APPROVED

INSTALLATION & OPERATING INSTRUCTIONS

ProtoNode RER and ProtoNode LER

(FPC N34)
B-85

(FPC N35)
B-86

For Interfacing Raypak heating products equipped with the VERSA IC® control platform to Building Automation Systems: BACnet MS/TP, BACnet IP, Modbus TCP, Metasys N2, and LonWorks

Raypak® A Rheem® Company

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Revision 3 reflects the following changes:

Reformatted to reflect latest I&O template. Paragraph added to bottom of page 4. Figures 1, 6, 7 & 9 revised. Text revised following Figure 8. Section 4 verbiage and figures revised. Figures 14, 15, 16, 19 & 24 revised. " Instructions to Upload XIF" section revised. Appendix A "Troubleshooting:" section revised. Appendix B table "Point Name" descriptions updated.

APPROVED

TABLE OF CONTENTS

1. INTRODUCTION

ProtoNode is an external, high performance building automation multi-protocol gateway that is configured to allow communication between Raypak heating products equipped with the VERSA IC® control platform to various building automation protocols. These protocols include BACnet MS/TP, BACnet/IP, Modbus TCP, Metasys N2, and LonWorks.

- All Raypak products using VERSA IC control platform support ProtoNode.

Through the ProtoNode Web GUI Configurator, the user selects how many VERSA IC Master units are connected to the ProtoNode as well as sets the Modbus Node-ID for each VERSA IC Master. A Versa IC Master Unit can have up to 169 Modbus points for up to 4 connected Versa IC equipped units. Once the Raypak products are selected, the ProtoNode Automatically builds and downloads the Configuration for the desired protocol.

- The total number of VERSA IC Master units attached to the ProtoNode RER (FPC-N34) cannot exceed 8 Master units or 1400 Modbus registers for BACnet MS/TP, BACnet IP, Modbus TCP or Metasys N2.
- The total number of VERSA IC Master units attached to the ProtoNode LER (FPC-N35) cannot exceed 6 Master units or 1000 Modbus registers for LonWorks.

This document provides the necessary information to facilitate installation of the ProtoNode.

Raypak Videos

Go to www.youtube.com/RaypakChannel to watch the latest videos on our products and how you can troubleshoot/service them.

BTL Mark – BACnet Testing Laboratory

The BTL Mark on the ProtoNode RER 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.

Offered Configurations		
Part No.	**Option**	**Protocols**
014691	B-85	BACnet MS/TP, MS/IP, Modbus TCP, Metasys N2
014692	B-86	LonWorks

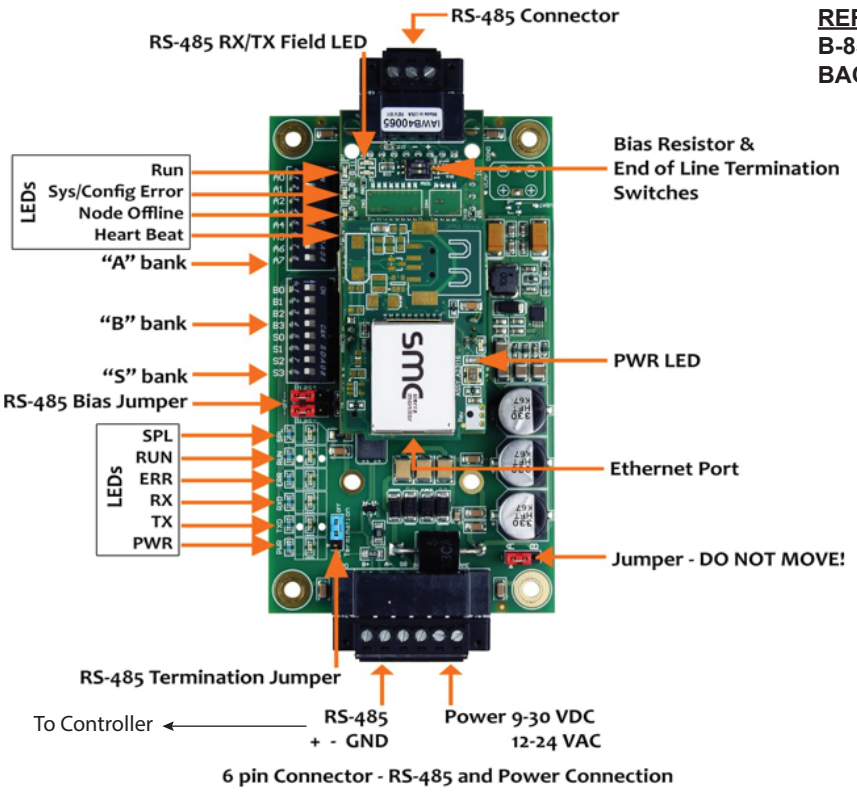
Table A. Offered Configurations

The wired configuration may be installed inside of the cabinet ,or at a convenient location outside of the cabinet.

The wireless configuration must be installed outside of the cabinet.

2. INTERFACING THE PROTONODE TO RAYPAK PRODUCTS

ProtoNode RER (FPC-N34) and LER (FPC-N35) showing connection ports



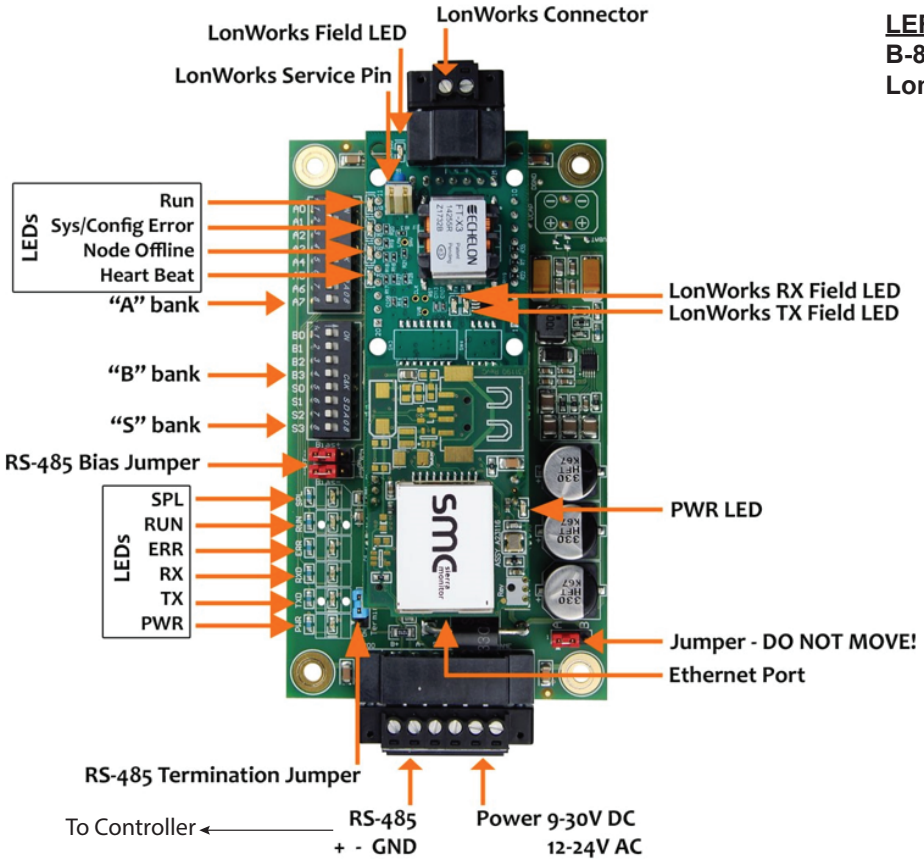


Figure 1. ProtoNode BACnet RER (BACnet) and ProtoNode LER (LonWorks)

3. BACNET/LONWORKS SETUP FOR PROTOCESSOR PROTONODE RER/LER

Connects only to a master unit, not a follower. Follow these instructions step-by-step for successful commissioning of the device.

Installation steps for the customer

1. Record identification data. (See page 5)
2. Set the Raypak VERSA IC Modbus RTU serial settings (i.e. baud rate, parity, stop bits) and Modbus Node-ID's for each VERSA IC Master that will be connected to the ProtoNode FPC-N34 or FPC-N35. (See **Table A**)
3. Select the Field Protocol (BACnet MS/TP, BACnet IP, Modbus TCP or Metasys N2) on the S Bank Dip Switches on the FPC-N34-0636. (See **Figure 2**)
4. Set BACnet device address for the ProtoNode RER (FPC-N34). (See "Setting the MAC Address for BACnet MS/TP for the ProtoNode RER (FPC-N34)" on page 8)
5. Set Metasys N2 Node-ID. (See "Configure Raypak VERSA IC Modbus COM Settings" on page 6)
6. If using BACnet MS/TP, Set B bank of DIP switches to set the baud rate on ProtoNode RER (FPC-N34). (See **Figure 4** & **Table D**)
7. Connect the ProtoNode's 3 pin RS-485 port to the Field Protocol cabling. (See **Figure 8**)
8. Connect each of the Raypak devices to the RS-485 Modbus RTU port to the ProtoNode's RS-485 interface which is located on the 6 pin connector of the ProtoNode (FPC-N34 and FPC-35). (See **Figure 5** through **Figure 7**)
9. Connect Power to the ProtoNode RER or LER. (See **Figure 11**) Raypak recommends a dedicated power supply be used to power the ProtoNode.
10. Follow instructions on page **12** to use web configurator.
11. Use Web-Configurator to select the Raypak products that will be attached to the ProtoNode and set the current Modbus Node-ID for each these products. Once the Raypak products are selected, the ProtoNode Automatically builds and downloads the Configuration for the specific application. (See "Selecting the Raypak profiles that will be connected the ProtoNode" on page 13).
12. Where the Field protocol is BACnet/IP or Modbus TCP, run the ProtoNode web GUI utility program to change the IP address. No changes to the configuration file are necessary. (See "Set IP Address for BACnet/IP via GUI" on page 15)
13. Commission the ProtoNode on the LonWorks Network. This needs to be done by the LonWorks administrator using a LonWorks Commissioning tool. (See "Commissioning the ProtoNode LER on a LonWorks network" on page 16)

Record Identification Data

Each ProtoNode has a unique part number located on the underside of the unit. The numbers are as follows:

- FieldServer part # FPC-N34-0636:VERSA IC to BACnet MS/TP, BACnet/IP, Modbus TCP, Metasys N2.
- FieldServer part # FPC-N35-0637: VERSA IC to LonWorks.

This number should be recorded, as it may be required for technical support.

Configure Raypak VERSA IC Modbus COM Settings

- All Raypak VERSA IC Master units connected to the ProtoNode MUST ALL have the same Baud Rate, Data Bits, Stop Bits, and Parity. (See **Figure 2**) These settings have no impact on the BMS portion of the Protonode communication and only are used to connect between the Versa IC Master and the Protonode.
- Set Modbus Node-ID's (Address) for each of the Raypak VERSA IC Master units attached to the ProtoNode. The Modbus Node-ID's need to be uniquely assigned between 1 and 127.
  - The Modbus Node-ID's that are assigned for each Raypak VERSA IC Master unit needs to be noted for later use when assigning Node-ID's in the web configurator. (See **Figure 18**)
  - The Metasys N2 and Modbus TCP Node-ID will be set to same value as the Node-ID of the Modbus RTU device.

Serial Port Setting	VERSA IC
Baud Rate	19K2 (19200)
Data Bits	8
Stop Bits	1
Parity	Even

Table B. Modbus RTU COM settings for the Raypak VERSA IC control platform

Select the Desired Field Protocol – for ProtoNode RER (FPC-N34)

Using S0 – S3 bank of DIP Switches

- The S bank of DIP switches, S0 – S3 are used to select the BACnet MS/TP, BACnet/IP, Modbus TCP, or Metasys N2 on the ProtoNode RER (FPC-N34-0636).
- The S bank of DIP switches on ProtoNode LER (FPC-N35-0637 - LonWorks) is disabled.

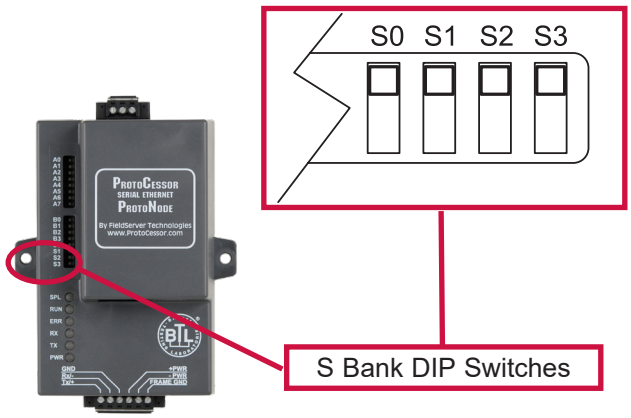


Figure 2. S0 through S3 DIP Switches

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

Installation Steps for the Customer

The following chart describes S0 - S3 DIP switch configuration settings for the Raypak products to support BACnet MS/TP or BACnet/IP on a ProtoNode RER (Part # FPC-N34-0636).

- When the S bank of switches are all off (default setting) BACnet IP is enabled.

ProtoNode RER FPC-N34-0636	ProtoNode S Bank DIP Switches			
Profile	**SO**	**S1**	**S2**	**S3**
BACnet IP	Off	Off	Off	Off
BACnet MS/TP	On	Off	Off	Off
Modbus TCP	Off	On	Off	Off
Metasys	On	On	Off	Off

Table C. "S" Bank DIP Switch Settings

Setting the Device Instance (Node-ID) for BACnet MS/TP and BACnet/IP on ProtoNode RER (FPC-N34)

- BACnet IP/BACnet MSTP addressing: The BACnet device instances will be set by taking the BN_Node_Offset found in the Web Configurator (See page 13) and added to each Modbus RTU device address set on the Raypak VERSA IC Master units, attached to the ProtoNode.
  - 50000 is the default.
  - If one of the Raypak VERSA IC Master units Modbus RTU node addresses were set for 10, then the device instance would be 50010.
  - If the 2nd Device is Modbus address set 2, then the device instance will be set to 50002.
  - To change the BN_Node_Offset (See page 15). The node offset can be changed from 50000 to some other number via the Web Configurator.

Setting the Node-ID for Metasys N2 and Modbus TCP on ProtoNode RER (FPC-N34)

- Metasys N2 and Modbus TCP Node-ID Addressing: Metasys N2 and Modbus TCP Node-ID's range from 1-127. The Metasys N2 and Modbus TCP Node-ID will automatically set to the same value as the Node-ID (Address) of the Raypak VERSA IC Master units. Do not use ID values over 127.

Setting the MAC Address for BACnet MS/TP for the ProtoNode RER (FPC-N34)

- Only 1 MAC address is set for the ProtoNode regardless of how many Raypak devices are connected to the ProtoNode.
- Set the BACnet MS/TP MAC addresses between 1 to 127. This is so that the BMS Front End can find the ProtoNode.
- Addresses from 128 to 255 are Slave Addresses and cannot be discovered by BMS Front Ends that support auto discovery of BACnet MS/TP devices. Never set a BACnet MS/TP MAC Address from 128 to 255.
- Set DIP switches A0 – A7 to assign MAC Address for BACnet MS/TP for the first Raypak device attached to the ProtoNode.
- Please refer to "Address DIP Switch Settings" on page 24 for the full range of addresses to set Node-ID/Device Instance.
- When using Metasys N2 and Modbus TCP, the A Bank of DIP switches are disabled and not used. They should be set to OFF.

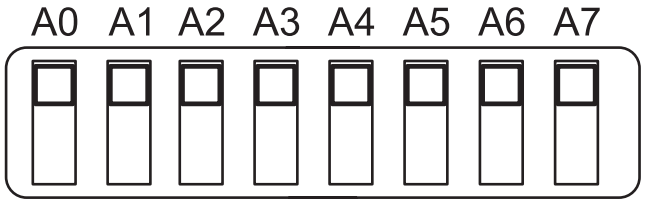


Figure 3. A0 through A7 DIP Switches

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

Set Field RS-485 Baud Rate for BACnet MS/TP on ProtoNode RER (FPC-N34)

The serial baud rate setting between the BMS and the Protonode has no impact on the communication baud rate between the Versa IC Master and the Protonode. The serial baud rate and Versa IC baud rate are not required to match for communication to take place. The Versa IC Master baud rate must always be set for 19K2 (19200) to allow communication between the Versa IC Master and the Protonode.

Setting the Serial Baud Rate (DIP Switch B0 – B3) for BACnet MS/TP

- 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 LER (FPC-N35 LonWorks).
- The rate on the ProtoNode for Metasys is set for 9600. DIP Switches B0 – B3 are disabled for Metasys N2 on ProtoNode RER (FPC-N34).

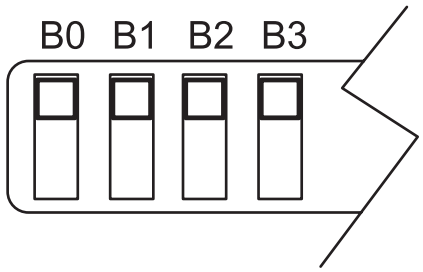


Figure 4. B0 through B3 DIP Switches

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

Table D. "B" Bank DIP Switch Settings

Wiring Connections to ProtoNode RER (FPC-N34 BACnet) and ProtoNode LER (FPC-N35 LonWorks)

Raypak Pin #	ProtoNode	Pin Assignment
MODBUS A (+)	Pin 1	RS-485 +
MODBUS B (-)	Pin 2	RS-485 -
MODBUS GND	Pin 3	RS-485 GND
Power In (+)	Pin 4	V +
Power In (-)	Pin 5	V -
Frame Ground	Pin 6	Frame GND

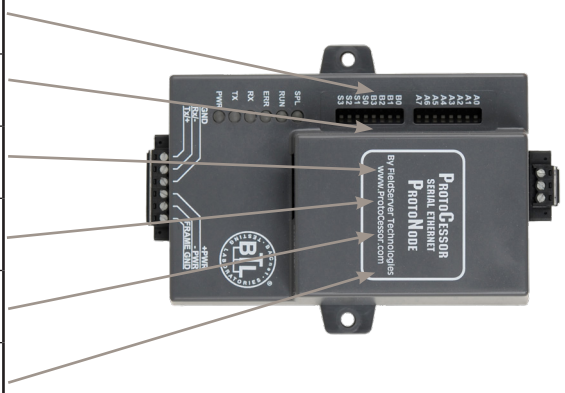


Figure 5. Power and RS485 pin outs

Connecting the VERSA IC Modbus port to the ProtoNode's Phoenix 6 pin connector.

- Connect VERSA IC Modbus pin A (RS485+) to the ProtoNode's pin 1 (RS485+) on the Phoenix 6 pin connector.
- Connect VERSA IC Modbus pin B (RS485-) to the ProtoNode's pin 2 (RS485-) on the Phoenix 6 pin connector.
- Connect VERSA IC Modbus pin GND (Ground) and the ProtoNode's pin 3 (Signal Ground) on the Phoenix 6 pin connector.

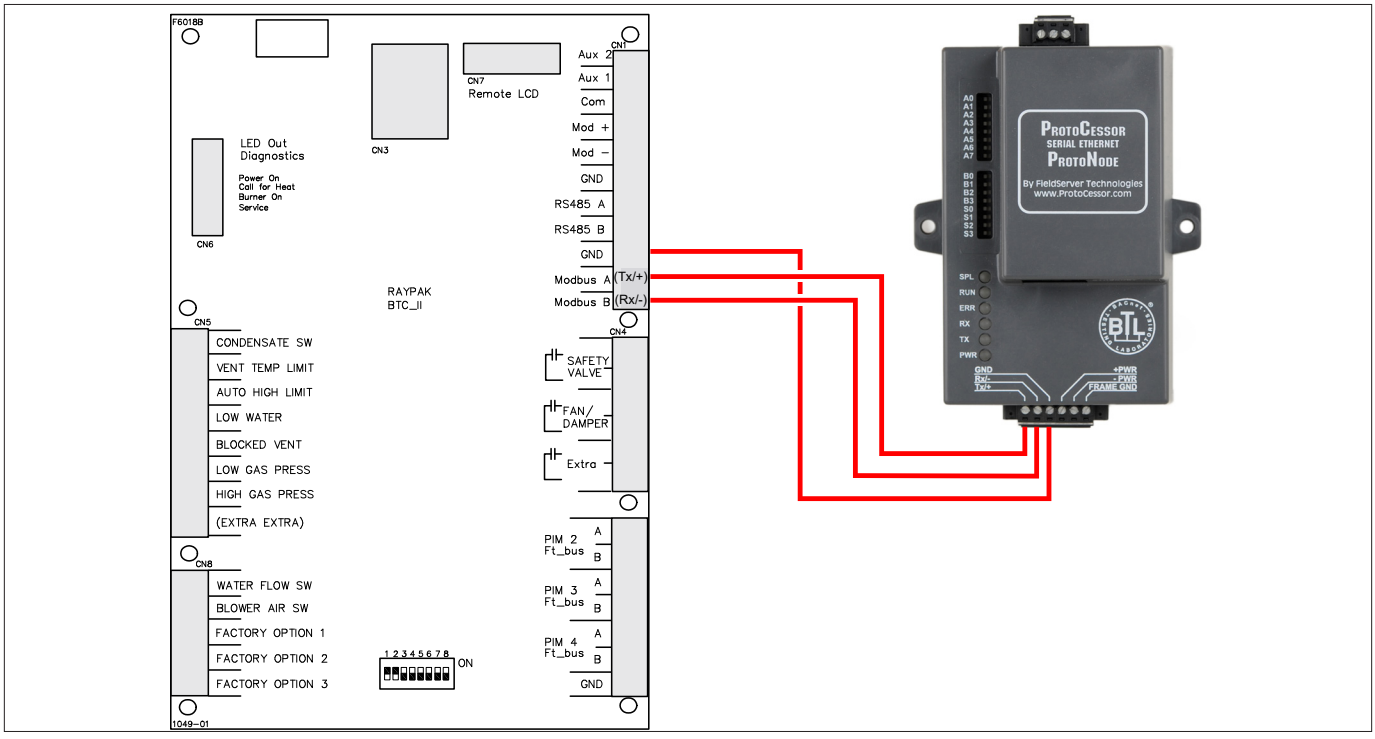


Figure 6. VERSA IC Modbus RS485 pin outs to the ProtoNode's Modbus port

NOTE: Multiple Master configuration requires each Master to have different ID's.

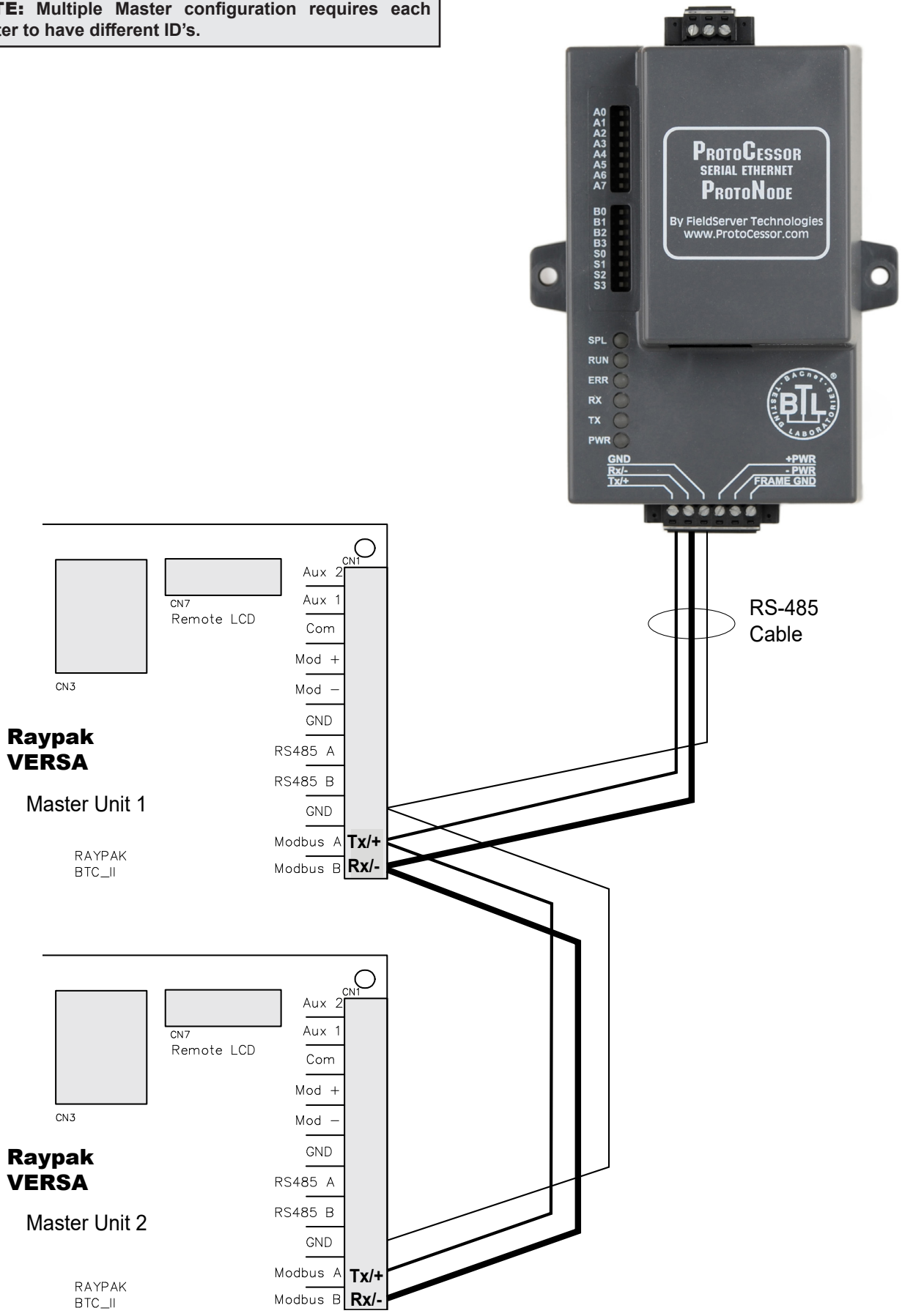


Figure 7. Multiple VERSA IC Masters

Wiring the ProtoNode RER to RS-485 Field Protocol (BACnet MS/TP or Metasys N2)

- Connect BMS BACnet MS/TP or Metasys N2 RS485 port to the 3-pin RS485 connector on ProtoNode RER as shown below.

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

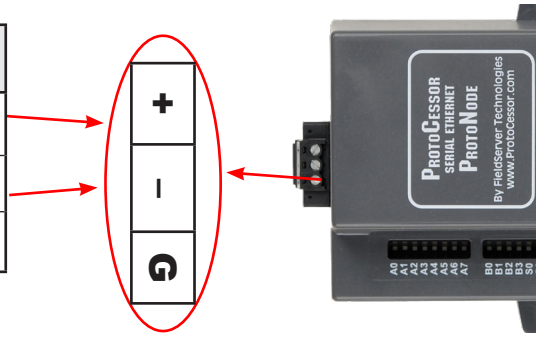


Figure 8. Connection from ProtoNode to RS-485 Field Protocol –BACnet MS/TP

• If the ProtoNode is the last device on the trunk, then the end of line (EOL) termination switch needs to be enabled, as shown below:
* The default setting from the factory is OFF (switch position = right side).
* To enable the EOL termination, turn the EOL switch ON (switch position = left side)

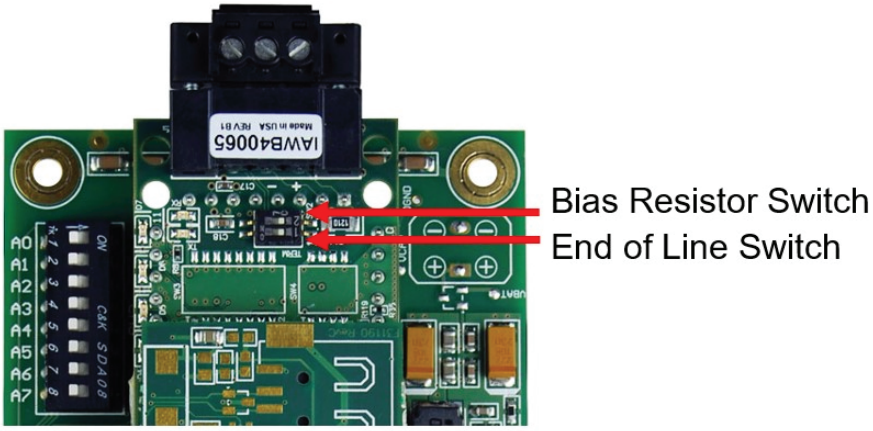


Figure 9. End-of-line termination on from ProtoNode to RS-485 Field Protocol – BACnet MS/TP

Wiring the ProtoNode LER (FPC-N35) Field Port to a LonWorks network

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

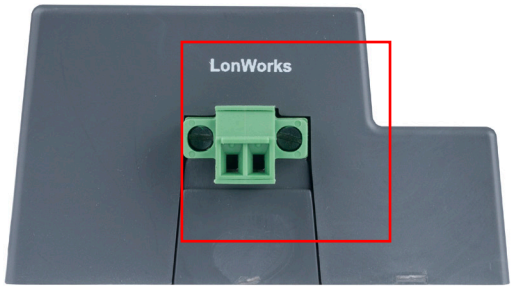


Figure 10. LonWorks Terminal

Power-Up the ProtoNode RER (FPC-N34 BACnet) or ProtoNode LER (FPC-N35 LonWorks)

- Apply power to the ProtoNode. Ensure that the power supply used complies with the specifications provided in Appendix C. Ensure that the cable is grounded using the “Frame-GND” terminal. The ProtoNode is factory set to accept both 9-30 VDC and 12-24 VAC. Raypak recommends using a dedicated power supply for the Protonode in lieu of unit power.

Voltage Pin outs

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

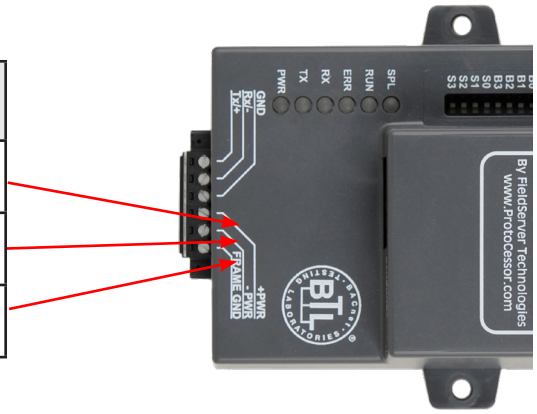


Figure 11. Power pin outs to the ProtoNode

4. CONNECT TO THE PROTONODE’S WEB CONFIGURATOR TO SETUP THE RAYPAK PRODUCTS (PROFILES) CONNECTED TO THE PROTONODE RER OR LER

Connect the PC to the ProtoNode via the Ethernet port

For BACnet IP only. For all others, use RS485 connection.

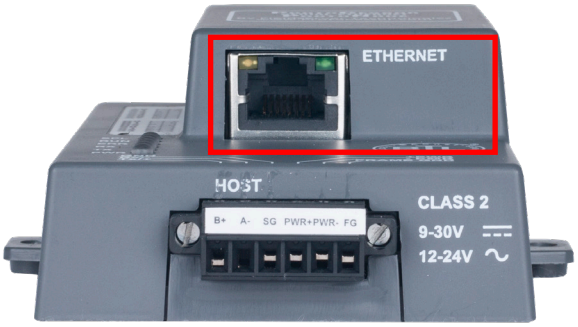


Figure 12. Ethernet port location of ProtoNode

- Connect a Cat-5 Ethernet cable (straight through or cross-over) between the PC and ProtoNode.
- The default IP Address for the ProtoNode is 192.168.1.24, Subnet Mask is 255.255.255.0. If the PC and ProtoNode are on different IP networks, assign a static IP Address to the PC on the 192.168.1.xxx network.

For Windows 10:

- Find the search field in the local computer’s taskbar (usually to the right of the windows icon and type in “Control Panel”.
- Click “Control Panel”, click “Network and Internet” and then click “Network and Sharing Center”.
- Click “Change adapter settings” on the left side of the window.
- Right-click on “Local Area Connection” and select “Properties” from the drop down menu.
- Highlight 

and then click the Properties button
- Select and enter a static IP Address on the same subnet. For example:

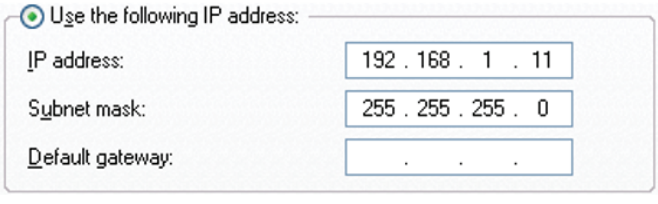


Figure 13. Local Area Connection Properties

- Click the OK button to close the Internet Protocol window and the Close button to close the Ethernet Properties window.

Configure Profiles in the ProtoNode's Web Configurator

- Open PC web browser; enter the default IP address of the ProtoNode 192.168.1.24.
- When the S bank of DIP switches are set for BACnet you will see all the Raypak Profiles supporting BACnet listed in the Configurator.
- When the S bank is set for BACnet MS/TP, all Raypak profiles supporting BACnet MS/TP will appear.

Selecting the Raypak profiles that will be connected the ProtoNode

- When you open the Web Configurator, you will see Active Profiles on the left side of the screen. There is a pull down box under Current Profiles that will list all the profiles available to select from.
- To add an active profile to the ProtoNode, select Add under Active Profiles. For every Raypak VERSA IC Master Unit that will be added to the ProtoNode, you will need to add the Active Profile (on the left of the screen) and the Modbus Node Address that the device is assigned to. Each Versa IC Master unit must have a unique Modbus Node Address selected in the Versa adjust menu. **Note: Modbus Node Address must match the Node ID selected when commissioning the Protonode from the Web Configurator shown below.**

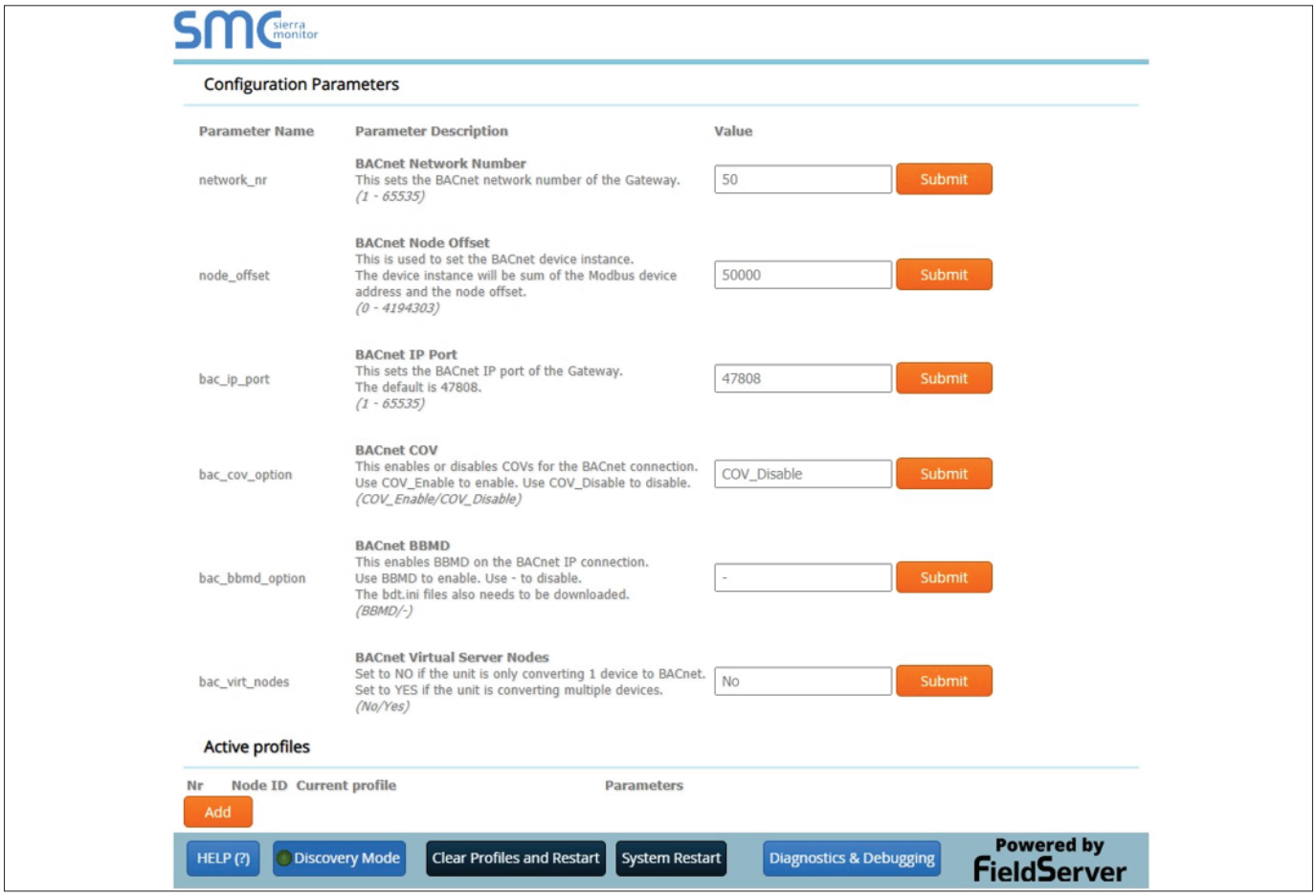


Figure 14. Web Configurator showing the active profiles to select from

- Once the Profile and Modbus Node Address have been selected, press the Add button to add the Profile to be configured.

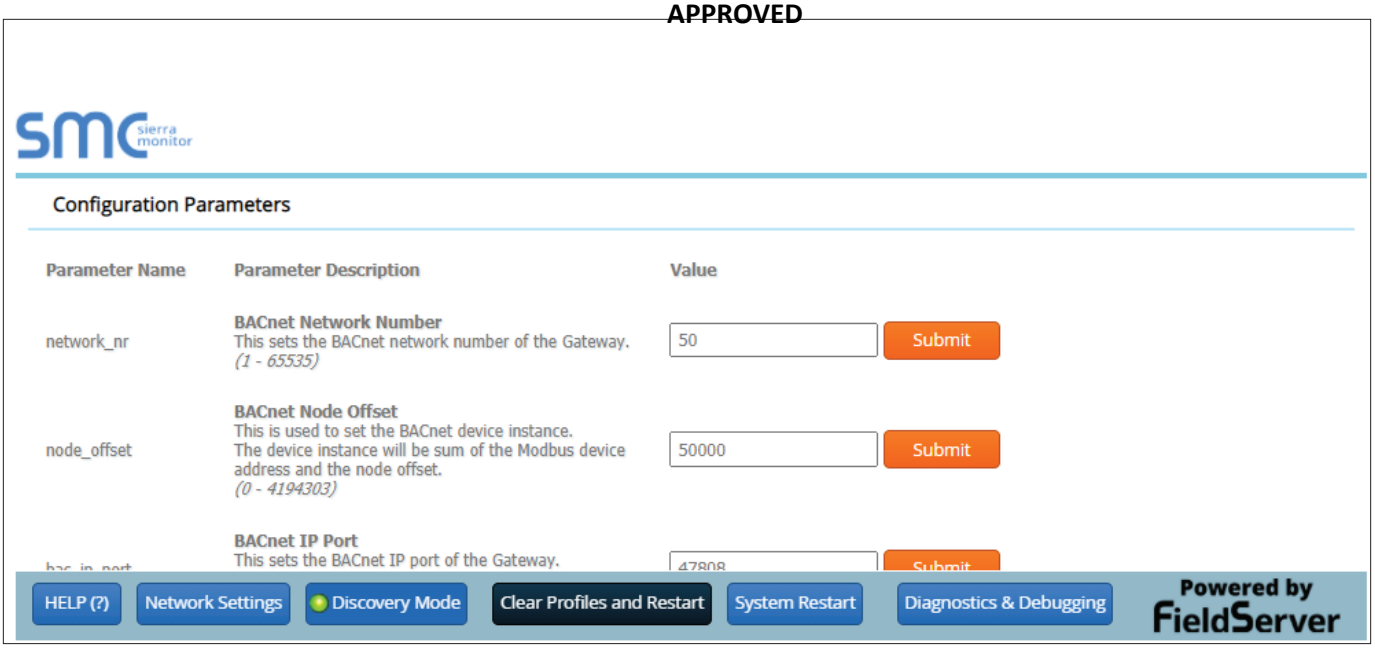


Figure 15. Web Configurator showing a profile selected

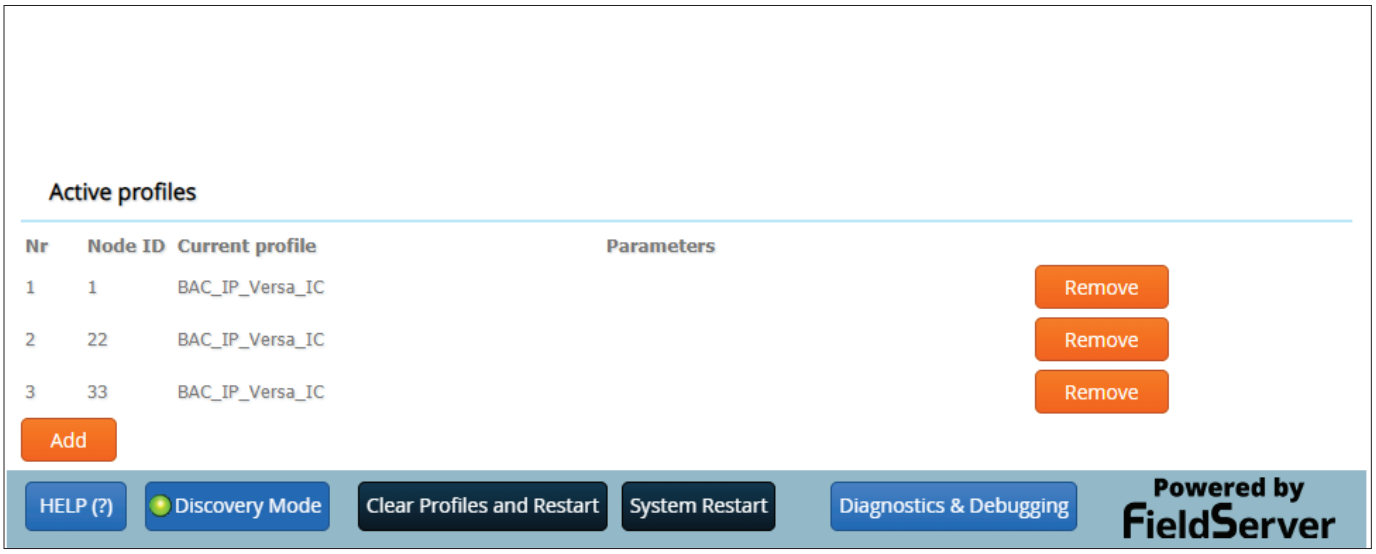


Figure 16. Web Configurator showing a completed profile added

- Continue this process until all the Raypak VERSA IC Master units have been added.

Changing BN_Node_Offset via the ProtoNode's Web Configurator

- The BACnet Device Instance is equal to the Modbus Node ID plus the BN_Node_Offset.
- To change the BN_Node_offset, enter the new values for the offset in web configurator.
- And click Submit to update new values.

Set IP Address for BACnet/IP via GUI

- Open a PC web browser, enter the default IP address of the ProtoNode 192.168.1.24 and connect to the Protonote.
- The Default GUI landing page is the Web Configuration.
- Press the Diagnostics and Debugging button at the bottom right corner of the page to go to FSGUI utility.

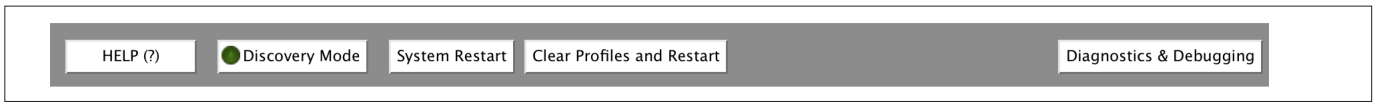


Figure 17. Web Configurator showing multiple completed profiles added

- Click on setup and then Network Settings to enter the Edit IP Address Settings menu.

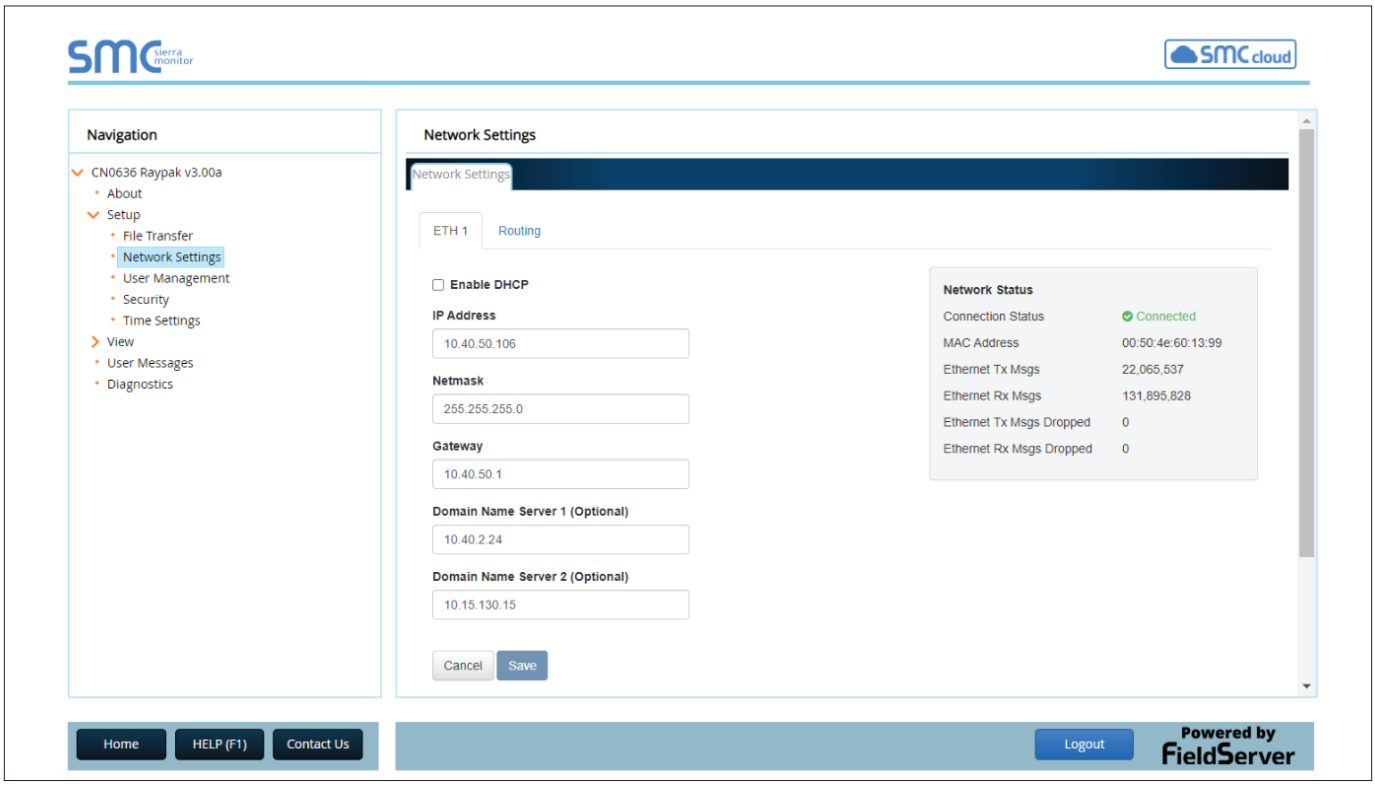


Figure 18. ProtoNode Network Settings Tab

- 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

5. COMMISSIONING THE PROTONODE LER ON A LONWORKS NETWORK

Commissioning may only be performed by the LonWorks administrator.

Commissioning the ProtoNode LER on a LonWorks network

To commission the ProtoNode LER LonWorks port, insert a small screwdriver in the commissioning hole on the face of the LER's enclosure to access the Service Pin. See the illustration on the ProtoNode LER as to which way to toggle the screw driver during commissioning.

Figure 19. ProtoNode LER Commissioning Hole Location

- If an XIF file is required, see **Figure 27** to generate XIF.

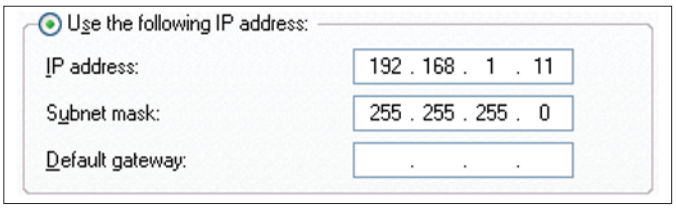
Instructions to Upload XIF File From the ProtoNode LER Using FS GUI Web Server

- Connect a Cat-5 Ethernet cable (straight through or cross-over) between the PC and ProtoNode.
- The default IP Address for the ProtoNode is 192.168.1.24, Subnet Mask is 255.255.255.0. If the PC and ProtoNode are on different IP networks, assign a static IP Address to the PC on the 192.168.1.xxx network.

For Windows 10:

- Find the search field in the local computer's taskbar (usually to the right of the windows icon and type in "Control Panel". 
- Click "Control Panel", click "Network and Internet" and then click "Network and Sharing Center".
- Click "Change adapter settings" on the left side of the window.
- Right-click on "Local Area Connection" and select "Properties" from the dropdown menu
- Highlight 

> and then click the Properties button.
- Select and enter a static IP Address on the same subnet. For example.



- Click the OK button to close the Internet Protocol window and the Close button to close the Ethernet Properties window.
- Open a web browser and go to the following address: [IP Address of ProtoNode]/fserver.xif.
  - o Example: 192.168.1.24/fserver.xif
- If the web browser prompts to save the file, save the file onto the PC. If the web browser displays the .xif file as a web page, save the file onto the local PC as "fserver.xif".

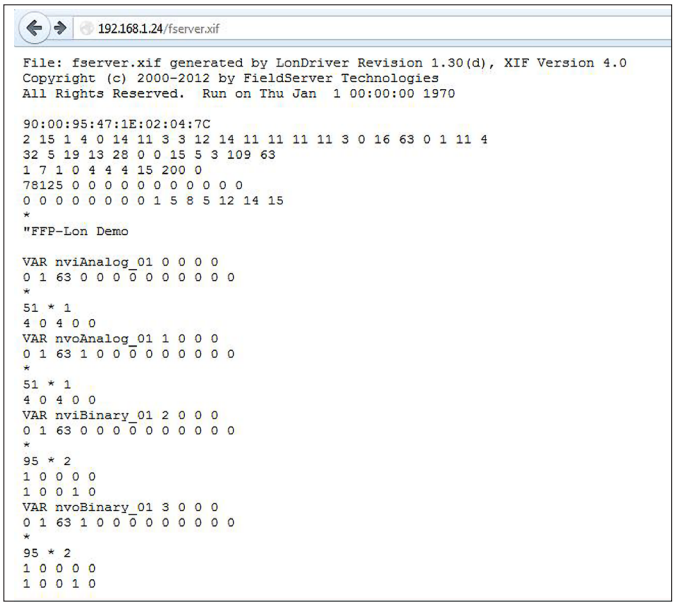


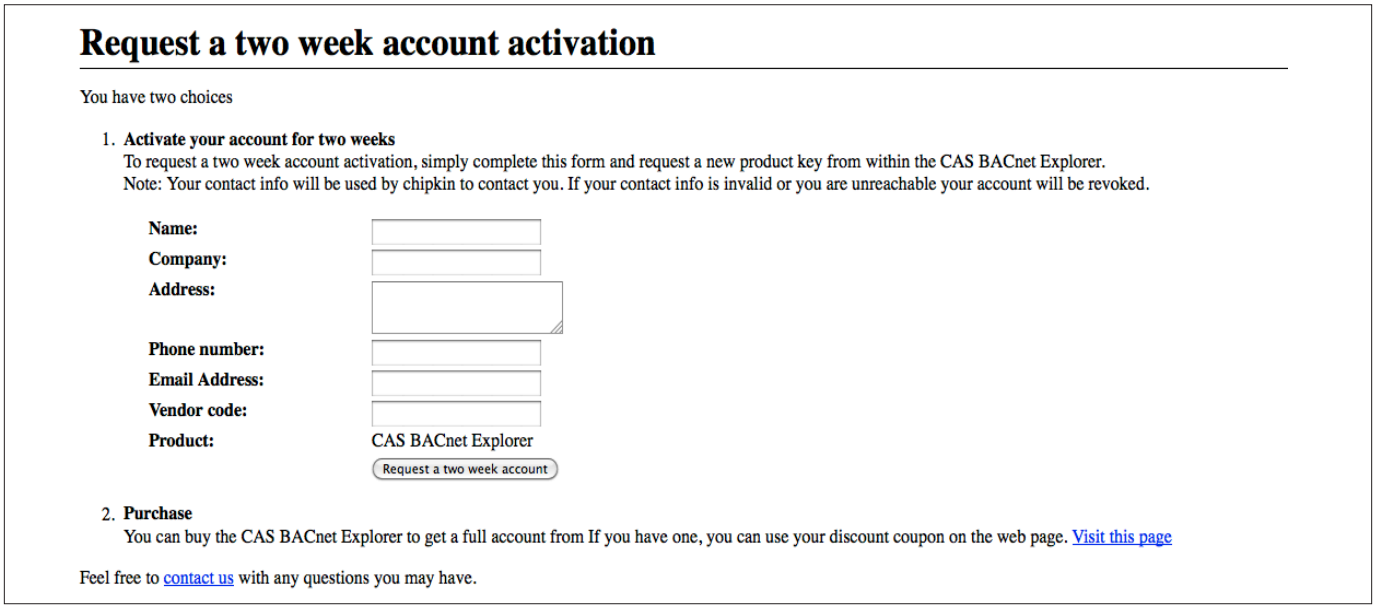
Figure 20. Sample of Fserver.XIF file being generated.

6. CHIPKIN AUTOMATION'S CAS BACNET EXPLORER FOR VALIDATING THE PROTONODE IN THE FIELD

Chipkin Automation has extended to Raypak and their customers a free complementary 2 week fully functional copy of CAS BACnet Explorer that can be used to validate BACnet MS/TP and/or BACnet/IP communications of the 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.

Downloading Chipkin Automation's CAS Explorer and Requesting an Activation Key

- To request a 2-week complementary BACnet CAS key, go to http://app.chipkin.com/activation/twoweek/ and fill in all the information. Enter Vendor Code "Raypak2012". Once completed, the key will be sent to the email address that was submitted. From this email from Chipkin Automation, 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
Request a two week account

2. **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.

- Go to Chipkin Automation's 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 from Chipkin Automation. Once completed, select Activation.

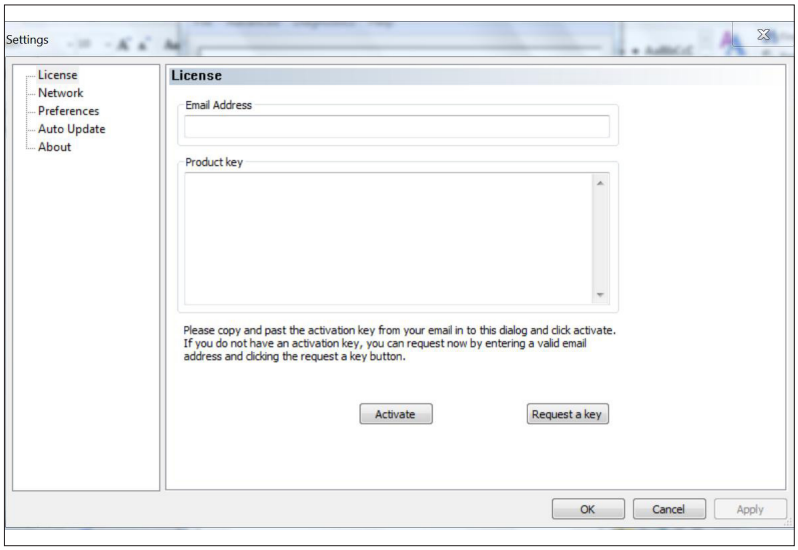


Figure 21. Chipkin Account Activation

CAS BACnet Setup

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

CAS BACnet MS/TP Setup

1. Using the Serial or USB to RS-485 converter, connect it to your PC and the 3 Pin BACnet MS/TP connector on the ProtoNode RER.
2. In CAS Explorer, do the following:
   a. Click on settings.
   b. Check the BACnet MSTP box and uncheck the BACnet IP and BACnet Ethernet boxes.
   c. Set the BACnet MSTP MAC address to 0.
   d. Set the BACnet MSTP Baud Rate to 38400.
   e. Click OK.
   f. On the bottom right-hand corner, make sure that the BACnet MSTP box is green.
   g. Click on discover.
   h. Check all 4 boxes.
   i. Click Send.

CAS BACnet BACnet/IP Setup

1. Set the IP address and subnet of the PC that will be running the CAS Explorer.
2. Connect a straight through or cross Ethernet cable from the PC to the ProtoNode.
3. In CAS Explorer, do the following:
   a. Click on settings.
   b. Check the BACnet IP box and uncheck the BACnet MSTP and BACnet Ethernet boxes.
   c. In the “Select a Network Device” box, select the network card of the PC by clicking on it.
   d. Click OK.
   e. On the bottom right-hand corner, make sure that the BACnet IP box is green.
   f. Click on discover.
   g. Check all 4 boxes.
   h. Click Send.

7. APPENDIX A. TROUBLESHOOTING

Check Wiring and Settings

1. No COMS on Modbus RTU side. If the Tx/Rx LEDs are not flashing rapidly then there is a COM issue. To fix this, check the following:
   - o Visual observations of LEDs on ProtoNode (Section 8)
   - o Check baud rate, parity, data bits, stop bits.
   - o Check device address.
   - o Verify wiring.
   - o Verify the device was listed in the Web Configurator (Section 6).
   - Field COM problems:
     - o Visual observations of LEDs on the ProtoNode
     - o Verify IP Address setting
     - o Verify wiring

NOTE: If the problem persists, a Diagnostic Capture needs to be taken and sent to support. (Section A)

Take Diagnostic Capture With the FieldServer Utilities

NOTE: When there is a problem on-site that cannot easily be resolved, perform a Diagnostic Capture before contacting support. Once the Diagnostic Capture is complete, email it to technical support. The Diagnostic Capture will accelerate diagnosis of the problem. Once the Diagnostic Capture is complete, email it to support@protocessor.com. The Diagnostic Capture will allow us to rapidly diagnose the problem.

If the FieldServer bios is updated/released on November 2017 or later, then the Diagnostic Capture is performed via the gateway’s on-board system.

- Access the FieldServer Diagnostics page via one of the following methods:
  - o Open the FieldServer FS-GUI page and click on Diagnostics in the Navigation panel.
  - o Open the FieldServer Toolbox software and click the diagnose icon  of the desired device.

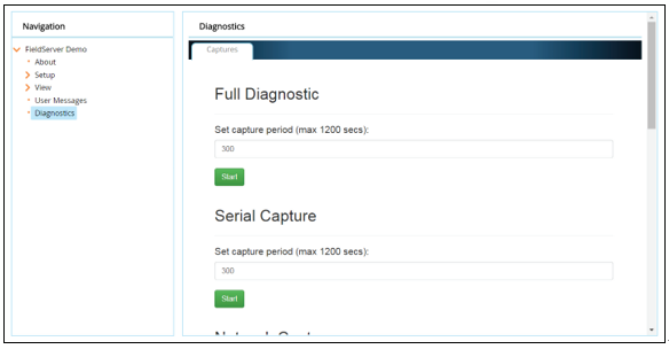


Figure 22. Full Diagnostics Screen

- Go to Full Diagnostic and select the capture period.
- Click the Start button under the Full Diagnostic heading to start the capture.

o When the capture period is finished, a Download button will appear next to the Start button.

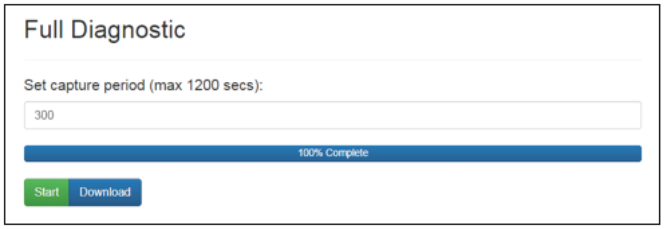


Figure 23. Capture Download Button

- Click Download for the capture to be downloaded to the local PC.
- Email the diagnostic zip file to technical support.

NOTE: Diagnostic captures of BACnet MS/TP communication are output in a ".PCAP" file extension which is compatible with Wireshark.

Taking a Capture with Older Firmware

If the FieldServer firmware is from before November 2017, the Diagnostic Capture can be done by downloading the FieldServer Toolbox software but network connections (such as Ethernet and Wi-Fi) cannot be captured (if a network diagnostic is needed take a Wire Shark capture).

NOTE: Once the Diagnostic Capture is complete, email it to technical support. The Diagnostic Capture will accelerate diagnosis of the problem.

- Ensure that FieldServer Toolbox is loaded onto the local PC. Otherwise, download the FieldServer Toolbox.zip via the MSA Safety website.
- Extract the executable file and complete the installation.

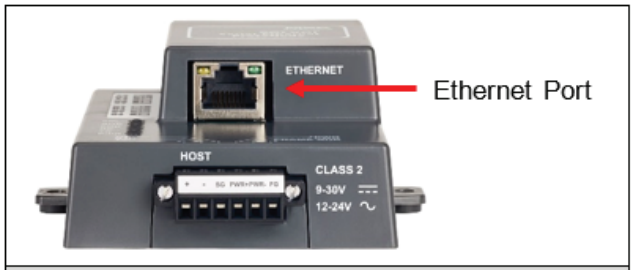


Figure 24. Ethernet Port Location

- Connect a standard Cat-5 Ethernet cable between the PC and ProtoNode.
- Double click on the FS Toolbox Utility.
- **Step 1**: Take a Log.
- Click on the diagnose icon  for the desired device.

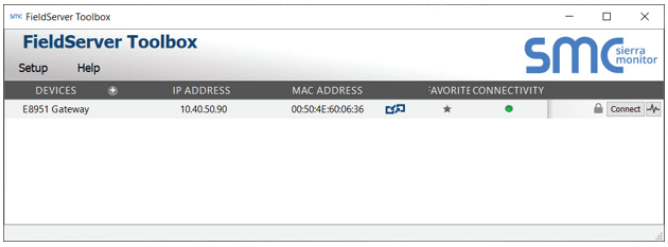


Figure 25. Device Options Screen

o Select "Full Diagnostic" from the drop down menu.

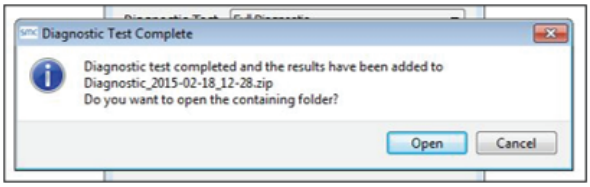
NOTE: If desired, the default capture period can be changed.

o Click on the Start Diagnostic button.

o Wait for the capture period to finish and the Diagnostic Test Complete window will appear.

- **Step 2**: Send Log.

o Once the diagnostic test is complete, a .zip file is saved on the PC.



o Choose "Open" to launch explorer and have it point directly at the correct folder.

o Send the Diagnostic zip file to technical support.

Setting the Network Number for BACnet IP

On the main Web-Configurator screen, update the Network Number in the BN_Network_Nr and hit Submit. Please note that the default value is 5.

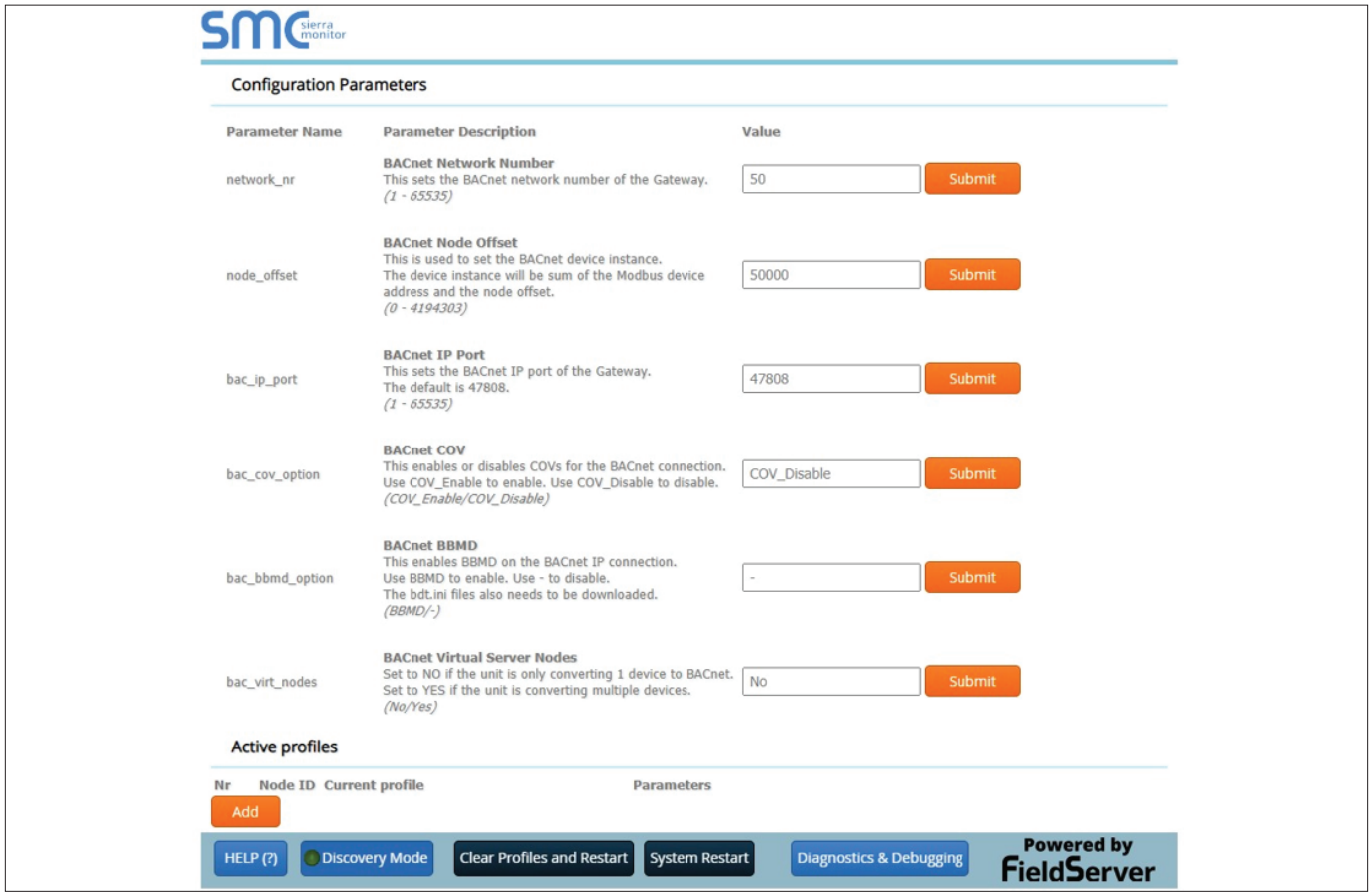
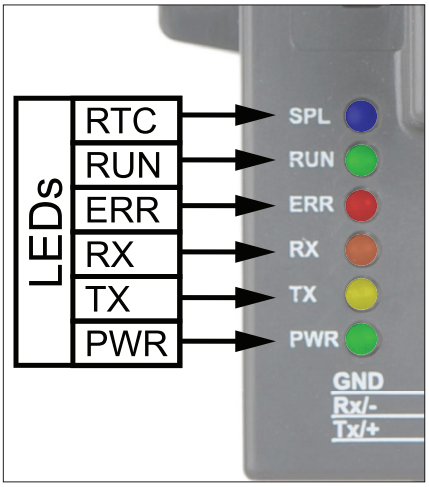


Figure 26. Setting the Network Number for BACnet IP

LED Diagnostics for Modbus RTU Communications between the ProtoNode and Raypak VERSA IC

ProtoNode RER (B-85) and LER (B-86) LED Locations:



Light	Description For ProtoNode RER and LER
RTC	Unused
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 the 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 Modbus RTU.
TX	The TX LED will flash when a message is sent on the Modbus RTU.
PWR	This is the power light and should show steady green at all times when the ProtoNode is powered.

Figure 27. Diagnostic LEDs Location and Description

8. APPENDIX B. PICS STATEMENT

Raypak VERSA IC Modbus RTU Mappings to BACnet MS/TP, BACnet/IP, Metasys N2 and LonWorks

AI = Analog Input	BV = Binary Value
AO = Analog Output	DI = Digital Input
AV = Analog Value	DO = Digital Output
BI = Binary Input	SNVT = Standard Network Variable Type

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT Type
MODBUS	AI	1	AI	1	nvoMODBUS_XXX	SNVT_count_f
System Supply Temperature	AI	2	AI	2	nvoSysSupTmp_XXX	SNVT_temp_p
Outdoor Temperature	AI	3	AI	3	nvoOutdrTmp_XXX	SNVT_temp_p
DHW Temperature	AI	4	AI	4	nvoDHWTmp_XXX	SNVT_temp_p
Aux 1 Temperature	AI	5	AI	5	nvoAux1Tmp_XXX	SNVT_temp_p
Aux 2 Temperature	AI	6	AI	6	nvoAux2Tmp_XXX	SNVT_temp_p
System Pump	AI	7	AI	7	nvoSysPmp_XXX	SNVT_count_f
System Pump Runtime	AI	8	AI	8	nvoSysPmpRtm_XXX	SNVT_count_f
DHW Pump	AI	9	AI	9	nvoDHWPmp_XXX	SNVT_count_f
DHW Pump Runtime	AI	10	AI	10	nvoDHWPmpRtm_XXX	SNVT_count_f
Setback	AI	11	AI	11	nvoSetback_XXX	SNVT_count_f
CH Call	AI	12	AI	12	nvoCHCall_XXX	SNVT_count_f
DHW Call	AI	13	AI	13	nvoDHWCall_XXX	SNVT_count_f
Target temperature	AI	14	AI	14	nvoTargetTmp_XXX	SNVT_temp_p
Target rate	AI	15	AI	15	nvoTargetRat_XXX	SNVT_lev_percent
Auto Diff	BI	16	DI	16	nvoMonAutoDf_XXX	SNVT_switch
Boiler1 detected	BI	17	DI	17	nvoLdDetct_XXX	SNVT_switch
Boiler1 Outlet temperature	AI	18	AI	18	nvoLdOutTmp_XXX	SNVT_temp_p
Boiler1 Inlet temperature	AI	19	AI	19	nvoLdInTmp_XXX	SNVT_temp_p
Boiler1 Vent temperature	AI	20	AI	20	nvoLdVntTmp_XXX	SNVT_temp_p
Boiler1 High Limit temperature	AI	21	AI	21	nvoLdHiLmTp_XXX	SNVT_temp_p
Boiler1 Operator temperature	AI	22	AI	22	nvoLdOpTmp_XXX	SNVT_temp_p
Boiler1 Mod Rate	AI	23	AI	23	nvoLdModRat_XXX	SNVT_lev_percent
Boiler1 Mix Rate	AI	24	AI	24	nvoLdMixRat_XXX	SNVT_lev_percent
Boiler1 Ignition Status	AI	25	AI	25	nvoLdIgStat_XXX	SNVT_count_f
Boiler1 Runtime	AI	26	AI	26	nvoLdRtim_XXX	SNVT_count_f
Boiler1 Cycles	AI	27	AI	27	nvoLdCyc_XXX	SNVT_count_f
Boiler1 Pump	AI	28	AI	28	nvoLdPmp_XXX	SNVT_count_f
Boiler1 Pump Runtime	AI	29	AI	29	nvoLdPmpRtm_XXX	SNVT_count_f
Boiler1 Error Code	AI	30	AI	30	nvoLdErrCod_XXX	SNVT_count_f
Boiler1 Error History 1	AI	31	AI	31	nvoLdErHt1_XXX	SNVT_count_f
Boiler1 Error History 2	AI	32	AI	32	nvoLdErHt2_XXX	SNVT_count_f
Boiler1 Error History 3	AI	33	AI	33	nvoLdErHt3_XXX	SNVT_count_f
Boiler1 Error History 4	AI	34	AI	34	nvoLdErHt4_XXX	SNVT_count_f
Boiler1 Error History 5	AI	35	AI	35	nvoLdErHt5_XXX	SNVT_count_f
Boiler1 Error History 6	AI	36	AI	36	nvoLdErHt6_XXX	SNVT_count_f
Boiler1 Error History 7	AI	37	AI	37	nvoLdErHt7_XXX	SNVT_count_f
Boiler1 Error History 8	AI	38	AI	38	nvoLdErHt8_XXX	SNVT_count_f
Boiler1 Error History 9	AI	39	AI	39	nvoLdErHt9_XXX	SNVT_count_f
Boiler1 Error History 10	AI	40	AI	40	nvoLdErHt10_XXX	SNVT_count_f
Boiler1 Error History 11	AI	41	AI	41	nvoLdErHt11_XXX	SNVT_count_f
Boiler1 Error History 12	AI	42	AI	42	nvoLdErHt12_XXX	SNVT_count_f
Boiler1 Error History 13	AI	43	AI	43	nvoLdErHt13_XXX	SNVT_count_f
Boiler1 Error History 14	AI	44	AI	44	nvoLdErHt14_XXX	SNVT_count_f
Boiler1 Error History 15	AI	45	AI	45	nvoLdErHt15_XXX	SNVT_count_f
Boiler2 detected	BI	46	DI	46	nvoFl1Detct_XXX	SNVT_switch
Boiler2 Outlet temperature	AI	47	AI	47	nvoFl1OutTmp_XXX	SNVT_temp_p
Boiler2 Inlet temperature	AI	48	AI	48	nvoFl1InTmp_XXX	SNVT_temp_p
Boiler2 Vent temperature	AI	49	AI	49	nvoFl1VntTmp_XXX	SNVT_temp_p
Boiler2 High Limit temperature	AI	50	AI	50	nvoFl1HiLmTp_XXX	SNVT_temp_p
Boiler2 Operator temperature	AI	51	AI	51	nvoFl1OpTmp_XXX	SNVT_temp_p
Boiler2 Mod Rate	AI	52	AI	52	nvoFl1ModRat_XXX	SNVT_lev_percent
Boiler2 Mix Rate	AI	53	AI	53	nvoFl1MixRat_XXX	SNVT_lev_percent
Boiler2 Ignition Status	AI	54	AI	54	nvoFl1IgStat_XXX	SNVT_count_f
Boiler2 Runtime	AI	55	AI	55	nvoFl1Rtm_XXX	SNVT_count_f
Boiler2 Cycles	AI	56	AI	56	nvoFl1Cyc_XXX	SNVT_count_f
Boiler2 Pump	AI	57	AI	57	nvoFl1Pmp_XXX	SNVT_count_f
Boiler2 Pump Runtime	AI	58	AI	58	nvoFl1PmpRtm_XXX	SNVT_count_f
Boiler2 Error Code	AI	59	AI	59	nvoFl1ErrCod_XXX	SNVT_count_f
Boiler2 Error History 1	AI	60	AI	60	nvoFl1ErHt1_XXX	SNVT_count_f

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT Type
Boiler2 Error History 2	AI	61	AI	61	nvoFl1ErHt2_XXX	SNVT_count_f
Boiler2 Error History 3	AI	62	AI	62	nvoFl1ErHt3_XXX	SNVT_count_f
Boiler2 Error History 4	AI	63	AI	63	nvoFl1ErHt4_XXX	SNVT_count_f
Boiler2 Error History 5	AI	64	AI	64	nvoFl1ErHt5_XXX	SNVT_count_f
Boiler2 Error History 6	AI	65	AI	65	nvoFl1ErHt6_XXX	SNVT_count_f
Boiler2 Error History 7	AI	66	AI	66	nvoFl1ErHt7_XXX	SNVT_count_f
Boiler2 Error History 8	AI	67	AI	67	nvoFl1ErHt8_XXX	SNVT_count_f
Boiler2 Error History 9	AI	68	AI	68	nvoFl1ErHt9_XXX	SNVT_count_f
Boiler2 Error History 10	AI	69	AI	69	nvoFl1ErHt10_XXX	SNVT_count_f
Boiler2 Error History 11	AI	70	AI	70	nvoFl1ErHt11_XXX	SNVT_count_f
Boiler2 Error History 12	AI	71	AI	71	nvoFl1ErHt12_XXX	SNVT_count_f
Boiler2 Error History 13	AI	72	AI	72	nvoFl1ErHt13_XXX	SNVT_count_f
Boiler2 Error History 14	AI	73	AI	73	nvoFl1ErHt14_XXX	SNVT_count_f
Boiler2 Error History 15	AI	74	AI	74	nvoFl1ErHt15_XXX	SNVT_count_f
Boiler3 detected	BI	75	DI	75	nvoFl2Detct_XXX	SNVT_switch
Boiler3 Outlet temperature	AI	76	AI	76	nvoFl2OutTmp_XXX	SNVT_temp_p
Boiler3 Inlet temperature	AI	77	AI	77	nvoFl2InTmp_XXX	SNVT_temp_p
Boiler3 Vent temperature	AI	78	AI	78	nvoFl2VntTmp_XXX	SNVT_temp_p
Boiler3 High Limit temperature	AI	79	AI	79	nvoFl2HiLmTp_XXX	SNVT_temp_p
Boiler3 Operator temperature	AI	80	AI	80	nvoFl2OpTmp_XXX	SNVT_temp_p
Boiler3 Mod Rate	AI	81	AI	81	nvoFl2ModRat_XXX	SNVT_lev_percent
Boiler3 Mix Rate	AI	82	AI	82	nvoFl2MixRat_XXX	SNVT_lev_percent
Boiler3 Ignition Status	AI	83	AI	83	nvoFl2IgStat_XXX	SNVT_count_f
Boiler3 Runtime	AI	84	AI	84	nvoFl2Rtm_XXX	SNVT_count_f
Boiler3 Cycles	AI	85	AI	85	nvoFl2Cyc_XXX	SNVT_count_f
Boiler3 Pump	AI	86	AI	86	nvoFl2Pmp_XXX	SNVT_count_f
Boiler3 Pump Runtime	AI	87	AI	87	nvoFl2PmpRtm_XXX	SNVT_count_f
Boiler3 Error Code	AI	88	AI	88	nvoFl2ErrCod_XXX	SNVT_count_f
Boiler3 Error History 1	AI	89	AI	89	nvoFl2ErHt1_XXX	SNVT_count_f
Boiler3 Error History 2	AI	90	AI	90	nvoFl2ErHt2_XXX	SNVT_count_f
Boiler3 Error History 3	AI	91	AI	91	nvoFl2ErHt3_XXX	SNVT_count_f
Boiler3 Error History 4	AI	92	AI	92	nvoFl2ErHt4_XXX	SNVT_count_f
Boiler3 Error History 5	AI	93	AI	93	nvoFl2ErHt5_XXX	SNVT_count_f
Boiler3 Error History 6	AI	94	AI	94	nvoFl2ErHt6_XXX	SNVT_count_f
Boiler3 Error History 7	AI	95	AI	95	nvoFl2ErHt7_XXX	SNVT_count_f
Boiler3 Error History 8	AI	96	AI	96	nvoFl2ErHt8_XXX	SNVT_count_f
Boiler3 Error History 9	AI	97	AI	97	nvoFl2ErHt9_XXX	SNVT_count_f
Boiler3 Error History 10	AI	98	AI	98	nvoFl2ErHt10_XXX	SNVT_count_f
Boiler3 Error History 11	AI	99	AI	99	nvoFl2ErHt11_XXX	SNVT_count_f
Boiler3 Error History 12	AI	100	AI	100	nvoFl2ErHt12_XXX	SNVT_count_f
Boiler3 Error History 13	AI	101	AI	101	nvoFl2ErHt13_XXX	SNVT_count_f
Boiler3 Error History 14	AI	102	AI	102	nvoFl2ErHt14_XXX	SNVT_count_f
Boiler3 Error History 15	AI	103	AI	103	nvoFl2ErHt15_XXX	SNVT_count_f
Boiler4 detected	BI	104	DI	104	nvoFl3Detct_XXX	SNVT_switch
Boiler4 Outlet temperature	AI	105	AI	105	nvoFl3OutTmp_XXX	SNVT_temp_p
Boiler4 Inlet temperature	AI	106	AI	106	nvoFl3InTmp_XXX	SNVT_temp_p
Boiler4 Vent temperature	AI	107	AI	107	nvoFl3VntTmp_XXX	SNVT_temp_p
Boiler4 High Limit temperature	AI	108	AI	108	nvoFl3HiLmTp_XXX	SNVT_temp_p
Boiler4 Operator temperature	AI	109	AI	109	nvoFl3OpTmp_XXX	SNVT_temp_p
Boiler4 Mod Rate	AI	110	AI	110	nvoFl3ModRat_XXX	SNVT_lev_percent
Boiler4 Mix Rate	AI	111	AI	111	nvoFl3MixRat_XXX	SNVT_lev_percent
Boiler4 Ignition Status	AI	112	AI	112	nvoFl3IgStat_XXX	SNVT_count_f
Boiler4 Runtime	AI	113	AI	113	nvoFl3Rtm_XXX	SNVT_count_f
Boiler4 Cycles	AI	114	AI	114	nvoFl3Cyc_XXX	SNVT_count_f
Boiler4 Pump	AI	115	AI	115	nvoFl3Pmp_XXX	SNVT_count_f
Boiler4 Pump Runtime	AI	116	AI	116	nvoFl3PmpRtm_XXX	SNVT_count_f
Boiler4 Error Code	AI	117	AI	117	nvoFl3ErrCod_XXX	SNVT_count_f
Boiler4 Error History 1	AI	118	AI	118	nvoFl3ErHt1_XXX	SNVT_count_f
Boiler4 Error History 2	AI	119	AI	119	nvoFl3ErHt2_XXX	SNVT_count_f
Boiler4 Error History 3	AI	120	AI	120	nvoFl3ErHt3_XXX	SNVT_count_f

Point Name	BACnet Data Type	BACnet Object Id	N2 Data Type	N2 Point Address	Lon Name	Lon SNVT Type
Boiler4 Error History 4	AI	121	AI	121	nvoFl3ErHt4_XXX	SNVT_count_f
Boiler4 Error History 5	AI	122	AI	122	nvoFl3ErHt5_XXX	SNVT_count_f
Boiler4 Error History 6	AI	123	AI	123	nvoFl3ErHt6_XXX	SNVT_count_f
Boiler4 Error History 7	AI	124	AI	124	nvoFl3ErHt7_XXX	SNVT_count_f
Boiler4 Error History 8	AI	125	AI	125	nvoFl3ErHt8_XXX	SNVT_count_f
Boiler4 Error History 9	AI	126	AI	126	nvoFl3ErHt9_XXX	SNVT_count_f
Boiler4 Error History 10	AI	127	AI	127	nvoFl3ErHt10_XXX	SNVT_count_f
Boiler4 Error History 11	AI	128	AI	128	nvoFl3ErHt11_XXX	SNVT_count_f
Boiler4 Error History 12	AI	129	AI	129	nvoFl3ErHt12_XXX	SNVT_count_f
Boiler4 Error History 13	AI	130	AI	130	nvoFl3ErHt13_XXX	SNVT_count_f
Boiler4 Error History 14	AI	131	AI	131	nvoFl3ErHt14_XXX	SNVT_count_f
Boiler4 Error History 15	AI	132	AI	132	nvoFl3ErHt15_XXX	SNVT_count_f
Target Mode	BV	134	DO	134	nviTargetMod_XXX	SNVT_switch
Setpoint Target	AV	135	AO	135	nviSPTarget_XXX	SNVT_temp_p
Outdoor Start	AV	136	AO	136	nviOutdrStrt_XXX	SNVT_temp_p
Outdoor Design	AV	137	AO	137	nviOutdrDsgn_XXX	SNVT_temp_p
Boil Start	AV	138	AO	138	nviBoilStrt_XXX	SNVT_temp_p
Boil Design	AV	139	AO	139	nviBoilDsgn_XXX	SNVT_temp_p
Manual Differential, Monitor Mode	AV	140	AO	140	nviMonManDif_XXX	SNVT_temp_p
DHW Exchange	AV	141	AO	141	nviDHWExch_XXX	SNVT_temp_p
DHW Tank	AV	142	AO	142	nviDHWTank_XXX	SNVT_temp_p
DHW Differential	AV	143	AO	143	nviDHWDiff_XXX	SNVT_temp_p
DHW Priority	BV	144	DO	144	nviDHWPrio_XXX	SNVT_switch
DHW During UnOcc	BV	145	DO	145	nviDHWUnOc_XXX	SNVT_switch
WWSD During Occ	AV	146	AO	146	nviWWSDOcc_XXX	SNVT_temp_p
WWSD During UnOcc	AV	147	AO	147	nviWWSDUnOc_XXX	SNVT_temp_p
Tank Setpoint	AV	148	AO	148	nviTnkSP_XXX	SNVT_temp_p
Tank Differential	AV	149	AO	149	nviTnkDiff_XXX	SNVT_temp_p
Tank During UnOcc	BV	150	DO	150	nviTkDurUnOc_XXX	SNVT_switch
Pool Setpoint	AV	151	AO	151	nviPoolSP_XXX	SNVT_temp_p
Pool Differential	AV	152	AO	152	nviPoolDiff_XXX	SNVT_temp_p
Pool Supply Max	AV	153	AO	153	nviPoolSupMx_XXX	SNVT_temp_p
Pool During UnOcc	BV	154	DO	154	nviPoolUnOcc_XXX	SNVT_switch
System Pump	AV	155	AO	155	nviSysPmp_XXX	SNVT_count_f
DHW Pump	AV	156	AO	156	nviDHWPmp_XXX	SNVT_count_f
Boiler Pump	AV	157	AO	157	nviBlrPmp_XXX	SNVT_count_f
Target temperature	AV	158	AO	158	nviTargetTmp_XXX	SNVT_temp_p
Manual Differential, Temp Mode	AV	159	AO	159	nviTmpManDif_XXX	SNVT_temp_p
Target Mod Rate	AV	160	AO	160	nviTrgModRat_XXX	SNVT_lev_percent
Target Mix Rate	AV	161	AO	161	nviTrgMixRat_XXX	SNVT_lev_percent
Boiler1 On/Off	BV	162	DO	162	nviLdOnOff_XXX	SNVT_switch
Boiler2 On/Off	BV	163	DO	163	nviFl1OnOff_XXX	SNVT_switch
Boiler3 On/Off	BV	164	DO	164	nviFl2OnOff_XXX	SNVT_switch
Boiler4 On/Off	BV	165	DO	165	nviFl3OnOff_XXX	SNVT_switch
Boiler1 Flow Sensor	AI	166	AI	166	nvoLdFlwSen_XXX	SNVT_count_f
Boiler2 Flow Sensor	AI	167	AI	167	nvoFl1FlwSen_XXX	SNVT_count_f
Boiler3 Flow Sensor	AI	168	AI	168	nvoFl2FlwSen_XXX	SNVT_count_f
Boiler4 Flow Sensor	AI	169	AI	169	nvoFl3FlwSen_XXX	SNVT_count_f
Override Governor	AI	170	AI	170	nvoOvrGvrnr_XXX	SNVT_count_f

Address DIP Switch Settings

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Off	Off	Off	Off	Off	Off	On	Off	2
Off	Off	Off	Off	Off	Off	On	On	3
Off	Off	Off	Off	Off	On	Off	Off	4
Off	Off	Off	Off	Off	On	Off	On	5
Off	Off	Off	Off	Off	On	On	Off	6
Off	Off	Off	Off	Off	On	On	On	7
Off	Off	Off	Off	On	Off	Off	Off	8
Off	Off	Off	Off	On	Off	Off	On	9
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Off	Off	Off	Off	On	Off	On	On	11
Off	Off	Off	Off	On	On	Off	Off	12
Off	Off	Off	Off	On	On	Off	On	13
Off	Off	Off	Off	On	On	On	Off	14
Off	Off	Off	Off	On	On	On	On	15
Off	Off	Off	On	Off	Off	Off	Off	16
Off	Off	Off	On	Off	Off	Off	On	17
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Off	On	Off	Off	On	On	Off	Off	76
Off	On	Off	Off	On	On	Off	On	77
Off	On	Off	Off	On	On	On	Off	78
Off	On	Off	Off	On	On	On	On	79

A7	A6	A5	A4	A3	A2	A1	A0	Address
Off	On	Off	On	Off	Off	Off	Off	80
Off	On	Off	On	Off	Off	Off	On	81
Off	On	Off	On	Off	Off	On	Off	82
Off	On	Off	On	Off	Off	On	On	83
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Off	On	On	Off	Off	Off	On	Off	98
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Off	On	On	Off	On	Off	On	On	107
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Off	On	On	On	Off	Off	Off	Off	112
Off	On	On	On	Off	Off	Off	On	113
Off	On	On	On	Off	Off	On	Off	114
Off	On	On	On	Off	Off	On	On	115
Off	On	On	On	Off	On	Off	Off	116
Off	On	On	On	Off	On	Off	On	117
Off	On	On	On	Off	On	On	Off	118
Off	On	On	On	Off	On	On	On	119
Off	On	On	On	On	Off	Off	Off	120

A7	A6	A5	A4	A3	A2	A1	A0	Address
Off	On	On	On	On	Off	Off	Off	120
Off	On	On	On	On	Off	Off	On	121
Off	On	On	On	On	Off	On	Off	122
Off	On	On	On	On	Off	On	On	123
Off	On	On	On	On	On	Off	Off	124
Off	On	On	On	On	On	Off	On	125
Off	On	On	On	On	On	On	Off	126
Off	On	On	On	On	On	On	On	127

9. APPENDIX C. REFERENCE

Specifications

Specification	ProtoNode RER	ProtoNode LER
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, Pending 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 2.5 W	
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)

Compliance with UL Regulations

For UL compliance, the following instructions must be met when operating the 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 the ProtoNode/Net.
- Furthermore, the interconnecting power cable shall:
  - Be of length not exceeding 3.05 m (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.

10. 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.