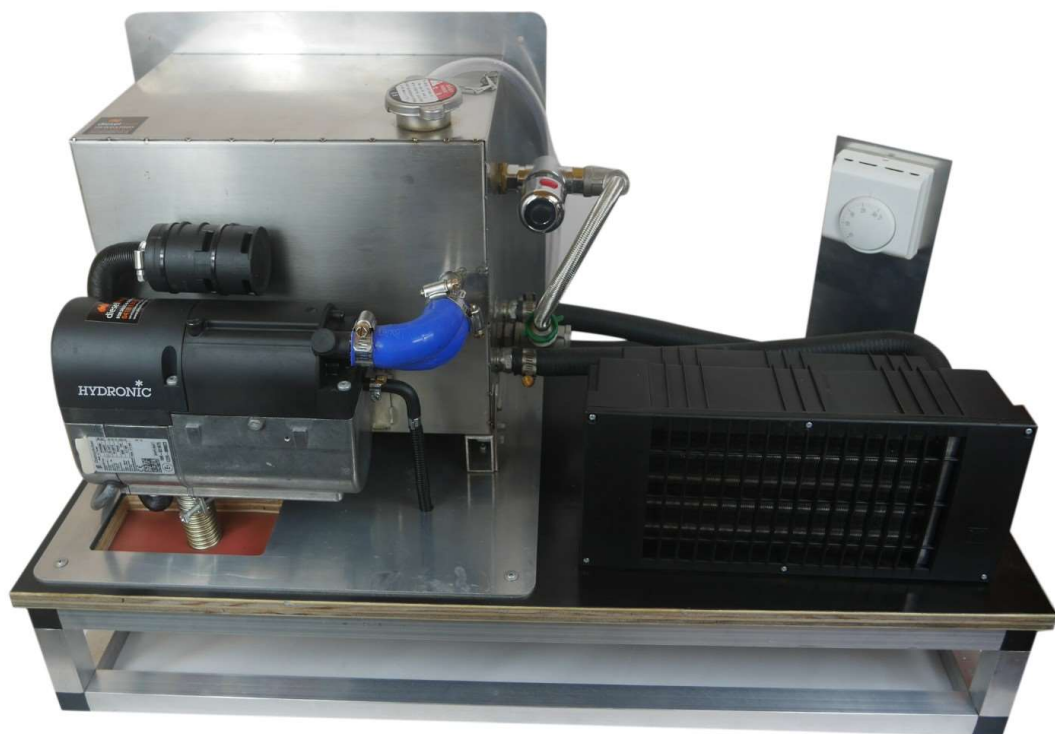


# STOP DON'T PANIC READ THE INSTRUCTIONS

## **DIESELHEAT** **DH12 HYDRONIC HOT WATER INSTALLATION MANUAL**



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## Installation Guidelines

Dieselheat is providing this installation manual to help make sure your installation is successful. Please read this guide carefully as many product issues can result from improperly performed installations. We can't take responsibility for poor installation practices or failing to follow recommended guidelines that may result in performance loss, product damage or failure.

We pride ourselves on our client's successful installation and use of their new diesel hot water system. If you have any questions not answered by the manual please give us a call.

## Introduction - Principles of Operation

DH12 hydronic hot water heaters operate by transferring the energy from coolant heated by the diesel furnace to heat exchangers. The primary heat exchanger is the domestic water plate heat exchanger installed inside the DH12 hot water service. An additional, optional heat exchanger is a cabin fan heater (air heater). These cabin fan heaters are similar to what is under the dashboard of a motor vehicle to warm the interior.

The full system consists of the diesel coolant furnace and the DH12 hot water service, as well as an optional cabin fan heater.

### Diesel Coolant Furnace

The diesel coolant furnace is the heart of the system. It is the component that burns diesel/air mixture to generate heat. The heat is transferred to the coolant, which passes through the water jacket surrounding the furnace.

Hot coolant is circulated via a pump which can be either inside the diesel furnace or

mounted beside it connected to the DH12 water service by a rubber heater hose.

### DH12 Hydronic Hot Water Service

The hot water service is where the energy in the coolant is transferred to your domestic water. After the coolant has travelled through the system and given up its energy to the domestic water or air heating head it is returned to the diesel furnace.

### Component Location

Unless requested otherwise the DH12 system will generally be shipped with the furnace attached to the hot water system (tank).

One of the many benefits of the system is that the components don't have to be installed in close proximity to each other and, in many situations, it is ideal to have them some distance apart.

The furnace can be located up to 4m from the hot water service.

When remote mounting the furnace the connecting hoses can be covered in insulation tube if the vehicle/boat is in an ultra-cold climate but is not necessary in most Australian conditions.

#### Direct mounting:

- Guarantees the coolant pump in the furnace will always have coolant.
- Makes bleeding the air out of the system and commissioning simpler.

#### External/Remote mounting:

- Increases the volume of glycol in the system which is beneficial.
- Facilitates installation in tight spaces.
- Moves the furnace to a location where noise can be better managed
- For marine installations can move the furnace to a location that makes the exhaust easier to install.

#### When remote mounting the furnace

- Take appropriate precautions to stop external hose damage where hoses pass through walls or bulkheads.
- If the hoses need to be routed around corners or bends and there is a possibility of kinking, fit elbows into the hose.

#### Diesel Coolant Furnace

The furnace is weatherproof and can be mounted in a variety of locations

##### Caravan/RV

- Attached to the hot water tank above floor level with the exhaust exiting via the floor.
- Externally in a box.

- Under the chassis on a vehicle that will not be used off road. This is a good option because there are no fuel line or exhaust connections in the vehicle. Plus, noise is reduced in the vehicle.

##### Marine

- Attached to the hot water tank with the tank on a plinth and the exhaust exiting down and to the side.
- Split from the tank in the engine room.
- Split from the tank in a locker/lazarette which can facilitate easier installation of the marine exhaust system.

**Note: The diesel furnace must be installed below the middle of the hot water service to ensure it fills with coolant.**

**Note: All diesel furnaces require servicing from time to time, so the installation location should always facilitate easy removal of the furnace.**

**Note: The coolant circulating pump is either inside the furnace or should be mounted close to it.**

#### Hot Water Service

In most situations, the hot water service is mounted in the same compartment a typical hot water service would be fitted. In RVs the hot water service is generally mounted above floor level in a cupboard, under a bed or in a locker.

For marine installations the hot water service can be located in the engine room,

under a seat in the cabin or cockpit in the engine compartment.

#### Hot Water Service Mounting Requirements

- Must be mounted vertically with filler cap on top.
- Filler cap should be accessible to fill the system and periodically check coolant level.
- Run the overflow tube on the filler neck through the floor in an RV or into the bilge in a boat.

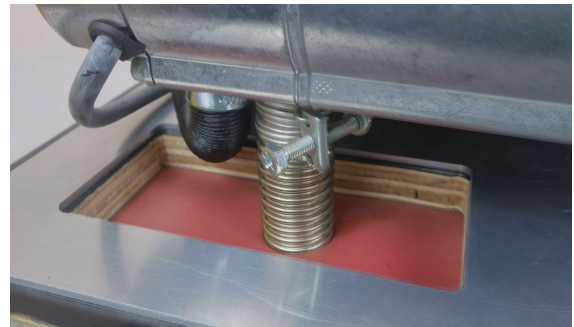
#### Provision for Exhaust

In standard form with the furnace mounted on the hot water service, the furnace exhaust protrudes below the level of the hot water service.



In marine applications the hot water service will need to be mounted on a bracket or plinth to facilitate connection of the exhaust to the furnace, allowing the exhaust to turn upwards to exit the hull.

In RV applications the hot water service can sit on the floor or the standard mounting bracket with furnace exhaust exiting through the floor via the optional high temperature silicon plate.



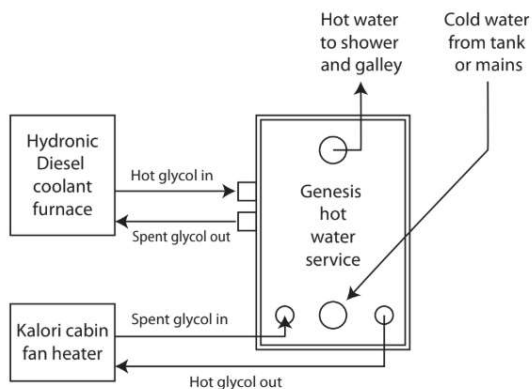
Tip: If the DH12 water service is mounted inside the vehicle the compartment can be covered in 10mm closed cell insulation foam to reduce radiated heat and noise.

## Plumbing the Coolant Hoses

The furnace to hot water service plumbing should be done with rubber or silicone hoses of 18mm ID and secured with quality hose clamps.

The hot water service to fan heating head plumbing should be done with 16mm ID rubber or silicon hoses and secured with quality hose clamps.

Note: for both the furnace and the fan head, the direction of coolant flow and connection ports needs to follow the diagram below for optimal performance.



Clear tubing on the top of the tank connects to the overflow barb on the coolant filler neck and exits through the floor of the compartment or the bilge/catch bottle on a boat.

## Fan Heater Installation

The hoses connecting the cabin fan heater are connected directly to the DH12 water service lower ports. The cabin fan heaters should be plumbed with 16mm hose.

To mount the cabin heater:

- Remove the front face of the heater and measure the outlet surface area. Cut the appropriate hole in the board.
- Sandwich the kickboard between the face and the main heater housing.
- If the kickboard is thicker than 10mm, longer screws may be required.
- The cabin heater can be mounted vertically or horizontally.

The fan head must be below the middle of the hot water service so that it fills with coolant and the coolant circulates.

The hose barb on the bottom of the cabin fan heater is always coolant in from the furnace.

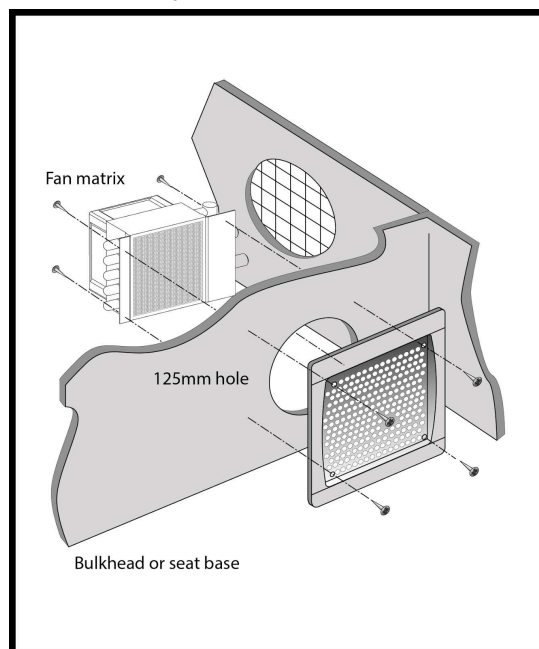
If the components are located in separate compartments, drill two suitable sized holes through the flooring or walls to let the heater hose through. Take appropriate precautions to stop external hose damage when hoses pass through walls or bulkheads.

If the hoses need to be routed around corners or bends and there is a possibility of kinking, fit elbows into the hose. The hoses can be covered in insulation tube if the vehicle is in an ultra cold climate but is not

really necessary in most Australian conditions.



Non-ducted units feature very low power consumption fans that gives their maximum performance when air can flow with minimal restriction. Fan heads should be mounted as close to the area that requires heating as possible. The areas that the fan heads are located must be well ventilated otherwise the fan head performance will be reduced.





## Controlling The Air Temperature

Temperature control can be achieved via 2 methods.

Firstly via a ball valve inline with the coolant return line from the fan head. Partially closing the ball valve will restrict the coolant circulation and will reduce the heat given off by the fan head. This will also force more coolant through the plate heat exchanger inside the hot water service which increases hot water delivery.

It is recommended to always install a ball valve inline with the fan head so during hotter months the coolant circulation can be closed off completely. This stops the cabin fan heater from acting like a static radiator in a warm climate.

Secondly, via an electrical thermostat which will turn off the fan in the fan head when the preset room temperature is reached. This is an optional addition to the system and needs to be wired up with the fan heads at time of installation.



## Tempering Valve - Controlling Water Temperature

When the system has been turned on and has warmed up, the water coming straight from the DH12 hot water service will be approximately 70-75 degrees.

The tempering valve not only controls the outlet temperature but will increase the usable hot water capacity. The volume of coolant at 70 - 75 degrees is directly related to how much hot water is available at 45-50 degrees.



The tempering valves can be set from 28 to 48 degrees.



**The system will always be shipped with the tempering valve installed.**

**Never operate the system without the tempering valve or with a defective tempering valve as the outlet water temperature can be as hot as 80 degrees.**

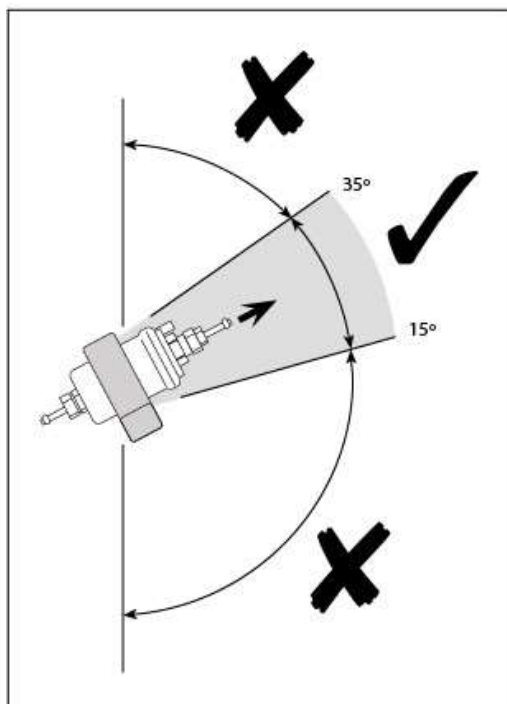


## Fuel System

DH12 with an Eberspacher furnace has an internal fuel pump.

DH12 with a Belief furnace has an external fuel pump.

For external fuel pumps, ensure the pump is installed in the correct orientation.



When connecting to main fuel systems in boats or motorhomes it is important to ensure that the fuel take off point is not pressurised (downstream of any feed pumps) and that there are no opportunities for air to enter the fuel lines.

### Instructions for Installing the Fuel System

- Only use a sharp blade to cut the plastic/rubber fuel hoses and pipes.
- Ensure all cuts are free from burrs and the fuel lines are not crushed or restricted.
- Fuel lines must be secured every 50cm to avoid noise and/or damage by vibration.
- Fuel lines must be protected from any mechanical damage.
- Avoid running the fuel lines where their condition and longevity may be affected by movement, vibration or heat.
- Do not secure the fuel lines to any exhaust system.
- Do not position any fuel connection where it could leak onto electrical connections or hot surfaces.
- The fuel must not be conveyed by gravity or overpressure in the fuel tank.
- Withdrawal of fuel after any engine fuel pump is not allowed.

### Fuel Source

The DH12 can be connected to an auxiliary fuel tank, a day tank or to a connection point on the main fuel system or generator fuel system.

## Electrical Connection

The furnace is switched on and off via a simple switch. The wiring loom for the on/off switch can be extended if necessary.

The furnace requires 12V and uses approximately 8A to start, operating current is approximately 2-4A once the starting sequence has completed.

The furnace should be connected directly to the house batteries using 6mm<sup>2</sup> cable. If connecting via an isolation switch or switchboard it is important that the switchboard has ample power supply from the batteries to prevent voltage drop making the unit hard to start.

**Note: Except in an emergency never switch the DH12 off at the main power supply, the furnace must go through a cooldown sequence prior to stopping, this is triggered by switching the furnace off at the on/off switch.**

**Note: If you have a Belief furnace you will find a digital timer in the kit. Do not connect both the on/off switch and timer together at the same time. We recommend using the on/off switch for normal operation, and use the timer only for fault diagnostics.**

## RV Exhaust

The exhaust system on an RV will consist of 2 lengths of exhaust and a muffler. The exhaust should be installed in a manner that ensures it cannot dislodge or move to come into contact with any electrical wiring, water pipes etc. as it is hot enough to melt plastics.

The exhaust should have a length of pipe before the muffler and generally at least 30cm of pipe after the muffler, this helps to manage noise. Ideally install all of the exhaust pipe provided to reduce noise.

The exhaust pipe should be level or have a slight downward slope to prevent condensation being trapped in the pipe. If the exhaust pipe has a valley or low spot drill a 3mm hole at the lowest point to allow condensation to drain.

## Marine Exhaust

The total maximum length of exhaust is 2m. Always install the exhaust with a gooseneck on the inside of a hull fitting to prevent water washing back into the exhaust system.

Always use high quality marine stainless steel exhaust system and clamps to ensure no exhaust gasses are vented inside the boat.

**Note: The exhaust system reaches temperatures of up to 300degC. Always lag the exhaust and ensure that the exhaust is not in contact with any materials which can be damaged/set alight by this heat.**

### Installing the hull/deck fitting

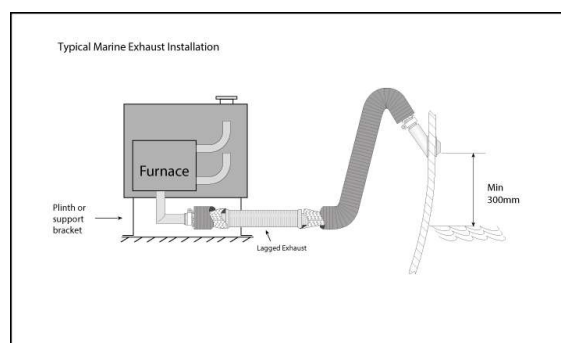
The position of the exhaust hull fitting will depend on several factors, where you have located the DH12, whether your boat is sail or power, and the suitable surfaces available.

On a sailboat, the preferred location is on the transom, as it is normally the area least likely to be affected by seawater when sailing.

On a motorboat, the transom or side of the hull are suitable locations. However, when locating the hull fitting on the transom of a motorboat, the fitting should be positioned a minimum of 300mm above the waterline to avoid any following seas covering the fitting when the boat slows suddenly.

If using a closable deck fitting ensure it is located in a position that cannot snare running rigging and is not a hazard for people walking on the deck.

To avoid potential safety issues the exhaust system must be installed according to these instructions.



- Under no circumstances connect the heater exhaust to an engine exhaust or any other exhaust system.
- The exhaust outlet must vent directly to atmosphere.
- Adequate clearance must be kept around the exhaust system to prevent interference with important functional parts of the boat, e.g. steering or throttle cables.
- Route the flexible exhaust giving clearance and consideration to heat sensitive components such as fuel lines, electrical cables, etc.
- Ensure the support brackets are used to secure the exhaust and avoid damage by vibration.
- Position the hull fitting so that either the heater combustion air or other inlets cannot draw in exhaust fumes.
- Ensure that the position of the hull/deck fitting allows fumes to exit freely and not affect nearby surfaces, e.g. fenders, ropes or mouldings.

- To avoid water ingress, the hull fitting must be at least 300mm above the waterline and a suitable bend formed in the exhaust to prevent water collecting in the exhaust.

The exhaust must not be routed through the living area.

## Combustion Air

The DH12 ships with the furnace combustion air inlet pipe and combustion silencer separated from the furnace. This is to facilitate installation by the user in the most appropriate way.

For marine applications or instances in RVs where the furnace is installed inside a locker or cupboard it is acceptable to install the combustion air inlet inside the engine room or locker.

For RV applications where the furnace is exhausting directly through the floor via the high temperature silicon plate,, it is also possible to pass the combustion air inlet through the floor and draw combustion air from below the vehicle.

## Commissioning

It is a time consuming and messy operation to rectify any bad joints or leaks after the system is filled with coolant. The coolant system operates at approximately 5 psi, so check that all hose connections are secure and all hoses are kink free before filling the system with coolant.

**Note: Do not start the furnace without coolant in the system.**

- Remove the radiator cap on the DH12 hot water service.
- Fill the system with AS 2108-2004 "TYPE B" premixed coolant to the top of the DH12 hot water service. The system will hold around 12L plus any additional coolant to fill fan heating heads.
- To bleed the air from the system you will need to do the following:
  - a. Turn the unit on.
  - b. The pump will start.
  - c. Wait until the fuel pump starts to tick.
  - d. Turn the unit off.
  - e. Wait for the unit to turn off completely.
  - f. Repeat.
  - g. It may take 4 or 5 times to push all of the air out of the system.
  - h. Look at the top of the tank and you will see the small air bubbles coming through the liquid.
  - i. The pump will change tone and you will see the coolant flow becoming quite strong.
  - j. When this has happened, leave the switch on and the furnace will start to heat the coolant
- At this point the best tools you have are your hands. As the furnace begins to heat the coolant, the hoses will start to get warm. Move your hands over all the hoses, they all should be a similar temperature.
- After a few minutes, the DH12 water heater should be warm to the touch. The hoses to and from the cabin fan heater should be a similar temperature to the main hoses.
- If these hoses are still at ambient temperature, there is an air lock in the loop. If there is a ball valve in the main line, closing it will force coolant into the cabin fan heater loop and push the air bubble into the DH12 water heater.
- If a ball valve is not fitted, massaging the hoses by squeezing and releasing them will generally push the air through.
- Depending on ambient temperature, the furnace will cycle down after 8-10 minutes as the glycol reaches 70decC. All hoses should be at a similar temperature.
- Top the coolant level up in the DH12 hot water service until it is approximately 30mm from the top of the tank and replace the filler cap.
- Leave the system on and wait until the furnace reignites. Wait until it cycles down again and check for any leaks

Congratulations you have now successfully installed your DH12 air/hot water system.

### Coolant Furnace Operation

- Turn on the furnace with the on/off switch.
- After approximately 10 seconds the coolant circulating pump comes on. The glow pin and fuel pump will then come on and the furnace will start its combustion cycle.
- Once the furnace obtains full combustion, it will continue to produce heat until the coolant temperature reaches 70degC. This will take approximately 15 minutes, depending on the ambient temperature.
- At this temperature, the furnace will cycle down to its lower heat setting but the circulating pump will continue to circulate coolant around the system.
- When the coolant reaches approximately 80-85degC the furnace will shut down but the glycol circulation pump will continue.
- The furnace will not restart until the coolant temperature drops to approximately 68 degrees. This will happen either by heat dissipation over time, or if the DH12 hot water service or cabin fan heater demands heat.

**Note: Turn the furnace off only by its own switch. Do not cut power to the furnace during any stage of its operation.**