



---

# Table of Contents

---

General Information.....	3
Data Sharing .....	3
Scheduling.....	3
Hardware Specifications .....	3
Connection and Wiring Information .....	4
Configuring the PT-Link Controller .....	5
PT-Link Hardware Connection .....	5
Computer IP Address Set-up for Windows 98, NT, and XP.....	5
Connecting to the PT-Link.....	7
Making Changes to the Configuration File (config.csv).....	7
Uploading Config.csv from the PT-Link.....	7
Modifying Config.csv .....	8
Downloading Config.csv to the PT-Link.....	10
Troubleshooting the PT-Link Controller .....	11
Addressing WattMaster Devices in a BACnet® Network. ....	11
PT-Link Board LEDs.....	11
ProtoCessor Module LEDs.....	12
Using RUINET .....	13
Verifying Proper Communications .....	13
Verifying Proper Values.....	13
Data Arrays.....	14
Table 2: VCM-X Modular Data Array for Field Server.....	14
Table 3: VCM-X WSHP (Tulsa) Data Array for Field Server.....	14
Table 4: VCM-X WSHP (Coil) Data Array for Field Server .....	15
Table 5: VCM-X Data Array for Field Server.....	15
Table 6: SA Controller Data Array for Field Server .....	16
Table 7: VCM Data Array For Field Server .....	16
Appendix A.....	17
Figure 23: RJ-45 8P8C Cable for WattMaster Cross Over Networking - WattMaster Part #HZ000136.....	17
Appendix B.....	18
ProtoCessor Driver - (PICS) BACnet Protocol Implementation Conformance Statement.....	18
Appendix C - VCM-X Modular and VCM-X WSHP BACnet Parameters .....	19
Appendix D - VCM-X BACnet Parameters.....	21
Appendix E - SA Controller BACnet Parameters.....	27
Appendix F - VCM BACnet Parameters .....	31

WattMaster Controls, Inc.  
8500 NW River Park Drive · Parkville, MO 64152  
Toll Free Phone: 866-918-1100  
PH: (816) 505-1100 · FAX: (816) 505-1101 · E-mail: mail@wattmaster.com  
Visit our web site at [www.orioncontrols.com](http://www.orioncontrols.com)  
Form: OR-PTBACNET-TGD-01M Copyright 2010 WattMaster Controls, Inc.  
BACnet® is a registered trademark of ASHRAE Inc., Atlanta, GA.  
WattMaster Controls, Inc. assumes no responsibility for errors or omissions.  
This document is subject to change without notice.

The OE368-22-BACNET, PT-Link-BACnet® provides bi-directional communication between your BACnet® MS/TP protocol network and up to four of any of the following types of Orion controllers—VCM-X, VCM, MUA II, or VAV/CAV:

- VCM-X Controller (SS1026, SS1030, SS1032, SS1033, SS1034, Y200920); SA Controller (Y200921)
- VCM Controller (SS1016, Y200409, Y200616, Y200822)
- \*MUA II Controller (Y200405); VAV/CAV Controller (Y200301)

\*NOTE: Documentation is available for MUA II/VAV/CAV on our Orion Controls website: [www.orioncontrols.com/literature-new.html](http://www.orioncontrols.com/literature-new.html)

NOTE: The PT-Link-BACnet® device can be used to connect to only four Orion controllers. If more than four Orion controllers are present in a system, you will need one or more additional PT-Link-BACnet® devices for integration with a BACnet® protocol network.

To determine what controller you have, you must look at the label located on the controller EPROM. If the controller label does not match any of the SS or Y numbers listed above, your controller will not work with the PT-Link-BACnet®.

### Data Sharing

The PT-Link-BACnet® interface provides the following data sharing capabilities:

- Provides values from points on the Orion side of the gateway to BACnet® devices as if the values were originating from BACnet® objects.

- Allows BACnet® devices to modify point values on the Orion controller side of the PT-Link-BACnet® by using standard BACnet® write services.

### Scheduling

- Ability to allow BACnet® devices to send Schedule events to the Orion controller side of the gateway by using standard BACnet® services.

### Hardware Specifications

Table 1 contains the hardware specifications for the PT-Link-BACnet® interface.

Technical Data	
BACnet®-MS/TP Loop	9600, 19200, 38400, 76800 Mbps
Controller Loop	RS-485, 9600 Baud Rate
Network Protocol	BACnet®
Protocol (WattMaster Loop)	HSI Open Protocol Token Passing
Power Input Voltage	24 VAC
Power Consumption	10 VA Maximum
Operating Temp	10°F to 149°F
Operating Humidity	90% RH Non-Condensing
Weight	8 oz.

Table 1: PT-Link-BACnet® Interface Technical Data

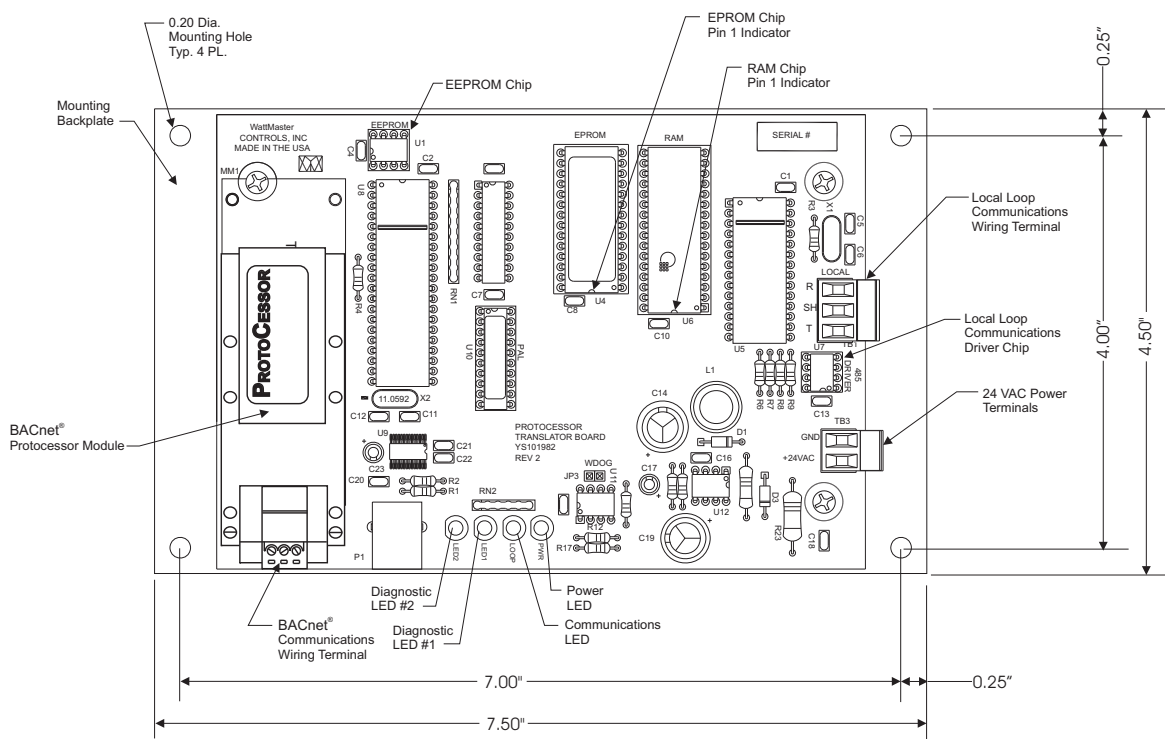


Figure 1: PT-Link-BACnet® Board Components and Dimensions

Connection and Wiring Information

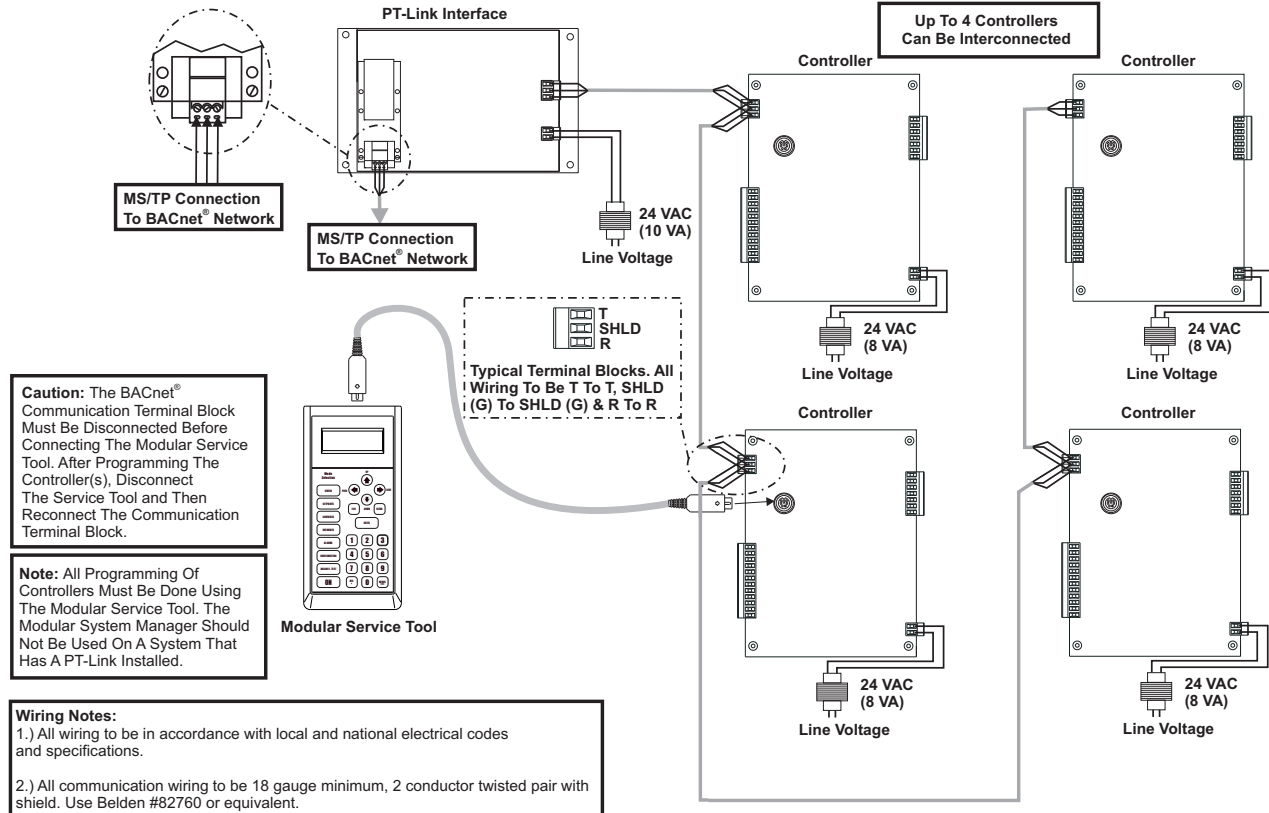


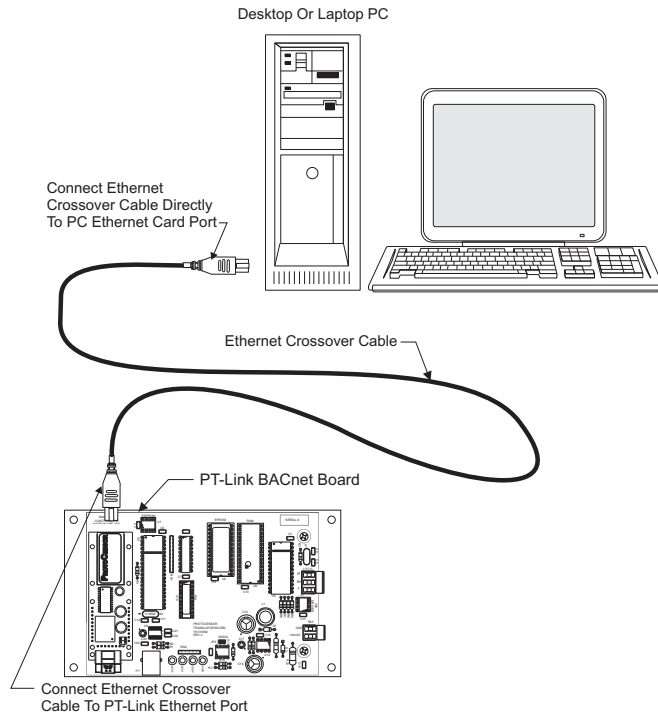
Figure 2: PT-Link-BACnet® Interface Wiring

## Configuring the PT-Link Controller

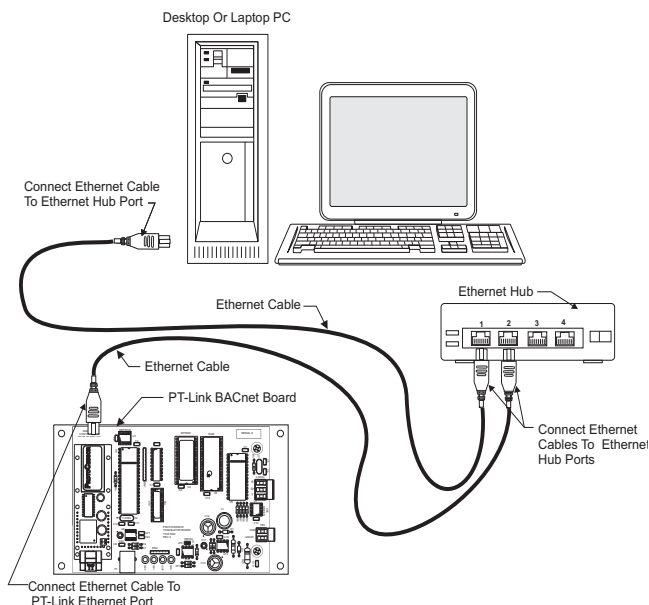
### PT-Link Hardware Connection

You have two options for connecting the PT-Link to your PC via Ethernet:

- 1.) You may connect the PT-Link directly to your PC by using a crossover cable (by others) as shown. **See Figure 3** for details.
- 2.) You can also connect both your PC and the PT-Link to an Ethernet Hub with standard CAT5 cables. **See Figure 4** for details.



**Figure 3: Connecting With Crossover Cable**



**Figure 4: Connecting With Ethernet Cable & Hub**

Locate a CAT5 cable and plug one end into your computer's Ethernet port (use a crossover cable if connecting directly to the PT-Link). If connecting directly, plug the other end of the Cable into the Ethernet port on the PT-Link. If connecting through an Ethernet Hub, plug the other end of the PC cable into the hub, and use a second CAT5 cable to connect the PT-Link to the hub as well.

Power up the PT-Link by plugging in the power cable. The PT-Link may take up to three minutes to power up completely. Once the PT-Link is powered up, you should notice that the green "GPI05" LED light on the ProtoCessor Board remains on continuously. **See Figure 19** for a diagram showing the location of the ProtoCessor "GPI05" LED.

### Computer IP Address Set-up for Windows 98, NT, and XP

In order for the PT-Link to communicate properly, it is imperative to set the IP address of both the PT-Link as well as the computer to be within the same netmask. You need to change the IP address on your computer. The following instructions will explain how to configure the IP address for Microsoft® Windows 98 and Microsoft® Windows NT and XP computers.

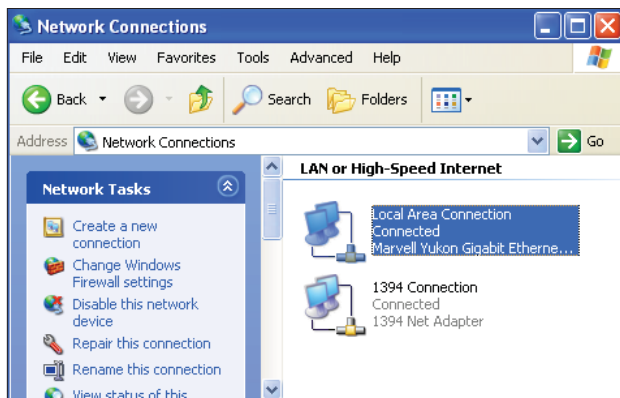
#### Computer IP Address Set-up for Windows 98

- 1.) From the Windows START button select **Start->Setting->Control panel**.
- 2.) Double click on the **Network** icon.
- 3.) In the **Configuration** window, select the **TCP/IP** entry.
- 4.) Select **Properties** and go to the **IP Address** tab.
- 5.) Select **Specify an IP address** and then enter the following information:
  - a.) IP Address 192.168.1.5
  - b.) Netmask 255.255.255.0
- 6.) Select **OK** until the network configuration program exits.
- 7.) You might have to reboot the computer before the IP address is valid.

## Configuring the PT-Link Controller

### Computer IP Address Set-up for Windows NT or XP

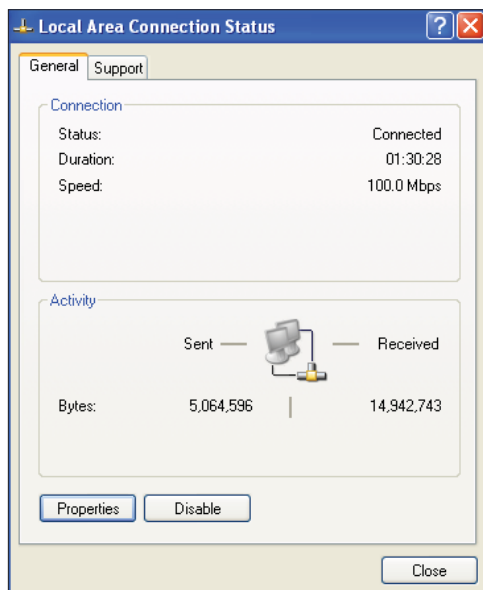
- 1.) *Click* <start>; then *click* <Control Panel>.
- 2.) *Double-click* on the **Network Connections** icon. The Network Connections Window will appear.



**Figure 5: Network Connections Window**

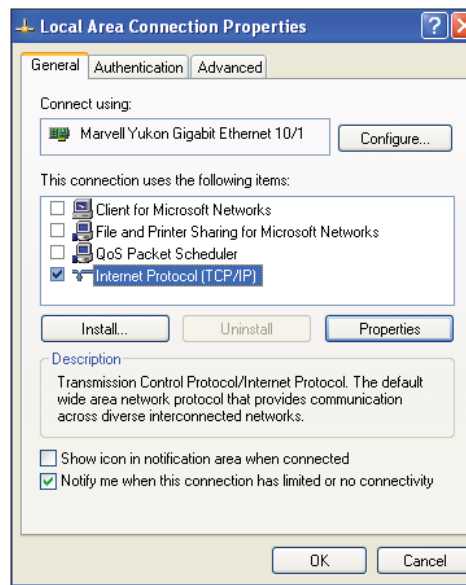
NOTE: If any wireless connections are listed, disable them by *right-clicking* the connection and *selecting* <Disable>.

- 3.) In the **Network Connections** window, *select* the **Local Area Connections** entry. The Local Area Connection Status Window will appear.



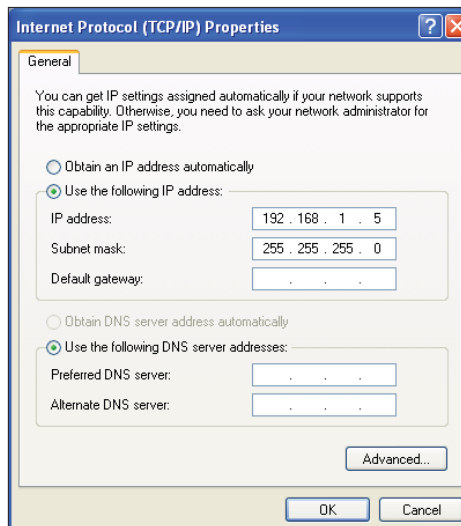
**Figure 6: Local Area Connection Status Window**

- 4.) *Click* <Properties> in the lower left of the window. The Local Area Connection Properties window will appear.



**Figure 7: Local Area Connection Properties Window**

- 5.) In the Connection Items list box, be sure the Internet Protocol (TCP/IP) is checked. Select the Internet Protocol (TCP/IP) item to highlight it and then *click* <Properties>. The Internet Protocol Properties window will appear.



**Figure 8: Internet Protocol Properties Window**

- 6.) *Type in* the following information:
  - a.) IP address 192.168.1.5
  - b.) Subnet mask 255.255.255.0
  - c.) Default Gateway is blank
- 7.) *Select* <OK> until all of the above network configuration windows are closed. You may have to *reboot* the computer before the new values are valid.

## Configuring the PT-Link Controller

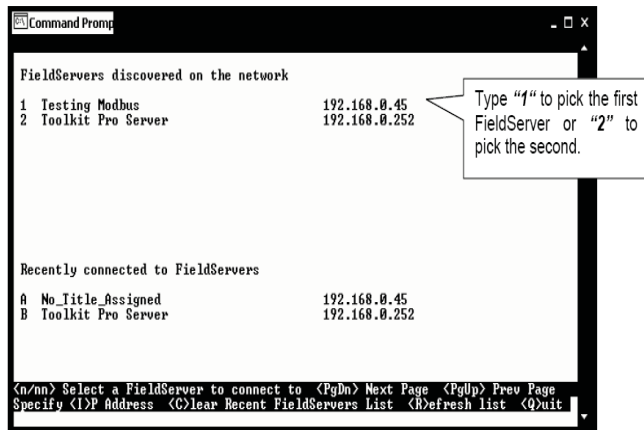
## Connecting To The PT-Link

In order to communicate and program the PT-Link you will need to install RUINET software on your computer. If you do not have the software, it is available for downloading at [www.orioncontrols.com](http://www.orioncontrols.com) in the software area of the website. After installing the software, proceed with the following instructions:

**WARNING:** Make sure to load RUINET onto your hard drive and run the program from your hard drive. DO NOT under any circumstances run RUINET from your cd drive.

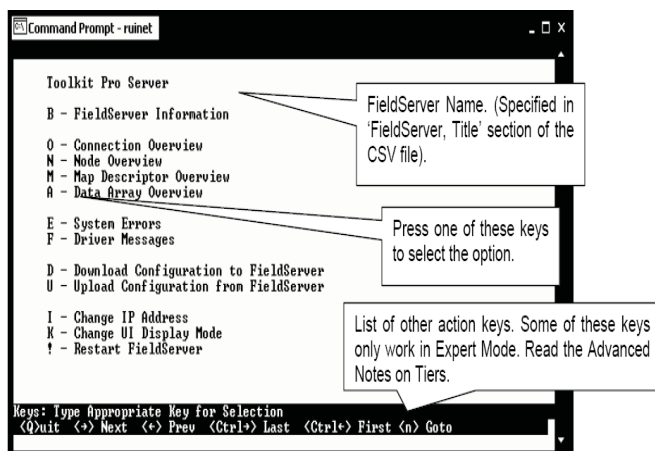
If RUINET is in the desktop directory (if it isn't, locate its directory), double-click on RUINET, and the RUINET program should run. If you have only one PT-Link connected to the network, then RUINET will automatically connect to that particular PT-Link; otherwise, a menu will appear to allow the selection of the desired PT-Link.

This menu will look similar to the one shown in **Figure 9**.



**Figure 9: RUINET PT-Link Selection Menu**

Select the required PT-Link by typing the Number or Letter in the left hand column. You should now have a menu that looks like **Figure 10**. You are now ready to send and receive files to and from the PT-Link.



**Figure 10: RUINET PT-Link Main Menu**

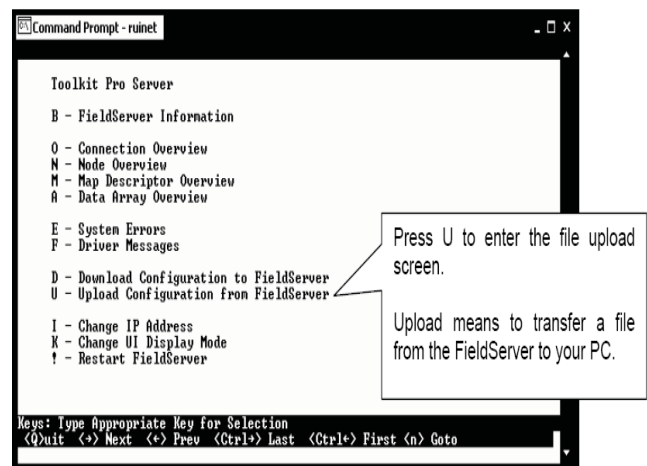
**Note:** If RUINET is unable to establish a connection, there are a few simple procedures you can perform to try to determine the problem. To verify your network cables, observe the “**Yellow**” LED displayed below “**Ethernet Connection**” on the PT-Link’s ProtoCessor Module. This LED should be on if the 10 BaseT cable is good. Secondly, observe the “**Green**” LED below “**Ethernet Connection**”. This LED should be solid while RUINET is running. If the LEDs are lit as expected, and RUINET still does not receive replies, then the netmask is probably incorrect. If this does not help, then your Ethernet setup on your PC is possibly not compatible. Ensure that you have an Ethernet adapter installed in your software configuration and that it is configured to run the TCP/IP protocol. If you are still unable to connect, please contact WattMaster Controls.

## Making Changes to the Configuration File (config.csv)

To make changes to the configuration file on the PT-Link, use the procedures outlined that follow — Upload, Modify, and Download the Configuration File.

## Uploading Config.csv from the PT-Link

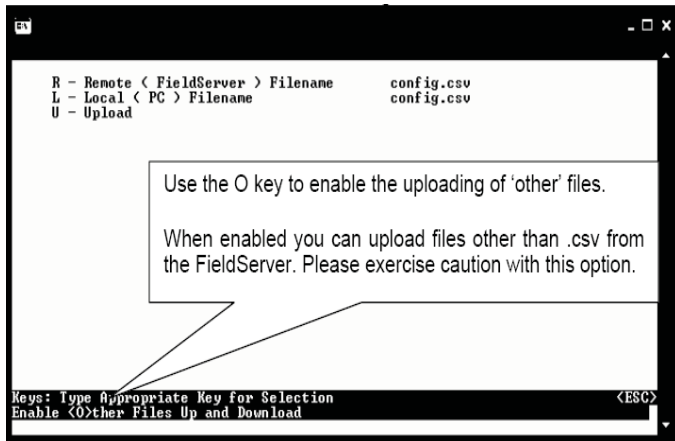
The PT-Link contains a configuration file (config.csv) that includes information such as addressing, baud rate, IP address, MAC address, etc. It can be uploaded from the PT-Link for modification if needed. When uploaded, this file can be located in the same directory that the RUINET executable file is stored and run from. Be sure when uploading that the correct file is specified in the upload window. Refer to Figures 11 & 12 for screen details.



**Figure 11: RUINET PT-Link Main Menu - Upload**

## Configuring the PT-Link Controller

From the Main Menu, type “U.” The menu in Figure 12 will appear.



**Figure 12: RUINET PT-Link Uploading Files**

- 1.) Begin the upload by pressing “U.”
- 2.) When the upload is completed, open the uploaded file using Microsoft® Notepad. This program is supplied with Microsoft Windows®. Type “N” to open using Notepad.

**WARNING:** Only edit the config.sys file using Notepad. Do NOT use Excel. Using Excel to edit the config.sys file will corrupt its contents!

## Modifying Config.csv

Make sure to upload the configuration file (config.csv) from the PT-Link control using the instructions in the previews section. After the configuration file has been uploaded open, the file using Microsoft® Notepad. Now you are ready to make modifications to the configuration. See Figures 13, 14 and 15 for a view of the section of code related to the Configuration of the PT-Link.

### Changing the Baud Rate

To change the Baud Rate, execute the instructions that follow and see Figure 13 for an example.

- 1.) Open the configuration file.
- 2.) Locate the Connections section.
- 3.) Locate the Server Baud column.
- 4.) Change the Server\_Baud values to the desired Baud Rate (9600, 19200, 38400, 76800).
- 5.) Save the configuration file with the new changes.
- 6.) Download the modified configuration file to the PT-Link.
  - \* See the Download Config.cvs section on page 10.
- 7.) Restart the PT-Link.

**NOTE:** For information on how the client will see the Orion units, see the next section.

```
Connections,,,,,,,,,
Port ,Baud ,Data_Bits ,Stop_Bits ,Parity ,Protocol, Auto_Config_Client, Auto_Config_Server, Server_Object_ID_Style, Virtual_Server_Nodes, Server_Baud
S1 ,38400,8,1,None ,wattmstr, Yes , BACnet-mstp ,5, No ,38400

//=====,,,,,,,,,,
```

**Figure 13: Changing the Baud Rate**



### Changing the MS/TP Device Instance

To change the MS/TP Device Instance, execute the instructions that follow and see **Figure 14** for an example.

- 1.) Open the configuration file.
- 2.) Locate the Client Side Nodes section.
- 3.) Locate the Node\_ID column.
- 4.) Change the Node\_ID value to the desired MS/TP Device Instance.
- 5.) Save the configuration file with the new changes.
- 6.) Download the modified configuration file to the PT-Link.
- 7.) Restart the PT-Link.

```
//=====
// Client Side Nodes,,,,,,,,,
//
//=====
/// The Client Node_ID is used when",,,,,,,,,
// virtual server side nodes are created for MSTP and MN2,,,,,,,,,
// The driver adds the Node_ID to the instance number of each,,,,,,,,,
/// class to make a server node_ID.",,,,,,,,,
//=====

Nodes,,,,,,,,,
Node_Name ,Node_ID ,Protocol ,Port
NODE_01 ,1,wattmstr ,S1

//=====
```

**Figure 14: Changing the MS/TP Device Instance**

### Changing the MAC Address

To change the MAC Address, execute the instructions that follow and see **Figure 15** for an example.

- 1.) Open the configuration file.
- 2.) Locate the Common Information section.
- 3.) Locate the System\_Node\_ID column.
- 4.) Change the System\_Node\_ID value to the desired value.
- 5.) Save the configuration file with the new changes.
- 6.) Download the modified configuration file to the PT-Link.
- 7.) Restart the PT-Link.

```
//=====,
//,
// Common Information,
//,
//,
/// System_Node_Id",
/// -----",
/// For BACnet_MSTP the System_Node_id is used as the MAC address.",
//,
//,
Bridge,
"Title " ,System_Node_Id
Wattmaster 1.00c ,11

//=====,
```

**Figure 15: Changing the MAC Address**

## Configuring the PT-Link Controller

### Downloading Config.csv to the PT-Link

NOTE: Before attempting to send files to the PT-Link, make sure that these files are in the same directory as the RUINET utility being used for sending.

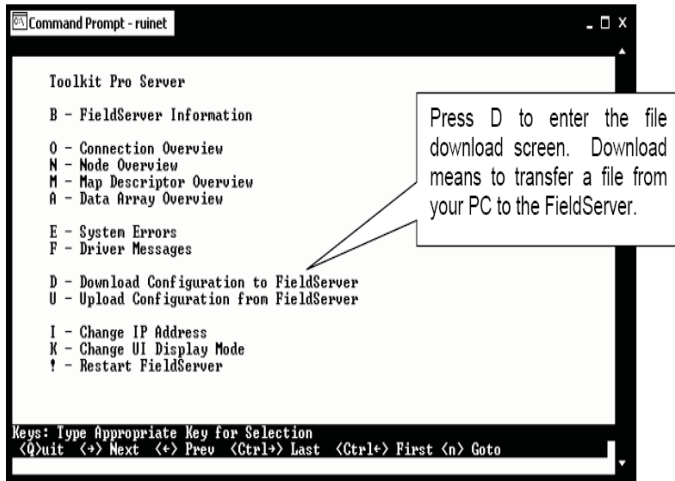


Figure 16: RUINET PT-Link Main Menu - Download

From the Main Menu, type “D”. The menu shown in Figure 17 will appear.

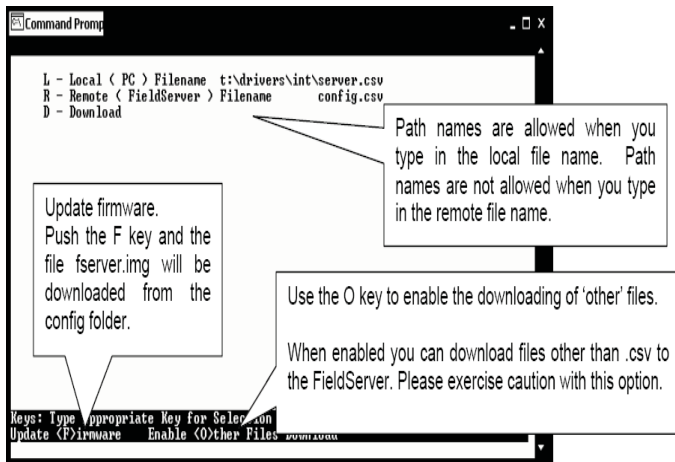


Figure 17: RUINET PT-Link Downloading Files

1.) Begin the download by selecting “D.”

NOTE: The utility will indicate when downloading is complete. **DO NOT** reset the PT-Link until this message is displayed, as this will corrupt the PT-Link.

2.) Once the download is complete, push <Esc> to get back to the main menu and use the “!” option (or simply cycle power to the PT-Link) to put the new file into operation. It is possible to do multiple downloads to the PT-Link before resetting it.

NOTE: The Remote Filename option must always be named “config.csv” for configurations; otherwise, they will be ignored by the PT-Link.

## Troubleshooting the PT-Link Controller

### Addressing WattMaster Devices in a BACnet® Network.

Each PT-Link-BACnet® generates only one BACnet® device regardless of the number of WattMaster controls connected to it. This device will have all the properties of all the WattMaster controls connected. The instance of the device is equal to the unit address (see Changing the Unit Address section of this manual). The properties of each control can be differentiated by an offset of 500. Examples:

- 1.) Properties of the controller address as 1 will range from 0 to 499.
- 2.) Properties of the controller address as 2 will range from 500 to 999.
- 3.) Properties of the controller address as 3 will range from 1000 to 1499.

To search for the instance of a specific property, follow the next formula:

**Property Instance** = ((Controller Address – 1) \* 500) + Instance Number from table.

Example:

- 1.) The PT-Link-BACnet® has a Node ID equal to five.
- 2.) Two VCM controllers connected and addressed to one and four.
- 3.) Searching for the Outdoor Temperature of each controller.
- 4.) Instance of the Outdoor Temperature in the VCM table equal to AI: 54.
- 5.) Client will only see Device 5.
- 6.) Under Device 5 it will see AI: 54 for the Outdoor Temperature of the unit addressed as 1 and AI: 1554 for the Outdoor Temperature of the unit addressed as 4.

NOTE: To simplify the calculation, we recommend that the WattMaster controllers be addressed in sequential order from one to the last controller without any unused address(es) in between.

### PT-Link Board LEDs

The PT-Link-BACnet® is equipped with LEDs that can be used for troubleshooting. There are four LEDs on the PT-Link board. See **Figure 18** for the locations of the LEDs on the PT-Link board. The LED descriptions and functions are listed in the following paragraphs.

#### PWR LED

When the PT-Link-BACnet® is powered up, the “**PWR**” LED should light up and stay on continuously. If it does not light up, check to be sure that you have 24 VAC connected to the board, that the wiring connections are tight, and that they are wired for correct polarity. The 24 VAC power must be connected so that all ground wires remain common. If after making all these checks the “**PWR**” LED still does not light up, please contact WattMaster Controls Technical Support at our Toll Free number—866-918-1100—for assistance.

#### LOOP LED

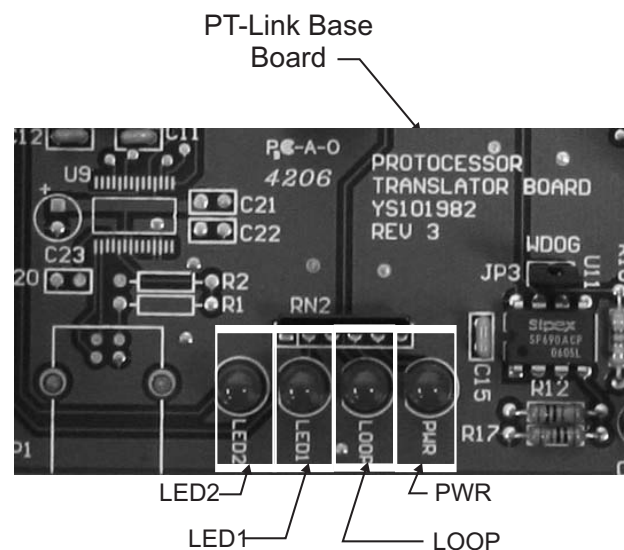
When power is applied to the PT-Link-BACnet® the “**LOOP**” LED will also light up. The LED should flicker rapidly, indicating that the PT-Link is trying to communicate with the controllers on the loop. A “**flicker**” is defined as a brief moment when the LED turns off and back on. If the “**LOOP**” LED does not operate as indicated above, first power down the unit and then reapply power. If this does not work, please contact WattMaster Controls Technical Support at our Toll Free number—866-918-1100—for assistance.

#### LED 1

When power is first applied, “**LED 1**” will be off temporarily and then will blink one time for each controller it is communicating with. For example, if you have 4 controllers on the loop connected to the PT-Link, “**LED 1**” will blink 4 times. If the amount of blinks does not match the number of controllers connected to the loop, it indicates there is a communications problem. The best way to find out which board is not communicating is to go to each controller and look at its “**COMM**” LED. The “**COMM**” LED should be solid and will flicker occasionally indicating communication with the PT-Link-BACnet®. If the “**COMM**” LED does not flicker, there is no communication with that controller.

#### LED 2

When power is first applied, “**LED 2**” will be off temporarily and then will blink slowly indicating that the PT-Link baseboard is communicating with the Processor Module. If “**LED 2**” does not blink, check that the Processor Module is installed correctly in the PT-Link baseboard.



**Figure 18: PT-Link-BACnet® LED Locations**

## Troubleshooting the PT-Link Controller

### ProtoCessor Module LEDs

#### PWR LED

When the PT-Link is first powered up, the “**PWR**” LED should light up and stay on continuously. **See Figure 19**. If the LED doesn’t light up, check that the ProtoCessor is installed correctly and firmly connected to the Base Board.

#### GPI05 LED

The “**GPI05**” LED will light up when the Base Board and the ProtoCessor Module have established communications. **See Figure 19**. This can take up to 3 minutes depending on the number of units connected to the PT-Link. If it fails to light up after 3 minutes, check that the ProtoCessor is installed correctly and firmly to the Base Board.

#### LB LED

Once the unit is powered up, the “**LB**” LED must be blinking constantly. **See Figure 19**. If this LED is constantly on or off, the Module is not working properly and needs to be replaced.

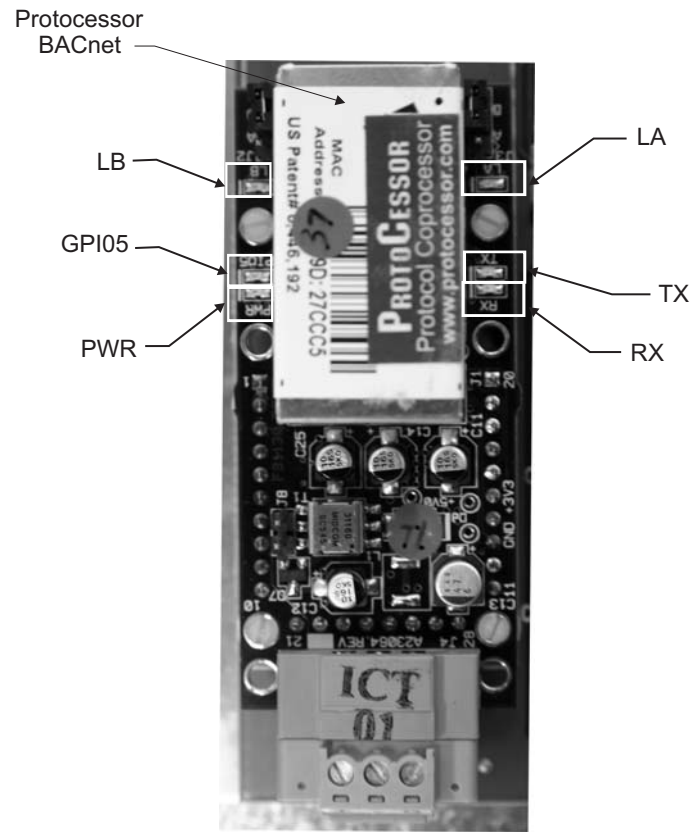
#### LA LED

Once the unit is powered up, the “**LA**” LED must be blinking constantly. **See Figure 19**. If this LED is constantly on or off, the Module is not working properly and needs to be replaced.

#### TX & RX LEDs

The “**TX**” and “**RX**” LEDs work together to indicate that communication is being established with the desired protocol network. If both LEDs are blinking, then communication is working properly. **See Figure 19**. If not, check the protocol network wiring and the baud rate in the configuration file.

If all of these tests are made and the controller still doesn’t operate, please contact WattMaster Controls Technical Support at our Toll Free number—866-918-1100—for assistance.



**Figure 19: PT-Link-BACnet® LED Locations**

## Using RUINET

Before continuing with the troubleshooting, make sure the PT-Link is connected correctly and the RUINET software is installed, running, and functioning correctly.

## Verifying Proper Communications

From the **Main Screen**, press “O” to go the **Connection Overview Screen**. This screen supplies information on communication between the PT-Link and remote devices. A number of aspect screens are available, and some of the aspect screens have more than one page. Use the space bar to toggle between aspects and use the <PgUp> and <PgDn> keys to toggle between pages of the same aspect. The **Connection Overview and Settings Aspect Screen** is shown in **Figure 20**.

The main purpose in this screen is to verify that messages and characters are being transmitted and received. In addition, it shows the number of communication errors. If the PT-Link connection “03” is the protocol connection, verify that is communicating appropriately. If it is not, check that the PT-Link LEDs are working properly, the unit is wired correctly, and the PT-Link is configured correctly (Baud Rate, Unit Address & MAC Address). If the number of errors is constantly increasing, move to the **Error Screen** by pressing the <Space Bar> 3 times to find out the cause of the errors. Use the <PgUp> and <PgDn> keys to toggle between pages of the **Error Screen**.

## Verifying Proper Values

To verify that the correct values for each unit are being communicated to the PT-Link, move to the **Data Array Overview Screen**. To get to the screen, press “A” from the **Main Menu**. See **Figure 21** for screen details.

In the **Data Array Overview Screen (Figure 21)** you will be able to see the data arrays of all the units connected to the PT-Link denoted by an array name “DA\_XXX\_IY”—Y being the address of the unit minus one. The Address of the unit is determined by a set of dip switches. To view the values being communicated from a specific unit, move to the **Data Array Detail Screen (Figure 22)** of the unit by entering the number under which it is listed. For example, for the unit listed in the third position, enter “03”.

To understand what each value means, look at the Data Array Tables for the desired unit type, VAV/CAV, MUA II, or VCM. You can change the writable values from this screen by using the modify command. To use the modify command press “M” from the **Data Array Detail Screen** and then enter the Offset you want to change followed by a space and the new value. Example: To change the Cooling Supply Setpoint to 60 in the VAV/CAV, press “M”, enter “58 60”, and then press <Enter>. This could be useful to provide that the unit can take and keep the set-points properly.

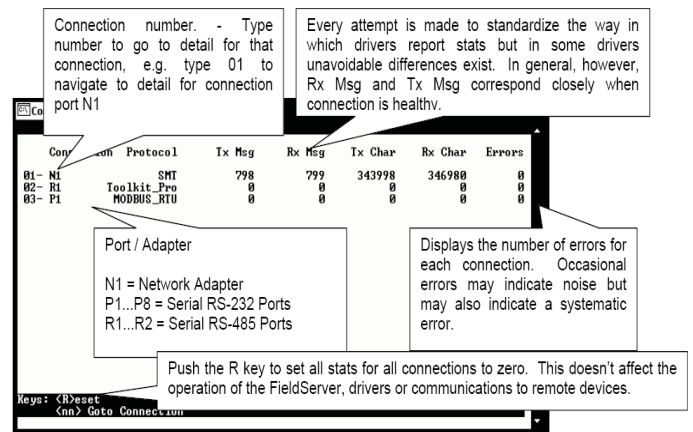


Figure 20: Connection Overview Screen

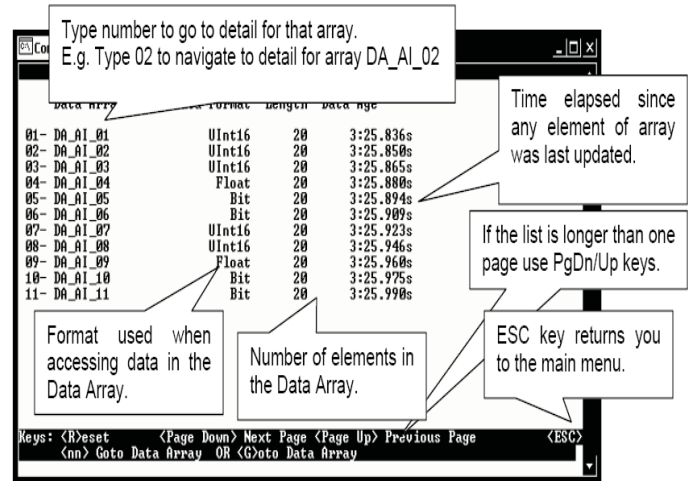


Figure 21: Data Array Overview Screen

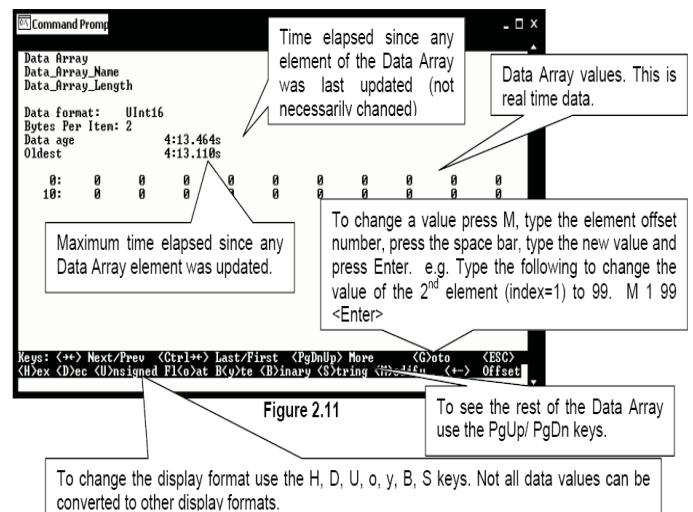


Figure 22: Data Array Detail Screen

## Data Arrays

VCM-X Modular Data Array For Field Server								
Offset	0	1	2	3	4	5	6	7
0	AppVer	CISt	HtSt	OaWtbl	TpDmnd	SpCtp	SaTp	RaTp
8	OaTp	DuctPr	OaRh	UnitMode	CtrlSts	CIEnbl	HtEnbl	EcoEnbl
16	FanDly	PofCfg	CO2Cfg	MdHt2Ins	Rt2Ins	OnRlys	ExRlys12	ExRlys34
24	EcoPos	VfdBwPos	VfdExPos	AlrmSts	AlrmGrp1	AlrmGrp2	AlrmGrp3	SaTpAlm
32	OaTpAlm	SpCtpAlm	MchClAlm	MchHtAlm	PofAlm	DrtFAlm	SmokeAlm	LoSaAlm
40	HiSaAlm	CtrlTpCF	CtrlTpHF	CtrlTp	InRh	InRhStM	DptStM	MdClPos
48	MdHtPos	MdHt2Pos	Rt2Pos	OcpClSt	OcpHtSt	UnClOst	UnHtOst	WtblSt
56	SaClSt	SaHtSt	WmupSt	SpCtpOst	SaTpOst	RaTpOst	OaTpOst	CoilTpSt
64	DptSt	InRhSt	DuctPrSt	RfPrSt	SchdFrc	OnRly1	OnRly2	OnRly3
72	OnRly4	OnRly5	ExRly1	ExRly2	ExRly3	ExRly4	ExRly5	ExRly6
80	ExRly7	ExRly8	ExRly9	ExRly10	ExRly11	ExRly12	ExRly13	ExRly14
88	ExRly15	ExRly16	CO2St	MinEcoSt	CO2Level	ByPasDmp	RaDmp	RfPr
96	OaDwpt	CoilTp	SaTpStM	PreHtSp	OaCFM	EtCFM	SaCFM	OACfmSt
104	OACfmRs	OACfmStM	MdCmp2	HdPr1	HdPr2	CdFan1	CdFan2	–

Table 2: VCM-X Modular Data Array For Field Server

VCM-X WSHP (Tulsa) Data Array For Field Server								
Offset	0	1	2	3	4	5	6	7
0	AppVer	CISt	HtSt	OaWtbl	TpDmnd	SpCtp	SaTp	RaTp
8	OaTp	DuctPr	OaRh	UnitMode	CtrlSts	CIEnbl	HtEnbl	EcoEnbl
16	FanDly	PofCfg	CO2Cfg	MdHt2Ins	Rt2Ins	OnRlys	ExRlys12	ExRlys34
24	EcoPos	VfdBwPos	VfdExPos	AlrmSts	AlrmGrp1	AlrmGrp2	AlrmGrp3	SaTpAlm
32	OaTpAlm	SpCtpAlm	MchClAlm	MchHtAlm	PofAlm	DrtFAlm	SmokeAlm	LoSaAlm
40	HiSaAlm	CtrlTpCF	CtrlTpHF	CtrlTp	InRh	InRhStM	DptStM	MdClPos
48	MdHtPos	MdHt2Pos	Rt2Pos	OcpClSt	OcpHtSt	UnClOst	UnHtOst	WtblSt
56	SaClSt	SaHtSt	WmupSt	SpCtpOst	SaTpOst	RaTpOst	OaTpOst	CoilTpSt
64	DptSt	InRhSt	DuctPrSt	RfPrSt	SchdFrc	OnRly1	OnRly2	OnRly3
72	OnRly4	OnRly5	ExRly1	ExRly2	ExRly3	ExRly4	ExRly5	ExRly6
80	ExRly7	ExRly8	ExRly9	ExRly10	ExRly11	ExRly12	ExRly13	ExRly14
88	ExRly15	ExRly16	CO2St	MinEcoSt	CO2Level	ByPasDmp	RaDmp	RfPr
96	OaDwpt	CoilTp	SaTpStM	PreHtSp	OaCFM	EtCFM	SaCFM	OACfmSt
104	OACfmRs	OACfmStM	MdCmp2	HdPr1	HdPr2	CdFan1	CdFan2	WaterTpA
112	WaterTpB	A1LSPAlm	A1LktAlm	A2LSPAlm	A2LktAlm	B1LSPAlm	B1LktAlm	B2LSPAlm
120	B2LktAlm	LWT1Alm	LWT2Alm	POWF1Alm	POWF2Alm	ComMAlm	–	–

Table 3: VCM-X WSHP (Tulsa) Data Array For Field Server

VCM-X WSHP (Coil) Data Array For Field Server								
Offset	0	1	2	3	4	5	6	7
0	AppVer	ClSt	HtSt	OaWtbl	TpDmnd	SpCtp	SaTp	RaTp
8	OaTp	DuctPr	OaRh	UnitMode	CtrlSts	ClEnbl	HtEnbl	EcoEnbl
16	FanDly	PofCfg	CO2Cfg	MdHt2Ins	Rt2Ins	OnRlys	ExRlys12	ExRlys34
24	EcoPos	VfdBwPos	VfdExPos	AlrmSts	AlrmGrp1	AlrmGrp2	AlrmGrp3	SaTpAlm
32	OaTpAlm	SpCtpAlm	MchClAlm	MchHtAlm	PofAlm	DrtFAlm	SmokeAlm	LoSaAlm
40	HiSaAlm	CtrlTpCF	CtrlTpHF	CtrlTp	InRh	InRhStM	DptStM	MdClPos
48	MdHtPos	MdHt2Pos	Rt2Pos	OcpClSt	OcpHtSt	UnClOst	UnHtOst	WtblSt
56	SaClSt	SaHtSt	WmupSt	SpCtpOst	SaTpOst	RaTpOst	OaTpOst	CoilTpSt
64	DptSt	InRhSt	DuctPrSt	RfPrSt	SchdFrc	OnRly1	OnRly2	OnRly3
72	OnRly4	OnRly5	ExRly1	ExRly2	ExRly3	ExRly4	ExRly5	ExRly6
80	ExRly7	ExRly8	ExRly9	ExRly10	ExRly11	ExRly12	ExRly13	ExRly14
88	ExRly15	ExRly16	CO2St	MinEcoSt	CO2Level	ByPasDmp	RaDmp	RfPr
96	OaDwpt	CoilTp	SaTpStM	PreHtSp	OaCFM	EtCFM	SaCFM	OACfmSt
104	OACfmRs	OACfmStM	MdCmp2	HdPr1	HdPr2	CdFan1	CdFan2	WaterTpA
112	AlLSPAlm	AlLktAlm	BlLSPAlm	BlLktAlm	LWT1Alm	POWF1Alm	ComMAlm	–

Table 4: VCM-X WSHP (Coil) Data Array For Field Server

VCM-X Data Array For Field Server								
Offset	0	1	2	3	4	5	6	7
0	AppVer	ClSt	HtSt	OaWtbl	TpDmnd	SpCtp	SaTp	RaTp
8	OaTp	DuctPr	OaRh	UnitMode	CtrlSts	ClEnbl	HtEnbl	EcoEnbl
16	FanDly	PofCfg	CO2Cfg	MdHt2Ins	Rt2Ins	OnRlys	ExRlys12	ExRlys34
24	EcoPos	VfdBwPos	VfdExPos	AlrmSts	AlrmGrp1	AlrmGrp2	AlrmGrp3	SaTpAlm
32	OaTpAlm	SpCtpAlm	MchClAlm	MchHtAlm	PofAlm	DrtFAlm	SmokeAlm	LoSaAlm
40	HiSaAlm	CtrlTpCF	CtrlTpHF	CtrlTp	InRh	InRhStM	DptStM	MdClPos
48	MdHtPos	MdHt2Pos	Rt2Pos	OcpClSt	OcpHtSt	UnClOst	UnHtOst	WtblSt
56	SaClSt	SaHtSt	WmupSt	SpCtpOst	SaTpOst	RaTpOst	OaTpOst	CoilTpSt
64	DptSt	InRhSt	DuctPrSt	RfPrSt	SchdFrc	OnRly1	OnRly2	OnRly3
72	OnRly4	OnRly5	ExRly1	ExRly2	ExRly3	ExRly4	ExRly5	ExRly6
80	ExRly7	ExRly8	ExRly9	ExRly10	ExRly11	ExRly12	ExRly13	ExRly14
88	ExRly15	ExRly16	CO2St	MinEcoSt	CO2Level	ByPasDmp	RaDmp	RfPr
96	OaDwpt	CoilTp	SaTpStM	PreHtSp	OaCFM	EtCFM	SaCFM	OACfmSt
104	OACfmRs	OACfmStM	–	–	–	–	–	–

Table 5: VCM-X Data Array For Field Server

## Data Arrays

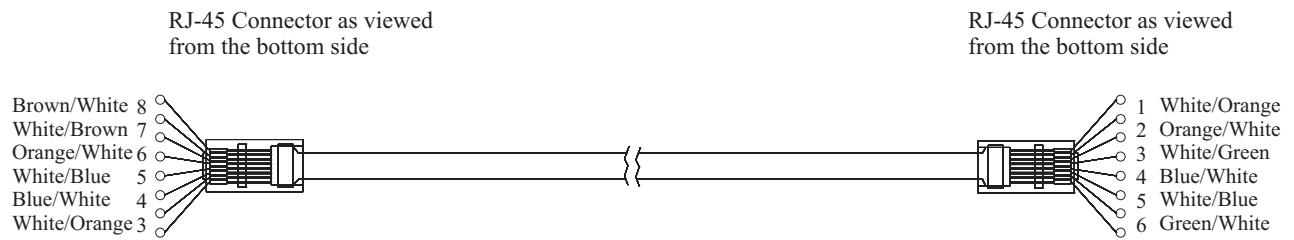
SA Controller Data Array For Field Server								
Offset	0	1	2	3	4	5	6	7
0	AppVer	ClSt	HtSt	TpDmnd	SpcTp	SaTp	DuctPr	UnitMode
8	CtrlSts	ClEnbl	HtEnbl	EcoEnbl	FanDly	MdHt2Ins	Rt2Ins	EcoPos
16	VfdBwPos	SaTpAlm	SpcTpAlm	MchClAlm	MchHtAlm	PofAlm	DrtFlAlm	LoSaAlm
24	HiSaAlm	CtrlTpCF	CtrlTpHF	CtrlTp	InRh	InRhStM	DptStM	MdClPos
32	MdHtPos	MdHt2Pos	Rt2Pos	OcpClSt	OcpHtSt	UnClOst	UnHtOst	SaClSt
40	SaHtSt	WmupSt	SpcTpOst	SaTpOst	CoilTpSt	DptSt	InRhSt	DuctPrSt
48	SchdFrc	OnRly1	OnRly2	OnRly3	OnRly4	OnRly5	ExRly1	ExRly2
56	ExRly3	ExRly4	ExRly5	ExRly6	ExRly7	ExRly8	ExRly9	ExRly10
64	ExRly11	ExRly12	ExRly13	ExRly14	ExRly15	ExRly16	CoilTp	SaTpStM
72	PreHtSp	EaTp	EwTp	EaRH	HdPr1	HdPr2	CoilTp2	EaDpt
80	WSEByp	WSEByp2	MdCmp2	CoilTpSt	CdPos1	CdPos2	EaTpAlm	EmerAlm
88	PoWFAlm	DrnAlm	EaTpOst	EwTpOst	–	–	–	–

Table 6: SA Controller Data Array For Field Server

VCM Data Array For Field Server								
Offset	0	1	2	3	4	5	6	7
0	AppVer	ClSt	HtSt	OaWtbl	TpDmnd	SpcTp	SaTp	RaTp
8	OaTp	DuctPr	OaRh	UnitMode	CtrlSts	ClDmnd	HtDmnd	DehmDmnd
16	ClEnbl	HtEnbl	EcoEnbl	FanDly	WmupDmnd	PofCfg	CO2Cfg	MdHt2Ins
24	Rt2Ins	OnRlys	ExRlys12	ExRlys34	EcoPos	VfdBwPos	VfdExPos	AlrmSts
32	AlrmGrp1	AlrmGrp2	AlrmGrp3	SaTpAlm	OaTpAlm	SpcTpAlm	MchClAlm	MchHtAlm
40	PofAlm	DrtFlAlm	SmokeAlm	LoSaAlm	HiSaAlm	CtrlTpCF	CtrlTpHF	CtrlTp
48	InRh	InRhStM	DptStM	MdClPos	MdHtPos	MdHt2Pos	Rt2Pos	OcpClSt
56	OcpHtSt	UnClOst	UnHtOst	WtblSt	SaClSt	SaHtSt	WmupSt	SpcTpOst
64	SaTpOst	RaTpOst	OaTpOst	CoilTpSt	DptSt	InRhSt	DuctPrSt	RfPrSt
72	SchdFrc	OnRly1	OnRly2	OnRly3	OnRly4	OnRly5	ExRly1	ExRly2
80	ExRly3	ExRly4	ExRly5	ExRly6	ExRly7	ExRly8	ExRly9	ExRly10
88	ExRly11	ExRly12	ExRly13	ExRly14	ExRly15	ExRly16	CO2St	MinEcoSt
96	CO2Level	ByPasDmp	RaDmp	RfPr	OaDwpt	CoilTp	SaTpStM	PreHtSp

Table 7: VCM Data Array For Field Server





Use the standard EIA/TIA color code for "CROSS OVER CABLE" as shown.  
It is not the same as a standard Cat 5 patch cabling. The outer cable jacket should be "Orange" in color. This is not a straight thru pin 1 to pin 1 cable.

**Figure 23: RJ-45 8P8C Cable for WattMaster Cross Over Networking - WattMaster Part #HZ000136**

## Appendix B

### ProtoCessor Driver - (PICS) BACnet Protocol Implementation Conformance Statement

#### BACnet® Protocol

Date: July 13, 2006  
Vendor Name: FieldServer Technologies  
Product Name: FieldServer

Product Model  
Number: ASP-485 ProtoCessor

Product Description: This software product will provide bi-directional communication between various RTU, DCS, SCADA and PLC using most common protocols and a BACnet system. The FieldServer can perform protocol conversion (as opposed to routing) between the different BACnet Data Link Layer options. This is arranged by way of static mappings.

Protocol Conversions: See FieldServer Technologies list of protocol drivers available to determine available protocol conversions.

#### BACnet Standardized Device Profile (Annex L)

- √ BACnet Smart Sensor (B-SS)
- √ BACnet Smart Actuator (B-SA)
- √ BACnet Application Specific Controller (B-ASC)

#### BACnet Interoperability Building Blocks Supported (Annex K):

- √ K.1.2 BIBB - Data Sharing - ReadProperty-B (DS-RP-B)
- √ K.1.8 BIBB - Data Sharing - WriteProperty-B (DS-WP-B)
- √ K.5.2 BIBB - Device Management - Dynamic Device Binding-B (DM-DDB-B)

Segmentation Capability: None

#### Standard Object Types Supported

- √ Device Object
- √ Analog Input
- √ Analog Output
- √ Analog Value
- √ Binary Input
- √ Binary Output
- √ Binary Value
- √ Multi State Input Output
- √ Multi State Output
- √ Multi State Value

For all of these properties, the following applies:

- 1.) Does not support BACnet CreateObject
- 2.) Does not support BACnet DeleteObject
- 3.) Does not support any optional properties
- 4.) No additional writeable properties exist
- 5.) No proprietary properties exist
- 6.) No range restrictions exist

#### Data Link Layer Options:

- √ MS/TP master (Clause 9), baud rate up to 76800 bps
- √ MS/TP slave (Clause 9), baud rate up to 76800 bps

Device Address Binding: Not supported

#### Character Sets Supported:

Where support for multiple character sets is indicated, this does not imply that they can all be supported simultaneously.

- √ ANSI X3.4
- ISO 10646 (UCS-2)
- IBM/Microsoft DBCS
- ISO 10646 (ICS-4)
- ISO 8859-1
- JIS C

Appendix C - VCM-X Modular and WSHP BACnet Parameters

NOTE: The following points for the VCM-X Modular and VCM-X WSHP Controllers are additional points. All points and property identifiers in the VCM-X Controller table (pages 21-26) also apply to the VCM-X Modular and VCM-X WSHP Controllers.

BACnet Properties for VCM-X Modular

Parameter	Name	Object	Description	Limits
Modulating Compressor 2	MdCmp2	AI: 206	Current position of the 2nd Stage of Compressor Modulation.	
Head Pressure 1	HdPr1	AI: 207	Head Pressure for 1st Compressor	
Head Pressure 2	HdPr2	AI: 208	Head Pressure for 2nd Compressor	
Condenser Fan 1	CdFan1	AI: 209	Condenser Fan 1 Signal Status	
Condenser Fan 2	CdFan2	AI: 210	Condenser Fan 2 Signal Status	

BACnet Properties for VCM-X WSHP (Tulsa)

Parameter	Name	Object	Description
Modulating Compressor 2	MdCmp2	AI: 206	Current position of the 2nd Stage of Compressor Modulation.
Head Pressure 1	HdPr1	AI: 207	Head Pressure for 1st Compressor
Head Pressure 2	HdPr2	AI: 208	Head Pressure for 2nd Compressor
Condenser Fan 1	CdFan1	AI: 209	Condenser Fan 1 Signal Status
Condenser Fan 2	CdFan2	AI: 210	Condenser Fan 2 Signal Status
Water Temp. A	WaterTpA	AI: 220	Current water temperature of refrigerant for System A.
Water Temp. B	WaterTpB	AI: 221	Current water temperature of refrigerant for System B.

BACnet Properties for VCM-X WSHP (Tulsa)

Parameter	Name	Object	Description
Compressor A1 Low Suction Pressure Alarm	A1LSPAIm	BI: 222	Alarm that indicates Suction Pressure for Compressor A1 is below the Low Suction Pressure Cooling (Heating) Setpoint.
Compressor A1 Lockout Alarm	A1LktAlm	BI: 223	Alarm that indicates Compressor A1 is locked out.
Compressor A2 Low Suction Pressure Alarm	A2LSPAIm	BI: 224	Alarm that indicates Suction Pressure for Compressor A2 is below the Low Suction Pressure Cooling (Heating) Setpoint.
Compressor A2 Lockout Alarm	A2LktAlm	BI: 225	Alarm that indicates Compressor A2 is locked out.
Compressor B1 Low Suction Pressure Alarm	B1LSPAIm	BI: 226	Alarm that indicates Suction Pressure for Compressor B1 is below the Low Suction Pressure Cooling (Heating) Setpoint.
Compressor B1 Lockout Alarm	B1LktAlm	BI: 227	Alarm that indicates Compressor B1 is locked out.
Compressor B2 Low Suction Pressure Alarm	B2LSPAIm	BI: 228	Alarm that indicates Suction Pressure for Compressor B2 is below the Low Suction Pressure Cooling (Heating) Setpoint.
Compressor 4 Lockout Alarm	B2LktAlm	BI: 229	Alarm that indicates Compressor B2 is locked out.
Low Water Temperature 1 Alarm	LWT1Alm	BI: 230	Alarm that indicates water temperature is below the Leaving Water Safety Setpoint (Heating only) for System A.
Low Water Temperature 2 Alarm	LWT2Alm	BI: 231	Alarm that indicates water temperature is below the Leaving Water Safety Setpoint (Heating only) for System B
Proof of Water 1 Flow Alarm	POWF1Alm	BI: 232	Alarm that indicates no Proof of Water Flow for System A (A1/A2)
Proof of Water 2 Flow Alarm	POWF2Alm	BI: 233	Alarm that indicates no Proof of Water Flow for System B (B1/B2)
Module Communications Alarm	ComMAIm	BI: 234	Alarm that indicates that one or more Modules are not communicating with the VCM-X WSHP Controller.

## Appendix C - VCM-X Modular and WSHP BACnet Parameters

BACnet Properties for VCM-X WSHP (Coil)

Parameter	Name	Object	Description
Modulating Compressor 2	MdCmp2	AI: 206	Current position of the 2nd Stage of Compressor Modulation.
Head Pressure 1	HdPr1	AI: 207	Head Pressure for 1st Compressor
Head Pressure 2	HdPr2	AI: 208	Head Pressure for 2nd Compressor
Condenser Fan 1	CdFan1	AI: 209	Condenser Fan 1 Signal Status
Condenser Fan 2	CdFan2	AI: 210	Condenser Fan 2 Signal Status
Water Temp. A	WaterTpA	AI: 220	Current water temperature.
Compressor A Low Suction Pressure Alarm	A1LSPAlm	BI: 222	Alarm that indicates Suction Pressure for Circuit A is below the Low Suction Pressure Cooling (Heating) Setpoint.
Compressor A Lockout Alarm	A1LktAlm	BI: 223	Alarm that indicates Circuit A Compressors are locked out.
Compressor B Low Suction Pressure Alarm	B1LSPAlm	BI: 226	Alarm that indicates Suction Pressure for Circuit B is below the Low Suction Pressure Cooling (Heating) Setpoint.
Compressor B Lockout Alarm	B1LktAlm	BI: 227	Alarm that indicates Circuit B Compressors are locked out.
Low Water Temperature Alarm	LWT1Alm	BI: 230	Alarm that indicates water temperature is below the Leaving Water Safety Setpoint (Heating only).
Proof of Water Flow Alarm	POWF1Alm	BI: 232	Alarm that indicates no Proof of Water Flow.
Module Communications Alarm	ComMAIm	BI: 234	Alarm that indicates that one or more Modules are not communicating with the VCM-X WSHP Controller.

## Appendix D - VCM-X BACnet Parameters

BACnet Properties for the VCM-X Controller				
Parameter	Name	Object	Description	Limits
Alarm Status	AlmSts	AI: 1	Needed only in legacy application.	
Control Status	CtrlSts	AI: 4	Current operational status.	
Occupied/ Mode Enable Cooling Setpoint Mirror	CISt	AI: 7	Occupied/ Mode Enable Cooling Setpoint Mirror.	
Control Temperature	CtrlTp	AI: 9	Current value of the control temperature sensor.	
Duct Static Pressure	DuctPr	AI: 14	Current value of the duct static pressure sensor.	
Economizer Position	EcoPos	AI: 16	Current position of the economizer damper.	
Occupied/ Mode Enable Heating Setpoint Mirror	HtSt	AI: 31	Occupied/ Mode Enable Heating Setpoint Mirror.	
Modulating Gas Valve Position	MdHt-2Pos	AI: 38	Current position of MODGAS II modulating gas valve control.	
On Board Relays	OnRlys	AI: 44	Needed only in legacy application.	
Outdoor Air Dewpoint	OaDwpt	AI: 47	Current calculated outdoor air dewpoint added on version 1.09.	
Outdoor Air Humidity	OaRh	AI: 52	Current value of the outdoor humidity sensor.	
Outdoor Air Temperature	OaTp	AI: 54	Current value of the outdoor temperature sensor.	
Outdoor Air Wetbulb	OaWtbl	AI: 55	Current calculated value of the outdoor wetbulb temperature.	
Reheat Value Position	Rt2Pos	AI: 60	Current position of MHGRV modulating hot gas reheat valve control.	
Relief Pressure	RfPr	AI: 62	Current value of the building pressure sensor.	
Return Air Temperature	RaTp	AI: 64	Current value of the return temperature sensor.	
Indoor Humidity	InRh	AI: 67	Current value of the indoor humidity sensor.	

BACnet Properties for the VCM-X Controller				
Parameter	Name	Object	Description	Limits
Space Temperature	SpcTp	AI: 72	Current value of the space temperature sensor.	
Current Supply Air Setpoint	SaTpStM	AI: 82	Current SAT Cooling or Heating setpoint if there is no reset source; Current calculated SAT setpoint with Reset Source.	
Supply Air Temperature	SaTp	AI: 83	Current value of the supply air temperature sensor.	
Temperature Demand	TpDmnd	AI: 84	Based on the comparison between the current Control Temperature and the Heating or Cooling Setpoint Temperatures. Does not work for supply air control	
VFD Blower Fan	VfdBw-Pos	AI: 88	Current position of the VFD blower fan signal.	
VFD Relief Fan	VfdExPos	AI: 89	Current position of the VFD relief fan signal.	
Application Software Version	AppVer	AI: 99	Current version of the software in the unit.	
Alarm Group 1	AlrmGrp1	AI: 104	Needed only in legacy application.	
Alarm Group 2	AlrmGrp2	AI: 105	Needed only in legacy application.	
Alarm Group 3	AlrmGrp3	AI: 106	Needed only in legacy application.	
Dewpoint Setpoint Mirror	DptStM	AI: 110	Mirror of the DPTst "read only."	
External Relays 1-2	ExRlys12	AI: 111	Needed only in legacy application.	
External Relays 3-4	ExRlys34	AI: 112	Needed only in legacy application.	
Indoor Rh Setpoint Mirror	InRhStM	AI: 114	Mirror of the InRhSt "read only."	
Modulating Cool Position	MdCIPos	AI: 115	Current position of the modulating cooling signal (Chilled water or digital compressor).	
Modulating Heat Position	MdHtPos	AI: 116	Current position of the modulating heating signal (hot water or SCR heat).	

Appendix D - VCM-X BACnet Parameters

BACnet Properties for the VCM-X Controller					
Parameter	Name	Object	Description	Limits	
Unit Mode	UnitMode	AI: 123	Needed only in legacy application.		
Return Air CO <sub>2</sub> Level	CO2Level	AI: 150	Current value of the CO <sub>2</sub> sensor.		
Bypass Damper Position	ByPas-Dmp	AI: 153	Current position of the bypass damper signal.		
Return Damper Position	RaDmp	AI: 154	Current position of the return damper signal.		
Coil Temperature	CoilTp	AI: 181	Current coil temperature reading added on version 1.09.		
Outdoor Air CFM	OaCFM	AI: 193	Current Outdoor Airflow Measurement		
Exhaust CFM	EtCFM	AI: 194	Current Exhaust Airflow Measurement		
Supply Air CFM	SaCFM	AI: 195	Current Supply Airflow Measurement		
Current Calculated OA CFM setpoint	OACfm-StM	AI: 205	Current calculated Outdoor Air CFM based on CO <sub>2</sub> level.		
Dewpoint Setpoint	DptSt	AO: 13	If the outdoor dewpoint rises above this setpoint, the unit will activate the Dehumidification Demand.	35	80
Occupied/ Mode Enable Cooling Setpoint	OcpClSt	AO: 42	If the control temperature rises one degree above this setpoint, the control will activate the cooling demand. If the control temperature is the Supply Air Sensor, then the cooling demand is always active.	0	99
Occupied/ Mode Enable Heating Setpoint	OcpHtSt	AO: 43	If the control temperature drops one degree below this setpoint, the control will activate the heating demand. If the control temperature is the Supply Air Sensor, then there is no heating demand.		99

BACnet Properties for the VCM-X Controller					
Parameter	Name	Object	Description	Limits	
Outdoor Air Sensor Offset	OaTpOst	AO: 53	If the Outdoor Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100
Return Air Sensor Offset	RaTpOst	AO: 65	If the Return Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100
Schedule Force	SchdFrc	AO: 66	0 = Auto/ Unoccupied Mode 1 = Forced On 2 = Forced Off	0	2
Space Sensor Offset	SpcTpOst	AO: 71	If the Space Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100
SAT/Reset Source Cooling Setpoint	SaClSt	AO: 77	Supply Air setpoint or Reset Source target temperature in Cooling Mode.	40	80
SAT/Reset Source Heating Setpoint	SaHtSt	AO: 78	Supply Air setpoint or Reset Source target temperature in Heating Mode.	40	200
Supply Air Sensor Offset	SaTpOst	AO: 80	If the Supply Air Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100
Warm Up Setpoint	WmupSt	AO: 91	In a VAV application, upon entering the occupied mode, the Warm-up Demand will be activated if the return air temperature falls one degree below this setpoint.	50	90

## Appendix D - VCM-X BACnet Parameters

BACnet Properties for the VCM-X Controller					
Parameter	Name	Object	Description	Limits	
Wet Bulb Setpoint	WtblSt	AO: 92	The economizer is enabled if the outdoor temperature or wetbulb falls below this setpoint.	0	80
Coil Temperature Setpoint	CoilTpSt	AO: 107	This is the coil suction temperature target during dehumidification mode. Produces dewpoint in the supply air approximately 10°F above this setpoint.	35	70
Relief Pressure Setpoint	RfPrSt	AO: 118	This is the target building pressure to be maintained by the VFD Relief signal.	-0.2	0.2
Indoor Humidity Setpoint	InRhSt	AO: 120	If the indoor humidity rises above this setpoint, the unit will activate the Dehumidification Demand.	0	100
Unoccupied Cooling Offset	UnClOst	AO: 124	During the Unoccupied Mode of Operation, this Setpoint spreads the Occupied Cooling Setpoint out by a user adjustable amount. If you do not want Cooling to operate during the Unoccupied Mode, use the default setting of 30°F for these setpoints.	0	30
Unoccupied Heating Offset	UnHtOst	AO: 125	During the Unoccupied Mode of Operation, this Setpoint spreads the Occupied Heating Setpoint out by a user adjustable amount. If you do not want Heating to operate during the Unoccupied Mode, use the default setting of 30°F for these setpoints.	0	30

BACnet Properties for the VCM-X Controller					
Parameter	Name	Object	Description	Limits	
CO <sub>2</sub> Setpoint	CO2St	AO: 149	When the CO <sub>2</sub> level rises above the CO <sub>2</sub> Protection Limit Max Level, the Economizer's Minimum Position will begin to reset open proportionally between the CO <sub>2</sub> Protection Limit Max Level Setpoint and the Reset Range Setpoint.	0	3000
Minimum Outside Air Setpoint	MinEcoSt	AO: 151	This is the minimum position of the economizer in the occupied modes.	1	100
Static Pressure Setpoint	DuctPrSt	AO: 152	This is the target duct pressure to be maintained by the VFD blower signal.	0.01	3
Preheater Setpoint	PreHtSp	AO: 196	Low Outside Air Ambient Protection Setpoint	0	100
Outdoor Air CFM Setpoint	OACfmSt	AO: 203	Minimum desired Outdoor Air CFM.	0.10 K	200 K
Outdoor Air CFM Reset Limit	OACfmRs	AO: 204	Maximum desired Outdoor Air CFM when CO <sub>2</sub> reaches its reset limit.	0.10 K	200 K

Appendix D - VCM-X BACnet Parameters

BACnet Properties for the VCM-X Controller				
Parameter	Name	Object	Description	Limits
Bad Supply Air Sensor	SaTpAlm	BI: 2	Alarm that indicates a failure in the supply air sensor.	
CO <sub>2</sub> Sensor Installed	CO2Cfg	BI: 3	Status that indicates the CO <sub>2</sub> function has been configured.	
Cooling Enabled	CIEnbl	BI: 6	Status that indicates mechanical cooling is enabled.	
Economizer Enabled	EcoEnbl	BI: 15	Status that indicates the economizer is enabled.	
Fan Start Up Delay	FanDly	BI: 25	Status that indicates the fan is commanded to run, but it is in the start up delay mode.	
Fan Proving Alarm	PofAlm	BI: 26	Alarm that indicates a failure in the flow of the VFD blower.	
Heating Enabled	HtEnbl	BI: 30	Status that indicates that mechanical heating is enabled.	
High Supply Air Temperature Alarm	HiSaAlm	BI: 33	The Supply Air has risen above the Hi SAT Cutoff Setpoint. Heating stages begin to deactivate and the fan continues to run.	
Low Supply Air Temperature Alarm	LoSaAlm	BI: 37	The Supply Air has fallen below the Hi SAT Cutoff Setpoint and cooling stages will begin to deactivate. If the unit is in Economizer, Vent, or Heating Mode the Supply Fan will shut off.	
MODGAS II Connected	MdHt2Ins	BI: 39	Status that indicates the MODGAS II controller is connected.	
Proof of Flow Configured	PofCfg	BI: 57	Status that indicates the proof of flow function has been configured.	
REHEAT II Connected	Rt2Ins	BI: 58	Status that indicates the MHGRV controllers is connected to the system.	

BACnet Properties for the VCM-X Controller				
Parameter	Name	Object	Description	Limits
Mechanical Cooling Alarm	MchClAlm	BI: 94	Compressor Relays are enabled but the Supply Air Temperature has not fallen 5°F w/in a user-adjustable time period. This does not indicate compressors are active and will not shut the unit down.	
Mechanical Heating Alarm	MchHtAlm	BI: 95	Heating Mode has been initiated but the Supply Air Temperature has not risen 5°F w/in a user-adjustable time period. This does not indicate heat stages are active and will not shut the unit down.	
Dirty Filter Detected	DrtFlAlm	BI: 96	Alarm that indicates the filters are dirty.	
Control Temperature Cool Failure	CtrlTpCF	BI: 108	This alarm is activated if the control temperature does not get within 5°F to the occupied cooling setpoint in an hour in the cooling mode. This alarm is not used in 100% outside air units or supply air control.	
Control Temperature Heat Failure	CtrlTpHF	BI: 109	This alarm is activated if the control temperature does not get within 5°F to the occupied heating setpoint in an hour in the heating mode. This alarm is not used in 100% outside air units or supply air control.	
Outdoor Air Temperature Lost	OaTpAlm	BI: 117	Alarm that indicates a failure in the outdoor air temperature.	
Smoke Detected Alarm	SmokeAlm	BI: 119	Alarm that indicates the Smoke sensor has been activated.	
Space Temperature Sensor Lost	SpcTpAlm	BI: 101	Alarm that indicates a failure in the space temperature sensor.	



## Appendix D - VCM-X BACnet Parameters

BACnet Properties for the VCM-X Controller				
Parameter	Name	Object	Description	Limits
On Board Relay 1	OnRly1	BI: 127	Current status of relay 1.	
On Board Relay 2	OnRly2	BI: 128	Current status of relay 2.	
On Board Relay 3	OnRly3	BI: 129	Current status of relay 3.	
On Board Relay 4	OnRly4	BI: 130	Current status of relay 4.	
On Board Relay 5	OnRly5	BI: 131	Current status of relay 5.	
Expansion Relay 1	ExRly1	BI: 133	Current status of relay 6.	
Expansion Relay 2	ExRly2	BI: 134	Current status of relay 7.	
Expansion Relay 3	ExRly3	BI: 135	Current status of relay 8.	
Expansion Relay 4	ExRly4	BI: 136	Current status of relay 9.	
Expansion Relay 5	ExRly5	BI: 137	Current status of relay 10.	
Expansion Relay 6	ExRly6	BI: 138	Current status of relay 11.	
Expansion Relay 7	ExRly7	BI: 139	Current status of relay 12.	
Expansion Relay 8	ExRly8	BI: 140	Current status of relay 13.	
Expansion Relay 9	ExRly9	BI: 141	Current status of relay 14.	
Expansion Relay 10	ExRly10	BI: 142	Current status of relay 15.	
Expansion Relay 11	ExRly11	BI: 143	Current status of relay 16.	
Expansion Relay 12	ExRly12	BI: 144	Current status of relay 17.	
Expansion Relay 13	ExRly13	BI: 145	Current status of relay 18.	
Expansion Relay 14	ExRly14	BI: 146	Current status of relay 19.	
Expansion Relay 15	ExRly15	BI: 147	Current status of relay 20.	
Expansion Relay 16	ExRly16	BI: 148	Current status of relay 21.	

### VCM-X PT-Link-BACnet® Property Identifier:

The PT-Link-BACnet® Link amends the following property identity to the BACnet® property identifier.

#### BACNETPropertyIdentifier :

```

WattBACNETScheduleForce ::= ENUMERATED {
    NormalOperation                (0),
    ForceOccupied                  (1),
    ForceUnoccupied                (2)
}

```

```

VcmxUnitMode ::= ENUMERATED {
    Unoccupied                      (0),
    RemoteContactOccupied          (1),
    NormalScheduleOccupied        (2),
    PushButtonOrZoneOverride      (3),
    HolidayModeActive              (4),
    UnoccupiedZoneDemand          (5),
    RemoteScheduleOverride        (6),
    CurrentOutputForceMode        (7),
    SATHighOrLowCutOff            (8),
    CO2OverrideInProgress         (9),
    PurgeModeActive                (10)
}

```

```

VcmxControlStatusBits ::= ENUMERATED {
    Off                             (0),
    Vent                            (1),
    Cool                            (2),
    Heat                            (3),
    Dehum                           (4),
    Dehum Cool                      (5),
    Dehum Heat                      (6),
    Warm Up Mode                    (7)
}

```

```

VcmxOnBoardRelaysBits ::= BIT STRING {
    OnBoardRelay1                  (0),
    OnBoardRelay2                  (1),
    OnBoardRelay3                  (2),
    OnBoardRelay4                  (3),
    OnBoardRelay5                  (4)
}

```

## Appendix D - VCM-X BACnet Parameters

**VcmxExternal Relays1-2Bits** ::= BIT STRING {

```

ExpansionBoard1Relay1      (0),
ExpansionBoard1Relay2      (1),
ExpansionBoard1Relay3      (2),
ExpansionBoard1Relay4      (3),
ExpansionBoard2Relay1      (4),
ExpansionBoard2Relay2      (5),
ExpansionBoard2Relay3      (6),
ExpansionBoard2Relay4      (7)
}

```

**VcmxExternal Relays2-4Bits** ::= BIT STRING {

```

ExpansionBoard3Relay1      (0),
ExpansionBoard3Relay2      (1),
ExpansionBoard3Relay3      (2),
ExpansionBoard3Relay4      (3),
ExpansionBoard4Relay1      (4),
ExpansionBoard4Relay2      (5),
ExpansionBoard4Relay3      (6),
ExpansionBoard4Relay4      (7)
}

```

**VcmxAlarmStatusBits** ::= BIT STRING {

```

Alarm Group1               (0),
Alarm Group2               (1),
Alarm Group3               (2)
}

```

**VcmxAlarmGroup1Bits** ::= BIT STRING {

```

SupplyTempSensorFailure    (0),
LostOutdoorTempSensorSignal (1),
LostSpaceTempSensorSignal  (2)
}

```

**VcmxAlarmGroup2Bits** ::= BIT STRING {

```

MechanicalCoolingAlarm     (0),
MechanicalHeatingAlarm     (1),
FanProvingAlarm            (2),
DirtyFilterDetected        (3),
SmokeDetected              (4)
}

```

**VcmxAlarmGroup3Bits** ::= BIT STRING {

```

LowSupplyAirTempAlarm      (0),
HighSupplyAirTempAlarm     (1),
LowControlTempAlarm        (2),
HighControlTempAlarm       (3)
}

```

## Appendix E - SA Controller BACnet Parameters

BACnet Properties for SA Controller				
Parameter	Name	Object	Description	Limits
Control Status	CtrlSts	AI: 4	Current operational status.	
Occupied/ Mode Enable Cooling Setpoint Mirror	CISt	AI: 7	Occupied/ Mode Enable Cooling Setpoint Mirror.	
Control Temperature	CtrlTp	AI: 9	Current value of the control temperature sensor.	
Duct Static Pressure	DuctPr	AI: 14	Current value of the duct static pressure sensor.	
Economizer Position	EcoPos	AI: 16	Current position of the economizer damper.	
Occupied/ Mode Enable Heating Setpoint Mirror	HtSt	AI: 31	Occupied/ Mode Enable Heating Setpoint Mirror.	
Modulating Gas Valve Position	MdHt-2Pos	AI: 38	Current position of MODGAS II modulating gas valve control.	
Reheat Value Position	Rt2Pos	AI: 60	Current position of MHGRV modulating hot gas reheat valve control.	
Indoor Humidity	InRh	AI: 67	Current value of the indoor humidity sensor.	
Space Temperature	SpcTp	AI: 72	Current value of the space temperature sensor.	
Current Supply Air Setpoint	SaTpStM	AI: 82	Current SAT Cooling or Heating setpoint if there is no reset source; Current calculated SAT setpoint with Reset Source.	
Supply Air Temperature	SaTp	AI: 83	Current value of the supply air temperature sensor.	
Temperature Demand	TpDmnd	AI: 84	Based on the comparison between the current Control Temperature and the Heating or Cooling Setpoint Temperatures. Does not work for supply air control	
VFD Blower Fan	VfdBw-Pos	AI: 88	Current position of the VFD blower fan signal.	

BACnet Properties for SA Controller				
Parameter	Name	Object	Description	Limits
Application Software Version	AppVer	AI: 99	Current version of the software in the unit.	
Coil Temperature Setpoint	CoilTpSt	AI: 107	Current Coil Temperature Setpoint.	
Dewpoint Setpoint Mirror	DptStM	AI: 110	Mirror of the DPtSt "read only."	
Indoor RH Setpoint Mirror	InRhStM	AI: 114	Mirror of the InRhSt "read only."	
Modulating Cool Position	MdClPos	AI: 115	Current position of the modulating cooling signal (Chilled water or digital compressor).	
Modulating Heat Position	MdHtPos	AI: 116	Current position of the modulating heating signal (hot water or SCR heat).	
Unit Mode	UnitMode	AI: 123	Needed only in legacy application.	
Coil Temperature	CoilTp	AI: 181	Current coil temperature reading added on version 1.09.	
Modulating Compressor 2 Position	MdCmp2	AI: 206	Current position of the 2nd Stage of Compressor Modulation.	
Head Pressure 1	HdPr1	AI: 207	Head Pressure for 1st unit.	
Head Pressure 2	HdPr2	AI: 208	Head Pressure for 2nd unit.	
Entering Air Temperature	EaTp	AI: 235	Temperature of the air that is entering the unit.	
Entering Water Temperature	EwTp	AI: 236	Temperature of the water that is entering the unit.	
Entering Air Humidity	EaRh	AI: 237	Relative Humidity of the Entering Air.	
Coil Temperature 2	CoilTp2	AI: 240	Current Coil Temperature for 2nd unit.	
Entering Air Dewpoint	EaDpt	AI: 241	Current Entering Air Dewpoint	
Water Side Economizer Bypass	WSEByp	AI: 242	Current Water Side Economizer Bypass Position for 1st unit.	
Water Side Economizer Bypass 2	WSEByp2	AI: 243	Current Water Side Economizer Bypass Position for 2nd unit.	
Condenser Position 1	CdPos1	AI: 246	Current Condenser Position for 1st unit.	

Appendix E - SA Controller BACnet Parameters

BACnet Properties for SA Controller					
Parameter	Name	Object	Description	Limits	
Condenser Position 2	CdPos2	AI: 247	Current Condenser Position for 2nd unit.		
Dewpoint Setpoint	DptSt	AO: 13	If the outdoor dewpoint rises above this setpoint, the unit will activate the Dehumidification Demand.	35	80
Occupied/ Mode Enable Cooling Setpoint	OcpClSt	AO: 42	If the control temperature rises one degree above this setpoint, the control will activate the cooling demand. If the control temperature is the Supply Air Sensor, then the cooling demand is always active.	0	99
Occupied/ Mode Enable Heating Setpoint	OcpHtSt	AO: 43	If the control temperature drops one degree below this setpoint, the control will activate the heating demand. If the control temperature is the Supply Air Sensor, then there is no heating demand.		99
Schedule Force	SchdFrc	AO: 66	0 = Auto/ 1 = Forced On 2 = Forced Off	0	2
Space Sensor Offset	SpcTpOst	AO: 71	If the Space Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100
SAT/Reset Source Cooling Setpoint	SaClSt	AO: 77	Supply Air setpoint or Reset Source target temperature in Cooling Mode.	40	80
SAT/Reset Source Heating Setpoint	SaHtSt	AO: 78	Supply Air setpoint or Reset Source target temperature in Heating Mode.	40	200

BACnet Properties for SA Controller					
Parameter	Name	Object	Description	Limits	
Supply Air Sensor Offset	SaTpOst	AO: 80	If the Supply Air Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100
Warm Up Setpoint	WmupSt	AO: 91	In a VAV application, upon entering the occupied mode, the Warm-up Demand will be activated if the return air temperature falls one degree below this setpoint.	50	90
Coil Temperature Setpoint	CoilTpSt	AO: 107	This is the coil suction temperature target during dehumidification mode. Produces dewpoint in the supply air approximately 10°F above this setpoint.	35	70
Indoor Humidity Setpoint	InRhSt	AO: 120	If the indoor humidity rises above this setpoint, the unit will activate the Dehumidification Demand.	0	100
Unoccupied Cooling Offset	UnClOst	AO: 124	During the Unoccupied Mode of Operation, this Setpoint spreads the Occupied Cooling Setpoint out by a user adjustable amount. If you do not want Cooling to operate during the Unoccupied Mode, use the default setting of 30°F for these setpoints.	0	30

## Appendix E - SA Controller BACnet Parameters

BACnet Properties for SA Controller					
Parameter	Name	Object	Description	Limits	
Unoccupied Heating Offset	UnHtOst	AO: 125	During the Unoccupied Mode of Operation, this Setpoint spreads the Occupied Heating Setpoint out by a user adjustable amount. If you do not want Heating to operate during the Unoccupied Mode, use the default setting of 30°F for these setpoints.	0	30
Static Pressure Setpoint	DuctPrSt	AO: 152	This is the target duct pressure to be maintained by the VFD blower signal.	0.01	3
Preheater Setpoint	PreHtSp	AO: 196	Low Outside Air Ambient Protection Setpoint	0	100
Entering Air Offset Setpoint	EaTpOst	AO: 238	If the Entering Air Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.		
Entering Water Offset Setpoint	EwTpOst	AO: 239	If the Entering Water Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.		

BACnet Properties for SA Controller			
Parameter	Name	Object	Description
Bad Supply Air Sensor	SaTpAlm	BI: 2	Alarm that indicates a failure in the supply air sensor.
Cooling Enabled	ClEnbl	BI: 6	Status that indicates mechanical cooling is enabled.
Economizer Enabled	EcoEnbl	BI: 15	Status that indicates the economizer is enabled.
Fan Start Up Delay	FanDly	BI: 25	Status that indicates the fan is commanded to run, but it is in the start up delay mode.
Fan Proving Alarm	PofAlm	BI: 26	Alarm that indicates a failure in the flow of the VFD blower.
Heating Enabled	HtEnbl	BI: 30	Status that indicates that mechanical heating is enabled.
High Supply Air Temperature Alarm	HiSaAlm	BI: 33	The Supply Air has risen above the Hi SAT Cutoff Setpoint. Heating stages begin to deactivate and the fan continues to run.
Low Supply Air Temperature Alarm	LoSaAlm	BI: 37	The Supply Air has fallen below the Hi SAT Cutoff Setpoint and cooling stages will begin to deactivate. If the unit is in Economizer, Vent, or Heating Mode the Supply Fan will shut off.
MODGAS II Connected	MdHt2Ins	BI: 39	Status that indicates the MODGAS II controller is connected.
REHEAT II Connected	Rt2Ins	BI: 58	Status that indicates the MHGRV controllers is connected to the system.
Mechanical Cooling Alarm	MchClAlm	BI: 94	Compressor Relays are enabled but the Supply Air Temperature has not fallen 5°F w/in a user-adjustable time period. This does not indicate compressors are active and will not shut the unit down.

## Appendix E - SA Controller BACnet Parameters

BACnet Properties for SA Controller			
Parameter	Name	Object	Description
Mechanical Heating Alarm	MchHtAlm	BI: 95	Heating Mode has been initiated but the Supply Air Temperature has not risen 5°F w/in a user-adjustable time period. This does not indicate heat stages are active and will not shut the unit down.
Dirty Filter Detected	DrtFlAlm	BI: 96	Alarm that indicates the filters are dirty.
Control Temperature Cool Failure	CtrlTpCF	BI: 108	This alarm is activated if the control temperature does not get within 5°F to the occupied cooling setpoint in an hour in the cooling mode. This alarm is not used in 100% outside air units or supply air control.
Control Temperature Heat Failure	CtrlTpHF	BI: 109	This alarm is activated if the control temperature does not get within 5°F to the occupied heating setpoint in an hour in the heating mode. This alarm is not used in 100% outside air units or supply air control.
Space Temperature Sensor Lost	SpcTpAlm	BI: 101	Alarm that indicates a failure in the space temperature sensor.
On Board Relay 1	OnRly1	BI: 127	Current status of relay 1.
On Board Relay 2	OnRly2	BI: 128	Current status of relay 2.
On Board Relay 3	OnRly3	BI: 129	Current status of relay 3.
On Board Relay 4	OnRly4	BI: 130	Current status of relay 4.
On Board Relay 5	OnRly5	BI: 131	Current status of relay 5.
Expansion Relay 1	ExRly1	BI: 133	Current status of relay 6.
Expansion Relay 2	ExRly2	BI: 134	Current status of relay 7.
Expansion Relay 3	ExRly3	BI: 135	Current status of relay 8.
Expansion Relay 4	ExRly4	BI: 136	Current status of relay 9.
Expansion Relay 5	ExRly5	BI: 137	Current status of relay 10.
Expansion Relay 6	ExRly6	BI: 138	Current status of relay 11.
Expansion Relay 7	ExRly7	BI: 139	Current status of relay 12.
Expansion Relay 8	ExRly8	BI: 140	Current status of relay 13.
Expansion Relay 9	ExRly9	BI: 141	Current status of relay 14.
Expansion Relay 10	ExRly10	BI: 142	Current status of relay 15.

BACnet Properties for SA Controller			
Parameter	Name	Object	Description
Expansion Relay 11	ExRly11	BI: 143	Current status of relay 16.
Expansion Relay 12	ExRly12	BI: 144	Current status of relay 17.
Expansion Relay 13	ExRly13	BI: 145	Current status of relay 18.
Expansion Relay 14	ExRly14	BI: 146	Current status of relay 19.
Expansion Relay 15	ExRly15	BI: 147	Current status of relay 20.
Expansion Relay 16	ExRly16	BI: 148	Current status of relay 21.
Emergency Shutdown Alarm	EmerAlm	BI: 219	Alarm that indicates Emergency Shutdown.
Drain Pan Overflow	DrnAlm	BI: 244	Alarm that indicates overflow of the drain pan.
Proof of Water Flow Alarm	PoWFAlm	BI: 245	Alarm that indicates no Proof of Water Flow.
Entering Air Temperature Alarm	EaTpAlm	BI: 248	Alarm that indicates failure in the Entering Air Temperature Sensor.

### SA Controller PT-Link-BACnet® Property Identifier:

The PT-Link-BACnet® Link amends the following property identity to the BACnet® property identifier.

#### BACNETPropertyIdentifier :

```
VcmxControlStatusBits ::= ENUMERATED {
    Off (0),
    Vent (1),
    Cool (2),
    Heat (3),
    Dehum (4),
    Dehum Cool (5),
    Dehum Heat (6),
    Warm Up Mode (7)
}
```

## Appendix F - VCM BACnet Parameters

BACnet Properties for the VCM Controller				
Parameter	Name	Object	Description	Limits
Application Software Version	AppVer	AI: 99	Current version of the software in the unit.	
Alarm Status	AlrmSts	AI: 1	Needed only in legacy application.	
Unit Mode	UnitMode	AI: 123	Needed only in legacy application.	
Control Status	CtrlSts	AI: 4	Current operational status.	
Control Temperature	CtrlTp	AI: 9	Current value of the control temperature sensor.	
Occupied/ Mode Enable Cooling Setpoint Mirror	ClSt	AI: 7	Occupied/ Mode Enable Cooling Setpoint Mirror.	
Duct Static Pressure	DuctPr	AI: 14	Current value of the duct static pressure sensor.	
Economizer Position	EcoPos	AI: 16	Current position of the economizer damper.	
External Relays 1-2	ExRlys12	AI: 111	Needed only in legacy application.	
External Relays 3-4	ExRlys34	AI: 112	Needed only in legacy application.	
Indoor Humidity	InRh	AI: 67	Current value of the indoor humidity sensor.	
Occupied/ Mode Enable Heating Setpoint Mirror	HtSt	AI: 31	Occupied/ Mode Enable Heating Setpoint Mirror.	
On Board Relays	OnRlys	AI: 44	Needed only in legacy application.	
Outdoor Air Humidity	OaRh	AI: 52	Current value of the outdoor humidity sensor.	
Outdoor Air Temperature	OaTp	AI: 54	Current value of the outdoor temperature sensor.	
Outdoor Air Wetbulb	OaWtbl	AI: 55	Current calculated value of the outdoor wetbulb temperature.	
Relief Pressure	RfPr	AI: 62	Current value of the building pressure sensor.	
Return Air CO <sub>2</sub> Level	CO2Level	AI: 150	Current value of the CO <sub>2</sub> sensor.	
Return Air Temperature	RaTp	AI: 64	Current value of the return temperature sensor.	
Space Temperature	SpcTp	AI: 72	Current value of the space temperature sensor.	

BACnet Properties for the VCM Controller				
Parameter	Name	Object	Description	Limits
Supply Air Temperature	SaTp	AI: 83	Current value of the supply air temperature sensor.	
Temperature Demand	TpDmnd	AI: 84	Based on the comparison between the current Control Temperature and the Heating or Cooling Setpoint Temperatures. Does not work for supply air control.	
VFD Blower Fan	VfdBwPos	AI: 88	Current position of the VFD blower fan signal.	
VFD Relief Fan	VfdExPos	AI: 89	Current position of the VFD relief fan signal.	
Modulating Gas Valve Position	MdHt2Pos	AI: 38	Current position of MODGAS II modulating gas valve control.	
Reheat Value Position	Rt2Pos	AI: 60	Current position of MHGRV modulating hot gas reheat valve control.	
Alarm Group 1	AlrmGrp1	AI: 104	Needed only in legacy application.	
Alarm Group 2	AlrmGrp2	AI: 105	Needed only in legacy application.	
Alarm Group 3	AlrmGrp3	AI: 106	Needed only in legacy application.	
Dewpoint Setpoint Mirror	DptStM	AI: 110	Mirror of the DPtSt "read only."	
Indoor RH Setpoint Mirror	InRhStM	AI: 114	Mirror of the InRhSt "read only."	
Modulating Cool Position	MdCIPos	AI: 115	Current position of the modulating cooling signal (Chilled water or digital compressor).	

Appendix F - VCM BACnet Parameters

BACnet Properties for the VCM Controller					
Parameter	Name	Object	Description	Limits	
Modulating Heat Position	MdHtPos	AI: 116	Current position of the modulating heating signal (hot water or SCR heat).		
Bypass Damper Position	ByPasDmp	AI: 153	Current position of the bypass damper signal.		
Return Damper Position	RaDmp	AI: 154	Current position of the return damper signal.		
Outdoor Air Dewpoint	OaDwpt	AI: 47	Current calculated outdoor air dewpoint added on version 1.09.		
Current Supply Air Setpoint	SaTpStM	AI: 82	Current SAT Cooling or Heating setpoint if there is no reset source; Current calculated SAT setpoint with Reset Source.		
Coil Temperature	CoilTp	AI: 181	Current coil temperature reading added on version 1.09.		
Preheater Setpoint	PreHtSp	AO: 196	Low Outside Air Ambient Protection Setpoint	0	100
CO <sub>2</sub> Setpoint	CO2St	AO: 149	When the CO <sub>2</sub> level rises above the CO <sub>2</sub> Protection Limit Max Level, the Economizer's Minimum Position will begin to reset open proportionally between the CO <sub>2</sub> Protection Limit Max Level Setpoint and the Reset Range Setpoint.	0	3000
Static Pressure Setpoint	DuctPrSt	AO: 152	This is the target duct pressure to be maintained by the VFD blower signal.	0.01	3

BACnet Properties for the VCM Controller					
Parameter	Name	Object	Description	Limits	
Minimum Outside Air Setpoint	MinEcoSt	AO: 151	This is the minimum position of the economizer in the occupied modes.	1	100
Occupied/ Mode Enable Cooling Setpoint	OcpClSt	AO: 42	If the control temperature rises one degree above this setpoint, the control will activate the cooling demand. If the control temperature is the Supply Air Sensor, then the cooling demand is always active.	0	99
Occupied/ Mode Enable Heating Setpoint	OcpHtSt	AO: 43	If the control temperature drops one degree below this setpoint, the control will activate the heating demand. If the control temperature is the Supply Air Sensor, then there is no heating demand.	0	99
Outdoor Air Sensor Offset	OaTpOst	AO: 53	If the Outdoor Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100
Relief Pressure Setpoint	RfPrSt	AO: 118	This is the target building pressure to be maintained by the VFD Relief signal.	-0.2	0.2
Return Air Sensor Offset	RaTpOst	AO: 65	If the Return Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100



## Appendix F - VCM BACnet Parameters

BACnet Properties for the VCM Controller					
Parameter	Name	Object	Description	Limits	
Schedule Force	SchdFrc	AO: 66	0 = Auto/ Unoccupied Mode 1 = Forced On 2 = Forced Off	0	2
Space Sensor Offset	SpcTpOst	AO: 71	If the Space Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100
SAT/Reset Source Cooling Setpoint	SaClSt	AO: 77	Supply Air setpoint or Reset Source target temperature in Cooling Mode.	40	80
SAT/Reset Source Heating Setpoint	SaHtSt	AO: 78	Supply Air setpoint or Reset Source target temperature in Heating Mode.	40	200
Supply Air Sensor Offset	SaTpOst	AO: 80	If the Supply Air Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature.	-100	100
Unoccupied Cooling Offset	UnClOst	AO: 124	During the Unoccupied Mode of Operation, this Setpoint spreads the Occupied Cooling Setpoint out by a user adjustable amount. If you do not want Cooling to operate during the Unoccupied Mode, use the default setting of 30°F for these setpoints.	0	30
Unoccupied Heating Offset	UnHtOst	AO: 125	During the Unoccupied Mode of Operation, this Setpoint spreads the Occupied Heating Setpoint out by a user adjustable amount. If you do not want Heating to operate during the Unoccupied Mode, use the default setting of 30°F for these setpoints.	0	30

BACnet Properties for the VCM Controller					
Parameter	Name	Object	Description	Limits	
Dewpoint Setpoint	DptSt	AO: 13	If the outdoor dewpoint rises above this setpoint, the unit will activate the Dehumidification Demand.	35	80
Coil Temperature Setpoint	CoilTpSt	AO: 107	This is the coil suction temperature target during dehumidification mode. Produces dewpoint in the supply air approximately 10°F above this setpoint.	35	70
Indoor Humidity Setpoint	InRhSt	AO: 120	If the indoor humidity rises above this setpoint, the unit will activate the Dehumidification Demand.	0	100
Warm Up Setpoint	WmupSt	AO: 91	In a VAV application, upon entering the occupied mode, the Warm-up Demand will be activated if the return air temperature falls one degree below this setpoint.	50	90
Wet Bulb Setpoint	WtblSt	AO: 92	The economizer is enabled if the outdoor temperature or wetbulb falls below this setpoint.	0	80
Bad Supply Air Sensor	SaTpAlm	BI: 2	Alarm that indicates a failure in the supply air sensor.		
CO <sub>2</sub> Sensor Installed	CO2Cfg	BI: 3	Status that indicates the CO <sub>2</sub> function has been configured.		
Cooling Demand	ClDmnd	BI: 5	Status that indicates a demand for cooling.		
Cooling Enabled	ClEnbl	BI: 6	Status that indicates mechanical cooling is enabled.		
Economizer Enabled	EcoEnbl	BI: 15	Status that indicates the economizer is enabled.		

Appendix F - VCM BACnet Parameters

BACnet Properties for the VCM Controller				
Parameter	Name	Object	Description	Limits
Fan Start Up Delay	FanDly	BI: 25	Status that indicates the fan is commanded to run, but it is in the start up delay mode.	
Fan Proving Alarm	PofAlm	BI: 26	Alarm that indicates a failure in the flow of the VFD blower.	
Heating Demand	HtDmnd	BI: 29	Status that indicates a demand for heating.	
Heating Enabled	HtEnbl	BI: 30	Status that indicates that mechanical heating is enabled.	
High Supply Air Temperature Alarm	HiSaAlm	BI: 33	The Supply Air has risen above the Hi SAT Cutoff Setpoint. Heating stages begin to deactivate and the fan continues to run.	
Low Supply Air Temperature Alarm	LoSaAlm	BI: 37	The Supply Air has fallen below the Hi SAT Cutoff Setpoint and cooling stages will begin to deactivate. If the unit is in Economizer, Vent, or Heating Mode the Supply Fan will shut off.	
MODGAS II Connected	MdHt2Ins	BI: 39	Status that indicates the MODGAS II controller is connected.	
Proof of Flow Configured	PofCfg	BI: 57	Status that indicates the proof of flow function has been configured.	
REHEAT II Connected	Rt2Ins	BI: 58	Status that indicates the MHGRV controllers is connected to the system.	
Warm Up Mode Active	WmupDmnd	BI: 90	Status that indicates the control is in the Warm-up mode.	
Mechanical Cooling Alarm	MchClAlm	BI: 94	Compressor Relays are enabled but the Supply Air Temperature has not fallen 5°F w/in a user-adjustable time period. This does not indicate compressors are active and will not shut the unit down.	

BACnet Properties for the VCM Controller				
Parameter	Name	Object	Description	Limits
Mechanical Heating Alarm	MchHtAlm	BI: 95	Heating Mode has been initiated but the Supply Air Temperature has not risen 5°F w/in a user-adjustable time period. This does not indicate heat stages are active and will not shut the unit down.	
Dirty Filter Detected	DrtFlAlm	BI: 96	Alarm that indicates the filters are dirty.	
Control Temperature Cool Failure	CtrlTpCF	BI: 108	This alarm is activated if the control temperature does not get within 5°F to the occupied cooling setpoint in an hour in the cooling mode. This alarm is not used in 100% outside air units or supply air control.	
Control Temperature Heat Failure	CtrlTpHF	BI: 109	This alarm is activated if the control temperature does not get within 5°F to the occupied heating setpoint in an hour in the heating mode. This alarm is not used in 100% outside air units or supply air control.	
Dehumidification Demand	DehmDmnd	BI: 113	Status that indicates a demand for dehumidification.	
Outdoor Air Temperature Lost	OaTpAlm	BI: 117	Alarm that indicates a failure in the outdoor air temperature.	
Smoke Detected Alarm	SmokeAlm	BI: 119	Alarm that indicates the Smoke sensor has been activated.	
Space Temperature Sensor Lost	SpcTpAlm	BI: 101	Alarm that indicates a failure in the space temperature sensor.	
On Board Relay 1	OnRly1	BI: 127	Current status of relay 1.	
On Board Relay 2	OnRly2	BI: 128	Current status of relay 2.	
On Board Relay 3	OnRly3	BI: 129	Current status of relay 3.	
On Board Relay 4	OnRly4	BI: 130	Current status of relay 4.	

## Appendix F - VCM BACnet Parameters

<b>BACnet Properties for the VCM Controller</b>				
<b>Parameter</b>	<b>Name</b>	<b>Object</b>	<b>Description</b>	<b>Limits</b>
On Board Relay 5	OnRly5	BI: 131	Current status of relay 5.	
Expansion Relay 1	ExRly1	BI: 133	Current status of relay 6.	
Expansion Relay 2	ExRly2	BI: 134	Current status of relay 7.	
Expansion Relay 3	ExRly3	BI: 135	Current status of relay 8.	
Expansion Relay 4	ExRly4	BI: 136	Current status of relay 9.	
Expansion Relay 5	ExRly5	BI: 137	Current status of relay 10.	
Expansion Relay 6	ExRly6	BI: 138	Current status of relay 11.	
Expansion Relay 7	ExRly7	BI: 139	Current status of relay 12.	
Expansion Relay 8	ExRly8	BI: 140	Current status of relay 13.	
Expansion Relay 9	ExRly9	BI: 141	Current status of relay 14.	
Expansion Relay 10	ExRly10	BI: 142	Current status of relay 15.	
Expansion Relay 11	ExRly11	BI: 143	Current status of relay 16.	
Expansion Relay 12	ExRly12	BI: 144	Current status of relay 17.	
Expansion Relay 13	ExRly13	BI: 145	Current status of relay 18.	
Expansion Relay 14	ExRly14	BI: 146	Current status of relay 19.	
Expansion Relay 15	ExRly15	BI: 147	Current status of relay 20.	
Expansion Relay 16	ExRly16	BI: 148	Current status of relay 21.	

### VCM PT-Link-BACnet® Property Identifier:

The PT-Link-BACnet® Link amends the following property identity to the BACnet® property identifier.

#### **BACNETPropertyIdentifier :**

```
WattBACNETScheduleForce ::= ENUMERATED {
    NormalOperation           (0),
    ForceOccupied             (1),
    ForceUnoccupied           (2)
}
```

```
VcmUnitMode ::= ENUMERATED {
    Unoccupied                 (0),
    RemoteContactOccupied     (1),
    NormalScheduleOccupied    (2),
    PushButtonOrZoneOverride (3),
    HolidayModeActive         (4),
    UnoccupiedZoneDemand      (5),
    RemoteScheduleOverride    (6),
    CurrentOutputForceMode    (7),
    SATHighOrLowCutOff        (8),
    CO2OverrideInProgress     (9),
    PurgeModeActive           (10)
}
```

```
VcmControlStatusBits ::= BIT STRING {
    AhuControlEconomizer      (0),
    NoOutdoorAirTempSensor    (1),
    CarbonDioxideSensorPresent (2),
    HeatCoolStagingDisabled   (3),
    DehumidificationMode      (4),
    ModGasIICConnected        (5),
    ReheatIICConnected        (6)
}
```

```
VcmOnBoardRelaysBits ::= BIT STRING {
    OnBoardRelay1             (0),
    OnBoardRelay2             (1),
    OnBoardRelay3             (2),
    OnBoardRelay4             (3),
    OnBoardRelay5             (4)
}
```

## Appendix F - VCM BACnet Parameters

**VcmExternal Relays1-2Bits** ::= BIT STRING {

```

ExpansionBoard1Relay1      (0),
ExpansionBoard1Relay2      (1),
ExpansionBoard1Relay3      (2),
ExpansionBoard1Relay4      (3),
ExpansionBoard2Relay1      (4),
ExpansionBoard2Relay2      (5),
ExpansionBoard2Relay3      (6),
ExpansionBoard2Relay4      (7)
}

```

**VcmExternal Relays2-4Bits** ::= BIT STRING {

```

ExpansionBoard3Relay1      (0),
ExpansionBoard3Relay2      (1),
ExpansionBoard3Relay3      (2),
ExpansionBoard3Relay4      (3),
ExpansionBoard4Relay1      (4),
ExpansionBoard4Relay2      (5),
ExpansionBoard4Relay3      (6),
ExpansionBoard4Relay4      (7)
}

```

**VcmAlarmStatusBits** ::= BIT STRING {

```

Alarm Group1               (0),
Alarm Group2               (1),
Alarm Group3               (2)
}

```

**VcmAlarmGroup1Bits** ::= BIT STRING {

```

SupplyTempSensorFailure    (0),
LostOutdoorTempSensorSignal (1),
LostSpaceTempSensorSignal  (2)
}

```

**VcmAlarmGroup2Bits** ::= BIT STRING {

```

MechanicalCoolingAlarm     (0),
MechanicalHeatingAlarm     (1),
FanProvingAlarm            (2),
DirtyFilterDetected        (3),
SmokeDetected              (4)
}

```

**VcmAlarmGroup3Bits** ::= BIT STRING {

```

LowSupplyAirTempAlarm      (0),
HighSupplyAirTempAlarm     (1),
LowControlTempAlarm        (2),
HighControlTempAlarm       (3)
}

```



Notes

---





Form: OR-PTBACNET-TGD-01M  
All rights reserved.

Printed in the USA

June 2010  
Copyright 2010

WattMaster Controls, Inc. • 8500 NW River Park Drive • Parkville, MO • 64152  
Phone (816) 505-1100      [www.orioncontrols.com](http://www.orioncontrols.com)      Fax (816) 505-1101