



Start-up Guide
ProtoNode FPC-N54
For Interfacing Armstrong Products



Document Revision: 7.A

Web Configurator

Technical Support

Thank you for purchasing the ProtoNode for Armstrong.

Please call Armstrong for technical support of the ProtoNode product.

MSA Safety does not provide direct support. If Armstrong needs to escalate the concern, they will contact MSA Safety for assistance.

Support Contact Information:

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Three Rivers, MI 49093, USA

Customer Service:

(269) 273-1415

Email: hvacsales@armstronginternational.com

Website: www.armstronginternational.com

Quick Start Guide

1. Record the information about the unit. ([Section 2.1](#))
2. Check that the ProtoNode and customer device COM settings match. ([Section 2.3](#))
3. Connect the ProtoNode 3 pin RS-485 R1 port to the RS-485 network connected to each of the devices. ([Section 3.1](#))
4. **If using a serial field protocol:**
Connect the ProtoNode 3 pin RS-485 R2 port to the field protocol cabling. ([Section 3.2](#))
5. Connect power to ProtoNode 3 pin power port. ([Section 3.5](#))
6. Connect a PC to the ProtoNode via Ethernet cable. ([Section 4](#))
7. Setup Web Server Security and login via web browser. ([Section 5](#))
8. Use a web browser to access the ProtoNode Web Configurator page to select the profile of the device attached to the ProtoNode and enter any necessary device information. Once the device is selected, the ProtoNode automatically builds and loads the appropriate configuration. ([Section 6.2](#))
9. Ethernet Network: If using an Ethernet field protocol, use a web browser to access the ProtoNode Web Configurator page to change the IP Address. ([Section 6.4](#))

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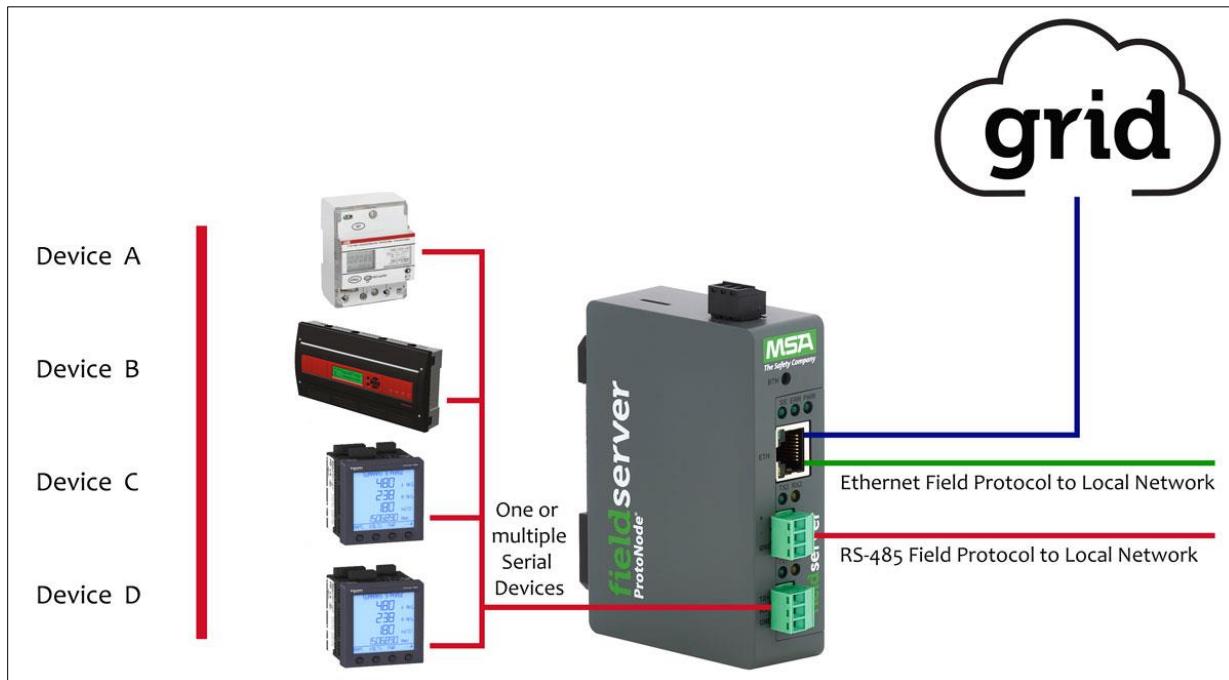
1 Introduction

1.1 ProtoNode Gateway

The ProtoNode is an external, high performance **building automation multi-protocol gateway** that is preconfigured to automatically communicate between Armstrong's devices (hereafter simply called "device") connected to the ProtoNode and automatically configures them for BACnet/IP, BACnet MS/TP, Modbus TCP/IP or Metasys^{®1} N2 by JCI.

It is not necessary to download any configuration files to support the required applications. The ProtoNode is pre-loaded with tested profiles/configurations for the supported devices.

FPC-N54 Connectivity Diagram:



The ProtoNode can connect with the MSA Grid – FieldServer Manager. The FieldServer Manager allows technicians, the OEM's support team and MSA Safety's support team to remotely connect to the ProtoNode. The FieldServer Manager provides the following capabilities for any registered devices in the field:

- Remotely monitor and control devices.
- Collect device data and view it on the Dashboard and the MSA Smart Phone App.
- Create user defined device notifications (alarm, trouble and warning) via SMS and/or Email.
- Generate diagnostic captures (as needed for troubleshooting) without going to the site.

For more information on the FieldServer Manager, see the [MSA Grid - FieldServer Manager Start-up Guide](#).

¹ Metasys is a registered trademark of Johnson Controls Inc.

2 Setup for ProtoNode

2.1 Record Identification Data

Each ProtoNode has a unique part number located on the side or the back of the unit. This number should be recorded, as it may be required for technical support. The numbers are as follows:

Model	Part Number
ProtoNode	FPC-N54-1734
Figure 1: ProtoNode Part Numbers	

- FPC-N54 units have the following 3 ports: RS-485 + Ethernet + RS-485/RS-232

2.2 Point Count Capacity

The total number of registers presented the device(s) attached to the ProtoNode cannot exceed:

Part number	Total Registers
FPC-N54-1734	1,500
Figure 2: Supported Point Count Capacity	

Devices	Point Count Per Device
GFH	26
ELMC	24
RTH	21
EHU	28
CS-20	53
new GFH	89
HC6000	60
HC6000 Legacy	59
DRV25	15
DRV40_80	25
Rada_Digital_Faucet	93
BDB-CDB (Node-ID = 32)	99
Figure 3: Points per Device	

2.3 Configuring Device Communications

2.3.1 Confirm the Device and ProtoNode COM Settings Match

- Any connected serial device **MUST have the same baud rate, data bits, stop bits, and parity settings as the ProtoNode.**
- The table below specifies the device serial port settings required to communicate with the ProtoNode.

Port Setting	Device
Protocol	Modbus RTU
Baud Rate	9600
Parity	None
Data Bits	8
Stop Bits	1
Figure 4: COM Settings	

2.3.2 Set Node-ID for Any Device Attached to the ProtoNode

- Set Node-ID for any device attached to ProtoNode. The Node-ID needs to be uniquely assigned between 1 and 255.
- Document the Node-ID that is assigned. The Node-ID assigned is used for deriving the Device Instance for BACnet/IP and BACnet MS/TP. (**Section 6.5**)

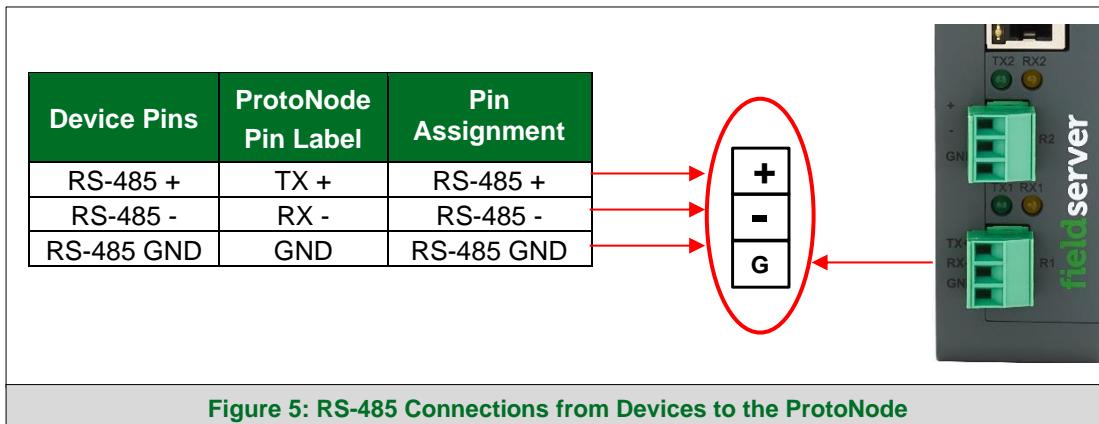
NOTE: The Metasys N2 and Modbus TCP/IP field protocol Node-ID is automatically set to be the same value as the Node-ID of the device.

3 Interfacing ProtoNode to Devices

3.1 Device Connections to ProtoNode

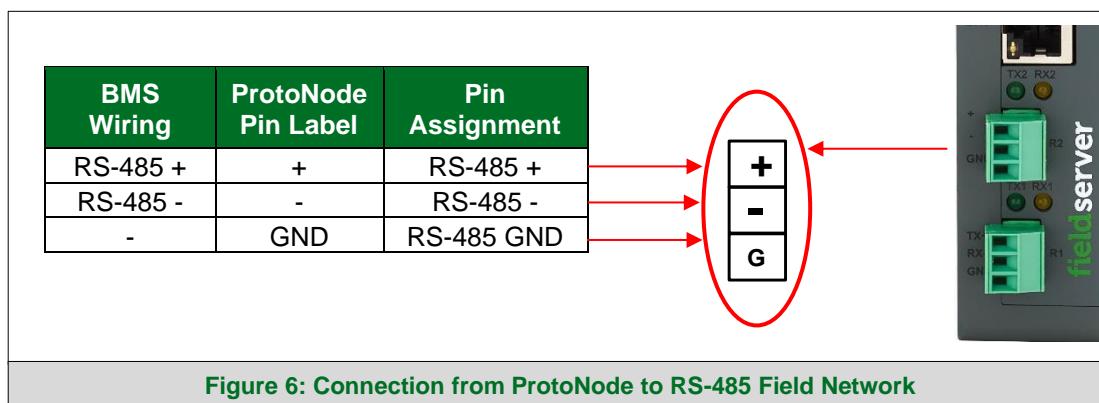
The ProtoNode has a 3-pin Phoenix connector for connecting RS-485 devices on the R1 port.

NOTE: Use standard grounding principles for RS-485 GND.

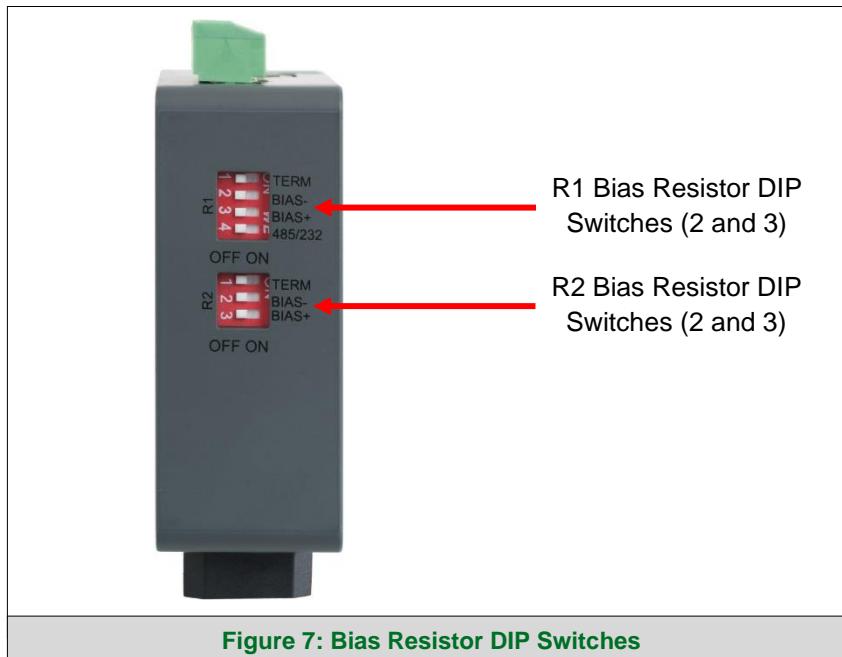


3.2 Wiring Field Port to RS-485 Serial Network

- Connect the RS-485 network wires to the 3-pin RS-485 connector on the R2 port. ([Figure 6](#))
 - Use standard grounding principles for RS-485 GND
- See [Section 4](#) for information on connecting to an Ethernet network.



3.3 Bias Resistors



To enable Bias Resistors, move both the BIAS- and BIAS+ dip switches to the right as shown in Figure 7.

The ProtoNode bias resistors are used to keep the RS-485 bus to a known state, when there is no transmission on the line (bus is idling), to help prevent false bits of data from being detected. The bias resistors typically pull one line high and the other low - far away from the decision point of the logic.

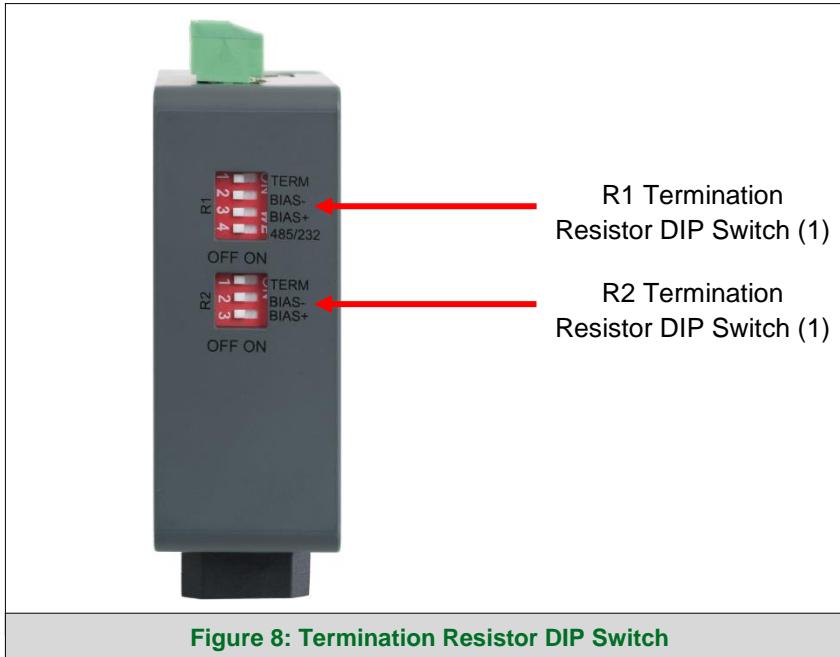
The bias resistor is 510 ohms which is in line with the BACnet spec. It should only be enabled at one point on the bus (for example, on the field port where there are very weak bias resistors of 100k). Since there are no jumpers, many gateways can be put on the network without running into the bias resistor limit which is < 500 ohms.

NOTE: See www.ni.com/support/serial/resinfo.htm for additional pictures and notes.

NOTE: The R1 and R2 DIP Switches apply settings to the respective serial port.

NOTE: If the gateway is already powered on, DIP switch settings will not take effect unless the unit is power cycled.

3.4 Termination Resistor



If the ProtoNode is the last device on the serial trunk, then the End-Of-Line Termination Switch needs to be enabled. **To enable the Termination Resistor, move the TERM dip switch to the right as shown in Figure 8.**

Termination resistor is also used to reduce noise. It pulls the two lines of an idle bus together. However, the resistor would override the effect of any bias resistors if connected.

NOTE: The R1 and R2 DIP Switches apply settings to the respective serial port.

NOTE: If the gateway is already powered on, DIP switch settings will not take effect unless the unit is power cycled.

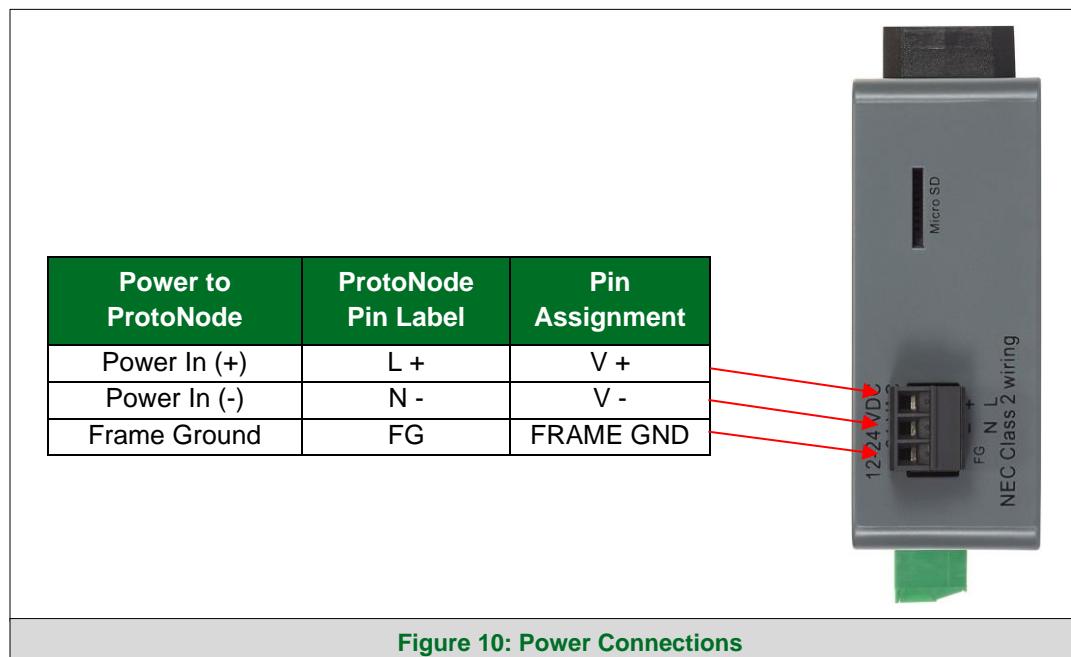
3.5 Power-Up ProtoNode

Check power requirements in the table below:

Power Requirement for ProtoNode External Gateway		
	Current Draw Type	
ProtoNode Family	12VDC	24VDC/AC
FPC – N54 (Typical)	250mA	125mA
NOTE: These values are ‘nominal’ and a safety margin should be added to the power supply of the host system. A safety margin of 25% is recommended.		
Figure 9: Required Current Draw for the ProtoNode		

Apply power to the ProtoNode as shown below in **Figure 10**. Ensure that the power supply used complies with the specifications provided in **Section 10**.

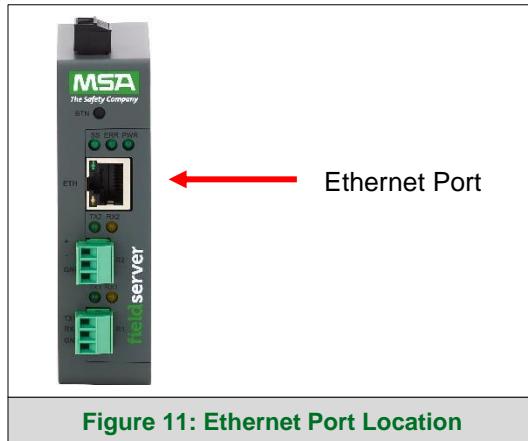
- The ProtoNode accepts 9-30VDC or 24VAC on pins L+ and N-.
- Frame GND should be connected.



4 Connect the PC to the ProtoNode

4.1 Connecting to the Gateway via Ethernet

Connect a Cat-5 Ethernet cable (straight through or cross-over) between the local PC and ProtoNode.



4.1.1 Changing the Subnet of the Connected PC

The default IP Address for the ProtoNode is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and ProtoNode are on different IP networks, assign a static IP Address to the PC on the 192.168.1.xxx network.

For Windows 10:

- Find the search field in the local computer's taskbar (usually to the right of the windows icon ) and type in "Control Panel".
- Click "Control Panel", click "Network and Internet" and then click "Network and Sharing Center".
- Click "Change adapter settings" on the left side of the window.
- Right-click on "Local Area Connection" and select "Properties" from the dropdown menu.
- Highlight **Internet Protocol Version 4 (TCP/IPv4)** and then click the Properties button.
- Select and enter a static IP Address on the same subnet. For example:

Use the following IP address:

IP address:	192 . 168 . 1 . 11
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	

- Click the Okay button to close the Internet Protocol window and the Close button to close the Ethernet Properties window.

5 Setup Web Server Security

Navigate to the IP Address of the ProtoNode on the local PC by opening a web browser and entering the IP Address of the ProtoNode; the default Ethernet address is 192.168.1.24.

NOTE: If the IP Address of the ProtoNode has been changed, the assigned IP Address can be discovered using the FS Toolbox utility. See Section 7.1 for instructions.

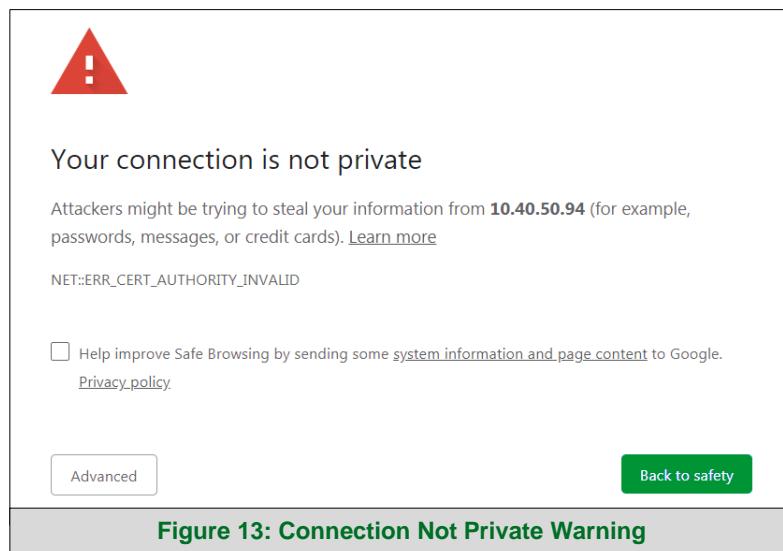
5.1 Login to the FieldServer

The first time the FieldServer GUI is opened in a browser, the IP Address for the gateway will appear as untrusted. This will cause the following pop-up windows to appear.

- When the Web Server Security Unconfigured window appears, read the text and choose whether to move forward with HTTPS or HTTP.

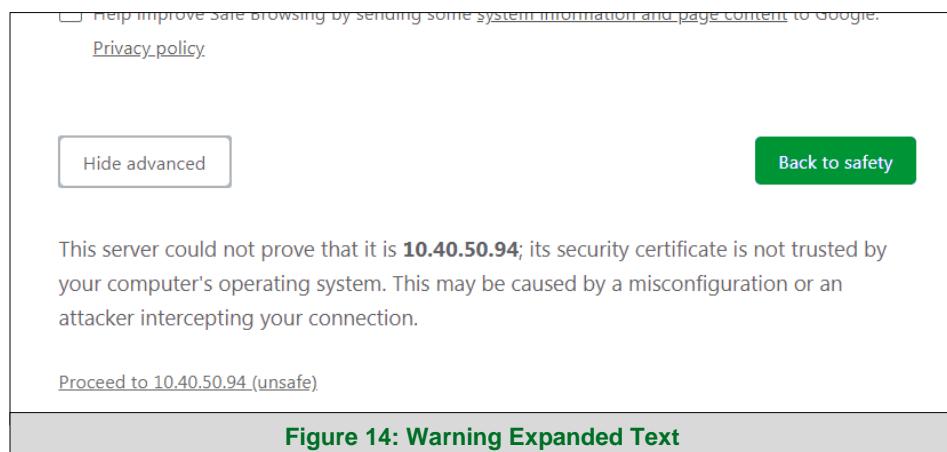


- When the warning that "Your connection is not private" appears, click the advanced button on the bottom left corner of the screen.



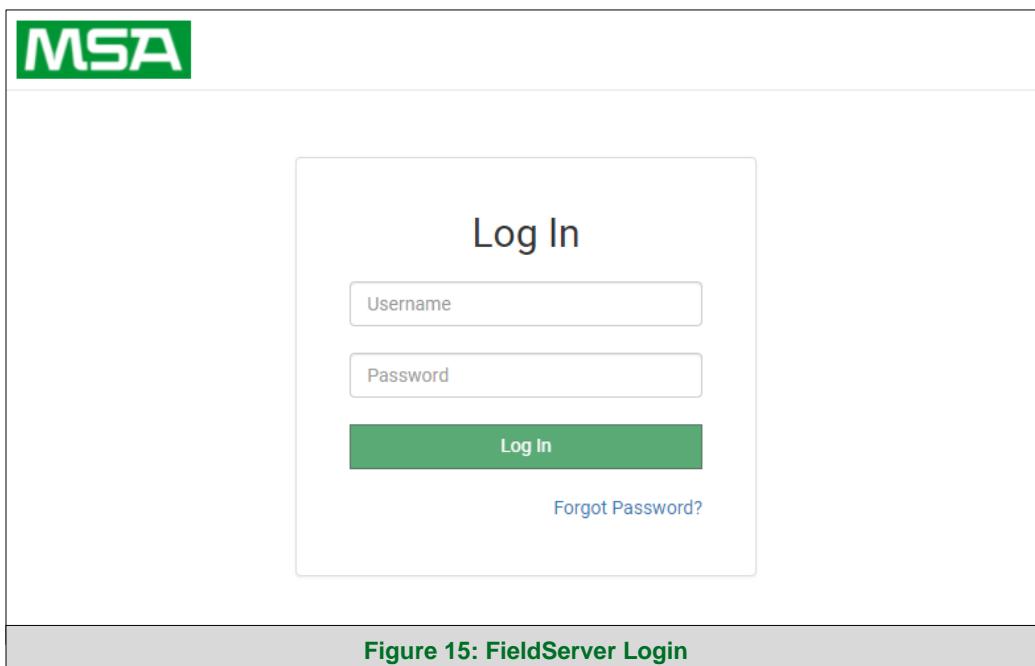
Setup Web Server Security

- Additional text will expand below the warning, click the underlined text to go to the IP Address. In the **Figure 14** example this text is “[Proceed to 10.40.50.94 \(unsafe\)](#)”.



- When the login screen appears, put in the Username (default is “admin”) and the Password (found on the label of the FieldServer).

NOTE: There is also a QR code in the top right corner of the FieldServer label that shows the default unique password when scanned.



NOTE: A user has 5 attempts to login then there will be a 10-minute lockout. There is no timeout on the FieldServer to enter a password.

NOTE: To create individual user logins, go to Section [8.7](#).

Setup Web Server Security

5.2 Select the Security Mode

On the first login to the FieldServer, the following screen will appear that allows the user to select which mode the FieldServer should use.

Web server security is not configured

Please select the web security profile from the options below.

Note that browsers will issue a security warning when browsing to a HTTPS server with an untrusted self-signed certificate.

Mode

HTTPS with default trusted TLS certificate (requires internet connection to be trusted)

HTTPS with own trusted TLS certificate

HTTP (not secure, vulnerable to man-in-the-middle attacks)

Save

Figure 16: Security Mode Selection Screen

NOTE: Cookies are used for authentication.

NOTE: To change the web server security mode after initial setup, go to Section 8.1.

The sections that follow include instructions for assigning the different security modes.

Setup Web Server Security

5.2.1 HTTPS with Own Trusted TLS Certificate

This is the recommended selection and the most secure. **Please contact your IT department to find out if you can obtain a TLS certificate from your company before proceeding with the Own Trusted TLS Certificate option.**

- Once this option is selected, the Certificate, Private Key and Private Key Passphrase fields will appear under the mode selection.

The screenshot shows the 'Security Mode Selection' screen with three main sections:

- Certificate:** A large text area containing a long string of characters representing a certificate, ending with "-----END CERTIFICATE-----".
- Private Key:** A large text area containing a long string of characters representing a private key, ending with "-----END RSA PRIVATE KEY-----".
- Private Key Passphrase:** A section with a text input field labeled "Specify if encrypted" and a green "Save" button below it.

At the bottom of the screen is a caption: "Figure 17: Security Mode Selection Screen – Certificate & Private Key".

- Copy and paste the Certificate and Private Key text into their respective fields. If the Private Key is encrypted type in the associated Passphrase.
- Click Save.
- A "Redirecting" message will appear. After a short time, the FieldServer GUI will open.

5.2.2 HTTPS with Default Untrusted Self-Signed TLS Certificate or HTTP with Built-in Payload Encryption

- Select one of these options and click the Save button.
- A "Redirecting" message will appear. After a short time, the FieldServer GUI will open.

6 Configure the ProtoNode

6.1 Select Field Protocol and Set Configuration Parameters

- On the Web Configurator page, the first configuration parameter is the Protocol Selector.

The screenshot shows the 'Configuration Parameters' section of the MSA Web Configurator. It lists four parameters:

Parameter Name	Parameter Description	Value	Action
protocol_select	Protocol Selector Set to 1 for BACnet IP Set to 2 for BACnet MSTP Set to 3 for Metasys N2 Set to 4 for Modbus TCP	<input type="text" value="1"/>	<input type="button" value="Submit"/>
network_nr	BACnet Network Number This sets the BACnet network number of the Gateway. (1 - 65535)	<input type="text" value="50"/>	<input type="button" value="Submit"/>
node_offset	BACnet Node Offset This is used to set the BACnet device instance. The device instance will be sum of the Modbus device address and the node offset. (0 - 4194303)	<input type="text" value="93000"/>	<input type="button" value="Submit"/>

Below the parameters, there is a 'BACnet IP Port' section with a dropdown menu set to '4789R'. At the bottom of the page, there are three buttons: 'Clear Profiles and Restart', 'System Restart', and 'Diagnostics & Debugging'. To the right, it says 'fieldserver'. On the left, there is a note 'has no port' and a 'HELP (?)' button.

Figure 18: Web Configurator Showing Configuration Parameters

- Select the field protocol by entering the appropriate number into the Protocol Selector Value. Click the Submit button. Click the System Restart button to save the updated configuration.

NOTE: Protocol specific parameters are only visible when the associated protocol is selected.

NOTE: If Modbus TCP/IP was selected and is used for the field protocol, skip Section 6.2. Device profiles are NOT used for Modbus TCP/IP.

- Ensure that all parameters are entered for successful operation of the gateway. Find the legal value options for each parameter under the Parameter Description in parentheses.

NOTE: If multiple devices are connected to the ProtoNode, set the BACnet Virtual Server Nodes field to "Yes"; otherwise leave the field on the default "No" setting.

Configuring the Gateway

6.2 Setting ProtoNode Active Profiles

- In the Web Configurator, the Active Profiles are shown below the configuration parameters. The Active Profiles section lists the currently active device profiles, including previous Web Configurator additions. This list is empty for new installations, or after clearing all configurations. (**Figure 19**)



Configuration Parameters

Parameter Name	Parameter Description	Value	Submit
protocol_select	Protocol Selector Set to 1 for BACnet IP Set to 2 for BACnet MSTP Set to 3 for Metasys N2 Set to 4 for Modbus TCP	<input type="text" value="1"/>	Submit
network_nr	BACnet Network Number This sets the BACnet network number of the Gateway. (1 - 65535)	<input type="text" value="50"/>	Submit
node_offset	BACnet Node Offset This is used to set the BACnet device instance. The device instance will be sum of the Modbus device address and the node offset. (0 - 4194303)	<input type="text" value="93000"/>	Submit
bac_ip_port	BACnet IP Port This sets the BACnet IP port of the Gateway. The default is 47808. (1 - 65535)	<input type="text" value="47808"/>	Submit
bac_cov_option	BACnet COV This enables or disables COVs for the BACnet connection. Use COV_Enable to enable. Use COV_Disable to disable. (COV_Enable/COV_Disable)	<input type="text" value="COV_Disable"/>	Submit
bac_bbmd_option	BACnet BBMD This enables BBMD on the BACnet IP connection. Use BBMD to enable. Use - to disable. The bdt.ini files also needs to be downloaded. (BBMD/-)	<input type="text" value="-"/>	Submit
bac_virt_nodes	BACnet Virtual Server Nodes Set to NO if the unit is only converting 1 device to BACnet. Set to YES if the unit is converting multiple devices. (No/Yes)	<input type="text" value="No"/>	Submit

Active profiles

Nr	Node ID	Current profile	Parameters
Add			
HELP (?)		Clear Profiles and Restart	System Restart
			Diagnostics & Debugging

fieldserver

Figure 19: Web Configurator Showing no Active Profiles

Configuring the Gateway

- To add an active profile to support a device, click the Add button under the Active Profiles heading. This will present a profile drop-down menu underneath the Current profile column.
- Once the Profile for the device has been selected from the drop-down list, enter the value of the device's Node-ID which was assigned in [Section 2.3.2](#).

NOTE: If using the BDB-CDB profile, set the Node-ID to 32.

- Then press the "Submit" button to add the Profile to the list of devices to be configured.
- Completed additions are listed under "Active profiles" as shown in [Figure 20](#).

Active profiles			
Nr	Node ID	Current profile	Parameters
1	1	BAC_IP_BDB-CDB	<button>Remove</button>
2	22	BAC_IP_DRV25	<button>Remove</button>
3	33	BAC_IP_New_GFH	<button>Remove</button>

Add **HELP (?)** **Clear Profiles and Restart** **System Restart** **Diagnostics & Debugging** **fieldserver**

Figure 20: Web Configurator Showing Active Profile Additions

6.3 Verify Device Communications

- **If using a serial connection, check that the port R1 TX1 and RX1 LEDs are rapidly flashing.** See [Section 7.4](#) for additional LED information and images.
- Confirm the software shows good communications without errors ([Section 7.2](#)).

Configuring the Gateway

6.4 Ethernet Network: Setting IP Address for the Field Network

- Follow the steps outlined in **Section 5.1** to access the ProtoNode Web Configurator.
- To access the FS-GUI, click the “Diagnostics & Debugging” button at the bottom of the page.



Configuration Parameters

Parameter Name	Parameter Description	Value	Submit
protocol_select	Protocol Selector Set to 1 for BACnet IP Set to 2 for BACnet MSTP Set to 3 for Metasys N2 Set to 4 for Modbus TCP	<input type="text" value="1"/>	Submit
network_nr	BACnet Network Number This sets the BACnet network number of the Gateway. (1 - 65535)	<input type="text" value="50"/>	Submit
node_offset	BACnet Node Offset This is used to set the BACnet device instance. The device instance will be sum of the Modbus device address and the node offset. (0 - 4194303)	<input type="text" value="93000"/>	Submit
bac_ip_port	BACnet IP Port This sets the BACnet IP port of the Gateway. The default is 47808. (1 - 65535)	<input type="text" value="47808"/>	Submit
bac_cov_option	BACnet COV This enables or disables COVs for the BACnet connection. Use COV_Enable to enable. Use COV_Disable to disable. (COV_Enable/COV_Disable)	<input type="text" value="COV_Disable"/>	Submit
bac_bbmd_option	BACnet BBMD This enables BBMD on the BACnet IP connection. Use BBMD to enable. Use - to disable. The bdt.ini files also needs to be downloaded. (BBMD/-)	<input type="text" value="-"/>	Submit
bac_virt_nodes	BACnet Virtual Server Nodes Set to NO if the unit is only converting 1 device to BACnet. Set to YES if the unit is converting multiple devices. (No/Yes)	<input type="text" value="No"/>	Submit

Active profiles

Nr	Node ID	Current profile	Parameters
		Add	
		HELP (?)	Clear Profiles and Restart
		System Restart	Diagnostics & Debugging

fieldserver

Figure 21: Web Configurator Screen

Configuring the Gateway

- From the FS-GUI landing page, click on “Setup” to expand the navigation tree and then select “Network Settings” to access the IP Settings menu. (**Figure 22**)

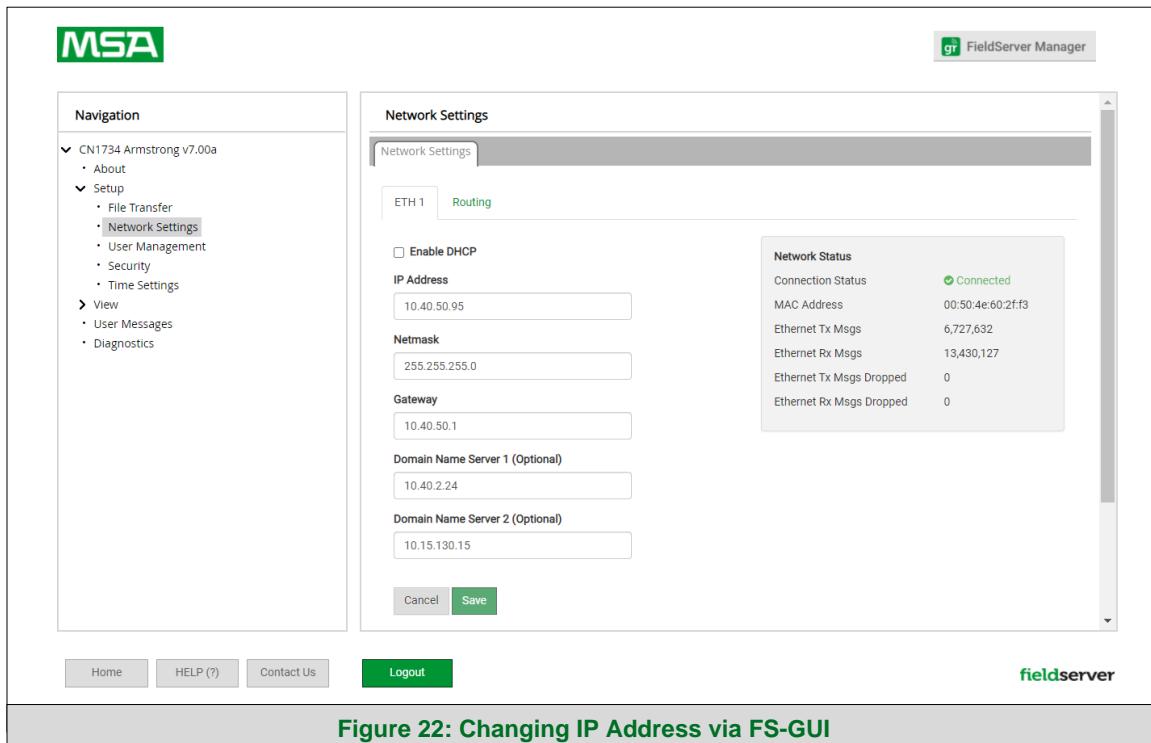


Figure 22: Changing IP Address via FS-GUI

- Enable DHCP to automatically assign IP Settings or modify the IP Settings manually as needed, via these fields: IP Address, Netmask, Gateway, and Domain Name Server1/2.

NOTE: If connected to a router, set the Gateway to the same IP Address as the router.

- Click Save to record and activate the new IP Address.
- Connect the FieldServer to the local network or router.

NOTE: If the webpage was open in a browser, the browser will need to be pointed to the new IP Address of the FieldServer before the webpage will be accessible again.

- Unplug Ethernet cable from PC and connect it to the network switch or router.
- Record the IP Address assigned to the ProtoNode for future reference.

NOTE: For Router settings go to Section 8.8.

NOTE: The FieldServer Manager tab **(see above) allows users to connect to the Grid, MSA Safety's device cloud solution for IIoT. FieldServer Manager enables secure remote connection to field devices through a FieldServer and its local applications for configuration, management, maintenance. For more information about the FieldServer Manager, refer to the [MSA Grid - FieldServer Manager Start-up Guide](#).**

6.5 BACnet: Setting Node_Offset to Assign Specific Device Instances

- Follow the steps outlined in [Section 5.1](#) to access the ProtoNode Web Configurator.
- Node_Offset field shows the current value (default = 50,000).
 - The values allowed for a BACnet Device Instance can range from 1 to 4,194,303
- To assign a specific Device Instance (or range); change the Node_Offset value as needed using the calculation below:

$$\text{Device Instance (desired)} = \text{Node_Offset} + \text{Node_ID}$$

For example, if the desired Device Instance for the device 1 is 50,001 and the following is true:

- Device 1 has a Node-ID of 1
- Device 2 has a Node-ID of 22
- Device 3 has a Node-ID of 33

Then plug the device 1's information into the formula to find the desired Node_Offset:

$$50,001 = \text{Node_Offset} + 1$$

➤ **50,000 = Node_Offset**

Once the Node_Offset value is input, it will be applied as shown below:

- Device 1 Instance = 50,000 + Node_ID = 50,000 + 1 = 50,001
- Device 2 Instance = 50,000 + Node_ID = 50,000 + 22 = 50,022
- Device 3 Instance = 50,000 + Node_ID = 50,000 + 33 = 50,033

- Click "Submit" once the desired value is entered.

BACnet Node Offset
This is used to set the BACnet device instance.
The device instance will be sum of the Modbus device address and the node offset.
(0 - 4194303)

Submit

Figure 23: Web Configurator Node Offset Field

Active profiles			
Nr	Node ID	Current profile	Parameters
1	1	BAC_IP_BDB-CDB	Remove
2	22	BAC_IP_DRV25	Remove
3	33	BAC_IP_New_GFH	Remove

Add **HELP (?)** **Clear Profiles and Restart** **System Restart** **Diagnostics & Debugging** **fieldserver**

Figure 24: Active Profiles

6.6 How to Start the Installation Over: Clearing Profiles

- Follow the steps outlined in [Section 5.1](#) to access the ProtoNode Web Configurator.
- At the bottom-left of the page, click the “Clear Profiles and Restart” button.
- Once restart is complete, all past profiles discovered and/or added via Web configurator are deleted. The unit can now be reinstalled.

7 Troubleshooting

7.1 Lost or Incorrect IP Address

- Ensure that FieldServer Toolbox is loaded onto the local PC. Otherwise, download the FieldServer-Toolbox.zip via the MSA Safety website.
- Extract the executable file and complete the installation.

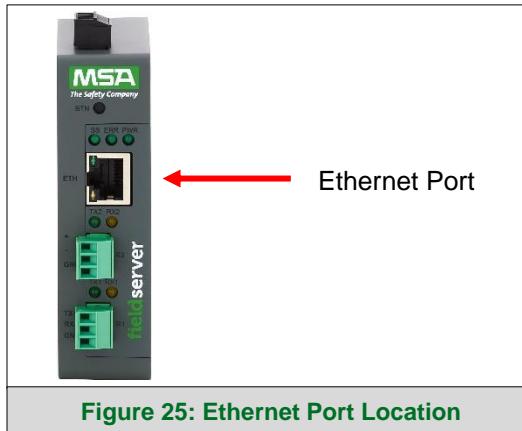
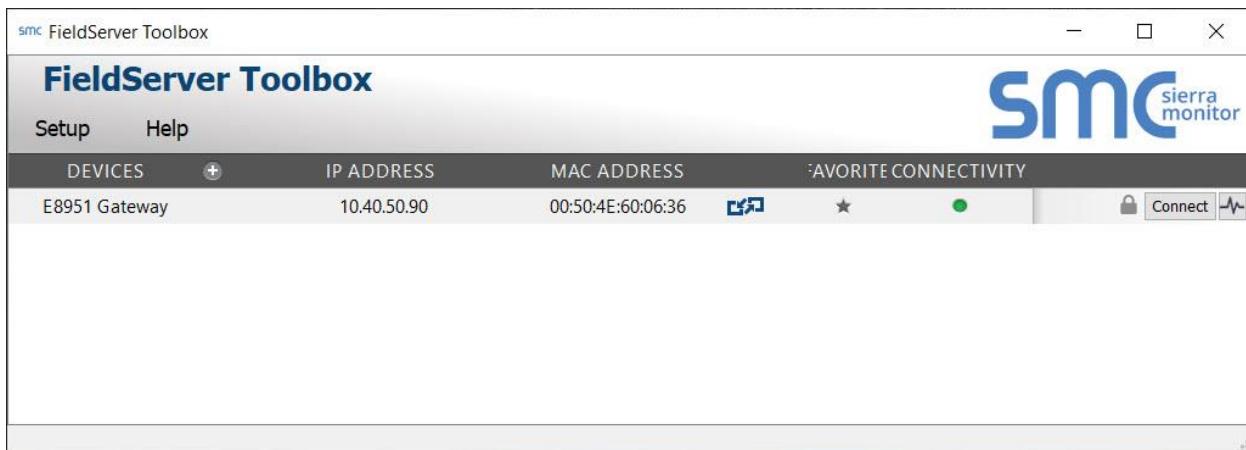


Figure 25: Ethernet Port Location

- Connect a standard Cat-5 Ethernet cable between the user's PC and ProtoNode.
- Double click on the FS Toolbox Utility and click Discover Now on the splash page.
- Check for the IP Address of the desired gateway.



7.2 Viewing Diagnostic Information

- Type the IP Address of the ProtoNode into the web browser or use the FieldServer Toolbox to connect to the ProtoNode.
- Click on Diagnostics and Debugging Button, then click on view, and then on connections.
- If there are any errors showing on the Connection page, refer to **Section 7.3** for the relevant wiring and settings.

The screenshot shows the FieldServer Manager interface with the following details:

- Top Bar:** MSA logo and "FieldServer Manager" text.
- Navigation Panel (Left):**
 - CN1734 Armstrong v7.00a
 - About
 - Setup
 - View**
 - Connections**
 - R1 - MODBUS_RTU
 - ETH1 - BACnet_IP
 - Data Arrays
 - Nodes
 - Map Descriptors
 - User Messages
 - Diagnostics
- Connections Screen (Main):**
 - Overview** tab selected.
 - Connections Table:**

Index	Name	Tx Msg	Rx Msg	Tx Char	Rx Char	Errors
0	R1 - MODBUS_RTU	26	0	208	0	26
1	ETH1 - BACnet_IP	6	53	84	550	0
- Bottom Navigation:** Home, HELP (?), Contact Us, Reset Statistics, Logout.
- Bottom Footer:** fieldserver logo.

Caption: Figure 26: Error Messages Screen

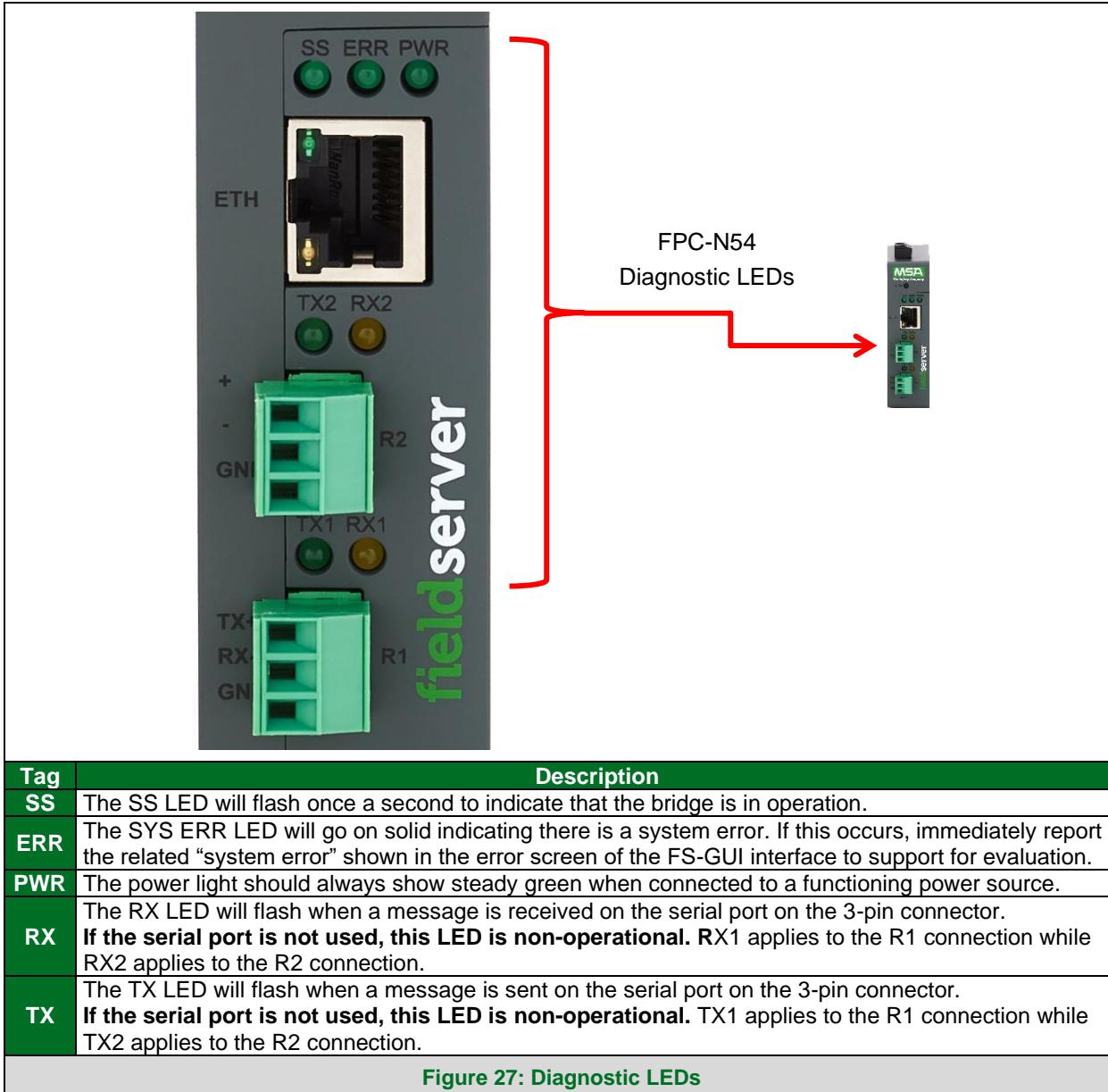
7.3 Checking Wiring and Settings

- No COMS on Modbus RTU side. If the Tx/Rx LEDs are not flashing rapidly then there is a COM issue. To fix this, check the following:
 - Visual observations of LEDs on the ProtoNode ([Section 7.4](#))
 - Check baud rate, parity, data bits, stop bits
 - Check device address
 - Verify wiring
 - Verify the device was listed in the Web Configurator ([Section 6.2](#))
- Field COM problems:
 - Visual observations of LEDs on the ProtoNode ([Section 7.4](#))
 - Verify IP Address setting
 - Verify wiring

NOTE: If the problem persists, a Diagnostic Capture needs to be taken and sent to support. ([Section 7.5](#))

7.4 LED Diagnostics for Communications Between ProtoNode and Devices

See the diagram below for ProtoNode LED Locations.



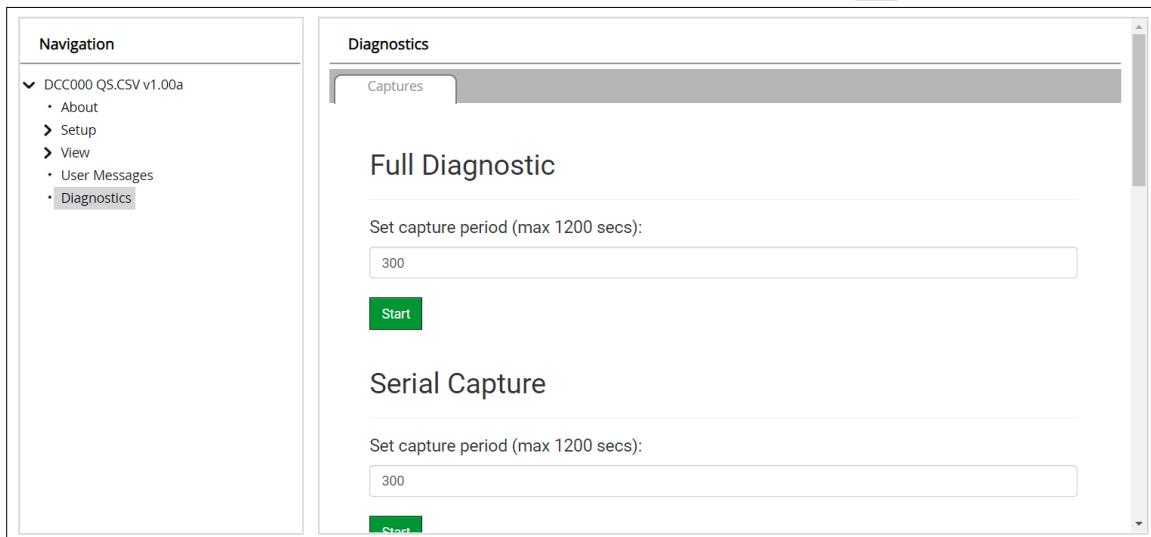
7.5 Taking a FieldServer Diagnostic Capture

When there is a problem on-site that cannot easily be resolved, perform a Diagnostic Capture before contacting support. Once the Diagnostic Capture is complete, email it to technical support. The Diagnostic Capture will accelerate diagnosis of the problem.

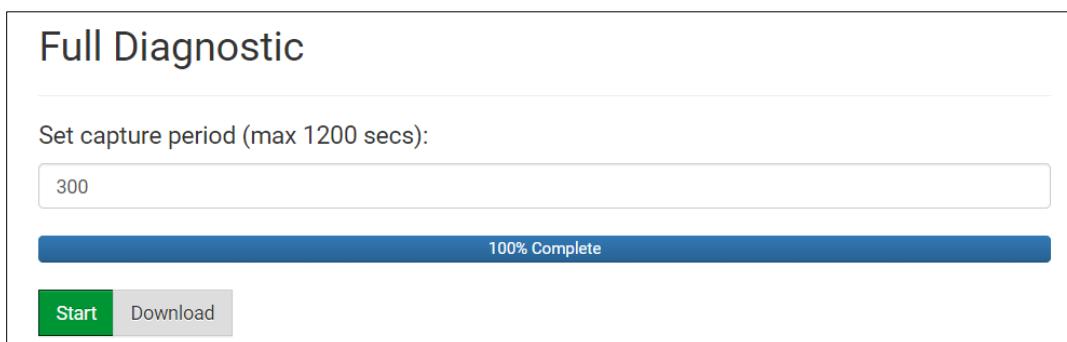
If the FieldServer bios is updated/released on November 2017 or later then the Diagnostic Capture is performed via the gateway's on-board system.

NOTE: The MIB file will be saved when a capture is performed.

- Access the FieldServer Diagnostics page via one of the following methods:
 - Open the FieldServer FS-GUI page and click on Diagnostics in the Navigation panel
 - Open the FieldServer Toolbox software and click the diagnose icon  of the desired device



- Go to Full Diagnostic and select the capture period.
- Click the Start button under the Full Diagnostic heading to start the capture.
 - When the capture period is finished, a Download button will appear next to the Start button



- Click Download for the capture to be downloaded to the local PC.
- Email the diagnostic zip file to technical support.

NOTE: Diagnostic captures of BACnet MS/TP communication are output in a “.PCAP” file extension which is compatible with Wireshark.

7.6 Factory Reset Instructions

For instructions on how to reset a FieldServer back to its factory released state, see [ENOTE - FieldServer Next Gen Recovery](#).

7.7 Internet Browsers Not Supported

The following web browsers are supported:

- Chrome Rev. 57 and higher
- Firefox Rev. 35 and higher
- Microsoft Edge Rev. 41 and higher
- Safari Rev. 3 and higher

NOTE: Internet Explorer is no longer supported as recommended by Microsoft.

NOTE: Computer and network firewalls must be opened for Port 80 to allow FieldServer GUI to function.

8 Additional Information

8.1 Update Firmware

To load a new version of the firmware, follow these instructions:

1. Extract and save the new file onto the local PC.
2. Open a web browser and type the IP Address of the FieldServer in the address bar.
 - o Default IP Address is 192.168.1.24
 - o Use the FS Toolbox utility if the IP Address is unknown ([Section 7.1](#))
3. Click on the “Diagnostics & Debugging” button.
4. In the Navigation Tree on the left hand side, do the following:
 - a. Click on “Setup”
 - b. Click on “File Transfer”
 - c. Click on the “General” tab
5. In the General tab, click on “Choose Files” and select the web.img file extracted in step 1.
6. Click on the orange “Submit” button.
7. When the download is complete, click on the “System Restart” button.

8.2 BACnet: Setting Network_Number for More Than One ProtoNode on the Subnet

For both BACnet MS/TP and BACnet/IP, if more than one ProtoNode is connected to the same subnet, they must be assigned unique Network_Number values.

On the main Web Configuration screen, update the BACnet Network Number field and click submit. The default value is 50.

network_nr	BACnet Network Number This sets the BACnet network number of the Gateway. (1 - 65535)	<input type="text" value="50"/>	<input type="button" value="Submit"/>
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Figure 28: Web Configurator – Network Number Field

8.3 Mounting

The ProtoNode can be mounted using the DIN rail mounting bracket on the back of the unit.



Figure 29: DIN Rail

8.4 Certification

8.4.1 BTL Mark – BACnet® Testing Laboratory



BACnet is a registered trademark of ASHRAE. ASHRAE does not endorse, approve or test products. Its conformance with ASHRAE standards, compliance of listed products to requirements of ASHRAE Standard 135 is the responsibility of the BACnet International. BTL is a registered trademark of the BACnet International.

The BTL Mark on ProtoNode is a symbol that indicates that a product has passed a series of rigorous tests conducted by an independent laboratory which verifies that the product correctly implements the BACnet features claimed in the listing. The mark is a symbol of a high-quality BACnet product.

Go to www.BACnetInternational.net for more information about the BACnet Testing Laboratory. Click [here](#) for the BACnet PIC Statement.

NOTE: BACnet is a registered trademark of ASHRAE.

8.5 Physical Dimension Drawing

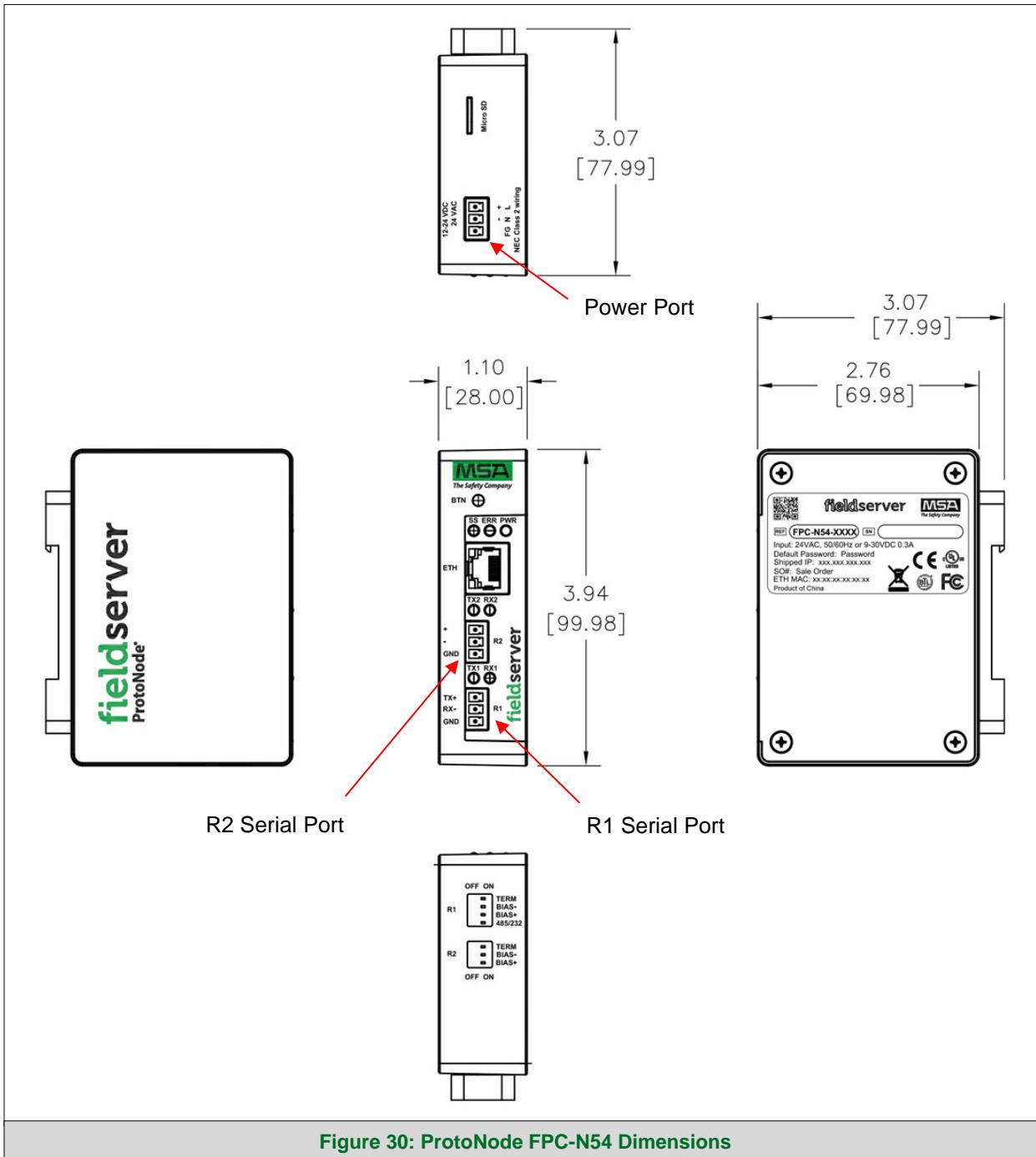


Figure 30: ProtoNode FPC-N54 Dimensions

8.6 Change Web Server Security Settings After Initial Setup

NOTE: Any changes will require a FieldServer reboot to take effect.

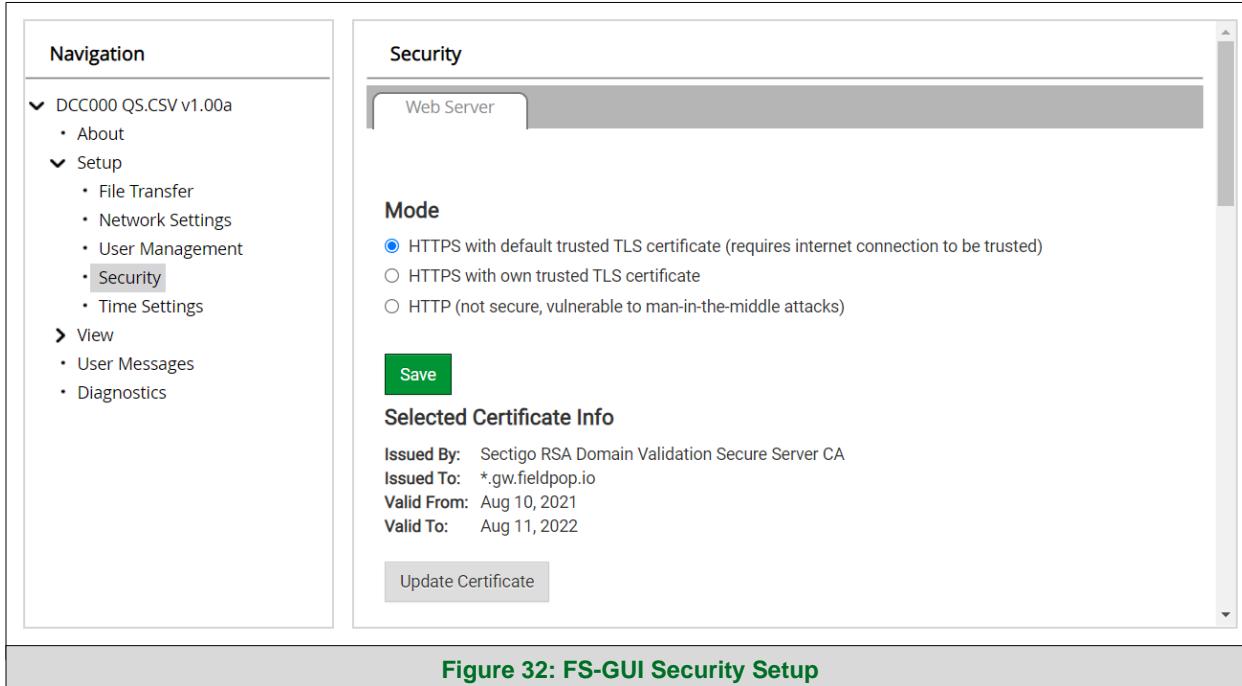
- From the FS-GUI page, click Setup in the Navigation panel.

The screenshot shows the FieldServer Manager interface. At the top right is the 'FieldServer Manager' logo. On the left is a 'Navigation' sidebar with a tree view. Under 'DCC000 QS.CSV v1.00a', the 'Status' node is expanded, showing sub-nodes: About, Setup, View, User Messages, and Diagnostics. Below the sidebar is a main content area titled 'DCC000 QS.CSV v1.00a'. It has tabs for Status, Settings, and Info Stats, with Status selected. A table displays various system parameters with their values. At the bottom of the content area are several green buttons: System Restart, System Reboot, System Time Synch, Reset Cycle Times, and Logout. To the right of these buttons is the 'fieldserver' logo. At the very bottom of the page is a grey footer bar with the text 'Figure 31: FS-GUI Page'.

Name	Value
Driver_Configuration	DCC000
DCC_Version	V6.05p (A)
Kernel_Version	V6.51c (D)
Release_Status	Normal
Build_Revision	6.1.3
Build_Date	2021-09-08 13:12:43 +0200
BIOS_Version	4.8.0
FieldServer_Model	FPC-N54
Serial_Number	1911100008VZL
Carrier Type	-
Data_Points_Used	220
Data_Points_Max	1500
Application Memory:	
Protocol_Engine_Memory_Used	0.68%

8.6.1 Change Security Mode

- Click Security in the Navigation panel.

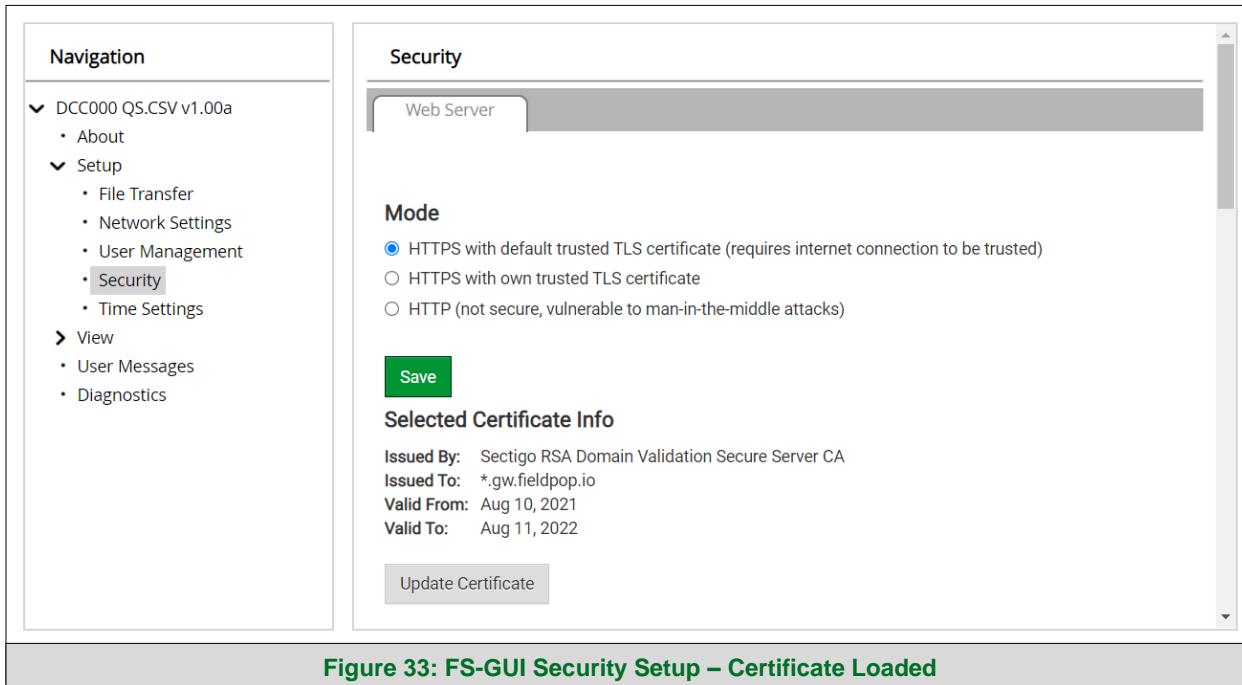


- Click the Mode desired.
 - If HTTPS with own trusted TLS certificate is selected, follow instructions in **Section 5.2.1**
- Click the Save button.

8.6.2 Edit the Certificate Loaded onto the FieldServer

NOTE: A loaded certificate will only be available if the security mode was previously setup as HTTPS with own trusted TLS certificate.

- Click Security in the Navigation panel.



- Click the Edit Certificate button to open the certificate and key fields.
- Edit the loaded certificate or key text as needed.
- Click Save.

8.7 Change User Management Settings

- From the FS-GUI page, click Setup in the Navigation panel.
- Click User Management in the navigation panel.

NOTE: If the passwords are lost, the unit can be reset to factory settings to reinstate the default unique password on the label. For ProtoNode, ProtoCessor or ProtoCarrier recovery instructions, see the [FieldServer Recovery Instructions document](#). For ProtoNode FPC-N54, ProtoNode FPC-N64 or ProtoAir recovery instructions, see the [FieldServer Next Gen Recovery document](#). If the default unique password is lost, then the unit must be mailed back to the factory.

NOTE: Any changes will require a FieldServer reboot to take effect.

- Check that the Users tab is selected.

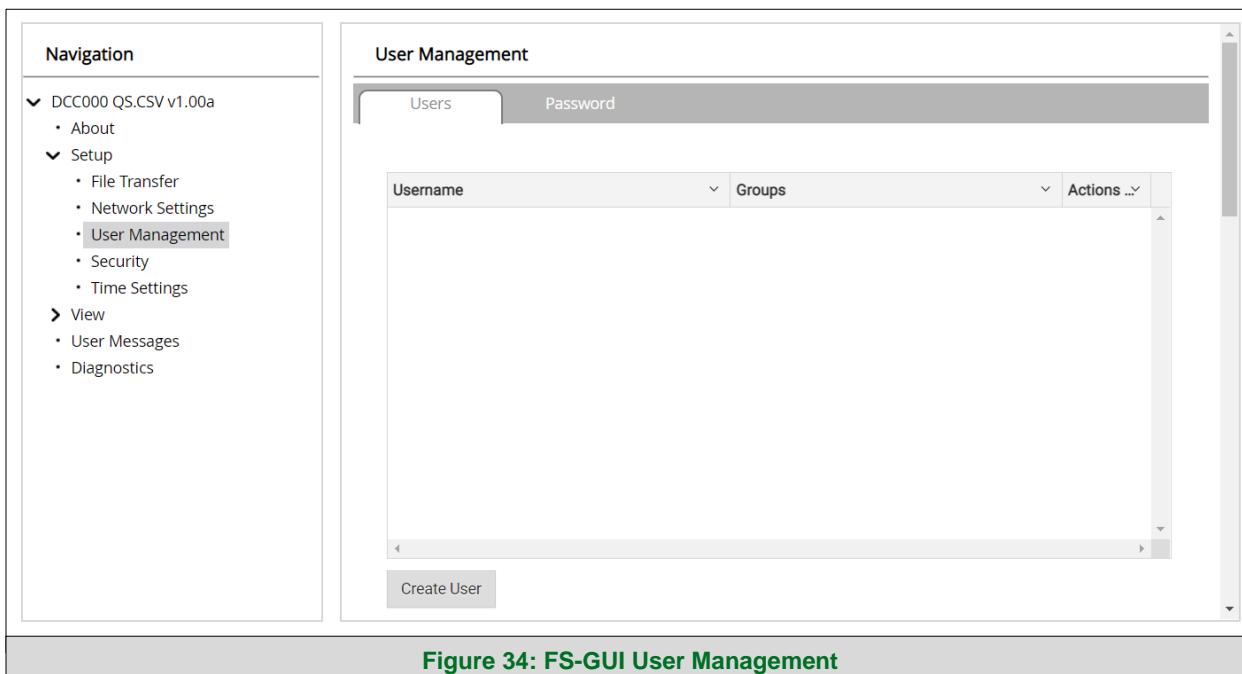


Figure 34: FS-GUI User Management

User Types:

Admin – Can modify and view any settings on the FieldServer.

Operator – Can modify and view any data in the FieldServer array(s).

Viewer – Can only view settings/readings on the FieldServer.

8.7.1 Create Users

- Click the Create User button.

The screenshot shows a modal window titled "Create User". It contains the following fields:

- Username:** A text input field with placeholder text "Enter a unique username".
- Security Groups:** A section with three checkboxes:
 - Admin
 - Operator
 - Viewer
- Password:** A text input field with placeholder text "Enter password". To its right is a red "Weak" status indicator with a warning icon.
- Show Passwords:** A checkbox labeled "Show Passwords".
- Confirm Password:** A text input field with placeholder text "Confirm password".
- Generate Password:** A button labeled "Generate Password".
- Action Buttons:** At the bottom are two buttons: a green "Create" button and a grey "Cancel" button.

Figure 35: Create User Window

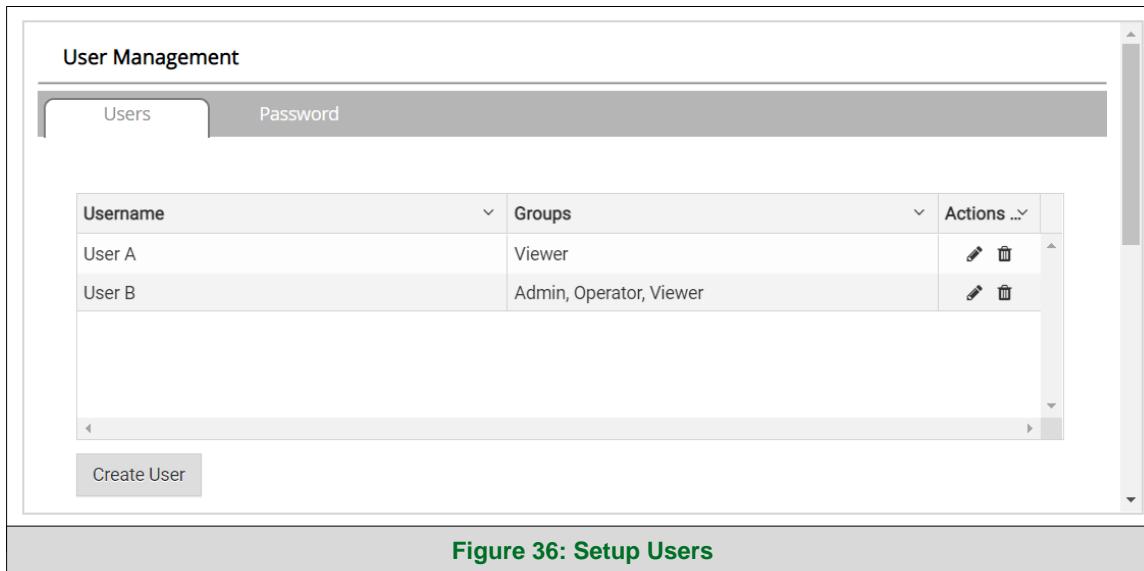
- Enter the new User fields: Name, Security Group and Password.
 - User details are hashed and salted

NOTE: The password must meet the minimum complexity requirements. An algorithm automatically checks the password entered and notes the level of strength on the top right of the Password text field.

- Click the Create button.
- Once the Success message appears, click OK.

8.7.2 Edit Users

- Click the pencil icon next to the desired user to open the User Edit window.



- Once the User Edit window opens, change the User Security Group and Password as needed.

The screenshot shows the 'Edit User' dialog box. It contains the following fields:

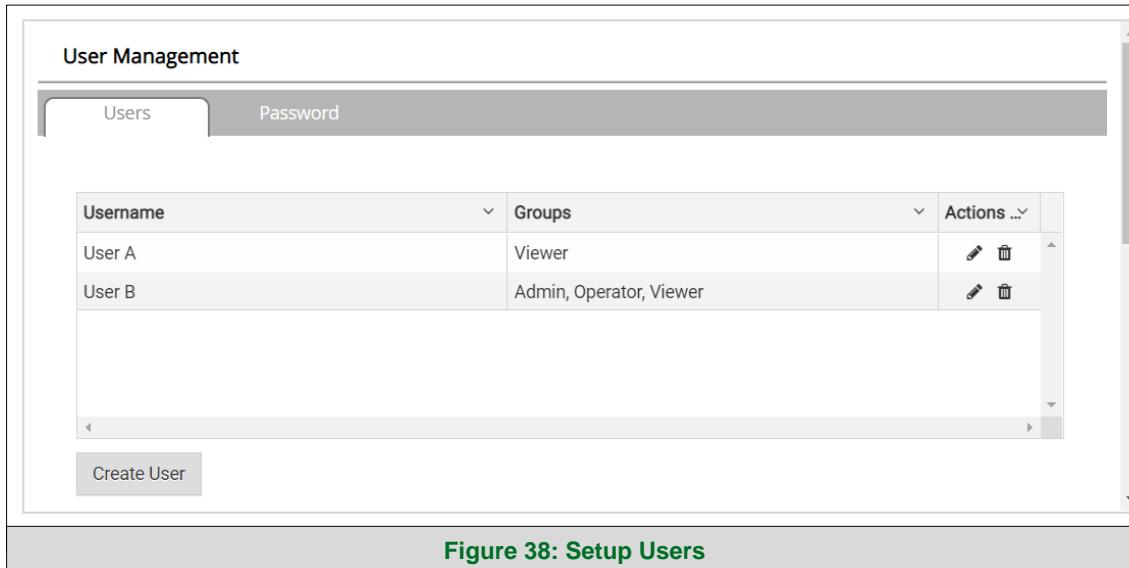
- Username:** User A
- Security Groups:** Admin (unchecked), Operator (unchecked), Viewer (checked)
- Password:** Optional
- Confirm Password:** Optional
- Show passwords:** Unchecked checkbox
- Generate Password:** Button
- Buttons:** 'Confirm' (green) and 'Cancel'

Figure 37: Edit User Window

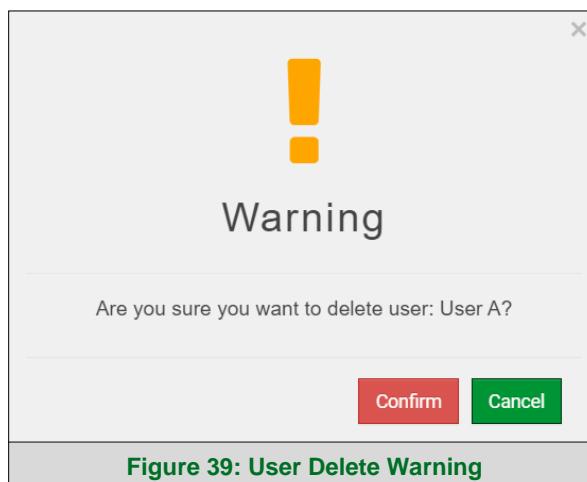
- Click Confirm.
- Once the Success message appears, click OK.

8.7.3 Delete Users

- Click the trash can icon next to the desired user to delete the entry.



- When the warning message appears, click Confirm.



8.7.4 Change FieldServer Password

- Click the Password tab.

The screenshot shows the FieldServer GUI interface. On the left is a navigation sidebar with sections like DCC000 QS.CSV v1.00a, Setup (with sub-options File Transfer, Network Settings, User Management, Security, Time Settings), View (User Messages, Diagnostics), and a general About section. The main area is titled 'User Management' and has tabs for 'Users' and 'Password'. The 'Password' tab is active, showing fields for 'Enter password' (containing 'password123') which is marked as 'Weak' with a red exclamation icon, 'Show passwords' (unchecked), 'Confirm Password' (containing 'password123'), and a 'Generate Password' button. At the bottom right is a large green 'Confirm' button.

Figure 40: FieldServer Password Update via FS-GUI

- Change the general login password for the FieldServer as needed.

NOTE: The password must meet the minimum complexity requirements. An algorithm automatically checks the password entered and notes the level of strength on the top right of the Password text field.

8.8 Routing Settings

The Routing settings make it possible to set up the IP routing rules for the FieldServer's internet and network connections.

- Click the Add Rule button to add a new row and set a new Destination Network, Netmask and Gateway IP Address as needed.
- Set the Priority for each connection (1-255 with 1 as the highest priority and 255 as the lowest).
- Click the Save button to activate the new settings.

The screenshot shows the 'Network Settings' interface with the 'Routing' tab selected. A table lists routing rules:

Interface	Destination Network	Netmask	Gateway IP Address	Priority
ETH	Default	-	10.40.50.1	255
ETH	10.40.50.10	255.255.255.255	10.40.50.1	254

Buttons include '+ Add Rule', 'Cancel', and a green 'Save' button. A message at the bottom says 'There are unsaved settings'.

Figure 41: Routing Settings

9 Vendor Information – Armstrong

NOTE: All Modbus TCP/IP registers are the same as the Modbus RTU registers for the serial device. If this point list is needed, contact technical support. The Modbus TCP/IP node address of the device is also the same as the Modbus RTU node address.

9.1 GFH Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Stack Pressure Switch	BI	1	DI	1
Safety low level sensor	BI	2	DI	2
High limit	BI	3	DI	3
Start_Stop unit	BV	1	DO	1
Signal simulation	BV	2	DO	2
Demand	AI	1	AI	1
Steam output	AI	2	AI	2
Water level	AI	3	AI	3
Run status	AI	4	AI	4
Bed Life	AI	5	AI	5
Run Time	AI	6	AI	6
Idle Time	AI	7	AI	7
Proportional Signal	AI	8	AI	8
Tank temperature	AI	9	AI	9
Failure	AI	10	AI	10
water used	AI	11	AI	11
regulation used	AI	12	AI	12
Aquastat	AV	1	AO	1
Bed Life	AV	2	AO	2
Drain cycle	AV	3	AO	3
Drain duration	AV	4	AO	4
Idle Time (End of Season Time)	AV	5	AO	5
Steam capacity limit	AV	6	AO	6
Signal simulation	AV	7	AO	7

9.2 ELMC Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Steam Production (Contactor)	BI	1	DI	1
High water level sensor	BI	2	DI	2
High limit (terminal block 1 and 2)	BI	3	DI	3
Fill (Inlet Valve)	BI	4	DI	4
Drain (Drain Valve)	BI	5	DI	5
Ventilation Pack (Blower)	BI	6	DI	6
Maintenance	BI	7	DI	7
General fault	BI	8	DI	8
Stop the humidifier	BV	1	DO	1
Demand	AI	1	AI	1
Steam output	AI	2	AI	2
Current	AI	3	AI	3
Run status	AI	4	AI	4
Bed Life	AI	5	AI	5
Run Time	AI	6	AI	6
Idle Time before drain	AI	7	AI	7
Proportional Signal (analog input)	AI	8	AI	8
Temperature tank (Maint hot water)	AI	9	AI	9
Failure	AI	10	AI	10
water used	AI	11	AI	11
regulation used	AI	12	AI	12
Maintenance interval	AV	1	AO	1
Adjust steam by	AV	2	AO	2

Drain duration (Foam scale control)	AV	3	AO	3
Idle Time (End of Season Time)	AV	4	AO	4
Steam capacity limit	AV	5	AO	5

9.3 RTH Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Steam Production (Contactor)	BI	1	DI	1
High limit (terminal block 1 and 2)	BI	2	DI	2
Fill (Inlet Valve)	BI	3	DI	3
Drain (Drain Valve)	BI	4	DI	4
Ventilation Pack (Blower)	BI	5	DI	5
Maintenance	BI	6	DI	6
General fault	BI	7	DI	7
Stop the humidifier	BV	1	DO	1
Run status	AI	1	AI	1
Steam output	AI	2	AI	2
Steam output	AI	3	AI	3
Demand	AI	4	AI	4
Proportional Signal (analog input)	AI	5	AI	5
Temperature tank	AI	6	AI	6
Temperature tank	AI	7	AI	7
Bed Life	AI	8	AI	8
Run Time	AI	9	AI	9
Idle Time before drain	AI	10	AI	10
Maintenance interval	AV	1	AO	1
Idle Time (End of Season Time)	AV	2	AO	2
Steam capacity limit	AV	3	AO	3

9.4 EHU Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Steam Production (Contactor)	BI	1	DI	1
High water level sensor	BI	2	DI	2
High limit (terminal blk 1 and 2)	BI	3	DI	3
Fill (Inlet Valve)	BI	4	DI	4
Drain (Drain Valve)	BI	5	DI	5
Ventilation Pack (Blower)	BI	6	DI	6
Maintenance	BI	7	DI	7
General fault	BI	8	DI	8
Stop the humidifier	BV	1	DO	1
Demand	AI	1	AI	1
Steam Output	AI	2	AI	2
Current	AI	3	AI	3
Run Status	AI	4	AI	4
Bed Life	AI	5	AI	5
Run Time	AI	6	AI	6
Idle Time Before Drain	AI	7	AI	7
Proportional Signal (analog input)	AI	8	AI	8
Temperature Tank	AI	9	AI	9
Failure	AI	10	AI	10
Water Used	AI	11	AI	11
Regulation Used	AI	12	AI	12
Maintenance interval	AV	1	AO	1
Adjust Steam By	AV	2	AO	2
Drain Duration (Foam Scale Control)	AV	3	AO	3
Idle Time (End of Season Time)	AV	4	AO	4
Steam Capacity Limit	AV	5	AO	5
Rh Sensor or Steam Demand	AV	6	AO	6
Rh Setpoint	AV	7	AO	7

9.5 CS-20 Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Fill Valve Status	BI	1	DI	1
Drain Valve Status	BI	2	DI	2
Fan Package Status	BI	3	DI	3
Remote Alarm Status	BI	4	DI	4
On/Off Remote Status	BI	5	DI	5
Low Level Status	BI	6	DI	6
High Level Status	BI	7	DI	7
High Limit Switch Status	BI	8	DI	8
Duct Pressure Switch Status	BI	9	DI	9
E1 Status	BI	10	DI	10
E2 Status	BI	11	DI	11
E3 Status	BI	12	DI	12
E4 Status	BI	13	DI	13
E5 Status	BI	14	DI	14
Stop the Humidifier via the BMS	BV	1	DO	1
EOS Draining Status	BV	2	DO	2
Demand	AI	1	AI	1
Steam Output	AI	2	AI	2
Run Status	AI	3	AI	3
Bed Life	AI	4	AI	4
Run Time Since Service	AI	5	AI	5
Idle Time Before Eos Drain	AI	6	AI	6
Proportional Signal	AI	7	AI	7
Temperature Tank	AI	8	AI	8
E1 Timer	AI	9	AI	9
E2 Timer	AI	10	AI	10
E3 Timer	AI	11	AI	11
E4 Timer	AI	12	AI	12
E5 Timer	AI	13	AI	13
Drain Cycle Time	AI	14	AI	14
RH Sensor Or Steam Demand	AV	1	AO	1
RH Set Point	AV	2	AO	2
Idle Time	AV	3	AO	3
Steam Capacity	AV	4	AO	4
Maintenance Interval	AV	5	AO	5
Aquasta Type	AV	6	AO	6
Aquastat Setpoint	AV	7	AO	7
Control Signal Type	AV	8	AO	8
Drain Timer	AV	9	AO	9
Drain Frequency	AV	10	AO	10
X10 Function	AV	11	AO	11
X01 Function	AV	12	AO	12
Adjustment Ctrl Signal Input	AV	13	AO	13
Adjustment Prop Valve Ctrl	AV	14	AO	14
Adjustment Temperature Sensor	AV	15	AO	15
P Factor Of PID	AV	16	AO	16
I Factor Of PID	AV	17	AO	17
D Factor Of PID	AV	18	AO	18
Unit Type	AV	19	AO	19
Feature Type	AV	20	AO	20
Menu Pointer Value	AV	21	AO	21
Hour RTC	AV	22	AO	22
Min RTC	AV	23	AO	23

9.6 New_GFH Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Fill Valve Status	BI	1	DI	1
Drain Valve Status	BI	2	DI	2

Additional Information

Fan Pack Status	BI	3	DI	3
Remote Alarm Status	BI	4	DI	4
Remote On / Off Status	BI	5	DI	5
Low Level Float Status	BI	6	DI	6
High Level Float Status	BI	7	DI	7
High Limit Status	BI	8	DI	8
Duct Airflow Switch Status	BI	9	DI	9
Flue Pressure Switch Status	BI	10	DI	10
Safety Low Float Status	BI	11	DI	11
Burner Alarm Status	BI	12	DI	12
Burner 1 Heat Demand	BI	13	DI	13
Burner 2 Heat Demand	BI	14	DI	14
Burner 3 Heat Demand	BI	15	DI	15
Burner 4 Heat Demand	BI	16	DI	16
E1 Status	BI	17	DI	17
E2 Status	BI	18	DI	18
E3 Status	BI	19	DI	19
E4 Status	BI	20	DI	20
E5 Status	BI	21	DI	21
E6 Status	BI	22	DI	22
E7 Status	BI	23	DI	23
E8 Status	BI	24	DI	24
E9 Status	BI	25	DI	25
E10 Status	BI	26	DI	26
E11 Status	BI	27	DI	27
E12 Status	BI	28	DI	28
E13 Status	BI	29	DI	29
Rh Sensor Error	BI	30	DI	30
Remote Start / Stop	BV	1	DO	1
EOS Drain Status	BV	2	DO	2
Failed Level Modification	BV	3	DO	3
Disable Test Level at Startup	BV	4	DO	4
Type Unit	AI	1	AI	1
Reg Version	AI	2	AI	2
Demand	AI	3	AI	3
Steam Output Production	AI	4	AI	4
Run Status	AI	5	AI	5
Bed Life	AI	6	AI	6
Run Time since service	AI	7	AI	7
Idle Time before EOS Drain	AI	8	AI	8
Proportional Signal	AI	9	AI	9
Tank Temperature	AI	10	AI	10
Over Heat Temperature	AI	11	AI	11
E1 Timer	AI	12	AI	12
E2 timer	AI	13	AI	13
E3 timer	AI	14	AI	14
E4 /E13 timer	AI	15	AI	15
E5 timer	AI	16	AI	16
E8 timer	AI	17	AI	17
Time to Periodic Drain	AI	18	AI	18
Burner 1 Control Signal	AI	19	AI	19
Burner 2 Control Signal	AI	20	AI	20
Burner 3 Control Signal	AI	21	AI	21
Burner 4 Control Signal	AI	22	AI	22
High limit Control Value	AI	23	AI	23
RH Value or Steam Demand	AV	1	AO	1
RH Set point	AV	2	AO	2
EOS Idle Time	AV	3	AO	3
Steam Capacity	AV	4	AO	4
EOL Timer	AV	5	AO	5
Aquastat Type	AV	6	AO	6
Aquasta Setpoint	AV	7	AO	7
Control Signal Type	AV	8	AO	8
High Limit Signal Type	AV	9	AO	9
Drain Timer	AV	10	AO	10

Drain Frequency	AV	11	AO	11
X10 function	AV	12	AO	12
Control Signal Calibration	AV	13	AO	13
High Limit Signal Calibration	AV	14	AO	14
Aquastat Calibration	AV	15	AO	15
Flue Temperature Calibration	AV	16	AO	16
Burner 1 Calibration	AV	17	AO	17
Burner 2 Calibration	AV	18	AO	18
Burner 3 Calibration	AV	19	AO	19
Burner 4 Calibration	AV	20	AO	20
Proportional Band	AV	21	AO	21
Integral	AV	22	AO	22
Derivative	AV	23	AO	23
GFH Model Type	AV	24	AO	24
GFH Option	AV	25	AO	25
RTC Set Hours	AV	27	AO	27
RTC Set Minutes	AV	28	AO	28
Initial Fill Timeout	AV	29	AO	29
Low Level Timeout	AV	30	AO	30
Refill Timeout	AV	31	AO	31
High Level Timeout	AV	32	AO	32
Complete Drain Timeout	AV	33	AO	33

9.7 H6000 Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Fill Valve Status	BI	1	DI	1
Drain Valve Status	BI	2	DI	2
contactor 1 Status	BI	3	DI	3
contactor 2 Status	BI	4	DI	4
contactor 3 Status	BI	5	DI	5
contactor 4 Status	BI	6	DI	6
Comm Type	BV	1	DO	1
Sensor Select	BV	2	DO	2
High Limit Sensor Select	BV	3	DO	3
Outside Temperature	BV	4	DO	4
Modulating Fill Enable	BV	5	DO	5
Desired RH / Demand	AI	1	AI	1
Steam Output	AI	2	AI	2
Water Level	AI	3	AI	3
Run Status	AI	4	AI	4
Bed Life Hours	AI	5	AI	5
Bed Life Minutes	AI	6	AI	6
Run Time Hours	AI	7	AI	7
Run Time Minutes	AI	8	AI	8
Drain Freq Hours	AI	9	AI	9
Drain Freq Minutes	AI	10	AI	10
Idle Time Hours	AI	11	AI	11
Idle Time Minutes	AI	12	AI	12
RH / Demand (Analog Input)	AI	13	AI	13
Duct Value	AI	14	AI	14
Outside Temperature	AI	15	AI	15
Water Temperature	AI	16	AI	16
Heat Temperature	AI	17	AI	17
Failure	AI	18	AI	18
Contactor Number	AI	19	AI	19
Heating Element Power	AI	20	AI	20
Language Select	AV	1	AO	1
Set RH / Demand	AV	2	AO	2
Duct High Limit Setpoint	AV	3	AO	3
Outside Temp High Setpoint	AV	4	AO	4
Outside Temp Low Setpoint	AV	5	AO	5

Outside RH Low Setpoint	AV	6	AO	6
Run Mode	AV	7	AO	7
AQUASTAT	AV	8	AO	8
Bed Life	AV	9	AO	9
Drain Cycle	AV	10	AO	10
Drain Duration	AV	11	AO	11
Signal Type	AV	12	AO	12
PID_DIV	AV	13	AO	13
PID_PB	AV	14	AO	14
PID_SI	AV	15	AO	15
PID_DG	AV	16	AO	16
Modulating Fill Cycle	AV	17	AO	17
Modulating Fill Duration	AV	18	AO	18
Water Temp Compensate	AV	19	AO	19
Thermocouple Compensate	AV	20	AO	20
First Run	AV	21	AO	21
Idle Time	AV	22	AO	22
Drain Time	AV	23	AO	23
Bed Life	AV	24	AO	24
Bed Drying Time Hours	AV	25	AO	25
Bed Drying Time Minutes	AV	26	AO	26
Capacity Adjustment	AV	27	AO	27
Network Control	AV	28	AO	28
Heater Temp Setpoint	AV	29	AO	29

9.8 H6000_Legacy Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Fill Valve Status	BI	1	DI	1
Drain Valve Status	BI	2	DI	2
Contactor 1 Status	BI	3	DI	3
Contactor 2 Status	BI	4	DI	4
Contactor 3 Status	BI	5	DI	5
Contactor 4 Status	BI	6	DI	6
Network Control	BI	7	DI	7
Comm Type	BV	1	DO	1
Sensor Select	BV	2	DO	2
High Limit Sensor Select	BV	3	DO	3
Outside Temperature	BV	4	DO	4
Network Enable	BV	5	DO	5
Modulating Fill Enable	BV	6	DO	6
Desired RH / Demand	AI	1	AI	1
Steam Output	AI	2	AI	2
Water Level	AI	3	AI	3
Run Status	AI	4	AI	4
Bed Life Hours	AI	5	AI	5
Bed Life Minutes	AI	6	AI	6
Run Time Hours	AI	7	AI	7
Run Time Minutes	AI	8	AI	8
Drain Freq Hours	AI	9	AI	9
Drain Freq Minutes	AI	10	AI	10
Idle Time Hours	AI	11	AI	11
Idle Time Minutes	AI	12	AI	12
RH / Demand (Analog Input)	AI	13	AI	13
Duct Value	AI	14	AI	14
Outside Temperature	AI	15	AI	15
Water Temperature	AI	16	AI	16
Heat Temperature	AI	17	AI	17
Failure	AI	18	AI	18
Contactor Number	AI	19	AI	19
Heating Element Power	AI	20	AI	20
Language Select	AV	1	AO	1

Set RH / Demand	AV	2	AO	2
Duct High Limit Setpoint	AV	3	AO	3
Outside Temp High Setpoint	AV	4	AO	4
Outside Temp Low Setpoint	AV	5	AO	5
Outside RH Low Setpoint	AV	6	AO	6
Run Mode	AV	7	AO	7
AQUASTAT	AV	8	AO	8
Bed Life	AV	9	AO	9
Drain Cycle	AV	10	AO	10
Drain Duration	AV	11	AO	11
Signal Type	AV	12	AO	12
PID_DIV	AV	13	AO	13
PID_PB	AV	14	AO	14
PID_SI	AV	15	AO	15
PID_DG	AV	16	AO	16
Modulating Fill Cycle	AV	17	AO	17
Modulating Fill Duration	AV	18	AO	18
Water Temp Compensate	AV	19	AO	19
Themocouple Compensate	AV	20	AO	20
First Run	AV	21	AO	21
Idle Time	AV	22	AO	22
Drain Time	AV	23	AO	23
Bed Life	AV	24	AO	24
Bed Drying Time Hours	AV	25	AO	25
Bed Drying Time Minutes	AV	26	AO	26

9.9 DRV25 Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Valve Status	AV	25	AO	25
Outlet Temperature	AI	6	AI	6
Valve Error Code	AI	8	AI	8
Hot Inlet Temperature	AI	4	AI	4
Cold Inlet Temperature	AI	5	AI	5
Valve Firmware Type Number	AI	35	AI	35
Valve Firmware Version Number	AI	36	AI	36
Default Setpoint Temperature	AV	3	AO	3
Disinfection Target Temperature	AV	40	AO	40
Disinfection Enable	BV	41	DO	41
Disinfection Timeout	AV	42	AO	42
Arm Disinfection Command	AV	43	AO	43
Trigger Disinfection Command	AV	44	AO	44
Disinfection Cool Down	AV	45	AO	45
Abort Disinfection Command	AV	46	AO	46

9.10 DRV40_80 Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Setpoint Temperature	AV	1	AO	1
Valve Status	AV	2	AO	2
Valve Outlet Temperature	AI	3	AI	3
Valve Remaining Time	AI	4	AI	4
Valve Error Code	AI	5	AI	5
Hot Inlet Temperature	AV	6	AO	6
Cold Inlet Temperature	AV	7	AO	7
Disinfection Confirmation	AI	8	AI	8
Arm Disinfection Command	AV	9	AO	9
Trigger Disinfection Command	AV	10	AO	10
Abort Disinfection Command	AV	11	AO	11
Disinfection Cool Down	AV	12	AO	12

Drv Series Serial Line Address	BV	13	DO	13
Disinfection Enable	BV	14	DO	14
Disinfection Timeout	AV	15	AO	15
High Alert	AV	16	AO	16
Low Alert	AV	17	AO	17
Error Temperature	AV	18	AO	18
Relay Active	BV	19	DO	19
Offset Temperature	AV	20	AO	20
Valves Temperature Units	BV	21	DO	21
Drv Maximum Setpoint	AV	22	AO	22
Drv Minimum Setpoint	AV	23	AO	23
Drv Default Setpoint	AV	24	AO	24
Disinfection Target Temperature	AV	25	AO	25

9.11 Rada_Digital_Faucet Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
SetpointTemperature	AV	1	AO	1
Outlet1Flow	AV	2	AO	2
Outlet2Flow	AV	3	AO	3
ValveStatus	BV	4	DO	4
ValveOutletTemperature	AI	5	AI	5
ValveRemainingTime	AI	6	AI	6
ValveErrorCode	BI	7	DI	7
Outlet1FlowIncrement	AV	8	AO	8
Outlet1DefaultFlow	AV	9	AO	9
Outlet1Timeout	AV	10	AO	10
Outlet1MaxSetpoint	AV	11	AO	11
Outlet1MinSetpoint	AV	12	AO	12
Outlet1DefaultSetpoint	AV	13	AO	13
Outlet2FlowIncrement	AV	14	AO	14
Outlet2DefaultFlow	AV	15	AO	15
Outlet2Timeout	AV	16	AO	16
Outlet2MaxSetpoint	AV	17	AO	17
Outlet2MinSetpoint	AV	18	AO	18
Outlet2DefaultSetpoint	AV	19	AO	19
Outlet1Type	BI	20	DI	20
Outlet1Subtype	BV	21	DO	21
Outlet1ConfigDutyFlush	BV	22	DO	22
Outlet1ConfigDisinfection	BV	23	DO	23
Outlet1ConfigFullCold	BV	24	DO	24
Outlet1ConfigStartCold	BV	25	DO	25
Outlet1ConfigCoarseAdjustment	BV	26	DO	26
Outlet1BlockingTime	AV	27	AO	27
Outlet1ReactivationTime	AV	28	AO	28
Outlet1RunOnTime	AV	29	AO	29
DisinfectionType	BV	30	DO	30
DisinfectionNumberOfDataPoint	AI	31	AI	31
DisinfectionTemperatureBottom	AV	32	AO	32
DisinfectionTemperatureTop	AV	33	AO	33
DisinfectionTimeout	AV	34	AO	34
DisinfectionWarmupTime	AV	35	AO	35
DisinfectionDisinectionTime	AV	36	AO	36
SerialNumber	AV	37	AO	37
ValveFirmwareType	AI	38	AI	38
ValveFirmwareVersion	AI	39	AI	39
ValveConfigId	AI	40	AI	40
ValveConfigVersion	AI	41	AI	41
NumberOfValveOperations	AV	42	AO	42
ValveOnTime	AV	43	AO	43
HoursUnused	AI	44	AI	44
Valveld	AI	45	AI	45

HoursSinceLastDisinfection	AI	46	AI	46
LastDisinfectionStatus	BI	47	DI	47
OutlookDutyFlushType	BV	48	DO	48
OutlookDutyFlushDelayTime	AV	49	AO	49
OutlookDutyFlushDuration	AV	50	AO	50
OutlookDutyFlushSetpoint	AV	51	AO	51
OutlookDutyFlushActTimeAfterMidnight	AV	52	AO	52
OutlookDutyFlushWarmupTime	AV	53	AO	53
ValveOutletsOnTimeCumulative	AI	54	AI	54
OutlookOutlet1DutyFlushStatus	BI	55	DI	55
OutlookOutlet2DutyFlushStatus	BI	56	DI	56
ArmDisinfectionCmd	AV	57	AO	57
TriggerDisinfectionCmd	AV	58	AO	58
AbortDisinfectionCmd	AV	59	AO	59
ResetValveCmd	AV	60	AO	60
DisableUnit	AV	61	AO	61
TriggerBlendDutyFlush	AV	62	AO	62
TriggerColdSupplyFlush	AV	63	AO	63
FlowRate	AV	64	AO	64
DutyFlushFlowRate	AV	65	AO	65
DutyFlushColdPostFlushTime	AV	66	AO	66
ColdFlushType	BV	67	DO	67
ColdFlushActivationTimeAfterMidnight	AV	68	AO	68
ColdFlushIntervalPeriod	AV	69	AO	69
ColdFlushCooldownTemperature	AV	70	AO	70
ColdFlushCooldownTimeout	AV	71	AO	71
ColdFlushMaintainTemperature	AV	72	AO	72
ColdFlushMaintainTemperatureTimeout	AV	73	AO	73
ColdFlushFlowRate	AV	74	AO	74
LastColdFlushCooldownTemperature	AI	75	AI	75
LastColdFlushCooldownTimeout	AI	76	AI	76
LastColdFlushMaintainTemperature	AI	77	AI	77
LastColdFlushMaintainDuration	AI	78	AI	78
LastColdFlushFlowRate	AI	79	AI	79
LastColdFlushStatus	BI	80	DI	80
LastDutyFlushType	BI	81	DI	81
LastDutyFlushDuration	AI	82	AI	82
LastDutyFlushSetpoint	AI	83	AI	83
LastDutyWarmupTime	AI	84	AI	84
LastDutyFlushFlowRate	AV	85	AO	85
LastDisinfectionType	BI	86	DI	86
LastDisinfectionTemperatureBottom	AI	87	AI	87
LastDisinfectionTemperatureTop	AI	88	AI	88
LastDisinfectionTimeout	AI	89	AI	89
LastDisinfectionWarmupTime	AI	90	AI	90
LastDisinfectionTargetTime	AI	91	AI	91
LastDisinfectionFlowRate	AI	92	AI	92
LastDisinfectionDuration	AI	93	AI	93

9.12 BDB-CDB Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
System Configuration	AI	1	AI	1
CH Requests	AV	2	AO	2
CH SP / CH Offset 1	AV	3	AO	3
CH SP / CH Offset 2	AV	4	AO	4
CH SP / CH Offset 3	AV	5	AO	5
CH SP / CH Offset 4	AV	6	AO	6
CH SP / CH Offset 5	AV	7	AO	7
CH SP / CH Offset 6	AV	8	AO	8
CH SP / CH Offset 7	AV	9	AO	9
CH SP / CH Offset 8	AV	10	AO	10

Additional Information

Boiler For Heating Setpoint	AV	11	AO	11
Dhw SP Temp	AV	12	AO	12
Recirculation SP For Cascade Reg	AV	13	AO	13
Idhw SP Temp	AV	14	AO	14
Boiler For Idhw Load Setpoint	AV	15	AO	15
Ispa SP Temp	AV	16	AO	16
Boiler For Pool Load Setpoint	AV	17	AO	17
Ipool SP Temp	AV	18	AO	18
Boiler For Spa Load Setpoint	AV	19	AO	19
Cascade Temp Sensors State	AI	20	AI	20
Cascade S1 Temp Sensor Value	AI	21	AI	21
Cascade S2 Temp Sensor Value	AI	22	AI	22
Cascade S3 Temp Sensor Value	AI	23	AI	23
Cascade S4 Temp Sensor Value	AI	24	AI	24
Cascade S5 Temp Sensor Value	AI	25	AI	25
Cascade S6 Temp Sensor Value	AI	26	AI	26
Cascade Anomaly	AI	27	AI	27
BCB1 Temp Sensors State	AI	28	AI	28
BCB1 T1 Temp Sensor Value	AI	29	AI	29
BCB1 T2 Temp Sensor Value	AI	30	AI	30
BCB1 Working Status	AI	31	AI	31
BCB1 Anom Code 1	AI	32	AI	32
BCB1 Anom Code 2 Prefix	MI	33	ADI	33
BCB1 Anom Code 2 Suffix	MI	34	ADI	34
BCB1 Fan Modulation Relative Per	AI	35	AI	35
BCB1 Fan Modulation Absolute Per	AI	36	AI	36
BCB2 Temp Sensors State	AI	37	AI	37
BCB2 T1 Temp Sensor Value	AI	38	AI	38
BCB2 T2 Temp Sensor Value	AI	39	AI	39
BCB2 Working Status	AI	40	AI	40
BCB2 Anom Code 1	AI	41	AI	41
BCB2 Anom Code 2 Prefix	MI	42	ADI	42
BCB2 Anom Code 2 Suffix	MI	43	ADI	43
BCB2 Fan Modulation Relative Per	AI	44	AI	44
BCB2 Fan Modulation Absolute Per	AI	45	AI	45
BCB3 Temp Sensors State	AI	46	AI	46
BCB3 T1 Temp Sensor Value	AI	47	AI	47
BCB3 T2 Temp Sensor Value	AI	48	AI	48
BCB3 Working Status	AI	49	AI	49
BCB3 Anom Code 1	AI	50	AI	50
BCB3 Anom Code 2 Prefix	MI	51	ADI	51
BCB3 Anom Code 2 Suffix	MI	52	ADI	52
BCB3 Fan Modulation Relative Per	AI	53	AI	53
BCB3 Fan Modulation Absolute Per	AI	54	AI	54
BCB4 Temp Sensors State	AI	55	AI	55
BCB4 T1 Temp Sensor Value	AI	56	AI	56
BCB4 T2 Temp Sensor Value	AI	57	AI	57
BCB4 Working Status	AI	58	AI	58
BCB4 Anom Code 1	AI	59	AI	59
BCB4 Anom Code 2 Prefix	MI	60	ADI	60
BCB4 Anom Code 2 Suffix	MI	61	ADI	61
BCB4 Fan Modulation Relative Per	AI	62	AI	62
BCB4 Fan Modulation Absolute Per	AI	63	AI	63
BCB5 Temp Sensors State	AI	64	AI	64
BCB5 T1 Temp Sensor Value	AI	65	AI	65
BCB5 T2 Temp Sensor Value	AI	66	AI	66
BCB5 Working Status	AI	67	AI	67
BCB5 Anom Code 1	AI	68	AI	68
BCB5 Anom Code 2 Prefix	MI	69	ADI	69
BCB5 Anom Code 2 Suffix	MI	70	ADI	70
BCB5 Fan Modulation Relative Per	AI	71	AI	71
BCB5 Fan Modulation Absolute Per	AI	72	AI	72
BCB6 Temp Sensors State	AI	73	AI	73
BCB6 T1 Temp Sensor Value	AI	74	AI	74
BCB6 T2 Temp Sensor Value	AI	75	AI	75

Additional Information

BCB6 Working Status	AI	76	AI	76
BCB6 Anom Code 1	AI	77	AI	77
BCB6 Anom Code 2 Prefix	MI	78	ADI	78
BCB6 Anom Code 2 Suffix	MI	79	ADI	79
BCB6 Fan Modulation Relative Per	AI	80	AI	80
BCB6 Fan Modulation Absolute Per	AI	81	AI	81
BCB7 Temp Sensors State	AI	82	AI	82
BCB7 T1 Temp Sensor Value	AI	83	AI	83
BCB7 T2 Temp Sensor Value	AI	84	AI	84
BCB7 Working Status	AI	85	AI	85
BCB7 Anom Code 1	AI	86	AI	86
BCB7 Anom Code 2 Prefix	MI	87	ADI	87
BCB7 Anom Code 2 Suffix	MI	88	ADI	88
BCB7 Fan Modulation Relative Per	AI	89	AI	89
BCB7 Fan Modulation Absolute Per	AI	90	AI	90
BCB8 Temp Sensors State	AI	91	AI	91
BCB8 T1 Temp Sensor Value	AI	92	AI	92
BCB8 T2 Temp Sensor Value	AI	93	AI	93
BCB8 Working Status	AI	94	AI	94
BCB8 Anom Code 1	AI	95	AI	95
BCB8 Anom Code 2 Prefix	MI	96	ADI	96
BCB8 Anom Code 2 Suffix	MI	97	ADI	97
BCB8 Fan Modulation Relative Per	AI	98	AI	98
BCB8 Fan Modulation Absolute Per	AI	99	AI	99

10 Specifications



ProtoNode FPC-N54 ²	
Electrical Connections	One 3-pin Phoenix connector with: RS-485/RS-232 (Tx+ / Rx- / gnd) One 3-pin Phoenix connector with: RS-485 (Tx+ / Rx- / gnd) One 3-pin Phoenix connector with: Power port (+ / - / Frame-gnd) One Ethernet 10/100 BaseT port
Power Requirements	<i>Input Voltage:</i> 9-30VDC or 24VAC <i>Current draw:</i> 24VAC 0.125A <i>Max Power:</i> 3 Watts 9-30VDC .25A @12VDC
Approvals	CE and FCC class B & C part 15, UL 60950-1, WEEE compliant, IC Canada, RoHS3 compliant, DNP 3.0 conformance tested, REACH compliant, UKCA compliant
Physical Dimensions	4 x 1.1 x 2.7 in (10.16 x 2.8 x 6.8 cm)
Weight	0.4 lbs (0.2 Kg)
Operating Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	10-95% RH non-condensing
Figure 42: Specifications	

10.1.1 Compliance with UL Regulations

For UL compliance, the following instructions must be met when operating the ProtoNode.

- The units shall be powered by listed LPS or Class 2 power supply suited to the expected operating temperature range.
- The interconnecting power connector and power cable shall:
 - Comply with local electrical code
 - Be suited to the expected operating temperature range
 - Meet the current and voltage rating for the ProtoNode
- Furthermore, the interconnecting power cable shall:
 - Be of length not exceeding 3.05m (118.3")
 - Be constructed of materials rated VW-1, FT-1 or better
- If the unit is to be installed in an operating environment with a temperature above 65 °C, it should be installed in a Restricted Access Area requiring a key or a special tool to gain access.
- This device must not be connected to a LAN segment with outdoor wiring.

² Specifications subject to change without notice.

11 Limited 2 Year Warranty

MSA Safety warrants its products to be free from defects in workmanship or material under normal use and service for two years after date of shipment. MSA Safety will repair or replace any equipment found to be defective during the warranty period. Final determination of the nature and responsibility for defective or damaged equipment will be made by MSA Safety personnel.

All warranties hereunder are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without MSA Safety's approval or which have been subjected to accident, improper maintenance, installation or application; or on which original identification marks have been removed or altered. This Limited Warranty also will not apply to interconnecting cables or wires, consumables or to any damage resulting from battery leakage.

In all cases MSA Safety's responsibility and liability under this warranty shall be limited to the cost of the equipment. The purchaser must obtain shipping instructions for the prepaid return of any item under this warranty provision and compliance with such instruction shall be a condition of this warranty.

Except for the express warranty stated above, MSA Safety disclaims all warranties with regard to the products sold hereunder including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of MSA Safety for damages including, but not limited to, consequential damages arising out of or in connection with the use or performance of the product.