AquaSmart™
ENERGY SAVING DEVICE

An electronic version of the AQUA SMART owner's manual, **Translated inFRENCH**, can be found on our website under OWNERS MANUAL.

www.aquaenergysaver.com

Une version électronique de l'AQUA SMART Manuel du propriétaire, traduit en français, peut être trouvé sur notre site web :
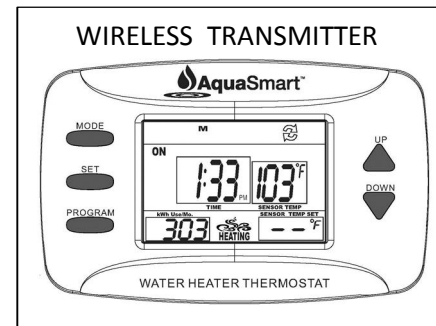
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AquaSmart™
ENERGY SAVING DEVICE

A *WIRELESS*, REMOTE CONTROL SYSTEM FOR RESIDENTIAL, ELECTRIC HOT WATER HEATERS

Installation & Operating Manual

WIRELESS TRANSMITTER

WATER HEATER THERMOSTAT

RECEIVER

Patent Pending

The **AQUA SMART™** system consists of a wireless TRANSMITTER and a RECEIVER that mounts on top of a residential, electric, hot water heater. Wiring of the **AQUA SMART™** Receiver is integrated into the standard wiring/electrical connections on a hot water heater.

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INSTALLER NOTES: *The AQUA SMART™ installation is primarily an electrical installation which may be made by an individual, an electrician or a plumber licensed or trained in electrical installations.*

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A CONVERSATION REGARDING THE ENERGY CONSUMPTION OF ELECTRIC HOT WATER HEATERS

Water heating is the second largest use of energy in homes accounting for 17% to 29% of residential energy consumption.

Two separate studies published by the U.S. DEPARTMENT OF ENERGY[1], in September 2009 & 2010, supports a major need for homeowners and businesses to address the high energy use, as well as the efficiency, of hot water heating whether using electric, natural or propane gas models.

The **AQUA SMART™** system was developed as a **RETROFIT SYSTEM** for previously installed electric hot water heaters or newly installed electric hot water heaters that do not include factory-installed, energy saving features. The **AQUA SMART™** system can save 20% and more of the energy usage of an electric hot water heater, however, *these savings depend on the* __user's proactive operation of the system__*.* No savings will be realized unless the user activates the available MODES or PROGRAMS on the system's **Transmitter** and monitors the hot water heaters electrical usage.

The **AQUA SMART™ Receiver's** wiring is integrated into the incoming power supply to the electric hot water heater and mounts on top of the water heater and operates on 208-240VAC. Once installed, the user should not have to monitor the Receiver component.

The operation of the **AQUA SMART™** system is controlled by the **Remote Transmitter** which features 4 operating **MODES** and operates, "wirelessly", from up to 100 feet from the Receiver.
- The **ON** mode is activated when the user wants to operate the hot water heater by-passing the other operating MODES in the **AQUA SMART™** system.
- In the **AWAY** mode, user can "set-back" the water heater temperature to operate between 75°F and 85°F when plans call for being away for 2 - 7 days.
- User can also enter the **VACATION** mode which operates the water heater between 40°F and 50°F when the user plans to be away from the home for longer periods of time.
- In the **PROGRAM** mode, the **user** can enter daily time/temperature settings to fit user's lifestyle or defer to the settings in the **factory-set** program.

Following the INSTALLATION instructions for mounting of the **AQUA SMART™** system on the hot water heater and understanding, the **AQUA SMART™** OPERATING INSTRUCTIONS, will provide for the maximum in **ENERGY SAVINGS**.

[1] Energy Star Water Heater Profiles- September 2009 & 2010.

The **AQUA SMART™** system was developed to allow the homeowner to <u>reduce electrical power consumption and conserve energy</u> when the homeowner is away from the home for short or extended periods of time.

With the **AQUA SMART™** system, the user can control the temperatures of the hot water, without having to go to the water heater, remove the water heater's access panels, and manually adjust the water heaters "on-board" thermostats.

<u>CONSUMER INFORMATION:</u> The **AQUA SMART™** system should be installed in accordance with the local electrical codes. In the absence of such codes, then follow the National Electrical Code (NEC), NFPA 70.

> *The **AQUA SMART™** system is designed to be installed on electric hot water heaters with current ratings up to 30 amps.*

The **AQUA SMART™** system includes a 30 amp, BY-PASS breaker allowing the user to override the system. (See page 16).

> <u>***IMPORTANT:*** *If you lack the necessary skills or understanding of the wiring of a 208-240V electric hot water heater, or you have difficulty or hesitation following these instructions, you should not proceed with this installation and should contact a qualified electrician or plumber to perform the installation of the AQUA SMART™ system.*</u>

<u>CONSUMER RESPONSIBILITIES</u>: This manual has been prepared to guide you through the proper installation, operation and maintenance of the **AQUA SMART™** system.

We urge you to read all the instructions relating to the installation and operation of this energy saving device. It is imperative that the user become **proactive** with the **programming and activation** of the energy-saving MODES to maximize the energy savings.

<u>*AQUA SMART, INC. and its manufacturing entities will not be liable for any damages caused by the improper installation and operation of this device.*</u>

UNDERSTANDING THE ADVANTAGES OF SETTING THE MODES OF OPERATION OF THE AQUA SMART™ "WIRELESS" SYSTEM WILL SAVE ENERGY COSTS THROUGHOUT THE LIFE OF THE WATER HEATER.

TECHNICAL INFORMATION

● **3-WIRE – 208-240 VOLT WIRING:** The use of 208-240 volt wiring for residential homes is necessary for powering larger appliances such as water heaters, furnaces and air conditioners. 208-240 volt wiring for a hot water heater relies on two separate "hot wires", each carrying 110-120 volts of current and a "ground wire" which may be a bare copper wire or an insulated wire, green in color. The 2 "hot wires" complete the 208-240 volt circuit, one being positively charged, the other being negatively charged. Each wire delivers electricity to the hot water heater by alternating polarities and doubling the current to the water heater. The wiring to the water heater must be connected to a breaker, rated at a maximum of 30 amps, or meet the ampere requirements for the water heater that the **AQUA SMART™** is to be installed on. The bare copper or green ground wire is attached to a grounding screw at the junction box on the water heater.

> *The AQUA SMART system is designed to be installed on electric, hot water heaters with current ratings up to 30 amps or less with wattage ratings from 3000 watts to 6000 watts.*

● **WATER HEATER INSTALLATION VIDEOS:** While the **AQUA SMART™** system is designed to be **retrofitted** to existing electric hot water heaters, it can also be installed on new water heaters that do not have factory-installed, energy saver features included. A review of a water heater installation video can be found on the web at: **www.hotwater101.com** which is very instructive. You may also want to visit website **www.waterheatertimer.com** for other technical data for installing and maintaining electric hot water heaters.

We strongly recommend that you visit the AQUA SMART™ website at: www.aquaenergysaver.com to view an installation/ instruction video for installing the AQUA SMART™ system.

> *When installing the AQUA SMART™ system, we strongly recommend you closely follow the instructions in this manual.*

TOOLS REQUIRED

- Electric Drill with 1/8" bit
- ¼" nut driver/adjustable wrench
- Wire Cutters
- Straight blade screwdriver
- Philips head screwdriver
- Punch or Nail
- Circuit tester or voltmeter

SECTION 1

INSTALLATION INSTRUCTIONS

The **AQUA SMART™** system is an energy saving device that **retrofits** on any 208-240 volt electric hot water heater. The system consists of the **Receiver** which mounts on top of the electric hot water heater. The Receiver is wired into the water heater's junction box on top of the water heater. <u>The Receiver includes 2-way signaling software that allows the Receiver and Transmitter to communicate with each other, confirming signals have been received by each other, as illustrated by an ICON on the transmitter's LCD.</u>

The **AQUA SMART™** system includes a <u>**Wireless, Remote Control Transmitter**</u> that signals the Receiver to operate in one of FOUR modes: **ON, AWAY, VACATION or PROGRAM**. The system operates on one of 1,048,576, unique security codes that are programmed into the transmitter at the factory. The Transmitter's security code must be matched to the Receiver upon **INITIAL SET-UP.** The operating distance of the **AQUA SMART™** system can be up to100 feet depending on any obstructions and/ or electrical or metallic interference between the Receiver and Transmitter. A test to verify the communication/operating distance is discussed in a later section. See pages (18-19).

⬡ **STOP**   **WATER TEMPERATURE READING FOR "BALANCING" PROCEDURE**   ⬡ **STOP**
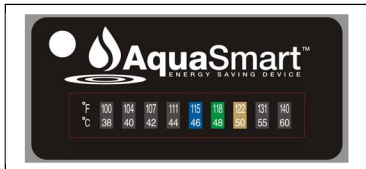
In the TRANSMITTER package, you will find a small thermometer strip you will use later in the "BALANCING" programming procedure. (See pages 23-24 for a detailed explanation of this procedure).

The "BALANCING" programming is EXTREMELY important to the proper set up of the transmitter and operation of the AQUA SMART™ system. We recommend you proceed with the above step <u>NOW</u> so that the HOT water pipe will cool down before the "BALANCING" number is entered into the Transmitter. (See pages 23-24 for the BALANCING procedure).

Draw a small glass of HOT water from a faucet that the water heater supplies and drop the thermometer strip into the water. Write down the mid-temperature reading from the strip. Save for later use when performing the "BALANCING" procedure on the Transmitter. (See Set-Up pages 23-24).


INSTALLATION INSTRUCTIONS – (continued)

> **_IMPORTANT_**_: If you lack the necessary skills or understanding of the wiring of a 208-240V electric hot water heater, or you have difficulty or hesitation following these instructions, you should not proceed with this installation and should contact a qualified electrician or plumber to perform the installation of the AQUA SMART™ system._

FIRST - SHUT OFF POWER TO HOT WATER HEATER
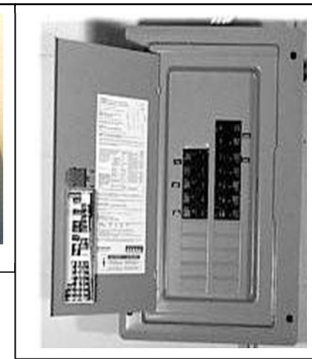
A. Shut off the electrical power to the hot water heater at the breaker panel, fuse box or power switch near the water heater.

<u>SECOND</u> - EXPOSE & TEST WIRES IN JUNCTION BOX
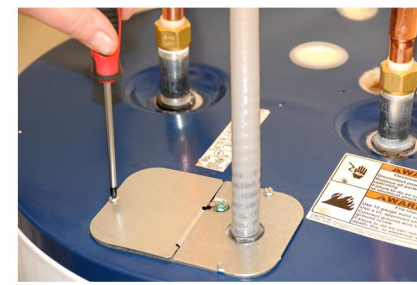
B. Remove the junction box cover(s) on top of the water heater. Use ¼" nut driver, screwdriver or wrench to remove screws.

C. Check that power has been disconnected with a circuit tester or volt meter.
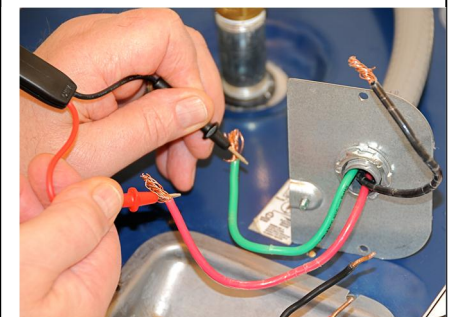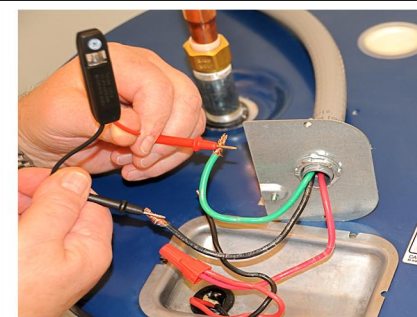
Verify that the power has been disconnected, with a voltmeter or circuit tester, testing other incoming "HOT" wires.

D. Disconnect the incoming power supply lines, cable, conduit and connector leading to the junction box on top of the water heater.

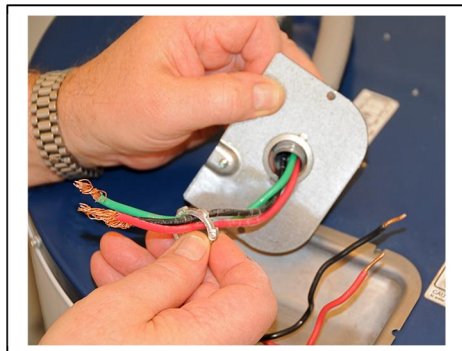E. There should be 2ea. –powering wires, plus a ground coming from the power supply. There should be 2 wires coming out of the WATER HEATER's junction box

SECTION 2

INSTALLING THE RECEIVER

Remove the 4 screws holding the receiver cover to the base and remove cover from the base. The receiver contains a plastic bag holding the components pictured below. (See pg. 9)

HARDWARE PACKAGE
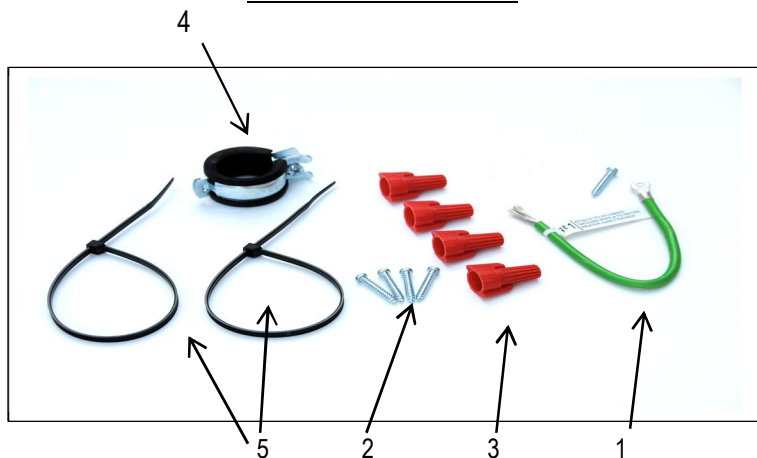
1. 1 ea. - Ground wire & Long Sheet Metal Screw (SMS) to ground water heater.
2. 4 ea. - Long Sheet Metal Screws (SMS) to mount Receiver base to top of water heater.
3. 4 ea. - Wire nuts to attach wires inside Receiver to Incoming Power & Water Heater wires.
4. 1 ea. - Pipe clamp to affix THERMAL SENSOR to HOT water pipe. (Packed with Receiver)
5. 2 ea. - plastic cable ties to affix insulating foam to HOT water pipe.

8.
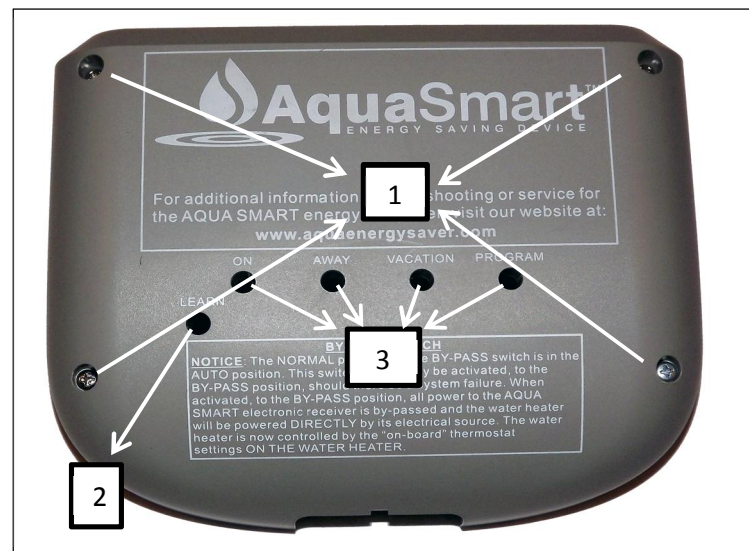
RECEIVER

RECEIVER - TOP COVER

1. 4 Mounting screws attach RECEIVER COVER to RECEIVER BASE.
2. LEARN button to accept Transmitter's security code upon **initial set-up**.
3. Illuminating LEDs indicating the 4 MODES of operation.
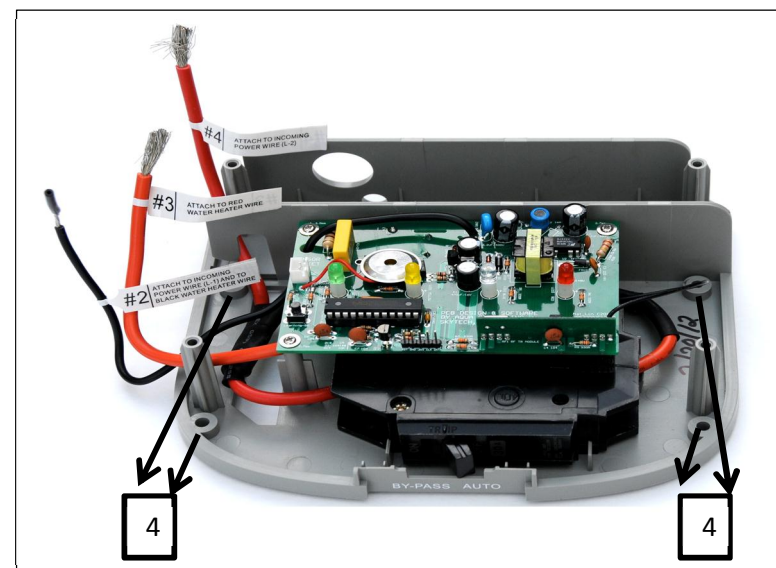
RECEIVER - MOUNTING BASE

4. Mount BASE to top of water heater with the 4 SMS provided in the hardware package. (See mounting holes #4).

9.

1. Position the Receiver BASE over the junction box **opening** on top of the water heater. Mark the position of the 4 mounting holes (on the BASE) to top of the water heater with a punch or nail.

> **NOTE:** Pull water heater wires thru the bottom opening on the BASE of Receiver.

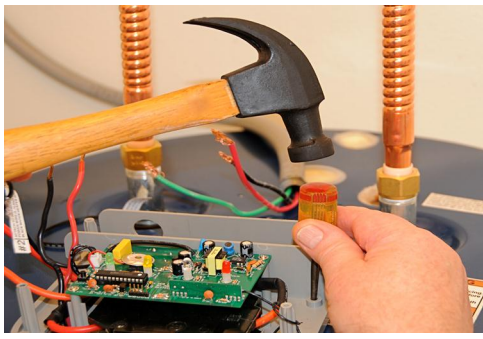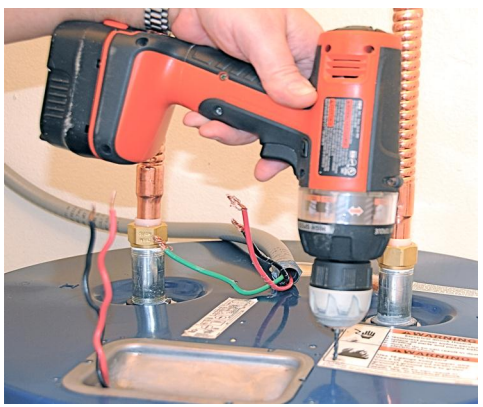**IMPORTANT:** Be sure BASE completely covers junction box opening on top of water heater. If necessary, replace one of the junction box cover plates to close any gap or opening between the water heater junction box and the area around the Receiver BASE.

2. Drill 4 ea. - 1/8" holes through the top metal jacket on water heater. **Only drill through the thin metal jacket.**

3. Drill a 1/8" hole through the bottom of the junction box to attach the **GREEN GROUND** wire.
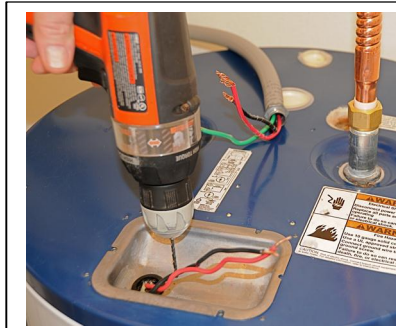
4. Attach the short, **GREEN, GROUND** wire, from the hardware package, with one of the SMS from the hardware package to the bottom of the junction box.

IMPORTANT: WATER HEATER MUST BE GROUNDED.

10.

5. Position the Receiver BASE over the wires coming from the water heaters junction box and attach the Receiver BASE to the top of the water heater with 4 of the SMS supplied in the hardware package.
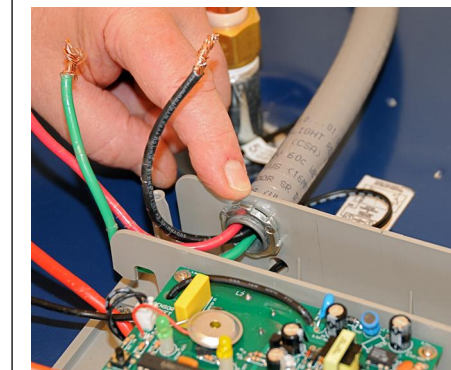
6. Using the same incoming power supply wires and connector, removed in **Step D. SECTION 1,** attach the wires/connector thru the back of the Receiver BASE in the opening and reattach connector/nut to the back of the Receiver BASE. Most installations use the ½" opening ¾" template is provided, if a larger connector was used.

AT THIS TIME, THE RECEIVER BASE SHOULD BE SECURELY ATTACHED TO THE TOP OF THE WATER HEATER AND THE INCOMING WIRES / WIRE CONNECTOR SHOULD BE FIRMLY ATTACHED TO THE BACK OF THE RECEIVER BASE.
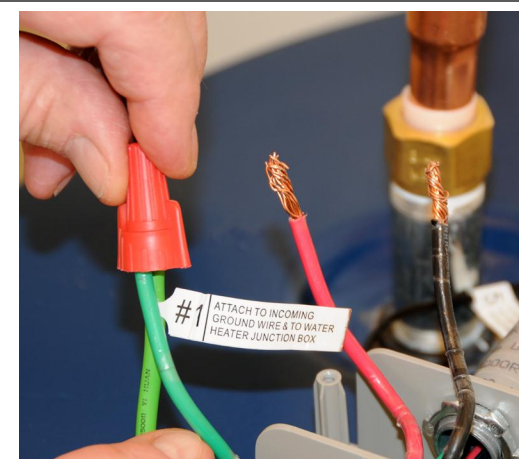
7. Attach the incoming **ground wire**, **from the power supply**, to the newly installed ground wire, in Step #4, with one of the wire nuts from the hardware package.

NOTE: Be sure to attach the incoming ground wire that was previously installed on the water heater's junction box with the **ground** wire installed in Step #4.

IMPORTANT: WATER HEATER MUST BE GROUNDED.

11.

AT THIS POINT, BEGIN ATTACHING THE WIRES FROM THE RECEIVER TO THE INCOMING POWER SUPPLY WIRES AND TO THE HOT WATER HEATER WIRES.

EACH OF THE WIRES FROM THE RECEIVER ARE LABELED TO ASSIST MAKING PROPER CONNECTIONS TO THE OF INCOMING POWER, GROUND WIRES AND TO THE 2 WIRES COMING FROM THE HOT WATER HEATER

WIRING CONNECTIONS ILLUSTRATED

ATTACH SENSOR HEAD TO HOT WATER PIPE ON TOP OF WATER HEATER

INCOMING POWER WIRE BLACK

INCOMING POWER WIRE RED

WIRE NUT

INCOMING GROUND WIRE

G B R

WATER HEATER BLACK WIRE(ATTACH TO INCOMING POWER BLACK WIRE)

PCB WIRE BLACK (ATTACH TO INCOMING WIRE BLACK)

PCB ORANGE WIRE

SENSOR SOCKET

ATTACH TO INCOMING POWER WIRE RED

WATER HEATER RED WIRE(ATTACH TO PCB ORANGE WIRE)

ATTACH TO INCOMING GROUND WIRE & TO WATER HEATER JACKET

12.

IMPORTANT   IMPORTANT   IMPORTANT
IT IS CRITICAL TO FOLLOW THESE WIRING CONNECTIONS FOR RELIABLE OPERATION OF THE AQUA SMART™ SYSTEM

WIRING DIAGRAM

INCOMING POWER

L-1   220 VAC   L-2

GROUND WIRE

**BLACK

**RED

**GREEN

* #4- RED

#5-SENSOR WIRE

HOT WATER PIPE

* #1- GREEN

* #2- BLACK

SENSOR SOCKET

BLACK

* #3- ORANGE

R-CP CONTROL PANEL

GROUND   RED

= WIRE NUTS/CONNECTIONS

JUNCTION BOX

220 VAC WATER HEATER

* CONNECT (* # - COLORED) WIRES TO INCOMING POWER LINES AND TO THE WATER HEATER WIRES PER ILLUSTRATION.

** NOTE: INCOMING (** WIRE COLORS) TO YOUR WATER HEATER MAY BE DIFFERENT THAN THE COLORS IN THE ILLUSTRATION ABOVE. WIRE ACCORDING TO YOUR POWER LINE COLORS.

13.

ATTACH THE THERMAL SENSOR HEAD TO THE HOT WATER PIPE

VERY IMPORTANT INSTRUCTIONS

THE PROPER POSITIONING OF THE THERMAL SENSOR HEAD IS ONE OF MOST IMPORTANT STEPS IN THE INSTALLATION OF THE AQUA SMART™ SYSTEM. THIS COMPONENT CONTROLS THE REMOTE TEMPERATURE OPERATIONS OF THE SYSTEM

Taped to the back of the receiver case is the **THERMAL SENSOR** which is to be attached to the HOT water pipe coming out of the hot water heater. The **THERMAL SENSOR** controls the operation of the **AQUA SMART™** system.

Prepare to attach the **THERMAL SENSOR** to the **LOWEST** point on the **HOT** water pipe coming out of the top of the water heater. (Usually the top of water heater is marked **HOT** or feel the pipe to be sure attachment is to the **HOT** water pipe).


Locate the pipe clamp with bolt/nut, included in the hardware package.

Unscrew the clamp bolt so that only a few threads remain in the bolt. Slide the head of the bolt to the side so that it releases from the clamp. Spread the clamp open and slip the clamp around the **HOT** water pipe. Tighten the clamp bolt being sure clamp is at the **LOWEST POSITION** on the **HOT** water pipe exiting the hot water heater. Do not tighten clamp to the pipe, yet.

Now tighten the bolt on the clamp so the **THERMAL SENSOR** head is covered by the rubber insulation and is snug against the HOT water pipe.
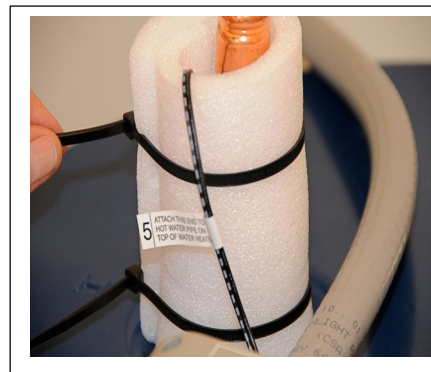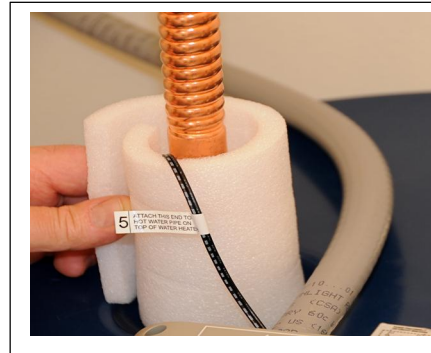
Carefully, insert the **THERMAL SENSOR** head between the clamp and the HOT water pipe positioning the **SENSOR** head so that it is covered by the clamp and is snug against the HOT water pipe.

Following the securing of the **THERMAL SENSOR** head, to the **HOT** water pipe, wrap the piece of foam insulation over the **CLAMP & SENSOR** and firmly attach with 2 wire ties. **BE SURE TIES ARE INSTALLED SO THEY "CLICK -LOCK"** (The foam insulation was packed in the shipping box.The wire ties are in the hardware package.)

This step is necessary to minimalize the effects of any ambient temperature differences between the **SENSOR** head and the location of the water heater. The **SENSOR** head needs to be isolated from any external temperature influences which could have a thermal effect upon the signals that the **THERMAL SENSOR** sends to the Receiver.

TECHNICAL NOTE:
The **THERMAL SENSOR** records the temperature at the **HOT** water pipe and sends a temperature reading to the Receiver. The Receiver processes the temperature data sending a signal to the Transmitter to activate the water heater **to the MODE setting, on the TRANSMITTER**.

BY-PASS   AUTO

IMPORTANT NOTICE
The position of the BY-PASS switch, at the BASE of the RECEIVER, should be in the <u>AUTO</u> position.

A **BY-PASS** switch has been included on the Receiver allowing the user to by-pass the Receiver powering the water heater directly. When the **BY-PASS** switch is activated, from the **AUTO** position to the **BY-PASS** position, the water heater will operate normally, however the water temperatures will be maintained at the temperature settings of the "on-board" thermostats that are on the water heater. The **AQUA SMART™** system will be by-passed and the water heater will cease to operate, **wirelessly.**

BY-PASS SWITCH
NOTICE: The NORMAL position for the BY-PASS switch is in the AUTO position. This switch should only be activated, to the BY-PASS position, when troubleshooting the water heater or should there be a system failure. When activated, to the BY-PASS position, all power to the **Aqua Smart™** Receiver is by-passed and the water heater will be powered DIRECTLY by its electrical source. The water heater will now be controlled by the "on-board" thermostat settings ON THE WATER HEATER.

Do not activate the BY-PASS switch for any other purpose than to override the AQUA SMART™ system should there be a malfunction or TROUBLESHOOTING procedures are being initiated. (See page 38).

Should the **AQUA SMART™** system stop working or become inoperative, review the TROUBLESHOOTING GUIDE on page 38 of this manual or contact the dealer from who the system was purchased or visit our website at: **www.aquaenergysaver.com,** if the problem is not resolved.

SECTION 3

### RESTORE POWER TO THE HOT WATER HEATER

Restore power to the hot water heater at the circuit breaker panel or at the power switch used to disconnect power to the water heater. Upon powering the Receiver, all the LEDs on the Receiver should illuminate and then go off. The Receiver is waiting to **"LEARN"** the transmitter's security code. **The "LEARN" process is explained on page 24.**

TECHNICAL NOTE:
The Receiver is operated by the 208-240VAC lines powering the hot water heater and therefore it has no batteries. In a rare instance of a power surge or malfunction of the Receiver, the powering of the Receiver may be interrupted and/or damaged. This will be evidenced when the LED lights on the Receiver case are no longer illuminated indicating a problem at the breaker, incoming power lines or with the Receiver. A loss of hot water will also result. **Review BY-PASS switch operation in previous section. (See page 16).**

SECTION 4

INSTALL BATTERIES IN TRANSMITTER

LCD SCREEN   BATTERY COMPARTMENT
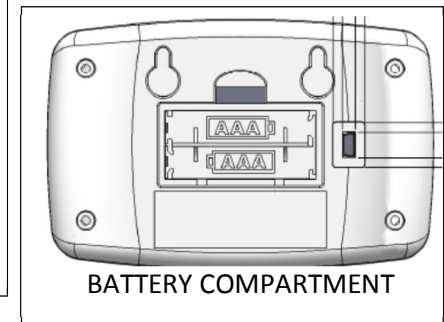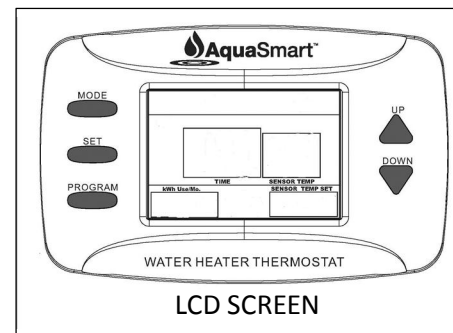
1. Locate the TRANSMITTER and hardware bag in carton. The transmitter hardware bag will include: 2 ea. - AAA batteries, 2 ea. - Screw- type Wall Anchors, 2ea. - Mounting screws, 1ea. - Thermometer strip and a paper, mounting template.
2. First, install the 2-AAA batteries into the battery compartment on the back of the Transmitter. When the AAA batteries are installed in the Transmitter all the ICONS on the Transmitter will illuminate for 2 seconds and a single beep will be heard. Several of the LCD icons will illuminate with the HOUR digit blinking.

"LEARNING" PROCESS
TEACHING TRANSMITTER'S SECURITY CODE TO THE RECEIVER

Each Transmitter for the **AQUA SMART™** system has one of 1,048,576 unique security codes embedded into its memory. It will be necessary to program the Receiver to **LEARN** the security code of the Transmitter, **upon initial use,** or if a replacement Transmitter has been purchased from your dealer or the factory.

1. Standing approximately 3 feet from the hot water heater, where the Receiver has been mounted, program the Transmitter's security code into the Receiver.

2. To program the Receiver to **LEARN** the Transmitter's security code, insert a small screwdriver or punch into the **LEARN** button hole on top of the Receiver case. Push down **gently** until a LONG BEEP is heard signaling that the Receiver is ready to learn the Transmitter's security code.

3. Now press the **MODE** button on the Transmitter and 5 RAPID BEEPS will be heard confirming that the **LEARN** process has been completed. When first powered, all 4 of the LEDs, on the Receiver, will remain ON for a short period of time confirming that the LEDs are operational.

TESTING THE OPERATING (POWERING) MODES

The **AQUA SMART™** system features 2– way communication software allowing the RECEIVER and the TRANSMITTER to communicate with each other.

This bi-directional communication provides confirmation of the radio frequency (RF) signals being sent between the Transmitter and the Receiver. Each operating MODE initiates different temperatures for the water heater to operate on and are identified by the colored LEDs, on the Receiver, as indicated below.

GREEN = **ON** MODE
AMBER = **AWAY** MODE
BLUE = **VACATION** MODE
RED = **PROGRAM** MODE

It is recommended that each of the operating MODES in the **AQUA SMART™** system be tested with the Transmitter standing approximately 3 feet from the water heater/Receiver. When any of the MODE buttons are pressed on the Transmitter, the **SYNC** icon on the Transmitter's LCD display will display and the command is, wirelessly, sent to the Receiver. When the Receiver receives the command from the Transmitter, a corresponding LED will illuminate on the Receiver and the Receiver will send a wireless, signal back to the Transmitter confirming receipt of the Transmitter's command.

18.

TESTING THE OPERATING (POWERING) MODES – (continued)

If for some reason the Transmitter does not receive a confirmation signal from the Receiver, within 5 seconds, the WARNING icon, on the Transmitter's LCD screen, will illuminate on the LCD screen and the mode selection process will need to be repeated. Test all 4 modes in a similar manner. **NOTE:** Upon the Receiver receiving any of the Transmitter's signals, you <u>may</u> hear the "clicking sound" of a relay, inside the Receiver case, further confirming receipt of the Transmitter's command in addition to the illumination of the corresponding LED on the Receiver case.

OPERATION OF LEDs: When any of the MODES is in a **"powering state"** the LED identifying that mode, **plus** the **ON**-LED, <u>will</u> illuminate on the Receiver. When the same MODE is **not** in a **"powering state"**, it's LED will illuminate but the **ON**-LED **will not** illuminate.

NOTE: **"Powering state"**, means that a MODE is being **"powered"** and the **GREEN LED** plus the selected mode's LED is illuminated. When the MODE is entered and **no power** is being delivered, only the MODE LED will be illuminated on the Receiver.

THE OPERATING TEMPERATURES AND COLOR OF THE LEDs ON THE RECEIVER FOR EACH MODE ARE AS FOLLOWS:

- **ON:** The Transmitter signals the Receiver to manage the temperature of the water heater at the thermostat settings of the "on board" thermostat on the water heater, usually around 120°F. When **"powering"**, the **GREEN** LED on the Receiver will be illuminated.

- **AWAY:** The Transmitter signals the Receiver to manage water heater's operating temperature to between 75°F and 85°F and the **AMBER** LED on the Receiver will be illuminated. When **"powering"** the water heater in the AWAY mode, both the **AMBER** and the **GREEN** LEDs will be illuminated.

- **VACATION:** The Transmitter signals the Receiver to manage water heater's operating temperature to between 40°F and 50°F and the **BLUE** LED on the Receiver will be illuminated. When **"powering"** the water heater in the VACATION mode, both the **BLUE** and the **GREEN** LEDs will be illuminated.

- **PROGRAM**: When in the PROGRAM mode, the Transmitter signals the Receiver, on a daily basis, to manage the water heater from a menu of programmed timed/temperature settings, (**ON** and **OFF**), as encrypted in the transmitter by either the "**factory program**" and/or the program entered into the transmitter **by the user.** In the PROGRAM mode, the **RED** led will illuminate. When **"powering"** the water heater in the PROGRAM mode, both the **RED** LED and the **GREEN** LEDs will be illuminated.

19.

TRANSMITTER LCD & SET-UP
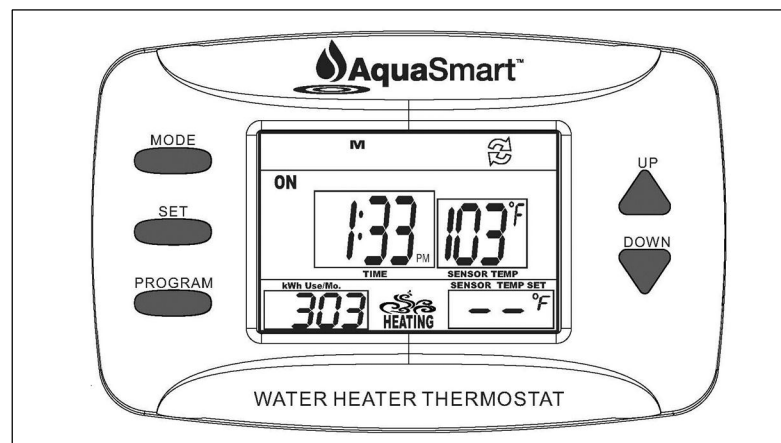
NORMAL VIEW OF LCD FOLLOWING SET-UP

LCD DISPLAY SCREEN
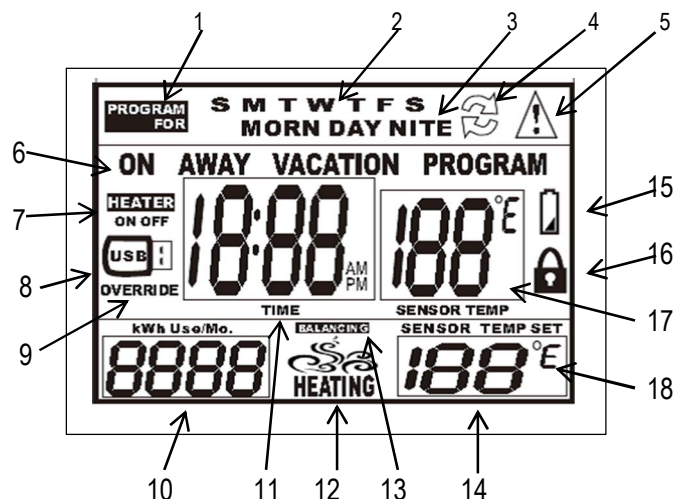
On the following page, a brief description of the **LCD SCREEN DISPLAY ICONS** is provided to understand the many features of the **AQUA SMART™** system.

For a more complete explanation of the **OPERATING FUNCTIONS** of these features, review the **PROGRAM OPERATION** and **OPERATING FEATURES** in a later sections of this manual. (See pages 26-29).

LCD DISPLAY SCREEN ICONS

1. **PROGRAM FOR:** Flashes when entering programming function. Stays illuminated when programming times and temperatures.
2. **DAY:** Flashes when current day or day of week is being programmed during initial set-up. Displays in normal state.
3. **PERIOD:** Displays in program mode and when programming.
4. **SYNC:** Indicates 2-way communication in between Transmitter and Receiver.
5. **ALERT:** Indicates that 2-way communication failed. Check operation **at the RECEIVER** with **Transmitter** nearby**.**
6. **MODE:** Indicates MODE of operation. ON-AWAY-VACATION-PROGRAM.
7. **HEATER:** Flashes when entering programming function. Stays illuminated when programming times and temperatures.
   ON-OFF Icons: Display when entering program settings. Flashes when programming the ON and OFF times and temperatures.
8. **USB:** Reserved for future wireless feature. Not in operation on this model.
9. **OVERRIDE:** Displays when "programmed" SET TEMPERATURE is overridden. Override operates **in the PROGRAM mode only.**
10. **kWh Use/MO.:** Displays and stores kWh usage for a 30 day period before automatically resetting to "zero". Transmitter stores 12 previous kWh readings
11. **TIME:** Displays the CURRENT time in AM-PM.
12. **HEATING:** The word HEATING and the STEAM TRAILS will begin blinking when the water heater is in the **"powering"** state.
13. **BALANCING:** During initial set up of system, icon begins blinking when "BALANCEING" actual water heater temperature with the Thermal Sensor reading.
14. **SENSOR TEMP SET:** Displays temperatures in the BALANCING process and in 5°F increments in the PROGRAMMING mode.
15. **BATTERY:** Battery power is low. Replace batteries in 2-4 weeks.
16. **LOCK:** Displays when "LOCK OUT" of Transmitter is engaged.
17. **SENSOR TEMP:** Displays the THERMAL SENSOR temperature from the HOT water pipe.
18. **°F°/C:** Factory programmed in °F (Fahrenheit). User can change to °C (Celsius).

TRANSMITTER FUNCTIONS

In the sections that follow, each ICON and Transmitter function will be discussed, in detail, to provide a full understanding of the software logic that "commands" the **AQUA SMART™** system. Detailing these functions allows user to fully understand the "logic" of the various features in the **AQUA SMART™** system.

> *Further demonstrations of these functions can be found on our website/video at: **www.aquaenergysaver.com**. We suggest viewing this video to answer any questions about the AQUA SMART™ system.*

INITIAL SET – UP & PROGRAMMING OF THE TRANSMITTER

*TWO IMPORTANT SETTINGS MUST BE MADE OR THE SYSTEM
WILL NOT ACCURATELY CALCULATE THE TEMPERATURE DATA*
*AT THIS TIME, IT IS RECOMMENDED THAT THE USER REVIEW
THESE TWO SET – UP PROCEEDURES SO THAT DATA IS READY TO BE
ENTERED INTO THE TRANSMITTER, WHEN PROMPTED.*

**#1 – BALANCING THERMAL SENSOR TEMPERATURE
#2 – WATER HEATER WATTAGE RATING**

Follow the SET-UP procedures below, upon **FIRST USE** of the transmitter.

INITIAL SET: **Push and hold** *SET* **button for more than 5 seconds and then release button for initial set-up**. A beeping sound will be heard. The initial settings include settings for **TIME, °F/°C** conversion, **DAY** of the Week, **BALANCING** and **WATTAGE** of Water Heater.
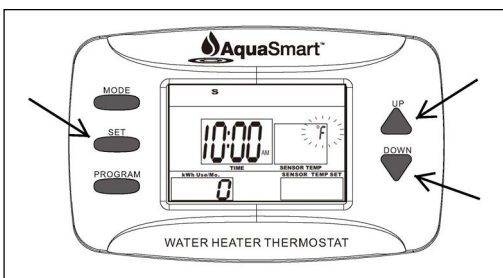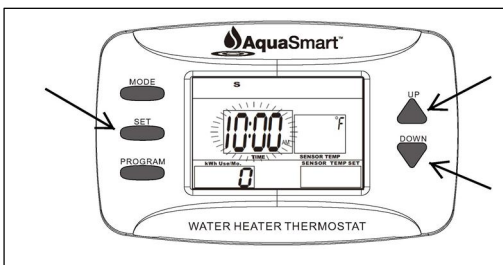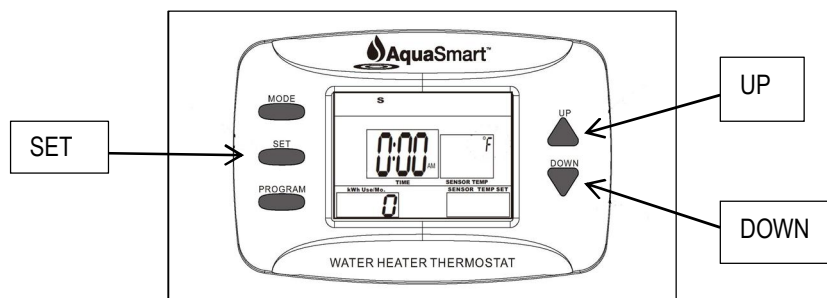
A. SETTING CURRENT TIME: Following the push of the *SET* button in the step above, the **HOUR** digits will begin blinking in the **TIME** window. Press the *UP/DOWN* buttons to set the current **HOUR**, in the corresponding AM/PM time period. Press *SET* button again and the **MINUTES** will begin blinking. Press the *UP/DOWN* buttons to set the current **MINUTES**. Press the *SET* button again and the **°F/°C** will begin blinking.

C. SETTING THE TEMPERATURE SCALE: Press the *UP/DOWN* buttons to change the **°F/°C** scale. (Factory setting is °F). Press the *SET* button again. The icon **S** will begin blinking prompting the user to enter the current **DAY** of the week.
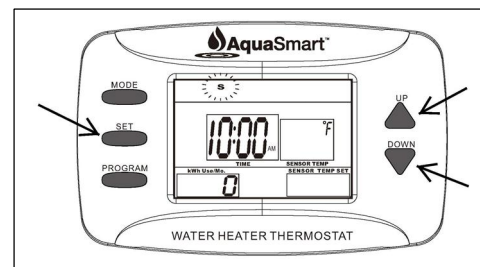
D. SETTING THE DAY OF THE WEEK:
To change to the current **DAY** of the week, press the *UP/DOWN* button to display current **DAY**. The press the *SET* button and the **BALANCING** window will begin blinking.

IMPORTANT NOTE: If you are not able to preform the next 2 SET-UP proceedures within the next 30 seconds, the transmitter will return to its NORMAL STATE. When you are ready to restart the SET-UP again, press the SET button for 5 seconds, release button and scroll to CRITICAL ADJUSTMENTS #1 and #2 pressing the SET button several times and prepare to enter the required data.
*# 1 - BALANCING THE THERMAL SENSOR*

PREVIOUS INSTRUCTIONS, ON PAGE 6, RECOMMENDED THAT YOU RECORD THE WATER TEMPERATURE FROM THE THERMOMETER STRIP.THIS IS THE READING THAT IS TO BE ENTERED IN THE SENSOR TEMP WINDOW ON THE TRANSMITTER'S LCD.

A small ***THERMOMETER STRIP*** has been supplied to allow user to measure the ACTUAL temperature of the hot water coming out of a water faucet supplied by the water heater. During the initial set-up process, user **MUST** adjust the **SENSOR TEMP** to the actual water temperature coming from a HOT water faucet in the home. From a faucet nearest the hot water heater, fill a glass with hot water and drop the temperature strip into the water. Observe the mid- temperature strip reading on the temperature strip comparing this reading in the **SENSOR TEMP** window on the Transmitter's LCD screen.

TEMPERATURE STRIP IN GLASS OF HOT WATER

TEMPERATURE STRIP
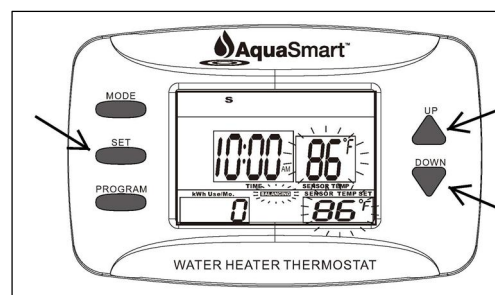
Using the *UP / DOWN* buttons, adjust the **SENSOR TEMP** temperature reading on the LCD screen to closely match the temperature of the HOT water coming from the water faucet. The **"BALANCING"** numbers will display in both the **SENSOR TEMP** and **SENSOR TEMP SET** windows on the LCD screen during this process. Press the *SET* button to hold the new **BALANCED** temperature reading.

BALANCING FEATURE- (continued)

This procedure allows for a more accurate "temperature "triggering" of the **AQUA SMART™** system to the Transmitters newly, **"BALANCED"** temperature.

TECHNICAL NOTE: When user activates the **BALANCING** process and determines that additional **BALANCING** degrees are needed to be added to the Transmitter's software, these additional degrees can be added by pressing the *UP/DOWN* buttons on the Transmitter thereby **BALANCING** the faucet's HOT water temperature to the **SENSOR TEMP** display on the LCD screen. Initially, the factory has embedded 10°F in the Transmitter's software. User can reduce the 10°F **or** add up to 25°F to the balancing process depending on the climate and location of the water heater, in single digits.

IMPORTANT NOTE: If the "balancing process", is **NOT ACTIVATED**, the factory has added a 10°F differential into the transmitter's software. The purpose of the 10°F differential is to compensate for the average, ambient temperature change between the hot water heater and the **THERMAL SENSOR** reading on the hot water pipe.

Some newer water heaters have a **"heat trap"** component, installed in the HOT water outlet pipe preventing heated water from being drawn into the home's piping system when there is no demand for HOT water. This can reduce the pipe temperature at the location of the THERMAL SENSOR. The 10°F will remain in the software whether or not the user activates the "balancing process". After the balancing process has been completed, the new **SENSOR** number will display in the **SENSOR TEMP** window, only.

Continuing to the last **Initial Set-Up** procedure, press the *SET* button to continue programming the **WATTAGE** of the water heater that the Receiver has been installed on.

2 WATER HEATER WATTAGE RATING

WATER HEATER WATTAGE RATING: The water heater **WATTAGE** rating must be entered into the transmitter during the **INITIAL SET- UP** procedure. User **MUST** match the **WATTAGE** rating of the water heater to the Receiver that the **AQUA SMART™** has been installed on. This procedure is necessary to allow the system's software to accurately calculate the **kWh electrical usage** when the water heater is operating.
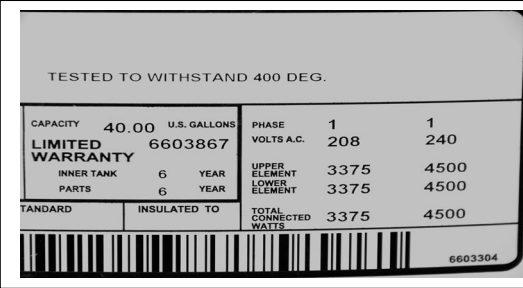

On the front of the water heater jacket, there will be several labels. Locate the label that lists the water heater capacity and electrical specifications. A standard label will then list PHASE, VOLTAGE-AC, UPPER ELEMENT, LOWER ELEMENT and TOTAL CONNECTED WATTS. (Continued)

WATER HEATER WATTAGE RATING- (continued)

These headings may be followed by two columns of ratings listed as PHASE 1. The first column may be headed 208 and the second may be headed 240.The column headed 208 will list wattage ratings for 208 voltage systems, usually found in CANADA. The column headed 240 will list wattage ratings for 240 voltage systems, found in the U.S.

> *User MUST locate the water heater wattage rating from the label on the front of the water heater or Owner's manual and enter that data during the SET–UP procedure.*
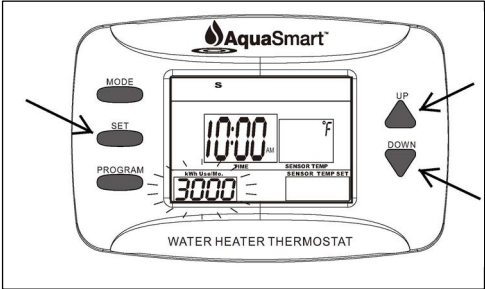

During the initial set up, user **MUST** *set the* **WATTAGE** *rating.* in the transmitter to match the water heater **WATTAGE** rating that the Receiver has been installed on. *The factory-set number 3000W.* Press the *UP/DOWN* buttons to make the change. The **WATTAGE** rating numbers appear in the **kWh Use/Mo**. window on the LCD screen.

Changes to the **WATTAGE** rating can be viewed in this window and are listed in 100 watt increments. Scroll through the water heater **WATTAGE** ratings on the LCD screen and when user's water heater rating is displayed, in the **kWh Use/Mo.** window, press the *SET* button matching the two **WATTAGE** rating numbers. This completes the transmitter set-up and the icons should stop blinking and the LCD should appear as pictured below.

The **AQUA SMART™** system is designed to operate on electric hot water heaters rated from 3000W to 6000W.

> ***THE INITIAL SET-UP OF THE TRANSMITTER HAS BEEN COMPLETED AND THE NORMAL STATE OF THE LCD SHOULD APPEAR AS BELOW***
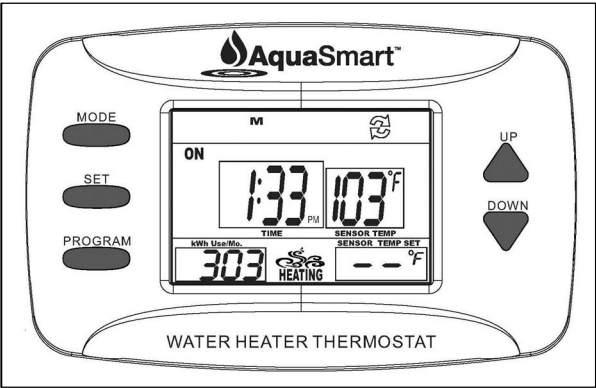
PROGRAM OPERATION OF THE AQUA SMART™ SYSTEM

THE FOLLOWING SECTIONS REGARDING PROGRAM OPERATION ARE ONLY APPLICIABLE WHEN USER SCROLLS TO <u>THE PROGRAM MODE.</u>

The **AQUA SMART™** can operate from a **factory-installed** program or one entered by **the user**. A description of both these programs follows with reprogramming instructions.

<u>**FACTORY-SET PROGRAM**</u> – The transmitter has a **factory-set** program that has been encrypted into the software with **factory-set, ON-OFF** settings to operate the water heater. This **factory-set** program will operate ONLY when in the **PROGRAM** mode, and will be overridden when a user enters his personal program. **<u>The factory –set program is displayed below:</u>**

FACTORY-SET   PROGRAM

MODE	ON	(TEMP. SETTING)	OFF	(TEMP. SETTING)
MORN:	5:00 am	(120°F)	8:00 am	(75°F)
DAY:	4:00 pm	(120°F)	6:00 pm	(75°F)
NITE:	7:00 pm	(120°F)	9:00 pm	(75°F)

The temperature for the **ON** setting is 120°F. However, if the "on board" thermostat settings on the users' hot water heater are higher than 120°F, the software commands the system to "default" to the "on board" thermostat setting on the water heater. For safety purposes, this setting should be at 120°F. However, it could be higher if the user has set the "on board" thermostats to a higher temperature, *but only 120°F will show on the LCD.*

The temperature for the **OFF** setting is 75°F. When the water temperature drops to 75°F, the water heater is **"powered"** and shuts off at 80°F.

Review the matrix/protocol for the **ON - OFF** temperature settings and the "triggering spreads" between **ON - OFF** at the end of this manual. (See pages 36-37).

<u>IMPORTANT NOTE:</u> The <u>FACTORY –SET</u> program settings may not match with the user's daily activities and reprogramming, <u>by the user,</u> may be necessary. User programming instructions are covered on pages 27-29.

<u>USER-SET PROGRAMMING PROCEEDURES-</u> User may change the following settings, <u>but only in the **PROGRAM** mode.</u> Below is a list of **"user"** program settings.

- PERIODS OF THE DAY: **MORN   DAY   NITE**
  (For each DAY OF THE WEEK: **S - M - T - W - T - F - S**)
- **HOUR OF DAY** WITHIN EACH PERIOD
- **ON - OFF** TEMPERATURE SETTINGS WITHIN EACH PERIOD

User can program the <u>daily operation</u> of the AQUA SMART™ system following the programming procedures below.
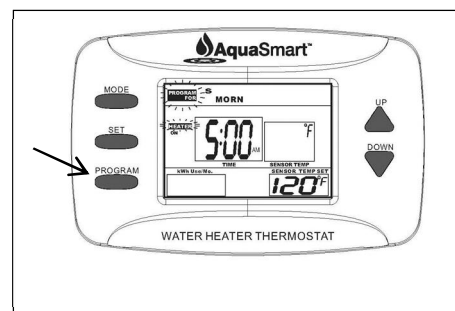

1. Press and hold the *PROGRAM* button for more than 5 seconds. The shaded boxes with the **PROGRAM FOR** and **HEATER** words will begin blinking and the word, **ON,** will display. (**S, MORN, 5:00AM, °F** and **120°F** will also be displayed).

NOTE: *The INITIAL SET-UP procedures must have been previously entered or the user programming cannot be continued.*
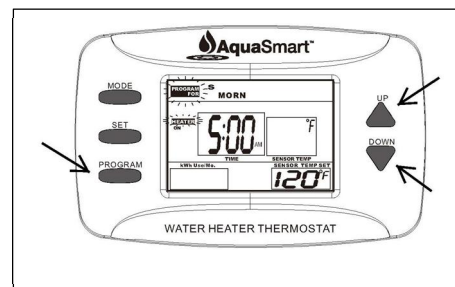
2. To program the **PERIOD** and **DAY** for the heater to go **ON**, press the *UP/DOWN* buttons scrolling through the **PERIODS.** (The **days** will advance as you scroll through the **periods**). When the **PERIOD** and **DAY** are selected, press the *PROGRAM* button. The **PROGRAM FOR** and **HEATER** words will stop blinking and the word, **ON,** and the **HOUR** digit will begin blinking.
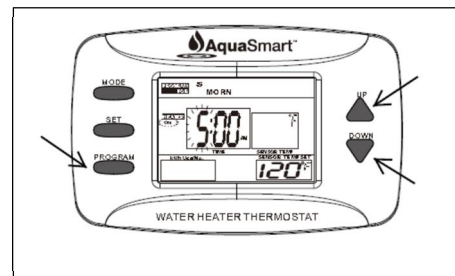
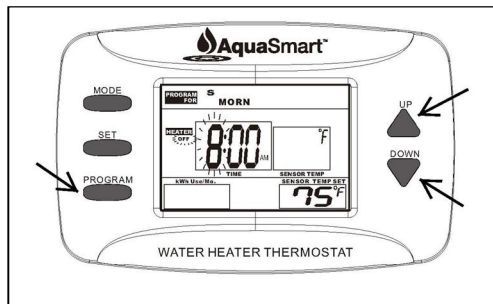
3. To set the **HOUR** for the heater to go **ON**, press the *UP/DOWN* buttons, adjusting the time, **in full hour increments.** Press the *PROGRAM* button to set the **HOUR** and the **SENSOR TEMP SET** temperature will begin blinking.
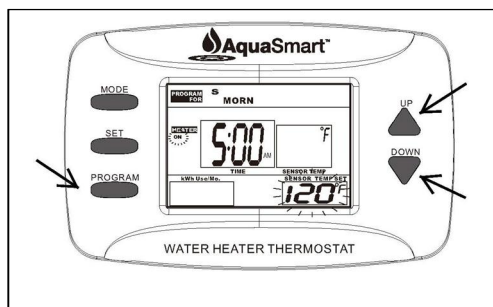
4. To set the water **TEMPERATURE** for the heater to go **ON**, press the *UP/DOWN* buttons to program water heater to go **ON** at the **time** entered in step 3.

Press the *PROGRAM* button again and the word, **OFF**, and the **HOUR** digits will begin blinking.

5. To set the **HOUR** for the water heater to go **OFF**, press the *UP/DOWN* buttons, adjusting the time, **in full hour increments** and press the *PROGRAM* button to set the **HOUR**. The **SENSOR TEMP SET** temperature will begin blinking.
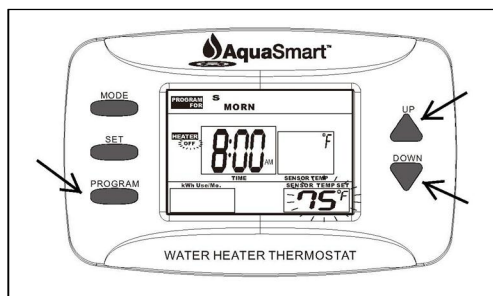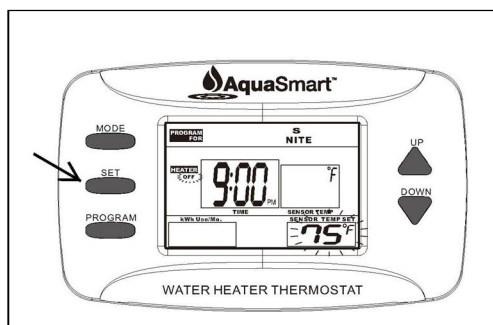
6. To set the water **TEMPERATURE** for the heater to go **OFF**, press the *UP/DOWN* buttons to program water heater to go **OFF** at the **time** entered in step 5. Press the *PROGRAM* button again and the **PROGRAM FOR** and **HEATER** words will begin blinking.

The next **PERIOD** and the next **DAY** will advance after programming the **NITE** period.

The **PROGRAM FOR** and **HEATER** words will begin blinking.

7. To set the next **DAY & PERIOD**, press the *PROGRAM* button **again** and then repeat steps 2-7 to complete the user programming process.

8. At the end of the user programming process, press the *SET* button to "lock in" the new "user program".

IMPORTANT NOTE: User settings are limited to between 75°F and 120°F. The lowest temperature for the OFF setting is 75°F. When the water temperature drops to 75°F, the water heater is "powered" and shuts off at 80°F. The highest OFF temperature setting is 120°F.

MATRIX - PROTOCAL TEMPERATURE RESTRICTIONS

When user *SETS* a temperature to **ON**, user can also set the **OFF** temperature, however, the setting for the **OFF** temperature can be no less than 10°F from the **ON** temperature setting. Review the **matrix** - **protocol** charts for the **ON - OFF** temperature settings and "triggering spreads" between **ON - OFF** on pages 36-37.

Temperature settings between the 75°F and 120°F will operate within a 5°F temperature spread/swing. (See page 37).Should user want to set lower temperatures, user can activate the **VACATION** mode but will have to remember to return to another mode for higher temperatures.
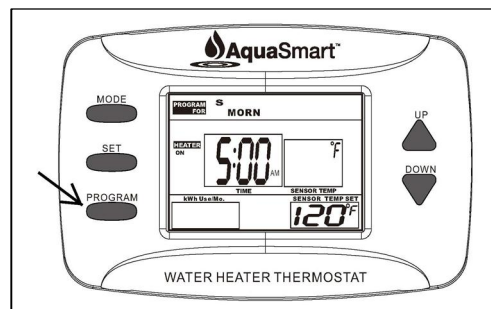
7. PROGRAM REVIEW: To review program settings, enter a short push of the *PROGRAM* button which enables user to review either the **factory-set** or **user-set** PROGRAM settings. Then, continue to enter short pushes on the *PROGRAM* button to review all the programmed settings. Press *SET* button when review completed.

CHANGING/CANCELLING PROGRAMS: User may change the **factory-set** program by following the procedures as outlined in steps 1-6. Should user wish to return to the **factory-set** program, PUSH and HOLD the *UP* and *PROGRAM* buttons, at the same time for more than 5 seconds, and **user-set** program is cancelled and the system reverts back to the **factory-set** program. The transmitter will emit 4 short beeps confirming the cancellation step.
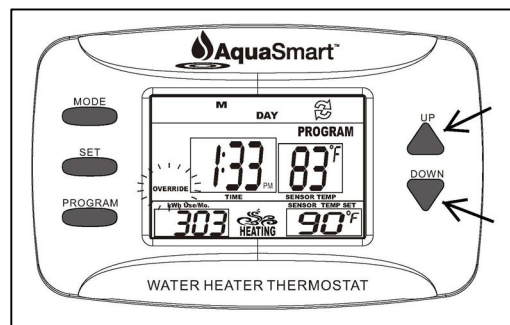
8. OVERRIDE: The OVERRIDE feature only operates in the PROGRAM mode. User may change the current **SET TEMPERATURE** in the PROGRAM mode without changing the other programs stored in the transmitter. When in the PROGRAM mode, user can push *UP/DOWN* buttons to change **factory-set** and/or **user-set** **TEMPERATURE** settings, in single digits.

The word OVERRIDE will appear on the LCD and the OVERRIDE feature activates. The OVERRIDE setting will be automatically cancelled at the start of the next PROGRAM PERIOD.

SECTION 5

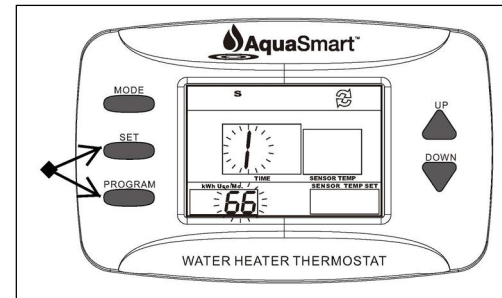## OPERATING FEATURES OF THE AQUA SMART™ SYSTEM

Once the **AQUA SMART™** is properly installed and the Transmitter has been "set-up" and "programmed", the system is ready to begin reducing energy costs. It is imperative that the **USER becomes PROACTIVE in setting one of the MODES when there is a planned absence from the home**. If the PROGRAM MODE is engaged, the savings may be even greater as the system will be automatic, on a daily basis.

To help with the energy saving process, when the user has forgotten to engage the AQUA SMART™ system, the system has a Built-In feature referred to as the AQUA SMART MODE.

AQUA SMART MODE: The **AQUA SMART™** system includes another ENERGY SAVINGS feature that "automatically" produces energy savings when the user forgets to set a MODE prior to leaving the residence for more than two days. A brief explanation follows:

- The AQUA SMART™ system monitors changes in the hot water temperature using the **THERMAL SENSOR** that is attached to the hot water pipe on the hot water heater. During every 3 hour period, the **SENSOR** records temperature changes, storing the information in the system's software. If, during this 3 hour period, there is a change in the water temperature, these records are erased and the system begins a new 3 hour monitoring period.

- If there are no temperature changes, greater than 10° F **during a 2 day period,** the system AUTOMATICALLY defaults to the **AWAY** mode setting. In the **AWAY** mode, the temperature is maintained between 75° F and 85°F. The water heater reduces energy consumption while in the **AWAY** mode.

- When the **AQUA SMART MODE** is engaged, the **AWAY** icon on the Transmitter, will cycle ON and OFF for 1 second, alternately. Additionally, the Transmitter will emit 8 short, beeping sounds, at the transmitter, every 15 minutes alerting the returning homeowner that the system has entered the **AWAY** setting in the **AQUA SMART MODE** and the user needs to reset the Transmitter. The AMBER LED on the Receiver will also be blinking.

30.

KILOWATT (kWh) HOUR USAGE
The **AQUA SMART™** system features an ENERGY USAGE factor which uses its software to calculate the amount of time the water heater is operating sending that data to the Transmitter. This data will be displayed in **kWh Use/Mo** window on the LCD screen.

Each 30 days, the Transmitter resets the kilowatt usage data to zero (0) allowing the user to review energy usage for each 30 day period. User can override **kWh Use/MO.** setting and reset to "0" at any time to restart calculation.

NOTE: This feature will only be accurate if the user has entered the water heater's WATTAGE RATING. (See pages 24-25 for proper setting).

To reset this reading, push and hold the *SET* and *DOWN* buttons, at the same time, for more than 5 seconds.

This feature also stores up to 12 previous records of kilowatt usage. To review previous records, push and hold the *SET* and *PROGRAM* buttons for more than 5 seconds and those records will appear in the **kWh Use/Mo**. window. At the same time, the number of stored records will appear in the **TIME** window on the LCD. To return to the normal state, press *SET* button.

This feature allows the user to monitor the energy use of the hot water heater and adjust the system to maximize energy savings by being PROACTIVE in engaging the energy saving features of the AQUA SMART™ system.
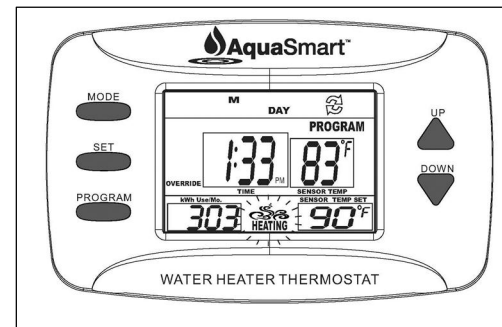
HEATING ICON: When the **AQUA SMART™** system is in the **ON** or **"powering state",** in any of the MODES, the HEATING icon (with steam trails) will begin blinking and continue blinking until the power to the water heater switched OFF.

31.
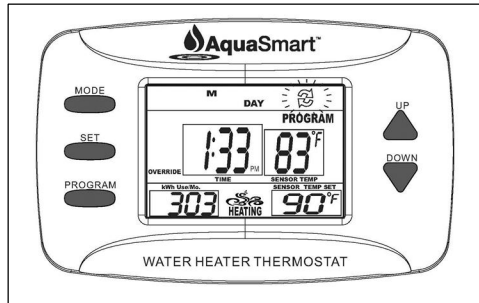
TWO-WAY COMMUNICATION:

A "two-way" **SYNC** icon will be displayed on the LCD screen indicating that the radio frequency (RF) signals, between Transmitter and the Receiver, are communicating with each other confirming commands sent by the Transmitter and/or the Receiver. This icon will be illuminated at all times. Should the 2 way communication between the Transmitter and/or the Receiver be interrupted or stop working, a series of 4 rapid beeps will be emitted from the Transmitter, every 15 minutes, to alert the user of a problem that needs to be corrected.
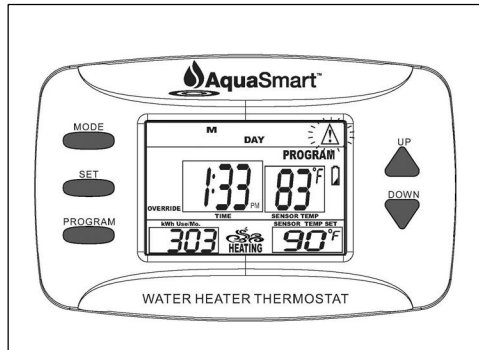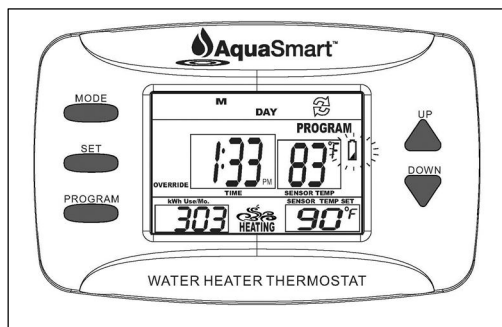

WARNING TRIANGLE: A "warning" icon is displayed, on the LCD, when the Transmitter is out of the RF operating range of the Receiver, as well as indicating other problems with the **AQUA SMART™** system. A beeping signal, consisting of 4 rapid beeps every 15 minutes emits from the Transmitter, indicating there is a problem which the user must resolve. (See page 38).

LOW BATTERY: A "low battery" icon alerts homeowner when it is time to replace batteries with a "blinking" icon. When battery is low, the Transmitter will emit 3 long beeps every hour to remind user to change batteries. It is suggested that batteries be replaced every 12 months. The Transmitter operates on 2-AAA batteries. When the batteries are removed, the software in the Transmitter will memorialize all <u>settings with the exception of TIME, DAY of WEEK, TEMPERATURE SENSOR and KWh Use.</u>
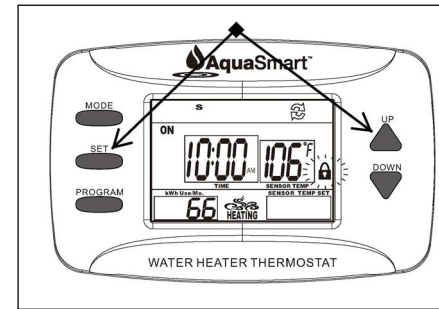
LOCKOUT: A "lockout" feature allows the user to set a **LOCKOUT** mode on the Transmitter, only to be unlocked by the user that programmed the Transmitter. Press and hold the *SET* and *UP* buttons for more than 5 seconds to activate or deactivate this feature.

MOUNTING THE TRANSMITTER

After testing and observing the MODE operations of the Transmitter in the proximity of the water heater/Receiver, take the Transmitter to the area in the home that you plan to install it.

NOTE: It is advised that you test all MODES, on the Transmitter, from the remote location that you plan to install the Transmitter. Depending on the distance from the water heater and from any electrical interference in the home, you want to be sure the wireless Transmitter operates from this remote location.

It is recommended that the Transmitter be mounted on a wall near the home's heating/cooling thermostat. Positioning near the home thermostat prompts the user to "set back" both the water heater and the heating/cooling thermostat, at the same time, thereby conserving energy throughout the home.

With the **PAPER TEMPLATE** provided with the Transmitter hardware package, mark two mounting holes on the wall with a pencil. SUGGESTION: Use a level to align properly. Follow the mounting instructions written on the TEMPLATE, below.
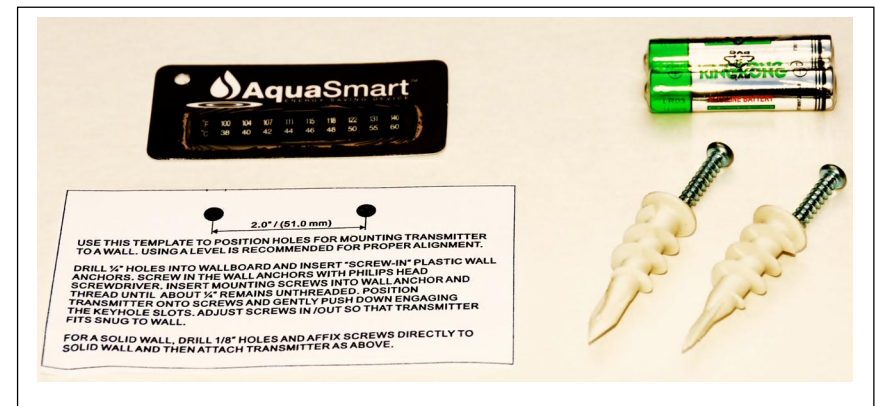
OPERATING THE AQUA SMART™ SYSTEM

The previous sections in this manual have been instructive from the standpoint of providing the user a thorough understanding all the various features that have been included in the **AQUA SMART™** system.

The key element in saving electrical energy, using the **AQUA SMART™** system, is <u>WITH THE USER</u>. With a conscious effort by the user to engage and monitor the **AQUA SMART™** system, hundreds of dollars can be saved each year and over the lifetime of the installation.

The LCD displays the 4 operating MODES that are the operating protocol for the **AQUA SMART ™** system and are activated by the MODE button on the Transmitter.
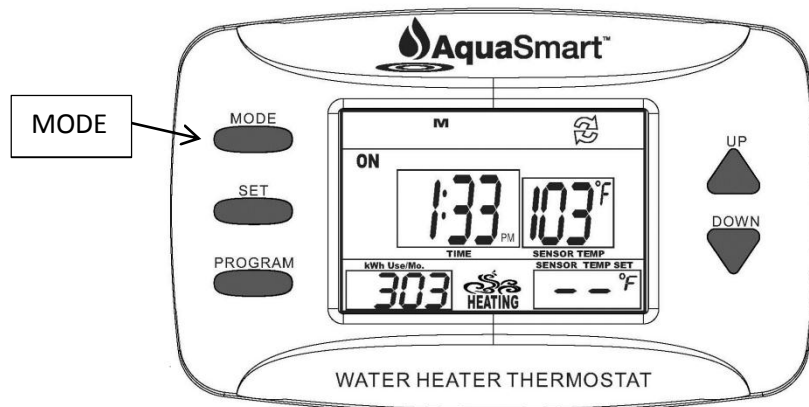

The TRANSMITTER operates in one of 4 modes: **ON–AWAY – VACATION- PROGRAM**

SELECTING THE OPERATING MODE FOR THE MOST EFFICIENT OPERATION OF THE AQUA SMART SYSTEM

ON MODE: In the **ON** mode, the water heater will operate at 120°F or at whatever thermostat setting on at the water heater's thermostats. Manufacturers' factory settings are usually at 120°F but can be adjusted by the homeowner. The **ON** setting is the least economical setting for the system but is necessary when the residence is occupied.
The normal operating temperature of the **AQUA SMART™** system, when NOT in the AWAY, VACATION or PROGRAM modes, will be whatever the "on board" thermostat settings are on the water heater. (See water heater's operating manual to make any temperature adjustments).

**Review the CPSC Government chart regarding the Danger Zones
for hot water heating in an earlier section in this manual. (See page 37).**

AWAY MODE: In the AWAY MODE, the water heater will operate between 75°F and 85° F reducing the energy consumption when the homeowner is away for 2 days or up to 7 days. As an electric water heater can consume from between 17% to 29% of a residential electric bill, reducing the amount of energy to maintain higher temperatures is recommended.

<u>VACATION MODE:</u> In the VACATION MODE, the water heater will operate between 40°F and 50°F thereby reducing energy consumption. This setting is recommended when the homeowner will be away for 7 days or longer periods of time. This is the most economical mode to engage for the greatest energy savings. When the **AQUA SMART™** system is in this mode, there continues to be power to the water heater and it safely maintains the water temperature in the water heater, above the freezing point of (32°F/0°C), when the water heater installation is in a garage or in a vacation home.

<u>NOTE:</u> Depending on the make and age of the water heater that the **AQUA SMART™** system has been installed on, the water temperature recovery from the VACATION mode to the normal water temperature can range between 1 and up to 2 hours.

<u>PROGRAM MODE:</u> When engaged in the **PROGRAM** mode, the water heater operates at the "factory-set program" or the "user-set" program entered by the user during the PROGRAMMING process.

The Transmitter has a "default", FACTORY-SET program encrypted into the software which will operate system only in **PROGRAM** mode. Should user decide to revert to the FACTORY-SET program, after completing the USER-SET programming process, user can <u>push and hold</u> the UP and the PROGRAM buttons, <u>at the same time</u>, for 5 or more seconds and cancel the USER-SET program and revert back the FACTORY-SET program. This will cancel the user-set program that had been previously entered. User will have to enter a new program should the old program be deleted.

UNDERSTANDING THE ADVANTAGES OF SETTING THE MODES OF OPERATION OF THE AQUA SMART™ WATER HEATER, WIRELESS SYSTEM WILL SAVE ENERGY COSTS THROUGHOUT THE LIFE OF THE WATER HEATER.

UNDERSTANDING SOFTWARE MATRIX /PROTOCAL WHEN USER ENTERS TEMPERATURE PROGRAMMING FOR ON/OFF CYCLES.

FOR EXAMPLE: If the ON temperature is to be 115°F, then the OFF temperature can be no higher than 105°F, but could be as low as 75°F.

User-programmed ON/OFF Temperatures

ON/ (°F) OFF	120	115	110	105	100	95	90	85	80	75
120	X	X	X	X	X	X	X	X	X	X
115	X	X	X	X	X	X	X	X	X	X
110	OK	X	X	X	X	X	X		X	X
105	OK	OK	X	X	X	X	X	X	X	X
100	OK	OK	OK	X	X	X	X	X	X	X
95	OK	OK	OK	OK	X	X	X	X	X	X
90	OK	OK	OK	OK	OK	X	X	X	X	X
85	OK	OK	OK	OK	OK	OK	X	X	X	X
80	OK	OK	OK	OK	OK	OK	OK	X	X	X
75	OK	OK	OK	OK	OK	OK	OK	OK	X	X

TEMPERATURE CONVERSION FORMULAS

To convert a F° temperature to C° do the following:

Take F° temperature, subtract 32 then divide by 1.8, equals C°
   EXAMPLE: 120°F - 32 divide by 1.8 = 49 °C

To convert a C° temperature to F° do the following:

Take °C temperature, multiply by 1.8, add 32, equals F°
   EXAMPLE: 49°C x 1.8 + 32 = 120°F

UNDERSTANDING SOFTWARE MATRIX/PROTOCAL WHEN USER ENTERS TEMPERATURE PROGRAMMING FOR ON/OFF CYCLES. (Continued)

FOR EXAMPLE: If the SET temperatures 110°F and the operating "spread" between ON and OFF is 5F°, then the water heater would cycle OFF at 115F°and cycle ON at 110F°

Temperature SPREAD between ON/OFF

PROGRAMMED TEMPERATURE SETTINGS TO ON in (°F)	5°F SPREAD BETWEEN CLOSE (ON) ~ OPEN (OFF) TEMPERATURES
120	DEFAULTS TO ON BOARD SETTING
115	115~120
110	110~115
105	105~110
100	100~105
95	95~100
90	90~95
85	85~90
80	80~85
75	75~80

WATER TEMPERATURE ADJUSTMENT RECOMMENDATIONS

The "on-board" thermostats on a hot water heater, coming from the factory, are usually set at around 120°F. Homeowners can adjust the thermostats on the water heater but the risk of setting the water temperature too high can increase the risk of scalding. Below is a chart published by the U.S. Government, C.P.S.C. Department that highlights the dangers of setting the thermostats higher than 120°F.

Water Temperature °F	Time for 1st Degree Burns (Less Severe Burns)	Time for 2nd & 3rd Degree (Most Severe Burns)
110	(normal shower temp)	
116	(pain threshold)	
116	35 minutes	45 minutes
122	1 minute	5 minutes
131	5 seconds	25 seconds
140	2 seconds	5 seconds
149	1 second	2 seconds
154	instantaneous	1 second

TROUBLESHOOTING GUIDE

There are numerous possibilities that could cause a malfunction of the water heater and/or the **AQUA SMART™** system. To properly diagnose any problems, **first troubleshoot the WATER HEATER** and then the **AQUA SMART™** system. To do this, refer to page 16 of this manual for an understanding of the BY-PASS switch.

NOTE: **Be sure to check the batteries in the transmitter to be sure they are at full power**.

1. First, be sure that the power source has not been interrupted by checking the panel box making sure the breaker has not tripped or a fuse has blown.
2. If that was not the problem, then move the BY-PASS switch, on the Receiver, from AUTO to BY-PASS position allowing the water heater to be powered directly from the power source.
3. Then check the operation of the **WATER HEATER** performing all the Troubleshooting Tests recommended in the, **Owner's Manual that came with the water heater.** This will entail checking the incoming power/voltage with a circuit tester or volt meter, determining that the RED, hi-limit switch/Reset button has not been tripped, and checking for defective thermostats or heating elements.
4. Check that the thermostat setting is at the recommended 120 °F.

If all of the above tests prove positive, then switch the BY-PASS switch back to AUTO and start testing the **AQUA SMART™** Receiver.

1. First check the batteries in the transmitter to be sure they are at full power.
2. Remove the transmitter from the wall where it has been installed and begin testing within 3 feet from the water heater/Receiver. (See pages 18-19).
3. Be sure that the LEDs are working by changing the MODES on the transmitter. If the LEDs illuminate on the Receiver and you hear a clicking sound, then the transmitter and AQUA SMART™ Receiver are communicating.

As with other electrical devices, sometimes removing the power source from the device will reset the software and the problem may resolve itself with this simple operation. Try re-setting the circuit breaker at the power source.

4. If the relay does not respond and the LEDs are not changing, then there may be an internal problem with the Receiver which will require the removal of the Receiver cover to check the circuits.

If you are not familiar with testing electrical components, we STRONGLY recommend that you contact a qualified electrician to conduct a further diagnosis of the Receiver. Visit our website: www.aquaenergysaver.com for further information on troubleshooting.

SPECIFCATIONS - WARRANTY

FCC ID #s: Transmitter- xxxxxxxxxxxxxx   Receiver - xxxxxxxxxxxxxxxx
Canadian ISC ID #'s: Transmitter- xxxxxxxxxxxxxxxx: Receiver- xxxxxxxxxxxxxxx
Operating Frequency: 433.9 MHz   ETL Control No.: xxxxxxxxxxxxx

The AQUA SMART™ system has been tested to UL Standard #873 and CSA Standard C22.2 No. 24 and meets all safety requirements.

POWER SPECIFICATIONS:

RECEIVER: 208 - 240VAC (Coming from the incoming power lines).
TRANSMITTER: BATTERIES: 3V – 2 AAA - 1.5 V Alkaline Batteries

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Register your **AQUA SMART™** system at: www.aquaenergysaver.com/warranty.

To obtain technical, warranty or service assistance for the **AQUA SMART™** system, visit our website at: **www.aquaenergysaver.com**
Please have the following information available when making inquiry:
　　　　Model #:   **91510**   Date of installation: _____
　　　　Date Code: _____   Place of Purchase: _____

An electronic version of the AQUA SMART OWNER'S MANUAL, translated in FRENCH, can be found on our website:
www.aquaenergysaver.com
Une version électronique de l'AQUA SMART Manuel du propriétaire, traduit en français, peut être trouvé sur notre site web :
www.aquaenergysaver.com

LIMITED WARRANTY

The **AQUA SMART™** system is warranted for 1 YEAR from date of purchase, or installation by the original purchaser, to be free of defects in materials and workmanship. Damage to the **AQUA SMART™** system caused by accident, misuse, abuse, or installation, whether performed by a contractor, a service company or owner is not covered by this warranty. The company will not be responsible for labor charges and/or damage incurred in the installation, repair, replacement, or for incidental or consequential damages. Batteries and any damage caused by them are not covered by this warranty.
Some states, provinces and nations do not allow exclusion or limitations of incidental or consequential damages, so the above limitations or exclusions may not apply. This warranty gives you specific legal rights. You may also have other rights that vary by state, province or nation.

Notice

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Warning:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.