



Operating Manual

ProtoNode FPC-N54 for Interfacing Frio Controls Products



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Technical Support

Thank you for purchasing the ProtoNode for Frio Controls.

Please contact Frio Controls for technical support of the ProtoNode product.

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

Support Contact Information:

Frio Controls
141 Flushing Ave
Brooklyn, NY 11205

Customer Service:

Phone: (332) 278-2858

Website: <https://www.frio.co/>

Email: info@frio.co

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. Configure the ProtoNode to connect to the local network. ([Section 6 Setup Network](#))
9. Integrate the ProtoNode with the FieldServer Manager or opt out. ([Section 7.1 Choose Whether to Integrate the FieldServer Manager](#))
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 Configure the ProtoNode](#))

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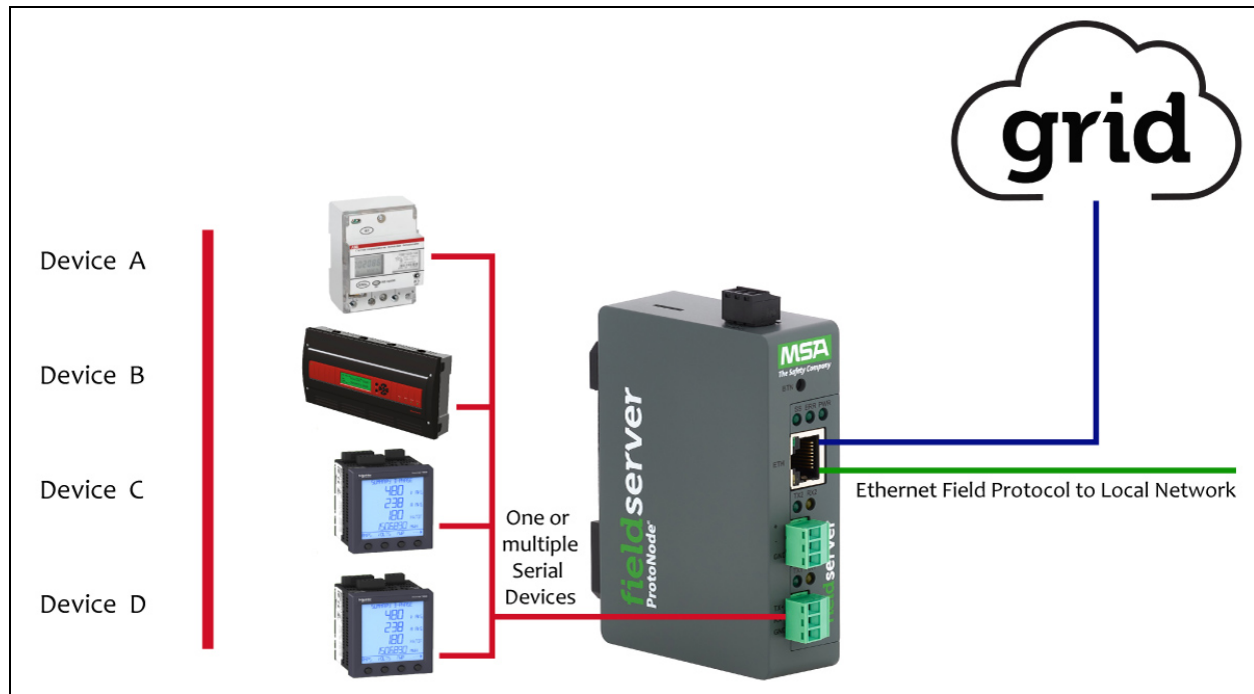
1 Introduction

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 Frio Controls devices (hereafter simply called “device”) connected to the ProtoNode and automatically configures them for Modbus TCP/IP, BACnet/IP and BACnet MS/TP.

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-N54-2231

- 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-N54-2231	1,500

Devices	Point Count Per Device
Frio_S1_Controller	25

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	9600
Parity	None
Data Bits	8
Stop Bits	1

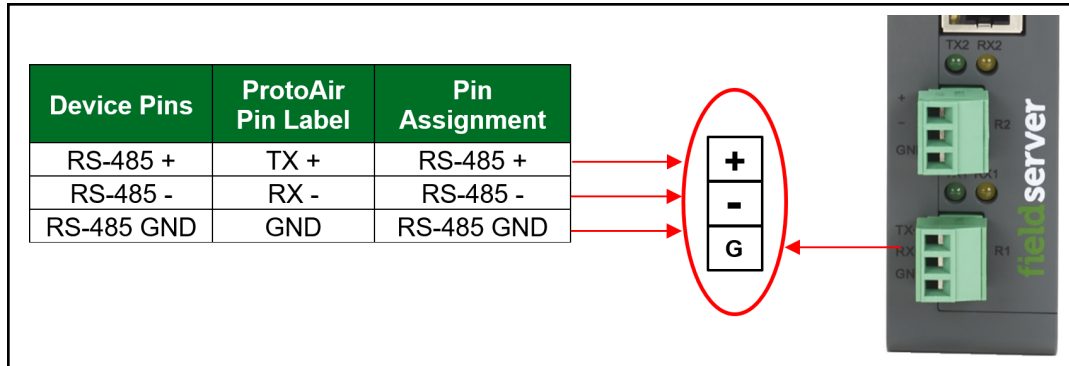
2.3.2 Set Node-ID for Any Device Attached to the ProtoNode

- 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 8.5 BACnet: Setting Node_Offset to Assign Specific Device Instances](#))

2.4 Device Connections to ProtoNode

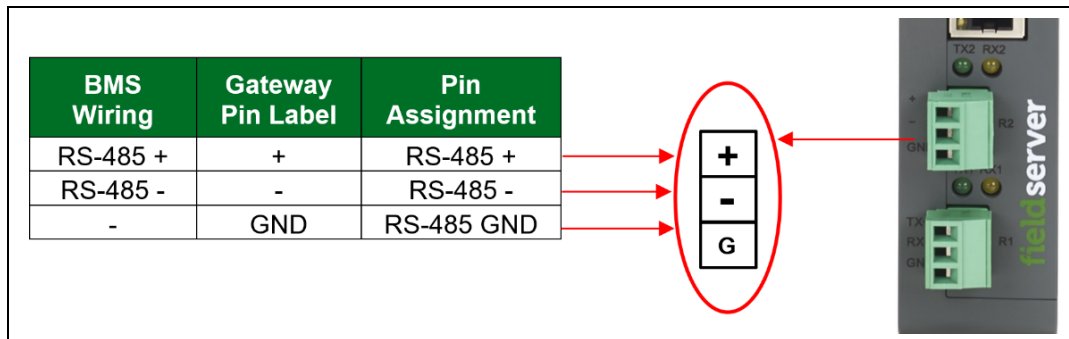
The ProtoNode has a 3-pin Phoenix connector for connecting RS-485 devices on the R1 port.

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

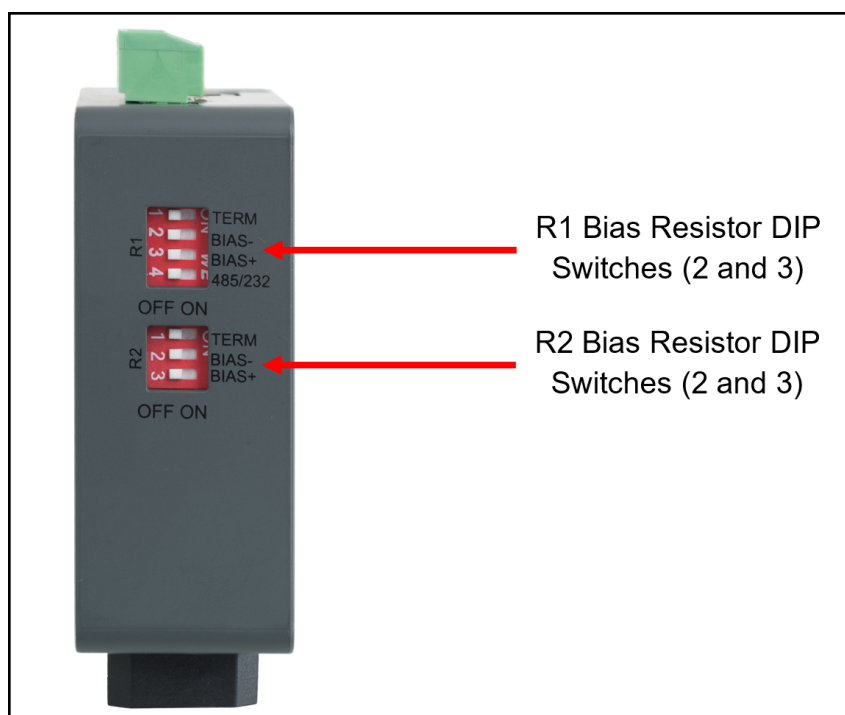


2.5 Wiring Field Port to RS-485 Serial Network

- 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 be 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.



2.6 Bias Resistors



To enable Bias Resistors, move 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.

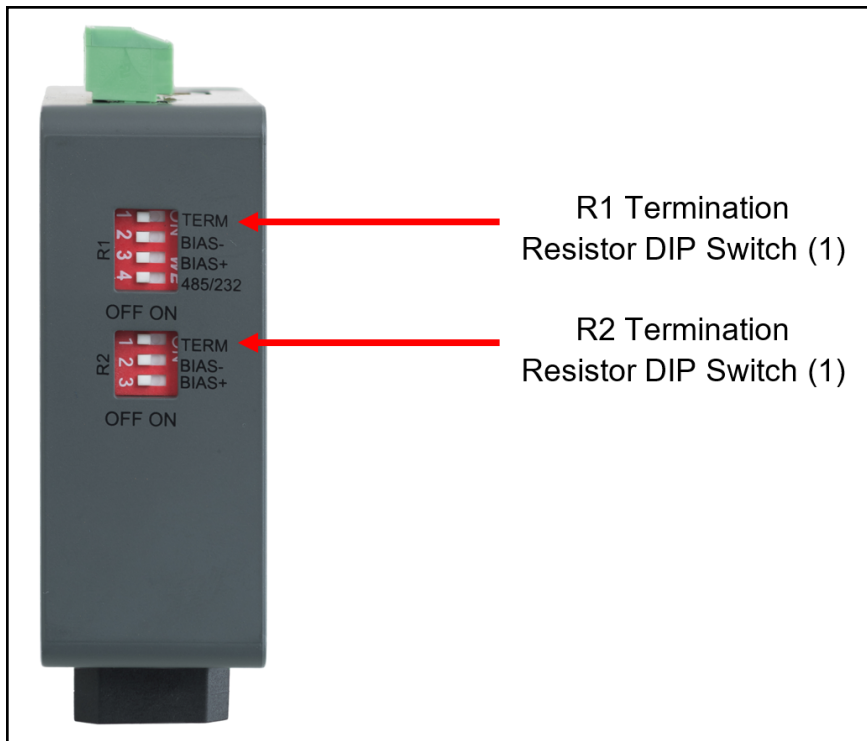
The bias resistor is 510 ohms which is in line with the BACnet spec. It should only be enabled at one point on the bus (for example, on the field port where there are very weak bias resistors of 100k). Since there are no jumpers, many ProtoNodes can be put on the network without running into the bias 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 gateway is already powered on, DIP switch settings won't take effect unless the unit is power cycled.

3 Power up the Gateway

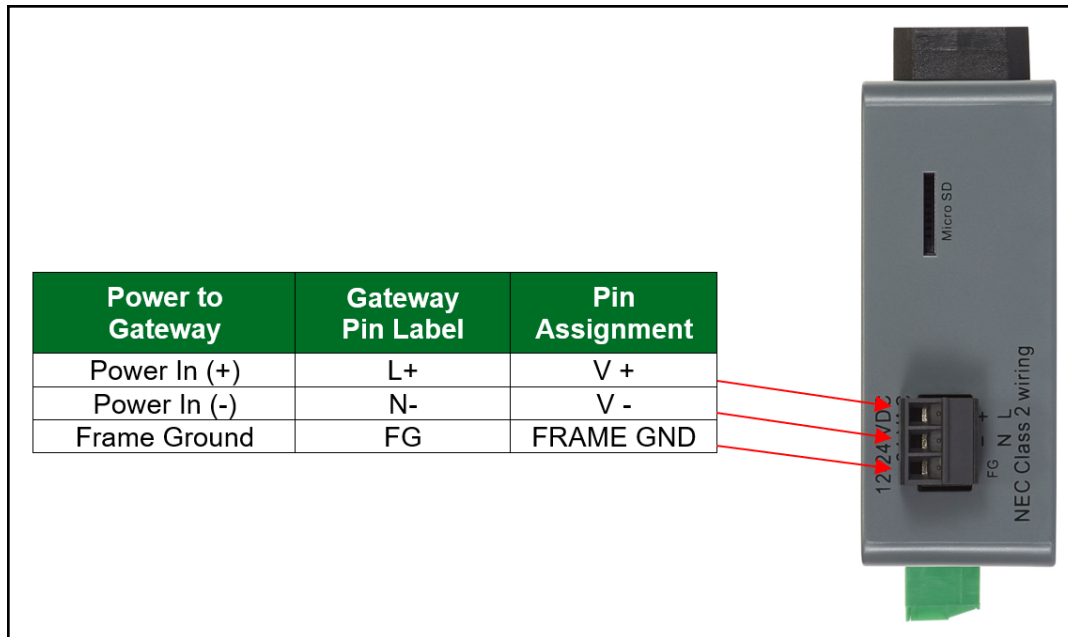
Check power requirements in the table below:

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 [12 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: Only Class 2 PSU's must be used to power FieldServers.



5 Setup Web Server Security

5.1 Navigate to the Login Page

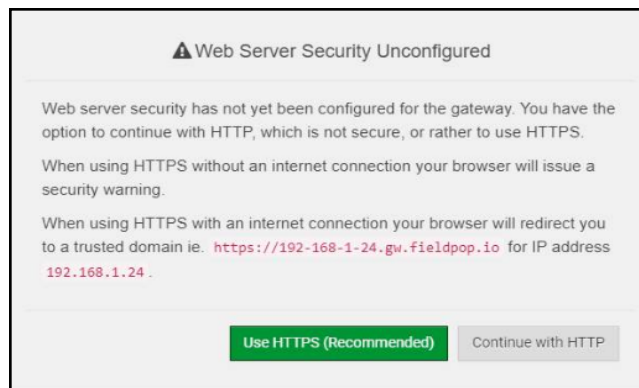
- Open a web browser and connect to the FieldServer's default IP Address. The default IP Address of the FieldServer is **192.168.1.24**, Subnet Mask is **255.255.255.0**.

NOTE: If the IP Address of the ProtoNode has been changed, the IP Address can be discovered using the FS Toolbox utility. See Section 9.1 [Lost or Incorrect IP Address](#) for instructions.

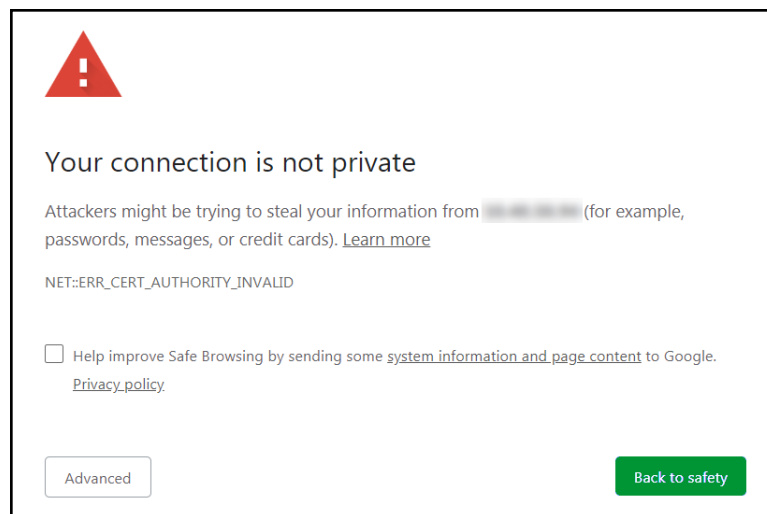
5.2 Login to the FieldServer

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.

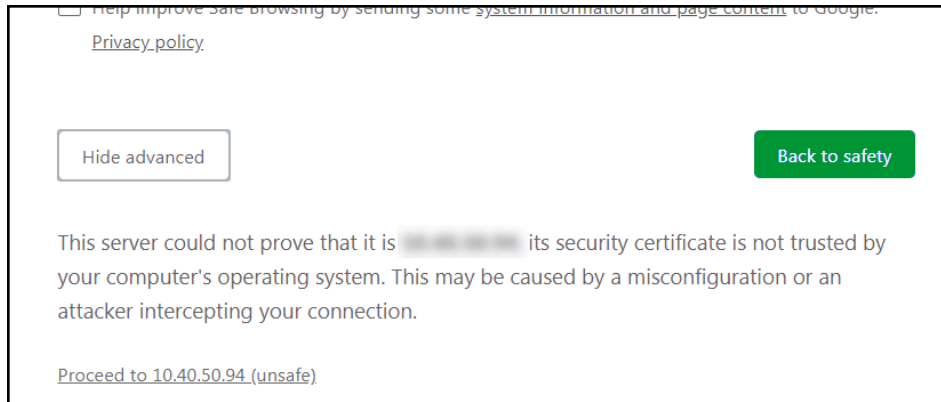
- When the Web Server Security Unconfigured window appears, read the text and choose whether to move forward with HTTPS or HTTP.



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

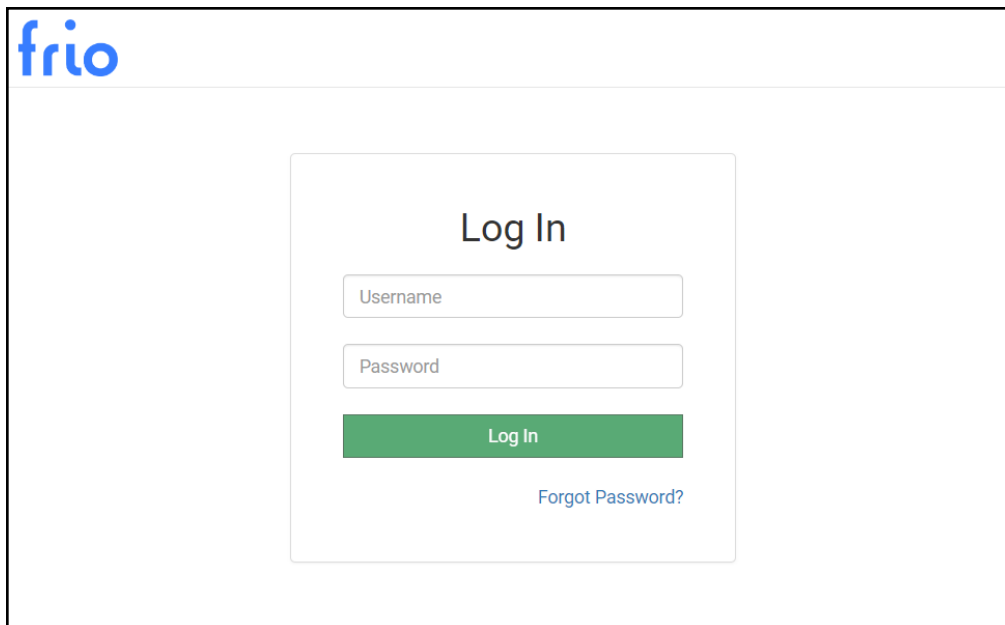


- Additional text will expand below the warning, click the underlined text to go to the IP Address. In the example below this text is “[Proceed to <FieldServer IP> \(unsafe\)](#)”.



- 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 [10.7 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.

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

NOTE: Cookies are used for authentication.

NOTE: To change the web server security mode after initial setup, go to [Section 10.6 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.

Certificate

```
XzyMbQZFiRuJZJPe7CTHLcHOrHLowUJFoVtaBMYd4d6VGdNklKazByWKcNOL7mrX
A4IBAQBfM+IPvOx3T/47VEmaiXqE3bx3zEuBFJ6pWPlw7LHf2r2ZoHw+9xb+aNMU
dVyAelhBMTMsnI2ERvQVp0xj3psSv2EJyKXS1bOYNRLsq7UzpwuAdT/Wy3o6vUM5
K+Cwf9qEoQ0LuxDZTIEct67MkcHMiuFi5pk7TRicHnQF/sfOAYOulduHOy9exlk9
FmHFVDIZt/cJUaF+e74EuSph+gEr0lQo2wmmhyc7L22UXse1NoOfu2Zg0Eu1VWtu
JRryaMwIRFEWuuzMGZtKFWVC+8q2JQsVcqiRWM7naoblEhOCMH+sKHJMCxDoXGt
vtZjpZUoAL51YXxWSVcyZdGiAP5e
-----END CERTIFICATE-----
```

Private Key

```
sHB0zZoHr4YQSDK2BbYVzzbl0LDuKtc8+JiO3ooGjoTuHnqkeAj/fkfbTAsKeAzw
gKQe+H5UQNK0bdvZfOJrm6daDK2vDmR5k+juUhej5N49uplroB97MQgYotzgf+
THlbpq5t1SIK617k04ObKmHF5l8fck+ru545sVmpeezh0m5j5SURYAZMvbq5daCu
J4l5NlihbEvxRF4UK41ZDMCvujopCkUWrb1a/3XXnDnM2K9xyz2wze998D6Wk46
+7aOFY9F+7j5ljmkoS3GYtwCyH5jP+mPP1K6RnuiD019wvGPb4dtN/RTnfd0eF
GYeVSkI9fxxkxDOFtdWRZbM/rPin4tmO1Xf8HqONVN1x/iaMynOXG4cukoi4+VO
u0rZaUEsII2zNkfrn7fAASm5NBWg202Cy9IAYnuujs3aALl5uGBEEK62oTMxlzx
-----END RSA PRIVATE KEY-----
```

Private Key Passphrase

Specify if encrypted

Save

- 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.

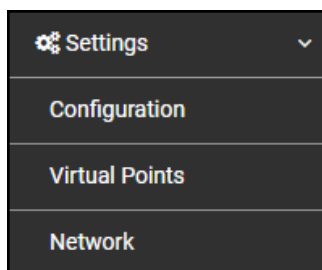
6 Setup Network

6.1 Navigate to the Network Settings

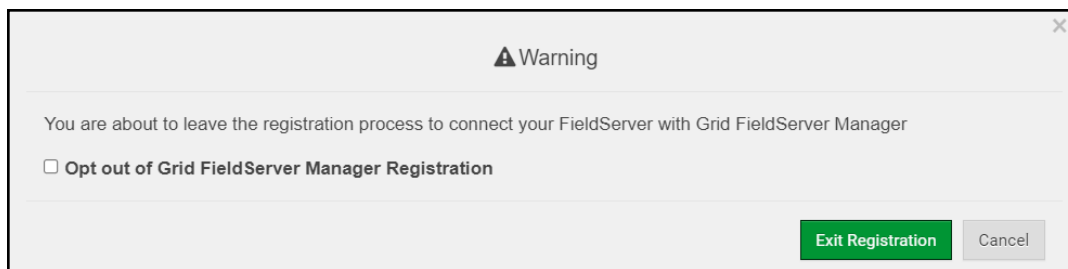
- From the Web App landing page, click the Settings tab on the left side of the screen.



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



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



6.2 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.

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 

There are unsaved settings

6.3 Ethernet 1

The ETH 1 section contains the wired network settings. To change the FieldServer IP Settings, 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 the FieldServer is connected to a router, the IP Gateway of the FieldServer should be set to the same IP Address of the router.

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

NOTE: The browser needs to be updated to the new IP Address of the FieldServer before the settings will be accessible again.

The screenshot displays the 'ETH 1 Routing' configuration page. On the left, there are several input fields for network parameters: 'IP Address' (10.40.50.109), 'Netmask' (255.255.255.0), 'Gateway' (10.40.50.1), 'Domain Name Server 1 (Optional)' (10.40.2.24), and 'Domain Name Server 2 (Optional)' (10.15.130.15). There is an unchecked checkbox for 'Enable DHCP' and 'Cancel' and 'Save' buttons at the bottom. On the right, a 'Network Status' box shows the connection status as 'Connected' with a green checkmark, along with MAC Address (00:50:4e:60:13:be), Ethernet Tx/Rx Msgs (1,209,919 / 2,745,183), and Ethernet Tx/Rx Msgs Dropped (0 / 0).

Network Status	
Connection Status	✔ Connected
MAC Address	00:50:4e:60:13:be
Ethernet Tx Msgs	1,209,919
Ethernet Rx Msgs	2,745,183
Ethernet Tx Msgs Dropped	0
Ethernet Rx Msgs Dropped	0

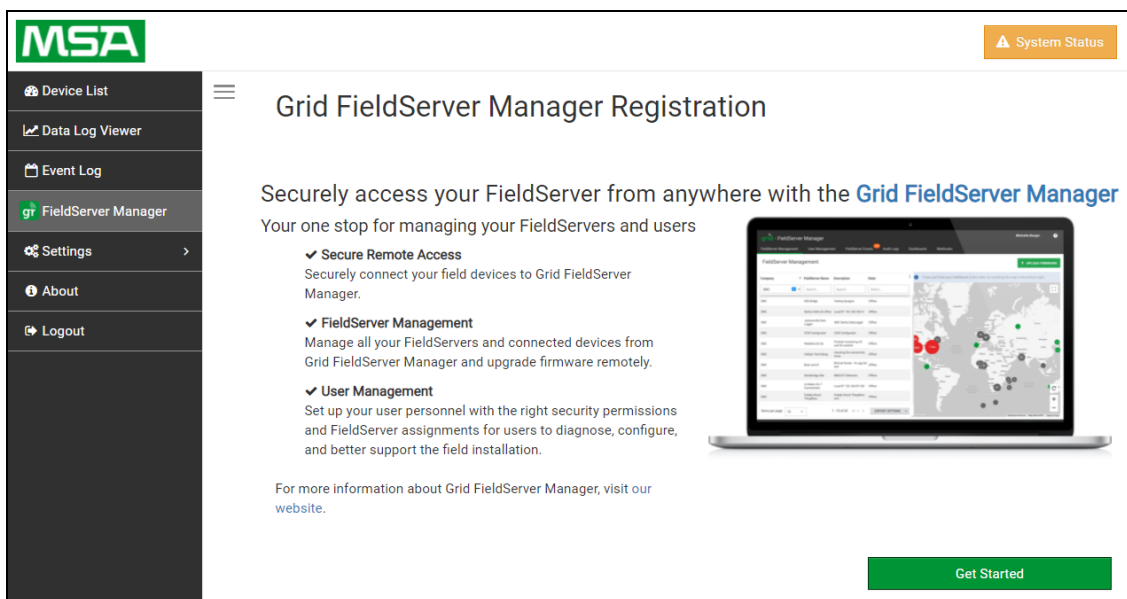
7 MSA Grid - FieldSever Manager Setup

The MSA Grid is MSA Safety's device cloud solution for IIoT. Integration with the MSA Grid - FieldServer Manager enables the 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 Manager Start-up Guide](#).

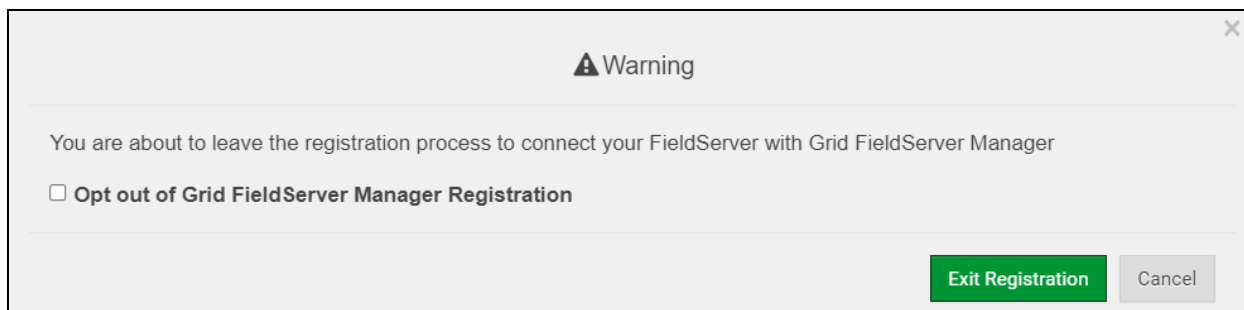
7.1 Choose Whether to Integrate the FieldServer Manager

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

NOTE: If a warning message appears instead, go to [Section 10.8 FieldServer Manager Connection Warning Message](#) to resolve the connection issue.



- Either go through the FieldServer Manager setup to integrate cloud functionality to the FieldServer or opt out.
 - For FieldServer Manager setup, continue with instructions in the following sections
 - To opt out of the FieldServer Manager, 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
 - To ignore FieldServer Manager setup until the next time the 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




NOTE: If user setup is already complete go to [Section 7.3 Registration Process](#).

7.2 User Setup

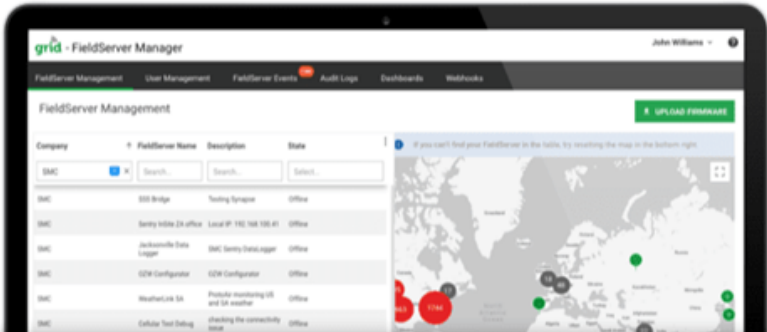
Before the gateway can be connected to the FieldServer Manager, a user account must be created. Once an invitation has been requested, follow the instructions below to set up login details:

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



Fieldserver Manager

Welcome to FieldServer Manager




Your one stop for managing your FieldServers and users

- ✓ Secure Remote Access
- ✓ FieldServer Management
- ✓ User Management

COMPLETE REGISTRATION

Contact Us
 +1 408 262-6611
smc-support@msasafety.com
www.msasafety.com

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NOTE: If no email was received, check the spam/junk folder for an email from 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
 *
*Invalid Mobile Number

New Password
 *

Confirm Password
 *
* Please enter new password

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

* Mandatory Fields

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

- Click the FieldServer Manager tab.

NOTE: If a warning message appears instead, go to [Section 10.8 FieldServer Manager Connection Warning Message](#) to resolve the connection issue.

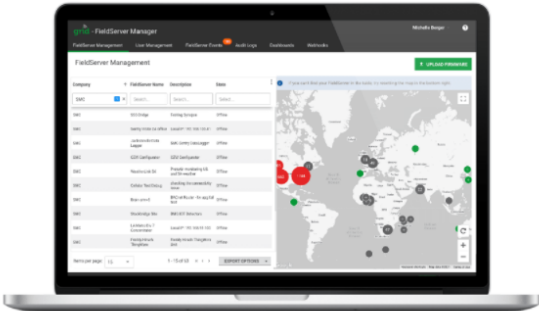
Grid FieldServer Manager Registration

Securely access your FieldServer from anywhere with the **Grid FieldServer Manager**

Your one stop for managing your FieldServers and users

- ✓ **Secure Remote Access**
Securely connect your field devices to Grid FieldServer Manager.
- ✓ **FieldServer Management**
Manage all your FieldServers and connected devices from Grid FieldServer Manager and upgrade firmware remotely.
- ✓ **User Management**
Set up your user personnel with the right security permissions and FieldServer assignments for users to diagnose, configure, and better support the field installation.

For more information about Grid FieldServer Manager, visit [our website](#).



Get Started

- Click Get Started to view the FieldServer Manager registration page.

7 MSA Grid - FieldServer Manager Setup

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

The screenshot shows the registration process with four steps: 1. Installer Details (highlighted), 2. Installation Site, 3. FieldServer Details, and 4. Account Details. The 'Installer Details' section includes the following fields:

- Installer Name:
- Company:
- Telephone:
- Email:
- Installation Date:

At the bottom right, there are 'Cancel' and 'Next' buttons.

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

The screenshot shows the registration process with four steps: 1. Installer Details, 2. Installation Site (highlighted), 3. FieldServer Details, and 4. Account Details. The 'Installation Site Details' section includes the following fields:

- Search:
- Site Name:
- Building:
- Street Address:
- Suburb:
- City:
- State:
- Country:
- Postal Code:
- Latitude:
- Longitude:

To the right of the form is a Google Maps interface showing a map of the Lafayette, Louisiana area. At the bottom right, there are 'Cancel', 'Previous', and 'Next' buttons.

- 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 (GMT -08:00) America/Los_Angeles ▼

Cancel Previous **Next**

- Click the “Create an Grid FieldServer Manager account” button and enter a valid email to send a “Welcome to MSA Grid – FieldServer Manager” invite to the email address entered

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**

- 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

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

[Update FieldServer Details](#)

NOTE: Update these details at any time by going to the FieldServer Manager tab and clicking the Update FieldServer Details button.


7.4 Login to the FieldServer Manager

After the gateway is registered, go to www.smccloud.net and type in the appropriate login information as per registration credentials.

grid - FieldServer Manager

Sign in

Email

Password show 

[Forgot Password](#)

Keep me signed in

[SIGN IN](#)

MSA | fieldserver

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](#).

grid - FieldServer Manager

User A

FieldServer Management | User Management | FieldServer Events | Audit Logs | Dashboards | Webhooks

FieldServer Management UPLOAD FIRMWARE

Company	FieldServer Name	Description	State
Select...	Search...	Search...	Select...
Eggers OEM	Jens's Brain 31	192.168.1.31	Offline
Eggers OEM	Jens MBP Core App	~/git/smc-core-application	Offline
Eggers OEM	Jens's Dell Profile View	~/git/profile-view	Offline
Eggers OEM	hd_test_log_to_fpop	testing_modbus	Offline
Eggers OEM	Mbus demo	testing registration	Offline
SMC	TestWall-PA2port 97	Testwall pa 2 97	Offline
SMC	TestWall-Lon152	Testwall unit	Offline

If you can't find your FieldServer in the table, try resetting the map in the bottom right.

© 2021 MSA. All rights reserved. MSA | fieldserver

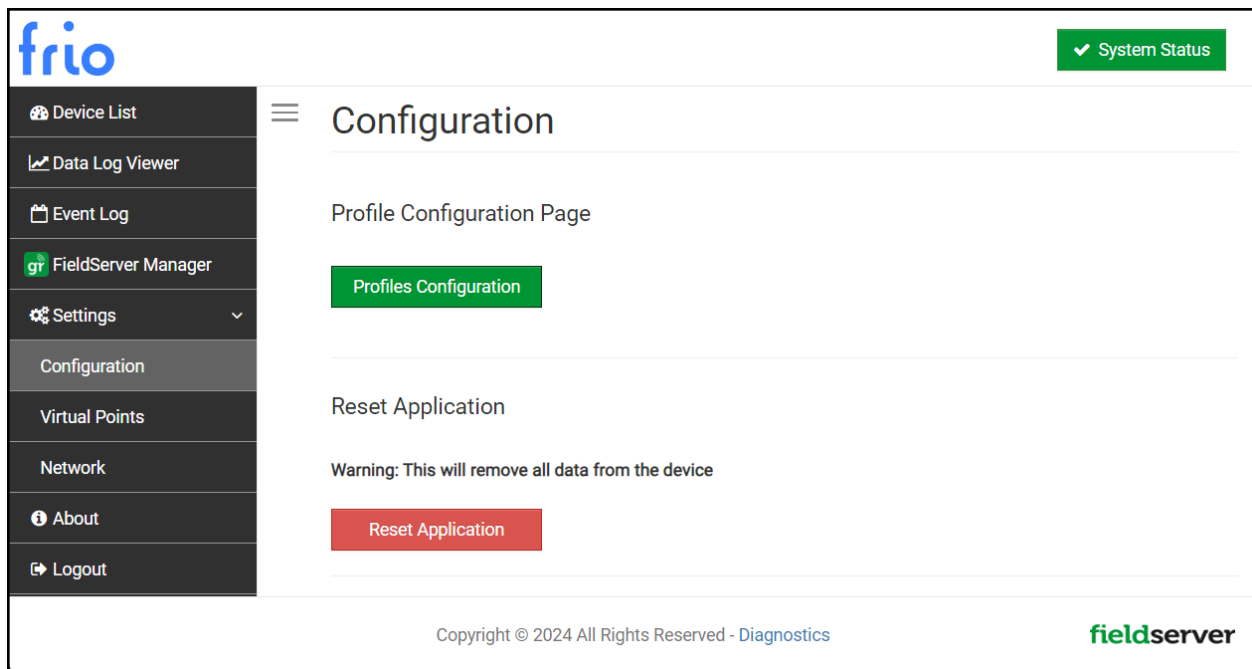
8 Configure the ProtoNode

8.1 Navigate to the ProtoNode Web Configurator

- From the Web App Device List page, click the Settings tab and then click Configuration.



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



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.

frio

Configuration Parameters

Parameter Name	Parameter Description	Value
protocol_select	Protocol Selector Set to 1 for BACnet IP/Modbus TCP Set to 2 for BACnet MSTP Set to 3 for BACnet MSTP (single node)	1 <input type="button" value="Submit"/>
mod_baud_rate	Modbus RTU Baud Rate This sets the Modbus RTU baud rate. (9600/19200/38400/57600)	38400 <input type="button" value="Submit"/>
mod_parity	Modbus RTU Parity This sets the Modbus RTU parity.	None <input type="button" value="Submit"/>

HELP (?) **fieldserver**

- 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 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.




Configuration Parameters

Parameter Name	Parameter Description	Value
protocol_select	Protocol Selector Set to 1 for BACnet IP/Modbus TCP Set to 2 for BACnet MSTP Set to 3 for BACnet MSTP (single node)	<input type="text" value="1"/> Submit
mod_baud_rate	Modbus RTU Baud Rate This sets the Modbus RTU baud rate. (9600/19200/38400/57600)	<input type="text" value="38400"/> Submit
mod_parity	Modbus RTU Parity This sets the Modbus RTU parity. (None/Even/Odd)	<input type="text" value="None"/> Submit
mod_data_bits	Modbus RTU Data Bits This sets the Modbus RTU data bits. (7 or 8)	<input type="text" value="8"/> Submit
mod_stop_bits	Modbus RTU Stop Bits This sets the Modbus RTU stop bits. (1 or 2)	<input type="text" value="1"/> Submit
network_nr	BACnet Network Number This sets the BACnet network number of the Gateway. (1 - 65535)	<input type="text" value="50"/> Submit
node_offset	BACnet Node Offset This is used to set the BACnet device instance. The device instance will be sum of the Modbus device address and the node offset. (0 - 4194303)	<input type="text" value="50000"/> Submit
bac_ip_port	BACnet IP Port This sets the BACnet IP port of the Gateway. The default is 47808. (1 - 65535)	<input type="text" value="47808"/> Submit
bac_cov_option	BACnet COV This enables or disables COVs for the BACnet connection. Use COV_Enable to enable. Use COV_Disable to disable. (COV_Enable/COV_Disable)	<input type="text" value="COV_Disable"/> Submit
bac_bbmd_option	BACnet BBMD This enables BBMD on the BACnet IP connection. Use BBMD to enable. Use - to disable. The bdt.ini files also needs to be downloaded. (BBMD/-)	<input type="text" value="-"/> Submit
bac_virt_nodes	BACnet Virtual Server Nodes Set to NO if the unit is only converting 1 device to BACnet. Set to YES if the unit is converting multiple devices. (No/Yes)	<input type="text" value="No"/> Submit

Active profiles

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



- 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.

Active profiles			
Nr	Node ID	Current profile	Parameters
1	1	BAC_IP_Frio_S1_Controller	<input type="button" value="Remove"/>
2	22	BAC_IP_Frio_S1_Controller	<input type="button" value="Remove"/>
3	33	BAC_IP_Frio_S1_Controller	<input type="button" value="Remove"/>
<input type="button" value="Add"/>			
<input type="button" value="HELP (?)"/>			
<input type="button" value="Clear Profiles and Restart"/>			
<input type="button" value="System Restart"/>			
<input type="button" value="Diagnostics & Debugging"/>			

fieldserver

8.4 Verify Device Communications

- If using a serial connection, check that TX and RX LEDs are rapidly flashing ([Section 9.4 LED Functions](#)).
- Confirm the software shows good communications without errors ([Section 9.2 Viewing Diagnostic Information](#)).

8.5 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:

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

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:

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

$$\mathbf{50,000 = \text{Node_Offset}}$$

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

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

Click "Submit" once the desired value is entered.

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

Active profiles

Nr	Node ID	Current profile	Parameters
1	1	BAC_IP_Frio_S1_Controller	<input type="button" value="Remove"/>
2	22	BAC_IP_Frio_S1_Controller	<input type="button" value="Remove"/>
3	33	BAC_IP_Frio_S1_Controller	<input type="button" value="Remove"/>

fieldserver

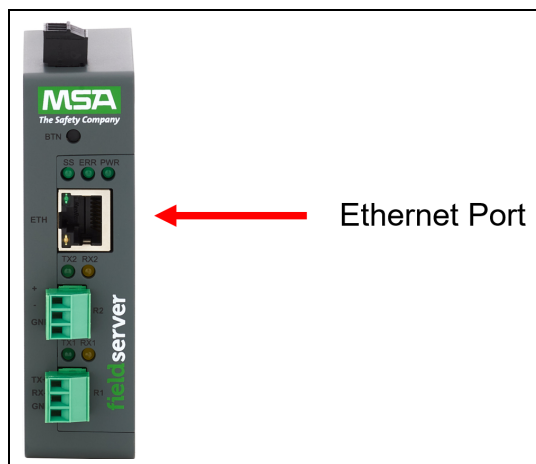
8.6 How to Start the Installation Over: Clearing Profiles

- 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.

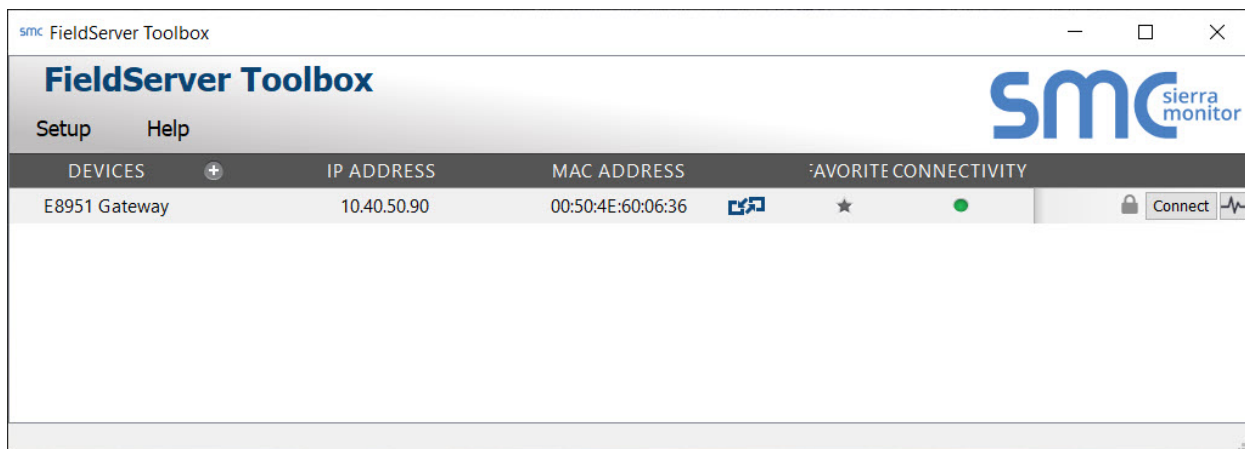
9 Troubleshooting

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.

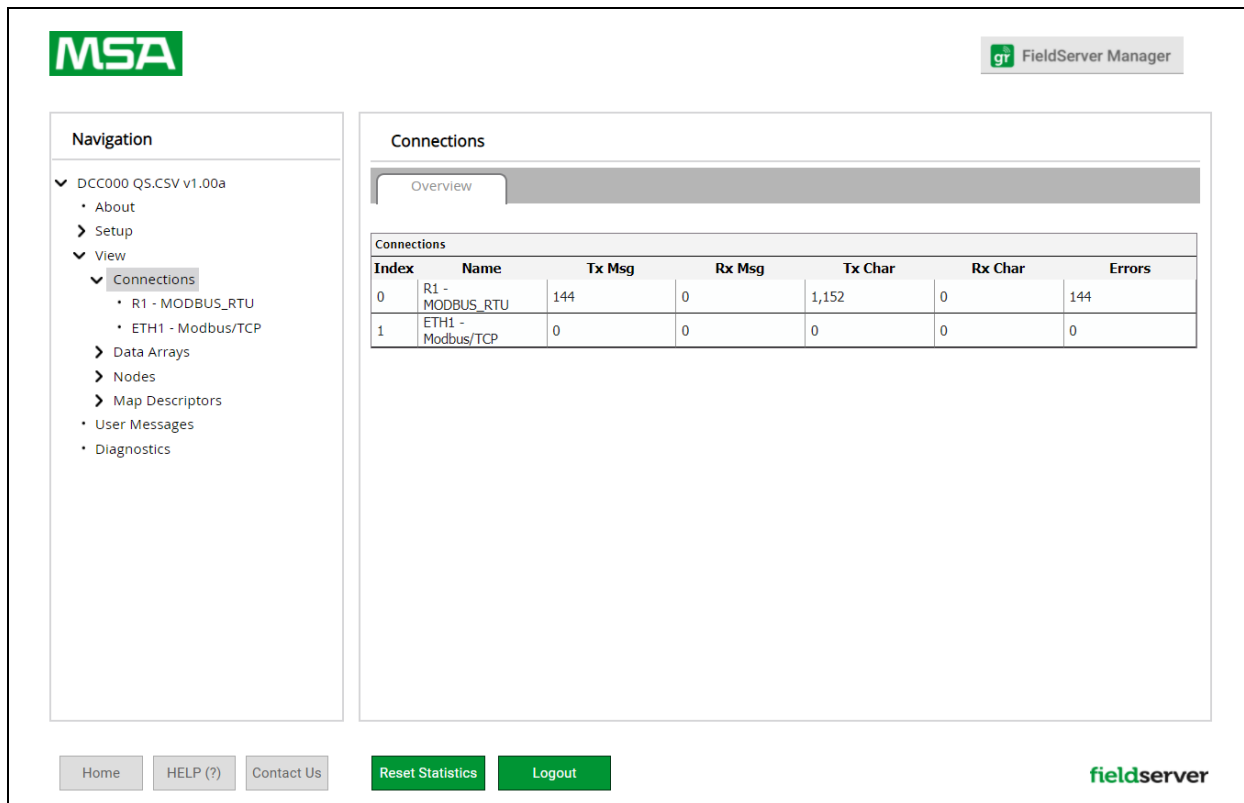


- Connect a standard Cat-5 Ethernet cable between the user's PC and ProtoNode.
- Double click on the FS Toolbox Utility and click Discover Now on the splash page.
- Check for the IP Address of the desired gateway.



9.2 Viewing Diagnostic Information

- Type the IP Address of the 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 9.3 Checking Wiring and Settings](#) for the relevant wiring and settings.



The screenshot shows the MSA FieldServer Manager interface. On the left is a navigation menu with options like About, Setup, View, Connections, Data Arrays, Nodes, Map Descriptors, User Messages, and Diagnostics. The main area is titled 'Connections' and shows a table of connection statistics.

Index	Name	Tx Msg	Rx Msg	Tx Char	Rx Char	Errors
0	R1 - MODBUS_RTU	144	0	1,152	0	144
1	ETH1 - Modbus/TCP	0	0	0	0	0

At the bottom of the interface, there are buttons for Home, HELP (?), Contact Us, Reset Statistics, and Logout. The fieldserver logo is visible in the bottom right corner.

9.3 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:

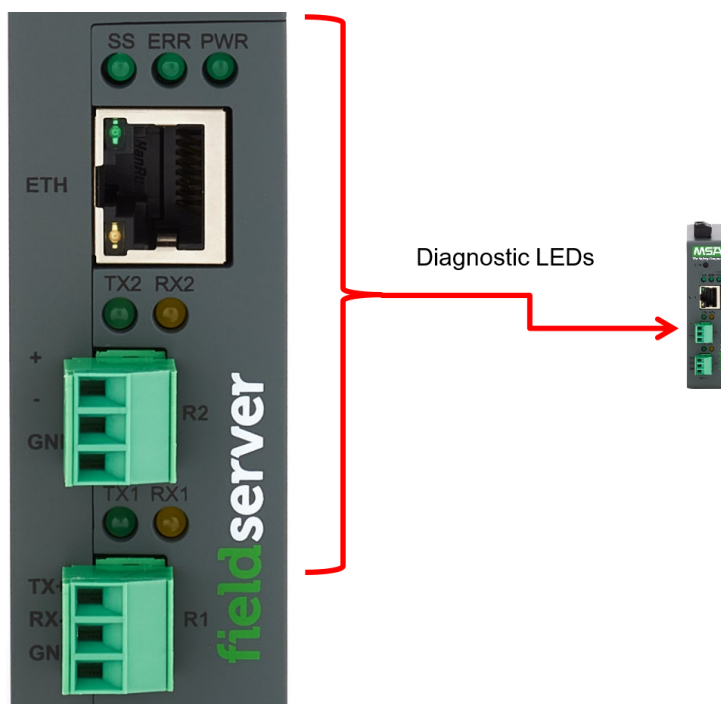
- Visual observations of LEDs on the ProtoNode. ([Section 9.4 LED Functions](#))
- Check baud rate, parity, data bits, stop bits.
- Check device address.
- Verify wiring.
- Verify the device was listed in the Web Configurator ([Section 8.3 Setting Active Profiles](#)).

Field COM problems:

- Visual observations of LEDs on the ProtoNode. ([Section 9.4 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 9.7 Taking a FieldServer Diagnostic Capture](#))

9.4 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.

9.5 Factory Reset Instructions

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

9.6 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

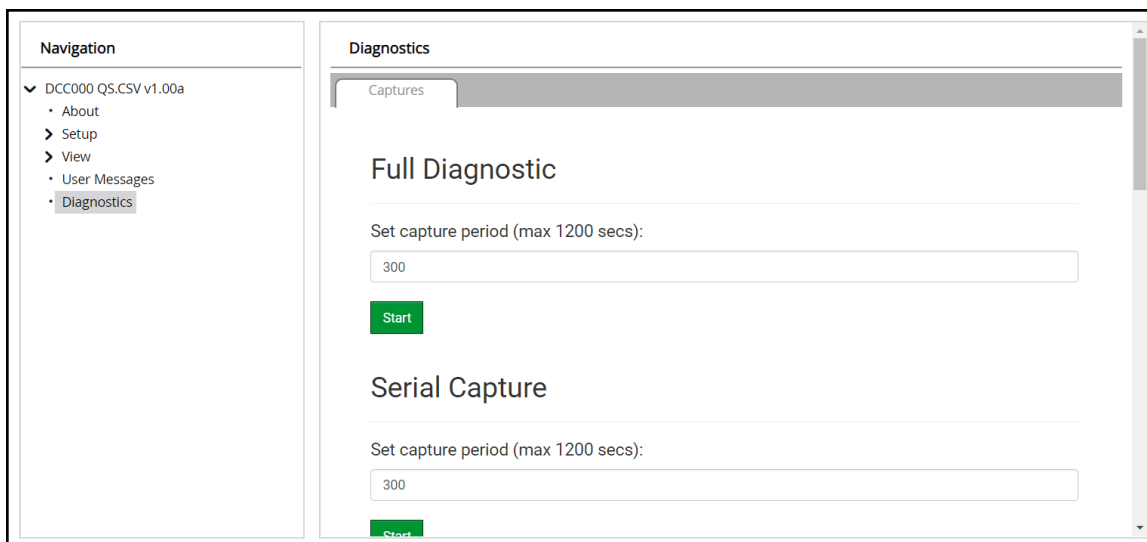
NOTE: Internet Explorer is no longer supported as recommended by Microsoft.

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

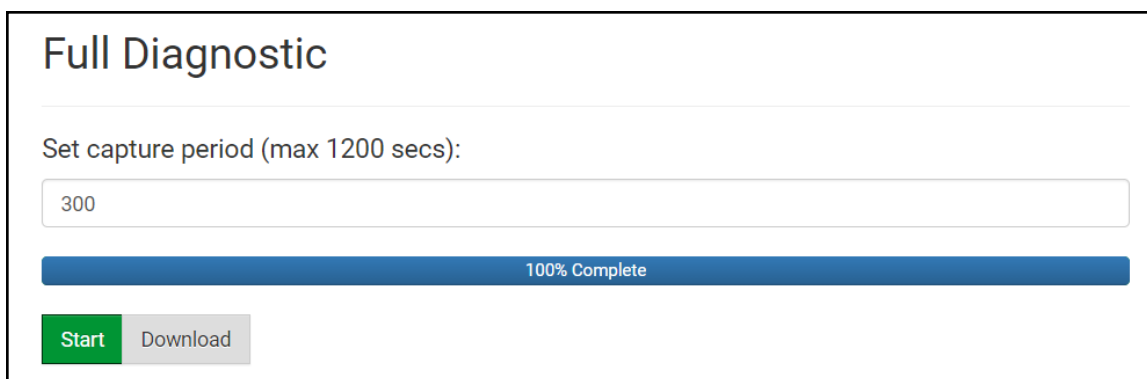
9.7 Taking a FieldServer Diagnostic Capture

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.

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 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 Frio Controls to receive any firmware updates.

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	BACnet Network Number This sets the BACnet network number of the Gateway. (1 - 65535)	<input type="text" value="50"/>	<input type="submit" value="Submit"/>
------------	--	---------------------------------	---------------------------------------

10.3 Mounting

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



10.4 Certification

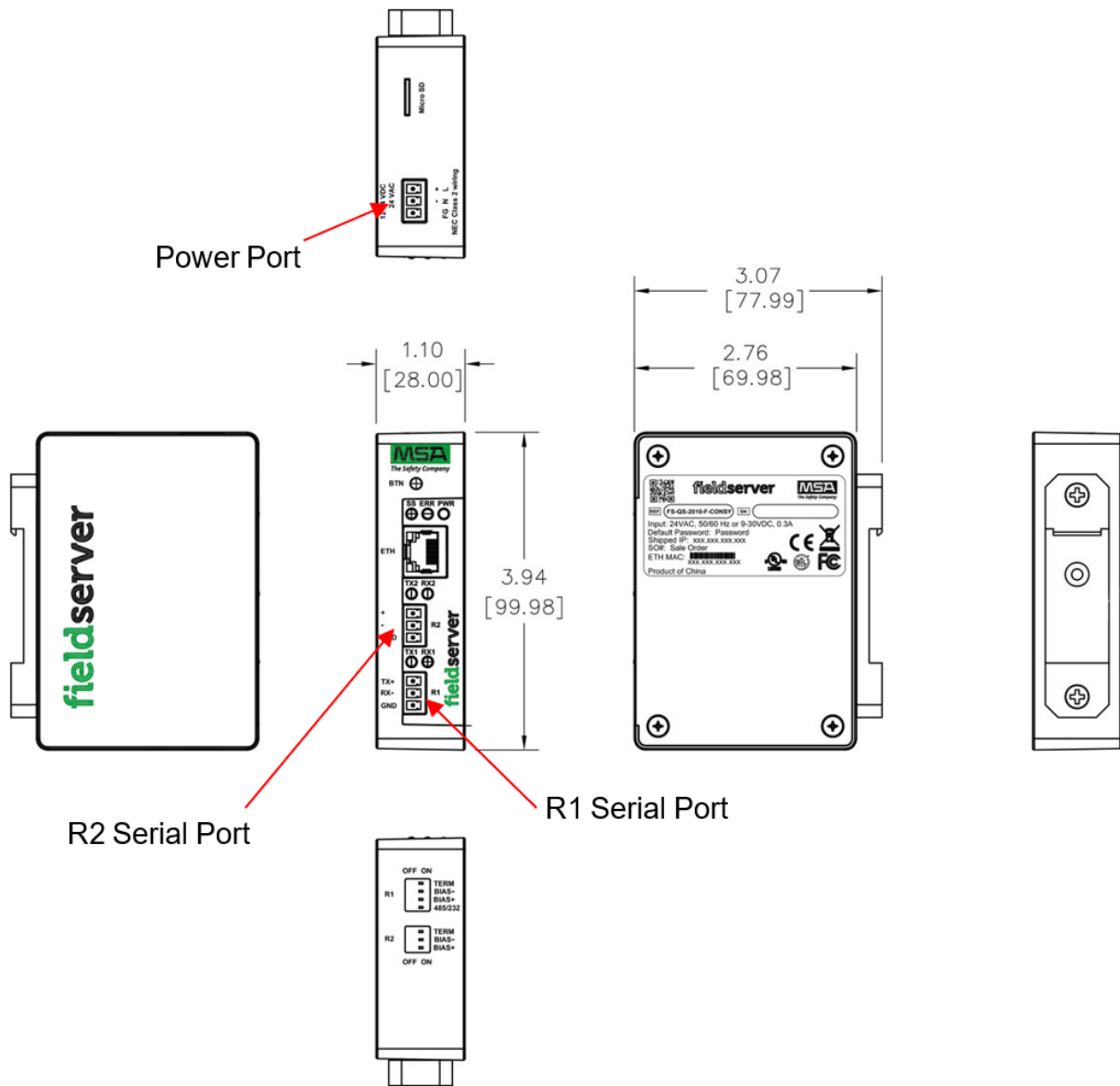
BTL Mark – BACnet Testing Laboratory



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.*

10.5 Physical Dimensions



10.6 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.

The screenshot shows the FieldServer Manager interface. On the left is a navigation panel with a tree view under 'DCC000 QS.CSV v1.00a' containing 'About', 'Setup', 'View', 'User Messages', and 'Diagnostics'. The main content area is titled 'DCC000 QS.CSV v1.00a' and has tabs for 'Status', 'Settings', and 'Info Stats'. The 'Status' tab is active, displaying a table of system information:

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

At the bottom of the main area are buttons for 'System Restart', 'System Reboot', 'System Time Sync', 'Reset Cycle Times', and 'Logout'. The 'fieldserver' logo is in the bottom right corner.

10.6.1 Change Security Mode

- Click Security in the Navigation panel.

The screenshot shows the 'Security' settings page in the FieldServer Manager. The navigation panel on the left has 'Security' selected under the 'Setup' section. The main content area is titled 'Security' and has a tab for 'Web Server'. Under the 'Mode' section, there are three radio button options:

- 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)

Below the mode options is a green 'Save' button. Under the 'Selected Certificate Info' section, the following details are displayed:

- Issued By: Sectigo RSA Domain Validation Secure Server CA
- Issued To: *.gw.fieldpop.io
- Valid From: Aug 10, 2021
- Valid To: Aug 11, 2022

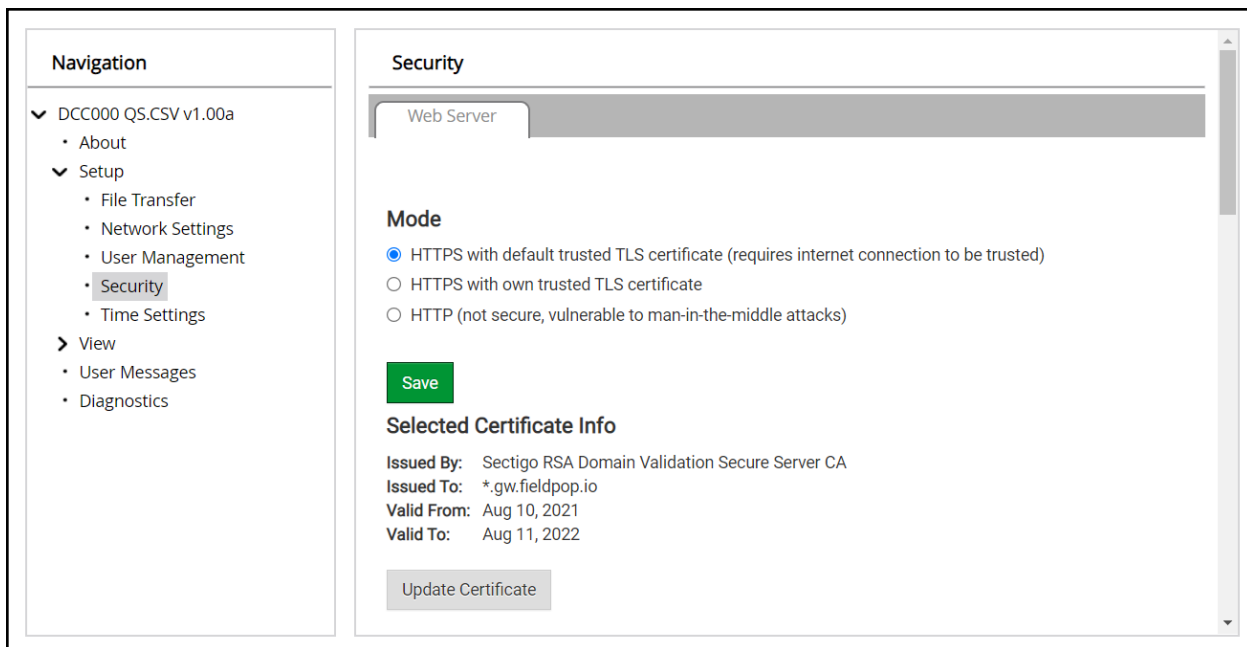
At the bottom of the certificate info section is an 'Update Certificate' button.

- 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.

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.



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

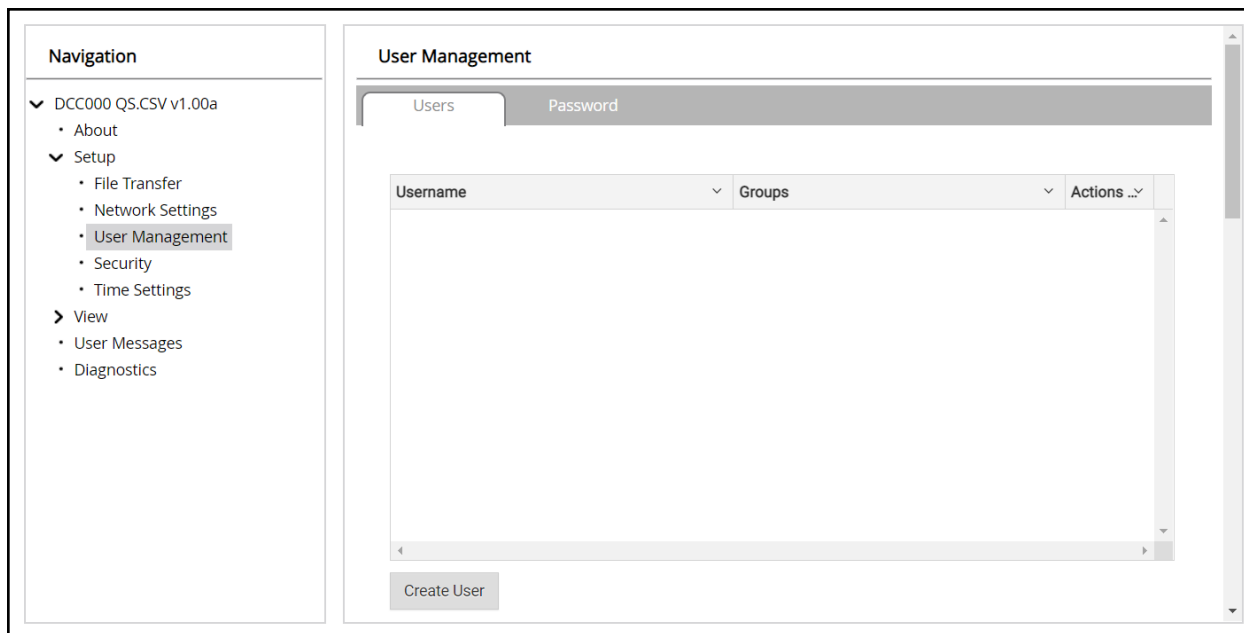
10.7 Change User Management Settings

- 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 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.

10.7.1 Create Users

- Click the Create User button.

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

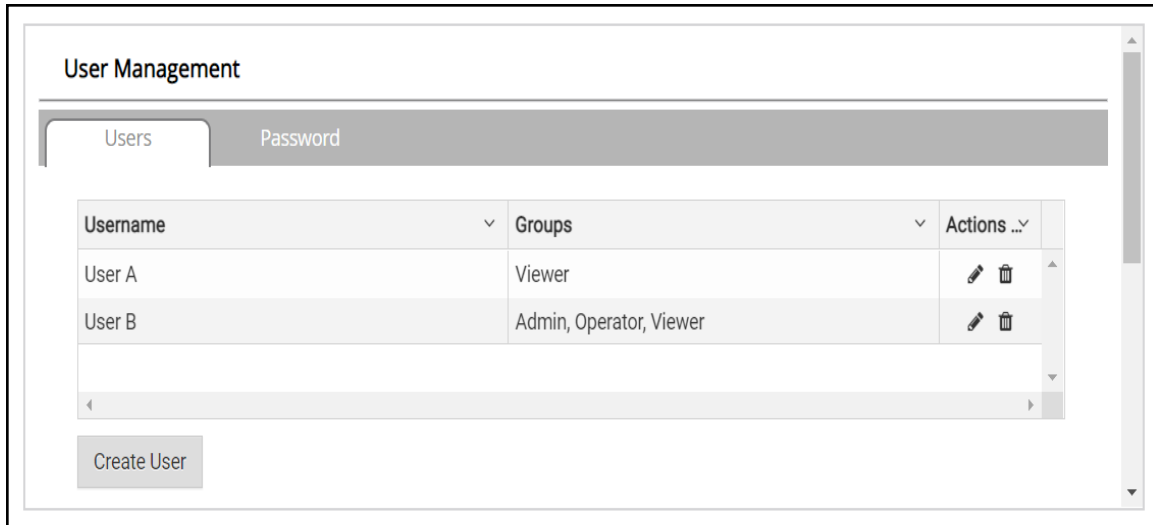
- Enter the new User fields: Name, Security Group and Password.
 - **User details are hashed and salted**

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.

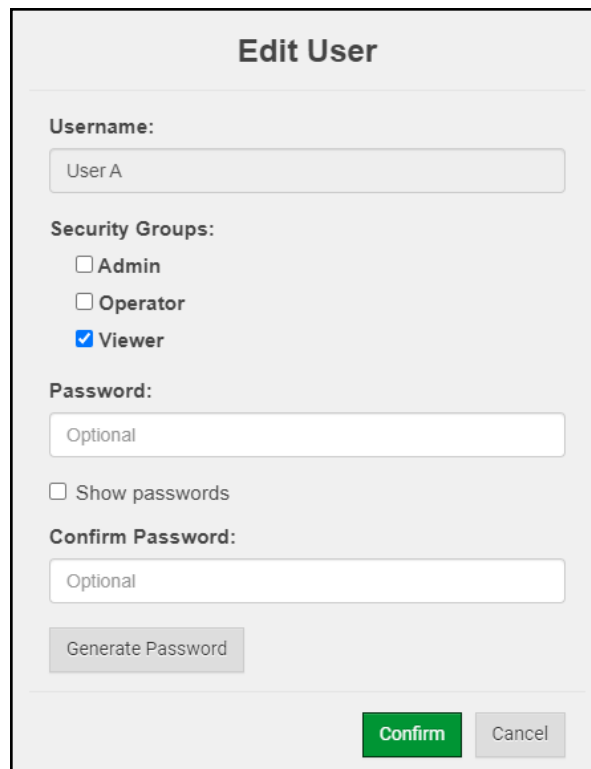
- Click the Create button.
- Once the Success message appears, click OK.

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.



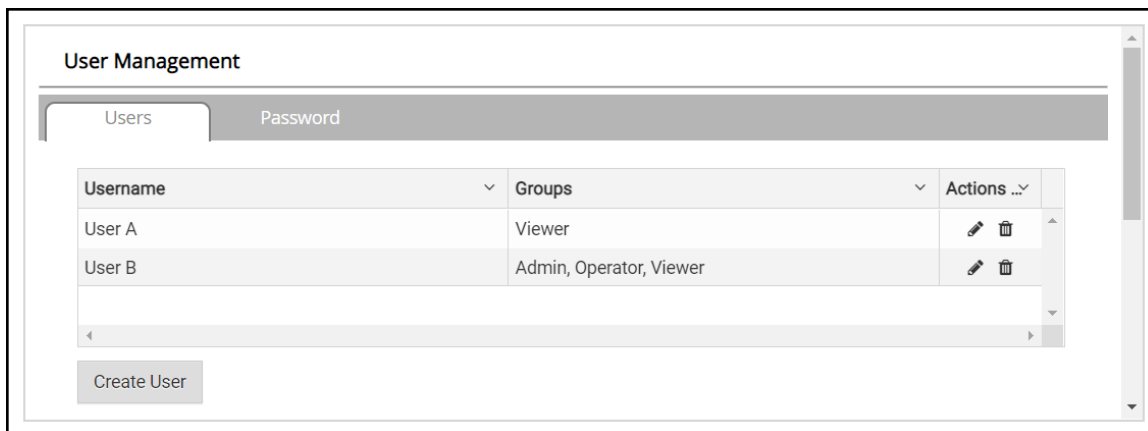
The 'Edit User' dialog box contains the following fields and options:

- 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
- Confirm Password:** A text input field containing 'Optional'.
-
-

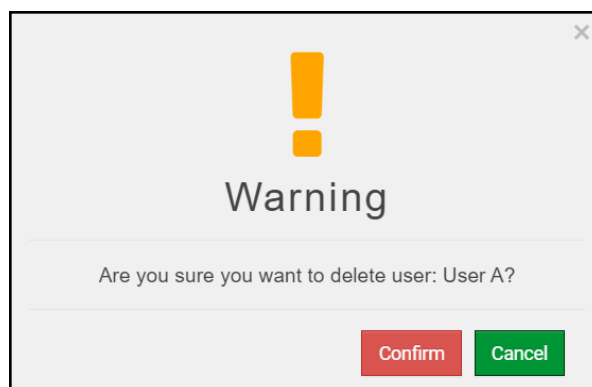
- Click Confirm.
- Once the Success message appears, click OK.

10.7.3 Delete Users

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

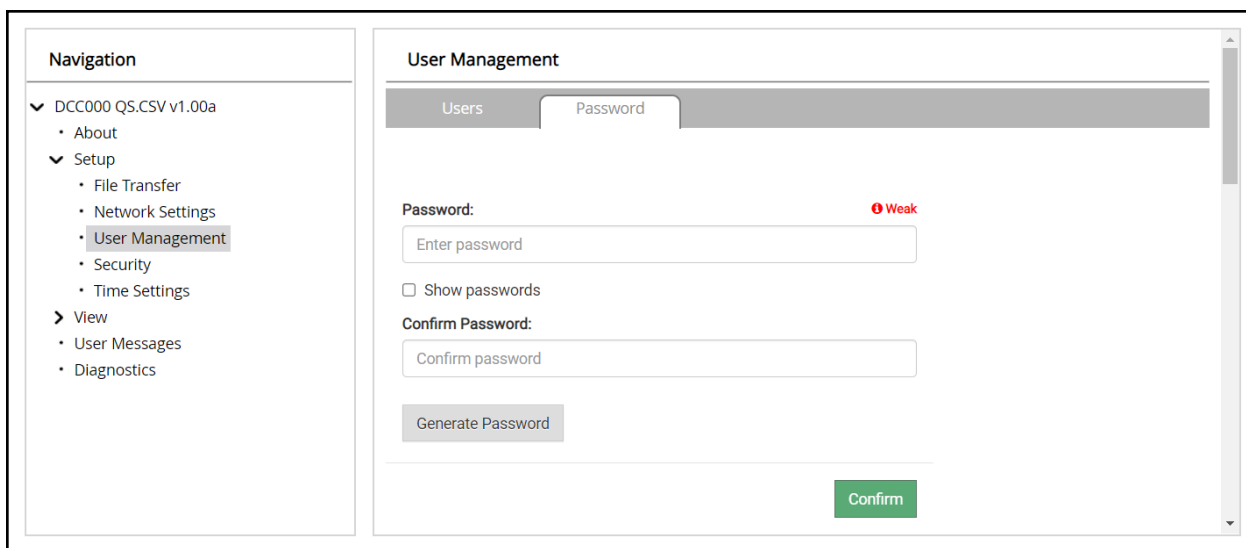


- When the warning message appears, click Confirm.



10.7.4 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.

10.8 FieldServer Manager Connection Warning Message

- If a warning message appears instead of the page as shown below, follow the suggestion that appears on screen.
 - If the FieldServer cannot reach the server, the following message will appear

Grid FieldServer Manager Registration

Grid FieldServer Manager™ Server Unreachable

The device is unable to connect to the Grid FieldServer Manager server.

The following network issues have been detected. Correcting them might resolve connectivity to the server:

- Could not ping Gateway [192.168.2.1]
- Could not ping Domain Name Server 1 [8.8.8.8]
- Could not ping Domain Name Server 2 [8.8.4.4]

Ensure your network firewall is configured to allow this device to access the Grid FieldServer Manager server:

- Error Code: **EAL_AGAIN**
- FieldServer MAC address: **00:50:4E:60:6C:E8**
- Allow HTTPS communications to the following domains on **port 443**:
 - **www.fieldpop.io**
 - **ts.fieldpop.io**

- 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 FieldServer 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.



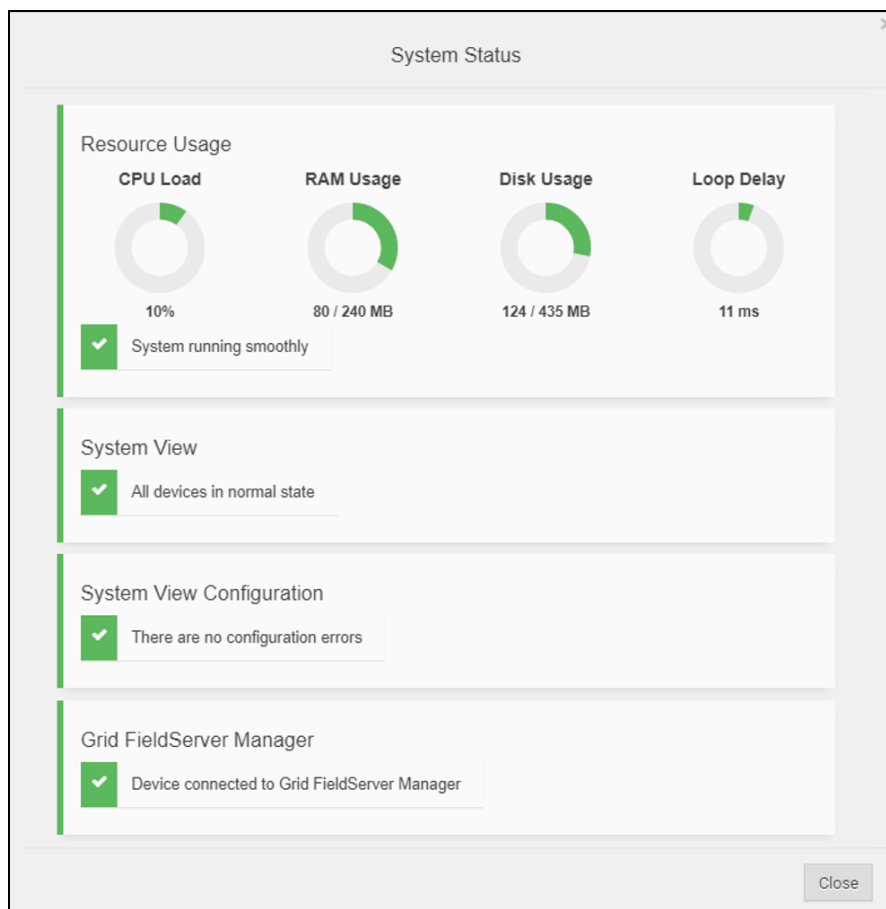
The color of the button represents the status of one to all three systems:

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, the Grid FieldServer Manager status will not appear 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 – Frio Controls

11.1 Frio_S1_Controller Modbus RTU Mappings to BACnet

Point Name	BACnet Object Type	BACnet Object ID
Current	AI	1
Voltage	AI	2
RTD Temperature C	AI	3
Thermistor Temperature C	AI	4
RTD Temperature F	AI	5
Thermistor Temperature F	AI	6
Controller Mode	AI	7
State	AI	8
Substate	AI	9
Network Connection	AI	10
Alarm	BI	11
Heater Relay State	BI	12
Force On/Off	AO	13
Alarms - GFEP Trip	BI	14
Alarms - GFEP System	BI	15
Alarms - Low Temperature	BI	16
Alarms - High Temperature	BI	17
Alarms - Low Current	BI	18
Alarms - High Current	BI	19
Alarms - Thermistor	BI	20
Alarms - RTD	BI	21
Alarms - Power Loss	BI	22
Alarms - Network	BI	23
Alarms - GF High Current	BI	24
Alarms - Power Monitor	BI	25

12 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	<i>Input Voltage:</i> 12-24VDC or 24VAC <i>Max Power:</i> 3 Watts <i>Current draw:</i> 24VAC 0.125A 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 to 158°F)
Humidity	10-95% RH non-condensing

NOTE: Specifications subject to change without notice.

12.1 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.

12.2 Compliance with EN IEC 62368-1

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

- 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.

13 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.