



## ProtoNode FPC-N54 Installation and Operating Manual



Document Revision: 14.A

Web Configurator

H2423400-

## Technical Support

Thank you for purchasing the ProtoNode for LAARS.

Please call LAARS for technical support of the ProtoNode product.

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

Support Contact Information:

LAARS  
20 Industrial Way,  
Rochester, NH 03867

Customer Service:  
(603) 335-6300

Email: [info@LAARS.com](mailto:info@LAARS.com)

Website: [www.laars.com](http://www.laars.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. Configure the ProtoNode to connect to the local network. (Section 6)
9. Integrate the ProtoNode with the FieldServer Manager or opt out. (Section 7)
10. 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 8.3)

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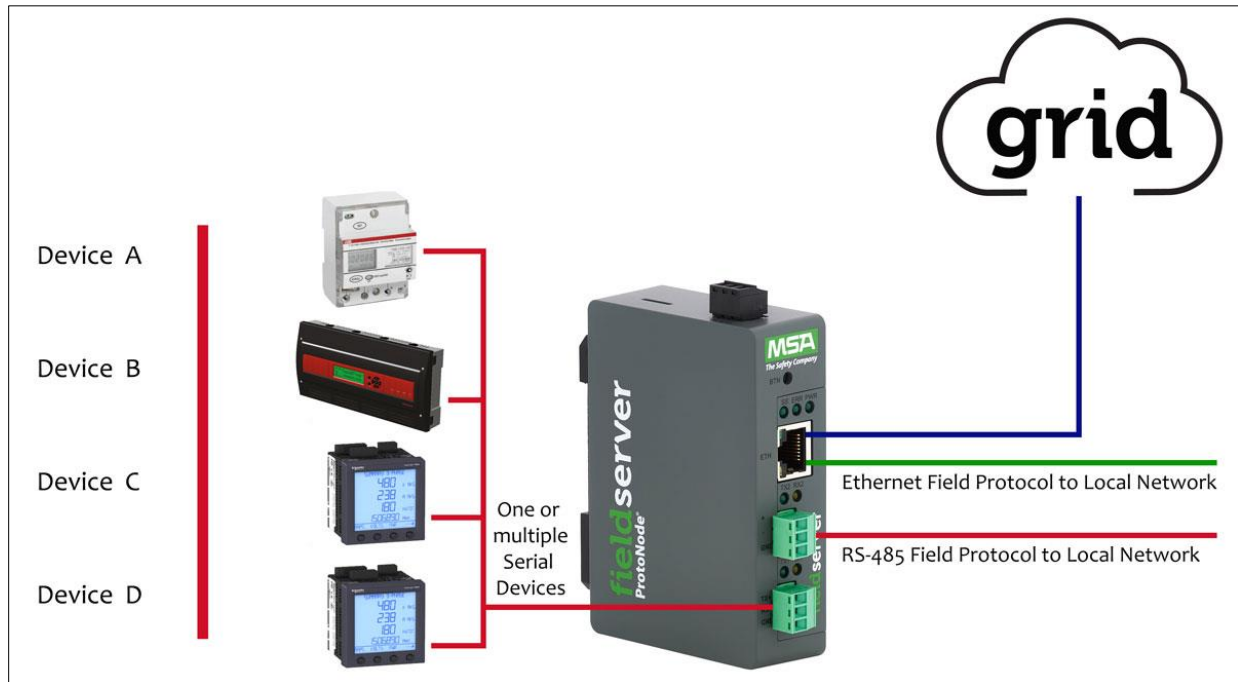
## 1 Introduction

### 1.1 ProtoNode Gateway

The ProtoNode wireless gateway is an external, high performance **building automation multi-protocol gateway** that is preconfigured to automatically communicate between LAARS' devices (hereafter simply called "device") connected to the ProtoNode and automatically configures them for BACnet/IP, BACnet MS/TP, Modbus TCP/IP and Metasys N2.

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](#).



## 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-N54-2061
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 and Registers per Device

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

Part number	Total Registers
FPC-N54-2061	1,500
Figure 2: Supported Point Count Capacity	

Devices	Points Per Device
Sola	88
Multiburner	149
SV2	82
HTD	254
OmniTherm	174
MagnaTherm	174
Figure 3: Points per Device	

## 2.3 Configuring Device Communications

### 2.3.1 Confirm the Device and ProtoNode COM Settings Match

- Any connected serial devices **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	38400
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 8.3**)

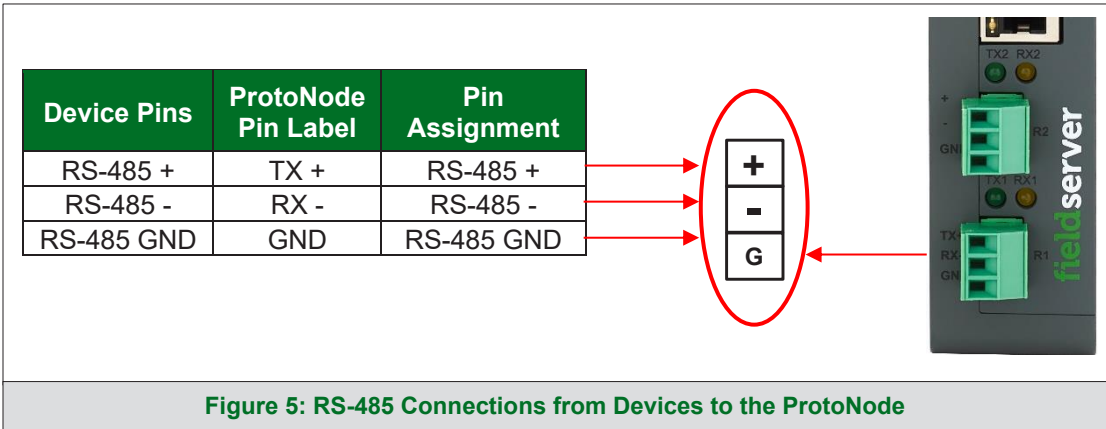
**NOTE:** The Metasys N2 and Modbus TCP/IP field protocol Node-ID is automatically set to be the same value as the Node-ID of the device.

3 Interfacing ProtoNode to Devices

3.1 Device Connections to ProtoNode

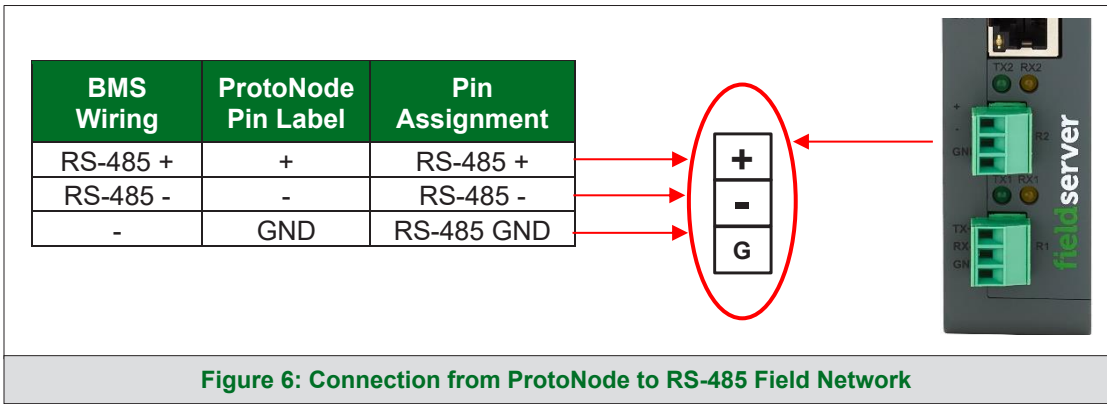
The ProtoNode has a 3-pin Phoenix connector for connecting RS-485 devices on the R1 port.

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

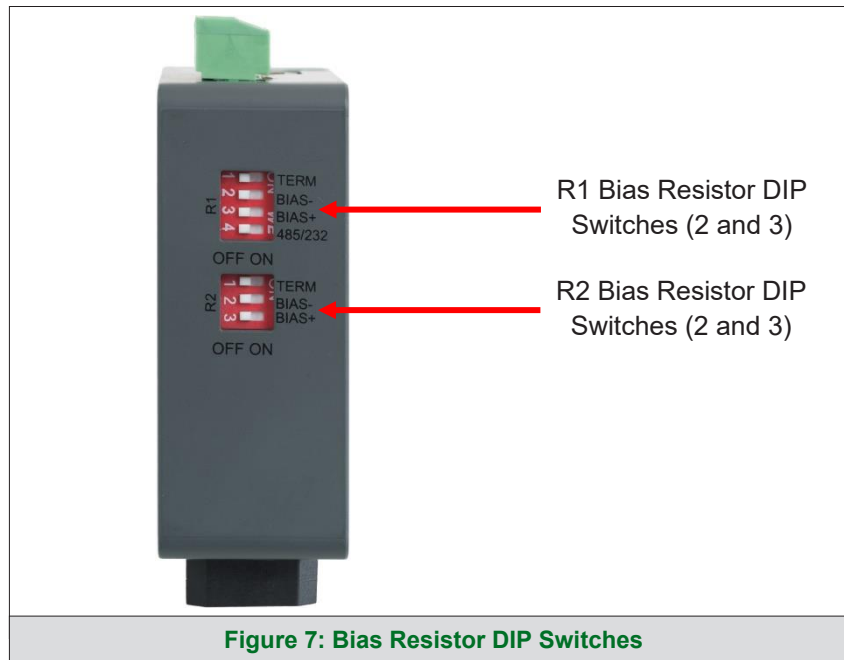


3.2 Wiring Field Port to RS-485 Serial Network

- 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.

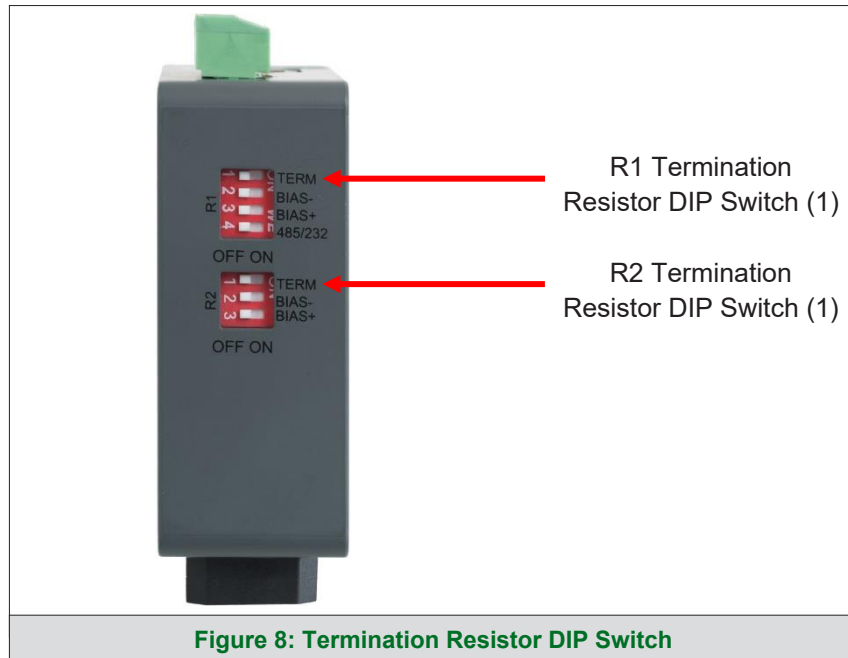
The bias resistor is 510 ohms which is in line with the BACnet spec. It should only be enabled at one point on the bus (for example, on the field port where there are very weak bias resistors of 100k). Since there are no jumpers, many gateways can be put on the network without running into the bias resistor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

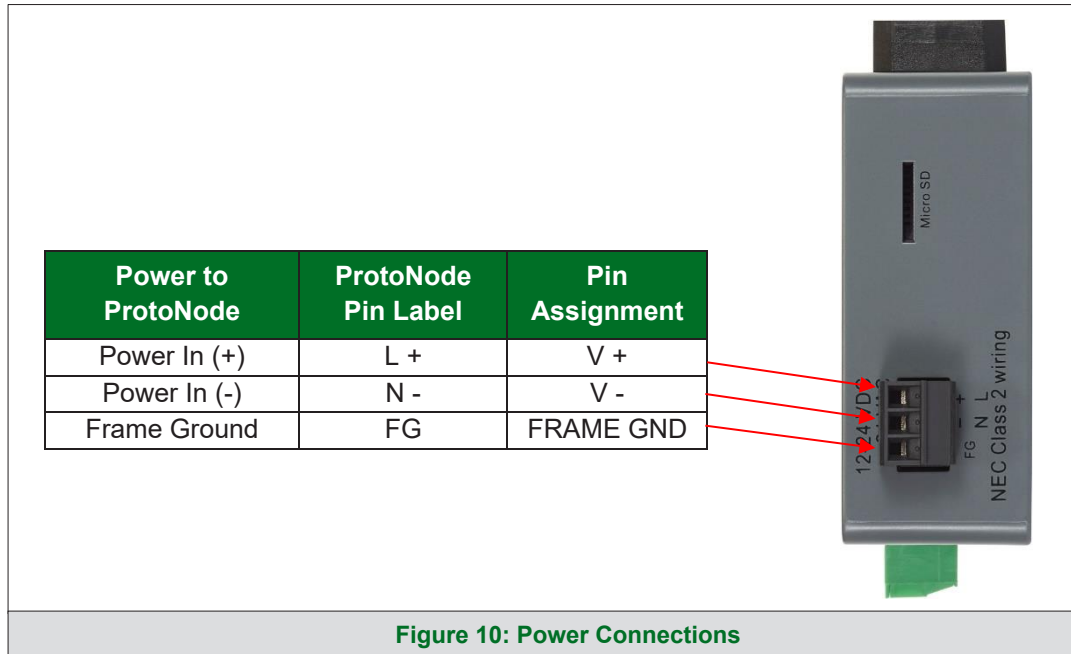
### 3.5 Power-Up ProtoNode

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 12**.

- 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.

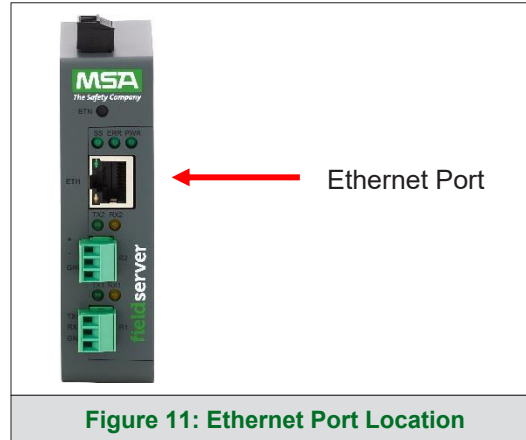




Figure 11: Ethernet Port Location

#### 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 9.1 for instructions.

### 5.1 Login to the FieldServer

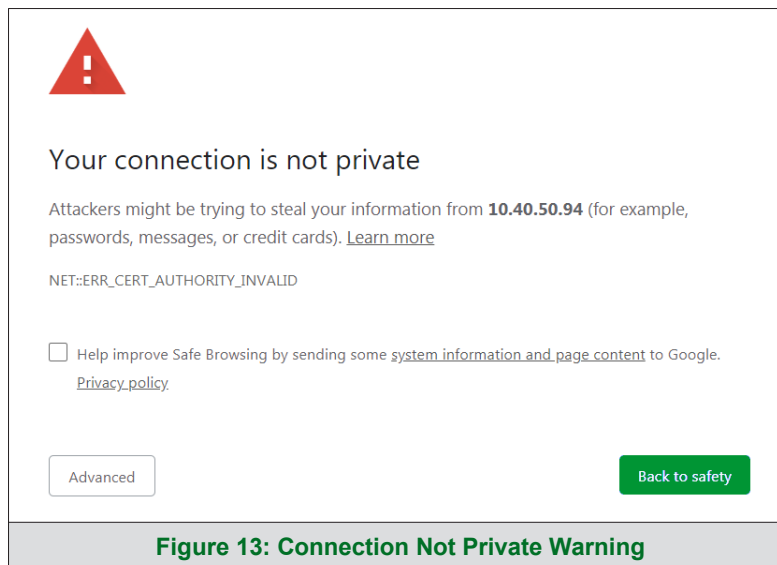
The first time the FieldServer GUI is opened in a browser, the IP Address for the gateway will appear as untrusted. This will cause the following pop-up windows to appear.

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



**Figure 12: Web Server Security Window**

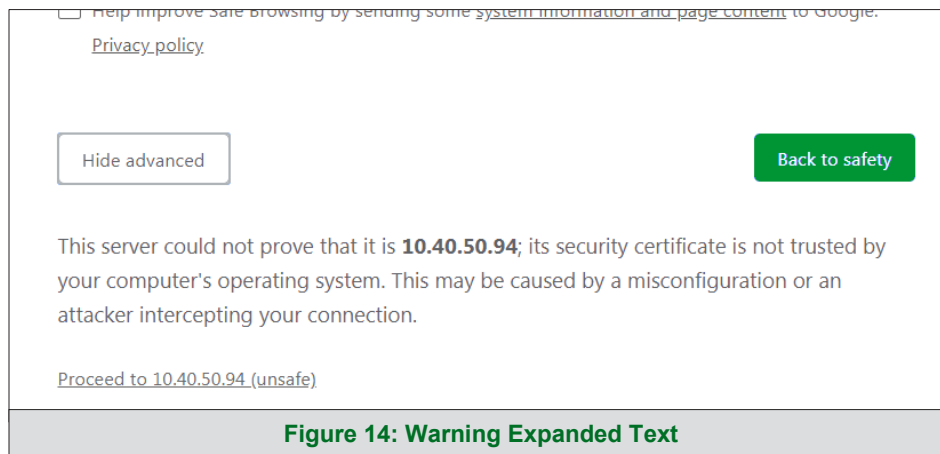
- When the warning that “Your connection is not private” appears, click the advanced button on the bottom left corner of the screen.



**Figure 13: Connection Not Private Warning**

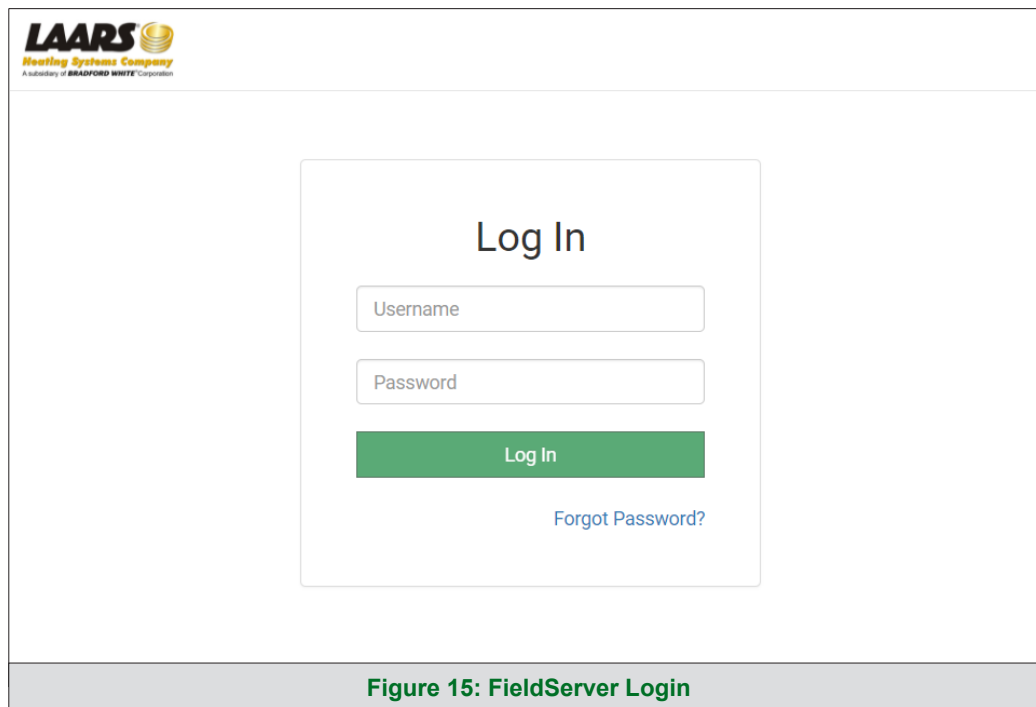


- Additional text will expand below the warning, click the underlined text to go to the IP Address. In the **Figure 14** example this text is “[Proceed to 10.40.50.94 \(unsafe\)](#)”.



- 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.

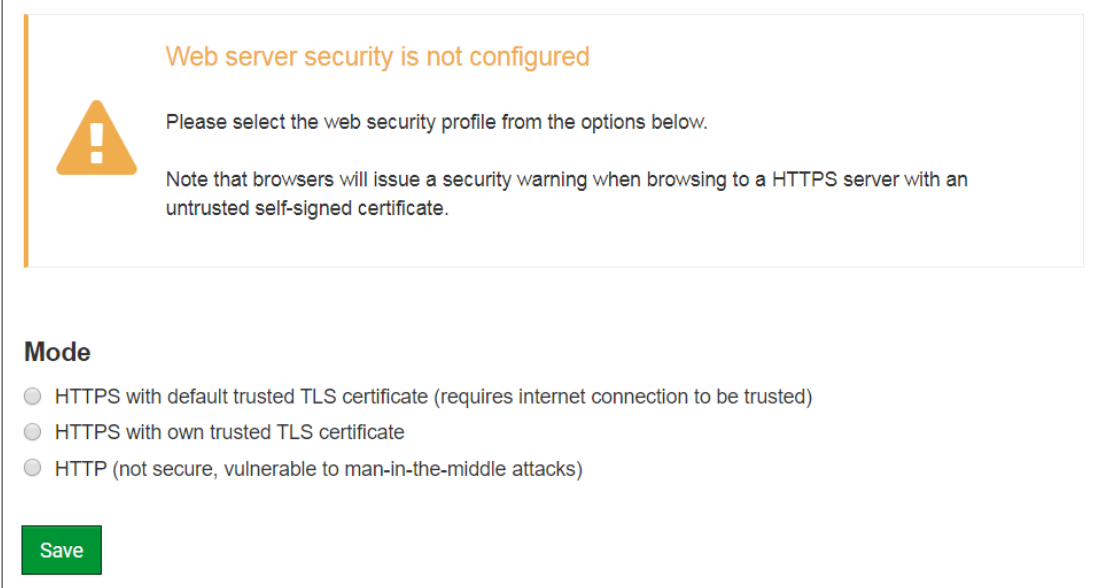


**NOTE:** A user has 5 attempts to login then there will be a 10-minute lockout. There is no timeout on the FieldServer to enter a password.

**NOTE:** To create individual user logins, go to Section 10.7.

## 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.

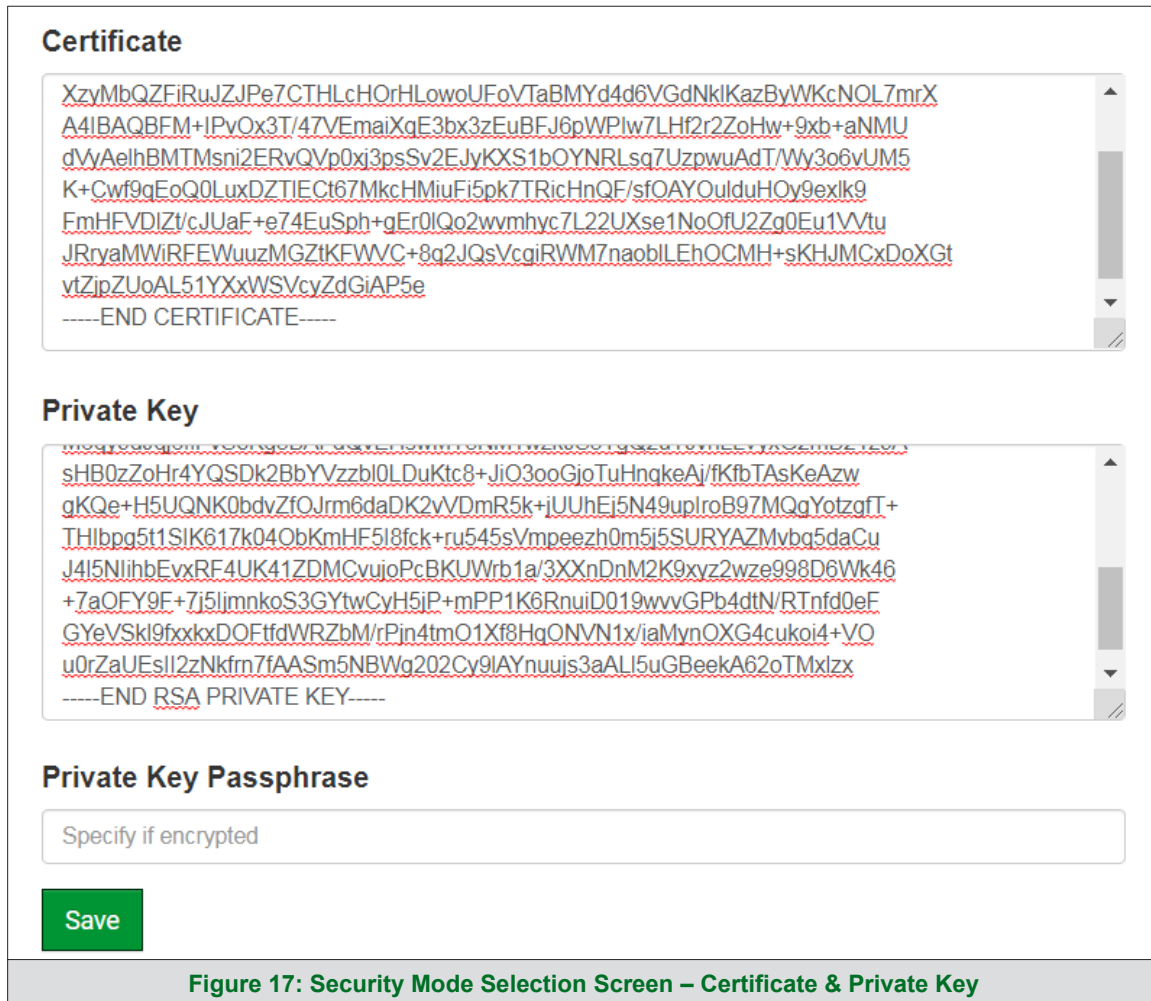
**NOTE:** To change the web server security mode after initial setup, go to Section 10.1.

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.



The screenshot shows a web interface for setting up security. It has three main sections: 'Certificate', 'Private Key', and 'Private Key Passphrase'. Each section has a text area for input. The 'Certificate' and 'Private Key' sections also have a 'Save' button. The 'Private Key Passphrase' section has a dropdown menu for 'Specify if encrypted'.

**Certificate**

```
XzyMbQZFiRuJZJPe7CTHLcHOrHLowoUFoVTaBMYd4d6VGdNklKazByWKcNOL7mrX
A4lBAQBfM+IPvOx3T/47VEmaiXqE3bx3zEuBFJ6pWPlw7LHf2r2ZoHw+9xb+aNMU
dVyAelhBMTmsni2ERvQVp0xj3psSv2EJyKXS1bOYNRLsq7UzpwuAdT/Wy3o6vUM5
K+Cwf9qEoQOLuxDZTIECt67MkcHMiuFi5pk7TRicHnQF/sfOAYOulduHOy9exlk9
FmHFVDIZt/cJUaF+e74EuSph+gEr0lQo2wmmhyc7L22UXse1NoOfU2Zg0Eu1VWtu
JRryaMWIRFEWuuuzMGZtKFWVC+8q2JQsVcqiRWM7naoblEhOCMH+sKHJMCxDoXGt
vtZjpZUoAL51YXxWSVcyZdGiAP5e
-----END CERTIFICATE-----
```

**Private Key**

```
sHB0zZoHr4YQSDK2BbYVzzbl0LDuKtc8+JiO3ooGjoTuHngkeAj/fKfbTAsKeAzW
gKQe+H5UQNK0bdvZfOJrm6daDK2vDmR5k+jUUhEj5N49uplroB97MQgYotzgfT+
THlbpq5t1SIK617k04ObKmHF5l8fck+ru545sVmpeeZh0m5j5SURYAZMvbq5daCu
J4l5NlihbEvxRF4UK41ZDMCvujopCbkUWrb1a/3XXnDnM2K9xyz2wze998D6Wk46
+7aOFY9F+7j5ljmkoS3GYtwCyH5jP+mPP1K6RnuiD019wvGPb4dtN/RTnfd0eF
GYeVSkI9fxkxDOFtdWRZbM/rPin4tmO1Xf8HqONVN1x/iaMynOXG4cukoI4+VO
u0rZaUESlI2zNkfrn7fAASm5NBWg202Cy9IAYnuujs3aALi5uGBEEKa62oTMxlzx
-----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 Network Settings

### 6.1 Navigate to the Settings

- From the Web App landing page, click the Settings tab on the left side of the screen.

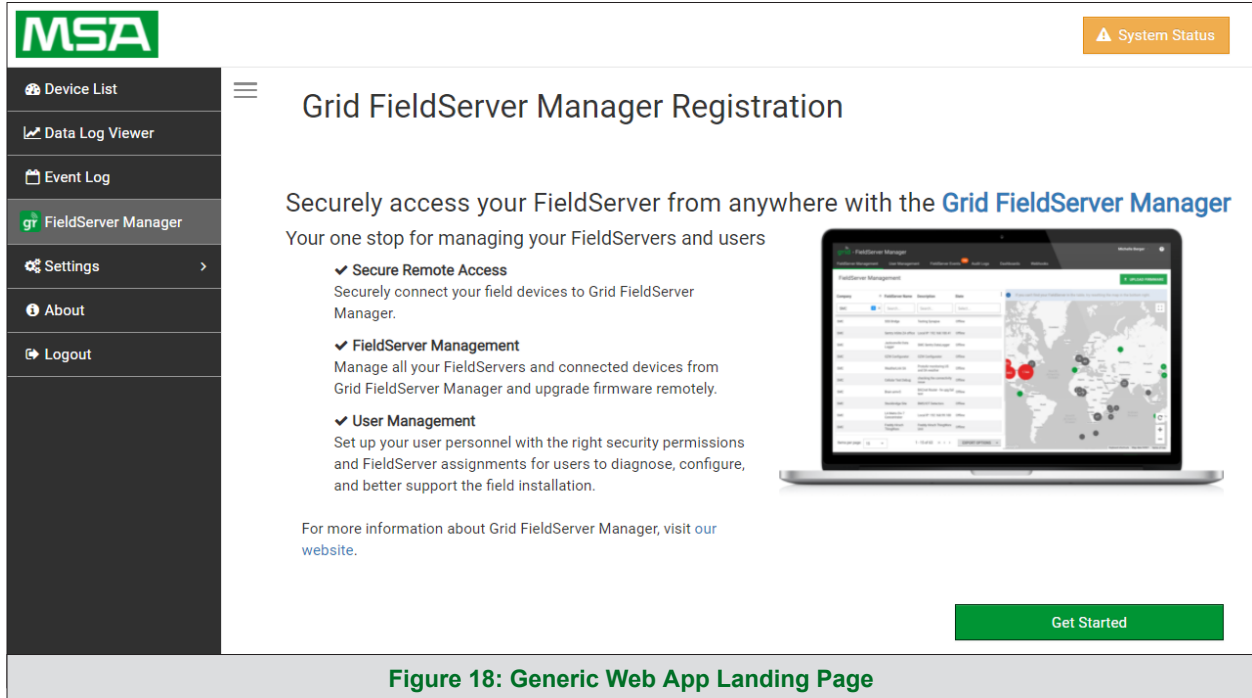


Figure 18: Generic Web App Landing Page

- Click the Network tab that appears to open the Network Settings page.

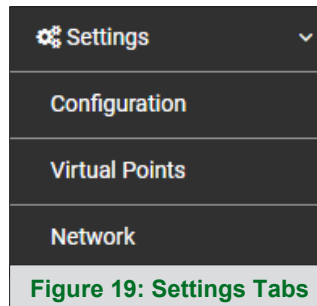


Figure 19: Settings Tabs

- A warning message will appear when performing the first-time setup, click the Exit Registration button to continue to the Settings page.

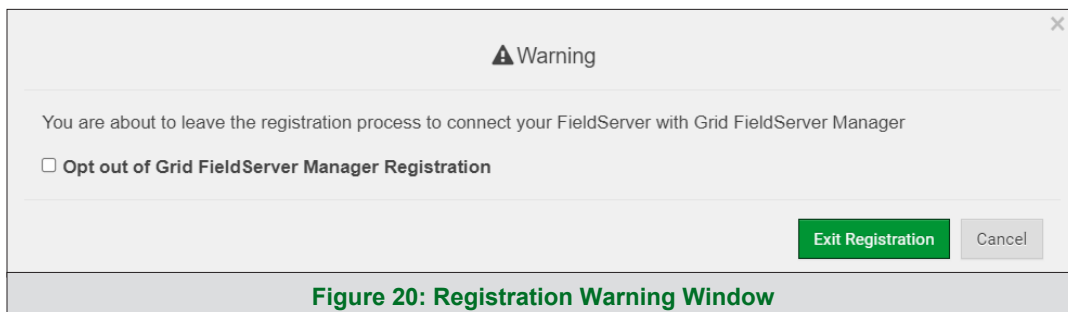


Figure 20: Registration Warning Window

## 6.2 Change the ProtoNode IP Address

The IP Settings section updates the wired network configuration. To update, follow these instructions:

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

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

- Click the Save button to activate the new settings.

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

ETH 1 Routing

☐ Enable DHCP

IP Address  
10.40.50.90

Netmask  
255.255.255.0

Gateway  
10.40.50.1

Domain Name Server 1 (Optional)  
8.8.8.8

Domain Name Server 2 (Optional)  
8.8.4.4

Cancel Save

Network Status	
Connection Status	✓ Connected
MAC Address	00:50:4e:60:06:3c
Ethernet Tx Msgs	8,397,726
Ethernet Rx Msgs	54,936,400
Ethernet Tx Msgs Dropped	0
Ethernet Rx Msgs Dropped	0

**Figure 21: ETH 1 Port Network Settings**


### 6.3 Routing

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

**NOTE: The default connection is ETH1.**





- Select the default connection in the first row.
- 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.

ETH 1

Routing 

Set up the IP routing rules of your FieldServer for internet access and access to other networks.

If you want to reach another device that is not connected to the local network, you can add a rule to determine on which gateway the device must be routed to.

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 

+ Add Rule

Cancel

Save

There are unsaved settings

## 7 FieldServer Manager User Setup, Registration and Login

The Grid is MSA Safety's device cloud solution for IIoT. Integration with the MSA Grid – FieldServer Manager enables a secure remote connection to field devices through a FieldServer and hosts local applications for device configuration, management, as well as maintenance. For more information about the FieldServer Manager, refer to the [MSA Grid - FieldServer Start-up Guide](#).

### 7.1 Choose Whether to Integrate the FieldServer Manager

When first logging onto the ProtoNode, the Web App will open on the Grid FieldServer Manager page.

**NOTE:** If a warning message appears instead, go to [Section 10.8](#) to resolve the connection issue.

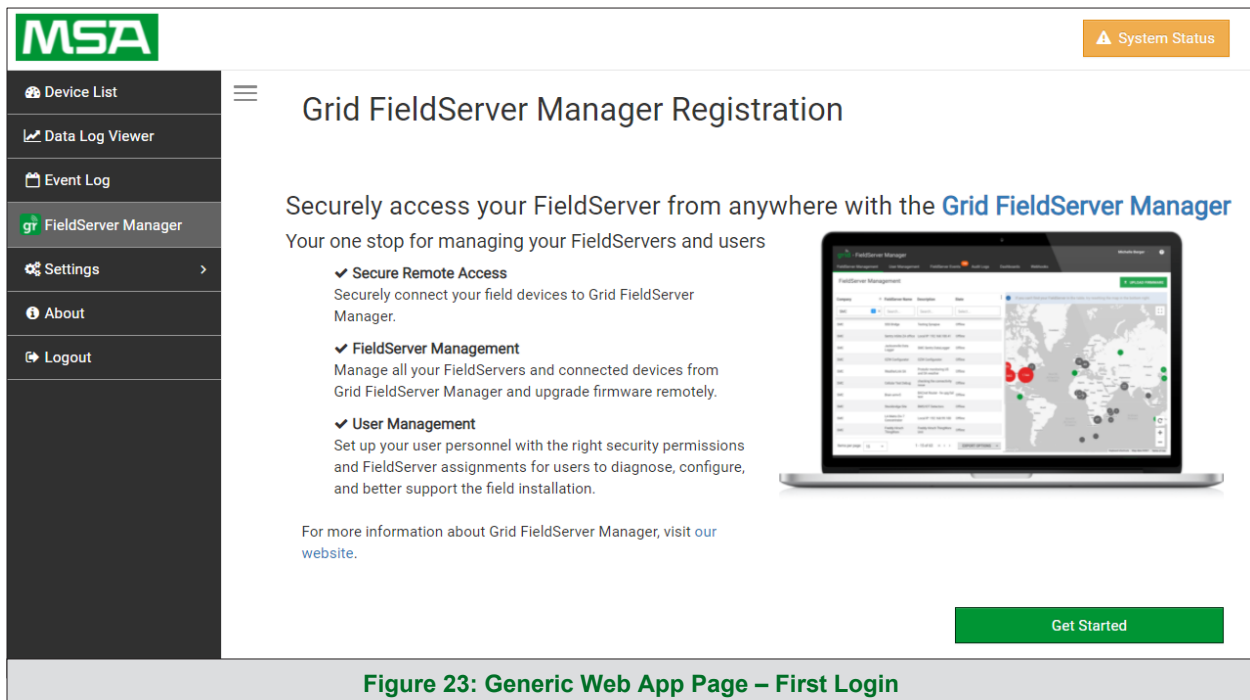


Figure 23: Generic Web App Page – First Login

- Either go through the FieldServer Manager setup to integrate cloud functionality to the FieldServer or optout of FieldServer Manager setup.
  - For FieldServer Manager setup, continue with instructions in the following sections
  - To opt out, click on a tab other than the Grid FieldServer Manger tab, click the checkbox next to “Opt out of Grid FieldServer Manager Registration” in the Warning window that appears and click the Exit Registration button (skip to **Section 8** to continue FieldServer configuration)
  - To ignore setup until the next time the FieldServer Web App is opened, click a tab other than Grid FieldServer Manager and then click the Exit Registration button with the “Opt out” checkbox unchecked (skip to **Section 8** to continue FieldServer configuration)

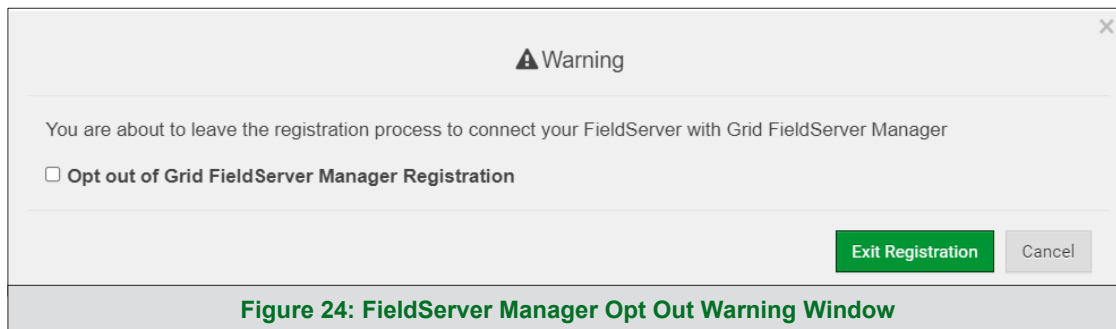


Figure 24: FieldServer Manager Opt Out Warning Window

**NOTE:** If FieldServer Manager integration with the ProtoNode is not desired, skip to **Section 8** to continue gateway setup. If user setup is already complete go to **Section 7.3**.



## 7.2 User Setup

Before the gateway can be connected to the FieldServer Manager, a user account must be created. Request an invitation to the FieldServer Manager from the manufacturer's support team and follow the instructions below to set up login details:

- The "Welcome to the MSA Grid – FieldServer Manager" email will appear as shown below.

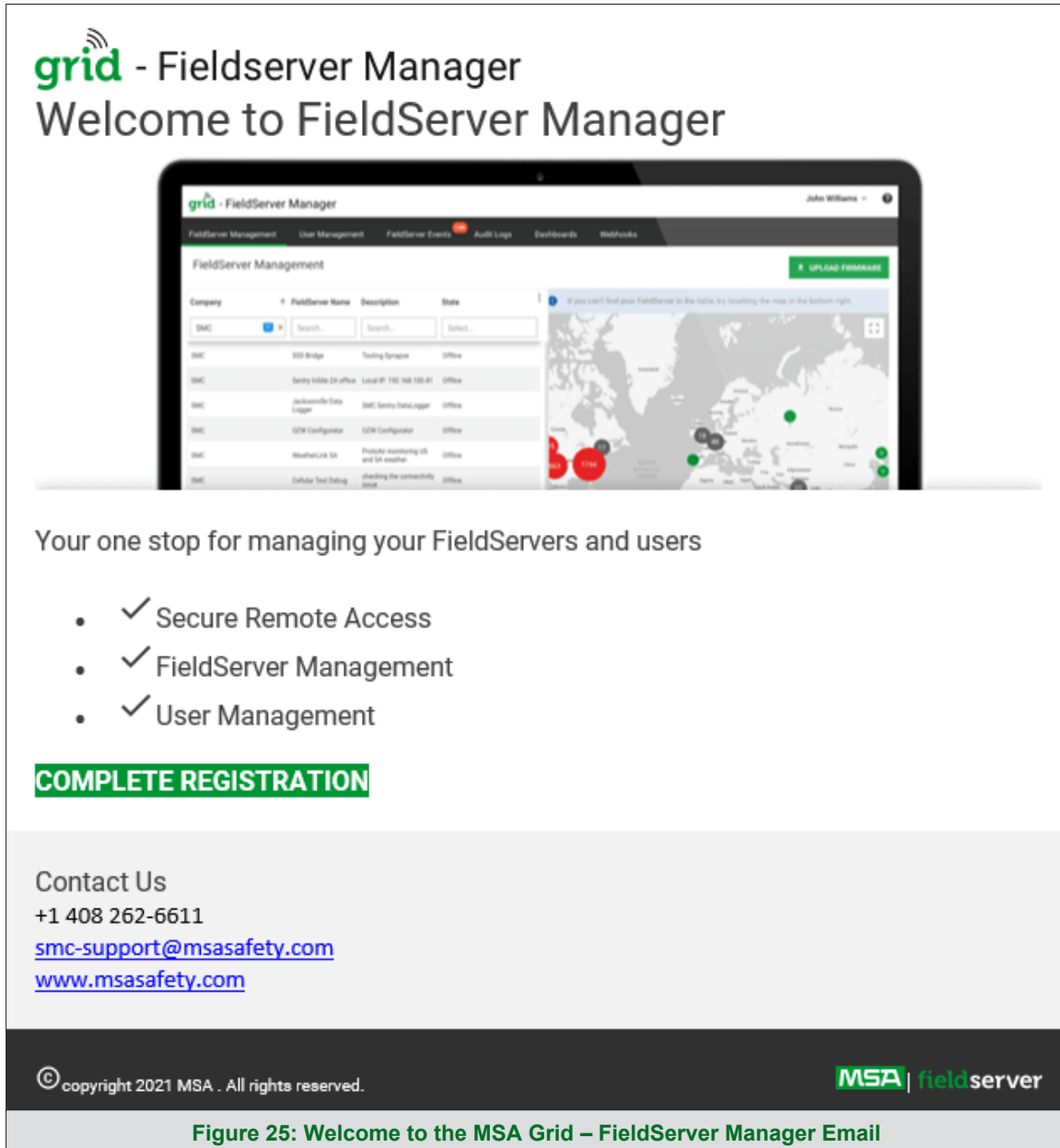


Figure 25: Welcome to the MSA Grid – FieldServer Manager Email

**NOTE:** If no email was received, check the spam/junk folder for an email from [notification@fieldpop.io](mailto:notification@fieldpop.io). Contact the manufacturer's support team if no email is found.

- Click the “Complete Registration” button and fill in user details accordingly.

### Complete Your Registration

Email Address

First Name

Last Name

Mobile Phone Number

New Password

Confirm Password

☐ By registering my account with MSA, I understand that I am agreeing to the FieldServer Manager [Terms of Service and Privacy Policy](#)

**Figure 26: Setting User Details**

- Fill in the name, phone number, password fields and click the checkbox to agree to the privacy policy and terms of service.

**NOTE:** If access to data logs using RESTful API is needed, do not include “#” in the password.

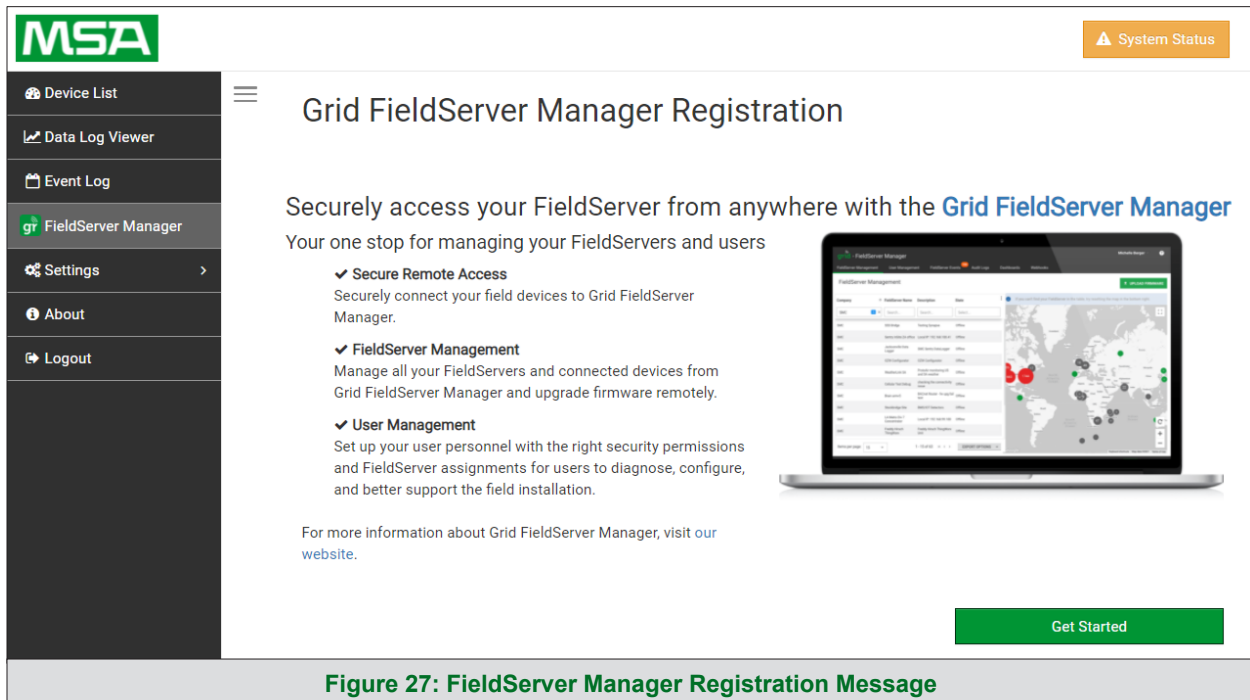
- Click “Save” to save the user details.
- Click “OK” when the Success message appears.
- Record the email account used and password for future use.

### 7.3 Registration Process

Once FieldServer Manager user credentials have been generated, the ProtoNode can be registered onto the server.

- When first logging onto the ProtoNode, the Web App will open on the Grid FieldServer Manager page.

**NOTE:** If a warning message appears instead, go to Section 10.8 to resolve the connection issue.



- Click Get Started to view the registration page.

**NOTE:** For information on the System Status button, go to Section 10.9.

- To register, fill in the user details, site details, gateway details and account credentials.
  - Enter user details and click Next

The screenshot shows the 'Installer Details' step of the registration process. At the top, there are four numbered tabs: 1 (Installer Details), 2 (Installation Site), 3 (FieldServer Details), and 4 (Account Details). The 'Installer Details' tab is active. Below the tabs, the form includes fields for 'Installer Name', 'Company', 'Telephone', 'Email', and 'Installation Date' (pre-filled with '20-September-2021'). At the bottom right, there are 'Cancel' and 'Next' buttons.

**Figure 28: FieldServer Manager Registration – Installer Details**

- Enter the site details by entering the physical address fields or the latitude and longitude then click Next

The screenshot shows the 'Installation Site Details' step of the registration process. At the top, there are four numbered tabs: 1 (Installer Details), 2 (Installation Site), 3 (FieldServer Details), and 4 (Account Details). The 'Installation Site' tab is active. Below the tabs, the form includes a 'Search' bar with 'Search Google Maps' text. Below this are fields for 'Site Name', 'Building', 'Street Address', 'Suburb', 'City', 'State', 'Country', 'Postal Code', 'Latitude', and 'Longitude'. To the right of these fields is a Google Map showing a location in Lafayette, Louisiana. At the bottom right, there are 'Cancel', 'Previous', and 'Next' buttons.

**Figure 29: FieldServer Manager Registration – Site Details**

- Enter Name and Description (required) then click Next

**Grid FieldServer Manager Registration**

1 Installer Details    2 Installation Site    3 FieldServer Details    4 Account Details

**FieldServer Details**

Name

Description

FieldServer Info   
Optionally specify any other information relating to the FieldServer i.e., calibration, commissioning or other notes

Timezone

Cancel Previous Next

**Figure 30: FieldServer Manager Registration – Gateway Details**

- Enter user credentials and click Register Device

**Grid FieldServer Manager Registration**

1 Installer Details    2 Installation Site    3 FieldServer Details    4 Account Details

**New Users**

If you do not have Grid FieldServer Manager credentials, you can create a new Grid FieldServer Manager account now [Create an Grid FieldServer Manager account](#)

**Existing Users - Enter FieldServer registration details**

**User Credentials**

Username

Password

Cancel Previous Register FieldServer

**Figure 31: FieldServer Manager Registration – Account**

- Once the device has successfully been registered, a confirmation window will appear. Click the Close button and the following screen will appear listing the device details and additional information auto-populated by the ProtoNode.

## Grid FieldServer Manager Registration

### FieldServer Registered

<div>FieldServer Details</div> <p><b>Name:</b> Test1</p> <p><b>Description:</b> FS Test</p> <p><b>FieldServer Info:</b></p> <p><b>Timezone:</b> America/Los_Angeles</p> <p><b>MAC Address:</b> 00:50:4E:60:13:FE</p> <p><b>Tunnel Server URL:</b> tunnel.fieldpop.io</p> <p><b>FieldServer ID:</b> treedancer_KrgPKmLRY</p> <p><b>Product Name:</b> Core Application - Default</p> <p><b>Product Version:</b> 5.2.0</p>	<div>Installer Details</div> <p><b>Installer Name:</b> Test</p> <p><b>Company:</b> MSA Safety</p> <p><b>Telephone:</b> (408) 444-4444</p> <p><b>Email:</b> contactus@msasafety.com</p> <p><b>Installation Date:</b> Sep 20, 2021</p>	<div>Installation Site Details</div> <p><b>Site Name:</b> Site#1</p> <p><b>Building:</b></p> <p><b>Street Address:</b> 1020 Canal Road</p> <p><b>Suburb:</b></p> <p><b>City:</b> Lafayette</p> <p><b>State:</b> Indiana</p> <p><b>Country:</b> United States</p> <p><b>Postal Code:</b> 47904</p>
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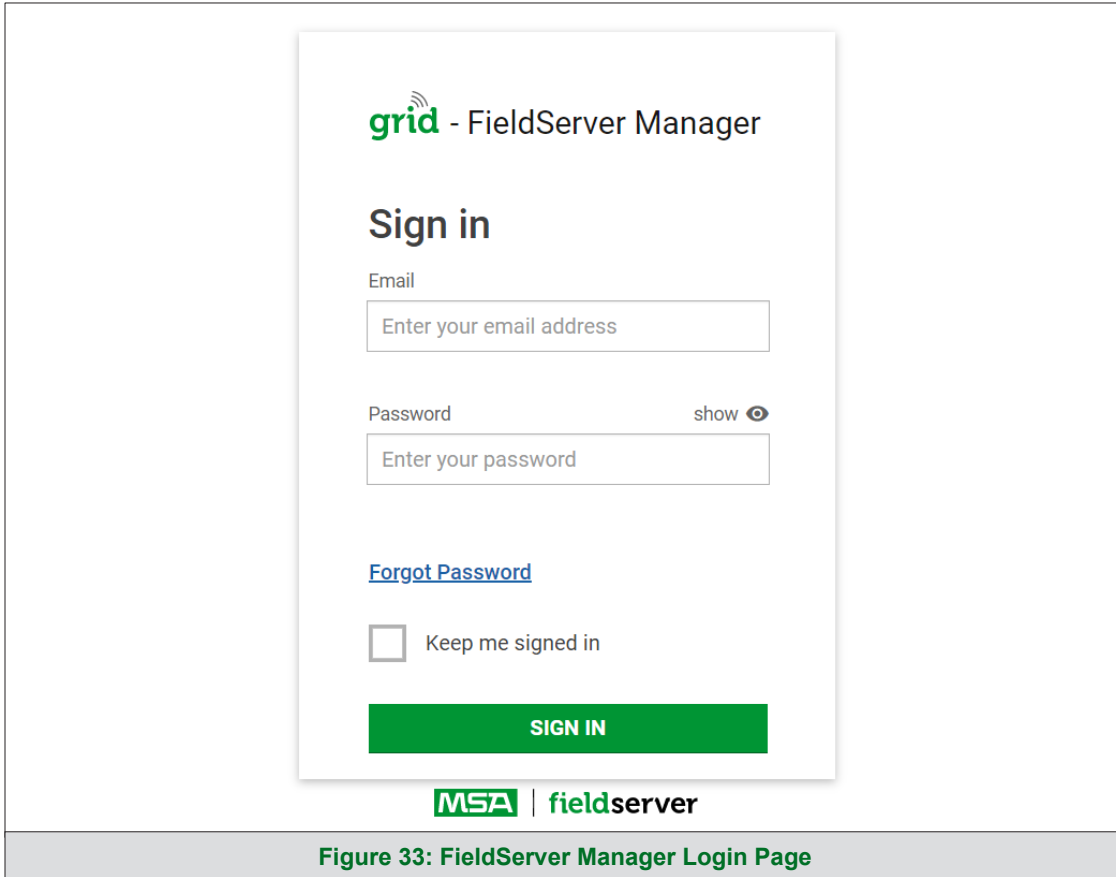
Update FieldServer Details

**Figure 32: Device Registered for the FieldServer Manager**

**NOTE:** Update these details at any time by going to the device's FS-GUI webpage, clicking the FieldServer Manager button and then clicking the Update FieldServer Details button.

#### 7.4 Login to the FieldServer Manager

After the ProtoNode is registered, go to [www.smccloud.net](http://www.smccloud.net) and type in the appropriate login information as per registration credentials.




grid - FieldServer Manager

Sign in

Email

Enter your email address

Password

show 

Enter your password

[Forgot Password](#)

☐ Keep me signed in

**SIGN IN**

**MSA** | fieldserver

Figure 33: FieldServer Manager Login Page

**NOTE:** If the login password is lost, see the [MSA Grid - FieldServer Manager Start-up Guide](#) for recovery instructions.

NOTE: For additional FieldServer Manager instructions see the [MSA Grid - FieldServer Manager Start-up Guide](#).

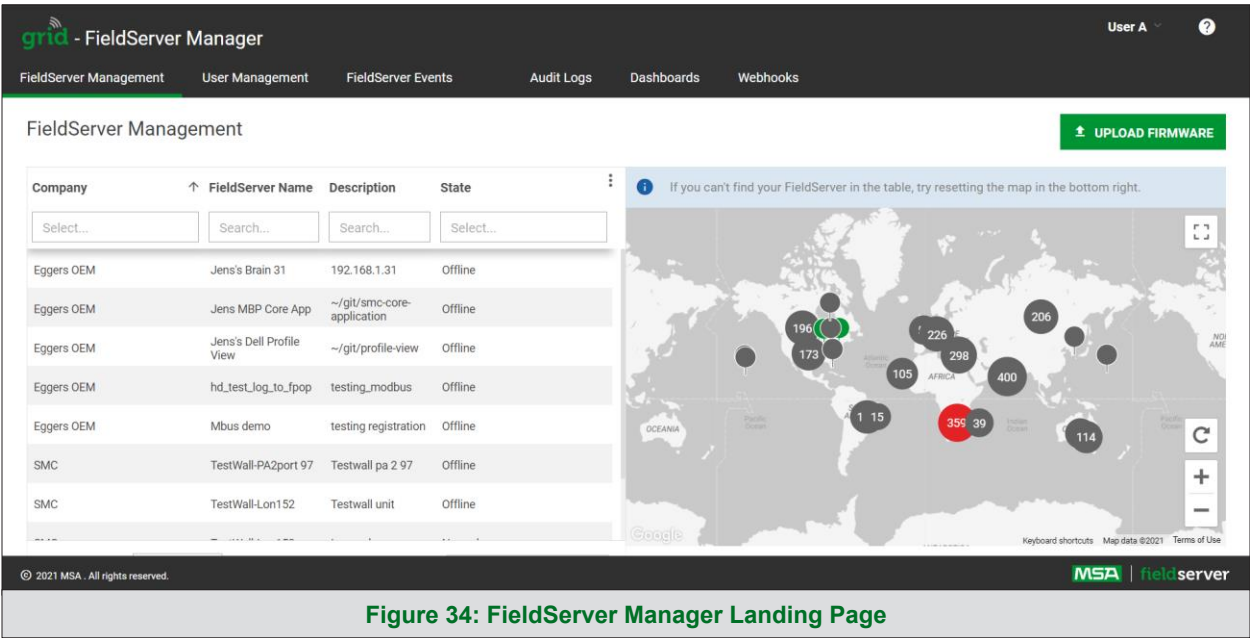


Figure 34: FieldServer Manager Landing Page



## 8 Configure the ProtoNode

### 8.1 Navigate to the ProtoNode Web Configurator

- From the Web App landing page (**Figure 35**), click the Settings tab and then click Configuration.

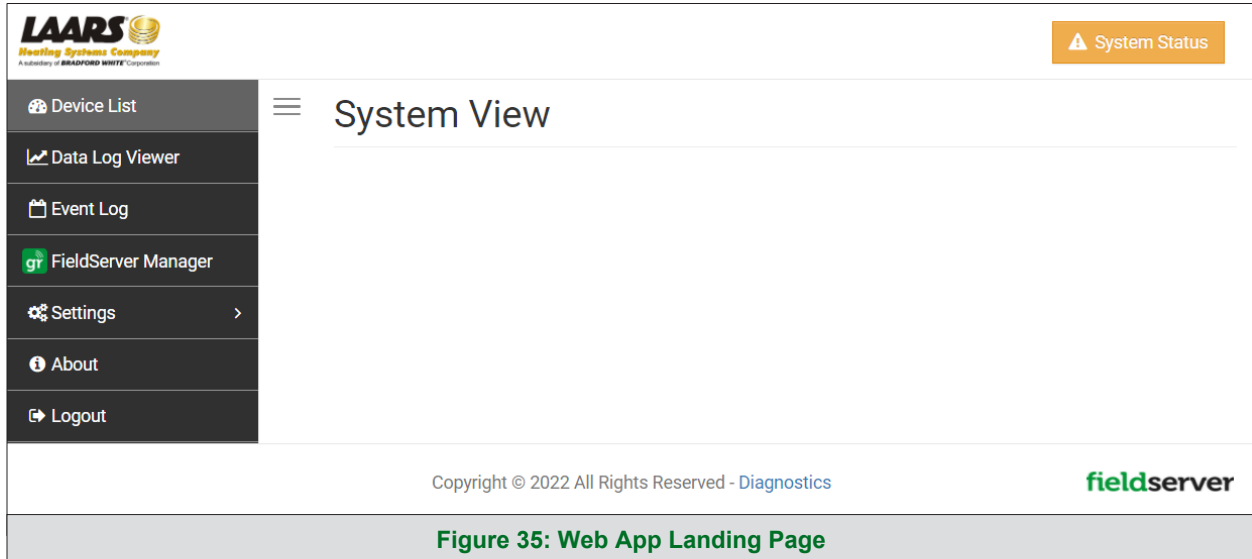


Figure 35: Web App Landing Page

**NOTE:** For information on the System Status button, go to Section 10.9.

- Then click the Profiles Configuration button to go to the Web Configurator page.

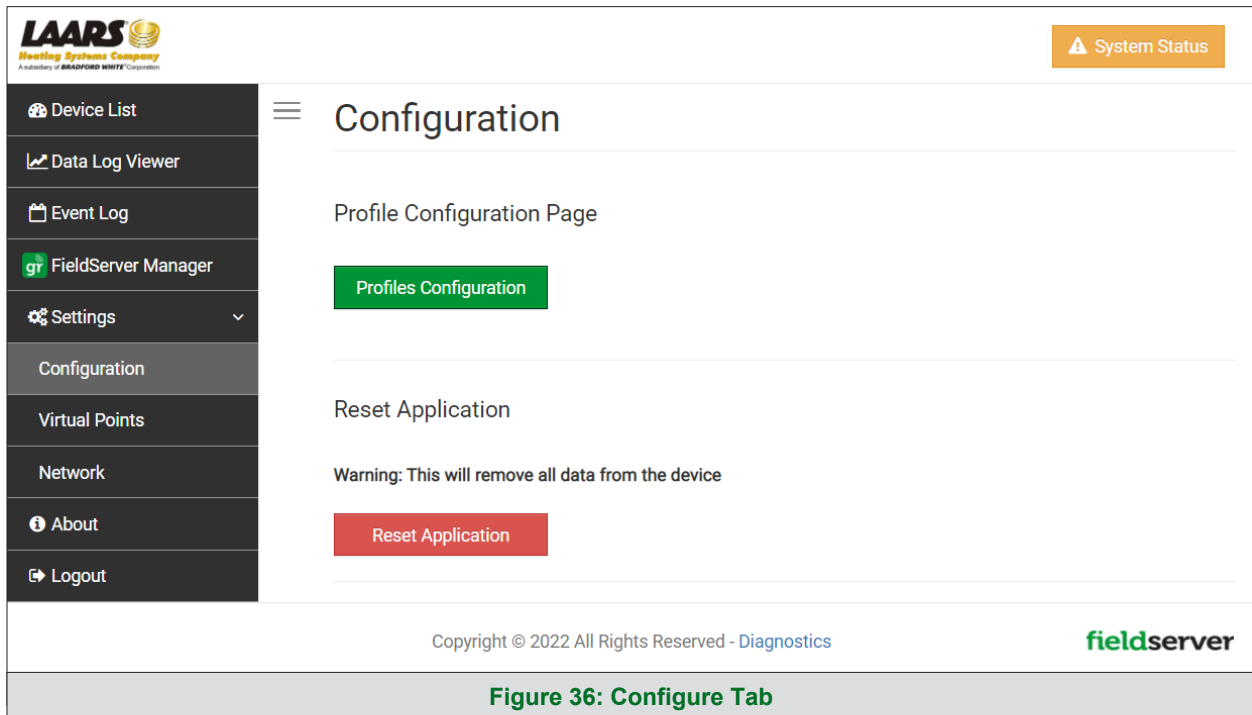
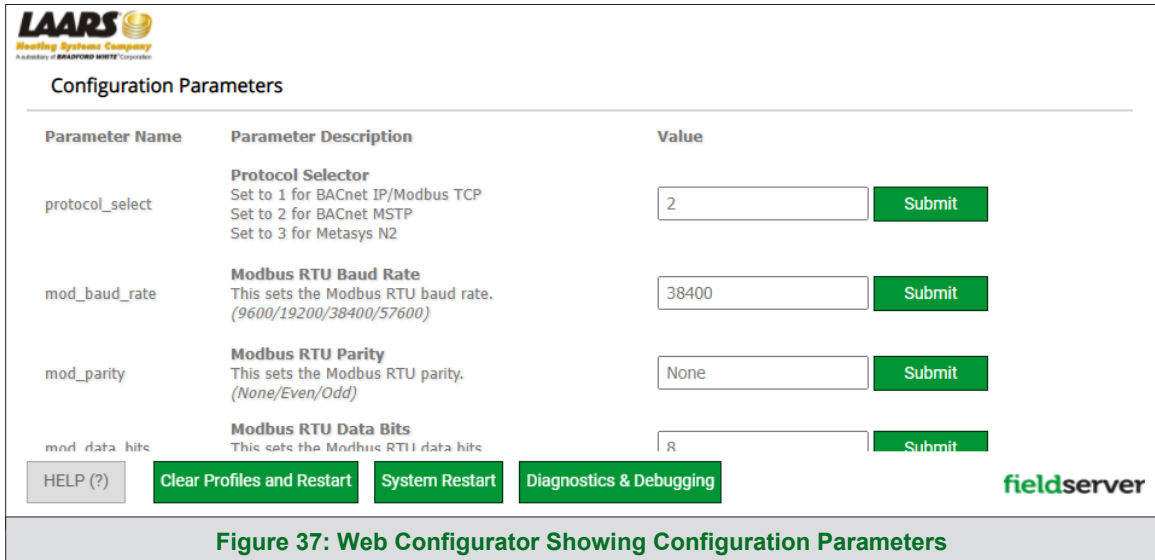


Figure 36: Configure Tab

**NOTE:** For Web App instructions to the System View, Data Log Viewer, Event Logger and Virtual Points functions, see the [MSA Grid - FieldServer Manager Start-up Guide](#).

## 8.2 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' page of the LAARS Web Configurator. The page has a header with the LAARS logo and 'Heating Systems Company' text. Below the header is a table with three columns: 'Parameter Name', 'Parameter Description', and 'Value'. The table contains four rows of configuration parameters, each with a 'Submit' button next to the value field.

Parameter Name	Parameter Description	Value
protocol_select	<b>Protocol Selector</b> Set to 1 for BACnet IP/Modbus TCP Set to 2 for BACnet MSTP Set to 3 for Metasys N2	2 <input type="button" value="Submit"/>
mod_baud_rate	<b>Modbus RTU Baud Rate</b> This sets the Modbus RTU baud rate. (9600/19200/38400/57600)	38400 <input type="button" value="Submit"/>
mod_parity	<b>Modbus RTU Parity</b> This sets the Modbus RTU parity. (None/Even/Odd)	None <input type="button" value="Submit"/>
mod_data_bits	<b>Modbus RTU Data Bits</b> This sets the Modbus RTU data bits	8 <input type="button" value="Submit"/>

At the bottom of the page, there are four buttons: 'HELP (?)', 'Clear Profiles and Restart', 'System Restart', and 'Diagnostics & Debugging'. The 'fieldserver' logo is in the bottom right corner.

**Figure 37: 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.**

- 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.**

### 8.3 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 38)



**Configuration Parameters**

Parameter Name	Parameter Description	Value
protocol_select	<b>Protocol Selector</b> Set to 1 for BACnet IP/Modbus TCP Set to 2 for BACnet MSTP Set to 3 for Metasys N2	<input type="text" value="2"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
mod_baud_rate	<b>Modbus RTU Baud Rate</b> This sets the Modbus RTU baud rate. (9600/19200/38400/57600)	<input type="text" value="38400"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
mod_parity	<b>Modbus RTU Parity</b> This sets the Modbus RTU parity. (None/Even/Odd)	<input type="text" value="None"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
mod_data_bits	<b>Modbus RTU Data Bits</b> This sets the Modbus RTU data bits. (7 or 8)	<input type="text" value="8"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
mod_stop_bits	<b>Modbus RTU Stop Bits</b> This sets the Modbus RTU stop bits. (1 or 2)	<input type="text" value="1"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
network_nr	<b>BACnet Network Number</b> This sets the BACnet network number of the Gateway. (1 - 65535)	<input type="text" value="50"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
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. (0 - 4194303)	<input type="text" value="50000"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
bac_mac_addr	<b>BACnet MSTP Mac Address</b> This sets the BACnet MSTP MAC address. (1 - 127)	<input type="text" value="127"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
bac_baud_rate	<b>BACnet MSTP Baud Rate</b> This sets the BACnet MSTP baud rate. (9600/19200/38400/76800)	<input type="text" value="38400"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
bac_max_master	<b>BACnet MSTP Max Master</b> This sets the BACnet MSTP max master. (1 - 127)	<input type="text" value="127"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
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. (COV_Enable/COV_Disable)	<input type="text" value="COV_Disable"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>
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. (No/Yes)	<input type="text" value="No"/> <span style="float: right; background-color: #008000; color: white; padding: 2px 5px;">Submit</span>

**Active profiles**

Nr	Node ID	Current profile	Parameters
<span style="background-color: #008000; color: white; padding: 2px 10px; margin: 0 5px;">Add</span>			
<span style="background-color: #cccccc; padding: 2px 10px; margin: 0 5px;">HELP (?)</span> <span style="background-color: #008000; color: white; padding: 2px 10px; margin: 0 5px;">Clear Profiles and Restart</span> <span style="background-color: #008000; color: white; padding: 2px 10px; margin: 0 5px;">System Restart</span> <span style="background-color: #008000; color: white; padding: 2px 10px; margin: 0 5px;">Diagnostics &amp; Debugging</span>			


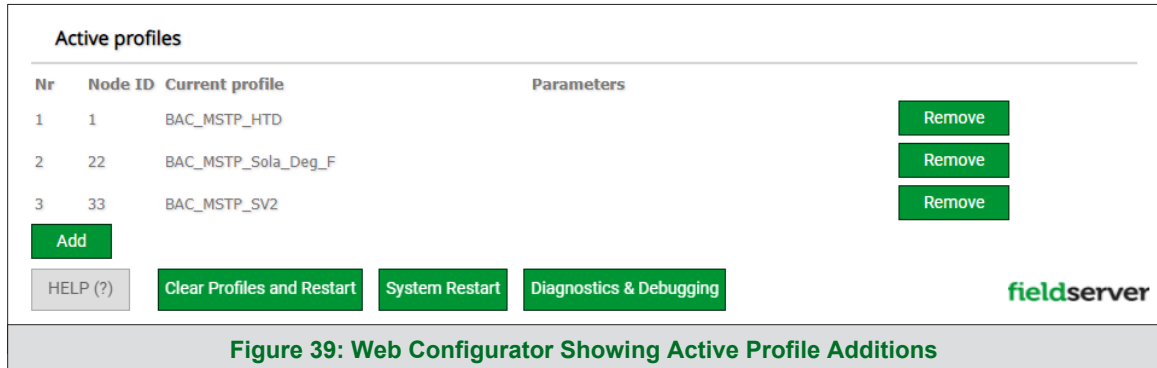


Figure 38: Web Configurator Showing no Active Profiles

- 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**.
- Then press the “Submit” button to add the Profile to the list of devices to be configured.
- Repeat this process until all the devices have been added.
- Completed additions are listed under “Active profiles” as shown in **Figure 39**.



**Figure 39: Web Configurator Showing Active Profile Additions**

#### 8.4 Verify Device Communications

- **Check that the port R1 TX1 and RX1 LEDs are rapidly flashing.** See **Section 9.4** for additional LED information and images.
- Confirm the software shows good communications without errors (**Section 9.2**).

## 8.5 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 =  $50,000 + \text{Node\_ID} = 50,000 + 1 = 50,001$
- Device 2 Instance =  $50,000 + \text{Node\_ID} = 50,000 + 22 = 50,022$
- Device 3 Instance =  $50,000 + \text{Node\_ID} = 50,000 + 33 = 50,033$

- 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)

node\_offset

50000

Submit

Figure 40: Web Configurator Node Offset Field

**Active profiles**

Nr	Node ID	Current profile	Parameters
1	1	BAC_MSTP_HTD	
2	22	BAC_MSTP_Sola_Deg_F	
3	33	BAC_MSTP_SV2	

Remove Remove Remove

Add

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

fieldserver

Figure 41: Active Profiles

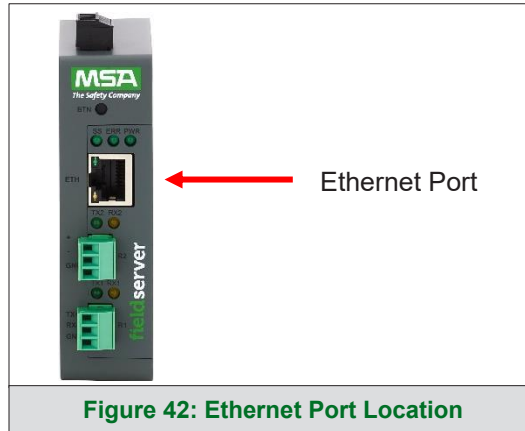
### 8.6 How to Start the Installation Over: Clearing Profiles

- 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.

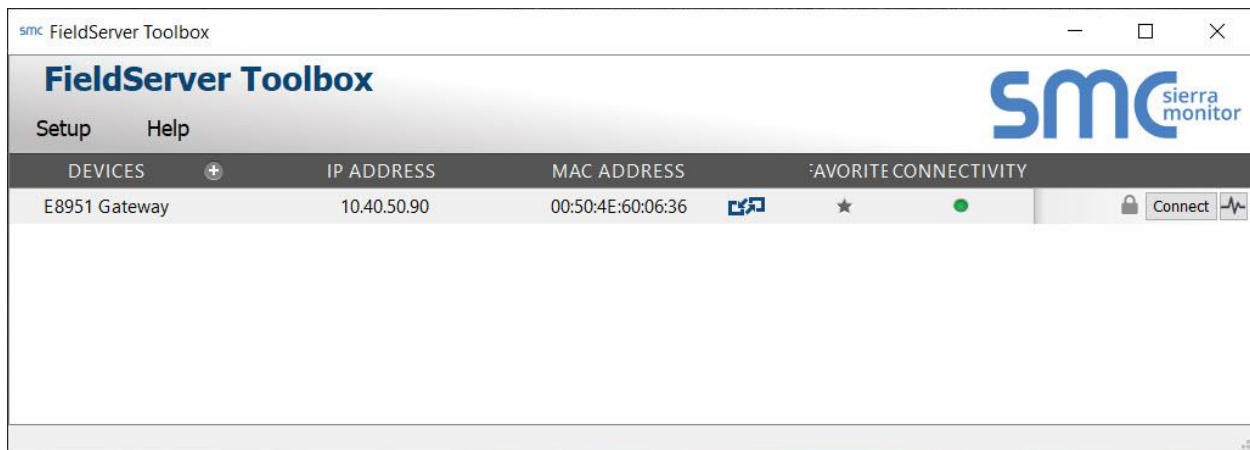
## 9 Troubleshooting

### 9.1 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.

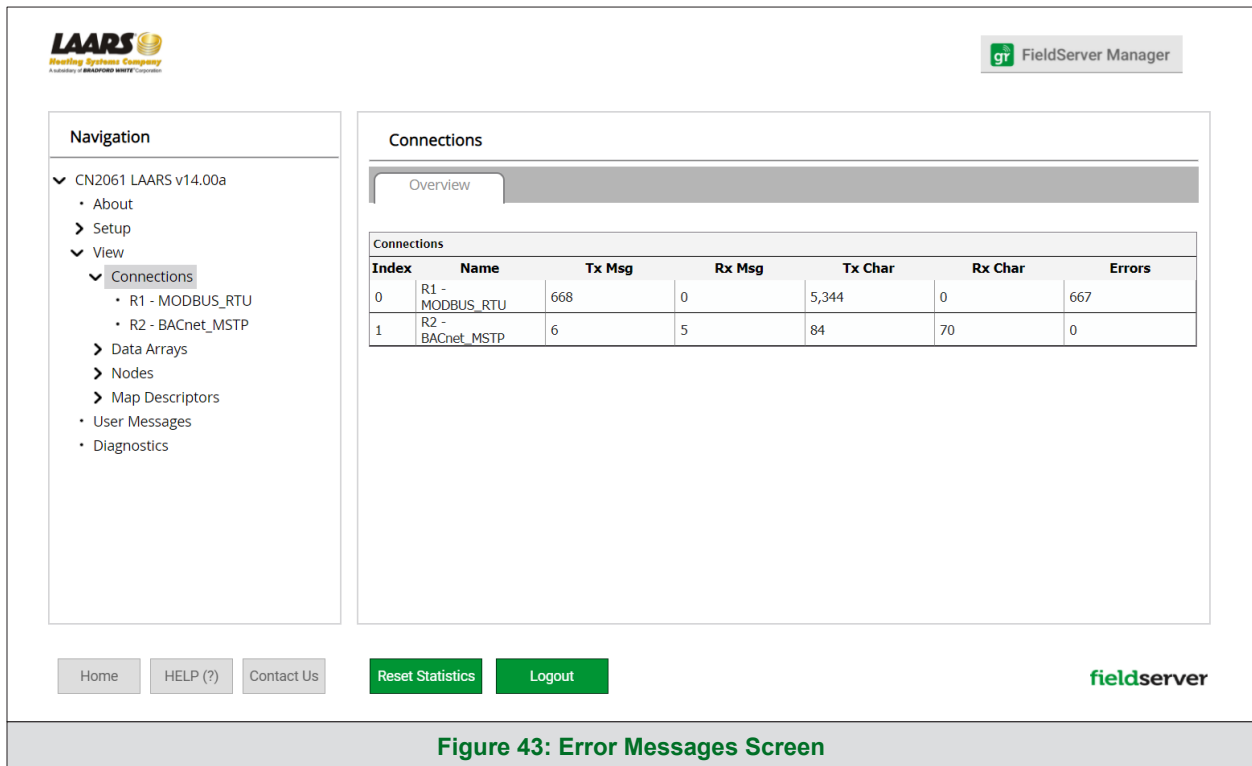


- Connect a standard Cat-5 Ethernet cable between the user's PC and ProtoNode.
- Double click on the FS Toolbox Utility and click Discover Now on the splash page.
- Check for the IP Address of the desired gateway.



## 9.2 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 9.3** for the relevant wiring and settings.



The screenshot displays the LAARS FieldServer Manager web interface. On the left is a navigation menu with options like Overview, About, Setup, View, Connections, Data Arrays, Nodes, Map Descriptors, User Messages, and Diagnostics. The 'Connections' section is active, showing a table with two rows of connection data. The top row shows 'R1 - MODBUS\_RTU' with 668 Tx Msg, 0 Rx Msg, 5,344 Tx Char, 0 Rx Char, and 667 Errors. The bottom row shows 'R2 - BACnet\_MSTP' with 6 Tx Msg, 5 Rx Msg, 84 Tx Char, 70 Rx Char, and 0 Errors. The interface also includes a 'Reset Statistics' button and a 'Logout' button at the bottom.

Index	Name	Tx Msg	Rx Msg	Tx Char	Rx Char	Errors
0	R1 - MODBUS_RTU	668	0	5,344	0	667
1	R2 - BACnet_MSTP	6	5	84	70	0

Figure 43: Error Messages Screen



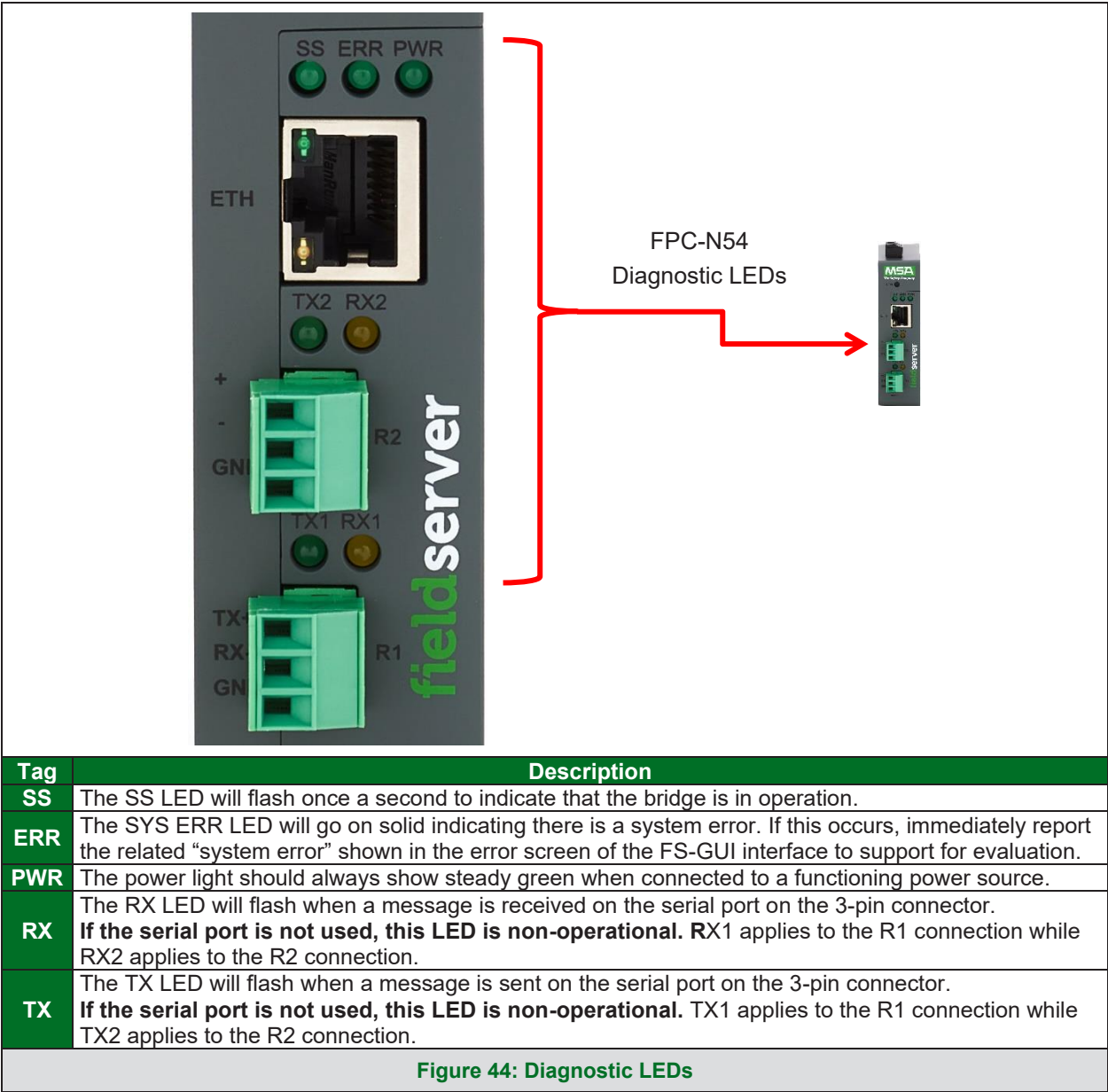
### 9.3 Checking Wiring and Settings

- 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 9.4**)
  - Check baud rate, parity, data bits, stop bits
  - Check device address
  - Verify wiring
  - Verify the device was listed in the Web Configurator Active Profiles (**Section 8.3**)
- Field COM problems:
  - Visual observations of LEDs on the ProtoNode (**Section 9.4**)
  - Verify IP Address setting
  - Verify wiring

**NOTE:** If the problem persists, a Diagnostic Capture needs to be taken and sent to support. (**Section 9.5**)


9.4 LED Diagnostics for Communications Between ProtoNode and Devices

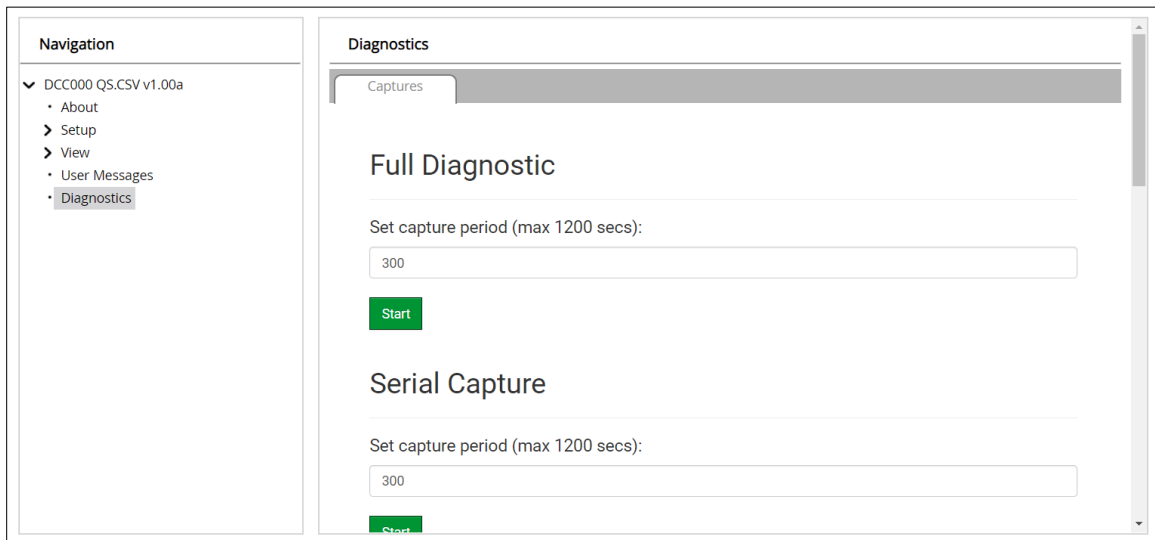
See the diagram below for ProtoNode LED Locations.




### 9.5 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.

- 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.

### 9.6 Factory Reset Instructions

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

### 9.7 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.

## 10 Additional Information

### 10.1 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 9.1**)
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 “Firmware” tab
5. In the Firmware tab, click on “Choose Files” and select the firmware file extracted in step 1.
6. Click on the orange “Submit” button.
7. When the download is complete, click on the “System Restart” button.

### 10.2 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"/>
------------	--	---------------------------------	---------------------------------------

**Figure 45: Web Configurator – Network Number Field**

### 10.3 Mounting

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



### 10.4 Certification

#### 10.4.1 BTL Mark – BACnet® Testing Laboratory

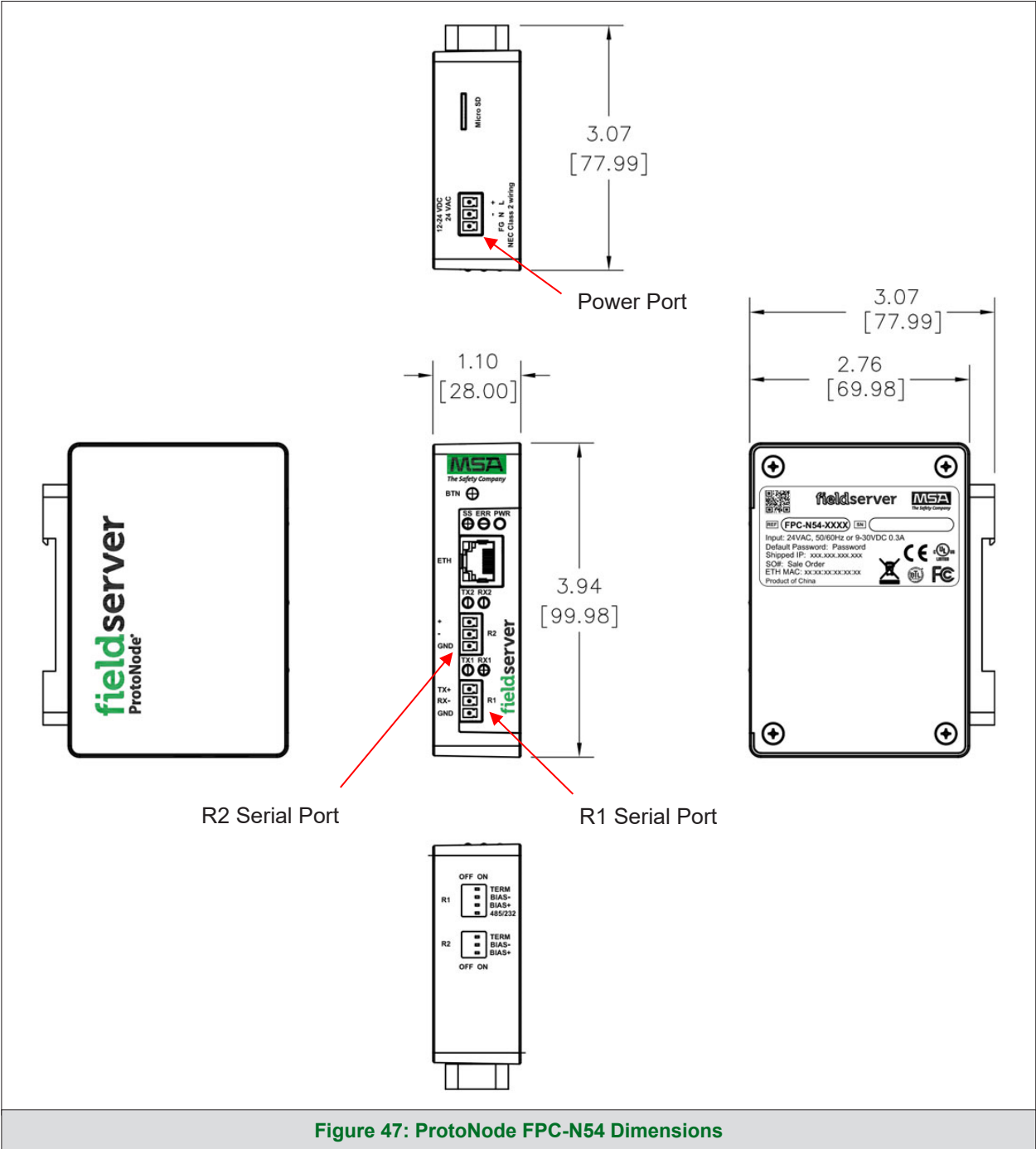


The BTL Mark on ProtoNode is a symbol that indicates that a product has passed a series of rigorous tests conducted by an independent laboratory which verifies that the product correctly implements the BACnet features claimed in the listing. The mark is a symbol of a high-quality BACnet product.

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.**

10.5 Physical Dimension Drawing



## 10.6 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 displays the MSA FieldServer Manager web interface. On the left is a 'Navigation' panel with a tree view containing 'DCC000 QS.CSV v1.00a' (selected), 'About', 'Setup', 'View', 'User Messages', and 'Diagnostics'. The main content area shows the 'Status' page for 'DCC000 QS.CSV v1.00a', with tabs for 'Status', 'Settings', and 'Info Stats'. A table lists system parameters and their values:

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%

At the bottom of the interface are buttons for 'Home', 'HELP (?)', 'Contact Us', 'System Restart', 'System Reboot', 'System Time Synch', 'Reset Cycle Times', and 'Logout'. The 'fieldserver' logo is in the bottom right corner.

**Figure 48: FS-GUI Page**



### 10.6.1 Change Security Mode

- Click Security in the Navigation panel.

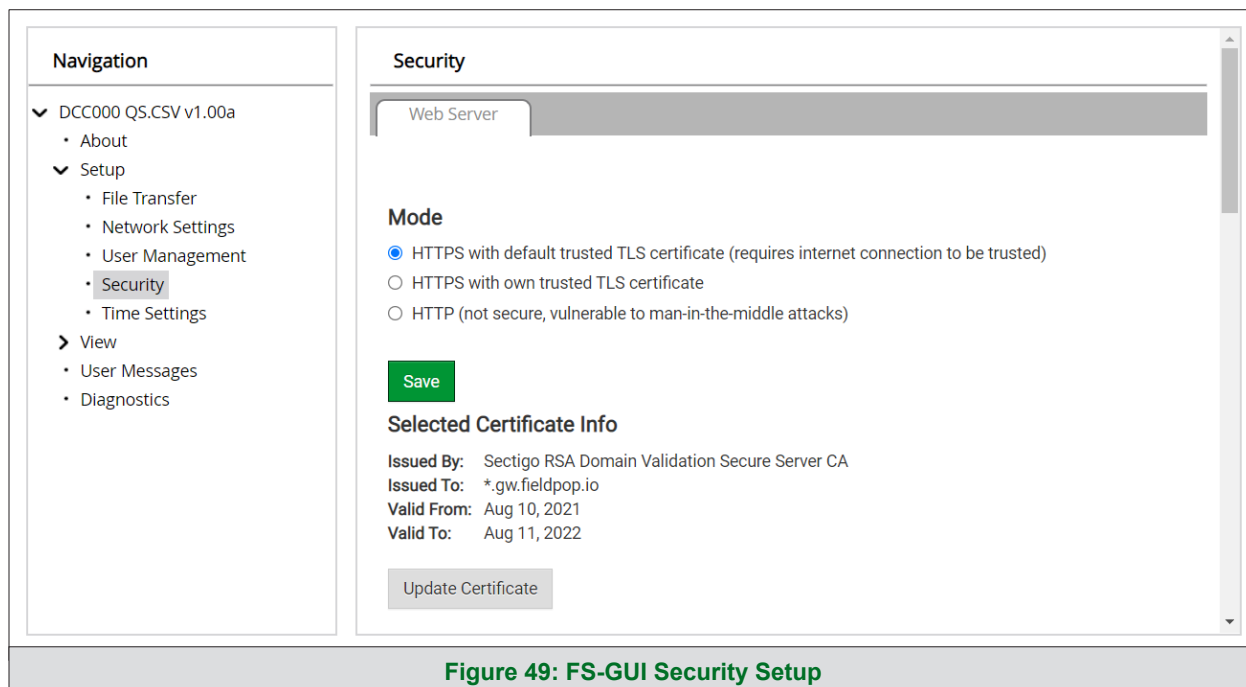


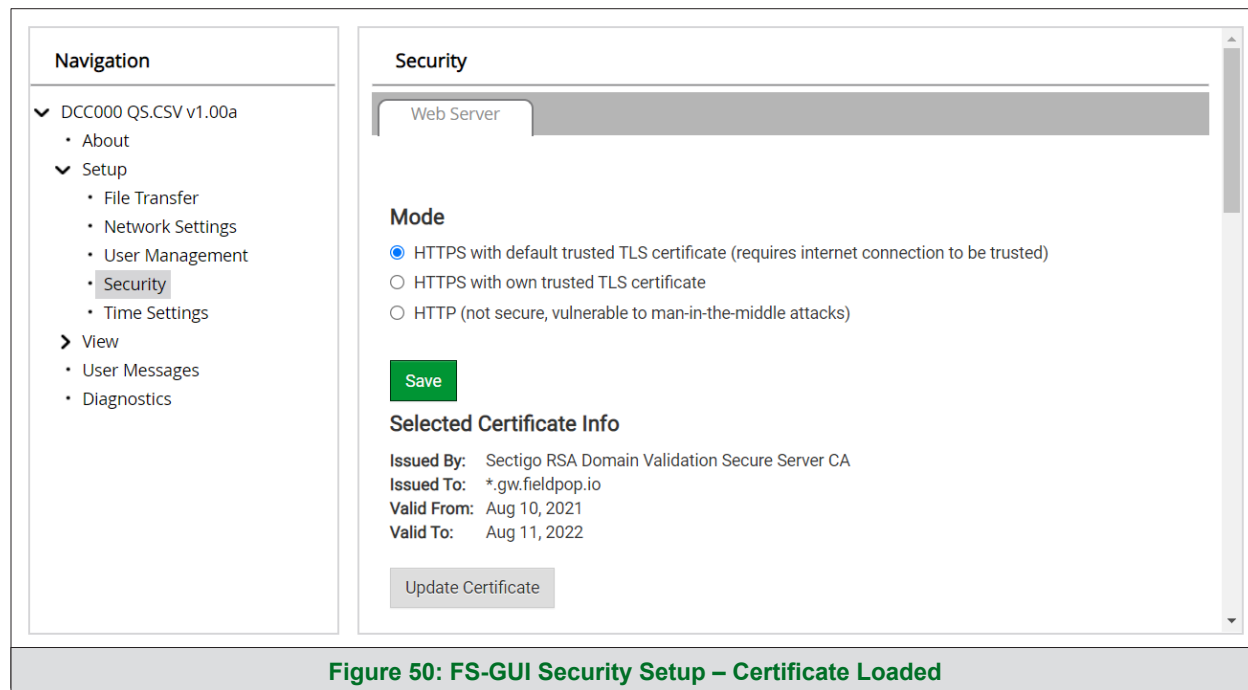
Figure 49: FS-GUI Security Setup

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

### 10.6.2 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 50: 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.

## 10.7 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.

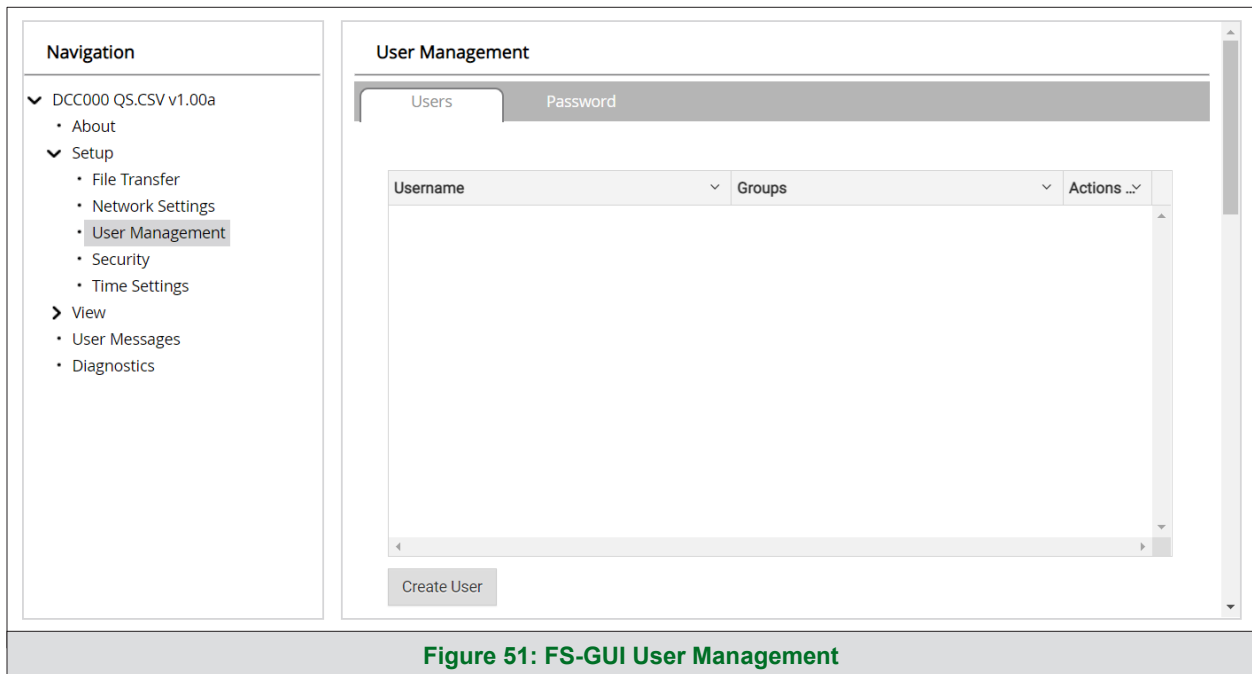


Figure 51: FS-GUI User Management

User Types:

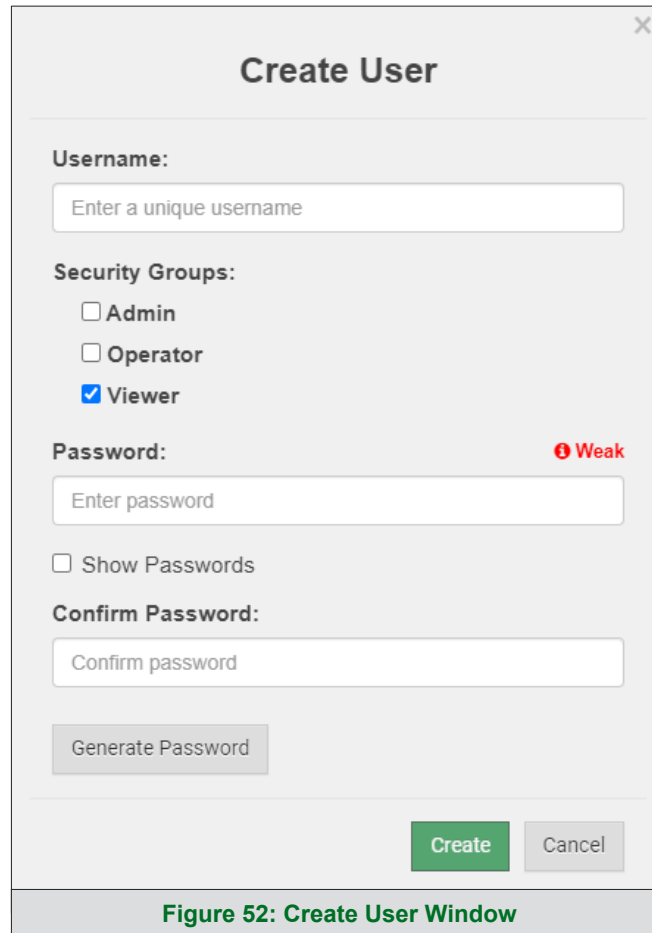
**Admin** – Can modify and view any settings on the FieldServer.

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

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

### 10.7.1 Create Users

- Click the Create User button.

A screenshot of the 'Create User' window. The window has a title bar with a close button (X). The title 'Create User' is centered at the top. Below the title, there are three main sections: 'Username:', 'Security Groups:', and 'Password:'. The 'Username:' section has a text input field with the placeholder 'Enter a unique username'. The 'Security Groups:' section has three checkboxes: 'Admin' (unchecked), 'Operator' (unchecked), and 'Viewer' (checked). The 'Password:' section has a text input field with the placeholder 'Enter password'. To the right of the password field, there is a red icon of a person and the word 'Weak'. Below the password field, there is a checkbox labeled 'Show Passwords'. Below the password field and the 'Show Passwords' checkbox, there is a text input field for 'Confirm Password:' with the placeholder 'Confirm password'. Below the 'Confirm Password' field, there is a button labeled 'Generate Password'. At the bottom right of the window, there are two buttons: 'Create' (green) and 'Cancel' (gray).

**Create User**

**Username:**

Enter a unique username

**Security Groups:**

☐ Admin

☐ Operator

☒ Viewer

**Password:** Weak

Enter password

☐ Show Passwords

**Confirm Password:**

Confirm password

Generate Password

Create Cancel

Figure 52: Create User Window

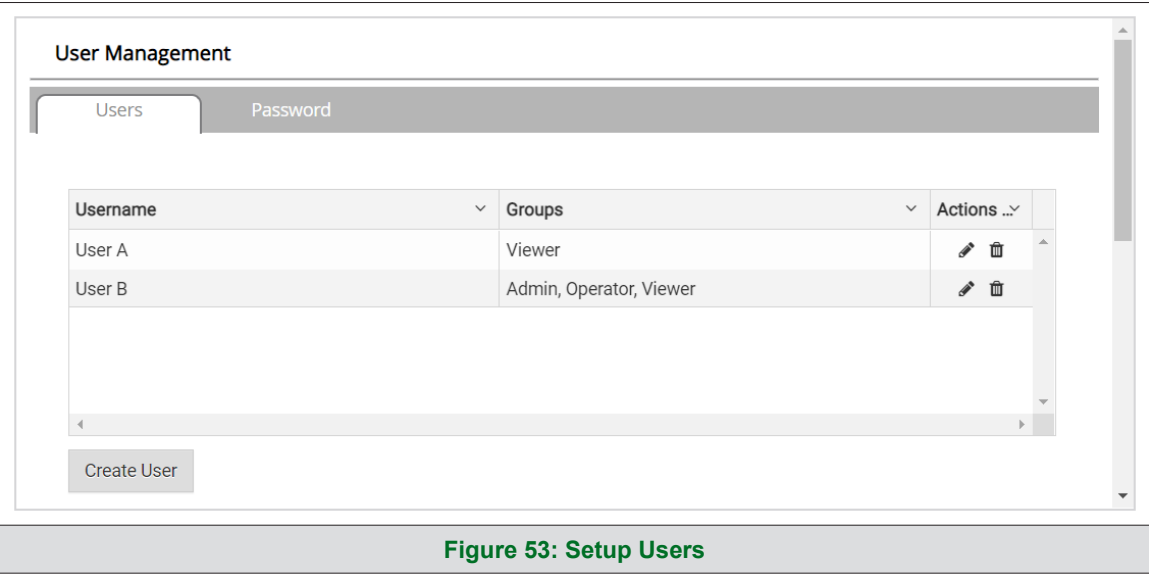
- Enter the new User fields: Name, Security Group and Password.
  - User details are hashed and salted

**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.

10.7.2 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 a web form titled "Edit User". It contains the following fields and controls:

- Username:** A text input field containing "User A".
- Security Groups:** Three checkboxes: "Admin" (unchecked), "Operator" (unchecked), and "Viewer" (checked).
- Password:** A text input field containing "Optional".
- Show passwords:** An unchecked checkbox.
- Confirm Password:** A text input field containing "Optional".
- Generate Password:** A button.
- Confirm:** A green button.
- Cancel:** A grey button.

**Figure 54: Edit User Window**

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

### 10.7.3 Delete Users

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

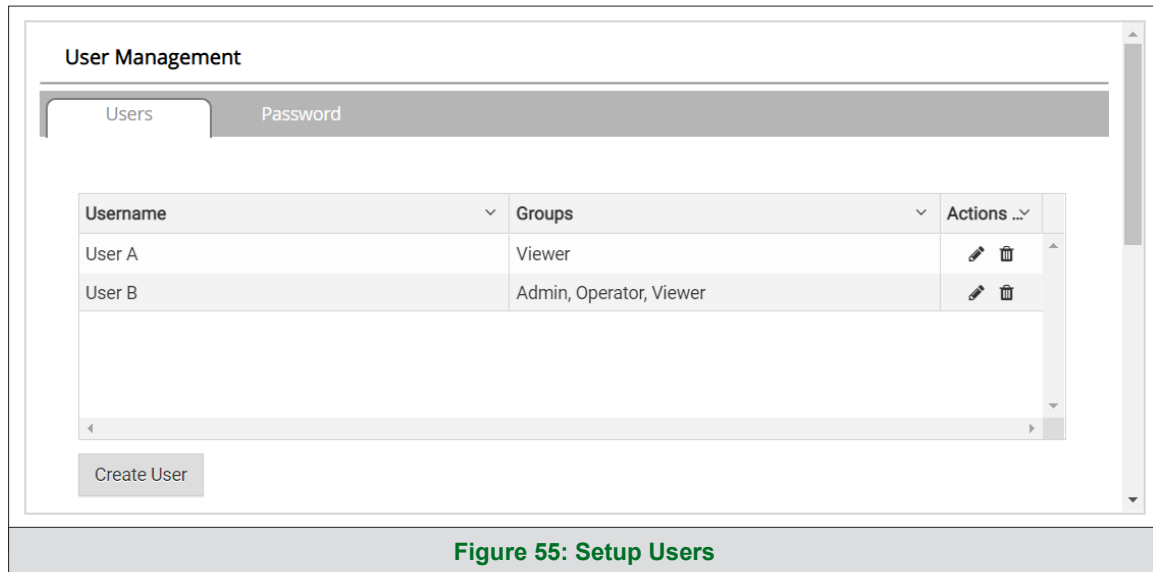


Figure 55: Setup Users

- When the warning message appears, click Confirm.

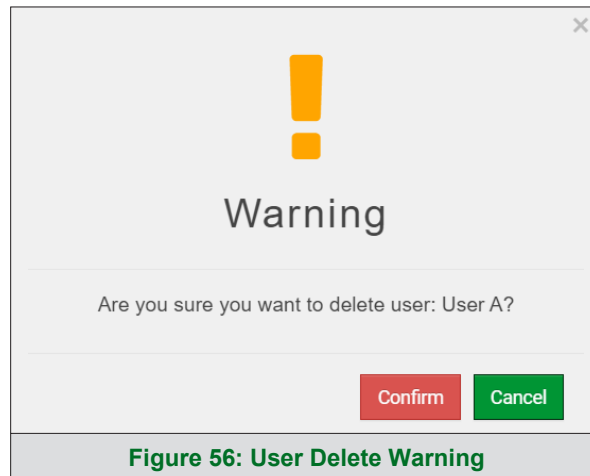


Figure 56: User Delete Warning

#### 10.7.4 Change FieldServer Password

- Click the Password tab.

The screenshot shows the 'User Management' interface with the 'Password' tab selected. On the left is a 'Navigation' sidebar with a tree structure: 'DCC000 QS.CSV v1.00a' (expanded) containing 'About', 'Setup' (expanded), 'Security', and 'Time Settings'; 'View' (expanded) containing 'User Messages' and 'Diagnostics'. The 'User Management' panel has two tabs: 'Users' and 'Password'. The 'Password' tab contains a 'Password:' label with a red 'Weak' indicator, a text input field with placeholder 'Enter password', a 'Show passwords' checkbox, a 'Confirm Password:' label, another text input field with placeholder 'Confirm password', a 'Generate Password' button, and a 'Confirm' button at the bottom right.

**Figure 57: 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.

### 10.8 FieldServer Manager Connection Warning Message

- If a warning message appears instead of the page as shown in **Figure 27**, follow the suggestion that appears on screen.
  - If the ProtoNode cannot reach the server, the following message will appear



**Figure 58: FieldServer Manager Connection Problems Message**

- Follow the directions presented in the warning message.
  - Go to the network settings by clicking the Settings tab and then click the Network tab
  - Check with the site's IT support that the DNS settings are setup correctly
  - Ensure that the ProtoNode is properly connected to the Internet

**NOTE:** If changes to the network settings are done, remember to click the **Save** button. Then power cycle the FieldServer by clicking on the **Confirm** button in the window and click on the bolded "Restart" text in the yellow pop-up box that appears in the upper right corner of the screen.



### 10.9 System Status Button

The System Status Button can be found on any page of the web apps. This shows the level of alert/functionality for the customer device. This is an aggregate of the Web App page's resource usage upon the local PC or mobile device, connectivity and device alert level.



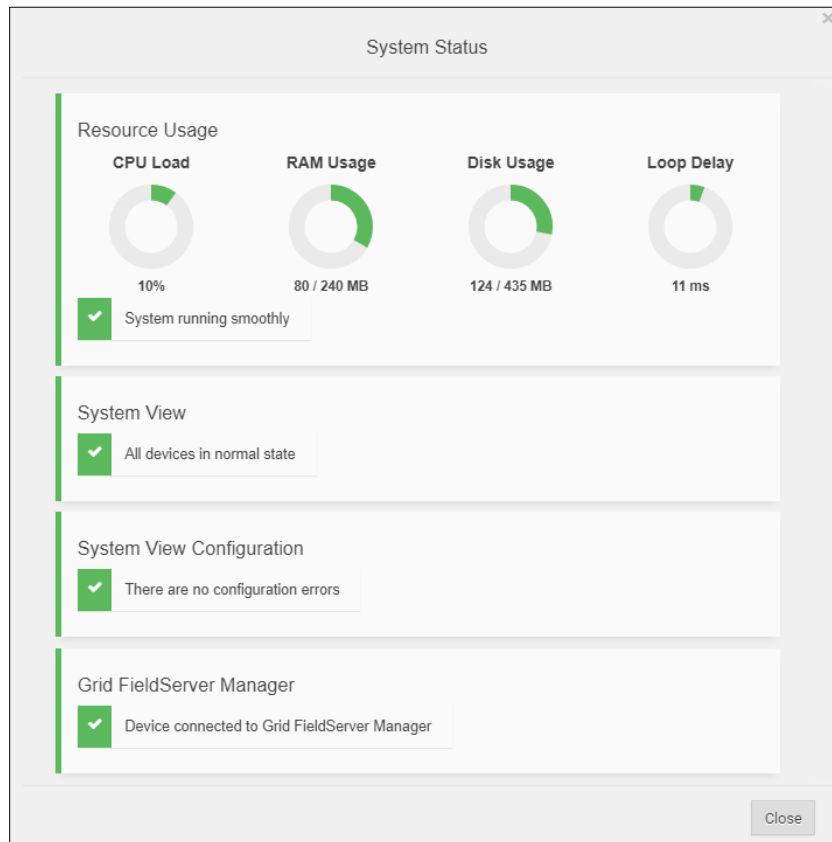
The color of the button represents the status of one to all three systems:

**Green** – Normal status

**Yellow** – Warning status

**Red** – Alarm status

Click on the System Status Button to open the System Status window, showing more details on the status of each system.



**NOTE:** If it was selected to opt out of the FieldServer Manager (Figure 24), the Grid FieldServer Manager status will not show in the System Status window. This means the status will show as green even if the gateway is not connected to the FieldServer Manager.

## 11 Vendor Information – LAARS

See document “LAARS Vendor Mapping” for the complete point list for all the devices referenced in this manual. Only the protocols listed as supported for this FieldServer are supported (see **Section 1.1**). Ignore all points referring to unsupported protocols when using this FieldServer.

## 12 Specifications



	ProtoNode FPC-N54 <sup>1</sup>
<b>Electrical Connections</b>	One 3-pin Phoenix connector with: RS-485/RS-232 port (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 0.25A @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
<b>Wi-Fi 802.11 b/g/n</b>	<i>Frequency:</i> 2.4 GHz <i>Channels:</i> 1 to 11 (inclusive) <i>Antenna Type:</i> SMA <i>Encryption:</i> TKIP, WPA & AES
<b>Figure 59: Specifications</b>	

### 12.1 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>1</sup> Specifications subject to change without notice.

