ProtoAir FPA-W44 for Interfacing

Bryan Steam & Thermal Solutions Products

MSAsafety.com

MSA | fieldserver

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Technical Support

Thank you for purchasing the ProtoAir for Bryan Steam & Thermal Solutions.

Please call Bryan Steam or Thermal Solutions for technical support of the ProtoAir product.

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

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Quick Start Guide

1. Methods of Configuration: (**Section 1.2 Methods of Configuration**)

   - **Auto-Discovery:** See the table of devices that support automatic configuration.

   - **Web Configurator:** For devices that cannot be automatically configured, use a web browser to access the Web Configurator page.

2. Record the information about the unit. (**Section 2.1 Record Identification Data**)

3. Check that the ProtoAir and customer device COM settings match. (**Section 2.3 Configuring Device Communications**)

4. Connect the ProtoAir 3 pin RS-485 R1 port to the RS-485 network connected to each of the devices. (**Section 3.1 Device Connections to ProtoAir**)

5. Connect the ProtoAir 3 pin RS-485 R2 port to the field protocol cabling. (**Section 3.2 Wiring Field Port to RS-485 Serial Network**)

6. Connect power to ProtoAir 3 pin power port. (**Section 4 Power up the Gateway**)

7. Connect a PC to the ProtoAir via Ethernet cable. (**Section 5 Connect the PC to the Gateway**)

8. Setup Web Server Security and login via web browser. (**Section 6 Setup Web Server Security**)

9. Configure the ProtoAir to connect to the local network. (**Section 7 Setup Network**)

10. Integrate the ProtoAir with the FieldServer Manager or opt out. (**Section 8.1 Choose Whether to Integrate the FieldServer Manager**)

11. Use a web browser to access the ProtoAir Web Configurator page to set configuration parameters and setup connected devices using one of the methods below:

    - **Auto-Discovery Devices:** Click the Discovery Mode button at the bottom of the screen. It may take around 3 minutes for all the devices to be discovered and the configuration file to be built. Skip this step if Auto-Discovery was accomplished with DIP switches. (**Section 9.3.1   Use Discovery Mode**)

    - **Web Configurator Devices:** Select the profiles of the devices attached to the ProtoAir and enter any necessary device information. Once the devices are selected, the ProtoAir automatically builds and loads the appropriate configuration. (**Section 9.3.2   Setting Active Profiles**)

Contents

1 Introduction

1.1 ProtoAir Gateway

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

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

FPA-W44 Connectivity Diagram:
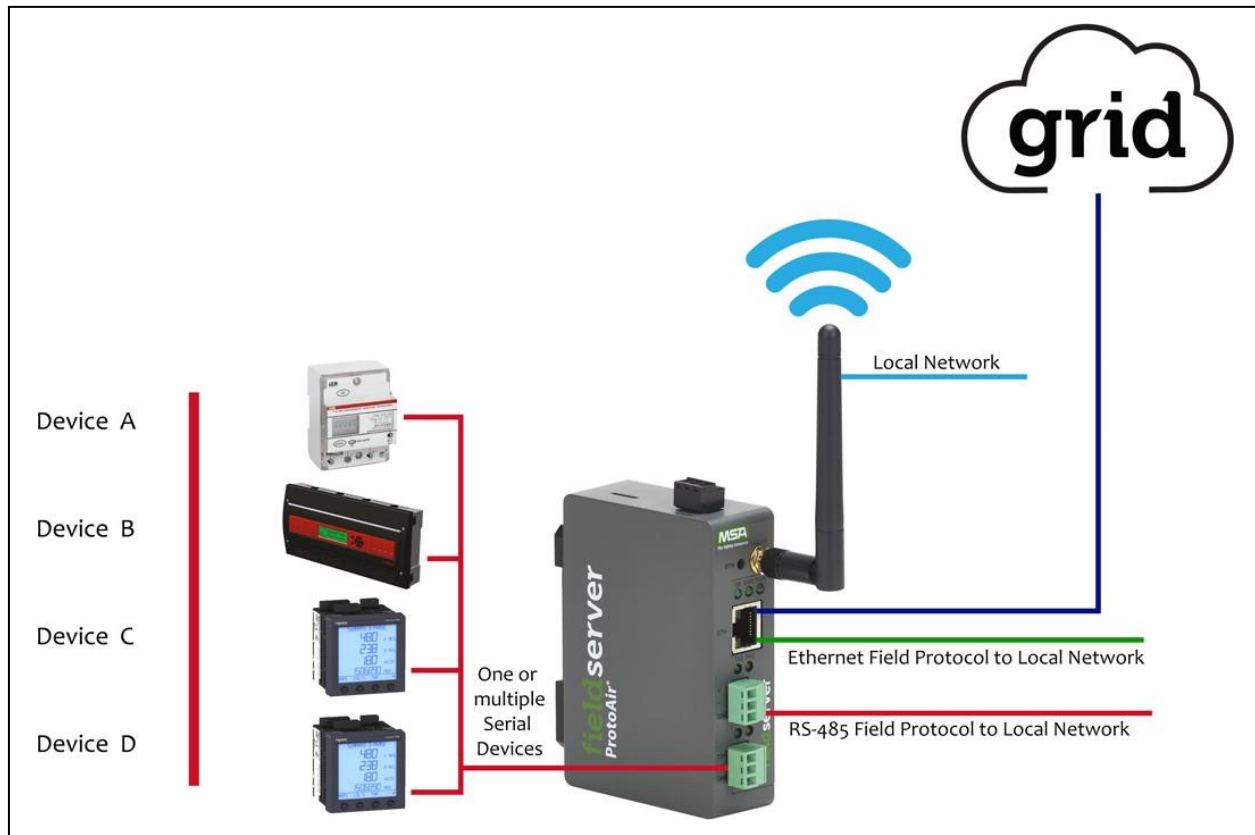
The ProtoAir can connect with the MSA Grid – FieldServer Manager. The FieldServer Manager allows technicians, the OEM's support team and MSA Safety's support team to remotely connect to the ProtoAir. The FieldServer Manager provides the following capabilities for any registered devices in the field:

• Remotely monitor and control devices.

• Collect device data and view it on the Dashboard and the MSA Smart Phone App.

• Create user defined device notifications (alarm, trouble and warning) via SMS and/or Email.

• Generate diagnostic captures (as needed for troubleshooting) without going to the site.

For more information on the FieldServer Manager, see the MSA Grid - FieldServer Manager Start-up Guide.

1.2   Methods of Configuration

The ProtoAir offers two methods of configuration:

• **Auto-Discovery:** Supported RS-485 devices can be automatically detected and identified for addition to the ProtoAir's configuration via the ProtoAir's Web Configurator. (**Section 9.3.1   Use Discovery Mode**)

• **Web Configurator:** Devices that cannot be identified by Auto-Discovery must be configured to the gateway by selecting profiles on the ProtoAir's Web Configurator. The Web Configurator shows all the stored profiles/devices on the ProtoAir. It will also show all the devices that were previously discovered or selected. To configure, select a device and enter the Modbus Node-ID. Once all required device profiles are saved, the ProtoAir automatically builds and downloads the configuration for the desired protocol. (**Section 9.3.2   Setting Active Profiles**)

Devices	Type of Communication	Type of Configuration
Sola	Modbus RTU	Web-Configurator
RWF40	Modbus RTU	Web-Configurator
LMV52	Modbus RTU	Web-Configurator
RM7800	Modbus RTU	Web-Configurator
LMV36	Modbus RTU	Web-Configurator
PD765	Modbus RTU	Web-Configurator
RWF55	Modbus RTU	Web-Configurator
4109 (Sage 2.1)	Modbus RTU	Auto-Discovery
TSBC	Modbus RTU	Auto-Discovery
4716 (Sage 2.2)	Modbus RTU	Auto-Discovery
Conductor EMS	Modbus RTU	Web-Configurator
LMV2_3	Modbus RTU	Web-Configurator
YB110	Modbus RTU	Web-Configurator

2   Setup for ProtoAir

2.1   Record Identification Data

Each ProtoAir 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
ProtoAir	FPA-W44-1744

• FPA-W44 units have the following 4 ports: Ethernet + Wi-Fi + 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 ProtoAir cannot exceed:

Part number	Total Registers
FPA-W44-1744	1,500

Devices	Point Count Per Device
Sola	28
RWF40	15
LMV52	32
RM7800	37
LMV36	9
PD765	32
RWF55	46
4109 (Sage 2.1)	29
TSBC	59
4716 (Sage 2.2)	46
Conductor EMS	214
LMV2_3	80
YB110	97

2.3   Configuring Device Communications

2.3.1 Confirm the Device and ProtoAir COM Settings Match

- Any connected serial devices MUST have the same baud rate, data bits, stop bits, and parity settings as the ProtoAir.

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

Port Setting	Sola, 4109, TSBC, 4716 & Conductor EMS	Other Devices
Protocol	Modbus RTU	Modbus RTU
Baud Rate	38400	9600
Parity	None	None
Data Bits	8	8
Stop Bits	1	1

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

- Set Node-ID for any device attached to ProtoAir. 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 9.5 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   Attaching the Antenna

Wi-Fi Antenna:

Screw in the Wi-Fi antenna to the front of the unit as shown in **Section 11.5 Physical Dimensions**.

NOTE: Using an external antenna is also an option. An external antenna can be plugged into the SMA connector. The best antenna for the job depends on the range, topography and obstacles between the two radios.

3   Interfacing ProtoAir to Devices

3.1   Device Connections to ProtoAir

The ProtoAir has a 3-pin Phoenix connector for connecting RS-485 devices 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
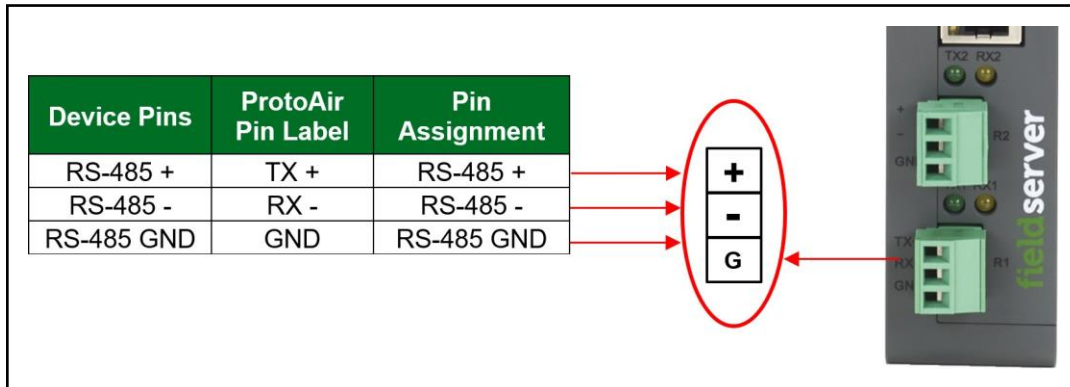
3.1.1 Wiring the Sola to the ProtoAir without Display – Single Sola Controller

- Connect MB2's terminal A (RS-485+) to Pin 1 (RS-485+) on the ProtoAir 3-pin Phoenix connector.

- Connect MB2's terminal B (RS-485-) to Pin 2 (RS-485-) on the ProtoAir 3-pin Phoenix connector.

- MB2's terminal C (Ground) does not need to be grounded to the ProtoAir.

NOTE: Do not connect the Sola's Enviracom port to the ProtoAir. It will fry the ProtoAir.

Option 1

Type A or B RJ45 Wires
1(TX) – Wire to Brown
2(RX) – Wire to White/Brown

EMS/Boiler-to-Boiler Communication Network (Use CAT5 Cable) RJ45

Wiring Apex with Panasonic Modbus Communication to an Energy Management System (EMS)
The Modbus communication connects to the same RJ45 port that is used by the boiler-to-boiler communication. Connect one end of the RJ45 cable to the boiler and cut off the other end of the cable to access the individual wires of the RJ45 cable. Wire the RJ45 cable as shown above.

RJ45 Cable

Option 2

3.1.2 Wiring the Sola to the ProtoAir on Apex & AMP/BFIT 400-1000L with Concert Display

- There are two options for wiring the ProtoAir to an Apex or AMP/BFIT 400-1000L with Concert Display:
  - Connect one end of an RJ45 cable to the boiler PCB and cut off the other end of the cable to access the individual wires of the RJ45 cable. Wire the RJ45 cable as shown below.
  - Wire the ProtoAir to the PCB using the EMS (Delta Only) terminals
- Terminal C (Ground) does not need to be grounded to the ProtoAir.
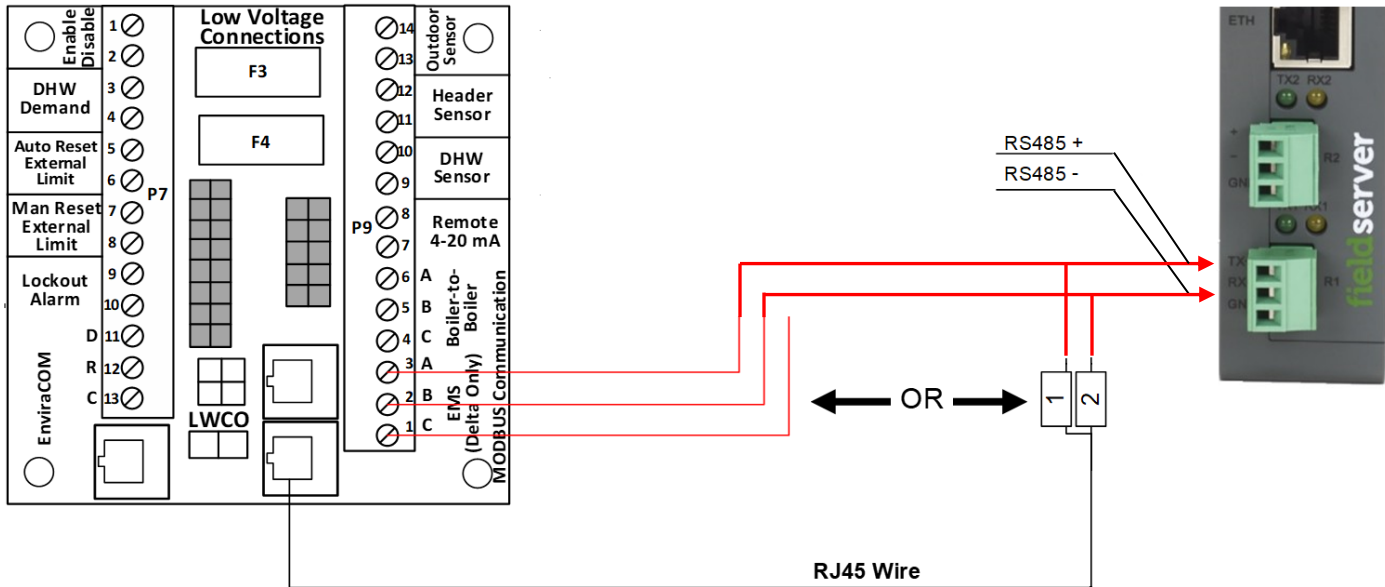
3.1.3 Wiring the Sola to the ProtoAir on Arctic/FreeFlex 1000

- Arctic/FreeFlex with Concert Display is able to do both Lead Lag (Sequencer) and EMS communication at the same time.
- Connect terminal J3-7 to Pin 1 (RS-485+) on the ProtoAir 3-pin connector.
- Connect terminal J3-8 to Pin 2 (RS-485-) on the ProtoAir 3-pin connector.
- Terminal J3-6 (Ground) does not need to be grounded to the ProtoAir.
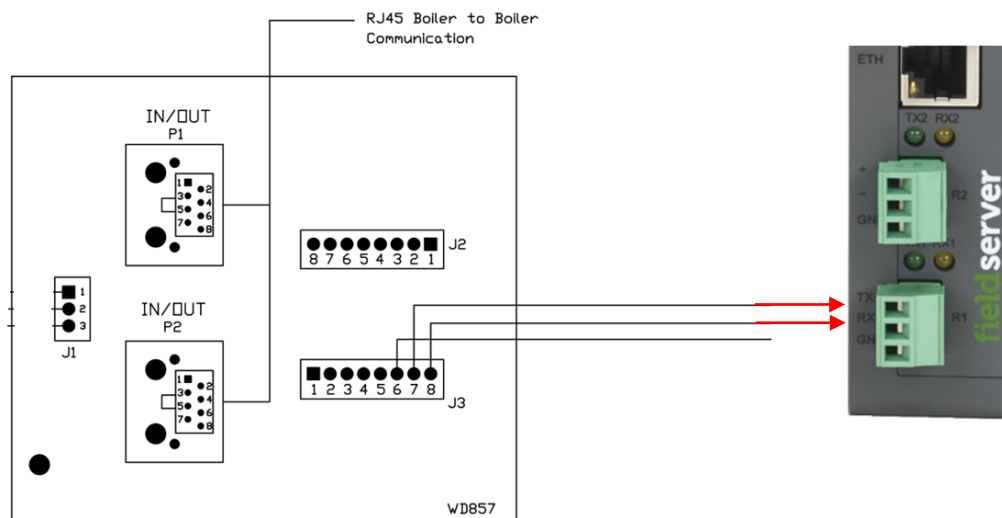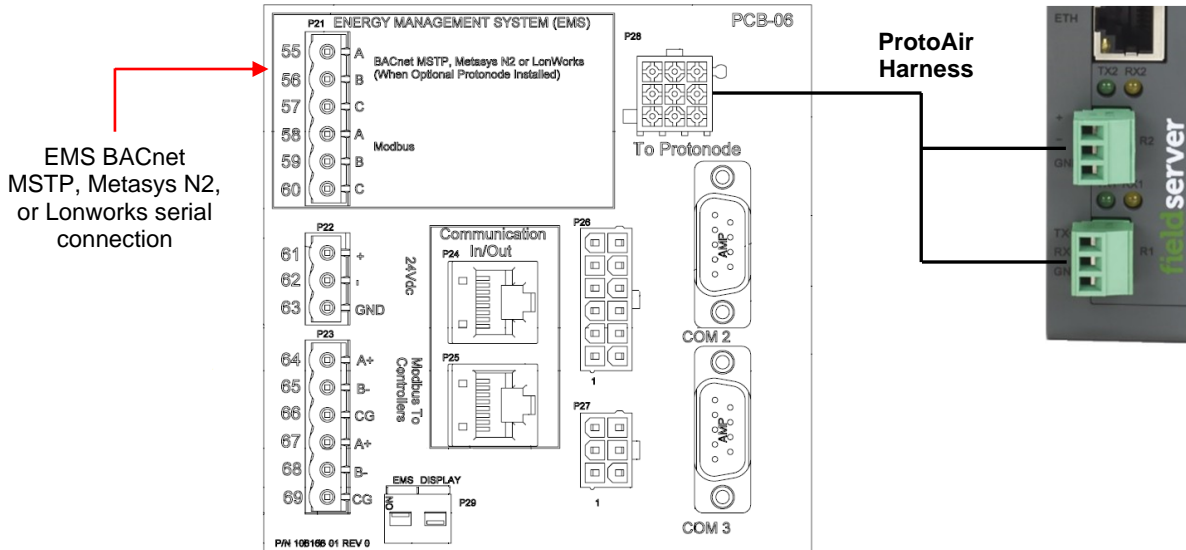
3.1.4 Wiring the Sola to the ProtoAir on Arctic/FreeFlex 1500-6000 & AMP/BFIT 1000-4000

• Arctic/FreeFlex & AMP/BFIT 1000-4000 with Concert Displays are able to do both Lead Lag (Sequencer) and EMS communication at the same time.

• These boilers are equipped with a wire harness which connects the Sola, Communications Board (PCB-06), and ProtoAir.

3.1.5 Wiring the RWF40 or RWF55 to the ProtoAir

• Connect terminal CA (RWF40) or R+ (RWF55) to Pin 1 (RS-485+) on the ProtoAir 3-pin Phoenix connector.

• Connect terminal CB (RWF40) or R- (RWF55) to Pin 2 (RS-485-) on the ProtoAir 3-pin connector.

• CG (Ground) terminal does not need to be grounded to the RS-485 Ground port of ProtoAir.

RWF40 Wiring

RWF55 Wiring
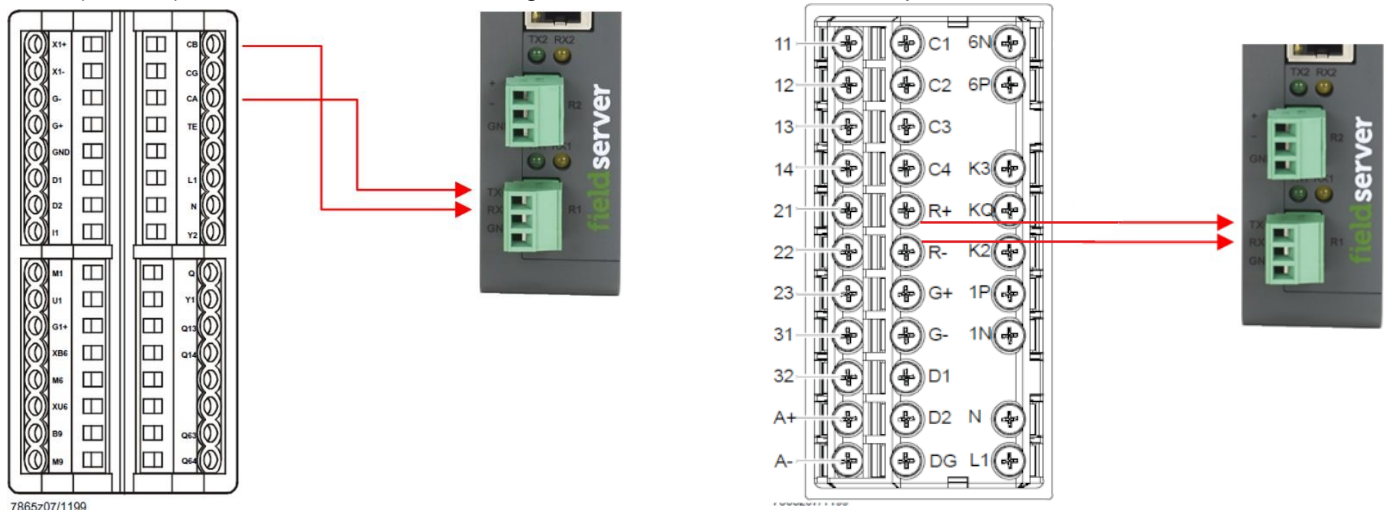
3.1.6 Wiring RM7800 Series to the ProtoAir

- On the RM7800 Series; connect terminal A (RS-485+) to Pin 1 (RS-485+) on the ProtoAir 3-pin Phoenix connector.

- Connect terminal CB RxD / TxD- (RS-485-) to Pin 2 (RS-485-) on the ProtoAir 3-pin Phoenix connector.

- CG Ground terminal does not need to be grounded to the RS-485 Ground port of ProtoAir.
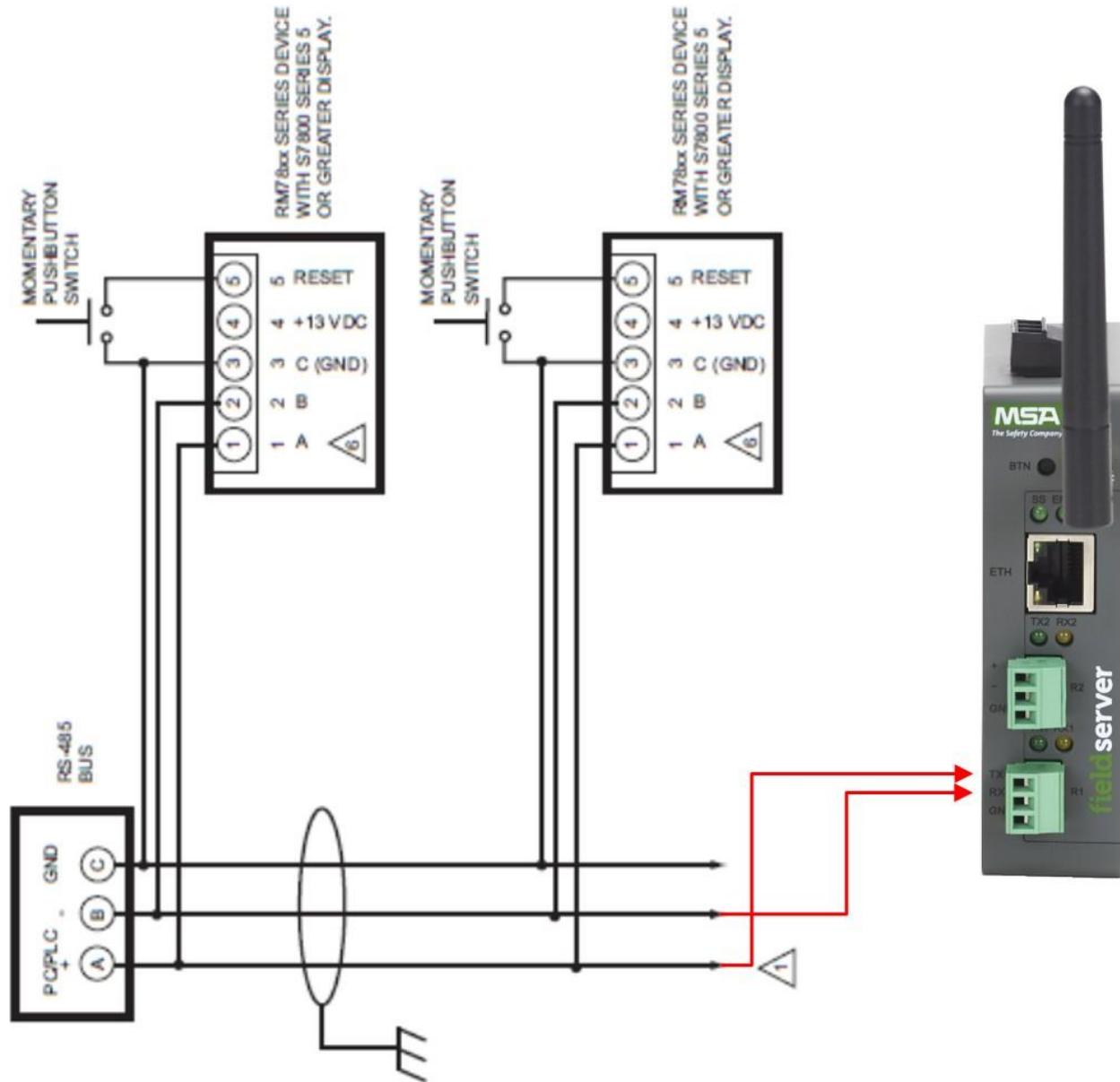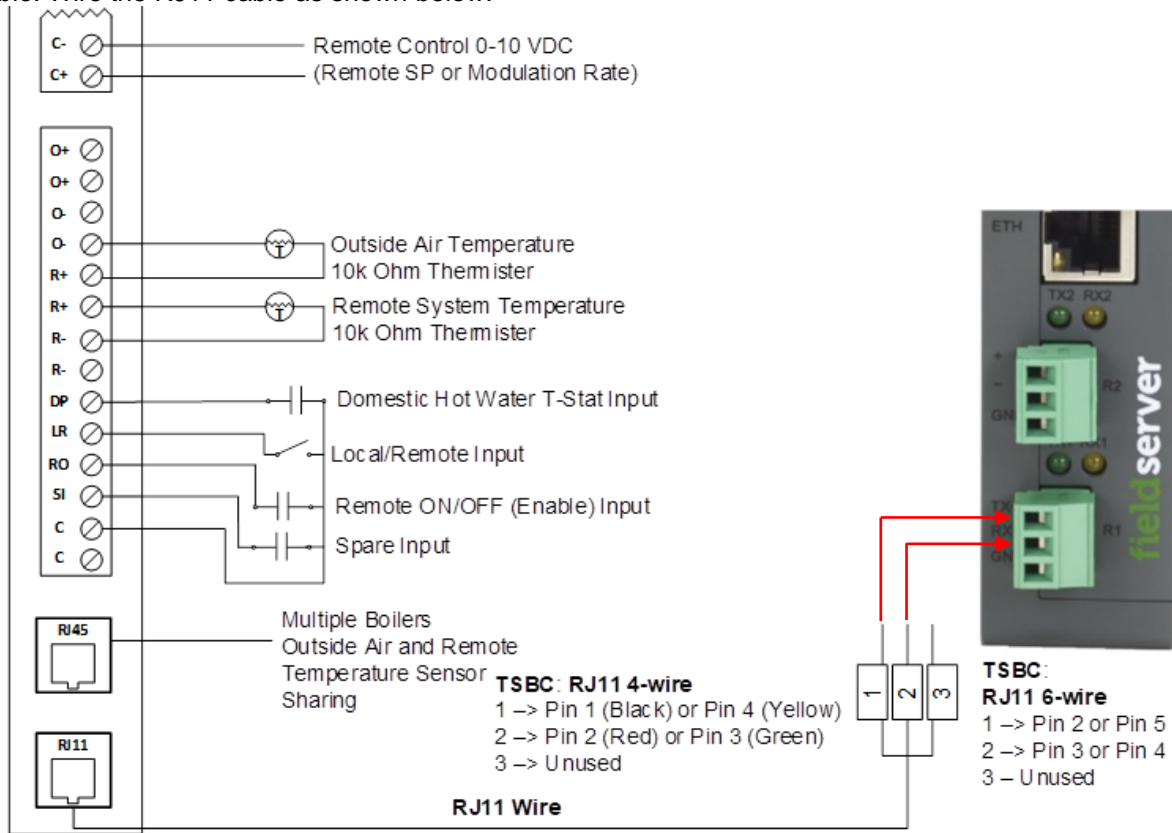
3.1.7 Wiring TSBC to the ProtoAir

• The Modbus communication connects to the same RJ11 port that is used by the boiler-to-boiler communication.

• Connect one end of the RJ11 cable to the TSBC and cut off the other end of the cable to access the individual wires of the RJ11 cable. Wire the RJ11 cable as shown below.

| C- | Remote Control 0-10 VDC |
| C+ | (Remote SP or Modulation Rate) |

O+	
O+	
O-	
O-	Outside Air Temperature
R+	10k Ohm Thermister
R+	Remote System Temperature
R-	10k Ohm Thermister
R-	
DP	Domestic Hot Water T-Stat Input
LR	
RO	Local/Remote Input
SI	
C	Remote ON/OFF (Enable) Input
C	Spare Input

RJ45

RJ11

Multiple Boilers
Outside Air and Remote
Temperature Sensor
Sharing

TSBC: RJ11 4-wire
1 –> Pin 1 (Black) or Pin 4 (Yellow)
2 –> Pin 2 (Red) or Pin 3 (Green)
3 –> Unused

RJ11 Wire

TSBC:
RJ11 6-wire
1 –> Pin 2 or Pin 5
2 –> Pin 3 or Pin 4
3 – Unused

RJ11 connection, from the back, on right-hand side of TSBC Control
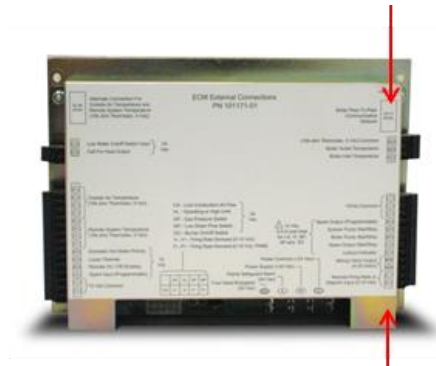
Jumper LR to C if you are writing to the boiler controls.

3.2   Wiring Field Port to RS-485 Serial Network

•   Connect the RS-485 network wires to the 3-pin RS-485 connector on the R2 port.

   ◦   Use standard grounding principles for RS-485 GND

•   See **Section 5.1 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
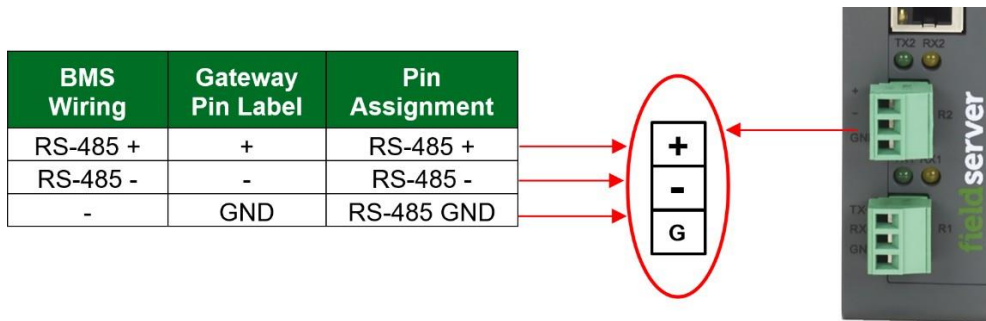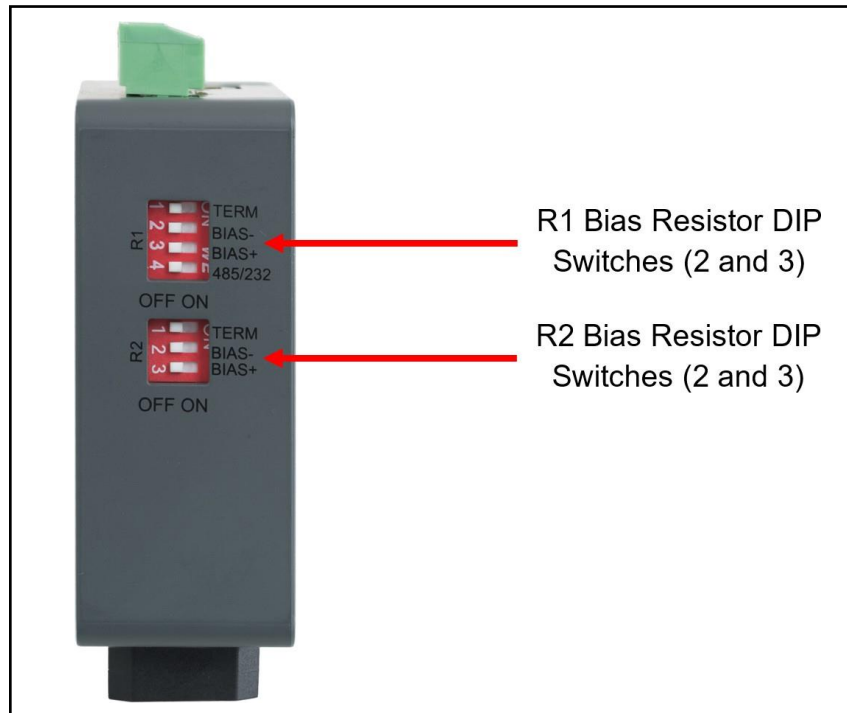
3.2.1 Bias Resistors

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 ProtoAirs 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 already powered on, DIP switch settings will not take effect unless the unit is power cycled.

3.2.2 Termination Resistor

R1 Termination
Resistor DIP Switch (1)

R2 Termination
Resistor DIP Switch (1)
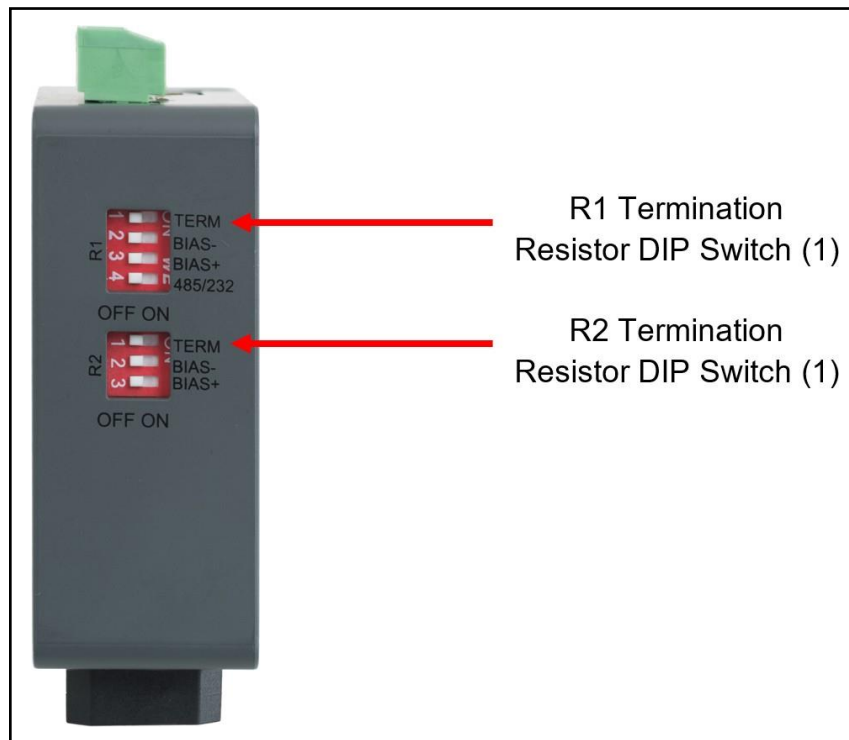
If the gateway is the last device on the serial trunk, then the End-Of-Line Termination Switch needs to be enabled**. To enable the Termination Resistor, move the TERM dip switch to the right in the orientation shown in above**.

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

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

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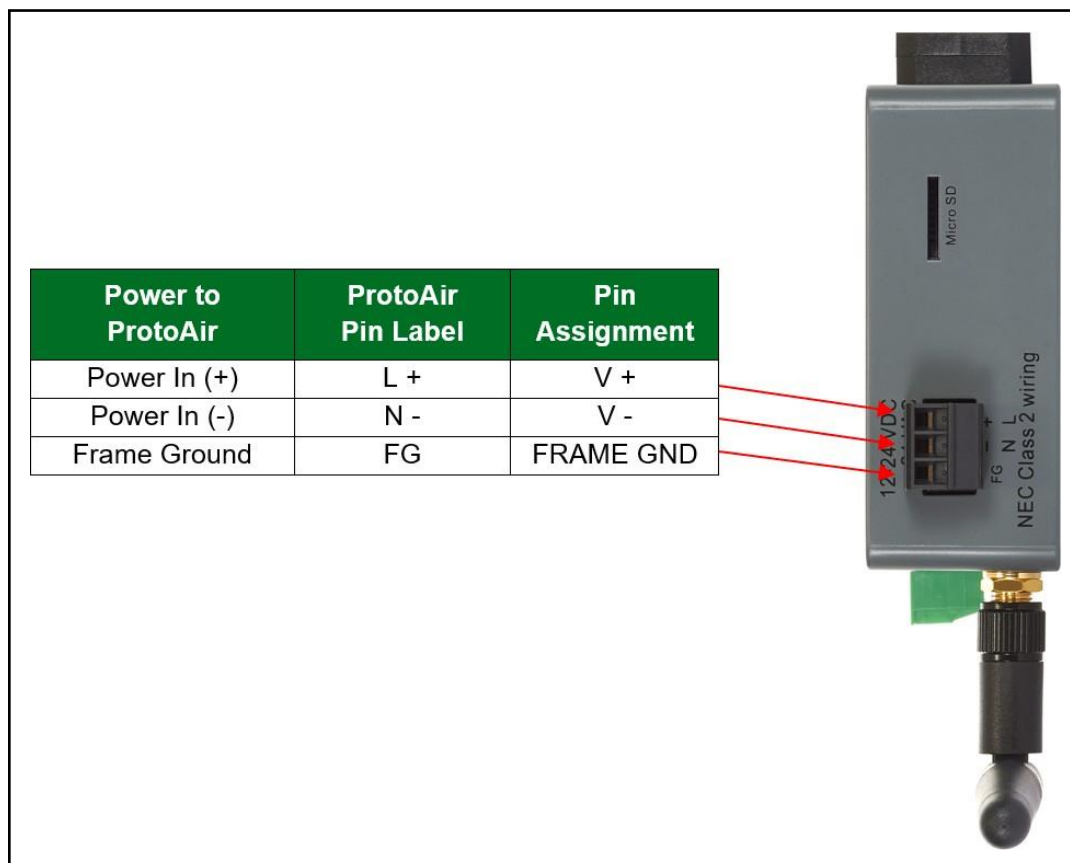
4   Power up the Gateway

Check power requirements in the table below:

Power Requirement for ProtoAir External Gateway		
	Current Draw Type	
ProtoAir Family	12VDC	24VDC/AC
FPA –W44 (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 ProtoAir as shown below. Ensure that the power supply used complies with the specifications provided **Section 13 Specifications**.

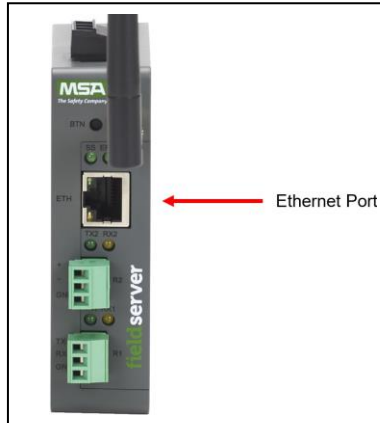• The gateway accepts 9-30VDC or 24VAC on pins L+ and N-.

• Frame GND should be connected.

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

5   Connect the PC to the Gateway

5.1   Connecting to the Gateway via Ethernet

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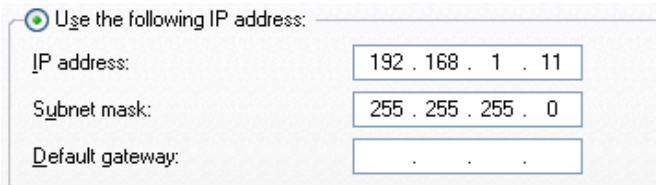

Ethernet Port

5.1.1 Changing the Subnet of the Connected PC

The default IP Address for the ProtoAir is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and ProtoAir 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 the Close button to exit the Ethernet Properties window.

5.2   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 theProtoAir has been changed, the IP Address can be discovered using the FS Toolbox utility. See Section 10.1 Lost or Incorrect IP Address for instructions.

6 Setup Web Server Security

6.1 Login to the FieldServer

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

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

- When the warning that "Your connection is not private" appears, click the advanced button on the bottom left corner of the screen.
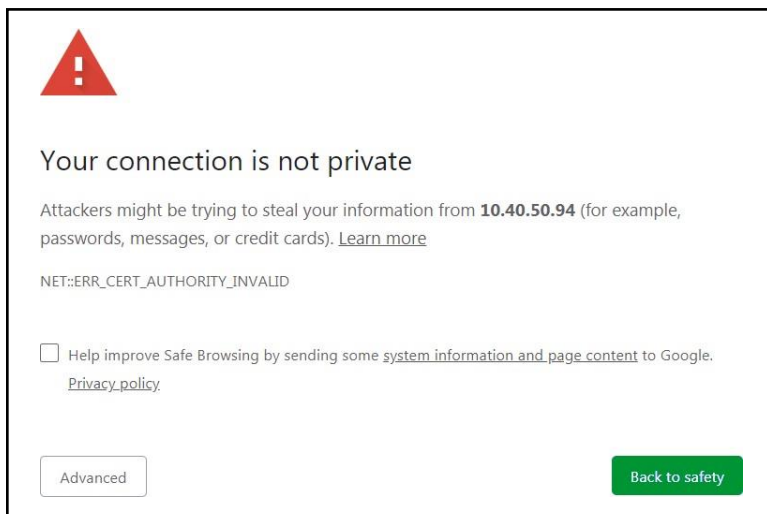
- Additional text will expand below the warning, click the underlined text to go to the IP Address. In the example below this text is "Proceed to 10.40.50.94 (unsafe)".

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

NOTE: There is also a QR code in the top right corner of the FieldServer label that shows the default unique password when scanned.
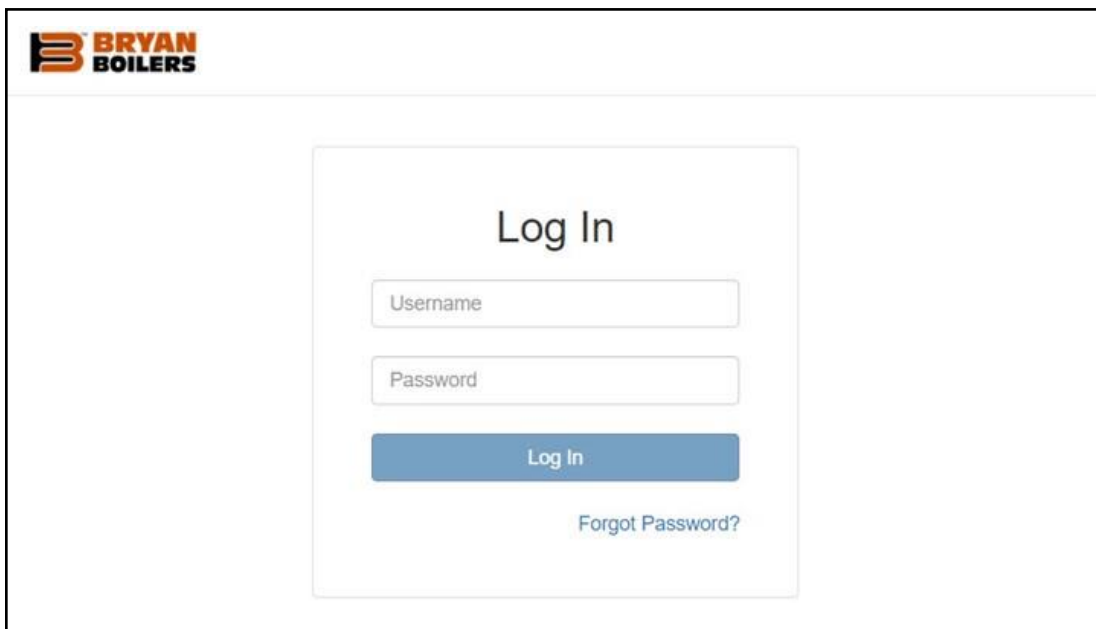
NOTE: A user has 5 attempts to login then there will be a 10-minute lockout. There is no timeout on the FieldServer to enter a password.

NOTE: To create individual user logins, go to Section 11.7 Change User Management Settings.

6.2 Select the Security Mode

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

NOTE: Cookies are used for authentication.

NOTE: To change the web server security mode after initial setup, go to Section 11.6 Change Web Server Security Settings After Initial Setup.

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

6.2.1 HTTPS with Own Trusted TLS Certificate

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

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

• 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.

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

• Select one of these options and click the Save button.

• A "Redirecting" message will appear. After a short time, the FieldServer GUI will open.

7   Setup Network

7.1   Navigate to the Network Settings

• From the Web App landing page, click the Settings tab on the left side of the screen.
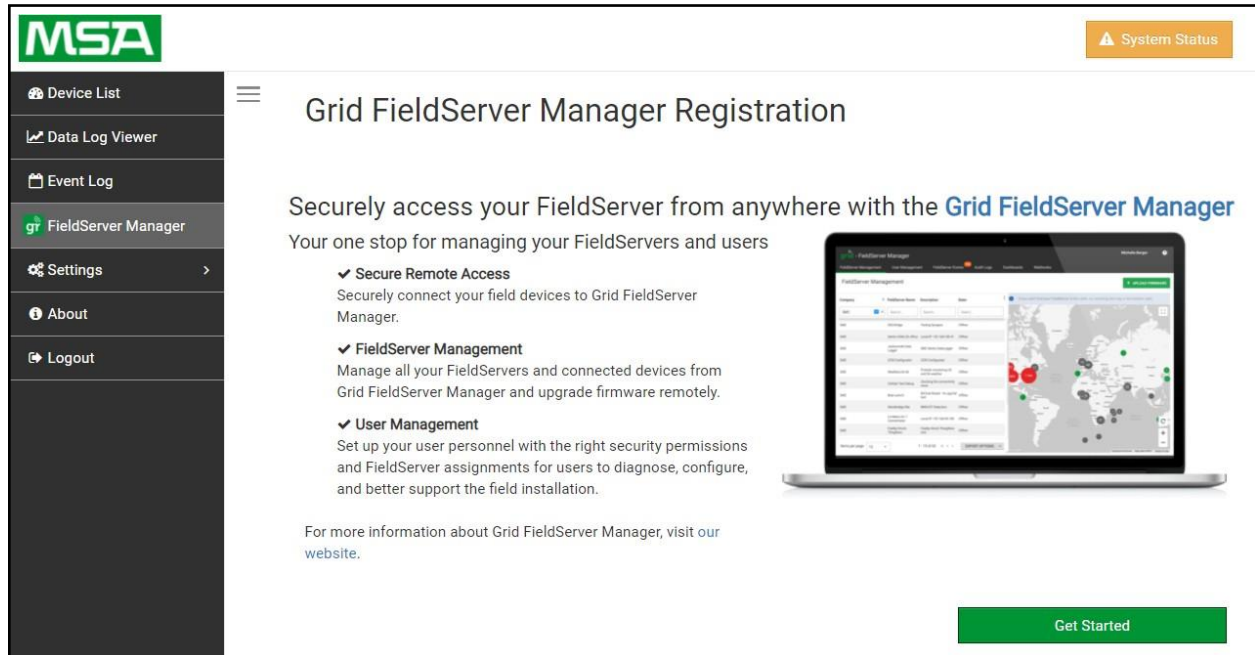
• Click the Network tab that appears to open the Network Settings page.
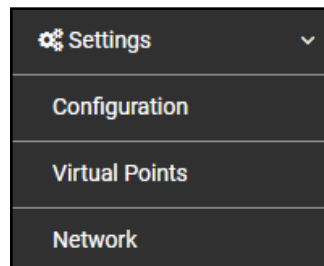
• A warning message will appear when performing the first-time setup, click the Exit Registration button to continue to the Settings page.
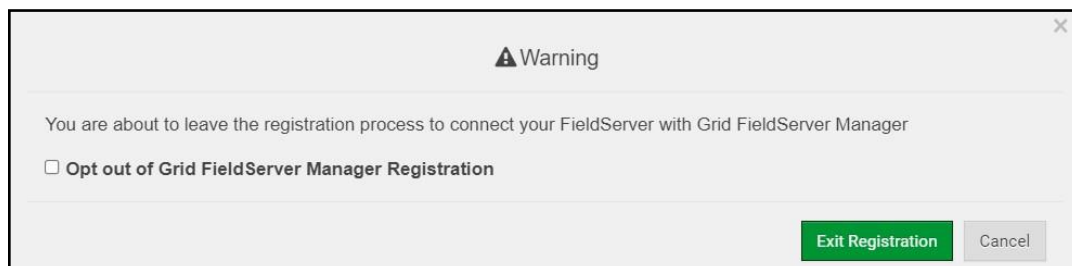
7.2 Change the ProtoAir IP Address

Configure the IP settings of the ProtoAir using the following sections of the Network page:

- If using the Ethernet port to connect to the local network, scroll to "ETH 1" **(Section 7.2.2   Ethernet 1**).

- If connecting the ProtoAir to a local wireless network, scroll to "WiFi Client Settings" (**Section 7.2.3   Wi-Fi Client Settings).**

- If updating Wi-Fi Access Point settings, scroll to "WiFi Access Point Settings" (**Section 7.2.4   Wi-Fi Access Point Settings**).

7.2.1 Routing Settings

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

- Click the Add Rule button to add a new row and set a new Destination Network, Netmask and Gateway IP Address as needed.

- Set the Priority for each connection (1-255 with 1 as the highest priority and 255 as the lowest).

- Click the Save button to activate the new settings.

NOTE: If using Wi-Fi Client and not Ethernet, make the top priority rule a Wi-Fi Client connection.

7.2.2 Ethernet 1

The ETH 1 section contains the wired network settings. To change the 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 will need to be pointed to the new IP Address of the FieldServer before the settings will be accessible again.**

7.2.3 Wi-Fi Client Settings

• Set the Wi-Fi Status to ENABLED for the ProtoAir to communicate with other devices via Wi-Fi.

• Enter the Wi-Fi SSID and Wi-Fi Password for the local wireless access point.

• Enable DHCP to automatically assign all Wi-Fi Client Settings fields or modify the Settings manually, via the fields immediately below the note (IP Address, Network, etc.).

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

• Click the Save button to activate the new settings.

• Go to Routing (**Section 7.2.1   Routing Settings**) to set the default connection to Wi-Fi Client.

7.2.4 Wi-Fi Access Point Settings

• Check the Enable tick box to allow connecting to the ProtoAir via Wi-Fi Access Point.

• Modify the Settings manually as needed, via these fields: SSID, Password, Channel, IP Address, Netmask, IP Pool Address Start, and IP Pool Address End.

NOTE: The default channel is 11. The default IP Address is 192.168.50.1.

• Click the Save button to activate the new settings.

NOTE: If the webpage was open in a browser via Wi-Fi, the browser will need to be updated with the new Wi-Fi details before the webpage will be accessible again.

8   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](#).

8.1   Choose Whether to Integrate the FieldServer Manager

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

NOTE: If a warning message appears instead, go to Section 11.8 FieldServer Manager Connection Warning Message to resolve the connection issue.
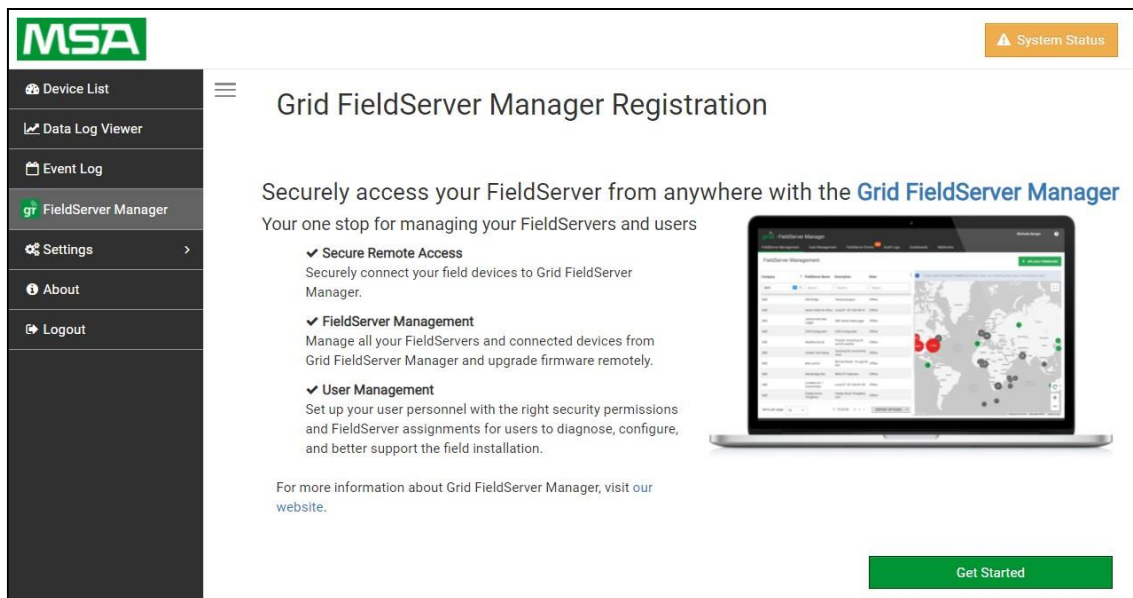
- Either go through the FieldServer Manager setup to integrate cloud functionality to the FieldServer or opt out.

  ◦ 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
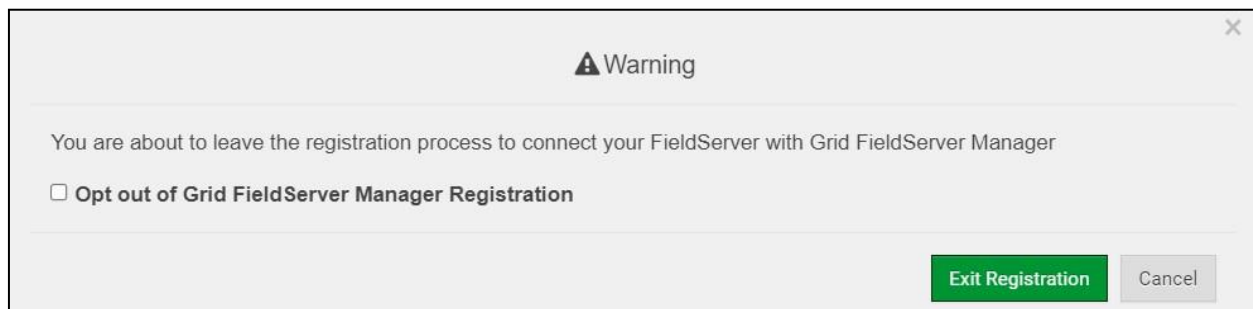
NOTE: If user setup is already complete go to Section 8.3 Registration Process.

8.2   User Setup

Before the gateway can be connected to the FieldServer Manager, a user account must be created. Request an invitation to the FieldServer Manager from the manufacturer's support team. 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.
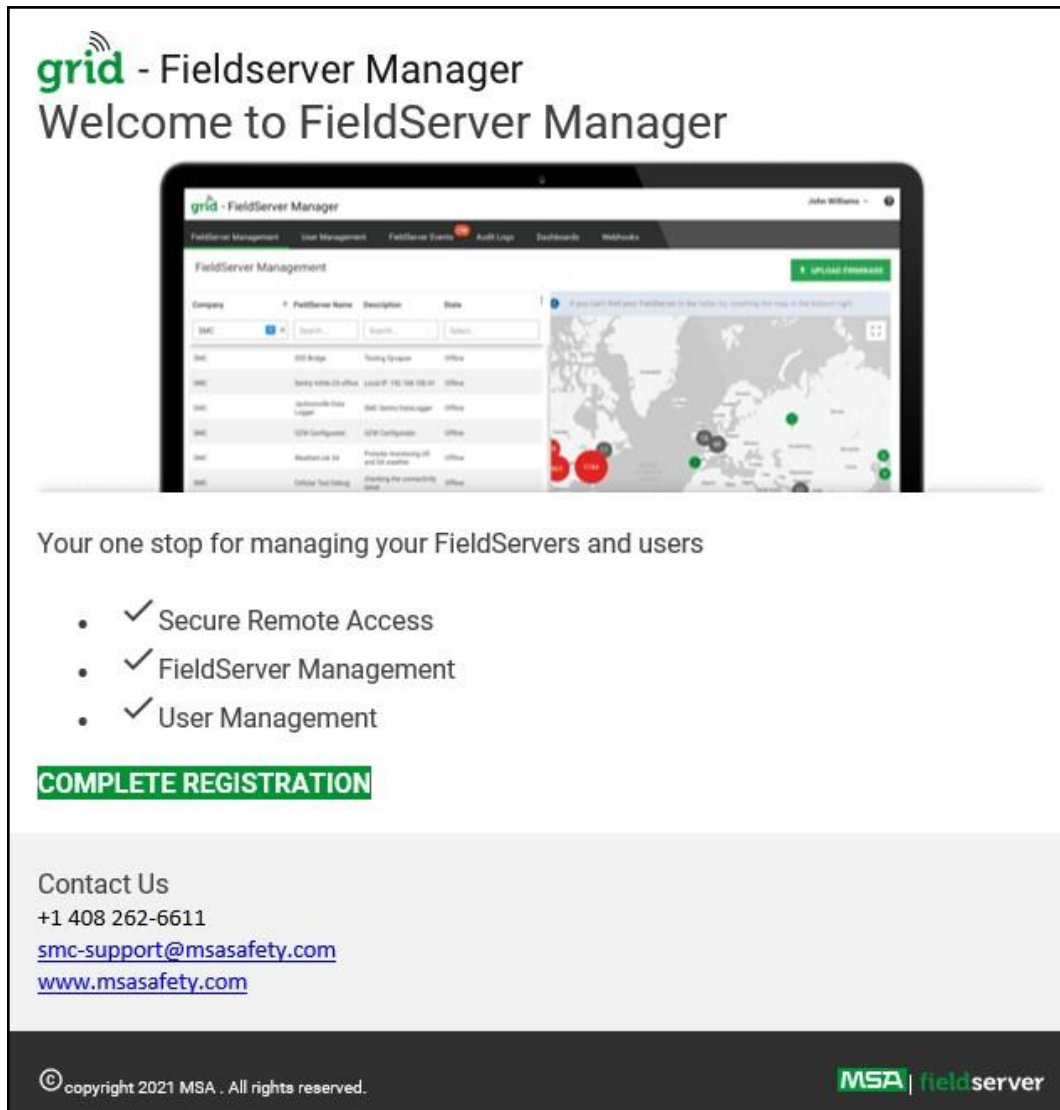
NOTE: If no email was received, check the spam/junk folder for an email from notification@fieldpop.io. Contact the manufacturer's support team if no email is found.

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

- 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.

8.3 Registration Process

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

• Click the FieldServer Manager tab.

NOTE: **If a warning message appears instead, go to Section 11.8 FieldServer Manager Connection Warning Message to resolve the connection issue.**

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

- To register, fill in the user details, site details, gateway details and FieldServer Manager account credentials.
  - ◦ Enter user details and click Next
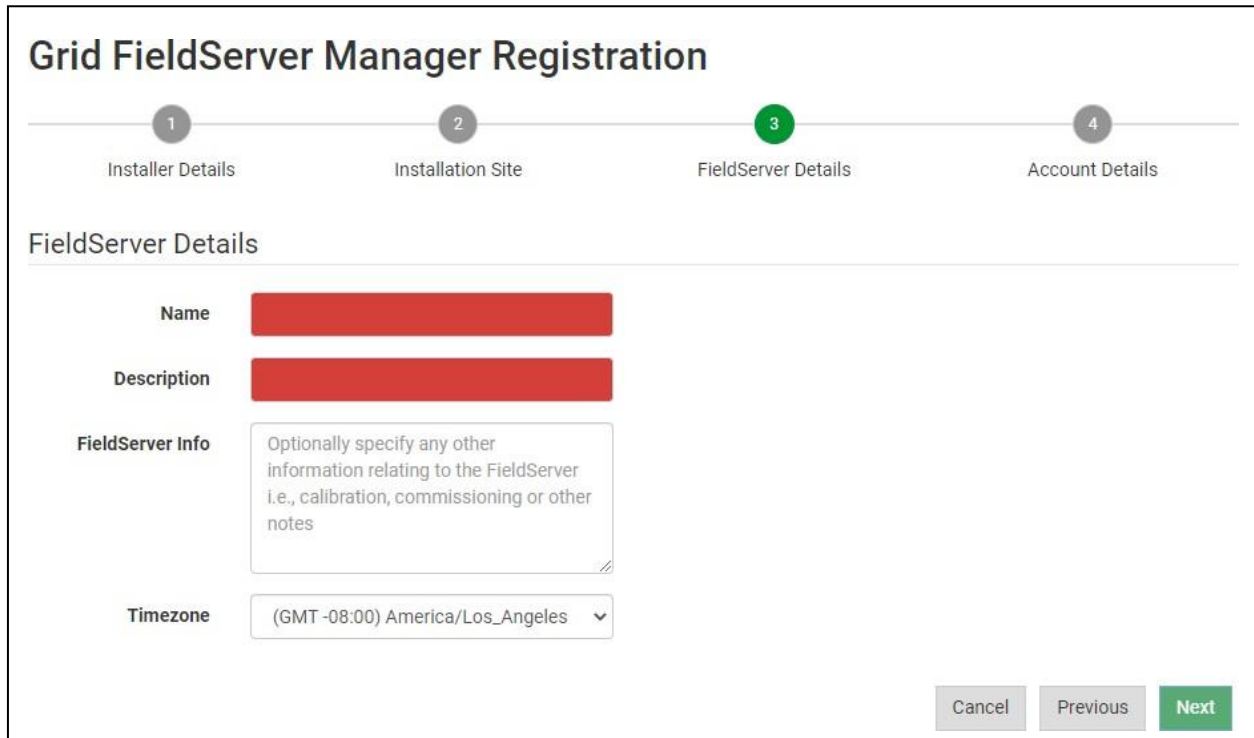
  - ◦ Enter the site details by entering the physical address fields or the latitude and longitude then click Next

◦ Enter Name and Description (required) then click Next
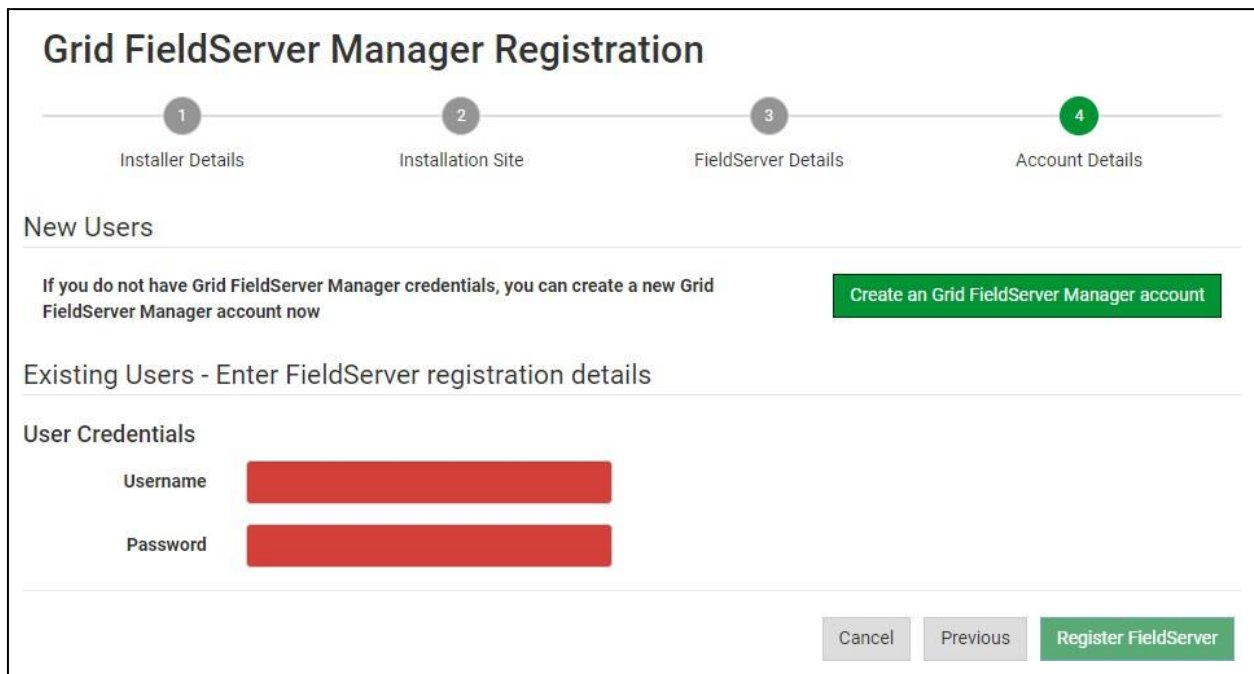
◦ Click the "Create an Grid FieldServer Manager account" button and enter a valid email to send a "Welcome to MSA Grid – FieldServer Manager" invite to the email address entered

- 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 ProtoAir.

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
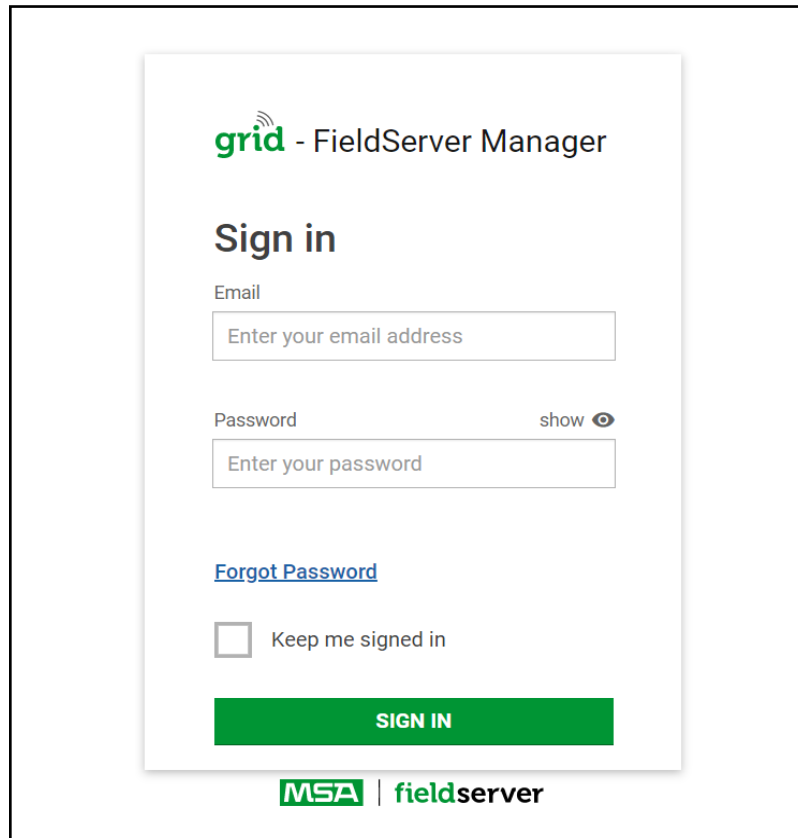
Installation Site Details

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.

8.4 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.

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**.

9   Configure the ProtoAir

9.1   Navigate to the ProtoAir Web Configurator

• From the Web App Device List page, click the Settings tab and then click Configuration.
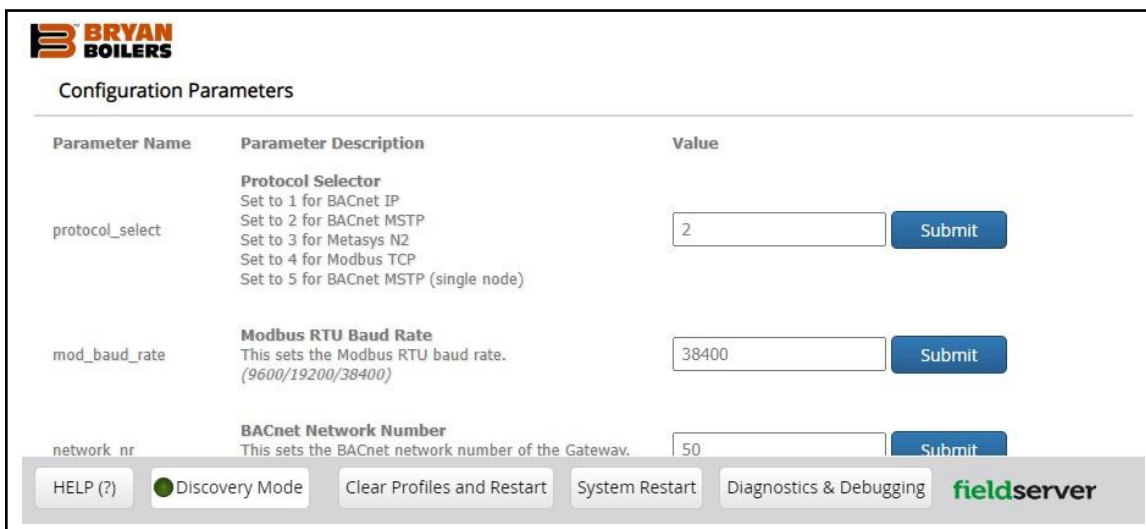
• Then click the Profiles Configuration button to go to the Web Configurator page.
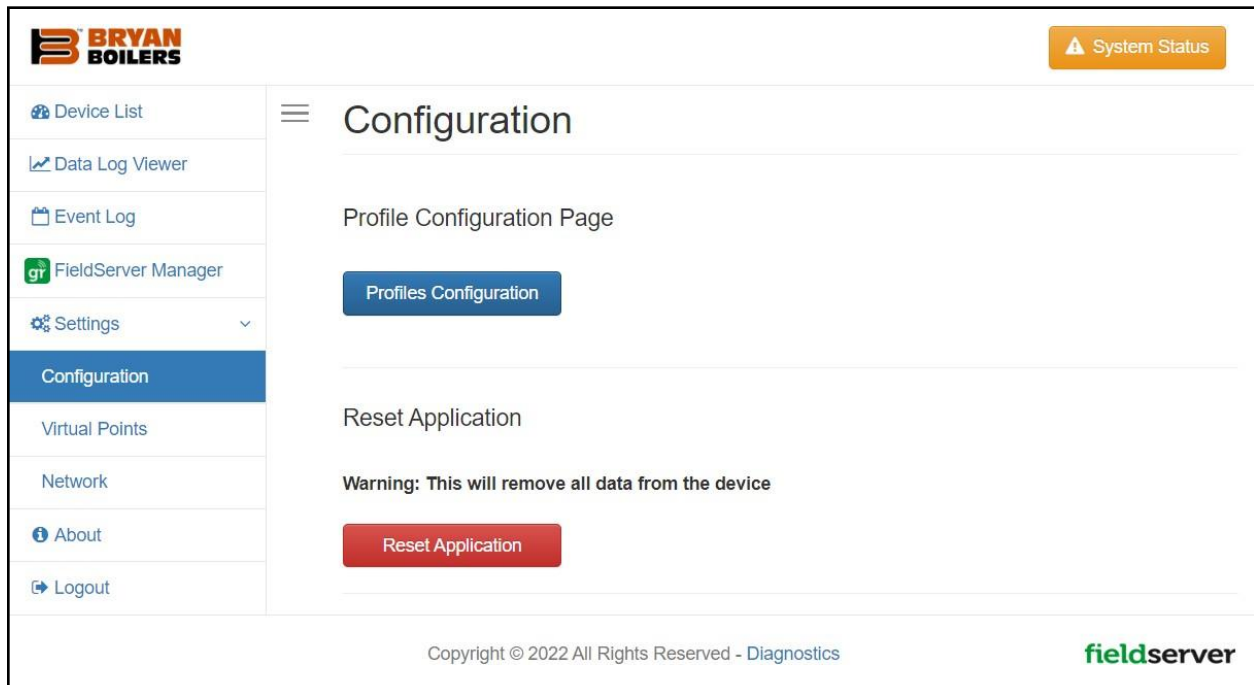
NOTE: For Web App instructions to the System View, Data Log Viewer, Event Logger and Virtual Points functions, see the MSA Grid - FieldServer Manager Start-up Guide.

9.2 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 9.3 Configure Devices Connected to the Gateway. 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 ProtoAir, set the BACnet Virtual Server Nodes field to "Yes"; otherwise leave the field on the default "No" setting.**

9.3 Configure Devices Connected to the Gateway

9.3.1 Use Discovery Mode

This configuration method works only with devices set as Auto-Discovery in Section 1.2 Methods of Configuration.

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

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

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

- If the discovery is successful, the desired device profile should appear under the Active profiles title near the bottom of the screen.

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

9.3.2 Setting Active Profiles

This section applies to Web Configurator devices referenced in Section 1.2 Methods of Configuration.

• 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 ProtoAir**.

- 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.

9.4   Verify Device Communications

- If using a serial connection, check that TX and RX LEDs are rapidly flashing. See **Section 10.4 LED Functions** for information and images.

- Confirm the software shows good communications without errors (**Section 10.2 Viewing Diagnostic Information**).

9.5   BACnet: Setting Node_Offset to Assign Specific Device Instances

- Follow the steps outlined in **Section 6 Setup Web Server Security** to access the ProtoAir 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.

9.6 How to Start the Installation Over: Clearing Profiles

- Follow the steps outlined in **Section 6 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.

10 Troubleshooting

10.1 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.
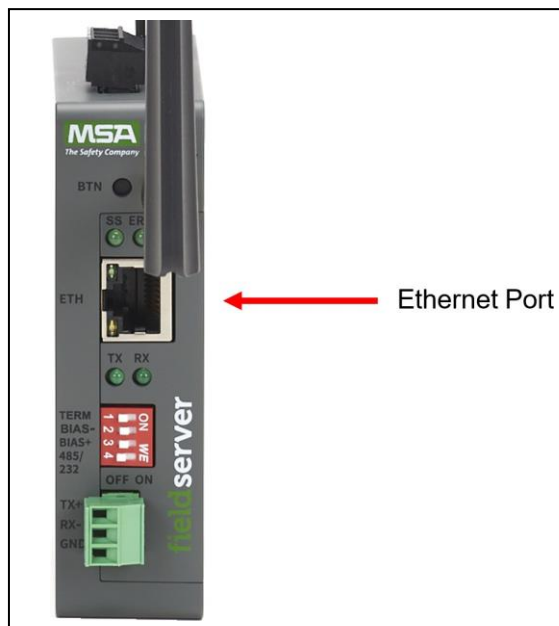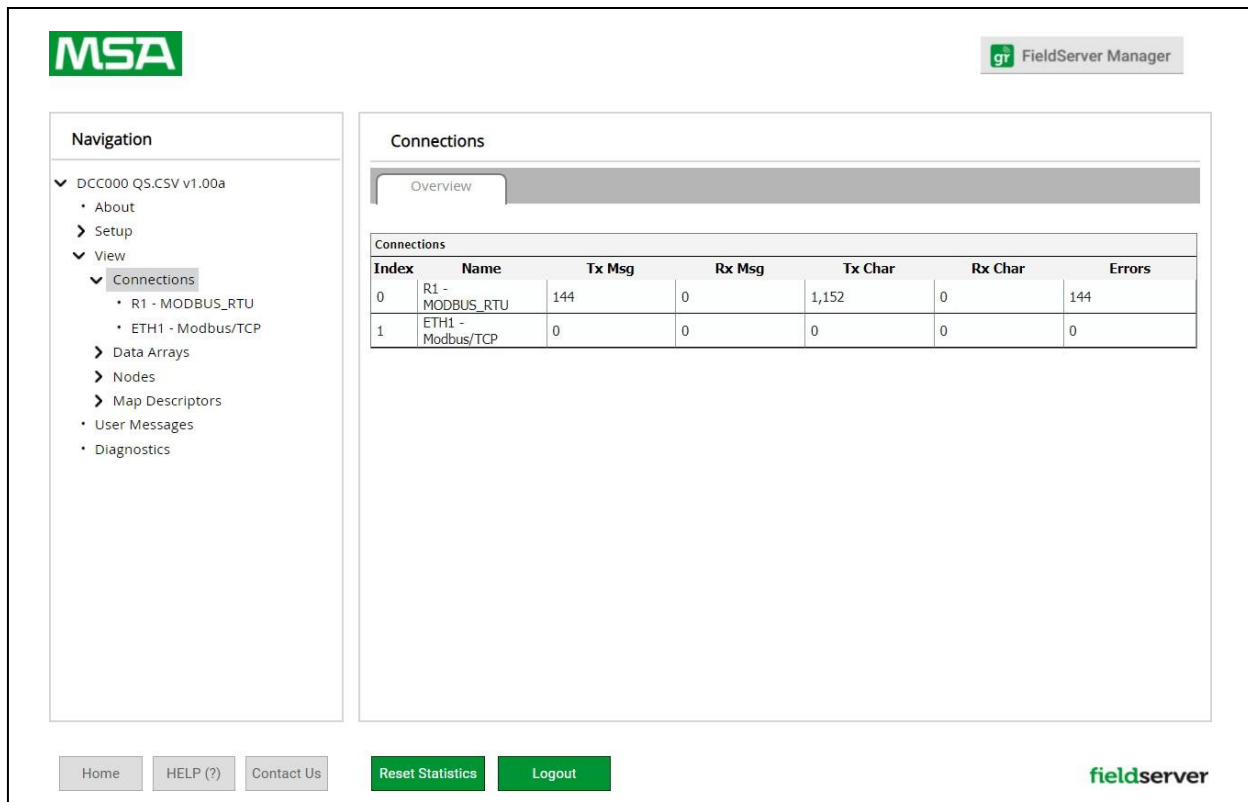
• Connect a standard Cat-5 Ethernet cable between the user's PC and ProtoAir.

• Double click on the FS Toolbox Utility and click Discover Now on the splash page.

• Check for the IP Address of the desired gateway.
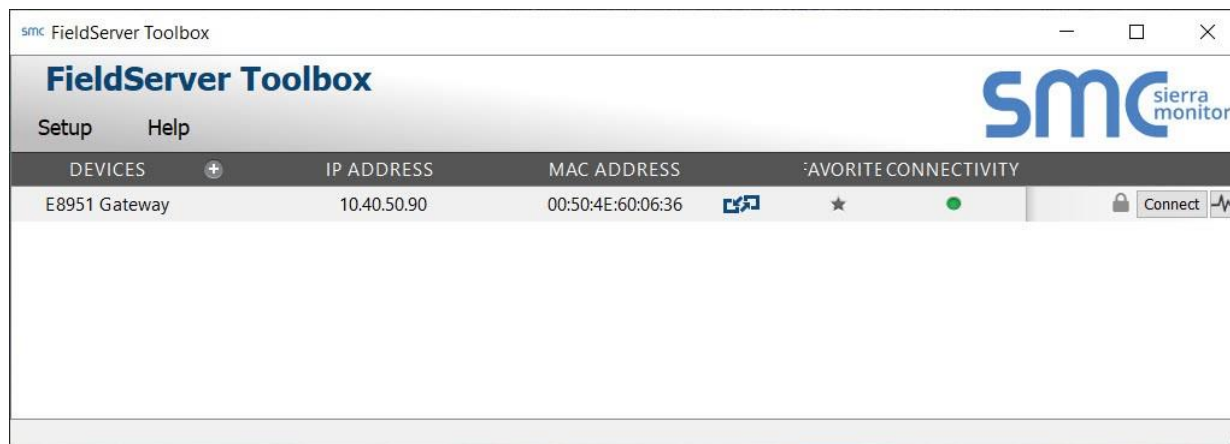
10.2   Viewing Diagnostic Information

- 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 10.3 Checking Wiring and Settings** for the relevant wiring and settings.

10.3   Checking Wiring and Settings

No COMS on the Modbus RTU 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 ProtoAir. (**Section 10.4 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 9.3.2   Setting Active Profiles**).

Field COM problems:

• Visual observations of LEDs on the ProtoAir. (**Section 10.4 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 10.5 Taking a FieldServer Diagnostic Capture)

10.4 LED Functions

FPA-W44

Diagnostic LEDs
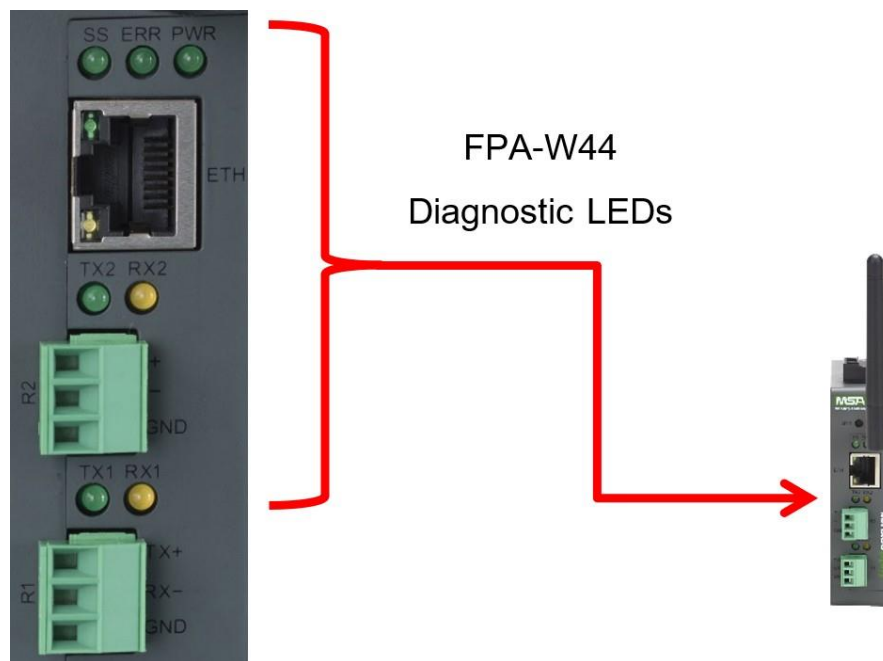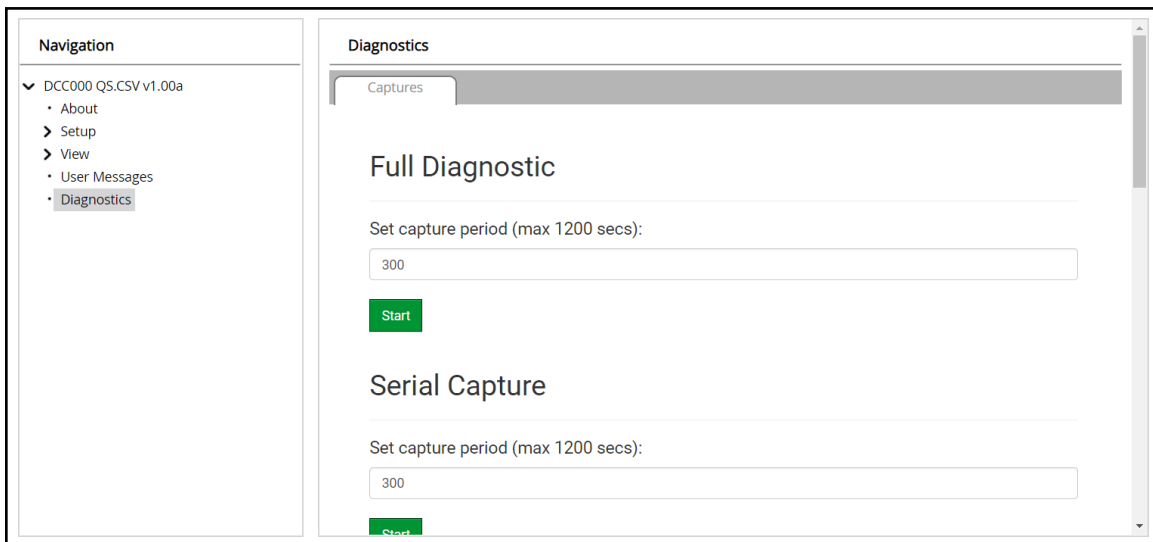
Tag	Description
SS	The SS LED will flash once a second to indicate that the bridge is in operation.
ERR	The SYS ERR LED will go on solid indicating there is a system error. If this occurs, immediately report the related "system error" shown in the error screen of the FS-GUI interface to support for evaluation.
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.

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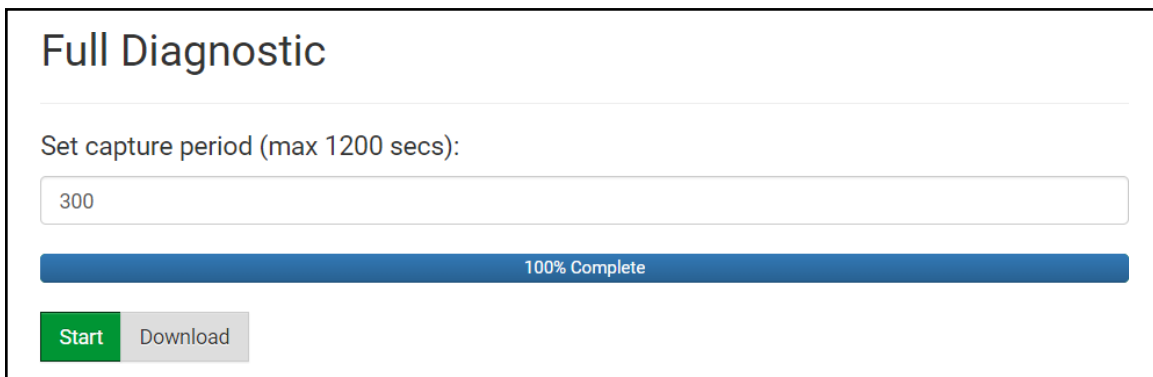
When there is a problem on-site that cannot easily be resolved, perform a Diagnostic Capture before contacting support. Once the Diagnostic Capture is complete, email it to technical support. The Diagnostic Capture will accelerate diagnosis of the problem.

- 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.

10.6 Wi-Fi Signal Strength

Wi-Fi
<60dBm – Excellent
<70dBm – Very good
<80dBm – Good
>80dBm – Weak

NOTE: **If the signal is weak or spotty, try to improve the signal strength by checking the antenna and the FieldServer position.**

10.7 Factory Reset Instructions

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

10.8 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.**

11　Additional Information

11.1　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 10.1 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.

11.2　BACnet: Setting Network_Number for More Than One ProtoAir on the Subnet

For both BACnet MS/TP and BACnet/IP, if more than oneProtoAir 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.

11.3 Mounting

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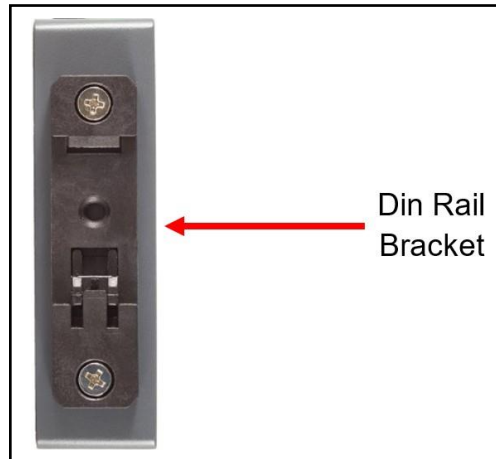
11.4 Certification

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.*

11.5 Physical Dimensions

Power·Port¶

4.60
[116.78]

3.07
[77.99]

2.76
[69.98]

6.64
[168.67]

3.94
[99.98]

Wi-Fi·Antenna·
Socket¶

R2·Serial·Port¶

R1·Serial·Port¶
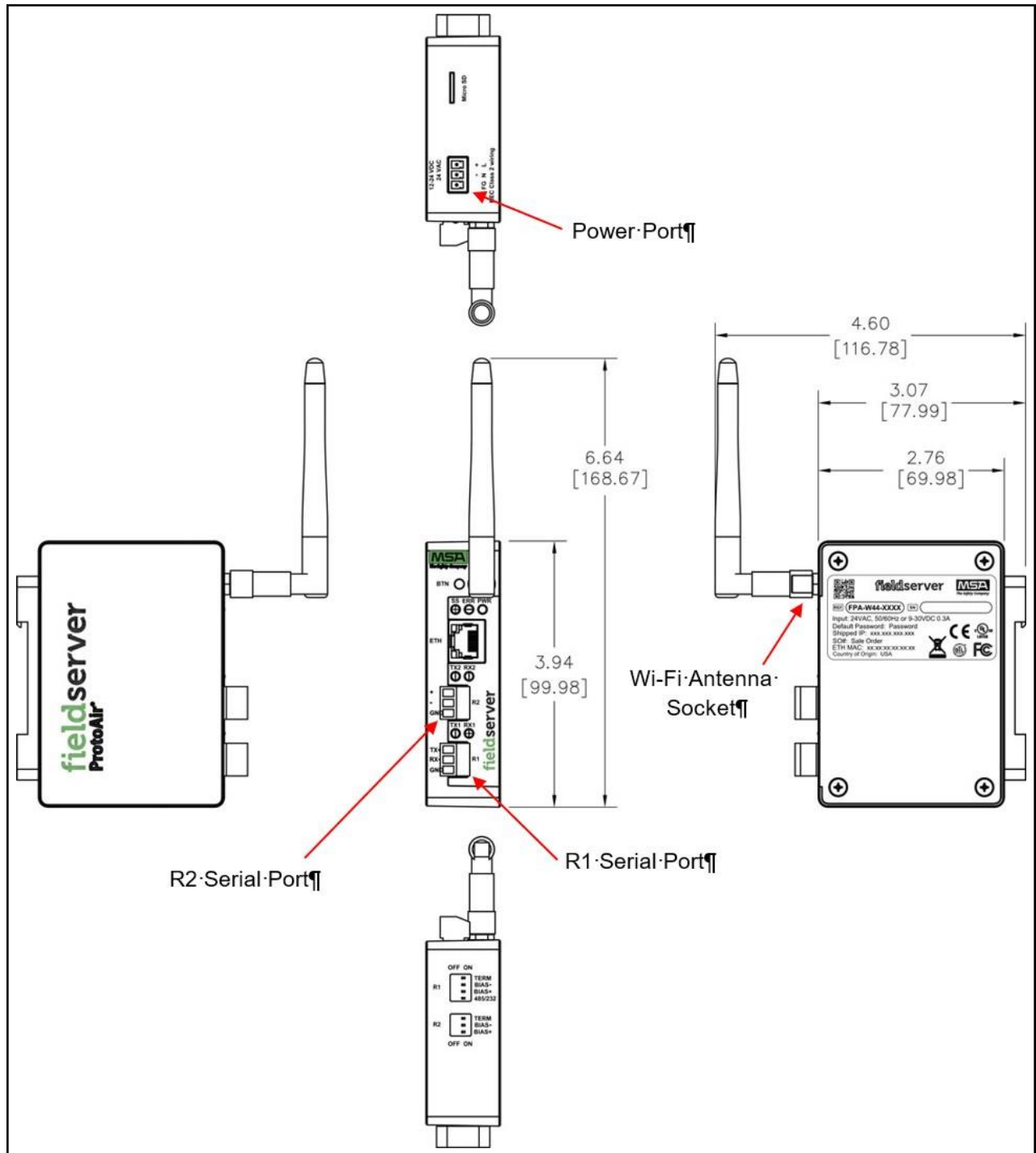
11.6   Change Web Server Security Settings After Initial Setup

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

• Click Setup in the Navigation panel.

11.6.1 Change Security Mode

• Click Security in the Navigation panel.
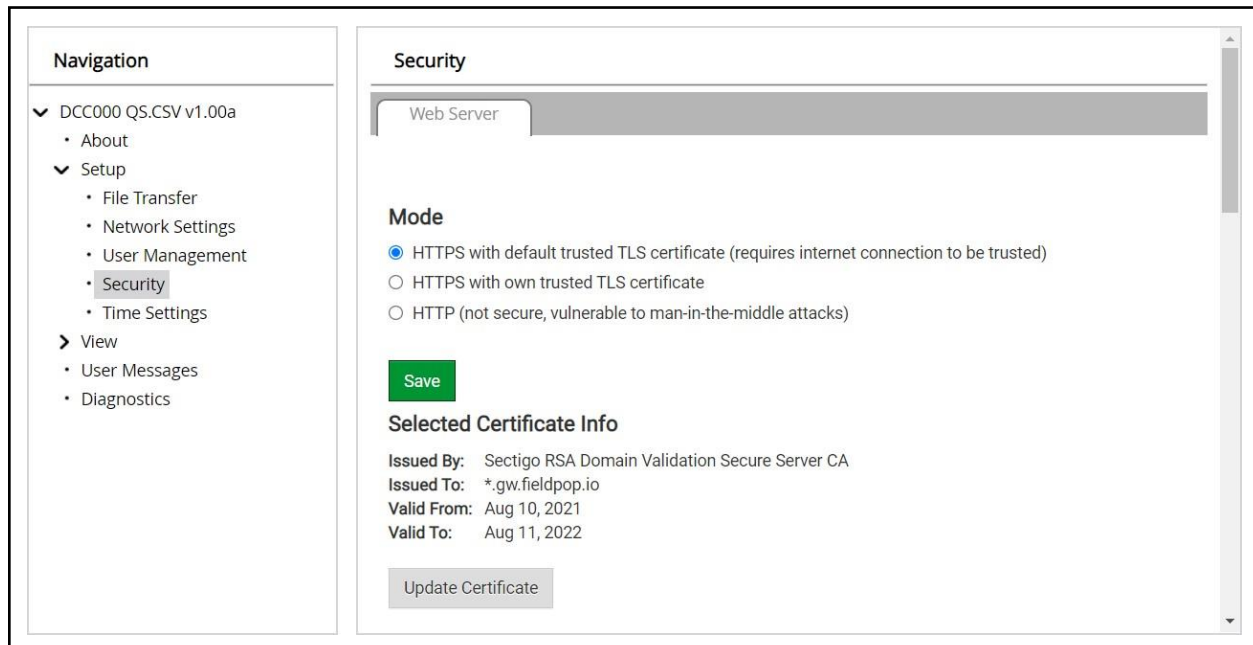
• Click the Mode desired.
  ◦ If HTTPS with own trusted TLS certificate is selected, follow instructions in **Section 6.2.1   HTTPS with Own Trusted TLS Certificate**

• Click the Save button.

11.6.2 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.

11.7 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.
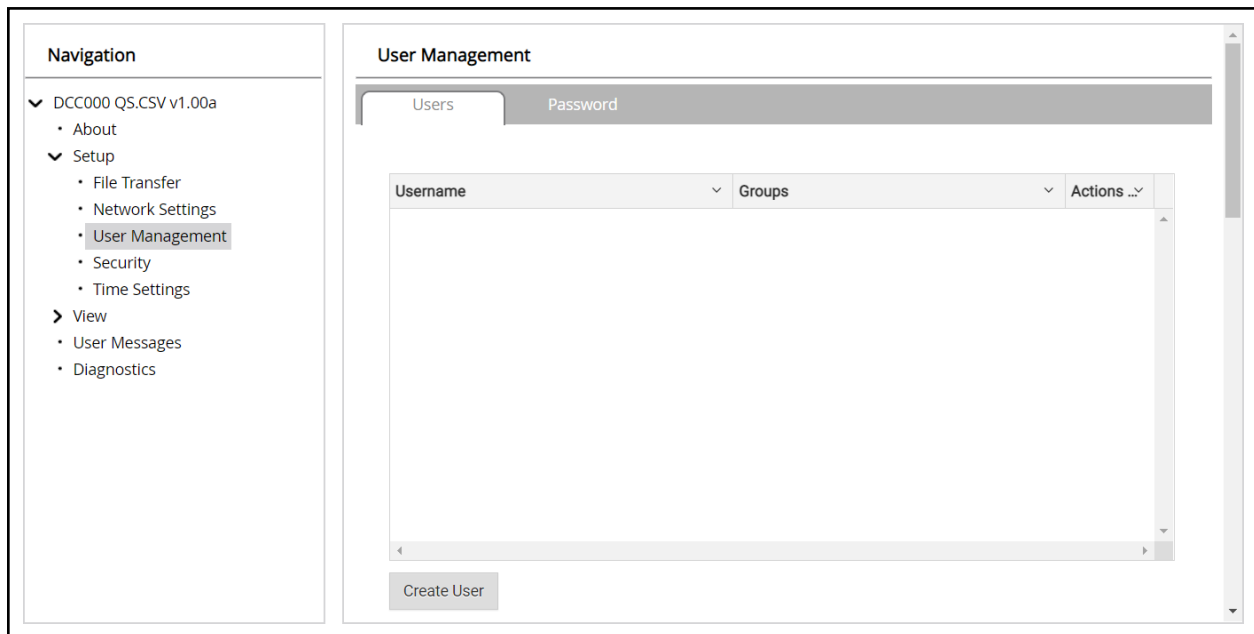
User Types:
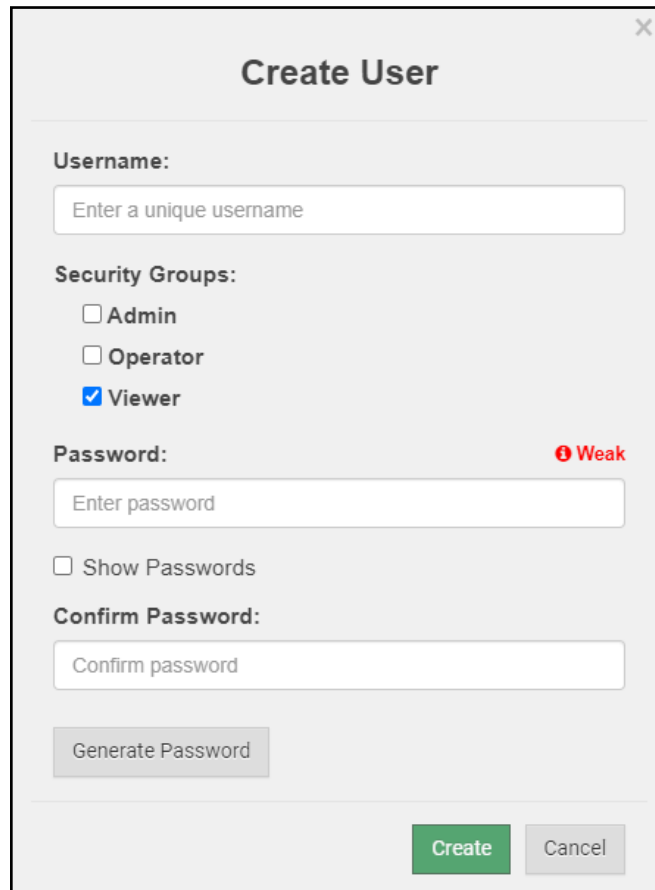
Admin – Can modify and view any settings on the FieldServer.

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

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

11.7.1 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.

11.7.2 Edit Users

- Click the pencil icon next to the desired user to open the User Edit window.
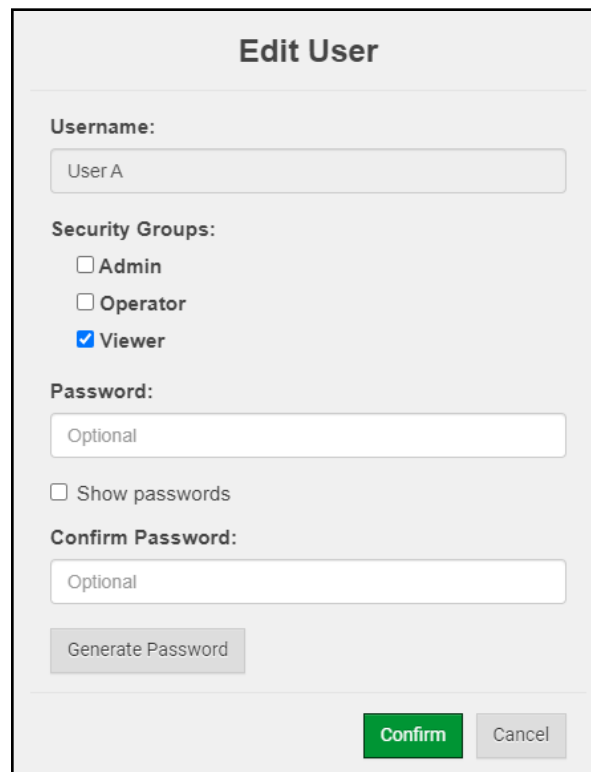
- Once the User Edit window opens, change the User Security Group and Password as needed.

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

11.7.3 Delete Users

• Click the trash can icon next to the desired user to delete the entry.
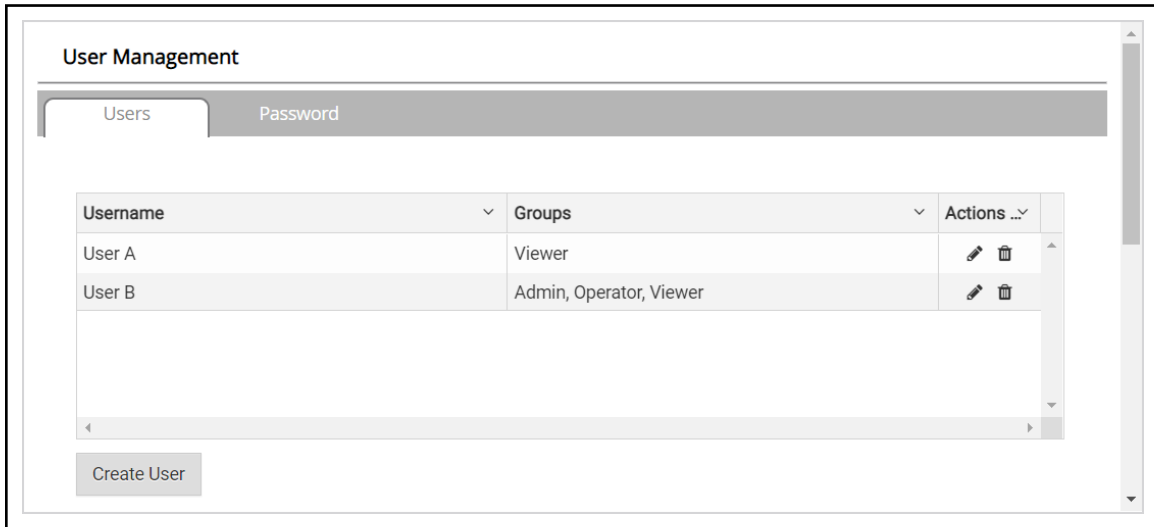
• When the warning message appears, click Confirm.
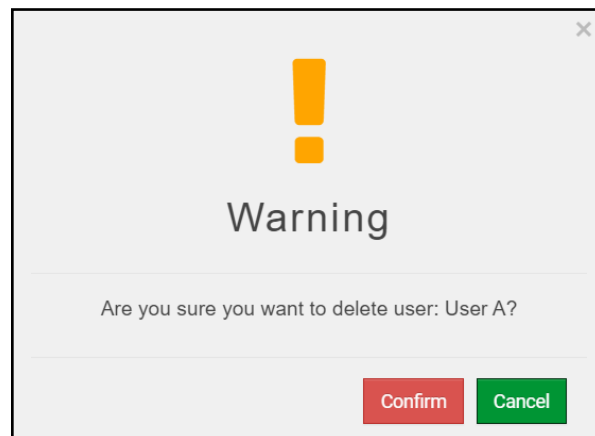
11.7.4 Change FieldServer Password

- 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.**

11.8 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: **EAI_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.

11.9   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.
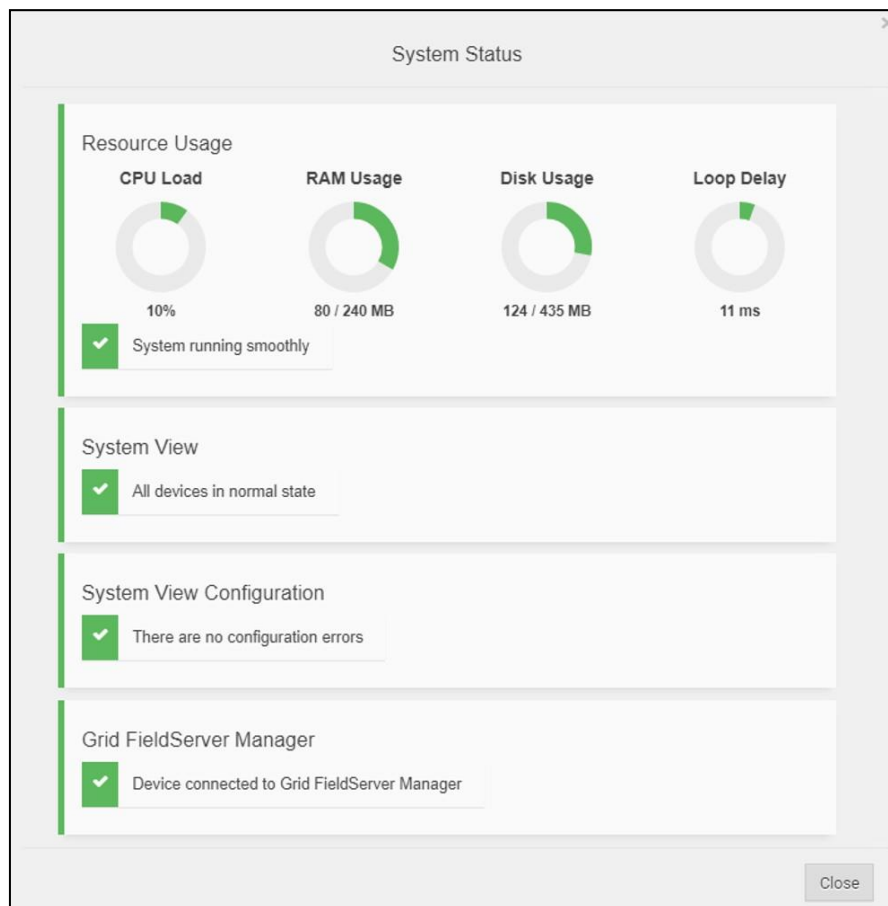
NOTE: If it was selected to opt out of the FieldServer Manager, the Grid FieldServer Manager status will not appear in the System Status window. This means the status will show as green even if the gateway is not connected to the FieldServer Manager.

12   Points Lists

12.1   BRYAN STEAM HONEYWELL SOLA MODBUS RTU MAPPINGS TO BACNET, METASYS N2, AND LONWORKS

| Point Name | Description | FPC-N34 | | | | FPC-N35 | |
		BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT Type
Com Status	1 = Communication Established 0 = No Communication	BI	1	DI	1	nvoComStatus_XXX	SNVT_switch
Demand source	Current demand source: 0=Unknown 1=No source demand 2=CH 3=DHW 4=Lead Lag slave 5=Lead Lag master 6=CH frost protection 7=DHW frost protection 8=No demand, burner switch turned off 9=DHW storage 10=Reserved 11=Warm weather shutdown	AI	1	AI	1	nvoDemSrc_XXX	SNVT_count_f
Outlet sensor	Boiler supply water temperature	AI	2	AI	2	nvoOutletSen_XXX	SNVT_temp_f
Fan speed	Speed of the combustion air blower in rpm	AI	3	AI	3	nvoFanSpeed_XXX	SNVT_count_f
Flame signal	Signal strength of the flame 0 – 15 VDC	AI	4	AI	4	nvoFlmSignal_XXX	SNVT_count_f
Inlet sensor	Boilers return water temperature	AI	5	AI	5	nvoInletSen_XXX	SNVT_temp_f
DHW sensor	Domestic hot water temperature	AI	6	AI	6	nvoDHW_Sen_XXX	SNVT_temp_f
S5 sensor	Header temperature or outdoor temperature	AI	7	AI	7	nvoS5Sensor_XXX	SNVT_temp_f
Stack sensor	Temperature of the flue gasses.	AI	8	AI	8	nvoStackSen_XXX	SNVT_temp_f
4-20 mA remote input	The mA value for S2 (J8-6) remote set point & remote modulation	AI	9	AI	9	nvoRemCtlIn_XXX	SNVT_count_f
Burner control status	0=Disabled 1=Locked out 4=Anti-short cycle 5=Unconfigured safety data 34=Standby Hold 35=Standby Delay 48=Normal Standby 49=Preparing 50=Ignition 51=Firing 52=Postpurge	AI	10	AI	10	nvoBrnCtlSt_XXX	SNVT_count_f
Lockout code	0 = No lockout 1 – 282 (see table 9 in SOLA Modbus Interface Manual)	AI	11	AI	11	nvoLockotCod_XXX	SNVT_count_f

Annunciator first out	See boiler control manual for annunciator names 0 = None or undetermined 1 = Running interlock (ILK) 2 = PII (Proof of valve closure when provided) 11 = A1 12 = A2 13 = A3 14 = A4 15 = A5 16 = A6 17 = A7 18 = A8	AI	12	AI	12	nvoAnn1stOut_XXX	SNVT_count_f
Burner cycle count	0-999,999 (U32)	AI	13	AI	13	nvoBrnCycCnt_XXX	SNVT_count_f
Burner run time	Hours (U32)	AI	14	AI	14	nvoBrnRunTim_XXX	SNVT_count_f
CH pump cycle count	0-999,999 (U32)	AI	15	AI	15	nvoCHPmpCyCn_XXX	SNVT_count_f
DHW pump cycle count	0-999,999 (U32)	AI	16	AI	16	nvoDHWPmCyCt_XXX	SNVT_count_f
System pump cycle count	0-999,999 (U32)	AI	17	AI	17	nvoSysPmCyCt_XXX	SNVT_count_f
Boiler pump cycle count	0-999,999 (U32)	AI	18	AI	18	nvoBlrPmCyCt_XXX	SNVT_count_f
Outdoor temperature	Temperature of the remote outdoor sensor	AI	19	AI	19	nvoOutdrTmp_XXX	SNVT_temp_f
Burner switch	Used to Enable/Disable boiler firing 1 = Enabled 0 = Disabled	BV	20	DO	20	nvi/nvoBurnerSw_XXX	SNVT_switch
CH enable	Enable/Disable central heating 1 = Enabled 0 = Disabled	BV	21	DO	21	nvi/nvoCH_Enable_XXX	SNVT_switch
CH setpoint	Change Boiler Set point[1]	AV	22	AO	22	nvi/nvoCH_SP_XXX	SNVT_temp_f
CH TOD setpoint	Boiler Set point when Time of Day switch is on[1]	AV	23	AO	23	nvi/nvoCH_TOD_SP_XXX	SNVT_temp_f
DHW Enable	Enable/Disable domestic hot water. 1 = Enabled 0 = Disabled	BV	24	DO	24	nvi/nvoDHW_Enabl_XXX	SNVT_switch
DHW Setpoint	Change the domestic hot water set point[1]	AV	25	AO	25	nvi/nvoDHW_SP_XXX	SNVT_temp_f
Lead Lag setpoint	Change the lead lag set point[1]	AV	26	AO	26	nvi/nvoLeadLagSP_XXX	SNVT_temp_f
Lead Lag enable	Enable/ Disable Lead Lag 1 = Enabled 0 = Disabled	BV	27	DO	27	nvi/nvoLdLgEnabl_XXX	SNVT_switch

[1] All temperature registers are expressed in °C regardless what Temperature units (register 179) is set to.
Temperature range is -40°C to 130°C with values given in 0.1°C units (for example, 32.0°C = 320). A temperature that is NOT applicable in this SOLA, i.e., not enabled, has a value of 0x8FFF. This temperature setting is denoted as "UNCONFIGURED" at the user interface.

12.2 SIEMENS RWF55 MODBUS RTU MAPPINGS TO BACNET, METASYS N2 AND LONWORKS

Point Name	FPC-N34				FPC-N35	
	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT Type
Com Status	BI	1	DI	1	nvoComStatus_XXX	SNVT_switch
Analog Input InP1	AI	1	AI	1	nvoInP1_XXX	SNVT_count_inc_f
Analog Input InP2	AI	2	AI	2	nvoInP2_XXX	SNVT_count_inc_f
Analog Input InP3	AI	3	AI	3	nvoInP3_XXX	SNVT_count_inc_f
Actual Setpoint	AI	4	AI	4	nvoActSP_XXX	SNVT_count_inc_f
Setpoint 1	AV	5	AO	5	nvi/nvoSP_1_XXX	SNVT_count_inc_f
Setpoint 2	AV	6	AO	6	nvi/nvoSP_2_XXX	SNVT_count_inc_f
Analog Input InP3	AI	7	AI	7	nvoInP3Unfil_XXX	SNVT_count_inc_f
Actual Angular Positioning	AI	8	AI	8	nvoActAngPos_XXX	SNVT_count_inc_f
Burner Alarm	AI	9	AI	9	nvoBrnrAlm_XXX	SNVT_count_inc_f
Activation Remote Operation	AV	10	AO	10	nvi/nvoREM_XXX	SNVT_count_inc_f
Controller Off In Remote Setpoint	AV	11	AO	11	nvi/nvorOFF_XXX	SNVT_count_inc_f
Switch-On Threshold Remote	AV	12	AO	12	nvi/nvorHYS1_XXX	SNVT_count_inc_f
Switch-Off Threshold Down Remote	AV	13	AO	13	nvi/nvorHYS2_XXX	SNVT_count_inc_f
Switch-Off Threshold Up Remote	AV	14	AO	14	nvi/nvorHYS3_XXX	SNVT_count_inc_f
Setpoint Remote	AV	15	AO	15	nvi/nvoSPr_XXX	SNVT_count_inc_f
Burner Release Remote Operation	AV	16	AO	16	nvi/nvoRK1_XXX	SNVT_count_inc_f
Relay K2 Remote Operation	AV	17	AO	17	nvi/nvoRK2_XXX	SNVT_count_inc_f
Relay K3 Remote Operation	AV	18	AO	18	nvi/nvoRK3_XXX	SNVT_count_inc_f
Relay K6 Remote Operation	AV	19	AO	19	nvi/nvoRK6_XXX	SNVT_count_inc_f
Step-By-Step Control Rem Operation	AV	20	AO	20	nvi/nvorStEP_XXX	SNVT_count_inc_f
Angular Pos Output Remote Operation	AV	21	AO	21	nvi/nvorY_XXX	SNVT_count_inc_f
Switch-On Threshold Remote	AV	22	AO	22	nvi/nvorHYS4_XXX	SNVT_count_inc_f
Switch-Off Threshold Down Remote	AV	23	AO	23	nvi/nvorHYS5_XXX	SNVT_count_inc_f
Switch-Off Threshold Up Remote	AV	24	AO	24	nvi/nvorHYS6_XXX	SNVT_count_inc_f

12.3 SIEMENS LMV52 MODBUS RTU MAPPINGS TO BACNET, METASYS N2 AND LONWORKS

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT Type
Com Status	BI	1	DI	1	nvoComStatus_XXX	SNVT_switch
Process Value	AI	1	AI	1	nvoProcVal_XXX	SNVT_count_f
Flame Signal	AI	2	AI	2	nvoFlameSig_XXX	SNVT_lev_percent
Fuel Rate Volume	AI	3	AI	3	nvoFuelRtVol_XXX	SNVT_count_f
O2 Level	AI	4	AI	4	nvoO2Level_XXX	SNVT_lev_percent
Supply Air	AI	5	AI	5	nvoSupplyAir_XXX	SNVT_count_f
Flue Gas	AI	6	AI	6	nvoFlueGas_XXX	SNVT_count_f
Combustion Efficiency	AI	7	AI	7	nvoCombstEff_XXX	SNVT_lev_percent
Control Mode	BV	8	DO	8	nvi/nvoCtrlMode_XXX	SNVT_switch
Operating Mode	AV	9	AO	9	nvi/nvoOpMode_XXX	SNVT_count_f
External Setpoint	AV	10	AO	10	nvi/nvoExtSP_XXX	SNVT_count_f
Fuel Rate	AV	11	AO	11	nvi/nvoFuelRate_XXX	SNVT_count_f
Process Setpoint	AV	12	AO	12	nvi/nvoProcSP_XXX	SNVT_count_f
Hours	AI	13	AI	13	nvoHours_XXX	SNVT_time_hour
Current Lockout Error code	AI	14	AI	14	nvoCrntErCd_XXX	SNVT_count_f
Current Lockout Error diagnosis	AI	15	AI	15	nvoCrntErDg_XXX	SNVT_count_f
Current Lockout Error class	AI	16	AI	16	nvoCrntErCls_XXX	SNVT_count_f
Current Lockout Error phase	AI	17	AI	17	nvoCrntErPh_XXX	SNVT_count_f
Current Lockout Fuel	AI	18	AI	18	nvoCrntFuel_XXX	SNVT_count_f
Current Lockout Output	AI	19	AI	19	nvoCrntOutpt_XXX	SNVT_count_f
Current Lockout Date: Year	AI	20	AI	20	nvoCrntTPDYr_XXX	SNVT_count_f
Current Lockout Date: Month	AI	21	AI	21	nvoCrntTPDMn_XXX	SNVT_count_f
Current Lockout Date: Day	AI	22	AI	22	nvoCrntTPDDy_XXX	SNVT_count_f
Current Lockout Time of day: hours	AI	23	AI	23	nvoCrntTODHr_XXX	SNVT_count_f
Current Lockout Time of day: minutes	AI	24	AI	24	nvoCrntTODMn_XXX	SNVT_count_f
Current Lockout Time of day: Seconds	AI	25	AI	25	nvoCrntTODSc_XXX	SNVT_count_f
Current Lockout Startup counter total	AI	26	AI	26	nvoCrntStCtT_XXX	SNVT_count_f
Current Lockout Hours run total	AI	27	AI	27	nvoCrntHrRnT_XXX	SNVT_time_hour
Lockout Error Code	AI	140	AI	140	nvoLckotErCd_XXX	SNVT_count_f
Lockout Diagnostic Code	AI	141	AI	141	nvoLckotDgCd_XXX	SNVT_count_f
Fuel Selected	AI	142	AI	142	nvoFuelSel_XXX	SNVT_count_f
Firing Rate	AI	143	AI	143	nvoFirRate_XXX	SNVT_count_f

12.4 HONEYWELL RM7800 MODBUS RTU MAPPINGS TO BACNET, METASYS N2 AND LONWORKS

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT Type
Com Status	BI	1	DI	1	nvoComStatus_XXX	SNVT_switch
Flame Signal	AI	1	AI	1	nvoFlameSig_XXX	SNVT_count_f
Burner Cycles	AI	2	AI	2	nvoBrnCyc_XXX	SNVT_count_f
Burner Hours	AI	3	AI	3	nvoBrnHrs_XXX	SNVT_time_hour
Burner Fault Code	AI	4	AI	4	nvoBrnFltCod_XXX	SNVT_count_f
Initiate	AI	53	AI	53	nvoInitiate_XXX	SNVT_switch
Standby	AI	54	AI	54	nvoStandby_XXX	SNVT_switch
Purge	AI	55	AI	55	nvoPurge_XXX	SNVT_switch
Pilot Ignition	AI	56	AI	56	nvoPilotIgn_XXX	SNVT_switch
Main Ignition	AI	57	AI	57	nvoMainIgn_XXX	SNVT_switch
Run	AI	58	AI	58	nvoRun_XXX	SNVT_switch
Postpurge	AI	59	AI	59	nvoPostpurge_XXX	SNVT_switch
Pre-Ignition	AI	60	AI	60	nvoPreIgntn_XXX	SNVT_switch
Valve Proving	AI	61	AI	61	nvoVlvProv_XXX	SNVT_switch
Alarm	AI	62	AI	62	nvoAlarm_XXX	SNVT_switch
Hold	AI	63	AI	63	nvoHold_XXX	SNVT_switch
Lockout	AI	64	AI	64	nvoLockout_XXX	SNVT_switch
First Out Code *	AI	65	AI	65	nvo1stOutCod_XXX	SNVT_count_f
Main Valve Proof of Closure *	BI	66	DI	66	nvoMnVlvCls_XXX	SNVT_switch
Burner Switch *	BI	67	DI	67	nvoBrnrSw_XXX	SNVT_switch
Operating Control *	BI	68	DI	68	nvoOpCtrl_XXX	SNVT_switch
Auxiliary Limit 1 *	BI	69	DI	69	nvoAuxLim1_XXX	SNVT_switch
Auxiliary Limit 2 *	BI	70	DI	70	nvoAuxLim2_XXX	SNVT_switch
Low Water Cutoff *	BI	71	DI	71	nvoLoWtrCut_XXX	SNVT_switch
High Limit *	BI	72	DI	72	nvoHiLim_XXX	SNVT_switch
Auxiliary Limit 3 *	BI	73	DI	73	nvoAuxLim3_XXX	SNVT_switch
Oil Select Switch *	BI	74	DI	74	nvoOilSelSw_XXX	SNVT_switch
High Oil Pressure *	BI	75	DI	75	nvoHiOilPrs_XXX	SNVT_switch
Low Oil Pressure *	BI	76	DI	76	nvoLoOilPrs_XXX	SNVT_switch
High Oil Temperature *	BI	77	DI	77	nvoHiOilTmp_XXX	SNVT_switch
Low Oil Temperature *	BI	78	DI	78	nvoLoOilTmp_XXX	SNVT_switch
Gas Select Switch *	BI	79	DI	79	nvoGasSelSw_XXX	SNVT_switch
High Gas Pressure *	BI	80	DI	80	nvoHiGasPrs_XXX	SNVT_switch
Low Gas Pressure *	BI	81	DI	81	nvoLoGasPrs_XXX	SNVT_switch
Air Flow Switch *	BI	82	DI	82	nvoAirFLoSw_XXX	SNVT_switch
Auxiliary Interlock 4 *	BI	83	DI	83	nvoAuxIntlk4_XXX	SNVT_switch
Auxiliary Interlock 5 *	BI	84	DI	84	nvoAuxIntlk5_XXX	SNVT_switch
*Requires S7830 Expanded Annunciator						

12.5   SIEMENS RWF40 MODBUS RTU MAPPINGS TO BACNET, AND METASYS N2

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address
Com Status	BI	1	DI	1
Input 1	AI	1	AI	1
Input 2	AI	2	AI	2
Input 3	AI	3	AI	3
First Setpoint	AV	4	AO	4
Second Setpoint	AV	5	AO	5
Operation Mode	AV	6	AO	6
Process Enable	BV	7	DO	7
Process Setpoint	AV	8	AO	8
Enable K1	BV	9	DO	9
Enable K2	BV	10	DO	10
Enable K3	BV	11	DO	11
Enable K6	BV	12	DO	12
Step Control	AV	13	AO	13
Modulation	AV	14	AO	14

12.6   SIEMENS LMV36 MODBUS RTU MAPPINGS TO BACNET, METASYS N2 AND LONWORKS

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT Type
Com Status	BI	1	DI	1	nvoComStatus_XXX	SNVT_switch
Flame Signal	AI	1	AI	1	nvoFlameSig_XXX	SNVT_lev_percent
Lockout Error Code	AI	2	AI	2	nvoLckotErCd_XXX	SNVT_count_f
Lockout Diagnostic Code	AI	3	AI	3	nvoLckotDgCd_XXX	SNVT_count_f
Control Mode	BV	4	DO	4	nvi/nvoCtrlMode_XXX	SNVT_switch
Operating Mode	AV	5	AO	5	nvi/nvoOp_Mode_XXX	SNVT_count_f
Fuel Rate	AV	6	AO	6	nvi/nvoFuelRate_XXX	SNVT_count_f
Fuel Selected	AI	7	AI	7	nvoFuelSel_XXX	SNVT_count_f
Firing Rate	AI	8	AI	8	nvoFirRate_XXX	SNVT_count_f

12.7 PRECISION DIGITAL TRIDENT PD765 MODBUS RTU MAPPINGS TO BACNET, METASYS N2 AND LONWORKS

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT Type
PD765 Modbus RTU Mappings to BACnet, Metasys N2 and LonWorks						
Com Status	BI	1	DI	1	nvoComStatus_XXX	SNVT_switch
Display Value	AI	1	AI	1	nvoDispVal_XXX	SNVT_count_f
Relay 1 Status	BV	2	DO	2	nvi/nvoRel1Stat_XXX	SNVT_switch
Relay 2 Status	BV	3	DO	3	nvi/nvoRel2Stat_XXX	SNVT_switch
Alarm 1 Status	BI	4	DI	4	nvoAlm1Stat_XXX	SNVT_switch
Alarm 2 Status	BI	5	DI	5	nvoAlm2Stat_XXX	SNVT_switch
Alarm 1 Acknowledge	BV	6	DO	6	nvi/nvoAlm1Ack_XXX	SNVT_switch
Alarm 2 Acknowledge	BV	7	DO	7	nvi/nvoAlm2Ack_XXX	SNVT_switch
Relay 1 Set Point	AV	8	AO	8	nvi/nvoRl1SP_XXX	SNVT_count_f
Relay 1 Reset Point	AV	9	AO	9	nvi/nvoRl1ResPt_XXX	SNVT_count_f
Relay 1 Turn-on Delay	AV	10	AO	10	nvi/nvoRl1TnOnDl_XXX	SNVT_count_f
Relay 1 Turn-off Delay	AV	11	AO	11	nvi/nvoRl1TnOfDl_XXX	SNVT_count_f
Relay 1 Normal/Fail-Safe	BV	12	DO	12	nvi/nvoRl1NrFlSf_XXX	SNVT_switch
Relay 1 Operation	AV	13	AO	13	nvi/nvoRl1Oper_XXX	SNVT_count_f
Relay 2 Set Point	AV	14	AO	14	nvi/nvoRl2SP_XXX	SNVT_count_f
Relay 2 Reset Point	AV	15	AO	15	nvi/nvoRl2ResPt_XXX	SNVT_count_f
Relay 2 Turn-on Delay	AV	16	AO	16	nvi/nvoRl2TnOnDl_XXX	SNVT_count_f
Relay 2 Turn-off Delay	AV	17	AO	17	nvi/nvoRl2TnOfDl_XXX	SNVT_count_f
Relay 2 Normal/Fail-Safe	BV	18	DO	18	nvi/nvoRl2NrFlSf_XXX	SNVT_switch
Relay 2 Operation	AV	19	AO	19	nvi/nvoRl2Oper_XXX	SNVT_count_f
4-20mA Out-Mode Output Option	BV	20	DO	20	nvi/nvo420MdOtOp_XXX	SNVT_switch
4-20mA Out-Mode Data Source	AV	21	AO	21	nvi/nvo420MdDtSr_XXX	SNVT_count_f
4-20mA Out–Sensor Break Value	AV	22	AO	22	nvi/nvo420SnBkVl_XXX	SNVT_count_f
4-20mA Out–Overrange value	AV	23	AO	23	nvi/nvo420OvrVal_XXX	SNVT_count_f
4-20mA Out–Underrange value	AV	24	AO	24	nvi/nvo420UndVal_XXX	SNVT_count_f
4-20mA Out–Max value Allowed	AV	25	AO	25	nvi/nvo420MxVlAl_XXX	SNVT_count_f
4-20mA Out–Min value Allowed	AV	26	AO	26	nvi/nvo420MnVlAl_XXX	SNVT_count_f
4-20mA Out–Display Value 1	AV	27	AO	27	nvi/nvo420DspVl1_XXX	SNVT_count_f
4-20mA Out–Display Value 2	AV	28	AO	28	nvi/nvo420DspVl2_XXX	SNVT_count_f
4-20mA Out–Output 1	AV	29	AO	29	nvi/nvo420Outpt1_XXX	SNVT_count_f
4-20mA Out–Output 2	AV	30	AO	30	nvi/nvo420Outpt2_XXX	SNVT_count_f
4-20mA Out–Data in mA or Data in bit	AV	31	AO	31	nvi/nvo420DtmABt_XXX	SNVT_count_f

12.8 THERMAL SOLUTIONS HONEYWELL SOLA (4109 SOFTWARE*) MODBUS RTU MAPPINGS TO BACNET, METASYS N2 AND LONWORKS

Point Name	Read/Write	BACnet		N2		LonWorks	
		Data Type	Data ID	Data Type	Pnt Addr	Lon Name	Lon SNVT
Burner On Off [1]	R/W	BI	1	DI	1	nvi/nvoBrnrOnOff_XXX	SNVT_switch
Demand Source	R	AI	2	AI	2	nvoDem_Src_XXX	SNVT_count_f
CH Setpoint [2]	R/W	AV	3	AO	3	nvi/nvoCH_SP_XXX	SNVT_temp_p
DHW Setpoint	R/W	AV	4	AO	4	nvi/nvoDHW_SP_XXX	SNVT_temp_p
Lead Lag Setpoint	R/W	AV	5	AO	5	nvi/nvoLL_SP_XXX	SNVT_temp_p
CH TOD Setpoint	R/W	AV	6	AO	6	nvi/nvoCH_TOD_SP_XXX	SNVT_temp_p
CH Setpoint Source	R	AI	7	AI	7	nvoCH_SP_Src_XXX	SNVT_count_f
Active CH Setpoint	R	AI	8	AI	8	nvoAct_CH_SP_XXX	SNVT_temp_p
DHW Setpoint Source	R	AI	9	AI	9	nvoDHW_SPSrc_XXX	SNVT_count_f
Active DHW Setpoint	R	AI	10	AI	10	nvoActDHW_SP_XXX	SNVT_temp_p
LL Master Setpoint Source	R	AI	11	AI	11	nvoLLMstSPSr_XXX	SNVT_count_f
Active LL Setpoint	R	AI	12	AI	12	nvoAct_LL_SP_XXX	SNVT_temp_p
Supply Sensor	R	AI	13	AI	13	nvoSupSensor_XXX	SNVT_temp_p
Return Sensor	R	AI	14	AI	14	nvoRetSensor_XXX	SNVT_temp_p
Header Sensor	R	AI	15	AI	15	nvoHdrSensor_XXX	SNVT_temp_p
Stack Sensor	R	AI	16	AI	16	nvoStkSensor_XXX	SNVT_temp_p
Outdoor Sensor	R	AI	17	AI	17	nvoOtdrSensr_XXX	SNVT_temp_p
4-20 mA Rem Control Input	R	AI	18	AI	18	nvoRemCtrlIn_XXX	SNVT_count_f
Fan Speed	R	AI	19	AI	19	nvoFan_Speed_XXX	SNVT_count_f
Flame Signal	R	AI	20	AI	20	nvoFlmSig_XXX	SNVT_count_f
Burner Control State	R	AI	21	AI	21	nvoBrnCtrlSt_XXX	SNVT_count_f
Lockout Code	R	AI	22	AI	22	nvoLockotCod_XXX	SNVT_count_f
Hold Code	R	AI	23	AI	23	nvoHoldCode_XXX	SNVT_count_f
Burner Cycle Count	R/W	AV	24	AO	24	nvi/nvoBrnCycCnt_XXX	SNVT_count_f
Burner Run Time	R/W	AV	25	AO	25	nvi/nvoBrnRunTim_XXX	SNVT_time_hour
System Pump Cycle Count	R/W	AV	26	AO	26	nvi/nvoSysPmCyCt_XXX	SNVT_count_f
DHW Pump Cycle Count	R/W	AV	27	AO	27	nvi/nvoDHWPmCyCt_XXX	SNVT_count_f
Boiler Pump Cycle Count	R/W	AV	28	AO	28	nvi/nvoBlrPmCyCt_XXX	SNVT_count_f

*4109 software revision was superseded by version 4716 on Sola controls released after 5/11/15.

[1] If only the burner on/off Modbus signal is used instead of the Enable / Disable contact input the boiler will be turned off, but the system pump may remain running.

[2] When writing CH Setpoint the Energy Management System is responsible for the boiler's setpoint for central heating. Disable the boiler's Outdoor Air Reset function. **WARNING:** All parameters are stored in EEPROM. Only perform writes when it is absolutely necessary to change the value of a register. Care must be taken to avoid excessive writing to parameters stored in EEPROM memory.

12.9   TSBC MODBUS RTU MAPPINGS TO BACNET, METASYS N2 AND LONWORKS

Point Name	Read/ Write	BACnet Data Type	N2 Object Id	Lon Works Data Type	Pt Addr	Read/ Write Lon Name	BACnet Lon SNVT Type
Outdoor Air Reset Enable/Disable		BI	1	DI	1	nvoOAResEnDs_XXX	SNVT_switch
Domestic Hot Water Priority		BI	2	DI	2	nvoDmHtWtPri_XXX	SNVT_switch
Local/Remote		BI	3	DI	3	nvoLoc_Rem_XXX	SNVT_switch
Remote On/Off Modbus Command	R/W	BV	4	DO	4	nvi/nvoRmOnOfCmd_XXX	SNVT_switch
Spare Input (Programmable)		BI	5	DI	5	nvoSprInput_XXX	SNVT_switch
Low Water Cutoff Switch		BI	6	DI	6	nvoLoWtCtOff_XXX	SNVT_switch
Burner On/Off Switch		BI	7	DI	7	nvoBrnOnOfSw_XXX	SNVT_switch
Low Water Flow		BI	8	DI	8	nvoLoWtrFLo_XXX	SNVT_switch
High and Low Gas Pressure Switches		BI	9	DI	9	nvoHiLoGsPrs_XXX	SNVT_switch
Operating or High Limit		BI	10	DI	10	nvoOpOrHiLim_XXX	SNVT_switch
Low Combustion Air Flow		BI	11	DI	11	nvoLoCmbArFl_XXX	SNVT_switch
Fuel Valve Energized		BI	12	DI	12	nvoFlVlvEnrg_XXX	SNVT_switch
Flame Safeguard Alarm		BI	13	DI	13	nvoFlmSfgdAl_XXX	SNVT_switch
Call For Heat (CFH)		BI	14	DI	14	nvoCallForHt_XXX	SNVT_switch
General Alarm		BI	15	DI	15	nvoGenAlm_XXX	SNVT_switch
Vent Inducer		BI	16	DI	16	nvoVntIndcr_XXX	SNVT_switch
Boiler Pump		BI	17	DI	17	nvoBlrPump_XXX	SNVT_switch
System Pump		BI	18	DI	18	nvoSystPmp_XXX	SNVT_switch
Spare Output (Programmable)		BI	19	DI	19	nvoSprOutput_XXX	SNVT_switch
State Boiler Disabled		BI	20	DI	20	nvoStBlrDis_XXX	SNVT_switch
State Weather Shutdown		BI	21	DI	21	nvoStWthShdn_XXX	SNVT_switch
State Lockout		BI	22	DI	22	nvoStLockout_XXX	SNVT_switch
State Pump Purge		BI	23	DI	23	nvoStPmpPurg_XXX	SNVT_switch
State Limit Hold		BI	24	DI	24	nvoStLimHold_XXX	SNVT_switch
State Purge/Pilot Ign		BI	25	DI	25	nvoStPrgPlIg_XXX	SNVT_switch
State Low Fire/Ignition		BI	26	DI	26	nvoStLoFirIg_XXX	SNVT_switch
State Main Ignition		BI	27	DI	27	nvoStMainIgn_XXX	SNVT_switch
State Low Fire Hold		BI	28	DI	28	nvoStLoFrHld_XXX	SNVT_switch
State Boiler Running		BI	29	DI	29	nvoStBlrRun_XXX	SNVT_switch
State Fan Post Purge		BI	30	DI	30	nvoStFnPstPg_XXX	SNVT_switch
State Pump Cool Down		BI	31	DI	31	nvoStPmpClDn_XXX	SNVT_switch
State Standby		BI	32	DI	32	nvoStStandby_XXX	SNVT_switch
Annunciator Low Water Level		BI	33	DI	33	nvoAnLoWtLvl_XXX	SNVT_switch
Annunciator Off Switch		BI	34	DI	34	nvoAnnOffSw_XXX	SNVT_switch
Annunciator Low Water Flow		BI	35	DI	35	nvoAnLoWtFlo_XXX	SNVT_switch
Annunciator Fuel Limit		BI	36	DI	36	nvoAnnFlLim_XXX	SNVT_switch
Annunciator High Temp Limit		BI	37	DI	37	nvoAnHiTmpLm_XXX	SNVT_switch
Annunciator Low Air Flow		BI	38	DI	38	nvoAnLoArFlo_XXX	SNVT_switch
Annunciator FSG Lockout		BI	39	DI	39	nvoAnFSGLkot_XXX	SNVT_switch
Annunciator Outlet Temp Fail		BI	40	DI	40	nvoAnOtlTpFl_XXX	SNVT_switch
Annunciator Inlet Temp Fail		BI	41	DI	41	nvoAnInlTpFl_XXX	SNVT_switch

Annunciator OA Temp Fail		BI	42	DI	42	nvoAnOATmpFl_XXX	SNVT_switch
Annunciator Remote Temp Fail		BI	43	DI	43	nvoAnRemTpFl_XXX	SNVT_switch
Annunciator Remote In Fail		BI	44	DI	44	nvoAnRemInFl_XXX	SNVT_switch
Annunciator Comm Fail		BI	45	DI	45	nvoAnComFl_XXX	SNVT_switch
Annunciator Low Inlet Temp		BI	46	DI	46	nvoAnLoInlTp_XXX	SNVT_switch
Annunciator Memory Failure		BI	47	DI	47	nvoAnnMemFl_XXX	SNVT_switch
Boiler Outlet Water Temp		AI	48	AI	48	nvoBlOtlWtTp_XXX	SNVT_temp_p
Boiler Inlet Water Temp		AI	49	AI	49	nvoBlInlWtTp_XXX	SNVT_temp_p
Outside Air Temp		AI	50	AI	50	nvoOATmp_XXX	SNVT_temp_p
Boiler Actual SP		AI	51	AI	51	nvoBlrActSP_XXX	SNVT_temp_p
Remote System Temp		AI	52	AI	52	nvoRemSysTmp_XXX	SNVT_temp_p
Remote Firing Rate or Remote SP	R/W	AV	53	AO	53	nvi/nvoRmFrRatSP_XXX	SNVT_count_f
PCB Temp Sensor		AI	54	AI	54	nvoPCBTmpSen_XXX	SNVT_temp_p
Firing Rate Output to Mod Motor		AI	55	AI	55	nvoFrRtOtMod_XXX	SNVT_lev_percent
Minimum Return Temp SP		AI	56	AI	56	nvoMnRetTpSP_XXX	SNVT_temp_p
Mixing Valve Output		AI	57	AI	57	nvoMixVlvOut_XXX	SNVT_lev_percent
Control Mode		AI	58	AI	58	nvoCtrlMode_XXX	SNVT_count_f

12.10 THERMAL SOLUTIONS HONEYWELL SOLA (4716 SOFTWARE) MODBUS RTU MAPPINGS TO BACNET, METASYS N2 AND LONWORKS

Point Name	Read/Write	BACnet Data Type	BACnet Data Id	N2 Data Type	N2 Pt Addr	Lon Name	Lon SNVT Type
Burner On Off	R	BV	1	DO	1	nvi/nvoBrnrOnOff_XXX	SNVT_switch
Demand Source	R	AI	2	AI	2	nvoDem_Src_XXX	SNVT_count_f
CH Setpoint	R	AV	3	AO	3	nvi/nvoCH_SP_XXX	SNVT_temp_p
DHW Setpoint	R	AV	4	AO	4	nvi/nvoDHW_SP_XXX	SNVT_temp_p
Lead Lag Setpoint	R	AV	5	AO	5	nvi/nvoLL_SP_XXX	SNVT_temp_p
CH TOD Setpoint	R	AV	6	AO	6	nvi/nvoCH_TOD_SP_XXX	SNVT_temp_p
CH Setpoint Source	R	AI	7	AI	7	nvoCH_SP_Src_XXX	SNVT_count_f
Active CH Setpoint	R	AI	8	AI	8	nvoAct_CH_SP_XXX	SNVT_temp_p
DHW Setpoint Source	R	AI	9	AI	9	nvoDHW_SPSrc_XXX	SNVT_count_f
Active DHW Setpoint	R	AI	10	AI	10	nvoActDHW_SP_XXX	SNVT_temp_p
LL Master Setpoint Source	R	AI	11	AI	11	nvoLLMstSPSr_XXX	SNVT_count_f
Active LL Setpoint	R	AI	12	AI	12	nvoAct_LL_SP_XXX	SNVT_temp_p
Supply Sensor	R	AI	13	AI	13	nvoSupSensor_XXX	SNVT_temp_p
Return Sensor	R	AI	14	AI	14	nvoRetSensor_XXX	SNVT_temp_p
Header Sensor	R	AI	15	AI	15	nvoHdrSensor_XXX	SNVT_temp_p
Stack Sensor	R	AI	16	AI	16	nvoStkSensor_XXX	SNVT_temp_p
Outdoor Sensor	R	AI	17	AI	17	nvoOtdrSensr_XXX	SNVT_temp_p
4-20 mA Rem Control Input	R	AI	18	AI	18	nvoRemCtrlIn_XXX	SNVT_count_f
Fan Speed	R	AI	19	AI	19	nvoFan_Speed_XXX	SNVT_count_f
Flame Signal	R	AI	20	AI	20	nvoFlmSig_XXX	SNVT_count_f
Burner Control State	R	AI	21	AI	21	nvoBrnCtrlSt_XXX	SNVT_count_f
Lockout Code	R	AI	22	AI	22	nvoLockotCod_XXX	SNVT_count_f
Hold Code	R	AI	23	AI	23	nvoHoldCode_XXX	SNVT_count_f
Burner Cycle Count	R/W	AV	24	AO	24	nvi/nvoBrnCycCnt_XXX	SNVT_count_f
Burner Run Time	R/W	AV	25	AO	25	nvi/nvoBrnRunTim_XXX	SNVT_time_hour
System Pum Cycle Count	R/W	AV	26	AO	26	nvi/nvoSysPmCyCt_XXX	SNVT_count_f
DHW Pump Cycle Count	R/W	AV	27	AO	27	nvi/nvoDHWPmCyCt_XXX	SNVT_count_f
Boiler Pump Cycle Count	R/W	AV	28	AO	28	nvi/nvoBlrPmCyCt_XXX	SNVT_count_f
CH Modbus Stat	W	BV	29	DO	29	nvi/nvoCHModStat_XXX	SNVT_switch
LLCH Modbus Stat	W	BV	30	DO	30	nvi/nvoLLCHModSt_XXX	SNVT_switch
CH Modbus SP	W	AV	31	AO	31	nvi/nvoCHModSP_XXX	SNVT_temp_p
CH Sequencer Modbus SP	W	AV	32	AO	32	nvi/nvoCHSeqMdSP_XXX	SNVT_temp_p
Outdoor Temperature	W	AV	33	AO	33	nvi/nvoOutTemp_XXX	SNVT_temp_p
CH Modbus Rate	W	AV	34	C	34	nvi/nvoCHModRate_XXX	SNVT_lev_percent
Fan Speed Measured	R	AI	35	AI	35	nvoFanSpdMes_XXX	SNVT_count_f
Modbus command timeout	R/W	AV	36	AO	36	nvoModCmdTim_XXX	SNVT_count_f
CH pump status	R	AI	37	AI	37	nvoCHPmpStat_XXX	SNVT_count_f
DHW pump status	R	AI	38	AI	38	nvoDHWPmpSt_XXX	SNVT_count_f
Boiler pump status	R	AI	39	AI	39	nvoBlrPmpSt_XXX	SNVT_count_f
Low Temp SP	R	AI	40	AI	40	nvoLoTmpSP_XXX	SNVT_temp_p
Low TempSP source	R	AI	41	AI	41	nvoLoTmpSPSr_XXX	SNVT_count_f
Active Low Temp SP	R	AI	42	AI	42	nvoActLoTpSP_XXX	SNVT_temp_p
CH heat demand	W	BI	43	DI	43	nvoCH_HtDem_XXX	SNVT_switch
DHW heat demand	R	BI	44	DI	44	nvoDHW_HtDem_XXX	SNVT_switch
Low Temp Loop demand	R	BI	45	DI	45	nvoLoTpLHtDm_XXX	SNVT_switch

12.11 CONDUCTOR MODBUS RTU MAPPINGS TO BACNET

Modbus Register Address	Protocol Name	BACnet Data Type	BACnet Object ID	Read I/ Write (W)	Description
System Status					
9847	Plant_load	AI	0	**R**	Status of Load Monitoring. Units: kBTU/h
9848	EMS_Enable	BV	0	**R/W**	Use this register to enable the Master Sequencer. 0 = Disable 1 = Enable Jumper 1 on PCB-10 must be cut.
9849	EMS_Setpoint	AV	0	**R/W**	Use this register to change the Sequencer setpoint. Valid range 60°F to 230°F or [pressure range] PSI
9845	Firing_Rate	AI	1	**R**	Master Sequencer modulation rate. Units: %
9846	Active_Setpoint	AI	2	**R**	Setpoint currently in use by controller. Units: F
9850	Master_SP_Source	AI	4	**R**	Master Setpoint Source 0 = Normal 1 = Remote 2 = DHW 3 = Reset, 4 = Reset/Setback 5 = Setback
9851	Status	AI	3	**R**	0 Standby 1 Start Lead 2 Start 1st Lag 3 Start 2nd Lag 4 Start 3rd Lag 5 Start 4th Lag 6 Start 5th Lag 7 Start 6th Lag 8 Start 7th Lag
9844	Priority	AI	5	**R**	0 Disabled 1 Sequence Off 2 WWSD Both 3 WWSD Boiler 4 Non-Condensing 5 Condensing
9827	Lead	AI	6	**R**	Number of Lead Boiler
Analog Inputs					
9836	SYSTEM_SUPPLY	AI	7	**R**	Units: F
9837	SYSTEM_RETURN	AI	8	**R**	Units: F
9838	OUTDOOR_AIR	AI	9	**R**	Units: F
8976	UAI5_EMS_SETPOINT	AI	10	**R**	Units: F
8978	UAI7_PUMP_FEEDBACK	AI	11	**R**	Units: %
9843	STEAM_PRESSURE	AI	12	**R**	Units: psi
9839	BLR_A_SHELL	AI	13	**R**	Units: F
9840	BLR_B_SHELL	AI	14	**R**	Units: F
9841	BLR_C_SHELL	AI	15	**R**	Units: F
9842	BLR_D_SHELL	AI	16	**R**	Units: F

Discrete Outputs					
8990	UDO1_CONFIGURABLE	AI	17	**R**	0 = Off 1 = On
8991	UDO2_ALARM	AI	18	**R**	0 = Off 1 = On
8996	UDO7_BLR_D_ISOLATION_VALVE	AI	19	**R**	0 = Off 1 = On
8997	UDO8_PUMP_A	AI	20	**R**	0 = Off 1 = On
8998	UDO9_BLR_A_ISOLATION_VALVE	AI	21	**R**	0 = Off 1 = On
8999	UDO10_BLR_B_ISOLATION_VALVE	AI	22	**R**	0 = Off 1 = On
9000	UDO11_BLR_C_ISOLATION_VALVE	AI	23	**R**	0 = Off 1 = On
9001	UDO12_PUMP_B	AI	24	**R**	0 = Off 1 = On
System Alarms					
9684	ALR_Press_High	AI	25	**R**	High Steam Pressure 0 = Normal 1 = High
9685	ALR_Press_Low	AI	26	**R**	Low Steam Pressure 0 = Normal 1 = Low
9686	ALR_Temp_High	AI	27	**R**	High Supply Water Temperature 0 = Normal 1 = High
9687	ALR_Temp_Low	AI	28	**R**	Low Supply Water Temperature 0 = Normal 1 = Low
9688	ALR_Return_Temp_Low	AI	29	**R**	Low Return Water Temperature 0 = Normal 1 = Low
9696	ALR_Pump_A_Fault	AI	30	**R**	System Pump A Fault 0 = Normal 1 = Fault
9697	ALR_Pump_B_Fault	AI	31	**R**	System Pump B Fault 0 = Normal 1 = Fault
9702	ALR_Shell_1_High	AI	32	**R**	Boiler 1 High Shell Temperature (Steam) 0 = Normal 1 = High
9703	ALR_Shell_2_High	AI	33	**R**	Boiler 2 High Shell Temperature (Steam) 0 = Normal 1 = High
9704	ALR_Shell_3_High	AI	34	**R**	Boiler 3 High Shell Temperature (Steam) 0 = Normal 1 = High
9705	ALR_Shell_4_High	AI	35	**R**	Boiler 4 High Shell Temperature (Steam) 0 = Normal 1 = High

Boiler 1 Points

9426	BLR1_Supply	AI	36	**R**	Supply Temperature, Units: F
9427	BLR1_Return	AI	37	**R**	Return Temperature, Units: F
9428	BLR1_Stack	AI	38	**R**	Stack Temperature, Units: F
9429	BLR1_CH_Mod_Rate	AI	39	**R**	Boiler Firing Rate, Units: %
9430	BLR1_Rate_Commanded	AI	40	**R**	Boiler Firing Rate Feedback, Units: %
9433	BLR1_CH_Mod_Stat	AI	41	**R**	CH Modbus STAT 0 = No Demand 1 = Demand
9434	BLR1_General_Alarm	AI	42	**R**	0 = Normal 1 = Fault
9435	BLR1_Boiler_Pump	AI	43	**R**	0 = Off 1 = On
9436	BLR1_System_Pump	AI	44	**R**	0 = Off 1 = On
9920	BLR1_Pump_Status	AI	45	**R**	0 = Off 1 = On
9438	BLR1_Flame	AI	46	**R**	Flame Signal, Units: mA/V
9439	BLR1_State	AI	47	**R**	See state codes below:

Sola States	TSBC States	S7800 States	Hardwired States
0 Initiate	0 Undefined	0 Initiate	0 Unknown
1 Standby Delay	1 Boiler Disabled	1 Standby	1 Off Network
2 Standby	2 Weather Shutdown	2 Purge	2 Disabled
3 Safe Startup	3 Lockout	3 Pilot Ignition	3 Blocked
4 Drive Purge	4 Pump Purge	4 Main Ignition	4 Available
5 Prepurge	5 Limit Hold	5 Run	5 Valve Opening
6 Drive Lightoff	6 Purge/Pilot Ignition	6 Postpurge	6 Limit Hold
7 Preignition Test	7 Low Fire/Ignition	7 Pre-Ignition	7 Add stage
8 Preignition	8 Main Ignition	8 Valve Proving	8 Drive to Low Fire
9 Pilot Flame Establishing Period	9 Low Fire Hold	13 Alarm	9 Low Fire Hold
10 Main Flame Establishing Period	10 Boiler Running	14 Hold	10 Running
11 Direct Ignition	11 Fan Post Purge	15 Lockout	
12 Running	12 Pump Cool Down		
13 Postpurge	13 Standby		
14 Lockout			

9440	BLR1_Ann_Lockout	AI	48	**R**	See Lockout codes below:

Sola Lockout	TSBC Lockout	S7800 Lockout	
0 No lockout,	0 No Lockout	0 No lockout,	31 Flame Amp Type
4 Supply high limit	1 Low Water Level	1 No Purge Card	32 Jumpers Changed
5 DHW high limit	2 Off Switch	2 AC Frequency/Noise	33 Delayed MV On
6 Stack High limit	3 Low Water Flow	3 AC Line Dropout	34 Man-Open SW On
12 Flame detected out of sequence	4 Fuel Limit	4 AC Frequency	35 Jumpers Wrong
18 Lightoff rate proving failed	5 High Temp Limit	5 Low Line Voltage	36 Flame Too Strong
19 Purge rate proving failed	6 Low Air Flow	6 Purge Card Error	37 Lockout Switch
20 Invalid Safety Parameters	7 FSG Lockout	7 Flame Amplifier	38 Comb. Pressure
21 Invalid Modulation Parameter	8 Outlet Temp Fail	8 Flame Amp/Shutter	39 Purge Fan SW On
22 Safety data verification needed	9 Inlet Temp Fail	9 Flame Detected	40 Block Intake
23 24VAC voltage low/high	10 OA Temp Fail	10 Preignition ILK	41 Purge Fan SW Off
24 Fuel Valve Error	11 Remote Temp Fail	11 Running ILK On	42 AC Phase
25 Hardware Fault	12 Remote In Fail	12 Lockout ILK On	43 Device Specific
26 Internal Fault	13 Comm Fail	13 Airflow Switch On	44 Accessory
27 Ignition Failure	14 Low Inlet Temp	14 High Fire Switch	45 Poor Flame Sensor
27 Interrupted Air SW ON	15 Memory Failure	15 Flame-Out Timer	46 Valve Closure
		16 Main Flame Fail	47 Aux Interlock
		17 Main Flame Ign.	48 Low Gas Pressure

27 Interrupted Air SW OFF 42 AC Phase Fault 47 Flame Lost 48 Static flame 49 Pre-ignition Interlock Off 50 Pilot test hold 51 Demand lost in run					18 Low Fire SW Off 49 High Gas Pressure 19 Running ILK 50 Atomizing SW 20 Lockout ILK 51 Low Oil Temp 21 Air Flow Switch 52 High Oil Temp 22 Call Service 53 Low Oil Pressure 23 Man-Open Sw. Off 54 High Oil Pressure 24 Start Switch On 55 Both Fuels Select 25 Pilot Flame Fail 56 Fuel Select Off 26 Control On 57 Aux Limit 27 Main Valve On 58 High Limit 28 Pilot Valve 1 On 59 LWCO 29 Ignition On 30 Pilot Valve 2 On
9441	BLR1_Ann_Hold	AI	49	R	Hold Code (Sola Only) 0 None 1 Anti short cycle 2 Boiler Safety Limit Open 3 Boiler Safety Limit Open, (ILK Off) 7 Return sensor fault 8 Supply sensor fault 9 DHW sensor fault 10 Stack sensor fault 11 Ignition failure 13 Flame rod shorted to ground 14 Delta T inlet/outlet high 15 Return temp higher than supply 16 Supply temp has risen too quickly 17 Fan speed not proved 23 24VAC voltage low/high 25 Hardware Fault 27 Ignition Failure
9706	ALR_BLR1SupplyHigh	AI	50	R	High Supply Water Temperature 0 = Normal 1 = Fault
9714	ALR_LeadBLR1Fault	AI	51	R	Lead Boiler Fault 0 = Normal 1 = Fault
9722	ALR_BLR1StartFault	AI	52	R	Boiler Start Fault 0 = Normal 1 = Fault
9730	ALR_BLR1Lockout	AI	53	R	Boiler Lockout 0 = Normal 1 = Fault
9738	ALR_BLR1lost	AI	54	R	Communication Lost 0 = Normal 1 = Fault
9891	ALR_BLR1Mod_Source	AI	55	R	Modulation Source Fault 0 = Normal 1 = Fault
9900	ALR_BLR1DMD_Source	AI	56	R	Demand Source Fault 0 = Normal 1 = Fault
10264	BLR1_Cycles	AI	212	R	Count of boiler starts
10280	BLR1_Run_Time	AI	220	R	Units: hours

Boiler 2 Points (see Boiler 1 Points for descriptions)					
9446	BLR2_Supply	AI	57	**R**	
9447	BLR2_Return	AI	58	**R**	
9448	BLR2_Stack	AI	59	**R**	
9449	BLR2_CH_Mod_Rate	AI	60	**R**	
9450	BLR2_Rate_Commanded	AI	61	**R**	
9453	BLR2_CH_Mod_Stat	AI	62	**R**	
9454	BLR2_General_Alarm	AI	63	**R**	
9455	BLR2_Boiler_Pump	AI	64	**R**	
9456	BLR2_System_Pump	AI	65	**R**	
9921	BLR2_Pump_Status	AI	66	**R**	
9458	BLR2_Flame	AI	67	**R**	
9459	BLR2_State	AI	68	**R**	
9460	BLR2_Ann_Lockout	AI	69	**R**	
9461	BLR2_Ann_Hold	AI	70	**R**	
9707	ALR_BLR2SupplyHigh	AI	71	**R**	
9715	ALR_LeadBLR2Fault	AI	72	**R**	
9723	ALR_BLR2StartFault	AI	73	**R**	
9731	ALR_BLR2Lockout	AI	74	**R**	
9739	ALR_BLR2lost	AI	75	**R**	
9893	ALR_BLR2Mod_Source	AI	76	**R**	
9901	ALR_BLR2DMD_Source	AI	77	**R**	
10266	BLR2_Cycles	AI	213	**R**	
10282	BLR2_Run_Time	AI	221	**R**	
Boiler 3 Points (see Boiler 1 Points for descriptions)					
9466	BLR3_Supply	AI	78	**R**	
9467	BLR3_Return	AI	79	**R**	
9468	BLR3_Stack	AI	80	**R**	
9469	BLR3_CH_Mod_Rate	AI	81	**R**	
9470	BLR3_Rate_Commanded	AI	82	**R**	
9473	BLR3_CH_Mod_Stat	AI	83	**R**	
9474	BLR3_General_Alarm	AI	84	**R**	
9475	BLR3_Boiler_Pump	AI	85	**R**	
9476	BLR3_System_Pump	AI	86	**R**	
9922	BLR3_Pump_Status	AI	87	**R**	
9478	BLR3_Flame	AI	88	**R**	
9479	BLR3_State	AI	89	**R**	
9480	BLR3_Ann_Lockout	AI	90	**R**	
9481	BLR3_Ann_Hold	AI	91	**R**	
9708	ALR_BLR3SupplyHigh	AI	92	**R**	

Boiler 3 Points (continued)					
9716	ALR_LeadBLR3Fault	AI	93	**R**	
9724	ALR_BLR3StartFault	AI	94	**R**	
9732	ALR_BLR3Lockout	AI	95	**R**	
9740	ALR_BLR3lost	AI	96	**R**	
9894	ALR_BLR3Mod_Source	AI	97	**R**	
9902	ALR_BLR3DMD_Source	AI	98	**R**	
10268	BLR3_Cycles	AI	214	**R**	
10284	BLR3_Run_Time	AI	222	**R**	
Boiler 4 Points (see Boiler 1 Points for descriptions)					
9486	BLR4_Supply	AI	99	**R**	
9487	BLR4_Return	AI	100	**R**	
9488	BLR4_Stack	AI	101	**R**	
9489	BLR4_CH_Mod_Rate	AI	102	**R**	
9490	BLR4_Rate_Commanded	AI	103	**R**	
9493	BLR4_CH_Mod_Stat	AI	104	**R**	
9494	BLR4_General_Alarm	AI	105	**R**	
9495	BLR4_Boiler_Pump	AI	106	**R**	
9496	BLR4_System_Pump	AI	107	**R**	
9923	BLR4_Pump_Status	AI	108	**R**	
9498	BLR4_Flame	AI	109	**R**	
9499	BLR4_State	AI	110	**R**	
9500	BLR4_Ann_Lockout	AI	111	**R**	
9501	BLR4_Ann_Hold	AI	112	**R**	
9709	ALR_BLR4SupplyHigh	AI	113	**R**	
9717	ALR_LeadBLR4Fault	AI	114	**R**	
9725	ALR_BLR4StartFault	AI	115	**R**	
9733	ALR_BLR4Lockout	AI	116	**R**	
9741	ALR_BLR4lost	AI	117	**R**	
9895	ALR_BLR4Mod_Source	AI	118	**R**	
9903	ALR_BLR4DMD_Source	AI	119	**R**	
10270	BLR4_Cycles	AI	215	**R**	
10286	BLR4_Run_Time	AI	223	**R**	
Boiler 5 Points (see Boiler 1 Points for descriptions)					
9506	BLR5_Supply	AI	120	**R**	
9507	BLR5_Return	AI	121	**R**	
9508	BLR5_Stack	AI	122	**R**	
9509	BLR5_CH_Mod_Rate	AI	123	**R**	
9510	BLR5_Rate_Commanded	AI	124	**R**	
9513	BLR5_CH_Mod_Stat	AI	125	**R**	

Boiler 5 Points (continued)					
9514	BLR5_General_Alarm	AI	126	**R**	
9515	BLR5_Boiler_Pump	AI	127	**R**	
9516	BLR5_System_Pump	AI	128	**R**	
9924	BLR5_Pump_Status	AI	129	**R**	
9518	BLR5_Flame	AI	130	**R**	
9519	BLR5_State	AI	131	**R**	
9520	BLR5_Ann_Lockout	AI	132	**R**	
9521	BLR5_Ann_Hold	AI	133	**R**	
9710	ALR_BLR5SupplyHigh	AI	134	**R**	
9718	ALR_LeadBLR5Fault	AI	135	**R**	
9726	ALR_BLR5StartFault	AI	136	**R**	
9734	ALR_BLR5Lockout	AI	137	**R**	
9742	ALR_BLR5lost	AI	138	**R**	
9896	ALR_BLR5Mod_Source	AI	139	**R**	
9904	ALR_BLR5DMD_Source	AI	140	**R**	
10272	BLR5_Cycles	AI	216	**R**	
10288	BLR5_Run_Time	AI	224	**R**	
Boiler 6 Points (see Boiler 1 Points for descriptions)					
9526	BLR6_Supply	AI	141	**R**	
9527	BLR6_Return	AI	142	**R**	
9528	BLR6_Stack	AI	143	**R**	
9529	BLR6_CH_Mod_Rate	AI	144	**R**	
9530	BLR6_Rate_Commanded	AI	145	**R**	
9533	BLR6_CH_Mod_Stat	AI	146	**R**	
9534	BLR6_General_Alarm	AI	147	**R**	
9535	BLR6_Boiler_Pump	AI	148	**R**	
9536	BLR6_System_Pump	AI	149	**R**	
9925	BLR6_Pump_Status	AI	150	**R**	
9538	BLR6_Flame	AI	151	**R**	
9539	BLR6_State	AI	152	**R**	
9540	BLR6_Ann_Lockout	AI	153	**R**	
9541	BLR6_Ann_Hold	AI	154	**R**	
9711	ALR_BLR6SupplyHigh	AI	155	**R**	
9719	ALR_LeadBLR6Fault	AI	156	**R**	
9727	ALR_BLR6StartFault	AI	157	**R**	
9735	ALR_BLR6Lockout	AI	158	**R**	
9743	ALR_BLR6lost	AI	159	**R**	
9897	ALR_BLR6Mod_Source	AI	160	**R**	
9905	ALR_BLR6DMD_Source	AI	161	**R**	

Boiler 6 Points (continued)					
10274	BLR6_Cycles	AI	217	**R**	
10290	BLR6_Run_Time	AI	225	**R**	
Boiler 7 Points (see Boiler 1 Points for descriptions)					
9546	BLR7_Supply	AI	162	**R**	
9547	BLR7_Return	AI	163	**R**	
9548	BLR7_Stack	AI	164	**R**	
9549	BLR7_CH_Mod_Rate	AI	165	**R**	
9550	BLR7_Rate_Commanded	AI	166	**R**	
9553	BLR7_CH_Mod_Stat	AI	167	**R**	
9554	BLR7_General_Alarm	AI	168	**R**	
9555	BLR7_Boiler_Pump	AI	169	**R**	
9556	BLR7_System_Pump	AI	170	**R**	
9926	BLR7_Pump_Status	AI	171	**R**	
9558	BLR7_Flame	AI	172	**R**	
9559	BLR7_State	AI	173	**R**	
9560	BLR7_Ann_Lockout	AI	174	**R**	
9561	BLR7_Ann_Hold	AI	175	**R**	
9712	ALR_BLR7SupplyHigh	AI	176	**R**	
9720	ALR_LeadBLR7Fault	AI	177	**R**	
9728	ALR_BLR7StartFault	AI	178	**R**	
9736	ALR_BLR7Lockout	AI	179	**R**	
9744	ALR_BLR7lost	AI	180	**R**	
9898	ALR_BLR7Mod_Source	AI	181	**R**	
9906	ALR_BLR7DMD_Source	AI	182	**R**	
10276	BLR7_Cycles	AI	218	**R**	
10292	BLR7_Run_Time	AI	226	**R**	
Boiler 8 Points (see Boiler 1 Points for descriptions)					
9566	BLR8_Supply	AI	183	**R**	
9567	BLR8_Return	AI	184	**R**	
9568	BLR8_Stack	AI	185	**R**	
9569	BLR8_CH_Mod_Rate	AI	186	**R**	
9570	BLR8_Rate_Commanded	AI	187	**R**	
9573	BLR8_CH_Mod_Stat	AI	188	**R**	
9574	BLR8_General_Alarm	AI	189	**R**	
9575	BLR8_Boiler_Pump	AI	190	**R**	
9576	BLR8_System_Pump	AI	191	**R**	
9927	BLR8_Pump_Status	AI	192	**R**	
9578	BLR8_Flame	AI	193	**R**	
9579	BLR8_State	AI	194	**R**	

Boiler 8 Points (continued)					
9580	BLR8_Ann_Lockout	AI	195	**R**	
9581	BLR8_Ann_Hold	AI	196	**R**	
9713	ALR_BLR8SupplyHigh	AI	197	**R**	
9721	ALR_LeadBLR8Fault	AI	198	**R**	
9729	ALR_BLR8StartFault	AI	199	**R**	
9737	ALR_BLR8Lockout	AI	200	**R**	
9745	ALR_BLR8lost	AI	201	**R**	
9899	ALR_BLR8Mod_Source	AI	202	**R**	
9907	ALR_BLR8DMD_Source	AI	203	**R**	
10278	BLR8_Cycles	AI	219	**R**	
10294	BLR8_Run_Time	AI	227	**R**	

12.12 SIEMENS LMV2_3 MODBUS RTU MAPPINGS TO BACNET, AND METASYS N2

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address
Com Status	BV	1	DO	1
Burner control phase	AI	1	AI	1
Pos of current fuel actuator	AI	2	AI	2
Pos of air actuator	AI	3	AI	3
Manipulated variable VSD	AI	4	AI	4
Current type of fuel	AI	5	AI	5
Current output	AI	6	AI	6
Flame signal	AI	7	AI	7
Current fuel throughput	AI	8	AI	8
Startup counter total	AI	9	AI	9
Current error: Error code	AI	10	AI	10
Current error: Diagnostic code	AI	11	AI	11
Current error: Error class	AI	12	AI	12
Current error: Error phase	AI	13	AI	13
Program stop	AV	14	AO	14
Modbus mode	AV	15	AO	15
Modbus breakdown time	AV	16	AO	16
Operating mode in remote op	AV	17	AO	17
Preselect target output mod/multistg	AV	18	AO	18
Hours run fuel 0 resettable	AV	19	AO	19
Hours run fuel 1 resettable	AV	20	AO	20
Hours run unit live	AI	21	AI	21
Start counter fuel 0 resettable	AV	22	AO	22
Start counter fuel 1 resettable	AV	23	AO	23
Start counter total	AI	24	AI	24
Fuel volume fuel 0 resettable	AV	25	AO	25
Fuel volume fuel 1 resettable	AV	26	AO	26
Number of faults	AI	27	AI	27
Preselected output Fuel 0	AV	28	AO	28
Preselected output Fuel 1	AV	29	AO	29
Burner control parameter set code	AI	30	AI	30
Burner control parameter set version	AI	31	AI	31
Burner control identification number	AI	32	AI	32
SW version burner control	AI	33	AI	33
Min output fuel 0	AI	34	AI	34
Max output fuel 0	AI	35	AI	35
Min output fuel 1	AI	36	AI	36
Max output fuel 1	AI	37	AI	37
Operation mode of burner fuel 0	AI	38	AI	38

Operation mode of burner fuel 1	AI	39	AI	39
Error History Current Error	AI	40	AI	40
Error History Diagnostic Code	AI	41	AI	41
Error History Error Class	AI	42	AI	42
Error History Error Phase	AI	43	AI	43
Error History Type of Fuel	AI	44	AI	44
Error History Output	AI	45	AI	45
Error History Start counter total	AI	46	AI	46
Inputs Word	AI	47	AI	47
Controller On/Off	BI	1	DI	1
Inputs Word 1	BI	2	DI	2
Inputs Word 2	BI	3	DI	3
Inputs Word 3	BI	4	DI	4
Inputs Word 4	BI	5	DI	5
Inputs Word 5	BI	6	DI	6
Inputs Word 6	BI	7	DI	7
Pressure Switch Valve Proving	BI	8	DI	8
Safety Loop	BI	9	DI	9
Inputs Word 9	BI	10	DI	10
Pressure Switch Min	BI	11	DI	11
Pressure Switch Max	BI	12	DI	12
Inputs Word 12	BI	13	DI	13
Air Pressure Switch	BI	14	DI	14
Inputs Word 14	BI	15	DI	15
Inputs Word 15	BI	16	DI	16
Outputs Word	AI	60	AI	60
Alarm	BI	17	DI	17
Outputs Word 1	BI	18	DI	18
Outputs Word 2	BI	19	DI	19
Outputs Word 3	BI	20	DI	20
Ignition	BI	21	DI	21
Outputs Word 5	BI	22	DI	22
Fan	BI	23	DI	23
Outputs Word 7	BI	24	DI	24
Outputs Word 8	BI	25	DI	25
Outputs Word 9	BI	26	DI	26
Outputs Word 10	BI	27	DI	27
Outputs Word 11	BI	28	DI	28
Outputs Word 12	BI	29	DI	29
Fuel Valve 1	BI	30	DI	30
Fuel Valve 2	BI	31	DI	31
Fuel Valve 3/PV	BI	32	DI	32

12.13 YB110 MODBUS RTU MAPPINGS TO BACNET, AND METASYS N2

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address
Com Status	BV	1	DO	1
Safety_Relay	BI	1	DI	1
Main_Valve_In	BI	2	DI	2
Delayed_Valve_In	BI	3	DI	3
Pilot_Valve_In	BI	4	DI	4
Ignition_In	BI	5	DI	5
Blower_In	BI	6	DI	6
Op_Cntrl	BI	7	DI	7
Run_Intlck	BI	8	DI	8
Purge_Damper	BI	9	DI	9
Term_23	BI	10	DI	10
Remote_Reset	BI	11	DI	11
Start_Input	BI	12	DI	12
FVES_POC	BI	13	DI	13
Pilot_Hold	BI	14	DI	14
Low_Fire_Start	BI	15	DI	15
Ref_AC_Line	BI	16	DI	16
Ignition_Out	BI	17	DI	17
Pilot_Valve_Out	BI	18	DI	18
Blower_Out	BI	19	DI	19
Main_Valve_Out	BI	20	DI	20
Delayed_Valve_Out	BI	21	DI	21
Internal_Safety_Out	BI	22	DI	22
Low_Fire_Out	BI	23	DI	23
High_Fire_Out	BI	24	DI	24
Auto_Out	BI	25	DI	25
Alarm_Out	BI	26	DI	26
Status	AI	1	AI	1
Msgn	AI	2	AI	2
Gstat	AI	3	AI	3
Timer	AI	4	AI	4
Flame	AI	5	AI	5
Logstat	AI	6	AI	6
Sysmins	AI	7	AI	7
Bnrmins	AI	8	AI	8
Cycles	AI	9	AI	9
Lockout_Count	AI	10	AI	10
Lockout1_Msg	AI	11	AI	11
Lockout1_Module	AI	12	AI	12

Lockout1_BnrHrs	AI	13	AI	13
Lockout1_BnrCycs	AI	14	AI	14
Lockout2_Msg	AI	15	AI	15
Lockout2_Module	AI	16	AI	16
Lockout2_BnrHrs	AI	17	AI	17
Lockout2_BnrCycs	AI	18	AI	18
Lockout3_Msg	AI	19	AI	19
Lockout3_Module	AI	20	AI	20
Lockout3_BnrHrs	AI	21	AI	21
Lockout3_BnrCycs	AI	22	AI	22
Lockout4_Msg	AI	23	AI	23
Lockout4_Module	AI	24	AI	24
Lockout4_BnrHrs	AI	25	AI	25
Lockout4_BnrCycs	AI	26	AI	26
Lockout5_Msg	AI	27	AI	27
Lockout5_Module	AI	28	AI	28
Lockout5_BnrHrs	AI	29	AI	29
Lockout5_BnrCycs	AI	30	AI	30
Lockout6_Msg	AI	31	AI	31
Lockout6_Module	AI	32	AI	32
Lockout6_BnrHrs	AI	33	AI	33
Lockout6_BnrCycs	AI	34	AI	34
Lockout7_Msg	AI	35	AI	35
Lockout7_Module	AI	36	AI	36
Lockout7_BnrHrs	AI	37	AI	37
Lockout7_BnrCycs	AI	38	AI	38
Lockout8_Msg	AI	39	AI	39
Lockout8_Module	AI	40	AI	40
Lockout8_BnrHrs	AI	41	AI	41
Lockout8_BnrCycs	AI	42	AI	42
Lockout9_Msg	AI	43	AI	43
Lockout9_Module	AI	44	AI	44
Lockout9_BnrHrs	AI	45	AI	45
Lockout9_BnrCycs	AI	46	AI	46
Lockout10_Msg	AI	47	AI	47
Lockout10_Module	AI	48	AI	48
Lockout10_BnrHrs	AI	49	AI	49
Lockout10_BnrCycs	AI	50	AI	50
Op_Control	BI	27	DI	27
Aux_1	BI	28	DI	28
Aux_2	BI	29	DI	29
Aux_3	BI	30	DI	30
High_water	BI	31	DI	31
Low_Water	BI	32	DI	32

High_Oil_Temp	BI	33	DI	33
Low_Oil_Temp	BI	34	DI	34
Low_Oil_Press	BI	35	DI	35
Low_Atom_Media	BI	36	DI	36
Low_Gas_Press	BI	37	DI	37
High_Gas_Press	BI	38	DI	38
Aux_Gas	BI	39	DI	39
High_Press	BI	40	DI	40
High_Temp	BI	41	DI	41
Aux_4	BI	42	DI	42
Aux_5	BI	43	DI	43
Aux_6	BI	44	DI	44
Aux_7	BI	45	DI	45
Air_Flow	BI	46	DI	46

13   Specifications

ProtoAir FPA-W44	
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	CE and FCC Part 15 C, UL 60950-1 and CAN/CSA C22.2, DNP 3.0 and Modbus conformance tested, WEEE compliant, RoHS3 compliant, REACH compliant, UKCA compliant
Physical Dimensions	4 x 1.1 x 2.7 in (10.16 x 2.8 x 6.8 cm)
Weight	0.4 lbs (0.2 Kg)
Operating Temperature	-20°C to 70°C (-4°F to158°F)
Humidity	10-95% RH non-condensing
Wi-Fi 802.11 b/g/n	*Frequency:* 2.4 GHz *Channels:* 1 to 11 (inclusive) *Antenna Type:* SMA *Encryption:* TKIP, WPA & AES

NOTE: Specifications subject to change without notice.

13.1   Compliance with UL Regulations

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

- 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.

14   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.