

Thermo Top Z

Supplementary Heater

Thermo Top E ***Thermo Top C***

Auxiliary Heater

Type Thermo Top E - B

Type Thermo Top Z/C - B
Fuel

Type Thermo Top E - D

Type Thermo Top Z/C - D
Diesel

must be observed. The use of the heater in "vehicles for the transportation of dangerous goods" (ADR) is not permitted.

The examination is performed by presentation of the manufacturer's operating/installation instructions. The year of first operation must be durably marked by the installer on the heater identification label by removing the numerals of the years not applicable.

The heater must not be installed in the passenger or driver compartments of vehicles.

The heater may only be installed in vehicles or independent heating systems with a minimum coolant capacity of 4 litres.

When checking the cooling water level proceed in accordance with the vehicle manufacturer's instructions. The water in the heating circuit of the heater must contain at least 10 % of a quality brand anti-freeze.

Extracting combustion air from the vehicle interior is prohibited.

The exhaust line outlet is to point downwards or to the side, or in case of exhaust venting below the vehicle floor, to be located at the nearest possible location of the vehicle's or cockpit side or rear end.

Exhaust lines must be routed so that exhaust fumes are unlikely to penetrate into the vehicle's interior. The function of any part of the vehicle essential for operation must not be impaired. Accumulations of condensate in the exhaust line must be directly drained. A drain hole may be provided as required.

The openings of the combustion air inlet and the exhaust outlet must not allow a ball of 16 mm in diameter to be inserted.

Electrical lines and switching gear of the heater must be located in the vehicle so that their proper function cannot be impaired under normal operating conditions.

For the routing of fuel lines and the installation of additional fuel tanks §§ 45 and 46 of the StVZO are to be adhered to. The most important regulations are:

- fuel lines are to be designed in such a way that they remain unaffected by torsional stresses in the vehicle, engine movement, and the like. They must be protected against mechanical damage. Fuel-carrying parts are to be protected against excessive heat and are to be arranged so that any dripping or evaporating fuel can neither accumulate nor be ignited by hot components or electrical equipment.
- the heater must not be located in rooms accommodating persons.

- the heater mode of operation – at least "on" or "off" – must be clearly visible.

1.4.2 General Safety Notes

At filling stations and fuel depots the heater must be switched off as there is a potential danger of explosion.

Due to the danger of poisoning and suffocation the heater must not be operated, not even with timer or under remote radio control (Telestart), in enclosed areas such as garages or workshops not equipped with an exhaust venting facility.

In the vicinity of the heater a temperature of 120° C (storage temperature) must not be exceeded under any circumstances (e.g. during body paint work). Excessive temperatures may cause permanent damage to the electronics.

All fuel lines must have leak-proof connections, must show no damage and must be checked in regular intervals (at least to the same schedule as the vehicle itself). Should damage or leakage be detected, it is not permitted to continue heater operation until the damage has been rectified by an authorized Webasto repair shop.

NOTE

Make heater inoperative by removing fuse. The fuel lines (Mecanyl hoses) must not come into direct contact with exhaust pipe and must be thermally insulated to prevent fires.

Non-compliance with the installation instructions will void the Webasto warranty. The same applies for unskilled repairs or repairs not using original spare parts. This will also void the general marks of conformity of the heater and thus the vehicle's permit of operation.

Before first operation make sure to read the heater operating instructions.

1.5 Corrections and Improvements

Deficiencies, improvements, or proposals for correction of this workshop manual are to be mailed to:

Webasto Thermosysteme GmbH
Abt. Technische Dokumentation
D-82131 Stockdorf
Telefon: 089/85794-542
Telefax: 089/85794-757

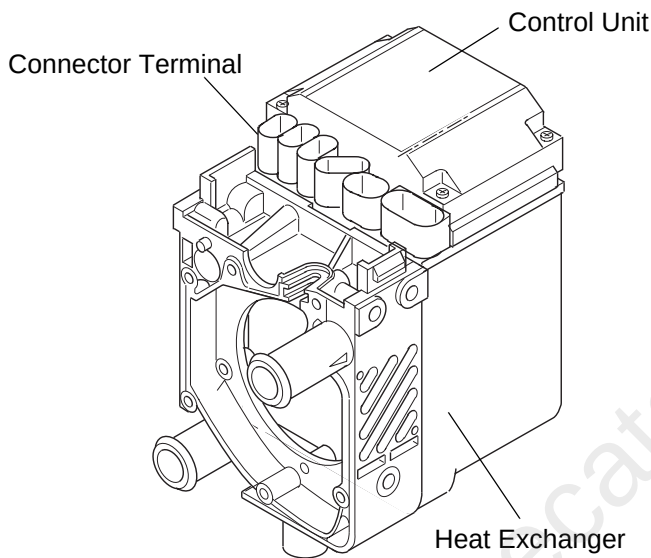
2.4 Control Unit / Heat Exchanger

The control unit / heat exchanger includes the

- control unit
- temperature sensor
- overheat protection
- heat exchanger
- connector terminal.

CAUTION

The control unit / heat exchanger and the burner housing represent an assembly and must not be disassembled.



2.4.1 Control Unit

The control unit is the central unit and ensures control and monitoring of combustion operation.

The control unit is ventilated by means of a ventilation hose routed from the combustion air collector compartment of the burner.

2.4.2 Temperature Sensor

The temperature sensor senses the coolant temperature in the heat exchanger of the heater as an electrical resistance. This signal is routed to the control unit for processing.

2.4.3 Overheat Protection

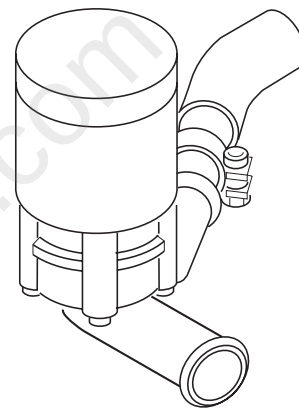
Overheat protection, controlled by a temperature resistor, protects the heater against undue operating temperatures. Overheat protection responds at a water temperature in excess of 105° C and switches the heater off.

2.4.4 Heat Exchanger

The heat exchanger transfers the heat generated by combustion to the coolant circuit.

2.5 Circulation Pump (Thermo Top E and C only)

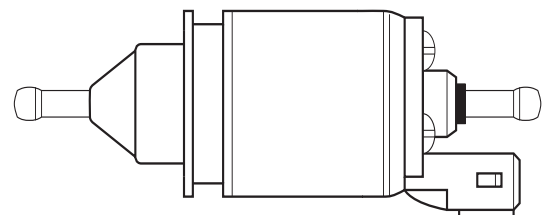
The circulation pump ensures circulation of the coolant within the vehicle and heater coolant circuit. The pump is activated by the control unit and is in continuous operation.



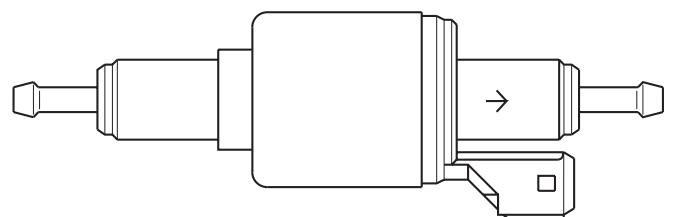
Circulation Pump

2.6 Dosing Pump

The dosing pump is a combined delivery, dosing and shut-off system for the fuel supply of the heater out of the vehicle fuel tank.



Dosing Pump DP 2 for Fuel operated Heaters



Dosing Pump DP 30.2 for Diesel operated Heaters

4.2 Thermo Top Z/C (Heating Flow 5.0 kW)

Where no threshold values are specified technical data in the table are understood to include standard tolerances for heater units of $\pm 10\%$ at an ambient temperature of $+20^\circ\text{C}$.

All electrical components are selected for a nominal voltage of 12 Volts.

Propellant for Thermo Top Z/C (Fuel):

The proper fuel is the fuel specified by the vehicle manufacturer

Propellant for Thermo Top Z/C (Diesel):

The proper Diesel fuel is the one specified by the vehicle manufacturer. When switching to low temperature propellants the heater must be operated for at least 15 minutes to prime the fuel pipe and pump with the new type of fuel.

A persistent influence by additives is not known.

Heater	Operation	Thermo Top Z/C - B	Thermo Top Z/C - D	Thermo Top Z/C - D
Mark of conformity		~ S292	~ S289	
Type		Water heater with evaporator burner		
Heating flow	Full load Part load	5.0 kW 2.5 kW		
Fuel		Fuel	Diesel	Diesel/PME*
Fuel consumption	Full load Part load	0.67 l/h 0.34 l/h	0.59 l/h 0.30 l/h	
Nominal voltage		12 V		
Operating voltage range		10.5 ... 15 V		
Nominal power consumption without circulation pump (without vehicle air fan)	Full load Part load	26 W 18 W		
Permissible ambient temperature: Heater: – operation – storage Dosing pump: – operation		–40° C ... + 60° C –40° C ... +120° C –40° C ... + 20° C		–20° C ... + 60° C –40° C ... +120° C –20° C*... + 20° C
Permissible operating overpressure (heat carrier)		0.4 ... 2.5 bar		
Heat exchanger capacity		0.15 l		
Minimum coolout circuit capacity		4.00 l		
Minimum volume flow for the heater		250 l/h		
CO ₂ in exhaust (permissible functional range)		8 ... 12 Vol.-%		
Dimensions of heater		length 214 mm width 106 mm height 168 mm		
Weight		2.9 kg		

Circulation pump		4847
Volume flow against 0.1 bar		900 l/h
Nominal voltage		12 V
Operating voltage range		10.5 ... 15 V
Nominal power consumption		14 W
Dimensions of circulation pump		length 95 mm width 61 mm height 61 mm
Weight		0.3 kg

*) If viscosity of PME permits due to its natural condition.

Glow plug short circuit	<i>Thermo Top Z:</i> - Switched line short circuit to plus of power supply - Overload or short circuit of glow plug <i>Thermo Top E und C:</i> - Ground short in power supply line to glow plug
Glow plug open circuit	Open line to glow plug / flame sensor - Short circuit to plus of power supply - Rise in coolant temperature within 9 min after start is < 3 K (<i>Thermo Top C only</i>)
Water pump short circuit	<i>Thermo Top Z:</i> - Switched line short circuit to plus of power supply - Overload or short circuit of circulation pump <i>Thermo Top E und C:</i> - Ground short in power supply line to circulation pump - Overload
Water pump open circuit	- Open line to circulation pump - Short circuit to plus of power supply
Fan short circuit	- Line to fan relay shorted against ground - Overload of output to fan trigger (I > 500 mA)

Fig. 502 Error Messages (Sheet 2 of 2)

5.3 Malfunctions

5.3.1 Error Lockout by Malfunction of Heater

In case of a "no flame-up" condition fuel is delivered for a maximum of 180 seconds.

In the event of overheating (temperature limiter responds) fuel delivery is stopped immediately.

In all cases of malfunction (except for a defect on the combustion air fan) there will be an error lockout with a subsequent run-down. Dependent on the software variant implemented there might be deviations from the run-down times specified.

NOTE

An error lockout due to overheating does not display an indication.

5.3.2 Error Lockout due to Low or High Voltage

A low voltage level of 9.8 ± 0.3 V (measured at the wiring harness input) over a period of 20 seconds will cause an error lockout with a run-down of 120 seconds.

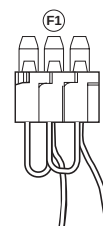
A high voltage level of 15.5 ± 0.5 V (measured at the heater) over a period of more than 6 seconds will also cause an error lockout with a run-down of 120 seconds.

5.3.3 Error Lockout Reset

NOTE

Before attempting an error lockout reset check fuse F1 in Webasto flat fuse holder. A 15 A fuse must be replaced with a 20 A fuse.

If the heater nevertheless fails to switch on, reset error lockout according to 5.3.3.4.



5.3.3.1 Error Lockout Reset Thermo Top E and C with "Timer"

Eliminate cause of trouble.

Switch off heater using the instant heat switch on the timer and switch on again. If heater fails to switch on, perform error lockout reset according to 5.3.3.4.

An error lockout due to overheating does not have an indication.

The fuse is not blown in case of overheating.

The error lockout may be cleared by disconnection of the power supply of the control unit.

Perform error lockout reset according to 5.3.3.4.

6.2.5 Functional Test with Diagnosis Tester Thermo Test

NOTE

- For operation of diagnosis tester refer to operating instructions.
- If error messages are displayed during functional testing, perform troubleshooting according to Section 5.

CAUTION

When connecting diagnosis tester the heater must be in switched off condition.

- Connect screw coupling of adapter wiring harness to diagnosis tester.
- Connect plug (yellow wire) to diagnosis connector in vehicle (connector with yellow wire).

- Connect red battery terminal clamp to battery plus and black battery terminal clamp to battery minus of vehicle.

NOTE

After connection of diagnosis tester the following text is indicated alternately:

**Diagnostic Adapter
SW-Version X.XX**

**Webasto
Thermosysteme**

By pressing any key the equipment select menu is called up.

Working Step	Result	
	Indication	Heater
Press any key	Equipment selection	
By pressing left key select heater and language	- Thermo Top - Thermo Top E - Thermo Top Z/C - Language	
Acknowledge Thermo Top E or Z/C selection by pressing "OK" key	Main menu	
By pressing left key select desired function	- Read error - Delete error - Components test - Automatic test - CO₂ setting - Equipment selection	
Acknowledge selected function with "OK" key	Dependent on selected function	
Selection "Read error"	Error indication: - maximum of 3 errors or no error - return	
NOTE Record error!		
Selection "Delete error"	- Error deleted - return	
Selection "Components test"	- Dosing pump on - Burner motor on - Glow plug / flame sensor on - Circulation pump on - Fan relay on - Cancel	Dosing pump cycles Burner motor runs Glow plug / flame sensor on Circulation pump runs Fan runs
Selection "Automatic test"	- Indication of component triggered or - Indication of an error	Components are triggered as indicated

- Select main menu "Equipment selection" and disconnect diagnosis tester from battery and from diagnosis connector.

8 Servicing

8.1 General

This section describes the servicing procedures allowed on the heater when installed.

WARNING

There is a potential danger of skin burns as the heater and its components may be very hot.

8.2 Work on the Heater

For any type of work on the heater the main power supply cable is to be disconnected from the vehicle battery. As long as the heater is in operation or in run-down the battery main power supply must not be disconnected to prevent the heater from overheating by response of the overheat protection. When performing long time repairs on the heater its removal is compulsory. After repairs on the heating circuit it must be replenished with a mixture of coolant and water to manufacturer's instructions followed by careful bleeding of the circuit. Repairs requiring a change of location the relevant installation instructions and the vehicle specific heater installation proposal have to be observed.

8.3 Work on the Vehicle

CAUTION

In the vicinity of the heater a temperature of 120° C must under no circumstances be exceeded (e.g. during paint work on the vehicle).

8.4 Heater Test Run

The heater must not be operated, not even with the timer, in enclosed areas like garages or workshops not provided with exhaust ventilation facilities.

8.5 Servicing

To ensure functional reliability of the heater the following servicing must be performed in regular intervals:

- clean air heater exterior (prevent the ingress of water).
- examine electrical connections for corrosion of contacts and for security.
- inspect combustion air and exhaust ducting for damage and obstructions.

- inspect fuel lines and fuel filter for leakage.
- inspect coolant circuit and circulation pump (Thermo Top E and C only) for leakage.
- inspect hoses for cracks.
- replace fuel filter, if installed.

8.6 Visual Inspections and Installation Regulations

8.6.1 Connection to Vehicle Cooling System

The installation location of the heater should be as low as possible to ensure self-venting of the heater and circulation pump. This applies in particular to the circulation pump (Thermo Top E and C only), which is not self-sucking.

The circulation pump may be installed in the location provided on the heater or remote from the heater integrated in the coolant circuit. The correct direction of flow through the heater must be observed (coolant outlet on top, coolant inlet on bottom), otherwise malfunctions may result.

The heater is to be connected to the vehicle cooling system according to Fig. 801 or 802. The amount of coolant used in the circuit must be at least 4 litres.

The heater integration into the cooling circuit must be upstream of the vehicle's own heat exchanger.

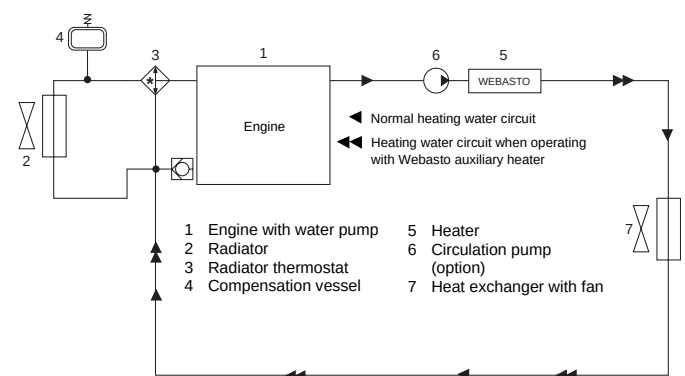


Fig. 801
"Inline Integration" in the Engine Water Cooling Circuit

combustion air must be taken in from and the exhaust vented to the exterior. The line feedthroughs must be sealed against splash water.

8.6.3 Air Intake Muffler

The permitted installation position of the air intake muffler is between 0° and 90° pointing downwards.

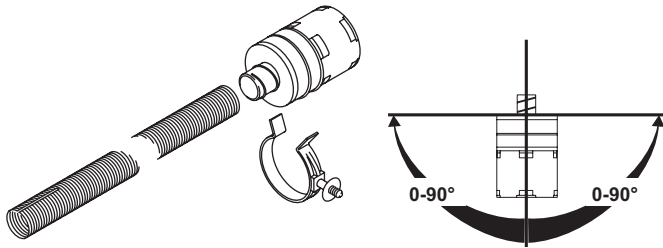


Fig. 807 Air Intake Muffler, Installation Position

8.6.3.1 General Remarks for Installation

Plug air intake hose with its slotted end (approx. 18 mm) onto air intake connecting pipe of heater and fasten with hose clamp.

Screw air intake muffler all the way into unslotted end of combustion air intake hose (additional fastening with hose clamp not required).

CAUTION

Ensure sufficient distance to exhaust system.

Dependent on installation area fasten air intake muffler with retaining clip or with cable ties in suitable location.

8.6.4 Exhaust Line

The exhaust line (inner diameter 22 mm) may be routed in several bends (total of 270°, smallest bending radius 50 mm). The minimum line length is 500 mm, the maximum length is 1000 mm.

The exhaust muffler is to be mounted near the heater, however at least 200 mm away from the heater. The exhaust muffler must not be installed near the combustion air intake. Heater operation without exhaust muffler is not permitted.

NOTE

Accumulations of condensate in the exhaust line must be directly drained. A condensate drain hole (3 mm Ø) may be provided as required.

The exhaust line outlet must not point in the direction of forward motion (Fig. 808)

Rigid pipes of unalloyed steel with a minimum wall thickness of 1.0 mm or flexible hoses of alloyed steel only may be used as exhaust ducts.

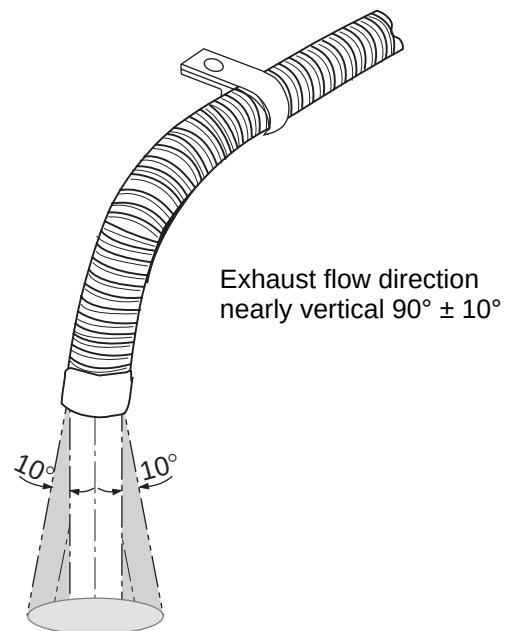


Fig. 808 Exhaust Pipe Outlet, Installation Position

9.2 Disassembly and Assembly

9.2.1 Circulation Pump, Replacement (Thermo Top E and C)

9.2.1.1 Removal

1. Remove cover (4, Fig. 901) and disconnect electrical connector of circulation pump.
2. Loosen spring band steel clamp (5, Fig. 901).
3. Remove screw (7) and clamp (2).
4. Withdraw circulation pump (6) and remove spring band steel clamp (5).
5. Withdraw collar (1) as required.
6. Perform procedures on components after disassembly (refer to 9.1.1).

9.2.1.2 Installation

1. Slide spring band steel clamp (5, Fig. 901) onto hose end.
2. Position collar (1) on circulation pump (6) as required.
3. Locate circulation pump (6) for installation and secure with clamp (2) and screw (7) on combustion air fan (3).
4. Position spring band steel clamp (5).
5. Torque screw (7) with 3.5 ± 0.3 Nm.
6. Connect circulation pump electrical connection and fit cover (4).

NOTE

Circulation pump may also be mounted remotely in vehicle.

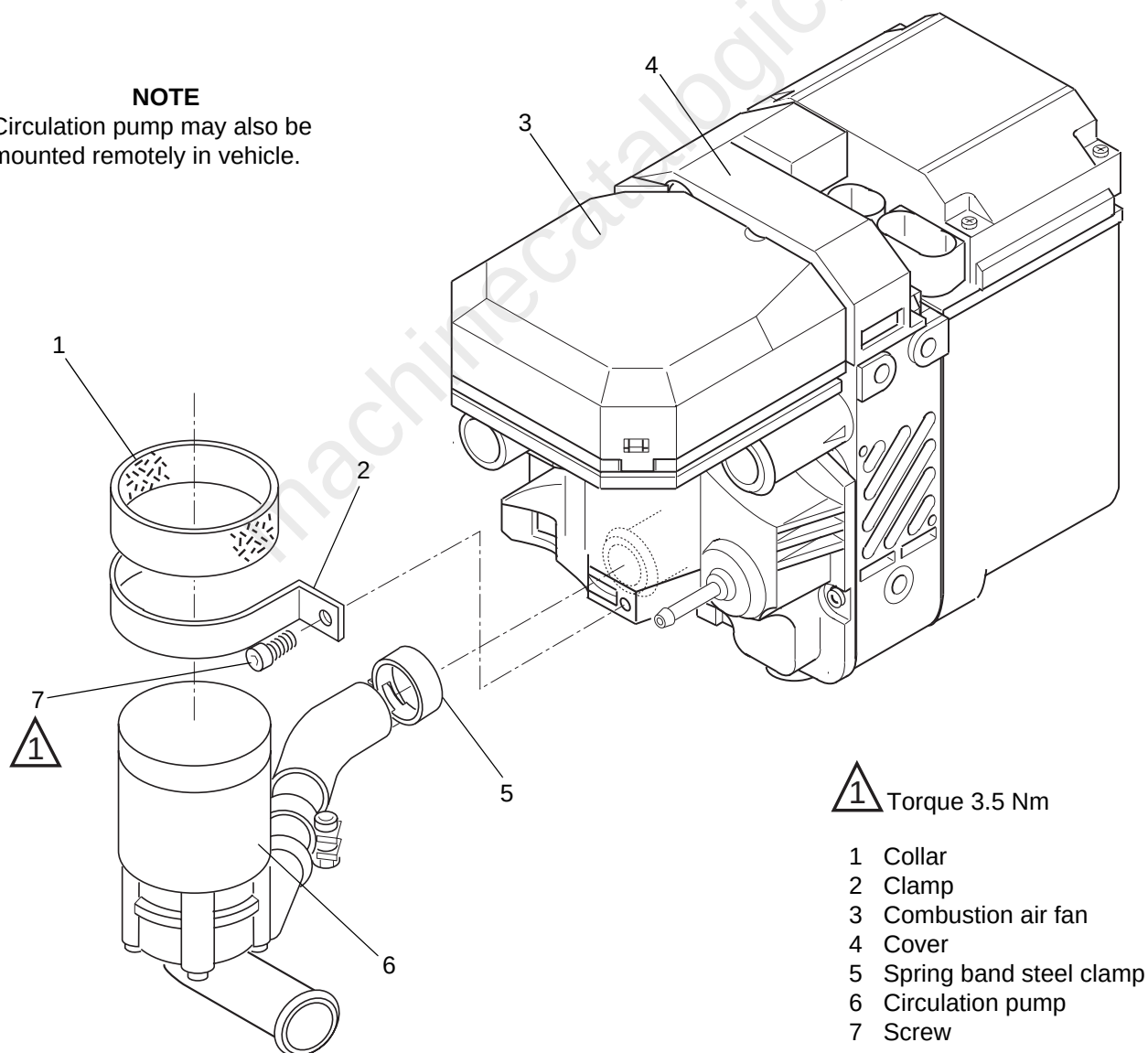


Fig. 901 Replacement of Circulation Pump (Thermo Top E and C)

Full Version Available

Webasto Thermo 50 Heater Service Manual

Webasto Thermo 50 heater service manual with repair procedures, troubleshooting and disassembly steps for Thermo Top models. Instant PDF download.

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