

Installation Manual
Central Processing Unit 0500
Version 2.50

The HBX logo consists of the letters 'HBX' in a bold, black, sans-serif font. The letters are centered between two horizontal red bars, one above and one below. The background of the entire page features a complex pattern of thin, light-colored lines that create a sense of depth and movement, with some lines curving and others straight.

Mixing • Boiler Staging • Differential Setpoint • Geothermal • Pump Sequencer

CPU-0500

HBX Control Systems Inc.



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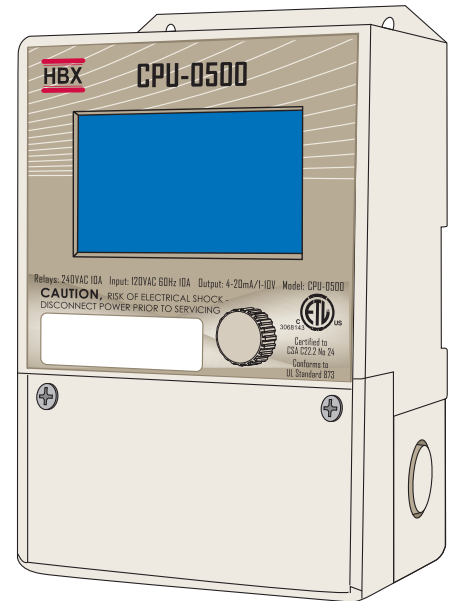
HBX CPU-0500 HVAC CONTROLLER

INTRODUCTION

This manual will help with the installation, parameter setting, troubleshooting and general maintenance requirements for the controller. To guarantee the safe and reliable operation of this control, you must first read this manual in detail and take particular note to any and all warnings or caution directives prior to connecting to AC power.

Only suitably qualified individuals with formal training in electrical and HVAC controls should attempt the installation of this equipment. Incorrect wiring and installation will affect the warranty provided with this unit. Wiring must be completed in accordance with the codes and practices applicable to the jurisdiction for the actual installation.

Please consult and install the heating appliance in accordance with manufacture's recommendations.



SAFETY SYMBOLS & WARNINGS



Extreme Hazard

This action poses a serious threat that could result in personal injury or death, as well as permanent damage to the equipment. Proceed with caution.



Moderate Hazard

This action may cause personal injury or have adverse effects on the installation process if handled incorrectly.



Disconnect Power Source

The presence of low voltage(24VAC) or high voltage(120VAC) could result in personal injury or permanent damage to components or equipment.



Point of Interest

This point clarifies pertinent information, or brings your attention to an action that may have adverse effects on the installation process.



Drawing Reference

Refer to the specified electrical or mechanical drawing at the back of the manual.



Only suitably qualified individuals with formal training in electrical and HVAC controls should attempt the installation of this equipment. Incorrect wiring and installation will affect the warranty provided with this unit. Wiring must be completed in accordance with the codes and practices applicable to the jurisdiction for the actual installation.



The HBX CPU-0500 is a microprocessor based controller and as such is not to be regarded as a safety (limit) control. Please consult and install the heating or cooling appliance in accordance with the manufacturer's recommendations.

RECEIPT & INSPECTION

After receiving, inspect the unit for any possible physical damage that may have occurred during transportation.

After unpacking the unit make sure the box contains:

- 1 x Remote Outdoor sensor
- 2 x Universal sensors
- 1 x Terminal Screwdriver (2.5mm)
- 2 x Cable ties

HBX CPU-0500 HVAC CONTROLLER

DESCRIPTION

The CPU-0500 is designed to be a stand-alone Outdoor Reset Control device. The purpose and function of the CPU-0500 is to provide control for multiple applications. The applications are selectable through single dial operation on the programming interface and consist of Boiler, Mixing, Differential Setpoint, Geothermal Control or Pump Sequencer.

Mixing Control

As a Mixing Control, the CPU-0500 has the capability to run a single On/Off or modulating boiler. Mixing types include Modulating Mixing, PMIp or Floating Action.

Boiler Control

The use of the CPU-0500 as a Boiler Control allows the capability to run up to two On/Off boilers, or a single modulating boiler with DHW requirements.

Differential Setpoint Control

The CPU-0500, when selected as a Setpoint Control, will allow for Dual or Differential Setpoint requirements.

Geothermal Control

Manages applications using heat pumps, chillers or compressors. The control handles the reversing valve, up to 2 heat pumps, hot tank and cold tank, or a single hot/cold tank. This mode also allows for a built-in backup feature.

Pump Sequencer

This control allows the system to sequence and cycle pumps, override pumps and turn the pump off when the outdoor temperature goes above a certain value (WWSD).

TECHNICAL DATA & DIMENSIONS

TECHNICAL DATA

Specifications:

- Built in 2 Amp fast acting fuse
- 3 x Thermistor Input (10K Ohm)
- 2 x Miscellaneous Input Signal
- 2 x Relay Outputs
- Dry Contacts (240VAC 10Amps)
- 1 x Modulating Output / 2Amp Dry Contact (4-20mA or 1-10VDC)

Weight:

0.408Kg

Dimensions:

100mm W x 168mm H x 70mm

ETL Listings:

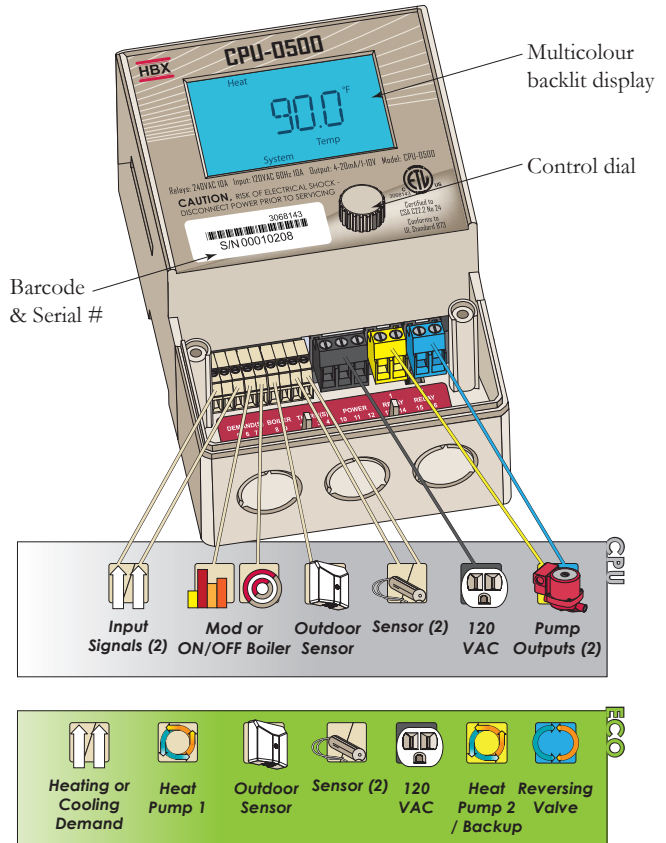
Meets CSA C22.2 No. 24

Meets UL Standard 873

ETL Control No. 3068143

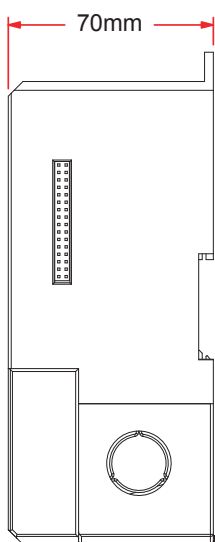
Storage:

50°F to 104°F (10°C to 40°C)

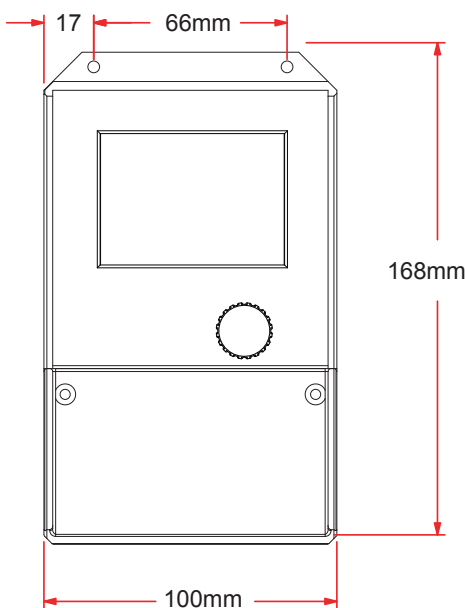


DIMENSIONS

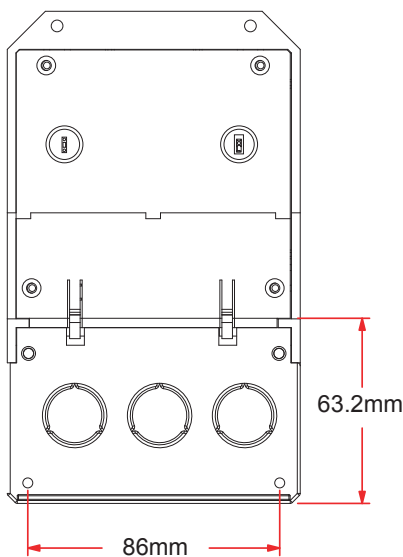
Side View



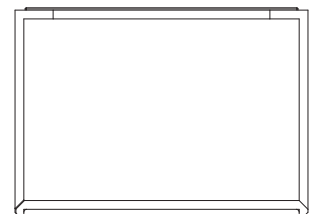
Front View



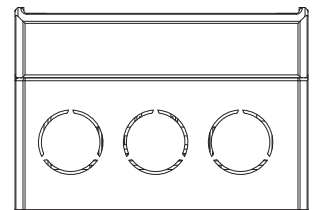
Rear View



Top View



Bottom View



WIRING AND INSTALLATION

Wiring

All signal wiring must be with a minimum of 18AWG wire at a maximum of 500ft.

Jumper

This jumper is used to add or remove arc suppression from the relay 2 contacts.



If you are using the CPU-0500 in Mixing Mode and doing PMLp injection the jumper should be left in place. Remove the jumper for all other modes.

Dipswitch

The CPU-0500 is able to output either a 4-20mA signal or a 1-10VDC signal from the 4 & 5 contacts when in Modulating Mode.

For 4-20mA the dipswitch is set to OFF (up position).

For 1-10VDC the dipswitch is set to ON (down position).

1, 2: Demand Signal 1

Apply heat demand from a dry contact.

2, 3: Demand Signal 2

Used for DHW or Setpoint demand. Dry contacts only.

4, 5: Modulating / Boiler Contacts / Heat Pump 1

Modulating, Boiler 1, and Heat Pump 1 Output. Also used in differential setpoint output for modulating devices.

Sensor Inputs

6, 9: Primarily used for boiler temperature but also used for setpoint 1 temperature in Setpoint controls or hot tank temps.

7, 9: Used for DHW or setpoint on Boiler controls and low temperature system temperature on Mixing control. Also used for setpoint 2 temperature or cold tank temps.

8, 9: Outdoor temperature. Only on Boiler, Mixing and ECO controls.

15, 16: Relay 2

Generally used as a pump contact unless in Setpoint mode or reversing valves (ECO Mode).

13, 14: Relay 1

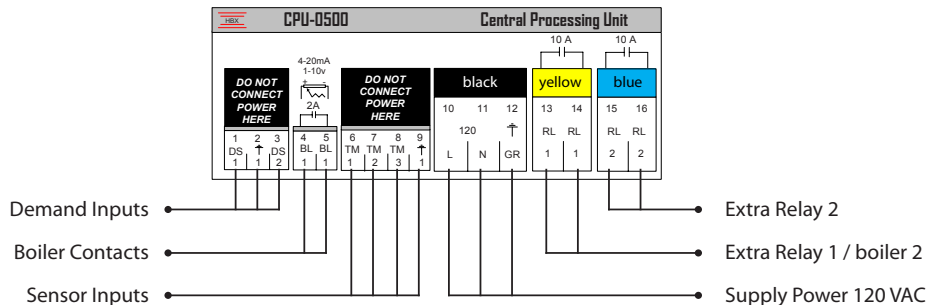
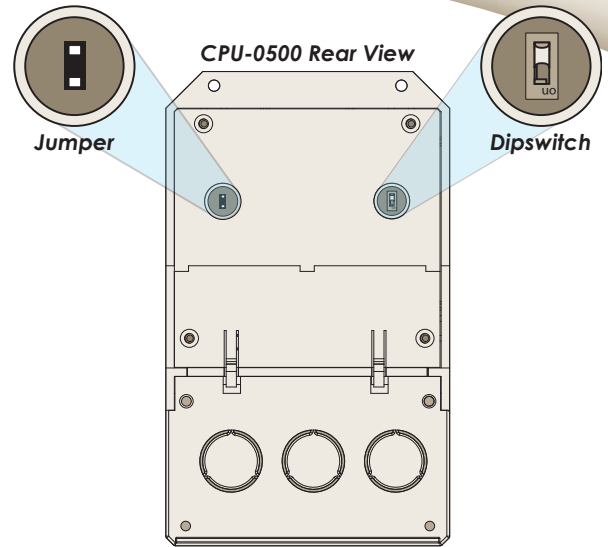
This relay is generally a pump contact or can be used as a second stage boiler or second heat pump.



(Relays 1 & 2 are dry contacts and rated for a maximum of 10 Amps.)



Please ensure no power is applied to pin 4,5 when in any modulating mode.



Installation

The CPU-0500 is designed to be wall mounted, DIN rail mounted or installed in a separate electrical enclosure. The unit should be mounted inside and protected from falling water and high humidity conditions. With all the covers in place it is designed to protect any individual from accidental electrical shock.

PROGRAMMING

MULTICOLOUR BACKLIT DISPLAY

The Multicolour Backlit Display is one of the key features of the HBX Controls stand-alone CPU-0500 Control. Depending on which mode of operation is selected the screen colour will change to indicate information about the status of the system.

Screen Colours

Mixing and Staging:

Light Blue - NO Heat Demand

Red - Demand (DHW or Heat Demand) and Boiler running

Green/Yellow - Heat Demand ON, boiler running but in boiler protection

Dark Blue - Heat Demand ON and boiler satisfied

Geothermal:

Green/Yellow - Demand on, no heat pumps running.

Red - Demand and heat pumps running (Heating mode).

Dark Blue - Demand and heat pumps running (Cooling mode)

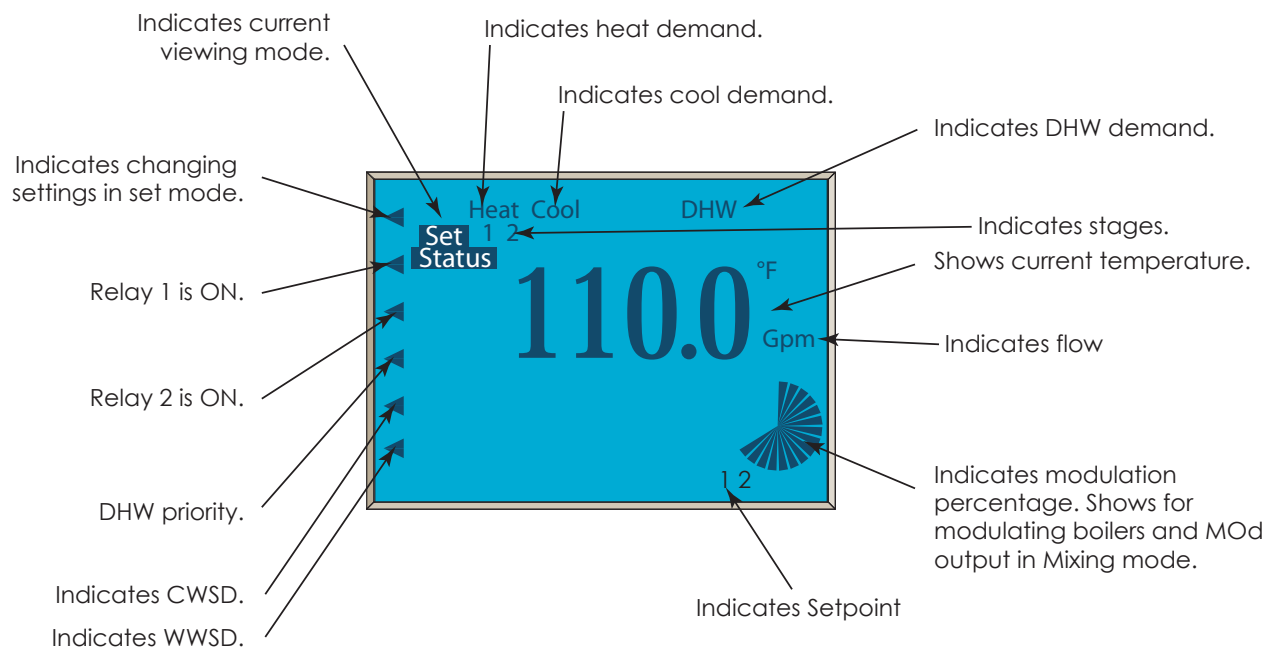
Light Blue - No demands

Pump Sequencer:

Light Blue - No Demand

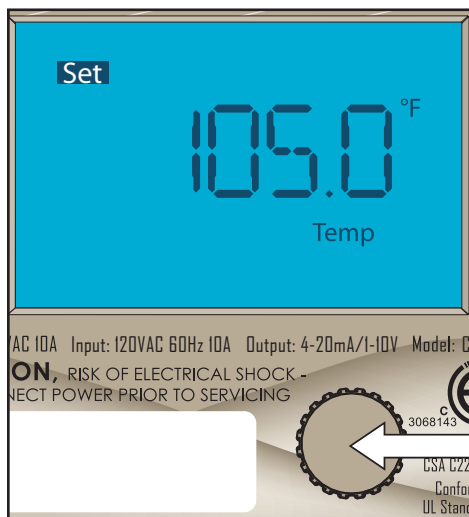
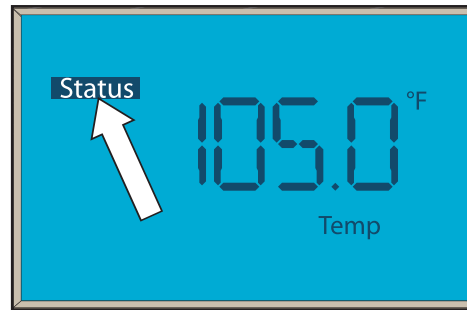
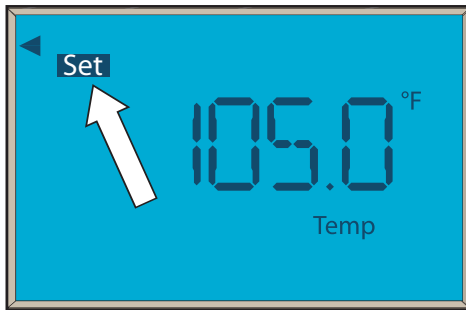
Dark Blue - Pump Running

Red - No Flow Alarm



DIAL OPERATION & SET/STATUS MODE

There are 2 modes for the control, **programming** and **status screens**. The **programming** screen is identified by the **SET icon** on the top/middle left corner. The status screen is indicated by the **STATUS icon** the top/middle left corner.



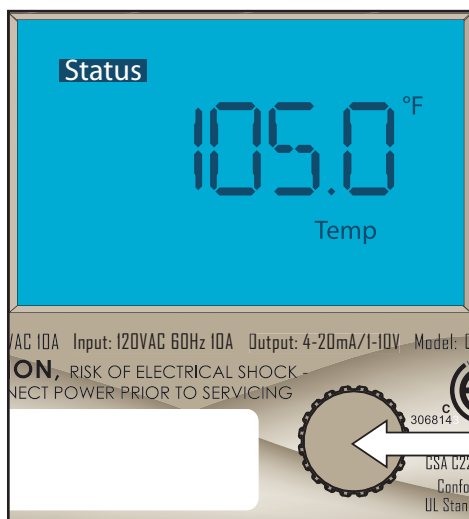
By pressing the dial in for more than one second will allow the user to access the **programming** section of the control.

PROGRAMMING SCROLL MODE

To enter this mode the dial must be pressed in for more than one second. When the **SET** indicator comes on release the button, you will now be in Programming Scroll Mode.

In this mode turning the dial to the left or right will scroll through the programming options on the control. Each setting will be indicated by the icons around the screen as well as the temperature/number of that setting.

If you allow the control to idle in Programming Scroll Mode for thirty seconds the control will automatically return to **STATUS** mode.

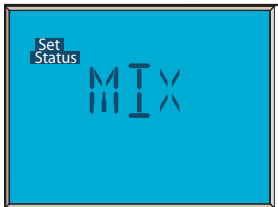


PROGRAMMING CHANGE MODE

To change a setting you must press the dial in momentarily and an arrow will appear in the top left corner of the screen. This will indicate the control is in the Programming Change Mode. While in the change mode the user will be able to change the setting of that selection by turning the dial to the left or right. Once you have finished changing the setting, press the dial momentarily and the arrow in the top left corner will disappear. This will indicate that the user is no longer in Programming Change Mode.

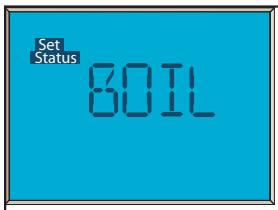
CONTROL MODE

The programming instructions for the CPU-0500 are broken down into the five control modes listed below. When the control is first plugged in you are asked to select which control mode you would like your CPU-0500 to operate in. To select your control mode simply turn the dial to the left or right to select the correct mode then wait five seconds to accept your selection.



Mixing Mode (Default = Mixing Mode)

Programming for this mode can be found on pages 9 through 11. This mode is used when running mixing pumps or valves. Mixing configurations include PMIp, Modulating, and Floating Valve. When in Pulse Modulated Injection (PMIp) or Floating Valve the control will run single modulating or On/Off boiler. In modes other than Floating Valve the control will run the injection and system pump.



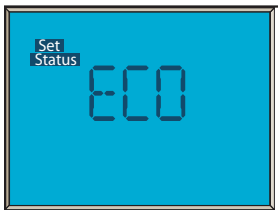
Boiler Mode

Programming for this mode can be found on pages 12 through 14. This mode is used when running boilers only. The boiler configurations available in this mode are single modulating, On/Off boiler, and two stage On/Off boiler. With single boiler operation the control will run the boiler pump and DHW pump. In two stage operation the control will not run the DHW pump.



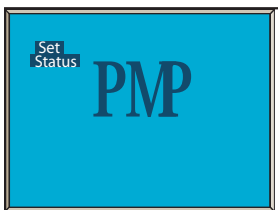
Differential Setpoint Mode

Programming for this mode can be found on page 15. This mode is used when running a differential setpoint. This may be used with solar installations. This mode also includes a high temperature dump feature from the tank so that multiple tanks can be used. In differential mode, the control will also send a modulating signal output based on how far the control is from the differential. This can be used to run a pump in modulating applications for constant flow.



Geothermal Mode

Programming for this mode can be found on pages 16 through 18. This mode is used when running heat pumps/chillers or geothermal related installations. The control will run up to 2 stages of heat pumps, a reversing valve for heating and cooling applications, as well as hot and cold tanks. This mode also allows for a built-in backup feature.



Pump Sequencer

Programming for this mode can be found on page 19. This mode is used to provide pump control for two pumps and maintain the feed water flow through the boiler. This control allows the system to sequence and cycle pumps, override pumps and turn the pump off when the outdoor temperature goes above a certain value (WWSD)

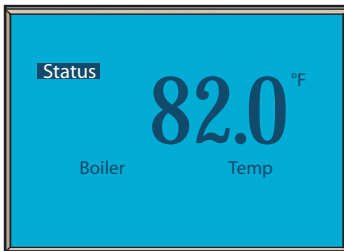
REPROGRAMMING THE CONTROL

To reprogram the control for a different mode simply unplug the control and wait ten seconds before plugging the control back in. This will allow you to manually select a different mode for the control. The control will not reset to factory defaults.

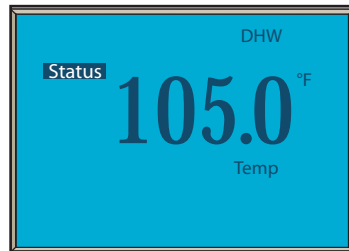
STATUS SCREENS (BOILER & MIXING)



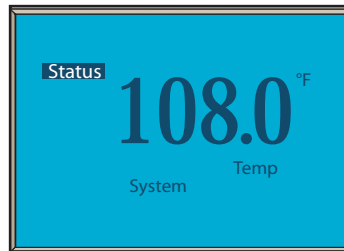
Status screens will differ depending upon the operation mode you have selected.



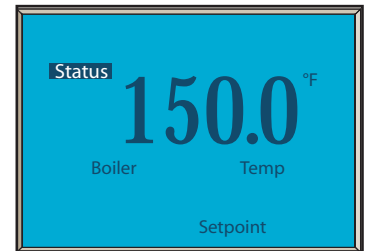
Boiler Temperature



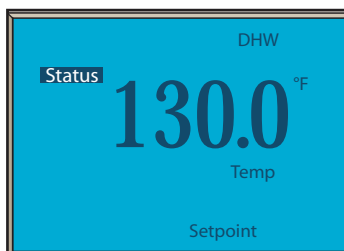
DHW Temperature
(boiler mode only)



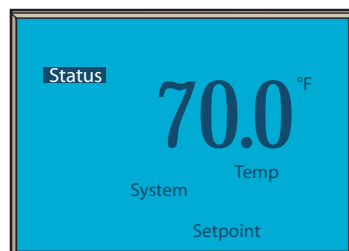
Low Temperature System
Temperature
(mixing mode only)



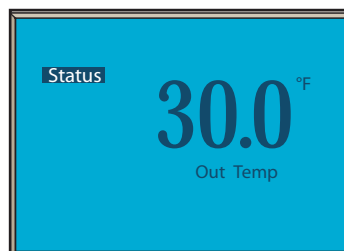
Boiler Target



DHW Target
(boiler mode only)

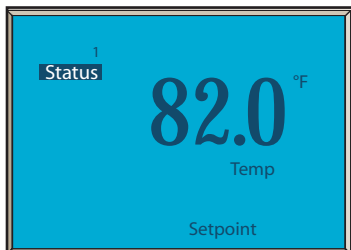


Low Temperature System
Target (mixing mode only)

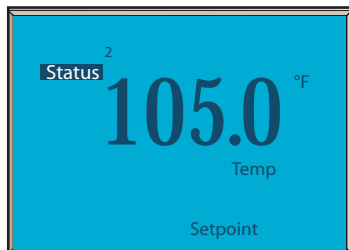


Outdoor Temperature

STATUS SCREENS (DIFFERENTIAL SETPOINT)

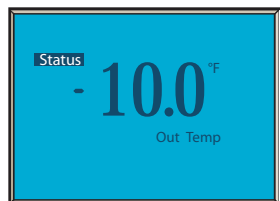


Setpoint 1 Temperature

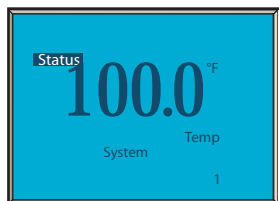


Setpoint 2 Temperature

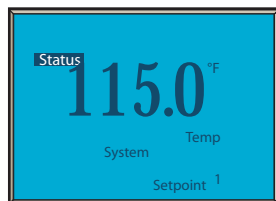
STATUS SCREENS (GEOTHERMAL)



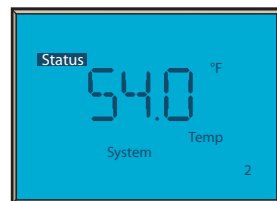
Outdoor
Temperature



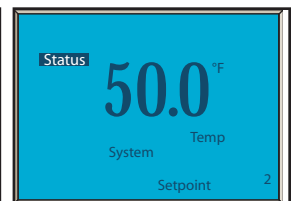
Hot Tank
Temperature



Hot Tank Setpoint

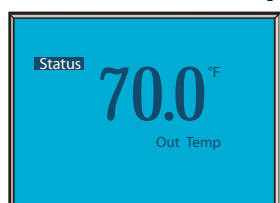


Cold Tank
Temperature



Cold Tank Setpoint

STATUS SCREENS (PUMP SEQUENCER)



Outdoor
Temperature



Pump 1 Alarm



Pump 2 Alarm

► MIXING CONTROL PROGRAMMING

◀ Set

190.0

Boiler Temp

Design Boiler Temperature

This is the design boiler temperature. It is used in the outdoor reset design calculation and is also the maximum setting for the boiler.

(50°F to 200°F) Default: 190°F

◀ Set

135.0

System Temp

◀ Set

70.0

Room Temp

◀ Set

- 10.0

Out Temp

◀ Set

OFF.

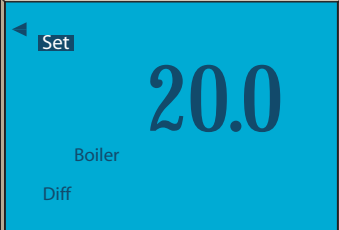


Boiler Temp^{Min}

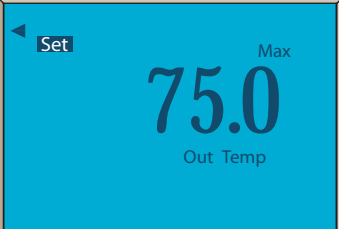
◀ Set

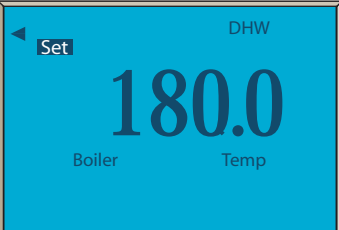

70.0

System Temp^{Min}

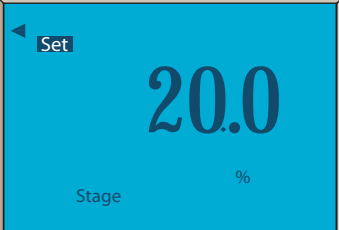
Screen Applicable in Single Stage On/Off Boiler Mode only:



	<p>Boiler Differential</p> <p>This is the differential for the boiler. Adjust this setting to the desired differential for the boiler. (2°F to 60°F) Default: 20°F</p> <p> Eg.) 6°F differential would be 3°F above and 3°F below.</p> <p> Refer to Diagram #7 Single On/Off Boiler with Injection</p>
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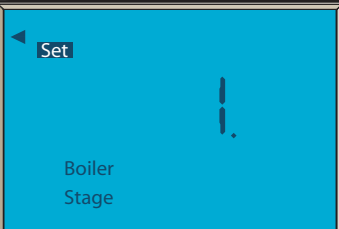
	<p>Warm Weather Shut Down (WWSD)</p> <p>This setting is used to set the temperature at which the CPU-0500 will go into WWSD. Above this temperature the system will be shut off. (20°F to 150°F) Default: 75°F</p>
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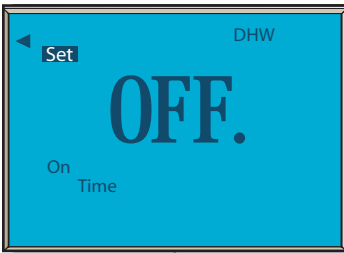
	<p>DHW Boiler Setpoint</p> <p>This setting is used to set the desired boiler setpoint when there is a DHW demand. This can be triggered from an aquastat. (50°F to 200°F) Default: 180°F</p> <p> When mixing, this can only be triggered by an aquastat.</p>
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Screens applicable in Modulating Mixing Mode only:

	<p>Minimum Modulation Percentage</p> <p>This setting is used to set the minimum modulation level that the device can go down to. It can also be used to set the minimum positions on valves. (10% to 60%) Default: 20%</p>
--	---

	<p>Modulating Step Time</p> <p>When in Mixing mode this is the setting for the steps between modulating up or down on the device. (1s to 300s) Default: 10s</p> <p> Refer to Diagram #8 Modulating Mixing.</p>
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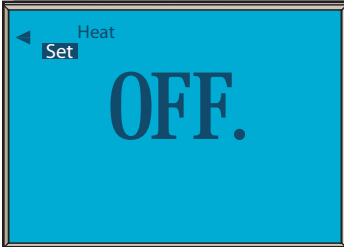
	<p>Boiler Selection</p> <p>This setting is used to select what boiler(s) are connected to the control.</p> <p>Selection Types: MOD: Modulating Boiler 1: Single Stage ON/OFF Boiler Default: 1.</p>
--	---



DHW Priority

This setting is used to set the DHW priority. If set to ON then the System Pump will shut off when there is a DHW call. The priority time is 60 minutes. In Mixing mode the injection device will shut off in a priority situation.

(ON/OFF Default: OFF)

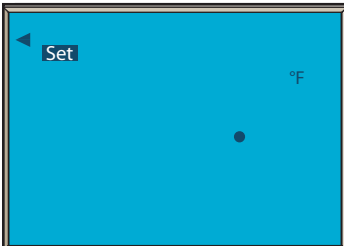


Heat Demand

1) ON: This setting indicates that the CPU-0500 is in a permanent heat demand. Use instead of attaching a thermostat.

2) OFF

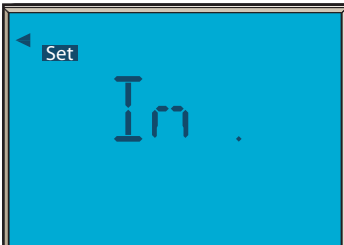
(ON/OFF) Default: OFF



Celsius & Fahrenheit

Use this setting to change the display format from °C to °F.

(°C/°F) Default: °F



Mixing Type

This setting is used to select your Mixing type.

In: PMIp Injection Pump

MO: Modulating Output (4-20mA or 1-10vDC)

FL: Floating action valve (power open / power close)

Default: In

► BOILER CONTROL PROGRAMMING

◀ Set

190.0

Boiler Temp

Design Boiler Temperature

This is the design boiler temperature. It is used in the outdoor reset design calculation and is also the maximum setting for the boiler.

(50°F to 200°F) Default: 190°F

◀ Set

70.0

Room Temp

Design Room Temperature

This is the design room temperature. It is used in the outdoor reset design calculation. Set it to the approximate desired room temperature.

(50°F to 120°F) Default: 70°F

◀ Set

- 10.0

Out Temp

Design Outdoor Temperature

This is the design outdoor temperature. It is used in the outdoor reset design calculation. Set the maximum temperature you would like the control to be at.

(-50°F to 150°F) Default: -10°F

◀ Set

OFF.

Boiler Min Temp

Minimum Boiler Temperature

This is the minimum boiler temperature. This setting will vary depending on the type of boiler you are running. This is boiler supply temperature so keep that in mind when selecting this feature.

If the minimum boiler temperature is set to OFF then the boiler demand will always be ON when a heat demand is present.

(OFF / 51°F to 200°F) Default: OFF



This is used when you would like the modulating boiler to control itself.

Screen Not Applicable in MOD Boiler Mode:

◀ Set

20.0

Boiler Diff

Boiler Differential

This is the differential for the boiler. Adjust this setting to the desired differential for the boiler.

(2°F to 60°F) Default: 20°F



Eg.) 6°F differential would be 3°F above and 3°F below.

◀ Set

75.0

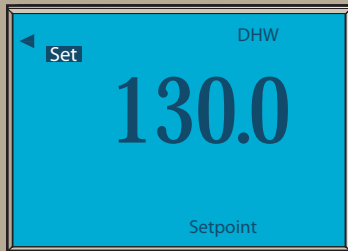
Max Out Temp

Warm Weather Shut Down (WWSD)

This setting is used to set the temperature at which the CPU-0500 will go into WWSD. Above this temperature the system will be shut off.

(20°F to 150°F) Default: 75°F

Screen Not Applicable in Boiler Two Stage Mode:



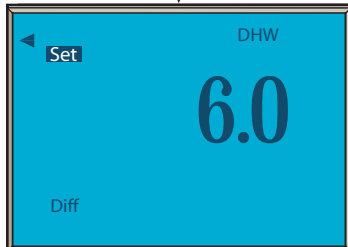
A blue rectangular screen with a white border. At the top right, it says 'DHW'. In the center, the number '130.0' is displayed in large white font. Below the number, the word 'Setpoint' is written in white. In the top left corner, there is a small white box with the word 'Set' and a left-pointing arrow.

DHW Target

This setting is used to set the desired DHW tank temperature.
(OFF/1°F to 200°F) Default: 130 °F



Refer to Diagram #3 Single Modulating Boiler with DHW or #4 Single On/Off Boiler with DHW.



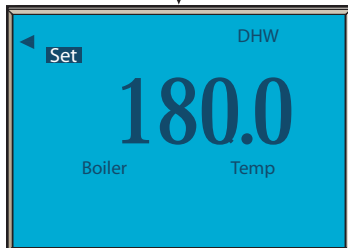
A blue rectangular screen with a white border. At the top right, it says 'DHW'. In the center, the number '6.0' is displayed in large white font. Below the number, the word 'Diff' is written in white. In the top left corner, there is a small white box with the word 'Set' and a left-pointing arrow.

DHW Differential

This is the differential for the DHW tank. Set this setting to the desired differential for the DHW tank.
(2°F to 60°F) Default: 6°F



Eg.) 6°F differential would be 3°F above and 3°F below.



A blue rectangular screen with a white border. At the top right, it says 'DHW'. In the center, the number '180.0' is displayed in large white font. Below the number, the words 'Boiler' and 'Temp' are written in white. In the top left corner, there is a small white box with the word 'Set' and a left-pointing arrow.

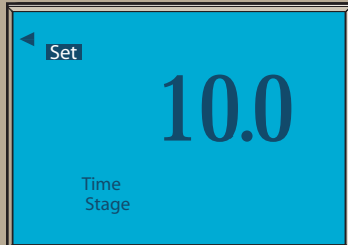
DHW Boiler Setpoint

This setting is used to set the desired boiler setpoint when there is a DHW demand. This can be triggered from either a thermistor or an aquastat.
(50°F to 200°F) Default: 180°F



When stage 2 is selected this can only be triggered by an aquastat.

Screen Applicable in Boiler Two Stage Mode only:



A blue rectangular screen with a white border. In the center, the number '10.0' is displayed in large white font. Below the number, the words 'Time' and 'Stage' are written in white. In the top left corner, there is a small white box with the word 'Set' and a left-pointing arrow.

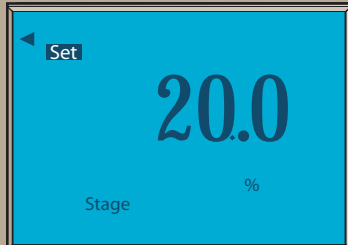
Boiler Two Stage

When the boiler is set for two stages this setting will be set for the minimum lag time between boiler stages.
(1m to 300m) Default: 10m



Refer to Diagram #5 Two Stage Boiler.

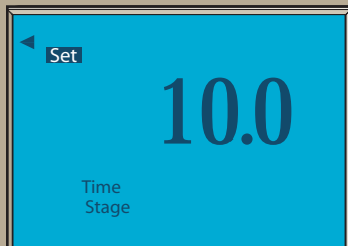
Screens applicable in Modulating Mode only:



A blue rectangular screen with a white border. In the center, the number '20.0' is displayed in large white font. Below the number, the words 'Stage' and '%' are written in white. In the top left corner, there is a small white box with the word 'Set' and a left-pointing arrow.

Minimum Modulation Percentage

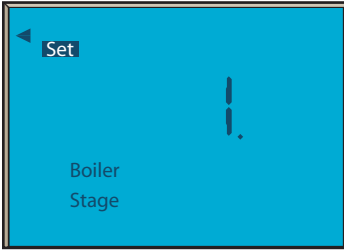
This setting is used to set the lowest modulation level the boiler can go down to.
(10% to 60%) Default: 20%



A blue rectangular screen with a white border. In the center, the number '10.0' is displayed in large white font. Below the number, the words 'Time' and 'Stage' are written in white. In the top left corner, there is a small white box with the word 'Set' and a left-pointing arrow.

Modulating Step Time & Staging Lag Time

When the boiler is set to MOD mode this setting sets the time between the steps when the boiler needs to increase or decrease the firing rate.
(1s to 300s) Default: 10s



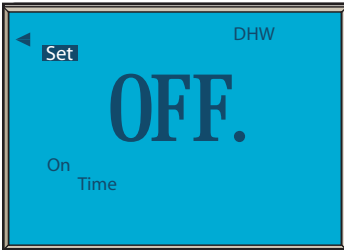
Boiler Selection

This setting is used to select what boiler(s) are connected to the control.
Selection Types:

- 1: Single Stage ON/OFF Boiler
- 2RT: 2 Stages of ON/OFF Boiler with Rotation
- 2: 2 Stage Boiler with No Rotation
- MOD: Modulating Boiler
- Default: 1



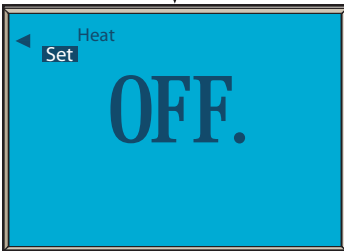
The time of rotation between heat pumps is 48 hours of run time. It means that the boilers are going to rotate when the first boiler exceeds the second by 48 hours and vice versa.



DHW Priority

This setting is used to set the DHW priority. If set to ON then the System Pump will shut off when there is a DHW call. The priority time is 60 minutes. In Mixing mode the injection device will shut off in a priority situation.

(ON/OFF) Default: OFF



Heat Demand

1) ON: This setting indicates that the CPU-0500 is in a permanent heat demand. Use instead of attaching a thermostat.

2) OFF

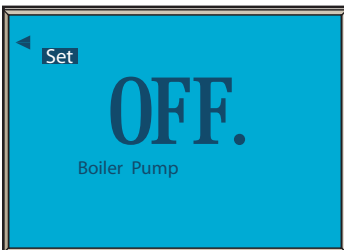
(ON/OFF) Default: OFF



Celsius & Fahrenheit

Use this setting to change the display format from °C to °F.

(°C/°F) Default: °F



Boiler Pump Selection

1) ON: This setting is used to setup the boiler pump contact. If this setting is on, then the boiler pump contact will come on only if the boiler is being enabled. This setting also works for modulating boilers.


2) OFF: If this setting is off the boiler pump contact will come on with the demand.

Default: OFF

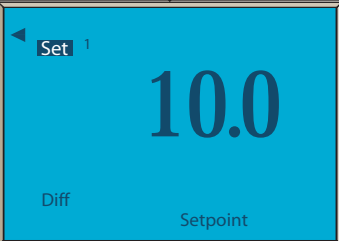


The setting can be used as a boiler enable signal for modulating boilers.

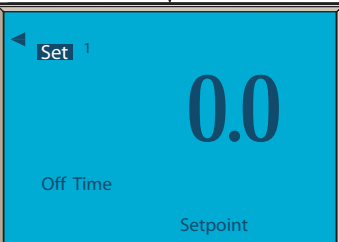
▶ DIFFERENTIAL SETPOINT PROGRAMMING




Celsius & Fahrenheit
Use this setting to change the display format from °C to °F.
(°C/°F) Default: °F

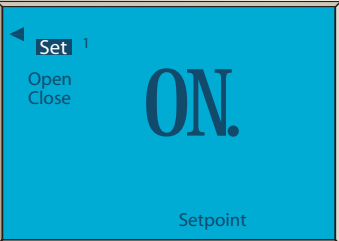


Setpoint 1 Differential
This setting is used to set the differential between setpoint 2 temperature and setpoint 1 temperature.
When the difference exceeds this then relay #1 will engage.
(2°F to 100°F) Default: 10°F



Setpoint 1 Lagtime
This setting is used to set a lagtime on setpoint 1. When this is set above zero the control will wait the predetermined time before turning the relay for the setpoint back on.
(0s to 240s) Default: 0s

 **This will help to stop short cycling of the connected device.**

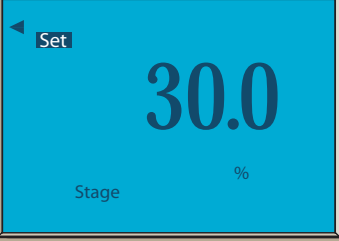


Setpoint 1 Heating/Cooling
This setting is used to set whether or not you would like setpoint 1 to be a heating or cooling setpoint. Set this to OFF for a cooling setpoint.
(OFF/ON) Default: ON

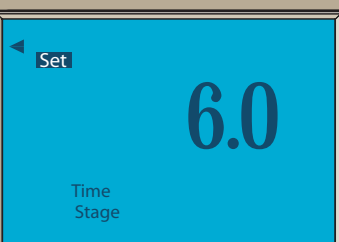


High Temperature Dump
This setting is used as a high temperature dump when the setpoint 1 temperature exceeds this temperature. When this happens relay #2 will engage.
(5°F to 200°F) Default: 180°F


Screens applicable for Modulating Output only:



Minimum Modulation Percentage
This setting is used to set the minimum modulation level that the device can go down to. It can also be used to set the minimum positions on valves.
(10% to 60%) Default: 30%



Mixing Modulating Mode
When using modulating output this is the setting for the steps between modulating up or down of the device.
(1s to 300s) Default: 6s

 **Refer to Diagram #10 Differential Setpoint.**

► GEOTHERMAL CONTROL PROGRAMMING

◀ Set

110.0

°F

System Temp

1

System Temperature 1

Set the System Temperature 1 for the desired heating temperature. When a heat demand is present and not in WWSD, the control will target this temperature for heating.

(50°F to 200°F) Default = 110°F

◀ Set

50.0

°F


System Temp

2

System Temperature 2

Set the System Temperature 2 for the desired cooling temperature. When a cooling demand is present and not in CWSD, the control will target this temperature for cooling.

(20°F to 100°F) Default = 50°F

 **If there is no thermistor attached to pins 7 and 9, the control assumes single tank operation.**

◀ Set

70.0

°F

Room Temp

Design Room Temperature

This is the design room temperature. It is used in the outdoor reset design calculation. Set it to the approximate desired room temperature.

(50°F to 120°F) Default: 70°F

◀ Set


OFF.

Out Temp

Design Outdoor Temperature

This is the design outdoor temperature. It is used in the outdoor reset design calculation. Set this temperature to the value at which you would like to hit your maximum temperature in the control.

(Off/ -50°F to 126°F) Default: OFF

 **Outdoor reset is not applicable if the control is set to OFF.**

◀ Set

10.0

°F


System Diff

1

Heating Differential

This setting is used to set the heating differential. This option sets the tank differential when heating.

(2°F to 50°F) Default: 10°F

 **Eg.) 6°F differential would be 3°F above and 3°F below.**

◀ Set

10.0

°F


System Diff

2

Cooling Differential

This setting is used to set the cooling differential. This option sets the tank differential when cooling.

(2°F to 50°F) Default: 10°F

 **Eg.) 6°F differential would be 3°F above and 3°F below.**

◀ Set

75.0

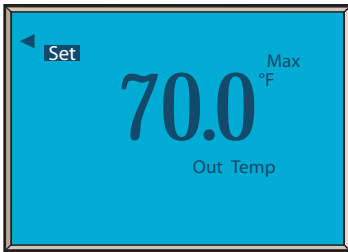
°F

Out Temp Min

Cold Weather Shut Down

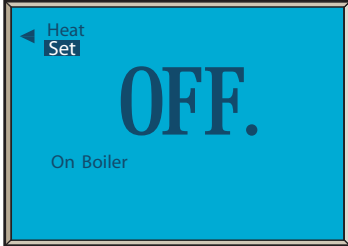
This setting is used to set the temperature at which the CPU-0500 will go into CWSD. Below this temperature the system will not allow the control to instigate cooling mode.

(-50°F to 150°F) Default: 75°F



Warm Weather Shut Down (WWSD)

This setting is used to set the temperature at which the CPU-0500 will go into WWSD. Above this temperature the system will not allow the control to instigate heating mode.
(20°F to 150°F) Default: 70°F



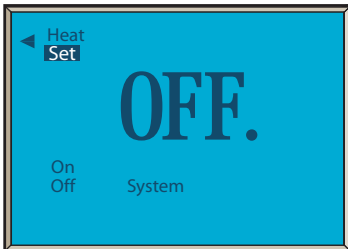
Use Backup Temperature

Set this temperature to the desired outdoor temperature that will allow the backup (stage 2) to come on. When the temperature resides above this value, the backup will not initiate a heat demand.

(Off/-50°F to 199°F) Default: OFF



If set to OFF, the backup (stage 2) will come on only based on time delay.



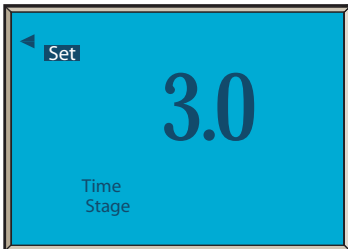
Heating or Cooling Priority

Designates either heating or cooling priority in a system.

OFF = Cooling priority

ON = Heating priority

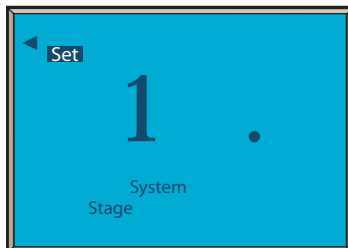
(ON/OFF) Default: OFF



Minimum Lag Time

Choose the minimum lag time between heat pumps in a multi-heat pump application.

(1 minute to 30 minutes) Default: 3 minutes



Stage Selection

1: Single stage heat pump.

2 RT: 2 stages of heat pumps with rotation.

2: 2 stages of heat pumps without rotation.

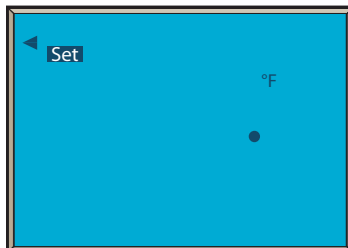
Default: 1



The time of rotation between heat pumps is 48 hours of run time. It means that the heat pumps are going to rotate when the first heat pump exceeds the second by 48 hours and vice versa.



Use the setting when a backup is being used. This way the backup will not rotate into the number 1 position.



Celsius or Fahrenheit

Use this setting to change the display format between °F and °C.

(°F/°C) Default: °F

◀ Set
20.0 °F
Boiler
Diff

Backup Differential

This setting can be used with the USE Backup Temperature or on its own to bring the backup on. This setting is used to set a differential on the tank at which you would like the backup to come on. This setting will override the Use Backup Temperature. eg. 20.0°F Diff and System/ Setpoint 100.0°F. The backup will come on at 80.0°F once the stage time has elapsed.

(OFF/20 to 50°F) Default: 20°F

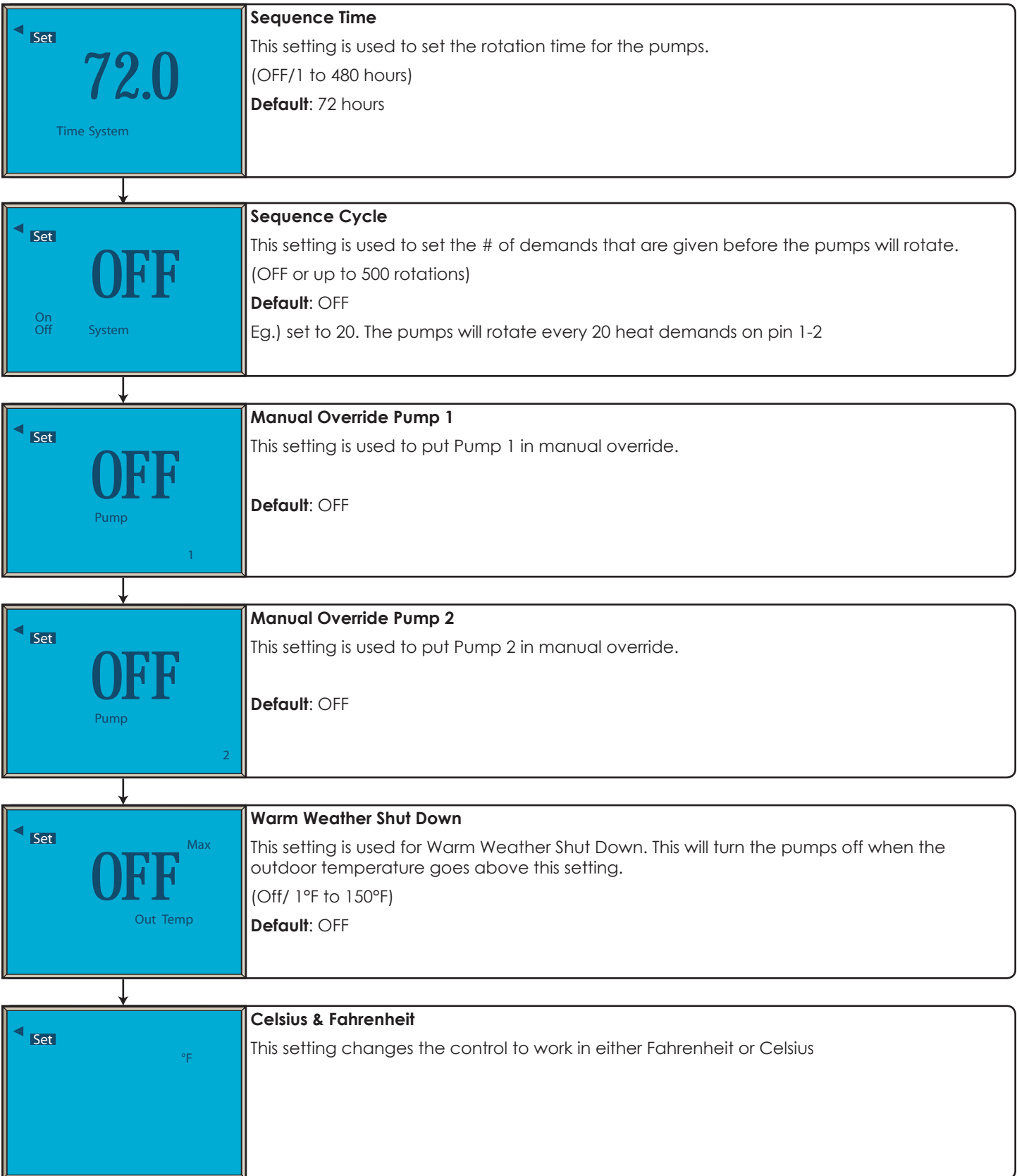
◀ Set
OFF.
On
Off
Stage

Rotate Cycles

Set the number of cycles at which you would like to rotate the heat pumps.

(OFF/2 to 240) Default: OFF

► PUMP SEQUENCER



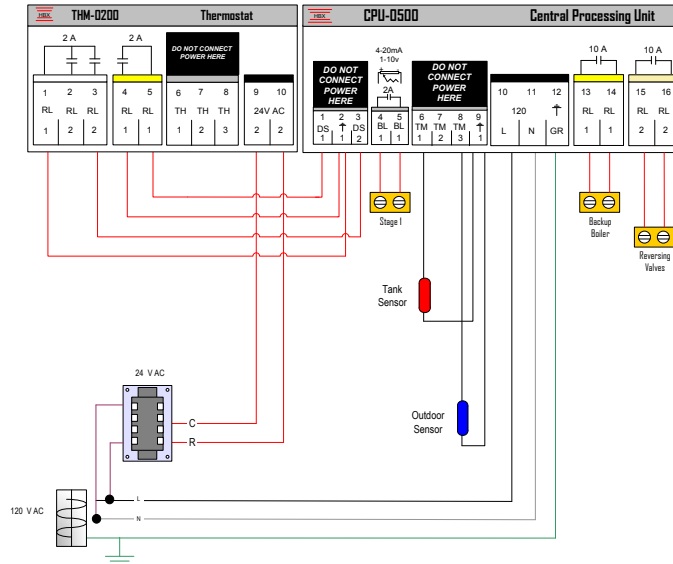
The alarm contact will engage if a pump is running and we have a NO FLOW condition.

The pump sequencer will permanently take a pump out of rotation if it had NO FLOW when turned ON for 10 tries.

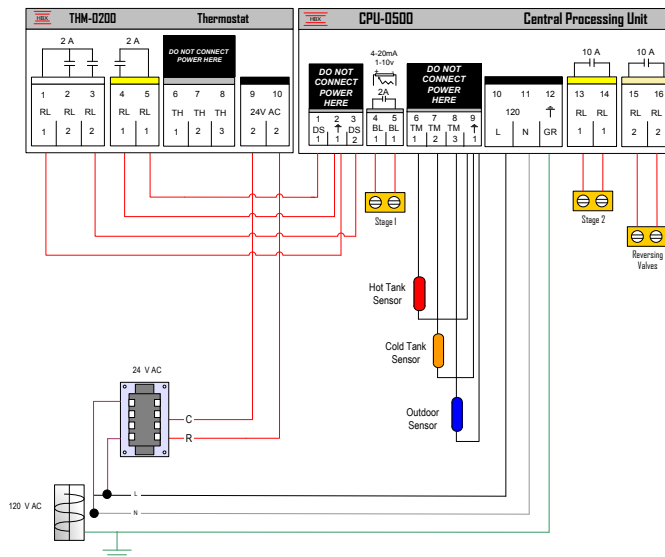
To reset alarm and NO FLOW count. Take heat demand away from pins 1-2.

DRAWINGS (GEOTHERMAL)

#1. **Single Stage Heat Pump with Backup.** This system uses a single tank for heating and cooling.

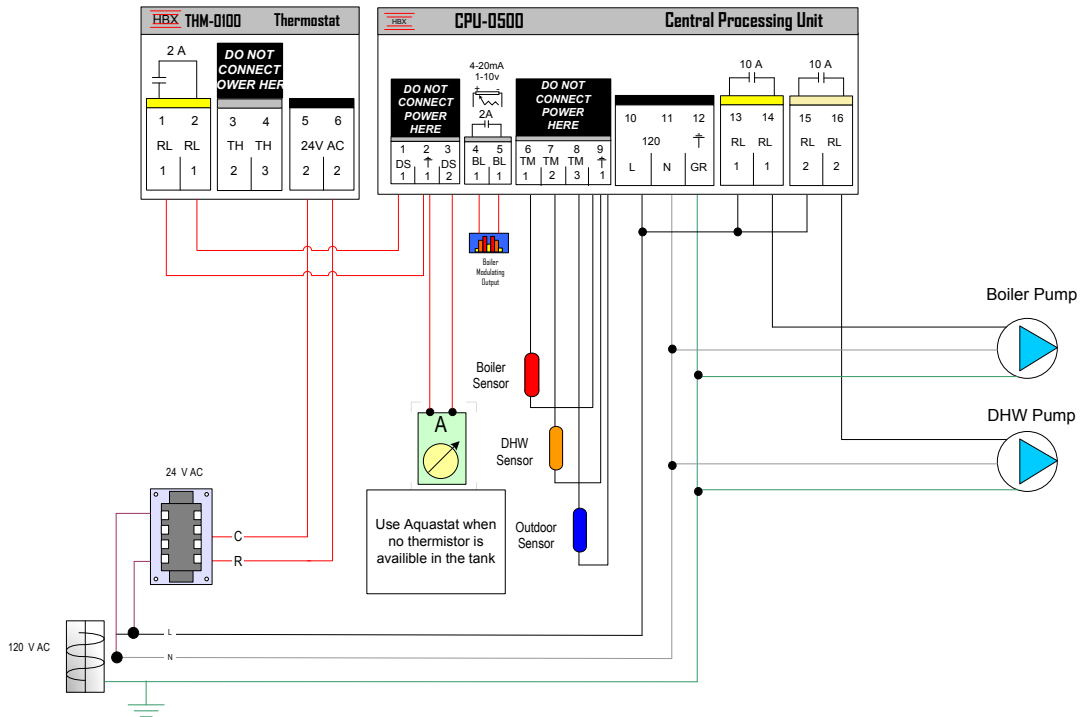


#2. **2 Stage Heat Pump Control** using a separate hot and cold tank.

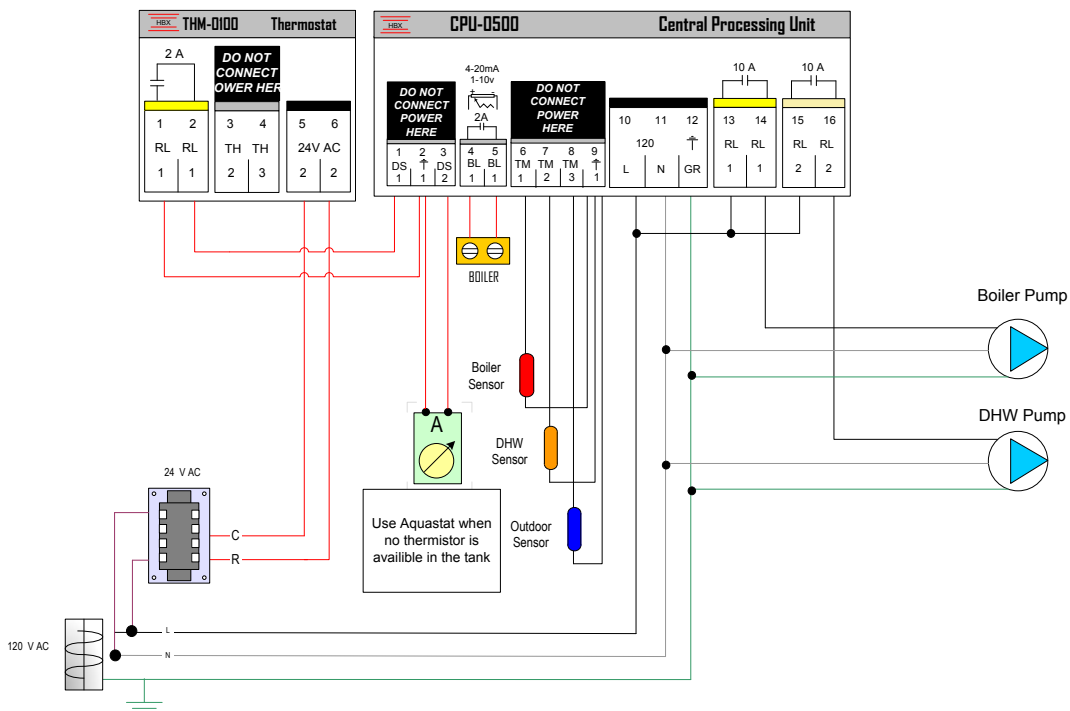


DRAWINGS (BOILER)

#3. Single Modulating Boiler with DHW for use in single modulating boiler applications like heating and/or DHW generation.

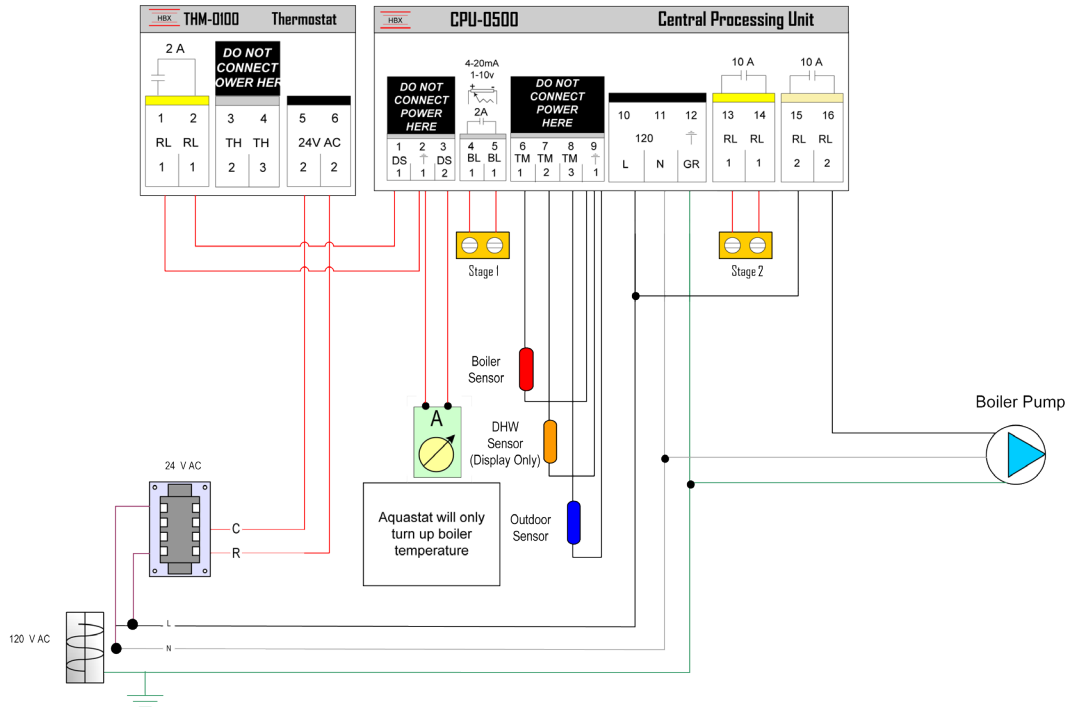


#4. Single On/Off Boiler with DHW for use with On/Off boiler applications like heating and/or DHW generation.



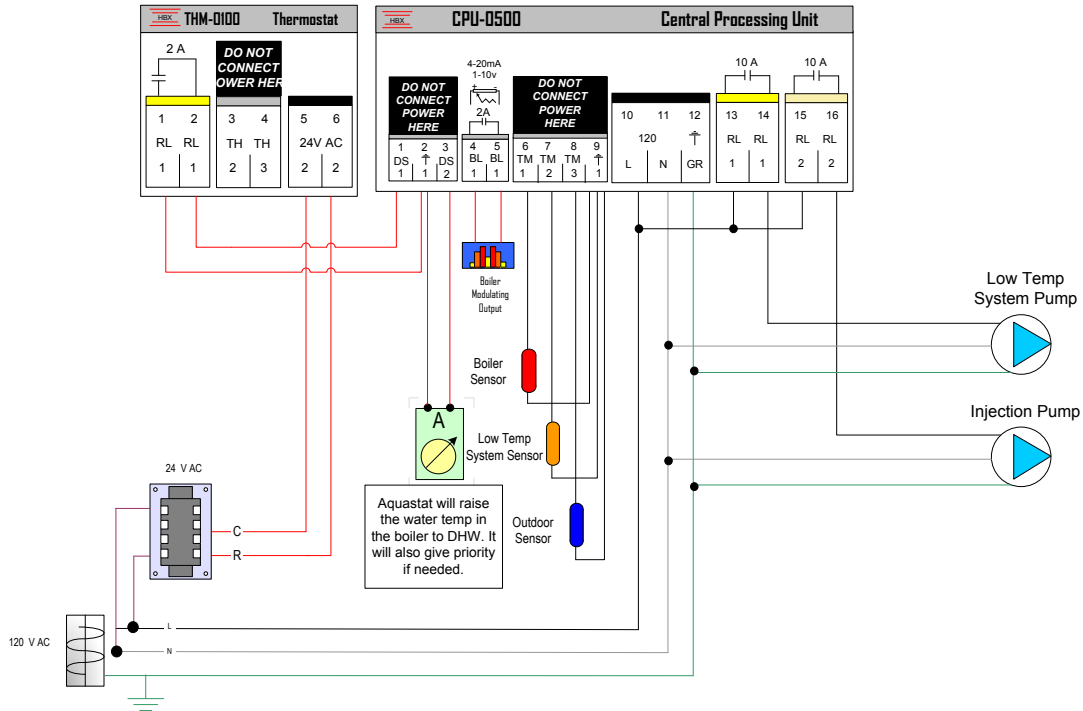
DRAWINGS (BOILER)

#5. **Two Stage Boiler** for use with two single stage boilers or one 2 stage boiler. The aquastat will only increase the boiler temperature for DHW.

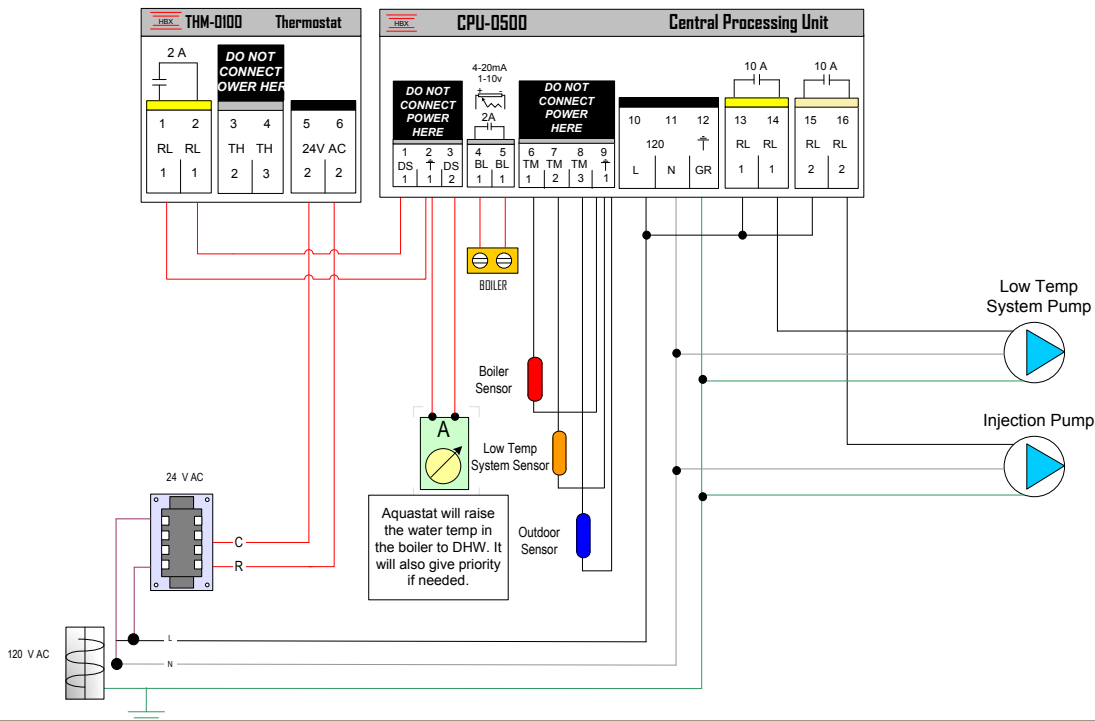


DRAWINGS (MIXING)

#6. Single Modulating Boiler for use with a modulating boiler and injection pump to lower the temperature. Allows for two different temperatures to be generated at once. Both high and low temperature reset curves can be set.

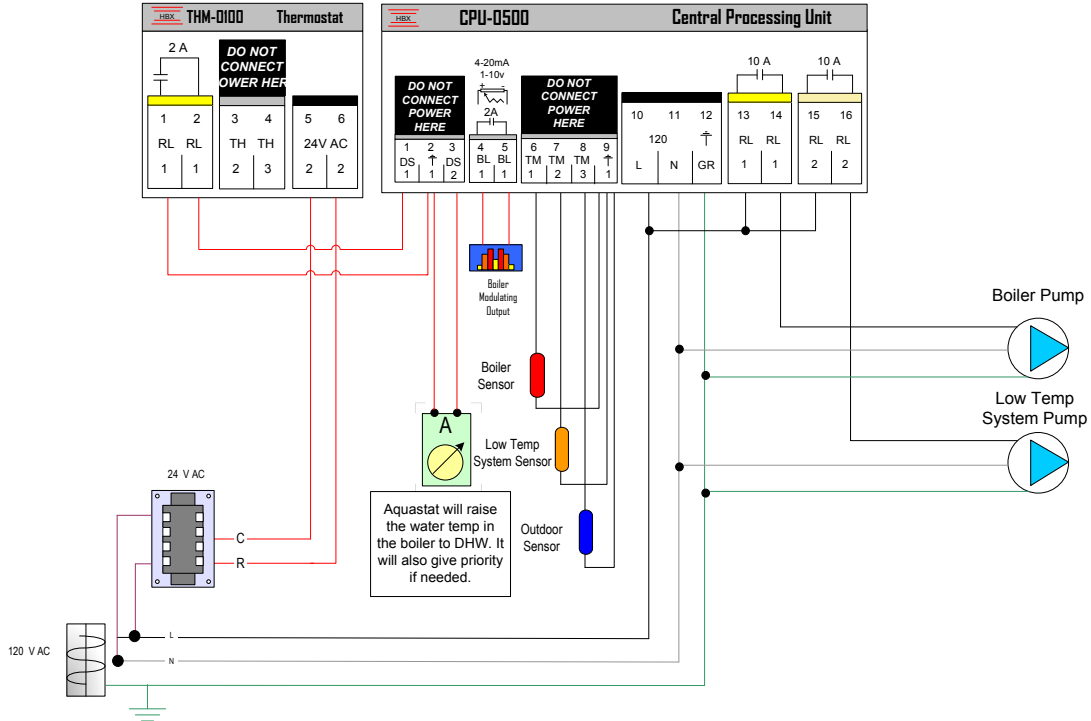


#7. Single On/Off Boiler with Injection for use with a modulating boiler and injection pump to lower the temperature. Allows for two different temperatures to be generated at once. Both high and low temperature reset curves can be set.

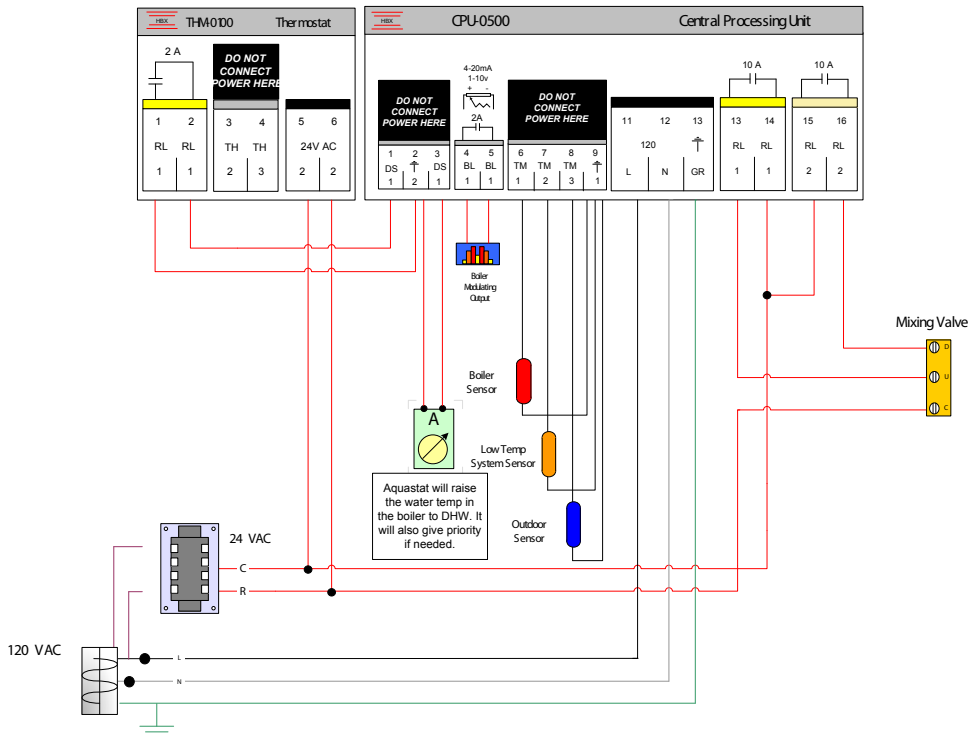


DRAWINGS (MIXING)

#8. Modulating Mixing is used when small injection pumps may not work. Modulating signal can run 3-4 way mixing valves or VFD's on large pumps.



#9. Mixing with On/Off or Modulating Boiler for use when a single boiler (either modulating or On/Off) is used with a floating action valve (power open / power close).



DRAWING (DIFFERENTIAL)

#10. Differential Setpoint

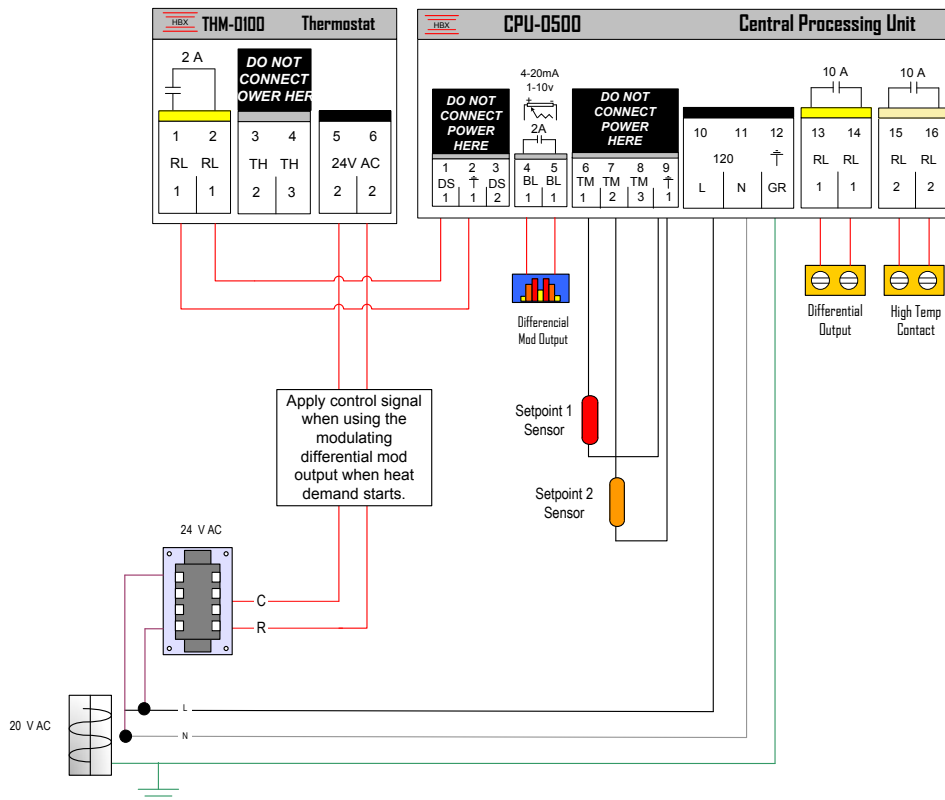
For use when a differential temperature is needed. When the differential is exceeded the differential output will close.

When using the modulating signal the thermostat input must close before the modulating signal will output. The modulating signal will increase if the Δt is larger than the set Δt and the modulating signal will decrease if the Δt is smaller than the set Δt .

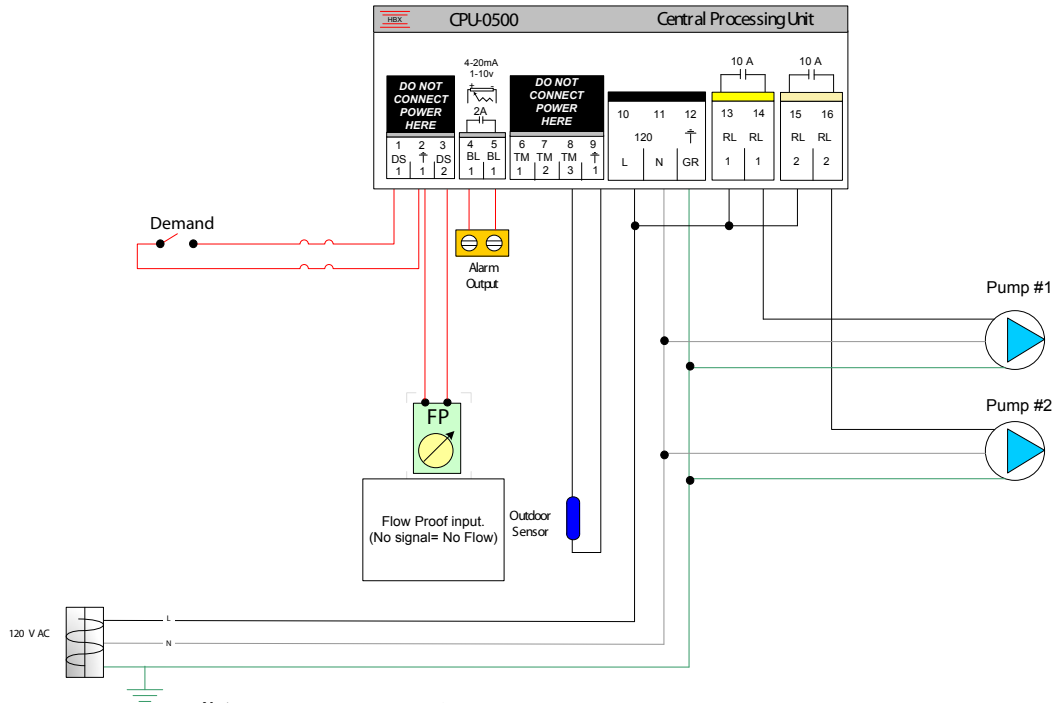
When setpoint one is higher than your high temperature dump setting the high temperature contact will close.

Solar Setup:

- Setpoint 1 Sensor = Tank Sensor
- Setpoint 2 Sensor = Solar Sensor



DRAWING (PUMP SEQUENCER) #11. Pump Sequencer



Note: Alarm output will engage if while a pump is running and we get a NO FLOW condition. After 10 tries on that pump it will be permanently taken out of rotation.

Limited Warranty

HBX Controls warrants each of its products to be free from defects in workmanship and materials under normal use and service for a period of 24 months from date of manufacture or 12 months from date of purchase from an HBX Authorized Dealer, if within the above documented period after date of manufacture.

If the product proves to be defective within the applicable warranty period, HBX on its sole discretion will repair or replace said product. Replacement product may be new or refurbished of equivalent or better specifications, relative to the defective product. Replacement product need not be of identical design or model. Any repair or replacement product pursuant to this warranty shall be warranted for not less than 90 days from date of such repair, irrespective of any earlier expiration of original warranty period. When HBX provides replacement, the defective product becomes the property of HBX Controls.

Warranty Service, within the applicable warranty period, may be obtained by contacting your nearest HBX Controls office via the original Authorized Agent and requesting a Return Material Authorization Number (RMA #). Proof of purchase in the form a dated invoice/receipt must be provided to expedite the issuance of a Factory RMA.

After an RMA number has been issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit. The RMA number must be visible on the outside of the package and a copy included inside the package. The package must be mailed or otherwise shipped back to HBX with all costs of mailing/shipping/insurance prepaid by the warranty claimant.

Any package/s returned to HBX without an approved and visible RMA number will be rejected and shipped back to purchaser at purchaser's expense. HBX reserves the right, if deemed necessary, to charge a reasonable levy for costs incurred, additional to mailing or shipping costs.

Limitation of Warranties

If the HBX product does not operate as warranted above the purchasers sole remedy shall be, at HBX's option, repair or replacement. The foregoing warranties and remedies are exclusive and in lieu of all other warranties, expressed or implied, either in fact or by operation of law, statutory or otherwise, including warranties of merchantability and fitness for a particular purpose/application. HBX neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale, installation maintenance or use of HBX Controls products.

HBX shall not be liable under this warranty; if its testing and examination discloses that the alleged defect in the product does not exist or was caused by the purchasers or third persons misuse, neglect, improper installation or testing, unauthorized attempts to repair or any other cause beyond the range of intended use, or by accident, fire, lightning or other hazard.

Limitation of Liability

In no event will HBX be liable for any damages, including loss of data, loss of profits, costs of cover or other incidental, consequential or indirect damages arising out of the installation, maintenance, commissioning, performance, failure or interruption of an HBX product, however caused and on any theory of liability. This limitation will apply even if HBX has been advised of the possibility of such damage.

Local Law

This limited warranty statement gives the purchaser specific legal rights. The purchaser may also have other rights which vary from state to state in the United States, from Province to Province in Canada and from Country to Country elsewhere in the world.

To the extent this Limited Warranty Statement is inconsistent with local law, this statement shall be deemed modified to be consistent with such local law. Under such local law, certain disclaimers and limitations of this statement may not apply to the purchaser. For example, some states in the United States, as well as some governments outside the United States (including Canadian Provinces), may:

Preclude the disclaimers and limitations in this statement from limiting the statutory rights of a consumer (e.g. United Kingdom);

Otherwise restrict the ability of a manufacturer to enforce such disclaimers or limitations; or

Grant the purchaser additional warranty rights which the manufacturer cannot disclaim, or not allow limitations on the duration of implied warranties.



Control Systems Inc.

HBX CPU-0500 HVAC Control
Version 2.50

NOTES:



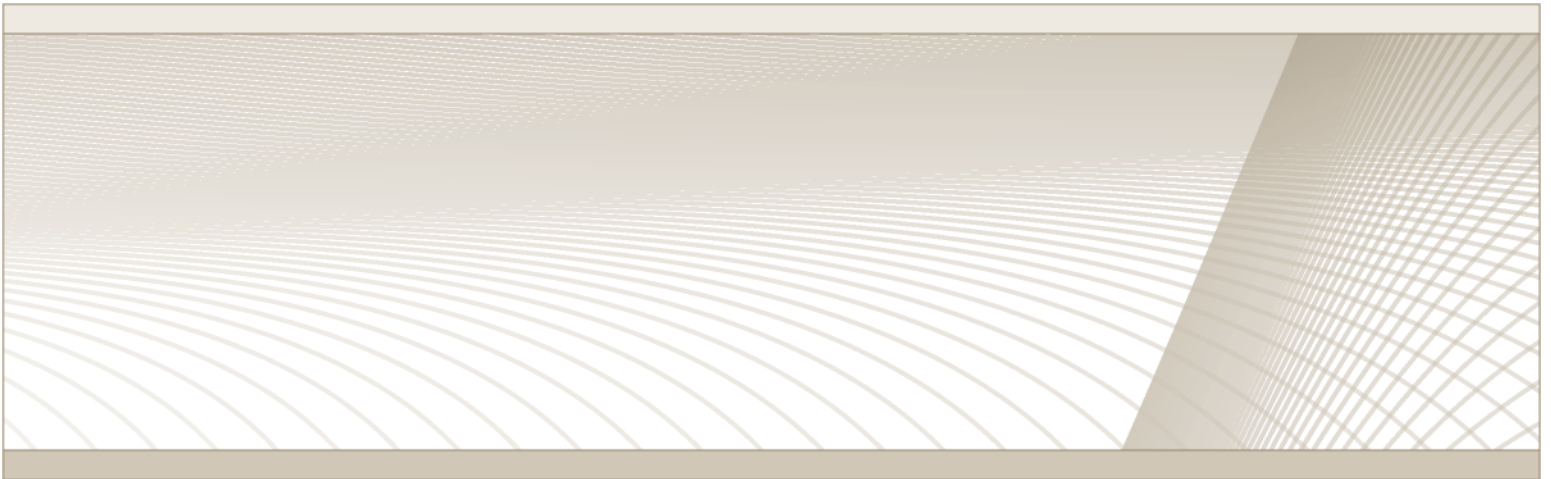
Control Systems Inc.

HBX CPU-0500 HVAC Control
Version 2.50

NOTES:

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Manual Version v3.7



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