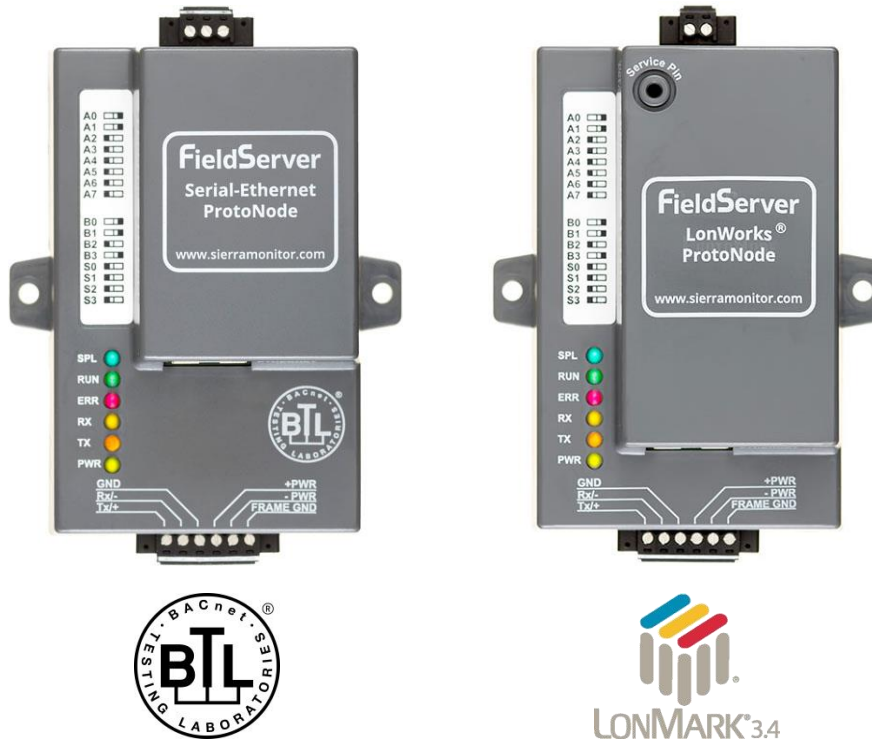




# BOSCH



## ProtoNode FPC-N38 and ProtoNode FPC-N39 Start-up Guide

For Interfacing Bosch Products: Bosch Buderus SSB800,  
SSB1000, SSB1000TL

To Building Automation Systems:  
BACnet MS/TP, BACnet/IP, Modbus TCP/IP, Metasys N2  
and LonWorks

### APPLICABILITY & EFFECTIVITY

Explains ProtoNode hardware and installation.

The instructions are effective for the above as of March 2018.

## Technical Support

Thank you for purchasing the ProtoNode for your Bosch Buderus SSB Boiler.

Please call Bosch for technical support of the ProtoNode product.

SMC does not provide direct support. If Bosch needs to escalate the concern, they will contact Sierra Monitor Corporation for assistance.

Support Contact Information:

Bosch Thermotechnology Corp.  
50 Wentworth Ave.  
Londonderry, NH 03053 USA

Customer Service:

1-866-642-3198 or 1-603-552-1100

Contact via website: [www.bosch-climate.us/support-center/technical-support/technical-support-form](http://www.bosch-climate.us/support-center/technical-support/technical-support-form)

Website: [www.bosch-climate.us](http://www.bosch-climate.us)

## Quick Start Guide

1. Record the information about the unit. (**Section 3.1**)
2. Set the device's COM settings and Station Address for each of the devices that are to connect to the ProtoNode. (**Section 3.3**)
3. FPC-N38: Select the protocol configuration on the S Bank DIP Switches. (**Section 3.4.1**)
4. BACnet MS/TP (FPC-N38): Set the MAC Address on the A Bank DIP Switches. (**Section 3.5.1**)
5. BACnet MS/TP (FPC-N38): Set the baud rate of the BACnet MS/TP field protocol on the B Bank DIP Switches. (**Section 3.5.3**)
6. Connect the ProtoNode 6 pin RS-485 connector to the RS-232 network that is connected to each of the devices. (**Section 4.2**)
7. **Connect the ProtoNode FPC-N38** 3 pin RS-485 port to the field protocol cabling, (**Section 4.3**)  
**or connect the ProtoNode FPC-N39** 2 pin LonWorks port to the field protocol cabling. (**Section 4.4**)
8. Connect power to the ProtoNode 6 pin connector. (**Section 4.5**)
9. Use a web browser to access the ProtoNode Web Configurator page to select the profiles of the devices attached to the ProtoNode and input the Node-ID from each device. Once the devices are selected, the ProtoNode automatically builds and loads the appropriate configuration. (**Section 5.3**)
10. Ethernet network (FPC-N38): Use a web browser to access the ProtoNode Web Configurator page to change the IP Address. No changes to the configuration file are necessary. (**Section 5.4**)
11. LonWorks (FPC-N39): The ProtoNode must be commissioned on the LonWorks Network. This needs to be done by the LonWorks administrator using a LonWorks Commissioning tool. (**Section 8**)

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# 1 CERTIFICATION

## 1.1 BTL Mark – BACnet<sup>®1</sup> Testing Laboratory



BTLMark is a registered trademark of ASHRAE. ASHRAE does not endorse, approve or test products for compliance with ASHRAE standards. Compliance of listed products to requirements of ASHRAE Standard 133 is the responsibility of the BACnet International. BTL is a registered trademark of the BACnet International.

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

Go to [www.BACnetInternational.net](http://www.BACnetInternational.net) for more information about the BACnet Testing Laboratory. Click [here](#) for the BACnet PIC Statement.

## 1.2 LonMark Certification



LonMark International is the recognized authority for certification, education, and promotion of interoperability standards for the benefit of manufacturers, integrators and end users. LonMark International has developed extensive product certification standards and tests to provide the integrator and user with confidence that products from multiple manufacturers utilizing LonMark devices work together. Sierra Monitor has more LonMark Certified gateways than any other gateway manufacturer, including the ProtoCessor, ProtoCarrier and ProtoNode for OEM applications and the full featured, configurable gateways.

<sup>1</sup> BACnet is a registered trademark of ASHRAE

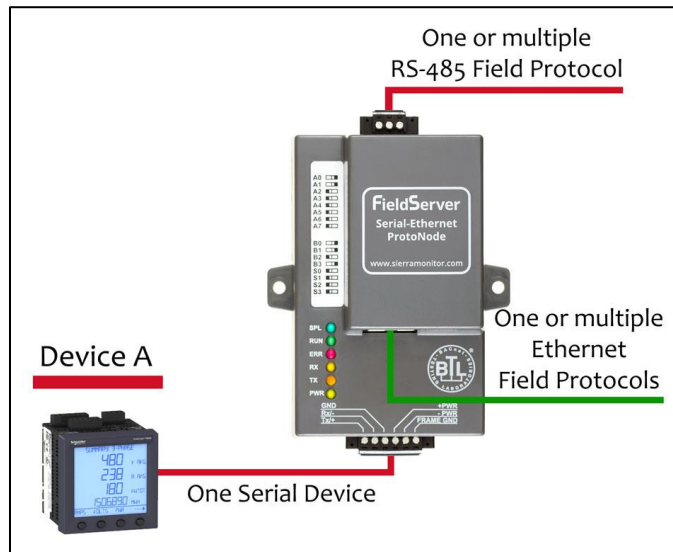
## 2 INTRODUCTION

### 2.1 ProtoNode Gateway

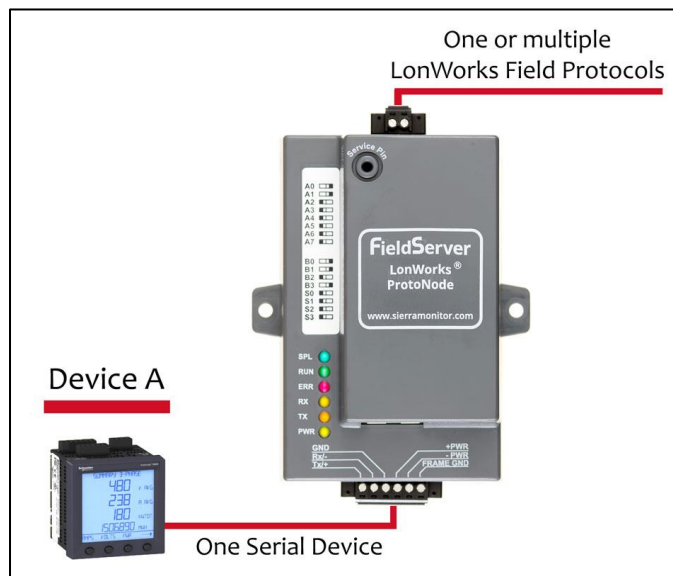
The ProtoNode is an external, high performance **building automation multi-protocol gateway** that is preconfigured to automatically communicate between any of Bosch’s products (hereafter called “device”) connected to the ProtoNode and automatically configures them for BACnet MS/TP, BACnet/IP, Metasys<sup>2</sup> N2 by JCI, Modbus TCP/IP or LonWorks<sup>3</sup>.

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

#### FPC-N38 Connectivity Diagram:



#### FPC-N39 Connectivity Diagram:



<sup>2</sup> Metasys is a registered trademark of Johnson Controls Inc.  
<sup>3</sup> LonWorks is a registered trademark of Echelon Corporation

### 3 PROTONODE SETUP

#### 3.1 Record Identification Data

Each ProtoNode has a unique part number located on the side or the back of the unit. This number should be recorded, as it may be required for technical support. The numbers are as follows:

Model	Part Number
ProtoNode N38	FPC-N38-1689
ProtoNode N39	FPC-N39-1690

**Figure 1: ProtoNode Part Numbers**

- FPC-N38 units have the following 3 ports: RS-485 + Ethernet + RS-232
- FPC-N39 units have the following 3 ports: LonWorks + Ethernet + RS-232

#### 3.2 Point Count Capacity and Registers per Device

The total number of registers presented by all the devices attached to the ProtoNode cannot exceed:

Part number	Total Registers
FPC-N38-1689	1,500
FPC-N39-1690	1,500

**Figure 2: Supported Point Count Capacity**

Devices	Registers Per Device
D_Platform 1 managing boiler (D_Plat_1_Blr)	63
D_Platform 1 managing & 1 dependent boiler (D_Plat_2_Blr)	91
D_Platform 1 managing & 2 dependent boilers (D_Plat_3_Blr)	119
D_Platform 1 managing & 3 dependent boilers (D_Plat_4_Blr)	147

**Figure 3: Registers per Device**

### 3.3 Configuring Device Communications

#### 3.3.1 Input COM Settings on the Device Connected to the ProtoNode

- **The connected serial device MUST have the same Baud Rate, Data Bits, Stop Bits, and Parity settings as the ProtoNode.**
- **Figure 4** specifies the device serial port settings required to communicate with the ProtoNode.

Port Setting	Device
Protocol	Modbus RTU
Baud Rate	9600
Parity	None
Data Bits	8
Stop Bits	2
<b>Figure 4: Modbus COM Settings</b>	

#### 3.3.2 Set Station Address for the Device Attached to the ProtoNode

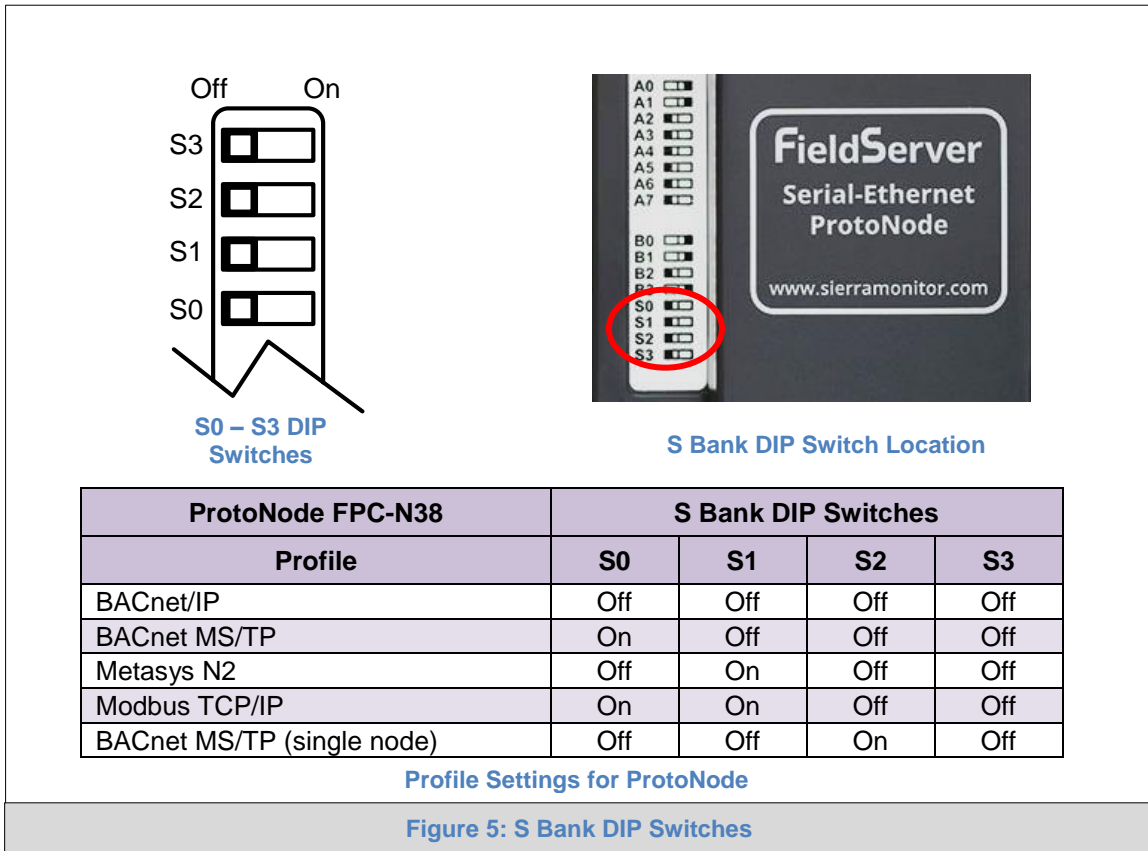
- Set Station Address for the device attached to ProtoNode to 1.

**NOTE: The Metasys N2 and Modbus TCP/IP field protocol Station Addresses are automatically set to be the same value as the Station Address of the device.**

### 3.4 Selecting the Desired Protocol Configuration

#### 3.4.1 Selecting Desired Field Protocol

- ProtoNode FPC-N38 units use the “S” bank of DIP switches (S0 – S3) to select the protocol configuration.
  - See the table in **Figure 5** for the switch settings for the ProtoNode.
  - The OFF position is when the DIP switches are set closest to the outside of the box.
- ProtoNode FPC-N39 units do not use the “S” bank DIP switches (S0 – S3) to select a protocol.
  - On ProtoNode FPC-N39 units, these switches are disabled; the field protocol is always LonWorks.



**NOTE:** When setting DIP switches, ensure that power to the board is OFF.

### 3.5 BMS Network Settings: MAC Address, Device Instance and Baud Rate

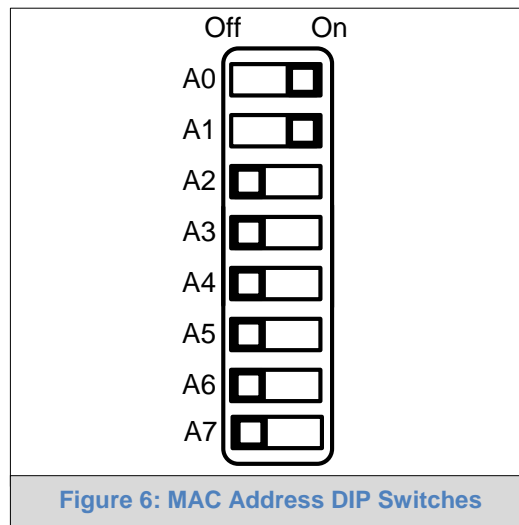
#### 3.5.1 BACnet MS/TP (FPC-N38): Setting the MAC Address for BMS Network

- Set the BACnet MS/TP MAC Address of the ProtoNode to a value between 1 to 127 (MAC Master Addresses); this is so that the BMS front end can find the ProtoNode via BACnet Auto-Discovery.

**NOTE: Never set a BACnet MS/TP MAC Address from 128 to 255.** Addresses from 128 to 255 are Slave Addresses and can not be discovered by BMS front ends that support Auto-Discovery of BACnet MS/TP devices.

- Set “A” bank DIP switches A0 – A7 to assign a MAC Address to the ProtoNode for BACnet MS/TP.
- Refer to [Appendix C.1](#) for the complete range of MAC Addresses and DIP switch settings.

**NOTE: When using Metasys N2 and Modbus TCP/IP, the A Bank of DIP switches are disabled and not used. They should be set to OFF.**



**NOTE:** When setting DIP Switches, ensure that power to the board is OFF.

### 3.5.2 BACnet (FPC-N38): Calculating the Default Device Instance

- The Device Instance value is automatically generated using the following formula:  
 **$BACnet\ Device\ Instance = (Device\ Station\ Address) + (Default\ Node\ Offset)$**

**NOTE: The default Node Offset is 50,000.**

For example, if Device A has a Station Address of 1 and Device B has a Station Address of 2, then:

BACnet Device Instance A = (1) + (50000) = 50001

BACnet Device Instance B = (2) + (50000) = 50002

**NOTE: The Station Address is set in Section 3.3.2.**

- To reach a specific BACnet Device Instance result, refer to **Section 6**.

### 3.5.3 BACnet MS/TP (FPC-N38): Setting the Baud Rate for BMS Network

- DIP switches B0 – B3 can be used to set the field baud rate of the ProtoNode to match the baud rate required by the BMS for BACnet MS/TP.
- The ProtoNode baud rate for Metasys N2 is set for 9600. “B” bank DIP switches B0 – B3 are disabled for Metasys N2 on the ProtoNode FPC-N38.
- DIP switches B0 – B3 are disabled on ProtoNode FPC-N39 (LonWorks).

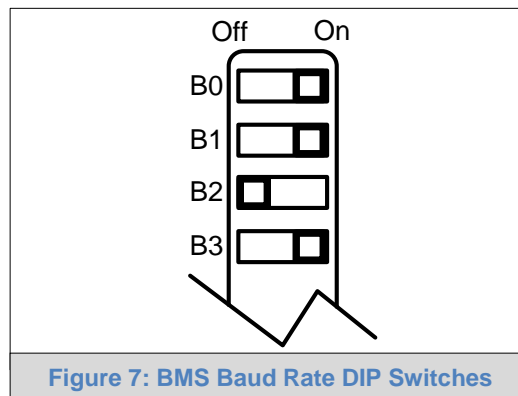


Figure 7: BMS Baud Rate DIP Switches

**NOTE:** When setting DIP switches, ensure that power to the board is OFF.

#### 3.5.3.1 Baud Rate DIP Switch Selection

Baud	B0	B1	B2	B3
9600	On	On	On	Off
19200	Off	Off	Off	On
<b>38400*</b>	<b>On</b>	<b>On</b>	<b>Off</b>	<b>On</b>
57600	Off	Off	On	On
76800	On	Off	On	On

Figure 8: BMS Baud Rate

\* Factory default setting = 38400

4 INTERFACING PROTONODE TO DEVICES

4.1 ProtoNode FPC-N38 and FPC-N39 Showing Connection Ports

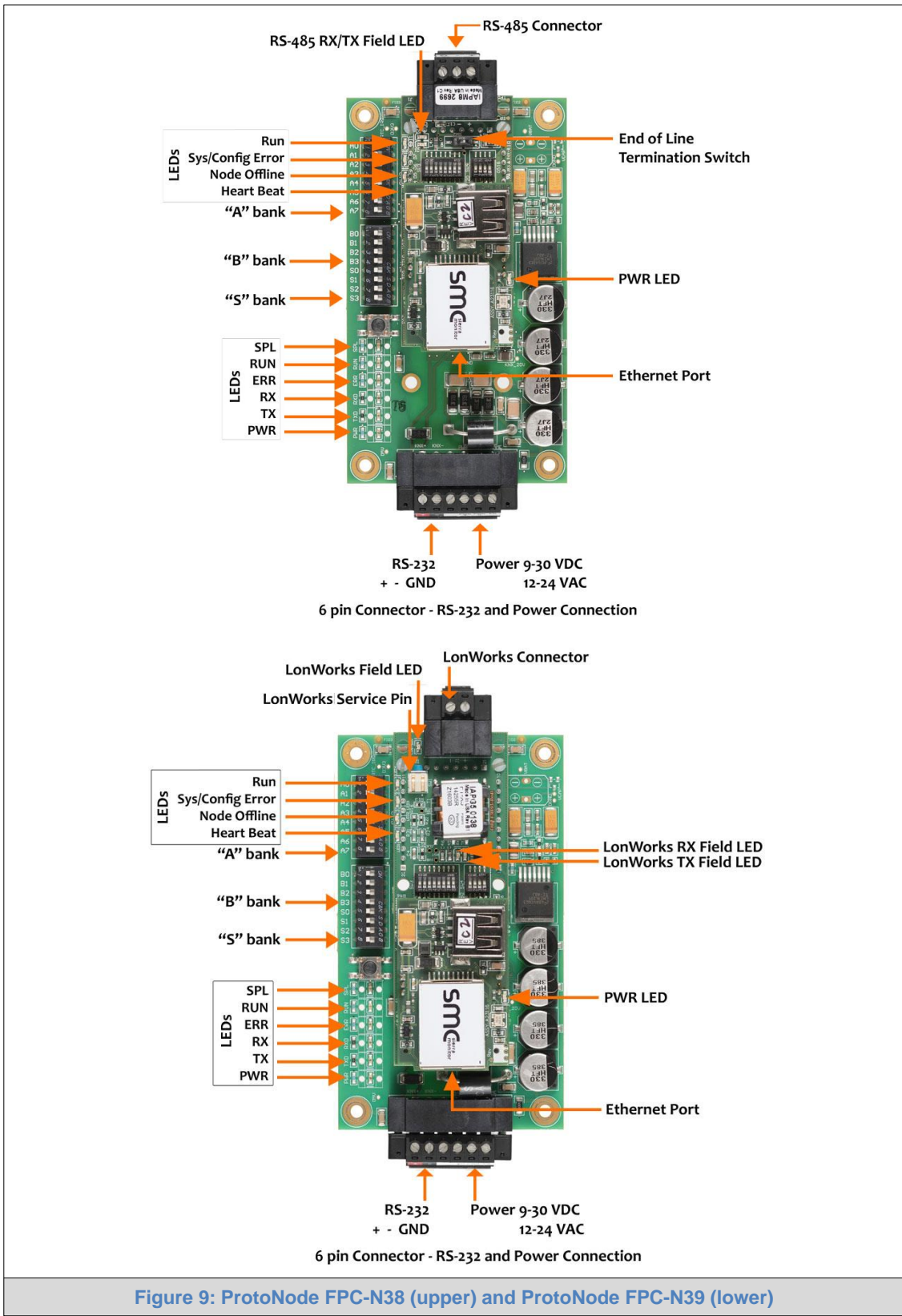


Figure 9: ProtoNode FPC-N38 (upper) and ProtoNode FPC-N39 (lower)

## 4.2 Device Connections to ProtoNode

### ProtoNode 6 Pin Phoenix connector:

- The 6 pin Phoenix connector is the same for ProtoNode FPC-N38 (BACnet) and FPC-N39 (LonWorks).
- Pins 1 through 3 are for RS-232 devices. **GND must be connected.**
  - Use standard grounding principles for GND
- Pins 4 through 6 are for power. **Do not connect power until Section 4.5.**

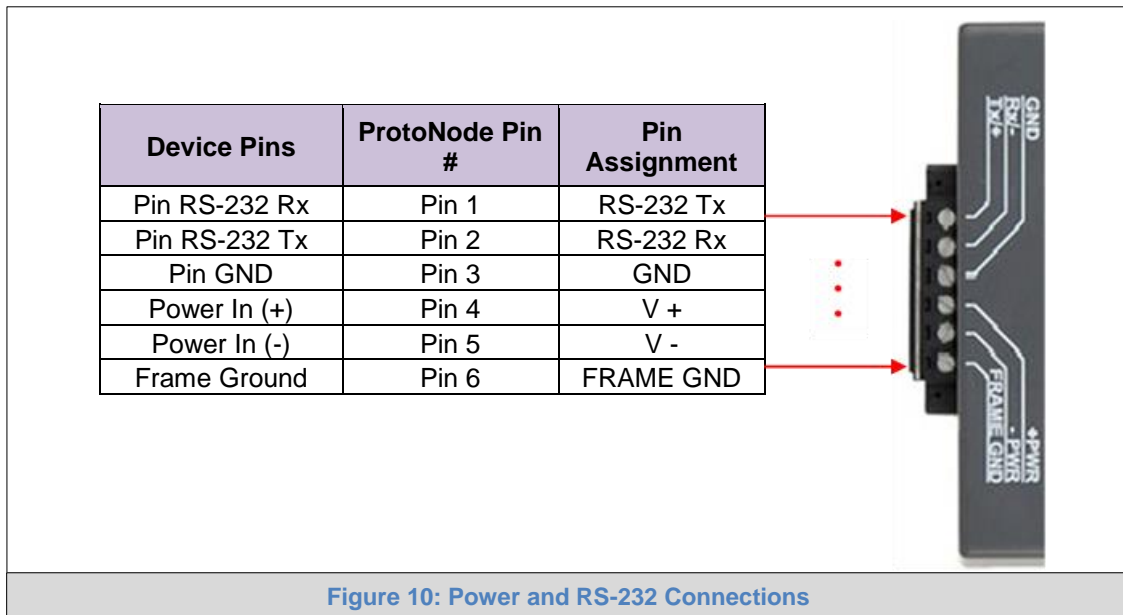
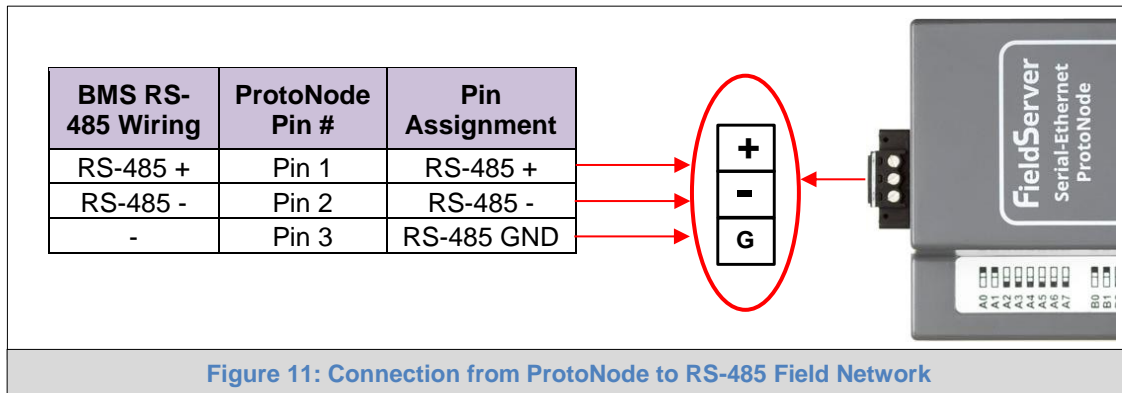


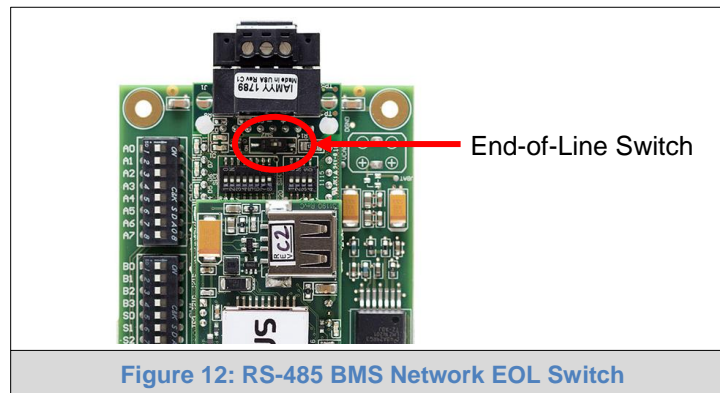
Figure 10: Power and RS-232 Connections

### 4.3 Serial Network (FPC-N38): Wiring Field Port to RS-485 Network

- Connect the RS-485 network wires to the 3-pin RS-485 connector on ProtoNode FPC-N38 as shown in **Figure 11**.
  - Use standard grounding principles for RS-485 GND
- See **Section 5.4** for information on connecting to BACnet/IP network.



- If the ProtoNode is the last device on the trunk, then the End-Of-Line Termination Switch needs to be enabled. (**Figure 12**)
  - The default setting from the factory is OFF (switch position = right side)
  - To enable the EOL Termination, turn the EOL switch ON (switch position = left side)



### 4.4 LonWorks (FPC-N39): Wiring LonWorks Devices to the LonWorks Terminal

- Wire the LonWorks device network to the ProtoNode LonWorks Terminal.
  - Use approved cable per the FT-10 installation guidelines
- LonWorks has no polarity.



## 4.5 Power-Up ProtoNode

Check power requirements in the table below:

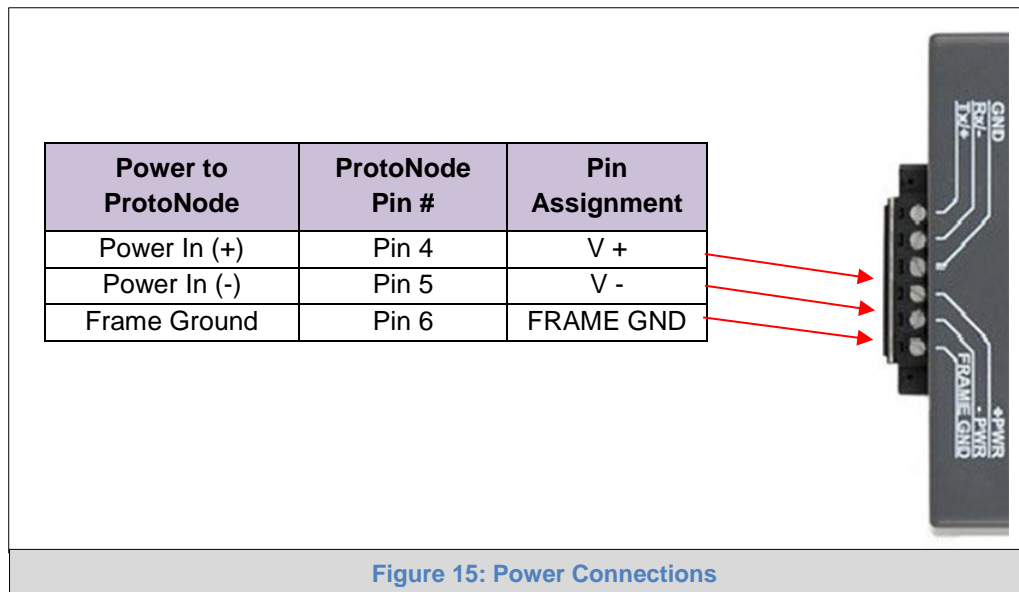
Power Requirement for ProtoNode External Gateway			
ProtoNode Family	Current Draw Type		
	12V DC/AC	24V DC/AC	30V DC
FPC – N38 (Typical)	170mA	100mA	80mA
FPC – N38 (Maximum)	240mA	140mA	100mA
FPC – N39 (Typical)	210mA	130mA	90mA
FPC – N39 (Maximum)	250mA	170mA	110mA

**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.

**Figure 14: Required Current Draw for the ProtoNode**

Apply power to the ProtoNode as shown below in **Figure 15**. Ensure that the power supply used complies with the specifications provided in **Appendix D.1**.





- ProtoNode accepts either 9-30V DC or 12-24V AC on pins 4 and 5.
- **Frame GND should be connected.**



## 5 USE THE PROTONODE WEB CONFIGURATOR TO SETUP THE GATEWAY

### 5.1 Connect the PC to ProtoNode via the Ethernet Port

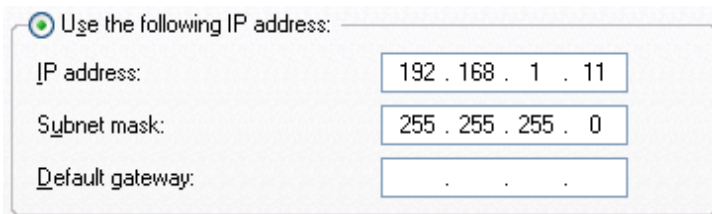
- Connect a CAT5 Ethernet cable (Straight through or Cross-Over) between the local PC and ProtoNode.
- The Default IP Address of ProtoNode is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and ProtoNode are on different IP Networks, assign a static IP Address to the PC on the 192.168.1.xxx network.
- For Windows 10:

Right click on  >  Control Panel >  Network and Internet  
>  Network and Sharing Center > [Change adapter settings](#)

Right-click on Local Area Connection > Properties

Highlight   Internet Protocol Version 4 (TCP/IPv4) > 

- Use the following IP Address:



Use the following IP address:

IP address:	192 . 168 . 1 . 11
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	. . .

- Click  twice.

## 5.2 Connecting to the ProtoNode Web Configurator

After setting a local PC on the same subnet as the ProtoNode (**Section 5.1**), open a web browser on the PC and enter the IP Address of the ProtoNode; the default address is 192.168.1.24.

**NOTE: If the IP Address of the ProtoNode was changed, the assigned IP Address can be discovered using the FS Toolbox utility. See Appendix A.1 for instructions.**

## 5.3 Selecting Profiles for Devices Connected to ProtoNode

**NOTE: If Modbus TCP/IP was selected in Section 3.4 for the Field/BMS protocol, skip this section. Device profiles are NOT used for Modbus TCP/IP.**

- In the Web Configurator, the Active Profiles are shown below the Configuration Parameters.

The screenshot shows the SMC web configurator interface. At the top left is the SMC Sierra Monitor logo. Below it is a section titled "Configuration Parameters" which contains a table of settings. Each row in the table includes a parameter name, a description, a value input field, and a "Submit" button. The parameters are: network\_nr (BACnet Network Number, value 50001), rte\_net\_num (BACnet Router Network Number, value 50002), int\_net\_num (BACnet Internal Network Number, value 50003), node\_offset (BACnet Node Offset, value 50000), bac\_ip\_port (BACnet IP Port, value 47808), bac\_cov\_option (BACnet COV, value COV\_Disable), bac\_bbmd\_option (BACnet BBMD, value -), and bac\_virt\_nodes (BACnet Virtual Server Nodes, value No). Below the configuration parameters is a section titled "Active profiles" which contains a table with columns for "Nr", "Node ID", "Current profile", and "Parameters". There is an "Add" button below this table. At the bottom of the interface are several navigation buttons: "HELP (?)", "Network Settings", "Clear Profiles and Restart", "System Restart", and "Diagnostics & Debugging".

Parameter Name	Parameter Description	Value
network_nr	<b>BACnet Network Number</b> This sets the BACnet network number of the Gateway. (1 - 65535)	50001
rte_net_num	<b>BACnet Router Network Number</b> This sets the BACnet router network number. Needs to be unique across the BACnet network. (1 - 65534)	50002
int_net_num	<b>BACnet Internal Network Number</b> This is used for internal BACnet traffic. Needs to be unique across the BACnet network. (1 - 65534)	50003
node_offset	<b>BACnet Node Offset</b> This is used to set the BACnet device instance. The device instance will be sum of the Modbus device address and the node offset. (0 - 4194303)	50000
bac_ip_port	<b>BACnet IP Port</b> This sets the BACnet IP port of the Gateway. The default is 47808. (1 - 65535)	47808
bac_cov_option	<b>BACnet COV</b> This enables or disables COVs for the BACnet connection. Use COV_Enable to enable. Use COV_Disable to disable. (COV_Enable/COV_Disable)	COV_Disable
bac_bbmd_option	<b>BACnet BBMD</b> This enables BBMD on the BACnet IP connection. Use BBMD to enable. Use - to disable. The bdt.ini files also needs to be downloaded. (BBMD/-)	-
bac_virt_nodes	<b>BACnet Virtual Server Nodes</b> Set to NO if the unit is only converting 1 device to BACnet. Set to YES if the unit is converting multiple devices. (No/Yes)	No

Nr	Node ID	Current profile	Parameters
Add			

Navigation buttons: HELP (?), Network Settings, Clear Profiles and Restart, System Restart, Diagnostics & Debugging

Figure 16: Web Configurator Showing no Active Profiles

- The Active profiles section lists the currently active device profiles, including previous Web Configurator additions. This list is empty for new installations, or after clearing all configurations. (Figure 16)
- To add an active profile to support a device, click the Add button under the Active Profiles heading. This will present a drop-down box underneath the Current profile column that lists all the available profiles. (Figure 17)
- For every device that is added, assign a unique Node-ID. This specification must match the device’s network settings.

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

- 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 3.3.2.



Figure 17: Web Configurator Showing Available Profiles for Selection

- Then press the “Submit” button to add the Profile to the list of devices to be configured.
- Repeat this process until all the devices have been added.
- Completed additions are listed under “Active Profiles” as shown in Figure 18.



Figure 18: Web Configurator Showing Active Profile Additions

## 5.4 Ethernet Network: Setting IP Address for the Field Network

- After setting a local PC on the same subnet as the ProtoNode (**Section 5.1**), open a web browser on the PC and enter the IP Address of the ProtoNode; the default address is 192.168.1.24.
- The Web Configurator is displayed as the landing page. (**Figure 19**)
- To access the FS-GUI, click on the “Diagnostics & Debugging” button in the bottom right side of the page.

The screenshot shows the 'Configuration Parameters' section of the web configurator. It contains a table with columns for Parameter Name, Parameter Description, and Value. Each row includes a text input field and a 'Submit' button.

Parameter Name	Parameter Description	Value
network_nr	<b>BACnet Network Number</b> This sets the BACnet network number of the Gateway. (1 - 65535)	50001
rte_net_num	<b>BACnet Router Network Number</b> This sets the BACnet router network number. Needs to be unique across the BACnet network. (1 - 65534)	50002
int_net_num	<b>BACnet Internal Network Number</b> This is used for internal BACnet traffic. Needs to be unique across the BACnet network. (1 - 65534)	50003
node_offset	<b>BACnet Node Offset</b> This is used to set the BACnet device instance. The device instance will be sum of the Modbus device address and the node offset. (0 - 4194303)	50000
bac_ip_port	<b>BACnet IP Port</b> This sets the BACnet IP port of the Gateway. The default is 47808. (1 - 65535)	47808
bac_cov_option	<b>BACnet COV</b> This enables or disables COVs for the BACnet connection. Use COV_Enable to enable. Use COV_Disable to disable. (COV_Enable/COV_Disable)	COV_Disable
bac_bbmd_option	<b>BACnet BBMD</b> This enables BBMD on the BACnet IP connection. Use BBMD to enable. Use - to disable. The bdt.ini files also needs to be downloaded. (BBMD/-)	-
bac_virt_nodes	<b>BACnet Virtual Server Nodes</b> Set to NO if the unit is only converting 1 device to BACnet. Set to YES if the unit is converting multiple devices. (No/Yes)	No

Below the configuration parameters is an 'Active profiles' section with a table:

Nr	Node ID	Current profile	Parameters
Add			

At the bottom of the screen are several navigation buttons: HELP (?), Network Settings, Clear Profiles and Restart, System Restart, and Diagnostics & Debugging.

Figure 19: Web Configurator Screen

- From the FS-GUI landing page, click on “Setup” to expand the navigation tree. Then select “Network Settings” to access the IP Settings menu. (Figure 20)

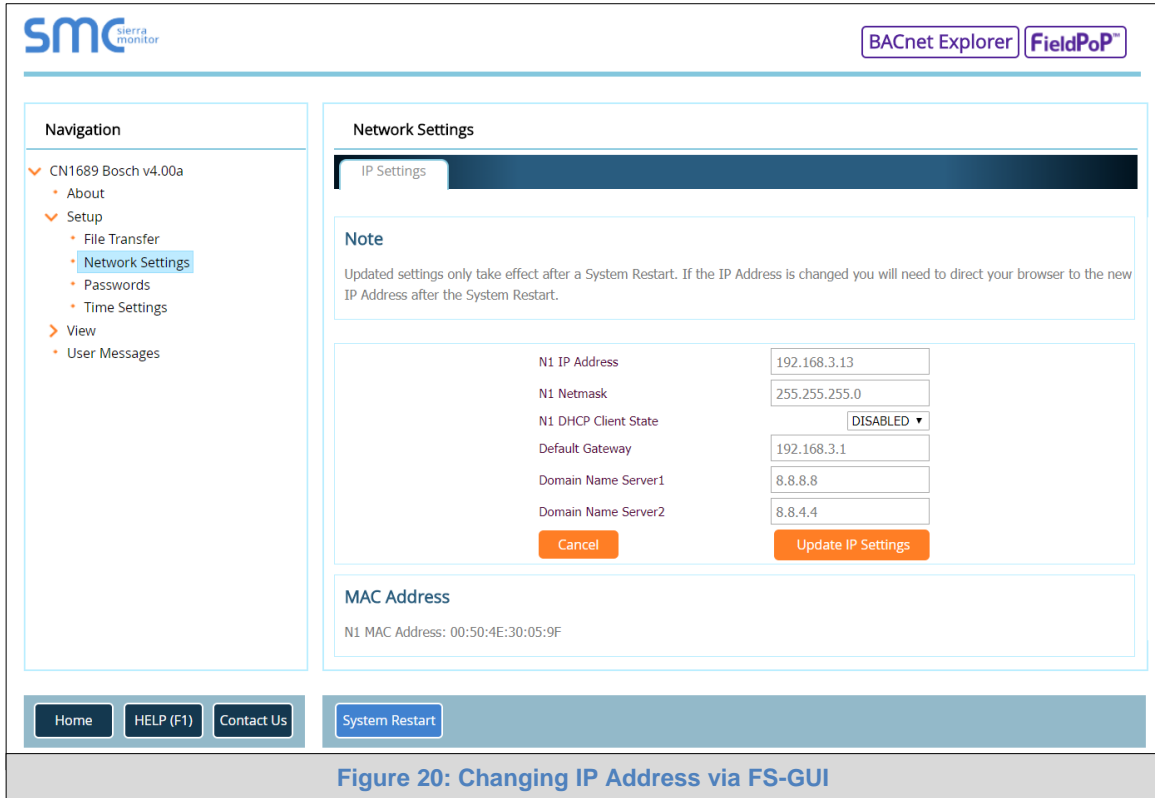


Figure 20: Changing IP Address via FS-GUI

- Modify the IP Address (N1 IP Address field) of the ProtoNode Ethernet port.
- If necessary, change the Netmask (N1 Netmask field).
- If necessary, change the IP Gateway (Default Gateway field).

**NOTE:** If the ProtoNode is connected to a managed switch/router, the IP Gateway of the ProtoNode should be set to the IP Address of that managed switch/router.

- Click the “System Restart” button at the bottom of the page to apply changes and restart the ProtoNode.
- Unplug Ethernet cable from PC and connect it to the network switch or router.
- Record the IP Address assigned to the ProtoNode for future reference.**

**NOTE:** The FieldPoP™ button (see Figure 20) allows users to connect to the SMC Cloud, Sierra Monitor’s device cloud solution for IIoT. The SMC Cloud enables secure remote connection to field devices through a FieldServer and its local applications for configuration, management, maintenance. For more information about the SMC Cloud, refer to the [SMC Cloud Start-up Guide](#).

## 6 BACNET: SETTING NODE\_OFFSET TO ASSIGN SPECIFIC DEVICE INSTANCES

- After setting a local PC to the same subnet as the ProtoNode (**Section 5.1**), open a web browser on the PC and enter the IP Address of the ProtoNode; the default address is 192.168.1.24.
  - If the IP Address of the ProtoNode has been changed by previous configuration, the assigned IP Address will need to be obtained from the network administrator.
  - The Web Configurator is displayed as the landing page.
- Node\_Offset field shows the current value (default = 50,000).
  - The values allowed for a BACnet Device Instance can range from 1 to 4,194,303.
- To assign a specific Device Instance (or range); change the Node\_Offset value as needed using the calculation below:

$$\text{Device Instance (desired)} = \text{Node\_Offset} + \text{Station Address}$$

**NOTE: Place the Station Address under the Node ID header in the Web Configurator.**

For example, if the desired Device Instance for the device 1 is 50,001 and the following is true:

- Device 1 has a Station Address of 1
- Device 2 has a Station Address of 22
- Device 3 has a Station Address of 33

Then plug the device 1's information into the formula to find the desired Node\_Offset:

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

➤ **50,000 = Node\_Offset**

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

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

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

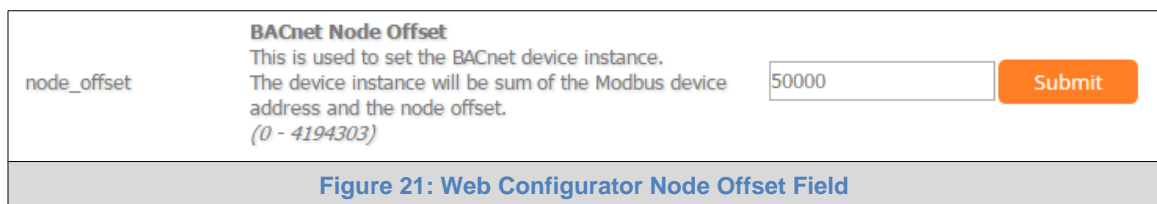


Figure 21: Web Configurator Node Offset Field

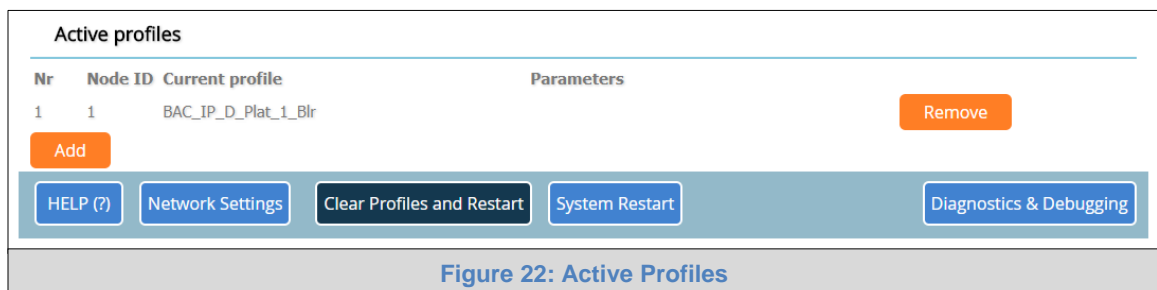


Figure 22: Active Profiles

## 7 HOW TO START THE INSTALLATION OVER: CLEARING PROFILES

- After setting a local PC to the same subnet as the ProtoNode (**Section 5.1**), open a web browser on the PC and enter the IP Address of the ProtoNode; the default address is 192.168.1.24.
- If the IP Address of the ProtoNode has been changed by previous configuration, the assigned IP Address will need to be obtained from the network administrator.
- The Web Configurator is displayed as the landing page.
- 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.

## 8 LONWORKS (FPC-N39): COMMISSIONING PROTONODE ON A LONWORKS NETWORK

Commissioning may only be performed by the LonWorks administrator.

### 8.1 Commissioning ProtoNode FPC-N39 on a LonWorks Network

During the commissioning process, the LonWorks Administrator may prompt the User to hit the Service Pin on the ProtoNode FPC-N39 at a specific point (this step occurs at different points of the commissioning process for each LonWorks Network Management Tool).

- If an XIF file is required, see steps in **Section 8.1.1** to generate XIF.



Figure 23: LonWorks Service Pin Location

#### 8.1.1 Instructions to Upload XIF File from ProtoNode FPC-N39 Using Browser

- Connect a CAT5 Ethernet cable (straight through or cross-over) between the PC and ProtoNode.
- The Default IP Address of the ProtoNode is **192.168.1.24**, the Subnet Mask is **255.255.255.0**. If the PC and ProtoNode are on different IP Networks, assign a static IP Address to the PC on the 192.168.1.xxx network.
- For Windows 10:

Right click on > Control Panel > Network and Internet  
> Network and Sharing Center > [Change adapter settings](#)

Right-click on Local Area Connection > Properties

Highlight  [Internet Protocol Version 4 \(TCP/IPv4\)](#) > [Properties](#)

- Once in the properties window, enter the following IP Address:

Use the following IP address:

IP address:	192 . 168 . 1 . 11
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	. . .

- Click [OK](#) twice.

- Open a web browser and go to the following address: [IP Address of ProtoNode]/fserver.xif.
  - Example: 192.168.1.24/fserver.xif
- If the web browser prompts to save the file, save the file onto the PC. If the web browser displays the xif file as a web page, save the file onto the local PC as "fserver.xif".

```

File: fserver.xif generated by LonDriver Revision 1.30(d), XIF Version 4.0
Copyright (c) 2000-2012 by FieldServer Technologies
All Rights Reserved. Run on Thu Jan 1 00:00:00 1970

90:00:95:47:1E:02:04:7C
2 15 1 4 0 14 11 3 3 12 14 11 11 11 11 3 0 16 63 0 1 11 4
32 5 19 13 28 0 0 15 5 3 109 63
1 7 1 0 4 4 4 15 200 0
78125 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 5 8 5 12 14 15
*
"FFP-Lon Demo

VAR nviAnalog_01 0 0 0 0
0 1 63 0 0 0 0 0 0 0 0 0
*
51 * 1
4 0 4 0 0
VAR nvoAnalog_01 1 0 0 0
0 1 63 1 0 0 0 0 0 0 0 0
*
51 * 1
4 0 4 0 0
VAR nviBinary_01 2 0 0 0
0 1 63 0 0 0 0 0 0 0 0 0
*
95 * 2
1 0 0 0 0
1 0 0 1 0
VAR nvoBinary_01 3 0 0 0
0 1 63 1 0 0 0 0 0 0 0 0
*
95 * 2
1 0 0 0 0
1 0 0 1 0

```

Figure 24: Sample of Fserver.XIF File Generated

## 9 USING THE EMBEDDED BACNET EXPLORER

The embedded Bacnet Explorer allows installers of the OEM product to validate that their equipment is working on Bacnet without having to ask the BMS integrator to test the unit.

- To access the embedded BACnet Explorer, go to the FS-GUI page and click the BACnet Explorer button.

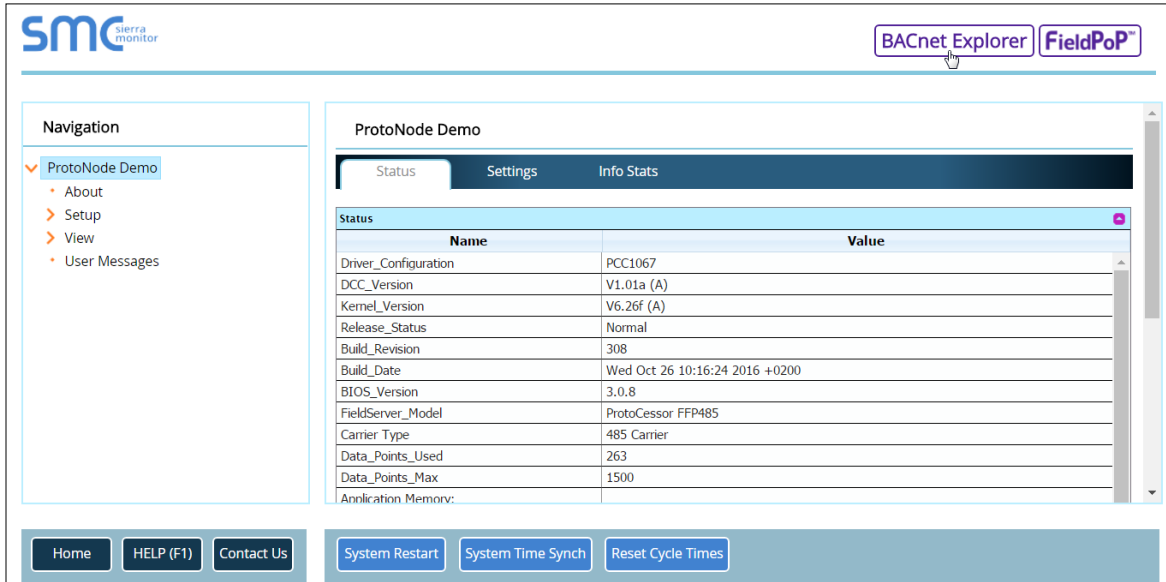


Figure 25: FS-GUI BACnet Explorer Button

- Then login to the BACnet Explorer page using the supplied username and password.

**NOTE:** The default user name is “admin” and default password is “admin”.

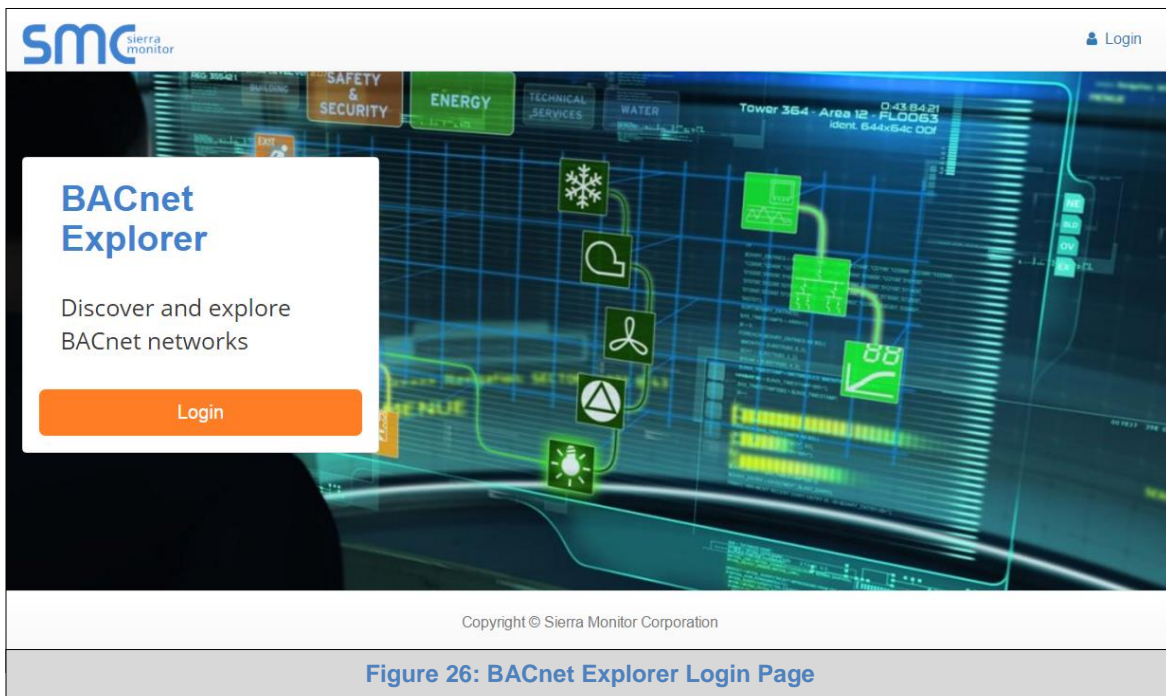


Figure 26: BACnet Explorer Login Page

**NOTE:** For BACnet/IP, click on the Settings button on the left side of the landing page to ensure the ProtoNode is on the BACnet/IP network subnet or to configure BBMD.

## 9.1 Discover Device List

- From the BACnet Explorer landing page, click on the BACnet Explorer button on the left side of the screen to go to the BACnet Explorer page.

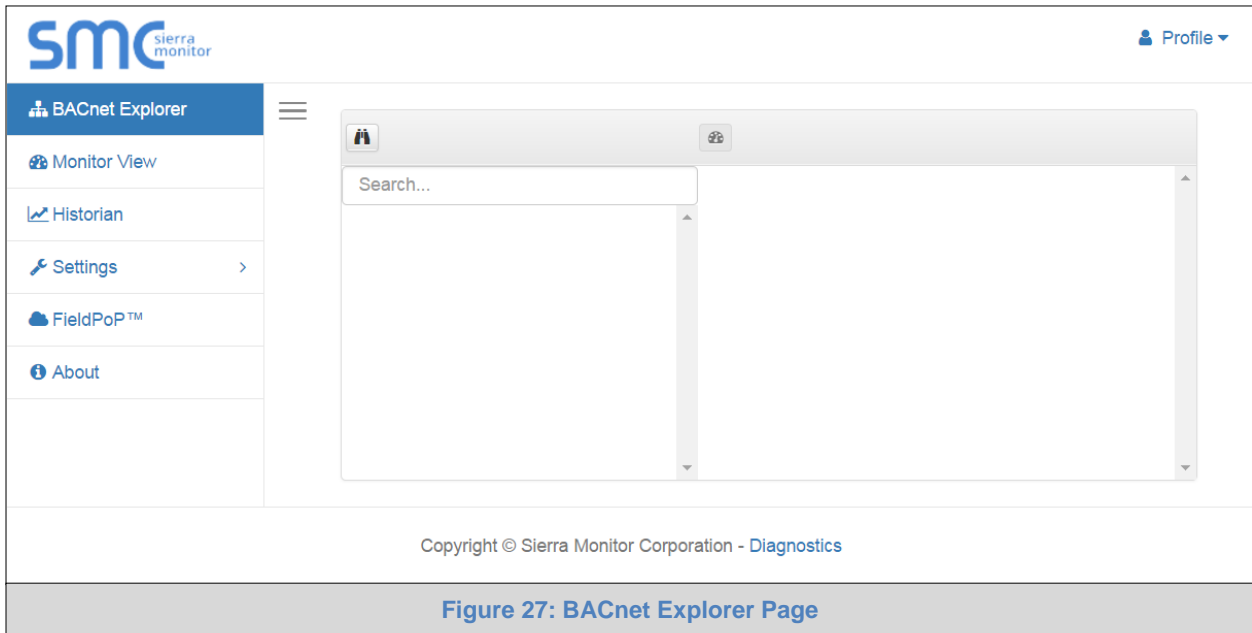


Figure 27: BACnet Explorer Page


- To discover the devices connected to the same subnet as the BACnet Explorer, click the Discover button  (binocular icon).
- This will open the Discovery window, click the checkboxes next to the desired discovery settings and click Discover to start the search.



Figure 28: Discovery Window

**NOTE:** Allow the devices to populate before interacting with the device list for optimal performance. Any discovery or explore process will cause a green message to appear in the upper right corner of the browser to confirm that the action is complete.

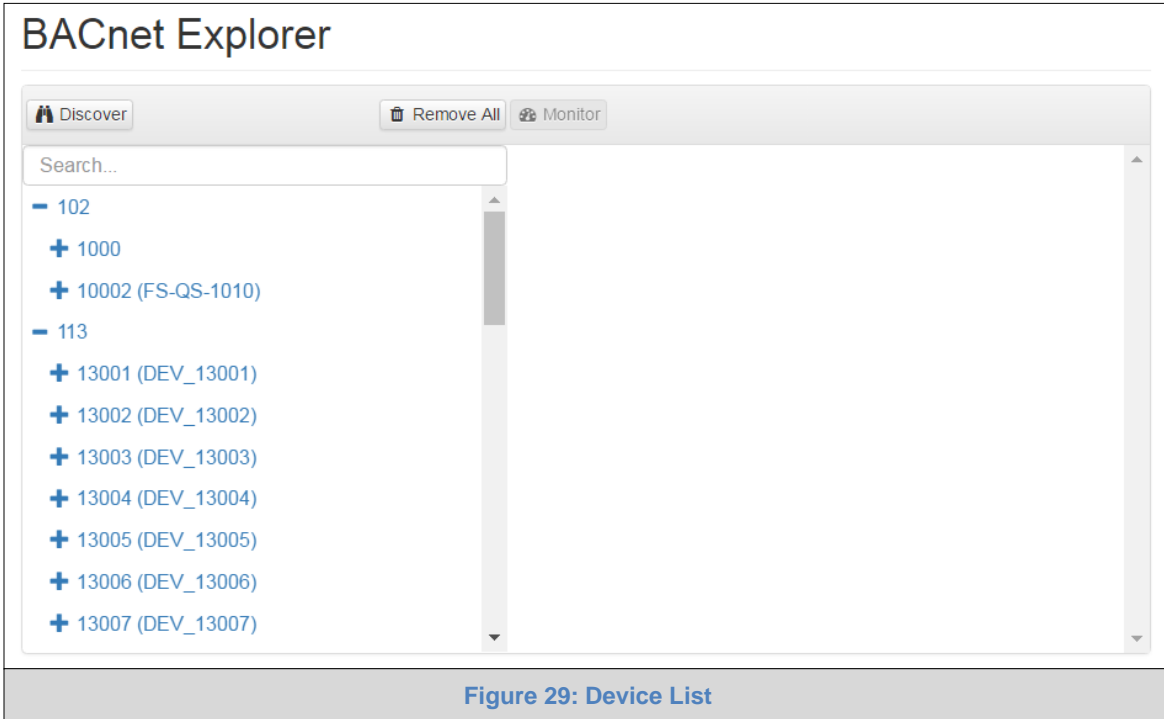


Figure 29: Device List

## 9.2 View Device Details and Explore Points/Parameters

- To view the device details, click the blue plus sign (+) next to the desired device in the list.
  - This will show only some of the device properties for the selected aspect of a device

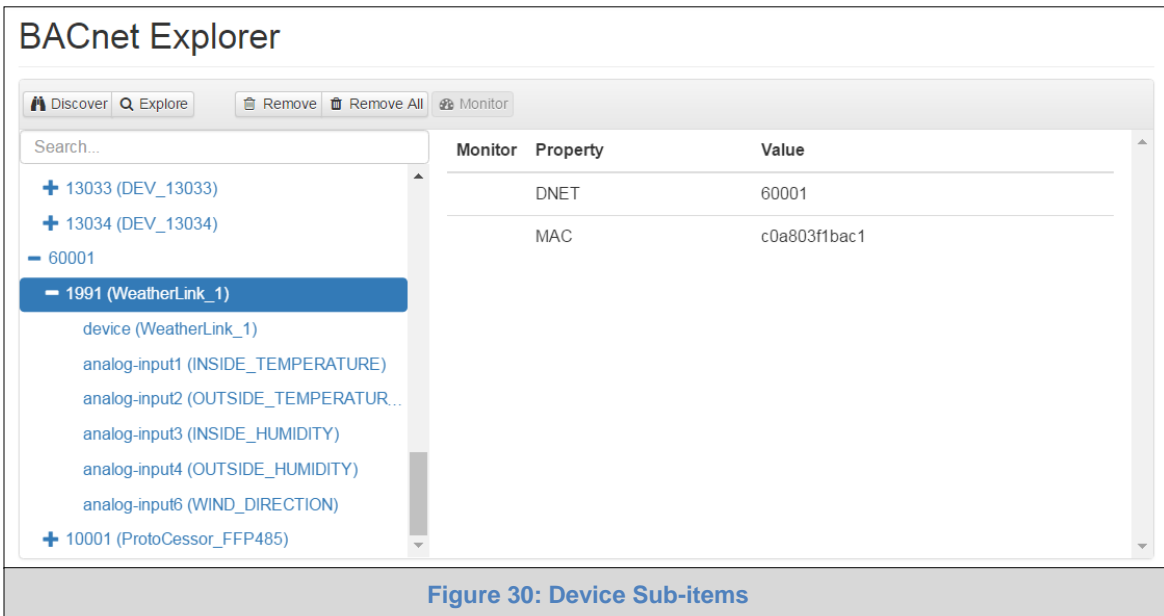



Figure 30: Device Sub-items

- To view the full details of a device, go back to highlighting the device directly (in [Figure 31](#) “50001”) and click the Explore button  Explore or double-click the device/object.

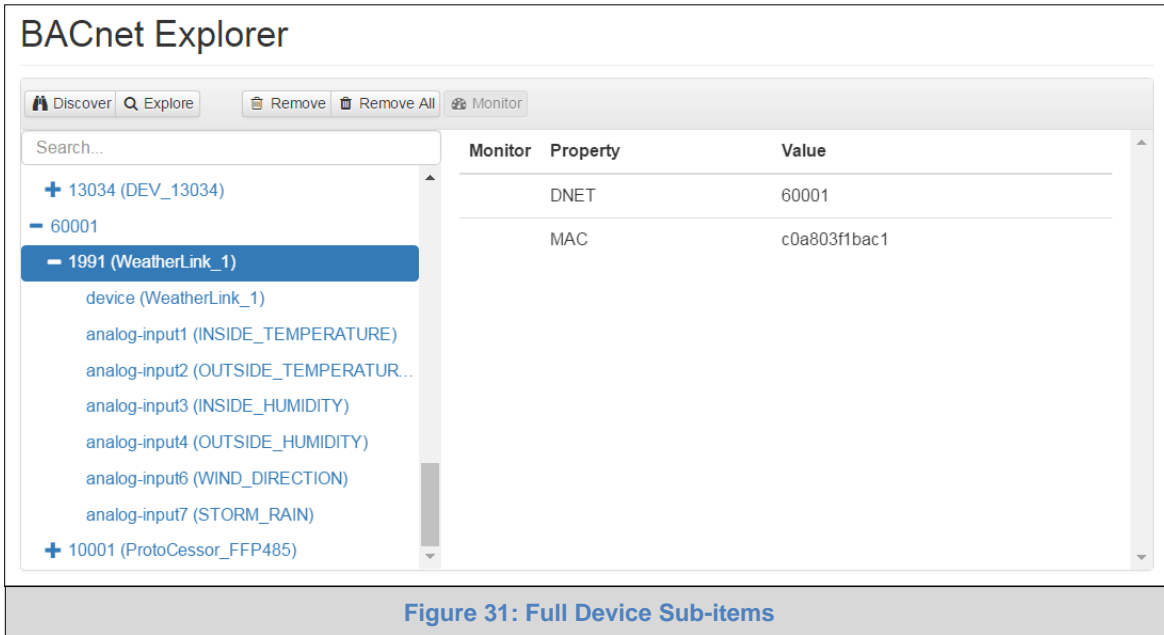


Figure 31: Full Device Sub-items

- o Now additional device details are viewable; however, the device can be explored even further
- Click on one of the device details.

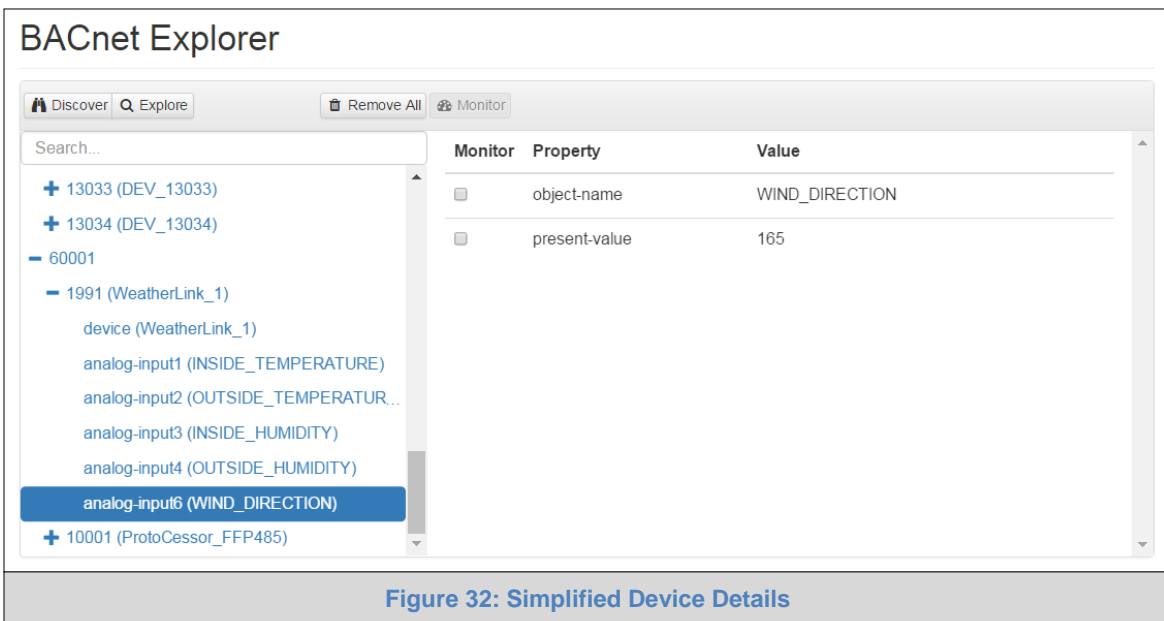
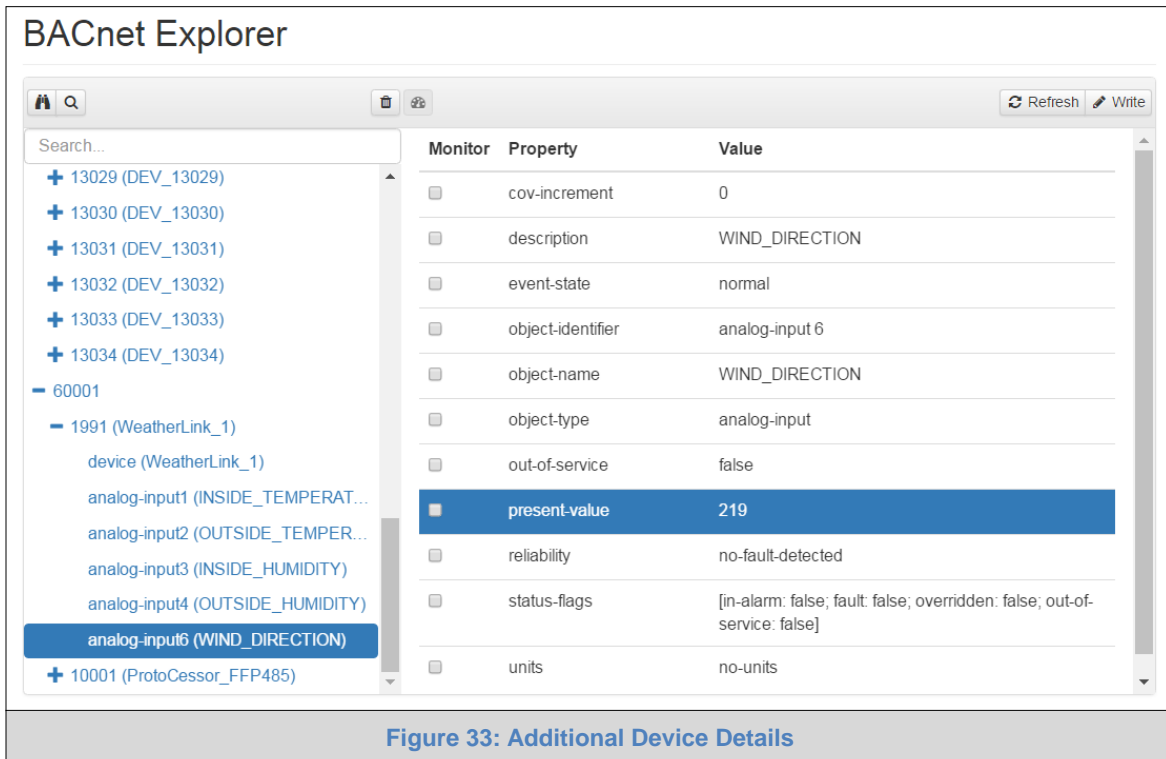


Figure 32: Simplified Device Details

- Then click on the Explore button or double-click the device object.



A full list of the device details will appear on the right side window. If changes are expected since the last explore, simply press the Refresh button Refresh that appears on the upper right side of the screen when highlighting individual properties to refresh all the values.

**NOTE: The Explorer Search Bar will find devices based on their Device ID.**

**NOTE: The Explorer Discovery Tree has 3 levels that correspond to the following.**

- Network number
  - Device
    - **Device object**

### 9.2.1 Edit the Present Value Field

The only recommended field to edit via BACnet Explorer is the device's present value field.

**NOTE: Other BACnet properties are editable (such as object name, object description, etc.); however, this is not recommended because the BACnet Explorer is a discovery tool not a Building Management System (BMS).**

- To edit the present value, select it in the property listings.

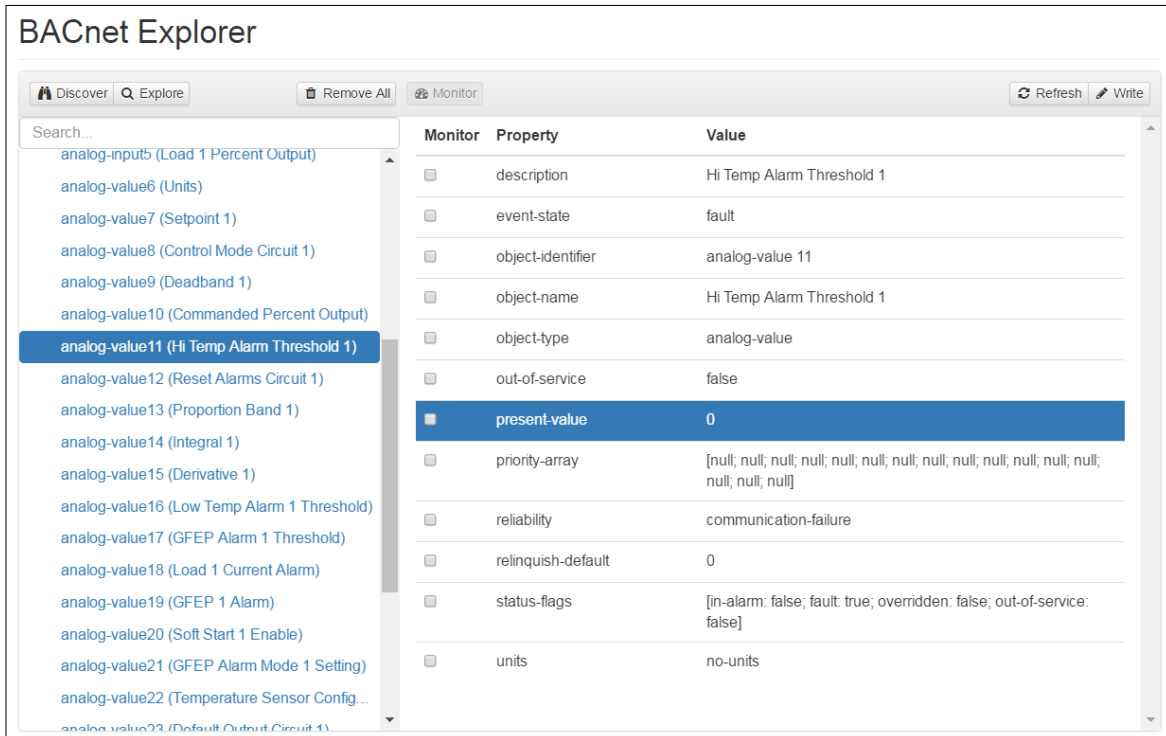



Figure 34: Highlighted Present Value

- Then click the write button  (found in the upper right corner of the screen) to bring up the Write Property window.

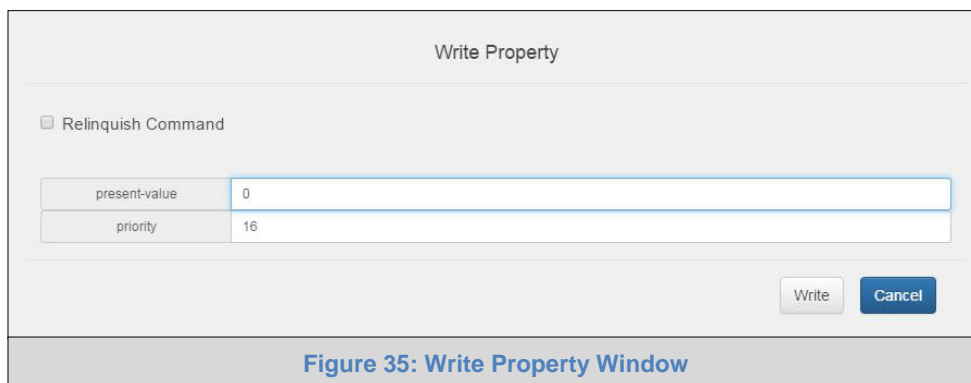


Figure 35: Write Property Window

- Enter the appropriate change and click write.

A check will appear inside the save button and the window will close. When the BACnet Explorer page appears the present value will be changed as specified.

The screenshot shows the BACnet Explorer interface. On the left, a search list contains various analog values, with 'analog-value11 (Hi Temp Alarm Threshold 1)' selected. On the right, a table displays the properties of this selected object. The 'present-value' property is highlighted in blue and has a value of 2. Other properties include description, event-state, object-identifier, object-name, object-type, out-of-service, priority-array, reliability, relinquish-default, status-flags, and units.

Monitor	Property	Value
<input type="checkbox"/>	description	Hi Temp Alarm Threshold 1
<input type="checkbox"/>	event-state	fault
<input type="checkbox"/>	object-identifier	analog-value 11
<input type="checkbox"/>	object-name	Hi Temp Alarm Threshold 1
<input type="checkbox"/>	object-type	analog-value
<input type="checkbox"/>	out-of-service	false
<input checked="" type="checkbox"/>	present-value	2
<input type="checkbox"/>	priority-array	[null; null; null; null; null; null; null; null; null; null; null; null; null; 2]
<input type="checkbox"/>	reliability	communication-failure
<input type="checkbox"/>	relinquish-default	0
<input type="checkbox"/>	status-flags	[in-alarm: false; fault: true; overridden: false; out-of-service: false]
<input type="checkbox"/>	units	no-units

**Figure 36: Updated Present Value**

**APPENDIX A TROUBLESHOOTING**

**Appendix A.1 Lost or Incorrect IP Address**

- Ensure that FieldServer Toolbox is loaded onto the local PC. Otherwise, download the FieldServer-Toolbox.zip via the Sierra Monitor Resource Center [Software Downloads](#).
- Extract the executable file and complete the installation.

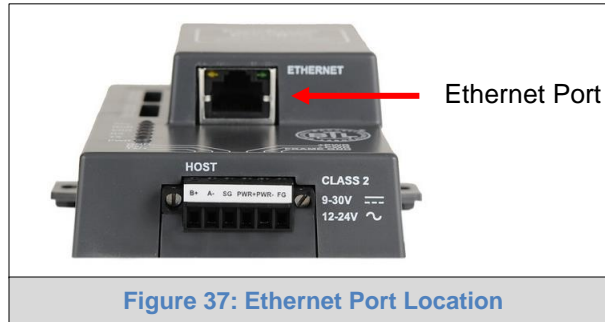
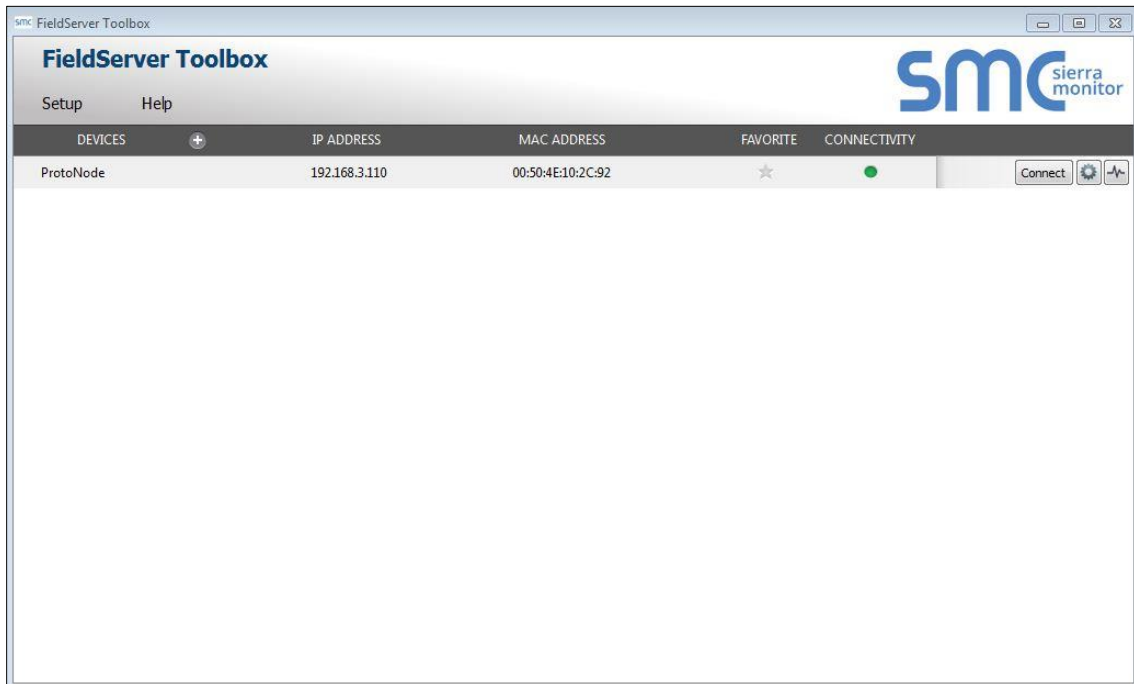



Figure 37: Ethernet Port Location

- Connect a standard CAT5 Ethernet cable between the user's PC and ProtoNode.
- Double click on the FS Toolbox Utility and click Discover Now on the splash page.
- Check for the IP Address of the desired gateway.



- If correcting the IP Address of the gateway: click the settings icon  on the same row as the gateway, then click Network Settings, change the IP Address and click Update IP Settings to save.

## Appendix A.2 Viewing Diagnostic Information

- Type the IP Address of the ProtoNode into the web browser or use the FieldServer Toolbox to connect to the ProtoNode.
- Click on Diagnostics and Debugging Button, then click on view, and then on connections.
- If there are any errors showing on the Connection page, refer to [Appendix A.3](#) for the relevant wiring and settings.

The screenshot shows the SMC web interface with the 'Connections' page selected. The navigation menu on the left includes 'Connections' under the 'View' section. The main content area displays a table of connections with the following data:

Index	Name	Tx Msg	Rx Msg	Tx Char	Rx Char	Errors
0	S1 - MODBUS_RTU	0	0	0	0	0
1	N1 - BACnet_IP	8	86	0	0	0
2	N1 - BACnet_IP 47800	90	0	0	0	0

At the bottom of the interface, there are buttons for 'Home', 'HELP (F1)', 'Contact Us', and 'Reset Statistics'.

Figure 38: Error Messages Screen

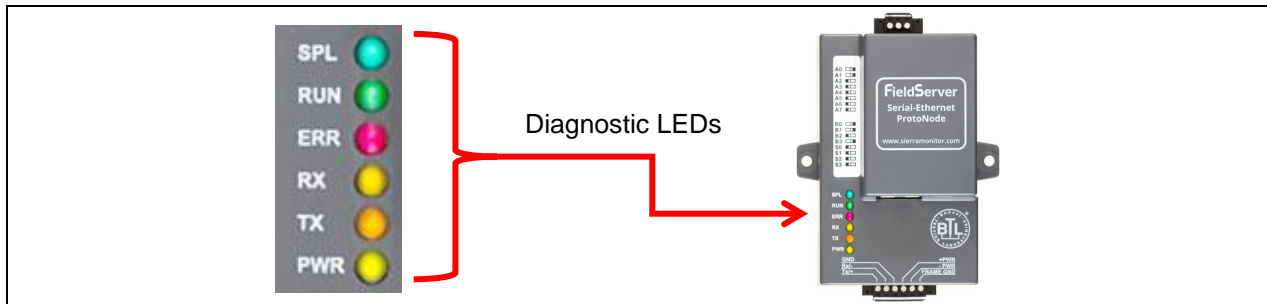
### Appendix A.3 Checking Wiring and Settings

- No COMS on Modbus RTU side. If Tx/Rx are not flashing rapidly then there is a COM issue on the Modbus side. To fix this problem, check the following:
  - Visual observations of LEDs on ProtoNode ([Appendix A.4](#))
  - Check baud rate, parity, data bits, stop bits
  - Check Modbus device address
  - Verify wiring
  - Verify Modbus device is connected to the same subnet as the ProtoNode
  - Verify the Modbus device was discovered in Web Configurator ([Section 5.4](#))
- Field COM problems:
  - If Ethernet protocols are used, observe Ethernet LEDs on the ProtoNode ([Appendix A.4](#))
  - Check DIP switch settings (using correct baud rate and device instance)
  - Verify IP Address setting
  - Verify wiring

**NOTE:** If the problem still exists, a Diagnostic Capture needs to be taken and sent to technical support. ([Appendix A.5](#))

Appendix A.4 LED Diagnostics for Communications Between ProtoNode and Devices

See the diagram below for ProtoNode FPC-N38 and FPC-N39 LED Locations.



Tag	Description
<b>SPL</b>	The SPL LED will light if the unit is not getting a response from one or more of the configured devices. <b>For LonWorks units</b> , LED will light until the unit is commissioned on the LonWorks network.
<b>RUN</b>	The RUN LED will start flashing 20 seconds after power indicating normal operation.
<b>ERR</b>	The SYS ERR LED will go on solid 15 seconds after power up. It will turn off after 5 seconds. A steady red light will indicate there is a system error on the unit. If this occurs, immediately report the related "system error" shown in the error screen of the FS-GUI interface to support for evaluation.
<b>RX</b>	The RX LED will flash when a message is received on the serial port on the 6-pin connector. <b>If the serial port is not used</b> , this LED is non-operational.
<b>TX</b>	The TX LED will flash when a message is sent on the serial port on the 6-pin connector. <b>If the serial port is not used</b> , this LED is non-operational.
<b>PWR</b>	This is the power light and should show steady green at all times when the unit is powered.

Figure 39: Diagnostic LEDs

Appendix A.5 Taking Diagnostic Capture with the FieldServer Toolbox

- Once the diagnostic capture is complete, email it to technical support. The diagnostic capture will accelerate diagnosis of the problem.
- Ensure that FieldServer Toolbox is loaded onto the local PC. Otherwise, download the FieldServer-Toolbox.zip via the Sierra Monitor Resource Center [Software Downloads](#).
- Extract the executable file and complete the installation.

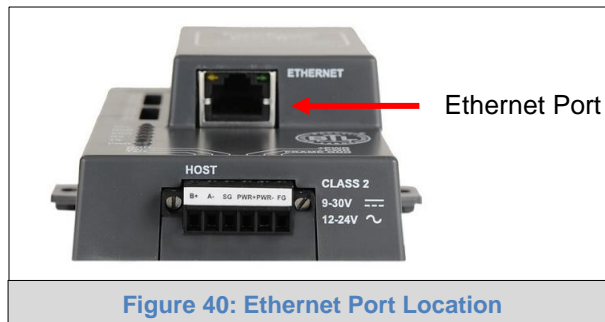

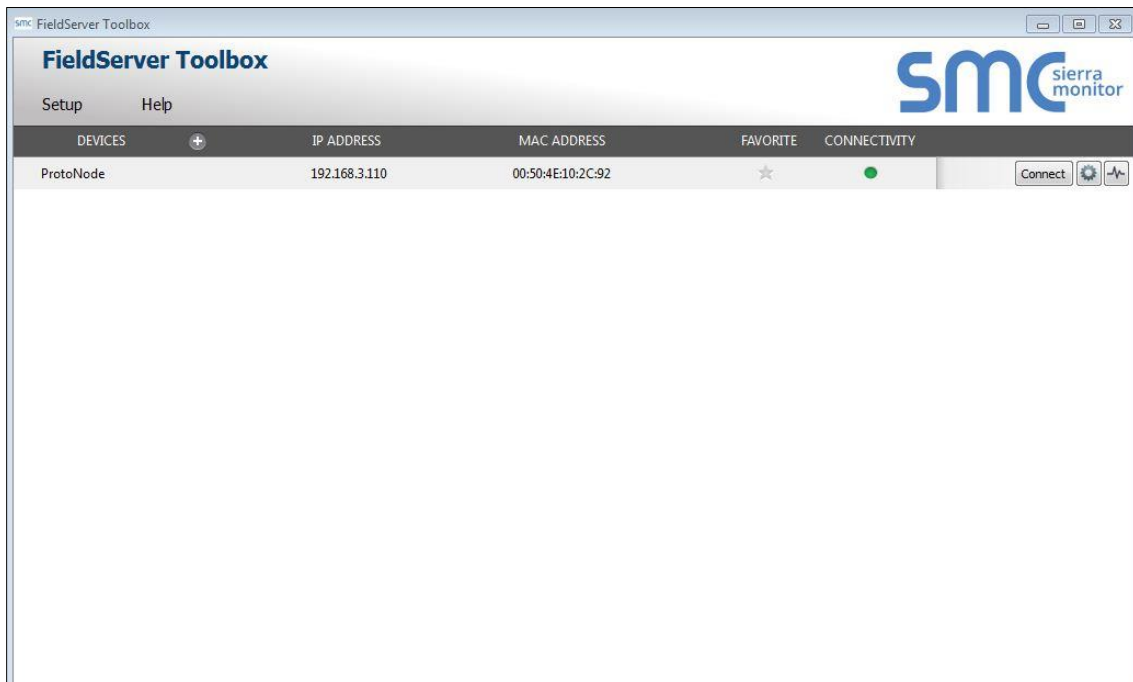


Figure 40: Ethernet Port Location

- Connect a standard Cat5 Ethernet cable between the PC and ProtoNode.
- Double click on the FS Toolbox Utility.
- **Step 1: Take a Log**
  - Click on the diagnose icon  of the desired device

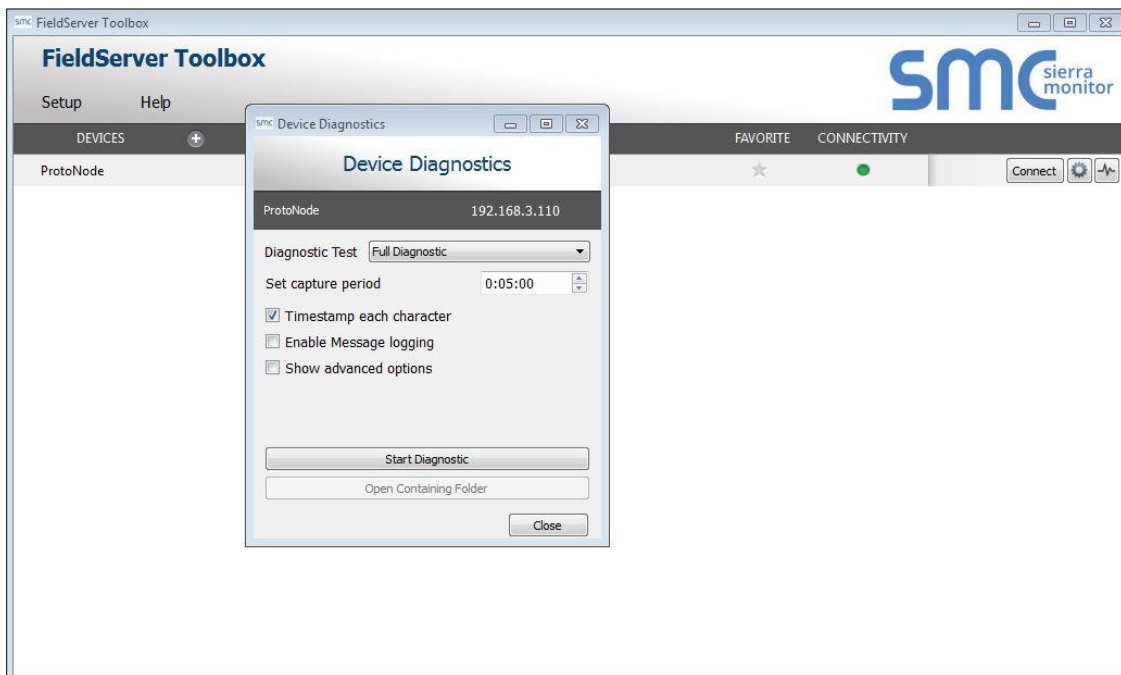


- o Ensure "Full Diagnostic" is selected (this is the default)



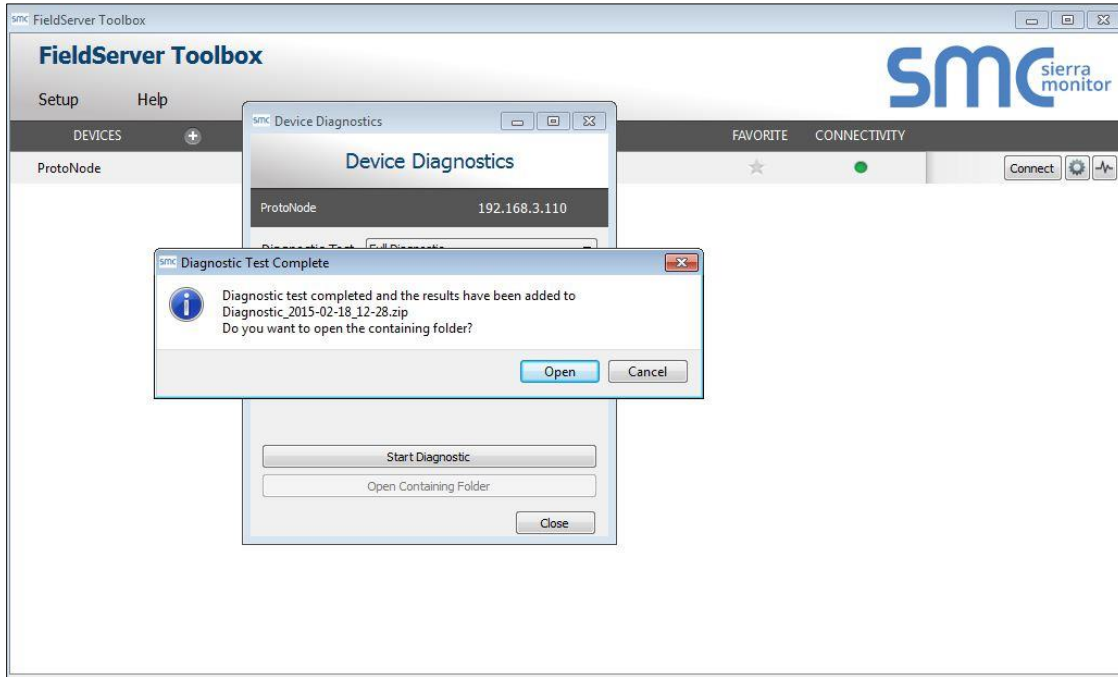
**NOTE:** If desired, the default capture period can be changed.

- o Click on "Start Diagnostic"



- o Wait for Capture period to finish, then the Diagnostic Test Complete window will appear

- **Step 2: Send Log**
  - Once the Diagnostic test is complete, a .zip file is saved on the PC



- Choose “Open” to launch explorer and have it point directly at the correct folder
- Send the Diagnostic zip file to [technical support](#)

Diagnostic_2014-07-17_20-15.zip	2014/07/17 20:16	zip Archive	676 KB
---------------------------------	------------------	-------------	--------

## Appendix A.6 Updating 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.
  - o Default IP Address is 192.168.1.24
  - o Use the FS Toolbox utility if the IP Address is unknown ([Appendix A.1](#))
3. Click on the “Diagnostics & Debugging” button.
4. In the Navigation Tree on the left hand side, do the following:
  - a. Click on “Setup”
  - b. Click on “File Transfer”
  - c. Click on the “General” tab
5. In the General tab, click on “Choose Files” and select the web.img file extracted in step 1.
6. Click on the orange “Submit” button.
7. When the download is complete, click on the “System Restart” button.

## Appendix A.7 BACnet: Setting Network\_Number for More Than one ProtoNode on the Subnet

For both BACnet MS/TP and BACnet/IP, if more than one ProtoNode is connected to the same subnet, they must be assigned unique Network\_Number values.

On the main Web Configuration screen, update the BACnet Network Number field and click submit. The default value is 50001.



Figure 41: Web Configurator – Network Number Field

## Appendix A.8 Securing ProtoNode with Passwords

Access to the ProtoNode can be restricted by enabling a password on the FS-GUI Passwords page – click Setup and then Passwords in the navigation panel. There are 2 access levels defined by 2 account names: Admin and User.

- The Admin account has unrestricted access to the ProtoNode.
- The User account can view any ProtoNode information, but cannot make any changes or restart the ProtoNode.

The password needs to be a minimum of eight characters and **is case sensitive**.

If the password is lost, click cancel on the password authentication popup window, and email the password recovery token to technical support to receive a temporary password from the customer support team. Access the ProtoNode to set a new password.

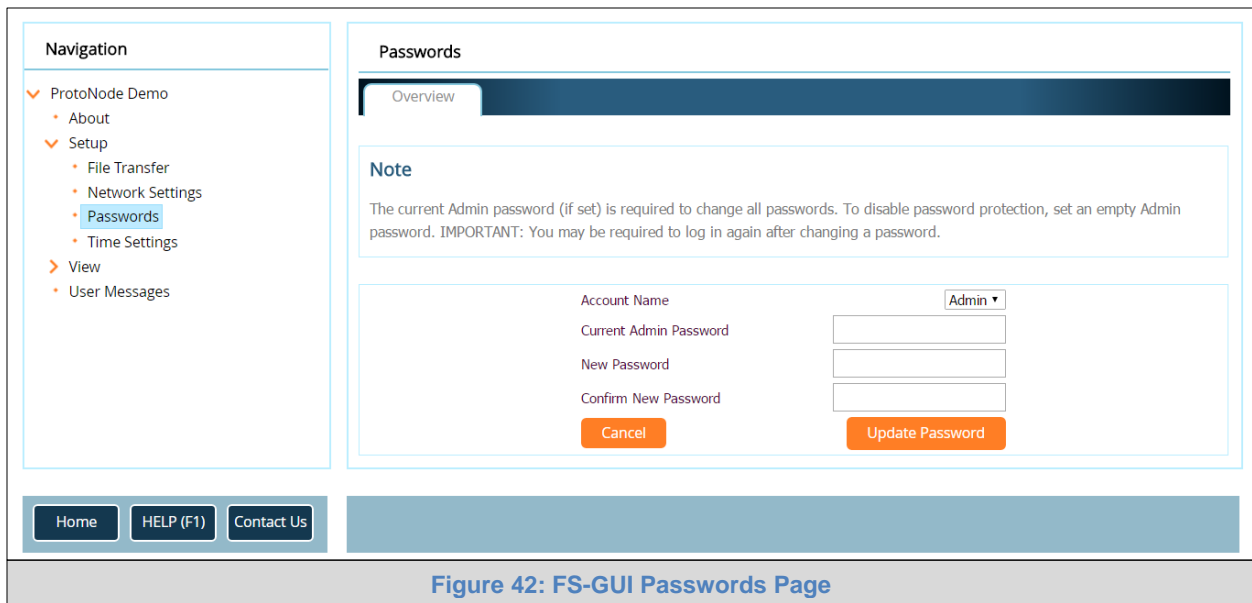


Figure 42: FS-GUI Passwords Page



Figure 43: Password Recovery Page

**APPENDIX B VENDOR INFORMATION – BOSCH**

**NOTE:** All Modbus TCP/IP registers are the same as the Modbus RTU registers for the serial device. If this point list is needed, contact Bosch technical support. The Modbus TCP/IP node address of the device is also the same as the Modbus RTU node address.

**Appendix B.1 D\_Platform Modbus RTU Mappings to BACnet, Metasys N2 and LonWorks**

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Address	LonWorks Name	LonWorks SNVT
Reset Curve Boiler Design	AV	1	AO	1	nvi/nvoResCvBIDs_XXX	SNVT_temp_p
Reset Curve Boiler Mild Weather	AV	2	AO	2	nvi/nvoResCvBMWt_XXX	SNVT_temp_p
Reset Curve Outdoor Mild Weather	AV	3	AO	3	nvi/nvoResCvOMWt_XXX	SNVT_temp_p
Reset Curve Outdoor Design	AV	4	AO	4	nvi/nvoResCvOtDs_XXX	SNVT_temp_p
Warm Weather Shutdown	AV	5	AO	5	nvi/nvoWmWthShDn_XXX	SNVT_temp_p
Reset Curve Boiler Maximum	AV	6	AO	6	nvi/nvoResCvBIMx_XXX	SNVT_temp_p
Reset Curve Boiler Minimum	AV	7	AO	7	nvi/nvoResCvBIMn_XXX	SNVT_temp_p
Night Setback	AV	8	AO	8	nvi/nvoNtStbk_XXX	SNVT_temp_p
Power Level For Entire System	AI	9	AI	9	nvoPwrLvl_XXX	SNVT_lev_percent
Cascade Ch Mode X SP	AV	10	AO	10	nvi/nvoCscChMdSP_XXX	SNVT_temp_p
System Supply SP	AI	11	AI	11	nvoSysSupSP_XXX	SNVT_temp_p
System Supply Sensor Temp	AI	12	AI	12	nvoSysSpSnTp_XXX	SNVT_temp_p
Outdoor Sensor Temp	AI	13	AI	13	nvoOutSenTmp_XXX	SNVT_temp_p
Cascade Pump Status	BI	14	DI	14	nvoCscPmpSt_XXX	SNVT_switch
Boiler 1 Available / Present	BI	15	DI	15	nvoB1Avail_XXX	SNVT_switch
Boiler 2 Available / Present	BI	16	DI	16	nvoB2Avail_XXX	SNVT_switch
Boiler 3 Available / Present	BI	17	DI	17	nvoB3Avail_XXX	SNVT_switch
Boiler 4 Available / Present	BI	18	DI	18	nvoB4Avail_XXX	SNVT_switch
Boiler 1 Is Active / Heating	BI	19	DI	19	nvoB1ActHt_XXX	SNVT_switch
Boiler 2 Is Active / Heating	BI	20	DI	20	nvoB2ActHt_XXX	SNVT_switch
Boiler 3 Is Active / Heating	BI	21	DI	21	nvoB3ActHt_XXX	SNVT_switch
Boiler 4 Is Active / Heating	BI	22	DI	22	nvoB4ActHt_XXX	SNVT_switch
Boiler 1 Has Error	BI	23	DI	23	nvoB1Err_XXX	SNVT_switch
Boiler 2 Has Error	BI	24	DI	24	nvoB2Err_XXX	SNVT_switch
Boiler 3 Has Error	BI	25	DI	25	nvoB3Err_XXX	SNVT_switch
Boiler 4 Has Error	BI	26	DI	26	nvoB4Err_XXX	SNVT_switch
Boiler 1 Requires Service	BI	27	DI	27	nvoB1ReqSvc_XXX	SNVT_switch
Boiler 2 Requires Service	BI	28	DI	28	nvoB2ReqSvc_XXX	SNVT_switch
Boiler 3 Requires Service	BI	29	DI	29	nvoB3ReqSvc_XXX	SNVT_switch
Boiler 4 Requires Service	BI	30	DI	30	nvoB4ReqSvc_XXX	SNVT_switch
Boiler Address	AV	31	AO	31	nvi/nvoBlrAddr_XXX	SNVT_count_f
Power Level For The Boiler	AI	32	AI	32	nvoBlrPwrLvl_XXX	SNVT_lev_percent
Boiler Supply SP	AI	33	AI	33	nvoBlrSupSP_XXX	SNVT_temp_p
Heat Demand Type	AI	34	AI	34	nvoHtDemTyp_XXX	SNVT_count_f
System Sensor Temp	AI	35	AI	35	nvoSysSenTmp_XXX	SNVT_temp_p
Dhw Temp	AI	36	AI	36	nvoDhwTemp_XXX	SNVT_temp_p
Ch Pump Running	BI	37	DI	37	nvoChPPmpRun_XXX	SNVT_switch
Dhw Pump Status	BI	38	DI	38	nvoDhwPmpSt_XXX	SNVT_switch
Total Burn Hours	AI	39	AI	39	nvoTotBrnHr_XXX	SNVT_time_hour
Blr 1 - Burner 1 Available/Present	BI	40	DI	40	nvo1B1Avail_XXX	SNVT_switch
Blr 1 - Burner 2 Available/Present	BI	41	DI	41	nvo1B2Avail_XXX	SNVT_switch
Blr 2 - Burner 1 Available/Present	BI	42	DI	42	nvo2B1Avail_XXX	SNVT_switch
Blr 2 - Burner 2 Available/Present	BI	43	DI	43	nvo2B2Avail_XXX	SNVT_switch
Blr 3 - Burner 1 Available/Present	BI	44	DI	44	nvo3B1Avail_XXX	SNVT_switch
Blr 3 - Burner 2 Available/Present	BI	45	DI	45	nvo3B2Avail_XXX	SNVT_switch
Blr 4 - Burner 1 Available/Present	BI	46	DI	46	nvo4B1Avail_XXX	SNVT_switch
Blr 4 - Burner 2 Available/Present	BI	47	DI	47	nvo4B2Avail_XXX	SNVT_switch
Blr 1 - Burner 1 Current State	AI	48	AI	48	nvo1B1CurSt_XXX	SNVT_count_f
Blr 1 - Burner 1 Error	AI	49	AI	49	nvo1B1Err_XXX	SNVT_count_f
Blr 1 - Burner 1 Supply SP	AI	50	AI	50	nvo1B1SupSP_XXX	SNVT_temp_p
Blr 1 - Burner 1 Power Level	AI	51	AI	51	nvo1B1PwrLvl_XXX	SNVT_lev_percent
Blr 1 - Burner 1 Gen Pump Status	BI	52	DI	52	nvo1B1GnPmSt_XXX	SNVT_switch

Blr 1 - Burner 1 CH Flow Rate	AI	53	AI	53	nvo1B1ChFIRt_XXX	SNVT_count_f
Blr 1 - Burner 1 Actual Fan Speed	AI	54	AI	54	nvo1B1AcFnSp_XXX	SNVT_count_f
Blr 1 - Burner 1 Supply Sensor Temp	AI	55	AI	55	nvo1B1SpSnTp_XXX	SNVT_temp_p
Blr 1 - Burner 1 Return Sensor Temp	AI	56	AI	56	nvo1B1RtSnTp_XXX	SNVT_temp_p
Blr 1 - Burner 1 Flue Sensor Temp	AI	57	AI	57	nvo1B1FISnTp_XXX	SNVT_temp_p
Blr 1 - Burner 1 Total Burn Hours	AI	58	AI	58	nvo1B1ToBnHr_XXX	SNVT_time_hour
Blr 1 - Burner 2 Current State	AI	59	AI	59	nvo1B2CurSt_XXX	SNVT_count_f
Blr 1 - Burner 2 Error	AI	60	AI	60	nvo1B2Err_XXX	SNVT_count_f
Blr 1 - Burner 2 Supply SP	AI	61	AI	61	nvo1B2SupSP_XXX	SNVT_temp_p
Blr 1 - Burner 2 Power Level	AI	62	AI	62	nvo1B2PwrLvl_XXX	SNVT_lev_percent
Blr 1 - Burner 2 Gen Pump Status	BI	63	DI	63	nvo1B2GnPmSt_XXX	SNVT_switch
Blr 1 - Burner 2 CH Flow Rate	AI	64	AI	64	nvo1B2ChFIRt_XXX	SNVT_count_f
Blr 1 - Burner 2 Actual Fan Speed	AI	65	AI	65	nvo1B2AcFnSp_XXX	SNVT_count_f
Blr 1 - Burner 2 Supply Sensor Temp	AI	66	AI	66	nvo1B2SpSnTp_XXX	SNVT_temp_p
Blr 1 - Burner 2 Return Sensor Temp	AI	67	AI	67	nvo1B2RtSnTp_XXX	SNVT_temp_p
Blr 1 - Burner 2 Flue Sensor Temp	AI	68	AI	68	nvo1B2FISnTp_XXX	SNVT_temp_p
Blr 1 - Burner 2 Total Burn Hours	AI	69	AI	69	nvo1B2ToBnHr_XXX	SNVT_time_hour
Blr 2 - Burner 1 Current State	AI	70	AI	70	nvo2B1CurSt_XXX	SNVT_count_f
Blr 2 - Burner 1 Error	AI	71	AI	71	nvo2B1Err_XXX	SNVT_count_f
Blr 2 - Burner 1 Supply SP	AI	72	AI	72	nvo2B1SupSP_XXX	SNVT_temp_p
Blr 2 - Burner 1 Power Level	AI	73	AI	73	nvo2B1PwrLvl_XXX	SNVT_lev_percent
Blr 2 - Burner 1 Gen Pump Status	BI	74	DI	74	nvo2B1GnPmSt_XXX	SNVT_switch
Blr 2 - Burner 1 CH Flow Rate	AI	75	AI	75	nvo2B1ChFIRt_XXX	SNVT_count_f
Blr 2 - Burner 1 Actual Fan Speed	AI	76	AI	76	nvo2B1AcFnSp_XXX	SNVT_count_f
Blr 2 - Burner 1 Supply Sensor Temp	AI	77	AI	77	nvo2B1SpSnTp_XXX	SNVT_temp_p
Blr 2 - Burner 1 Return Sensor Temp	AI	78	AI	78	nvo2B1RtSnTp_XXX	SNVT_temp_p
Blr 2 - Burner 1 Flue Sensor Temp	AI	79	AI	79	nvo2B1FISnTp_XXX	SNVT_temp_p
Blr 2 - Burner 1 Total Burn Hours	AI	80	AI	80	nvo2B1ToBnHr_XXX	SNVT_time_hour
Blr 2 - Burner 2 Current State	AI	81	AI	81	nvo2B2CurSt_XXX	SNVT_count_f
Blr 2 - Burner 2 Error	AI	82	AI	82	nvo2B2Err_XXX	SNVT_count_f
Blr 2 - Burner 2 Supply SP	AI	83	AI	83	nvo2B2SupSP_XXX	SNVT_temp_p
Blr 2 - Burner 2 Power Level	AI	84	AI	84	nvo2B2PwrLvl_XXX	SNVT_lev_percent
Blr 2 - Burner 2 Gen Pump Status	BI	85	DI	85	nvo2B2GnPmSt_XXX	SNVT_switch
Blr 2 - Burner 2 CH Flow Rate	AI	86	AI	86	nvo2B2ChFIRt_XXX	SNVT_count_f
Blr 2 - Burner 2 Actual Fan Speed	AI	87	AI	87	nvo2B2AcFnSp_XXX	SNVT_count_f
Blr 2 - Burner 2 Supply Sensor Temp	AI	88	AI	88	nvo2B2SpSnTp_XXX	SNVT_temp_p
Blr 2 - Burner 2 Return Sensor Temp	AI	89	AI	89	nvo2B2RtSnTp_XXX	SNVT_temp_p
Blr 2 - Burner 2 Flue Sensor Temp	AI	90	AI	90	nvo2B2FISnTp_XXX	SNVT_temp_p
Blr 2 - Burner 2 Total Burn Hours	AI	91	AI	91	nvo2B2ToBnHr_XXX	SNVT_time_hour
Blr 3 - Burner 1 Current State	AI	92	AI	92	nvo3B1CurSt_XXX	SNVT_count_f
Blr 3 - Burner 1 Error	AI	93	AI	93	nvo3B1Err_XXX	SNVT_count_f
Blr 3 - Burner 1 Supply SP	AI	94	AI	94	nvo3B1SupSP_XXX	SNVT_temp_p
Blr 3 - Burner 1 Power Level	AI	95	AI	95	nvo3B1PwrLvl_XXX	SNVT_lev_percent
Blr 3 - Burner 1 Gen Pump Status	BI	96	DI	96	nvo3B1GnPmSt_XXX	SNVT_switch
Blr 3 - Burner 1 CH Flow Rate	AI	97	AI	97	nvo3B1ChFIRt_XXX	SNVT_count_f
Blr 3 - Burner 1 Actual Fan Speed	AI	98	AI	98	nvo3B1AcFnSp_XXX	SNVT_count_f
Blr 3 - Burner 1 Supply Sensor Temp	AI	99	AI	99	nvo3B1SpSnTp_XXX	SNVT_temp_p
Blr 3 - Burner 1 Return Sensor Temp	AI	100	AI	100	nvo3B1RtSnTp_XXX	SNVT_temp_p
Blr 3 - Burner 1 Flue Sensor Temp	AI	101	AI	101	nvo3B1FISnTp_XXX	SNVT_temp_p
Blr 3 - Burner 1 Total Burn Hours	AI	102	AI	102	nvo3B1ToBnHr_XXX	SNVT_time_hour
Blr 3 - Burner 2 Current State	AI	103	AI	103	nvo3B2CurSt_XXX	SNVT_count_f
Blr 3 - Burner 2 Error	AI	104	AI	104	nvo3B2Err_XXX	SNVT_count_f
Blr 3 - Burner 2 Supply SP	AI	105	AI	105	nvo3B2SupSP_XXX	SNVT_temp_p
Blr 3 - Burner 2 Power Level	AI	106	AI	106	nvo3B2PwrLvl_XXX	SNVT_lev_percent
Blr 3 - Burner 2 Gen Pump Status	BI	107	DI	107	nvo3B2GnPmSt_XXX	SNVT_switch
Blr 3 - Burner 2 CH Flow Rate	AI	108	AI	108	nvo3B2ChFIRt_XXX	SNVT_count_f
Blr 3 - Burner 2 Actual Fan Speed	AI	109	AI	109	nvo3B2AcFnSp_XXX	SNVT_count_f
Blr 3 - Burner 2 Supply Sensor Temp	AI	110	AI	110	nvo3B2SpSnTp_XXX	SNVT_temp_p
Blr 3 - Burner 2 Return Sensor Temp	AI	111	AI	111	nvo3B2RtSnTp_XXX	SNVT_temp_p
Blr 3 - Burner 2 Flue Sensor Temp	AI	112	AI	112	nvo3B2FISnTp_XXX	SNVT_temp_p
Blr 3 - Burner 2 Total Burn Hours	AI	113	AI	113	nvo3B2ToBnHr_XXX	SNVT_time_hour
Blr 4 - Burner 1 Current State	AI	114	AI	114	nvo4B1CurSt_XXX	SNVT_count_f
Blr 4 - Burner 1 Error	AI	115	AI	115	nvo4B1Err_XXX	SNVT_count_f
Blr 4 - Burner 1 Supply SP	AI	116	AI	116	nvo4B1SupSP_XXX	SNVT_temp_p

Blr 4 - Burner 1 Power Level	AI	117	AI	117	nvo4B1PwrLvl_XXX	SNVT_lev_percent
Blr 4 - Burner 1 Gen Pump Status	BI	118	DI	118	nvo4B1GnPmSt_XXX	SNVT_switch
Blr 4 - Burner 1 CH Flow Rate	AI	119	AI	119	nvo4B1ChFIRt_XXX	SNVT_count_f
Blr 4 - Burner 1 Actual Fan Speed	AI	120	AI	120	nvo4B1AcFnSp_XXX	SNVT_count_f
Blr 4 - Burner 1 Supply Sensor Temp	AI	121	AI	121	nvo4B1SpSnTp_XXX	SNVT_temp_p
Blr 4 - Burner 1 Return Sensor Temp	AI	122	AI	122	nvo4B1RtSnTp_XXX	SNVT_temp_p
Blr 4 - Burner 1 Flue Sensor Temp	AI	123	AI	123	nvo4B1FISnTp_XXX	SNVT_temp_p
Blr 4 - Burner 1 Total Burn Hours	AI	124	AI	124	nvo4B1ToBnHr_XXX	SNVT_time_hour
Blr 4 - Burner 2 Current State	AI	125	AI	125	nvo4B2CurSt_XXX	SNVT_count_f
Blr 4 - Burner 2 Error	AI	126	AI	126	nvo4B2Err_XXX	SNVT_count_f
Blr 4 - Burner 2 Supply SP	AI	127	AI	127	nvo4B2SupSP_XXX	SNVT_temp_p
Blr 4 - Burner 2 Power Level	AI	128	AI	128	nvo4B2PwrLvl_XXX	SNVT_lev_percent
Blr 4 - Burner 2 Gen Pump Status	BI	129	DI	129	nvo4B2GnPmSt_XXX	SNVT_switch
Blr 4 - Burner 2 CH Flow Rate	AI	130	AI	130	nvo4B2ChFIRt_XXX	SNVT_count_f
Blr 4 - Burner 2 Actual Fan Speed	AI	131	AI	131	nvo4B2AcFnSp_XXX	SNVT_count_f
Blr 4 - Burner 2 Supply Sensor Temp	AI	132	AI	132	nvo4B2SpSnTp_XXX	SNVT_temp_p
Blr 4 - Burner 2 Return Sensor Temp	AI	133	AI	133	nvo4B2RtSnTp_XXX	SNVT_temp_p
Blr 4 - Burner 2 Flue Sensor Temp	AI	134	AI	134	nvo4B2FISnTp_XXX	SNVT_temp_p
Blr 4 - Burner 2 Total Burn Hours	AI	135	AI	135	nvo4B2ToBnHr_XXX	SNVT_time_hour
Error Number	AI	136	AI	136	nvoErrNum_XXX	SNVT_count_f
Boiler ID	AI	137	AI	137	nvoBlrID_XXX	SNVT_count_f
Timestamp: Day Of Week	AI	138	AI	138	nvoTmDayOfWk_XXX	SNVT_count_f
Timestamp: Day Of Month	AI	139	AI	139	nvoTmDayOfMt_XXX	SNVT_count_f
Timestamp: Month	AI	140	AI	140	nvoTmMonth_XXX	SNVT_count_f
Timestamp: Year	AI	141	AI	141	nvoTmYear_XXX	SNVT_count_f
Timestamp: Hour	AI	142	AI	142	nvoTmHour_XXX	SNVT_count_f
Timestamp: Minute	AI	143	AI	143	nvoTmMinute_XXX	SNVT_count_f
Burn Hours Since Last Service	AI	144	AI	144	nvoTmSncltSv_XXX	SNVT_time_hour
Burn Hours Till Service Is Required	AI	145	AI	145	nvoBrHrSvc_XXX	SNVT_count_f
Overdue Counter 0	AI	146	AI	146	nvoOvrduCnt0_XXX	SNVT_time_hour
Service Interval	AI	147	AI	147	nvoSrvclnt_XXX	SNVT_time_hour

**APPENDIX C “A” BANK DIP SWITCH SETTINGS**

Appendix C.1 “A” Bank DIP Switch Settings

Address	A0	A1	A2	A3	A4	A5	A6	A7
1	On	Off	Off	Off	Off	Off	Off	Off
2	Off	On	Off	Off	Off	Off	Off	Off
3	On	On	Off	Off	Off	Off	Off	Off
4	Off	Off	On	Off	Off	Off	Off	Off
5	On	Off	On	Off	Off	Off	Off	Off
6	Off	On	On	Off	Off	Off	Off	Off
7	On	On	On	Off	Off	Off	Off	Off
8	Off	Off	Off	On	Off	Off	Off	Off
9	On	Off	Off	On	Off	Off	Off	Off
10	Off	On	Off	On	Off	Off	Off	Off
11	On	On	Off	On	Off	Off	Off	Off
12	Off	Off	On	On	Off	Off	Off	Off
13	On	Off	On	On	Off	Off	Off	Off
14	Off	On	On	On	Off	Off	Off	Off
15	On	On	On	On	Off	Off	Off	Off
16	Off	Off	Off	Off	On	Off	Off	Off
17	On	Off	Off	Off	On	Off	Off	Off
18	Off	On	Off	Off	On	Off	Off	Off
19	On	On	Off	Off	On	Off	Off	Off
20	Off	Off	On	Off	On	Off	Off	Off
21	On	Off	On	Off	On	Off	Off	Off
22	Off	On	On	Off	On	Off	Off	Off
23	On	On	On	Off	On	Off	Off	Off
24	Off	Off	Off	On	On	Off	Off	Off
25	On	Off	Off	On	On	Off	Off	Off
26	Off	On	Off	On	On	Off	Off	Off
27	On	On	Off	On	On	Off	Off	Off
28	Off	Off	On	On	On	Off	Off	Off
29	On	Off	On	On	On	Off	Off	Off
30	Off	On	On	On	On	Off	Off	Off
31	On	On	On	On	On	Off	Off	Off
32	Off	Off	Off	Off	Off	On	Off	Off
33	On	Off	Off	Off	Off	On	Off	Off
34	Off	On	Off	Off	Off	On	Off	Off
35	On	On	Off	Off	Off	On	Off	Off
36	Off	Off	On	Off	Off	On	Off	Off
37	On	Off	On	Off	Off	On	Off	Off
38	Off	On	On	Off	Off	On	Off	Off
39	On	On	On	Off	Off	On	Off	Off
40	Off	Off	Off	On	Off	On	Off	Off
41	On	Off	Off	On	Off	On	Off	Off
42	Off	On	Off	On	Off	On	Off	Off
43	On	On	Off	On	Off	On	Off	Off
44	Off	Off	On	On	Off	On	Off	Off
45	On	Off	On	On	Off	On	Off	Off
46	Off	On	On	On	Off	On	Off	Off

Address	A0	A1	A2	A3	A4	A5	A6	A7
47	On	On	On	On	Off	On	Off	Off
48	Off	Off	Off	Off	On	On	Off	Off
49	On	Off	Off	Off	On	On	Off	Off
50	Off	On	Off	Off	On	On	Off	Off
51	On	On	Off	Off	On	On	Off	Off
52	Off	Off	On	Off	On	On	Off	Off
53	On	Off	On	Off	On	On	Off	Off
54	Off	On	On	Off	On	On	Off	Off
55	On	On	On	Off	On	On	Off	Off
56	Off	Off	Off	On	On	On	Off	Off
57	On	Off	Off	On	On	On	Off	Off
58	Off	On	Off	On	On	On	Off	Off
59	On	On	Off	On	On	On	Off	Off
60	Off	Off	On	On	On	On	Off	Off
61	On	Off	On	On	On	On	Off	Off
62	Off	On	On	On	On	On	Off	Off
63	On	On	On	On	On	On	Off	Off
64	Off	Off	Off	Off	Off	Off	On	Off
65	On	Off	Off	Off	Off	Off	On	Off
66	Off	On	Off	Off	Off	Off	On	Off
67	On	On	Off	Off	Off	Off	On	Off
68	Off	Off	On	Off	Off	Off	On	Off
69	On	Off	On	Off	Off	Off	On	Off
70	Off	On	On	Off	Off	Off	On	Off
71	On	On	On	Off	Off	Off	On	Off
72	Off	Off	Off	On	Off	Off	On	Off
73	On	Off	Off	On	Off	Off	On	Off
74	Off	On	Off	On	Off	Off	On	Off
75	On	On	Off	On	Off	Off	On	Off
76	Off	Off	On	On	Off	Off	On	Off
77	On	Off	On	On	Off	Off	On	Off
78	Off	On	On	On	Off	Off	On	Off
79	On	On	On	On	Off	Off	On	Off
80	Off	Off	Off	Off	On	Off	On	Off
81	On	Off	Off	Off	On	Off	On	Off
82	Off	On	Off	Off	On	Off	On	Off
83	On	On	Off	Off	On	Off	On	Off
84	Off	Off	On	Off	On	Off	On	Off
85	On	Off	On	Off	On	Off	On	Off
86	Off	On	On	Off	On	Off	On	Off
87	On	On	On	Off	On	Off	On	Off
88	Off	Off	Off	On	On	Off	On	Off
89	On	Off	Off	On	On	Off	On	Off
90	Off	On	Off	On	On	Off	On	Off
91	On	On	Off	On	On	Off	On	Off
92	Off	Off	On	On	On	Off	On	Off

Address	A0	A1	A2	A3	A4	A5	A6	A7
93	On	Off	On	On	On	Off	On	Off
94	Off	On	On	On	On	Off	On	Off
95	On	On	On	On	On	Off	On	Off
96	Off	Off	Off	Off	Off	On	On	Off
97	On	Off	Off	Off	Off	On	On	Off
98	Off	On	Off	Off	Off	On	On	Off
99	On	On	Off	Off	Off	On	On	Off
100	Off	Off	On	Off	Off	On	On	Off
101	On	Off	On	Off	Off	On	On	Off
102	Off	On	On	Off	Off	On	On	Off
103	On	On	On	Off	Off	On	On	Off
104	Off	Off	Off	On	Off	On	On	Off
105	On	Off	Off	On	Off	On	On	Off
106	Off	On	Off	On	Off	On	On	Off
107	On	On	Off	On	Off	On	On	Off
108	Off	Off	On	On	Off	On	On	Off
109	On	Off	On	On	Off	On	On	Off
110	Off	On	On	On	Off	On	On	Off
111	On	On	On	On	Off	On	On	Off
112	Off	Off	Off	Off	On	On	On	Off
113	On	Off	Off	Off	On	On	On	Off
114	Off	On	Off	Off	On	On	On	Off
115	On	On	Off	Off	On	On	On	Off
116	Off	Off	On	Off	On	On	On	Off
117	On	Off	On	Off	On	On	On	Off
118	Off	On	On	Off	On	On	On	Off
119	On	On	On	Off	On	On	On	Off
120	Off	Off	Off	On	On	On	On	Off
121	On	Off	Off	On	On	On	On	Off
122	Off	On	Off	On	On	On	On	Off
123	On	On	Off	On	On	On	On	Off
124	Off	Off	On	On	On	On	On	Off
125	On	Off	On	On	On	On	On	Off
126	Off	On	On	On	On	On	On	Off
127	On	On	On	On	On	On	On	Off
128	Off	Off	Off	Off	Off	Off	Off	On
129	On	Off	Off	Off	Off	Off	Off	On
130	Off	On	Off	Off	Off	Off	Off	On
131	On	On	Off	Off	Off	Off	Off	On
132	Off	Off	On	Off	Off	Off	Off	On
133	On	Off	On	Off	Off	Off	Off	On
134	Off	On	On	Off	Off	Off	Off	On
135	On	On	On	Off	Off	Off	Off	On
136	Off	Off	Off	On	Off	Off	Off	On
137	On	Off	Off	On	Off	Off	Off	On
138	Off	On	Off	On	Off	Off	Off	On
139	On	On	Off	On	Off	Off	Off	On
140	Off	Off	On	On	Off	Off	Off	On
141	On	Off	On	On	Off	Off	Off	On
142	Off	On	On	On	Off	Off	Off	On

Address	A0	A1	A2	A3	A4	A5	A6	A7
143	On	On	On	On	Off	Off	Off	On
144	Off	Off	Off	Off	On	Off	Off	On
145	On	Off	Off	Off	On	Off	Off	On
146	Off	On	Off	Off	On	Off	Off	On
147	On	On	Off	Off	On	Off	Off	On
148	Off	Off	On	Off	On	Off	Off	On
149	On	Off	On	Off	On	Off	Off	On
150	Off	On	On	Off	On	Off	Off	On
151	On	On	On	Off	On	Off	Off	On
152	Off	Off	Off	On	On	Off	Off	On
153	On	Off	Off	On	On	Off	Off	On
154	Off	On	Off	On	On	Off	Off	On
155	On	On	Off	On	On	Off	Off	On
156	Off	Off	On	On	On	Off	Off	On
157	On	Off	On	On	On	Off	Off	On
158	Off	On	On	On	On	Off	Off	On
159	On	On	On	On	On	Off	Off	On
160	Off	Off	Off	Off	Off	On	Off	On
161	On	Off	Off	Off	Off	On	Off	On
162	Off	On	Off	Off	Off	On	Off	On
163	On	On	Off	Off	Off	On	Off	On
164	Off	Off	On	Off	Off	On	Off	On
165	On	Off	On	Off	Off	On	Off	On
166	Off	On	On	Off	Off	On	Off	On
167	On	On	On	Off	Off	On	Off	On
168	Off	Off	Off	On	Off	On	Off	On
169	On	Off	Off	On	Off	On	Off	On
170	Off	On	Off	On	Off	On	Off	On
171	On	On	Off	On	Off	On	Off	On
172	Off	Off	On	On	Off	On	Off	On
173	On	Off	On	On	Off	On	Off	On
174	Off	On	On	On	Off	On	Off	On
175	On	On	On	On	Off	On	Off	On
176	Off	Off	Off	Off	On	On	Off	On
177	On	Off	Off	Off	On	On	Off	On
178	Off	On	Off	Off	On	On	Off	On
179	On	On	Off	Off	On	On	Off	On
180	Off	Off	On	Off	On	On	Off	On
181	On	Off	On	Off	On	On	Off	On
182	Off	On	On	Off	On	On	Off	On
183	On	On	On	Off	On	On	Off	On
184	Off	Off	Off	On	On	On	Off	On
185	On	Off	Off	On	On	On	Off	On
186	Off	On	Off	On	On	On	Off	On
187	On	On	Off	On	On	On	Off	On
188	Off	Off	On	On	On	On	Off	On
189	On	Off	On	On	On	On	Off	On
190	Off	On	On	On	On	On	Off	On
191	On	On	On	On	On	On	Off	On
192	Off	Off	Off	Off	Off	Off	On	On

Address	A0	A1	A2	A3	A4	A5	A6	A7
193	On	Off	Off	Off	Off	Off	On	On
194	Off	On	Off	Off	Off	Off	On	On
195	On	On	Off	Off	Off	Off	On	On
196	Off	Off	On	Off	Off	Off	On	On
197	On	Off	On	Off	Off	Off	On	On
198	Off	On	On	Off	Off	Off	On	On
199	On	On	On	Off	Off	Off	On	On
200	Off	Off	Off	On	Off	Off	On	On
201	On	Off	Off	On	Off	Off	On	On
202	Off	On	Off	On	Off	Off	On	On
203	On	On	Off	On	Off	Off	On	On
204	Off	Off	On	On	Off	Off	On	On
205	On	Off	On	On	Off	Off	On	On
206	Off	On	On	On	Off	Off	On	On
207	On	On	On	On	Off	Off	On	On
208	Off	Off	Off	Off	On	Off	On	On
209	On	Off	Off	Off	On	Off	On	On
210	Off	On	Off	Off	On	Off	On	On
211	On	On	Off	Off	On	Off	On	On
212	Off	Off	On	Off	On	Off	On	On
213	On	Off	On	Off	On	Off	On	On
214	Off	On	On	Off	On	Off	On	On
215	On	On	On	Off	On	Off	On	On
216	Off	Off	Off	On	On	Off	On	On
217	On	Off	Off	On	On	Off	On	On
218	Off	On	Off	On	On	Off	On	On
219	On	On	Off	On	On	Off	On	On
220	Off	Off	On	On	On	Off	On	On
221	On	Off	On	On	On	Off	On	On
222	Off	On	On	On	On	Off	On	On
223	On	On	On	On	On	Off	On	On
224	Off	Off	Off	Off	Off	On	On	On
225	On	Off	Off	Off	Off	On	On	On
226	Off	On	Off	Off	Off	On	On	On
227	On	On	Off	Off	Off	On	On	On
228	Off	Off	On	Off	Off	On	On	On
229	On	Off	On	Off	Off	On	On	On
230	Off	On	On	Off	Off	On	On	On
231	On	On	On	Off	Off	On	On	On
232	Off	Off	Off	On	Off	On	On	On
233	On	Off	Off	On	Off	On	On	On
234	Off	On	Off	On	Off	On	On	On
235	On	On	Off	On	Off	On	On	On
236	Off	Off	On	On	Off	On	On	On
237	On	Off	On	On	Off	On	On	On
238	Off	On	On	On	Off	On	On	On
239	On	On	On	On	Off	On	On	On
240	Off	Off	Off	Off	On	On	On	On
241	On	Off	Off	Off	On	On	On	On
242	Off	On	Off	Off	On	On	On	On

Address	A0	A1	A2	A3	A4	A5	A6	A7
243	On	On	Off	Off	On	On	On	On
244	Off	Off	On	Off	On	On	On	On
245	On	Off	On	Off	On	On	On	On
246	Off	On	On	Off	On	On	On	On
247	On	On	On	Off	On	On	On	On
248	Off	Off	Off	On	On	On	On	On
249	On	Off	Off	On	On	On	On	On
250	Off	On	Off	On	On	On	On	On
251	On	On	Off	On	On	On	On	On
252	Off	Off	On	On	On	On	On	On
253	On	Off	On	On	On	On	On	On
254	Off	On	On	On	On	On	On	On
255	On	On	On	On	On	On	On	On

**APPENDIX D REFERENCE**

Appendix D.1 Specifications



	ProtoNode FPC-N38	ProtoNode FPC-N39
<b>Electrical Connections</b>	One 6-pin Phoenix connector with: RS-232 port (Tx / Rx / gnd) Power port (+ / - / Frame-gnd) One 3-pin Phoenix connector with RS-485 port (+ / - / gnd) One Ethernet 10/100 BaseT port	One 6-pin Phoenix connector with: RS-232 port (Tx / Rx / gnd) Power port (+ / - / Frame-gnd) One 2-pin Phoenix connector with: One FTT-10 LonWorks port One Ethernet 10/100 BaseT port
<b>Approvals</b>	CE Certified; TUV approved to UL 916, EN 60950-1, EN 50491-3 and CSA C22-2 standards; FCC Class A Part 15; DNP 3.0 Conformance Tested; RoHS Compliant; CSA 205 Approved	
	BTL Marked	LonMark Certified
<b>Power Requirements</b>	Multi-mode power adapter: 9-30V DC or 12 - 24V AC	
<b>Physical Dimensions</b>	11.5 cm L x 8.3 cm W x 4.1 cm H (4.5 x 3.2 x 1.6 in.)	
<b>Weight</b>	0.2 kg (0.4 lbs)	
<b>Operating Temperature</b>	-40°C to 75°C (-40°F to 167°F)	
<b>Surge Suppression</b>	EN61000-4-2 ESD EN61000-4-3 EMC EN61000-4-4 EFT	
<b>Humidity</b>	5 - 90% RH (non-condensing)	
(Specifications subject to change without notice)		
<b>Figure 44: Specifications</b>		

Appendix D.1.1 Compliance with UL Regulations

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

- The units shall be powered by listed LPS or Class 2 power supply suited to the expected operating temperature range.
- The interconnecting power connector and power cable shall:
  - Comply with local electrical code
  - Be suited to the expected operating temperature range
  - Meet the current and voltage rating for ProtoNode
- Furthermore, the interconnecting power cable shall:
  - Be of length not exceeding 3.05m (118.3")
  - Be constructed of materials rated VW-1, FT-1 or better
- If the unit is to be installed in an operating environment with a temperature above 65 °C, it should be installed in a Restricted Access Area requiring a key or a special tool to gain access.
- This device must not be connected to a LAN segment with outdoor wiring.

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**APPENDIX E LIMITED 2 YEAR WARRANTY**

Sierra Monitor Corporation warrants its products to be free from defects in workmanship or material under normal use and service for two years after date of shipment. Sierra Monitor Corporation 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 Sierra Monitor Corporation 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 Sierra Monitor Corporation'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 Sierra Monitor Corporation'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, Sierra Monitor Corporation 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 Sierra Monitor Corporation for damages including, but not limited to, consequential damages arising out of/or in connection with the use or performance of the product.