ICDM-RX/PN1

PROFINET IO to Modbus

Manual

Your automation, our passion.

PEPPERL+FUCHS

With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

Worldwide

Pepperl+Fuchs Group

Lilienthalstr. 200

68307 Mannheim

Germany

Phone: +49 621 776 - 0

E-mail: info@de.pepperl-fuchs.com

North American Headquarters

Pepperl+Fuchs Inc.

1600 Enterprise Parkway

Twinsburg, Ohio 44087

USA

Phone: +1 330 425-3555

E-mail: sales@us.pepperl-fuchs.com

Asia Headquarters

Pepperl+Fuchs Pte. Ltd.

P+F Building

18 Ayer Rajah Crescent

Singapore 139942

Phone: +65 6779-9091

E-mail: sales@sg.pepperl-fuchs.com

https://www.pepperl-fuchs.com

TABLE OF CONTENTS

TDOCT-6598 0320

TDOCT-6598 0320

TDOCT-6598 0320

TDOCT-6598 0320

1 Introduction

1.1 Installation Overview

Use the ***ICDM-RX Hardware Installation and Configuration Manual*** found at **www.pepperl-fuchs.com** to do the following:

1. Install the hardware.
2. Configure the IP address.
3. If necessary, upload the latest firmware.
4. Attach the serial device.

This *User Guide* is organized to reflect the installation order after you have used installed the hardware and done basic network configuration (assign IP address).

1. Configure the serial device or devices.
2. Configure the Modbus device.
3. Configure the ICDM-RX/PN1 in TIA Portal.

In addition, this *User Guide* also provides the following information:

- IO data handling
- Provides an example project
- Discusses advanced functions
- Provides information about the Network, Data Mapping, Diagnostics, and System web pages

1.2 Supported Models

This *User Guide* supports the ICDM-RX/PN1 Industrial Gateway, which includes the following products:

- ICDM-RX/PN1-DB9/RJ45-PM
- ICDM-RX/PN1-DB9/RJ45-DIN
- ICDM-RX/PN1-ST/RJ45-DIN
- ICDM-RX/PN1-2DB9/RJ45-DIN
- ICDM-RX/PN1-2ST/RJ45-DIN
- ICDM-RX/PN1-4DB9/2RJ45-DIN

Note

Industrial Gateway products are typically referred to as ICDM-RX/PN1 in this User Manual unless there is product specific information.

1.3 Software and Documentation

You can access the appropriate firmware assembly, PortVision DX, and the *ICDM-RX Hardware Installation and Configuration Manual* from: **https://www.pepperl-fuchs.com**.

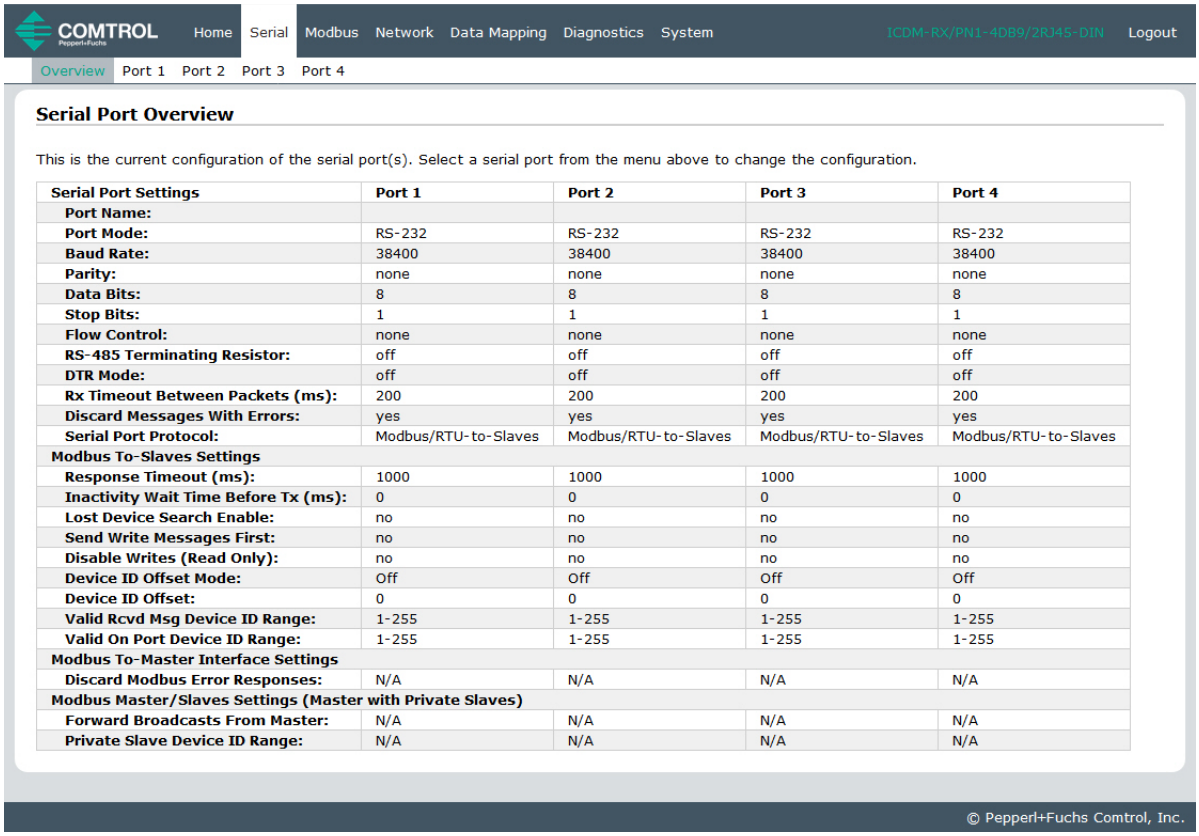
TDOCT-6598 0220

TDOCT-6598 0220

2 Configuring a Serial Port

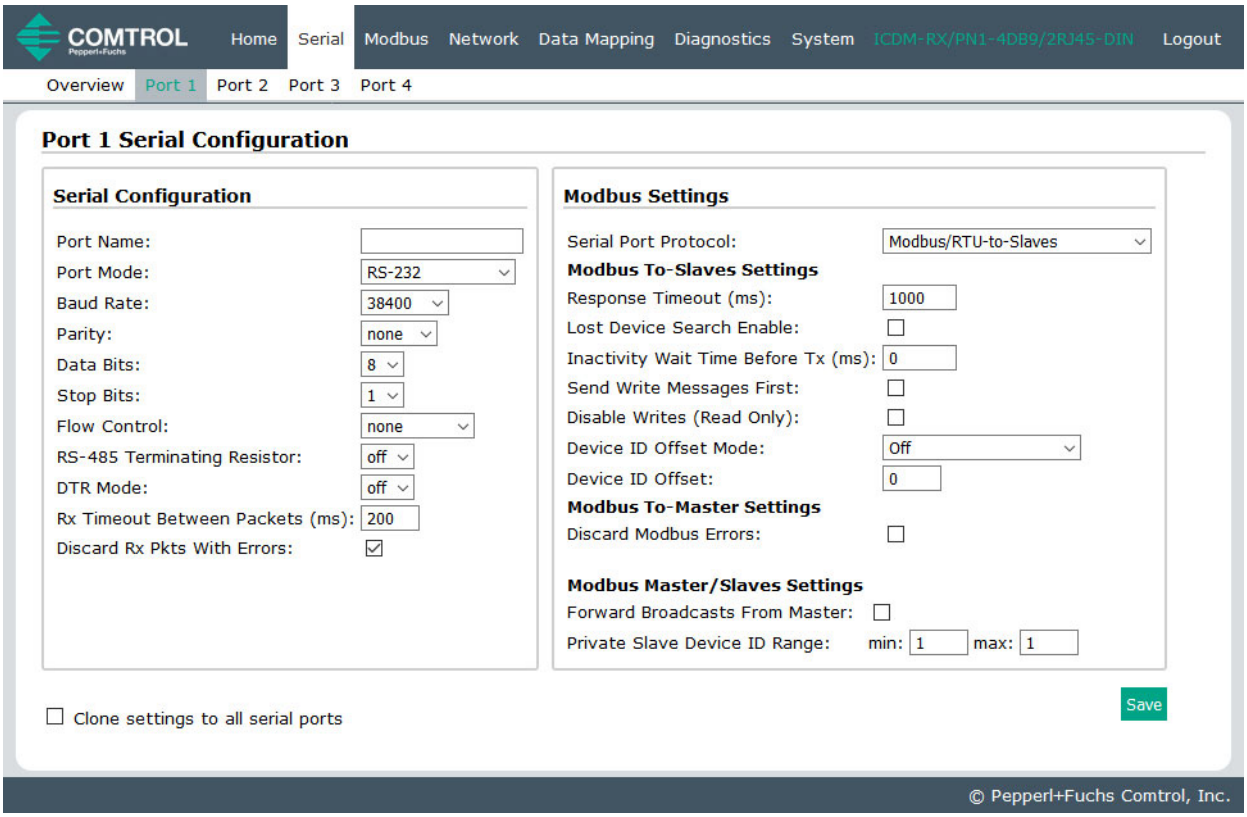
Use the following procedure to configure the serial ports.

1. Open the ICDM-RX/PN web interface using your browser. The default IP address is 192.168.250.250. You can use PortVision DX to program your IP address, if necessary.
2. Click **Serial** and the **Serial Port Overview** page displays.



Serial Port Settings	Port 1	Port 2	Port 3	Port 4
Port Name:				
Port Mode:	RS-232	RS-232	RS-232	RS-232
Baud Rate:	38400	38400	38400	38400
Parity:	none	none	none	none
Data Bits:	8	8	8	8
Stop Bits:	1	1	1	1
Flow Control:	none	none	none	none
RS-485 Terminating Resistor:	off	off	off	off
DTR Mode:	off	off	off	off
Rx Timeout Between Packets (ms):	200	200	200	200
Discard Messages With Errors:	yes	yes	yes	yes
Serial Port Protocol:	Modbus/RTU-to-Slaves	Modbus/RTU-to-Slaves	Modbus/RTU-to-Slaves	Modbus/RTU-to-Slaves
Modbus To-Slaves Settings				
Response Timeout (ms):	1000	1000	1000	1000
Inactivity Wait Time Before Tx (ms):	0	0	0	0
Lost Device Search Enable:	no	no	no	no
Send Write Messages First:	no	no	no	no
Disable Writes (Read Only):	no	no	no	no
Device ID Offset Mode:	Off	Off	Off	Off
Device ID Offset:	0	0	0	0
Valid Rcvd Msg Device ID Range:	1-255	1-255	1-255	1-255
Valid On Port Device ID Range:	1-255	1-255	1-255	1-255
Modbus To-Master Interface Settings				
Discard Modbus Error Responses:	N/A	N/A	N/A	N/A
Modbus Master/Slaves Settings (Master with Private Slaves)				
Forward Broadcasts From Master:	N/A	N/A	N/A	N/A
Private Slave Device ID Range:	N/A	N/A	N/A	N/A

3. Click the port number that you want to configure and the corresponding port page displays.



4. Configure the serial port to match the serial device that you plan on attaching to that serial port and click **Save** when you are done. Refer to the following tables if you need information about the options on the **Port Configuration** page.
   - Serial Port Configuration - Serial Device Options (below)
   - Serial Port Configuration - Modbus Settings on page 11

Serial Port Configuration - Serial Configuration	
Port Name	A user definable string used to describe the serial interface. Valid characters include a-z, A-Z, 0-9, underscores, spaces and dashes. All other characters are discarded. Up to 80 character ASCII string. The default is blank.
Port Mode	Select the communications mode for the serial device that you are connecting to the port. The available modes are RS-232, RS-422, and RS-485.
Baud Rate	Select a baud rate from the list. The baud rate that you select determines how fast information is transferred through a port.
Parity	Select a method for error checking. • None - When the parity is set to none, there is no parity bit, and ICDM-RX/PN does not perform parity checking. • Odd - Indicates that the sum of all the 1-bits in the byte plus the parity bit must be odd. When the total is odd, the parity bit is set to zero, when it is even, the parity bit is set to one. • Even - When the sum of all the 1-bits is even, the parity bit must be set to zero; when it is odd, the parity bit must be set to one.
Data Bits	Select the number of bits that make up the data. Choose from 5, 6, 7 or 8-bits.
Stop Bits	Select the number of bits to mark the end of data transmission.

TDOCT-6598 0220

Serial Port Configuration - Serial Configuration (Continued)	
Flow Control	Specifies the ability to start and stop the flow of data without the loss of bytes. Select a method for controlling the flow of data from the following list: • None - Indicates flow control is not in affect. • RTS/CTS - Request To Send (RTS) tells the receiving device that the sending device has data that is ready to send and Clear To Send (CTS) indicates the device is ready to accept data. • XON/XOFF - When selected, applies the standard method of controlling data flow between two modems. • Half Duplex - Transmits data in half-duplex mode.
RS-485 Terminator Resistor	This option displays on supported models. Select the state of the terminator resistor in RS-485 mode. The terminator resistor is available on the DIN rail models. • on - Enable RS-485 Terminator Resistor • off - Disable RS-485 Terminator Resistor
DTR Mode	Select the state of Data Terminal Ready (DTR). • on - Enables DTR. • off - Disables DTR.
Rx Timeout Between Packets	Specifies the following information, once the start of a packet is received: • How long the ICDM-RX/PN should wait (in milliseconds) before timing-out, if the ETX Rx Detect length is one byte or two bytes and the ETX byte(s) are not received. • The time to wait in milliseconds between serial packets if the ETX Rx Detect length is set to none.
Discard Rx Pkts With Errors	By default, this box is checked and the ICDM-RX/PN discards serial packets with errors. Clear the check box when you need to receive a serial packet with errors to troubleshoot an issue.

Serial Port Configuration - Modbus Settings	
Serial Port Protocol	The Modbus protocol, setting for this serial port: • Modbus/RTU-to-Slaves – Configures the serial port to communicate to Modbus/RTU slaves. • Modbus/ASCII-to-Slaves – Configures the serial port to communicate to Modbus/ASCII slaves. • Modbus/RTU-to-Master – Configures the serial port to communicate to a Modbus/RTU master. • Modbus/ASCII-to-Master – Configures the serial port to communicate to a Modbus/ASCII master. • Modbus/RTU-to-Master/Slaves – Configures the serial port to communicate to a serial bus with a Modbus/RTU master and Modbus/RTU slave(s). • Modbus/ASCII-to-Master/Slaves – Configures the serial port to communicate to a serial bus with a Modbus/ASCII master and Modbus/ASCII slaves.
Modbus To-Slaves Settings	
Response Timeout (Default = 750 msec)	The maximum allowable time (0 to 65535 msec.) for a slave device to respond to a message before the message is considered timed out.
Lost Device Search Enable Not supported: 1-port (Default = Off)	If selected, lost devices that were on this port are searched for on other Modbus/RTU and Modbus/ASCII slave ports that also have this option set.

TDOCT-6598 0220

Serial Port Configuration - Modbus Settings (Continued)	
Inactivity Wait Time Before Tx (ms) (Default = 0 ms)	The minimum time (0 to 65535 msec.) that the ICDM/RX-PN1 waits after receiving a response or transmitting a Modbus request before transmitting the next request.
Send Write Messages First (Default = Off)	If selected, it transmits any write messages before transmitting any read messages that may have already been queued for transmission.
Disable Writes (Read Only) (Default = Off)	If selected, it disables transmission of all standard Modbus write messages.
Device ID Offset Mode (Default = Off)	• Off disables Device ID Offset functionality. • Add-to-Msg-ID adds the Device Offset to the message device ID. • Subtract-from-Msg-ID subtracts the Device ID Offset from the message device ID.
Device ID Offset	• 0 = disables Device ID Offset functionality. • 1-254 = dependent on the Device ID Offset Mode, is added to or subtracted from the message device ID before the Modbus message is transmitted out the serial port.
Modbus To-Master Settings	
Discard Modbus Errors (Default = Off)	If selected, all broadcast messages from the serial master will be forwarded to the Modbus network through the ICDM/RX-PN1.
Modbus Master/Slave Settings	
Forward Broadcasts from Master (Default = Off)	If selected, all broadcast messages from the serial master will be forwarded to the Modbus network through the ICDM/RX-PN1.
Private Slave Device ID Range (Default: Min = 1, Max = 1)	This range (1-255) defines the expected slave device ID range on the serial bus. Modbus request messages received on this port within this device ID range will not be forwarded to the Modbus network. **The ICDM/RX-PN1 has a built-in auto-detect algorithm for detecting private slave device(s) with ID(s) not defined within the private device ID range.** **The minimum value must be less than or equal to the maximum value.**

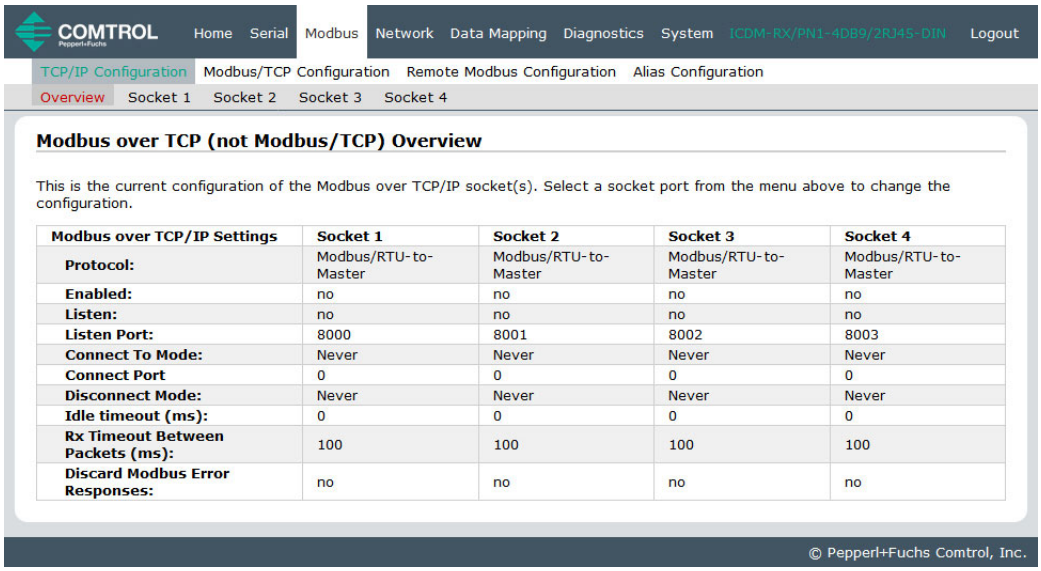
TDOCT-6598 0220

3 Configuring a Modbus Device

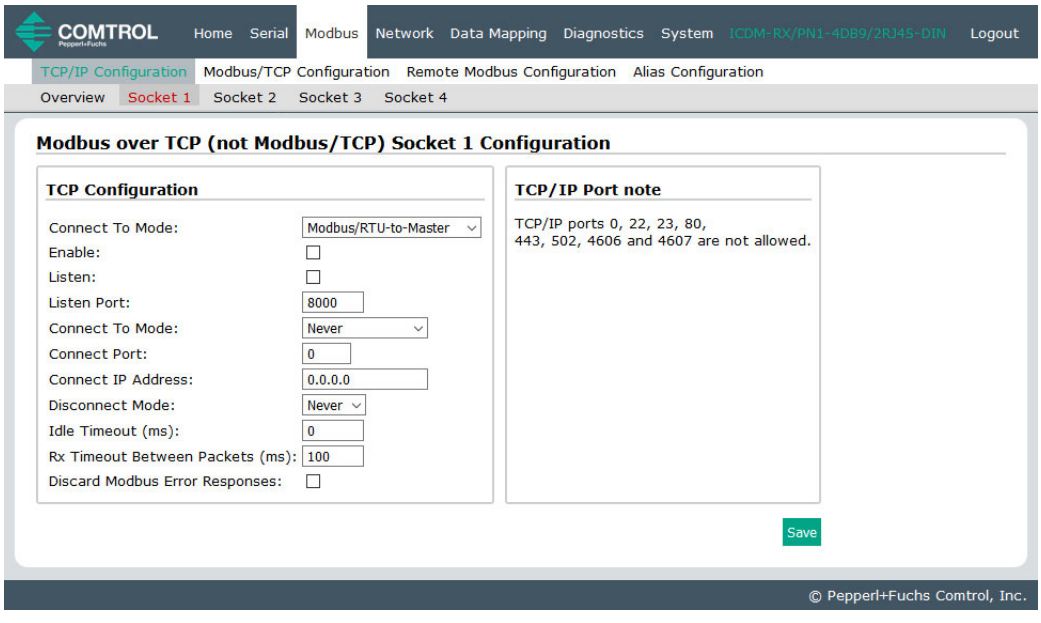
3.1 TCP/IP Configuration Page

Use the following procedure to configure Modbus over TCP (not Modbus TCP) characteristics for the port.

1. Open the ICDM-RX/PN1 web interface using your browser.
2. Click **Modbus** and the **Modbus over TCP (not Modbus/TCP) Overview** page displays.



3. Click the device number that you want to configure and the corresponding page displays.



4. Configure the Modbus settings to match the device that you plan on using and click **Save** when you are done.

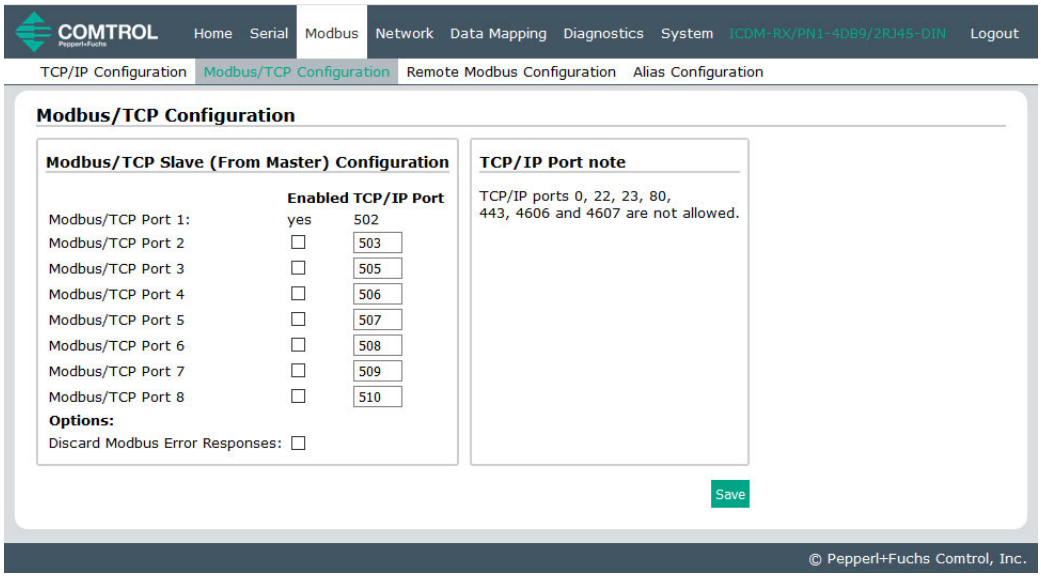
Modbus over TCP (not Modbus/TCP) Socket Configuration Page	
TCP Configuration	
Connect To Mode	• Modbus/RTU-to-Master – Configures the TCP/IP connection(s) to communicate to Modbus/RTU master(s). • Modbus/ASCII-to-Master – Configures the TCP/IP connection(s) to communicate to Modbus/ASCII master(s).
Enable (Default = Off)	If selected, this TCP/IP socket interface will be enabled
Listen (Default = Off)	If selected, the TCP/IP socket interface will listen for a connection at the specified Listen Port.
Listen Port (Defaults: Port 1=8000 Port 2=8001 Port 3=8002 Port 4=8003)	The Listen Port values are 1-65535. If Enable and Listen are both selected, allows acceptance of: • Up to six connections from external applications if there is no active Connect-to connection. • Up to five connections if there is an active Connect-to connection. The following TCP/IP ports are not allowed: 0, 22, 23, 80, 443, 502, 4606, and 4607.
Connect to Mode (Default = Never)	If Enable is selected, this setting determines how to connect to an application. • If Never: Do not attempt to make a connection. • If Connect-Always: Always attempt to maintain a connection to the application at Connect IP Address and Connect Port
Connect Port (Default = 0)	Socket port to connect to (1 to 65535). Used in conjunction with Connect to Mode and Connect IP Address.
Connect IP Address (Default = 0)	IP Address of application to create a connection. Used in conjunction with Connect to Mode and Connect Port. **The IP Address of this ICDM-RX/PN1 will not be accepted as valid configuration data.**
Disconnect Mode (Default = Never)	Mode on which to disconnect from the application. • Never – Will not disconnect when connection(s) are idle. • Idle– Utilizes the Idle Timer to determine when to close the connection.
Idle Timer (Default = 0)	If the Disconnect Mode is set to Idle, the idle or inactivity time (1 to 65535 ms) when the connection(s) will be closed.
Rx Timeout Between Packets (Default = 100)	Receive timeout (0-65565) between packets in msec. This is the maximum spacing between received bytes allowed before the received Modbus message is expected to be complete.
Discard Modbus Error Responses	If enabled, Modbus error responses are discarded.

TDOCT-6598 0220

3.2 Modbus/TCP Configuration Page

Use the following procedure to configure Modbus/TCP characteristics for the port.

1. Open the ICDM-RX/PN1 web interface using your browser.
2. Click **Modbus** I **Modbus/TCP Configuration** and the **Modbus/TCP Configuration** page displays.



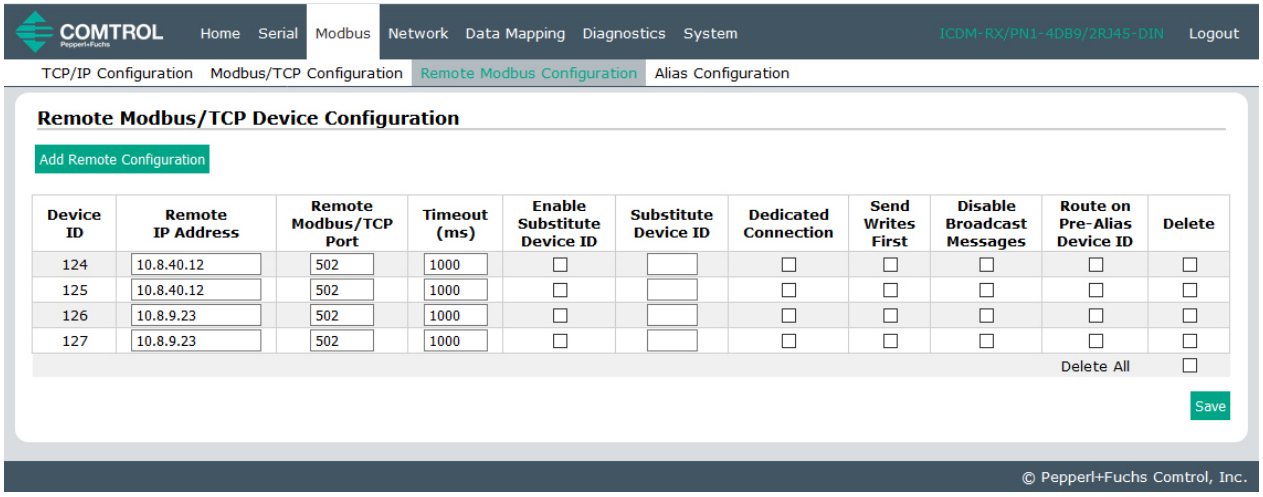
3. Configure the characteristics for your environment. Refer to the following table for information about this page.

Modbus/TCP Configuration Page	
Modbus TCP/IP Port 1	
Enabled	Always enabled. Cannot be disabled.
TCP/IP Port	The standard Modbus TCP/IP port of 502. This port is always enabled.
Modbus TCP/IP Ports 2 to 8	
Enabled (Default: No)	If selected, the ICDM-RX/PN1will listen for Modbus/TCP requests on the configured TCP/IP port.
TCP/IP Port Default Port 2 = 503 Default Port 3 = 505 Default Port 4 = 506 Default Port 5 = 507 Default Port 6 = 508 Default Port 7 = 509 Default Port 8 = 510	The specified TCP/IP port(1-65535) that the ICDM-RX/PN1 will listen for Modbus/TCP requests on. Default ports are the first seven unassigned ports, as determined by the Internet Assigned Numbers Authority after the standard Modbus/TCP port of 502. **TCP/IP ports 0, 22, 23, 80, 443, 4606 and 4607 are not allowed. Enabling TCP/IP ports other than the defaults may cause disruptions on your network. Please verify any configuration changes with your IT department.**

3.3 Remote Modbus/TCP Device Configuration Page

Use the following procedure to configure Modbus/TCP Device characteristics for the port.

1. Open the ICDM-RX/PN1 web interface using your browser.
2. Click **Modbus** I **Remote Modbus Configuration** and the **Modbus/TCP Configuration** page displays.



Click the **Add Remote Configuration** button to add additional remote devices. Refer to the following table for details.

Remote Modbus/TCP Device Configuration Page	
Device ID #	The Device ID (also often called the unit ID) of the remote device must be unique. The Device ID range is 1-255. 0 means that it is not configured.
Remote IP Address	IP address of the Modbus/TCP device. All 0s means that it is not configured. **The IP address of the ICDM-RX/PN1 will not be accepted as valid configuration data.**
Remote Modbus/TCP Port (Default = 502)	The TCP/IP port (1-65535) to connect to on the remote device.
Timeout (ms) (Default = 1000 msec)	The maximum allowable time (0 to 65535 msec) for a slave device to respond to a message before the message is considered timed out.
Enable Substitute Device ID	If this option is selected: • In all messages sent to the Modbus/TCP device, the configured Device ID will be replaced with the Substitute Device ID. • The response received from the device, which will contain the Substitute Device ID, will then be changed back to the Device ID before returning the response to the message originator.
Substitute Device ID	The device ID used if the Enable Substitute Device ID option is selected.
Dedicated Connection (Default = Off)	If selected, a dedicated Modbus/TCP connection will be used to connect to this remote device. This is most commonly used when connecting to another gateway, multiple devices are being accessed, and maximum bandwidth is desired.

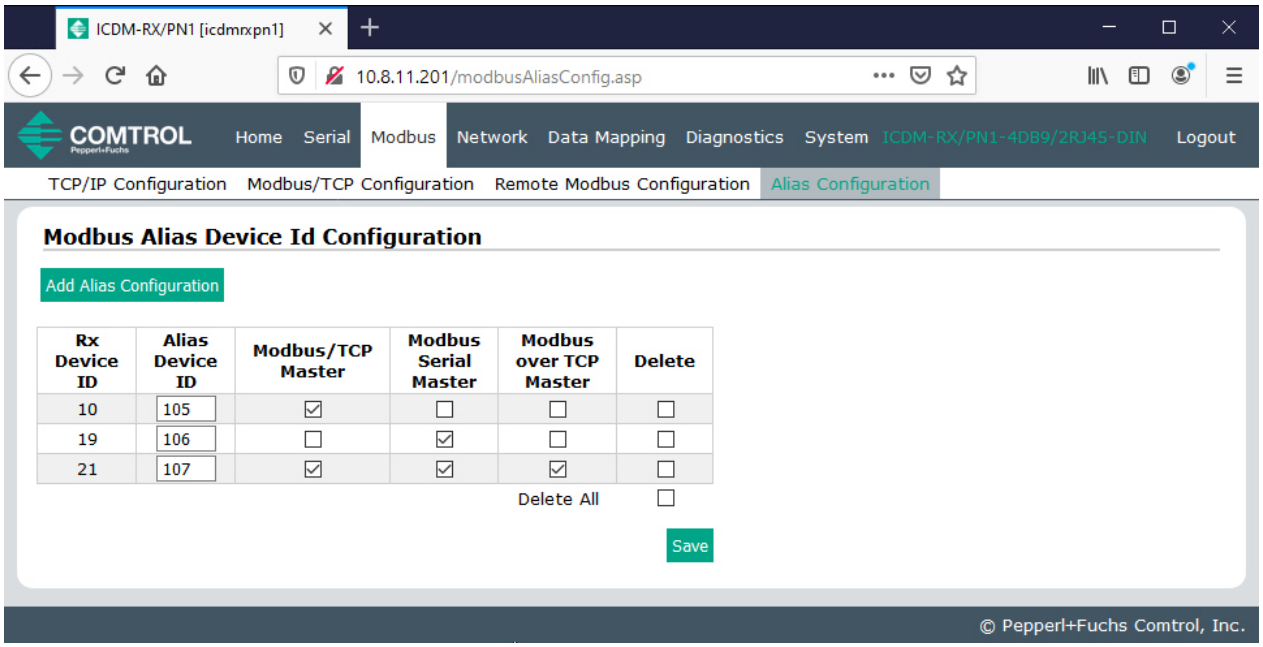
TDOCT-6598 0220

Remote Modbus/TCP Device Configuration Page (Continued)	
Send Writes First (Default = Off)	If selected, will forward write messages before forwarding any pending read messages. This is most commonly used when multiple messages may be outstanding for the remote device(s) and low latency for write messages is desired.
Disable Broadcast Messages (Default = Off)	If selected, will disable broadcasts to this remote device. If multiple remote devices are accessed through another gateway, then this option must be selected for all remote devices configured to that gateway to prevent broadcast messages from being sent to those devices.
Route on Pre-Alias Device ID (Default = Off)	This setting only applies to a Modbus message if the following two statements are true: • The Modbus message device ID has been aliased, or changed, as a result of a corresponding Alias Device ID configuration via the **Modbus Alias Id Configuration** page. • A Remote Modbus/TCP Device configuration exists for the pre-aliased, or original, device ID. If selected and all requirements are true, then the Remote Device ID configuration for the pre-aliased device ID will be applied to the Modbus message. This includes the IP address/port, timeout and control flags.
Delete	If enabled, that Device ID or IDs are deleted when you click the Save button.

3.4 Alias Configuration Page

Use the following procedure to configure Modbus Alias Device ID configuration characteristics for the port.

1. Open the ICDM-RX/PN1 web interface using your browser.
2. Click **Modbus** I **Alias Configuration** and the **Modbus Alias Device Id Configuration** page displays. Refer to the following table for information about the configuration options



Modbus Alias Device Id Configuration Page	
Rx Device ID	The device ID (also often called the unit ID) of the received message from a master. Device IDs range from 1 to 255.
Alias Device ID	The alias device ID to convert the received device ID to. Alias Device IDs range from 1 to 255.
Modbus/TCP Master (Default = Off)	If selected, this applies the alias device ID configuration to messages received from Modbus/TCP masters.
Modbus Serial Master (Default = Off)	If selected, this applies the alias device ID configuration to messages received from serial Modbus masters.
Modbus over TCP Master (Default = Off)	If selected, this applies the alias device ID configuration to messages received from Modbus RTU/ASCII over Ethernet TCP/IP masters.

TDOCT-6598 0220

4 Configuring the ICDM-RX/PN1 in TIA Portal

4.1 Installing the GSD File

Use the following steps to install the ICDM-RX/PN1 GSD file into TIA Portal.

1. Open the ICDM-RX/PN1 home page, download and unzip the GSDML zip file to a working directory.

   If you have not previously configured an IP address using PortVision DX, the default IP address is 192.168.250.250 with a subnet mask of 255.255.0.0. If you do not use PortVision DX to program the IP address, you may need to change your system IP address to initially communicate with the ICDM-RX/PN1.

2. Open TIA Portal and click Project View.
3. Use the Options | Install general station description file (GSD) menu to install the GSD file.

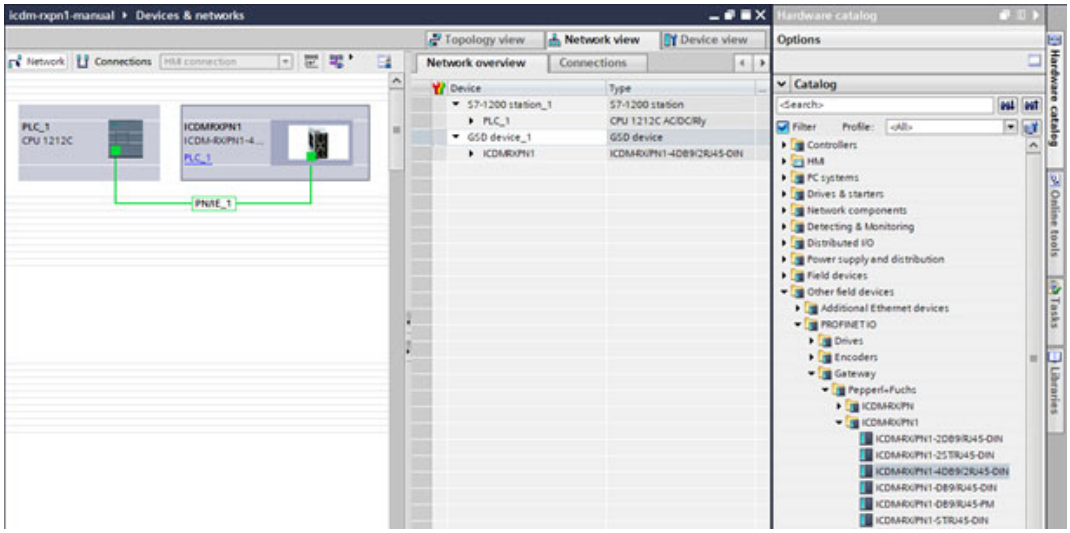
4.2 Adding the ICDM-RX/PN1

Use these steps to add the ICDM-RX/PN1

1. From the Hardware catalog, under Other field devices | PROFINET IO | Gateway | Pepperl+Fuchs | ICDM-RX/PN1, select the model corresponding to your device, and drag it into the Network view area.

TDOCT-6598 0220

2. To connect the device to PLC, click the link on the device and select **PLC_1.PROFINET interface_1** from the pop-up menu, as shown in the following screen shot.



3. A valid IP address and a device name are required to establish a connection (Application Relationship) between an ICDM-RX/PN1 gateway and an IO controller. The next two subsections describe various methods to assign IP address and device name to the ICDM-RX/PN1.

4.3 IP Address Assignment

The ICDM-RX/PN1 gateway supports three methods for IP address assignment according to GSDML Specification V2.32.

- LOCAL - A device specific method for IP address assignment.
- DHCP - The Dynamic Host Configuration Protocol for IP address assignment.
- DCP - IP address assignment via Discovery and basic Configuration Protocol (DCP).

Note

The ICDM-RX/PN1's default IP address is 192.168.250.250 and the default subnet mask is 255.255.0.0. You may need to change your laptop or PC IP address range to access the web interface or you can use PortVision DX to change the IP address without changing your settings. Refer to the *ICDM-RX Hardware Installation and Configuration Manual* for detailed information.

4.3.1 Assigning an IP Address Statically

IP addresses can be assigned statically using one of the following methods:

- Embedded web interface (or PortVision DX)
- Assign IP address function of TIA Portal on-line access

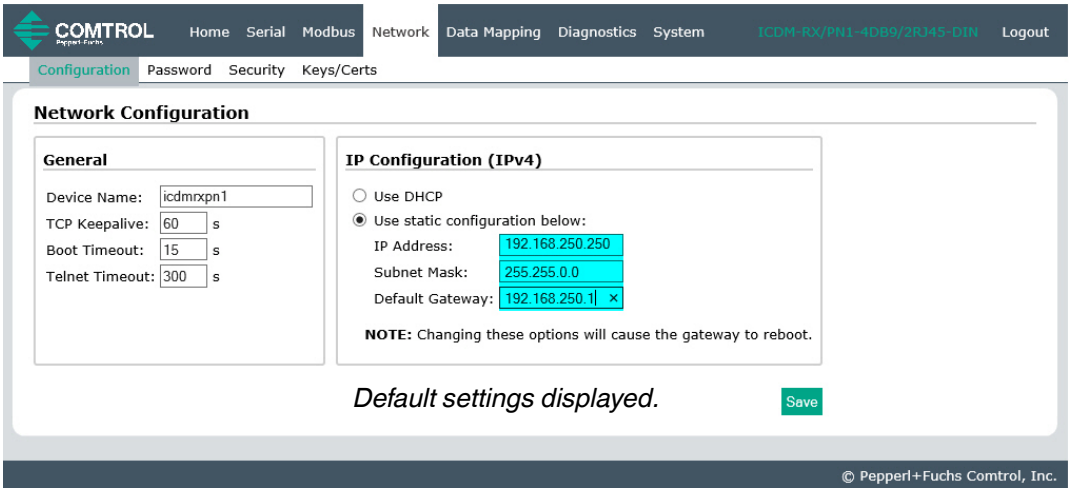
4.3.1.1 Assigning IP Address Statically Using the Web Page

You can use the following procedure to configure a static IP address using the web interface.

1. Open a web browser and enter the ICDM-RX/PN1 gateway address.
2. Click **Network** | **Configuration**.
3. Select the **Use static config below** radio button.

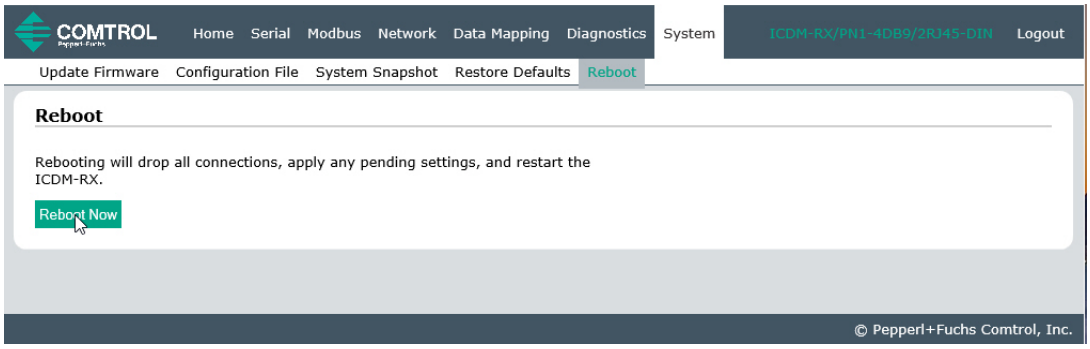
TDOCT-6598 0220

4. Enter an IP address, subnet mask, and gateway address.
5. Click the **Save** button.



A reboot is required for the new IP address to take effect.

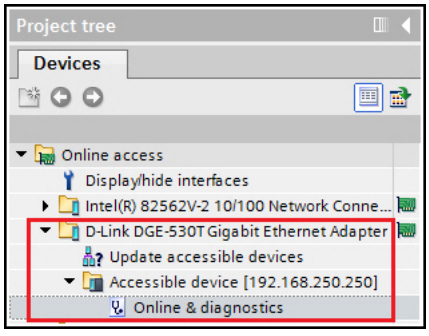
6. Click **System** | **Reboot** and the ICDM-RX/PN1 will reboot in 10 seconds or you can click on the **Reboot Now** button to reboot immediately.



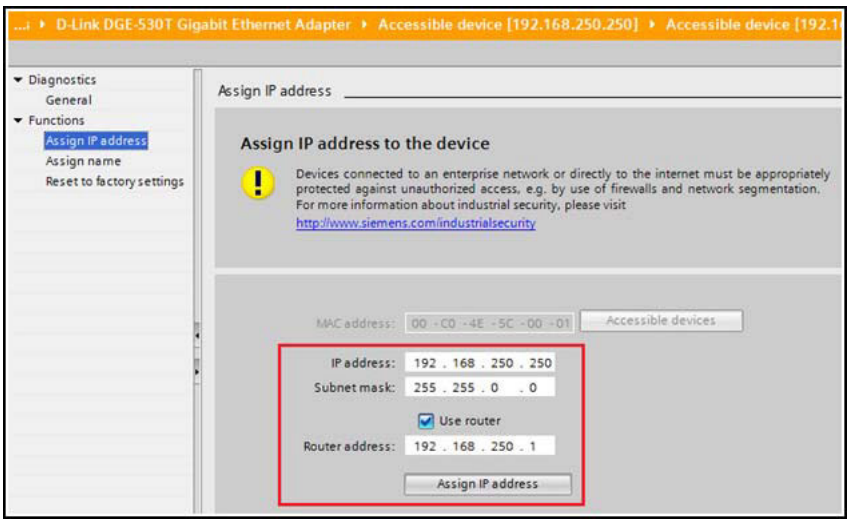
4.3.1.2 Assigning IP Address Statically Using TIA Portal

You can also use the following procedure to configure a static IP address using TIA Portal.

1. Double-click **Project tree** | **Online access** | **Your Ethernet Adapter** | **Accessible device [192.168.250.250]** | **Online & diagnostics** to open the Online access window, where **Your Ethernet Adapter** is the name of your networking interface, and **Accessible device** [192.168.250.250] is the gateway, as shown in this figure.



2. Click **Functions** I **Assign IP address** and enter the desired IP configurations, as shown in the next screen shot.
3. Click the **Assign IP address** button and then the IP configuration is assigned to the gateway.

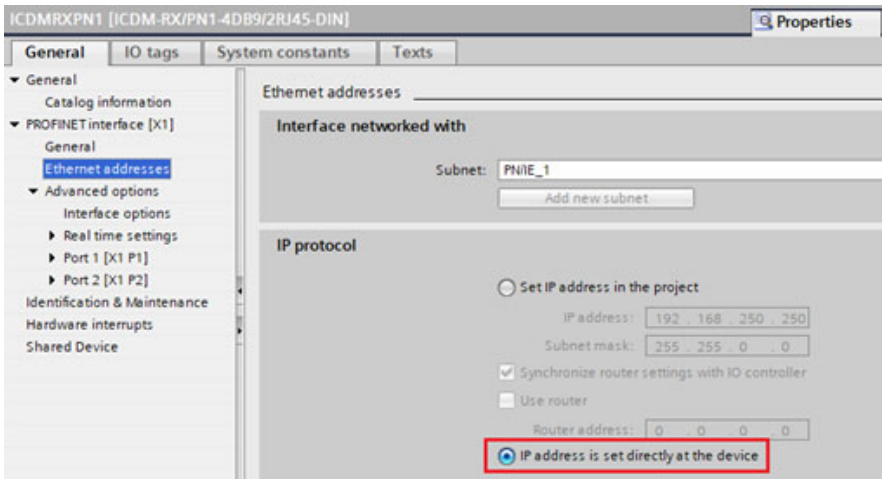


I You can access the gateway using the new IP address immediately. A reboot is not required.

4.3.1.3 Configuring TIA Portal Project Not to Set the IP Address

When using static IP address assignment either through the web interface or TIA Portal on-line access, you will need to configure the TIA Portal project not to set IP address in project.

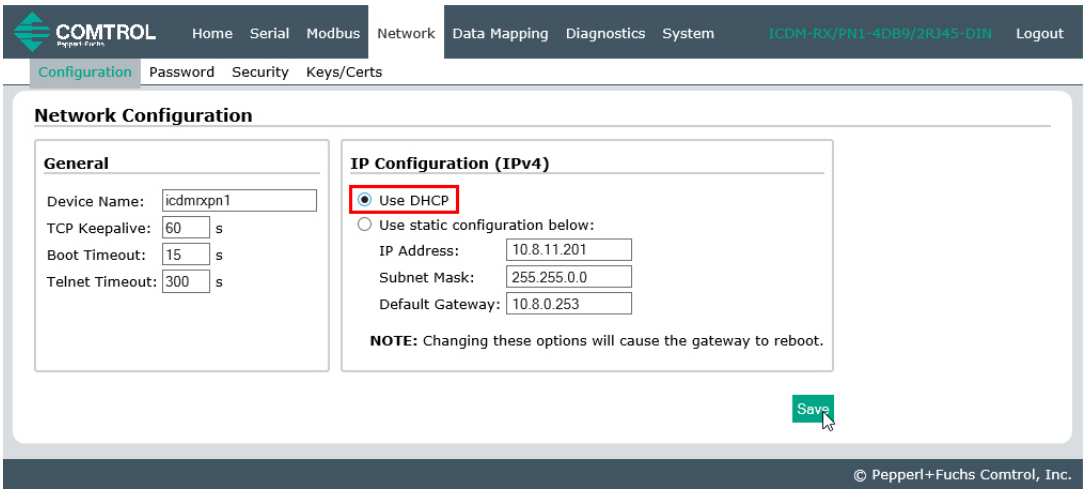
1. In TIA Portal, double-click the ICDM-RX/PN1 module to open the Device View.
2. On the **Properties** I **General** tab, click the **PROFINET interface [X1]** I **Ethernet** addresses, which opens the Ethernet addresses properties window.
3. Make sure the **IP address is set directly at the device** radio button is selected, as shown in this figure.



4.3.2 Assigning an IP Address via DHCP

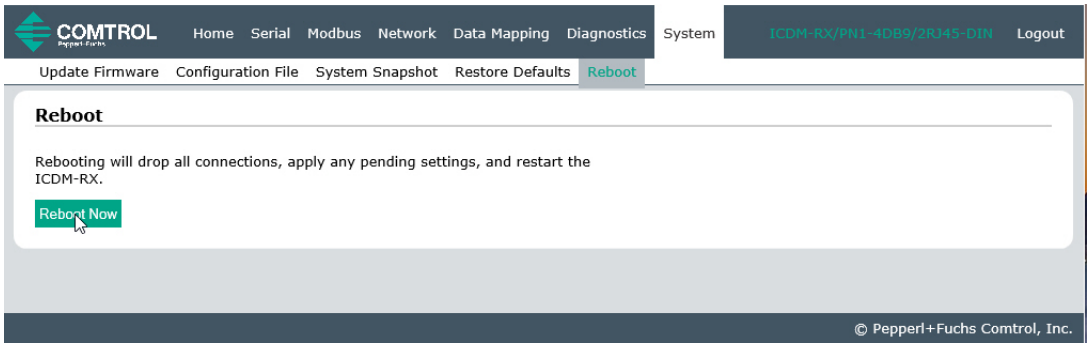
The ICDM-RX/PN1 gateway supports DHCP for IP address assignment. DHCP is disabled by default. Use the following steps to enable DHCP.

1. Open a web browser and enter the ICDM-RX/PN1 IP address. The default IP address is 192.168.250.250.
2. Click **Network** I **Configuration**.
3. Select the **Use DHCP** radio button and click the **Save** button.



A reboot is required for the change to take effect.

4. Click **System** I **Reboot** and the ICDM-RX/PN1 will reboot in 10 seconds or you can click on the **Reboot Now** button to reboot immediately.



Once rebooted, the gateway attempts to obtain an IP address from a DHCP server. You can use PortVision DX to find out the new IP address of the gateway or do a network scan in TIA Portal.

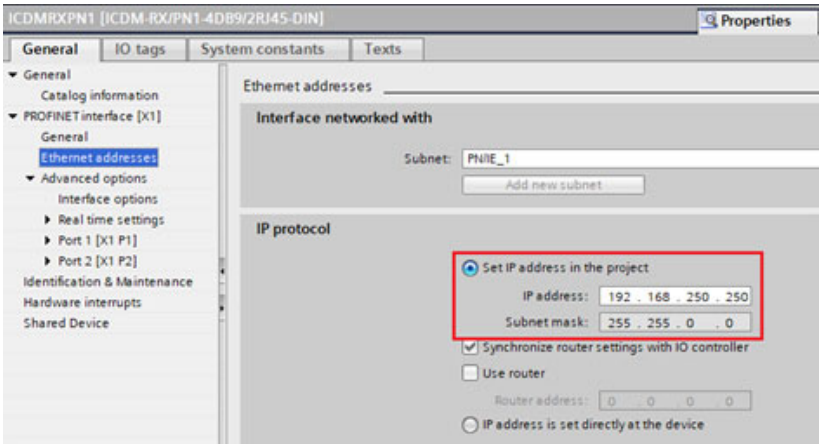
Notes

- DHCP can only be enabled or disabled via the web interface. Certain versions of SIMATIC STEP 7 have a function to enable DHCP if a PROFINET IO device supports it. However, the ICDM-RX/PN1 does not support enabling DHCP through STEP 7.
- Similar to static IP address assignment, when DHCP is enabled, you will need to configure the TIA Portal project not to set IP address in project. Refer to *Configuring TIA Portal Project Not to Set the IP Address* (Page 22) to set the IP address is set directly at the device option.

4.3.3 Assigning an IP Address via IO Controller

An IO controller can assign IP address to the ICDM-RX/PN1 via DCP. The IO controller and the ICDM-RX/PN1 gateway have to be on the same subnet.

1. In TIA Portal, double-click the ICDM-RX/PN1 module to open the **Device View**.
2. On the **Properties** | **General** tab, click the **PROFINET interface [X1]** | **Ethernet addresses**, which opens the **Ethernet addresses properties** window.



3. Make sure the **Set IP address in the project** radio button is selected.
4. Manually enter the IP address for the ICDM-RX/PN1 gateway.
5. Compile and download the project.

The new IP configuration takes effect when a connection is established between the ICDM-RX/PN1 and the IO controller. A reboot is not required.

4.3.4 Special Considerations Regarding IP Assignment

When an IP address is assigned by an IO controller, the ICDM-RX/PN1 does not store the assigned IP address in the non-volatile memory. If the ICDM-RX/PN1 is rebooted, it starts with the 0.0.0.0 IP address after the reboot. The ICDM-RX/PN1 stays in that state until a connection is reestablished with the IO controller, at which point the (same) IP address is reassigned by the IO controller. This behavior is a requirement of the PROFINET specification.

Since the 0.0.0.0 is not a valid IP address, the ICDM-RX/PN1 is not assessable via the web interface, Telnet, or SSH. You can use PortVision DX and TIA Portal to discover the ICDM-RX/PN1 and assign a static IP address. For information using PortVision DX to configure the IP address, refer to the *ICDM-RX Hardware Installation and Configuration Manual*.

Pepperl+Fuchs recommends using static IP address assignment when possible. The web interface always works regardless of the presence of an IO controller or not.

In addition, DCP IP assignment overwrites the static or DHCP IP assignment. For example: an IO controller is configured to set IP address in the project. The IO controller is powered off temporarily. A new IP address is assigned to the ICDM-RX/PN1 using PortVision DX. Later when the IO controller is turned back on, it changes the gateway's IP address back to the address that was configured in the project.

TDOCT-6598 0220

4.4 Device Name Assignment

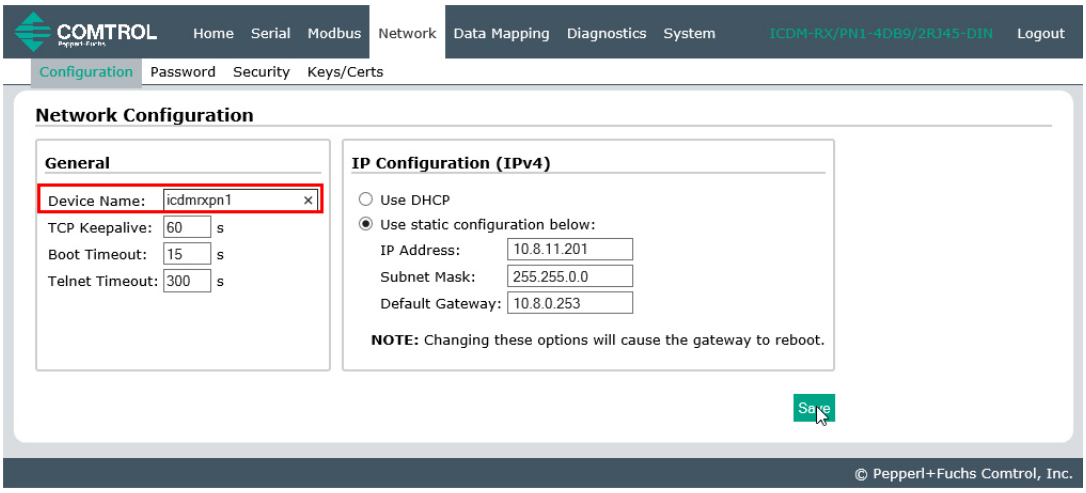
Use one of the following methods to configure the Device Name.

- Web interface
- TIA Portal

4.4.1 Assigning the Device Name Using the Web Interface

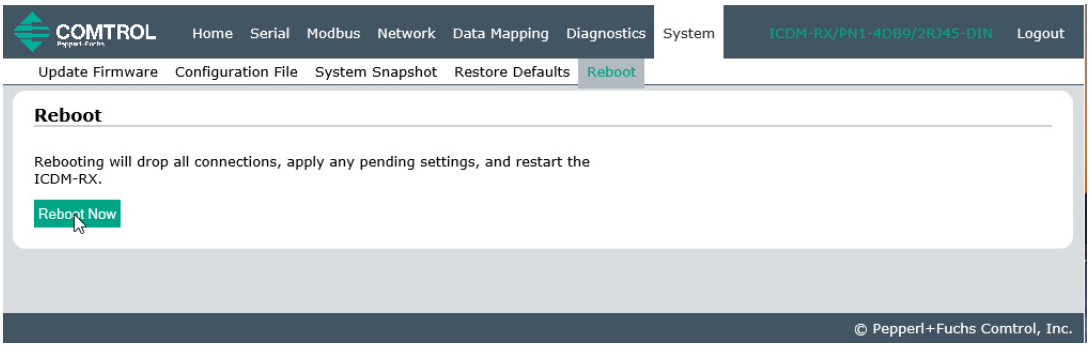
You can use the Network | Configuration page to assign the device name for PROFINET IO.

1. If necessary, open the gateway web interface with your web browser using the IP address.
2. Click **Network | Configuration**.
3. Enter the PROFINET IO Device Name. The PROFINET IO device name is not case-sensitive and the default is empty. The device name must be specified according to DNS conventions.
   - Parts of the name within the device name; in other words, a string between two periods, must not exceed a maximum of 63 characters.
   - No special characters such as umlauts (**ä, ö** etc.), brackets, underscore, slash, blank etc. The dash is the only permitted special character.
   - The device name must not begin or end with the "**-**" character.
   - The device name must not begin with numbers.
   - The device name must not have the structure **n.n.n.n** (n = 0...999).
   - The device name must not begin with the character string "**port-xyz-**" (x , y, z = 0...9).
4. Click the **Save** button.



A reboot is required for the new name to take effect.

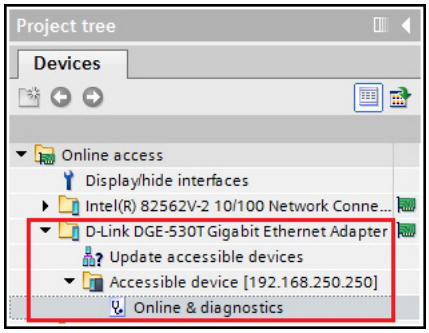
5. Click **System** I **Reboot** to reboot the gateway.

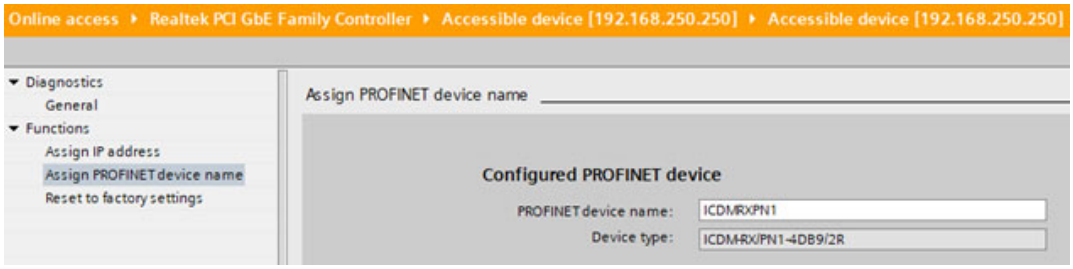


4.4.2 Assigning the Device Name in TIA Portal

Use the following procedure to configure the Device Name using TIA Portal.

1. In TIA Portal, open on-line access.
2. Click **Function** I **Assign** name, enter the desired PROFINET device name.
3. Click the **Assign name** button.



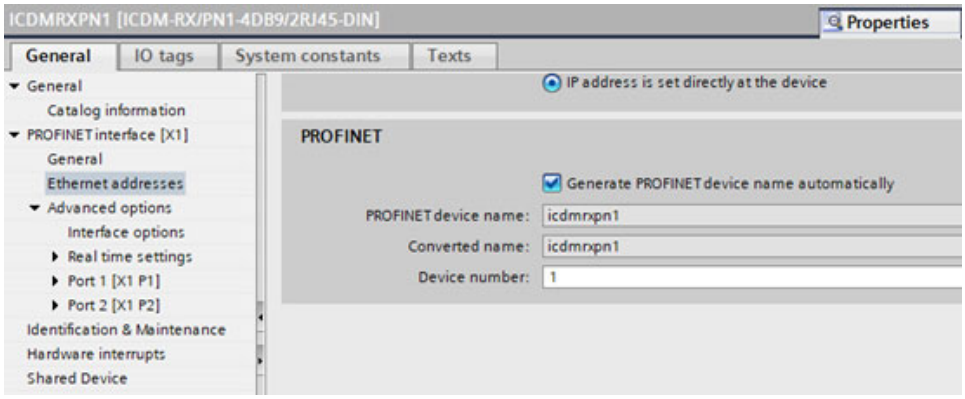


The new device name takes effects immediately. A reboot is not required.

4.4.3 Configuring the Device Name in TIA Portal Project

After assigning a device name to the ICDM-RX/PN1, the same device name also needs to be configured in the TIA Portal project.

1. In TIA Portal, double-click the ICDM-RX/PN1 module to open the **Device View**.
2. On the **Properties | General** tab, click the **PROFINET interface [X1] | Ethernet addresses**, which opens the **Ethernet addresses properties** window.
3. When the **Generate PROFINET device name automatically** check box is selected, a default device name is entered automatically. If the ICDM-RX/PN1 has been assigned a different device name, then un-check the check box and manually enter the device name.



4. Compile and download the project.

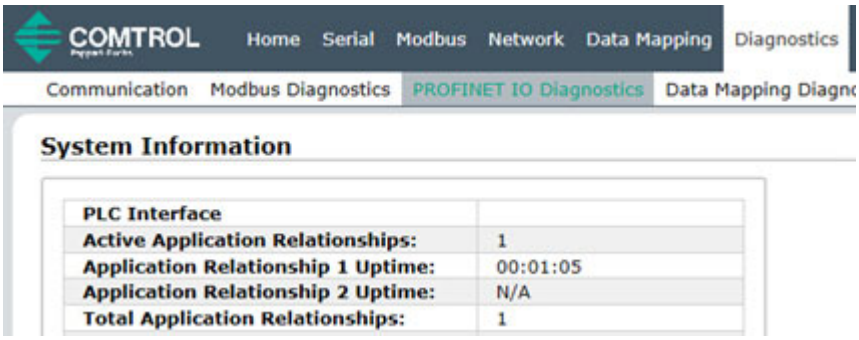
Notes

- Configuring a PROFINET device name in the project does not automatically assign that name to the ICDM-RX/PN1. Use the procedures in *Assigning the Device Name Using the Web Interface* (Page 25) or *Assigning the Device Name in TIA Portal* (Page 26) to assign a device name to the ICDM-RX/PN1.
- The device name must be unique on the network.

4.5 Establishing a PROFINET IO Connection

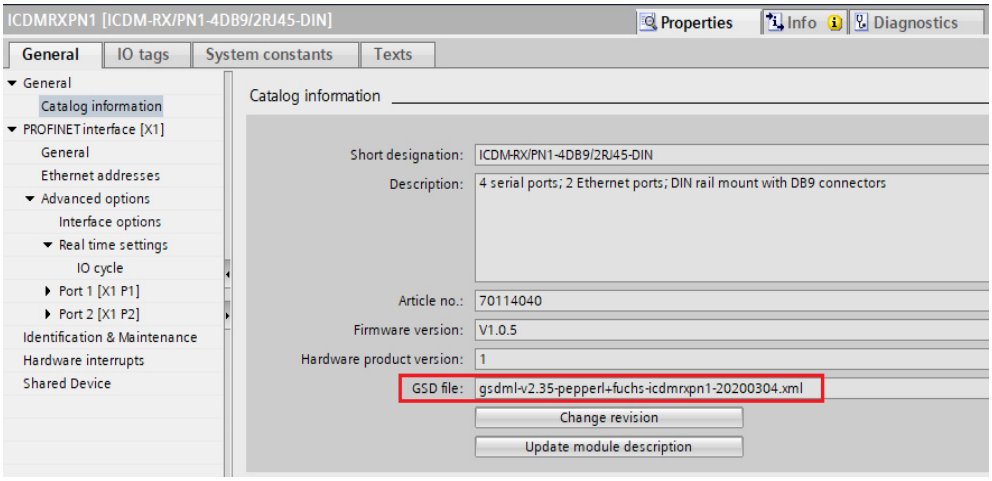
At this point, an ICDM-RX/PN1 gateway was added to a TIA Portal project, the IP address and device name were assigned. The next step is to establish a connection between the gateway and IO controller before starting configuration of the IO modules. You may need to compile and download the project and if necessary, reboot the ICDM-RX/PN1.

Open the **Diagnostics** I **PROFINET IO Diagnostic** web page on the ICDM-RX/PN1. Verify under the PLC Interface section, that a PROFINET IO connection has been successfully established between the gateway and IO controller, the Active Application Relationships should be 1. The **Status** LED has a solid, steady light on the ICDM-RX/PN1 and the status LED(s) on the IO controller should be solid green.



If a connection has not been established, here are some troubleshooting tips:

- Check if the correct GSD file is installed in TIA Portal.
- Check if the ICDM-RX/PN1 module in TIA Portal is using the right GSD revision. If an older version of the GSD file was installed before, you may need to change GSD revision, or remove the ICDM-RX/PN1 device(s) from an existing project, and reinsert it after the new GSD file is installed.



- Check if the right model is added in the project.
- Remove any modules and submodules of the ICDM-RX/PN1 in TIA project. Only keep the head module.
- Check if the gateway has a valid IP address. See *IP Address Assignment* (Page 20) for IP address assignment.
- Verify that the gateway has a valid device name. See *Device Name Assignment* (Page 25) for assigning device name.
- Make sure there are no other devices on the same network using the same IP address or device name.

TDOCT-6598 0220

- Make sure the matching device name is configured in TIA Portal project.
- Make sure there is no other IO controller that is having or trying to establish a connection with the gateway.
- Go to **Diagnostics** I **System Log** web page, look for any possible error messages.

4.6 Status LED Behavior

The ICDM-RX/PN1 has a single **Status** LED.

Status LED Activity	
Blinks every 10 seconds	No PLC connection
On (solid)	One or more PLC connections have been established
Flashing	• LED flashing mode is enabled in PortVision DX • Error detection or diagnostics information available

4.7 Configuring IO Modules

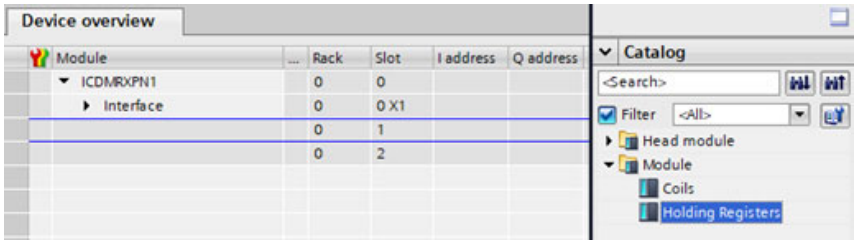
IO modules are used to exchange input and output data with the shared memory blocks provided by the ICDM-RX/PN1. The ICDM-RX/PN1 gateway has two categories of IO modules:

- Coils – for accessing shared coils
- Holding Registers – for accessing shared holding registers

4.7.1 Inserting IO Modules and Submodules

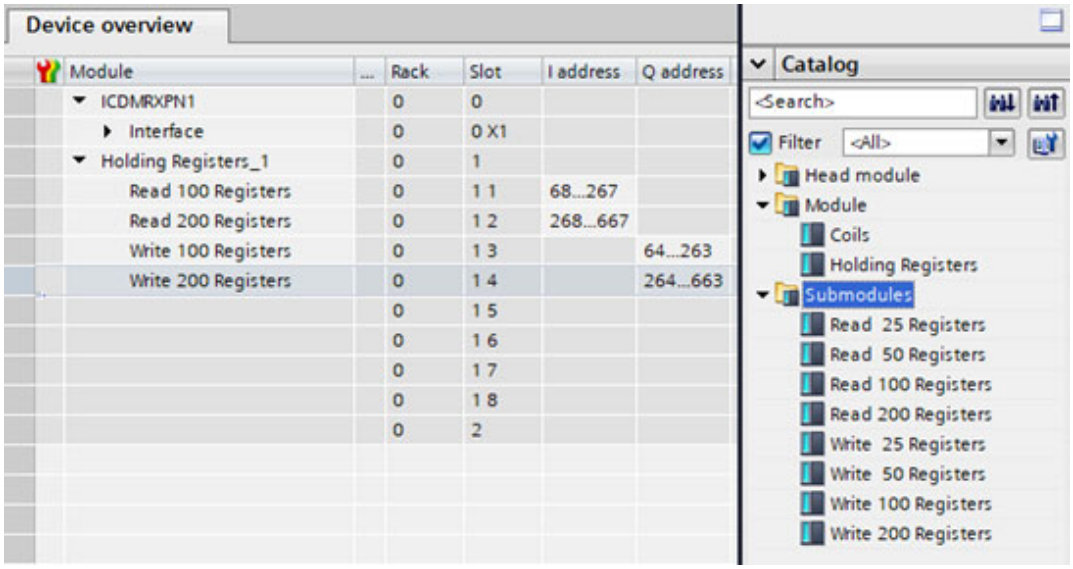
Use the following procedure to insert IO modules and submodules.

1. Double-click the ICDM-RX/PN1 module in the **Network** view to open the **Device overview** window.
2. From the **Catalog** I **Module**, select the **Coils** or **Holding Registers** and drag it into one of the highlighted slots in the **Device overview** window.



- Slot 1 is reserved for Holding Registers.
- Slot 2 is reserved for Coils.

Once an IO module is inserted into a slot, you can configure the submodules for that IO module. There are input and output submodules with various IO sizes.



TDOCT-6598 0220

Each submodule can be inserted to one of the eight available sub-slots of an IO module. Sub-slot 1 is reserved for Block 1 of the shared Holding Registers or Coils. Sub-slot 2 is for the Block 2 of shared Holding Registers or Coils, so on and so forth.

Sub-Slot	Allowed Submodules
1-8 of a Holding Register	Read 25, 50, 100, or 200 Registers Write 25, 50, 100, or 200 Registers
1-8 of a Coils	Read 48, 80, 160, or 320 Coils Write 48, 80, 160, or 320 Coils

In the *Inserting Submodules in TIA Portal* figure (above), a Read 100 Registers submodule and a Read 200 Registers submodule are inserted in sub-slot 1 and 2 of slot 1 respectively. A Write 100 Registers submodule and a Write 200 Registers submodule are inserted in sub-slot 3 and 4 of slot 2 respectively.

The PLC therefore will read 100 holding registers at shared block 1 and 200 holding registers at shared block 2, also write to 100 holding registers at shared block 3 and 200 holding registers at shared block 4.

Similarly, you can configure a Coils module by inserting desired input and output submodules into the sub-slots of the Coils module.

Here are some tips when configuring IO modules and submodules.

- A Coils or Holding Registers module must be inserted first in order to configure the sub-modules.
- If you do not find an exact matching IO size, select the next size (larger). For instance, use the Read/Write 100 Holding Registers submodule for a device that has 80 holding registers.
- The sub-slots are independent. However, each block must have the correct read or write access enabled for PROFINET IO. Use web page **Data Mapping** I **Shared Memory** to configure share memory blocks read/write access.
- Each sub-slot can only have one submodule. Therefore the block can only have read only or write only access.

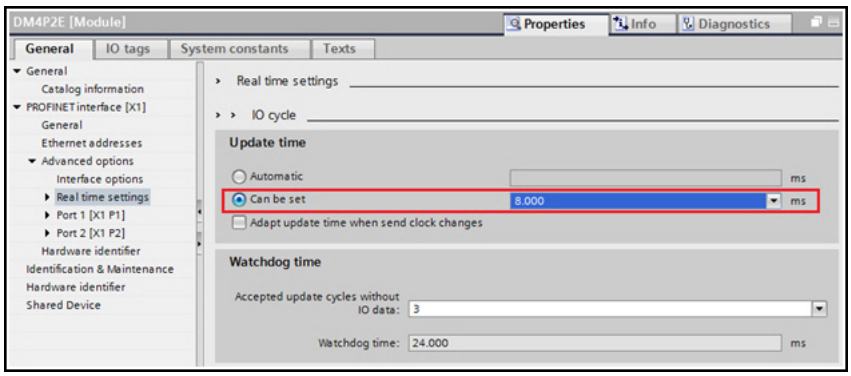
Note

Certain versions of TIA Portal may not allow a module without any submodules. You must insert at least one submodule for a Coils and Holding Registers module.

4.8 Setting the IO Cycle Update Time

Use the following procedure to set the IO Cycle Update Time.

1. Double-click the ICDM-RX/PN1 module to open the **Device View**.
2. On the **Properties** I **General** tab, click the **PROFINET interface [X1]** I **Real time settings**, which opens the **Real time settings** window.
3. Select the **Set update time manually** radio button and select the desired update time. The fastest IO cycle update time is 8ms.



5 Project Example

This section demonstrates how to read and write shared memory blocks in PLC. This example uses an ICDM-RX/PN1-4DB9/2RJ45-DIN. By default, the Holding Registers Block 1-2 and Coils Block 1-2 are PROFINET IO readable. The Holding Registers Block 3-4 and Coils Block 3-4 are PROFINET IO writeable.

1. In a new TIA Portal project, add an IO controller and the ICDM-RX/PN1-4DB9/2RJ45-DIN.
2. Insert a Holding Register module to Slot 1. Then insert two Read 200 Registers submodules into Sub-slot 1 and 2. Insert two Write 200 Registers submodules into Sub-slot 3 and 4, as shown in the figure below.
3. Insert a Coils module to Slot 2. Then insert two Read 320 Coils submodules into Sub-slot 1 and 2. Insert two Write 320 Coils submodules into Slot 2 Sub-slot 3 and 4.

Device overview

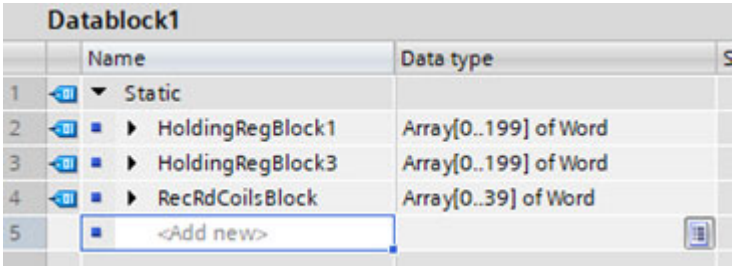
Module	...	Rack	Slot	I address	Q address
ICDMRXPN1		0	0		
Interface		0	0 X1		
Holding Registers_1		0	1		
Read 200 Registers		0	1 1	68...467	
Read 200 Registers_1		0	1 2	468...867	
Write 200 Registers		0	1 3		64...463
Write 200 Registers_1		0	1 4		464...863
		0	1 5		
		0	1 6		
		0	1 7		
		0	1 8		
Coils_1		0	2		
Read 320 Coils		0	2 1	868...907	
Read 320 Coils_1		0	2 2	908...947	
Write 320 Coils		0	2 3		864...903
Write 320 Coils_1		0	2 4		904...943
		0	2 5		
		0	2 6		
		0	2 7		
		0	2 8		

TDOCT-6598 0220

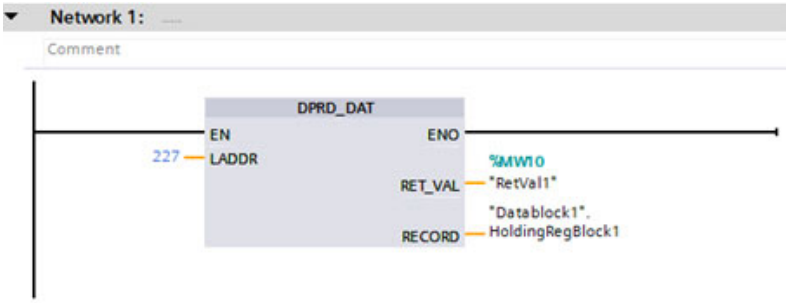
5.1 Reading Shared Holding Registers

The first Read 200 Registers submodule has an input IO address range 68..467 (400 bytes), which is mapped into 200 16-bit holding registers at address range 400001-400200 of the shared Holding Registers Block 1.

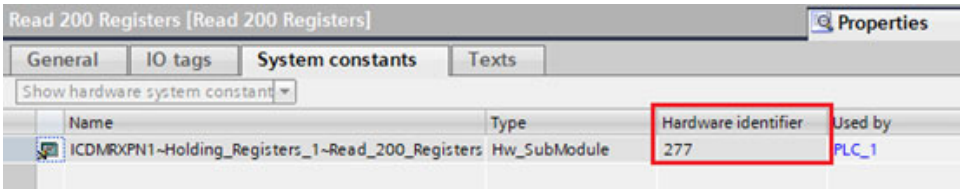
1. Add a data block `Data_block_1` to the project.
2. Create an array of 200 of words structure as the input data buffer, called `HoldingRegBlock1` as shown in the following figure.



3. Add a `DPRD_DAT` instruction into the main block to copy data from input IO address into the `HoldingRegBlock1` structure in the data block, as shown in the following figure.



- Parameter `LADDR` - Enter the hardware identifier of the input submodule, which can be found in the **Properties tab** I **General** I **Hardware** identifier, as show in the following figure.
- Parameter `RECORD` - Enter `Data_block_1.HoldingRegBlock1`.



4. Compile and download the project.

5. In TIA Portal, go on-line and watch the Datablock1. The following figure shows the input data value of Holding Registers Block 1.

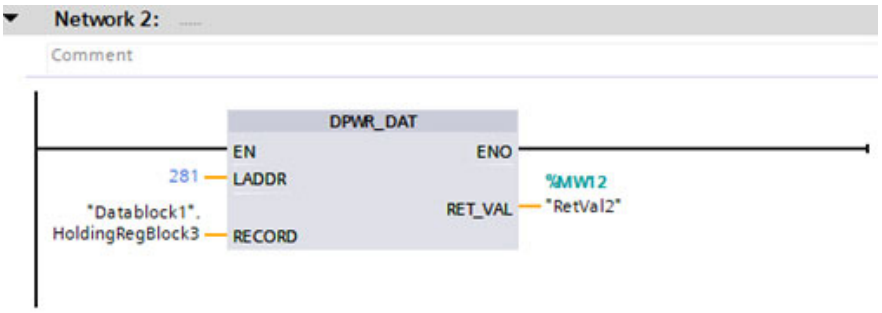
Datablock1

	Name	Data type	Start value	Monitor value
1	Static			
2	HoldingRegBlock1	Array[0..199] of Word		
3	HoldingRegBlock1[0]	Word	16#0	16#0000
4	HoldingRegBlock1[1]	Word	16#0	16#0000
5	HoldingRegBlock1[2]	Word	16#0	16#0000
6	HoldingRegBlock1[3]	Word	16#0	16#0000
7	HoldingRegBlock1[4]	Word	16#0	16#0000
8	HoldingRegBlock1[5]	Word	16#0	16#0000
9	HoldingRegBlock1[6]	Word	16#0	16#0000
10	HoldingRegBlock1[7]	Word	16#0	16#0000
11	HoldingRegBlock1[8]	Word	16#0	16#0000
12	HoldingRegBlock1[9]	Word	16#0	16#0000
13	HoldingRegBlock1[10]	Word	16#0	16#0000

5.2 Writing Shared Holding Registers

The first Write 200 Registers submodule has an output IO address range 64..463 (400 bytes), which is mapped into 200 16-bit holding registers at address range 400401-400600 of the shared Holding Registers Block 3.

1. In the same `Datablock1`, create an array of 200 of words structure as the output data buffer called `HoldingRegBlock3`.
2. Add a DPWR_DAT instruction into the main block to copy data from the `HoldingRegBlock3` structure in the data block to output IO address.



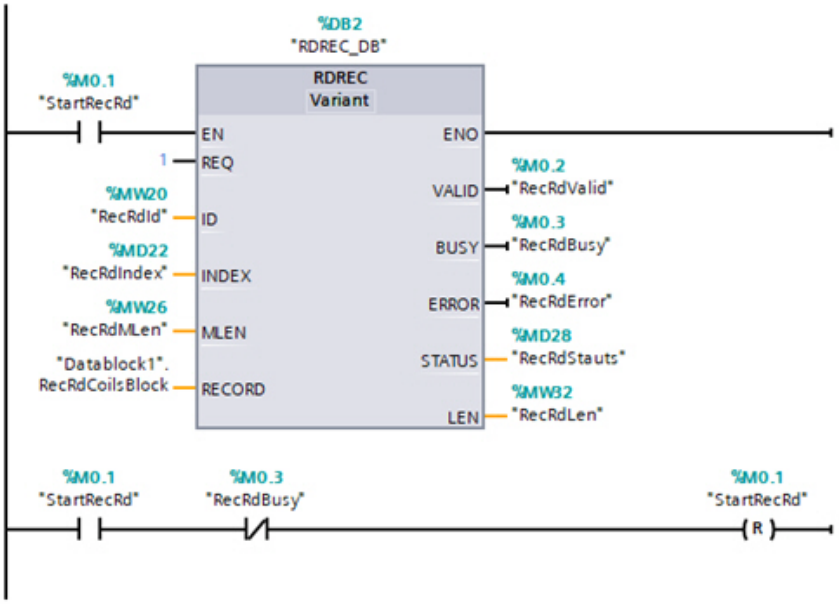
- Parameter `LADDR` - Enter the hardware identifier of the output submodule, which can be found in the **Properties tab I General** or **System** constants.
- Parameter `RECORD` - Enter `Datablock1.HoldingRegBlock3`.

5.2.1 Access Shared Memory Blocks using Data Record Instruction

Shared memory blocks can also be accessed using the RDREC and WRREC data record instructions.

The ICDM-RX/PN1 allows you to index into a shared memory block, or access multiple consecutive shared memory blocks together using the data record instructions.

The following figure shows an example of a read data record instruction (RDREC) and the table lists its parameters. For more information regarding the RDREC instruction, refer to TIA Portal help system.



RDREC Instruction Parameters	Declaration	Description
REQ	Input	REQ = 1: Transfer data record
ID	Input	Hardware identifier of the input submodule.
INDEX	Input	Record indexes of the input submodule. Note: index uses 16-bit word address.
MLEN	Input	The length in bytes of the data record to be read.
VALID	Output	New data record was received and is valid.
BUSY	Output	BUSY = 1: the reading process is not yet complete.
ERROR	Output	ERROR = 1: An error occurred during the reading process.
STATUS	Output	Block status of error information.
LEN	Output	Length of the read data record information.
RECORD	InOut	Target range for the data record read.

TDOCT-6598 0220

A watch table is used to set the parameters of the RDREC instruction and monitor the result.

	Name	Address	Display format	Monitor value	Modify value
1	"StartRecRd"	%M0.1	Bool	FALSE	TRUE
2	"RecRdId"	%MW20	DEC	278	278
3	"RecRdIndex"	%MD22	DEC+/-	10	10
4	"RecRdMLen"	%MW26	DEC	20	20
5	"RecRdBusy"	%M0.3	Bool	FALSE	
6	"RecRdValid"	%M0.2	Bool	TRUE	
7	"RecRdError"	%M0.4	Bool	FALSE	
8	"RecRdStauts"	%MD28	Hex	16#0000_0000	
9	"RecRdLen"	%MW32	DEC	20	
10		<Add new>			

Example #1: Read 160 coils from address range 161-320 of shared Coils Block 1. Set RecRdId to the hardware identifier (278) of the Read 320 Coils submodule in Slot 2 Sub-slot 1. Set RecRdIndex to 10 (in 16-bit word address), which will index into Block 1 at address 160. Set RecRdMLen to 20, which will read 20 bytes (160 coils) at the address specified by the index parameter. If successful, the target range will contain the data read and the RecRdLen will contain the actual number of bytes read.

Example #2: Read shared Coils Block 1 and 2 together. Set RecRdId to the hardware identifier (278) of the first Read 320 Coils submodule in Slot 2 Sub-slot 1. Set RecRdIndex to 0, which will read from the beginning of Block 1. Set RedRdMLen to 80 (bytes), which will read a total of 640 coils from address 1 to 640 (Block 1 and 2).

Note

Note in Example #2, only the first block needs an IO submodule. The ICDM-RX/PN1 allows data record instructions to access subsequent blocks without corresponding IO submodules.
When accessing shared memory blocks, all blocks being accessed must have PROFINET IO read or write access enabled.

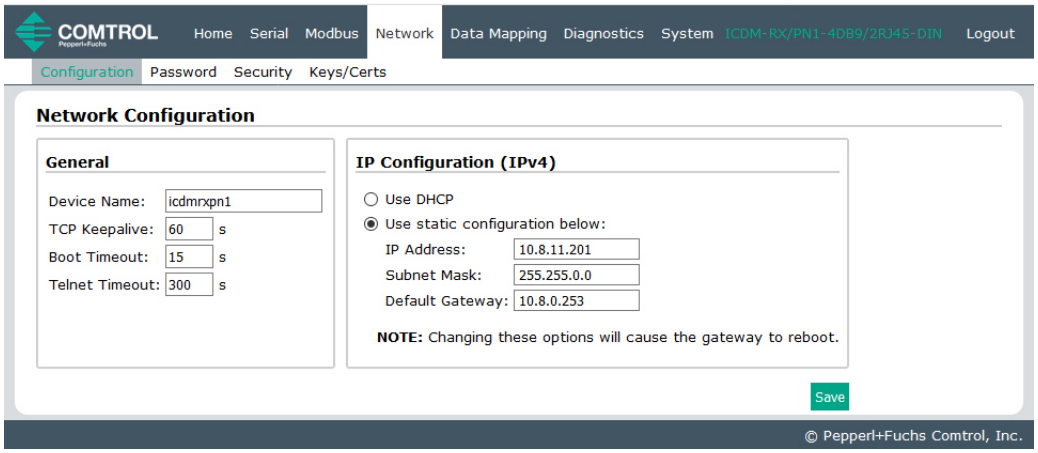
TDOCT-6598 0220

6 Using the Network Menus

6.1 Network Configuration Page

You can use the Network Configuration page to change the ICDM-RX/PN1 network configuration after using PortVision DX for initial network configuration.

1. Open the ICDM-RX/PN1 web interface using your browser.
2. Click **Network** and the **Network Configuration** page displays.



Network Configuration Page	
General	
Device Name	You can enter a 16-character Device Name to identify this ICDM-RX/PN1 on the **Home** page.
TCP Keepalive Default = 60	The TCP protocol has a keepalive feature where the two network stacks periodically ping each other to make sure the connection is still up. Upon loss of a TCP/IP connection, the network stack starts a timer. If the TCP/IP connection is still lost after the number of seconds set by the TCP Keepalive value, then the ICDM-RX/PN1 closes the connection and frees all the ports associated with the connection. If the ICDM-RX/PN1 was the originator of the first connection, it will then try to re-connect the TCP/IP connection. This allows the ICDM-RX/PN1 to be connected and ready to send/receive data even after a network disturbance. For most networks the default value should not need to be changed.
Boot Timeout Default = 15	Allows you to change the bootloader time-out value before the default application, PN1 (PROFINET to Modbus) loads. You may need to increase this time-out value to 45 for compatibility with spanning tree devices (normally switches). If you change the time-out value to 0, this prevents PN1 firmware from loading.
Telnet Timeout	Allows you to change the telnet time-out value before telnet times out. You may need to increase this time-out value to 45 for compatibility with spanning tree devices (normally switches). If you change the time-out value to 0, this prevents the firmware from loading.

Network Configuration Page (Continued)	
IP Configuration (IPv4)	
Use DHCP	Configures the ICDM-RX/PN1 to use DHCPv4 mode. If you select Use DHCP, the IPv4 Address field below is disabled and set to 0.0.0.0. See your System Administrator to acquire a unique reserved IPv4 address if you are using DHCP. They will need the MAC address of the unit to provide you with an IPv4 address.
Use static configuration below	Configures the ICDM-RX/PN1 with the static IPv4 address information that you provide in the IPv4 Address, IPv4 Netmask, and IPv4 Gateway fields below. The ICDM-RX/EN is shipped from the factory with the following default IPv4 network settings: • IPv4 address = 192.168.250.250 • IPv4 Netmask = 255.255.0.0 • IPv4 Gateway address = 192.168.250.1

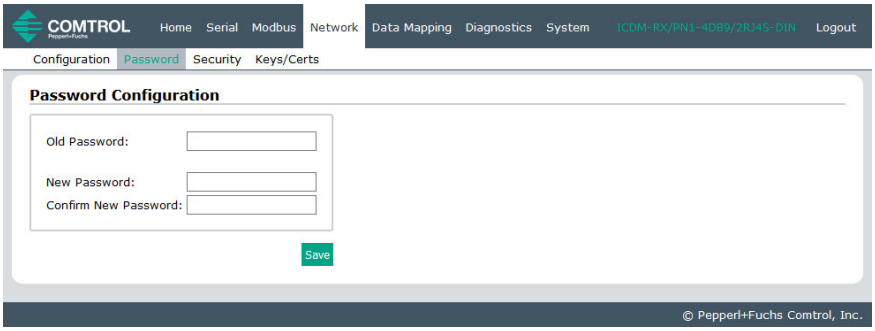
6.2 Password Menu

Use the following information to configure a password for this ICDM-RX/PN1.

Note

There is not password set from the factory.

1. Click **Network** | **Password**.
2. If changing an existing password, enter that password in the **Old Password** field.
3. Enter a new password and enter the confirmation password.



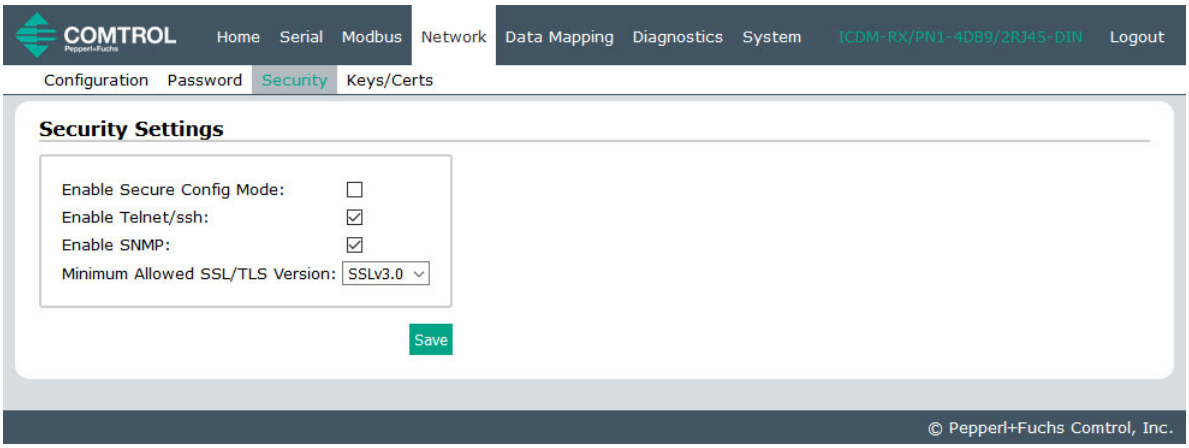
4. Click the **Save** button.

When anyone attempts to log into the ICDM-RX/PN1, you must enter the following:

- `admin` for the **username**
- The configured password for the password

6.3 Security Page

The following table discusses the Security Settings page options.



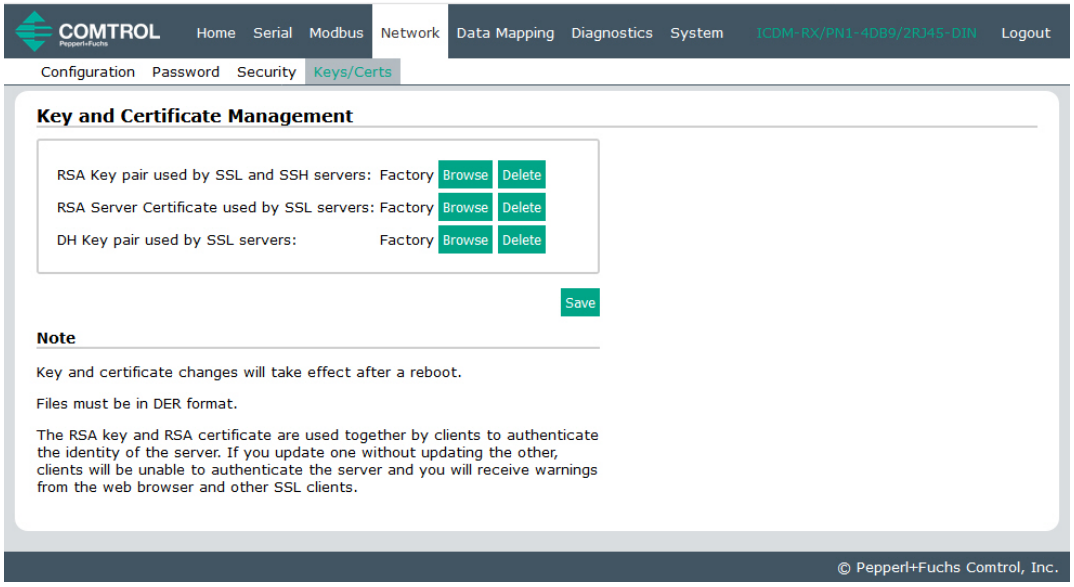
Security Settings Options	
Enable Secure Config Mode	If **Secure Config** mode is enabled, unencrypted access to administrative and diagnostic functions is disabled. **Secure Config** mode changes ICDM-RX/PN1 behavior as follows: • Telnet access to administrative and diagnostic functions is disabled. SSH access is still allowed. • Unencrypted access to the web server via port 80 (http:// URLs) is disabled. Encrypted access to the web server via port 443 (https:// URLs) is still allowed. • Administrative commands that change configuration or operating state that are received using the Pepperl+Fuchs MAC mode proprietary Ethernet protocol number 0x11FE are ignored.
Enable Telnet/ssh (Default = Enabled)	This option enables or disables the telnet security feature after you click **Save** and the ICDM-RX/PN1 has been rebooted.
Enable SNMP (Default = Enabled)	This option enables or disables the SNMP security feature after you click **Save** and the ICDM-RX/PN1 has been rebooted.
Minimum Allowed SSL/TLS Version	You can select the appropriate version for your environment. • SSLv3.0 • TLSv1.0 (default) • TLSv1.1 • TLSv1.2

Use the following steps to change security settings in the ICDM-RX/PN1.

1. Click the **Network** I **Security**.
2. Click the appropriate check boxes in the **Security Settings** page to enable or disable security accordingly.
3. After making changes, you must click **Save**.
4. You may need to configure security keys or certificates depending on your choices.

6.4 Keys/Certs Page

The **Key and Certificate Management** page is discussed in the following table.



Key and Certificate Management Options	
RSA Key pair used by SSL and SSH servers	This is a private/public key pair that is used for two purposes: • It is used by some cipher suites to encrypt the SSL/TLS handshaking messages. Possession of the private portion of this key pair allows an eavesdropper to both decrypt traffic on SSL/ TLS connections that use RSA encryption during handshaking. • It is used to sign the Server RSA Certificate in order to verify that the ICDM-RX/PN1 is authorized to use the server RSA identity certificate. *Possession of the private portion of this key pair allows somebody to pose as the ICDM-RX/PN1.* *If the Server RSA Key is to be replaced, a corresponding RSA identity certificate must also be generated and uploaded or clients are not able to verify the identity certificate.*
RSA Server Certificate used by SSL servers	This is the RSA identity certificate that the ICDM-RX/PN1 uses during SSL/TLS handshaking to identify itself. It is used most frequently by SSL server code in the ICDM-RX/PN1 when clients open connections to the ICDM-RX/PN1 secure web server or other secure TCP ports. If an ICDM-RX/PN1 serial port configuration is set up to open (as a client) a TCP connection to another server device, the ICDM-RX/PN1 also uses this certificate to identify itself as an SSL client if requested by the server. In order to function properly, this certificate must be signed using the Server RSA Key. This means that the server RSA certificate and server RSA key must be replaced as a pair.

TDOCT-6598 0220

Key and Certificate Management Options (Continued)	
DH Key pair used by SSL servers	This is a private/public key pair that is used by some cipher suites to encrypt the SSL/TLS handshaking messages. *Possession of the private portion of the key pair allows an eavesdropper to decrypt traffic on SSL/TLS connections that use DH encryption during handshaking*
Client Authentication Certificate used by SSL servers	If configured with a CA certificate, the ICDM-RX/PN1 requires all SSL/ TLS clients to present an RSA identity certificate that has been signed by the configured CA certificate. As shipped, the ICDM-RX/PN1 is not configured with a CA certificate and all SSL/TLS clients are allowed. See *Client Authentication* (below) for more detailed information.

Note

All ICDM-RX/PN1 units are shipped from the factory with identical configurations. They all have the identical, self-signed, Pepperl+Fuchs Server RSA Certificates, Server RSA Keys, Server DH Keys, and no Client Authentication Certificates.

For maximum data and access security, you should configure all ICDM-RX/PN1 units with custom certificates and keys.

6.4.1 Client Authentication

If desired, controlled access to SSL/TLS protected features can be configured by uploading a client authentication certificate to the ICDM-RX/PN1. By default, the ICDM-RX/PN1 is shipped without a CA (Certificate Authority) and therefore allows connections from any SSL/TLS client.

If a CA certificate is uploaded, the ICDM-RX/PN1 only allows SSL/TLS connections from client applications that provide to the ICDM-RX/PN1 an identity certificate that has been signed by the CA certificate that was uploaded to the ICDM-RX/PN1.

This uploaded CA certificate that is used to validate a client's identity is sometimes referred to as a trusted root certificate, a trusted authority certificate, or a trusted CA certificate. This CA certificate might be that of a trusted commercial certificate authority or it may be a privately generated certificate that an organization creates internally to provide a mechanism to control access to resources that are protected by the SSL/TLS protocols.

To control access to the ICDM-RX/PN1 SSL/TLS protected resources you should create your own custom CA certificate and then configure authorized client applications with identity certificates signed by the custom CA certificate.

6.4.2 Changing Keys and Certificates

Use the following steps to update security keys and certificates in the ICDM-RX/PN1.

1. Click **Network** I **Keys/Cert**.
2. Click **Browse** to locate the key or certificate file, highlight the file, and click **Open**. Refer to *Keys/Certs Page* (Page 42) for detailed information.
3. Click **Upload** when you return to the **Key and Certificate Management** area. The key or certificate notation changes from factory or none to User when the ICDM-RX/PN1 is secure.
4. Changes will not take effect until the ICDM-RX/PN1 is rebooted.
5. Click **System** I **Reboot** to reboot the ICDM-RX/PN1.

TDOCT-6598 0220

7 Data Mapping Menus

7.1 Modbus to Modbus Configuration Page

Use this page to configure Modbus to Modbus communications.

1. Open the ICDM-RX/PN1 web interface using your browser.
2. Click **Data Mapping** | **Modbus to Modbus** to open the **Modbus to Modbus Configuration** page.
3. Click the **Add Default Configuration** button.

Modbus to Modbus Configuration Page	

Line	This is the configuration line number.
	• If the configuration entry has been saved, the line number is not directly modifiable.
	• If the configuration entry is in the process of being added and has not been saved, then the line number can be set to anywhere in the configuration list.
	  • The placement of the entry in the saved list is in relation to the current list of saved entries. For example, if you wish to place an entry before the current 4th entry, then enter 4 for the line number.
	  • If more than one entry is added at one time, the order is preserved but final line numbers may or may not be the same as the selected numbers.

Active	If selected, the configuration becomes active when the **Save** button is clicked. The Data Mapping process immediately begins to perform the configured operations. If not selected, the configuration becomes inactive when the **Save** button is clicked. The Data Mapping process then ignores the configured operations.
Modbus (Read)	

Device ID	The Modbus Device ID to be read.
	• If access to the Shared Memory is desired:
	  • The Shared Memory must be enabled.
	  • The Shared Memory device ID must be entered.
	• If a Device ID for a Modbus slave is entered, the ICDM-RX/PN1 gateway routes the message to the appropriate location.

Function Code	Select the Modbus Read function code: • 01: Coil Status (00x) - read one or more coils • 02: Input Status (10x) – read one or more discrete inputs • 03: Holding Registers (40x) - read one or more holding registers • 04: Input Registers (30x) – read one or more input registers
Address (Base 1)	Enter the Modbus address in Base 1 format. (The address of the tables starts at 1, instead of 0 for Base 0). Enter only the lower 16 bits of the address (1-65536).
Length (Regs/Coils)	Enter the number of registers or coils to be read.

TDOCT-6598 0220

Modbus to Modbus Configuration Page (Continued)	
Poll Rate (ms)	Enter the rate at which the Data Mapping process should read the configured Modbus device or Shared Memory.
Modbus (Write)	
Change of State	If selected, the Data Mapping process only writes the received data to the write Modbus Device if: • The data is being received for the first time. • The received data has changed. • The previous write attempt to the write Modbus Device was unsuccessful.

Device ID	The Modbus Device ID to be written to.
	• If access to the Shared Memory is desired:
	  • The Shared Memory must be enabled.
	  • The Shared Memory device ID must be entered.
	• If a Device ID for a Modbus slave is entered, the ICDM-RX/PN1 gateway routes the message to the appropriate location.

Function Code	Select the Modbus Write function code: • 05: Single Coil (10x) - write one coil • 06: Single Register (40x) – write one holding register • 15: Multiple Coils (30x) – write one or more coils • 16: Multiple Registers (40x) – write one or more holding registers
Address (Base 1)	Enter the Modbus address in Base 1 format. (The address of the tables starts at 1, instead of 0 for Base 0). Enter only the lower 16 bits of the address (1-65536).
Length (Regs/Coils)	Enter the number of registers or coils to be written.
Functions	
Save	When this button is clicked: • The settings are verified. • Any changes are saved. • The Data Mapping process immediately is reconfigured and begins performing the configured operations.
Delete	If selected, the entry is deleted from the list when **Save** is selected.
Delete All	If selected, the entire list will be deleted when **Save** is selected.
Add Default Configuration	Adds a default entry to the end of the list. The entry will not become active until it is saved by clicking **Save**.
Clone Line	Add a new configuration entry to the end of the list that is identical to the entered line number. The entry will not become active until it is saved by clicking **Save**. *Note that no action will be taken if the entered line number is invalid.*
Sort By (Read Device ID)	Reorders the list based on the Read Device ID when **Save** is selected.
Sort By (Write Device ID)	Reorders the list based on the Write Device ID when **Save** is selected.

TDOCT-6598 0220

7.2 Shared Memory Configuration Page

The Shared Memory functionality enables multiple methods for communicating between a wide variety of controllers, Modbus masters and Modbus slave devices.

- The Shared Memory interface contains eight 200 Holding Register blocks and eight 320 Coil blocks.
- All Modbus masters, (Modbus/TCP, serial Modbus RTU/ASCII, and Modbus RTU/ASCII over Ethernet TCP/IP), can read the contents of the Shared Memory blocks.
- Data Mapping configurations can read Shared Memory blocks.
- Write access can be controlled to each Holding Register and Coil block. Each block can be can be restricted to:
  - A port-specific serial master
  - A Modbus/TCP master
  - Modbus Object message(s)
  - Tag/File to Modbus Data Mapping configuration(s).
  - Modbus to Modbus Data Mapping configuration(s)
- The Shared Memory contents can be displayed and cleared via the web pages.
- Diagnostics for each block include read, write and blocked write message counts.
- Blocked write messages are recorded in the Write Violation Log.

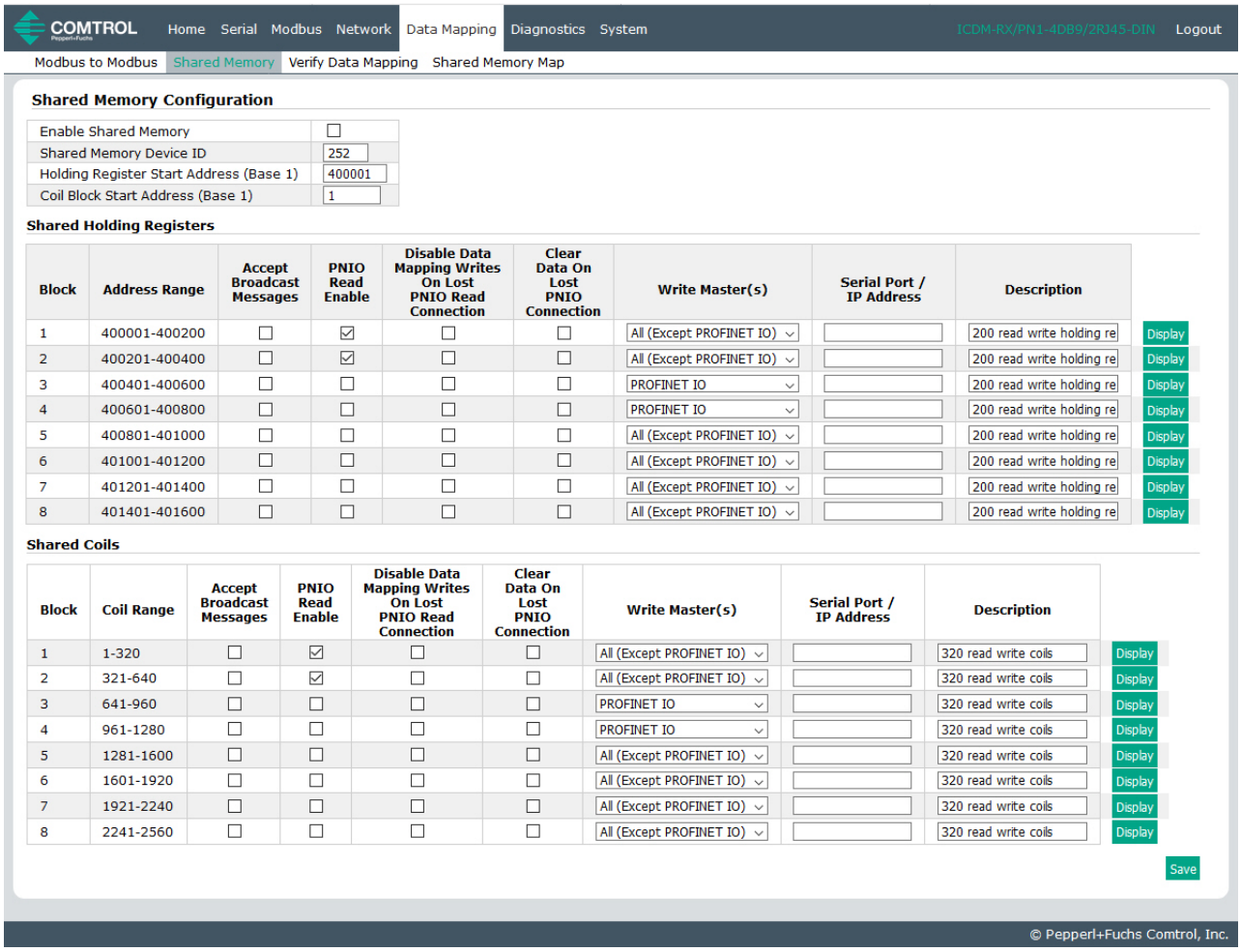
This table displays the supported Holding Register Block Function Codes:

Function Code	Description
3	Read Holding Registers
4	Read Input Registers
6	Write Single Register
16	Write Multiple Registers
22	Write Mask Register
23	Read Write Registers

This table shows the supported Coil Block Function Codes:

Function Code	Description
1	Read Coils
2	Read Discrete Input
5	Write Single Coil
15	Write Multiple Coils

Click Data Mapping | Shared Memory to open the Shared Memory Configuration page.



The following table provides details about the configuration options. Click the **Display** button to view detailed information about a specific block or coil.

Shared Memory Configuration Page	
Enable Shared Memory (Default = Off)	If selected, enables the Shared Memory functionality.
Shared Memory Device ID (Default = 252)	The Device ID (also often called the unit ID) of the Shared Memory must be unique within the public Modbus network. The Device ID range is 1 to 255.
Holding Register Start Address (Base 1) (Default = 400001)	Specifies the starting address of the Shared Memory Holding Register blocks. The range is 400001 to 463935.
Coil Block Start Address (Base 1) (Default = 1)	Specifies the starting address of the Shared Memory Coil blocks. The range is 1 to 64255.
Shared Holding Registers	
Block	Specifies the block number.
Address Range	Specifies the block address range.

Shared Memory Configuration Page (Continued)	
Accept Broadcast Messages (Default = Disabled)	If selected, the Shared Memory block(s) will accept broadcast messages addressed to their memory block(s).
PNIO Read Enable	If selected, the Shared Memory block is added to the PROFINET IO configuration.
Disable Data Mapping Writes On Lost PNIO Read Connection (Default = Disabled)	If selected, the Data Mapping process performs writes to this Shared Memory block only when there is an active PROFINET IO read connection to this block.
Clear Data On Lost PNIO Connection (Default = Disabled)	If selected, the Shared Memory block's data are cleared when all PROFINET IO connections to this block are lost.

Write Master(s) [Defaults: Block 3 and 4: PROFINET IO Other blocks: All (Except PROFINET IO)]	Indicates which master(s) have write access to the Shared Memory block.
	• All (Except PROFINET IO) – Except for PROFINET IO connections, all Modbus masters, Modbus Object and Data Mapping functions have write access to the block.
	• Port specific serial master:
	  • Port-1
	  • Port-2 (2-port and 4-port models only)
	  • Port-3 (4-port models only)
	  • Port-4 (4-port models only)
	• Modbus/TCP - Modbus/TCP master(s) at a specified IP address.
	• Ethernet TCP/IP – Ethernet TCP/IP master(s) at a specified IP address.
	• PROFINET IO – PROFINET IO connection. Only one PROFINET IO connection can access the block at one time.
	• Modbus to Modbus – Modbus to Modbus configuration(s).

Serial Port / IP Address (Default = blank)	IP address of the Modbus/TCP master, Ethernet TCP/IP master or PROFINET IO controller. Zeros indicate that there is no configuration. *This does not apply to All (PROFINET IO), port-specific serial masters, PROFINET IO, or Modbus to Modbus configuration(s)..*
Description (Default = 200 read write holding registers)	User-defined description of the Shared Memory block. ASCII string with a maximum of 80 characters in length.
Shared Coils	
Block	Specifies the block number.
Coil Range	Specifies the coil range.
Accept Broadcast Messages (Default = Disabled)	If selected, the Shared Coil(s) accept broadcast messages from Modbus masters addressed to their memory block(s).
PNIO Read Enable	If selected, the Shared Coil is added to the PROFINET IO configuration.
Disable Data Mapping Writes On Lost PNIO Read Connection (Default = Disabled)	If selected, the Data Mapping process performs writes to this Shared Coil only when there is an active PROFINET IO read connection to this coil.
Clear Data On Lost PNIO Connection (Default = Disabled)	If selected, the Shared coil's data are cleared when all PROFINET IO connections to this coil are lost.

Shared Memory Configuration Page (Continued)	

Write Master(s) [Defaults: Coil 3 and 4: PROFINET IO Other Coil: All (Except PROFINET IO)]	Indicates which master(s) have write access to the Shared Coil.
	• All (Except PROFINET IO) – Except for PROFINET IO connections, all Modbus masters, Modbus Object and Data Mapping functions have write access to the coil.
	• Port specific serial master:
	  • Port-1
	  • Port-2 (2-port and 4-port models only)
	  • Port-3 (4-port models only)
	  • Port-4 (4-port models only)
	• Modbus/TCP - Modbus/TCP master(s) at a specified IP address.
	• Ethernet TCP/IP – Ethernet TCP/IP master(s) at a specified IP address.
	• PROFINET IO – PROFINET IO connection. Only one PROFINET IO connection can access the coil at one time.
	• Modbus to Modbus – Modbus to Modbus configuration(s).

Serial Port / IP Address (Default = blank)	IP address of the Modbus/TCP master, Ethernet TCP/IP master or PROFINET IO controller. Zeros indicate that there is no configuration. *This does not apply to All (Except PROFINET IO), port-specific serial masters, PROFINET IO, or Modbus to Modbus configuration(s)..*
Description (Default = 200 read write holding registers)	User-defined description of the Shared Coil. ASCII string with a maximum of 80 characters in length.

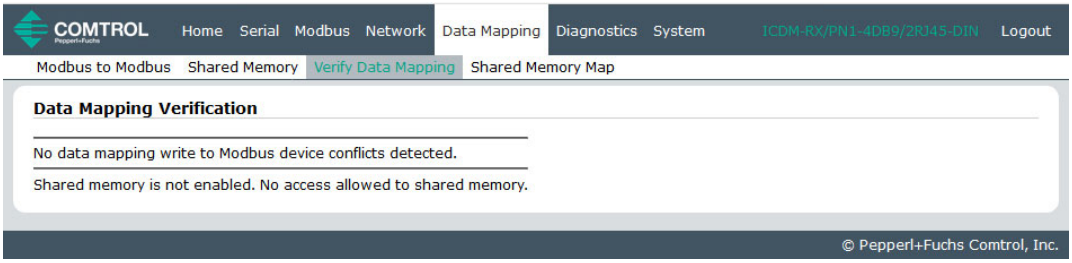
7.3 Data Mapping Verification Page

The **Verify Data Mapping** page is used to check for the following configuration problems.

Configuration Issue	Description
Write conflicts to PROFINET IO PLCs	This occurs when two or more Data Mapping configurations can write to the same PLC tag or File locations.
Write conflicts to Modus devices	This occurs when two or more Data Mapping configurations can write to the same Modbus device address.
Write to Shared Memory conflicts	This occurs when two or more Data Mapping configurations can write to the same Shared Memory address.
Invalid Shared Memory Addresses	This occurs when Data Mapping configuration can write to an invalid Shared Memory address.
Shared Memory block write protection violations	This occurs when a Data Mapping configuration can write to a Shared Memory address that is write-protected and there is no write access allowed.

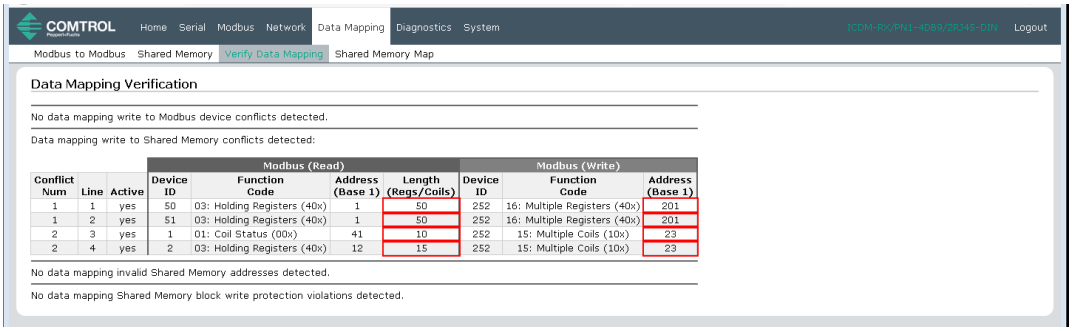
TDOCT-6598 0220

Access the **Data Mapping Verification** page by clicking **Data Mapping** I **Verify Data Mapping**. The following page indicates that the are no conflicts or violations detected.



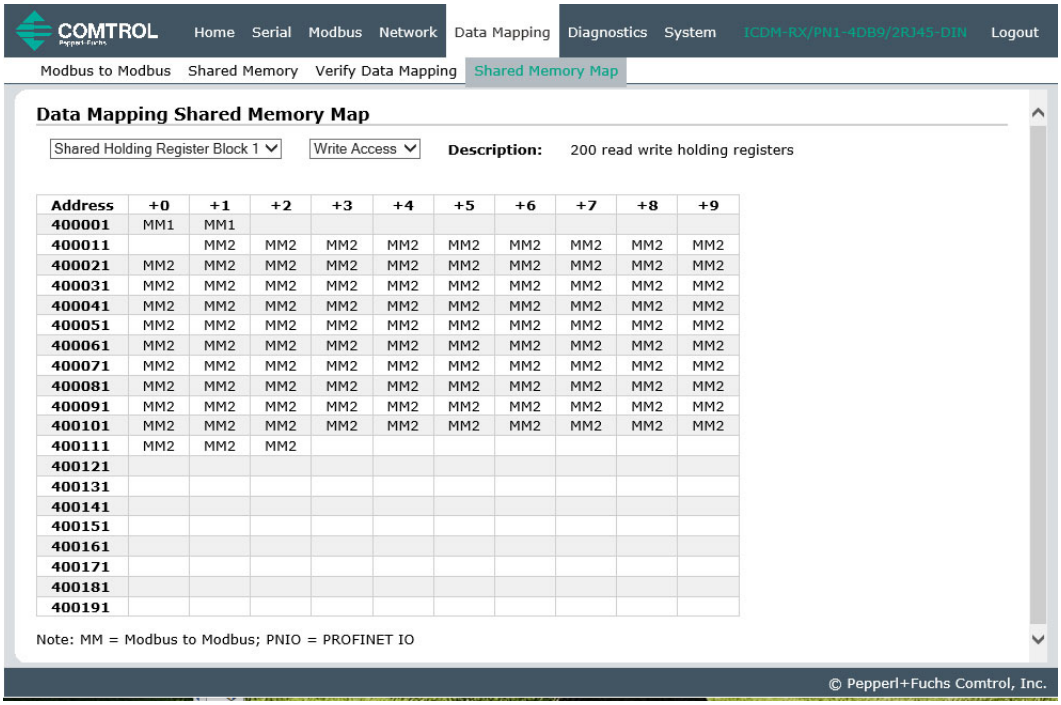
The following page demonstrates what is displayed when there are multiple conflicts with the Data Mapping configurations.

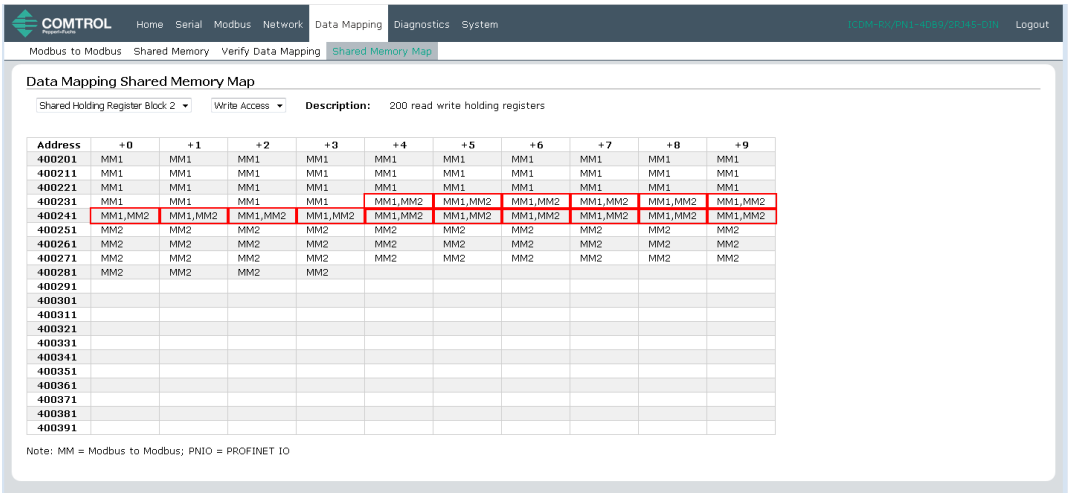
- A write to PROFINET IO PLC conflict. Two configurations are writing to the same tag. Conflicting settings are highlighted in red.
- Two configuration are writing to the same address on a Modbus device.
- There are two separate conflicts writing to the same Shared Memory addresses. Conflicting settings are highlighted in red.



7.4 Shared Memory Map Page

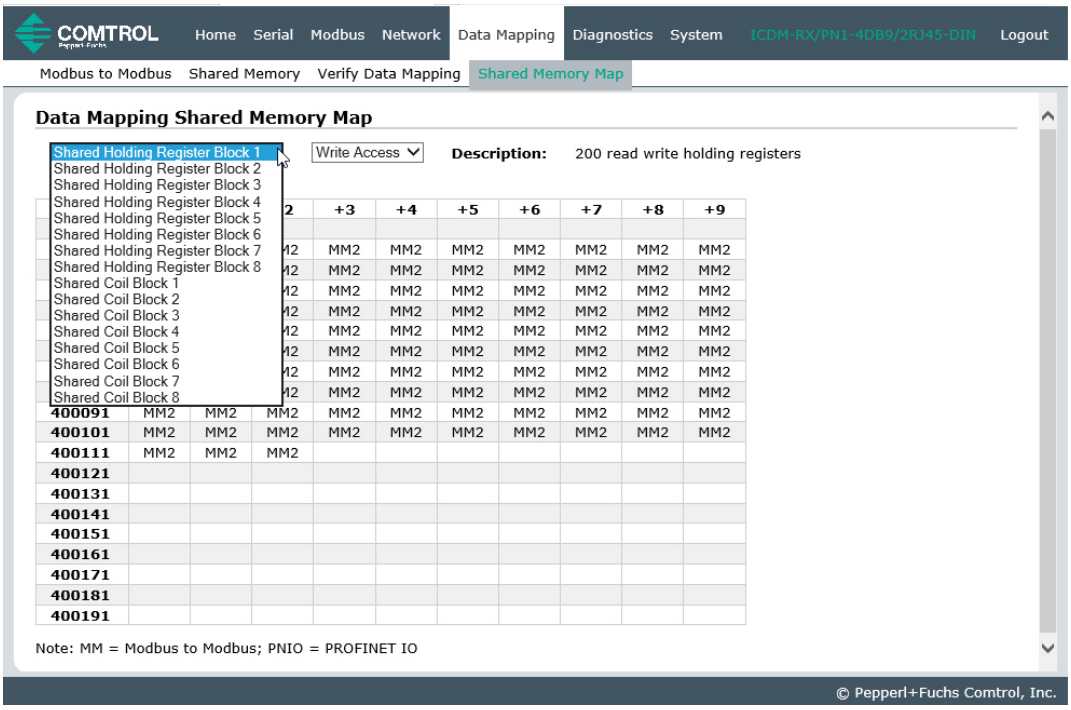
The **Shared Memory Map** page is provided to show the Built-in Configuration and PROFINET IO access to each Shared Memory block. Write conflicts are shown highlighted in red as shown in the second image.





Access the **Data Mapping Shared Memory Map** page by clicking D**ata Mapping** I **Shared Memory Map**.

1. Select the shared holding register or coil block that you want to review.
2. Select **Write Access** or **Read Access**.

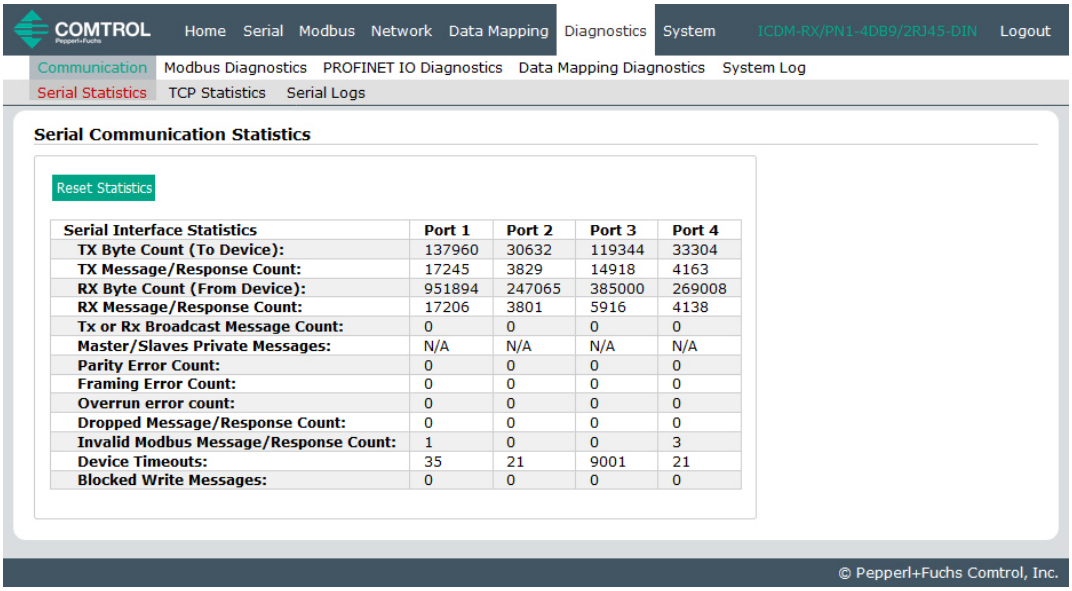


TDOCT-6598 0220

8 Diagnostics Menus

8.1 Serial Communication Statistics

The default **Diagnostics** menu page is the **Serial Communication Statistics** page.



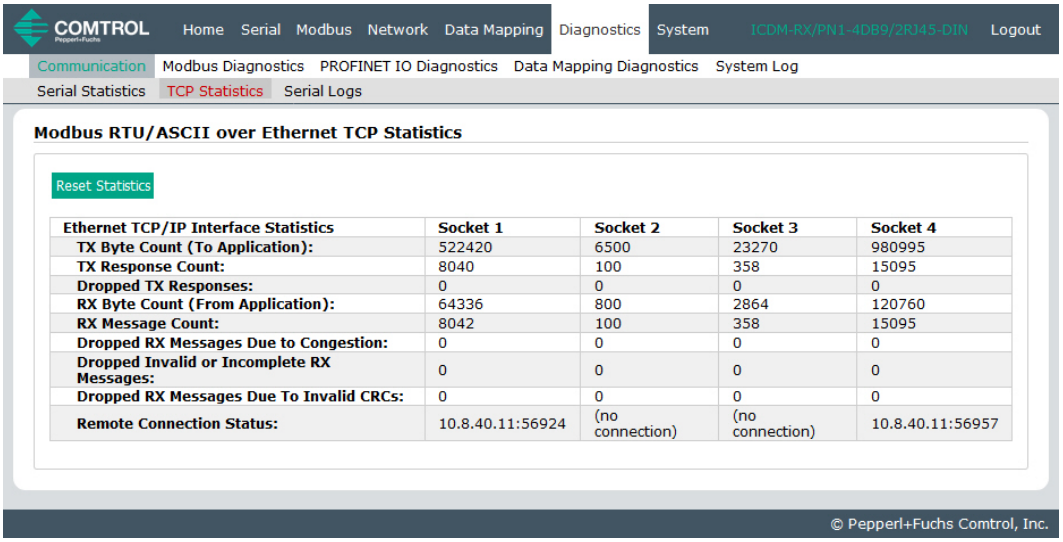
The following table provides detailed information about the **Serial Communication Statistics** page.

Serial Communication Statistics Page	
TX Byte Count (To Device)	Displays the number of bytes transmitted out the serial port.
TX Message/Response Count	Displays the number of messages or responses transmitted out of the serial port.
RX Byte Count (From Device)	Displays the number of bytes received on the serial port.
RX Message/Response Count	Displays the number of messages or responses received on the serial port.
Tx or Rx Broadcast Message Count	Displays the number of broadcast messages transmitted out the serial port.
Master/Slaves Private Messages	Displays the number of private messages detected, those between a master and private slave(s), on a serial port configured in Master/Slaves mode.
Parity Error Count	Displays the number of parity errors received on the serial port. Typically occurs due to an incorrect parity setting.
Framing Error Count	Displays the number of framing errors received on the serial port. Typically occurs due to an incorrect baud rate or stop bit setting.
Overrun Error Count	Displays the number of overrun errors received on the serial port. This typically occurs to one of the following events: incorrect flow control, incorrect baud rate, incorrect data size, or incorrect stop bit setting.
Dropped Message/Response Count	Displays the number of messages or responses dropped to any of the following: • Incomplete message or response. • Did not receive valid start and/or end characters (Modbus/ASCII only).

Serial Communication Statistics Page (Continued)	
Invalid Modbus Message/Response Count	Displays the number of invalid messages or responses received to any of the following events: • Message received after the timeout period. This may require increasing the Device Response Timeout. • Incorrect device ID in response message. • Incorrect function code in response message.
Device Timeouts	Displays the number of device timeouts that occurred when there was no response for a Modbus message.
Blocked Write Messages	Displays the number of Modbus write messages that were not transmitted as a result of the Disable Writes (Read Only) option being set.

8.2 Modbus RTU/ASCII over Ethernet TCP Statistics Page

Click **Diagnostics** | **Communication** | **TCP Statistics** to access the **Modbus RTU/ASCII over Ethernet TCP Statistics** page.



This table provides information about the **Modbus RTU/ASCII over Ethernet TCP Statistics** page.

Modbus RTU/ASCII over Ethernet TCP Statistics Page	
TX Byte Count (To Application)	The number of bytes transmitted out of the TCP/IP connection(s).
TX Response Count	The number of responses transmitted out of the TCP/IP connection(s).
Dropped TX Responses	The number of responses that were intended to be transmitted out the TCP/IP connection(s) but could not be and were dropped. This typically occurs when one or more connections close unexpectedly.
RX Byte Count (From Application)	The number of bytes received on the TCP/IP connection(s).
RX Message Count	The number of messages received on the TCP/IP connection(s).
Dropped RX Messages Due to Congestion	The number of messages that were dropped to the gateway being overly congested. This typically occurs when the application(s) send messages faster than the slave device(s) can respond.

TDOCT-6598 0220

Modbus RTU/ASCII over Ethernet TCP Statistics Page	
Dropped Invalid or Incomplete RX Messages	The number of messages from the application(s) that were dropped to: • Containing an invalid Modbus message format. • Containing an incomplete Modbus message.
Dropped RX Messages Due to Invalid CRCs	The number of messages from the application(s) that were dropped due to an invalid Modbus/RTU CRC or Modbus/ASCII LRC.
Remote Connection Status	Displays remote TCP/IP connections.

8.3 Serial Interface Logs Page

Access the **Serial Interface Logs** page by clicking **Diagnostics | Communication | Serial Logs**.

The **Serial Interface Logs** page provides a log of received and transmitted serial port messages. Up to 512 bytes per message and up to 32 messages are logged. It is intended to help with debugging serial connectivity problems, determining the proper start and end of transmission bytes, and diagnosing device problems.

The format is as follows:

`Pkt(n): ddd:hh:mm:ss.ms Tx/Rx:<Data>`

Where:

`ddd` – days since last system restart

`hh` – hours since last system restart

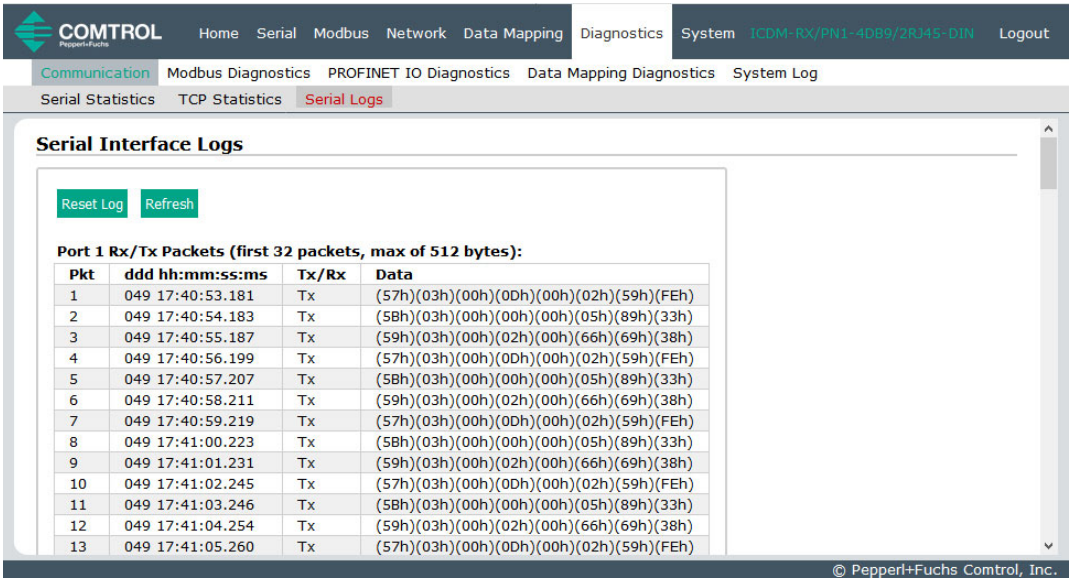
`ms` – minutes since last system restart

`ss` – seconds since last system restart

`mm` – milliseconds since last system restart

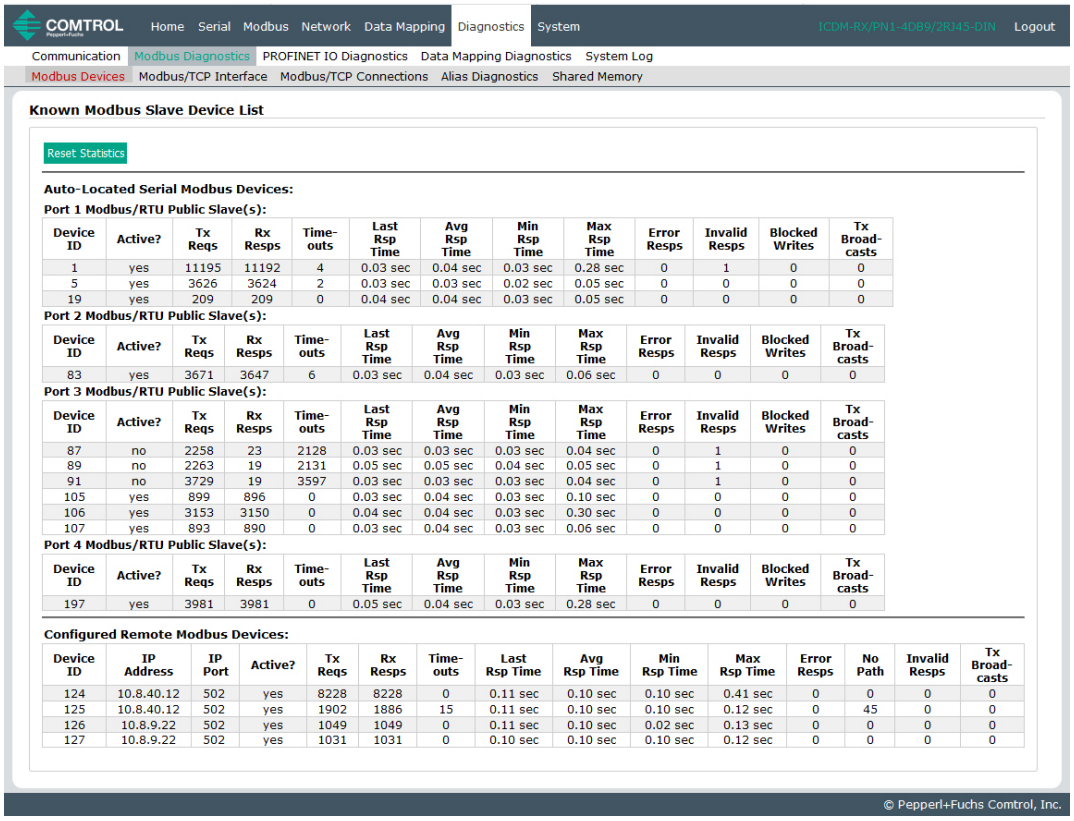
`<Data>` - Data packet received.

- For Modbus slave data, all data bytes shown in hex (`xxh`) format.
- For Raw/ASCII and Modbus/ASCII data
- ASCII characters displayed as characters
- Non-ASCII displayed in hex (`xxh`) format



8.4 Known Modbus Slave Device List Page

The **Known Modbus Slave Device List** page provides device specific status and statistics for each device connected locally to one or more of the serial ports or remotely through a remote Modbus/TCP device configuration.



Access the **Known Modbus Slave Device List** page by clicking **Diagnostics | Modbus Diagnostics | Modbus Devices**.

Known Modbus Slave Device List Page - Public Devices	
Active?	Displays the status of device: • Yes means that the last request received a valid response and did not time out. • No means that the last request timed out or the device has not yet received a message.
IP Address	Displays the IP address associated with the local device under Configured Remote Modbus Devices.
IP Port	Displays the TCP/IP port associated with the remote device under Configured Remote Modbus Devices.
Tx Req	Displays the number of Modbus messages transmitted to this device.
Rx Rsp	Displays the number of Modbus responses received from this device.
Timeouts	Displays the number of response timeouts associated with this device.
Last Rsp Time	Displays the last response time from the Modbus device.
Avg Rsp Time	Displays the TCP/IP port associated with the remote device under Configured Remote Modbus Devices.
Tx Req	Displays the number of Modbus messages transmitted to this device.
Rx Rsp	Displays the number of Modbus responses received from this device.
Timeouts	Displays the number of response timeouts associated with this device.

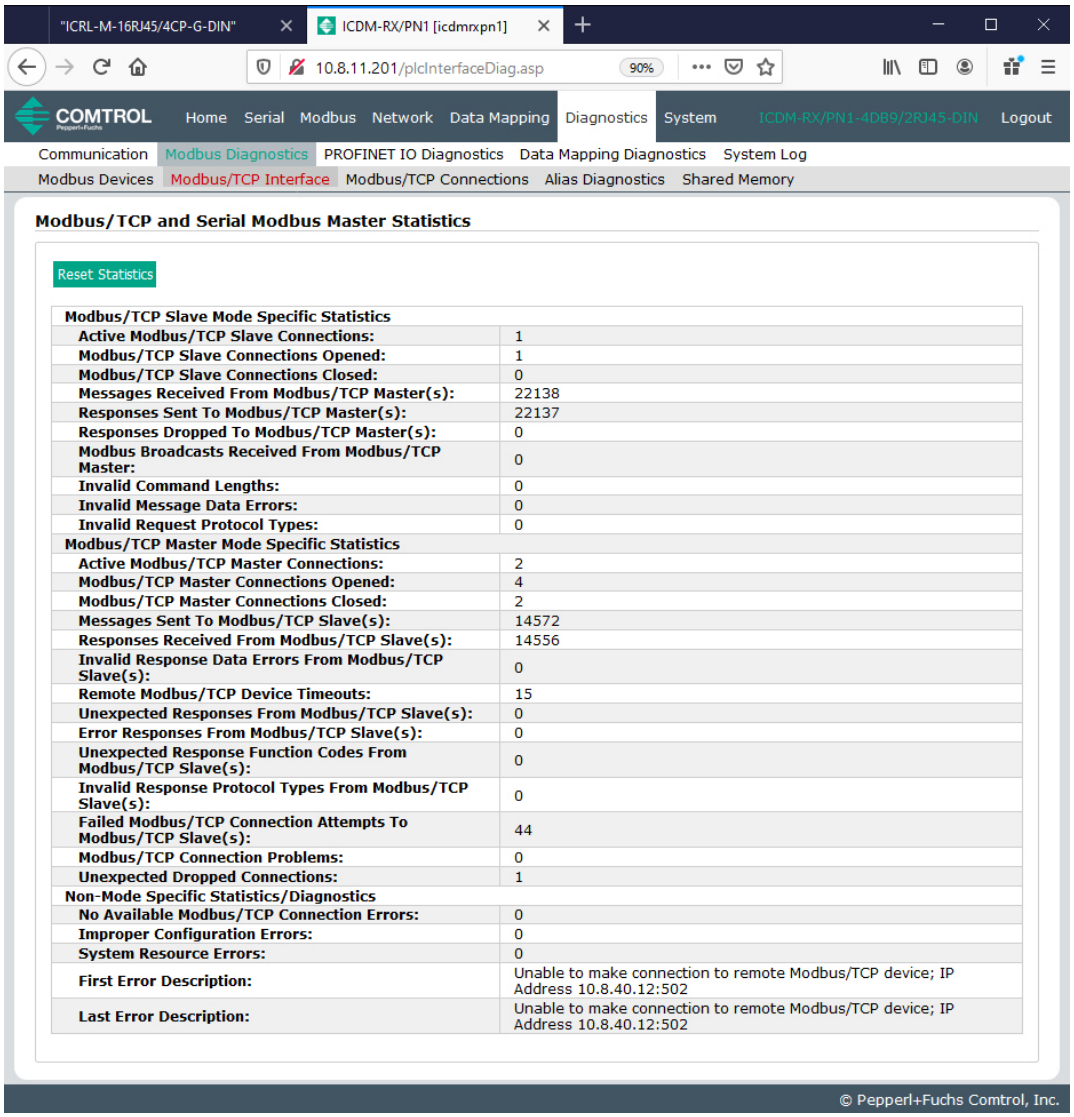
Known Modbus Slave Device List Page - Public Devices (Continued)	
Last Rsp Time	Displays the last response time from the Modbus device.
Avg Rsp Time	Displays the average response time from the Modbus device.
Min Rsp Time	Displays the minimum response time from the Modbus device.
Max Rsp Time	Displays the maximum response time from the Modbus device.
Error Rsp	Displays the number of responses with Modbus error indications.
No Path	This displays under **Configured Remote Modbus Devices** the number of times the network path could not be connected. This could be a result of: • Out of Modbus/TCP connections. • Modbus/TCP device not responding. • Incorrect IP address.
Invalid Responses	Displays the number of invalid messages or responses received to any of the following: • Message received after the timeout period. This may require increasing the Device Response Timeout. • Incorrect device ID in response message. • Incorrect function code in response message.
Blocked Writes	Displays the number of Modbus write messages that were not transmitted for this device. This only occurs when the Disable Writes (Read Only) serial port option is selected.
Tx Broadcasts	Displays the number of Modbus broadcast messages transmitted to this device.

Known Modbus Slave Device List Page - Private Devices	
Device ID	Displays the device ID associated with this device. *Note that if the Device ID Offset Mode option is enabled, the actual device ID transmitted out the serial port displays as (SP=xxx).*
Requests	Displays the number of private requests addressed to this Modbus device.
Responses	Displays the number of private responses from this Modbus device.
Req Or Resp?	Displays the number of private requests/responses addressed to/from this Modbus device that could not be identified specifically as either a request or a response.
No Responses	Displays the number of requests that this Modbus device did not respond to.
Last Rsp	Time Displays the last response time from the Modbus device.
Avg Rsp Time	Displays the average response time from the Modbus device.
Min Rsp Time	Displays the minimum response time from the Modbus device.
Max Rsp Time	Displays the maximum response time from the Modbus device.
Error Rsp	Displays the number of responses with Modbus error indications.

TDOCT-6598 0220

8.5 Modbus/TCP and Serial Modbus Master Statistics Page

Click **Diagnostics** | **Modbus Diagnostics** | **Modbus/TCP Interface** to access the **Modbus/TCP and Serial Modbus Master Statistics** page, which is explained in the following table.



Note

The Modbus/TCP interface uses the standard socket port of 502.

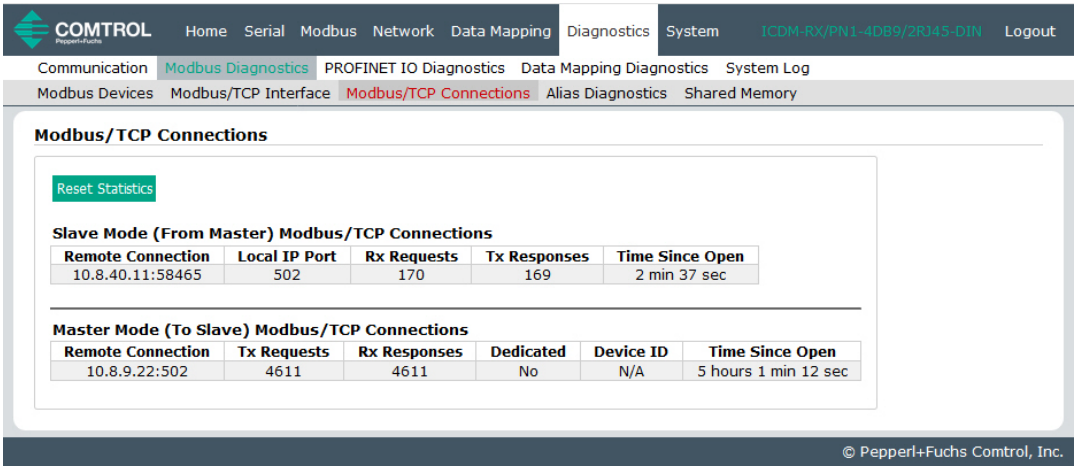
Modbus/TCP and Serial Modbus Master Statistics Page	
Modbus/TCP Slave Mode Specific Statistics	
Active Modbus/TCP Slave Connections	Displays the current number of active Modbus/TCP slave connections. These connections were initiated by a controller to the ICDM-RX/PN1.
Modbus/TCP Slave Connections Opened	Displays the total number of Modbus/TCP slave connections that have been opened.
Modbus/TCP Slave Connections Closed	Displays the total number of Modbus/TCP slave connections that have been closed.
Messages Received From Modbus/TCP Master(s)	Displays the total number of Modbus/TCP messages received from Modbus/TCP master(s).
Responses Sent to Modbus/TCP Master(s)	Displays the total number of Modbus/TCP responses sent to Modbus/TCP master(s).
Responses Dropped to Modbus/TCP Master	
Modbus Broadcasts Received From Modbus/TCP Master	Displays the number of Modbus broadcast messages received from Modbus/TCP Masters.
Invalid Command Lengths	Displays the number of messages received with invalid command lengths.
Invalid Message Data Errors	Displays the number of messages received with invalid message data errors. These errors occur when the ICDM-RX/PN1receives a message that cannot be processed due to improper message data.
Invalid Request Protocol Types	Displays the number of messages received with invalid protocol errors. This occurs when a message is received with a protocol other than the Modbus/TCP protocol value of zero.
Modbus/TCP Master Mode Specific Statistics	
Active Modbus/TCP Master Connections	Displays the current number of active Modbus/TCP master connections. These connections were initiated by the ICDM-RX/PN1 to a Modbus/TCP slave.
Modbus/TCP Master Connections Opened	Displays the total number of Modbus/TCP master connections that have been opened.
Modbus/TCP Master Connections Closed	Displays the total number of Modbus/TCP master connections that have been closed.
Messages Sent To Modbus/TCP Slave(s)	Displays the total number Modbus messages sent to remote Modbus/TCP slaves.
Responses Received From Modbus/TCP Slave(s)	Displays the total number of Modbus responses received from the Modbus/TCP Slave(s).
Invalid Response Data Errors From Modbus/TCP Slave(s)	Displays the number of response data errors to polling requests returned from the Modbus/TCP Slave(s). Possible causes include: • Incorrect transaction ID incorrect. • Message command length to large. • Incorrect device Id in response.
Remote Modbus/TCP Device Timeouts	Displays the number of messages to remote devices that were determined to have timed out by this gateway.
Unexpected Responses From Modbus/TCP Slave(s)	Displays the number of responses received when no response was expected.

Modbus/TCP and Serial Modbus Master Statistics Page (Continued)	
Error Responses from Modbus/TCP Slave(s)	Displays the number of responses received from Modbus/TCP slaves with errors indicated. This may be caused by such things as: • Device timeouts detected by slave Modbus/TCP device, such a gateway. • Invalid device address. • Invalid device ID. • Invalid message data.
Unexpected Response Function Codes From Modbus/TCP Slave(s)	Displays the number of unexpected response function codes from Modbus/TCP slaves. This occurs when a response was received with a different function code than what was sent.
Invalid Response Protocol Types From Modbus/TCP Slave(s)	Displays the number of responses with invalid protocol errors. This occurs when a response is returned with a protocol other than the Modbus/TCP protocol value of zero.
Failed Modbus/TCP Connection Attempts to Modbus/TCP Slave(s)	Displays the number of failed Modbus/TCP connection attempts to the specified PLC IP address.
Modbus/TCP Connection Problems	Displays the number of Modbus/TCP connection attempt problems. This occurs when the device responds and the connection is made, but there are problems setting up the connection options. The possible option problems include: • Setting the TCP connection to `TCP_NODELAY`. • Setting the socket connection to `SO_OOBINLINE`. • Setting the socket connection to `SO_KEEPALIVE`.
Unexpected Dropped Connections	Displays the number of Modbus/TCP connections that were unexpectedly dropped.
Non-Mode Specific Statistics/Diagnostics	
No Available Modbus/TCP Connection Errors	Displays the number of connections aborted when there are no available Modbus/TCP connections. This error occurs when the maximum number of Modbus/TCP connections has been reached and the ICDM-RX/PN1 is attempting to form another Modbus/TCP connection.
Improper Configuration Errors	Displays the number of errors that were caused by improper configuration errors.
System Resource Errors	Displays the numbers of system resource errors. These errors are typically caused by congestion and/or non-responding devices.
First Error Description	Displays the first error detected.
Last Error Description	Displays the last or most recent error detected.

TDOCT-6598 0220

8.6 Modbus/TCP Connections Page

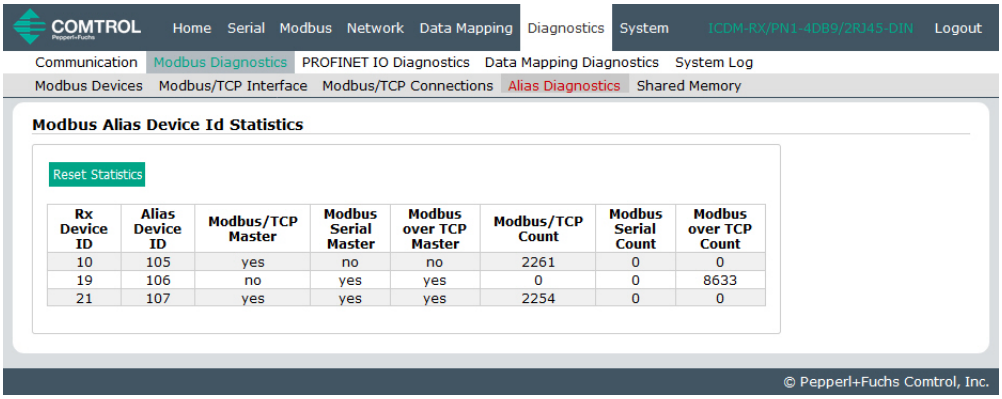
Access the **Modbus/TCP Connections** page by clicking D**iagnostics** I **Modbus Diagnostics** I **Modbus/TCP Connections**.



Modbus/TCP Connections Page	
Slave Mode (From Master) Modbus/TCP Connections ***Note*: Only displayed if active connections.**	
Remote Connection	The Modbus/TCP master connection in IP Address:Port Number format (xxx.xxx.xxx.xxx:pppp).
Local IP Port	The local TCP/IP port on the ICDM-RX/PN1. The standard Modbus/TCP port of 502 is always enabled. Optionally, up to seven additional Modbus/TCP ports may also be enabled.
Rx Requests	Displays the number of Modbus requests that have been received since the connection was opened.
Tx Responses	Displays the number of Modbus responses that have been transmitted since the connection was opened.
Time Since Open	The time that has elapsed since the connection was opened.
Master Mode (To Slave) Modbus/TCP Connections **Note: Only displayed if active connections.**	
Remote Connection	The Modbus/TCP master connection in IP Address:Port Number format (xxx.xxx.xxx.xxx:pppp).
Tx Requests	Displays the number of Modbus requests that have been transmitted since the connection was opened.
Rx Responses	Displays the number of Modbus responses that have been received since the connection was opened.
Dedicated	Indicates if the connection is dedicated for a specified Modbus device ID.
Device ID	If the connection is dedicated, the corresponding device ID.
Time Since Open	The time that has elapsed since the connection was opened.

8.7 Modbus Alias Device ID Statistics Page

Access the **Modbus Alias Device ID Statistics** page by clicking **Diagnostics** | **Modbus Diagnostics** | **Alias Diagnostics**.



Modbus Alias Device ID Statistics Page	
Rx Device ID	Displays the device ID (also often called the unit ID) of the received message from a master.
Alias Device ID	The alias device ID to convert the received device ID to.
Modbus/TCP Master	If selected, this applies the alias device ID configuration to messages received from Modbus/TCP masters.
Modbus Serial Master	If selected, this applies the alias device ID configuration to messages received from serial Modbus masters.
Modbus over TCP Master	If selected, this applies the alias device ID configuration to messages received from Modbus RTU/ASCII over Ethernet TCP/IP masters.
Modbus/TCP Count	Number of Aliased Modbus messages received from Modbus/TCP masters.
Modbus Serial Count	Number of Aliased Modbus messages received from Modbus Serial masters.
Modbus over TCP Count	Number of Aliased Modbus messages received from Modbus over TCP masters.

TDOCT-6598 0220

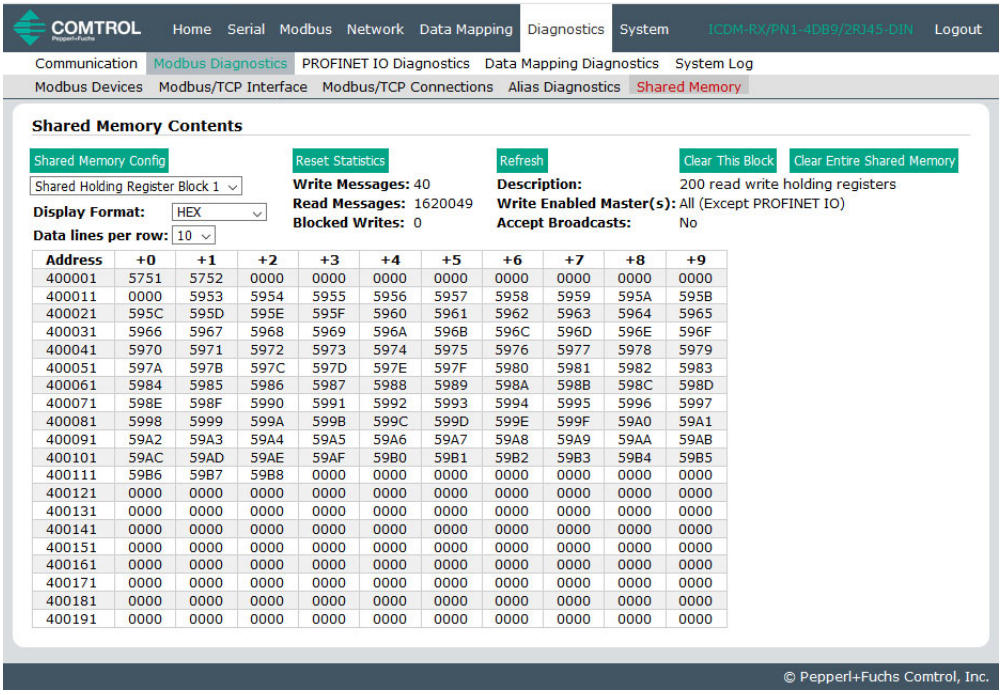
8.8 Shared Memory Contents

This page displays the contents of a Shared Holding Register and Shared Coil blocks.

Access this page by clicking **Diagnostics** I **Modbus Diagnostics** I **Shared Memory** and select the **Holding Register Block** or **Shared Coil Block** that you want to display in the drop list.

8.8.1 Shared Holding Block Register Blocks

The following image illustrates Shared Holding Register Block 1. Use the drop list to view other register blocks.



Shared Memory Contents Page	
Shared Memory Config button	Click this button to jump to the **Shared Memory Configuration** page.
Reset Statistics button	Click this button to reset the following: • Write messages • Read messages • Blocked writes
Refresh button	Click this button to refresh this page.
Clear This Block button	Click this button to clear the diagnostics and data contents of this Holding Register block.
Clear Entire Shared Memory button	Click this button to clear the diagnostics and data contents of all Holding Register and Coil blocks.
Shared Holding Register Block drop list	Use this drop list to select the Shared Holding Register Block or Shared Coil Block that you want to display.
Rx Rsp	Displays the number of Modbus responses received from this device.

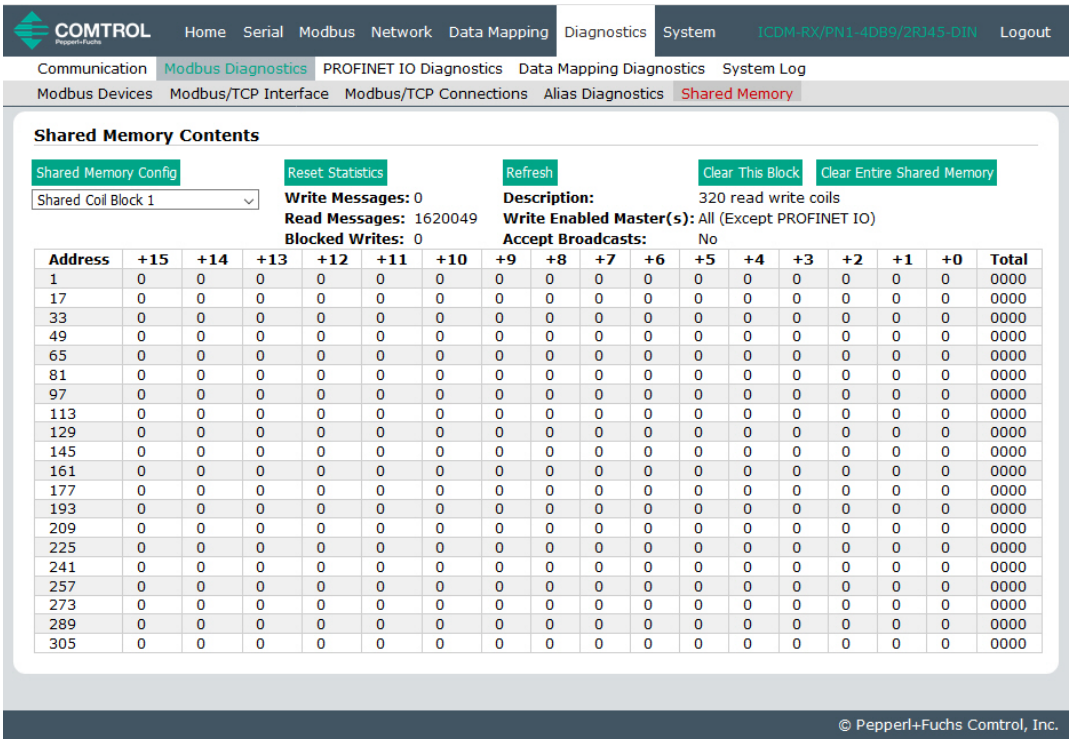
Shared Memory Contents Page (Continued)	
Display Format	Selectable data format to display the contents of the Holding Register block data. • Hex - 16 bit word (default) • word-16 - unsigned 16 bit decimal • word-32 - unsigned 32 bit decimal • string - ASCII character string
Data line per row	Selectable data entries per row to display the contents of the Holding Register block data. • 10-per-row – ten entries display per row • 20-per-row – twenty entries displayed per row (default)
Write Messages	Displays the number of successful write messages to this Shared Memory block.
Read Messages	Displays the number of read messages addressed to this Shared Memory block.
Blocked Writes	Displays the number of write messages that were blocked, or prevented, from writing to this Shared Memory block. *Note that blocked writes are treated as write violations and are added to the Write Violation Log.*
Description	This is the description from the **Shared Memory Configuration** page.
Write Enabled Master(s)	Displays how this is configured in the **Shared Memory Configuration** page.
Accept Broadcasts	Displays if the **Accept Broadcast Messages** option is enabled in the **Shared Memory Configuration** page.

TDOCT-6598 0220

8.8.2 Shared Coil Blocks

This page displays the contents of the selected **Shared Coil block**.

Access this page from the **Shared Memory Configuration** page and click **Display** next to the Coil block that you want to display.

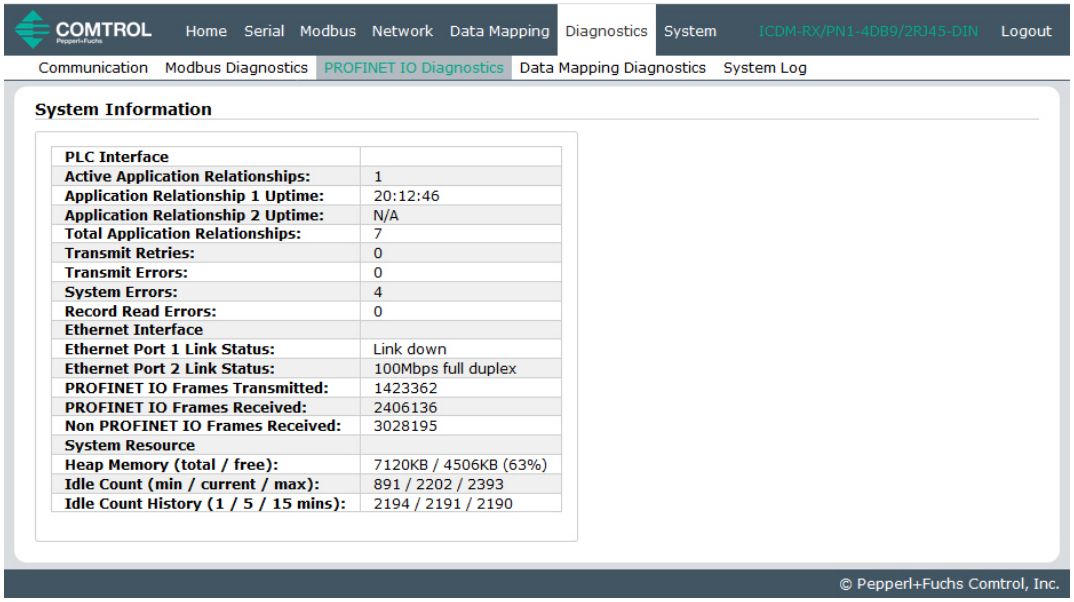


Shared Memory Contents Page - Shared Coil Blocks	
Shared Memory button	Selecting this button returns you to the **Shared Memory Configuration** page.
Config button	Selecting this button returns you to the **Shared Memory Configuration** page.
Reset Statistics button	Click this button to clear the diagnostics for this Holding Register block.
Refresh button	Click this button to refresh the data on the page.
Clear This Block button	This button clears the diagnostics and data contents of the Holding Register block in the drop list.
Clear Entire Shared Memory button	Click this button to clear the diagnostics and data contents of all Holding Register and Coil blocks.
Shared Coil Block Drop List	Use this drop list to display data for a specific Shared Holding Register Block or Shared Coil Block.
Write Messages	Displays the number of successful write messages to this Shared Memory block.
Read Messages	Displays the number of read messages addressed to this Shared Memory block.
Blocked Writes	Displays the number of write messages that were blocked, or prevented, from writing to this Shared Memory block. *Note that blocked writes are treated as write violations and are added to the Write Violation Log.*
Description	This is the description from the **Shared Memory Configuration** page.

Shared Memory Contents Page - Shared Coil Blocks (Continued)	
Write Enabled Master(s)	Displays how this is configured in the **Shared Memory Configuration** page.
Accept Broadcasts	Displays if the **Accept Broadcast Messages** option is enabled in the **Shared Memory Configuration** page.

8.9 PROFINET IO Diagnostics

The following table provides you information about the **Diagnostics** I **PROFINET IO Diagnostics** page.



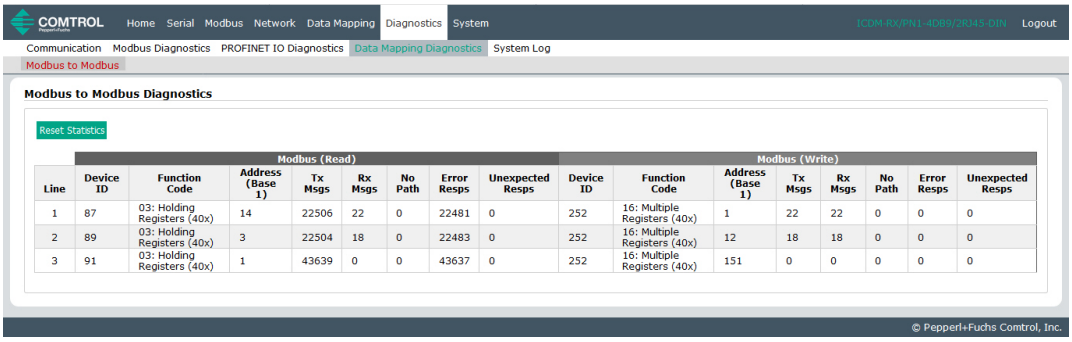
PROFINET IO Diagnostics Page	
PLC Interface	
Active Application Relationships	The number of active application relationships.
Application Relationship 1 Uptime	The uptime of application relationship 1.
Application Relationship 2 Uptime	The uptime of application relationship 2.
Total Application Relationships	The total number of application relationships that have been established.
Transmit Retries	The number of retries occurred when transmitting PROFIET IO frames.
Transmit Errors	The number of errors occurred when transmitting PROFINET IO frames.
System Errors	The number of system errors detected: • Port MAC address information not available • Errors occurred when accessing Ethernet interface • Invalid application relationship number • Invalid module, submodule, slot, or subslot number
Record Read Errors	The number of errors occurred when reading record data.

TDOCT-6598 0220

PROFINET IO Diagnostics Page (Continued)	
Ethernet Interface	
Ethernet Port Link 1 Status	The link status of Ethernet port 1.
Ethernet Port Link 2 Status	The link status of Ethernet port 2. Only available on models with dual Ethernet ports.
PROFINET IO Frames Transmitted	The number of PROFINET IO frames transmitted.
PROFINET IO Frames Received	The number of PROFINET IO frames received.
Non PROFINET IO Frames Received	The number of non PROFINET IO frames received.
System Resource	
Heap memory (total / free)	Memory usage (total and free memory).
Idle count (min / current / max)	The minimum, current, and maximum CPU idle count.
Idle count history (1 / 5 / 15 mins)	The average CPU idle count in the last 1, 5, and 15 minutes.

8.10 Modbus to Modbus Diagnostics Page

Access the **Modbus to Modbus Diagnostics** page by clicking **Diagnostics | Data Mapping Diagnostics | Modbus to Modbus**.



Modbus to Modbus Diagnostics	
Line	Displays the configuration line number.
Device ID (Read)	Displays the Modbus Device ID that is being read. This may be the device ID of either the Shared Memory or a Modbus slave device.
Function code	Displays the function being used to perform the read operation.
Address (base 1)	Displays the Modbus address in Base 1 format.
Tx Messages	Displays the number of read messages transmitted to the Shared Memory or Modbus device.
Error Responses	Displays the number of read response errors received from the Shared Memory or Modbus device.

Modbus to Modbus Diagnostics	

No Path	Displays the number of no path conditions. No path conditions occur when any of the following occur:
	• There is no valid destination to send the Modbus message.
	  • There are no serial ports configured as slave ports.
	  • There is no remote Modbus configuration for the device ID.
	• If there is a remote Modbus configuration, the gateway is unable to connect to the Modbus/TCP IP address.

Unexpected Responses	Displays the number of unexpected read responses received from the Shared Memory or Modbus device. These occur when an incorrect function code is received in the response, or a response message is received when it is not expected.
Device ID (Write)	Displays the Modbus Device ID that is being written to. This may be the device ID of either the Shared Memory or a Modbus slave device.
Function code	Displays the function being used to perform the write operation.
Address (base 1)	Displays the Modbus address in Base 1 format.
Tx Messages	Displays the number of write messages transmitted to the Shared Memory or Modbus device.
Rx Messages	Displays the number of valid write responses received from the Shared Memory or Modbus device.

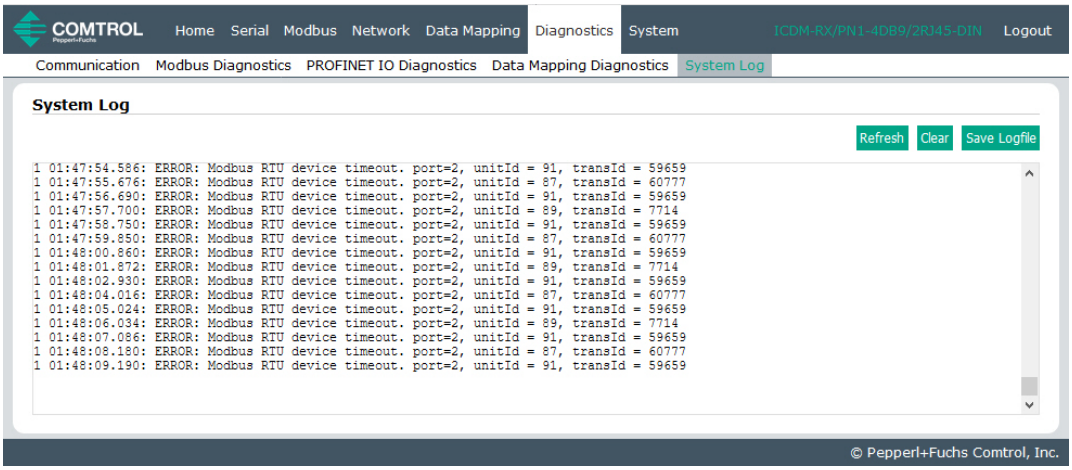
No Path	Displays the number of no path conditions. No path conditions occur when any of the following occur:
	• There is no valid destination to send the Modbus message.
	  • There are no serial ports configured as slave ports.
	  • There is no remote Modbus configuration for the device ID.
	• If there is a remote Modbus configuration, the gateway is unable to connect to the Modbus/TCP IP address.

Error Responses	Displays the number of write response errors received from the Shared Memory or Modbus device.
Invalid Responses	Displays the number of invalid write responses received from the Shared Memory or Modbus device. These occur when an incorrect function code is received in the response, or a response message is received when it is not expected.
Reset Statistics	Resets the statistics to all zeros.

TDOCT-6598 0220

8.11 System Log

The **System Log** page provides system level information, which is updated every 10 seconds.



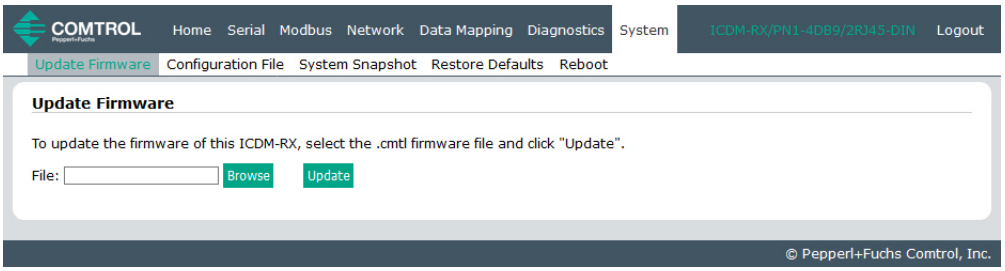
- Click the **Refresh** button to view the latest system log information.
- Click the **Clear** button to restart a new system log file.
- Click the **Save Logfile** button to save the system log file, if requested by Technical Support.

TDOCT-6598 0220

9 System Menus

9.1 Update Firmware

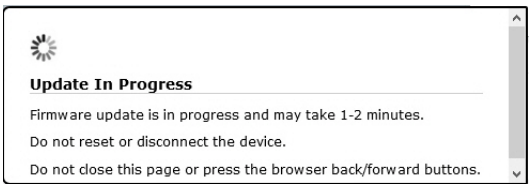
The default **System** menu page is the **Update Firmware** page.



Use the following procedure to upload firmware.

1. Open your web browser and enter the IP address of the ICDM-RX/PN1.
2. Click the **System** menu, which opens the **Update Firmware** page.
3. Click the **Browse** button, navigate to the file, select it and click the **Open** button.
4. Click the **Update** button.

An **Update In Progress** pop up notifies you with the upload duration, not to reset or disconnect the device or to close the page.



9.2 Configuration File

You can use the **Save Configuration** option to save an ICDM-RX/PN1 configuration file for recovery purposes or to quickly configure other ICDM-RX/PN1 units that require the same configuration using the **Load Configuration** option.

Note

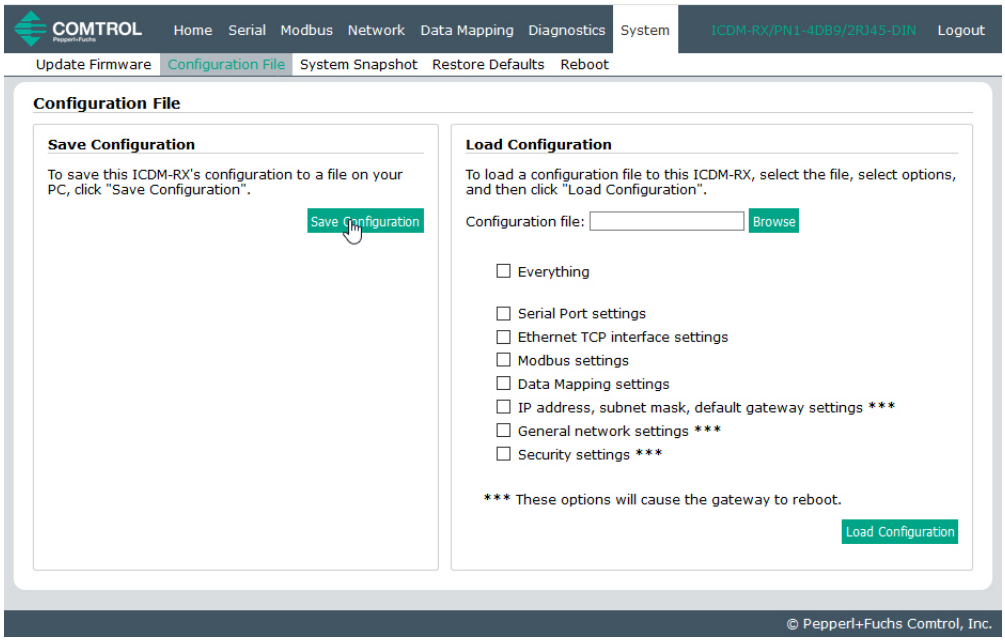
Optionally, you can use PortVision DX to save and load configuration files.

- Click the **Clear** button to restart a new system log file.
- Click the **Save Logfile** button to save the system log file, if requested by Technical Support.

9.2.1 Saving a Configuration File

Use the following procedure to save a configuration file.

1. Open your web browser and enter the IP address of the ICDM-RX/PN1.
2. Click **System** I **Configuration** File.
3. Click the **Save Configuration** button.



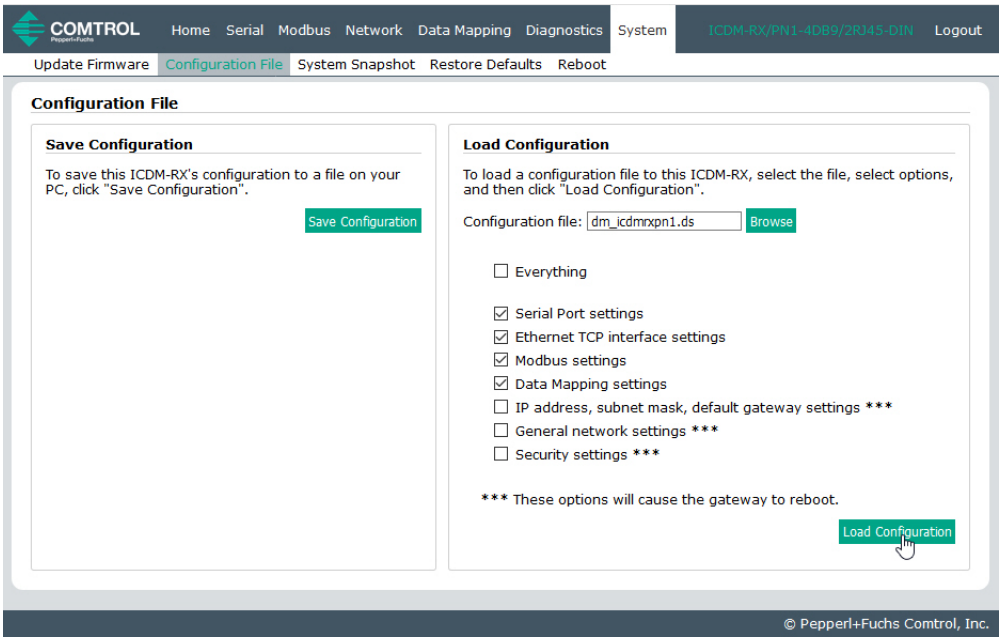
4. Save the configuration file following your browser prompts.

9.2.2 Loading a Configuration File

You can use this procedure to load a previously saved ICDM-RX/PN1 configuration file.

1. Click **System** I **Configuration File**.
2. Click the **Browse** button, highlight the configuration file you want to load, and click the **Open** button.

3. Select **Everything** or the items you want to load.

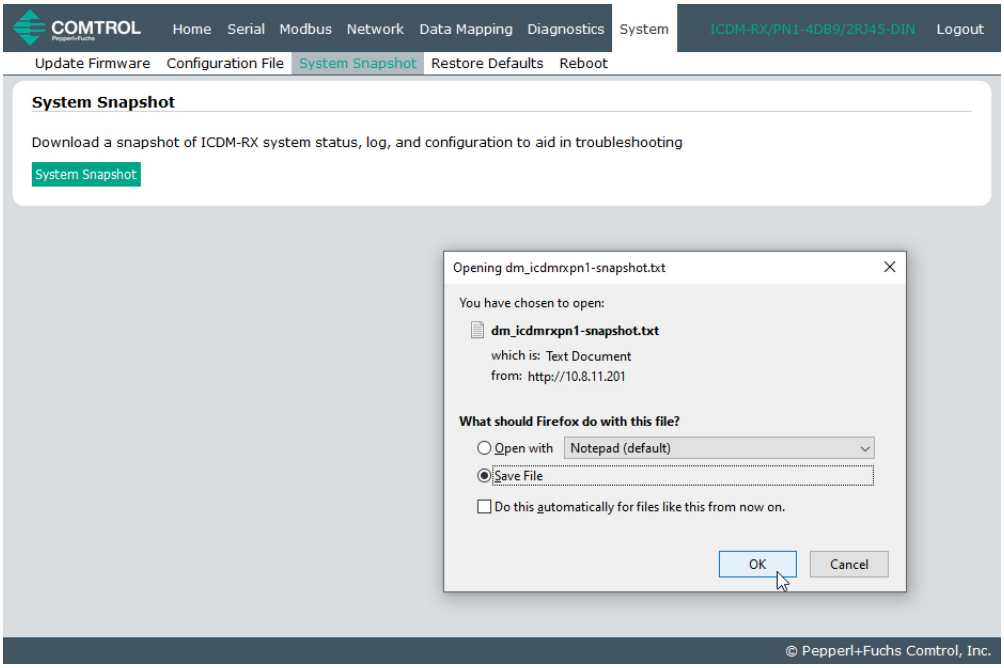


4. Click the **Load Configuration** button.

9.3 System Snapshot Page

You can use the System Snapshot page to download a snapshot of the device status, log, and configuration. You may find the information can help you diagnose a problem with the ICDM-RX/PN1. In addition, this information may be requested by technical support if you have called for assistance.

1. Open your browser and enter the IP address of the ICDM-RX/PN1.
2. Click **System** I **System Snapshot.**
3. Click the **Device Snapshot** button.



4. Save the file using the method appropriate for your browser.

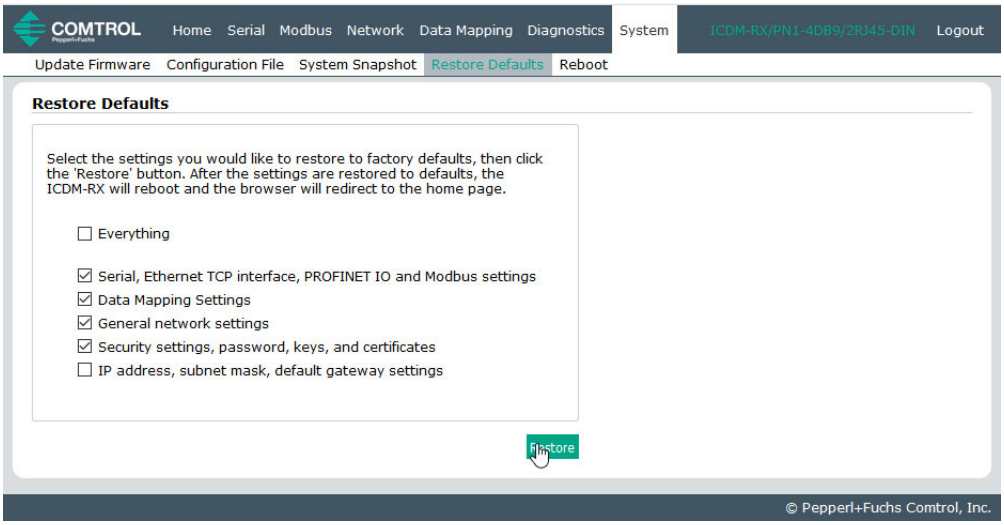
9.4 Restore Defaults Page

You can easily some or all of your settings to factory defaults by using the procedure below.

1. Open your browser and enter the IP address of the ICDM-RX/PN1.
2. Click **System** I **Restore Defaults**.

TDOCT-6598 0220

3. Select **Everything** or the specific setting or settings that you want to restore.

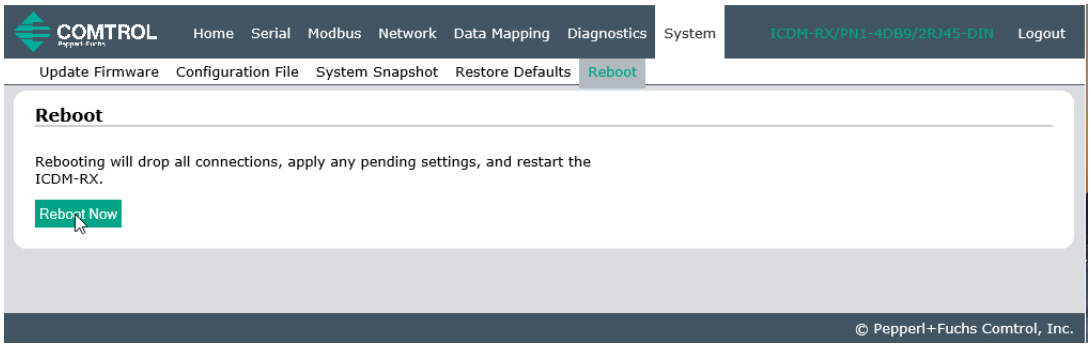


4. Click the **Restore** button.
5. The ICDM-RX/PN1 reboots and re-opens the web interface.

9.5 Reboot Page

You can reboot the ICDM-RX/PN1 remotely using the Reboot web page.

1. Click **System** I **Reboot**.
2. Click the **Reboot Now** button or wait the 10 seconds for it automatically reboot.



TDOCT-6598 0220

10 Troubleshooting

This section contains troubleshooting information for your ICDM-RX/PN1. You should review the following subsections before calling Technical Support because they will request that you perform many of the procedures or verifications before they will be able to help you diagnose a problem.

10.1 Troubleshooting Checklist

The following checklist may help you diagnose your problem:

- Verify that you are using the correct types of cables on the correct connectors and that all cables are connected securely.
- Isolate the ICDM-RX/PN1 from the network by connecting the device directly to a NIC in a host system using a standard Ethernet cable.

Model	Connected To	Connector Name
ICDM-RX/PN1-DB9/RJ45-PM	Ethernet hub or NIC	10/100 Ethernet
ICDM-RX/PN1-ST/RJ45-DIN ICDM-RX/PN1-DB9/RJ45-DIN ICDM-RX/PN1-2DB9/RJ45-DIN ICDM-RX/PN1-2ST/RJ45-DIN		10/100
ICDM-RX/PN1-4DB9/2RJ45-DIN		10/100 E1 and E2

- Verify that the Ethernet hub and any other network devices between the system and the ICDM-RX/PN1 are powered up and operating.
- Reset the power on the ICDM-RX/PN1 and watch the Status light activity.

ICDM-RX/PN1 Status LED Activity	
5 sec. off, 3 flashes, 5 sec. off, 3 flashes ...	Redboot™ checksum failure.
5 sec. off, 4 flashes, 5 sec. off, 4 flashes ...	SREC load failure.
5 quick flashes	The PROFINET IO to Modbus application is starting up.
Blinks every 10 seconds	The PROFINET IO to Modbus application is running but there is no PLC connection.
On (solid)	One or more PLC connections have been established.
Flashing	• LED flashing mode is enabled in PortVision DX • Error detection or diagnostics information available

- Verify that the network IP address, subnet mask, and gateway is correct and appropriate for the network. If IP addressing is being used, the system should be able to ping the ICDM-RX/PN1.
- Verify that the IP address programmed into the ICDM-RX/PN1 matches the unique reserved IP configured address assigned by the system administrator.
- If using DHCP, the host system needs to provide the subnet mask and gateway.
- Reboot the system and the ICDM-RX/PN1.
- If you have a spare ICDM-RX/PN1, try replacing the device.

10.2 General Troubleshooting

The following table provides some general troubleshooting tips.

General Condition	Explanation/Action
Status LED Flashing	Indicates that boot program has not downloaded to the unit. 1. Reboot the system. 2. Make sure that you have downloaded the most current firmware for PROFINET IO to Modbus. *If the Status LED is still flashing, contact Technical Support*.
Status LED not lit	Indicates that power has not been applied or there is a hardware failure. Contact Technical Support.
Cannot ping the device through Ethernet hub	Isolate the ICDM-RX/PN1 from the network. Connect the device directly to the NIC in the host system.
Cannot ping or connect to the ICDM-RX/PN1	The default IP address is often not accessible due to the subnet masking from another network unless 192.168 is used in the network. In most cases, it will be necessary to program in an address that conforms to your network.
ICDM-RX/PN1 continuously reboots when connected to some Ethernet switches or routers	Invalid IP information may also cause the switch or router to check for a gateway address. Lack of a gateway address is a common cause.

10.3 Daisy-Chaining Models With Dual Ethernet Ports

ICDM-RX/PN1 models with two Ethernet ports follow the IEEE specifications for standard Ethernet topologies.

When using the E1/E2 ports, the ICDM-RX/PN1 is classified as a switch. When using the E1 or E2 port only, it is a simple end node device.

The maximum number of daisy-chained ICDM-RX/PN1 units, and the maximum distance between units is based on the Ethernet standards and will be determined by your own environment and the conformity of your network to these standards.

Pepperl+Fuchs has tested with seven ICDM-RX/PN1 units daisy-chained together using 10 foot CAT5 cables, but this is not the theoretical limit. You may experience a performance hit on the devices at the end of the chain, so it is recommended that you overload and test for performance in your environment. The OS and the application may also limit the total number of ports that may be installed.

Following are some quick guidelines and URLs of additional information. Please note that standards and URLs do change.

Note

Category 3 or 5 twisted pair cables look the same as telephone cables but they are not the same. The network will not work if telephone cables are used to connect the equipment.

- Ethernet 10BASE-T Rules
  - The maximum number of repeater hops is four.
  - You can use Category 3 or 5 twisted-pair 10BASE-T cables.
  - The maximum length of each cable is 100m (328ft).
- Fast Ethernet 100BASE-TX rules
  - The maximum number of repeater hops is two (for a Class II hub). A Class II hub can be connected directly to one other Class II Fast Ethernet hub. A Class I hub cannot be connected directly to another Fast Ethernet hub.

TDOCT-6598 0220

- You must use Category 5 twisted-pair 100BASE-TX cables.
- The maximum length of each twisted-pair cable is 100m (328ft).
- The total length of twisted-pair cabling (across directly connected hubs) must not exceed 205m (672ft).

- IEEE 802.3 specification: A network using repeaters between communicating stations (PCs) is subject to the “5-4-3” rule of repeater placement on the network:
  - Five segments connected on the network.
  - Four repeaters.
  - Three segments of the 5 segments can have stations connected. The other two segments must be Internet repeater link segments with no stations connected.

Additional information may be found by searching the web.

TDOCT-6598 0220

Your automation, our passion.

Explosion Protection

- Intrinsic Safety Barriers
- Signal Conditioners
- FieldConnex® Fieldbus
- Remote I/O Systems
- Electrical Ex Equipment
- Purge and Pressurization
- Industrial HMI
- Mobile Computing and Communications
- HART Interface Solutions
- Surge Protection
- Wireless Solutions
- Level Measurement

Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Fieldbus Modules
- AS-Interface
- Identification Systems
- Displays and Signal Processing
- Connectivity

Pepperl+Fuchs Quality
Download our latest policy here:

www.pepperl-fuchs.com/quality

PEPPERL+FUCHS

www.pepperl-fuchs.com

Printed in Germany / DOCT-B286