Webasto
Feel the drive

Integriertes Heizgerät
Integrated Heater
Riscaldatore integrato

Einbauanweisung
Installation Instructions
Istruzioni di montaggio

DUAL TOP
RHA 100 / 101 / 102

www.butlertechnik.com

Improper installation or repair of Webasto heating and cooling systems can cause fire or the leakage of deadly carbon monoxide leading to serious injury or death.

To install and repair Webasto heating and cooling systems you need to have completed a Webasto training course and have the appropriate technical documentation, special tools and special equipment.

Only genuine Webasto parts may be used. See also Webasto air and water heaters accessories catalogue.

NEVER try to install or repair Webasto heating or cooling systems if you have not completed a Webasto training course, you do not have the necessary technical skills and you do not have the technical documentation, tools and equipment available to ensure that you can complete the installation and repair work properly.

ALWAYS carefully follow Webasto installation and repair instructions and heed all WARNINGS.

Webasto rejects any liability for problems and damage caused by the system being installed by untrained personnel.

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1 General

For installation and repair of a Webasto Dual Top RHA 100 / 101 / 102 integrated heater you will need technical documentation, a special training by Webasto, special tools and special equipment.
You also have to be certified to work on 230 V electric systems.
Installation and all other jobs carried out by not certified persons can harm you, the Dual Top and the vehicle. In that case, Webasto will refuse all liability.

Only use genuine Webasto parts. See the Webasto air and water heaters accessory catalogue and Webasto camping catalogue.

2 Statutory regulations governing installation

The Dual Top RHA 100 / 101 / 102 heaters have been type-tested and approved in accordance with EC Directives 72/245/EEC (EMC) and 2001/56/EC (heater) with the following EC permit numbers:

e1 03 5000
e1 00 0195

Installation is governed above all by the provisions in Annex VII of Directive 2001/56/EC.

NOTE
The regulations of these guidelines are binding in the scope of the Directive 70/156/EEC and/or 2007/46/EC (for new vehicle models from 29/04/2009) and should also be observed in countries in which there are no special regulations.

See chapter 2.1, "Extract from Directive 2001/56/EC Annex VII"

The Dual Top complies with all applicable standards for this type of product.
When installing the Dual Top heater and related components, make sure to follow all local regulations (e.g. 98/83/EC Quality of Drinking Water, DIN 2001-2 Drinking Water Supply, DVGW W 291 Cleaning and Disinfection etc.).

Make sure that during the installation the legal requirements for the permits of the vehicle are not violated, in particular for the heater fixation and the routing of the exhaust lines.

Installation of the Dual Top RHA 101 / 102 heater and related components must be in accordance with IEC 60364 (“Electrical installations in caravan parks and caravans”).

IMPORTANT
Failure to follow the installation instructions and the notes contained therein will lead to all liability being refused by Webasto. The same applies if repairs are carried out incorrectly or with the use of parts other than genuine spare parts. This results in the type approval of the heater being voided, and with it the general **homologation of the vehicle.**

NOTE
For vehicles with an EU permit, no entry in accordance with § 19 Sub-Section 4 of Annex VIII b to the Road Traffic Act is required.

2.1. Extract from Directive 2001/56/EC Annex VII

Start of extract.

ANNEX VII

REQUIREMENTS FOR COMBUSTION HEATERS AND THEIR INSTALLATION

1. GENERAL REQUIREMENTS

1.7.1. A clearly visible tell-tale in the operator's field of view shall inform when the combustion heater is switched on or off.

2. VEHICLE INSTALLATION REQUIREMENTS

2.1. Scope

2.1.1. Subject to paragraph 2.1.2, combustion heaters shall be installed according to the requirements of this Annex.

2.1.2. Vehicles of category O having liquid fuel heaters are deemed to comply with the requirements of this Annex.

2.2. Positioning of heater

2.2.1. Body sections and any other components in the vicinity of the heater must be protected from excessive heat and the possibility of fuel or oil contamination.

2.2.2. The combustion heater shall not constitute a risk of fire, even in the case of overheating. This requirement shall be deemed to be fulfilled if the installation ensures an adequate distance to all parts and suitable ventilation, by the use of fire resistant materials or by the use of heat shields.

2.2.3. In the case of M2 and M3 vehicles, the heater must not be positioned in the passenger compartment. However, an installation in an effectively sealed envelope which also complies with the conditions in paragraph 2.2.2 may be used.

2.2.4. The label *(see chapter 7, "Identification plate")* referred to in paragraph 1.4, or a duplicate, must be positioned so that it can be easily read when the heater is installed in the vehicle.

2.2.5. Every reasonable precaution should be taken in positioning the heater to minimise the risk of injury and damage to personal property.

2.3. Fuel supply

2.3.1. The fuel filler must not be situated in the passenger compartment and must be provided with an effective cap to prevent fuel spillage

2.3.2. In the case of liquid fuel heaters, where a supply separate to that of the vehicle is provided, the type of fuel and its filler point must be clearly labelled.

2.3.3. A notice, indicating that the heater must be shut down before refuelling, must be affixed to the fuelling point. In addition a suitable instruction must be included in the manufacturer's operating manual.

2.4. Exhaust system

2.4.1. The exhaust outlet must be located so as to prevent emissions from entering the vehicle through ventilators, heated air inlets or opening windows.

2.5. Combustion air inlet

2.5.1. The air for the combustion chamber of the heater must not be drawn from the passenger compartment of the vehicle.
2.5.2. The air inlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.

2.6. Heating air inlet

2.6.1. The heating air supply may be fresh or recirculated air and must be drawn from a clean area not likely to be contaminated by exhaust fumes emitted either by the propulsion engine, the combustion heater or any other vehicle source.

2.6.2. The inlet duct must be protected by mesh or other suitable means.

2.7. Heating air outlet

2.7.1. Any ducting used to route the hot air through the vehicle must be so positioned or protected that no injury or damage could be caused if it were to be touched.

2.7.2. The air outlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.

End of extract.

3 Use of the integrated air / water heater

The integrated Dual Top RHA 100 / 101 / 102 air and water heaters from Webasto are used for heating and to provide hot water in motorhomes and similar vehicles.
The heaters operate independently of the vehicle engine and are connected to the fuel tank and the service battery of the vehicle in each case.

4 Additional safety instructions

- If the Dual Top falls to the floor, it must be returned to Webasto for a safety inspection/repair.
- It is not allowed to paint or re-paint the Dual Top heater partly or completely.

5 Installation example

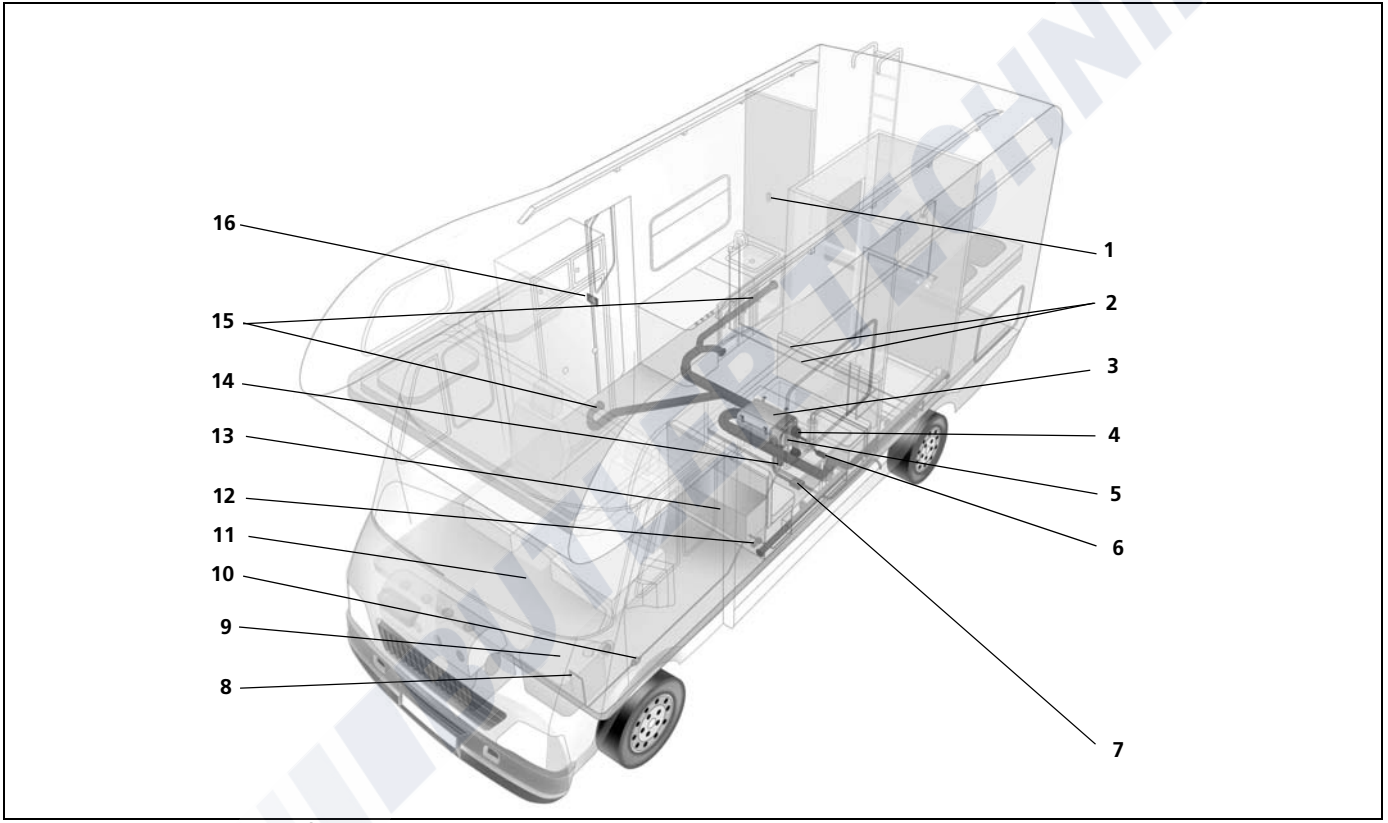


Fig. 1: Installation example for a Dual Top heater in a motorhome

1 Interior temperature sensor
2 Water lines
3 Dual Top heater
4 Dual Top cooling-air intake cover
5 Dual Top rubber bellow (heating air adapter)
6 Combustion air intake silencer
7 Exhaust silencer
8 Fuel tank connector
9 Fuel tank
10 Fuel pump
11 LED dashboard
12 Water pump
13 Water tank
14 Cooling air outlet
15 Hot air distribution
16 Control Panel

6 Heater installation

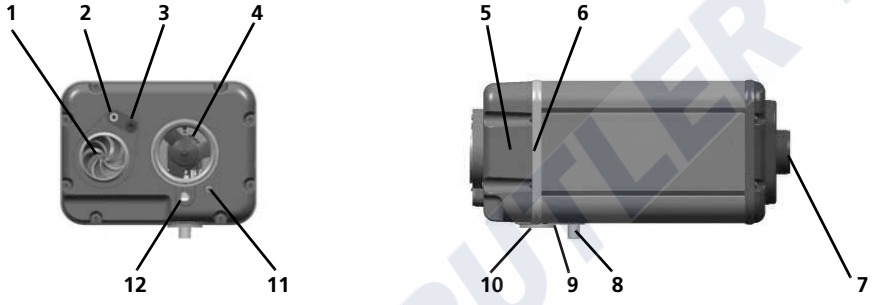
6.1. General

IMPORTANT
The regulations specified in chapter 2, "Statutory regulations governing installation" must be adhered to.

IMPORTANT
The Dual Top may not be lifted at the heating air inlet! This offsets the air fan and causes the heating air impeller to rub or block.

NOTE
Observe the installation details specified by the manufacturer of the relevant vehicle type.

6.2. Dual Top connections



1 Heating air inlet
2 Water inlet (cold)
3 Water outlet (hot)
4 Cooling air inlet
5 Housing cover with inlet interfaces
6 Wiring harness outlets
7 Housing cover with hot air outlet
8 Exhaust outlet
9 Drain hose for pressure relief valve and solenoid valve
10 Cooling air outlet
11 Fuel intake
12 Combustion air intake

Fig. 2: Connections of the heater

6.3. Installation location

At all sides of the heater there should be at least 20 mm space.

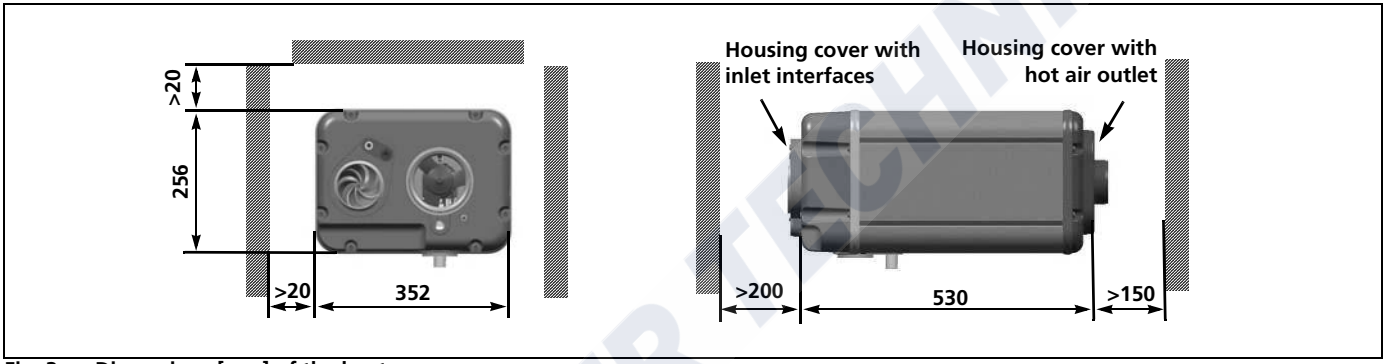


Fig. 3: Dimensions [mm] of the heater

- Space requirement for hot air outlet > 150 mm
- Length 530 mm
- Space requirement for air inlet > 200 mm
- Width 352 mm
- Height 256 mm
- Space requirement at sides > 20 mm
- Space above the heater > 20 mm

IMPORTANT
All materials located in the immediate vicinity of the heater must be heat-resistant (> 100 °C).

Heater installation

Find a suitable location for the heater.

Space for the heater:

- Make sure to have sufficient space at all sides of the heater. See Fig. 3;
- The heater must be fastened at a location in the vehicle which can withstand a weight of 35 kg;
- All parts above the water crossing level (specified for the vehicle);
- Possibility to remove the heater;
- Possibility to access and remove the housing cover with inlet interfaces of the heater.

We recommend installing the heater on the exterior of the vehicle to save space.Please also see chapter 6.6, "Additional information for exterior installation".

The information contained in chapter 6.7, "Additional information for interior installation" must also be observed for installation within the vehicle.

The installation location should always be protected against splash water and possible soiling.

Orientation of the heater:
The heater has to be mounted in a horizontal position (tolerance ± 5°), with exhaust outlet and cooling air outlet port pointing downwards. See Fig. 4.

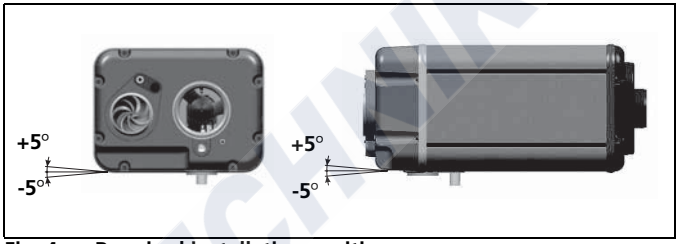


Fig. 4: Required installation position

IMPORTANT
Make sure that after installation the casing of the heater is not in contact with any parts of the vehicle body. Ensure that all moving parts can move easily. A failure to do this may result in the hot air fan, cooling air fan or another part blocking.

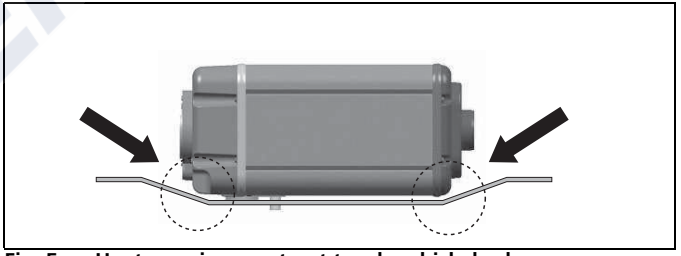


Fig. 5: Heater casing must not touch vehicle body

6.4. Connecting wiring harness

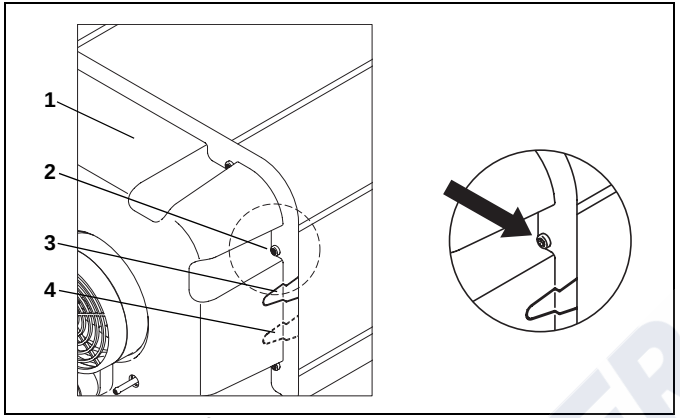


Fig. 6: Removing front cover

1. Housing cover with inlet interfaces
2. Fastening screws for housing cover with inlet interfaces
3. Opening for Dual Top wiring harness
4. Opening for wiring harness of electric heater (Dual Top RHA 101 / 102 only).

Connect the wiring harness plug X11 (12 poles) to the matching connector of the heater.

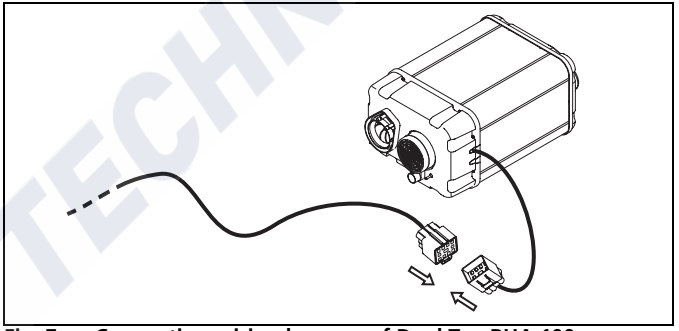


Fig. 7: Connecting wiring harness of Dual Top RHA 100

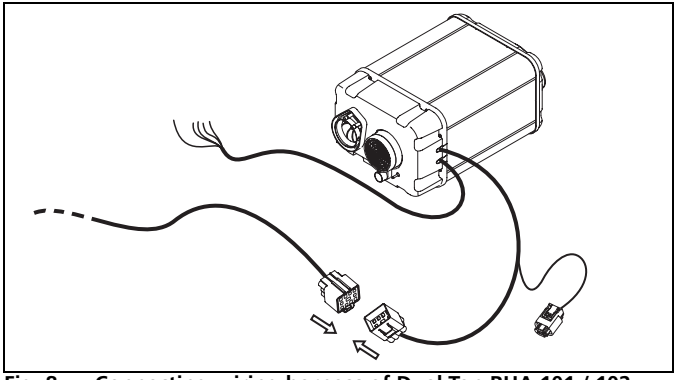


Fig. 8: Connecting wiring harness of Dual Top RHA 101 / 102

6.5. Installing the heater

- The heater is fastened on the load-bearing parts of the vehicle frame using brackets and M8 T-bolts which are integrated in the heater guide rails.
- To prevent breaks within the heater and noises, it is necessary to use vibration dampers.
  The M8 T-bolts and nuts are tightened with a torque of 22 to 25 Nm.
- Mount the heaters, brackets and vibration dampers so that the dampers are compressed by the weight of the heater.
- See Webasto product catalogue for different kinds of fixation brackets.
- At least 4 fixation points.
- Fixation of the heater only on the top or on one of the sides is not sufficient.
- Install the heater in such a way that it will not fall from the vehicle in case the vibration dampers fail.

See Fig. 9

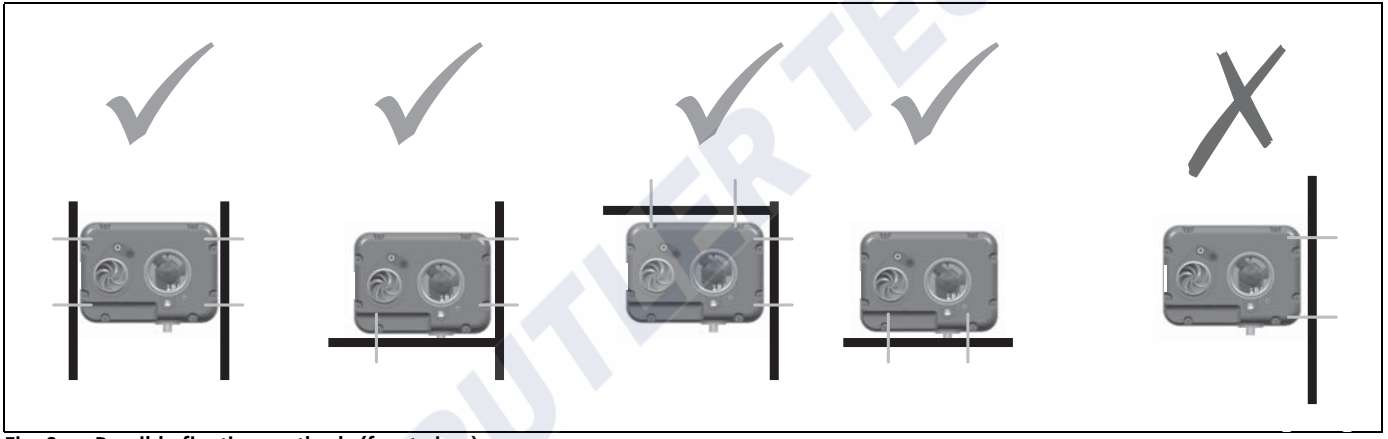


Fig. 9: Possible fixation methods (front view)

6.6. Additional information for exterior installation

- Install the heater in such a way that it will not fall from the vehicle in case the vibration dampers fail.
- The brackets must be spaced at least 200 mm apart. See Fig. 10.
- To minimize energy loss, it is recommended that the hot air hoses which run outside the vehicle be insulated.

A basic application possibility for individually fastening the Dual Top is included in the delivery scope.

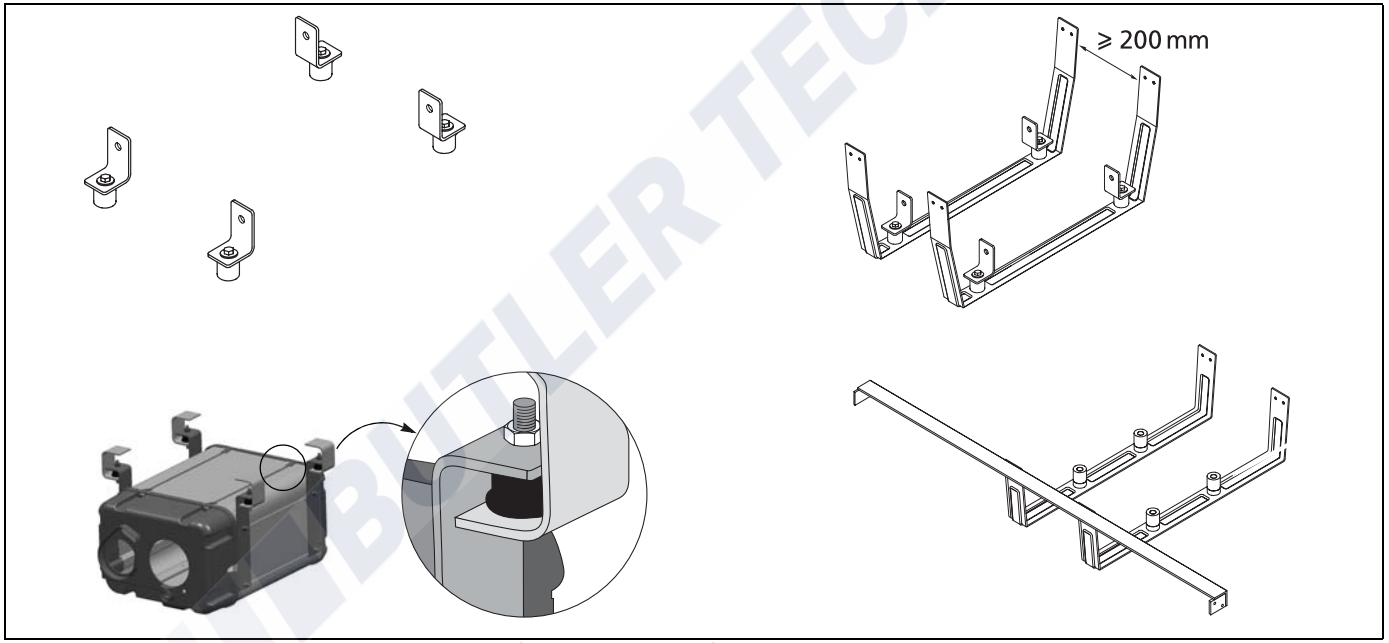


Fig. 10: Fixation brackets and vibrations dampers (Webasto examples)

6.7. Additional information for interior installation

IMPORTANT
Both the Dual Top and the hot air hoses must be installed firmly closed off outside the range of the vehicle occupants and parts which are not temperature-resistant (e.g. in an installation box or behind furniture, see Fig. 11).

- The minimum distances to the heater from chapter 6.3, "Installation location" (Fig. 3) must be complied with.
- All materials in the immediate vicinity of the heater must be heat-resistant (> 100 °C).
- The Dual Top must be installed so that no parts which are not heat-resistant can fall on the heater or block the air inlet and outlet.
- Accidental touching by the vehicle occupants must be avoided.
- The heater should be accessible when maintenance or repairs are carried out.
- To ensure uniform air circulation, a ventilation opening of at least 100 cm^2 must be provided. Also see chapter 9.1, "Heating air intake".

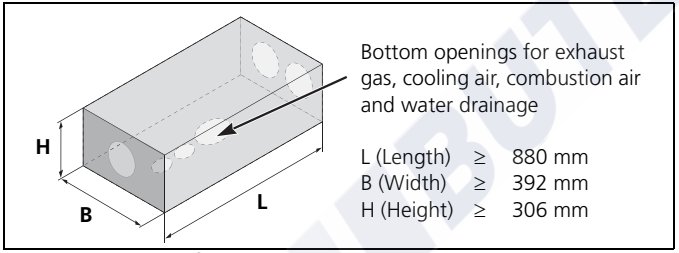


Fig. 11: Example of installation box with minimum inside dimensions

6.7.1. Sealing off of exhaust gas to outside

The exhaust gas must always be routed to the outside and may not enter the passenger compartment. Also see chapter 2, "Statutory regulations governing installation" for requirements of exhaust system and chapter 14, "Exhaust system".

IMPORTANT
Use the foam seal approved by Webasto to seal off the heater (and in particular the exhaust pipe) to the outside (see Fig. 12). Webasto assumes no liability for defects or damage resulting from the use of other materials.

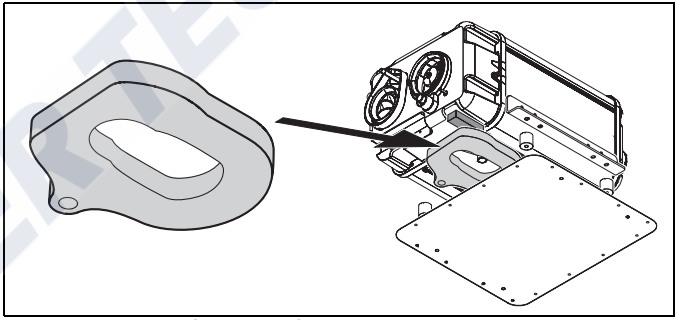


Fig. 12: Webasto foam seal for interior installation

First, a hole in the size and with the spacing of the two sections of the seal must be drilled in the vehicle floor. The seal can be used as a template for this purpose.

Then a clear positioning of the heater must be ensured. After the installation, the heater may not change either its position or that of the seal.

As the escaping exhaust gases can reach extremely high temperatures, a temperature-resistant (up to 90 °C) sealing compound should be used to seal off the floor.

When installing the heater, the following must also be ensured for sealing off to the outside:

- The seal is evenly compressed to 60 %.
  See Fig. 13.
  It is advisable to use vibration dampers with a height of 30 mm for this purpose.

- The exhaust pipe should be a minimum distance of 25 mm to the seal and the vehicle floor after the heater is installed.
  See Fig. 14.

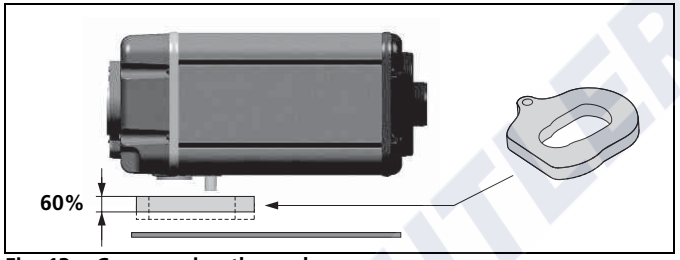


Fig. 13: Compressing the seal

IMPORTANT
To ensure the positioning of the foam seal over the entire service life of the heater, the seal must be replaced every time the heater is dismantled.

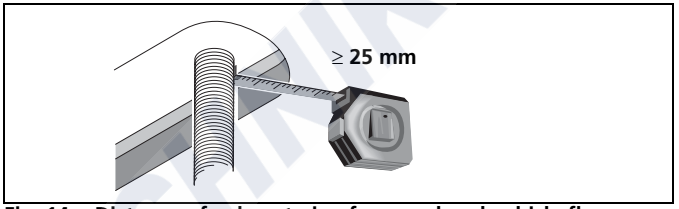


Fig. 14: Distance of exhaust pipe from seal and vehicle floor

NOTE
To guarantee proper, secure positioning of the heater and the foam seal, we recommend the "Dual Top Inside Application Kit". Using the bottom plate, the Dual Top can only be fixed in place in one position and the foam seal is simultaneously compressed to the proper dimension (see Fig. 15). If you are interested, please contact your Webasto Service Centre.

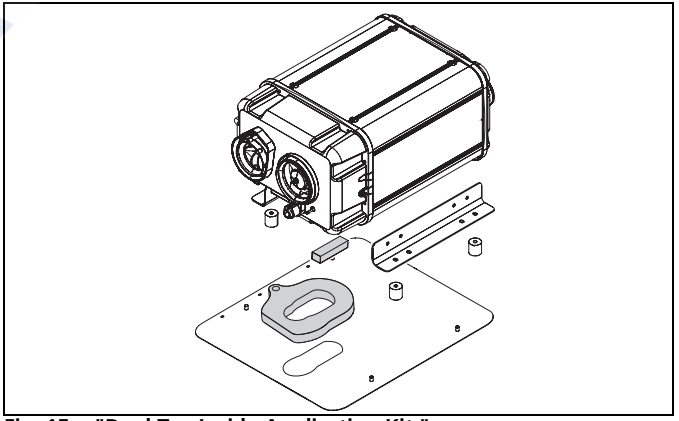


Fig. 15: "Dual Top Inside Application Kit "

7 Identification plate

The type label must be positioned so that it cannot be damaged and is clearly legible after installing the heater (otherwise, a duplicate type label must be applied in a highly visible location or in the engine compartment next to the vehicle type label).

Inapplicable years must be erased from the identification plate and the current year must be readable.

8 Hot water system

The Dual Top complies with all applicable standards for this type of product. When installing the Dual Top heater and related components, make sure to follow all local regulations (e.g. 98/83/EC, DIN 2001-2, DVGW W 291).

NOTE
During and after installation of the water system, it must be ensured that no dirt can enter into the water circuit.

To avoid leaks, 10 mm standard hose connector should be used to connect water lines or hoses to the heater (e.g. John Guest/ASP). The coolant pipes on the Dual Top are specially equipped with grooves which enable proper fastening and easy removal of the hose connectors if necessary.

- Place a thermostatic mixing valve if required.
- If no quick connection system is used, secure the lines at all connection points in a way that they can withstand pressure and are watertight.
- Fasten the hoses in a way that they cannot be damaged (e.g using hose clips).

1 Vehicle's water tank
2 Water pump
3 Cold water line
4 Water outlets
5 Optional thermostatic mixing valve
6 Hot water line
7 Dual Top heater

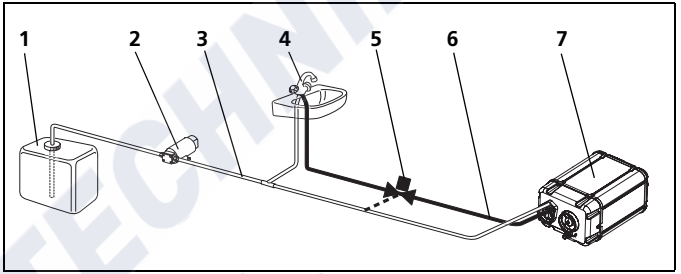


Fig. 16: Water system (scheme)

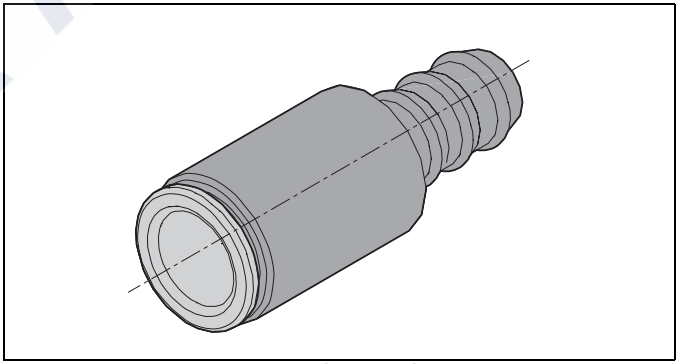


Fig. 17: Water line connection (example)

NOTE
The internal diameter of the hot water lines should be at least 8 mm.

Always use hoses, which are resistant to pressure (at least 4 bar) and hot water (90 °C).

For operating the heater it is possible to use all sanitary water pumps:
– creating a pressure up to 2.5 bar;
– closed when shut off;
– min. operating pressure 1 bar.

When using immersion pumps, the instructions from chapter 8.1, "Installation information for immersion pump systems" must also be observed.

Avoid the flow of water from the heater back into the vehicle's fresh water tank. Use one-way valves if required.

If the hot water temperature at the water outlets needs to be limited, use a thermostatic mixing valve as an option (see Fig. 16).

When connecting to a central water supply (rural or city mains) or if using a more powerful pump, a pressure reduction valve must always be installed to prevent a pressure above 2.5 bar developing in the boiler.

Route water hoses as short as possible and free of kinks. All hose connections must be secured in a way that they can withstand pressure and are watertight (also cold water hoses)! The thermal expansion of the water can cause pressures of up to 4 bar before the overpressure valve reacts.

It is recommended that all coolant hoses be mounted at a downhill slope to the heater wherever possible. Route intake and outlet pipes connected to the heater in such a way that there are no drain traps. So, if you drain the boiler, you also drain the water lines.

The water lines must be routed inside the heating air intake hose. This will avoid frozen water lines as long as the heater is operating in a proper mode (see Operating Instructions).
The Dual Top rubber bellow must be used to connect the air intake hose to the heater and secured with a clamp. See Fig. 18.

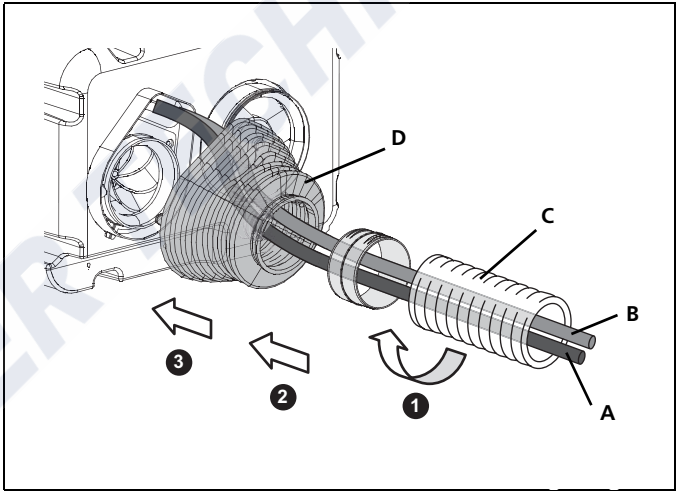


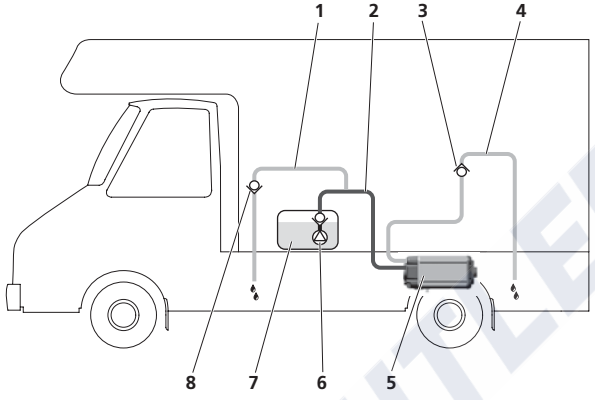
Fig. 18: Cold (A) and hot water lines (B), air intake hose (C) and Dual Top rubber bellow (D)

NOTE
Do not fasten the rubber bellow with screws which extend into the rubber bellow and housing cover with inlet interfaces. This could block the fans.

8.1. Installation information for immersion pump systems

The Dual Top application with an immersion pump system requires a "Dual Top Diving Pump" version and two additional ventilation hoses:

- One ventilation hose for the cold water line so that no water is sucked in from the vehicle water tank (fresh water tank) while draining the boiler
- One ventilation hose for the Dual Top heater



1 Ventilation hose
2 Cold water line
3 Check valve
4 Dual Top ventilation hose
5 "Dual Top Diving Pump" heater
6 Immersion pump
7 Vehicle's water tank
8 Check valve

Fig. 19: Dual Top application with an immersion pump system

Connect the ventilation hose (1) to the cold water line (2) and mount at a steep uphill slope to the check valve (8).

Position the hose (1) so that excess water flows unhindered out of the vehicle onto the ground.

IMPORTANT

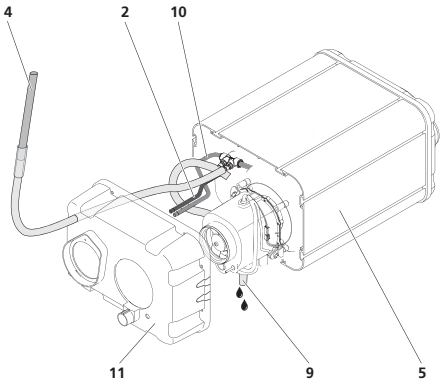
– The connection for the ventilation hose (1) and the check valve (8) must lie ABOVE the vehicle water tank (7)!
– No drain traps!

Connect the ventilation hose (4) to the hose which runs through the housing cover with inlet interfaces (11) of the Dual Top (5) and mount with a steep uphill slope to the check valve (3).

Position the hose (4) so that excess water flows unhindered out of the vehicle onto the ground.

IMPORTANT

– The ventilation hose (4) and the check valve (3) must lie ABOVE the vehicle water tank (7)!
– No drain traps!
– The ventilation hose (4) must be insulated outside the passenger compartment to avoid frost!



2 Cold water line
4 Dual Top ventilation hose
5 "Dual Top Diving Pump"heater
9 Drain hose for pressure relief valve and solenoid valve
10 Hot water line
11 Housing cover with inlet interfaces (service cap)

Fig. 20: Dual Top immersion pump version

9 Hot air system

NOTE
The heater must not be integrated into the vehicle's front heating system.

Only recirculation air mode is possible, with the heating air intake from the interior.
The recirculation mode ensures frost protection of the coolant hoses with underfloor installation. It also contributes to a high total efficiency and avoids fumes from the outside to be sucked inside.

The desired interior temperature can be adjusted at the Control Panel (5 to 35 °C). The heat is generated with a diesel-operated burner, and on the RHA 101 / 102 also with an electric heater or with combined use of both devices.
Power of the electric heater, depending on the type and setting:
RHA 101: low power = 600 W, high power = 1200 W
RHA 102: low power = 1000 W, high power = 2000 W.
The diesel powered heater automatically modulates the heating power between 1,500 W and 6,000 W depending on the output requirement (calculated from difference between selected temperature and current interior temperature).

To ensure that the heater functions satisfactorily, the flow resistance of the connected hot air system has to be minimised. Maximum pressure drop between the inlet and outlet side of the hot air line: 3.0 hPa at maximum speed of heating air ventilator.
(1 hPa corresponds to 1 mbar corresponds to 10 mm water column).
The points table for air guide parts in the Webasto air and water heaters accessory catalogue can be used to design the hot air system.

The overall flow resistance of 3.0 hPa means that 190 points must not be exceeded. Ensure that the air flow (air velocity) does not differ more than factor two comparing the two hot air distribution channels.
If the resistance of the hot air distribution channels is too high, the temperature sensors inside the heater will detect a high air temperature. This results in a higher speed of the heating air ventilator, causing then more noise and power consumption.
The hot air hoses (intake and output) must be secured with clamps or screws at their connection points.

NOTE
The installation must be checked for:
- No air short circuit between the vehicle's heating system and the heater air inlet;
- No air short circuit between the heater's air inlet and the heater's air outlet (see Fig. 21);
- No air leakage where openings have been made to route the hoses into or outside the interior.

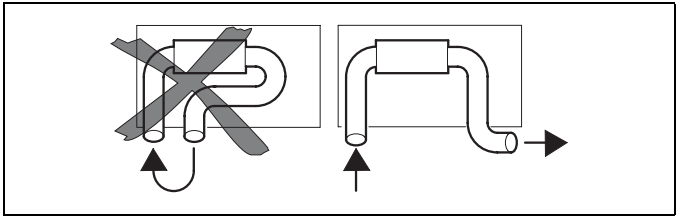


Fig. 21: Avoid short circuits

9.1. Heating air intake

9.1.1. General

NOTE
The heating air has to be drawn from the interior.

Extracting heating air from an enclosure (e.g. bottom of bed or seat box) will reduce noise coming from the heating air ventilator.

Mounting the air intake in a central area will provide an even air circulation throughout the interior.

Do not position the heating air inlet at a too low position, because of the risk that dirt or small particles will fall or be sucked in. Mount an air grille on the heating air intake if necessary.
It's recommended to extend the inlet above floor level.

Be careful that no fluids may be spilled into the air inlet.

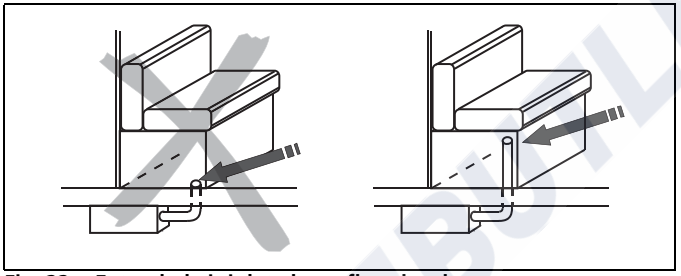


Fig. 22: Extended air inlet above floor level

The internal diameter of the air intake hose (when used) has to be 90 mm.

9.1.2. Installation

The length of air intake hose outside the interior shall be as short as possible, ideally less than 1 m.
This is to avoid heat losses and to protect the water pipes from freezing.
For the same reason, thermal insulation of the air hose is required.

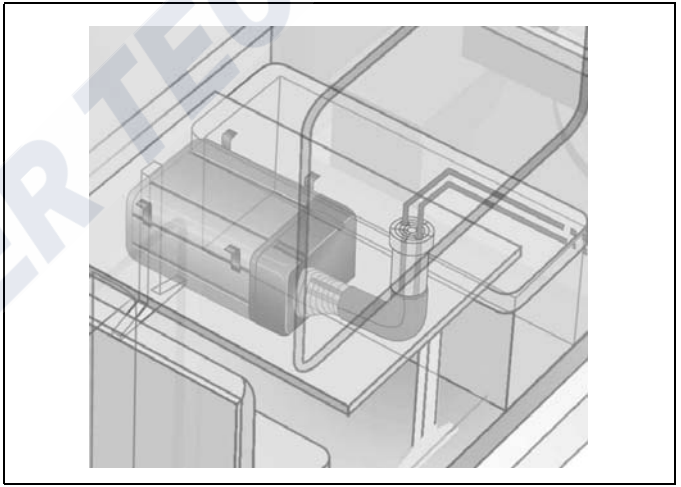


Fig. 23: Heating air intake

- Identify the position of a hole in the floor for the pass through of the air intake hose.
- Drill a hole in the floor with a diameter of 100 mm.
- Seal off the joint between the floor and the hose with temperature-resistant sealing compound (up to 90 °C).
- Insulate the air hoses located outside to protect the water lines from frost and to minimise the energy loss.
- Once inside the vehicle, guide the water pipes through the air intake hose.
- Fasten the hose to the wall or floor.

9.2. Hot air distribution

Design an air distribution system that allows an even distribution of heat into all heated sections of the vehicle. Design the system in such a way that the air flow through both heater outlets is quite similar.
See the Webasto air and water heaters accessory catalogue for branches, connecting pieces, Y-junctions, outlets, etc. made of high temperature resistant materials.

The housing cover with hot air outlet (see Fig. 2) is equipped with two hot air outlets to which the hot air hoses must be connected.

Both hot air outlets have to be used.

The internal diameter of the main section of the two hot air channels has to be 80 mm.

Guide the hot air with 80 mm hoses directly from the heater into the interior.

- Connect 80 mm hoses to the housing cover with hot air outlet and fasten them with screws to prevent them from sliding down during temperature changes (see Fig. 2).
- Connect the whole air distribution system using air dividers and reducers. Drill holes in furniture and floor where necessary.
  Through an appropriate selection of branches and diameters the air flow and thus the heat flow can be influenced.
- Seal the gap between floor and hose, in case the hose is going from the exterior to the interior of the vehicle.
- Mount Webasto air outlets at the end of each hose.
- Insulate hot air hoses routed to the outside to minimise energy loss.

- In case hot air hoses inside the interior are NOT running through closed compartments or areas, cover them to prevent damaging the hose and accidental touching.
- Secure the hoses at all connection points with hose clamps.
- Fasten the hoses to the wall or floor using hose clips.

NOTES

- The length of the hot air hoses from the heater to the first air outlet (from each heater outlet) must be at least 0.80 m.
- At least two air outlets (one each per main hot air hose) must be mounted at the same height. If possible, the air outlets with the shortest hot air hose to the heater should be used.
- To keep heat loss to a minimum, the length of the hot air hoses routed outside the passenger compartment should be as short as possible and should be insulated.
- Hose routing: as straight as possible, large curves;
- Avoid compressing or pinching the hot air hoses;
- Not more than 30% of the total number of outlets shall be closable;
- Arrange outlets in such a way that they do not get blocked;
- Free flow into the interior enables the best interior heating and air circulation;
- Position of the outlets close to the floor for best air circulation.

WARNING

Fire danger! Only use high temperature resistant Webasto hot air hoses. The hot air opening is to be positioned in such a way that the air is not blown on to any parts that cannot withstand the heat. Depending on the length of the hot air hose, the blow-out temperature can be 120 °C (and briefly even higher).

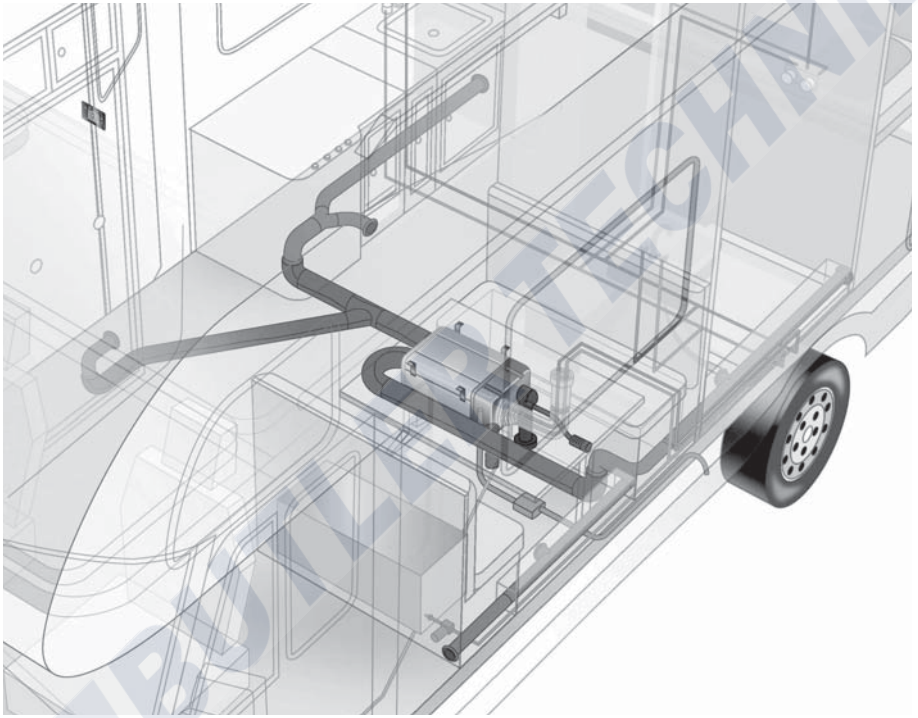


Fig. 24: Hot air distribution

Dark colour = below interior, insulated
Bright colour = inside interior

10 Cooling air system

Cooling air is required to protect the heaters' electronics and motor against overheating. Cooling air shall be taken from outside and not from inside the vehicle. The air has to be discharged outside the vehicle.

The heater is equipped with a motor and a ventilator to transport the cooling air. Besides this, it also provides the heater with combustion air.
This motor works independently from the hot air system that has an own motor and ventilator.

10.1. Installation

Mount a grille on the cooling air inlet of the heater.
Also mount a cooling-air inlet cover to prevent soiling and subsequent blockage of the fan.

NOTE
A narrow cooling air inlet can lead to acceleration of the fan and therefore to unnecessary noise.
Therefore, it is advisable to keep the resistance for the air intake as low as possible.

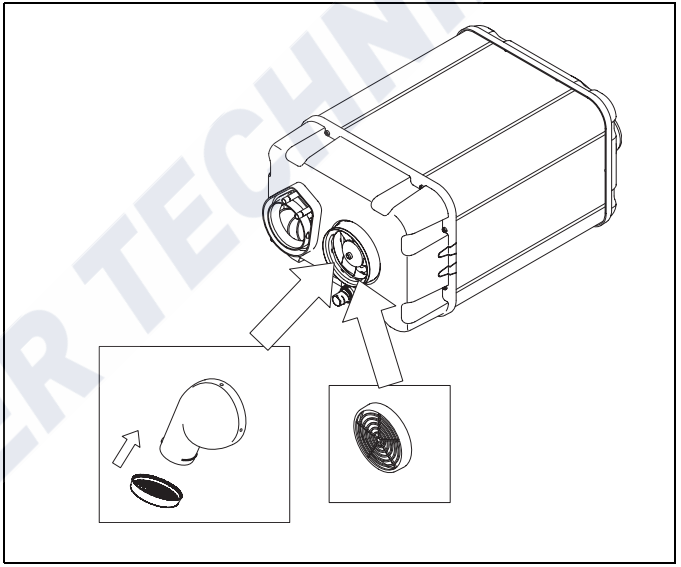


Fig. 25: Cooling air inlet on heater
- **with protective device and protective grille, 60 mm diameter (on left) or**
- **only with grille, 100 mm diameter (on right)**

11 Boiler drainage and pressure relief system

The heater is equipped with

1 a drainage system that drains the water contents automatically as a protection against frost (boiler water temperature below 6 °C). It is also possible to drain the unit manually;

2 a pressure relief system that prevents pressure above 3.5 bar inside the boiler.

In both cases, water is drained off via a hose outlet exiting at the bottom of the heater. The water is discharged under the vehicle.

The drain hose of the pressure relief valve and the solenoid valve (No. 9, Fig. 2) should be positioned and routed so that the water flows unimpaired out of the vehicle and onto the ground.

To completely drain the entire water system and the boiler, it is advisable to use clean compressed air (according to "Compressed air purity classes"). For this purpose, open all valves, connect compressed air of approx. 2 bars to **hot water tap** and leave connected until water no longer exits.

12 Fuel supply

12.1. General

The fuel is typically taken from the vehicle's own fuel tank. It may also be taken from a separate fuel tank (accessory). The permissible values for the maximum pressure at the fuel pump entry side are shown in Fig. 26.

NOTE
A notice, indicating that the heater must be shut down before refuelling, must be affixed to the fuelling point.
A sticker is provided in the delivery scope.

Internal diameter, iø	**= 2 mm**
Length suction side, l_1	**≤ 1.4 m**
Length pressure side, l_2	**≤ 6 m**

Permissible fuel feed height H [m]	at max. pressure [bar] in fuel line
0,0	1
1,0	0,91
2,0	0,83
Maximum fuel intake height S [m]	**at max. negative pressure [bar] in the fuel tank**
0,0	-0,10
0,5	-0,06

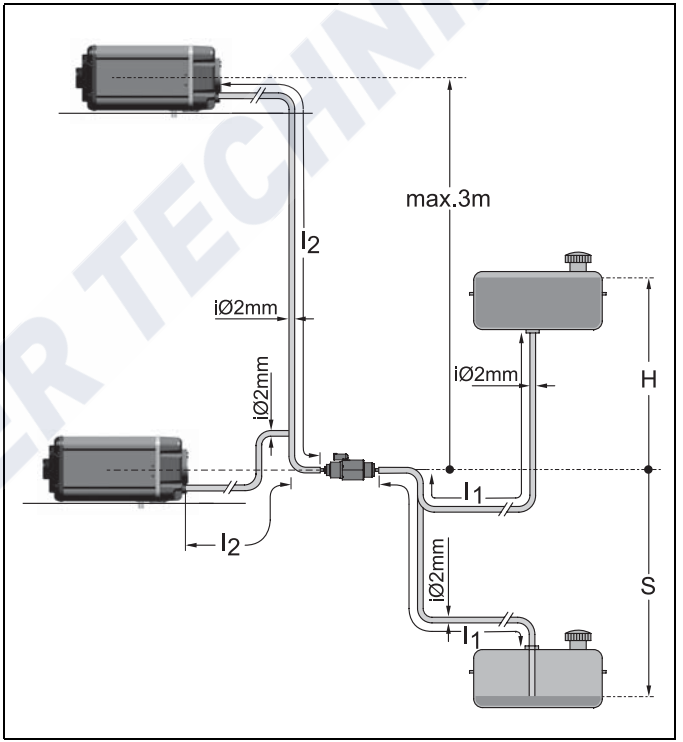


Fig. 26: Fuel supply

12.2. Fuel pump

The DP40 fuel pump is a combined delivery, metering and a shut-off system and is subject to certain installation criteria (see Fig. 26 and Fig. 28).

12.2.1. Installation location

The fuel pump and fuel lines must not be installed within the range of radiated heat from hot vehicle parts. A heat shield must be used if necessary.

The fuel pump must be mounted outside the vehicle.

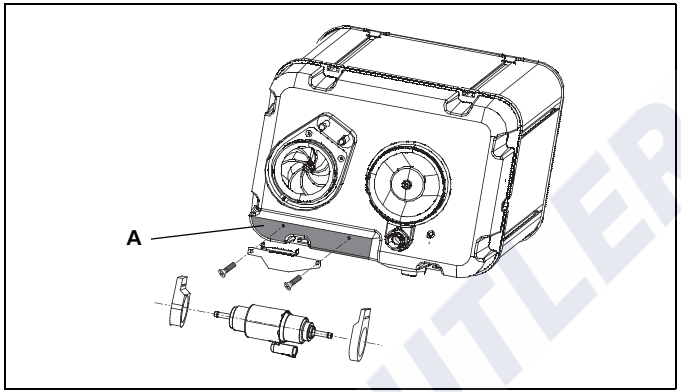


Fig. 27: Mounting location (A) for fuel pump on heater

Mounting the fuel pump on the heater (See Fig. 27, "Mounting location (A) for fuel pump on heater"), is only allowed if the length of the fuel line's suction side is not more than 1.4 m.

In case the length of the fuel line's suction side is more than 1.4 m, the fuel pump has to be installed separate from the heater. In this case, extend the wiring harness for the fuel pump.

12.2.2. Installation and attachment

The fuel pump installation position is limited as shown in Fig. 28 in order to ensure effective automatic bleeding.
The fuel pump must be installed in the horizontal position (0 to 5°).

To reduce noise, it should always be installed with the vibration-damping suspension.

Respect the direction of the fuel flow. The arrow on the pump needs to point towards the heater.

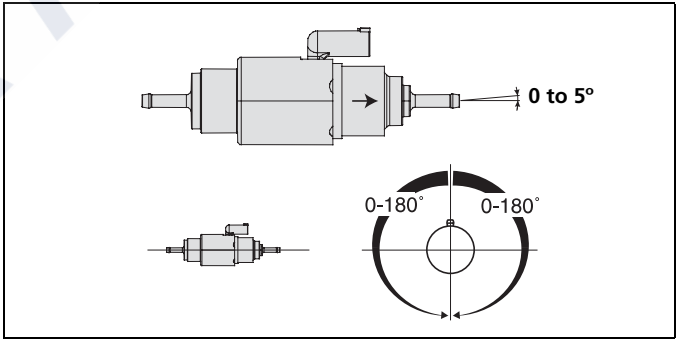


Fig. 28: Fuel pump DP40 installation position

12.3. Fuel extraction

For recommended fuel extraction solutions see Webasto camping catalogue.

1) Installation into the vehicle's fuel line.

   a) T-junction from the fuel line to the vehicle's engine if no feeding pump is installed inside the tank.

   b) T-junction from the fuel return line to the tank, if a feeding pump is installed in the tank.
   Make sure that the fuel return line inside the tank goes nearly to the bottom of the tank, otherwise the heater will receive no fuel if the tank's fuel level is low.

NOTE
Both options are only feasible, if the fuel pressure at the connection point to the fuel line does not exceed the in chapter 12.1, "General" specified values.
The line from the T-junction towards the fuel pump should run downwards.

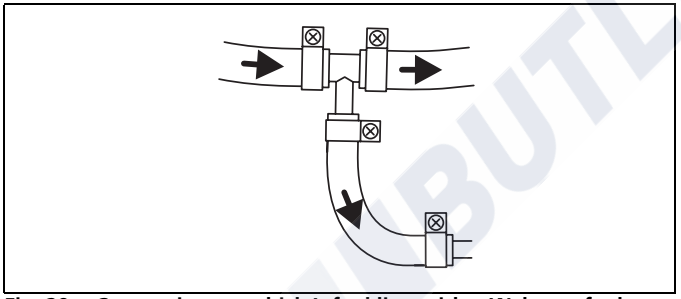


Fig. 29: Connection to vehicle's fuel line with a Webasto fuel connector

2) The fuel can be taken from the vehicle's own fuel tank or from a separate tank with a fuel extractor. See Fig. 30.
The fuel standpipe must be mounted in the fuel-tank sending unit. The fuel-tank sending unit must be removed previously. When drilling the hole, make sure to use a plain and even surface for proper sealing.

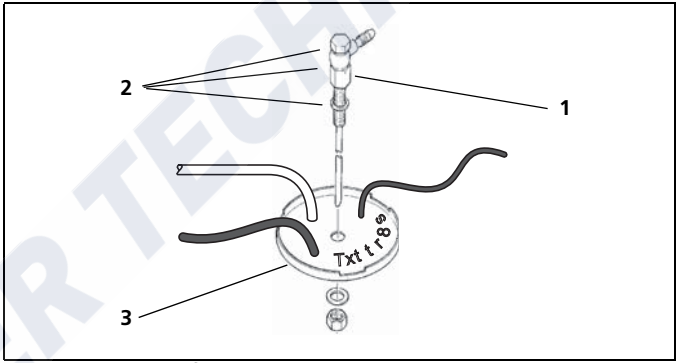


Fig. 30: Webasto fuel extractor

1 - fuel extractor
2 - sealing ring
3 - tank extracting device

3) Webasto fuel extractor.
See Fig. 31.
Observe the installation instructions for different fuel extractor types.

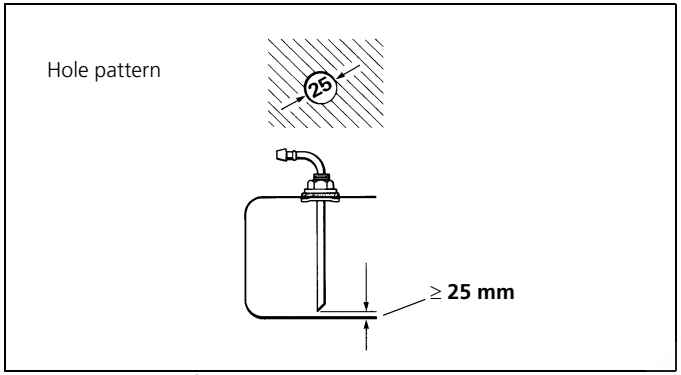


Fig. 31: Webasto fuel extractor

12.4. Fuel lines

Only steel, copper and plastic lines of plasticised, light and temperature-stabilized PA 11 or PA 12 (e.g. Mecanyl RWTL) pursuant to DIN 73378 may be used as fuel lines. Since the lines normally cannot be routed with a constant rising gradient, the internal diameter shall not exceed 2 mm. In larger fuel lines air or gas bubbles would accumulate and cause malfunctions.

12.4.1. Routing

The lines should be routed upwards from the fuel pump to the heater to facilitate automatic bleeding.

Avoid passing or crossing of hot areas (e.g. crossing of exhaust line) at a distance of less than 100 mm without using thermal shields.

Fuel lines must be tightened to the vehicle's chassis to prevent sagging. They must be installed in such a way that they cannot be damaged by flying road chippings or high temperatures (exhaust line). The fuel lines must be secured at the connections using hose clips to prevent slipping.

12.4.2. Connecting two pipes with a hose

The correct procedure for connecting fuel lines with hosing is shown in Fig. 32.
Ensure that there are no leaks.

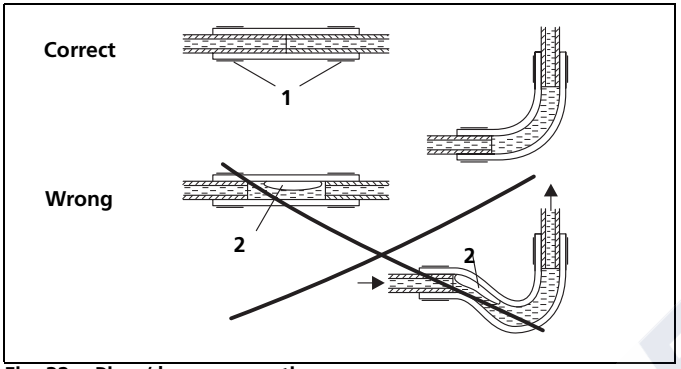


Fig. 32: Pipe / hose connection

1 = clip
2 = air or gas bubble

12.5. Fuel filter

No fuel filter is to be used in the heater fuel system. Due to the danger of frost for the moisture contained in the air bubbles, complete blocking of the fuel supply is possible in case of frost.

13 Combustion air supply

13.1. General

The air for the combustion chamber of the heater may not be taken out of the vehicle passenger compartment (extract from 2001/56/EC).

Length of the combustion air inlet line in total (with silencer):	max. 2.0 m
Internal diameter of the line:	22 mm
Minimum bending radius:	50 mm
Total bends combustion air line:	max. 270°

NOTE
An intake silencer must be fitted to reduce noise levels.

The combustion air must be taken from a position that is as cool as possible and protected from splashing water.

13.2. Combustion air intake line

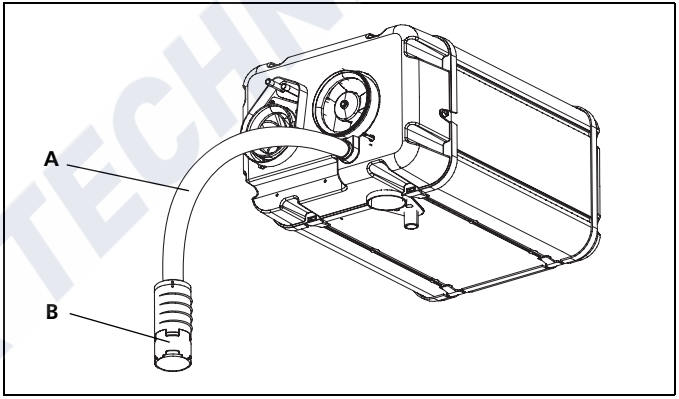


Fig. 33: Combustion air intake

A = connection to heater 22 mm dia.
B = silencer

An intake line is required for combustion air.

NOTE
Avoid compressing or pinching the air intake line.

NOTE
The intake opening for combustion air must be located so that it cannot become clogged with dirt or snow. See Fig. 34.

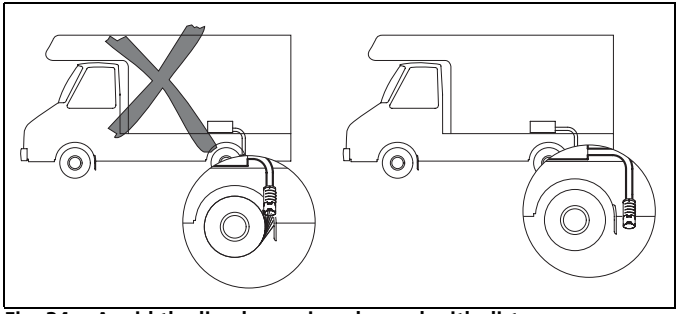


Fig. 34: Avoid the line becoming clogged with dirt

NOTE
The intake opening for combustion air must not point in the driving direction. See Fig. 35.

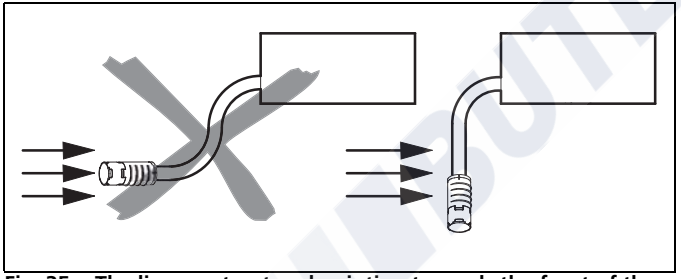


Fig. 35: The line must not end pointing towards the front of the vehicle

Combustion air intake hose should point downwards from the heater. If this is not possible, make a condensate drain hole with a diameter of 4 mm at its lowest point. See Fig. 36.

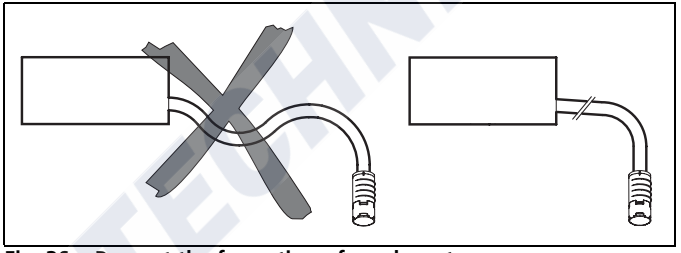


Fig. 36: Prevent the formation of condensate

14 Exhaust system

14.1. General

See chapter 2, "Statutory regulations governing installation" for requirements on exhaust system.

NOTE
An exhaust silencer must be fitted to reduce the noise level.
The silencer should ideally be installed near the heater (not more than 0.20 m distance); followed by a long tail pipe (min. 1 m) for best noise level reduction.
The silencer may be mounted on the vehicle chassis. It may also be mounted on the heater (see Fig. 37).

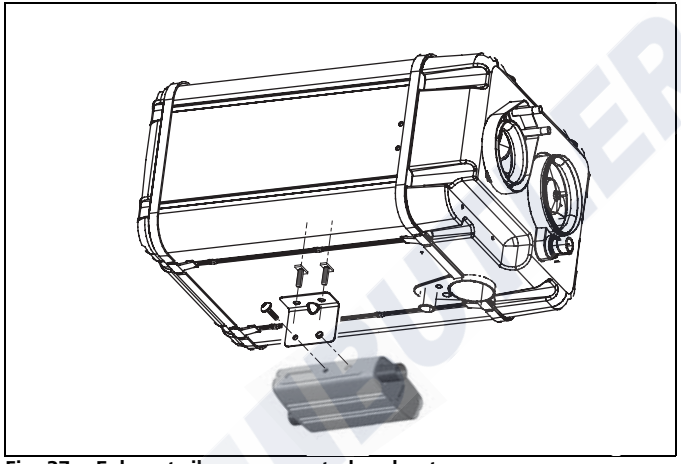


Fig. 37: Exhaust silencer mounted on heater

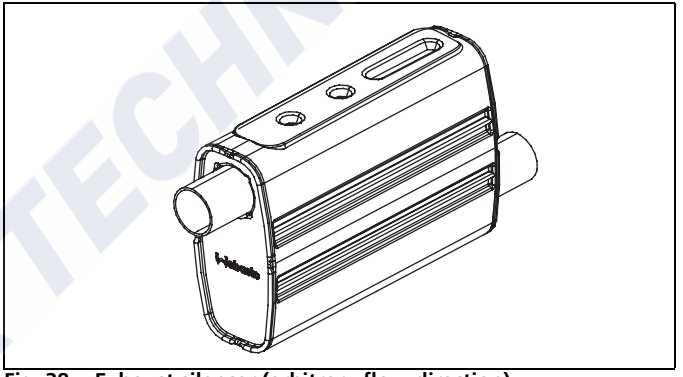


Fig. 38: Exhaust silencer (arbitrary flow direction)

14.2. Exhaust line

As exhaust lines use flexible piping of stainless steel or rigid pipes of stainless steel with a minimum wall thickness of 1.0 mm. The exhaust pipe has to be connected to the heater using a Webasto exhaust clamp. An exhaust assembly including a special bracket to mount the silencer on the heater can be used.

Length of the exhaust line in total (with silencer):	max. 3.0 m
Internal diameter of the line (stainless steel):	22 mm
Minimum bending radius:	50 mm
Total bends exhaust line:	max. 270°

- Max. one piece cast 90° elbow is allowed.
  Pipes with more than one 90° bends are allowed.
  See Fig. 39.
- The exhaust line should point from the heater downwards to let condensation water escape (see Fig. 40). If this is not possible, a condensate drain hole with a diameter of 4 mm must be drilled at its lowest point.
- The line must not point to the front of the vehicle. See Fig. 42.
- **Avoid the formation of an exhaust bag under the vehicle. See Fig. 42.**
- Discharge direction: 45 to 70°.
  A fixing bracket is required no further than 150 mm from the end of the exhaust pipe to ensure that the angle 45 to 70° is achieved.

  IMPORTANT
  If the exhaust pipe end is other than as shown, it will pose a fire risk.
  See Fig. 42.
- The complete exhaust system must be located outside the vehicle.
- Assemble the line in such a way that it cannot set fire to anything.
- The line must be located so that it cannot become clogged with dirt or snow.
  See Fig. 41.
- The line must be installed with a minimum distance of 12 in (300 mm) to windows or other ventilation openings and gas bottles or gas-bottle storage rooms (EN 1949 "Specification for installation of LPG systems").
- The line must be routed so that a minimum distance of 20 in (500 mm) is maintained to the fuel system.
- The exhaust gas outlet may not be located directly under a door, a window or any other ventilation opening. Make sure that the exhaust gas is not blown toward a neighbouring tent or motorhome.

- Exhaust outlet should be on the opposite side of the entrance door of the living cell.
- Avoid that the exhaust pipe can touch ground or pavement, including traffic calming measures.

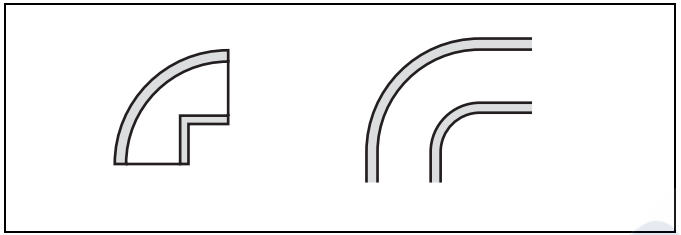


Fig. 39: Elbows, cast (left) and bent pipe (right)

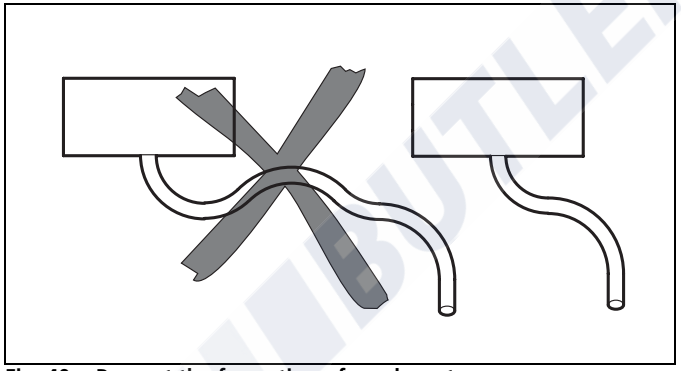


Fig. 40: Prevent the formation of condensate

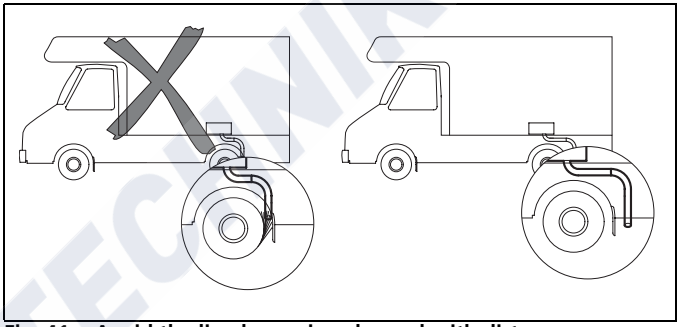


Fig. 41: Avoid the line becoming clogged with dirt

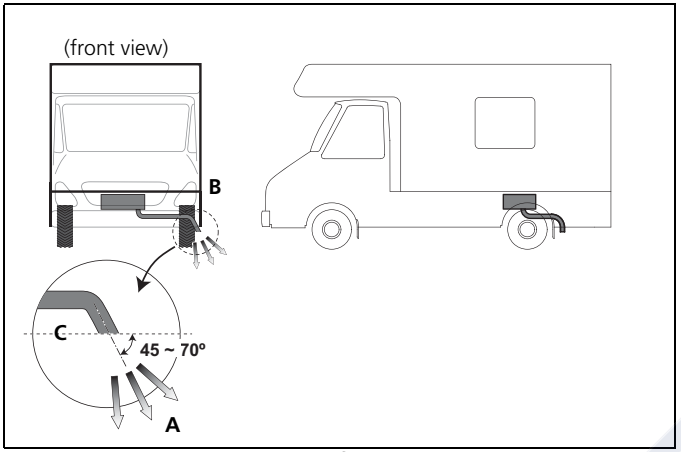


Fig. 42: Location and direction of exhaust

A: Flow exhaust fumes 45 to 70° downwards and at side to avoid exhaust bag under vehicle.

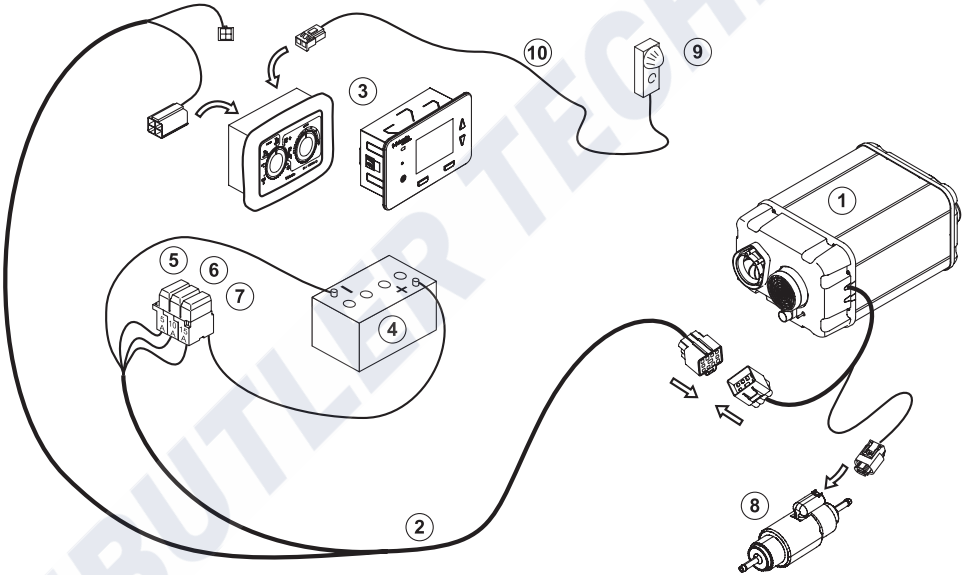
B: End exhaust line nearly aligned with side of vehicle body.

C: End exhaust line cut horizontally to avoid that ambient wind can enter.

15 Electrical connections

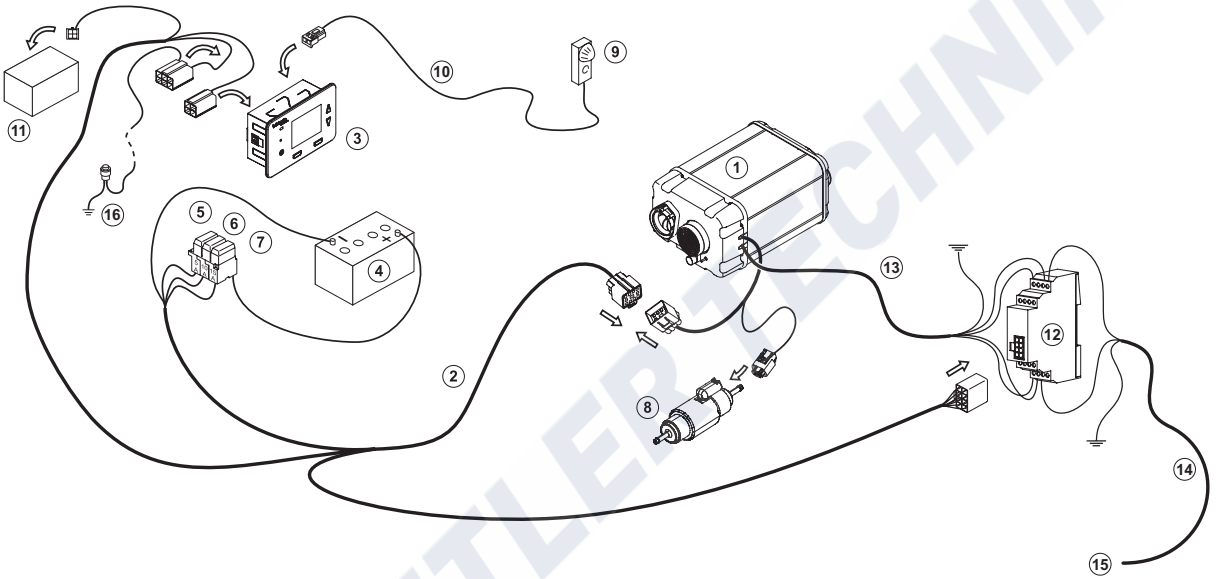
Carry out electrical connections in accordance with Fig. 43 or Fig. 44.

NOTE
When installing the Dual Top wiring harness in the vehicle, it should be ensured that no lines can be pinched.



1 DUAL TOP RHA 100
2 Wiring harness (external)
3 Manual/programmable heater control
4 Vehicle's leisure battery
5 Fuse 5 A
6 Fuse 10 A
7 Fuse 15 A
8 Fuel pump
9 Interior temperature sensor
10 Wiring interior temperature sensor

Fig. 43: Schematic diagram of electrical connections for Dual Top RHA 100 with heater control



1 DUAL TOP RHA 101 / 102
2 Wiring harness (external)
3 Programmable heater control
4 Vehicle's leisure battery
5 Fuse 5 A
6 Fuse 10 A
7 Fuse 15 A
8 Fuel pump
9 Interior temperature sensor
10 Wiring interior temperature sensor
11 Receiver Telestart / Thermo Call (option)
12 Relay box
13 Wiring harness electric heater
14 Wiring 230 V
15 230 V power supply
16 Dashboard LED

Fig. 44: Schematic diagram of electrical connections for Dual Top RHA 101 / 102 with programmable heater control

15.1. Supply voltage connection

Use 12 V DC only.
Ensure that you take it directly from the vehicle's leisure battery.
No additional switches may be used with the exception of the Control Panel switch. Switching the heater on and off shall only be done with the Dual Top Control Panel.

The fuse holder may only be installed in the interior of the vehicle.

Use fuses:
- 15 A
- 10 A
- 5 A

Fuses must be connected to the correct wires in each case (observe colour).

5 A: red-blue cable
10 A: red-black cable
15 A: red cable

Make sure that the yellow part is pushed into each fuse holder after connecting the cables. This prevents that cables may drop out when inserting or replacing a fuse.
See Fig. 45.

NOTE
Make sure that the Dual Top is switched off before replacing a fuse.

WARNING
In case of electrical deviations a fuse other than specified may cause fire.

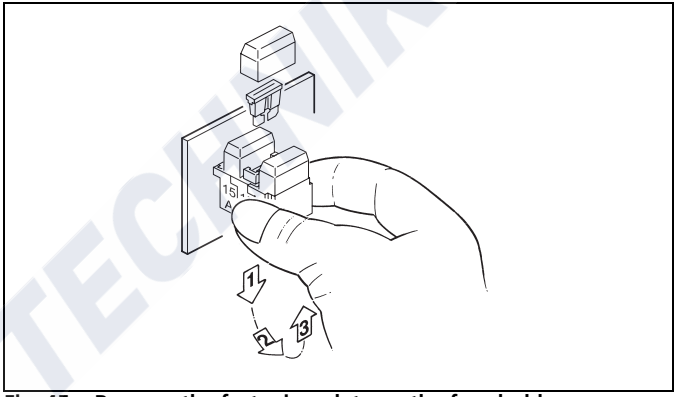


Fig. 45: Remove the fastening plate on the fuse holder

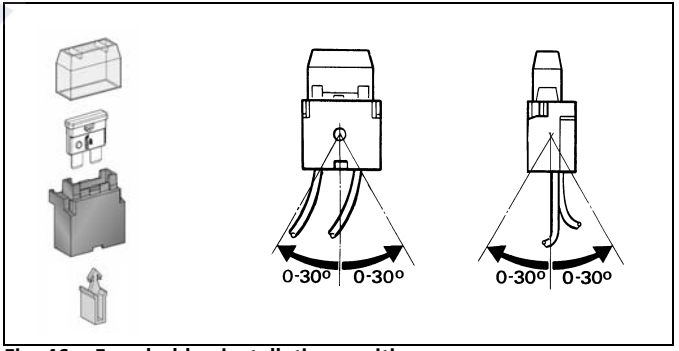


Fig. 46: Fuse holder, installation position

15.2. Interior temperature sensor

The remote interior temperature sensor must be installed at medium height in the interior on vertical surfaces.

Make sure that the inside temperature sensor is **not** positioned:

- in the direct current of hot air (from the vehicle's own heating system or the hot air heater);
- close to heat sources;
- placed in direct sunlight (for example on the dashboard);
- installed inside a locker;
- installed behind curtains or the like.

Make sure that cabin air can flow freely around the sensor.

Install the remote interior temperature sensor in the interior:

- Drill a 3 mm hole just below the position of the sensor.
- Lead the sensor cable through the hole.
- Fasten the sensor.
- Route the cable to the place of the Control Panel.
- Connect the plug to the cable.
- Fasten wires to the wall or floor.

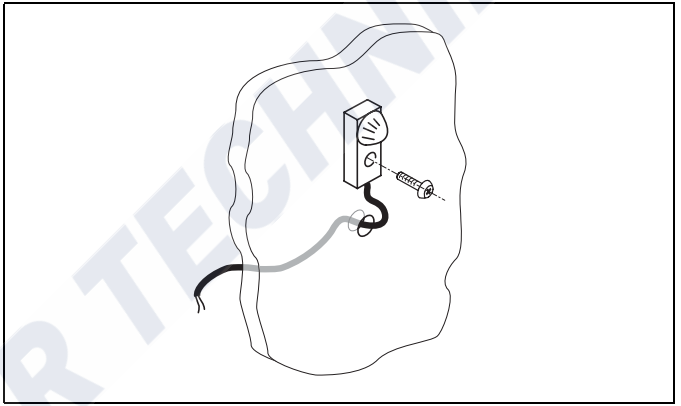


Fig. 47: Interior temperature sensor

15.3. Connecting instrument panel LED (only for programmable heater control)

- Make a hole where the Control Panel shall be placed, e.g. in the dashboard.
  The LED must be located in the driver's field of view.
- Connect the wiring. See Fig. 48.
  Extend the wire from the LED to plug X5 (pin 6), that goes into the Control Panel.
- Install the LED.

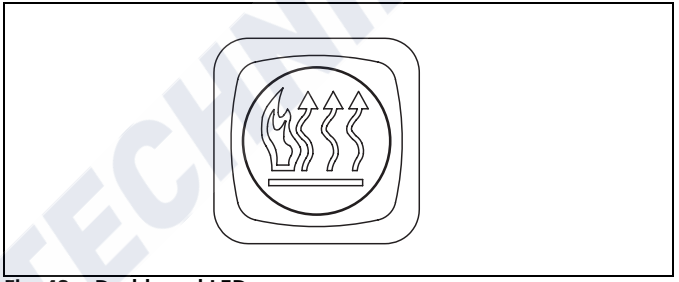


Fig. 48: Dashboard LED

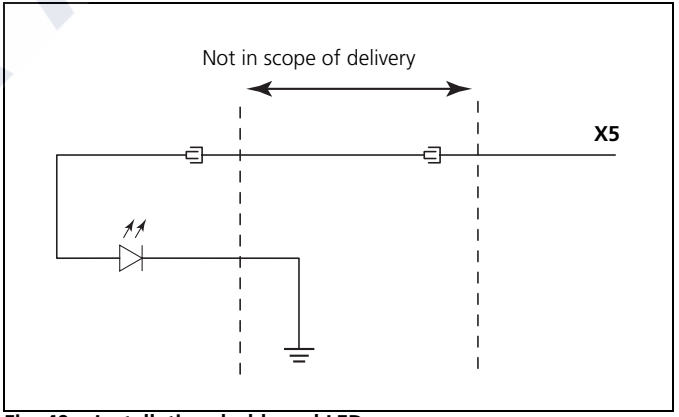


Fig. 49: Installation dashboard LED

15.4. Connection to manual heater control

- Determine the best position of the Control Panel.
  The Control Panel must be located in the driver's field of view.
  It should be visible and accessible for the operator.
  However at the same time, it must not be accessible to children.
  –15° < best viewing angle < 15°.
- Make sure that there is enough space behind the place where the Control Panel shall be placed.
- Drill a hole at the desired installation location (see Fig. 50).
- Connect plug X4 (4 poles) of the wiring harness to the Control Panel (see Fig. 51).
- Connect plug X0 (2 poles) of the inside temperature sensor to the heater control (see Fig. 51).
- Attach the Control Panel with 4 screws.
- Click the cover onto the Control Panel.

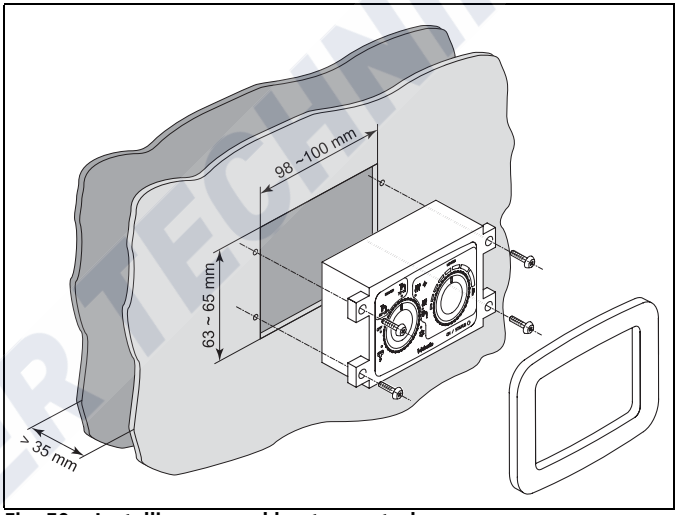


Fig. 50: Installing manual heater control

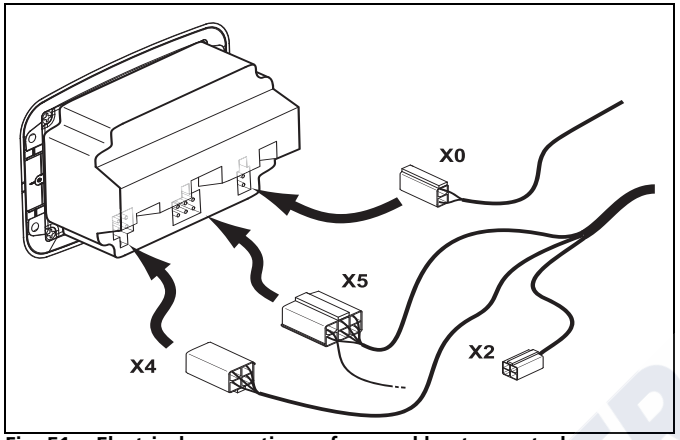


Fig. 51: Electrical connections of manual heater control

NOTE:
Connector X2 is for:

– Webasto Thermo Test PC-diagnosis and
– Webasto Telestart / Thermo Call
(optional for programmable Control Panel).

NOTE:
The Dual Top RHA 100 heater can easily be retrofitted with the programmable heater control. This provides the user with additional comfort functions which are not available in the manual heater control (e.g. programmable digital timer etc.).
If you are interested, please contact your Webasto Service Centre.

15.5. Connection to programmable heater control

- Determine the best position of the Control Panel.
It should be visible and accessible for the operator.
However at the same time, it must not be accessible to children.
–15° < best viewing angle < +15°.
- Make sure that there is enough space behind the place where the Control Panel shall be placed.
- Drill a hole at the desired installation location (see Fig. 52).
- Place adapter into hole.
- Bend lips of adapter outwards to fixate it.
- Connect plug X4 (4 poles) and X5 (6 poles) of the external wiring harness to the heater control (see Fig. 53).
- Connect plug X0 (2 poles) of the inside temperature sensor to the heater control (see Fig. 53).
- Optional: Connect plug X2 (4 poles) to receiver Telestart / Thermo Call (seeFig. 53).
- Click Control Panel into adapter.

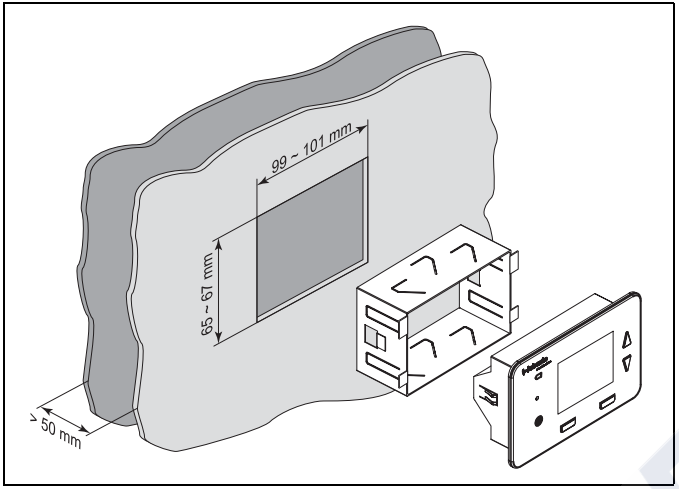


Fig. 52: Installing programmable heater control

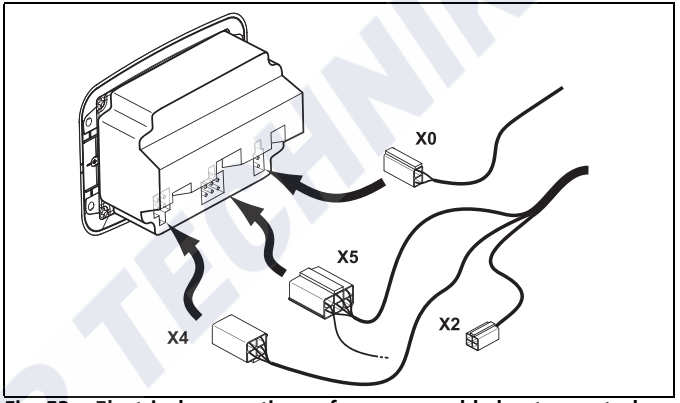


Fig. 53: Electrical connections of programmable heater control

NOTE

Connector X2 is for:

– Webasto Thermo Test PC-diagnosis and
– Webasto Telestart / Thermo Call (optional).

Disassembly Control Panel

Place 1 or 2 suction cups on the Control Panel.
Alternatively, slide flat, smooth material (e.g. plastic card) under the control panel at the left and right hand side.
Pull to remove the Control Panel out of the adapter.
Make sure that the heater control or the furniture is not damaged.

15.5.1. 230 V connection

1 Installation of the 230 V connection shall be carried out by personnel certified for 230 V electric systems.

2 Installation must be in accordance with IEC 60364.

3 Connect to 230 V power supply.

4 Install relay box in such a way that demanded protection class is realized. Protect relay box in any case against water, dirt and access of unauthorized persons in particular children.
Recommendation: place relay box on a DIN Rail.

NOTE
The length of the external wiring harness from the heater to the relay box is limited to a maximum of 3 m.

5 Connect 230 V wiring to relay box.

6 Connect connector X6 (8 pole) of the external wiring harness to the relay box.

7 Connect wiring harness electric heater to relay box (4 wires) and to ground (green/yellow).

8 Make a mechanical protection around the wiring to avoid friction, abrasion, cutting, breaking, etc.
Fasten the wiring to the wall or floor.

NOTE
Use a residual-current device (RCD) in accordance with the statutory regulations.

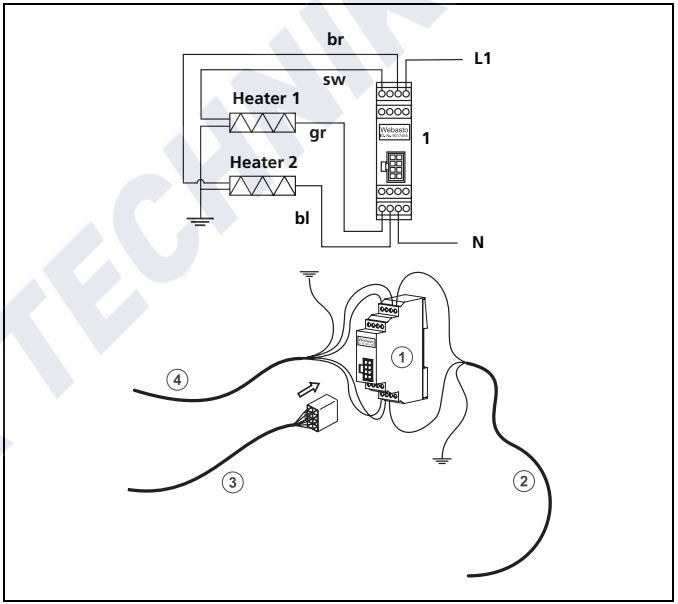


Fig. 54: Relay box connection

L1 = 230 V, phase
N = 230 V, neutral
bl = blue
br = brown
ge = yellow
gn = green
gr = grey
sw = black

1 Relay box
2 Wiring 230 V
3 Wiring harness (external) with connector X6
4 Wiring harness electric heater

16 Wiring diagrams

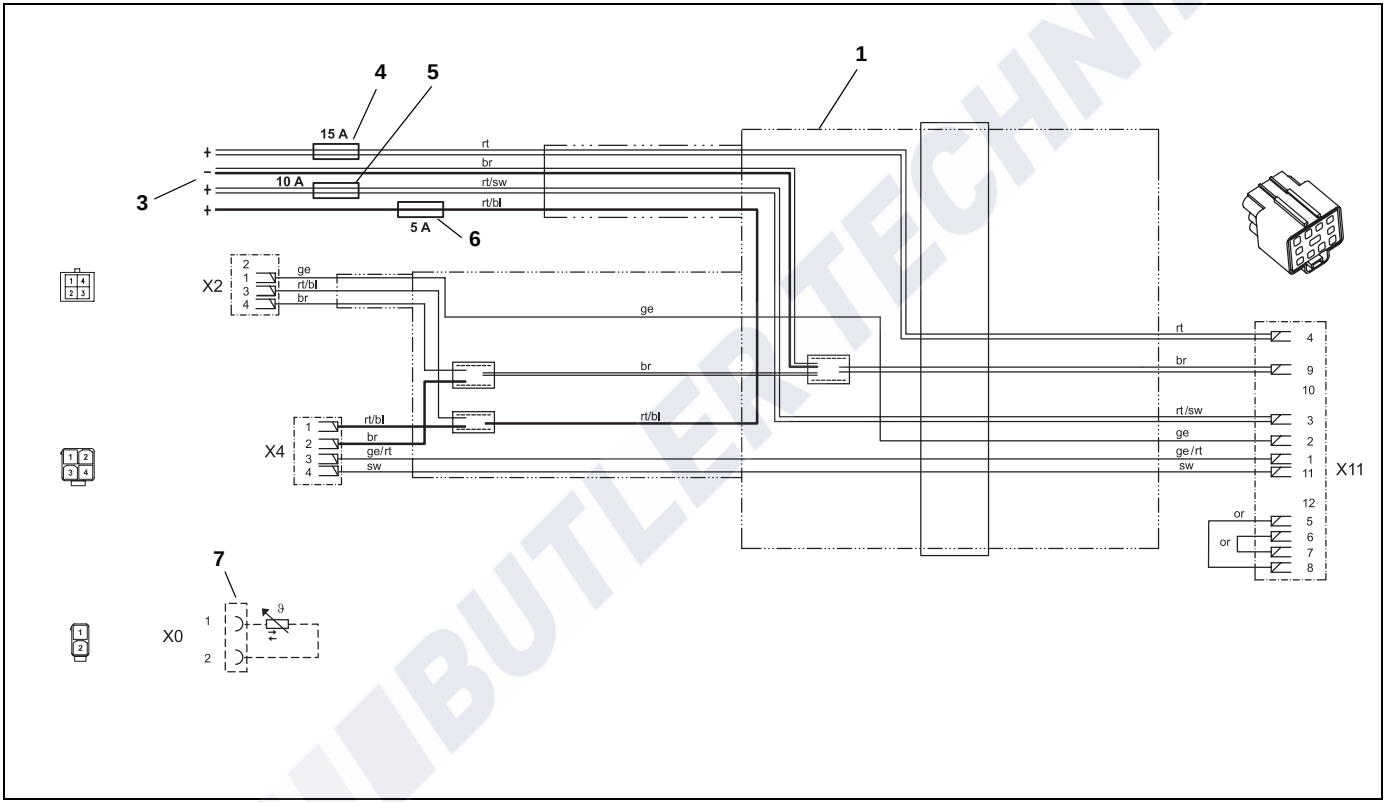


Fig. 55: Circuit diagram for Dual Top RHA 100

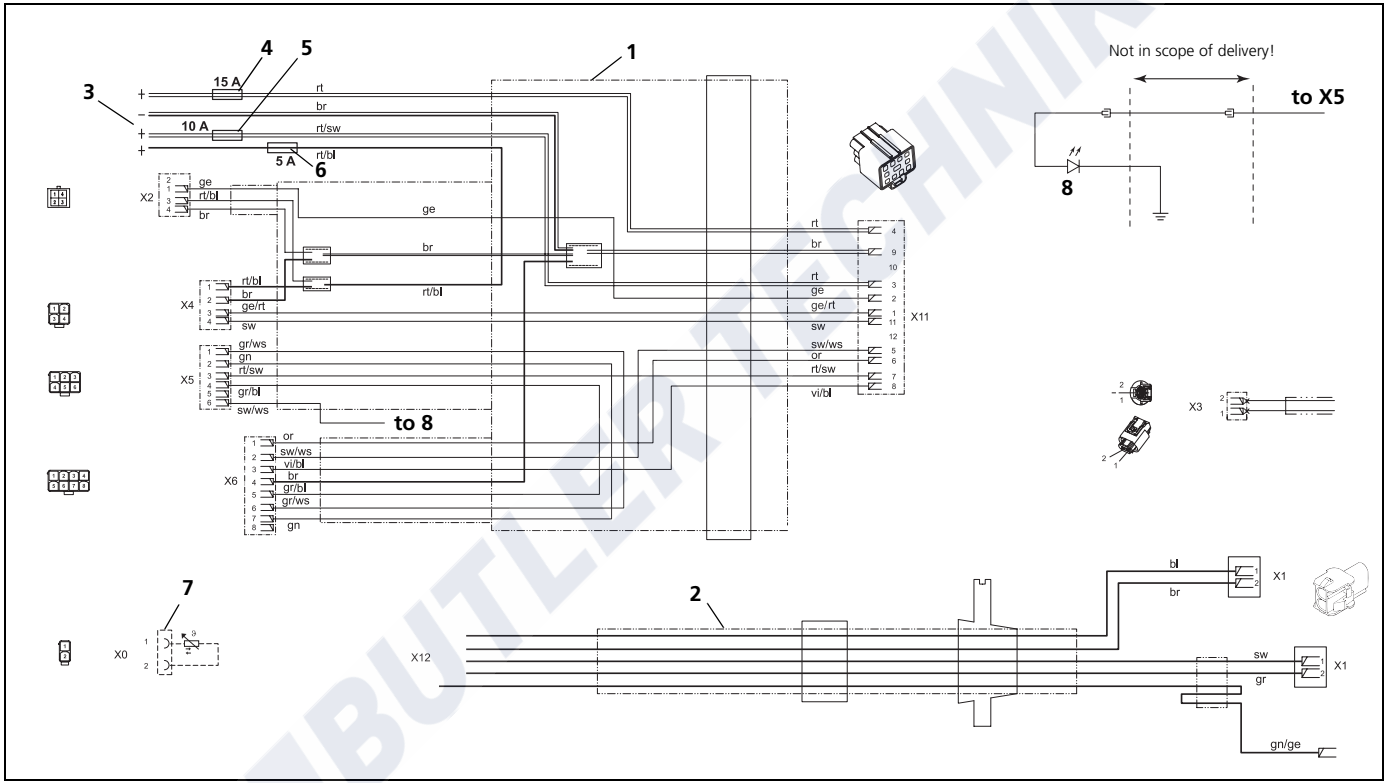


Fig. 56: Circuit diagram for Dual Top RHA 101 / 102

16.1. Legend for wiring diagrams

1 Wiring harness (external)
2 Wiring harness for electric heater (only for RHA 101 / 102)
3 Vehicle's leisure battery
4 15 A fuse (red cable)
5 10 A fuse (red/black cable)
6 5 A fuse (red/blue cable)
7 Interior temperature sensor
8 Instrument panel LED (only for programmable heater control)

Cable cross-sections		
	< 7.5 m	7,5 - 15 m
———	0.75 mm^2	1.0 mm^2
- - - -	1.0 mm^2	1.5 mm^2
▬▬▬	1.5 mm^2	2.5 mm^2
═══	2.5 mm^2	4.0 mm^2
▬═▬	4.0 mm^2	6.0 mm^2

Cable colours	
bl	blue
br	brown
ge	yellow
gn	green
gr	grey
or	orange
rt	red
sw	black
vi	violet
ws	white

Item	Description	Comment
X0	Plug connector, 2-pin	To control panel
X1	Plug connector, 2-pin	2 pcs, to electric heater inside Dual Top RHA 101/102
X2	Plug connector, 4-pin	To PC-diagnosis / Telestart / Thermo Call
X3	Plug connector, 2-pin	To fuel pump
X4	Plug connector, 4-pin	To control panel
X5	Plug connector, 6-pin	To heater control, 1 wire to instrument panel LED (only for programmable heater control)
X6	Plug connector, 8-pin	To relay box (only for RHA 101 / 102)
X11	Plug connector, 12-pin	To Dual Top RHA 100 / 101 / 102 heater
X12	Wire end	4x to relay box, 1 to earth (only for RHA 101 / 102)

17 Starting the heater for the first time

- After you have installed the heater, bleed the fuel supply line carefully.

  NOTE
  Due to the low fuel consumption the heater may have to be switched on several times to fill the fuel line completely.

- With Dual Top RHA 101 / 102: Connect an external power line (230 V AC).

- **Disinfect and rinse the entire water supply system.**
  See Operating Instructions, chapter Maintenance, how to disinfect the water supply system.

- Fill the water tank and water system.
  Use only drinking water and avoid dirt in the water system!
  Use a clean, thoroughly flushed (for approx. 30 seconds) hose.
  Bleed the water lines.

- Perform a heater test to check all connections for leaks and to ensure that they are secured. If the heater suffers a fault during operation, the fault must be located and remedied.

- Check the manual drainage function with the Control Panel.

18 Fault code output

The heater is able to identify faults on individual components and during the operation.

18.1. Manual heater control

The control panel gives out the fault code in a flashing mode.

After a series of 5 fast GREEN flashes, the fault code output will be a repeated sequence of long RED flashes. This procedure is repeated until the heater is switched off. The meaning of the number of red flashing pulses is contained in Tabelle 1, "Fault messages of manual heater control". After that, again there will be 5 fast GREEN flashes.

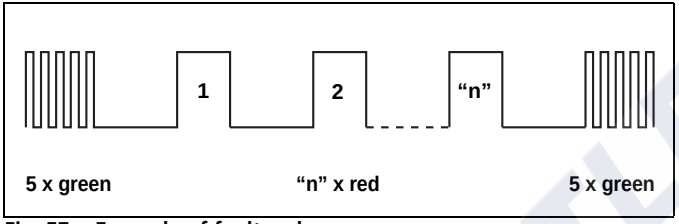


Fig. 57: Example of fault code

Rectify the cause of the fault.

To reset the fault, switch the heater off, wait at least 5 seconds and then switch the heater on.

If serious malfunctions such as overheating or failure to start reoccur, the heater is locked and can be put back into service by deleting the failures.
To do this, the power supply must be disconnected (e.g. by removing all 3 fuses in the order 5 A, 10 A, and 15 A; The fuses are then reinstalled in the reverse order while the device is switched on (see Operating Instructions, mode selector switch A in Position 1, 2, 3, 4 or 5), however the heater is not running (can be recognised from the noise of the heater).
Deleting failures can also be done with the Webasto Thermo Test PC-Diagnosis.

If a fault occurs, the heater stops. In case of electrical safety/drain valve fault (17 red flashes), heating of the interior is still possible.

Table 1: Fault messages of manual heater control

Number of RED flashes	Meaning	Remedy
00	No communication between Control Panel and heater, or error Control Panel	First, remove fuses 15 A and 5 A. Then put in fuse 15 A, followed by fuse 5 A. Check connections of Control Panel. Check fuse 15 A. Check wiring harness. Contact a Webasto service station.
01	No start (after 2 attempts to start)	Check fuel supply (enough fuel, at least 8 ltr.; check fuel connection and tubes), reset heater (by switching off for at least **30** sec.)
02	Flame failure Restart not successful	See fault code 01
03	Under voltage or over voltage	Charge battery or connect to another power source (12 V DC), reset heater (by switching off for at least 5 sec.)
04	Fuel pump disconnection / short circuit / overheating	Check fuel pump cable and connectors, check for overheating (see faults 06 and 07), reset heater (by switching off for at least 5 sec.)
05	Hot air motor fault: disconnection / short circuit / fan speed out of range / fan blocked	Ensure that hot interior air fan can rotate freely, remove possible blocking objects, reset heater (by switching off for at least 5 sec.)
06	Overheating or exceeding gradient water temperature sensor	Check water level, reset heater (by switching off for at least 5 sec.) or select winter mode without hot water production
07	Overheating or exceeding gradient hot air temperature sensor	Ensure that hot air can flow freely, air intake and outlets are not blocked. Reset heater (by switching off for at least 5 sec.)
08	Overheating of heaters' control unit	Ensure that cooling air can flow freely, reset heater (by switching off for at least 5 sec.)
09	Combustion air motor fault: disconnection / short circuit / overload / blocked	Ensure that cooling fan can freely rotate, remove possible blocking objects. Check fuse 15 A.
10	Control unit fault / heater locked	Put heater back into service (see beginning of section) and restart heater. Contact a Webasto service station.
11	Interior temperature sensor disconnection or short circuit	Check routing of cable, avoid that it is pinched or crushed, check the connector behind the control panel. Reset heater (by switching off for at least 5 sec.)
12	Hot air temperature sensor disconnection / short circuit	Reset heater (by switching off for at least 5 sec.) Contact a Webasto service station.

Table 1: Fault messages of manual heater control

Number of RED flashes	Meaning	Remedy
13	Water temperature sensor disconnection / short circuit	See fault code 12
14	Glow plug / flame detector disconnection / short circuit	See fault code 12
15	Early flame detection	See fault code 12
17	Electrical safety/drain valve disconnection / short circuit	See fault code 12

18.2. Programmable heater control

The Control Panel gives out the fault message.

Rectify the cause of the fault.

To reset the fault, confirm message by pressing OK (if provided) or switch off the Dual Top for at least 5 seconds.

If serious malfunctions such as overheating or failure to start reoccur, the heater is locked and can be put back into service by deleting the failures.

Do this by disconnecting the power supply:

1 Ensure that the heater/ventilator is not running (to be established by the sound of the heater operating).
If necessary wait until ventilators stop running.

2 Switch off Dual Top by pressing on/off button  .

3 Replace fuse 15 A for at least 5 seconds.

Now the heater is reset.
Deleting failures can also be done with the Webasto Thermo Test PC-Diagnosis.

If a fault occurs, the heater stops. Failure of drainage valve (message 28 and 29) will not abort heater operation and will not be shown during heater operation.

Table 1: Fault messages of programmable heater control

Message	Meaning	Remedy
Message 01 No data connection	No communication between Control Panel and heater, or error Control Panel	First, remove fuses 15 A and 5 A. Then put in fuse 15 A, followed by fuse 5 A. Check connections of Control Panel. Check fuse 15 A. Check wiring harness. Contact a Webasto service station.
Message 02 No start of combustion	No start (after 2 attempts to start)	Check fuel supply (enough fuel, at least 8 ltr.; check fuel connection and tubes), reset heater (by pressing OK or switching off for at least **30** sec.)
Message 03 Combustion interrupted	Flame failure. Restart not successful	See message 02.
Message 04 High battery voltage	Operation voltage is above permitted value	Reset heater (by pressing OK or switching off for at least 5 sec.)
Message 05 Low battery voltage	Operation voltage is below permitted value	Charge battery or connect to main power supply (230 V), reset heater (by pressing OK or switching off for at least 5 sec.)
Message 06 Fuel pump disconnected or system overheated	Fuel pump disconnection / one of the three overheating switches detects too high temperature OR relay box, cable or connection relay box is defective	Check fuel pump cable and connectors, check for overheating (see messages 10, 11, 12, 13 and 14), reset heater (by pressing OK or switching off for at least 5 sec.) Check wiring harness relay box to heater. Check relay box and connections relay box.
Message 07 Fuel pump short circuit	Fuel pump short circuit to ground OR relay box, cable or connection relay box is defective	Check fuel pump cable and connectors. Check wiring harness relay box to heater. Check relay box and connections relay box.
Message 08 Failure heating air ventilator	Hot air motor fault: disconnection / short circuit / fan speed out of range / fan blocked	Ensure that hot interior air fan can rotate freely, remove possible blocking objects, reset heater (by pressing OK or switching off for at least 5 sec.)
Message 09 Failure ventilator amplifier	No communication between amplifier of heating air ventilator and heaters control unit	Check internal cable routing (4-pins) from control unit to PWM module. Contact a Webasto service station.
Message 10 High temperature sanitary water	Overheating water temperature sensor	Check water level, reset heater (by pressing OK or switching off for at least 5 sec.) or select winter mode without hot water production Check fuel pump cable and connectors.
Message 11 High temperature sanitary water	Exceeding gradient water temperature sensor	See message 10. Check if hot and cold water pipes have been connected correctly.
Message 12 High temperature heating air	Overheating hot air temperature sensor	Ensure that hot air can flow freely, air intake and outlets are not blocked. Reset heater (by pressing OK or switching off for at least 5 sec.) Check fuel pump cable and connectors.
Message 13 High temperature heating air	Exceeding gradient hot air temperature sensor	See message 12.

Table 1: Fault messages of programmable heater control

Message	Meaning	Remedy
Message 14 Failure cooling air ventilation	Overheating of heaters' control unit	Ensure that cooling air can flow freely, reset heater (by pressing OK or switching off for at least 5 sec.)
Message 15 Failure combustion air motor	Combustion air motor interrupted	Ensure that cooling fan can freely rotate, remove possible blocking objects. Check fuse 15 A.
Message 16 Failure combustion air motor	Combustion air motor fault: disconnection / short circuit / overload / blocked	See message 15.
Message 17 Failure control unit	Control unit (heater) fault / heater locked	Put heater back into service (see above this table) and restart heater. Contact a Webasto service station.
Message 18 Failure cabin temperature sensor	Interior temperature sensor disconnection / short circuit	Check routing of cable, avoid that it is pinched or crushed, check the connector behind the control panel. Reset heater (by pressing OK or switching off for at least 5 sec.) Replace the inside temperature sensor.
Message 19	n/a	n/a
Message 20 Failure heating air temperature sensor	Hot air temperature sensor disconnection	Check routing of cable, avoid that it is pinched or crushed, check the connectors. Reset heater (by pressing OK or switching off for at least 5 sec.) Contact a Webasto service station.
Message 21 Failure heating air temperature sensor	Hot air temperature sensor short circuit	See message 20.
Message 22 Failure sanitary water temperature sensor	Water temperature sensor disconnection	See message 20.
Message 23 Failure sanitary water temperature sensor	Water temperature sensor short circuit	See message 20.
Message 24 Failure glow plug	Glow plug / flame detector disconnection	See message 20.
Message 25 Failure glow plug	Glow plug / flame detector short circuit	See message 20.
Message 26 Failure flame detection	Early flame detection	See message 20.
Message 27 Failure relay box	Short circuit of 230 V indication signal from relay box to heater	Check wiring harness relay box to heater. Check relay box and connection relay box. Check Control Panel and connections Control Panel. Contact a Webasto service station.

Table 1: Fault messages of programmable heater control

Message	Meaning	Remedy
Message 28 Failure drain valve	Electrical drainage valve disconnection	See message 20.
Message 29 Failure drain valve	Electrical drainage valve short circuit	See message 20.
Message 30 Failure relay	230 V high or low power relay circuit interrupted/short circuit	See message 27.
Message 31, 32, 33	n/a	n/a
Message 34 System overheated or relay circuit disconnected	One of the three overheating switches detects too high temperatures / overheating relay circuit interrupted	Check wiring harness relay box to heater. Check relay box and connection relay box. Check Control Panel and connections Control Panel. Check for overheating (see messages 10, 11, 12, 13 and 14). Reset heater (by pressing OK or switching off for at least 5 sec.) Contact a Webasto service station.
Message 35 Failure relay box	230 V overheating relay short circuit	See message 27.
Message 36, 37, 38, 39, 40, 41	n/a	n/a
Message 42 Failure 230 V heating element	Electric heating device 230 V defect. No relevant temperature increase detected.	Check water system related for a permanent open hot water tap OR heavy leakages. Check cable 230 V from relay box to heater and corresponding connectors. Contact a Webasto service station.

NOTE
n/a = not available

19 Validation and commissioning

Following completion of the installation and successful commissioning of the heater, the warranty card contained in the operating instructions must be filled out by the installation partner.

Warranty Card (see booklet Operating Instructions)

Consists of 2 parts:

WARRANTY CERTIFICATE:

Should remain with customer (in booklet).

CONTROL CARD:

Must be sent to the Webasto national company by the installation partner.
The installation partner fills in the respective technical information and the installation date for its customer and applies its stamp.
The installation partner retains a copy.

NOTE
Additional checklists and blank templates can be downloaded via the Webasto Dealer Portal (http://dealers.webasto.com) if necessary.

20 Technical data

Except where limit values are specified, the technical data refer to the usual heater tolerances of ± 10 % at an ambient temperature of + 20 °C and at the rated voltage and in rated conditions.

20.1. Fuel for Dual Top

The diesel according to DIN EN 590 specified by the manufacturer must be used. Class EL heating oil, L heating oil or PME (bio-diesel) must not be used.
Fuel additives have no negative influences on the heater. If fuel is extracted from the vehicle's tank, follow the additive instructions issued by the vehicle manufacturer.

After changing to low-temperature fuel, the heater must be operated for approx. 15 minutes so that the fuel system is filled with the new fuel.

20.2. Technical data

Heater	Operation	DUAL TOP RHA 100	DUAL TOP RHA 101	DUAL TOP RHA 102
Type approval heater: EMC:		e1 00 0195 e1 03 5000		
Model		Air heater with evaporator burner	Air heater with evaporator burner and electric heating device	
Heat output diesel electric	Control range	1.5 to 6.0 kW -	1.5 to 6.0 kW 0.6 / 1.2 kW	1.5 to 6.0 kW 1.0 / 2.0 kW
Fuel		Diesel, DIN EN 590		
Fuel consumption	Control range	0.17 to 0.65 l/h		
Rated voltage		12 V		
Operating voltage range		10.5 to 15 V		
Current input at 12 V	Summer operation Winter operation, heating and hot water Stand-by	< 1 A 0.5 to 7 A 0.001 A		
Rated power consumption	Control range	15 to 65 W (EN 1646)		
Max. ambient temperature: Heater: - Operation - Storage Control Panel: - Operation - Storage		 -30 to +50 °C -40 to +85 °C -30 to +75 °C -40 to +85 °C	 -30 to +50 °C -40 to +85 °C -25 to +50 °C -40 to +85 °C	
Max. altitude (guaranteed function)		2,200 m		
Adjustment range for interior temperature	Control range	+5 to +35 °C		
Delivery rate for hot air (free blowing without warm-air duct)	Maximum	> 200 m^3/h		
CO_2 in exhaust gas (permitted function range)	2 kW 6 kW	5.0 to 8.0 9.0 to 13		
Water content		11 l		
Water system pressure		max. 3.5 bar		

Heater	Operation	DUAL TOP RHA 100	DUAL TOP RHA 101	DUAL TOP RHA 102
Overpressure valve		4.0 bar		
Pressure water pump, central water supply	Maximum	2.5 bar		
Heater dimensions		Length: 530 ± 2 mm Width: 352 ± 1 mm Height: 256 ± 1 mm		
Weight (w/o water contents)		20 kg	21 kg	

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