

**ProtoNode FPC-N34 and ProtoNode FPC-N35  
Startup Guide  
For Interfacing Triangle Tube Products:  
Prestige and Keystone  
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

Date 9/24/21  
2012-E10 ProtoNode Startup  
Guide

## Technical Support:

Thank you for purchasing the ProtoNode for Triangle Tube.

Please call Triangle Tube for Technical support of the ProtoNode product.

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

### Support Contact Information:

Triangle Tube  
1240 Forest Parkway #100  
West Deptford, NJ 08066

Triangle Tube Service:

(856) 228-8881

Website: [www.triangletube.com](http://www.triangletube.com)

## Quick Start Guide

1. Record the information about the unit. (Section 2.1)
2. Set the device's Modbus Address for each of the devices that will be connected to ProtoNode FPC-N34 or FPC-N35. (Section 2.2.2)
3. Select a stored configuration and set field protocol MAC address/Node-ID/Device Instance, and baud rate. (Section 2.3)
4. 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)
5. **Connect FPC-N34** ProtoNode's 3 pin RS-485 port to the Field Protocol cabling (Section 3.3), **or connect FPC-N35** ProtoNode's 2 pin LonWorks port to the Field Protocol cabling. (Section 3.4)
6. Connect Power to ProtoNode's 6 pin connector. (Section 3.5)
7. BACnet/IP or Modbus/TCP (FPC-N34): Use the ProtoNode's embedded tool which is accessed with a browser, referred to in this manual as the Web Configurator, to change the IP address. No changes to the configuration file are necessary. (Section 4)
8. 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.

### ▪ 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. FieldServer Technologies 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 has been preprogrammed for Triangle Tube's products (hereafter called "device") to various building automation protocols. These protocols include BACnet<sup>1</sup>MS/TP, BACnet/IP, Metasys<sup>2</sup> N2 by JCI, Modbus TCP, and LonWorks<sup>3</sup>. Configurations for the various protocols are stored within the ProtoNode and are selectable via DIP switches for fast and easy installation.

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

## 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-N34-0822
ProtoNode FPC-N35	FPC-N35-103-401-0823

**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

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

<sup>2</sup> Metasys is a registered trademark of Johnson Controls Inc.

<sup>4</sup> LonWorks is a registered trademark of Echelon Corporation

## 2.2 Configuring Device Communications

### 2.2.1 Modbus COM settings for all of the devices connected to the ProtoNode

- The Prestige and Keystone communicate with the ProtoNode using the settings listed in [Figure 2](#). These settings are not adjustable.

Serial Port Setting	Device
Protocol	Modbus RTU
Baud Rate	38400
Parity	None
Data Bits	8
Stop Bits	1

[Figure 2: Modbus RTU COM Settings](#)

### 2.2.2 Set Modbus Address for each of the devices attached to the ProtoNode

Set the Modbus Address for each of the devices attached to ProtoNode.

- The Modbus Address needs to be uniquely assigned, **starting with a value of 1 for the first device.**
- **Modbus Address values for additional devices must be sequential (2, 3, 4, ...).**

2.3 Selecting Stored Configurations, Setting the Mac Address, Node\_ID, and Baud Rate

2.3.1 Selecting Configuration Files for Devices: “S” bank DIP Switches S0 – S3

- The S bank of DIP switches (S0 - S3) are used to select and load a configuration file from a group of pretested/preloaded configuration files which are stored in the ProtoNode FPC-N34 (BACnet MS/TP, BACnet/IP, Modbus TCP, Metasys N2) and the ProtoNode FPC-N35 (LonWorks).

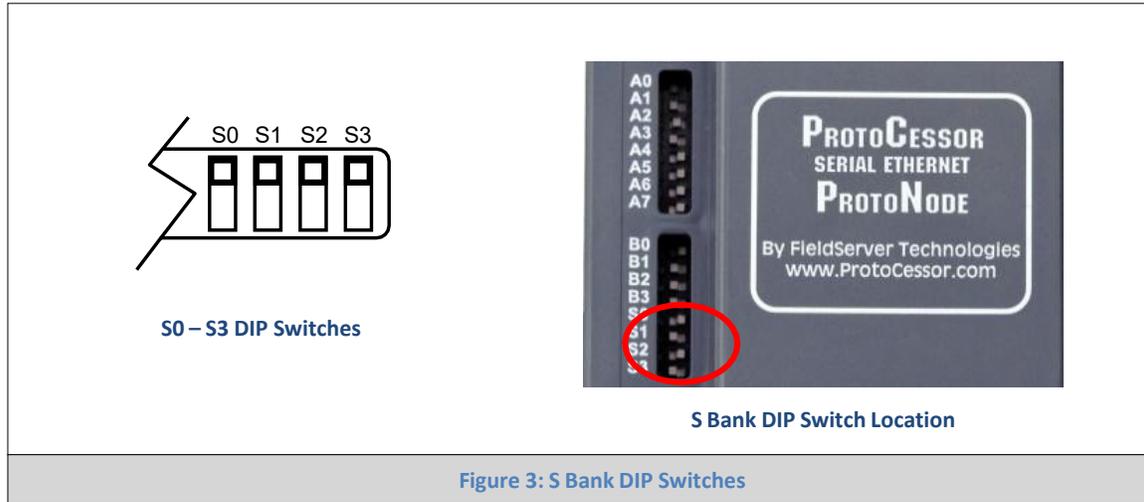


Figure 3: S Bank DIP Switches

2.3.1.1 BACnet MS/TP and BACnet IP DIP Switch Settings

The following chart describes S0 - S3 DIP Switch configuration settings for 1 through 8 device applications to support **BACnet MS/TP and BACnet/IP** on a ProtoNode FPC-N34

Cover doesn't need to be Removed	ProtoCarrier DIP Switches			
Profile - FPC-N34-0822	S0	S1	S2	S3
1 Prestige to BACnet IP/BACnet MSTP	Off	Off	Off	Off
2 Prestige to BACnet IP/BACnet MSTP	On	Off	Off	Off
3 Prestige to BACnet IP/BACnet MSTP	Off	On	Off	Off
4 Prestige to BACnet IP/BACnet MSTP	On	On	Off	Off
5 Prestige to BACnet IP/BACnet MSTP	Off	Off	On	Off
6 Prestige to BACnet IP/BACnet MSTP	On	Off	On	Off
7 Prestige to BACnet IP/BACnet MSTP	Off	On	On	Off
8 Prestige to BACnet IP/BACnet MSTP	On	On	On	Off
1 Keystone to BACnet IP/BACnet MSTP	Off	Off	Off	On
2 Keystone to BACnet IP/BACnet MSTP	On	Off	Off	On
3 Keystone to BACnet IP/BACnet MSTP	Off	On	Off	On
4 Keystone to BACnet IP/BACnet MSTP	On	On	Off	On
5 Keystone to BACnet IP/BACnet MSTP	Off	Off	On	On
6 Keystone to BACnet IP/BACnet MSTP	On	Off	On	On
7 Keystone to BACnet IP/BACnet MSTP	Off	On	On	On
8 Keystone to BACnet IP/BACnet MSTP	On	On	On	On

See Appendix B.1 for the Configuration DIP switch settings for - 1 through 8 Prestige and Keystone to Metasys N2 and Modbus TCP.

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

### 2.3.1.2 LonWorks DIP Switch Settings

The following chart describes the DIP switch settings for the Prestige and Keystone to support **LonWorks** on a ProtoNode FPC-N35.

Cover doesn't need to be removed	ProtoCarrier DIP Switches			
Profile - FPC-N35-103-401-0823	S0	S1	S2	S3
1 Prestige to Lonworks	Off	Off	Off	Off
2 Prestige to Lonworks	On	Off	Off	Off
3 Prestige to Lonworks	Off	On	Off	Off
4 Prestige to Lonworks	On	On	Off	Off
5 Prestige to Lonworks	Off	Off	On	Off
6 Prestige to Lonworks	On	Off	On	Off
7 Prestige to Lonworks	Off	On	On	Off
8 Prestige to Lonworks	On	On	On	Off
1 Keystone to Lonworks	Off	Off	Off	On
2 Keystone to Lonworks	On	Off	Off	On
3 Keystone to Lonworks	Off	On	Off	On
4 Keystone to Lonworks	On	On	Off	On
5 Keystone to Lonworks	Off	Off	On	On
6 Keystone to Lonworks	On	Off	On	On
7 Keystone to Lonworks	Off	On	On	On
8 Keystone to Lonworks	On	On	On	On

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

### 2.3.2 BACnet MS/TP (FPC-N34): Setting the MAC Address BACnet Networks

- 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 (MAC Master Address); 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 DIP switches A0 – A7 to assign MAC Address for BACnet MS/TP for the ProtoNode FPC-N34.
- Please refer to **Appendix D.1** for the complete range of MAC Addresses and DIP switch settings.

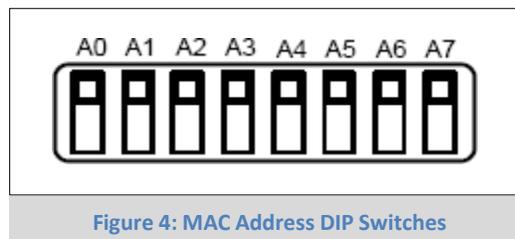


Figure 4: MAC Address DIP Switches

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

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

- The A Bank of DIP switches are also used to set the BACnet Device Instances.
- The BACnet Device Instance can range from 1 to 4,194,303.
- The BACnet device instances will be calculated by taking the Node\_Offset (default is 50,000) found in Web Configurator (Section 2.3.2.1) and adding it to the value of the A Bank DIP switches (MAC address). When more than one device is connected to the ProtoNode, the subsequent BACnet Device Instance numbers will be sequential from the first/previous device.

For example:

- **Given that: Device Instance = Node\_Offset + MAC address**
  - Default Node\_Offset value = 50,000
  - A Bank DIP switch (MAC address) = 11
- **Then the Device Instance values for the devices are:**
  - Device 1 Instance = 50,011
  - Device 2 Instance will then be 50,011(Device Instance 1) +1 = 50,012
  - Device 3 Instance will then be 50,012 (previous Device Instance) +1 = 50,013

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#### 2.3.3.1 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 4.2**
  - This step cannot be performed until after the unit is connected and powered.

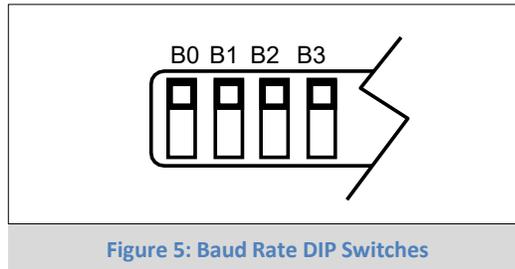
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### 2.3.4 Metasys N2 and Modbus/TCP (FPC-N34): Setting the Node-ID

- Set DIP switches A0 – A7 to assign Node-ID for Metasys N2 and Modbus TCP for the ProtoNode FPC-N34.
- Metasys N2 and Modbus/TCP Node-ID Addressing: Metasys N2 and Modbus/TCP Node-ID's range from 1-255
- Please refer to **Appendix D.1** for the full range of addresses for setting Node-ID.

### 2.3.5 BACnet MS/TP (FPC-N34): Setting the Serial Baud Rate (DIP Switch B0 – B3)

- DIP Switches B0 – B3 can be used to set the serial baud rate to match the baud rate provided by the Building Management System for BACnet MS/TP.
- DIP Switches B0 – B3 are disabled on ProtoNode FPC-N35 (FPC-N35 LonWorks).
- The baud rate on ProtoNode for Metasys N2 is set for 9600. DIP Switches B0 – B3 are disabled for Metasys N2 on ProtoNode FPC-N34.



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

#### 2.3.5.1 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 6: Baud Rate

### 3 INTERFACING PROTONODE TO DEVICES

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

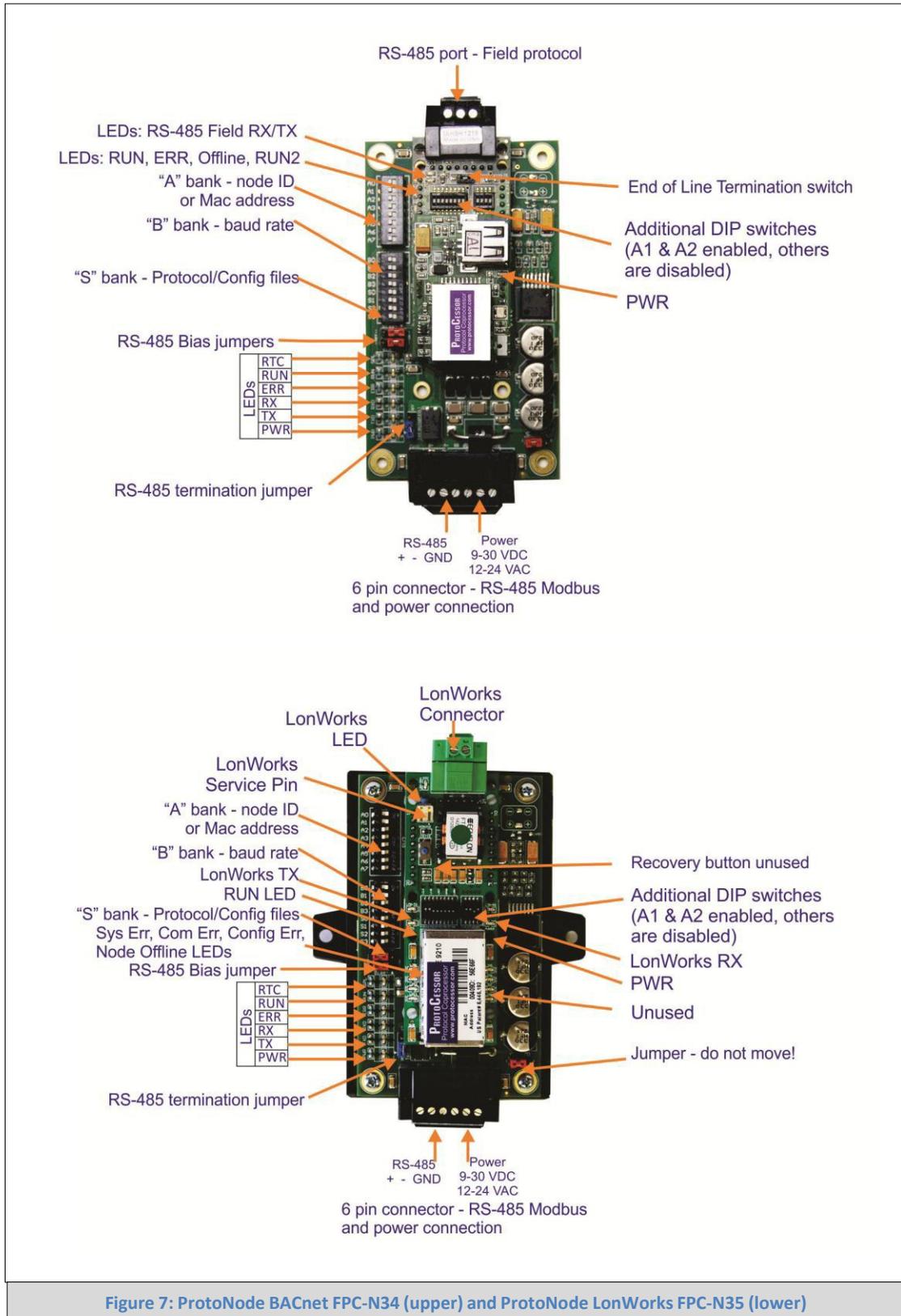


Figure 7: ProtoNode BACnet FPC-N34 (upper) and ProtoNode LonWorks FPC-N35 (lower)

### 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 connecting to each device.
  - Reference the table in [Figure 8](#) for Prestige and Keystone wiring terminations.
  - Multiple devices should be daisy chain wired to the ProtoNode.
- Pins 4 through 6 are for power. **Do not connect power** (wait until Section 3.5).

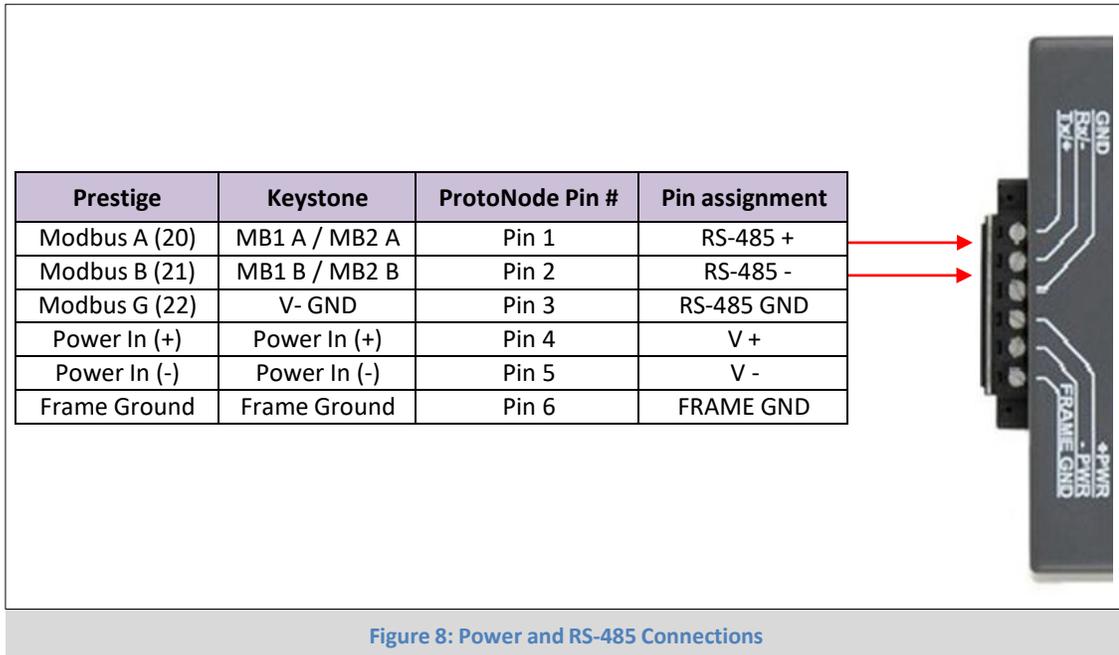


Figure 8: Power and RS-485 Connections

### 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 9](#).
- **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).**
- 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.

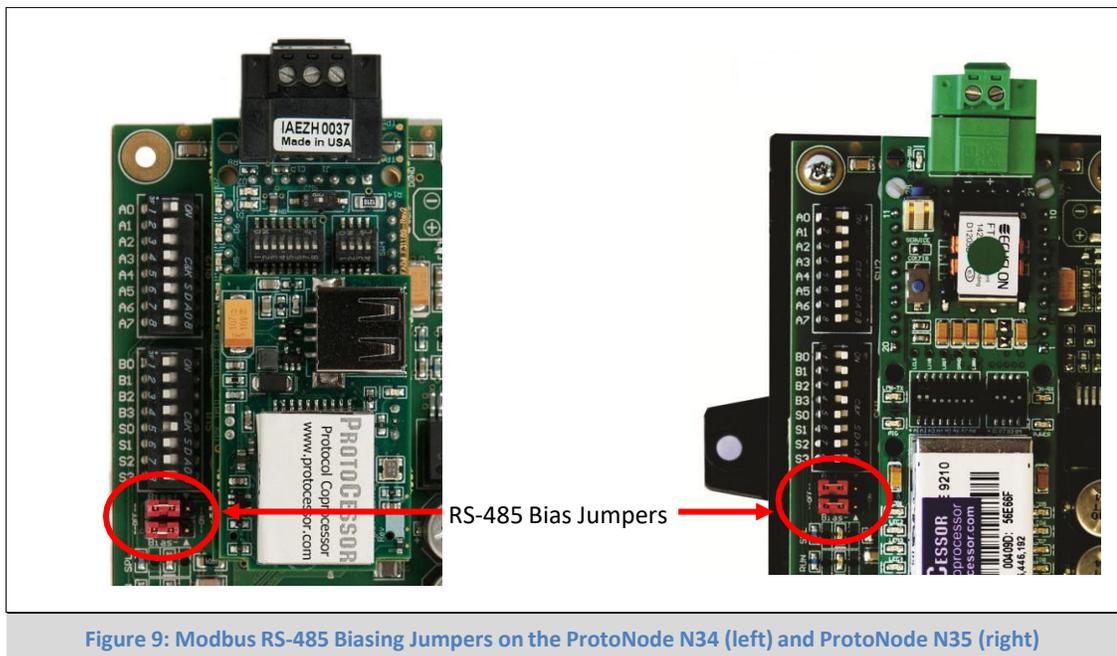
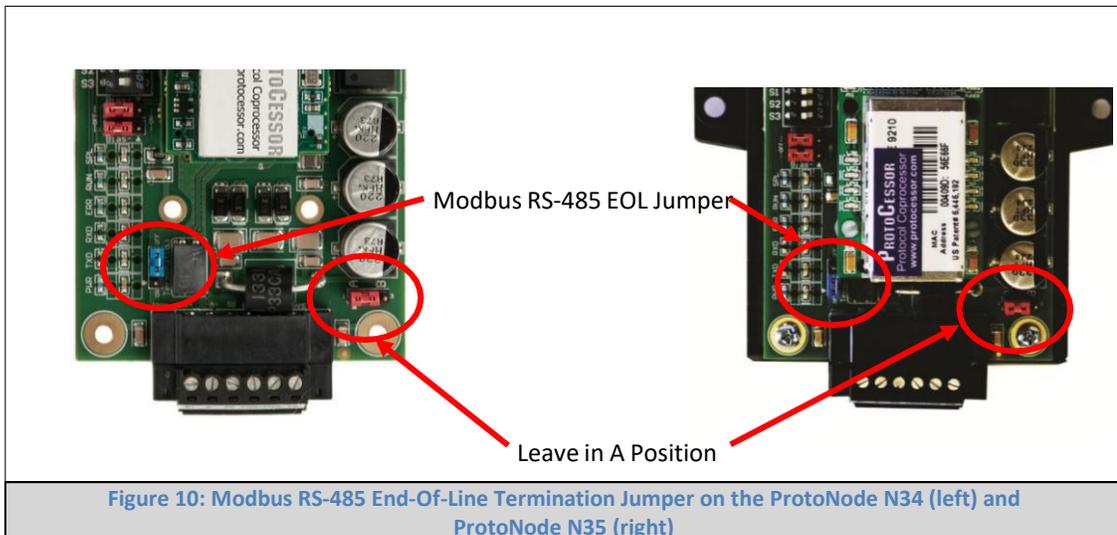


Figure 9: Modbus RS-485 Biasing Jumpers on the ProtoNode N34 (left) and ProtoNode N35 (right)

### 3.2.2 End of Line Termination Jumper 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.
- 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 jumper does not 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).**



### 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 11](#).
- See [Section 4](#) 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 ([Figure 12](#)). It is disabled by default.

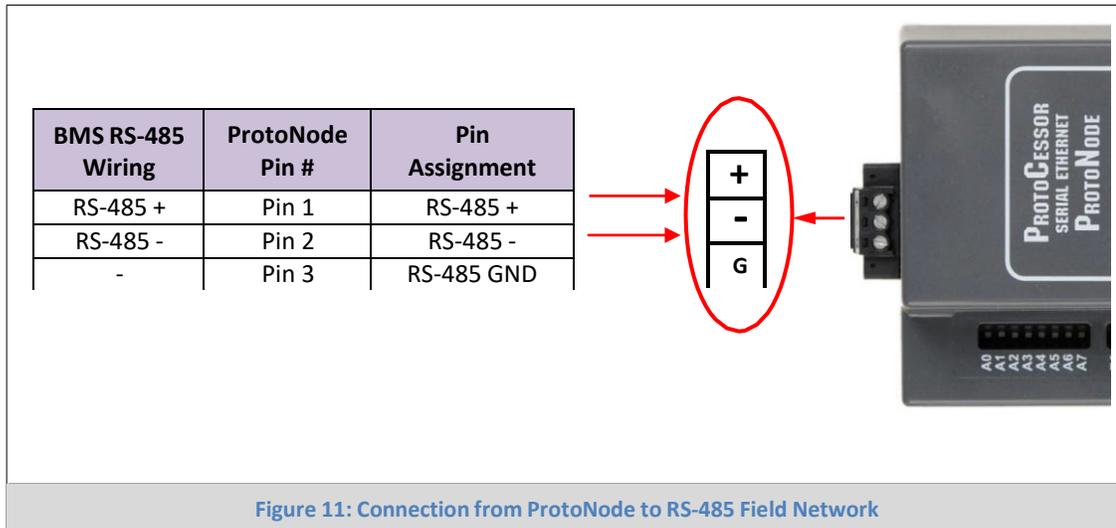


Figure 11: Connection from ProtoNode to RS-485 Field Network

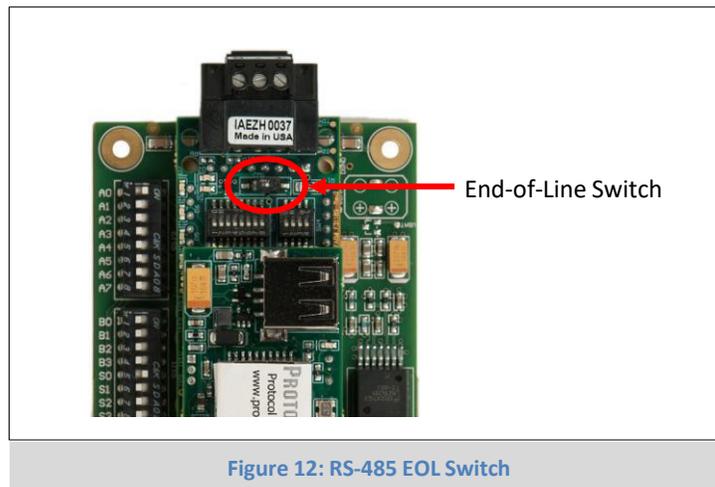


Figure 12: RS-485 EOL Switch

### 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 13: LonWorks Terminal

### 3.5 Connecting Power to ProtoNode

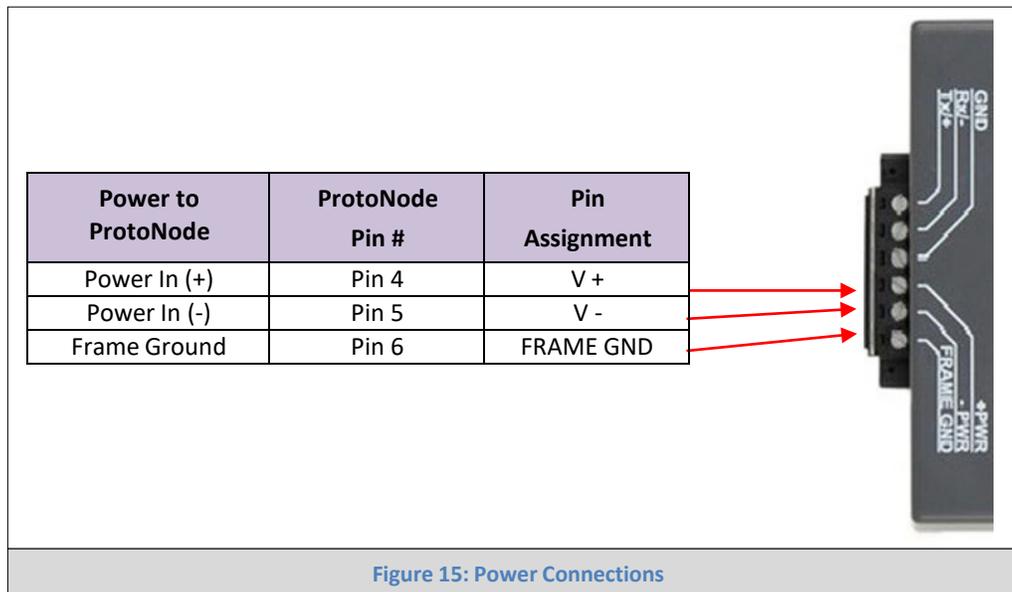
Apply power to ProtoNode as show below in **Figure 14**. Ensure that the power supply used complies with the specifications provided in Appendix E.1.

- ProtoNode accepts either 9-30VDC or 12-24 VAC on pins 4 and 5.

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 14: Required current draw for the ProtoNode**



## 4 BACNET/IP AND MODBUS TCP: CHANGE THE PROTONODE IP ADDRESS

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

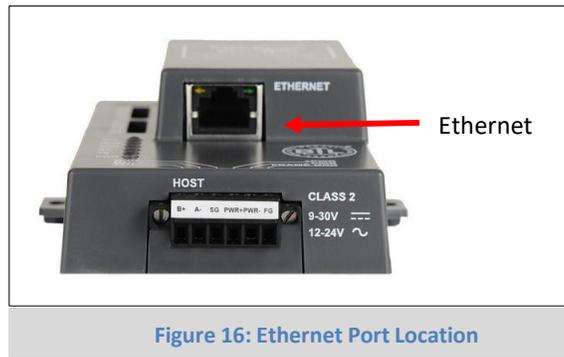
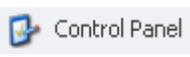


Figure 16: Ethernet Port Location

- 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
- For Windows XP:

Go to  >  Control Panel >  Network Connections

Right-click on Local Area Connection > Properties

Highlight   Internet Protocol (TCP/IP) >  Properties

- For Windows 7:

Go to  >  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

- 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

## 4.2 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 17)
- 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 + MAC address**
  - Then: **Node\_Offset (required) = Device Instance (desired) – MAC address**

For example:

- Device 1 has a Modbus Address of 1
- Device 2 has a Modbus Address of 2
- Device 3 has a Modbus Address of 3
- MAC address (Bank "A" DIP switches) = 11
- Desired Device Instance for 1<sup>st</sup> device = 1,011
- **Node\_Offset (required) = 1,011 – (MAC address) = 1,011 – 11 = 1,000**
- The Node\_Offset value will be applied to all devices.
- Device 1 Instance will then be = 1,000 + MAC address = 1,000 + 11 = 1,011
- Device 2 Instance will then be = Previous Value + 1 = 1,011 + 1 = 1,012
- Device 3 Instance will then be = Previous Value + 1 = 1,012 + 1 = 1,013

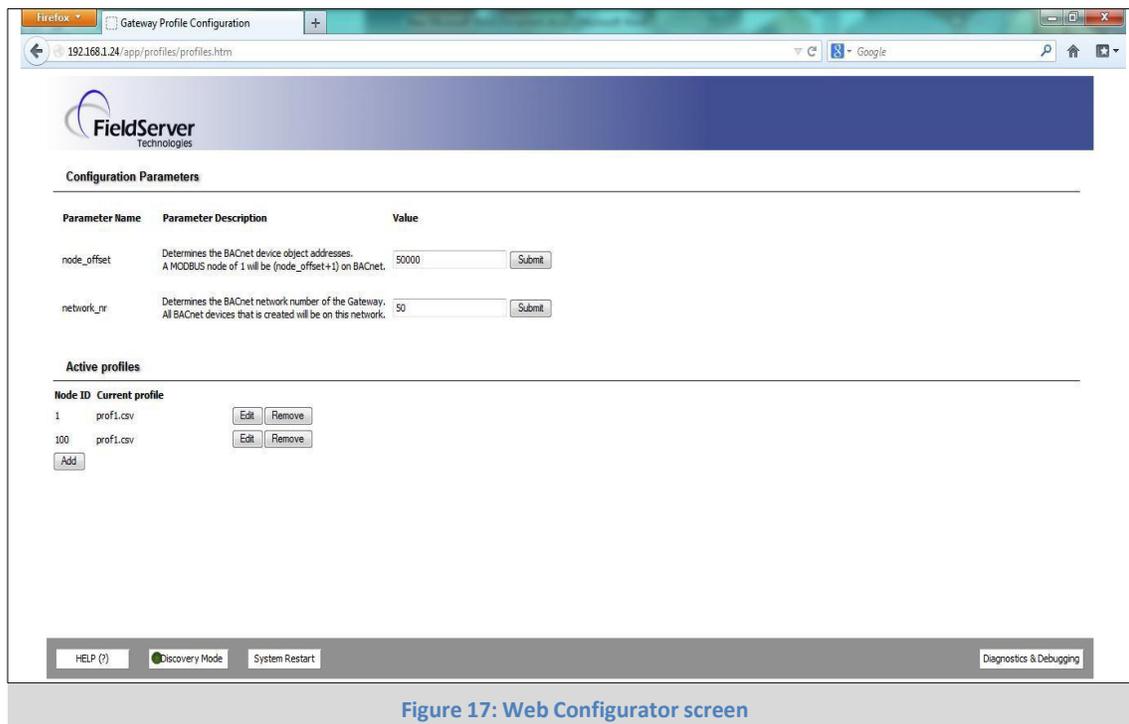


Figure 17: Web Configurator screen

### 4.3 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 18)
- Below the Active Profiles heading you should see profiles listed for connected devices. If no profiles are present, then the wiring, baud rate, and DIP switch settings must be checked, because there is a problem with device communications. All the active profiles must show the correct Node-ID's before proceeding.
- To access the FST Web GUI, click on the “Diagnostics & Debugging” button in the bottom right side of the page.

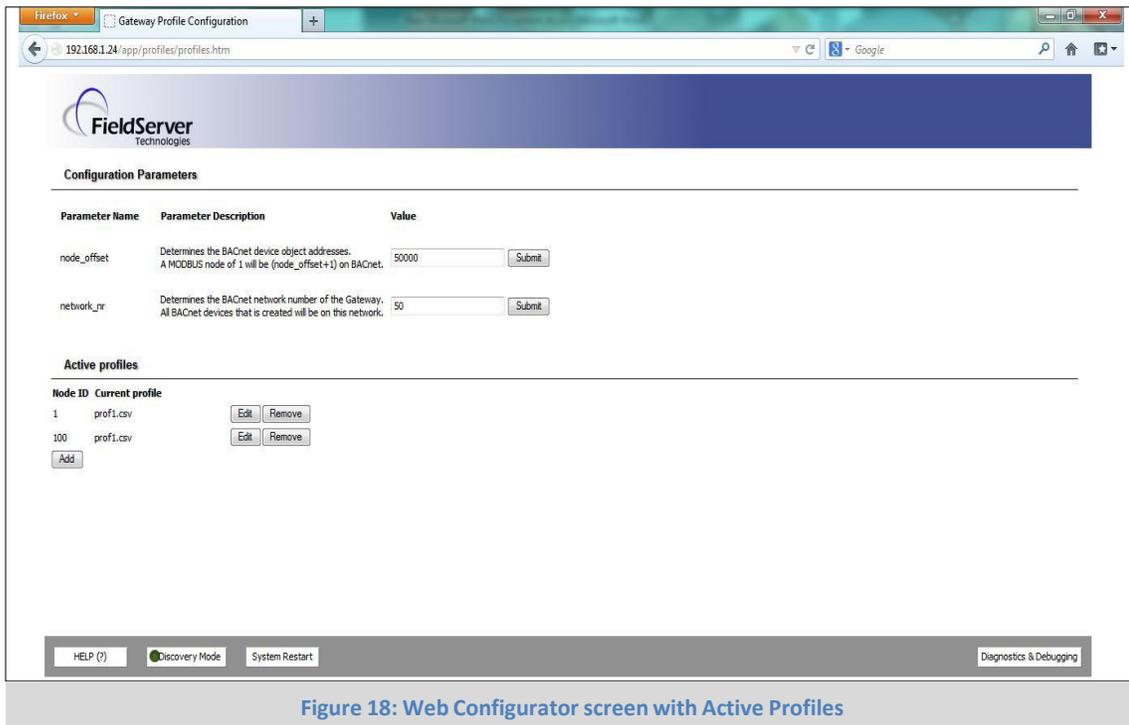


Figure 18: Web Configurator screen with Active Profiles

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

- From the Web Configurator landing page (**Figure 18**), 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 19**)

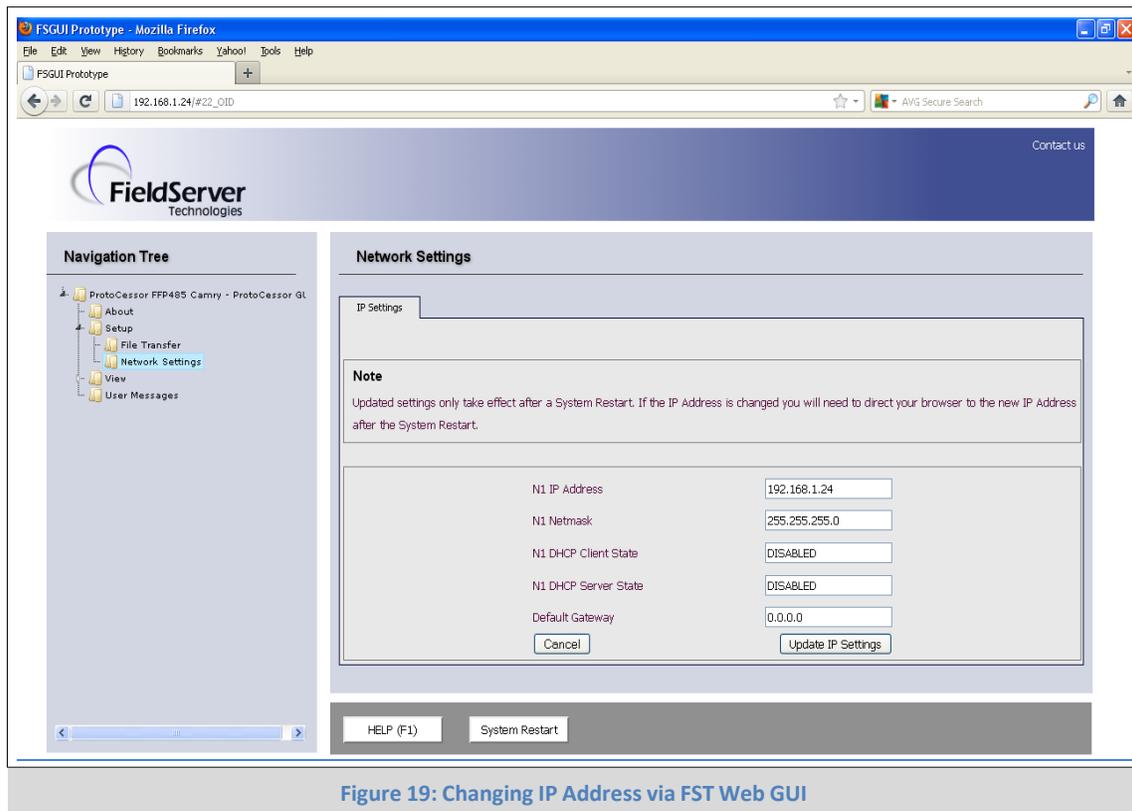


Figure 19: Changing IP Address via FST Web GUI

- Enter the new IP address for the ProtoNode's Ethernet port in the “N1 IP address” field.
- If necessary, change the Subnet Mask setting in the “N1 Netmask” field.
- If necessary, change the IP Gateway setting in the “Default Gateway” field.
- 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.
- 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 the ProtoNode 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 20: LonWorks Service Pin Location

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

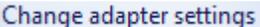
- Connect a standard CAT5 Ethernet cable (Straight through or Cross-Over) between the PC and ProtoNode
- The Default IP Address of ProtoNode is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and ProtoNode are on different IP Networks, assign a static IP Address to the PC on the 192.168.1.xxx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

Go to  >  >  Network Connections

Right-click on Local Area Connection > Properties

Highlight   Internet Protocol (TCP/IP) > 

- For Windows 7:

Go to  >  Control Panel >  Network and Internet  
>  Network and Sharing Center > 

Right-click on Local Area Connection > Properties

Highlight   Internet Protocol Version 4 (TCP/IPv4) > 

- 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

```

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 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 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 21: 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 "TriangleTube2BACnet"**. 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 22: 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 23: 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/TP 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 4.1 to set the IP address and subnet of the PC that will be running the CAS Explorer.
- Connect a standard CAT5 Ethernet cable (Straight through or Cross-Over) between the PC and 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 Modbus device address
  - Verify wiring
  - Verify all the Modbus RTU devices 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 Diagnostic Capture log is complete, email it to [support@protocessor.com](mailto:support@protocessor.com). The Diagnostic Capture will allow us to rapidly diagnose the problem.
- Make sure the FieldServer-Toolbox utilities are loaded on the PC  
<http://www.protocessor.com/tech-support/utilities-and-design-documents.php>

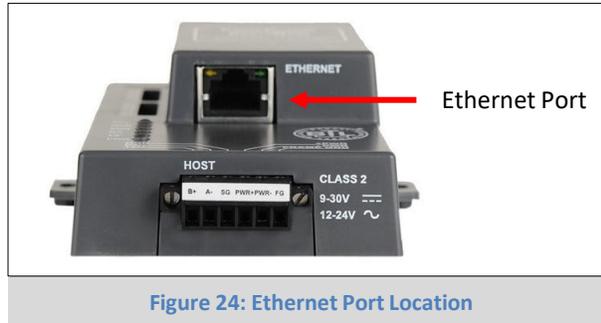
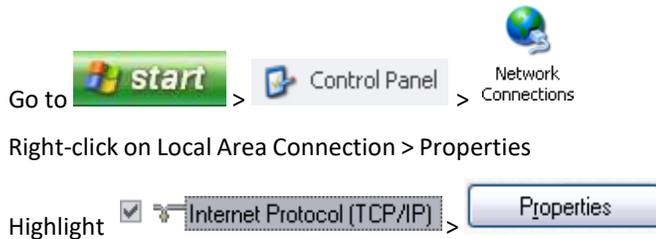
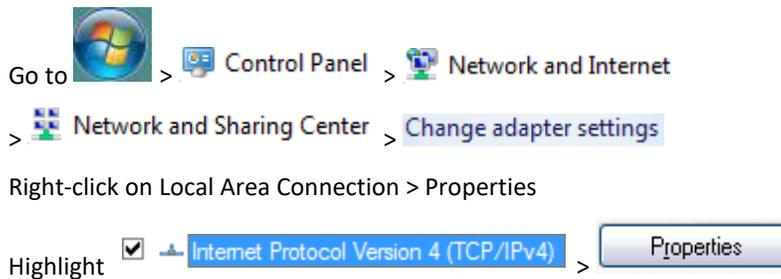


Figure 24: Ethernet Port Location

- Disable any wireless Ethernet adapters on the PC/Laptop
- Disable firewall and virus protection software if possible
- Connect a standard CAT5 Ethernet cable (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:



- For Windows 7:



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

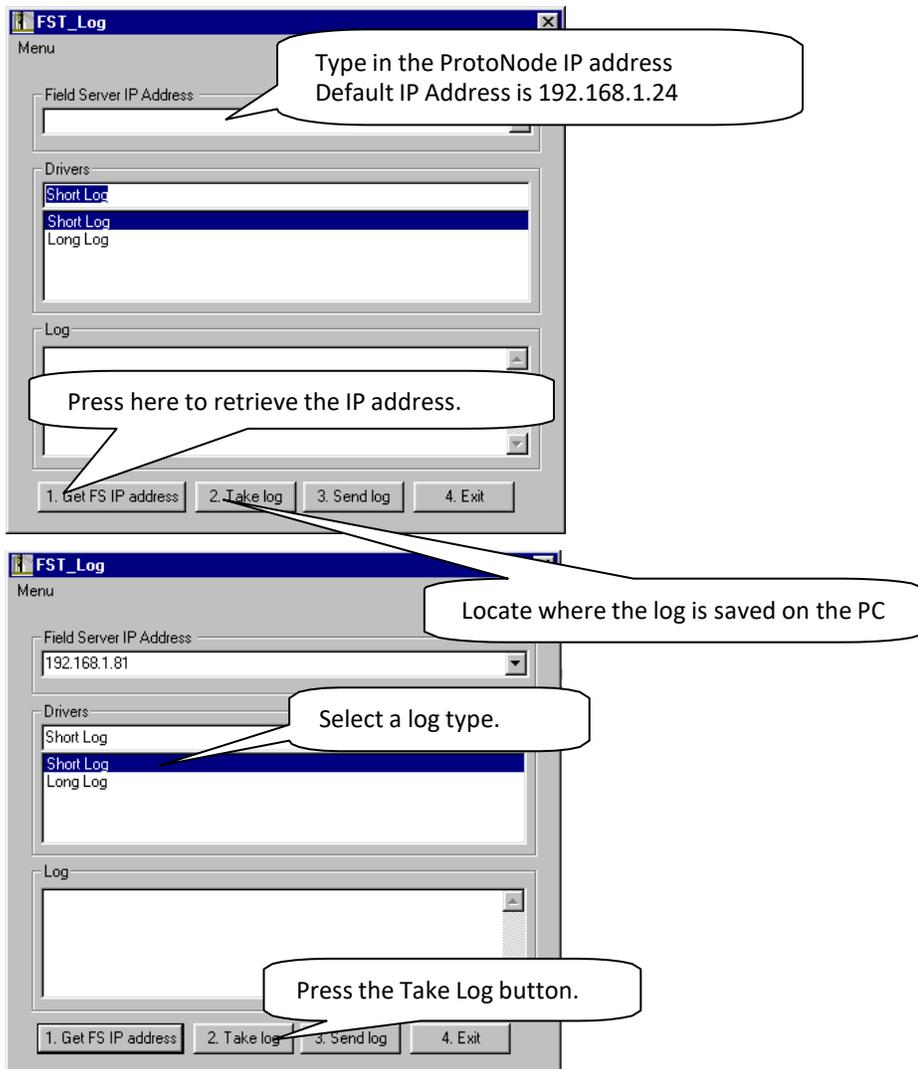
Use the following IP address:

IP address:

Subnet mask:

Default gateway:

- 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 

Appendix A.3. BACnet/IP: Setting Network\_Number for more than one ProtoNode on Subnet

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.

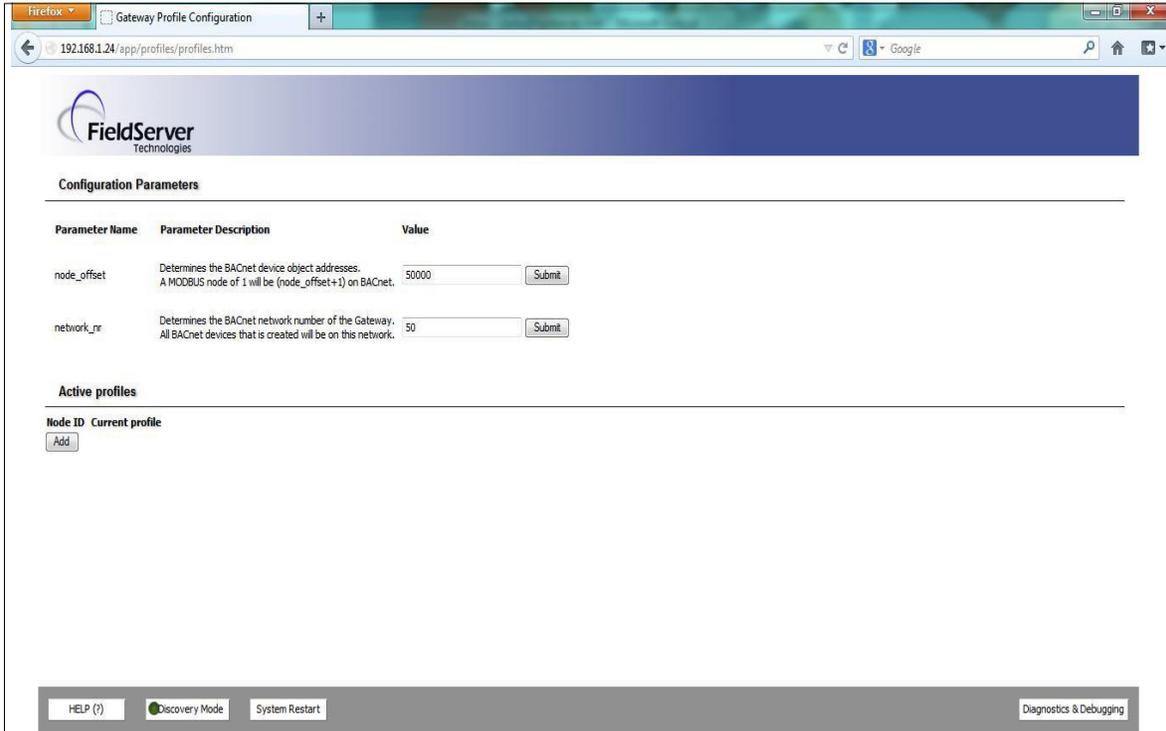
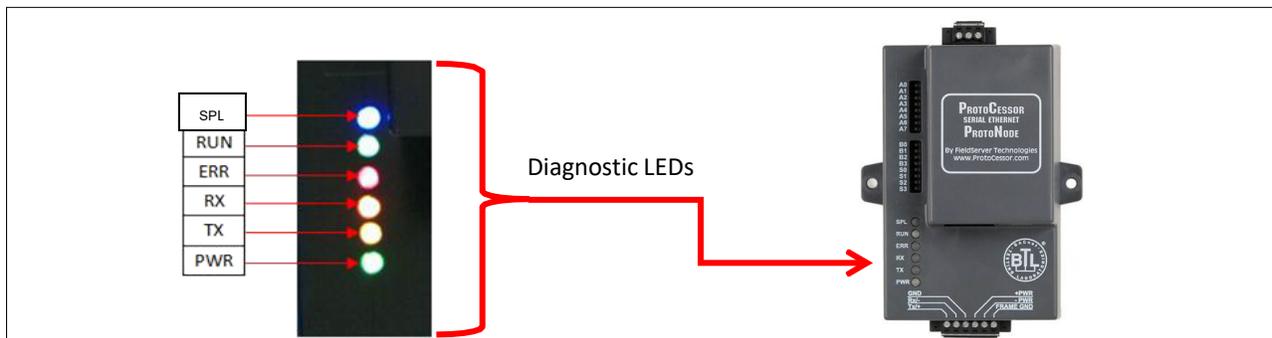


Figure 25: Web Configurator showing setting the network number for BACnet/IP

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.



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 from the boiler.
TX	The TX LED will flash when a message is sent to the boiler.
PWR	This is the power light and should show steady green at all times when ProtoNode is powered.

Figure 26: Diagnostic LEDs

**Appendix B. Additional Features**

**Appendix B.1. DIP switch settings to support 1 through 8 Prestige and Keystone to Metasys N2 and Modbus TCP**

Note: The lid on top of the ProtoNode has to be removed in order to select the A Bank of DIP switches. Pull on the lid while holding on to the 6 pin Phoenix connector. Please do not hold the wall mount tabs as these are designed to break off if not required!

- To select these configurations, open the ProtoNode and set the A bank of switches (A1 or A2 or A3) on the small ProtoCessor module that sits on top of the ProtoCarrier (inside the ProtoNode).
- ProtoCessor A1 DIP switch starts on the bottom of the A bank of DIP switches below.
- ProtoCessor A3-A8 DIP switches are disabled.



N2 and Modbus TCP	ProtoCarrier DIP Switches				ProtoCessor DIP Switches (Remove Cover)							
	S0	S1	S2	S3	A1	A2	A3	A4	A5	A6	A7	A8
Profile - FPC-N34-103-122-0676												
1 Prestige to Metasys N2	Off	Off	Off	Off	On	Off						
2 Prestige to Metasys N2	On	Off	Off	Off	On	Off						
3 Prestige to Metasys N2	Off	On	Off	Off	On	Off						
4 Prestige to Metasys N2	On	On	Off	Off	On	Off						
5 Prestige to Metasys N2	Off	Off	On	Off	On	Off						
6 Prestige to Metasys N2	On	Off	On	Off	On	Off						
7 Prestige to Metasys N2	Off	On	On	Off	On	Off						
8 Prestige to Metasys N2	On	On	On	Off	On	Off						
1 Keystone to Metasys N2	Off	Off	Off	On	On	Off						
2 Keystone to Metasys N2	On	Off	Off	On	On	Off						
3 Keystone to Metasys N2	Off	On	Off	On	On	Off						
4 Keystone to Metasys N2	On	On	Off	On	On	Off						
5 Keystone to Metasys N2	Off	Off	On	On	On	Off						
6 Keystone to Metasys N2	On	Off	On	On	On	Off						
7 Keystone to Metasys N2	Off	On	On	On	On	Off						
8 Keystone to Metasys N2	On	On	On	On	On	Off						
Modbus TCP for all	Off	Off	Off	Off	Off	On	Off	Off	Off	Off	Off	Off

## Appendix C. Vendor Information - Triangle Tube

## Appendix C.1. Prestige 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
CH Demand	AV	1	AO	1	nvi/nvoCHDemand	SNVT_count_inc_f
Maximum Firing Rate	AV	2	AO	2	nvi/nvoMaxFirRate	SNVT_lev_percent
CH Setpoint	AV	3	AO	3	nvi/nvoCH1SP	SNVT_temp_p
CH1 Max Setpoint	AI	4	AI	4	nvoCH1MaxSP	SNVT_temp_p
DHW Storage Setpoint	AI	5	AI	5	nvoDHWStorageSP	SNVT_temp_p
PC Manual Mode	BI	6	DI	6	nvoPCManualMode	SNVT_switch
DHW Mode	BI	7	DI	7	nvoDHWMode	SNVT_switch
CH Mode	BI	8	DI	8	nvoCHMode	SNVT_switch
Freeze Protection Mode	BI	9	DI	9	nvoFrzProtctMod	SNVT_switch
Flame Present	BI	10	DI	10	nvoFlamePresent	SNVT_switch
CH(1) Pump	BI	11	DI	11	nvoCHPmp	SNVT_switch
DHW Pump	BI	12	DI	12	nvoDHWpmp	SNVT_switch
System / CH2 Pump	BI	13	DI	13	nvoSysCH2Pmp	SNVT_switch
Lockout Code Type	AI	14	AI	14	nvoLckotCdType	SNVT_count_inc_f
Lockout Code	AI	15	AI	15	nvoLckotCd	SNVT_count_inc_f
Lockout Status	AI	16	AI	16	nvoLckotStatus	SNVT_count_inc_f
Boiler Supply Temp / Sys Temp	AI	17	AI	17	nvoBlrSupTmp	SNVT_temp_p
Boiler Return Temp	AI	18	AI	18	nvoBlrRetTmp	SNVT_temp_p
DHW Storage Temp	AI	19	AI	19	nvoDHWStrgTmp	SNVT_temp_p
Boiler Flue Temp	AI	20	AI	20	nvoBlrFlueTmp	SNVT_temp_p
Outdoor Temp	AI	21	AI	21	nvoOutdoorTmp	SNVT_temp_p
Flame Ionization Current	AI	22	AI	22	nvoFlmlonCrrt	SNVT_count_inc_f
Boiler / Cascade Firing Rate	AI	23	AI	23	nvoBlrCscFirRat	SNVT_lev_percent
Boiler Setpoint	AI	24	AI	24	nvoBlrSP	SNVT_temp_p

**Note:** See Modbus Interface in the Prestige Control Application Supplement – TriMax for additional information.

## Appendix C.2. Keystone 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
Demand source	AI	1	AI	1	nvoXDemSrc	SNVT_count_inc_f
Outlet sensor	AI	2	AI	2	nvoXOutletSen	SNVT_temp_p
Firing rate	AI	3	AI	3	nvoXFiringRate	SNVT_count_inc_f
Fan speed	AI	4	AI	4	nvoXFanSpeed	SNVT_count_inc_f
Flame signal	AI	5	AI	5	nvoXFlameSignal	SNVT_count_inc_f
Inlet sensor	AI	6	AI	6	nvoXInletSen	SNVT_temp_p
DHW sensor	AI	7	AI	7	nvoXDHWSen	SNVT_temp_p
Stack sensor	AI	8	AI	8	nvoXStackSen	SNVT_temp_p
Active CH setpoint	AI	9	AI	9	nvoXActCHSP	SNVT_temp_p
Active DHW setpoint	AI	10	AI	10	nvoXActDHWSP	SNVT_temp_p
Active LL setpoint	AI	11	AI	11	nvoXActLLSP	SNVT_temp_p
Analog modulation input	AI	12	AI	12	nvoXAnaModIn	SNVT_count_inc_f
Burner control status	AI	13	AI	13	nvoXBrnCtrlStat	SNVT_count_inc_f
Lockout code	AI	14	AI	14	nvoXLockoutCode	SNVT_count_inc_f
Alarm reason	AI	15	AI	15	nvoXAlarmReason	SNVT_count_inc_f
Hold code	AI	16	AI	16	nvoXHoldCode	SNVT_count_inc_f
CH status	AI	17	AI	17	nvoXCHStatus	SNVT_count_inc_f
CH setpoint source	AI	18	AI	18	nvoXCH_SP_Src	SNVT_count_inc_f
CH heat demand	AI	19	AI	19	nvoXCH_HeatDem	SNVT_count_inc_f
CH burner demand	AI	20	AI	20	nvoXCH_BrnDem	SNVT_count_inc_f
DHW status	AI	21	AI	21	nvoXDHWStatus	SNVT_count_inc_f
DHW Priority Count	AI	22	AI	22	nvoXDHWPriCount	SNVT_count_inc_f
DHW heat demand	AI	23	AI	23	nvoXDHWHeatDem	SNVT_count_inc_f
DHW burner demand	AI	24	AI	24	nvoXDHWBrnDem	SNVT_count_inc_f
DHW pump status	AI	25	AI	25	nvoXDHWPmpStatus	SNVT_count_inc_f
DHW Pump Idle Days Count	AI	26	AI	26	nvoXDHWPmpIdleDay	SNVT_count_inc_f
System pump status	AI	27	AI	27	nvoXSysPmpStat	SNVT_count_inc_f
System Pump Idle Days Count	AI	28	AI	28	nvoXSysPmpIdleDay	SNVT_count_inc_f
Boiler pump status	AI	29	AI	29	nvoXBlrPmpStat	SNVT_count_inc_f
Boiler Pump Idle Days Count	AI	30	AI	30	nvoXBlrPmpIdleDay	SNVT_count_inc_f
Burner run time	AV	31	AO	31	nvi/nvoXBrnRunTime	SNVT_count_inc_f
Lead lag master status	AI	32	AI	32	nvoXLLMstrStat	SNVT_count_inc_f
Lead lag slave status	AI	33	AI	33	nvoXLLSlvStat	SNVT_count_inc_f
Lead Lag Master Setpoint Source	AI	34	AI	34	nvoXLLMstrSPSrc	SNVT_count_inc_f
Outdoor temperature	AI	35	AI	35	nvoXOutdoorTmp	SNVT_temp_p
System Sensor	AI	36	AI	36	nvoXSysSen	SNVT_temp_p
CH setpoint	AV	37	AO	37	nvi/nvoXCH_SP	SNVT_temp_p
Lead Lag setpoint	AV	38	AO	38	nvi/nvoXLL_SP	SNVT_temp_p
Warm weather shutdown setpoint	AV	39	AO	39	nvi/nvoXWrmWthrSh tSP	SNVT_temp_p
Lead Lag active service	AI	40	AI	40	nvoXLLActSrvce	SNVT_count_inc_f
Slave 1 State	AI	41	AI	41	nvoXSlv1State	SNVT_count_inc_f
Slave 1 firing rate	AI	42	AI	42	nvoXSlv1FirRate	SNVT_count_inc_f

Slave 2 State	AI	43	AI	43	nvoXSlv2State	SNVT_count_inc_f
Slave 2 firing rate	AI	44	AI	44	nvoXSlv2FirRate	SNVT_count_inc_f
Slave 3 State	AI	45	AI	45	nvoXSlv3State	SNVT_count_inc_f
Slave 3 firing rate	AI	46	AI	46	nvoXSlv3FirRate	SNVT_count_inc_f
Slave 4 State	AI	47	AI	47	nvoXSlv4State	SNVT_count_inc_f
Slave 4 firing rate	AI	48	AI	48	nvoXSlv4FirRate	SNVT_count_inc_f
Slave 5 State	AI	49	AI	49	nvoXSlv5State	SNVT_count_inc_f
Slave 5 firing rate	AI	50	AI	50	nvoXSlv5FirRate	SNVT_count_inc_f
Slave 6 State	AI	51	AI	51	nvoXSlv6State	SNVT_count_inc_f
Slave 6 firing rate	AI	52	AI	52	nvoXSlv6FirRate	SNVT_count_inc_f
Slave 7 State	AI	53	AI	53	nvoXSlv7State	SNVT_count_inc_f
Slave 7 firing rate	AI	54	AI	54	nvoXSlv7FirRate	SNVT_count_inc_f
Slave 8 State	AI	55	AI	55	nvoXSlv8State	SNVT_count_inc_f
Slave 8 firing rate	AI	56	AI	56	nvoXSlv8FirRate	SNVT_count_inc_f
Master firing rate	AI	57	AI	57	nvoXMstrFirRate	SNVT_count_inc_f
CH Enable	BV	58	DO	58	nvi/nvo1CHEnable	SNVT_count_inc_f
Lead Lag Op Switch	BV	59	DO	59	nvi/nvo1LL_OpSwitch	SNVT_count_inc_f

**Note:** See Honeywell Software Interface Specification – Sola Modbus Interface (#65-0310) for additional information.

Appendix D. “A” Bank DIP Switch Settings

Appendix D.1. “A” Bank DIP Switch Settings for MAC Address or Node-ID

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

Address	A0	A1	A2	A3	A4	A5	A6	A7
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
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127	On	Off						
128	Off	On						
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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
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170	Off	On	Off	On	Off	On	Off	On
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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

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

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 E. Reference

Appendix E.1. Specifications



	ProtoNode FPC-N34	ProtoNode FPC-N35
<b>Electrical Connections</b>	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
<b>Approvals:</b>	Pending CE (EN55022;EN55024; EN60950), UL916, Pending FCC Class A Part 15, DNP3 Conformance Tested, OPC Self-tested for Compliance, RoHS Compliant, CSA 205 Approved BTL Marked	LonMark Certified
<b>Power Requirements</b>	Multi-mode power adapter: 9 - 30VDC or 12 - 24VAC	
<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 27: Specifications</b>		

Appendix E.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 F. 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.