ProtoNode FPC-N34 and ProtoNode FPC-N35 Startup Guide For Interfacing Customer Products: OnTrac, TempTrac, XR10CX and EOS Water Heater To Building Automation Systems: BACnet MS/TP, BACnet/IP, Modbus TCP/IP, Modbus RTU and LonWorks

APPLICABILITY & EFFECTIVITY

Explains ProtoNode FPC-N34 and FPC-N35 hardware and how to install it.

The instructions are effective for the above as of January 2016.

Document Revision: 2
Web Configurator
Template Revision: 51

PV500-43 01/2021

Technical Support:

Thank you for purchasing the ProtoNode for PVI.

Please call PVI for Technical support of the ProtoNode product.

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

Support Contact Information:

PVI Industries
425 W Everman Pkwy Ste.101
Fort Worth, TX 76134

Customer Service:

(800) 433-5654

Email: CustomerCare@pvi.com

Website: www.PVI.com

A Quick Start Guide

1. Record the information about the unit. (Section 2.1)
2. Set the device's Modbus RTU serial settings (i.e. baud rate, parity, stop bits and Modbus Node-ID's for each of the devices that will be connected to ProtoNode FPC-N34 or FPC-N35. (Section 2.3)
3. ProtoNode FPC-N34 units: Select the Field Protocol (BACnet MS/TP, BACnet/IP, Modbus TCP/IP or Modbus RTU) on the S Bank Dip Switches. (Section 2.4)
4. BACnet MS/TP (FPC-N34): Set the MAC Address on DIP Switch Bank A. (Section 2.5.1)
5. BACnet MS/TP or BACnet/IP (FPC-N34): Set the BACnet Device Instance. (Section 2.5.2)
6. Metasys N2 (FPC-N34): Set the Node-ID. (**Section** 2.5.3)
7. BACnet MS/TP (FPC-N34): Set the BAUD rate of the BACnet MS/TP Field Protocol on DIP Switch Bank B. (Section 2.5.4)
8. **Connect ProtoNode FPC-N34's** 3 pin RS-485 port to the Field Protocol cabling,
   or connect ProtoNode FPC-N35's 2 pin LonWorks port to the Field Protocol cabling. (Section 3.1)
9. Connect ProtoNode 6 pin RS-485 connector to the Modbus RS-485 network that is connected to each of the devices. (Section 3.2)
10. Connect Power to ProtoNode 6 pin connector. (Section 3.5)
11. Use a browser to access the ProtoNode's embedded tool, which is referred to in this manual as the Web Configurator, to select the devices that will be attached to ProtoNode and set the current Modbus Node-ID for each these products. Once the devices are selected, the ProtoNode Automatically builds and loads the Configuration for the devices. (Section 4)
12. BACnet/IP or Modbus TCP/IP (FPC-N34): Use a browser to access the ProtoNode Web Configurator to change the IP Address. No changes to the configuration are necessary. (Section 5)
13. LonWorks (FPC-N35): The ProtoNode must be commissioned on the LonWorks Network. This needs to be done by the LonWorks administrator using a LonWorks Commissioning tool. (Section 7)

Certifications

BTL MARK – BACNET TESTING LABORATORY

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

Go to http://www.BACnetInternational.net/btl/ for more information about the BACnet Testing Laboratory. Click here for BACnet PIC Statement.

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.

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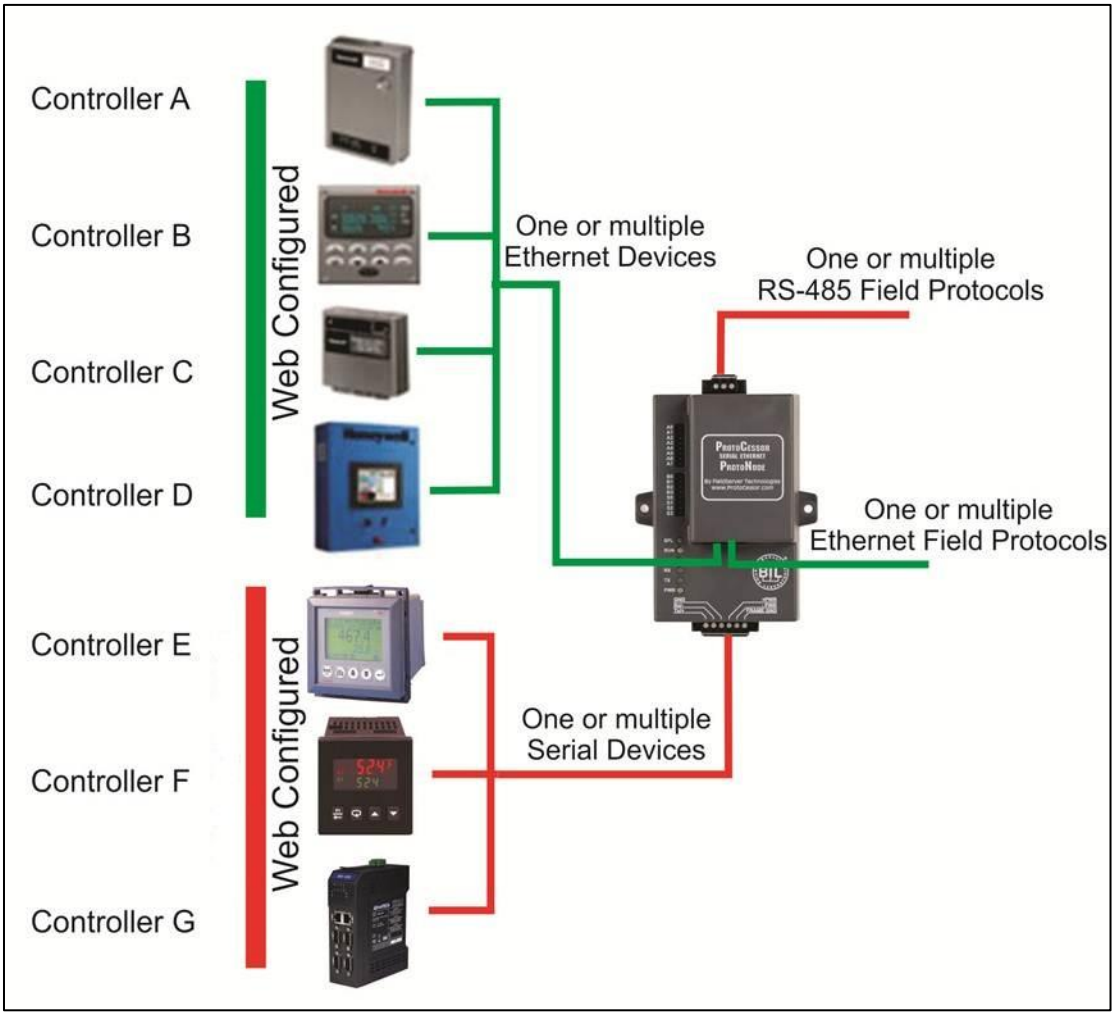
1 INTRODUCTION

1.1 ProtoNode Gateway

ProtoNode is an external, high performance **Building Automation multi-protocol gateway** that is preconfigured to automatically communicate between PVI's products (hereafter called "device") connected to the ProtoNode and automatically configures them for BACnet®[1]MS/TP, BACnet/IP Modbus TCP/IP, Modbus RTU or LonWorks®[2].

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.



[1] BACnet is a registered trademark of ASHRAE
[2] LonWorks is a registered trademark of Echelon Corporation

2 BACNET/LONWORKS SETUP FOR PROTOCESSOR PROTONODE FPC-N34/FPC-N35

2.1 Record Identification Data

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

Model	Part Number
ProtoNode FPC-N34	FPC-N34-0481
ProtoNode FPC-N35	FPC-N35-0589

Figure 1: ProtoCessor Part Numbers

- FPC-N34 units have the following 3 ports: RS-485 + Ethernet + RS-485
- FPC-N35 units have the following 3 ports: LonWorks + Ethernet + RS-485

2.2 Point Count Capacity and Registers per Device

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

Part number	Total Registers
FPC-N34-0481	1,500
FPC-N35-0589	1,500

Figure 2: Supported Point Count Capacity

Devices	Registers Per Device
OnTrac	757
TempTrac	38
XR10CX	11
EOS Water Heater	63

Figure 3: Modbus Registers per Device

2.3 Configuring Device Communications

2.3.1 Set Modbus COM setting on all of the devices connected to the ProtoNode

- All of the serial devices connected to ProtoNode **MUST have the same Baud Rate, Data Bits, Stop Bits, and Parity settings.**
- **Modbus TCP/IP device must be on the same subnet as the ProtoNode.**
- **Figure 4** specifies the device serial port settings required to communicate with the ProtoNode.

Serial Port Setting	OnTrac	TempTrac	XR10CX	EOS Water Heater
Protocol	Modbus TCP/IP	Modbus RTU	Modbus RTU	Modbus RTU
Baud Rate	N/A	9600	9600	19200
Parity	N/A	None	None	Even
Data Bits	N/A	8	8	8
Stop Bits	N/A	1	1	1

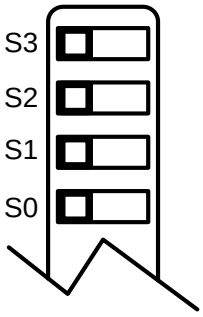
Figure 4: Modbus COM Settings

2.3.2 Set Modbus Node-ID for each of the Devices attached to the ProtoNode

- Set Modbus RTU Node-ID for each of the devices attached to ProtoNode. The Modbus Node-ID's need to be uniquely assigned between 1 and 255.
    - **The Modbus Node-ID that is assigned for each device needs to be documented.**
        - The Modbus Node-ID's assigned are used for designating the Device Instance for BACnet/IP and BACnet MS/TP (Section **2.5.2**)
- Modbus TCP/IP Node-ID will be set to same value as the Node-ID of the Modbus RTU device.

2.4 Selecting the Desired Field Protocol

- ProtoNode FPC-N34 units use the “S” bank of DIP switches (S0 – S3) to select the Field Protocol.
  - See the table in **Figure 5** for the switch settings to select BACnet MS/TP, BACnet/IP, Modbus TCP/IP or Modbus RTU.
  - The OFF position is when the DIP switches are set closest to the outside of the box.
- ProtoNode FPC-N35 units do not use the “S” bank DIP switches (S0 – S3) to select a Field Protocol.
  - On ProtoNode FPC-N35 units, these switches are disabled; the Field Protocol is always LonWorks.



S0 – S3 DIP Switches

S Bank DIP Switch Location

ProtoNode FPC-N34	S Bank DIP Switches			
Profile	**S0**	**S1**	**S2**	**S3**
BACnet/IP	Off	Off	Off	Off
BACnet MS/TP	On	Off	Off	Off
Modbus TCP/IP	Off	On	Off	Off
Modbus RTU	On	On	Off	Off

BACnet MS/TP, BACnet/IP, Modbus TCP/IP, or Modbus RTU for ProtoNode FPC-N34

Figure 5: S Bank DIP Switches

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

2.5.1 BACnet MS/TP (FPC-N34): Setting the MAC Address for BMS Network

- Only 1 MAC address is set for ProtoNode regardless of how many devices are connected to ProtoNode.
- Set the BACnet MS/TP MAC address of the ProtoNode to a value between 1 to 127 (Master MAC address); this is so that the BMS Front End can find ProtoNode via BACnet auto discovery.

NOTE: **Never set a BACnet MS/TP MAC Address of the ProtoNode to a value 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.
- Please refer to Error! Reference source not found. for the complete range of MAC Addresses a nd DIP switch settings.
- **When using Modbus TCP/IP, the A Bank of DIP switches are disabled and not used. They should be set to OFF**.

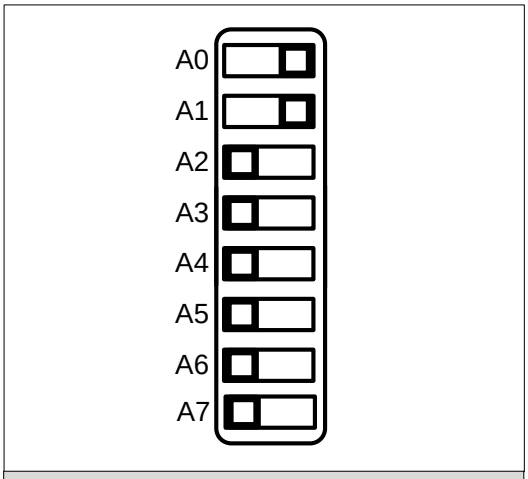


Figure 6: MAC Address DIP Switches

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

2.5.2 BACnet MS/TP and BACnet/IP (FPC-N34): Setting the Device Instance

- The BACnet Device Instances will be calculated by adding the Node_Offset (default value is 50,000) to the device's Modbus Node ID (that was assigned in Section 2.3.2).
- The BACnet Device Instance can range from 1 to 4,194,303.
- **To assign specific Device Instance values, change the Node_Offset value. (Section 2.3.2)**

  For example:
  - Node_Offset value (default) = 50,000
  - Device 1 has a Modbus Node-ID of 1
  - Device 2 has a Modbus Node-ID of 22
  - Device 3 has a Modbus Node-ID of 33
  - **Given that: Device Instance = Node_Offset + Modbus Node_ID**
  - Device Instance, Device 1 = 50,000 + 1 = 50,001
  - Device Instance, Device 2 = 50,000 + 22 = 50,022
  - Device Instance, Device 3 = 50,000 + 33 = 50,033

2.5.2.1 BACnet MS/TP or BACnet/IP: Assigning Specific Device Instances

- With the default Node_Offset value of 50,000 the Device Instances values generated will be within the range of 50,001 to 50,127.
- 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.
- **Methods for changing the Node_Offset value are provided in Section 5.**
  - This step cannot be performed until after the unit is connected and powered.

2.5.3 Modbus TCP/IP (FPC-N34): Setting the Node-ID

- The Modbus RTU Node-ID's assigned to the devices attached to the ProtoNode in **Section 2.3.2** will be the Modbus TCP/IP Node-ID's for the field protocols.
- Modbus TCP/IP Node-ID Addressing: Modbus TCP/IP Node-ID's range from 1-255.

2.5.4 BACnet MS/TP (FPC-N34): Setting the Baud Rate for BMS Network

- "B" bank DIP switches B0 – B3 can be used to set the Field baud rate of the ProtoNode to match the baud rate required by the Building Management System for BACnet MS/TP.
- "B" bank DIP switches B0 – B3 are disabled on ProtoNode FPC-N35 (LonWorks).

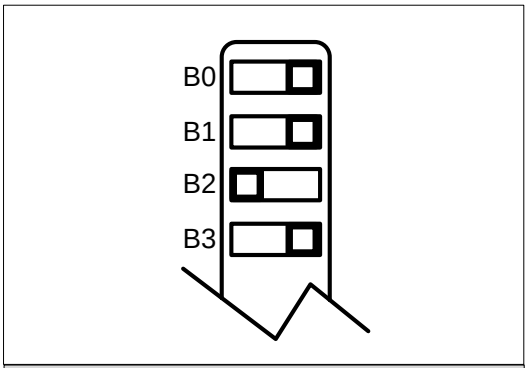


Figure 7: Baud Rate DIP Switches

2.5.4.1 Baud Rate DIP Switch Selection

Baud	B0	B1	B2	B3
9600	On	On	On	Off
19200	Off	Off	Off	On
38400*	**On**	**On**	**Off**	**On**
57600	Off	Off	On	On
76800	On	Off	On	On

Figure 8: BMS Baud Rate

* Factory default setting = 38,400

3 INTERFACING PROTONODE TO DEVICES

3.1 ProtoNode FPC-N34 and FPC-N35 Showing Connection Ports

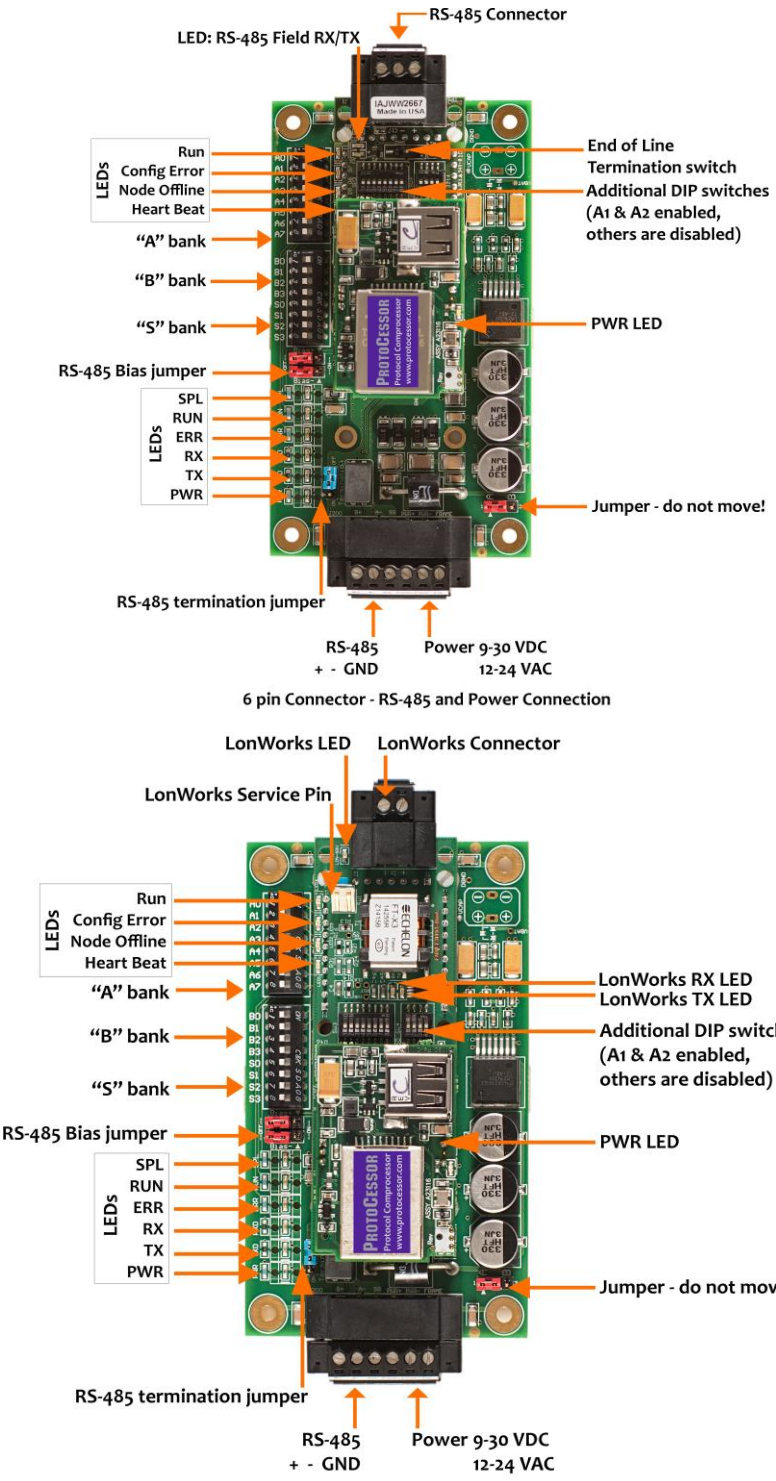


Figure 9: ProtoNode BACnet FPC-N34 (upper) and ProtoNode FPC-N35 (lower)

3.2 Device Connections to ProtoNode

ProtoNode 6 Pin Phoenix connector for RS-485 Devices

- The 6 pin Phoenix connector is the same for ProtoNode FPC-N34 (BACnet) and FPC-N35 (LonWorks).
- Pins 1 through 3 are for Modbus RS-485 devices.
  - The RS-485 GND (Pin 3) is not typically connected.
- Pins 4 through 6 are for power. **Do not connect power** (wait until **Section 3.5**).

Device Pins	ProtoNode Pin #	Pin assignment
Pin RS-485 +	Pin 1	RS-485 +
Pin RS-485 -	Pin 2	RS-485 -
Pin GND	Pin 3	RS-485 GND
Power In (+)	Pin 4	V +
Power In (-)	Pin 5	V -
Frame Ground	Pin 6	FRAME GND

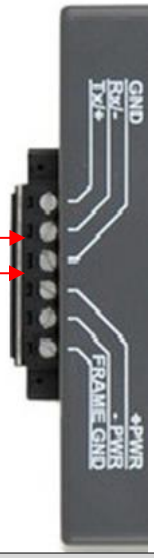


Figure 10: Power and RS-485 Connections

3.2.1 Biasing the Modbus RS-485 Device Network

- An RS-485 network with more than one device needs to have biasing to ensure proper communication. The biasing only needs to be done on one device.
- The ProtoNode has 510 Ohm resistors that can be used to set the biasing. The ProtoNode's default positions from the factory for the biasing jumpers are OFF.
- The OFF position is when the 2 RED biasing jumpers straddle the 4 pins closest to the outside of the board of the ProtoNode. (**Figure 11**).
- **Only turn biasing ON:**
  - **IF the BMS cannot see more than one device connected to the ProtoNode**
  - **AND all the settings (Modbus COM settings, wiring, and DIP switches) have been checked.**
- To turn biasing ON, move the 2 RED biasing jumpers to straddle the 4 pins closest to the inside of the board of the ProtoNode.

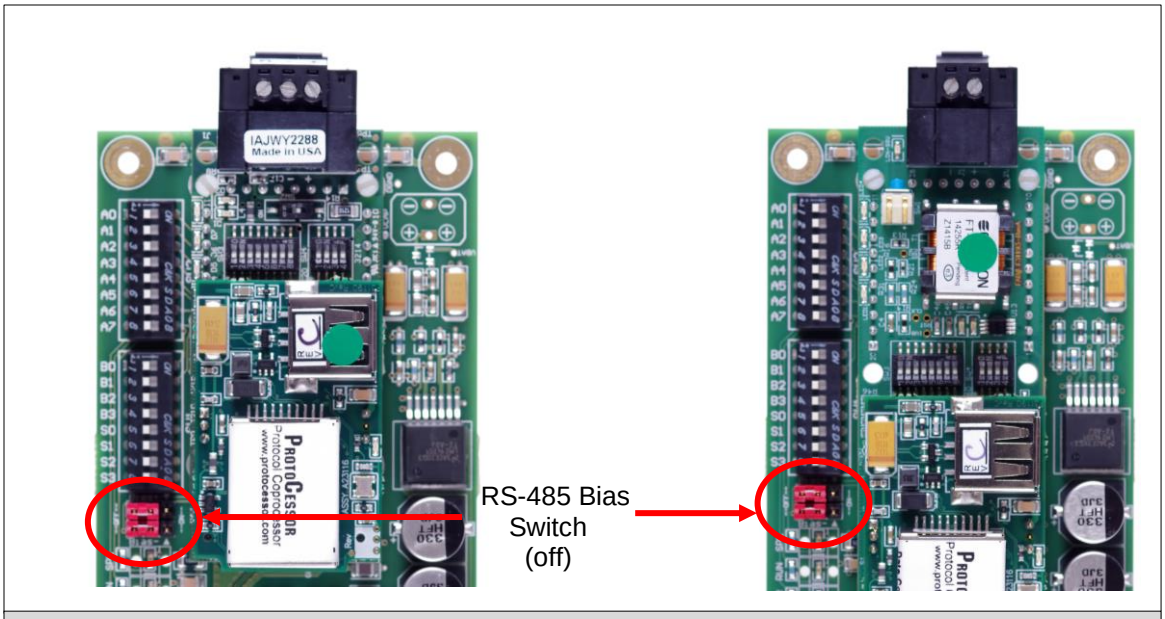


Figure 11: Modbus RS-485 Biasing Switch on the ProtoNode N34 (left) and ProtoNode N35 (right)

3.2.2 End of Line Termination Switch for the Modbus RS-485 Device Network

- On long RS-485 cabling runs, the RS-485 trunk must be properly terminated at each end.
- The ProtoNode has an End Of Line (EOL) blue jumper. The default setting for this Blue EOL switch is OFF with the jumper straddling the pins closest to the inside of the board of the ProtoNode.
    - On short cabling runs the EOL switch does not to need to be turned ON.
- **If the ProtoNode is placed at one of the ends of the trunk, set the blue EOL jumper to the ON position straddling the pins closest to the outside of the board of the ProtoNode.**
- **Always leave the single Red Jumper in the A position (default factory setting).**

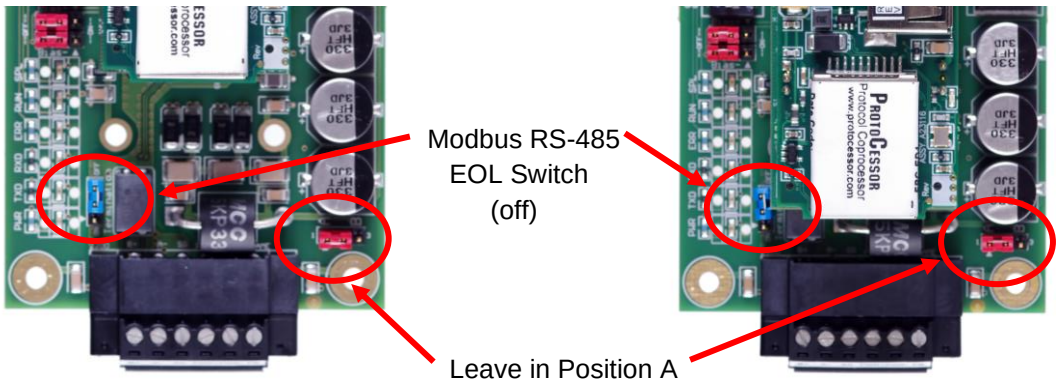


Figure 12: Modbus RS-485 End-Of-Line Termination Switch on the ProtoNode N34 (left) and ProtoNode N35 (right)

3.3 BACnet MS/TP (FPC-N34): Wiring Field Port to RS-485 Network

- Connect the BACnet MS/TP RS-485 network wires to the 3-pin RS-485 connector on ProtoNode FPC-N34 as shown below in **Figure 13**.
  - The RS-485 GND (Pin 3) is not typically connected.
- See **Section 5** for information on connecting to BACnet/IP network.
- If the ProtoNode is the last device on the BACnet MS/TP trunk, then the End-Of-Line Termination Switch needs to be enabled (**Figure 14**).
  - 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).

BMS RS-485 Wiring	ProtoNode Pin #	Pin Assignment
RS-485 +	Pin 1	RS-485 +
RS-485 -	Pin 2	RS-485 -
-	Pin 3	RS-485 GND

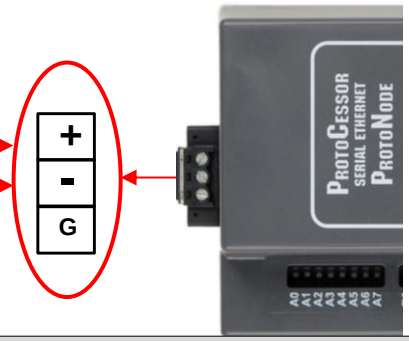


Figure 13: Connection from ProtoNode to RS-485 Field Network

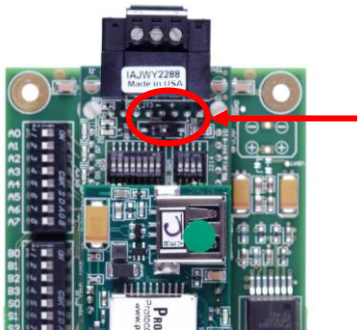


Figure 14: RS-485 BMS Network EOL Switch

3.4 LonWorks (FPC-N35): Wiring Field Port to LonWorks Network

- Connect ProtoNode to the field network with the LonWorks terminal using a twisted pair non-shielded cable. LonWorks has no polarity.

Figure 15: LonWorks Terminal

3.5 Power-Up ProtoNode

Apply power to ProtoNode as show below in **Figure 17**. Ensure that the power supply used complies with the specifications provided in **Appendix D.1**.

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

Power Requirement for ProtoNode External Gateway			
	Current Draw Type		
ProtoNode Family	12VDC/VAC	24VDC/VAC	30VDC
FPC – N34	170mA	100mA	80mA
FPC – N34 (Maximum)	240mA	140mA	100mA
FPC – N35 (Typical)	210mA	130mA	90mA
FPC – N35 (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 16: Required current draw for the ProtoNode

Power to ProtoNode	**ProtoNode Pin #**	**Pin Assignment**
Power In (+)	Pin 4	V +
Power In (-)	Pin 5	V -
Frame Ground	Pin 6	FRAME GND

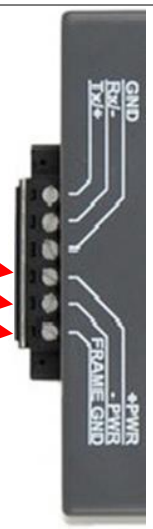


Figure 17: Power Connections

4 USE PROTONODE WEB CONFIGURATOR TO SELECT DEVICE PROFILES

4.1 Connect the PC to ProtoNode via the Ethernet Port

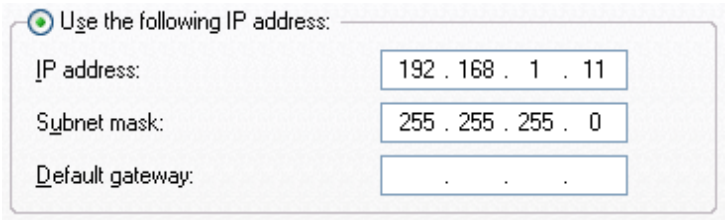
- Connect a CAT5 Ethernet cable (Straight through or Cross-Over) between the PC and ProtoNode.
- The Default IP Address of ProtoNode is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and ProtoNode are on different IP Networks, assign a static IP Address to the PC on the 192.168.1.xxx network.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

> 

> 

- Right-click on Local Area Connection > Properties
- Highlight 

- Select: Use the following IP Address



- Click 

twice

4.2 Connecting to ProtoNode Web Configurator

- After setting a local PC on the same subnet as the ProtoNode (**Section 4.1**), 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 must be gathered from the network administrator.

4.2.1 Selecting Profiles for Devices Connected to ProtoNode

NOTE: If Modbus TCP/IP was selected in Section 2.4 for the Field/BMS protocol, skip this section. Device profiles are NOT used for Modbus TCP/IP.

- In the Web Configurator, the Active Profiles section is shown on the lower left side of the screen.
- The Active Profiles section lists the currently active device profiles, including previous Web Configurator additions and any devices identified by Auto-Discovery configuration methods. This list will be empty for new installations, or after clearing all configurations. (**Figure 18**)
- To add an active profile to support a device, click the ADD button under Active Profiles. This will present a drop-down box underneath the Current Profile column that lists all the available profiles. (**Figure 19**)
- For every device that is added, assign a unique Modbus 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.

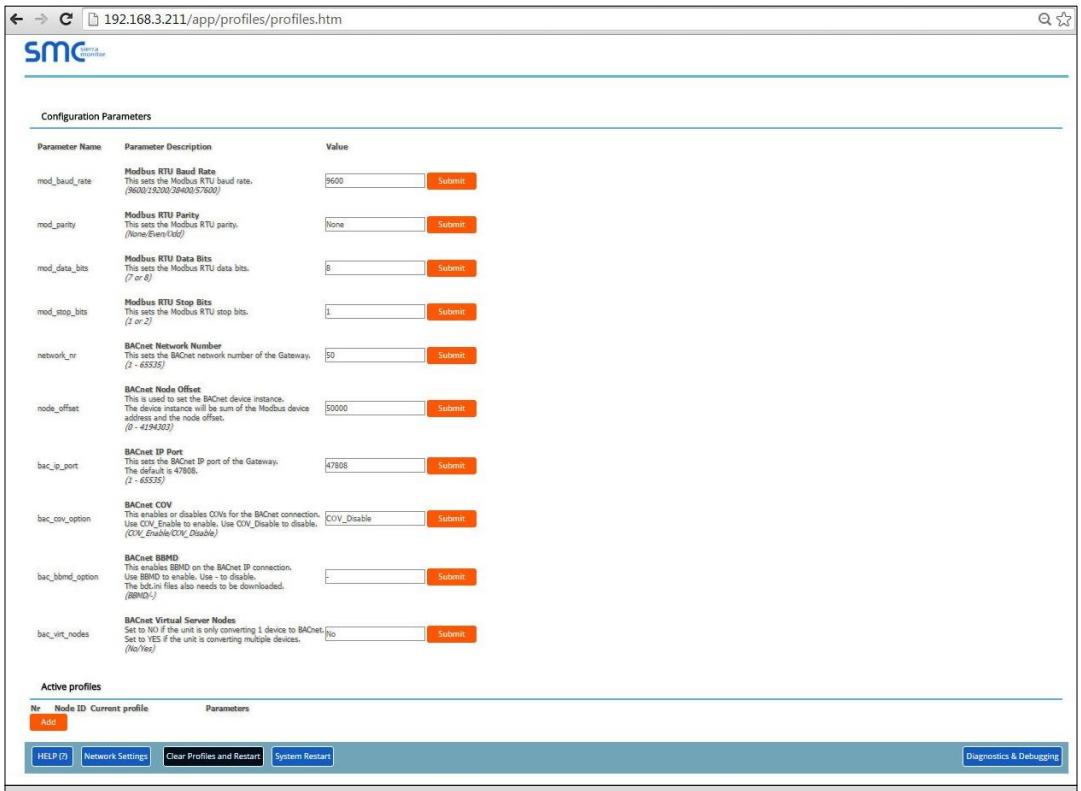


Figure 18: Web Configurator Showing no Active Profiles

- Once the Profile for the device has been selected from the drop-down list, enter the value of the device's Modbus Node-ID which was assigned in **Section** 2.3.2.

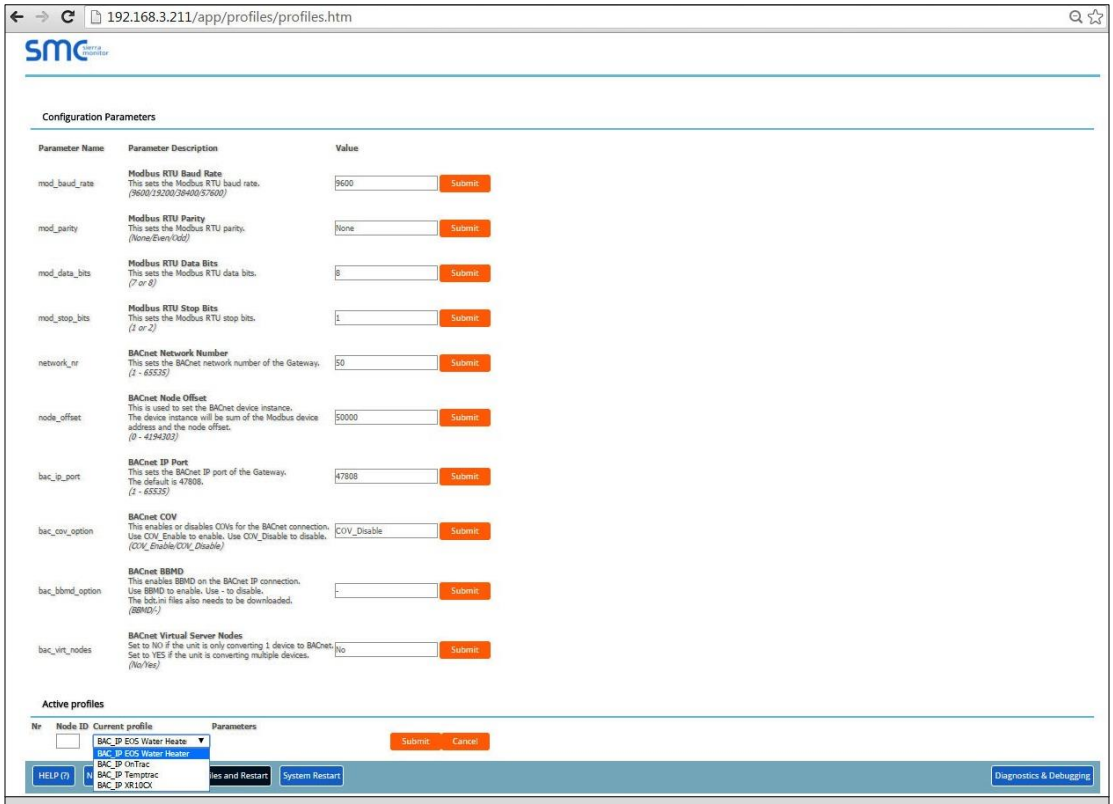


Figure 19: Web Configurator Showing Available Profile Selection

- 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 will be listed under Active Profiles as show in **Figure 20**.

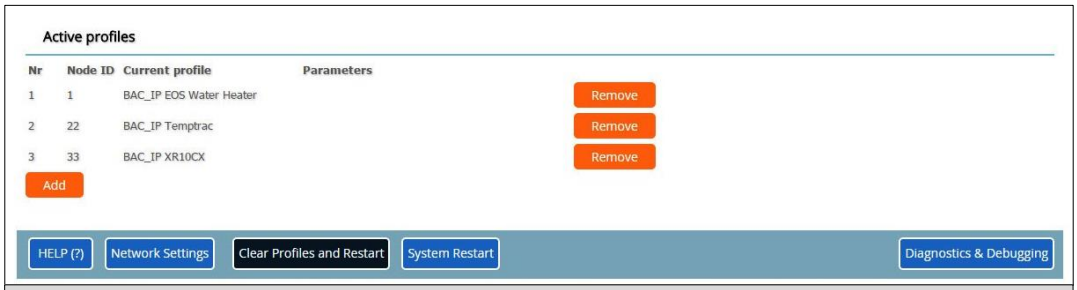


Figure 20: Web Configurator Showing an Active Profile Addition

4.3 BACnet/IP and Modbus TCP/IP: Setting IP Address for Field Network

- After setting a local PC to the same subnet as the ProtoNode (**Section 4.1**), 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 21**)
- **To access the Web GUI, click on the "Diagnostics & Debugging" button** in the bottom right side of the page.

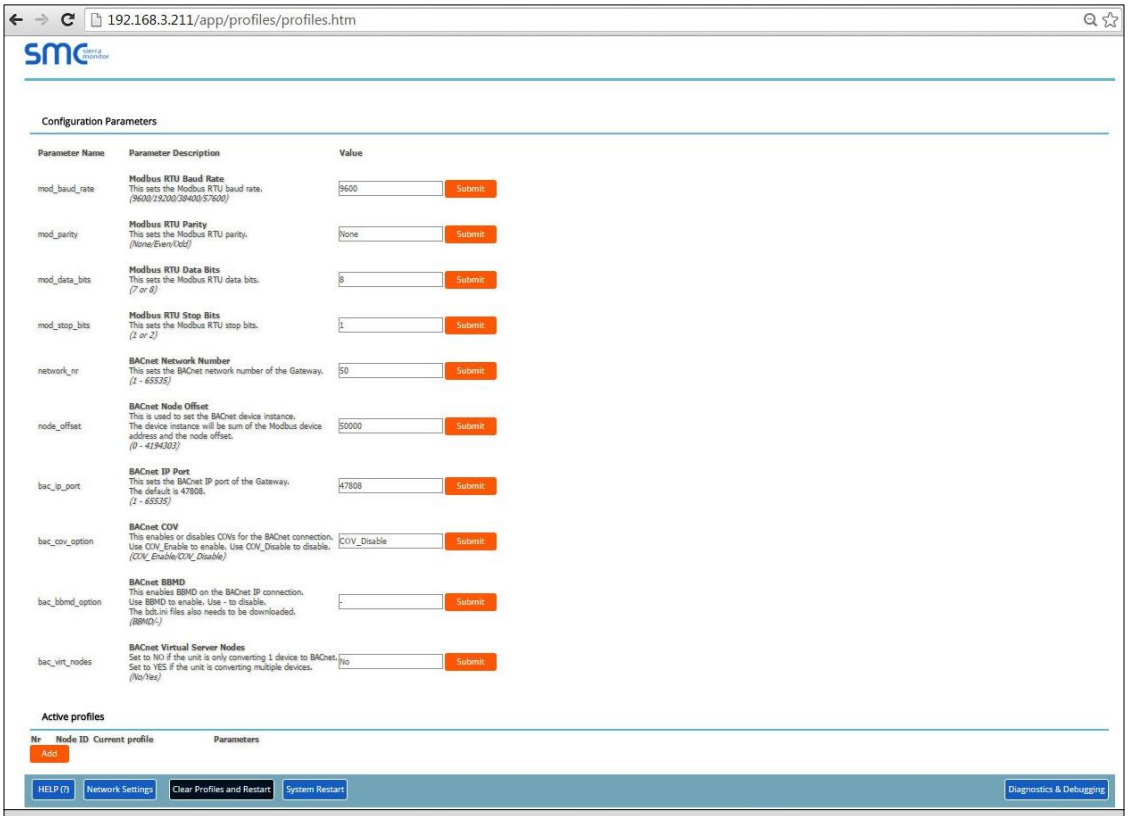


Figure 21: Web Configurator Screen

- From the Web GUI landing page, click on “Setup” to expand the navigation tree and then select “Network Settings” to access the IP Settings menu. (Figure 22)

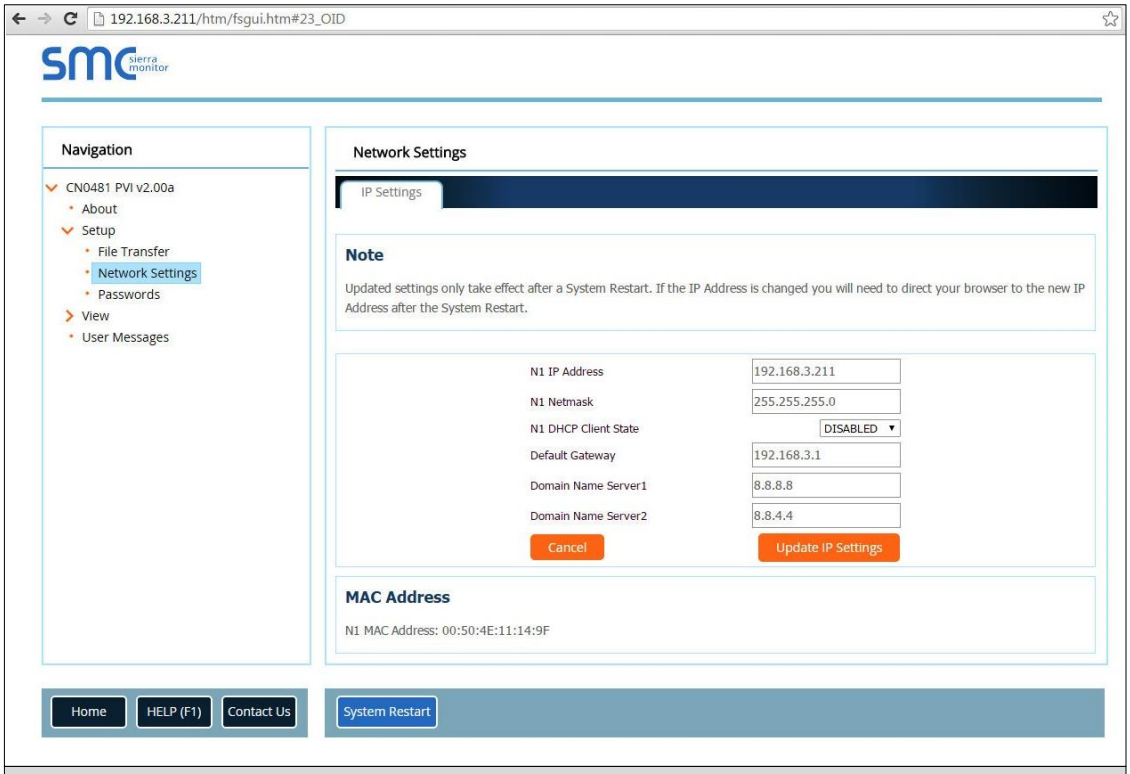


Figure 22: Changing IP Address via Web GUI

- Modify the IP Address (N1 IP Address field) of the ProtoNode Ethernet port.
- If necessary, change the Netmask (N1 Netmask field).
- Type in a new Subnet Mask.
- If necessary, change the IP Gateway (Default Gateway field).
- Type in a new IP Gateway.

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

- Reset ProtoNode.
- Unplug Ethernet cable from PC and connect it to the network hub or router.
- **Record the IP Address assigned to the ProtoNode for future reference.**

5 BACNET MS/TP AND BACNET/IP: SETTING NODE_OFFSET TO ASSIGN SPECIFIC DEVICE INSTANCES

- After setting a local PC to be on the same subnet as the ProtoNode (**Section 4.1**), 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 must be gathered from the network administrator.
- The Web Configurator is displayed as the landing page. (**Figure 21**)
- Node_Offset field will be presented displaying the current value (default = 50,000).
- Change the value of Node_Offset to establish the desired Device Instance values, and click SUBMIT.
    - Given that: **Device Instance = Node_Offset + Modbus Node_ID**
    - Then: **Node_Offset (required) = Device Instance (desired) – Modbus Node_ID**

For example, if the desired Device Instance for the 1st device is 1,001:

- Device 1 has a Modbus Node-ID of 1
- Device 2 has a Modbus Node-ID of 22
- Device 3 has a Modbus Node-ID of 33
- **Node_Offset (required) = 1,001 – (Modbus Node_ID) = 1,001 – 1 = 1,000**

NOTE: The Node_Offset value will be applied to all devices.

- Device 1 Instance will then be = 1,000 + Modbus Node_ID = 1,000 + 1 = 1,001
- Device 2 Instance will then be = 1,000 + Modbus Node_ID = 1,000 + 22 = 1,022
- Device 3 Instance will then be = 1,000 + Modbus Node_ID = 1,000 + 33 = 1,033

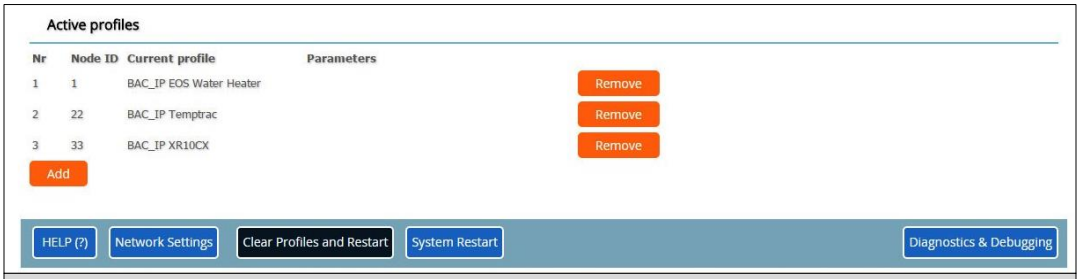


Figure 23: Web Configurator screen

6 HOW TO START THE INSTALLATION OVER: CLEARING PROFILES

- After setting a local PC to the same subnet as the ProtoNode (Section 4.1), 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 must be gathered 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.

7 LONWORKS (FPC-N35): COMMISSIONING PROTONODE ON A LONWORKS NETWORK

Commissioning may only be performed by the LonWorks administrator.

7.1 Commissioning ProtoNode FPC-N35 on a LonWorks Network

The User will be prompted by the LonWorks Administrator to hit the Service Pin on the ProtoNode FPC-N35 at the correct step of the Commissioning process which is different for each LonWorks Network Management Tool.

- If an XIF file is required, see steps in **Section** 7.1.1 to generate XIF.

Figure 24: LonWorks Service Pin Location

7.1.1 Instructions to Download XIF File from ProtoNode FPC-N35 Using Browser

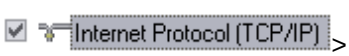
- Connect a CAT5 Ethernet cable (Straight through or Cross-Over) between the PC and ProtoNode.
- The Default IP Address of ProtoNode is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and ProtoNode are on different IP Networks, assign a static IP Address to the PC on the 192.168.1.xxx network.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

  Go to 

  > 

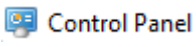
  > 

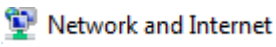
  Right-click on Local Area Connection > Properties

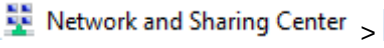
  Highlight 

  > 

- For Windows 7:

  Go to 
  > 

  > 

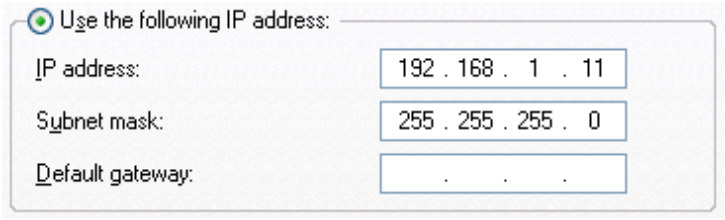
  > 

  Right-click on Local Area Connection > Properties

  Highlight 

  > 

- For Windows XP and Windows 7, use the following IP Address:



- Click OK twice.
- Open a web browser and go to the following address: IP Address of ProtoCessor/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”.

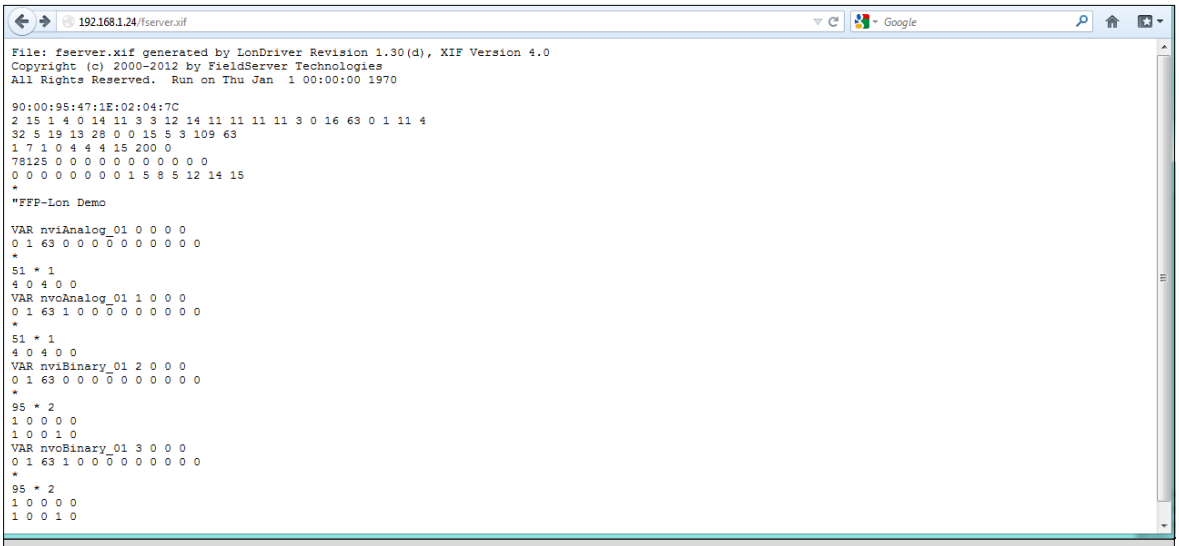


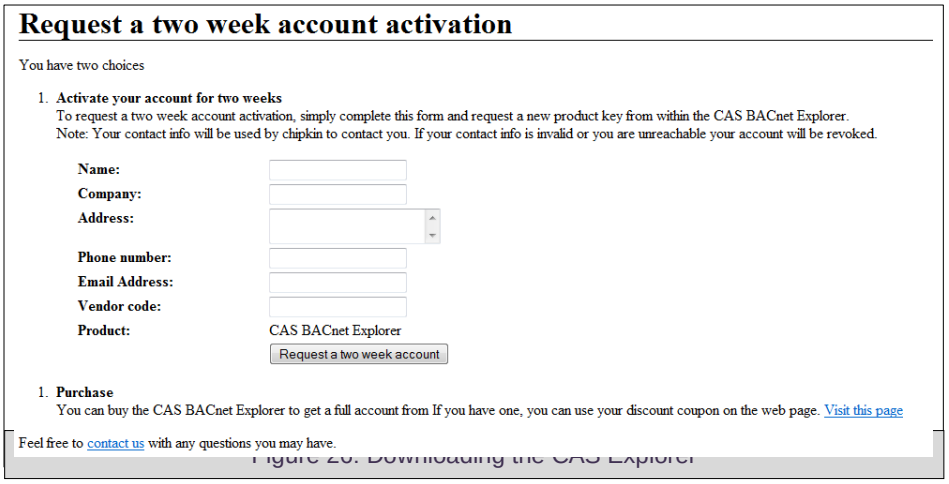
Figure 25: Sample of Fserver.XIF File Generated

8 CAS BACNET EXPLORER FOR VALIDATING PROTONODE IN THE FIELD

ProtoCessor has arranged a complementary 2 week fully functional copy of CAS BACnet Explorer (through Chipkin Automation) that can be used to validate BACnet MS/TP and/or BACnet/IP communications of ProtoNode in the field without having to have the BMS Integrator on site. A serial or USB to RS-485 converter is needed to test BACnet MS/TP.

8.1 Downloading the CAS Explorer and Requesting an Activation Key

- To request the complementary BACnet CAS key, go to http://app.chipkin.com/activation/twoweek/ and fill in all the information. **Enter Vendor Code "PVI2BACnet".** Once completed, the email address that was submitted will be registered.



- Go to the following web site, download and install the CAS BACnet Explorer to the local PC: http://www.chipkin.com/technical-resources/cas-bacnet-explorer/
- Open CAS BACnet Explorer; in the CAS Activation form, enter the email address that was registered and click on "Request a key". The CAS key will then be emailed to the registered address. Cut/paste key from email into the Product key field and click "Activate".

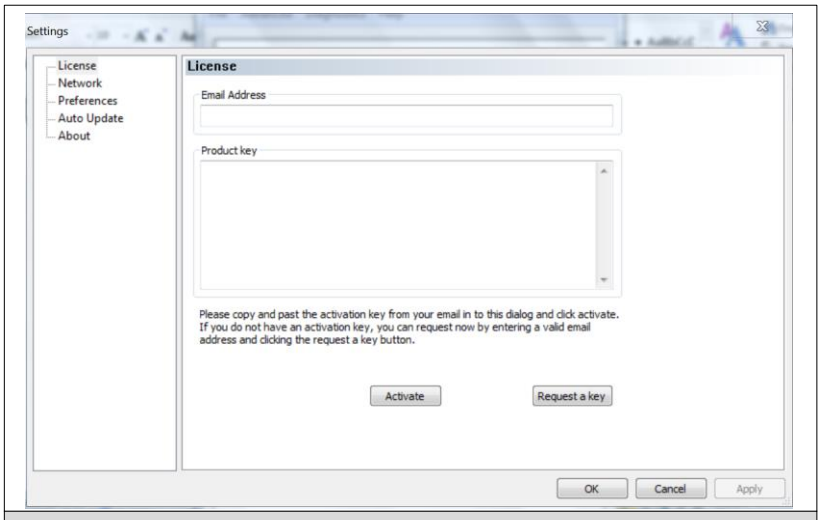


Figure 27: Requesting CAS Activation Key

8.2 CAS BACnet Setup

These are the instructions to set CAS Explorer up for the first time on BACnet MS/ST and BACnet/IP.

8.2.1 CAS BACnet MS/TP Setup

- Using the serial or USB to RS-485 converter, connect it to the local PC and the 3 Pin BACnet MS/TP connector on ProtoNode FPC-N34.
- In CAS Explorer, do the following:
    - Click on settings
    - Check the BACnet MS/TP box and uncheck the BACnet/IP and BACnet Ethernet boxes
    - Set the BACnet MS/TP MAC address to 0
    - Set the BACnet MS/TP Baud Rate to 38400
    - Click Ok
    - On the bottom right-hand corner, make sure that the BACnet MS/TP box is green
    - Click on discover
    - Check all 4 boxes
    - Click Send

8.2.2 CAS BACnet BACnet/IP Setup

- See Section **7.1** to set the IP Address and subnet of the PC that will be running the CAS Explorer.
- Connect a straight through or cross Ethernet cable from the PC to ProtoNode.
- In CAS Explorer, do the following:
    - Click on settings
    - Check the BACnet/IP box and uncheck the BACnet MS/TP and BACnet Ethernet boxes
    - In the “Select a Network Device” box, select the network card of the PC
    - Click Ok
    - On the bottom right-hand corner, make sure that the BACnet/IP box is green
    - Click on discover
    - Check all 4 boxes
    - Click Send

Appendix A. Troubleshooting

Appendix A.1. Lost or Incorrect IP Address

- Ensure that FieldServer Toolbox is loaded onto the local PC. If not, download FieldServer-Toolbox.zip on the Sierra Monitor webpage, under Customer Care-Resource Center, Software Downloads:
  http://www.sierramonitor.com/customer-care/resource-center?filters=software-downloads
- Extract the executable file and complete the installation.

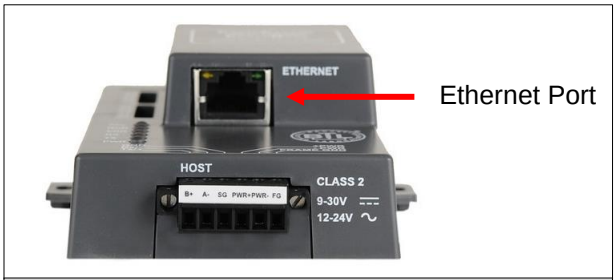
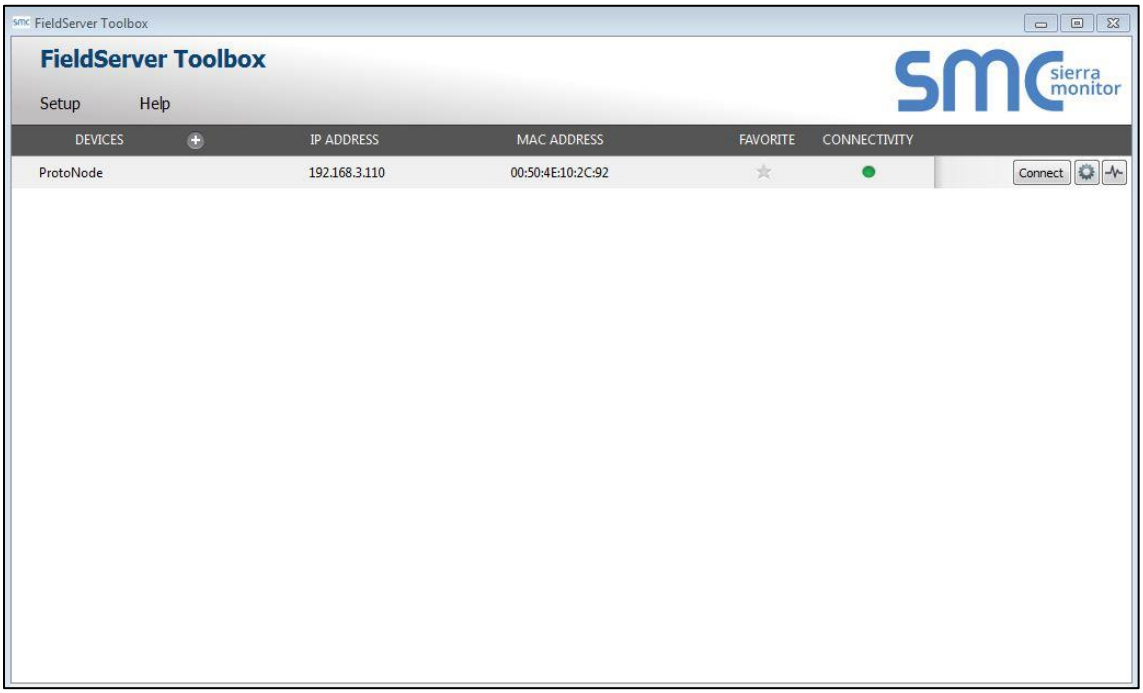


Figure 28: Ethernet Port Location

- Disable any wireless Ethernet adapters on the PC/Laptop.
- Disable firewall and virus protection software if possible.
- Connect a standard CAT5 Ethernet cable between the PC and ProtoNode.
- Double click on the FS Toolbox Utility.
- Check IP Addresses from the Device listings.



- Correct IP Address(es) by right clicking the settings icon  and changing the IP Address.

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.

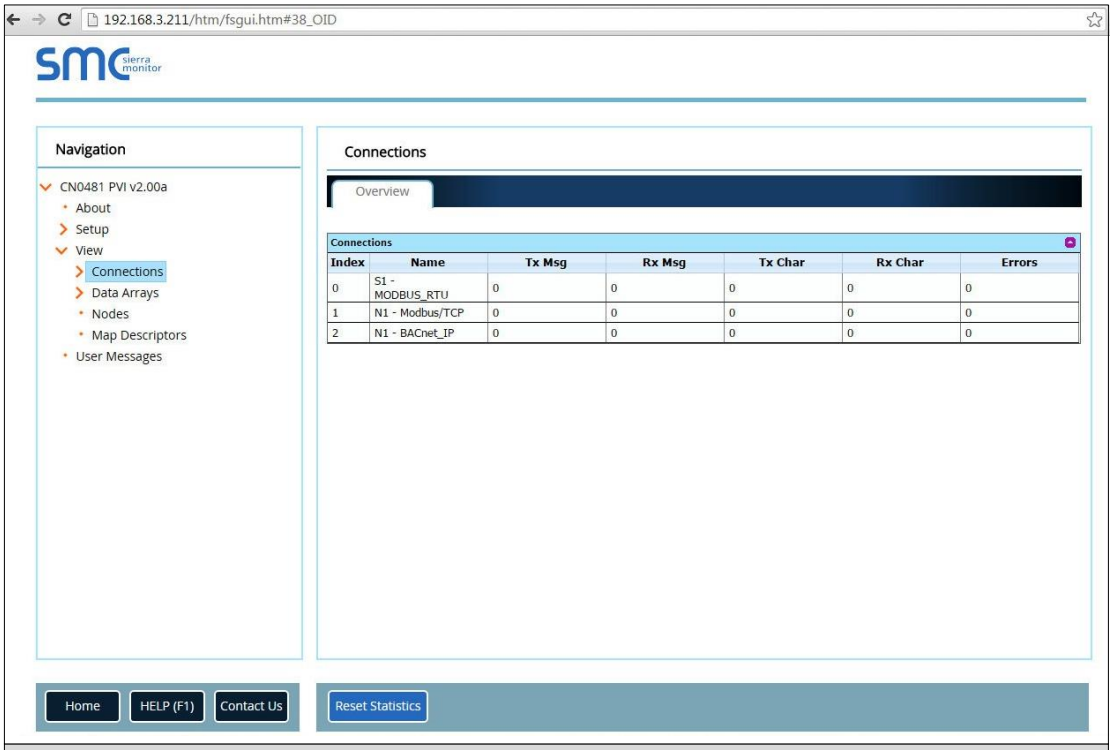


Figure 29: Error messages screen

- If there are any errors showing on the Connection page, please refer to **0** for the relevant wiring and settings.

Appendix A.3. Check 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, check the following:
  - Visual observations of LEDs on ProtoNode (**Appendix A.5**)
  - Check baud rate, parity, data bits, stop bits
  - Check Modbus device address
  - Verify wiring
  - Verify all the Modbus RTU devices were discovered in Web Configurator (**Section 0**)
- No COMS on Modbus TCP/IP side. To fix, check the following:
  - Visual observations of LEDs on ProtoNode (**Appendix A.5**)
  - Check Modbus device address
  - Verify wiring
  - Verify all the Modbus TCP/IP devices were discovered in Web Configurator (**Section 0**)
- Field COM problems:
  - Visual observations of LEDs on ProtoNode (**Appendix A.5**)
  - Visual dipswitch settings (using correct baud rate and device instance)
  - Verify IP Address setting
  - Verify wiring

If the problem still exists, a Diagnostic Capture needs to be taken and sent to Sierra Monitor Corporation. (Appendix A.4)

Appendix A.4. Take Diagnostic Capture With the FieldServer Utilities

- **Once the Diagnostic Capture is complete, email it to support@sierramonitor.com. The Diagnostic Capture will allow us to rapidly diagnose the problem.**
- Ensure that FieldServer Toolbox is Loaded on the PC that is currently being used, or download FieldServer-Toolbox.zip on the Sierra Monitor webpage, under Customer Care: Resource Center, Software Downloads:
  http://www.sierramonitor.com/customer-care/resource-center?filters=software-downloads
- Extract the executable file and complete the installation.

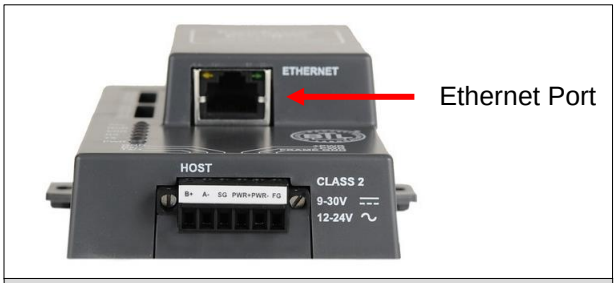
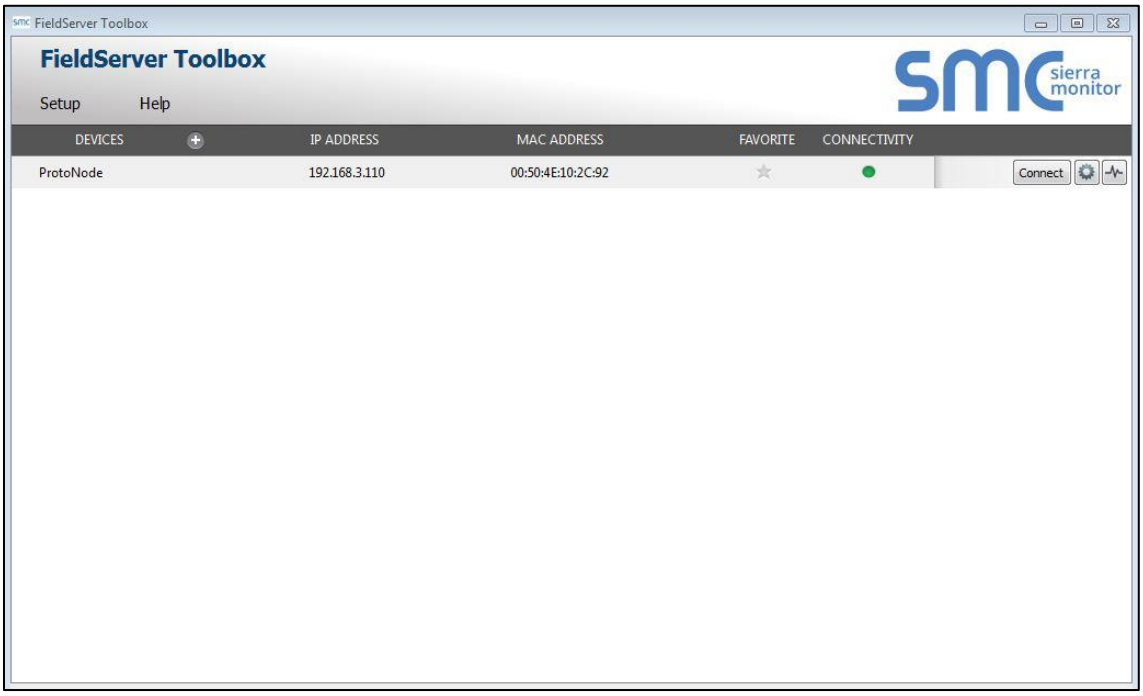


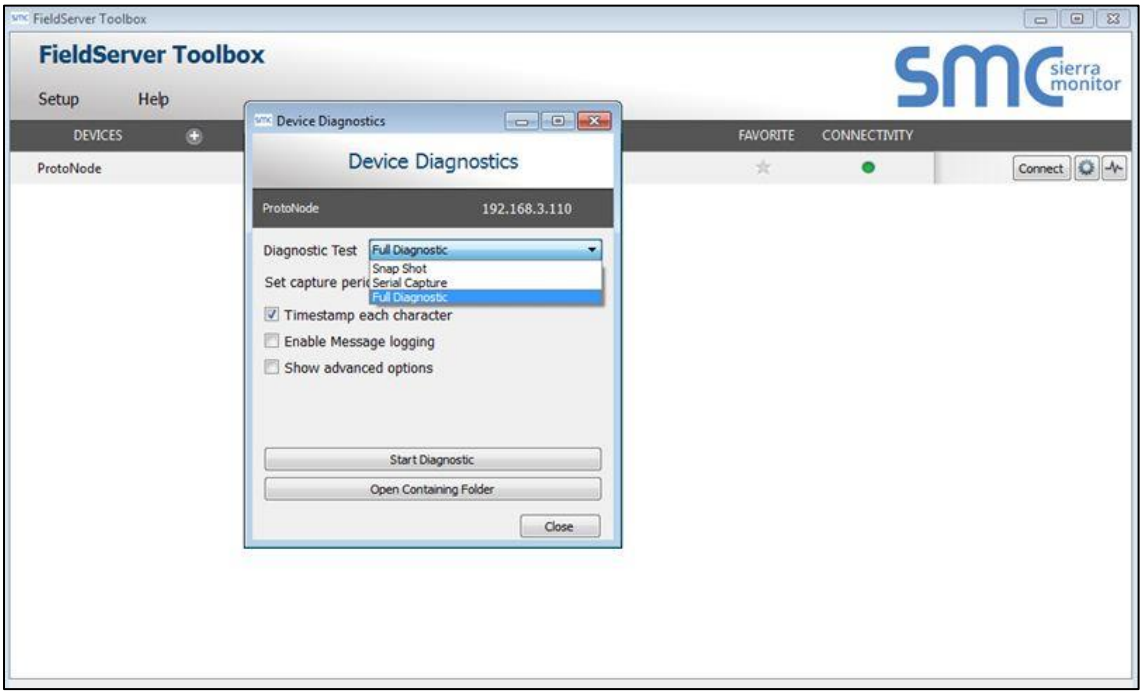
Figure 30: Ethernet Port Location

- Disable any wireless Ethernet adapters on the PC/Laptop.
- Disable firewall and virus protection software if possible.

- 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.

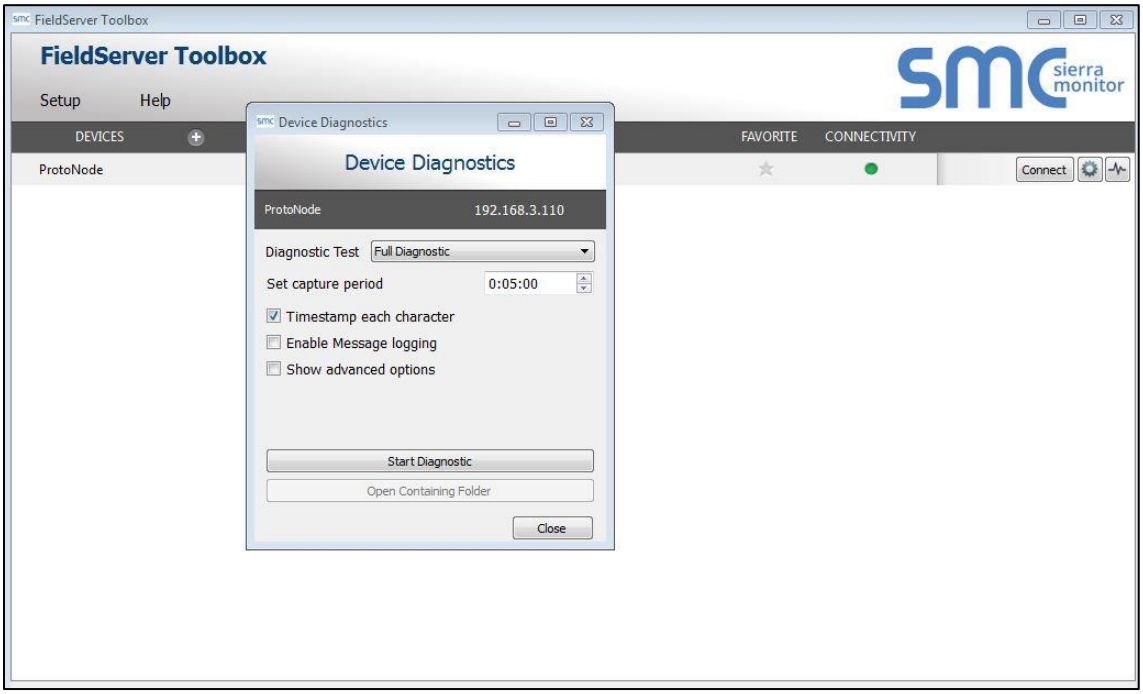


    - Select full Diagnostic.



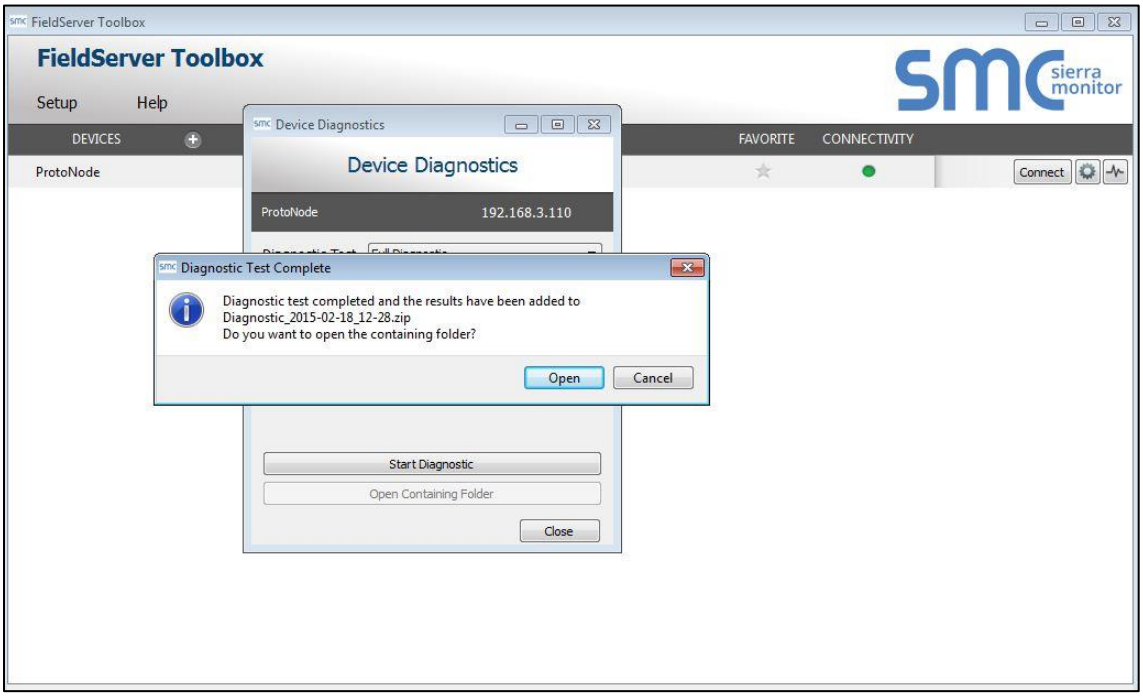
    - If desired, the default capture period can be changed.

- Click on Start Diagnostic.



- Wait for Capture period to finish. Diagnostic Test Complete window will appear.

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



- Choose open to launch explorer and have it point directly at the correct folder. Send the Diagnostic zip file to **support@sierramonitor.com**

Appendix A.5. BACnet: Setting Network_Number for more than one ProtoNode on 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 Network Number with the “network_nr” field and click submit. The default value is 50.

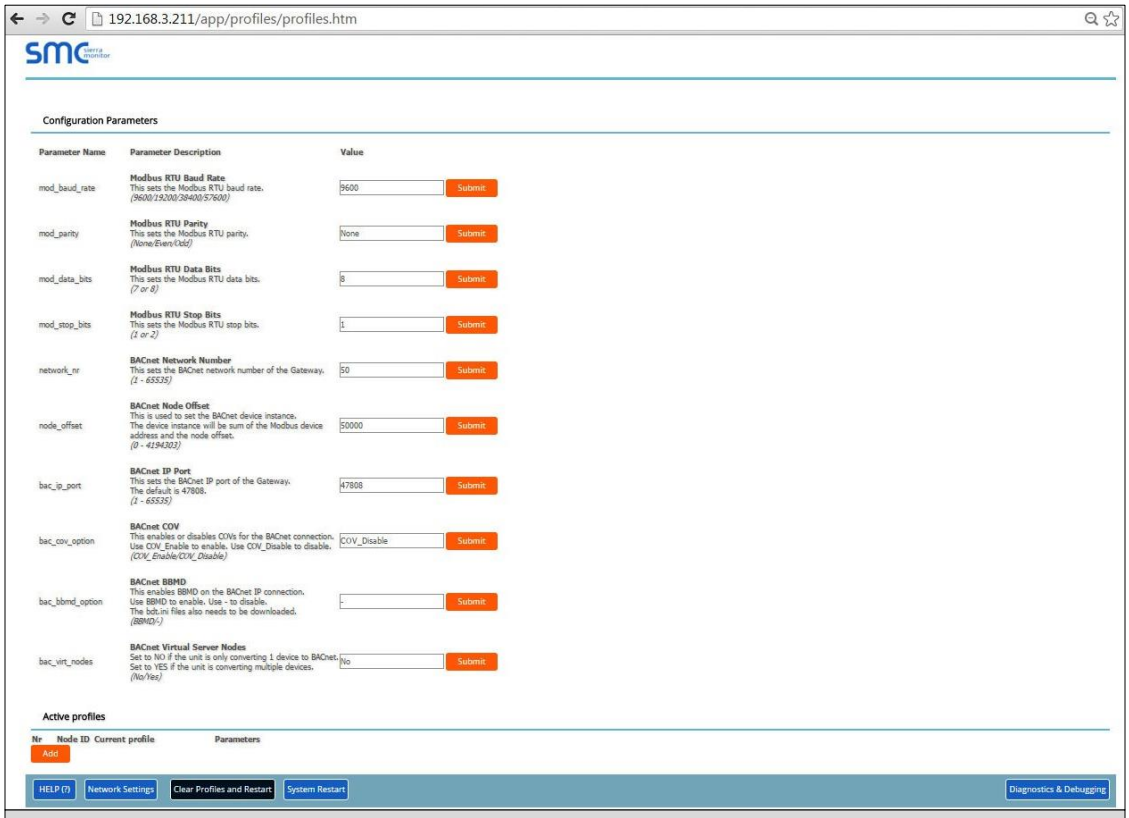
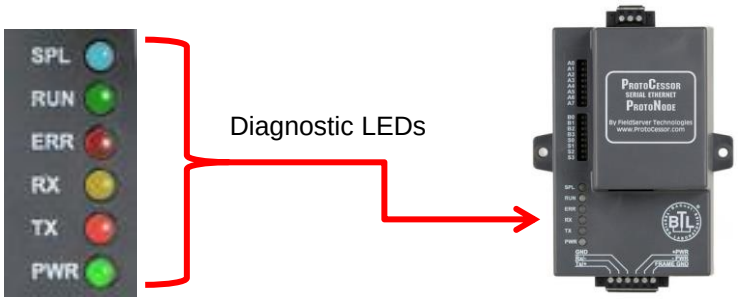


Figure 31: Web Configurator – Setting Network Number for BACnet

Appendix A.6. LED Diagnostics for Communications Between ProtoNode and Devices

Please see the diagram below for ProtoNode FPC-N34 and FPC-N35 LED Locations.



Tag	Description
SPL	The SPL LED will light if the ProtoNode is not getting a response from one or more of the configured devices. **For FPC-N35**, the LED will also light until ProtoNode is Commissioned on the LonWorks network.
RUN	The RUN LED will start flashing 20 seconds after power indicating normal operation.
ERR	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 ProtoNode. If this occurs, immediately report the related "system error" shown in the error screen of the GUI interface to Sierra Monitor Corporation for evaluation.
RX	The RX LED will flash when a message is received on the host port.
TX	The TX LED will flash when a message is sent on the host port.
PWR	This is the power light and should show steady green at all times when ProtoNode is powered.

Figure 32: Diagnostic LEDs

Appendix A.7. Passwords

Access to the ProtoNode can be restricted by enabling a password. 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 e-mail the Password recovery token to support@sierramonitor.com to receive a temporary password from the Sierra Monitor support team. Access the ProtoNode to set a new password.

Appendix B. Vendor Information - PVI

Appendix B.1. OnTrac Modbus TCP/IP Mappings to BACnet and LonWorks

OnTrac Interface Guide (PV7069-O-…PDF) contains information on wiring connections to the OnTrac and from the OnTrac to the boilers. Points List is also contained in this interface guide.

Appendix B.2. TempTrac Modbus RTU Mappings to BACnet and LonWorks

TempTrac Interface Guide (PV7069-T-…PDF) contains information on wiring connection to the TempTrac and specific applications and products the TempTrac may be installed with. TempTrac Points List is also contained in the interface guide.

Appendix B.3. XR10CX Modbus RTU Mappings to BACnet and LonWorks

XR10CX Interface Guide (PV7069-X-…PDF) contain information on wiring connection to the XR10CX and specific application and products the XR10CX may be installed with. XR10CX Points List is also contained in the interface guide.

Appendix B.4. EOS Water Heater Modbus RTU Mappings to BACnet and LonWorks

Reference the EOS Interface Guide (PV7069-E-…PDF) for interface guidance on the BTCII EOS wiring connections and specific applications. The EOS Points List is also contained in this document.

Appendix C. "A" Bank DIP Switch Settings

Address	A0 1	A1 2	A2 4	A3 8	A4 16	A5 32	A6 64	A7 128
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
…	…	…	…	…	…	…	…	…
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

Address is made by using binary weighted switch settings.
A0 = 1, A1=2, A2=4, A3=8, A4=16, A5=32, A6=64, A7=128.
Sum of ON switches = address.
For BACNET MSTP valid address range is 1-127
For MODBUS RTU valid address range is 1-247

Appendix D. Reference

Appendix D.1. Specifications

	ProtoNode FPC-N34	ProtoNode FPC-N35
Electrical Connections	One 6-pin Phoenix connector with: RS-485 port (+ / - / 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-485 port (+ / - / gnd) Power port (+ / - / Frame-gnd) One Ethernet 10/100 BaseT port One FTT-10 LonWorks port
Approvals:	CE Certified; TUV approved to UL 916, EN 60950-1, EN 50491-3 and CSA C22-2 standards; FCC Class A Part 15; DNP3 Conformance Tested; RoHS Compliant; CSA 205 Approved	
	BTL Marked	LonMark Certified
Power Requirements	Multi-mode power adapter: 9-30VDC or 12 - 24VAC	
Physical Dimensions	11.5 cm L x 8.3 cm W x 4.1 cm H (4.5 x 3.2 x 1.6 in.)	
Weight	0.2 kg (0.4 lbs)	
Operating Temperature	-40°C to 75°C (-40°F to167°F)	
Surge Suppression	EN61000-4-2 ESD EN61000-4-3 EMC EN61000-4-4 EFT	
Humidity	5 - 90% RH (non-condensing)	
(Specifications subject to change without notice)		

Figure 33: Specifications

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/Net
- 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.