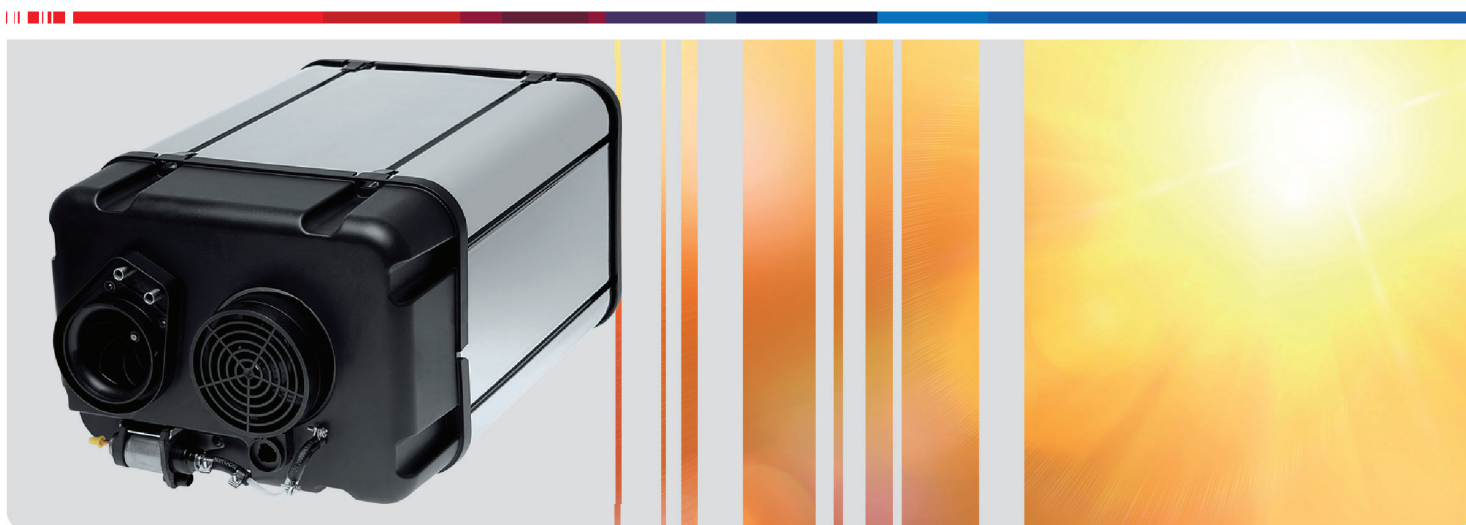


Installation Instructions

Dual Top ST 6



English



WARNING: Cancer and Reproductive Harm
www.P65Warnings.ca.gov

Table of Contents

1	Installation / Repair	3	12	Fuel supply	18
2	General information.....	3	12.1	General.....	18
3	Statutory Regulations governing installation	3	12.2	Fuel pump	18
3.1	Excerpt from the regulations ECE-R 122 points 5 (Part I) and Annex 7 for the installation of heaters	4	12.3	Fuel extraction.....	19
4	Additional Safety Instructions.....	5	12.4	Fuel lines	20
5	Installation example	6	12.5	Fuel filter	20
6	Heater installation	7	13	Combustion air supply	20
6.1	General.....	7	13.1	General.....	20
6.2	Dual Top ST connections	7	13.2	Combustion air intake line	21
6.3	Installation location	7	14	Exhaust system	21
6.4	Connecting the wiring harness	8	14.1	General.....	21
6.5	Installing the heater.....	8	14.2	Exhaust line	21
6.6	Additional information for exterior installation.....	8	15	Electrical connections	23
6.7	Additional information for interior installation	8	15.1	Schematic connection diagrams.....	23
7	Type label	10	15.2	Supply voltage connection.....	24
8	Hot water system	10	15.3	Interior temperature sensor	24
8.1	Installation information for submersible pump systems	11	15.4	Connection to manual control panel.....	24
9	Hot air system.....	12	15.5	Connection to programmable control panel.....	25
9.1	Heating air intake	12	16	Wiring diagrams	27
9.2	Hot air distribution	13	16.1	Legend for wiring diagrams	28
10	Cooling air system	13	17	Starting the heater for the first time	28
10.1	Installation.....	13	18	Fault Message Output	28
11	Boiler drainage and pressure relief system	15	18.1	Manual control panel.....	29
11.1	Frost	15	18.2	Programmable control panel.....	30
11.2	Draining the boiler manually	15	19	Warranty and customer service	33
11.3	How do to stop draining the boiler	15	20	Technical Data	33
11.4	Draining the boiler automatically	15	20.1	Fuel for the Dual Top ST	33
11.5	Frost protection	16	20.2	Technical data	34
			21	Declarations.....	35
			21.1	CE-declaration of conformity	35
			21.2	Drinking water conformity.....	35

1 Installation / Repair

The improper installation or repair of Webasto heating and cooling systems can cause fire or lead to leakage of deadly carbon monoxide. This can lead to serious injury or death.

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



Installation and repair may ONLY be carried out by persons trained and certified in a Webasto training course. NEVER try to install or repair Webasto 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 make sure that you can complete the installation and repair work properly. Only use genuine Webasto parts.

2 General information

Technical documentation, training by Webasto, special tools and equipment are required for the installation and repair of a Dual Top ST 6 heater from Webasto. This installation instruction is also available in several other languages on the Dealer Portal.

Only use genuine Webasto parts. Refer to the Webasto Spare Parts List, the Air and water heaters accessory catalogue, and the motorhome catalogue for more information.

The Dual Top ST is approved for the following applications:

- Caravans
- Motor homes

WARNING

The heater is used exclusively for comfort purposes. Due to its installation, it must not become a safety-relevant component for proper functioning of the vehicle.

CAUTION

Make sure to use fresh drinking water when filling the water tank of the vehicle / boiler. The heater complies with drinking water regulations. (see chapter 21.2, "Drinking water conformity" on page 35). In the following text, the term 'water' is used.

3 Statutory Regulations governing installation

Dual Top ST 6 heaters have been type-tested and approved in accordance with the regulations ECE-R 10 (EMC) and ECE-R 122 (heaters).

Permit numbers see chapter 20, "Technical Data" on page 33. Installation is governed by the provisions in points 5 (Part 1) and Annex 7 of Regulation ECE-R 122 above any other.

NOTE

The provisions of these regulations are binding within the scope of EU Regulation 2018/858 and should also be observed in countries where there are no special regulations!

See also:

chapter 3.1, "Excerpt from the regulations ECE-R 122 points 5 (Part I) and Annex 7 for the installation of heaters" on page 4

CAUTION

Failure to observe 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 Webasto service parts. This will result in the invalidation of the type approval for the heater and therefore of its homologation / type license.

The Dual Top ST 6 complies with all applicable standards for this type of product. When installing the Dual Top ST 6 heaters and related components, you must follow all local regulations, such as:

- 98/83/EC Quality of Drinking Water.
- DIN 2001-2 Drinking Water Supply.
- DVGW W 291 Cleaning and Disinfection.

Make sure that the legal requirements for fitting the heater are not violated during installation, in particular with regard to its location and the routing of the exhaust lines.

NOTE

You must comply with country-specific registration regulations.

For vehicles with an EU type approval, an entry is not required in accordance with § 19 section 4 of appendix VIII b of German StVZO.

3.1 Excerpt from the regulations ECE-R 122 points 5 (Part I) and Annex 7 for the installation of heaters

Subject to paragraph 5.3.1.2, heaters shall be installed according to the requirements of paragraph 5.3.

Requirement from ECE-R 122, point 5.3.1.1.

See eur-lex.europa.eu document 42010X0630(08) for more information.

Vehicles of category O having liquid fuel heaters are deemed to comply with the requirements of paragraph 5.3.

Requirement from ECE-R 122, point 5.3.1.2.

See eur-lex.europa.eu document 42010X0630(08) for more information.

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.

Requirement from ECE-R 122, point 5.3.2.1. See eur-

lex.europa.eu document 42010X0630(08) for more information.

The heater shall not constitute a risk of fire, even in the case of overheating. This requirement shall be deemed to be met 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.

Requirement from ECE-R 122, point 5.3.2.2. See eur-lex.europa.eu document 42010X0630(08) for more information.

In the case of M2 and M3 vehicles, the combustion 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 5.3.2.2 may be used.

Requirement from ECE-R 122, point 5.3.2.3.

See eur-lex.europa.eu document 42010X0630(08) for more information.

The label referred to in Annex 7, paragraph 4, or a duplicate, must be positioned so that it can be easily read when the combustion heater is installed in the vehicle.

Requirement from ECE-R 122, point 5.3.2.4. See eur-lex.europa.eu document 42010X0630(08) for more information.

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

Requirement from ECE-R 122, point 5.3.2.5.

See eur-lex.europa.eu document 42010X0630(08) for more information.

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

Requirement from ECE-R 122, point 5.3.3.1. See eur-lex.europa.eu document 42010X0630(08) for more information.

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

Requirement from ECE-R 122, point 5.3.3.2. See eur-lex.europa.eu document 42010X0630(08) for more information.

A notice, indicating that the heater must be shut down before refuelling, must be affixed to the filler neck of the vehicle. [...]

Requirement from ECE-R 122, point 5.3.3.3. See eur-lex.europa.eu document 42010X0630(08) for more information.

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

Requirement from ECE-R 122, point 5.3.4.1.

See eur-lex.europa.eu document 42010X0630(08) for more information.

The air for the combustion chamber of the heater must not be drawn from the passenger compartment of the vehicle.

Requirement from ECE-R 122, point 5.3.5.1.

See eur-lex.europa.eu document 42010X0630(08) for more information.

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

Requirement from ECE-R 122, point 5.3.5.2.

See eur-lex.europa.eu document 42010X0630(08) for more information.

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.

Requirement from ECE-R 122, point 5.3.6.1.

See eur-lex.europa.eu document 42010X0630(08) for more information.

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

Requirement from ECE-R 122, point 5.3.6.2.

See eur-lex.europa.eu document 42010X0630(08) for more information.

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.

Requirement from ECE-R 122, point 5.3.7.1.

See eur-lex.europa.eu document 42010X0630(08) for more information.

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

Requirement from ECE-R 122, point 5.3.7.2.

See eur-lex.europa.eu document 42010X0630(08) for more information.

The heating system must be switched off automatically and the supply of fuel must be stopped within five seconds when the vehicle's engine stops running. If a manual device is already activated, the heating system can stay in operation.

Requirement from ECE-R 122, point 5.3.8.1.

See eur-lex.europa.eu document 42010X0630(08) for more information.

A clearly visible operating display in the operator's field of view must indicate whether the combustion heater is switched on or off.

Requirement from ECE-R 122, Annex 7, point 7.1. See eur-lex.europa.eu document 42010X0630(08) for more information.

4 Additional Safety Instructions

- If the Dual Top ST heater suffers any impact damage, for example by falling onto the floor, you must return it to Webasto for safety inspection/repair.
- You must not paint or repaint the Dual Top heater in part or completely.

5 Installation example

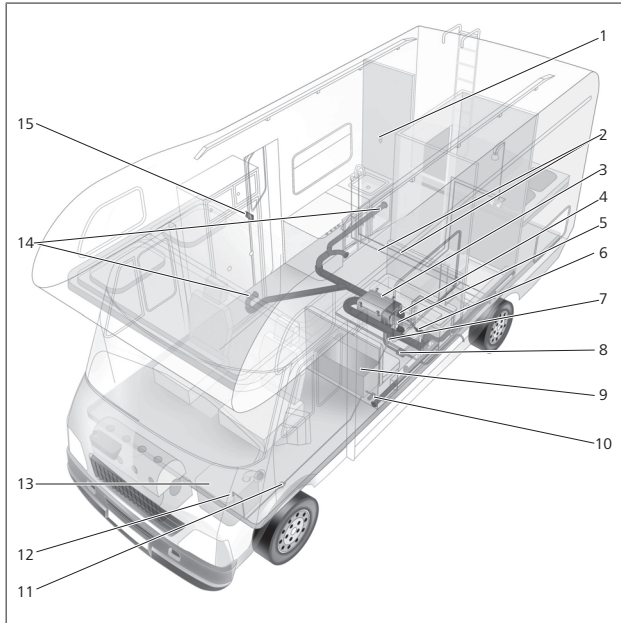


Fig. 1

Number	Description
1	Interior temperature sensor
2	Water lines
3	Dual Top ST Heater
4	Dual Top ST Cooling-air intake cover
5	Dual Top ST Rubber bellows
6	Combustion air intake silencer
7	Cooling air and drainage water drain
8	Exhaust silencer
9	Drinking water tank
10	Water pump
11	Fuel pump
12	Fuel tank connector
13	Fuel tank
14	Hot air ducts
15	Control panel

6 Heater installation

6.1 General

CAUTION

You must adhere to the regulations specified in chapter 3, "Statutory Regulations governing installation" on page 3.

CAUTION

You must not lift the Dual Top ST heater by the hot air inlet! This offsets the hot air fan and causes the fan to contact internal components.

NOTE

You must observe the installation details specified by the manufacturer of your vehicle.

6.2 Dual Top ST connections

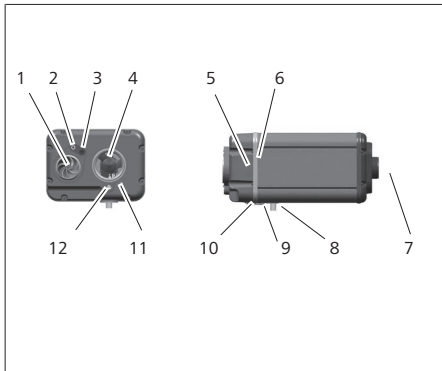


Fig. 2

Number	Description
1	Heating air inlet
2	Water inlet (cold)
3	Water outlet (hot)
4	Cooling air inlet
5	Housing cover with inlet interfaces
6	Opening for Dual Top ST electrical heater wiring harness (Dual Top ST 8 only)
7	Housing cover with hot air outlet
8	Exhaust outlet
9	Drain hose of overpressure valve and electrical safety/drainage valve
10	Cooling air outlet
11	Fuel inlet
12	Combustion air inlet

6.3 Installation location

Installation location

All sides of the heater must have a clearing of 0.8 in (20 mm) or more.

- Space requirement at sides > 0.8 in (20 mm)
- Space above the heater > 0.8 in (20 mm)
- Space requirement for air inlet > 7.8 in (200 mm)
- Space requirement for hot air outlet > 6 in (150 mm)
- Heater Length 20.8 in (530 mm)
- Heater Width 13.9 (352 mm)
- Heater Height 10 in (256 mm)

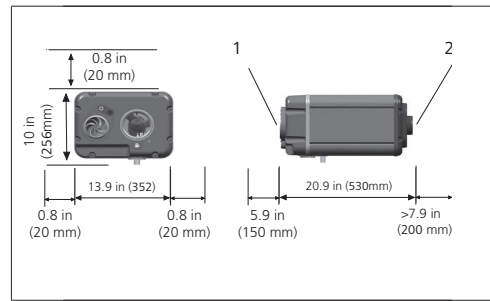


Fig. 3 Heater dimensions [mm]

Number	Description
1	Housing cover with inlet interfaces
2	Housing cover with hot air outlet

CAUTION

All materials located in the immediate vicinity of the heater must be heat-resistant > 212 °F (100 °C).

Find a suitable location for the heater

- Make sure to have sufficient space at all sides of the heater. See Fig. 3.
- The heater must be secured in a location in the vehicle that can withstand a weight of 81.6 lb (37 kg).
- All parts must be above the water wading depth (as specified for your vehicle).
- The heater must be removable.
- The heater must be accessible and the housing cover with the inlet interfaces removable.

Webasto recommends installing the heater on the exterior of the vehicle to save space. See also chapter 6.6, "Additional information for exterior installation" on page 8.

The information contained in chapter 6.7, "Additional information for interior installation" on page 8 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 must be mounted in a horizontal position (tolerance $\pm 5^\circ$), with its exhaust and cooling air outlet pointing down-wards. See Fig. 4.

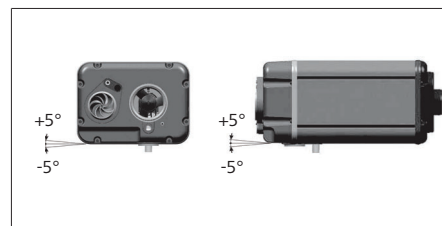


Fig. 4 Required installation position.

CAUTION

Make sure that after installation the casing of the heater is not in contact with any parts of the vehicle body. Make sure that all moving parts can move easily. Failure to do so may result in the hot air fan, cooling air fan or other part being blocked.

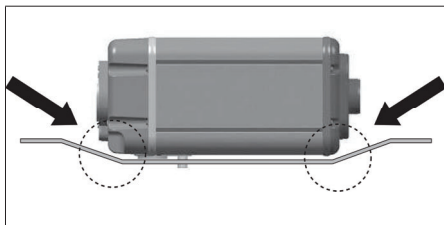


Fig. 5 The heater casing must not touch the vehicle body.

6.4 Connecting the wiring harness

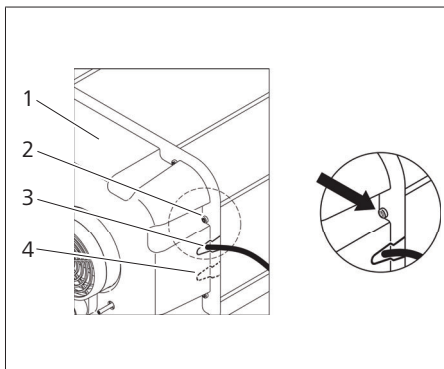


Fig. 6 Removing the housing cover with inlet interfaces

Number	Description
1	Housing cover with inlet interfaces
2	Fastening screws for housing cover with inlet interfaces
3	Opening for Dual Top ST wiring harness
4	Opening for electric heater wiring harness (Dual Top ST 8 only)

The wiring harness X11 (12-pin) is already connected to the heater.

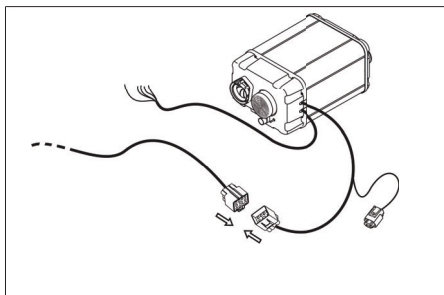


Fig. 7 Connecting the Dual Top ST 8 wiring harness.

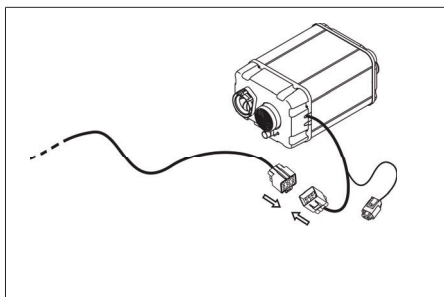


Fig. 8 Connecting wiring harness Dual Top ST 6

6.5 Installing the heater

- The heater is mounted 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 16 to 18 lb-ft (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 motorhomes for different kinds of fixation brackets.
- Use a minimum of 4 fixation points.
- Fixation of the heater only on the top or on one of the sides is not sufficient.

See Fig. 9

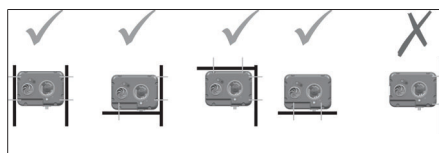


Fig. 9 Possible ways to mount the Dual Top ST

6.6 Additional information for exterior installation

- Secure the heater in such a way that it will not become detached from the vehicle in case the vibration dampers fail. A basic application possibility for securing the Dual Top ST (see Fig. 10) is included in the scope of delivery.
- To minimize energy loss, Webasto recommend that the hot air hoses which run outside the vehicle be insulated.

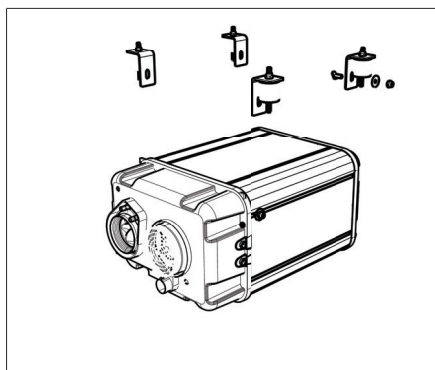


Fig. 10

6.7 Additional information for interior installation

CAUTION

Both the Dual Top ST heater and the hot air hoses must be installed out of range of the vehicle occupants and of parts which are not temperature-resistant, such as an installation box or behind furniture, see Fig. 11).

- ▶ The minimum distances to the heater must be complied with. See also Fig. 3.
- ▶ All materials in the immediate vicinity of the heater must be heat-resistant > 212 °F (100 °C).

ATTENTION

- ▶ You must install the Dual Top ST heater in such a way that no non-heat-resistant part can fall onto the heater or block the air inlet or outlet.
- ▶ Accidental contact by the vehicle occupants must be avoided.
- ▶ The heater must be accessible when maintenance or repairs are carried out.
- ▶ To ensure uniform air circulation, a ventilation opening of at least 39.4 in² (100 cm²) must be provided. See also chapter 9.1, "Heating air intake" on page 12.

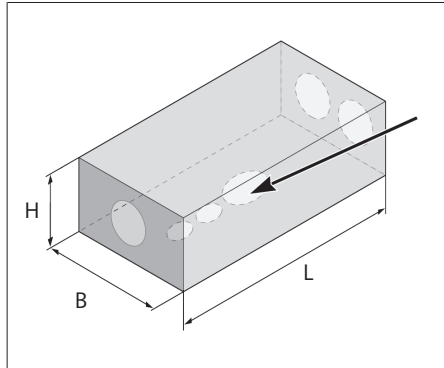


Fig. 11 Example of the installation box

Arrow: Bottom openings for exhaust gas, cooling air, combustion air and water drainage. Bottom opening using cut-out for foam seal.

L	≥ 34.6 in (880 mm)
B	≥ 15.4 in (392 mm)
H	≥ 12 in (306 mm)

6.7.1 Sealing off of exhaust gas to outside

Exhaust gases must always be routed to the outside and must never enter the passenger compartment. Also see chapter 14, "Exhaust system" on page 21, and chapter 3, "Statutory Regulations governing installation" on page 3, for requirements of exhaust system.

CAUTION

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

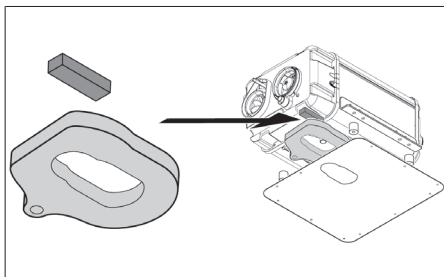


Fig. 12 Webasto foam seal

1. Drill a hole with the size and spacing of the two sections in the vehicle floor. You can use the seal as template for this purpose.
2. Make sure that the heating is positioned with enough clearance. After the installation, the heater position, or that of the seal must not be changed.

3. Escaping exhaust gases can reach extremely high temperatures, therefore you must use a temperature resistant sealing compound (up to 194 °F, 90 °C) to seal the floor.

When installing the heater, you must also make sure that you meet the following requirements to seal off the outside:

- The seal must be evenly compressed to 60 %. See Fig. 13. It is advisable to use vibration dampers with a height of 1.2 in (30 mm) for this purpose.
- After the heater is installed the exhaust pipe must be at a minimum distance of 1 in (25 mm) from the seal and the vehicle floor. See Fig. 14.

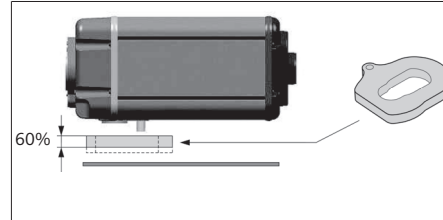


Fig. 13 Compressing the seal

CAUTION

To secure 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.

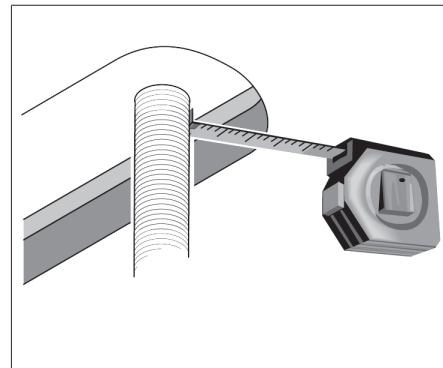


Fig. 14 Distance of exhaust pipe from seal and vehicle floor

NOTE

To guarantee proper, secure positioning of the heater and the foam seal, Webasto recommend that you use the Dual Top Interior Installation Kit. Using the bottom plate, you can only secure the heater 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.

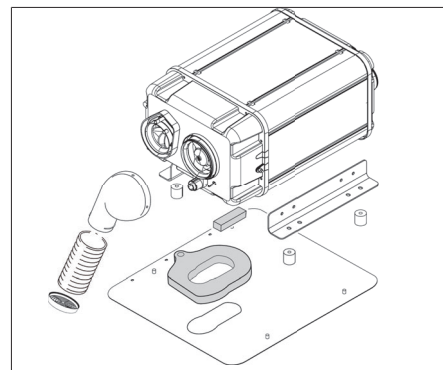


Fig. 15 Webasto interior installation kit

7 Type label

The type label must be positioned in such way that it cannot be damaged and remains clearly readable 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 type label and only the current year must be readable.

8 Hot water system

The Dual Top ST 6 complies with all applicable standards for this type of product. When installing the Dual Top ST 6 heaters and related components, you must follow all local regulations, such as:

- 98/83/EC Quality of Drinking Water.
- DIN 2001-2 Drinking Water Supply.
- DVGW W 291 Cleaning and Disinfection.

NOTE

During and after installation of the water system, you must make sure that no dirt can enter the water circuit.

To avoid leaks you must use a 10 mm standard hose connector, such as John Guest/ASP, to connect water lines or hoses to the heater. The water pipes on the Dual Top ST are especially equipped with grooves which enable you to properly secure and easily remove the hose connectors if necessary.

- Use a thermostatic mixing valve if required.
- If you are not using a quick connection system used, then secure the lines at all connection points in such a way that they can withstand the system pressure and are watertight.
- Fasten the hoses in such a way that they cannot be damaged, for example by using hose clips.

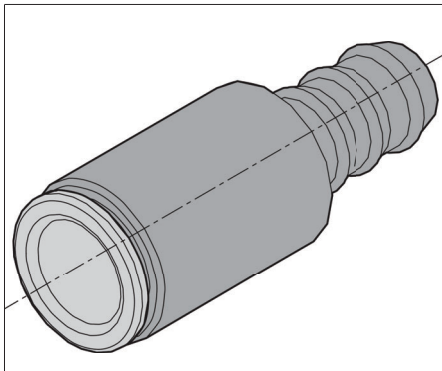


Fig. 16

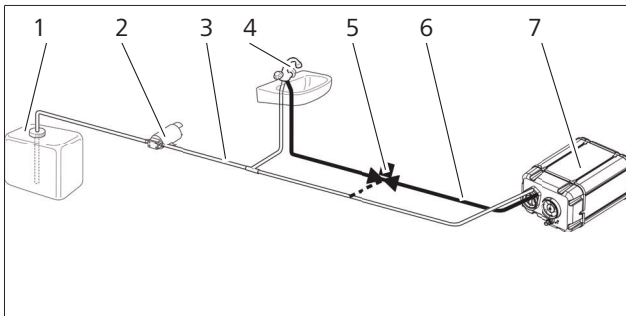


Fig. 17

Number	Description
1	Fresh drinking water tank of the vehicle
2	Water pump
3	Cold water pump
4	Water outlets
5	Optional thermostatic mixing valve
6	Hot water line
7	Dual Top ST heater

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 (194 °F, 90 °C).

To operate the heater you may use any sanitary water pump that:

- creates a pressure of up to 36 psi (2.5 bar).
- closes when shut off.
- has a minimum operating pressure of 14.5 psi (1 bar).

When using submersible pumps, observed the instructions from chapter 8.1, "Installation information for submersible pump systems" on page 11.

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

If the hot water temperature needs to be limited at the water outlets, optionally use a thermostatic mixing valve (see Fig. 16). If you connect to a central water supply (rural or city mains) or a more powerful water pump, then you must always install a pressure reduction valve to prevent a pressure above 36 psi (2.5 bar) developing in the boiler.

Route water hoses as short as possible and make sure they are free of kinks. You must secure all hose connections in such a way that they can withstand the system pressure and are watertight; this also applies to cold water hoses. Thermal expansion of the water can cause pressures of up to 58 psi (4 bar) before the over-pressure valve responds.

Webasto recommend that all water hoses be mounted at a downhill slope to the heater wherever possible. You must route intake and outlet pipes that are connected to the heater in such a way that there are no drain traps. By doing so, if you drain the boiler, you will also drain the water lines.

If you install the Dual Top ST heater outside, the water lines must be routed within the air intake hose. This will avoid frozen water lines as long as the heater is operating in the corresponding mode. Also refer to the relevant Operating Instructions.

The Dual Top ST rubber bellow must be used to connect the air intake hose to the heater. This must be secured with a clamp. See Fig. 18.

NOTE

Do not fasten the rubber bellow with screws which extend into the rubber bellow and into the housing cover with inlet interfaces because this may block the fans.

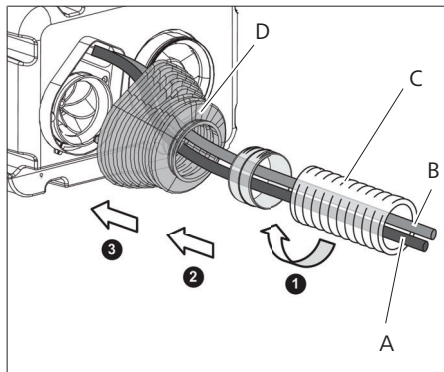


Fig. 18

A	Cold water line
B	Hot water line
C	Air intake hose
D	Dual Top ST rubber bellow

8.1 Installation information for submersible pump systems

The Dual Top ST application with a submersible pump system requires a Dual Top ST heater with submersible pump version and two extra ventilation hoses:

- one ventilation hose for the cold water line, so that no water is drawn from the vehicle's fresh water tank while draining the boiler.
- one ventilation hose for the Dual Top ST heater.

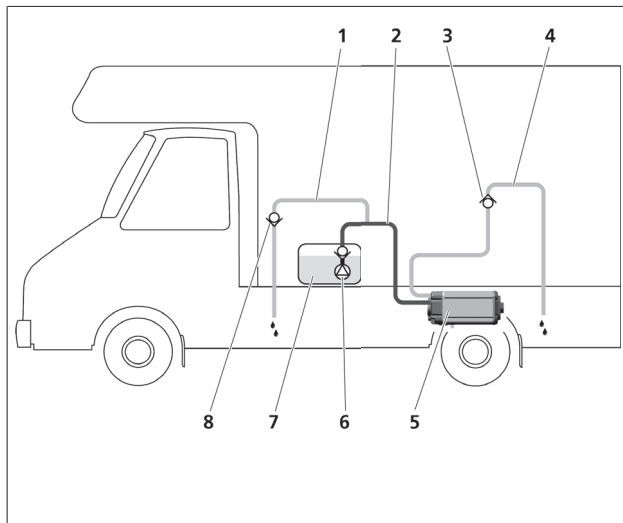


Fig. 19 Dual Top ST application with submersible pump system

Number	Description
1	Ventilation hose
2	Cold water line
3	Check valve
4	Ventilation hose Dual Top ST
5	Dual Top ST heater submersible pump version
6	Submersible pump
7	Vehicle's fresh drinking water tank
8	Check valve

The numbers in Fig. 20 correspond with the same numbers in Fig. 19.

1. Connect the ventilation hose (1) to the cold water line (2) and mount the hose at a steep upward slope toward the check valve (8).
2. Position the hose (1) in such a way that excess water flows unimpaired from the vehicle to the ground.

CAUTION

- The connection for the ventilation hose (1) and the check valve (8) must lie above the vehicle fresh drinking water tank (7).
- No drain traps!

1. Connect the ventilation hose (4) to the hose which runs through the housing cover with inlet interfaces (11) of the Dual Top ST (5), and mount the hose with a steep upward slope toward the check valve (3).
2. Position the hose (4) in such a way that excess water flows unimpaired from the vehicle to the ground.

CAUTION

- The ventilation hose (4) and the check valve (3) must lie **above** the vehicle fresh drinking water tank (7)!
- No drain traps!
- Outside the passenger compartment you must insulate the ventilation hose (4) to avoid frost!

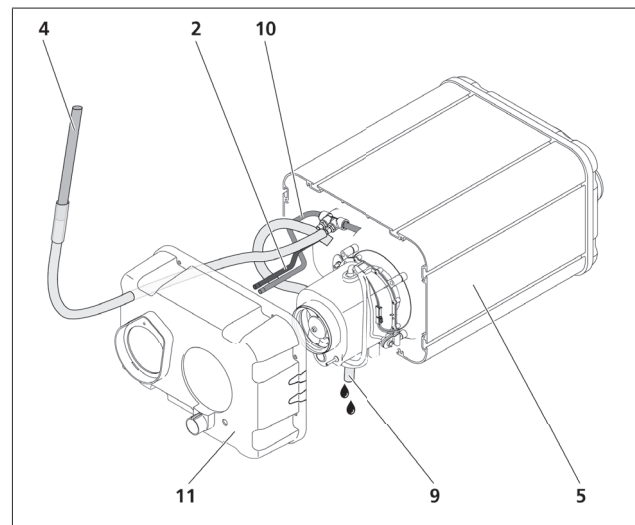


Fig. 20

Number	Description
2	Cold water line
4	Ventilation hose Dual Top ST
5	Dual Top ST submersible pump version
9	Drain hose of overpressure valve and electrical safety / drainage valve
10	Hot water line
11	Housing cover with inlet interfaces (service cap)

CAUTION

Never try to open the heater if you are not certified. Installation and repair may only be carried out by persons trained and certified in a Webasto training course.

9 Hot air system

NOTE

The heater must not be integrated into the vehicle heating system.

The recirculating air system ensures frost protection of the water hoses with underfloor installation. It also contributes to a high total efficiency and avoids fumes from the outside being drawn inside. You can only use the recirculating air system with air intake from the interior.

Use the control panel to adjust the interior temperature 41 to 95 °F (5 to 35 °C). Heat is generated with a diesel-operated burner. The

Dual Top ST 8 also generates heat with an electric heater, combining both devices (not available in North America). Power of the Dual Top ST 8 electric heater, depending on the type and setting:

- Low power = 1,000 W.
- High power = 2,000 W.

The heating capacity is automatically adjusted by the diesel powered heater and modulated between 1,500 W and 6,000 W depending on the output requirement. This is calculated from difference between selected temperature and current interior temperature.

To make sure that the heater functions satisfactorily, the flow resistance of the connected hot air system must be minimized. At maximum speed of the hot air fan, the maximum pressure drop between the inlet and outlet side of the hot air line is 3.0 hPa (hectopascal).

Make sure 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 ducts is too high, the temperature sensors inside the heater will detect a high air temperature. This results in a higher speed of the hot air fan, causing more noise and power consumption.

You must secure the hot air hoses (inlet and outlet) with clamps or screws at their connection points.

NOTE

Check the installation for:

- ▶ No air due to a short circuit between the vehicle's heating system and the heater air inlet.
- ▶ No air due to a short circuit between the heater's air inlet and its air outlet, see also Fig. 21.
- ▶ No air due to leakage from openings created to route the hoses in or out of the interior.

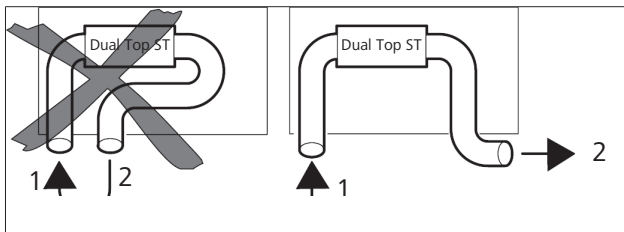


Fig. 21

1	Air inlet for the heater
2	Air outlet for the heater

9.1 Heating air intake

9.1.1 General

NOTE

The heating air must be drawn from the interior.

Extracting heating air from an enclosure, such as the bottom of the bed or the seat box, will reduce noise from the hot air fan. Mounting the air intake in a central area provides even air circulation throughout the interior.

Do not position the heating air inlet too low. This minimizes the risk of dirt and small particles being sucked in. If necessary, mount an air grille on the heating air intake.

Webasto recommend to position the inlet sufficiently above floor level.

Make sure that no fluids can be spilled into the air inlet.

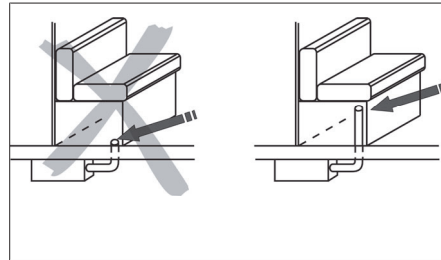


Fig. 22

If an air intake hose is used, its internal diameter must be 3.6 in (90 mm).

9.1.2 Installation

The length of air intake hose outside the interior shall be as short as possible, ideally less than 3.3 ft (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 intake hose is re-quired.

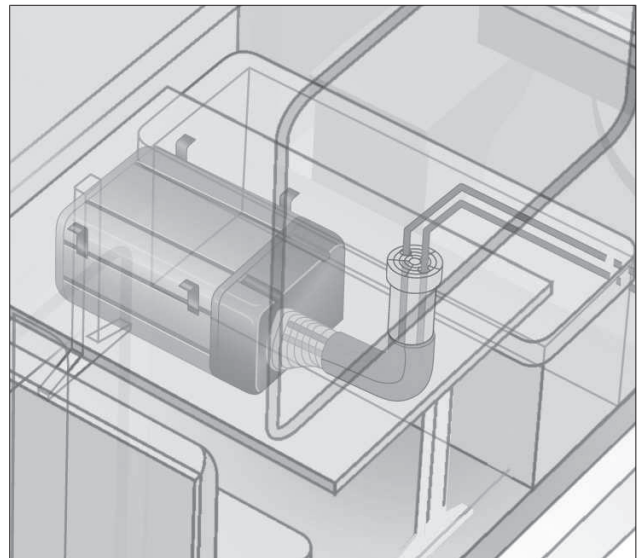


Fig. 23 Heating air intake

1. Determine the position of the hole in the floor through which you want to pass the air intake hose.
2. Drill a hole in the floor with a diameter of 4 in (100 mm).
3. Seal the joint between the floor and the air intake hose with temperature resistant sealing compound (up to 194 °F 90 °C).
4. Outside the vehicle, insulate the air intake hoses to protect the water lines against frost and to minimize energy loss.

5. Inside the vehicle, guide the water pipes through the air intake hose.
6. Secure the air intake hose to the wall or the floor.

9.2 Hot air distribution

Design an air distribution system that provides an even distribution of heat into all heated sections of the vehicle. Design the system so that the air flow through both heater outlets is similar.

 See the Webasto air and water heaters accessory catalogue or the Webasto motorhome product catalogue for branches, connecting pieces, Y-junctions, outlets, etc. made of high-temperature resistant materials.

The air distribution must be designed to be as uniform as possible to prevent possible air circulation in the hot air ducts in hot water mode.

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

You must use both hot air outlets

The internal diameter of the main section of the two hot air ducts must be 176 in (80 mm).

Guide the hot air with 176 in (80 mm) hoses directly from the heater into the interior.

1. Connect 76 in (80 mm) hoses to the housing cover with hot air outlet and secure them with screws to prevent them from becoming detached during temperature changes (see Fig. 2 and Fig. 24).
2. Connect the whole air distribution system using air distributors and reducers. Drill holes through the furniture and floor where necessary. You can adjust the air flow, and therefore the heat flow, through the selection of appropriate branches and diameters.
3. Seal the gap between floor and hot air hose if the hot air hose is going from the exterior to the interior of the vehicle.
4. Mount the Webasto air outlets at the end of each hot air hose.
5. Insulate hot air ducts routed to the outside to minimize energy loss.
6. In case hot air hoses inside the interior are **not** running through closed compartments or areas, cover these hot air hoses to prevent hose damage and accidental touching.
7. Secure the hot air hoses at all connection points using hose clamps.
8. Secure the hot air hoses to the wall or floor using hose clips.

NOTE

- ▶ Make sure that the length of the hot air ducts from the heater to the first air outlet (from each heater outlet) is at least 2.6 ft (0.80 m).
- ▶ You must mount at least two air outlets (one each per main section of the two hot air ducts) at the same height. If possible, the air outlets with the shortest hot air duct to the heater should be used.
- ▶ You must ensure that the length of the hot air ducts routed outside the passenger compartment is as short as possible and insulated to keep heat loss to a minimum.



- ▶ Install hot air hose routing as straight as possible, using large curves if necessary;
- ▶ Avoid compressing or pinching the hot air hoses.
- ▶ You must not be able to close more than 30% of the total number of outlets.
- ▶ Position outlets in such a way that they are least likely to get blocked. Free flow into the interior enables the best interior heating and air circulation.
- ▶ Position the outlets close to the floor / ground for best air circulation.

CAUTION

Fire danger!

Only use high-temperature resistant Webasto hot air hoses.

You must position the hot air opening in such a way that air is not blown onto any parts that cannot withstand the heat. Depending on the length of the hot air ducts, the blow-out temperature can be 248 °F (120 °C) and briefly higher.

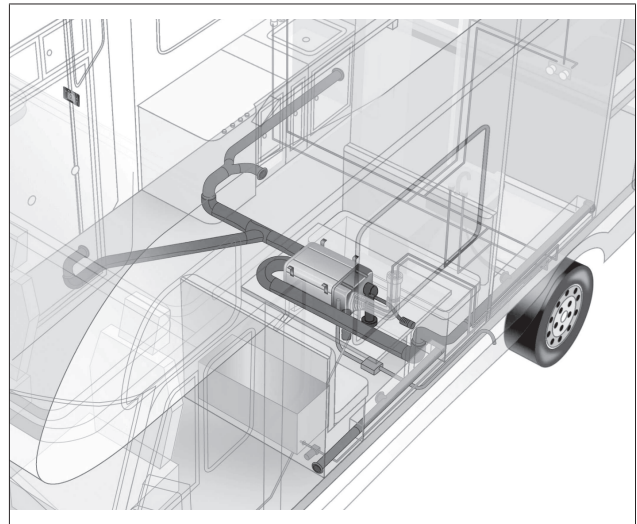


Fig. 24 Hot air distribution

■ Dark grey: Below interior, insulated

■ Light grey: Interior

10 Cooling air system

Cooling air is needed to protect the heaters' electronics and the motor against overheating. Cooling air must be taken from outside and not from inside the vehicle.

The air used has to be discharged outside the vehicle.

The heater is equipped with a motor and a fan to transport the cooling air. Besides this, the fan also provides the heater with combustion air.

This motor works independently from the hot air system that has an own motor and fan.

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 may lead to acceleration of the fan and unnecessary noise.

Webasto therefore advise to keep the air intake resistance to a minimum.

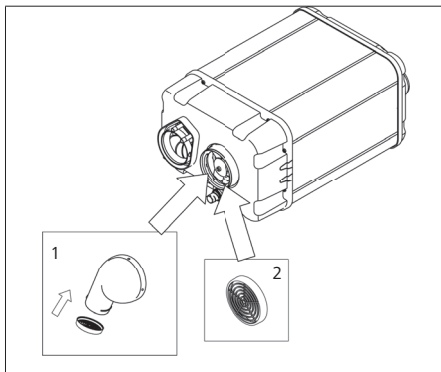


Fig. 25

1	Cooling-air inlet cover and protective grille, 60 mm diameter
2	Protective grille only, 100 mm diameter

11 Boiler drainage and pressure relief system

11.1 Frost

There are several features that protect the water supply system against frost.

- Drain water contents manually when there is risk of frost and when storing the vehicle for a longer period. See "Draining the boiler manually." The boiler is drained automatically in case you forget to drain manually. See "Draining the boiler automatically."
- If you do not want to drain the water supply system and you do not heat the interior of the vehicle, you can select the frost protection mode. see "Frost protection."

For sections 11.2 through 11.5, see the illustration of controls on page 17.

11.2 Draining the boiler manually

Drain water contents manually when there is risk of frost and when storing the vehicle for a longer period.

Both manual and programmable control panel:

1. Interrupt power for vehicle system water pump (main switch or pump switch, depending on instructions of the vehicle manufacturer).
2. Open hot water taps in kitchen, bathroom, shower, etc. (set preselecting mixing taps or single-lever valves to "hot").

If you have manual control panel, then continue with following steps:

1. The electrical safety/drain valve is opened by turning and holding the mode selector knob (A) against the spring force in the position drain boiler (6) for at least 5 seconds.
2. Then, release the knob. The electrical safety/drainage valve will be open for approx. 90 minutes.
3. During drainage, all green icons on the control panel, as well as the red indicator on the mode selector knob (A), are blinking.

The boiler content is now discharged to the outside through the electrical safety/drainage valve.

Place a container beneath the outlet to check whether the water in the boiler has completely drained away (approx. 9 litres!).

If you have programmable control panel, then continue with the following steps:

1. Make sure the device is switched on.
2. Press **MENU**.
3. Press **▲** and **▼** to select "♣ Draining Boiler".
4. Press **OK**. The display shows: "Press OK to confirm boiler drainage"
5. Press **OK**. The display shows: "Draining... Press MENU to select heating operation" and "Press STOP to abort drainage" "♣" (9)



NOTE

Any kind of heater operation will be stopped when manually starting boiler drainage.



NOTE To stop drainage see "How to stop draining the boiler."

- ▶ The boiler content is now discharged to the outside through the electrical safety/ drainage valve.
- ▶ Place a container beneath the outlet to check whether the water in the boiler has completely drained away (approx. 9 litres!).
- ▶ After approx. 90 min, the message "**Drainage completed**" is shown.

1. Press **OK** to end manual drainage.



NOTE

Any kind of water from the vehicle has to be discharged at an appropriate disposal facility.



NOTE

Avoid the formation of micro-organisms in the lines and in the boiler during storage and make sure that the water supply system is completely drained. To do this, open all water valves, connect an air pressure of approx. 2 bar to the hot water line and leave it connected until the residual water is completely drained off.

11.3 How to stop draining the boiler

For heaters with a manual control panel, you can stop drainage by moving mode selector knob (A) to drainage mode (6) for at least 5 seconds and then releasing the knob.

In case of a programmable control panel, you can stop boiler drainage, if needed.

1. Make sure the device is switched on.
2. Press **MENU**.
3. Press **▲** and **▼** to select "♣ Draining Boiler".
4. Press **OK**.
5. The display shows "Press OK to confirm boiler drainage". Press **OK**.
The display shows:
"Draining... Press MENU to select heating operation"
"Press STOP to abort drainage" "♣" (9).
6. Press **STOP**.
The display shows: "Drainage aborted".
7. Press **OK**.

11.4 Draining the boiler automatically

The electrical safety/drainage valve is opened electrically.

If the water temperature at the electrical safety/drainage valve is less than 43 °F (6 °C) for 30 minutes, the boiler water contents may drain automatically.

This function is active when:

- the device is switched "OFF";
- in winter mode (heating **without** hot water production) during a period when there is no heating action in the heater (e.g.: selected interior temperature is reached, low outside temperature);
- if battery power is too low (below 10V for 30 minutes, there is a failure!

NOTE

Note that the electrical safety/drainage valve only works when a 12 V power supply is available!

With a manual control panel, during drainage, all green icons, as well as the red indicator on the mode selector knob (A), are blinking.

With a programmable control panel, during drainage "❄" (9) appears on display.

After approx. 90 min, the electrical safety/drainage valve will be closed again.

The drainage outlet of the electrical safety/drainage valve must always be kept clear (free from dirt, ice, leaves etc.)!

To avoid water loss and to protect the heater and boiler against frost, select the frost protection mode (see chapter "Frost protection."

NOTE

Draining the boiler as well as the frost protection mode protect the heater and boiler against frost. Not all water lines in the vehicle can be protected against freezing due to installation variations.

When storing the vehicle, either choose a place that is well protected against low temperatures or drain the whole water system, including all lines and tubes (e.g. with air pressure, see "Draining the boiler manually."

Warranty claims for damage caused by frost will not be honoured!

11.5 Frost protection

The frost protection mode is a safety feature for the heater only. It does not prevent the water circuits inside and outside the vehicle from freezing.

Store the vehicle at a place that is well protected against frost or drain water contents if there is a risk of frost!

For Dual Top ST with a manual control panel: To avoid freezing of the tubes and the boiler move mode selector knob (A) to frost protection mode (5).

The indicator (C) on the control panel lights green when the equipment is switched on. The red indicator on the mode selector knob (A) illuminates.

The heater functions as in the wintermode, heating with hot water production, but with lower values for air and water temperatures.

For Dual Top ST with a programmable control panel: Make sure the device is switched on.

1. Press **MENU**.
2. Press **▲** and **▼** to select "**Frost Protection**".
3. Press **OK**. For Dual Top ST 6: The display shows: "Selection completed".
4. For Dual Top ST 8: Press **▲** and **▼** to select the desired heat source:

Dual Top ST 8
"Diesel powered"
"1,000 W ~ 230 V" *
"2,000 W ~ 230 V" *

* Options "...W ~ 230 V" shown only when external 230 V power supply is connected.

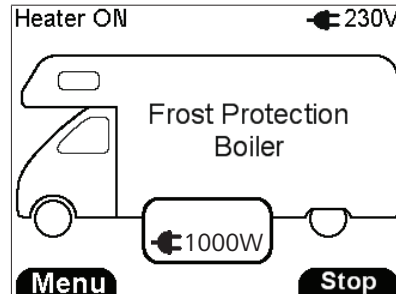
5. Press **OK**. The display shows: "Selection completed".

NOTE

When the heater is already "ON", the text "**Selection completed, press OK to change operation mode**" is displayed.

- Press **OK**.

After 3 seconds the power indicator (6) lights up in green and the display changes to:



☛ 230V und ☛ ... W: Only Dual Top ST 8

- "Heater ON"
- "**Frost Protection Boiler**"
- "❄ diesel", "☛ 1000 W" or "☛ 2000 W" (depending on heater type and selected heat source).

The heater functions as in the winter mode, heating **with** hot water production, but with lower values for air and water temperatures.

NOTE

When the frost protection mode is selected in dependence on the selected heat source, diesel and electrical power are used. Therefore, it should be ensured that the battery is charged and there is enough diesel in the tank when "**Diesel mode**" is selected. Check this frequently.



NOTE When ambient temperatures below -4 °F (-20 °C) are expected, select heat source "**Diesel powered**" for 100% frost-protection of the system.

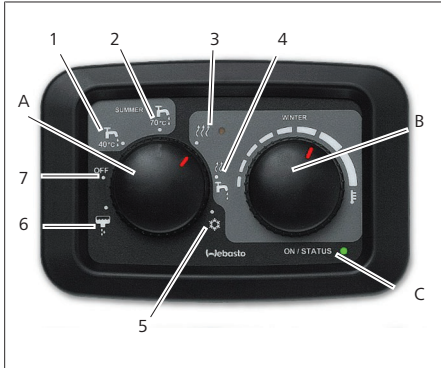
NOTE

Make sure that the boiler is filled with water when choosing frost protection mode.

NOTE

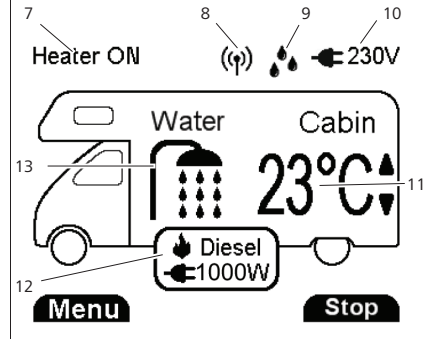
The frost protection mode enables the user to park the vehicle for a short time without being observed and without having to worry about frost and frost damage. During winter storage or when parking the unused vehicle for a longer time, the entire water system should be drained and the heater disconnected from the battery to avoid unnecessary battery discharging or possible frost damage.

Manual control panel



- A -- Model selector switch
- B -- Interior temperature selector knob
- C -- Power indicator / fault message display
- 1 -- Summer operation mode 104 °F (40 °C)
- 2 -- Summer operation mode 158 °F (70 °C)
- 3 -- Winter operation mode, heating **without** hot water production
- 4 -- Winter operation mode, heating **with** hot water production
- 5 -- Frost protection mode
- 6 -- Drainage boiler
- 7 -- OFF

Programmable control panel



- 1 -- Up button
- 2 -- Down button
- 3 -- Start / Stop / OK
- 4 -- Menu / Back / Cancel
- 5 -- ON / OFF
- 6 -- Power indicator
- 7 -- Heater ON / Heater OFF
- 8 -- Remote indicator
- 9 -- Drainage indicator
- 10 -- 230 V indicator (Dual Top ST 8)
- 11 -- Interior heating temp indicator
- 12 -- Active heat source (only diesel Dual Top ST 6 / diesel and electricity 1000 W / 20000 W Dual Top ST 8)
- 13 -- Water heating temp indicator

Fuel supply

12.1 General

The fuel is typically taken from the vehicle's own fuel tank. It can also be taken from a separate fuel tank (accessory). Suitable fuel pumps are the DP 40 and the DP 42.4. The permissible values for the maximum pressure at the fuel pump entry side are shown in Fig. 26 for DP 40 and Fig. 27 for DP 42.4.

NOTE

A notice, indicating that the heater must be shut down before refueling, must be affixed to the fueling point. A relevant sticker is part of the delivery scope.

Pressure table fuel supply for DP 40

Internal diameter (iø)	= 2 mm
Length suction side (l1)	≤ 4.6 ft (1.4 m)
Length pressure side, (l2)	≤ 19.7 ft (6 m)
Permissible fuel supply-line height H ft (m)	at max. pressure psi (bar) in the fuel line
0.0	14.5 (1)
3.3 (1.0)	13.2 (0.91)
6.6 (2.0)	12 (0.83)
Maximum fuel supply-line height S ft (m)	at max. negative pressure psi (bar) in the fuel tank
0.0	-1.5 (-0.10)
1.6 (0.5)	-0.09 (-0.06)

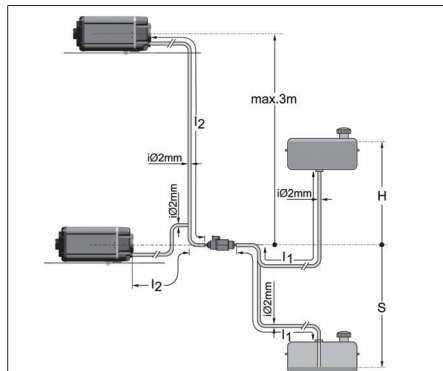


Fig. 26 Permissible pressure at the fuel take-off point DP 40

Pressure table fuel supply for DP 42.4

Requirements for the fuel lines		Value
	Inside diameter	2mm
L1	Max length (intake side) ft (m)	16.4 (5 m)
L2	Max length (pressure side) ft (m)	33 (10 m)
L1 + L2	Max overall length ft (m)	39.4 (12 m)
H1	Max height difference form heater-fuel pump (heater above fuel pump)	29.4 (3 m)
H2	Max height difference form heater – fuel pump (heater below fuel pump)	3.3 (1 m)

h1 ft (m)	pmax psi (bar)
h1 = 0	-1.5 to +7.25 (-0.1 to +0.5)
h1 = 0 to 3.3 (0 to 1)	-1.5 to +5.8 (-0.1 to +0.4)
h1 = 3.3 to 6.6 (1 to 2)	-1.5 to +4.4 (-0.1 to +0.3)

h2 ft (m)	pmax psi (bar)
h2 = 0 to 4.3 (0 to 1.3)	-1.5 to +7.25 (-0.1 to +0.5)

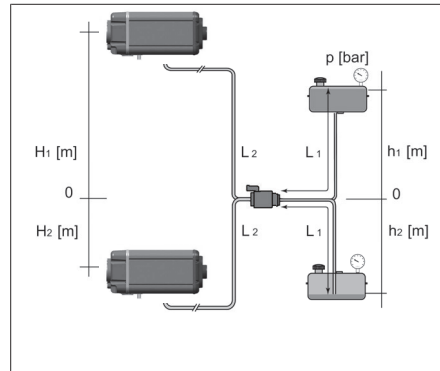


Fig. 27 Permissible pressure at the fuel take-off point DP 42.4

12.2 Fuel pump

The fuel pump DP40 and the fuel pump DP42.4 provide a combined *delivery, metering* and a *shut-off system*. The pumps are subject to certain installation criteria (see Fig. 26 and Fig. 27).

12.2.1 Installation location

You must not install the fuel pump and its fuel lines within range of hot vehicle parts which radiate heat. Use a heat shield if necessary.

The fuel pump must be mounted outside the vehicle.

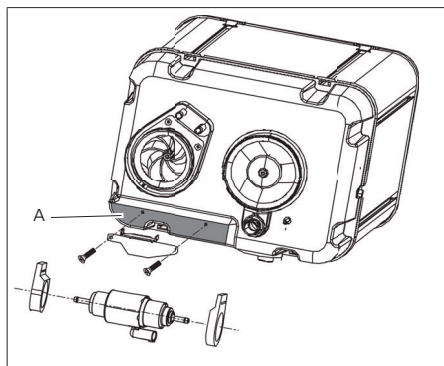


Fig. 28 Mounting location (A) for fuel pump on heater

Mounting the fuel pump on the heater (see Fig. 28, "Mounting location (A) for fuel pump on heater") is only allowed if the length of the fuel line's suction side does not exceed 4.6 ft (1.4 m).

If the length of the fuel line's suction side is over 4.6 ft (1.4 m), then the fuel pump and the heater have to be installed separate from each other. In this case you must extend the fuel pump's

NOTE

You can reduce the vibration level by mounting the fuel pump on the sturdiest possible part of the vehicle chassis, such as a frame side member. As a result, the ticking noise of the fuel pump may be perceived as being more quiet.

12.2.2 Installation and attachment

The fuel pump installation position is limited as shown in Fig. 29 to ensure effective automatic bleeding.

The fuel pump must be installed in a horizontal position (0 to 5°).

To reduce noise, the fuel pump must be installed with a vibration-damping suspension.

Pay attention to the direction of the fuel flow. The arrow on the fuel pump must point towards the heater.

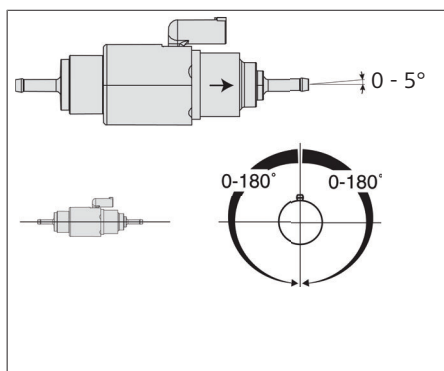


Fig. 29 Fuel pump DP40 installation position

The next picture shows the installation position for the fuel pump DP 42.4

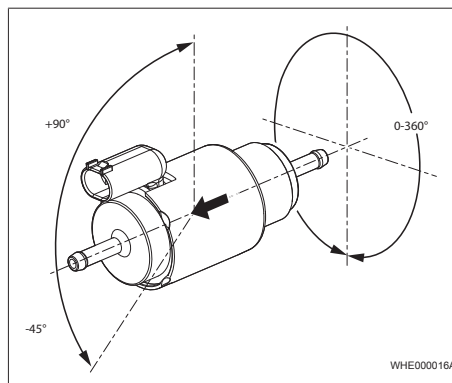


Fig. 30 Fuel pump DP42.2 installation position

12.3 Fuel extraction

For recommended fuel extraction solutions see the Webasto Recreational Vehicle catalogue.

Installation into the vehicle's fuel line:

- | | |
|----|--|
| a) | T-junction from the fuel line to the vehicle's engine if no delivery pump is installed inside the tank. |
| b) | T-junction from the fuel return line to the tank, if a delivery 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

Webasto recommend that the fuel be pumped out of the **return** line. Please confirm before installation whether this is possible for your vehicle type. Contact a Webasto Service Centre.

NOTE

Both options are only feasible if the fuel pressure at the connection point to the fuel line does not exceed the specified values in chapter 12.1, "General" on page 18. The line from the T-junction towards the fuel pump should run downwards.

- The fuel can be taken from the vehicle's own fuel tank or from a separate tank with a fuel extractor. See Fig. 32.
- The fuel standpipe must be mounted in the fuel-tank sender unit. The fuel-tank sender unit must be removed previously. When drilling the hole, make sure to use a flat surface for correct sealing.
- Webasto fuel extractor, see Fig. 33.

Observe the installation instructions for the different fuel extractor types.

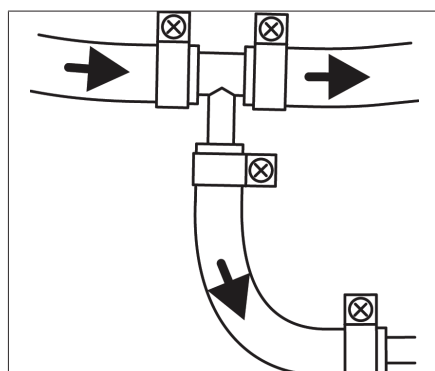


Fig. 31 Connection to vehicle's fuel line using a Webasto fuel connector

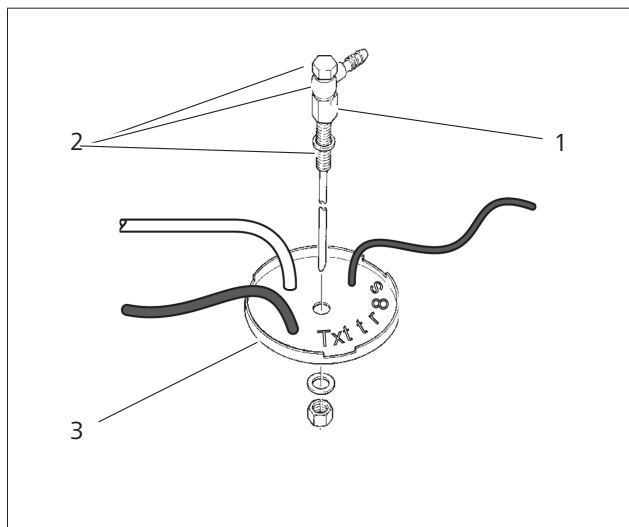


Fig. 32 Webasto fuel extractor

- | | |
|---|-----------------------|
| 1 | Fuel standpipe |
| 2 | Sealing ring |
| 3 | Fuel-tank sender unit |

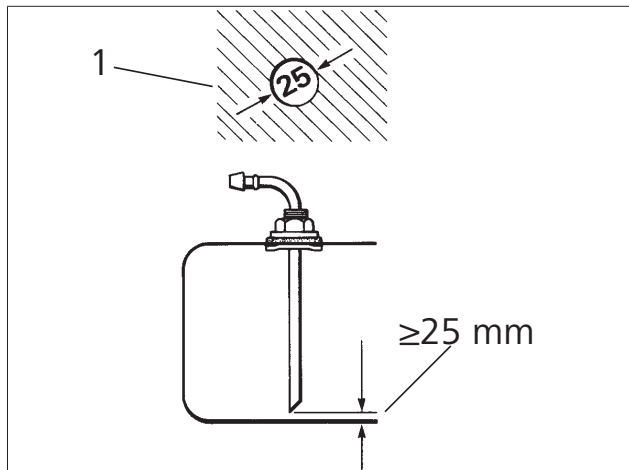


Fig. 33 Webasto fuel extractor (side view)

- | | |
|---|--------------|
| 1 | Hole pattern |
|---|--------------|

12.4 Fuel lines

In accordance with DIN 73378, only steel and plastic lines of plasticized, light and temperature-stabilized PA 11 or PA 12, such as Mecanyl RWTL, may be used as fuel lines. Because the lines cannot normally be routed with a constant rising gradient, the internal diameter must 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, such as the exhaust line, at a distance of less than 3.9 in (100 mm) without using thermal shields. Fuel lines must be secured 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 them from detaching.

12.4.2 Connecting two pipes with a hose

The correct procedure for connecting fuel lines with hosing is shown in Fig. 34.

Make sure that there are no leaks.

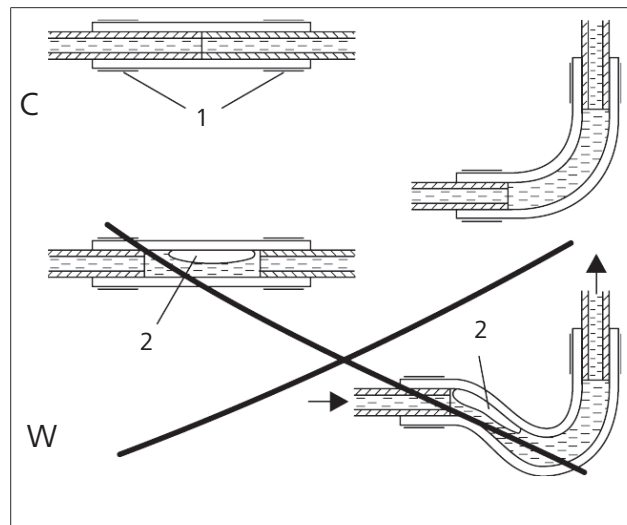


Fig. 34

- | | |
|---|-------------------|
| C | Correct |
| W | Wrong |
| 1 | Clip |
| 2 | Air or gas bubble |

12.5 Fuel filter

You must **not** use a fuel filter in the heater fuel system. This is due to the possibility of frost affecting the moisture contained in the air bubbles, the fuel supply could be completely blocked in case of frost.

13 Combustion air supply

13.1 General

The air for the combustion chamber of the heater must not be taken from the vehicle's passenger compartment (excerpt from ECE-R 122).

Maximal total length of the combustion air inlet pipe (including silencer)	2.0 m
Internal diameter of the pipe - in (mm)	0.9 (22)
Minimal bending radius - in (mm)	2 (50)
Maximal total bends of the combustion air pipe in degrees	270°

NOTE

An air intake silencer must be fitted to reduce the noise level.

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

13.2 Combustion air intake line

A	Connection to heater 22 mm diameter
B	Silencer

An intake pipe is required for combustion air.

NOTE

- Avoid the air intake pipe being compressed or pinched.
- The intake opening for combustion air must be located so that it cannot become clogged with dirt or snow. See Fig. 36.

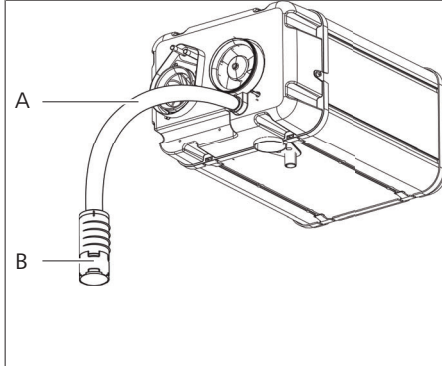


Fig. 35 Combustion air intake

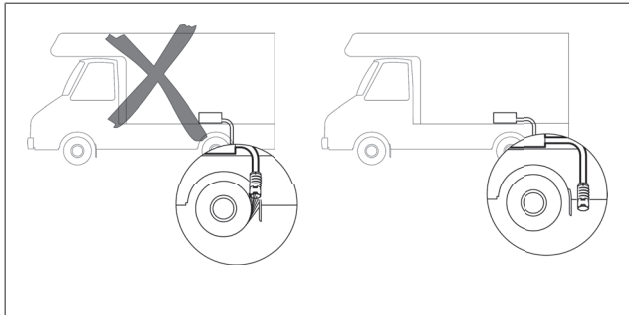


Fig. 36 Avoid the intake pipe becoming clogged

NOTE

The intake opening for combustion air must not point in the driving direction. See Fig. 37.

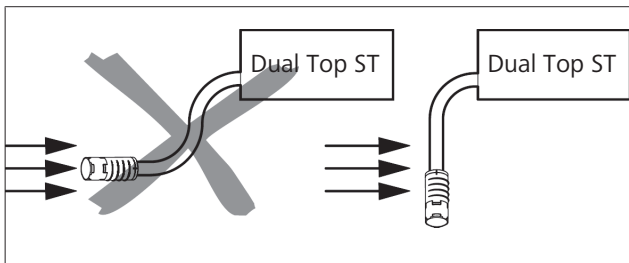


Fig. 37 The end of the pipe must not point towards the front of the vehicle

Combustion air intake hose must point downwards from the heater. If this is impossible, you must drill a condensate drain hole with a diameter of 5/32 in (4 mm) at the lowest point of the pipe.

See Fig. 38.

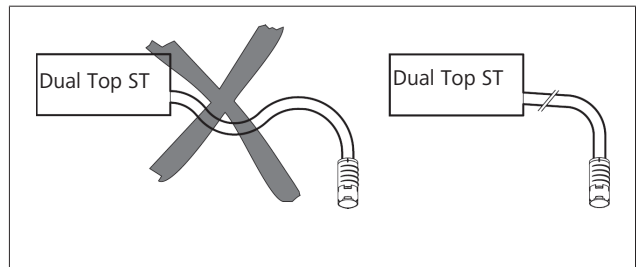


Fig. 38 Prevent condensation forming

14 Exhaust system

14.1 General

See chapter 3, "Statutory Regulations governing installation" on page 3 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 7.9 in, 0.20 m distance); followed by a long tail pipe (min. 3.3 ft, 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. 39).

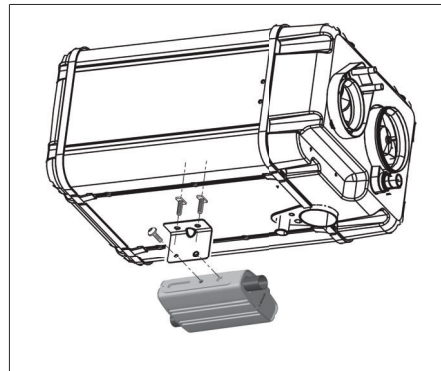


Fig. 39 Exhaust silencer mounted on a heater

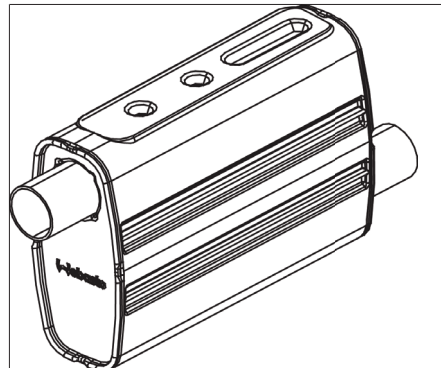


Fig. 40 Exhaust silencer (arbitrary flow direction)

14.2 Exhaust line

Exhaust lines use flexible piping of stainless steel or rigid pipes of stainless steel with a minimum wall thickness of 0.4 in (1.0 mm). The exhaust pipe has to be connected to the heater using a Webasto exhaust clamp. You can use an exhaust assembly including a special bracket to mount the silencer on the heater.

Max total exhaust pipe length (including silencer) - ft (m)	9.9 (3.0)
Internal diameter of the stainless steel pipe - in (mm)	0.9 (22)
Minimal bending radius (mm)	2 (50)
Maximal total exhaust line bend in degrees	270°

- Only one piece of cast 90° elbow is allowed.
- Pipes with 90° bends or more are allowed. See Fig. 41.
- The exhaust line must point from the heater downwards to allow condensation water to drain (see Fig. 38). If this is not possible, you must drill a condensation drain hole with a diameter of 5/32 in (4 mm) at its lowest point.
- The exhaust line must not point to the front of the vehicle. See Fig. 44.
- Avoid the formation of an exhaust accumulation under the vehicle. See Fig. 44.
- Discharge direction: 45° to 70°.

A fixing bracket is required no further than 6 in (150 mm) from the end of the exhaust pipe to ensure that the angle 45° to 70° is achieved.

CAUTION

If the exhaust pipe end is other than as shown, it will pose a fire risk. See Fig. 43.

- ▶ 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 pipe must be located so that it cannot become clogged with dirt or snow. See Fig. 36.
- ▶ The pipe must be installed at a minimum distance of 12 in (300 mm) from windows, ventilation openings, gas bottles and gas-bottle storage rooms. See also: NEN 1949, "Specification for installation of LPG systems".

CAUTION

- ▶ The pipe must be routed so that a minimum distance of 19.7 (500 mm) to the fuel system is maintained.
- ▶ The exhaust gas outlet must 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.
- ▶ The exhaust outlet must be on the opposite side of the entrance door of the living cell.
- ▶ Make sure there is sufficient ground clearance, so the exhaust system cannot touch the ground or pavement, taking any traffic calming measures into account.



Fig. 41 Elbows: cast pipe (left) and bent pipe (right)

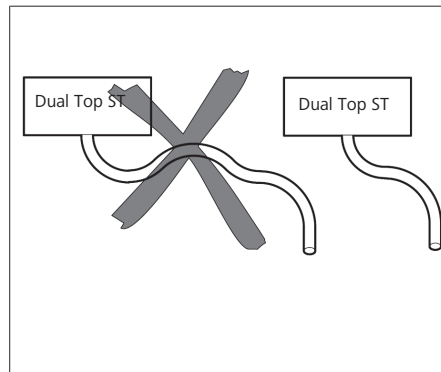


Fig. 42 Prevent condensation forming

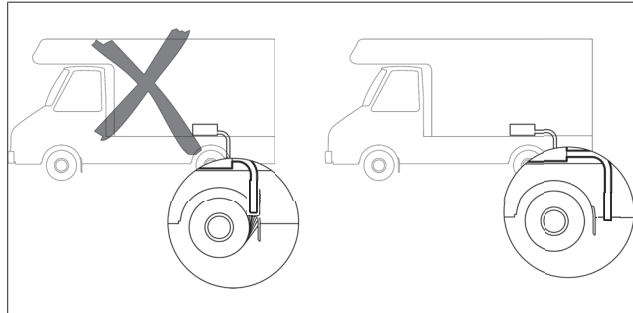


Fig. 43 Avoid the exhaust pipe becoming clogged

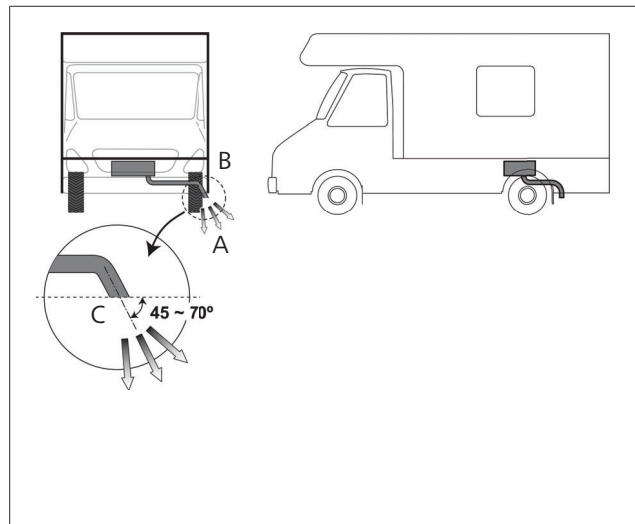


Fig. 44 Location and direction of the exhaust

A	Direct the flow of exhaust fumes 45° to 70° downwards on the side of the vehicle to avoid accumulation of fumes under the vehicle.
B	Make sure that the end of the exhaust is almost aligned with the side of the vehicle body.
C	Make sure that the end of the exhaust is cut horizontally to avoid ambient wind entering.

15 Electrical connections

15.1 Schematic connection diagrams

Carry out electrical connections in accordance with Fig. 45 or Fig. 46.

NOTE

When installing the Dual Top ST wiring harness in the vehicle, you must make sure that no wires can become strained.

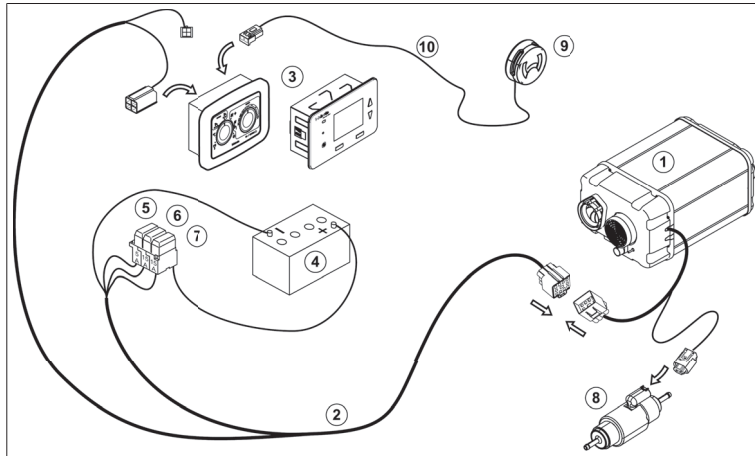


Fig. 45 Schematic diagram of electrical connections Dual Top ST 6

Number	Description
1	Dual Top ST 6
2	Wiring harness
3	Manual or programmable control panel
4	Vehicle's service battery
5	Fuse 5 A
6	Fuse 15 A
7	Fuse 15 A
8	Fuel pump
9	Interior temperature sensor
10	Wiring interior temperature sensor

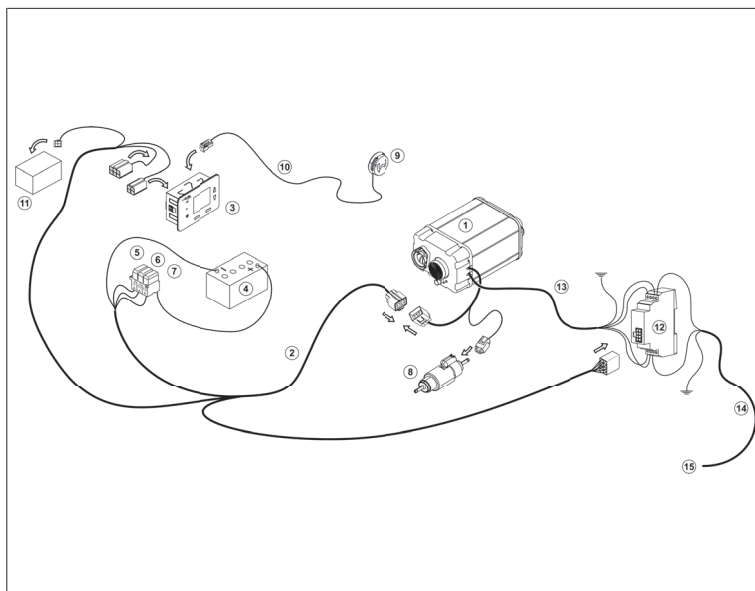


Fig. 46 Schematic diagram of electrical connections for Dual Top ST 8

Number	Description
1	Dual Top ST 8 Not Available In North America
2	Wiring harness (external)
3	Programmable control panel
4	Vehicle's service battery
5	Fuse 5 A
6	Fuse 15 A
7	Fuse 15 A
8	Fuel pump
9	Interior temperature sensor
10	Wiring interior sensor
11	Receiver Telestart
12	Relay box
13	Wiring harness of the electric heater (integrated)
14	Wiring 230 V
15	230 V power supply

15.2 Supply voltage connection

Use 12 V DC only

Make sure you take power directly from the vehicle's service battery. You must not use any additional switches with the exception of the control panel switch.

You must switch the heater on and off with the Dual Top ST control panel.

The fuse holder must be installed in the interior of the vehicle.

Use fuses:

- 5 A
- 15 A
- 15 A

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

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

After connecting the cables, make sure that the yellow part is pushed into each fuse holder correctly. This prevents cables being pushed out when inserting or replacing a fuse. See Fig. 46.

NOTE

Make sure that the Dual Top ST heater is switched off before you replace a fuse.

CAUTION

In case of electrical deviations, using fuses other than the specified ones may cause a fire.

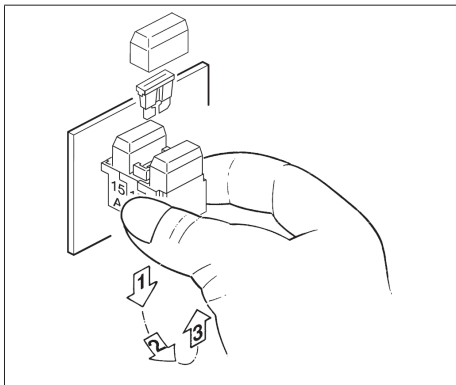


Fig. 47

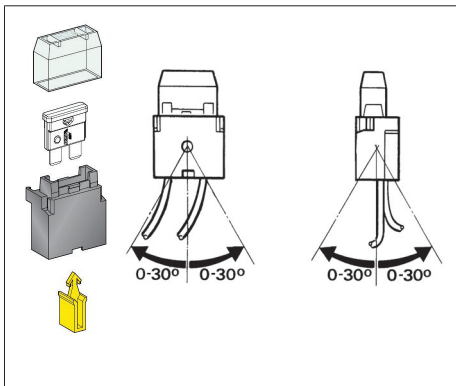


Fig. 48 Fuse holder, installation and position

15.3 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 heating system or from the Dual Top ST heater).

- close to heat sources.
- placed in direct sunlight (for example on the dashboard).
- installed inside a locker.
- installed behind curtains or similar.

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

To install the remote interior temperature sensor in the interior:

1. Drill a 3/8 in (10 mm) hole just below the position of the sensor.
2. Remove the blade connector from the cable to enable it to be guided through easily.
3. Lead the sensor cable through the hole.
4. Secure the sensor.
5. Route the cable to the location of the control panel.
6. Remount the blade connector on the sensor cable.
7. Secure the wires to the wall or to the floor.

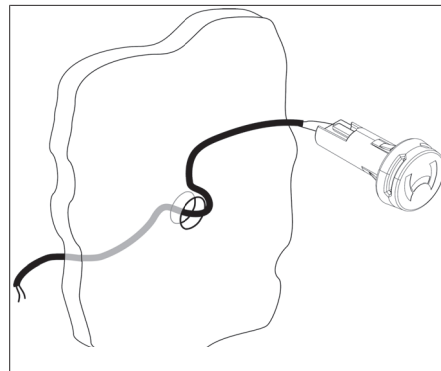


Fig. 49

15.4 Connection to manual control panel

Positioning and installing the manual control panel

1. The control panel must be located in the driver's field of view.
2. The control panel should be visible and accessible to the operator. It must not be accessible to children however.
3. $-15^\circ < \text{best viewing angle} < +15^\circ$.
4. Make sure that there is enough space behind the location where the control panel will be mounted.
5. Cut the aperture in the desired installation location (see Fig. 50).
6. Connect the X4 plug (4 poles) of the wiring harness to the control panel (see Fig. 51).
7. Connect the X0 plug (2 poles) of the inside temperature sensor to the control panel (see Fig. 51).
8. Mount the control panel using the 4 screws.
9. Click the cover onto the control panel.

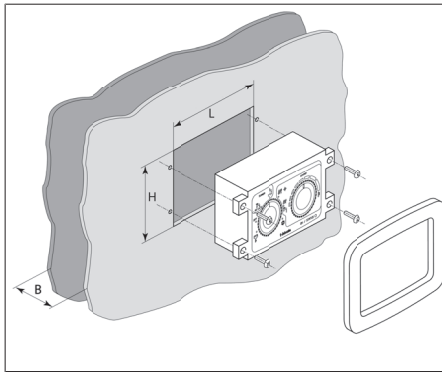


Fig. 50 Installing the manual control panel

L	3.9 ~ 4.0 in (98 ~ 100 mm)
H	2.5 ~ 2.6 in (63 ~ 65 mm)
B	> 1.38 in (35 mm)

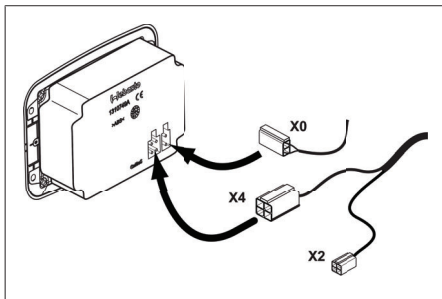


Fig. 51 Mounting the manual control panel back

NOTE

Connector X2 is for:

- Webasto Thermo Test PC-diagnosis
- Webasto Telestart.

NOTE

You can easily retrofit the Dual Top ST 6 heater with the programmable control panel. This provides you with additional comfort functions, such as a programmable digital timer, which are not available from the manual control panel. Please contact your Webasto Service Centre for information.

15.5 Connection to programmable control panel

Positioning and installing the programmable control panel

1. The control panel must be located in the driver's field of view.
2. It should be visible and accessible to the operator. It must not be accessible to children however.
3. $-15^\circ < \text{best viewing angle} < +15^\circ$.
4. Make sure that there is enough space behind the location where the control panel will be mounted.
5. Cut the aperture in the desired installation location (see Fig. 52).
6. Place the adapter into the opening.
7. Bend the lips of the adapter outwards to secure it.
8. Connect the X4 plug (4 poles) and the X5 plug (6 poles) of the external wiring harness to the control panel (see Fig. 53).

9. Connect the X0 plug (2 poles) of the inside temperature sensor to the control panel (see Fig. 51).
10. Optional: Connect the X2 plug (4 poles) to receiver Telestart. (see Fig. 53).
11. Engage control panel in adapter.

NOTE

Connector X2 is for:

- Webasto Thermo Test PC-diagnosis
- Webasto Telestart.

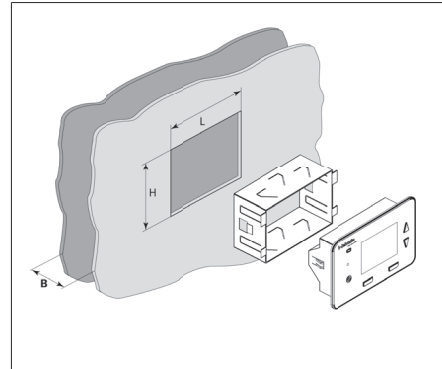


Fig. 52 Installing the programmable control panel

L	3.9 ~ 4.0 in (99 ~ 101 mm)
H	2.6 ~ 2.6 in (65 ~ 67 mm)
B	> 2 in (50 mm)

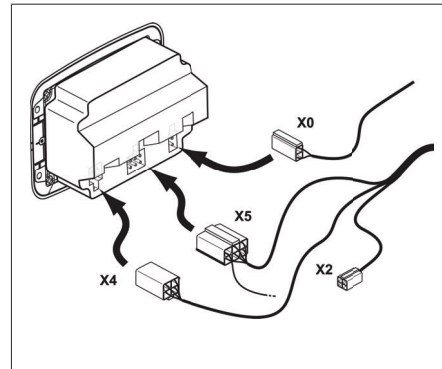


Fig. 53 Electrical connections of the programmable control panel

Disassembling the programmable control panel

1. Place one or two suction cups on the control panel.
Alternatively, slide flat, smooth sheet, such as a plastic card, under the control panel on the left and on the right.
2. Pull the suction cups to remove the control panel from the adapter.
3. Make sure that the control panel and the housing are not damaged.

15.5.1 230 V connection

- Installation of the 230 V connection must be carried out by a qualified electrician.
- Installation must be in accordance with:
 - IEC 60364 Section 708
 - IEC 60364 Section 721.
- Connect to 230 V power supply.
- Protect relay box against water, dirt and access of unauthorized persons, and children in particular.

- Install the relay box in such a way that the required protection class is achieved.

Recommendation: Install the relay box on a DIN Rail.

The length of the external wiring harness from the heater to the relay box is limited to 9.8 ft (3 m).

1. Connect the 230 V wiring to the relay box.
2. Connect the X6 connector (8 pole) of the external wiring harness to the relay box.
3. Connect the electric heater wiring harness to the relay box (4 wires) and to ground (green/yellow).
4. Provide mechanical protection around the wiring to avoid friction, abrasion, cutting, breaking, etc.
5. Secure the wiring to the wall or to the floor.

NOTE

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

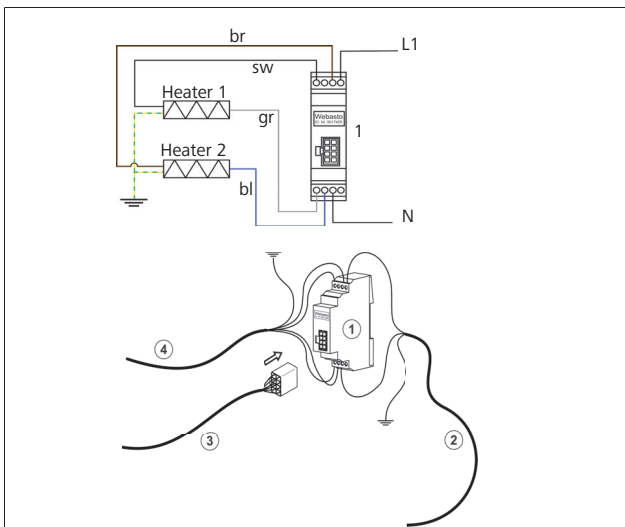


Fig. 54

Number	Description
L1	230 V, phase
N	230 V, neutral
bl	Blue
br	Brown
ge	Yellow
gr	green
sw	Black
1	Relay box
2	Wiring 230 V
3	Wiring harness (external) with connector X6
4	Wiring harness electric heater

16 Wiring diagrams

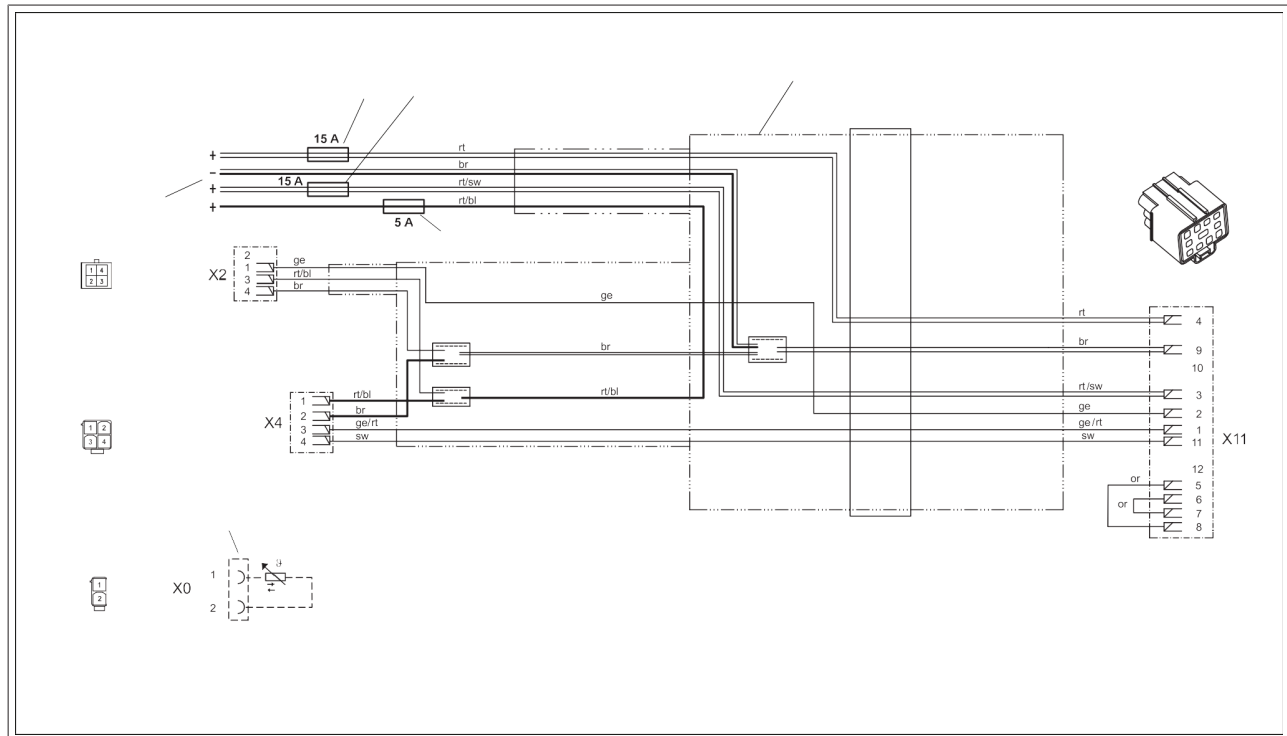


Fig. 55 Circuit diagram Dual Top ST 6

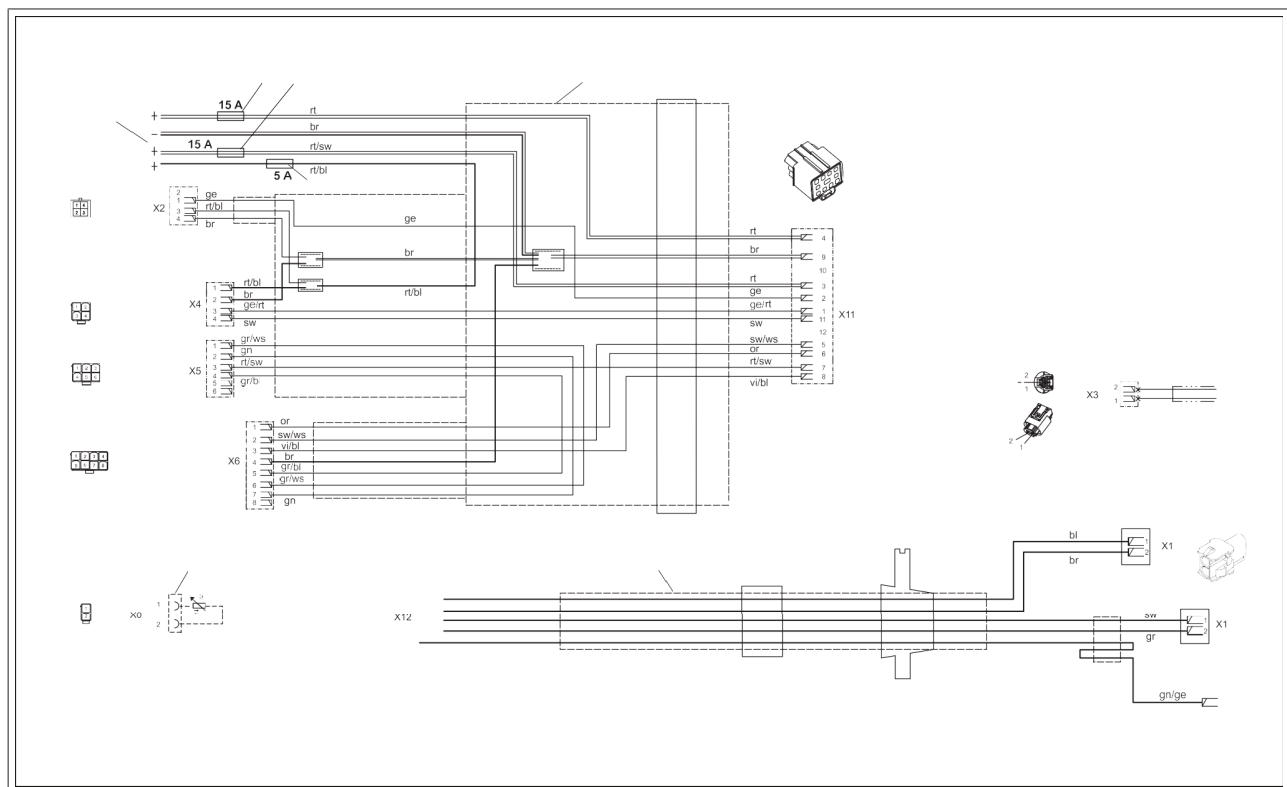


Fig. 56 Circuit diagram Dual Top ST 8

16.1 Legend for wiring diagrams

1	Wiring harness (external)
2	Wiring harness for electric heater (Dual Top ST 8 only)
3	Vehicle's service battery
4	15 A fuse (red wire)
5	15 A fuse (red-and-black wire)
6	5 A fuse (red-and-blue wire)
7	Interior temperature sensor

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

Wiring 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	2X, to electric heater in Dual Top ST 8
X2	Plug connector, 4-pin	to PC-diagnosis / Teletest
X3	Plug connector, 2-pin	to fuel pump
X4	Plug connector, 4-pin	to control panel
X5	Plug connector, 6-pin	to control panel
X6	Plug connector, 8-pin	to relay box (for Dual Top ST 8 only)
X11	Plug connector, 12-pin	to Dual Top ST 6 / 8 heater
X12	Wire end	4X to relay box, 1 to earth (for Dual Top ST 8 only)

17 Starting the heater for the first time

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

NOTE

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

Using a Dual Top ST :

For Dual Top ST 8: Connect an external power line (230 V AC).

1. Disinfect and rinse the entire water supply system.
2. For details, refer to the **Maintenance** chapter of the **Operating Instructions**.
3. Fill the fresh drinking water tank and the water system.
4. **Use drinking water only and avoid polluting the water system in any way.**
5. Use fresh drinking water to flush the hose thoroughly clean (approx. 30 seconds).
6. Bleed the water lines.
7. Perform a heater test run to check all connections for leaks and to ensure that all are secure.
If the heater suffers a fault during operation, you must locate and rectify the fault.
8. Check the manual drainage function using the control panel.

18 Fault Message Output

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

18.1 Manual control panel

Fault messages are displayed on the control panel by flashing pulses.

After a series of 5 **fast green** flashing pulses, the actual fault message consists of a given number of **long red** flashing pulses. After that, there are another 5 **fast green** flashing pulses. The entire sequence is repeated until you switch the heater off.

To look up the meaning of the number of red flashing pulses, see the table that begins on the bottom half of this page.

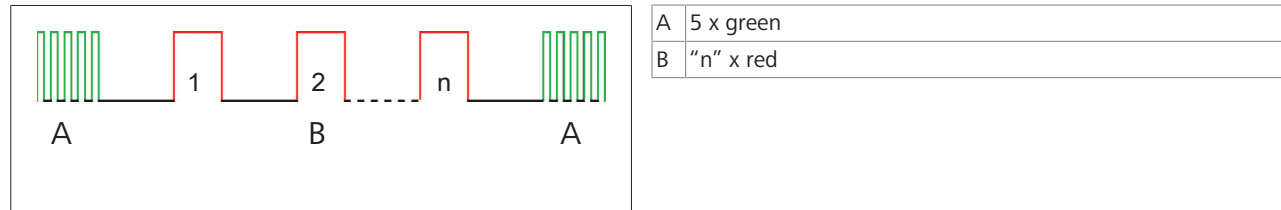


Fig. 57 Example fault message

To rectify the cause of the fault:

1. Switch the heater off.
 2. Wait at least 5 seconds.
 3. Switch the heater back on.
If serious faults such as overheating or failure to start reoccur, the heater may be locked and must be put back in service by unlocking the heater with the next steps.
 4. Disconnect the power supply by removing all three fuses in the order 5 A (red / blue), 15 A (red / black), and 15 A (red).
 5. Reinstalled the fuses in reverse order while the device is switched on.
See Operating Instructions, mode selector A in position 1, 2, 3, 4 or 5.
The heater must **not** running (you can verify this by the absence of noise from the heater).
- To unlock a Dual Top ST heater with a programmable control panel, use the steps in chapter 18.2, "Programmable control panel" on page 30 or use Webasto Thermo Test (WTT) PC-Diagnosis software.

If a fault occurs, the heater will stop. However, failure of an electrical safety / drainage valve fault (indicated by 17 red flashing pulses) will **not** stop the heater, you can still heat the interior.

Number of RED flashing pulses	Cause	Action
00	No communication between the control panel and the heater, or control panel error	1. Remove fuses 15 A (red cable) and 5 A. 2. Insert fuse 15A (red cable) followed by fuse 5 A. 3. Check the connections of the control panel. 4. Check fuse 15 A (red cable). 5. Check wiring harness. 6. Contact a Webasto Service Centre.
01	No start (after 2 attempts to start)	1. Check fuel supply (enough fuel, at least 8 litre) 2. Check fuel connection and tubes) 3. Reset heater (by switching off for at least 30 sec.)
02	Flame failure Restart not successful.	See fault message 01
03	Under-voltage or over-voltage.	1. Charge the battery or connect to another power source (12 V DC), 2. Reset heater by switching off for at least 5 sec.
04	Fuel pump disconnection / short circuit / overheating.	1. Check fuel pump cable and connectors, 2. Check for overheating (see faults 06 and 07), 3. 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.	1. Make sure that hot air fan can rotate freely, 2. Remove possible blocking objects, 3. Reset heater by switching off for at least 5 sec.
06	Overheating or exceeding gradient water temperature sensor.	1. Check water level, 2. Reset heater (by switching off for at least 5 sec.) or select winter mode, heating without hot water production
07	Overheating or exceeding gradient hot air temperature sensor.	1. Make sure that hot air can flow freely, and that air intake and outlets are not blocked.

		2. Reset heater by switching off for at least 5 sec.
08	Overheating of heaters' control unit.	1. Make sure that cooling air can flow freely, 2. Reset heater by switching off for at least 5 sec.
09	Combustion air motor fault: disconnection / short circuit / overload / blocked.	1. Make sure that cooling fan can rotate freely, 2. Remove possible blocking objects. 3. Check fuse 15 A (red cable).
10	Control unit fault / heater locked.	1. Put heater back into service (see beginning of paragraph) and re-start heater. 2. Contact a Webasto Service Centre.
11	Interior temperature sensor disconnection or short circuit.	1. Check routing of cable, avoid that it is pinched or crushed, 2. Check the connector behind the control panel. 3. Reset heater by switching off for at least 5 sec.
12	Hot air temperature sensor disconnection / short circuit	1. Reset heater by switching off for at least 5 sec. 2. Contact a Webasto Service Centre.
13	Water temperature sensor disconnection / short circuit.	See fault message 12
14	Glow plug / flame detector disconnection / short circuit.	See fault message 12
15	Premature flame detection	See fault message 12
17	Electrical safety / drain valve disconnection / short circuit.	See fault message 12

18.2 Programmable control panel

The control panel returns a given fault message.

To rectify the cause of the fault:

1. Confirm the message by pressing **OK** (if provided) or switch off the Dual Top ST for at least 5 s.

If the fault is serious, such as overheating, or a recurrent failure to start, then the heater will be locked. In which case you can only return the Dual Top ST to service by unlocking it with the next steps.

2. Before you disconnect the power supply, make sure that the heater / fan is not running (to be established by the sound from the heater operating). If necessary wait until the fans stop running.
3. Switch off the Dual Top ST by pressing the **On/Off** button.
4. Remove the **15 A** fuse (red cable).
5. Wait at least 5 s. and then insert the fuse again. The heater is now reset.

You can also delete failures by using the Webasto Thermo Test (WTT) PC-Diagnosis.

If a fault occurs, the heater will stop. However, failure of electrical safety/drainage valve (message **28** and **29**) will **not** stop the heater and will not be shown during heater operation.

Message	Cause	Action
Message 01 - <i>No data connection</i>	No communication between control panel and heater, or control panel error.	1. Remove fuses 15 A (red cable) and 5 A, 2. Put in fuse 15A (red cable), followed by fuse 5 A. 3. Check connections of control panel. 4. Check fuse 15 A (red cable). Check wiring harness. 5. Contact a Webasto Service Centre.
Message 02 - <i>No start of combustion</i>	No start (after 2 attempts to start).	1. Check fuel supply (enough fuel, at least 8 liter. 2. Check fuel connection and tubes, 3. Reset heater by pressing OK or switching off for at least 30 sec.
Message 03 - <i>Combustion interrupted</i>	Flame failure. Restart not successful.	See message 02.
Message 04 - <i>High battery voltage</i>	Operation voltage is above permitted value.	Reset heater by pressing OK or switching off for at least 5 sec.
Message 05 - <i>Low battery voltage</i>	Operation voltage is below permitted value.	1. Charge battery or connect to main power supply (230 V),

		2. 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 a temperature or relay box, cable or connection relay box is defective.	1. Check fuel pump cable and connectors, check for overheating (see messages 10, 11, 12, 13 and 14), 2. Reset heater by pressing OK or switching off for at least 5 sec. 3. Check wiring harness relay box to heater. 4. 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.	1. Check fuel pump cable and connectors. 2. Check wiring harness relay box to heater. 3. Check relay box and connections relay box.
Message 08 - Failure hot air fan	Hot air motor fault: disconnection / short circuit / fan speed out of range / fan blocked.	1. Make sure that hot air fan can rotate freely, 2. Remove possible blocking objects, 3. Reset heater by pressing OK or switching off for at least 5 sec.
Message 09 - Failure fan amplifier	No communication between amplifier of hot air fan and heater control unit.	1. Check internal cable routing (4-pins) from control unit to PWM module. 2. Contact a Webasto Service Centre.
Message 10 - High temperature sanitary water	Overheating water temperature sensor.	1. Check water level, 2. Reset heater by pressing OK or switching off for at least 5 sec. or select winter mode without hot water production. 3. Check fuel pump cable and connectors.
Message 11 - High temperature sanitary water	Exceeding gradient water temperature sensor.	1. See message 10. 2. Check if hot and cold water pipes have been connected correctly.
Message 12 - High temperature heating air	Overheating hot air temperature sensor.	1. Make sure that hot air can flow freely, air intake and outlets are not blocked. 2. Reset heater by pressing OK or switching off for at least 5 sec. 3. Check fuel pump cable and connectors.

Table 5: Table 2: Fault messages of programmable control panel

Message 13 - High temperature heating air	Exceeding gradient hot air temperature sensor.	See message 12.
Message 14 - Failure cooling air ventilation	Overheating of heaters' control unit.	1. Make sure that cooling air can flow freely, 2. Reset heater by pressing OK or switching off for at least 5 sec.
Message 15 - Failure combustion air motor	Combustion air motor interrupted.	1. Make sure that cooling fan can rotate freely, 2. Remove possible blocking objects. 3. Check fuse 15 A (red cable).
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.	1. Put heater back into service (see above this table) and restart heater. 2. Contact a Webasto Service Centre.
Message 18 - Failure cabin temperature sensor	Interior temperature sensor disconnection / short circuit.	1. Check routing of cable, avoid that it is pinched or crushed, 2. Check the connector behind the control panel. 3. Reset heater by pressing OK or switching off for at least 5 sec. 4. Replace the interior temperature sensor.
Message 19	n/a	n/a

Message 20 - <i>Failure heating air temperature sensor</i>	Hot air temperature sensor disconnection.	1. Check routing of cable, avoid that it is pinched or crushed, 2. Check the connectors. 3. Reset heater by pressing OK or switching off for at least 5 sec. 4. Contact a Webasto Service Centre.
Message 21 - <i>Failure heating air temperature sensor</i>	Hot air temperature sensor short circuit.	See message 20.
Message 22 - <i>Failure sanitary water temperature sensor</i>	Water temperature sensor disconnection.	See message 20.
Message 23 - <i>Failure sanitary water temperature sensor</i>	Water temperature sensor disconnection.	See message 20.
Message 24 - <i>Failure glow plug</i>	Glow plug / flame monitor disconnection.	See message 20.
Message 25 - <i>Failure glow plug</i>	Glow plug / flame monitor disconnection.	See message 20.
Message 26 - <i>Failure flame detection</i>	Premature flame detection.	See message 20.
Message 27 - <i>Failure relay box</i>	Short circuit of 230 V indication signal from relay box to heater.	1. Check wiring harness relay box to heater. 2. Check relay box and connection relay box. 3. Check control panel and connections control panel. 4. Contact a Webasto Service Centre.
Message 28 - <i>Failure drain valve</i>	Electrical safety / drainage valve disconnection.	See message 20.
Message 29 - <i>Failure drain valve</i>	Electrical safety/drainage valve short circuit.	See message 20.
Message 30 - <i>Failure relay</i>	230 V high or low power relay circuit interrupted/ short circuit.	See message 27.
Message 31 - 33	n/a	n/a
Message 34 - <i>System overheated or relay circuit disconnected</i>	One of the three overheating switches detects too high temperatures / overheating relay circuit interrupted.	1. Check wiring harness relay box to heater. 2. Check relay box and connection relay box. 3. Check control panel and connections control panel. 4. Check for overheating (see messages 10, 11, 12, 13 and 14). 5. Reset heater by pressing OK or switching off for at least 5 sec. 6. Contact a Webasto Service Centre.
Message 35 - <i>Failure relay box</i>	230 V overheating relay short circuit.	See message 27.
Message 36 - 41	n/a	n/a
Message 42 - <i>Failure 230 V heating element</i>	Electric heater (230 V) defect. No relevant temperature increase detected.	1. Check water system for a permanently open hot water tap or heavy leakage. 2. Check cable 230 V from relay box to heater and corresponding connectors. 3. Contact a Webasto Service Centre.

n/a = not available

19 Warranty and customer service

1. Online registration of the product:
<https://dealers.webasto.com>
2. Provide the registration documentation to the next owner or user of the heater.

Do you have any technical questions or problem with the device?

National phone numbers of our representatives are provided on: www.webasto.com

20 Technical Data

Except where limit values are specified, the technical data refer to the usual heater tolerances of $\pm 10\%$ at an ambient temperature of $+68^\circ\text{F}$ (20°C) and at the rated voltage and in rated conditions.

20.1 Fuel for the Dual Top ST

You must use diesel according to DIN EN 590, as specified by the manufacturer.

You must **not** use EL heating oil, L heating oil or PME (bio-diesel).

Fuel additives have no negative effects on the heater. If fuel is extracted from the vehicle's tank, follow the instructions on additives as issued by the vehicle manufacturer.

After changing to low-temperature fuel, you must operate the heater for approximately 15 minutes for the fuel system to be filled with the new fuel.

20.2 Technical data

Heater	Operation	Dual Top ST 6	Dual Top ST 8
Type approval heater: EMC:		E1 10R-06 5000 E1 122R-00 0195	
Model		Air heater with evaporator burner	Air heater with evaporator burner and electric heater
Heat output diesel electric	Control range	1.5 to 6.0 kW -	1.5 to 6.0 kW 1.0 / 2.0 kW
Fuel		Diesel, DIN EN 590	
Fuel consumption	Control range	0.5 to 17 gal/h (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		-22 to 122 °F (-30 to +50 °C)	-22 to 122 °F (-30 to +50 °C)
Storage		-40 to 185 °F (-40 to +85 °C)	-40 to 185 °F (-40 to +85 °C)
Control Panel			
Operation		-22 to 167 °F (-30 to +75 °C)	-22 to 167 °F (-30 to +75 °C)
Storage		-40 to 185 °F (-40 to +85 °C)	-40 to 185 °F (-40 to +85 °C)
Max. altitude (guaranteed func- tion)		7,218 ft (2,200 m)	
Adjustment range for interior tem- perature	Control range	41 to 95 °F (+5 to +35 °C)	
Delivery rate for hot air (free blowing without hot air rout- ing system)	Maximum	> 755 ft³/hr (230 m³/h)	
CO2 in exhaust gas % (permitted function range)	2 kW	5.0 to 8.0	
	6 kW	9.0 to 13	
Water content		2.6 gal (9.8 l)	
Water system pressure (maximum)		50.8 psi (3.5 bar)	
Overpressure valve		58 psi (4.0 bar)	
Pressure water pump, central wa- ter supply	Maximum	36 psi (2.5 bar)	
Heater dimensions		Length: 20.87 in (530 mm) Width: 13.9 in (352 mm) Height: 10 in (256 mm)	
Weight (w/o water contents)		50.7 lbs (23 kg)	52.9 lbs (24 kg)

21 Declarations

21.1 Drinking water conformity

- DIRECTIVE 98/83/EC on the quality of water intended for human consumption
- Trinkwasserverordnung – TrinkwV 2018 regulation on the quality of water for consumption.
- UBA KTW Leitlinie - Guideline for the hygienic assessment of organic materials in contact with drinking water

These are the original instructions. The English language is binding.
You can request your language if it is missing. The telephone number of each country can be found in the Webasto service centre leaflet or the website of the respective Webasto representative of your country.



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