HEAT-TIMER®

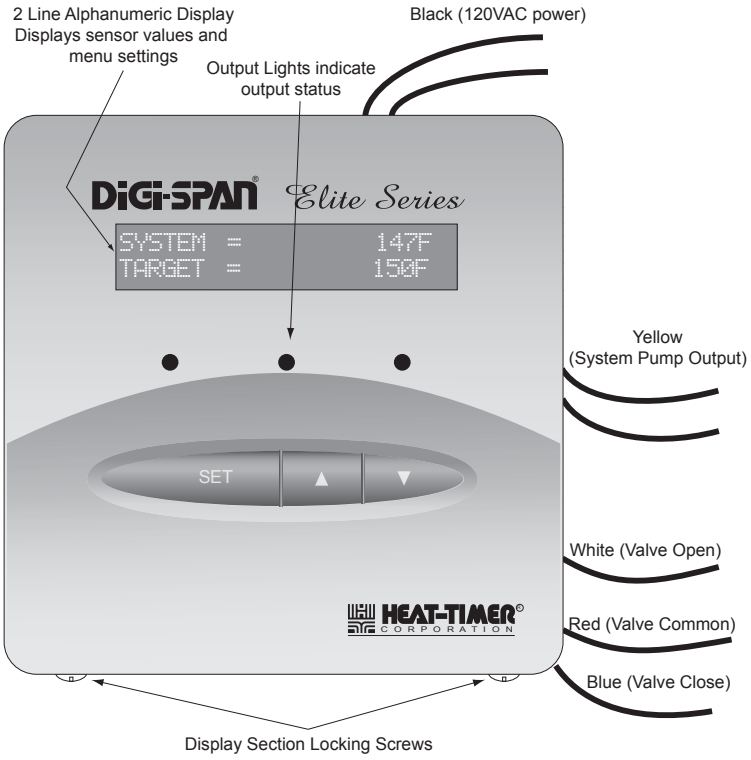
INSTALLATION AND OPERATION INSTRUCTIONS

DiGi-SPAN® *Elite Series*

HWE-MOV DIGI-ELITE

Hydronic Motorized Valve Control

Hot Water Control with Outdoor Reset or Set Point



⚠ WARNING

This Heat-Timer control is strictly an operating control; it should never be used as a primary limit or safety control. All equipment must have its own certified limit and safety controls required by local codes. The installer must verify proper operation and correct any safety problems prior to the installation of this Heat-Timer control.

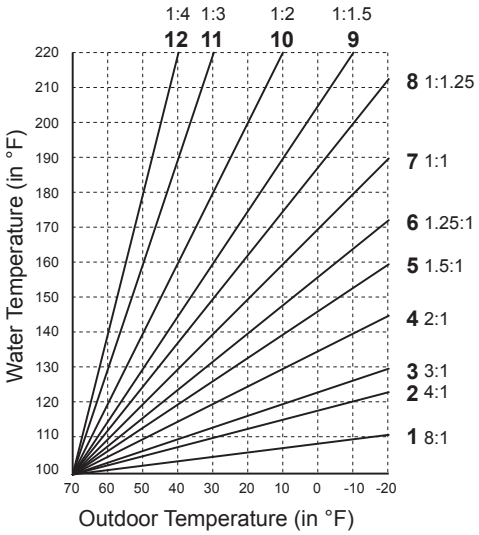
The HWE-Motorized Valve (HWE-MOV) DIGI-SPAN Elite establishes ambient comfort by varying the temperature of the heating system's circulating hot water in response to changes in the outdoor temperature. In addition, it provides an outdoor temperature based cutoff, heating system pump control. Two new features have been added to this control including a customized reset ratio curve. A Set Point option was added for applications where outdoor reset will not apply.

Two sensors are used, one to monitor the outdoor temperature, and one to monitor the circulating hot water temperature in the heating system. When the outdoor temperature falls below outdoor cutoff setting, the heating system is activated and the hot water temperature is increased proportionally to satisfy the load. Should it get warmer outdoors, the hot water temperature is automatically lowered by the control. If the outdoor temperature continues to rise to the outdoor cutoff setting then the heating system is turned off.
Because of the many different physical characteristics of buildings, and the type of radiation, i.e., baseboard or radiant, the heat loss varies. In one building, a 1-degree temperature change outdoors may require a change of 1 degree in heating water temperature; for another it may require a change of 2, 3, or even 4 degrees in order to gain the desired comfort level. This is known as the Reset Ratio. The middle chart shows the wide range of Reset Ratios available for the HWE-MOV.

The installer fits the HWE-MOV to a specific building by adjusting the Reset Ratio curve. With curve 4 (2:1 reset ratio) a 2-degree change in outdoor temperature will change the circulating hot water temperature by 1 degree; at curve 11 (1:3 reset ratio) an outdoor change of 1 degree will change the water temperature by 3 degrees. Most buildings with baseboard radiation require curve 6, 7, or 8. Radiant heat applications usually require a lower curve. Another, is a Setback input that will switch the heating system to a lower set point determined by the Set Back setting.

An optional Boiler Return water sensor is provided to avoid thermal shock to the boiler and, therefore, to help prolong boiler life. If the sensor registers that the boiler return water is colder than 120°F, the HWE-MOV immediately lowers the temperature of the circulating heating water to reduce the load on the boiler, allowing the return water temperature to rise.

Type of Radiation in Building	Reset Ratio	Offset
Radiators (Steel & Cast Iron)	1.00 (OD) : 1.00 (SYS)	0˚F
Baseboard (Finned copper tube& Cast Iron)	1.00 (OD) : 1.00 (SYS)	0˚F
Radiant (High Mass/Concrete)	4.00 (OD) : 1.00 (SYS)	-10˚F
Radiant (Low Mass/Joists)	2.00 (OD) : 1.00 (SYS)	-10˚F
Fan Coils & Air Handlers	1.00 (OD) : 1.00 (SYS)	20˚F

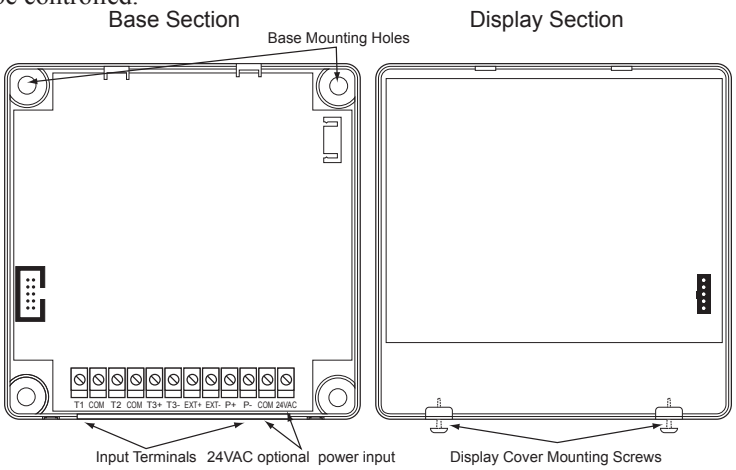


Reset Ratio Curves

Reset Ratios are presented as Outdoor : Water

Mounting the Controller

- The HWE-MOV DIGI-Elite is designed to mount on a 1900 (4”x4”) deep electrical box.
- If additional room is needed for wiring use the extension skirt provided in the box.
- Place the HWE-MOV in a convenient location near the unit to be controlled.
- Mount the HWE-MOV indoors and away from excessive heat or cold.
- Partially unscrew the Display Cover Mounting screws. This allows for its removal.
- Lifting the Display Section away from the base will unplug it from the Base section.
- Proceed with the power and output wiring instructions.
- Use the screws provided to mount the HWE-MOV to the 1900 box or the extension skirt.
- Mount Display Section back to the Base Section. Tighten the Display Cover Mounting Screws.

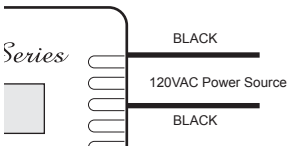


Wiring

Wiring Power Input

The HWE-MOV is designed to accept ***ONLY A SINGLE POWER SOURCE***. It can be wired to either 120VAC using the two Black wires or 24VAC using the right most two terminals on the terminal block on bottom of the control. Heat-Timer recommends the installation of a Surge Suppressor and a Power Switch before the Power Line connection for safety and ease of service.

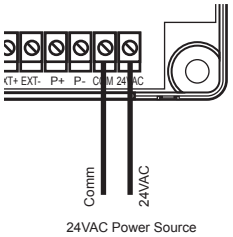
120VAC Power Wiring



120VAC

- Attach line voltage, 120VAC, to the two Black wires extending from the back of the HWE-MOV. Remember to use the power line from a different source than the equipment being controlled.

24VAC Power Wiring



24VAC

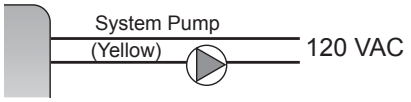
- Use a dedicated transformer with at least a 5VA output.
- Bring 24VAC to the two right most terminals on the front of the HWE-MOV marked *24VAC and COM*.

Wire Colors and Output Lights

- The HWE-MOV has a three S.P.S.T. (single-pole single-throw N.O.) relays. Each output is rated at 1A pilot duty (1/8 HP) or 6 A resistive at 120VAC 60Hz.
- The HWE-MOV has three lights that follow the output relays operation. When a relay energizes, its LED will turn on.
- The outputs are dry contacts only. They do not source any power.
- The two Yellow wires represent System Output relay and the left LED.
- The Blue wire represents the Valve Close Output relay and the left LED.
- The White wire represents the Valve Open Output relay and the middle LED.
- The Red wire represents Valve Common.

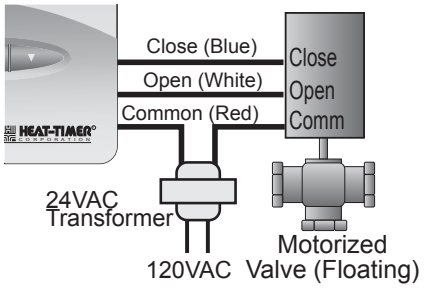
Wiring the System Output to a Pump

- The HWE-MOV will control the System Pump up to a maximum output of 1 Amp inductive or 1/8 HP.
- Wire the two Yellow wires to the System Pump circuit.
- The HWE-MOV Elite does not source any output power to the pump. The relay makes when energized to switch the power to the pump.

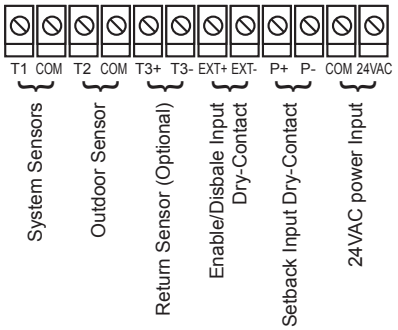


Wiring Motorized Valve

- The output relays are dry-contacts only. They do not source any power.
- The Red wire is Common. If the valve has only three wires, it is necessary to wire in a power source for the valve. One side of the valve power source is connected to the valve Common, and the other side is connected to the HWE-MOV Red wire Common. Check wiring instructions for the specific valve before making any connections.
- The White wire connects to the valve Open terminal.
- The Blue wire connects to the valve Close terminal.



Wiring Input Terminals



Heating System Sensor (HSS) Installation (T1, COM)

- Place the Heating System sensor in the common header where it will register the output of the boiler before any takeoffs.
- Only use the Standard Brass Tube sensor (HT #904250-00) provided.
- The sensor wires can be extended up to 500' using a shielded 2-conductor cable (Belden #8760 or equivalent (#18/2)). Do not connect the shield at the sensor but at the control using the *COM* terminal.
- Do not run sensor wires in conduit with line voltage wiring.

IMMERSION Heating System Sensor (HSS) Installation

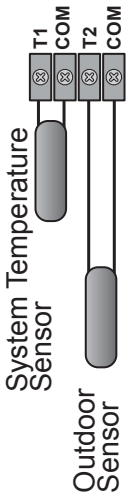
- Install a 3/8"ID 1/2"NPT immersion well (HT #350147-00 or equivalent).
- Insert the supplied sensor probe into the well.

Strap-On Heating System Sensor (HSS) Installation

- Strap the sensor to the pipe using metal clamps. Do not over tighten the clamp.
- Strap pipe insulation around the sensor and the pipe.

⚠ ALERT

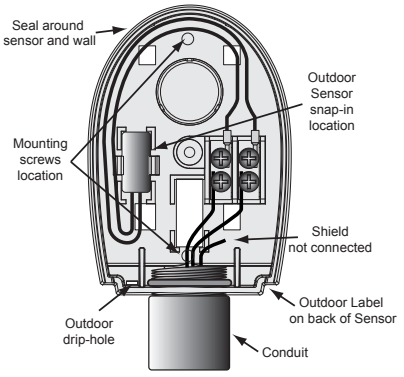
Determining the proper location for the Outdoor Sensor is very important. The HWE-MOV will base the heat on the outdoor temperature information it receives from this location. If the sensor is in the sun, or covered with ice, its reading will be different from the actual Outdoor temperature.



Outdoor Sensor Installation (T2, COM)

- The Outdoor Sensor must be used when Outdoor Reset is selected from the Startup menu. However, in Set Point mode, the Outdoor Sensor is optional. When connected in that mode, it will be used as an outdoor cutoff sensor only.
- Only use the Heat-Timer sensor included with the unit.
- Place the sensor in the shade on the north side of the building.
- Be sure the location is away from doors, windows, exhaust fans, vents, or other heat sources.
- The sensor should be mounted approximately 10' feet above ground level.
- Mount the sensor clip base to the outside of the building. Insert the sensor in the middle and snap close the clip on the sensor.
- The sensor wires can be extended up to 500' using shielded 2-conductor cable. Do not ground the shield at the sensor but at the control using the COM terminal.
- Do not run sensor wires in conduit with line voltage wiring.

Outdoor Sensor

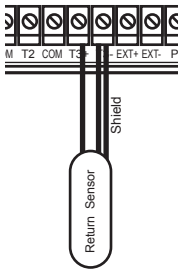


OPTIONAL - Boiler Return Sensor Installation (T3+, T3-)

- The Boiler Return Sensor is designed to be installed in a 3/8” ID well.
- If sensor is installed as a Strap-On, good contact is required for proper operation. Also, insulating the sensor with the pipe will ensure sensor will have a more accurate reading.
- Place the sensor in the boiler return piping. The sensor should be located where it will register the correct return from all loops to boiler
- The sensor wires can be extended up to 500’ by splicing with 18 gauge shielded wire.
- The sensor has no polarity. Connect either sensor wire to the front terminal marked T3+,

T3-. Connect the other sensor wire and the shield to the front terminal marked T3-.
- Do not run sensor wires in conduit with line voltage wiring.

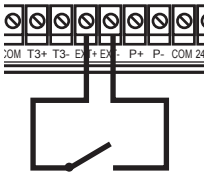
Return Sensor Wiring



Wiring the Enable/Disable (EXT+, EXT-)

- The EXT terminals can be used to enable or disable the system by connecting it to a thermostat, external control, or a switch. It accepts dry contact input only.
- If no thermostat or control is connected to the EXT terminals, leave the jumper supplied as a contact to the terminals.
- The HWE-MOV will close the valve unless the EXT terminals are closed/shorted.

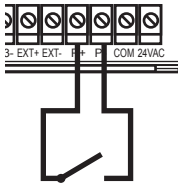
Enable/Disable Wiring



Wiring the Setback/Boost (P+, P-)

- The Setback feature can be used to provide the HWE-MOV with a lower temperature Set Point when less heat is required.
- A typical use for Setback is to provide less system temperature to a building during the night or on the weekends when building is not occupied, but heat is still required.
- The Setback is activated by closing/shorting the P+ and P- terminals using an external timer.

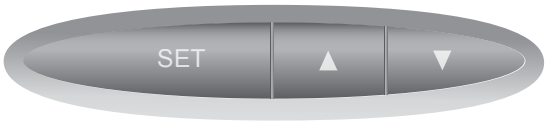
Setback/Boost Wiring



Button and Navigating Menus

The HWE-MOV has three buttons.

- The SET button function varies. When the Default Screen is displayed, pressing the SET Button views the MENU. When in the Menus and settings, the SET Button accepts the selected entry or setting value.
- When in the menus, pressing the Up and Down buttons will scroll through the menu options. They can be used to change the setting of a specific function. i.e., change the Set Point, Differential, or System Trim. In addition, when in the default screen, the Up and Down buttons will display the outdoor temperature and Outdoor Cutoff when no return sensor is available, or the outdoor temperature and the return temperature when an active return sensor is connected.
- At the end of every operation menu there is a <Back> option that allows the user to go back one menu level. If the SET Button was held down for three seconds on the <Back> option, the display will go back to the default screen.



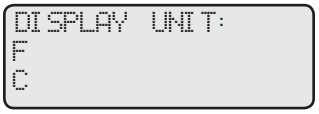
Startup Options

When the control is initiated for the first time or after a manual reset, it will start its operation with the Startup Menu. Later, the Startup menu can be accessed as an option from the operation menu. An option must be accepted in each screen in the Startup Menu to move to the next level.

Display Unit

***Options:* °F, °C** **Default: °F**

SET */<System Startup>/Display Unit*

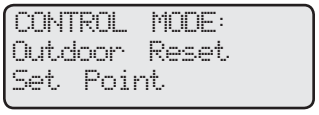


- The HWE-MOV will offer two different temperature displays. If °F is selected, all temperatures will display in Fahrenheit. If °C is selected, all temperatures will display in Celsius.

Control Mode

***Options:* Outdoor Reset, Set Point** **Default: Outdoor Reset**

SET */<System Startup>/Display Unit/Control Mode*



- The new HWE-MOV have two heating logics. Outdoor Reset; varies the system set point/target based on outdoor temperature. This selection will add several menu options, Reset Ratio, Offset, Min Water temp, Max Water temp, and Outdoor Cutoff, to allow of adjustment and fine tuning of the Reset Curve. In addition, a customized curve will be available for specialized applications.
- Set Point; Gives the installer the flexibility of selecting a fixed set point. The Outdoor Cutoff will be available if an outdoor sensor was installed.

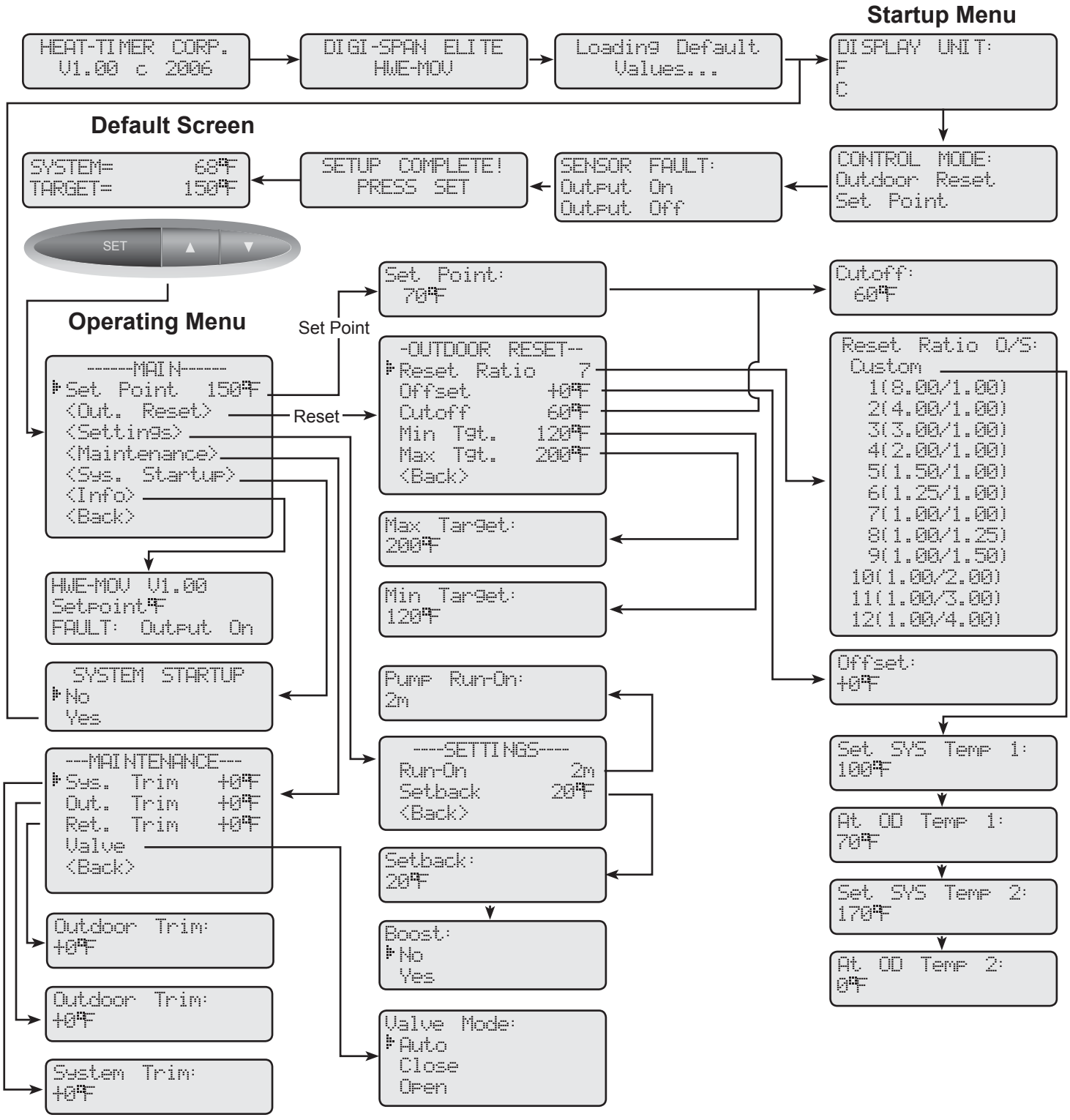
Sensor Fault

***Options:* Output On, Output Off** **Default: Output On**

SET */<System Startup>/..../Sensor Fault*

- The Sensor Fault will determine the operating status of the output relays when a sensor reads Short or Open. On sensor fault the Set Point will indicate FAULT TGT=ON or OFF to indicate the condition of the output and the faulty sensor will read OPEN or SHORT to indicate the condition of the sensor.

Menus


Startup Menu
HEAT-TIMER CORP.
V1.00 c 2006
DIGI-SPAN ELITE
HWE-MOV
Loading Default
Values...
DISPLAY UNIT:
F
C
Default Screen
SYSTEM= 68°F
TARGET= 150°F
SETUP COMPLETE!
PRESS SET
SENSOR FAULT:
Output On
Output Off
CONTROL MODE:
Outdoor Reset
Set Point
SET
Operating Menu
Set Point:
70°F
Outoff:
60°F
Set Point
-OUTDOOR RESET--
Reset Ratio 7
Offset +0°F
Cutoff 60°F
Min Tgt. 120°F
Max Tgt. 200°F
<Back>
Reset Ratio O/S:
Custom
1(8.00/1.00)
2(4.00/1.00)
3(3.00/1.00)
4(2.00/1.00)
5(1.50/1.00)
6(1.25/1.00)
7(1.00/1.00)
8(1.00/1.25)
9(1.00/1.50)
10(1.00/2.00)
11(1.00/3.00)
12(1.00/4.00)
-----MAIN-----
Set Point 150°F
<Out. Reset>
<Settings>
<Maintenance>
<Sys. Startup>
<Info>
<Back>
Reset
Max Target:
200°F
Min Target:
120°F
HWE-MOV V1.00
Setpoint°F
FAULT: Output On
Offset:
+0°F
SYSTEM STARTUP
No
Yes
Pump Run-On:
2m
Set SYS Temp 1:
100°F
----SETTINGS----
Run-On 2m
Setback 20°F
<Back>
--MAINTENANCE--
Sys. Trim +0°F
Out. Trim +0°F
Ret. Trim +0°F
Valve
<Back>
At OD Temp 1:
70°F
Set SYS Temp 2:
170°F
Setback:
20°F
Outdoor Trim:
+0°F
Boost:
No
Yes
At OD Temp 2:
0°F
Outdoor Trim:
+0°F
Valve Mode:
Auto
Close
Open
System Trim:
+0°F

Outdoor Reset Mode

- When Output-On is selected, the HWE-MOV will energize the motorized valve open relay and system relay when System reads Short or Open and Outdoor is below Outdoor Cutoff. However, if the Outdoor sensor fails and the Outdoor reads Short or Open, the HWE-MOV will change the Target Set Point to the Max Water Temperature.
- When Output-Off is selected, the HWE-MOV will energize the motorized valve close relay when the System sensor reads Short or Open. However, when the Outdoor sensor fails, reads short or open, the HWE-MOV will change the Target Set Point to be the Min Water Temperature.

Set Point Mode

- Output On, the HWE-MOV will energize the motorized valve Open relay when the System sensor reads Short or Open.
- Output-Off, the HWE-MOV will energize the motorized valve Close relay when the System sensor reads Short or Open.
- The Outdoor Sensor Short or Open status will not affect the control operation in Set Point mode.

Setting the Control to Factory Default

To Reset the HWE-MOV control to its original factory defaults, power down the control. Hold down the SET and DOWN buttons while powering the control back up until the Loading Default Values screen appears. The Display will direct you to the Startup menu after the defaults are loaded to program the control.

NOTE: When resetting the control to original factory defaults all control settings will be over written and will no longer exist.

Default Display

The default display will show the current System temperature and the Target temperature. In addition, by clicking the Up or Down button, the display will show the current Outdoor temperature and the current Return temperature, only if the return sensor is connected to terminals T3+ and T3-. However, if no return sensor is connected, the control will display the current Outdoor temperature and the Outdoor Cutoff.

Operating Menu Options

Set Point

(Available when Startup Control Mode = Set Point)

Options: **From -10ºF/-23ºC to 230ºF/110ºC Default: 70ºF/21ºC**

SET */Set Point*

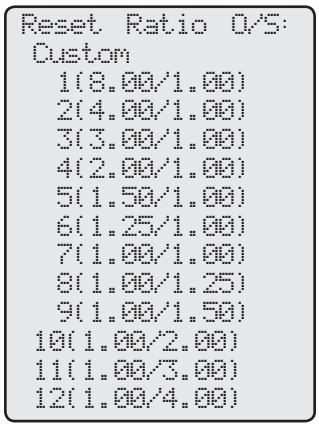
- The Set Point option provides the user with an adjustable fixed Target temperature to control the system. If an Outdoor Sensor was connected, the next menu option will show Outdoor Cutoff, otherwise there will be no Outdoor Cutoff option.

Outdoor Reset

(Available when Startup Control Mode = Outdoor Reset)

Options: **From 1(8.00º/1.00º) to 12(1.00º/4.00º), Custom Default: 7(1.00º/1.00º)**

SET */<Out. Reset>/Reset Ratio*



- The Reset Ratio determines how the System water temperature will vary with Outside temperature (OD). With any of the ratios, the colder it becomes outside, the hotter the temperature of the system water. The Ratio is measured as; Outdoor : System Water temperature.
- With a 1.00:4.00 ratio, the System water temperature will increase rapidly as the outside temperature falls, hitting the maximum water temperature of 240°F at 24°F outdoor temperature. With a 4.00 (OD):1.00 (SYS) ratio, the System water temperature (SYS) will increase slowly as the outside temperature falls.
- The Reset Ratio controls the amount of heat that enters the heating system based on the outdoor temperature. A higher numbered Reset Ratio will result in a higher Calculated water temperature. See the Reset Ratio chart on the second page. If the application has radiant heat, a lower

numbered Reset Ratio curve should be selected.

- If required: **Adjust the RESET RATIO in cold weather.** If the ambient building temperatures are too cold in cold weather, move the ratio to a higher selection. That is, if 1.00 (OD):1.00 (SYS) was initially selected, change the selection to 1.00 (OD):1.25 (SYS). If the building temperatures are too warm in cold weather, move the ratio to a lower selection. That is, if 1.00 (OD):1.00 (SYS) was initially selected, change the selection to 1.25 (OD):1.00 (SYS).
- The Custom option gives the user the capability of creating a specialized Reset Ratio curve. Setting two points on the Reset Ratio chart generates the customized curve. Each point requires a System Water Temperature and an Outdoor Temperature. The line connecting the two points will be the customized reset ratio.
- Reset Ratios are adjustable based on the building and application. See suggested ratios on page 2.

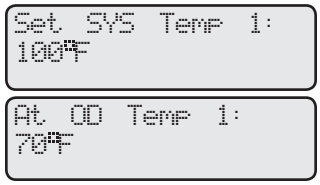
Custom Outdoor Reset Curve

(Available when Startup Control Mode = Outdoor Reset)

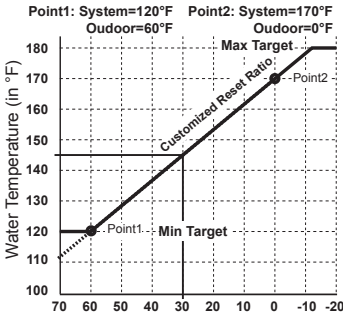
Options: **Sys Temp 1, 2 (-10ºF/21ºC) to (210ºF/99ºC) Default: 1(100ºF/38ºC), 2(171ºF/77ºC)**

Options: **Outdoor Temp 1, 2 (-10ºF/-23ºC) to (100ºF/38ºC) Default: 1(70ºF/21ºC), 2(0ºF/-18ºC)**

SET */<Out. Reset>/Reset Ratio/Custom*



- For situations where the provided reset ratios do not provide the perfect building heat-loss equilibrium, the customized option can be used.
- The Custom Reset Ratio is only available when Custom is selected from the Reset Ratio menu option. It provides the user with the capability of assigning two points on the reset ratio diagram and use the line that connects those two points as the customized reset ratio curve. Each of the two points will need a specific System and Outdoor Temperature to identify it on the diagram.
- To Set the first point, specify Sys Temp 1, and OD Temp 1. Then, specify Sys Temp 2, and OD Temp 2, to set the second point on the curve. The two points can be any where on the line, not necessarily at the ends.
- The chart shows an example of a customized curve 6(OD):5(SYS) that do not exist in the standard curve options. If the outdoor temperature reaches 30ºF, the system target will be 145ºF.
- Remember that the Min Target and Max Target apply to all reset ratios including the customized reset ratio ones.

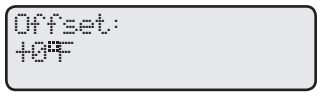


Custom Reset Ratio

Offset

(Available when Startup Control Mode = Outdoor Reset)

Options: **From -40ºF/-22ºC to +40ºF/+22ºC Default: 0ºF/0ºC**



SET */<Out. Reset>/Offset*

- The Offset setting lets you adjust the starting points of the Reset Ratio curves. This means that, regardless of the Outdoor temperature (OD), or the Reset Ratio that has been selected, when the Offset setting is changed, that change is directly added to or subtracted from the calculated temperature/Target. For example, if the Set Point temperature was 130°F and the Offset was changed from 0° to +10°, then the Set Point temperature would increase to 140°F
- If required: **Adjust the Water Offset in mild weather**. If the ambient building temperatures are too warm in the mild weather, decrease the Offset. If the ambient building temperatures are too cold in the mild weather, increase the Offset. The rule of thumb for baseboard radiation is to change the Offset 4°F for every 1°F you wish to change the building temperatures. In radiant heat applications, change the Offset 1°F or 2°F for every 1°F you wish to change the building temperature.

Outdoor Cutoff

Options: **Off, 20ºF/0ºC to 100ºF/25ºC, On Default: 65ºF**

SET */Set Point/Cutoff* **in Set Point**

SET */Set Point/<Out. Reset>/Cutoff* **in Reset**

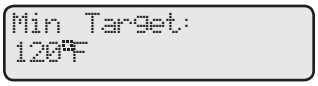
- In Set Point, if the outdoor sensor is installed, the Outdoor Cutoff setting screen will automatically appear after the temperature Set Point has been selected.
- The Outdoor and its Cutoff temperatures can be viewed from the default screen by clicking the Up or Down buttons.
- When the outdoor temperature falls to the adjustable Outdoor Cutoff temperature, the HWE-MOV will control the System Pump and Motorized valve relays to provide heat.
- When the outdoor temperature rises to the Outdoor Cutoff plus a 2°F differential, the HWE-MOV will energize the Motorized Valve Close relay for 6 minutes to guarantee valve closure. The System relay will remain energized for the Run-On delay.
- The Outdoor Cutoff can be set from 20°F to 100°F. In addition, the Setting can be set to ON or OFF. If ON is selected, the System Relay will energize regardless of the Outdoor temperature and the HWE-MOV will the control the motorized valve to hold the target temperature. If OFF is selected, the System and Open relays will always be off.

Minimum Target

(Available when Startup Control Mode = Outdoor Reset)

Options: **From 70ºF/21ºC to 180ºF/77ºC** **Default: 70ºF/27ºC**

SET */Set Point/<Out. Reset>/Min. Tgt*



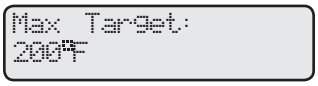
- The Minimum Target Temperature must be set to the system design specification. The HWE-MOV will calculate the Target based on the Outdoor temperature (OD), the Reset Ratio, and the Offset value. The HWE-MOV will control the motorized valve to hold either the calculated temperature or the Minimum Target Temperature whichever is higher.
- The Minimum Target Temperature must be at least 20°F lower than the Maximum Temperature (See next setting).

Maximum Target

(Available when Startup Control Mode = Outdoor Reset)

Options: **From 90ºF/38ºC to 240ºF/116ºC** **Default: 240ºF/116ºC**

SET */Set Point/<Out. Reset>/Max. Tgt*



- This is the highest temperature heating water the HWE-MOV will circulate through the heating system.
- When using a radiation system, it should be set according to the tubing or floor manufacturer's specification.
- The Maximum Temperature must be at least 20°F higher than the Minimum Temperature.

Run-On

Options: **From 0 min to 60 min** **Default: 2 min**

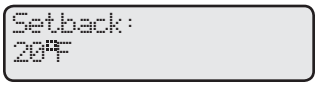
SET */Settings>/Run On*

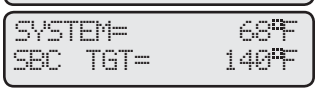
- The SYS relay will energize whenever the Outdoor temperature is below the Outdoor Cutoff. When the Outdoor temperature increases 2°F above the Outdoor Cutoff, the SYS relay will stay on for a period set by the System Run-On. This allows the Pump to dissipate the residual heat within the system back into the building.
- The System Run-On time should be set based on the size and type of the piping and pumps.

Setback

Options: **From 0ºF/0ºC to 80ºF/44ºC** **Default: 11ºF/6ºC**

SET */Settings>/Setback.*





- The Setback feature can be used to provide the HWE-MOV with a lower temperature Set Point when less load is required.
- The lower Set Point will appear on the main display indicating SBC TGT= .
- For example; when the calculated temperature is 160°F and the Setback is set to 20°F, a setback call will change the Set Point to (160v - 20°F) 140°F.
- A typical use for Setback is to provide less system temperature to a building during the night or on the weekends when building is not occupied, but heat is still required.
- The Setback is activated by closing/shorting the P+ and P- terminals using an external timer.

Boost

Options: **Yes, No** **Default: No**

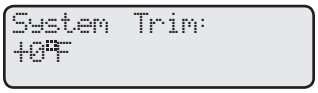
SET */Settings>/Setback/Boost.*

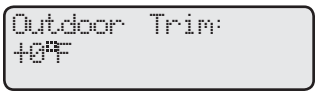
- The morning Boost is designed to return the building to comfortable ambient temperatures after the Night (Setback) period. The HWE-MOV will accomplish this by running elevated water temperatures (will add Setback setting to calculated water temperature) for 30 minutes after the opening of the setback terminals P+ and P-. That is, if the normal set point at a specific outdoor was 145˚F and the Setback setting was 20˚F, the boost will raise the system calculated temperature to 165˚F for 30 minutes after the setback.

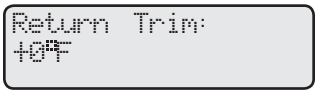
System, Outdoor, and Boiler Return Trim

Options: **From -20Fº/-11Cº to +20Fº/+11Cº** **Default: 11Fº/6Cº**

SET */<Maintenance>/Sys. Trm, Out. Trim, or Ret. Trim*







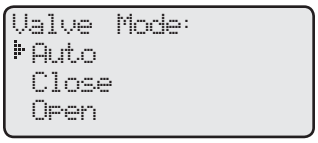
- The Heat-Timer sensors are very accurate. However, sometime it might be beneficial to adjust the values to match and existing system. The System and Outdoor Trim values adjust the System Sensor and Outdoor Sensor readings using positive or negative values.

Valve Mode

Options: **Auto, Close, Open** **Default: Auto**

SET */<Maintenance>/Valve*

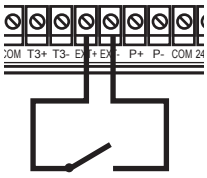
- The Auto option allows the HWE-MOV to modulate and pulse the valve open or close to achieve a specific target temperature.
- The Close option will energize the Close relay constantly. This is useful in cases of equipment repairs and testing.
- The Open option will energize the Open relay constantly. This is useful in cases of equipment repairs and testing.



Enable/Disable Input

- The HWE-MOV will provide heat only if the EXT- and EXT+ terminals are shorted. If no external equipment or switch is connected to these terminals, leave the factory installed jumper.
- When the terminals are OPEN, the Target will display TSTAT OPEN.
- Even if the EXT terminals are open, a call for DHW will energize the output relays based on the DHW Priority configuration.
- The Enable /Disable terminals can be used as a Summer/Winter switch when connected to an external switch.

Enable/Disable Wiring



NOTE: On a sensor fault while the Enable/Disable terminals are open, the control will follow the Enable /Disable state regardless of the sensor fault condition.

Troubleshoot

No Display or LED Lights

Check the power to the HWE-MOV. The HWE-MOV requires 120VAC power to the Black wires or 24VAC to the right most terminals. Turn the power off and back on to restore the display. If unsuccessful, make sure the Display Cover of the control is securely mounted to the Base.

System or Outdoor Reads OPEN or SHORT

If Open, short the sensor input terminals. The display should read SHORT. If it doesn't, the HWE-MOV may be damaged. If Short, remove the wires from the input terminals. The display should read OPEN. If it doesn't, the HWE-MOV may be damaged.

System or Outdoor Reads an Incorrect Temperature

Remove the wires from the input terminals. The display should change to read OPEN. If it doesn't, the HWE-MOV may be damaged. Take an ohm reading across the detached sensor wires. The ohm reading should correspond to the Temperature Sensor Chart. If the difference is within 5°F adjust the Trim for the sensor Otherwise, the sensor may be damaged.

No Heat - All LEDs are OFF

Check the outdoor temperature and Outdoor Cutoff readings. If the outdoor temperature is above the Outdoor Cutoff, the HWE-MOV will not give heat. If the display shows TSTAT OPEN then, check the *EXT*± terminals. If the *EXT*± terminals are not jumped together, the HWE-MOV will not give heat. Finally, if the display shows MANUAL CLOSE then, the Valve Mode has been set to Close. Change Valve Mode to AUTO.

No Heat - System Pump LED ON - Pump Not Running

Remove any connections to the Yellow wires for the Heating System Pump. Test for continuity across the pair of Yellow wires. If the wires are continuous, the HWE-MOV is calling for the Heating System Pump to run. and the problem is not with the HWE-MOV. Check the power source and the pump to determine why it is not circulating.

No Heat - System Pump LED ON - Pump Running

Check that the boiler (or other hot water source) is providing hot water to the inlet of the motorized valve. If hot water is available, check that System temperature reading is lower than the Target. If it is, then, remove all wiring to the motorized valve and check for continuity across the MOV's Red and White wires when the Middle LED is ON. If the continuity exists, the HWE-MOV is working properly, check the valve and motor.

Too Little Heat

First check that the Outdoor sensor reads a temperature not Short or Open. If it does and Sensor Fault has been set to Output Off, the HWE-MOV will try to maintain the Minimum Target temperature. Follow the System or Outdoor Reads Open or Short section. Repair or replace the faulty sensor. Otherwise, if all sensor readings are accurate, check if the Target temperature is the same as the Maximum Target. If so, check the Maximum Target has not been set too low for the system (DO NOT increase the Maximum Target without consulting the installer or tubing/flooring manufacturer). Finally, adjust the Reset Ratio or Offset to increase the temperature of the circulating hot water. Note that, depending on the type of radiation, it may take several hours before the ambient temperature increases.

Too Much Heat

Check if the Outdoor or System sensor is not reading SHORT or OPEN. Follow the System or Outdoor Reads Open or Short section. If Sensor Fault was set to Output ON, the HWE-MOV will provide excess heat to the building. Repair or replace the faulty sensor. Otherwise, if all sensor readings are accurate, adjust the Reset Ratio or Offset to decrease the temperature of the circulating hot water.

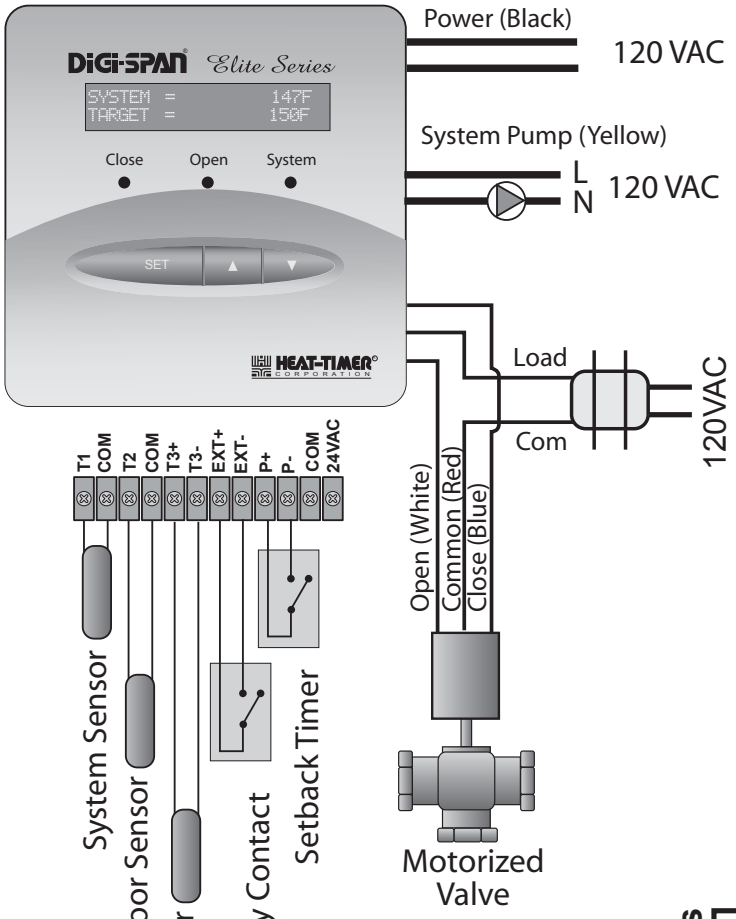
Temperature Sensor Chart

TEMPERATURE (in Degrees °F)	Value (in Ohms)
-30	117720
-20	82823
-10	59076
0	42683
10	31215
20	23089
25	19939
30	17264
35	14985
40	13040
45	11374
50	9944
55	8714
60	7653
70	5941
80	4649
90	3667

TEMPERATURE (in Degrees °F)	Value (in Ohms)
100	2914
110	2332
120	1879
130	1524
140	1243
150	1021
160	842
170	699
180	583
190	489
200	412
210	349
220	297
230	253
240	217
250	187

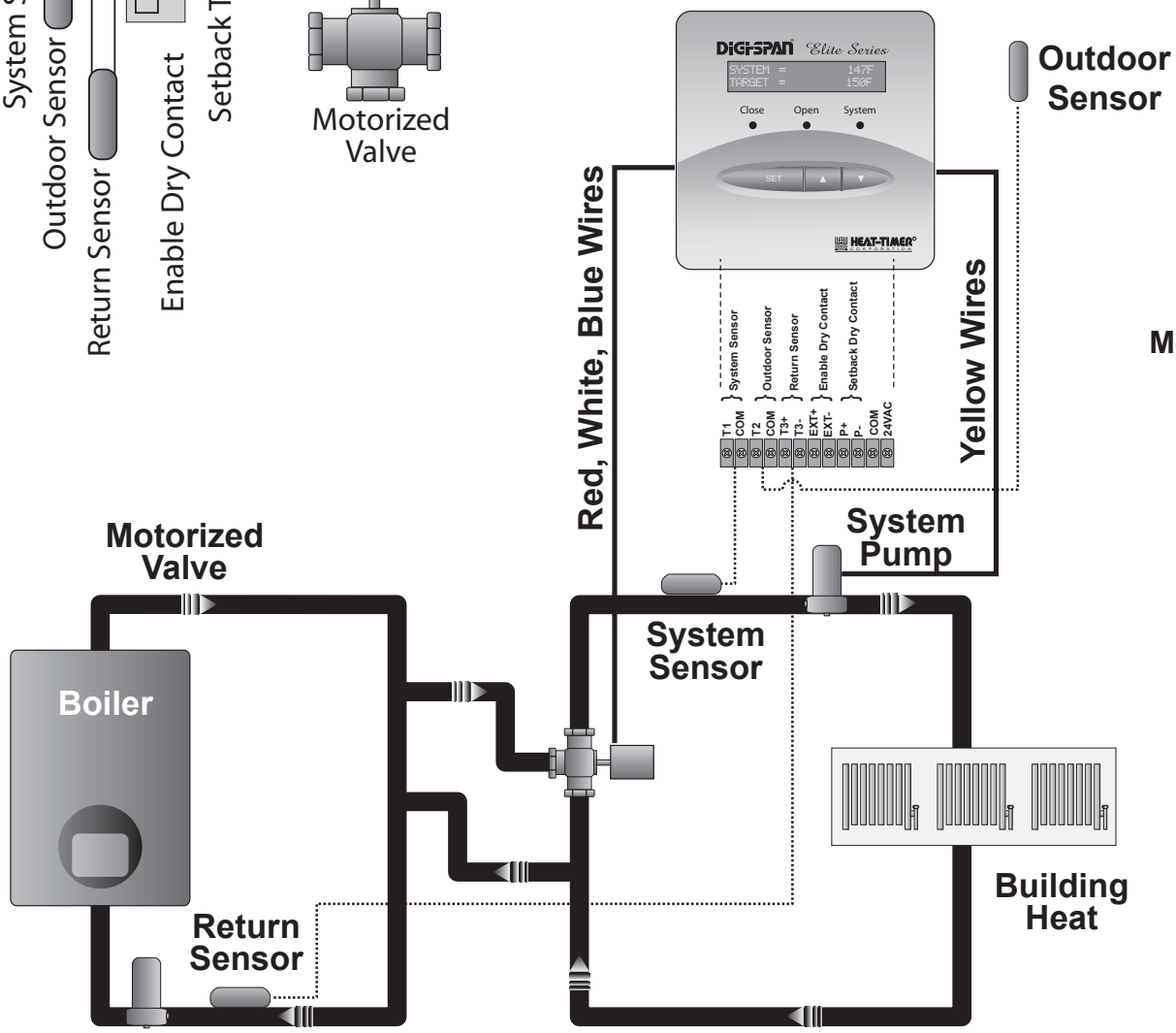
HWE-MOV Plumbing and Wiring Diagrams

Electrical



NOTE: The diagrams are conceptual only. Heat-Timer is aware that each installation is unique, however, the diagrams in this document are to represent control operation concept. It is the installer responsibility to comply with local codes and to install safety controls.

Mechanical



Specifications

Voltage Input: 120 VAC 60 Hz(2 Black wires) /24VAC 60 Hz (24VAc terminals) (Only One Power Source)
Power Consumption: 3 VA Max
Operating Temperature: 20°F to 120°F
Operating Humidity: 20% to 80%
Dimensions: 4"W x 4"H x 2½"
Weight: 1 pound
Display: Back Lite 2 Line Alphanumeric LCD Display
Display Units: Fahrenheit (ºF) and Celsius (ºC)
Outputs: 3 S.P.S.T (Yellow = System Pump.), (White = Open MOV.), (Blue = Close MOV), (Red = MOV Common)
Output Relay Ratings: 1 Amp inductive (Maximum of 1/8 HP), 6Amp resistive at 120 VAC 60 Hz
Control Modes: Outdoor Reset, Set Point
Reset Ratios: 12 Standard ranging from 8:1 to 1:4 (Outdoor: System), and one Custom
Set Point: from -10˚F (-23˚C) to 230˚F (110˚C)
Pump Run-On: from 0 to 60 minutes
Minimum Boiler Return: 120˚F (158˚C) Requires a Return Sensor (Optional)
Valve Mode: Auto, Close , Open
Setback: from 0˚F (0˚C) to 80˚F (44˚C)
Boost: Yes, No
Sensor Fault Operating Options: Output On or Output Off
Temperature Ranges: from -10˚F (-23˚C) to 230˚F (110˚C)
LED: 3 representing the Output relays (Left=Close, Middle=Open, Right=System Pump)
Buttons: 3 (Set, Up, Down)
Enable/Disable: Terminals EXT+, EXT-