

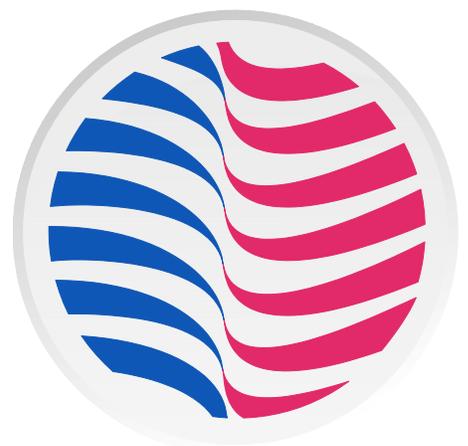
USE AND CARE GUIDE

600 SERIES



600D and 675D

with



Thank you for equipping your RV or home with an Aqua-Hot hydronic heating system! We value your business and are grateful for the trust you have placed with Aqua-Hot Heating Systems Inc. Our customers are our top priority and we are committed to providing best-in-class products, service, and support.

We understand how important comfort is to you as a recreational vehicle or manufactured home owner; therefore, we have designed a heating system to significantly improve all of your comfort levels. Additionally, the Aqua-Hot hydronic heating system is a low-emissions, fuel efficient system that adds thousands of dollars in value to your RV or home.

We know you must be eager to get underway, but take time to read the entire Use and Care Guide and understand your Aqua-Hot unit. This guide should be maintained in legible condition and kept in a safe, accessible location for future review.

Should you have any suggestions how we can better serve you, please do not hesitate to contact us at +1 (800) 685-4298 or +1 (303) 651-5500.

The Aqua-Hot heating system is protected by the finest warranty in the industry (read about it on page 20.)

IMPORTANT NOTE:

- A qualified installer or service technician must perform equipment installation or service. Contact Aqua-Hot for Factory Authorized Service Centers or Certified Technicians located near you at www.aquahot.com/service-help, or call us at +1 (800) 685-4298 or +1 (303) 651-5500.
- Warranty work must be performed by an Aqua-Hot Factory Authorized Service Center

IMPORTANT NOTE:

- Your on-product identity label contains specifications of your unit. Factory settings may be adjusted by the RV or home manufacturer, confirm final setting with your dealer.



- If the information in this guide is not followed exactly, a fire or explosion may result, causing property damage or personal injury.



Comfort Zone #1: Comfortable Cabin Heat

Get heat where you want it, when you want it! This Aqua-Hot system puts heat where you need it. Therefore, your interior temperatures will be just right. Don't hesitate to crank up the heat because the Aqua-Hot system doesn't remove moisture from the air. From now on, you will have to blame the dry skin and itchy eyes on Mother Nature!

Comfort Zone #2: Quiet Operation

Say goodbye to rude awakenings from the forced air furnace, you're an Aqua-Hot owner now! The Aqua-Hot is quiet when operating, so you'll never have to turn up the TV, yell across the room, or have an interrupted night of sleep again due to your heating system.

Comfort Zone #3: Continuous, Hot Water

Take long, guilt free showers knowing there is no recovery time for the next shower or load of laundry. The freedom to take a shower when you want makes your experience feel much more like home.

Comfort Zone #4: Low Emissions

Aqua-Hot's new low emission systems are fumeless and odorless. It's good for you, good for your neighbor, and good for the environment.

Comfort Zone #5: Over 200 Factory-Trained Service Centers

You won't need to service your Aqua-Hot often, but when you do, you can be confident in our Certified Service Centers that are close by and trained to assist you with all of your Aqua-Hot specific needs.

Comfort Zone #6: Adds Value

The NADA Recreational Vehicle Guide lists Aqua-Hot as adding thousands of dollars to the value of an RV. That value will pay off when it's time to trade up or sell.

Comfort Zone #7: Low Fuel Costs

There's no need to burn propane each time heat or hot water is needed. The Aqua-Hot heats a boiler tank and uses the heat stored in the liquid of the boiler tank to provide interior heat. Aqua-Hot's 600 series uses TribriidHot™ technology to power the Aqua-Hot system by pulling heat from one or a combination of heat sources. Use the electric setting to keep the boiler tank up to temperature and for light heating needs, Use the burner when colder conditions require or when using hot water.

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Caution Notes

As you read this information, take particular note of the NOTICE, CAUTION, WARNING, and DANGER symbols when they appear. This information is important for safe and efficient use of the Aqua-Hot equipment.



NOTICE signals a situation where potential damage to the equipment could occur.



CAUTION signals a situation where potential harm or risk of minor or moderate injury could occur if instructions are not followed.



WARNING signals a hazardous situation where potential harm, risk of serious injury or death could result if you do not follow instructions.



DANGER signals a situation where immediate risk of serious injury or death will result if you do not follow instructions.

NOTE: This manual will also use notes sections similar to this one to draw attention to features and practices which should be observed.

The Aqua-Hot Heating System

Read and understand all instructions before installing this unit.

- Read this owner's manual before installing or using the Aqua-Hot system to reduce the risk of injury to persons or damage to equipment.
- The product identity label contains specifications of the unit, to what standard it has been tested, and important safety notices.
- The Aqua-Hot must be installed in a compartment that is closed off from living quarters and accessible only from the outdoors.
- Propylene glycol based antifreeze "Generally Recognized As Safe" (GRAS) by the FDA must be utilized for antifreeze and water heating solution.
- An interlock switch prevents the Aqua-Hot heater from operating when the cover is not installed in the correct position.
- Should any additional assistance be needed, please contact the Product Application Department at +1 (800) 685-4298 or +1 (303) 651-5500.
- Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance

CAUTION

- Disconnect electric wiring to the Aqua-Hot system before welding or plasma cutting the RV or home to avoid damage to equipment
- Air pressure to the tank must NOT exceed 20PSI or it will cause damage
- The Aqua-Hot exhaust is HOT and must be kept away from heat sensitive material
- Use caution when working on or near the propane gas system
- DO NOT connect the 12V DC power to the Aqua-Hot if the RV or home requires welding
- At maximum operating temperatures, the coolant will be very hot and scalding hot vapor or coolant may result in

serious burns or injury

- DO NOT activate the burner until the antifreeze and water heating solution has been added to the boiler tank to avoid serious damage to the heater

WHAT TO DO IF YOU SMELL GAS

- Evacuate all persons from the vehicle



WARNING

If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury, or death.

- Shut off the gas supply at the gas container or source
- Do not touch any electrical switch or use any phone or radio in the vehicle
- Do not start the engine or electric generator (if equipped)
- Contact the nearest gas supplier or qualified service technician for repairs
- If you cannot contact the nearest gas supplier or qualified service technician, contact the nearest fire department
- Do not turn on the gas supply until the gas leak or leaks (if relevant) has been repaired
- Installation and service must be performed by a qualified installer, service agency or gas supplier

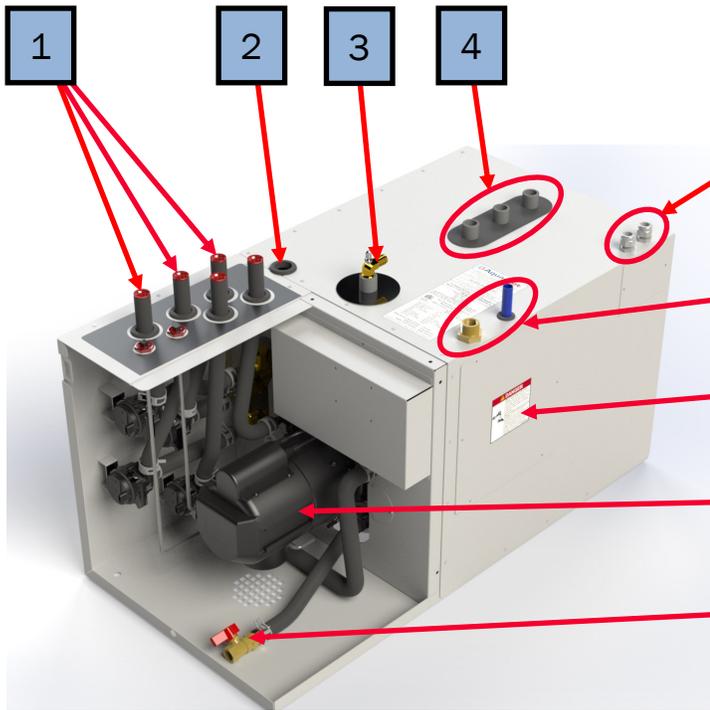


CAUTION

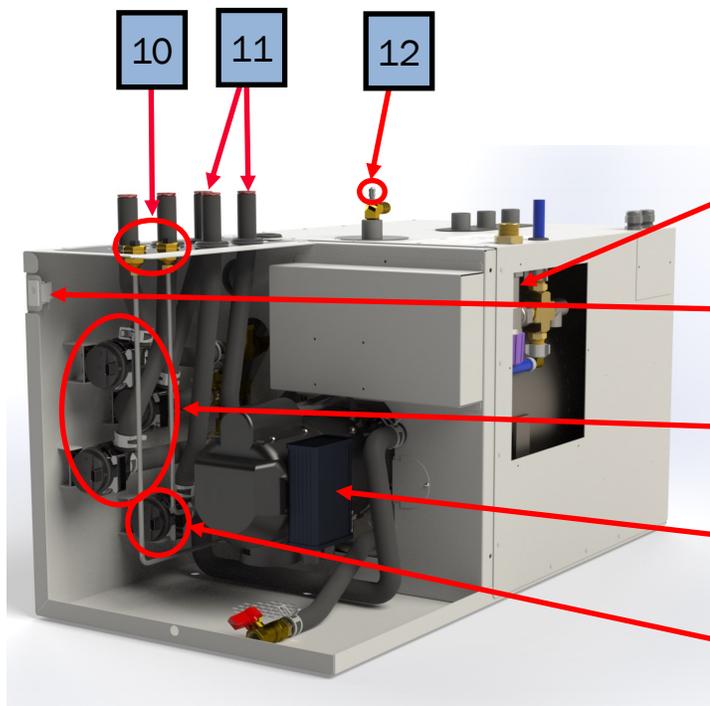
As with any appliance, allow the Aqua-Hot to completely shut down BEFORE disengaging the coach 12V power disconnect.

The Aqua-Hot's exhaust is HOT!

- Do NOT park in areas where dry conditions exist (i.e. grassy, dry fields)
- Do NOT operate the burner inside an enclosed building
- The heater must be switched OFF when refueling



1. Heating Zone Outlet Ports
2. Wiring Harness Port
3. Expansion Tank Connection
4. Heating Zone Inlet Ports
5. AC Wiring Ports
6. Domestic Water Connections
7. Domestic Water Access Panel
8. Diesel Burner
9. Drain Valve
10. Diesel Fuel Inlet/Outlet Ports
11. Engine Preheat Inlet/Outlet Ports
12. Air Relief Valve
13. Tempering Valve
14. Interlock Switch
15. Zone Circulation Pumps
16. Diesel Burner Controller
17. Engine Preheat Pump
18. Access Covers



Aqua-Hot 600D and 675D Features

The Aqua-Hot Heating System is a low-emissions Hydronic Heating System (heating with hot water) that significantly improves your level of comfort, decreases harmful emissions released into the atmosphere, and adds thousands of dollars in value to your coach.

The Aqua-Hot Heating System is four systems in one:

1. Interior Heating System
The Aqua-Hot provides quiet, comfortable interior heat with independent temperature zones that ensures even temperatures when requested, and where requested throughout the cabin.
2. Bay Heating System
Keep pipes and tanks from freezing in the bay storage area.
3. Tankless Hot Water System
The tankless design of the Aqua-Hot ensures that continuous hot water will be supplied whenever it is requested
4. Engine Preheating System
Reduces engine wear due to cold starting by preheating the engine from 30°F to 90°F in one hour

The Aqua-Hot System is powered by TribridHot™ technology

TribridHot™ technology allows the Aqua-Hot to heat from one of, or a combination of the following heat sources.

1. AC Electric Elements
When plugged into shore power, or operating on a generator, the AC Electric Elements may be utilized to provide heat for light duty heating and hot water needs.
2. Diesel Burner
The diesel burner serves as the primary and most powerful heating source for the Aqua-Hot, and will provide adequate heat for all ranges of heating and hot water needs.
3. Vehicle Engine
When driving or idling your coach, the engine's surplus heat is transferred to the Aqua-Hot, providing interior heat and limited hot water without burning additional fuel.

NOTE: This Aqua-Hot product utilizes a propylene glycol based antifreeze and water heating solution. This propylene glycol based solution is a boiler type antifreeze that is "Generally Recognized As Safe" (GRAS) by the FDA. For additional information regarding this "GRAS" antifreeze product, see the Care & Maintenance section of this guide, or contact the Aqua-Hot Heating Systems Technical Support department at +1 (800) 685-4298 or visit our website at www.aquahot.com.



For installation only in a compartment that is completely closed off from living quarters and accessible only from the outdoors.
Exhaust system MUST NOT terminate beneath the vehicle or under an openable window or vent.
Combustion Air MUST BE supplied from outside the vehicle.
THIS APPLIANCE OPERATES ON BOTH AC AND DC POWER.
USE COPPER CONDUCTORS ONLY!
Use a 25A fuse for over-current protection for the DC power supply.
Use a circuit breaker that cuts power at 20A maximum for over-current protection for each 120-VAC power supplies.
Mount the Heater near a bay/storage door so that the Access cover can be easily removed for service.

For Detailed Information, reference the Owner's Manual or contact Aqua-Hot Heating Systems Inc. at 1-800-685-4298.

Minimum Heater Clearances
Front - Open Access
 Back - 0 inches
 Top - 0 inches
 Sides - 0 inches
 This appliance must be installed in accordance with local codes or, in the absence of local codes, the Standard for Recreational Vehicles, NFPA 1192 or CAN/CSA-Z240 RV.

For Direct Vent Installation in a Recreational Vehicle.
 Meets or Exceeds: UL 307A, UL 174
 CSA/CAN B140.0-03
 CAN/CSA-C22.2 No.110-94



Max Tank Pressure	0 PSI
Max Watts (DC)	184W
Max Watts (AC)	(2) 2000 W
Nozzle Size / Angle	.35 GPH / 60°
Volts (DC)	12 VDC
Volts (AC)	120 VAC / 60 Hz
Pump Pressure	145 PSI / 10.0 bar
Input Firing Rate	56,000 BTU / 16.4 kWh
Diesel Burner Model	Webasto
Fuel Type	Diesel

Diesel Burner Serial Number: XXXXXX
 Model Number: AHE-600-D04
 Heater Serial Number: A600-XXXXXX

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NOTE: The product label is attached to the side of the Aqua-Hot and provides a ready reference to specifications, test standards and important safety notices.

Switches

The Aqua-Hot Heating System is controlled by two switches, the burner switch and the electric element switch. This style of Aqua-Hot is equipped with an Engine Preheat element as well. When one or both of the burner or electric element switches are in the “ON” position, it will supply the necessary heat to the boiler tank. Keep in mind that the Aqua-Hot must be at operating temperature for the heating zones and hot water to function properly. Please contact the specific coach dealer for the exact location of switch locations.

The Aqua-Hot interior switch panel has a high/low switch that will operate in conjunction with the electric element switch.

- **Low Switch**

Moving the High/Low switch to the “LOW” position will energize one of the two AC elements inside of the Aqua-Hot. On the “LOW” setting, allow 1-2 hours for the Aqua-Hot to reach operating temperature.

- **High Switch**

Moving the High/Low switch to the “HIGH” position will energize both AC electric elements within the Aqua-Hot, providing adequate heat for light-duty heating and hot water needs. Allow 30 minutes to 1 hour for the Aqua-Hot to heat to operating temperature with the “HIGH” setting activated.

Thermostats

The interior room thermostat can be set at a desired temperature, signaling to the Aqua-Hot that it is “calling for heat.” Once this occurs, the Aqua-Hot circulation pump, interior heat exchangers, and heat source will be activated, thereby providing heat to the coach.

NOTE: The fresh water thermostat controls the bay heating area and should NOT be set below 40°F to prevent freezing of the domestic water storage system. Please contact the specific coach dealer for the exact location of the thermostat controls.



Heating System Operation

Overview:

The heating features are powered by a 12V DC diesel burner, and two AC electric elements. These elements, in combination with the diesel burner heat the anti-freeze and water heating solution within the Aqua-Hot to provide steady, continuous heat and hot water.

- **Diesel**

The diesel burner is the primary, and most powerful heating source within the Aqua-Hot. The diesel burner can meet all demands for heat and hot water that the coach may require. It can be activated by simple moving the “BURNER” switch on the interior switch panel to the “ON” position.

- **Electric**

The electric elements are intended as a *secondary* heat source within the Aqua-Hot, and can provide light-duty hot water and interior heat in mild conditions. The electric elements can be activated by moving the “ELECTRIC” switch, located on the interior switch panel to the “ON” position.

NOTE: The coach must be operating on shore power, or the generator must be active in order to utilize the electric element functionality of the Aqua-Hot.

- **Engine Preheat**

In order to use the Engine Preheat element of the Aqua-Hot system, both the diesel burner AND the engine preheat switch, located on the interior switch panel, must be in the “ON” position. Allow the engine preheat element to function for one hour before starting the vehicle’s engine.

Controlling Heat Levels:

The interior room thermostat can be adjusted to the desired temperature, and the Aqua-Hot will be automatically activated and de-activated as needed to maintain the set interior temperature. Keep in mind that in some conditions, the “BURNER” and “ELECTRIC” switches must both be in the “ON” position to provide enough heat to maintain interior temperature.

Controlling and Balancing Heating Zones

Set the interior room thermostat for each independent heating zone at the desired temperature. This feature allows you to customize various temperatures on each heating zone throughout your coach.

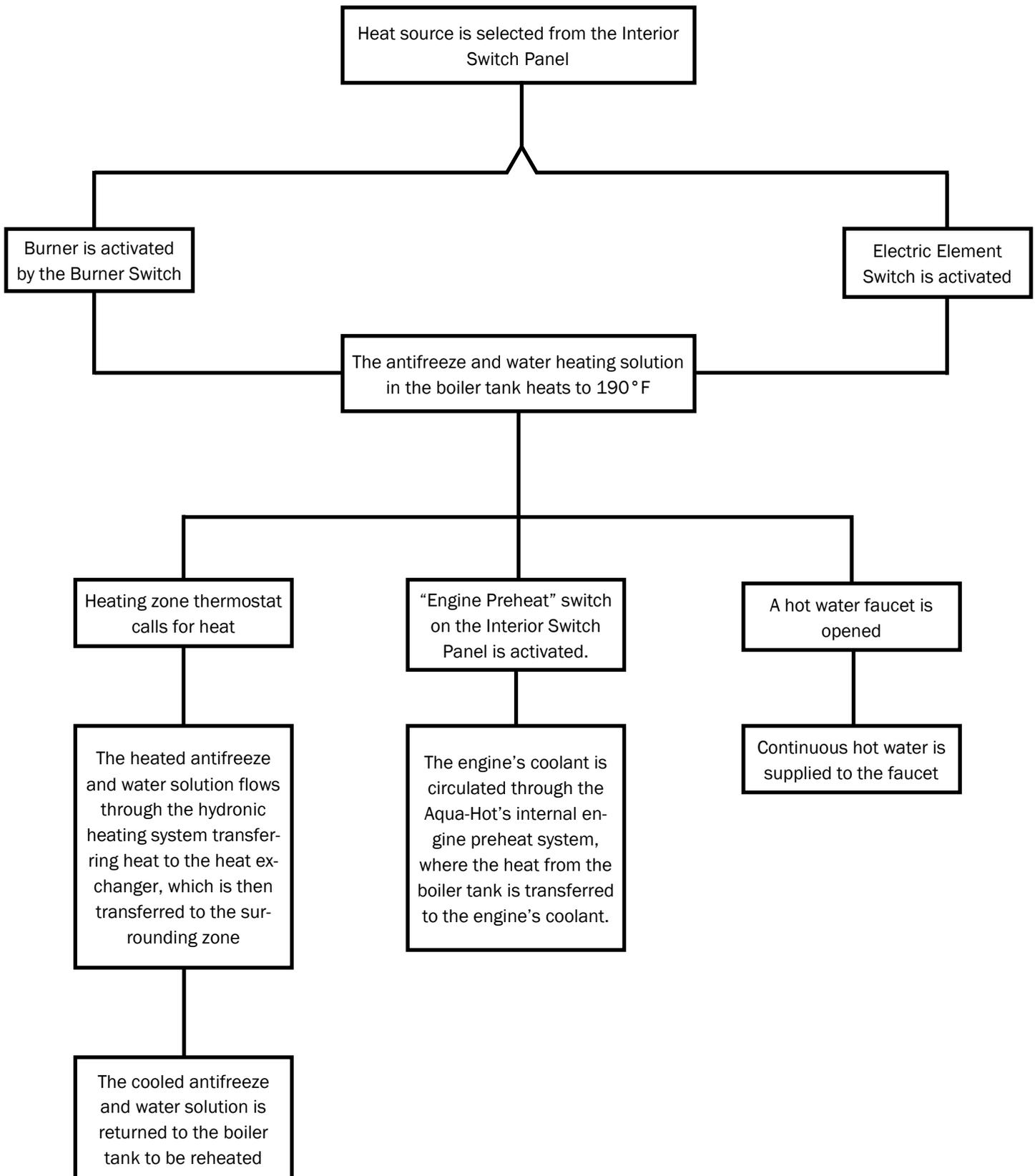
Using the Water Heating System

General Information:

The Aqua-Hot system is known as an on-demand hot water heating system because hot water is not stored within the coach. Instead, when the burner and/or electric elements are activated the Aqua-Hot is heated to operating temperature. Once the Aqua-Hot reaches operating temperature, domestic water is heated as it is supplied to the faucets. Therefore, simply open a hot water faucet within the coach once the system is up to operating temperature, and a continuous supply of hot water will be available within a few seconds.

Operation Instructions:

To operate the electric heating elements, or the diesel burner, simply move the “BURNER,” and “ELECTRIC” switches to the “ON” position. This action will activate the corresponding devices within the Aqua-Hot to begin heating the unit to operating temperature. Please note that the electric element retains “HIGH” and “LOW” functionality, and this will impact the performance of the electric elements accordingly.



The Aqua-Hot Reporter

General Information:

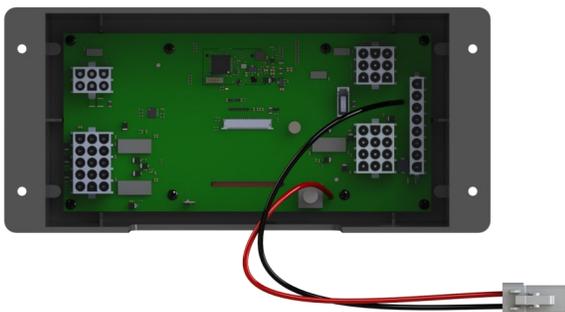
The Aqua-Hot 600 series now contain Aqua-Hot's new Reporter unit. The Reporter serves to replace the electronic controller in 600-D04, and 675-D04 units and later. Should the Aqua-Hot cease to operate, complete the following steps.

1. Verify that the Aqua-Hot's access cover is securely installed. Reference page 5, part number 18. The Aqua-Hot will not operate if the access cover is not correctly installed.
2. Ensure that the vehicle's fuel tank contains a sufficient level of fuel. The Aqua-Hot system will not operate if the fuel level is at, or below 1/4 tank.
3. Ensure that the Aqua-Hot boiler tank has a sufficient supply of antifreeze and water heating solution by checking the level at the expansion tank. If this level is low, reference the Care & Maintenance section of this guide for refilling instructions.
4. Check the Aqua-Hot Reporter faults screen. If faults are present, record them on a notepad.

If the unit is not made functional by the aforementioned checks, please contact the Aqua-Hot Heating Systems Technical Support Department at +1 (800) 685-4298, or visit our website at www.aquahot.com.

If the Aqua-Hot diesel burner switch indicator light does not illuminate and the diesel burner is not functioning, locate the Reporter and check the following:

1. Check the Reporter's fault screen for any faults associated with this unit.
2. Check for loose wire connections on the Reporter by removing the four bolts or screws securing the housing to its mounting position. It may be necessary to check with your coach manufacturer to determine the best way to remove the Reporter.



3. Remove the Reporter and ensure that all connections are secured, and that the wires are in good condition.
4. Ensure that the vehicle's fuel tank has a sufficient level of fuel.
5. If at this stage the Aqua-Hot does not begin to function, please contact the Aqua-Hot Heating Systems Technical Support Department at +1 (800) 685-4298, or visit our website at www.aquahot.com

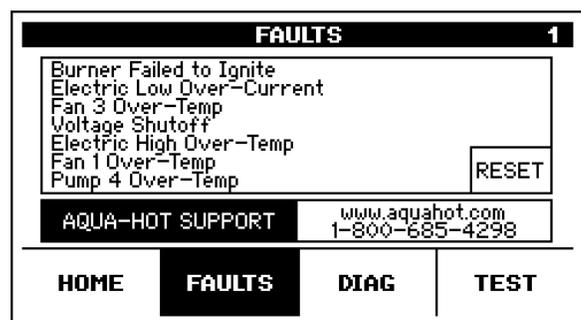
The Aqua-Hot Reporter contains both a fault page, and a fault log. The fault page contains information on faults that have occurred since the last time the Reporter was reset or power cycled. The fault log cannot be cleared, and can contain up to four historic fault conditions that may or may not be related to a presently experienced issue.

Fault Conditions

The Reporter will display the following fault conditions, accompanied by the component which caused the fault (pump, fan, burner, etc.)

Over-Current

An over-current fault condition occurs when too much current is drawn by a specific component channel. This fault is typically, but not always, associated with a pump, or the diesel burner.



Over-Temperature

An over-temperature fault occurs only if any particular power channel within the Reporter has reached an over-current condition. The fault will be accompanied by the component which triggered the fault.

Low Voltage

The Reporter is designed to operate between 11V DC and 16V DC. A low-voltage fault will occur if the Reporter drops below 11.8V DC. If the Reporter falls below 11.2V DC for at least thirty seconds, it will discontinue the operation of the Aqua-Hot as a safety mechanism.

Low-Level Cutoff

If the Reporter senses a low fluid level, the heating system will shut down all fans, pumps, and heat sources until the unit is refilled.

Ignition Failure

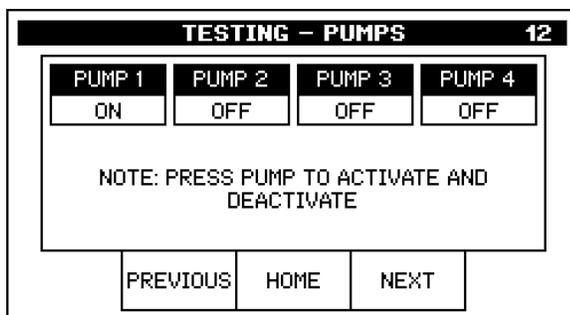
The ignition failure fault is triggered if, for some reason, the burner fails to operate.

Test Functionality

The Reporter has been designed to include a host of test features allowing for quicker diagnosis and repair of components. Using the “PREVIOUS” and “NEXT” buttons on the test screen as shown below, it is possible to cycle between the burner and electrical subsystems, zone fans, and pumps.

These tests are sorted into different sections, “TESTING-HEAT,” “TESTING- PUMPS,” “TESTING-FANS.” Only one section of tests may be used at any one time, because of this it is not possible to test pumps, and fans concurrently.

The Reporter will time out after five minutes and return to the home screen, and any tests which are underway at that time will be ended.



Pumps and Zone Fans

Pumps and Zone fans are activated individually, and remain active until the Reporter times out, or the test is manually ended. It is possible to activate multiple pumps, and multiple fans concurrently for testing. However, it is not possible to activate pumps and fans at the same time.

Heating Sub-Systems

The Reporter will allow the electric and burner sub-systems to be independently activated and operated for a maximum of five minutes.

NOTICE

MIS-USE OF THIS TESTING FUNCTIONALITY COULD RESULT IN DAMAGE TO THE AQUA-HOT UNIT. DO NOT ATTEMPT TO SUSTAIN LONG-TERM OPERATION OF THE AQUA-HOT WITH THE HEATING SUB-SYSTEM TEST FUNCTIONALITY.

Heartbeat Function

Aqua-Hot Reporter units with firmware version 5 and later are equipped with a “heartbeat” function that is used as a safety mechanism in the event of power loss.

The heartbeat functions by establishing a signal between the RVC system of the coach (if applicable,) and the Reporter. The Reporter is constantly awaiting a “stay-alive” signal from the RVC network indicating that the Reporter should continue Aqua-Hot operation as normal. The Reporter will cease all Aqua-Hot functionality after the loss of 6 consecutive signals from the RVC network. If such a situation were to occur, the Reporter would then display “BATTERY DISCONNECT SWITCH OFF” in the fault log.

Tempering Valve

The tempering valve functions as a means for mixing the hot, and cold domestic water to reduce the risk of scalding. This valve is located in the middle section of the cabinet. Reference page 5, part number 13.

Maintenance Schedule

Monthly Maintenance

Check the Aqua-Hot's antifreeze and water heating solution to ensure that it is at the proper level. This can be accomplished by visually checking the coolant level in the Aqua-Hot's expansion tank; reference figure 5, page 14.

Please note that the coolant level should be checked **ONLY** when the Aqua-Hot is at maximum operating temperature. This should be done immediately after the burner cycles off.

At maximum operating temperature, the antifreeze and water heating solution should be at the level marked "HOT" on the expansion tank.

Run the interior heating zones until you feel warm air blowing out of the heat exchangers.

Run the burner once a month. This will ensure proper operation of the burner.

Replenishing the Antifreeze and Water Heating Solution

If the antifreeze and water heating solution needs replenishing, remove the cap for the expansion bottle and fill it to the "HOT" mark. Replace the expansion bottle cap when this is complete.

Reference appendices A through C in order to determine the correct ratio of antifreeze to water, the proper type of antifreeze, and the water quality recommendations for the Aqua-Hot antifreeze and water heating solution. Reference appendix D for the proper tool and instructions for usage in measuring the system's antifreeze mixture ratio.

Annual Maintenance

To keep the diesel burner running smoothly, a tune-up, or annual service should be performed on the unit. An annual service consists of a new fuel nozzle and fuel filter. To ensure best diesel-burner performance, always use the recommended fuel nozzle and fuel filter when replacing these parts.



DANGER

When the Aqua-Hot is at maximum operating temperature, the coolant will be very hot. If the Aqua-Hot's heating system is accessed, scalding by hot vapor or coolant could result. Before cleaning or servicing, disconnect all power supplies



WARNING

DO NOT operate the burner and/or the electric heating element without the antifreeze and water heating solution in the Aqua-Hot's boiler tank. Doing so will cause serious damage to the heater.

Propylene glycol that is "Generally Recognized As Safe" by the FDA must be utilized for the antifreeze and water heating solution.

NOTE: For additional information regarding this propylene glycol based, boiler type antifreeze that has been "Generally Recognized As Safe" by the FDA, please reference Appendix A, contact Aqua-Hot Heating Systems Technical Support Department at +1 (800) 685-4298, or visit our website at www.aquahot.com.

Winterizing the Domestic Water Heating System

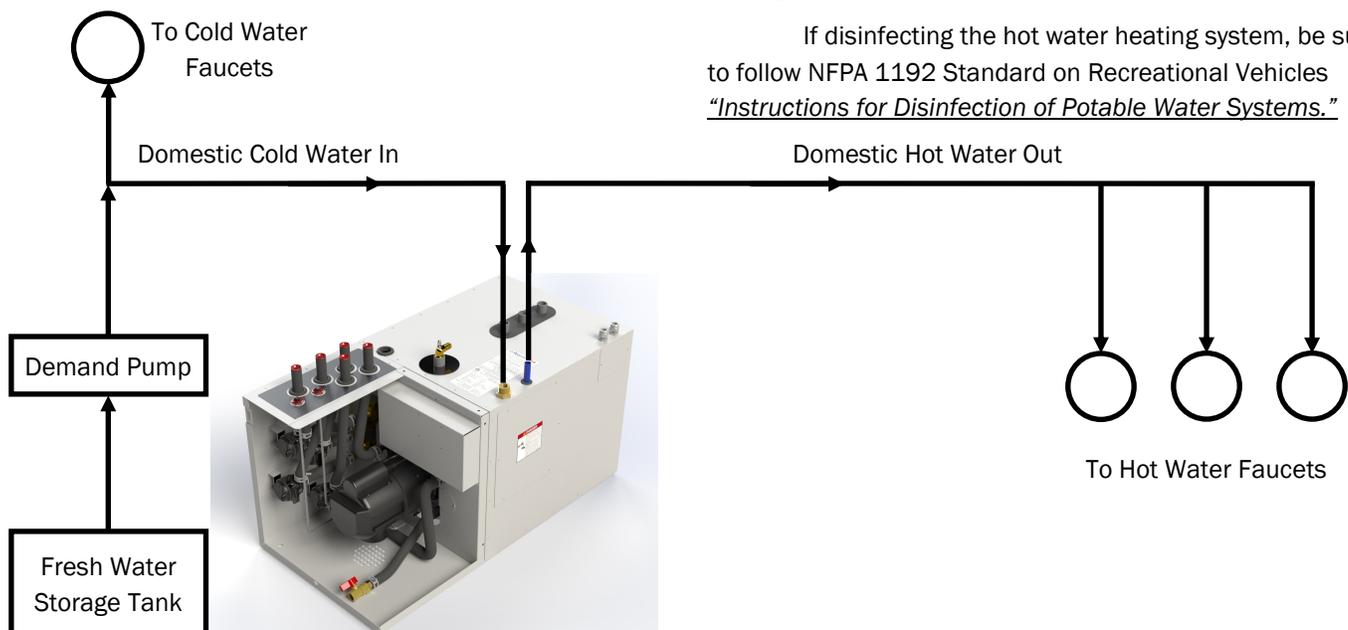
The Aqua-Hot's domestic water heating system must be completely drained of domestic water at any time the heater is stored where freezing temperatures may be experienced.

NOTE: The Aqua-Hot can continue to be used for interior zone heat once the domestic water heating system has been drained and winterized.

Please follow these instructions when winterizing the Aqua-Hot domestic water heating system. Reference figure 4 for a system overview.

1. Completely drain the fresh water storage tank
2. Disconnect the domestic water demand pump suction line from the fresh water storage tank
3. Attach an adequate piece of hose onto the suction side of the domestic water demand pump
4. Place the opposite end of the hose into an adequate supply of FDA-approved "GRAS" RV antifreeze and allow the fluid to pump through
5. Open and close all interior and exterior water faucets one at a time, until ONLY pure RV antifreeze is present. Perform this procedure for both cold and hot water faucets
6. Remove the hose and reconnect the domestic water demand pump's suction line to the fresh water storage tank

Figure 4



WARNING

Not winterizing the Aqua-Hot when freezing temperatures are present will result in serious damage to the Aqua-Hot domestic water heating system. Ensure that FDA approved "GRAS" antifreeze rated for winterization is used when winterizing this unit.

De-Winterization

To de-winterize the Aqua-Hot system, completely fill the fresh water storage tank. Open and close the interior and exterior faucets, one at a time, until only clear water is present.

Disinfecting the Domestic Water System

NOTICE

Aqua-Hot systems contain copper tubing and are not compatible to prolonged exposure to sodium hypochlorite (bleach or liquid bleach.) Using products containing bleach, including water refreshers, may cause corrosion of the domestic water coil, resulting in a catastrophic failure of the Aqua-Hot system by creating leaks that cannot be repaired. This damage is not covered by the Aqua-Hot warranty.

If disinfecting the hot water heating system, be sure to follow NFPA 1192 Standard on Recreational Vehicles *"Instructions for Disinfection of Potable Water Systems."*

General Information

Should the Aqua-Hot Hydronic Heating System fail to operate, complete the following checks:

1. Verify that the Aqua-Hot's access cover is securely installed. The Aqua-Hot will not operate if the access cover is not fully installed.

NOTE: An interlock switch prevents the Aqua-Hot from operating when the cover is not installed and properly secured in place. Reference page 5, part #14 for interlock switch locations.

2. Ensure that the vehicle's propane tank contains a sufficient level of fuel. The Aqua-Hot system will not operate if the fuel level is at or below 1/4 tank.
3. Ensure that the Aqua-Hot boiler tank has an adequate supply of antifreeze and water heating solution by checking the level at the expansion tank. If the level is low, reference the maintenance section of this guide for refilling instructions

NOTE: The fluid level sensor is located in the Aqua-Hot's expansion tank. If the antifreeze solution in the expansion tank drops below the level of the fluid sensor, the Aqua-Hot will not operate.

If the Aqua-Hot's failure to operate is not resolved with the aforementioned checks, please contact the Aqua-Hot Heating Systems Technical Support Department at **+1 (800) 685-4298** for additional assistance, or visit our website at **www.aquahot.com**.

Fluid will reach this line when Hot

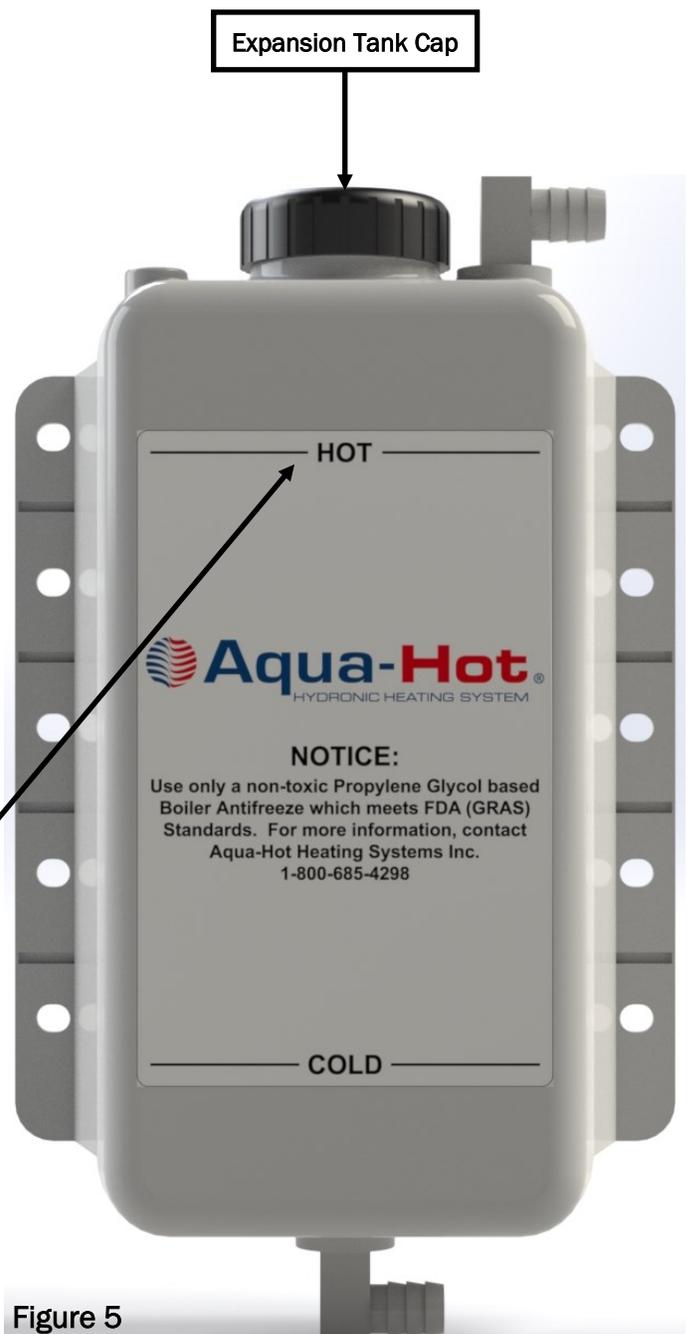


Figure 5

Appendix A: Antifreeze Types

The following information addresses the necessary usage of propylene glycol based “boiler” type antifreeze in the Aqua-Hot. Propylene glycol is a safer alternative to the more toxic ethylene glycol antifreeze; however, as mandated by the International Association Plumbing and Mechanical Officials (IAPMO,) only propylene glycol based “boiler” type antifreezes deemed “Generally Recognized As Safe” (GRAS) by the FDA should be utilized.

Due to the significant impact of various types of antifreeze on a hydronic heating system, including the level of safety provided, it has been recognized that there is a need to provide an explanation regarding two additional prominent types of antifreeze/coolant available. The following information should be utilized as an educational means of ensuring that the proper type of propylene glycol based antifreeze is selected.

RV & Marine Antifreeze

These types of propylene glycol based antifreeze products are formulated specifically for “winterizing” applications ONLY. Although RV and Marine antifreeze is often GRAS approved by the FDA, it should never be used in the Aqua-Hot’s Hydronic Heating System. This type of antifreeze is not formulated to transfer heat, which is essential to the heating system’s functionality and does not contain rust inhibitors. Please note that RV and Marine antifreeze can be utilized to winterize the Aqua-Hot’s domestic water coil for extended storage periods.

Automotive Antifreeze/Coolant

These types of propylene glycol based antifreeze products are formulated specifically to protect automotive engines against corrosion, freezing temperatures, and overheating. They also have excellent heat transfer and thermal conductivity characteristics. Although these types of antifreeze products are considered less toxic and safer than ethylene glycol for people, pets, and the environment, they are not GRAS rated by the FDA. Therefore, they must be marked with a “harmful if swallowed” warning. This additional warning is required because these types of antifreeze products contain high levels of chemical rust inhibitors. Due to their potentially hazardous properties, they should never be used in an Aqua-Hot heating system.

Appendix B: Antifreeze Mixture Water Quality Recommendations

In order to ensure maximum performance and longevity of an Aqua-Hot heating system’s boiler tank and associated components, it has been determined that there is a need to use distilled, de-ionized, or soft water in combination with concentrated propylene glycol for the Aqua-Hot’s antifreeze and water heating solution. Please note that this is only necessary when mixing concentrated propylene glycol antifreeze with water; suppliers of pre-mixed antifreeze are responsible for the use of high-quality (distilled, de-ionized, or soft) water when preparing their antifreeze for sale.

Hard water possesses a high-level of calcium and magnesium ions, which deplete the corrosion inhibitors in the propylene glycol. This causes the antifreeze and water heating solution to begin turning acidic, which can corrode the Aqua-Hot boiler tank and domestic water coil prematurely, thereby shortening the operational lifespan of the Aqua-Hot. Therefore, concentrated propylene glycol should be used with distilled, deionized, or soft water. The local water agency should have up-to-date water quality reports which will indicate if the local tap water is within our guideline of 80ppm of hardness or less.

Appendix C: Antifreeze Terms and Mixture Ratio

The following information addresses the process of selecting a propylene glycol based antifreeze solution that provides adequate freeze, boiling, rust, and corrosion protection. A 50/50 mixture ratio is recommended, which will result in a freeze point of approximately -28°F and a boiling point of approximately 222°F .

The following information should be utilized for the purpose of clarifying some terms commonly associated with antifreeze.

Freeze and Burst Point

Antifreeze solution lowers the freezing point of any liquid to which it has been added by preventing the formation of crystals. However, as the ambient temperature continues to decline, the water in the solution will attempt to attain a solid state. The point at which the water begins to solidify (or “gel”) is termed as the “freeze point.” Although the water in the solution has begun to freeze, producing a “slushy” consistency,

the antifreeze in the solution will continue to combat the normal expansion of the solution as it freezes. The point in which the solution can begin to expand due to colder temperatures is called the “burst point.” Once the solution reaches the burst point, the potential is present for ruptured pipes to exist. The burst point of the antifreeze and water solution is dependent upon the brand of propylene glycol antifreeze employed.

Boiling Point

The Aqua-Hot utilizes the propylene glycol based (PPG) antifreeze and water heating solution as a transportation means for the heat produced from the internal processes. The PPG antifreeze solution absorbs the heat created until its boiling point is reached. It is at this point when the liquid turns to a gas and is expelled to prevent the heating system from overheating. Each time the boiling point is reached, a loss of efficiency occurs because the heat produced is expelled rather than utilized for the function of the heating system. Therefore, a higher boiling point is desired in order to combat the loss of efficiency, which allows the antifreeze to transport the heat created from the internal process throughout the motorhome where it can be utilized productively rather than dissipating due to its change from a liquid to a gas.

Rust and Anti-Corrosive Inhibitors

Another major function of the antifreeze solution is to protect the internal metal components of the Aqua-Hot system from corrosion and rust. Antifreeze is able to perform this function by the addition of rust and corrosion inhibitors, which are designed specifically to activate in a water solution.

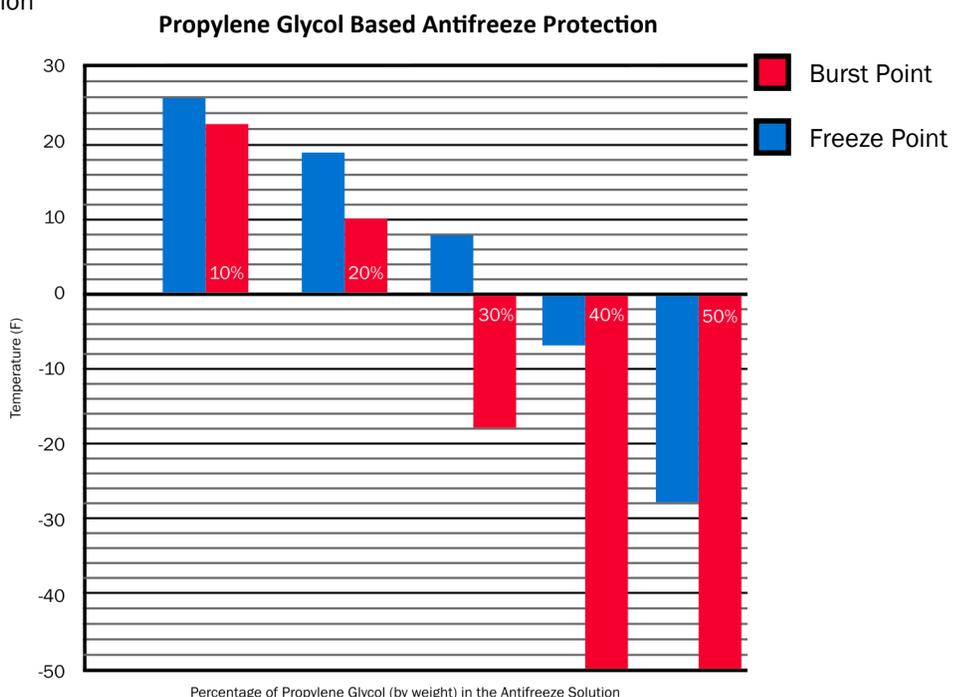
Summary

Antifreeze solution has three basic functions

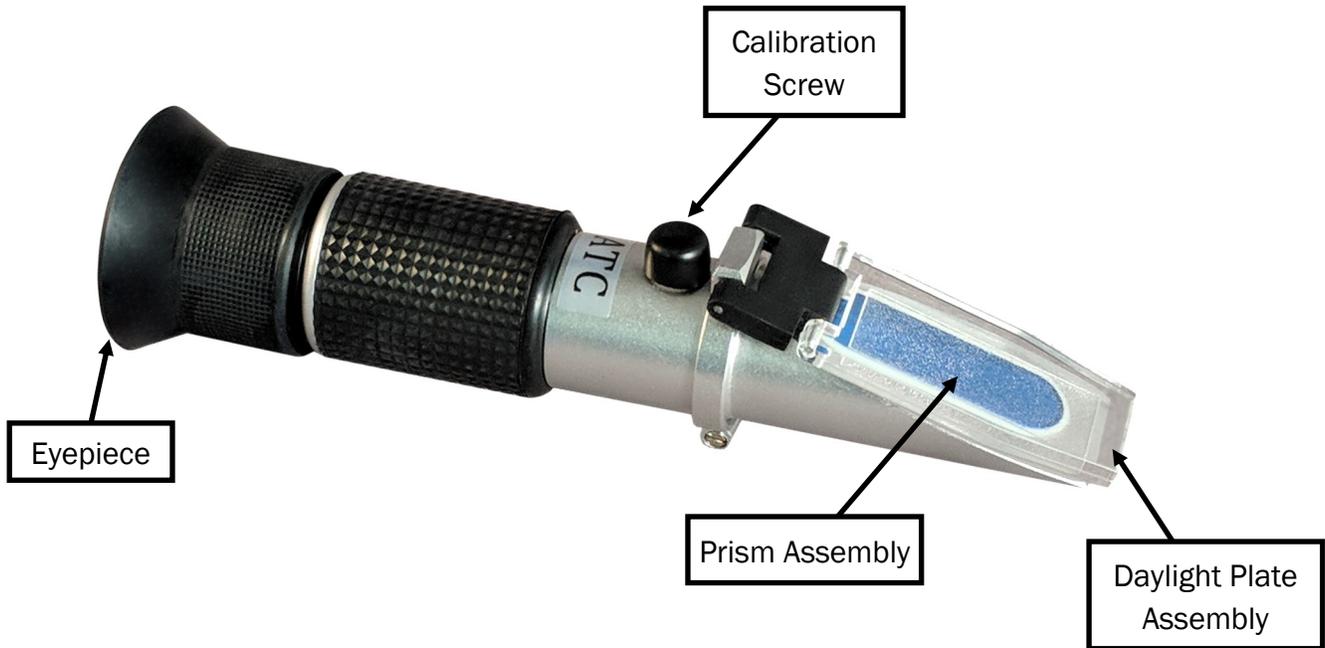
1. Freeze Protection
2. Boil-over Protection
3. Anticorrosion and Rust Protection

PPG antifreeze solution is also primarily responsible for heat transfer; however, propylene glycol itself does not possess acceptable heat transfer characteristics. Therefore, water is added to the mixture due to its nature as an excellent heat conductor. PPG antifreeze solution, mixed with water that is 35% to 50% propylene glycol is recommended to provide the best performance combination of the aforementioned functions. If excess propylene glycol exists within the antifreeze and water heating solution, the water’s heat absorption properties will be compromised. This could ultimately inhibit the Aqua-Hot from providing adequate domestic hot water and interior heating.

Additionally if the antifreeze and water heating solution contains over 70% propylene glycol, the freezing point is raised, resulting in less freeze protection. Please reference the attached graphical representation regarding percentage of antifreeze to water and how it directly affects the solution’s freezing point.



Appendix D: Measuring Propylene Glycol Using a Refractometer



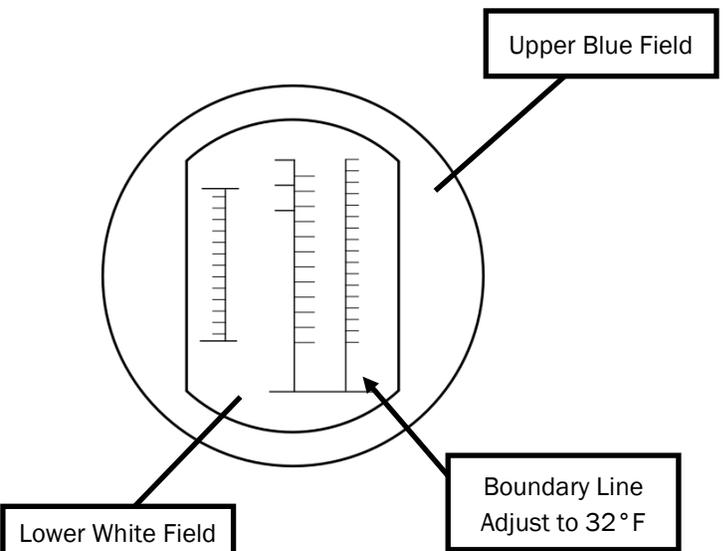
Properly Apply Antifreeze to the Prism Assembly

Use the guide below to properly apply the propylene glycol mixture to the prism assembly of the refractometer. Once that is complete, peer through the eyeglass of the refractometer to continue to the next step.

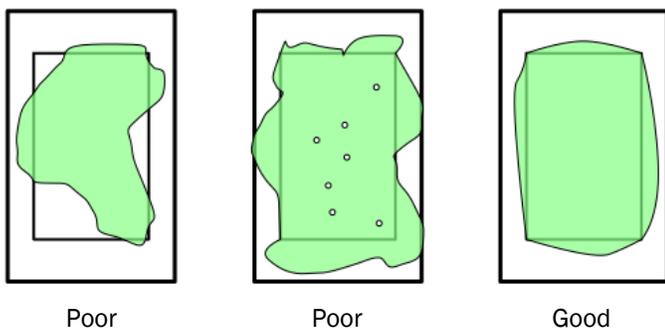
Adjust the Boundary Line

Once the glycol solution has been properly applied, adjust the calibration screw until the boundary line labelled "Propylene Glycol" is set to 32 °F. The graphic to the right has been designed as an aid, but note that it may differ from what is shown in the refractometer sight glass.

Refractometer Sight Glass



Application of Propylene Glycol



DATE	SERVICE PERFORMED	SERVICE CENTER

DATE	SERVICE PERFORMED	SERVICE CENTER



2-YEAR LIMITED WARRANTY AQUA-HOT® HYDRONIC HEATING SYSTEM

Aqua-Hot Heating Systems Inc. warrants the Aqua-Hot Heater to be free from defects in material and workmanship under normal use and service for a period of two years on both parts and labor commencing upon the original date of registration of the vehicle. Replacement parts are warranted for the remainder of the Heater's standard warranty coverage or for six months, whichever is greater. The intent of this warranty is to protect the heater's end-user from such defects, which would occur in the manufacturing of the product. Thus, problems due to improper specifications, improper installations, improper use, the use of accessory parts or parts not authorized by Aqua-Hot Heating Systems Inc., repair by unauthorized persons, and damage or abuse of the heater are specially excluded from warranty coverage.

For additional information, or to obtain a warranty repair authorization, please contact the *Aqua-Hot Heating Systems Warranty Administrator* at 1-800-685-4298 (7:00 AM to 4:00 PM Mountain Standard Time) or visit www.aqua-hot.com.

My Comfort Zones are On-Board

Vehicle:

Purchased From:

Dealer Information:

Name:

Location:

Phone Number:

Heating System:

Serial Number:

LTE-907-900 Rev. C

600 SERIES



Aqua-Hot Heating Systems, Inc.
7501 Miller Drive, Frederick, CO 80504

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