

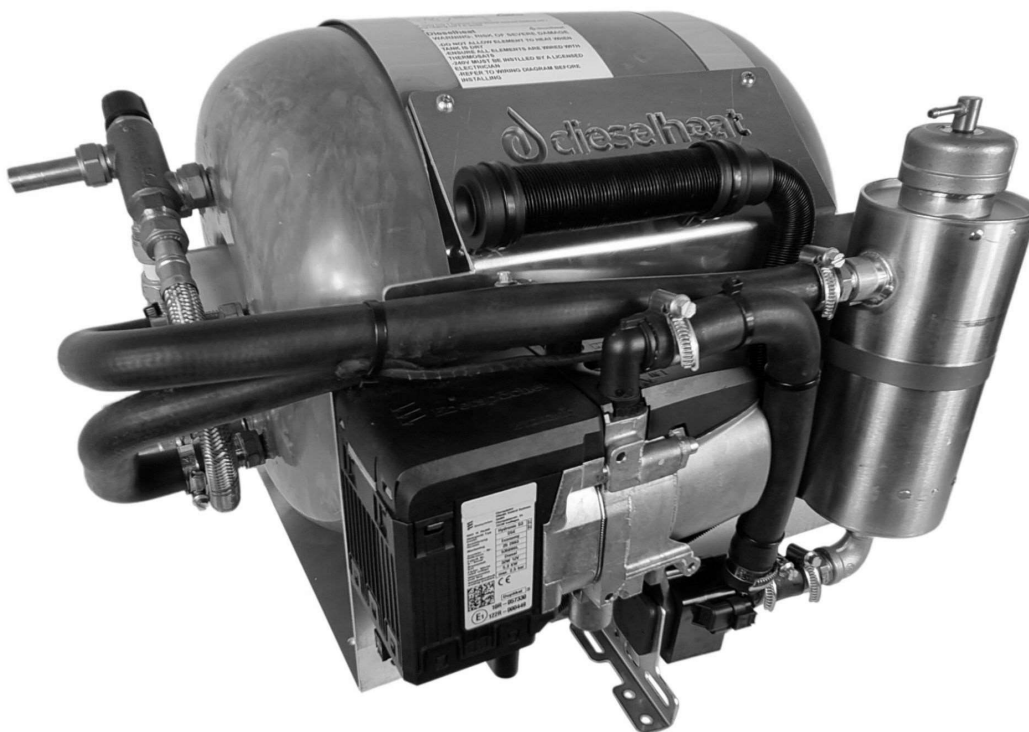
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STOP

DON'T PANIC

READ THE INSTRUCTIONS

DIESELHEAT
DH22/DH40 E-SOLAR
HOT WATER INSTALLATION MANUAL
Version 1



Important	3
Principles of Operation	3
Diesel Coolant Furnace	3
Furnace Important Considerations	3
Operating Considerations	4
System Locations	4
System Mounting	4
Tank Connections	5
Hot water only installations.	5
Systems with Air Heating	5
Coolant Bypass Assemblies	6
Plumbing the Coolant Hoses	7
Coolant Circulation Pump	7
Coolant	7
Fan Heater Installation	8
Controlling The Air Temperature	9
Tempering Valve - Controlling Water Temperature	10
Drain/Pressure Relief Valve	10
Expansion Tanks	10
Fuel System	11
Fuel Source	12
Allowable Suction Head	12
Diesel Furnace Electrical Connection	13
Main Wiring	13
Fuel Pump	14
Coolant Pump	14
On/Off Switch	14
Controller Connector	16
Diagnostic Port	16
Main Wiring Diagram	17
Inlet and Exhaust General Arrangement	18
Combustion Air	18
RV Exhaust	19
Marine Exhaust	20
12V Heating Element Wiring	21
Commissioning	23
Coolant Pump Priming	23
Initial Startup	23
Post Initial Startup	24
Coolant Furnace Operation	24
Commissioning Troubleshooting	25

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. Performance loss, product damage or failure can result from poor installation practices or a failure to follow recommended guidelines.

We pride ourselves on our clients' successful installation and use of their new diesel hot water system. If you have any further questions after reading this manual, please give us a call.

This manual contains relevant extracts from the Eberspacher D5E Technical Manual, however it is not the complete manual. For the full manual please refer to the QR code opposite.



Important

The 240v heating element must be installed by a qualified electrician.

The Surecal tank must be earthed.

Always ensure that the thermostats on the 12V and 240V heating elements are wired up to switch off the elements when the tank is fully heated. Refer to wiring diagrams in these instructions.

Never allow the 12V or 240v elements to turn on when there is no water in the tank.

Do not connect power to the furnace until the installation is 100% complete.

Principles of Operation

The E-Solar hydronic hot water heaters operate by storing potable water in the copper Surecal hot water tank and by heating it via a 12V or 240V element. The system can also be boosted via the Eberspacher diesel furnace which heats a coolant loop which circulates inside the tank via finned copper heat transfer pipes. An optional cabin fan heater (air heater) can also be used on the coolant loop.

Diesel Coolant Furnace

The diesel coolant furnace burns the 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 to the Surecal tank via the pump that is supplied with the furnace.

Furnace Important Considerations

- No diesel appliances like ingesting dust. Consider air inlet locations and system location to minimise or prevent dust being sucked into the combustion inlet.
- Never combine exhausts, i.e. join exhausts from different devices.

- Keep fuel supplies and fuel plumbing as simple as possible to minimise the chance of air leaks. Always use the provided fuel line; never use a substitute.
- Always place furnace units where they can be easily accessed for service or removal.
- Avoid main power isolation switches on the diesel furnace - these will allow a user to cut power to the furnace whilst it is running, bypassing the proper shut down /cool down process. This will damage the unit.
- Ensure adequate supply of combustion air. If installing the unit in a sealed box, the door must be open for the unit to run, or alternatively an air inlet pathway must be provided. Operating the furnace with inadequate inlet air will cause sooting up and almost immediate need for service.
- All diesel furnaces require servicing from time to time, so the system should always be installed in a location where the furnace can be removed.
- For marine installations, when deciding where to locate the furnace, always take into account that the maximum allowable length of the exhaust is 2m.
- If you need to get system error codes, need to remove a furnace lock, or need diagnostics, you will require an Easystart Pro controller.

Never start the furnace without coolant in the system.

System Locations

In most situations, the system is mounted in the same compartment where a typical hot water service would be fitted.

For marine installations, the system can be located in the engine room, under a seat in the cabin, or in the engine compartment.

Ideally, the system should be the highest point (relative to any air heating heads) if not a separate header tank or coolant booster pump may be required.

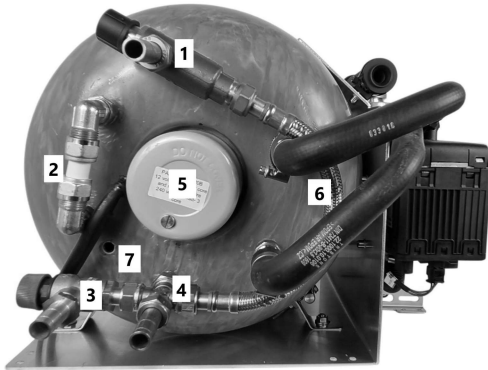
System Mounting

- The coolant filler cap should be easily accessible to fill the system and periodically check coolant level.
- The mounting plate has 8 pre cut holes for mounting screws, the system is heavy so it is recommended that appropriate screws are used in all mounting holes.

Operating Considerations

- Generally, furnace units are designed to be switched on when needed and turned off when not in use. Extended periods with the furnace left in standby are not recommended.
- Never store fuel in clear fuel tanks exposed to sunlight. This will cause fuel degradation or algae growth that can clog the fuel pump.

Tank Connections



1. Hot water outlet (use 16mm shark bite fitting)
2. Coolant link pipe (remove for air heating connections)
3. Pressure relief and drain valve. Must be plumbed outside or into the bilge
4. Cold water inlet (use 16mm shark bite fitting), this has a built in non return valve. **If changing connectors (removing this fitting) a separate non return valve must be installed.**
5. Electrical elements
6. Hot coolant pipes to diesel furnace.
7. Temperature probe well to allow hot water temperature to be measured

Hot water only installations.

For hot water only installations the system is shipped already plumbed with a link pipe (2) connecting the 2 internal heat transfer pipes.

Systems with Air Heating

If not already done, remove coil link pipe (2) and install 16mm hose tails on the fittings. If the system was ordered with an air heating attachment this will already be done.



Note: The coolant flow through the system must not be stopped, if installing air heaters with shutoff valves it is important to use bypass assemblies to ensure shutting off the coolant in the air head does not shut down the coolant in the diesel furnace.

Coolant Bypass Assemblies

Coolant by bypass assemblies must be installed on each fan head so that if the coolant is shut off in any one fan head, coolant circulation is not stopped in the whole system.

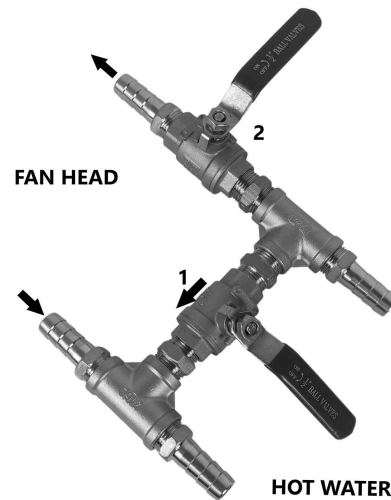
For simple systems with 1 fan head where a bypass assembly can be mounted behind the fan head, a valveless bypass assembly can be used.



For valveless bypass assemblies, because they rely on momentum of the coolant to force it through the fan head it is important to install the bypass valve behind the fan head at approximately the same level as the fan head so coolant flow through the fan head is adequate.



For larger systems or when a valveless bypass assembly cannot be installed at the same level as the fan head a valved bypass assembly can be used.



The valved assembly allows the bypass valve (1) to be partially shut, forcing coolant through the fan head, but also allowing sufficient coolant to continue to flow through the system if the fan head shutoff valve (2) is closed.



Note: If you are unsure of how to configure your air heating or have doubts, please consult with Dieselheat.

Plumbing the Coolant Hoses

The hot water service to fan heating head plumbing should be done with 16mm ID rubber hoses and secured with hose clamps. Fan head installation kits from Dieselheat contain 2m of the necessary hose and all other hose tails and clamps.

Coolant Circulation Pump

The coolant circulation pump supplied as part of the furnace kit will support systems with up to approximately 20m of coolant pipe.

Larger systems with multiple air heating heads or longer pipe runs, particularly on boats, will require a booster pump. This can be powered and switched via a relay that can be attached to the Eberspacher D5E wiring loom.

Coolant

The system must be filled with good quality engine coolant to prevent corrosion of the furnace's internal components.

Generally, commonly available coolants that include corrosion inhibitors are acceptable and should be used in accordance with the manufacturer's specifications.

Antifreeze is not required unless the system will be operated or stored in freezing conditions.

It is acceptable to initially leak test the system using water during the installation and testing phase, as long as the water is immediately removed and replaced with coolant after testing.

Note: Never leave a system that was filled with water for testing sitting empty, as residual moisture and air will immediately trigger internal corrosion.

Fan Heater Installation

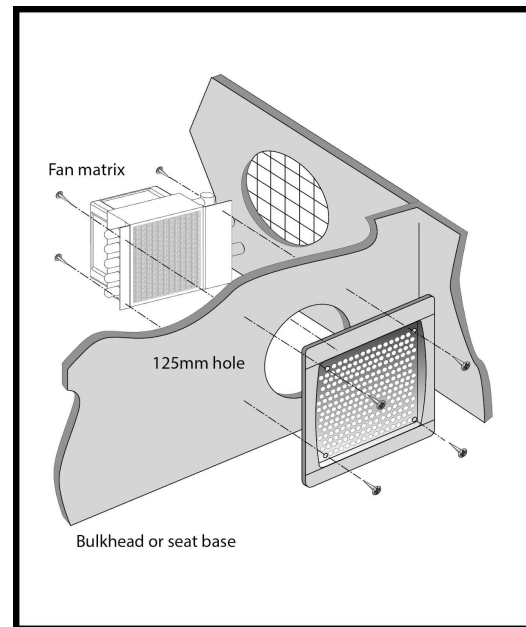
The hoses connecting the a fan heater are connected directly to the DH22ES tank ports. The cabin fan heaters should be plumbed with 16mm hose for short runs (less than 2m) or 16mm insulated PEX for longer runs.

The fan heater can be mounted vertically or horizontally.

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.

Non-ducted units feature very low power consumption fans that give 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 where the fan heads are located must be well ventilated with good return air flow or the fan head performance will be significantly reduced.



Always make sure there is adequate return air ventilation to ensure the fan head works effectively.

Note: All fan head wiring and control is independent of the Eberspacher furnace wiring and control.

Controlling The Air Temperature

Temperature control can be achieved via 2 methods.

The first method is via an inline valve with the coolant return line from the fan head. Partially closing the valve will restrict the coolant circulation and reduce the heat given off by the fan head. The VA200 fan head has the valve built in, while other fan heads can have a ball valve installed behind them.

It is recommended to always install a valve inline with the fan head so that 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.

The second method is via the Dieselheat touch screen thermostat. This thermostat is designed to control the room temperature and hydronic furnace in a Dieselheat hydronic hot water and heating system.

The thermostat features 2 fan control outputs to control either a 12v Kalori fan directly or the electronically controlled Dieselheat ducted fan units.

The thermostat also includes a relay that acts as a switch to turn on or off a diesel hydronic furnace.

The thermostat can operate in either hot water only or hot water and air heating modes.

This controller does not provide any error codes or diagnostics for diesel hydronic furnaces. This function must be provided by the manufacturer's controller.



Tempering Valve - Controlling Water Temperature

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

The tempering valve not only controls the outlet temperature but will increase the usable hot water capacity as it mixes in some cold water to drop the temperature to safe levels.



The supplied tempering valves come pre-set at 50, but can be set at between 40 and 55 degrees by rotating the black knob.

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.

Drain/Pressure Relief Valve

The drain/pressure relief valve serves 2 purposes.

1. As the tank heats the water will expand and so the valve relieves excess pressure by dripping out a small amount of water.
2. In freezing conditions the valve can be manually opened to allow the tank to be drained.

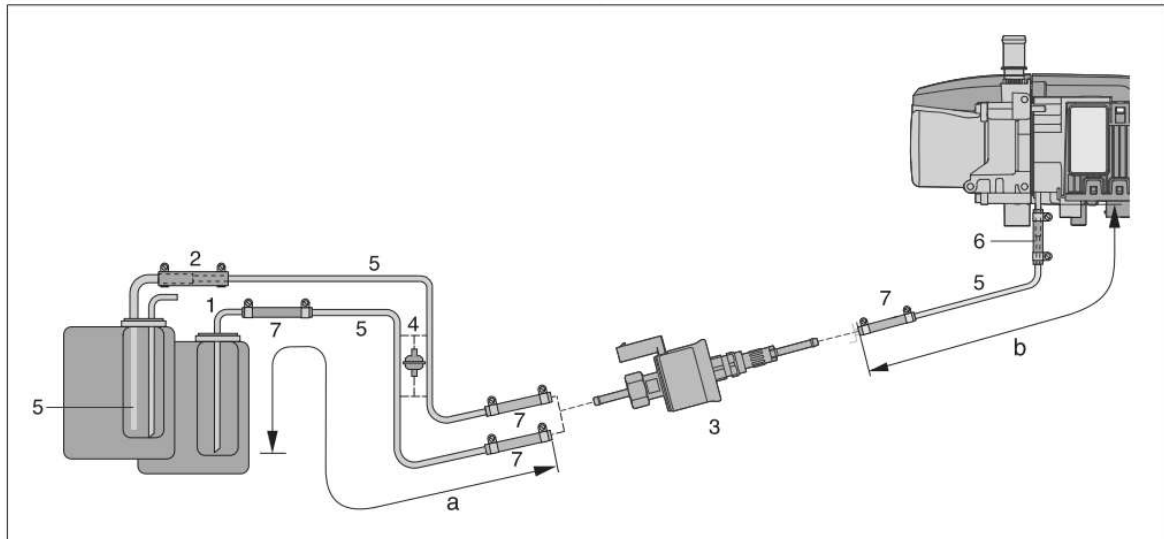
The outlet on the drain/pressure relief valve should always be plumbed into the bilge on a boat or down through the floor and outside in an RV.

Expansion Tanks

Where it is undesirable to allow the drain/pressure relief valve to drip as the tank heats - such as in boats an expansion tank can be installed in the hot water side plumbing. This tank allows the water to expand into the tank as it heats.



Fuel System



Picture 20

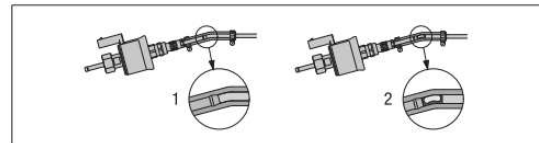
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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 Tank connection (di = Ø 2 mm, da = Ø 4 mm) – installed in the vehicle's own tank fitting</p> <p>2 Adapter (Ø 7.5 / 3.5 mm) – connected to the vehicle's own tank fitting, at a socket Ø 8 mm, used to pass through the intake line (fuel pipe 4 x 1) up to just before the bottom of the tank.</p> | <p>3 Metering pump</p> <p>4 Fuel filter – only required for contaminated fuel</p> <p>5 Fuel pipe, 4 x 1 (di Ø 2 mm)</p> <p>6 Adapter (Ø 4.5 / 3.5 mm)</p> <p>7 Fuel hose, 3.5 x 3 (di Ø 3.5 mm), approx. 50 mm long</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Permissible line lengths: a = max 2m; b = max 6m

Fuel System Installation

- To install the fuel line into the rubber joiners use a small amount of vaseline or silicon grease prior to inserting into the joiner.
- When cutting the fuel line, use a sharp knife or snips, do not allow the end of the line to compress or burr.
- If possible have the fuel line running uphill from the pump to the furnace.
- Protect the fuel line with split corrugated conduit and secure it with cable ties or clamps to avoid mechanical damage or chafing.
- It is especially important to fix the fuel line in the vicinity of the fuel pump or impulses from the pump can cause the fuel lines to rattle.
- When making fuel line connections always push the fuel line all the

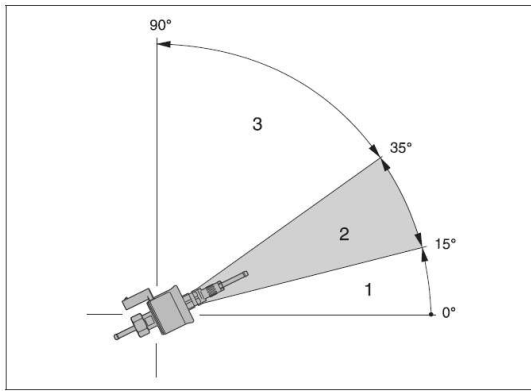
way into the rubber joiner to ensure a butt joint to prevent bubbles forming.



Picture 19

- | | |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 correctly laid lines</p> <p>2 incorrectly laid lines – bubbles form</p> | <ul style="list-style-type: none"> • Ensure all connections have screw or single use ear clamps installed. • Ensure the fuel line cannot contact anything hot like the furnace exhaust or a boat exhaust. |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Ensure the pump is installed with the correct orientation. The outlet is on the opposite side to the power cable and the pump must be angled upwards by 15-35 deg.



Picture 23

- 1 Installation position between 0° – 15° is not allowed
- 2 Preferred installation position within the range 15° – 35°
- 3 Installation position within the range 35° to 90° is allowed

It is advisable to install the pump as close as possible to the fuel source so it pushes the fuel instead of sucking it.

The Eberspacher fuel pump is very quiet so noise does not need to be a major consideration when selecting a location.

Note: The pump contains a small filter behind the nut on the inlet side.

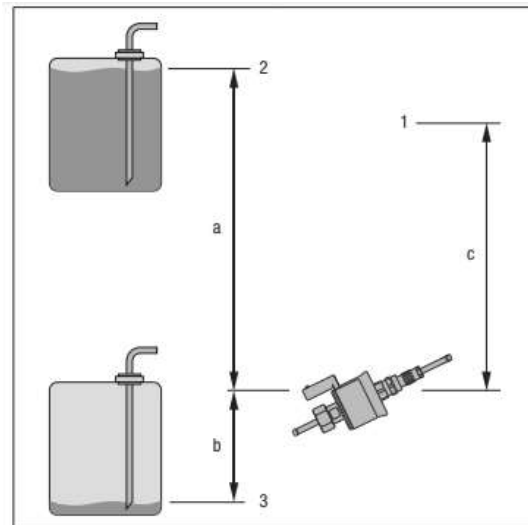
A small inline pre-filter is available as an option to prevent the fuel pump filter clogging if the fuel is dirty.

Fuel Source

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

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.

Allowable Suction Head



Picture 24

- | | |
|---|--------------------------|
| 2 | max. fuel level |
| 1 | Connection at the heater |
| 3 | min. fuel level |

Pressure head from vehicle tank to metering pump:
a = max. 3000 mm

Suction head in pressure-less vehicle tank:
b = max. 500 mm for petrol
b = max. 1000 mm for diesel

Suction head in a vehicle tank in which negative pressure occurs during extraction (valve with 0.03 bar in the tank cap):
b = max. 150 mm for petrol
b = max. 400 mm for diesel

Pressure head from the metering pump to the heater:
c = max. 2000 mm

Diesel Furnace Electrical Connection

All wires should be routed in split corrugated conduit and secured via cable ties or clamps to protect them from damage or chafing.

With the exception of the fuel pump cable, do not cut or shorten the loom, spare cable should be bundled up neatly and cable tied out of the way.

Pay special attention to wires in the vicinity of the exhaust system and where they connect to the furnace to ensure they cannot be damaged by the hot exhaust.

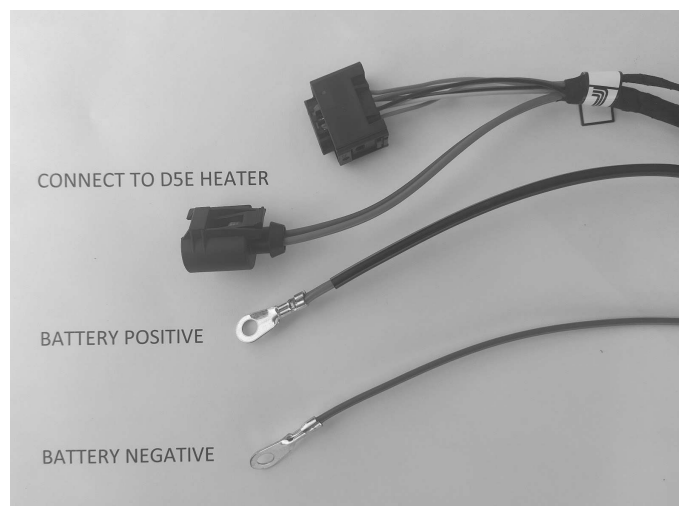
The furnace is switched on and off via a simple switch, the Dieselheat thermostat or the Easystart Pro controller. The wiring loom for the on/off switch can be extended if necessary.

The furnace requires 12V and uses approximately 8A to start. The operating current is approximately 2 - 4A once the starting sequence has completed. The furnace should be connected directly to the house batteries, if extending the loom use 6mm² cable.

If connecting via an isolation switch or switchboard (not recommended), it is important that the switchboard has ample power supply from the batteries to prevent voltage drop making the unit hard to start. Small caravan-style fuse boxes are not recommended for this reason. Only commercial quality marine switchboards with DC bus bars should be used.

Note: Except in an emergency, never switch the diesel furnace off at the main power supply. The furnace must go through a cool down sequence prior to stopping, which is triggered by switching the furnace off at its on/off switch or via the optional Easystart Pro controller. For this reason switches on the main power supply are not recommended.

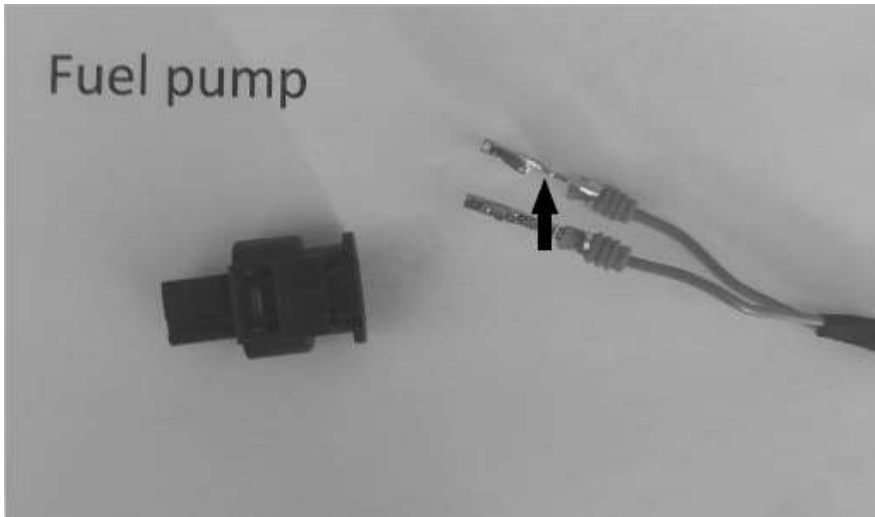
Main Wiring



Connect the wires shown below from the loom directly to the battery and heater. Red with black sheath is positive, brown is negative. If you need to extend the power wires use 6mm² cable. The fuse box should be in close proximity to the battery.

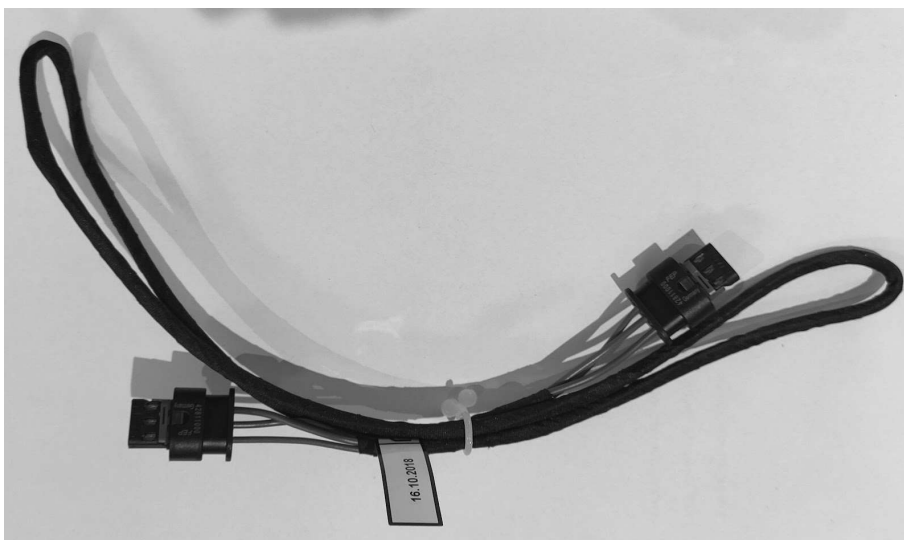
Fuel Pump

The fuel pump wires are not polarised. The cable bush has a small locking tab to lock the wires in place. Insert the fuel pump wires into the supplied cable plug (note they only go in one way, the side indicated by the arrow below faces the locking tab). Ensure the wires are all the way in (the green rubber should not protrude out the back of the plug). Ensure the plug clips into place on the fuel pump.



Coolant Pump

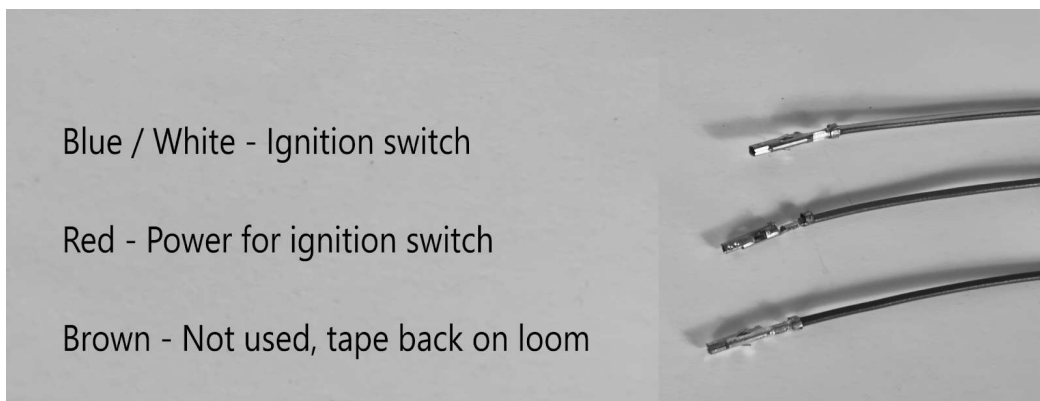
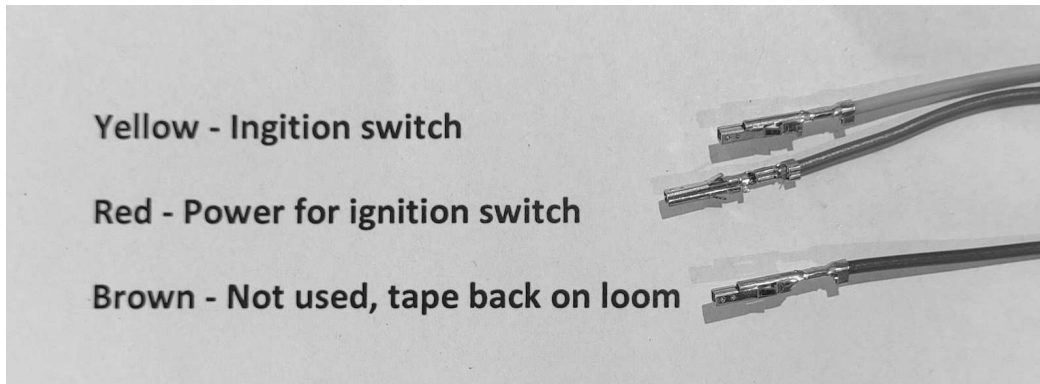
Connect each end of the coolant pump cable to the heater and coolant pump. Note on pre-assembled hot water systems the coolant pump wire will already be installed.



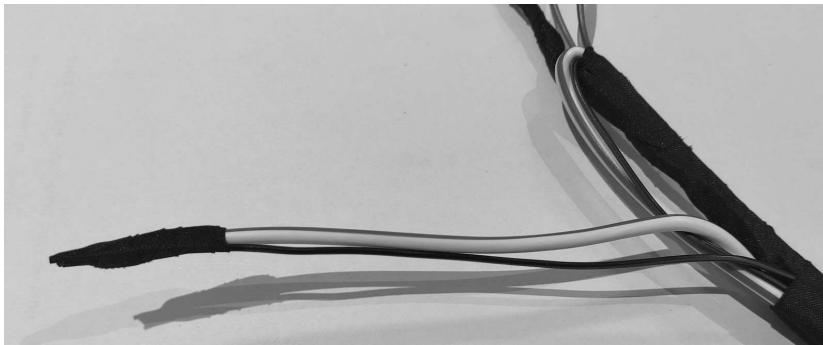
On/Off Switch

The furnace works with a controller or ignition (on/off) switch. Generally a controller is not used (unless diagnostics are needed), and systems use an ignition switch between the yellow and red wire (or blue/white and red wire on some systems) . On pre-assembled hot

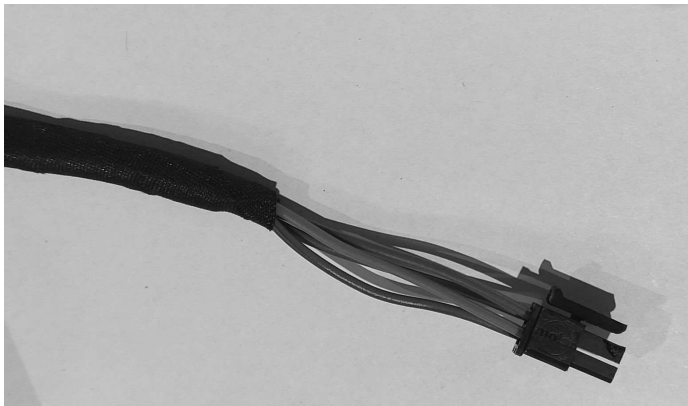
water systems this switch will be installed. The brown wire is not used and should be taped back on the loom.



The loom also includes white/red and brown/black wires which are pre-taped off. These are not used.

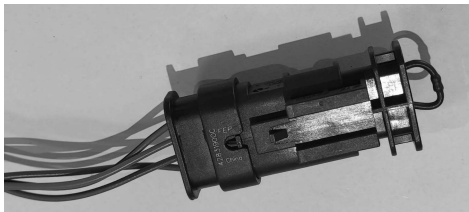


Controller Connector

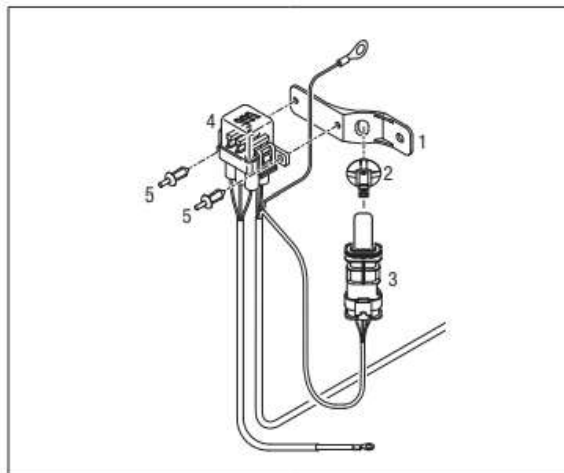


Easystart pro controller connector. This is an optional controller and is not used in most cases where the D5E is used for hot water and air heating. **This cable should not be cut or modified.** Bundle this cable and strap it in the vicinity of the DH E-Solar in a position where it can be found and accessed if an Easystart Pro controller is needed for diagnostic purposes in the future.

Diagnostic Port



Diagnostic port with end cap. This must be left as is and should be installed in an accessible position for future diagnostic purposes next to the fuse box on the supplied mounting tab (see diagram below).

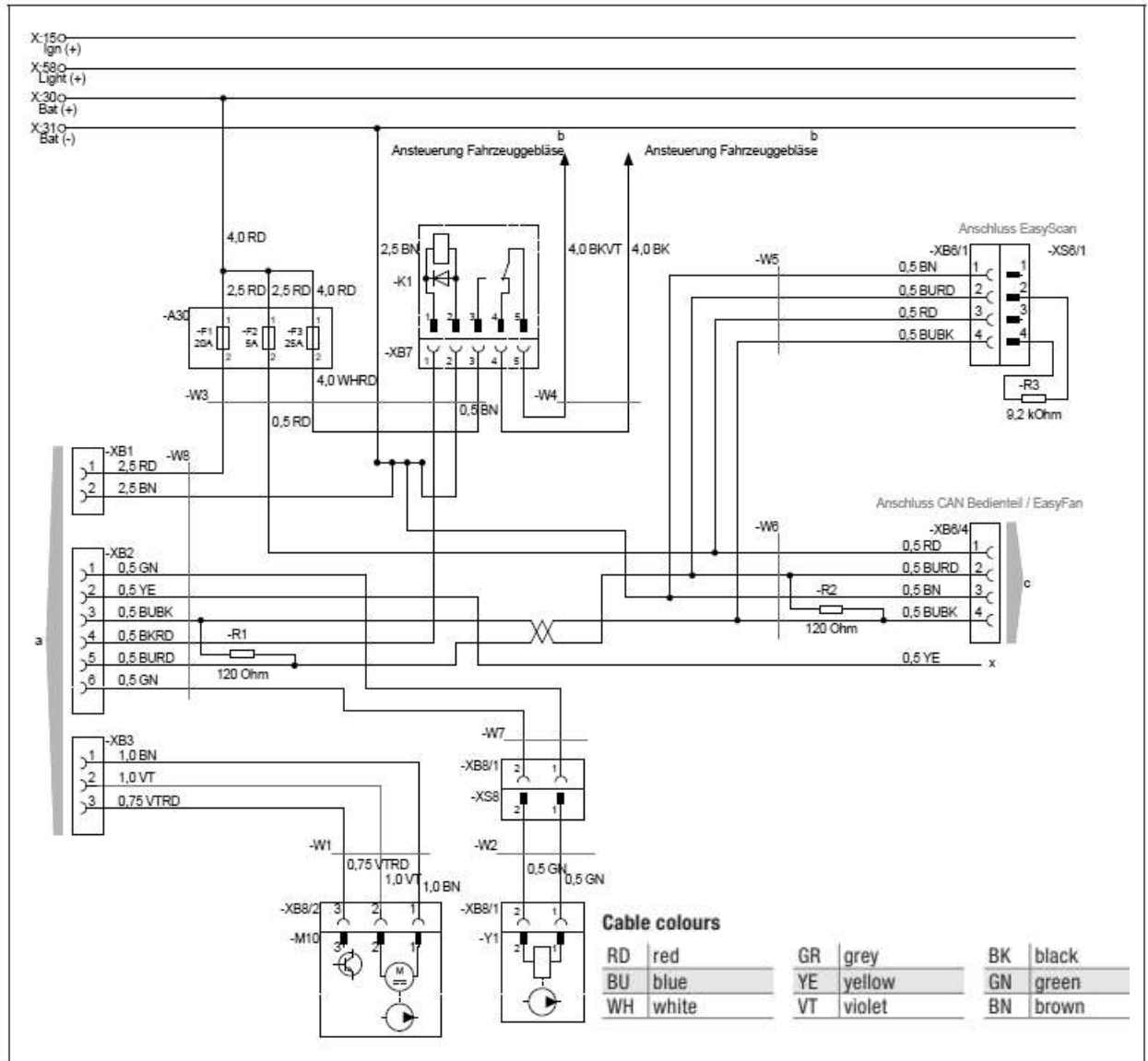


Picture 7

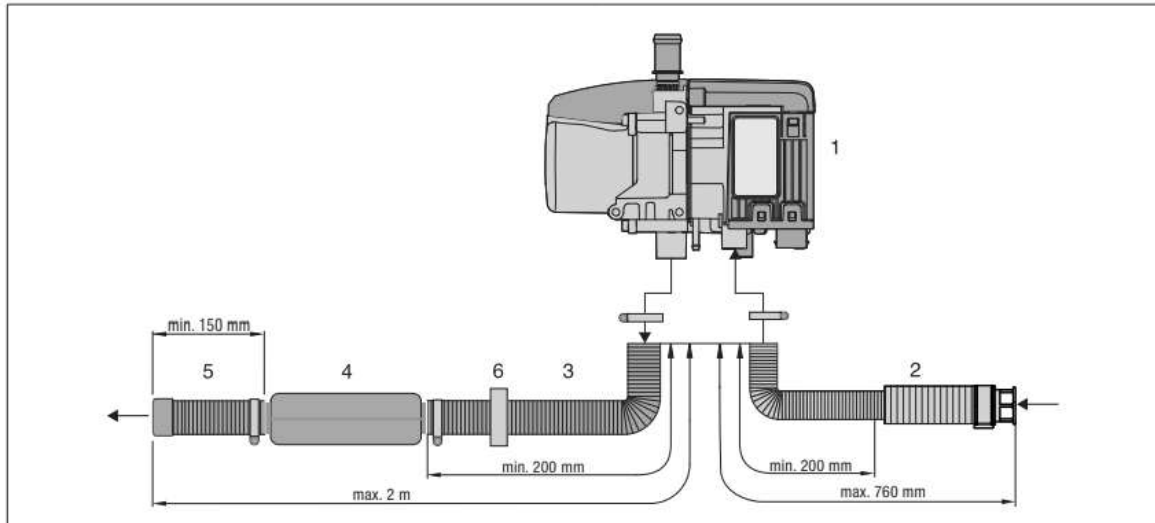
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| 1 Combined bracket | 4 Fuse bracket |
| 2 Retainer clip | 5 Split rivet |
| 3 Diagnostics connector | |

Main Wiring Diagram

- K1 - fan control relay
- A30 - Fuse block, F1 heater control fuse, F2 control unit fuse, F3 Fan relay fuse
- XS6/1 EasyScan (diagnostics port)
- XB8/1 Fuel pump connector
- XB8/2 Coolant Pump Connector
- XB6/4 Easy Start Pro connector



Inlet and Exhaust General Arrangement



Picture 18

- | | |
|----------------------------------|------------------------------------|
| 1 Heater | 4 Exhaust silencer |
| 2 Combustion air intake silencer | 5 Exhaust pipe end with end sleeve |
| 3 Flexible exhaust pipe | 6 Spacer ring |

Combustion Air

The DH E-Solar ships with the furnace combustion air inlet pipe and combustion silencer pre-installed.

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 vehicles that will be operating in dusty conditions, it is not recommended to install the combustion air inlet outside the vehicle. If it is necessary to do this, use the following strategy:

- Keep the air inlet up high and behind some part of the vehicle like a crossmember or water tank.
- Make sure the exhaust points backwards and down.
- Consider covering the exhaust with an exhaust end cap when not in use in dusty conditions. This can

prevent air circulating through the unit whilst traveling.

- After driving in dusty conditions, tap out or clean the inlet pipe prior to starting the unit.



Note: If the DH E-Solar is installed in a sealed box or compartment, always ensure the box is opened before use. Operating the furnace in a sealed box will result in inadequate combustion air and will result in immediate sooting up of the furnace.

RV Exhaust

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

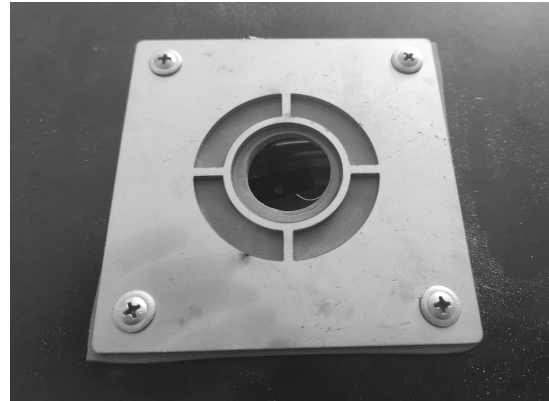
The exhaust should have a length of pipe before the muffler and generally at least 30cm of pipe after the muffler, as this helps to manage noise. If possible, install all of the exhaust pipe provided to reduce noise.

The exhaust pipe should be horizontal or have a slight downward slope to prevent condensation being trapped in the pipe.

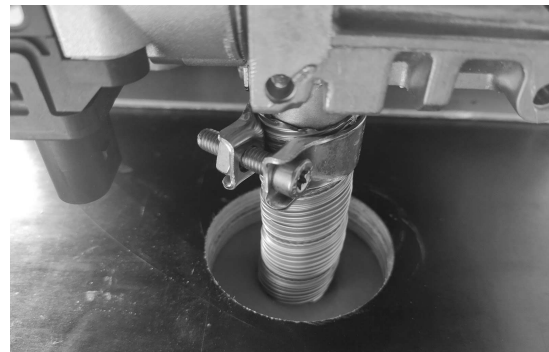
If the exhaust pipe has a valley or low spot, drill a 3mm hole at the lowest point to allow condensation to drain.



optional silicon plate, to make sure the exhaust cannot touch the timber, and to ensure there is a water/dust tight seal around the exhaust.



View of exhaust floor plate from below



View of exhaust floor plate from above

If the exhaust is passing through a timber floor, we strongly recommend using the

Marine Exhaust

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

The total maximum length of the marine 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.

Note: The exhaust system reaches temperatures of up to 300°C. Always lag the exhaust and ensure that the exhaust is not in contact with any materials that could be damaged or set alight by this heat.

Installing the hull/deck fitting

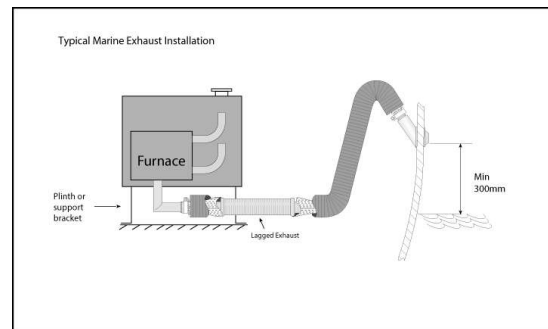
The position of the exhaust hull fitting will depend on several factors, including where you have located the DH E-Solar, whether your vessel is a sailboat or a motorboat, and the suitable surfaces available.

On a sailboat, the preferred location is on the transom or cabin wall, as this 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.

The hull fitting should be positioned as high as possible and a minimum of 300mm above the waterline to avoid water ingress.

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

To avoid potential safety issues, the exhaust system must be installed according to the following instructions:



- Under no circumstances connect the heater exhaust to an engine exhaust or any other exhaust system.
- The exhaust outlet must vent directly to the atmosphere.
- Adequate clearance must be maintained around the exhaust system to prevent interference with important functional parts of the boat, such as steering or throttle cables.
- Route the flexible exhaust giving clearance and consideration to heat sensitive components such as fuel lines and electrical cables.
- Ensure the support brackets are used to secure the exhaust in order to avoid damage from vibration.
- Position the hull fitting so that other inlets (hatches, windows) cannot draw in exhaust fumes.
- Ensure the hull/deck fitting is positioned to allow fumes to exit freely so as not to affect nearby surfaces, such as fenders, ropes or mouldings.
- The exhaust must not be routed through the living area.

12V Heating Element Wiring

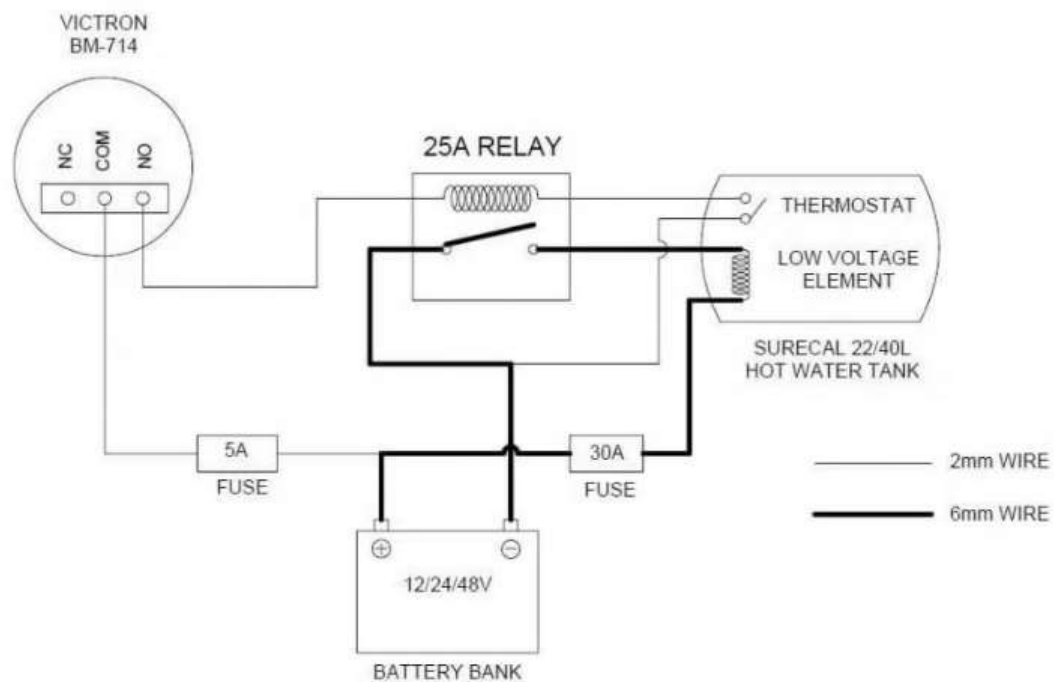
The 12V heating element should be wired to turn on via a 25A relay when

1. The batteries are charged and
2. The tank is below the temperature set on the 12v thermostat included in the 12v/240v element.

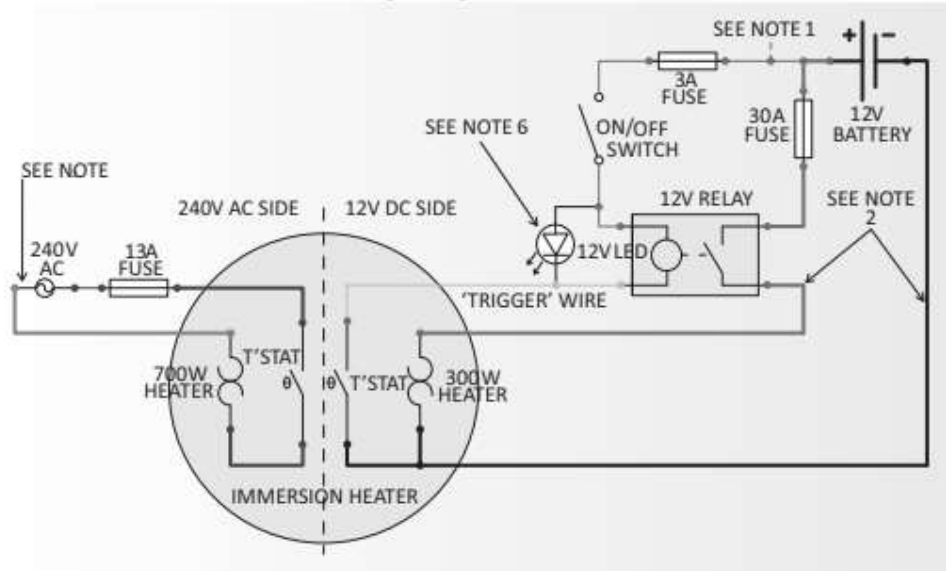
This is achieved by using the thermostat supplied in the combined 12V/240V element and a programmable relay in the RV/boat's solar battery system to control a 25A switching relay.

It is suggested to allow the 12v element to turn on when the battery state of charge is between 96% and 100%.

If the RV/boat has a solar charger with programmable relays, use these to control the switching relay. If the controller does not have this feature, use a battery monitor such as the Victron BM-714 which has a programmable relay to perform this function.



Immersion & 12v/240v Wiring Diagram



NOTES:

1. THIS 12V FEED CAN EITHER BE TAKEN DIRECTLY TO THE BATTERY '+' (AS SHOWN HERE) OR CAN BE TAKEN TO THE VEHICLE'S ALTERNATOR 'TRIGGER WIRE'. IF POWERED FROM THE ALTERNATOR TRIGGER WIRE, THE HEATER WILL ONLY OPERATE WHEN THE ENGINE IS RUNNING. IF TAKEN DIRECTLY TO THE BATTERY THEN THE HEATER CAN BE OPERATED WITH THE ENGINE OFF.
2. ENSURE THE CORRECT GAUGE WIRE IS USED AND DE-RATED ACCORDINGLY. A 300W HEATER AT 12V WILL DRAW ~25A; THEREFORE A 30A FUSE IS REQUIRED. THE WIRING NEEDS TO BE RATED HIGHER THAN THE FUSE RATING ONCE DE-RATED. 11 AWG (4 mm²) WIRE IS RECOMMENDED.
3. THIS END WOULD BE IN THE FORM OF A NORMAL 3-PIN MAINS PLUG FITTED WITH A 13A FUSE.
4. THE 240V AC THERMOSTAT IS WIRED DIFFERENTLY TO THE 12V THERMOSTAT. THIS IS BECAUSE BOTH THERMOSTATS ARE RATED FOR 20A MAX. - AT 240V THE CURRENT REQUIRED FOR THE 700W HEATER IS ~3A; THEREFORE THE THERMOSTAT CAN SAFELY BE WIRED IN SERIES WITH THE HEATER AS SHOWN. - AT 12V THE CURRENT REQUIRED FOR THE 300W HEATER IS ~25A; THEREFORE THE THERMOSTAT CANNOT BE WIRED IN SERIES AND A RELAY IS NEEDED AS SHOWN.
5. THE THERMOSTAT **MUST BE USED FOR SAFETY**.
6. MAKE SURE A 12V LED/INDICATOR IS USED. THESE HAVE RESISTORS BUILT IN AND DO NOT REQUIRE AN EXTERNAL RESISTOR.
7. WHEN SELECTING THE CORRECT RELAY, A 12V COIL IS NEEDED AND THE CONTACTS MUST HAVE A HIGHER RATING THAN THE FUSE THAT IS PROTECTING IT (GREATER THAN 30A).

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 5-10psi, so check that all hose connections are secure and all hoses are kink free before filling the system with coolant.

When the system is 100% installed, insert the fuses in the power line and power up the furnace.

Coolant Pump Priming

Remove the radiator cap on the DH E-Solar hot water service. Fill the system with pre-mixed coolant to approximately 20mm from the top of the tank. The DH15 holds around 15L and the DH30 holds approximately 30L plus any additional coolant to fill fan heating heads and pipes.

If the system is overfilled, some overflow from the overflow spigot under the cap will occur on first startup. This is not an issue and will not continue once the coolant level has dropped.

With the cap removed, switch on the furnace and observe the coolant pump starting. It should give off a quiet whining sound. The system will normally prime immediately and air bubbles will appear in the top of the tank as air is pushed out of the internal pipes, fan heating head, etc. This only happens on first startup.

Check that the coolant level has not dropped excessively and top up if necessary.

Observe the coolant in the tank through the filler and you should see some swirling and turbulence. The pump should be whining softly, not loudly. This indicates

the pump is primed and coolant is circulating and it is safe to allow the furnace to start.

Extended Air Bleeding/Priming

If the coolant is not circulating in the system as noted above, follow this procedure:

Recheck that all the plumbing is correctly installed and turn on all fan head valves.

Turn the unit on. The coolant pump will start. It will often surge as it tries to prime. Wait until the fuel pump starts to tick, then turn the unit off before the furnace tries to start.

Wait for the unit to turn off completely, repeat.

You may need to repeat the above steps 4 or 5 times to push all of the air out of the system. Look at the top of the tank and you will see small air bubbles coming through the liquid.

The pump will change tone and you will see the coolant swirling on the surface once priming has been achieved.

Initial Startup

Once the coolant pump is primed, leave the switch on and the furnace will attempt to start. The furnace will not start until the fuel pump and fuel line have primed.

A furnace start process involves 2 separate start attempts and takes approximately 6 minutes. During each start attempt, the coolant pump runs, the combustion fan revs up and down and the fuel pump attempts to pump fuel.

At the end of a start process (after 2 attempts), the furnace will shut down and wait. A new start process can be triggered

by turning the furnace off, removing the fuse, replacing it and turning the furnace on again. This process can take quite a few start attempts, particularly if the fuel line is long.

Note: The Ebersapcher furnace will lock out after approximately 10 failed start processes. Always double check the fuel line, pump orientation and fuel source before commencing startup. An Easy Start Pro controller is required to unlock a locked out furnace.

Post Initial Startup

As the furnace begins to heat the coolant, all the hoses will start to get warm. Move your hands over all the hoses to check they are all of a similar temperature.

After a few minutes, the DH E-Solar 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 everything is getting warm, top the coolant level up in the DH E-Solar hot water service until it is approximately 20mm from the top of the tank and replace the filler cap. Allow the system to fully heat for 15 minutes. Recheck the whole system for leaks.

Depending on the ambient temperature, the furnace will cycle down after about 8 minutes as the coolant reaches 70°C. All hoses should be at a similar temperature and, if installed, the fan head should blow hot air.

If water has been used for commissioning/testing, drain the system down and replace the water with coolant.

Congratulations! You have now successfully commissioned your DH E-Solar system.

Coolant Furnace Operation

- Turn on the furnace with the on/off switch.
- After approximately 3 seconds, the coolant circulating pump will come 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 on full power until the coolant temperature reaches 70°C. This will take approximately 8 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 80-85°C, the furnace will shut down, but the coolant circulation pump will continue.
- The furnace will not restart until the coolant temperature drops to approximately 68°C. This will happen either by heat dissipation over time, or if the DH E-Solar hot water service or cabin fan heater demands heat.

Note: Only turn the furnace off at its own switch. Do not cut power to the furnace during any stage of its operation.

Commissioning Troubleshooting

Problem	Things to Check
On initial switch on, furnace does nothing.	<ul style="list-style-type: none"> ● Check fuel pump connection wires are properly inserted into connector and connector is properly plugged into the pump. ● Check coolant pump wires are properly connected. ● Check power supply and fuses. ● Check furnace is wired directly to batteries. ● Check power wiring polarity - red (inside black sleeve is positive, brown is negative).
Furnace tries to start but doesn't start.	<ul style="list-style-type: none"> ● Check fuel pump is orientated correctly. ● Check fuel flow in fuel line by shining a torch on the fuel line and looking for bubbles or advancing fuel front. ● If installed, check the fuel filter has filled with fuel. ● The fuel pump will tick more loudly until filled with fuel. Check fuel pump noise when pump is pumping. ● Check all fuel line connectors are tight and air cannot enter the fuel line. ● Check battery voltage is above 12.5v. ● Check furnace is wired directly to batteries as per install instructions.
Eberspacher Only: Furnace has tried to start multiple times and is now 'dead'.	<ul style="list-style-type: none"> ● The furnace has locked out due to excessive start attempts and will need to be unlocked using an Easy Start Pro controller.
Furnace starts and runs for approx. 1 minute, then shuts down very quickly.	<ul style="list-style-type: none"> ● Check coolant circulation.
System works but the air heating fan head is not hot.	<ul style="list-style-type: none"> ● Check all shut off valves. ● Review plumbing and use of bypass valves as per the suggested system schematics. ● On larger systems (boats), review the use of booster pumps.
System runs but there is no hot water.	<ul style="list-style-type: none"> ● Check the system plumbing and ensure that hot coolant is passing through the plate heat exchanger (remote mounted furnaces only). ● Check the thermostatic tempering valve is installed with the 'H' at the top and the 'C' at the bottom.
System heats up but fan heads do not get hot.	<ul style="list-style-type: none"> ● Check fan head shut off valves are open. ● If using a valved bypass valve, ensure the bypass valve is partially closed. ● If using a valveless bypass valve, check the bypass valve is on the same level as the fan head. ● Check tank plumbing and bypass arrangements are in accordance with diagrams in these instructions.
Fan heads get hot but do not blow hot air.	<ul style="list-style-type: none"> ● Check fans are wired with correct polarity. ● Check fan head has adequate return air as per instructions.