



**MESTEK, INC.**



Start-up Guide

**ProtoNode FPC-N54**

**For Interfacing Mestek Products**



Document Revision: 1.A  
Auto-Discovery

## Technical Support

Thank you for purchasing the ProtoNode for Mestek.

Please call Mestek for technical support of the ProtoNode product.

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

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Westfield, MA 01085

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Website: [mestek.com](http://mestek.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. **If connecting to a serial device:**  
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 protocol of the device attached to the ProtoNode and enter any necessary device information. Click the Discovery Mode button at the bottom of the screen. It may take about 3 minutes for all the devices to be discovered and the configuration file to be built. (**Section 6**)
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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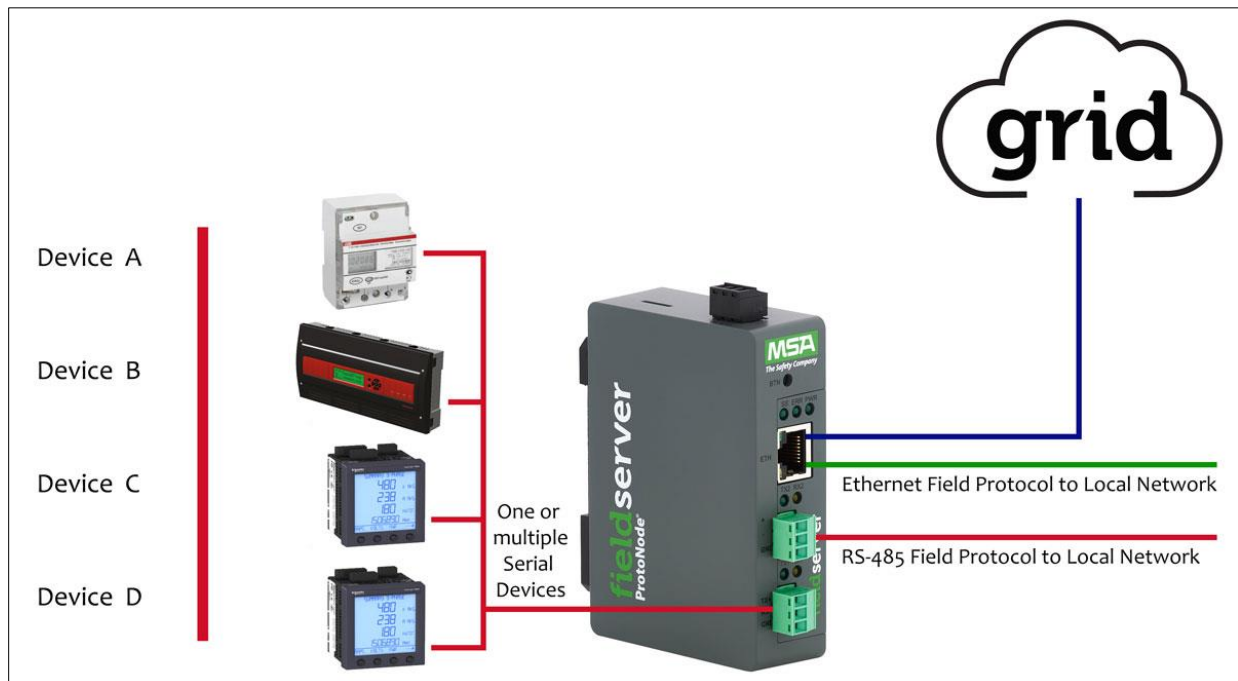
## 1 Introduction

### 1.1 ProtoNode Gateway

The ProtoNode is an external, high performance **building automation multi-protocol gateway** that is preconfigured to automatically communicate between Mestek's devices (hereafter simply called "device") connected to the ProtoNode and automatically configures them for BACnet/IP, BACnet MS/TP, Modbus TCP/IP and Metasys<sup>®1</sup> 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](#).

<sup>1</sup> 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-N54-1778
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-N54-1778	1,500
Figure 2: Supported Point Count Capacity	

Devices	Point Count Per Device
Mngr	41
Dep	25
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.
- **Figure 4** 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	2

**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**)

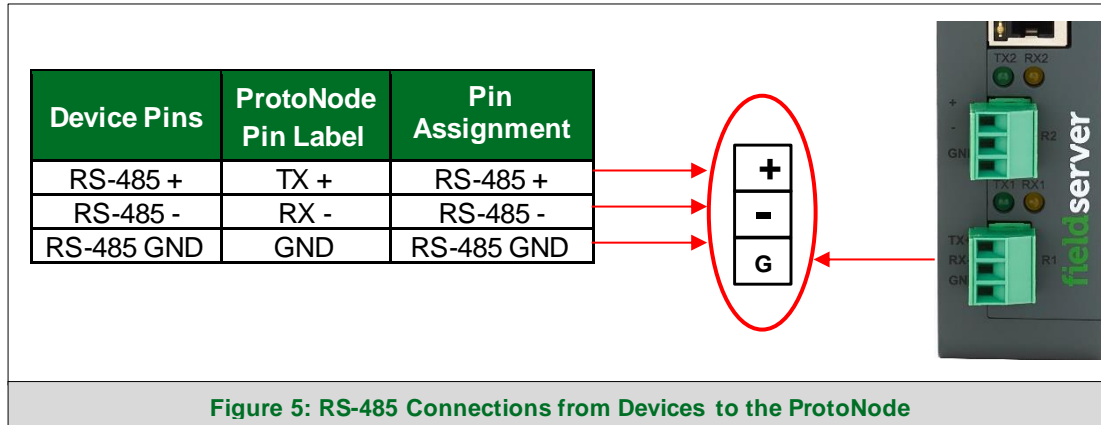
**NOTE:** The Metasys N2 and Modbus TCP/IP field protocol Node-ID is automatically set to be the same value as the Node-ID of the device.

## 3 Interfacing ProtoNode to Devices

### 3.1 Device Connections to ProtoNode

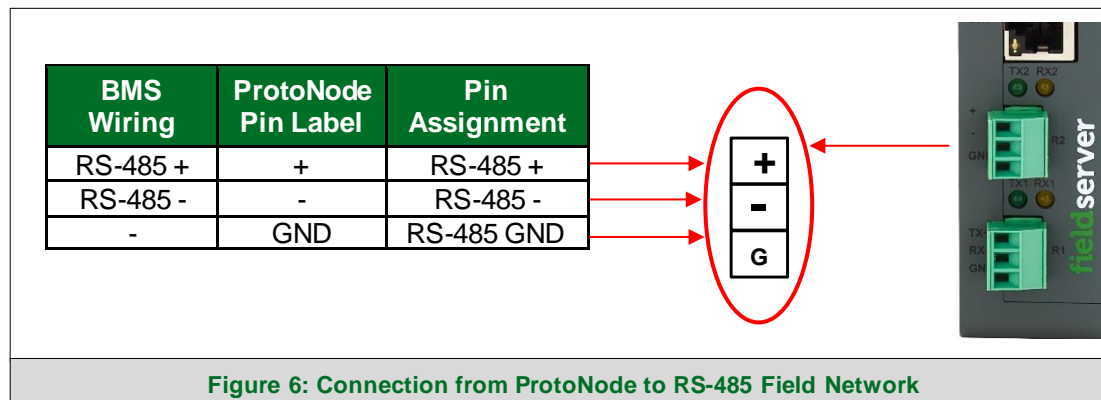
The ProtoNode has a 3-pin Phoenix connector for connecting RS-485 devices on the R1 port.

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

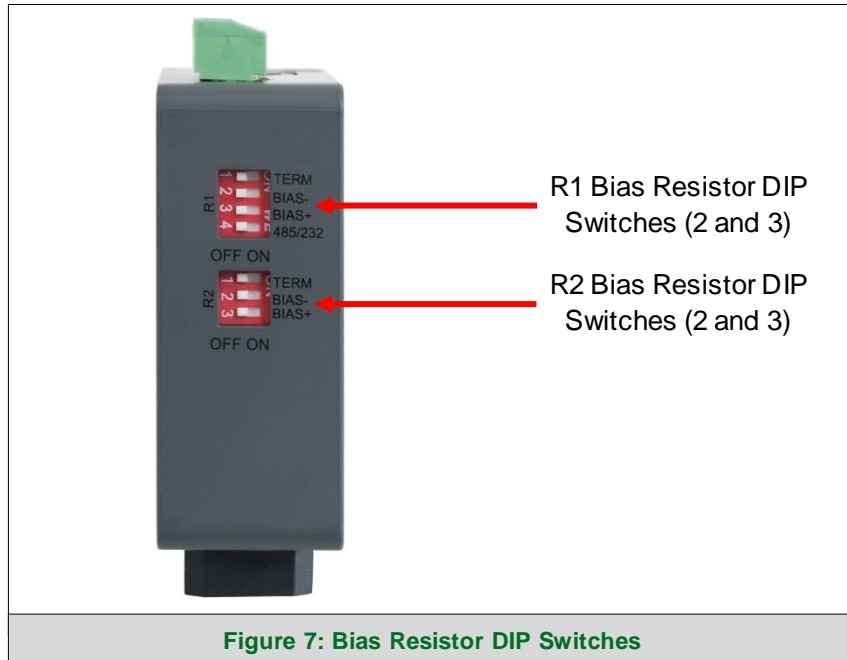


### 3.2 Wiring Field Port to RS-485 Serial Network

- 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.

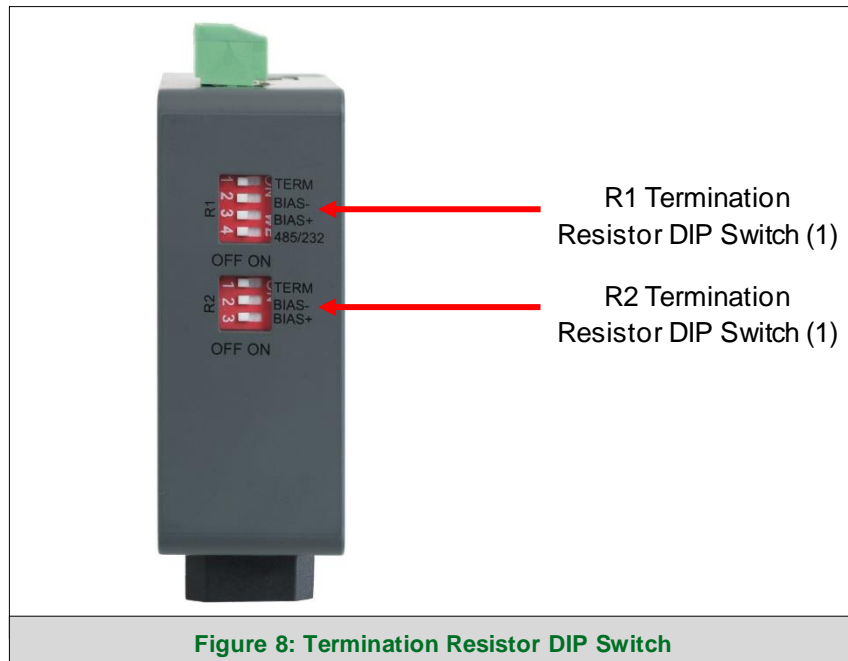
The bias resistor is 510 ohms which is in line with the BACnet spec. It should only be enabled at one point on the bus (for example, on the field port where there are very weak bias resistors of 100k). Since there are no jumpers, many gateways can be put on the network without running into the bias resistor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

**NOTE:** See [www.ni.com/support/serial/resinfo.htm](http://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.**

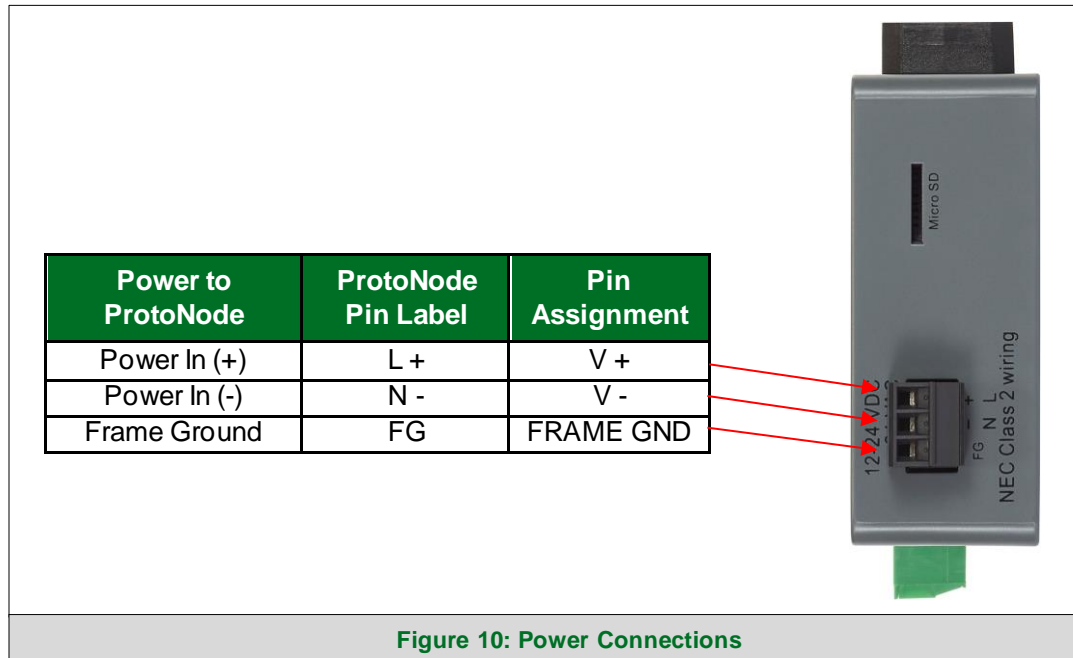
## 3.5 Power-Up ProtoNode

Check power requirements in the table below:

Power Requirement for ProtoNode External Gateway		
ProtoNode Family	Current Draw Type	
	12VDC	24VDC/AC
FPC – N54 (Typical)	250mA	125mA
<b>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.</b>		
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**.

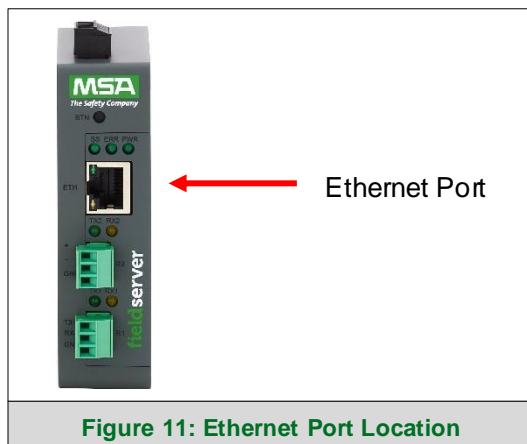
- The ProtoNode accepts 9-30VDC or 24VAC on pins L+ and N-.
- Frame GND should be connected.



#### 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

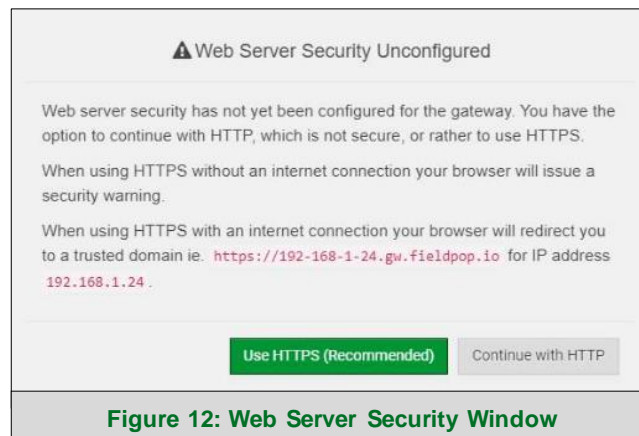
Navigate to the IP Address of the ProtoNode on the local PC by opening a web browser and entering the IP Address of the ProtoNode; the default Ethernet address is 192.168.1.24.

**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.**

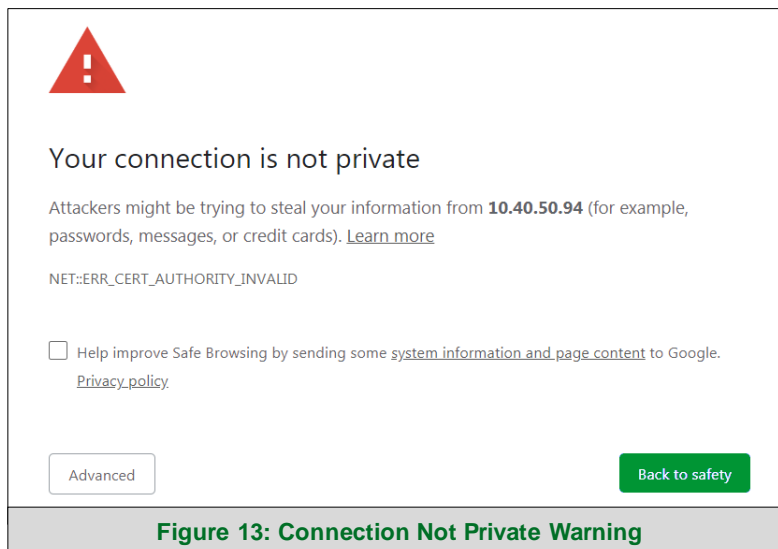
### 5.1 Login to the FieldServer

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.

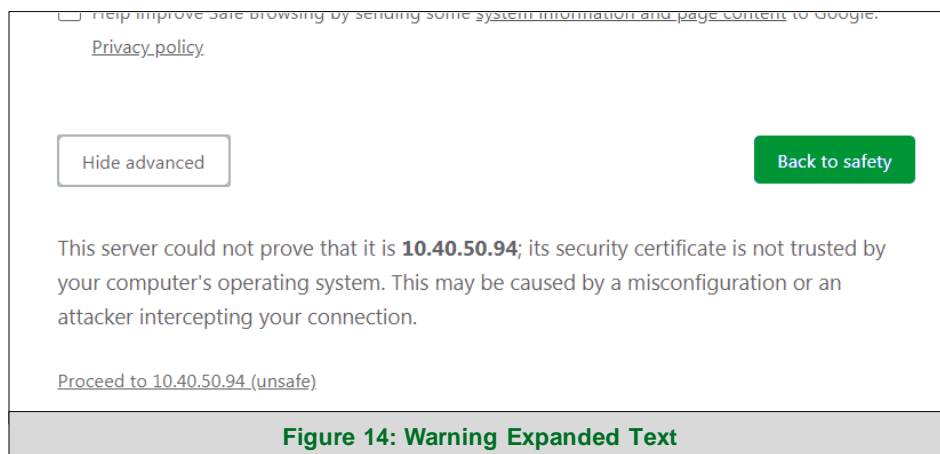


- When the warning that "Your connection is not private" appears, click the advanced button on the bottom left corner of the screen.



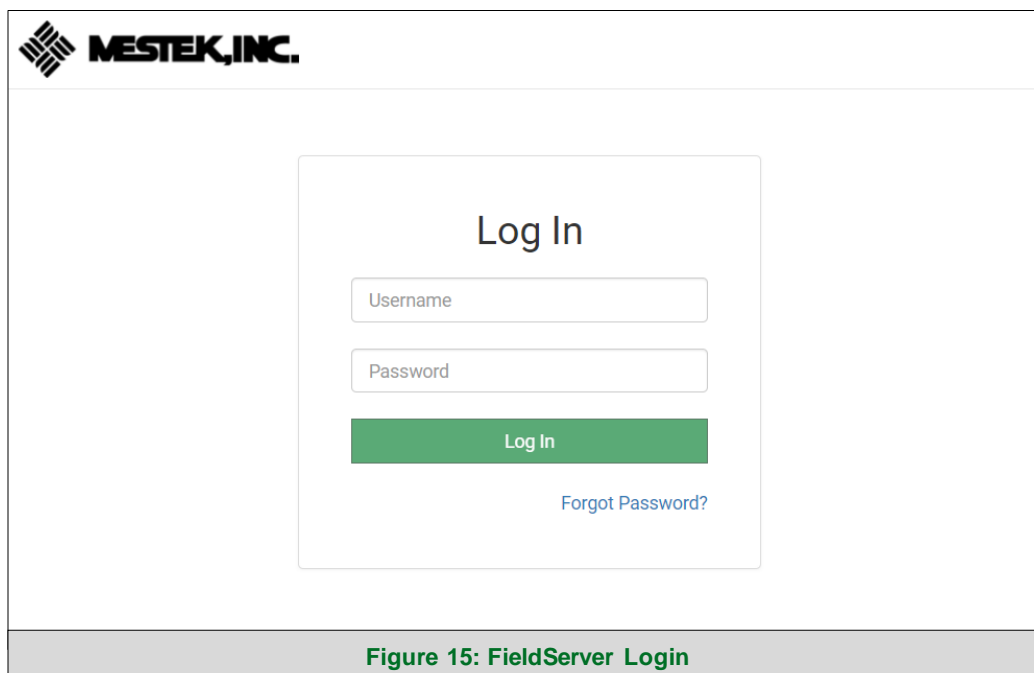
## Setup Web Server Security

- 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.



## 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.

## 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.

Certificate

XzyMbQZFIRuJZJPe7CTHLcHOrHLowoUFoVTaBMYd4d6VGdNklKazByWKcNOL7mrX  
A4lBAQBfM+IPyOx3T/47VEmaiXqE3bx3zEuBFJ6pWPlw7LHf2r2ZoHw+9xb+aNMU  
dVyAelhBMTMsnI2ERvQVp0xj3psSv2EJyKXS1bOYNRLsq7UzpwuAdT/Wy3o6vUM5  
K+Cwf9qEoQ0LxuDZTIECt67MkcHMiuFi5pk7TRicHnQF/sfOAYOulduHOy9exlk9  
FmHFVDIZt/cJUaF+e74EuSph+gEr0lQo2wmmhyc7L22UXse1NoOfU2Zg0Eu1VVtu  
JRryaMWIRFEWuuZMGZtKFWVC+8q2JQsVcqiRWM7naoblEhOCMH+sKHJMCxDoXGt  
vtZjpZUoAL51YXxWSVcyZdGiAP5e  
-----END CERTIFICATE-----

Private Key

sHB0zZoHr4YQSDK2BbYVzzbl0LDuKtc8+JiO3ooGjoTuHngkeAj/fKfbTAsKeAzw  
gKQe+H5UQNK0bdvZfOJrm6daDK2VDmR5k+JiUUhEj5N49uplroB97MQgYotzgfT+  
THlbpq5t1SIK617k04ObKmHF5l8fck+ru545sVmpeeZh0m5j5SURYAZMvbq5daCu  
J4l5NlihbEvxRF4UK41ZDMCvujopCpBKUWrb1a/3XXnDnM2K9xyz2wze998D6Wk46  
+7aOFY9F+7j5ljmnkoS3GYtwCyH5jP+mPP1K6RnuiD019wvGPb4dtN/RTnfd0eF  
GYeVskl9fxxkxDOftfdWRZbM/rPjn4tmO1Xf8HqONVN1x/iaMynOXG4cukoI4+VO  
u0rZaUEsII2zNkfrn7fAASm5NBWg202Cy9IAYnuujs3aALi5uGBEEKa62oTMxlzx  
-----END RSA PRIVATE KEY-----

Private Key Passphrase

Specify if encrypted

Save

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.

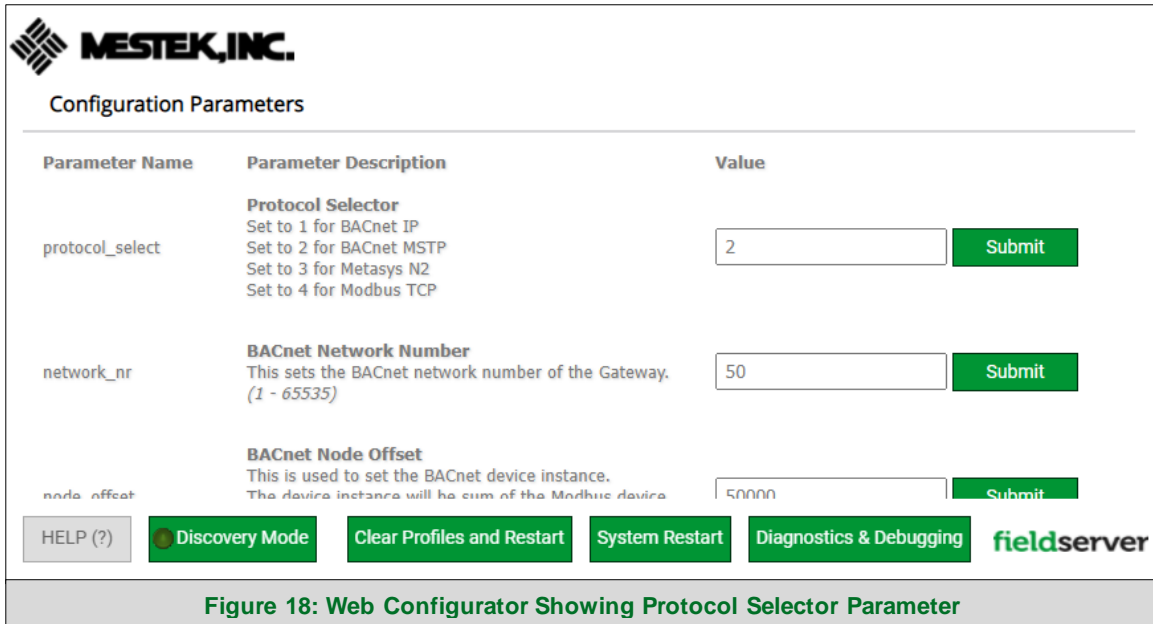
## 5.2.2 HTTPS with Default Untrusted Self-Signed TLS Certificate or HTTP with Built-in Payload Encryption

- 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.



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Configuration Parameters

Parameter Name	Parameter Description	Value
protocol_select	<b>Protocol Selector</b> Set to 1 for BACnet IP Set to 2 for BACnet MSTP Set to 3 for Metasys N2 Set to 4 for Modbus TCP	2 <input type="button" value="Submit"/>
network_nr	<b>BACnet Network Number</b> This sets the BACnet network number of the Gateway. (1 - 65535)	50 <input type="button" value="Submit"/>
node_offset	<b>BACnet Node Offset</b> This is used to set the BACnet device instance. The device instance will be sum of the Modbus device	50000 <input type="button" value="Submit"/>

**fieldserver**

**Figure 18: Web Configurator Showing Protocol Selector Parameter**

- 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.**

- 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.**

## 6.2 Use Discovery Mode

- Click the Discovery Mode button at the bottom of the screen.

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Configuration Parameters

Parameter Name	Parameter Description	Value
protocol_select	<b>Protocol Selector</b> Set to 1 for BACnet IP Set to 2 for BACnet MSTP Set to 3 for Metasys N2 Set to 4 for Modbus TCP	2 <input type="button" value="Submit"/>
network_nr	<b>BACnet Network Number</b> This sets the BACnet network number of the Gateway. (1 - 65535)	50 <input type="button" value="Submit"/>
node_offset	<b>BACnet Node Offset</b> This is used to set the BACnet device instance. The device instance will be sum of the Modbus device	50000 <input type="button" value="Submit"/>

**fieldserver**

**Figure 19: Web Configurator Showing Discovery Mode Button**

- Click the OK button in the window that appears to discover devices and restart the device.
- Wait for the ProtoNode to restart and the Discovery in Progress window to disappear.

**NOTE:** It may take about 3 minutes for all the devices to be discovered and the configuration file to be built.

- If the discovery is successful, the device profile should appear under the Active profiles title.

**Active profiles**

Nr	Node ID	Current profile	Parameters
1	1	BAC_MSTP_Dep	<input type="button" value="Remove"/>
2	22	BAC_MSTP_Mngr	<input type="button" value="Remove"/>
3	33	BAC_MSTP_Dep	<input type="button" value="Remove"/>

**fieldserver**

**Figure 20: Web Configurator Showing Discovered Profiles**


**NOTE:** Scroll down the page if the Active profiles header is not visible.

## 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**).

## 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
protocol_select	<b>Protocol Selector</b> 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="2"/> <input type="button" value="Submit"/>
network_nr	<b>BACnet Network Number</b> This sets the BACnet network number of the Gateway. <i>(1 - 65535)</i>	<input type="text" value="50"/> <input type="button" value="Submit"/>
node_offset	<b>BACnet Node Offset</b> This is used to set the BACnet device instance. The device instance will be sum of the Modbus device address and the node offset. <i>(0 - 4194303)</i>	<input type="text" value="50000"/> <input type="button" value="Submit"/>
bac_mac_addr	<b>BACnet MSTP Mac Address</b> This sets the BACnet MSTP MAC address. <i>(1 - 127)</i>	<input type="text" value="127"/> <input type="button" value="Submit"/>
bac_baud_rate	<b>BACnet MSTP Baud Rate</b> This sets the BACnet MSTP baud rate. <i>(9600/19200/38400/76800)</i>	<input type="text" value="38400"/> <input type="button" value="Submit"/>
bac_max_master	<b>BACnet MSTP Max Master</b> This sets the BACnet MSTP max master. <i>(1 - 127)</i>	<input type="text" value="127"/> <input type="button" value="Submit"/>
bac_cov_option	<b>BACnet COV</b> This enables or disables COVs for the BACnet connection. Use COV_Enable to enable. Use COV_Disable to disable. <i>(COV_Enable/COV_Disable)</i>	<input type="text" value="COV_Disable"/> <input type="button" value="Submit"/>
bac_virt_nodes	<b>BACnet Virtual Server Nodes</b> Set to NO if the unit is only converting 1 device to BACnet. Set to YES if the unit is converting multiple devices. <i>(No/Yes)</i>	<input type="text" value="No"/> <input type="button" value="Submit"/>

### Active profiles

Nr	Node ID	Current profile	Parameters
<input type="button" value="Add"/>			



**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)

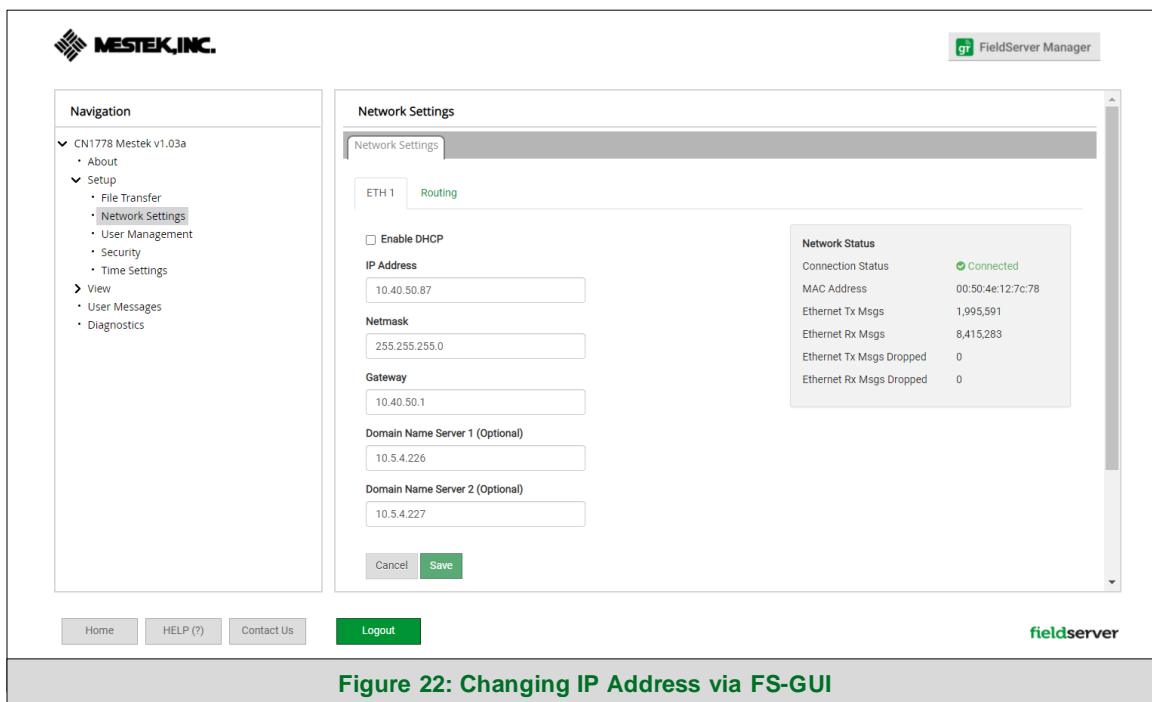


Figure 22: Changing IP Address via FS-GUI

- 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  FieldServer Manager (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:

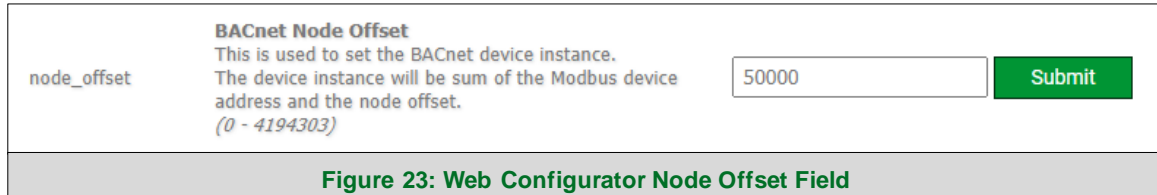
$$50,001 = \text{Node\_Offset} + 1$$

$$\Rightarrow 50,000 = \text{Node\_Offset}$$

Once the Node\_Offset value is input, it will be applied as shown below:

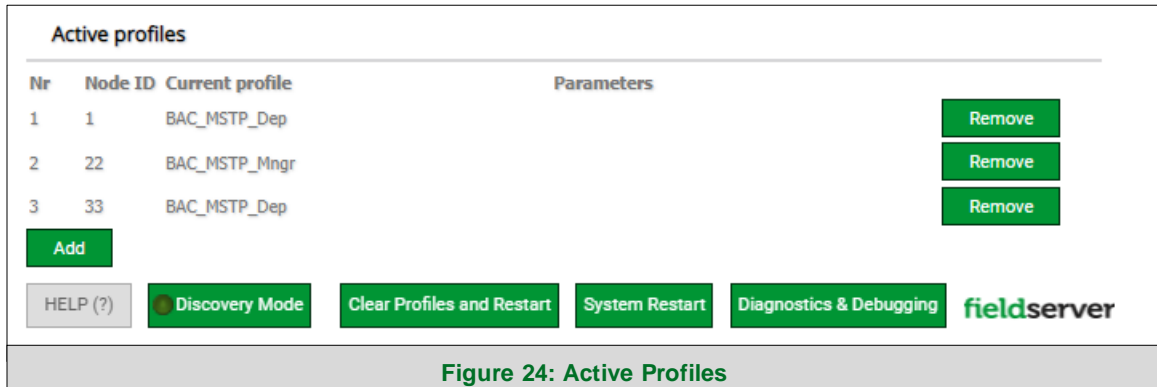
- Device 1 Instance = 50,000 + Node\_ID = 50,000 + 1 = 50,001
- Device 2 Instance = 50,000 + Node\_ID = 50,000 + 22 = 50,022
- Device 3 Instance = 50,000 + Node\_ID = 50,000 + 33 = 50,033

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



The screenshot shows a web form for configuring the BACnet Node Offset. It includes a label 'node\_offset', a title 'BACnet Node Offset', a description '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)', a text input field containing '50000', and a green 'Submit' button.

Figure 23: Web Configurator Node Offset Field



The screenshot shows the 'Active profiles' section of the web configurator. It contains a table with columns 'Nr', 'Node ID', and 'Current profile'. There are three active profiles listed. Each profile has a green 'Remove' button to its right. Below the table is a green 'Add' button. At the bottom, there is a row of buttons: 'HELP (?)', 'Discovery Mode', 'Clear Profiles and Restart', 'System Restart', 'Diagnostics & Debugging', and the 'fieldserver' logo.

Nr	Node ID	Current profile	Parameters
1	1	BAC_MSTP_Dep	
2	22	BAC_MSTP_Mngr	
3	33	BAC_MSTP_Dep	

Figure 24: Active Profiles

### 6.6 How to Start the Installation Over: Clearing Profiles

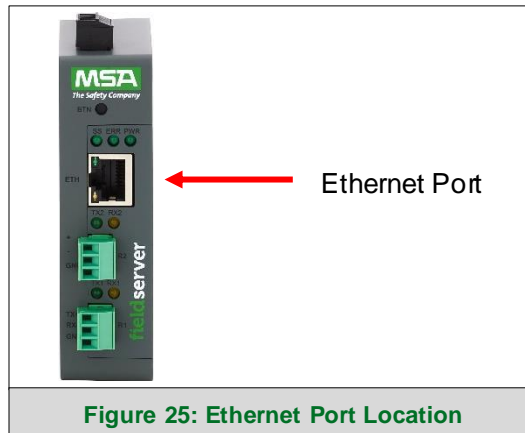
- Follow the steps outlined in **Section 5.1** to access the ProtoNode Web Configurator.
- At the bottom-left of the page, click the “Clear Profiles and Restart” button.
- Once restart is complete, all past profiles discovered and/or added via Web configurator are deleted. The unit can now be reinstalled.



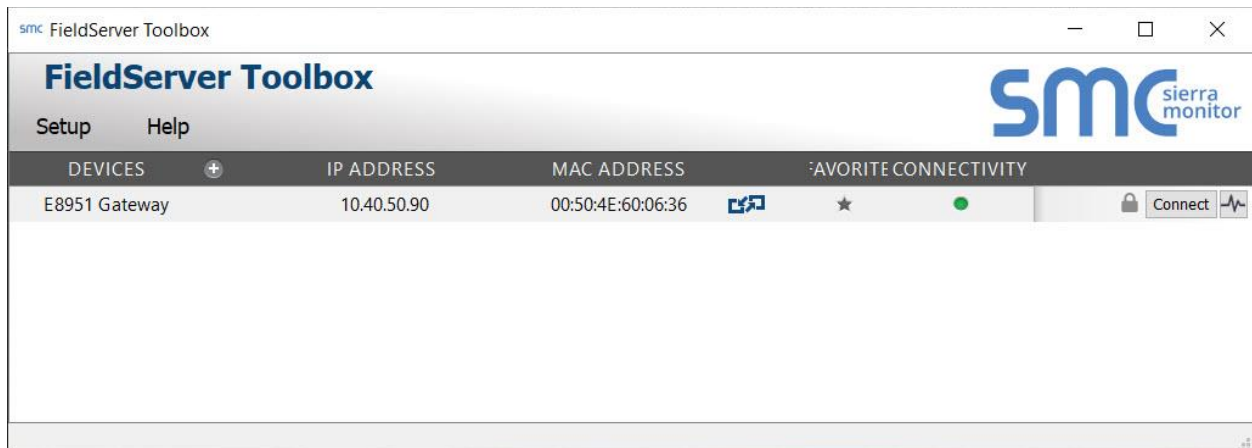
## 7 Troubleshooting

### 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.



- 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.

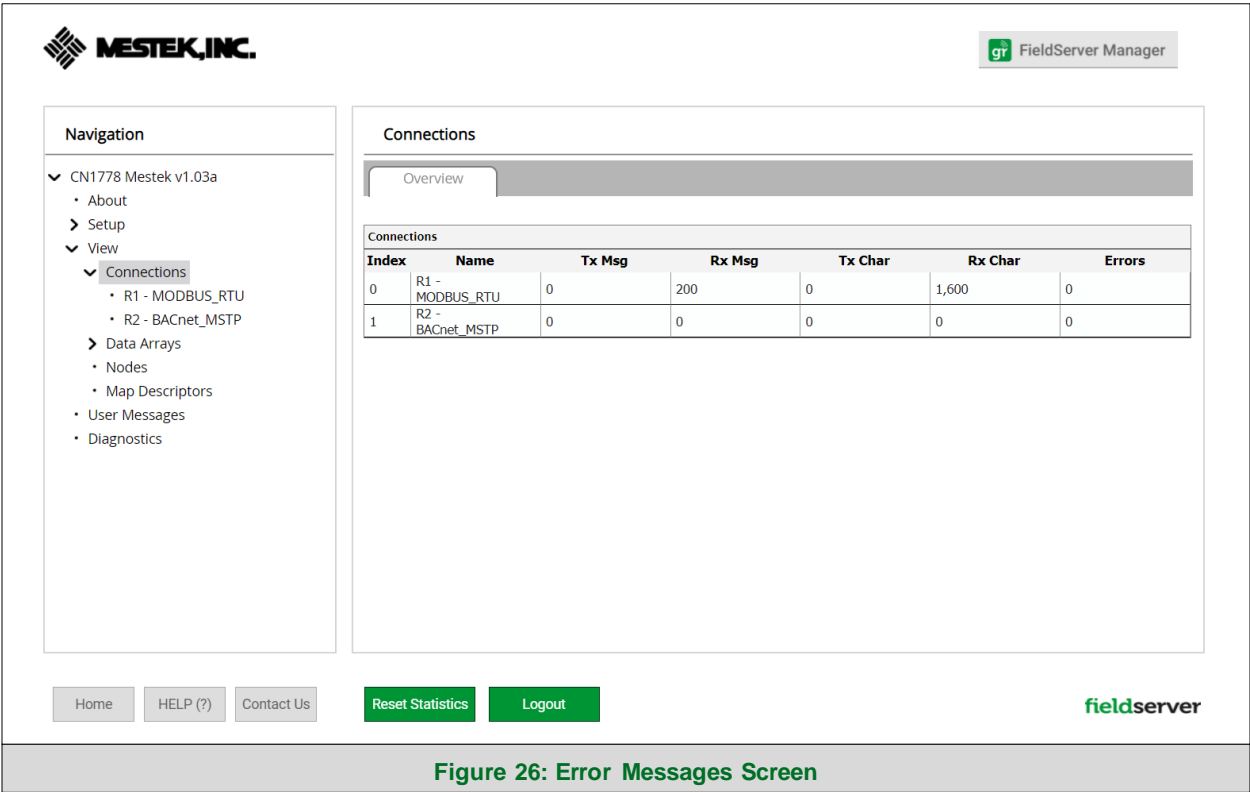


Figure 26: Error Messages Screen

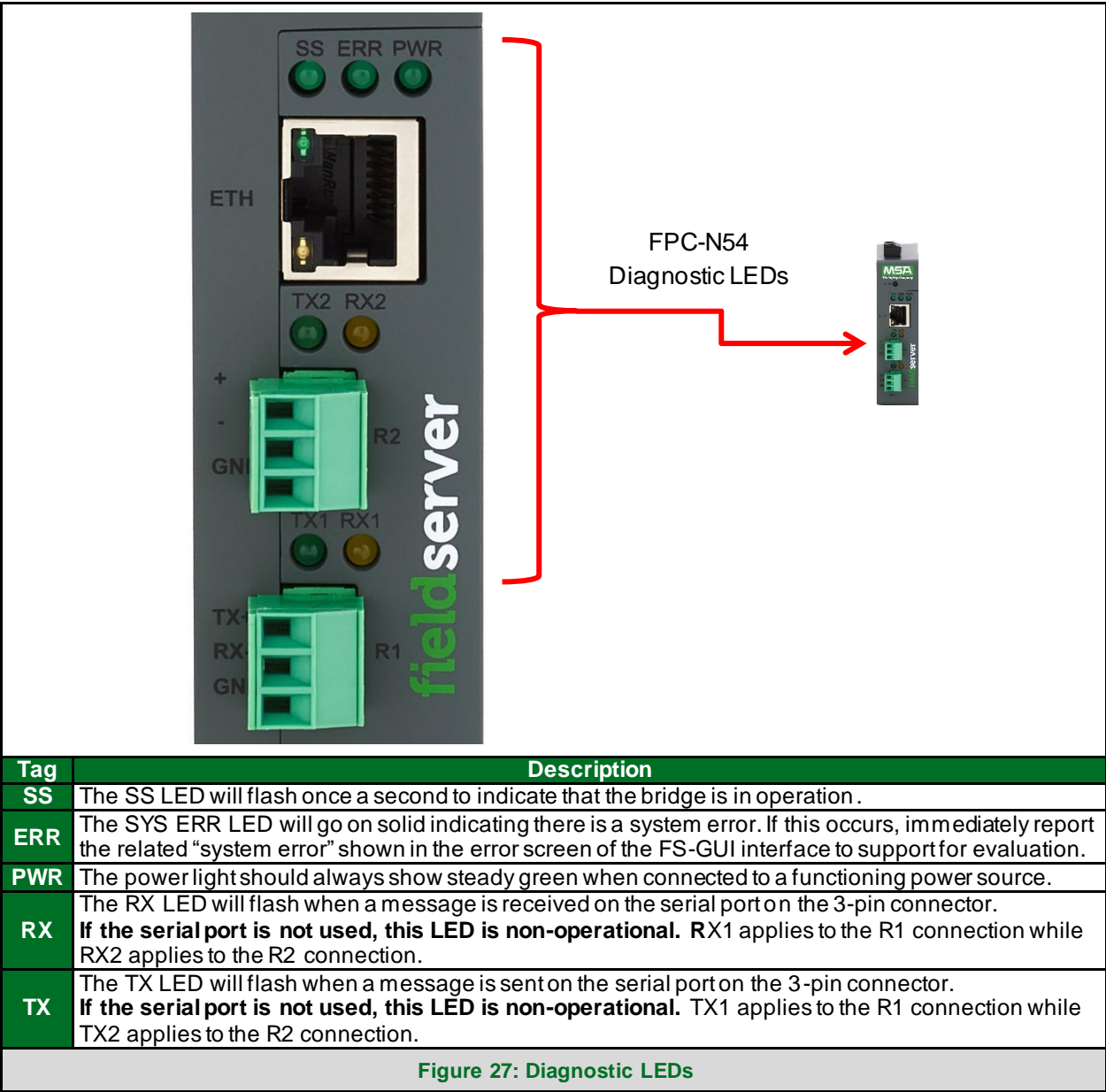
### 7.3 Checking Wiring and Settings

- 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 ProtoNode (**Section 7.4**)
  - Check baud rate, parity, data bits, stop bits
  - Check device address
  - Verify wiring
  - Verify the device was found 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.




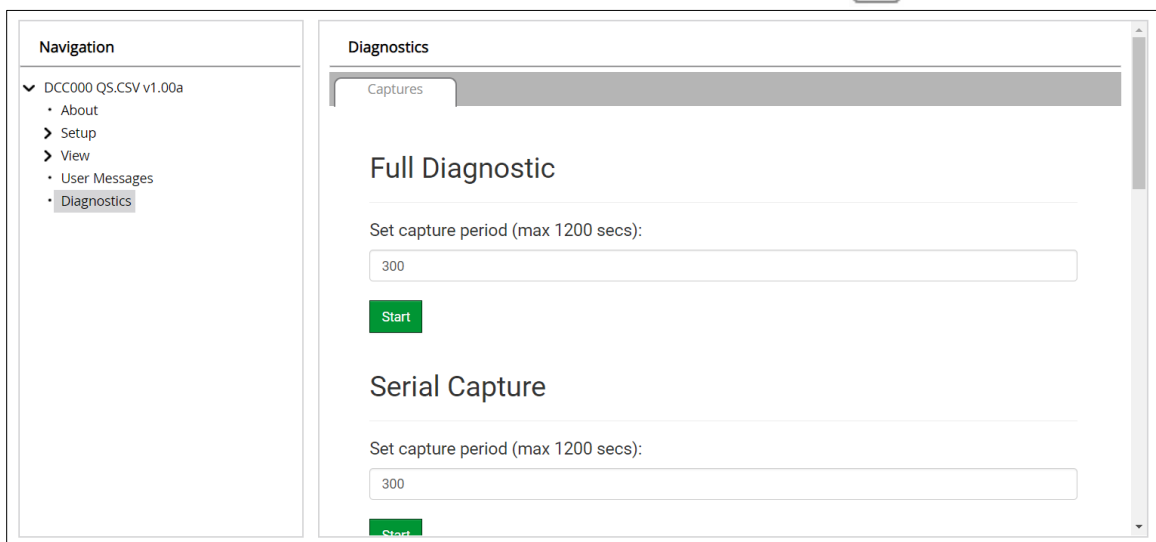
### 7.5 Taking a FieldServer Diagnostic Capture

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.

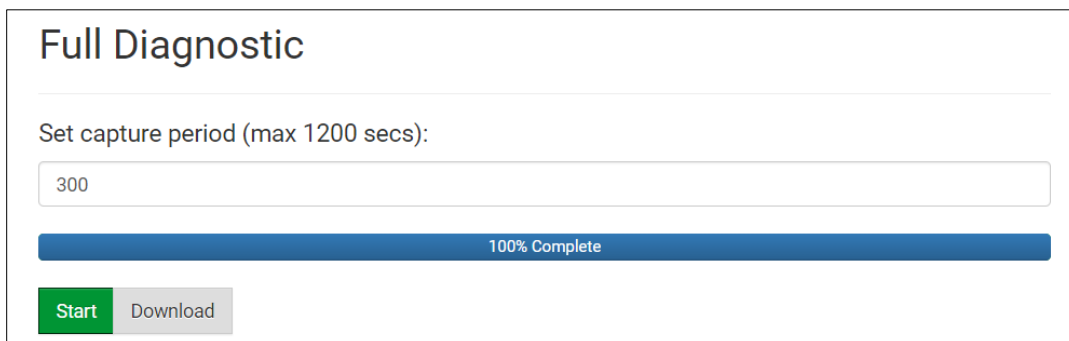
If the FieldServer bios is updated/released on November 2017 or later then the Diagnostic Capture is performed via the gateway's on-board system.

**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.
  - Default IP Address is 192.168.1.24
  - 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	<b>BACnet Network Number</b> This sets the BACnet network number of the Gateway. (1 - 65535)	<input type="text" value="50"/>	<input type="button" value="Submit"/>
<b>Figure 28: Web Configurator – Network Number Field</b>			

### 8.3 Mounting

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



### 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 for compliance 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](http://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

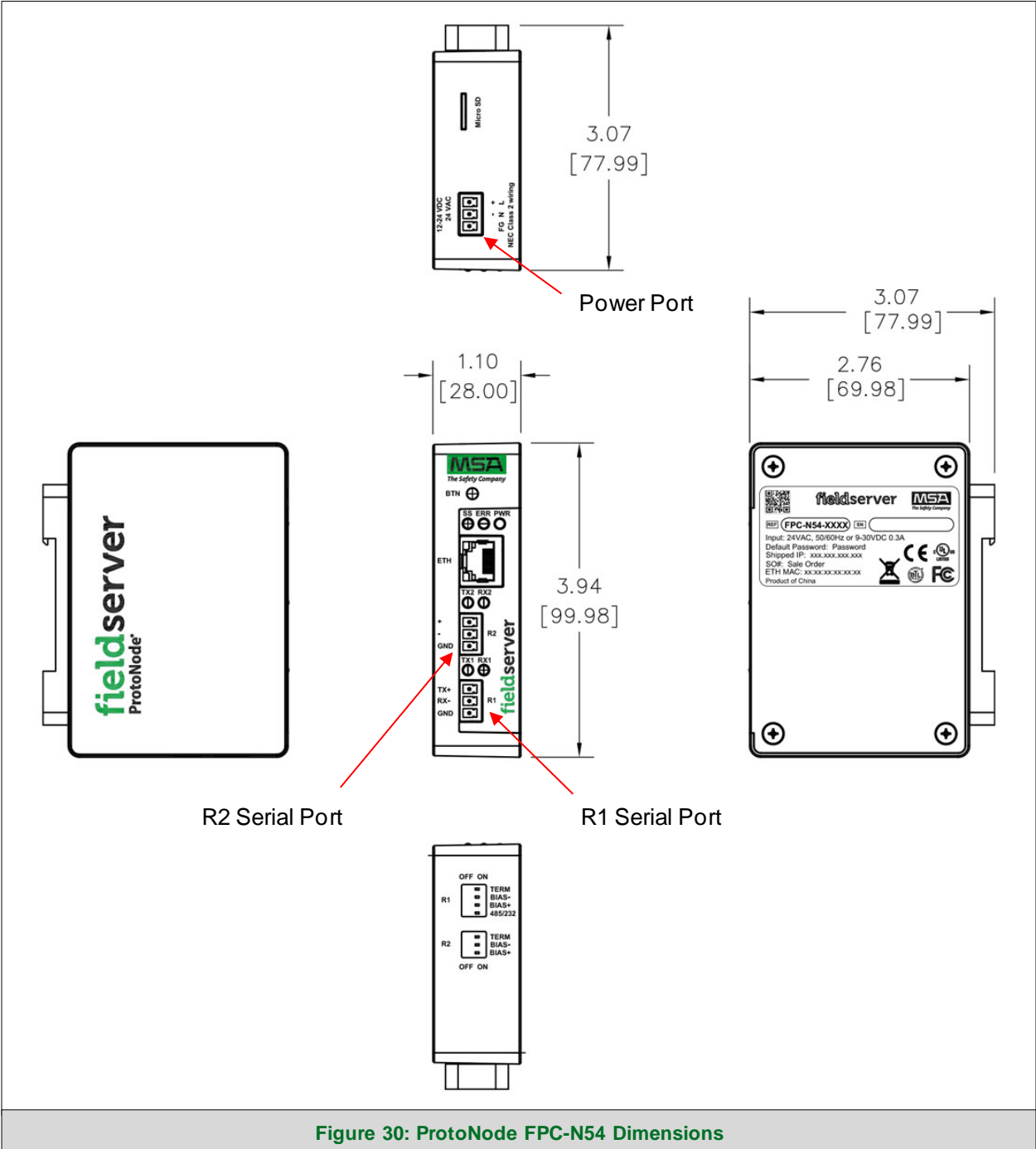
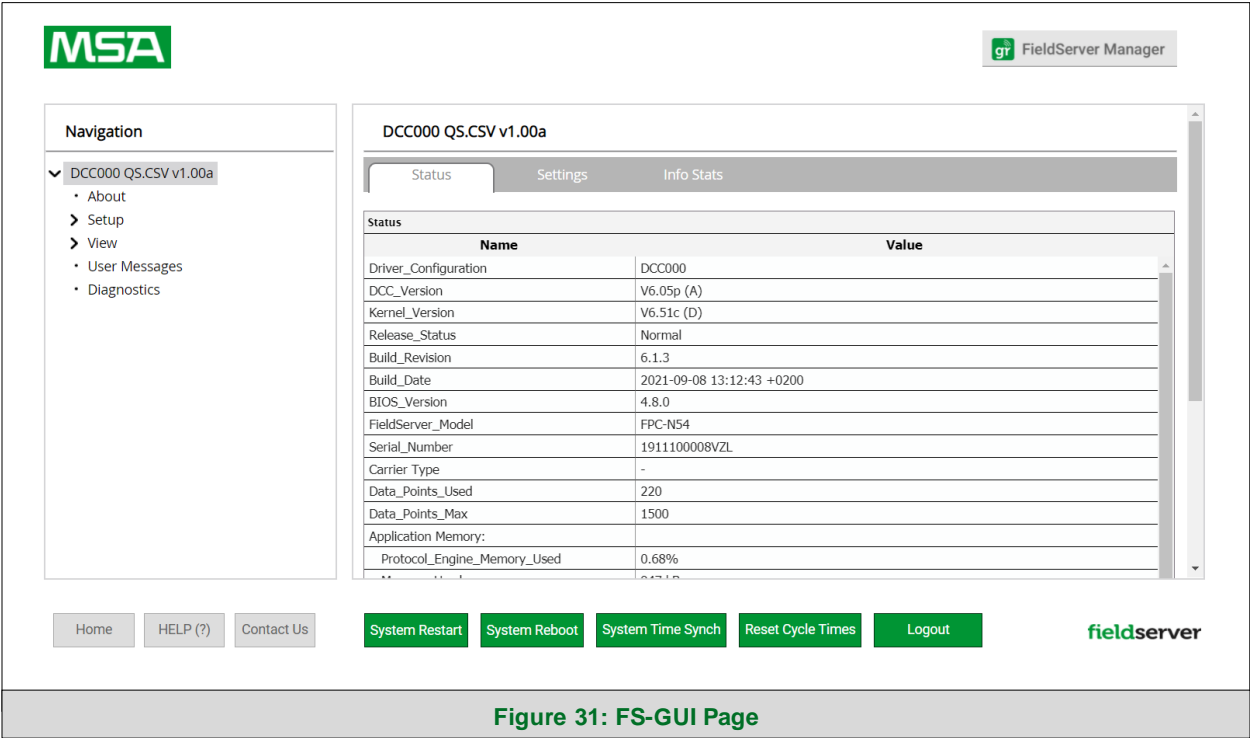


Figure 30: ProtoNode FPC-N54 Dimensions

8.6 Change Web Server Security Settings After Initial Setup

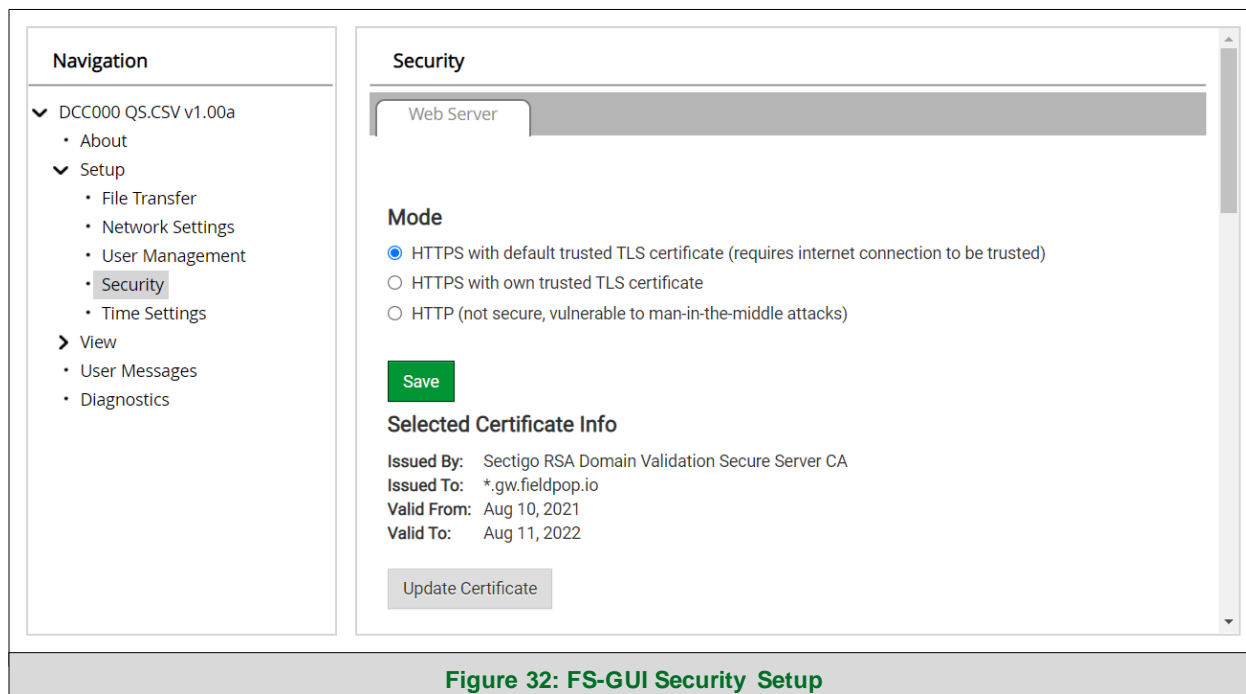
NOTE: Any changes will require a FieldServer reboot to take effect.

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



## 8.6.1 Change Security Mode

- Click Security in the Navigation panel.



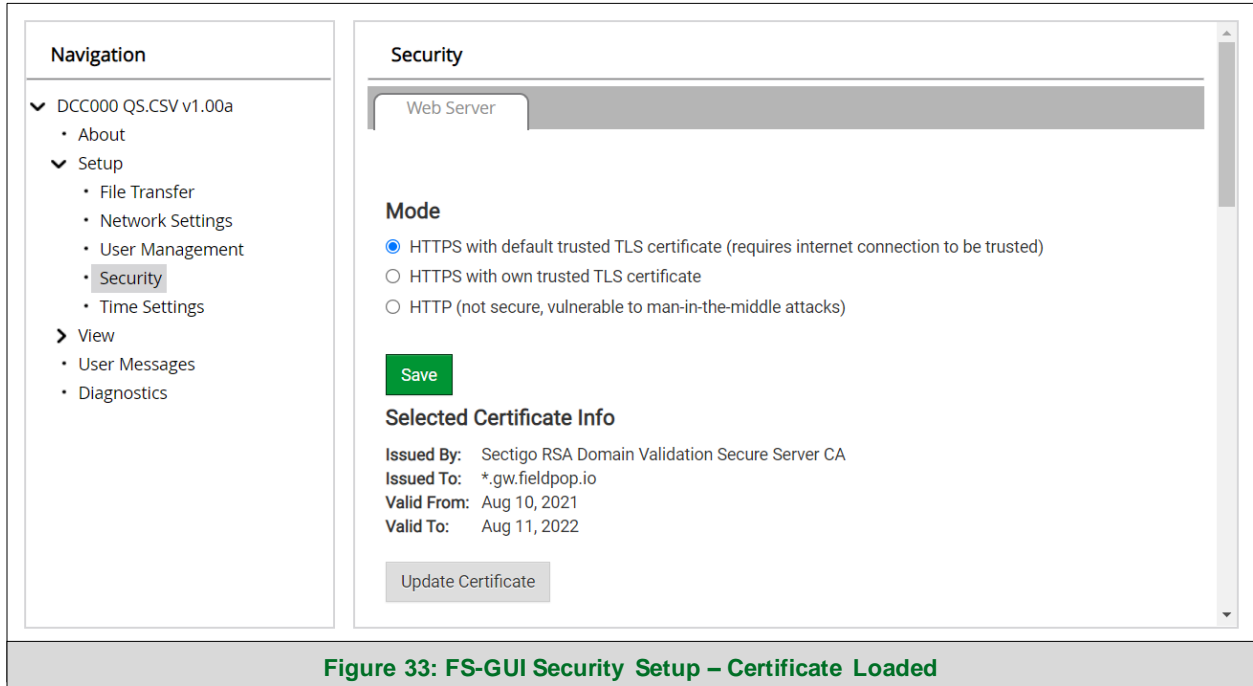
**Figure 32: FS-GUI Security Setup**

- 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.



**Figure 33: FS-GUI Security Setup – Certificate Loaded**

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

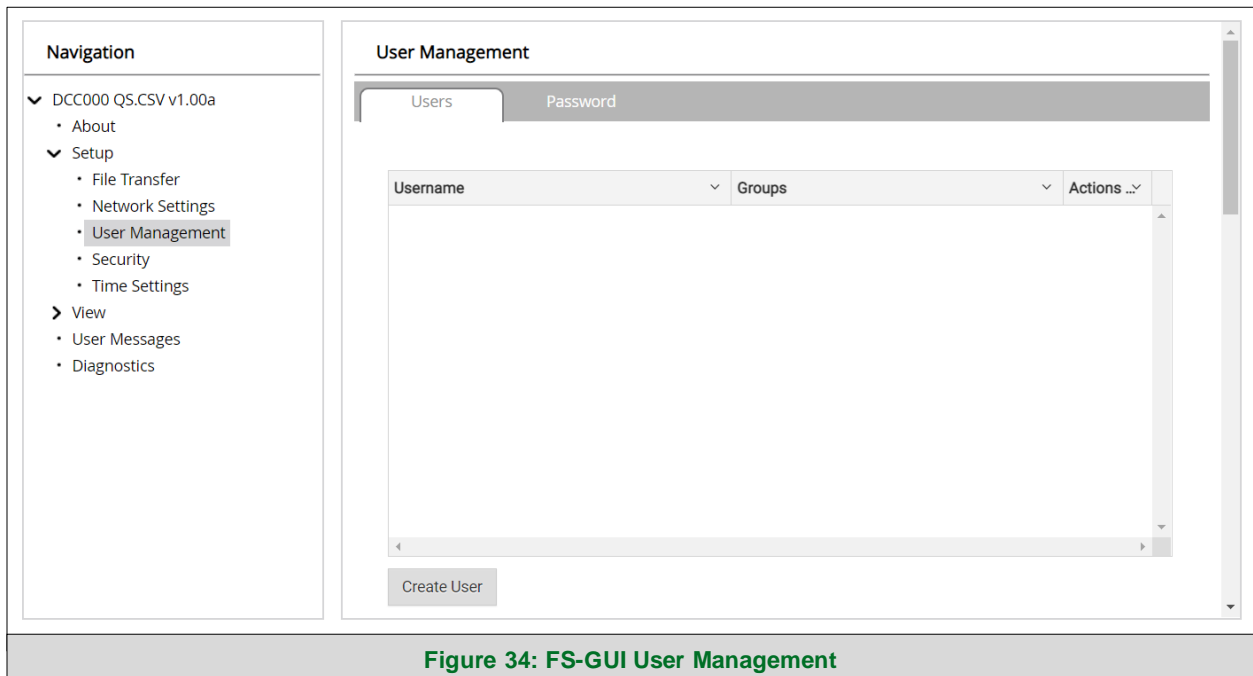
## 8.7 Change User Management Settings

- 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:

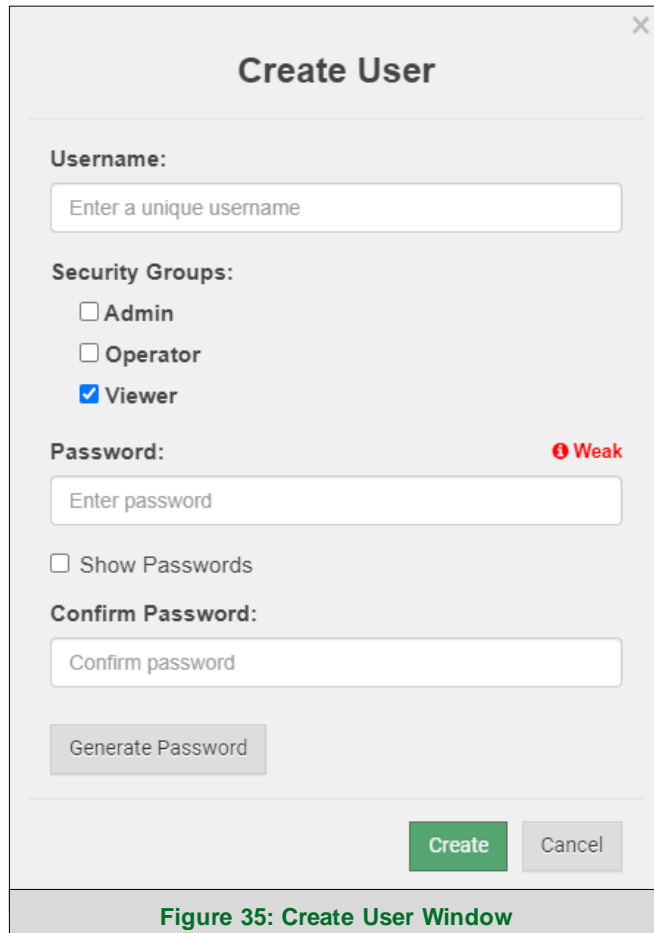
**Admin** – Can modify and view any settings on the FieldServer.

**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 image shows a 'Create User' dialog box with a close button (X) in the top right corner. The dialog contains the following fields and controls:

- Username:** A text input field with the placeholder text 'Enter a unique username'.
- Security Groups:** Three checkboxes: 'Admin' (unchecked), 'Operator' (unchecked), and 'Viewer' (checked).
- Password:** A text input field with the placeholder text 'Enter password'. To the right of the field is a red indicator 'Weak'.
- Show Passwords:** An unchecked checkbox.
- Confirm Password:** A text input field with the placeholder text 'Confirm password'.
- Generate Password:** A button located below the Confirm Password field.
- Create and Cancel:** Two buttons at the bottom right, 'Create' (green) and 'Cancel' (grey).

Figure 35: Create User Window

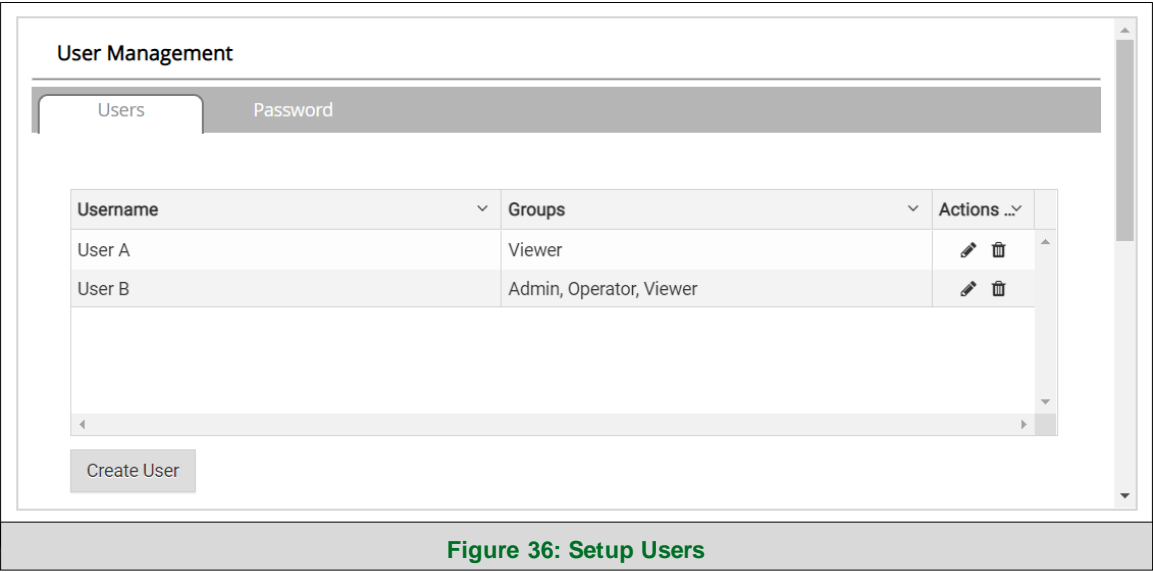
- Enter the new User fields: Name, Security Group and Password.
  - **User details are hashed and salted**

**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.

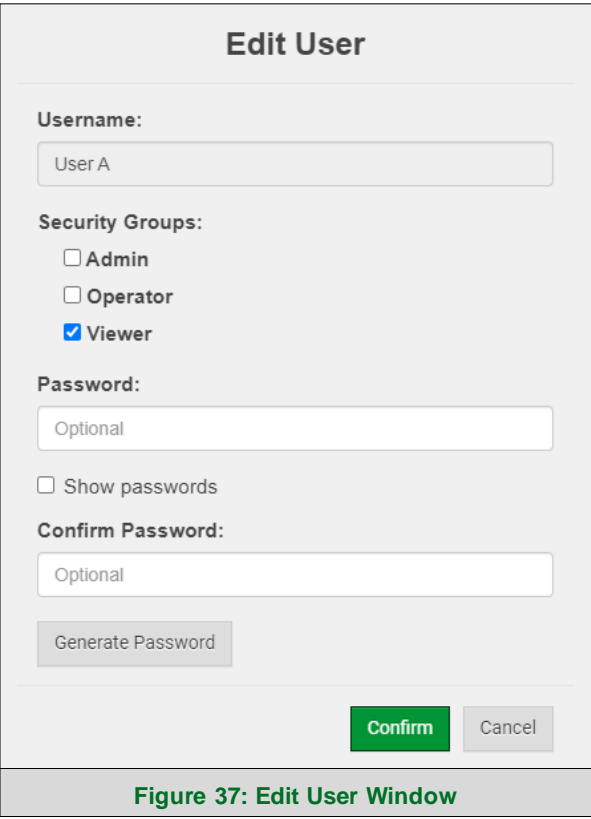
- Click the Create button.
- Once the Success message appears, click OK.

8.7.2 Edit Users

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



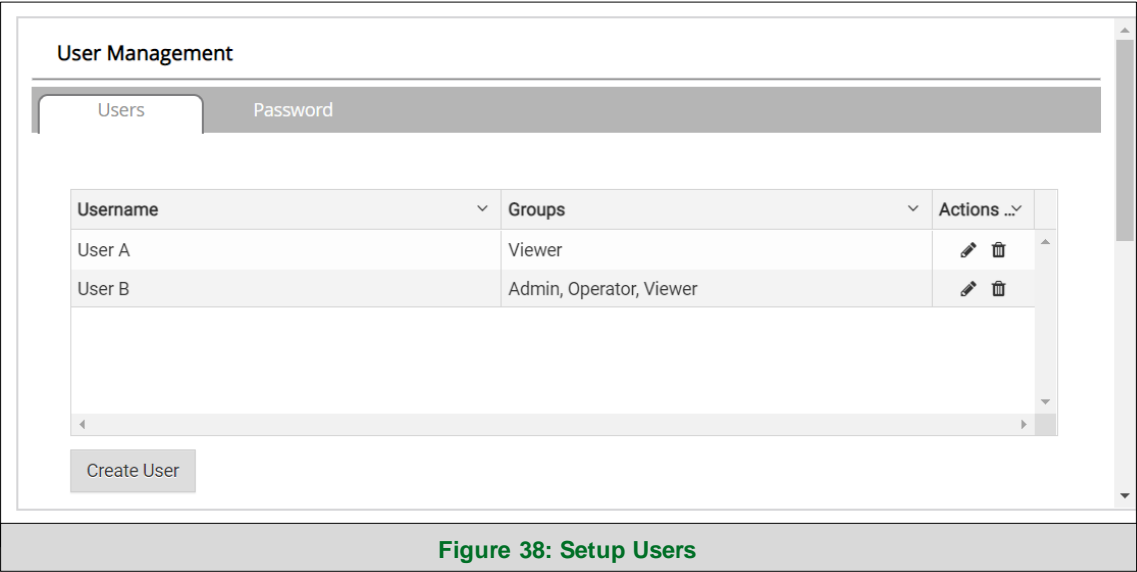
- Once the User Edit window opens, change the User Security Group and Password as needed.



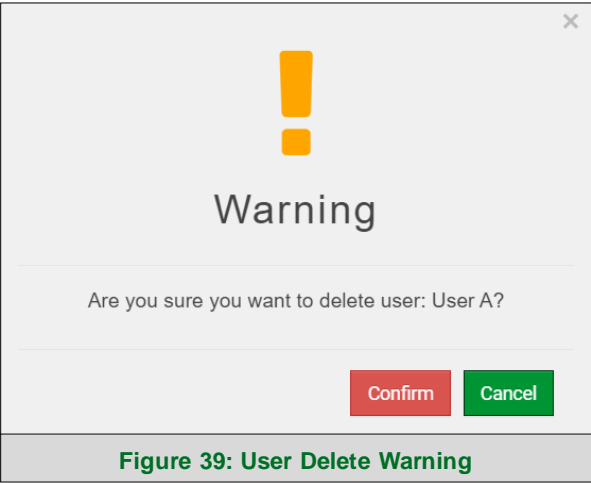
- Click Confirm.
- Once the Success message appears, click OK.

8.7.3 Delete Users

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



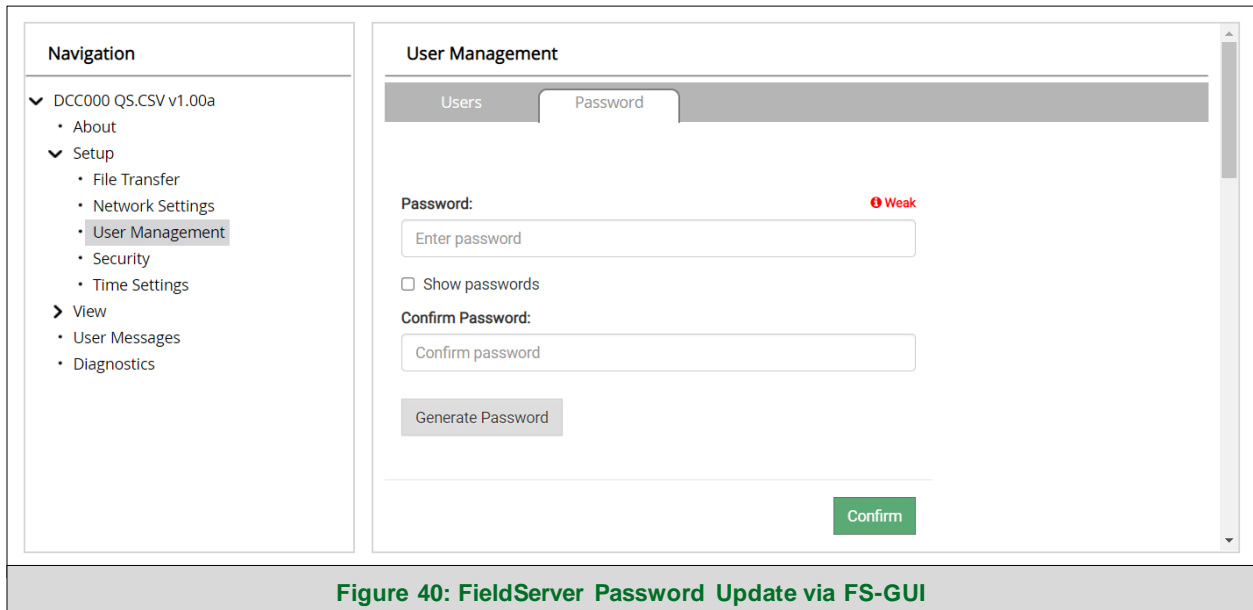
- When the warning message appears, click Confirm.





### 8.7.4 Change FieldServer Password

- Click the Password tab.



**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.

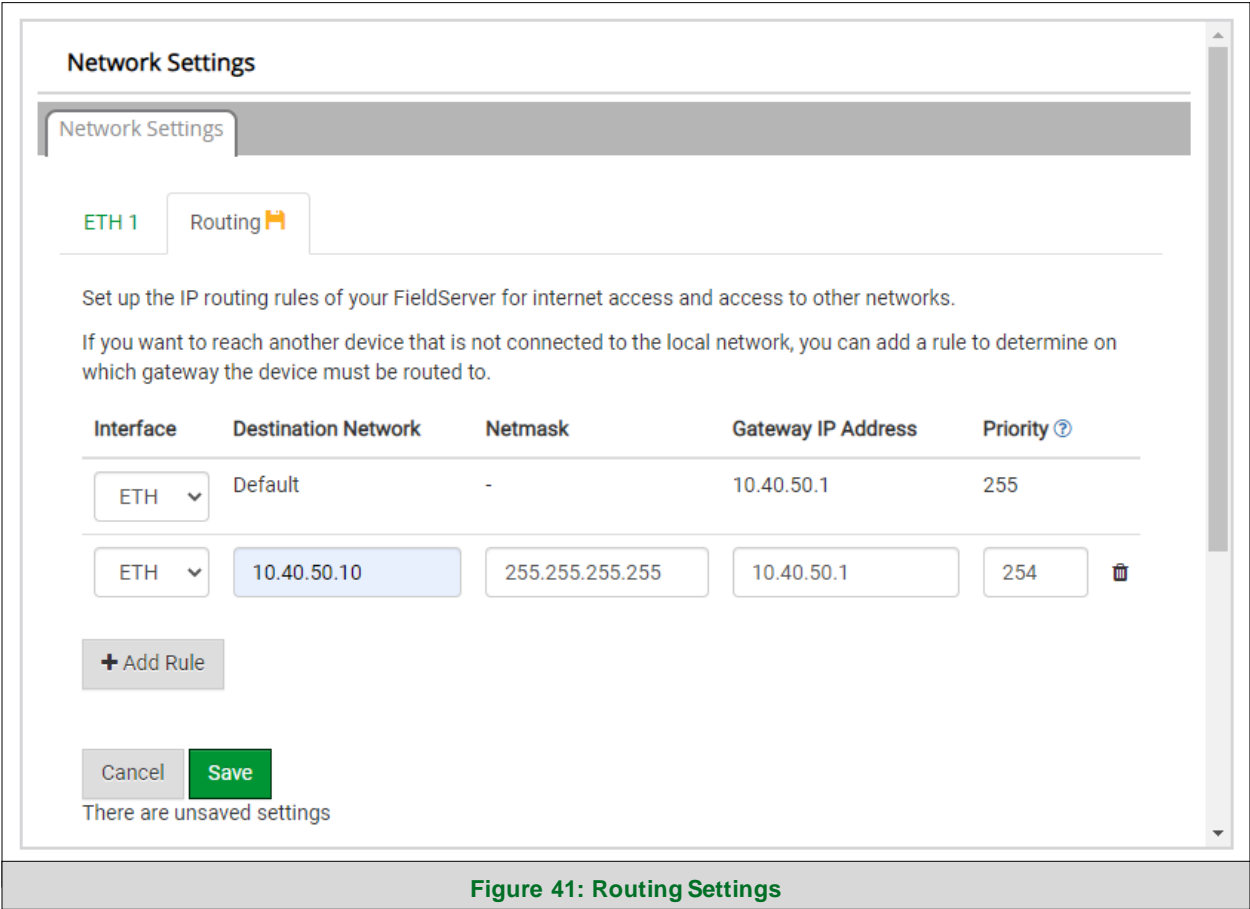


Figure 41: Routing Settings

## 9 Vendor Information – Mestek

**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 Mngr Modbus RTU Mappings to BACnet & Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Modbus Units	AV	1	AI	1
State	AI	2	AI	2
Status	AI	3	AI	3
Error Code	AI	4	AI	4
Boiler CH SP	AV	5	AI	5
Boiler DHW SP	AV	6	AI	6
CH Mode	AV	7	AI	7
DHW Mode	AV	8	AI	8
Supply Temp	AI	9	AI	9
Return Temp	AI	10	AI	10
DHW Temp	AI	11	AI	11
Flue Gas Temp	AI	12	AI	12
Heat Exchanger Temp	AI	13	AI	13
Firing Rate	AI	14	AI	14
Flame Current	AI	15	AI	15
Water Pressure	AI	16	AI	16
Analog in	AI	17	AI	17
CH pump	AI	18	AI	18
Dependent_1 State	AI	19	AI	19
Dependent_1 Status	AI	20	AI	20
Dependent_1 Error Code	AI	21	AI	21
Dependent_1 Firing Rate	AI	22	AI	22
Dependent_2 State	AI	23	AI	23
Dependent_2 Status	AI	24	AI	24
Dependent_2 Error Code	AI	25	AI	25
Dependent_2 Firing Rate	AI	26	AI	26
Dependent_3 State	AI	27	AI	27
Dependent_3 Status	AI	28	AI	28
Dependent_3 Error Code	AI	29	AI	29
Dependent_3 Firing Rate	AI	30	AI	30
Dependent_4 State	AI	31	AI	31
Dependent_4 Status	AI	32	AI	32
Dependent_4 Error Code	AI	33	AI	33
Dependent_4 Firing Rate	AI	34	AI	34
Spring Outdoor Temp	AV	35	AI	35
Spring Supply Temp	AV	36	AI	36
Winter Supply Temp	AV	37	AI	37
Warm Weather Shut Temp	AV	38	AI	38
Night Setback Temp	AV	39	AI	39
Outdoor Temp	AI	40	AI	40
Control Register	MV	95	AI	95

### 9.2 Dep Modbus RTU Mappings to BACnet & Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Modbus Units	AV	1	AI	1
State	AI	2	AI	2
Status	AI	3	AI	3
Error Code	AI	4	AI	4
Boiler CH SP	AV	5	AI	5
Boiler DHW SP	AV	6	AI	6
CH Mode	AV	7	AI	7

## Additional Information

DHW Mode	AV	8	AI	8
Supply Temp	AI	9	AI	9
Return Temp	AI	10	AI	10
DHW Temp	AI	11	AI	11
Flue Gas Temp	AI	12	AI	12
Heat Exchanger Temp	AI	13	AI	13
Firing Rate	AI	14	AI	14
Flame Current	AI	15	AI	15
Water Pressure	AI	16	AI	16
Analog in	AI	17	AI	17
CH pump	AI	18	AI	18
Spring Outdoor Temp	AV	19	AI	19
Spring Supply Temp	AV	20	AI	20
Winter Supply Temp	AV	21	AI	21
Warm Weather Shut Temp	AV	22	AI	22
Night Setback Temp	AV	23	AI	23
Outdoor Temp	AI	24	AI	24
Control Register	MV	95	AI	95

## 10 Specifications



ProtoNode FPC-N54 <sup>2</sup>	
<b>Electrical Connections</b>	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
<b>Power Requirements</b>	<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
<b>Approvals</b>	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
<b>Physical Dimensions</b>	4 x 1.1 x 2.7 in (10.16 x 2.8 x 6.8 cm)
<b>Weight</b>	0.4 lbs (0.2 Kg)
<b>Operating Temperature</b>	-20°C to 70°C (-4°F to 158°F)
<b>Humidity</b>	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.

<sup>2</sup> 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.