



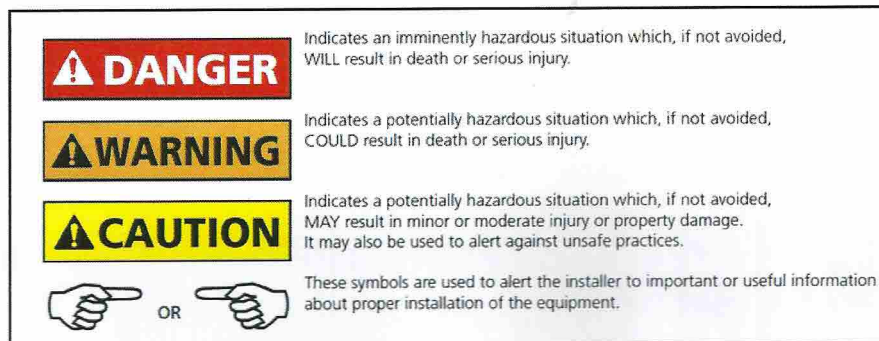
# PHEC System Installation & Operation Guide

## General Information

Webasto Thermo & Comfort Australia Pty Ltd is pleased to provide this installation guide for the PHEC water and air heating system. When used according to the guidelines stated in this booklet, you should expect many years of trouble-free, enjoyable operation.

This installation guide represents our latest effort to produce the best technical documentation possible. In our efforts toward continuous, ongoing product improvement, we also encourage our customers to provide feedback concerning this guide and the PHEC heating system.

Visit our website for technical documents: [www.webasto.com.au](http://www.webasto.com.au)



This Webasto Diesel Heater comes with a 2 year warranty.

*Failure to follow these installation instructions and the notes contained therein will lead to all warranty being refused by Webasto Thermo & Comfort Australia Ltd Pty . The same applies if the repairs are carried out incorrectly or with use of parts other than genuine Webasto service parts. This will result in the voiding of all warranty. All service and repairs have to be carried out by authorised Webasto service dealers.*

## Purpose of the PHEC Heater

The Webasto PHEC heater is designed to heat water and air, specifically for camper trailers, however it can also be installed into caravans and motorhomes.

The heater operates independently of an engine and is connected to a fuel tank and the electrical system of the trailer/vehicle.

They are not designed to heat hazardous substances.

## Pre-Installation Considerations

1. Location and orientation of the heater.  
*The heater may be fitted internally or externally to a vehicle. If it is installed externally ensure that the heater is fitted in a position where it is protected from water and dust ingress.*
2. Location of the controller, electrical wiring, fuse and battery connections. (Plug & Play)
3. Location of the fuel pump and fuel filter.
4. Location of the exhaust and combustion air systems.
5. Location of fuel tank – 12L Webasto fuel tank. (Typically installed on the A frame).
6. Water pump flow rate to be max 10L/min.

## Tips

Place the heater in your desired location to predetermine the mounting holes, exhaust system, wiring, controller, water connection hoses and general clearances for easy accessibility for service and repair.

## Serial Number Labelling

Ensure that the serial number labels are attached on the top or the side of the heater, in case the heater is mounted against a wall and the original label may be inaccessible. Additional labels are supplied in the kit and one should go on the installation manual envelope to hand over to the customer at the time of commissioning .



Fig 1 – Serial number labels – Heater



Fig 2 – Serial number label written as Fabr Nr.

*Note: In case of warranty situations, the serial number will be requested by Webasto or an authorised dealer to validate.*

# 1. PHEC & Radiator Fan Heater Dimensions

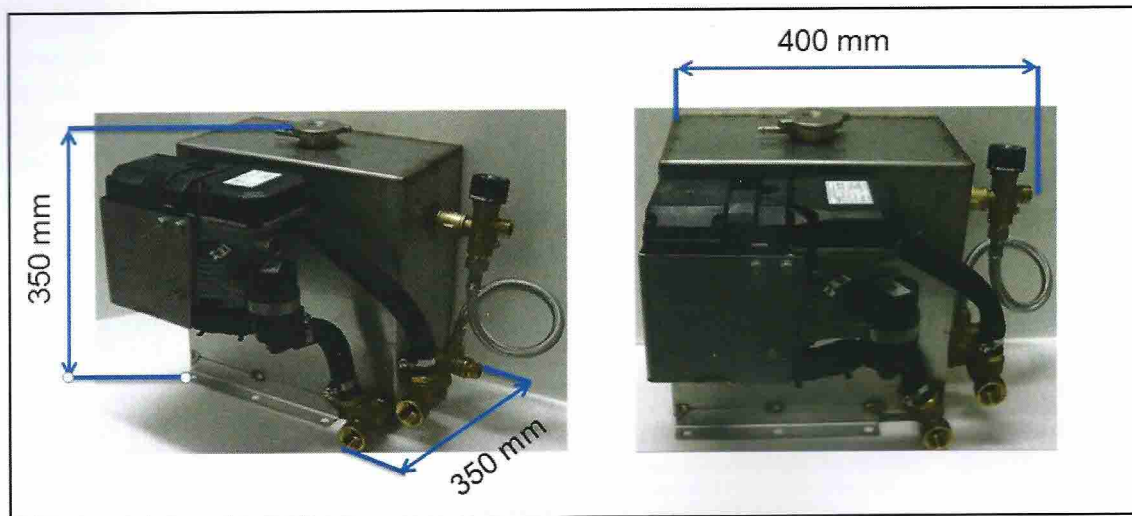
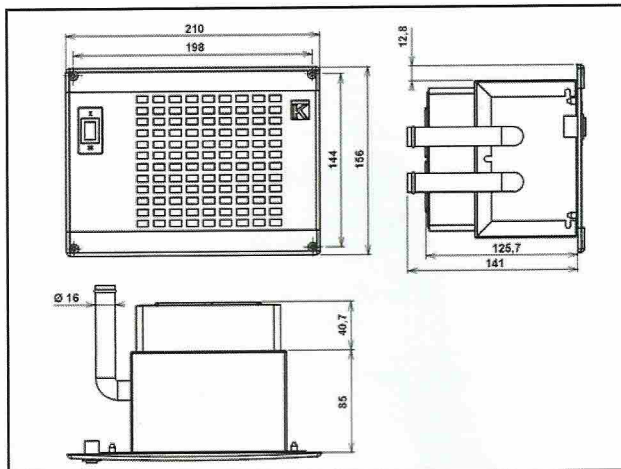


Fig 3 - With all installations, always allow clearance so the unit can be easily removed and installed in case of service and repair.

## 1.1 Radiator Fan Heater (Cabin Heater)



<b>Calorific Power</b>	1500 kcal/h
<b>Heating Power</b>	1.7 kW
<b>Air Flow</b>	110 m <sup>3</sup> /h
<b>Power Consumption</b>	7 W
<b>Noise Level</b>	48 dB
<b>Weight</b>	1 kg
<b>Water Fitting</b>	Ø 16 mm

Fig 4 - Remove the plugs on the inlet and outlet of the radiator fan heater before installing the hoses.  
Heater Mounting Cutout: 195 x 135 mm (L x H) x 170 mm depth clearance.

## 2. Hot Water System Layout

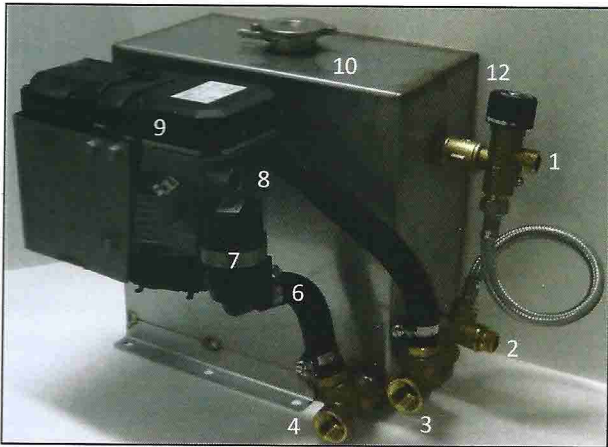


Fig 5 – Heater component location

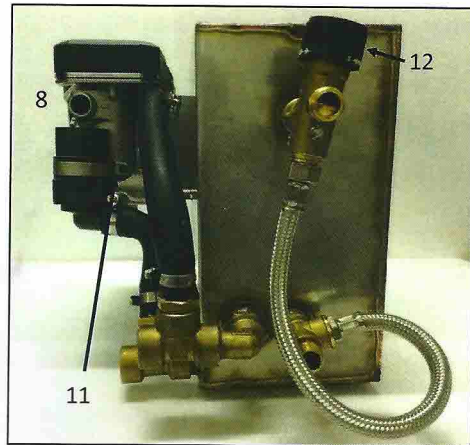


Fig 6 – Fuel Connection

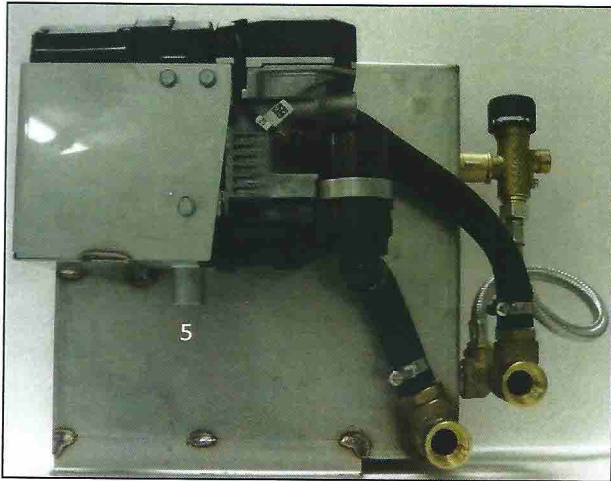


Fig 5A – Exhaust Outlet

ITEM	DESCRIPTION
1	HOT WATER OUTLET
2	FRESH WATER INLET
3	RADIATOR FAN HEATER OUTLET
4	RADIATOR FAN HEATER INLET
5	EXHAUST OUTLET
6	CIRCULATION PUMP INLET
7	CIRCULATION PUMP
8	COMBUSTION AIR INLET
9	HEATER
10	BUFFER TANK
11	FUEL CONNECTION
12	MIXING VALVE

### 3. Step by Step Installation

- 3.1 Place the heater in your desired location to predetermine the position of the mounting holes, exhaust outlet, fuel line and electrical wiring.
- 3.2 Drill the 10mm mounting holes to secure the heater. When drilling the mounting holes, ensure that you allow clearance for chassis rails, water tanks, wiring harness etc. (Fixing hardware not supplied).

### 4. Combustion Air

- 4.1 Connect the combustion air tube (8) to the heater (Fig. 5 & 6) utilising the 25mm clamp.
- 4.2 Connect the combustion air silencer to the other end of the combustion air tube (Fig. 7)

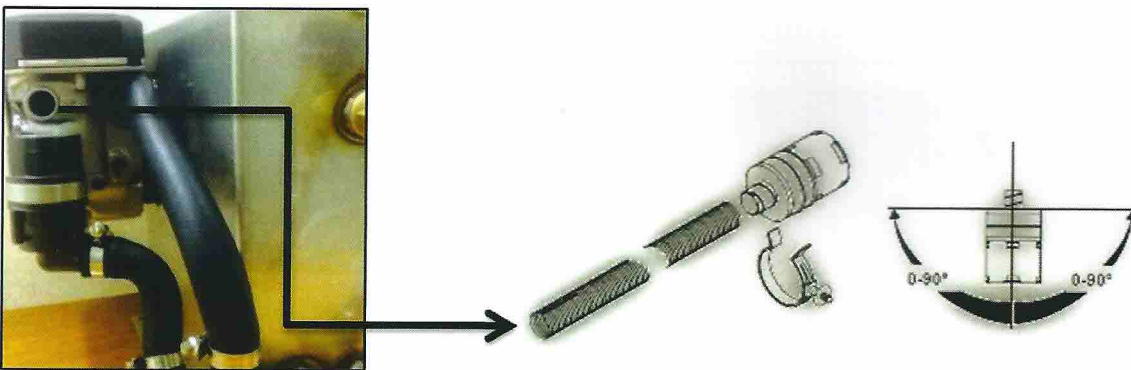


Fig 7 - Combustion filter, tube and clamps are all supplied in the kit.



*The combustion air tube must be positioned in such a way that it cannot be obstructed by other objects.  
Opening for combustion air must be located so that it cannot become clogged with dust and is protected from water ingress and located away from direct heat source.  
Ensure that the hose clamps supplied in the kit are used.*

## 5. Exhaust System

- 5.1 Install the stainless steel exhaust pipe using the 25mm exhaust clamp to the exhaust gas outlet (Fig. 5A) (5). Webasto can supply exhaust lagging if required.



The exhaust pipe temperature is above 250°C. Ensure that the end cap is properly mounted and pointing downwards. The exhaust **must not** point in the direction of travel. **The exhaust must be secured and away from heat sensitive components, vehicle fuel lines and harnesses.**

**Note:** If the exhaust pipe is going through the wooden floor, Webasto can supply exhaust lagging if required.

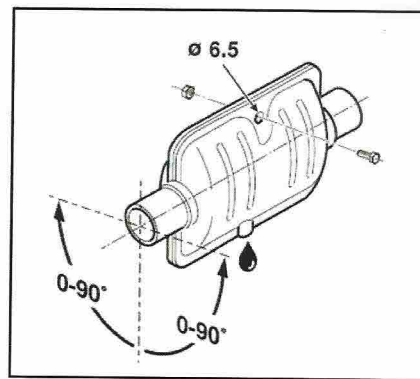


Fig 8 - Exhaust muffler is supplied in the kit, there is a drain hole at the bottom, which is the condensation drain. Ensure the muffler is installed correctly to allow any condensation to drain. Mounting hardware with a bracket is supplied in the kit.

## 6. Electrical System

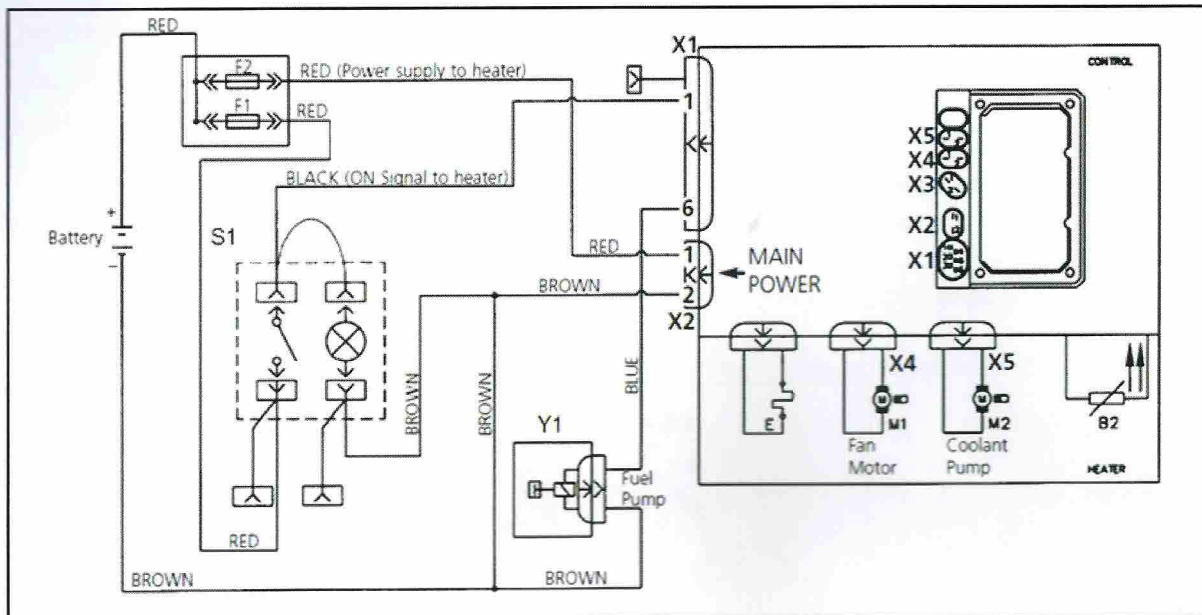


Fig 9 - Electrical Wiring Diagram

ITEM	DESCRIPTION	FUNCTION
F1	FUSE 1A	TIMER / SWITCH
F2	FUSE 20A	HEATER
S1	SWITCH	MAIN ON/OFF
X1	PLUG CONNECTOR, 6 PIN	MAIN PLUG (+,-)
X2	PLUG CONNECTOR, 2 PIN	MAIN PLUG
Y1	METERING PUMP	FUEL PUMP

Fig 10 - Electrical connection functions



## 6.1 Wiring Harness (Plug & Play)

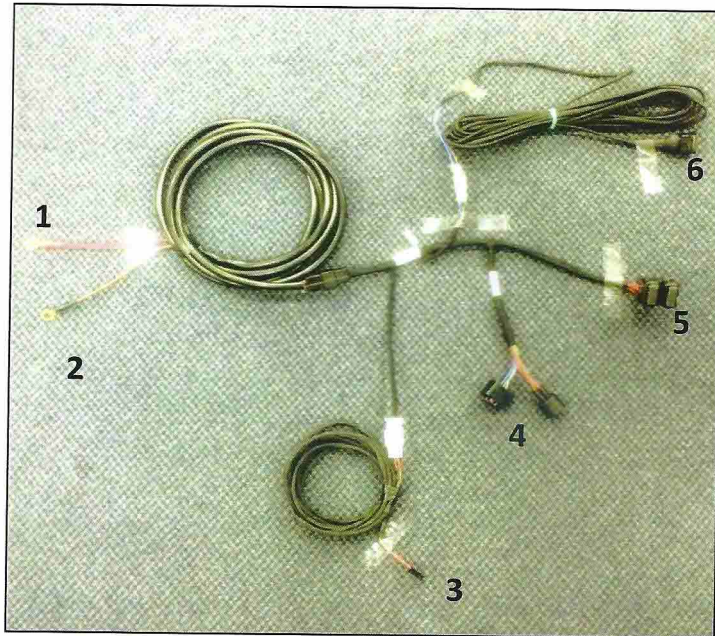


Fig 11 - Main Wiring Harness. All connections are labelled to ensure correct wiring.

ITEM	DESCRIPTION
1	BATTERY POSITIVE (RED) (Fig 15)
2	BATTERY NEGATIVE (BROWN) (Fig 15)
3	CONTROLLER PLUG X1 & X2 (Fig 14)
4	HEATER PLUGS (Fig 17)
5	FUSE BLOCK
6	FUEL PUMP PLUG (Fig 16)

## 6.2 Controller

The PHEC Heater can be operated with two different controllers.

### 6.2.1 Digital Multi Controller



Fig 12 – Digital Multi Controller

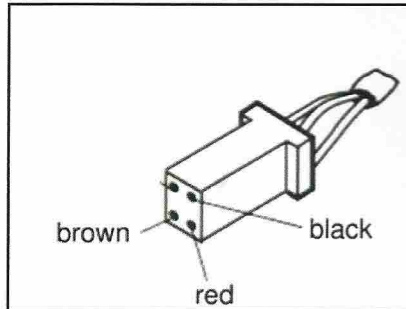


Fig 13 - 4 pin timer plug

The harness is supplied with a 4 pin timer plug for the timer connection (Fig 13).

**Note:** Refer to the PHEC Digital Multi Controller Quick User Guide for operational information.

### 6.2.2 ON/OFF Switch

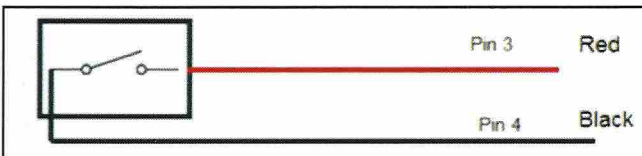


Fig 14 – On/Off Switch connection.

**Note:** The harness is supplied with a 4 pin timer plug for the timer connection (Fig 13). If the timer option is not used and an On/Off switch is used in its place (Fig 14), cut off the 4 pin plug (Fig 13) and connect the switch in between the red and black wire (Fig 13), the brown wire is not required.

## 6.3 Battery Connections

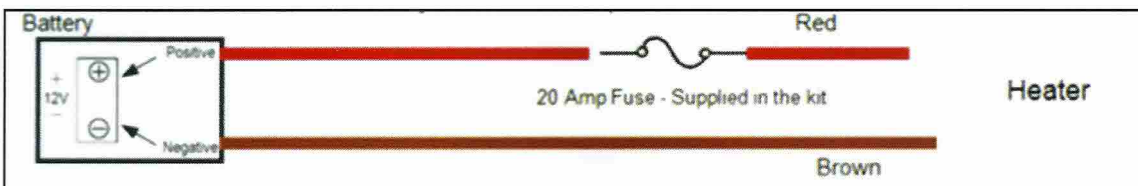


Fig 15 – Battery connection

**Note:** Ensure that the red positive and brown negative is connected directly to the house battery for correct shut down cycle, using the fuse supplied in the kit. (Fig 15)

## 6.4 Fuel Wiring

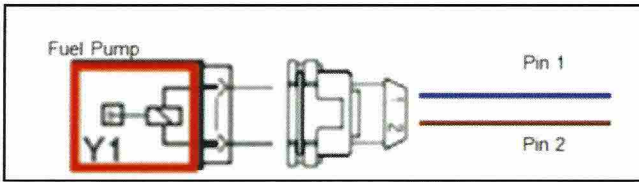


Fig 16 – Fuel pump connection

## 6.5 Heater Wiring (Main Plugs Fig. 11)

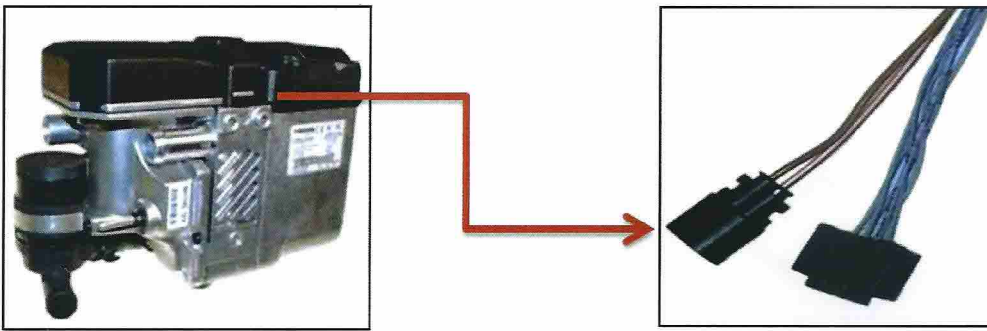


Fig 17 – Main plugs to the heater X1 & X2.

The specific wiring harness is supplied in the kit with all connections. The wiring harness is play & plug. The main plugs X1 & X2 connect to the top of the heater and they can only connect one way.

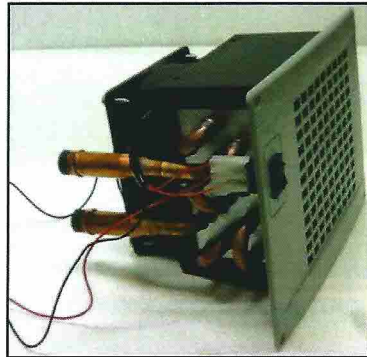


Fig 18– Wiring for the radiator fan heater.

Connect the red wire from heater switch to 12V positive and the black wire to negative. The heater is fitted with a two speed fan switch.

## 7. Fuel System

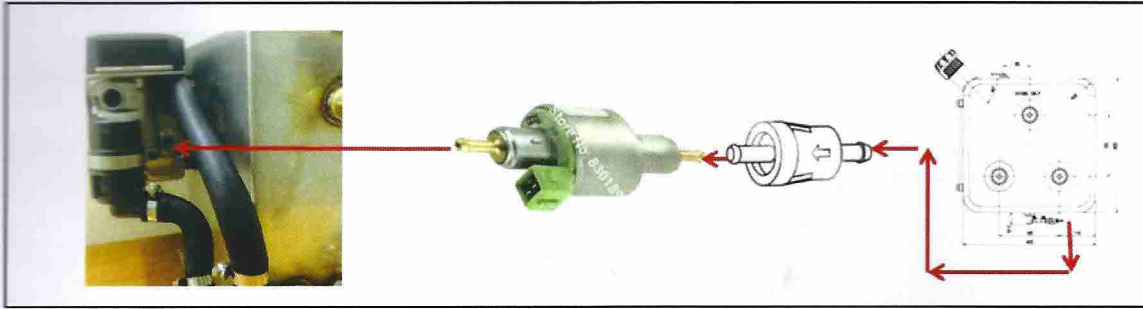


Fig 19 The kit is supplied with fuel pump, fuel filter, fuel line connections, hose clamp and 6m of fuel line. Follow the direction of flow as indicated on the fuel pump and the fuel filter.

### 7.1 Fuel Vibration Dampener



Fig 20 – Fuel pump, vibration dampener and mounting kit supplied in the kit.

### 7.2 Installation - Fuel Pump

Ensure that the fuel pump is installed with the clamp and the vibration rubber mount supplied in the kit. This will reduce resonance through the vehicle (Fig. 20).

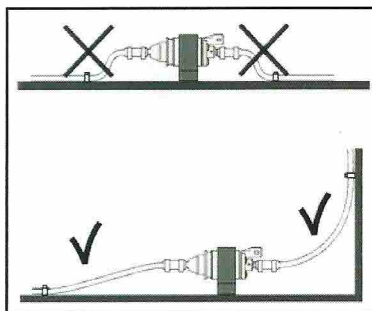


Fig 21 Fuel pump installed with vibration rubber mount

## 8. Mixing Valve

The mixing valve (Fig 6) (12) is located at the hot water outlet on the tank. The user will achieve the desired water temperature by turning the knob on top of the valve (Fig 23) in the desired direction (clockwise or anticlockwise) in order to obtain water temperature between 38°C-55°C with a tolerance of  $\pm 7^{\circ}\text{C}$ .

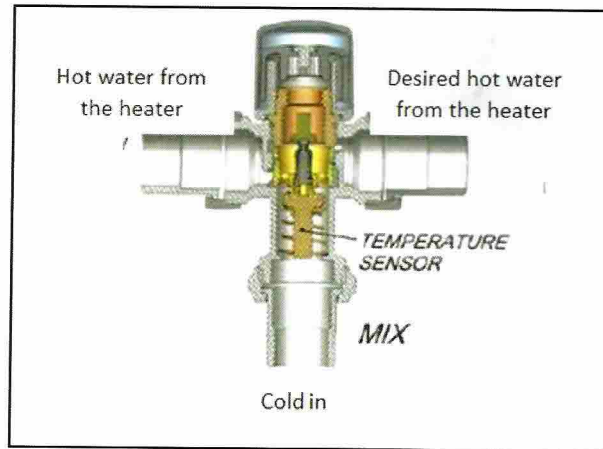


Fig 22 – Webasto mixing valve



CHARACTERISTICS OF THERMOSTATIC MIXING VALVE	
TEMPERATURE RANGE	38-55°C $\pm 7^{\circ}\text{C}$
FLOW RATE	1 BAR / 1.3 L/h
MAXIMUM TEMPERATURE	110°C
MAXIMUM PRESSURE	10 BAR / 145 psi
W	Hot Water In
BV	Hot Water out
KV	Cold Water In

Fig 23 – Webasto mixing valve, the mixing valve is fully installed ready to connect to the water circuit.



**A mixing valve must be installed to avoid scolding**

## 9. Water Circuit

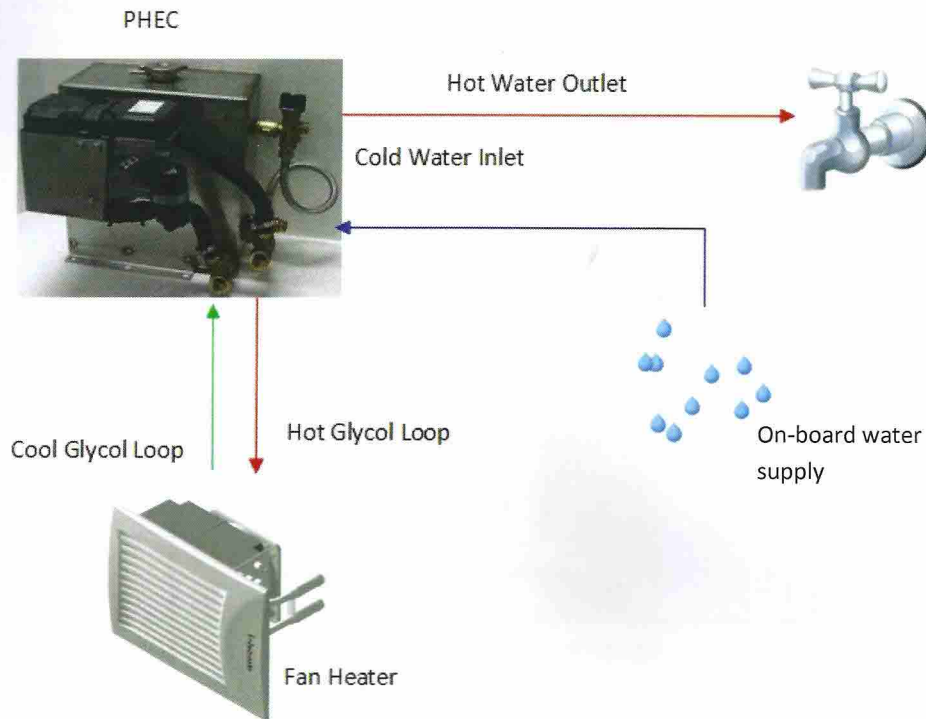


Fig 24 – Cold and hot water circuit. (Ensure that the maximum flow rate is 10L /min)

## 10. Radiator Air Fan Heater Circuit - Option

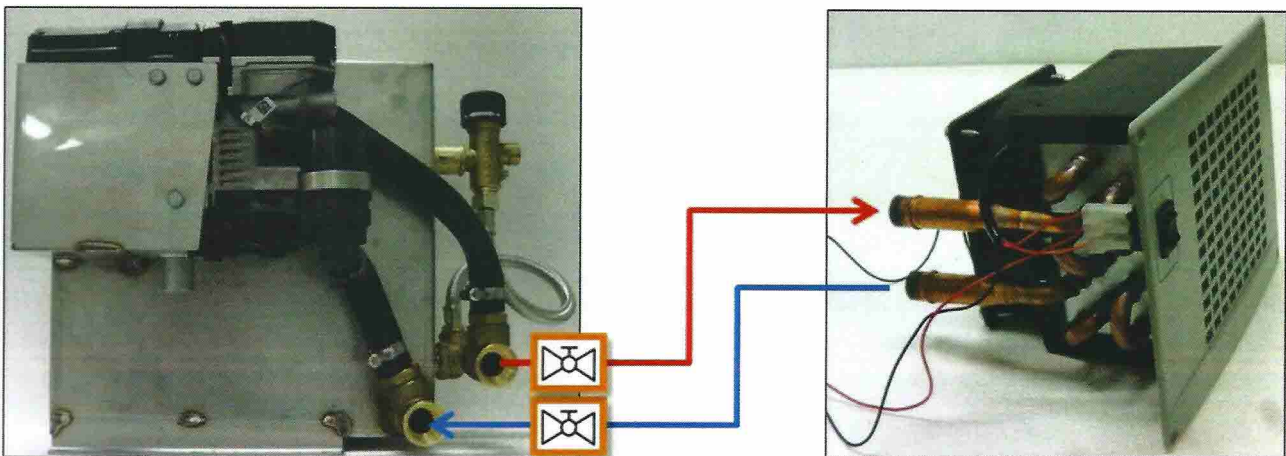


Fig 25 The kit is supplied with brass ball valves, during the summer season the ball valves can be shut off to avoid any radiant heat passing in to the cabin. Remove the plugs on the inlet and outlet of the radiator fan heater before installing the hoses. Heater Mounting Cutout: 195 x 135 mm (L x H) x 170 mm depth clearance. The air fan heater can be mounted down on the kickboard or side of the cabinet, or as low as possible. Maximum length of the coolant hose is 3 meters. The kit is supplied with 3m of insulated  $\frac{3}{4}$  rubber hose. Ensure that there is a consistent flow of coolant to the radiator fan.

## 11. Start-up Sequence: Starting the Heater for the very first time

1. Ensure that the heater is bolted and secured.
2. Ensure all electrical wiring is connected and secured.
3. Ensure that the combustion air tube and silencer are connected.
4. Ensure the exhaust is connected.
5. Ensure all water hoses are connected and secured.
6. Test for any water leaks by pressurising the water system via the vehicle water pump.
7. If a radiator fan heater is connected ensure that the coolant lines are connected and secured.
8. Check there are no kinks on the coolant lines.
9. Ensure that the fuel line and fuel pump are connected and secured.
10. Fill the 15L buffer tank with coolant mixture; 2 parts coolant to 1 part water. (Standard glycol sold at any service station).
11. Ensure all fuel connections and clamps are connected and secured.
12. Fill up the fuel tank.
13. If Radiator Air heater option is being used, open the brass ball valves.
14. Ensure that the battery connections are connected and secured.
15. Ensure the fuse is installed. (Check amperage 20A).
16. Bleed the fuel system. (See Section 12 for Fuel Line bleeding).
17. Bleed the coolant the line. (See Section 13 for Coolant Line bleeding)
18. To allow full functional test of the heater (hot water & air) run the heater for at least an hour.

## 12. Fuel Line Bleeding Tip

Turn the heater on and with the start-up sequence, the process of the fuel pump will operate. During this operation fuel will be delivered to the heater. Depending on the length of the fuel line this may take a few attempts.

During the process the heater will try to start twice and if the fuel has not being delivered, it will enter in to a fault mode.

You will need to reset the heater by following the reset procedure in section 16.

## 13. Coolant Line Bleeding (Radiator Fan Heater Option)

If the cabin heating option is used ensure you bleed the coolant lines.

Turn the heater on and undo the radiator cap on the buffer tank to let any air bubbles out or you can also bleed by releasing a coolant line. Once the system is bled ensure there are no coolant leaks.

## 14. Operation

The Thermo Top E/PHEC heater can be installed in a wide range of applications. This is a drop in solution designed by Webasto Thermo & Comfort Australia to minimize the installation time for the manufacturer and optimize the heating system. To meet the high quality standards of Webasto products, only qualified and authorized installers are allowed to perform the installation. The PHEC system designed by Webasto Australia has 15L stainless steel glycol tank. The glycol used for the system is standard glycol used in automotive industry sold at any service station or auto parts retailer. The proportion of glycol used, 2 parts glycol and 1 part water.

### 14.1 Switching ON

The heater is simply designed to turn on via the controller and is thermostatically controlled. The coolant circulation pump, glow plug and combustion air fan starts operation and after approximately 60 seconds combustion starts (audible combustion sound). After the coolant has reached the set point of 80°C the heater will automatically adjust its heat output to a lower operation range (partial heat load output). If the temperature of the coolant continues to rise and climb over 80°C at the heater outlet, the heater will cycle off. When the coolant temperature falls below 65°C the heater will restart and repeat the heating cycle. On initial start-up it will take 25-30 mins to heat the coolant to around 80°C.

#### 14.1.1 Radiator Fan Heater (Cabin Heating Option)

- Turn the cabin heater onto high fan speed.
- The cabin heater is now consuming energy from the coolant and will produce 50-55°C of hot air.

#### 14.1.2 Hot Water

Adjust the tempering valve half way between maximum hot and maximum cold (half turn)

Turn the water pump on and adjust the tempering valve to obtain the desired outlet temperature.

(Cold water inlet temperature, will affect the hot water output temperature)

Refer Section 8 for the operation of mixing valve.

### 14.2 Switching OFF

When heating is no longer required, switch the heater off by the means of the ON/OFF toggle switch or the timer option on the unit. Never turn off the heater by the main power supply. The combustion will be extinguished, followed by a shutdown cooling cycle of approximately 90 seconds.



## 15. Preventative Maintenance

The heater requires minimum maintenance to keep it in good operating condition:

1. Clean the heater compartment from any accumulated debris or dust.
2. Inspect all components for wear and damage
3. Check air intake and exhaust for any restriction.
4. Check fuel line for damage, restriction, kinks or loose connections
5. Inspect all coolant lines and clamps for leakage or damage
6. Check water coolant and fuel connections for leaks, tighten hose clamps if necessary.
7. Check glycol level, top up if necessary. (Standard glycol sold at any auto parts retail store).

## 16. Reset Procedure

The heater is designed with a lockout safety feature built in to the control unit. After 3 unsuccessful start-up attempts, the heater will lock itself out from any further starts. The heater may also enter lockout mode after experiencing overheating conditions.

### Reset Lockout Mode

1. Turn on the heater and remove the 20A fuse.
2. Wait for a few minutes then reinsert the fuse
3. Restart the heater and test.

## 17. Trouble Shooting

FAILURE SYMPTOMS	PROBABLE CAUSE	REMEDY
Coolant heater switches off automatically (Fault lockout)	No combustion after start or automatic restart  Flame extinguished during operation  Heater overheats  Vehicle electric system voltage too low	Switch off heater momentarily and switch on once again  Switch off heater momentarily and switch on once again  Check coolant lines for obstruction, for closed valves and kinks. Check coolant level. Allow heater to cool down, reset over heat limiter, switch-off heater momentarily and switch on once again  Charge battery, Switch off heater momentarily and switch on once again
Heater expels black smoke from exhaust	Combustion air and/or exhaust ducting blocked	Check combustion and exhaust ducting for obstructions

## Webasto's Authorised Dealer Network

NSW	<b>Albury Wodonga RV World</b> 1A Watson Street WODONGA 3690	<b>02 6024 4222</b>	<a href="mailto:andrew@awrvworld.com.au">andrew@awrvworld.com.au</a> Andrew Brown
	<b>Australian Motor Homes</b> 31 Pacific Hwy BENNETTS GREEN 2290	<b>02 4948 0433</b> fax 02 4948 0466	<a href="mailto:enquiries@australianmotorhomes.com.au">enquiries@australianmotorhomes.com.au</a> Geoff Bithery
	<b>Varley Group</b> 2 Sheridan Close MILPERRA 2214	<b>02 9771 3838</b> fax 02 4964 0499	<a href="mailto:adan.hoerner@varleygroup.com">adan.hoerner@varleygroup.com</a> Adan Hoerner
	<b>Wagga Car Radio</b> 379 Edward Street WAGGA WAGGA 2650	<b>02 6925 6111</b> fax 02 6925 5862	<a href="mailto:admin@wcr.net.au">admin@wcr.net.au</a> Geoff Maurer
VIC	<b>Carac</b> 2 Zenith Road DANDENONG 3175	<b>03 9794 7977</b> fax 03 9793 4410	<a href="mailto:sales@carac.com.au">sales@carac.com.au</a> Steve Bosman
	<b>Caravan Innovations</b> 43 McDougall Road SUNBURY 3429	<b>03 9740 0841</b> <b>0417 036 116</b>	<a href="mailto:caravaninnovations@outlook.com">caravaninnovations@outlook.com</a> Travis Inness
	<b>Canterbury Caravans</b> 138 Canterbury Road BAYSWATER 3153	<b>03 9729 8188</b> fax 03 9761 4428	<a href="mailto:parts@canterburycaravans.com.au">parts@canterburycaravans.com.au</a> David Cooke
	<b>Cool Factor</b> 5/314 Governor Road BRAESIDE 3195	<b>03 9587 5244</b> fax 03 9587 5277	<a href="mailto:cfactor@bigpond.net.au">cfactor@bigpond.net.au</a> Noel Thomas
	<b>Retro Looms</b> 42 Renver Road CLAYTON 3168	<b>03 8521 3021</b>	<a href="mailto:darren@retrolooms.com.au">darren@retrolooms.com.au</a> Darren Hellenen
<b>RV Sales Centre (THL)</b> Central West Business Park, Building 2, 9 Ashley Street BRAYBROOK 3019	<b>03 8398 8848</b>	<a href="mailto:info@rvsalescentre.com.au">info@rvsalescentre.com.au</a>	
QLD	<b>Caravan &amp; RV Works</b> 12-14 Enterprise Street KUNDA PARK 4556	<b>07 5445 6662</b> fax 07 5445 6663	<a href="mailto:admin@caravanandrworks.com.au">admin@caravanandrworks.com.au</a> Gary Scambler
	<b>Caravan Services CRS</b> 4/68-72 Perrin Dr UNDERWOOD QLD 4119	<b>07 3209 5044</b> fax 07 3209 5663	<a href="mailto:garry@caravanservices.com.au">garry@caravanservices.com.au</a> Garry Hogarth
	<b>Multivolt</b> 2/20 Carlo Drive CANNONVALE 4802	<b>0402 479 483</b> fax 07 4946 1436	<a href="mailto:james@multivolt.com.au">james@multivolt.com.au</a> James Lang
SA	<b>Roof Rack City</b> 37 Gilbert Street ADELAIDE 5000	<b>08 8211 7600</b> fax 08 8211 7660	<a href="mailto:ian@roofracksa.com.au">ian@roofracksa.com.au</a> Ian Hume
WA	<b>Care A Van</b> 52 Mordaunt Circuit CANNING VALE 6155	<b>08 9256 3300</b> fax 08 9256 4300	<a href="mailto:jamie@careavan.com.au">jamie@careavan.com.au</a> Jamie Reeves
	<b>Pilgrim RV</b> 10/9 Inspiration Drive WANGARA 6065	<b>08 9303 4494</b> fax 08 9303 4483	<a href="mailto:aaron@caravanandrparts.com.au">aaron@caravanandrparts.com.au</a> Aaron Pilgrim
TAS	<b>Able Marine</b> 61 Ferry Road KETTERING 7155	<b>03 6267 5031</b>	<a href="mailto:ablemarine@optusnet.com.au">ablemarine@optusnet.com.au</a> Angelo Perry
	<b>Tas Mobile Caravan Service</b> 83 Meander Valley Road WESTBURY 7303	<b>0458 615 003</b>	<a href="mailto:tasmobile@live.com.au">tasmobile@live.com.au</a> Peter Booth

Webasto Thermo & Comfort Australia Pty Ltd

423-427 The Boulevard

Kirrawee NSW 2232

Ph: +61 (0)2 8536 4800

Fax: +61 (0)2 8536 4899

[info@webasto.com.au](mailto:info@webasto.com.au)

[www.webasto.com.au](http://www.webasto.com.au)

