ProtoNode FPC-N34 and ProtoNode FPC-N35 Start-up Guide

For Interfacing KEP Products: SUPERtrol_II, SUPERtrol_I, LEVELtrol_II

To Building Automation Systems: BACnet MS/TP, BACnet/IP, Modbus TCP/IP, Metasys N2 EtherNet/IP, DF1 and LonWorks

APPLICABILITY & EFFECTIVITY

Explains ProtoNode hardware and installation.

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

Document Revision: 5.B
Auto Discovery/Web Configurator
Template Revision: 60

990331 07/01/16

Technical Support

Thank you for purchasing the ProtoNode for KEP.

Please call KEP for Technical support of the ProtoNode product.

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

Support Contact Information:

Kessler-Ellis Products
10 Industrial Way East
Eatontown, NJ 07724

Customer Service:

(800) 631 – 2165
(732) 935 – 1320

Email: flowsupport@kep.com

Website: www.KEP.com

Quick Start Guide

1. Record the information about the unit. (**Section** 2.1)
2. Set the device's Modbus RTU serial settings (i.e. baud rate, parity, stop bits) and Modbus Node-ID for each of the devices that will be connected to ProtoNode FPC-N34 or FPC-N35. (**Section** 2.3)
3. ProtoNode FPC-N34 units: Select the Field Protocol on the S Bank Dip Switches. (**Section** 2.4.1)
4. Enable the ProtoNode "Auto Discovery" mode on Dip Switch Bank S. (**Section** 2.4.2)
5. BACnet MS/TP (FPC-N34): Set the MAC Address on DIP Switch Bank A. (**Section** 2.5.1)
6. BACnet MS/TP or BACnet/IP (FPC-N34): Set the BACnet Device Instance. (**Section** 2.5.2)
7. BACnet MS/TP (FPC-N34): Set the BAUD rate of the BACnet MS/TP Field Protocol on DIP Switch Bank B. (**Section** 2.5.3)
8. Connect ProtoNode's 6 pin RS-485 connector to the RS-485 network that is connected to each of the devices. (**Section** 3.2)
9. **Connect ProtoNode FPC-N34's** 3 pin RS-485 port to the Field Protocol cabling, (**Section** 3.3)
   or connect ProtoNode FPC-N35's 2 pin LonWorks port to the Field Protocol cabling. (**Section** 3.4)
10. Connect Power to ProtoNode's 6 pin connector. (**Section** 3.5)
11. When power is applied it will take about 3 minutes for all the devices to be discovered, and the configuration file to be built. Once Auto-Discovery is complete turn OFF the S3 DIP Switch to save the configuration settings. (**Section** 3.5.1)
12. BACnet/IP or Modbus TCP/IP (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)
13. LonWorks (FPC-N35): The ProtoNode must be commissioned on the LonWorks Network. This needs to be done by the LonWorks administrator using a LonWorks Commissioning tool. (**Section** 7)

Certifications

BTL MARK – BACNET TESTING LABORATORY

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

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

LONMARK CERTIFICATION

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

TABLE OF CONTENTS

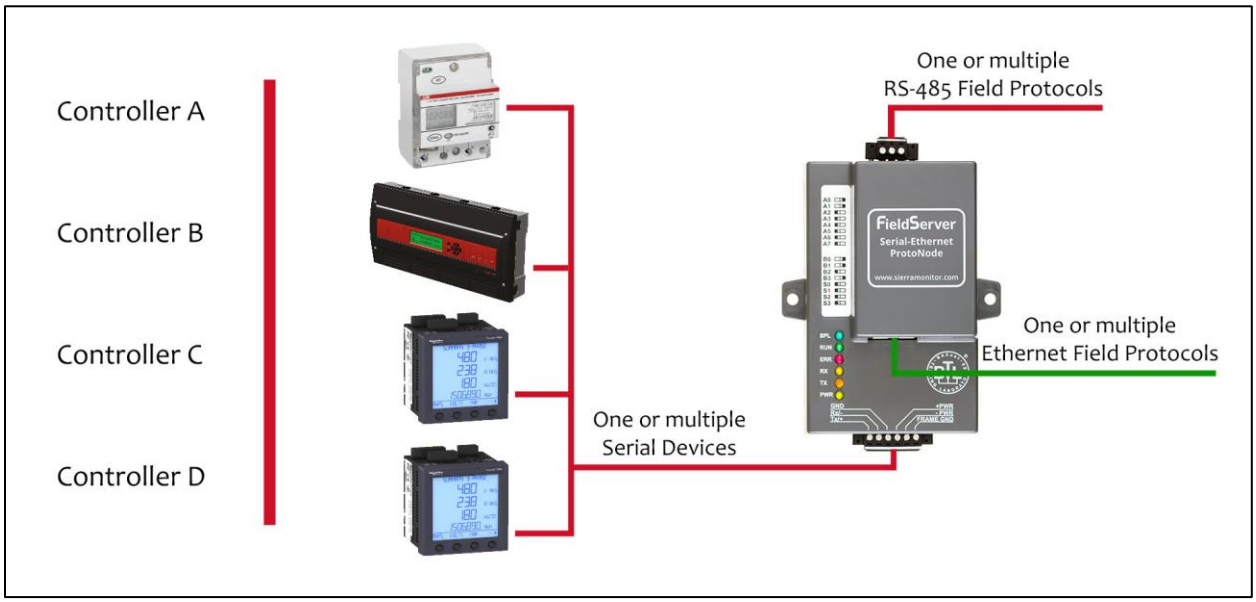
LIST OF FIGURES

1 INTRODUCTION

1.1 ProtoNode Gateway

ProtoNode is an external, high performance **Building Automation multi-protocol gateway** that is preconfigured to Auto-Discover any of KEP's products (hereafter called "device") connected to the ProtoNode and automatically configures them for BACnet®[1]MS/TP, BACnet/IP, Metasys®[2] N2 by JCI, Modbus TCP/IP, EtherNet/IP, DF1 or LonWorks®[3].

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



[1] BACnet is a registered trademark of ASHRAE
[2] Metasys is a registered trademark of Johnson Controls Inc.
[3] LonWorks is a registered trademark of Echelon Corporation

2 PROTONODE SETUP

2.1 Record Identification Data

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

Model	Part Number
ProtoNode N34	FPC-N34-0804
ProtoNode N35	FPC-N35-0059

Figure 1: ProtoNode Part Numbers

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

2.2 Point Count Capacity and Registers per Device

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

Part number	Total Registers
FPC-N34-0804	1,500
FPC-N35-0059	1,500

Figure 2: Supported Point Count Capacity

Devices	Registers Per Device
SUPERtrol_II	116
SUPERtrol_I	64
LEVELtrol_II	40

Figure 3: Modbus Registers per Device

2.3 Configuring Device Communications

2.3.1 Input COM settings on all Devices connected to the ProtoNode

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

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

Figure 4: Modbus COM Settings

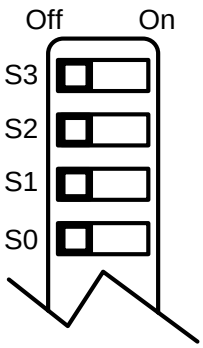
2.3.2 Set Modbus RTU Node-ID for each Device attached to the ProtoNode

- Set Modbus Node-ID for each of the devices attached to ProtoNode. The Modbus Node-ID's need to be uniquely assigned between 1 and 255.
    - **The Modbus Node-ID that is assigned for each device needs to be documented.**
        - The Modbus Node-ID's assigned are used for designating the Device Instance for BACnet/IP and BACnet MS/TP (**Section** 2.5.2)
- **The Metasys N2 and Modbus TCP/IP Node-IDs are automatically set to be the same value as the Node-ID of the Modbus RTU device.**

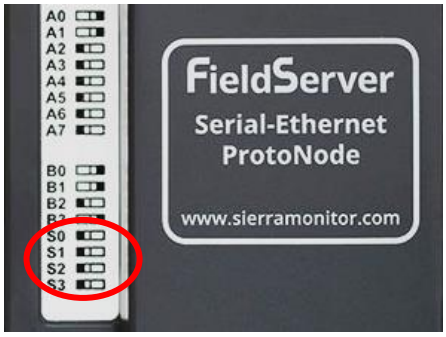
2.4 Selecting the Desired Field Protocol and Enabling Auto-Discovery

2.4.1 Selecting Desired Field Protocol

- ProtoNode FPC-N34 units use the "S" bank of DIP switches (S0 – S2) to select the Field Protocol.
  - See the table in **Figure 5** for the switch settings for the ProtoNode.
  - The OFF position is when the DIP switches are set closest to the outside of the box.
- ProtoNode FPC-N35 units do not use the "S" bank DIP switches (S0 – S2) to select a Field Protocol.
  - On ProtoNode FPC-N35 units, these switches are disabled; the Field Protocol is always LonWorks.



S0 – S3 DIP Switches



S Bank DIP Switch Location

ProtoNode FPC-N34	S Bank DIP Switches		
Profile	**S0**	**S1**	**S2**
BACnet/IP	Off	Off	Off
BACnet MS/TP	On	Off	Off
Metasys N2	Off	On	Off
Modbus TCP/IP	On	On	Off
EtherNet/IP	Off	Off	On
DF1	On	Off	On

Profile Settings for ProtoNode

Figure 5: S Bank DIP Switches

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

2.4.2 Enabling Auto-Discovery

NOTE: If Modbus TCP/IP was selected in Section 2.4.1 for the Field/BMS protocol, skip this section. Auto-Discovery is NOT used for Modbus TCP/IP.

- The S3 DIP switch is used to both enable Auto-Discovery of known devices attached to the ProtoNode, and to save the recently discovered configuration.
    - See the table in **Figure 6** for the switch setting to enable Auto-Discovery.
    - If the ProtoNode is being installed for the first time, set S3 to the ON position to enable Auto-Discovery.
    - The ON position is when the DIP switches are set closest to the inside of the box.

S3 DIP Switch Auto-Discovery Mode	S3
Auto-Discovery ON – Build New Configuration	On
Auto-Discover OFF – Save Current Configuration	Off

Figure 6: S3 DIP Switch setting for Auto Discovering Devices

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

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

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

NOTE: **Never set a BACnet MS/TP MAC Address from 128 to 255**. Addresses from 128 to 255 are Slave Addresses and can not be discovered by BMS Front Ends that support auto discovery of BACnet MS/TP devices.

- Set "A" bank DIP switches A0 – A7 to assign a MAC Address to the ProtoNode for BACnet MS/TP.
- Refer to **Appendix C.1** for the complete range of MAC Addresses and DIP switch settings.

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

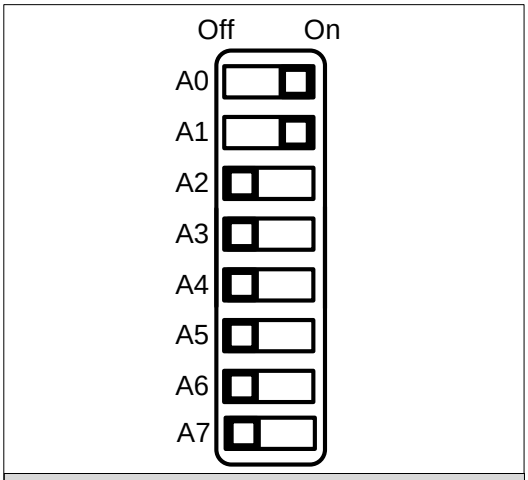


Figure 7: MAC Address DIP Switches

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

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

- The A Bank of DIP switches are used for two purposes:
    - For BACnet MS/TP, they are used to set the BACnet MS/TP MAC address (**Section 2.5.1**)
    - For both BACnet MS/TP and BACnet/IP, they are also used to determine the BACnet Device Instance values
- 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 5**) and adding it to the value of the A Bank DIP switches. When more than one device is connected to the ProtoNode, the subsequent BACnet Device Instance values will be sequential from the first/previous device.

  For example:

  Given that Device Instance = Node_Offset + A Bank DIP switch value
    - Default Node_Offset value = 50,000
    - A Bank DIP switch value = 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

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

- "B" bank DIP switches B0 – B3 can be used to set the Field baud rate of the ProtoNode to match the baud rate required by the Building Management System for BACnet MS/TP.
- The baud rate on ProtoNode for Metasys N2 is set for 9600. "B" bank DIP switches B0 – B3 are disabled for Metasys N2 on ProtoNode FPC-N34.
- "B" bank DIP switches B0 – B3 are disabled on ProtoNode FPC-N35 (LonWorks).

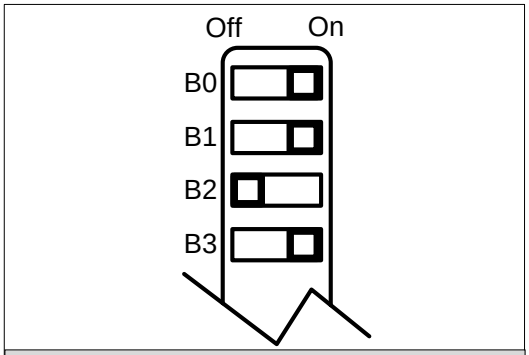


Figure 8: BMS Baud Rate DIP Switches

2.5.3.1 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 9: BMS Baud Rate

* Factory default setting = 38400

3 INTERFACING PROTONODE TO DEVICES

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

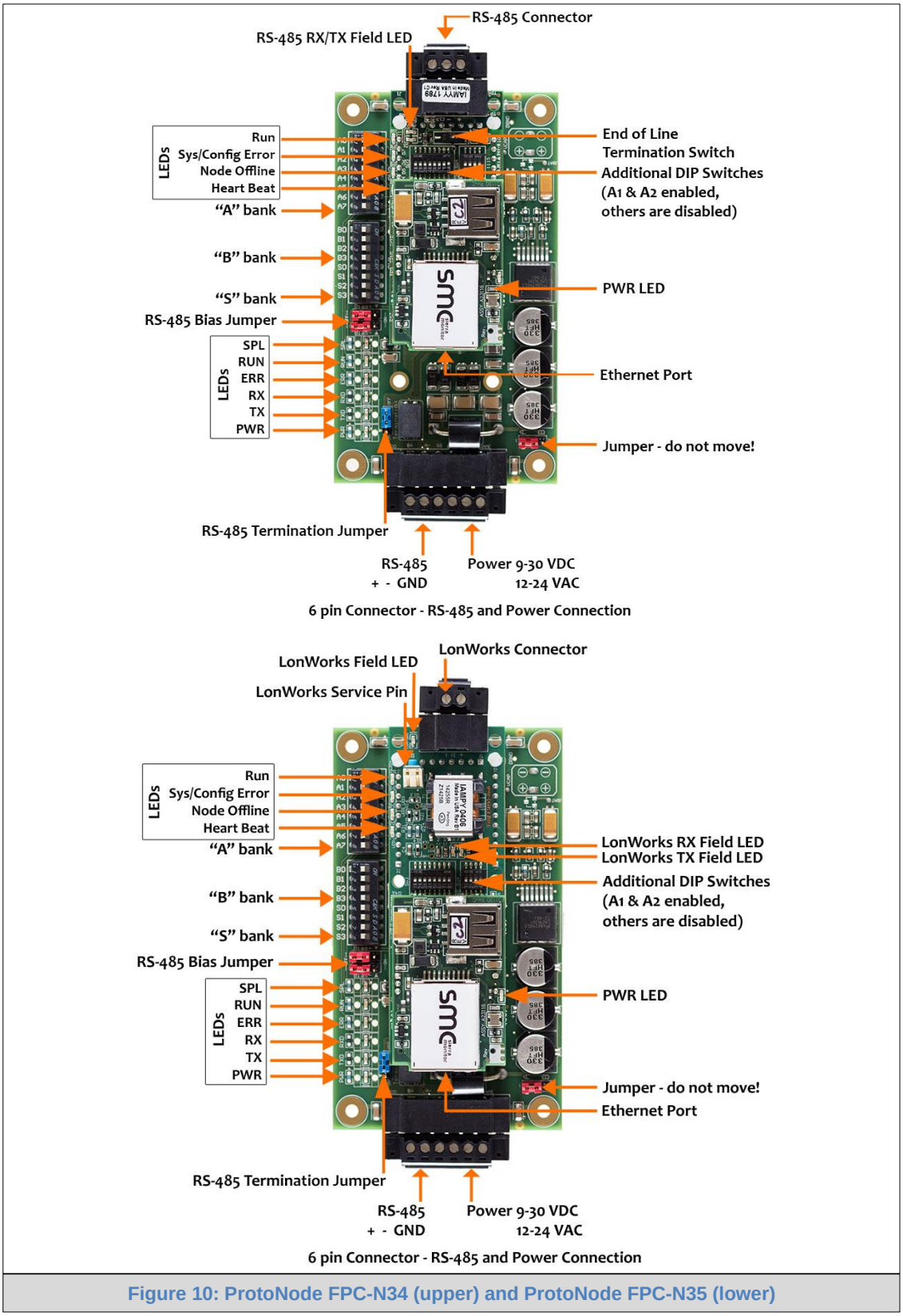


Figure 10: ProtoNode FPC-N34 (upper) and ProtoNode FPC-N35 (lower)

3.2 Device Connections to ProtoNode

ProtoNode 6 Pin Phoenix connector for RS-485 Devices

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

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

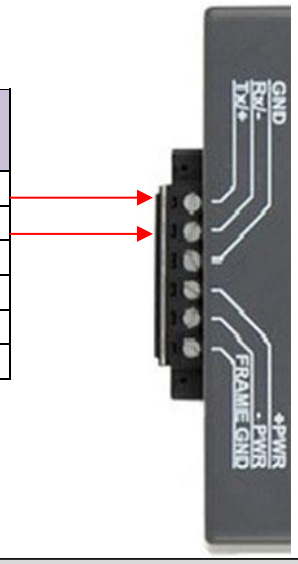


Figure 11: Power and RS-485 Connections

3.2.1 Biasing the Modbus RS-485 Device Network

- An RS-485 network with more than one device needs to have biasing to ensure proper communication. The biasing only needs to be done on one device.
- The ProtoNode has 510 Ohm resistors that can be used to set the biasing. The ProtoNode's default positions from the factory for the Biasing jumpers are OFF.
- The OFF position is when the 2 RED biasing jumpers straddle the 4 pins closest to the outside of the board of the ProtoNode. (**Figure 12**)
- **Only turn biasing ON:**
    - **IF the BMS cannot see more than one device connected to the ProtoNode**
    - **AND all the settings (Modbus COM settings, wiring, and DIP switches) have been checked.**
- To turn biasing ON, move the 2 RED biasing jumpers to straddle the 4 pins closest to the inside of the board of the ProtoNode.

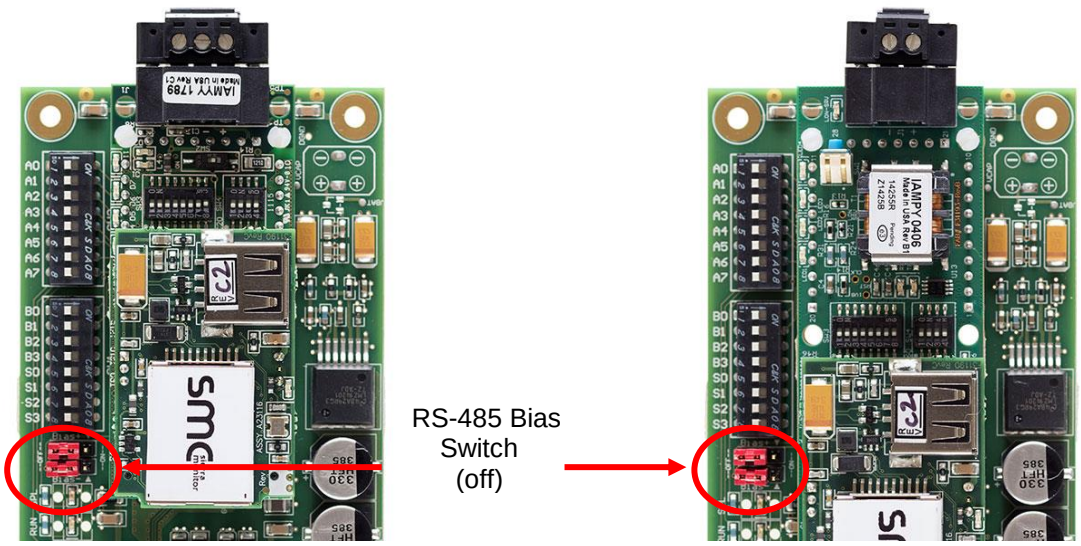


Figure 12: Modbus RS-485 Biasing Switch on the ProtoNode N34 (left) and ProtoNode N35 (right)

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

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

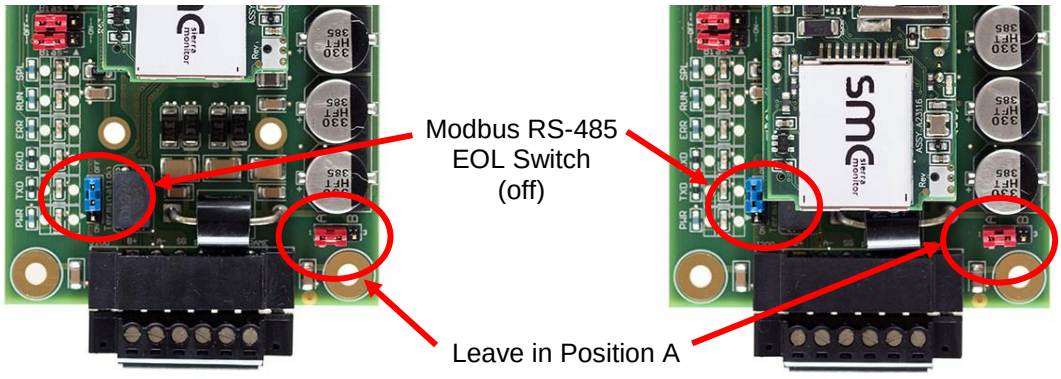


Figure 13: Modbus RS-485 End-Of-Line Termination Switch on the ProtoNode N34 (left) and ProtoNode N35 (right)

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

- Connect the BACnet MS/TP or Metasys N2 RS-485 network wires to the 3-pin RS-485 connector on ProtoNode FPC-N34. (**Figure 14**)
    - The RS-485 GND (Pin 3) is not typically connected
- See **Section 4.2** 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 15**)
    - The default setting from the factory is OFF (switch position = right side)
    - To enable the EOL Termination, turn the EOL switch ON (switch position = left side)

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

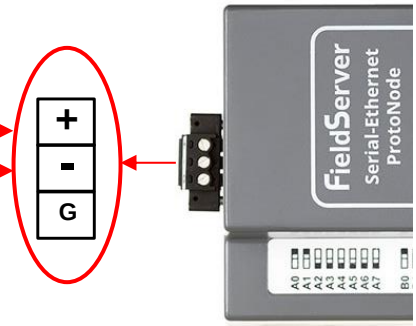


Figure 14: Connection from ProtoNode to RS-485 Field Network

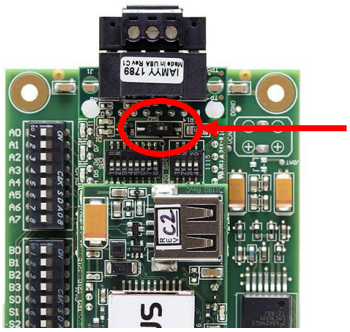


Figure 15: RS-485 BMS Network EOL Switch

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

- Connect ProtoNode to the field network with the LonWorks terminal using approved cable per the FT-10 installation guidelines. LonWorks has no polarity.

Figure 16: LonWorks Terminal

3.5 Power-Up ProtoNode

Apply power to ProtoNode as show below in **Figure 18.** Ensure that the power supply used complies with the specifications provided in **Appendix D.1**.

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

Power Requirement for ProtoNode External Gateway			
	Current Draw Type		
ProtoNode Family	12VDC/VAC	24VDC/VAC	30VDC
FPC – N34 (Typical)	170mA	100mA	80mA
FPC – N34 (Maximum)	240mA	140mA	100mA
FPC – N35 (Typical)	210mA	130mA	90mA
FPC – N35 (Maximum)	250mA	170mA	110mA
NOTE: These values are 'nominal' and a safety margin should be added to the power supply of the host system. A safety margin of 25% is recommended.			

Figure 17: Required current draw for the ProtoNode

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

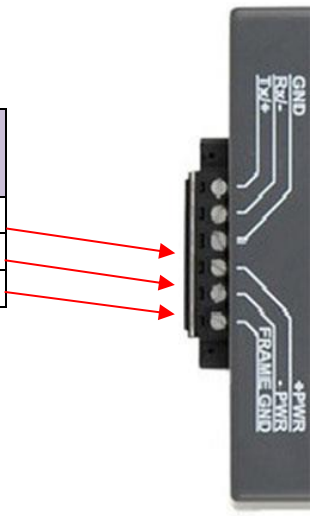


Figure 18: Power Connections

3.5.1 Auto-Discovery: After Completion – Turn Off to Save Configuration

NOTE: If Modbus TCP/IP was selected in Section 2.4.1 for the Field/BMS protocol, skip this section. Auto-Discovery is NOT used for Modbus TCP/IP.

The S3 DIP Switch for Enabling Auto-Discovery should have been set in **Section 2.4.2** before applying power to the ProtoNode. **Do not** Enable Auto-Discovery when the unit is powered.

- When power is applied to a ProtoNode that is set to Enable Auto-Discovery, it will take 3 minutes to complete the discovery of all of the RS-485 devices attached to the ProtoNode.
- The "TX" LED will flash during Auto-Discovery. The "TX" LED will stop flashing when completed.
- **Once the ProtoNode has discovered all of the RS-485 devices, set the S3 DIP switch to the OFF position to save the current configuration.**
- Then turn the power to the ProtoNode back ON. The stored configuration will be loaded.

S3 DIP Switch Auto-Discovery Mode	S3
Auto-Discovery ON – Build New Configuration	On
Auto-Discover OFF – Save Current Configuration	Off

Figure 19: S3 DIP Switch setting for Auto Discovering Devices

4 BACNET/IP OR MODBUS TCP/IP: CHANGE THE PROTONODE IP ADDRESS

4.1 Connect the PC to ProtoNode via the Ethernet Port

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

  Go to 

> 

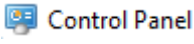
> 

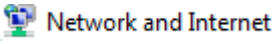
  Right-click on Local Area Connection > Properties

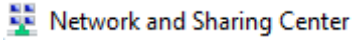
  Highlight 

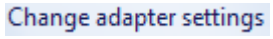
> 

- For Windows 7 or later:

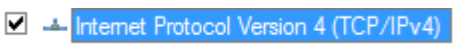
  Go to 
> 

> 

> 

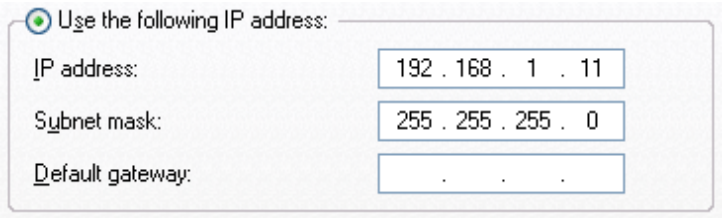
> 

  Right-click on Local Area Connection > Properties

  Highlight 

> 

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



- Click 

twice.

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

- After setting a local PC on the same subnet as the ProtoNode (**Section 4.1**), open a web browser on the PC and enter the IP Address of the ProtoNode; the default address is 192.168.1.24.

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

- The Web Configurator will be displayed as the landing page. (**Figure 20**)

NOTE: Below the "Active profiles" heading are listed the profiles 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.

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

- To access the Web GUI, click on the "Diagnostics & Debugging" button in the bottom right side of the page.

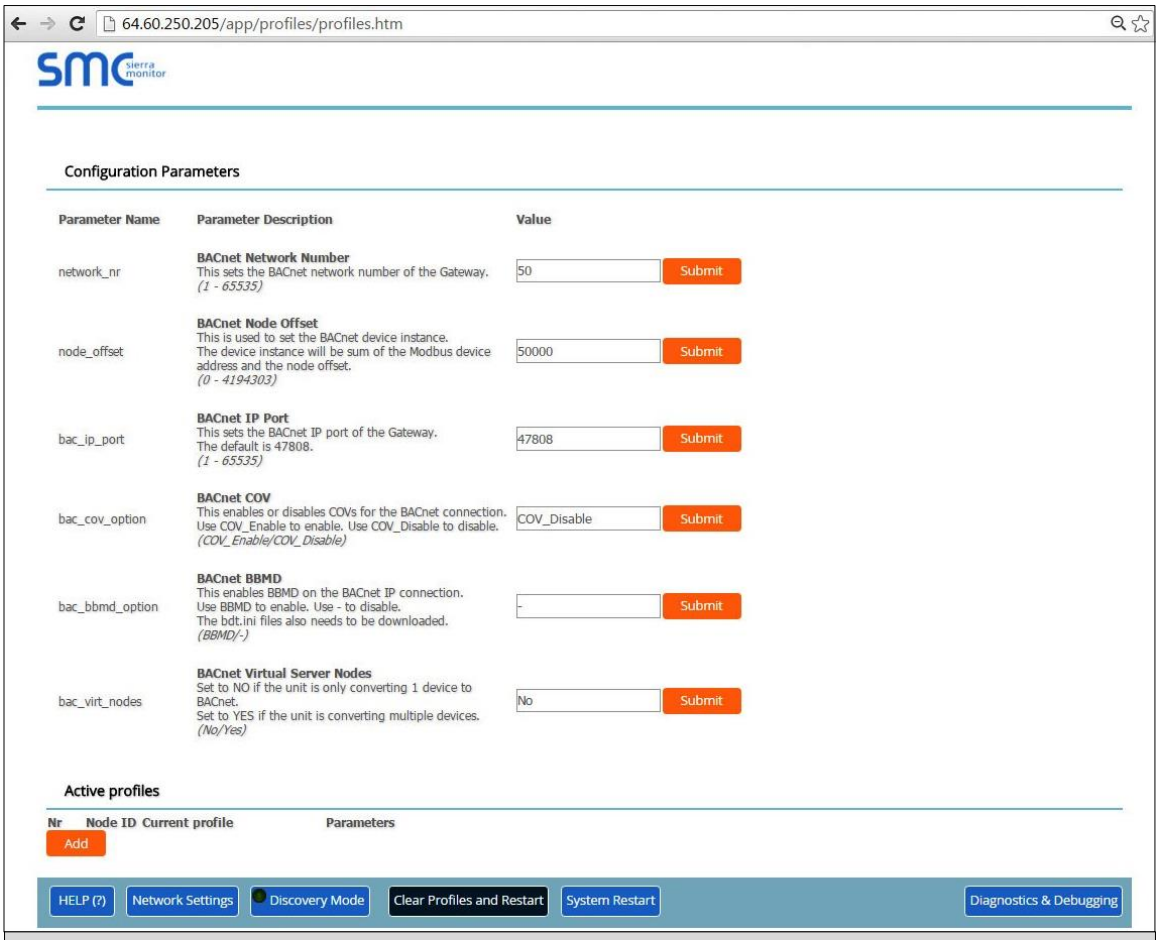


Figure 20: Web Configurator Screen

- From the Web GUI's landing page, click on "Setup" to expand the navigation tree. Then select "Network Settings" to access the IP Settings menu. (Figure 21)

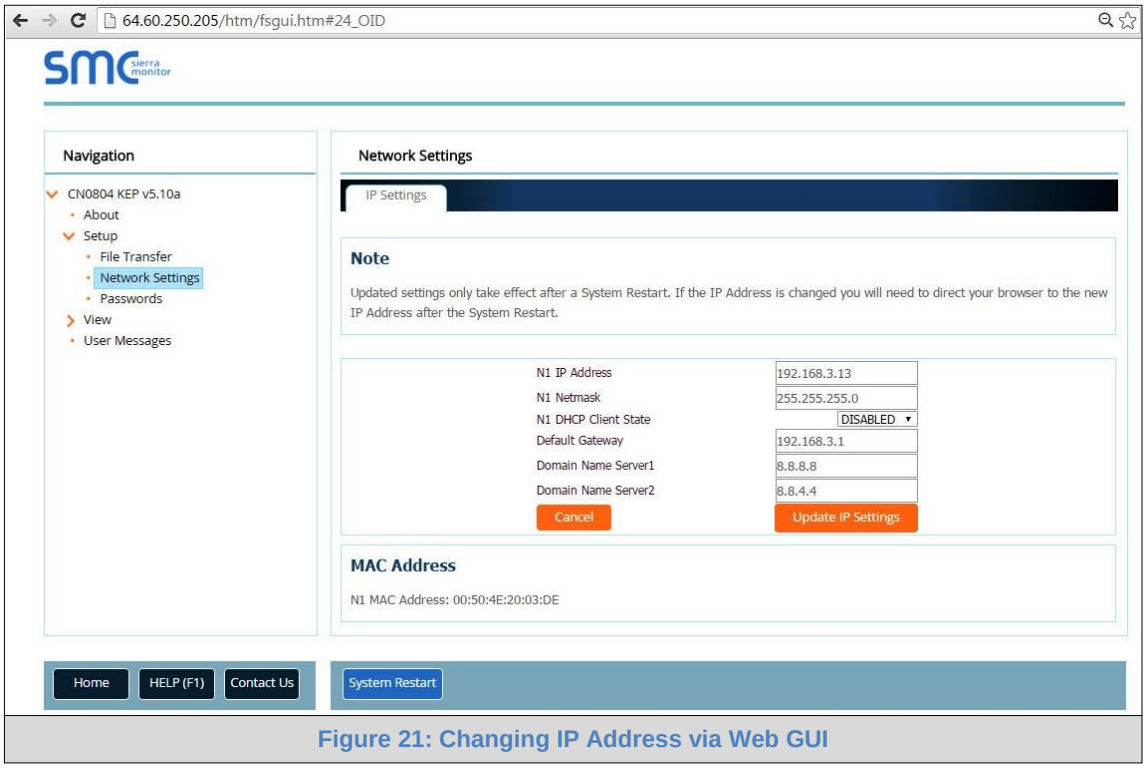


Figure 21: Changing IP Address via Web GUI

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

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

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

4.3 Selecting Profiles for Devices Connected to ProtoNode

NOTE: If Modbus TCP/IP was selected in Section 2.4.1 for the Field/BMS protocol, skip this section. Device profiles are NOT used for Modbus TCP/IP.

- In the Web Configurator, the Active Profiles section is shown on the lower left side of the screen.
- The Active Profiles section lists the currently active device profiles, including previous Web Configurator additions and any devices identified by Auto-Discovery configuration methods. This list will be empty for new installations, or after clearing all configurations. (Figure 22)
- To add an active profile to support a device, click the ADD button under Active Profiles. This will present a drop-down box underneath the Current Profile column that lists all the available profiles. (Figure 23)
- For every device that is added, assign a unique Modbus Node-ID. This specification must match the device's network settings.

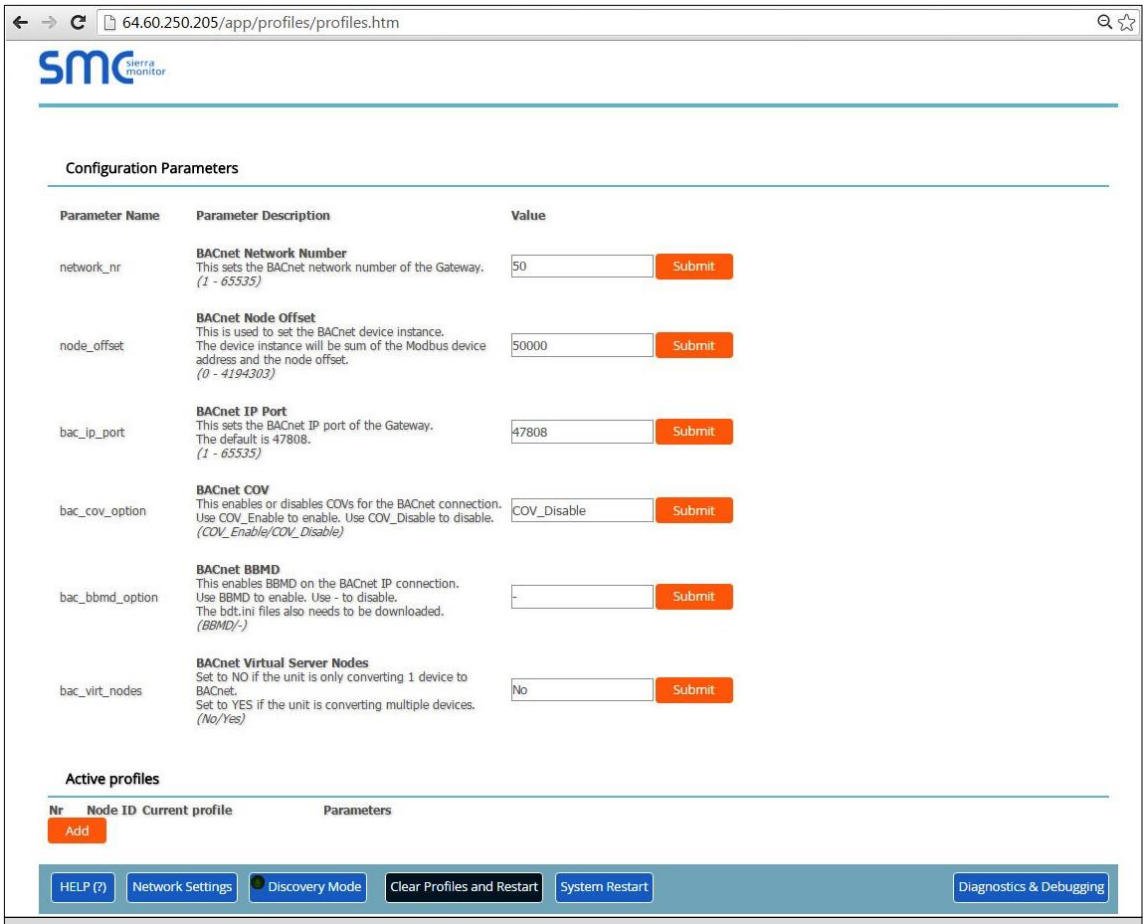


Figure 22: Web Configurator Showing no Active Profiles

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

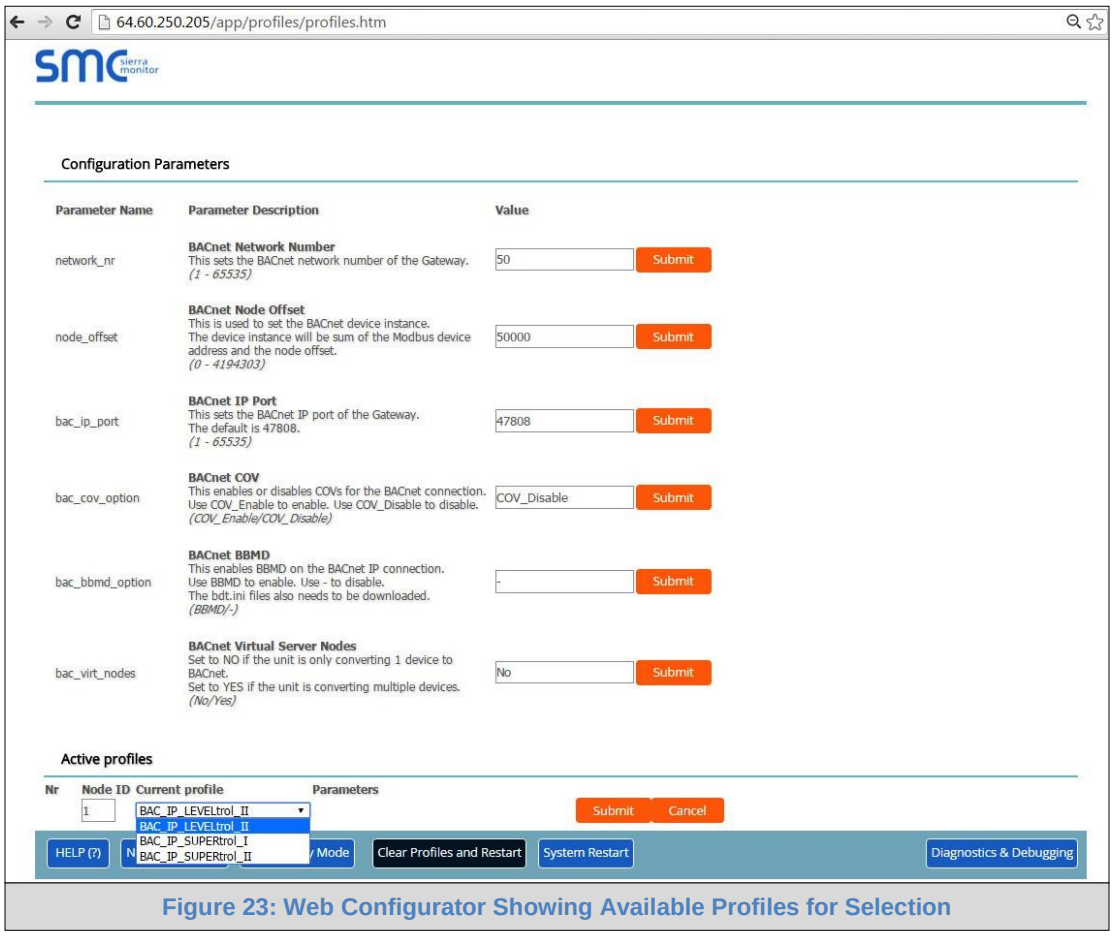


Figure 23: Web Configurator Showing Available Profiles for Selection

- Then press the SUBMIT button to add the profile to the list of devices to be configured.
- Repeat this process until all the devices have been added.
- Completed additions will be listed under Active Profiles as show in Figure 24.

Figure 24: Web Configurator Showing Active Profile Additions

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

- After setting a local PC to the same subnet as the ProtoNode (**Section 4.1**), open a web browser on the PC and enter the IP Address of the ProtoNode; the default address is 192.168.1.24.
    - If the IP Address of the ProtoNode has been changed by previous configuration, the assigned IP Address will need to be obtained from the network administrator.
    - The Web Configurator will be displayed as the landing page. (**Figure 25**)
- Node_Offset field shows the current value (default = 50,000).
    - The values allowed for a BACnet Device Instance can range from 1 to 4,194,303.
- To assign a specific Device Instance (or range), change the Node_Offset value accordingly.
    - Given that: **Device Instance = Node_Offset + Modbus Node_ID**
    - Then: **Node_Offset (required) = Device Instance (desired) – Modbus Node_ID**

      For example, if the 1st device's Device Instance must be 1,001 and the following is true:
        - Device 1 has a Modbus Node-ID of 1
        - Device 2 has a Modbus Node-ID of 22
        - Device 3 has a Modbus Node-ID of 33

      Then Node_Offset (required) = 1,001 – 1 = 1,000.
      Once submitted, the Node_Offset value is applied to all devices as shown below:
        - Device 1 Instance = 1,000 + Modbus Node_ID = 1,000 + 1 = 1,001
        - Device 2 Instance = 1,000 + Modbus Node_ID = 1,000 + 22 = 1,022
        - Device 3 Instance = 1,000 + Modbus Node_ID = 1,000 + 33 = 1,033
- Click "Submit" once the desired value is entered

Figure 25: Web Configurator Screen with Active Profiles

6 HOW TO START THE INSTALLATION OVER: CLEARING PROFILES

- After setting a local PC to the same subnet as the ProtoNode (**Section 4.1**), open a web browser on the PC and enter the IP Address of the ProtoNode; the default address is 192.168.1.24.
- If the IP Address of the ProtoNode has been changed by previous configuration, the assigned IP Address will need to be obtained from the network administrator.
- The Web Configurator will be displayed as the landing page.
- **At the bottom-left of the page, click the "Clear Profiles and Restart" button.**
- Once restart is complete, all past profiles discovered and/or added via Web configurator are deleted. The unit can now be reinstalled.

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

Commissioning may only be performed by the LonWorks administrator.

7.1 Commissioning ProtoNode FPC-N35 on a LonWorks Network

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

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

Figure 26: LonWorks Service Pin Location

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

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

  Go to start > Control Panel > Network Connections

  Right-click on Local Area Connection > Properties

  Highlight Internet Protocol (TCP/IP) > Properties

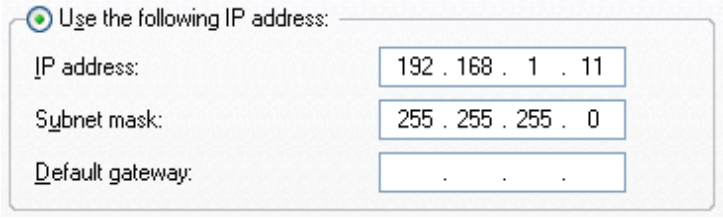
- For Windows 7 or later:

  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, use the following IP Address:



- Click 

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

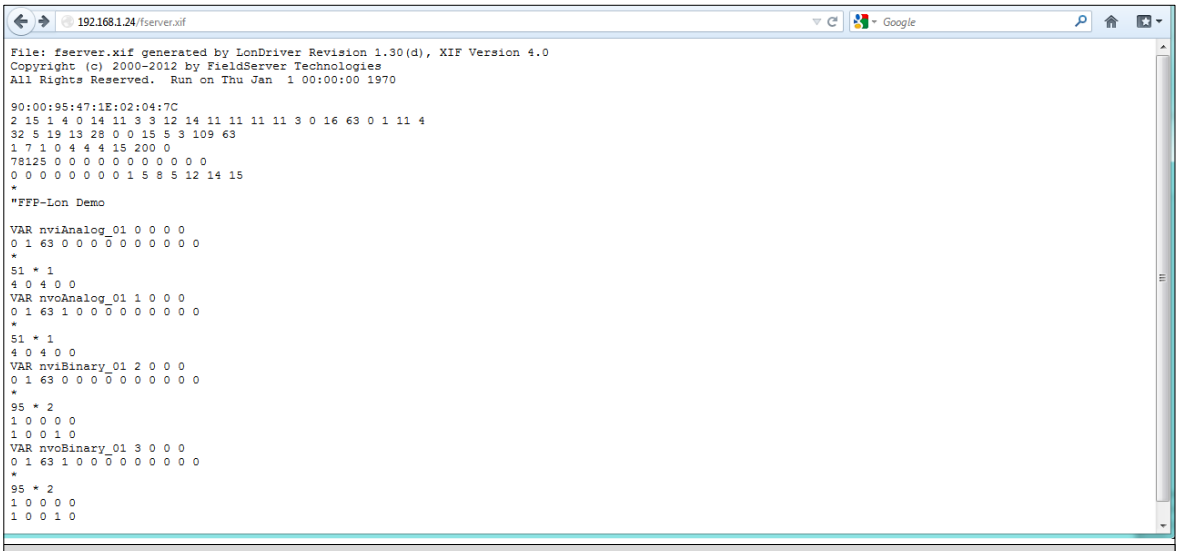


Figure 27: Sample of Fserver.XIF File Generated

Appendix A. Troubleshooting

Appendix A.1. Lost or Incorrect IP Address

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

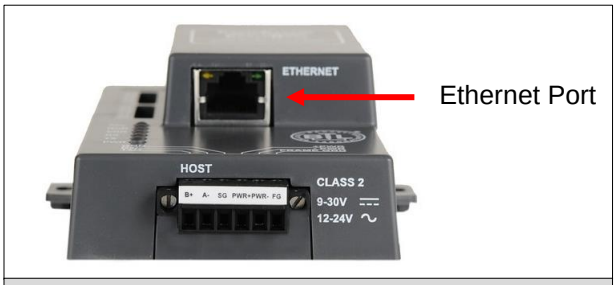
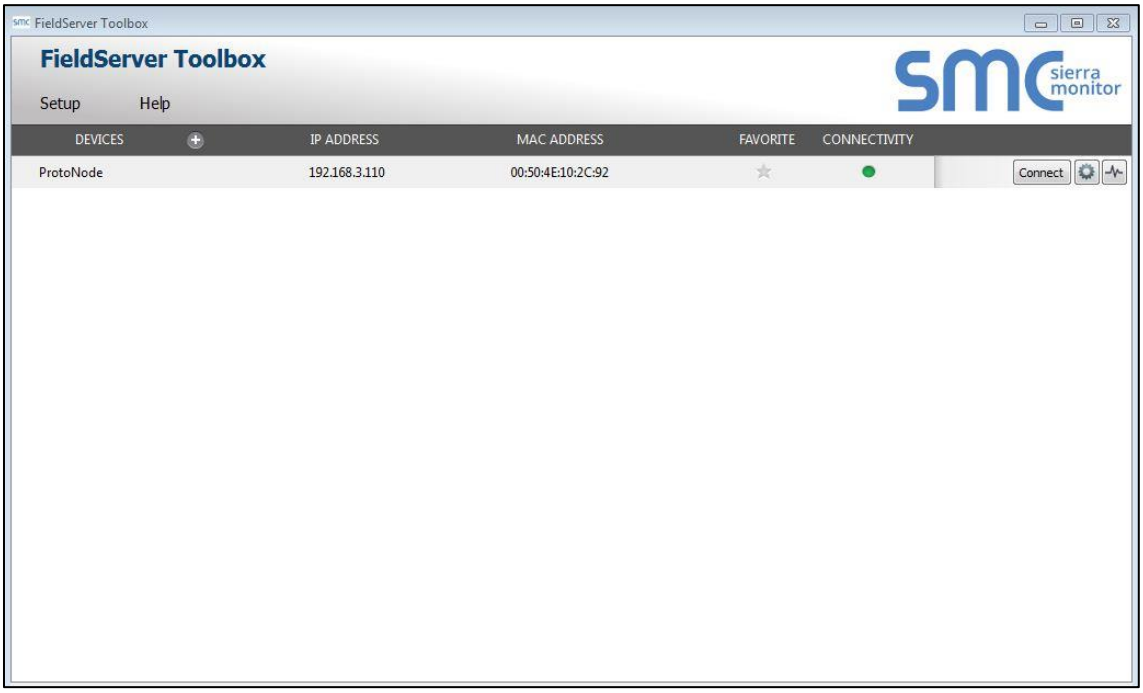


Figure 28: Ethernet Port Location

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



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

Appendix A.2. Viewing Diagnostic information

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

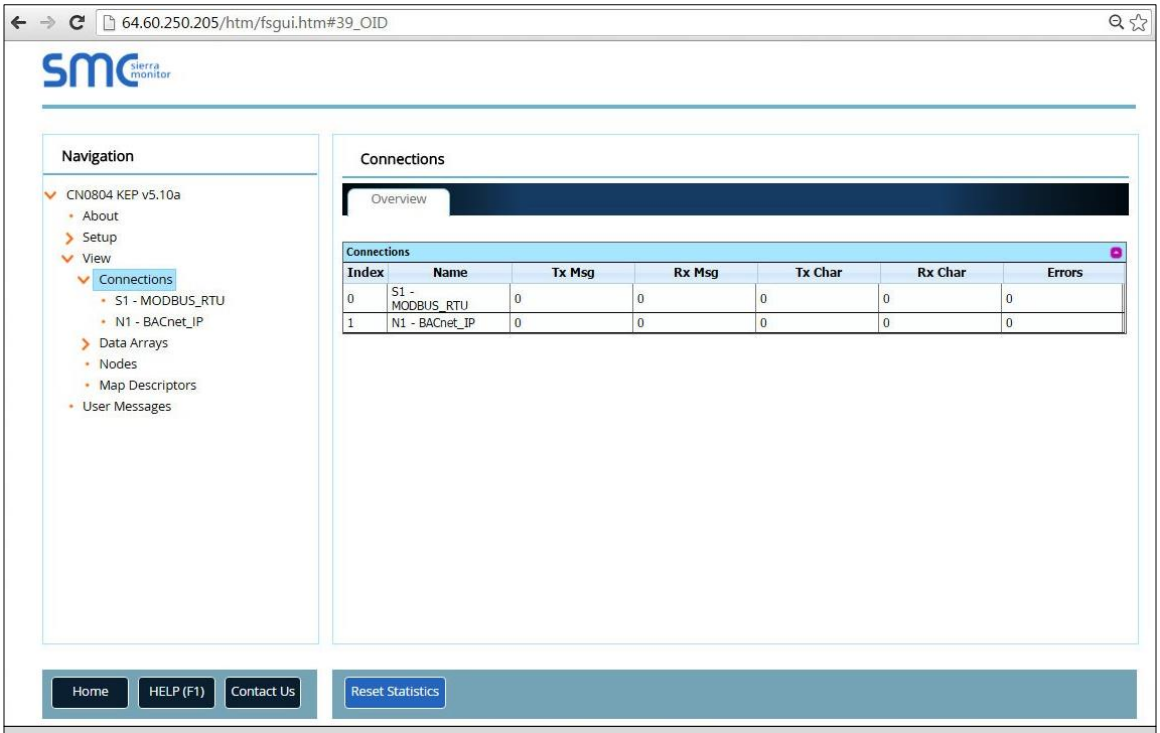


Figure 29: Error messages screen

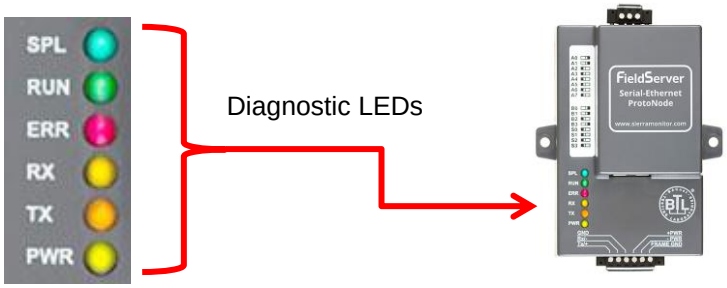
Appendix A.3. Checking Wiring and Settings

- No COMS on Modbus RTU side. If Tx/Rx are not flashing rapidly then there is a COM issue on the Modbus side. To fix this problem, check the following:
  - Visual observations of LEDs on ProtoNode (**Appendix A.4**)
  - Check baud rate, parity, data bits, stop bits
  - Check Modbus device address
  - Verify wiring
  - Verify Modbus device is connected to the same subnet as the ProtoNode
  - Verify the Modbus device was discovered in Web Configurator (**Section 4.2**)
- Field COM problems:
  - If Ethernet protocols are used, observe Ethernet LEDs on the ProtoNode (**Appendix A.4**)
  - Check dipswitch settings (using correct baud rate and device instance)
  - Verify IP Address setting
  - Verify wiring

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

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

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



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

Figure 30: Diagnostic LEDs

Appendix A.5. Taking Diagnostic Capture with the FieldServer Toolbox

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

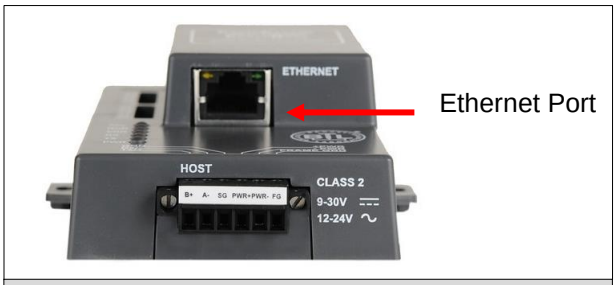
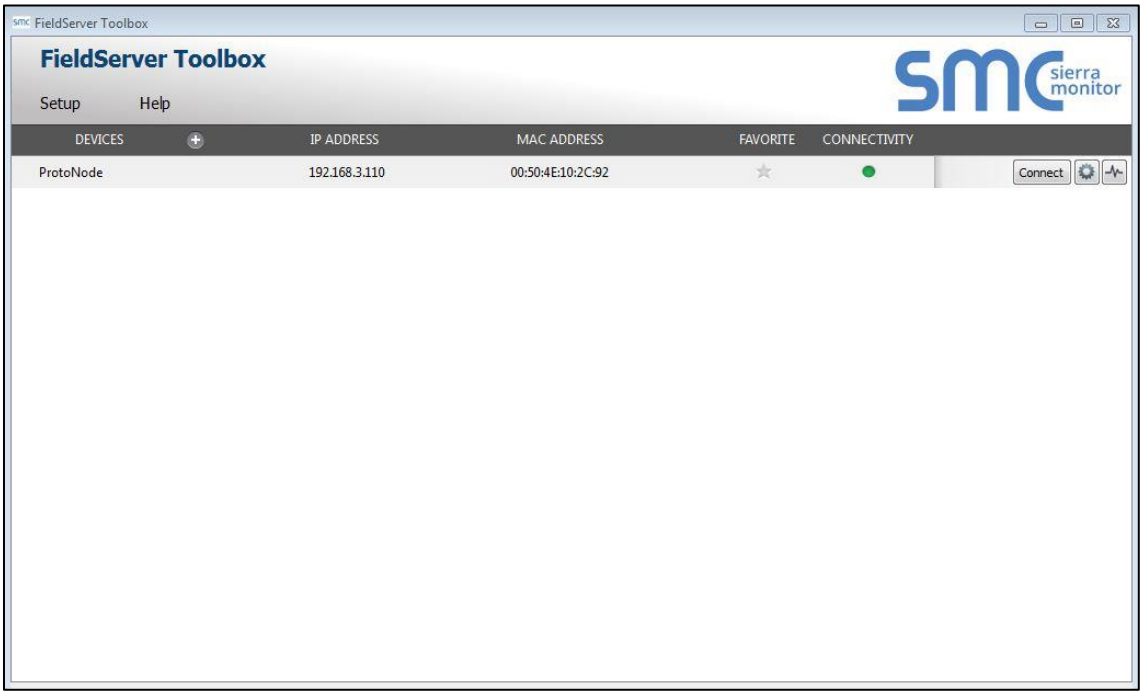
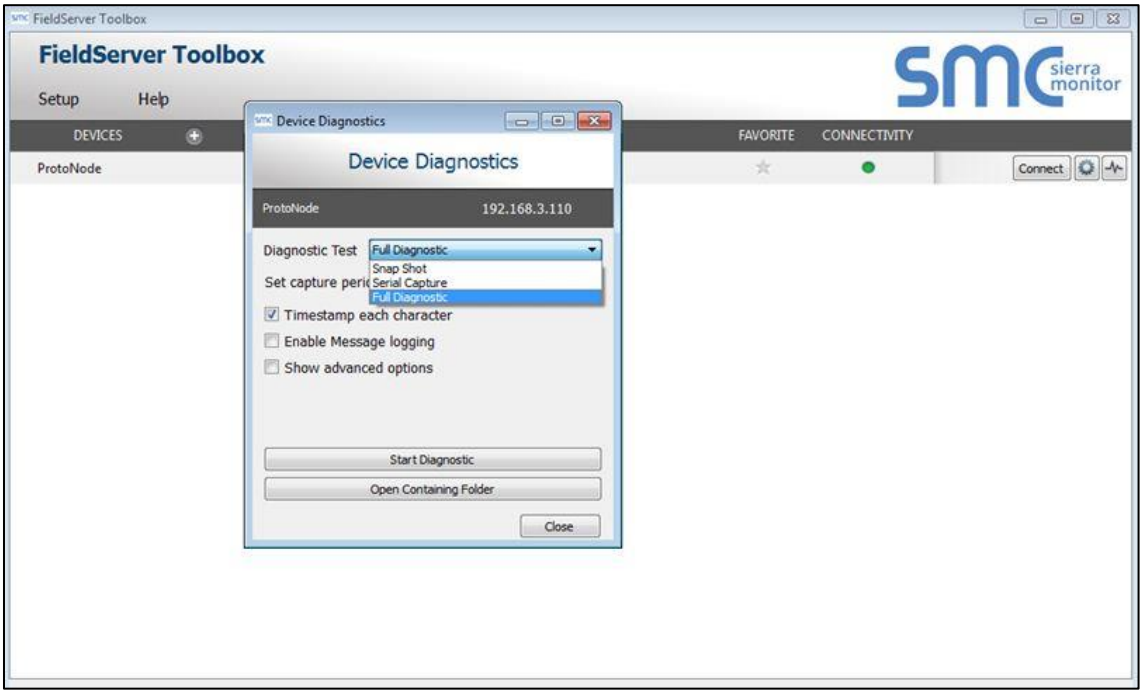


Figure 31: Ethernet Port Location

- Disable any wireless Ethernet adapters on the PC/Laptop.
- Disable firewall and virus protection software if possible.
- Connect a standard Cat5 Ethernet cable between the PC and ProtoNode.
- Double click on the FS Toolbox Utility.
- **Step 1:** Take a Log
  - Click on the diagnose icon  of the desired device

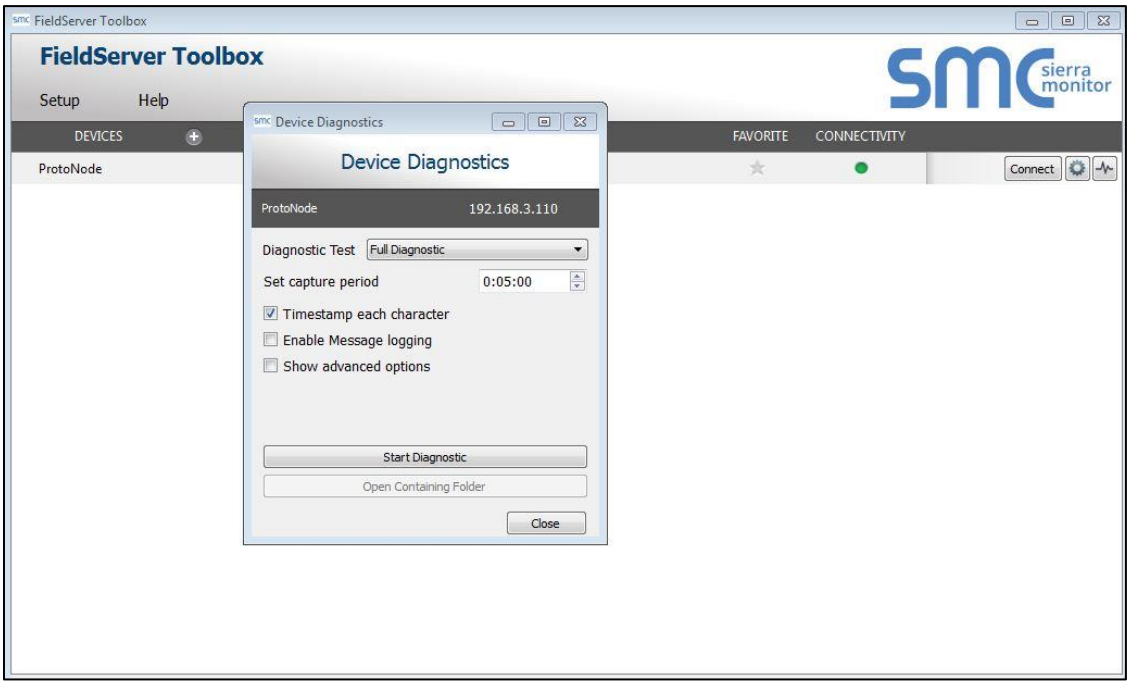


- Select full Diagnostic



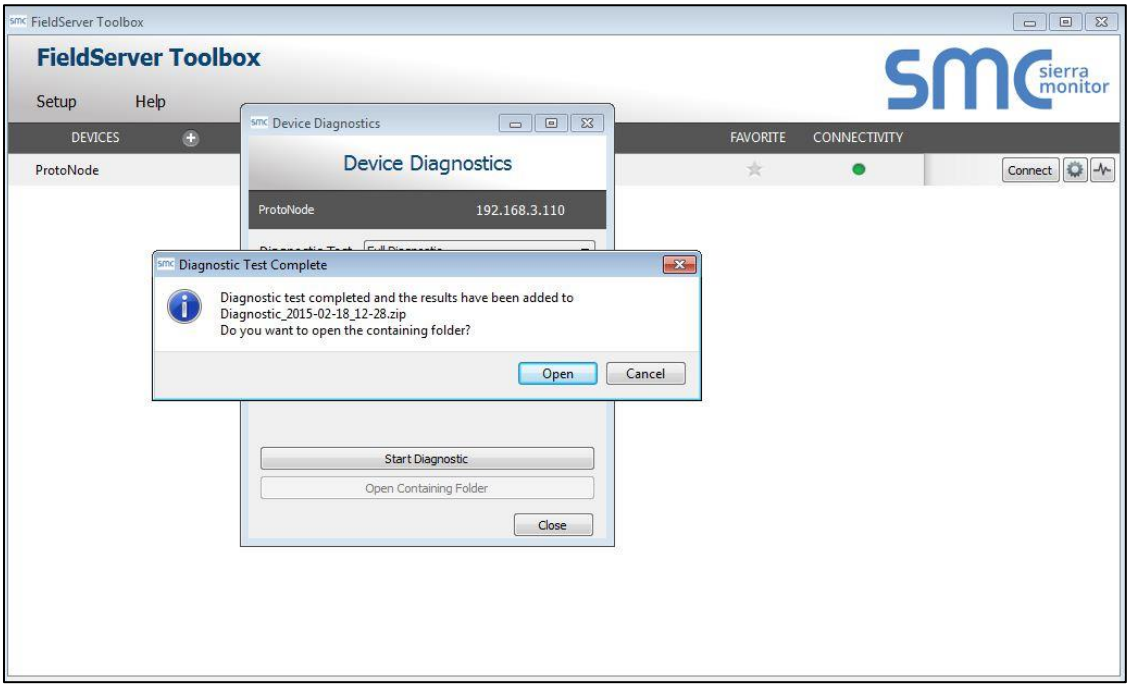
NOTE: If desired, the default capture period can be changed.

- Click on “Start Diagnostic”



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

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



    - Choose “Open” to launch explorer and have it point directly at the correct folder
    - Send the Diagnostic zip file to flowsupport@kep.com

Appendix A.6. Updating Firmware

To load a new version of the firmware, follow these instructions:

1. Extract and save the new file onto the local PC.
2. Open a web browser and type the IP Address of the FieldServer in the address bar.
   NOTE: Default IP Address is 192.168.1.24
   NOTE: Use the FS Toolbox utility if the IP Address is unknown (**Appendix A.1**)
3. Click on the “Diagnostics & Debugging” button.
4. In the Navigation Tree on the left hand side, do the following:
   a. Click on “Setup”
   b. Click on “File Transfer”
   c. Click on the “Firmware” tab
5. In the Firmware tab, click on “Choose Files” and select the firmware file extracted in step 1.
6. Click on the orange “Submit” button.
7. When the download is complete, click on the “System Restart” button.

Appendix A.7. BACnet: Setting Network_Number for more than one ProtoNode on Subnet

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

On the main Web Configuration screen, update the Network Number with the “network_nr” field and click submit. The default value is 50.

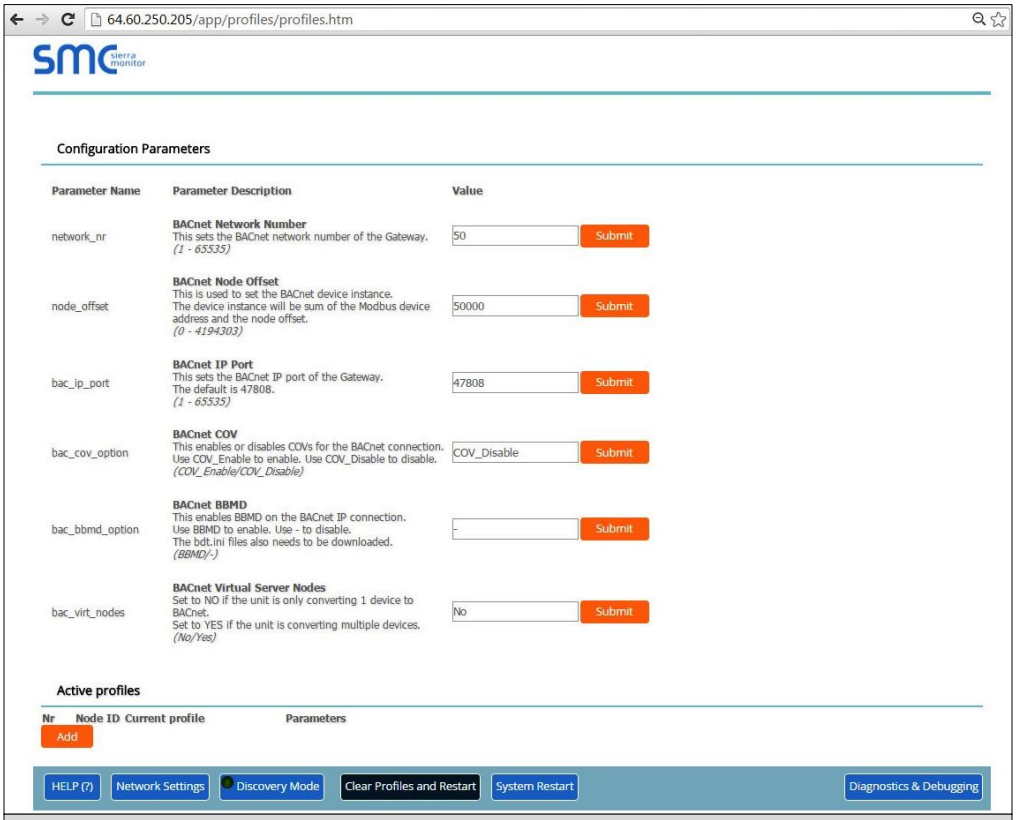


Figure 32: Web Configurator – Setting Network Number for BACnet

Appendix A.8. Securing ProtoNode with Passwords

Access to the ProtoNode can be restricted by enabling a password. There are 2 access levels defined by 2 account names: Admin and User.

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

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

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

Appendix A.9. Reading Data Arrays

- Connect to the ProtoNode with a browser and click on the Diagnostics & Debugging button.
- Select the User Messages branch.
- Select the info tab.
- See which profile has been loaded.
  - Example: prof1b.csv
- In the address bar of the browser, type the IP address/filename.
  - Example: 192.168.1.24/prof1b.csv
- Press the enter key and save the file.
- Open the file and go to the server side map descriptors section.
- The map_descriptor_name, data_array_name, and data array_offset will be shown for each point.
- Go back to the browser and select the view branch.
- Select the data arrays branch.
- Select the data array that corresponds with the point that you want to monitor.
- View the offset that corresponds with the point that you want to monitor.

Appendix B. Vendor Information - KEP

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

Appendix B.1. SUPERtrol_II Modbus RTU Mappings to BACnet, Metasys N2, EtherNet/IP, DF1, Modbus TCP/IP and LonWorks

Point Name	BACnet Object Type	BACnet Object ID	Metasys N2 Data Type	Metasys N2 Address	EIP Tag Name	DF1 Address	LonWorks Name	LonWorks SNVT
Heat Flow	AI	1	AI	1	Flt_XXX[000]	F11:000	nvoHeatFlo_XXX	SNVT_count_f
Mass Flow	AI	2	AI	2	Flt_XXX[001]	F11:001	nvoMassFlo_XXX	SNVT_count_f
STD Volume Flow	AI	3	AI	3	Flt_XXX[002]	F11:002	nvoSTDVolFlo_XXX	SNVT_count_f
Volume Flow	AI	4	AI	4	Flt_XXX[003]	F11:003	nvoVolFlo_XXX	SNVT_count_f
Temperature 1	AI	5	AI	5	Flt_XXX[004]	F11:004	nvoTmp1_XXX	SNVT_count_f
Temperature 2	AI	6	AI	6	Flt_XXX[005]	F11:005	nvoTmp2_XXX	SNVT_count_f
Delta Temperature	AI	7	AI	7	Flt_XXX[006]	F11:006	nvoDeltaTmp_XXX	SNVT_count_f
Process Pressure	AI	8	AI	8	Flt_XXX[007]	F11:007	nvoProcesPrs_XXX	SNVT_count_f
Diff. Pressure	AI	9	AI	9	Flt_XXX[008]	F11:008	nvoDiffPrs_XXX	SNVT_count_f
Density	AI	10	AI	10	Flt_XXX[009]	F11:009	nvoDensity_XXX	SNVT_count_f
Specific Enthalpy	AI	11	AI	11	Flt_XXX[010]	F11:010	nvoSpecEnth_XXX	SNVT_count_f
Heat Total	AI	12	AI	12	Flt_XXX[011]	F11:011	nvoHeatTot_XXX	SNVT_count_f
Mass Total	AI	13	AI	13	Flt_XXX[012]	F11:012	nvoMassTot_XXX	SNVT_count_f
STD Volume Total	AI	14	AI	14	Flt_XXX[013]	F11:013	nvoSTDVolTot_XXX	SNVT_count_f
Volume Total	AI	15	AI	15	Flt_XXX[014]	F11:014	nvoVolTot_XXX	SNVT_count_f
Heat Grand Total	AI	16	AI	16	Flt_XXX[015]	F11:015	nvoHtTotal_XXX	SNVT_count_f
Mass Grand Total	AI	17	AI	17	Flt_XXX[016]	F11:016	nvoMasTotal_XXX	SNVT_count_f
STD Volume Grand Total	AI	18	AI	18	Flt_XXX[017]	F11:017	nvoSTDVlGrTo_XXX	SNVT_count_f
Volume Grand Total	AI	19	AI	19	Flt_XXX[018]	F11:018	nvoVolTotal_XXX	SNVT_count_f
Alarm Point 1	AI	20	AI	20	Flt_XXX[019]	F11:019	nvoAlmPt1_XXX	SNVT_count_f
Alarm Point 2	AI	21	AI	21	Flt_XXX[020]	F11:020	nvoAlmPt2_XXX	SNVT_count_f
Alarm Point 3	AI	22	AI	22	Flt_XXX[021]	F11:021	nvoAlmPt3_XXX	SNVT_count_f
Year	AI	23	AI	23	U16_XXX[044]	N10:044	nvoYear_XXX	SNVT_count_f
Month	AI	24	AI	24	U16_XXX[045]	N10:045	nvoMonth_XXX	SNVT_count_f
Day	AI	25	AI	25	U16_XXX[046]	N10:046	nvoDay_XXX	SNVT_count_f
Hours	AI	26	AI	26	U16_XXX[047]	N10:047	nvoHours_XXX	SNVT_count_f

Min	AI	27	AI	27	U16_XXX[048]	N10:048	nvoMin_XXX	SNVT_count_f
Sec	AI	28	AI	28	U16_XXX[049]	N10:049	nvoSec_XXX	SNVT_count_f
Peak Demand	AI	29	AI	29	Flt_XXX[022]	F11:022	nvoPeakDmd_XXX	SNVT_count_f
Demand Last Hour	AI	30	AI	30	Flt_XXX[023]	F11:023	nvoDmdLastHr_XXX	SNVT_count_f
Viscosity	AI	31	AI	31	Flt_XXX[024]	F11:024	nvoViscosity_XXX	SNVT_count_f
Absolute Viscosity	AI	32	AI	32	Flt_XXX[025]	F11:025	nvoAbsVisc_XXX	SNVT_count_f
Relative Humidity	AI	33	AI	33	Flt_XXX[026]	F11:026	nvoRelHum_XXX	SNVT_count_f
Power Loss Hour	AI	34	AI	34	Flt_XXX[060]	F11:060	nvoPwrLossHr_XXX	SNVT_count_f
Power Loss Min	AI	35	AI	35	Flt_XXX[061]	F11:061	nvoPwrLossMn_XXX	SNVT_count_f
Time base	AI	36	AI	36	U16_XXX[076]	N10:076	nvoTimebase_XXX	SNVT_count_f
Heat Flow Units	AI	37	AI	37	U16_XXX[077]	N10:077	nvoHtFloUnt_XXX	SNVT_count_f
Mass Flow Units	AI	38	AI	38	U16_XXX[078]	N10:078	nvoMasFlUnt_XXX	SNVT_count_f
STD Flow Units	AI	39	AI	39	U16_XXX[079]	N10:079	nvoSTDFlUnt_XXX	SNVT_count_f
Vol Flow Units	AI	40	AI	40	U16_XXX[080]	N10:080	nvoVolFlUnt_XXX	SNVT_count_f
Temperature Units	AI	41	AI	41	U16_XXX[081]	N10:081	nvoTmpUnits_XXX	SNVT_count_f
Pressure Units	AI	42	AI	42	U16_XXX[082]	N10:082	nvoPrsUnits_XXX	SNVT_count_f
Density Units	AI	43	AI	43	U16_XXX[083]	N10:083	nvoDensUnt_XXX	SNVT_count_f
Heat Total Units	AI	44	AI	44	U16_XXX[084]	N10:084	nvoHtTotUnt_XXX	SNVT_count_f
Mass Total Units	AI	45	AI	45	U16_XXX[085]	N10:085	nvoMasTotUnt_XXX	SNVT_count_f
STD Total Units	AI	46	AI	46	U16_XXX[086]	N10:086	nvoSTDTotUnt_XXX	SNVT_count_f
Vol Total Units	AI	47	AI	47	U16_XXX[087]	N10:087	nvoVolTotUnt_XXX	SNVT_count_f
Definition of Barrel	AI	48	AI	48	U16_XXX[088]	N10:088	nvoDefBarrel_XXX	SNVT_count_f
Specific Enthalpy Units	AI	49	AI	49	U16_XXX[089]	N10:089	nvoSpEnthUnt_XXX	SNVT_count_f
Length Units	AI	50	AI	50	U16_XXX[090]	N10:090	nvoLengthUnt_XXX	SNVT_count_f
Calibration trail	AI	51	AI	51	U16_XXX[091]	N10:091	nvoCalTrail_XXX	SNVT_count_f
Configuration trail	AI	52	AI	52	U16_XXX[092]	N10:092	nvoCfgTrail_XXX	SNVT_count_f
Tag Number	AI	53	AI	53	U16_XXX[093]	N10:093	nvoTagNumber_XXX	SNVT_count_f
Peak Year	AI	54	AI	54	U16_XXX[094]	N10:094	nvoPeakYear_XXX	SNVT_count_f
Peak Month	AI	55	AI	55	U16_XXX[095]	N10:095	nvoPeakMonth_XXX	SNVT_count_f
Peak Day	AI	56	AI	56	U16_XXX[096]	N10:096	nvoPeakDay_XXX	SNVT_count_f
Peak Hours	AI	57	AI	57	U16_XXX[097]	N10:097	nvoPeakHours_XXX	SNVT_count_f
Peak Min	AI	58	AI	58	U16_XXX[098]	N10:098	nvoPeakMin_XXX	SNVT_count_f
Sys Alm Power Failure	BI	1	DI	1	Bit_XXX[000]	B12:000	nvoAlmPwrFl_XXX	SNVT_switch
Sys Alm Watchdog	BI	2	DI	2	Bit_XXX[001]	B12:001	nvoAlmWtchdg_XXX	SNVT_switch
Sys Alm Communication Error	BI	3	DI	3	Bit_XXX[002]	B12:002	nvoAlmComErr_XXX	SNVT_switch

Sys Alm Calibration Error	BI	4	DI	4	Bit_XXX[003]	B12:003	nvoAlmCalErr_XXX	SNVT_switch
Sys Alm Print Buffer Full	BI	5	DI	5	Bit_XXX[004]	B12:004	nvoAlmPrBfFl_XXX	SNVT_switch
Sys Alm Totalizer Error	BI	6	DI	6	Bit_XXX[005]	B12:005	nvoAlmTotErr_XXX	SNVT_switch
Sens/Proc Alm Wet Steam Alm	BI	7	DI	7	Bit_XXX[006]	B12:006	nvoAlWtStmAl_XXX	SNVT_switch
Sens/Proc Alm Off Fluid Table	BI	8	DI	8	Bit_XXX[007]	B12:007	nvoAlOfFlTbl_XXX	SNVT_switch
Sens/Proc Alm Flow In Over Range	BI	9	DI	9	Bit_XXX[008]	B12:008	nvoAlFlInOvr_XXX	SNVT_switch
Sens/Proc Alm Input 1 Over Range	BI	10	DI	10	Bit_XXX[009]	B12:009	nvoAlIn1Ovr_XXX	SNVT_switch
Sens/Proc Alm Input 2 Over Range	BI	11	DI	11	Bit_XXX[010]	B12:010	nvoAlIn2Ovr_XXX	SNVT_switch
Sens/Proc Alm Flow Loop Broken	BI	12	DI	12	Bit_XXX[011]	B12:011	nvoAlFlLpBrk_XXX	SNVT_switch
Sens/Proc Alm Loop 1 Broken	BI	13	DI	13	Bit_XXX[012]	B12:012	nvoAlL1Brkn_XXX	SNVT_switch
Sens/Proc Alm Loop 2 Broken	BI	14	DI	14	Bit_XXX[013]	B12:013	nvoAlL2Brkn_XXX	SNVT_switch
Sens/Proc Alm RTD 1 Open	BI	15	DI	15	Bit_XXX[014]	B12:014	nvoAlRTD1Opn_XXX	SNVT_switch
Sens/Proc Alm RTD 1 Short	BI	16	DI	16	Bit_XXX[015]	B12:015	nvoAlRTD1Sht_XXX	SNVT_switch
Sens/Proc Alm RTD 2 Open	BI	17	DI	17	Bit_XXX[016]	B12:016	nvoAlRTD2Opn_XXX	SNVT_switch
Sens/Proc Alm RTD 2 Short	BI	18	DI	18	Bit_XXX[017]	B12:017	nvoAlRTD2Sht_XXX	SNVT_switch
Sens/Proc Alm Pulse Out Overrun	BI	19	DI	19	Bit_XXX[018]	B12:018	nvoAlPlsOtOv_XXX	SNVT_switch
Sens/Proc Alm Iout 1 Out Of Range	BI	20	DI	20	Bit_XXX[019]	B12:019	nvoAlI1OutRg_XXX	SNVT_switch
Sens/Proc Alm Iout 2 Out Of Range	BI	21	DI	21	Bit_XXX[020]	B12:020	nvoAlI2OutRg_XXX	SNVT_switch
Sens/Proc Alm Relay 1 Hi Alm	BI	22	DI	22	Bit_XXX[021]	B12:021	nvoAlRl1HiAl_XXX	SNVT_switch
Sens/Proc Alm Relay 1 Lo Alm	BI	23	DI	23	Bit_XXX[022]	B12:022	nvoAlRl1LoAl_XXX	SNVT_switch
Sens/Proc Alm Relay 2 Hi Alm	BI	24	DI	24	Bit_XXX[023]	B12:023	nvoAlRl2HiAl_XXX	SNVT_switch
Sens/Proc Alm Relay 2 Lo Alm	BI	25	DI	25	Bit_XXX[024]	B12:024	nvoAlRl2LoAl_XXX	SNVT_switch
Sens/Proc Alm Relay 3 Hi Alm	BI	26	DI	26	Bit_XXX[025]	B12:025	nvoAlRl3HiAl_XXX	SNVT_switch
Sens/Proc Alm Relay 3 Lo Alm	BI	27	DI	27	Bit_XXX[026]	B12:026	nvoAlRl3LoAl_XXX	SNVT_switch
Srvc Test 24Vdc Out Error	BI	28	DI	28	Bit_XXX[027]	B12:027	nvo24VDCErr_XXX	SNVT_switch
Srvc Test Pulse In Error	BI	29	DI	29	Bit_XXX[028]	B12:028	nvoPlseInErr_XXX	SNVT_switch
Srvc Test Input 1 Vin Error	BI	30	DI	30	Bit_XXX[029]	B12:029	nvoIn1VinErr_XXX	SNVT_switch
Srvc Test Input 1 Iin Error	BI	31	DI	31	Bit_XXX[030]	B12:030	nvoIn1IinErr_XXX	SNVT_switch
Srvc Test Input 2 Iin Error	BI	32	DI	32	Bit_XXX[031]	B12:031	nvoIn2IinErr_XXX	SNVT_switch
Srvc Test Input 2 RTD Error	BI	33	DI	33	Bit_XXX[032]	B12:032	nvoIn2RTDErr_XXX	SNVT_switch
Srvc Test Input 3 Iin Error	BI	34	DI	34	Bit_XXX[033]	B12:033	nvoIn3IinErr_XXX	SNVT_switch
Srvc Test Input 3 RTD Error	BI	35	DI	35	Bit_XXX[034]	B12:034	nvoIn3RTDErr_XXX	SNVT_switch
Srvc Test Pulse Out Error	BI	36	DI	36	Bit_XXX[035]	B12:035	nvoPlsOutErr_XXX	SNVT_switch
Srvc Test Iout 1 Error	BI	37	DI	37	Bit_XXX[036]	B12:036	nvoIout1Err_XXX	SNVT_switch
Srvc Test Iout 2 Error	BI	38	DI	38	Bit_XXX[037]	B12:037	nvoIout2Err_XXX	SNVT_switch

Srvc Test Relay 1 Error	BI	39	DI	39	Bit_XXX[038]	B12:038	nvoRelay1Err_XXX	SNVT_switch
Srvc Test Relay 2 Error	BI	40	DI	40	Bit_XXX[039]	B12:039	nvoRelay2Err_XXX	SNVT_switch
Srvc Test RS-232 Error	BI	41	DI	41	Bit_XXX[040]	B12:040	nvoRS232Err_XXX	SNVT_switch
Self Test A/D Malfunction	BI	42	DI	42	Bit_XXX[041]	B12:041	nvoADMalfnct_XXX	SNVT_switch
Self Test Program Error	BI	43	DI	43	Bit_XXX[042]	B12:042	nvoPrgrmErr_XXX	SNVT_switch
Self Test Setup Data Lost	BI	44	DI	44	Bit_XXX[043]	B12:043	nvoStupDtLst_XXX	SNVT_switch
Self Test Time Clock Lost	BI	45	DI	45	Bit_XXX[044]	B12:044	nvoTmClkLst_XXX	SNVT_switch
Self Test Display Malfunction	BI	46	DI	46	Bit_XXX[045]	B12:045	nvoDsplMalfn_XXX	SNVT_switch
Self Test Ram Malfunction	BI	47	DI	47	Bit_XXX[046]	B12:046	nvoRAMMalfnc_XXX	SNVT_switch
Language Select	BV	48	DO	48	Bit_XXX[047]	B12:047	nviLangSel_XXX	SNVT_switch
Reset Totalizers	BV	49	DO	49	Bit_XXX[048]	B12:048	nviResTot_XXX	SNVT_switch
Reset All Error Codes	BV	50	DO	50	Bit_XXX[049]	B12:049	nviResErrCod_XXX	SNVT_switch
Reset Alm 1	BV	51	DO	51	Bit_XXX[050]	B12:050	nviResAlm1_XXX	SNVT_switch
Reset Alm 2	BV	52	DO	52	Bit_XXX[051]	B12:051	nviResAlm2_XXX	SNVT_switch
Reset Alm 3	BV	53	DO	53	Bit_XXX[052]	B12:052	nviResAlm3_XXX	SNVT_switch
Print Transaction Document	BV	54	DO	54	Bit_XXX[053]	B12:053	nviPrtTrnDoc_XXX	SNVT_switch
Reset Peak Demand	BV	55	DO	55	Bit_XXX[054]	B12:054	nviResPkDmd_XXX	SNVT_switch
Reset Accumulated Power Loss	BV	56	DO	56	Bit_XXX[055]	B12:055	nviResAcPrLs_XXX	SNVT_switch
Aux. Status Input	BI	57	DI	57	Bit_XXX[056]	B12:056	nvoAuxStInp_XXX	SNVT_switch
Flowmeter Location	BI	58	DI	58	Bit_XXX[062]	B12:062	nvoFloMtrLoc_XXX	SNVT_switch

Appendix B.2. SUPERtrol_I Modbus RTU Mappings to BACnet, Metasys N2, EtherNet/IP, DF1, Modbus TCP/IP and LonWorks

Point Name	BACnet Object Type	BACnet Object ID	Metasys N2 Data Type	Metasys N2 Address	EIP Tag Name	DF1 Address	LonWorks Name	LonWorks SNVT
Volume Flow	AI	1	AI	1	Flt_XXX[000]	F11:000	nvoVolFlow_XXX	SNVT_count_f
CorVol or Mass Flow	AI	2	AI	2	Flt_XXX[001]	F11:001	nvoCorVol_XXX	SNVT_count_f
Total	AI	3	AI	3	Flt_XXX[002]	F11:002	nvoTotal_XXX	SNVT_count_f
Grand Total	AI	4	AI	4	Flt_XXX[003]	F11:003	nvoGrndTot_XXX	SNVT_count_f
Temperature	AI	5	AI	5	Flt_XXX[004]	F11:004	nvoTemp_XXX	SNVT_count_f
Density	AI	6	AI	6	Flt_XXX[005]	F11:005	nvoDensity_XXX	SNVT_count_f
Preset 1	AV	7	AO	7	Flt_XXX[006]	F11:006	nviPreset1_XXX	SNVT_count_f
Preset 2	AV	8	AO	8	Flt_XXX[007]	F11:007	nviPreset2_XXX	SNVT_count_f
Preset 3	AV	9	AO	9	Flt_XXX[008]	F11:008	nviPreset3_XXX	SNVT_count_f

Preset 4	AV	10	AO	10	Flt_XXX[009]	F11:009	nviPreset4_XXX	SNVT_count_f
Year	AI	11	AI	11	U16_XXX[020]	N10:020	nvoYear_XXX	SNVT_count_f
Month	AI	12	AI	12	U16_XXX[021]	N10:021	nvoMonth_XXX	SNVT_count_f
Day	AI	13	AI	13	U16_XXX[022]	N10:022	nvoDay_XXX	SNVT_count_f
Hours	AI	14	AI	14	U16_XXX[023]	N10:023	nvoHours_XXX	SNVT_count_f
Minutes	AI	15	AI	15	U16_XXX[024]	N10:024	nvoMinutes_XXX	SNVT_count_f
Seconds	AI	16	AI	16	U16_XXX[025]	N10:025	nvoSeconds_XXX	SNVT_count_f
Viscosity	AI	17	AI	17	Flt_XXX[010]	F11:010	nvoViscosity_XXX	SNVT_count_f
Transaction Number	AI	18	AI	18	U16_XXX[028]	N10:028	nvoTransNum_XXX	SNVT_count_f
Fluid Number	AV	19	AO	19	U16_XXX[044]	N10:044	nviFluidNum_XXX	SNVT_count_f
Error-Pulse Out Overflow	BI	1	DI	1	Bit_XXX[000]	B12:000	nvoPlsOutOvr_XXX	SNVT_switch
Alarm-Flow Rate Alarm Low	BI	2	DI	2	Bit_XXX[001]	B12:001	nvoFlRtAlmLo_XXX	SNVT_switch
Alarm-Flow Rate Alarm High	BI	3	DI	3	Bit_XXX[002]	B12:002	nvoFlRtAlmHi_XXX	SNVT_switch
Alarm-Temp Alarm Low	BI	4	DI	4	Bit_XXX[003]	B12:003	nvoTempAlmLo_XXX	SNVT_switch
Alarm-Temp Alarm High	BI	5	DI	5	Bit_XXX[004]	B12:004	nvoTempAlmHi_XXX	SNVT_switch
Alarm-Density Alarm Low	BI	6	DI	6	Bit_XXX[005]	B12:005	nvoDensAlmLo_XXX	SNVT_switch
Alarm-Density Alarm High	BI	7	DI	7	Bit_XXX[006]	B12:006	nvoDensAlmHi_XXX	SNVT_switch
Alarm-Batch Overrun Alarm	BI	8	DI	8	Bit_XXX[013]	B12:013	nvoBtcOvrAlm_XXX	SNVT_switch
Error-Software Error Reset	BI	9	DI	9	Bit_XXX[014]	B12:014	nvoSwErrRes_XXX	SNVT_switch
Error-Extended PFI Lockup	BI	10	DI	10	Bit_XXX[015]	B12:015	nvoExPFILck_XXX	SNVT_switch
Error-Cal Checksum Error	BI	11	DI	11	Bit_XXX[018]	B12:018	nvoCalChkErr_XXX	SNVT_switch
Error-Modem Not Found	BI	12	DI	12	Bit_XXX[019]	B12:019	nvoModmNtFnd_XXX	SNVT_switch
Error-Setup Checksum Error	BI	13	DI	13	Bit_XXX[020]	B12:020	nvoSetChkErr_XXX	SNVT_switch
Error-Rate Overflow Error	BI	14	DI	14	Bit_XXX[021]	B12:021	nvoRtOvrfErr_XXX	SNVT_switch
Error-A to D Not Converting	BI	15	DI	15	Bit_XXX[022]	B12:022	nvoAtDNtCnv_XXX	SNVT_switch
Error-Aux Input Too Low	BI	16	DI	16	Bit_XXX[023]	B12:023	nvoAuxIn2Lo_XXX	SNVT_switch
Error-Aux Input Too High	BI	17	DI	17	Bit_XXX[024]	B12:024	nvoAuxIn2Hi_XXX	SNVT_switch
Error-Flow Input Too Low	BI	18	DI	18	Bit_XXX[025]	B12:025	nvoFloIn2Lo_XXX	SNVT_switch
Error-Flow Input Too High	BI	19	DI	19	Bit_XXX[026]	B12:026	nvoFloIn2Hi_XXX	SNVT_switch
Error-Pulse Security Error	BI	20	DI	20	Bit_XXX[027]	B12:027	nvoPlsSecErr_XXX	SNVT_switch
Error-RTD Out Of Range	BI	21	DI	21	Bit_XXX[028]	B12:028	nvoRTDOutRng_XXX	SNVT_switch
Warning-Battery Low Warning	BI	22	DI	22	Bit_XXX[029]	B12:029	nvoBatLoWarn_XXX	SNVT_switch
Error-Time Clock Error	BI	23	DI	23	Bit_XXX[030]	B12:030	nvoTmeClkErr_XXX	SNVT_switch
Warning-Totalizer Rollover	BI	24	DI	24	Bit_XXX[031]	B12:031	nvoTotRllOvr_XXX	SNVT_switch
Command-Reset Total	BV	25	DO	25	Bit_XXX[032]	B12:032	nviResetTot_XXX	SNVT_switch

Command-Reset Errors	BV	26	DO	26	Bit_XXX[033]	B12:033	nviResetErr_XXX	SNVT_switch
Command-Print Command	BV	27	DO	27	Bit_XXX[034]	B12:034	nviPrintCmd_XXX	SNVT_switch
Status-Instr Type Rate/Total or Batch	BI	28	DI	28	Bit_XXX[035]	B12:035	nvoInstTypRt_XXX	SNVT_switch
Command-Start Batch Command	BV	29	DO	29	Bit_XXX[036]	B12:036	nviSttBtcCmd_XXX	SNVT_switch
Command-Stop Batch Command	BV	30	DO	30	Bit_XXX[037]	B12:037	nviStpBtcCmd_XXX	SNVT_switch
Command-Clear Batch Command	BV	31	DO	31	Bit_XXX[038]	B12:038	nviClrBtcCmd_XXX	SNVT_switch
Status-Batch Filling Status	BI	32	DI	32	Bit_XXX[039]	B12:039	nvoBtcFillSt_XXX	SNVT_switch
Status-Batch Stopped Status	BI	33	DI	33	Bit_XXX[040]	B12:040	nvoBtcStpSt_XXX	SNVT_switch
Status-Batch Idle Status	BI	34	DI	34	Bit_XXX[041]	B12:041	nvoBtcIdlSt_XXX	SNVT_switch
Command-Relay 1 Command	BV	35	DO	35	Bit_XXX[042]	B12:042	nviRel1Cmd_XXX	SNVT_switch
Command-Relay 2 Command	BV	36	DO	36	Bit_XXX[043]	B12:043	nviRel2Cmd_XXX	SNVT_switch
Command-Relay 3 Command	BV	37	DO	37	Bit_XXX[044]	B12:044	nviRel3Cmd_XXX	SNVT_switch
Command-Relay 4 Command	BV	38	DO	38	Bit_XXX[045]	B12:045	nviRel4Cmd_XXX	SNVT_switch
Status-Relay 1 Status	BI	39	DI	39	Bit_XXX[046]	B12:046	nvoRel1Stat_XXX	SNVT_switch
Status-Relay 2 Status	BI	40	DI	40	Bit_XXX[047]	B12:047	nvoRel2Stat_XXX	SNVT_switch
Status-Relay 3 Status	BI	41	DI	41	Bit_XXX[048]	B12:048	nvoRel3Stat_XXX	SNVT_switch
Status-Relay 4 Status	BI	42	DI	42	Bit_XXX[049]	B12:049	nvoRel4Stat_XXX	SNVT_switch
Status-Control 1 Status	BI	43	DI	43	Bit_XXX[050]	B12:050	nvoCtrl1Stat_XXX	SNVT_switch
Status-Control 2 Status	BI	44	DI	44	Bit_XXX[051]	B12:051	nvoCtrl2Stat_XXX	SNVT_switch
Status-Control 3 Status	BI	45	DI	45	Bit_XXX[052]	B12:052	nvoCtrl3Stat_XXX	SNVT_switch

Appendix B.3. LEVELtrol_II Modbus RTU Mappings to BACnet, Metasys N2, EtherNet/IP, DF1, Modbus TCP/IP and LonWorks

Point Name	BACnet Object Type	BACnet Object ID	Metasys N2 Data Type	Metasys N2 Address	EIP Tag Name	DF1 Address	LonWorks Name	LonWorks SNVT
Level	AI	1	AI	1	Flt_XXX[000]	F11:000	nvoLevel_XXX	SNVT_count_f
Total	AI	2	AI	2	Flt_XXX[002]	F11:002	nvoTotal_XXX	SNVT_count_f
Grand Total	AI	3	AI	3	Flt_XXX[003]	F11:003	nvoGrandTot_XXX	SNVT_count_f
Temperature	AI	4	AI	4	Flt_XXX[004]	F11:004	nvoTemp_XXX	SNVT_count_f
Density	AI	5	AI	5	Flt_XXX[005]	F11:005	nvoDensity_XXX	SNVT_count_f
Preset 1	AV	6	AO	6	Flt_XXX[006]	F11:006	nviPreset1_XXX	SNVT_count_f
Preset 2	AV	7	AO	7	Flt_XXX[007]	F11:007	nviPreset2_XXX	SNVT_count_f
Preset 3	AV	8	AO	8	Flt_XXX[008]	F11:008	nviPreset3_XXX	SNVT_count_f

Preset 4	AV	9	AO	9	Flt_XXX[009]	F11:009	nviPreset4_XXX	SNVT_count_f
Year	AI	10	AI	10	U16_XXX[020]	N10:020	nvoYear_XXX	SNVT_count_f
Month	AI	11	AI	11	U16_XXX[021]	N10:021	nvoMonth_XXX	SNVT_count_f
Day	AI	12	AI	12	U16_XXX[022]	N10:022	nvoDay_XXX	SNVT_count_f
Hours	AI	13	AI	13	U16_XXX[023]	N10:023	nvoHours_XXX	SNVT_count_f
Minutes	AI	14	AI	14	U16_XXX[024]	N10:024	nvoMinutes_XXX	SNVT_count_f
Seconds	AI	15	AI	15	U16_XXX[025]	N10:025	nvoSeconds_XXX	SNVT_count_f
Transaction Number	AI	16	AI	16	U16_XXX[028]	N10:028	nvoTransNum_XXX	SNVT_count_f
Error-Pulse Out Overflow	BI	1	DI	1	Bit_XXX[000]	B12:000	nvoPlsOutOvr_XXX	SNVT_switch
Error-A to D Not Converting	BI	2	DI	2	Bit_XXX[022]	B12:022	nvoAtDNtConv_XXX	SNVT_switch
Error-Aux Input Too Low	BI	3	DI	3	Bit_XXX[023]	B12:023	nvoAuxIn2Lo_XXX	SNVT_switch
Error-Aux Input Too High	BI	4	DI	4	Bit_XXX[024]	B12:024	nvoAuxIn2Hi_XXX	SNVT_switch
Error-Level Input Too Low	BI	5	DI	5	Bit_XXX[025]	B12:025	nvoLvlIn2Lo_XXX	SNVT_switch
Error-Level Input Too High	BI	6	DI	6	Bit_XXX[026]	B12:026	nvoLvlIn2Hi_XXX	SNVT_switch
Error-RTD Out Of Range	BI	7	DI	7	Bit_XXX[028]	B12:028	nvoRTDOutRng_XXX	SNVT_switch
Warning-Battery Low Warning	BI	8	DI	8	Bit_XXX[029]	B12:029	nvoBattLoWrn_XXX	SNVT_switch
Command-Reset Errors	BV	9	DO	9	Bit_XXX[033]	B12:033	nviResErr_XXX	SNVT_switch
Command-Print Command	BV	10	DO	10	Bit_XXX[034]	B12:034	nviPrintCmd_XXX	SNVT_switch
Status-Instr Type Rate/Total or Batch	BI	11	DI	11	Bit_XXX[035]	B12:035	nvoInsTypRt_XXX	SNVT_switch
Command-Start Batch Command	BV	12	DO	12	Bit_XXX[036]	B12:036	nviSttBtcCmd_XXX	SNVT_switch
Command-Stop Batch Command	BV	13	DO	13	Bit_XXX[037]	B12:037	nviStpBtcCmd_XXX	SNVT_switch
Command-Clear Batch Command	BV	14	DO	14	Bit_XXX[038]	B12:038	nviClrBtcCmd_XXX	SNVT_switch
Status-Batch Filling Status	BI	15	DI	15	Bit_XXX[039]	B12:039	nvoBtcFillSt_XXX	SNVT_switch
Status-Batch Stopped Status	BI	16	DI	16	Bit_XXX[040]	B12:040	nvoBtcStopSt_XXX	SNVT_switch
Status-Batch Idle Status	BI	17	DI	17	Bit_XXX[041]	B12:041	nvoBtcIdleSt_XXX	SNVT_switch
Status-Relay 1 Status	BI	18	DI	18	Bit_XXX[046]	B12:046	nvoRel1Stat_XXX	SNVT_switch
Status-Relay 2 Status	BI	19	DI	19	Bit_XXX[047]	B12:047	nvoRel2Stat_XXX	SNVT_switch
Status-Relay 3 Status	BI	20	DI	20	Bit_XXX[048]	B12:048	nvoRel3Stat_XXX	SNVT_switch
Status-Relay 4 Status	BI	21	DI	21	Bit_XXX[049]	B12:049	nvoRel4Stat_XXX	SNVT_switch
Status-Control 1 Status	BI	22	DI	22	Bit_XXX[050]	B12:050	nvoCtrl1Stat_XXX	SNVT_switch
Status-Control 2 Status	BI	23	DI	23	Bit_XXX[051]	B12:051	nvoCtrl2Stat_XXX	SNVT_switch
Status-Control 3 Status	BI	24	DI	24	Bit_XXX[052]	B12:052	nvoCtrl3Stat_XXX	SNVT_switch

Appendix C. "A" Bank DIP Switch Settings

Appendix C.1. "A" Bank DIP Switch Settings

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

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

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

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

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

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

Appendix D. Reference

Appendix D.1. Specifications

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

Figure 33: Specifications

Appendix D.1.1. Compliance with UL Regulations

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

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

Appendix E. Limited 2 Year Warranty

Sierra Monitor Corporation warrants its products to be free from defects in workmanship or material under normal use and service for two years after date of shipment. Sierra Monitor Corporation will repair or replace any equipment found to be defective during the warranty period. Final determination of the nature and responsibility for defective or damaged equipment will be made by Sierra Monitor Corporation personnel.

All warranties hereunder are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without Sierra Monitor Corporation's approval or which have been subjected to accident, improper maintenance, installation or application, or on which original identification marks have been removed or altered. This Limited Warranty also will not apply to interconnecting cables or wires, consumables or to any damage resulting from battery leakage.

In all cases Sierra Monitor Corporation's responsibility and liability under this warranty shall be limited to the cost of the equipment. The purchaser must obtain shipping instructions for the prepaid return of any item under this warranty provision and compliance with such instruction shall be a condition of this warranty.

Except for the express warranty stated above, Sierra Monitor Corporation disclaims all warranties with regard to the products sold hereunder including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of Sierra Monitor Corporation for damages including, but not limited to, consequential damages arising out of/or in connection with the use or performance of the product.