

# AquaHeat Digital Thermostat 450010 - Dual Sensing

ComfortPro Systems  
**AquaHeat**



New Product!



- Superior comfort control
  - Ultimate floor protection features
  - Maximum Energy Efficiency
  - Simplest Installation
  - Direct System Control
  - Modern, small, compact design

## Key Features

- Electronic 24V thermostat with LCD display
- Easy three button control
- Superior comfort control through accurate temperature sensitivity reading in 0.2°F steps
- Set-back/Night Reduction Modes
- External Timer Programmable
- Included External Sensor
- Switchable Dual Sensor Operation
- High Temperature limiter
- Low Temperature limiter
- Software Controlled Heating or Cooling Operation
- Direct control of up to four manifold and zone actuators
- Small, compact design

## Description

Its many state-of-the-art features make AquaHeat 450010 digital dual sensing thermostats the most versatile and best performing room control in its value range. A simple and straight forward install menu for programming and operation enables a quick and reliable setup. All features are programmable through the three button controlled LCD screen menu.

The 450010 dual sensing thermostat provides accurate reading of room and floor conditions and with our +/- 0.2°F temperature accuracy, your customers will be comfortable and protect their HVAC systems. Target temperature is being adjusted through a proportional integration function which guarantees maximum regulation efficiency. The thermostat works in either heating, cooling, set back or timer compatible modes.

It is a single device that can directly operate up to four manifold or zone actuators on 24V<sub>AC</sub> power. The thermostat further features a direct connection possibility for pump relays and auxiliary circuit components.

The dual sensing thermostat with its external probe included allows for the integration in heat/freeze-sensitive flooring applications (wood, marble) either through its maximum temperature limiting function or through its minimum temperature setting to maintain a specific slab temperature in the event the home is un-occupied during cold months.

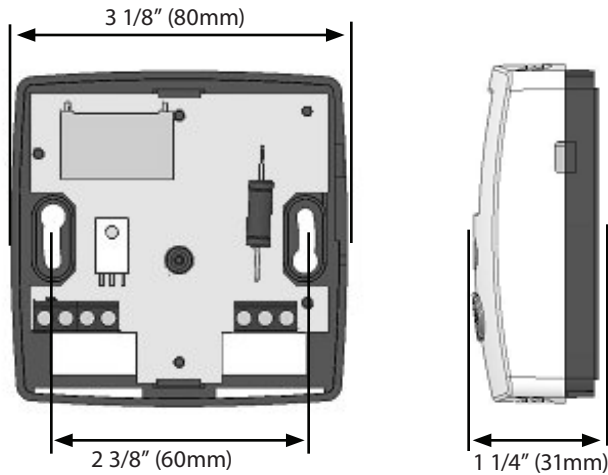
Setback and timer modes can achieve an energy savings of up to 30% over conventional thermostats. Timer function is achieved through an optional timer control module in a central location like the AquaHeat Pro Clock Timer.

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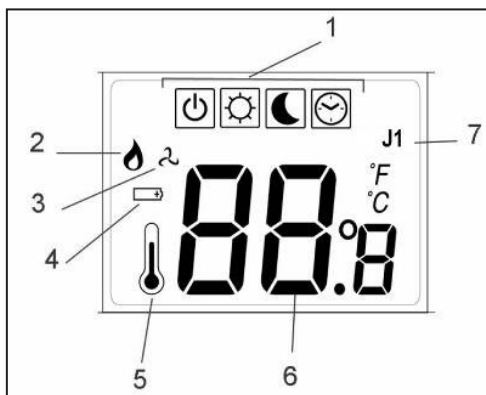
### Dimensions



### Specifications

Measured Temperature Precision	0.2°F
Operating temperature	32°F – 122°F
Temperature Setting Range	41°F - 99°F in 0.5°F increments
Regulation Characteristics	Proportional Integral regulation Cycle: 15 minutes or Static differential 0.5°F Anti-short cycle: 3min in OFF, 2min in ON.
Electrical Protection	Class II - IP30
Power Supply	24 V <sub>AC</sub> +/- 10%
Output	TRIAC output 24 V <sub>AC</sub> , 15 VA max. (4 actuators CPS #450002)
External Floor Sensor	NTC (10K Ohms) 9ft
Dimensions	3 1/8" L x 3 1/8" H x 1 1/4" W

### Display



- 1: Operating mode menu
- 2: Heating indication
- 3: Cooling indication
- 4: Not applicable (Low Battery)
- 5: If lit-up 6 displays the measured temperature
- 6: Measured temperature or set temperature
- 7: Programming feature Menu

### Modes Of Operations

Operational Modes are selected via the easy three button controlled, on-display menu by repeatedly pressing the OK button. Comfort Setting describes desired normal day time temperature settings. Night Reduction/Efficiency Mode reduces the Comfort temperature to the reduced temperature. With an external timer/controller module comfort and Night reduction/efficiency modes can be overridden.

- ☀ COMFORT operating mode  
Force comfort temperature operation indefinitely. By pressing +/- keys the comfort temperature setting starts to blink and can be adjusted.
- 🌙 Night Reduction/Efficiency operating mode  
Forces reduced temperature operation indefinitely. By pressing +/- keys the reduced temperature setting starts to blink and can be adjusted.
- 🕒 Timer or External Control mode  
Thermostat will follow the external control signal.
  - ☀ Blinking to indicate a comfort signal.
  - 🌙 Blinking to indicate a reduced signal.

### Thermostat Configuration Menu

Menu ID	Description	De- fault
J0	°C / °F temperature display selection	°F
J1	Heating/Cooling Operation Selector (value: "Hot"/"Cold")	Hot
Cy	Proportional Integral regulation time cycle value in minutes	15 min.
bp	Proportional Integral regulation band amplitude value [°F] (default:)	3.6°F
J4	Actuator Type Selector (value: "NC" -normally closed, "NO" -normally open)	NC
J5	Switches PNP to perform a one minute exercise everyday	pn <sub>p</sub>
J6	Sensor selector (values Air, Flr)	Air
J7	Selector Proportional Integral (rEG) or Hysteresis (HYs)	rEG
Cp	Compensation Value, Professionals only	3.6°F
Ao	Internal (Air) sensor offset adjustment	Off
Fo	Floor sensor offset adjustment	Off
FL	Floor low temperature limitation	41°F
FH	Floor high temperature limitation	82°F
CLr	Resets Thermostat parameters to factory default (press for 5 seconds)	
End	Exit Installation Menu and return to normal operation	

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### Configuring Thermostat

Due to its versatile features, AquaHeat 450010 digital dual sensing thermostats can be configured for almost all applications in modern heating and cooling systems. To accomplish an adequate feature set for specific requirements, the thermostat has to be adjusted to the desired system setup through the on-screen configuration menu.

#### Enter/Exit Configuration Menu

Press the OK button for more than 5 seconds to enter the configuration menu, Then use + or - keys to select the configuration parameter to be adjusted.

When you have finished adjusting parameters, use + / - keys to switch menu items until the 'End' item is being displayed and then press OK to exit the configuration menu.

#### Change Configuration Menu Parameters

Press OK to toggle the parameter setting or edit the value. If the value starts to blink you can use + / - keys to adjust this value. Press + / - keys at the same time to reset this value to the factory default value. Once you have adjusted the value press OK to validate this parameter value.

### Configuration Example

Setting the Floor temperature limit with external sensor in a hardwood floor application where the temperature cannot exceed 78°F

Make sure the thermostat is attached to 24V<sub>AC</sub> power supply, actuators, and the external floor sensor is connected to the thermostat.

1. Enter the configuration menu by pressing OK button for more than 5 seconds.
2. Navigate with the + and - buttons on the menu until you see menu item "J6" displayed.
3. Press OK button again to enter the configuration parameter change level.
4. By pressing + and - buttons adjust configuration parameter to AF (Air and floor sensor active). In this case the floor sensor works as a limiting sensor.
5. Press OK button to confirm the selection.
6. To set the high limit temperature of 78°F now navigate to menu item "FH" and press OK to enter the configuration parameter change level.
7. Pressing + or - buttons until the desired value of 78°F shows on the display.
8. Press OK button to confirm the selection.
9. When configuration is done navigate to the "End" menu item and press OK button to exit the configuration menu.

### Configuration Parameter Overview

#### J0 Temperature Display Unit Selector

You can switch between degree Celsius or degree Fahrenheit with the factory default set to Celsius. The selected temperature value system is displayed on the center - right hand side of the display.

#### J1 Heating/Cooling Selector

The versatile 450010 thermostat can be used for heating and cooling (i.e. air conditioning) applications. Factory default is set to "heating" - visible in the configuration menu as "Hot" when J1 is selected. If you need to control a "cooling" application, the "Cold" selection reverses the open/closed circuit output of the thermostat, such that the thermostat signals the actuator to open when the temperature is rising above the target room temperature instead of a closing signal when in "heating" mode.

#### J4 NC/NO Actuator Selector

Selects the actuator type of either "Normally Closed" (NC) or "Normally Open" (NO). In most manifold zone loops, NC actuators are being used. If a zone valve in front of a heating loop is being used, i.e. 1 zone systems a Normally Open (NO) might be used.

#### J5 Pump Exercise Selector

With this option selected it forces the system to pump fresh water through the circuit on a daily basis. This 1 minute circulation maintains the system functions while not regularly in use like a heating system in summer or provides freeze protection during the winter month if the area is not in use. Default value is "pnp" (on).

#### J6 Sensor Selector

The 450010 can measure air and/or floor temperatures through the internal or included external slab sensor (9ft cable). The slab sensor is installed by lowering through a conduit into the floor slab. Select whether to use the internal sensor (Air) only, external sensor only (Flr). Default value set to Air (Internal sensor) and Flr (external sensor).

Note: If both floor and air sensor are being used, floor sensor works as a temperature limiter.

#### J7 Proportional Integral/Static Hysteresis Selector

Proportional Integral control mechanism builds the basis in modern HVAC control systems and particularly should be selected for floor heating applications. It is superior in the

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### Configuration Parameter (cont.)

precision over regular static controls and eliminates the typical off-set problem in the system. It further minimizes circulator/pump time operation to regulate secondary circuit flow. Proportional Integral control method is set as default value (rEG).

#### Cy PI Regulation Time Cycle

Regulating the proportional integral control method reacts to signals from the floor or air sensor. The response time between a measurement and the controlling signal output is dependent on the floor heating or the cooling environment in your application. For example a thick concrete slab based floor heating loop reacts slower than a dry below or dry above installed floor loop. In order to adjust thermostat regulation response times to specific installation conditions, the PI regulation time cycle can be adapted to the requirements. The default value is set to 15 minutes.

#### bp PI Band Amplitude Regulator

Certain floor installation conditions may require an adjustment in the regulation band amplitudes. Within the measured temperature band, the control will operate to react to signal responses, typically in the 2°F - 4°F range. The default value is set to 3.6°F.

#### Cp Compensation Value

This Parameter should only be adjusted by an Installation Professional. Cp allows for calibration between the displayed temperature reading and a calibrated temperature reading.

#### A0 Internal Sensor Offset Adjustment

In specific cases of heating or cooling installations, the displayed room temperature through the thermostat might deviate from the internal sensor measured room temperature. In this case the internal sensor can be off-set to adjust for the incorrect reading. Default value is "no off-set".

#### F0 Floor Sensor Offset Adjustment

In specific cases of heating or cooling installations the measured floor temperature through the thermostat's external sensor might deviate from the floor sensor measured temperature reading. In this case the floor sensor can be off-set to adjust for the incorrect reading. Default value is "no off-set".

#### FH Floor Sensor High Temperature Limit

This Parameter sets the highest temperature at which the thermostat turns heating circuit on to deliver heat. This limit is set to provide overheating of the floor or room heating

system. This parameter only affects applications in which the internal and external sensors are both enabled ("AF" setting in J6 configuration menu item). Default value for the high temperature limit is set to 82°F.

#### FL Floor Sensor Low Temperature Limit

This Parameter sets the Lowest floor temperature reading before the thermostat turns heating circuits on to deliver heat. This limit is set to provide freeze protection of the floor or room. This parameter only affects applications in which the internal and external sensors are both enabled ("AF" setting in J6 configuration menu item). Default value for Low temperature limit is set to 41°F.

#### Clr Clear All Configuration Selector

Selecting the clear all configuration option (Clr) resets all parameters and configuration switches to factory defaults. It allows for new configuration of the thermostat. As a precaution against accidental reset, press the OK button for a minimum 5 seconds to invoke the reset function.

#### End Configuration menu selection

Select this menu option to end configuring and exit the menu. Once pressed, regular thermostat operation resumes.

### Optional System Components

450014	ProZone Transformer 24VAC, 60VA
450003/4	4/6 ProZone Multi-Zone Control Box
450007	Pro Clock Timer Control Box
450002	ProMix Zone Actuator, NC, 4-Wire
760002	ProLock Zone Actuator, NC, 4-Wire

ComfortPro Systems LLC  
9645 Willow Lane Mokena, IL 60448  
Phone: 1-800-968-8905  
www.comfortprosystems.com

#### Representative