

Installation Instructions

Thermo Top Evo / EVO Smart

Water Heater



English

This document is valid for:

Thermo Top Evo - B/D

Thermo Top Evo RV/HD - D

Thermo Top Evo HD - D

Thermo Top Evo RV - D

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1 General information

1.1 Purpose of the document

These installation instructions are part of the Thermo Top Evo Smart and contain all the information required to ensure correct and safe installation.



NOTE

The actual availability of these functions depends on each installed heater.



NOTE

Carefully read through and follow the heater Installation Instructions and the safety information contained therein.

1.2 Using this document



The requirements of this document must be observed when installing the heater. The workshop manual must be followed when carrying out work to the heater.

To access further documents use one of the following options:

The Webasto Dealer Portal

(<https://dealers.webasto.com>)

Operating instructions are available in various languages at: <https://www.techwebasto.com>

1.3 Warranty and liability

Webasto shall not assume liability for defects or damages that are the result of disregarding the installation and operating instructions. This liability exclusion particularly applies to:

- Installation or maintenance by untrained personnel.
- Improper use.
- Repairs not carried out by a Webasto service workshop.
- Use of non-genuine parts.



DANGER

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 will result in the invalidation of the type approval for the heater and therefore of its homologation / EC type licence.



WARNING

Repair and maintenance work on the heater requires specialist knowledge and special tools. Incorrect adjustment or maintenance can cause damage to the heater or accidents which will result in serious damage.

The installation personnel must have the following qualifications:

- Successful completion of Webasto training.
- Corresponding qualification for working on technical systems.

1.4 Use of symbols and highlighting



DANGER

This signal word denotes a hazard with a high degree of risk which, if not avoided, may lead to death or serious injury.



WARNING

This signal word denotes a hazard with a moderate degree of risk which, if not avoided, may lead to minor or moderate injury.



CAUTION

This signal word denotes a hazard with a low degree of risk which, if not avoided, will lead to minor or moderate injury.



NOTE

This signal word denotes a Special Technical Feature or (if not observed) potential damage to the product.



Refers to separate documents which are enclosed or can be requested from Webasto.



Requirements for the following necessary action.

2 Safety

2.1 Intended use



NOTE

The heater must not be used for safety-related purposes. It serves to provide comfort.

The heater works independently of the vehicle engine and is integrated in the cooling system and the electrical system of the vehicle.

The heater is approved for the following applications:

- The heater is approved for cars (Class M1).
- Installation in Class O, N2 and N3 motor vehicles and vehicles for transporting hazardous substances is not permissible.
- If it is installed in special-purpose vehicles, the applicable regulations must be observed. Alternative applications are only possible with the prior approval of Webasto.
- Thermo Top Evo RV Classic with continuous heating is recommended for use in caravan & camping vehicles.
- The heater works together with the vehicle's heating system:
 - to heat the passenger compartment
 - to defrost vehicle windows
 - to preheat water-cooled
- engines (if technically possible).
- The heater can be installed as a parking heater or auxiliary heater.

2.2 General safety information

2.2.1 Safety information on operation



DANGER

Risk of injury from the defective unit

Do not operate a defective Thermo Top Evo or Thermo Top Evo Smart and put it out of service by removing the fuse:

- prolonged heavy smoke development.
- unusual burner noise.
- smell of fuel.
- permanent fault switch-offs with error messages (flash code).
- damaged heater.
- ▶ Contact a Webasto service workshop.



WARNING

Danger of explosion and suffocation

Do not operate the heater:

- ▶ at filling stations and tank facilities.
- ▶ at locations where highly flammable gases or dust can form, or at locations where highly flammable liquids or solid materials are stored (e.g. near fuel, coal and wood dust, grain storage areas, dry grass and leaves, cardboard boxes, paper, etc.).
- ▶ in closed rooms such as garages that do not have an exhaust extraction unit, especially not with programmed heating start (time preselect or remote start).



NOTE

Incorrect handling

- ▶ Protect the heater against mechanical stress (e.g. dropping, impacts or knocks).
- ▶ Do not stand on the heater.
- ▶ Do not place any objects on top of the heater.
- ▶ Avoid shutting down the heater incorrectly during the after-running period. After switching off via the control element, the fan of the heater continues to run.
- ▶ Always switch off the heater via the control element.
- ▶ Do not disconnect from the power supply until the after-running period has elapsed.

2.2.2 Safety information on installation



DANGER

Live parts are dangerous

- ▶ Disconnect the vehicle from the power supply before installation.
- ▶ Make sure that the electrical system is earthed correctly.
- ▶ Always comply with all legal requirements.
- ▶ Observe the information on the type label.

2.2.3 Avoiding damage to property



NOTE

Use suitable Webasto control elements approved for use with the heater.

Regulations and legal requirements

The heater Thermo Top Evo, Thermo Top Evo Smart has been granted type approval for vehicle classes **M**, **N** and **O** by the regulatory body in accordance with the UN ECE regulations listed below.

ECE R10 Revision 06

ECE R122 Revision 17

(Version valid at 08/2024)

The approval is recognized by the countries listed and marked accordingly in the overview list. The valid certificates and the current overview of countries can be found on the Webasto dealer portal at <https://dealers.webasto.com>.

2.3.1 ECE R122 Requirements

See eur-lex.europa.eu for more information.

Requirement from ECE-R 122:

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. (Point 5.3.2.1.).

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. (Point 5.3.2.2.).

Every reasonable precaution should be taken in positioning the heater to minimize the risk of injury and damage to personal property. (Point 5.3.2.5.).

The fuel filler neck must not be situated in the passenger compartment and must be provided with an effective cap to prevent fuel spillage. (Point 5.3.3.1.).

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 neck must be clearly labelled. (Point 5.3.3.2.).

The air inlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely. (Point 5.3.5.2.).

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. (Point 5.3.2.1.).

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. (Point 5.3.2.2.).

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. (Point 5.3.2.3.).

Every reasonable precaution should be taken in positioning the heater to minimize the risk of injury and damage to personal property. (Point 5.3.2.5.).

The fuel filler must not be situated in the passenger compartment and must be provided with an effective cap to prevent fuel spillage. (Point 5.3.3.1.).

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 neck must be clearly labelled. (Point 5.3.3.2.).

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. (Point 5.3.2.1.).

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. (Point 5.3.2.2.).

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. (Point 5.3.2.4.).

Every reasonable precaution should be taken in positioning the heater to minimize the risk of injury and damage to personal property. (Point 5.3.2.5.).

The fuel filler must not be situated in the passenger compartment and must be provided with an effective cap to prevent fuel spillage. (Point 5.3.3.1.).

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. (Point 5.3.3.2.).

A notice, indicating that the heater must be shut down before refuelling, must be affixed to the filler neck of the vehicle. [...] (Point 5.3.3.3.).

The exhaust gas outlet must be located so as to prevent exhaust gas from entering the vehicle through ventilators, hot air inlets or open windows. (Point 5.3.4.1.).

The air for the combustion chamber of the heater must not be drawn from the passenger compartment of the vehicle. (Point 5.3.5.1.).

The air inlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely. (Point 5.3.5.2.).

A clearly visible indicator lamp in the operator's field of view must indicate whether the combustion heater is switched on or off. (Annex 7, point 7.1.).

Additionally for hazardous material vehicles (ADR)

EX/II, EX/III, AT, FL and OX vehicles:

The combustion heaters and their exhaust gas routing shall be designed, located, protected or covered so as to prevent any unacceptable risk of heating or ignition of the load. This requirement shall be considered as fulfilled if the fuel tank and the exhaust system of the heater conform to the following provisions:

- Each fuel tank for supplying the heater must comply with the following regulations: In the event of a leak, the fuel must drain to the ground without coming into contact with hot parts of the vehicle or the load.
- The exhaust system as well as the exhaust pipes shall be so directed or protected to avoid any danger to the load through heating or ignition. Parts of the exhaust system situated directly below the fuel tank (...) shall have a clearance of at least 100 mm or be protected by a thermal shield.

Compliance with this paragraph shall be verified on the completed vehicle.

(Annex 9, point 3.1.1.).

EX/II, EX/III, AT, FL and OX vehicles:

The combustion heater shall be switched on manually. Programming devices are prohibited. (Annex 9, point 3.1.2.).

FL vehicles:

The combustion heaters shall be put out of operation by at least the following methods:

- a) Intentional manual switching off from the driver's cab;
- b) Stopping of the vehicle engine; in this case the heater may be restarted manually by the driver;
- c) Start up of a feed pump on the motor vehicle for the dangerous goods carried.

(Annex 9, point 3.3.1.).

3 Version

Thermo Top Evo – D, Thermo Top Evo Smart - D

For diesel fuel with heating time up to 120 min.

Thermo Top Evo – B, Thermo Top Evo Smart - B

For petrol fuel with heating time up to 120 min.

Thermo Top Evo RV – D, Thermo Top Evo Smart RV – D

For diesel fuel with continuous heating

Thermo Top Evo Smart RV – B

For petrol fuel with continuous heating

Thermo Top Evo HD - D

For diesel fuel with continuous heating.

- For technical information, see Technical data.



NOTE

Thermo Top Evo 5+ heater versions must not be used for island coolant system applications.

3.1 Parking heater

The heater works independently of the vehicle engine and is integrated into the coolant system, the fuel system and the electrical system of the vehicle.

- The stepless heating capacity control regulates the coolant at a target temperature of 176° (80 °C).
- Switch: Pin 3: +12 V (violet) / Pin 1: +0 V (grey).

3.2 Auxiliary heater (optional)

- When switching on the engine, the heater will be switched on, depending on the outside temperature.
- When the engine is switched off, the heater is automatically switched off.
- The stepless heating capacity control regulates the coolant at a target temperature of 169° (76 °C) (RV/HD) or 176° (80 °C) (default).
- Switch: Pin 3: +12 V (violet) / Pin 1: +12 V (grey).

4 Disposal end of life

The Thermo Top Evo, Thermo Top Evo Smart must not be disposed of in domestic waste.

- Observe the regional regulations for disposal of electronic products.

5 Installation location and installation position

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.



DANGER

Danger of overheating

Outcome: Risk of fire. Protect vehicle components in the vicinity of the heater and exhaust line from overheating by implementing the following measures:

- ▶ Maintain minimum safety distances.
- ▶ Ensure adequate ventilation.
- ▶ Use fire-resistant materials or heat shields.
- ▶ Always comply with legal requirements.

- ▶ The heater must not be installed in the interior of the vehicle. The heater is preferably installed in the engine compartment, i.e. in the area between the wheel well and the front bumper.
- ▶ It should be installed as low as possible in order to ensure automatic bleeding of the heater and coolant pump.



WARNING

The water connection pieces must not point downwards in any installation position.

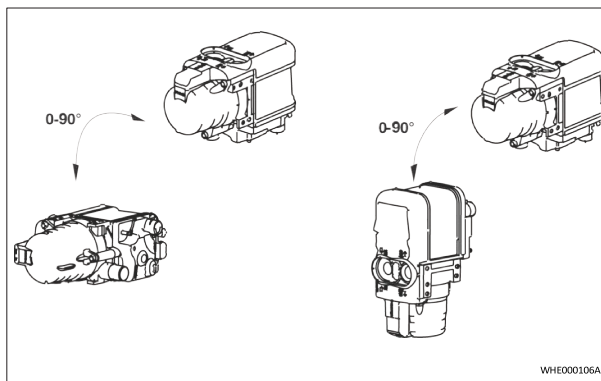


Fig. 1 Permissible installation position

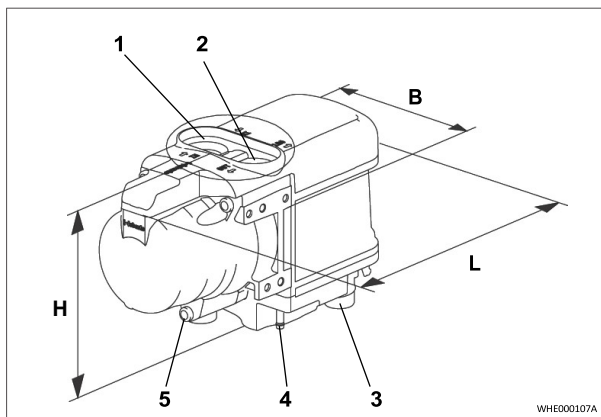


Fig. 2 Position of the openings in the heat exchanger

1	Heat exchanger inlet	L	Length
2	Heat exchanger outlet	B	Width
3	Combustion air inlet	H	Height
4	Fuel inlet		
5	Exhaust outlet		

Dimensions Thermo Top Evo, Thermo Top Evo Smart see Technical data Thermo Top Evo.



WARNING

The heater must not be installed:

- ▶ In the direct radiated heat range of exhaust systems.
- ▶ Below the wading line of the vehicle.
- ▶ Above the coolant expansion tank.

5.1 Type label

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.

If the type label (Fig. 3) is not visible after installing the heater:

- ▶ Secure the type label duplicate such that it is clearly visible in a protected area on the vehicle.

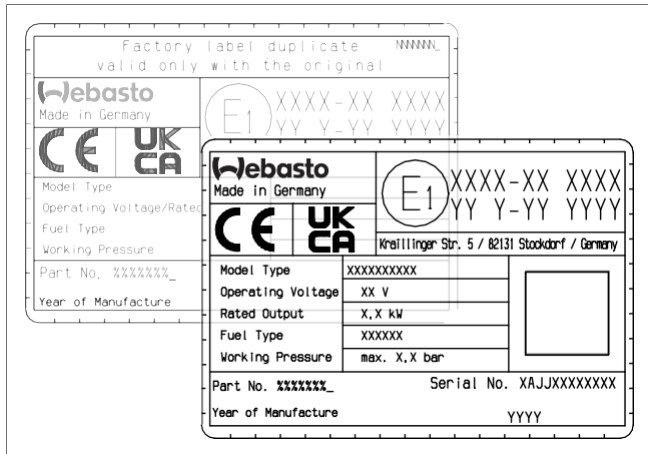


Fig. 3 Example of type label

5.2 Standard bracket

- The Thermo Top Evo, Thermo Top Evo Smart must be fastened to the bracket using at least 3 heater-specific screws M5 with 71 in-lbs (8 Nm) torque.
- The heater mounting screws are approved for bracket plate thicknesses of 0.06 – 1.2 in (1.5 to 3.0 mm).
- The standard bracket must be secured to the vehicle body or to an intermediate bracket using at least 4 screws ¼ in (M6).
- Do not use sheet-metal screws to secure the bracket to the vehicle body.

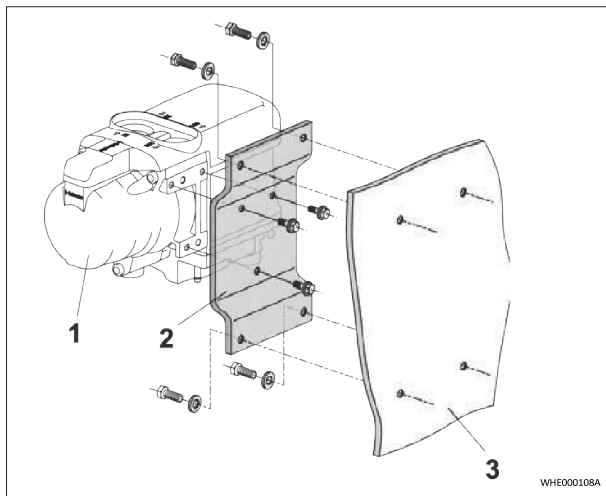


Fig. 4 Example for standard bracket

1	Heater	3	Vehicle body
2	Bracket for heater		

6 Installation example in the vehicle

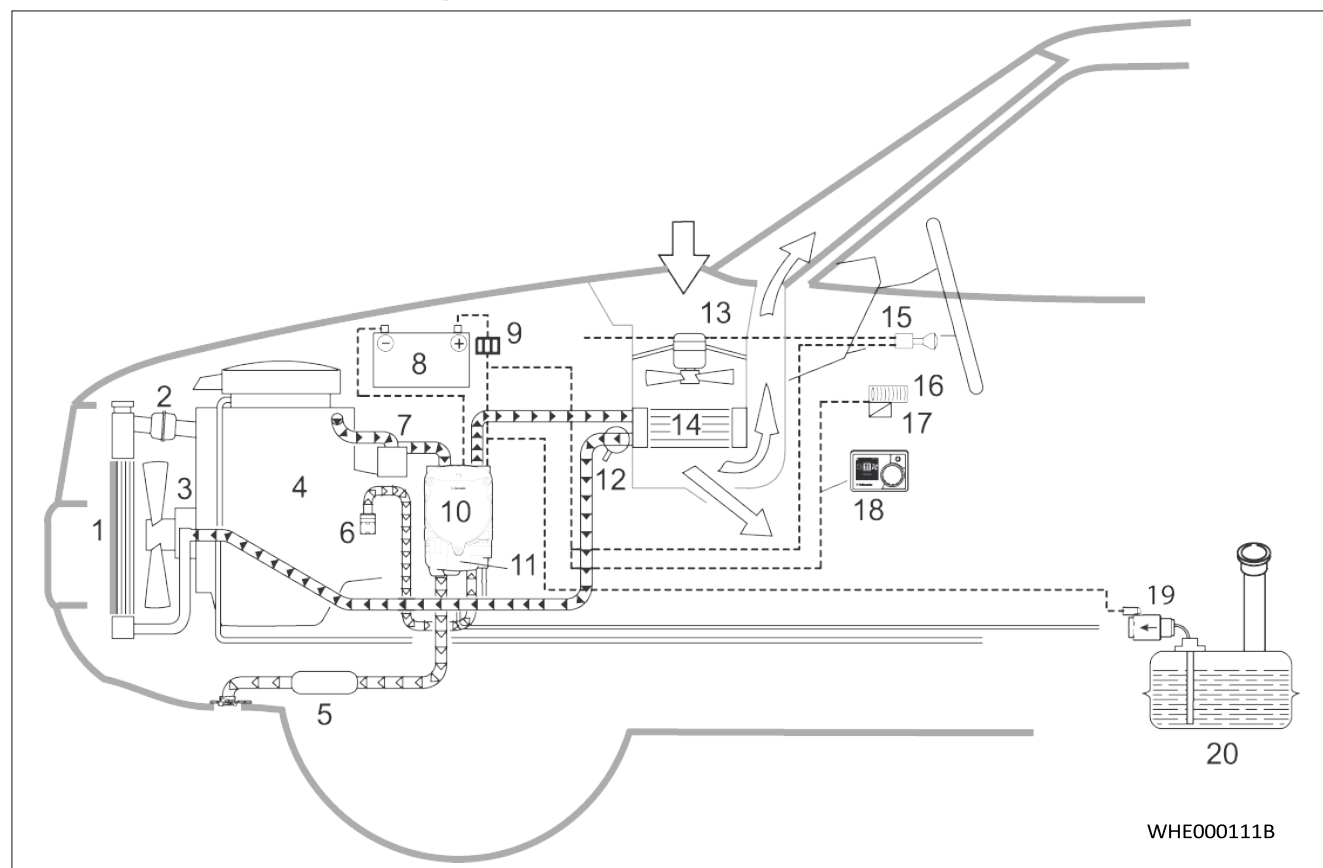


Fig. 5 Example installation of the heater

1	Radiator	11	Control unit (in the heater)
2	Coolant thermostat	12	-
3	Coolant pump	13	Fan of the vehicle heating system
4	Internal combustion engine	14	Heat exchanger for vehicle heating system
5	Exhaust silencer	15	Switch for fan of the vehicle heating system
6	Intake silencer, combustion air intake pipe	16	Fuse block in vehicle
7	Coolant pump	17	Vehicle connection/blower interface
8	Battery	18	Control element
9	Fuse holder	19	Fuel dosing pump
10	Heater	20	Fuel extraction

7 Integration in the coolant system



DANGER

Danger of scalding from leaking hot coolant

Scalding on opening the coolant circuit. The vehicle coolant circuit is pressurized.

- ▶ Allow the coolant to cool before working on the vehicle coolant system.

7.1 Connection

- The Thermo Top Evo, Thermo Top Evo Smart is connected to the vehicle coolant system as shown in Fig. 7, Fig. 5 and Fig. 6.
- The volume of coolant in the circuit must not be less than the volume specified in the Technical data.
- The heater should preferably be integrated in the coolant system at the vehicle's heat exchanger inlet.

Coolant system Inline

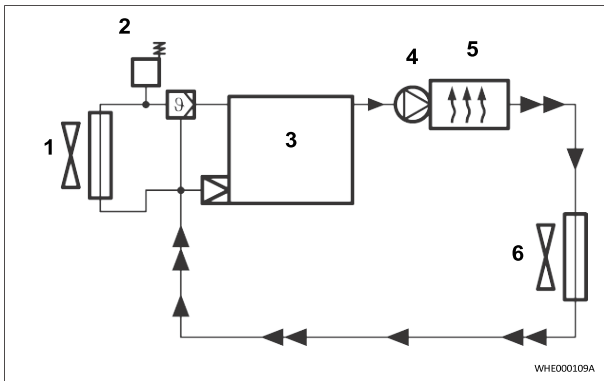


Fig. 6 Integration in the coolant system Inline

1	Radiator	4	Coolant pump
2	Expansion tank	5	Heater
3	Internal combustion engine	6	Heat exchanger for vehicle heating system

Coolant system Island

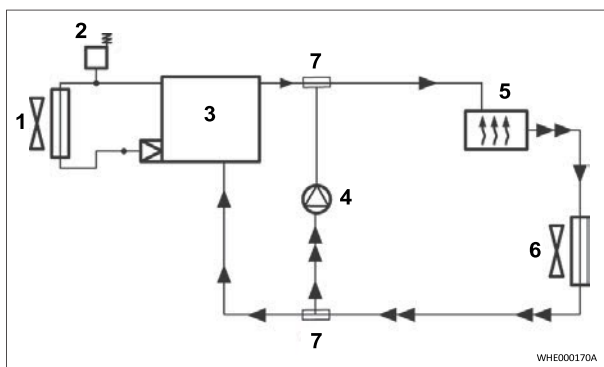


Fig. 7 Integration in the coolant system Island

1	Radiator	5	Heater
2	Expansion tank	6	Heat exchanger for vehicle heating system
3	Internal combustion engine	7	Non-return valve
4	Coolant pump		



NOTE

- ▶ Collect the coolant running out of the system in a suitable container. The cooling system must be vented according to the manufacturer's instructions.

- The coolant hoses supplied by Webasto should always be used. If this is not possible, the hoses must comply with DIN 73411 material class B as a minimum.
- The hoses should be installed without kinks and – for problem-free bleeding – as far as possible with an upward slope away from the heater.
- Hoses must have an inner diameter of 18 mm.
- Hose connections must be secured against slipping using clamps.



NOTE

Correct bleeding can be identified by the fact that the coolant pump is making very little noise.

7.2 Assembly of the water connection piece



NOTE

Never mount the holding plate and the water connection pieces when the heater is installed.

- ✓ The contact surfaces of the O-rings in the heat exchanger must be clean and must not show any signs of damage.
- ✓ The O-rings must be wetted with water before being inserted into the heat exchanger.

- Position the O-rings in the openings in the heat exchanger.
 - Insert the water connection pieces in the holding plate.
 - Move the connection pieces into the required installation position.
 - Secure the retaining plate with water connection piece onto the heat exchanger. Self-tapping screw DG 5X15 mm, torque 7 Nm.
- ▶ In order to ensure automatic bleeding of the heater, the water connection pieces must point upwards at an angle of 0° to 90°.



WARNING

The water connection pieces must not point downwards in any installation position.

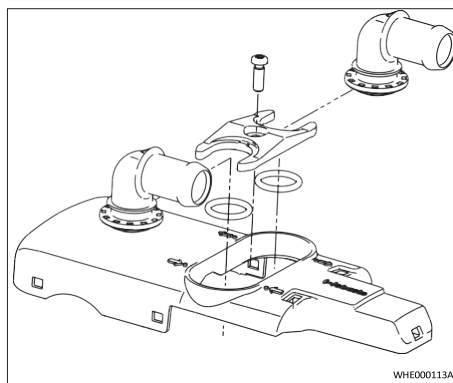


Fig. 8 Position of the openings in the heat exchanger



WARNING

Make sure the sensor cable is positioned correctly.

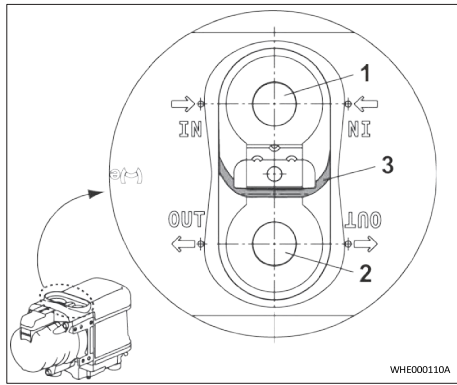


Fig. 9 Sensor cable position

1	Heat exchanger inlet	3	Sensor cable
2	Heat exchanger outlet		

7.3 Assembling water hoses

- When connecting the coolant hoses to the coolant circuit, pay attention to the correct direction of flow of the coolant.
- To facilitate installation, the water hoses, coolant inlet and outlet on the heater and the coolant pump are marked with arrow markings.
- The clamps must be installed on the heat exchanger connection piece between the bead and the hose stop.
- Before initial start-up of the heater, or following replacement of the coolant, the cooling system should be bled carefully.
- The heater and lines must be installed in such a way that static bleeding is ensured.



NOTE

- Only spring clips that are approved by Webasto may be used for securing the water hoses.



NOTE

Correct bleeding can be identified by the fact that the coolant pump is making very little noise.

7.4 Installing the coolant pump

- The coolant pump must be mounted in the coolant circuit on the pressure side of the heater/heat exchanger inlet (see Fig. 6).
- Ensure the correct direction of flow of the coolant pump to the vehicle coolant circuit.
- The installation position of the coolant pump must be selected such that the coolant pump can perform automatic bleeding.
- The air volume contained in the coolant pump must be able to escape upwards independently via the connection pieces.
- Incorrect installation may lead to malfunctions of the coolant pump operation.

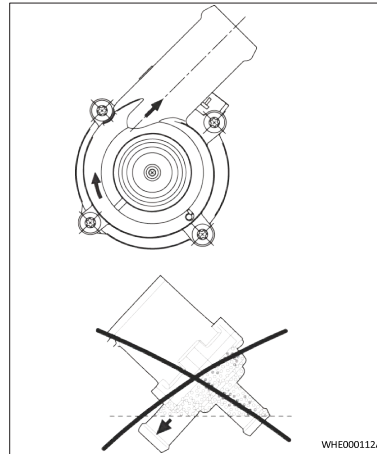


Fig. 10 Coolant pump

For electrical connection see also Electrical Connections .

7.5 Inspection

Once the heater and all coolant-carrying components have been installed, the entire coolant system should be checked for leaks and compliant hose fastening at the system pressure specified by the vehicle manufacturer.



DANGER

Overheating

Insufficient bleeding can lead to a malfunction as a result from overheating in heating mode.

- Take care when bleeding the coolant system. Always bleed:
 - Before first commissioning the heater.
 - After replacing the coolant.

8

Fuel integration



DANGER

Risk of fire by fuel escaping from leaking fuel tank.

- Do not drill into plastic fuel tank.
- Install suitable tank extracting device only on the vehicle's fuel delivery unit.

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.

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. The fuel integration is carried out either in the supply or return line or by a special tank extraction unit.

8.1 Integration in the motor supply or return line

On vehicles with their own fuel feed pump in the fuel tank, the fuel must not be removed from the fuel supply line!

- If the vehicle is equipped with a non-return valve to the tank, the fuel must not be extracted from the return line.
- It must be ensured that no zero shut-off occurs in the vehicle system when extracting fuel.
- When removing fuel from the swirl pot, it must be ensured that it is not completely empty.

8.2 Integration via vehicle's own fuel delivery unit

The tank extracting device is installed in the fuel extraction unit of the tank.

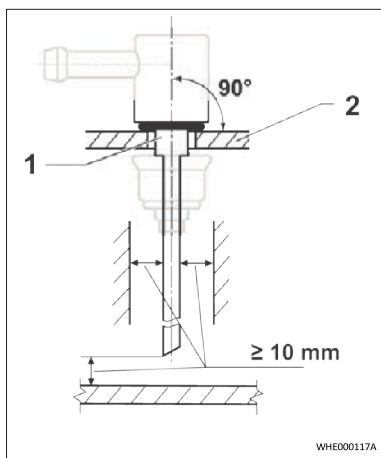


Fig. 11 Tank extracting device

1	Tank extracting device	2	Vehicle's own fuel delivery unit with hole
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- The mounting surface of the tank extracting device must be clean, level and free of burrs.
- Make sure the standpipe is carefully routed when inserting the tank extracting device into the fuel extraction unit. The standpipe must not adversely affect the function of the fuel extraction unit parts, including the fill level indicator, during any of the operating states.
- The length of the standpipe should be selected such that, in the installed state, a minimum clearance of 3/8 in (10 mm) above the floor of the tank or 0.8 in (20 mm) above the floor of the fuel delivery unit is ensured.
- The safeguarding measures and the corresponding torque specified by the vehicle manufacturer must be observed.

8.3 Fuel line



DANGER

Fuel leak if fuel line is damaged or components are faulty.

Outcome: Risk of fire.

- If the fuel line is cut through or incorrectly fitted or if components fail, there is a risk of leaking fuel.



WARNING

Do not route the fuel lines through the vehicle interior.

- Use Webasto-approved fuel lines and genuine Webasto connectors.
- Make sure that the connections are tight.



NOTE

Malfunctions during combustion caused by gas bubbles and high fuel temperatures.

Gas bubbles caused by the heat from the engine and high fuel temperatures can cause malfunctions during operation.

- Install the fuel lines in cool areas.

- Keep line lengths as short as possible.
- Avoid sagging of the fuel line.
- Fasten fuel lines.
- Protect the fuel lines from damage:

- Install stone impact guard.
- Fit protectors on sharp edges.
- Protect fuel lines from high temperatures (e.g. from exhaust pipe):
 - Install heat shield if necessary.
 - Do not install fuel lines in areas where heat builds up.
- Make sure the fuel lines are not damaged.



NOTE

Use only plastic fuel lines made from light and temperature-resistant PA12/ETFE, PA12/ EFEP, PA9T/PA12 in accordance with DIN 73378 or suitable steel lines.



NOTE

Only lines approved by Webasto may be used as fuel lines.

Length of intake pipe [m]	max. 10 ft (3.0m)
Intake height [m] (height difference between tank and fuel pump)	max. 3.3 ft (1.0m)
Length of pressure pipe	max. 29.5 ft (9.0m)

8.4 Connecting 2 lines using a hose

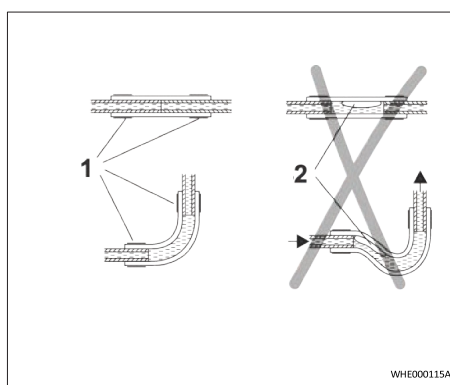


Fig. 12 Connecting fuel lines using a hose

1	Hose clip	2	Air bubble
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WARNING

Make sure there are no leaks!



NOTE

Only Webasto-approved fuel lines and fastening and connecting parts may be used.

8.5 Fuel pump



NOTE

Damage to the fuel pump.

- Lines should be filled under the control of the Webasto Thermo Test PC Diagnostics only.
- Do not operate the fuel pump using the vehicle voltage.



NOTE

Operating the heater with any other than the DP 42 / 42.4 fuel pump will invalidate the warranty and type approval.

- The heater must only be operated using the fuel pump DP 42 / 42.4.

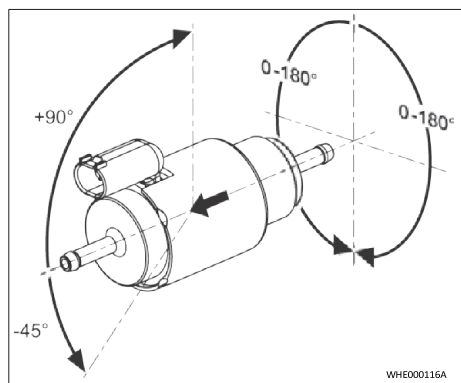


Fig. 13 Permissible installation positions of the fuel pump

8.6 Installation and attachment fuel pump

- The fuel pump must be secured with a vibration-damping mounting.
- The installation position is restricted (maximum inclination angle and axial installation position of fuel pump) as illustrated in Fig. 13 to ensure effective automatic bleeding.
- The arrow indicates the direction the fuel is flowing.
- ▶ The fuel pump must not be installed within the radiated heat range of hot vehicle components. Fit a heat shield if necessary. The fuel pump should be preferably installed close to the fuel tank.

Permissible ambient temperature depending on the fuel used, see Technical data.

8.7 Fuel filter



NOTE

- ▶ If use of poor-quality fuel is likely, a Webasto fuel filter must be installed.
- ▶ Enter fuel filter in the vehicle's service booklet.

8.8 Sticker

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.

- ▶ Affix the sticker "Switch Off Heater Before Refuelling" (included in scope of delivery) in area of fuel filler neck.

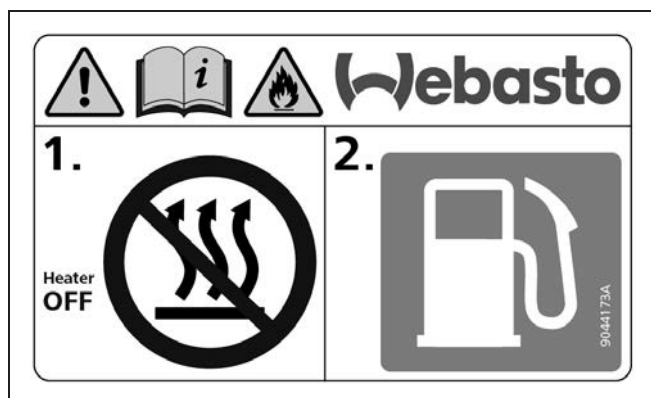


Fig. 14 Sticker

8.9 Cold-resistant fuels

When switching to cold-resistant fuels, the heater must be run in operation for approx. 15 minutes so that the fuel line and fuel pump are also filled with new fuel.

9 Combustion air supply



WARNING

It is important to avoid pressure differences (positive or negative) between the exhaust gas outlet and the combustion air inlet.



DANGER

Risk of burn injuries due to insufficient distance between hot air outlet and persons.

Burn injuries

- ▶ Make sure that people are protected from the direct hot air flow from the heater and from contact with surfaces that will become hot.
- ▶ Heat-sensitive parts must be protected from the direct hot air flow.



DANGER

Danger of fire

Flammable materials or liquids in the combustion air flow.

- ▶ Keep combustion air flow clear.

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.

9.1 Combustion air pipe

The design of the combustion air intake line can only be used in combination with an intake silencer.

9.2 Intake silencer

- The combustion intake opening must be arranged in such a way that it cannot become clogged with dirt.
- The take-off point for the combustion air must be situated at a location above the wading depth of the vehicle that is cool and protected against spray; the installation space must not cause overpressure or underpressure (e.g. owing to the airstream).
- A ventilation opening measuring at least 0.5 in² (3 cm²) is required if the intake opening is installed in an enclosed installation space. A direct airstream flow must be avoided.

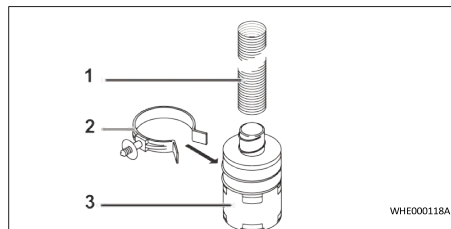


Fig. 15 Combustion-air intake silencer

1	Combustion air intake line	3	Combustion-air intake silencer
2	Mounting clip		

9.3 Notes on installation



DANGER

Use only combustion air intake lines approved by the manufacturer. Damage caused by confusing the exhaust line with the combustion air intake line.

1. Screw a combustion-air intake pipe with a maximum length of 15.75 in (400 mm) onto the combustion-air intake connection piece of the heater.
2. Screw the combustion-air intake silencer as far as possible into the combustion-air intake pipe.



DANGER

Leaks can result in a higher noise level. Ensure an adequate distance from the exhaust system to prevent the intake of exhaust gas!

10 Exhaust system



DANGER

Danger of suffocation

Outcome: Poisoning and asphyxiation

- ▶ Exhaust gas must be routed outside.
- ▶ Make sure that the exhaust gasses and exhaust lines are not routed through the interior.



DANGER

Fire risk due to hot exhaust gasses

Outcome: Injuries or damage to property caused by fire

- ▶ Do not direct the exhaust gas outlet towards highly flammable or heat-sensitive parts.

- ✓ Avoid syphons (risk of condensation accumulation).

Requirements of the exhaust line	Value
Inside diameter	0.9 in (22 mm)
Material	Non-corroding
Minimum length	1.6 ft (0.5 m)
Maximum length	16.4 ft (5 m) *
Maximum length with exhaust or / and combustion air intake silencer	8.2 ft (2.5 m) *
Smallest bend radius	0.4 in (50 mm)
Max. sum of all bends	270°

*: Maximum total length of combustion air intake line and exhaust pipes combined.

- ▶ Do not secure the exhaust line to heat-sensitive parts.
- ▶ Install exhaust lines continually falling from heater (condensation can drain off).
- ▶ If exhaust line cannot be installed continually falling:
 - Make a condensation drain hole 5/32 in (4 mm) at the low-est point of the syphon. See Condensed-water drain.
 - Make sure that the condensation drain hole does not point towards parts that are sensitive to water or heat.
- ▶ Insulate exhaust line (use appropriate insulation) to prevent condensation.
- ▶ Maintain maximum length of exhaust line.
- ✓ The exhaust gasses can flow out unhindered.
- ✓ The exhaust gas outlet must not be blocked.
- ✓ Exhaust gases must not emerge in the direction of travel.
- ✓ The exhaust gas outlet is not too close to the ground.

- ✓ The exhaust silencer must be installed at least 7.9 in (200 mm) away from the heater.
- ✓ The exhaust silencer is not secured to heat-sensitive parts (e.g. brake lines, electrical cables).
- ▶ Ensure the correct installation position of the exhaust silencer (horizontal, +/- 45°).
- ▶ Maintain adequate distance from heat-sensitive parts. A heat shield can be fitted.
- ▶ Install exhaust silencer such that condensation can drain off through the condensation drain hole in the exhaust silencer.



NOTE

The spacer must not be used as an exhaust pipe end mounting device in the engine undertray.

- ✓ The exhaust gas outlet may not be in the area in which the wheels throw up matter.
- ✓ Ensure the maximum turning angle of the front wheels.
- ✓ Care must be taken to ensure that the exhaust outlet cannot be blocked and cannot be damaged under any usage conditions.
- ✓ The exit of the exhaust pipe must not face in the direction of travel.
- ✓ Point the direction of outflow vertically downward or a maximum of 20° opposite the direction of travel.

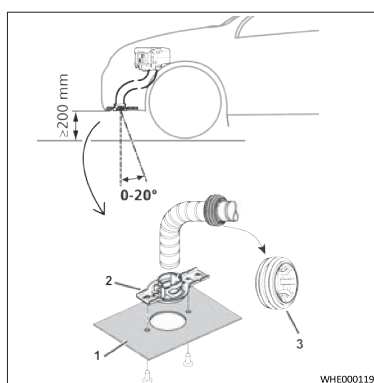


Fig. 16 Exhaust outlet

1	Underride protection	3	Spacer
2	Exhaust end fastener		

11 Electrical Connections



DANGER

Danger of fire and/or overheating caused by live parts.

- ▶ The vehicle power supply must be disconnected when the heater is being installed or worked on.



DANGER

Danger of fire and/or overheating caused by live parts

- ▶ The electrical cable or wiring harness must be sufficiently dimensioned and insulated.
- ▶ All electrical circuits must be protected by fuses or automatic circuit breakers.
- ▶ The electrical cable or wiring harness must be firmly secured and routed such that the cable or wiring harness is adequately protected against mechanical and thermal stress.

**NOTE**

- Electrical components, such as relays, fuses, switches, etc., must be installed so that they are protected from the penetration of water (splash water, high-pressure cleaners, etc.).

**NOTE**

- The electrical connector must be routed so that the cable cannot be kinked directly after the connector under any circumstances. The electrical connector must be installed tension and pressure-free in all directions.



The vehicle blower is controlled as set out in the vehicle-specific installation documentation.



Observe additional requirements from the operating and installation instructions for the Thermo Top Evo, Thermo Top Evo Smart and the control element.

12 Wiring Diagram



Wires or components shown with dashed lines are optional and not included in the scope of delivery or in the wiring harness.

**NOTE**

The line cross-sections specified in the system wiring diagram apply for line lengths < 4.5 m.

bl	Blue
br	Brown
ge	Yellow
gn	Green
gr	Grey
or	Orange
rt	Red
sw	Black
vi	Violet
ws	White

12.1 Wiring diagrams

Multiple configurations are possible for the heater.

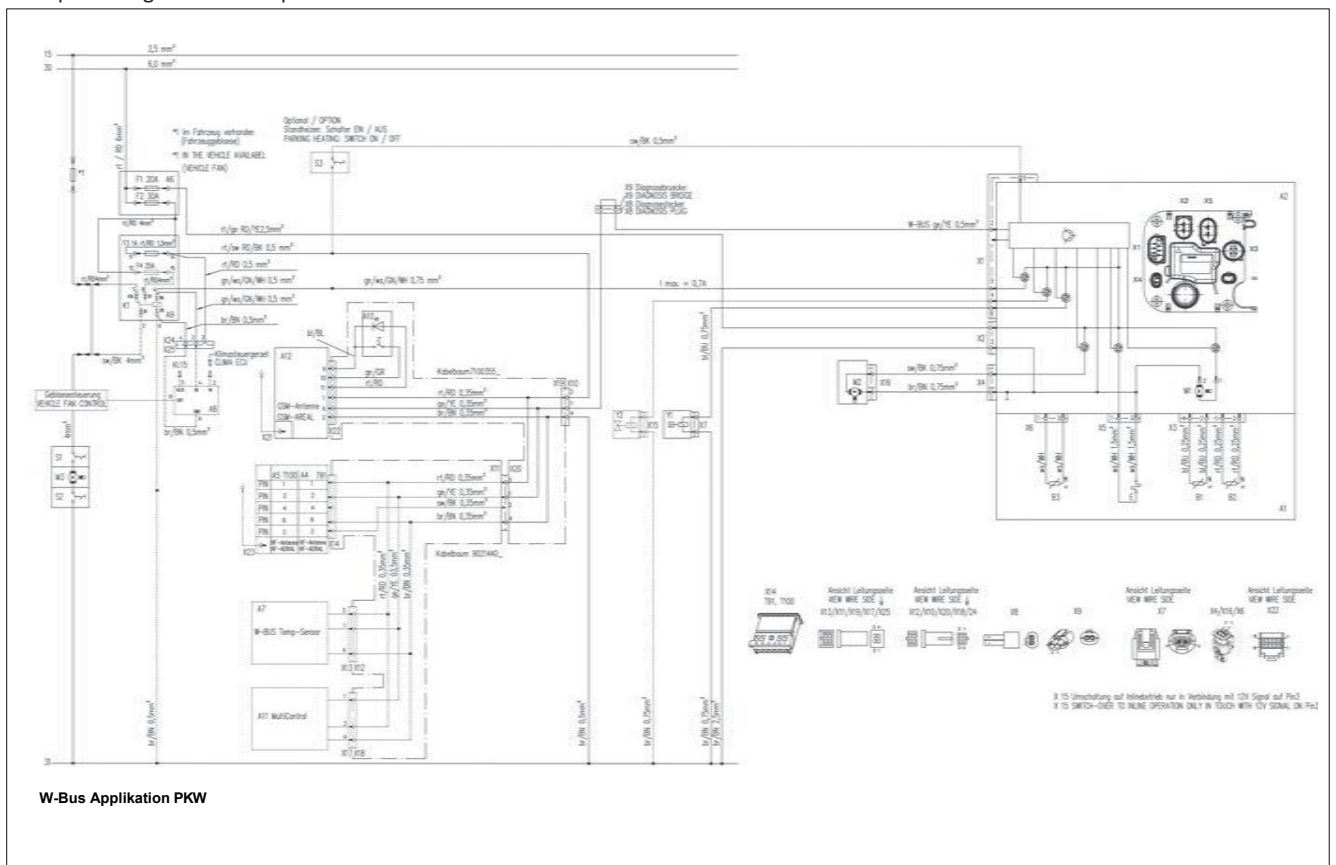


Fig. 17 W-bus application Car

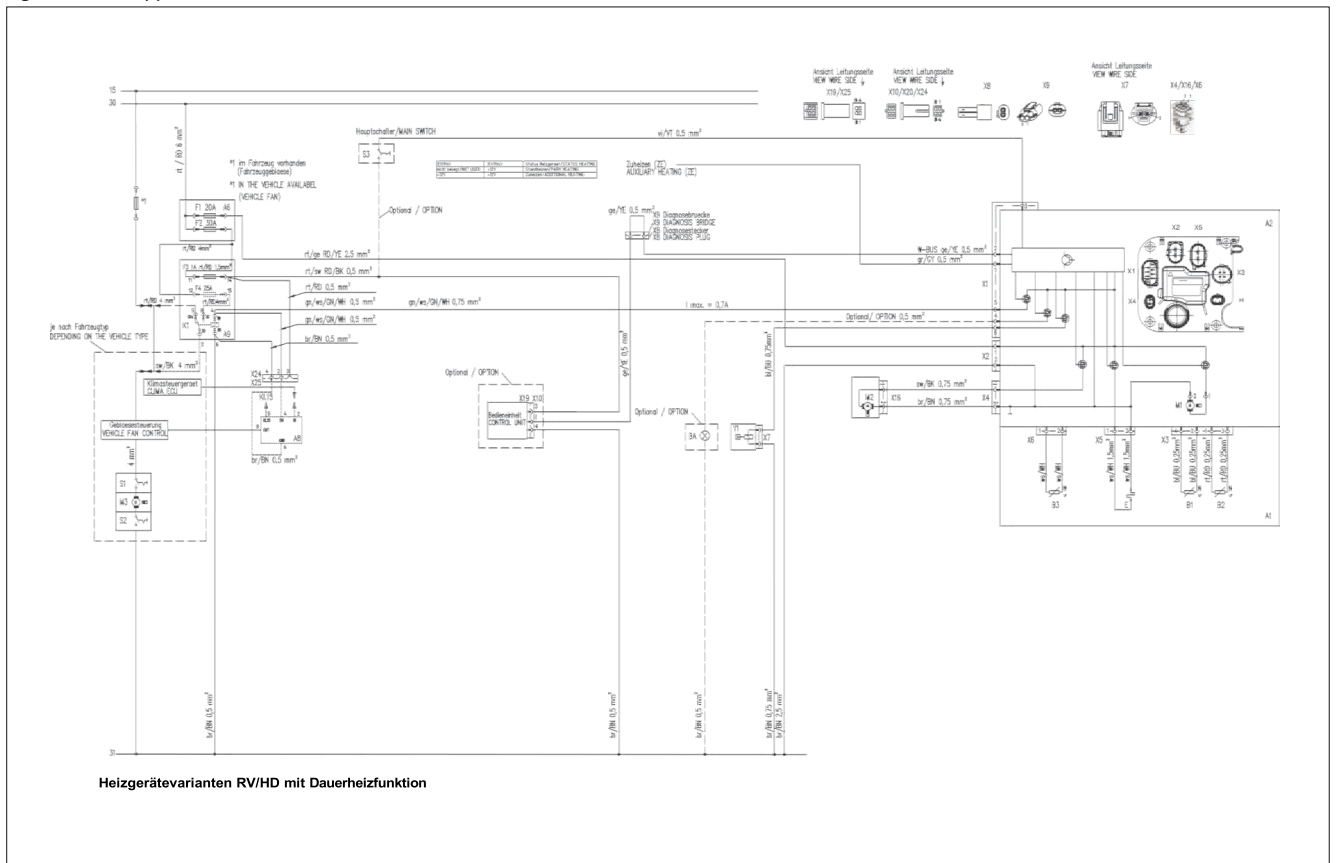
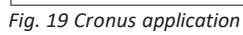


Fig. 18 Heater versions RV/HD with continuous heating function



12.1.1 Legend to wiring diagrams and pin assignment


NOTE

The connection in the heater control unit is designed for a current consumption of $I_{\max} = 0.5 \text{ A}$.

No.	W-bus	W-bus RV/HD with continuous heating	Cronus
A1	Heater Thermo Top Evo	Heater Thermo Top Evo	Heater Thermo Top Evo
A2	Control unit	Control unit	Control unit
A4	Telestart T91 / T99		
A5	Telestart T100 HTM		
A6	Fuse holder heating / air-conditioning control unit	Fuse holder temperature sensor W bus	Fuse holder fuse and diagnostics
A7	W-bus temperature sensor		T-LIN-R module (optional)
A8	PWM Gateway fan controller	PWM Gateway fan controller	
A9	Relay socket with fuses	Relay socket with fuses	
A10	Button TC4		
A11	MultiControl		
A12	ThermoCall TC4		
A13			Cronus / Webasto passenger compartment control unit
A14			Cronus push button
F1	Fuse 20A	Fuse 20A	Fuse 20A
F2	Fuse 30A	Fuse 30A	Fuse 30A
F3	Fuse 1A	Fuse 1A	Fuse 1A
F4	Fuse 25A	Fuse 25A	
B1	Coolant temperature sensor	Coolant temperature sensor	Coolant temperature sensor
B2	Temperature sensor overheating	Temperature sensor overheating	Temperature sensor overheating
B3	Temperature sensor not in use	Exhaust gas temperature sensor	Exhaust gas temperature sensor (optional)
M1	Motor combustion air fan	Motor combustion air fan	Motor combustion air fan
M2	Motor Coolant pump	Motor Coolant pump	Motor Coolant pump
M3	Vehicle blower	Vehicle blower	Motor Second coolant pump (optional)
M4			Motor vehicle blower
S1	Switch for vehicle blower	Switch for vehicle blower	
S2	Switch for vehicle blower	Switch for vehicle blower	
S3		Main switch	
E	Glow plug	Glow plug	
Y1	DP42 fuel pump	DP42 fuel pump	
Y2	Coolant switching valve		Coolant switching valve
BA		Operating indicator	
K1	Fan relay	Fan relay	
X1	6-pin connector Vehicle signal	6-pin connector Vehicle signal	6-pin connector Vehicle signal and coolant pump control
X2	2-pin connector Power supply	2-pin connector Power supply	2-pin connector Power supply
X3	4-pin connector Temperature sensors	4-pin connector Temperature sensors	4-pin connector Temperature sensor for heater
X4	2-pin connector Coolant pump	2-pin connector Coolant pump	2-pin connector Coolant pump
X4.1	3-pin connector Coolant pump	3-pin connector Coolant pump	3-pin connector Coolant pump
X5	2-pin connector Glow plug	2-pin connector Glow plug	2-pin connector Glow plug
X6	2-pin connector not in use	2-pin connector Exhaust gas temperature sensor	2-pin connector Exhaust gas temperature sensor
X7	2-pin connector Fuel pump	2-pin connector Fuel pump	2-pin connector Fuel pump
X8	2-pin connector Diagnostic connector	2-pin connector Diagnostic connector	

No.	W-bus	W-bus RV/HD with continuous heating	Cronus
X9	2-pin connector Diagnosis bridge	2-pin connector Diagnosis bridge	
X10	4-pin connector Heater controls	4-pin connector Heater controls	4-pin connector Passenger compartment, Cronus
X11	4-pin connector Wiring harness		4-pin connector Passenger compartment, Cronus
X12	4-pin connector Temperature sensor W bus wiring harness		3-pin connector Temperature sensor and cold start module
X13	4-pin connector W-bus temperature sensor		3-pin connector Temperature sensor and cold start module
X14	6-pin connector Telestart T91 / T99 / T100 HTM		
X15	Coolant switching valve		
X16	2-pin connector Coolant pump	2-pin connector Coolant pump	3-pin connector Coolant pump
X17	4-pin connector MultiControl		4-pin connector Control element
X18	4-pin connector Wiring harness		4-pin connector Control element
X19	4-pin connector Wiring harness	4-pin connector Control elements	4-pin connector Push button connector
X20	4-pin connector Wiring harness		4-pin connector Push button connector
X21			3-pin connector Adapter for 2-pin coolant pump
X22	4-pin connector ThermoCall		2-pin connector Adapter for 2-pin coolant pump
X24	4-pin connector Relay socket with fuses	4-pin connector vehicle connection	
X25	4-pin connector Air-conditioning control unit	4-pin connector vehicle connection	
1	Present in vehicle: PWM gateway socket		

13 Initial start-up



Observe additional requirements from the operating and installation instructions for the Thermo Top Evo Smart and the control element.

- The heater is fully installed.
- Carefully bleed the coolant circuit and the fuel supply system using the Webasto Thermo Test PC diagnostics. The vehicle manufacturer's specifications should be followed.



Before initial start-up of the heater, the coolant temperature must be $< 86^{\circ}$ (30°C) since the heater does not commence burner operation at high engine temperatures.

The corresponding Webasto diagnostic system must be used for the initial start-up of the heaters:

- **Thermo Top Evo:** Webasto Thermo Test PC-diagnosis (WTT).
 - **Thermo Top Evo Smart:** Webasto System Diagnosis (WSD) – LIN Bus-based system diagnostics.
1. Activate corresponding Webasto Thermo Test PC diagnostics, initiate the start-up then follow and carry out the instructions in the indicated sequence.
 2. Save or print the final report.
 3. Program MultiControl, pair Telestart transmitter.
 4. Make settings on A/C control panel according to the "operating instructions".
 5. Function check.
 6. Switch on the heater via the control element (see control element operating instructions).
 7. Function check.



NOTE

When using Cronus Smart, be sure to select the corresponding application of the WTT diagnostics.



Observe additional requirements from the operating and installation instructions for the Cronus Smart.

14 Technical data



NOTE

The technical data apply under the following conditions: ambient temperature: +20°C, geodetic height: 0 m above sea level, rated voltage. The standard tolerances of $\pm 10\%$ for heaters shall apply if no limits are specified.



Tolerances:

If no limiting values are specified, the technical data below will refer to the usual heater tolerances of $\pm 10\%$ at an ambient temperature of 68° (20°C) and at the rated voltage.

14.1 Technical data for coolant pump

14.1.1 Technical data for coolant pump U4847 econ

Coolant pump	U4847 econ
Volume flow against 0.1 bar	approx. 238 g/h (900 l/h)
Rated voltage	12 Volt
Operating voltage range	10.5 to 17 Volt
Rated power consumption	14W
Fuel pump dimensions	Length max. 4.3 in (109 mm) Diameter 1.9 (48.5 mm)
Weight	Approx. 0.7 lbs (0.3 kg)

Table 1: Technical data U4847

14.1.2 Technical data for coolant pump CP500

Coolant pump	CP500
Volume flow against 140 mbar	approx. 119 g/h (450 l/h)
Rated voltage	12 Volt
Operating voltage range	10.5 to 17 Volt
Rated power consumption	14W
Fuel pump dimensions	Length 3.9 in (98 mm) Width 2.1 in (53 mm)
Weight	0.6 lbs (0.25 kg)

Table 2: Technical data CP500

14.2 Technical data

14.2.1 Technical data Thermo Top Evo

Heater		Operation	Thermo Top Evo - B		Thermo Top Evo – D (also RV and HD)		
			5 kW	4 kW	5 kW	4 kW	
ECE approval mark			R122 E1 00 0258 (heating), R10 E1 04 5627 (EMC)				
Design			Heater with evaporator burner				
Heat flow	Maximum heating capacity		5.0 kW	4.0 kW	5.0 kW	4.0 kW	
	Minimum heating capacity		2.8 kW	2.8 kW	2.5 kW / 1.8 kW*	2.5 kW	
Fuel			E0-E10 according to EN 228 E85 according to DIN 51625		B7 according to EN 590 HVO in accordance with DIN EN 15940		
Fuel consumption +/- 10 %g/hr (l/h)	Maximum heating capacity		0.2 (0.705)	0.15 (0.560)	0.16 (0.620) - 5 kW	0.13 (0.495)	
	Minimum heating capacity		0.1 (0.395)	0.1 (0.395)	0.08 (0.310) (2.5 kW) 0.06 (0.22) (1.8 kW)*	0.08 (0.310)	
Rated voltage			12 Volt				
Operating voltage range			10 to 16.5 Volt				
Rated power consumption +/- 10% (without coolant pump and vehicle blower)	Maximum heating capacity		31 W	21 W	31 W	21 W	
	Minimum heating capacity		14 W	14 W	12 W (2.5 kW), 10 W (1.8 kW)*	12 W	
Ambient temperature in heating mode (In-install. space conditions)							
Heater °F (°C)			-40 to 140 (-40 to 60)		-40 to 140 (-40 to 60)		
Fuel pump	Winter petrol		-40 to 50 (-40 to +10)		Arctic diesel	-40 to 86 (-40 to 30)	
	Summer petrol		-4 to 68 (-20 to 20)		Winter diesel	-4 to 86 (-20 to +30)	
Storage ambient temperature conditions							
Heater		-40 to 257 (-40 to 125)					
Fuel pump		-40 to 194 (-40 to +90)					
Perm. operating pressure		36.3 psi (2.5 bar)					
Capacity of the heat exchanger		2.5 oz (0.075 l)					
Minimum volume in coolant circuit		0.6 gal (2.0 l)					
Minimum volume flow for heater		53 g/h (200 l/h)					
CO ₂ in exhaust gas (permitted function range)		functional range approx. 8-12 %					
Dimensions of heater without attached parts. Also see Fig. 2 (tolerance ± 0.1 in (3 mm))		Length 8.6 in (218 mm) Width 3.6 (91 mm) Height 5.8 (147 mm) without coolant connection piece					
Weight		4.9 lb (2.2 kg)					

Table 3: Technical data Thermo Top Evo

* Thermo Top Evo RV

14.2.2 Technical data Thermo Top Evo Smart

	Thermo Top Evo 4 Smart CAR AM		Thermo Top Evo 5 Smart CAR AM		Thermo Top Evo 5 Smart RV/HD	
Model overview	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol
ECE approval mark	R122 E1 00 0258 (heating), R10 E1 06 5627 (EMC)					
Heating capacity (partial load/full load) [kW]	1.8/4.0		1.8/5.0			
Fuel consumption (part load/full load) oz [l/h]	7.8 / 16.6 [0.23/0.49]	9.5/19 [0.28/0.56]	10.5 / 21 [0.31/0.62]	13.2/23.7 [0.39/0.70]	10.5 / 21 [0.31/0.62]	7.8/21 [0.23/0.62]
Rated voltage [V]	12					
Communication	Analogue / W-bus / LIN / CI-bus					
Rated power consumption (part load/full load) [W]	12/21	15/21	12/33	15/33	12/33	12/33
Fuels	Diesel (DIN EN 590) Arctic diesel HVO/GTL (DIN EN 15940)	E0-E10 (EN228) E85 (DIN51625) M15	Diesel (DIN EN 590) Arctic diesel HVO/GTL (DIN EN 15940)	E0-E10 (EN228) E85 (DIN51625) M15	Diesel (DIN EN 590) Arctic diesel HVO/GTL (DIN EN 15940)	E0-E10 (EN228) E85 (DIN51625) M15
Ambient temperature in heating mode (Installation space conditions)						
Heater	-40 to 140 (-40 °C to 60 °C)					
Fuel pump						
Summer petrol – °F (°C)	-	-4 to 68 (-20 to 20)	-	-4 to 68 (-20 to 20)	-	-4 to 68 (-20 to 20)
Winter petrol	-	-40 to 50 (-40 to +10)	-	-40 to 50 (-40 to +10)	-	-40 to 50 (-40 to +10)
Winter diesel	-4 to 86 (-20 to +30)	-	-4 to 86 (-20 to +30)	-	-4 to 86 (-20 to +30)	-
Arctic diesel	-40 to 86 (-20 to +30)	-	-40 to 86 (-20 to +30)	-	-40 to 86 (-20 to +30)	-
Storage ambient temperature conditions						
Heater	-40 to 257 °F (-40 to +125 °C)					
Fuel pump	-40 to 194°F (-40 to +90 °C)					
Perm. operating pressure	36.25 psi (2.5 bar)					
Capacity of the heat exchanger	2.5 oz (0.075 l)					
Minimum volume in coolant circuit	0.6 gal (2.0 l)					
Minimum volume flow for heater	52.8 gal/h (200 l/h)					
Dimensions of heater without attached parts. Also see Fig. 2 (tolerance ± 3 mm)	Length 8.6 in (218 mm) Width 3.6 (91 mm) Height 5.8 (147 mm) without coolant connection piece					
Weight [kg]	5 lbs (2.1)					

Table 4: Technical data Thermo Top Evo Smart

NOTES



Webasto Thermo & Comfort N.A., Inc.

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Fenton, MI 48430

Technical Assistance Hotline

USA: (800) 860-7866

Canada: (800) 667-8900

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