PFC 2000-4000
Universal Gateway
Instruction Manual

January 18th, 2023 Revision 1

PeerlessBoilers.com

Contents

Application

The Universal Gateway (ProtoNode) provides monitoring, remote setpoint, firing rate and burner on/off control to the Energy Management Systems/ Building Automation System/ Building Management System (EMS). It supports the following controllers:

- PFC 2000-4000 with Honeywell Display & Sola Control (4716 software)

There are two ProtoNode Options:

BACnet ProtoNode: Provides BACnet MS/TP, BACnet/IP, N2, Modbus TCP communications.

LonWorks ProtoNode: Provides Lonworks communication.

Intent

This document provides the necessary information to facilitate Gateway installation. This Instruction Manual includes practical, installation and setup detailed information. The intended users are contractors and factory support personnel.

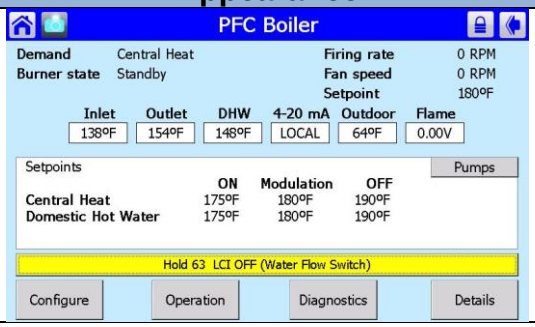
FPC-N34-0816
BACnet-ProtoNodes

FPC-N35-0817
Lonworks-ProtoNodes

Revision Notes

Rev. 1	Manual created for use with PFC 2000-4000 series

Legend

Application	Appearance
PFC 2000-4000 with Honeywell Display & Sola Control **4716 Software.**	

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1 INTRODUCTION

Universal Gateway (ProtoNode) is an external, high performance Energy Management System (EMS) multi-protocol gateway that uses the **FieldServer ProtoNode Technology**. The ProtoNode can support multiple Boilers. It has been pre-programmed to Auto-Discover any Sola Control (4109 or 4716 software) equipped boilers connected to the ProtoNode and automatically configures them for BACnet®[1]MS/TP, BACnet/IP, Metasys®[2] N2 by JCI, Modbus TCP **or** LonWorks®[3]. It is not necessary to download any configuration files to support the required applications.

1.1 BTL Mark – BACnet Testing Laboratory

The BTL Mark on the Gateway is a symbol that indicates to a consumer 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.

1.2 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.

[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 SETUP

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

Model	Part Number
ProtoNode RER - BACnet	FPC-N34-0816
ProtoNode LER - Lonworks	FPC-N35-0817

2.1 Boiler Setup

2.1.1 Settings for PFC Boilers with Honeywell Display

On PFC Boilers with Honeywell Displays enable EMS communication on COM2 port and assign a unique COM1 Port Address for each boiler connected to the ProtoNode.

1. To enable the COM2 port, from the Home screen press Setup > Display Setup > COM2 tab.
2. Press the check box for “Enable COM2 port”.
3. To change “COM1 Port Address”, from the Home screen press Setup > Control Setup.
4. Select “Change Address” and enter a number between 1 and 8. Then press OK.

Parameter	Selection
Protocol	Modbus
Modbus Address	Between 1 and 8
Baud Rate	38400 bps
Parity	None

5. To edit Baud Rate from the Home screen press Setup > Display Setup > COM2 tab.
6. Press the yellow rectangle next to “Modbus baud rate”, and select 38400 bps.

Refer to the Boiler’s instruction manual for password and menu navigation instructions.

2.2 ProtoNode Setup

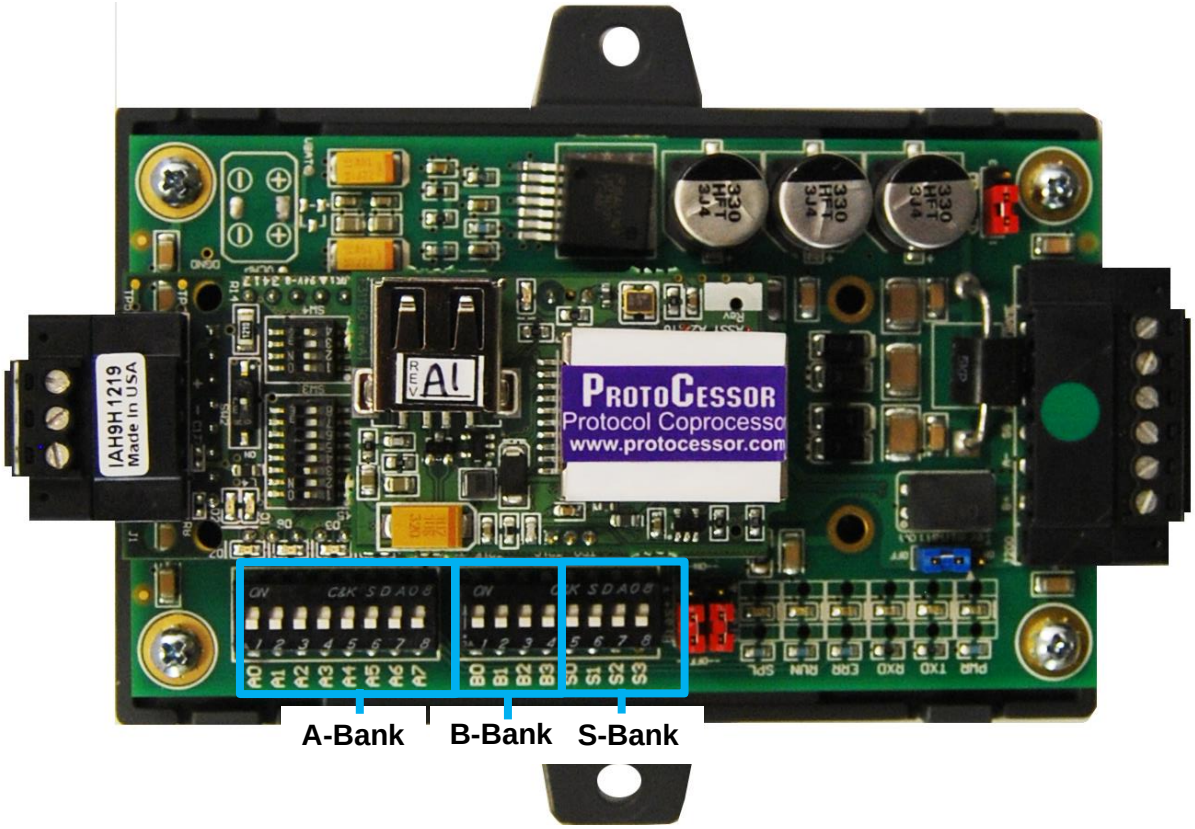


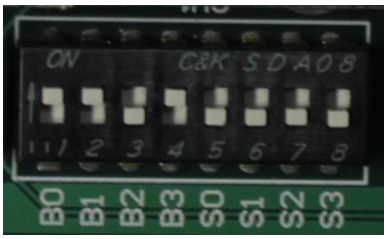
Figure 1: ProtoNode showing DIP switch "Banks" on bottom

2.2.1 Select EMS Protocol

Set Dipswitches to match Protocol of EMS. Remove ProtoNode cover and check protocol dip switch settings:

- The "S0 – S2" bank of DIP switches on the ProtoNode RER BACnet are used to select the various field protocols (BACnet MS/TP). See the chart below for the DIP switch settings.
- The "S0 – S2" bank of DIP switches on the ProtoNode LER LonWorks are disabled.
- "BACnet MS/TP (Multiple Node) is designed for MS/TP systems that are compatible with virtual nodes. The "Single Node" option is for MS/TP systems without this compatibility.

ProtoNode BACnet	S Bank DIP Switches		
Profile	**S0**	**S1**	**S2**
BACnet IP	Off	Off	Off
BACnet MS/TP (Multiple Node)	**On**	Off	Off
Metasys N2	Off	**On**	Off
Modbus TCP/IP	**On**	**On**	Off
BACnet MS/TP (Single Node)	Off	Off	**On**

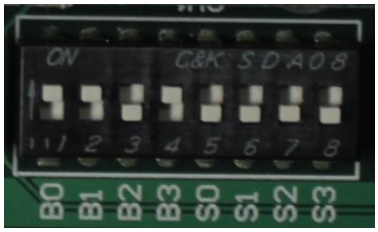


2.2.2 Enable Auto-Discovery

The following table describes “S3” DIP Switch setting for the Enabling Auto-Discovering of known devices attached to the ProtoNode RER or LER.

- Power down ProtoNode.
- Ensure all boilers are powered and connected to the ProtoNode.
- Set “S3” DIP switch to “On” position and power the ProtoNode to Auto-Discover Boilers. It will take 3 minutes to discover all Modbus RTU devices attached to the ProtoNode.
- Once the ProtoNode has discovered all of the Modbus RTU devices, set the S3 DIP switch to the OFF position to save the recently built configuration.

ProtoNode BACnet & Lonworks	
S3 DIP Switch Auto-Discovery Mode	**S3**
Auto-Discovery ON – Build New Configuration	**On**
Auto-Discover OFF – Load Current Configuration	Off



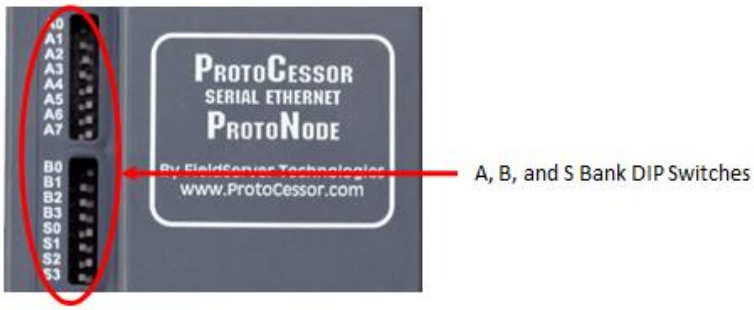
NOTE: Initial Auto Discovery Cycle

All boilers **MUST** be **POWERED** and **CONNECTED** to the ProtoNode before cycling power to the ProtoNode. The ProtoNode will auto discover only connected boilers. If a boiler is connected after the ProtoNode has completed auto discovery it will not “find” the new boiler.

2.2.3 BACnet MS/TP Single Node and Multiple Node: Set MAC Address

- Only 1 MAC address is set for ProtoNode regardless of how many devices are connected to ProtoNode.

- Set ProtoNode MAC Address. (**Must be between 1 and 127**)



- Set DIP Switch (A0 – A7) for a MAC address between 1 and 127 which are Master addresses. (Appendix G shows settings)
- **Note: Never set a BACnet MS/TP MAC Address from 128 to 255.** Addresses between 128 and 255 are Slave address. BACnet Master Addresses pass tokens on the BACnet MS/TP network and can be Auto-Discovered by Energy Management System (EMS) front end systems that support Auto-Discovery. BACnet Slave Addresses cannot pass Tokens and will never be Auto-Discovered by EMS front end systems that support Auto-Discovery.

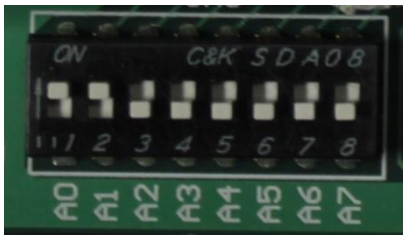


Figure 2: A0 – A7 DIP Switches (MAC address "3" is show)

- Please refer to Appendix D for the full range of addresses to set Node-ID/Device Instance.

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

2.2.4 BACnet MS/TP Single Node and Multiple Node: Set Serial Baud Rate

DIP Switches B0 – B3 are used to set the serial baud rate to match the baud rate provided by the Energy Management System.

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**

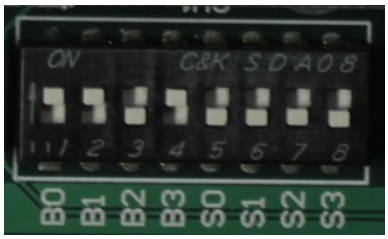


Figure 3: B0 – B3 DIP Switches (38400 Baud show*n)*

2.2.5 BACnet IP and BACnet MS/TP Multiple Node: Setting the Device Instance

The BACnet device instances will be set by the “Node Offset” + “Boiler Address” (Modbus RTU device).

The BACnet Device Instance can range from 1 to 4,194,303.

To assign specific Device Instance values, change the Node_Offset value.

- The Node_Offset value is currently set to 50000 in the configuration file
- Modbus address 1 would be assigned a device instance of 50001.
- Modbus address 2 would be assigned a device instance of 50002.
- Modbus address 3 would be assigned a device instance of 50003.

The device instance is calculated by: Device Instance = Node_Offset + Modbus Address

- The Node_Offset can be changed from 50000 to any number between 1 and 4,194,302 via the Web Configurator. (To use web configurator see section 4.3)

2.2.6 BACnet MS/TP Single Node: Setting the Device Instance

The BACnet single node instance will be set by the “Node Offset” + “MAC Address”. All registers from the devices connected to the ProtoNode will be listed under this single node instance. The registers are organized each devices “Modbus Address.”

To assign a specific single node instance value, change the Node_Offset or MAC address value.

- The Node_Offset value is currently set to 50000 in the configuration file
- MAC address 1 would be assigned a node instance of 50001.
- MAC address 2 would be assigned a node instance of 50002.

The Node_Offset can be changed from 50000 to any number between 1 and 4,194,302 via the Web Configurator. (To use web configurator see section 4.3)

Under this single node, the registers will be listed by their Modbus Address.

- Modbus address 1 will be listed sequentially as 1001, 1002, 1003…etc.
- Modbus address 2 will be listed sequentially as 2001, 2002, 2003…etc.

2.2.7 Metasys N2 & Modbus TCP/IP Setup

Metasys N2 & Modbus TCP/IP Device Address Setting

- The device addresses will be the same as the discovered Boilers’ Boiler Address (Modbus RTU devices) (1 through 8).

2.2.8 Commission the ProtoNode for Lonworks

This needs to be done by the LonWorks administrator use a LonWorks Commissioning tool. (See Section 4.7)

2.2.9 BACnet IP & Modbus TCP: Set IP Address

Run the ProtoNode web GUI utility program to change the IP address to match network. No changes to the configuration file are necessary. (See Section 4 for details on the Web Configurator)

3 WIRING

3.1 ProtoNode Overview

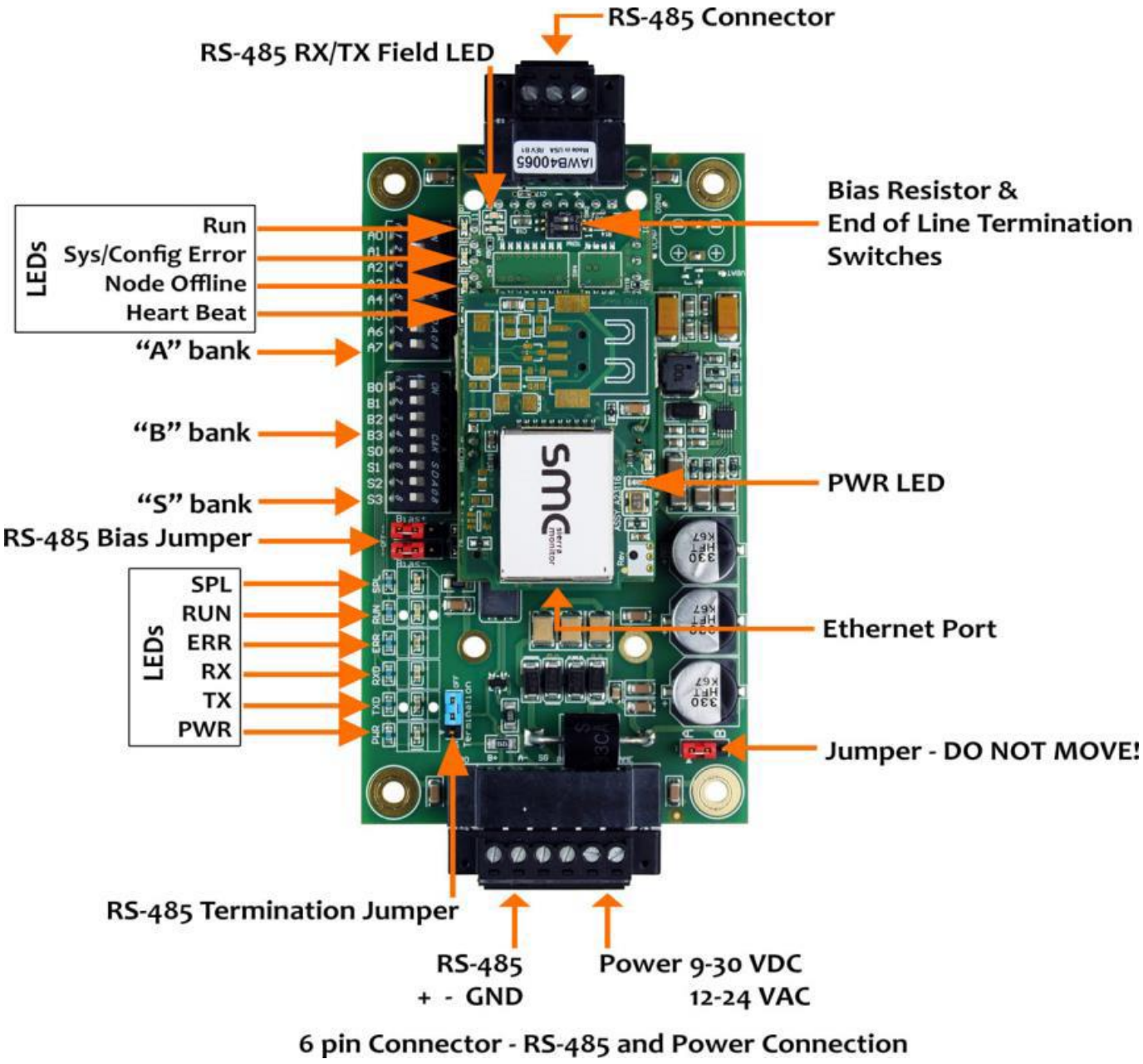


Figure 4: ProtoNode BACnet

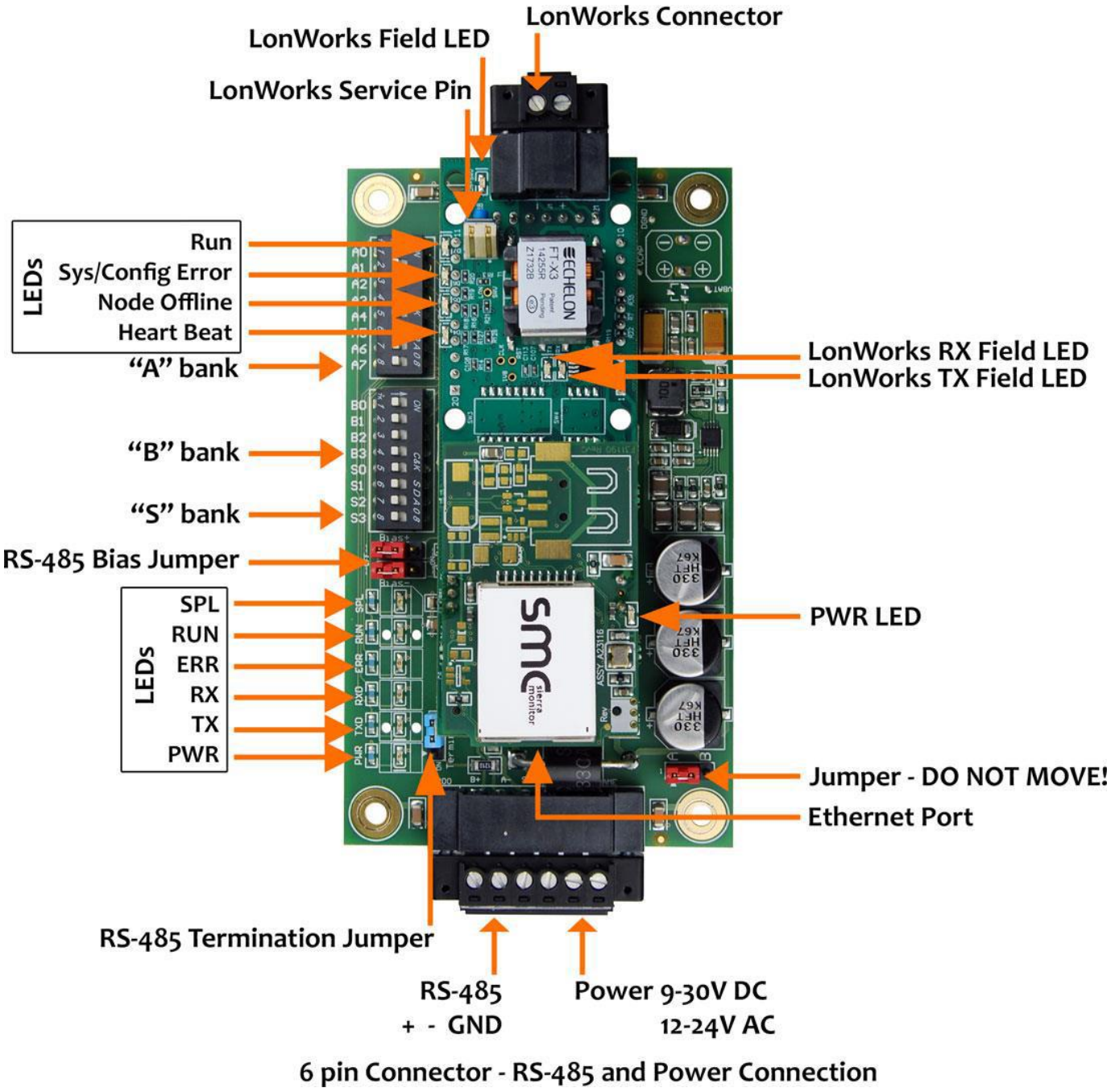
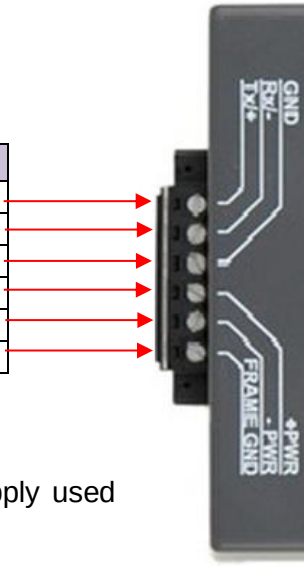


Figure 5: ProtoNode Lonworks

3.2 Wiring to the ProtoNode 6 Pin Connector

- The 6 pin connector is the same for ProtoNode BACnet and Lonwork
- Pins 1 through 3 are for Modbus RS-485 devices. The RS-485 GND (Pin 3) is not typically connected.
- Pins 4 through 6 are for power.

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	24 VAC +
Power In (-)	Pin 5	24 VAC -
Frame Ground	Pin 6	FRAME GND

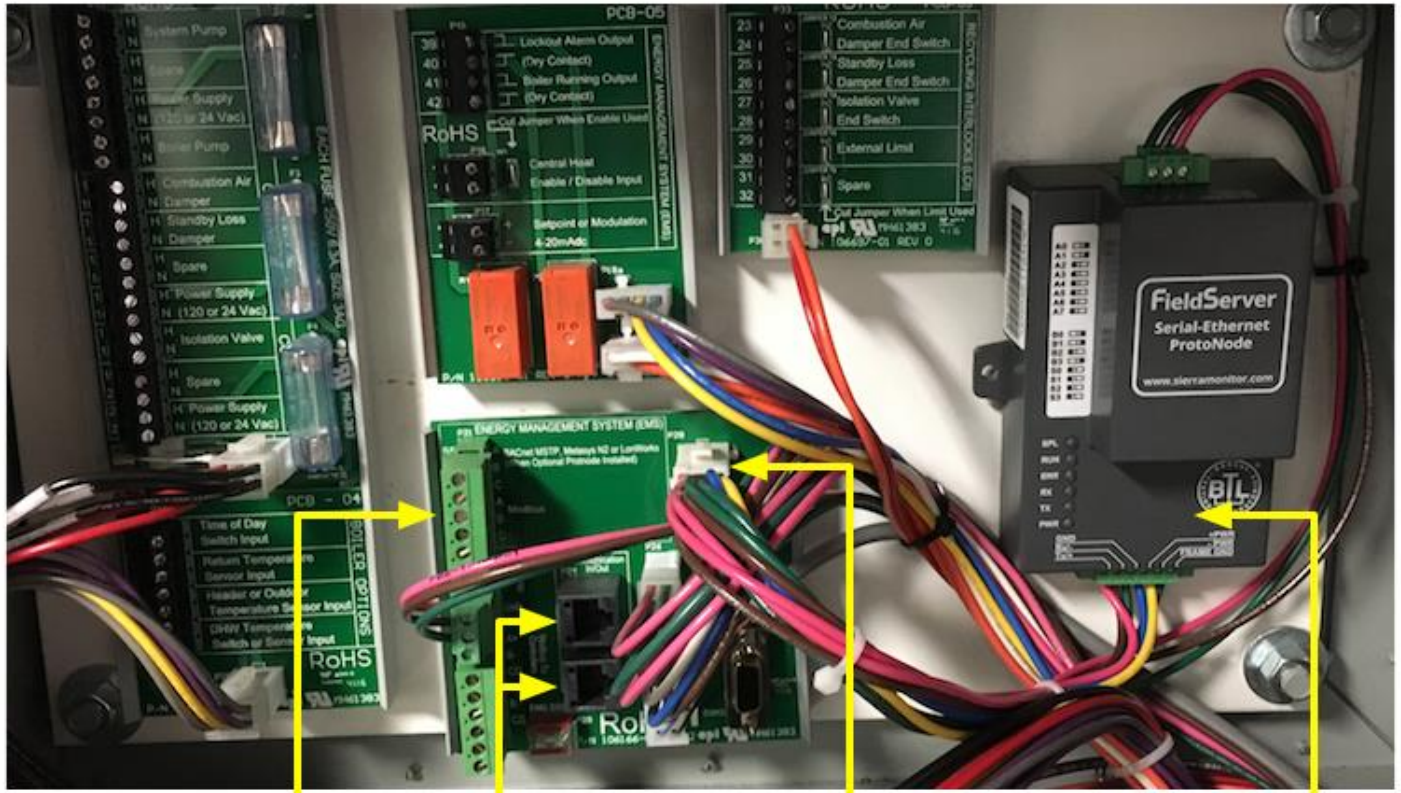


Apply power to ProtoNode as show below. Ensure that the power supply used complies with the specifications provided in Section 7.

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

Power Requirement for ProtoNode at 9V through 24 VAC	
	Current Draw Type
ProtoNode Family	24VAC
FPC – N34 – 0816 BACnet ProtoNode	140mA
FPC – N35 – 0817 Lonworks ProtoNode	130mA

3.3 PFC 2000 – 4000 with Honeywell Control: Network Wiring



IMPORTANT NOTES:

- PFC 2000-4000 with Honeywell Controls are able to do both Lead Lag (Sequencer) and EMS communication at the same time.

3.4 ProtoNode BACnet Wiring

Wiring the BACnet ProtoNode to the Network (RS-485 Field Protocol)

- Connection from ProtoNode RER to **BACnet MS/TP**, and **Metasys N2** network.
- See Section 4.2 for information on connecting the BACnet ProtoNode to a **BACnet IP** network.
- The Field Protocol can be connected to the 3-pin connector on ProtoNode RER as shown.

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

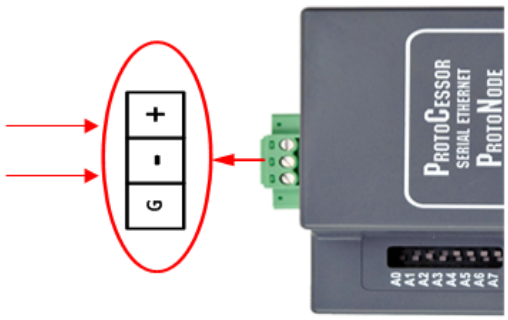


Figure 6: Connection from ProtoNode to RS-485 Field Protocol –BACnet MS/TP or Metasys N2.

- If the ProtoNode is the last device on the RS-485 trunk, then enable the End-of-line termination needs to be enabled. The default is off (switch position = right side).

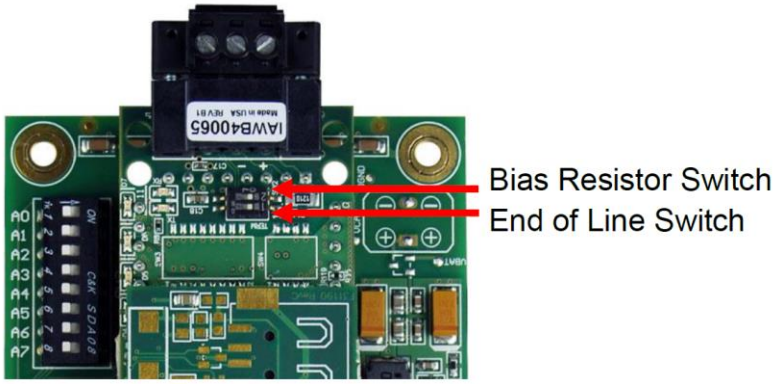


Figure 7: End-of-line termination on from ProtoNode to RS-485 Field Protocol –BACnet MS/TP or Metasys N2.

3.5 ProtoNode LonWorks Wiring

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

3.6 ProtoNobe IP Wiring

- Connect the ProtoNobe to the field IP Network at the Ethernet Port using a standard CAT5 Ethernet Cable.

Figure 9: Ethernet port location on the ProtoNode

4 COMMISSIONING

4.1 Use the ProtoNode Web Configurator to setup the Gateway

First, connect a standard CAT5 Ethernet cable (straight through or cross-over) between the local PC and ProtoNode.

There are two methods to access the ProtoNode via Ethernet connection, either by changing the subnet of the connected PC (Section 4.1.1) or using the FieldServer Toolbox to change the IP Address of the ProtoNode (Section 4.1.2).

4.1.1 Changing the Subnet of the Connected PC

The default IP Address of the ProtoNode is **192.168.1.24**, subnet mask is **255.255.255.0**. If the PC and the ProtoNode are on different IP Networks, assign a static IP Address to the PC on the 192.168.1.xxx network.

- For Windows 10:

  Go to 

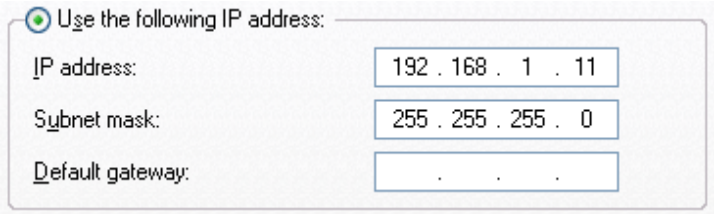
  Type “control panel”

  Then click 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

- Select: Use the following IP address



- Click OK twice

- For Windows 7:

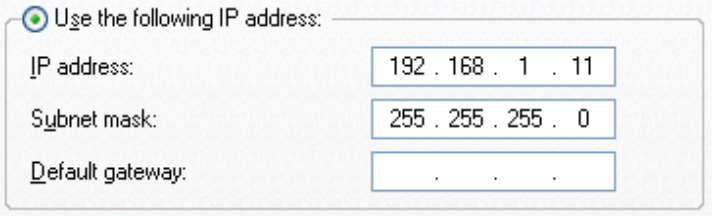
  Go to > Control Panel > Network and Internet > Network and Sharing Center > Change adapter settings

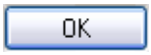
  Right-click on Local Area Connection > Properties

Highlight 

>

- Select: Use the following IP address

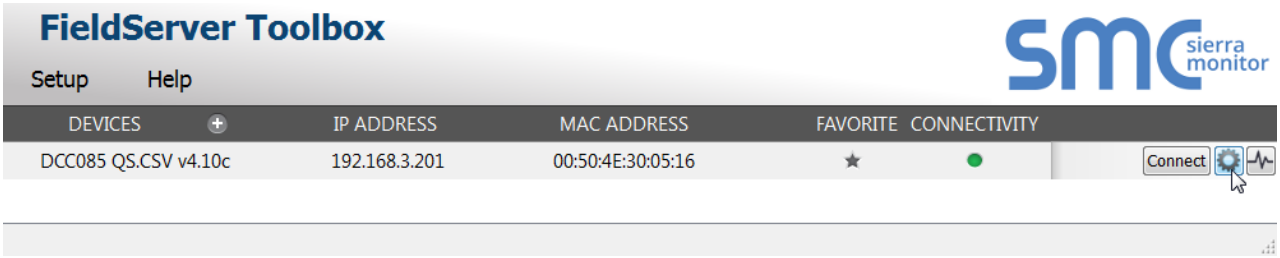


- Click 

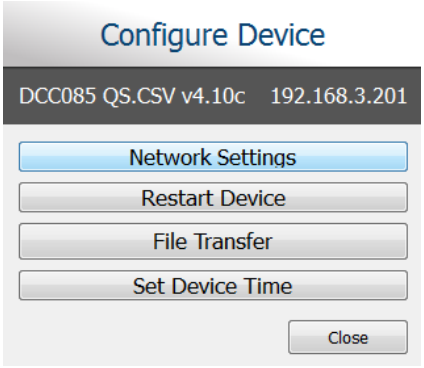
twice

4.1.2 Changing the IP Address of the ProtoNode with FieldServer Toolbox

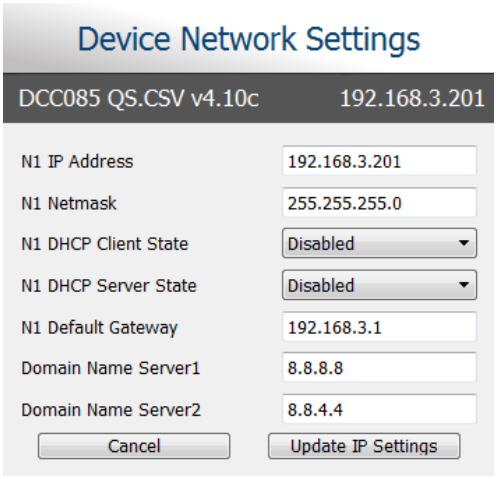
- Ensure that FieldServer Toolbox is loaded onto the local PC. Otherwise, download the
- FieldServer-Toolbox.zip via the Sierra Monitor website's Software Downloads.
- Extract the executable file and complete the installation.
- Double click on the FS Toolbox Utility and click Discover Now on the splash page.
- Find the desired gateway and click the Configure Device button (gear icon) to the right of the gateway information.



- Select Network Settings in the Configure Device window.



- Modify the IP Address (N1 IP Address field) of the gateway Ethernet port.
  - The following fields may also be changed as needed: Netmask (N1 Netmask field), DHCP Client State (N1 DHCP Client State field), IP Gateway (Default Gateway field) and DNS 1 & 2 (Domain Name Server fields)



NOTE: If the gateway is connected to a router, the Default Gateway field of the gateway should be set to the IP Address of the connected router.

NOTE: Do not change the DHCP Server State (N1 DHCP Server State field).

NOTE: If DNS settings are unknown, set DNS1 to "8.8.8.8" and DNS2 to "8.8.4.4".

- Click Update IP Settings, then click on the Change and Restart to restart the Gateway and activate the new IP Address.

4.2 Connecting to the ProtoNode Web Configurator

After setting a local PC on the same subnet as the ProtoNode (Section 4.1), open a PC web browser, and enter the IP address of the ProtoNode (default: 192.168.1.24)

NOTE: If the IP Address of the ProtoNode was changed, the assigned IP Address can be discovered using the FS Toolbox utility.

- User Name: admin
- Password is printed on label of ProtoNode should be under the cover by the Ethernet port. You will also be asked about security. Choose HTTP non secure unless you want to add security. Call factory for info setting up security.

4.3 Configure Auto-Discovery Devices Connected to the Gateway with Discovery Mode

If Auto-Discovery was performed through the S3 DIP switch on power up, skip this step.

- Click the Discovery Mode button at the bottom of the screen.

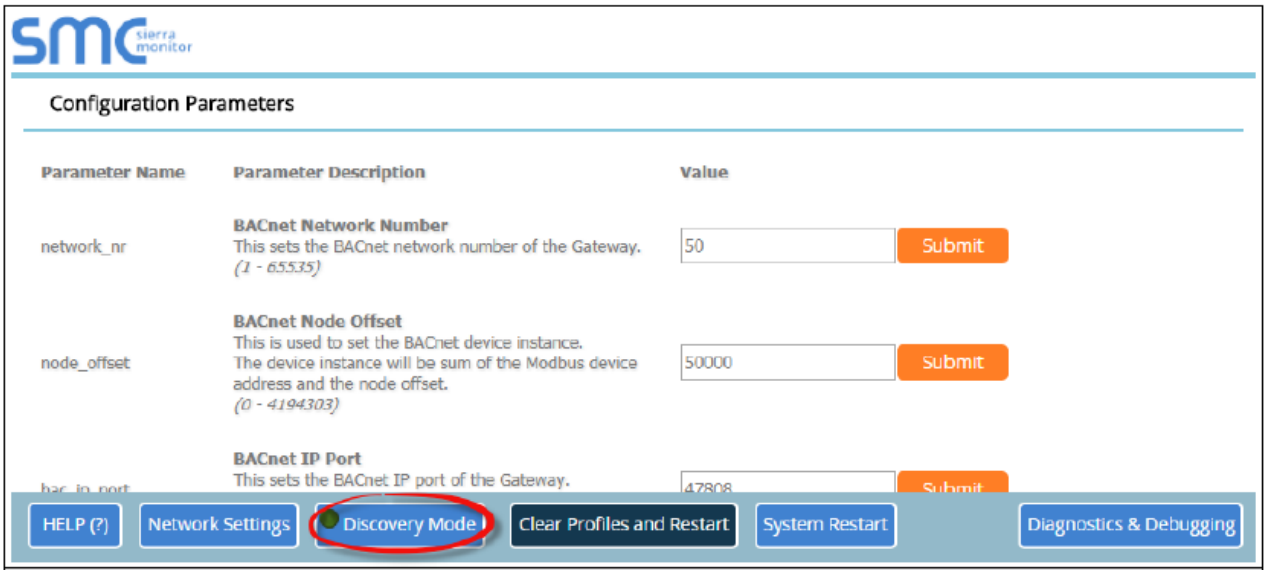


Figure 10: Web Configurator Showing Discovery Mode Button

- Click the OK button in the window that appears to discover devices and restart the device.
- Wait for the ProtoNode to restart and the Discovery in Progress window to disappear.

NOTE: It may take about 3 minutes for all the devices to be discovered and the configuration file to be built.

- If the discovery is successful the desired device profile should appear under the Active profiles title near the bottom of the screen.

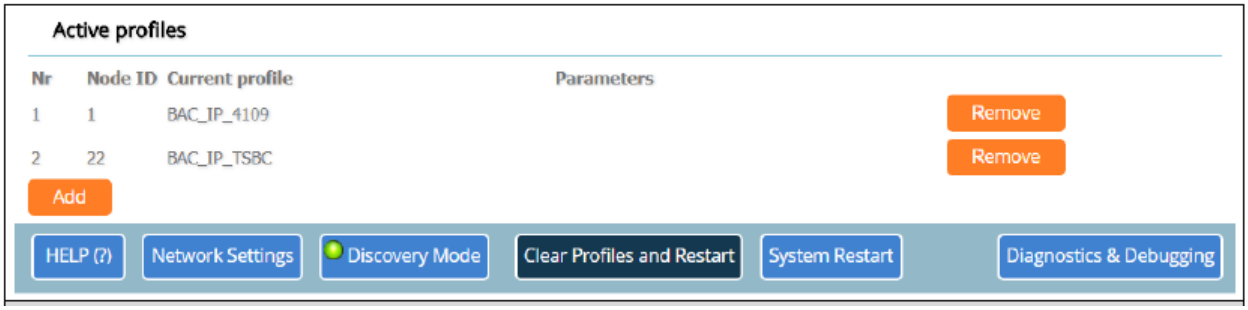


Figure 11: Web Configurator Showing Discovered Profiles

NOTE: If using multiple node configuration, set the BACnet virtual server nodes field to "Yes" before starting Auto-Discovery; otherwise leave the field on the default "No" setting.

4.4 Selecting Profiles for Devices Connected to ProtoNode

NOTE: If Modbus TCP/IP was selected in Section 3.4 for the Field/BMS protocol, skip this section. Device profiles are NOT used for Modbus TCP/IP.

- In the Web Configurator, the Active Profiles are shown below the Configuration Parameters.
- 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 is empty for new installations, or after clearing all configurations. (**Figure 12**)

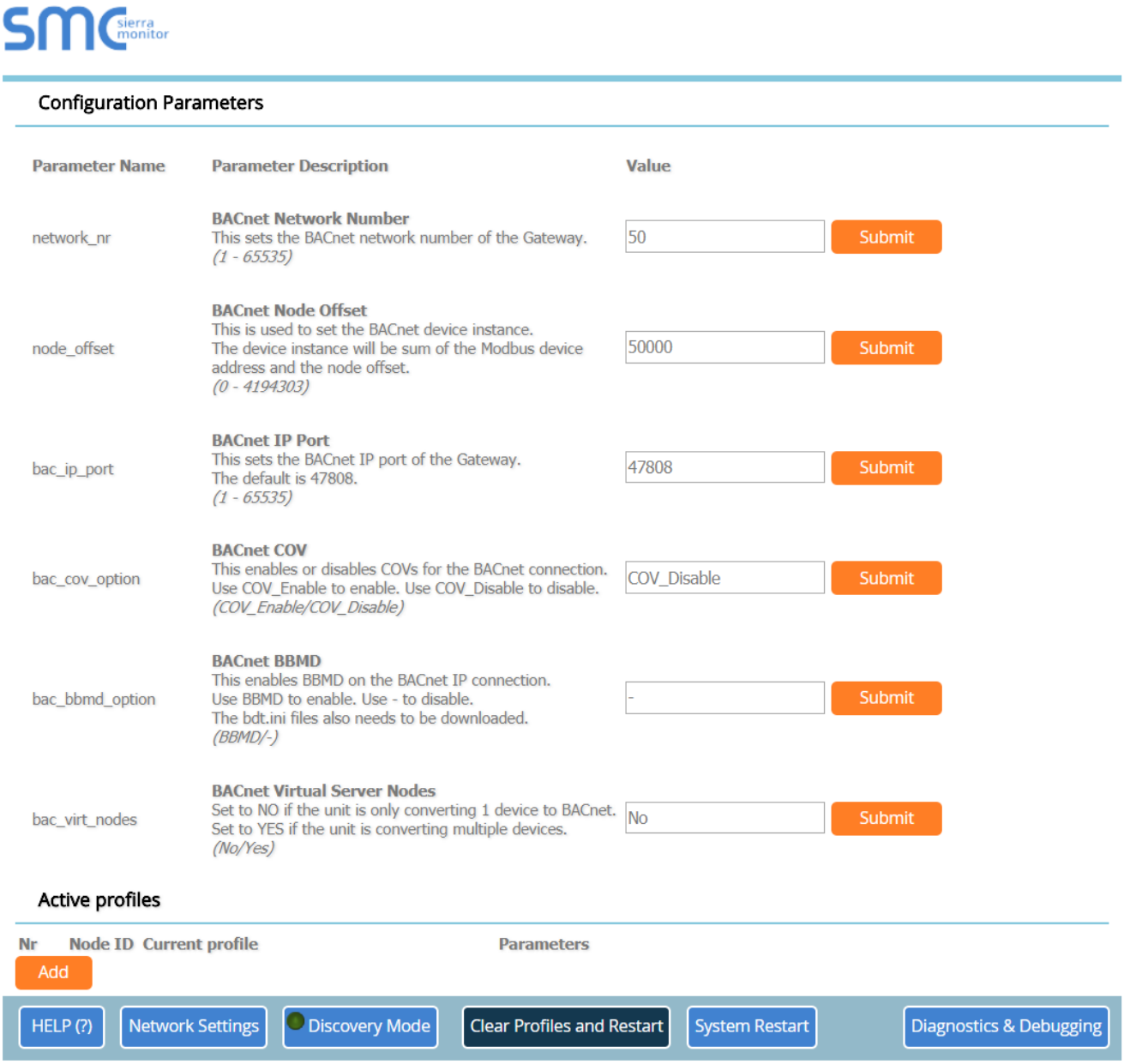


Figure 12: Web Configurator Showing no Active Profiles

- To add an active profile to support a device, click the Add button under the Active Profiles heading. This will present a drop-down box underneath the Current profile column that lists all the available profiles. (**Figure 13**)
- For every device that is added, assign a unique Node-ID. This specification must match the device's network settings.

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

- Once the Profile for the device has been selected from the drop-down list, enter the value of the device's Node-ID (Modbus address).

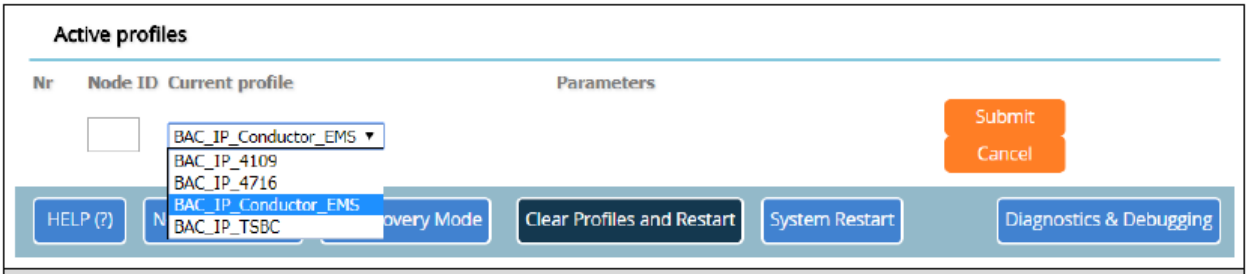


Figure 13: Web Configurator Showing Available Profiles for Selection

- 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 are listed under "Active Profiles" as shown in **Figure 14.**

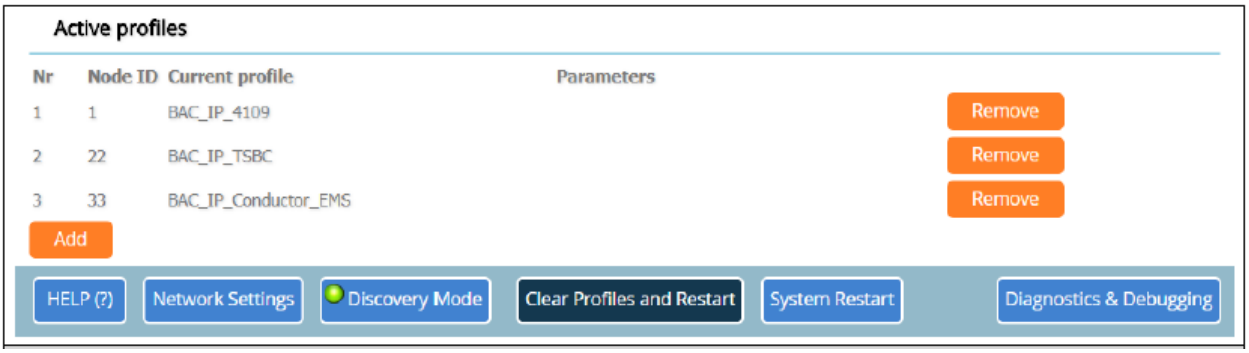
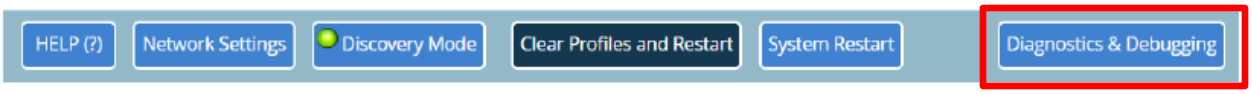


Figure 14: Web Configurator Showing Active Profile Additions

4.5 Set ProtoNode IP Address

When it is necessary to set the BACnet/IP or Modbus TCP ID the following procedure could be followed. Note this is the responsibility of the Energy Management System Administrator.

- Open a PC web browser, enter the default IP address of the ProtoNode 192.168.1.24 and connect to the ProtoNode.
- From the Web GUI's home page, click the "Diagnostic & Debugging" button.



- After the screen changes, from the left hand side of the screen click on "Setup" and then select "Network Settings" to access the IP Address Settings menu. See image below.

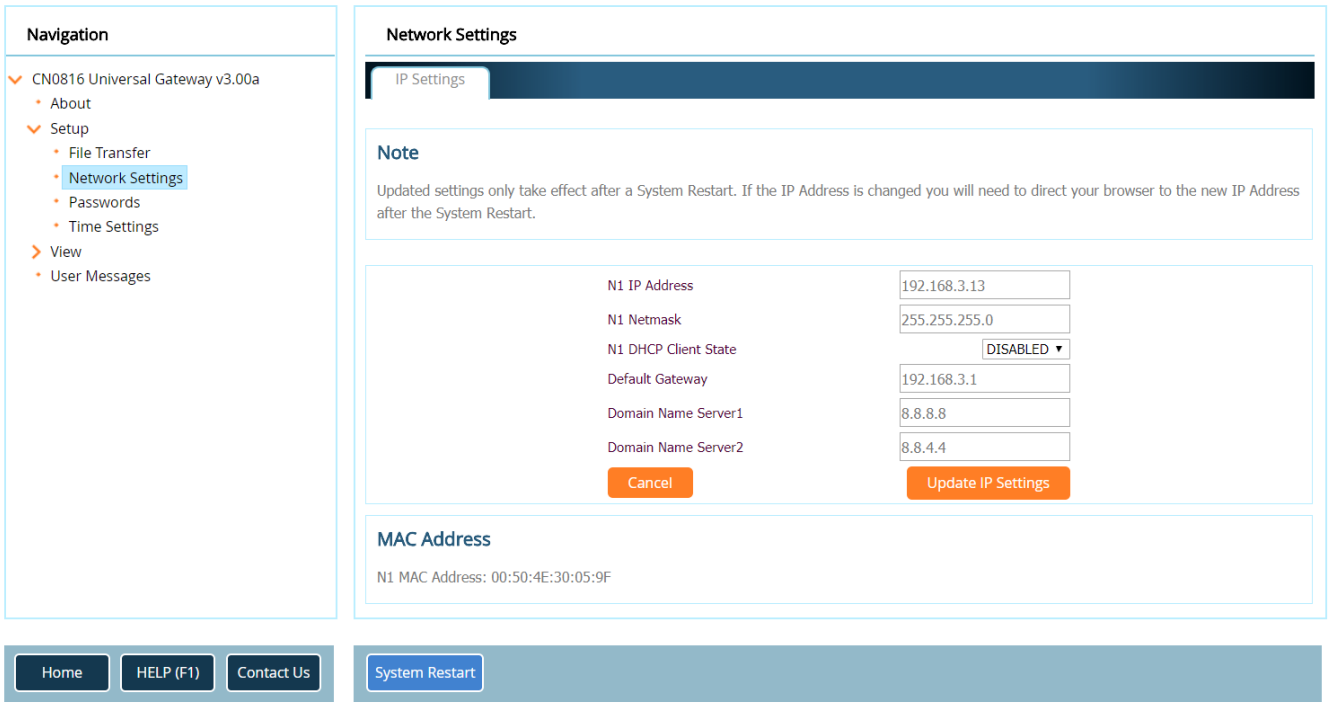


Figure15: Changing IP Address via FS-GUI

- Modify the IP address (N1 IP address field) of the ProtoNode Ethernet port to match EMS network.
- If necessary, change the Netmask (N1 Netmask field).
- If necessary, change the IP Gateway (Default Gateway field)

NOTE: If the ProtoNode is connected to a managed switch/router, the IP Gateway of the ProtoNode should be set to the IP address of that managed switch/router.

- Click the "System Restart" button at the bottom of the page to apply changes and restart the ProtoNode.
- **Record the IP address assigned to the ProtoNode for future reference.**
- **Unplug Ethernet cable from PC and connect it to the network hub or router.**

NOTE: The FieldPoP™ button (see Figure 15) allows users to connect to the SMC Cloud, Sierra Monitor's device cloud solution for IIoT. The SMC Cloud enables secure remote connection to field devices through a FieldServer and its local applications for configuration, management, maintenance. For more information about the SMC Cloud, refer to the SMC Cloud Start-up Guide.

4.6 BACnet: Setting Node_Offset to Assign Specific Device Instances

- After setting a local PC to the same subnet as the ProtoNode (**Section 5.1**), open a web browser on the PC and enter the IP Address of the ProtoNode.
  - If the IP Address of the ProtoNode has been changed by previous configuration, the assigned IP Address must be gathered from the network administrator
  - The Web Configurator is displayed as the landing page
- 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 as needed using the calculation below:

  Device Instance (desired) = Node_Offset + Node_ID

  For example, if the desired Device Instance for the device 1 is 50,001 and the following is true:

  - Device 1 has a Node-ID of 1
  - Device 2 has a Node-ID of 22
  - Device 3 has a Node-ID of 33

  Then plug the device 1's information into the formula to find the desired Node_Offset:

  50,001 = Node_Offset + 1

  ➢ **50,000 = Node_Offset**

  Once the Node_Offset value is input, it will be applied to all devices as shown below:

  - Device 1 Instance = 50,000 + Node_ID = 50,000 + 1 = 50,001
  - Device 2 Instance = 50,000 + Node_ID = 50,000 + 22 = 50,022
  - Device 3 Instance = 50,000 + Node_ID = 50,000 + 33 = 50,033
- Click "Submit" once the desired value is entered.

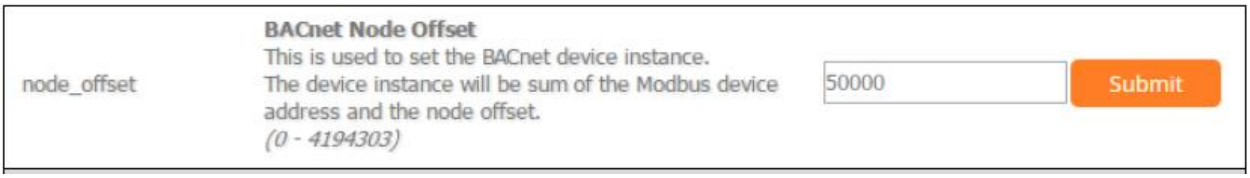


Figure 16: Web Configurator Node Offset Field

4.7 How to Start the Installation Over: Clearing Profiles

- After setting a local PC to the same subnet as the ProtoNode (**Section 5.1**), open a web browser on the PC and enter the IP Address of the ProtoNode; the default address is 192.168.1.24.
- If the IP Address of the ProtoNode has been changed by previous configuration, the assigned IP Address must be gathered from the network administrator.
- The Web Configurator is displayed as the landing page.
- At the bottom-left of the page, click the "Clear Profiles and Restart" button.
- Once restart is complete, all past profiles discovered and/or added via Web configurator are deleted. The unit can now be reinstalled.

4.8 Commissioning Lonworks ProtoNode

Commissioning may only be performed by the LonWorks administrator. 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.

- **If an XIF file is required, see steps Section 4.1.1 to generate XIF**

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

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

- For Windows 10:

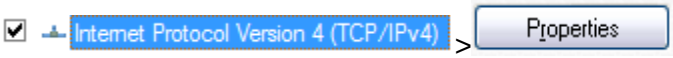
  Go to 

  Type "control panel"

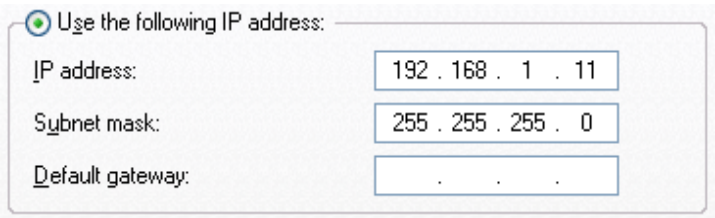
  Then click Control Panel > Network and Internet

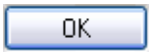
  > Network and Sharing Center > Change adapter settings

  Right-click on Local Area Connection > Properties

  Highlight 

  - Select: Use the following IP address

  - Click 

    twice

- For Windows 7:

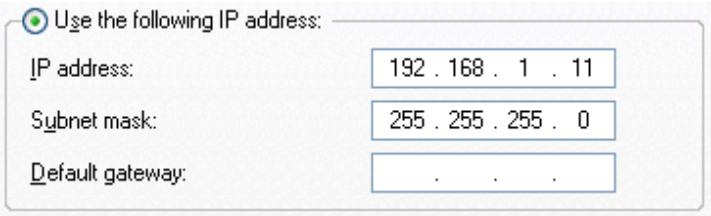
  Go to  > Control Panel > Network and Internet

> Network and Sharing Center > Change adapter settings

Right-click on Local Area Connection > Properties

Highlight Internet Protocol Version 4 (TCP/IPv4) > Properties

- Select: Use the following IP address



- Click OK twice

- Open a web browser and go to the following address:
  IP address of ProtoCessor/fserver.xif

- Example: **192.168.1.24/fserver.xif**

- Download and save the file onto the PC.

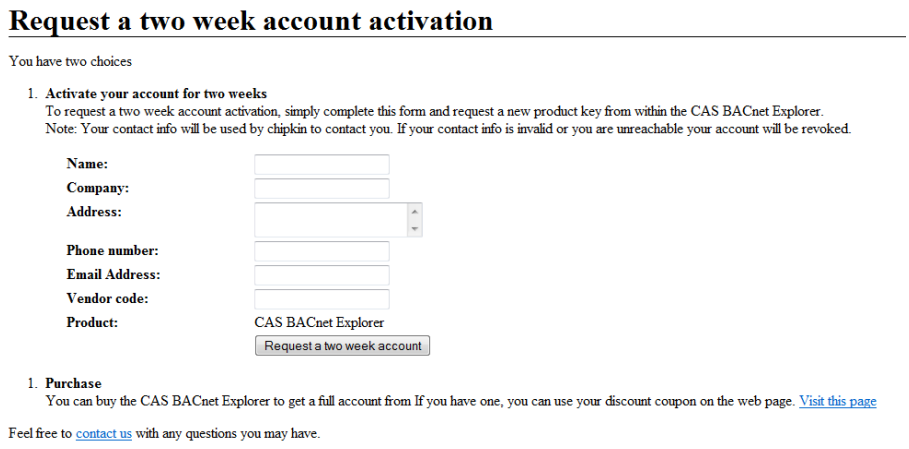
Figure 17: Sample of fserver.xif file being generated

5 FIELD VALIDATING

Chipkin Automation offers 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 EMS Integrator on site. A Serial or USB to RS-485 converter is needed to test BACnet MS/TP.

5.1 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 "Burnham012". 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

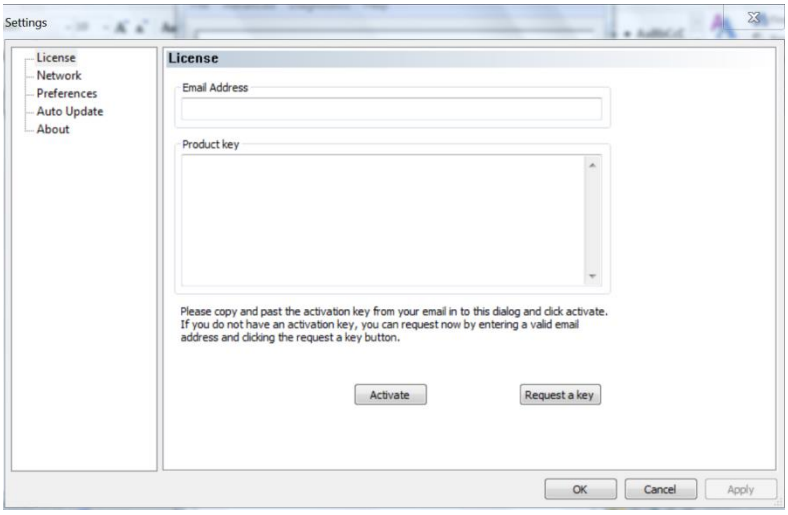
1. **Activate your account for two weeks**
   To request a two week account activation, simply complete this form and request a new product key from within the CAS BACnet Explorer.
   Note: Your contact info will be used by chipkin to contact you. If your contact info is invalid or you are unreachable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

Name:
Company:
Address:
Phone number:
Email Address:
Vendor code:
Product: CAS BACnet Explorer
Request a two week account

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

Feel free to contact us with any questions you may have.

- 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.



5.2 CAS BACnet Setup

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

5.2.1 CAS BACnet MS/TP Setup

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

5.2.2 CAS BACnet IP Setup

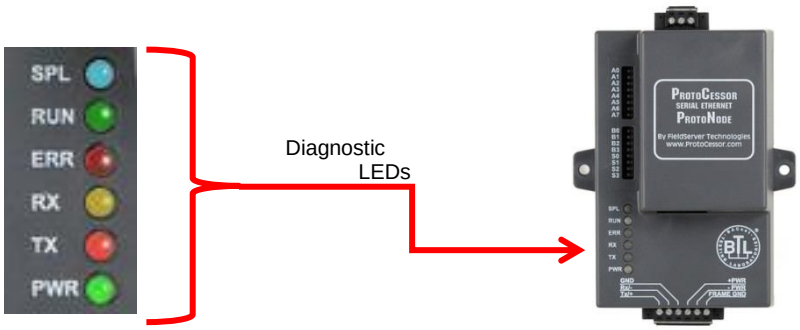
- See Section 5.1 to set the IP address and subnet of the PC that will be running the CAS Explorer.
- Connect a straight through or cross Ethernet cable from the PC to the ProtoNode.
- In CAS Explorer, do the following:
  - Click on “Settings”
  - Check the BACnet IP box and uncheck the BACnet MSTP and BACnet Ethernet boxes.
  - In the “Select a Network Device” box, select the network card of the PC by clicking on it.
  - Click “Ok”.
  - On the bottom right-hand corner, make sure that the BACnet IP box is green.
  - Click on “Discover”.
  - Click a “Check” into all 4 boxes.
  - Click “Send”.

Data is now available to view and edit. Select the “+” signs to open the branches and view data from all connected boilers.

6 TROUBLESHOOTING

6.1 LED Diagnostics

Please see the diagram below for ProtoNode RER BACnet and LER LonWorks LED Locations.



Tag	Description
SPL	The SPL LED will light if the ProtoNode is off line.
RUN	The RUN LED will start flashing 20 seconds after power indicating normal operation.
ERR	The SYS ERR LED will go on solid 15 seconds after power up. It will turn off after 5 seconds. A steady red light will indicate there is a system error on ProtoNode. If this occurs, immediately report the related “system error” shown in the error screen of the GUI interface to FieldServer Technologies for evaluation.
RX	The RX LED will flash when a message is received on the host port.
TX	The TX LED will flash when a message is sent on the host port.
PWR	This is the power light and should show steady green at all times when ProtoNode is powered.

6.2 "No Communication" Troubleshooting Trees

6.2.1 General Troubleshooting

Whenever a setting is changed (i.e. dipswitches or communication) power should be cycled to the ProtoNode to allow for settings to take effect.

1. Is power connected to boilers and ProtoNode?
   - Green PWR LED solid on ProtoNode
   - Green LED solid on control
2. Is the ERR LED red? (see Section 6.1)
3. Is the wiring from the ProtoNode to the Boilers correct? (See sections 3.2 – 3.9)
4. Does each boiler have a unique address? (see section 2.1)
5. For TSBC boilers, are the Parity and Baud rate set correctly? (see section 2.1.3)
6. Does the ProtoNode Discover boilers but give zero for values?
   - The ProtoNode has remembered older profiles and must be cleared.
   - Connect a PC using an Ethernet cable.
   - Go to 192.168.1.24 ProtoNode profile internet explorer page
   - Select "Clear Profiles And Restart"

For further "No Communication" Troubleshooting, go to the Network Protocol of the EMS Network and follow the Troubleshooting tree under it.

6.2.2 BACnet IP Troubleshooting

1. Are the "S Bank" Dipswitches set to BACnet IP? (See section 2.2.1)
2. Is the wiring to the EMS Network Correct? (See section 4.2 – 4.4)
3. Does the Baud Rate of the ProtoNode match the Baud Rate of the network (see section 2.2.4)
4. Has an Auto-Discovery been performed? (See section 2.2.2)

6.2.3 BACnet MS/TP Troubleshooting

1. Are the "S Bank" Dipswitches set to BACnet MS/TP? (See section 2.2.1)
2. Is the wiring to the EMS Network Correct? (See section 3.11)
3. Is the MAC address between 1 – 127 AND unique on the EMS network? (Section 2.2.3)
4. Does the Baud Rate of the ProtoNode match the Baud Rate of the network (see section 2.2.4)
5. Has an Auto-Discovery been performed? (See section 2.2.2)

6.2.4 Metasys N2 Troubleshooting

1. Are the “S Bank” Dipswitches set to Metasys N2? (See section 2.2.1)
2. Is the wiring to the EMS Network Correct? (See section 3.11)

6.2.5 Lonworks troubleshooting

1. Is the wiring to the EMS Network Correct? (See section 4.1)
2. Has an Auto-Discovery been performed? (See section 2.2.2)

6.3 Take Diagnostic Capture with FieldServer Utilities

- Once the log is complete, email it to support@protocessor.com. The log will allow us to rapidly diagnose the issue.
- Make sure the FieldServer Toolbox is loaded on the PC that the ProtoNode is connected to.
- Toolbox is found at: http://www.sierramonitor.com/customer-care/resource-center > Software Downloads > FieldServer Toolbox

Figure 18: Ethernet port location of the ProtoNode

- After FieldServer Toolbox has been installed, disable any Wireless Network Connection adapters on the PC/Laptop.
- Disable firewall and virus protection software.
- Connect a standard Cat5 Ethernet cable between the PC and the ProtoNode.

6.3 Take Diagnostic Capture with FieldServer Utilities (continued)

- The Default IP Address of the ProtoNode is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and the ProtoNode are on different IP Networks, assign a static IP Address to the PC on the 192.168.1.xxx network.

- For Windows 10:

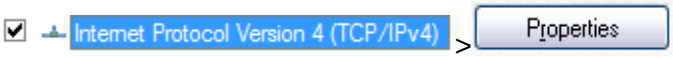
  Go to 

  Type “control panel”

  Then click Control Panel > Network and Internet

  > Network and Sharing Center > Change adapter settings

  Right-click on Local Area Connection > Properties

  Highlight 

- For Windows 7:

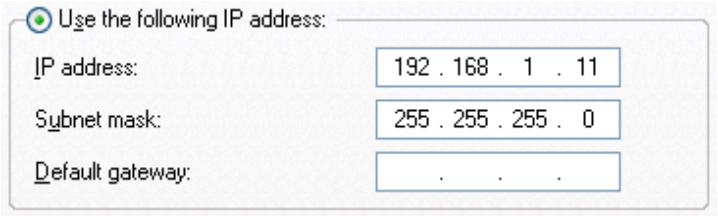
  Go to > Control Panel > Network and Internet

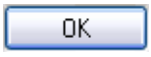
  > Network and Sharing Center > Change adapter settings

  Right-click on Local Area Connection > Properties

  Highlight 

- For Windows 10 and Windows 7, select: Use the following IP address

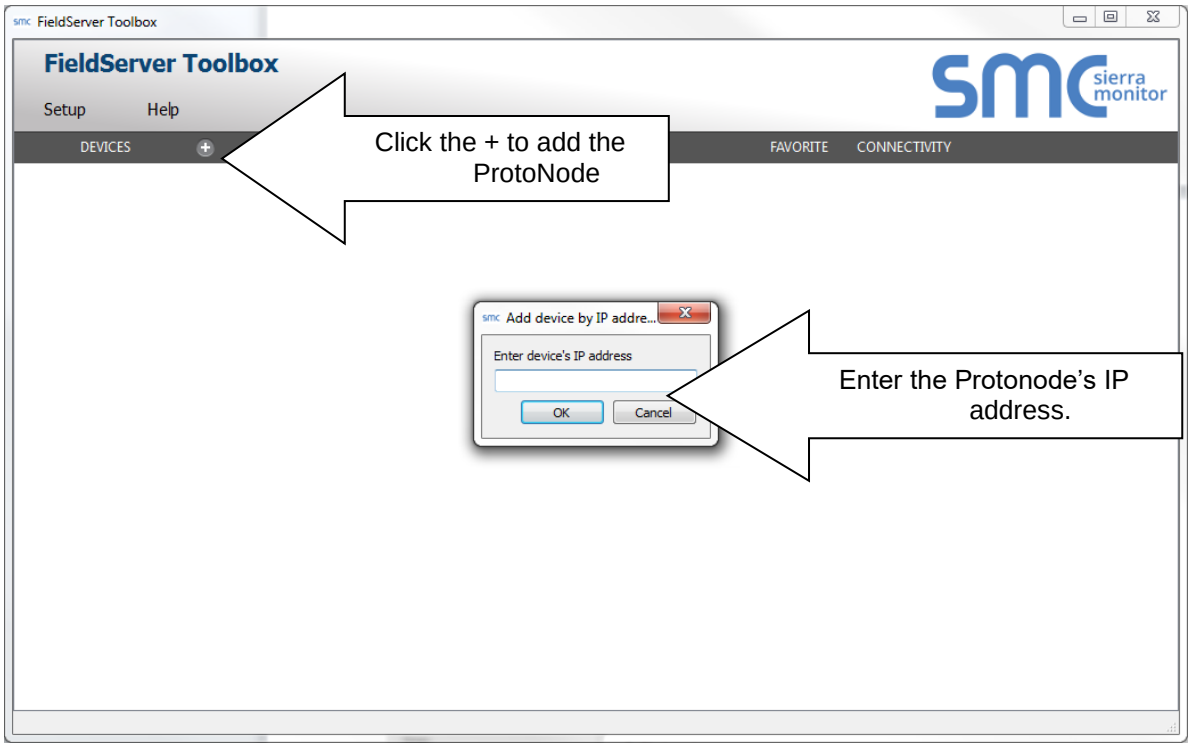


- Click 

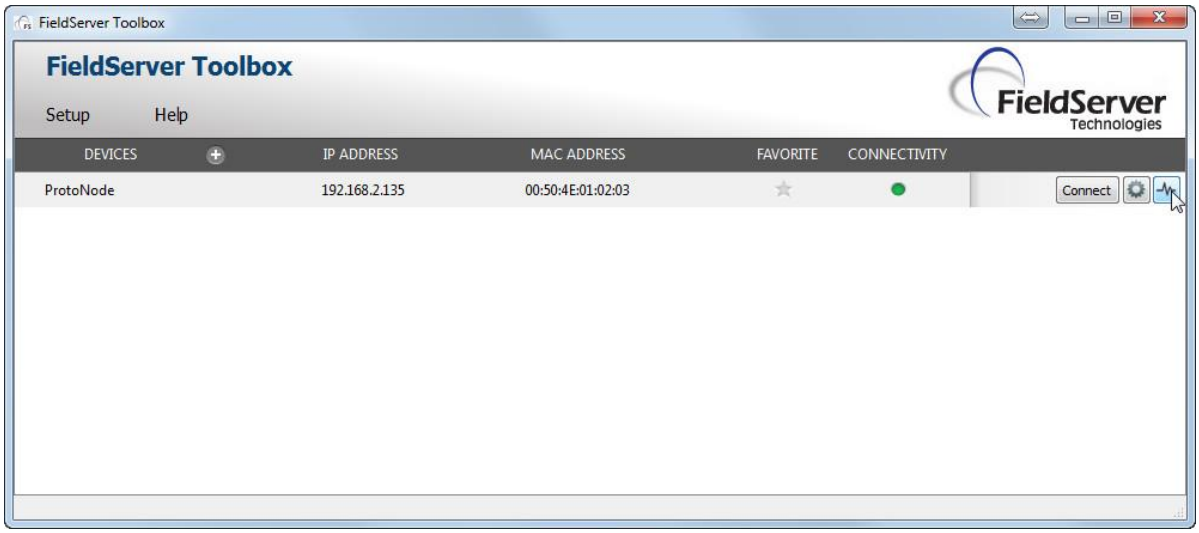
twice

- Double click on the FieldServer Toolbox.

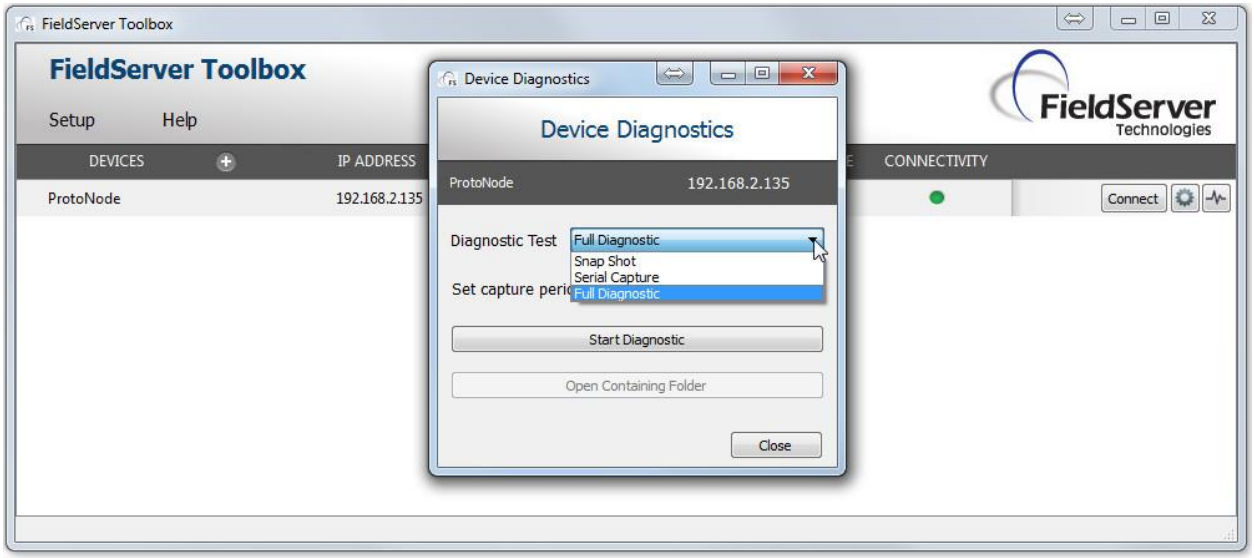
6.3 Take Diagnostic Capture with FieldServer Utilities (continued)



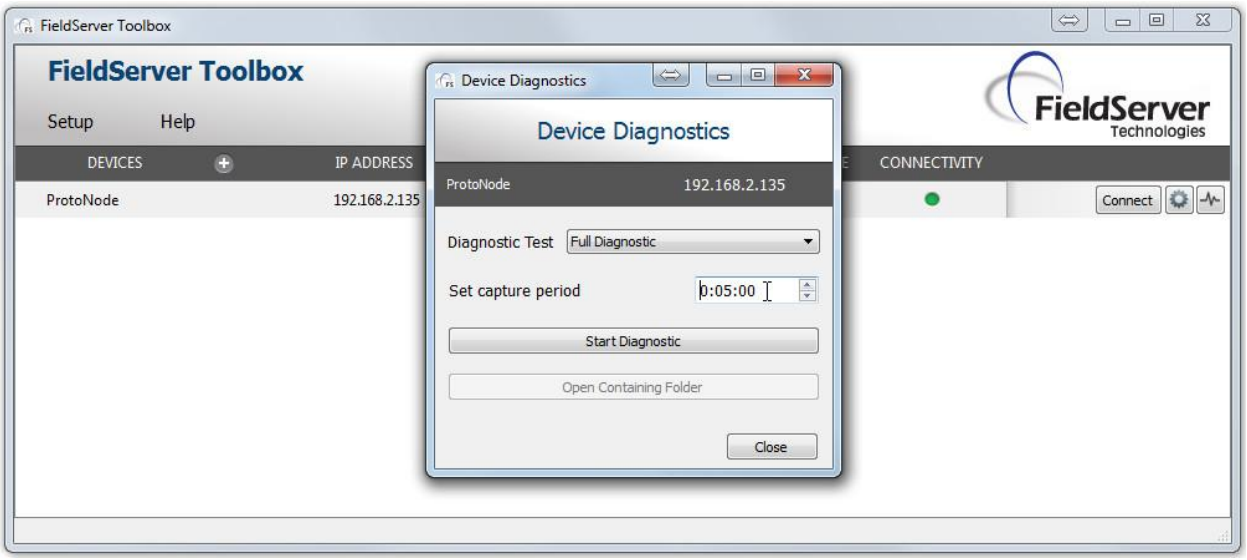
- **Step 1:** Take a Log
  - Click on the diagnose icon  of the desired device.



- Select full Diagnostic



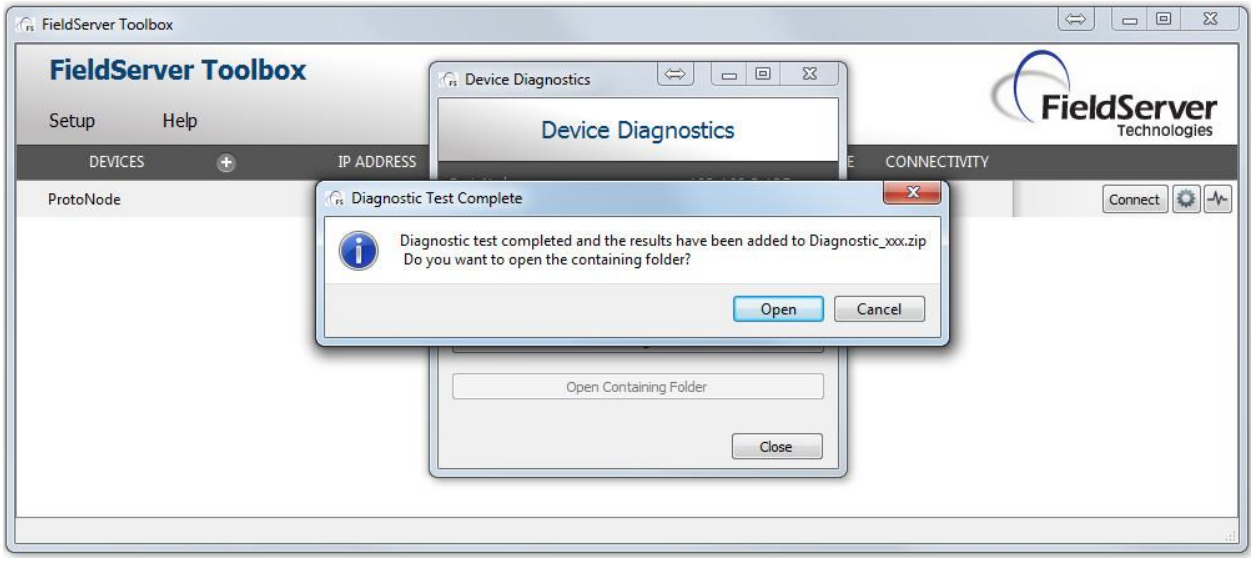
- If desired, the default capture period can be changed.
- Click on Start Diagnostic



- Wait for Capture period to finish. Diagnostic Test Complete window will appear.
- If Diagnostic Test Complete window does not appear after "Set Capture Period" is over, the diagnostic log may be found in the FieldServer directory (likely on the computer's C Drive or under Program Files) :
  - C: Drive > FieldServer > FieldServer Toolbox > Config > Diagnostic_XXXX-XX-XX_XX-XX (The X's will be the date and time the log was taken)

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

6.3 Take Diagnostic Capture with FieldServer Utilities (continued)



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

- If Diagnostic Test Complete window does not appear after "Set Capture Period" is over, the diagnostic log may be found in the FieldServer directory (likely on the computer's C Drive or under Program Files) :
  - C: Drive > FieldServer > FieldServer Toolbox > Config > Diagnostic_XXXX-XX-XX_XX-XX (The X's will be the date and time the log was taken)
  - Send this folder instead of the .zip file

7 PROTONODE INFORMATION

7.1 Specifications and Ordering Information

	ProtoNode RER BACnet	ProtoNode LER LonWorks
Protocol	BACnet MS/TP, BACnet/IP, Metasys N2 Open, or Modbus TCP	LonWorks
ProtoNode Part Number	Part Number: **106416-01** FieldServer #: FPC-N34-0816	Part Number: **106418-01** FieldServer #: FPC-N35-0817
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 Base T 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; OPC Self-tested for Compliance; RoHS Compliant; CSA 205 Approved	
	BTL Marked	LonMark Certified
Operating Temperature	-40°C to 75°C (-40°F to167°F)	
Humidity	5 - 90% RH (non-condensing)	
Power Requirements	Multi-mode power adapter: 9-30VDC or 12 - 24VAC	
Operating Temperature:	-40°C to 75°C (-40°F to167°F)	
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)	

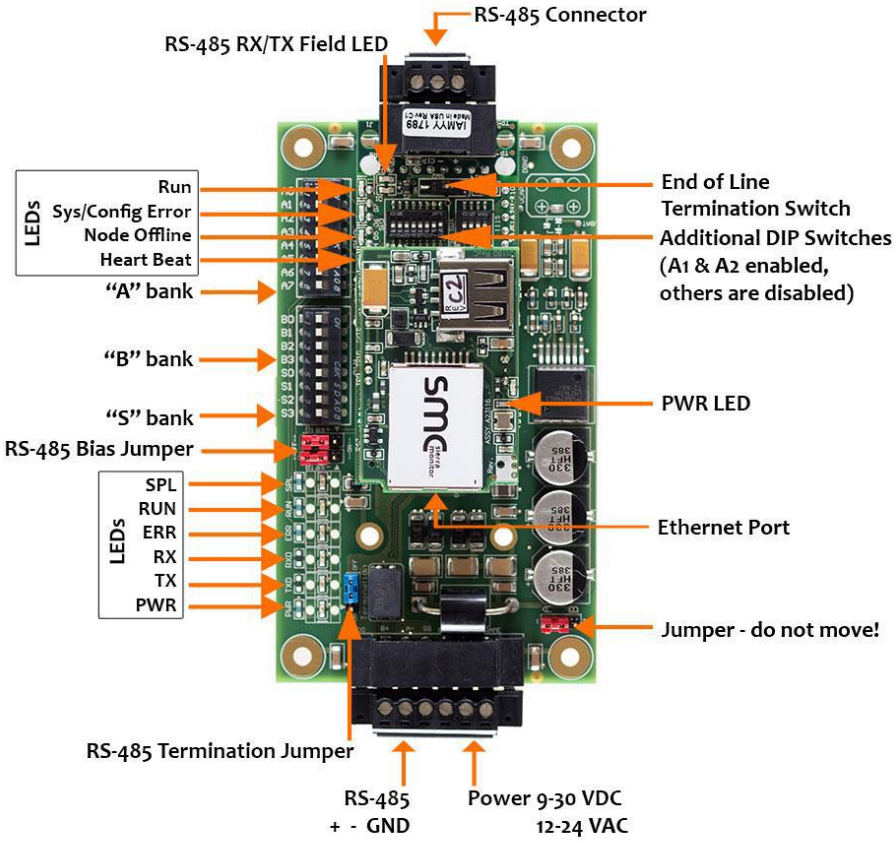
Boiler Communication Statistics

Protocol	Modbus RTU
Baud Rate	38400
Parity	None
Data Bits	8
Stop Bits	1

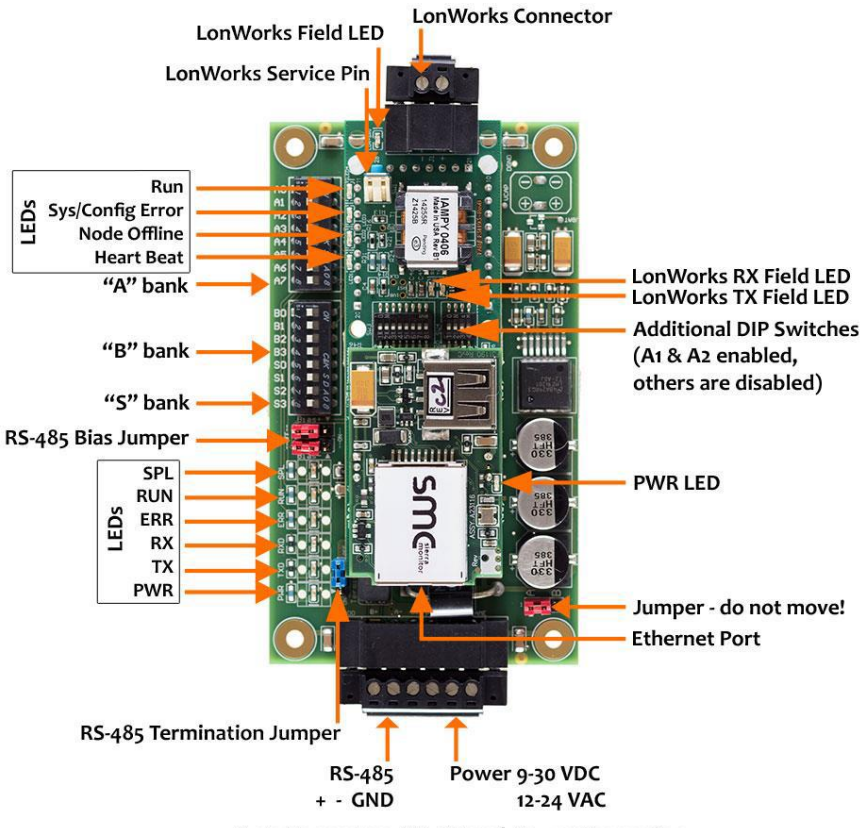
Ordering information

	ProtoNode RER BACnet	ProtoNode LER LonWorks
Universal Gateway (ProtoNode)	PN: 106416-01	PN: 106418-01
Universal Gateway I&O	PN: 106417-01	PN: 106417-01
Universal Gateway Kit (Includes ProtoNode and I&O)	PN: 106432-01	PN: 106433-01

7.2 ProtoNode Detailed View



6 pin Connector - RS-485 and Power Connection



6 pin Connector - RS-485 and Power Connection

Appendix A. PFC 2000-4000 with Honeywell Control Points List

BACnet, N2 and LonWorks Points

		BACnet		N2		LonWorks	
Point Name	Read/ Write	Data Type	Data Id	Data Type	Pt Addr	Lon Name	Lon SNVT Type
Burner On Off	R	BV	1	DO	1	nvi/nvoBrnrOnOff_XXX	SNVT_switch
Demand Source	R	AI	2	AI	2	nvoDem_Src_XXX	SNVT_count_f
CH Setpoint	R	AV	3	AO	3	nvi/nvoCH_SP_XXX	SNVT_temp_p
DHW Setpoint	R	AV	4	AO	4	nvi/nvoDHW_SP_XXX	SNVT_temp_p
Lead Lag Setpoint	R	AV	5	AO	5	nvi/nvoLL_SP_XXX	SNVT_temp_p
CH TOD Setpoint	R	AV	6	AO	6	nvi/nvoCH_TOD_SP_XXX	SNVT_temp_p
CH Setpoint Source	R	AI	7	AI	7	nvoCH_SP_Src_XXX	SNVT_count_f
Active CH Setpoint	R	AI	8	AI	8	nvoAct_CH_SP_XXX	SNVT_temp_p
DHW Setpoint Source	R	AI	9	AI	9	nvoDHW_SPSrc_XXX	SNVT_count_f
Active DHW Setpoint	R	AI	10	AI	10	nvoActDHW_SP_XXX	SNVT_temp_p
LL Master Setpoint Source	R	AI	11	AI	11	nvoLLMstSPSr_XXX	SNVT_count_f
Active LL Setpoint	R	AI	12	AI	12	nvoAct_LL_SP_XXX	SNVT_temp_p
Supply Sensor	R	AI	13	AI	13	nvoSupSensor_XXX	SNVT_temp_p
Return Sensor	R	AI	14	AI	14	nvoRetSensor_XXX	SNVT_temp_p
Header Sensor	R	AI	15	AI	15	nvoHdrSensor_XXX	SNVT_temp_p
Stack Sensor	R	AI	16	AI	16	nvoStkSensor_XXX	SNVT_temp_p
Outdoor Sensor	R	AI	17	AI	17	nvoOtdrSensr_XXX	SNVT_temp_p
4-20 mA Rem Control Input	R	AI	18	AI	18	nvoRemCtrlIn_XXX	SNVT_count_f
Fan Speed	R	AI	19	AI	19	nvoFan_Speed_XXX	SNVT_count_f
Flame Signal	R	AI	20	AI	20	nvoFlmSig_XXX	SNVT_count_f
Burner Control State	R	AI	21	AI	21	nvoBrnCtrlSt_XXX	SNVT_count_f
Lockout Code	R	AI	22	AI	22	nvoLockotCod_XXX	SNVT_count_f
Hold Code	R	AI	23	AI	23	nvoHoldCode_XXX	SNVT_count_f
Burner Cycle Count	R/W	AV	24	AO	24	nvi/nvoBrnCycCnt_XXX	SNVT_count_f
Burner Run Time	R/W	AV	25	AO	25	nvi/nvoBrnRunTim_XXX	SNVT_time_hour
System Pum Cycle Count	R/W	AV	26	AO	26	nvi/nvoSysPmCyCt_XXX	SNVT_count_f
DHW Pump Cycle Count	R/W	AV	27	AO	27	nvi/nvoDHWPmCyCt_XXX	SNVT_count_f
Boiler Pump Cycle Count	R/W	AV	28	AO	28	nvi/nvoBlrPmCyCt_XXX	SNVT_count_f
CH Modbus Stat	W	BV	29	DO	29	nvi/nvoCHModStat_XXX	SNVT_switch
LLCH Modbus Stat	W	BV	30	DO	30	nvi/nvoLLCHModSt_XXX	SNVT_switch
CH Modbus SP	W	AV	31	AO	31	nvi/nvoCHModSP_XXX	SNVT_temp_p
CH Sequencer Modbus SP	W	AV	32	AO	32	nvi/nvoCHSeqMdSP_XXX	SNVT_temp_p
Outdoor Temperature	W	AV	33	AO	33	nvi/nvoOutTemp_XXX	SNVT_temp_p
CH Modbus Rate	W	AV	34	C	34	nvi/nvoCHModRate_XXX	SNVT_lev_percent
Fan Speed Measured	R	AI	35	AI	35	nvoFanSpdMes_XXX	SNVT_count_f
Modbus command timeout	R/W	AV	36	AO	36	nvoModCmdTim_XXX	SNVT_count_f
CH pump status	R	AI	37	AI	37	nvoCHPmpStat_XXX	SNVT_count_f
DHW pump status	R	AI	38	AI	38	nvoDHWPmpSt_XXX	SNVT_count_f
Boiler pump status	R	AI	39	AI	39	nvoBlrPmpSt_XXX	SNVT_count_f
Low Temp SP	R	AI	40	AI	40	nvoLoTmpSP_XXX	SNVT_temp_p
Low TempSP source	R	AI	41	AI	41	nvoLoTmpSPSr_XXX	SNVT_count_f
Active Low Temp SP	R	AI	42	AI	42	nvoActLoTpSP_XXX	SNVT_temp_p
CH heat demand	W	BI	43	DI	43	nvoCH_HtDem_XXX	SNVT_switch
DHW heat demand	R	BI	44	DI	44	nvoDHW_HtDem_XXX	SNVT_switch
Low Temp Loop demand	R	BI	45	DI	45	nvoLoTpLHtDm_XXX	SNVT_switch

Modbus Points

Modbus Register	Protocol Name	Description	Read/ Write
Enable / Disable			
400,577	CH Modbus Stat	CH Modbus STAT 0 = no demand 1 = demand When this register is not written every “Modbus Command Time Out” parameter seconds (default 30 seconds), CH Modbus Stat is reverted to 0, no demand.	W
400,563	LLCH Modbus Stat	LL CH Modbus STAT 0 = no demand 1 = demand When this register is not written every “Modbus Command Time Out” parameter seconds (default 30 seconds), CH Modbus Stat is reverted to 0, no demand.	W
400,203	Burner on/off	Enable / disable burner. 1 = on 0 = off	R
400,006	Demand source	0 = Unknown 1 = No source demand 2 = Central heat 3 = Domestic hot water 4 = Lead Lag slave 5 = Lead Lag master 6 = Central heat frost protection 7 = Domestic hot water frost protection 8 = No demand due to burner switch turned off 9 = Domestic hot water storage 11 = Warm weather shutdown	R
400,066	CH heat demand	0=Off, 1=On	R
400,083	DHW heat demand	0=Off, 1=On	R
400,123	Low Temperature Loop heat demand	0=Off, 1=On	R
Setpoints			
410,579	CH Modbus Setpoint	Use this register to change the boiler setpoint. When this register is not written every “Modbus Command Time Out” parameter seconds (default 30 seconds), setpoint reverts to local setpoint valid range 60 F to 190 F	W
410,562	CH Sequencer Modbus Setpoint	Use this register to change the multiple boiler Sequencer setpoint. When this register is not written every “Modbus Command Time Out” parameter seconds (default 30 seconds), setpoint reverts to local setpoint valid range 60 F to 190 F	W
410,211	CH setpoint	Status of local setpoint	R
410,453	DHW setpoint	Status of local setpoint	R
410,546	Lead Lag setpoint	Status of local setpoint	R
410,212	CH TOD setpoint	Status of local setpoint	R

Modbus Register	Protocol Name	Description	Read/ Write
410,065	CH setpoint source	0=Unknown, 1=Normal setpoint, 2=TOD setpoint, 3=Outdoor reset, 4=Remote control (4-20mA), 7=Outdoor reset time of day	R
410,016	Active CH setpoint	-40 F (-40°C) to 266 F (130°C) Setpoint determined by CH setpoint source (register 65).	R
410,081	DHW setpoint source	0=Unknown, 1=Normal setpoint, 2=TOD setpoint, 5=DHW tap setpoint, 6=DHW preheat setpoint	R
410,017	Active DHW setpoint	-40 F (-40°C) to 266 F (130°C) Setpoint determined by DHW setpoint source (register 81).	R
410,162	Lead Lag master setpoint source	0=Unknown, 1=CH setpoint, 2=CH TOD setpoint, 3=Outdoor reset, 4=Remote control (4-20mA), 5=DHW setpoint, 6=DHW TOD setpoint, 7=Outdoor reset time of day, 8=Mix setpoint	R
410,018	Active LL setpoint	-40 F (-40°C) to 266 F (130°C) Setpoint determined by LL setpoint source (register 162).	R
410,643	Low Temperature setpoint	Setpoint entered on the local user interface. valid range 79 F (26.1 C) to 191 F (88.3 C)	R
410,121	Low Temperature setpoint source	0=Unknown, 1=Normal setpoint, 2=TOD setpoint, 3=Outdoor reset, 4=Remote control, 7=Outdoor reset time of day, 9=Outdoor boost	R
410,024	Active Low Temperature setpoint	-40 F (-40°C) to 266 F (130°C) Setpoint determined by Low Temp setpoint source (register 121).	R
Temperature Sensors			
410,007	Supply sensor	-40 F (-40°C) to 266 F (130°C)	R
410,011	Return sensor	-40 F (-40°C) to 266 F (130°C)	R
410,013	Header sensor	-40 F (-40°C) to 266 F (130°C)	R
410,014	Stack sensor	-40 F (-40°C) to 266 F (130°C)	R
410,170	Outdoor sensor	-40 F (-40°C) to 266 F (130°C)	R
400,015	4 - 20 mA remote control input	mA value for S2 (J8-6) parameter selectable as (remote set point) & (remote modulation)	R

Modbus Register	Protocol Name	Description	Read/ Write
410,817	Outdoor Temperature	Building Automation may send the controller the outdoor air temperature. Use this register to change the outdoor temperature. When this register is not written every "Modbus Command Time Out" parameter seconds (default 30 seconds), temperature is set to bad data quality and outdoor air reset is set back to local setpoint. valid range -40 F to 302 F	W
Burner			
400,581	CH Modbus Rate	Use this register to drive individual boiler firing rates. This register is used when firing rate control is performed by an external building automation system. Firing rate reverts to local control when register is not written every "Modbus Command Time Out" parameter seconds (default 30 seconds), Range is 0 to 200 % provides 0-100% firing rate.	W
400,008	Fan Speed Measured	Speed of the combustion air blower in rpm	R
400,009	Fan Speed Commanded	Speed of the combustion air blower in rpm	R
400,010	Flame signal	0.01V or 0.01µA precision (0.00-50.00V)	R
400,033	Burner control state	0 Initiate 1 Standby Delay 2 Standby 3 Safe Startup 4 Prepurge - Drive to Purge Rate 5 Prepurge – Measured Purge Time 6 Prepurge – Drive to Lightoff Rate 7 Preignition Test 8 Preignition Time 9 Pilot Flame Establishing Period 10 Main Flame Establishing Period 11 Direct Burner Ignition 12 Run 13 Postpurge 14 Lockout	R
Trouble Shooting			
410,034	Lockout code	Reasons for burner lockout 0 No lockout 3 Burner Interlock Open (ILK OFF) 4 Supply high limit 5 DHW high limit 6 Stack High limit 12 Flame detected out of sequence 14 Delta T Inlet/Outlet High 15 Return Temp Higher Than Supply 16 Supply Temp Rose Too Quickly 18 Lightoff rate proving failed 19 Purge rate proving failed 20 Invalid Safety Parameters 21 Invalid Modulation Parameter 22 Safety data verification needed 23 24VAC voltage low/high 24 Fuel Valve Error 25 Hardware Fault 26 Internal Fault 27 Ignition Failure 31 Fan Failed 32 ILK ON 42 AC Phase Fault 46 Pilot Test Flame 47 Flame Lost 284 Memory Reset	R

Modbus Register	Protocol Name	Description	Read/ Write
410,040	Hold code	Reason for burner hold 0 None 1 Anti short cycle 2 Boiler Safety Limit Open 3 Boiler Safety Limit Open, (ILK Off) 7 Return sensor fault 8 Supply sensor fault 9 DHW sensor fault 10 Stack sensor fault 11 Ignition failure 13 Flame rod shorted to ground 14 Delta T inlet/outlet high 15 Return temp higher than supply 16 Supply temp has risen too quickly 17 Fan speed not proved 23 24VAC voltage low/high 25 Hardware Fault 27 Ignition Failure	R
Statistics			
400,763	Modbus command timeout	This parameter sets the amount of time the control will wait for input from the Energy Management System (EMS). If the EMS does not write to the following register within the "Modbus Command timeout" seconds the following inputs are considered invalid: CH Modbus Stat, CH Modbus Setpoint, CH Sequencer Modbus Setpoint CH Modbus Rate range 30 – 120, Default 30 seconds Other R/W registers should only be written when a value is needed to be changed. Only the above listed registers are stored in non-volatile registers.	R/W
Pump Status			
400,096	CH pump status	See table 1	R
400,100	DHW pump status	See table 1	R
400,108	Boiler pump status	See table 1	R
400,128-400,129	Burner cycle count	0-999,999 (U32)	R/W
400,130-400,131	Burner run time	Hours (U32)	R/W
400,132-400,133	System pump cycle count	0-999,999 (U32)	R/W
400,134-400,135	DHW pump cycle count	0-999,999 (U32)	R/W
400,138-400,139	Boiler pump cycle count	0-999,999 (U32)	R/W

Status	Description	Note
92	Forced On from manual pump control	
93	Forced On due to Outlet high limit is active	
94	Forced On from burner demand	
95	Forced On due to Lead Lag slave has demand	
96	Forced Off from local DHW priority service	
97	Forced Off from Lead Lag DHW priority service	
98	Forced Off from Central Heat anti-condensation	
99	Forced Off from DHW anti-condensation	
100	Forced Off due to DHW high limit is active	
101	Forced Off from EnviraCOM DHW priority service	
102	On due to local CH frost protection is active	
103	On due to Lead Lag CH frost protection is active	
104	On due to local DHW frost protection is active	
105	On due to Lead Lag DHW frost protection is active	
106	On from local Central Heat demand	
107	On from Lead Lag Central Heat demand	
108	On from local DHW demand	
109	On from Lead Lag DHW demand	
110	On from local Mix demand	
111	On from Lead Lag Mix demand	
112	On from local Central Heat service	
113	On from Lead Lag Central Heat service	
114	On from local DHW service	
115	On from Lead Lag DHW service	
116	On from local Mix service	
117	On from Lead Lag Mix service	
118	On from Lead Lag auxiliary pump X	
119	On from Lead Lag auxiliary pump Y	
120	On from Lead Lag auxiliary pump Z	
121	On, but inhibited by pump start delay	
122	On from pump override	
123	Off, not needed	
124	On from burner demand	
125	On from exercise	
126	On from local Lead Lag service	
127	On from local Lead Lag pump demand	

Pump Status Codes

Appendix B. "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
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22	Off	On	On	Off	On	Off	Off	Off
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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
47	On	On	On	On	Off	On	Off	Off
48	Off	Off	Off	Off	On	On	Off	Off

Address	A0	A1	A2	A3	A4	A5	A6	A7
49	On	Off	Off	Off	On	On	Off	Off
50	Off	On	Off	Off	On	On	Off	Off
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95	On	On	On	On	On	Off	On	Off
96	Off	Off	Off	Off	Off	On	On	Off

Address	A0	A1	A2	A3	A4	A5	A6	A7
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Address	A0	A1	A2	A3	A4	A5	A6	A7
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Address	A0	A1	A2	A3	A4	A5	A6	A7
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242	Off	On	Off	Off	On	On	On	On
243	On	On	Off	Off	On	On	On	On

Address	A0	A1	A2	A3	A4	A5	A6	A7
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

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