Installation Manual

200 Series

Aqua-Hot®

An AIRXCEL Brand

AHE-250-D03

Contents

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 system.

NOTICE signals a situation where potential damage to the Aqua-Hot could occur.

CAUTION signals a situation where potential harm or risk of minor or moderate injury could occur if you do not follow instructions.

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

DANGER signals a situation where immediate risk of serious injury or death will result if instructions are not followed.

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

Read all instructions before installing the Aqua-Hot unit. Aqua-Hot Heating Systems is not liable for damage resulting from failing to follow instructions contained in this, and any other Aqua-Hot documentation relevant to this unit.

- Read this manual before installing or using the Aqua-Hot System to reduce the risk of injury to persons or damage to the equipment.
- The product identity label contains specifications of the unit, to what standards 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 exterior of the vehicle.
- **Propylene glycol** based antifreeze "Generally Recognized As Safe" (GRAS) by the FDA must be utilized for the 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.
- Disconnect electric wiring to the Aqua-Hot System before welding or plasma cutting the coach to avoid damage to equipment.
- The Aqua-Hot tank and heating loop operate at 0.0 PSI (zero pressure system). Air pressure to the tank must not exceed 20 PSI. Exceeding this rating will cause internal damage to the Aqua-Hot.
- Use caution when working on or near any fuel system.

⚠ CAUTION

- At maximum operating temperature, the coolant will be very hot and scalding. Hot vapor or coolant may cause in serious burns or injury. Be aware of hot surfaces.
- 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.

NOTE: For networked control of the Aqua-Hot Controller, Aqua-Hot requires system integrators ensure that individual commands are received and processed. Aqua-Hot requires that commands be repeated or confirmed so that if a single message were dropped, or if there is a brief network disturbance, the Controller would get into the correct state as soon as the disruption was removed.

The Aqua-Hot Controller monitors the heating system and handles all logic relating to safeties and heating control. As such, the system integrator is required to display all pertinent status information but not use that information to lock out operation or add additional safety layers that could impact the end of operation if a message from the Controller was missed.

Safety Features

Low-Voltage Shutdown

The Aqua-Hot Controller is designed to operate between 11V DC and 16V DC. If the Controller detects that it is receiving voltage below 11.8V DC, a System Voltage fault will trigger a display on the LCD screen. If the Controller system drops below 11.2V DC for 30 seconds, it will discontinue operation of the Aqua-Hot heating system.

Over-Current

An Over-Current fault condition occurs when too much current is drawn by a component, usually a fan or pump. When this fault is triggered, the output channel is shut off until the system has been reset or power-cycled.

Over-Temperature

An over-temperature fault will occur if your Aqua-Hot heating system has reached 218° F. The Controller will deactivate the heater and display an over-temperature fault on the LCD display screen.

Low-Level Cutoff

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

House Power Sense

The Aqua-Hot Controller contains within it a fail-safe functionality known as House Power Sense. This functionality serves as a live signal to the Aqua-Hot allowing it to continue operating. If power is lost to the on-board RVC network or other on-board control systems, the controller is signaled to shut down operation until a 12V DC power signal is returned to the unit.

Interlock Switch

The Aqua-Hot 250-D03 is equipped with an interlock switch that prevents the heater from operating when the cover is not installed in the correct position, or if its not properly secured in place. This is a safety device to ensure the burner will not ignite if the service panel is not secure.

⚠ WARNING

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

NOTE: Should any additional assistance be needed, please contact the Technical Support Department at 574-AIR-XCEL (574-247-9235).

About the Aqua-Hot 200 Series

The Aqua-Hot 250 Diesel Series Hydronic (water-based) heating systems provide interior heat and tank-less continuous hot water in one small, easy to install package.

The Aqua-Hot Heating is a 2-in-1 System

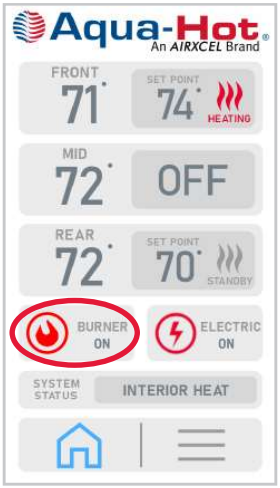
1. Interior heating system: provides quiet, comfortable interior heat and even temperatures.
2. Tank-less hot water system: provides a flow of comfortable hot water.

The Aqua-Hot is equipped with up to three thermostatically controlled temperature zones. The tank-less hot water system produces 90 gallons per hour (1.5 GPM) of continuous hot water.

These TribridHot™ Systems use one or a combination of heat sources to heat FDA-approved "Generally Recognized As Safe" (GRAS) **propylene glycol** based antifreeze solution in the Aqua-Hot's boiler tank.

The heater also employs a 12V DC diesel burner as the primary heating source. The burner should be used for continuous hot water and interior heating in cold conditions. In addition to the burner, the 250-D03 Series model also employs an electric heating element as a *supplemental* heating source. Once the tank has reached temperature by way of the 12V DC diesel burner, the electric element may be engaged to provide light-duty hot water and heating needs, and serves to maintain tank temperature during periods which the heater is not in used. For continuous hot water and heat in cold conditions, the diesel burner **must** be active.

To get the Aqua-Hot to temperature, turn the diesel burner to the "ON" position on either the Aqua-Hot LCD screen (*optional*) or on the coach control panel. It may take up to 10 minutes to get to operating temperature before heat or hot water are available.

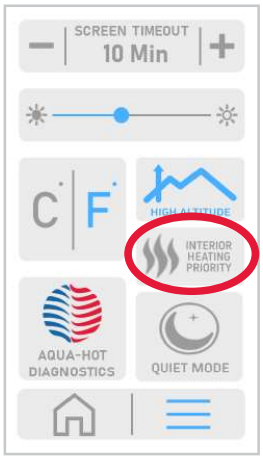


Important Notes:

- 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 574-AIR-XCEL (574-247-9235).
- Warranty work must be performed by an Aqua-Hot Authorized Service Center.
- Your on-product identity label contains the specifications of your unit. Factory settings may be adjusted by the vehicle manufacturer, confirm final setting with your dealer.
- This heating system has been certified for installation only in recreational vehicles, not certified for use in boats.
- The Aqua-Hot heating system operates independently of the vehicle engine and is connected directly to the electrical system of the vehicle. The diesel burner is only connected directly to the fuel system of the vehicle.
- Please read this manual and follow instructions to avoid injuries during installation and/or operation.

Heat Priority Option:

The Aqua-Hot comes equipped with the three-way valve (sometimes known as the summer/winter valve). This controls the flow of the antifreeze and water heating solution within the Aqua-Hot to deliver either hot water or interior as priority. Tapping on this element will change the valve's orientation. When this element displays "INT. HEAT", this valve is oriented to provide interior heat by circulating the heating solution throughout the interior heating zone. When the element says "HOT WATER", the valve is oriented so that the heating solution is routed to prioritize hot water.



NOTE: The Aqua-Hot LCD is an ***OPTIONAL*** add-on. It is encouraged that RVs already equipped with an RV-C enabled touchscreen have all Aqua-Hot screens and features mirrored on the coach display. For more information on the Aqua-Hot 5" LCD Screen, please reference the "LCD Operation Guide" which can be found at www.aquahot.com.

Aqua-Hot®
An AIRXCEL Brand

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 and not less than 3 feet from an openable window.

Combustion Air MUST BE supplied from outside the vehicle.

Suitable for water (potable) heating and space heating.

THIS APPLIANCE OPERATES ON BOTH DC AND AC POWER.

USE COPPER CONDUCTORS ONLY!

Use a circuit breaker that cuts power at 20-Amps maximum for over-current protection for the 120-VAC power supply.

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 574-AIR-XCEL (574-247-9235).

Minimum Service Clearances
Front - Open Access
Back - 1 Inches
Top - 8 Inches
Sides - 1 Inches

This appliance must be installed in accordance with local codes or, in the absence of local codes, the Standard for Recreational Vehicles, ANSI A119.2/NFPA 1192 or CAN/CSA-Z240 RV

ETL C US LISTED
Intertek
3069328

For Direct Vent Installation in a Recreational Vehicle.

Meets or Exceeds: UL 307B, UL 174
CSA/CAN B140.0-03
CAN/CSA-C22.2 No. 110-94

Max Tank Pressure	0 PSI
Watts (DC)	146.4
Watts (AC)	1000
Tank Capacity	3.7 gal
Orifice Size/Angle	0.35/60°
Volts/Amps	12VDC, 12.2A
Volts/Amps/Frequency	120VAC, 9.6A, 50/60Hz
Pump Pressure	145 PSI/10.0 bar
Input Firing Rate	56,000 BTU/hr, 16.4 kWh
Diesel Burner Model	Webasto
Fuel Type	Diesel

Diesel Burner
Serial Number: XXXXXX
Model Number: 250-D03
Serial Number: A250D-210001

7501 Miller Drive • Frederick, CO 80504 • 574-AIR-XCEL • www.aquahot.com

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

Figure 1

System Specifications

Electric Element

Power Consumption ..... 1000 W (maximum)
Voltage ..... 120V AC

DC Power

Heat Input ..... 66,000 BTU/hr ± 10%
Fuel Consumption ..... 0.40 gallon/hr
Power Consumption ..... 108W (maximum)

Zone Heat Circulation

Pumps 1
Power Consumption (max) 21W
Voltage ..... 12V DC

Heating Zones

Maximum 1

Domestic Water Heating

Maximum ..... 1.5 GPM

Physical Specifications

Dimensions (US) ..... 26"L x 12.46"W x 17.2"H
Dry Weight ..... 84lbs.
Wet Weight ..... 104lbs.

All vehicle installations must comply with the requirements listed in the Recreational Vehicle Industry Association's (RVIA) ANSI/NFPA 1192 Handbook for Recreational Vehicle Standards.

250-D03
1. Access Cover Screw
2. Drain Valve
3. 3-Way Valve
4. Tempering Valve
5. Diesel Burner Controller
6. Diesel Burner Assembly
7. Interlock Switch
8. Domestic Cold Water Inlet
9. Domestic Hot Water Outlet
10. 120V AC Connection
11. Diesel Fuel Return Port
12. Diesel Fuel Supply Port
13. Expansion Tank Connection
14. Heating Zone Return Port
15. Heating Zone Outlet Port
16. Boiler Tank
17. Domestic Hot-Water Coil
18. Zone Circulation Pump
19. Aqua-Hot Controller

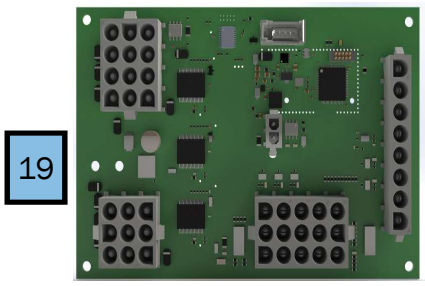


Figure 2

NOTE: The side panel in the view below has been made transparent to aid in the explanation of the heater. DO NOT remove the panels. Doing so risks irreparable damage to the Aqua-Hot. Only remove the service panel for service.

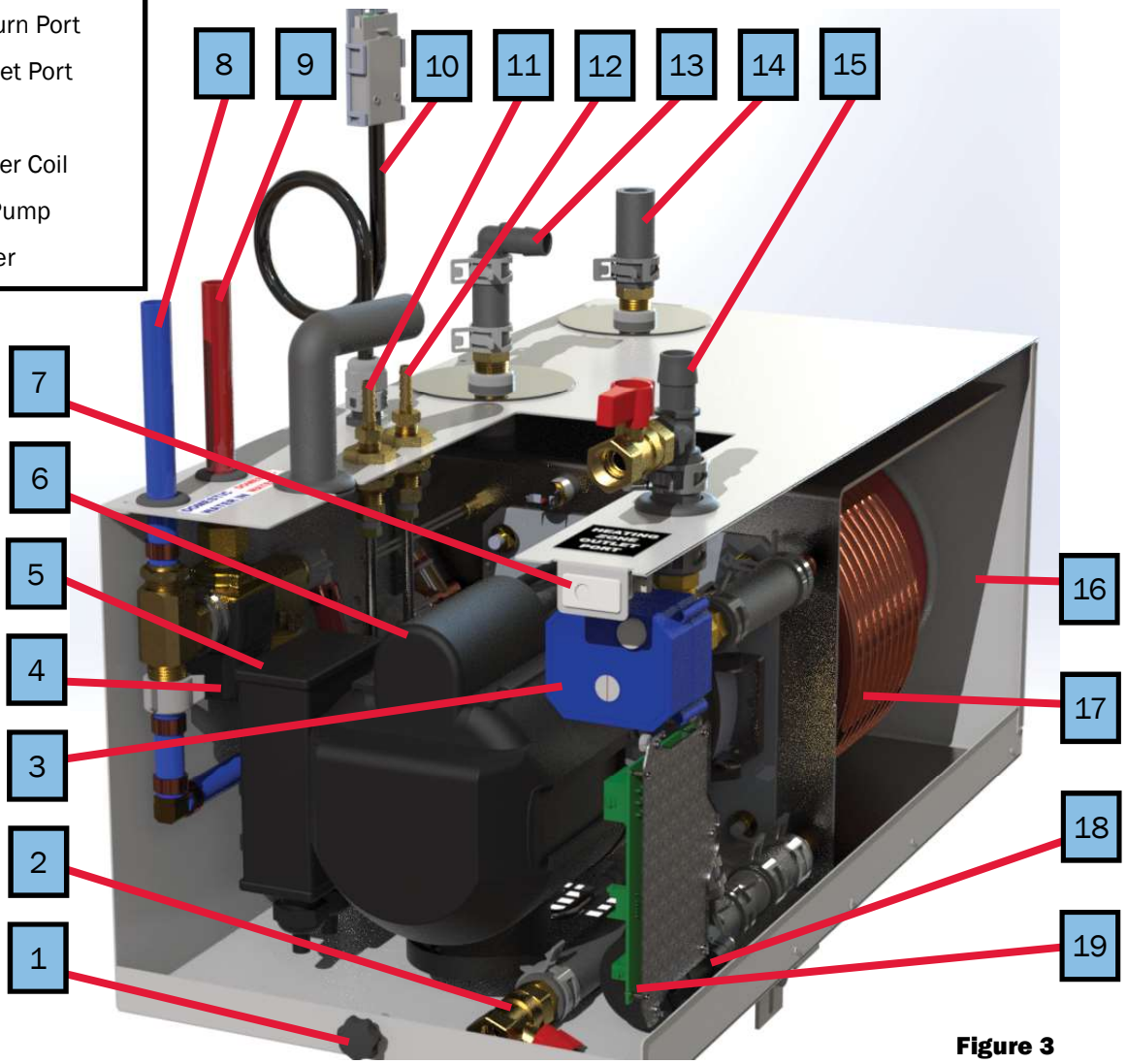


Figure 3

Installing the 250-D03

Install the Aqua-Hot in a compartment which protects the unit and allows service access to the top and front panel of the Aqua-Hot. The Aqua-Hot must be installed in a compartment that is completely closed off from living quarters and accessible only from the exterior.

1. Reference the following illustrations below for mounting information.
2. Cut out the required mounting flange opening Reference Figure 5.
3. Install the flange located on the bottom of the Aqua-Hot into the cutout opening. Reference Figure 7 & 8.
4. Take the angle brackets and included ¼-20 bolts and washers. Install the angle brackets into the nuts located on the flanges.

- Front view Aqua-Hot dimensions Figure 4.
- Floor cutout information Figure 5.
- ID Label noting the front and service access clearance requirements Page 4.

NOTE: Inspect the area beneath the mounting location to ensure that no structural members will interfere with the cutout for the mounting flange. Verify that a support structure of adequate strength has been constructed. Figure 6.

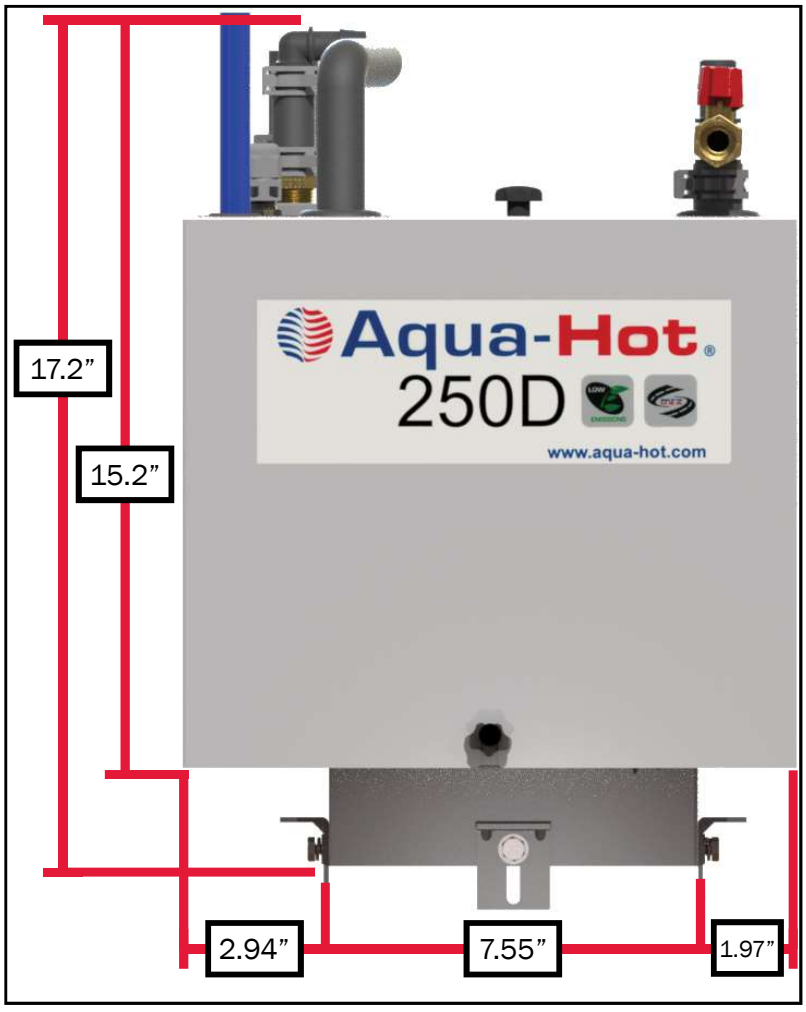


Figure 4

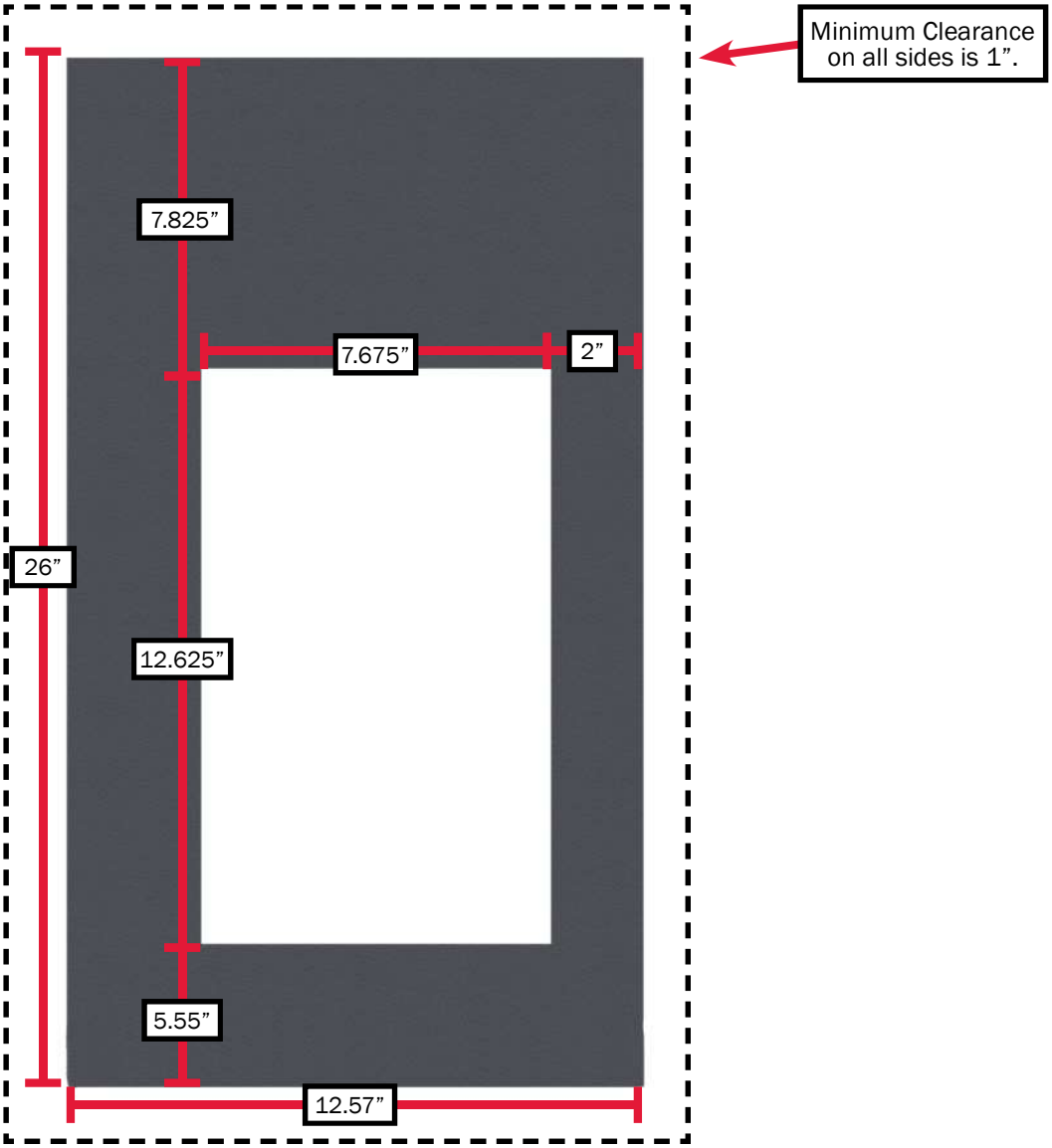


Figure 5

NOTE: The mounting flange of the Aqua-Hot is not centered on the body of the heater. Reference Figure 5 for the correct dimensions to construct the surface on which the Aqua-Hot will be mounted.

Additional cross-members are required if the existing structure is unable to support 104lbs.

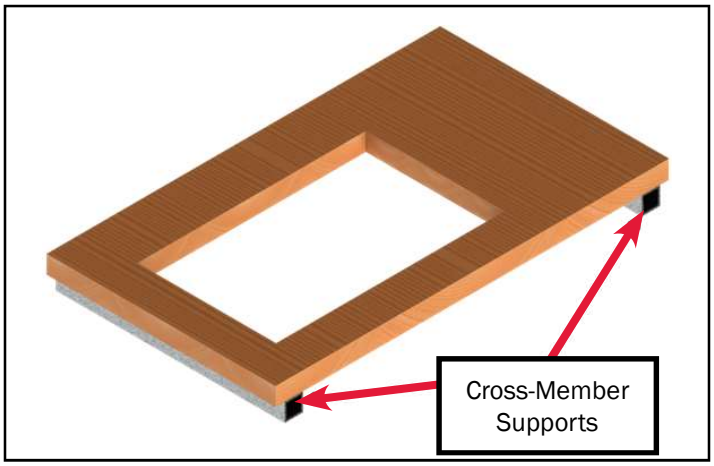


Figure 6

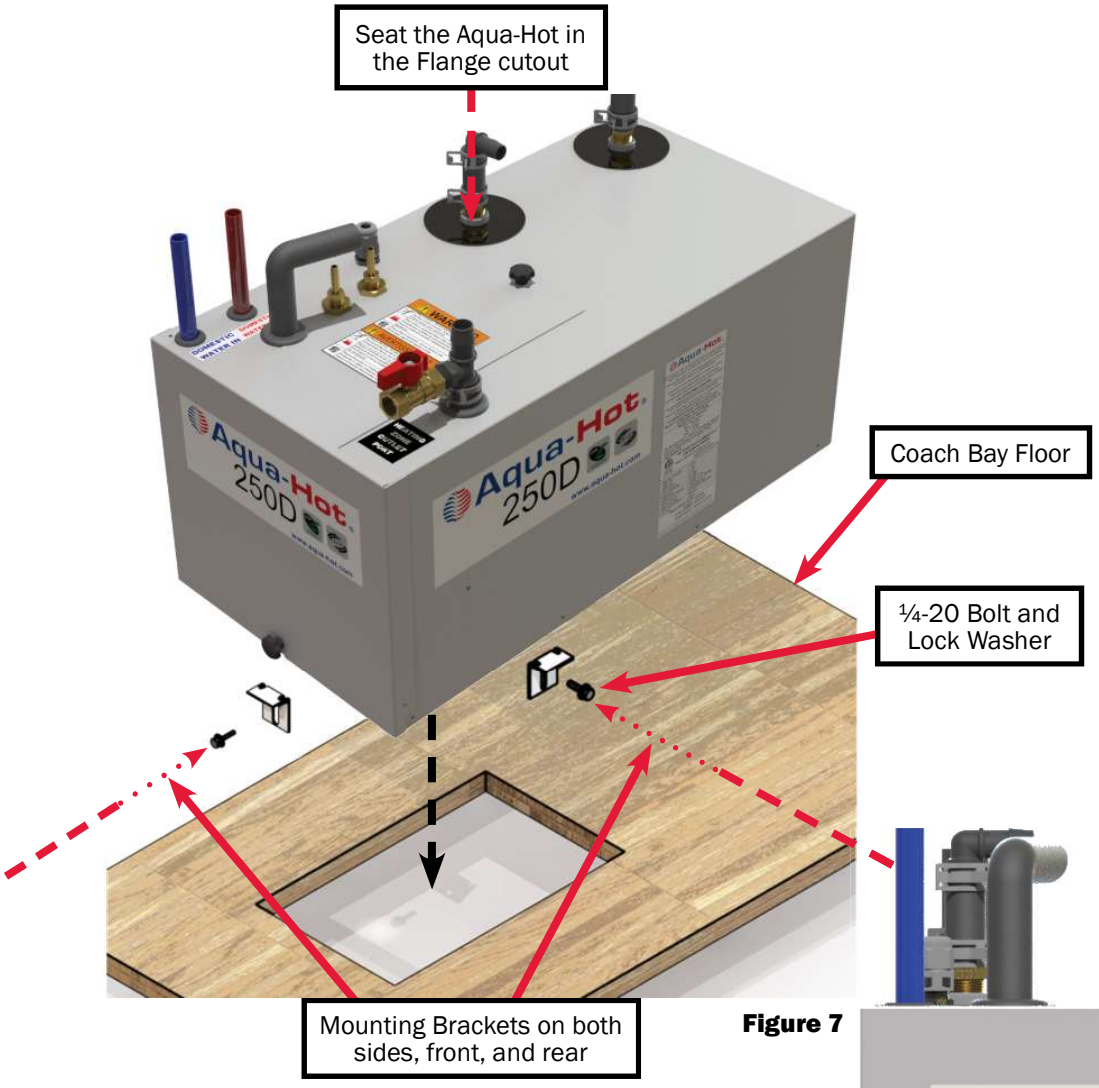


Figure 7

NOTE: Angle mounting bracket must be flush to the underside of the coach floor and flush to the heater flange. Tighten bolts to roughly 76 in-lbs.

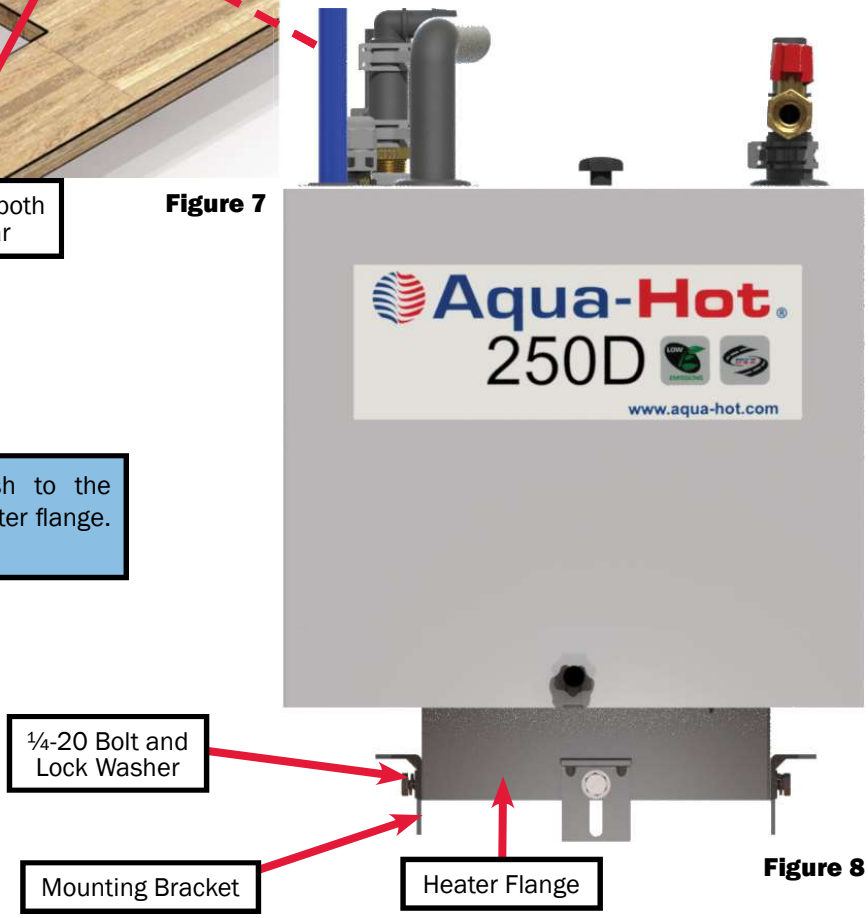


Figure 8

Installation of the Expansion Bottle

Introduction:

The fluid expansion bottle is integral to the operation of the Aqua-Hot. It provides an area for hot, expanded fluid to empty into, and also protects the Aqua-Hot from low-fluid, which could lead to catastrophic damage of the Aqua-Hot.

Follow the directions in this section to correctly install the fluid expansion bottle.

Installation Procedure:

1. Select a mounting location that allows for easy access and clear visibility whenever the storage bay containing the expansion bottle is open.
2. Mount the expansion tank as illustrated in Figure 10.
3. Connect and clamp the overflow tubing from the expansion tank to the Aqua-Hot's expansion tank connection.
4. Drill a hole in the bay floor and cut a piece of overflow tubing (included with unit) of adequate length so that it can be connected to the top of the expansion tank and extend through the bay floor. The expansion hose should vent to the exterior of the Aqua-Hot bay.
5. Locate the wires of the expansion bottle and connect them to wires J43 and J44 on the wiring harness.
6. Once complete, secure these wire leads to minimize risk of accidental damage.

NOTE: Avoid any bends or dips in the overflow tubing from the Aqua-Hot. Air can become trapped in these bends and will prevent excess antifreeze and water heating solution from depositing properly in the expansion bottle.

⚠ CAUTION

The Aqua-Hot tank and heating loop operate at 0.0 PSI (zero pressure system). Air pressure applied to the tank MUST NOT exceed 20 PSI. Excess pressure will result in internal damage.

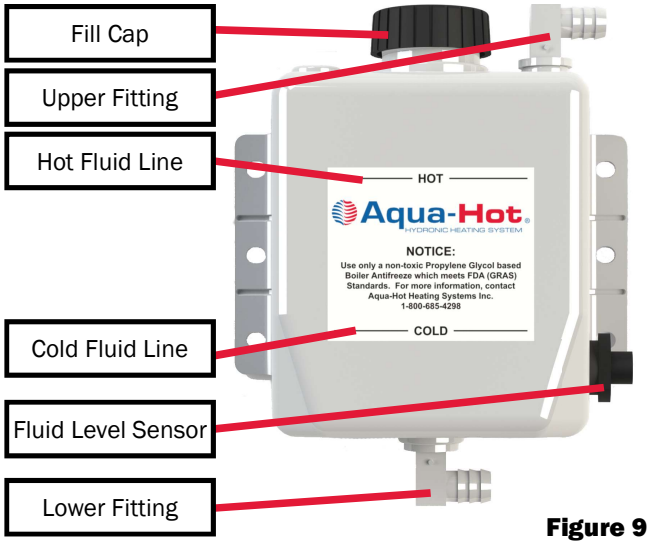


Figure 9

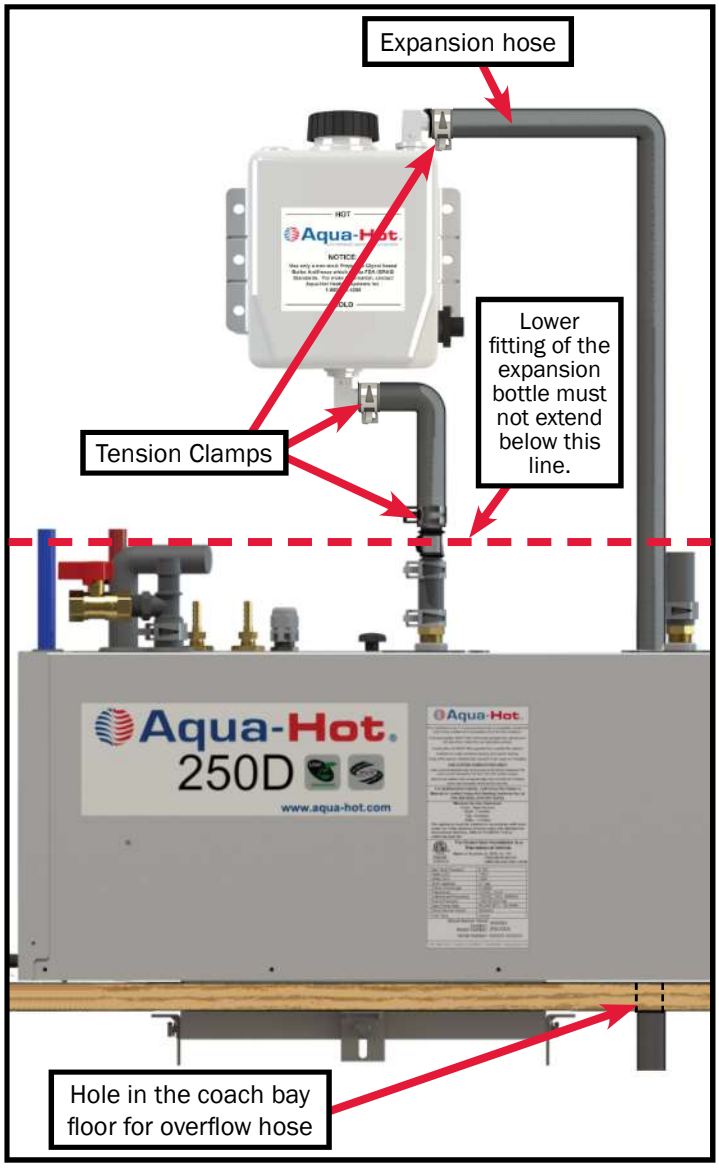


Figure 10

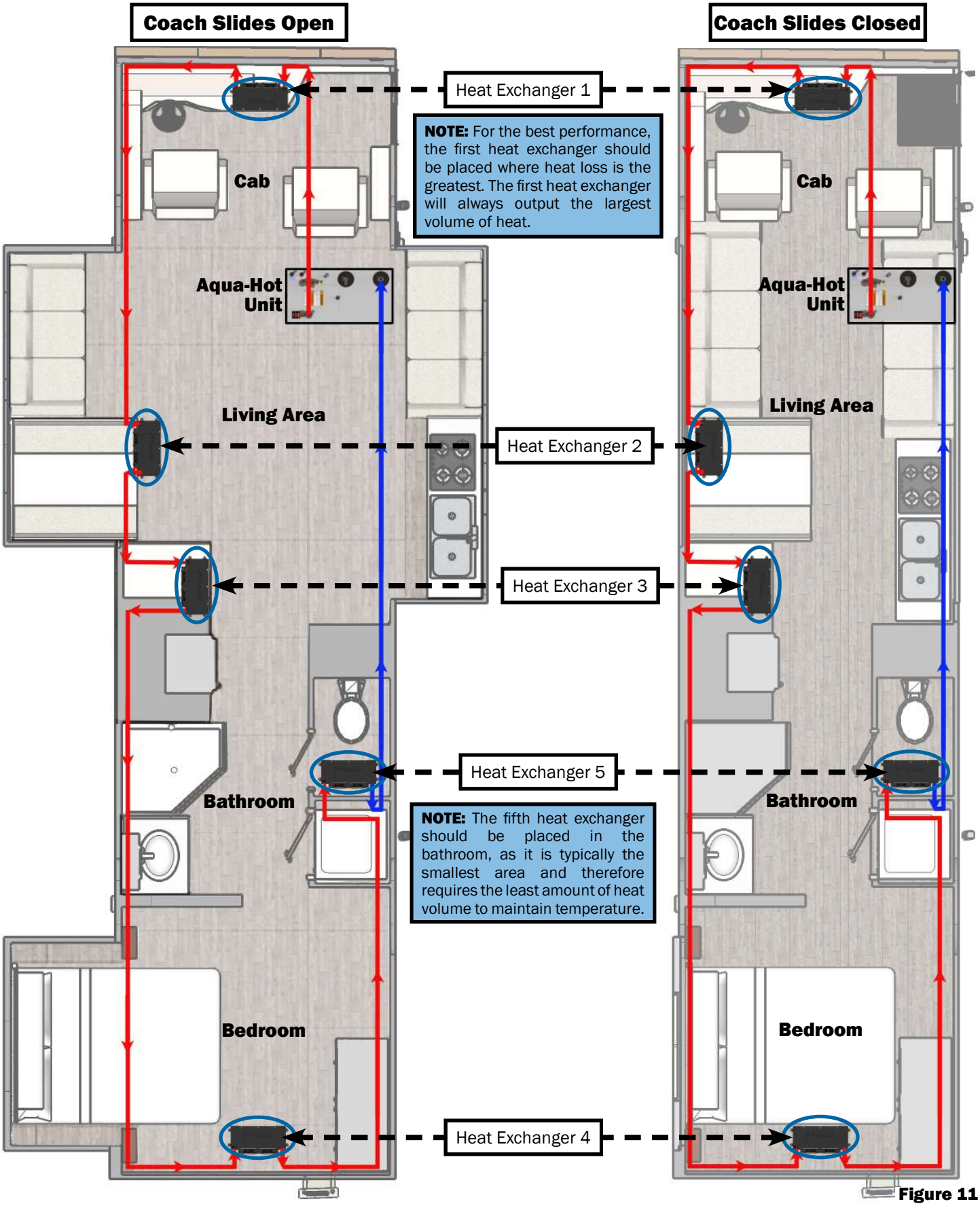

Coach Slides Open
Coach Slides Closed
Heat Exchanger 1
NOTE: For the best performance, the first heat exchanger should be placed where heat loss is the greatest. The first heat exchanger will always output the largest volume of heat.
Cab
Aqua-Hot Unit
Living Area
Heat Exchanger 2
Heat Exchanger 3
Heat Exchanger 5
Bathroom
NOTE: The fifth heat exchanger should be placed in the bathroom, as it is typically the smallest area and therefore requires the least amount of heat volume to maintain temperature.
Bedroom
Heat Exchanger 4

Figure 11

Installation Requirements

Cozy heat exchangers can be mounted in one of two configurations: either flat on the ground, or vertically. Reference Figure 12.

- Supply ventilation cross-sectional area of at least 29in^2 (74cm^2) must be supplied to each heat exchanger.
- Do not supply heat exchangers air which is drawn from the bay areas.
- Return air should be drawn from the same room the heat exchanger is heating.
- The anti-freeze and water heating solution must flow in through the bottom of the heat exchanger, and out the top (reference Figure 24).

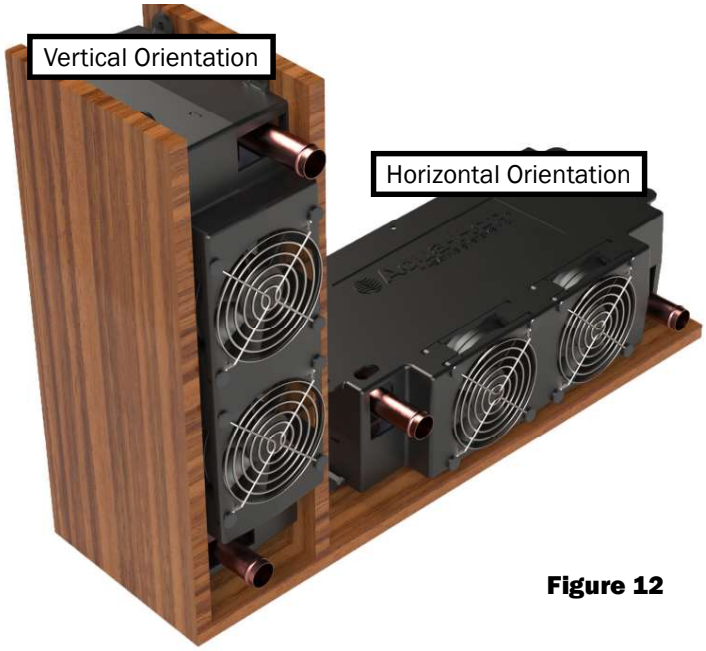


Figure 12

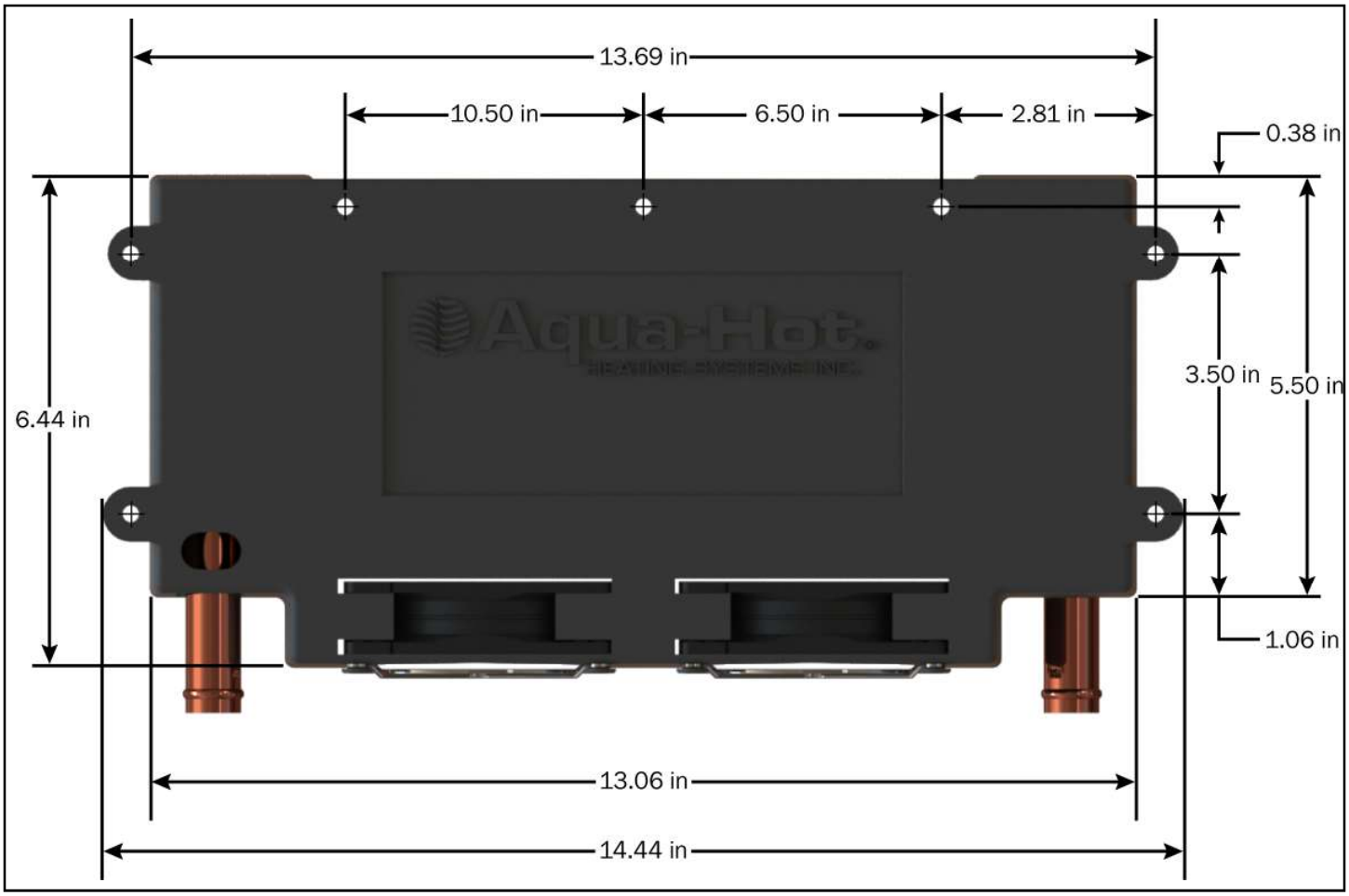


Figure 13

Mounting the Heat Exchangers

1. Cut out a 2.5” x 10” (7cm x 26cm) opening for each heat exchanger outlet and cold-air return grate as shown in Figure 15.
2. Mount each heat exchanger permanently into place. There are 4 tabs on both sides - see Figure 24.
3. Install the hot-air outlet and cold-air return grate. Figure 15.

A minimum of supply ventilation cross-sectional area of at least 29in^2 (74cm^2) must be supplied to each heat exchanger. Please note that a return-air register may not be required, however, adequate return air must be provided to the heat exchanger or you may experience diminished performance of the heat exchanger unit.

If the toe-kick area is inadequate to house a heat exchanger for regular installation, a plenum assembly may be purchased to redirect air via ducting. The plenum allows only the desired outlets to be opened by removing the metal insert on the vent. Refer to Figure 14 & 16.

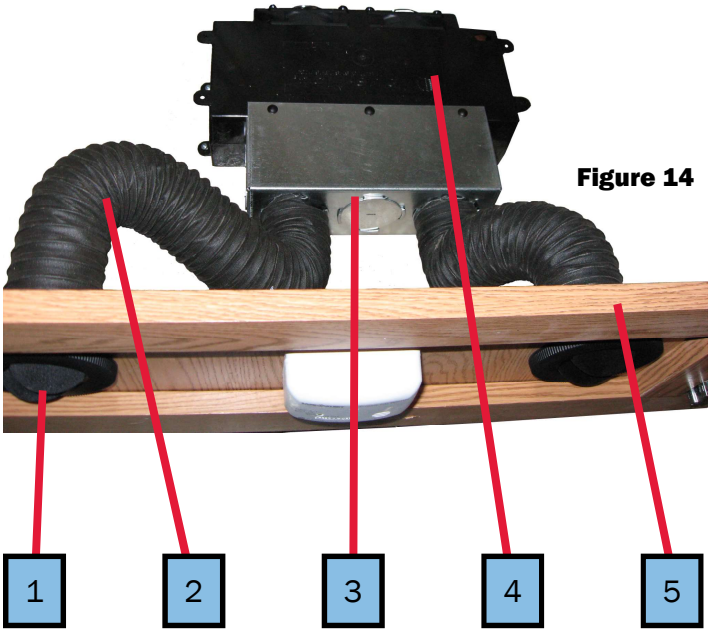


Figure 14

1. Hot Air Outlet Vent
2. Air Ducting Hose
3. Plenum
4. Cozy Heat Exchanger
5. Toe Kick Board

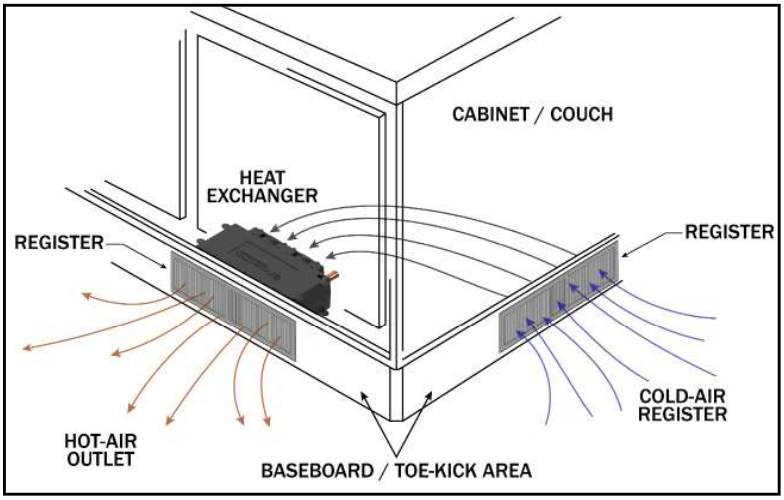


Figure 15

Figure 16

Heat Exchanger Locations and Clearances

NOTE: For single slide-out configurations, it is usually simplest to place a heat exchanger on the opposite side of the coach pointing towards the slide-out.

- Position the heat exchangers so that even heat is distributed throughout the coach interior.
- The first heat exchanger on the loop will output the most interior heat.
- It is best practice to place the heat exchanger in an area where it can be easily accessed for maintenance.
- Place the heat exchangers as close to the floor as possible for best performance.
- If a heat exchanger is kept in the fresh water storage bay, then the last heat exchanger in the coolant loop should be used.
- The heating air supply may be fresh or recirculated air that is drawn from a clean area not likely to be contaminated.

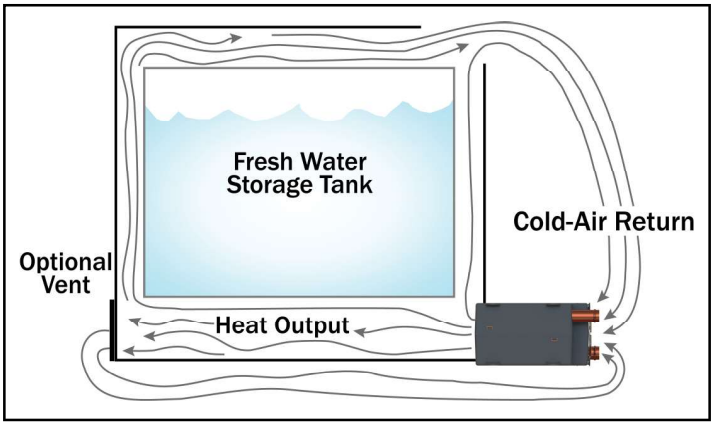


Figure 17

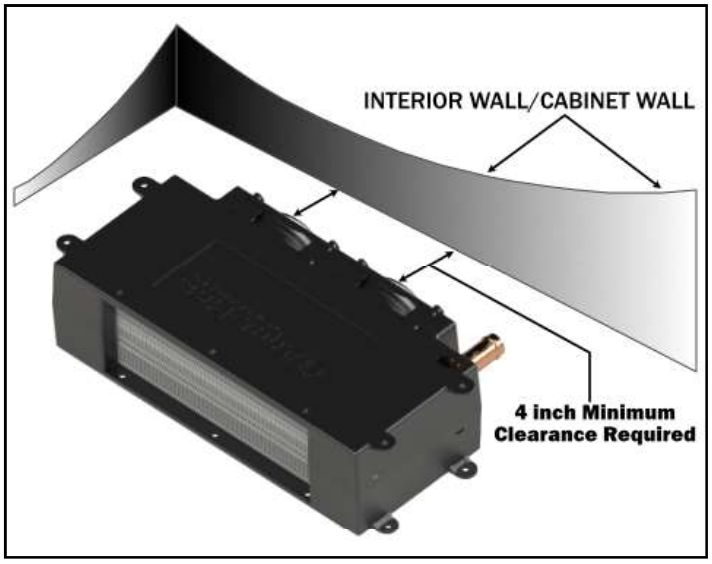


Figure 18

Boost Pump

If desired, a 6th Cozy Heat Exchanger may be added to the heating loop within your coach. Please note, however, that an additional boost pump is required to provide adequate fluid pressure to allow the 6th heat exchanger to operate as intended.

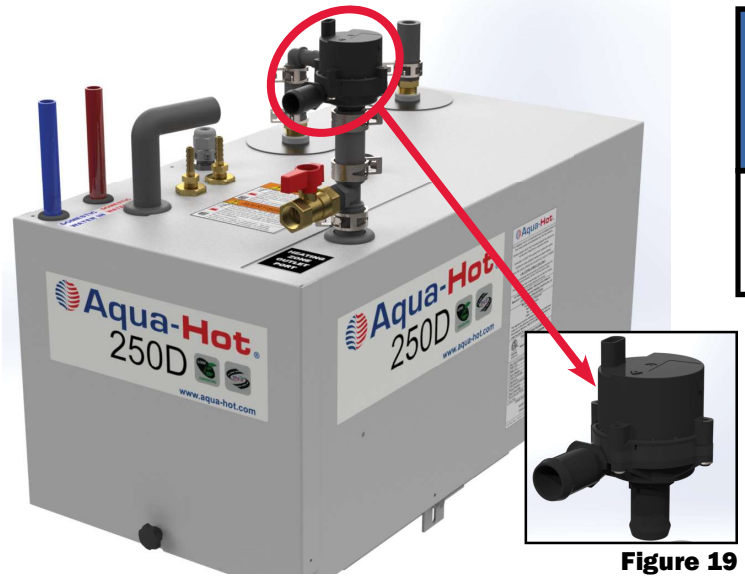


Figure 19

NOTICE

Aqua-Hot advises against placing a heat exchanger on the slide-out section of any vehicle due to the high probability of damage occurring to the heating loop from moving parts.

Wiring the Heat Exchangers

This section will explain in detail how to wire the heat exchangers for optimal functionality. Do not deviate from these guidelines. If a deviation is required, contact Aqua-Hot Heating Systems prior to installing these exchangers for express permission to proceed with modifications.

1. Wire each heat exchanger (in a thermostatic zone) in parallel to one another as shown in Figure 22.
2. Wire each heat exchanger independently to the J7 plug of the unit controller.
3. Pin-out information is shown to the right.

NOTE: Quiet-mode functionality of the new controller requires that the heat exchangers be wired directly into the controller.

Thermostatic Zone Number	Supply (+) Pin Number	Ground (-) Pin Number
1	J7-1	J7-4
2	J7-2	J7-5
3	J7-3	J7-6

Connector Part Numbers		
Part Number	**Manufacturer**	**Description**
1-480706-0	TE Connectivity	J7 Plug Housing
350550-1	TE Connectivity	J7 Socket Terminal

NOTE: The 250D can have up to 3 individual, thermostatic heating zones. The heat exchangers in different zones are wired to a different set of pins of the J7 plug.

J7 Wire insertion view shown

Figure 20

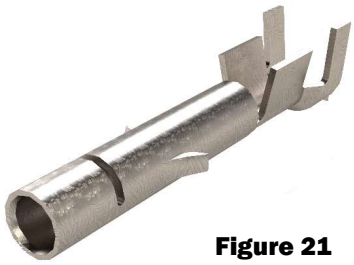


Figure 21

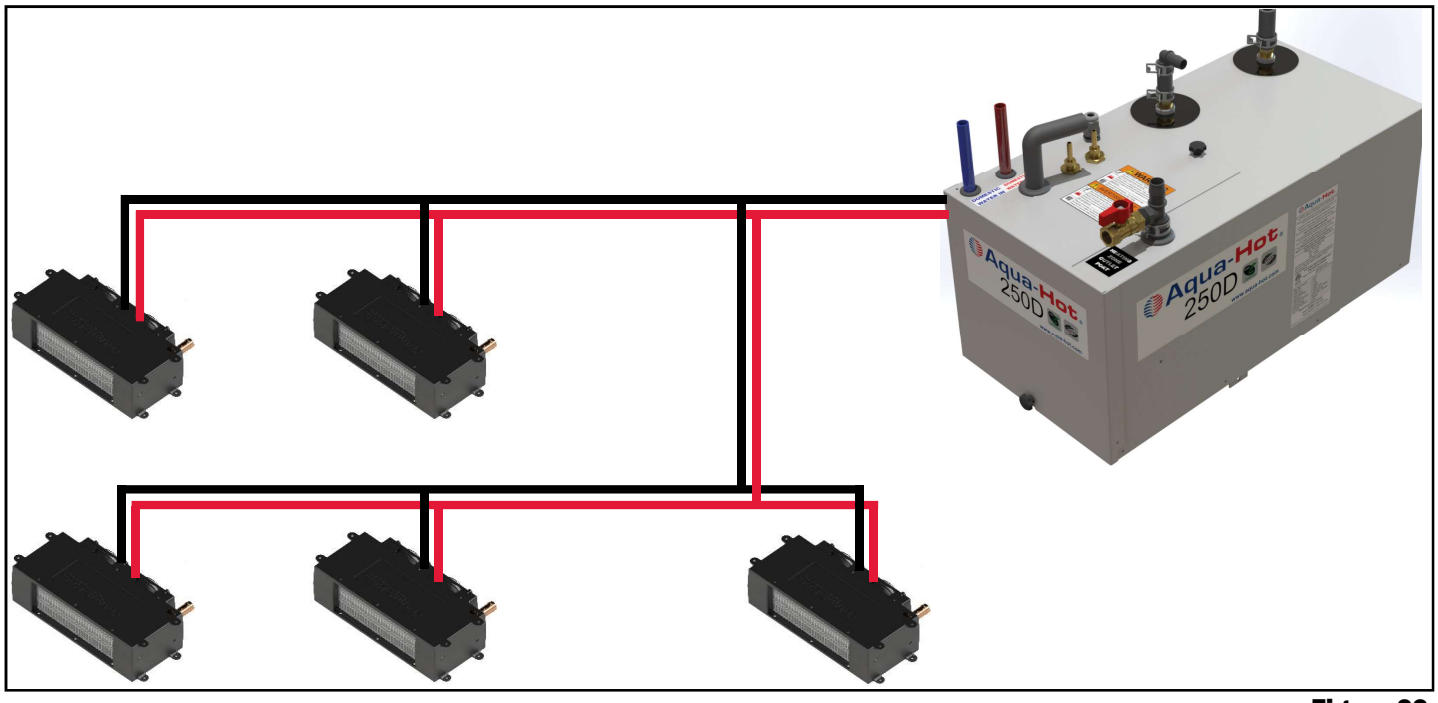


Figure 22

Plumbing the Heating Zone

The following guidelines should be used when planning the coolant loop for the heating zone. The order of the heat exchangers should consider priority on the loop. Failure to adhere to these installation principles can hinder the operation of the heat exchangers.

- All plumbing should be installed as flatly as possible.
- Extreme rises in height should be avoided to avoid any potential air traps.
- Use ⅝" ID plumbing lines, ¾" SAE J20 type coolant hose, heater hose, or PEX tubing for the single heating loop.
- Use wide-sweeping elbows or "bend supports" whenever the plumbing lines may be susceptible to kinking.
- When exceeding 5 heat exchangers, a boost pump must be installed in the coolant line to provide adequate pressure to ensure that coolant is distributed throughout the heating loop. See Figure 19.
- Plumbing lines should be run in areas where there is no reasonable possibility that they can be pinched off or damaged under normal operating conditions.
- Secure all lines where necessary and apply protective shielding in areas where chafing may occur.
- Rubber coated/closed-type clamps are recommended when securing the plumbing lines.
- Inlet and outlet plumbing lines can be installed with a straight fitting or an elbow.

Instructions:

1. Layout the plumbing lines for all heat exchangers (see the example in Figure 25).
2. Label each line and designate as an outlet or an inlet line.
3. Connect and clamp the outlet line from the heater to the lowest port (inlet port).
4. Connect and clamp a line from the first heat exchanger's highest port, and connect the other end to the next heat exchanger's lowest point.
5. Connect each additional heat exchanger in the same arrangement.
6. Connect and clamp the inlet line from the heater to the highest port on the last heat exchanger to complete the heating loop.

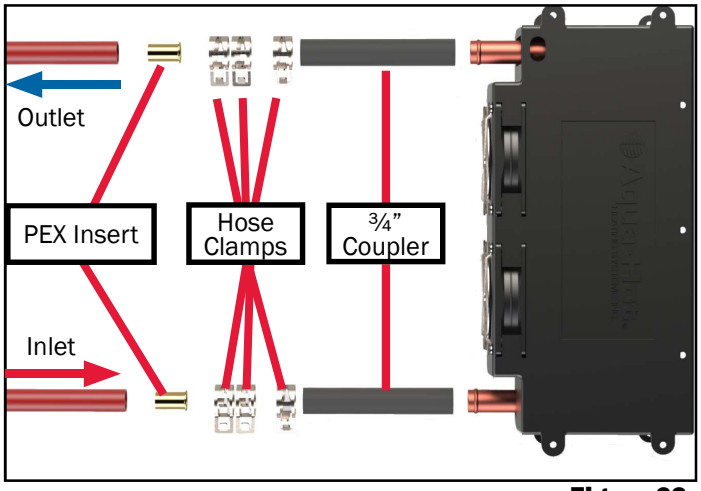


Figure 23

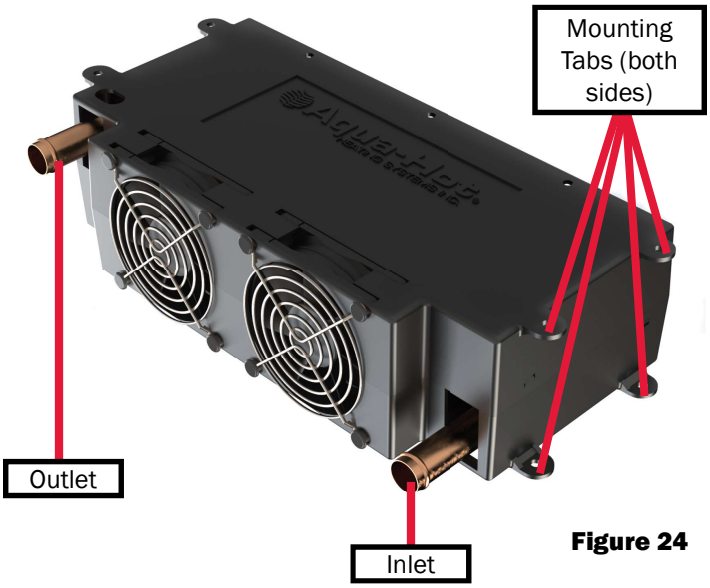


Figure 24

NOTE: The diagram below is simply a reference to show the layout and flow of the plumbing to and from heat exchangers. Placement and quantity may vary depending on the coach.

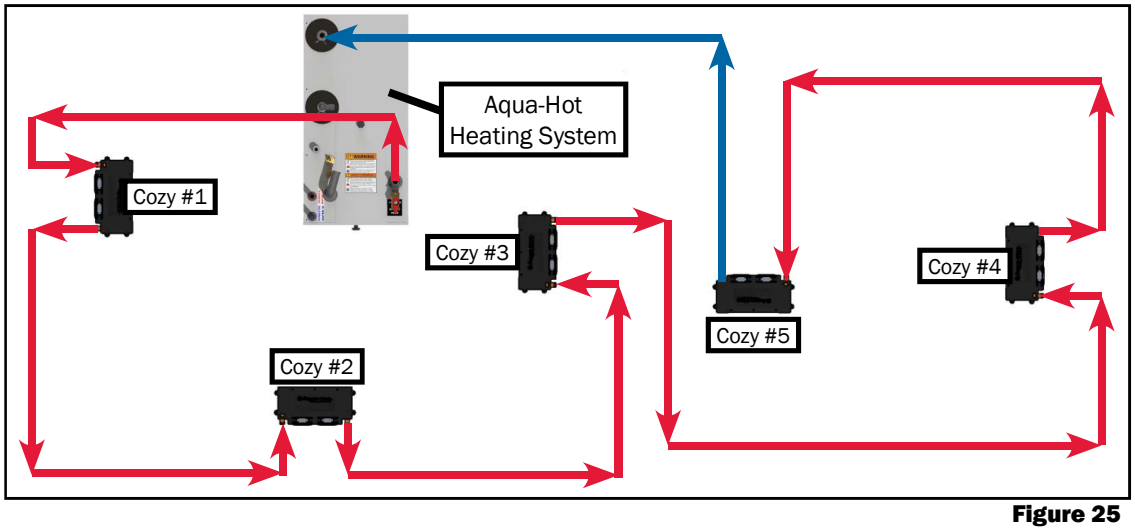


Figure 25

Figure 26

Figure 27

Domestic Water System Requirements

- Reference A119.2/NFPA 501C Standard on Recreational Vehicles 1993 Edition for relevant regulatory information regarding the design of Domestic Water Systems.
- The Aqua-Hot is equipped with a pressure relief valve and a tempering valve in order to provide safe hot water without chance of scalding or an over-pressurized system.
- Plumb the domestic water system according to Figure 28.

NOTE: Extended exposure to household bleach will corrode the components of the Aqua-Hot that will potentially dramatically shorten the operational lifetime of the Aqua-Hot. Under no circumstances is the Aqua-Hot to be exposed to household bleach for extended periods of time. This type of damage is not covered by the Aqua-Hot warranty.

Plumbing the Domestic Water System

The Aqua-Hot is also able to provide domestic hot water while the boiler tank is up at operating temperature. Activate the diesel burner to provide adequate heat for hot water needs. The electric element will only provide light duty hot water.

The tempering valve is integrated into the cabinet of the Aqua-Hot, and is set upon departure from the Aqua-Hot factory. So long as the tempering valve is not modified, it will provide hot, non-scalding water.

Instructions

1. Locate the domestic cold water inlet (blue PEX tube) and connect it to the vehicle's domestic cold water system.
2. Locate the domestic hot water outlet (red PEX tube) and connect it to the vehicle's domestic hot water system.

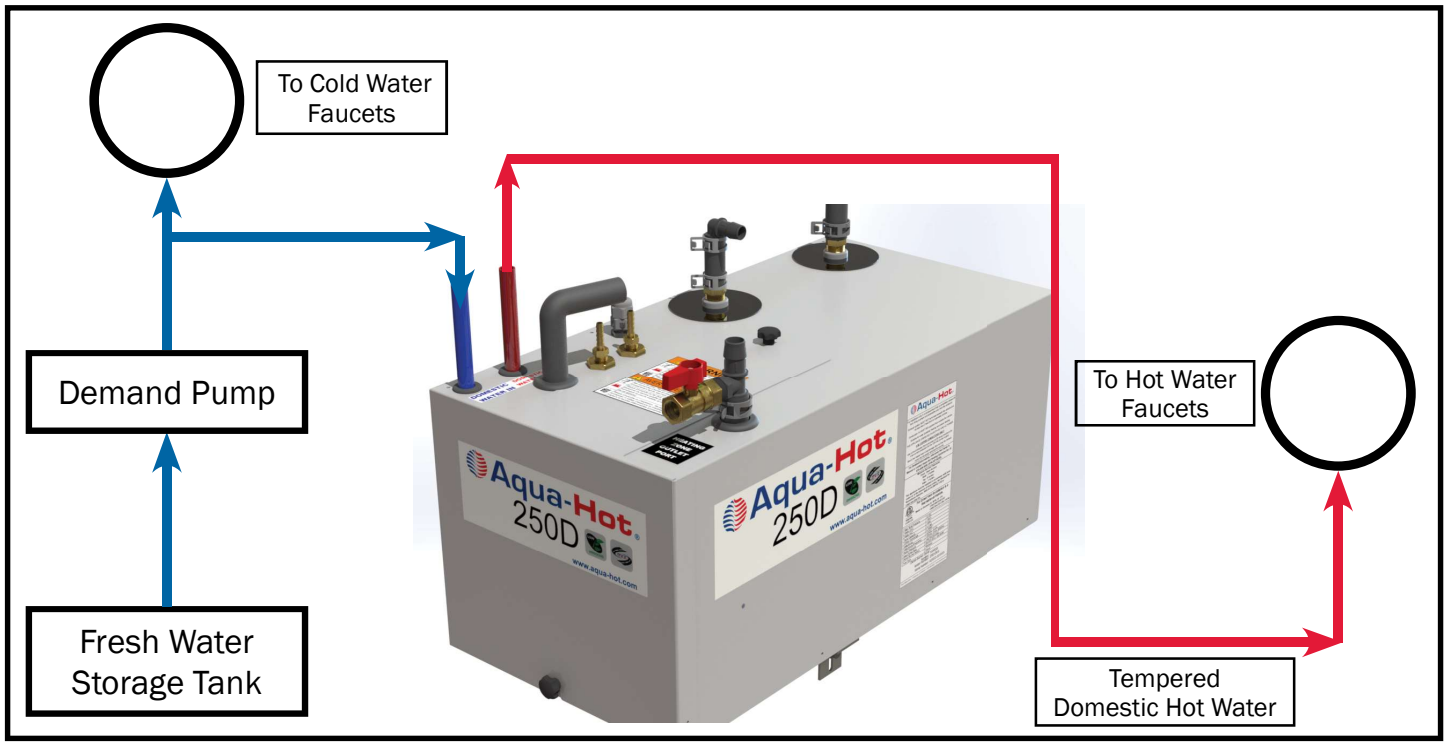


Figure 28

Mounting the Aqua-Hot LCD (*optional*)

Figure 29

Introduction:

This following section will explain in detail how to mount the Aqua-Hot LCD on the interior of the coach. The Aqua-Hot LCD screen is optional. The coach may have its own control panel.

Mounting Considerations:

- Purchase the necessary RVC connection parts according to the table below.

Manufacturer	Part Number	Common Name
3M	37104-2165-000 FL 100	4-pin RVC Male Connector
General Cable	E2104S.41.02	RVC Communication Cable

- Route the 15' RVC cable from the intended mounting position of the LCD to the Aqua-Hot Controller.
- The LCD screen is powered via the RVC cable which connects directly to the Aqua-Hot Controller, or via an on-board RVC network.
- "DATA ONLY" RVC cable configurations are not compatible with the LCD screen.
- The screen requires at least ¾" (1.9cm) of backside clearance to allow room for cables and connections.

NOTE: For networked control of the Aqua-Hot Controller, Aqua-Hot requires system integrators ensure that individual commands are received and processed. Aqua-Hot requires that commands be repeated or confirmed so that if a single message were dropped, or if there is a brief network disturbance, the Controller would get into the correct state as soon as the disruption was removed.

The Aqua-Hot Controller monitors the heating system and handles all logic relating to safeties and heating control. As such, the system integrator is required to display all pertinent status information but not use that information to lock out operation or add additional safety layers that could impact the end of operation if a message from the Controller was missed.

Mounting Procedure:

1. Select a location within the coach.
2. Cut a 3.06" x 5.15" (7.77cm x 13.08cm) hole in the coach wall.
3. Route the corners of this cutout with a ¼" (64mm) diameter bit.
4. Using four countersunk #4 screws, secure the LCD bracket into place over the cutout just made.
5. Connect the RVC cable to the back of the LCD screen.

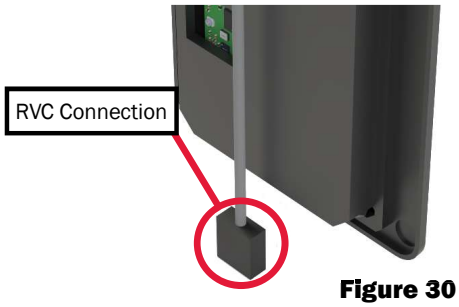


Figure 30

6. Snap the LCD screen into the mounting bracket.

NOTE: Please note that the LCD Screen mounting bracket may only be mounted in this configuration as shown in Figure 31. The screen will not fit in properly any other way.

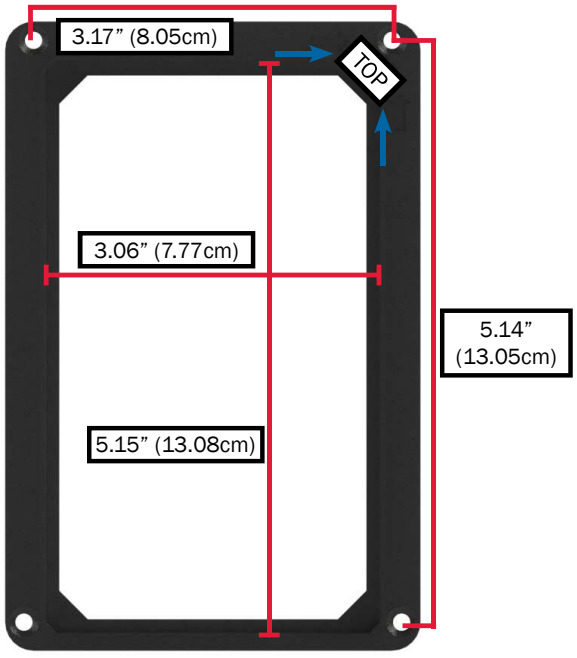


Figure 31

NOTE: The Aqua-Hot LCD is an ***OPTIONAL*** add-on. It is encouraged that RVs already equipped with an RV-C enabled touchscreen have all Aqua-Hot screens and features mirrored on the coach display.

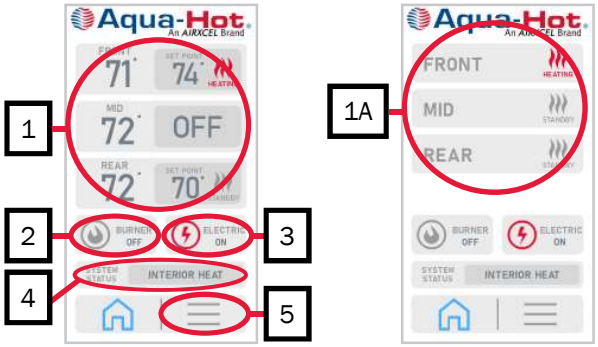
Operating the Aqua-Hot

Introduction:

This document will outline the basic operating instructions for the Aqua-Hot using either the optional LCD Screen or the coach LCD via the RV-C network communication. Contact your coach manufacturer to determine which control panel you may have. The screens will appear the same on either control panel.

Climate Pages:

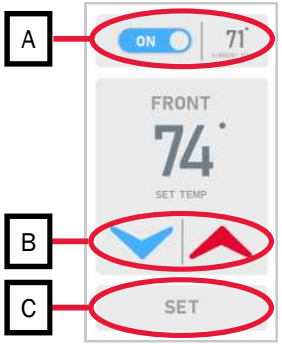
The climate pages are for all intents and purposes the "Home" of the display screen. From here, the end-user will select their interior temperature set-points, activate or deactivate the diesel burner and/or the electric element.



Zone Control (1):

Precise zone control display will differ depending on the type of zone thermostats used within the coach.

Section 1A demonstrates the appearance of the zone control section when ON/OFF thermostats are used within the coach. In this use-case, these buttons serve only as ON/OFF toggle switches.



Tapping on one of the zones shown above will display a new screen where the interior temperature can be set.

NOTE: The Aqua-Hot LCD is an ***OPTIONAL*** add-on. It is encouraged that RVs already equipped with an RV-C enabled touchscreen have all Aqua-Hot screens and features mirrored on the coach display.

Section A:

This section shows the current zone temperature (shown as 71°F in the example above) as well as a button to turn the zone on or off. (Setting specific temperatures can only be done *if* thermistors are installed. Thermostats would only show ON/OFF.)

If the zone temperature is set, but this item is not set to ON, the zone heat exchanger will not activate.

Section B:

These arrows are used to increase or decrease the desired set-point temperature of the zone thermistor.

Section C:

After the desired temperature set-point has been selected tap "SET" on the display to set that temperature. The Aqua-Hot will now work to maintain this interior temperature, and the screen will return home.

Diesel Burner Activation (2):

The diesel burner of the Aqua-Hot can be activated by tapping on the "burner" item on-screen. The diesel burner has two modes: ON and OFF.

ON:

While set to ON, the Aqua-Hot diesel burner will work to maintain a tank temperature of 180° F, with a minimum tank temperature of 160° F.

OFF:

While off, the diesel burner will not serve to provide any heat to the boiler of the Aqua-Hot whatsoever.

Electrical Element Activation (3):

Similar to the diesel burner, tapping this button will signal to the controller to activate the AC electric relay, energizing the 1000W electric element within the Aqua-Hot. The electric element has two modes: ON and OFF.

ON:

While set to ON, the electric element will work to maintain a tank temperature of 180° F, with a minimum tank temperature of 160° F.

OFF:

While off, the element will not serve to provide any heat to the boiler of the Aqua-Hot whatsoever.

System Status (4):

This item will indicate the current operational status of the Aqua-Hot. If any faults have triggered, those will be displayed here.

During normal operation, this should display either INTERIOR HEAT or HOT WATER relating to the priority and position of the 3-way valve.

While in INTERIOR HEAT mode, the 3-way valve is oriented so as to circulate heated antifreeze and water solution through the heating zones of the coach.

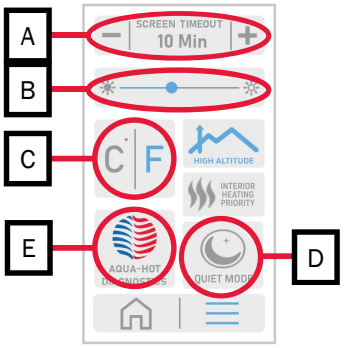
While in HOT WATER mode, the 3-way valve is oriented so that the heated antifreeze and water solution is circulated immediately back into the boiler tank. This is known as “stirring” the tank, and it is done to provide as much heat as possible to the domestic water line while water is flowing.

Module Options (5):

Tapping on the module options screen (the 3 lines on the bottom right of the home screen) will display the screen shown above. This is known as the Module Options screen. From here, it is possible to access unit diagnostics, activate Quiet Mode, change the temperature units, adjust screen brightness, and unit timeout.

Screen Timeout (A):

The screen timeout item sets the amount of time required to allow the screen to shut-off when idle.



Screen Brightness (B):

This setting changes the screen brightness.

Unit of Measurement (C):

This setting will change the display units of the Aqua-Hot. Either Fahrenheit or Celsius can be selected.

Quiet Mode (D):

This option toggles the Aqua-Hot’s quiet mode. Quiet mode is a setting where the speed and output of the heat exchanger fans is reduced to 80%. This is done to reduce noise of the heat exchangers.

Please note that this feature must be activated and deactivated as needed.

Aqua-Hot Diagnostics (E):

Tapping on this element will direct you to the Aqua-Hot’s built-in diagnostic, testing, and troubleshooting tools.

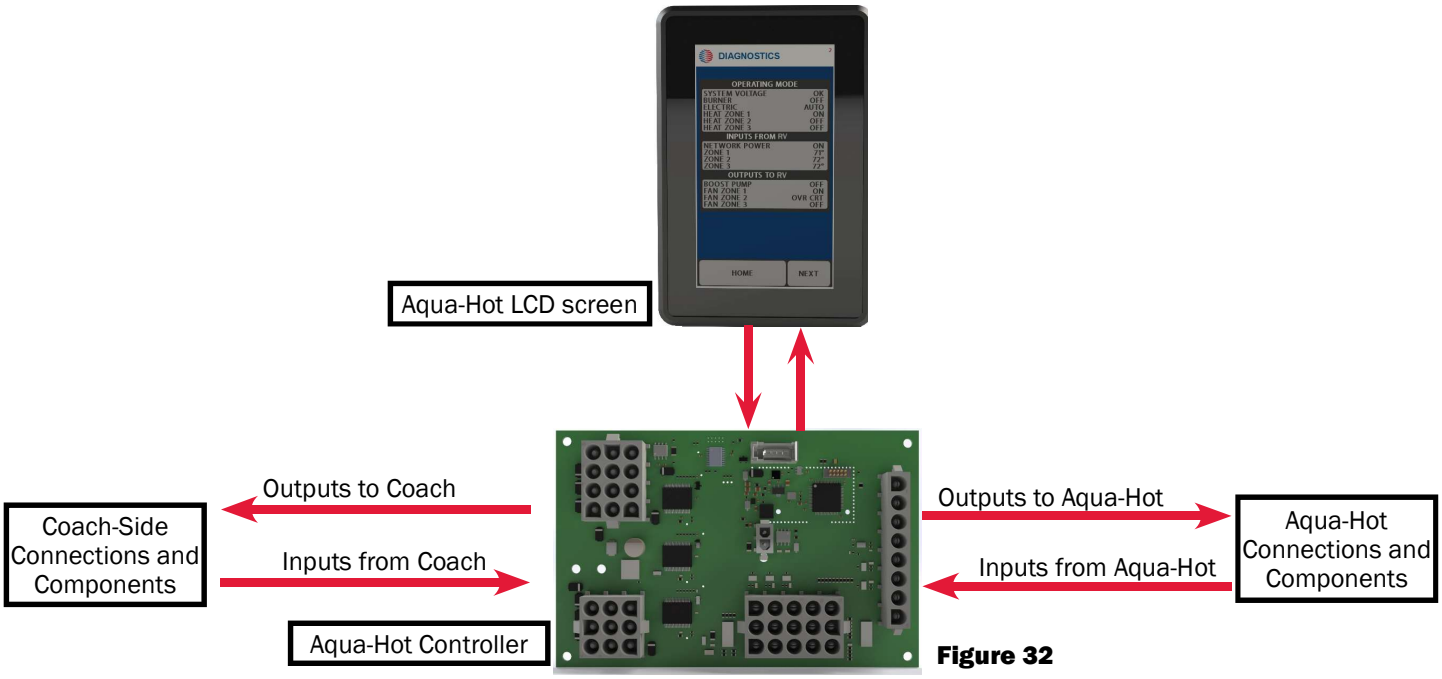


Figure 32

Diesel Fuel System

The following section will outline details of installing the diesel fuel delivery system to the Aqua-Hot 250-D03. These guidelines and instructions are to be followed exactly. Failure to follow instructions herein can cause damage to the Aqua-Hot unit, coach, and may cause serious personal injury. Please note that the fuel ports on a D03 product are reversed from the previous D01 products - see Figure 33.

Fuel Filter

A 10 Micron diesel fuel filter must be installed at the diesel fuel source at all times during the operation of the Aqua-Hot 250-D03. This fuel filter ensures clean fuel is delivered to the fuel nozzle at all times. Ensure that the fuel filter assembly is mounted in an accessible area, as the fuel filter needs to be replaced regularly to ensure optimal operation of the 250-D03.

NOTE: If an auxiliary fuel tank is required, be sure to consult the ANSI/NFPA 1192 Handbook concerning heating systems' diesel fuel specifications, and fuel distribution specifications.

NOTE: Ensure that the fuel filter is installed with correct flow in mind as referenced in Figure 34.

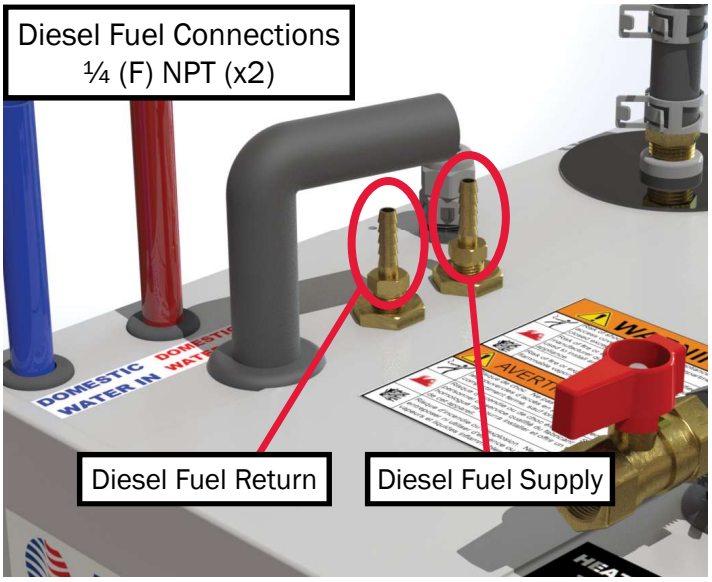


Figure 33

NOTE: The fuel ports on a D03 product are reversed from the previous D01 products.

Fuel System Requirements

- The diesel fuel supply should be drawn directly from the vehicle's main fuel tank, if applicable.
- The fuel tank should be equipped with a dedicated fuel pick-up pipe (outlet port and inlet port).
- Use ¼" I.D. (Inside Diameter) fuel lines.
- The combined length of the supply and return fuel lines should not exceed 50 feet in total length.
- All fuel lines should be laid as flat as possible, and any extreme rises in height should be avoided to eliminate any potential air traps.
- Run the fuel lines in areas where they cannot be pinched, kinked, or otherwise damaged during normal operation.
- Run the fuel tank outlet fuel line past the fuel filter in preparation for Step 5.
- Secure all fuel lines where necessary, and apply protective shielding in areas where chafing may occur.
- All fuel-fitting hardware (at the vehicle fuel tank, fuel filter, and Aqua-Hot parts) must be ¼" NPT or greater with a barbed fitting. Fuel fittings that are less than ¼" NPT may restrict fuel flow, thereby compromising the diesel burner's performance.
- The maximum allowable suction height is 7 feet. Reference Figure 36.
- The maximum allowable head pressure is 10 feet. Reference Figure 37.

Diesel Fuel System Installation

Fuel System Installation

1. Run two ¼" fuel lines from the fuel tank inlet and outlet ports to the Aqua-Hot. Label both fuel lines indicating whether the line is incoming or outgoing.
2. Install and tighten the fuel fittings onto the two ports of the fuel filter. Reference Figure 34 for the correct connection configuration.
3. Install and tighten the appropriate fuel fittings onto the Aqua-Hot's fuel ports.
4. Connect the Aqua-Hot's fuel lines to the fuel tank.
5. Cut the fuel line at the fuel filter mounting location and connect the fuel lines as illustrated in Figure 34.

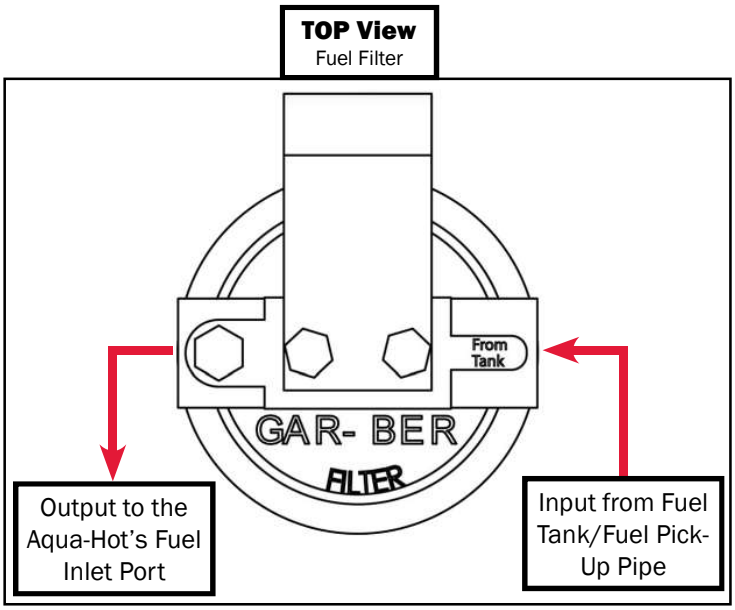


Figure 34

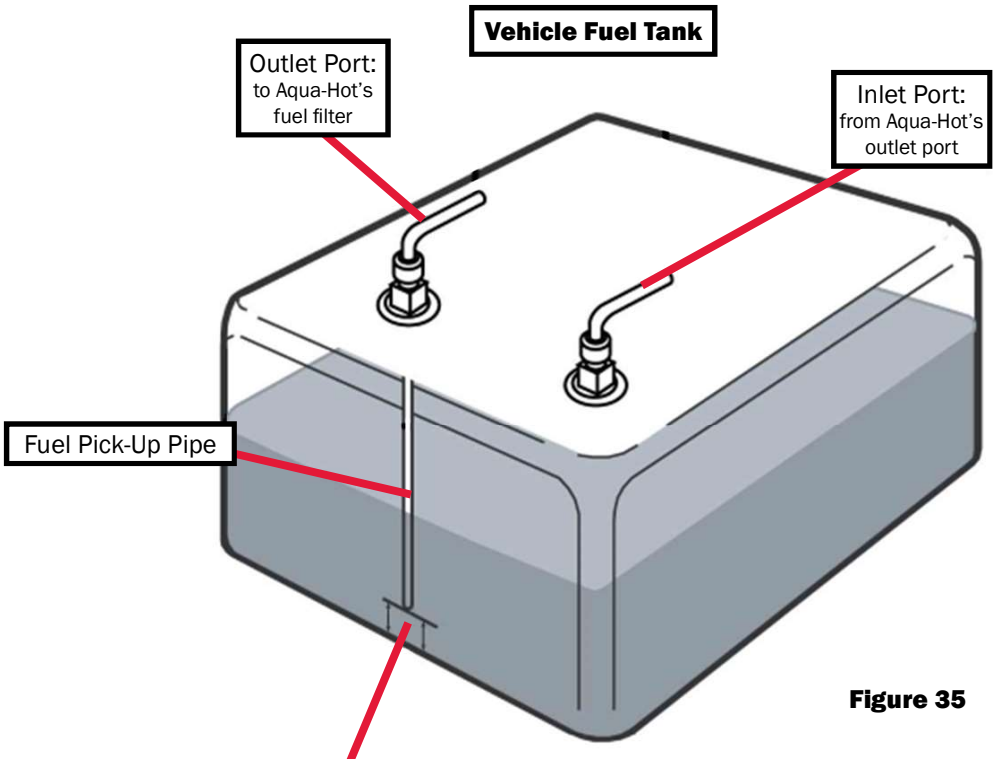


Figure 35

NOTE: The fuel pick-up pipe should not extend further than the motor home's engine fuel supply pick-up and should be consistent with the on-board generator's fuel supply pick-up length.

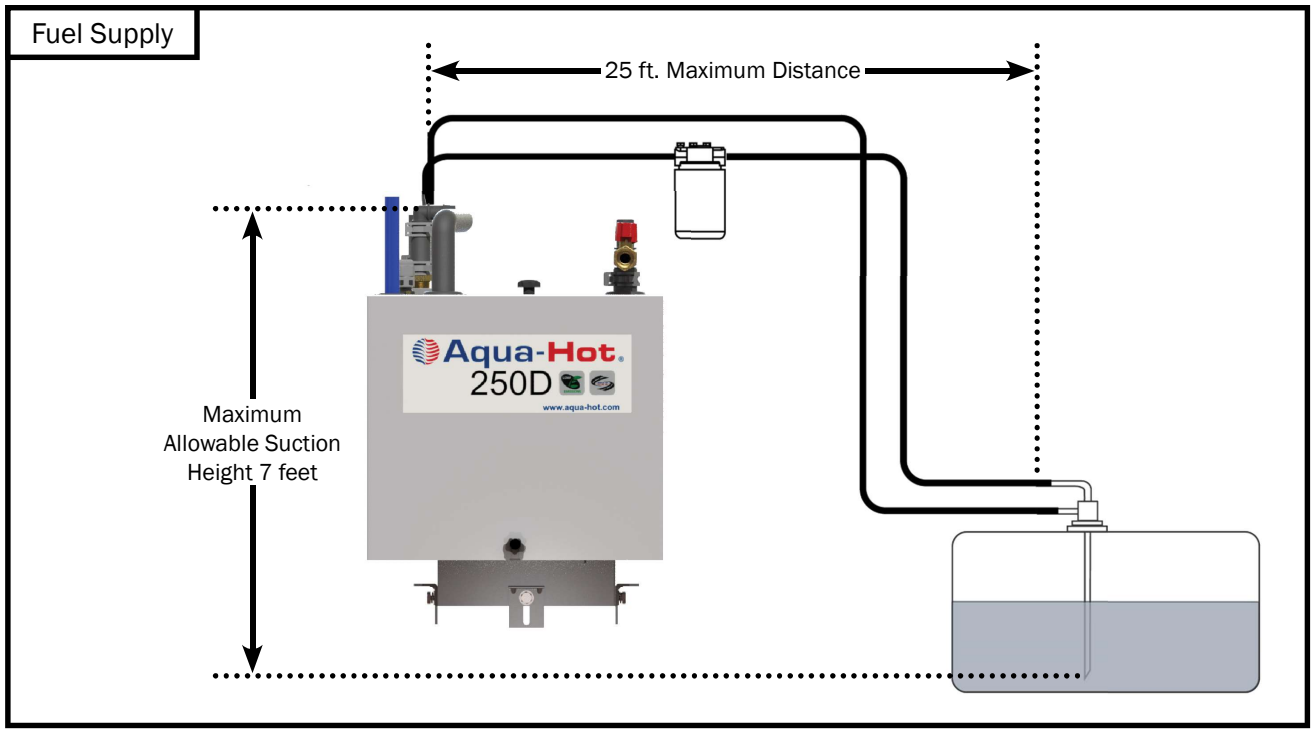


Figure 36

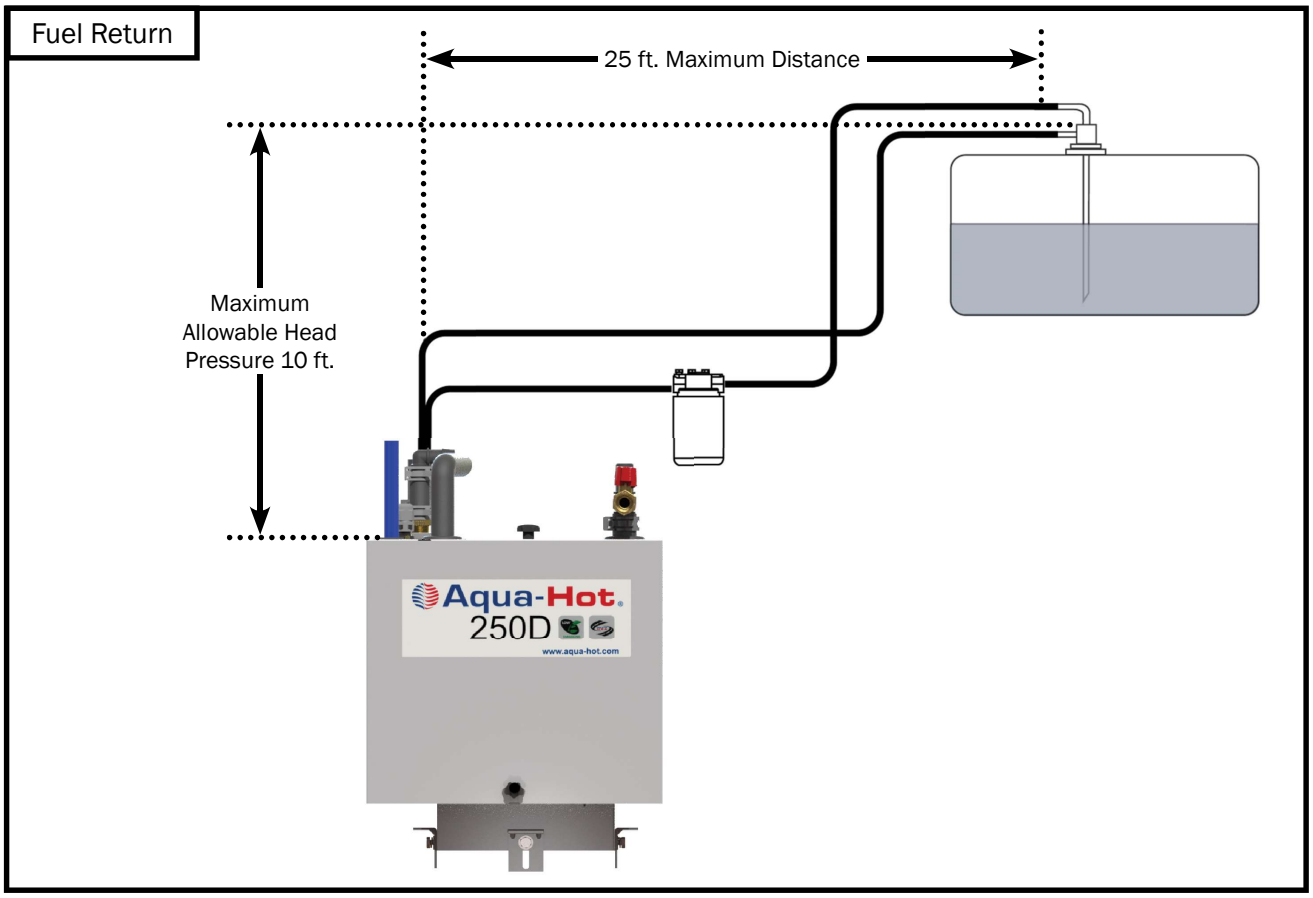


Figure 37

Exhaust System

This section outlines in detail the specifications and requirements for installing the exhaust system. These requirements must be adhered to in order to create optimal operating conditions for the Aqua-Hot unit.

WARNING

Exhaust from the Aqua-Hot is very HOT and must be kept away from any heat sensitive materials.

Failure to do so may result in a fire.

Exhaust System Requirements

- Do NOT direct exhaust downward as fire may result when parked in dry, grassy areas.
- Exhaust must not terminate beneath the vehicle, or beneath an openable window or vent.
- Do NOT terminate the exhaust pipe within the awning area of the coach, if applicable.
- Ensure that the exhaust is shunted away from slide-out areas.
- Angle the exhaust pipe away from, and towards the back of the vehicle so that the exhaust naturally moves away while the vehicle is in motion.
- Use standard 2" automotive exhaust pipe and avoid any bends, if possible.
- Do NOT use galvanized pipe or fittings, only black-iron pipe fittings are permitted for use.

CAUTION

All Aqua-Hot exhaust system installations MUST utilize the two black pipe nipples and the black pipe elbow, which are supplied separately from the heating system in the configuration best suited for the particular recreational vehicle application. Failure to conform to this standard could create a hazardous situation and will void the Aqua-Hot's ETL product listing.

Refer to "Internal Combustion Engine Exhaust and Vehicle Wall Openings"in RVIA's ANSI/NFPA 1192 Handbook for Recreational Vehicle Standards, as well as the National Fire Protection Association's (NFPA) 1192 Standard on Recreational Vehicles for additional information.

Should the particular application require modification of the exhaust pipe, please contact the Aqua-Hot Heating Systems Product Application Department at 574-AIR-XCEL (574-247-9235).

Installing the Exhaust System

Aqua-Hot separately supplies a kit that contains two 1.5" NPT black pipe nipples - one is 3" in length, the other is 4" in length. These three exhaust system components must be utilized with all Aqua-Hot product installations. Be sure to reference Figures 40 & 41 to determine which exhaust nipple should be connected directly to the Aqua-Hot's exhaust port (i.e. the 3" or 4" black pipe nipple).

1. Run the exhaust pipe to the driver's side or the back of the vehicle to ensure that the exhaust fumes cannot enter into the passenger compartment. Be sure to keep the exhaust away from the slide-out areas.
2. Be sure to secure the end of the exhaust pipe to the vehicle with the proper exhaust hanger/support hardware.

NOTE: Total exhaust length shall not exceed 30 ft, and shall contain no more than two 90° pipe bends.

Figure 38

Figure 39

NOTE: If the exhaust pipe has low points, a ⅛" weep hole is required so as to drain any condensation from the exhaust pipe.

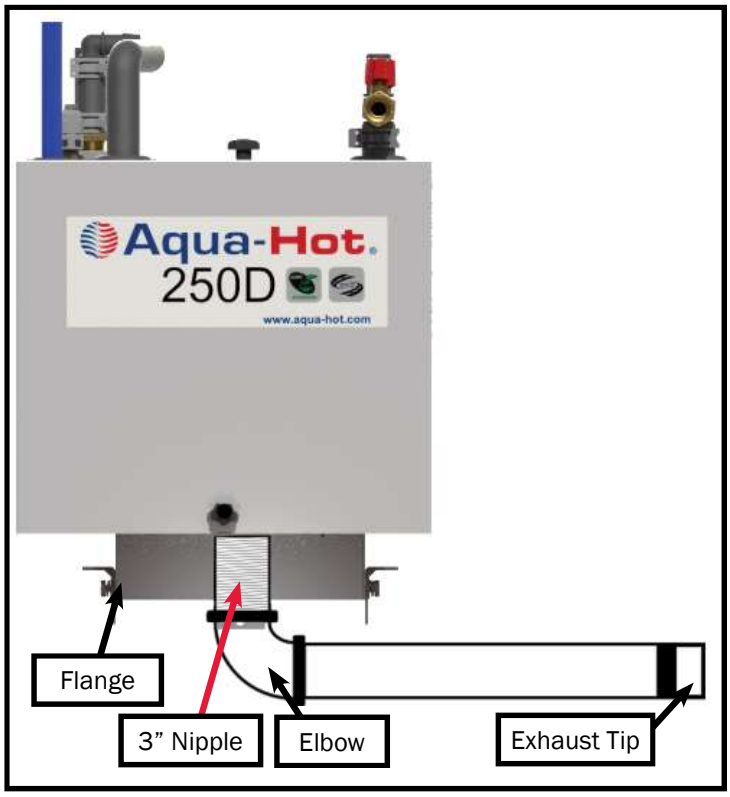


Figure 40

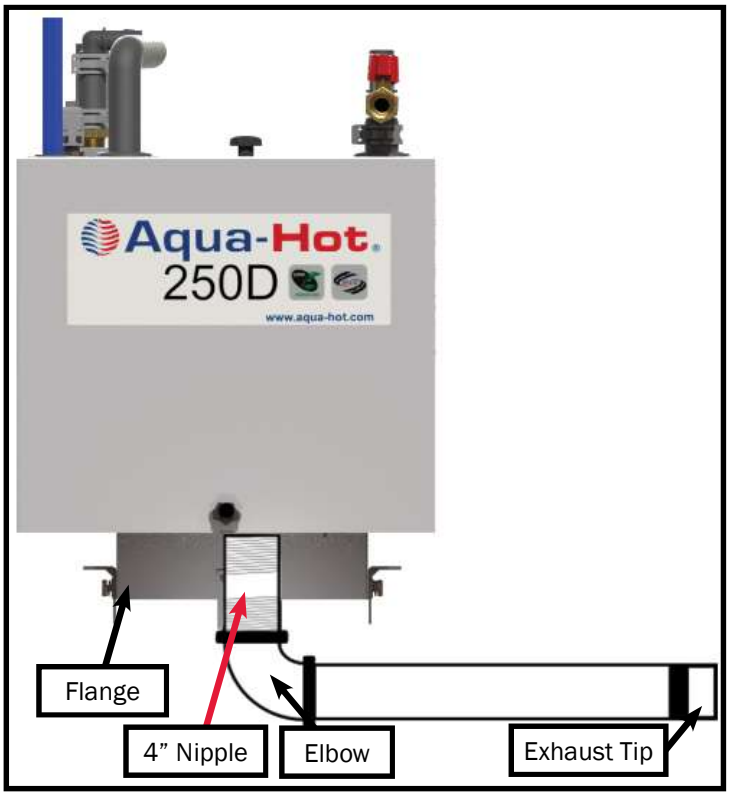


Figure 41

NOTE: Exhaust must terminate at least 3 ft from any coach openings (doors and windows).

Wiring the Aqua-Hot

This section will introduce the basic considerations, practices, and information necessary to wire the Aqua-Hot to any relevant coach-side systems.

WARNING

Installation must be performed by a professional installer or technician as per national/local regulations.

Improper installation can cause property damage, injury, or death.

J7 Plug:

The J7 plug is responsible for managing all zone fan power connections, and boost pump supply and return.

J7 Wire insertion view shown

Figure 42

Manufacturer	Part No.	Common Name
TE Connectivity	1-480706-0	9-Position Mate-N-Lock
TE Connectivity	350550-1	Mate-N-Lock Power Contacts

Once all the required hardware has been acquired, wire the J7 plug according to the table below. J7-9 is not used.

Pin Number	Function	Connect To
J7-1	Fan 1 Supply	Zone 1 Fans (+)
J7-2	Fan 2 Supply	Zone 2 Fans (+)
J7-3	Fan 3 Supply	Zone 3 Fans (+)
J7-4	Fan 1 Ground	Zone 1 Fans (-)
J7-5	Fan 2 Ground	Zone 2 Fans (-)
J7-6	Fan 3 Ground	Zone 3 Fans (-)
J7-7	Boost Pump Supply	Boost Pump +
J7-8	Boost Pump Ground	Boost Pump -
J7-9	UNUSED	UNUSED

J8 Plug:

The J8 plug is meant to handle the zone thermostats and House Power Sense functionality. House power sense functionality will be described in detail later in this manual.

J8 Wire Insertion View Shown

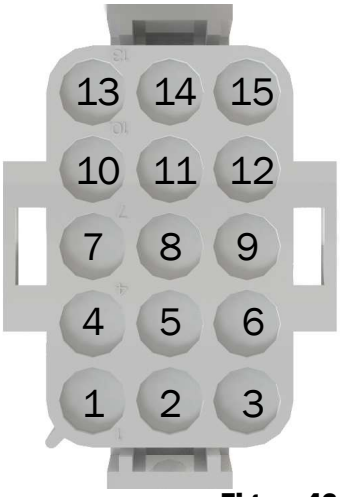


Figure 43

Manufacturer	Part No.	Common Name
TE Connectivity	1-480710-0	15 Position Mate-N-Lock
TE Connectivity	350550-1	Mate-N-Lock Power Contacts

Once the required hardware has been acquired, wire the J8 plug according to the table below. Pins J8-10 through J8-15 are not utilized.

Pin Number	Function	Connect To
J8-1	Zone 1 Thermostat In	Zone 1 Thermostat
J8-2	Zone 1 Thermostat Supply	Zone 1 Thermostat
J8-3	UNUSED	UNUSED
J8-4	Zone 2 Thermostat In	Zone 2 Thermostat
J8-5	Zone 2 Thermostat Supply	Zone 2 Thermostat
J8-6	UNUSED	UNUSED
J8-7	Zone 3 Thermostat In	Zone 3 Thermostat
J8-8	Zone 3 Thermostat Supply	Zone 3 Thermostat
J8-9	House Power Sense	12V DC Power (+)
J8-10	UNUSED	UNUSED
J8-11	UNUSED	UNUSED
J8-12	UNUSED	UNUSED
J8-13	UNUSED	UNUSED
J8-14	UNUSED	UNUSED
J8-15	UNUSED	UNUSED

J3 Plug:

The J3 plug connects to the on-board RVC system of the coach. It is a 4-pin connector with self contained power pins. See the diagram below for the crimping information for the J3 plug. Crimp these parts together using pliers.

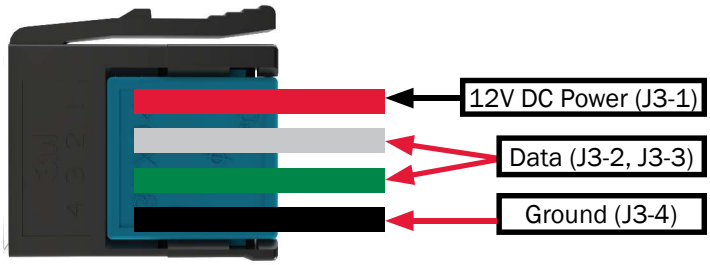


Figure 44

Manufac-turer	Part No.	Description
3M	37401-2165-000 FL 100	4-Position MALE Plug
3M	37104-2165-000 FL 100	4-Position FEMALE Receptacle
General Cable	E2104S.41.02	4COND 22AWG WHT SHLD Cable

The parts listed above can be purchased from any major electronics retailer. Only the parts listed above are approved for use in the Aqua-Hot.

Pin Number	Description
J3-1	12V DC Power
J3-2	Data
J3-3	Data
J3-4	Ground

NOTE: For networked control of the Aqua-Hot Controller, Aqua-Hot requires system integrators ensure that individual commands are received and processed. Aqua-Hot requires that commands be repeated or confirmed so that if a single message were dropped, or if there is a brief network disturbance, the Controller would get into the correct state as soon as the disruption was removed.

The Aqua-Hot Controller monitors the heating system and handles all logic relating to safeties and heating control. As such, the system integrator is required to display all pertinent status information but not use that information to lock out operation or add additional safety layers that could impact the end of operation if a message from the Controller was missed.

Aqua-Hot Wiring Connections

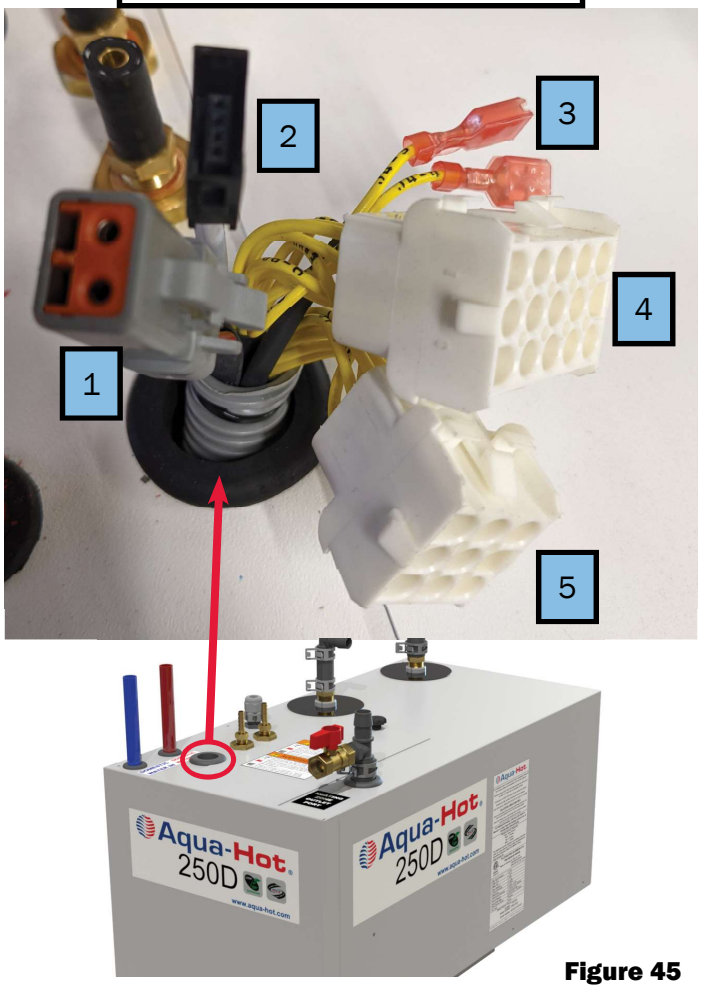


Figure 45

1. **Deutch 12V+ Power Connector**
2. **RV-C Network Connector** (terminator can be placed in-line here)
3. **Overflow Bottle Terminals**
4. **J8 Plug** (manages zone fan power connections, boost pump supply & return)
5. **J7 Plug** (handles the zone thermostats and House Power Sense functionality)

House Power Sense

Introduction:

The Aqua-Hot Controller contains within it a fail-safe functionality known as House Power Sense. This functionality serves as a live signal to the Aqua-Hot allowing it to continue operating. If power is lost to the on-board RVC network or other on-board control systems, the Controller is signaled to shut down operation until a 12V DC power signal is returned to the unit.

Wiring for House Power Sense

In order for the Aqua-Hot to function correctly, supply 12V DC power to either the J8-9 pin OR to the J3-1 pin.

In order to maintain the fail-safe nature of the House Power Sense, supply 12V DC power to the J8-9 pin OR the J3-1 pin. Do NOT supply power to both of these pins.

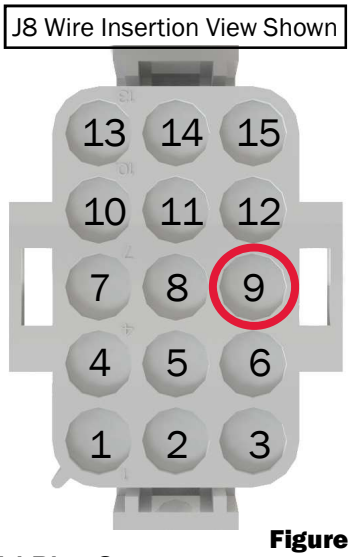


Figure 46

Wiring for Multi-Plex Systems:

When wiring for Multi-Plex Systems, route a power wire from a power connection on the RVC system to the Aqua-Hot's J3-1 pin (that is, plug J3, pin 1.) The House Power Sense will not function correctly if 12V DC power is not supplied from a device on the RVC network.

Routing the wire from the RVC network (or from an accessory on the RVC network) ensures that if the RVC network goes off-line (but the vehicle remains otherwise powered), the Aqua-Hot will not continue to operate unabated.

There are two ways to wire the House Power Sense for use with a Multi-Plex network; typical wiring case and a special wiring case.

Typical

The typical use case in wiring the House Power Sense requires a constant 12V DC signal on plug J3-1 for the House Power Sense. Plug J3 is the 4-position RVC plug. This is the easiest way to implement House Power Sense on vehicles with on-board Multi-Plex systems.

Special

If for some reason pin J3-1 cannot be supplied with power, supply 12V DC power to the J8-9 pin.

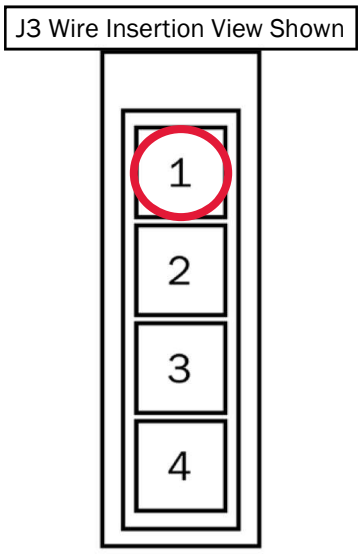


Figure 47

Connecting the 250D to 12V DC Power

⚠ CAUTION

DO NOT connect 12V DC power to the Aqua-Hot if the vehicle requires welding. Electrical welding will cause serious, irreversible damage to the Aqua-Hot.

The section will outline the requirements, steps, and information necessary to connect the Aqua-Hot to the vehicle's 12V DC power system. Follow all guidelines and pay attention to all notes contained herein. Failure to adhere to these guidelines can inhibit unit performance, and may cause damage to the Aqua-Hot and/or the coach.

- Installation must be performed by a qualified, professional according to current national regulations. Reference A119.2/NFPA 501C Standard on Recreational Vehicles 1993 Edition for relevant national regulatory information.
- Select the correct wire gauge for installation referencing ANSI/RVIA-LV.
- Protect the Aqua-Hot from over-current and shorting by incorporating a 20A breaker (minimum) to the Aqua-Hot's coach-side power connection.
- Acquire the relevant parts for connecting the Aqua-Hot to 12V DC power by referencing the table below.

	Deutsche	Amphenol
Pins	1060-12-0222	AT60-12-0222
Housing	DPT04-2P	ATP04-2P
Wedge	WP-2P	AWP-2P

- After crimping and assembling the power connector, connect this plug to its receptacle on the Aqua-Hot until it clicks into place.

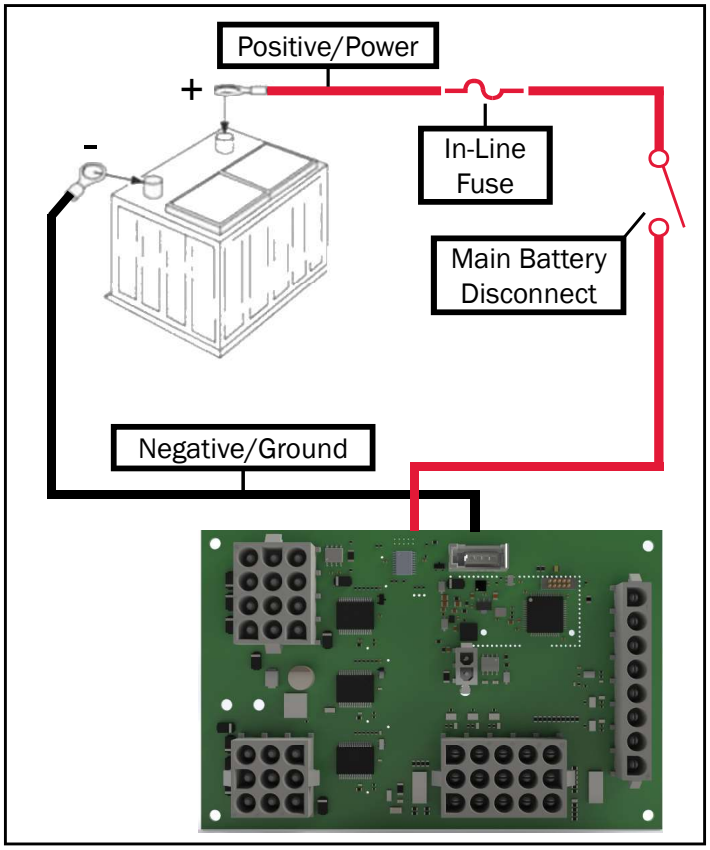


Figure 48

- The image above is simply a reference. A professional, licensed installer needs to determine the necessary components and configuration according to local codes and standards.
- The 12-volt supply to the heater must be routed directly from the battery.
- All power circuits must be protected with fuses or automatic circuit breakers.

Pins

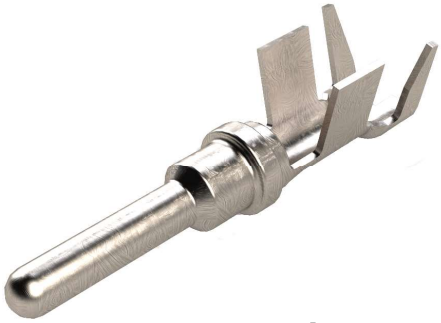


Figure 49

Housing

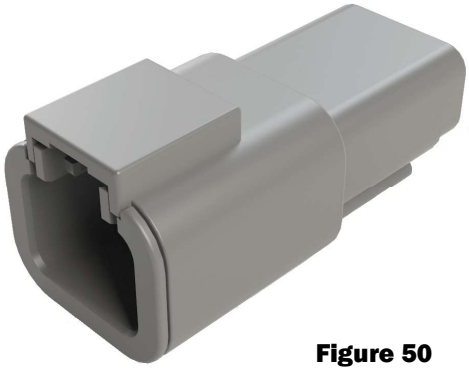


Figure 50

Wedge

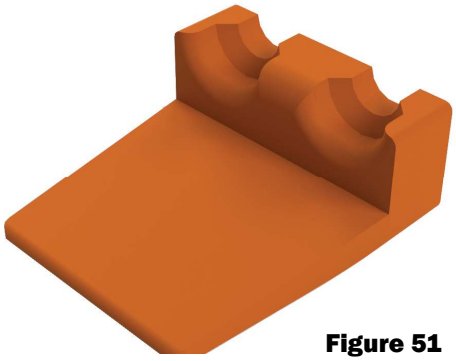


Figure 51

Connecting the Aqua-Hot to AC Power

WARNING

Do NOT activate the burner until antifreeze and water heating solution has been added to the boiler tank and the heating system has been completely bled of air. Operating the Aqua-Hot without the antifreeze and water heating solution could cause serious damage to the Aqua-Hot boiler tank.

The following section explains in detail how to wire and connect the Aqua-Hot into your coach-side 120V AC power system. Included are examples of plugs and connections, as well as mating part numbers and location call-outs.

The Aqua-Hot utilizes Molex 19403 and 19045 series connectors for the AC electrical circuit. These are self-contained connectors which can be readily purchased from your choice of electronics supplier. Listed below are three different mating connections.

- Installation must be performed by a qualified professional according to current national regulations. Reference A119.2/NFPA 501C Standard on Recreational Vehicles 1993 Edition.
- The boiler must be connected to a 120V AC supply permanently and be protected with a 20A breaker (minimum). The 120V AC must be separate from 12V DC.
- It must be possible to disconnect the power to the boiler, either an easily accessible plug or a circuit breaker.
- Refer to the schematic on Page 38.

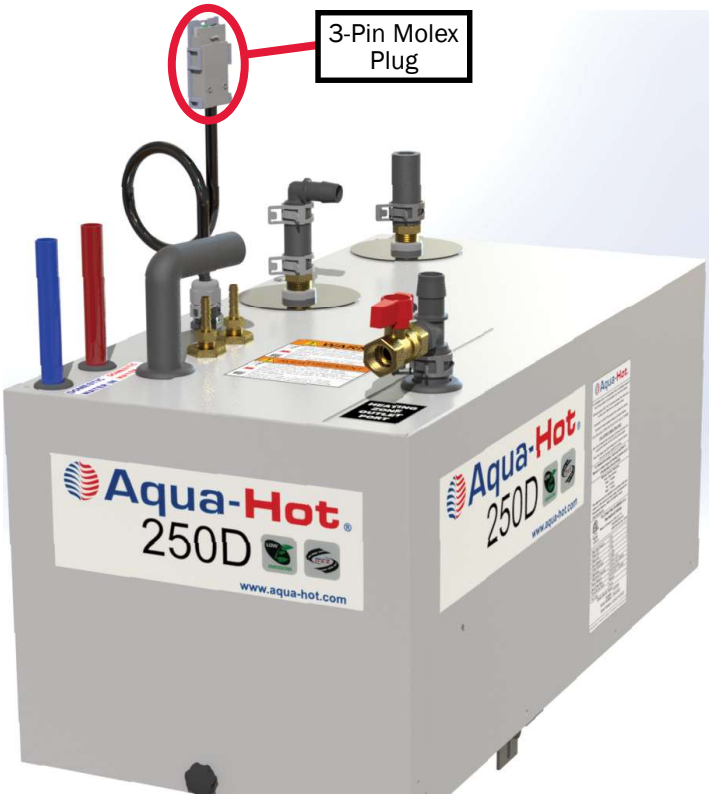


Figure 52

1. Route three 120V AC power source wires to the Aqua-Hot heater.
2. Using one of the Molex connectors described below, crimp the 120V AC power source wire into the connector.
3. Plug the new crimped 120V AC Molex connection into the mating Molex connection on the Aqua-Hot.

Self-Contained Power Connector - 2 Circuit for Solid Wire		
Size	Part Number	Housing Color
12AWG-14AWG	19045-1000	White
Self-Contained Power Connector - 2 Circuit for Stranded Wire		
14AWG-16AWG	19403-1011	Blue
12AWG	19403-1010	Yellow

Molex 19403-1000

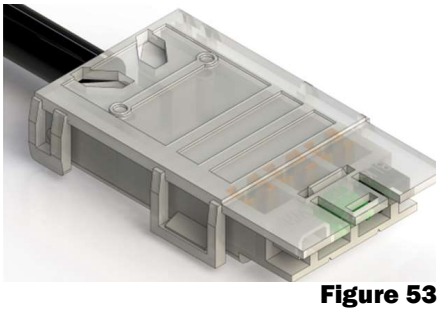


Figure 53

Molex 19403-1011

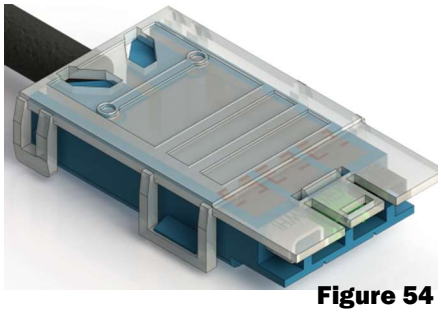


Figure 54

Molex 19045-1010

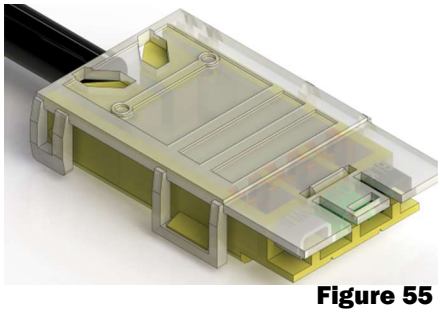


Figure 55

Filling and Purging the Aqua-Hot 250-D03

Before the first activation of the Aqua-Hot, fill the unit with antifreeze and water heating solution. Without the solution present, the Aqua-Hot will not operate. Follow the directions below to fill and purge the Aqua-Hot.

A 50/50 mixture of "GRAS" (Generally Recognized as Safe) approved **propylene glycol** antifreeze and distilled or de-ionized water is recommended. The mixture may be modified to provide the most adequate freezing, boiling, and rust/anti-corrosive protection. Reference pages 40-41 for more information about antifreeze.

Procedure:

1. Locate the fill valve at the zone port outlet (Figure 57).
2. Make a ½" NPT connection from the propylene glycol source to the fill valve.
3. Remove the access cover and locate the 3-way valve in the Aqua-Hot. Ensure that the sight glass is oriented as shown below. Reference Page 5, Figure 3 (Item #3) for the 3-Way Valve location.

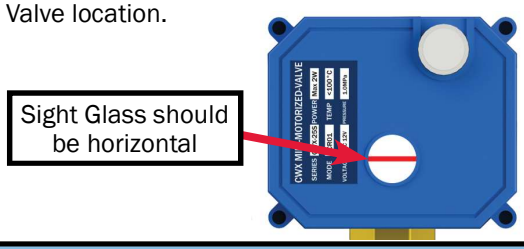


Figure 56

NOTE: If the sight glass is not oriented in this way while the unit is cold, apply power to the main harness connection and the valve will return to horizontal.

4. Activate the fluid transfer pump and begin filling the Aqua-Hot through the fill valve.
5. When the fluid level reaches the cold mark on the expansion bottle, deactivate the fluid pump.
6. Close the fill valve and disconnect the pump.
7. Reattach the access cover.
8. Turn on the burner at the interior control panel and set the thermostat to its maximum temperature to allow for interior heating. Let the Aqua-Hot run for at least 20 minutes to ensure that any air in the heating loop has been purged. If necessary, top off the propylene glycol solution at the fluid expansion bottle.

WARNING

Only Propylene Glycol based "boiler" antifreeze deemed "GRAS" by the FDA shall be used in the Aqua-Hot's hydronic heating system, Failure to use approved antifreeze could cause serious injury or death.

CAUTION

Ensure that the expansion tube is connected to both the expansion bottle and to the Aqua-Hot. Also ensure that the overflow hose is connected to the top port on the expansion bottle and is allowed to flow out of the coach through the floor of the bay as shown below.

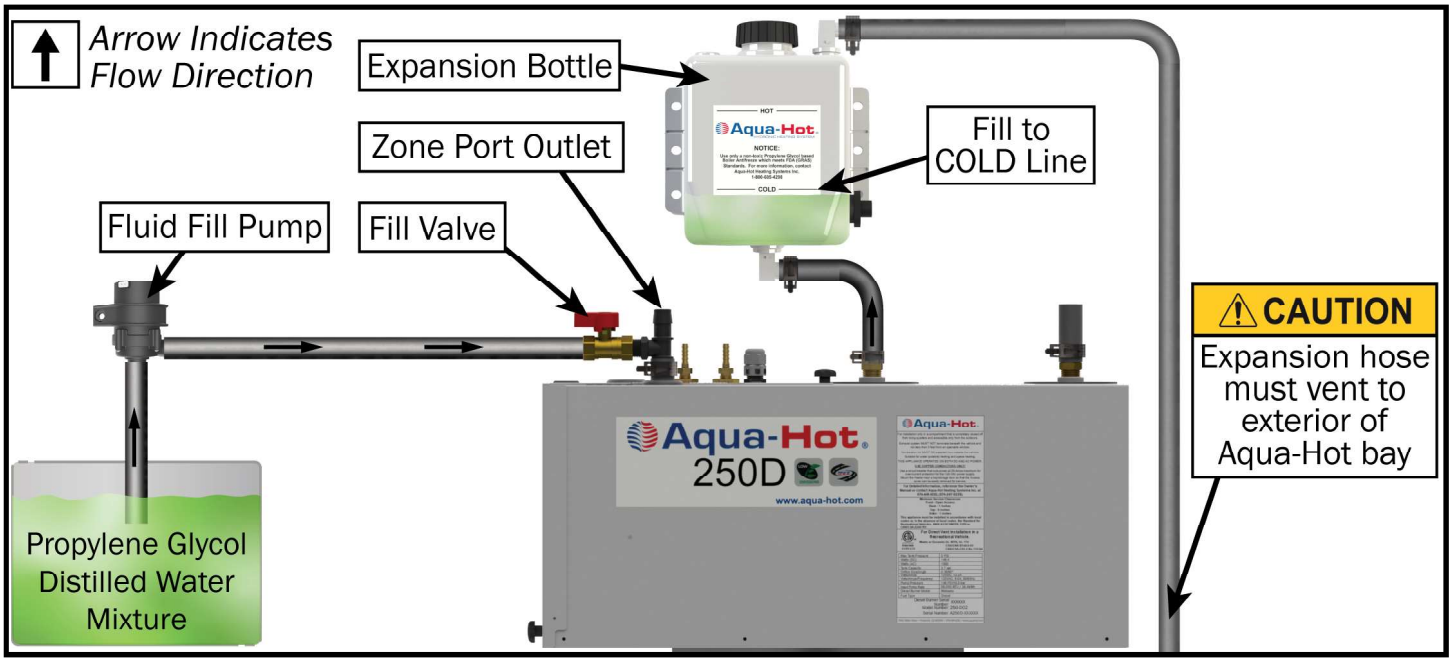


Figure 57

Aqua-Hot First Operation

Activation Instructions (Electric Element):

1. Make sure power supply to the Aqua-Hot is on.
2. Confirm that the antifreeze and distilled water heating solution is adequately filled.
3. Confirm the system and heating loop has been properly purged of any air.
4. Make sure to flush the domestic water system thoroughly with clean water prior to use.
5. Tap the electric element to "ON" on the Aqua-Hot LCD screen, or the coach control panel, to supply the 120V AC electric element with power.

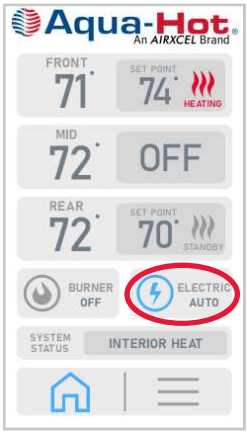


Figure 58

6. Allow approximately 20 minutes for the electric element to heat the tank. Turn on a hot water faucet, and allow to run until hot water flows. Once there is hot water, close the faucet. This will verify that the electric element is operating as it should.

Once these checks have been confirmed, the electric heating element is now ready for normal operation and use.

Continue to the next procedure to activate the diesel burner.

The first operation of the burner with the Aqua-Hot may not light up perfectly. This is normal and may take a couple tries to get the fuel lines purged of air before a successful start-up.

Activation Instructions (Diesel Burner)

1. Make sure there are no blockages or debris to the exhaust outlet or combustion air inlet.
2. Make sure the plumbing lines and fuel lines are properly purged and free of air.
3. Make sure there is adequate fuel in the vehicle fuel tank (at the least ¼ tank).
4. Turn on the burner on the heater control panel.

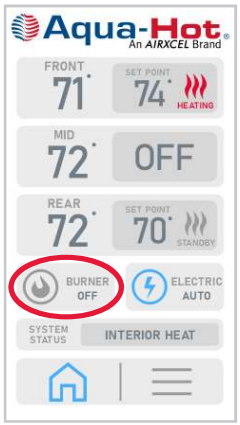


Figure 59

5. Once the burner turns on, the circulation pump and combustion air fan should run (can be determined by listening).
6. The burner should start up after approximately 120 seconds. This can be determined by the hot exhaust exiting from the exhaust tube.
7. Allow the burner to run a full cycle. Turn on the heat or hot water inside the RV to confirm the burner is properly operating.

NOTE: It is recommended to run the burner for at least 20 minutes every month to ensure optimum heater condition.

Once these checks have been confirmed, the diesel burner is now ready for normal operation and use.

NOTE: Both the electric heating element and the 12V DC burner are thermostatically controlled. The element and/or burner will automatically maintain the temperature of the boiler tank's antifreeze and water heating solution.

Winterizing the Aqua-Hot

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.

Please follow these instructions when winterizing the Aqua-Hot domestic water heating system. Reference Figure 60 for a system overview.

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

1. Disconnect or shut off any external sources of freshwater.
2. Open all faucets, shower heads, and similar. Open both the "HOT" and "COLD" valves on the faucet, if applicable.
   - If only one valve, open it to the "halfway point".
3. Ensure that the coach is connected to a waste collection point, such as a grey water tank.
4. Attach an external fluid pump to your fresh water connection.
5. Ensure that the fill pump intake hose is situated in a large enough supply of "GRAS" winterization antifreeze so that the pump does not run dry if left unattended.
6. Activate the external fill pump. Allow the pump to run until ONLY antifreeze is exiting the faucets in the coach.
7. Once this has been completed, deactivate and disconnect the external fluid pump.
8. Close all but one faucet in the coach. This will allow the winterization antifreeze to expand and contract as necessary with temperature changes, thereby greatly reducing the likelihood of pressure-related damage to interior pipes.

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 only non-toxic RV antifreeze (FDA approved "GRAS" antifreeze) rated for winterization is used when winterizing this unit. The warranty does not cover freeze damage.

De-Winterization:

1. To de-winterize the unit, connect a freshwater source to the coach.
2. Ensure that all the interior faucets have been re-opened.
3. Turn on the external water source, and allow it to run until winterization antifreeze no longer flows from any faucets.

Disinfecting the Domestic Water System

NOTICE

The Aqua-Hot Heating components 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 lines, 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 system, be sure to follow NFPA 1192 Standard of Recreational Vehicles "Instructions for Disinfection of Potable Water Systems" or any other applicable local standards for Potable Water Systems.

NOTE: Extended exposure to household bleach will corrode the components of the Aqua-Hot will potentially dramatically shorten the operational lifetime of the Aqua-Hot. Under no circumstances is the Aqua-Hot to be exposed to household bleach for extended periods of time.

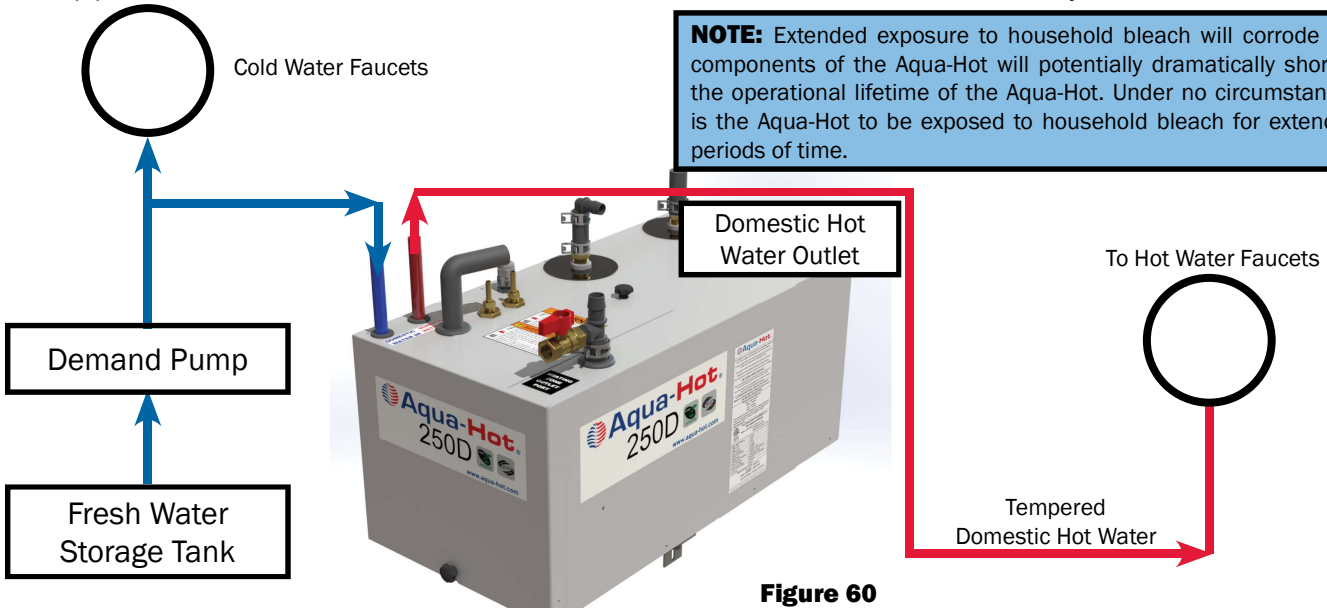
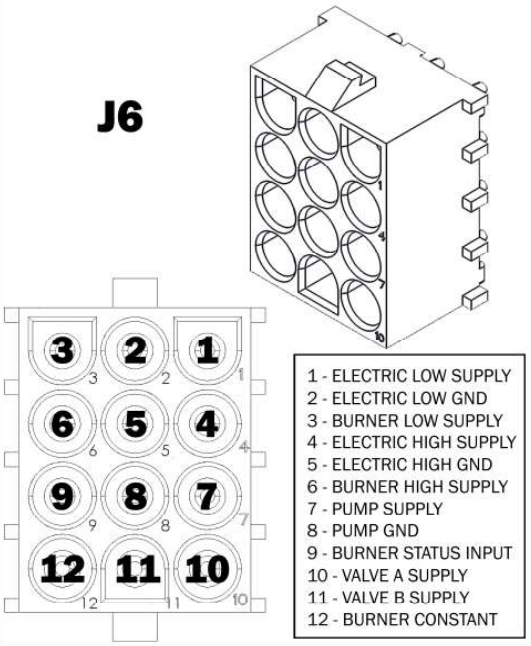


Figure 60

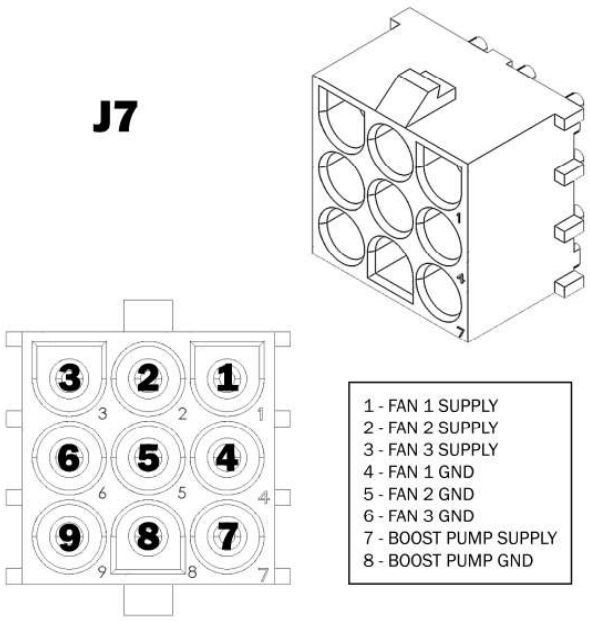
CONTROLLER PIN OUT REFERENCE

J6



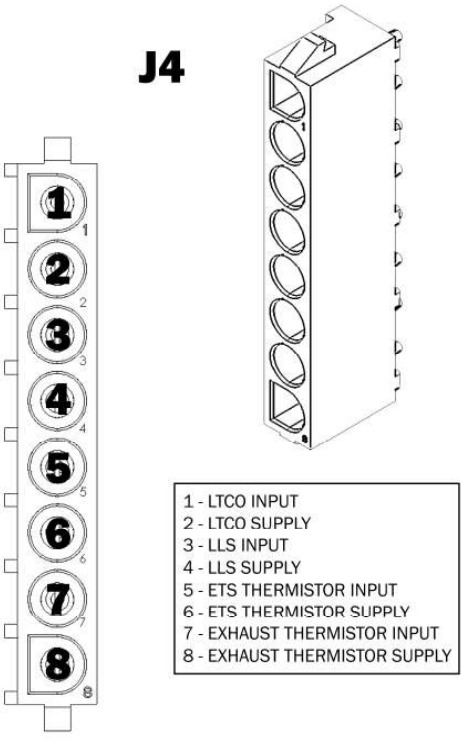
1 - ELECTRIC LOW SUPPLY
2 - ELECTRIC LOW GND
3 - BURNER LOW SUPPLY
4 - ELECTRIC HIGH SUPPLY
5 - ELECTRIC HIGH GND
6 - BURNER HIGH SUPPLY
7 - PUMP SUPPLY
8 - PUMP GND
9 - BURNER STATUS INPUT
10 - VALVE A SUPPLY
11 - VALVE B SUPPLY
12 - BURNER CONSTANT

J7



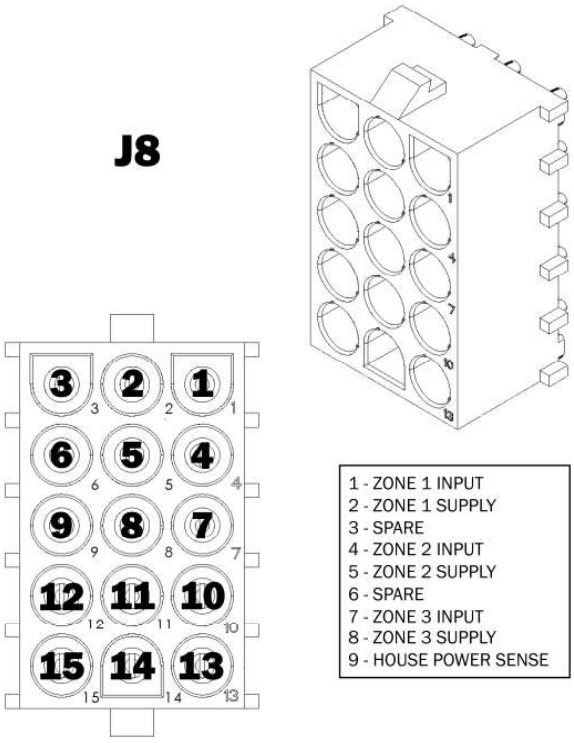
1 - FAN 1 SUPPLY
2 - FAN 2 SUPPLY
3 - FAN 3 SUPPLY
4 - FAN 1 GND
5 - FAN 2 GND
6 - FAN 3 GND
7 - BOOST PUMP SUPPLY
8 - BOOST PUMP GND

J4



1 - LTCO INPUT
2 - LTCO SUPPLY
3 - LLS INPUT
4 - LLS SUPPLY
5 - ETS THERMISTOR INPUT
6 - ETS THERMISTOR SUPPLY
7 - EXHAUST THERMISTOR INPUT
8 - EXHAUST THERMISTOR SUPPLY

J8

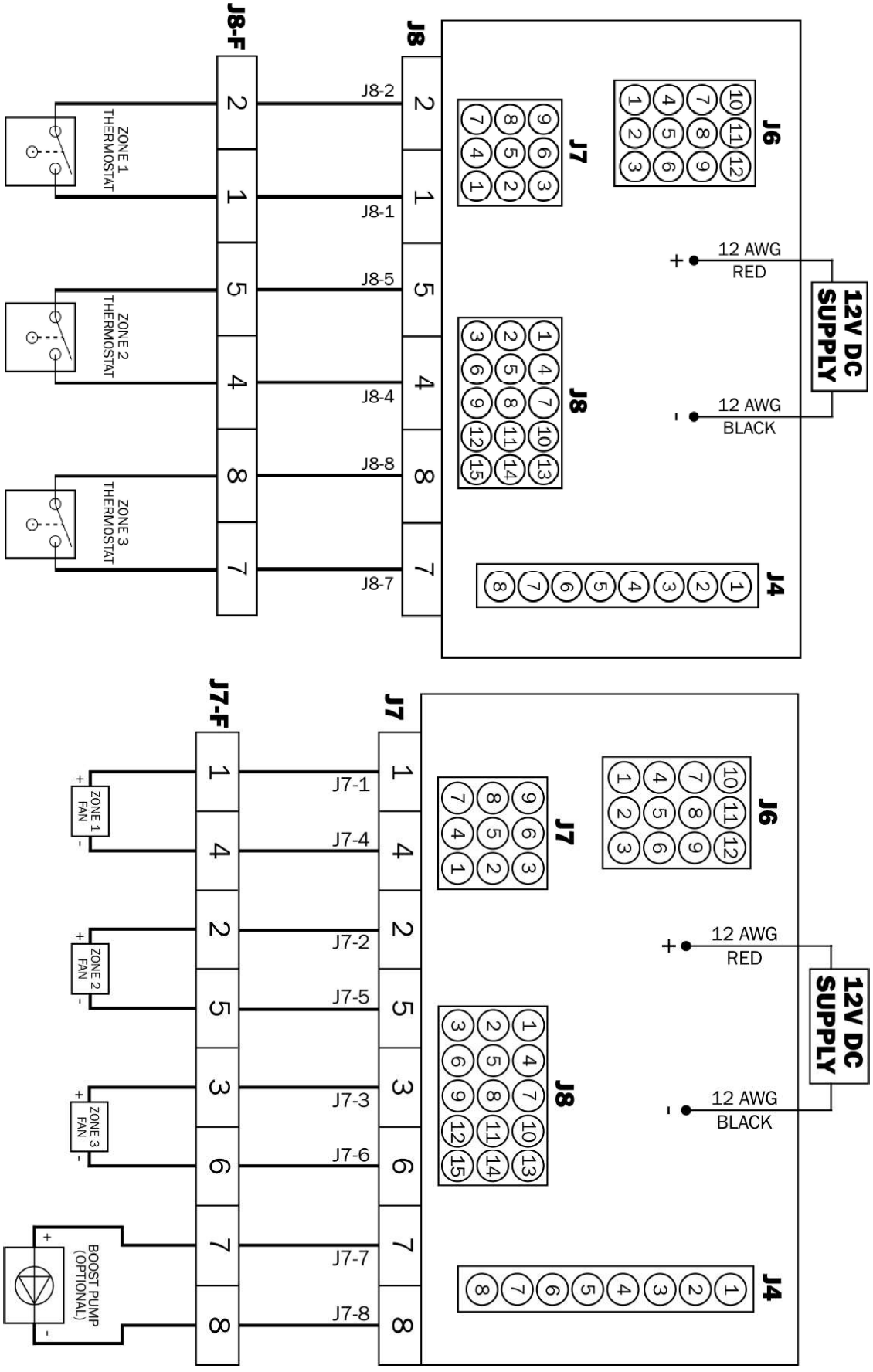


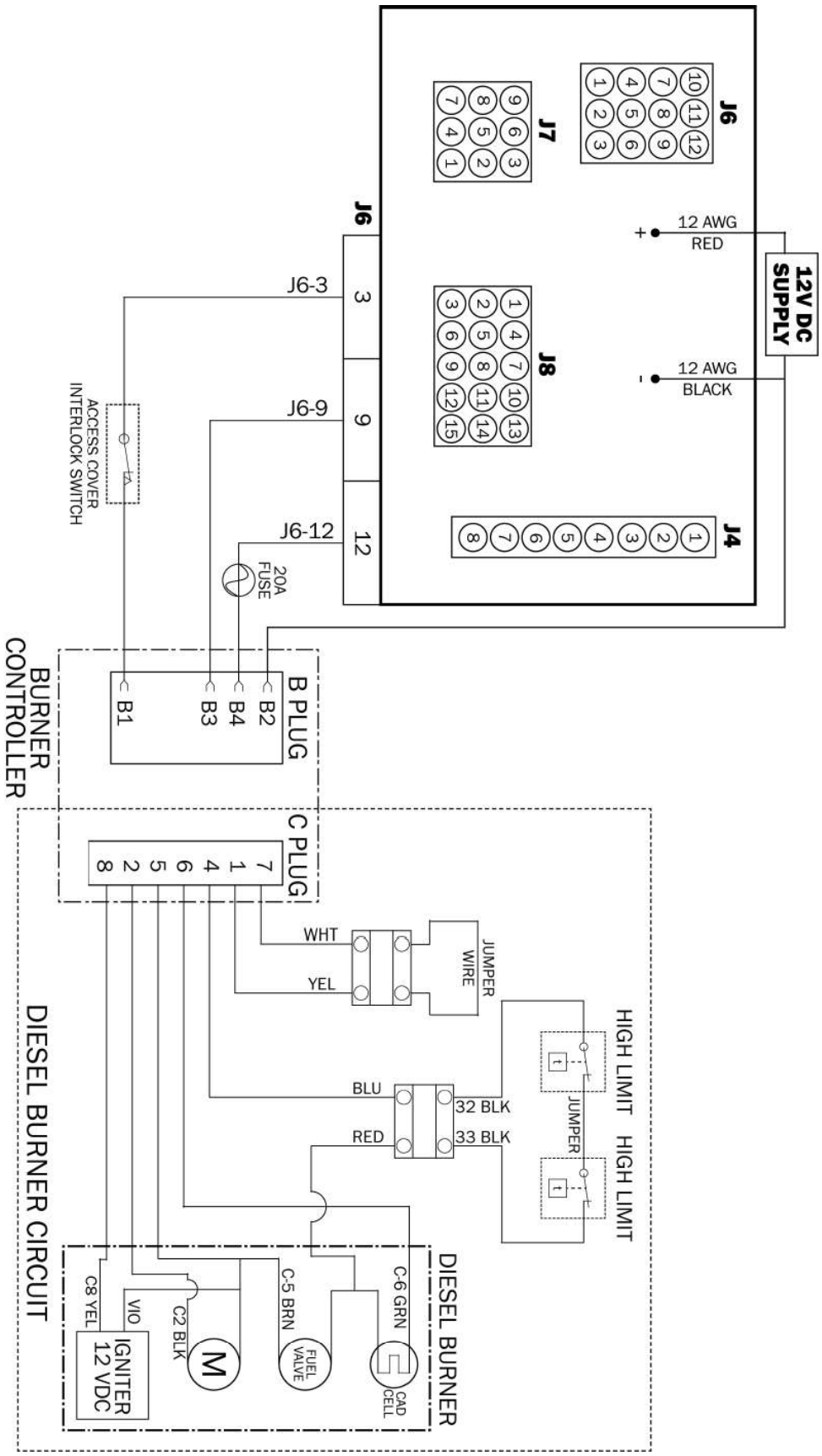
1 - ZONE 1 INPUT
2 - ZONE 1 SUPPLY
3 - SPARE
4 - ZONE 2 INPUT
5 - ZONE 2 SUPPLY
6 - SPARE
7 - ZONE 3 INPUT
8 - ZONE 3 SUPPLY
9 - HOUSE POWER SENSE

PCB CONNECTOR DESIGNATION	HOUSING MANUFACTURER	HOUSING PART NUMBER	DC HARNESS MATING PART NUMBER (NOT PICTURED)
J4	TE CONNECTIVITY	641828-1	640582-1
J6	TE CONNECTIVITY	1-480708-0	350735-1
J7	TE CONNECTIVITY	1-480706-0	350720-1
J8	TE CONNECTIVITY	1-480710-0	350736-1

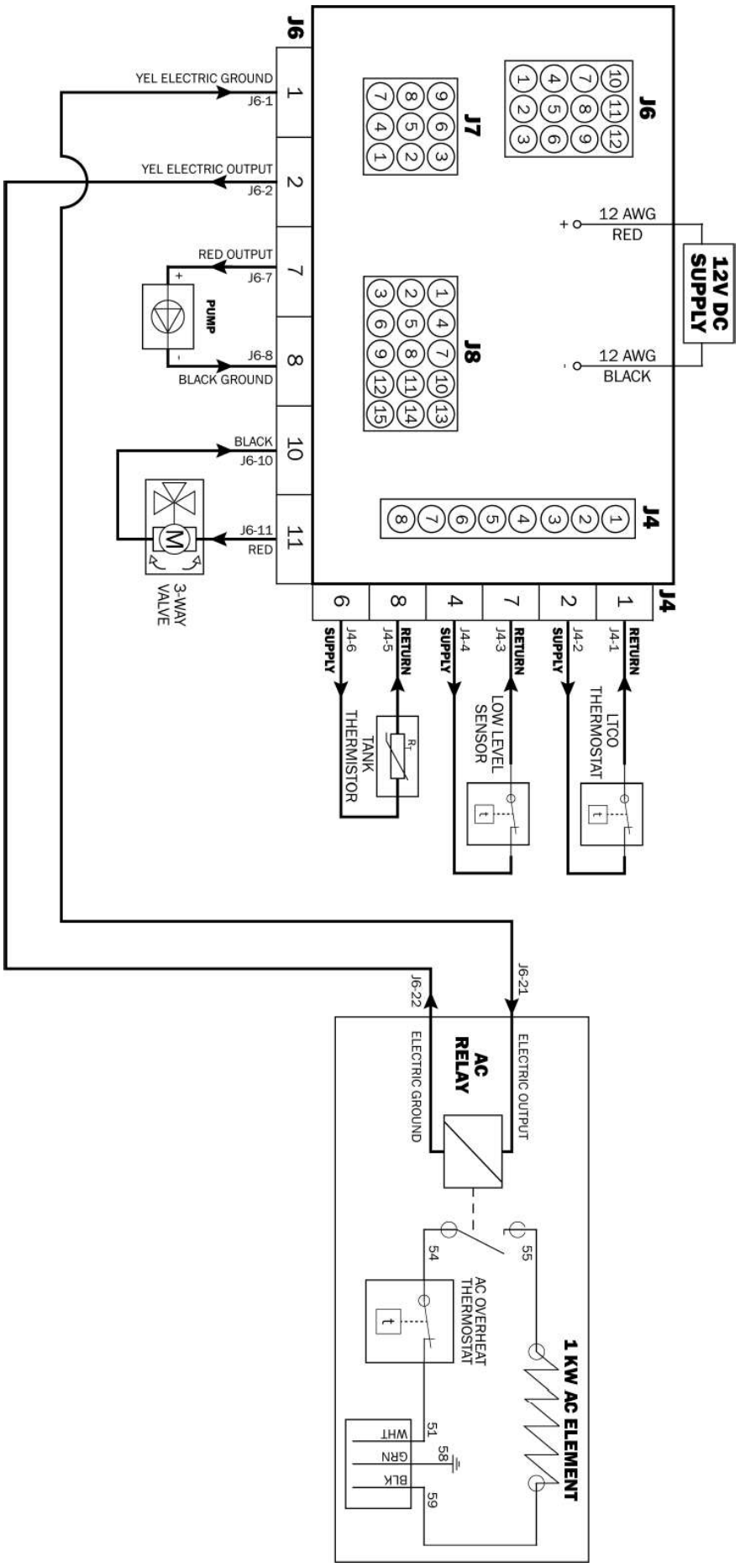
NOTE: All connectors are shown from Pin insertion side.

ZONE THERMOSTATS & ZONE HEAT EXCHANGERS

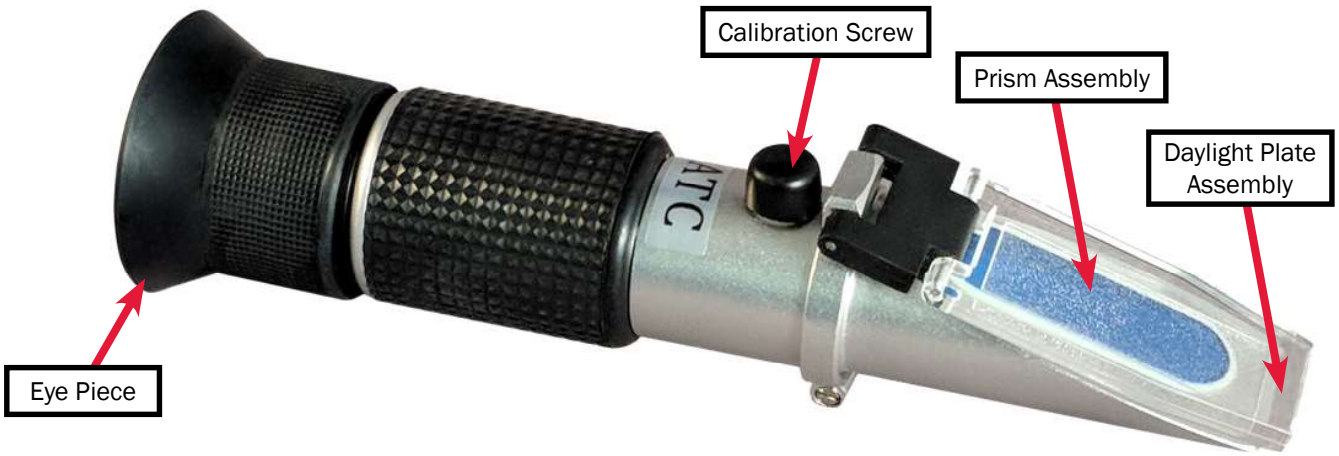



J6
J7
J8
J4
12 AWG
RED
12 AWG
BLACK
12V DC
SUPPLY
J6-3
J6-9
J6-12
ACCESS COVER
INTERLOCK SWITCH
20A
FUSE
BURNER
CONTROLLER
B PLUG
B1
B2
B3
B4
C PLUG
WHT
YEL
JUMPER
WIRE
BLU
RED
32 BLK
33 BLK
HIGH LIMIT
HIGH LIMIT
JUMPER
DIESEL BURNER CIRCUIT
DIESEL BURNER
C8 YEL
VIO
C2 BLK
C-5 BRN
C-6 GRN
IGNITER
12 VDC
M
FUEL
VALVE
CAD
CELL

ELECTRIC ELEMENT, SENSORS, AND THERMOSTATS



Measuring Antifreeze Using a Refractometer

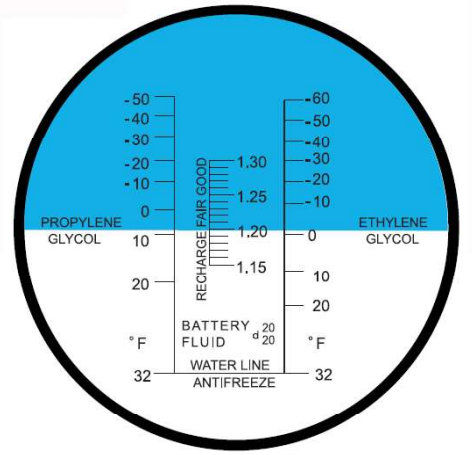


Properly Apply Antifreeze to the Prism Assembly

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.

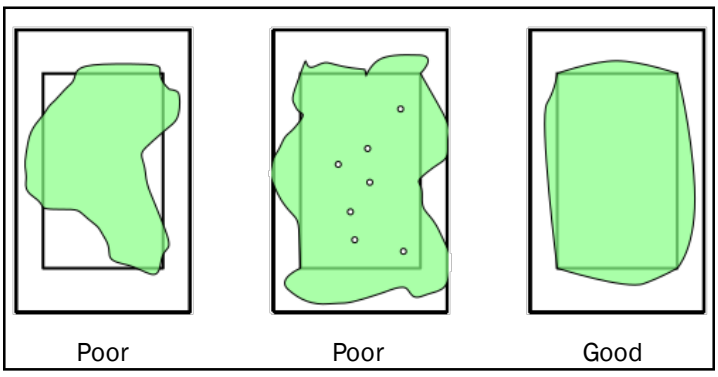
Adjust the Boundary Line

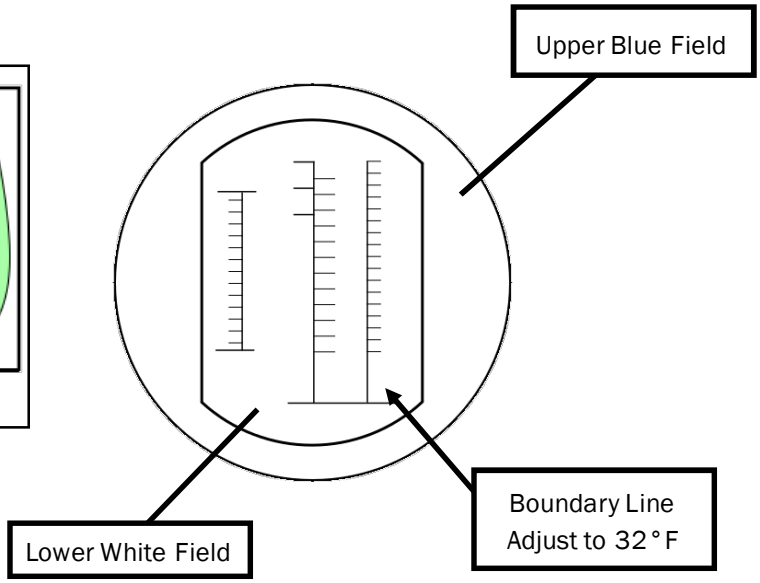
Once the glycol solution has been properly applied, adjust the calibration screw until the boundary line labeled “Propylene Glycol” is set to 32 °F. The graphic to the right has been designed as an aid, but note that it may differ from what is shown in the refractometer sight glass.



Refractometer Sight Glass

Application of Propylene Glycol





Antifreeze Types

The following information addresses the necessary usage of a 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 IAPMO (International Association of Plumbing and Mechanical Officials), only propylene glycol based "boiler" type antifreezes deemed "Generally Recognized As Safe" (GRAS) by the FDA should be utilized.

Due to the significant impact various types of antifreeze can have 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 & Marine antifreeze is often "Generally Recognized As Safe" 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, however, that RV & Marine antifreeze can be utilized to winterize the Aqua-Hot's Domestic Hot Water Heating Systems.

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 "Generally Recognized As Safe" (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 the Aqua-Hot's Hydronic Heating System.

Antifreeze Mixture 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, deionized, 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 premixed antifreeze are responsible for the use of high-quality (distilled, deionized, or soft) water when preparing their antifreeze for sale.

Hard water possesses a high-level of calcium and magnesium ions, which deplete the propylene glycol antifreeze's corrosion inhibitors. This, in turn, causes the antifreeze and water heating solution to begin turning acidic, which can corrode the Aqua-Hot's boiler tank and associated components prematurely. Therefore, concentrated propylene glycol should be diluted with distilled, deionized, or soft water which is 80ppm or less in total hardness. The local water agency should have up-to-date water quality reports, which should indicate if the local tap water is within this guideline.

Antifreeze Terms & Mixture Ratio

Propylene Glycol Based Antifreeze Solution

The following information addresses the process of selecting a propylene glycol based antifreeze solution that provides adequate freeze, boiling, and rust/anti-corrosive protection.

A propylene glycol antifreeze solution that is 35% to 50% propylene glycol to distilled water is recommended. Antifreeze solution with 50% propylene glycol will result in a freeze point of approximately -28°F and a boil point of approximately 222°F.

Freeze Point and Burst Point

NOTE: The installer of the Aqua-Hot system must refer to the information and chart to determine the percentage of propylene glycol the antifreeze solution should contain for the level of protection needed.

Antifreeze solution lowers the freezing point of any liquid, to which it has added, by preventing the formation of ice crystals. However, as the ambient temperature continues to decline, the water in the solution will attempt to attain a solid state. The point in which the water begins to solidify is termed the "Freeze Point". Although the water in the solution has begun to freeze and starts 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 heating solution is dependent upon the brand of propylene glycol antifreeze employed.

Rust and Anti-Corrosive Inhibitors

Another major function of antifreeze solution is to provide

protection to the internal metal components of the Aqua-Hot Hydronic Heating System from corrosion and rust. Antifreeze is able to perform this function by the addition of rust and anti-corrosive inhibitors, which are designed specifically to activate in a water solution.

Summary

Antifreeze solution has three basic functions: freeze protection, boil-over protection, and rust/anti-corrosion protection.

Propylene glycol antifreeze solution is also primarily responsible for heat transfer; however, propylene glycol itself does not possess acceptable heat transfer characteristics. Therefore, as water is an excellent heat conductor, it is added to the mixture. Propylene glycol antifreeze solution, mixed with distilled water, at a ratio of 35% to 50% is recommended to provide the best performance combination of the aforementioned functions. If excess propylene glycol exists within the heating solution, the water's heat absorption properties are compromised. Ultimately, this could 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 actually raised, resulting in less freeze protection. Please reference the attached graphical representation regarding the percentage of antifreeze to water and how it directly affects the solution's freezing point.

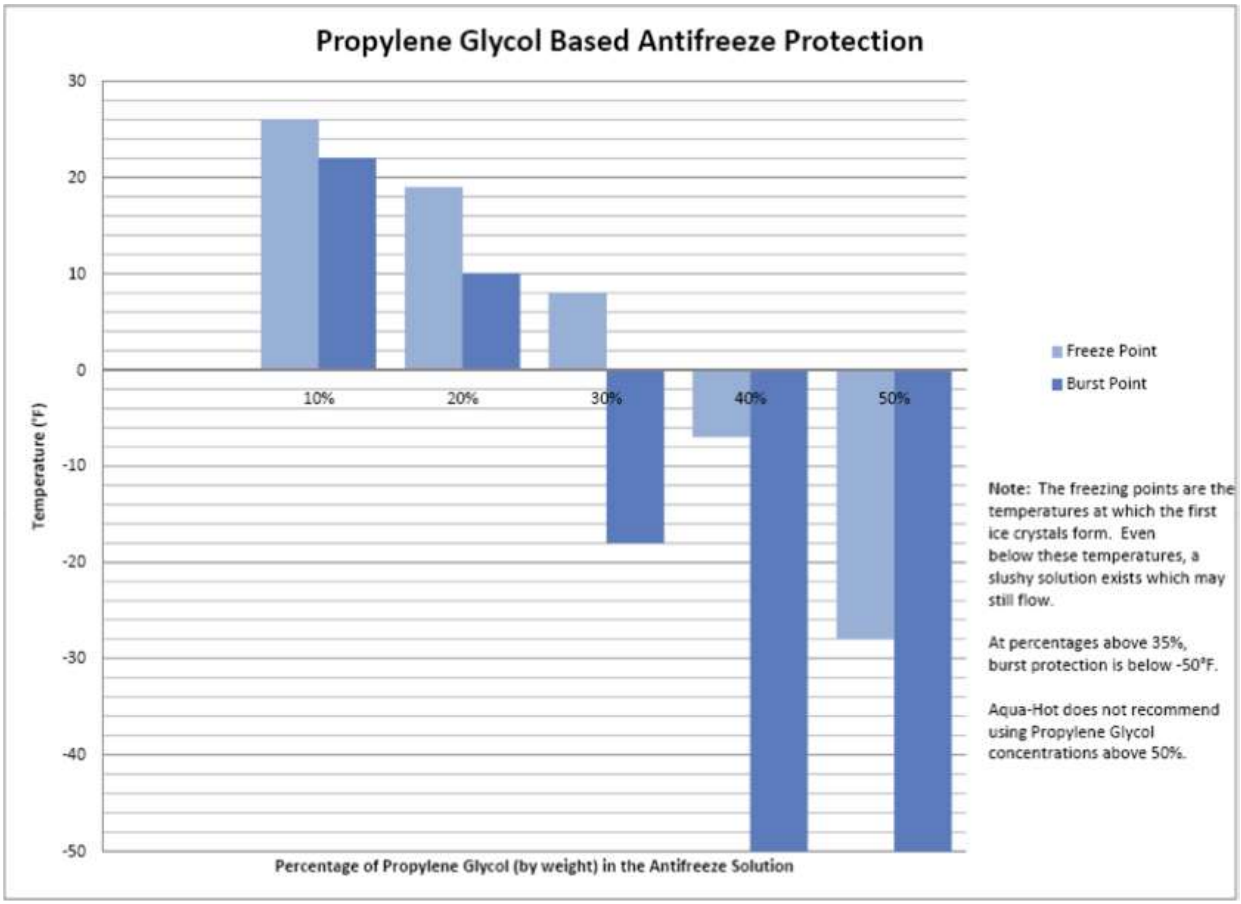
In order to provide the best freeze protection, boil-over protection, anti-corrosion, and rust protection, a mixture of 50/50 "GRAS" approved **Propylene Glycol** antifreeze and distilled or de-ionized water is recommended. Reference Page 39 for measuring the antifreeze mixture with a refractometer and also the table below for the mixture ratios.

Propylene Glycol

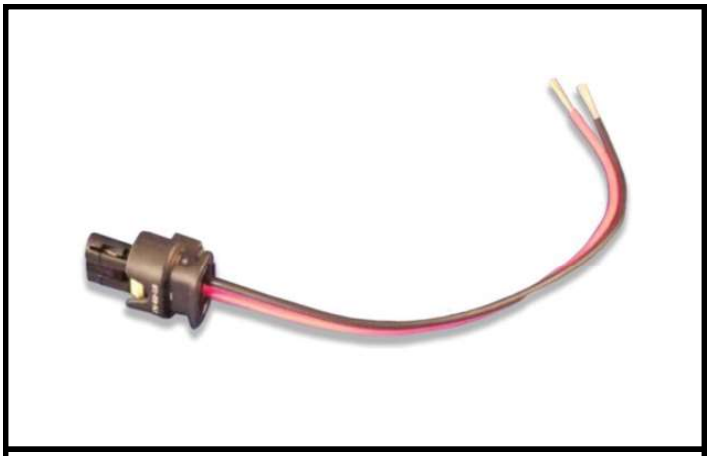
Freeze Point (°F)	0	-4	-7	-9	-12	-15	-18	-23	-29	-34	-40	-46
Concen-tration (%)	0	12	19	25	30	34	38	44	49	53	57	60

DANGER

Failure to utilize a propylene glycol which has been deemed Generally Recognized As Safe ("GRAS") by the FDA could result in serious bodily harm to damage to the Aqua-Hot system.



AHE-250-D03
250 Series Diesel w/ Electric Element (1kW @ 120V AC)



ELE-400-900
Boost Pump Harness

ELX-THM-309 (white) or ELX-THM-310 (black)
Thermistor

ELX-700-007
Room Thermostat, Positive Off

EXE-103-0EX
Heat Exchanger, Cozy III

EXE-505-65A
Heat Exchanger, Whisper Silent, 12V DC.

EXX-006-500
Grille, Long, 3.5” x 21.5”, Black

EXX-013-100
Nozzle, Round 4” w/o Connector, Black

EXX-013-105
Nozzle, 4” Round w/ 2-½” Connector, Black

EXX-950-411
Grille, 10” x 2” Cozy

EXX-006-501
Grille, Medium, 3.5” x 15”, Black

EXX-006-502
Grille, Small, 3.5” x 8.5”, Black

MSE-200-OFB
Overflow Bottle Kit (Tank, Hose, Clamp, Tie, Labels).

PLX-000-200
Tube, ⅝” Safety Stripe, 12ft.

PLX-000-820
Fitting, Elbow, 90°, ¾”, Barb, Black Nylon

PLX-000-835
Fitting, Reducer ¾” to ⅝” Black Nylon

PLX-100-836
Pump Mounting Bracket

PLX-100-900
Boost Pump

PLX-120-626
Tube, ⅝”, Red 02 Barrier Pex 100 Ft.

PLX-200-103
Fitting ½” (M) NPT x ¾” Barb Black Nylon

PLX-284-74V
Hose, Molded, Elbow 90°

PLX-432-000
Fitting, Straight, ½” PEX x ½” (M)NPT PSF

PLX-664-730
Fitting, Pipe Nipple, Exhaust, 1-½” x 4”

PLX-664-750
Fitting, Exhaust Nipple, 1-½” x 3” NPT

PLX-803-000
Fitting, Straight, ½” PEX x ½” (F) NPT

PLX-803-ELB
Elbow Fitting, 90°, ½” PEX x ½” PSF

PLX-803-FSE
Elbow Fitting, 90°, ½” PEX Fitting

PLX-CTB-270
Clamp, Hose, Constant Tension, 0.75”

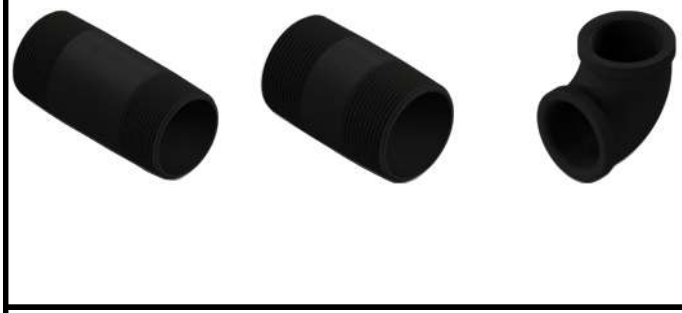
PLX-A51-106
Bend Support, ⅝”

PLX-A65-200
Fitting, Brass Barb, ¾” x ½” (M) NPT

PLX-A65-300
Fitting, Brass Barb, 90°, ¾” x ½” (M) NPT

PLX-T44-006
Fitting, Insert Modified Bras

SME-102-000
Cozy Plenum Assembly



MSE-200-EXH
Exhaust Kit

MSX-300-270
Boiler Antifreeze, 1-gallon, Pink

MSX-300-300
Boiler Antifreeze, 1-gallon, Green

Aqua-Hot®
An AIRXCEL Brand

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 574-AIR-XCEL (574-247-9235) (7:00 AM to 4:00 PM Mountain Standard Time) or visit www.aquahot.com.

My Comfort Zones are On-Board
Vehicle:

Purchased From:
Dealer Information:
Name:
Location:
Phone Number:

Heating System:
Serial Number:

Installation Manual

200 SERIES

Aqua-Hot®
An *AIRXCEL* Brand

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

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Call us at 574-AIR-XCEL (574-247-9235)