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1. What is the AquaSmart?

The Beckett AquaSmart is an advanced triple acting boiler temperature control (BTC) designed for use on residential and light commercial boiler systems. A triple acting BTC incorporates a High and Low limit with differential functions. The triple acting BTC also controls circulator functions. This employs a BTC that acts in reverse. The reverse BTC opens to turn the circulator off if boiler water temperature drops below a set temperature, typically to maintain a minimum boiler temperature in both the High and Low limit functions. The circulator circulates the heat transfer fluid to the heated zone. The Beckett AquaSmart comes equipped with the Department of Energy (DOE) 2012 compliant HeatManager. All models include the option of enabling the Beckett HeatManager load-matching energy saving calculation. When selected it provides up to 20% fuel consumption savings.

2. What is the Beckett HeatManager Calculation?

The HeatManager saves fuel by dynamically changing the temperature high operating limit to the minimum temperature necessary to meet the heating demand. The contractor can adjust the HeatManager calculation to maximize comfort or energy savings. The HeatManager calculation is designed to operate the boiler at its lowest possible temperature while still meeting the heating demand. By dynamically changing the boiler temperature, it is designed to reduce the energy used by the system without sacrificing comfort.

3. How does this new HeatManager logic compare to the HeatManager Classic we are familiar with?

As opposed to the new HeatManager calculation the Beckett HeatManager Classic works to hold off the burner from firing if the outlet water temperature from the boiler is warm enough to still heat the home. This causes the burner to cycle less and indirectly lowers the average boiler water temperature, which generates fuel savings.

The Beckett AquaSmart HeatManager calculation adjusts the high limit of the boiler based how long the system is on or off. If the system is calling for heat, the adjusted high limit will increase over time but never above the high limit set point. If the system is not calling for heat, the adjusted high limit will decrease over time. The minimum temperature the AquaSmart will allow the adjusted high limit to drop is based on a number of factors including the high limit, low limit, differentials, and HeatManager efficiency settings.

The AquaSmart HeatManager never overrides the low limit, which can be beneficial in keeping hot water available in tankless coil systems. If Domestic Hot Water Priority (DHWP) is set on one of the AquaSmart's inputs, a priority heat call will temporarily override the operation of the HeatManager.

4. How do you know how to set the HeatManager function for different applications?

The default HIGH efficiency setting should work best for most systems. However, there are many system factors that may have an effect on its ability to react to changes quickly enough and supply adequate heat, such as the amount of connected radiation, boiler size, system design temperatures, etc. The efficiency setting adjusts how aggressively the HeatManager calculation attempts to reduce the boiler operating temperature. If a loss of comfort is experienced, decreasing the efficiency setting will help regain comfort at the expense of fuel savings.

5. How will the new HeatManager calculation interact with a system utilizing a tankless coil?

The HeatManager calculation will positively affect the hot water available in a system utilizing a tankless coil. Because the HeatManager does not change the low limit setting to accommodate the tankless coil or "hold off" the burner when it needs to fire, you can expect more consistency in your hot water supply.



6. Does the AquaSmart have any other fuel efficiency features?

Yes, one of the AquaSmart's advanced features is the Circulator-off delay. Once the call for heat is satisfied the circulator-off delay holds the circulator pump on for the delay period. The Circulator-off Delay increases the efficiency of the system by delivering more heat to the Zones instead of keeping it in the boiler or losing it up the chimney.

7. What other advanced features does the AquaSmart have?

There are several. They are as follows:

Circulator-On Delay: Once a call for heat is received the Circulator-On Delay holds the circulator pump off for the delay period. This allows the boiler to heat up faster and spend less time in the condensing range. Consequently this reduces the amount of condensation produced, which enhances the life of the boiler.

Domestic Hot Water Priority: The Domestic Hot Water Priority (DHWP) setting ensures that hot water will be produced when needed by temporarily overriding the HeatManager Dynamic Temperature Reset functionality when there is a call for domestic hot water. The Domestic Hot Water Priority has a maximum duration of twenty minutes.

Circulator Seize-up Protection: There are times when the circulator may be inactive for an extended period of time, especially during the summer months. This feature will briefly energize the circulator periodically exercising the circulator pump, which helps to prevent seize-up during the summer months.

Automatic Freeze-up Resistance: Automatic Freeze-up Resistance is when the circulator circulates water to all zones calling for heat during most control or system failure modes which delays or prevents pipes from freezing. This normally happens when the burner has been in failure for one hour or the AquaSmart has been in lockout for one hour (Except in low voltage situations).

Advanced 2N1 Self-checking Sensor: The 2N1 AquaSmart sensor measures both “boiler water temperature” and “presence of water” (low water cut-off) functions. The AquaSmart’s 2N1 sensor continually performs internal self-checks to determine if the sensor is operating properly. With the AquaSmart you can also view Boiler Cycle History

8. Is the AquaSmart available for Gas applications?

Yes, both Oil and Gas offerings are available.

9. What can cause the AquaSmart to lockout?

There are four reasons for the AquaSmart to lockout.

- The AquaSmart will lockout when the **2N1 Self-checking Sensor** either detects an internal error or is not communicating properly with the control. The AquaSmart will not reset from this condition until it can detect a properly working sensor.
- When an **internal safety check**, such as the check on the B1 relay contacts has failed, the control will lockout. To reset from this condition hold the “ENTER (RESET)” key for 5 seconds. If the error occurs again, replace the control.
- The AquaSmart will lockout when the **“ENTER (RESET)” key** is held for 5 seconds or longer. (Manual Shutdown) The control’s operation will be temporarily suspended and will resume normal operation once the “ENTER (RESET)” button is released.
- The AquaSmart will lockout when a **low water condition** is detected. If the control is set to “MAN” you will need hold down the “ENTER (RESET)” key for 5 seconds. If the control is set on “Auto” it will reset automatically.



10. What options do I have when mounting the AquaSmart?

There are two basic mounting options for the AquaSmart™ control, the immersion well method and the surface method. The surface method is also referred to as a wall mount. Mounting the AquaSmart directly to the immersion well is the most common method. The AquaSmart temperature sensor mounts in standard immersion wells. Surface mounting is sometimes required and is part of the AquaSmart™ base design. It is also retrofit compatible with most standard boiler temperature controls.

11. When wiring the AquaSmart does the color of the wires have any significance?

Besides for using the white wire for neutral, black for hot and green for the ground there is no significance to the colors of the wires. On the other hand the terminals on the AquaSmart are approved for copper wire only.

12. What are the electrical ratings for the AquaSmart?

The Burner Circuit is 120Vac for the oil control and 24Vac for gas while the Circulator Control is 120Vac. The AquaSmart has a 120Vac Zone Control and is 24 Vac thermostats compatible.

13. Since the AquaSmart is made of plastic will the wiring knockouts hold up?

Yes, the AquaSmart control has five different knockouts. There is one on both the right and left side and three more on the bottom of the unit. The knockouts are reinforced with a steel plate to secure conduit connectors and provide grounding.

14. How difficult is the AquaSmart to program?

The AquaSmart control is equipped with an installer easy-to-use keypad along with a prominent backlit LCD digital display. All of the basic functions, including High and Low Limit and High and Low Differential are easily accessible on the face of the programming panel.



15. What happens if I inadvertently select temperature settings that overlap each other?

The AquaSmart will not allow overlapping temperature settings to be selected. For example: If the HIGH LIMIT is set to 180°F and both the HIGH DIFF and LOW DIFF are set to 10° F, the control will not allow a LOW LIMIT above 165° F to be entered.

16. Generally, what is the typical operation of the AquaSmart?

Following are typical responses to a variety of system actions.

<i>System Action</i>	<i>AquaSmart Response</i>
<i>Maintaining the Low Limit</i>	<i>Burner is turned on until the water temperature reaches the low limit plus the low differential. ZC is turned off until the water temperature reaches the low limit plus the low differential</i>
<i>Thermostat Call for Heat</i>	<i>Burner is turned on as long as the water temperature is below the high limit. Circulator is turned on after circulator-on delay if the low limit is satisfied.</i>
<i>Thermostat is Satisfied</i>	<i>Burner is turned off Circulator is turned off after circulator-off delay</i>
<i>ZR Call for Heat</i>	<i>Burner is turned on as long as the water temperature is below the high limit.</i>
<i>ZR is Satisfied</i>	<i>Burner is turned off.</i>
<i>Maintaining the High Limit</i>	<i>Burner is turned off until the water temperature falls below the high limit minus the high differential.</i>

17. How can I be sure that I have installed the AquaSmart correctly?

When you have completed the installation of the unit you will go through the Control Checkout Procedure.

These procedures are typical for the default configuration of the control. Before beginning the AquaSmart checkout procedure, make sure the control is wired and configured as is required by the application. You will find the steps for the check out procedure in the AquaSmart Information and Operation Manual.

CAUTION! Do not leave the installation site if the AquaSmart operation did not match the descriptions in any of the steps in the checkout procedure. Make all necessary adjustments until the correct operation is verified. The checkout procedure helps to verify that the high and low limits are working properly and that the thermostat is wired correctly to the control.

18. Does the AquaSmart provide any other Benefits?

Yes, there are benefits provided in several different areas.

The homeowner should know that in a short period of time the AquaSmart will pay for itself when the HeatManager is enabled. That's right. Due to the up to 20% energy savings from our energy efficient features the homeowner will realize up to \$300 savings per year in a typical home. With conserving energy and saving money the AquaSmart is precisely what consumer is looking for.

Additionally, the homeowner benefits from increased comfort and peace of mind. The AquaSmart will give priority to a call for Domestic Hot Water. This helps to ensure a steady supply of hot water to the home. The AquaSmart will also give the homeowner added peace of mind due to its automatic freeze-up resistance feature.

Our Environment definitely Benefits with the AquaSmart. Did you know that if every Boiler in the United States used the AquaSmart control it would reduce our nation's fuel consumption by the equivalent of 24.6 million barrels of fuel/year?

We all can be a part of this solution.