

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

2 General Description

The water heater Thermo Top Z (supplementary heater) is intended to compensate for the shortage in heat generated by engines optimised for low fuel consumption.

The water heater Thermo Top E and C (auxiliary heater) is used to:

- heat the vehicle cabin,
- defrost the vehicle windscreens,
- preheat water-cooled vehicle engines.

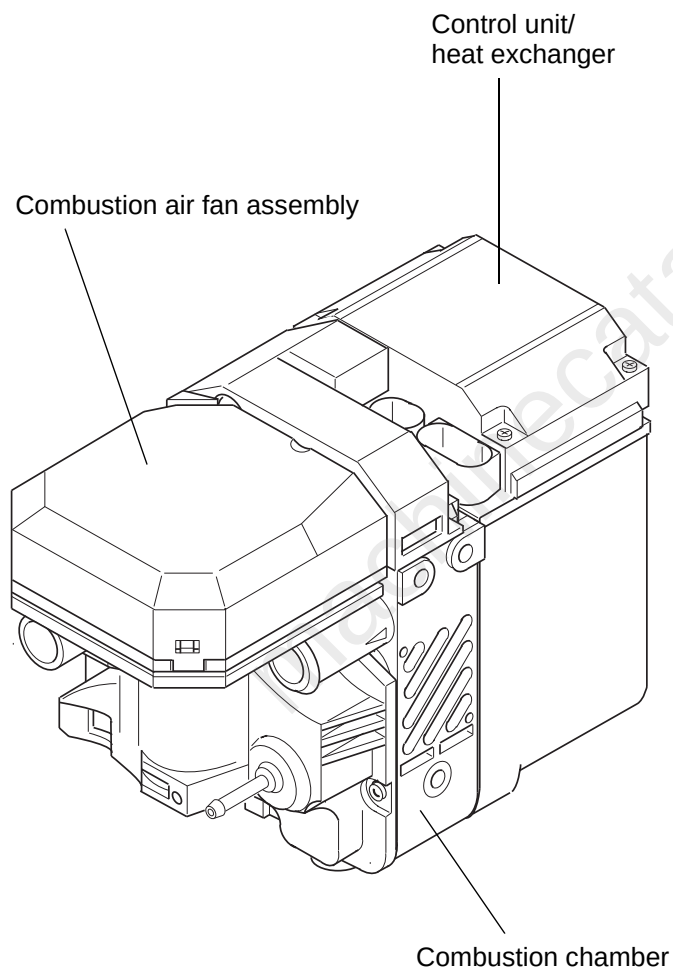
The heater Thermo Top Z may be converted into an auxiliary heater using a retrofit kit.

The heater designed to the evaporator principle operates intermittently controlled by the temperature sensor.

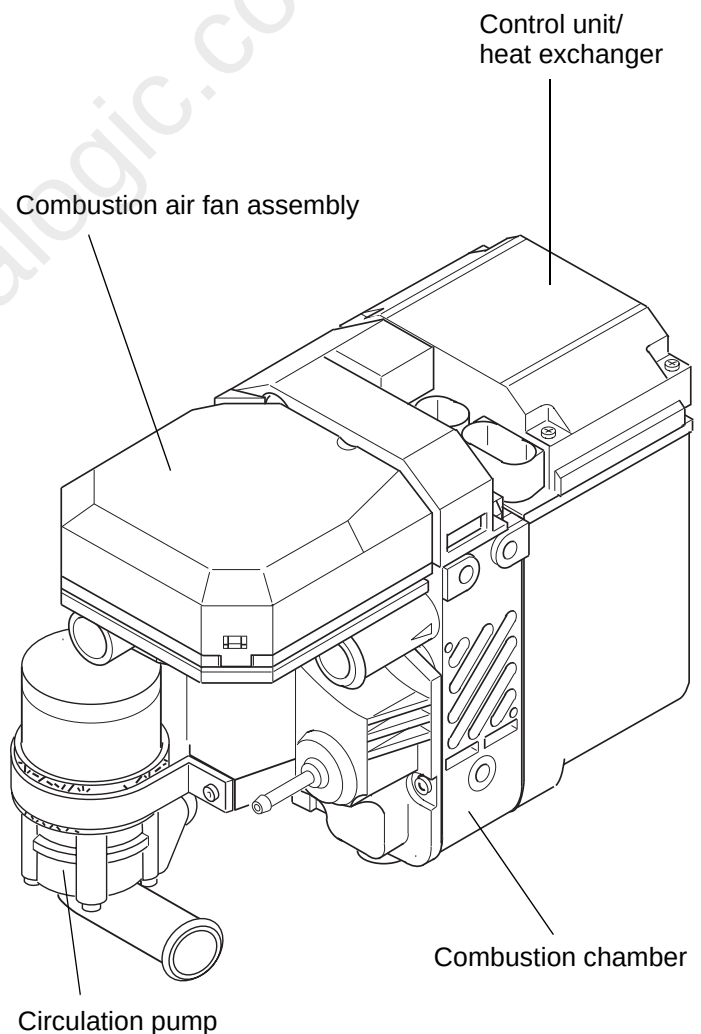
In order to minimise the battery's workload the heater switches from full-load operation to part-load operation after reaching a water temperature of 72° C.

In this mode of operation the heater operates with extremely low noise and particularly low power and fuel consumption.

The heater consists of the combustion air fan assembly, the control unit/heat exchanger, the burner insert and the combustion chamber. The Thermo Top E and C heater has an additional circulation pump.



Thermo Top Z



Thermo Top E and C

3 Functional Description

3.1 Functional Description Thermo Top Z (Supplementary Heater)

3.1.1 Switch On / Starting

Fuel

When starting the vehicle engine the heater goes in standby. With a water circuit temperature below 60° C and an outside temperature below 5° C (option with outside temperature sensor) the starting sequence commences. The glow plug and the combustion air fan are activated. After 30 seconds the fuel dosing pump starts operation and combustion air fan operation is suspended for 3 seconds. Subsequently the combustion air fan speed is increased in a ramp within 57 seconds to nearly full load operation.

After reaching full load fuel delivery within this period the glow plug is deactivated and the combustion air fan operation increased to full load.

During the subsequent 45 seconds as well as in normal operation the glow plug functions as flame sensor to monitor the flame condition.

After all these events the automatically controlled heating operation starts. In case of a no flame condition or a flameout, a restart is automatically initiated. If the no flame condition persists, fuel delivery is stopped and the heaters enters an error lockout with a run-down of the combustion air fan.

Diesel

When starting the vehicle engine the heater goes in standby. With a water circuit temperature below 60° C and an outside temperature below 5° C (option with outside temperature sensor) the starting sequence commences. The glow plug and the combustion air fan are activated. After 30 seconds the fuel dosing pump starts operation and combustion air fan operation is suspended for 3 seconds. Subsequently the combustion air fan speed is increased in two ramps within 56 seconds to nearly full load operation. After a stabilisation phase (constant speed) of 15 seconds the combustion air fan speed is again increased in a ramp within 50 seconds to nearly full load.

After reaching full load fuel delivery the glow plug is deactivated and the combustion air fan operation increased to full load.

During the subsequent 45 seconds as well as in normal operation the glow plug functions as flame sensor to monitor the flame condition.

After all these events the automatically controlled heating operation starts. In case of a no flame condition or a flameout, a restart is automatically initiated. If the no flame condition persists, fuel delivery is stopped and the heater enters an error lockout with a run-down of the combustion air fan.

A flameout during normal combustion operation causes an automatic restart.

3.1.2 Heating Operation

Fuel

When the temperature rises to reach 72° C the heater switches to the energy saving part load operation. A rise in temperature up to 76.5° C causes the heater to enter a control idle period. This also happens when exceeding a total heating operating time of 76 minutes.

After cool-down of the coolant to 71° C the heater resumes part load operation. Another rise in temperature to 76.5° C causes the heater to enter again the control idle period. A drop in the coolant temperature during part load operation due to an increased demand in heat will cause the heater to switch to full load operation at 56° C.

Diesel

Heating operation for the Diesel type heater is identical in the sequence of events. Should the coolant temperature drop during the control idle period to but not below 71° C within 900 seconds, a subsequent drop in the coolant temperature below 71° C causes the heater to perform a regular starting sequence into full load operation.

A drop in the coolant temperature during part load operation due to an increased demand in heat will cause the heater to switch to full load operation at 65° C.

3.1.3 Switch Off / Deactivation

When turning the engine off the heater is deactivated. Combustion stops and run-down commences. The combustion air fan first continues operation to cool the heater down (run-down) to be automatically switched off afterwards.

NOTE

The run-down time and the combustion air fan speed depend on the heater operating condition at the time of deactivation.

Run-down time is for:

Fuel

168 seconds when deactivated in full load operation and 157 seconds when deactivated in part load operation.

Diesel

175 seconds when deactivated in full load operation and 100 seconds when deactivated in part load operation. Dependent on the software variant implemented in the control unit there might be deviations from those run-down periods.

4 Technical Data

4.1 Thermo Top E

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 E (Fuel):

The proper fuel is the fuel specified by the vehicle manufacturer.

Propellant for Thermo Top E (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 E - B	Thermo Top E - D	Thermo Top E - D
Mark of conformity		~ S316	~ S317	
Type		Water heater with evaporator burner		
Heating flow	Full load Part load	4.0 kW 2.5 kW		
Fuel		Fuel	Diesel	Diesel/PME*
Fuel consumption	Full load Part load	0.54 l/h 0.34 l/h	0.47 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	22 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		3.00 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

*) Operation only permitted with mixture Diesel/PME with PME quantity < 50 %.

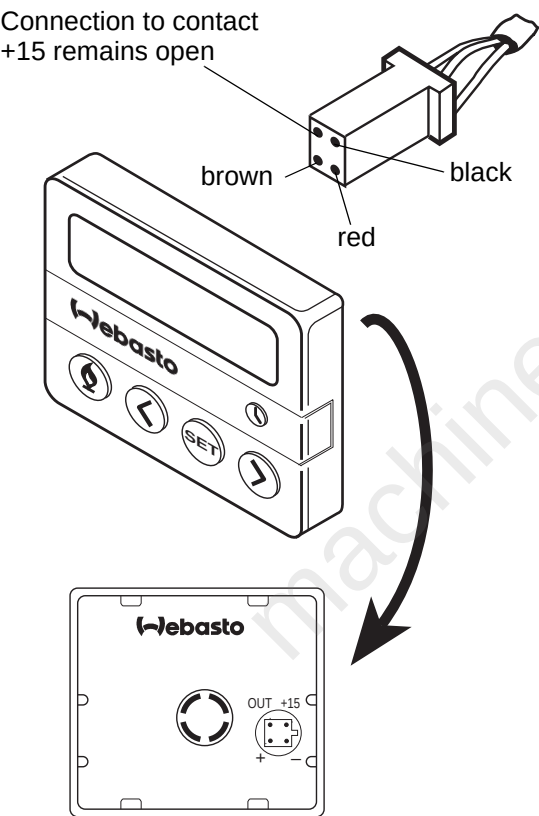
6.2.2 Timer Functional Test
(Thermo Top E and C)

6.2.2.1 Voltage Check

1. Remove cover using a small screw driver.
2. Loosen screw.
3. Disconnect plug from clock.
4. Measure voltage between "+" and "-" (see figure). Voltage indicated is according to voltage of vehicle battery, approx. 12 V.

NOTE

In case no voltage is indicated check or replace fuse F2 and/or timer wiring.



6.2.2.2 Switch On Signal Test

1. Operate "ON" button and check voltage between "-" and "OUT". Voltage is approx. 7 V with the timer connected to the control unit or 12 V with the output not connected.
2. Operate "ON" button again and check voltage between "-" and "OUT". Voltage is 0 V.

6.2.3 Telestart T60 Functional Test
(Thermo Top C)

6.2.3.1 Transmitter Check

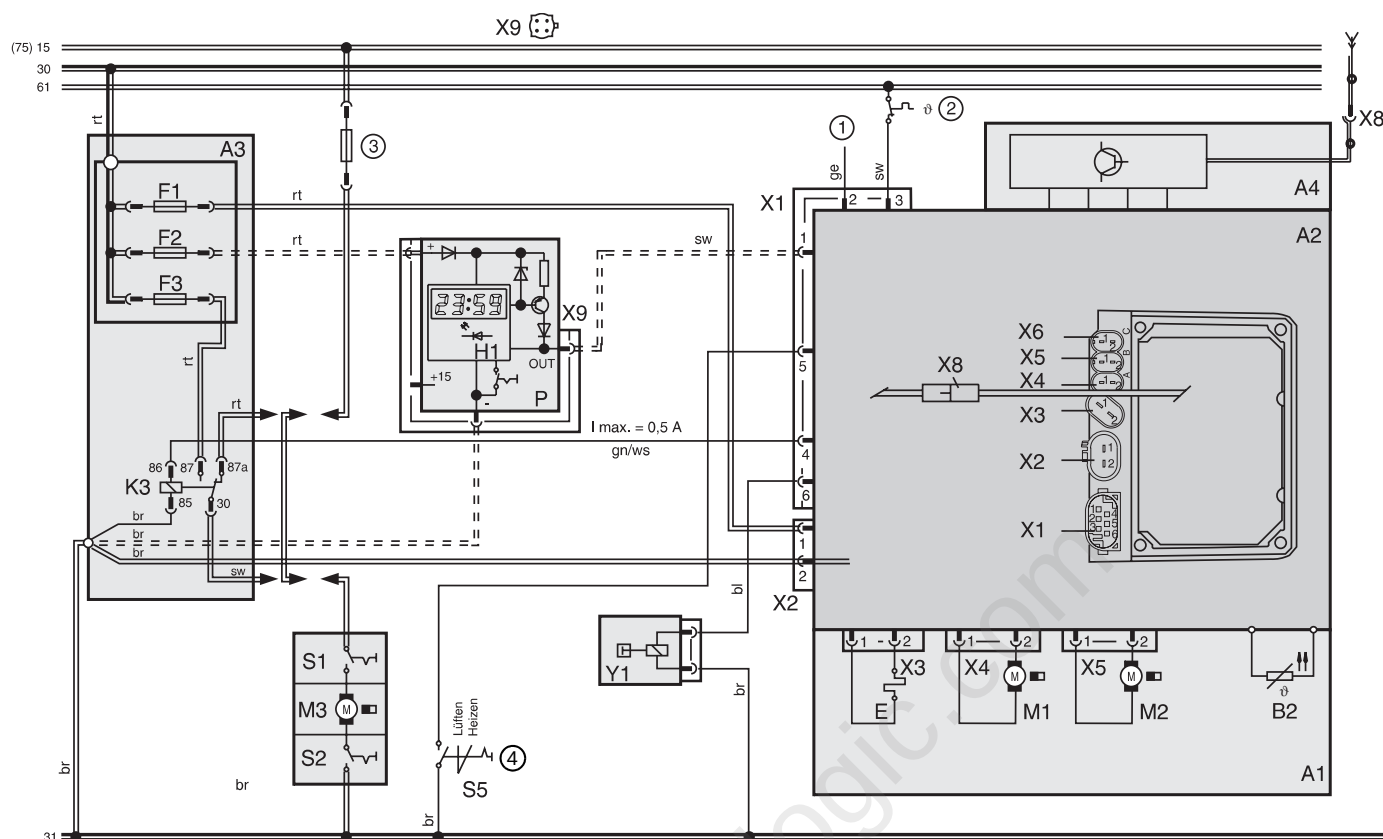
1. Operate switch on transmitter. Ensure operating indicator light (green or red LED) flashes. If LED is not flashing, batteries are too cold or too weak.
2. Using switch on transmitter switch Telestart off.

6.2.4 Telestart T70 Functional Test
(Thermo Top C and E)

6.2.4.1 Batteries Check

1. Operate ON or OFF switch.

Batteries	LED	Actions
serviceable	illuminates after 1 second for approx. 0.5 seconds	
weak	flashes in orange after 1 second for 3 seconds	– warm up batteries to above 0° C – replace batteries as soon as possible
discharged	illuminates in orange after 1 second for 5 seconds	– warm up batteries to above 0° C – replace batteries



Item	Nomenclature	Remark
A1	Heater	Thermo Top E or Z/C
A2	Control unit	
A3	Connector box	
A4	Telestart receiver	T60
B2	Temperature sensor	
E	Glow plug / flame sensor	
F1	Fuse 15 A	Flat fuse SAE J 1284
F2	Fuse 1 A	Flat fuse SAE J 1284
F3	Fuse 25 A	Flat fuse SAE J 1284
H1	LED (in item P)	operating indicator light
K3	Relay (in item A3)	vehicle air fan
M1	Motor	combustion air fan
M2	Motor	circulation pump
M3	Motor	vehicle air fan
P	Timer, digital	for timer operation
S1	Switch for vehicle air fan	depending on vehicle S1 or S2
S2	Switch for vehicle air fan	depending on vehicle S1 or S2
S5	Switch	summer/winter switch
X1	Connection, 6-pole	
X2	Connection, 2-pole	water repellant
X3	Connection, 2-pole	water repellant
X4	Connection, 2-pole	water repellant
X5	Connection, 2-pole	water repellant
X6	Connection, 2-pole	water repellant
X8	Connection, 2-pole	HF, coaxial
X9	Connection, 4-pole	
Y1	Dosing pump	

Wire Gauges		
	< 7.5 m	7.5 - 15 m
-----	0,5 mm ²	0,75 mm ²
=====	0,75 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

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

Legend for circuit diagrams

- ① Diagnosis
- ② Outside air temperature
- ③ Vehicle heating air fan fuse provided in vehicle
- ④ Option

Fig. 702 Automatic Switching Circuit for Thermo Top E and Z/C, 12 V Timer and Telestart T60

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.

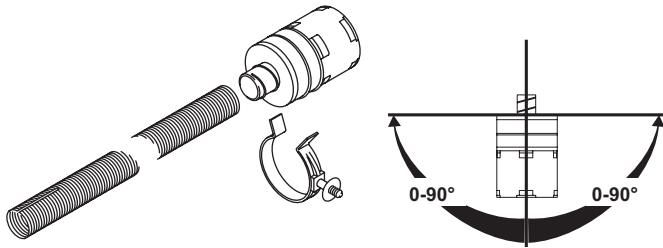


Fig. 807 Air Intake Muffler, Installation Position

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.

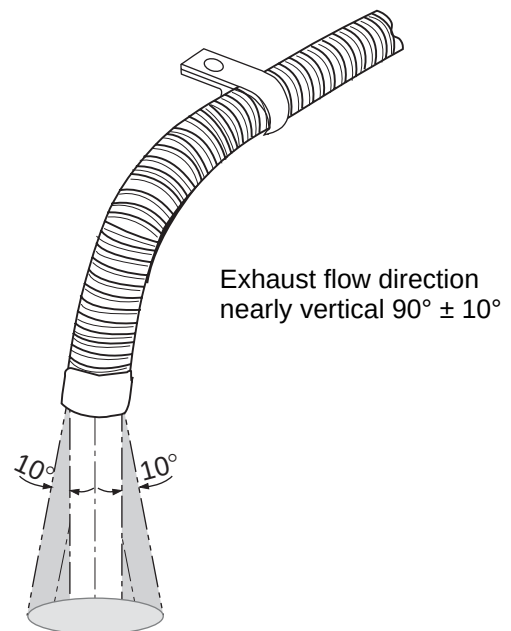


Fig. 808 Exhaust Pipe Outlet, Installation Position

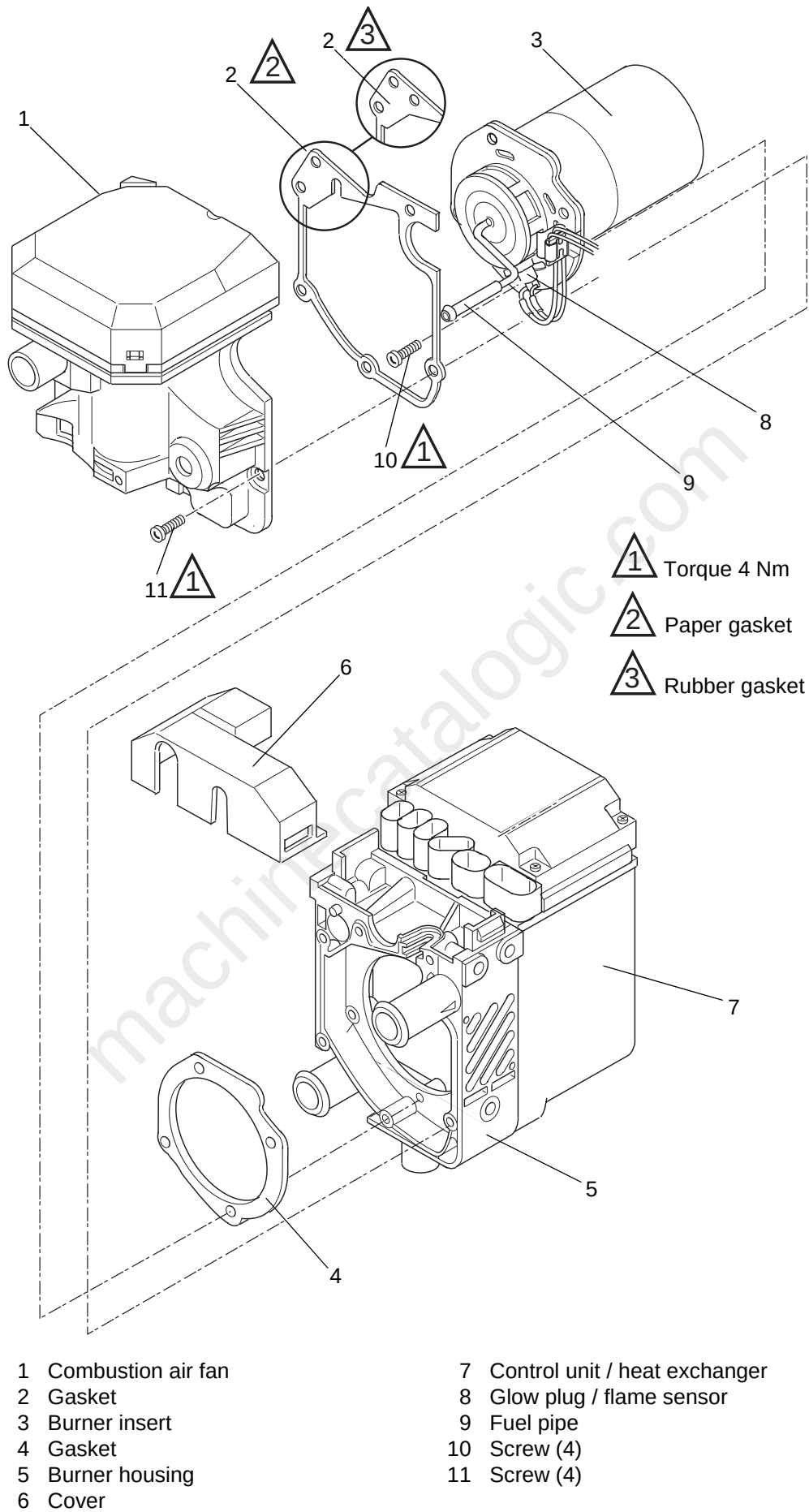


Fig. 902 Heater Disassembly

Full Version Available

Webasto Thermo Top Z Heater Service Manual

Webasto Thermo Top Z heater service manual with repair, servicing and troubleshooting procedures plus wiring and installation details. Instant PDF download.

VIEW THE FULL MANUAL

<https://machinecatalogic.com/webasto-thermo-top-z-heater-service-manual/>

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