

**Thermo 90 S**

**Thermo 90 S-ADR**

(Transport of hazardous goods)

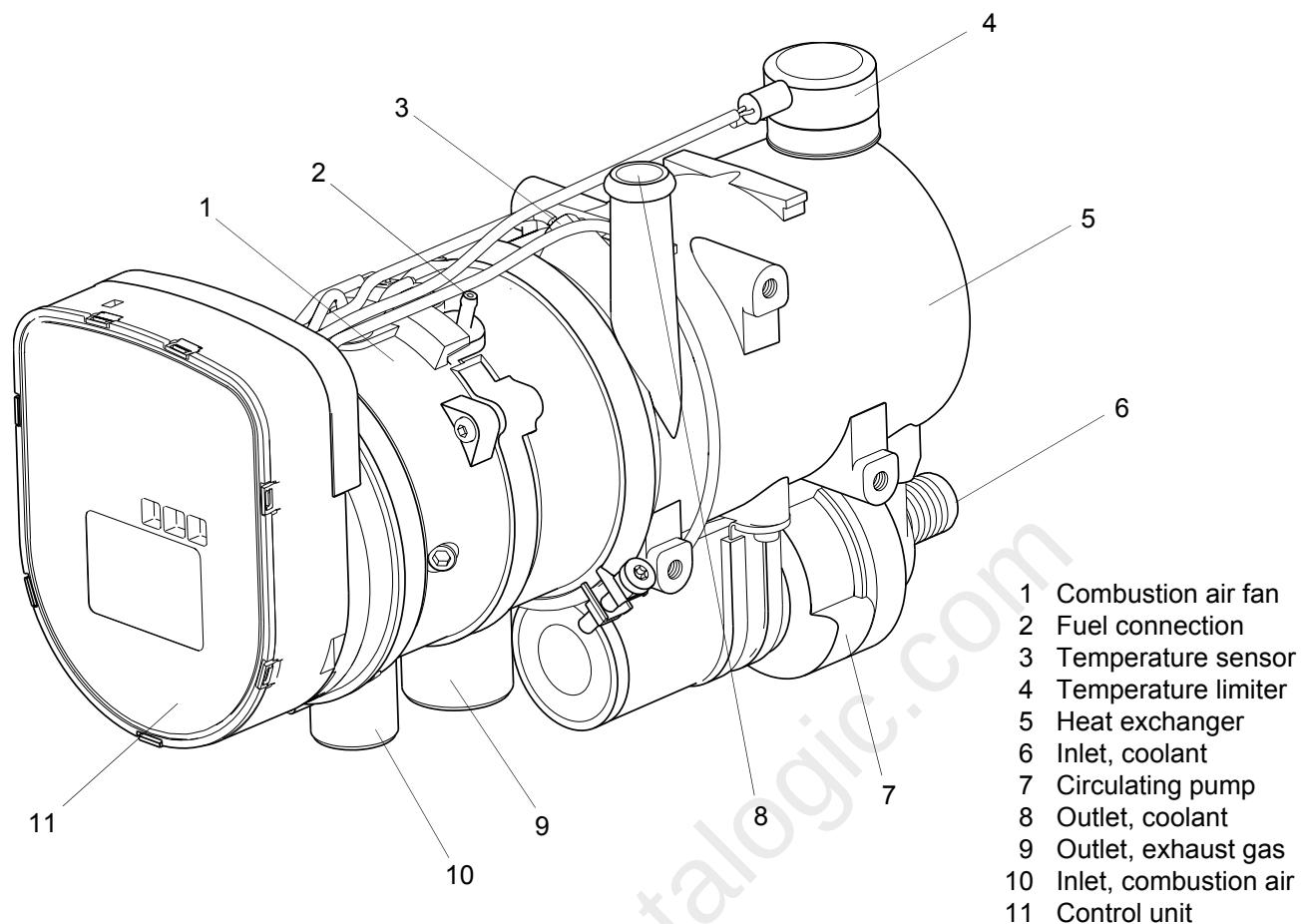
**Thermo 90 ST**

**Thermo 90 ST-ADR**

(Transport of hazardous goods)

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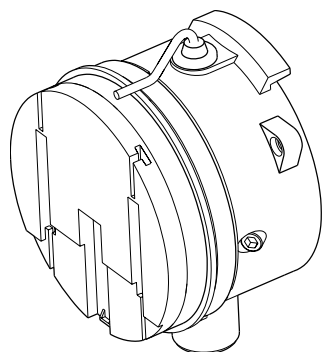
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Thermo 90 ST heater

### 2.1 Combustion air fan

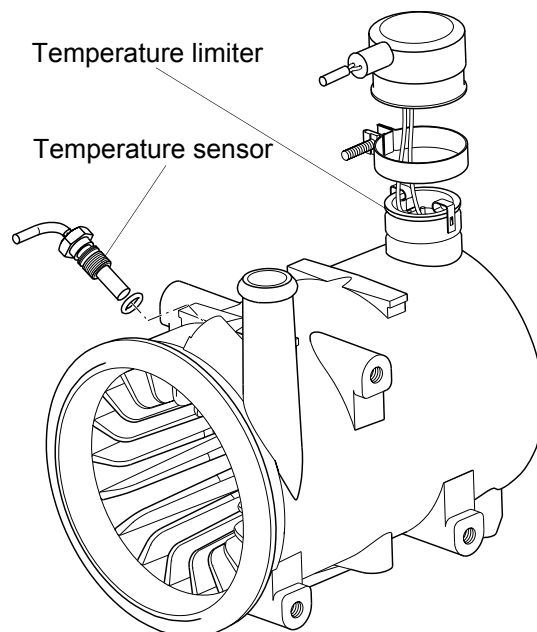
The combustion air fan supplies the air required for the combustion process from the combustion air inlet to the burner insert.



Combustion air fan

### 2.2 Heat exchanger

In the heat exchanger, the heat generated by combustion is transferred to the coolant circuit.



Heat exchanger



| Fault indication                                   | Possible cause             | Remedy                                                                                                                                                                     |
|----------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9 Flashing pulses<br>(glow plug defective)         | Cabling                    | Check cabling for damage, discontinuity and short-circuit                                                                                                                  |
|                                                    | Flow plug defective        | Replace glow plug                                                                                                                                                          |
| 10 Flashing pulses<br>(overheating)                | Heater overheats           | Check coolant and top up if necessary.<br>After the unit has cooled down, press the button of the temperature limiter before switching on or fit a new temperature limiter |
| 11 Flashing pulses<br>(circulating pump defective) | Cabling                    | Check cabling for damage, discontinuity and short-circuit                                                                                                                  |
|                                                    | Circulating pump defective | Replace circulating pump                                                                                                                                                   |

Fig. 502 Fault indications on fault lock-out (page 2 of 2)

## 5.4 Visual check for assessing the burner

The burner and the evaporator in the heater display specific characteristics when they must be replaced or do not have any fault source.

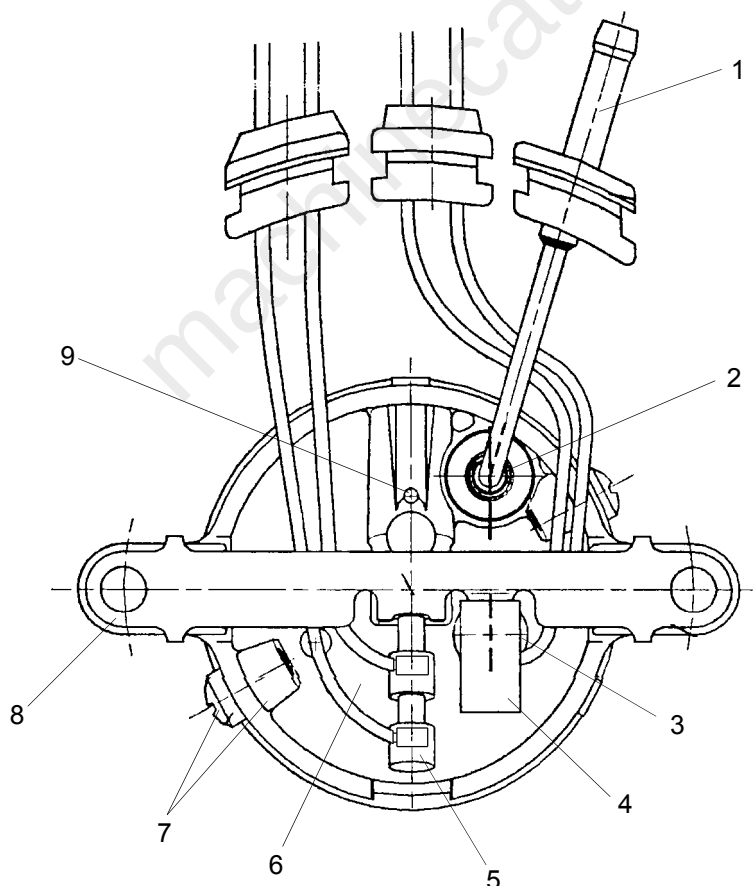
The criteria of a correct check are listed below.

### 5.4.1 Burner housing

- The start air hole (Fig. 503) must be clear otherwise no start will occur.

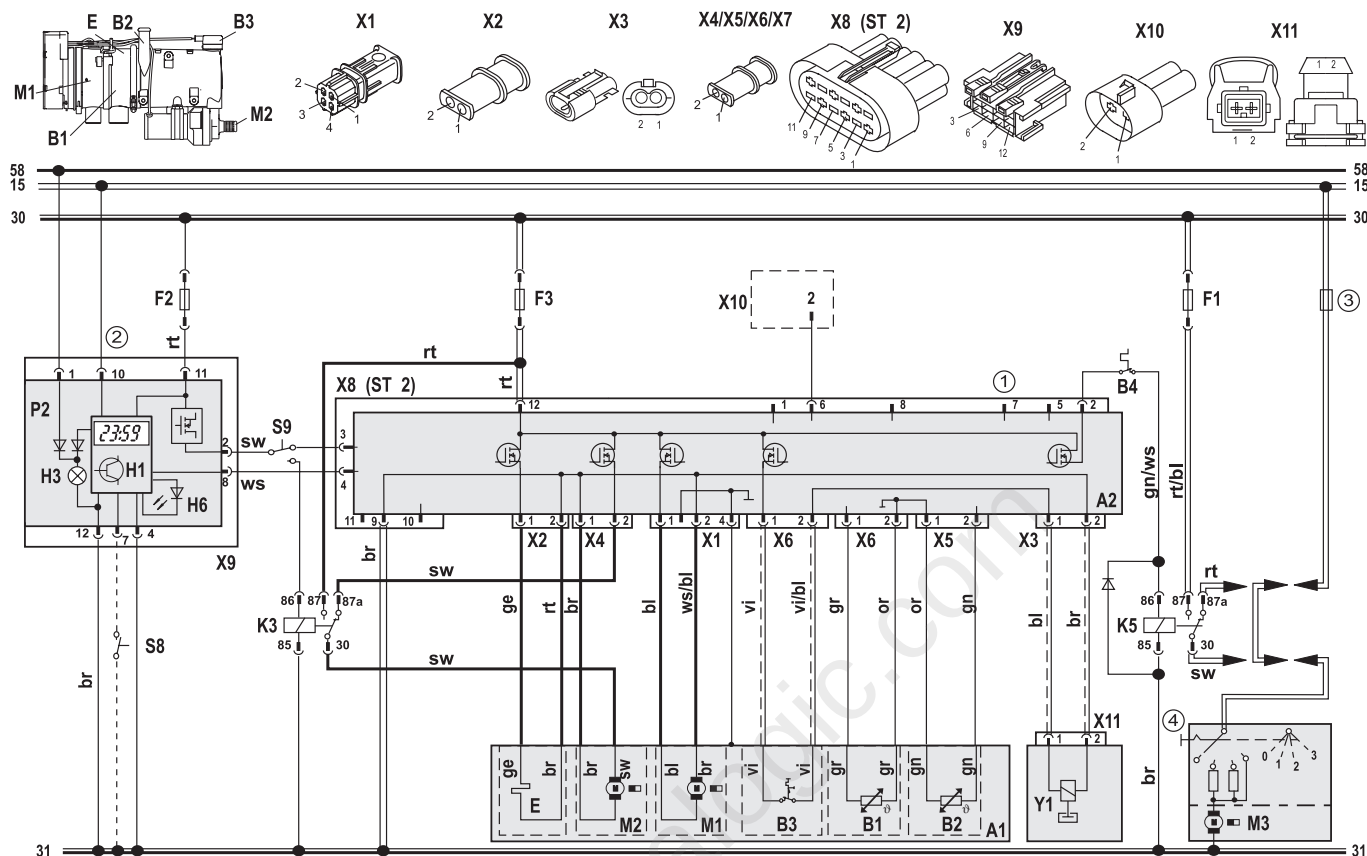
#### Remedy

Carefully remove impurities from the start air hole (e.g. using a 1.5 mm diameter wire). Remove the glow plug first.



- 1 Fuel pipe
- 2 Round seal
- 3 Flame monitor
- 4 Insulation
- 5 Glow plug
- 6 Housing
- 7 Screw
- 8 Bar
- 9 Start air hole

Fig. 503 Visual check, burner back wall



- ① Temperature coding (temperature at water outlet):  
See table on page 302
- ② Digital timer P2:  
with positive at connection 10 = Continuous operation with immediate heating  
Connection 10 open = Variable heating duration can be (10 min to 120 min); Default setting 120 min  
programmed
- ③ Vehicle fuse
- ④ Vehicle fan switch

| Cable cross-sections |                      |                     |
|----------------------|----------------------|---------------------|
|                      | < 7.5 m              | 7.5 - 15 m          |
| —                    | 0.75 mm <sup>2</sup> | 1.0 mm <sup>2</sup> |
| - - -                | 0.75 mm <sup>2</sup> | 1.0 mm <sup>2</sup> |
| - - -                | 1.0 mm <sup>2</sup>  | 1.5 mm <sup>2</sup> |
| —                    | 1.5 mm <sup>2</sup>  | 2.5 mm <sup>2</sup> |
| —                    | 2.5 mm <sup>2</sup>  | 4.0 mm <sup>2</sup> |
| —                    | 4.0 mm <sup>2</sup>  | 6.0 mm <sup>2</sup> |

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

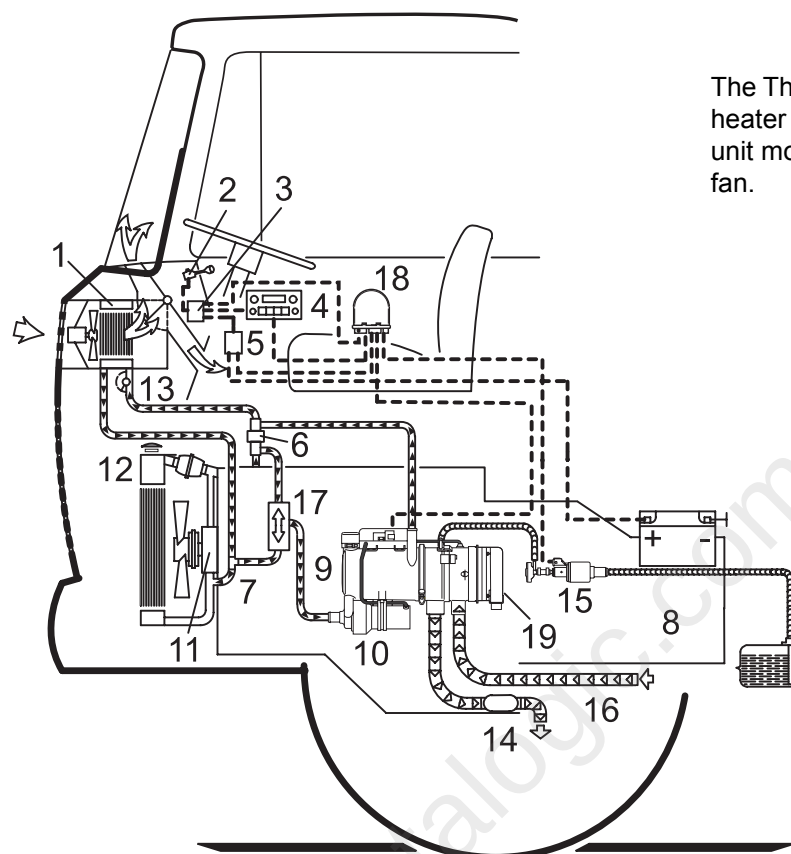
| Item | Designation                                   | Comment                                                                           |
|------|-----------------------------------------------|-----------------------------------------------------------------------------------|
| A1   | Heater                                        |                                                                                   |
| A2   | Control unit                                  |                                                                                   |
| B1   | Flame monitor                                 |                                                                                   |
| B2   | Temperature sensor                            |                                                                                   |
| B3   | Temperature limiter/overheating guard circuit |                                                                                   |
| B4   | Cabin thermostat                              |                                                                                   |
| E    | Glow plug                                     |                                                                                   |
| F1   | 20 A fuse                                     | Blade-type fuse SAE J 1284                                                        |
| F2   | 5 A fuse                                      | Blade-type fuse SAE J 1284                                                        |
| F3   | 20 A fuse                                     | Blade-type fuse SAE J 1284                                                        |
| H1   | "Heating" symbol in the display               | Operating indicator (in item P2)                                                  |
| H3   | Symbol light                                  | Light (in item P2)                                                                |
| H6   | Red LED                                       | Light in immediate heat button, ready indicator, switch-on indicator (in item P2) |
| K3   | Relay                                         | For circulating pump remote control                                               |
| K5   | Relay                                         | For vehicle fan                                                                   |

| Item | Designation              | Comment                                 |
|------|--------------------------|-----------------------------------------|
| M1   | Motor                    | Combustion air fan                      |
| M2   | Motor                    | Circulating pump                        |
| M3   | Motor                    | Vehicle fan                             |
| P2   | Standard clock           | For programmed operation                |
| S8   | Momentary-contact switch | Immediate heat button remote control    |
| S9   | Switch                   | Heating/circulating pump remote control |
| X1   | 4-pin plug connector     | To item A2                              |
| X2   | 2-pin plug connector     | To item A2                              |
| X3   | 2-pin plug connector     | To item A2                              |
| X4   | 2-pin plug connector     | To item A2                              |
| X5   | 2-pin plug connector     | To item A2                              |
| X6   | 2-pin plug connector     | Diagnosis                               |
| X8   | 12-pin plug connector    | To item A2 (ST 2)                       |
| X9   | 12-pin plug connector    | To item P2                              |
| X10  | 2-pin plug connector     | W-bus diagnosis                         |
| X11  | 2-pin plug connector     | To Y1                                   |
| Y1   | Metering pump            | Fuel pump for heater                    |

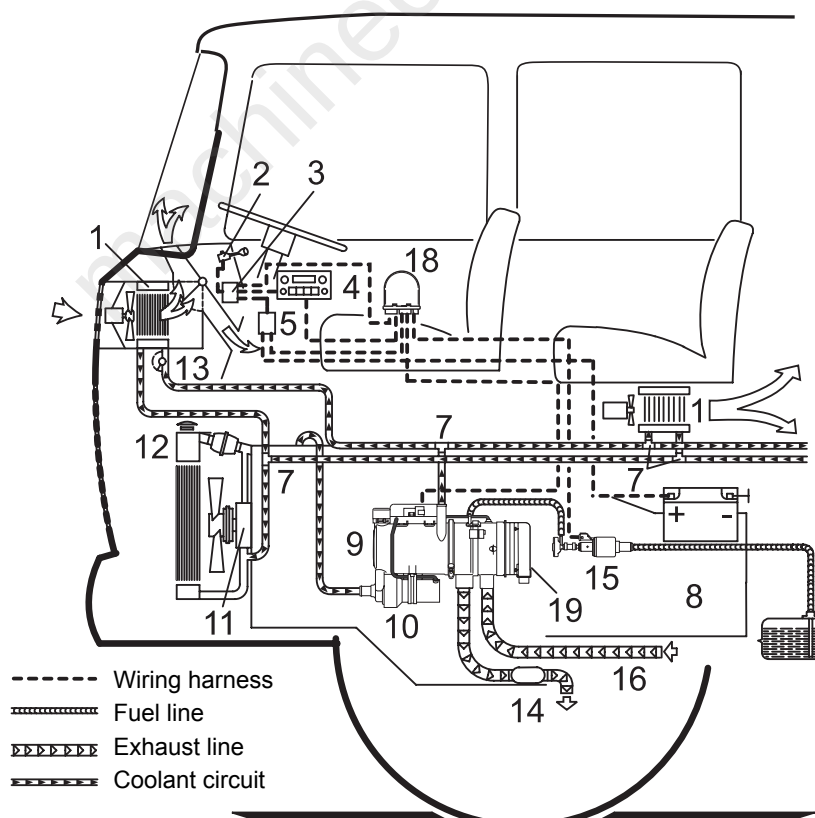
Fig. 706 System circuit for Thermo 90 ST, 12 and 24 V, with standard clock and separate circulating pump control

**NOTE**

The Thermo 90 S and Thermo 90 ST heater is supplied with the control unit mounted on the combustion air fan.



With non-return valve and thermostat



Without non-return valve

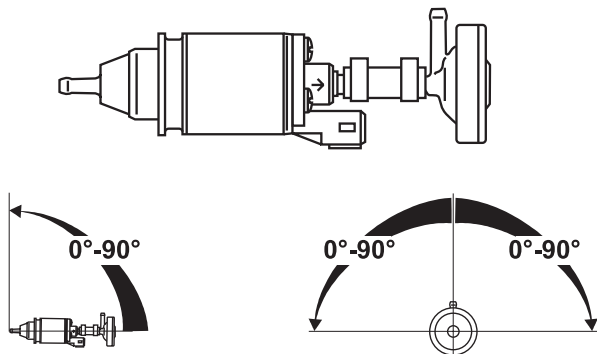
- 1 Heat exchanger vehicle heating
- 2 Switch for fan of the vehicle heating
- 3 Relay for vehicle fan
- 4 Digital timer
- 5 Fuse strip in the car
- 6 Non-return valve with leakage hole
- 7 T-piece
- 8 Vehicle engine
- 9 Heater
- 10 Circulating pump
- 11 Water pump
- 12 Radiator
- 13 Regulating valve
- 14 Exhaust muffler
- 15 Metering pump
- 16 Combustion air intake line
- 17 Thermostat
- 18 Control unit (optional on the Thermo 90 S)
- 19 Control unit (installation position of Thermo 90 ST and optionally in Thermo 90 S)

----- Wiring harness  
 ..... Fuel line  
 >>>>>>> Exhaust line  
 ===== Coolant circuit

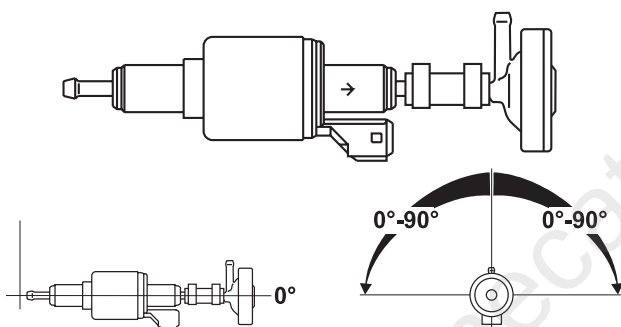
Fig. 801 Specimen installations for heater in a truck

### 8.6.3 Metering pump with damper

The metering pump is a combined delivery, metering and shut-off system and is subject to certain installation criteria (Figs. 802 and 808).



12 volts and 24 volts – petrol and diesel DP2



12 volts and 24 volts – diesel DP 30.2 only

#### Horizontal installation position

Fig. 808 Metering pump, installation position and attachment

#### 8.6.3.1 Installation position

Before installing the metering pump, ensure that the maximum pressure occurring at the pickup point is less than 0.2 bar

It is advisable to install the metering pump in a cool place. The maximum ambient temperature must not exceed +20 °C for petrol and +40 °C for diesel at any time during operation.

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

The pump should ideally be installed near the tank.

#### 8.6.3.2 Installation and attachment

The metering pump must be secured with a vibration-damping mounting. Its installation position is limited as shown in Fig. 808 in order to ensure effective automatic bleeding.

#### 8.6.4 Fuel filter

Only a Webasto filter, order no. 487 171, is allowed to be used if the fuel is expected to be contaminated. Install vertically if possible, however at least horizontally.

#### NOTE

Note the installation position and direction of flow.

#### 8.6.5 Combustion air supply

Under no circumstances may the combustion air be taken from areas occupied by people. The combustion air intake opening must not point in the direction of travel. It must be located so that it cannot become clogged with dirt or snow and cannot suck in splashing water.

The combustion air intake line (internal diameter at least 30 mm) may be 0.5 m to 5 m long with several bends totalling 360°. Minimum bending radius is 45 mm.

The combustion air inlet must not be routed above the exhaust outlet.

#### NOTE

If the combustion air intake line cannot be installed so that it slopes downwards, a water drain hole (with a diameter of 4 mm) is to be made at its lowest point.

If the heater is installed in a general installation space near the vehicle's fuel tank, the combustion air must be taken in from the outside and the exhaust fumes discharged into the atmosphere. The openings must be splash-proof.

A ventilation opening measuring at least 6 cm<sup>2</sup> is required if the heater is installed in an enclosed box. The size of the ventilation opening must be increased accordingly if the temperature in the box exceeds the permitted ambient temperature of the heater (see Technical data).

## 9.2.5 Changing the combustion air fan

## 9.2.5.1 Removal

1. Remove the heater (see 8.7.1.1).
2. Disconnect the electrical connections (see 9.2.1.1).
3. Remove the screws (2, Fig. 904).
4. Pull the combustion air fan (1) off the burner head (4) and remove together with the shaped sealing ring (3).

**NOTE**

Remove the control unit if necessary from the Thermo 90 S/Thermo 90 ST heater with flange-mounted control unit.

5. Complete the work on stripped-down components (see 9.1.1).

## 9.2.5.2 Fitting

**NOTE**

Insert the shaped seal (3, Fig. 904) correctly and grease it (e.g. with Vaseline). Take care not to squash it.

1. Fit the new shaped sealing ring (3) onto the combustion air fan (1). Bring the fan into the assembly position and secure it with screws (2).
2. Tighten the screws (2) to 3 Nm  $\pm$ 10%.

**NOTE**

Install the control unit if necessary on the Thermo 90 S/Thermo 90 ST heater with flange-mounted control unit.

3. Connect the electrical connections (see 9.2.1.2).
4. Install the heater (see 8.7.1.2).

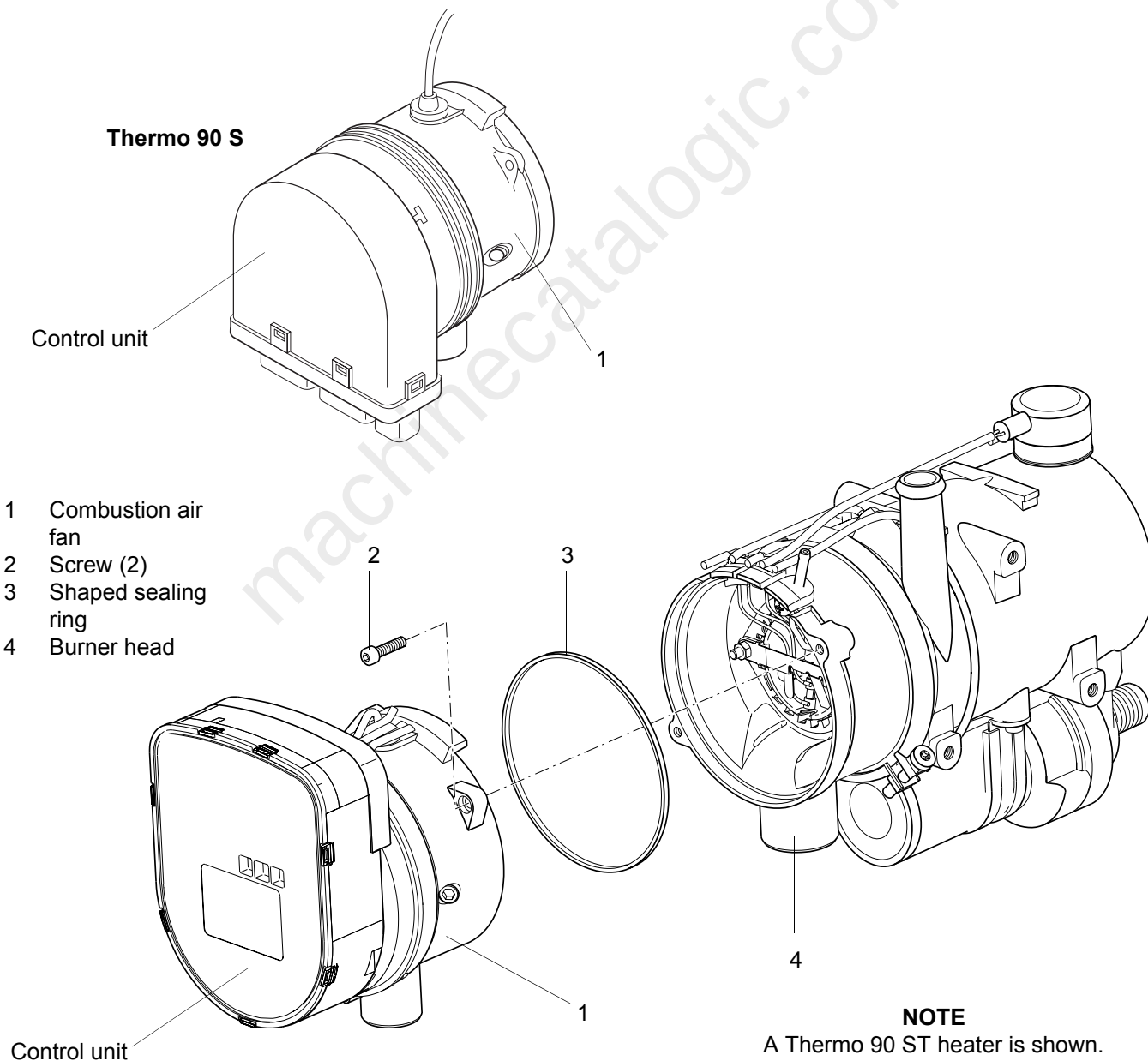


Fig. 904 Changing the combustion air fan

# Full Version Available

## Webasto Thermo 90 ST-ADR Heater Service Manual

Webasto Thermo 90 ST-ADR heater service manual, with repair procedures, function tests and circuit diagrams. Searchable PDF. Instant PDF download.

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