# Table of Contents

OVERVIEW ................................................................................................................................................. 3  
Features ........................................................................................................................................................... 3  
Step-By-Step Guide ......................................................................................................................................... 4  

SECTION 1: LEAD/LAG WIRING & SETUP................................................................................................ 5  
Environmental Requirements ........................................................................................................................... 5  
Mounting .......................................................................................................................................................... 5  
Power Supply ................................................................................................................................................... 5  
Lead/Lag Controller Dimensions ...................................................................................................................... 5  
Lead/Lag Wiring ............................................................................................................................................... 6  
Communication Settings .................................................................................................................................. 7  
Addressing and Baud Rate Selection .............................................................................................................. 8  

SECTION 2: INSTALLING PRISM 2........................................................................................................... 9  

SECTION 3: LEAD/LAG NAVIGATION AND STATUS ............................................................................... 10  

SECTION 4: CONFIGURING ANALOG INPUTS ....................................................................................... 13  

SECTION 5: CONFIGURING BINARY INPUTS ........................................................................................ 17  

SECTION 6: CONFIGURING RELAYS ...................................................................................................... 20  

SECTION 7: CONFIGURING ANALOG OUTPUTS ..................................................................................... 25  

SECTION 8: OUTDOOR STATUS & LEAD/LAG ENABLE ......................................................................... 31  

SECTION 9: SETTING SCHEDULES ....................................................................................................... 32  

SECTION 10: CONFIGURING ALARMS .................................................................................................. 36  

SECTION 11: SAVING AND RESTORING SETPOINTS ............................................................................ 37  

SECTION 12: PRINTING STATUS REPORTS ..........................................................................................39  

APPENDIX A: SAMPLE CONFIGURATIONS ............................................................................................41  

APPENDIX B: USB DRIVER INSTALLATION ...........................................................................................48  

INDEX ...................................................................................................................................................... 50  

WattMaster Controls, Inc. 
8500 NW River Park Drive · Parkville, MO 64152 
Toll Free Phone: 866-918-1100 
PH: (816) 505-1100 · FAX: (816) 505-1101 · 
E-mail: mail@wattmaster.com 
Visit our web site at www.wattmaster.com 

WattMaster Controls, Inc. assumes no responsibility for errors or omissions. 
This document is subject to change without notice. 
Form: WM-LEADLAG-TGD-01A 
Copyright December 2013 WattMaster Controls, Inc.
Overview

The OE338-23-LL Lead/Lag Controller is used for controlling multiple pumps or HVAC units that require equal run time. The first application—Lead/Lag—is for controlling up to (4) sets of devices, and the second application—2 Lead/1 Lag—is for controlling (3) devices where (2) of the devices will be running at a time.

The Lead/Lag Controller 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.

The Lead/Lag Controller has (8) configurable analog inputs which will accept signals from thermistor temperature sensors or from 4-20mA or 0-5VDC transmitters. The inputs are set for the desired scaling by means of a jumper bar.

An additional modular input is available for WattMaster communicating sensors. The Lead/Lag Controller 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. There are (4) 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.

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

Features

The Lead/Lag 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 (0-10VDC) for modulating control
- E-BUS port for WattMaster communicating sensors
- 4 separate 2 events per day schedules which can be assigned to any output for operational control or alarm recognition based on time of day
- Schedules can be configured to broadcast to other WattMaster HVAC equipment installed on the same communications loop as the Lead/Lag Controller
- Can be configured using a computer with Prism 2 software installed
- 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

Lead Lag Operation

The first application option is the Lead/Lag operation. With the Lead/Lag application, you can configure one “Lead” device and one or more “Lag” devices.

For example, if you have three pumps, but only one runs at a time (Lead/Lag/Lag), the Lead/Lag Controller will run the first pump for a specified period of time, then run the second for that amount of time, and finally run the third for that amount of time.

If any of the pumps fail, the Controller will switch to the next one and generate an alarm. You can have multiple Lead/Lag functions on the controller. For example, since the Controller has 8 relay outputs, you could have up to 4 Lead/Lag combinations. Relays 1 and 2 could Lead/Lag the first 2 pumps, relays 3 and 4 could Lead/Lag the second set of pumps, etc. Or, you could have two sets of Lead/Lag/Lag/Lag.

2 Lead / 1 Lag Operation

The second application option is the 2 Lead/1 Lag operation. The 2 Lead/1 Lag operation is used to control three devices to maintain equal run times, where two of them are running at the same time. The run time and failure operation would be the same as described above. Only one “2 Lead/1 Lag” function can be configured on the controller.
Step-By-Step Guide

This guide will lead you through each step in configuring your Lead/Lag Controller. Below is a quick overview of each step.

Section 1: Lead/Lag Controller Wiring & Setup—This section explains how to mount and wire your Lead/Lag Controller 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 Lead/Lag 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 the Orion Controls website: www.orioncontrols.com/literature-new.html.

Section 3: Lead/Lag Controller Personalization & Status—This section explains how to individualize and access Lead/Lag Controllers when more than one is installed and also provides an overview of the Lead/Lag Controller Status Screens.

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 Lead Lag Enable—This section explains the Override Status and Lead/Lag Enable Status.

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

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

Section 11: Saving and Copying Setpoints—This section explains how to save Lead/Lag setpoints to a file on your computer and how to restore Lead/Lag setpoints once you have saved them to a file. It also describes how to Load the Factory Default Settings.

Section 12: Printing Daily Status Reports—This section explains how to view and print Daily Status Reports.

Appendix A—This appendix provides Sample Configurations.

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 Lead/Lag Controller needs to be installed in an environment that can maintain a temperature range between -30°F and 150°F and not exceed 90% RH levels (non-condensing).

Mounting

The Lead/Lag 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 Lead/Lag Controller requires a 24 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-VAC. Failure to observe polarity could result in damage to the boards.

---

Figure 1: Lead/Lag Controller Dimensions
Section 1: Lead/Lag Wiring & Setup

Installation & Wiring

Important Wiring Considerations

Please read carefully and apply the following information when wiring the Lead/Lag Controller:

1. To operate the Lead/Lag Controller, you must connect power to the 24 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 for wiring.

Figure 2: Lead/Lag Controller Wiring Diagram

24 VAC Power For Relay Outputs

8 Relay Outputs Are Available For On/Off Control Of Equipment Configured For The Following:
1. Lead Relay for Lead/Lag Control
2. Lag Relay for Lead/Lag Control

Analog Outputs AOUT1 through AOUT4 Provide (4) 0-10 VDC Outputs Configured For The Following:
1. Not Configured
2. Direct Acting Floating Point
3. Reverse Acting Floating Point
4. Direct Acting PID
5. Reverse Acting PID

Address Dipswitch is Used For Setting the Address and Baud Rate.

Notes:
1) 24 VAC Must Be Connected So That All Ground Wires Remain Common. Failure To Do So Will Result In Damage To The Controller
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.
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 Lead/Lag Controller 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 Lead/Lag Controller 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 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.

NOTE: If using the Internal CommLink, you must set up the USB drivers. See Appendix B, page 48.

Network Operation

The Lead/Lag Controller 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 found on the upper left hand side of the board need to be set to OFF. See Figure 3 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/ON if using a CommLink 5. See Figure 4, page 8 for details.

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.

<table>
<thead>
<tr>
<th>Jumper 1</th>
<th>Jumper 2</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>Use On-Board CommLink</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>Use External CommLink</td>
</tr>
</tbody>
</table>

Both Jumpers ON

![ON BOARD COMMLINK CONNECT](image)

Both Jumpers OFF

![ON BOARD COMMLINK CONNECT](image)
Controller Addressing and Baud Rate

The Lead/Lag Controller is equipped with address switches. When using Prism 2 to program and configure the Lead/Lag 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. See Figure 4 below for 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

<table>
<thead>
<tr>
<th>Baud</th>
<th>Switch 7</th>
<th>Switch 8</th>
<th>Communication Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>9600</td>
<td>OFF</td>
<td>OFF</td>
<td>CommLink IV</td>
</tr>
<tr>
<td>57600</td>
<td>OFF</td>
<td>ON</td>
<td>CommLink 5 &amp; Stand Alone</td>
</tr>
</tbody>
</table>

Address 1 @ 9600 Baud
- ADD→
  - 1
  - 2
  - 4
  - 8
  - 16
  - 32
  - Baud 0
  - Baud 1

Address 5 @ 57600 Baud
- ADD→
  - 1
  - 2
  - 4
  - 8
  - 16
  - 32
  - Baud 0
  - Baud 1

The Address For Each Controller Must Be Unique To The Other Controllers On The Local Loop And Be Between 1 and 59.
### 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. In order to configure and program the Lead/Lag Controller, you must use Prism 2 software. This gives you access to the status, configuration, and setpoint screens of the Lead/Lag Controller. The software is distributed on CD or can be downloaded for free from our website: [www.wattmaster.com/techsupport](http://www.wattmaster.com/techsupport).

If you are unfamiliar with Prism 2, we recommend that you reference 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 or Windows® 8
  
  **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*

* NOTE: The Lead/Lag Controller 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, a WattMaster IP-Module (Ethernet) must also be installed in the CommLink.

### Software License

Prism 2 does not require any license agreement and may be freely copied and distributed.

### Support Information

WattMaster Controls 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:** WattMaster Controls Technical Support cannot troubleshoot internal PC and/or Windows®-based operating system problems.

**NOTE:** WattMaster Controls Technical Support cannot troubleshoot firewalls, routers, and/or problems on a customer's internal or external network. An IT professional may need to be consulted.

---

*Figure 5: Computer with Prism 2 Software Installed and CommLink*
Selecting and Naming Lead/Lag Controllers

Selecting Lead/Lag 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 Lead/Lag Controller address in the Unit Selection Window. In this example, it is address 3. See Figure 6.

![Figure 6: Prism 2 Main Screen Lead/Lag Controller Selection](image)

Naming Lead/Lag Controllers

If you have more than one Lead/Lag Controller, you can rename it in the Selected Name Dialog Box. See Figure 7. Many users name their Lead/Lag Controller according to the application that it performs.

![Figure 7: Naming the Lead/Lag Controller](image)
Lead/Lag Status Screen

Figure 8 depicts the Lead/Lag Status Screen. To access the Lead/Lag Status Screen, you might need to click the <Switch to Lead/Lag> button found on the lower left of the 2 Lead/1 Lag Status Screen (Figure 9, page 12).

The screen is divided into separate windows as follows: Analog Inputs, Binary Inputs, Relays, Analog Outputs, Outdoor Status, Lead/Lag Enables, Schedule Status, and Alarms.

The Lead/Lag Status Screen Toolbar also gives you the options to access Reset Factory Defaults, Save and Restore Setpoints, and Print a Status Report for the current day.

The Lead/Lag 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 you configure the operation of the Lead/Lag application.

Once you configure your inputs, outputs, and operating schedules, everything you need to monitor the Lead/Lag application is found on this Lead/Lag 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, page 13
- Binary Inputs, page 17
- Relays, page 20
- Analog Outputs, page 25
- Outdoor Status, page 31
- Lead/Lag Enables, page 31
- Schedules, page 32
- Configuring Alarms, page 36

From the Top Toolbar:
- Setpoints, Restore Defaults, page 37
- Setpoints, Save and Restore, pages 37 & 38
- Print Status Report, page 39
Section 3: Lead/Lag & 2 Lead/1 Lag Navigation & Status

2 Lead / 1 Lag Status Screen

Figure 9 depicts the 2 Lead/1 Lag Status Screen. To access the 2 Lead/1 Lag Status Screen, you might need to click the <Switch to 2 Lead/1 Lag> button found on the lower left of the Lead/Lag Status Screen (Figure 8, page 11).

The screen is divided into separate windows as follows: Analog Inputs, Binary Inputs, Relays, Analog Outputs, Outdoor Status, Lead/Lag Enables, Schedule Status, and Alarms.

The 2 Lead/1 Lag Status Screen Toolbar also gives you the options to access Reset Factory Defaults, Save and Restore Setpoints, and Print a Status Report for the current day.

The 2 Lead/1 Lag 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 you configure the operation of the 2 Lead/1 Lag application.

Once you configure your inputs, outputs, and operating schedules, everything you need to monitor the 2 Lead/1 Lag application is found on this 2 Lead/1 Lag 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, page 13
- Binary Inputs, page 17
- Relays, page 20
- Analog Outputs, page 25
- Outdoor Status, page 31
- Lead/Lag Enables, page 31
- Schedules, page 32
- Configuring Alarms, page 36

From the Top Toolbar:

- Setpoints, Restore Defaults, page 37
- Setpoints, Save and Restore, pages 37 & 38
- Print Status Report, page 39
Analog Inputs

The Analog Inputs Window is located in the upper left-hand side of the Lead/Lag Status Screens (Figures 8 & 9, pages 11 & 12). There are 8 Analog Inputs. See Figure 10 for the Analog Inputs Window component summary and the pages that follow for details.

Right or Left-click on any of the Analog Input name fields to access the description entry box to add or change the name of the Analog Input.

Left-Click in the data entry field to configure the Analog Input.

Right-Click on these fields to access the Calibration, Override, and Clear Override.

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.

Figure 10: 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 (Figure 11). Once you have typed in a new description, press <ENTER> to save. The maximum number of characters is 17.

Figure 11: 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 12).

The eight analog inputs can be configured in several different ways. Generally, the first four inputs are the only ones used for Lead/Lag control. These inputs can be used to generate an alarm and switch from one device to another if the first cannot maintain a temperature or PSI setpoint. The others can be used to monitor various inputs.

The controlling devices can be set up to look at one sensor or each device can have its own sensor.

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 (see Figure 2, page 6).
- **Thermistor Celsius Temperature**: 10K Ohm Type III Scaled for Celsius. Set jumper to the appropriate setting (see Figure 2, page 6).
- **4 - 20mA User Scaled**: 4-20mA User-Scaled Sensor. Set jumper to the appropriate setting (see Figure 2, page 6).
- **0 - 5vdc User Scaled**: Select this option if using a 0-5vdc scaled sensor. Set jumper associated with this input to the appropriate 0-5v setting (see Figure 2, page 6).
- **Read Global Analog Broadcast Channel from Another Controller**
- **Communicating Temperature Sensor (OE217-02)**: If using a WattMaster 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>.
- **Communicating Humidity Sensor (OE217-03)**: 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 (OE256-05 or OE256-07)**: If using a WattMaster Communicating CO₂ 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>.*

Section 4: Configuring Analog Inputs

Sensor Reading, Scaling, and Override Duration

Sensor Reading Appendix

Select from the drop down list in the <Sensor Reading Appendix> field (Figure 13) to give the sensor reading a qualifier.

- **None**: No Appendix Required
- **RH%**: Humidity Percentage
- **%**: Percentage
- **°F**: Fahrenheit
- **°C**: Celsius
- **PPM**: Parts per Million
- **PSI**: Pound per Square Inch
- **"WG**: Inches of Water Gauge
- **"**: Inches
- **Ft.**: Feet
- **RPM**: Revolutions per Minute
- **VDC**: Volts D.C.
- **BTU**: British Thermal Unit
- **CFM**: Cubic Feet per Minute
- **Hr**: Hours
- **Min**: Minutes
- **GPM**: Gallons per Minute
- **kPa**: Kilopascals

Figure 13: Sensor Reading Appendix Field

Number of Readings to Average

This function has the capability of averaging up to 25 sensor readings before it displays a new value on one of the Lead/Lag Controller Status Screens. 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 15. Valid entries are from 1-25.

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

Figure 15: Number of Readings to Average Field

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. This means you can display values with ± 1, ± 0.1, ± 0.1± 0.01 or higher resolutions. Just keep in mind that the maximum value that can be sent from the controller is ±30,000, so if you have scaled your reading to ± 0.001, then the maximum value you can send is ± 30 with the 3 additional decimal values (30.000). See Figure 16. Type in the values and press <ENTER> to save.

Figure 16: User Scaling Box

Sensor Scaling

All readings are user-scalable according to the number of digits to the right of the decimal point. See Figure 14 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 14: Sensor Scaling Field
Calibrate, Override, and Clear Sensor Override

Once configured, all readings can be overridden to specific values for test purposes. Additionally, all thermistor sensors can also be calibrated by entering positive or negative offsets to be applied to the current readings.

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 17 and select the desired function.

If you select Calibrate Sensor or Override Reading, the data entry window as shown by Figure 18 will open. Left-click in the yellow text field, type in the desired value, and press <ENTER> to save.

### Figure 18: Data Entry Field

- **Calibrate Sensor:** Type a positive or negative offset that will be applied to the current reading and press <ENTER> to save. **NOTE:** The reading Offset can be from -100° to +100°. This function only applies to Thermistor Temperature Sensors.

- **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 Lead/Lag Controller Status Screens (Figures 8 & 9, pages 11 & 12). There are 8 Binary Inputs. Binary Inputs are used as either Enable Inputs or Proof Inputs. These Binary Inputs are 24 V AC wet contacts. See Figure 19 for the Binary Inputs Window component details.

#### Enable Inputs

The first 4 Binary Inputs are Enable Inputs—Inputs #1-#4. Enable Inputs can be used to activate the Lead/Lag devices. Configuring the Lead/Lag devices to use the Enable (Activation) Inputs is done in the Relay Configuration Screens.

#### Proof Inputs

The last 4 Binary Inputs are Proof Inputs—Inputs #5-#8. Proof Inputs are used to prove that the devices are operating correctly. They can be such things as air flow switches, water flow switches, or pressure differential switches. Configuring the Lead/Lag devices to use the Proof Inputs is done in the Relay Configuration Screens.

### 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 20). Once you have typed in a new description (max 17 characters), press <ENTER> to save.
Section 5: Configuring Binary Inputs

Configuring Binary Inputs

*Left-click* on the “ON” or “OFF” button to the right of Binary Input #1 in the *Binary Input Window* (Figure 19, page 17) to open the *Binary Input Configuration Window* (Figure 21). Each Binary Input is separately configured, so 8 binary input combinations are possible for one controller.

**Binary Configuration**

The following configurations are available for each Binary Input:

- **Not Used**
- **N/O Contact (Closes for Active)** - This normally open (N/O) input will become active when 24 V AC is applied.
- **N/C Contact (Opens for Active)** - This normally closed (N/C) input will become active when 24 V AC is removed.
- **Read Global Binary** - This input will read the Global Binary on the selected channel.

Override

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

*Right-click* on the Status box in the *Binary Inputs Window* (Figure 19, page 17) to open the *Override Binary Input Dialog Box* shown in Figure 22, and select the desired function.

- **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.
Lead/Lag Relays

The Relays Window is located in the upper right of the Lead/Lag Controller Status Screens (Figures 8 & 9, pages 11 & 12). There are 8 Relays. See Figure 23 for the Lead/Lag Relays Window component summary and the pages that follow for details. See Figure 24 for the 2 Lead/1 Lag Relays Window component summary and the pages that follow for details.

Figure 23: Lead/Lag Relays Window

<table>
<thead>
<tr>
<th>Relays</th>
<th>Configuration</th>
<th>Runtimes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay #1</td>
<td>OFF</td>
<td>Lead #1</td>
</tr>
<tr>
<td>Relay #2</td>
<td>OFF</td>
<td>Lead #2</td>
</tr>
<tr>
<td>Relay #3</td>
<td>OFF</td>
<td>Lag #2</td>
</tr>
<tr>
<td>Relay #4</td>
<td>OFF</td>
<td>Lead #2</td>
</tr>
<tr>
<td>Relay #5</td>
<td>OFF</td>
<td>Not Used</td>
</tr>
<tr>
<td>Relay #6</td>
<td>OFF</td>
<td>Not Used</td>
</tr>
<tr>
<td>Relay #7</td>
<td>OFF</td>
<td>Not Used</td>
</tr>
<tr>
<td>Relay #8</td>
<td>OFF</td>
<td>Not Used</td>
</tr>
</tbody>
</table>

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.

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

Figure 24: 2 Lead/1 Lag 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 25). Once you have typed in a new description, press <ENTER> to save.

Figure 25: Relay Data Entry Dialog Box
Configuring Lead/Lag Relays

Left-click on the “ON” or “OFF” button to the right of the Relay # in the Relays Window (Figure 23, page 19) to open the Lead/Lag Relay Configuration Screen. (Figure 26).

One relay can be configured as the lead and up to 7 relays can be lag.

There are (8) relays that can be configured.

The Relay Configuration Screen contains (4) windows which are described on the pages that follow:

- Main Control Method
- Timers
- Relay Output Type
- Lead/Lag Proof Setpoint Help

Figure 26: Lead/Lag Relay Configuration Screen
Section 6: Configuring Relays

Configuring 2 Lead/1 Lag Relays

*Left-click* on the “ON” or “OFF” button to the right of the Relay # in the Relays Window (Figure 24, page 19) to open the 2 Lead/1 Lag Relay Configuration Screen. (Figure 27).

Only three relays are used. Two of them are configured as Lead and 1 is Lag.

The 2 Lead/1 Lag Relay Configuration Screen contains (4) windows which are described on the pages that follow:

- Main Control Method & Control Source
- Timers
- Relay Output Type
- Lead/Lag Proof Setpoint Help

Figure 27: 2 Lead/1 Lag Relay Configuration Screen
Control Method

The Control Method Drop Down Menu (Figure 28) is located on the top left of the Relay Configuration Screens (Figure 26 & 27, page 20 & 21). 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.

For Lead/Lag configuration, one relay will be the Lead and up to seven can be the Lag, and they are configured from their own Relay Configuration Screens. For 2 Lead / 1 Lag, two relays are Lead and one is Lag and all three relays are configured from Relay #1 screen. The choices are one of the following methods of control listed below:

- Not Configured
- Lead Relay
- Lag Relay

Lead Relay – 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 30, page 23).

If your Proof is a Binary Input, the Proof Failure is initiated when the selected Binary Input is “Active” (See Binary Input Activation Window, Figure 35, page 24.)

In the Timers Window (Figure 36, page 24) found at bottom left of the Lead/Lag Relay Configuration Screen (Figure 26, page 20), you can configure a Lead/Lag Changeover Interval and a Proof Failure Timeout Delay.

Lag Relay – This Lag Relay will follow the same configurations as the Lead Relay.

Control Source

The Control Source Options in the Control Source Drop Down Menu (Figure 29) are shown below:

- Not Configured
- Analog Input #1
- Analog Input #2
- Analog Input #3
- Analog Input #4
- Analog Input #5
- Analog Input #6
- Analog Input #7
- Analog Input #8
- Proof Input #1
- Proof Input #2
- Proof Input #3
- Proof Input #4
- Outdoor Air
Section 6: Configuring Relays

Increasing and Decreasing Proof Setpoints

**Increasing Proof Setpoint**

Use this option if you want to use a temperature as proof that the device is operating correctly and to determine if the unit has failed if it cannot maintain a temperature that is above this setpoint. For example, if the unit is trying to maintain an 80°F supply air temperature and drops below this setpoint for the “Proof Failure Timeout Delay”, then the Lead/Lag controller will shut off the device that is running, start the backup device, and generate an alarm.

**Decreasing Proof Setpoint**

Use this option if you want to use a temperature as proof that the device is operating correctly and to determine if the unit has failed if it cannot maintain a temperature that is below this setpoint. For example, if the unit is trying to maintain a 55°F supply air temperature and it rises above this setpoint for the “Proof Failure Timeout Delay”, then the Lead/Lag controller will shut off the device that is running, start the backup device, and generate an alarm.

**Relay Output Type**

Some control methods require the relay contacts to be closed when the output is activated; others require the contacts to be open. You can select which method of control to use with this option.

**Activation Schedule**

Control of the Lead/Lag devices must be initiated based on a Schedule and/or a Binary Input Activation. If only an Activation Schedule is selected the Lead/Lag operation will be active whenever the Schedule is Occupied. The schedule can be set with a 7-day schedule with 2 start/stops per day, or it can be configured for continuous 24/7 operation. If both an Activation Schedule and a Binary Input Activation are selected, the Lead/Lag operation will be active when the Binary Input is active and the Schedule is Occupied. If no Activation Schedule is selected, the Lead/Lag operation will activate solely on the basis of a Binary Input Activation.

The controller only uses Schedule #1 for control of 2 Lead/1 Lag functions. For Lead/Lag operation, 4 schedules are available. Schedule #1 would correspond to Lead/Lag #1 operation, Schedule #2 for Lead/Lag #2 operation, etc. See Section 9: Setting Schedules, page 32 for more information.
Section 6: Configuring Relays

Binary Input Activation and Timers

Binary Input Activation (Enable)
Control of the Lead/Lag devices must be initiated based on a Binary Input Activation (Enable) and/or an Activation Schedule. Binary Inputs #1 - #4 are used as Activation Binary Inputs. If no Activation Schedule is configured, the Lead/Lag operation will be initiated solely on the basis of a Binary Input Activation. If both a Binary Input Activation and an Activation Schedule and are selected, the Lead/Lag operation will be active when the Binary Input is active and the Schedule is Occupied.

Timers
The Changeover Interval is the amount of time the first device will run before it switches to a backup device. See Figure 36. It can be set up to a maximum of 1488 hours.

The Proof Failure Timeout Delay establishes the time the controller will wait to prove that the Lead device is running correctly before switching to Lag device and generating an alarm. If it is a pump, it could be proof of water flow or pressure, and if it is an air handling unit, it might be temperature or proof of air flow. See Figure 36.
Analog Outputs

The Analog Outputs Window is located in the lower right-hand side of the Lead/Lag Controller Status Screens (Figures 8 & 9, pages 11 & 12). There are 4 Analog Outputs. See Figure 37 for the Analog Outputs Window component summary. See the pages that follow for details.

![Analog Outputs Table]

- **Enabled or Disabled** indicates whether the output is active or inactive.
- **The Light bulb will light up when the Output is in the Occupied Mode.**
- **The Light bulb will light up when the Output is in the Occupied Mode.**
- **Right or Left-click on any of the Analog Output name fields to access the description entry box and change the name of the Analog Output.**
- **Left-Click in the data entry field to configure the Analog Output.**
- **Right-Click on these fields to access the Override and Cancel Override options.**

**Figure 37: 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 38). Once you have typed in a new description, press <ENTER> to save.

![Analog Output Data Entry Dialog Box]

**Figure 38: Analog Output Data Entry Dialog Box**
Configuring Analog Outputs

Left-click in the data entry field in the Analog Outputs Window (Figure 37, page 25) to open the Analog Output Configuration Window (Figure 39).

**Figure 39: Analog Output Configuration Window**

**Control Type Field**

The following are the control options available (Figure 40):

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

**Figure 40: Control Type Field**
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 41.

![Figure 41: Calculation Settings for Floating Point Control](image)

- **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 42.

![Figure 42: Calculation Settings for PID Control](image)

- **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.

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.

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.
Section 7: Configuring Analog Outputs

Control Source, Control Setpoints, Setpoint Reset Source

Control Source
The Control Source Options are as follows (Figure 43):

- Analog Inputs #1 - 8

Figure 43: Control Source

Control Setpoints & Reset Limits
For most applications, only the Max Setpoint and the Deadband will be used. See Figure 44. 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 44: Control Setpoints & Reset Limits

Setpoint Reset Source
You can configure a Setpoint Reset Source that will allow reset of the Control Setpoints (Figure 45). 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 46). 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 45: Setpoint Reset Source

Disabled Mode Offsets
The Disabled Mode Offsets (Figure 46) 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 46: Disabled Mode Offsets
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 47.

Figure 47: 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 48. Actual Schedules are set in the Schedules Window. See instructions on page 33 for setting Schedules.

Figure 48: 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 49.

Figure 49: Enabling Relay

Enabling Binary Input

An Enabling Binary Input can also be selected (Figure 50). 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 50: 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 51).

Figure 51: Output Voltage Limits
Section 7: Configuring Analog Outputs

Alternate Override and Override

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 52).

![Figure 52: Alternate Override](image-url1)

First select which Override Source to use:

- Analog Inputs # 1 – 8
- Outdoor Air

Next select the logic, setpoint, and deadband that will determine the Override (Figure 53). Right or left-click in the Logic Field to select <, >, or =.

![Figure 53: Logic, Setpoint, and Deadband](image-url2)

Finally, select the voltage you want to hold this output to based on the above logic (Figure 54).

![Figure 54: Voltage](image-url3)

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 37, page 25) to open the Override Voltage Box shown in Figure 55 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 55: Calibrate and Override Sensor](image-url4)
Section 8: Outdoor Status & Lead/Lag Enable

Outdoor Status

The Outdoor Status Window is located in the center of the Lead/Lag Controller Status Screens (Figure 8-9, pages 11-12) and displays the Outdoor Air (OA) Temperature. See Figure 56. In order for the Outdoor Air Temperature to display, you must have another controller set up to broadcast the Outdoor Air Temperature.

Lead/Lag Enables Windows

Lead/Lag Enables for Lead/Lag

The Lead/Lag Enables Window is located in the center of the Lead/Lag Controller Status Screen (Figure 8, page 11). See Figure 57.

Each Group corresponds to a schedule. So Group #1 corresponds to Schedule #1, Group #2 corresponds to Schedule #2, and so on.

The lightbulb lights up when the Schedule is activated in the Relay Configuration Window (Figure 34, page 23).

Lead/Lag Enables for 2 Lead/1 Lag

The Lead Lag Enables Window is located in the center of the 2 Lead/1 Lag Controller Status Screen (Figure 9, page 12). See Figure 58.

Group #1 corresponds to Schedule #1. The lightbulb lights up when Schedule #1 is activated in the Relay Configuration Window (Figure 34, page 23).

Figure 56: Outdoor Status Window

Figure 57: Lead/Lag Enables Window

Figure 58: 2 Lead/1 Lag Enables Window
Section 9: Setting Schedules

Schedules Window Components and Navigation

Schedule Status Window

The Schedule Status Window is located in the bottom left of the Lead/Lag Controller Status Screens (Figures 8 & 9, pages 11 & 12) and allows (4) Schedules with (4) associated Holiday Schedules and Overrides (Force Mode). See Figure 59 for the Schedule Status Window components and summary and the pages that follow for details.

Click on the Holiday button to program the Holidays for each schedule.

Click on the Schedules button (ON/OFF button) to program each schedule.

Click on this button to Override the Schedule.

Figure 59: Schedule Status Window
Setting Schedules

Left click the <Schedules> button (ON/OFF button) in the Schedules Status Window (Figure 59, page 32) to open the Schedule Configuration Window (Figure 60). You can configure up to (4) separate schedules for various uses on the Lead/Lag Controller, but can only configure (1) schedule on the 2 Lead/1 Lag Controller. These Schedules are (7) day, (2) event per day Schedules.

The Schedule Configuration Window in the example shows a 7:30 AM to 5:30 PM operating schedule for Monday through Friday. You can also use 24 hour military format if you wish. 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 35.

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 11:59 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 34 for an explanation of each of these functions.

WARNING: <Erase Schedules> will clear ALL entered stop/start times, so use with caution.
Section 9: Setting Schedules

Saving, Restoring, Copying Schedules

Saving Schedules
To save the weekly time schedule, click <Save>. The File Save Window will appear (Figure 61). Give the file a name in the “Selected File” field and click <Save> or press <ENTER> to save.

Figure 61: 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. Once you have located the 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 62).

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 62: 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 63). In order to return to the normal schedule, you will need to restore the schedule.

Figure 63: 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

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 59, page 32). The Holiday Schedule Window will appear. See Figure 64.

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 Mode> button next to the Schedule you wish to override from the Schedules Status Window (Figure 59, page 32). See Figure 65.

- **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.
Configuring Alarms

Alarm Notification

The controller can generate alarms for remote alarm notification if alarms have been enabled and if 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 Lead/Lag Controller Status Screen will light up. See Figure 66. If no alarm(s) exists, the button will be gray and display the words, No Alarms. See Figure 67.

Figure 66: ALARM Button

Individual alarms will also be indicated with a bright red alarm bell icon in the Relays Status Window. See Figure 68.

Figure 67: No Alarms Button

Figure 68: Relay Status Alarm Icon

Configuring and Enabling Alarms

Alarms are enabled in the Lead/Lag Alarms Window. To configure alarms, click on the <ALARM> or <No Alarms> button in the upper right hand corner of the Lead/Lag Controller Status Screens (Figures 8 & 9, pages 11 & 12). The Lead/Lag Alarms Window will open. See Figure 69.

Due to the quantity of Inputs and Outputs on the Lead/Lag controller, alarms have been grouped into 4 Groups. Each group corresponds to a Schedule. So Group #1 is linked to Schedule #1, Group #2 to Schedule #2, and so on.

Figure 69: Lead/Lag 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 2 Screen will turn bright red (Figure 6, page 10 & Figures 8 & 9, pages 11-12). This selection will also allow that Alarm to send out an e-mail notification if your system is set up for that function. See the Prism 2 Technical Guide for instructions on setting up e-mail alarm notifications.

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 only one Group generates 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 more than one Group generates 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.
Section 11: Saving and Restoring Setpoints

Reset Factory Defaults

WARNING: <Reset Defaults> resets ALL settings and configurations back to the original defaults. Use this option with extreme caution!

From the top toolbar of the Lead/Lag Controller Status Screens (Figure 8 & 9, pages 11 & 12), click on <Setpoints>, and then click on <Reset Defaults>. See Figure 70.

Saving Lead/Lag 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 Lead/Lag Controller Status Screen, click <Setpoints> and then click <Save To File>. See Figure 72.

Figure 70: Setpoints Menu

The following warning will appear (Figure 71). Click <No> if you do not want to reset the defaults. Click <Yes> if you want to reset to the defaults.

Figure 71: Reset Defaults Warning

Figure 72: Setpoints Menu - Save To File

In the File Save Window (Figure 73), give the setpoint file a name and then click <Save>.

Figure 73: File Save Window
Restore From File

Restoring / Copying Lead/Lag Setpoints

Once you save the Lead/Lag setpoints to a file on your computer, you can restore or copy the setpoints to another controller.

From the top toolbar of the Lead/Lag Controller Status Screen, click <Setpoints> and then click <Restore From File>. See Figure 74.

In the File Open Window (Figure 75), click on the desired file from the list of folders and click <Open>.

Figure 74: Setpoints Menu - Restore From File

Figure 75: File Open Window
Printing Daily 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 Lead/Lag Controller Status Screen Toolbar, click <Print>. See Figure 76.

The Status Report for the current day will appear in a Print Preview. See Figure 78 on page 40 for a Sample Status Report.

To print, first select a printer from the Default Printer Selection Dialog Box (Figure 77) located at the bottom right of the Status Report Print Preview 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.
Status Report Example

To print a status report for the current day, from the Lead/Lag Controller Status Screen Toolbar, click <Print>. The Status Report for the current day will appear in a Print Preview. See the Sample Report shown in Figure 78. Select the printer from the list of installed printers at the bottom of the Status Report Print Preview Window and click <Print>.

![Status Report Print Preview Window](image-url)

**Figure 78: Status Report Print Preview Window**
Lead/Lag Example - Controlling 3 Sets of Pumps

The user would like to control 3 sets of pumps. Each pair of pumps will run for different run times and a proof of water flow switch is in each set of pumps’ common line. Each pair of pumps will have their own schedule and Enable Input. See Figure 79.

Figure 79: Lead/Lag Status for Sample #1 after Configuration
Appendix A - Sample Configurations

Lead/Lag Example - Controlling 3 Sets of Pumps

Relay Configuration

Relay #1 is configured as Boiler Pump #1 and is set to Lead. Relay #2 is configured as Lag. Relay #3 is configured as Chiller Pump #1 Lead. Relay #4 is set to Lag. Relay #5 is configured for Domestic Pump #1. And Relay #6 is set to Lag. See Figure 80 for Relay 1’s configuration and Figure 81 for Relay 2’s configuration.

![Figure 80: Relay 1 Configuration](image-url)
Lead/Lag Example - Controlling 3 Sets of Pumps

Figure 81: Relay 2 Configuration
Appendix A - Sample Configurations

Lead/Lag Example - Controlling 3 Sets of Pumps

Binary Input Configuration

Binary Enable Input #1 is a switch that can start and stop the boiler pumps.
Binary Enable Input #2 is a switch that can start and stop the chiller pumps.
Binary Enable Input #3 is a switch that can start and stop the domestic pumps.

Binary Input Configuration

Binary Enable Input #1 is a switch that can start and stop the boiler pumps.
Binary Enable Input #2 is a switch that can start and stop the chiller pumps.
Binary Enable Input #3 is a switch that can start and stop the domestic pumps.

Binary Proof Input #1 is a water flow switch for the boiler pumps.
Binary Proof Input #2 is a water flow switch for the chiller pumps.
Binary Proof Input #3 is a water flow switch for the domestic water pumps.

See Figure 82 for the configuration for Binary Enable Input #1 and Figure 83 for the configuration for Binary Input Proof #1.

Figure 82: Binary Enable Input 1 Configuration

Figure 83: Binary Proof Input 1 Configuration
2 Lead / 1 Lag Example - Controlling Roof Top Units

The user would like to use the Lead/Lag Controller to control 3 Roof Top Units that are feeding a large surgery suite. They need 2 of the units to run all of the time. RTU-1 and RTU-2 will run first, and at the end of the Changeover Interval, RTU-2 will shut off, and RTU-3 will be energized. After the next Changeover Interval, RTU-1 will shut off and RTU-2 will be brought back on. We select 2 Lead/1 Lag as the control method. Each RTU has its own supply air temperature sensor and is trying to maintain 55°. If the supply air gets above 60° on one of the RTUs, it will be shut down, the third unit will be brought on, and an alarm will be sent. See Figure 84.
Appendix A - Sample Configurations

2 Lead/1 Lag Example - Controlling 3 Roof Top Units

Relay Configuration

Relays 1 & 2 are configured as Lead relays and Relay 3 is configured as a Lag relay. The control source is the supply air temperature for each unit. The Decreasing Proof Setpoint is set to 60°F, meaning that if the supply air temperature of any of the units running drops below the setpoint for 10 minutes, that unit will be shut off and the unit not running will be started. See Figure 85 for Relay 1’s configuration.

This relay (Figure 85) was chosen to be the Lead control output and was connected to AHU #1. Either RTU could have been selected as RTU #1. This was an arbitrary decision.

The Supply Air was selected as the Control Source and the Proof Setpoint was set to 60.0°F. The RTU’s will change the Lead every 168 Hours, and if the Supply Air rises above 60°F for more than 10 minutes, it will be considered to be in failure mode and the Lag RTU will be activated. Also, an alarm will be generated so that an immediate service call can be made to determine the cause of failure. If both units should happen to fail, there is no further redundant capabilities, and service personnel will need to correct the problems and then Reset the control from the Alarm Indicator Screen.
Analog Inputs 1-3 Configuration

These inputs are all configured for thermistor sensor with °F as the appendix. See Figure 86.

Enable Binary Input 1 Configuration

This input is connected to an on/off switch to disable the units. See Figures 87 & 88.

---

Figure 86: Analog Input 1 Configuration

Figure 87: Binary Input 1 On/Off Switch

Figure 88: Binary Input 1 Configuration
USB Driver Installation

USB Serial Converter and Serial Port Driver Installation

The internal USB communication port of the Lead/Lag 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.

1. Before you begin, you must determine if your computer is running 32-bit or 64-bit Windows. Open the System information by clicking the <Start> button, clicking <Control Panel>, and 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 10.

2. Insert the USB Drivers CD-ROM into your CD-ROM drive or download the USB Drivers file from www.orioncontrols.com/software-new.html. If using the CD-ROM, go to Step 7. If downloading the file, you will need to scroll down the page and right-click the picture of the CommLink in the box labeled “USB Drivers For All Products” to download the driver files.

3. Click <Save Link As> or <Save Target As> and select Desktop as the destination.

4. Go to the “USB-DRIVERS-ALL.exe” file on your desktop. Double-click on this file and choose “Run” from the options list. The following window will appear:

5. Select <Unzip> and the file will be unzipped to the folder C:\Temp\WM-USB-Drivers folder by default.

6. Next, go to the C:\Temp\WM-USB-Drivers folder and now go to Step 9.

7. Click your <Start> button and then click, <Computer>.

8. Double-click your CD-ROM drive. Open the Media Files Folder.

9. Double-click the folder “USBLink NewSS0073”.

10. 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.

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

12. When successful installation has occurred, connect the USB cable between the PC and the Lead/Lag 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 49 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.
Index

A-C

0 - 5vdc User Scaled..............14
2 Lead / 1 Lag Operation.........3
2 Lead/1 Lag Relays..............19
   Configuring..............21
2 Lead/1 Lag Relays Window.......19
2 Lead / 1 Lag Status Screen....12
4 - 20mA User Scaled.............14
24 Hour Operation..............33,34
°C..............15
°F..............15

A

 Activation, Binary Input.........24
 Activation Schedule..............23
 Address, Communicating Sensor...14
 ADDRESS Dipswitches.............7
 Addressing....................8
 Address Switch Setting...........7
 ALARM Button...................36
 Alarm Indicator................36
 Alarm Notification..............36
 Alarms
   Configuring..............36
   Enabling Alarms..............36
   Notification..............36
 Alarms Window..............36
 Alternate Override..............30
 Voltage..............30
 Analog Inputs...............13
   Alarm Notification..........36
   Calibrate Sensor............16
   Clear Sensor Override.......16
   Configuration Window.......14
   Configuring..............14
   Data Entry Dialog Box.......13
   Number of Readings to Average......15
   Override Reading............16
   Renaming...................13
   Sensor Reading Appendix.....15
   Sensor Scaling.............15
   User Scaling..............15
 Analog Inputs Window...........13
   Navigation................13
 Analog Output
   Cancel Override............30
   Override..............30
 Analog Output Configuration Window...26
 Analog Outputs...............25,26
   Alternate Override........30
   Configuring..............25,26
   Controlling Schedule.......29
   Control Setpoints..........28
   Control Source...........28

Control Type Field.............26
Derivative Constant..............27
Enabling Binary Input...........29
Enabling Relay..............29
Floating Point Control...........27
Integral Constant..............27
Logic, Setpoint, and Deadband...30
Naming...................25
Outdoor Air Enable Setpoints.....29
Output Voltage Limits...........29
Override..............30
PID Control...........27
PID Derivative Filter...........27
Renaming...................25
Reset Limits..............28
Analog Outputs Window...........25
  Components............25
  Navigation..............25
Averaging Readings.............15

B

 Baud Rate...........8
 Binary Configuration...........18
 Binary Input Activation........24
 Binary Input Configuration Window....18,23,24
 Binary Input Override...........18
 Binary Inputs...........17
   Configuring...........18
   Naming................17
   Navigation............17
   Override Binary........18
   Renaming.............17
 Binary Input Window.............17
 Binary Override.............18
 Broadcast Channel.............14
 BTU..............15

C

 Calculation Interval...........27
 Calibrate and Override Sensor...30
 Calibrate Sensor...............16
 Cancel Override..............30
   Analog Output............30
 Carbon Dioxide Sensor, Communicating....14
 Celsius................14
 CFM...................15
 Changeover Interval...........24
 Channel..............14
 Clear Sensor Override........16
 CommLink.............3,7
   Baud Rate...........8
Index

C-K

CommLink 5
  Baud Rate..............8
CommLink IV..............7
CommLink Jumpers..............7
Communicating Carbon Dioxide Sensor..............14
Communicating Humidity Sensor..............14
Communicating Sensor Address..............14
Communicating Temperature Sensor..............14
Communication Settings..............7
COM Port Number..............49
Configuring 2 Lead/1 Lag Relays..............21
Configuring Alarms..............36
Configuring Analog Inputs..............14
Configuring Analog Outputs..............26
Configuring Binary Inputs..............18
Configuring Lead/Lag Relays..............20
Configuring Relays..............20,21
Controlling Schedule..............29
Control Method..............22
Control Setpoints..............28
Control Setpoints Window..............28
Control Source..............21,22,28
Control Source Field..............22,23
Control Source Window..............28
Control Type
  Floating Point Control..............27
  PID Control..............27
Control Type Field..............26
Copying Schedules..............34
Copying Setpoints..............38
Copy Setpoints Window..............34

Decreasing Proof Setpoint..............23
Default Printer Selection..............39
Defaults, Resetting..............37
Derivative Constant..............27
Diagrams, Lead/Lag Wiring..............6
Direct Acting Floating Point..............26
Direct Acting PID..............26
Direct Acting PID Control..............27
Disabled Mode Offsets..............28
Disable Mode Offsets..............28

E
  E-BUS Digital Room Sensor Technical Guide..............14
  E-BUS Duct-Mounted CO₂ Sensor Technical Guide..............14
  E-BUS Wall-Mounted CO₂ Sensor Technical Guide..............14
Enable Inputs..............17
Enabling Alarms..............36
Enabling Binary Input..............29
Enabling Relay..............29
Environmental Requirements..............5
Erase Schedules..............33,34
Examples..............41

F
  Factory Defaults..............37
  Fahrenheit..............14
  File Open Window..............38
  File Save Window..............34,37
  Floating Point Control..............27
  Ft..............15

G
  GPM..............15

H
  Hardware Requirements..............9
  Holidays..............35
  Holiday Schedule Window..............35
  HR..............15
  Humidity Sensor, Communicating..............14

I
  Increasing Proof Setpoint..............23
  Initialization..............9
  Installation & Wiring..............6
  Integral Constant..............27

K
  Kd..............27
  Ki..............27
  Kp..............27
  kPa..............15

L

Lead/Lag Controller Technical Guide
Index

L-R

Lag Relay..............22
Lag Relay for Lead/Lag Control ..............22
Lead/Lag Alarms Window ..............36
Lead/Lag Controller
  Accessing ..............10
  Address ..............8
  Address Switch Settings ..............7
  Dimensions ..............5
  Mounting ..............5
  Naming ..............10
  Navigation ..............11,12
  Power Supply ..............5
  Renaming ..............10
  Wiring Diagram ..............6
Lead/Lag Controller Status Screen ..............11,12
Lead/Lag Controller Status Screen Toolbar ..............11,12
Lead/Lag Enables ..............31
Lead/Lag Example ..............41
Lead Lag Operation ..............3
Lead/Lag Proof Setpoint Help ..............20,21
Lead/Lag Relay Configuration Screen ..............20
Lead/Lag Relays ..............19
  Configuring ..............20
Lead/Lag Relays Window ..............19
Lead/Lag Status Screen ..............11
Lead Relay ..............22
LEDs ..............9
License ..............9
Logic ..............30
Logic, Setpoint, and Deadband ..............30

M

Main Control Method ..............20,21
Main Control Method Window ..............22
MIN ..............15
Mounting ..............5

N

N/C Contact (Open for Active) ..............18
Network Operation ..............7
No Alarms Button ..............36
N/O Contact (Close for Active) ..............18
Number of Readings to Average ..............15

O

OE217-02 ..............14
OE217-03 ..............14
OE256-05 ..............14
OE256-07 ..............14
Operating System ..............9
Outdoor Air ..............30
Outdoor Air Enable ..............29
Outdoor Air Enable Setpoints ..............29
Outdoor Air Enable Window ..............29
Outdoor Status ..............31
Output Voltage Limits ..............29
Override ..............18
  Analog Output ..............30
  Analog Outputs ..............30
  Binary Input ..............18
  Schedule ..............35
Override Binary ..............18
Override Reading, Analog Inputs ..............16
Override Relay ..............23
Override Sensor ..............30

P

PID Control ..............27
PID Derivative Filter ..............27
PPM ..............15
Printer Selection ..............39
Printer Selection Dialog Box ..............39
Printing Status Reports ..............39
Prism 2 Main Screen ..............10
Prism 2 Software ..............9
Prism 2 System Requirements ..............9
Prism 2 Technical Guide ..............9
Proof Failure Timeout Delay ..............23,24
Proof Input ..............22
Proof Inputs ..............17
Proof Setpoint ..............23
Proportional Control Window ..............27
PSI ..............15

R

Read Global Analog Channel ..............14
Read Global Binary ..............18
Readings to Average ..............15
Relay Configuration Screen ..............20,21
Relay Output Type ..............20,21,23
Relay Override ..............23
Relays ..............19
  Configuring ..............20,21
  Control Source Field ..............22,23
  Naming ..............19
  Renaming ..............19
Relays Window ..............19
Renaming Analog Outputs ..............25
Renaming Relays ..............19
Reset Factory Defaults ..............37
Reset Lead/Lag Button ..............36
Reset Limits ..............28
Restoring Schedules ..............34
Restoring Setpoints..............38
Reverse Acting Floating Point..............26
Reverse Acting PID..............26
Reverse Acting PID Control..............27
RH%..............15
RPM..............15

S

Saving Lead/Lag Setpoints..............37
Saving Schedules..............34
Schedule, Activation..............23
Schedule Configuration Window..............33
Schedule Override..............35
Schedules..............33
  24 Hour Operation..............34
  Copying..............34
  Erase..............34
  Saving..............34
Schedule Setting..............32
Schedule Status Window..............32
Screens
  Alarms Window..............36
  Analog Input Configuration Window..............14
  Analog Inputs Window..............13
  Analog Output Configuration Window..............26
  Analog Outputs Window..............25
  Binary Input Configuration Window..............18,23,24
  Binary Input Window..............17
  Control Setpoints Window..............28
  Control Source Window..............28
  Lead/Lag Controller Status Screen..............11,12
  Holiday Schedule Window..............35
  Main Control Method Window..............22
  Prism 2 Main Screen..............10
  Relay Configuration Screen..............20,21
  Relays Window..............19
  Schedule Configuration Window..............33
  Schedule Status Window..............32
  Setpoint Reset Source Window..............28
Sensor, Calibrate..............30
Sensor Override..............30
Sensor Reading Appendix..............15
Sensor Scaling..............15
Set 24 Hour Operation..............33,34
Setpoint Reset Source..............28
Setpoint Reset Source Window..............28
Setpoints
  Copying..............38
  Restoring..............38
  Saving..............37
Setpoints Menu - Miscellaneous Settings..............37
Setpoints Menu - Restore From File..............38,39
Setpoints Menu - Save To File..............37
Setting Holidays..............35
Setting Schedules..............32,33
Software License..............9
Stand-Alone Baud Rate..............8
Stand Alone Operation..............7
STATUS1..............9
STATUS2..............9
Status Report Example..............40
Status Report Preview
  Window..............40,41,42,43,44,45,46,47
Status Reports
  Printing..............39
Status Screen..............11,12
Step by Step Guide..............4
Support Information..............9
System Requirements
  Prism 2..............9

T

Temperature Sensor
  Communicating..............14
Thermistor Celsius Temperature..............14
Thermistor Fahrenheit Temperature..............14
Timers..............20,21,24
Timers Window..............24
Toolbar..............11,12

U

Unit Selection Window..............10
USB Driver Installation..............48
USB Serial Converter..............48
User Scaling..............15
User Scaling Box..............15

V

VDC..............15
Voltage..............30
  Alternate Override..............30
Voltage Limits..............29

W

WattMaster Technical Support..............9
  “WG”..............15
Wiring Considerations..............6