Operating Manual

ProtoNode FPC-N54 for Interfacing Lochinvar Products

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MSAsafety.com

Technical Support

Thank you for purchasing the ProtoNode for Lochinvar.

Please call Lochinvar for technical support of the ProtoNode product.

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

Support Contact Information:

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300 Maddox Simpson Pkwy.
Lebanon, TN 37090

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(800) 722-2101

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Email: 2tech@lochinvar.com

Quick Start Guide

1. Record the information about the unit. (**Section 2.1 Record Identification Data**)
2. Check that the ProtoNode and customer device COM settings match. (**Section 2.3 Configuring Device Communications**)
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 2.4 Device Connections to ProtoNode**)
4. **If using a serial field protocol:**
   Connect the ProtoNode 3 pin RS-485 R2 port to the field protocol cabling (**Section 2.5 Wiring Field Port to RS-485 Serial Network**).
5. Connect power to ProtoNode 3 pin power port. (**Section 3 Power up the Gateway**)
6. Connect a PC to the ProtoNode via Ethernet cable. (**Section 4 Connect the PC to the Gateway**)
7. Setup Web Server Security and login via web browser. (**Section 5 Setup Web Server Security**)
8. Use a web browser to access the ProtoNode Web Configurator page to select the profile of the device attached to the ProtoNode and enter any necessary device information. Once the device is selected, the ProtoNode automatically builds and loads the appropriate configuration. (**Section 6 Configure the ProtoNode**)
9. Ethernet Network: If using an Ethernet field protocol, use a web browser to access the ProtoNodeWeb Configurator page to change the IP Address. (**Section 6.4 Ethernet Network: Setting IP Address for the Field Network**)

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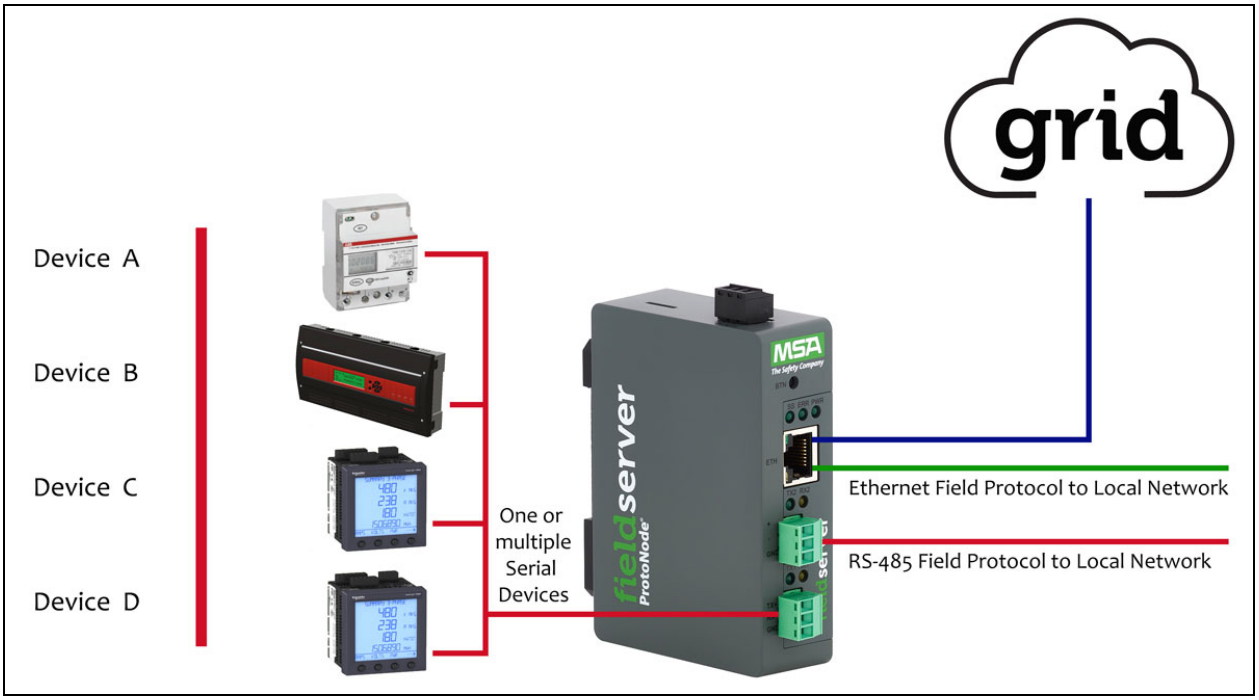
1 Introduction

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 Lochinvar devices (hereafter simply called “device”) connected to the ProtoNode and automatically configures them for BACnet/IP, BACnet MS/TP, Metasys N2, Modbus RTU or Modbus TCP/IP.

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-N54-1998

- FPC-N54 units have the following 3 ports: Ethernet + RS-485 + 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-N54-1998	1,500

Devices	Point Count Per Device
Veritus	54
Emerge_X	54

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.
- The table below specifies the device serial port settings required to communicate with the ProtoNode.

Port Setting	Devices
Protocol	Modbus RTU
Baud Rate	19200
Parity	None
Data Bits	8
Stop Bits	1

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

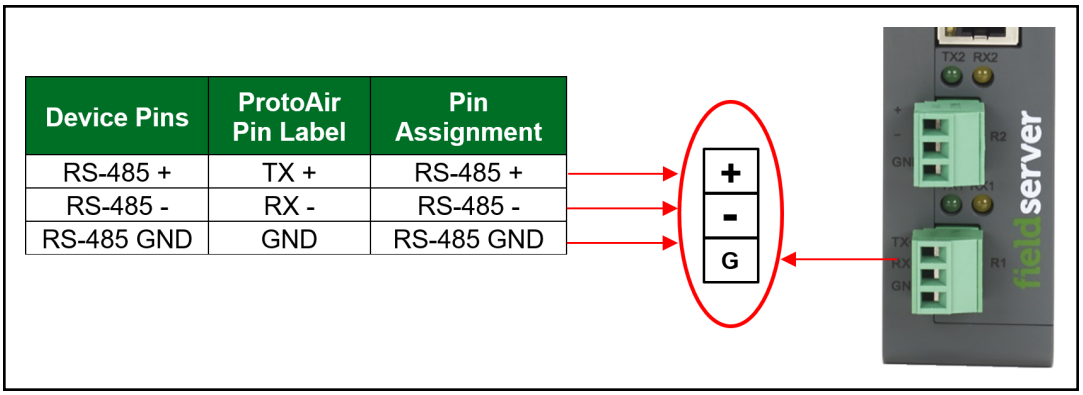
- Set Node-ID for any device attached to ProtoNode. The Node-ID needs to be uniquely assigned between 1 and 255.
- Document the Node-ID that is assigned. The Node-ID assigned is used for deriving the Device Instance for BACnet/IP and BACnet MS/TP. (**Section 6.5 BACnet: Setting Node_Offset to Assign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

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.

2.4 Device Connections to ProtoNode

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

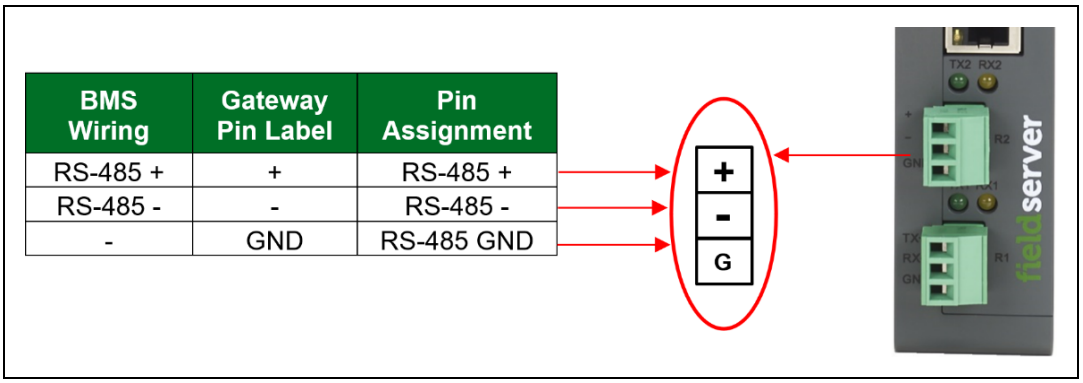
NOTE: Use standard grounding principles for RS-485 GND.



Device Pins	ProtoAir Pin Label	Pin Assignment
RS-485 +	TX +	RS-485 +
RS-485 -	RX -	RS-485 -
RS-485 GND	GND	RS-485 GND

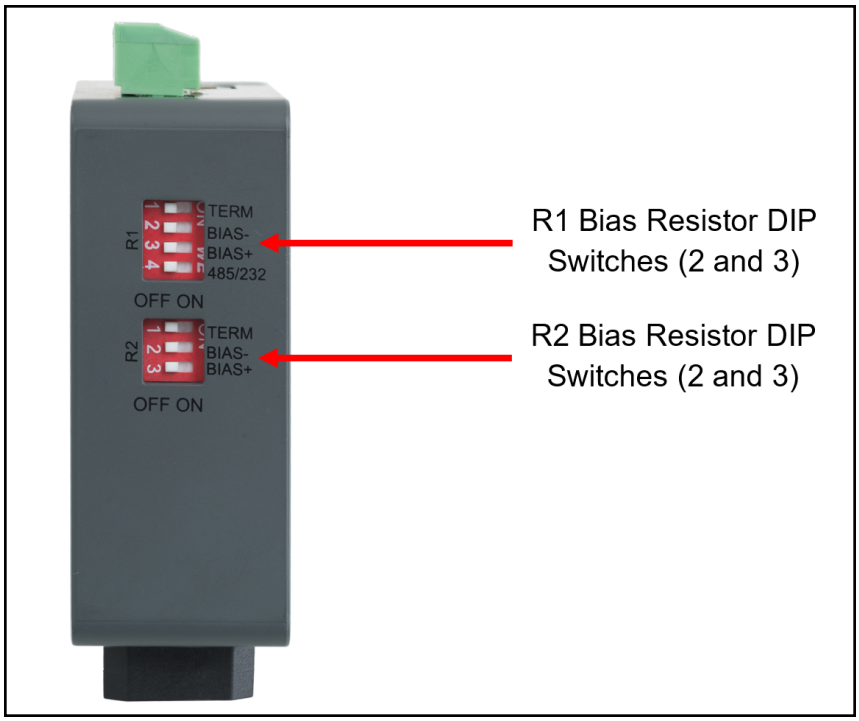
2.5 Wiring Field Port to RS-485 Serial Network

- Connect the RS-485 network wires to the 3-pin RS-485 connector on the R2 port.
  - RS-485 is part of the RS-485 interface and must be connected to the corresponding terminal on the BMS. If the cable is shielded, the shield must connected only at one end and to earth ground – it will help suppress the electromagnetic field interference. (Connecting the shield at both ends will likely produce current loops, which could produce noise or interference that the shield was intended to block).
- See **Section** **4.1 Connecting to the Gateway via Ethernet** for information on connecting to an Ethernet network.



BMS Wiring	Gateway Pin Label	Pin Assignment
RS-485 +	+	RS-485 +
RS-485 -	-	RS-485 -
-	GND	RS-485 GND

2.6 Bias Resistors



To enable Bias Resistors, move both the BIAS- and BIAS+ DIP switches to the right in the orientation shown above.

The 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.

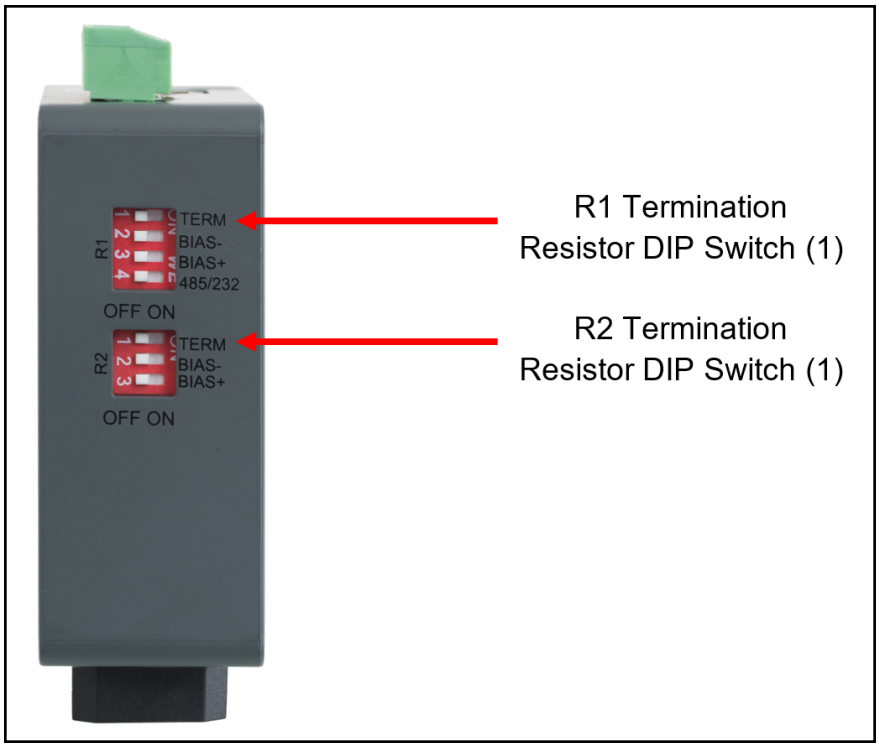
The bias resistor is 510 ohms which is in line with the BACnet spec. It should only be enabled at one point on the bus (for example, on the field port were there are very weak bias resistors of 100k). Since there are no jumpers, many ProtoNodes can be put on the network without running into the bias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

NOTE: See the Termination and Bias Resistance Enote for additional information.

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

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

2.7 Termination Resistor



If the gateway 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 in the orientation shown in above**.

The 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. The R1 termination resistor is 120 Ohms.

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 Power up the Gateway

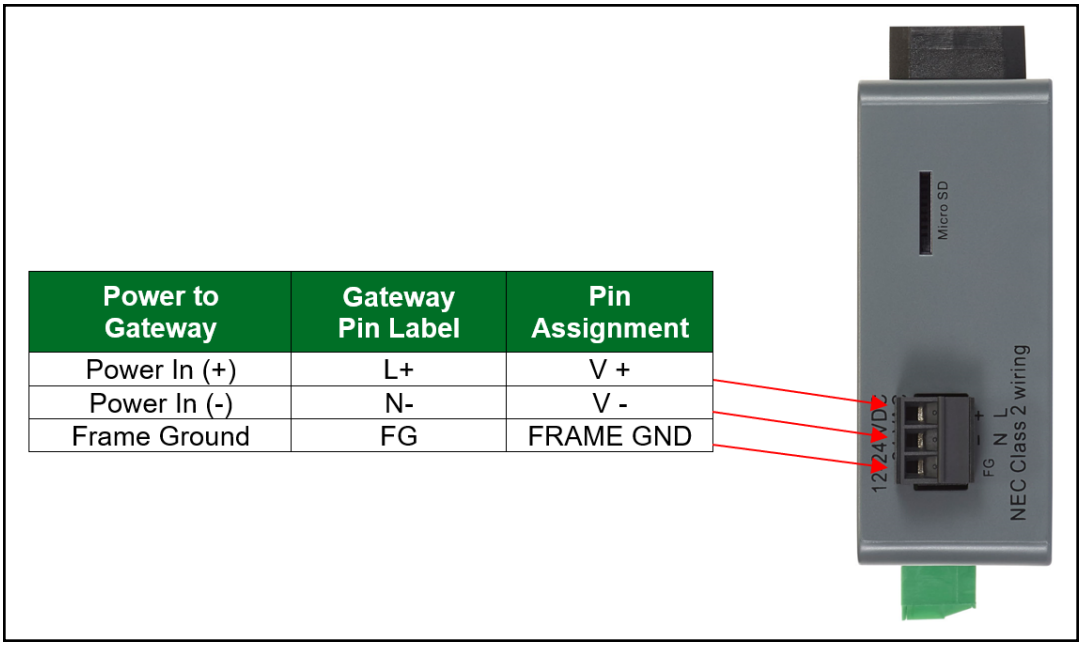
Check power requirements in the table below:

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

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

- The gateway accepts 12-24VDC or 24VAC on pins L+ and N-.
- Frame GND should be connected to ensure personnel safety and to limit material damages due to electrical faults. Ground planes are susceptible to transient events that cause sudden surges in current. The frame ground connection provides a safe and effective path to divert the excess current from the equipment to earth ground.

NOTE: Floating AC Power Supplies are supported.

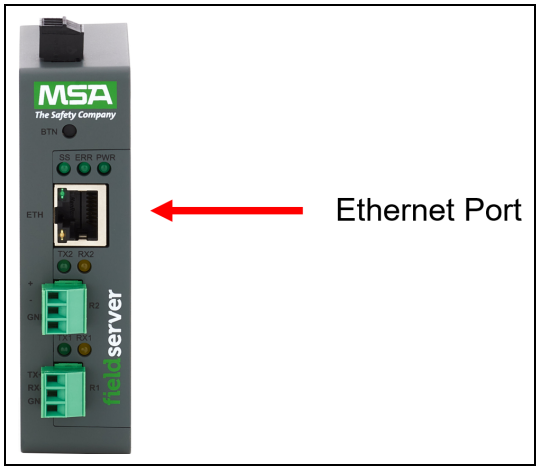


Power to Gateway	Gateway Pin Label	Pin Assignment
Power In (+)	L+	V +
Power In (-)	N-	V -
Frame Ground	FG	FRAME GND

4 Connect the PC to the Gateway

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.

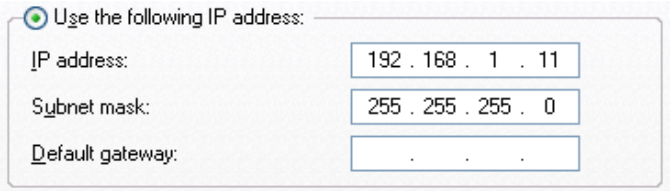


4.1.1 Changing the Subnet of the Connected PC

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:

- Use the search field in the local computer's taskbar (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:



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

5 Setup Web Server Security

5.1 Navigate to the Login Page

- Open a web browser and connect to the FieldServer's default IP Address. The default IP Address of the FieldServer is **192.168.1.24**, Subnet Mask is **255.255.255.0**.

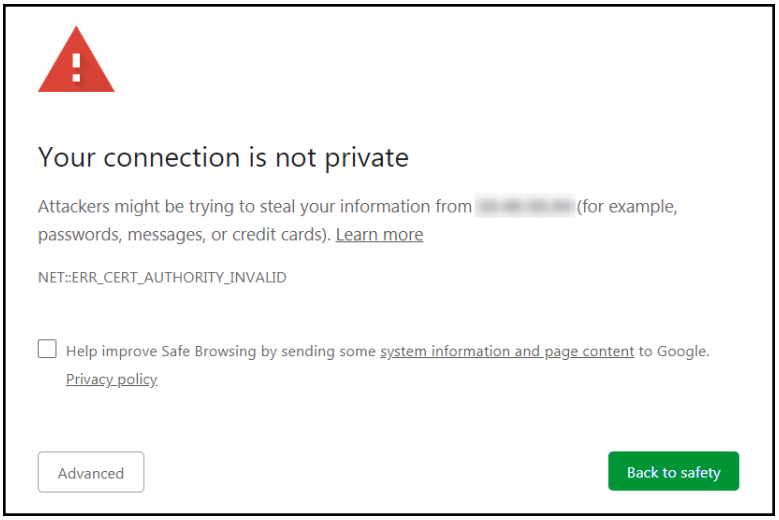
NOTE: If the IP Address of the ProtoNode has been changed, the IP Address can be discovered using the FS Toolbox utility. See Section 7.1 Lost or Incorrect IP Address for instructions.

5.2 Login to the FieldServer

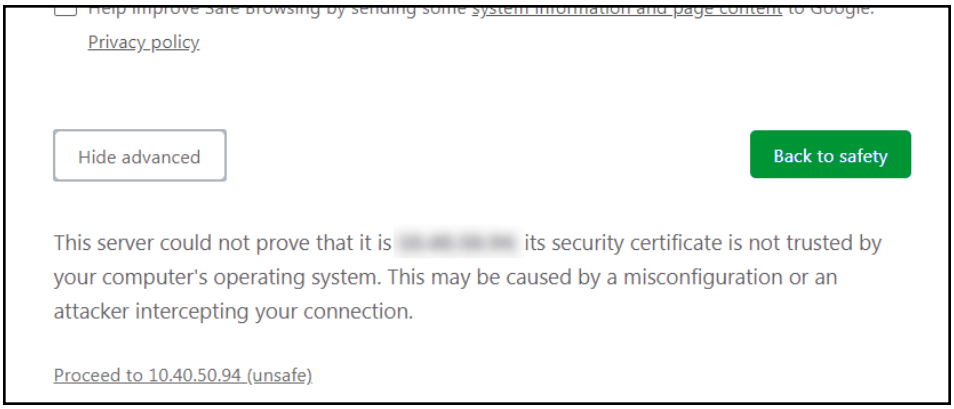
The first time the FieldServer GUI is opened in a browser, the IP Address for the gateway will appear as untrusted. This will cause the following pop-up windows to appear.

- 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.

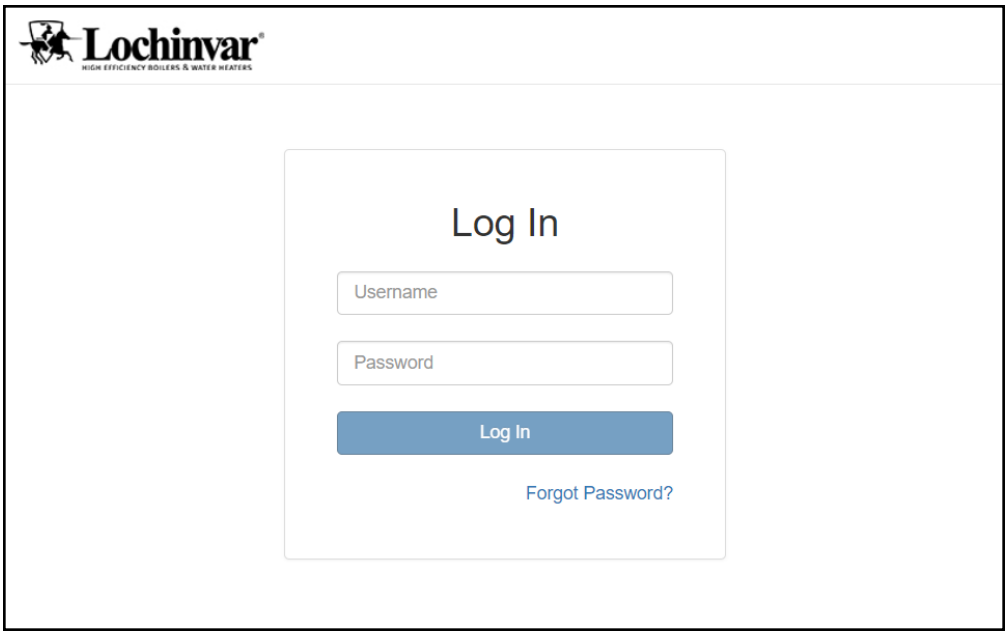


- Additional text will expand below the warning, click the underlined text to go to the IP Address. In the example below this text is “Proceed to <FieldServer IP> (unsafe)”.



- 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.

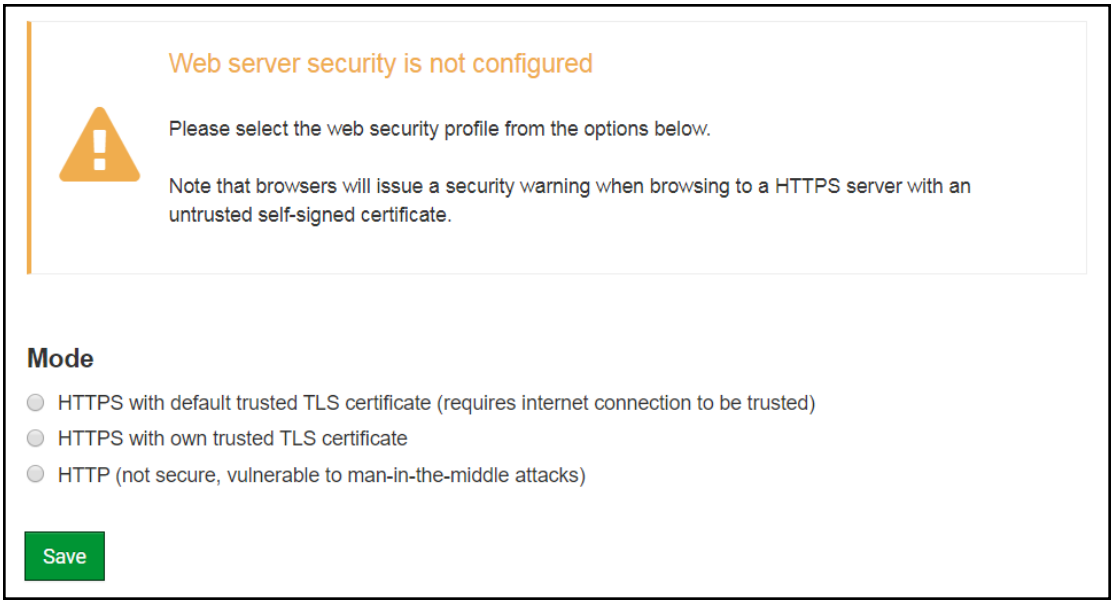


NOTE: A user has 5 attempts to login then there will be a 10-minute lockout. There is no timeout on the FieldServer to enter a password.

NOTE: To create individual user logins, go to Section 8.7 Change User Management Settings.

5.3 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.



NOTE: Cookies are used for authentication.

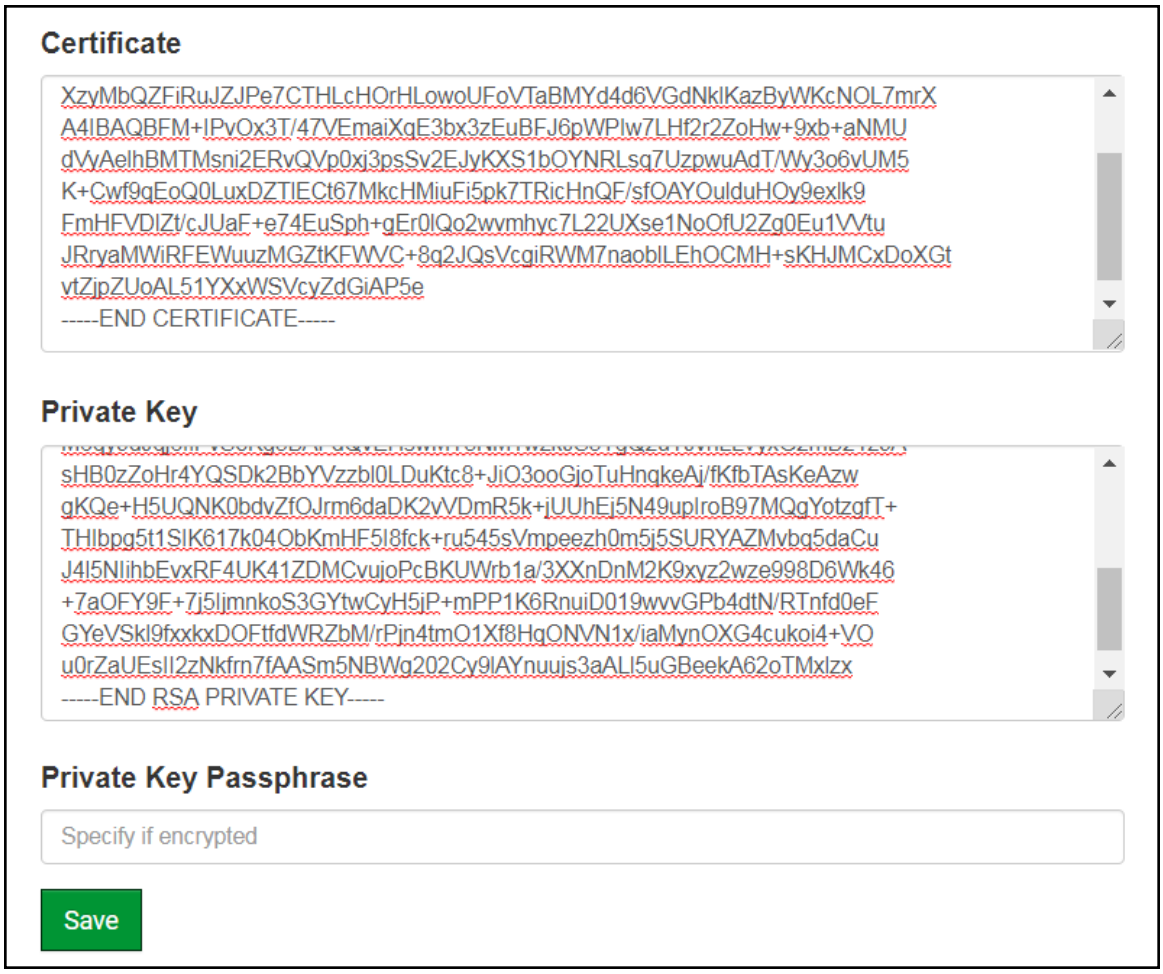
NOTE: To change the web server security mode after initial setup, go to Section 8.6 Change Web Server Security Settings After Initial Setup.

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

5.3.1 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.



- 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.

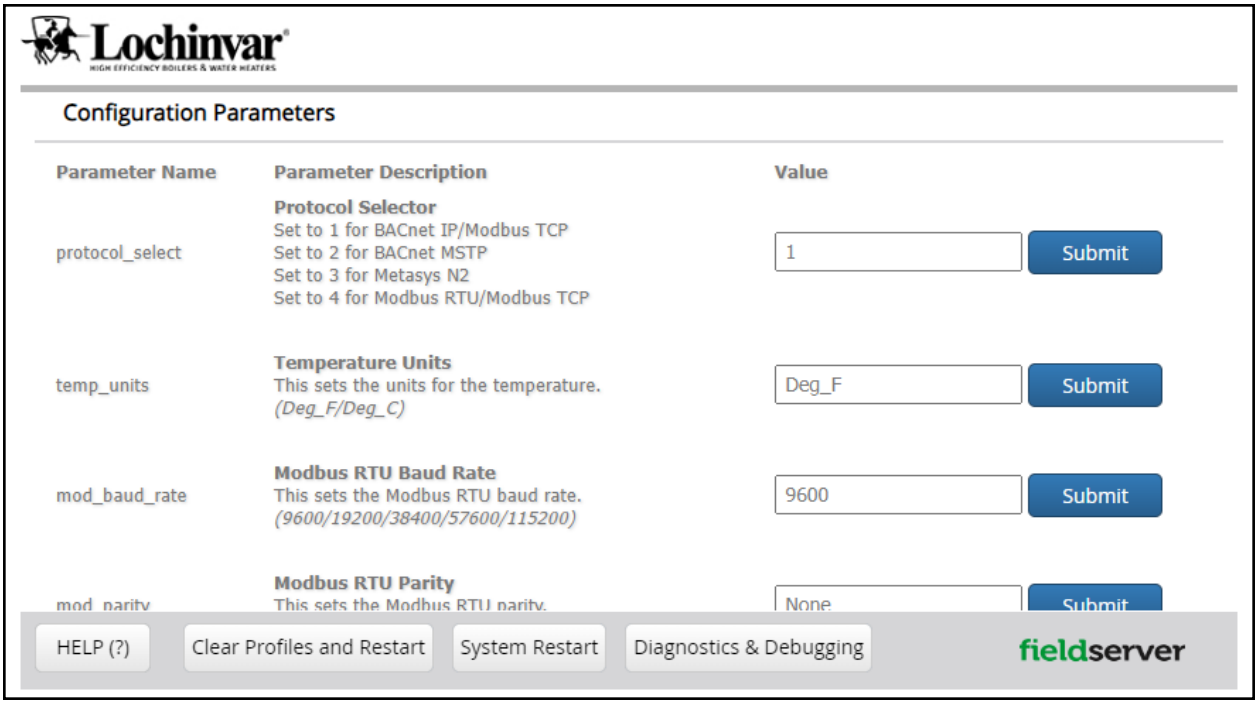
5.3.2 HTTPS with Default Untrusted Self-Signed TLS Certificate or HTTP with Built-in Payload Encryption

- 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.



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

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

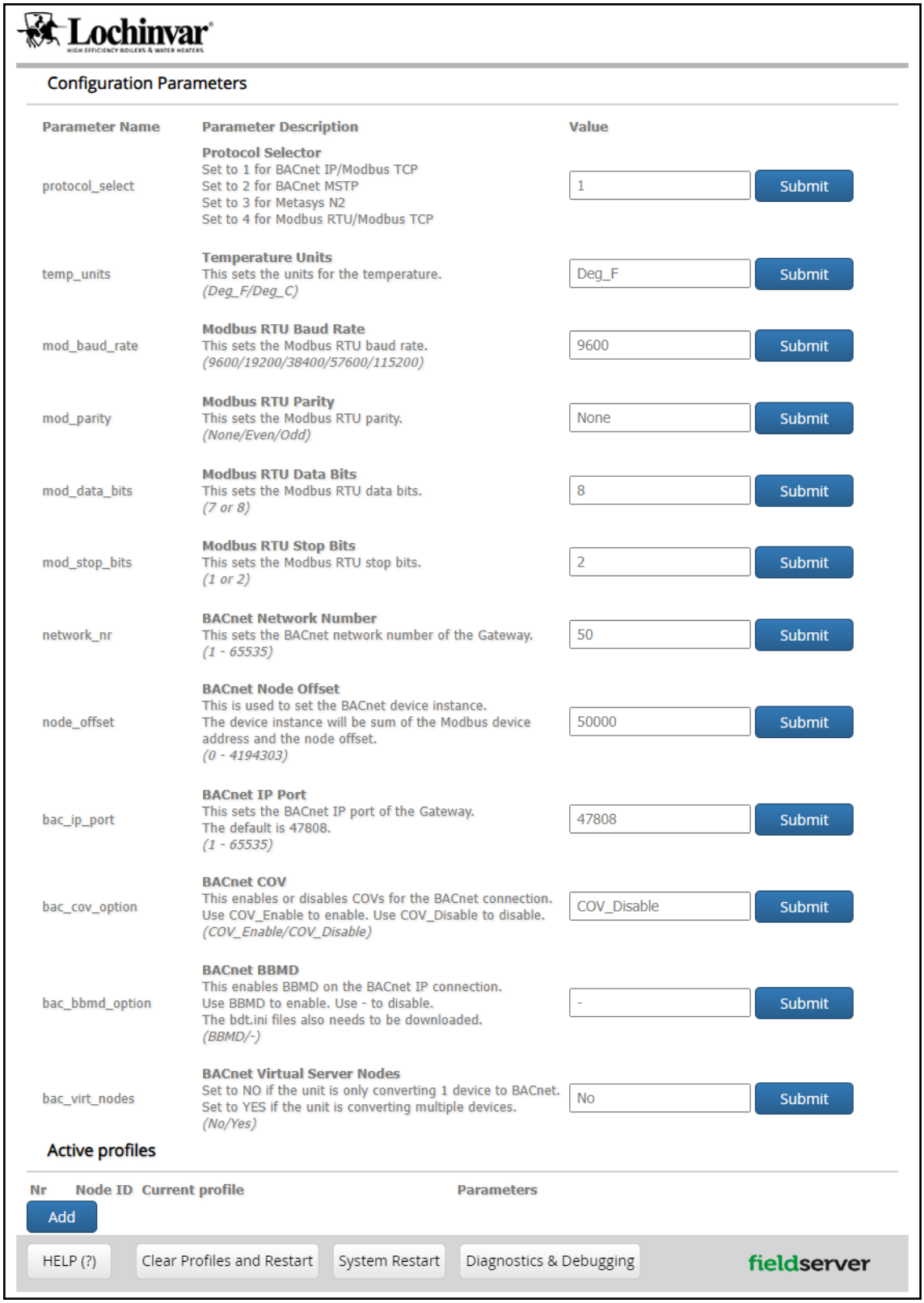
NOTE: If Modbus TCP/IP was selected and is used for the field protocol, skip Section 6.2 Setting Active Profiles. Device profiles are NOT used for Modbus TCP/IP.

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

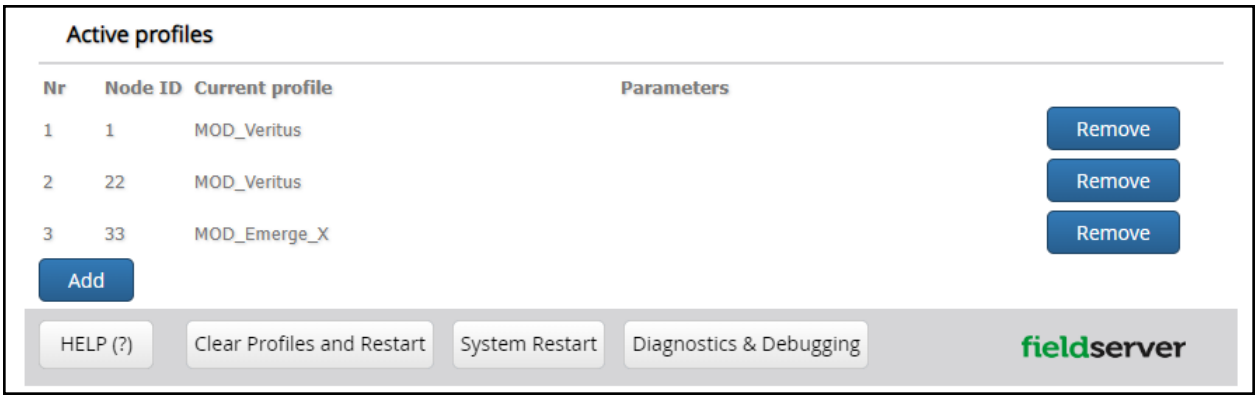
NOTE: If multiple devices are connected to the ProtoNode, set the BACnet Virtual Server Nodes field to “Yes”; otherwise leave the field on the default “No” setting.

6.2 Setting 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. This list is empty for new installations, or after clearing all configurations.



- To add an active profile to support a device, click the Add button under the Active Profiles heading. This will present a 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 Set Node-ID for Any Device Attached to the ProtoNode**.
- 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 below.

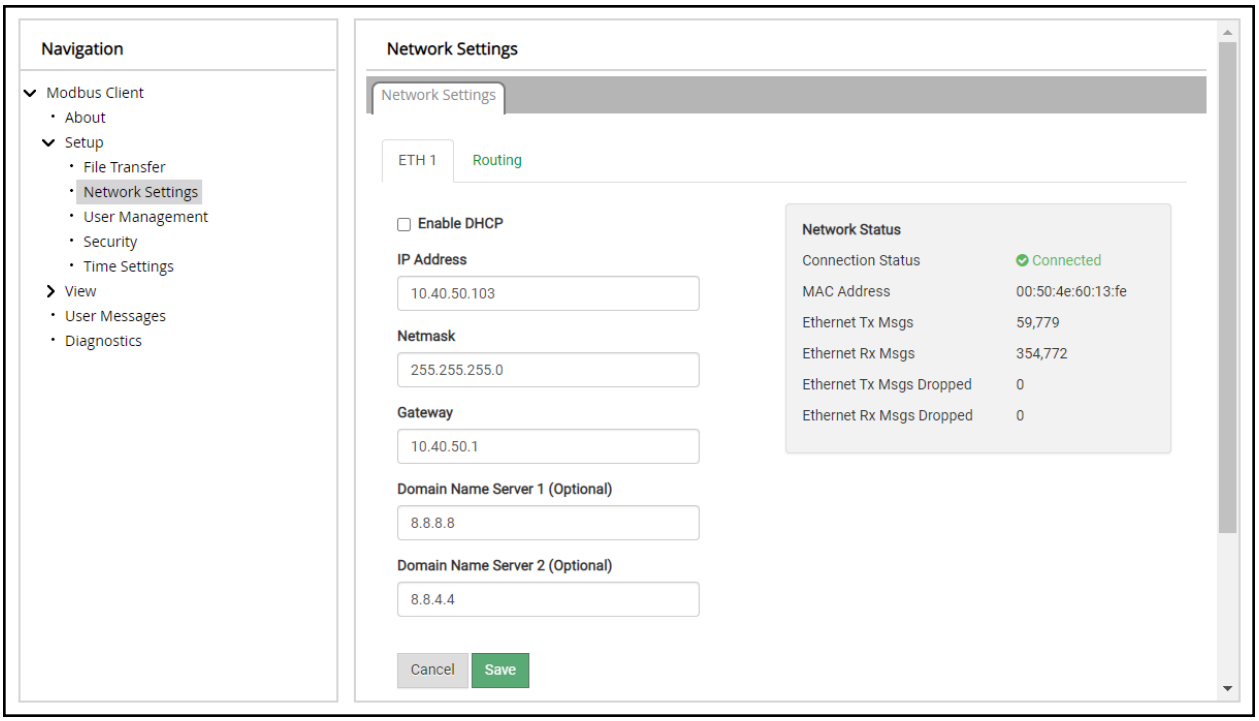


6.3 Verify Device Communications

- If using a serial connection, check that TX and RX LEDs are rapidly flashing (**Section 7.4 LED Functions**).
- Confirm the software shows good communications without errors (**Section 7.2 Viewing Diagnostic Information**).

6.4 Ethernet Network: Setting IP Address for the Field Network

- Follow the steps outlined in **Section 5.2 Login to the FieldServer** to access the ProtoNode Web Configurator.
- To access the FS-GUI, click the “Diagnostics & Debugging” button at the bottom of the page.
- 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.



- 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 Routing Settings.

NOTE: The FieldServer Manager tab 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 Setup Web Server Security** to access the ProtoNode Web Configurator.
- The 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:

Device Instance (desired) = Node_Offset + 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:

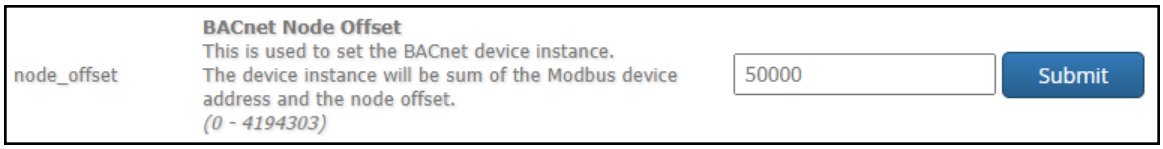
50,001 = Node_Offset + 1

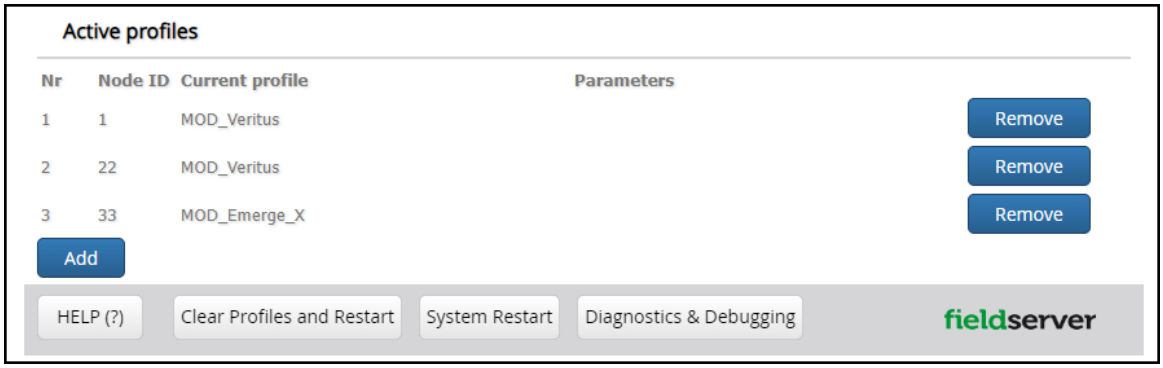
50,000 = Node_Offset

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

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

Click "Submit" once the desired value is entered.





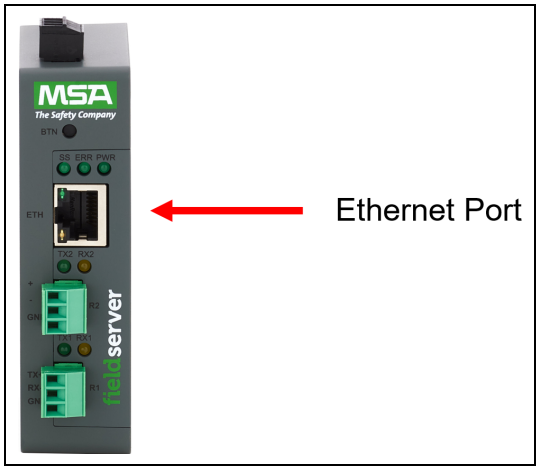
6.6 How to Start the Installation Over: Clearing Profiles

- Follow the steps outlined in **Section 5 Setup Web Server Security** to access the ProtoAir 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.

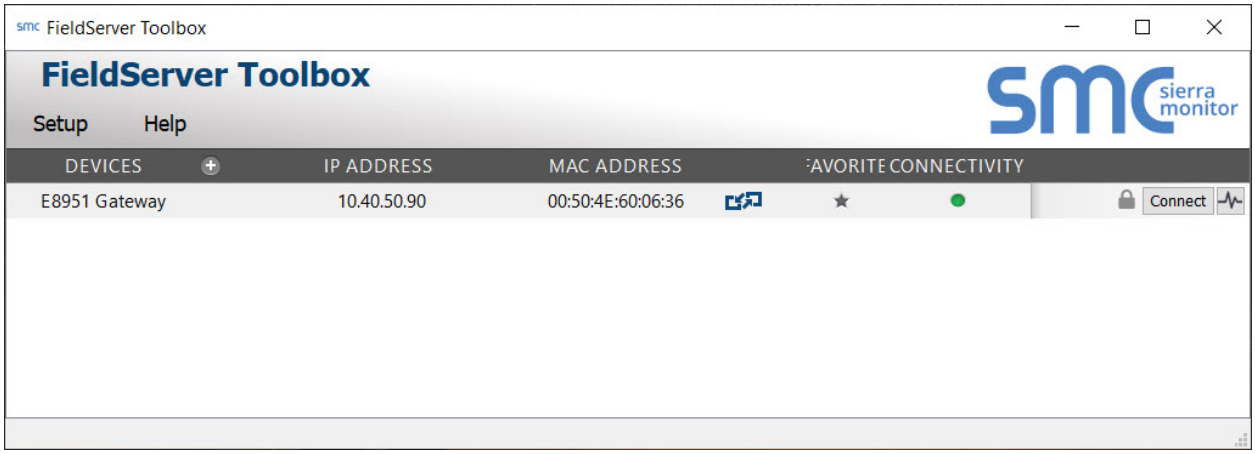
7 Troubleshooting

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.

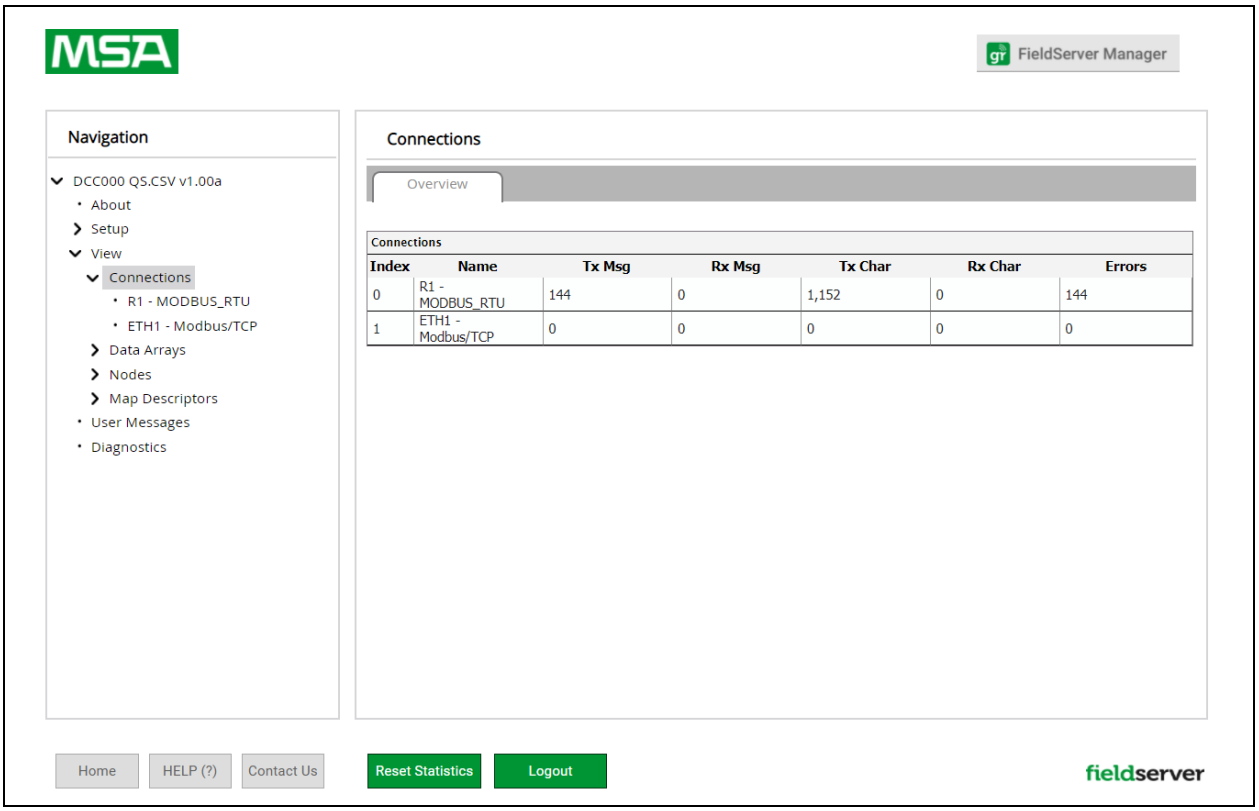


- Connect a standard Cat-5 Ethernet cable between the user's PC and ProtoNode.
- Double click on the FS Toolbox Utility and click Discover Now on the splash page.
- Check for the IP Address of the desired gateway.



7.2 Viewing Diagnostic Information

- Type the IP Address of the FieldServer into the web browser or use the FieldServer Toolbox to connect to the FieldServer.
- 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 Checking Wiring and Settings** for the relevant wiring and settings.



7.3 Checking Wiring and Settings

No COMS on the Serial side. If the Tx/Rx LEDs are not flashing rapidly then there is a COM issue. To fix this problem, check the following:

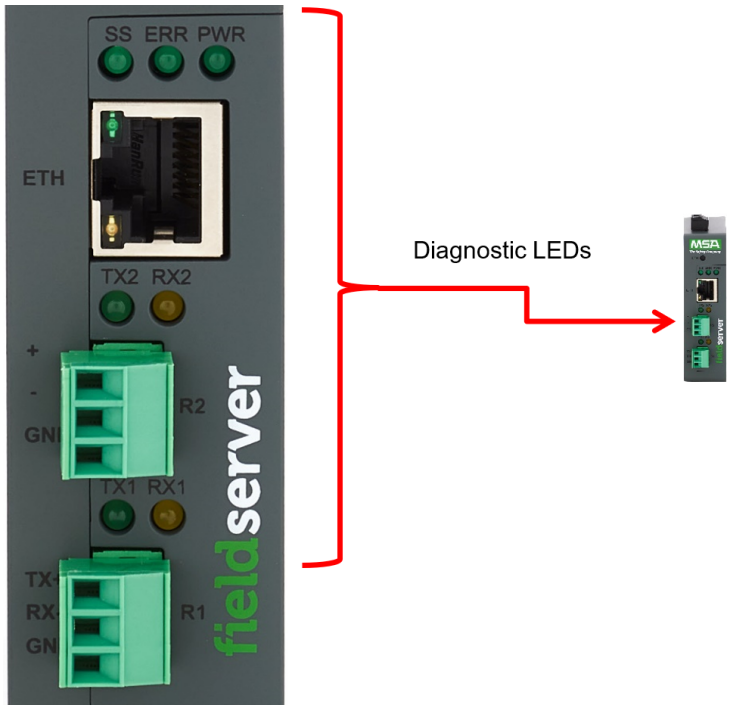
- Visual observations of LEDs on the ProtoNode. (**Section 7.4 LED Functions**)
- Check baud rate, parity, data bits, stop bits.
- Check device address.
- Verify wiring.
- Verify the device was listed in the Web Configurator (**Section 6.2 Setting Active Profiles**).

Field COM problems:

- Visual observations of LEDs on the ProtoNode. (**Section 7.4 LED Functions**)
- Verify wiring.
- Verify IP Address setting.

NOTE: If the problem still exists, a Diagnostic Capture needs to be taken and sent to support. (Section 7.7 Taking a FieldServer Diagnostic Capture)

7.4 LED Functions



Tag	Description
SS	The SS LED will flash once a second to indicate that the bridge is in operation.
ERR	The SYS ERR LED will go on solid indicating there is a system error. If this occurs, immediately report the related “system error” shown in the error screen of the FS-GUI interface to support for evaluation.
PWR	This is the power light and should always be steady green when the unit is powered.
RX	The RX LED will flash when a message is received on the serial port on the 3-pin connector. If the serial port is not used, this LED is non-operational. RX1 applies to the R1 connection while RX2 applies to the R2 connection.
TX	The TX LED will flash when a message is sent on the serial port on the 3-pin connector. If the serial port is not used, this LED is non-operational. TX1 applies to the R1 connection while TX2 applies to the R2 connection.

7.5 Factory Reset Instructions

For instructions on how to reset a FieldServer back to its factory released state, see ENOTE FieldServer Next Gen Recovery.

7.6 Internet Browser Software Support

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

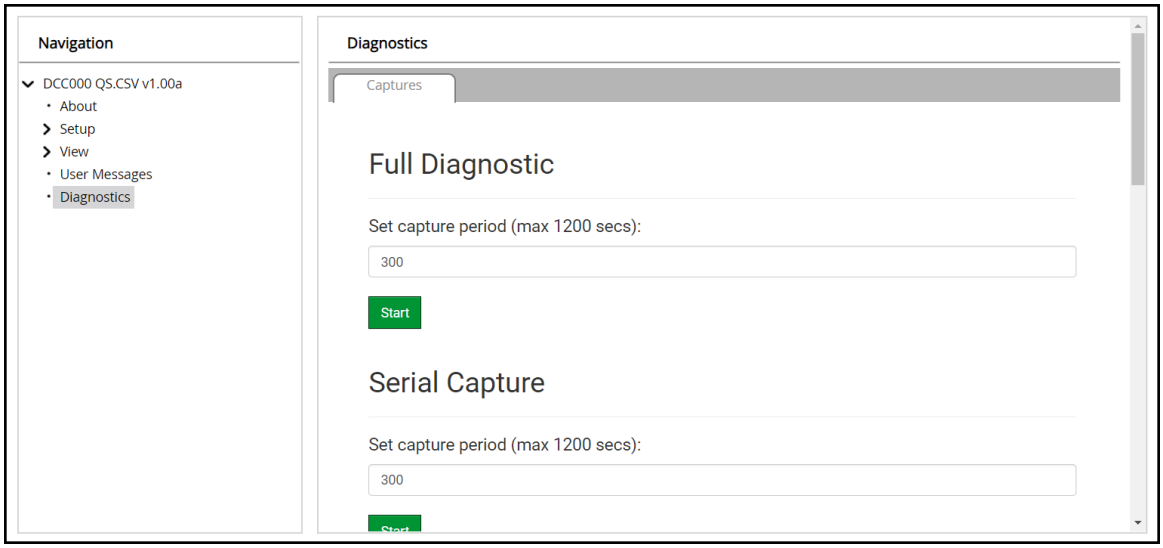
NOTE: Internet Explorer is no longer supported as recommended by Microsoft.

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

7.7 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.

- 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 (smc-support.emea@msasafety.com).

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

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 Lost or Incorrect IP Address**)
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.

NOTE: Contact Lochinvar to receive any firmware updates.

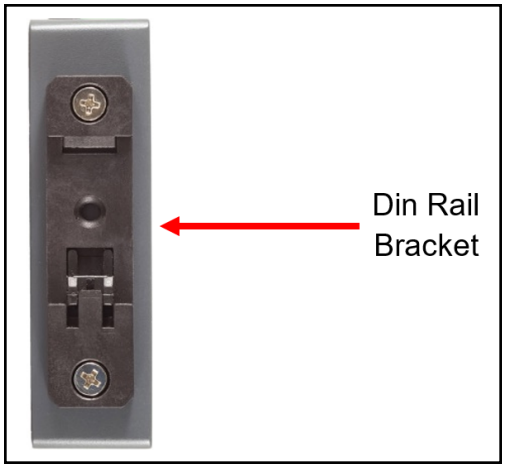
8.2 BACnet: Setting Network_Number for More Than One ProtoNode on the Subnet

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.

8.3 Mounting

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



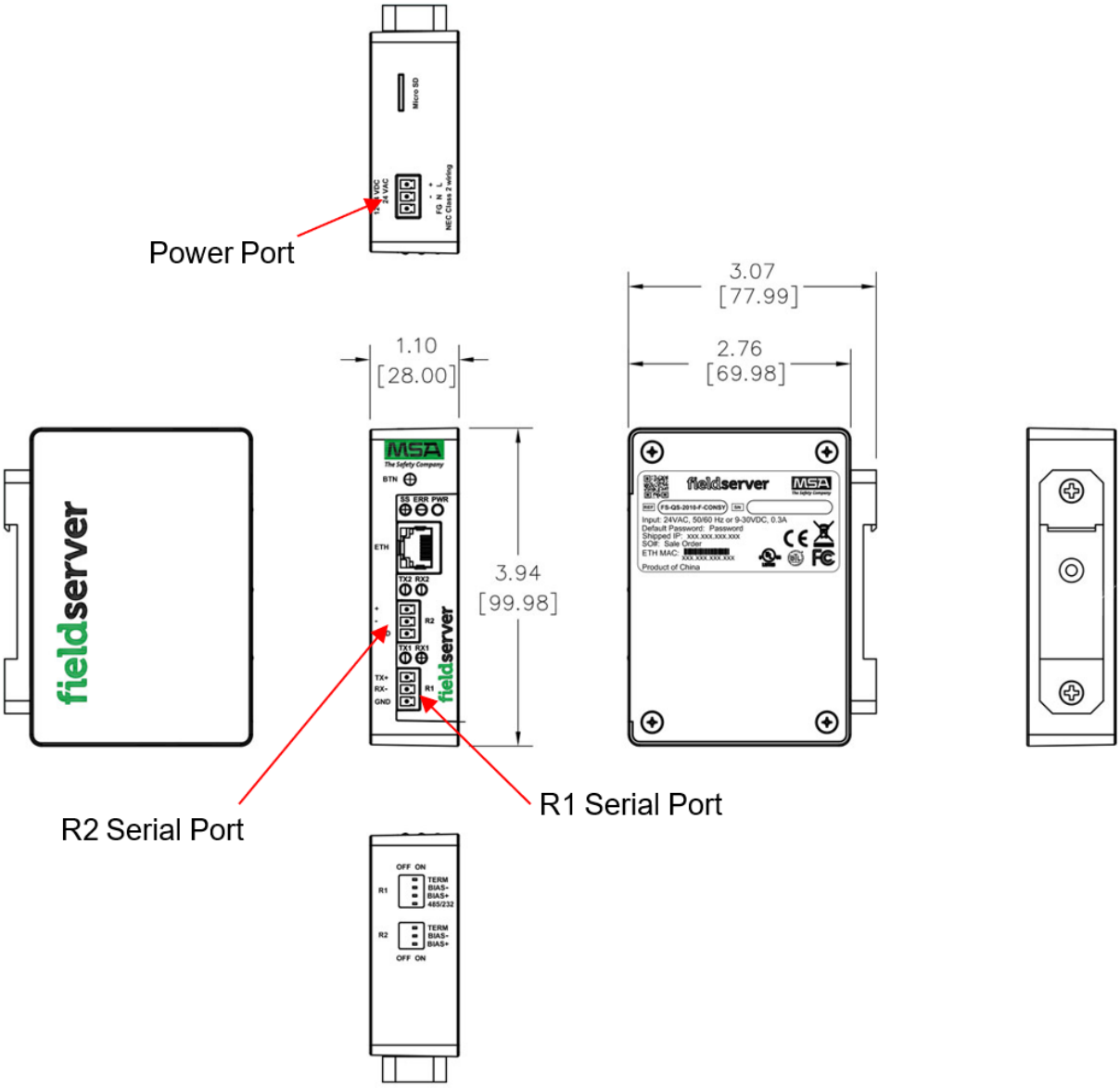
8.4 Certification

BTL Mark – BACnet Testing Laboratory

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

Go to www.BACnetInternational.net for more information about the BACnet Testing Laboratory. Click here for the BACnet PIC Statement. *BACnet is a registered trademark of ASHRAE*.

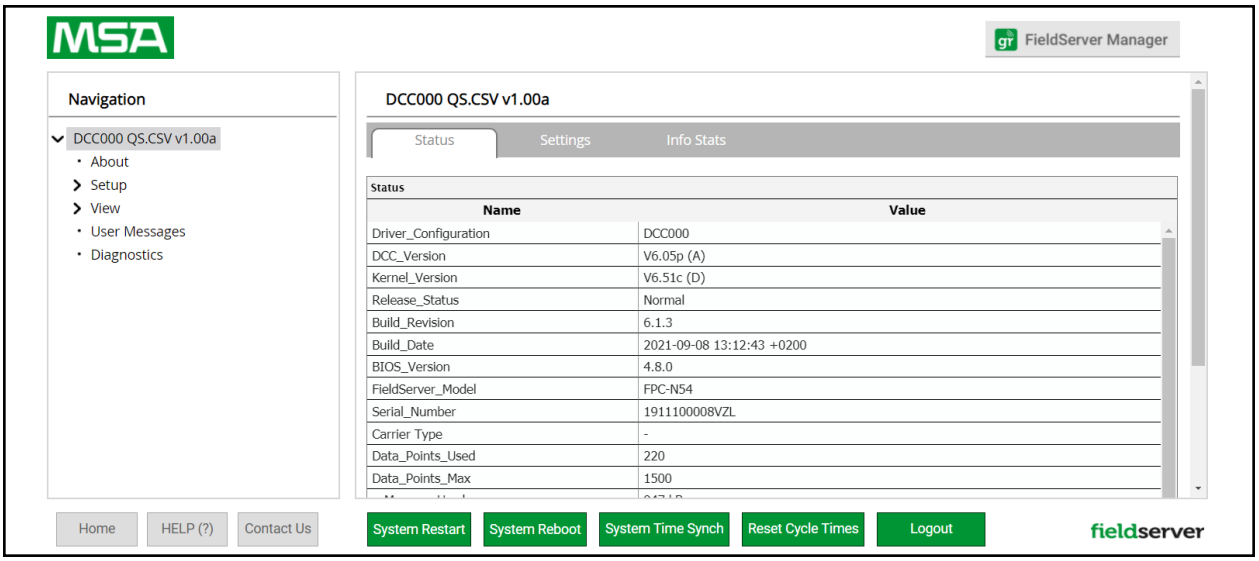
8.5 Physical Dimensions



8.6 Change Web Server Security Settings After Initial Setup

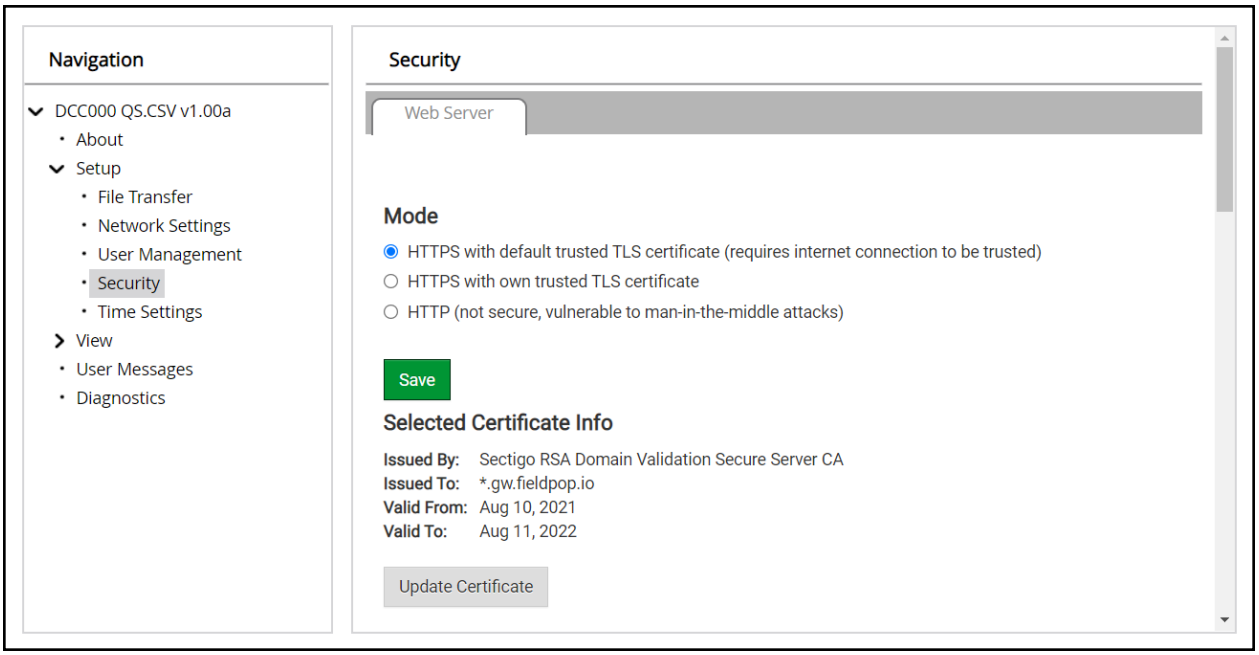
NOTE: Any changes will require a FieldServer reboot to take effect.

- Navigate to the FS-GUI page.
- Click Setup in the Navigation panel.



8.6.1 Change Security Mode

- Click Security in the Navigation panel.

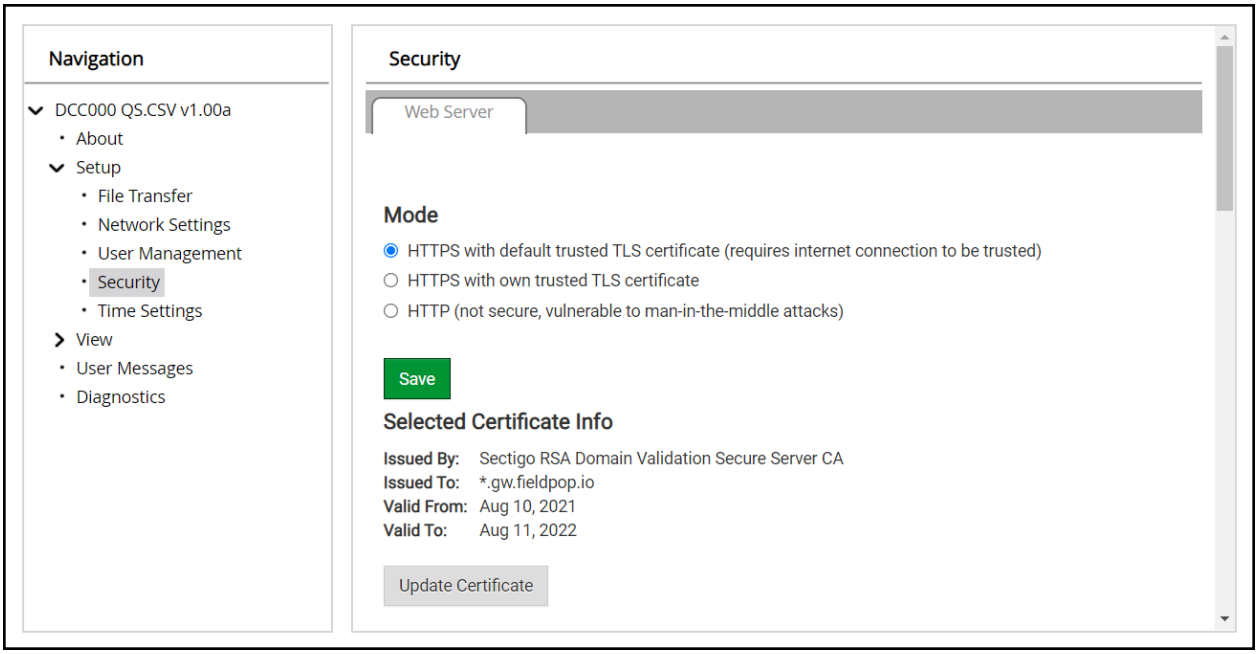


- Click the Mode desired.
  - If HTTPS with own trusted TLS certificate is selected, follow instructions in **Section 5.3.1 HTTPS with Own Trusted TLS Certificate**
- Click the Save button.

8.6.2 Edit the Certificate Loaded onto the FieldServer

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

- Click Security in the Navigation panel.



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

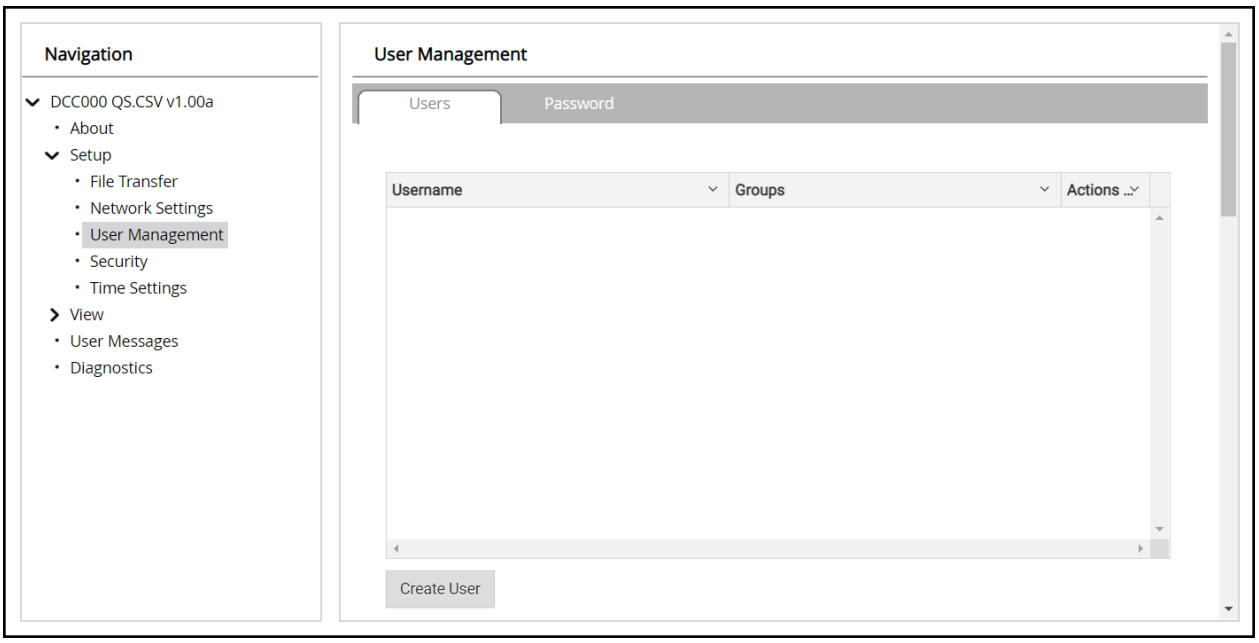
8.7 Change User Management Settings

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

NOTE: If the passwords are lost, the unit can be reset to factory settings to reinstate the default unique password on the label. For 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.



User Types:

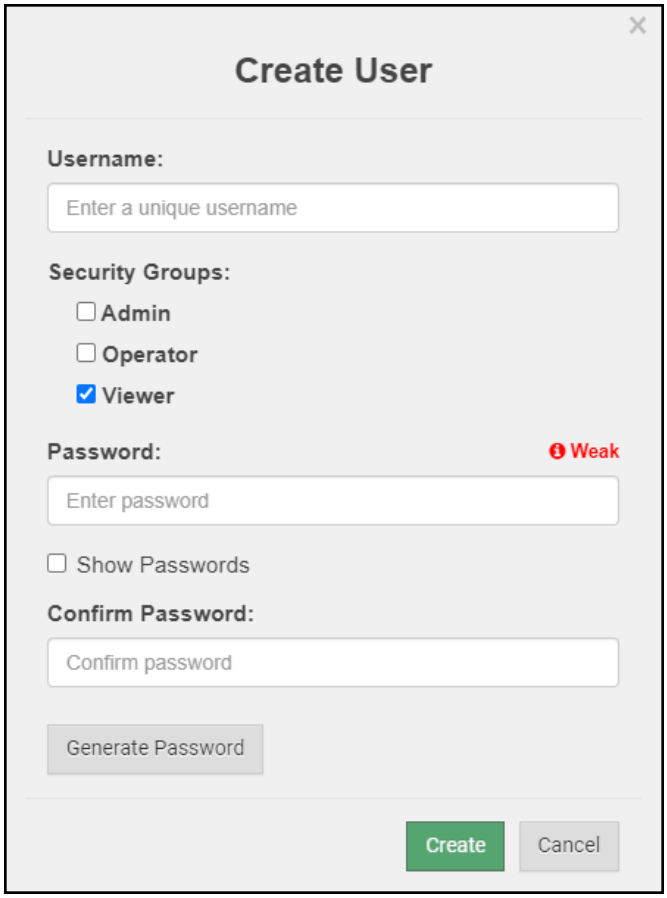
Admin – Can modify and view any settings on the FieldServer.

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.



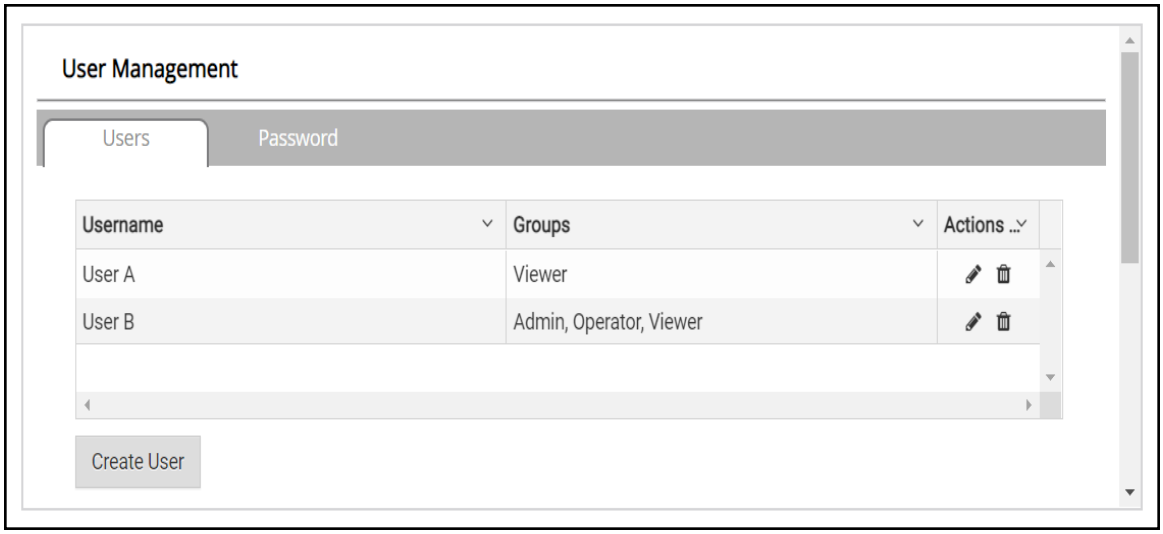
- Enter the new User fields: Name, Security Group and Password.
  - **User details are hashed and salted**

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.

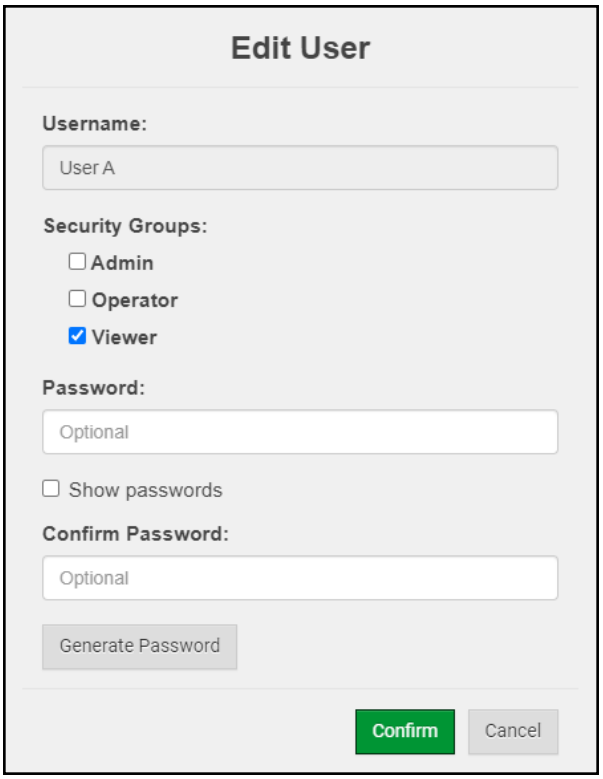
- Click the Create button.
- Once the Success message appears, click OK.

8.7.2 Edit Users

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



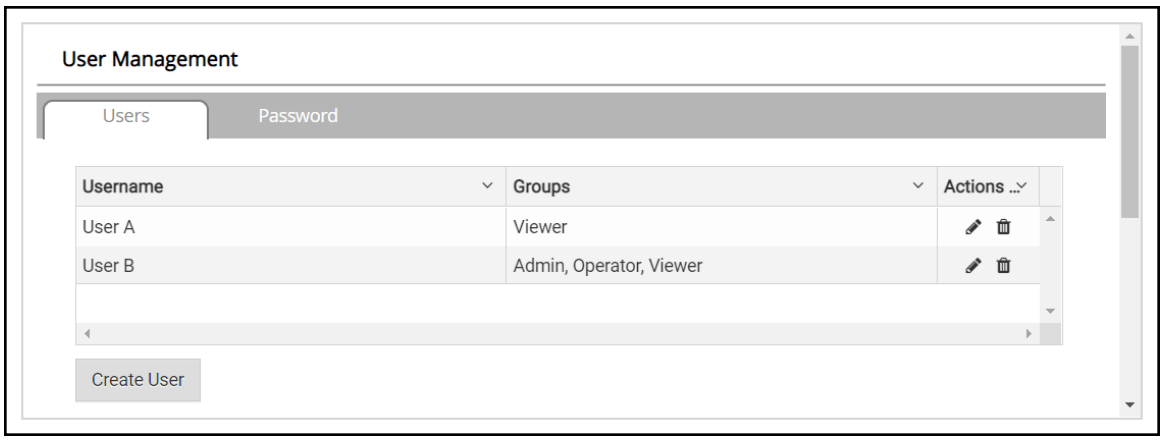
- Once the User Edit window opens, change the User Security Group and Password as needed.



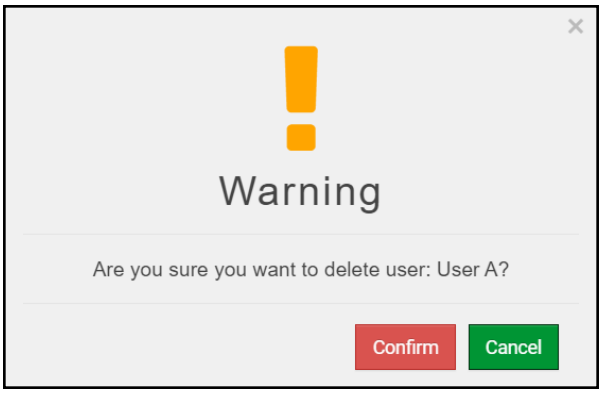
- Click Confirm.
- Once the Success message appears, click OK.

8.7.3 Delete Users

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

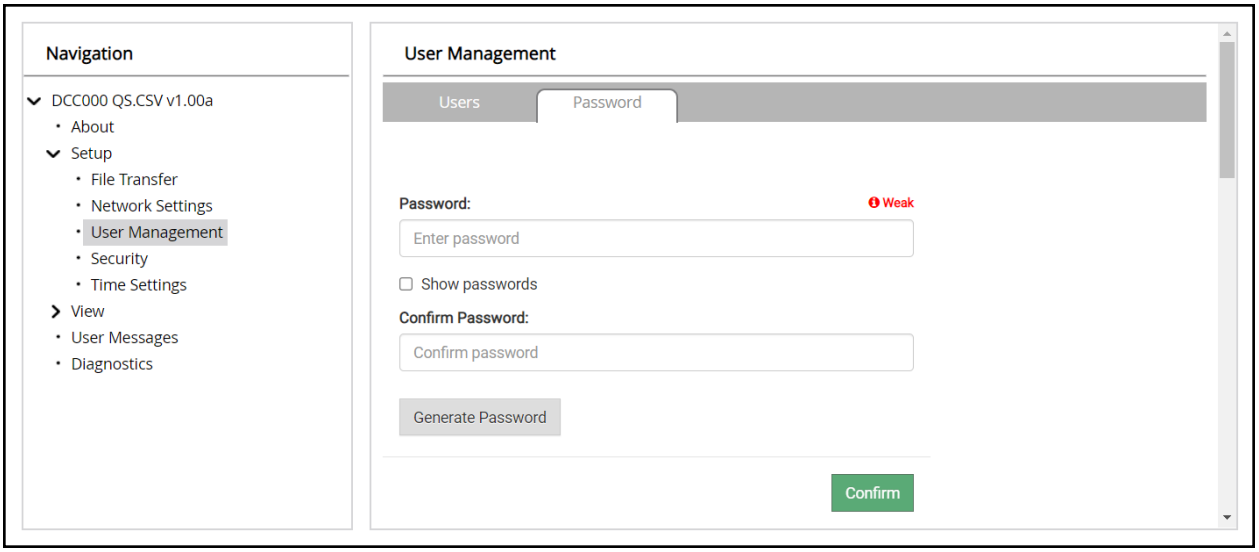


- When the warning message appears, click Confirm.



8.7.4 Change FieldServer Password

- Click the Password tab.



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

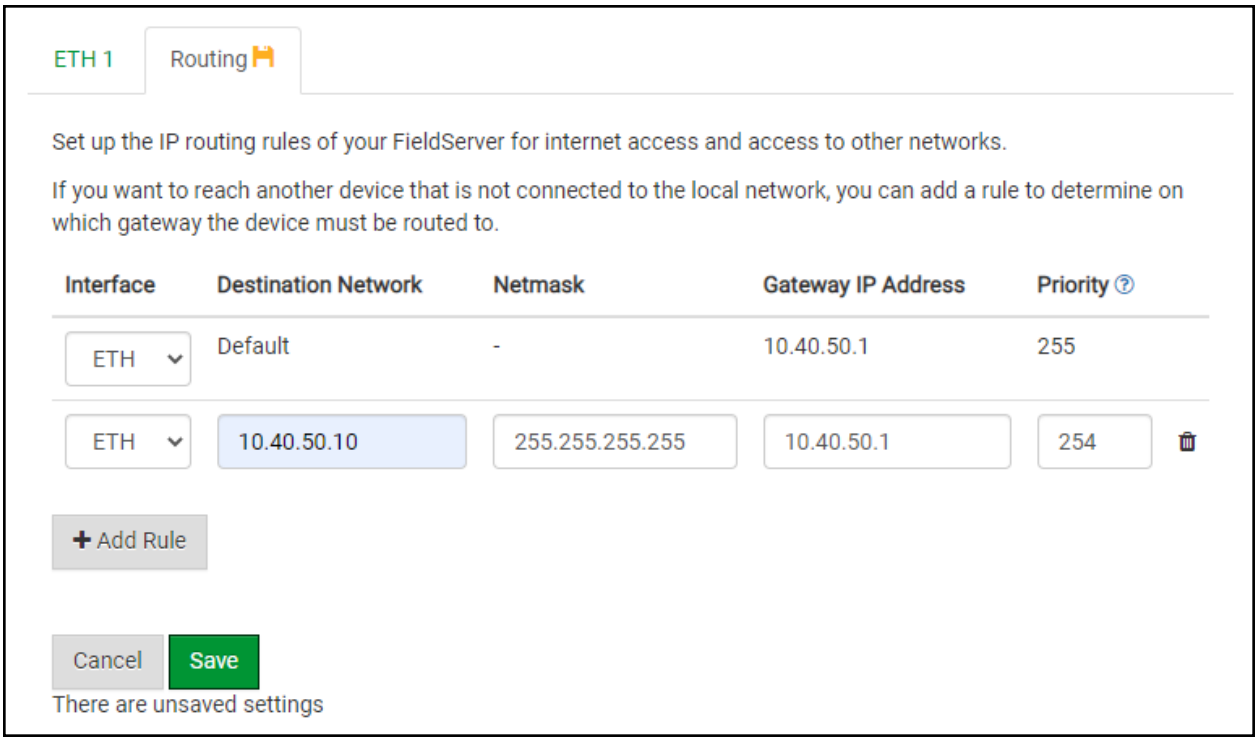
NOTE: The password must meet the minimum complexity requirements. An algorithm automatically checks the password entered and notes the level of strength on the top right of the Password text field.

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.

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.



9 Vendor Information – Lochinvar

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 Veritus and Emerge_X Modbus RTU Mappings to BACnet and Metasys N2

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
TSTAT	BI	1	DI	1
BMS Enable	BI	2	DI	2
Louver Proving	BI	3	DI	3
Louver Relay	BI	4	DI	4
Recirc Pump	BI	5	DI	5
Runtime Relay	BI	6	DI	6
Alarm Relay	BI	7	DI	7
Backup Heat 1	BI	8	DI	8
Backup Heat 2	BI	9	DI	9
Discrete Inputs 0-8	AI	10	AI	10
30001	AI	11	AI	11
30002	AI	12	AI	12
30003	AI	13	AI	13
System Setpoint	AI	14	AI	14
System Supply Temperature	AI	15	AI	15
System Return Temperature	AI	16	AI	16
System Recirc Temperature	AI	17	AI	17
System Outdoor Temperature	AI	18	AI	18
Tank 1 Temperature	AI	19	AI	19
Tank 2 Temperature	AI	20	AI	20
Tank 3 Temperature	AI	21	AI	21
Tank 4 Temperature	AI	22	AI	22
Tank 5 Temperature	AI	23	AI	23
Tank 6 Temperature	AI	24	AI	24
Units Present (1-16)	AI	25	AI	25
Units Present (17-32)	AI	26	AI	26
Units Present (33-48)	AI	27	AI	27
Units Present (49-64)	AI	28	AI	28
Units In Run (1-16)	AI	29	AI	29
Units In Run (17-32)	AI	30	AI	30
Units In Run (33-48)	AI	31	AI	31
Units In Run (49-64)	AI	32	AI	32
Units In Blocking (1-16)	AI	33	AI	33
Units In Blocking (17-32)	AI	34	AI	34
Units In Blocking (33-48)	AI	35	AI	35
Units In Blocking (49-64)	AI	36	AI	36
Units In Lockout (1-16)	AI	37	AI	37
Units In Lockout (17-32)	AI	38	AI	38
Units In Lockout (33-48)	AI	39	AI	39
Units In Lockout (49-64)	AI	40	AI	40
SCB Error Code	AI	41	AI	41
SCB Warning Code	AI	42	AI	42
Backup Heat 1 Rate	AI	43	AI	43
Backup Heat 2 Rate	AI	44	AI	44
Total Heat Pump Flow	AI	45	AI	45
Configuration	AV	46	AO	46
Demand Enable	AV	47	AO	47
Tank Setpoint	AV	48	AO	48
0-10V BMS Input	AV	49	AO	49
Active Tank Sensor	AV	50	AO	50
Backup Heat 1	AV	51	AO	51

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address
Backup Heat 2	AV	52	AO	52
Backup Heat 1 Rate	AV	53	AO	53
Backup Heat 2 Rate	AV	54	AO	54

10 Specifications

	FPC-N54
Electrical Connections	One 3-pin Phoenix connector with: RS-485/RS-232 (Tx+ / Rx- / gnd) One 3-pin Phoenix connector with: RS-485 (+ / - / gnd) One 3-pin Phoenix connector with: Power port (+ / - / Frame-gnd) One Ethernet 10/100 BaseT port
Power Requirements	*Input Voltage:*12-24VDC or 24VAC *Current draw:* 24VAC 0.125A *Max Power:* 3 Watts 12-24VDC 0.25A @12VDC
Approvals	FCC Part 15 B, CAN/CSA C22.2 No. 60950-1, EN IEC 62368-1, DNP 3.0 and Modbus conformance tested, BTL marked, WEEE compliant, RoHS compliant, REACH compliant, UKCA and CE compliant, ODVA conformant, CAN ICES-003(B) / NMB-003(B)
Physical Dimensions	4 x 1.1 x 2.7 in (10.16 x 2.8 x 6.8 cm)
Weight	0.4 lbs (0.2 Kg)
Operating Temperature	-20°C to 70°C (-4°F to158°F)
Humidity	10-95% RH non-condensing

NOTE: Specifications subject to change without notice.

10.1 Warnings

FCC Class B

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

10.2 Compliance with EN IEC 62368-1

For EN IEC 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 FieldServer
- 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.

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.

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