

# **PACSystems™ Versamax**

PROFINET SCANNER

USER MANUAL

# Contents

<b>Chapter 1: Introduction .....</b>	<b>1</b>
1.1 VersaMax PROFINET Scanner Overview.....	1
1.2 VersaMax PROFINET Scanner Versions .....	2
1.3 VersaMax PROFINET Scanner Specifications .....	3
1.3.1 VersaMax PROFINET Scanner Controls and Indicators .....	4
1.3.2 VersaMax PROFINET Scanner LEDs.....	4
1.3.3 Power Supply Modules .....	6
1.3.4 Ethernet Network Ports .....	7
1.3.5 USB Port.....	9
1.4 Compatible VersaMax Modules, Carriers, and Power Supplies .....	9
<b>Chapter 2: Installation .....</b>	<b>14</b>
2.1 Module Installation.....	14
2.1.1 Cable and Connector Clearance Requirements .....	15
2.2 General Installation Requirements .....	16
2.2.1 Installation in Hazardous Areas.....	16
2.2.2 ATEX Marking.....	17
2.2.3 Installing the Module on a DIN Rail .....	17
2.2.4 Removing the Module from the DIN Rail .....	17
2.2.5 Installing Power Supplies .....	19
2.3 PROFINET Scanner Power-up and Restart.....	20
2.4 LED Operation .....	20
2.4.1 Special LED Blink Patterns.....	21
2.5 Firmware Updates .....	22
2.5.1 Firmware Update for Modules in the Remote Node .....	23
<b>Chapter 3: Configuration .....</b>	<b>25</b>
3.1 Configuration Overview.....	25
3.1.1 Basic Configuration Steps.....	25
3.1.2 Configuration Tool .....	26
3.2 Adding a VersaMax PROFINET Scanner to a LAN .....	26
3.2.1 Configuring VersaMax PROFINET Scanner Parameters .....	26
3.2.2 Adding VersaMax PROFINET Scanner Power Supplies .....	27
3.2.3 Adding VersaMax Modules to a Remote Node .....	28

3.2.4	Adding Power Supplies between Modules .....	28
3.2.5	Configuring VersaMax Module Parameters .....	28
3.2.6	Configuring Analog Modules that Have Jumpers .....	30
3.3	Assigning IO-Device Names .....	32
3.4	After the Configuration is Stored to the IO-Controller .....	33
3.5	Output Operation .....	33
3.6	Clearing the IO-Controller Configuration .....	34
3.7	Replacing PROFINET Scanner Hardware .....	35
<b>Chapter 4: Diagnostics .....</b>		<b>36</b>
4.1	PROFINET Scanner Status and Control Data .....	36
4.1.1	Output Control Bits .....	36
4.1.2	Input Status Bits .....	37
4.2	Error Handling .....	37
4.2.1	Fatal Error Handling .....	38
4.2.2	PROFINET Alarms .....	38
4.2.3	Clearing Faults on VersaMax Analog Modules .....	41
4.2.4	PROFINET Module Loss, Add & Mismatch Faults .....	42
4.3	Diagnostics for BEM003 PROFIBUS DP Networks .....	43
<b>Chapter 5: Maintenance Mode .....</b>		<b>44</b>
5.1	Entering Maintenance Mode and Performing Maintenance .....	45
5.2	Exiting Maintenance Mode and Restoring Operation .....	45
5.3	Maintenance Mode Retentiveness through Power Cycle .....	46
<b>Appendix A: PROFINET Specifications .....</b>		<b>47</b>
A.1	PROFINET Protocol Support .....	47
A.2	Technical Data .....	47
A.3	Limitations .....	48

---

## Warnings, Caution Notes as Used in this Publication

---



### Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury to exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

---



### Caution

Caution notices are used where equipment might be damaged if care is not taken.

---

---

**Notes:** Notes merely call attention to information that is especially significant to understanding and operating the equipment.

---

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met during installation, operation, and maintenance. The information is supplied for informational purposes only, and Emerson makes no warranty as to the accuracy of the information included herein. Changes, modifications, and/or improvements to equipment and specifications are made periodically and these changes may or may not be reflected herein. It is understood that Emerson may make changes, modifications, or improvements to the equipment referenced herein or to the document itself at any time. This document is intended for trained personnel familiar with the Emerson products referenced herein.

Emerson may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not provide any license whatsoever to any of these patents.

Emerson provides the following document and the information included therein as-is and without warranty of any kind, expressed or implied, including but not limited to any implied statutory warranty of merchantability or fitness for particular purpose.

# Chapter 1: Introduction

This chapter provides an overview of the VersaMax PROFINET Scanner (PNS) module and its operation. This chapter also includes a list of the VersaMax modules that can be included in the VersaMax PROFINET Scanner IO-Device.

**Chapter 2**, Installation, gives instructions for module installation, panel-mounting, grounding, installing power supplies, and updating firmware. It also describes powerup and restart, and LED operation.

**Chapter 3**, Configuration, describes how to configure the PROFINET Scanner and its associated I/O devices.

**Chapter 4**, Diagnostics, describes the input and output data that can be used to monitor and control the PROFINET Scanner. This chapter also explains how the PROFINET Scanner reports errors to the control system.

**Appendix A, PROFINET Specifications**, summarizes the features specified for PROFINET v2.3 Class A IO-Devices that are supported by the VersaMax PROFINET Scanner module.

## 1.1 VersaMax PROFINET Scanner Overview

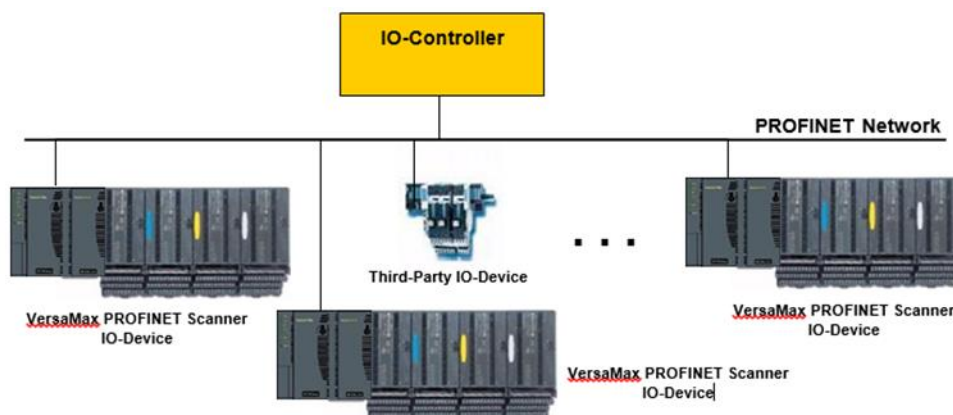
The VersaMax PROFINET Scanner (PNS) module interfaces a remote node of VersaMax modules to a PROFINET IO network. The PROFINET Scanner scans the modules in its node (retrieving input data and providing output data), publishes input data on the PROFINET network at the configured update rate, and receives data for module outputs.

The PNS manages PROFINET communication and module configuration between an IO-Controller and modules within the remote node. If network communications are lost, the PROFINET Scanner manages I/O states according to the individual module configurations.

The VersaMax PROFINET Scanner automatically converts between data formats used by VersaMax modules and the big-endian format used for PROFINET communications.

Input and Output data are coherent over a full scan of the I/O modules. All input data read from one scan of the modules is kept together and then sent over the PROFINET network. Similarly, outputs delivered on the network are sent to the I/O modules as a unit. If new outputs arrive during the writing of data to the output modules, the PNS continues to write to the outputs using the previous data until all modules have been updated before switching to the newly delivered data.

Figure 1



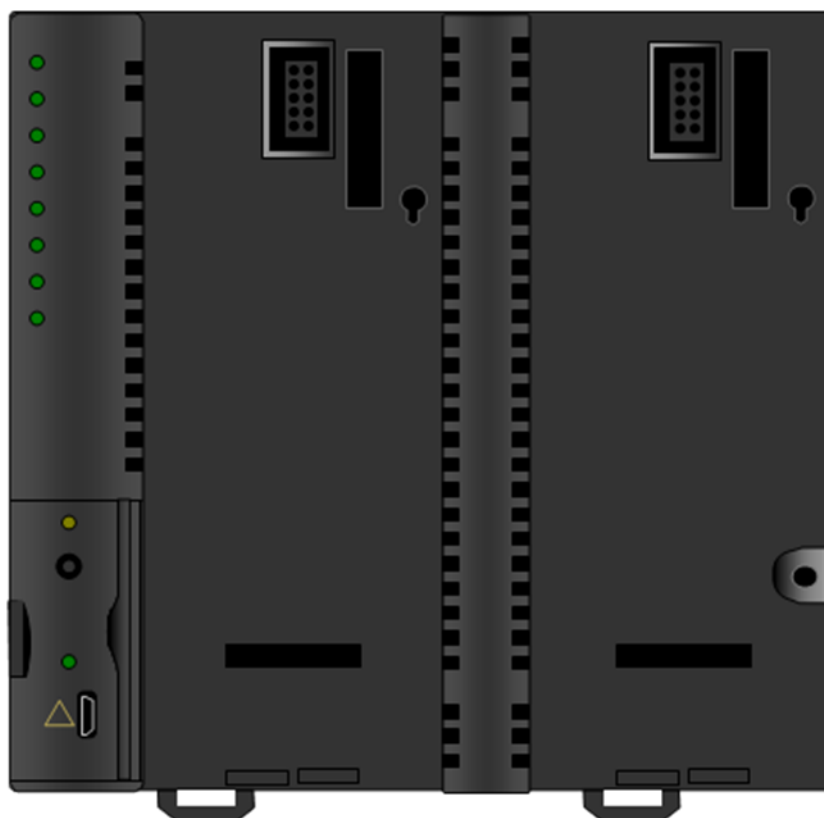
## 1.2 VersaMax PROFINET Scanner Versions

The PNS network interface module is available in two versions to allow you to use the network media that meets the requirements of your application.

IC200PNS001: Two 10/100 Mbps shielded copper RJ-45 media connectors

IC200PNS002: Two 100 Mbps SC-Duplex fiber optic media connectors

Figure 2



The PROFINET Scanner supports the use of either one or two power supplies. Use of the second power supply is optional. Power supplies mount directly onto the module and latch into place. The illustration above shows the PROFINET Scanner with no power supplies installed.

**Note:** For redundancy applications (MRP and Hot Standby CPU redundancy), it is recommended that each VersaMax PNS be installed and configured with dual power supplies.

## 1.3 VersaMax PROFINET Scanner Specifications

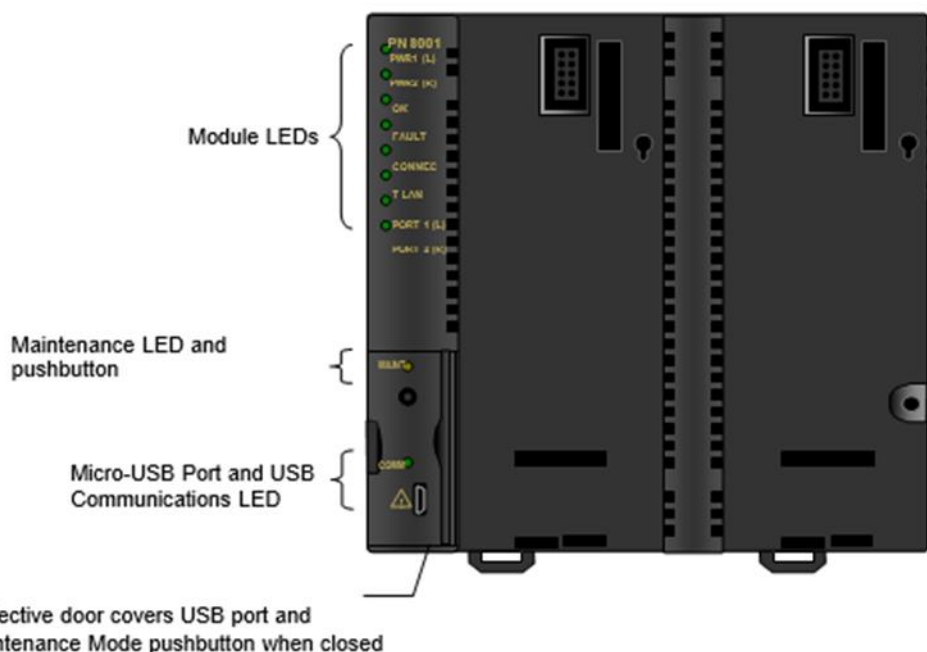
Table 1

PROFINET Support	PROFINET Version 2.3 Class A IO-Device Redundantly controlled operation conforms to PROFINET V2.3 Type S-2 System Redundancy.	
RX3i CPU Version Required	Firmware version 8.00 or later	
RX3i PNC Version Required	2.00 or later	
PAC Machine Edition Version Required	Version 8.0 or later	
Power Consumption	IC200PNS001: 0.60A at 5VDC IC200PNS002: 1.10A at 5VDC	
Module Dimensions	Height: 132mm (5.2 inches), Width: 134mm (5.28 inches)	
Carrier Required	No. Carrier is integrated into the module.	
Operating Temperature Range	0 to 60°C surrounding air temperature without a fan	
Number of Port Connectors	IC200PNS001: Two RJ-45 IC200PNS002: Two SC-Duplex	
USB Connector (for firmware upgrades)	One Micro-B connector. USB 2.0 compliant running at Full-speed (12 MHz)	
PNS Status and Control Bits	32 input status bits and 32 output control bits	
I/O Data Update on the PROFINET network	Configurable: 1ms, 2ms, 4ms, 8ms, 16ms, 32ms, 64ms, 128ms, 256ms and 512ms	
Number of IP addresses	One. Supports Classless Inter-Domain Routing (CIDR)	
Number of MAC Addresses	Three. One per external port and one internal. External MAC addresses are only used for specialized Ethernet protocols such as MRP or LLDP	
I/O Station Maximum Limits	Number of I/O Modules per station	8
	I/O data per station	2880 bytes total 1440 bytes of input data 1440 bytes of output data
RoHS Compliance	Yes	
Configuration	Configured using PAC Machine Edition when used with a PACSystems RX3i PROFINET Controller (PNC) module, as part of an RX3i PROFINET network. V2.3 GSDML file is available for import into 3rd-Party tools.	

For product standards, general operating specifications, and installation requirements, refer to the VersaMax I/O Modules Manual, GFK-1504. VersaMax PROFINET Scanner Controls and Indicators

The illustration below shows a VersaMax PROFINET Scanner with one power supply installed.

**Figure 3**



### 1.3.1 VersaMax PROFINET Scanner LEDs

#### Power Supply LEDs

Each Power Supply LED (PWR1 and PWR2) is ON solid green when a minimum level of power is being supplied on the corresponding power supply connector on the front panel of the PROFINET Scanner.

#### OK LED

The OK LED is solid green ON for normal operation and when the PNS is in Maintenance Mode. The OK LED flashes or is OFF for all other module states. If there is a failure during power-up, or a fatal error during normal operation and the scanner is not configured for automatic restart, the OK LED blinks amber in a failure pattern specific to the error.

#### FAULT LED

The FAULT LED indicates the condition of the VersaMax node. On a successful power-up, the LED is initialized to OFF. The FAULT LED remains OFF during normal operation when no PROFINET diagnosis conditions are present on the PROFINET Scanner itself, or any module in the node. When a PROFINET diagnosis condition exists, the FAULT LED turns solid amber. When all diagnosis conditions have disappeared, the FAULT LED is OFF.



The FAULT LED blinks red (0.5 seconds ON/0.5 seconds OFF) if any of the MAC addresses read from non-volatile memory on power-up are invalid. The PROFINET Scanner remains disconnected from the Ethernet network if any of its MAC addresses are invalid.

Missing, failed, or mismatched modules in the remote node do not affect the PROFINET Scanner FAULT LED.

## **CONNECT LED**

When a new PROFINET Scanner module powers up for the first time, it has no network name. The CONNECT LED slowly blinks amber to indicate that the module is not ready to use. After a name is assigned, the CONNECT LED goes OFF.

If the PROFINET Scanner has an assigned network name, the CONNECT LED is OFF after a successful power up. It turns ON solid Green when the primary IO-Controller has established communications with the module. It turns ON solid Amber when the Backup IO-Controller has established communications with the module. It turns OFF when communications are terminated.

The CONNECT LED blinks amber rapidly when the PROFINET Scanner is updating the firmware of a module in the remote node, or the PROFINET Scanner is in Maintenance Mode, indicating that all PROFINET connections are blocked.

## **LAN LED**

The LAN LED blinks ON when the module is actively processing Ethernet packets (Tx/Rx). The LAN LED is OFF if there is no activity.

## **Port LEDs (10/100 Mbps and Link/Activity)**

The two Port LEDs indicate link speed, link connection and link activity on the Ethernet ports. Green indicates the associated port is connected at 100Mbps. Amber indicates the associated port is connected at 10Mbps. If a PORT LED is solid ON, the port is connected but is not currently receiving or transmitting Ethernet frames. A Port LED blinks when Ethernet frames are actively being transmitted or received. A Port LED is OFF if its associated Ethernet port is not connected to an Ethernet switch.

## **MAINT LED**

The MAINT LED indicates whether the VersaMax PNS is in Maintenance Mode. The MAINT LED blinks amber (0.5 seconds ON/0.5 seconds OFF) when the PNS is in Maintenance Mode. The LED is OFF when the PNS is working normally. For details on Maintenance Mode operation, see chapter 5.

## **COMM LED**

The COMM LED is OFF when a USB connection is not established and ON when the link with a computer is ready. The COMM LED flashes green when there is traffic such as Winloader activity on the port.

## MAINT Switch

The MAINT pushbutton switch can be used to place the VersaMax stick in Maintenance mode. This switch is located behind the door on the front panel of the PNS to prevent accidental operation.

To change from Normal Mode to Maintenance Mode, press and hold the MAINT pushbutton for at least 3 seconds. To exit Maintenance Mode and re-enter Normal Mode, press and hold the for at least 3 seconds. The new mode will be entered while the pushbutton is depressed. the MAINT LED indicates when the new mode is active. Any single press of the pushbutton causes

only a single Mode change, regardless of how long the pushbutton is depressed. The PNS does not change its mode of operation until the pushbutton has been released for at least 0.5

seconds before it is pushed down for another 3 seconds. For details on Maintenance Mode operation see chapter 5.

### 1.3.2 Power Supply Modules

The PROFINET Scanner can accommodate either one power supply or two redundant power supplies. If only one power supply is used, it can be installed in either location on the module.

Each power supply location that is used should be included in the configuration. Configured power supplies will alarm if they are not providing proper voltage. Be sure the installed power supply matches the configuration.

If two power supplies are installed, they serve as redundant backups for each other. A mix of AC and DC supplies is supported, but both should be isolated or both non-isolated. Either one of the power supplies must be capable of supplying all the power required by the node. The two supplies do not share the load cooperatively.

For PROFINET Scanners included in an RX3i PROFINET Controller configuration, PAC Machine Edition automatically calculates whether the power supply or supplies in the configuration can provide all the power that might be needed by the modules in the remote node. However, if the remote node is configured by a third-party IO-Controller, this error checking is not available.

---

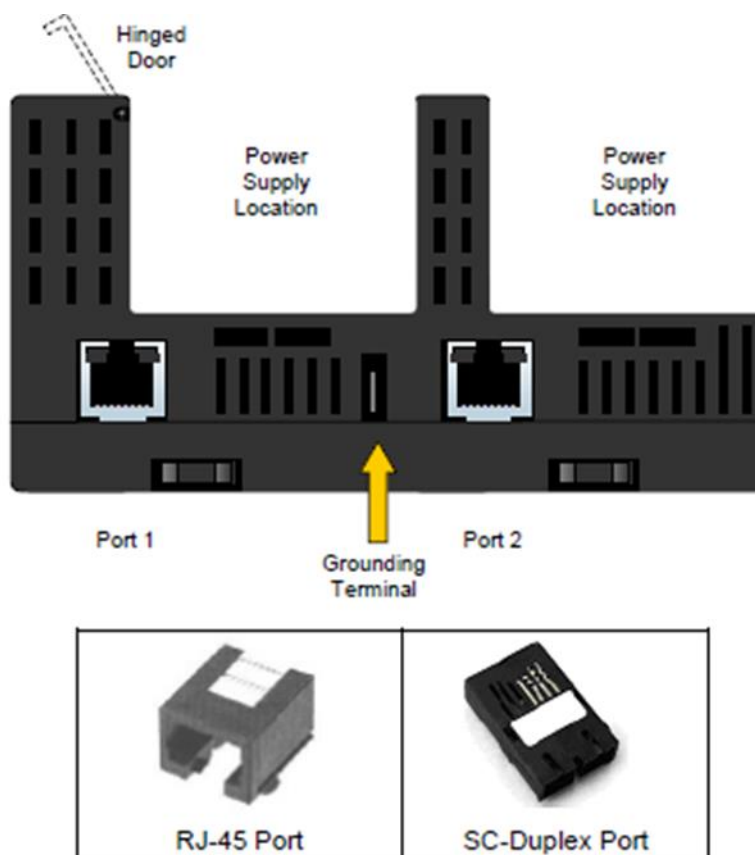
**Note:** For redundancy applications (MRP and Hot Standby CPU redundancy), it is recommended that each VersaMax PNS be installed and configured with dual power supplies.

---

### 1.3.3 Ethernet Network Ports

The two external Ethernet ports are on the bottom of the module. The illustration below is a bottom view of IC200PNS001 with its two RJ-45 ports

**Figure 4: Bottom view of IC200PNS001 with two RJ-45 Ports**



Model IC200PNS001 has two RJ-45 ports, providing 10/100 Mbps copper interfaces. Model IC200PNS002 has two SC-Duplex ports, providing 100Mbps Multi-Mode fiber interfaces. Each Ethernet port automatically senses the type of network and adjusts speed and connection parameters. The PROFINET Scanner requires at least one network be operating at full duplex for a connection to remain established. The PROFINET protocol may be sent and received over either or both two external ports.

Devices connected to the PROFINET Scanner ports should have Ethernet Autonegotiation enabled unless the IO-Controller supports configuring the port operation mode. If the IO-Controller configures the PROFINET Scanner port to a specific setting with autonegotiation disabled, the device connected to the PROFINET Scanner must be configured for the exact same setting.

#### **⚠ CAUTION**

Both ports on the Ethernet Interface must not be connected, directly or indirectly, to the same device to form a circular network unless Media Redundancy is enabled with one node actively set up as the Media Redundancy Manager.

The PROFINET Scanner supports the following network media type and distances.

**Table 2**

Media Type	Connector Type	Wavelength (nm)	Media Type	Core Size(μm)	Modal Bandwidth (MHz – Km)	Distance (m)
100BASE-FX	SC or SC-Duplex	1300	MMF	62.5	500	2 – 2,000 (Full-Duplex) 2 – 400 (Half-Duplex)
				50	400	
				50	500	
10/100BASE-T	RJ45	-	CAT5/ CAT5e/ CAT6	-	-	100 (maximum)

VersaMax PNS modules and other participating modules can be connected in a daisy-chain/line, star, or ring (redundant media) topology.

## VLAN Priority Settings for the PROFINET Scanner

The VersaMax PNS supports VLAN Priorities as well as incoming traffic that does not include a VLAN header. The Ethernet switch in the PROFINET Scanner supports two traffic classes, assigning VLAN Priorities to these classes based on whether rapid arrival of the traffic is critical to the system, or less important.

**Table 3**

VLAN Priority	Preference / Traffic Class
7, 6, 5	Realtime (High Priority). This includes the following Ethernet traffic: PTCIP, MRP, MRRT, RT_CLASS_2, RT_CLASS_1, RT_CLASS_UDP, High Priority RTA_CLASS_1, High Priority RTA_CLASS_UDP, Low Priority RTA_CLASS_1, Low Priority
4, 3, 2, 1, 0	Non-realtime (Lower Priority), This includes the following Ethernet traffic: IP, DCP, other untagged traffic

An external switch that supports only two traffic queues must be configured like the PROFINET Scanner, as listed in the table above. An external switch that does not support a VLAN priority mapping that exactly matches the mapping used by the VersaMax PROFINET Scanner can be used if it can be configured with the following relationships between VLAN priorities:

- VLAN Priority 7 is forwarded with at least as much preference as VLAN Priority 6.
- VLAN Priority 6 is forwarded with at least as much preference as VLAN Priority 5.
- VLAN Priority 5 is forwarded with more preference than VLAN Priorities 0, 1, 2, 3 and 4.

If the external switch does not allow VLAN priority 4 to be treated differently from priority 5, it should be used only if no device on the network will generate VLAN Priority 4 Ethernet Traffic.

## Media Redundancy Protocol Support

PROFINET Media Redundancy Protocol (MRP) supports devices configured in a ring topology. It is based on the functions of IEC62439. Media Redundancy Protocol is not routable between different IP subnets.

Each device within a Redundant Media network has at least two physical pathways to two other devices on the network. To connect to the ring, each device requires an integrated switch with at least two external ports (ring ports) that support Media Redundancy Protocol. Devices that are not MRP-capable can be connected to a device like an MRP-capable switch in the ring, but they cannot be in the ring themselves. The redundant paths only extend to the devices on the ring that are MRP-capable and enabled.

One of the devices on the ring must be configured as the Media Redundancy Manager (MRM), and all the other devices must be configured as Media Redundancy Clients (MRCs). The PNS can be configured to be an MRC. Configuring the PNS as an MRC alters how the Ethernet ports connect to the network. They attempt to indicate their state to the MRM before allowing traffic to flow between the ports and close the ring topology through the internal switch. They also send out notifications to the MRM when a port is lost. Operation of the PNS is otherwise unchanged.

### 1.3.4 USB Port

The USB port, located behind the hinged door on the front of the PROFINET Scanner, can be used to connect a computer for firmware updates for the PROFINET Scanner, and for modules in the remote node that support indirect firmware updates. The USB port accepts a standard USB cable (USB Micro B Male to USB Type A Male, not included). The port must be set up before using it, as described in chapter 2.

---

**Note:** The USB port is for firmware upgrades only. It is not intended for permanent connection.

---

## 1.4 Compatible VersaMax Modules, Carriers, and Power Supplies

The following modules can be used in a VersaMax PROFINET Scanner IO-Device:

Catalog Number	Module Description	Supported Versions
IC200ALG230	Analog Input Module, 12 Bit Voltage/Current 4 Channels	All
IC200ALG240	Analog Input Module, 16 Bit Voltage/Current, 1500VAC Isolation, 8 Channels	1.25 and later
IC200ALG260	Analog Input Module, 12 Bit Voltage/Current 8 Channels	All
IC200ALG261	Analog Input Module, 15 Bit Voltage Differential 8 Channels	All
IC200ALG262	Analog Input Module, 15 Bit Current Differential 8 Channels	All
IC200ALG263	Analog Input Module, 15 Bit Voltage 15 Channels	All

Catalog Number	Module Description	Supported Versions
IC200ALG264	Analog Input Module, 15 Bit Current 15 Channels	All
IC200ALG265	Analog Input 15 Bit Voltage 15Ch with enhanced over voltage protection	All
IC200ALG266	Analog Input 15 Bit Current 15Ch with enhanced over voltage protection	All
IC200ALG320	Analog Output Module, 12 Bit Current, 4 Channels	All
IC200ALG321	Analog Output Module, 12 Bit Voltage 4 Channels. 0 to +10VDC Range	All
IC200ALG322	Analog Output Module, 12 Bit Voltage 4 Channels. -10 to +10VDC Range	All
IC200ALG325	Analog Output Module, 13 Bit Voltage 8 Channels	All
IC200ALG326	Analog Output Module, 13 Bit Current 8 Channels	All
IC200ALG327	Analog Output Module, 13 Bit Voltage 12 Channels	All
IC200ALG328	Analog Output Module, 13 Bit Current 12 Channels	All
IC200ALG331	Analog Output Module, 16 Bit Voltage/Current, 1500VAC Isolation, 4 Channels	1.25 and later
IC200ALG430	Analog Mixed Module, Input Current 4 Channels, Output Current 2 Channels	All
IC200ALG431	Analog Mixed Module, 0 to +10VDC Input 4 Channels, Output 0 to +10VDC 2 Channels	All
IC200ALG432	Analog Mixed Module, 12 Bit -10 to +10VDC, Input 4 Channels / Output -10 to +10VDC 2 Channels	All
IC200ALG620	Analog Input Module, 16 Bit RTD, 4 Channels	1.25 and later
IC200ALG630	Analog Input Module, 16 Bit Thermocouple, 7 Channels	1.25 and later
IC200BEM003	PROFIBUS DP Master	All
IC200CBL105	2 connectors, 0.5m, no shield	All
IC200CBL110	2 connectors, 1.0m, no shield	All
IC200CBL120	2 connectors, 2.0m, no shield	All
IC200CBL230	1 connector, 3.0m, no shield	All
IC200CHS001	Barrier-Style Terminal I/O Carrier	All

Catalog Number	Module Description	Supported Versions
IC200CHS002	Box-Style Terminal I/O Carrier	All
IC200CHS003	Connector-Style I/O Carrier	All
IC200CHS005	Spring-Style Terminal I/O Carrier	All
IC200CHS006	Communications Carrier	All
IC200CHS011	Barrier-Style Interposing I/O Terminals	All
IC200CHS012	Box-Style Interposing I/O Terminals	All
IC200CHS014	Thermocouple-Style Interposing I/O Terminals	All
IC200CHS015	Spring-Style Interposing I/O Terminals	All
IC200CHS022	Compact Box-Style I/O Carrier	All
IC200CHS025	Compact Spring-Style I/O Carrier	All
IC200CHS101	Disconnect-Style Interposing I/O Terminals, Main Base.	All
IC200CHS102	Disconnect-Style Interposing I/O Terminals, Expansion Base	All
IC200CHS111	Relay-Style Interposing I/O Terminals, Main Base.	All
IC200CHS112	Relay-Style Interposing I/O Terminals, Expansion Base	All
IC200CHS121	Fuse-Style Interposing I/O Terminals, Main Base.	All
IC200CHS122	Fuse-Style Interposing I/O Terminals, Expansion Base	All
IC200CMM020	Serial Communications Module (Modbus RTU Master)	All
IC200MDD840	Mixed 24VDC Positive Logic Input Grouped 20 Point / Output Relay 2.0A per Point Grouped 12 Point Module	All
IC200MDD841	Mixed Module, 24VDC Positive Logic Input 20 Points / Output 12 Point / (4) High Speed Counter, PWM, or Pulse Train Configurable Points	1.22 and later
IC200MDD842	Mixed 16 Point Grouped Input 24VDC Pos/Neg Logic / 16 Pt Grouped Output 24VDC Pos. Logic 0.5A w/ESCP	All
IC200MDD843	Mixed 24VDC Positive Logic Input Grouped 10 Point / Output Relay 2.0A per Point 6 Point Module	All
IC200MDD844	Mixed 24 VDC Pos/Neg Logic Input Grouped 16 Point / Output 12/24VDC Pos. Logic 0.5A 16 Point Module	All
IC200MDD845	Mixed 16 Point Grouped Input 24VDC Pos/Neg Logic / 8 Pt Relay Output 2.0A per Pt Isolated Form A	All
IC200MDD846	Mixed 120VAC Input 8 Point / Output Relay 2.0A per Point 8 Point Module	All
IC200MDD847	Mixed 240VAC Input 8 Point / Output Relay 2.0A per Point 8 Point Module	All

Catalog Number	Module Description	Supported Versions
IC200MDD848	Mixed 120VAC Input 8 Point / Output 120VAC 0.5A per Point Isolated 8 Point Module	All
IC200MDD849	Mixed 120VAC In Isolated 8 Point / Output Relay 2.0A Isolated 8 Point Module	All
IC200MDD850	Mixed 240VAC In Isolated 4 Point / Output Relay 2.0A Isolated 8 Point Module	All
IC200MDD851	Mixed 5/12VDC Input Group 16Pt / Output 12/24VDC Group 16 Point	All
IC200MDL140	Input 120VAC 8 Point Grouped Module	All
IC200MDL141	Input 240VAC 8 Point Grouped Module	All
IC200MDL143	Input 120VAC 8 Point Isolated Module	All
IC200MDL144	Input 240VAC 4 Point Isolated Module	All
IC200MDL240	Input 120VAC (2 Groups of 8) 16 Point Module	All
IC200MDL241	Input 240VAC (2 Groups of 8) 16 Point Module	All
IC200MDL243	Input 120VAC 16 Point Isolated Module	All
IC200MDL244	Input 240VAC 8 Point Isolated Module	All
IC200MDL329	Output 120VAC 0.5A per Point Isolated 8 Point Module	All
IC200MDL330	Output 120VAC 0.5A per Point Isolated 16 Point Module	All
IC200MDL331	Output 120VAC 2.0A per Point Isolated 8 Point Module	All
IC200MDL631	Input 125VDC Positive/Negative Logic Grouped 8 Point Module	All
IC200MDL632	Input 125VDC Positive/Negative Logic Grouped 16 Point Module	All
IC200MDL635	Input 48VDC Positive/Negative Logic Grouped 16 Point Module	All
IC200MDL636	Input 48VDC Positive/Negative Logic Grouped 32 Point Module	All
IC200MDL640	Input 24VDC Positive/Negative Logic (2 Groups of 8) 16 Point Module	All
IC200MDL643	Input 5/12VDC (TTL) Positive/Negative Logic 16 Point Module	All
IC200MDL644	Input 5/12VDC (TTL) Positive/Negative Logic Grouped 32 Point Module	All



<b>Catalog Number</b>	<b>Module Description</b>	<b>Supported Versions</b>
IC200MDL650	Input 24VDC Positive/Negative Logic (4 Groups of 8) 32 Point Module	All
IC200MDL730	Output 24VDC Positive Logic 2.0A per Point (1 Group of 8) w/ESCP 8 Point Module	All
IC200MDL740	Output 12/24VDC Positive Logic 0.5A per Point (1 Group of 16) 16 Point Module	All
IC200MDL741	Output 24VDC Positive Logic 2.0A per Point (1 Group of 16) w/ESCP 16 Point Module	All
IC200MDL742	Output 24VDC Positive Logic 0.5A per Point (2 Groups of 16) w/ESCP 32 Point Module	All
IC200MDL743	Output 5/12/24VDC Negative Logic 0.5A per Point (1 Group of 16) 16 Point Module	All
IC200MDL744	Output 5/12/24VDC Negative Logic 0.5A per Point (2 Groups of 16) 32 Point Module	All
IC200MDL750	Output 12/24VDC Positive Logic 0.5A per Point (2 Groups of 16) 32 Point Module	All
IC200MDL930	Output Relay 2.0A per Point Isolated Form A 8 Point Module	All
IC200MDL940	Output Relay 2.0A per Point Isolated Form A 16 Point Module	All
IC200PWB001	Power Supply Booster Carrier	All
IC200PWR002	24VDC Expanded 3.3V Power Supply	All
IC200PWR012	24VDC Expanded 3.3V Isolated Power Supply	All
IC200PWR102	120/240VAC Expanded 3.3V Power Supply	All
IC200TBM001	Barrier-Style Auxiliary I/O Terminal Strip	All
IC200TBM002	Box-Style Auxiliary I/O Terminal Strip	All
IC200TBM005	Spring-Style Auxiliary I/O Terminal Strip	All

# Chapter 2: Installation

This chapter describes:

- Module Installation
  - Installing the Module on a DIN Rail
  - Removing the Module from the DIN Rail
  - Panel-Mounting
  - Grounding
  - Installing Power Supplies
- PROFINET Scanner Powerup and Restart
- LED Operation
  - Special LED Blink Patterns
- Firmware Updates
  - Installing the USB Port Driver

## 2.1 Module Installation

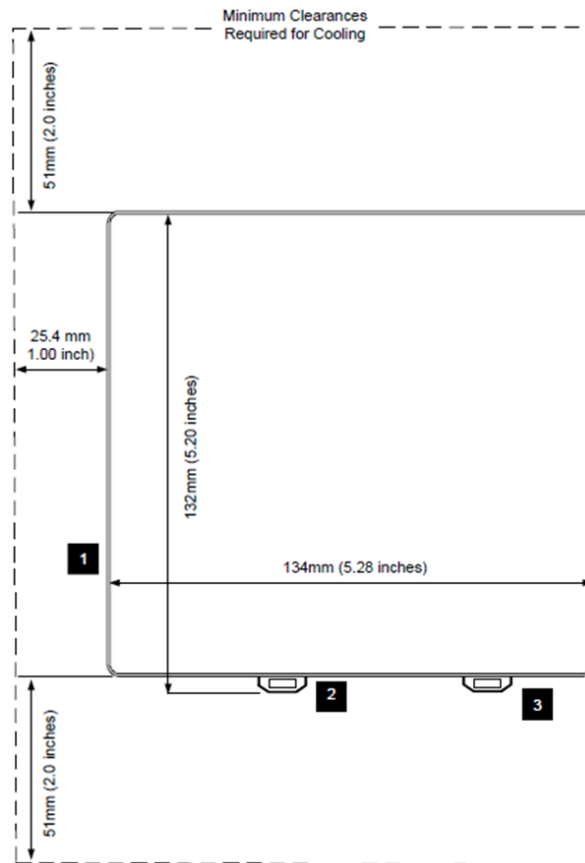
Modules must be mounted on a DIN rail. The PROFINET Scanner module with power supply attached fits into a 70mm deep enclosure.

Rated thermal specifications are based on a minimum clearance of 5.1cm (2in) above and below the equipment and 2.54cm (1in) to the left of the PNS module.

In addition to clearances required for cooling, space must be allowed for the following requirements

1. Allow enough finger clearance for opening the PNS door.
2. Allow adequate clearance for communications port cables. For an example, see page 2-3.
3. Allow adequate clearance for power wiring

Figure 5



## 2.1.1 Cable and Connector Clearance Requirements

You may need to allow more space for installation of cables and connectors than what is required for heat dissipation. To avoid impacting mechanical reliability and signal quality, cable installation must comply with the minimum bend radius specified by the cable manufacturer.

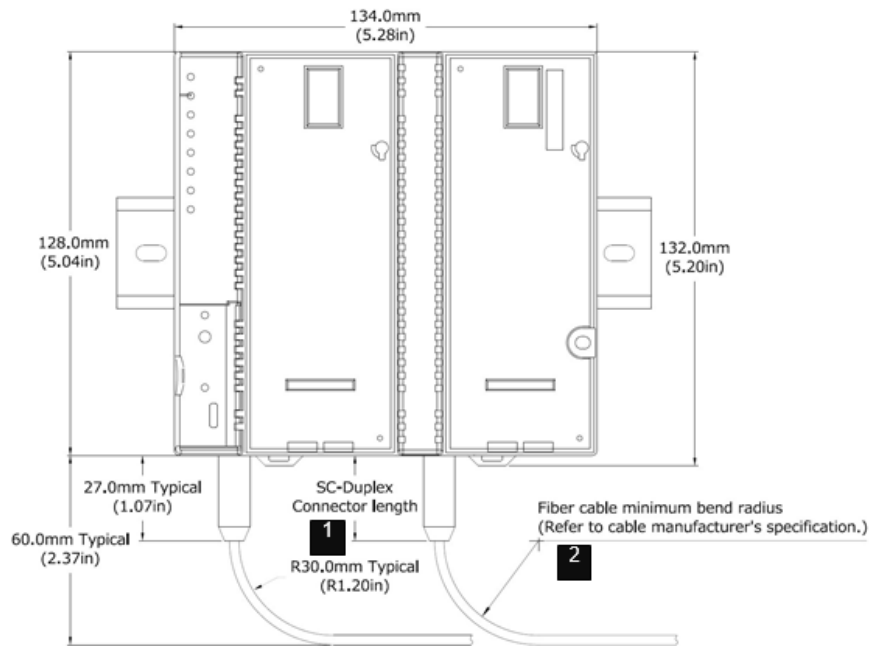
### Cable Clearance Example

In this example, a PNS002 module is installed with a fiber optic cable that has the following characteristics

1. SC-Duplex connector length: 27mm (1.07 inches)
2. Manufacturer-recommended long-term minimum bend radius: 30mm (1.2 inches)

The minimum clearance required to insert the connector into a port is 57mm (2.27 inches). Additional clearance is recommended to provide physical access. In the case of the PNS002, the space required for cabling will be greater than the space required to meet thermal ratings.

Figure 6



## 2.2 General Installation Requirements

This product is intended for use with the Product Sub Family system. Its components are considered open equipment (having live electrical parts that may be accessible to users) and must be installed in an ultimate enclosure that is manufactured to provide safety. As a minimum, the enclosure shall provide a degree of protection against solid objects up to 12mm (e.g. fingers). This equates to a NEMA/UL Type 1 enclosure or an IP20 rating (IEC60529) providing at least a pollution degree 2 environment.

### 2.2.1 Installation in Hazardous Areas

The following information is for products bearing the UL marking for Hazardous Locations or ATEX marking for explosive atmospheres:

- EQUIPMENT LABELED WITH REFERENCE TO CLASS I, GROUPS A, B, C & D, DIV.2 HAZARDOUS LOCATIONS IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D OR NON-HAZARDOUS LOCATIONS ONLY
- Equipment labeled with  $\text{Ex}$  II 3 G is suitable for use in Group 2 Category 3 environments.

### ⚠ WARNING

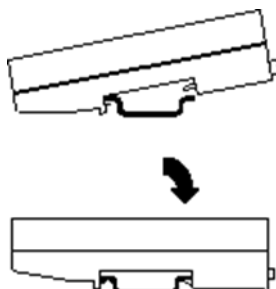
- Explosion hazard - Substitution of components may impair suitability for class I, Division 2;
- Explosion hazard - When in hazardous locations, turn off power before replacing or wiring modules; and
- Explosion hazard - Do not disconnect equipment unless power has been switched off or the area is known to be nonhazardous.
- Explosion hazard - USB port is only for use in nonhazardous locations, do not use unless area is known to be non-hazardous.

## 2.2.2 ATEX Marking

Ex II 3 G Ex nA IIC T5 X 0C<Ta>60C

## 2.2.3 Installing the Module on a DIN Rail

Figure 7



The PROFINET Scanner and connecting carriers must be installed on the same section of 35 mm x 7.5 mm DIN rail. The rail must have a conductive (unpainted) finish for proper grounding. For best resistance to vibration, the DIN rail should be installed on a panel using screws spaced approximately 6 inches (5.24 cm) apart.

Modules snap easily onto the DIN rail. No tools are required for mounting or grounding to the rail.

## 2.2.4 Removing the Module from the DIN Rail

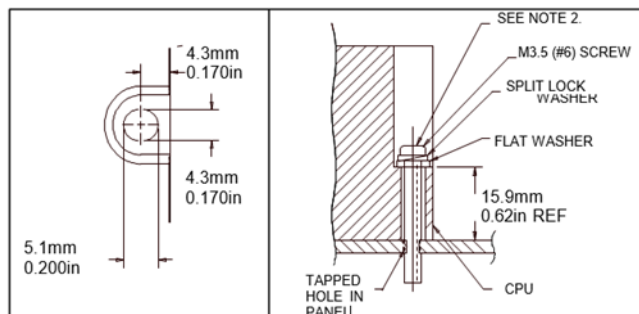
1. If the module is attached to the panel with a screw, remove the screw.
2. Slide the module along the DIN rail away from the other modules until the connector disengages.
3. With a small flathead screwdriver, pull the DIN rail latch tab outward while tilting the other end of the module down to disengage it from the DIN rail.

## Panel Mounting

For applications requiring maximum resistance to mechanical vibration and shock, the PROFINET scanner must also be panel-mounted.

**Note:** 1) Tolerances on all dimensions are  $\pm 0.13\text{mm}$  (0.005 in) non-cumulative.  
2) 1.1–1.4Nm (10–12 in/lbs) of torque should be applied to M3.5 (#6-32) steel screw threaded into material containing internal threads and having a minimum thickness of 2.4mm (.093in).

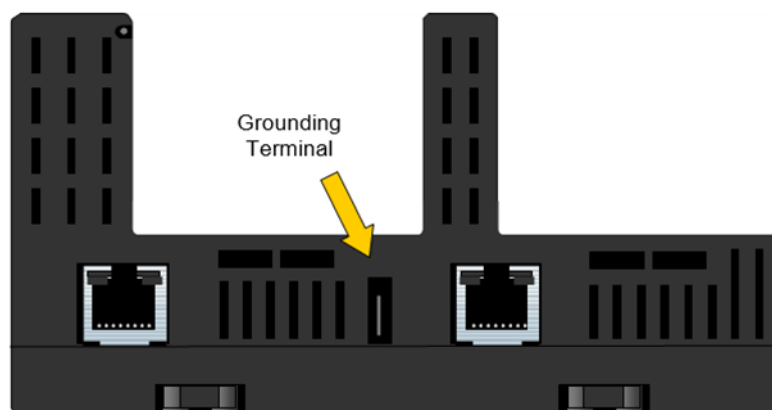
**Figure 8**



## Grounding

The VersaMax PROFINET Scanner has a separate shield ground connection to provide shielding for its two ports. Attach a wire with a stab-on connector to the grounding terminal on the bottom of the module.

**Figure 9**

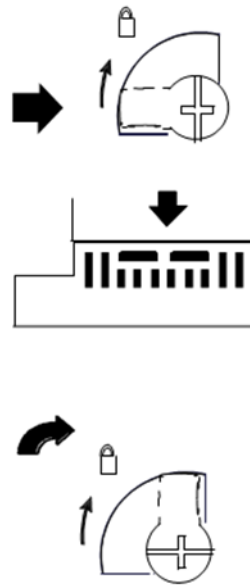


Connect a ring terminal on the other end of the wire to a grounded enclosure. Where the ring terminal contacts a painted enclosure panel, either install a star lock washer between the terminal and the panel to cut through the paint, or scrape the paint away down to clean, bare metal to ensure a good contact.

**Note:** The star lock washer method is suitable for a shield ground, but not suitable for a safety ground.

## 2.2.5 Installing Power Supplies

Figure 10: Depiction of Latch Mechanism



The latch on the power supply must be in the unlocked position, as illustrated. Power supplies can be installed in either or both locations on the PROFINET Scanner,

Align the connectors and the latch post and press the power supply module down firmly, until the two tabs on the bottom of the power supply click into place. Be sure the tabs are fully inserted in the slots.

Turn the latch to the locked position to secure the power supply.

To remove a Power Supply module from the PROFINET Scanner, the source power into the power supply module must be turned Off. The lever must be rotated to the unlocked position before detaching the Power Supply module.

---

**Note:** If only one power supply is used, an, IC200ACC200 Empty Filler module may be installed in the empty power supply slot.

---

### Installing a Redundant Power Supply

A redundant power supply can be installed on the PROFINET Scanner without disrupting system operation:

1. Turn off the source power to the power supply that will be installed.
2. Without disturbing the operating power supply module, install the redundant power supply module in the PROFINET Scanner's empty power supply location.
3. Turn on the power source to the redundant supply, and check the PWR LED on the PROFINET Scanner to be sure it is supplying power.

---

**Note:** *Isolated power supplies should not be mixed with non-isolated power supplies. If an isolated power supply is applied to a power slot on PNS or a booster carrier, all power supplies in that stick should be isolated power supplies. There is no restriction on mixing non-isolated AC with non-isolated DC power supplies on either the PNS or a booster.*

---

## Swapping a Redundant Power Supply

If two power supplies are installed on the PROFINET Scanner and the power sources to both can be turned off independently, either one can be removed or replaced without disrupting system operation.

1. Check the PWR LEDs on the PROFINET Scanner to be sure that the module that is not being removed is currently supplying power.
2. Turn off the power source of the power supply module that will be removed.
3. Wait until the PWR LED for the module that is being removed goes off.
4. Remove the power supply as described above.

Do not attempt to do this if there is only one power supply, or if there are two power supplies with the same power source, requiring both to be powered down. Otherwise, the PROFINET Scanner may lose power and turn off.

## 2.3 PROFINET Scanner Power-up and Restart

When power is applied to the PROFINET Scanner, it loads a firmware image. The PWR1 and/or PWR2 LEDs are green and steadily ON.

During the power-up/reset process, the module runs diagnostics and initializes its hardware components.

After completing power-up sequence, the OK LED changes to green, steadily ON. If a fatal error occurs during powerup, the LED blinks instead.

If the module encounters a hardware failure, invalid firmware image, or the powerup diagnostics fail, the module will not become operational or may enter firmware update mode. Cycling power to the module may restore operation. If not, the module should be returned to Emerson.

## 2.4 LED Operation

The following table summarizes the operation of the VersaMax Scanner's LEDs:

**Table 4**

LED	Color	State	Indication
PWR1	Green	On, Solid	Power supply has power
PWR2	---	OFF	No power applied
OK	Green	On, Solid	PROFINET Scanner module is OK
	Amber	Fast Blink	Diagnostic data for a fatal error is being saved. When this completes, a fatal error blink-code is displayed or the module resets itself, depending on how it has been configured.



LED	Color	State	Indication
	---	OFF	PROFINET Scanner has unrecoverable fault.
FAULT	Amber	On, Solid	Fault detected within the PROFINET Scanner or on a VersaMax module. PROFINET diagnosis data is available.
	Red	Slow Blink	Invalid MAC addresses (Indicates an error if any MAC address is bad.)
	---	Off	No faults detected
CONNECT	Green	On, Solid	Connected: Primary PROFINET application relationship (AR) has been established to this device.
	Amber	Slow Blink	The PROFINET Scanner has not been assigned a name.
		Fast Blink	PROFINET connection is being blocked because PROFINET Scanner is updating the firmware of a module in the node or PROFINET Scanner is in Maintenance mode.
		On, Solid	Connected: Backup PROFINET application relationship (AR) has been established to this device.
	---	Off	Not connected
LAN	Green	Irregular Blink	Activity (this node). Network interface is processing packets.
	---	OFF	No activity
PORT 1 PORT 2	Green	On, Solid	Link connected 100 Mbps
		Irregular Blink	Activity (this port) 100 Mbps
	Amber	On, Solid	Link connected 10 Mbps
		Irregular Blink	Activity (this port) 10 Mbps
	---	OFF	No link
MAINT	Amber	Slow Blink	Maintenance Mode enabled. Power to backplane modules is
		Off	Normal operation
COMM	Green	Irregular Blink	USB Port activity
		ON, solid	USB connection is active, but no data is being transferred
	---	Off	No activity on USB port

## 2.4.1 Special LED Blink Patterns

Multiple LEDs can blink in patterns that indicate special conditions:

**Table 5**

OK, FAULT, CONNECT, LAN, PORT 1 / PORT 2	The OK, CONNECT, FAULT, LAN, Port 1 and Port 2 LEDs flash amber once. The OK LED blinks an error. code in amber. The pattern is repeated until the module is reset or power-cycled.	Fatal Error See below.
PORT 2 / PORT 1, LAN, CONNECT, FAULT, OK	The LEDs listed at left go On (green) in order, from bottom to top. After the top LED (OK) has been ON for about 50 ms, the LEDs go Off from top to bottom, until all . of the LEDs are Off. After all the LEDs have been Off for about 50 ms, the pattern is repeated.	Module Identification requested. See below.
OK, FAULT,	These LEDs slow blink green in unison.	Firmware Update Mode

CONNECT, LAN, PORT 1, PORT 2		See below
OK, FAULT, CONNECT, LAN, PORT 1, PORT 2	These LEDs slow blink amber in unison.	Firmware Update Mode (bootloader update mode)

## Fatal Error Blink Pattern

If the PROFINET Scanner detects a fatal error, it attempts to write diagnostic data to nonvolatile storage. The OK LED fast blinks amber. If the module has been configured to blink fatal error codes, it starts blinking the error code after writing the diagnostic data to nonvolatile storage. The OK, FAULT, CONNECT, LAN, Port 1 and Port 2 LEDs flash amber once to indicate the start of the error code. After a pause, the OK LED blinks a 2-digit hexadecimal error code. The OK LED first blinks to indicate the most significant error digit, then after a one-second pause blinks again to indicate the least significant error digit. Repetitions continue until the module is reset or power-cycled.

## Module Identification LED Pattern

The Identification LED blink pattern described above can be used to locate and/or identify a PROFINET Scanner, for example, when assigning its Device Name. PAC Machine Edition or any DCP client can be used to command the module to begin or end the blink pattern.

## Firmware Update Mode Blink Patterns

Blink patterns described in the table above indicate that a firmware update of the PROFINET scanner is underway. Because the update is being done through the USB port, the USB LED also blinks to indicate activity on the USB port.

## 2.5 Firmware Updates

The PROFINET Scanner enters firmware update mode when commanded to do so from the Winloader update utility, or if a firmware component is corrupt or invalid.

In firmware update mode, the PROFINET Scanner module blinks its LEDs in a special pattern as described previously, and its Ethernet ports are not operational.

If the PROFINET Scanner is currently in use by an IO-Controller and the controller is in Run mode, all attempts to update the PROFINET scanner firmware are rejected.

If the PROFINET Scanner has experienced a fatal error, the module goes to an LED blink-code error condition and does not communicate with Winloader, causing Winloader to return a timeout failure indication. The module must be restarted or power-cycled before reattempting the update.

When the firmware update is completed and the PROFINET Scanner is rebooted, its previous connections are re-established and control resumes.

## 2.5.1 Firmware Update for Modules in the Remote Node

VersaMax modules in the remote node that support firmware updates can be updated via the PROFINET Scanner using Winloader. The computer running Winloader attaches to the USB port on the PROFINET Scanner. The module being updated is described by its slot location in the VersaMax node.

A module cannot be updated while the PROFINET Scanner is actively communicating with an IO Controller that is in Run mode. If the IO Controller is not in Run mode, communications with the IO Controller are stopped, the update proceeds, and communications are rejected until the update is complete.

During the I/O module firmware upgrade process, the CONNECT LED blinks Amber to indicate that the PROFINET connections are being blocked for the update. The module's Ethernet ports remain operational and its other LEDs continue to operate normally. The PROFINET Scanner sets module outputs to their configured defaults.

When the firmware update on a module has completed, previous connections are re-established and control resumes.

### Installing the USB Port Driver

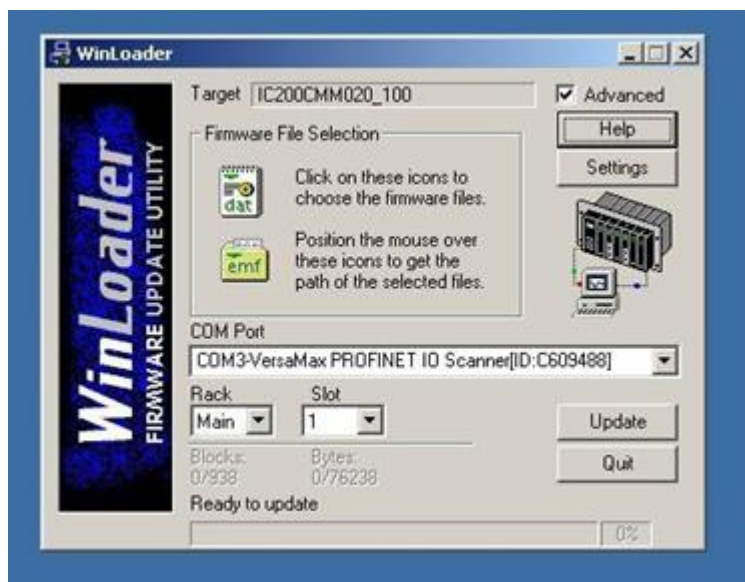
The USB port is only used for firmware updates. USB driver files are provided as part of upgrade packages compatible with the PROFINET Scanner.

With the provided installation files accessible on either a local or network drive, connect the computer's USB port to the VersaMax PROFINET Scanner's USB port. When requested, direct the installation to the proper location of the installation files.

The serial port name is COM followed by the next available number from 1 to 256. After the computer assigns the USB port a COM port number, that computer uses the same COM port number each time it connects to that Scanner module.

During firmware upgrades, Winloader will display the COM port name followed by the serial number of the PROFINET Scanner as shown on the right power supply slot. For example

Figure 11



In this example, Winloader shows that COM3 is a VersaMax PROFINET IO Scanner with serial number C609488.

**Note:** When connecting the USB cable to the PROFINET Scanner, you may receive a warning for installing a driver that has not passed Windows Logo testing. Because each Scanner has a different serial number, the operating system recognizes each driver installation as different.

## Chapter 3: Configuration

This chapter provides general information for configuring a VersaMax PNS and its IO modules in a PROFINET-IO network. For information on configuring the PROFINET IO-Controller and its network, refer to the IO-Controller manufacturer's documentation.

---

**Note:** To configure a VersaMax PNS in an RX3i Controller system, refer to the PACSystems RX3i PROFINET Controller Manual, GFK-2571

---

This chapter discusses the following topics:

### Configuration Overview

- Basic Configuration Steps
  - Configuration Tool
- Adding a VersaMax PROFINET Scanner to a LAN
  - Configuring VersaMax PROFINET Scanner Parameters
  - Adding VersaMax PROFINET Scanner Power Supplies
  - Adding VersaMax Modules to a Remote Node
  - Adding Power Supplies Between Modules
  - Configuring VersaMax Module Parameters
  - Configuring Analog Modules that have Jumpers
- Assigning IO-Device Names
- After the Configuration is Stored to the PROFINET IO-Controller
- Clearing the PROFINET IO-Controller Configuration
- Replacing PROFINET Scanner Hardware

## 3.1 Configuration Overview

The VersaMax PNS receives its configuration from a PROFINET IO-Controller, which is configured by a PROFINET IO configuration tool. The GSDML files provided with the PNS must be imported into the PROFINET IO configuration tool.

---

**Note:** For details on using the PAC Machine Edition PLC Logic Developer programmer to create and download the configuration for a VersaMax PNS in an RX3i PROFINET network, refer to the PACSystems RX3i Profinet Controller Manual, GFK-2571.

---

### 3.1.1 Basic Configuration Steps

The basic configuration steps are:

Configure a PROFINET IO-Controller and its PROFINET LAN using the Controller manufacturer's recommended PROFINET IO configuration tool.

Configure the parameters of the PROFINET Controller.

Add IO-Devices to the LAN. These IO-Devices can be VersaMax PROFINET Scanner modules or third-party IO-Devices. VersaMax PROFINET Scanners and other types of IO-Devices use

GSDML files to describe their capabilities. The PROFINET IO configuration tool imports these GSDML files and incorporates the devices into the configuration.

Configure the parameters of the VersaMax PROFINET Scanners and other IO-Devices.

Configure the communications properties of the PROFINET IO-Controller, VersaMax PROFINET Scanners, and other IO-Devices.

Add VersaMax modules to the VersaMax PROFINET Scanner remote nodes.

Configure the parameters of the VersaMax modules and other devices in the remote nodes.

When the configuration is ready, use a DCP tool to assign a name to each IO-Device so the PROFINET IO-Controller can connect to the devices and deliver their configuration.

Store the configuration data from the configuration tool to the PROFINET IO-Controller.

---

**Note:** When a VersaMax PROFINET Scanner receives a changed configuration, it temporarily sets all its outputs to their defaults. If the configuration has not changed, a VersaMax PROFINET Scanner does not default outputs.

---

### 3.1.2 Configuration Tool

The configuration tool used to configure the PROFINET LAN containing the PNS module must support PROFINET V2.3 IO Devices.

## 3.2 Adding a VersaMax PROFINET Scanner to a LAN

Use the PROFINET IO configuration tool to add a PNS module to the LAN. This process may include importing the PNS module's GSDML files. If necessary, for your application, change the settings of the PNS module's configurable parameters listed below.

### 3.2.1 Configuring VersaMax PROFINET Scanner Parameters

The PROFINET IO Scanner has 32-bits of Status data and 32-bits of Control data. These should be mapped to the IO-Controller's memory.

The IO-Controller determines the operation of inputs when the PNS is unable to provide them. This typically happens when the PNS is not powered on, connected to the network, or there is a network or configuration issue such that the IO-Controller cannot reach the PNS. The

IO-Controller may support defaulting inputs to fixed or configurable values or holding the last known good state of inputs until connectivity is restored.

The PNS has two parameters on slot 0, subslot 1. The first parameter specifies the action the PROFINET Scanner takes if a fatal error occurs. By default, the PROFINET Scanner module LEDs blink a fault code if a fatal error occurs. This can be changed to cause the PROFINET Scanner to restart instead. The second parameter specifies whether the PROFINET Scanner enables SNMP service. By default, the service is disabled.

The network parameters of the PNS (IP Address, subnet mask, and gateway IP) should either be configured to match the fixed parameters assigned to the PNS using a DCP Tool or to

what the IO-Controller should assign during the startup of communications between the PNS and IO-Controller.

---

**Note:** *If the network parameters assigned by the DCP tool are different from the configuration in the IO-Controller and the IO-Controller is configured to assign them to devices, then when the IO Controller assigns them as a temporary setting, the settings previously stored from the DCP tool are lost. On a reset, the IO-Device is set to factory default values (0.0.0.0/0.0.0.0/0.0.0.0).*

---

The rate of data exchange is usually configured on the PNS in configuration tools. The PNS supports update rates from 1ms to 512ms. The correct setting for each device can depend on the dynamics of the equipment being controlled, the network loading on the PROFINET-IO LAN, and the loading of the IO-Controller. It is not unexpected to have 'better' performance at 2ms, 4ms or greater periods than at 1ms depending on the overall system requirements, design, and loading.

### 3.2.1.1 Media Redundancy Parameters

By default, the PROFINET Scanner is not set up for Media Redundancy. If the PROFINET Scanner will be a Media Redundancy Client, select the module ports that will be used for Ring Port 1, Ring Port 2 and the MRP Domain. The MRP Domain name is used to assign MRP Clients to the media redundancy manager (MRM) for the network ring.

### 3.2.1.2 Hot-Standby CPU Redundancy using PROFINET I/O Parameters

The Redundancy tab selects whether the PNS is redundantly controlled.

Since the VersaMax PNS supports PROFINET System Redundancy when it is configured in an HSB CPU Redundancy system, the VersaMax PNS Programmer automatically selects redundant control by setting the Redundancy Mode parameter to "HSB CPU Redundancy".

When the VersaMax PNS is not configured in an HSB CPU Redundancy system, the VersaMax PNS Programmer automatically selects simplex operation (non-redundant control) by setting the Redundancy Mode parameter to None.

If desired, the user may configure a redundancy-capable PNS within an HSB CPU Redundancy system for simplex operation (non-redundant control) by changing the Redundancy Mode parameter on the Redundancy tab form "HSB CPU Redundancy" to "None"

## 3.2.2 Adding VersaMax PROFINET Scanner Power Supplies

The VersaMax PROFINET Scanner has connectors for either one or two power supplies. If necessary, additional power supplies can also be located between modules in the remote node.

If supported in your PROFINET IO configuration tool, add the VersaMax power supplies that will be installed directly on the PROFINET Scanner module to the configuration. The power supplies have no configurable parameters, but their details are included in their associated GSDML files. Slot 0, subslot 2 is the left power supply slot. Slot 0, subslot 3 is the right power supply slot.

Adding power supplies to the configuration sets up power supply alarms. Alarms will be triggered if the power supply is configured but not working, or configured in the wrong subslot.

### 3.2.3 Adding VersaMax Modules to a Remote Node

The PROFINET Scanner remote node can contain the module types listed in Chapter 1. It cannot contain the following expansion modules or communications modules:

**Table 6**

Unsupported VersaMax Modules	
Asi Network Master Module	IC200BEM104
DeviceNet Network Control Module	IC200BEM103
Expansion Transmitter Module	IC200ETM001
Expansion Receiver Module, Isolated	IC200ERM001
Expansion Receiver Module, Non-isolated	IC200ERM002
Profibus-DP Network Slave Module	IC200BEM002

### 3.2.4 Adding Power Supplies between Modules

Additional power supplies can be installed between modules if necessary, to meet the power requirements of modules to their right. GSDML-based configuration does not support these power supplies as they are transparent to the operation of the VersaMax system. It is the responsibility of the configurator to supply adequate power to the system.

These power supplies can be added when using the PAC Machine Edition PLC Logic Developer programmer to create and download the configuration for a VersaMax PNS in an RX3i PROFINET network, refer to the PACSystems RX3i Profinet Controller Manual,

GFK-2571.

### 3.2.5 Configuring VersaMax Module Parameters

After adding VersaMax modules to the remote node, their parameters must be configured. For all VersaMax modules, this includes configuring a set of basic parameters (such as: reference address, carrier type, report faults). Configuration details for those basic parameters are given on the following pages.

The VersaMax modules listed below require additional configuration beyond the basic parameters described in this chapter. Please refer to their module documentation for detailed parameter information.



Table 7

Catalog #	Module Description	Document
IC200ALG240	Analog Input Module, 16 Bit Voltage/Current, 1500VAC Isolation,	GFK-1522
IC200ALG620	Analog Input Module, 16 Bit RTD, 4 Channels	GFK-1523
IC200ALG331	Analog Output Module, 16 Bit Voltage/Current, 1500VAC	GFK-1559
IC200ALG630	Analog Input Module, 16 Bit Thermocouple, 7 Channels	GFK-1700
IC200BEM003	PROFIBUS DP Master	GFK-2740
IC200CMM020	Serial Communications Module (Modbus RTU Master)	GFK-2423
IC200MDD841	Mixed Module, 24VDC Positive Logic Input 20 Points / Output 12 Point / (4) High Speed Counter, PWM, or Pulse Train Configurable	GFK-1561

Note that several analog modules, which use jumpers to select voltage/current or output defaults, require an additional configuration step before editing their parameters. See “Configuring Analog Modules that have Jumpers” on page 3-8.

## Basic Module Parameters

The module parameters define how the IO-Controller scans and stores the module’s data. For discrete input or output modules, there is just one address assignment field.

For discrete modules with both inputs and outputs and for analog modules, there are multiple address assignment fields.

Default values are provided by the module’s GSDML file.

**Input Data / Output Data:** The address in the IO-Controller’s reference memory for the module’s data.

**Length:** For discrete modules, the length of the input /output data is fixed and cannot be edited. For some analog modules, the data length can be edited.

## Additional Module Parameters

Additional module parameters vary, depending on the module type. Some modules have only a few parameters. Others have several. The additional parameters that must be configured for more complex modules are explained in the individual module documentation.

**Carrier Type:** The carrier on which a VersaMax module is installed is chosen to meet the needs of a specific application.

**Report Faults:** Specify whether the module will report faults to the PROFINET Scanner.

**DC Filter Select:** This field selects additional filtering time for the module’s DC inputs to compensate for conditions such as noise spikes or switch bounce. During operation, a filter time of 0ms, 1.0ms, or 7.0ms will be added to the module’s basic input on/off response time.

If this is set to 0, no additional filter time will be added to the module’s basic maximum input on/off time:

Table 8

Basic On-Off Time	Module Types
0.5ms	IC200MDL631 / 632 / 635 / 636 / 640 / 650, IC200MDD840 / 842 / 843 / 844 / 845
0.25ms	IC200MDL643 / 644, IC200MDD851

**Outputs Default / Hold Last State:** When the module has outputs, this field specifies how the PROFINET Scanner will handle the module's output data if it loses communication with the IO- Controller. Select either Hold Last State or Default Value. This setting applies to all the module's outputs. If Default Value is chosen, default values can be set up on a per-point basis.

**Note:** VersaMax analog modules latch their last outputs when configured for Hold Last State and hold that value if field power remains on the module.  
In contrast, discrete modules transition to module defaults of zero, even if Hold Last State is configured, when they lose connection to the PROFINET Scanner.

**Default Output Values:** If the module has discrete outputs, a default value of 0 or 1 can be selected for each output. Outputs without a configured default value will default to 0.

All VersaMax Analog modules except MDD841 and ALG331 support only a default Analog value of zero.

**Note:** Unlike other VersaMax Scanners, the PROFINET Scanner does not contain input default actions and default values. In PROFINET, these settings are part of the IO-Controller configuration.

## 3.2.6 Configuring Analog Modules that Have Jumpers

The following VersaMax analog modules, which use jumpers to select their voltage / current operation or output defaults, require an additional configuration step after adding the module to the PROFINET Scanner configuration before their parameters can be configured:

Table 9

IC200ALG230	Analog Input Module, 12 Bit Voltage/Current 4 Channels
IC200ALG260	Analog Input Module, 12 Bit Voltage/Current 8 Channels
IC200ALG262	Analog Input Module, 15 Bit Current Differential 8 Channels
IC200ALG264	Analog Input Module, 15 Bit Current 15 Channels
IC200ALG266	Analog Input 15 Bit Current 15Ch with enhanced over voltage protection
IC200ALG320	Analog Output Module, 12 Bit Current, 4 Channels
IC200ALG321	Analog Output Module, 12 Bit Voltage 4 Channels. 0 to +10VDC Range
IC200ALG322	Analog Output Module, 12 Bit Voltage 4 Channels. -10 to +10VDC Range
IC200ALG325	Analog Output Module, 13 Bit Voltage 8 Channels
IC200ALG326	Analog Output Module, 13 Bit Current 8 Channels
IC200ALG327	Analog Output Module, 13 Bit Voltage 12 Channels
IC200ALG328	Analog Output Module, 13 Bit Current 12 Channels
IC200ALG430	Analog Mixed Module, Input Current 4 Channels, Output Current 2 Channels
IC200ALG431	Analog Mixed Module, 0 to +10VDC Input 4 Channels, Output 0 to +10VDC 2
IC200ALG432	Analog Mixed Module, 12 Bit -10 to +10VDC, Input 4 Channels / Output -10 to +10VDC 2

Each of these modules requires the user to assign a submodule that matches the jumper settings of the hardware.

Jumper settings are latched when the module is started, so the jumper setting cannot be altered during operation. The module must be removed and reinserted or the PNS system restarted for the jumper setting to be reevaluated.

## Configuring the Module Parameters

Analog input modules in this group require additional configuration to indicate the type of inputs or outputs that will be wired to the module. Analog output modules in this group require configuration to indicate the default output state. It is important to be sure that the jumper installation matches the module's configuration. If the channel is changed in the future, the module's configuration should be changed to match it.

The rest of the configuration for these modules is the same as the configuration of other VersaMax modules, which was explained on the previous pages.

The following table lists the configuration parameters that must match jumper settings:

**Table 10**

Catalog #	Description	Parameter	Jumper Setting
IC200ALG230	Analog Input Module, 12 Bit Voltage/Current 4 Channels	0 to 10 VDC input voltage	A15 - A16
		4 mA to 20 mA input current	A13 - A14
		-10 Vdc to +10Vdc input voltage	no jumper
IC200ALG260	Analog Input Module, 12 Bit Voltage/Current 8 Channels	Same as IC200ALG230	
IC200ALG262	Analog Input Module, 15 Bit Current Differential 8 Channels	0 mA to 20 mA input current	A17 - A18
		4 to 20 mA input current	no jumper
IC200ALG264	Analog Input Module, 15 Bit Current 15 Channels	0mA to 20 mA input current	A16 - A17
		4 to 20 mA input current	no jumper
IC200ALG266	Analog Input 15 Bit Current 15Ch with enhanced over voltage protection	Same as IC200ALG264	
IC200ALG320	Analog Output Module, 12 Bit Current, 4 Channels	Outputs default to 4mA	B13 - B14
		Outputs default to hold last state	no jumper

Catalog #	Description	Parameter	Jumper Setting
IC200ALG321	Analog Output Module, 12 Bit Voltage 4 Channels. 0 to +10 VDC Range	Outputs default to 0 V	B13 - B14
		Outputs default to hold last state	no jumper
IC200ALG322	Analog Output Module, 12 Bit Voltage 4 Channels. -10 to +10 VDC Range	Same as IC200ALG321	
IC200ALG325	Analog Output Module, 13 Bit Voltage 8 Channels	0Vdc to 10Vdc, outputs default to 0Vdc	B1 - B2, and B2 - B3
		0Vdc to 10vdc outputs default to hold last state	B1 - B2
		-10Vdc to +10 Vdc outputs default to 0Vdc	B2 - B3
		-10Vdc to +10 Vdc outputs default to hold last state	no jumper
IC200ALG326	Analog Output Module, 13 Bit Current 8 Channels	0mA to 20 mA outputs default to 0mA	B1 - B2, and B2 - B3
		0mA to 20 mA outputs default to hold last state	B1 - B2
		4mA to 20 mA outputs default to 4mA	B2 - B3
		4mA to 20 mA outputs default to hold last state	no jumper
IC200ALG327	Analog Output Module, 13 Bit Voltage 12 Channels	Same as IC200ALG325	
IC200ALG328	Analog Output Module, 13 Bit Current 12 Channels	Same as IC200ALG326	
IC200ALG430	Analog Mixed Module, Input Current 4 Channels, Output Current 2 Channels	Same as IC200ALG320	
IC200ALG431	Analog Mixed Module, 0 to +10VDC Input 4 Channels, Output 0 to +10VDC 2 Channels	Same as IC200ALG321	
IC200ALG432	Analog Mixed Module, 12 Bit -10 to +10VDC, Input 4 Channels / Output -10 to +10VDC 2 Channels	Same as IC200ALG321	

## 3.3 Assigning IO-Device Names

After the PROFINET Scanner and other IO-Devices on the LAN have been entered the configuration, a Discovery and Configuration Protocol (DCP) tool must be used to assign a name to each IO-Device. The Name of each device on the LAN must match the configuration. This step is required before downloading the configuration from the

PROFINET IO-Controller, or the PROFINET IO-Controller will be unable to connect to the devices and deliver their configuration.

The DCP tool must be connected to PROFINET IO LAN, either through the PROFINET IO-Controller or directly to the LAN depending on whether it operates through the IO-Controller or directly to IO-Devices.

## 3.4 After the Configuration is Stored to the IO-Controller

For complete instructions, refer to the documentation for the IO-Controller and the PROFINET IO configuration tool.

After successfully processing and applying its configuration data, the IO-Controller transfers the configuration for remote IO-Devices over the PROFINET network.

PROFINET delivers IO-Device configurations when the IO-Controller establishes an Application Relationship (AR) with the IO-Device. If all Application Relationships (ARs) are lost, the IO-Device (such as a VersaMax PROFINET Scanner) does not change the configuration of any of its IO sub-modules. Each sub-module retains the most recent configuration received since it was last powered up or restarted. If a sub-module has not been configured since powerup or restart, it remains in its hardware default condition. When the AR(s) are re-established and a configuration is sent to the IO-Device, and the configuration of a sub-module has changed, the IO-Device applies the new configuration.

If a PROFINET Scanner is powered up and its modules are at hardware defaults, when it receives a configuration for the first time, any new defaults that are different from hardware defaults are applied until the first output data arrives.

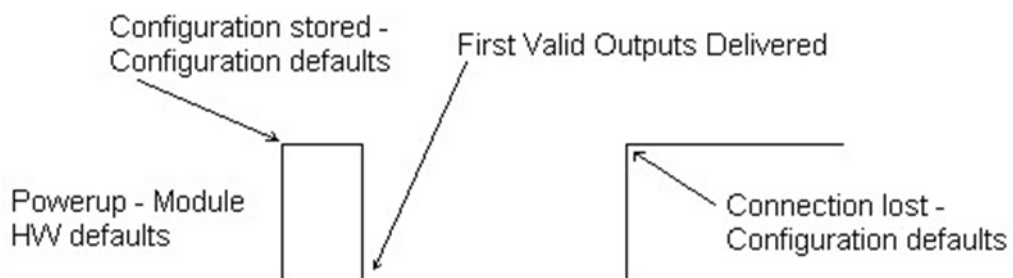
If a PROFINET Scanner is powered up and the connection is then lost after receiving a configuration, configuration defaults are applied when the connection is lost. On a subsequent connection, if the same configuration is sent, outputs remain at the configuration defaults until the first output data arrives. If a different configuration is sent, output defaults transition to the new defaults until the first output data arrives.

## 3.5 Output Operation

Module hardware defaults are typically zero for VersaMax modules, so until configuration is stored by the IO-Controller, outputs remain at zero. When the configuration is stored, the outputs immediately transition to their configured default operation. Outputs remain at these defaults until the first valid outputs are received from the IO-Controller. The amount of time outputs remain at defaults is a function of the IO-Controller's design and the communication rate configured between the IO-Controller and PROFINET scanner.

For example, if a discrete module is configured for a default value of 1 and there is a current value of 0 in the CPU, on power up the output will be zero, then transition to 1 and then return to 0 when the output data is received

Figure 12



## 3.6 Clearing the IO-Controller Configuration

The VersaMax PROFINET Scanner reacts to clearing the PROFINET IO-Controller as a loss of connectivity, and takes appropriate actions such as defaulting outputs. A clearing on the IO-Controller does not typically cause a clearing action on all connection IO-Devices.

## 3.7 Replacing PROFINET Scanner Hardware

If a PNS module needs to be replaced for any reason, the steps to commission a new hardware module are below.

If the replacement PNS module has no assigned name (the CONNECT LED is blinking Amber slowly), the network cabling can be plugged back in and the name assigned over the IO network. If there is a possibility of duplicate names existing on the network due to a pre-existing IO-Device name assigned in the replacement module, the IO-Device Name should be assigned before inserting it into a working IO network. The IO-Device Name and IP Address settings can be updated offline (for example, in an office setting).

1. Remove power from the previous PNS module. This should be done before network cabling is removed, especially in the case of fiber connections.
2. Remove network cabling from the old module.
3. Remove the old module.
4. Insert the new PNS module.
5. Connect network cabling to the new PNS module.
6. Apply power to the new PNS module hardware.
7. Optional: Assign IP address settings to the new PNS module using the DCP tool if this was not done offline. The IO-Controller will update any IP address settings automatically when it connects if this step is skipped.
8. Assign an IO-Device Name (page 3-10) to the new PNS module hardware if this was not done offline.

## Chapter 4: Diagnostics

This chapter describes:

- PROFINET Scanner Status and Control Data
  - Output Control Bits
  - Input Status Bits
- Error Handling
  - Fatal Error Handling
  - PROFINET Alarms
  - PROFINET Module Loss, Add & Mismatch Faults

### 4.1 PROFINET Scanner Status and Control Data

The VersaMax PROFINET Scanner provides 32 bits of input status data and receives 32 bits of output control data. The application program in the IO Controller system can monitor the input status bits and clear faults using the output control bits. This data is associated with slot 0 submodule 1 in the configuration.

#### 4.1.1 Output Control Bits

The PROFINET Scanner's 32 bits of control output data can be used to trigger module actions.

**Table 11**

Output Bits	Name	Description
1	Slot1 Clear Faults REQ	Used to initiate a clear of all Fault conditions and PROFINET Diagnosis data on the slot. If the attempt to clear the faults succeeds (and no other faults are present, and no faults recur) the FAULT LED will be OFF after this completes.  A transition from 0 to 1 initiates the clear. The application program must ensure this bit remains asserted until the Clear Faults ACK status bit indicates that the remote node has executed the command. If this is not done, then the request may not be seen / performed by the PROFINET Scanner because the PROFINET I/O production cycle is asynchronous to the IO Controller system's application program.  A transition from 1 to 0 is required before another clear request can be sent. The application program must keep this value cleared until the Clear Faults ACK status bit
2	Slot2 Clear Faults REQ	
3	Slot3 Clear Faults REQ	
4	Slot4 Clear Faults REQ	
5	Slot5 Clear Faults REQ	
6	Slot6 Clear Faults REQ	
7	Slot7 Clear Faults REQ	
8	Slot8 Clear Faults REQ	
9-32	Reserved	Must be 0



## 4.1.2 Input Status Bits

The PROFINET Scanner's 32 bits of input status provide information about the scanner alongside the I/O module data. All status bits are active high.

**Table 12**

Status Bits	Name	Description
1	Module OK	Indicates the health of the module. A value of 0 indicates the module is powering up or has failed. A value of 1 indicates the module is functioning properly.
2	Fault Present	Diagnosis data is available. Set to 1 whenever the FAULT LED is On; otherwise it is set to 0.
3	Port1 Link Up	1 = port is connected to another device and is operating correctly. 0 = port is not connected to another device, or the port has some sort of error preventing communications.
4	Port2 Link Up	
5–8	Reserved	Set to 0
9	Power1 OK	Indicates whether the Power Supply is providing power to the PROFINET Scanner.
10	Power2 OK	
11–16	Reserved	Set to 0
17	Slot1 Clear Faults ACK	Used to acknowledge the slot's Clear Faults REQ command bit.
18	Slot2 Clear Faults ACK	When the PROFINET Scanner sees a Clear Faults REQ bit transition from 0 to 1, it clears the fault conditions for that slot. Once that process has completed (whether it succeeds), the PROFINET Scanner sets the corresponding status bit to 1. This signals to the application program that the attempt to clear the faults has completed.
19	Slot3 Clear Faults ACK	
20	Slot4 Clear Faults ACK	
21	Slot5 Clear Faults ACK	
22	Slot6 Clear Faults ACK	When the PROFINET Scanner sees the Clear Faults REQ transition from 1 to 0, it immediately sets this status bit to 0 too. This signals to the application program that the PROFINET Scanner has seen the transition to 0, so it is possible to signal another Clear Faults request.
23	Slot7 Clear Faults ACK	
24	Slot8 Clear Faults ACK	
25–32	Reserved	Set to 0

## 4.2 Error Handling

The PROFINET Scanner has two error-handling methods: fatal error handling and PROFINET Diagnostics. Fatal error handling is described below. PROFINET diagnostics are described in the next section.

## 4.2.1 Fatal Error Handling

Any failures that occur during powerup or firmware update mode are considered fatal errors. This includes faults detected on non-critical devices such as the USB port. After successful powerup of the PROFINET Scanner, only catastrophic errors are treated as fatal.

If a fatal error occurs, the PROFINET scanner either blinks an error code on its LEDs or restarts automatically, depending on its configured Fatal Error Action. If the module has not been configured, it blinks an error code (the default setting). For example, a blink code of 4-5 is a Watchdog error. This may be expected during heavy network traffic.

When the PROFINET Scanner detects a catastrophic failure, it tries to save diagnostic information to non-volatile storage. This information overwrites any previous diagnostic information in storage. Only information about the most recent fatal error is retained. This information is available on future power cycles to be retrieved and sent to Emerson for analysis.

While diagnostic information is being saved, the PROFINET Scanner blinks its OK LED amber. The PROFINET Scanner disables Ethernet and USB communications, so communication with the module is not possible. If the PROFINET Scanner cannot save the diagnostic information, it is considered a failed Save attempt.

After the attempt to store the information has completed (whether it succeeded or failed), the module either blinks an error code or restarts, depending on how it is configured.

### Automatic Restart

If the PROFINET Scanner is configured to automatically restart after a fatal error, on the next successful power-up, a diagnosis alarm is generated to indicate the PROFINET Scanner reset. This diagnosis alarm turns the Fault LED on and persists until the PROFINET Scanner is power-cycled. There is no way to clear this fault other than a second successful restart.

This might be a preferable setting under certain conditions. For example, if you are experiencing repeated 4-5 Watchdog errors, you could use this setting to automatically recover.

A persistent fatal error that occurs after the PROFINET Scanner has successfully powered-up can cause the module to continually reset itself.

## 4.2.2 PROFINET Alarms

The PROFINET Scanner reports its own non-fatal errors and errors on modules in the remote node using PROFINET Diagnosis or PROFINET Pull/Plug alarms.

### PROFINET Diagnosis Alarms

Diagnosis Alarms indicate any fault conditions other than a module add, loss, or mismatch that a VersaMax PROFINET Scanner needs to communicate to the PROFINET Controller. Most faults generate Diagnosis alarms. Situations that do not send a PROFINET Diagnosis are covered in a later section.

When the VersaMax PROFINET Scanner detects a fault condition, it sends a Diagnosis alarm to the IO-Controller. If there is a Primary Application Relationship (AR) currently active that includes the affected module, the VersaMax PROFINET Scanner sends the Diagnosis alarm over that AR. Otherwise, the alarm is placed in diagnosis memory in the PROFINET Scanner to be read later, and no alarm is sent. The Scanner's FAULT LED is ON and the FAULT status bit (see bit definitions earlier in this chapter) is set to 1. An alarm is not generated on subsequent connections.

The PROFINET Scanner automatically clears (and sends Diagnosis Disappears alarms for) these diagnosis faults after the fault condition has been corrected. If no additional conditions exist in memory, the FAULT LED is turned OFF and the FAULT status bit is set to 0.

The table on the next page lists the faults reported to the IO-Controller. The VersaMax PROFINET Scanner generates all its application faults as channel diagnosis faults. The Alarm Type is Diagnosis or Diagnosis Disappears. The left column lists the Channel Error Type in PROFINET.

### PROFINET Scanner Diagnosis Alarms

Table 13:

Channel Error Type	Diagnosis Alarm Type	Module or Channel	Cause	Fault Text	Recommendation
1	Channel Diagnosis Appears / Disappears: Short Circuit	Module	Short Circuit. MDL741/742/842 ESCP protection activated. (>0.5A total drawn)	Short Circuit	Overcurrent/Short exists on at least one channel.
1	Channel Diagnosis Appears / Disappears: Short Circuit	Channel	Short Circuit. MDL730 ESCP tripped (> 2A drawn)	Short Circuit	Overload/Short on channel has existed and the latched fault has not been cleared by user.
6	Channel Diagnosis Appears / Disappears: Line Break	Channel	Open Wire. ALG262/264 are in 4-20mA and the current is below 4mA.	Line Break	Verify wiring and that current source is energized.

Channel Error Type	Diagnosis Alarm Type	Module or Channel	Cause	Fault Text	Recommendation
7	Channel Diagnosis Appears / Disappears: Upper limit value exceeded	Channel	High Alarm. Channel value is above configured Hi Alarm	Upper limit value exceeded	Bring process value below configured high alarm level
8	Channel Diagnosis Appears / Disappears: Lower limit value exceeded	Channel	Low Alarm. Channel value is below configured Low Alarm	Lower limit value exceeded	Bring process value above configured low alarm level
16	Channel Diagnosis Appears / Disappears: Parameterization Fault	Module	Rejected Configuration. The intelligent module rejected the configuration due to one of the parameters being incorrect.	Module not Configured	Verify the settings of the module with the module documentation. Not all settings allowed by GSDML in Emerson IO Controllers are supported by the module.
17	Channel Diagnosis Appears / Disappears: Power supply fault	Module	Loss of field power to module.	Power supply fault	Verify field power to the specified module is wired and energized correctly. Note: This does not apply to the Power Supply modules on the PNS.
257	Channel Diagnosis Appears / Disappears	Channel	Over range fault. A/D value is saturated above 99.5 % of hardware range	Over Range	Correct wiring -Provide input in correct range (such as 4-20mA) -Verify output is within range (remove shorts)
258	Channel Diagnosis Appears / Disappears	Channel	Under range fault. For example, current	Under Range	Correct Wiring -Provide input in correct range (such as 4-20mA)

Channel Error Type	Diagnosis Alarm Type	Module or Channel	Cause	Fault Text	Recommendation
			mode on an ALG240 with < 2mA input		-Verify output is within range (remove shorts)
259	Channel Diagnosis Appears / Disappears	Module	Nonvolatile Store Fault.	Non-Volatile Store Failed	There are no corrective actions for this. Try store again or fix hardware.
260	Channel Diagnosis Appears / Disappears	Channel	Wiring Fault. RTD measurements are such that wiring problems are suspected	Wiring Fault	Verify RTD wiring and configuration.
261	Channel Diagnosis Appears / Disappears	Module	Thermistor fault. The thermistor in the thermocouple carrier is out of range	Thermistor Fault	Verify the thermocouple carrier.
768	Channel Diagnosis	Channel	A PROFIBUS slave is not connected to IC200BEM003 PROFIBUS DP Master module	Loss of	Check PROFIBUS DB-9 connector and cable on IC200BEM003 module and the slave. or, Wait for a time when the PROFIBUS data rate is set very low.

### 4.2.3 Clearing Faults on VersaMax Analog Modules

The VersaMax PROFINET Scanner clears alarms as soon as the underlying condition returns to normal.

For some VersaMax modules such as the IC200ALG240, IC200ALG331, IC200ALG620, and IC200ALG630, the VersaMax PROFINET Scanner automatically checks every five seconds to see whether a module error condition is still present. When these modules are checked periodically, a historical log of alarms such as the IO Fault log in PAC Machine Edition may show new alarms occurring before previous alarms clear. For example, if field power is

restored on an IC200ALG240, new low-level alarms may arrive before the clear of the Loss of User Power.

The IC200MDL730 module requires manual intervention to clear fault conditions. The application can use the PROFINET Scanner's status and control bits Clear Faults and Clear Faults Acknowledge to clear such faults.

## 4.2.4 PROFINET Module Loss, Add & Mismatch Faults

The VersaMax PROFINET Scanner uses standard PROFINET Pull/Plug alarms to indicate differences between the expected, configured modules and the actual modules present in the remote node.

The PROFINET Scanner only sends Plug/Pull PROFINET alarms if a module is added or lost while an Application Relationship (AR) is established that includes it. During that period, if the PROFINET Scanner detects differences between the equipment that is present and what is configured in the Application Relationship (AR), it communicates loss and mismatch conditions.

- If a module is configured, but is not present or operating correctly, the PROFINET Scanner indicates the module as removed via a Pull Alarm. When used with a PACSystems RX3i PROFINET Controller system, all point faults for a pulled module are reported as FAULTED.
- If a mismatched VersaMax module is hot-inserted while an Application Relationship that includes the slot/sub-slot is active, the VersaMax PROFINET Scanner reports the mismatch using a Plug Wrong Submodule alarm. On future connections, the module will be reported as incorrect during the connection sequence.
- If a VersaMax module is installed but not included in the configuration of the Application Relationship (AR), no alarm is generated. The module is ignored by the PROFINET Scanner and remains at its module defaults.
- If a module is returned to service and matches the configuration in the PROFINET Scanner, the scanner sends a Plug Alarm.
- If a module is correct, but there is an inconsistent hardware jumper (for example, an analog module is configured for 4–20mA, but the jumper is for 0–10v), the PROFINET Scanner reports a configuration mismatch specifying the submodule in error. The I/O module must be powered down or removed, the jumper setting correct, and the I/O module restored, or the configuration must be changed to reflect the jumper setting.

---

**Note:** During hot insertion or removal of I/O modules, a transient Loss of Power fault on the module may occur. This is allowable behavior due to variations in user operation.

---

## 4.3 Diagnostics for BEM003 PROFIBUS DP Networks

When using the BEM003 PROFIBUS DP Master module with the PNS, any loss or add fault on PROFIBUS slave(s) connected to the BEM003 will not be displayed as PROFINET module or submodule loss or add alarms. Instead, when a PROFIBUS slave is not connected to BEM003, a Channel Diagnosis Appears alarm with channel error type 768 will be reported to the PNC. The IO Fault table will display a circuit number that indicates the PROFIBUS address of the lost PROFIBUS slave. When the PROFIBUS slave can connect to the BEM003, a Channel Diagnosis Disappears alarm will be reported.

When using the BEM003 module, not all diagnostics in PROFIBUS slaves are reported on PROFINET. The status of PROFIBUS slaves are reported in the BEM003 input data. The diagnostics can be read by sending a memory mapped COMMREQ to the BEM003 module. For details, see the VersaMax PROFIBUS Master Module User's Manual, GFK-2740.

Diagnosis Disappears alarms may be out of sequence with Diagnosis Appears alarms. For Intelligent Modules (IC200ALG240/ALG331/ALG620/ALG630/MDD841), Diagnosis Disappears alarms are generated by a polling process which may be slower than Appears messages.

Example: When re-applying field power, new channel alarms such as Hi/Low alarms may occur before the Loss of Field Power alarm clears.

## Chapter 5: Maintenance Mode

In Maintenance Mode, the remote node can be serviced while maintaining network connectivity. Maintenance Mode allows carriers and other components to be changed without network disruption such as opening a ring topology.

---

**Note:** To use maintenance mode, the VersaMax PNS must be –AB version or later. Previous versions must be upgraded to firmware to version 1.10 or later to support this feature

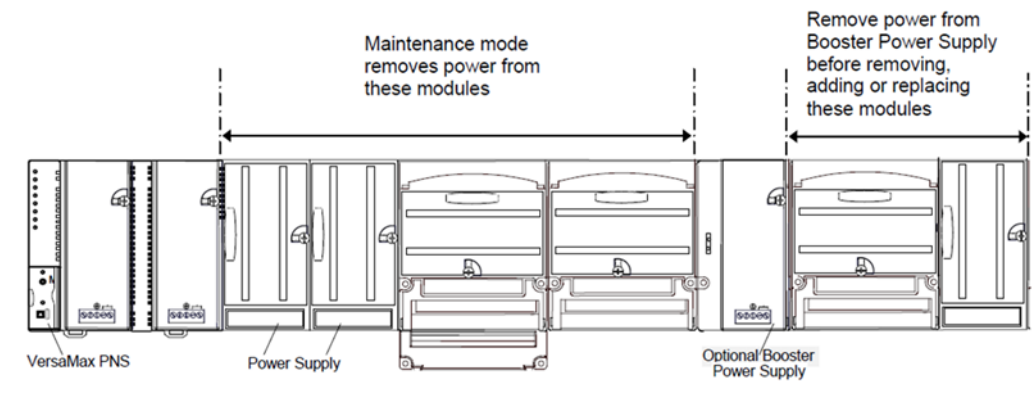
---

As received from the factory, the PNS module powers up into Normal Mode. When it is in this mode, the PNS provides the full set of PNS functionality, which includes supplying power to the backplane and controlling the other modules in the stick. The MAINT LED will be OFF when the PNS is in Normal mode.

When the VersaMax PNS enters Maintenance Mode, the PNS head-end disables control and power to the backplane modules up to the first Power Supply Booster in the stick. This allows workers to safely work on the device while power is still applied to the PNS itself so that the network connectivity is maintained. VersaMax supports hot insertion/extraction of a module into a carrier. It does not support hot reconfiguration of carriers.

Regardless of whether the PNS is in Normal mode or Maintenance mode, the PNS keeps its Ethernet switch functional, and (if so configured) continues to support the Media Redundancy protocol

**Figure 13**





## 5.1 Entering Maintenance Mode and Performing Maintenance

1. In Normal mode, press and hold the MAINT pushbutton for at least 3 seconds.
2. When the MAINT LED begins to blink, indicating the PNS has transitioned to Maintenance mode, release the pushbutton.
3. If modules or carriers to the right of a Booster Power Supply need to be changed, remove power from the Booster Power Supply.
4. Add, remove or replace carriers and modules as needed. If necessary, the PNS can be disconnected from the rest of the VersaMax stick.

### When the PNS is in Maintenance Mode:

- The MAINT LED blinks amber.
- Power to all backplane modules to the left of any Booster Power Supply is disabled.
- All backplane interface signals are tri-stated.
- All established PROFINET ARs are terminated.
- All requests to establish an AR are rejected.
- All modules are sent to their module default state. This is different from their configured defaults. For example, if a discrete output module is configured for non-zero defaults, entering Maintenance mode sets the outputs to zero, not their non-zero configured defaults. This is true for modules to the right of booster supplies as well as modules powered from the PNS power supplies.
- The PNS keeps its Ethernet switch functional, and (if so configured) continues to support the Media Redundancy protocol.

## 5.2 Exiting Maintenance Mode and Restoring Operation

1. With the PNS still in Maintenance mode, if the PNS was disconnected from the VersaMax stick, reconnect it.
2. Apply power to any Power Supply Boosters that were powered down.
3. Press the MAINT pushbutton for at least 3 seconds.
4. When the MAINT LED stops blinking, indicating the PNS has transitioned to Normal mode, release the pushbutton.
5. Download a configuration to the PNS device.

### When the PNS returns to Normal Mode:

- The MAINT LED stops blinking.
- The PNS applies power to the rest of the modules in the VersaMax stick (those that are not powered by a Power Supply Booster).

- When the PNS exits Maintenance Mode and re-enters Normal Mode, it will not configure modules in the stick using a previously received Configuration. Instead, the modules in the stick will be controlled in the same manner as when the PNS has just powered up. When an AR is established, the PNS will configure the modules using the data provided via that AR.
- Upon exiting Maintenance Mode, the PROFINET Scanner waits to receive its configuration from the IO Controller.
- The PNS keeps its Ethernet switch functional, and (if so configured) continues to support the Media Redundancy protocol.

## 5.3 Maintenance Mode Retentiveness through Power Cycle

The VersaMax PNS module will retain the current mode across power cycles. If the module is in Normal Mode and power is lost, the module will be in Normal mode when power is restored. Similarly, if the module is in Maintenance mode when power is lost, the module will be in Maintenance mode when power is restored.

# Appendix A: PROFINET Specifications

Release 2.00 of the VersaMax PROFINET IO Scanner supports PROFINET v2.3 Class A IO-Device with the clarifications listed below. For version-specific updates, refer to the Important

Product Information document provided with your module.

## A.1 PROFINET Protocol Support

RTC – Real time Cyclic Protocol: RT\_CLASS\_1 & RT\_CLASS\_2

RTA – Real time Acyclic Protocol

DCP – Discovery and Configuration Protocol

CL-RPC – Connectionless Remote Procedure Call

LLDP – Link Layer Discovery Protocol – transmission only

MRP – Client role only (Manager role not supported)

PTCP – Precision Transparent Clock Protocol – Line delay measurement only

SNMP – Simple Network Management Protocol – Note: the SNMP is disabled by default. SNMP can be enabled by setting SNMP Configuration to “Enable SNMP Service” using the VersaMax PNS Programmer.

## A.2 Technical Data

API:	Single API (0) used.
Number of Application Relations supported:	1 AR or 1SR-AR Set made of 2 SR-ARs
Maximum length of cyclic input data:	1440 bytes
Maximum length of output data:	1440 bytes
Alarm Types:	Diagnostic, Return of Submodule, Plug, Pull
DCP:	Get/Set/Identify supported. Only All, Name of Station, and Station Name Alias filters supported
Identification & Maintenance:	I&M0 only
Context Management	by CL-RPC
Minimum cycle time:	1ms
Ethernet rate:	100 Mbit/s full duplex with auto-negotiation

## **A.3 Limitations**

The following features are not supported in release 2.00:

RT over UDP IRT

Multicast communication

DHCP

DCP Hello service

DNS (Domain Name Service protocol)

FastStartUp

Supervisor-AR. Note: Supervisor-DA-AR is supported. (Device Access supported) Optical power diagnostics (IC200PNS002)

CBA

Substitute Data Only One Input-CR and one Output-CR are supported

## Technical Support & Contact Information

Home link: <http://www.Emerson.com/Industrial-Automation-Controls>

Knowledge Base: <https://www.emerson.com/Industrial-Automation-Controls/support>

**Note:** If the product is purchased through an Authorized Channel Partner, please contact the seller directly for any support.

Emerson reserves the right to modify or improve the designs or specifications of the products mentioned in this manual at any time without notice. Emerson does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Emerson product remains solely with the purchaser.

© 2019 Emerson. All rights reserved.

Emerson Terms and Conditions of Sale are available upon request. The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.

