GPC-XP Controller Technical Guide

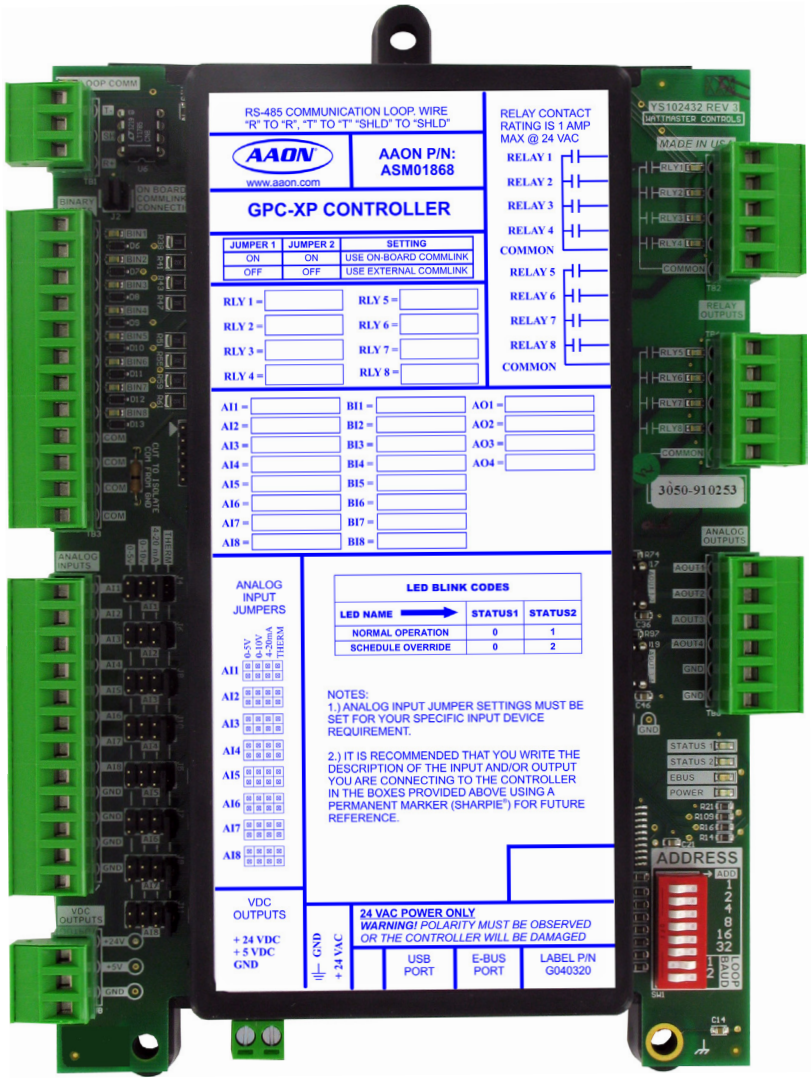


TABLE OF CONTENTS

Overview 3
Step-By-Step Guide 4
Dimensions, Mounting, and Wiring 5
Communication Settings 7
Initialization, Prism 2 Software, and SMTS II for GPC-XP 9
Selecting and Naming GPC-XP Controllers 10
GPC-XP Controller Status Screen 11
Components and Navigation 12
Analog Input Configuration Screen 13
Sensor Reading, Scaling, and Override Duration 14
Reading Average, Broadcast, and Scaling 15
Alarms, Calibration, and Overrides 16
Components and Navigation 17
Binary Input Type 18
Send Global Binary, Alarm Configuration & Internal Schedule 19
Components and Navigation 20
Relay Configuration Window 21
Main Control Method Window 22
Logical AND Control Method & Logical OR Control Method 26
Timing & Alarming & Relay Output Type 27
Components and Navigation 28
Analog Output Configuration Window 29
Control Type 30
Control Source, Control Setpoints, Setpoint Reset Source 31
Outdoor Air Enable, Controlling Schedule, Enabling Relay 32
Alternate Override and Override 33
Outdoor Status and AVC Status Windows 34
Schedules Window Components and Navigation 35
Saving, Restoring & Copying Schedules 37
Setting Holidays and Schedule Override 38
Configuring Alarms 39
Screen Components 40
Week Schedule Broadcasts, AVC Setpoints, and AVC Inputs 41
Rogue Sensor Limits & Reset & Outdoor Air Broadcasts 42
Daylight Savings Time, Trend Logging, & Reset Defaults 43
Saving and Copying Setpoints 44
Trend Logging and Printing 45
Graphing and Printing Trend Logs 46
Trend Log Select Unit and Printing Status Reports 47
Global Analog & Global Binary Help Screens 48
Formula Help Screen 49
Status Report Example 50
USB Driver Installation 52
Changing the COM Port Number 53

AAON, Inc.
2425 South Yukon Ave.
Tulsa, OK 74107-2728
www.aaon.com
Factory Technical Support Phone: 918-382-6450
Controls Support Phone: 866-918-1100

Copyright December 2019 © AAON.

AAON Part Number: G026160, Rev. 01K

AAON®,AAONAIRE®, WattMaster™, and WM™ are registered trademarks of AAON, Inc., Tulsa, OK.
Windows® 10 is a registered trademark of Microsoft Corporation.
AAON® assumes no responsibility for errors or omissions in this document. This document is subject to change without notice.
All rights reserved throughout the world.

Overview

The GPC-XP Controller (ASM01868) is used for controlling equipment or processes that cannot be controlled using a standard HVAC controller.

The GPC-XP provides the flexibility to control, schedule, and/or monitor equipment such as unit heaters, exhaust fans, motorized dampers, pumps, and other mechanical equipment. It can also be used for simple boiler, chiller, or refrigeration applications as well as to provide one lead/lag start function.

The GPC-XP has an on-board CommLink that provides for stand-alone programming and monitoring via a direct USB connection to a computer running Prism 2 software. If used on a networked system that has an external CommLink, this on-board CommLink would not be used. Alternatively, the System Manager Touch Screen II for GPC-XP can be used to view status, perform force modes, and set schedules.

The GPC-XP has (8) configurable analog inputs which will accept signals from thermistor temperature sensors or from 4-20mA, 0-5VDC, or 0-10VDC transmitters. The inputs are set for the desired scaling by means of a jumper bar. Custom formulas created by available math functions and operators can be used in conjunction with the analog inputs to create a calculated value to be used and displayed for a specific analog input. An additional modular input is available for AAON communicating sensors.

The GPC-XP has (8) wet contact binary inputs that can be configured for either normally open or normally closed operation. Also available are (8) relay outputs for on/off control and (4) analog outputs (0-10VDC) for modulating control. Highest/lowest/average (H/L/A) of the analog input values can be used in the GPC-XP logic or broadcast to other controllers on the control system loop. These H/L/A values are referred to in this technical guide as AVC (Analog Value Comparison) values.

There are (8) separate two events per day schedules which can be assigned to any input or output for operational control or for alarm recognition based on time of day. These schedules can also be configured to broadcast to other AAON controllers on the control system loop.

NOTE: The internal USB communication port of the GPC-XP Controller uses a specialized driver (USB Driver flash drive included) that must be installed on your Windows PC before communication to the device can be established. To install the USB Driver, follow the instructions in **Appendix B on page 52**.

Features

The GPC-XP Controller provides the following:

- 8 configurable analog inputs
- 8 wet contact binary inputs configured for normally open or normally closed operation
- 8 relay outputs for on/off control
- 4 analog outputs for proportional or PID control signals
- E-BUS port for communicating sensors
- 8 separate 2 events per day schedules which can be assigned to any input or output for operational control or alarm recognition based on time of day
- 1 Lead/Lag start function
- Schedules can be configured to broadcast to other AAON HVAC equipment installed on the same communications loop as the GPC-XP
- Can be configured using a computer with Prism 2 software installed
- The System Manager Touch Screen II for GPC-XP (sold separately) can be used to view status, perform force modes, and set schedules.
- Can be operated Stand-Alone or connected to a networked system
- On-board CommLink for Stand-Alone programming using a USB connection to a computer running Prism 2 software

NOTE: The GPC-XP Controller contains no user-serviceable parts. Contact qualified technical personnel if your Controller is not operating correctly.

Step-By-Step Guide

This guide will lead you through each step in configuring your GPC-XP Controller. Below is a quick overview of each step.

Section 1: GPC-XP Wiring & Setup—This section explains how to mount and wire your GPC-XP properly. It also explains how to set the address and baud rate for your particular system.

Section 2: Prism 2 Installation—This section explains how to install Prism 2 software required to program your GPC-XP Controller. If you are not familiar with the Prism 2 software program, please refer to the *Prism 2 Technical Guide* which can be downloaded from www.aaon.com under Software.

Section 3: GPC-XP Personalization & Status—This section explains how to individualize and access GPC-XP Controllers when more than one is installed and also provides and overview of the *GPC-XP Controller Status Screen*.

Section 4: Configuring Analog Inputs—This section explains how to configure analog inputs, individualize analog input descriptions, and calibrate thermistor sensors, and override and clear other analog input values.

Section 5: Configuring Binary Inputs—This section explains how to configure binary inputs, individualize binary input descriptions, and override binary inputs.

Section 6: Configuring Relays—This section explains how to configure relay outputs and individualize relay descriptions.

Section 7: Configuring Analog Outputs—This section explains how to configure analog outputs, individualize analog output descriptions, override voltages, and cancel overrides.

Section 8: Outdoor Status and AVC (Analog Value Comparison) Status—This section explains how to configure and view AVC and Outdoor Status setpoints.

Section 9: Setting Schedules—This section describes how to configure daily and holiday schedules and perform schedule force modes.

Section 10: Configuring Alarms—This section explains how to configure and view alarms.

Section 11: Miscellaneous Settings—This section includes miscellaneous settings for Week Schedule Broadcasts, AVC Inputs, AVC Setpoints, Rouge Sensor Limits, Reset Rogue Sensor, Outdoor Air Broadcasts, Trend Logging, and Daylight Savings.

Section 12: Saving and Copying Setpoints—This section explains how to save GPC-XP setpoints to a file on your computer and how to restore GPC-XP setpoints once you have saved them to a file.

Section 13: Viewing and Printing Trend Logs—This section explains how to view and print Trend Logs.

Appendix A—This appendix provides Help Screen information.

Appendix B—This appendix explains USB Driver Installation.

Index—The index provides page numbers for easy reference to quickly find the information you need.

Environmental Requirements

The GPC-XP Controller needs to be installed in an environment that can maintain a temperature range between -30°F and 150°F and not exceed 95% RH levels (non-condensing).

Mounting

The GPC-XP Controller is housed in a plastic enclosure. It is designed to be mounted by using the 3 mounting holes in the enclosure base. It is important to mount the module in a location that is free from extreme high or low temperatures, moisture, dust, and dirt. Be careful not to damage the electronic components when mounting the module.

See Figure 1 for Controller dimensions (in inches).

Power Supply

The GPC-XP Controller requires an 18-30 VAC power connection with a minimum rating of 8 VA.

WARNING: Observe polarity! All boards must be wired GND-to-GND and 24 VAC-to-24 VAC. Failure to observe polarity could result in damage to the boards.

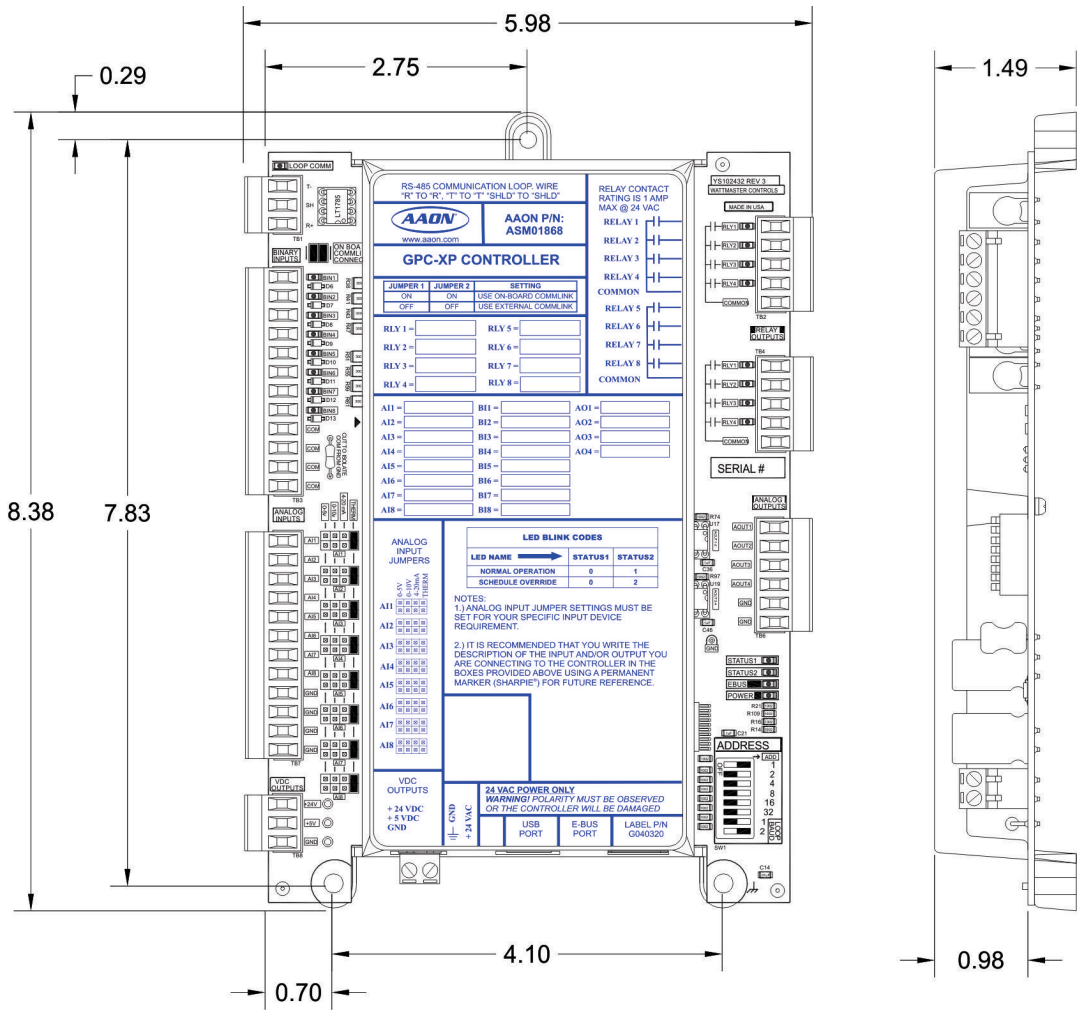


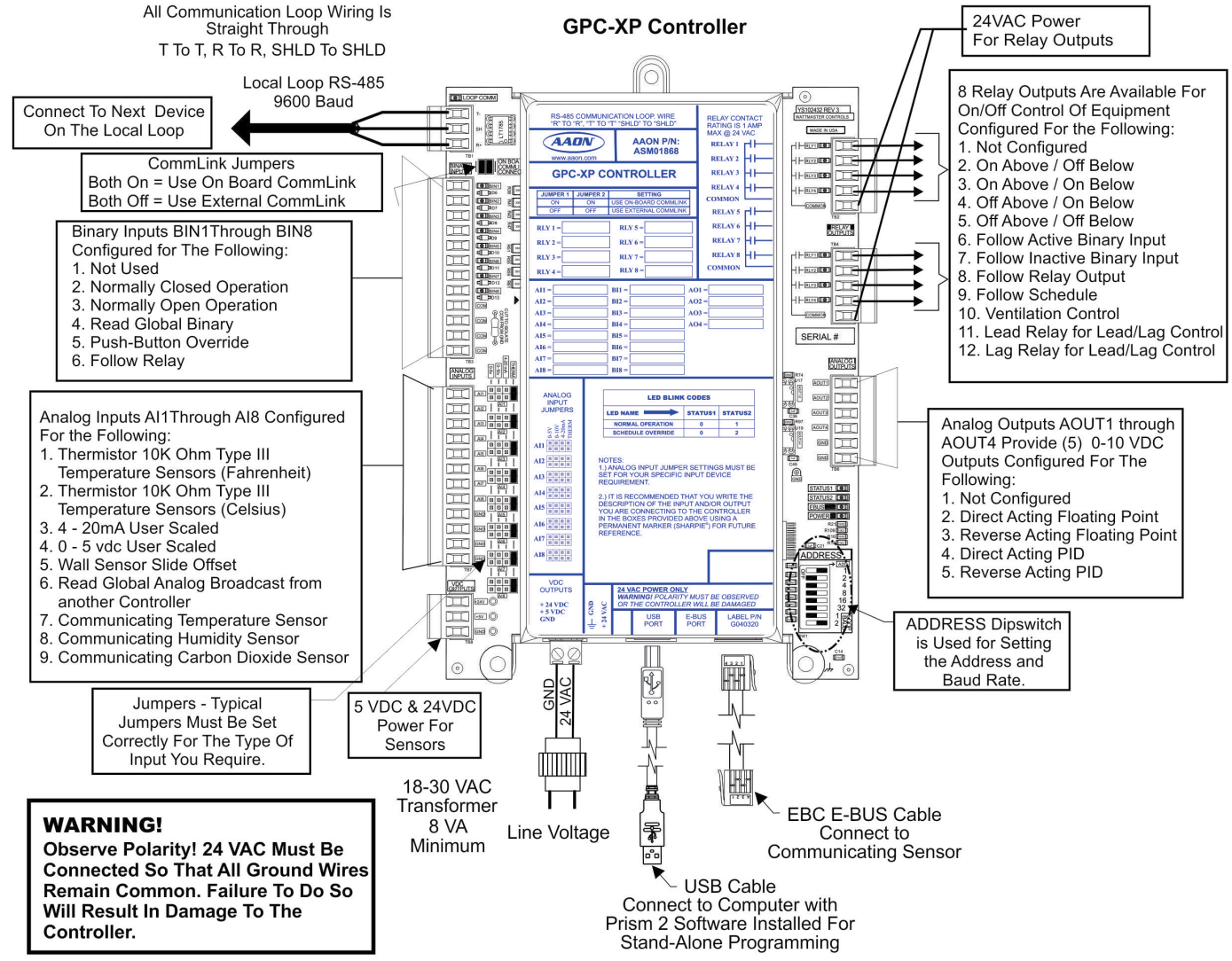
Figure 1: GPC-XP Dimensions

Installation & Wiring

Important Wiring Considerations

Please read carefully and apply the following information when wiring the GPC-XP Controller:

1. To operate the GPC-XP Controller, you must connect power to the 18-30 VAC input terminal block.
2. Check all wiring leads at the terminal block for tightness. Be sure that wire strands do not stick out and touch adjacent terminals. Confirm that all sensors required for your system are mounted in the appropriate location and wired into the correct terminals. See **Figure 2 below** for wiring.



WARNING!
Observe Polarity! 24 VAC Must Be Connected So That All Ground Wires Remain Common. Failure To Do So Will Result In Damage To The Controller.

NOTES:

1.)24 VAC Must Be Connected So That All Ground Wires Remain Common.

2.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

3.)All Communication Wiring To Be 18 Ga. Minimum, 2 Conductor Twisted Pair With Shield. Belden #82760 Or Equivalent.

4.)It Is Recommended That The Address Switch Is Set Before Installation.

Figure 2: GPC-XP Controller Wiring Diagram

Before Applying Power

In order to have a trouble free start-up, it is important to follow a few simple procedures. Before applying power for the first time, it is very important to correctly address the controller and run through a few simple checks.

Communication Settings

Stand Alone Operation

The GPC-XP has an on-board CommLink that is used during Stand-Alone Operation. When configured for Stand-Alone operation, a computer running Prism 2 software can be connected directly to the USB port located at the bottom of the GPC-XP for programming and monitoring. In order to operate in Stand-Alone Mode, two things need to be set. First, both CommLink Jumpers found on the upper left-hand side of the board need to be set to ON. See **Figure 3 below** for details. Second, the Baud Rate determined by setting ADDRESS Dipswitches 7 and 8 needs to be set to OFF/ON. See **Figure 4, page 8** for details.

Network Operation

The GPC-XP can be configured for connection to a networked system that has an external CommLink. In this case, the on-board CommLink would not be used. For this configuration, two things need to be set. First, both CommLink Jumpers found on the upper left-hand side of the board need to be set to OFF. See **Figure 3 below** for details. Second, the Baud Rate determined by setting ADDRESS Dipswitches 7 and 8 needs to be set to OFF/OFF if using a CommLink IV and to OFF/OFF or OFF/ON if using a CommLink 5. See **Figure 4, page 8** for details.

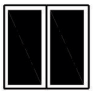
NOTE: For either application, you must install the USB drivers. See **Appendix B, page 52**.

Caution:
Disconnect All Communication Loop Wiring From The Controller Before Removing Power From The Controller. Reconnect Power And Then Reconnect Communication Loop Wiring.

ON-BOARD COMMLINK SETTING

Jumper 1	Jumper 2	Setting
ON	ON	Use On-Board CommLink
OFF	OFF	Use External CommLink

Both Jumpers ON



USE ON-BOARD COMMLINK

Both Jumpers OFF

USE EXTERNAL COMMLINK

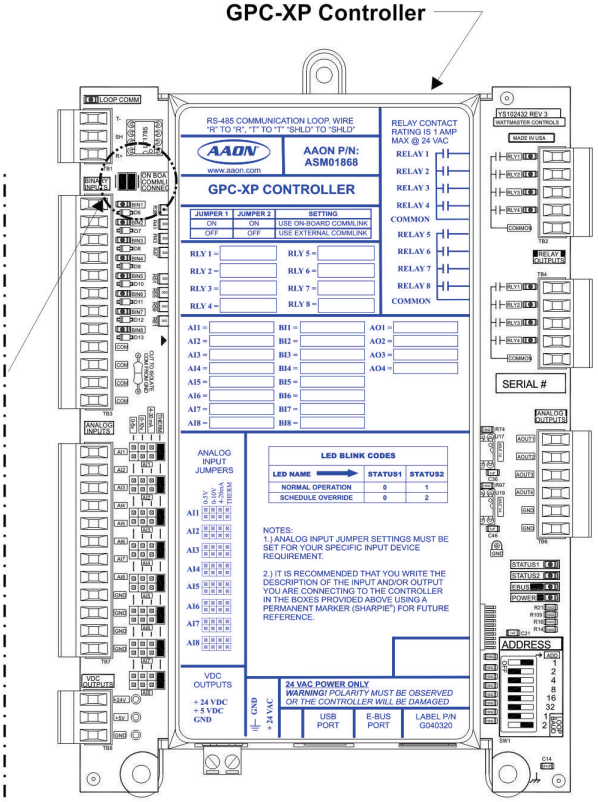


Figure 3: GPC-XP Controller On-Board CommLink Switch Setting

Addressing and Baud Rate Settings

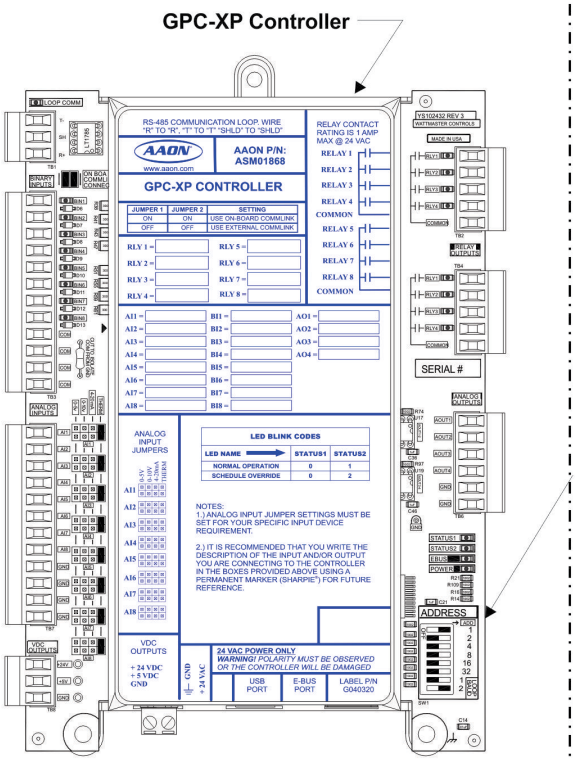
Controller Addressing and Baud Rate

The GPC-XP Controller is equipped with address switches. When using Prism 2 to program and configure the GPC-XP Controller, you would enter this address to communicate with the controller. When the system is to be connected to other HVAC unit controllers on a communication loop, each controller's address switch must be set with a unique address between 1 and 59.

Address switches 7 and 8 are used for the baud rate selection. The baud rate setting depends on both the version of CommLink being used and what type of controllers are being used. See **Figure 4 below** for address switch and baud rate setting information.

Caution:
Disconnect All Communication Loop Wiring From The Controller Before Removing Power From The Controller. Reconnect Power And Then Reconnect Communication Loop Wiring.

Note:
The Power To The Controller Must Be Removed And Reconnected After Changing The Address Switch Settings In Order For Any Changes To Take Effect.



BAUD RATE SELECTION

Baud	Switch 7	Switch 8	Communication Setting
9600	OFF	OFF	CommLink IV
9600	OFF	OFF	CommLink 5 Set at Low Speed*
57600	OFF	ON	CommLink 5 Set at High Speed* or GPC-XP is Stand Alone

* The CommLink 5 must be set to Low Speed if it is being used on a system that includes the VCM-X Controller, older generation of Orion Controllers, or original Auto-Zone Controllers.
** The CommLink 5 can be set to High Speed if is being used on a system that only includes VCCX2, VCB-X, or Auto-Zone 2 Controllers along with this GPC-XP Controller.

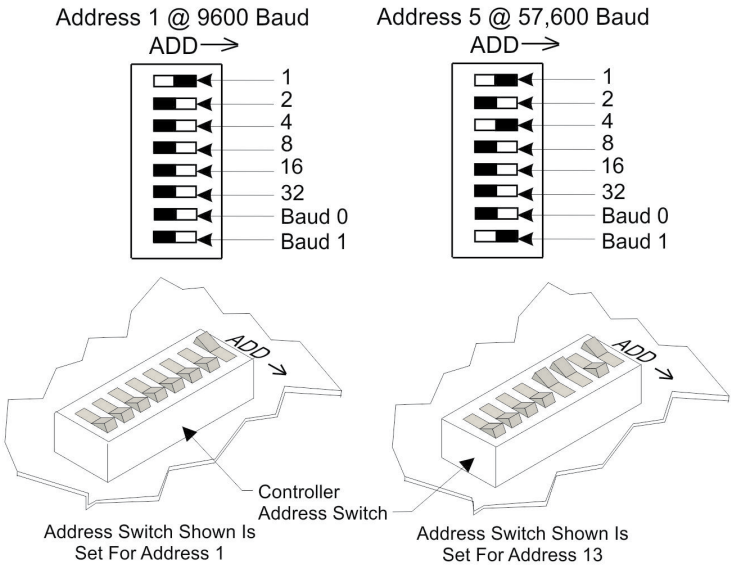


Figure 4: GPC-XP Controller Address Switch Setting

Initialization

On system power up, there is an approximately 30-second startup delay where all default setpoints are initialized, LED's are initialized, and all outputs are turned off.

When power is first applied, the STATUS1 LED will flash intermittently for about 10 seconds. After a short pause, STATUS1 LED and STATUS2 LED will flash out the controller address. STATUS1 LED will flash to represent the tens position. STATUS2 LED will flash to represent the ones position. After the controller address is complete, there will be a short pause while the initialization process is completed. There will be no controller operation or communications during initialization. After initialization, STATUS2 LED will continuously flash the status code—(1) blink indicates Normal Operation; (2) blinks indicates a Push-Button Schedule Override is in effect.

Example of a controller address of 25:
STATUS1 LED will flash 2 times. STATUS2 LED will flash 5 times.

Prism 2 Software

The next step is programming the controller for your specific requirements. Initial programming of the GPC-XP must first be done with a personal computer using our Prism 2 software. Prism 2 software gives you access to the status, configuration, and setpoint screens of the GPC-XP Controller. The software is distributed on CD or can be downloaded for free from our website: **www.aaon.com** and then select the category **Software**. Prism 2 does not require any license agreement and may be freely copied and distributed. See **Figure 5 below**.

For more information, please see the *Prism 2 Technical Guide* to familiarize yourself with the program.

System Requirements

To use Prism 2 you must have a computer that meets or exceeds the following requirements:

Operating System

- Microsoft® Windows® 2000/ Windows® Vista, Windows® 7, 8 or 10
  NOTE: Prism 2 is not intended for a server/client environment.

Minimum Hardware

- Windows® compatible computer
- Pentium 2 GHz Processor (Pentium 4 2 GHz or greater, **Recommended**)
- 1 GB RAM or greater)
- 120 MB hard drive space
- XVGA (1024 x 768) adapter and monitor (1280 x 1024, **Recommended**)
- Network card for TCP/IP connection when IP Module is used
- CommLink 5

*** NOTE:** The GPC-XP has a built-in CommLink that can be utilized in Stand-Alone Mode. **See page 7 for setting up Stand-Alone and Network operations.** In Network Mode, you must have a CommLink IV or CommLink 5 installed in order to communicate between your computer and the system. If remote communication is required, an IP-Module (Ethernet) must also be installed in the CommLink.

System Manager Touch Screen II for GPC-XP

The System Manager TS II (Touch Screen) for the GPC-XP provides a direct, graphic-enhanced, menu-driven link to enable you to view the status, perform force modes, and set schedules for your GPC-XP Controller. See **Figure 5 below**. For more information, please see the *System Manager TS II for GPC-XP Technical Guide*.

Support Information

AAON provides Prism 2 installation and configuration support. Call (866) 918-1100 for free, direct telephone support or (816) 505-1100 to talk to a Technical Support Representative. Support for all telephone services is available Monday through Friday, 7:00 AM to 5:00 PM central standard time.

NOTE: AAON Controls Support cannot troubleshoot internal PC and/or Windows®-based operating system problems.

NOTE: AAON Controls Support can-not troubleshoot firewalls, routers, and/or problems on a customer's internal or external network. An IT professional may need to be consulted.

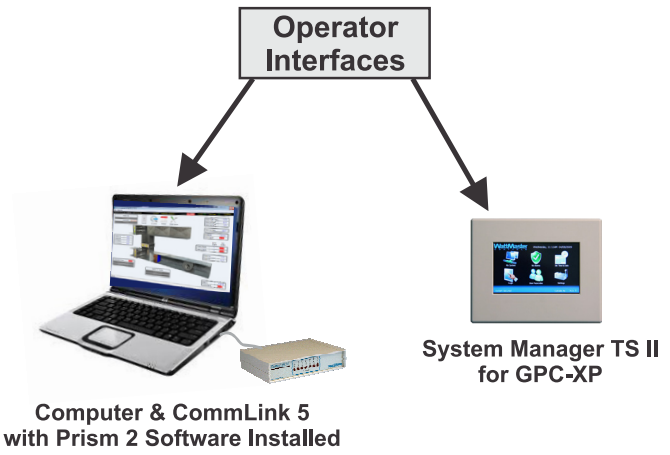


Figure 5: GPC-XP Operator Interfaces

Selecting and Naming GPC-XP Controllers

Selecting GPC-XP Controllers

NOTE: See the *Prism 2 Technical Guide* for instructions on setting up the job site and doing a search for units.

From the *Prism 2 Main Screen*, click on the GPC-XP Controller address in the *Unit Selection Window*. In this example, it is address 18. See **Figure 6 below**.

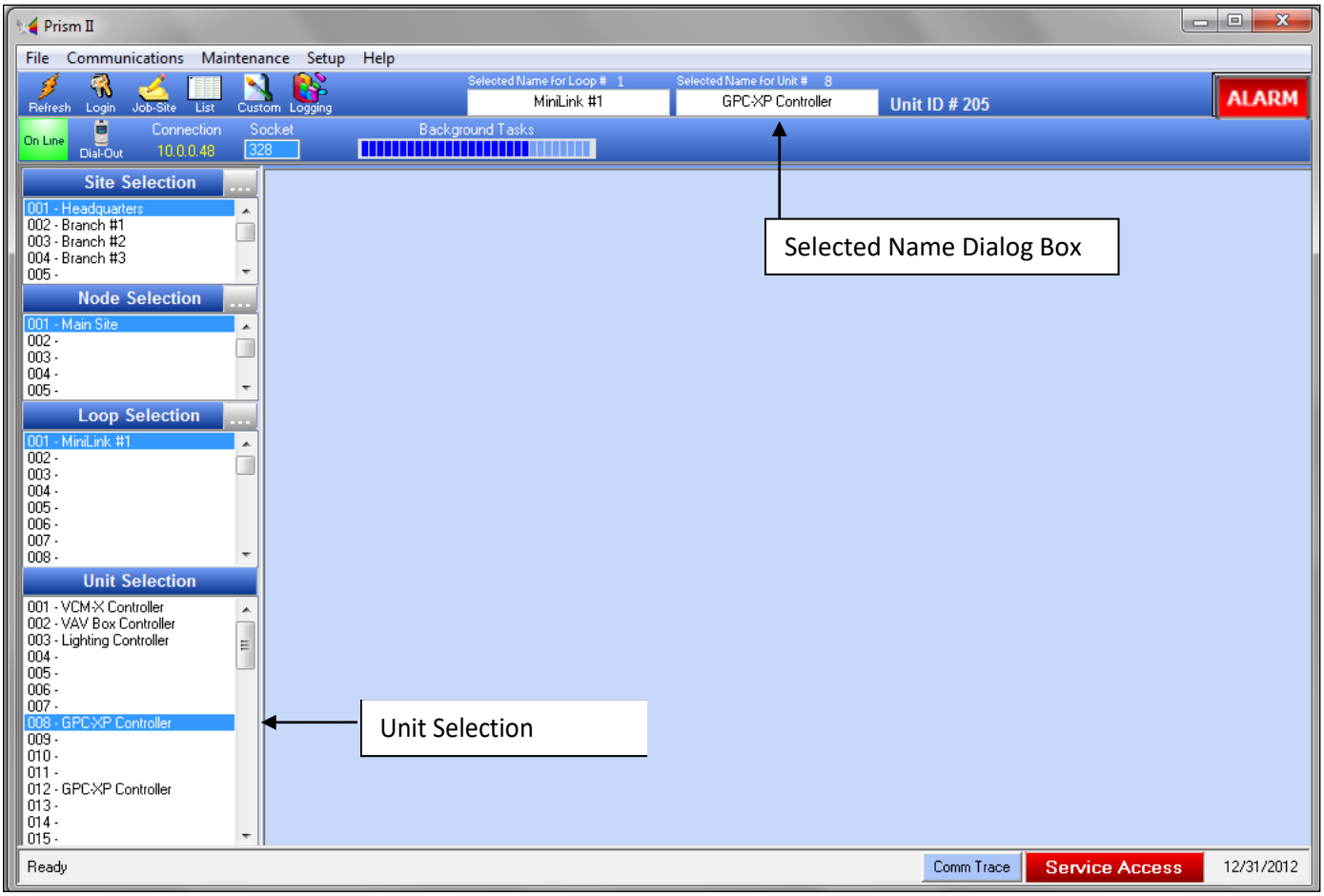


Figure 6: Prism 2 Main Screen GPC-XP Controller Selection

Naming GPC-XP Controllers

If you have more than one GPC-XP Controller, you can rename it in the *Selected Name Dialog Box*. See **Figure 7 below**. Many users name their GPC-XP Controller according to the application that it performs.

Figure 7: Naming the GPC-XP Controller

GPC-XP Controller Status Screen

Figure 8 below depicts the *GPC-XP Controller Status Screen* when you first access it with the Prism 2 program before any data has been entered.

The screen is divided into separate windows as follows: *Analog Inputs Window, Binary Inputs Window, Relays Window, Analog Outputs Window, Outdoor Status Window, AVC Status Window, Schedule Status Window,* and *Alarms*.

The *GPC-XP Controller Status Screen Toolbar* also gives you the options to access the Miscellaneous Setpoints Screen, Save and Restore Setpoints, View and Print Trend Logs, and Print a Status Report for the current day.

The *GPC-XP Controller Status Screen* provides real-time live updates of the current operating conditions and is used to access the various setpoint and configuration options.

No control takes place until the you configure the operation of the GPC-XP Controller..

Once you configure your inputs, outputs, and operating schedules, everything you need to monitor your GPC-XP is found on this *GPC-XP Controller Status Screen*.

The rest of this technical guide explains each component on this screen and provides detailed instructions for configuring the data.

The following is a list of topics and their page numbers:

Analog Inputs Window, **page 12**
Binary Inputs Window, **page 17**
Relays Window, **page 20**
Analog Outputs Window, **page 28**
Outdoor Status Window, **page 34**
AVC Status Window, **page 34**
Schedule Status Window, **page 35**
Configuring Alarms, **page 39**

Figure 8: GPC-XP Controller Status Screen

Components and Navigation

Analog Inputs

The *Analog Inputs Window* is located in the upper left-hand side of the *GPC-XP Controller Status Screen* (**Figure 8**, **page 11**). There are 8 Analog Inputs. See **Figure 9 below** for the *Analog Inputs Window* component summary and the pages that follow for details.

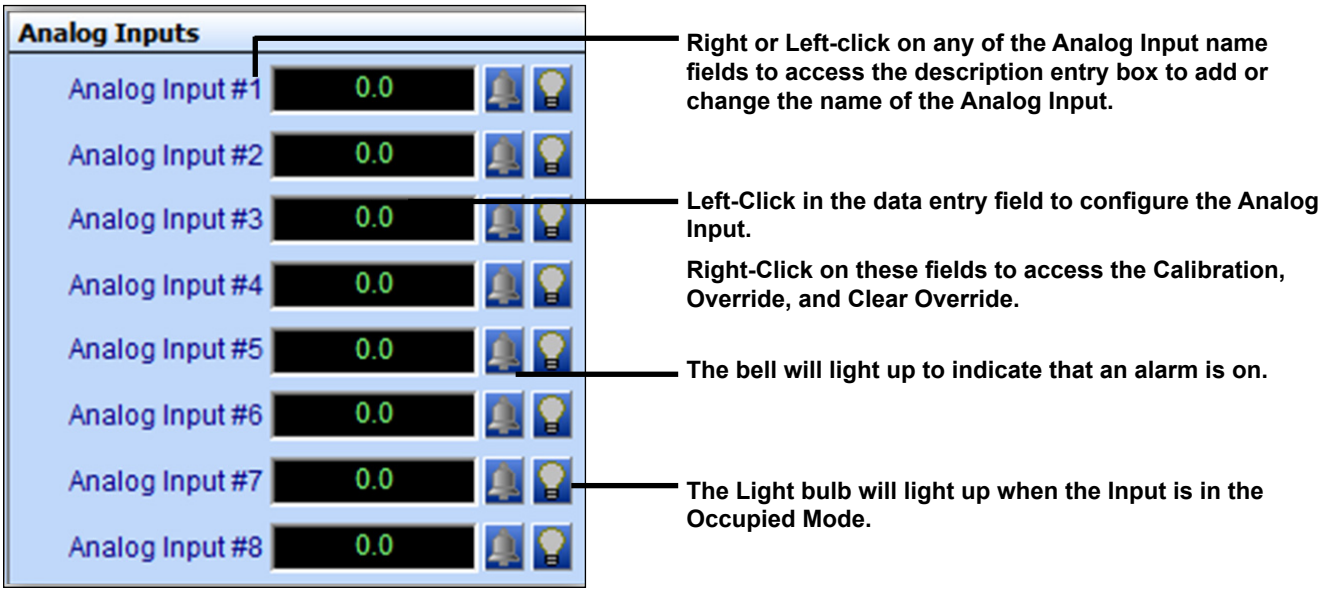


Figure 9: Analog Input Window Components and Navigation

Renaming Analog Inputs

To give an Analog Input a new name, click on the blue highlighted Analog Input # field and the *Analog Input Data Entry Dialog Box* will open. See **Figure 10 below**. Once you have typed in a new description, *press* **<ENTER>** to save. *The maximum number of characters is 17.*

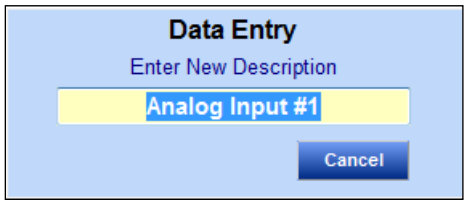


Figure 10: Analog Input Data Entry Dialog Box

Configuring Analog Inputs

Left-click in the data entry field in the *Analog Inputs Window* to open the *Analog Input Configuration Window* (**Figure 11 below**).

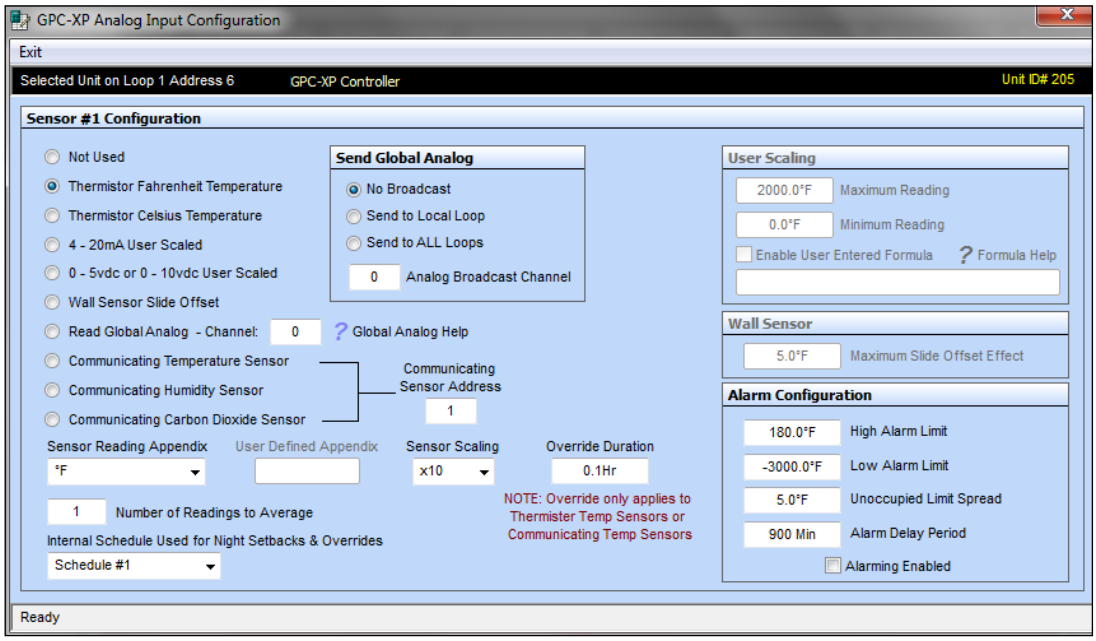


Figure 11: Analog Input Configuration Window

The following configurations are available for each Analog Input:

- **Not Used**
- **Thermistor Fahrenheit Temperature**: 10K Ohm Type III Scaled for Fahrenheit. Set jumper to the appropriate setting (**Figure 2, page 6**.)
- **Thermistor Celsius Temperature**: 10K Ohm Type III Scaled for Celsius. Set jumper to the appropriate setting (**Figure 2, page 6**.)
- **4 - 20mA User Scaled**: 4-20mA User-Scaled Sensor
- **0 - 5vdc or 0-10 vdc User Scaled**: Select this option if using a 0-5vdc or 10vdc scaled sensor. Set jumper associated with this input to the appropriate 0-5v or 0-10v setting (**Figure 2, page 6**.)
- **Wall Sensor Slide Offset**: If using an AAON thermistor space sensor with the slide adjust, this would be the input configuration for the AUX connection from that sensor.
- **Read Global Analog – Channel**: See **Figure 110, page 48** for an explanation of Analog Globals. *Left or right click* on the Question mark beside Global Analog Help to access information about the Global Broadcasts and to view pre-defined channels.
- **Communicating Temperature Sensor**: If using an AAON Communicating Temperature Sensor with a modular cable, configure this input to read the appropriate Communicating Sensor Address. *Enter* an address from 1-8 in the **<Communicating Sensor Address>** field and press **<ENTER>**. If using a combination Temperature and Humidity Communicating Sensor, configure one input to read the temperature and another input to read the humidity, both using the same Communicating Sensor address.*
- **Communicating Humidity Sensor**: If using a combination Temperature and Humidity Communicating Sensor with a modular cable, configure one input to read the temperature and another input to read the humidity, both using the same Communicating Sensor address. *Enter* an address from 1-8 in the **<Communicating Sensor Address>** field and press **<ENTER>**.*
- **Communicating Carbon Dioxide Sensor**: If using an AAON Communicating CO_2 Sensor with a modular cable, configure this input to read the appropriate Communicating Sensor Address. A maximum of two Communicating CO_2 Sensors can be used on a GPC-XP Controller. *Enter* an address from 1-2 in the **<Communicating Sensor Address>** field and press **<ENTER>**.*
- **Communicating Combination Outdoor Air Temperature and Humidity Sensor:** If using an AAON Communicating Combination Outdoor Air Temperature and Humidity Sensor, configure one input to read the temperature and another input to read the humidity. For each input, *enter* **<25>** as the Communicating Sensor Address. Only one of these sensors can be used on a GPC-XP.

***NOTE:** See the appropriate E-BUS Digital Room Sensor or E-BUS Digital CO_2 Sensor technical guides for information on how to address the communicating sensors.

Sensor Reading, Scaling, and Override Duration

Sensor Reading Appendix

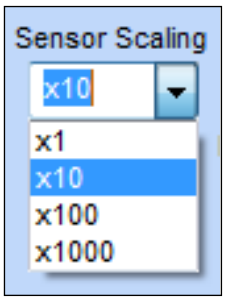
Figure 12: Sensor Reading Appendix Field

Select from the drop down list in the **<Sensor Reading Appendix>** field (**Figure 12 below**) to give the sensor reading a qualifier. For User Defined, type in your own qualifier in the **<User Defined Appendix>** field.

- **User Defined**: Enter your own in the User Defined Appendix field
- **°F**: Fahrenheit
- **°C**: Celsius
- **PPM**: Parts Per Million
- **PSI**: Pound per Square Inch
- **"WG**: Inches of Water Gauge
- **Ft.**: Feet
- **RPM**: Revolutions per Minute
- **RH%**: Humidity Percentage
- **%**: Percentage
- **VDC**: Volts D.C.
- **BTU**: British Thermal Unit
- **CFM**: Cubic Feet per Minute
- **HR**: Hours
- **MIN**: Minutes
- **GPM**: Gallons per Minute

Sensor Scaling

All readings are user-scalable according to the number of digits to the right of the decimal point. See **Figure 13** and values and examples below.



- **X 1** **65°F**
- **X 10** **65.5°F**
- **X 100** **65.54°F**
- **X 1000** **65.543°F**

Figure 13: Sensor Scaling Field

Internal Schedule Used for Night Setbacks and Overrides

If this input is reading a temperature sensor which will be using Night Setbacks or Unoccupied Overrides, select the applicable schedule. See **Figure 14 below**. Actual Schedules are set in the *Schedules Window*. See instructions on **page 35** for setting Schedules.

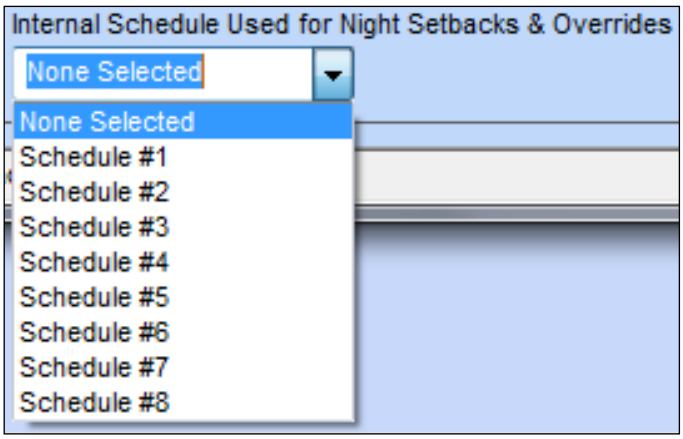
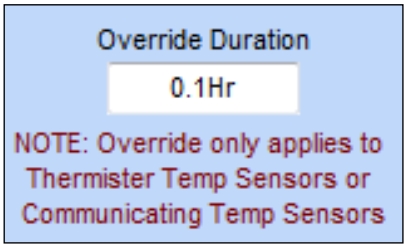


Figure 14: Schedule for Night Setbacks and Overrides

Override Duration

When either an AAON Thermistor Temperature Sensor with an Override Button or a Communicating Temperature Sensor is used, an Override Duration can be entered. When the Override Button is pushed on one of these sensors during the scheduled Unoccupied Mode, the schedule will be overridden back into the Occupied Mode. The Override Duration determines the amount of time the schedule will remain in Override Occupied Mode. When setting an Override Duration, you must first select the schedule in the **<Internal Schedule Used for Night Setbacks & Overrides>** field. The Override Button on a Space Sensor wired to Analog Input #1 will override Schedule #1. An Override on a Sensor on Analog Input #2 will Override Schedule #2, etc.



***Type* a value between .1 Hours and 24 Hours and *press* <ENTER> to save.**

Figure 15: Override Duration Field

NOTE: If using a Thermistor Sensor, the Override can be cancelled by pressing the override button for 3 to 10 seconds. If using a Communicating Sensor with an Override button, pressing the button while in Override operation will cancel the Override.

Number of Readings to Average

This function has the capability of averaging up to 25 sensor readings before it displays a new value on the *GPC-XP Controller Status Screen*. Sensor values are read once per second.

Type the number of readings from this sensor you want to average in the **<Number of Readings to Average>** field and *press* **<ENTER>** to save. See **Figure 16**. Valid entries are from 1-25.

If you want the input sensor to only show its most current reading, *enter* **<1>**.

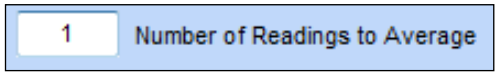


Figure 16: Number of Readings to Average Field

Send Global Analog

The reading of this sensor can also be "broadcast" to other controllers on the communications loop. See **Figure 17 below**. The following options are available: No Broadcast, Send to Local Loop, or Send to ALL Loops.

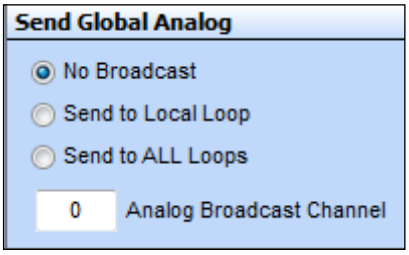


Figure 17: Send Global Analog Box

If you select **<Send to Local Loop>** or **<Send to ALL Loops>**, you must also *type* a channel in the **<Analog Broadcast Channel>** field and *press* **<ENTER>** to save. You must select from channel 15 to 31 for broadcast use. There are 31 available channels, but channels 1 to 14 are pre-defined for specific uses. See **Figure 110, page 48** in the Appendix for the list of predefined channels that appear in the *Global Analog Help Screen*.

Left or right click on the Question mark beside Global Analog Help to access information about the Global Broadcasts and to view predefined channels. See **Figure 18 below**.

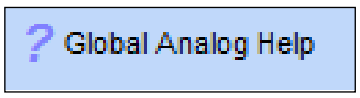


Figure 18: Accessing Global Analog Help

User Scaling

The *User Scaling Box* allows you to set a Maximum and Minimum Reading for the specific 4-20 mA or 0-5 vdc sensor you are using. See **Figure 19 below**. *Type* in the values and *press* **<ENTER>** to save.

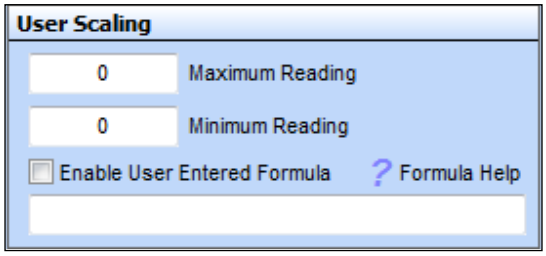


Figure 19: User Scaling Box

User Entered Formula

The User Entered Formula field allows you to create a custom math function (formula) associated with the Analog Input of the screen you are on. The product of this formula will then be displayed as the value of that Analog Input, just as if it were the reading of a sensor connected to the input. This value can then be used in the control logic of a Relay Output or an Analog Output or it can be used in a AVC Highest/Lowest/Average calculation.

The formula can utilize the value(s) of any of the Analog Inputs, the Analog Outputs, the calculated AVC Highest/Lowest/Average values of several sensors, as well as other values listed in the Formula Help Window accessed by clicking on the question mark next to Formula Help in the *User Scaling Box*.

To use this function you must *click* the **<Enable User Entered Formula>** check box and then *type* the formula in the text box and *press* **<ENTER>** to save.

Left or *right click* on the Question mark beside Formula Help to access information about accepted formula formats.

To view the Formula Help Screen which contains some examples, see the **Formula Help** section on **page 49**.

A maximum of 60 characters is allowed in the formula, so refrain from using spaces between characters and operators as they will use up needed space for the actual formula.

If you enter a formula incorrectly or create an invalid math function, such as dividing by zero, the *Analog Input Window* will display the word ERROR for that input so that you know something needs to be corrected in your formula.

Wall Sensor

If the sensor has been configured as a Wall Sensor Slide Offset, and you are using an AAON Standard Room Sensor or Digital Space Temperature Sensor with the slide offset function, *type* the amount of the desired offset in **<Maximum Slide Offset Effect>** field and *press* **<ENTER>** to save. See **Figure 20 below**.

The value you enter is the amount of offset that will be applied to the Space Temperature Setpoint when the slider is all the way up or all the way down. At the center slide position, the Offset will have no effect on the current Space Temperature Setpoints.

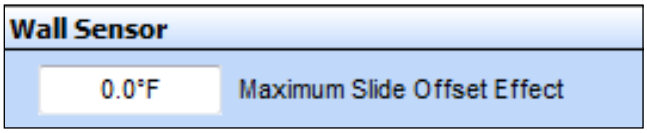


Figure 20: Maximum Slide Offset

Alarm Configuration

High and Low Alarm Limits can be programmed if the job-site requires out of range values to notify service personnel. The alarm limits can be increased at night by the amount of the Unoccupied Limit Spread. The Alarm Delay Period is the amount of time the sensor must be outside the limits before an alarm is generated. This prevents false alarms if the reading temporally exceeds the limit but then recovers and stays within the limits the remainder of the time. *Type* in a value and *press* **<ENTER>**. In order for the alarms to function, the **<Alarming Enabled>** check box must be checked. See **Figure 21 below**.

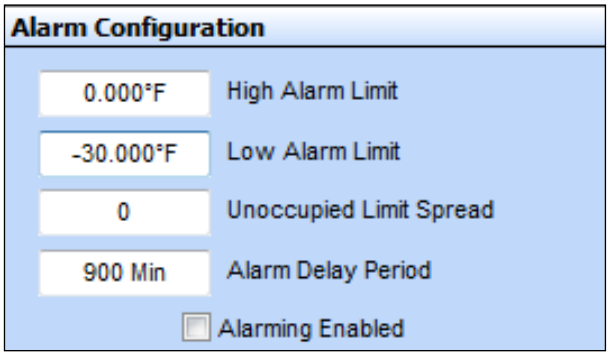


Figure 21: Alarm Configuration

Calibrate, Override, and Clear Sensor Override

Once configured, all thermistor sensors can be calibrated and all readings can be overridden to specific values.

Right-click in the data entry field in the *Analog Inputs Window* to open the *Calibrate, Override, and Clear Sensor Override Pop-Up Menu* shown in **Figure 22 below** and select the desired function.

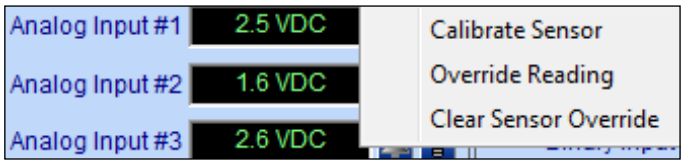


Figure 22: Calibrate and Override Sensor

If you select Calibrate Sensor or Override Reading, the data entry window as shown by **Figure 23 below** will open. *Left-click* in the yellow text field, *type* in the desired value, and *press* **<ENTER>** to save.

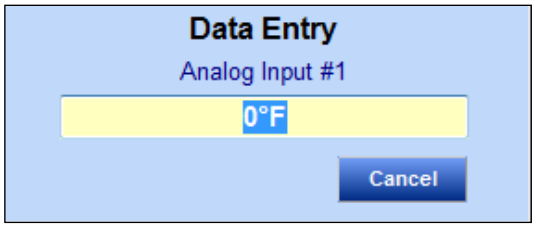


Figure 23: Data Entry Field

- **Calibrate Sensor:** *Type* a positive or negative offset that will be applied to the current reading and *press* **<ENTER>** to save.
- **Override Reading:** *Type* a value that will override the actual sensor reading and *press* **<ENTER>** to save.
- **Clear Sensor Override:** Select to clear a sensor override that was entered.

Binary Inputs

The *Binary Inputs Window* is located in the upper center of the *GPC-XP Controller Status Screen* (**Figure 8**, **page 11**). There are 8 Binary Inputs. See **Figure 24 below** for the *Binary Inputs Window* component details.

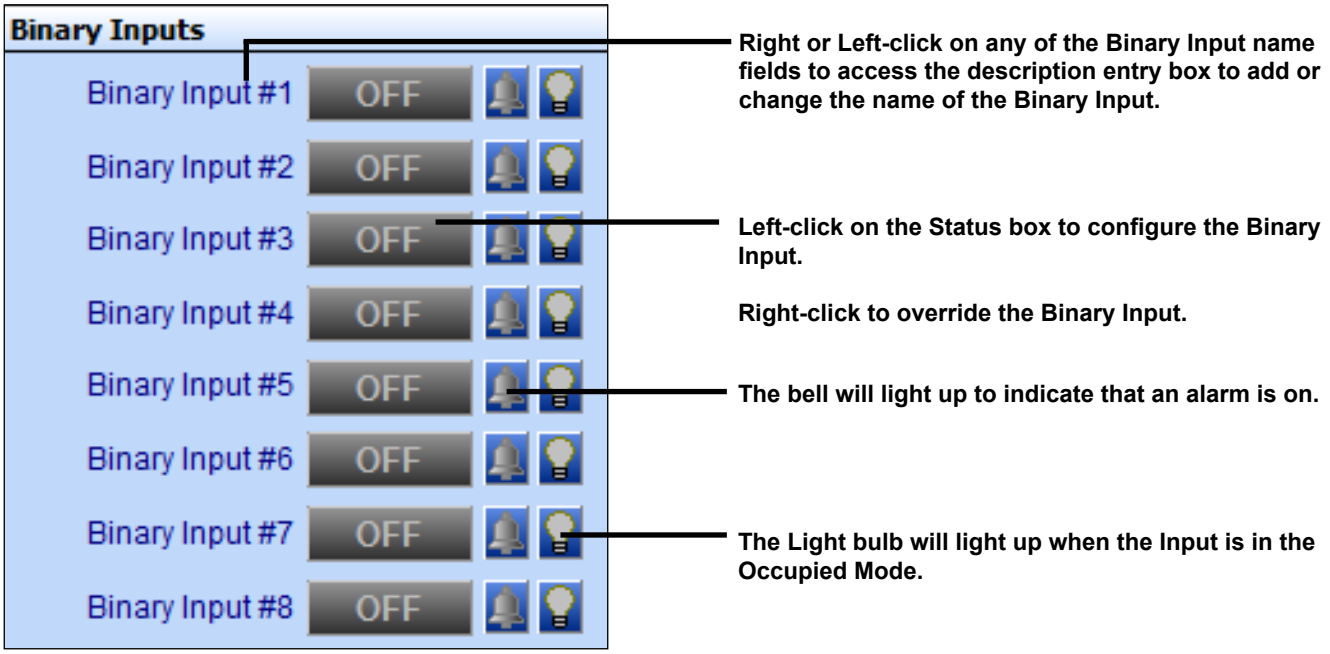


Figure 24: Binary Input Window Components and Navigation

Renaming Binary Inputs

To give the Binary Input a new name, click on the blue highlighted Binary Input # field and the *Binary Input Data Entry Dialog Box* will open (**Figure 25 below**). Once you have typed in a new description (max 17 characters), *press* **<ENTER>** to save.

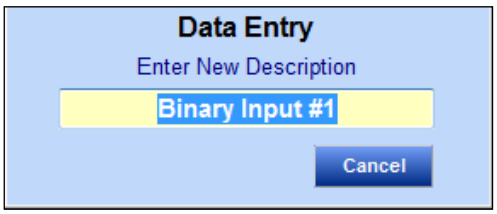


Figure 25: Binary Input Data Entry Dialog Box

Configuring Binary Inputs

Left-click on the "ON" or "OFF" button to the right of Binary Input #1 in the *Binary Input Window* (**Figure 24, page 17**) to open the *Binary Input Configuration Window* (**Figure 26 below**). Each Binary Input is separately configured, so 8 binary input combinations are possible in one controller.

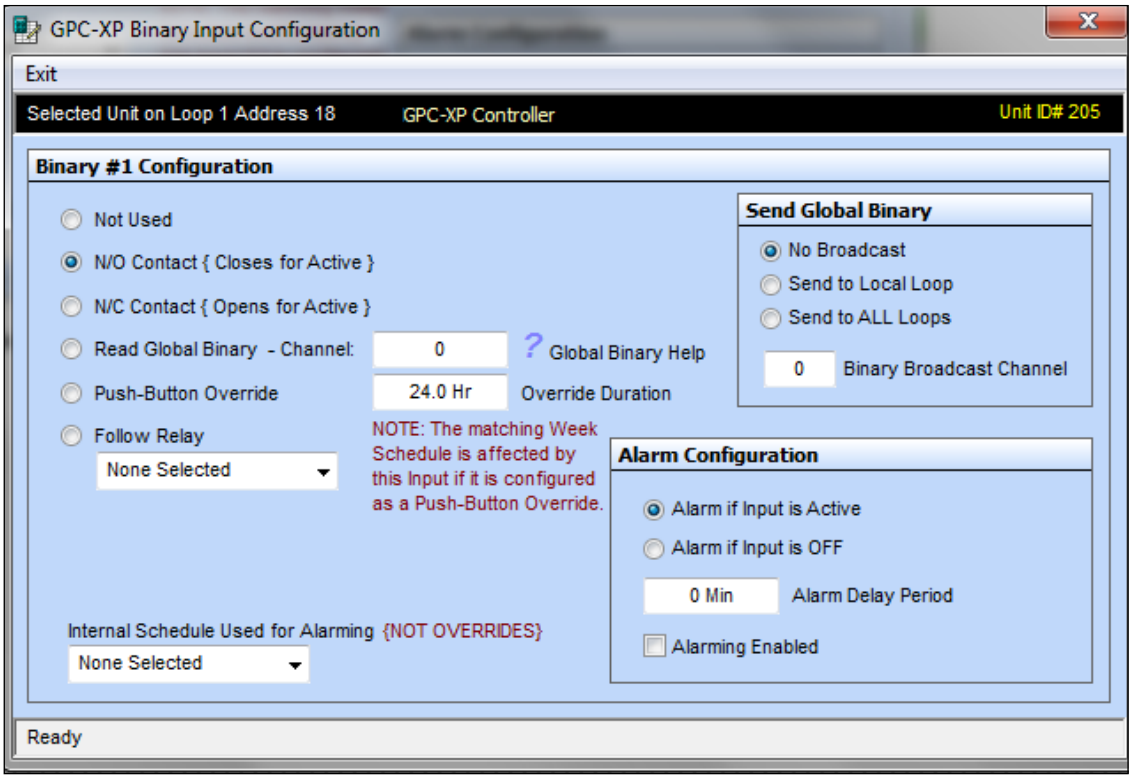


Figure 26: Binary Input Configuration Window

Binary Configuration

The following configurations are available for each Binary Input:

- **Not Used**
- **N/O Contact (Close for Active)** - This normally open (N/O) input will become active when 24 VAC is applied.
- **N/C Contact (Open for Active)** - This normally closed (N/C) input will become active when 24 VAC is removed.
- **Read Global Binary** - This input will read the Global Binary on the selected channel. *Click* on the Question Mark symbol for Help information. See **Figure 111, page 48** in the Appendix for the *Global Binary Help Screen*.
- **Push-Button Override** - If a discrete Push-Button Override switch (not on a space sensor) is wired to this input, also select the Override Duration desired (up to 24 hours). An Override on Binary Input #1 would affect Schedule #1. An Override on Binary Input #2 would affect Schedule #2, etc.
- **Follow Relay** - This input will be active when the selected relay is ON.

Send Global Binary

The binary condition of this input can also be "broadcast" to other GPC-XP Controllers on the communications loop. See **Figure 27 below**. The following options are available: No Broadcast, Send to Local Loop, and Send to ALL Loops.

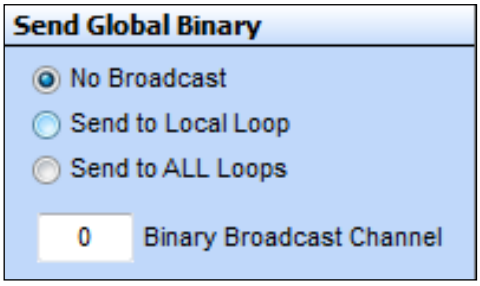


Figure 27: Send Global Binary Box

If you select **<Send to Local Loop>** or **<Send to ALL Loops>**, you must also *type* a channel in the **<Binary Broadcast Channel>** field and *press* **<ENTER>** to save. There are 16 available binary channels you can use.

Left or right click on the Question mark beside Global Binary Help to access information about the Global Broadcasts. See **Figure 28 below**. See **Figure 111**, **page 48** in the Appendix for Global Binary Help.

Figure 28: Accessing Global Binary Help

Alarm Configuration

You can select an alarm designation for this input based on if the input is active (ON) or input is OFF. The Alarm Delay Period is the time that must elapse after the ON/OFF condition occurs before the Alarm occurs. The maximum delay period is 300 minutes. The **<Alarming Enabled>** box must be checked for Alarming to occur. See **Figure 29 below**.

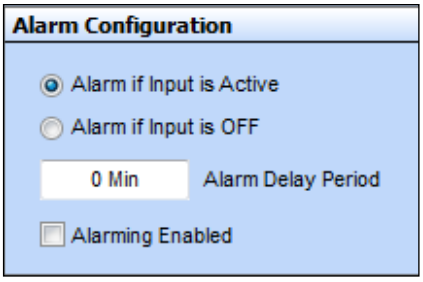


Figure 29: Alarm Configuration

Internal Schedule Used for Alarming (Not Overrides)

The configured Alarm condition will only become active during the Occupied Period of the selected schedule. See **Figure 30 below**. Actual Schedules are set in the *Schedules Window*. See instructions on **page 35** for setting Schedules.

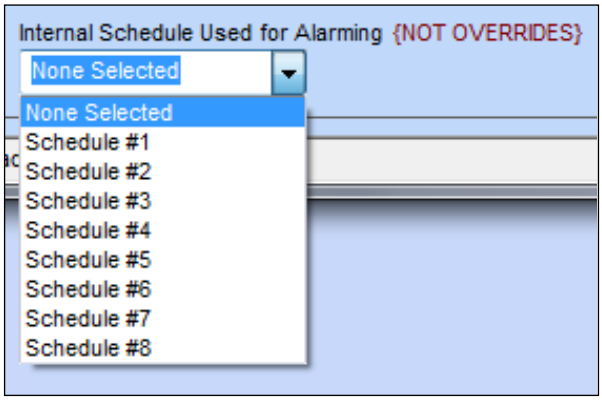


Figure 30: Internal Schedule Used for Alarms

Override

Once configured, Binary Inputs can be overridden to specific conditions.

Right-click on the Status box in the *Binary Inputs Window* (**Figure 24, page 17**) to open the *Override Binary Menu* shown in **Figure 31 below**, and select the desired function.

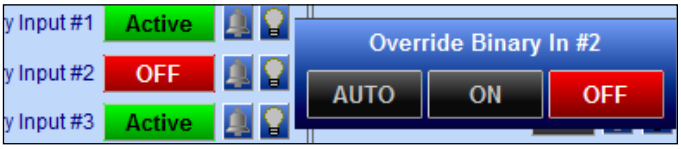


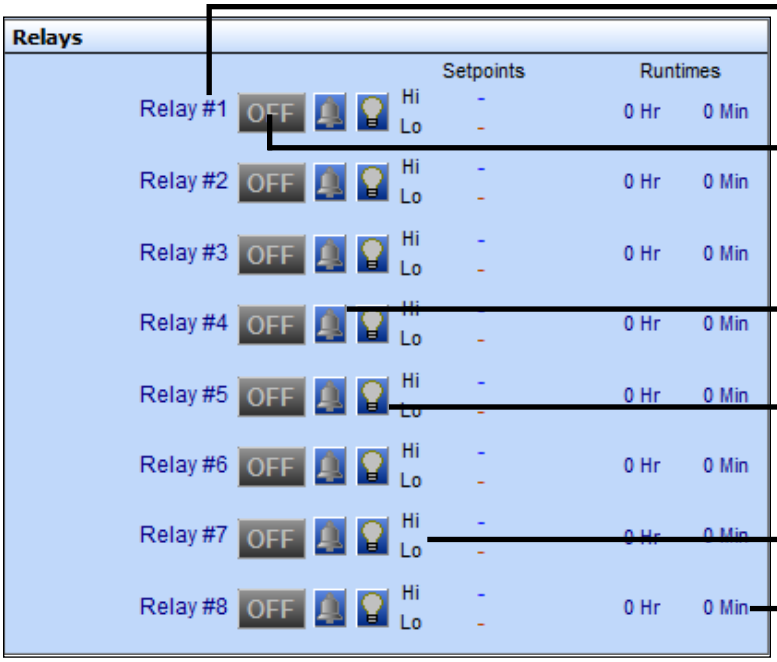
Figure 31: Override Binary Input

- **AUTO:** *Select* to have a Binary Input turn ON and OFF on its own.
- **ON:** *Select* to override and turn a Binary Input ON.
- **OFF:** *Select* to override and turn a Binary Input OFF.

Components and Navigation

Relays

The *Relays Window* is located in the upper right of the *GPC-XP Controller Status Screen* (**Figure 8**, **page 11**). There are 8 Relays. See **Figure 32 below** for the *Relays Window* component summary and the pages that follow for details.



Right or left-click on any of the Relay fields to access the description entry box to add or change the name of the Relay.

Left-click on this Status box to configure the Relays.

Right-click to override the Relay.

The bell will light up to indicate that an alarm is on.

The Light bulb will light up when the Input is in the Occupied Mode.

Hi Limit Setpoint and Lo Limit Setpoint.

Amount of time in hours and minutes that the relay has been energized.

Figure 32: Relays Window

Renaming Relays

To give the Relay a new name, click on the blue highlighted Relay # field and the *Relay Data Entry Dialog Box* will open (**Figure 33 below**). Once you have typed in a new description, *press* **<ENTER>** to save.

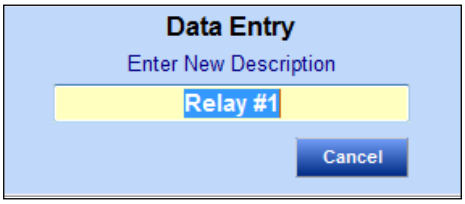


Figure 33: Relay Data Entry Dialog Box

Configuring Relays

Left-click on the "ON" or "OFF" button to the right of the Relay # in the *Relays Window* to open the *Relay Configuration Screen*. (**Figure 34 below**). There are (8) relay configurations available.

The *Relay Configuration Screen* contains (5) windows which are described on the pages that follow:

- **Main Control Method**
- **Logical AND Control Method**
- **Logical OR Control Method**
- **Timing & Alarming**
- **Relay Output Type**

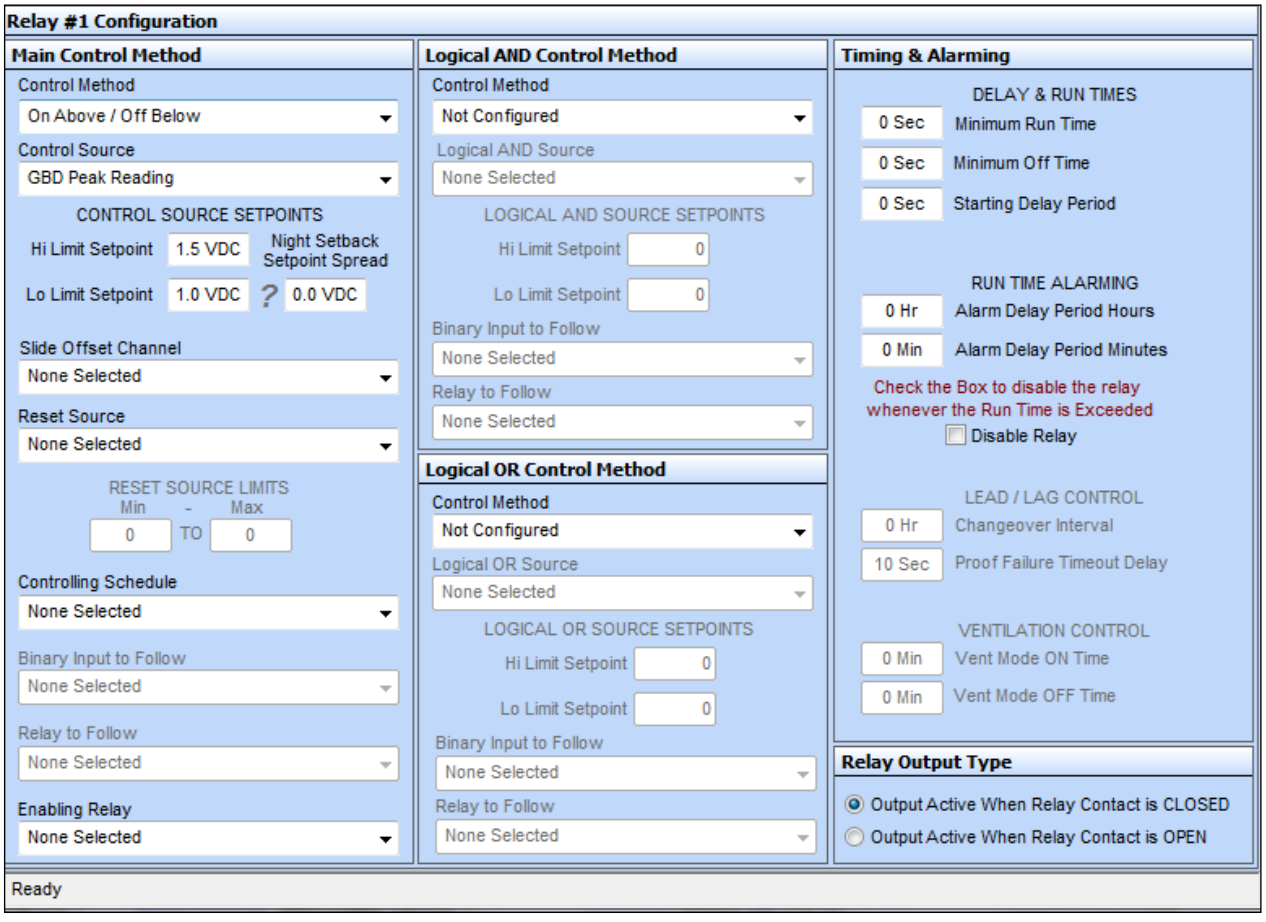


Figure 34: Relay Configuration Screen

Main Control Method Window

Main Control Method

The *Main Control Method Window* (**Figure 35 below**) is located on the left of the *Relay Configuration Screen* (**Figure 34, page 21**). **Figures 36 through 43** will walk you through the configuration steps in this window. As you select items, the corresponding fields that you need to fill out will become available. Fields that do not pertain to the configuration at hand will be greyed out.

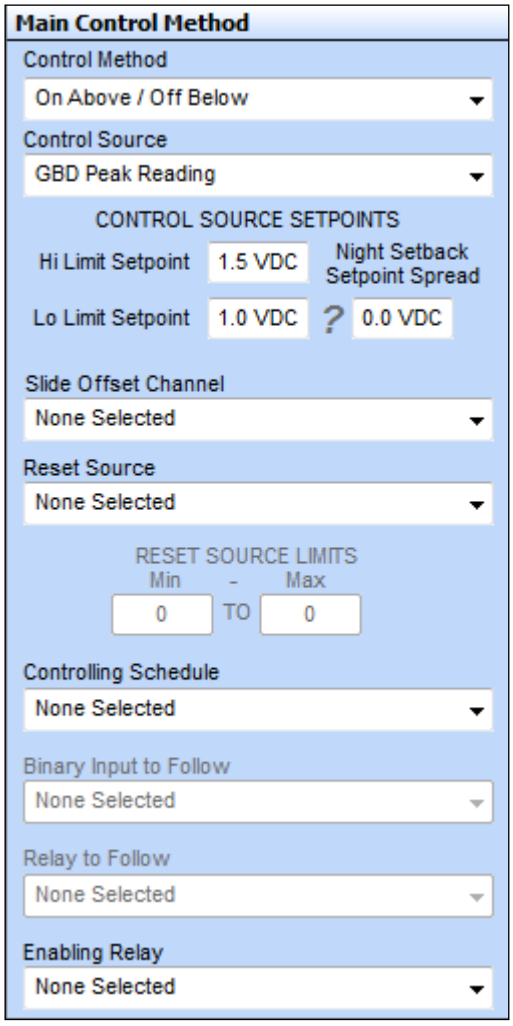


Figure 35: Main Control Method Window

Control Method Field

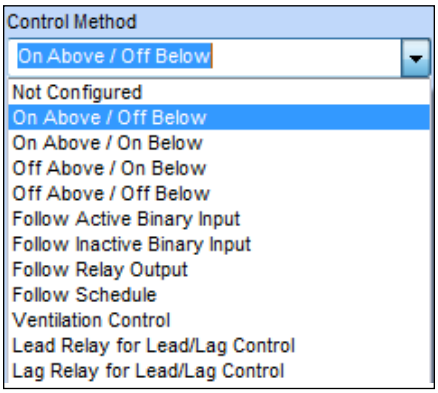


Figure 36: Control Method Field

- **Not Configured** – Select this if this relay will not be used.
- **Above/Below Options** – These options work with the Hi Limit and Lo Limit Setpoints. See **Figure 35**.
  - **On Above / Off Below**
  - **On Above / On Below**
  - **Off Above / On Below**
  - **Off Above / On Below**
- **Follow Active/Inactive Binary Input Options** – If one of these options is selected, you must then go to the **Binary Input to Follow** field (see **Figure 44, page 25**)—and select which Binary Input this Relay Output will be associated with. If the Follow Active Binary Input is selected, this relay will energize when the selected Binary Input is Active. If the Follow Inactive Binary Input is selected, this relay will energize when the selected Binary Input is Inactive. For example, if the Main Control Method is "Follow Active Binary Input" and the Binary Input chosen is configured "N/O Contact (Closes for Active)", then this relay will be energized when 24 VAC is applied to the binary input and the N/O contact closes (Active). If the Binary Input chosen is "N/C (Opens for Active)", then this relay will be energized when 24 VAC is removed from the binary input and the N/C contact opens (Active).
  - **Follow Active Binary Input**
  - **Follow Inactive Binary Input**
- **Follow Relay Output** – If this option is selected, you must then go to the **Relay to Follow** field (**Figure 45, page 25**) and select another relay that this relay is to follow. For example, if you are configuring Relay #1, you can configure it to energize whenever Relay #2 (based on its logic) energizes.

- **Follow Schedule** – If this option is selected, you must then go to the **Controlling Schedule** field (**Figure 43**, **page 25**)—and select the desired Schedule. This relay will be energized whenever the selected Schedule is in the Occupied Mode. See the Setting Schedule Section on **page 35** on how to set up Schedules. (*This option is not available with Logical AND/OR operations. See page 26.)*

- **Ventilation Control** – If this option is selected, you must then go to "Ventilation Control" at the bottom right of the *Relay Configuration Screen* (**Figure 34, page 21**). There you can configure a "Vent Mode ON Time" and a "Vent Mode OFF Time." This relay will then energize for the duration of the configured "Vent Mode ON Time" and then will de-energize for the duration of the configured "Vent Mode OFF Time." You have the option of selecting a Controlling Schedule for this function to follow. If no Schedule is configured, this relay will cycle continuously for the Vent Mode On/Vent Mode Off operation. If a Schedule is configured, the Vent Mode On/Off will only cycle the relay during the scheduled Occupied hours. See the Ventilation Control description on **page 27**. (*This option is not available with Logical AND/OR operations. See page 26.)*

- **Lead Relay for Lead/Lag Control** – The GPC-XP can perform 1 Lead/Lag start function. If this option is selected, you can also select a Control Source input in the next field to be used as a Proof of Operation to allow switching to the Lag Relay upon a failure. This proof can either be a binary contact activation or an analog input level. If your Proof is an analog input level, you can then configure either an Increasing or Decreasing Proof Setpoint (**Figure 39, page 24**).

  If your Proof is a Binary Input, the Proof Failure is initiated when the selected Binary Input is "Active" (See Configuring Binary Inputs on **page 18**.)

  In the Timing and Alarm Section (**Figure 34, page 21**) at the right of the *Relay Configuration Screen* (**Figure 34, page 21**), you can configure a Lead/Lag Changeover Interval and a Proof Failure Timeout Delay. For further information, see the Lead/Lag description on **page 27**. (*This option is not available with Logical AND/OR operations. See page 26.)*

- **Lag Relay for Lead/Lag Control** – The GPC-XP can perform 1 Lead/Lag start function. This Lag Relay will follow the same configurations as the Lead Relay.

- **Active on ANY Alarm (Not shown in Figure 36)**– There are several Alarm Configuration options available on the GPC-XP. If any of these alarm conditions occur, this relay will energize.

Control Source Field

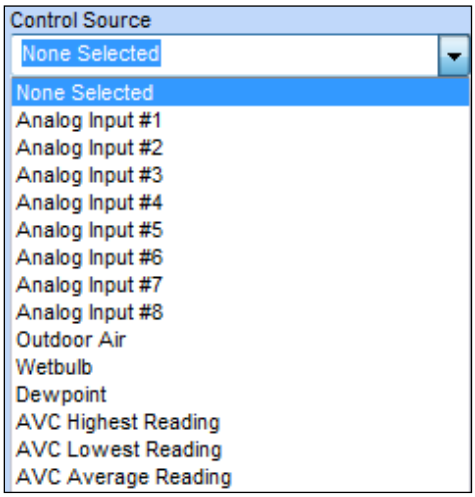


Figure 37: Control Source Field

A Control Source needs to be selected anytime you select one of the Above/Below Control Methods. A Control Source also needs to be selected anytime you select "Lead Relay for Lead/Lag Control" and you need a Proof Source to switch to Lag based on a failure condition. If you selected any other option as a Control Method, then the Control Source field is not applicable and will not be available to make a selection.

When a Control Source is selected, in most cases you will then need to configure Control Source Setpoints – either as Hi/Lo Setpoints or as Increasing/Decreasing Proof Setpoints. See the **Control Source Setpoints field** (**Figure 38 & 39, page 24**). In some cases, a Binary Input could be selected as the Control Source (acting as the Proof Source) for Lead/Lag changeover. For example, a Binary Input could monitor a Proof of Flow (POF) Switch. When the POF switch is closed and the Binary Input is Active, the Lead Relay would be energized. If the POF Switch opens and the Binary Input becomes Inactive, the controller would switch to the Lag relay. In this case the Control Source Setpoints would not be used.

The Control Source Options are shown below:

- **Analog Inputs # 1-8**
- **Outdoor Air Temp Broadcast**
- **OA Wetbulb**
- **OA Dewpoint**
- **AVC Highest Reading**
- **AVC Lowest Reading**
- **AVC Average Reading**
- **Binary Inputs #1- 8 (Not shown in Figure 37)**
- **Analog Outputs #1- 4 (Not shown in Figure 37)**

Main Control Method Window

Control Source Setpoints

If the Control Method for this Relay is one of the Above/Below options, then the Control Source Setpoints need to be configured. See **Figure 38 below**.

The "High Limit Setpoint" and the "Low Limit Setpoint" establish the Control Window.

For example, if "On Above/Off Below" is selected as the Control Method, then the relay will energize above the High Limit Setpoint and will de-energize below the Low Limit Setpoint. In between is a deadband.

If "On Above/On Below" is selected as the Control Method, then the relay will energize above the High Limit Setpoint and below the Low Limit Setpoint. In between these setpoints, the relay will be de-energized.

The "Night Setback Setpoint Spread" is the offset to the High and Low Limit Setpoints used during the Unoccupied Mode. The Question Mark feature is not used in this case.

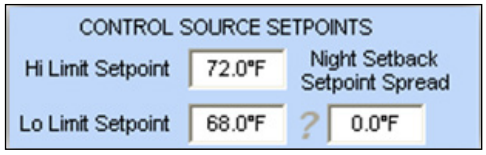


Figure 38: Control Source Setpoints

If the Control Method for this Relay is Lead Relay for Lead/Lag Control, then the Setpoint field in **Figure 39 below** will appear:

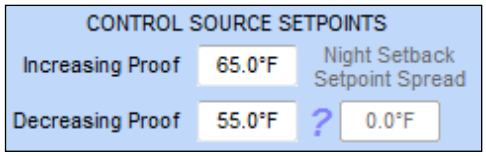


Figure 39: Control Source Setpoints for Lead Relay for Lead / Lag Control

The "Increasing Proof Setpoint" would be used if the Control Source input needs to rise to a certain level to establish Proof of Operation. The "Decreasing Proof Setpoint" would be used if the Control Source input needs to fall below a certain level to establish Proof of Operation. *Clicking* on the Question Mark will show Help information. Do not enter a value for both setpoints or the Increasing Proof Method will take control. If the Lead/Lag Proof is a binary input, these setpoints are not used. *The Night Setback Setpoint Spread field is not available in this configuration.*

Slide Offset Channel Field

If you are using an AAON Standard Flush Mount Wall Sensor which has the optional slide offset switch, and you want that slide switch to adjust the Control Source Setpoints up or down, be sure to select the analog input the slide offset was connected to (**Control Source field, Figure 37, page 23**). See **Figure 40 below**.

If you are using an AAON Digital Communicating Temperature Sensor and it is the Control Source, its slide offset will automatically be used if Control Source Setpoints were entered. In this case, you do not need to configure the Slide Offset Channel.

The slide offset effect will be reflected on the *Main GPC-XP Status Screen* in the Setpoints field next to this relay (**Figure 8, page 11**). The Hi Limit and Lo Limit Setpoints on this current screen will always reflect their configured values.

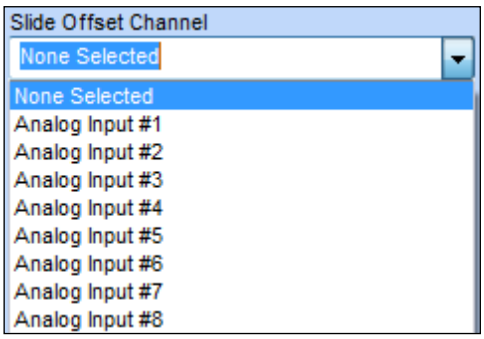


Figure 40: Slide Offset Channel

Reset Source/Reset Source Limits Field

You can select an input as the Reset Source (that is, any Source except the Binary Inputs) that will cause your Control Source Setpoint to be proportionally reset between the Lo Limit Setpoint and the Hi Limit Setpoint as the Reset Source changes from its programmed Minimum Limit to its Maximum Limit. The reset can be made reverse acting by reversing the Min/Max reset limits so that the Min is the higher value. **See Figures 41 & 42**.

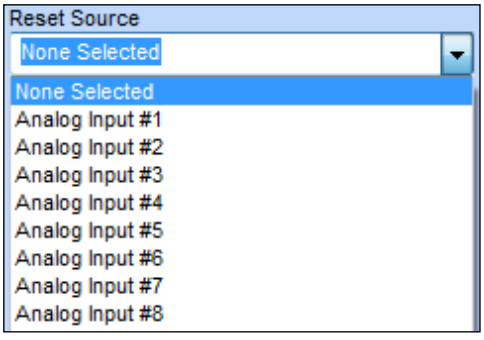


Figure 41: Reset Source

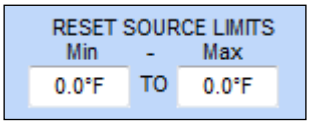


Figure 42: Reset Source Limits

Controlling Schedule Field

You can select one of the Internal Schedules to set the occupied or unoccupied mode of operation for this selected relay. If the relay does not require a schedule to be part of its control strategy, leave the selection as "None Selected." This will cause the controller to assume it is always "occupied" and therefore always available for operation. **See Figure 43 below**.

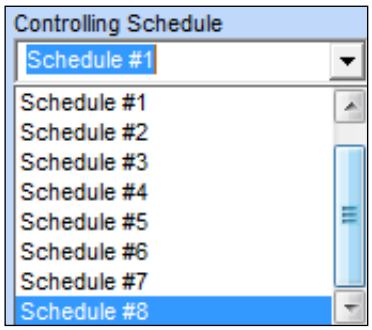


Figure 43: Controlling Schedule

Binary Input to Follow Field

You can configure this relay to energize whenever a selected Binary Input is Active/Inactive. If the Control Method you configured for this relay is "Follow Active/Inactive Binary Input" (see **Figure 36, page 22** for more detail), you need to select which Binary Input will cause this relay to energize in the appropriate condition. **See Figure 44 below**. The Binary Input does not require a physical contact closure to become active. It can follow a global broadcast or some other event as noted in the Binary Input Configuration section (**pages 18 & 19**).

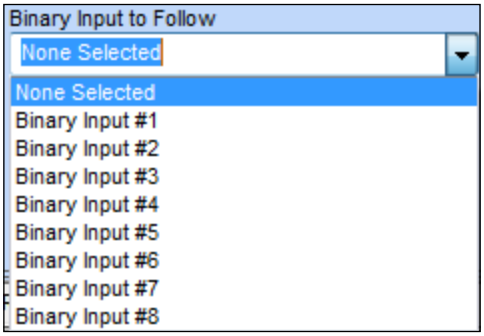


Figure 44: Binary Input to Follow

Relay to Follow Field

If you want this relay to energize at the same time as another relay (based on that relay's control logic), select "Follow Relay Output" in the **Control Method field, Figure 36, page 22**) and select the other relay here (**Figure 45 below**).

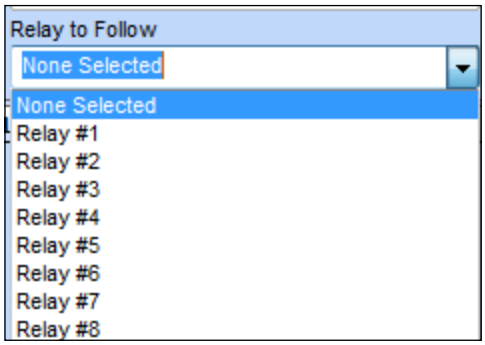


Figure 45: Relay to Follow

Enabling Relay Field

When configuring the operation of a relay, an Enabling Relay can also be selected. The operation of the configured relay can only occur once the Enabling Relay (based on its logic) has energized. For example, a Cool Stage Relay could be prevented from energizing until a Fan Relay (Enabling Relay) has first energized (**Figure 46 below**).

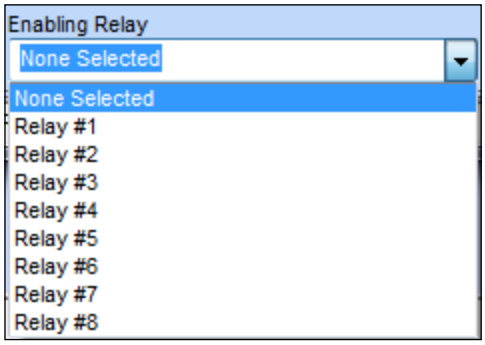


Figure 46: Enabling Relay

Logical AND Control Method & Logical OR Control Method

If more than one criterion is required to make a decision to energize a relay, there are two other options available to use in the decision process— a "Logical AND" condition and a "Logical OR" condition. If you do not need any additional criterion, simply select the **<Not Configured>** option under the Control Method for each of these sources.

If you need two events to be true before the relay output can be activated, use the Main Control Method in conjunction with the Logical AND Control Method. If you want either one event or a second event to activate this relay, use the Main Control Method in conjunction with the Logical OR Control Method.

You can combine all three options to create a condition where two events must be true (2 AND Statements) or a 3rd separate event (OR Statement) must be true to activate this relay.

Configuration of the Logical And Control Method and the Logical OR Control Method is similar to the configuration of the Main Control Method.

The *Logical AND Control Method Window* and the *Logical OR Control Method Window* are located in the center of the *Relay Configuration Screen* (**Figure 34**, **page 21**). See **Figures 47 & 48**.

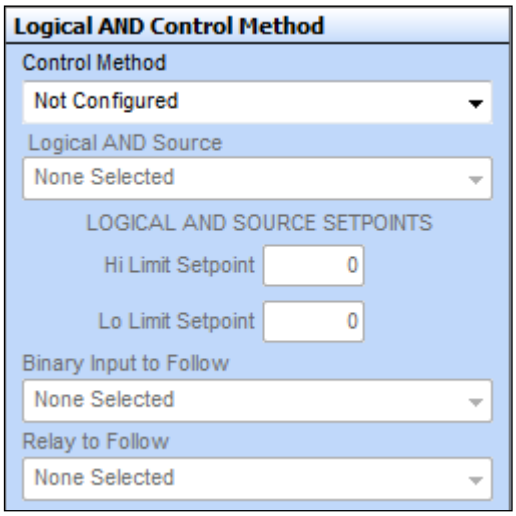


Figure 47: Logical AND Control Method Window

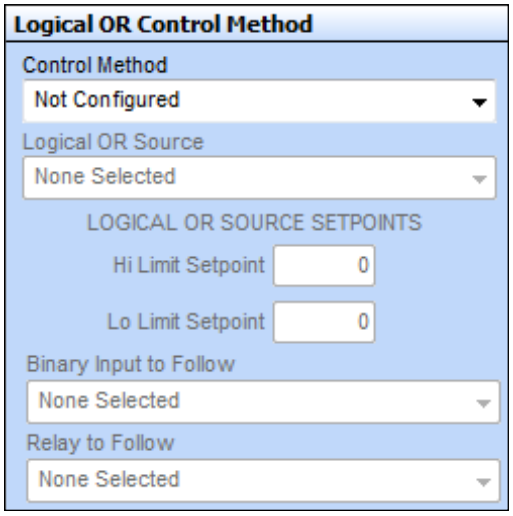


Figure 48: Logical OR Control Method Window

Timing & Alarming

The *Timing & Alarming Window* (**Figure 49 below**) is located on the right of the *Relay Configuration Screen (***Figure 34, page 21)**. The corresponding fields that you need to fill out will become available based on your previous selections.

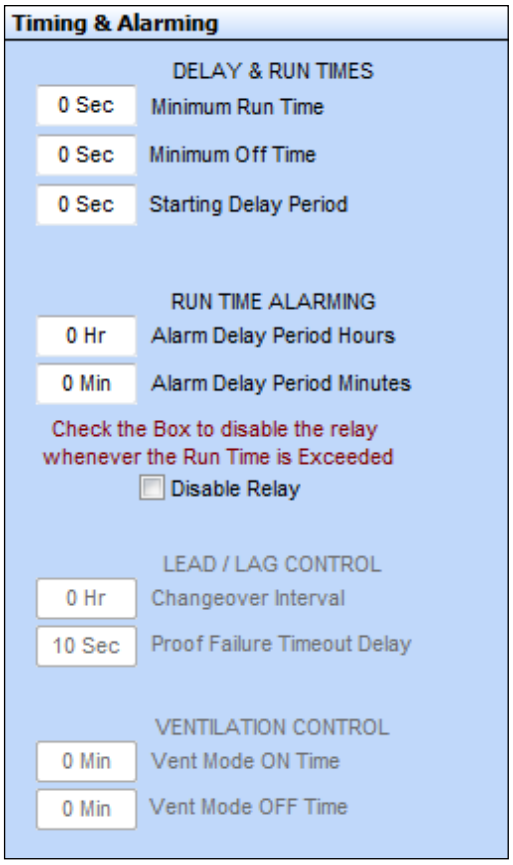


Figure 49: Timing & Alarming Window

Delay & Run Times

Once activated, the Relay can be forced to remain "On" for the "Minimum Run Time." Once de-activated, the Relay can be forced to remain "Off" for the "Minimum Off Time." The "Starting Delay Period" is the period of time before the Relay is called to activate and the time it is actually energized.

Run Time Alarming

If the selected relay output is controlling a device that needs periodic maintenance, you can enter a "Run Time Alarm Delay Period" that once exceeded generates an alarm. If you need to protect the equipment, you can select the *Disable Relay box*, and the relay will de-activate once this run time has been exceeded. To reset the Run Time Alarm, you must cycle power or uncheck the *Disable Relay box* and then re-check the box.

Lead/Lag Control

If you have configured this relay for "Lead Relay for Lead/Lag Control," you will also need to set the "Changeover Interval" and the "Proof Failure Timeout Delay."

The Changeover Interval is used to toggle the Lag output into the Lead output once the runtime hours of the Lead output exceed this amount of time on the Lag output.

The Proof Failure Time Out Delay is the amount of time given for the "Proof Source" input to become active once the Lead or Lag output is energized. If this proof is not made within the specified amount of time, the controller switches to the Lag output in an attempt to get the controller running and then sets an alarm to flag the user that a failure has occurred. See Lead /Lag information on **pages 22-24** for more detail.

Ventilation Control

If you configured the relay for "Ventilation Control," you can set the "Vent Mode ON Time" and the "Vent Mode OFF Time." This means that the output is active for the Vent Mode ON Time and then cycles off for the Vent Mode OFF Time. If the output is not enabled by a schedule, it will continue to cycle indefinitely at the On/Off rate. See additional information on **page 23**.

Relay Output Type

The *Relay Output Type Window* (**Figure 50 below**) is located on the far bottom right of the *Relay Configuration Screen (***Figure 34, page 21)**. Normally when the relay is On, the output is active. If you want to reverse that operation and have the output active when the relay is Off, select the second option.

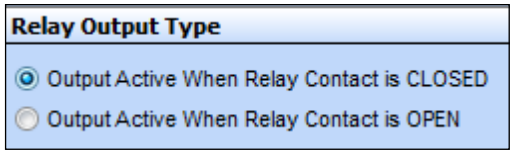


Figure 50: Relay Output Type Window

Components and Navigation

Analog Outputs

The *Analog Outputs Window* is located in the lower right-hand side of the *GPC-XP Controller Status Screen* (**Figure 8, page 11**). There are 4 Analog Outputs. See **Figure 51 below** for the *Analog Outputs Window* component summary. See the pages that follow for details.

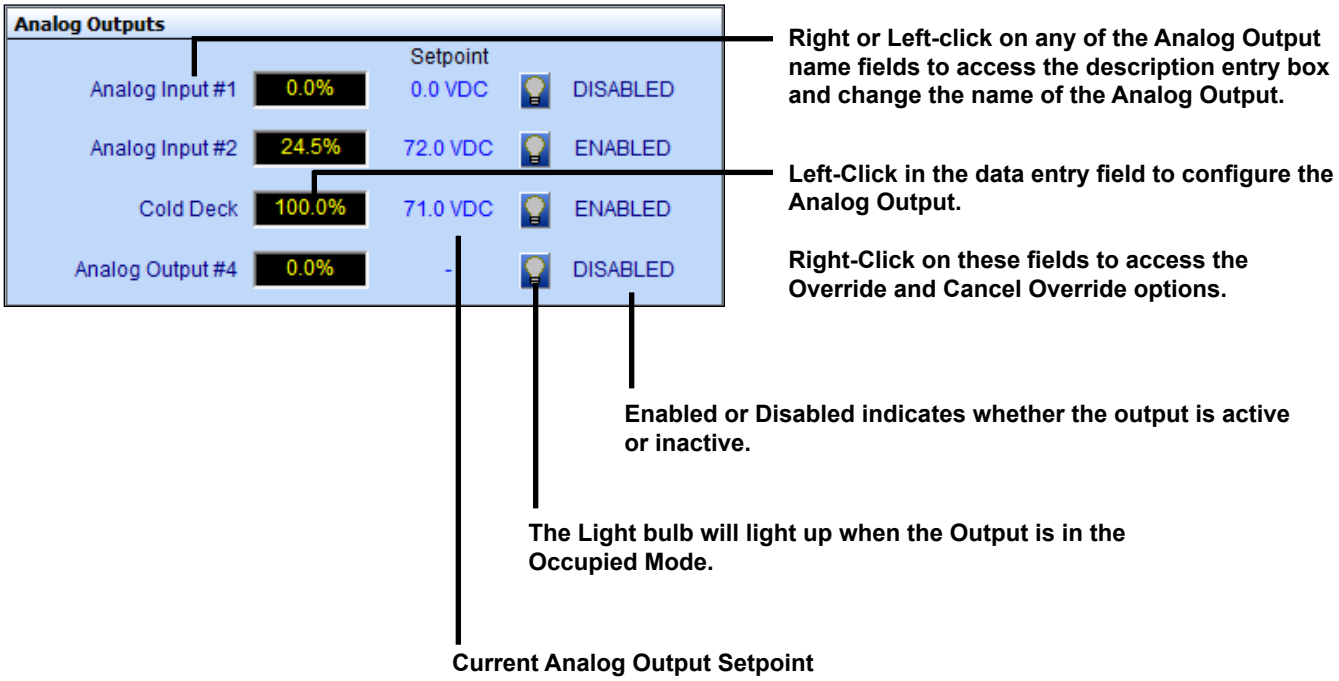


Figure 51: Analog Outputs Window Components and Navigation

Renaming Analog Outputs

To give the Analog Output a new name, *click* on the blue highlighted Analog Output # field and the *Analog Output Data Entry Dialog Box* will open (**Figure 52 below**). Once you have typed in a new description, *press* **<ENTER>** to save.

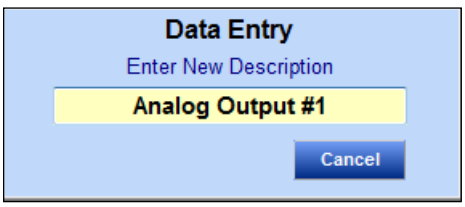


Figure 52: Analog Output Data Entry Dialog Box

Configuring Analog Outputs

Left-click in the data entry field in the *Analog Outputs Window* (**Figure 51, page 28**) to open the *Analog Output Configuration Window* (**Figure 53 below**).

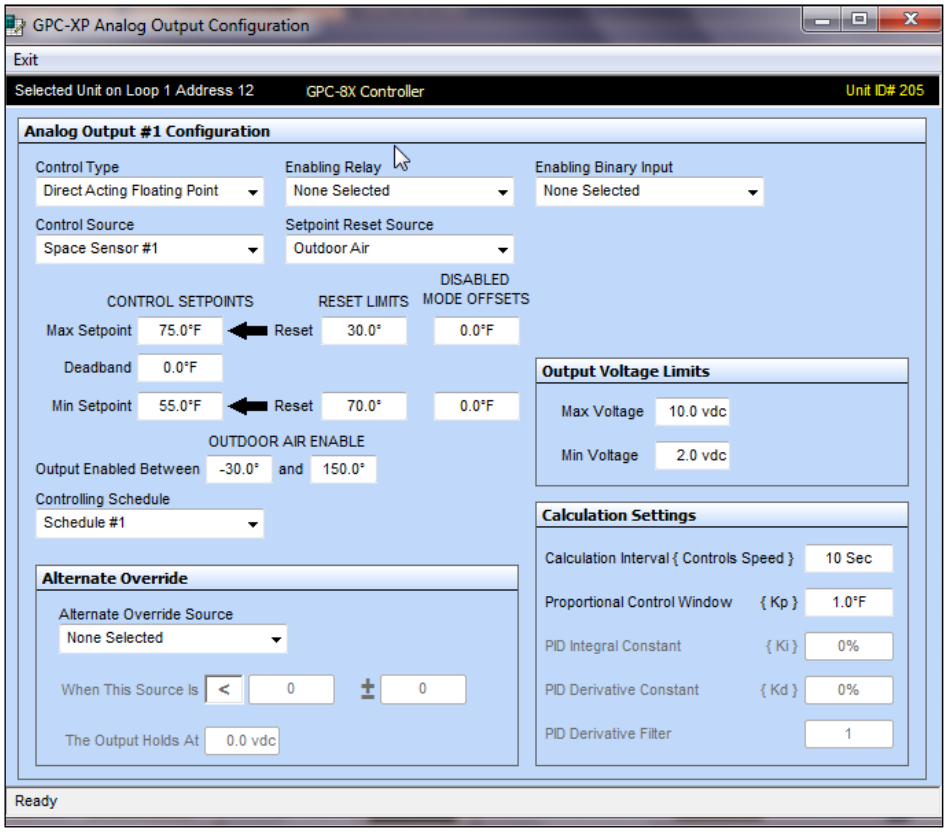


Figure 53: Analog Output Configuration Window

Control Type Field

The following are the control options available (**Figure 54 below**):

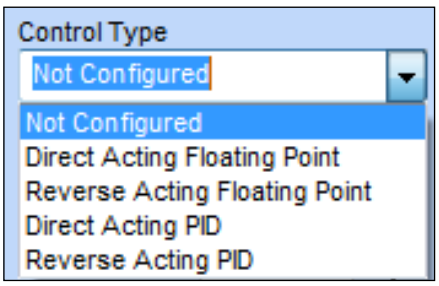


Figure 54: Control Type Field

- **Not Configured**
- **Direct Acting Floating Point**
- **Reverse Acting Floating Point**
- **Direct Acting PID**
- **Reverse Acting PID**

Control Type

Floating Point Control

Floating Point Control works best on slow changing applications where the amount of time it would take to drive full on or full off is not as critical. For faster response, the PID Control method is recommended.

With Direct Acting Floating Point Control, as the selected Control Source rises above Setpoint, the Analog Output voltage signal increases to try to maintain the Setpoint. As the Control Source falls below Setpoint, the Analog Output voltage signal decreases.

With Reverse Acting Floating Point Control, as the selected Control Source rises above Setpoint, the Analog Output voltage signal decreases to try to maintain the Setpoint. As the Control Source falls below Setpoint, the Analog Output voltage signal increases.

A Deadband above and below the Setpoint can be configured in which no control signal change is made.

With Floating Point Control, you can configure a Calculation Interval and a Proportional Control Window. See **Figure 55 below**.

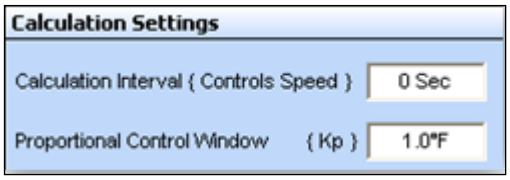


Figure 55: Calculation Settings for Floating Point Control

Calculation Interval - Determines how often the control signal calculation is made to try to reach setpoint. Setting this too fast can cause over-shooting.

Proportional Control Window - Determines how large of a signal change will occur at each Calculation Interval. The larger the Proportional Window, the smaller the signal change will be at each Calculation Interval.

PID Control

PID Control allows Proportional, Integral, and Derivative Rate of Change Control. With this option, you can configure the Proportional Control Window, an Integral Constant, and a Derivative Constant as well as the Calculation Interval and PID Derivative Filter. See **Figure 56**.

With Direct Acting PID Control, as the selected Control Source rises above Setpoint, the Analog Output voltage signal increases to try to maintain the Setpoint. As the Control Source falls below Setpoint, the Analog Output voltage signal decreases.

With Reverse Acting PID Control, as the selected Control Source rises above Setpoint, the Analog Output voltage signal decreases to try to maintain the Setpoint. As the Control Source falls below Setpoint, the Analog Output voltage signal increases.

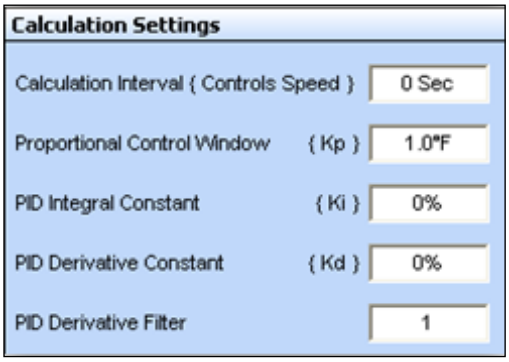


Figure 56: Calculation Settings for PID Control

Calculation Interval - Determines how often the control signal calculation is made to try to reach setpoint. Setting this too fast can cause over-shooting.

Proportional Control Window - Determines how large of a signal change will occur at each Calculation Interval. The larger the Proportional Window, the smaller the signal change will be at each Calculation Interval.

Integral Constant - Accelerates the movement of the process towards setpoint and eliminates the residual steady-state error that occurs with a pure proportional controller. However, since the integral term responds to accumulated errors from the past, it can cause the present value to overshoot the setpoint value. We recommend to start with a small Ki and increase it until a small overshoot occurs and then dial it back.

Derivative Constant - The derivative term slows the rate of change of the controller output. Derivative control is used to reduce the magnitude of the overshoot produced by the integral component and improve the combined controller-process stability. However, the derivative term slows the transient response of the controller. Also, differentiation of a signal amplifies noise and thus this term in the controller is highly sensitive to noise in the error term, and can cause a process to become unstable if the noise and the derivative gain are sufficiently large. We recommend to start with a small Kd and increase it until overshoot is reduced to desired point.

PID Derivative Filter - The controller will average this number of input changes in order to smooth out a fast changing value.

If the Derivative Constant (Kd) is set to "0," then control will be the Proportional/Integral (PI). If both the Derivative Constant (Kd) and the Integral Constant (Ki) are set to "0," then the control will only be Proportional.

Control Source

The Control Source Options are as follows (**Figure 57 below**):

- **Analog Inputs #1 - 8**
- **Outdoor Air**
- **OA Wetbulb**
- **OA Dewpoint**
- **AVC Highest Reading**
- **AVC Lowest Reading**
- **AVC Average Reading**
- **Analog Outputs #1-4 (not shown in Figure 57)**

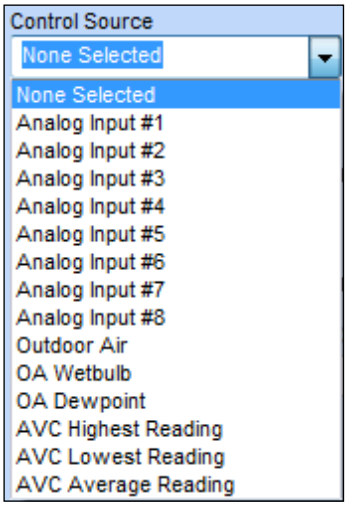


Figure 57: Control Source

Control Setpoints & Reset Limits

For most applications, only the Max Setpoint and the Deadband will be used. See **Figure 58 below**. Unless a Setpoint Reset Source is selected, the other values in this section will be grayed-out and not used. In this situation, the Max Setpoint will be the setpoint you are trying to maintain. The Deadband is the range above and below the Setpoint in which no control signal change is made.

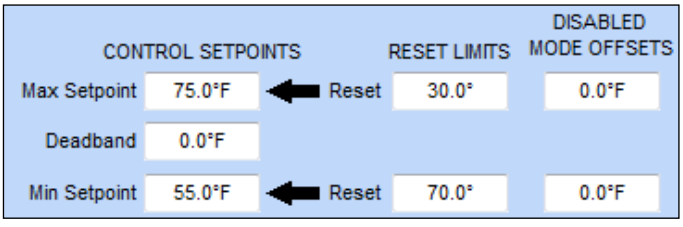


Figure 58: Control Setpoints & Reset Limits

Setpoint Reset Source

You can configure a Setpoint Reset Source that will allow reset of the Control Setpoints (**Figure 59 below**). Once a Reset Source is selected, you will be able to configure both a "Max Setpoint" and a "Min Setpoint" as well as a Max Reset value and a Min Reset value (**Figure 58**). As the Reset Source value varies between the Max and Min Reset values, the Control Setpoint will be proportionally reset between the Max and Min Control Setpoints. At the Max Reset value, the Control Source will be at the Max Setpoint, regardless if it is an inverse relationship.

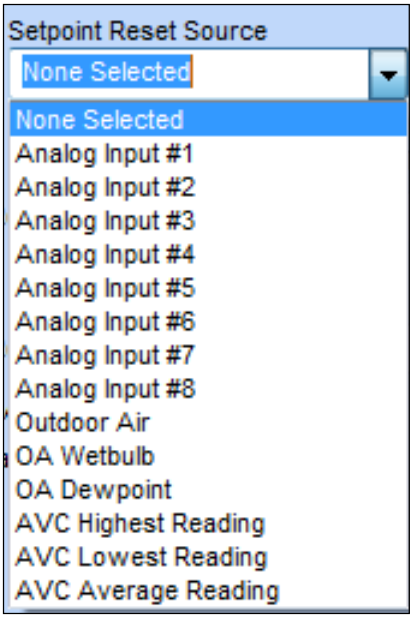


Figure 59: Setpoint Reset Source

Disabled Mode Offsets

The Disabled Mode Offsets (**Figure 60 below**) can be used if you are using an Enabling Relay, an Enabling Binary Input, or a Controlling Schedule. Anytime this output is not enabled by the Enabling Relay or the Enabling Binary, or is in the Unoccupied Mode (per the Schedule), these offsets will be applied to the Max/Min Setpoints to initiate the control operation of this analog output. These would then act as "Night Setback" type offsets. If these offset values are '0', there will be no Disabled Mode operation.

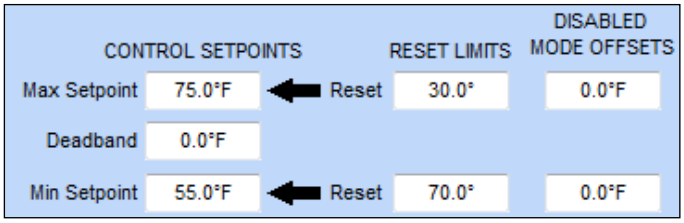


Figure 60: Disabled Mode Offsets

Outdoor Air Enable, Controlling Schedule, Enabling Relay

Outdoor Air Enable

If this option is used, the Outdoor Air Temperature must be between these setpoints for this Analog Output to function. See **Figure 61 below**.

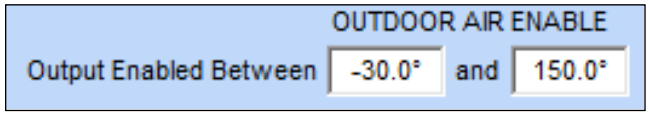


Figure 61: Outdoor Air Enable Setpoints

Controlling Schedule

No matter what Control Method or Control Source has been selected, each analog output can be configured to follow a schedule. See **Figure 62 below**. Actual Schedules are set in the *Schedules Window*. See instructions on **page 35** for setting Schedules.

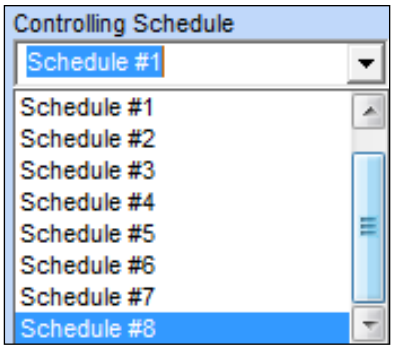


Figure 62: Controlling Schedule

Enabling Relay

An Enabling Relay can also be selected. The operation of this Analog Output will only occur once the Enabling Relay (based on its logic) has energized. See **Figure 63 below**.

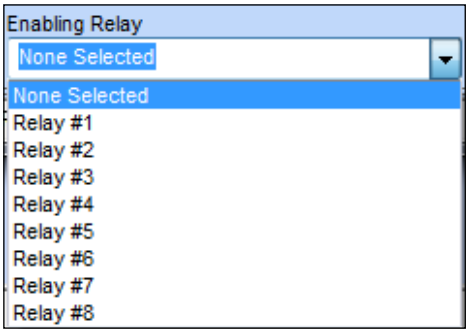


Figure 63: Enabling Relay

Enabling Binary Input

An Enabling Binary Input can also be selected (**Figure 64 below**). The operation of this Analog Output will only occur once the selected Binary Input is Active.

For example, if the Binary Input selected is configured as "N/O Contact (Closes for Active)," then this Analog Output is enabled when 24 VAC is applied and the N/O Binary Input contact closes (Active).

If the Binary Input selected is configured as "N/C (Opens for Active)," then this Analog Output will be enabled when 24 VAC is removed and the N/C Binary Input contact opens (Active).

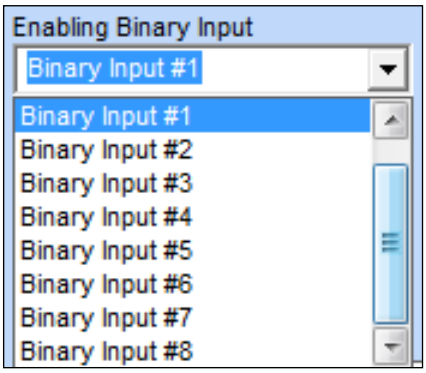


Figure 64: Enabling Relay Binary Input

Output Voltage Limits

This output normally operates with a range of 0-10 VDC. If you need it to operate with a different Min and/or Max voltage, those voltages can be entered in the *Output Voltage Limits Box* (**Figure 65 below**).

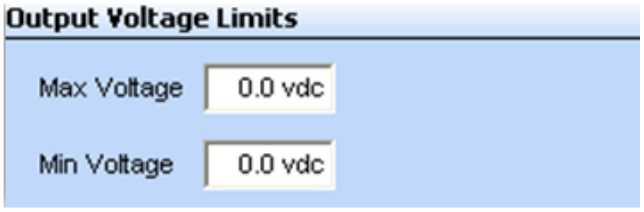


Figure 65: Output Voltage Limits

Alternate Override

An Alternate Override Source can be selected to override the output signal of this Analog Output to a fixed value when a certain condition occurs (**Figure 66 below**).

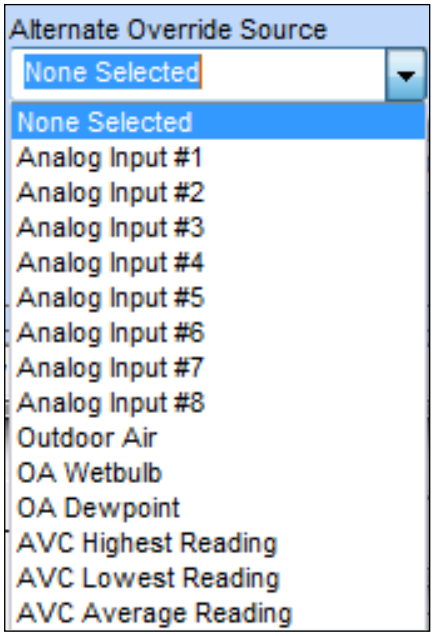


Figure 66: Alternate Override

First select which Override Source to use:

- **Analog Inputs # 1 – 8**
- **Outdoor Air**
- **OA Wetbulb**
- **OA Dewpoint**
- **AVC Highest Reading**
- **AVC Lowest Reading**
- **AVC Average Reading**

Next select the logic, setpoint, and deadband that will determine the Override (**Figure 67 below**). *Right or left-click* in the Logic Field to select **<** , **>**, or **=**.

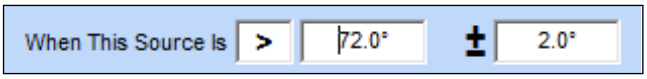


Figure 67: Logic, Setpoint, and Deadband

Finally, select the voltage you want to hold this output to based on the above logic (**Figure 68 below**).

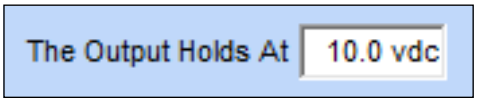


Figure 68: Voltage

Override & Cancel Override

You can manually override the logic of an Analog Output and force it to a specific voltage. The Override Voltage field defaults to "-1.0" which means no override.

Right-click in the data entry field in the *Analog Outputs Window* (**Figure 51, page 28**) to open the *Override Voltage Box* shown in **Figure 69 below** and enter an override value. *Click* the **<Enter>** button to save the value. If you enter an incorrect value, *click* the **<Clear>** button to start over. If there is any value in the field, including "0" when you *click* **<Enter>**, the voltage from this output will be forced to that value. Canceling the Override will cause the voltage to go back to its original reading, and the Override Voltage field will display "-1.0".

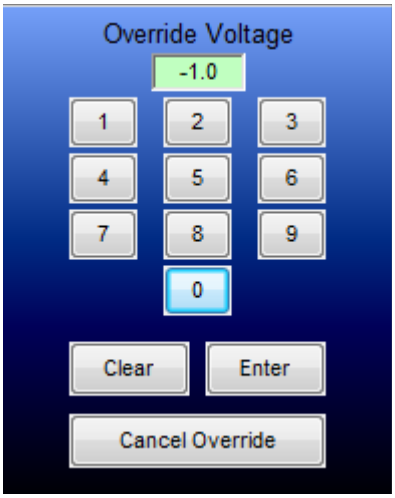


Figure 69: Calibrate and Override Sensor

Outdoor Status and AVC Status Windows

Outdoor Status

The *Outdoor Status Window* is located in the center of the *GPC-XP Controller Status Screen* (**Figure 8, page 11**) and displays the Outdoor Air (OA) Temperature, the OA Humidity, the OA Wetbulb, and OA Dewpoint. See **Figure 70 below**.

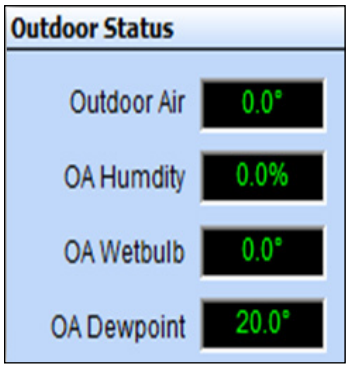


Figure 70: Outdoor Status Window

If the OA Temperature and OA Humidity values are available, the GPC-XP will always calculate the OA Wetbulb and the OA Dewpoint values shown in this section. The values can be selected as Control Source options when configuring Relay Outputs and Analog Outputs.

For details on setting up the OA Temperature and OA Humidity sources, as well as other related information, see the Outdoor Air Broadcast section on the *Miscellaneous Setpoints Screen* on **page 42**.

AVC Status

The *AVC (Analog Value Comparison) Status Window* is located in the center of the *GPC-XP Controller Status Screen* (**Figure 8, page 11**). The GPC-XP has the capability to select the current Highest or Lowest Reading or to calculate the current Average Reading from selected Analog Inputs. These values appear in the *AVC Status Window*. See **Figure 71 below**.

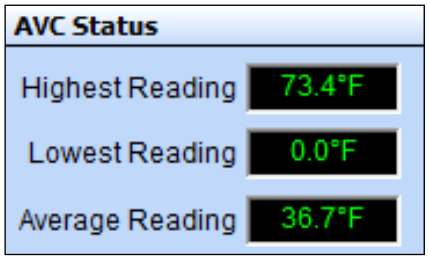


Figure 71: AVC Status Window

To select which Analog Inputs will be used for this AVC operation, *click* **<Setpoints>** from the Toolbar located at the top of the *GPC-XP Status Screen.* Then *click* **<Miscellaneous Settings>**. The *Miscellaneous Settings Screen* will open. See **Figure 85, page 40**. In the *AVC Inputs Window*, select the Analog Inputs that you wish to include in the AVC function. See **Figure 72 below**. Inputs not selected will perform their normal configured function and will not affect the AVC operations.

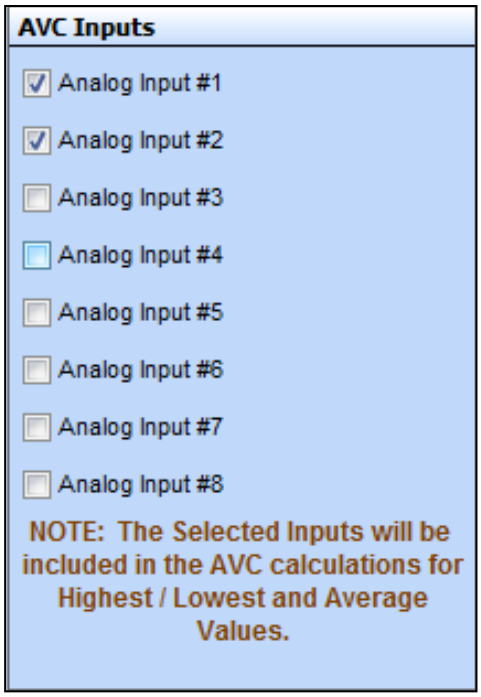


Figure 72: AVC Inputs Window

NOTE: Limits can be set for a Rogue Sensor, so that it is not included in the AVC Average function. See **Rogue Sensor Limits section**, **page 42**.

Schedule Status Window

The *Schedule Status Window* is located in the bottom left of the *GPC-XP Controller Status Screen* (**Figure 8, page 11**) and allows (8) Schedules and (8) associated Holiday Schedules, Overrides, and Force Mode. **See Figure 73 below** for the S*chedule Status Window* components and summary and the pages that follow for details.

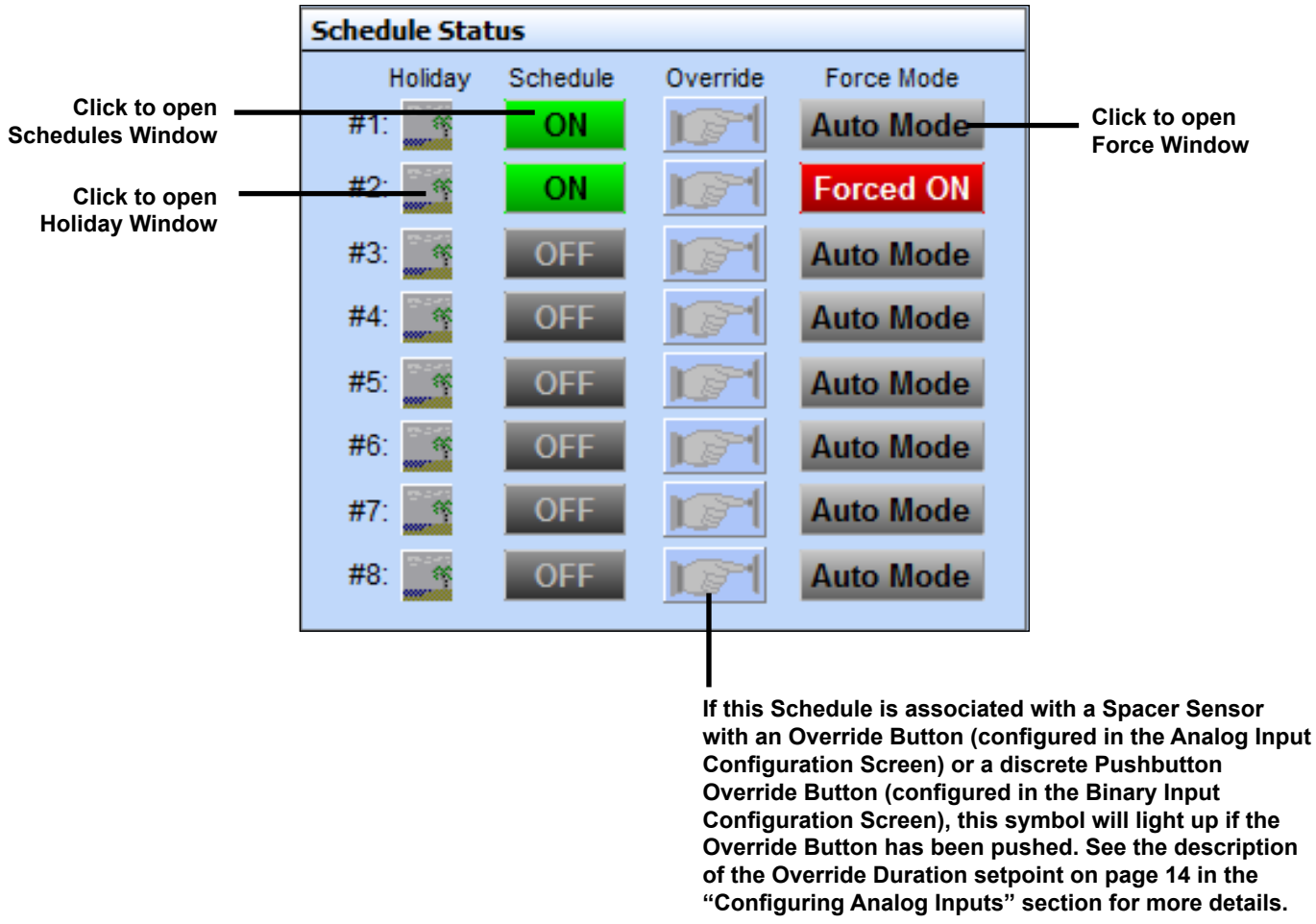


Figure 73: Schedule Status Window

Schedules Window

Setting Schedules

Click the **<Schedule>** button in the *Schedules Status Window* (**Figure 73, page 35**) to open the *Schedule Configuration Window* (**Figure 74 below**). You can configure up to (8) separate schedules for various uses on the GPC-XP Controller. These Schedules are (7) day, (2) event per day Schedules.

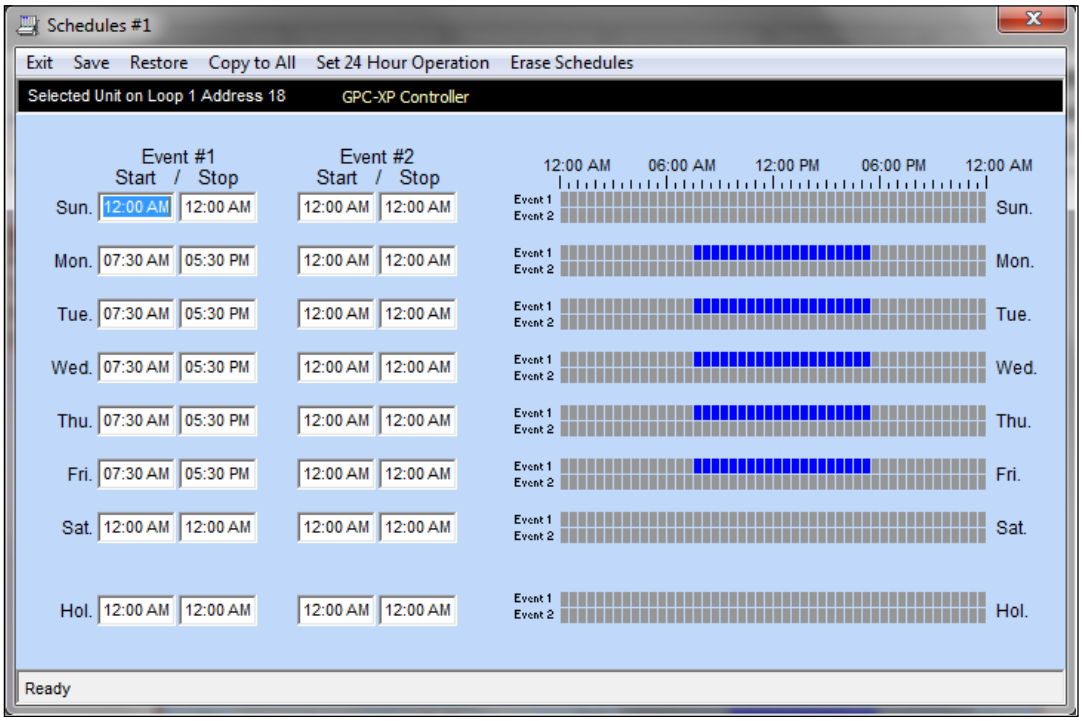


Figure 74: Schedule #1 Configuration #1 Window

The *Schedule Configuration Window* in the example shows a 7:30 AM to 5:30 PM operating schedule for Monday through Friday. The bars on the right side of the screen give a visual indication of the selected time periods.

When you enter a time in any field, you must designate AM or PM and *press* **<ENTER>** to save.

NOTE: You MUST *press* **<ENTER>** to have the system accept your entry. If you do not *press* **<ENTER>**, the bar graph to the right will either not display or will not change.

The holiday start and stop times will override the standard operating hours. The holidays themselves are scheduled in the *Holiday Schedule Window* described on **page 38**.

To eliminate a schedule from any event, simply *type* a zero and *press* **<ENTER>** for the Start and Stop time for that day. The screen will display 12:00 AM for both the Start and Stop times, indicating that the equipment will not activate for that day.

If you want the controller to run the full 24 hours, *type* a zero and *press* **<ENTER>** to set 12:00 AM for the Start time and type 11:59 PM and *press* **<ENTER>** for the Stop time. This ensures the full 24-hour period will remain in the occupied mode without interruption.

Select **<Save>** to save your schedule. *Select* **<Restore>** to restore a previously saved schedule. *Select* **<Copy to All>** to copy the schedule to all like controllers, *select* **<Set 24 Hour Operation>** to all schedules in this window for continuous operation, and *select* **<Erase Schedules>** to completely erase the schedule appearing in the window. *See page 37 for an explanation of each of these functions.*

WARNING: <Erase Schedules> will clear ALL entered stop/start times, so use with caution.

Saving Schedules

To save the weekly time schedule, click **<Save>**. The *File Save Window* will appear (**Figure 75 below**). Give the file a name in the "Selected File" field and *click* **<Save>** or *press* **<ENTER>** to save.

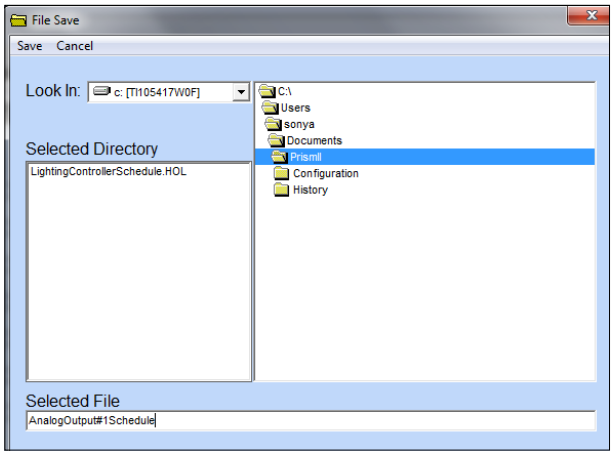


Figure 75: File Save Window

A message will pop up if the schedule is saved successfully. *Click* **<OK>** to make it disappear.

Restoring Schedules

Click **<Restore>** to restore any previously saved schedule from a previously saved file. *Click* **<Open>**. A message will pop up if the schedule is restored successfully. *Click* **<OK>** to make it disappear.

If you try to load a schedule from one type of controller to a different type of controller, Prism 2 will display an error message and prevent you from making this mistake.

Copying Schedules

Click **<Copy To All>** to copy a schedule to other controllers. The *Copy Setpoints Window* will appear (**Figure 76**).

Select a range to copy to in the *Range Box* or type unit number(s) in the *Selected Units Box* and then *click* **<Send>** to start the copy process. When the copying is complete, the message *Copy Completed* will appear in the bottom status bar of the window. *Click* **<Exit>** to close the window.

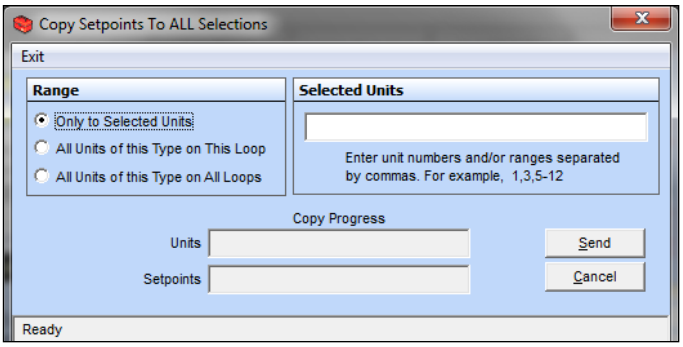


Figure 76: Copy Setpoints Window

Set 24 Hour Operation

NOTE: Make sure to save any schedules you desire before selecting this option.

To set all schedules for continuous operation, click **<Set 24 Hour Operation>**. The *Schedules Window* will display constant operation for weekends and weekdays (**Figure 77 below**). In order to return to the normal schedule, you will need to restore the schedule.

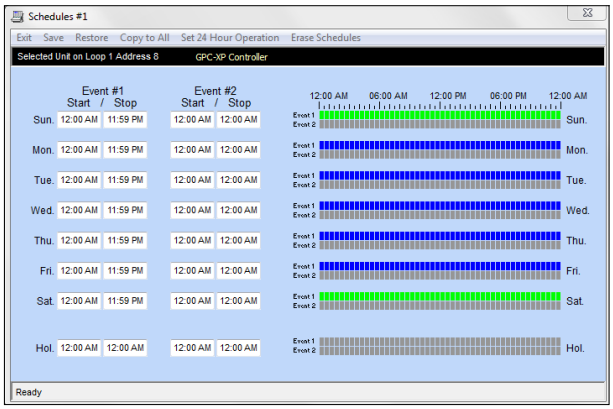


Figure 77: Set 24 Hour Schedule Operation

Erase Schedules

WARNING: <Erase Schedules> will clear ALL entered stop/start times, so use with caution.

To erase all schedules, *click* **<Erase Schedules>**. The schedules will be completely cleared. In order to return to a schedule, you will need to restore the schedule.

Setting Holidays and Schedule Override

Setting Holidays

If your job-site has days during the year when you need to override the standard operating hours to accommodate holidays or other special events, you can use this window to select the holidays.

To access the controller's Holiday scheduling, *click* the **<Holidays>** button in the *Schedules Status Window* (**Figure 73, page 35**). The *Holiday Schedule Window* will appear. See **Figure 78 below**.

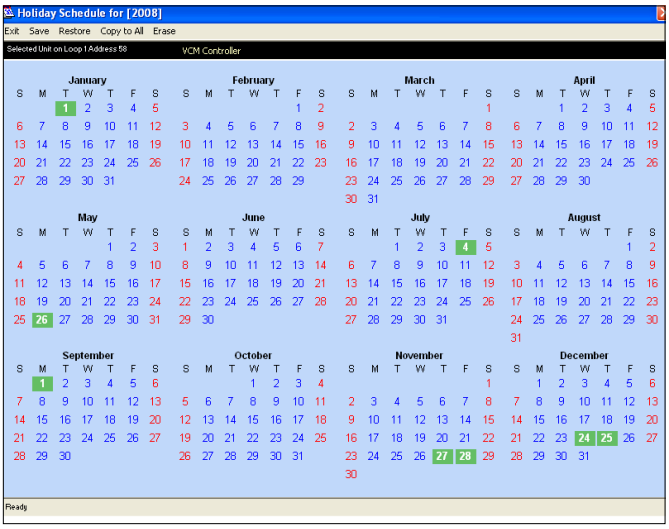


Figure 78: Holiday Schedule Window

Click on the date to highlight it and tag it as a holiday.

Days selected as holidays are indicated with a green background and white text.

There are 14 holiday periods available for each year. These holiday periods can be a single day or they can span multiple days, weeks, or even months. The key to extended holiday periods is to make sure you select every single day, including weekends, between the start of the holiday and the end of the holiday.

For example, if you want to schedule a summer break, you need only schedule one holiday period to define a two or three month break from operating in the occupied mode. Of course, the equipment will still operate with its unoccupied settings.

Every defined holiday uses the same Holiday operating schedule programmed in the *Schedules Window*.

As in the case with Week Schedules, you can select the **<Erase>** button to clear all selected holidays at one time. Refer to Week Schedules for directions on **<Save>**, **<Restore>**, and **<Copy to All>**.

Holidays can only be programmed for the current year. You cannot program holidays before the next year occurs. Holidays do not automatically adjust for the new year, so you will need to access this screen after the new year and make necessary adjustments to the days that float, such as Memorial Day.

Schedule Override

To override a schedule, *click* on the **<Force Modes>** button next to the Schedule you wish to override from the *Schedules Status Window* (**Figure 73, page 35**). See **Figure 79 below**.

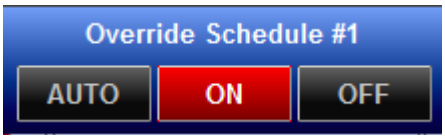


Figure 79: Override Schedule

- **Auto** - *Click* Auto to have the schedule run under its normal schedule.
- **ON** - *Click* ON to override the schedule and have the schedule be continuously occupied.
- **OFF** - *Click* OFF to override the schedule and have the schedule be continuously unoccupied.

Alarm Notification

The GPC-XP can generate alarms for remote alarm notification if alarms have been enabled and Prism 2 is connected and running 24 hours a day. If an alarm condition occurs, the **<ALARM>** button in the upper right hand corner of the *GPC-XP Controller Status Screen* will light up. See **Figure 80 below**. If no alarm(s) exists, the button will be gray. See **Figure 81 below**.

Figure 80: ALARM Button

Figure 81: No Alarms Button

Individual alarms will also be indicated with a bright red alarm bell icon in the *Analog Inputs Status, Binary Inputs Status*, and *Relays Status Windows*. See **Figure 82 below.**

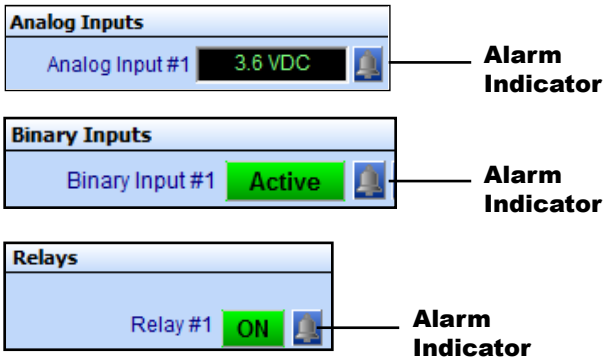


Figure 82: Analog Inputs Status, Binary Inputs Status, and Relay Status Alarm Icon

Configuring and Enabling Alarms

Alarms are configured and enabled in the *Analog Inputs Configuration Window* (**Figure 11, page 13**), *Binary Inputs Configuration Window* (**Figure 26, page 18**), and *Relay Configuration Screen* (**Figure 34, page 21**).

Alarms are also enabled in the *GPC-XP Alarms Window*. To configure alarms, click on the **<ALARM>** or **<No Alarms>** button in the upper right hand corner of the *GPC-XP Controller Status Screen* (**Figure 8, page 11**). The *GPC-XP Alarms Window* will open. See **Figure 83**.

Figure 83: GPC-XP Alarms Window

Click the Enabled box beside any Alarm you wish to enable. When that alarm condition occurs, the **<ALARM>** button in the upper right corner of the *Main Prism Screen* will turn bright red (**Figure 80, page 39 & Figure 6, page 10**). This selection will also allow that Alarm to send out an email notification if your system is set up for that function. See the *Prism 2 Technical Guide* for instructions on setting up email alarm notifications.

Due to the quantity of Inputs and Outputs on the GPC-XP, alarms have been grouped into "Sensor Input High/Low Alarm Indication" and "Relay Run Time Alarm Indication."

The remaining 3 alarm indicators apply strictly to Lead/Lag Relay operations. The Proof Source Failure indicator isn't limited to flow monitoring. It applies to any type of proof of operation your Lead/Lag requires whether it is Temperature, CFM - Airflow, PPM – Parts Per Million content, etc.

If the proof source doesn't meet the requirements in the programmed amount of time, the system switches to the standby output and generates the proof alarm and either the Lead or Standby alarm, depending on which relay caused the condition.

If either or both Lead/Lag Relays generate an alarm, normal operation can be restored by *clicking* the **<Reset Lead/Lag>** button. *Clicking* the **<Reset Lead/Lag>** button will restart the system using the relay with the least amount of accumulated run time. Both do not have to be in an alarm state for you to reset the lead/lag operation. If the system has switched to the standby output, it can be restored to the lead output if you want to test it again or repairs have been made and you just want to restore normal operations.

If both outputs generate an alarm, they will not attempt to activate again until the **<Reset Lead/Lag>** button has been clicked. This is to protect the equipment from possible severe damage if an output is attempting to operate damaged equipment.

Screen Components

Miscellaneous Settings Screen

The *Miscellaneous Settings Screen* includes settings for Week Schedule Broadcasts, AVC Inputs, AVC Setpoints, Rogue Sensor Limits, Reset Rogue Sensors, Outdoor Air Broadcasts, Trend Logging, and Daylight Savings.

From the top toolbar of the *GPC-XP Controller Status Screen* (**Figure 8, page 11**) , *click* on **<Setpoints>** and then *click* **<Miscellaneous>**. See **Figure 84 below**.

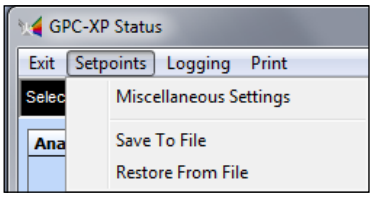


Figure 84: Setpoints Menu - Miscellaneous Settings

The *Miscellaneous Settings Screen* will open. See **Figure 85 below**.

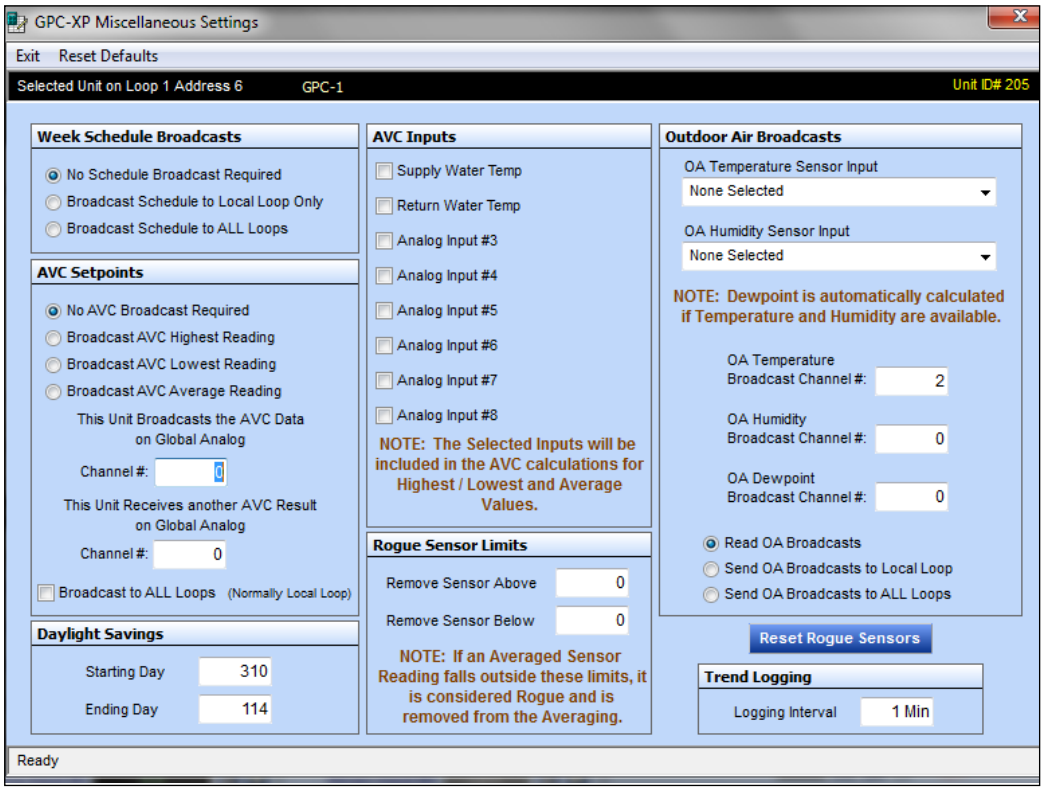


Figure 85: Miscellaneous Settings Screen

Week Schedule Broadcasts

The *Week Schedule Broadcasts Window* (**Figure 86 below**) located in the *Miscellaneous Settings Screen* (**Figure 85, page 40**) allows you to broadcast the Schedules of this GPC-XP to other Unit Controllers only on the Local Loop of this GPC-XP or to All Loops of a multiple loop system. If an option to broadcast is chosen, all (8) Schedules of this GPC-XP are broadcast. The decision of another controller to accept a specific Schedule is configured on the receiving controller. Schedules cannot be broadcast from one GPC-XP to another GPC-XP.

Figure 86: Week Schedules Broadcast Window

AVC Setpoints

In the *AVC (Analog Value Comparison) Setpoints Window* (**Figure 87 below**) located in the *Miscellaneous Settings Screen* (**Figure 85, page 40**), you can configure the controller to broadcast one of the AVC values so it can be used by another controller(s), such as an HVAC unit controller or a second GPC-XP Controller.

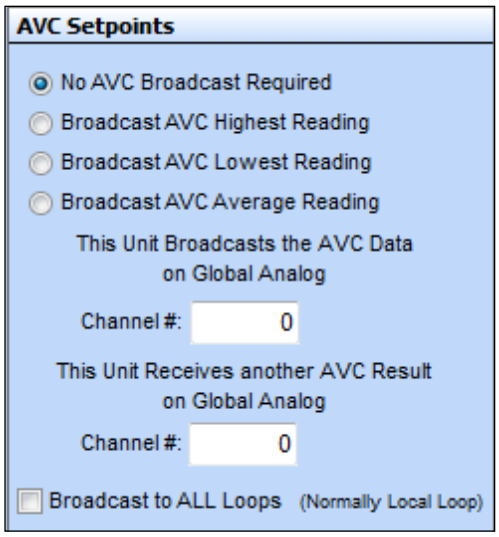


Figure 87: AVC Setpoints

Select which value to broadcast and select the channel it is to be broadcast on. You must use an unused channel between 15 and 31, since channels 1-14 are reserved for other broadcasts. (See the *Global Analog Help Screen*, **page 47**).

You can use two GPC-XP Controllers for this AVC function to allow the use of up to 16 Analog Inputs in the calculation. In this case, one GPC-XP must be configured to broadcast its value on a selected channel. The second GPC-XP (which will do the final AVC calculation) must be configured to use that same channel to receive the broadcast from the first GPC-XP. If that final AVC calculation of the second GPC-XP is to be broadcast to another controller, then a different channel must be selected for that broadcast.

Normally the selected AVC value is only broadcast on this controller's Local Loop. If you want the broadcast to be broadcast to all loops on the system, *check* "Broadcast to ALL LOOPS."

AVC Inputs

In the *AVC (Analog Value Comparison) Inputs Window* (**Figure 88 below**) located in the *Miscellaneous Settings Screen* (**Figure 85, page 40**), select the Analog Inputs that you wish to include in the AVC functions. Inputs not selected will perform their normal configured function and will not affect the AVC operations.

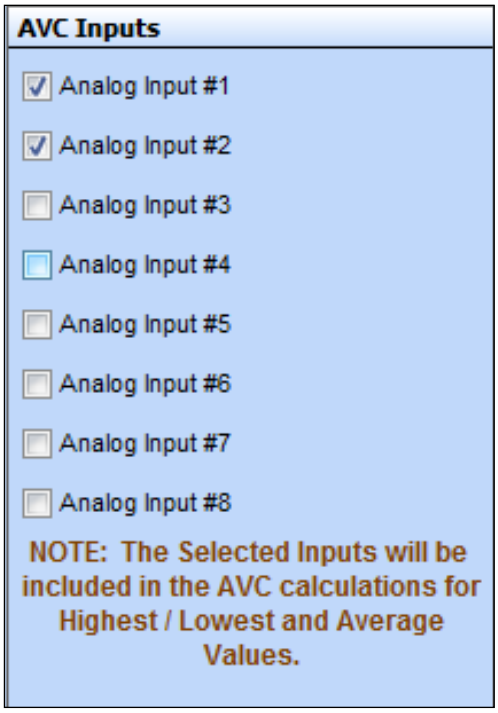


Figure 88: AVC Inputs

Rogue Sensor Limits & Reset & Outdoor Air Broadcasts

Rogue Sensor Limits

The *Rogue Sensor Limits Window* (**Figure 89 below**) is located in the *GPC-XP Miscellaneous Setpoints Screen* (**Figure 85, page 40**) This allows you to remove an AVC sensor value from the AVC Averaging function if it falls outside the range specified by the Above/Below values in this field. This condition could be caused by a bad sensor or a space condition that gets out of control for some reason. A Rogue Sensor Alarm can be generated and requires you to configure "Alarming Enabled" on the *Analog Input Configuration Screen* (see **Figure 11, page 13**) for each Analog Input included in the AVC function. The sensor will automatically be re-included in the AVC Average function if it returns to the acceptable range. The alarm, however, is locked until it is cleared by clicking on the **<Reset Rogue Sensors>** button (**Figure 90 below**).

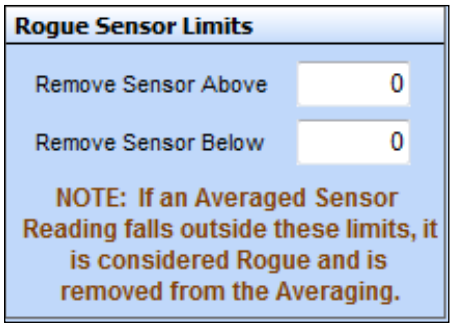


Figure 89: Rogue Sensor Limits

Reset Rogue Sensors

A Rogue Sensor will automatically be re-included in the AVC Average function if it returns to the acceptable range set in the *Rogue Sensor Limits Window* (**Figure 89 above**). The alarm, however, is locked until it is cleared by clicking on the **<Reset Rogue Sensors>** button (**Figure 90 below**). This ensures that the condition is reported and investigated.

Figure 90: Rogue Sensor Limits

Outdoor Air Broadcasts

In the *Outdoor Air Broadcasts Window* (**Figure 91 below**) located in the *Miscellaneous Settings Screen* (**Figure 85, page 40**), you can configure which inputs will be used to read the Outdoor Air (OA) Temperature and the OA Humidity. These are the values that will display in the Outdoor Status section of the *GPC-XP Controller Status Screen* (**Figure 8, page 11**).

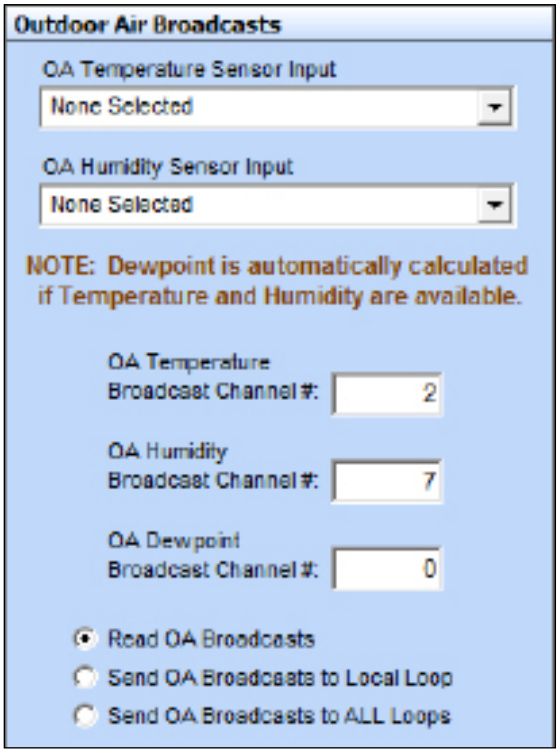


Figure 91: Outdoor Air Broadcasts

Alternately, these values can be read as broadcasts from other controllers by checking the "Read OA Broadcasts" option. In this case, the OA Temperature is always read on Global Channel #2, and the OA Humidity is read from Global Channel #7.

The OA Temperature and/or the OA Humidity (read from Analog Inputs on this GPC-XP) or the calculated Dewpoint from those inputs can be broadcast to other controller(s). To do this, you must select the channels you want to broadcast these values on. If the OA Temp and OA Humidity will be used universally on the system, you should select Channel 2 and Channel 7 respectively. If these are different values from what are already being broadcast on Channels 2 and 7, then you need to select different channels to broadcast these values (using Channels 15-31). To broadcast the OA Dewpoint you would also need to use a Channel from 15-31.

Daylight Savings Time

In the *Daylight Savings Time Window* (**Figure 92 below**) located in the *GPC-XP Miscellaneous Setpoints Screen* (**Figure 85, page 40**), if you want the Schedules on this GPC-XP to respond to Daylight Savings Time changes, you must enter the Start and End dates in this field.

Figure 92: Daylight Savings

Daylight Savings Starting Day

This is the date in the Spring when the time clock automatically adjusts itself forward one hour. If you are in a time zone that does not have daylight savings time or do not want to use this feature, leave this value at zero. High limit = 1231; Low limit = 0; Default = 0.

NOTE: The U.S. government has the authority to determine the switch-over dates each year. Currently, the time changes the second Sunday in March and then switches back the first Sunday in November.

Daylight Savings Ending Day

This is the date in the Fall when the time clock automatically adjusts itself backward one hour. If you are in a time zone that does not have daylight savings time or do not want to use this feature, leave this value as zero. High limit = 1231; Low limit = 0; Default = 0.

Trend Logging Interval

In the *Trend Logging Interval Window* (**Figure 93**) located in the *Miscellaneous Settings Screen* (**Figure 85, page 40**), you can configure how often you want the GPC-XP to log the Input and Output values and conditions by entering a Logging Interval and press **<ENTER>** to save. The maximum amount of time that can be entered is 60 minutes.

The GPC-XP will store up to 120 trend instances in its on-board memory. So, if you are Trend Logging every minute, you will always have the latest 120 minutes worth of trend logging saved in the controller.

No matter what your Trend Log Interval is, if you want to save Trend Logs over a longer period of time (beyond the 120 on-board) you can configure Prism 2 to download the Trend Logs your computer hard drive at multiple intervals during the day. See the Auto Logging instructions in the Prism 2 Technical Guide for instructions on setting up Auto Log Retrieve Times. Prism 2 must be continuously running on the computer for this Auto Logging to function.

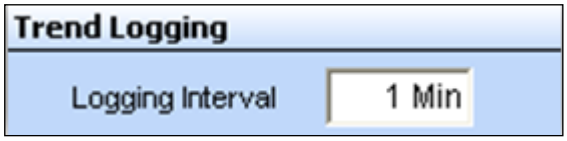


Figure 93: Trend Logging Interval

Reset Defaults

WARNING: <Reset Defaults> resets ALL settings and configurations back to defaults, so the GPC-XP Controller is like brand new again. Use this option with extreme caution!

From the top toolbar of the *Miscellaneous Settings Screen* (**Figure 85, page 40**), *click* on **<Reset Defaults>**. See **Figure 94 below**.

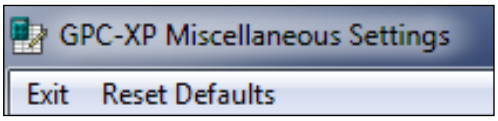


Figure 94: Reset Defaults Option

The following warning will appear (**Figure 95 below**). *Click* **<No>** if you do not want to reset the defaults. *Click* **<Yes>** if you do want to reset the defaults.

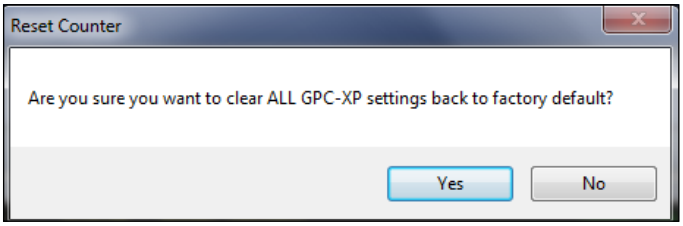


Figure 95: Reset Defaults Warning

Saving and Copying Setpoints

Saving GPC-XP Setpoints

You can save all setpoints to a file on your computer for use in restoring or for copying to another specific controller.

From the top toolbar of the *GPC-XP Controller Status Screen* (**Figure 8, page 11**), *click* **<Setpoints>** and then *click* **<Save To File>**. See **Figure 96 below**.

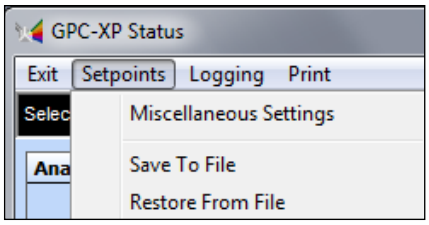


Figure 96: Setpoints Menu - Save To File

In the *File Save Window* (**Figure 97 below**), give the setpoint file a name and then *click* **<Save>**.

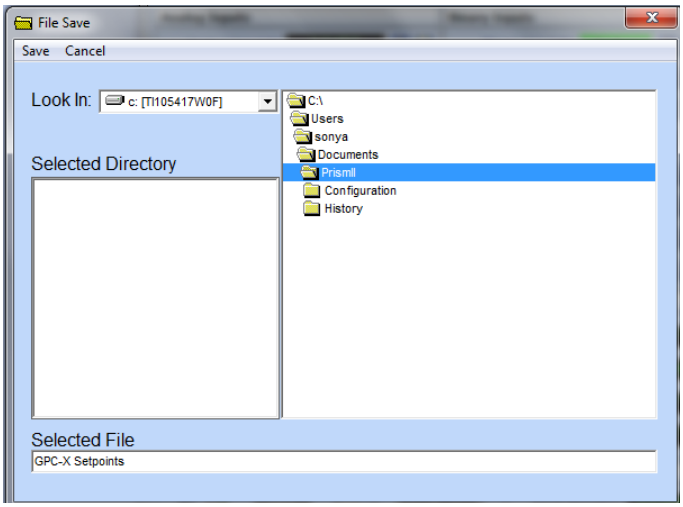


Figure 97: File Save Window

Restoring / Copying GPC-XP Setpoints

Once you save the GPC-XP setpoints to a file on your computer, you can restore or copy the setpoints to another controller.

From the top toolbar of the *GPC-XP Controller Status Screen* (**Figure 8, page 11**), *click* **<Setpoints>** and then *click* **<Restore From File>**. See **Figure 98 below**.

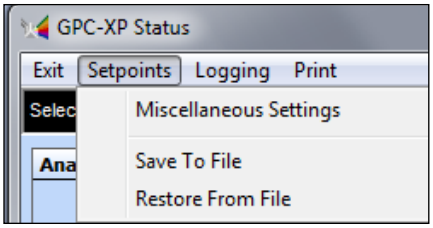


Figure 98: Setpoints Menu - Restore From File

In the *File Open Window* (**Figure 99 below**), *click* on the desired file from the list of folders and *click* **<Open>**.

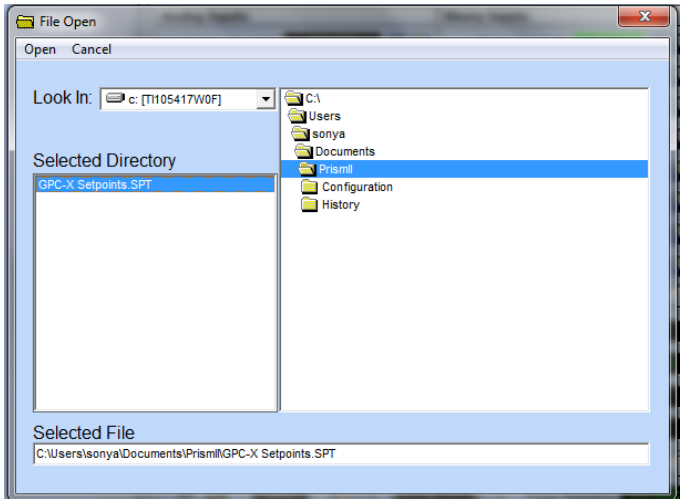


Figure 99: File Open Window

Trend Logging and Printing

Before you select this option, you should close any other open status, setpoint, or diagnostic screens. To display trend log data, from the *GPC-XP Status Screen Toolbar*, *click* **<Logging>**. See **Figure 100 below**. With this option, you can view and load trend logs, view Graphs (not available at this time), Print Logs, Export Daily Logs, and Export Monthly Logs.

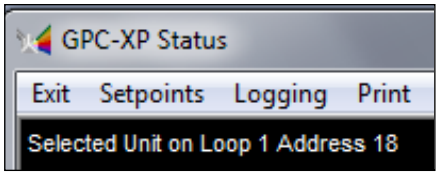


Figure 100: Logging Menu

The *Trend Logs Screen* will open. See **Figure 101 below**. It will be empty until you select a menu option.

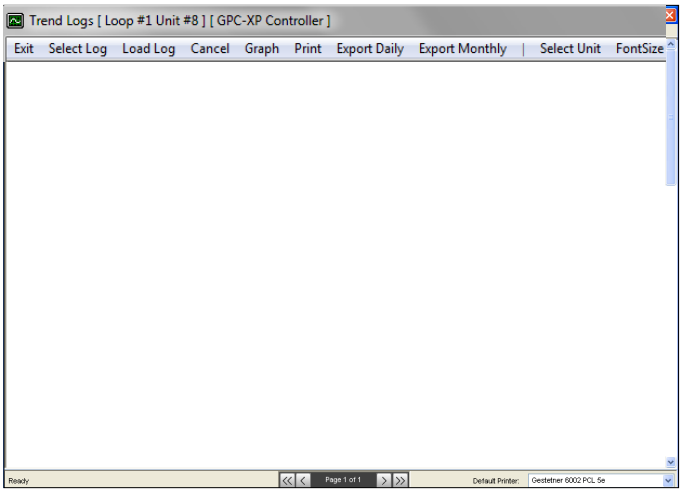


Figure 101: Trend Logs Screen

You can either load the most recent log data by *selecting* **<Load Log>** or load previously stored logs by *selecting* **<Select Log>**.

To view recent data, *click* **<Load Log>.** The Trend Log Report will load with the most recent log data. An example of a Trend Log Report appears in **Figure 102**.

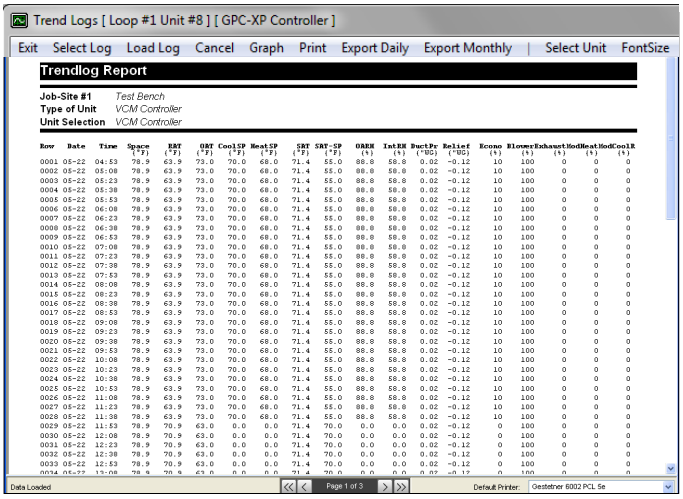


Figure 102: Trendlog Report

Please note that there may be more than one page. You can scroll through pages with the page scroll at the bottom of the screen.

To view previously saved log files, *click* **<Select Log>**. The *Log Selection Window* will appear (**Figure 103 below**). Prism 2 will search the folder of the specified unit to determine which days of the year a log has been saved.

If you are auto-logging (see **page 43, Trend Logging Interval**), every day of the year will display in red.

From this screen, you can see highlighted days of the year (represented with a red background) that indicate a log was saved for this controller on that day. *Click* on any highlighted date to load the data. The Trend Log Report for that date will appear (**Figure 102 above**).

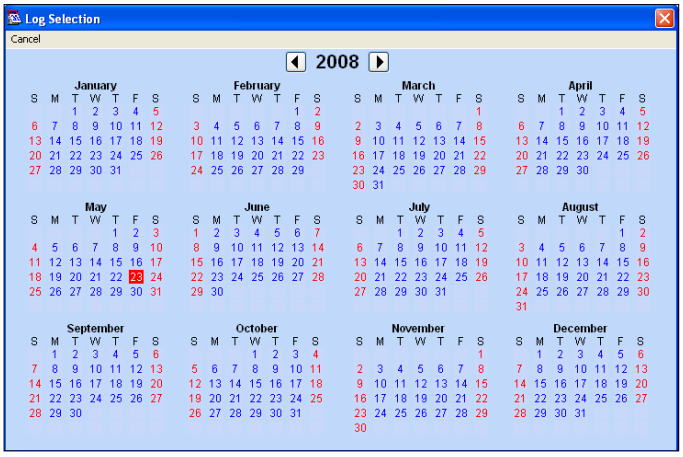


Figure 103: Log Selection

Graphing and Printing Trend Logs

If you would like to export a day's worth or month's worth of log data for further analysis not provided in Prism 2, *select* either **<Export Daily>** or **<Export Monthly>**. Prism 2 will create a comma delimited .CSV file that can be opened in most spreadsheet and database applications.

If you *select* **<Export Daily>**, the *File Save Dialog Box* will appear (**Figure 104 below**). Select the directory you wish to save the data to and enter a file name. Then *click* **<Save>**.

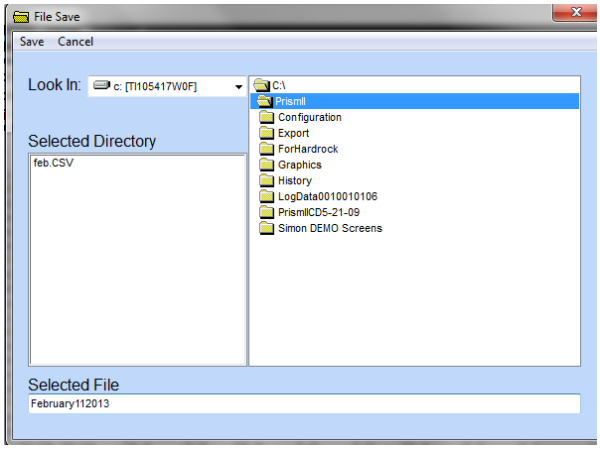


Figure 104: Trend Log Graph

If you *select* **<Export Monthly>**, the following dialog box will appear (**Figure 105 below**):

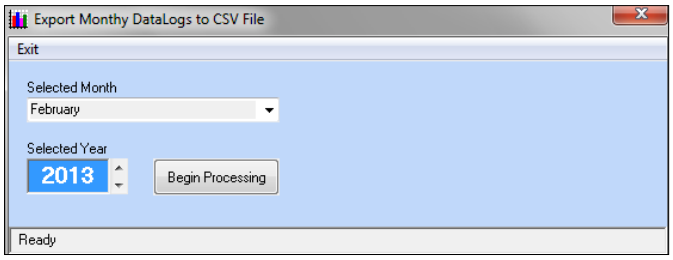


Figure 105: Export Monthly Data Logs

Select the month and the year and *click* **<Begin Processing>**. The *File Save Dialog Box* will appear (**Figure 104 above**). Select the directory you wish to save the data to and enter a file name. Then *click* **<Save>**.

To graph data from a log, *click* **<Graph>**. The *Log Selection Window* will appear again. *Select* a highlighted date to graph. The *Trendlog Graph Screen* will fill up your entire computer display. *Click* **<Exit>** to return to the *Trend Log Screen*.

Figure 106 is a sample line graph display.

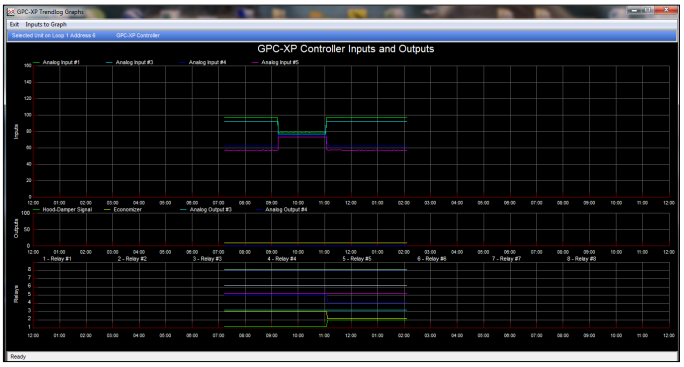


Figure 106: Trend Log Graph

To print a log, first *select* a printer from the *Default Printer Selection Dialog Box* (**Figure 107 below**) located at the bottom right of the *Trend Logs Screen* and then *click* **<Print>**. Every time you open Prism 2, this printer selection will be the default printer until you change it.

NOTE: If you select a printer from this list box, it will become the default printer for all programs on your computer unless you select a different printer in Prism 2 or from the Windows® Control Panel.

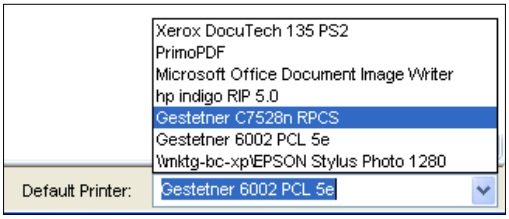


Figure 107: Printer Selection Dialog Box

To select a different unit for Trend Logging, *click* **<Select Unit>** and the *Select Unit Dialog Box* will appear (**Figure 108 below**).

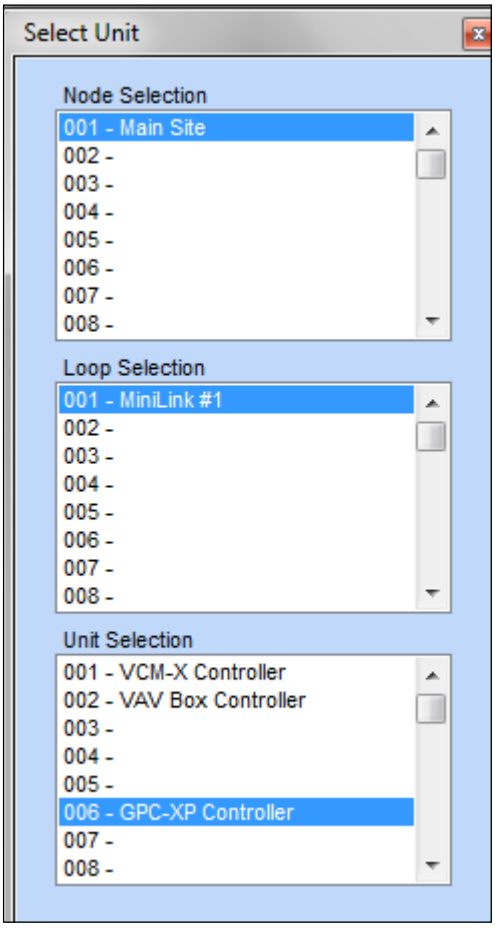


Figure 108: Select Unit Dialog Box

Printing Status Reports

Before you select this option, you should close any other open status, setpoint, or diagnostic screens. To print a status report for the current day, from the *GPC-XP Status Screen Toolbar*, *click* **<Print>**. See **Figure 109 below**. The Status Report for the current day will appear in a Print Preview. See **page 50** for a Sample Status Report. Select the printer from the list of installed printers at the bottom of the screen and *click* **<Print>**.

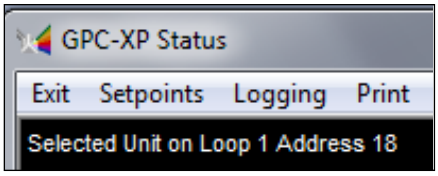


Figure 109: Print Menu

Global Analog & Global Binary Help Screens

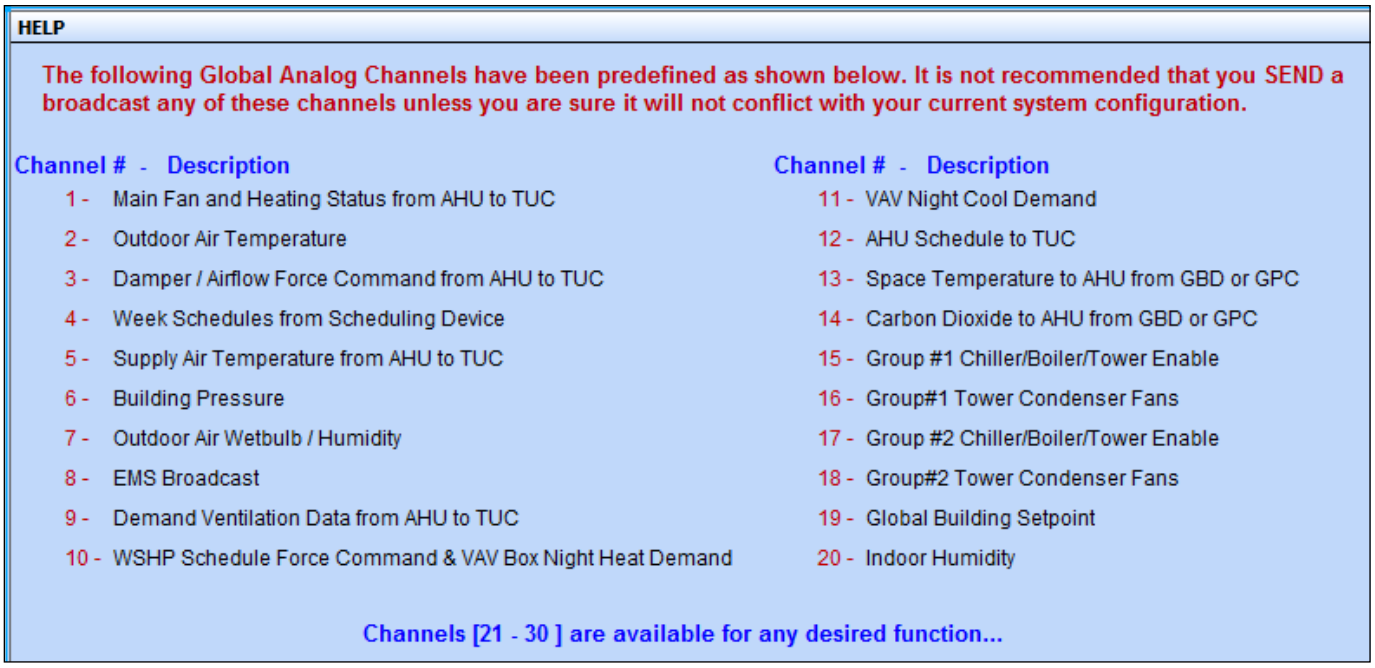


Figure 110: Global Analog Help Screen

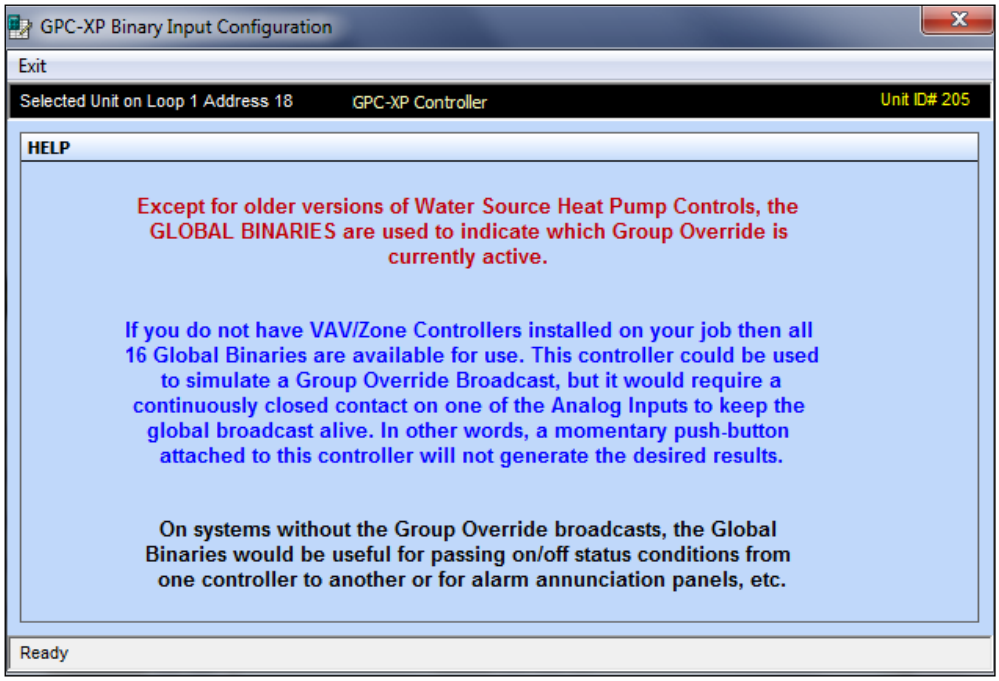


Figure 111: Global Binary Help Screen

Formula Help

To access Formula Help, click the question mark next to Formula Help in the *User Scaling Box* (**Figure 112 below**) found in the *Analog Input Configuration Window* (**Figure 11, page 13**). The *Formula Help Window* will open (**Figure 113 below**).

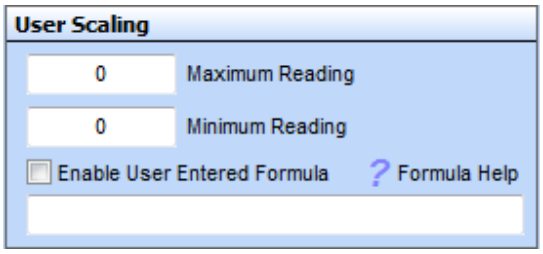


Figure 112: User Scaling Box

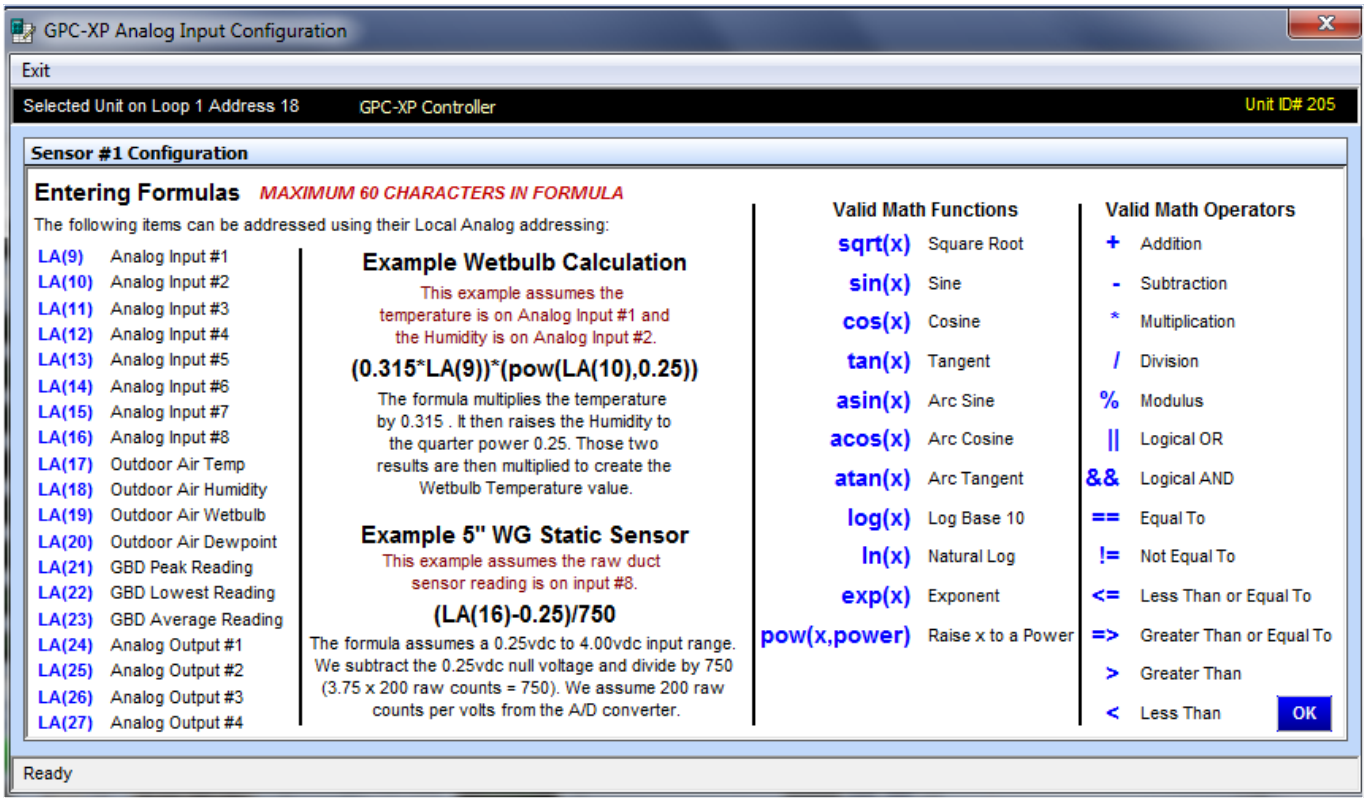


Figure 113: Formula Help Screen

Status Report Example

To print a status report for the current day, from the *GPC-XP Status Screen Toolbar, click* **<Print>**. The Status Report for the current day will appear in a Print Preview. See the Sample Report shown in **Figures 114 & 115**. Select the printer from the list of installed printers at the bottom of the *Status Report Preview Window* (**Figure 116, page 51**) and *click* **<Print>**.

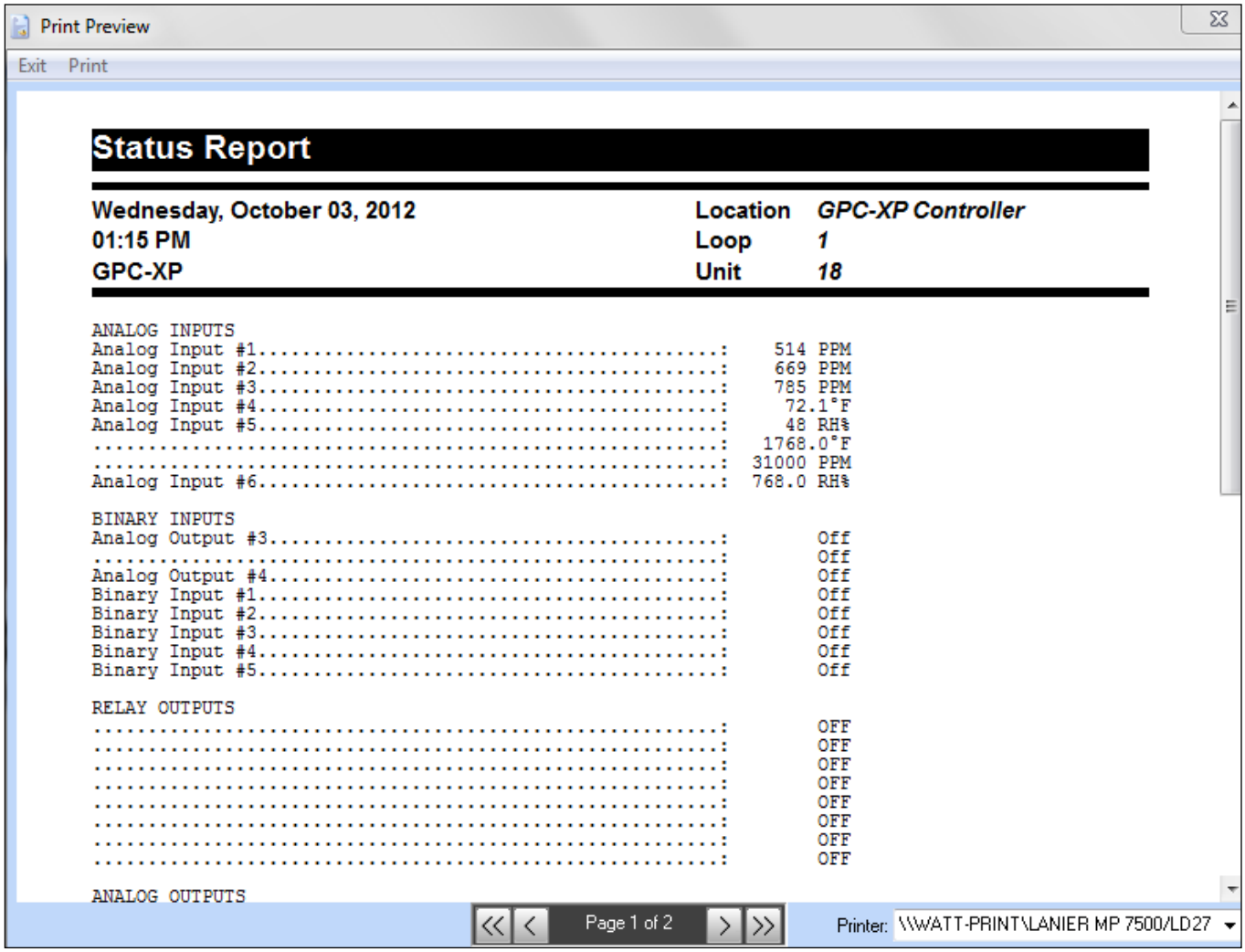


Figure 114: Status Report Preview Window, Page 1

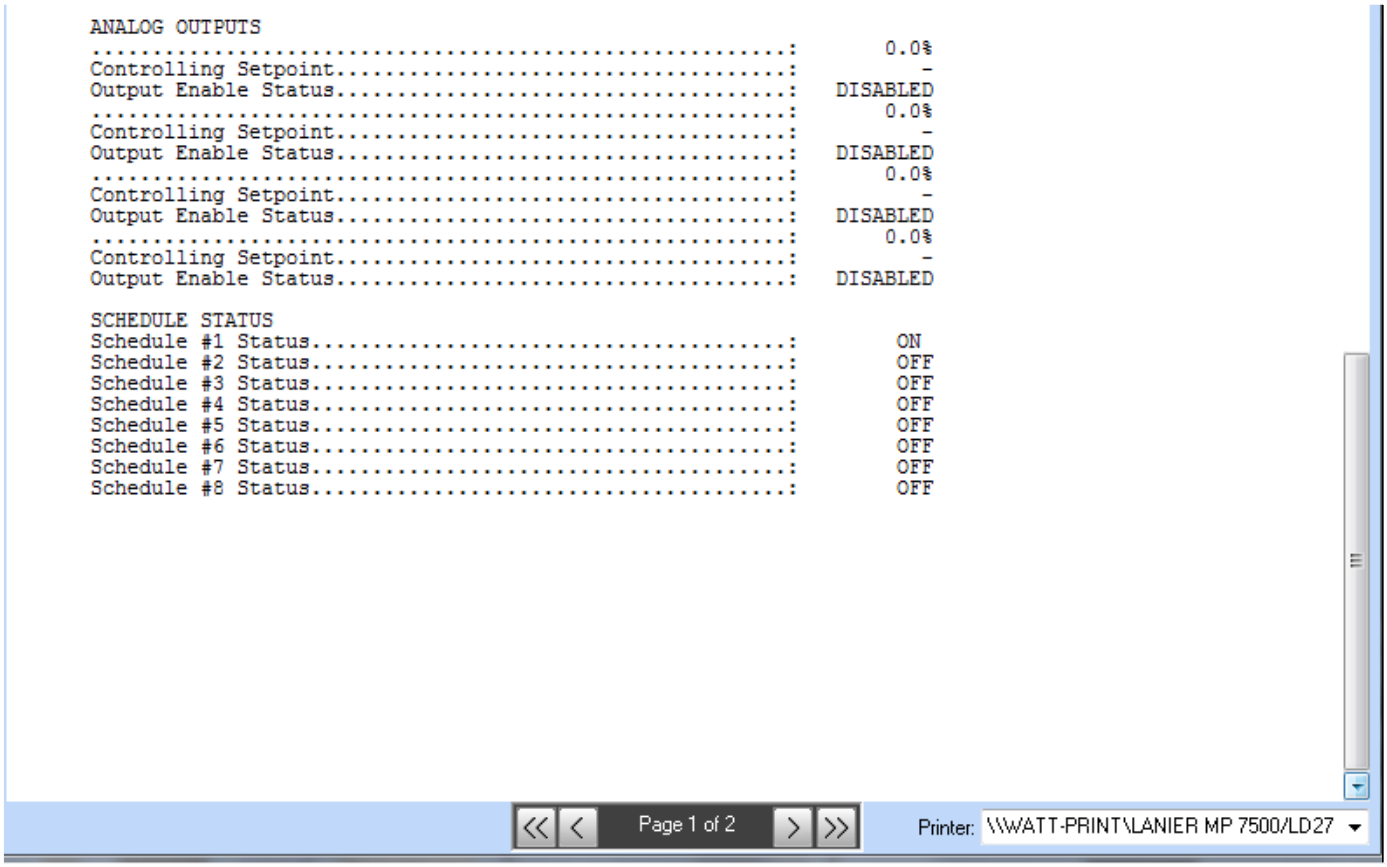


Figure 115: Status Report Preview Window, Page 2

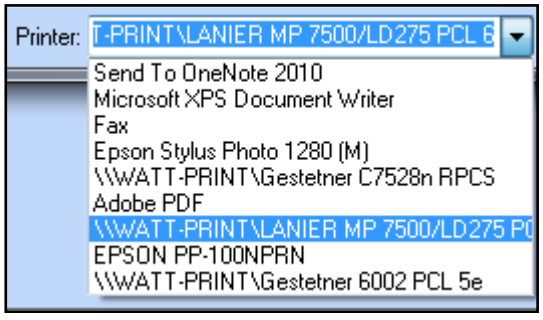


Figure 116: Printer Selection Drop Down Menu

USB Driver Installation

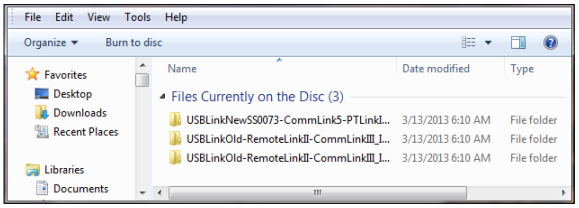
The internal USB communication port of the GPC-XP Controller uses a specialized driver that must be installed on your Windows PC before communication to the device can be established.

NOTE: You may already have this driver installed on your PC if you are using a USB-Link 2 or CommLink 5 on your system.

1. Before you begin, you must determine if your computer is running 32-bit or 64-bit Windows. Open the System information by right-clicking the **<Start>** button and then clicking **<System>**. Under System, you can view the system type. Based on what type of system you have, you will choose 32_Bit.exe or 64_Bit.exe from the list of files shown in Step 5.

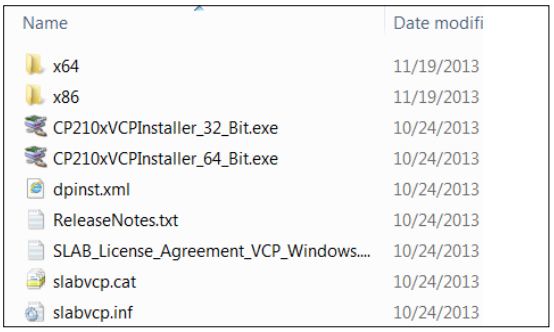
2. Insert the USB Flash Drive into the USB port of your computer.

3. Copy and paste the folder "USBLink NewSS0073" to a location on your computer's hard drive.

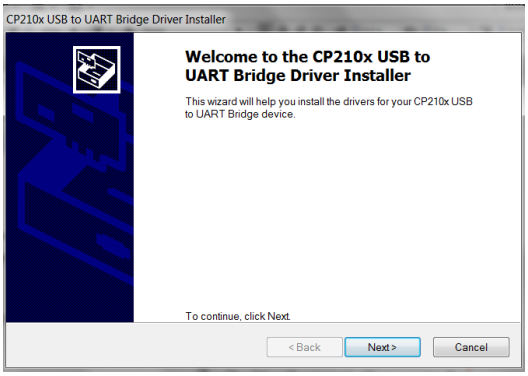


4. Locate the folder "USBLink NewSS0073" on your hard drive and *double-click* on it.

5. The following list of files will display. Choose 32_Bit.exe or 64_Bit.exe based on what type of system you determined you have in Step 1.



6. In the window that pops up, shown below, *click* **<Next>,** and the installation program will walk you through the rest of the steps.



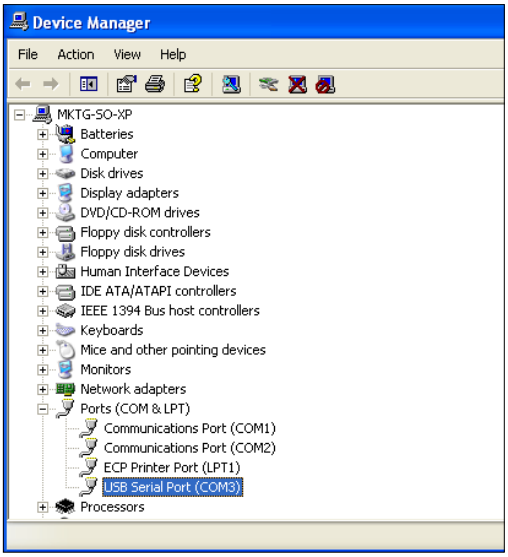
7. When successful installation has occurred, connect the USB cable between the PC and the GPC-XP Controller. The PC will automatically recognize the device and a COM port will be assigned.
NOTE: The COM port used must not be greater than COM9. If the PC assigned a COM port greater than COM9, please proceed to **page 53** to change the USB COM port.

Changing the USB COM Port Number

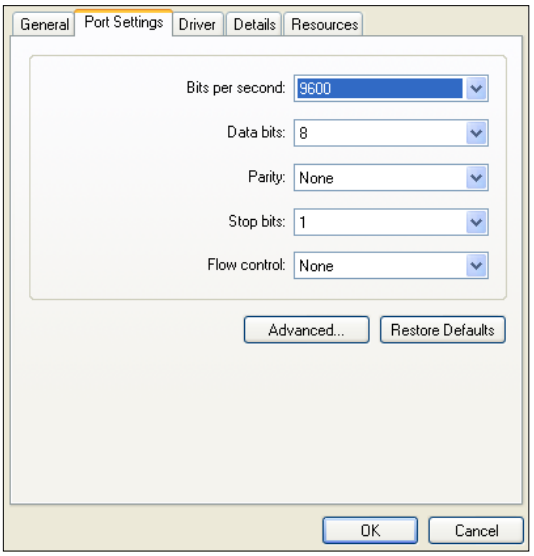
When your USB Device is first plugged in, it will be assigned a COM port number to be used for communicating with the Prism 2 software. If the port number is 10 or greater, it needs to be changed to a value less than 10 to be recognized by Prism 2.

1. *Click* **<Start>**, *click* **<Control Panel>**, *click* **<System>**, *click* the **<Hardware>** tab, and then *click* **<Device Manager>** to get to the *Device Manager Window*.

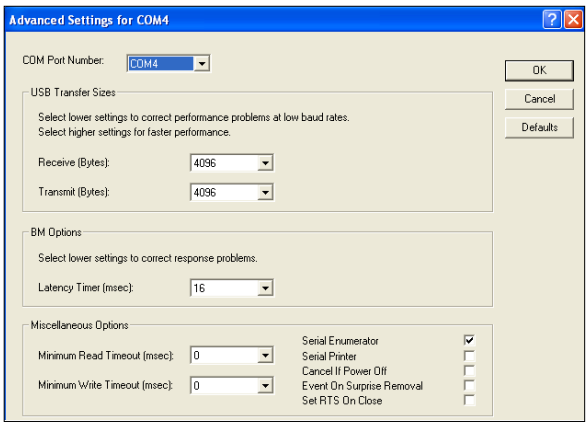
2. *Click* on the plus sign next to Ports to see all of the COM ports.



3. *Right-click* on "USB Serial Port (COM#)" and *select* **<Properties>**. In the *Properties Window*, *select* the **<Port Settings>** tab.



4. To assign a port number less than 10, *click* on **<Advanced>.** The *Advanced Settings Window* will appear.



5. In the COM Port Number drop box, *select* which COM port you wish to use. Make sure you select a COM port number that is not currently in use (you can see the ports in use in the *Device Manager Window*). *Select* a port number that is less than 10.

NOTE: Windows® will assign a port number to every device that has ever been installed on your computer. So if there are no available ports below 10, choose a port number less than 10 for a device listed that you know you are not currently using.

6. Once you select the correct COM port number, *click* **<OK>** and close any windows opened in the process of changing the port number. Make note of this number because you will need it for your Prism 2 setup.

A-B

0 - 5vdc User Scaled.....13
4 - 20mA User Scaled.....13
24 Hour Operation.....37

A

AAON Technical Support.....9
Above/Below Options.....22
Address
  Communicating Sensor.....13
ADDRESS Dipswitches.....7
Addressing.....8
Address Switch Setting.....7
ALARM Button.....39
Alarm Configuration.....19
  Analog Inputs.....16
  Binary Inputs.....19
Alarm Delay Period Hours.....27
Alarm Delay Period Minutes.....27
Alarming Enabled.....19
Alarm Notification.....39
Alarms
  Analog Inputs.....39
  Binary Inputs.....39
  Configuring.....39
  Enabling Alarms.....39
  Internal Schedule.....19
  Notification.....39
  Relay Status.....39
Alarms Window.....39
Alternate Override.....33
  Voltage.....33
Analog Broadcast Channel Box.....15
Analog Inputs.....12
  Alarm Configuration.....16
  Alarm Notification.....39
  Calibrate Sensor.....16
  Clear Sensor Override.....16
  Configuration Window.....13
  Data Entry Dialog Box.....12
  Internal Schedule.....14
  Number of Readings to Average.....15
  Override Duration.....14
  Override Reading.....16
  Renaming.....12
  Send Global Analog.....15
  Sensor Reading Appendix.....14
  Sensor Scaling.....14
  User Scaling.....15
  Wall Sensor.....16
Analog Inputs Window.....12
  Navigation.....12
Analog Output
  Cancel Override.....33
  Override.....33
Analog Output Configuration Window.....29
Analog Outputs
  Alternate Override.....33
  Configuring.....29
  Controlling Schedule.....32
  Control Setpoints.....31
  Control Source.....31
  Control Type Field.....29
  Derivative Constant.....30
  Enabling Binary Input.....32
  Enabling Relay.....32
  Floating Point Control.....30
  Integral Constant.....30
  Logic, Setpoint, and Deadband.....33
  Naming.....28
  Outdoor Air Enable Setpoints.....32
  Output Voltage Limits.....32
  PID Control.....30
  PID Derivative Filter.....30
  Renaming.....28
  Reset Limits.....31
Analog Outputs Window.....28
  Components.....28
  Navigation.....28
Averaging Readings.....15

B

Baud Rate.....8
Binary Broadcast Channel Box.....19
Binary Input Configuration Window.....18
Binary Inputs.....17
  Alarm Configuration.....19
  Alarm Notification.....39
  Configuring.....18
  Internal Schedule Used for Alarms.....19
  Naming.....17
  Navigation.....17
  Override Binary.....19
  Renaming.....17
  Send Global Binary.....19
Binary Input to Follow.....24,25
Binary Input Window.....17
Binary Override.....19
Broadcast Channels.....42

C

Calculation Interval.....30
Calibrate Sensor.....16
Cancel Override
  Analog Output.....33
Carbon Dioxide Sensor
  Communicating.....13
Changeover Interval.....27
Clear Sensor Override.....16
CommLink.....7
  Baud Rate.....8
CommLink 5
  Baud Rate.....8
CommLink IV.....7
CommLink Jumpers.....7
Communicating Carbon Dioxide Sensor.....13
Communicating Humidity Sensor.....13
Communicating Sensor Address.....13
Communicating Temperature Sensor.....13
Communication Settings.....7
Configuring Alarms.....39
Configuring Analog Inputs.....13
Configuring Analog Outputs.....29
Configuring Binary Inputs.....18
Configuring Relays.....21
Controlling Schedule.....32
  Relays.....24,25
Control Method Field.....22
Control Setpoints.....31
Control Setpoints Window.....31
Control Source.....31
  Decreasing Proof Setpoint.....24
  High Limit Setpoint.....24
  Increasing Proof Setpoint.....24
  Low Limit Setpoint.....24
  Night Setback Setpoint Spread.....24
Control Source Field.....23
Control Source Setpoints.....24
Control Source Window.....31
Control Type
  Floating Point Control.....30
  PID Control.....30
Control Type Field.....29
Copying Schedules.....37
Copying Setpoints.....44
Copy Setpoints Window.....37

D

Decreasing Proof Setpoint.....24
Default Printer Selection.....46
Defaults
  Resetting.....43
Delay & Run Times.....27
Derivative Constant.....30
Diagrams
  GPC-XP Wiring.....6
Direct Acting Floating Point.....29
Direct Acting PID.....29
Disable Mode Offsets.....31
Disable Relay.....27

E

Enabling Alarms.....39
Enabling Binary Input.....32
Enabling Relay.....25,32
Ending Day.....43
Environmental Requirements.....5
Export Daily.....46
Export Monthly.....46

F

File Open Window.....44
File Save Window.....37,44
Floating Point Control.....30
Follow Active Binary Input.....22
Follow Inactive Binary Input.....22
Follow Relay.....18
Follow Relay Output.....22
Follow Schedule.....22,23
Formula
  User Entered.....15
Formula Help.....49

G

GBD Average Reading.....31,33
GBD Inputs.....34
GBD Lowest Reading.....31
GBD Peak Reading.....31,33
GBD Status.....34
Global Analog
  Send to ALL Loops.....15
  Send to Local Loop.....15
Global Analog Help Screen.....48
Global Binary
  Help Screen.....48
  Send to Local Loop.....19
Global Binary
  Send to ALL Loops.....19
Global Binary Help Screen.....48
GPC-XP Controller
  Address.....8
  Address Switch Settings.....7
  Environmental Requirements.....5
  Mounting.....5
  Navigation.....11
  Overview.....3
  Power Supply.....5
  Wiring Diagram.....6
GPC-XP Controllers
  Accessing.....10
  Renaming.....10
GPC-XP Controller Status Screen.....11
GPC-XP Controller Status Screen Toolbar.....11

H

Hardware Requirements.....9
Help Screen
  Formula.....49
  Global Analog.....48
High Limit Setpoint
  Control Source.....24
Holidays.....38
Holiday Schedule Window.....38
Humidity Sensor
  Communicating.....13

I

Increasing Proof Setpoint.....24
Initialization.....9
Installation & Wiring.....6
Integral Constant.....30
Internal Schedule.....14
Internal Schedule Used for Alarms.....19

L

Lag Relay for Lead/Lag Control.....23
Lead/Lag Control.....27
Lead Relay for Lead/Lag Control.....23
LEDs.....9
License.....9
Load Log.....45
Logging.....45
Logging Interval.....42
Logging Menu.....45
Logical AND Control Method.....26
Logical OR Control Method.....26
Logic, Setpoint, and Deadband.....33
Log Selection.....45
Low Limit Setpoint
  Control Source.....24

M

Main Control Method.....22
Main Control Method Window.....22
Maximum Slide Offset Effect.....16
Minimum Off Time.....27
Minimum Run Time.....27
Mounting.....5

N

N/C Contact (Open for Active).....18
Network Operation.....7
Night Setback Setpoint Spread.....24
No Alarms Button.....39
N/O Contact (Close for Active).....18
Number of Readings to Average.....15

O

OA Dewpoint.....31,33,34
OA Humidity.....34
OA Humidity Sensor Input.....42
OA Temperature.....34
OA Temperature Sensor Input.....42
OA Wetbulb.....31,33,34
Off Above / Off Below.....22
Off Above / On Below.....22
On Above / Off Below.....22
On Above / On Below.....22
Operating System.....9
Outdoor Air.....31,33
Outdoor Air Broadcasts.....42
Outdoor Air Enable Setpoints.....32
Outdoor Air Enable Window.....32
Outdoor Status.....34
Output Active When Relay Contact is Closed.....27
Output Active When Relay Contact is Open.....27
Output Voltage Limits.....32
Override
  Analog Output.....33
  Schedule.....38
Override Binary.....19
Override Duration.....14
Override Reading
  Analog Inputs.....16

P

PID Control.....30
PID Derivative Filter.....30
Printer Selection.....46
Printer Selection Drop Down Menu.....51
Printing.....45
  Status Reports.....47
Printing Status Reports.....47
Printing Trend Logs.....46
Print Menu.....47
Prism 2
  System Requirements.....9
Prism 2 Main Screen.....10
Prism 2 Software.....9
Prism 2 Technical Guide.....9
Proof Failure Time Delay.....27
Proportional Control Window.....30
Push-Button Override.....18

R

Read Global Analog – Channel.....13
Read Global Binary.....18
Readings to Average.....15
Relay Configuration Screen.....21
Relay Output Type.....27
Relay Output Type Window.....27
Relays.....20
  Binary Input to Follow.....24,25
  Configuring.....21
  Controlling Schedule.....24,25
  Control Method Field.....22
  Control Source Field.....23
  Control Source Setpoints.....24
  Delay & Run Times.....27
  Enabling Relay.....25
  Lead/Lag Control.....27
  Logical AND Control Method.....26
  Logical OR Control Method.....26
  Main Control Method.....22
  Naming.....20
  Relay Output Type.....27
  Relay to Follow.....25
  Renaming.....20
  Run Time Alarming.....27
  Timing & Alarming.....27
  Ventilation Control.....27
Relay Status
  Alarm Notification.....39
Relays Window.....20
Relay to Follow.....25
Reset Defaults.....43
Reset Lead/Lag Button.....39
Reset Limits.....31
Reset Rogue Sensors.....42
Reset Source/Reset Source Limits.....24
Restoring Setpoints.....44
Reverse Acting Floating Point.....29
Reverse Acting PID.....29
Rogue Sensor Reset Limits.....42
Run Time Alarm Delay Period.....27
Run Time Alarming.....27

S

Saving GPC-XP Setpoints.....44
Saving Schedules.....37
Schedule Configuration Window.....36
Schedule for Night Setbacks and Overrides.....14
Schedule Override.....38
Schedules
  24 Hour Operation.....37
  Copying.....37
  Saving.....37
Schedule Setting.....35
Schedule Status Window.....35
Screens
  Alarms Window.....39
  Analog Input Configuration Window.....13
  Analog Inputs Window.....12
  Analog Output Configuration Window.....29
  Analog Outputs Window.....28
  Binary Input Configuration Window.....18
  Binary Input Window.....17
  Control Setpoints Window.....31
  Control Source Window.....31
  GPC-XP Controller Status Screen.....11
  Holiday Schedule Window.....38
  Logical AND Control Method.....26
  Logical OR Control Method.....26
  Main Control Method Window.....22
  Miscellaneous Settings Screen.....40
  Prism 2 Main Screen.....10
  Relay Configuration Screen.....21
  Relay Output Type Window.....27
  Relays Window.....20
  Schedule Configuration Window.....36
  Schedule Status Window.....35
  Setpoint Reset Source Window.....31
  Timing & Alarming Window.....27
  Trend Logs Screen.....45
Select Log.....45
Send Global Analog.....15
Send Global Binary.....19
Send to ALL Loops.....15,19
Send to Local Loop.....15,19
Sensor Reading Appendix.....14
Sensor Scaling.....14
Set 24 Hour Operation.....37
Setpoint Reset Source.....31
Setpoint Reset Source Window.....31
Setpoints
  Copying.....44
  Restoring.....44
  Saving.....44
Setpoints Menu - Miscellaneous Settings.....40
Setpoints Menu - Restore From File.....44
Setpoints Menu - Save To File.....44
Setting Holidays.....38
Setting Schedules.....35
Slide Offset Channel.....24
Software License.....9
Stand-Alone
  Baud Rate.....8
Stand Alone Operation.....7
Starting Day.....43
Starting Delay Period.....27
STATUS1.....9
STATUS2.....9
Status Report Example.....50
Status Report Preview Window.....50,51
Status Reports
  Printing.....47
Step by Step Guide.....4
Support Information.....9
System Requirements
  Prism 2.....9

T

Temperature Sensor
  Communicating.....13
Thermistor Celsius Temperature.....13
Thermistor Fahrenheit Temperature.....13
Timing & Alarming.....27
Timing & Alarming Window.....27
Toolbar.....11
Trend Logging.....42,45
  Logging Interval.....42
Trend Log Graph.....46
Trend Logs
  Printing.....46
Trend Logs Report.....45
Trend Logs Screen.....45

U

Unit Selection Window.....10
USB Driver Installation.....52
User Defined Appendix.....14
User Entered Formula.....15
User Scaling.....15
User Scaling Box.....49

V

Ventilation Control.....22,23,27
Vent Mode OFF Time.....27
Vent Mode ON Time.....27
Voltage.....33
    Alternate Override.....33

W

Wall Sensor.....16
Wall Sensor Slide Offset.....13,16
Week Schedule Broadcasts.....41
Wiring Considerations.....6

GPC-XP Controller Technical Guide

G026160 · Rev. 01K · 200421

AAON Factory Technical Support: 918-382-6450
techsupport@aaon.com

AAON Controls Support: 866-918-1100
Monday through Friday, 7:00 AM to 5:00 PM central standard time.

NOTE: Before calling Technical Support, please have the model and serial number of the unit available.

PARTS: For replacement parts please contact your local AAON Representative.

This manual is also available for download from our website—www.aaon.com/controlsmanuals—under Auxiliary Controllers, where you can always find the latest literature updates.

2425 South Yukon Ave • Tulsa, OK • 74107-2728
Ph: (918) 583-2266 • Fax: (918) 583-6094
AAON® Part No.: G026160, Rev. 01K
Printed in the USA • © December 2019 AAON • All Rights Reserved