

PT-Link-LON[®]

Technical Guide

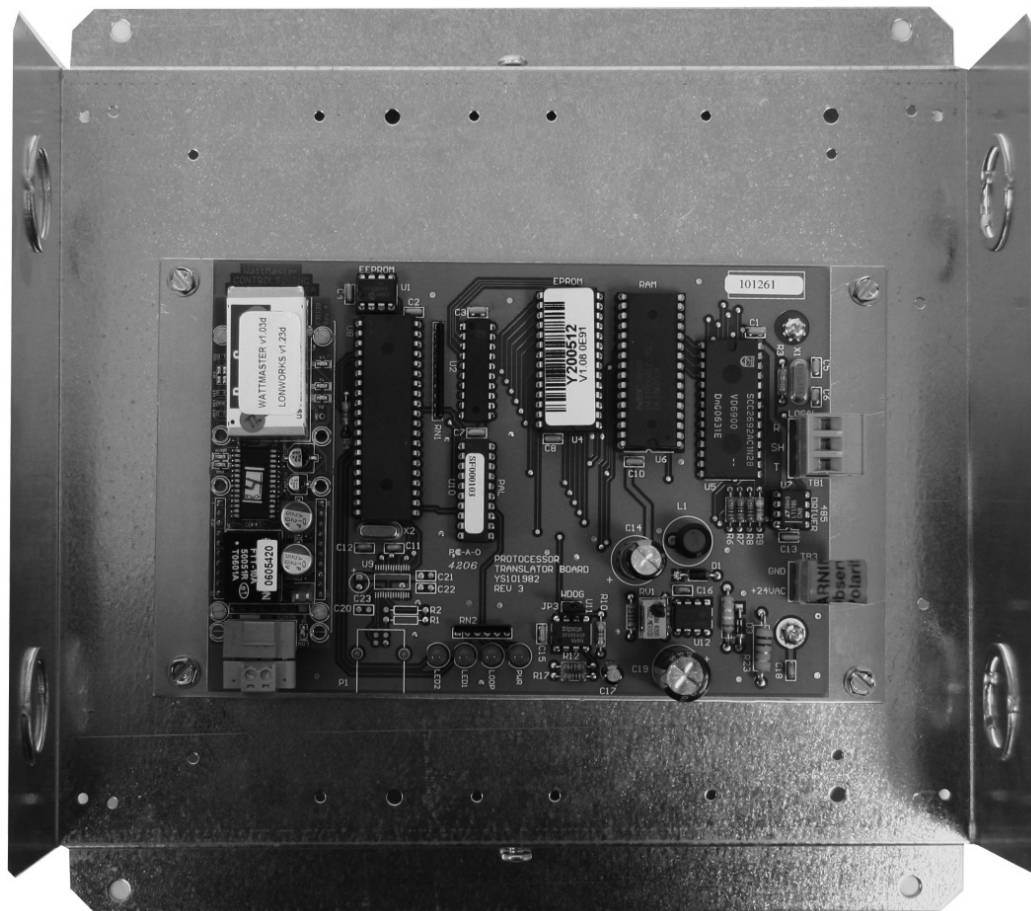


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The OE368-22-LON, PT-Link-LON, provides bi-directional communication between ONE of the following types of Orion controllers—VCM-X, VCM, MUA II, or VAV/CAV:

VCM-X Controller (SS1026, Y200920)

VCM Controller (SS1016, Y200409, Y200616, Y200822)

MUA II Controller (Y200405)

VAV/CAV Controller (Y200301)

NOTE: The PT-Link-LON device can be used to connect to only one Orion controller. If more than one Orion controller is present in a system, each one will require a PT-Link-LON device for integration with a LON 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-LON®.

Data Sharing

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

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

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

Hardware Specifications

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

| Technical Data | |
|----------------------------|---------------------------------|
| LON® Loop | TP/FT-10 (78 Kps) |
| Controller Loop | RS-485, 9600 Baud Rate |
| Network Protocol | LONWorks® |
| 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-LON® Interface Technical Data

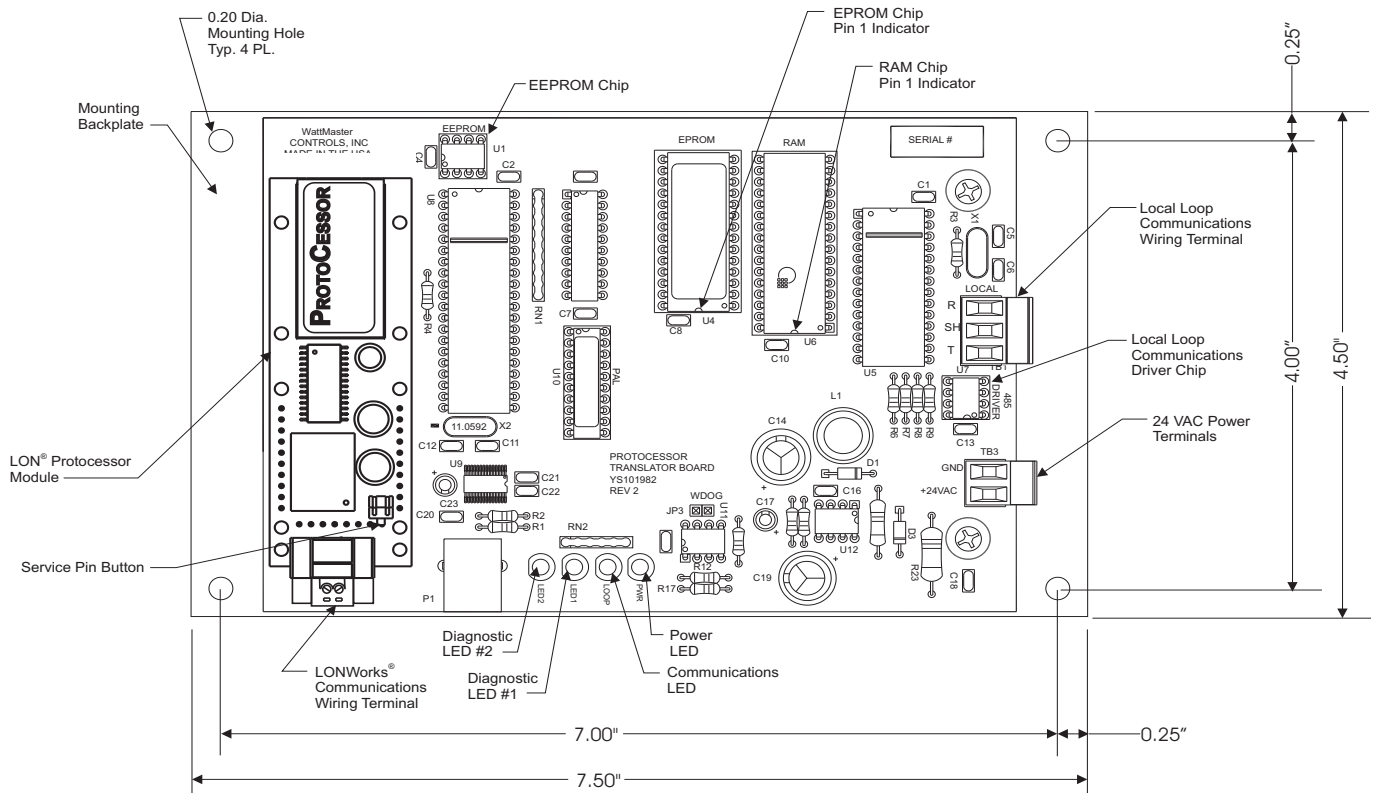


Figure 1: PT-Link-LON® Board Components and Dimensions

Connection and Wiring Information

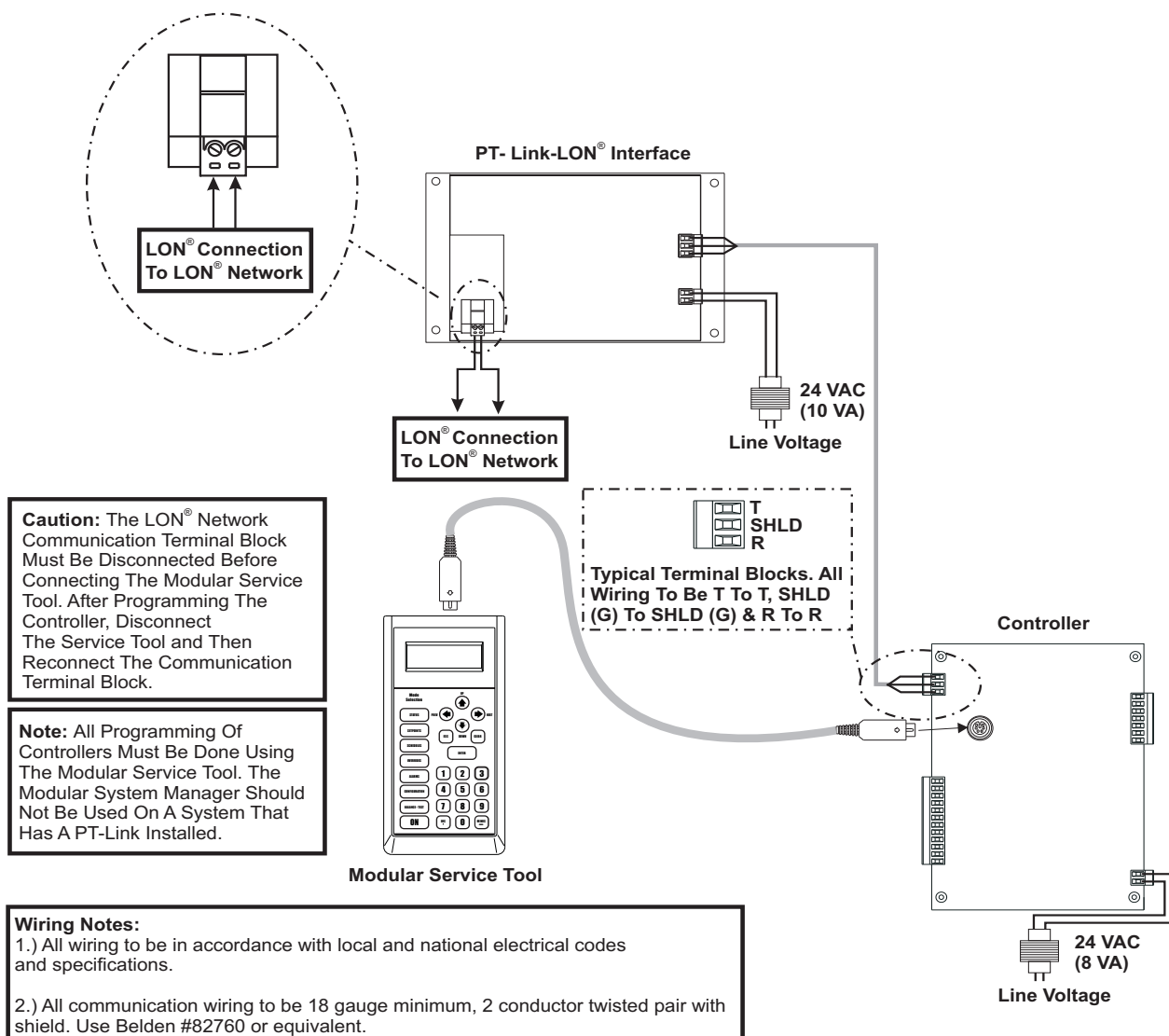


Figure 2: PT-Link-LON® Interface Wiring

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.

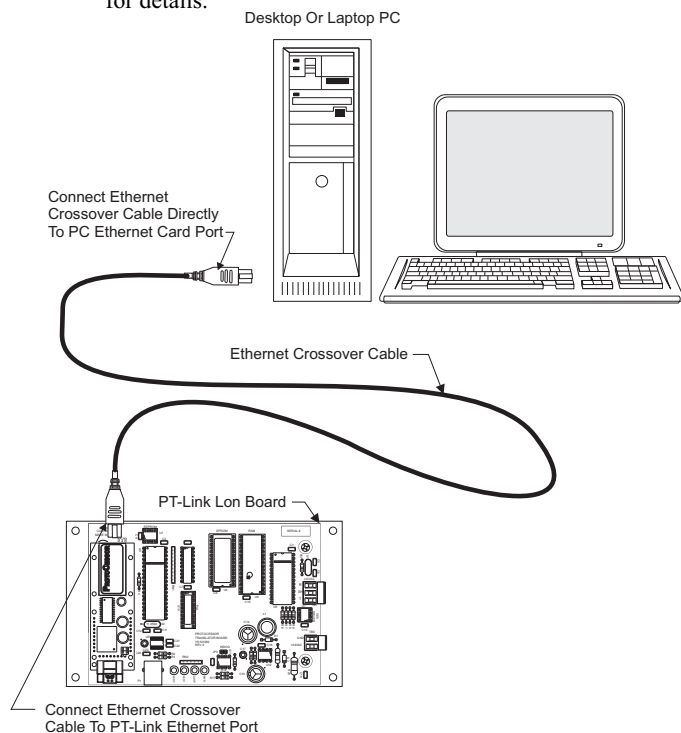


Figure 3: Connecting With Crossover Cable

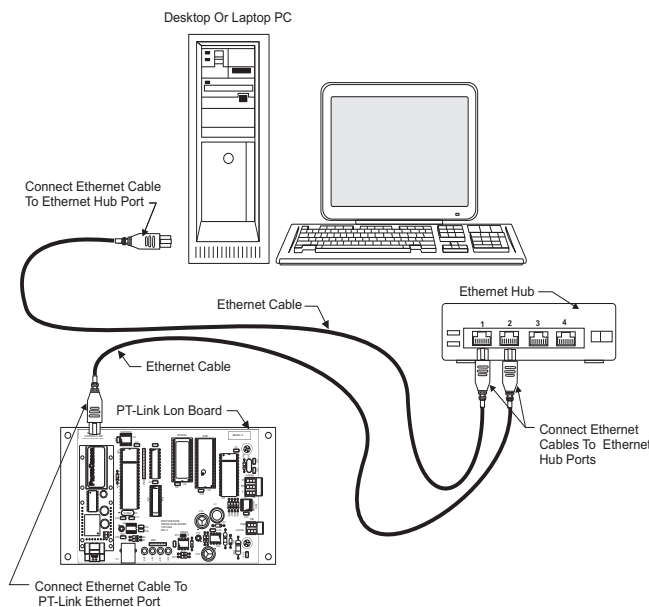


Figure 4: Connecting With Ethernet Cable & Hub

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** on page 12 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.

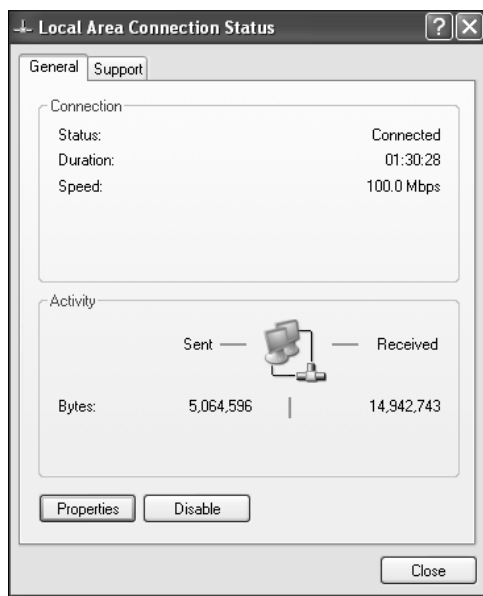


Figure 6: Local Area Connection Status Window

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

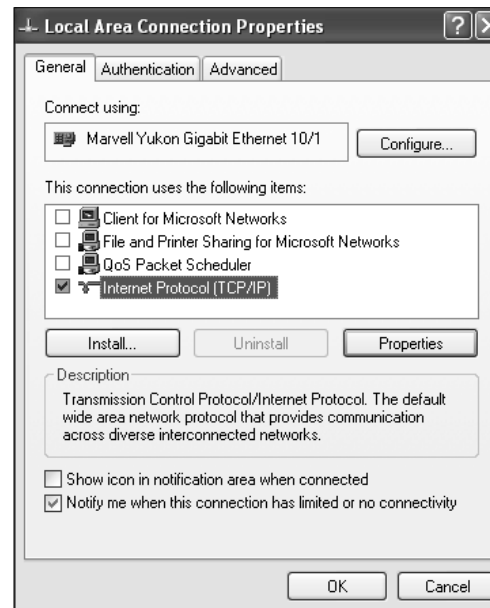


Figure 7: Local Area Connection Properties Window

- 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.

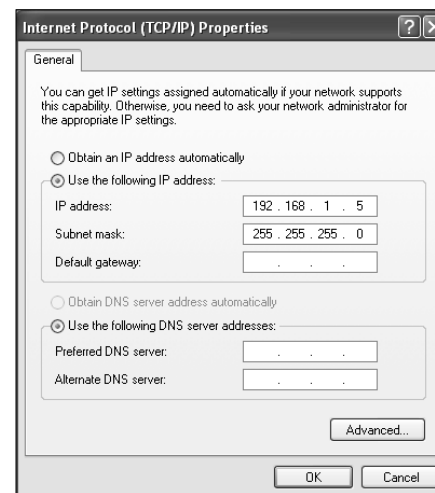


Figure 8: Internet Protocol Properties Window

- 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.

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 in the software area of the web site. 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**.

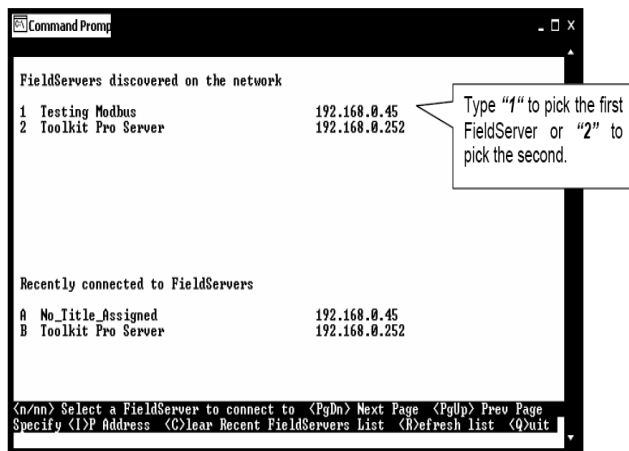


Figure 9: RUINET PT-Link Selection Menu

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.

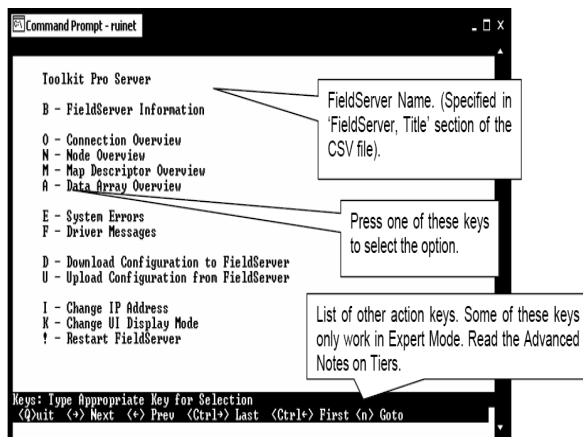


Figure 10: RUINET PT-Link Main Menu

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, Inc.

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, Address, Poll, and Download the Configuration File.

Upload Config.csv from the PT-Link

The PT-Link contains a configuration file (config.csv) that includes information such as addressing. This file can be uploaded from the PT-Link for modification if needed. The PT-Link also contains an external interface file otherwise called an XIF file (fserver.xif). The XIF file includes information such as SNVT names and LON network information. This file can be uploaded for use with LON programming software. When uploaded, these files 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. Refer to Appendix B for details on uploading XIF files.

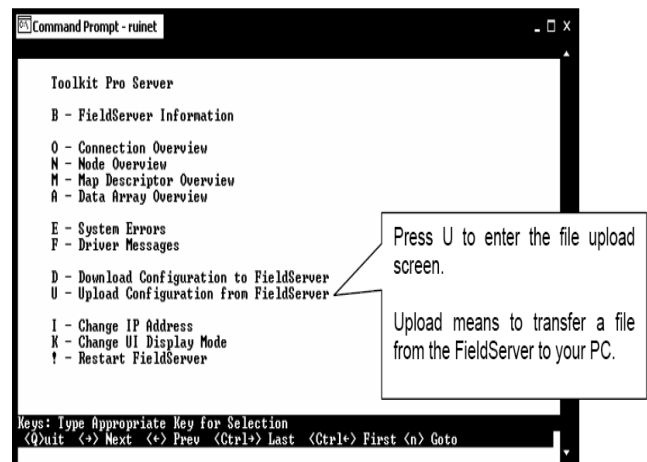


Figure 11: RUINET PT-Link Main Menu - Upload

Configuring the PT-Link Controller

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

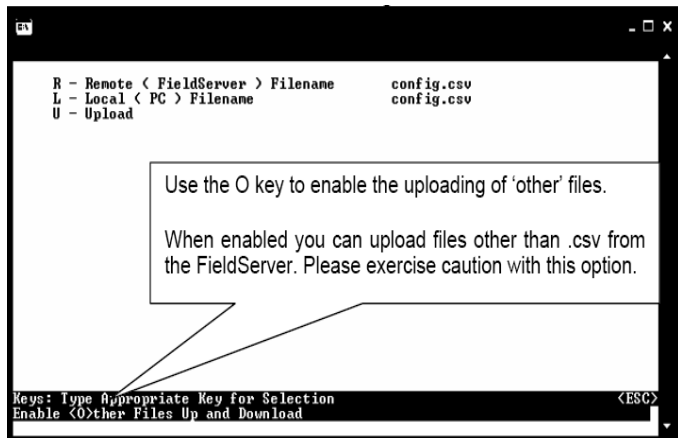


Figure 12: RUINET PT-Link Uploading Files

- 1.) Begin the upload by pressing “U.”
- 2.) When the upload is completed, open the uploaded file with 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!

Explicit and Implicit Addressing

Clients can address the PT-Link using explicit or implicit addressing. Clients using explicit addressing obtain their data transfer parameters directly from the PT-Link-LON configuration file (config.csv). Implicit addressing is used when a Network Management Tool such as LonMaker® is used to connect a PT-Link-LON to other LonWorks nodes—the PT-Link-LON is assigned its data transfer (binding) parameters by the Network Management Tool.

NOTE: The PT-Link-LON is configured from the factory to use implicit addressing.

Implicit Addressing — Network Manager assigns addresses for communication and ensures (via address tables in the devices) that communication connections are known.

Explicit Addressing — Device knows the address of the point in the remote device and communicates directly without the assistance of the Network Manager.

Implicit Addressing Commissioning Using LonMaker

- 1.) Ensure that the correct firmware and latest configuration is loaded on the PT-Link-LON.

NOTE: Each change in the PT-Link-LON requires re-commissioning of the PT-Link-LON in LonMaker.

- 2.) Ensure that the PT-Link-LON and the LonMaker machine are on the same network.
- 3.) Open the existing Network in LonMaker or create a new Network.

- 4.) Click on “Create New Network” and follow the network wizard, making the following selections:

Network Interface: Choose Network Attached

Management Mode: Choose Onnet unless you are working offline

Registered Plug-ins required: None

- 5.) Once Visio is open with the Network showing, drag a new device onto the drawing from the toolbox.
- 6.) Follow the Device Network, making the following selections:

Enter Device Name: Choose commission device

Specify Device Template: Choose upload from device

Specify Device Channel: Choose Auto Detect

Specify Device Properties: Leave as is (Ping is optional)

Identify Device: Choose service pin

Device Application Image: Leave unchecked

Initial State: Leave as is

- 7.) Press the service pin on the PT-Link-LON when asked to do so, and the PT-Link-LON will be commissioned.
- 8.) Drag a new function block onto the drawing from the toolbox. Give the function block a name and ensure that it is allocated to the PT-Link-LON device.
- 9.) Once the function block is on the drawing, you can drag input and output variables onto the function block. When you do this, LonMaker will show you the variables available for binding. Click on the variables you require (or use the select “all” option), and they will be commissioned onto the function block.
- 10.) You are now ready to connect these variables to other devices by dragging connections from the toolbox and connecting the variables.

Troubleshooting the PT-Link Controller

Explicit Addressing & Domain Table Setup

To use explicit addressing, the client needs to change the factory settings contained in the PT-Link-LON's configuration file (config.csv). The following are the steps to change the configuration file from implicit to explicit addressing:

- 1.) Upload and open the config.csv file.
- 2.) Locate the "Connections" section.
- 3.) Locate the "Lonworks_Server" column and change the value from "Implicit" shown in **Figure 13** to "Explicit" shown in **Figure 14**. You should also change the "Lonworks_Input" and "Lonworks_Outputs" from Update to Polled.

```
Connections
Port ,Baud ,Data_Bits ,Stop_Bits ,Parity ,Protocol ,Auto_Config_Client ,Auto_Config_Server , Lonworks_Server, Lonworks_Inputs, Lonworks_Outputs,
S1 ,38400 ,8 ,1 ,None ,Wattmstr ,Yes ,Lonworks , Implicit , Update , Update
...
```

Figure 13: PT-Link-LON Implicit Configuration

```
Connections
Port ,Baud ,Data_Bits ,Stop_Bits ,Parity ,Protocol ,Auto_Config_Client ,Auto_Config_Server , Lonworks_Server, Lonworks_Inputs, Lonworks_Outputs,
S1 ,38400 ,8 ,1 ,None ,Wattmstr ,Yes ,Lonworks , Explicit , Polled , Polled
...
```

Figure 14: PT-Link-LON Explicit Configuration

In addition, the PT-Link-LON must have its domain, subnet, and node IDs set. This feature is enabled in the configuration file by filling out the Title and System_Address fields of the PT-Link-LON parameters as follows:

```
//=====
//
// Common Information
//
Bridge
System_Address ,Title
23 ,":D48:S01:Wattmaster Explicit Lon v1.00d"
```

Figure 15: PT-Link-LON Domain and Subnet Setting

The Title field must start with "D", followed by the domain_id in hexadecimal notation, followed by "S", followed by the subnet_id in hexadecimal notation, and enclosed by ":". The domain length is automatically determined by the number of digits in the [domain_id] field. With 2 hexadecimal digits constituting 1 byte, "D123456", for example, would have a length of 3.

Once the domain table has been set, the "Dxx:Sxx:" part of the Title field will be removed.

Now the Title field will be left with [Title continued...] which may be the Node self documentation string or any title.

After the changes are done, do not forget to save the file, download the new configuration file, and restart the PT-Link-LON. Refer to the Download Section that follows.

Troubleshooting the PT-Link Controller

Download 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.

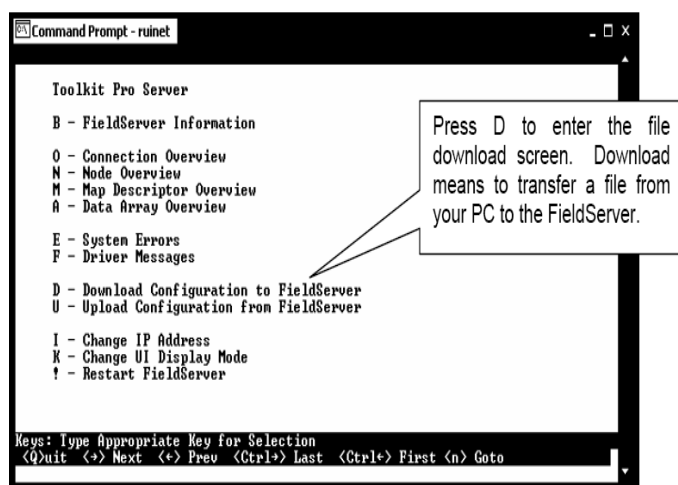


Figure 16: RUINET PT-Link Main Menu - Download

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.

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

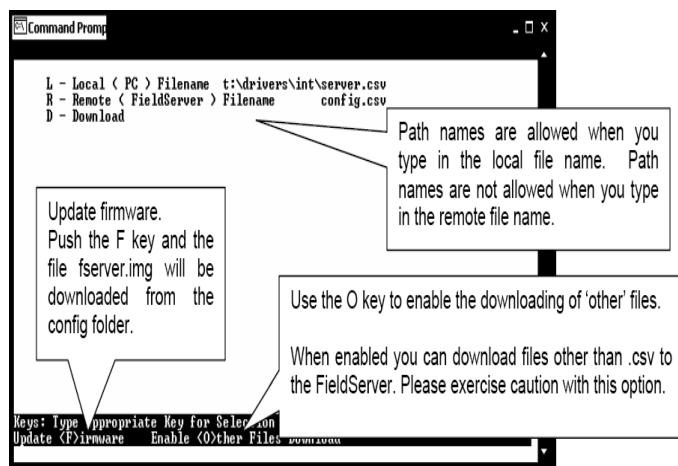


Figure 17: RUINET PT-Link Downloading Files

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

Troubleshooting the PT-Link Controller

PT-Link Board LEDs

The PT-Link-LON® 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-LON® 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-LON®, 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 once if it is communicating with the controller. If the LED is not blinking, there is a communication problem between the HVAC controller and the PT-Link board. The “COMM” LED on the HVAC controller also should be solid and will flicker occasionally indicating communication with the PT-Link-LON®. If the “COMM” LED does not flicker, then there is no communication between the PT Link and the 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.

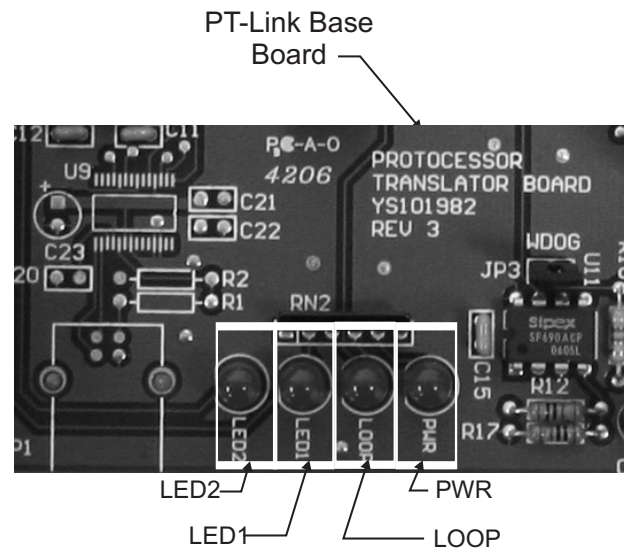


Figure 18: PT-Link-LON® LED Locations

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. 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.

LON LED

When the unit is first powered up, before commissioning has occurred, this LED will be blinking to indicate the unit has not been commissioned yet. Once the unit is commissioned, the LED will stay off during normal operations.

LA LED

When the unit is first powered up, this LED should be blinking constantly. If this LED is constantly on or constantly off, the Module is not working properly and needs to be replaced.

TX & RX LEDs

These 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. If both are not blinking, check the protocol network wiring.

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.

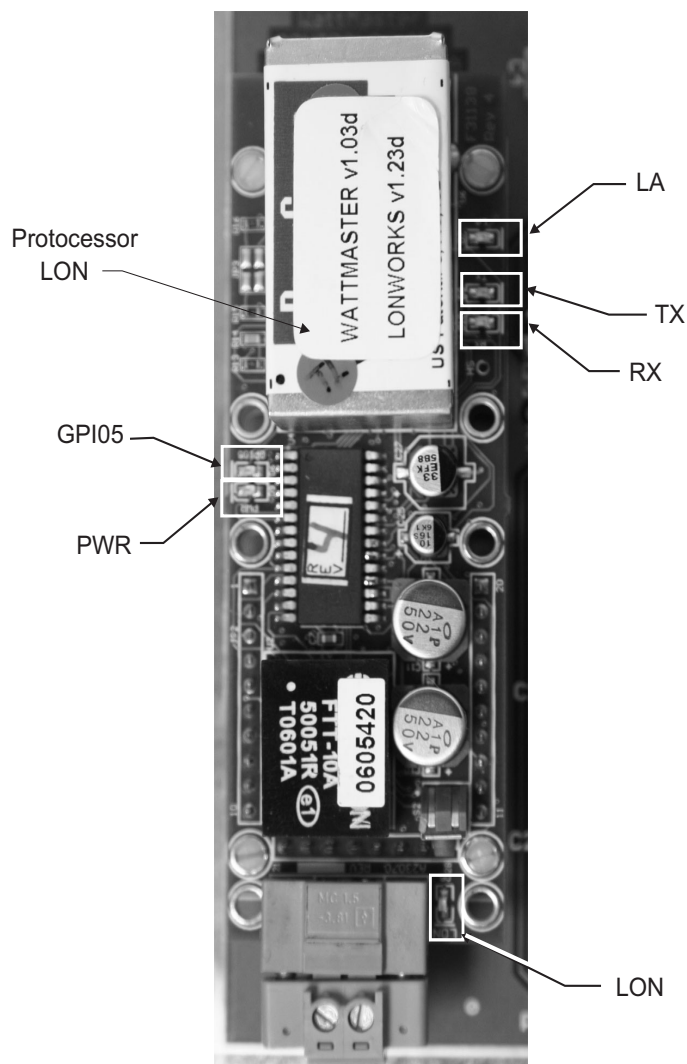


Figure 19: PT-Link-LON® LED Locations

Troubleshooting the PT-Link Controller

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 prove that the unit can take and keep the set-points properly.

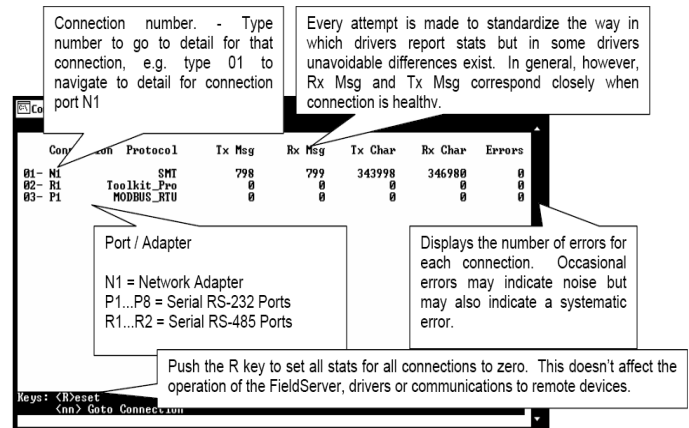


Figure 20: Connection Overview Screen

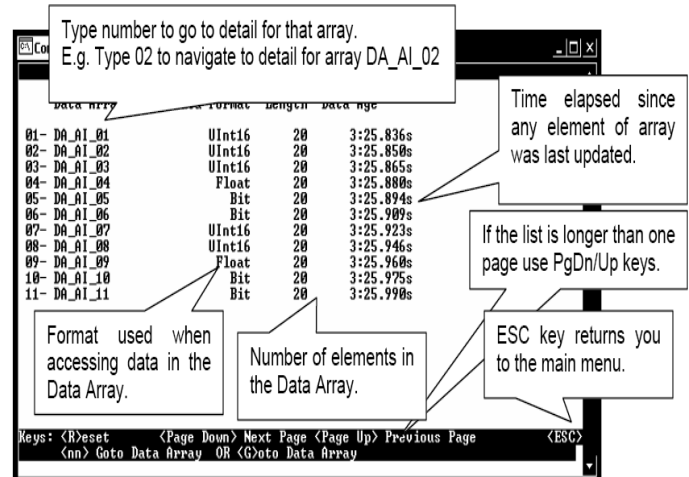


Figure 21: Data Array Overview Screen

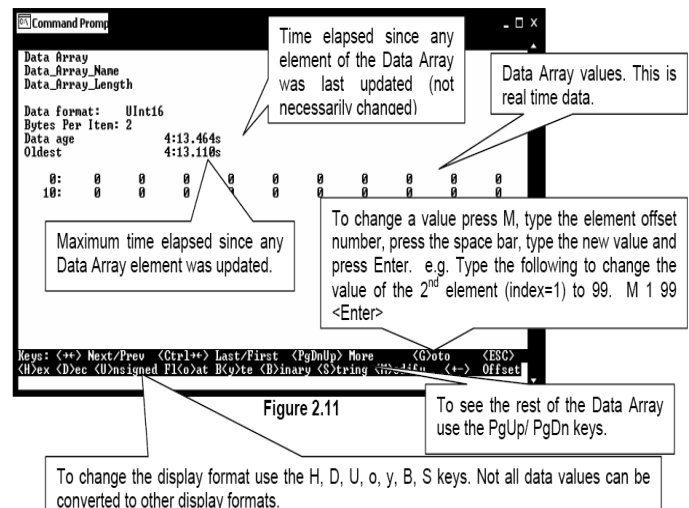


Figure 22: Data Array Detail Screen

Data Arrays

| VCM-X Data Arrays 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 | – | – | – | – | – | – |

Table 2: VCM-X Data Array For Field Server

| VCM Data Arrays 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 | ClDmnd | HtDmnd | DehmDmnd |
| 16 | CIEnbl | 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 | DrtFAlm | 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 | – | – | – | – |

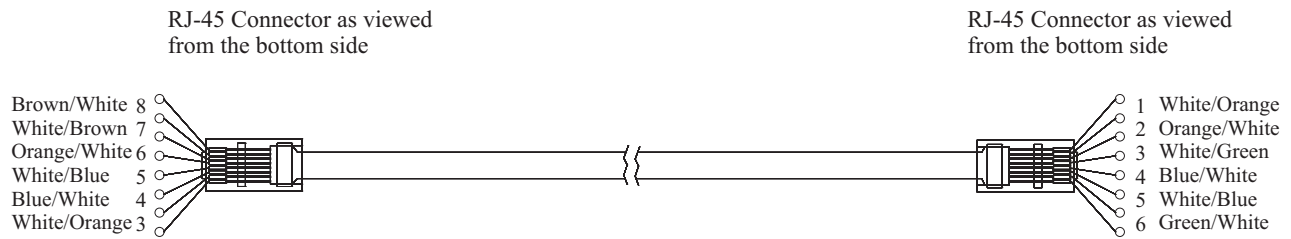
Table 3: VCM Data Array For Field Server

| MUA II Data Arrays For Field Server | | | | | | | | |
|-------------------------------------|----------|---------|---------|----------|---------|----------|----------|----------|
| Offset | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 0 | AppVer | SaTpStM | OaTp | OaClSt | OaHtSt | OaDwpt | OaDwptSt | OaRh |
| 8 | OaEtp | OaEtpSt | OaEtpDb | CtrlSts | CtrlMod | CIDnmd | HtDmnd | DehmDmnd |
| 16 | FanDly | PofCfg | InRhIns | SpcTpIns | ExHtCfg | RtRlyCfg | MdHt2Ins | Rt2Ins |
| 24 | OnRlys | ExRlys1 | ExRlys2 | ExRlys3 | InRh | AlmSts | SaTpAlm | OaTpAlm |
| 32 | RhAlm | PofAlm | LoSaAlm | HiSaAlm | ExHtPos | SpcTp | MdHt2Pos | Rt2Pos |
| 40 | SaTp | CIDb | HtDb | DptSt | EtpDb | SaRstSt | SpcTpMax | SpcTpMin |
| 48 | DptRstLt | InRhMax | InRhMin | ExHtPBd | SaTpSt | SchdFrc | OnRly1 | OnRly2 |
| 56 | OnRly3 | OnRly4 | OnRly5 | ExRly1 | ExRly2 | ExRly3 | ExRly4 | ExRly5 |
| 64 | ExRly6 | ExRly7 | ExRly8 | ExRly9 | ExRly10 | ExRly11 | ExRly12 | ExRly13 |
| 72 | ExRly14 | ExRly15 | ExRly16 | – | – | – | – | – |

Table 4: MUA II Data Array For Field Server

| VAV/CAV Data Arrays 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 | CrItSts | CtrlMod | AhuEco | OaTpAlm | CO2Cfg |
| 16 | HtCIDsbl | DehmMod | MdHt2Ins | Rt2Ins | CntInf | CIDmnd | HtDmnd | CIEnbl |
| 24 | HtEnbl | EcoEnbl | FanDly | WmupDmnd | PofAlm | HumSt | PofCfg | CavCfg |
| 32 | HtPmpCfg | RhCfg | WtblCfg | RfPrCfg | OnRlys | ExRlys12 | ExRlys3 | ExRlys4 |
| 40 | EcoPos | VfdBwPos | VfdExPos | AlmSts | SpcTpAlm | MchClAlm | MchHtAlm | DrtFlAlm |
| 48 | HiSpcAlm | LoSpcAlm | RfPr | CtrlTp | OcpClSt | OcpHcSt | UnClSt | UnHtSt |
| 56 | StgDb | WtblSt | SaClSt | SaHtSt | WmupSt | SpcTpOst | SaTpOst | RaTpOst |
| 64 | OaTpOst | SchdFrc | OnRly1 | OnRly2 | OnRly3 | OnRly4 | OnRly5 | ExRly1 |
| 72 | ExRly2 | ExRly3 | ExRly4 | ExRly5 | ExRly6 | ExRly7 | ExRly8 | ExRly9 |
| 80 | ExRly10 | ExRly11 | ExRly12 | ExRly13 | ExRly14 | ExRly15 | ExRly16 | DuctPrSt |
| 88 | MinEcoSt | RfPrSt | CO2Level | CO2St | – | – | – | – |

Table 5: VAV/CAV Data Array For Field Server

Appendix A

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

External Interface Files (XIF Files)

At start-up the PT-Link-LON creates an external interface file (XIF) called fServer.xif based on the information contained in the PT-Link-LON's configuration file (config.csv). The PT-Link-LON's configuration can be changed by uploading and editing the config.csv file; therefore, the XIF file must be obtained by uploading it from the PT-Link-LON.

The recommended procedure for obtaining the XIF file for the PT-Link-LON is to upload it. Remember that this XIF file will change whenever the configuration file has been changed and downloaded and the PT-Link-LON restarted. The following are the steps to extract the external interface file (XIF) from the PT-Link-LON:

- 1.) Start RUINET application.
- 2.) Select Fieldserver option **"I"** (this step may be skipped when application auto detects PT Link).
- 3.) In the **Main Menu** select **"A"** – Data Array Overview.
- 4.) You should see 2 array items that are labeled wattmstr-dump and wattmstr-stats. Ignore these.
- 5.) You should see 2 additional arrays for the controller connected.

Example: DA_C162_I0 and DA_C162_I0b.

 - 5.1.) The **"b"** at the end of the Data Array Name indicates that it is a mirror array. You can ignore these.
 - 5.2) Verify that your controller is visible or the XIF will not be generated.
- 6.) After connection has been verified, you can now exit to the **Main Menu** using the escape key.
- 7.) Type **"U"** – Upload Configuration.
- 8.) Type **"O"** to select other files.
- 9.) If prompted, press any key to continue.
- 10.) Type **"R"** – Remote Filename.
- 11.) Type **"fserver.xif"**
12. You should now see the name fserver.xif in the column to the right.
13. Type **"U"** to upload the XIF file.
14. Once finished you will have an .xif file available in the same directory as the RUINET executable file you were running from.

WARNING: For easier configuration, set the unit address to 1.

Appendix C - VCM-X LON Parameters

| SNVTs for the VCM-X Controller | | | | |
|---|----------|---------------|--|--------|
| Binary Output SNVTs are SNVT_lev_disc | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Application Software Version | AppVer | Analog Output | Current version of the software in the unit. | |
| Alarm Status | AlrmSts | Analog Output | Needed only in legacy application. | |
| Unit Mode | UnitMode | Analog Output | Needed only in legacy application. | |
| Control Status | CtrlSts | Analog Output | Current operational status. | |
| Control Temperature | CtrlTp | Analog Output | Current value of the control temperature sensor. | |
| Occupied/ Mode Enable Cooling Setpoint Mirror | ClSt | Analog Output | Occupied/ Mode Enable Cooling Setpoint Mirror. | |
| Duct Static Pressure | DuctPr | Analog Output | Current value of the duct static pressure sensor. | |
| Economizer Position | EcoPos | Analog Output | Current position of the economizer damper. | |
| External Relays 1-2 | ExRlys12 | Analog Output | Needed only in legacy application. | |
| External Relays 3-4 | ExRlys34 | Analog Output | Needed only in legacy application. | |
| Indoor Humidity | InRh | Analog Output | Current value of the indoor humidity sensor. | |
| Occupied/ Mode Enable Heating Setpoint Mirror | HtSt | Analog Output | Occupied/ Mode Enable Heating Setpoint Mirror. | |
| On Board Relay | OnRlys | Analog Output | Needed only in legacy application. | |
| Outdoor Air Humidity | OaRh | Analog Output | Current value of the outdoor humidity sensor. | |
| Outdoor Air Temperature | OaTp | Analog Output | Current value of the outdoor temperature sensor. | |
| Outdoor Air Wetbulb | OaWtbl | Analog Output | Current calculated value of the outdoor wetbulb temperature. | |
| Relief Pressure | RfPr | Analog Output | Current value of the building pressure sensor. | |
| Return Air CO ₂ Level | CO2Level | Analog Output | Current value of the CO ₂ sensor. | |
| Return Air Temperature | RaTp | Analog Output | Current value of the return temperature sensor. | |
| Space Temperature | SpcTp | Analog Output | Current value of the space temperature sensor. | |

| SNVTs for the VCM-X Controller | | | | |
|---------------------------------------|----------|---------------|---|--------|
| Binary Output SNVTs are SNVT_lev_disc | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Supply Air Temperature | SaTp | Analog Output | Current value of the supply air temperature sensor. | |
| Temperature Demand | TpDmnd | Analog Output | 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 | Analog Output | Current position of the VFD blower fan signal. | |
| VFD Relief Fan | VfdExPos | Analog Output | Current position of the VFD relief fan signal. | |
| Modulating Gas Valve Position | MdHt2Pos | Analog Output | Current position of MODGAS II modulating gas valve control. | |
| Reheat Value Position | Rt2Pos | Analog Output | Current position of MHGRV modulating hot gas reheat valve control. | |
| Alarm Group 1 | AlrmGrp1 | Analog Output | Needed only in legacy application. | |
| Alarm Group 2 | AlrmGrp2 | Analog Output | Needed only in legacy application. | |
| Alarm Group 3 | AlrmGrp3 | Analog Output | Needed only in legacy application. | |
| Dewpoint Setpoint Mirror | DptStM | Analog Output | Mirror of the DptSt “read only.” | |
| Indoor RH Setpoint Mirror | InRhStM | Analog Output | Mirror of the InRhSt “read only.” | |
| Modulating Cool Position | MdClPos | Analog Output | Current position of the modulating cooling signal (Chilled water or digital compressor). | |
| Modulating Heat Position | MdHtPos | Analog Output | Current position of the modulating heating signal (hot water or SCR heat). | |
| Bypass Damper Position | ByPasDmp | Analog Output | Current position of the bypass damper signal. | |

Appendix C - VCM-X LON Parameters

| SNVTs for the VCM-X Controller | | | | | |
|---------------------------------------|-----------|---------------|--|--------|-------|
| Binary Output SNVTs are SNVT_lev_disc | | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Return Damper Position | RaDmp | Analog Output | Current position of the return damper signal. | | |
| Outdoor Air Dewpoint | OaDwpt | Analog Output | Current calculated outdoor air dewpoint added on version 1.09. | | |
| Current Supply Air Setpoint | SaTpStM | Analog Output | Current SAT Cooling or Heating setpoint if there is no reset source; Current calculated SAT setpoint with Reset Source. | | |
| Coil Temperature | CoilTp | Analog Output | Current coil temperature reading added on version 1.09. | | |
| Outdoor Air CFM | OaCFM | Analog Output | Current Outdoor Airflow Measurement | | |
| Exhaust CFM | EtCFM | Analog Output | Current Exhaust Airflow Measurement | | |
| Supply Air CFM | SaCFM | Analog Output | Current Supply Airflow Measurement | | |
| Current Calculated OA CFM Setpoint | OACfm-StM | Analog Output | Current calculated Outdoor Air CFM based on CO ₂ level. | | |
| Outdoor Air CFM Setpoint | OACfmSt | Analog Input | Minimum desired Outdoor Air CFM. | 0.10 K | 200 K |
| Outdoor Air CFM Reset Limit | OACfmRs | Analog Input | Maximum desired Outdoor Air CFM when CO ₂ reaches its reset limit. | 0.10 K | 200 K |
| Preheater Setpoint | PreHtSp | Analog Input | Low Outside Air Ambient Protection Setpoint | 0 | 100 |
| CO ₂ Setpoint | CO2St | Analog Input | When the CO ₂ level rises above the CO ₂ Protection Limit Max Level, the Economizer's Minimum Position will begin to reset open proportionally between the CO ₂ Protection Limit Max Level Setpoint and the Reset Range Setpoint. | 0 | 3000 |

| SNVTs for the VCM-X Controller | | | | | |
|--|----------|--------------|---|--------|-----|
| Binary Output SNVTs are SNVT_lev_disc | | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Static Pressure Setpoint | DuctPrSt | Analog Input | This is the target duct pressure to be maintained by the VFD blower signal. | 0.01 | 3 |
| Minimum Outside Air Setpoint | MinEcoSt | Analog Input | This is the minimum position of the economizer in the occupied modes. | 1 | 100 |
| Occupied/ Mode Enable Cooling Setpoint | OcpClSt | Analog Input | 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 | Analog Input | 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 | Analog Input | 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 | Analog Input | This is the target building pressure to be maintained by the VFD Relief signal. | -0.2 | 0.2 |

Appendix C - VCM-X LON Parameters

| SNVTs for the VCM-X Controller | | | | | |
|---------------------------------------|----------|--------------|--|--------|-----|
| Binary Output SNVTs are SNVT_lev_disc | | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Return Air Sensor Offset | RaTpOst | Analog Input | 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 | Analog Input | 0 = Auto Unoccupied Mode 1 = Forced On 2 = Forced Off | 0 | 2 |
| Space Sensor Offset | SpcTpOst | Analog Input | 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 | Analog Input | Supply Air setpoint or Reset Source target temperature in Cooling Mode. | 40 | 80 |
| SAT/Reset Source Heating Setpoint | SaHtSt | Analog Input | Supply Air setpoint or Reset Source target temperature in Heating Mode. | 40 | 200 |
| Supply Air Sensor Offset | SaTpOst | Analog Input | 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 | Analog Input | 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 |

| SNVTs for the VCM-X Controller | | | | | |
|---------------------------------------|----------|---------------|--|--------|-----|
| Binary Output SNVTs are SNVT_lev_disc | | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Unoccupied Heating Offset | UnHtOst | Analog Input | 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 |
| Dewpoint Setpoint | DptSt | Analog Input | If the outdoor dewpoint rises above this setpoint, the unit will activate the Dehumidification Demand. | 35 | 80 |
| Coil Temperature Setpoint | CoilTpSt | Analog Input | This is the coil suction temperature during dehumidification mode. Produces dewpoint in the supply air approximately 10°F above this setpoint. | 35 | 70 |
| Indoor Humidity Setpoint | InRhSt | Analog Input | If the indoor humidity rises above this setpoint, the unit will activate the Dehumidification Demand. | 0 | 100 |
| Warm Up Setpoint | WmupSt | Analog Input | 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 | Analog Input | The economizer is enabled if the outdoor temperature or wetbulb falls below this setpoint. | 0 | 80 |
| Bad Supply Air Sensor | SaTpAlm | Binary Output | Alarm that indicates a failure in the supply air sensor. | | |
| CO ₂ Sensor Installed | CO2Cfg | Binary Output | Status that indicates the CO ₂ function has been configured. | | |

Appendix C - VCM-X LON Parameters

| SNVTs for the VCM-X Controller | | | | |
|---------------------------------------|----------|---------------|---|--------|
| Binary Output SNVTs are SNVT_lev_disc | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Cooling Enabled | ClEnbl | Binary Output | Status that indicates mechanical cooling is enabled. | |
| Economizer Enabled | EcoEnbl | Binary Output | Status that indicates the economizer is enabled. | |
| Fan Start Up Delay | FanDly | Binary Output | Status that indicates the fan is commanded to run, but it is in the start up delay mode. | |
| Fan Proving Alarm | PofAlm | Binary Output | Alarm that indicates a failure in the flow of the VFD blower. | |
| Heating Enabled | HtEnbl | Binary Output | Status that indicates that mechanical heating is enabled. | |
| High Supply Air Temperature Alarm | HiSaAlm | Binary Output | 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 | Binary Output | 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 | Binary Output | Status that indicates the MODGAS II controller is connected. | |
| Proof of Flow Configured | PofCfg | Binary Output | Status that indicates the proof of flow function has been configured. | |
| REHEAT II Connected | Rt2Ins | Binary Output | Status that indicates the MHGRV controllers is connected to the system. | |

| SNVTs for the VCM-X Controller | | | | |
|---------------------------------------|----------|---------------|---|--------|
| Binary Output SNVTs are SNVT_lev_disc | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Mechanical Cooling Alarm | MchClAlm | Binary Output | 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 | Binary Output | 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 | Binary Output | Alarm that indicates the filters are dirty. | |
| Control Temperature Cool Failure | CtrlTpCF | Binary Output | 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 | Binary Output | 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 | Binary Output | Alarm that indicates a failure in the outdoor air temperature. | |
| Smoke Detected Alarm | SmokeAlm | Binary Output | Alarm that indicates the Smoke sensor has been activated. | |
| Space Temperature Sensor Lost | SpcTpAlm | Binary Output | Alarm that indicates a failure in the space temperature sensor. | |

Appendix C - VCM-X LON Parameters

| SNVTs for the VCM-X Controller | | | | |
|---------------------------------------|---------|---------------|-----------------------------|--------|
| Binary Output SNVTs are SNVT_lev_disc | | | | |
| All the SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| On Board Relay 1 | OnRly1 | Binary Output | Current status of relay 1. | |
| On Board Relay 2 | OnRly2 | Binary Output | Current status of relay 2. | |
| On Board Relay 3 | OnRly3 | Binary Output | Current status of relay 3. | |
| On Board Relay 4 | OnRly4 | Binary Output | Current status of relay 4. | |
| On Board Relay 5 | OnRly5 | Binary Output | Current status of relay 5. | |
| Expansion Relay 1 | ExRly1 | Binary Output | Current status of relay 6. | |
| Expansion Relay 2 | ExRly2 | Binary Output | Current status of relay 7. | |
| Expansion Relay 3 | ExRly3 | Binary Output | Current status of relay 8. | |
| Expansion Relay 4 | ExRly4 | Binary Output | Current status of relay 9. | |
| Expansion Relay 5 | ExRly5 | Binary Output | Current status of relay 10. | |
| Expansion Relay 6 | ExRly6 | Binary Output | Current status of relay 11. | |
| Expansion Relay 7 | ExRly7 | Binary Output | Current status of relay 12. | |
| Expansion Relay 8 | ExRly8 | Binary Output | Current status of relay 13. | |
| Expansion Relay 9 | ExRly9 | Binary Output | Current status of relay 14. | |
| Expansion Relay 10 | ExRly10 | Binary Output | Current status of relay 15. | |
| Expansion Relay 11 | ExRly11 | Binary Output | Current status of relay 16. | |
| Expansion Relay 12 | ExRly12 | Binary Output | Current status of relay 17. | |
| Expansion Relay 13 | ExRly13 | Binary Output | Current status of relay 18. | |
| Expansion Relay 14 | ExRly14 | Binary Output | Current status of relay 19. | |
| Expansion Relay 15 | ExRly15 | Binary Output | Current status of relay 20. | |
| Expansion Relay 16 | ExRly16 | Binary Output | Current status of relay 21. | |

VCM-X PT-Link-LON® Property Identifier:

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

LONPropertyIdentifier :

```
WattLONScheduleForce ::= 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 C - VCM-X LON 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 D - VCM LON Parameters

| SNVTs for the VCM Controller | | | | |
|---|----------|---------------|--|--------|
| Binary Output SNVTs are SNVT_lev_disc | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Application Software Version | AppVer | Analog Output | Current version of the software in the unit. | |
| Alarm Status | AlrmSts | Analog Output | Needed only in legacy application. | |
| Unit Mode | UnitMode | Analog Output | Needed only in legacy application. | |
| Control Status | CtrlSts | Analog Output | Current operational status. | |
| Control Temperature | CtrlTp | Analog Output | Current value of the control temperature sensor. | |
| Occupied/ Mode Enable Cooling Setpoint Mirror | ClSt | Analog Output | Occupied/ Mode Enable Cooling Setpoint Mirror. | |
| Duct Static Pressure | DuctPr | Analog Output | Current value of the duct static pressure sensor. | |
| Economizer Position | EcoPos | Analog Output | Current position of the economizer damper. | |
| External Relays 1-2 | ExRlys12 | Analog Output | Needed only in legacy application. | |
| External Relays 3-4 | ExRlys34 | Analog Output | Needed only in legacy application. | |
| Indoor Humidity | InRh | Analog Output | Current value of the indoor humidity sensor. | |
| Occupied/ Mode Enable Heating Setpoint Mirror | HtSt | Analog Output | Occupied/ Mode Enable Heating Setpoint Mirror. | |
| On Board Relay | OnRlys | Analog Output | Needed only in legacy application. | |
| Outdoor Air Humidity | OaRh | Analog Output | Current value of the outdoor humidity sensor. | |
| Outdoor Air Temperature | OaTp | Analog Output | Current value of the outdoor temperature sensor. | |
| Outdoor Air Wetbulb | OaWtbl | Analog Output | Current calculated value of the outdoor wetbulb temperature. | |
| Relief Pressure | RfPr | Analog Output | Current value of the building pressure sensor. | |
| Return Air CO ₂ Level | CO2Level | Analog Output | Current value of the CO ₂ sensor. | |
| Return Air Temperature | RaTp | Analog Output | Current value of the return temperature sensor. | |
| Space Temperature | SpcTp | Analog Output | Current value of the space temperature sensor. | |

| SNVTs for the VCM Controller | | | | |
|---------------------------------------|----------|---------------|---|--------|
| Binary Output SNVTs are SNVT_lev_disc | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Supply Air Temperature | SaTp | Analog Output | Current value of the supply air temperature sensor. | |
| Temperature Demand | TpDmnd | Analog Output | 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 | Analog Output | Current position of the VFD blower fan signal. | |
| VFD Relief Fan | VfdExPos | Analog Output | Current position of the VFD relief fan signal. | |
| Modulating Gas Valve Position | MdHt2Pos | Analog Output | Current position of MODGAS II modulating gas valve control. | |
| Reheat Value Position | Rt2Pos | Analog Output | Current position of MHGRV modulating hot gas reheat valve control. | |
| Alarm Group 1 | AlrmGrp1 | Analog Output | Needed only in legacy application. | |
| Alarm Group 2 | AlrmGrp2 | Analog Output | Needed only in legacy application. | |
| Alarm Group 3 | AlrmGrp3 | Analog Output | Needed only in legacy application. | |
| Dewpoint Setpoint Mirror | DptStM | Analog Output | Mirror of the DPTSt "read only." | |
| Indoor RH Setpoint Mirror | InRhStM | Analog Output | Mirror of the InRhSt "read only." | |
| Modulating Cool Position | MdClPos | Analog Output | Current position of the modulating cooling signal (Chilled water or digital compressor). | |
| Modulating Heat Position | MdHtPos | Analog Output | Current position of the modulating heating signal (hot water or SCR heat). | |
| Bypass Damper Position | ByPasDmp | Analog Output | Current position of the bypass damper signal. | |

Appendix D - VCM LON Parameters

| SNVTs for the VCM Controller | | | | | |
|--|----------|---------------|--|--------|------|
| Binary Output SNVTs are SNVT_lev_disc | | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Return Damper Position | RaDmp | Analog Output | Current position of the return damper signal. | | |
| Outdoor Air Dewpoint | OaDwpt | Analog Output | Current calculated outdoor air dewpoint added on version 1.09. | | |
| Current Supply Air Setpoint | SaTpStM | Analog Output | Current SAT Cooling or Heating setpoint if there is no reset source; Current calculated SAT setpoint with Reset Source. | | |
| Coil Temperature | CoilTp | Analog Output | Current coil temperature reading added on version 1.09. | | |
| Preheater Setpoint | PreHtSp | Analog Input | Low Outside Air Ambient Protection Setpoint | 0 | 100 |
| CO ₂ Setpoint | CO2St | Analog Input | When the CO ₂ level rises above the CO ₂ Protection Limit Max Level, the Economizer's Minimum Position will begin to reset open proportionally between the CO ₂ Protection Limit Max Level Setpoint and the Reset Range Setpoint. | 0 | 3000 |
| Static Pressure Setpoint | DuctPrSt | Analog Input | This is the target duct pressure to be maintained by the VFD blower signal. | 0.01 | 3 |
| Minimum Outside Air Setpoint | MinEcoSt | Analog Input | This is the minimum position of the economizer in the occupied modes. | 1 | 100 |
| Occupied/ Mode Enable Cooling Setpoint | OcpClSt | Analog Input | 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 |

| SNVTs for the VCM Controller | | | | | |
|--|----------|--------------|--|--------|-----|
| Binary Output SNVTs are SNVT_lev_disc | | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Occupied/ Mode Enable Heating Setpoint | OcpHtSt | Analog Input | 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 | Analog Input | 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 | Analog Input | This is the target building pressure to be maintained by the VFD Relief signal. | -0.2 | 0.2 |
| Return Air Sensor Offset | RaTpOst | Analog Input | 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 | Analog Input | 0 = Auto Unoccupied Mode 1 = Forced On 2 = Forced Off | 0 | 2 |
| Space Sensor Offset | SpcTpOst | Analog Input | 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 | Analog Input | Supply Air setpoint or Reset Source target temperature in Cooling Mode. | 40 | 80 |
| SAT/Reset Source Heating Setpoint | SaHtSt | Analog Input | Supply Air setpoint or Reset Source target temperature in Heating Mode. | 40 | 200 |

Appendix D - VCM LON Parameters

| SNVTs for the VCM Controller | | | | | |
|---------------------------------------|---------|--------------|--|--------|-----|
| Binary Output SNVTs are SNVT_lev_disc | | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Supply Air Sensor Offset | SaTpOst | Analog Input | 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 | Analog Input | 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 | Analog Input | 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 |
| Dewpoint Setpoint | DptSt | Analog Input | If the outdoor dewpoint rises above this setpoint, the unit will activate the Dehumidification Demand. | 35 | 80 |

| SNVTs for the VCM Controller | | | | | |
|---------------------------------------|---------|---------------|---|--------|-----|
| Binary Output SNVTs are SNVT_lev_disc | | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Indoor Humidity Setpoint | InRhSt | Analog Input | If the indoor humidity rises above this setpoint, the unit will activate the Dehumidification Demand. | 0 | 100 |
| Warm Up Setpoint | WmupSt | Analog Input | 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 | Analog Input | The economizer is enabled if the outdoor temperature or wetbulb falls below this setpoint. | 0 | 80 |
| Bad Supply Air Sensor | SaTpAlm | Binary Output | Alarm that indicates a failure in the supply air sensor. | | |
| CO ₂ Sensor Installed | CO2Cfg | Binary Output | Status that indicates the CO ₂ function has been configured. | | |
| Cooling Demand | ClDmnd | Binary Output | Status that indicates a demand for cooling. | | |
| Cooling Enabled | ClEnbl | Binary Output | Status that indicates mechanical cooling is enabled. | | |
| Economizer Enabled | EcoEnbl | Binary Output | Status that indicates the economizer is enabled. | | |
| Fan Start Up Delay | FanDly | Binary Output | Status that indicates the fan is commanded to run, but it is in the start up delay mode. | | |
| Fan Proving Alarm | PofAlm | Binary Output | Alarm that indicates a failure in the flow of the VFD blower. | | |
| Heating Demand | HtDmnd | Binary Output | Status that indicates a demand for heating. | | |

Appendix D - VCM LON Parameters

| SNVTs for the VCM Controller | | | | | |
|---------------------------------------|----------|---------------|--|--------|----|
| Binary Output SNVTs are SNVT_lev_disc | | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Coil Temperature Setpoint | CoilTpSt | Analog Input | This is the coil suction temperature during dehumidification mode. Produces dewpoint in the supply air approximately 10°F above this setpoint. | 35 | 70 |
| Heating Enabled | HtEnbl | Binary Output | Status that indicates that mechanical heating is enabled. | | |
| High Supply Air Temperature Alarm | HiSaAlm | Binary Output | 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 | Binary Output | 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 | Binary Output | Status that indicates the MODGAS II controller is connected. | | |
| Proof of Flow Configured | PofCfg | Binary Output | Status that indicates the proof of flow function has been configured. | | |
| REHEAT II Connected | Rt2Ins | Binary Output | Status that indicates the MHGRV controllers is connected to the system. | | |
| Warm Up Mode Active | WmupDmnd | Binary Output | Status that indicates the control is in the Warm-up mode. | | |
| Mechanical Cooling Alarm | MchClAlm | Binary Output | 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. | | |

| SNVTs for the VCM Controller | | | | |
|---------------------------------------|----------|---------------|---|--------|
| Binary Output SNVTs are SNVT_lev_disc | | | | |
| All other SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Mechanical Heating Alarm | MchHtAlm | Binary Output | 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 | Binary Output | Alarm that indicates the filters are dirty. | |
| Control Temperature Cool Failure | CtrlTpCF | Binary Output | 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 | Binary Output | 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 | Binary Output | Status that indicates a demand for dehumidification. | |
| Outdoor Air Temperature Lost | OaTpAlm | Binary Output | Alarm that indicates a failure in the outdoor air temperature. | |
| Smoke Detected Alarm | SmokeAlm | Binary Output | Alarm that indicates the Smoke sensor has been activated. | |
| Space Temperature Sensor Lost | SpcTpAlm | Binary Output | Alarm that indicates a failure in the space temperature sensor. | |
| On Board Relay 1 | OnRly1 | Binary Output | Current status of relay 1. | |
| On Board Relay 2 | OnRly2 | Binary Output | Current status of relay 2. | |
| On Board Relay 3 | OnRly3 | Binary Output | Current status of relay 3. | |
| On Board Relay 4 | OnRly4 | Binary Output | Current status of relay 4. | |
| On Board Relay 5 | OnRly5 | Binary Output | Current status of relay 5. | |

Appendix D - VCM LON Parameters

SNVTs for the VCM Controller

Binary Output SNVTs are SNVT_lev_disc

All other SNVTs are SNVT_count_inc_f

| Parameter | Name | Object | Description | Limits |
|--------------------|---------|---------------|-----------------------------|--------|
| Expansion Relay 1 | ExRly1 | Binary Output | Current status of relay 6. | |
| Expansion Relay 2 | ExRly2 | Binary Output | Current status of relay 7. | |
| Expansion Relay 3 | ExRly3 | Binary Output | Current status of relay 8. | |
| Expansion Relay 4 | ExRly4 | Binary Output | Current status of relay 9. | |
| Expansion Relay 5 | ExRly5 | Binary Output | Current status of relay 10. | |
| Expansion Relay 6 | ExRly6 | Binary Output | Current status of relay 11. | |
| Expansion Relay 7 | ExRly7 | Binary Output | Current status of relay 12. | |
| Expansion Relay 8 | ExRly8 | Binary Output | Current status of relay 13. | |
| Expansion Relay 9 | ExRly9 | Binary Output | Current status of relay 14. | |
| Expansion Relay 10 | ExRly10 | Binary Output | Current status of relay 15. | |
| Expansion Relay 11 | ExRly11 | Binary Output | Current status of relay 16. | |
| Expansion Relay 12 | ExRly12 | Binary Output | Current status of relay 17. | |
| Expansion Relay 13 | ExRly13 | Binary Output | Current status of relay 18. | |
| Expansion Relay 14 | ExRly14 | Binary Output | Current status of relay 19. | |
| Expansion Relay 15 | ExRly15 | Binary Output | Current status of relay 20. | |
| Expansion Relay 16 | ExRly16 | Binary Output | Current status of relay 21. | |

VCM PT-Link-LON® Property Identifier:

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

LONPropertyIdentifier :

```
WattLONScheduleForce ::= 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)
}
```

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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)
}
```

Appendix E - MUA II LON Parameters

| SNVTs for the MUA II Controller | | | | |
|------------------------------------|----------|---------------|--|--------|
| All the SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Application Software Version | AppVer | Analog Output | Current version of the software in the unit. | |
| Alarm Status | AlmSts | Analog Output | Needed only in legacy application. | |
| Control Status | CtrlSts | Analog Output | Needed only in legacy application. | |
| Control Mode | CtrlMod | Analog Output | Needed only in legacy application. | |
| External Heat Position | ExHtPos | Analog Output | Current position of the external modulating heating signal. | |
| External Relays Group #1 | ExRlys1 | Analog Output | Needed only in legacy application. | |
| External Relays Group #2 | ExRlys2 | Analog Output | Needed only in legacy application. | |
| External Relays Group #3 | ExRlys3 | Analog Output | Needed only in legacy application. | |
| Modulating Gas Valve Position | MdHt2Pos | Analog Output | Current position of MODGAS II modulating gas valve control. | |
| On Board Relays | OnRlys | Analog Output | Needed only in legacy application. | |
| Outdoor Air Cooling Setpoint | OaClSt | Analog Output | Current calculated outdoor air cooling setpoint. | |
| Outdoor Air Dew Point | OaDwpt | Analog Output | Current calculated outdoor air dewpoint. | |
| Outdoor Air Dew Point Setpoint | OaDwptSt | Analog Output | Mirror of the DPtSt “read only.” | |
| Outdoor Air Enthalpy | OaEtp | Analog Output | Current calculated outdoor air enthalpy. | |
| Outdoor Air Enthalpy Deadband | OaEtpDb | Analog Output | Mirror of the DtpDb “read only.” | |
| Outdoor Air Enthalpy Setpoint | OaEtpSt | Analog Output | Calculated Enthalpy Setpoint at which the compressors start staging during dehumidification operation. | |
| Outdoor Air Heating Setpoint | OaHtSt | Analog Output | Current calculated outdoor air heating setpoint. | |

| SNVTs for the MUA II Controller | | | | |
|------------------------------------|----------|---------------|--|------------|
| All the SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Outdoor Air Humidity | OaRh | Analog Output | Current value of the outdoor humidity sensor. | |
| Outdoor Air Temperature | OaTp | Analog Output | Current value of the outdoor temperature sensor. | |
| Reheat Value Position | Rt2Pos | Analog Output | Current position of the MHGRV modulating hot gas reheat valve control. | |
| Space Humidity | InRh | Analog Output | Current value of the space humidity sensor. | |
| Space Temperature | SpcTp | Analog Output | Current value of the space air temperature sensor. | |
| Supply Air Setpoint Mirror | SaTpStM | Analog Output | Mirror of the SaTpSt “read only.” | |
| Supply Air Temperature | SaTp | Analog Output | Current value of the supply air temperature sensor. | |
| Cooling Deadband | CIDb | Analog Input | The Cooling Deadband added to the Supply Air Setpoint gives the Cooling Mode Setpoint. When the Outside Air Temperature rises above this setpoint, the unit will go to Cooling Mode. | 2 20 |
| Dew Point Reset Limit | DptRstLt | Analog Input | During space humidity reset of the dewpoint, this is the lower limit of the dewpoint reset. | 40 DP Spt. |
| Dewpoint Setpoint | DptSt | Analog Input | If the outdoor dewpoint rises above this setpoint, the unit will activate the Dehumidification Demand. | 40 80 |
| Enthalpy Deadband | EtpDb | Analog Input | The Enthalpy Deadband is the amount of Enthalpy in the Outside Air needed to activate an extra stage of cooling. | 3 20 |
| External Heat Proportion Band | ExHtPBd | Analog Input | The External Heat Proportional Deadband is the range through which the external heating device will proportionally modulate. | 1 30 |

Appendix E - MUA II LON Parameters

| SNVTs for the MUA II Controller | | | | | |
|------------------------------------|----------|--------------|---|---------|--------------|
| All the SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Heating Deadband | HtDb | Analog Input | The Heating Deadband is subtracted from the Supply Air Setpoint to get the Heating Mode Setpoint. When the Outside Air Temperature drops below this setpoint, the unit will go to Heating Mode. | 2 | 20 |
| Schedule Force | SchdFrc | Analog Input | Enter a value equal to 1 to force the unit to occupied and a value equal to 0 to send the unit to unoccupied. | 0 | 2 |
| Space Humidity At Max Supply | InRhMax | Analog Input | During space humidity reset of the dewpoint, this is the higher limit of the space humidity. This produces the lowest dewpoint possible. | 0 | 100 |
| Space Humidity At Min Supply | InRhMin | Analog Input | During space humidity reset of the dewpoint, this is the lower limit of the space humidity. This produces the highest dewpoint possible. | 0 | 100 |
| Space Temperature At Max Supply | SpcTpMax | Analog Input | During space temperature reset of the supply setpoint, this is the higher limit of the space temperature. This produces the lowest supply air setpoint possible. | 40 | 100 |
| Space Temperature At Min Supply | SpcTpMin | Analog Input | During space temperature reset of the supply setpoint, this is the lower limit of the space temperature. This produces the highest supply air setpoint possible. | 40 | 100 |
| Supply Air Reset Limit | SaRstSt | Analog Input | During space temperature reset of the supply setpoint, this is the highest limit of the supply setpoint reset. | SA Spt. | SA Spt. + 50 |

| SNVTs for the MUA II Controller | | | | | |
|------------------------------------|-----------|---------------|---|--------|----|
| All the SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Supply Air Setpoint | SaTpSt | Analog Input | The Supply Air Setpoint is the desired temperature to be delivered by the unit at any time during the occupied mode of operation. | 50 | 90 |
| Bad Supply Air Sensor | SaTpAlm | Binary Output | Alarm that indicates a failure in the supply air sensor. | | |
| Cooling Demand | ClDnmd | Binary Output | Status that indicates a demand for cooling. | | |
| Dehumidification Demand | Dehm Dmnd | Binary Output | Status that indicates a demand for dehumidification. | | |
| External Heat Configured | ExHtCfg | Binary Output | Status that indicates the unit has been configured to control modulating external heat source. | | |
| Fan Start Up Delay | FanDly | Binary Output | Status that indicates the fan is commanded to run, but it is on the start up delay mode. | | |
| Fan Proving Alarm | PofAlm | Binary Output | Alarm that indicates a failure in the flow of the VFD blower. | | |
| Heating Demand | HtDmnd | Binary Output | Status that indicates a demand for heating. | | |
| High Supply Air Temperature | HiSaAlm | Binary Output | Alarm that indicates the supply air temperature has risen above acceptable levels. The unit will shutdown. | | |
| Missing Humidity Sensor | RhAlm | Binary Output | Alarm that indicates a failure in the outdoor humidity sensor. | | |
| Low Supply Air Temperature | LoSaAlm | Binary Output | Alarm that indicates the supply air temperature dropped below acceptable levels. The unit will shutdown. | | |
| MODGAS II Connected | MdHt2Ins | Binary Output | Status that indicates the MODGAS II controller is connected. | | |
| No Outdoor Air Temperature | OaTpAlm | Binary Output | Alarm that indicates a failure in the outdoor air temperature. | | |
| Proof of Flow Configured | PofCfg | Binary Output | Status that indicates the proof of flow function has been configured. | | |

Appendix E - MUA II LON Parameters

| SNVTs for the MUA II Controller | | | | |
|------------------------------------|----------|---------------|---|--------|
| All the SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| REHEAT II Connected | Rt2Ins | Binary Output | Status that indicates the MHGRV controller is connected to the system. | |
| Reheat Relay Configured | RtRlyCfg | Binary Output | Status that indicates the unit has a reheat relay configured. | |
| Indoor Humidity Sensor Installed | InRhCfg | Binary Output | Status that indicates the unit is configured to read a space humidity sensor. | |
| Space Temperature Sensor Installed | SpcTpIns | Binary Output | Status that indicates the unit has a space temperature sensor installed. | |
| On Board Relay 1 | OnRly1 | Binary Output | Current status of relay 1. | |
| On Board Relay 2 | OnRly2 | Binary Output | Current status of relay 2. | |
| On Board Relay 3 | OnRly3 | Binary Output | Current status of relay 3. | |
| On Board Relay 4 | OnRly4 | Binary Output | Current status of relay 4. | |
| On Board Relay 5 | OnRly5 | Binary Output | Current status of relay 5. | |
| Expansion Relay 1 | ExRly1 | Binary Output | Current status of relay 6. | |
| Expansion Relay 2 | ExRly2 | Binary Output | Current status of relay 7. | |
| Expansion Relay 3 | ExRly3 | Binary Output | Current status of relay 8. | |
| Expansion Relay 4 | ExRly4 | Binary Output | Current status of relay 9. | |
| Expansion Relay 5 | ExRly5 | Binary Output | Current status of relay 10. | |
| Expansion Relay 6 | ExRly6 | Binary Output | Current status of relay 11. | |
| Expansion Relay 7 | ExRly7 | Binary Output | Current status of relay 12. | |
| Expansion Relay 8 | ExRly8 | Binary Output | Current status of relay 13. | |
| Expansion Relay 9 | ExRly9 | Binary Output | Current status of relay 14. | |
| Expansion Relay 10 | ExRly10 | Binary Output | Current status of relay 15. | |
| Expansion Relay 11 | ExRly11 | Binary Output | Current status of relay 16. | |
| Expansion Relay 12 | ExRly12 | Binary Output | Current status of relay 17. | |

| SNVTs for the MUA II Controller | | | | |
|------------------------------------|---------|---------------|-----------------------------|--------|
| All the SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Expansion Relay 13 | ExRly13 | Binary Output | Current status of relay 18. | |
| Expansion Relay 14 | ExRly14 | Binary Output | Current status of relay 19. | |
| Expansion Relay 15 | ExRly15 | Binary Output | Current status of relay 20. | |
| Expansion Relay 16 | ExRly16 | Binary Output | Current status of relay 21. | |

Appendix E - MUA II LON Parameters

MUA II PT-Link-LON® SNVT Identifier

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

LONPropertyIdentifier :

WattLONScheduleForce ::= ENUMERATED {

NormalOperation (0),
ForceOccupied (1),
ForceUnoccupied (2)
}

MuaIIControlMode ::= ENUMERATED {

Unoccupied (0),
RemoteContactOccupied (1),
NormalScheduleOccupied (2),
HolidayModeActive (3),
ScheduleForceOccupied (4),
ScheduleForceUnoccupied (5),
CurrentOutputForceMode (6),
PushButtonOverride (7)
}

MuaIIOnBoardRelaysBits ::= BIT STRING {

OnBoardRelay1 (0),
OnBoardRelay2 (1),
OnBoardRelay3 (2),
OnBoardRelay4 (3),
OnBoardRelay5 (4)
}

MuaIIExRelaysGroup1Bits ::= BIT STRING {

ExpansionBoard1Relay1 (0),
ExpansionBoard1Relay2 (1),
ExpansionBoard1Relay3 (2),
ExpansionBoard1Relay4 (3)
}

MuaIIExRelaysGroup2Bits ::= BIT STRING {

ExpansionBoard2Relay1 (0),
ExpansionBoard2Relay2 (1),
ExpansionBoard2Relay3 (2),
ExpansionBoard2Relay4 (3)
}

MuaIIExRelaysGroup3Bits ::= BIT STRING {

ExpansionBoard3Relay1 (0),
ExpansionBoard3Relay2 (1),
ExpansionBoard3Relay3 (2),
ExpansionBoard3Relay4 (3)
}

MuaIIAlarmStatusBits ::= BIT STRING {

BadSupplyAirTemperatureSensor (0),
NoOutdoorAirTemperatureAvailable (1),
MissingHumiditySensor (2),
FanProvingAlarm (3),
LowSupplyAirTemperature (4),
HighSupplyAirTemperature (5)
}

Appendix F - VAV/CAV LON Parameters

SNVTs for the VAV/CAV Controller

All the SNVTs are SNVT_count_inc_f

| Parameter | Name | Object | Description | Limits |
|----------------------------------|----------|---------------|--|--------|
| Application Software Version | AppVer | Analog Output | Current version of the software in the unit. | |
| Alarm Status | AlmSts | Analog Output | Needed only in legacy application. | |
| Configuration | CntInf | Analog Output | Needed only in legacy application. | |
| Control Mode | CtrlMod | Analog Output | Needed only in legacy application. | |
| Control Status | CrtlSts | Analog Output | Needed only in legacy application. | |
| Control Temperature | CrtlTp | Analog Output | Current value of the control temperature sensor. | |
| Cooling Setpoint | ClSt | Analog Output | Current calculated cooling setpoint. | |
| Duct Static Pressure | DuctPr | Analog Output | Current value of the duct static pressure sensor. | |
| Economizer Position | EcoPos | Analog Output | Current position of the economizer damper. | |
| External Relays Group #1 | Exlys12 | Analog Output | Needed only in legacy application. | |
| External Relays Group #2 | ExRlys3 | Analog Output | Needed only in legacy application. | |
| External Relays Group #3 | ExRlys4 | Analog Output | Needed only in legacy application. | |
| Heating Setpoint | HtSt | Analog Output | Current calculated heating setpoint. | |
| On Board Relays | OnRlys | Analog Output | Needed only in legacy application. | |
| Outdoor Air Humidity | OaRh | Analog Output | Current value of the outdoor humidity sensor. | |
| Outdoor Air Temperature | OaTp | Analog Output | Current value of the outdoor temperature sensor. | |
| Outdoor Air Wetbulb | OaWtbl | Analog Output | Current calculated value of the outdoor wetbulb temperature. | |
| Relief Pressure | RfPr | Analog Output | Current value of the building pressure sensor. | |
| Return Air CO ₂ Level | CO2Level | Analog Output | Current value of the CO ₂ sensor. | |
| Return Air Temperature | RaTp | Analog Output | Current value of the supply air temperature sensor. | |
| Space Temperature | SpcTp | Analog Output | Current value of the space temperature sensor. | |

SNVTs for the VAV/CAV Controller

All the SNVTs are SNVT_count_inc_f

| Parameter | Name | Object | Description | Limits | |
|------------------------------|----------|---------------|--|--------|------|
| Supply Air Temperature | SaTp | Analog Output | Current value of the supply air temperature sensor. | | |
| Temperature Demand | TpDmnd | Analog Output | Based on the comparison between the current Control Temperature and the Heating or Cooling Setpoint Temperatures. Does no work for supply air control. | | |
| VFD Blower Fan | VfdBwPos | Analog Output | Current position of the VFD blower fan signal. | | |
| VFD Exhaust Fan | VfdExPos | Analog Output | Current position of the VFD relief fan signal. | | |
| CO ₂ Setpoint | CO2St | Analog Input | When the CO ₂ level rises above the CO ₂ Protection Limit Max Level, the Economizer's Minimum Position will begin to reset open proportionally between the CO ₂ Protection Limit Max Level Setpoint and the Reset Range Setpoint. | 0 | 8000 |
| Duct Static Setpoint | DuctPrSt | Analog Input | This is the target duct pressure to be maintained by the VFD blower signal. | 0.01 | 3 |
| Minimum Outside Air Setpoint | MinEcoSt | Analog Input | This is the minimum position of the economizer in the occupied modes. | 1 | 99 |
| Occupied Cooling Setpoint | OcpClSt | Analog Input | 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, the cooling demand is always active. | 0 | 90 |

Appendix F - VAV/CAV LON Parameters

SNVTs for the VAV/CAV Controller

All the SNVTs are SNVT_count_inc_f

| Parameter | Name | Object | Description | Limits | |
|---------------------------|----------|--------------|---|--------|-----|
| Occupied Heating Setpoint | OcpHtSt | Analog Input | 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, there is no heating demand. | 0 | 90 |
| Outdoor Air Sensor Offset | OaTpOst | Analog Input | If the Outdoor Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature. | -10 | 10 |
| Relief Pressure Setpoint | RfPrSt | Analog Input | This is the target building pressure to be maintained by the VFD Relief signal. | -0.3 | 0.3 |
| Return Air Sensor Offset | RaTpOst | Analog Input | If the Return Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature. | -10 | 10 |
| Schedule Force | SchdFrc | Analog Input | Enter a value equal to 1 to force the unit to occupied and a value equal to 0 to send the unit to unoccupied. | 0 | 2 |
| Space Sensor Offset | SpcTpOst | Analog Input | If the Space Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature. | -10 | 10 |

SNVTs for the VAV/CAV Controller

All the SNVTs are SNVT_count_inc_f

| Parameter | Name | Object | Description | Limits | |
|-----------------------------|---------|--------------|--|--------|-----|
| Staging Deadband | StgDb | Analog Input | All heating and cooling stages are staged up and down as the Supply Air rises above or falls below the Supply Setpoint by an amount equal to the number of stages divided into the Deadband Setpoint. | 0 | 10 |
| Supply Air Cooling Setpoint | SaClSt | Analog Input | This is the supply air target temperature during the cooling mode. | 50 | 70 |
| Supply Air Heating Setpoint | SaHtSt | Analog Input | This is the supply air target temperature during the heating mode. | 0 | 300 |
| Supply Air Sensor Offset | SaTpOst | Analog Input | 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. | -10 | 10 |
| Unoccupied Cooling Setpoint | UnClSt | Analog Input | 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 Setpoint | UnHtSt | Analog Input | 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. | -30 | 0 |

Appendix F - VAV/CAV LON Parameters

| SNVTs for the VAV/CAV Controller | | | | | |
|------------------------------------|----------|---------------|---|--------|----|
| All the SNVTs are SNVT_count_inc_f | | | | | |
| Parameter | Name | Object | Description | Limits | |
| Warm Up Setpoint | WmupSt | Analog Input | In a VAV application, upon entering the occupied mode, the Warm-up Demand will be activated if the return air temperature drops one degree below this setpoint. | 50 | 90 |
| Wetbulb Setpoint | WtblSt | Analog Input | The economizer is enabled if the outdoor wetbulb reading rises above this setpoint. | 0 | 80 |
| AHU Controls Economizer | AhuEco | Binary Output | Status that indicates the unit has an economizer to be controlled. | | |
| CO ₂ Sensor Installed | CO2Cfg | Binary Output | Status that indicates the CO ₂ function has been configured. | | |
| Cooling Demand | ClDmnd | Binary Output | Status that indicates a demand for cooling. | | |
| Cooling Enabled | ClEnbl | Binary Output | Status that indicates mechanical cooling is enabled. | | |
| Constant Volume Configured | CavCfg | Binary Output | Status that indicates the unit will operate as a constant volume unit. | | |
| Dehumidification Mode | DehmMod | Binary Output | Status that indicates a demand for dehumidification. | | |
| Economizer Enabled | EcoEnbl | Binary Output | Status that indicates the economizer is enabled. | | |
| Fan Start Up Delay | FanDly | Binary Output | Status that indicates the fan is commanded to run, but it is on the start up delay mode. | | |
| Heat / Cool Staging Disabled | HtClDsbl | Binary Output | Status that indicates the mechanical heating and cooling is disabled. | | |
| Heating Demand | HtDmnd | Binary Output | Status that indicates a demand for heating. | | |
| Heating Enabled | HtEnbl | Binary Output | Status that indicates mechanical heating is enabled. | | |

| SNVTs for the VAV/CAV Controller | | | | |
|------------------------------------|----------|---------------|--|--------|
| All the SNVTs are SNVT_count_inc_f | | | | |
| Parameter | Name | Object | Description | Limits |
| Heat Pump Configured | HtPmpCfg | Binary Output | Status that indicates the unit will operate as a heat pump. | |
| Humidistat Contact | Humst | Binary Output | Status that indicates the humidistat has been activated. | |
| Outdoor Humidity Sensor Configured | RhCfg | Binary Output | Status that indicates the unit will read the outdoor humidity sensor. | |
| MODGAS II Connected | MdHt2Ins | Binary Output | Status that indicates the MODGAS II controller is connected. | |
| No Outdoor Air Temperature | OaTpAlm | Binary Output | Alarm that indicates a failure in the outdoor air temperature. | |
| Fan Proving Alarm | PofAlm | Binary Output | Alarm that indicates a failure in the flow of the VFD blower. | |
| Proof of Flow Configured | PofCfg | Binary Output | Status that indicates the proof of flow function has been configured. | |
| REHEAT II Configured | Rt2Ins | Binary Output | Status that indicates the MHGRV controllers is connected to the system. | |
| Relief Pressure Configured | RfPrCfg | Binary Output | Status that indicates the unit is configured to control building pressure. | |
| Warm Up Mode Active | WmupDmnd | Binary Output | Status that indicates the control is in the Warm-up mode. | |
| Wet Bulb Sensor Configured | WtblCfg | Binary Output | Status that indicates the unit will use wetbulb reading instead of the drybulb reading to enable the economizer. | |
| Mechanical Cooling Alarm | MchClAlm | Binary Output | Alarm that indicates the compressors are running, but the supply air temperature has not dropped more than 5°F w/in a user adjusted time period. | |

Appendix F - VAV/CAV LON Parameters

SNVTs for the VAV/CAV Controller

All the SNVTs are SNVT_count_inc_f

| Parameter | Name | Object | Description | Limits |
|------------------------------|----------|---------------|---|--------|
| Mechanical Heating Alarm | MchHtAlm | Binary Output | Alarm that indicates the stages of heat are running, but the supply air temperature has not risen more than 5°F w/in a user adjusted time period. | |
| Dirty Filter Detected | DrtFlAlm | Binary Output | Alarm that indicates a dirty filter has been detected. | |
| Bad Space Temperature Sensor | SpcTpAlm | Binary Output | Alarm that indicates a failure in the space temperature sensor. | |
| High Space Temperature | HiSpcAlm | Binary Output | This alarm is activated if the space temperature does not get within 5°F to the occupied heating setpoint in an hour in the heating mode. This alarm is available during space control operation. | |
| Low Space Temperature | LoSpcAlm | Binary Output | This alarm is activated if the space temperature does not get within 5°F to the occupied cooling setpoint in an hour in the cooling mode. This alarm is available during space control operation. | |
| On Board Relay 1 | OnRly1 | Binary Output | Current status of relay 1. | |
| On Board Relay 2 | OnRly2 | Binary Output | Current status of relay 2. | |
| On Board Relay 3 | OnRly3 | Binary Output | Current status of relay 3. | |
| On Board Relay 4 | OnRly4 | Binary Output | Current status of relay 4. | |
| On Board Relay 5 | OnRly5 | Binary Output | Current status of relay 5. | |
| Expansion Relay 1 | ExRly1 | Binary Output | Current status of relay 6. | |
| Expansion Relay 2 | ExRly2 | Binary Output | Current status of relay 7. | |
| Expansion Relay 3 | ExRly3 | Binary Output | Current status of relay 8. | |

SNVTs for the VAV/CAV Controller

All the SNVTs are SNVT_count_inc_f

| Parameter | Name | Object | Description | Limits |
|--------------------|---------|---------------|-----------------------------|--------|
| Expansion Relay 4 | ExRly4 | Binary Output | Current status of relay 9. | |
| Expansion Relay 5 | ExRly5 | Binary Output | Current status of relay 10. | |
| Expansion Relay 6 | ExRly6 | Binary Output | Current status of relay 11. | |
| Expansion Relay 7 | ExRly7 | Binary Output | Current status of relay 12. | |
| Expansion Relay 8 | ExRly8 | Binary Output | Current status of relay 13. | |
| Expansion Relay 9 | ExRly9 | Binary Output | Current status of relay 14. | |
| Expansion Relay 10 | ExRly10 | Binary Output | Current status of relay 15. | |
| Expansion Relay 11 | ExRly11 | Binary Output | Current status of relay 16. | |
| Expansion Relay 12 | ExRly12 | Binary Output | Current status of relay 17. | |
| Expansion Relay 13 | ExRly13 | Binary Output | Current status of relay 18. | |
| Expansion Relay 14 | ExRly14 | Binary Output | Current status of relay 19. | |
| Expansion Relay 15 | ExRly15 | Binary Output | Current status of relay 20. | |
| Expansion Relay 16 | ExRly16 | Binary Output | Current status of relay 21. | |

Appendix F - VAV/CAV LON Parameters

VAV/CAV PT-Link-LON®

Property Identifier

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

LONPropertyIdentifier :

WattLONScheduleForce ::= ENUMERATED {

| | |
|-----------------|------|
| NormalOperation | (0), |
| ForceOccupied | (1), |
| ForceUnoccupied | (2) |
| } | |

VavCavControlMode ::= ENUMERATED {

| | |
|--------------------------|------|
| Unoccupied | (0), |
| RemoteContactOccupied | (1), |
| NormalScheduleOccupied | (2), |
| PushButtonOrZoneOverride | (3), |
| HolidayModeActive | (4), |
| UnoccupiedZoneDemand | (5), |
| RemoteScheduleOverride | (6), |
| CurrentOutputForceMode | (7), |
| SATHighOrLowCutOff | (8), |
| CO2OverrideInProgress | (9), |
| PurgeModeActive | (10) |
| } | |

VavCavControlStatusBits ::= BIT STRING {

| | |
|----------------------------|------|
| AhuControlEconomizer | (0), |
| NoOutdoorAirTempSensor | (1), |
| CarbonDioxideSensorPresent | (2), |
| HeatCoolStagingDisabled | (3), |
| DehumidificationMode | (4), |
| ModGasIIConnected | (5), |
| ReheatIIConnected | (6) |
| } | |

VavCavConfigurationBits ::= BIT STRING {

| | |
|-------------------|------|
| CoolingDemand | (0), |
| HeatingDemand | (1), |
| CoolingEnabled | (2), |
| HeatingEnabled | (3), |
| EconomizerEnabled | (4), |
| FanInStartUpDelay | (5), |
| WarmUpModeActive | (6), |
| ProofOfFlow | (7), |
| HumidistatContact | (8), |

| | |
|----------------------|-------|
| ProofOfFlowConfig | (9), |
| ConstantVolumeConfig | (10), |
| HeatWheelConfig | (11), |
| HumiditySensorConfig | (12), |
| WetBulbSensorConfig | (13), |
| ReliefPressureConfig | (14) |
| } | |

VavCavOnBoardRelaysBits ::= BIT STRING {

| | |
|---------------|------|
| OnBoardRelay1 | (0), |
| OnBoardRelay2 | (1), |
| OnBoardRelay3 | (2), |
| OnBoardRelay4 | (3), |
| OnBoardRelay5 | (4) |
| } | |

VavCavExRelaysGroup1Bits ::= BIT STRING {

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

VavCavExRelaysGroup2Bits ::= BIT STRING {

| | |
|-----------------------|------|
| ExpansionBoard3Relay1 | (0), |
| ExpansionBoard3Relay2 | (1), |
| ExpansionBoard3Relay3 | (2), |
| ExpansionBoard3Relay4 | (3) |
| } | |

VavCavExRelaysGroup3Bits ::= BIT STRING {

| | |
|-----------------------|------|
| ExpansionBoard4Relay1 | (0), |
| ExpansionBoard4Relay2 | (1), |
| ExpansionBoard4Relay3 | (2), |
| ExpansionBoard4Relay4 | (3) |
| } | |

VavCavAlarmStatusBits ::= BIT STRING {

| | |
|------------------------|------|
| BadSpaceTempSensor | (0), |
| FanProvingAlarm | (1), |
| MechanicalCoolingAlarm | (2), |
| MechanicalHeatingAlarm | (3), |
| DirtyFilterDetected | (4), |
| HighSpaceTempAlarm | (5), |
| LowSpaceTempAlarm | (6) |
| } | |



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