



**ProtoNode FPC-N34 and ProtoNode FPC-N35
Startup Guide
For Interfacing Satec Products: BFM136 and EM133
To Building Automation Systems:
BACnet MS/TP, BACnet/IP, Modbus/TCP, Metasys N2 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 May 2014

Document Revision: 1
Web Configurator
Template Revision: 13

Technical Support:

Thank you for purchasing the ProtoNode for BFM136 and EM133.

Please call Satec for Technical support of the ProtoNode product.

FieldServer does not provide direct support. If Satec needs to escalate the concern, they will contact FieldServer for assistance.

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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 2.2)
3. ProtoNode FPC-N34 units: Select the Field Protocol (BACnet MS/TP, BACnet/IP, Modbus/TCP or Metasys N2) on the S Bank Dip Switches. (Section 2.3)
4. BACnet MS/TP (FPC-N34): Set the MAC Address on DIP Switch Bank A. (Section 2.4.1)
5. BACnet MS/TP or BACnet IP (FPC-N34): Set the BACnet Device Instance. (Section 2.4.2)
6. Metasys N2 or Modbus TCP (FPC-N34): Set the Node-ID. (See Section 2.4.3)
7. BACnet MS/TP (FPC-N34): Set the BAUD rate of the BACnet MS/TP Field Protocol on DIP Switch Bank B. (Section 2.4.4)
8. **Connect FPC-N34** ProtoNode's 3 pin RS-485 port to the Field Protocol cabling, **or connect FPC-N35** ProtoNode's 2 pin LonWorks port to the Field Protocol cabling. (Section 3.1)
9. Connect ProtoNode's 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's 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 (FPC-N34): Use a browser to access the ProtoNode's Web Configurator to change the IP address. No changes to the configuration are necessary. (Section 4.4)
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 5)

Certifications

▪ BTL MARK – BACNET TESTING LABORATORY



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The BTL Mark on ProtoNode FPC-N34 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.

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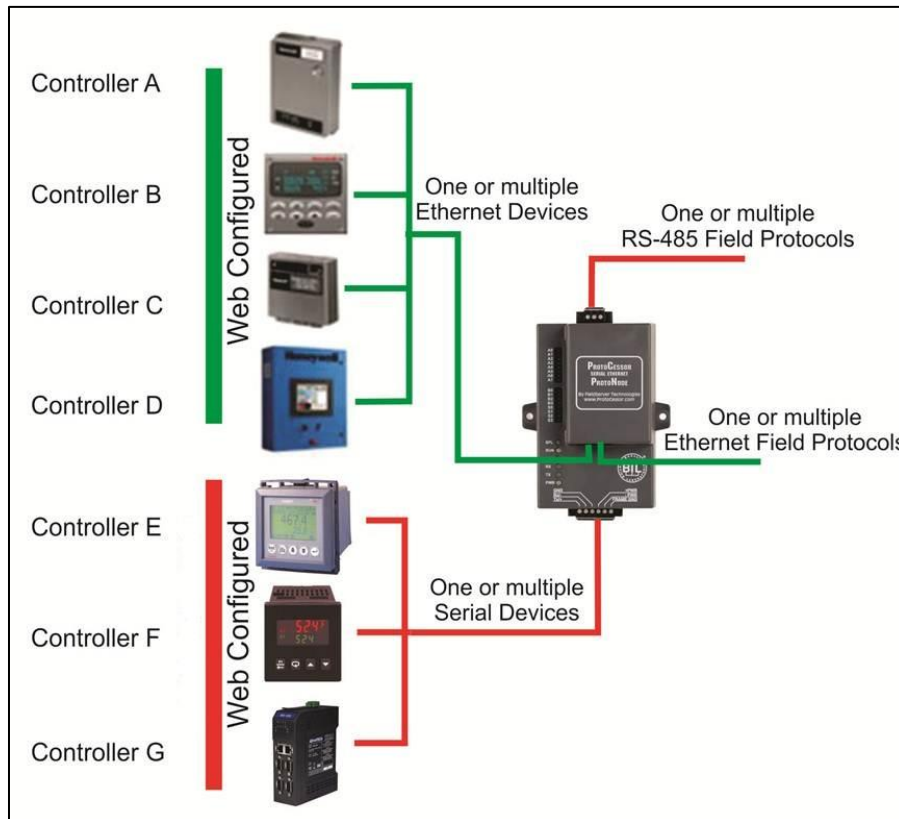
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1 INTRODUCTION

1.1 ProtoNode Gateway

ProtoNode is an external, high performance **Building Automation multi-protocol gateway** that is preconfigured to automatically communicate between Satec's products (hereafter called "device") connected to the ProtoNode and automatically configures them for BACnet¹MS/TP, BACnet/IP, Metasys² N2 by JCI, Modbus TCP or LonWorks³.

It is not necessary to download any configuration files to support the required applications.



1.2 Satec's Devices and Point Count Available

- The total number of devices attached to ProtoNode FPC-N34 cannot exceed 1500 Modbus registers for BACnet MS/TP, BACnet/IP, Modbus/TCP or Metasys N2.
- The total number of devices attached to ProtoNode FPC-N35 cannot exceed 1000 Modbus registers for LonWorks.

Devices	Point Count
BFM136	61
EM133	89

Figure 1: Modbus Registers

¹ BACnet is a registered trademark of ASHRAE
² Metasys is a registered trademark of Johnson Controls Inc.
³ 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 underside 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-N34-0995
ProtoNode FPC-N35	FPC-N35-102-401-0996

Figure 2: 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 Configuring Device Communications

2.2.1 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.**
- Figure 3 specifies the device serial port settings required to communicate with the ProtoNode.

Serial Port Setting	Device
Protocol	Modbus RTU
Baud Rate	9600
Parity	None
Data Bits	8
Stop Bits	1

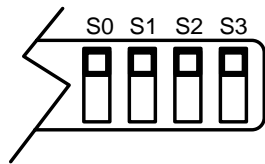
Figure 3: Modbus RTU COM Settings

2.2.2 Set Modbus RTU Node-ID for each of the devices attached to the ProtoNode

- Set Modbus 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 (See section 0)
 - The Metasys N2 and Modbus/TCP Node-ID will be set to same value as the Node-ID of the Modbus RTU device.

2.3 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 4 for the switch settings to select BACnet MS/TP, BACnet/IP, Modbus/TCP, or Metasys N2.
 - 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 MSTP	On	Off	Off	Off
Metasys N2	Off	On	Off	Off
Modbus TCP	On	On	Off	Off

BACnet MS/TP, BACnet/IP, Modbus/TCP, and Metasys N2 Settings for ProtoNode FPC-N34 (BACnet)

Figure 4: S Bank DIP Switches

2.4 Setting the MAC Address, Device Instance and Baud Rate

2.4.1 BACnet MS/TP (FPC-N34): Setting the MAC Address BACnet 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 **Appendix C** for the complete range of MAC Addresses and DIP switch settings.
- **When using Metasys N2 and Modbus/TCP, the A Bank of DIP switches are disabled and not used. They should be set to OFF.**

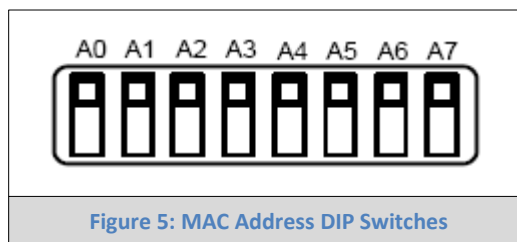


Figure 5: MAC Address DIP Switches

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

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

- 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 2.2).
- The BACnet Device Instance can range from 1 to 4,194,303.
- **To assign specific Device Instance values, change the Node_Offset value. (Section 2.4.2.1)**

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 + 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

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

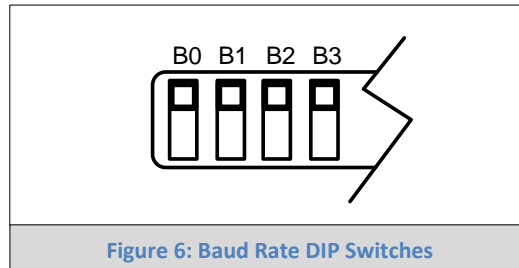
- With the default Node_Offset value of 50,000 the Device Instances values generated will be within the range of 50,000 to 50,127.
- The values allowed for a BACnet Device Instance can range from 1 to 4,194,303.
- To assign a specific Device Instance (or range), change the Node_Offset value.
- **Methods for changing the Node_Offset value are provided in Section 4.3**
 - This step cannot be performed until after the unit is connected and powered.

2.4.3 Metasys N2 or Modbus/TCP (FPC-N34): Setting the Node-ID

- The Modbus RTU Node-ID's assigned to the devices attached to the ProtoNode in Section 2.2 will be the Metasys N2 and Modbus TCP Node_ID's for the field protocols.
- Metasys N2 and Modbus/TCP Node-ID Addressing: Metasys N2 and Modbus/TCP Node-ID's range from 1-255.

2.4.4 BACnet MS/TP (FPC-N34): Setting the Baud Rate

- “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.
- The baud rate on ProtoNode for Metasys N2 is set for 9600. “B” bank DIP switches B0 – B3 are disabled for Metasys N2 on ProtoNode FPC-N34.
- “B” bank DIP switches B0 – B3 are disabled on ProtoNode FPC-N35 (FPC-N35 LonWorks).



2.4.4.1 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 7: Baud Rate

3 INTERFACING PROTONODE TO DEVICES

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

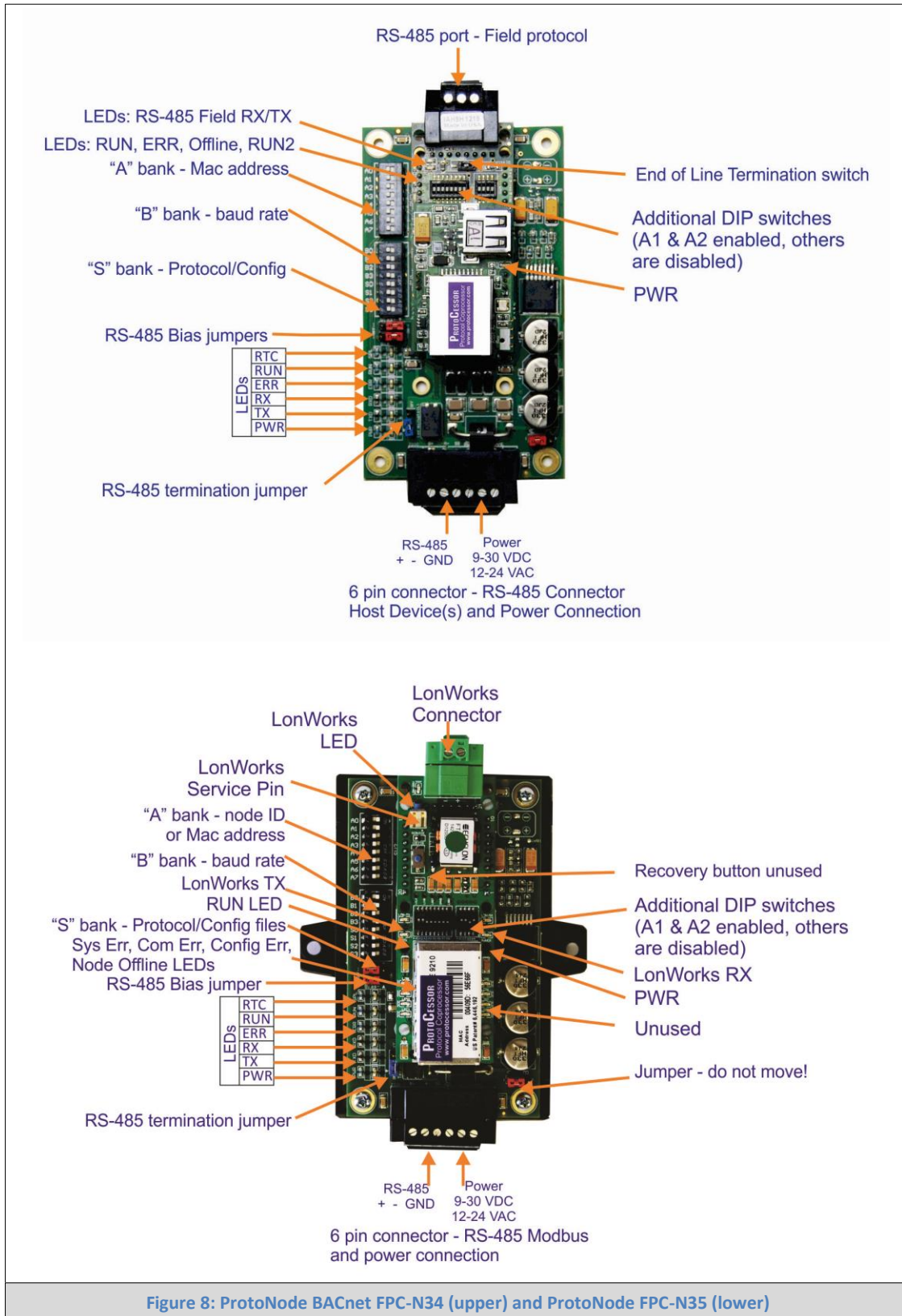
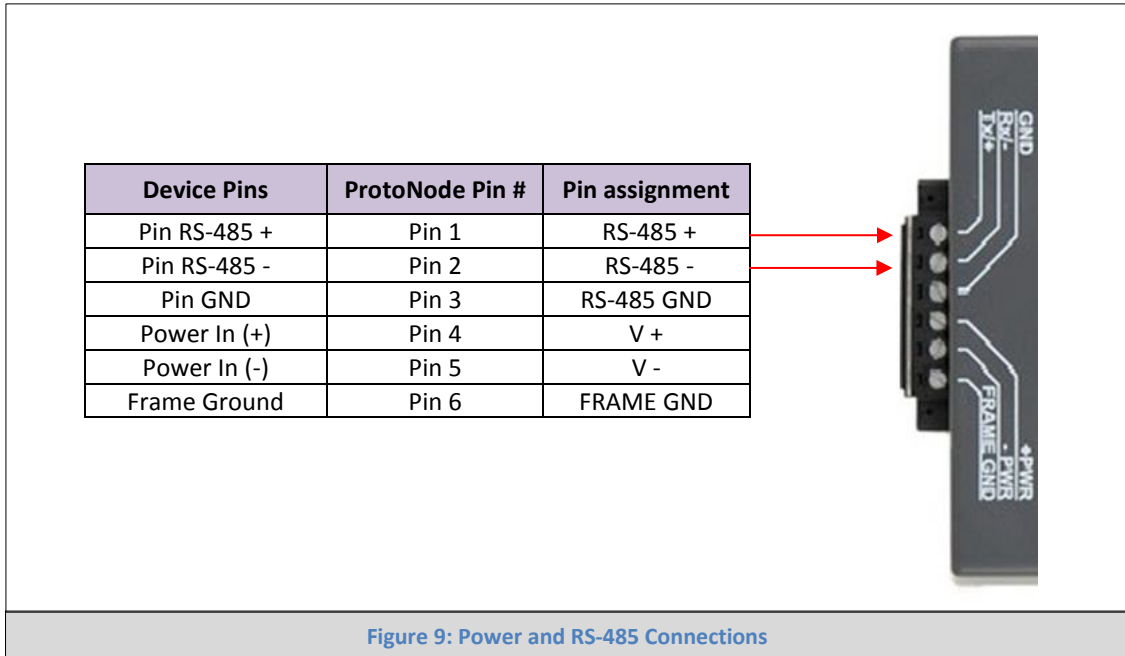


Figure 8: ProtoNode BACnet FPC-N34 (upper) and ProtoNode FPC-N35 (lower)

3.2 Device Connections to ProtoNode

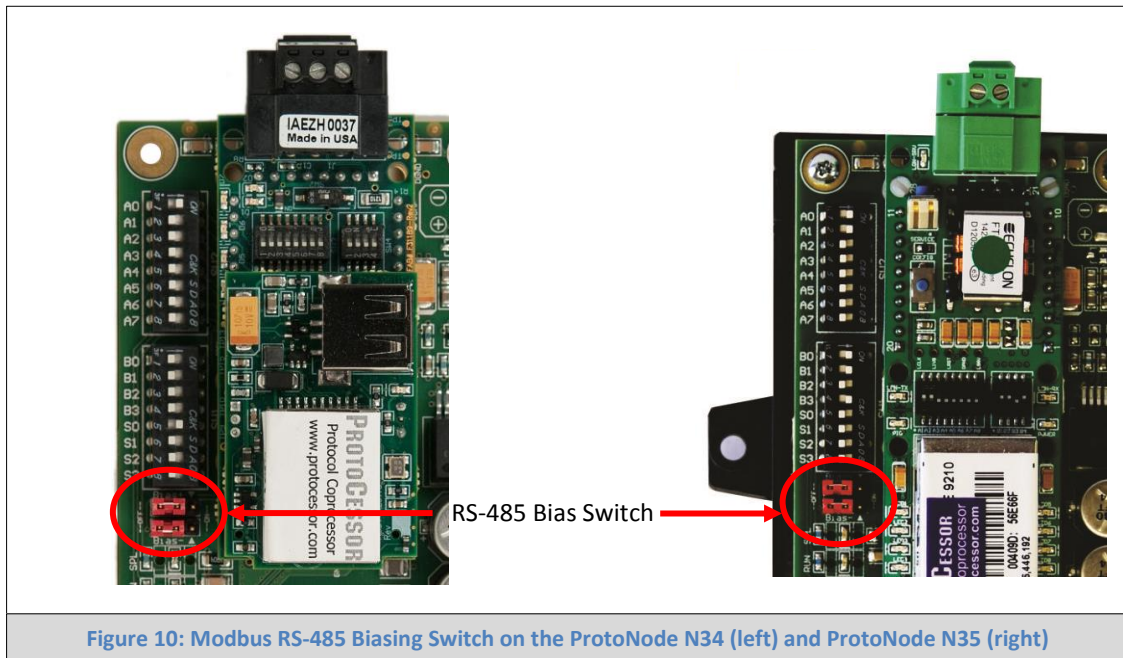
ProtoNode 6 Pin Phoenix connector for RS-485 Devices

- 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).



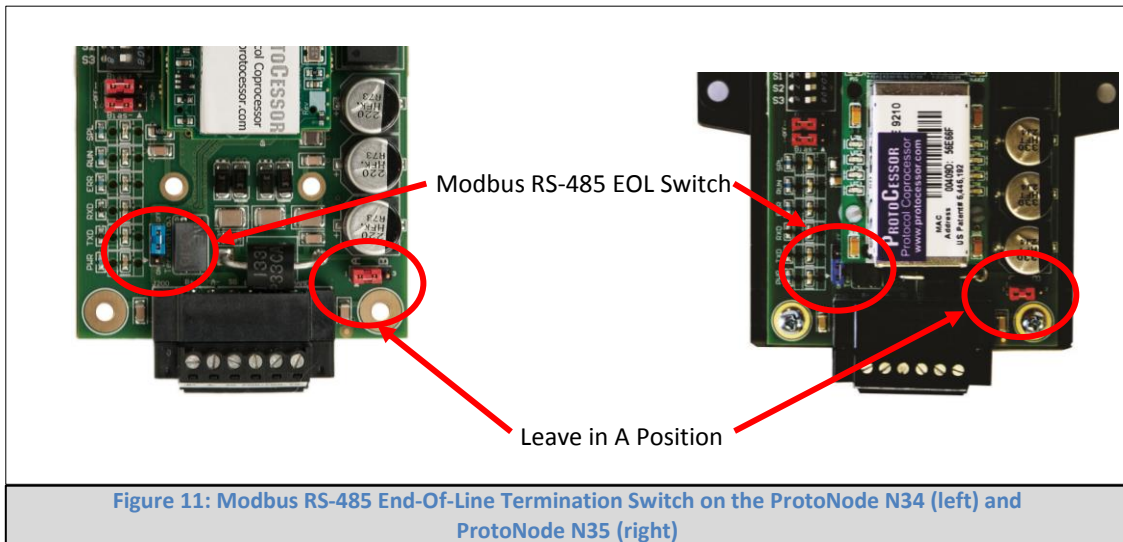
3.2.1 Biasing the Modbus RS-485 Network

- An RS-485 network with more than one device needs to have biasing to ensure proper communication. The biasing needs to be done on one device.
- The ProtoNode has 530 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. See Figure 10.
- **Only turn biasing ON:**
 - **IF the BMS cannot see more than one device connected to the ProtoNode**
 - **AND you have checked all the settings (Modbus COM settings, wiring, and DIP switches).**



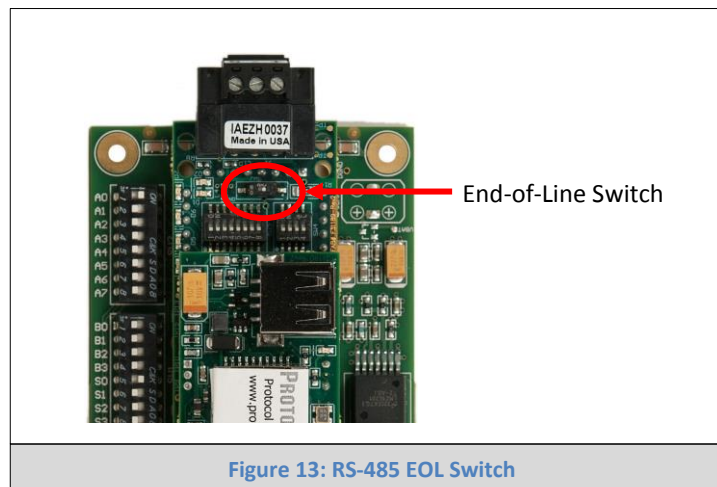
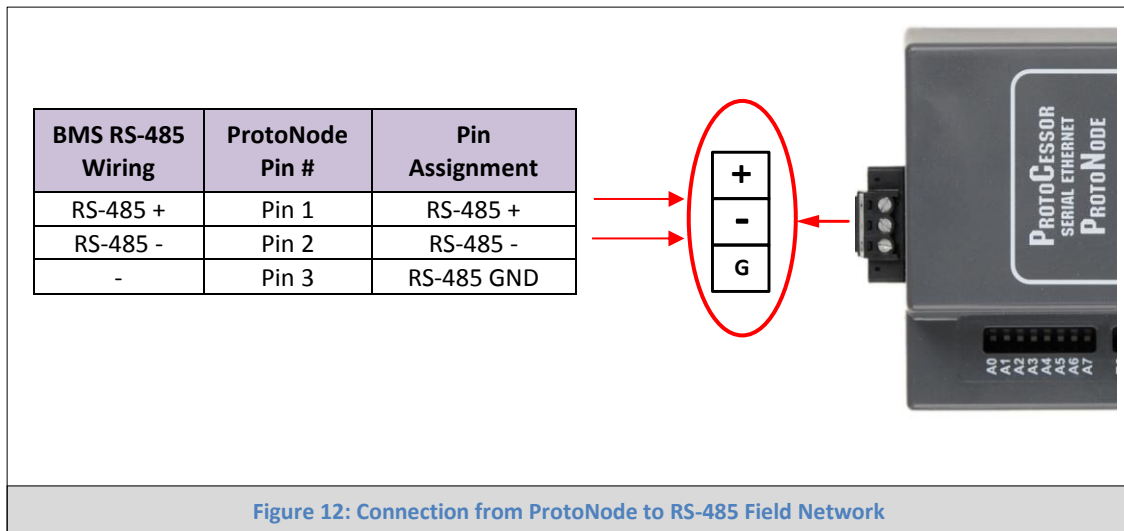
3.2.2 End of Line Termination Switch for the Modbus RS-485 port on the ProtoNode

- On long RS-485 cabling runs, the RS-485 trunk must be properly terminated at each end.
- On short cabling runs the EOL switch does not need to be turned ON. The default setting for this Blue EOL switch is OFF.
- **If the ProtoNode is placed at one of the ends of the trunk, you turn the Blue RS-485 End-of-Line Terminating switch to ON position.**
- **Always leave the single Red Jumper in the A position (default factory setting).**



3.3 BACnet MS/TP or Metasys N2 (FPC-N34): Wiring Field Port to RS-485 Network

- Connect the BACnet MS/TP or Metasys N2 RS-485 network wires to the 3-pin RS-485 connector on ProtoNode FPC-N34 as shown below in Figure 12.
 - The RS-485 GND (Pin 3) is not typically connected.
- See Section 4.3 for information on connecting to BACnet/IP network.
- If the ProtoNode is the last device on the BACnet MS/TP or Metasys N2 trunk, then the End-Of-Line Termination Switch needs to be enabled (See Figure 13). It is disabled by default.



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.



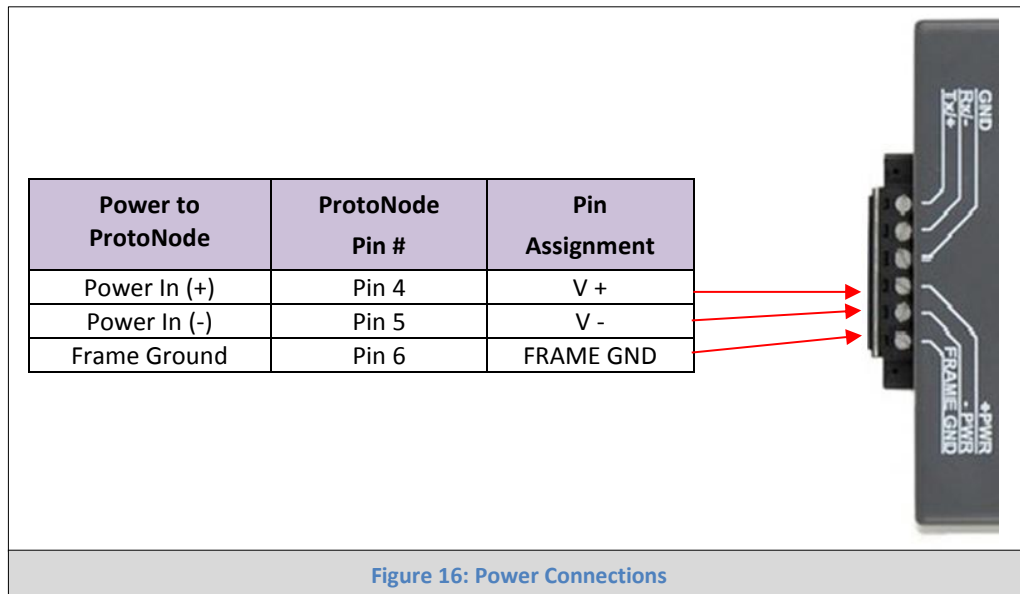
3.5 Connecting Power to ProtoNode.

Apply power to ProtoNode. Ensure that the power supply used complies with the specifications provided in Appendix D.1. Ensure that the cable is grounded using the "Frame-GND" terminal. ProtoNode accepts either 9-30VDC or 12-24 VAC.

Power Requirement for ProtoNode at 9V through 30 VDC or 12-24 VAC			
ProtoNode Family	Current Draw Type		
	12VDC/VAC	24VDC/VAC	30VDC
FPC – N34 (Typical)	170mA	100mA	80mA
FPC – N34 (Maximum)	240mA	140mA	100mA
FPC – N35 (Typical)	210mA	100mA	90mA
FPC – N35 (Maximum)	250mA	130mA	100mA

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 15: Required current draw for the ProtoNode



4 USE PROTONODE'S WEB CONFIGURATOR TO SELECT DEVICE PROFILES

4.1 Connect the PC to ProtoNode via the Ethernet Port

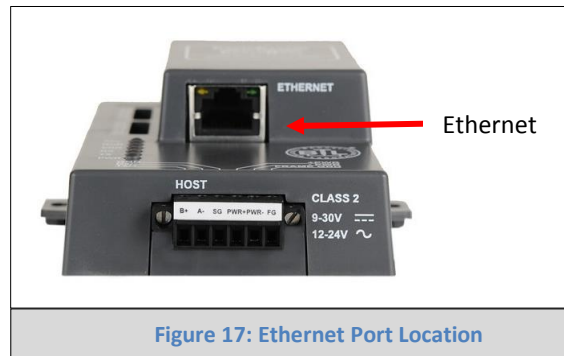







Figure 17: Ethernet Port Location


- Connect a standard 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  >  Control Panel >  Network Connections
- Right-click on Local Area Connection > Properties

- Highlight  Internet Protocol (TCP/IP) > 
- Select: 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

4.2 Connecting to ProtoNode's Web Configurator

- After setting your PC to be on the same subnet as the ProtoNode (Section 4.1), open a web browser on your 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, you will need to get the assigned IP address from the network administrator.

4.2.1 Selecting Profiles for Devices Connected to ProtoNode

- When you open the Web Configurator, you will see the Active Profiles section 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; see Figure 21.
- 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. See [Figure 19](#).
 - For FPC-N34 units, profiles for supported devices will be offered in the drop-down box only for the Field protocol option selected with the S bank of DIP switches in Section 2.3.
 - For FPC-N35 units, profiles for supported devices will be offered in the drop-down box for the Field protocol LonWorks.
- For every device that is added, you need to specify the Node-ID assigned to the particular device. This specification must match the device's network settings.

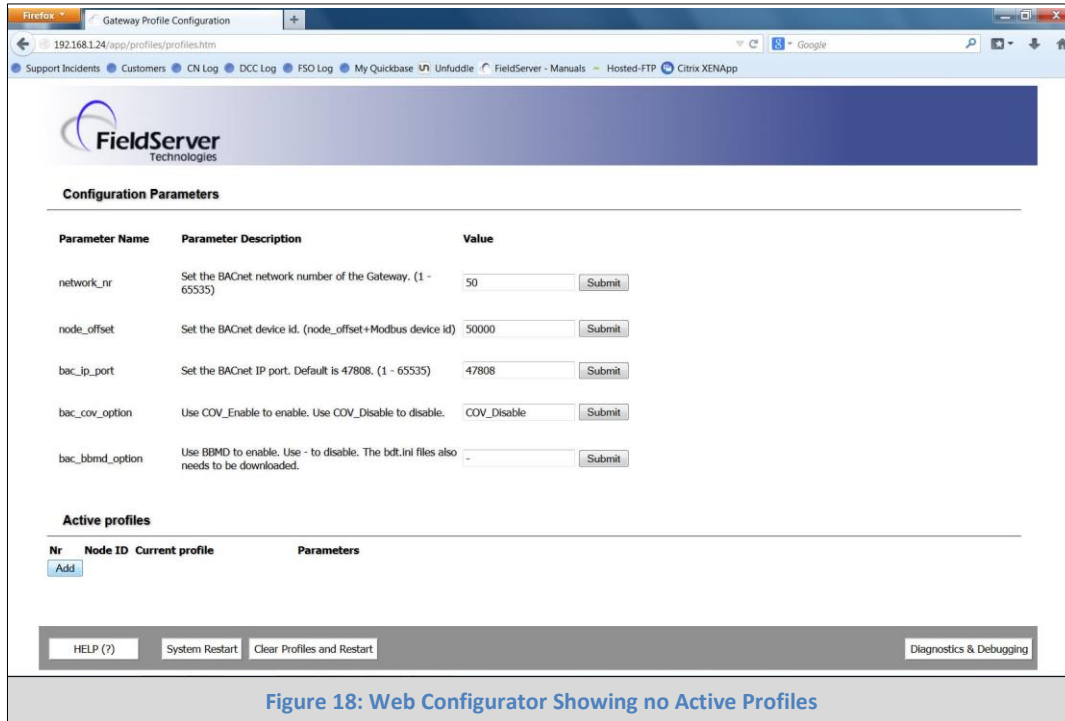


Figure 18: Web Configurator Showing no Active Profiles

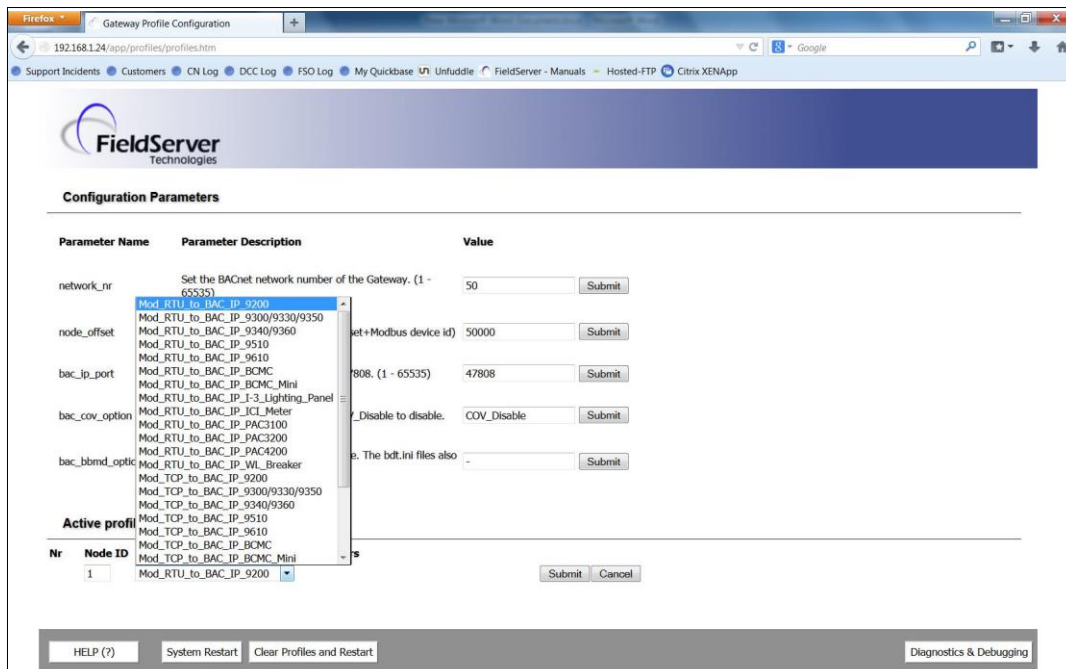


Figure 19: Web Configurator Showing Available Profiles for Selection

- 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 2.2.2
- Then press the ADD 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](#).

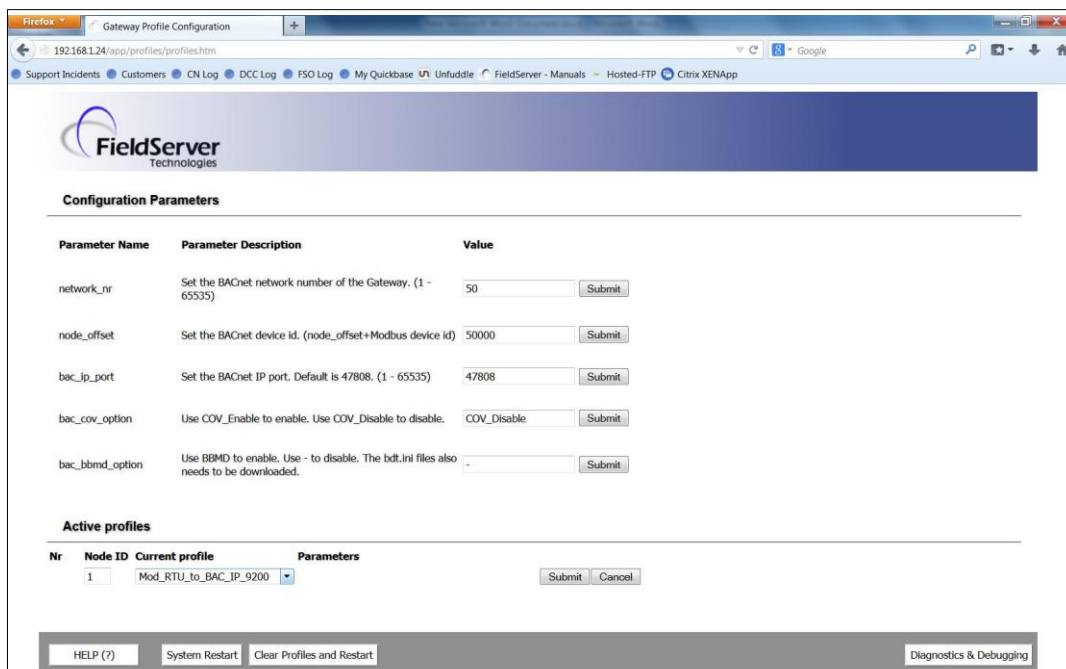


Figure 20: Web Configurator Showing an Active Profile Addition

4.3 BACnet MS/TP and BACnet/IP: Setting Node_Offset to Assign Specific Device Instances

- After setting your PC to be on the same subnet as the ProtoNode (Section 4.1), open a web browser on your 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, you will need to get the assigned IP address from the network administrator.
- The Web Configurator will be displayed as your 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: Node_Offset + Node_ID = Device Instance**
 - Then: **Node_Offset (required) = Device Instance (desired) – Node_ID**

For example:

- Device 1 has a Modbus Node-ID of 1, Device 2 has a Modbus Node-ID of 2, Device 3 has a Modbus Node-ID of 3
- Desired Device Instance for 1st device = 1,001
- **Node_Offset (required) = 1,001 – (Node_ID) = 1,001 – 1 = 1,000**
- The Node_Offset value will be applied to all devices.
- Device 2 Instance will then be 1,000 + Node_ID = 1,000 + 2 = 1,002
- Device 3 Instance will then be 1,000 + Node_ID = 1,000 + 3 = 1,003

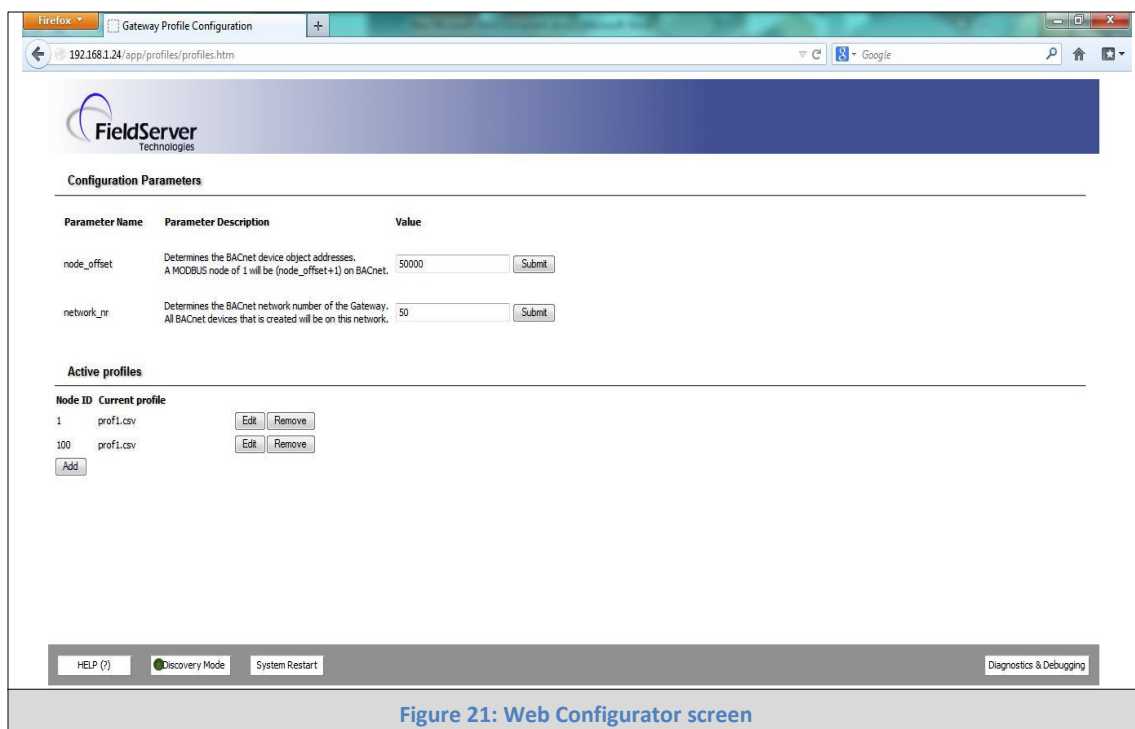


Figure 21: Web Configurator screen

4.4 Accessing the FST Web GUI from the Web Configurator

- After setting your PC to be on the same subnet as the ProtoNode (Section 4.1), open a web browser on your 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, you will need to get the assigned IP address from the network administrator.
- The Web Configurator will be displayed as your landing page. (Figure 22)
- **To access the FST Web GUI, click on the “Diagnostics & Debugging” button in the bottom right side of the page.**

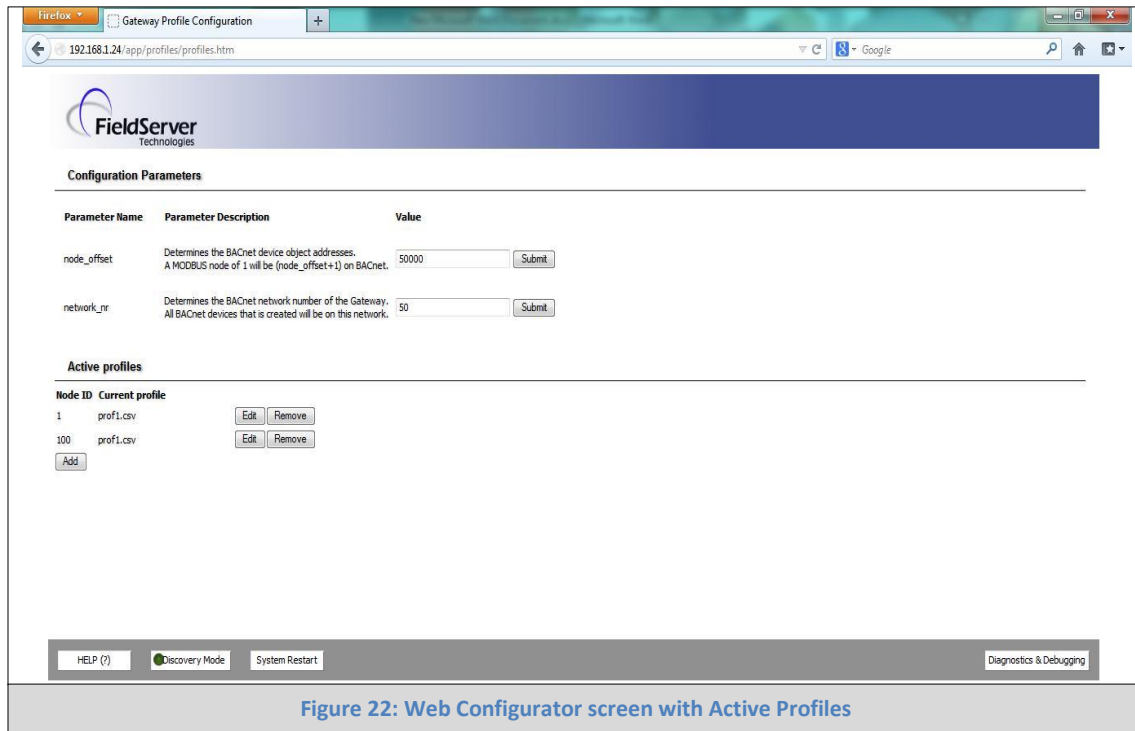


Figure 22: Web Configurator screen with Active Profiles

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

- From the Web Configurator landing page ([Figure 22](#)), click on the “Diagnostics & Debugging” button in the bottom right side of the page to access the FST Web GUI.
- The FST Web GUI page will be presented.
- From the FST Web GUI’s landing page, click on “Setup” to expand the navigation tree and then select “Network Settings” to access the IP Settings menu. ([Figure 23](#))

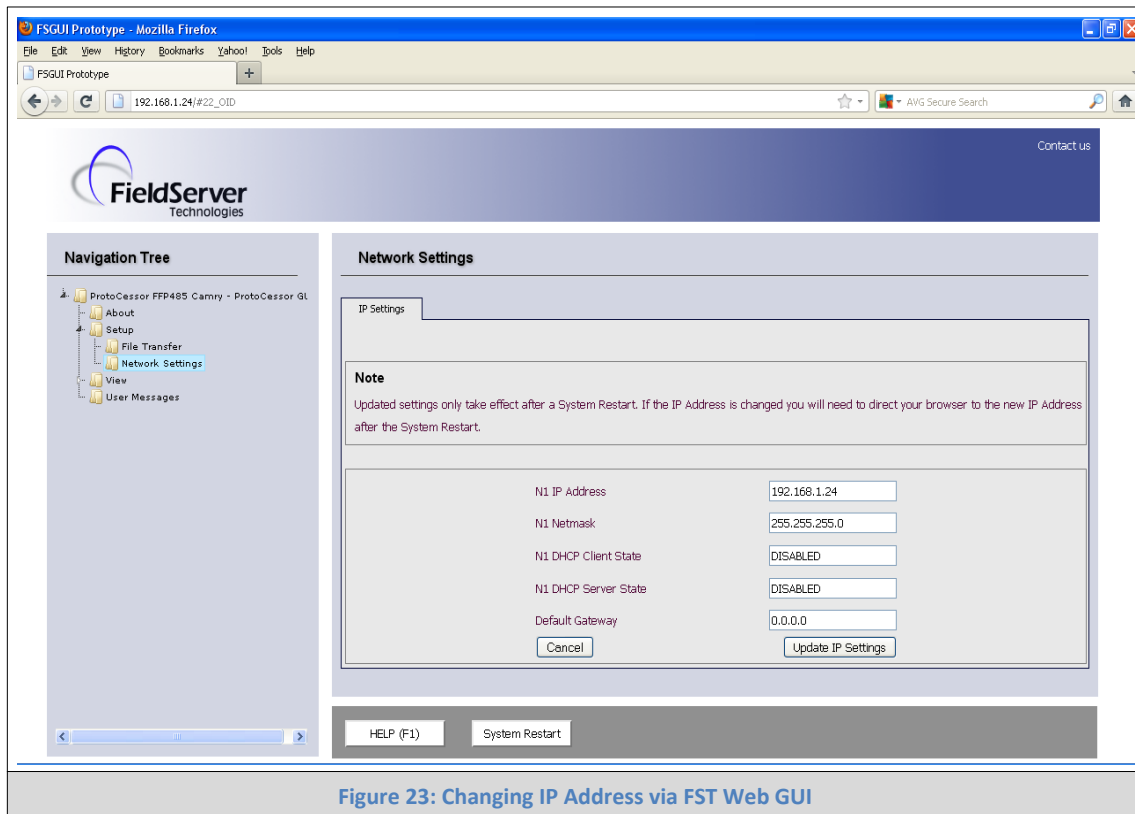


Figure 23: Changing IP Address via FST Web GUI

- From the GUI’s Utility page, click on setup and then Network Settings to enter the Edit IP Address Settings menu.
- 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 the router that it is connected to
- 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 LONWORKS (FPC-N35): COMMISSIONING PROTONODE ON A LONWORKS NETWORK

Commissioning may only be performed by the LonWorks administrator.

5.1 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 5.1.1 to generate XIF



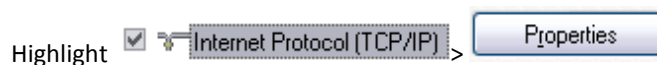
Figure 24: LonWorks Service Pin Location

5.1.1 Instructions to Upload XIF File from ProtoNode FPC-N35 Using FieldServer GUI Web Server

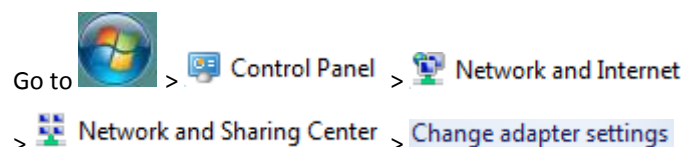
- Connect a standard cat5 Ethernet cable between the PC and ProtoNode
- The Default IP Address of ProtoNode is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and ProtoNode are on different IP Networks, assign a static IP Address to the PC on the 192.168.1.xxx network
- For Windows XP:



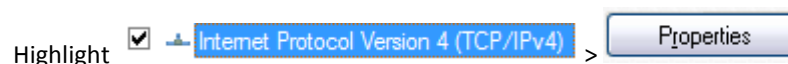
Right-click on Local Area Connection > Properties



- For Windows 7:



Right-click on Local Area Connection > Properties




- For Windows XP and Windows 7, select: 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
- 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 you to save file, save the file onto the PC. If the web browser displays the xif file as a web page, save the file on your PC as fserver.xif

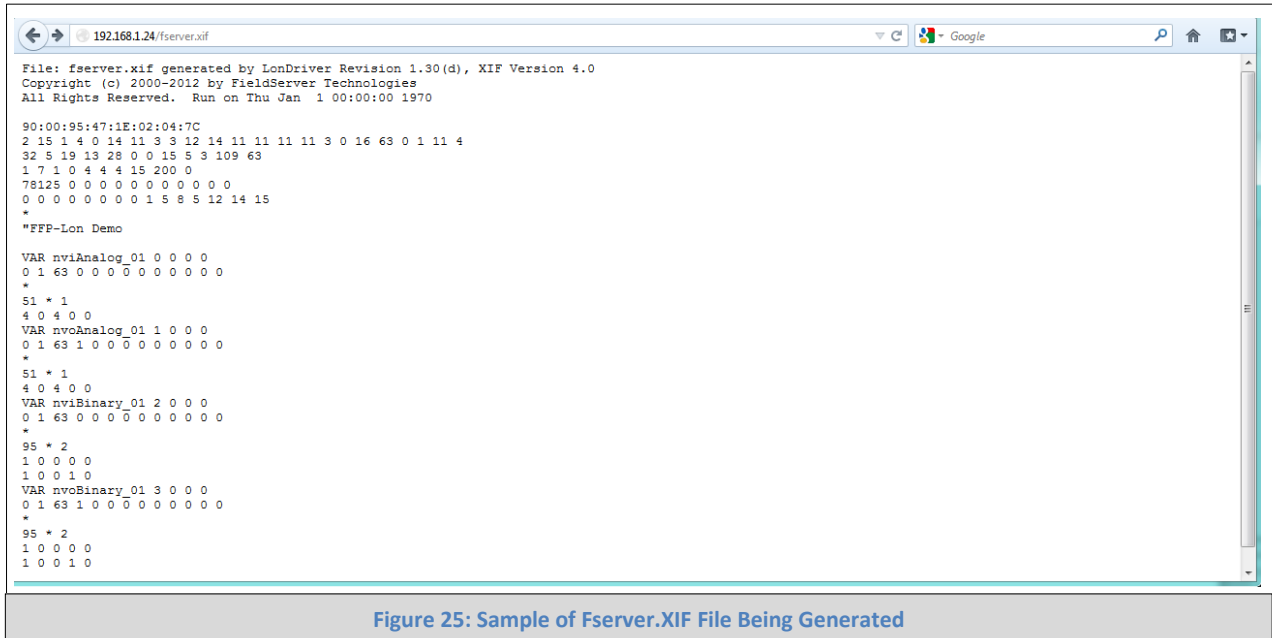


Figure 25: Sample of Fserver.XIF File Being Generated

6 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.

6.1 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 "Satec2BACnet"**. Once completed, the key will be sent to the email address that was submitted. From this email, the long key will need to be copied and pasted into the CAS key activation page.

Request a two week account activation

You have two choices

1. **Activate your account for two weeks**
 To request a two week account activation, simply complete this form and request a new product key from within the CAS BACnet Explorer.
 Note: Your contact info will be used by chipkin to contact you. If your contact info is invalid or you are unreachable your account will be revoked.

Name:

Company:

Address:

Phone number:

Email Address:

Vendor code:

Product: CAS BACnet Explorer

1. **Purchase**
 You can buy the CAS BACnet Explorer to get a full account from If you have one, you can use your discount coupon on the web page. [Visit this page](#)

Feel free to [contact us](#) with any questions you may have.

Figure 26: Downloading the CAS Explorer

- Go to the following web site, download and install the CAS BACnet Explorer to your PC:
<http://www.chipkin.com/technical-resources/cas-bacnet-explorer/>
- In the CAS Activation form, enter the email address and paste the CAS key that was sent. Once completed, select Activation.

Settings

License
 Network
 Preferences
 Auto Update
 About

License

Email Address:

Product key:

Please copy and past the activation key from your email in to this dialog and click activate.
 If you do not have an activation key, you can request now by entering a valid email address and clicking the request a key button.

Figure 27: Requesting CAS Activation Key

6.2 CAS BACnet Setup

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

6.2.1 CAS BACnet MS/TP Setup

- Using the Serial or USB to RS-485 converter, connect it to your 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 MSTP box and uncheck the BACnet/IP and BACnet Ethernet boxes
 - Set the BACnet MSTP MAC address to 0
 - Set the BACnet MSTP Baud Rate to 38400
 - Click Ok
 - On the bottom right-hand corner, make sure that the BACnet MSTP box is green
 - Click on discover
 - Check all 4 boxes
 - Click Send

6.2.2 CAS BACnet BACnet/IP Setup

- See Section 5.1 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 MSTP and BACnet Ethernet boxes
 - In the "Select a Network Device" box, select the network card of the PC by clicking on it
 - 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. 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 and you need to check the following things:
 - Visual observations of LEDs on ProtoNode. (Appendix A.4)
 - Check baud rate, parity, data bits, stop bits
 - Check Modbus device address
 - Verify wiring
 - Verify all the Modbus RTU devices that were discovered in FST Web Configurator. (Section 4.2)
- Field COM problems:
 - Visual observations of LEDs on ProtoNode. (Appendix A.4)
 - 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 FieldServer. (Appendix A.2)

Appendix A.2. Take Diagnostic Capture With the FieldServer Utilities

- Once the log is Diagnostic Capture is complete, email it to support@protoconnector.com. The Diagnostic Capture will allow us to rapidly diagnose the problem.
- Make sure the FieldServer utilities are loaded on the PC
<http://fieldserver.com/techsupport/utility/utility.php>

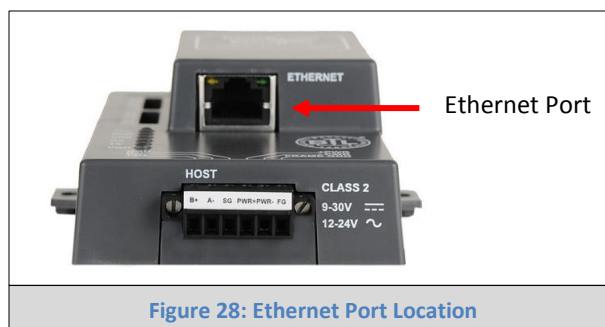
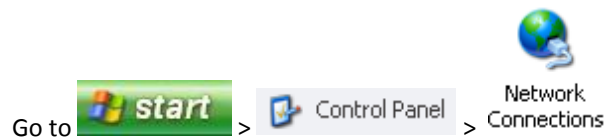
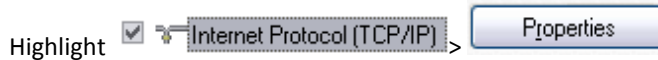


Figure 28: Ethernet Port Location

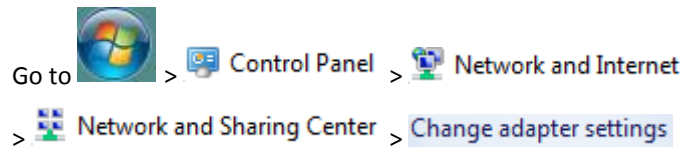
- Disable any wireless Ethernet adapters on the PC/Laptop
- Disable firewall and virus protection software if possible
- Connect a standard cat5 Ethernet cable between the PC and ProtoNode
- The Default IP Address of ProtoNode is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and ProtoNode are on different IP Networks, assign a static IP Address to the PC on the 192.168.1.xxx network
- For Windows XP:



Right-click on Local Area Connection > Properties



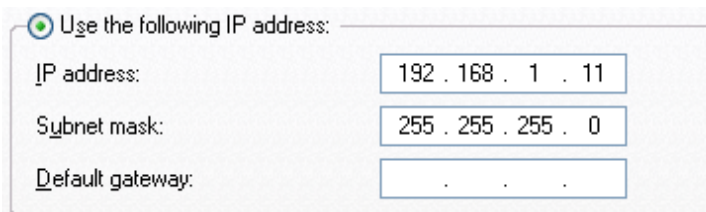
- For Windows 7:



Right-click on Local Area Connection > Properties

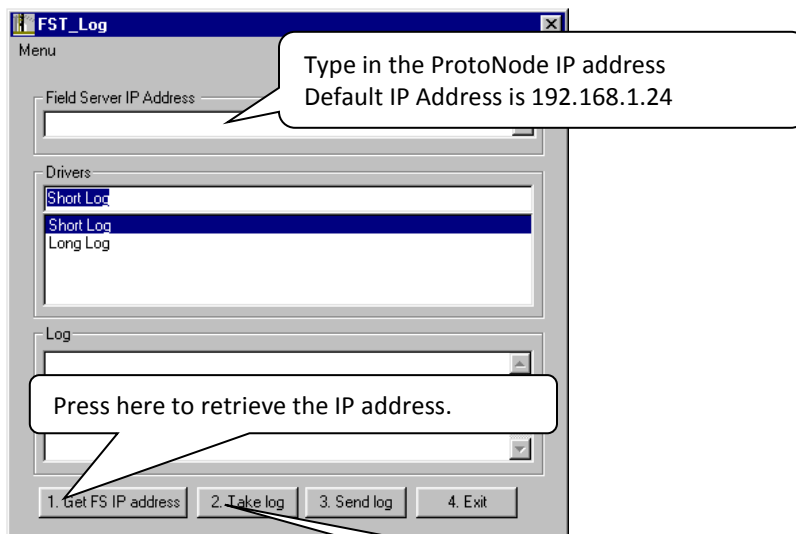


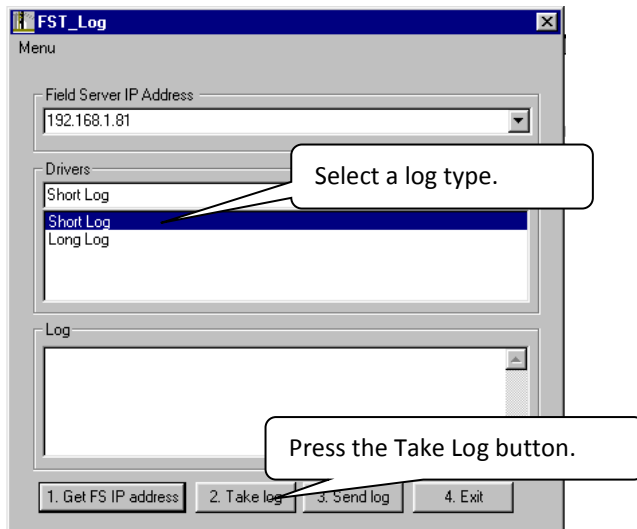
- For Windows XP and Windows 7, select: Use the following IP address



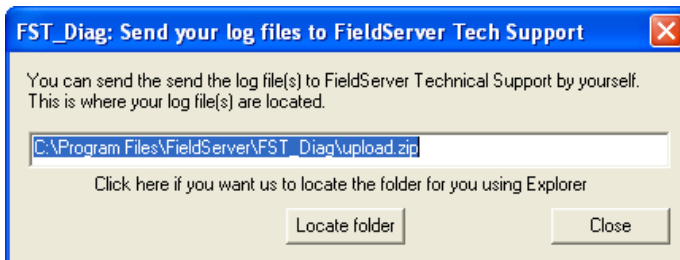
- Click  twice

- Double click on the FST Diag Utility
- **Step 1:** Select a Field Server IP Address
- The IP address can be entered manually or selected by clicking on button 1 using the Utility





- **Step 2:** Take a Log
- Press the Take Log button. While the Utility runs a few DOS prompts will flash across the monitor. Don't click or type anything in to these DOS prompts. This step may take a few minutes depending on the chosen Log Type and computer speed. When the Utility is finished you will be presented with a log of events that have occurred.
- **Step 3:** Send Log
- Click the "Send Log" button located near the bottom of the dialog. The following dialog should appear



- Push the 'Locate Folder' button to launch explorer and have it point directly at the correct folder. The file upload.zip must be sent to support@fieldserver.com
- **Step 4:** Close the Program
- Press the exit button when the log is completed

4. Exit

Appendix A.3. If there is more than 1 ProtoNode on the same BACnet/IP network, change Network Number

On the main Web Configurator screen, update the Network Number in the Network_Nr and hit Submit. Please note that the default value is 50.

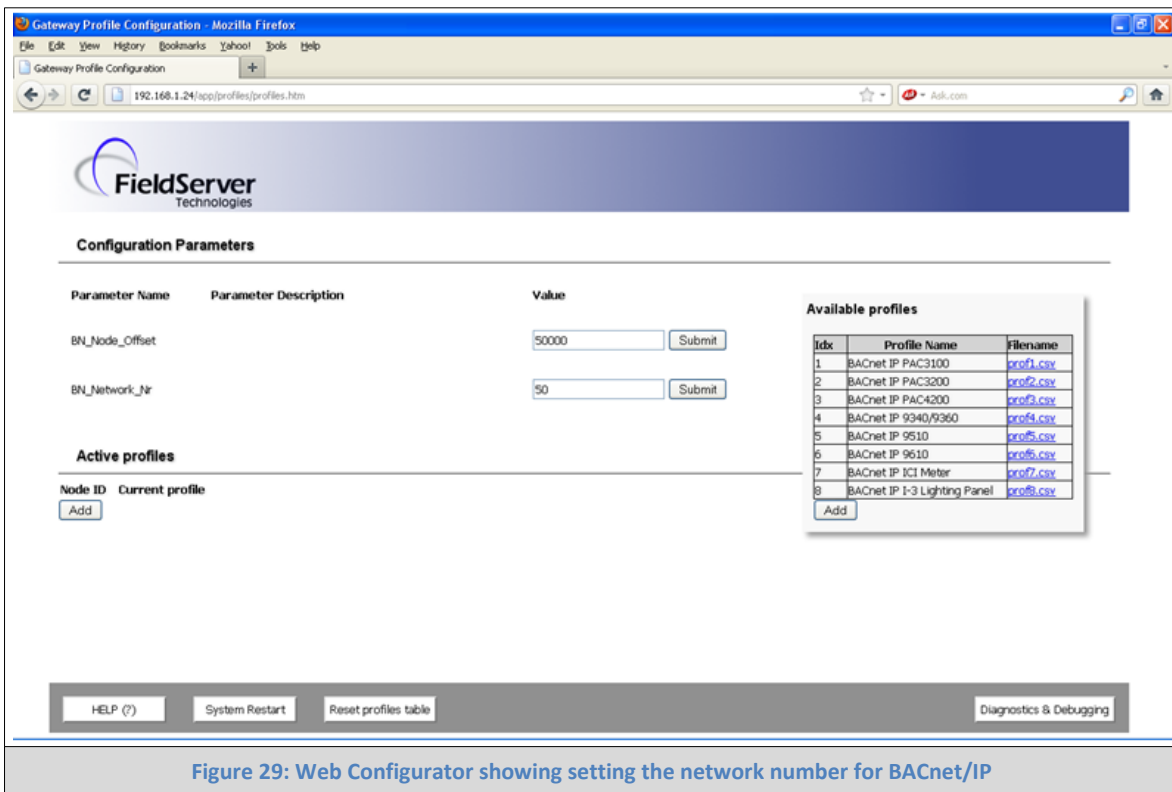


Figure 29: Web Configurator showing setting the network number for BACnet/IP

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

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

The diagram illustrates the diagnostic LEDs on a ProtoNode device. On the left, a legend lists the LEDs: SPL (blue), RUN (green), ERR (red), RX (yellow), TX (orange), and PWR (green). A red arrow points from this legend to the physical device on the right, which has corresponding LEDs labeled SPL, RUN, ERR, RX, TX, and PWR. The device is labeled 'ProtoCessor SERIAL ENERGY ProtoNode' and 'By FieldServer Technologies www.ProtoCessor.com'.

Tag	Description
SPL	The SPL LED will light if the ProtoNode is off line.
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 FieldServer Technologies 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 30: Diagnostic LEDs

Appendix B. Vendor Information - Satec

Appendix B.1. BFM136 Modbus RTU Mappings to BACnet MS/TP, BACnet/IP, Metasys N2 and LonWorks

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT
V1 Voltage	AI	1	AI	1	TBD	TBD
V2 Voltage	AI	2	AI	2	TBD	TBD
V3 Voltage	AI	3	AI	3	TBD	TBD
I1 Current	AI	4	AI	4	TBD	TBD
I2 Current	AI	5	AI	5	TBD	TBD
I3 Current	AI	6	AI	6	TBD	TBD
kW L1	AI	7	AI	7	TBD	TBD
kW L2	AI	8	AI	8	TBD	TBD
kW L3	AI	9	AI	9	TBD	TBD
kvar L1	AI	10	AI	10	TBD	TBD
kvar L2	AI	11	AI	11	TBD	TBD
kvar L3	AI	12	AI	12	TBD	TBD
kVA L1	AI	13	AI	13	TBD	TBD
kVA L2	AI	14	AI	14	TBD	TBD
kVA L3	AI	15	AI	15	TBD	TBD
Power factor L1	AI	16	AI	16	TBD	TBD
Power factor L2	AI	17	AI	17	TBD	TBD
Power factor L3	AI	18	AI	18	TBD	TBD
V12 Voltage	AI	19	AI	19	TBD	TBD
V23 Voltage	AI	20	AI	20	TBD	TBD
V31 Voltage	AI	21	AI	21	TBD	TBD
Total kW	AI	22	AI	22	TBD	TBD
Total kvar	AI	23	AI	23	TBD	TBD
Total kVA	AI	24	AI	24	TBD	TBD
Total PF	AI	25	AI	25	TBD	TBD
Total PF lag	AI	26	AI	26	TBD	TBD
Total PF lead	AI	27	AI	27	TBD	TBD
Total kW import	AI	28	AI	28	TBD	TBD
Total kW export	AI	29	AI	29	TBD	TBD
Total kvar import	AI	30	AI	30	TBD	TBD
Total kvar export	AI	31	AI	31	TBD	TBD
In (neutral) Current	AI	32	AI	32	TBD	TBD
Frequency	AI	33	AI	33	TBD	TBD
Voltage unbalance	AI	34	AI	34	TBD	TBD
Current unbalance	AI	35	AI	35	TBD	TBD
V1 Volt dem	AI	36	AI	36	TBD	TBD
V2 Volt dem	AI	37	AI	37	TBD	TBD
V3 Volt dem	AI	38	AI	38	TBD	TBD
I1 Ampere dem	AI	39	AI	39	TBD	TBD
I2 Ampere dem	AI	40	AI	40	TBD	TBD
I3 Ampere dem	AI	41	AI	41	TBD	TBD
kW import sliding wndw dem	AI	42	AI	42	TBD	TBD
kvar import sliding wndw dem	AI	43	AI	43	TBD	TBD
kVA sliding wndw dem	AI	44	AI	44	TBD	TBD
kW import accumulated dem	AI	45	AI	45	TBD	TBD
kvar import accumulated dem	AI	46	AI	46	TBD	TBD

kVA accumulated dem	AI	47	AI	47	TBD	TBD
kW import predicted sliding wndw dem	AI	48	AI	48	TBD	TBD
kvar import predicted sliding wndw dem	AI	49	AI	49	TBD	TBD
kVA predicted sliding wndw dem	AI	50	AI	50	TBD	TBD
kW export sliding wndw dem	AI	51	AI	51	TBD	TBD
kvar export sliding wndw dem	AI	52	AI	52	TBD	TBD
kW export accumulated dem	AI	53	AI	53	TBD	TBD
kvar export accumulated dem	AI	54	AI	54	TBD	TBD
kW export predicted sliding wndw dem	AI	55	AI	55	TBD	TBD
kvar export predicted sliding wndw dem	AI	56	AI	56	TBD	TBD
kWh import	AI	57	AI	57	TBD	TBD
kWh export	AI	58	AI	58	TBD	TBD
kvarh import	AI	59	AI	59	TBD	TBD
kvarh export	AI	60	AI	60	TBD	TBD
kVAh total	AI	61	AI	61	TBD	TBD

Appendix B.2. EM133 Modbus RTU Mappings to BACnet MS/TP, BACnet/IP, Metasys N2 and LonWorks

Point Name	BACnet Object Type	BACnet Object ID	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT
V1/V12 Voltage	AI	1	AI	1	TBD	TBD
V2/V23 Voltage	AI	2	AI	2	TBD	TBD
V3/V31 Voltage	AI	3	AI	3	TBD	TBD
I1 Current	AI	4	AI	4	TBD	TBD
I2 Current	AI	5	AI	5	TBD	TBD
I3 Current	AI	6	AI	6	TBD	TBD
kW L1	AI	7	AI	7	TBD	TBD
kW L2	AI	8	AI	8	TBD	TBD
kW L3	AI	9	AI	9	TBD	TBD
kvar L1	AI	10	AI	10	TBD	TBD
kvar L2	AI	11	AI	11	TBD	TBD
kvar L3	AI	12	AI	12	TBD	TBD
kVA L1	AI	13	AI	13	TBD	TBD
kVA L2	AI	14	AI	14	TBD	TBD
kVA L3	AI	15	AI	15	TBD	TBD
Power factor L1	AI	16	AI	16	TBD	TBD
Power factor L2	AI	17	AI	17	TBD	TBD
Power factor L3	AI	18	AI	18	TBD	TBD
V1/V12 Voltage THD	AI	19	AI	19	TBD	TBD
V2/V23 Voltage THD	AI	20	AI	20	TBD	TBD
V3/V31 Voltage THD	AI	21	AI	21	TBD	TBD
I1 Current THD	AI	22	AI	22	TBD	TBD
I2 Current THD	AI	23	AI	23	TBD	TBD
I3 Current THD	AI	24	AI	24	TBD	TBD
I1 K-Factor	AI	25	AI	25	TBD	TBD
I2 K-Factor	AI	26	AI	26	TBD	TBD
I3 K-Factor	AI	27	AI	27	TBD	TBD
I1 Current TDD	AI	28	AI	28	TBD	TBD
I2 Current TDD	AI	29	AI	29	TBD	TBD
I3 Current TDD	AI	30	AI	30	TBD	TBD
V12 Voltage	AI	31	AI	31	TBD	TBD

V23 Voltage	AI	32	AI	32	TBD	TBD
V31 Voltage	AI	33	AI	33	TBD	TBD
Total kW	AI	34	AI	34	TBD	TBD
Total kvar	AI	35	AI	35	TBD	TBD
Total kVA	AI	36	AI	36	TBD	TBD
Total PF	AI	37	AI	37	TBD	TBD
Total PF lag	AI	38	AI	38	TBD	TBD
Total PF lead	AI	39	AI	39	TBD	TBD
Total kW import	AI	40	AI	40	TBD	TBD
Total kW export	AI	41	AI	41	TBD	TBD
Total kvar import	AI	42	AI	42	TBD	TBD
Total kvar export	AI	43	AI	43	TBD	TBD
3-phase average L-N/L-L voltage	AI	44	AI	44	TBD	TBD
3-phase average L-L voltage	AI	45	AI	45	TBD	TBD
3-phase average current	AI	46	AI	46	TBD	TBD
In (neutral) Current	AI	47	AI	47	TBD	TBD
Frequency	AI	48	AI	48	TBD	TBD
Voltage unbalance	AI	49	AI	49	TBD	TBD
Current unbalance	AI	50	AI	50	TBD	TBD
V1/V12 Volt dem	AI	51	AI	51	TBD	TBD
V2/V23 Volt dem	AI	52	AI	52	TBD	TBD
V3/V31 Volt dem	AI	53	AI	53	TBD	TBD
I1 Ampere dem	AI	54	AI	54	TBD	TBD
I2 Ampere dem	AI	55	AI	55	TBD	TBD
I3 Ampere dem	AI	56	AI	56	TBD	TBD
kW import block dem	AI	57	AI	57	TBD	TBD
kvar import block dem	AI	58	AI	58	TBD	TBD
kVA block dem	AI	59	AI	59	TBD	TBD
kW import sliding wndw dem	AI	60	AI	60	TBD	TBD
kvar import sliding wndw dem	AI	61	AI	61	TBD	TBD
kVA sliding wndw dem	AI	62	AI	62	TBD	TBD
kW import accumulated dem	AI	63	AI	63	TBD	TBD
kvar import accumulated dem	AI	64	AI	64	TBD	TBD
kVA accumulated dem	AI	65	AI	65	TBD	TBD
kW import predicted sliding wndw dem	AI	66	AI	66	TBD	TBD
kvar import predicted sliding wndw dem	AI	67	AI	67	TBD	TBD
kVA predicted sliding wndw dem	AI	68	AI	68	TBD	TBD
PF (import) at Max. kVA slid wndw dem	AI	69	AI	69	TBD	TBD
kW export block dem	AI	70	AI	70	TBD	TBD
kvar export block dem	AI	71	AI	71	TBD	TBD
kW export sliding wndw dem	AI	72	AI	72	TBD	TBD
kvar export sliding wndw dem	AI	73	AI	73	TBD	TBD
kW export accumulated dem	AI	74	AI	74	TBD	TBD
kvar export accumulated dem	AI	75	AI	75	TBD	TBD
kW export predicted sliding wndw dem	AI	76	AI	76	TBD	TBD
kvar export predicted sliding wndw dem	AI	77	AI	77	TBD	TBD
In Ampere dem	AI	78	AI	78	TBD	TBD
kWh import	AI	79	AI	79	TBD	TBD
kWh export	AI	80	AI	80	TBD	TBD
kvarh import	AI	81	AI	81	TBD	TBD
kvarh export	AI	82	AI	82	TBD	TBD
kVAh total	AI	83	AI	83	TBD	TBD
kVAh import	AI	84	AI	84	TBD	TBD

kVAh export	AI	85	AI	85	TBD	TBD
kvarh Q1	AI	86	AI	86	TBD	TBD
kvarh Q2	AI	87	AI	87	TBD	TBD
kvarh Q3	AI	88	AI	88	TBD	TBD
kvarh Q4	AI	89	AI	89	TBD	TBD

Appendix C. MAC Address DIP Switch Settings

Appendix C.1. MAC Address DIP Switch Settings

Address	A0	A1	A2	A3	A4	A5	A6	A7
0	Off	Off	Off	Off	Off	Off	Off	Off
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
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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
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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
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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
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92	Off	Off	On	On	On	Off	On	Off
93	On	Off	On	On	On	Off	On	Off

Address	A0	A1	A2	A3	A4	A5	A6	A7
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142	Off	On	On	On	Off	Off	Off	On

Address	A0	A1	A2	A3	A4	A5	A6	A7
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147	On	On	Off	Off	On	Off	Off	On
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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

Address	A0	A1	A2	A3	A4	A5	A6	A7
192	Off	Off	Off	Off	Off	Off	On	On
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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

Address	A0	A1	A2	A3	A4	A5	A6	A7
241	On	Off	Off	Off	On	On	On	On
242	Off	On	Off	Off	On	On	On	On
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-N34	ProtoNode FPC-N35
Electrical Connections	One 6-pin Phoenix connector, one RS-485 +/- ground port, power +/- frame ground port One 3-pin RS-485 Phoenix connector, one RS-485 +/- ground port One Ethernet-10/100 Ethernet port	One 6-pin Phoenix connector, one RS-485 +/- ground port, power +/- frame ground port One Ethernet 10/100 BaseT port One FTT-10 LonWorks port
Approvals:	Pending CE (EN55022;EN55024; EN60950), UL916, FCC Class A Part 15, DNP3 Conformance Tested, OPC Self-tested for Compliance, 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 to 167°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 31: 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 or 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.

Appendix E. Limited 2 Year Warranty

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