-15-24-00-06-69



- *The MAC address is for reference and cannot be modified.*

4.8 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.

3. The current state of the parameter is shown

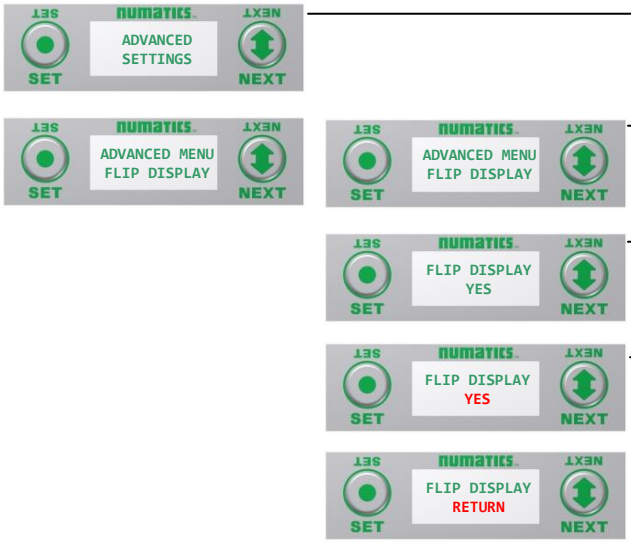
4. Press the SET button to change this parameter
   Press the NEXT button to scroll the choices for the desired brightness of the graphic display for all modules on the G3 system.

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

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

4.9 Advanced Settings – Flip Display

Flip Display Settings



1. Press the SET button to enter the ADVANCED SETTINGS menu.
2. Press the NEXT button to scroll to the CONFIG MENU / FLIP DIPLAY.

   Press the SET button to enter the CONFIG MENU / FLIP DIPLAY.
3. The current state of the parameter is shown
4. Press the NEXT button to change this parameter

   a. YES
   b. RETURN

   Press the SET button to confirm your choice.

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

4.10 Advanced Settings – Parameters Lock

PARAMETER Steps

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

2. Press the NEXT button to scroll through the choices to enable or disable the feature.
   d. UNLOCKED (Factory Default)
   e. LOCKED
   f. RETURN (this will return you to the main menu)

   Press the SET button to confirm your choice.

   By choosing LOCKED, all settable parameters will be read only via the graphic display. UNLOCKED, the factory default, will allow all parameters to be settable through the graphic display.
   Please note that all parameters are read only, regardless of this setting, when an IO connection between the communication module and the controller (PLC) is present

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

   Press the SET button to confirm your choice.

Apply Changes Steps

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

   Press the SET button to confirm your choice.

4.11 Advanced Settings – Fast Startup

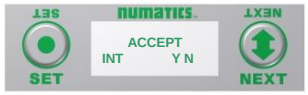
This will allow the enabling / disabling of the "FAST STARTUP" feature. "FAST STARTUP" streamlines the startup time of the G3 Sub-Bus and is typically utilized in automatic tool change applications.

Quick Connect Settings

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

2. Press the NEXT button to scroll to the ADVANCED MENU/FAST STARTUP
3. Press the SET button to enter the FAST STARTUP menu

4. Press the SET button, the current state of the parameter is highlighted.
5. Press the SET button to change this parameter
   Press the NEXT button;
   a. DISABLED menu)
   b. ENABLED
   c. RETURN (this will return you to the main



6. Press the SET button to confirm your choice
   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 FAST STARTUP menu.
   b. Selecting **Y**es will take you to the following save 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 FAST STARTUP selection to be saved in memory, you must Accept the saved changes before your next power cycle otherwise they will be lost.

4.12 Factory Defaults

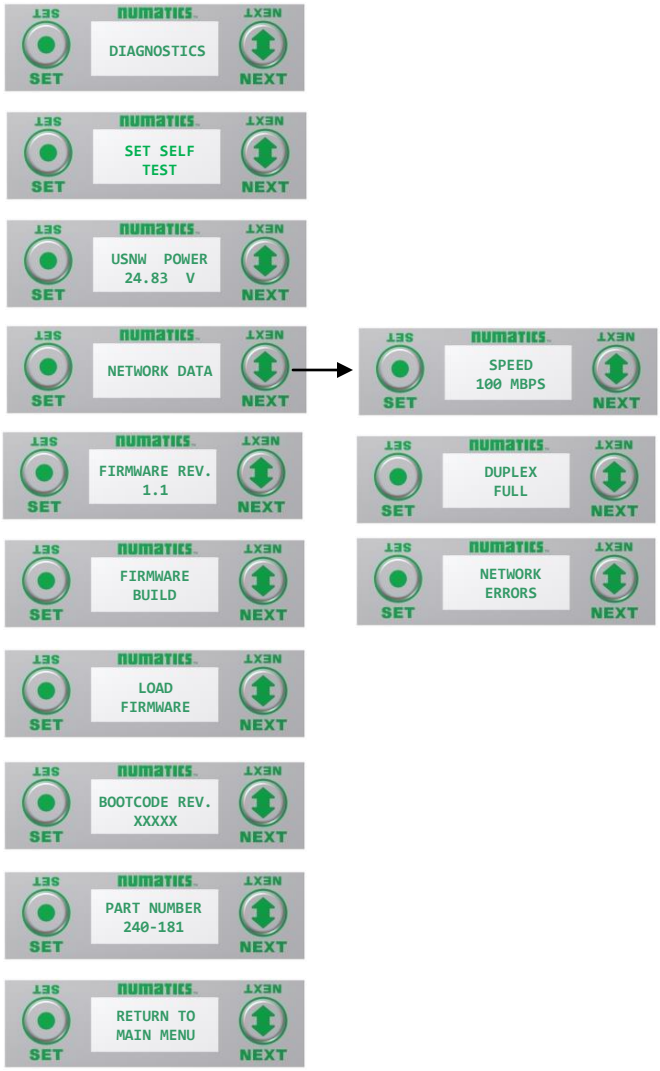
Factory Default Settings

1. Press the SET button to enter the FACTORY DEFAULTS sub-menu.
2. Press the SET button to change this parameter
3. Press the NEXT button to select Yes or No.
   a. Selecting No will bring you back to the main FACTORY DEFAULTS menu.
   b. Selecting Yes will cause the node to reset and return all parameters to the factory default conditions.
   c. Selecting RETUTN will bring you back to the main FACTORY DEFAULS menu

   Press the SET button to confirm your choice.

FACTORY DEFAULT SETTINGS	
Description	*Default*
Station Name	(blank)
IP Address	0.0.0.0
Sub Net Mask	0.0.0.0
Gateway Address	0.0.0.0
Brightness	High
Flip Display	Normal
Fast Startup	Disabled
Parameters	Unlocked

4.13 Diagnostics



1. All diagnostic information is read only
2. Press the SET button to enter DIAGNOSTICS sub-menu.
3. Press the NEXT button to scroll through the main diagnostic menu choices.
   a. SET SELF TEST
      i. - Please see following page for description
   b. USNW POWER
      i. - Displays voltage level of unswitched power (Node & Inputs)
   c. NETWORK DATA
      i. - Displays the network diagnostics
   d. FIRMWARE REVISION
      i. - For service personnel
   e. FIRMWARE BUILD
      i. - For service personnel
   f. LOAD FIRMWARE
      i. - For service personnel
   g. BOOTCODE REVISION
      i. - For service personnel
   h. BOOTCODE BUILD
      i. - For service personnel
   i. PART NUMBER
      i. - Displays replacement part number of module
   j. RETURN TO MAIN MENU

- *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.*

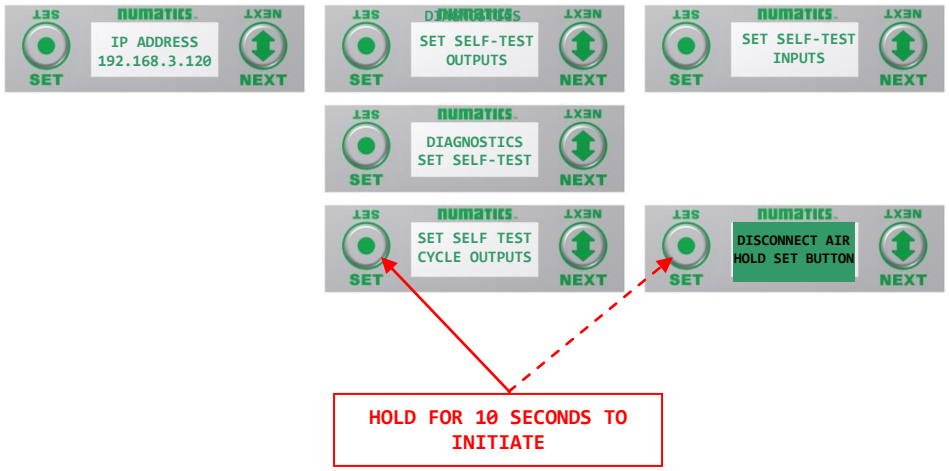
4.14 Diagnostics - Self Test Mode

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.

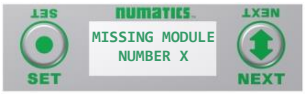


4.15 Error Messages

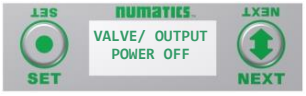
The following are automatic error messages that are displayed when specific faults occur during operation:

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

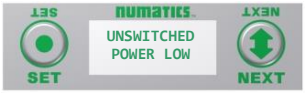
Displayed when a short circuit condition is detected on a valve coil



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



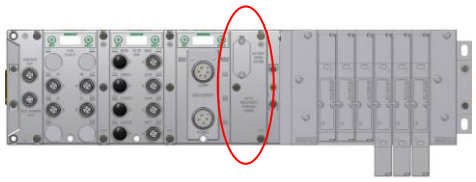
Displayed when +24 VDC on Pin No. 1 and No. 4 (Valves and Outputs) is not present or below 22 VDC



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

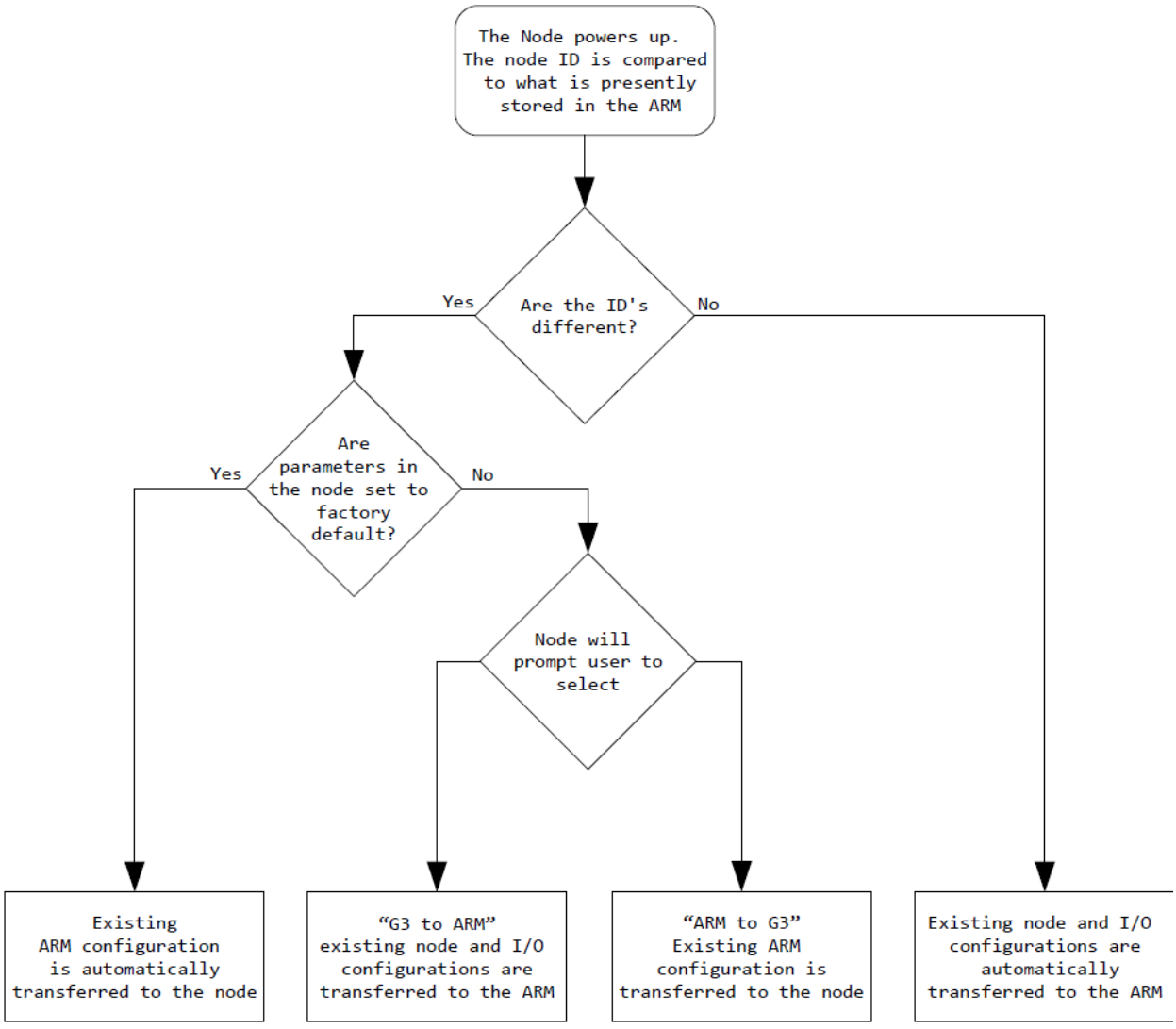
5. ARM – Auto Recovery Module (Optional)

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 system parameters 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.



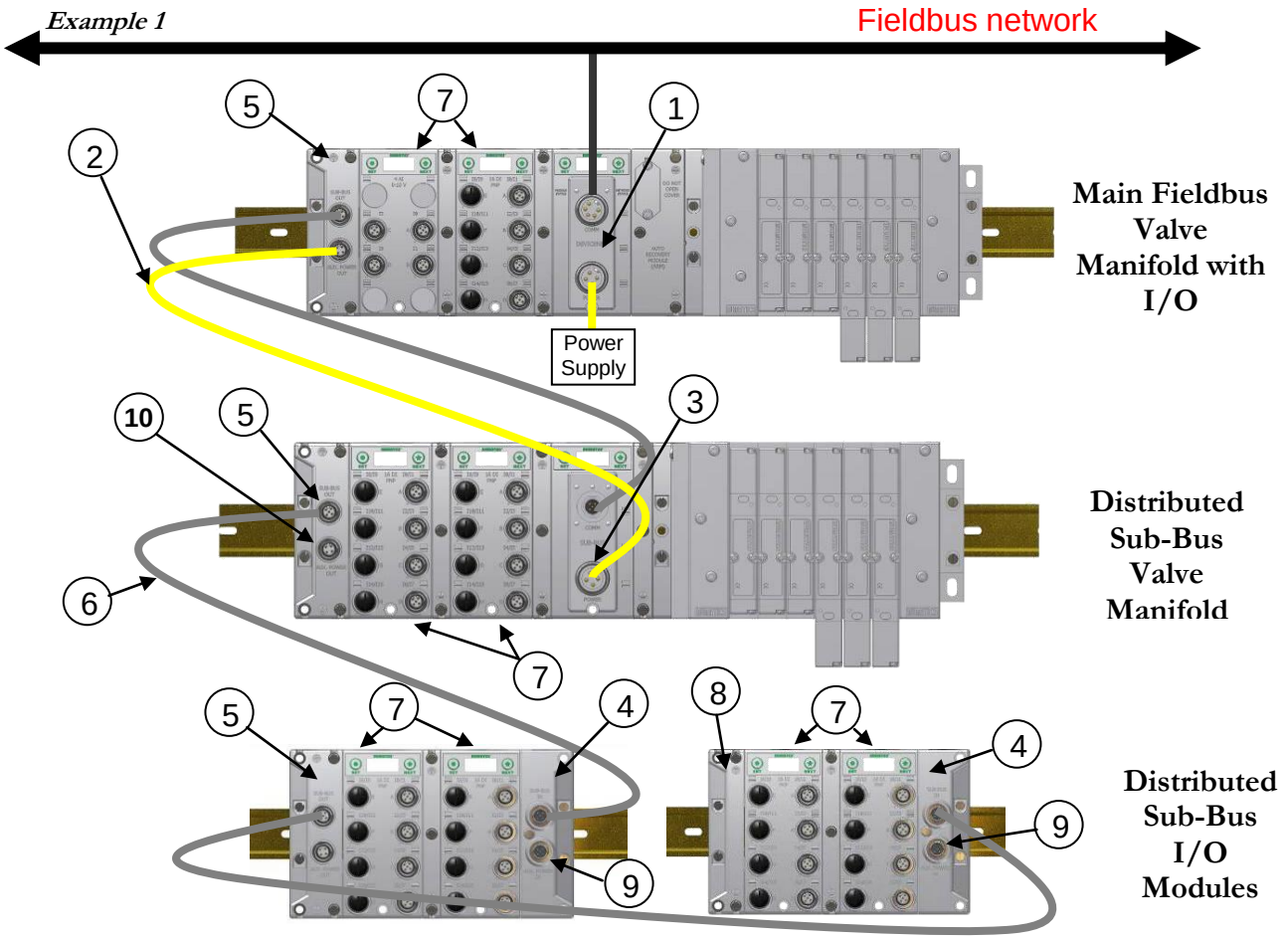
Description	*Replacement Part Number*
Complete ARM Module	240-182

5.1 ARM process flowchart



6. 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)

6.1 Sub-Bus Distribution Modules

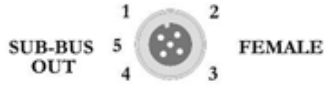
SUB-BUS OUT Module

- **Used only when distributing the Sub-Bus to another assembly is required.**

- **SUB-BUS OUT - 5 pin M12 female communication connector.**
  - **Used to distribute the Sub-Bus to the next Sub-Bus assembly.**
  - **Carries 24 VDC power for electronics of the next module.**

- **AUX. POWER OUT - 4 pin M12 female aux. power connector.**
  - **Optional connection.**
  - **Used as a convenience way to distribute the power connection to the next Sub-Bus assembly.**

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



PIN 1= SHIELD
PIN 2= V+
PIN 3= V-
PIN 4= CAN_H
PIN 5= CAN_L

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

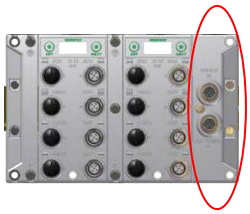
SUB-BUS IN Modules

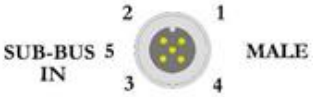
- Used to distribute I/O assemblies that do not have valves
  - Must be installed to the right of the I/O modules.

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

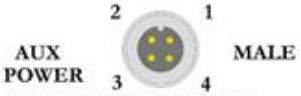
  - AUX. POWER IN - 4 pin M12 male connector.
    - Aux power is required for Output modules. This connection also allows Output power to be interrupted to all Output modules connected to this module.
    - Aux. Power is optional for Inputs. Power from the SUN-BUS IN connection is used to power sensors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

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





PIN 1= SHIELD
PIN 2= V+
PIN 3= V-
PIN 4= CAN_H
PIN 5= CAN_L

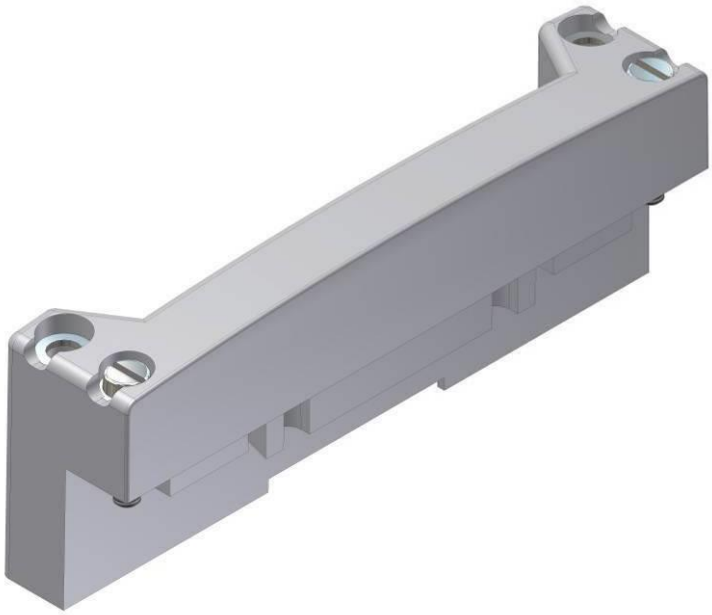


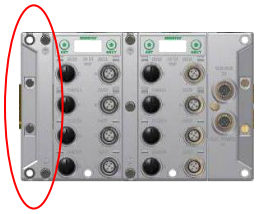
PIN 1= +24VDC (UNSW)
PIN 2= +24VDC (SW)
PIN 3= 0VDC (UNSW)
PIN 4= 0VDC (SW)

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





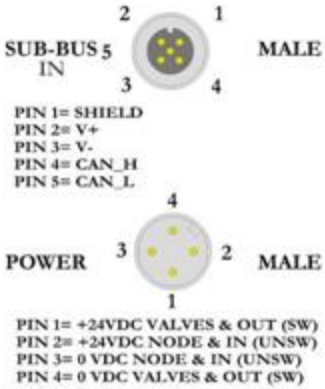
NOTE!

- *The terminator must be installed in the G3 system for proper operation.*

Sub-Bus Valve Module

- COMM - 5 pin M12 male Sub-Bus input communication connector.
  - Must be connected to the SUB-BUS OUT connector of the previous assembly
  - Carries 24 VDC power for electronics of module
- POWER - 4 pin MINI male power connector.
  - Power is required for Outputs
- Used to distribute Valves on the Sub-Bus.
  - Can accepts discrete I/O module to allow a Sub-Bus Valve manifold with I/O

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



NOTE!

- *The Sub-bus Valve Module drops 0.8 VDC across the module*

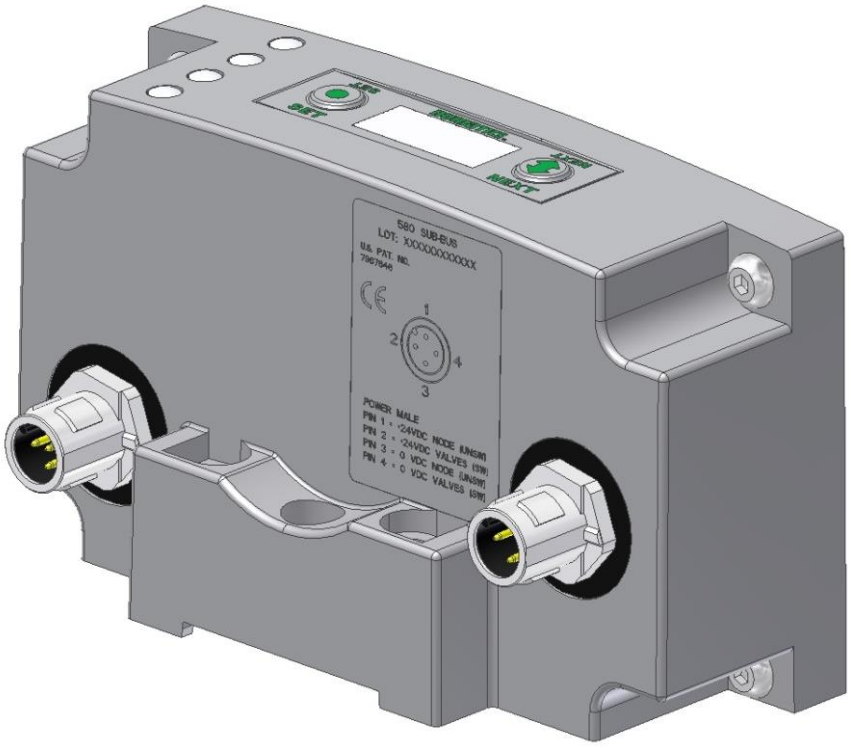
Sub-Bus Valve Module

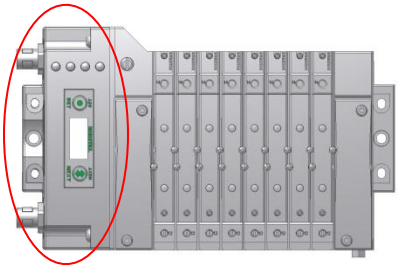
- **COMM - 5 pin M12 male Sub-Bus communication connector.**
  - **Must be connected to the SUB-BUS OUT connector of the previous assembly**
  - **Carries 24 VDC power for electronics of module**

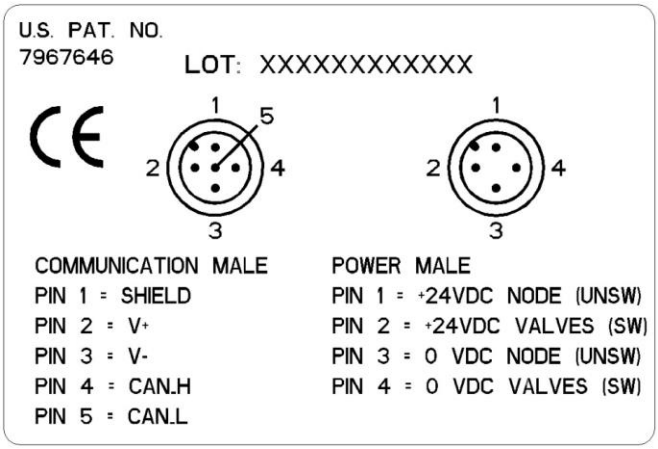
- **POWER - 4 pin M12 male power connector.**
  - **Power is required for Outputs**

- **Used to distribute Valves on the Sub-Bus.**
  - **Does not allow connection to G3 I/O modules.**

Description	*Part Number*
Sub-Bus Valve Module without I/O	P580AEDS4010A00



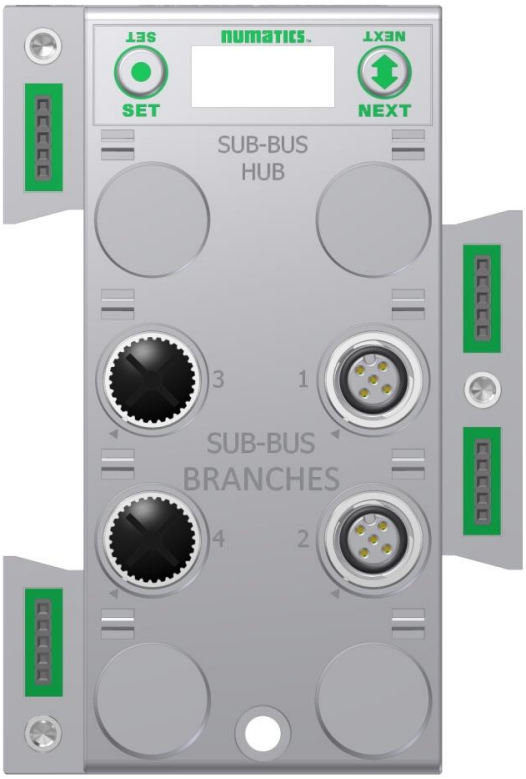




Sub-Bus Hub Module

The G3 HUB module allows for branch distribution from the I/O side of the G3 System and can be integrated into the existing G3 Series Sub-Bus configuration. Auto Addressing allows for trouble free set up and configuration. Input, Output, as well as Valve manifolds can be attached to the available four Branches on a HUB module. Each G3 System can support up to two HUB modules, allowing for maximum flexibility. The HUB module is transparent to the I/O side of the G3 and does not reserve one of the potential sixteen positions.

Description	*Part Number*
Sub-Bus Hub Module	240-326



6.2 Sub-Bus Cables

M12 STRAIGHT 5 PIN MALE TO FEMALE SUB-BUS CABLE - SHIELDED

TA0501MGDTC0571P – 1 Meter
TA0505MGDTC0571P – 5 Meter
TA0510MGDTC0571P – 10 Meter

M12 STRAIGHT 5 PIN FEMALE FIELD WIREABLE CONNECTOR, SPRING CAGE

TC05F2000000071V – PG9

M12 STRAIGHT 5 PIN MALE FIELD WIREABLE CONNECTOR, SPRING CAGE

TA05F2000000071V – PG9

M12 90° 5 PIN FEMALE FIELD WIREABLE CONNECTOR, SPRING CAGE

TD05F2000000071V – PG9

M12 90° 5 PIN MALE FIELD WIREABLE CONNECTOR, SPRING CAGE

TB05F2000000071V – PG9

BULK SUB-BUS CABLE	*NOTE
000550MGD0005000 – 50 Meter Length	
0005A0MGD0005000 – 100 Meter Length	

* Note:
Length of field wired cables should not exceed the maximum length of 30 meters for total sub-bus communications link. See appropriate technical manual for sub-bus length requirements. The cable assemblies and Bulk cable are the only approved cables for the G3 Sub-Bus link. See technical document TDG3SBWD1-0EN for proper installation and wiring of field wireable connectors.

Technical Data

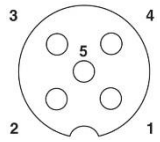
TECHNICAL DATA	CABLE	CONNECTORS	BULK CABLE
Molded Body / Insert	TPU	Zinc - Nickel Plated	N/A
Coupling Nut	Zinc - Nickel Plated	Brass - Nickel Plated	N/A
Cable Jacket Material	PUR	N/A	Gray RAL 7001
Cable O.D.	6.70 mm	N/A	6.70 mm
Voltage Rating (Nominal)	60 Volts	60 Volts	60 Volts
Current Rating	4.0 Amps	4.0 Amps	4.0 Amps
Degree of Protection	IP65 (mated)	IP65 (mated)	IP65 (terminated)
Operating Temperature	-40° C - 80° C	-40° C - 80° C	-20° C - 75° C
Conductor Gauge	24 AWG Signal 22 AWG Power	26-20 AWG	24 AWG Signal 22 AWG Power
Bend Radius	67 mm	N/A	67 mm
No. of Bending Cycles	5 Million	N/A	5 Million

G3 Sub-Bus Field Wiring Directions

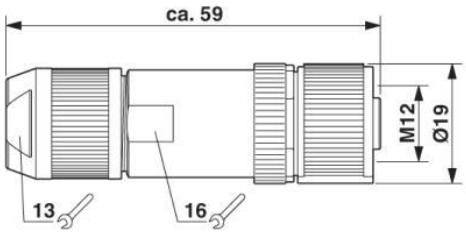
The purpose of this document is to instruct the end user of the proper wiring techniques required to make a G3 Sub-Bus cable from the available bulk cable and field wireable ends. The effectiveness of the resultant assembly remains on the end user and may have bearing on the proper functionality of the G3 Sub-Bus operation; please follow the manufacturer's Cable Assembly Procedure properly.

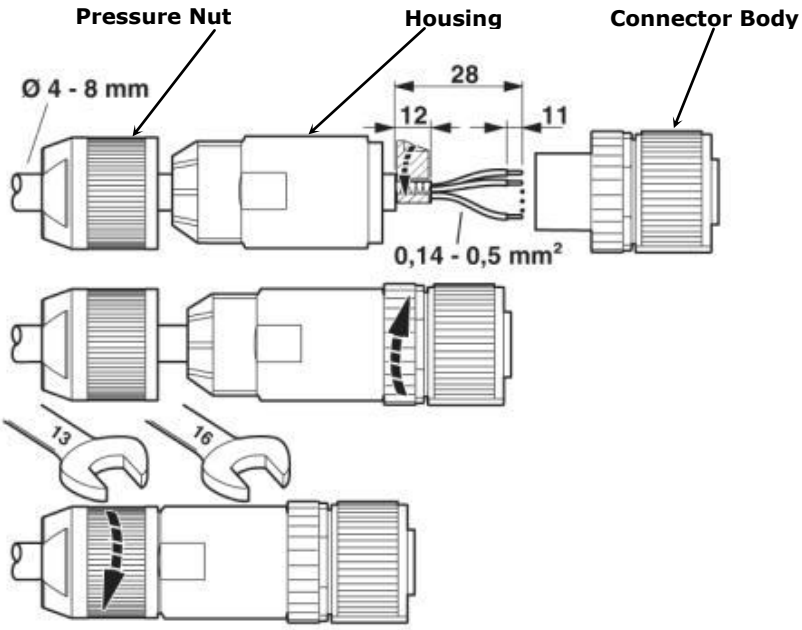
Cable Assembly Procedure

Step No.1	Cut cable to desired length.
Step No.2	Run cable through Pressure Nut and Housing.
Step No.3	Strip cable jacket back 28mm (1.10") for straight connectors and 35mm (1.38") for 90° connectors.
Step No.4	Remove shielding from end of wires back approximately 16mm (.630").
Step No.5	Apply shielding foil provided, around the shortened end of the shielding.
Step No.6	Strip individual conductors back approximately 11mm (.433").
Step No.7	Push stranded wires into appropriate colored terminal.
Step No.8	Attach the connector body onto the housing and tighten.
Step No.9	Attach the pressure nut on the back side and tighten
Step No.10	Confirm Continuity between all pins.



1 = Shield Wire (must be connected)
2 = Red
3 = Black
4 = White
5 = Blue



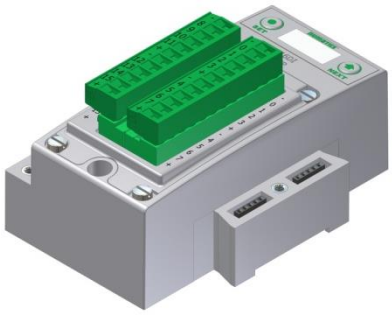


7. Digital I/O Module

7.1 Digital I/O Module Usage

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



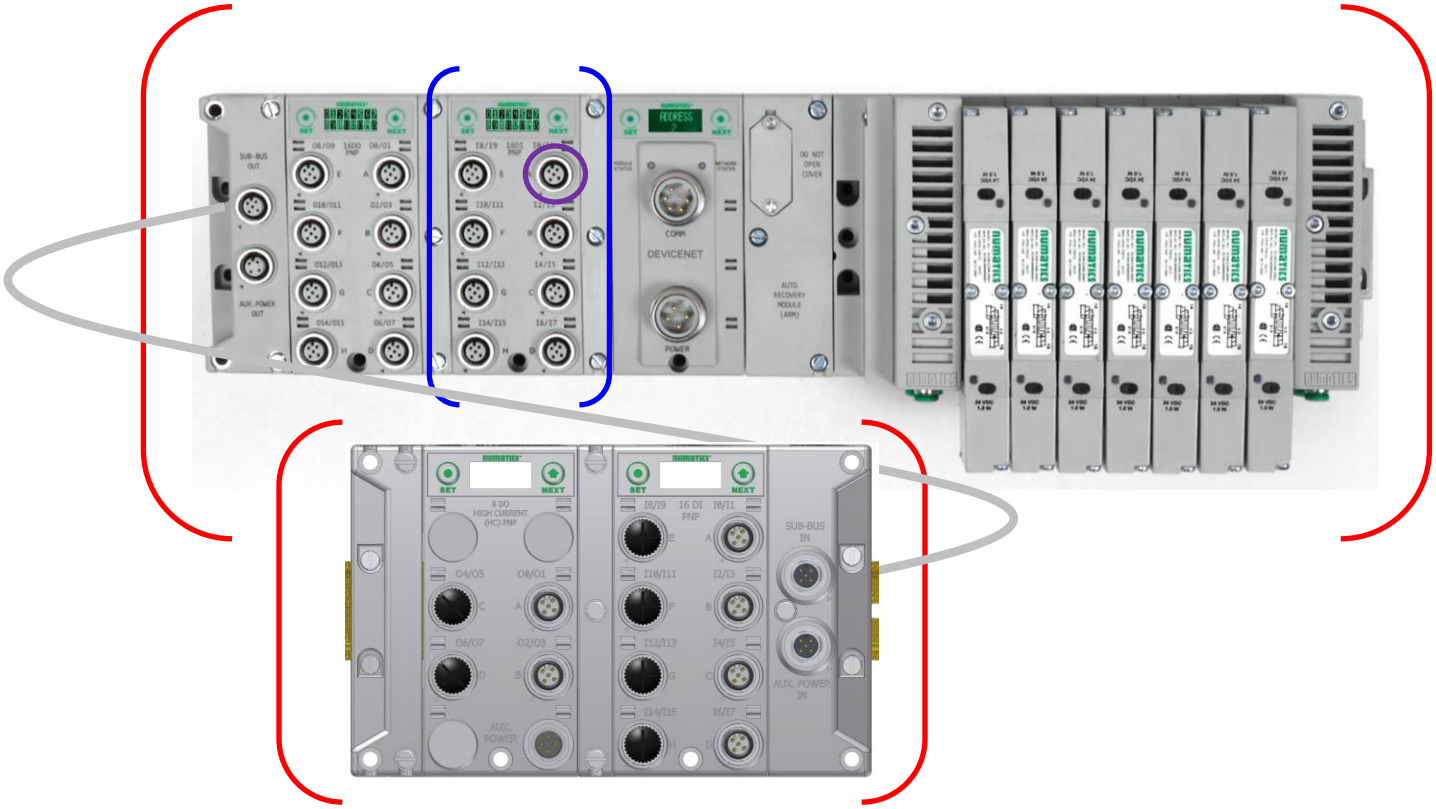
Output Module Types

Input/Output Module Types

Valve Side Output Module Types

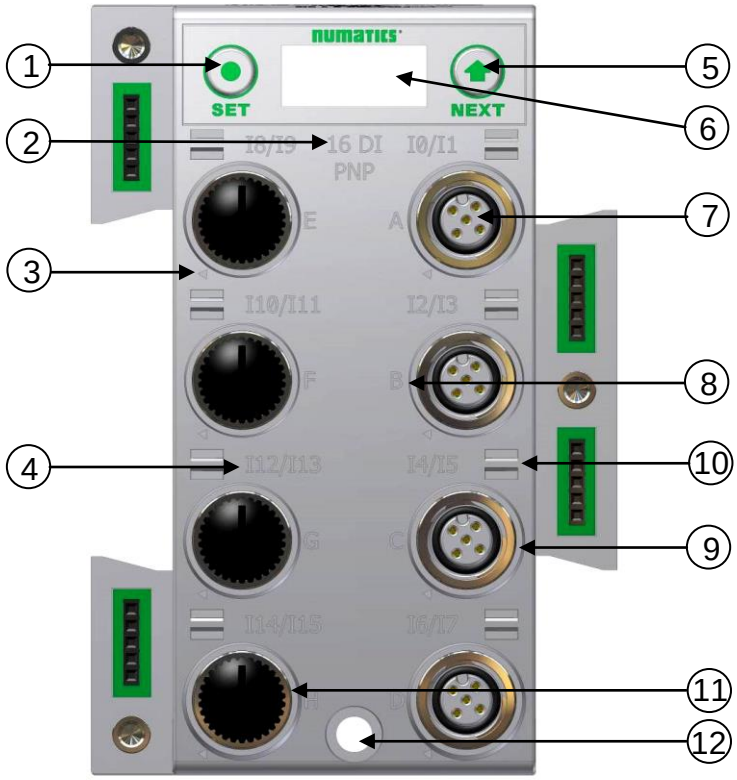
7.2 I/O Module Technical Data

Module No.	Description	Connector Type	Current Limitation for Module	Current Limitation for connector	Current Limitation for manifold assy.
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				
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)	
240-212 240-213 240-214 240-215	Analog IO modules	M12	1.2A	.15A (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
240-307	2 Analog Inputs and 2 High Current Analog Outputs	M12	4A (From Aux. Power Conn.)	2.0A (Pin 3 to Pin 4)	N/A
240-311	RTD	M12	1.2A	N/A	4A for +24 Valves and Outputs 4A for +24 Node and Inputs
240-316	8 PNP Inputs	Terminal Strip	1.2A	.30A for each +24VDC terminal	
240-323	16 PNP Inputs	Terminal Strip	1.2A	.30A for each +24VDC terminal	
240-330	16 PNP Outputs	Terminal Strip	1.2A	.50A / output connector	



7.3 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



NOTE All dust covers must be tightened to a torque of 4-6 in. lbs. to maintain the IP65 integrity.

7.4 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*
240-210	NPN (Sinking)	YES – Visual	YES – Optional	8
240-206	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**
Diagnostics								
X	**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
Diagnostics								
X	Conn. H SCP Status	Conn. G SCP Status	Conn. F SCP Status	Conn. E SCP Status	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status

FEMALE

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

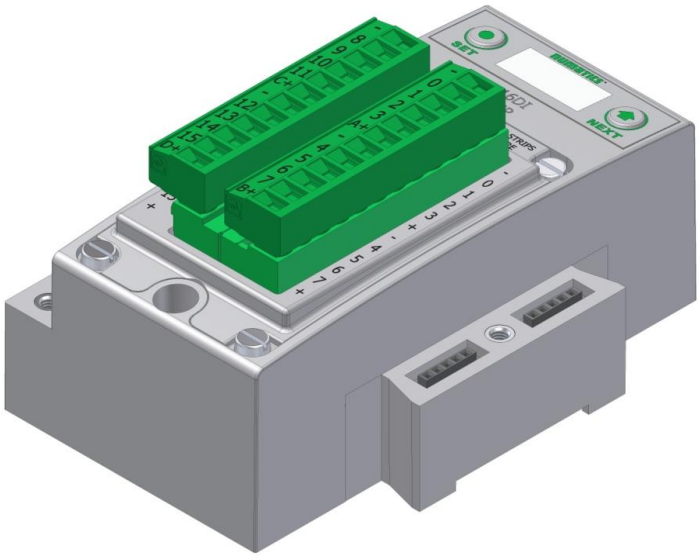
Sixteen Digital Inputs – Terminal Strip Modules

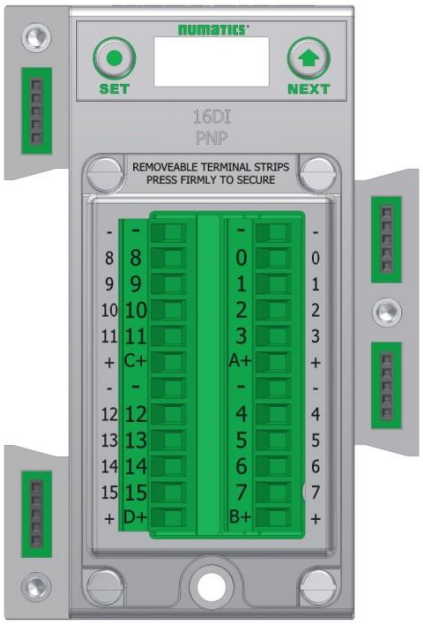
Specifications

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

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

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





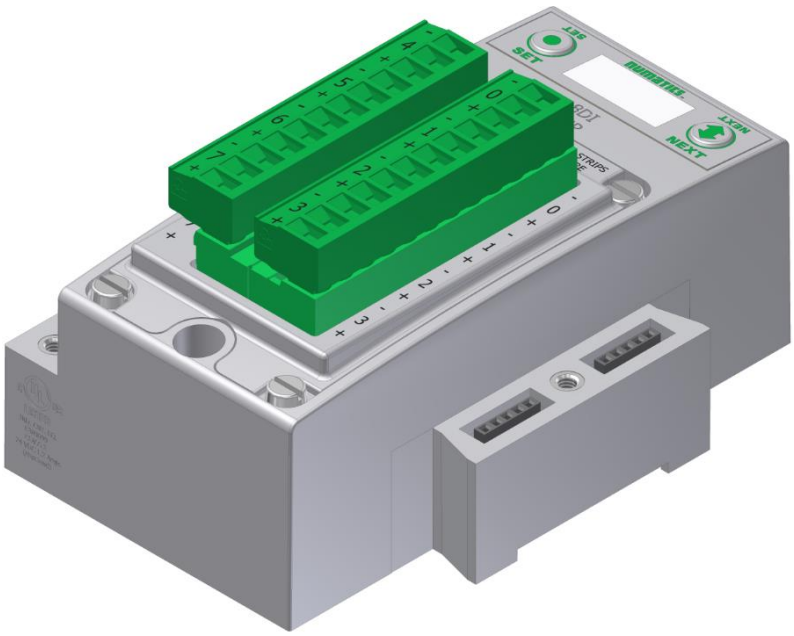
Eight Digital Inputs – Terminal Strip Modules

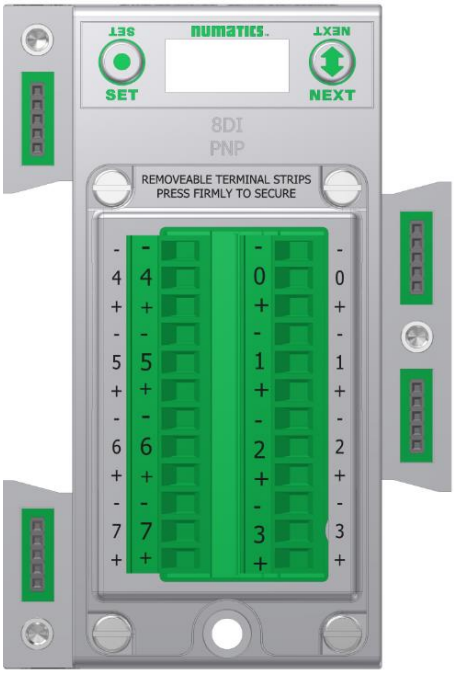
Specifications

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

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Input Points*
240-316	PNP (Sourcing)	YES	YES	8

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
Diagnostic Telegram								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Input 7 SCP Status	Input 6 SCP Status	Input 5 SCP Status	Input 4 SCP Status	Input 3 SCP Status	Input 2 SCP Status	Input 1 SCP Status	Input 0 SCP Status





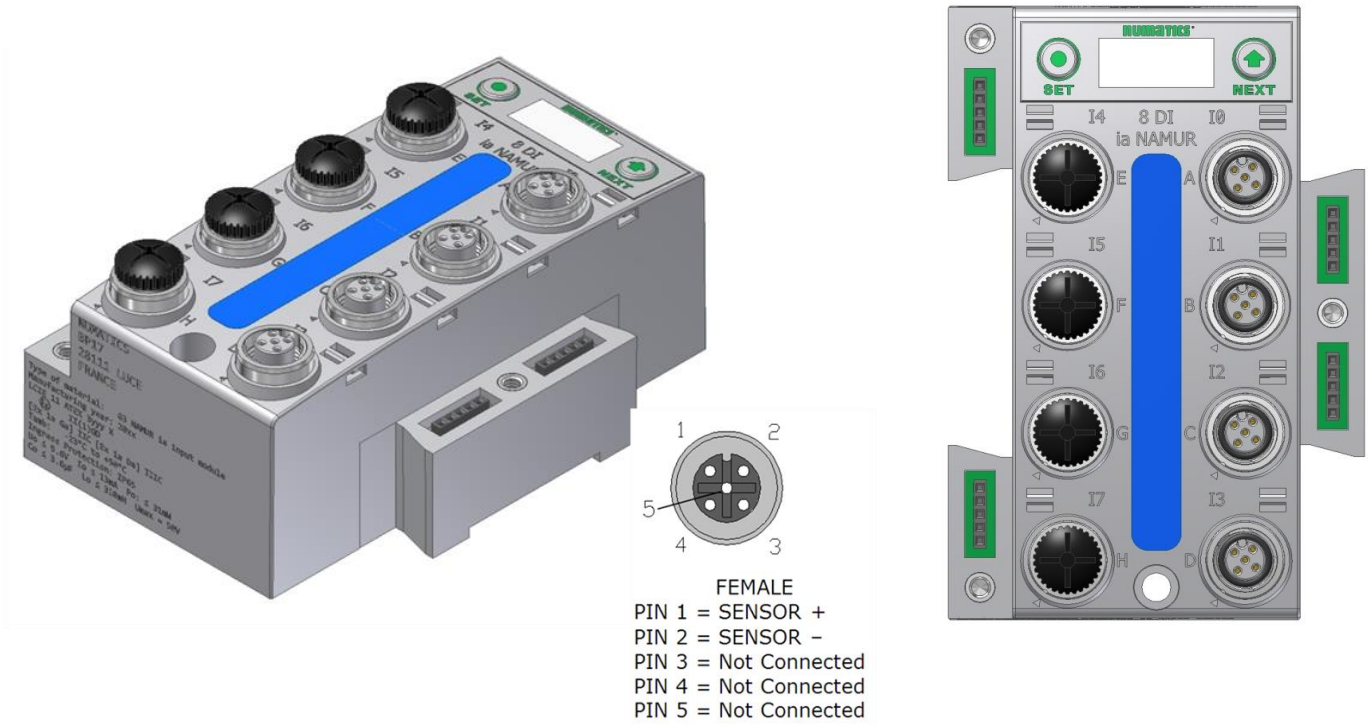
Intrinsically safe [Ex ia] NAMUR Compatible Input Module
One Digital Input per Connector – M12 Female

Input module is for use with NAMUR certified intrinsically safe (IS) sensors. The module can be placed in any G3 I/O position available, but must be used in conjunction with appropriate clips with partition plates (see picture on page 61). This module is for use with (IS) sensors (certified to EN 60947-5-6) where the sensor is placed within the hazardous area, (e.g. ATEX 0-20, 1-21, and 2-22). This [Ex ia] module is part of the G3 electronics platform, which is designed to reside outside of the hazardous environment or in Zone 2-22, inside of a cabinet with appropriate ingress protection. The partition plate clips, used between standard G3 modules and [Ex ia] modules, are required to maintain ATEX approval. The 8.2 V sensor supply for each input connector is short circuit protected.

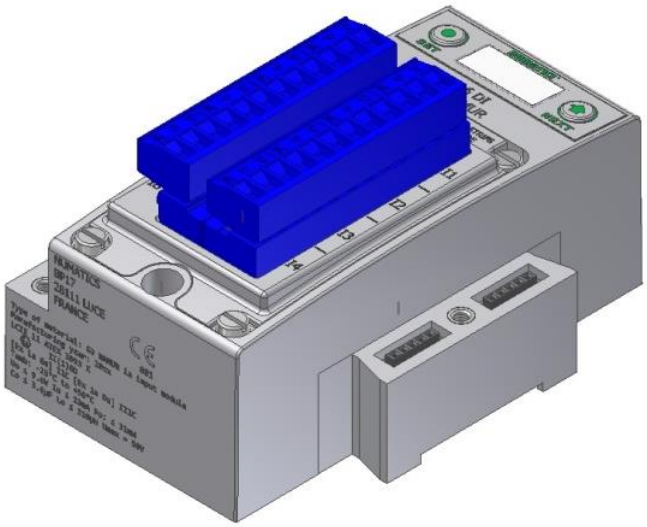
Part Numbers and Mapping

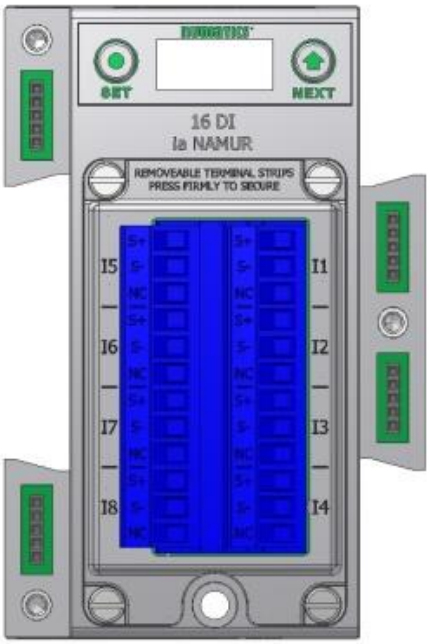
Module Part No.	*I/O Type*	*Short Circuit /Open Circuit Protection*	*Short Circuit /Open Circuit Present Status Bits*	*Input Points*
240-320	NAMUR	YES - Visual	YES - Optional	8

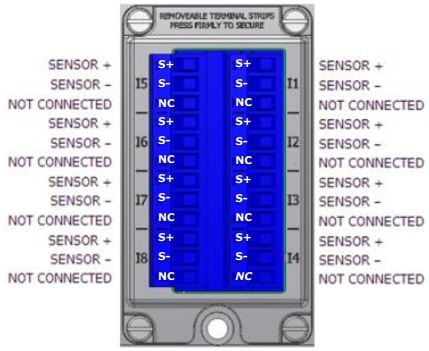
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X	Conn. H SC Status	Conn. G SC Status	Conn. F SC Status	Conn. E SC Status	Conn. D SC Status	Conn. C SC Status	Conn. B SC Status	Conn. A SC Status
X +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



Intrinsically safe [Ex ia] NAMUR Compatible Input terminal strip module

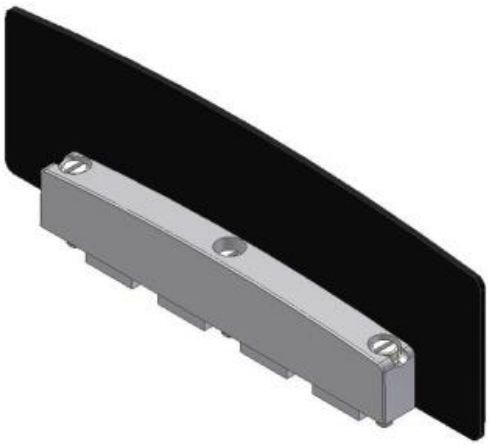






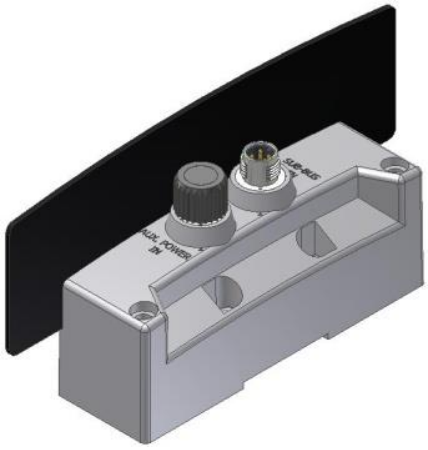
Intrinsically safe [Ex ia] Support Modules

Mechanical isolation between standard and [Ex ia] modules is mandatory to fulfill ATEX certification. Clips with Partition Plates are available to achieve the required isolation.



G3 [Ex ia] Clip 240-317

G3 [Ex ia] Sub-Bus Out 240-318



G3 [Ex ia] Sub-Bus In 240-319

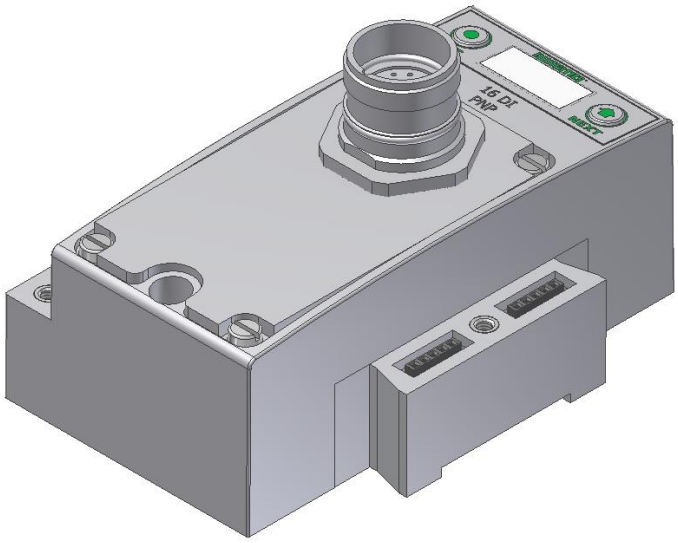
19 Pin M23 Input Module

The 19 Pin M23 Input module is for use with any Input block available from Phoenix Contact, Turck, Brad Harrison, etc. It can also be used with a single ended 19 Pin Cable.

Part Numbers and Mapping

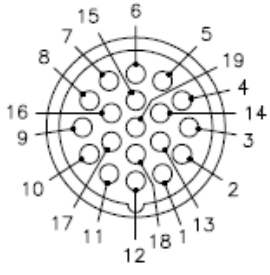
Module Part No.	*I/O Type*	*Short Circuit /Open Circuit Protection*	*Short Circuit /Open Circuit Present Status Bits*	*Input Points*
240-323	Digital	YES - Visual	YES - Optional	16

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	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
X + 1	Conn. H Open Status	Conn. G Open Status	Conn. F Open Status	Conn. E Open Status	Conn. D Open Status	Conn. C Open Status	Conn. B Open Status	Conn. A Open Status



Pin Out Information

Pin 1 = Input 14
Pin 2 = Input 10
Pin 3 = Input6
Pin 4 = Input 3
Pin 5 = Input 2
Pin 6 = 0 VDC
Pin 7 = Input 1
Pin 8 = Input 5
Pin 9 = Input 9
Pin 10 = Input 13
Pin 11 = Input 12
Pin 12 = P.E.
Pin 13 = Input 11
Pin 14 = Input 7
Pin 15 = Input 0
Pin 16 = Input 4
Pin 17 = Input 8
Pin 18 = Input 15
Pin 19 = + 24 VDC



7.5 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	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
Diagnostics								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	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	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

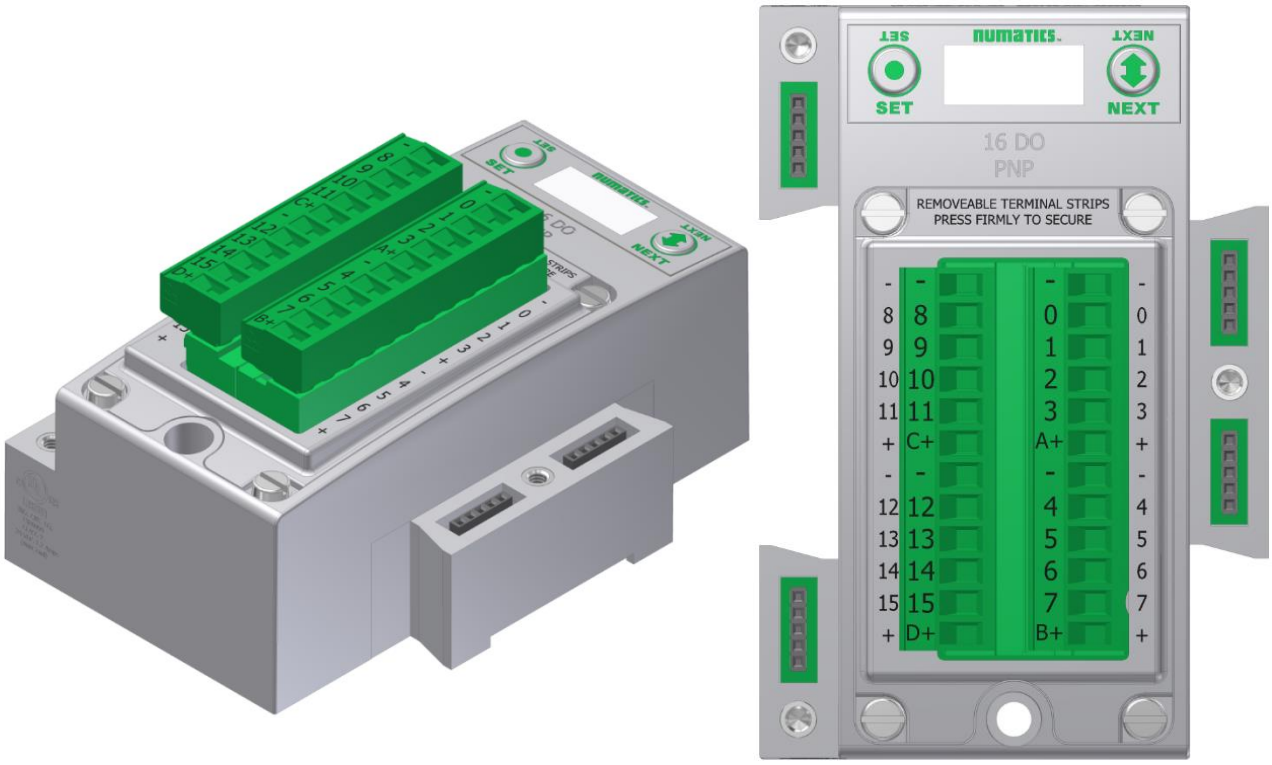
Sixteen Digital Outputs – Terminal Strip Modules

Specifications

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

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*
240-330	PNP (Sourcing)	YES	YES	16

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

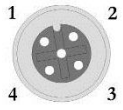


Two Digital High Current Outputs per Connector - M12 Female Modules

The high current output module is to be used with output devices requiring between 0.5 and 1.0 Amps. Each connector incorporates two outputs that are capable of sourcing 1.0 Amp per output.

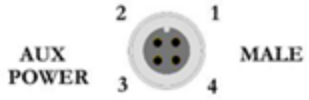
Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*
240-300	PNP (Sourcing)	YES – Visual	YES (8) – Optional	8

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
Diagnostics								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	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= OUTPUT 2
PIN 3= 0VDC (SW)
PIN 4= OUTPUT 1



Pin 1 = +24 VDC (For Conn A, B)
Pin 2 = +24 VDC (For Conn C, D)
Pin 3 = 0 VDC (For Conn A, B, C, D)
Pin 4 = 0 VDC (For Conn A, B, C, D)

7.6 Digital Input/Output Modules

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

Module Part No.	*I/O Type*			*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*	*Input Points*
240-211	PNP (Sourcing)			YES – Visual	YES (8) – Optional	8	8
Output Mapping							
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Input Mapping							
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
Diagnostics							
X	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+1	Output 7 Status Bit	Output 6 Status Bit	Output 5 Status Bit	Output 4 Status Bit	Output 3 Status Bit	Output 2 Status Bit	Output 1 Status Bit	Output 0 Status Bit

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

7.7 Sub-Bus Valve Module

Used to control a distributed valve manifold through the Sub-Bus. See page 47 for more information.

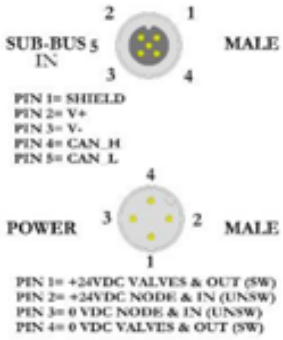
Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*
240-241	NPN (Sinking)	YES – Visual	YES (32) – Optional	32

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 (Selectable)	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 (Selectable)	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 (Selectable)	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

Diagnostics

BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Coil 7 Status	Coil 6 Status	Coil 5 Status	Coil 4 Status	Coil 3 Status	Coil 2 Status	Coil 1 Status	Coil 0 Status
X+1	Coil 15 Status	Coil 14 Status	Coil 13 Status	Coil 12 Status	Coil 11 Status	Coil 10 Status	Coil 9 Status	Coil 8 Status
X+2	Coil 23 Status	Coil 22 Status	Coil 21 Status	Coil 20 Status	Coil 19 Status	Coil 18 Status	Coil 17 Status	Coil 16 Status
X+3	Coil 31 Status	Coil 30 Status	Coil 29 Status	Coil 28 Status	Coil 27 Status	Coil 26 Status	Coil 25 Status	Coil 24 Status



7.8 580 Sub-bus Valve Module (without Distribution and I/O)

Used to control a distributed valve manifold through the Sub-Bus. See page 47 for more information.

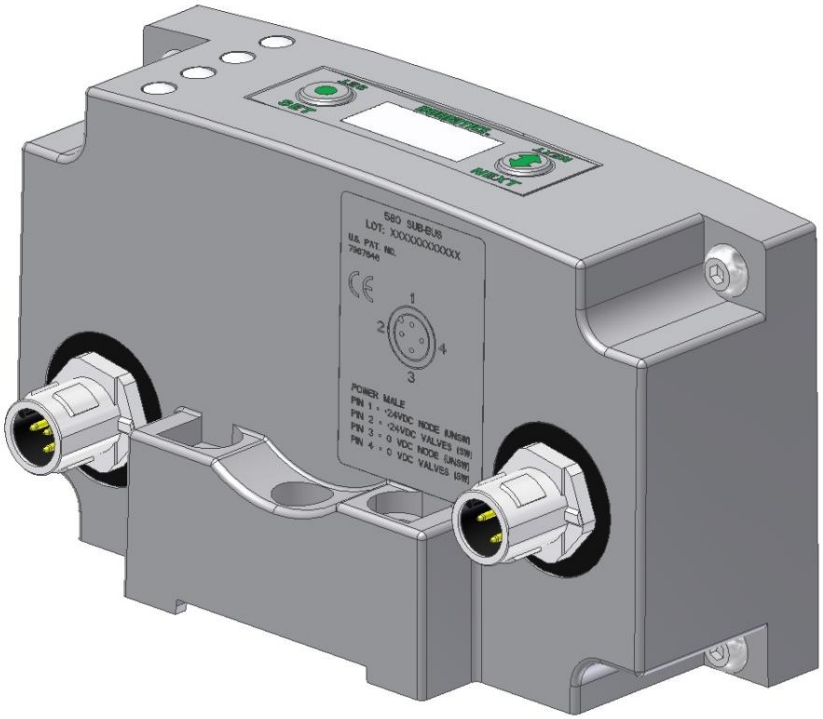
Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*
P580AEDS4010A00	NPN (Sinking)	YES – Visual	YES (32) – Optional	32

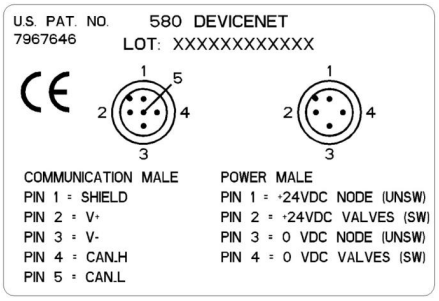
Output Mapping

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 (Selectable)	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 (Selectable)	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 (Selectable)	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

Diagnostics

BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	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 (Selectable)	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 (Selectable)	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 (Selectable)	Coil 31 Status	Coil 30 Status	Coil 29 Status	Coil 28 Status	Coil 27 Status	Coil 26 Status	Coil 25 Status	Coil 24 Status



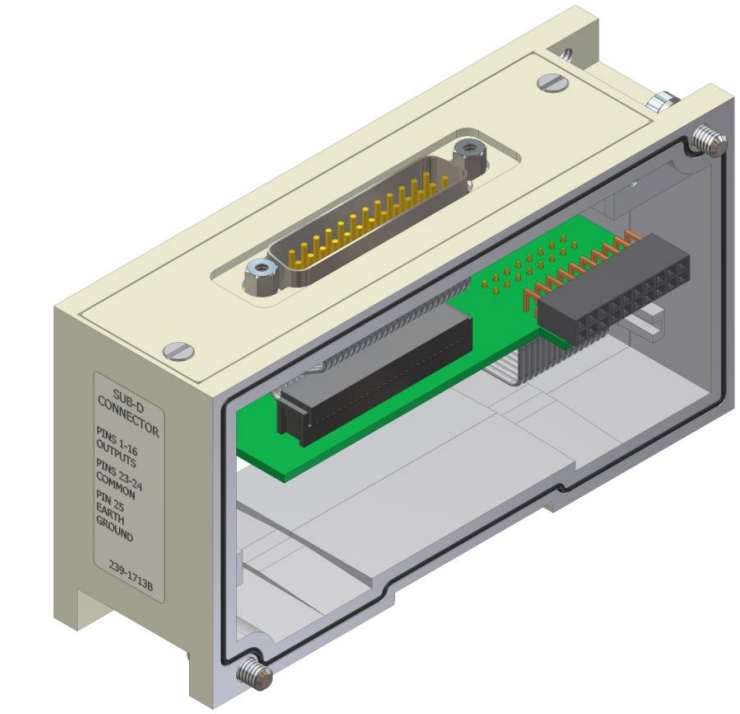


7.9 Valve Side Digital Output Module

The valve side output module is used to distribute available valve side output points (i.e. when valves are located away from the rest of the electronics). These modules go to the right of the G3 valve 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



8. Analog I/O Modules

8.1 Analog I/O Module Rules

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

Four I/O - 12mm Female Modules

Specifications

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

Module Part No.	*Signal Type*	*Input Points*	*Output Points*	*Short Circuit Protection*
240-212	0 - 10V	4	0	Yes
240-213	0 - 10V	2	2	
240-214	4 - 20mA	4	0	
240-215	4 - 20mA	2	2	
240-307	0 – 10V	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) – Selectable	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
Diagnostics								
X	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+1	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A

FEMALE

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

One Analog I/O per Connector – M12 Female Modules

Module Part No.	*Signal Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*	*Input Points*
240-213	0-10 VDC	YES – Visual	YES (4) – Selectable	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	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	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	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	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	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	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	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	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
Diagnostics								
X	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+1	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

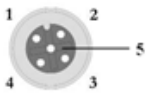
FEMALE

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

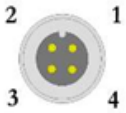
One Analog I/O per Connector – M12 Female Modules

Module Part No.	*Signal Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*	*Input Points*
240-307	0-10 VDC	YES	YES	2	2

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	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	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	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	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	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	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	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	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
Diagnostics								
X	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power / Short Status for Conn. D	Power / Short Status for Conn. C	Allocated and Reserved	Allocated and Reserved
X+1	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



I/O Connectors C & D (Female)
Pin 1 = +24 VDC
Pin 2 = OUTPUT
Pin 3 = 0 VDC
Pin 4 = INPUT
Pin 5 = NOT USED



AUXILIARY POWER (Male)
Pin 1 = +24 VDC (For Conn. C)
Pin 2 = +24 VDC (For Conn. D)
Pin 3 = 0 VDC (For Conn. C)
Pin 4 = 0 VDC (For Conn. D)

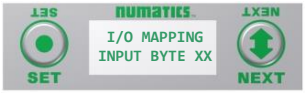
Input Connectors A & B (Female)
Pin 1 = +10 VDC
Pin 2 = NOT USED
Pin 3 = 0 VDC
Pin 4 = INPUT
Pin 5 = NOT USED

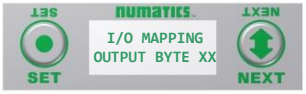
8.2 Analog Graphic Display

The G3 Analog I/O modules have an integrated graphic display that may be used to configure the parameters of the modules as well as show diagnostic information. Please see the following pages for detailed information regarding these displays.

Analog Module / I/O Mapping

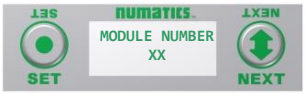
Displays the starting Input and Output byte address for the module





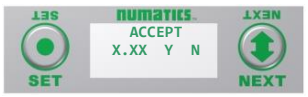
Analog Module / Module Number

Displays the module number; indentifying its position in the G3 I/O system.



Analog Module / Alarm Settings

Allows the setting of low and high alarms for analog inputs and outputs



Alarm Settings Steps

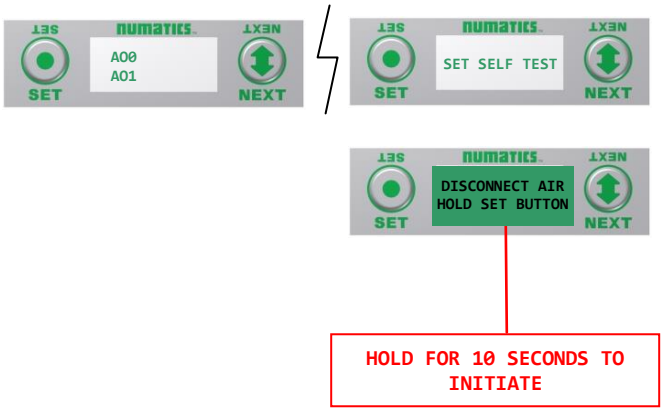
1. Press the SET button to enter the Alarm Settings sub-menu.
2. Press the SET button to Disable all alarms (default setting)
   *Note- Setting the Minimum value for Low alarm and the Maximum value for High alarm (for a channel) disables the alarm for that channel.
3. Press the NEXT button to scroll to the appropriate analog channel.
4. Press the SET button to set the LO alarm setting
   a. Push the SET button to access the menu and enter the alarm value
5. Press the NEXT button to SET the HI alarm setting.
   a. Push the SET button to access the menu and enter the alarm value
   b. Accept the changes by selecting Y and pushing SET
6. Press the SET button while in the RETURN screen to return to the main menu

8.3 Analog Module / Self Test Mode

Self test mode is an internal diagnostic tool that can be enabled on the analog module using the graphic display. This tool allows the user to confirm that all of the outputs on the module are fully functional without needing a network connection or controller. The test will cycle the analog outputs. Starting with Output 0 it will increment the analog signal at 10% intervals; once it has reached 100% it will test the next available output. The self-test will continue to run until it is turned off by pressing the SET button.

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

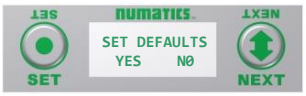
1) **Disconnect Air and Communication from the manifold!**
2) Starting at the Home Screen, navigate the menus by selecting the NEXT button until the **SELF-TEST** menu is shown.
3) Select the SET button to access the **SELF-TEST** menu
4) A message will appear: **DISCONNECT AIR HOLD SET BUTTON**
5) Hold the SET button down for approximately 10 seconds to enable the test. The Display will flash the above message while the button is pushed.
6) When the display stops flashing, the self-test mode will be running
7) Push or hold the NEXT button to cycle through the outputs. Holding the NEXT button will allow the analog outputs to cycle through the 10% intervals automatically. Pushing the NEXT button will allow the outputs to manually step through each 10% interval.
8) Releasing the NEXT button will keep the output in its current state.
9) The self-test mode can only be disabled by pushing the SET button



8.4 Analog Module / 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 module to reset and return all parameters to the factory default conditions.

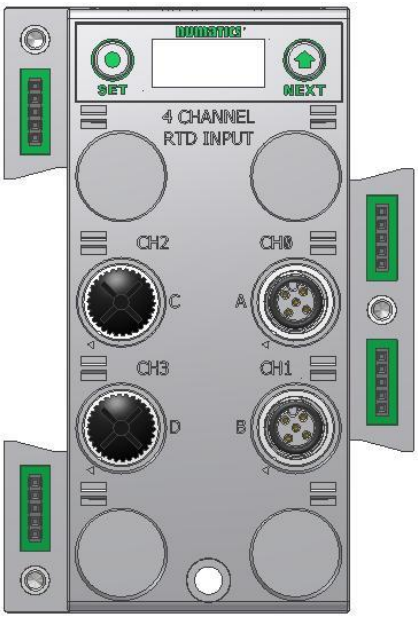
   Press the SET button to confirm your choice.

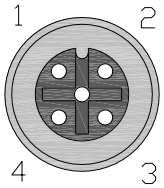
FACTORY DEFAULT SETTINGS	
Description	***Default***
Low Alarm Values	**0 V / 4 mA**
High Alarm Values	**10 V / 20 mA**
Brightness	**Medium**

9. Specialty Modules

9.1 RTD Module (240-311)

The G3 RTD Temperature module is used with Resistive Temperature Detectors (RTDs) and can support up to 4 RTD devices simultaneously. This module supports various RTD types including: Pt100, Pt200, Pt500, Pt1000, Ni100 and Ni1000. Standard M12 single key connector types are used; each connector/port supports one RTD device, but four different device types can be used simultaneously. User configuration of parameters include: RTD type, temperature scale (Celsius or Fahrenheit), Hi/Low temperature alarms, and filter times, and can be selected individually for each connector port using the integrated display. The G3 RTD module can be incorporated into any G3 electronic system regardless of the protocol or I/O module position.

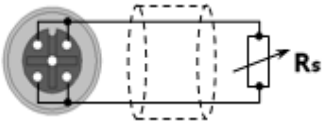




FEMALE
PIN 1 = Sensor Current Source (I+)
PIN 2 = Sense Voltage (VIN+)
PIN 3 = Sensor Current Source (I-)
PIN 4 = Sense Voltage (VIN-)
PIN 5 = Not Used

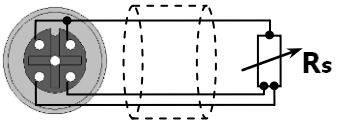
Sensor Wiring Diagrams

2 Wire Sensor Type
2 Wire Cable (Fig 1)



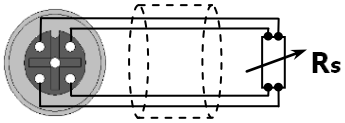
2 Wire Sensor Type Low Accuracy

3 Wire Sensor Type
3 Wire Cable (Fig 2)

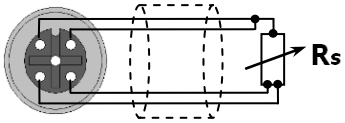


3 Wire Sensor Type Medium Accuracy

4 Wire Sensor Type
4 Wire Cable (Fig 4)



4 Wire Sensor Type High Accuracy



3 Wire Sensor Type
4 Wire Cable (Fig 3)

- ***For maximum accuracy on a 3 wire sensor type make identified jumper connections at the sensor end (see Figure 3). Cable resistance, resulting from cable length, affects measuring error; therefore use cables that are as short as possible.***

Electrical Data	
Voltage	24 VDC Module Supply (Via G3 System Aux. Power Connection)
Input Type	RTD (Resistive Temperature Detector), 4 per Module
Supported Sensor Types	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000
Supported Temperature Coefficients	.00385; .00392; ….Ω/Ω/°C
Resolution	15 bits, plus sign.
Data Format	Signed Integer; Two's complement.
Calibration	Factory Calibrated. Field Calibration w/ high tolerance (± 0.005%) 100 ohm and 350 ohm resistor.
Input Update (filter) Rate	Adjustable (5-20mS), factory default: 5mS
Accuracy	0.1% of full scale @ 25° C
Mechanical Data	
I/O Connector	M12 4 Pin Female (Accepts 5 Pin)
Mass	247g / 8.7 oz
Operating Data	
Temperature Range	-10º to 115º F (-23º to 46º C)
Humidity	95% relative humidity: non-condensing
Ingress Protection	IP65 (with appropriate assembly and terminations)

Part Numbers and Mapping

Module Part No.	*I/O Type*	*Alarms*	*Diagnostics*	*Input Points*
240-311	RTD	Hi/Low Temp for each Channel	Open/Short, Out of Range	4

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0
X + 1	Sign Bit Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0
X + 2	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1
X + 3	Sign Bit Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1
X + 4	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2
X + 5	Sign Bit Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2
X + 6	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3
X + 7	Sign Bit Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3
Diagnostic Telegram								
X + 8	Channel 3 Out of Range	Channel 2 Out of Range	Channel 1 Out of Range	Channel 0 Out of Range	Channel 3 Open/ Short	Channel 2 Open/ Short	Channel 1 Open/ Short	Channel 0 Open/ Short
X + 9	Channel 3 High Alarm	Channel 3 Low Alarm	Channel 2 High Alarm	Channel 2 Low Alarm	Channel 1 High Alarm	Channel 1 Low Alarm	Channel 0 High Alarm	Channel 0 Low Alarm

Data is represented by **Two's Complement**, in tenths of a degree.

RTD Module Graphic display

RTD Module / Temperature Monitoring

1) **Press the NEXT button to scroll through the Temperature Monitoring display options.**

   Pressing the SET button while in one of the Temperature Monitoring displays, will return the display back to the home screen.

   If "DISABLED" is the temperature identified at any channel, advance the display to Sensor Type Select, to choose a sensor/Enable the channel, or press the "SET" button to jump directly to the selection display.

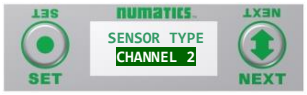
   Unused channels should be left "DISABLED".

RTD Module / Sensor Type Select (Channel Enable)
Allows the sensor type for each channel to be selected, and, enable the channel selected

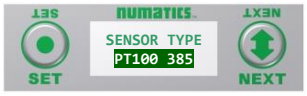
A) Press the SET button to enter the Sensor Type Select sub menu.

B) Press the NEXT button to scroll through the channels.

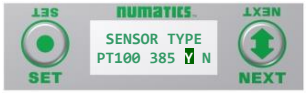
C) Press the SET button to select the desired channel. If "DISABLED" is the first selection, the channel is not enabled. Select a sensor type to enable the channel.



D) Press the NEXT button to scroll through the available sensor types.

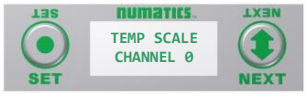


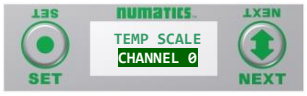
E) Press the SET button to select the desired sensor type.



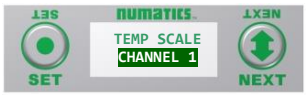
F) Press the SET button to load the selected sensor type.

RTD Module / Temperature Scale
Allows the temperature scale for each channel to be set to Celsius or Fahrenheit.





A) **Press the SET button to enter the Temp Scale sub menu.**



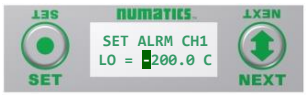
B) **Press the NEXT button to scroll through the channels.**

C) **Press the SET button to choose the desired channel.**

D) **Press the NEXT button to choose the desired scale.**

E) **Press the SET button to load the selection.**

RTD Module / Alarm Settings
Allows the Low and High alarms of each RTD Input channel to be set. This parameter generates a visual and logical (bit) when set value is achieved.



A) **Press the SET button to enter the Alarm Settings sub-menu.**

B) **Press the NEXT button to scroll through the RTD Input channels.**

C) **Press the SET button to enter the alarm setting for the selected Input channel.**

D) **Press the NEXT button to select the Lo or High setting for the selected channel.**

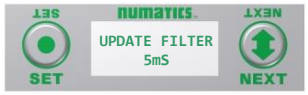
E) **Press the SET button to select the change process for the chosen alarm. The first digit/sign will be highlighted.**

F) **Press the NEXT button to choose the value, or the SET button to select and move to the next digit.**

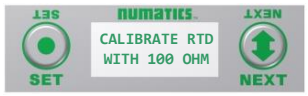
G) **Press the NEXT button to choose "Y" or "N" Select. Then press the SET Button to Accept.**

- ***When alarm values are set to maximum/minimum values, the alarm function is disabled.***
- ***Factory default settings for all alarms are disabled.***

RTD Module / Advanced Setting
Allows the Update Filters for each channel to be set and *Field Calibration to be performed.



A) **Press the SET button to enter the Advance Settings sub-menu.**



B) **Press the NEXT button to choose the option; Update Filters**

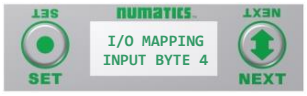
<u>Update Filters</u>

C) **Press the SET button to choose the Update Filter setting.**

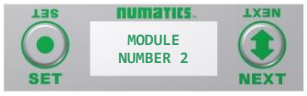
D) **Press the NEXT button to scroll through the filter times.**

E) **Press the SET button to select the desired Update Filter time.**

RTD Module / I/O Mapping Input Byte

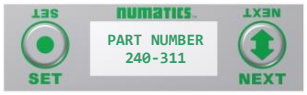


RTD Module / Module Number (Position)

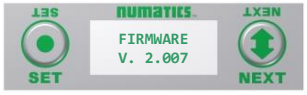


RTD Module / Module Description

RTD Module / Part Number



RTD Module / Firmware Revision



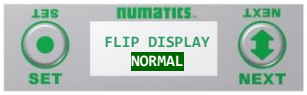
RTD Module / Set Display Brightness
Allows the Brightness of the display to be changed

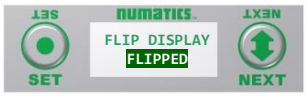
A) press the SET button to enter the Set Brightness sub menu.

B) Press the NEXT button to scroll through the brightness options

C) Press the SET button to load the selection.

RTD Module / Flip Display
Allows the Display to be flipped 180 degrees.



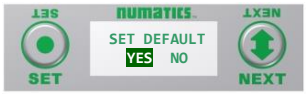


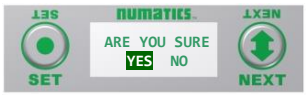
A) press the SET button to enter the Flip Display sub menu.

B) Press the NEXT button to choose the orientation.

C) Press the SET button to load the selection.

RTD Module / Factory Defaults
Set all parameter settings to default values.





A) Press the SET button to enter the Factory Defaults sub menu.

B) Presss the NEXT button to choose Yes or No.

C) Press the SET button to confirm.

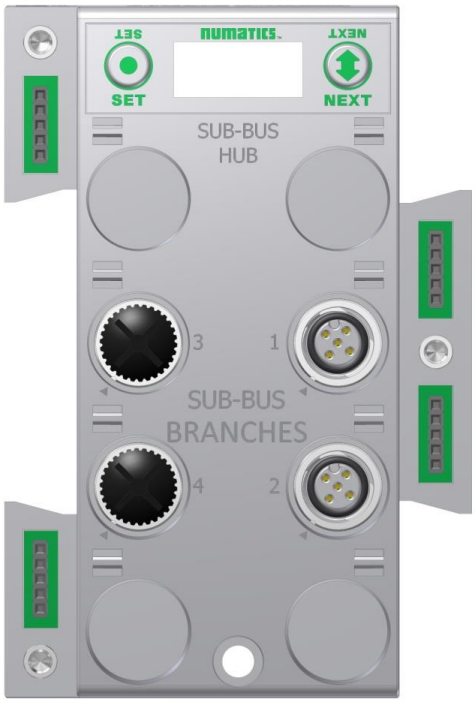
D) Press the SET button again.

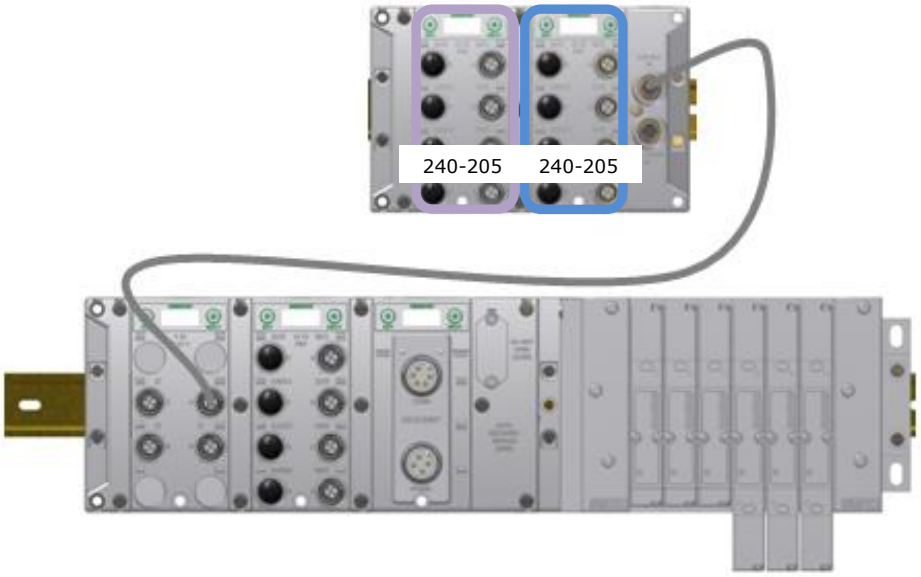
Factory Default Settings	
Alarm – High & Low	Disabled (Set to Min/Max for each chosen sensor)
Input Update Filter	5 mS
Sensor Type	Pt 100 385
Temp Scale	Celsius
Display Brightness	Medium
Flip Display	Normal

9.2 Sub-Bus Hub Module

The G3 HUB module allows for branch distribution from the I/O side of the G3 System and can be integrated into the existing G3 Series Sub-Bus configuration. Auto Addressing allows for trouble free set up and configuration. Input, Output, as well as Valve manifolds can be attached to the available four Branches on a HUB module. Each G3 System can support up to two HUB modules, allowing for maximum flexibility. The HUB module is transparent to the I/O side of the G3 and does not reserve one of the potential sixteen positions.

Module Part No.	*Module Type*	*Diagnostics*	*Input Size / Output Size*	*Branches*
240-326	HUB	Sub-Bus Short Circuit	0 / 0 – See Note	4





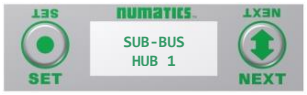
NOTE!

The Sub-bus hub module does not produce mapped diagnostics. The data table in this example represents what is physically attached to the HUB module. This will change as modules are added or removed.

Example I/O Mapping of Attached Modules								
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 (Selectable)	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
X + 3 (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X + 4 (Required)	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
X + 5 (Selectable)	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

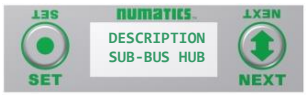
Where **X** = starting byte

Hub Module / Identification



1) Identifies HUB module in G3 System.

Hub Module / Description



2) Identifies Module type.

Hub Module / Advanced Settings

3) Allows the user to set/configure module parameters.

Press the SET button to advance to the first parameter/setting.

Brightness

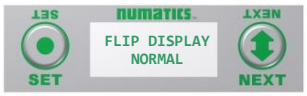
A) **Press the SET button to enter** the Set Brightness sub-menu and highlight the selection.

B) Press the NEXT button to select **the desired Brightness** selection, (**Low**, **Medium**, **High**).

C) Press the SET button to slect the desired Brightness level.

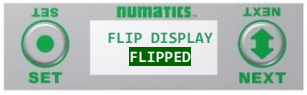
Screen Jumps to Next Parameter/Selection

Flip Display



D) Press the SET button to enter the Flip Display sub-menu and highlight the selection.

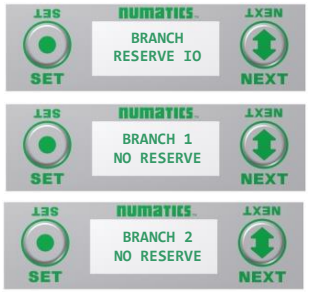
E) Press the NEXT button to select the desired Flip Display selection, (Normal, Flipped).



F) Press the SET button to select the desired display orientation.

G) Press NEXT to advance to the next parameter selection (Branch Reserve

Branch Reserve I/O



H) Press the SET button to enter the Branch Reserve IO sub-menu.

I) Press the NEXT button to select the desired Branch to reserve I/O bytes.

I/O data bytes can be reserved on each branch for future expansion within the G3 system. Space is reserved in Byte levels, and populates Input, Output, and Status depending on the protocol and configuration chosen (e.g. EtherNet/IP).

J) Press the SET button to enter the chosen Branch/Byte Selection screen.

K) Press the NEXT button to select the desired Tens value of reserved bytes.

L) Press the SET button to set the desired Tens value.

M) The screen will advance to the Ones selection

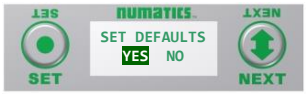
N) Press the NEXT button to select the desired Ones value for reserved bytes.

O) Press the SET button to set the desired Ones value.

Once the desired byte size is chosen for the selected branch, the screen will jump to the next branch. The same process is performed for the remaining branches, if desired. Press the NEXT button to skip over branches that do not require reserving I/O.

Factory Defaults

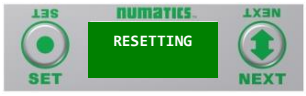
4) Allows all parameter settings to be set back to default values.



A) Press the SET button to enter the Factory Defaults sub menu.

B) Press the NEXT button to choose Yes or No.

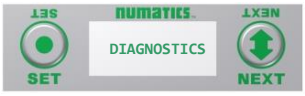
C) Press the SET button to confirm.



D) Press the SET button again.

Factory Default Settings	
Brightness	Medium
Flip Display	Normal
Reserve I/O	No Reserve (all Branches)

Diagnostics



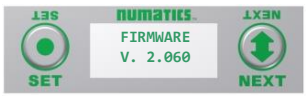
5) Allows the user to refernce Part No., Firmware Rev., and Branch Connections.

Part Number

A) Press the NEXT button to enter the Diagnostics sub-menu.

The Part Number screen is displayed (reference only).

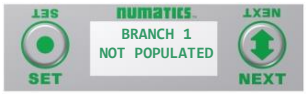
Firmware Rev.



B) Press the NEXT button to advance to the Firmware revision screen (reference only).

Branch Connections

C) Press the NEXT button to advance to the Branch Connections screen.



D) Press the SET button to enter the Branch Connections sub-menu.

E) Press the NEXT button to advance through the Branches.

Each Branch screen indicates identifys the module numbers that are currently connected to that Branch.

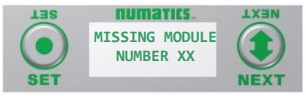
HELP

6) Directs the user to the Numatics website.

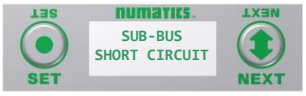
A) Press the SET button for website address.

Error/Event Messages

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

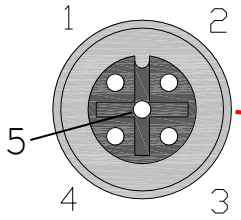


Displayed when a Sub-Bus module that had been previously installed becomes absent from the configuration



Displayed when a Sub-Bus power short circuit condition is detected

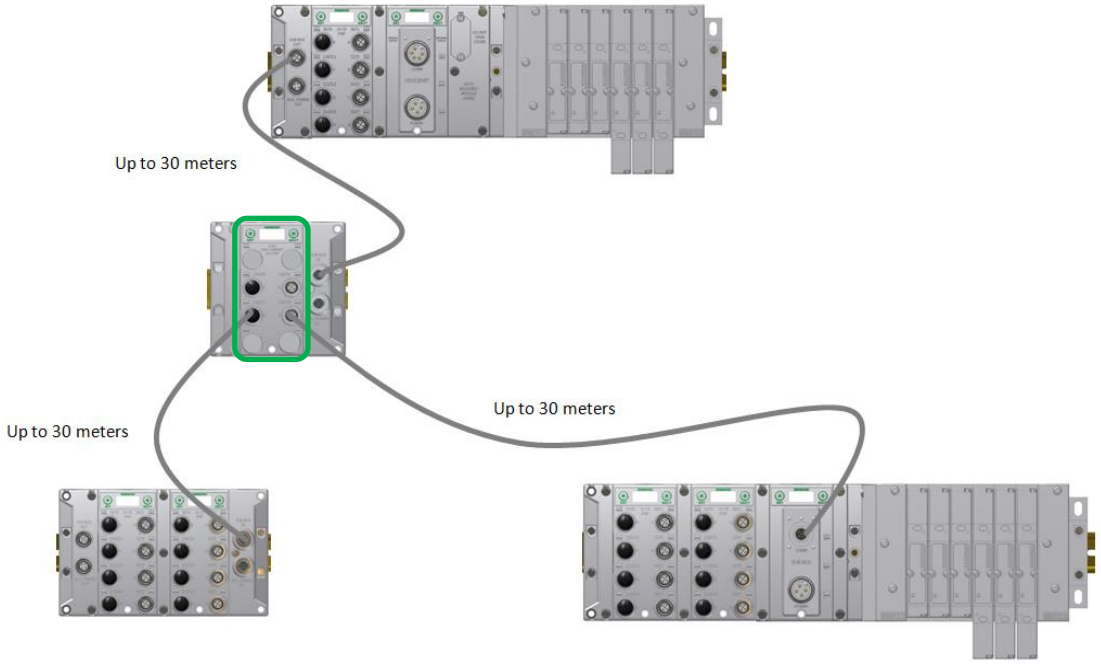
Connector Pin Out



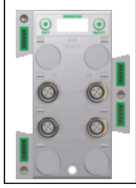
FEMALE
PIN 1 = Shield
PIN 2 = V+
PIN 3 = V-
PIN 4 = CAN_H
PIN 5 = CAN_L

- ***Length of molded or field wired Sub-Bus Branch cables should not exceed the maximum length of 30 meters per Sub-Bus Branch communication link.***
- ***The molded cable assemblies and bulk cable are the only approved cables for the G3 Sub-Bus and Branch Link. Please refer to the G3 Electronics catalog (LT-G3Catalog), for Sub-Bus cable and connectors options. See Technical Document TDG3SBWD1-0EN for proper installation and wiring of field wire-able connectors.***

HUB Integration - Example



Module	Part No.	Description	Details Export Config and Log	Activity
Node	240-325	EtherNet/IP DLR/QC Communications Module	Show Details Close all Details	✓
ARM	240-182	Auto Recovery Module	Show Details Close all Details	✓
No. 1	240-205	16 Inputs PNP Digital M12 x 8	Show Details Close all Details	✓
Hub 1	240-326	Sub-Bus Hub Module	Show Details Close all Details	✓



Firmware Revision:	2.070			
	Branch 1	Branch 2	Branch 3	Branch 4
I/O Reserved (bytes):	-	-	-	-
Unused Reserved Input (bytes):	-	-	-	-
Unused Reserved Diagnostic (Status) Inputs (bytes):	-	-	-	-
Unused Reserved Output (bytes):	-	-	-	-
Module No's. on branch:	-	2, 3, 4	-	5, 6

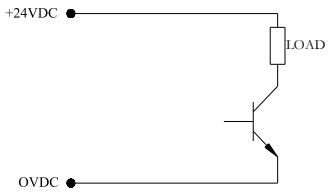
→ Branch 2, Mod. No. 2	240-241	Sub-Bus Valve Driver	Show Details Close all Details	✓
→ Branch 2, Mod. No. 3	240-205	16 Inputs PNP Digital M12 x 8	Show Details Close all Details	✓
→ Branch 2, Mod. No. 4	240-205	16 Inputs PNP Digital M12 x 8	Show Details Close all Details	✓
→ Branch 4, Mod. No. 5	240-205	16 Inputs PNP Digital M12 x 8	Show Details Close all Details	✓
→ Branch 4, Mod. No. 6	240-205	16 Inputs PNP Digital M12 x 8	Show Details Close all Details	✓
			Show Error/Event Log	

10. I/O Module Wiring Diagrams

10.1 NPN/PNP Definitions

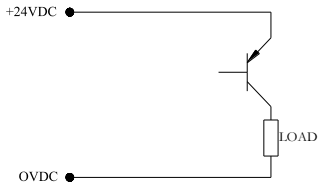
NPN Descriptions

- Sinking
- Switching Negative
- Positive Common



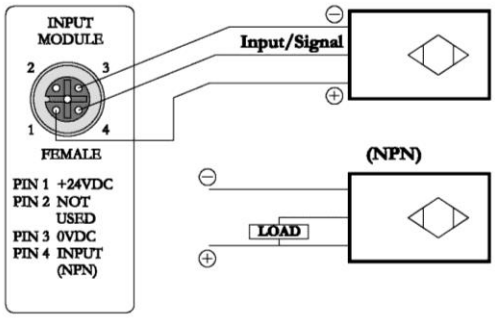
PNP Descriptions

- Sourcing
- Switching Positive
- Negative Common

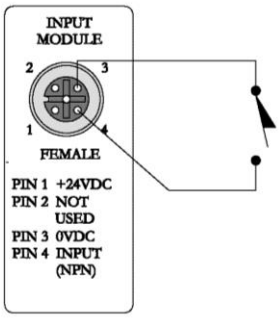


NPN (Sinking) Input Connection

Electric Sensor Type

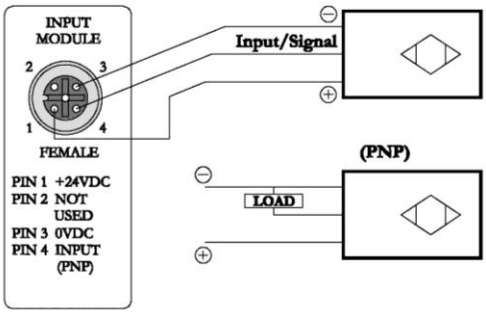


Mechanical Sensor Type

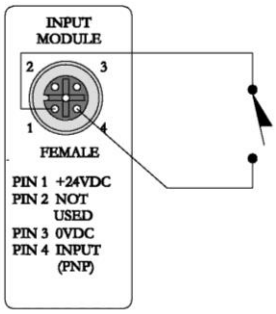


PNP (Sourcing) Input Connection

Electric Sensor Type

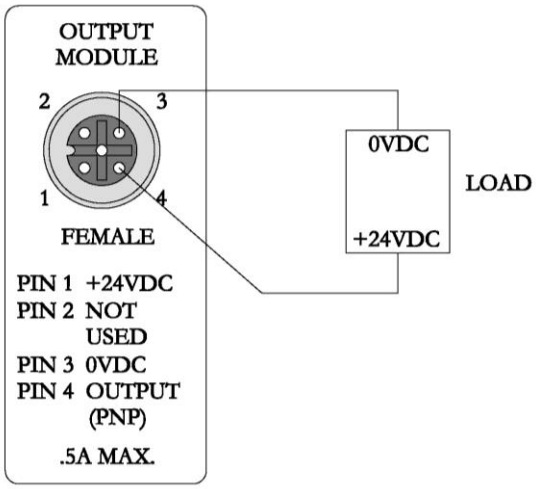


Mechanical Sensor Type



I/O Module Wiring Diagrams Continued

PNP (Sourcing) Output Connection



11. Profinet G3 Web Server

11.1 Integrated Web Page Configuration

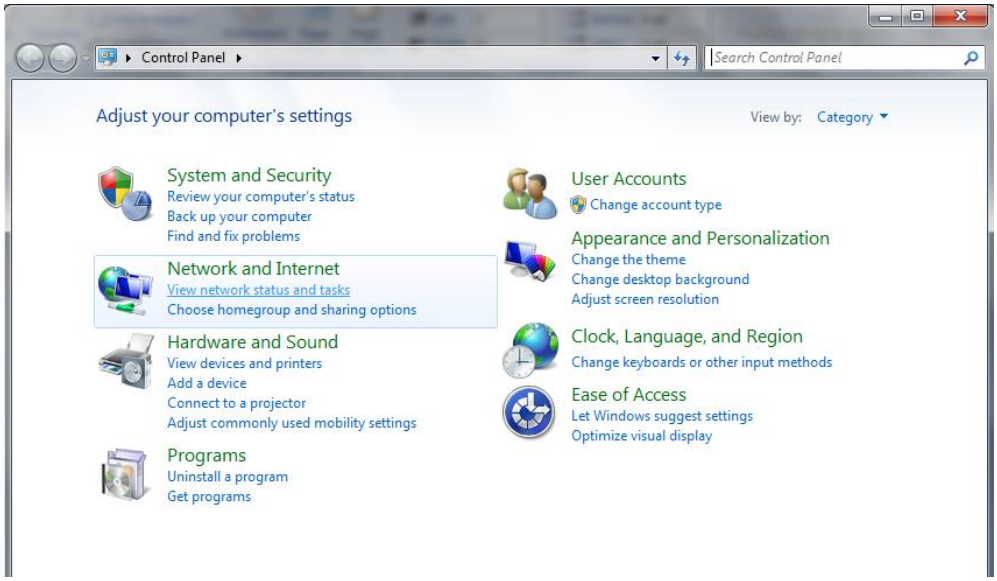
The Numatics G3 Profinet node utilizes an integrated web server for user access to configuration parameters and diagnostic features. The "G3 Webpage" can be accessed via any standard web browser program. The following steps describe how to connect to a G3 series Profinet to access the integrated webpage.

11.2 Connecting to a G3 Series Profinet Node

This section will discuss how to connect a computer to a G3 Series Profinet node. There are multiple ways to complete this task, so only two will be discussed. All computer commands are shown in Windows 7.

1. Connect a 24VDC power supply to the valve manifold. The connector pin-out can be found on the top of the Profinet node or on page 17 of this document. (Note: 24VDC only needs to be applied to the "+24VDC (NODE & INPUTS)" pin to power the node.)

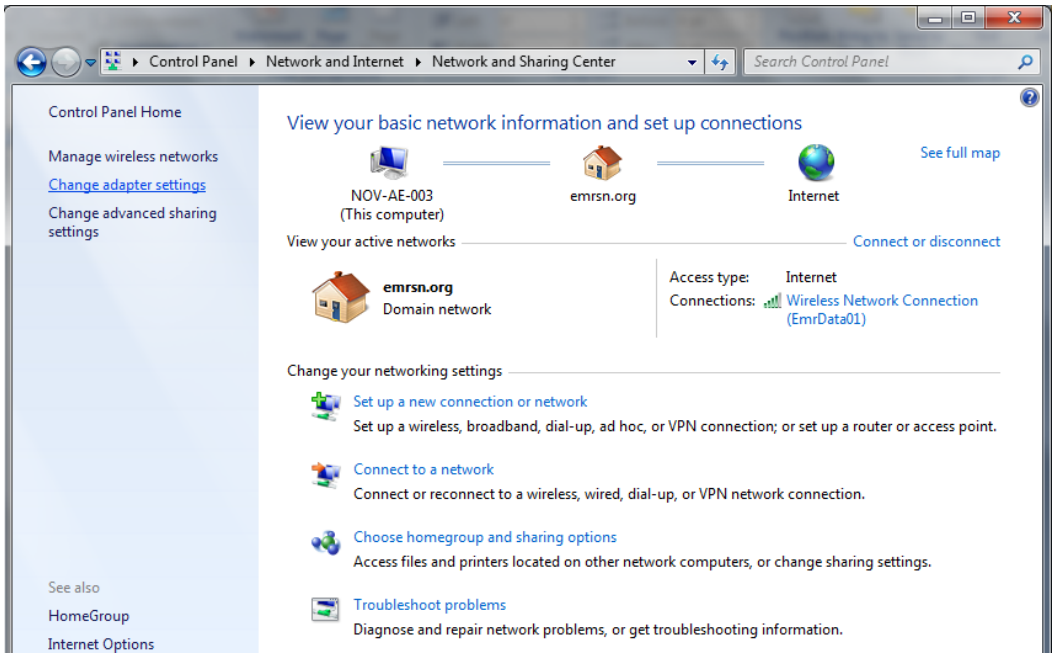
2. Connect an Ethernet cable directly from the manifold to the computer -OR- Connect an Ethernet cable from the manifold to a router, hub, or switch. Connect a second Ethernet cable from the computer to the router, hub, or switch. (Network lights should appear on the router, hub, or switch if the correct cables are used).



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

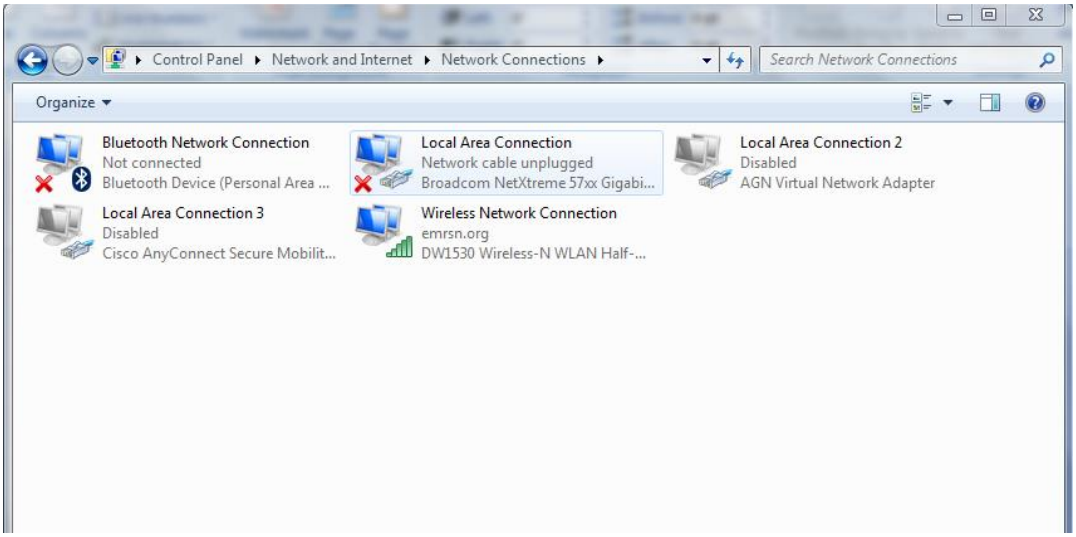
4. To communicate with an Profinet manifold the IP address of your computer must be known. To start this process, left click on the "Start" button.

5. Left click on control panel, then left click view network status and tasks

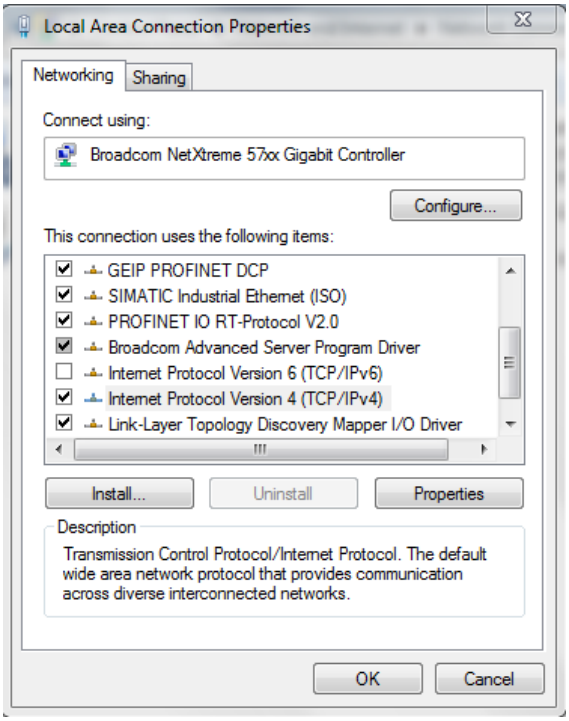


6. **The "Network and Sharing Center" window will open. Double click on "Change adapter settings".**

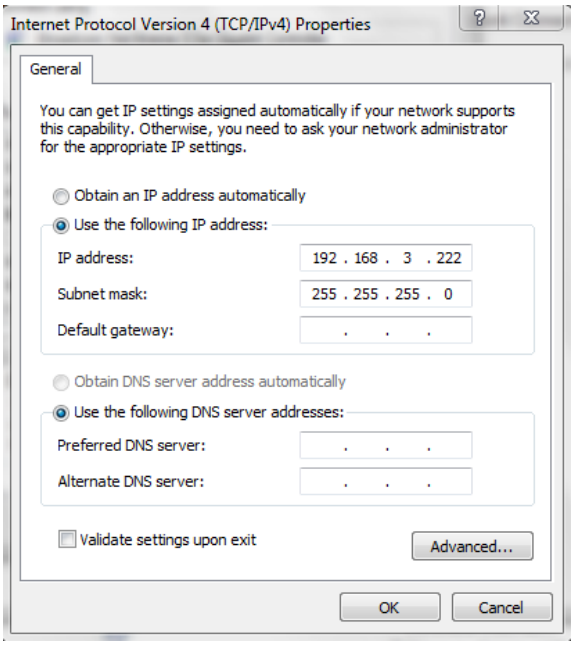
7. **The "Network Connections" window opens. Double click the "Local Area Connection Icon"**



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



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



10. **Left click "OK" in the "Internet Protocol (TCP/IP) Properties" and "Local Area Connection" windows for the changes to take effect on the computer. Modify the first three octets of the computer's IP address to match the G3 manifold (Example 192.168.3.xxx).**

- ***To connect to the G3 integrated webpage. The 1st three octets of the IP address of the computer must match the IP address of the node.***

11. Open a web browser on the computer and type the IP address of the manifold.
Ex. http://192.168.3.120. The Numatics G3 webpage should load after several seconds.

PROFINET INDUSTRIAL ETHERNET

Conformance Tested

11.3 Profinet Web Server functionality

This section will discuss the functionality of the G3 Profinet integrated web server. Every Numatics Profinet **has this feature. The G3 web page allows the user to configure the node, force I/O, check diagnostics, etc.**

Home

To get to the Numatics "Home" page, open a web browser. In the URL line, type in the IP address of the manifold and press "Enter". The Numatics "Home" page will appear. This page shows a picture of the Numatics Profinet manifold.

PROFI INDUSTRIAL ETHERNET NET

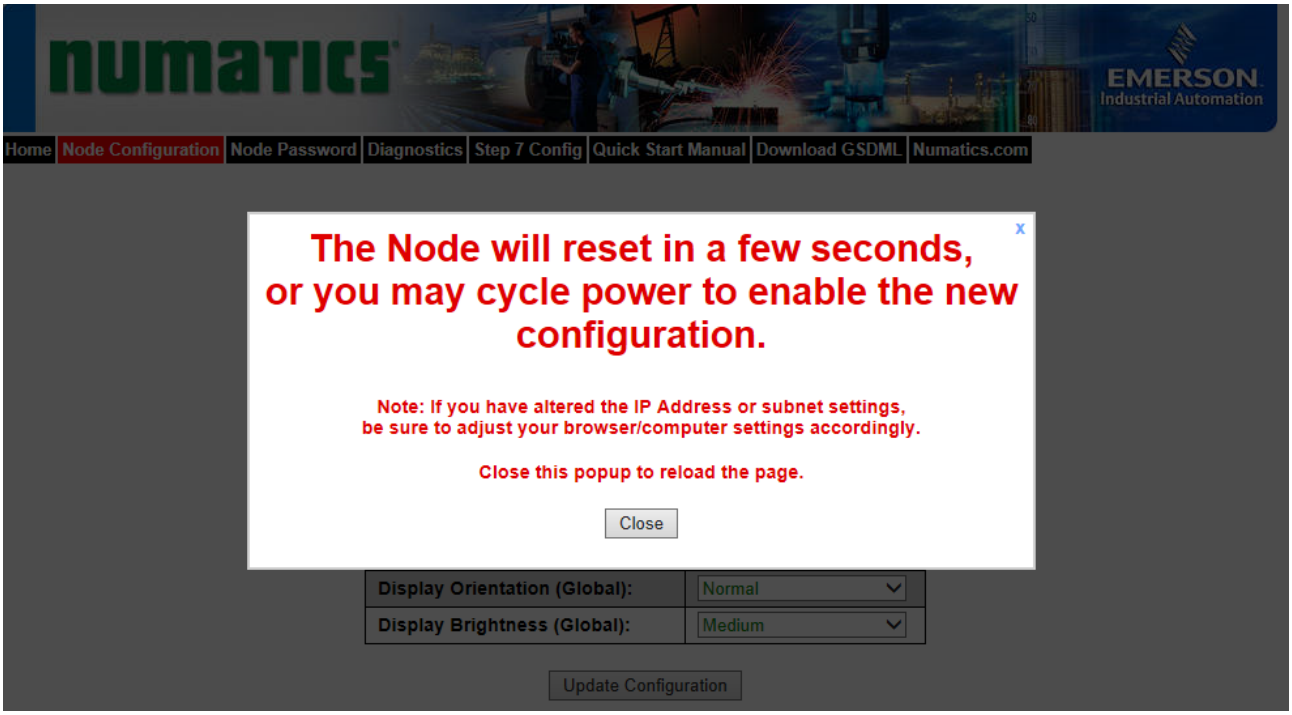
Conformance Tested

Node Configuration

Node Configuration (Green selections denote Factory Default settings)	
Station Name:	g3pnet
IP Address:	192.168.1.100
Subnet Mask:	255.255.255.0
Default Gateway IP Address:	
Web Server:	Enabled
Node Configuration Parameters:	Unlocked
Fast Startup:	Disabled
Display Orientation (Global):	Normal
Display Brightness (Global):	Medium

Update Configuration

These parameters will be saved to the node's non-volatile FLASH memory once "Update Configuration" is clicked, and power to the node is cycled. The "Configuration Successfully Updated" window will appear. The Profinet node will reset in a few seconds, or the user may cycle power to enable the new configuration.



Password

The "Password" window allows the user to set a password that will prevent unwanted access to the output enable function in the diagnostic tab. The password comes disabled from the factory. To set the initial password, leave the "Enter Current Password" field blank and type in the new password in the "Enter New Password" field.

Change Password	
Enter Current Password: (up to 20 characters)	
Enter New Password: (up to 20 characters)	
Repeat New Password:	

Change Password

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

Once a Password has been set, the security check screen will appear when accessing the I/O force and test page

Security Check
Password:
Submit Password

- ***If the password has been lost or forgotten, go through the process of changing the password. Enter the last 6 digits of the MAC Address in the current password field and then enter the desired password in the new password field.***

Diagnostics

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

Module	Part No.	Description	Details Export Config and Log	Activity
Node	240-240	PROFINET Communications Module	Show Details	✓
Valve Driver	219-828	Valve Driver Output Module	Show Details	✓
ARM	240-182	Auto Recovery Module	Show Details	✓
No. 1	240-215	2 Inputs / 2 Outputs 4-20mA Analog M12 x 4	Show Details	✓
No. 2	240-205	16 Inputs PNP Digital M12 x 8	Show Details	✓
			Show Error/Event Log	

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

Reports module status:

✓ = OK
! = Attention
X = Lost comm.

Selects which module details will be shown

Show Details:

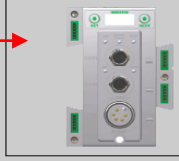
Current Configuration

Relevant node information including firmware revision

Graphic of module

Module	Part No.	Description	Details	Activity
Node	240-240	PROFINET Communications Module	Show Details / Close all Details	✓

Firmware Revision:	1.1 - 40917 (Firmware Upload / Factory Defaults)
IP Address:	192.168.3.120
Subnet Mask:	255.255.255.0
Gateway IP Address:	0.0.0.0
Active COMM Link Type:	Down
MAC Address:	00-15-24-00-1d-f7
Serial Number:	24001df7
Active Profinet Connections:	0
Node / Input Power:	24.4V



Diagnostic Word: Byte 0 Setting Disabled	7	6	5	4	3	2	1	0
ON = FAULT	Bit 0: Switched Power Status Bit 1: Unswitched Power below 19V Bit 2: Sub-Bus Module Error Bit 3: Sub-Bus Short Circuit							
Diagnostic Word: Byte 1	7	6	5	4	3	2	1	0
	Bits 0-4 (Module No.) No Error Bits 5-7 (Error Code) No Error							

Show Error/Event Log

Diagnostic word information with bit definitions presently shows: Error on Sub-bus, module 16 not communicating.

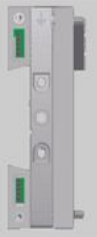
Webpage Diagnostic Data Format

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

Current Configuration

Valve Driver	219-828	Valve Driver Output Module	Show Details	Close all Details	✓

Firmware Revision: 2.04



Valve Coil:
Check/Uncheck box to force/un-force valve coil
I/O Mapping Output (Starting) Byte: 0

☐0	☐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

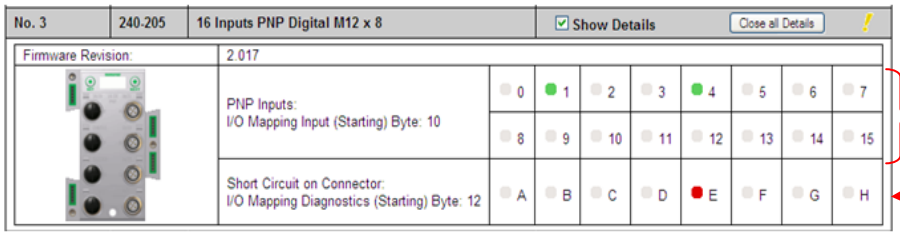
Output Status (Diagnostics):
● Shorted Coil
● Open Coil
I/O Mapping Diagnostics (Starting) Byte: 2

0	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

Valve coil forcing capability. Can be disabled with password

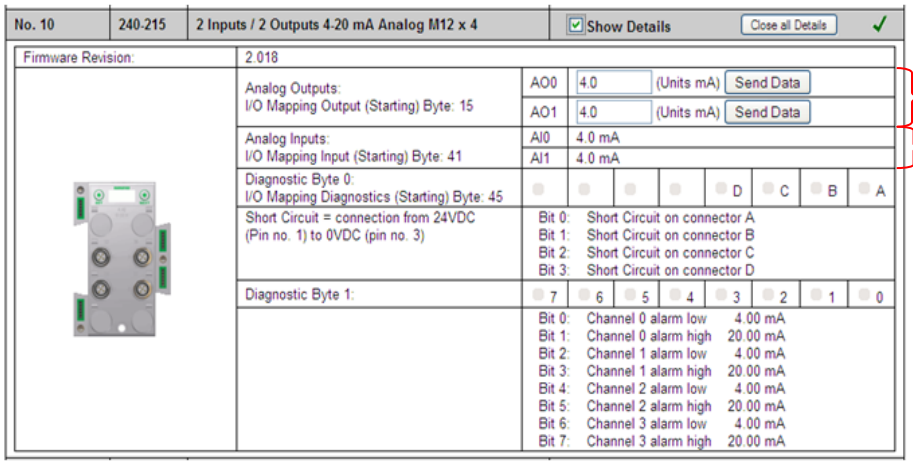
Shows diagnostic status of whether coils are shorted or open.

Show Details:



Shows input signal status

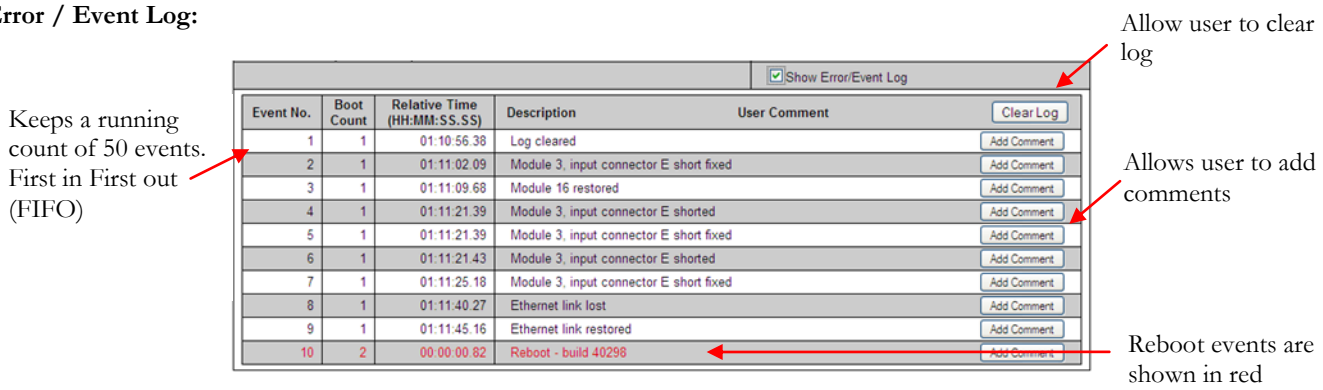
Shows diagnostic status of source power to sensor, "Connector E shorted"



Analog output forcing capability, can be disabled with password

Shows input signal status

Error / Event Log:



Download GSDML

The "Download GSDML" tab provides a link to download the GSDML file stored in the node or a link to the Numatics website http://www.numatics.com/

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

11.4 IP Address Configuration

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

- **Integrated Web Page Configuration**
- **Graphical display**
- **Siemens Step 7 PLC Software**

11.5 Communication Fault Behavior

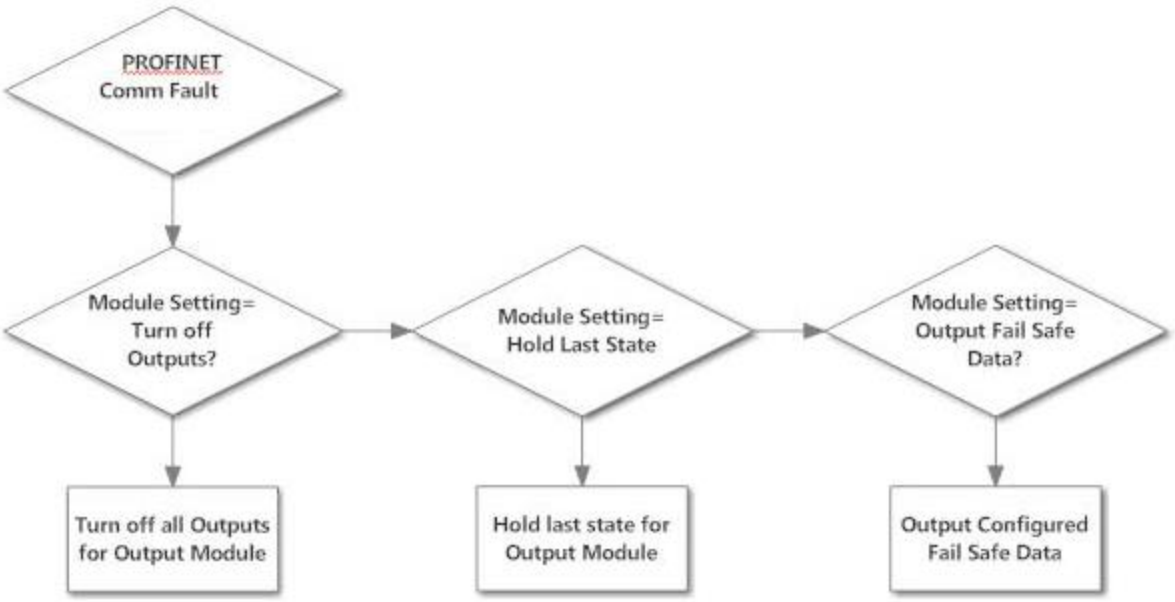
This parameter is used to describe characteristics or behaviors of outputs. The parameter shown below is used to determine what state the outputs of a particular G3 output module will have if a communication "Fault" occurs.

The user can configure each outputs fail state through the PLC configuration.

The three options are:

1. **Turn Off All Outputs**
2. **Hold Last State**
3. **Output a Specific Byte Value**

The G3 Profinet module responds based on the Communication Fault attribute setting in the PLC configuration (see flow chart).



12. Profinet ™ Mapping

12.1 I/O Sizes

Manifold

Outputs
Outputs are defined as any valve solenoid coil and/or any discrete output point from any output module.

Inputs
Inputs are defined as physical input bits from input modules.

Valve Side
The size for the "valve side" of the manifold consists of an output bit for each valve solenoid coil driver. This value for the valve side size is 4 bytes of outputs.

Discrete Side
The discrete side of the manifold is defined as all I/O modules connected to the left of the communication node. This includes physically attached modules as well as any distributed sub-bus modules. I/O data for the discrete side is automatically configured based on the type of I/O module installed.

12.2 Valve Output Mapping

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

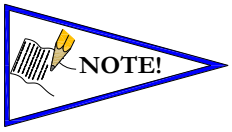
1) **Solenoid coil outputs are connected to the valve coils using the Z-Boards™.**

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

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

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

5) **Z-Boards™ can be used in any arrangement (all singles, all doubles, or any combination) 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.***

Manifold Configuration Examples

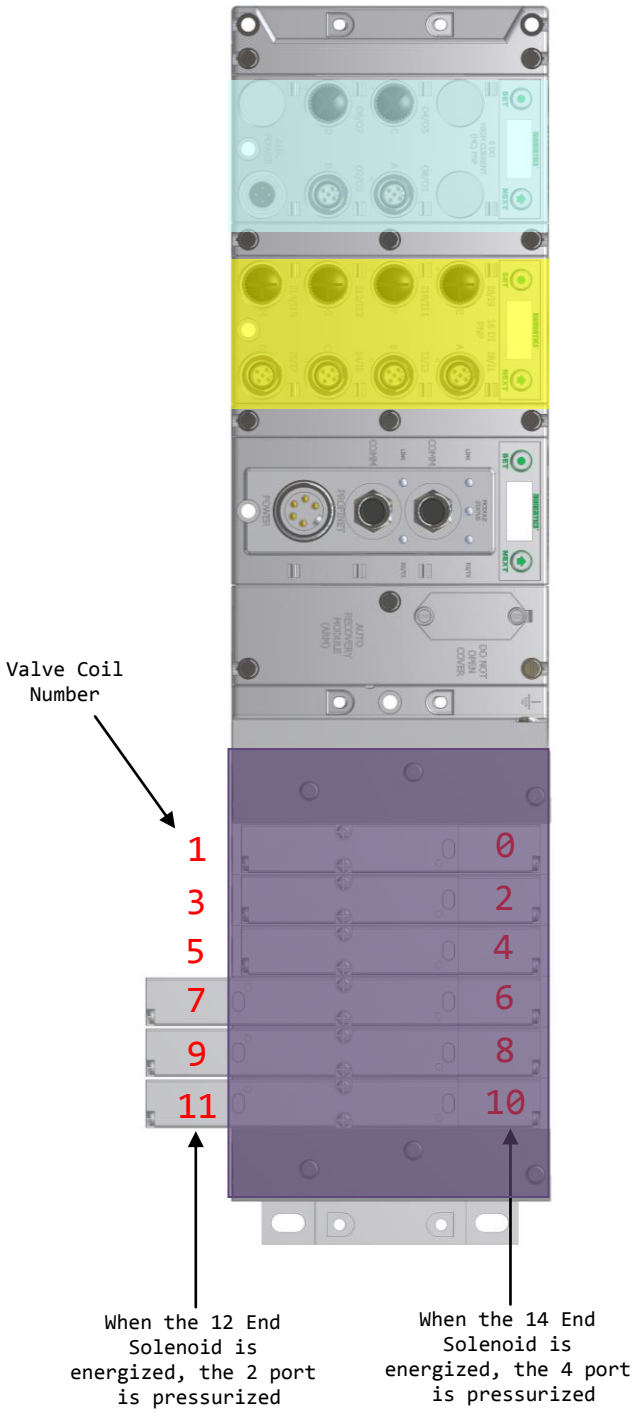
12.3 Example No. 1

Assumed Settings

- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.

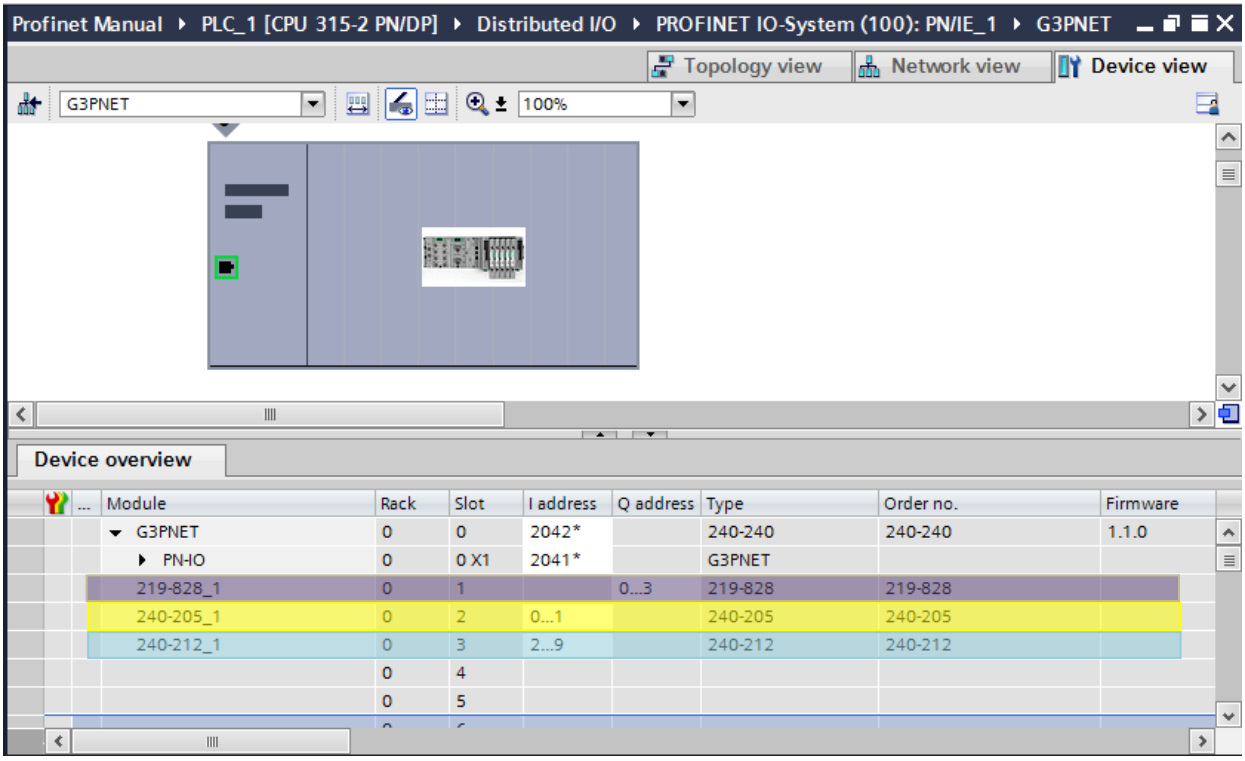
How to Order

Qty	*Part Number*
1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3PN102R0G32
1	240-205
1	240-212
	ASSEMBLED



Example No. 1 Step 7 Configuration

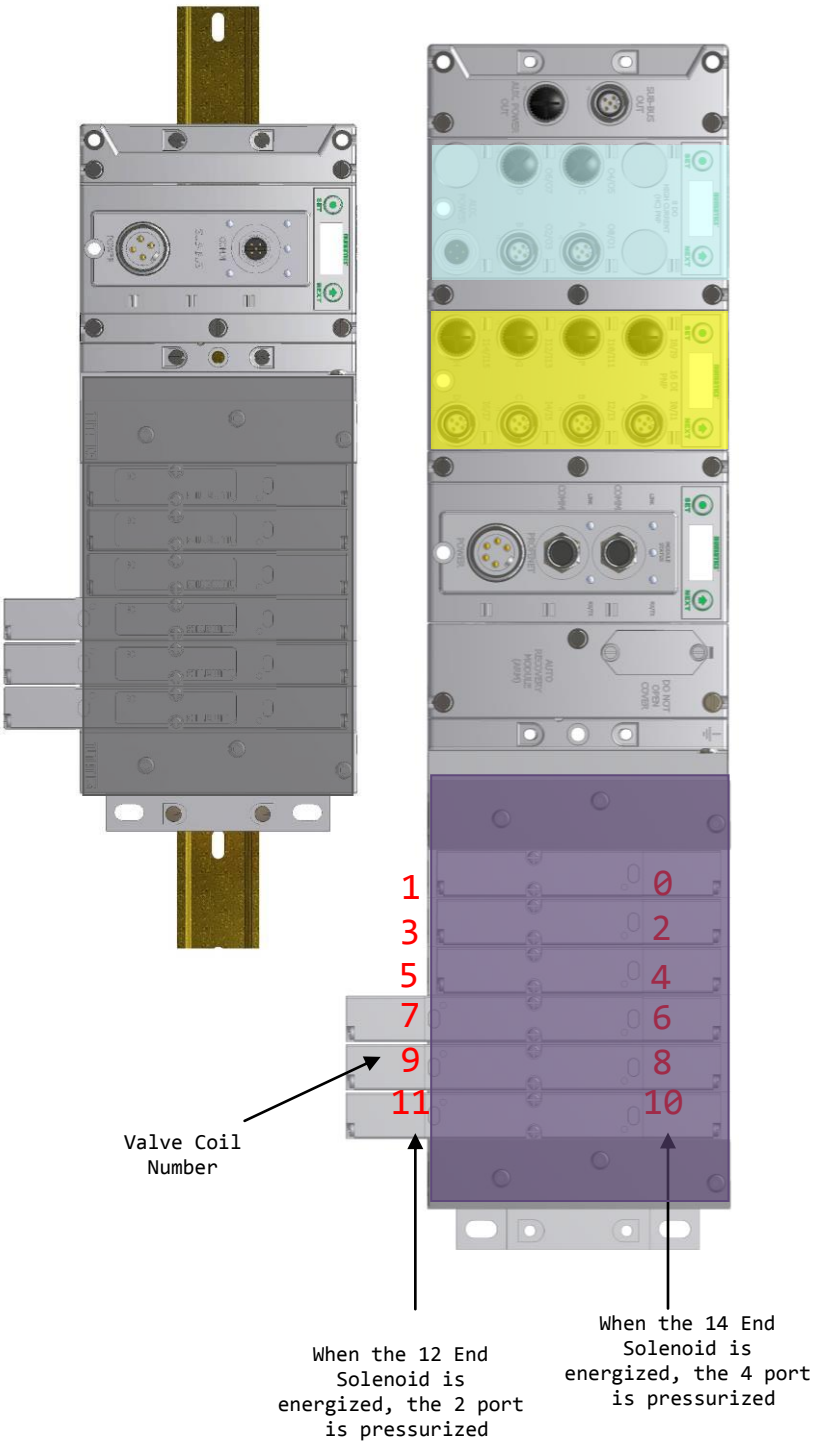
PosNo.	*Module Type*	*Part No.*	*In*	*Out*
			Bytes	
1	Valve Driver	219-828	0	4
2	16I PNP	240-205	2	0
3	4AI Analog	240-212	8	0



12.4 Example No. 2

Assumed Settings

- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.



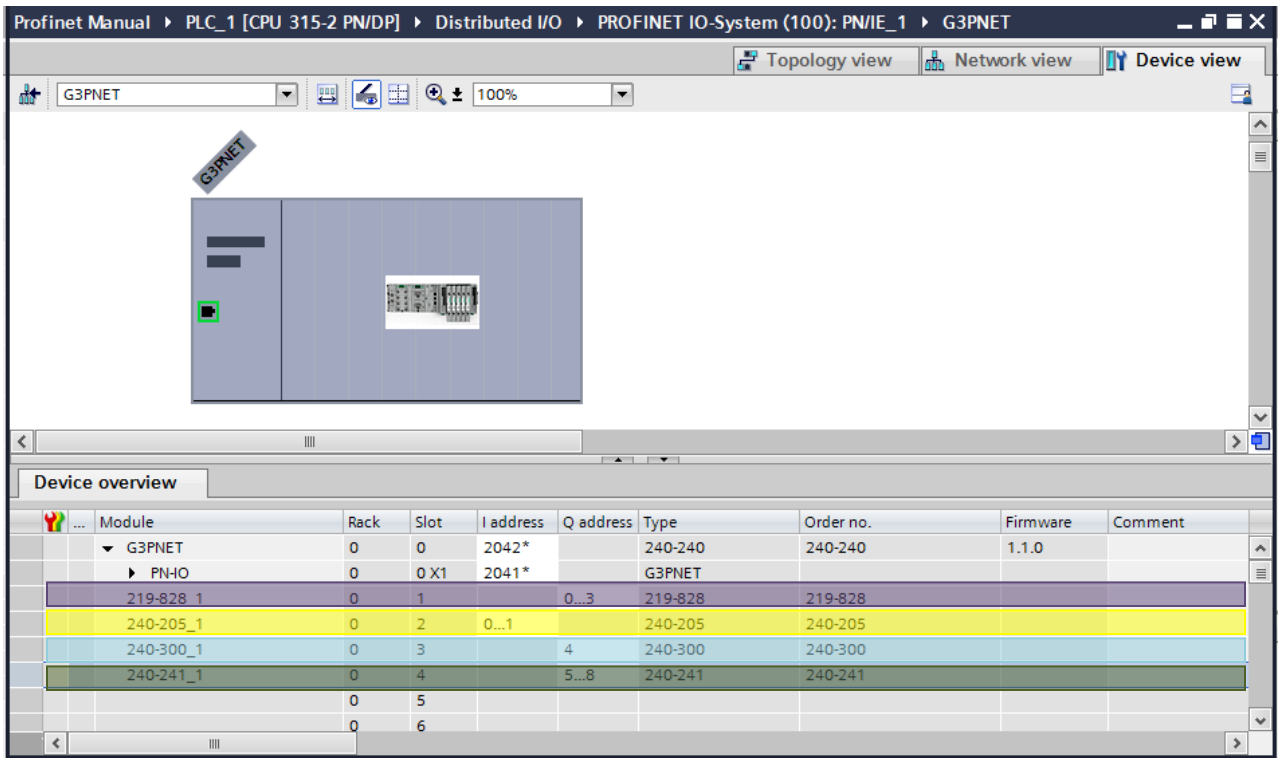
How to Order

Qty	*Part Number*
1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3PN102D0G32
1	240-205
1	240-300
	ASSEMBLED

1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3DS202R0DRM
	ASSEMBLED

Example No. 2 Step 7 Configuration

PosNo.	Module Type	Part No.	In	Out
			Bytes	
1	Node/Valve Driver	219-828	0	4
1	16 Point Digital PNP Input	240-205	2	0
2	8 Point High Current Digital PNP Output	240-300	0	1
3	Subbus Valve Module	240-241		4



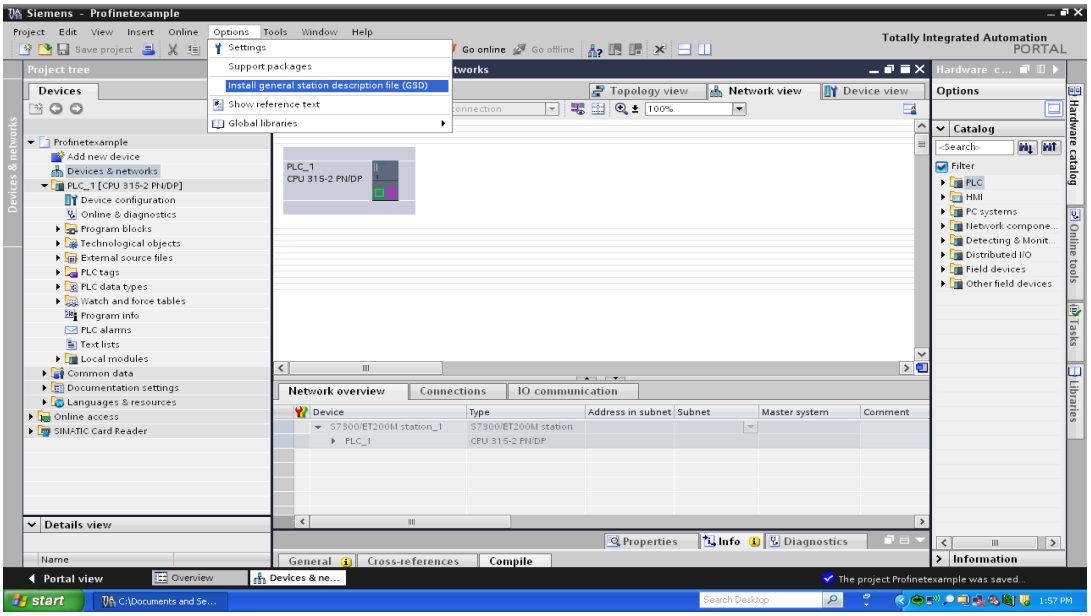
13. G3 PROFINET Configuration

13.1 Commissioning G3 PROFINET with Siemens TIA Portal Software

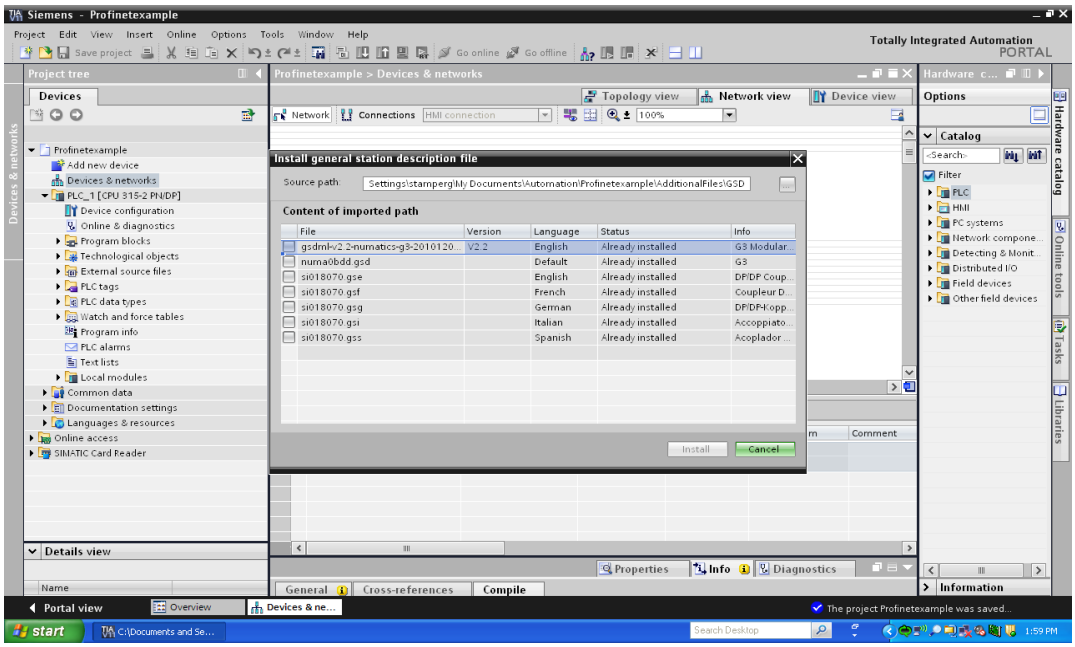
The following example illustrates the necessary steps to configure a Numatics G3 PROFINET Manifold with the station name "G3PNET". This includes how to install the Numatics PROFINET XML file and how to select the various software components to configure a G3 Manifold (GSD and XML files are available at www.numatics.com). All examples are based on a Siemens S7-300 PLC configured using Siemens TIA Portal v.11 programming software.

- **Hardware used**
  - **PROFINET Node (240-240)**
  - **Valve driver interface module (219-828)**
  - **16 Point Input module (240-205)**
  - **8 Point Input module (240-206)**
  - **Sub-bus module (240-241)**

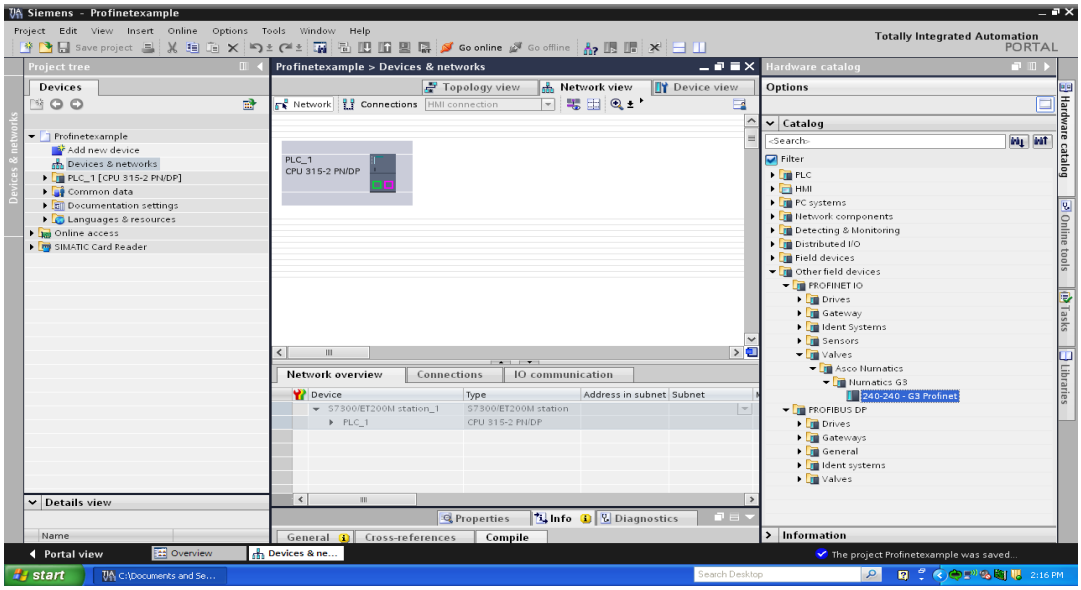
Load XML File
The XML file for the Numatics G3 PROFINET module 240-240 must be uploaded to the Siemens PLC programming software. Under options select; Install general station description file (GSD).



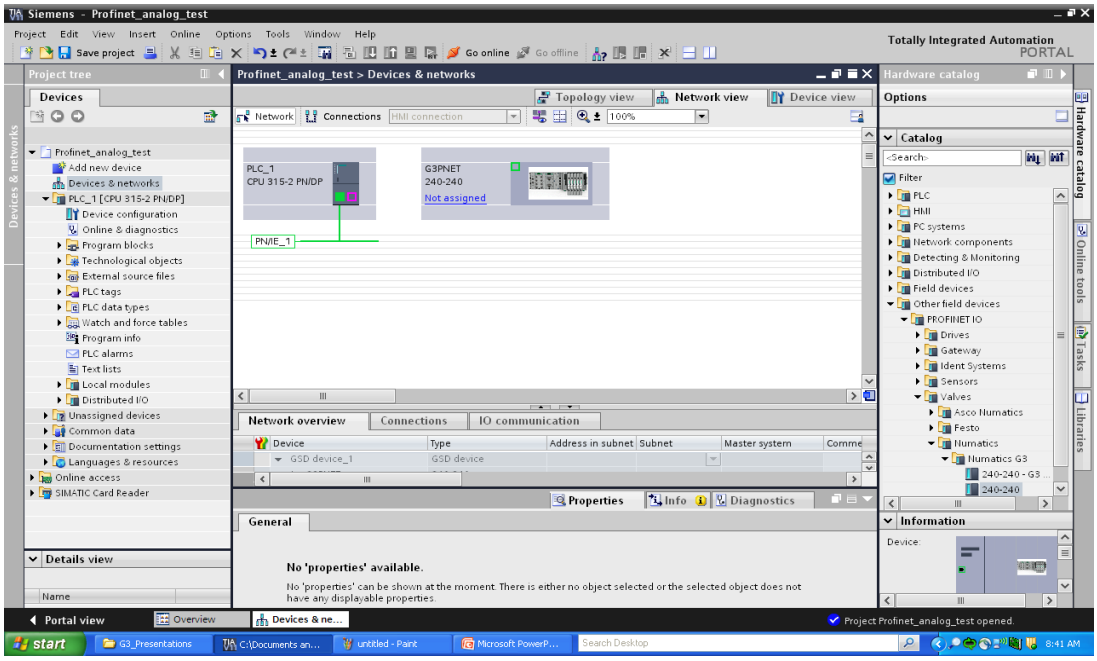
Select the newest version of the XML file for G3Profinet.



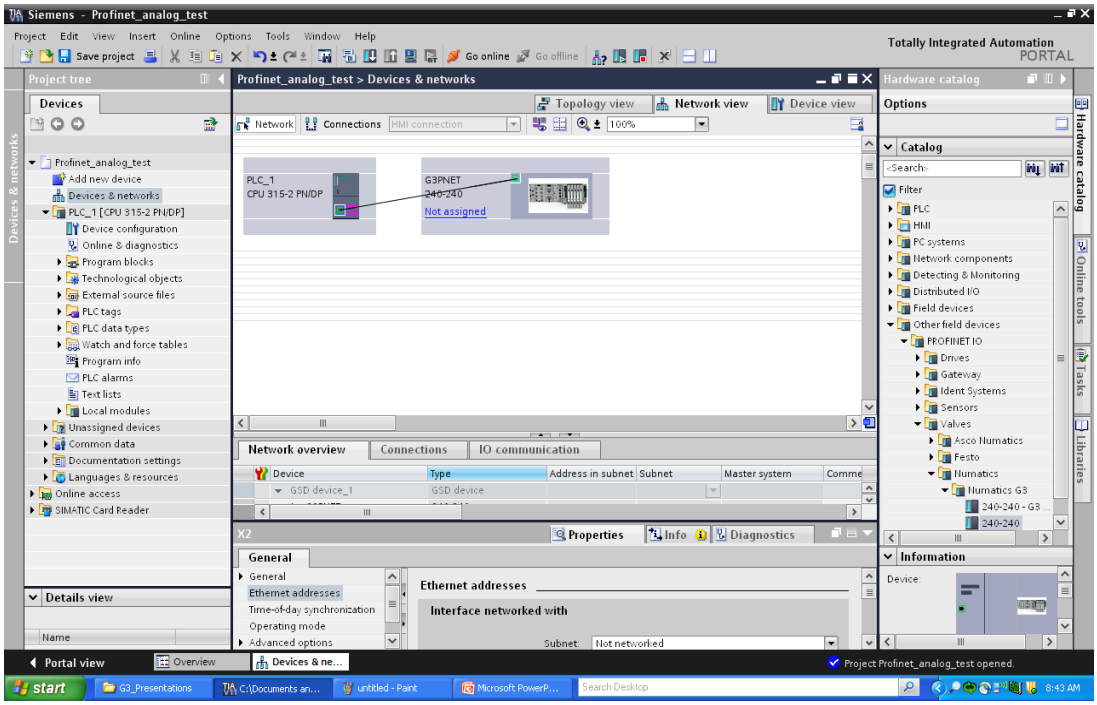
Add the G3 – 240-240 Node to "Devices and networks"
Select 240-240 - G3 PROFINET from the "Hardware catalog" (right pane).
Double click or drag and drop to add the manifold to the "Devices & networks" view.



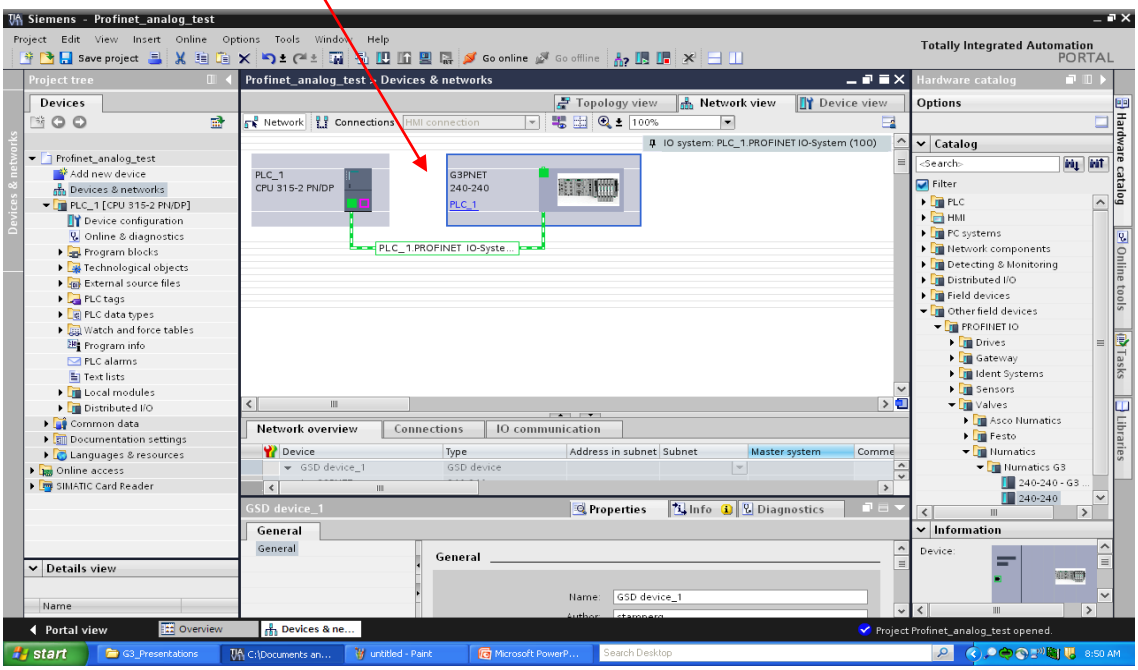
The G3 PROFINET manifold appears in the “Devices and networks”



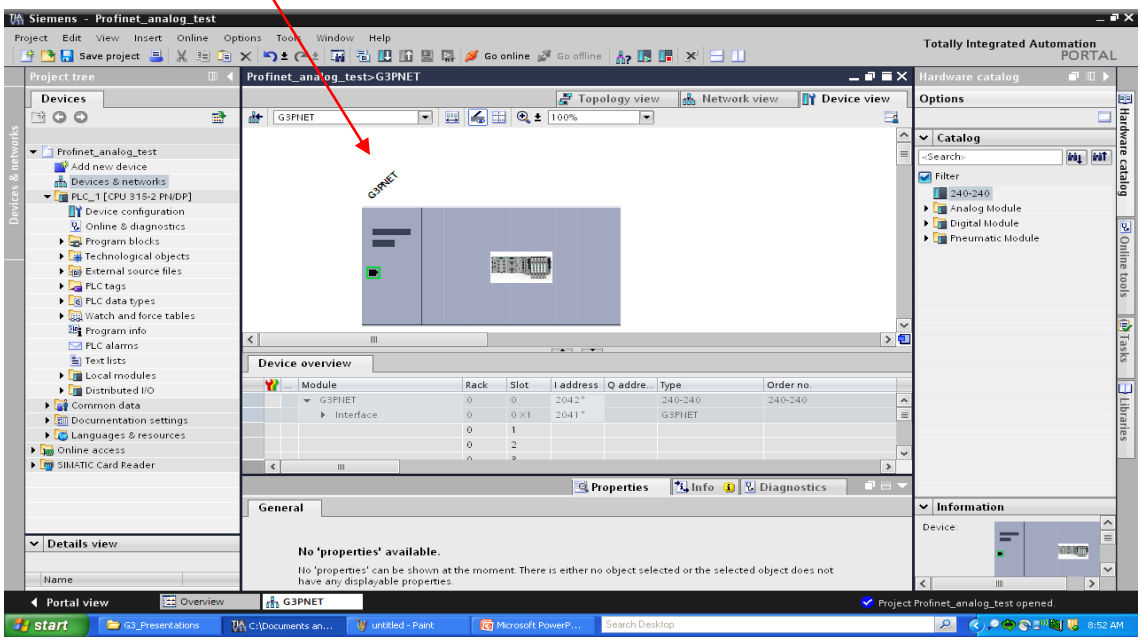
Starting at the PLC, Click and drag a line connecting the PLC’s PROFINET port to the PROFINET port on the G3 node



The PROFINET connection to the G3 Manifold is complete

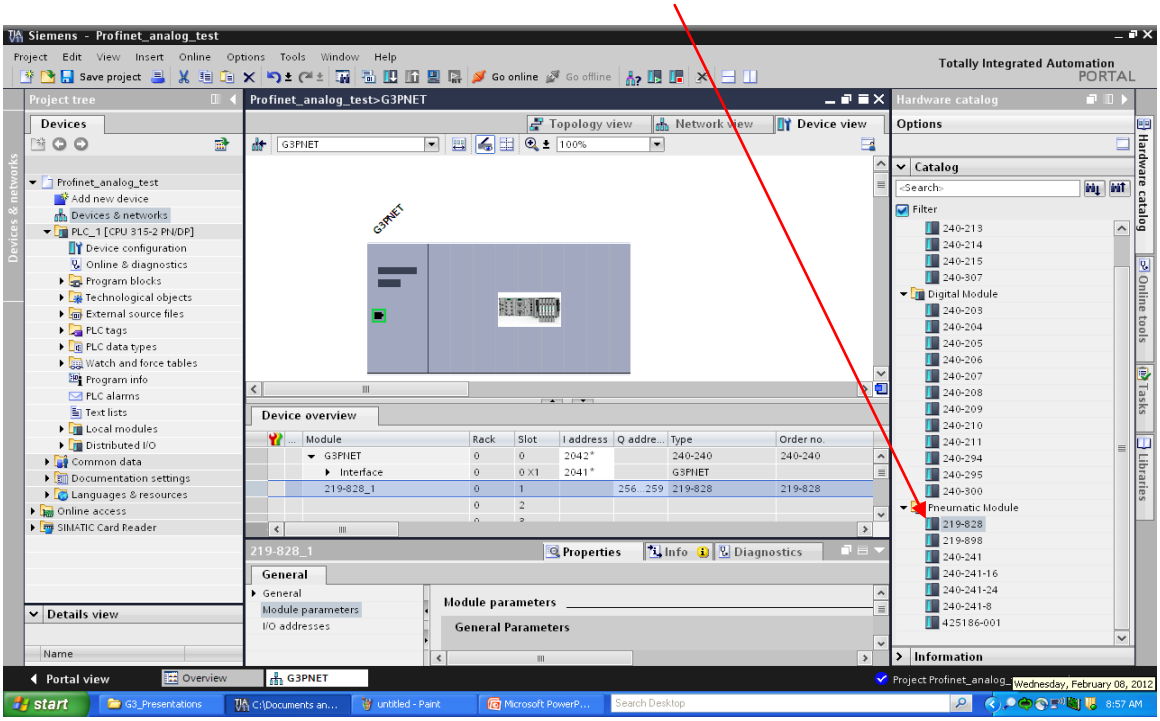


Note the station name defaults to **G3PNET**; this unique identifier is used by the PLC to establish communication with the device. The station name should be changed to identify physical location and/or function of the manifold. Double click the G3 Manifold Graphic to complete device configuration and I/O mapping.

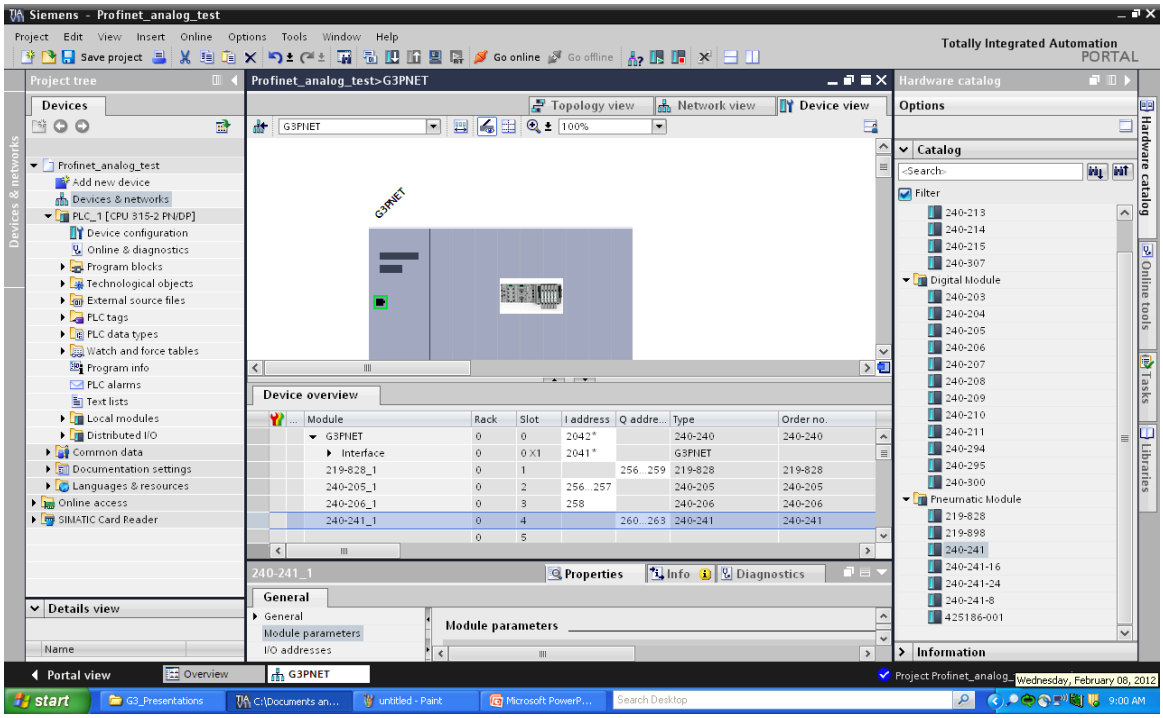


I/O Mapping

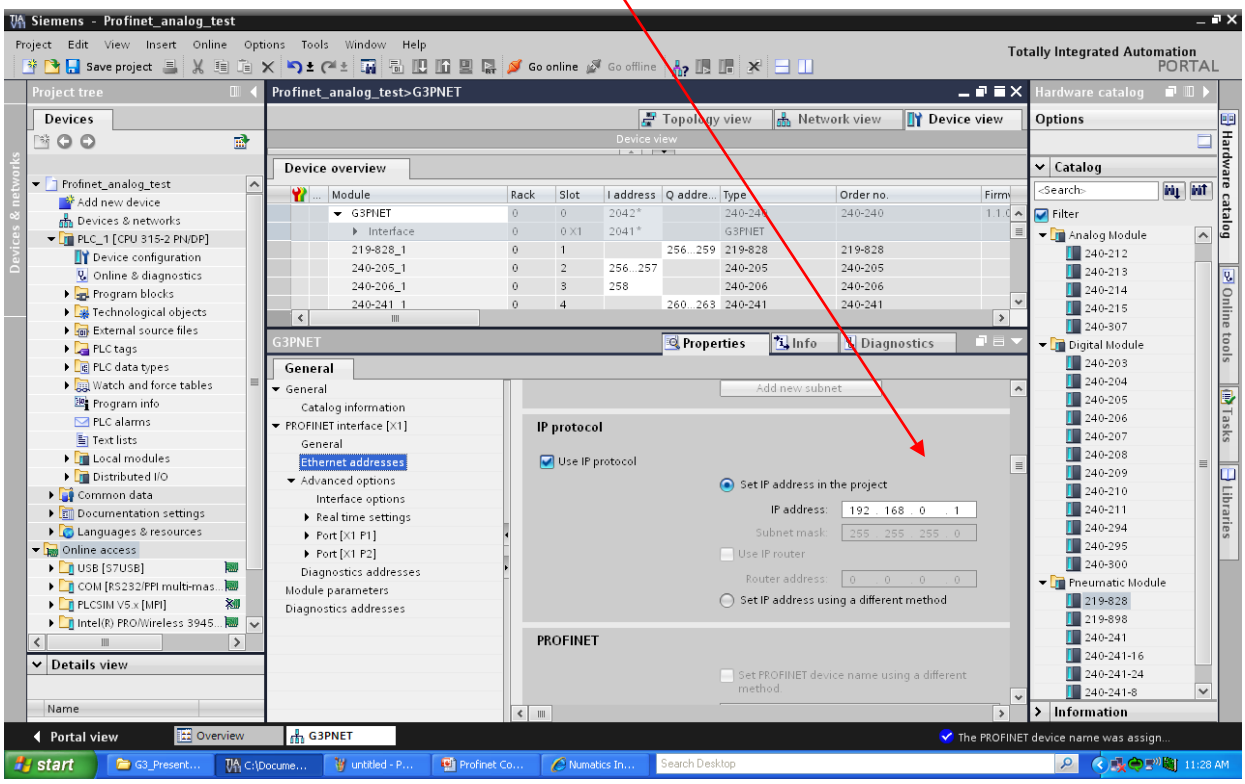
Add the required I/O modules from the "Hardware catalog" at right. For this configuration example; the 219-828 Valve driver is the first configured module. The module is mapped to output bytes 256-259.



The remaining three I/O modules are selected from the "Hardware catalog" at right. This includes 1 each; 240-205/240-206/240-241 The next step is to configure the G3 240-240 module properties. Select the G3PNET 240-240 and open the properties tab.



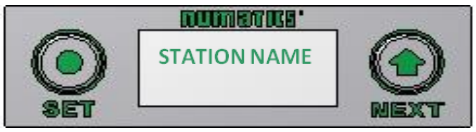
Select the Ethernet Addresses property to configure the G3 PROFINET address, in this example the PROFINET address is configured as; 192.168.0.1. Once all G3 Manifold configuration settings are complete, it is saved and downloaded as a component of the Siemens PLC configuration.



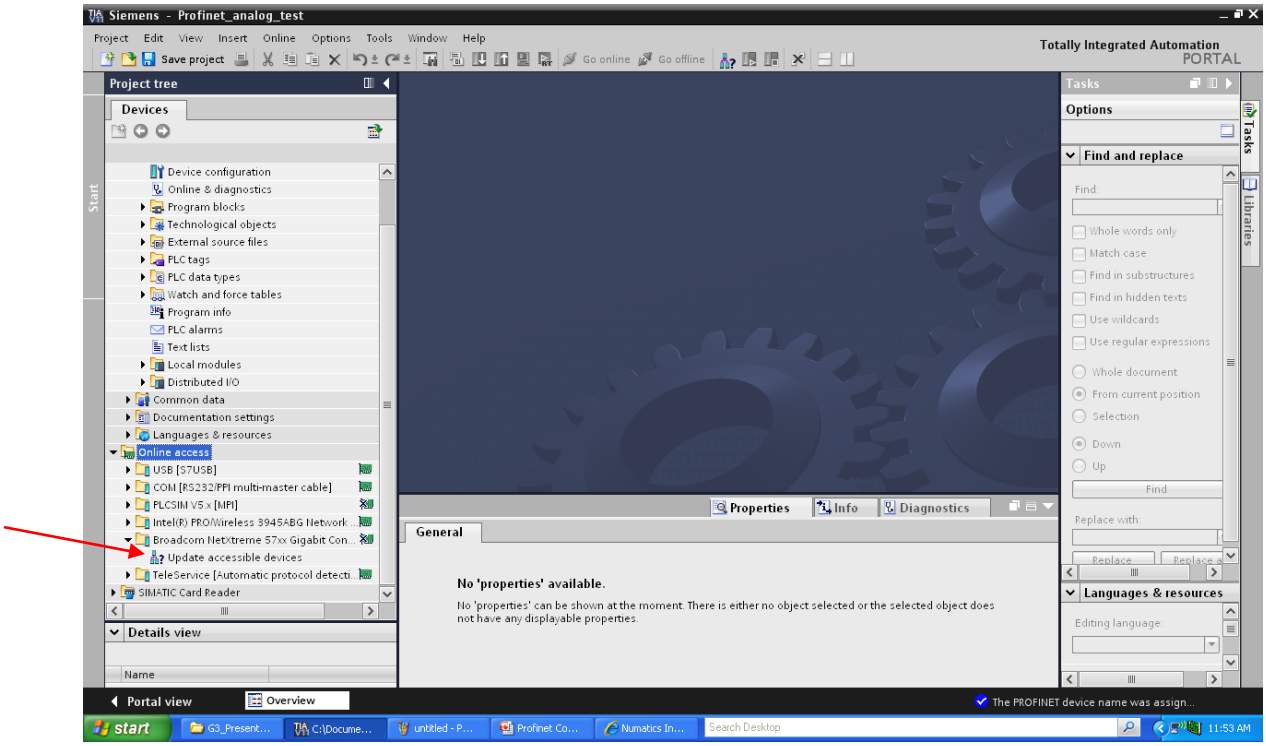
13.2 Commissioning the PROFINET Station Name

The G3 PROFINET node's station name must be assigned in order to establish communication with the PLC. The PLC recognizes the station name and assigns the associated parameters including PROFINET address. The station name is assigned using the Siemens TIA Automation Portal Software.

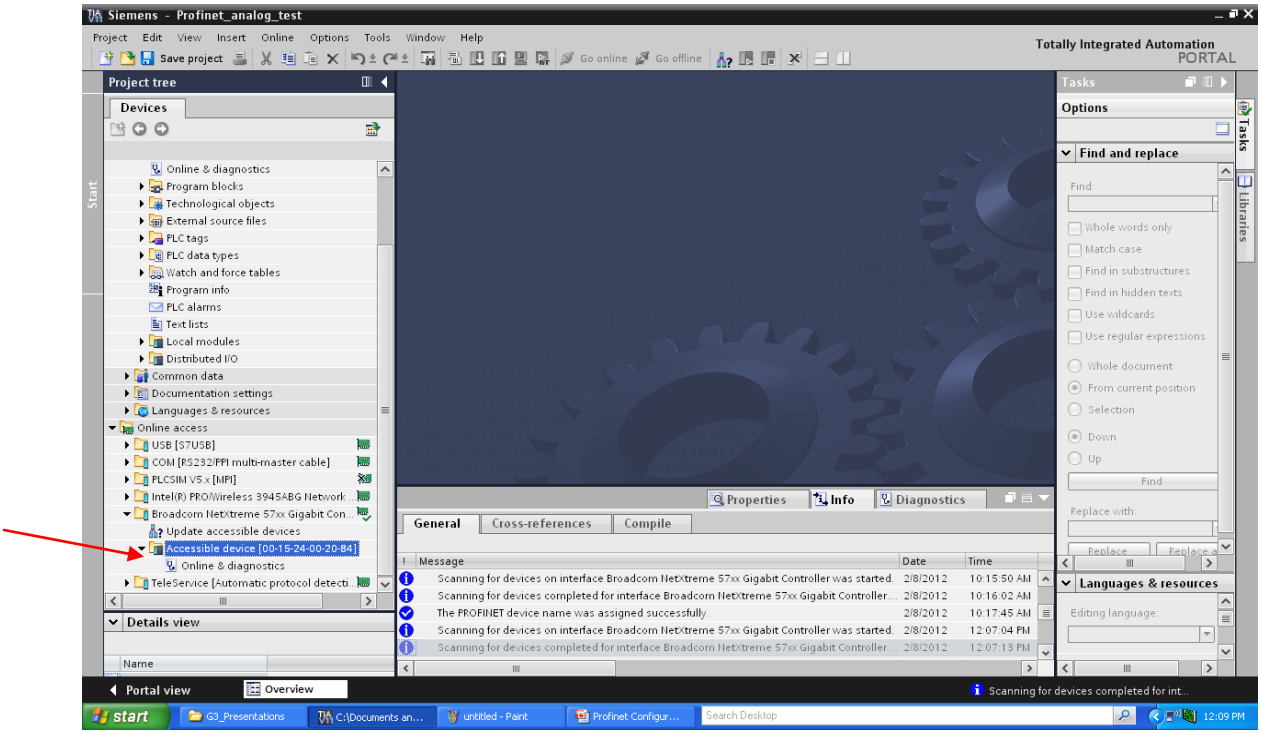
This is accomplished by connecting the Ethernet port of the programming device (PC) with the 240-240 - G3 PROFINET module. A PLC connection is not required; the G3 can connect directly to the programming device.



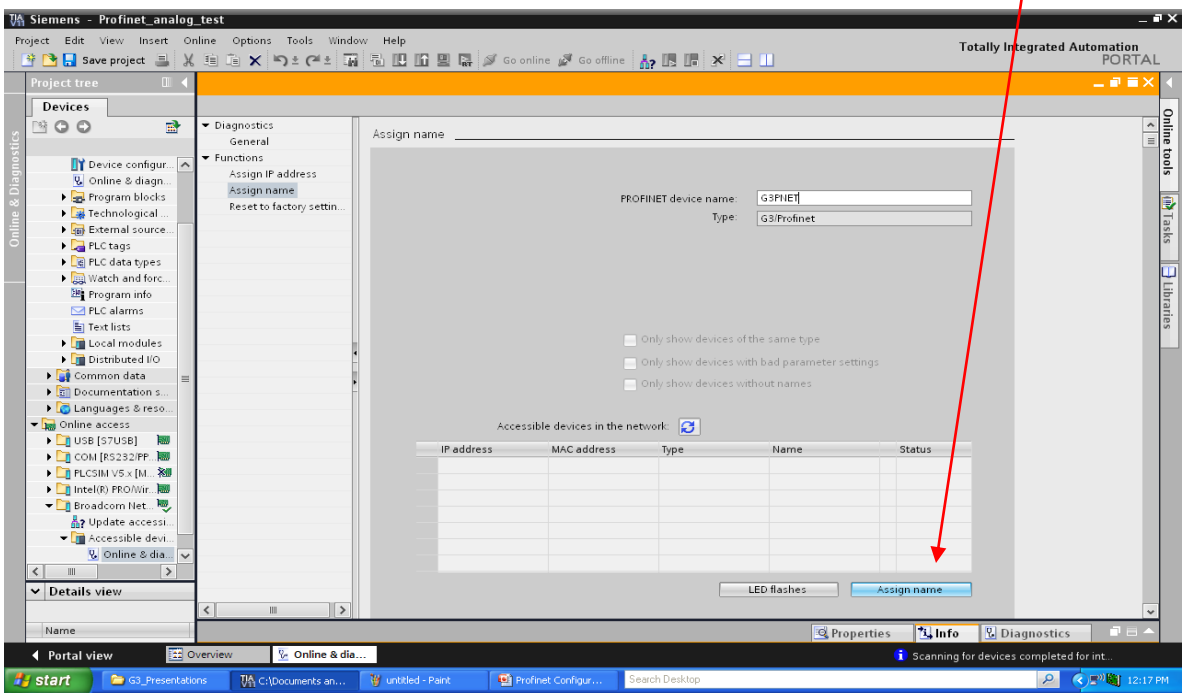
From the Siemens TIA software open the project tree, then expand the Online Access menu item from the "Devices" tab. Select the access device (typically the programming device's Ethernet card). Click "Update accessible devices"



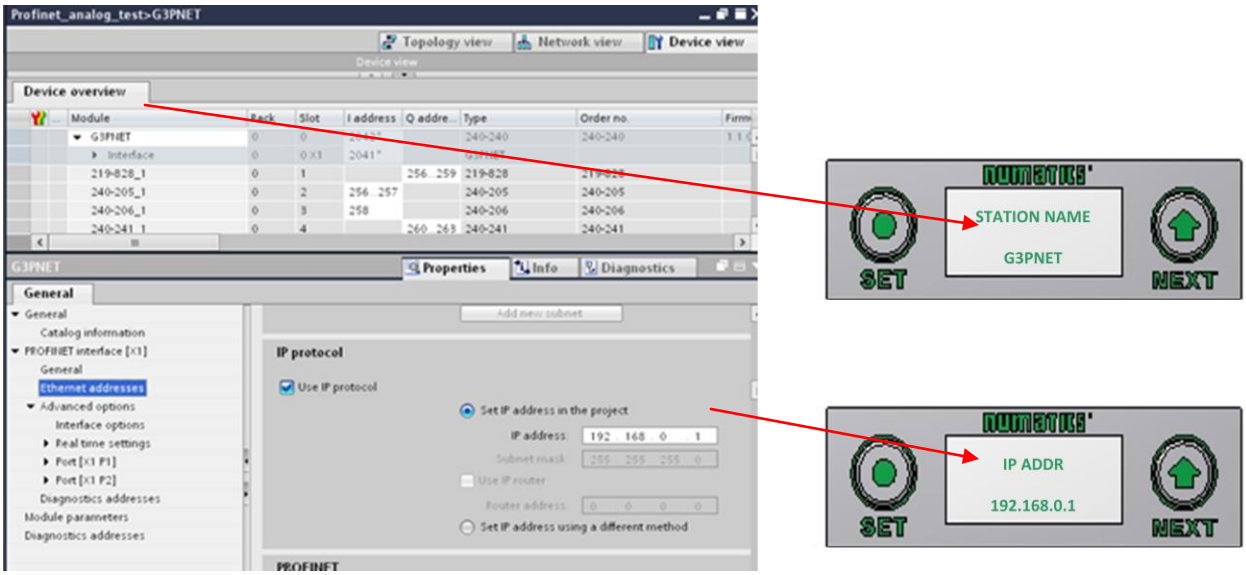
Once the G3 240-240 PROFINET node is found, it is identified by its MAC address (example 00-15-24-00-20-84). Double click the selection "online and diagnostics"



Expand the online functions tab and select "Assign name". Enter the Station name determined in G3 manifold properties. For this example, the default station name "**G3PNET"** is entered. Press the "Assign name" button.



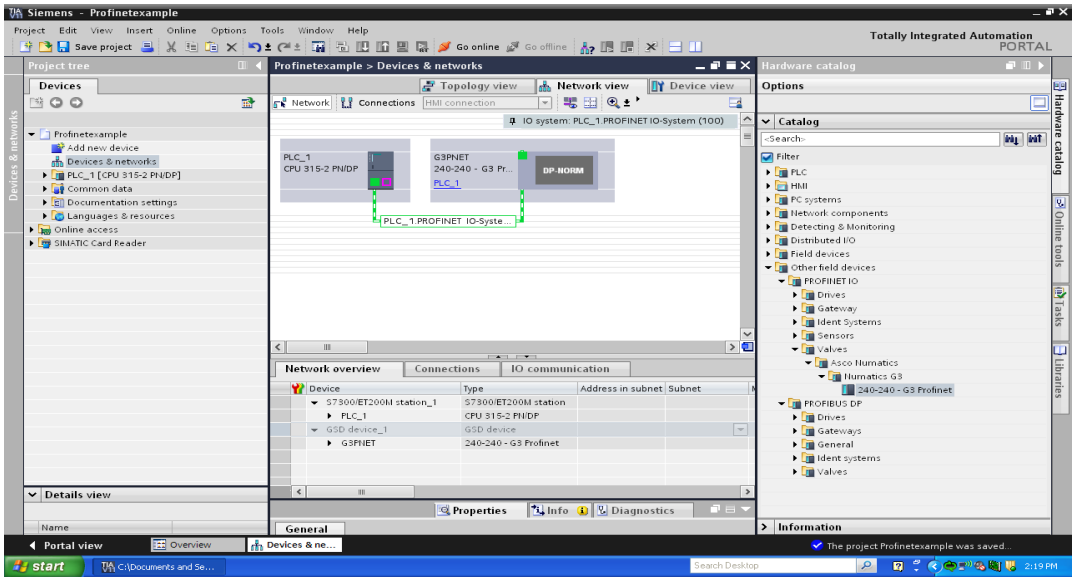
The station name "G3PNET" appears in the G3 display. All parameters including the PROFINET address associated with station name "G3PNET" are assigned to the node by the PLC.



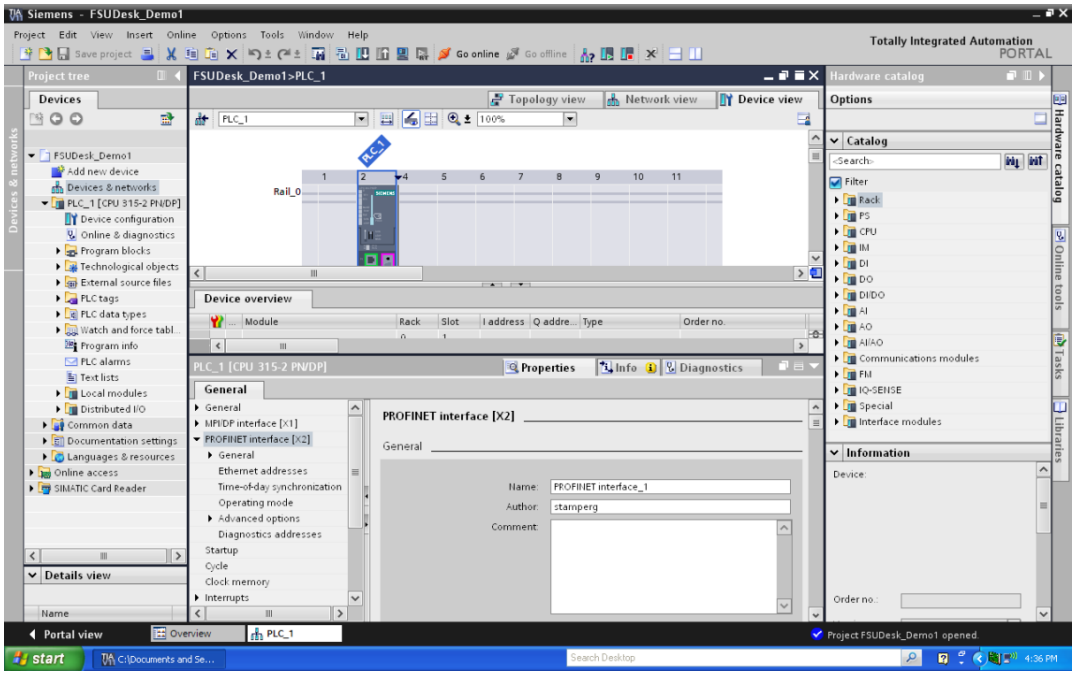
13.3 PROFINET Fast Start Up (FSU) - PLC to G3 Node configuration

The Fast Start-Up function allows rapid start-up of the PROFINET node. The communication connection between the controller and the node can be established in less than 600ms. This is important when considering robotic applications utilizing modular tooling; individual tools can be coupled and decoupled in the shortest possible time.

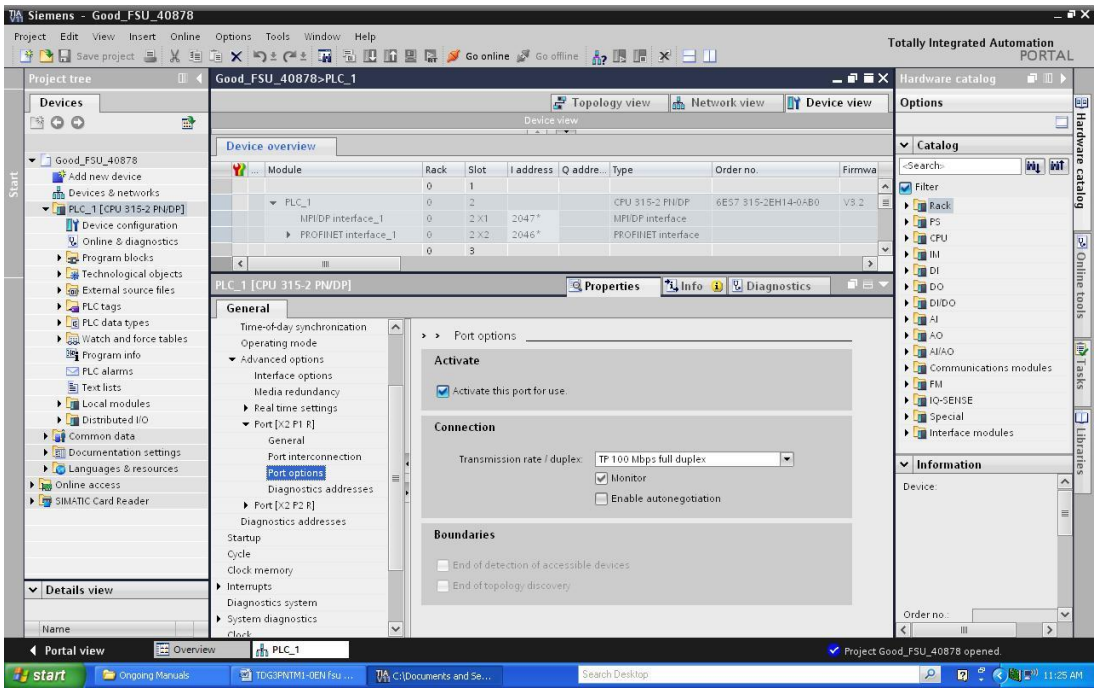
From the Devices and Networks menu select the PLC node and press enter



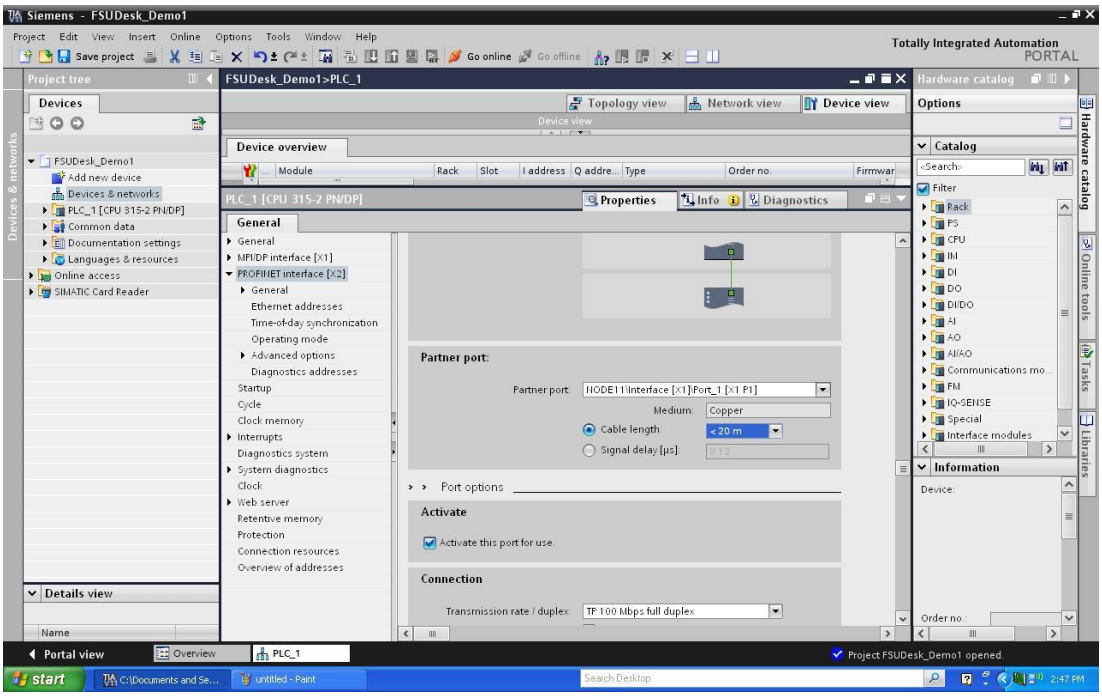
Select the PLC Graphic and open Properties, then select PROFINET interface (X2)



From PLC Properties select Port Options. Set the port to **TP 100Mbps full duplex and turn off autonegotiation**



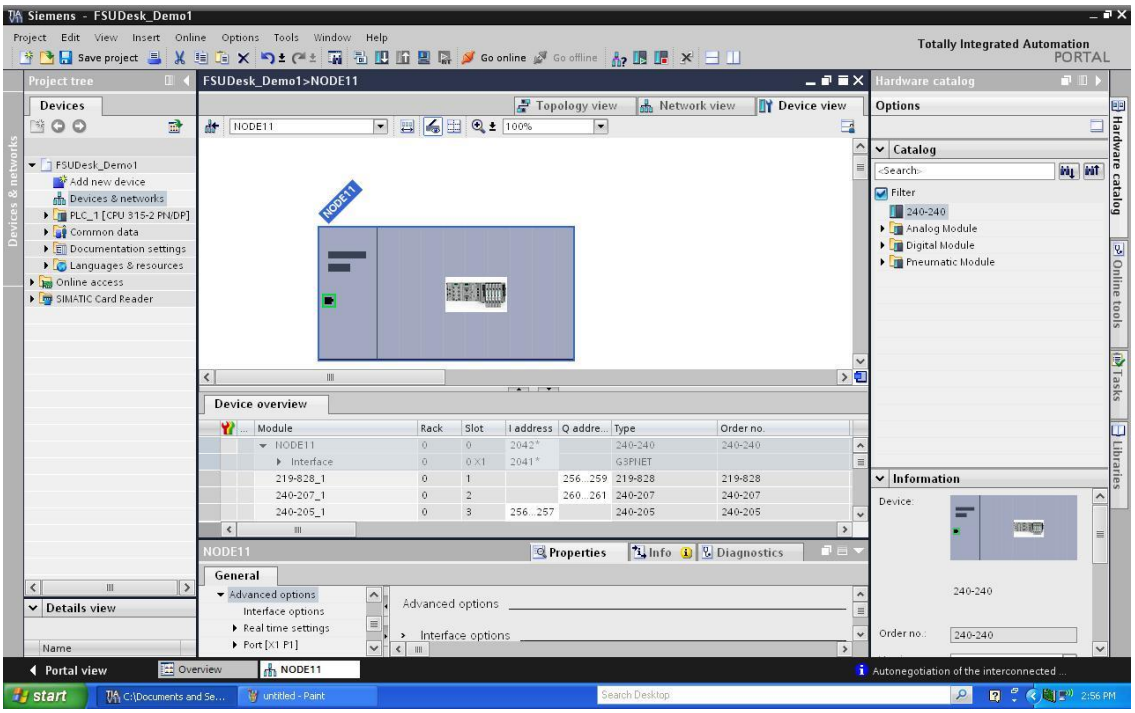
Select the partner port of the PLC's PROFINET port *(in this example the partner port is a G3 Ethernet IP node identified as Node 11)*



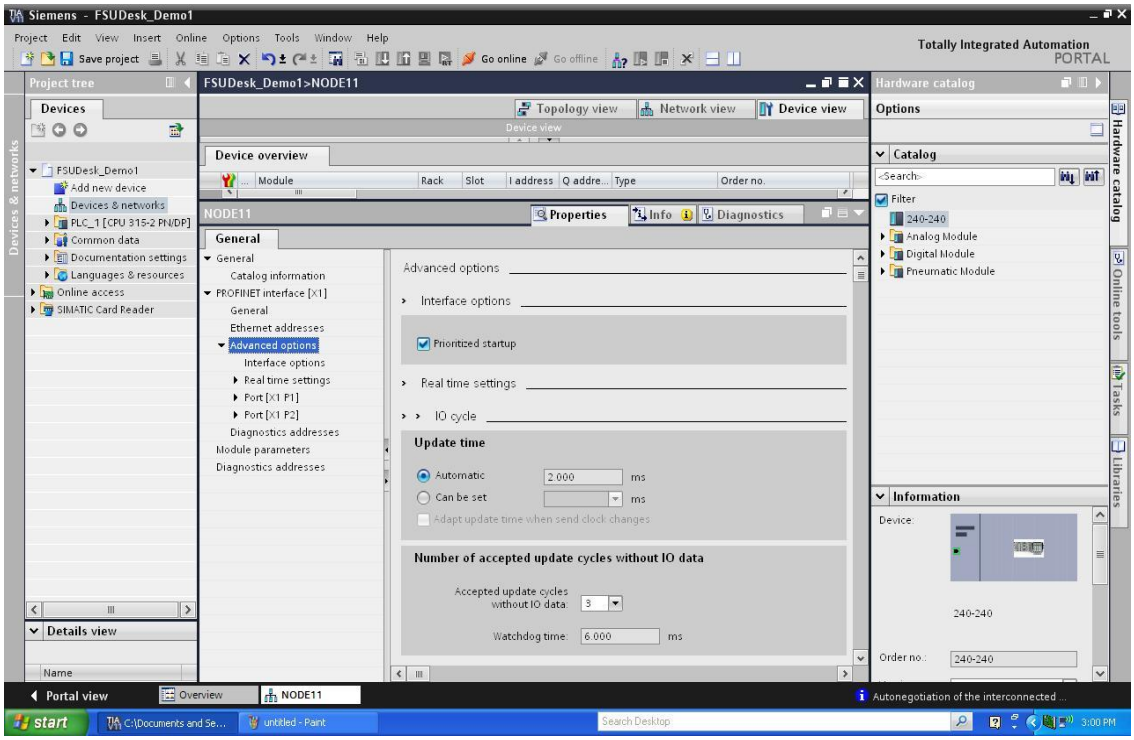
The PLC fast startup configuration is complete. The next step is to configure the G3 Node.

13.4 PROFINET Fast Start Up (FSU) - G3 Node to PLC configuration

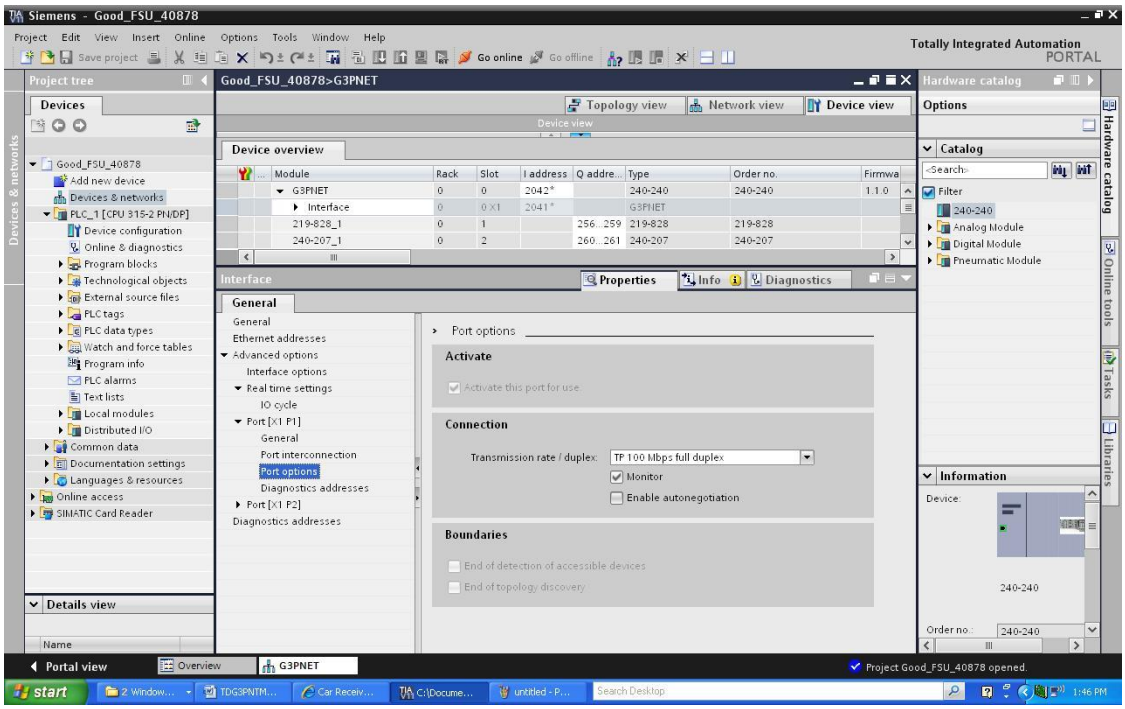
Select the Node Graphic and open Properties



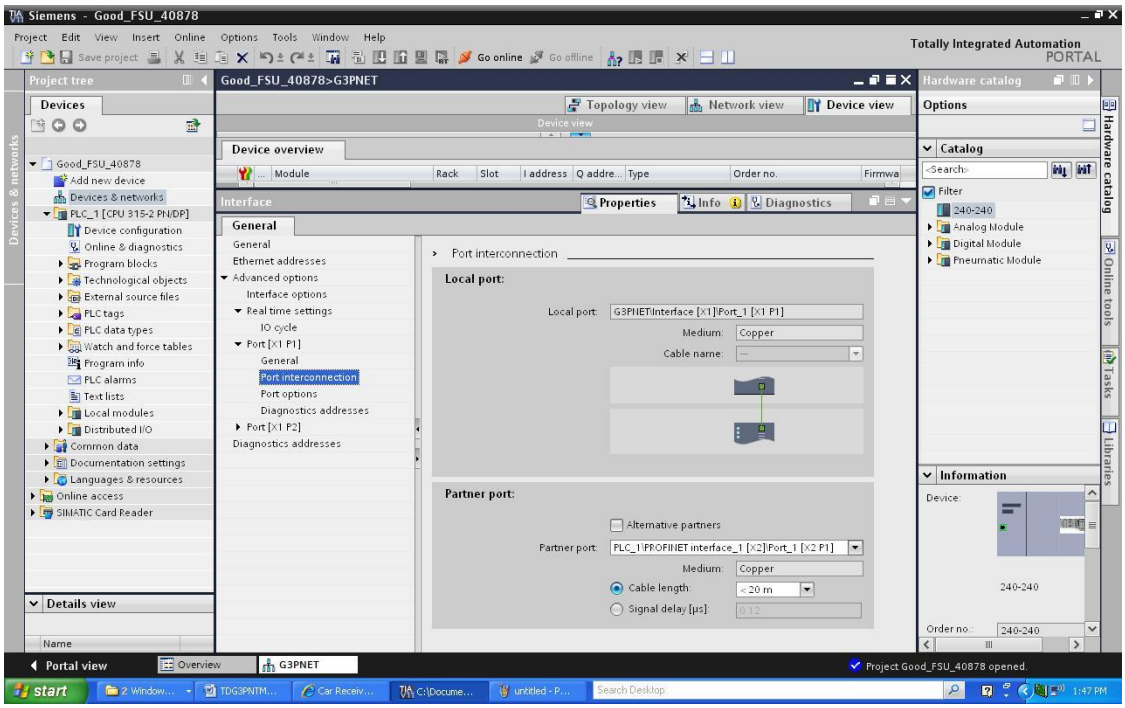
Select advanced options and check the box “Prioritized Startup”



From Node Properties select Port Options. Set the port to **TP 100Mbps full duplex and turn off autonegotiation**



Select the partner port of the Node PROFINET port *(in this example the partner port is PLC_1 PROFINET Port_1)*

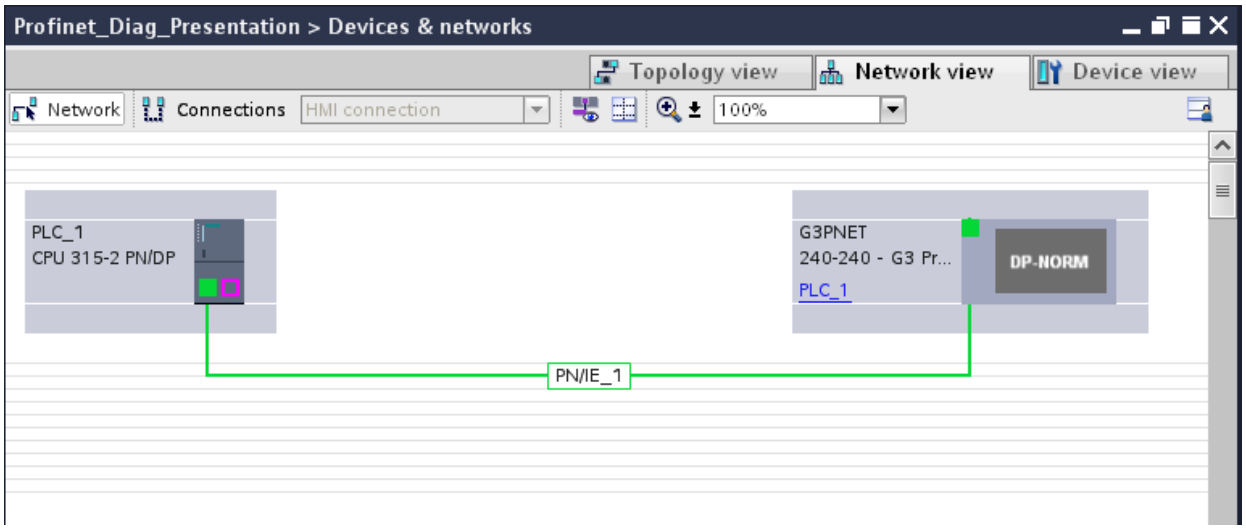


13.5 PROFINET and G3 Diagnostics

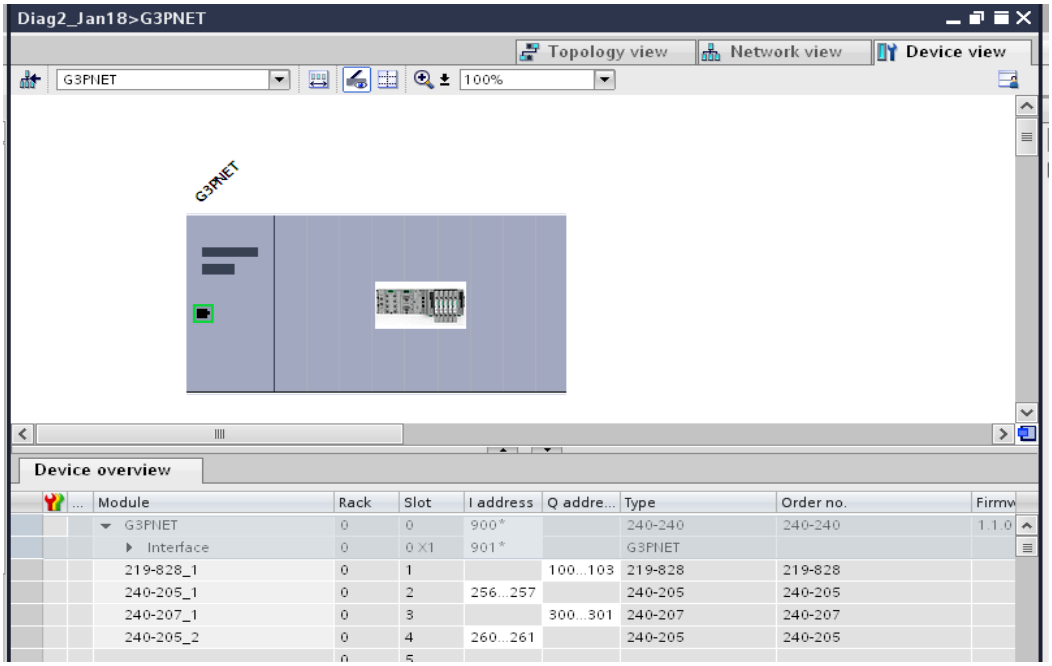
The following example illustrates how to use the diagnostic capability within the PLC program. This example uses a Numatics G3 PROFINET Manifold (with the station name "G3PNET"), a Siemens S7-300 PLC and Siemens TIA Portal v11 programming software.

- **The following configuration includes;**
  - **PROFINET Node (240-239)**
  - **Valve driver interface module (219-828)**
  - **16 Point Input module (240-205)**
  - **16 Point Output module (240-207)**
  - **16 Point Input module (240-205)**

Example G3 PROFINET Configuration
The G3 Manifold is configured as a PROFINET device named "G3PNET"as shown in the network configuration

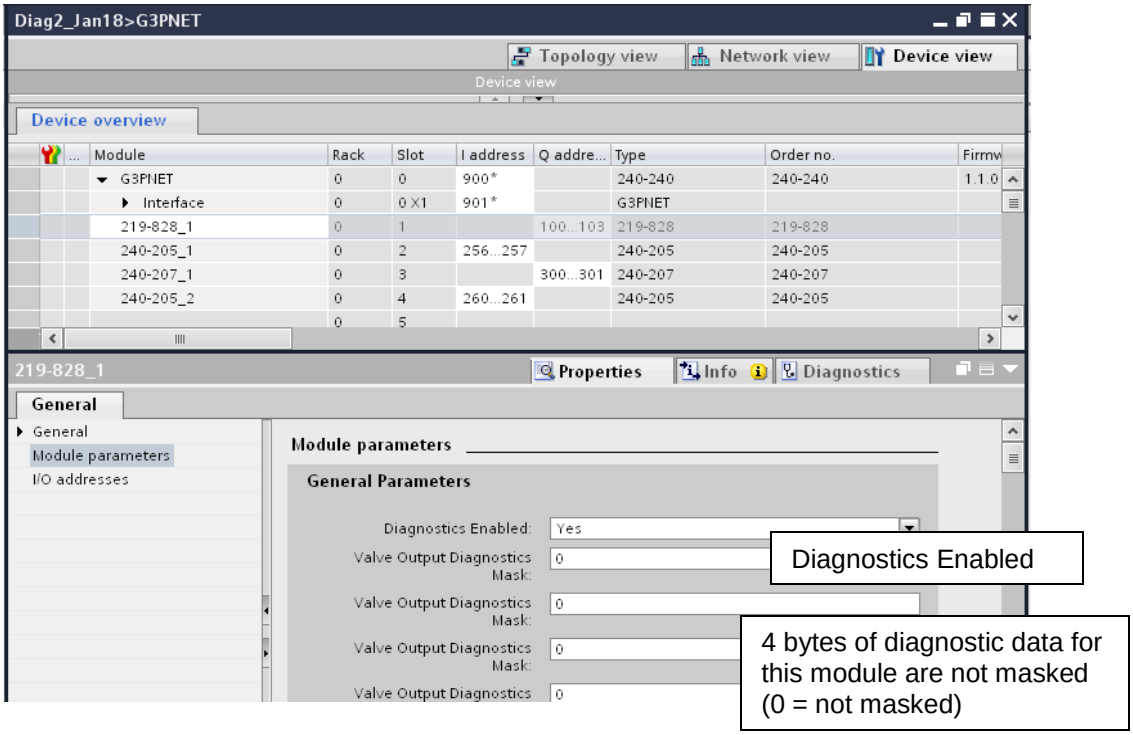


The G3PNET object is opened to display the I/O map configuration



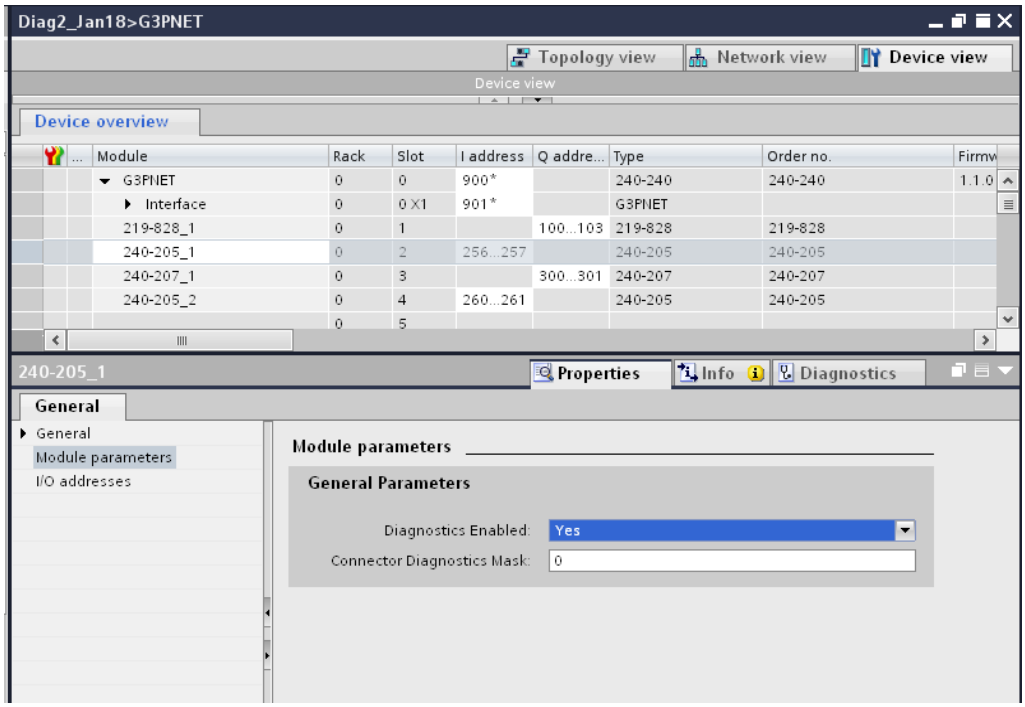
Module Properties

The 219-828 "Valve driver module" object is opened to display the module properties. Diagnostics must be enabled and the mask value remains 0 (not masked).



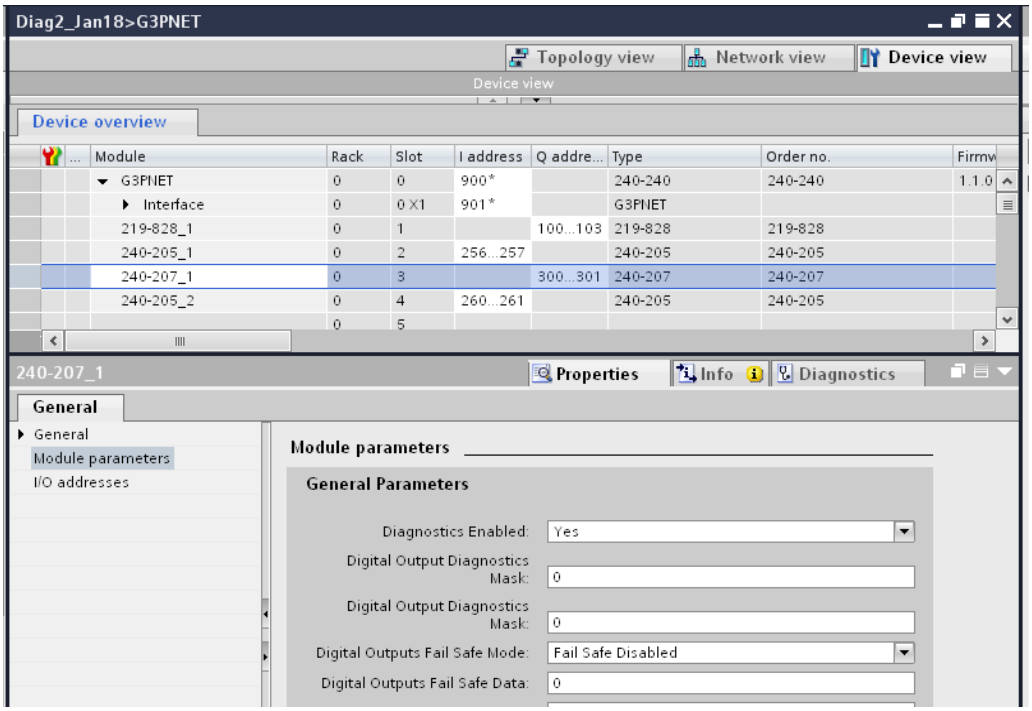
Module Properties

The 240-205 “discrete input module” object is opened to display the module properties. Diagnostics must be enabled and the mask value remains 0 (not masked).



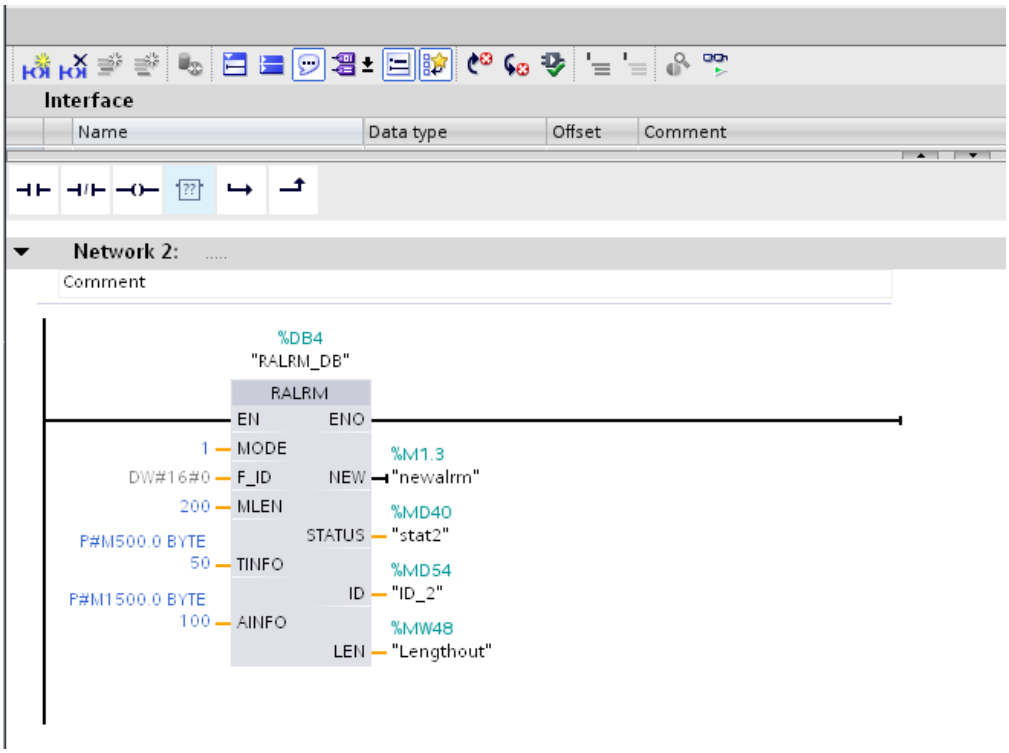
Module Properties

The 240-207 discrete output module object is opened to display the module properties. Diagnostics must be enabled and the mask value remains 0 (not masked).



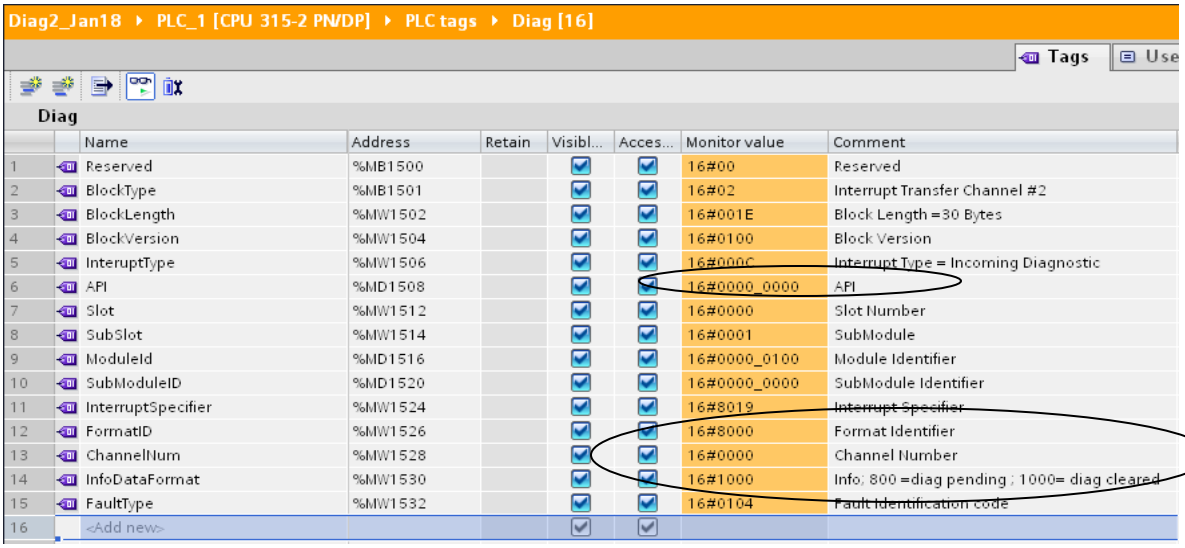
Example Siemens PLC Programming

The function RALRM was programmed in OB82. OB82 executes whenever a new diagnostic interrupt is detected. This copies the diagnostic telegram data into the AINFO area designated as a byte array beginning at address M1500. G3 diagnostics records are 34 Bytes long.



Example Diagnostic records

The diagnostic telegram data shown below was copied when G3 Valve power was switched off. Specific diagnostic information regarding module slot number, channel number, current status and fault identification code is shown.



Example Diagnostic records

The Diagnostic data generated when the PROFINET valve power switched off.

Monitor value	Comment
16#00	Reserved
16#02	Interrupt Transfer Channel #2
16#001E	Block Length =30 Bytes
16#0100	Block Version
16#000C	Interrupt Type = Incoming Diagnostic
16#0000_0000	API
16#0000	Slot Number
16#0001	SubModule
16#0000_0100	Module Identifier
16#0000_0000	SubModule Identifier
16#8019	Interrupt Specifier
16#8000	Format Identifier
16#0000	Channel Number
16#1000	Info; 800 =diag pending ; 1000= diag cleared
16#0104	Fault Identification code

Slot Number– Identifies module position in the manifold = **0 Slot 0= PROFINET NODE**

Channel Number – Identifies faulted channel
Channel = Not Applicable

Diagnostic Info = 800 = Diagnostic is pending
= **1000 = Diagnostic cleared**

Fault Identification code = Specific type of error
0104 Hex = Valve power off

Example Diagnostic records

The Diagnostic data was generated when a short circuit occurred on channel 3 of the discrete input module in slot 4.

Monitor value	Comment
16#00	Reserved
16#02	Interrupt Transfer Channel #2
16#001E	Block Length =30 Bytes
16#0100	Block Version
16#0001	Interrupt Type = Incoming Diagnostic
16#0000_0000	API
16#0004	Slot Number
16#0001	SubModule
16#0000_2020	Module Identifier
16#0000_0000	SubModule Identifier
16#A80D	Interrupt Specifier
16#8000	Format Identifier
16#0003	Channel Number
16#0800	Info; 800 =diag pending ; 1000= diag cleared
16#0110	Fault Identification code

Slot Number– Identifies module position in the manifold =
Slot 4 = 240-205 - 16Pt. Discrete Input

Channel Number – Identifies faulted channel
Channel = 3 = (Connector #3)

Diagnostic Info = **800 = Diagnostic is pending**
= 1000 = Diagnostic cleared

Fault Identification code = Specific type of error
0110 Hex = Shorted Input Connector

Diagnostic records

G3- Fault Identification hex codes

0007= Analog Input Channel Alarm High Error
0104 = Valve Power Switched Off
0105 = Shorted Coil
0106 = Open Coil
0110 = Shorted Input Connector

13. Appendix

13.1 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 23 for additional fuse sizing information.
Spike Suppression	Output spike suppression is internally provided for both discrete and valve outputs.
Discrete Outputs	Maximum 0.5 Amps per output. All outputs are short circuit protected and have internal spike suppression. Contact factory for higher current requirements.
Valve Solenoid Coil Output Drivers	Maximum 0.5 Amps per output. All output points are short circuit protected and have internal spike suppression.
Operating Temperature for Electronic Components	23 to 114°F (-5 to 50°C)

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13.2 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 **Error! Bookmark not defined.** for bit mapping rules
Valve outputs do not energize.	Output power not present or connected improperly on Auxiliary Power connector.	Check for 24VDC on the +24 VDC (Valves and Outputs) pin of the MINI Auxiliary Power connector of the Comm. module.
Unable to go to the manifold's web page.	Bad cabling, incorrect computer settings, etc.	Please see page 100
No Activity/Link LED	No network connection	Verify the type of cable (straight-thru or crossover) that is being used. Also, verify the wiring of the cable.

I/O Modules

Symptom	*Possible Cause*	*Solution*
Outputs remain on when communication is lost and/or PLC is in "Program" mode.	Communication Fault parameters are set incorrectly. See page 116.	Check the communication fault/idle mode parameter setting to ensure that it is not set to "Hold Last Output State".

13.3 Glossary of Terms

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

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

Glossary of Terms Continued

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

13.4 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