



Belief 2.2kW, 4kW DIESEL AIR HEATER INSTALLATION INSTRUCTIONS



Belief

STOP
DON'T PANIC
READ THE INSTRUCTIONS

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Congratulations on purchasing a high quality Belief diesel heater from Dieselheat. Your kit contains everything you need to complete a professional, quiet, reliable installation.

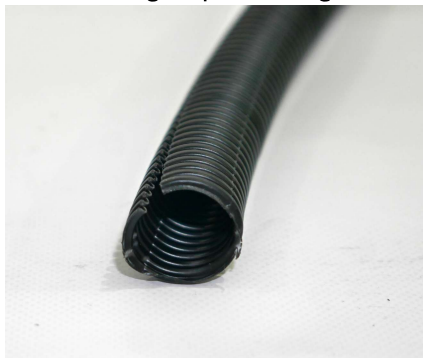
Remember, help isn't far away. Read the instructions first, but please feel free to call us if you need further assistance.

TIPS FOR A GREAT JOB

- Be super careful when putting screws into cabinets and from the bottom up in the floor. Floors and cabinets can be as thin as 12mm, so long screws can protrude through.
- When drilling holes with a hole saw in cabinets, always drill in from both sides to avoid splintering the cabinet. Drill in from the first side until the pilot drill comes through, then back drill from the other side.



- Run all cabling under the floor or, in places where it can be damaged (storage areas), run it through split corrugated conduit.



The hot air end of the heater is the one with the aluminum core showing (check by looking in the end). The cold air end is the one with the fan visible inside the end.



Outlet (hot end)



Inlet (cold end)

Fuel lines are joined by inserting the nylon fuel line or pump/filter/heater fuel spigots into the black rubber joiners and then clamping the outside. We recommend using a small smear of silicone grease or vaseline on the connections before assembling. This allows the black rubber joiner to easily slide over the fuel line, pump, filter, etc.

The single-use ear clamps supplied in the silent mount kit are closed using nail pincers, as shown:



When joining the fuel line onto the fuel filter, fuel pump or heater as shown below, try to push the nylon line all the way into the joiners so it touches the spigot.



SIMPLE MISTAKES TO AVOID

- Connect the heater directly to the battery. Do not connect via any existing fuse boxes or wiring. The heater needs plenty of power to start and existing wiring often isn't thick enough.
- Never install a switch on the power wiring. This will cause voltage drop and if the switch is switched off when the heater is running, the cool down cycle will not occur, which damages the heater.
- Ensure all the fuel connections are well sealed and cannot allow air ingress.
- Don't forget the vaseline or silicone grease on all the fuel line connections.
- Do not put ducting on the return air side of the heater. Let it draw air from the compartment in which it is installed. This will prevent the compartment heating up.
- Don't forget to drill 3mm drain holes in any low points in the exhaust to allow condensation to drain.
- When starting for the first time, it will take up to 5 or 6 attempts to prime the fuel line. Let the heater try and start twice, then if it hasn't started, it will lock out (indicated by a flashing red LED). Pull out the fuse to reset and try

again. Check the first startup procedure at the end of these instructions for full details.

Tools

This is what we use when we do an installation at Dieselheat. You can get away with less, but having these tools makes it easier!!!

Power tools

- Cordless drill
- Angle grinder with 1mm disk (for cutting, slotting exhaust)
- Rattle gun and bits (for Tek screws)

Drilling, mounting

- 60mm hole saw (for 2kW vents)
- 90mm hole saw (for 4kW vents)
- 12mm drill bit (for control cable, wiring)
- 146mm hole saw (for mounting plate hole. As an alternative, you can use a multi tool or jigsaw or drill lots of small holes beside each other)

Wiring

This is all optional and only required if you want to shorten or adjust the loom.

- soldering iron, solder, heat shrink
- wire cutters
- wire strippers

Fuel

- Nail pincers (fuel line clamps)
- Sharp knife or snips (to cut fuel line)
- silicone grease or vaseline (fuel connections)

Installation Consumables

Every installation is different. The following consumables are not supplied as part of the kit and need to be provided by the installer.

- short screws for attaching cables to the back of cabinets, screwing down mounting plate, etc.
- small P clips for attaching cables to floor and cabinets
- extra cable ties
- split corrugated conduit for wiring
- metal Tek screws to mount exhaust to chassis, etc.

Part A - Fixed Points

Install all the parts that are end points and have fixed locations first.

Step A1 - Select a location for the heater and make the 146mm hole

Mount the heater under a seat area, under a bed, or in a low traffic area. Measure your proposed location carefully above and below the floor to check you have clearance for the heater above and for the ring on the mounting plate below. Avoid chassis rails, water tanks, gas pipes, etc.

Ensure the heater will have enough space between the air inlet and the nearest wall or any solid objects. Allow 30mm for 2.2kW and 50mm for 4kW and 5kW.

Make sure there is space on the outlet side to fit the ducting, allow space for the back of the outlet vent which can also protrude back towards the heater if they are close.

Use things that penetrate the floor, like water pipes, other wires, the edge of the RV, etc., as references and measure above and below the floor to locate the heater. After measuring, mark the spot and drill a small hole with a 2mm drill bit. Leave the bit in the hole.



This enables you to exactly locate the installation point above and below the floor.

The heavy duty mounting plate supplied has a small hole in the middle. This is designed to

allow you to fit it over the drill bit to check clearances.

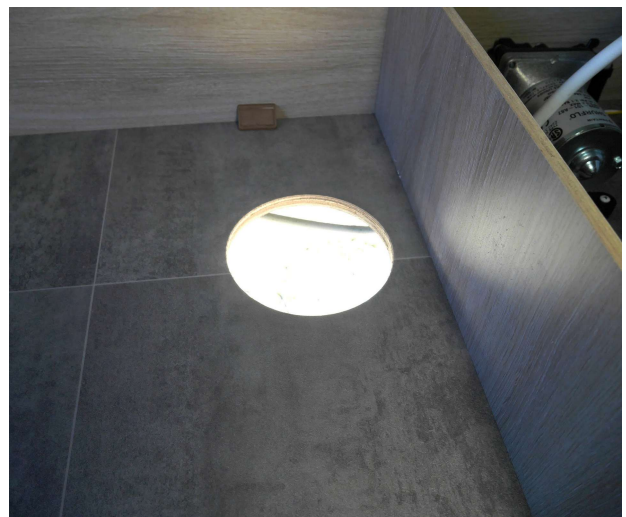


Place the mounting plate over the drill bit and check everything will fit above and below the floor.

Hold the heater in place above the proposed location and check clearances again.

Once you are sure the location is clear, drill/cut the 146mm hole for the mounting plate.

If you don't have a 146mm hole saw, you can make the hole by drilling lots of 5mm to 6mm holes very close together or by using a jigsaw or multi tool.

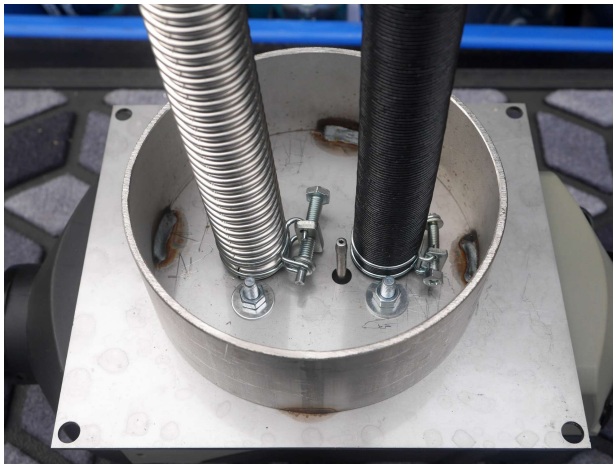


Step A2 - Set up the heater

Mount your heater mounting plate onto the heater using the 4 x 6mm nuts and washers. Make sure the rubber seal is between the heater and the mounting plate.



Install the exhaust pipe and air inlet pipe onto the heater while it is still upside down on your bench. It is much easier to do it this way than from under your RV.

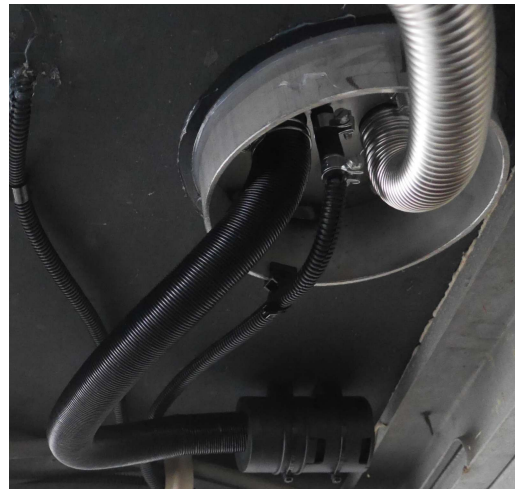


Note: The air inlet spigot on the heater is always the one that is closer to the fuel inlet pipe.

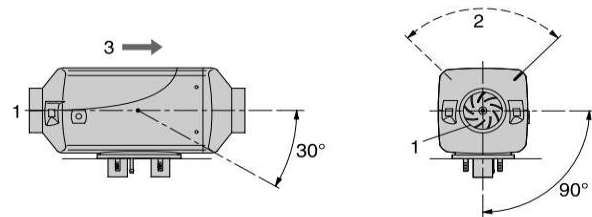
Step A3 - Install the heater

Put a bead of silicone or sikaflex around the underside of the mounting plate, then put the exhaust pipe and inlet pipe through the hole in the floor before placing the heater into its correct position. Secure the mounting plate with screws making sure there is a good seal so no exhaust gas can leak through.

Place a thick bead of silicone or sikaflex around the outside of the ring under the floor to protect the floor edges.



For specialised installations the following heater orientations are allowable. Note the heater can be rotated on it's long axis but the the fuel inlet pipe must end up above the inlet/exhaust spigots.



Step A4 - Install the hot air and return air vents

Using a 60mm hole saw, drill holes for the hot air vent and the inlet air vent. Think about the outlet location to minimise the duct length and keep the duct as straight as possible. Pop off the front of the directional (eyeball) vent and attach with 3 small screws.



Use silicone or sikaflex to glue in the return air (flat) vent. Alternatively, drill 2 small holes in the flange on the vent and screw it in with small screws.

Do not put ducting on the return air side of the heater. Let it draw air from the compartment in which it is installed. This will prevent the compartment heating up.

Note: This is the last of the major drilling holes. Now is a good time for a first vacuum/sweep.



Step A5 - Set up the fuel pump and install

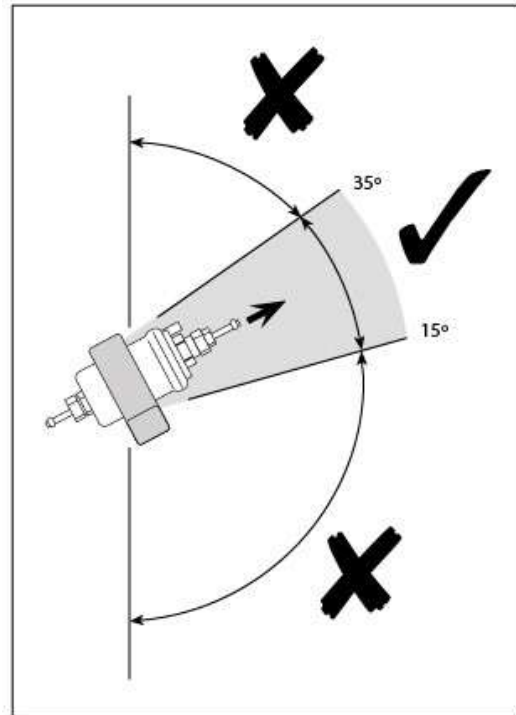
Follow the instructions in the fuel pump silent mount kit on how to set this up. If you didn't buy this kit then insert the pump into the rubber fuel pump mount and screw this directly to the floor/chassis.

Mount the fuel pump away from the bed under the kitchen or bathroom. When selecting a location for the fuel pump, choose a place that doesn't sound hollow or 'boomy' when you knock on it with your knuckles. If you choose a location that sounds dead or muffled when tapped, the pump will sound quieter inside.

If the floor is thin (12mm), use a metal screw onto a chassis cross member because a short wood screw may not hang on well enough to the plywood floor. Allow space for the fuel pipes to return back up onto the underside of the floor.



It is important to get the angle on the fuel pump correct. The outlet should be between 15 and 35 degrees upwards to allow air to purge from the pump.

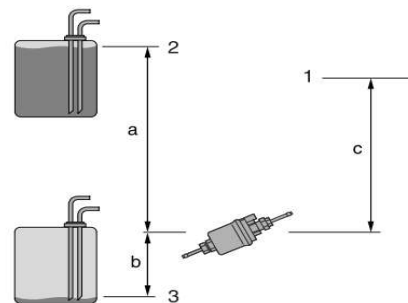


Allowable Fuel Line Lengths

Tank to Pump: Under 2m ideal, (3m max if all at similar level)

Pump to Heater: Up to 7m

Allowable Elevations



a = max 2m

b = max 1m

c = max 2m

Step A6 - Install the fuel tank

Wafer Tank

Follow the instructions provided with the tank and bolt the wafer tank to your front box, mounting bracket, etc.



Easy fit tank

These tanks are designed to be inside. Pre-drill holes in the base of the splash box and apply silicone or sikaflex to the underside around the holes before screwing it down. Screw or rivet the breather pipe so it is above the tank.



Part B - Make the connections

Well done!!! You have done the hardest parts. Now you just need to connect it all together.

Step B1 - Fuel line

It is recommended to install the fuel line in split corrugated conduit to protect it. Start at the heater and run the line to the pump. The outlet side of the pump is the one with the electrical connector on it. There is also an arrow on the pump showing the outlet direction.



Install the fuel line back from the pump to the tank. Remember to install the fuel filter between the tank and the pump.

Note: The orientation of the fuel filter is not critical. If the filter does not have the outlet facing upwards a small pocket of air may remain in the fuel filter, however, this is not a problem.

Use P clips or cable ties to secure the fuel line up against the underside of the floor.

Note: The pump power cable and fuel line can run in the same conduit or they can be run separately.

The T piece and check valve below are generally not needed in most installations.

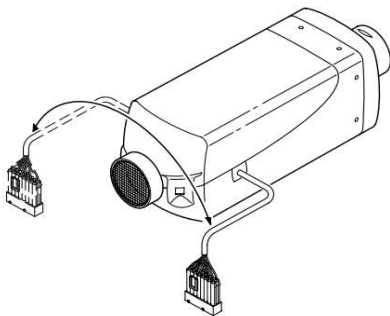


Step B2 - Loom and Power Wiring

The main wiring loom has 3 cables: the controller, the main power and the fuel pump. The main wiring loom plugs into the matching loom coming from the heater. Slide the locking catch to retain the main loom.



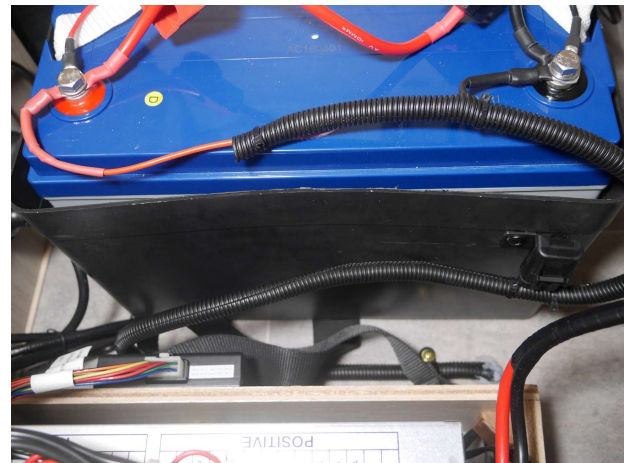
The exit point of the main loom can also be swapped on the heater if needed for a tidier install. To do this carefully remove the top cover, re-route the cable to the other side of the case and reinstall the top cover. Take care to be gentle with the cover locking tabs as they can easily be broken off.



Generally, the fuel pump and main power cables need to go through a small hole in the floor to be routed to the fuel pump and battery

(unless the battery is in the same compartment).

The power supply cable is the thicker one that has a brown (or black) and red cable and a fuse holder. If you are routing the cable under the floor to reach the battery, cut off the fuse holder. Enclose the power cable in split corrugated conduit and apply silicone to the hole where it passes through the floor. Once the cable is routed to the battery, cut off any excess cable and join the fuse holder back onto the loom. Solder all connections in the power cable to avoid voltage drops. Mount the fuse holder or tuck it neatly into the battery box.



If the standard loom is too short, we recommend replacing all the main power cable by cutting it off past the point where the 3 cables split from the one larger cable and soldering on good quality 6mm² twin cable for the full extended length.

Always run the heater directly from the battery. Do not run it via existing fuse boxes or wiring, as voltage drops will make it hard to start.

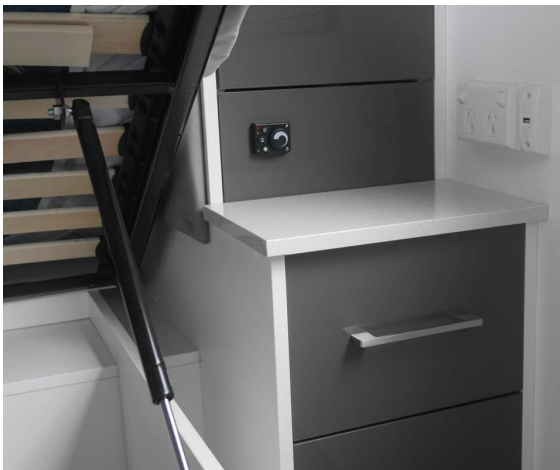
Step B3 - Fuel pump power

The fuel pump cable is part of the main loom. This needs to go through the floor next to the heater (possibly with the main power cable, depending on where the battery is located). The best way to do this is to cut the plug off the end of the cable, route the cable to the fuel pump, trim off any excess and then rejoin the cable. Use solder and heat shrink to ensure a good join. The fuel pump is not polarised, so the 2 cables can be joined either way.

Note: The pump power cable and fuel line can run in the same split corrugated conduit.

Step B4 - Heater Control

Locate the control where you can reach it without getting out of bed! Aside from this, the best locations are within easy reach of the heater (to make the cable routing easier), and where there are places to hide the cables in cupboards, etc.



Controller Cable

The controller cable comes with 2 plugs: a small flat white one that is used and a square black plug that is not needed. To make it easier to route the cable, you can cut off the square black plug.



Do this by cutting it about 40mm up from the junction and then unwinding the wrapping. Cut the 3 wires to different lengths so they cannot short circuit.



Tape the 3 wires back on the loom with electrical tape.

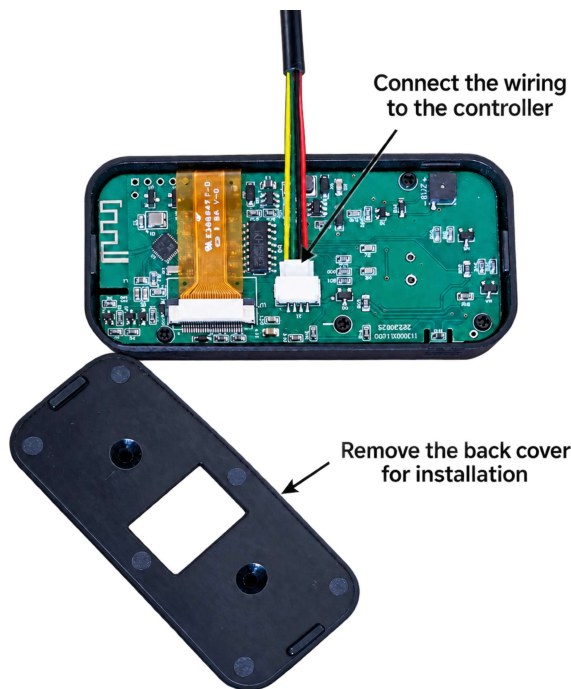


Once the extra plug has been removed, the controller cable can be routed through 12mm holes.

Digital Controller



Remove the back cover from the controller and screw to the wall. Drill a 12mm hole in the wall in the cutout to allow the control cable to feed through. Snap the controller back onto the back cover.



Rotary Controller

Drill a 12mm hole in the cabinet to allow the control cable plug to be passed through.

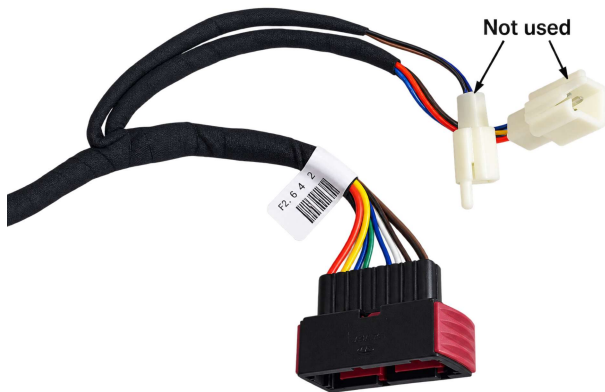
To mount the control switch, pull off the knob by putting your fingernails behind the edges. It is tight but it will click off.



Put a small amount of silicone or sikaflex on the back of the control switch. This will stop it from moving on the screw. Mount the control switch through a wall using the provided screw, ensuring it is pushed down and to the right so it covers all of the hole drilled for the cables. Replace the knob. Note: it will only go back on when properly aligned to its shaft.

Diagnostic and Sensor Connectors

The diagnostic and sensor connectors located next to the main plug are not used.



Step B5 - Duct

Cut the duct to length with a sharp knife and fit the duct between the heater outlet and the directional vent. Secure with the supplied clamps.

Do not install duct on the inlet side.



Lagging can be added to the ducting to keep heat out of the compartment.

Step B6 - Exhaust

The exhaust pipe consists of 2 lengths of exhaust pipe joined by the muffler. Both pipes are supplied with an end cap. The pipe between the heater and the muffler will need to have this end cap cut off.

Where an exhaust pipe fits the muffler or heater, it needs a slot in it to allow the clamp to compress the pipe so it tightens properly.

After you cut the exhaust pipe to length, add the slot using a 1mm blade on an angle grinder. Extend the slot approx. 20mm or to the back of the clamp.



The exhaust position and routing varies for each installation, depending on the location of the heater and what obstructions there are. Generally:

- use as much of the supplied exhaust pipe as possible, as longer exhausts are quieter.
- do not extend the exhaust beyond the pipe supplied.
- aim to take the exhaust out to the off side (away from the door), but do not worry if it doesn't quite reach the edge of the RV.
- the outlet of the exhaust should point down and back to avoid water/mud/dust from the wheels getting into it.

IMPORTANT: If the exhaust has any low points, drill a 3mm hole in the bottom at the low point of the pipe to drain any condensation that forms.



Step B7 - Inlet Air silencer

Remove the decorative end from the combustion air inlet pipe with a sharp knife and screw in the combustion inlet silencer.



Note: on some heater models, the inlet on the combustion inlet silencer will need to be trimmed back to allow access to the correct diameter connection point.

2.2kW, 4kW and 5kW heaters use the end step, so no trimming is needed.

The air silencer goes on the end of the combustion pipe and is secured with a cable tie under the chassis in an area that is protected from stones and water.



Finishing Off

All cable holes should be sealed with silicone, and all fuel lines, power cables, combustion pipes and exhaust pipes should be secured with a cable tie or clipped securely in place.

Make sure the exhaust is separated from the combustion air and the fuel inlet. Make sure the exhaust cannot come into contact with any other wiring, pipework, etc., as it will melt plastic.

Put at least 2L of diesel in the fuel tank to ensure the fuel pickup is submerged.

NOW.....open a beer and follow the first startup procedure while you clean up the huge mess you just made.....

First startup procedure

When you have finished the installation, it is time to start the heater.

1. Insert the fuse into the fuse holder.
2. Press the heat symbol button (top button). The red LED will come on, the heater will run through its internal safety check and then it will try to start. Over a period of about 6min the heater will try to start twice while it primes (draws fuel from the tank).
3. If the heater does not start after approx. 6min and 2 start attempts, the red LED will start to flash slowly. This will be due to fuel not reaching the heater yet.
4. Remove the fuse from the fuse holder and replace it. Go back to step 2.

You may need to repeat this process up to 5 or 6 times if you have a long fuel line, as it takes quite a few start attempts for the heater to prime and get fuel.

Simple Fault Finding

If your heater hasn't started after 5-6 resets, the issue is likely to be related to fuel or power:

Fuel

- check whether you can see fuel in the fuel filter
- check for air bubbles in the fuel line

If the fuel filter or line is dry or there are air bubbles in the fuel line, it is because you have a loose fuel connection or other fuel supply issue. Recheck all connections, check the fuel pump is facing the right way, ensure the tank has sufficient fuel for the pickup to be immersed, and check any quick disconnects are closed properly.

Power

The heater requires 9 Amps to start, so it is important that it has a good power supply.

The batteries may have good voltage when there is no load, but may drop under load. Check the battery voltage when the heater is trying to start. Plug into power to get your charger working. Make sure your cables go directly to the battery and not via any existing wiring.

Also see the more detailed troubleshooting guide over the page.

2 Year Product Warranty

Dieselheat offers a 2 year warranty on this product.

Upon receipt of proof of purchase of a product, Dieselheat will, where possible, provide product support via telephone or email. If Dieselheat determines that the issue necessitates the return of the product for inspection and/or repair, it is your responsibility to uninstall the product and return the product at your cost to Dieselheat.

Upon repair of the product, Dieselheat will return the product to you at its cost. It is your responsibility to reinstall the product. See our full warranty terms on our website.

New Installation Troubleshooting Guide

When you turn on the heater, it does a self test. If any faults are found, the red LED will immediately flash an error code. There will be a series of flashes followed by a pause, then the series of flashes will be repeated. If this happens, count the flashes and refer to the error codes below. If there are no errors found when you turn on the heater, the heater will go through 2 start attempts over a period of about 6 minutes. If the heater cannot ignite, the red LED will flash slowly and continuously. See the troubleshooting guide below.

Out of fuel/priming new heater	If you run out of fuel or are priming a new heater, the fuel line will fill with air and the heater will need to be primed. 1. Turn the heater on and wait 6 minutes while it makes two attempts to start. 2. Once the red LED starts to flash slowly, remove the fuse to reset it and then replace the fuse and turn it on again. 3. Repeat steps 1 and 2 up to 6 times to allow the heater to re-prime.
Heater starts, tries to ignite but cannot ignite and blows smoke from the exhaust.	Smoke normally indicates the heater is getting fuel but is not igniting. • Check batteries and power to the heater. Measure the voltage at the heater using a multimeter. It should be at least 12.5V or voltage drop between the batteries and the heater should be less than around 0.5V as it starts (with the glow plug on). If it exceeds this, check power wiring. • Check the heater is wired directly to the batteries with no kill switches, fuse boxes or skinny wiring to cause voltage drop. • Plug into power. If this helps, check batteries and wiring.
Heater tries to start but will not ignite. No smoke, fuel pump ticking.	This would indicate a fuel supply issue. • Follow the Out of Fuel procedure (see above). • Use a torch on the fuel line to see if fuel can be seen or is advancing up the fuel line. Each tick of the fuel pump should advance the fuel approx. 2cm up the fuel line. • If fuel is not advancing up the fuel lines, check the fuel lines and fuel tank. Look for blockages, improperly closed quick disconnect fittings, damaged fuel line, split or damaged fuel filter, loose connections.
Heater flashes an error code when turning on.	If the red LED makes a series of flashes immediately after the heater is turned on, count the flashes and check the error codes below. The LED will flash a number of times then pause, then repeat the sequence again.

Belief Error Codes (number of flashes of the red LED followed by a pause)

1	Second start failure, heater has no faults but cannot start. Follow troubleshooting guide above.
2	Heater has flamed out and tried to restart. Core temp too low. Check fuel and fuel supply, restart.
3	Voltage too high or too low - normally means flat batteries or poor connection to the battery.
4	Furnace is too hot to start. Wait 10 mins and try again.
5	Flame or hot air sensor failure - get service.
6	Air sensor failure - get service.
7	Fuel pump not connected or fuel pump wires short circuited - check fuel pump wiring.
8	Blower fan broken or jammed, check fan can spin, otherwise get service.
9	Glow plug broken or short circuited - get service.
10	Heater has overheated during operation or start process. Check ducting, vents and heater air flow. Let cool and restart.
11	Shell sensor failure - get service.