Water heater B 7 W/D 7 W

Troubleshooting and Repair Manual

Valid for heater versions

**B 7 W**
20 1673 05 00 00 – 12 Volt

**D 7 W**
25 1666 05 00 00 – 12 Volt 25 1807 05 00 00 – 12 Volt
25 1667 05 00 00 – 24 Volt

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New features in version 25 1807 05 00 00 – 12 Volt
- flame control PT 1000 in exhaust fitting
- new control unit
- spring-loaded overheating switch
- wiring diagram page 13, 14

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**In the event of faults, first check the following points:**

- Fuel in the tank?
- Heater lever (water valve) properly in the „WARM“ position?
- Fuses OK?
- Electrical lines, connectors, connections OK?
- Clogged combustion air line or exhaust line?
- Is the water pump running?

If not – check whether there is voltage at the motor?
  - if so – replace the water pump
  - if not – replace the control unit

- Has the overheating switch triggered?

  Press the middle raised knob of the rubber cover to unlock the overheating switch located below.

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**Function and fault test**

for 20 1673 05 00 00 – 12 Volt  
25 1666 05 00 00 – 12 Volt  
25 1667 05 00 00 – 24 Volt  
for 25 1807 05 00 00 – 12 Volt

Does the function and fault display (flashing code) integrated in the heating switch indicate a fault?

Identify the signal (flashing code) and rectify the fault according to the function and fault test, page 6 – 8.

A diagnosis unit (order no. 22 1512 89 00 00) can be connected up instead of the timer (3.2.5 in wiring diagram) to indicate possible faults.

For instructions, please refer to the operating manual for the diagnosis unit. Troubleshooting (fault list and fault rectification) see function and fault test page 6 – 8.

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If the fault is not recognized by the control unit, see page 5 of the function and fault test.
<table>
<thead>
<tr>
<th>Fault description</th>
<th>Signal</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start, heating phase (trouble-free operation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal operation (trouble-free operation)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Delayed shut-off, restart (heater still not shut off or in the control interval when started)</td>
<td></td>
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</tr>
<tr>
<td>Warning: power supply (undervoltage or overvoltage)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overheat (automatic cutout)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flame sensor defective (short-circuit)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flame out Low (flame goes out by itself in „Low“ setting)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flame out High (flame goes out by itself in „High“ setting)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Fault description</th>
<th>Signal</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glow plug defective</td>
<td></td>
<td>Glow plug fuse defective</td>
<td>Replace fuse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glow plug fuse defective</td>
<td>Replace glow plug</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flame sensor fouled/detective</td>
<td>Clean/replace flame sensor</td>
</tr>
<tr>
<td>Burner motor defective</td>
<td></td>
<td>Heater fuse defective</td>
<td>Replace fuse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electric motor defective or blower blocked</td>
<td>Replace blower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flame sensor fouled/detective</td>
<td>Clean/replace flame sensor</td>
</tr>
<tr>
<td>Cutout due to undervoltage</td>
<td></td>
<td>Undervoltage</td>
<td>Charge battery, check battery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Corrosion on electrical connections</td>
<td>Clean electrical connections</td>
</tr>
<tr>
<td>Cutout due to overvoltage</td>
<td></td>
<td>Overvoltage</td>
<td>Check regulator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Connect heater to battery</td>
</tr>
<tr>
<td>Non - start Safety time exceeded and automatic cutout</td>
<td></td>
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<td></td>
<td>Measure fuel quantity</td>
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<td></td>
<td></td>
<td></td>
<td>Replace metering pump</td>
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<td></td>
<td></td>
<td></td>
<td>Check plug</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Replace control unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Restart, check fuel line</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Measure fuel quantity</td>
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<td>Replace glow plug</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Check connection against wiring diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clean flame sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Replace flame sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Measure fuel quantity</td>
</tr>
<tr>
<td>Indication</td>
<td>Cause</td>
<td>Remedy</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>Faults not shown by the indicator:</td>
<td>Scooty combustion</td>
<td>Remove clog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No warm air in interior</td>
<td>Measure fuel quantity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deposits in heat exchanger</td>
<td>Replace blower</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Temperature sensor short-circuited (vehicle blower does not switch on above approx. 55°C water temperature)</td>
<td>Replace temperature sensor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heater lever closed</td>
<td>Open heater lever</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vehicle blower not switched on</td>
<td>Switch on vehicle blower</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vehicle blower relay defective</td>
<td>Replace relay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vehicle blower fuse defective</td>
<td>Replace fuse</td>
<td></td>
</tr>
</tbody>
</table>

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# Function and fault test for unit D 7 W 25 1807 05 00 00 – 12 Volt
(Control unit 25 1732 50 00 04 0C)

<table>
<thead>
<tr>
<th>Fault code</th>
<th>Fault description</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>No fault</td>
<td></td>
</tr>
<tr>
<td>001</td>
<td>Pre-heating, overvoltage</td>
<td>Voltage at control unit (between A12 and B12) greater than 14.5 V</td>
</tr>
<tr>
<td>002</td>
<td>Pre-heating, undervoltage</td>
<td>Voltage at control unit (between A12 and B12) less than 11 V</td>
</tr>
<tr>
<td>010</td>
<td>Overvoltage switch-off</td>
<td>Voltage at control unit (between A12 and B12) greater than 15 V</td>
</tr>
<tr>
<td>011</td>
<td>Undervoltage switch-off</td>
<td>Voltage at control unit (between A12 and B12) less than 10.2 V</td>
</tr>
<tr>
<td>012</td>
<td>Overheating</td>
<td>Overheating switch has triggered. Vent heater (lack of water), open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>heating valve and switch</td>
</tr>
<tr>
<td>013</td>
<td>Temperature at heat exchanger too</td>
<td>Flame sensor has reported temperature &gt; 560 °C (corresponding to</td>
</tr>
<tr>
<td></td>
<td>high</td>
<td>3000 Ω). Check sensor (connections A4 and A5 at control unit).</td>
</tr>
<tr>
<td>020</td>
<td>Glow plug defect</td>
<td>Check glow plug relay, check connections to glow plug and to control</td>
</tr>
<tr>
<td>022</td>
<td>Short circuit in current regulator</td>
<td>unit.</td>
</tr>
<tr>
<td>023</td>
<td>Interruption in current regulator</td>
<td>Check connection to control unit.</td>
</tr>
<tr>
<td>024</td>
<td>Short circuit in current regulator</td>
<td>Check connection to control unit.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Fault code</th>
<th>Fault description</th>
<th>Fault signal / flashing code</th>
<th>Seconds</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>025</td>
<td>Short circuit at diagnosis output</td>
<td>No flashing code</td>
<td></td>
<td>Check diagnosis lead (connection A1 at control unit). Check connection to control unit.</td>
</tr>
<tr>
<td>030</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>031</td>
<td>Combustion air fan does not rotate</td>
<td></td>
<td></td>
<td>Check combustion air fan. Check motor speed relay (2.5.8). Check connection to control unit (connections A11 and B1).</td>
</tr>
<tr>
<td>032</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>033</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>037</td>
<td>Water pump does not rotate</td>
<td></td>
<td></td>
<td>Check water pump (external triggering). Check connections to control unit (connections A11 and A13).</td>
</tr>
<tr>
<td>047</td>
<td>Short circuit in metering pump</td>
<td></td>
<td></td>
<td>Check metering pump. Check connections to control unit (connections A10 and B10).</td>
</tr>
<tr>
<td>051</td>
<td>Flame sensor defect</td>
<td></td>
<td></td>
<td>Temperature at flame sensor does not fall below 80 °C (corresponding to 1300 Ω). Check flame sensor or combustion, possibly replace. (Setpoints: 900 Ω to −25 °C, 1100 Ω to +25 °C).</td>
</tr>
<tr>
<td>052</td>
<td>Failure to start/safety time expired</td>
<td></td>
<td></td>
<td>See D 9 W</td>
</tr>
<tr>
<td>053</td>
<td>Flame abort in &quot;large&quot; stage</td>
<td></td>
<td></td>
<td>See D 9 W</td>
</tr>
<tr>
<td>055</td>
<td>Flame abort in &quot;small&quot; stage</td>
<td></td>
<td></td>
<td>See D 9 W</td>
</tr>
<tr>
<td>059</td>
<td>as D 9 W</td>
<td></td>
<td></td>
<td>See D 9 W</td>
</tr>
</tbody>
</table>
## Function and fault test for unit D 7 W 25 1807 05 00 00 – 12 Volt
(Control unit 25 1732 50 00 04 0C)

<table>
<thead>
<tr>
<th>Fault code</th>
<th>Fault description</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>060</td>
<td>Interruption in temperature sensor</td>
<td>Replace control unit.</td>
</tr>
<tr>
<td>061</td>
<td>Short circuit in temperature sensor</td>
<td>Check and where necessary replace control unit. Check cable harness.</td>
</tr>
<tr>
<td>064</td>
<td>Interruption in flame sensor</td>
<td>Replace control unit.</td>
</tr>
<tr>
<td>065</td>
<td>Short circuit in temperature sensor</td>
<td>Check and where necessary replace control unit. Check cable harness.</td>
</tr>
<tr>
<td>060</td>
<td>Control unit defect (internal reset)</td>
<td>Check and where necessary replace control unit. Check cable harness.</td>
</tr>
<tr>
<td>061</td>
<td>Control unit defect (general fault)</td>
<td>Check and where necessary replace control unit. Check cable harness.</td>
</tr>
<tr>
<td>062</td>
<td>ROM fault</td>
<td>Check voltage supply. Check connection to control unit (connections A12 and B12).</td>
</tr>
<tr>
<td>063</td>
<td>RAM fault</td>
<td>Check voltage supply. Check connection to control unit (connections A12 and B12).</td>
</tr>
<tr>
<td>064</td>
<td>EEPROM fault</td>
<td>Check voltage supply. Check connection to control unit (connections A12 and B12).</td>
</tr>
<tr>
<td>065</td>
<td>Control unit defect (general fault)</td>
<td>Check voltage supply. Check connection to control unit (connections A12 and B12).</td>
</tr>
<tr>
<td>066</td>
<td>Control unit defect or cable harness fault</td>
<td>Check voltage supply. Check connection to control unit (connections A12 and B12).</td>
</tr>
<tr>
<td>067</td>
<td>External interference voltage</td>
<td>Check voltage supply. Check connection to control unit (connections A12 and B12).</td>
</tr>
</tbody>
</table>

For faults not shown here, please see page 5

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If the heater has ignited properly and is heating without trouble, the temperature sensor switches on the vehicle blower when the cooling water temperature is approx. 55 °C.

Various operating conditions can now result in the heating circuit depending on the heat requirement.

Heat requirement 7000 W

If the heat requirement is 7000 W and more, the heater always operates in the „High“ setting. The cooling water temperature rises to a approx. 90 °C.

Heat requirement 1750 W to 7000 W

After switch-on, the heater operates in the „High“ setting. When a cooling water temperature of approx. 90 °C is reached, the heater switches to the „Low“ setting. Since the heat requirement is greater than 1750 W the cooling water temperature drops. When approx. 80 °C is reached the heater switches back to the „High“ setting.

Heat requirement less than 1750 W

After switch-on, the heater operates in the „High“ setting. When a cooling water temperature of approx. 90 °C is reached, the heater switches to the „Low“ setting. The temperature continues to rise due to the low heat requirement. At approx. 94 °C the heater starts with delayed shut-off operation and cuts out after approx. 120 seconds. The water pump and the vehicle blower remain in operation during the delayed shut-off and the control interval. The pilot light stays on.

Once the coolant has cooled down to approx. 80 °C, the heater restarts in the „High“ setting.
**Function sequence „Starting and control operation”**

<table>
<thead>
<tr>
<th>Test 1)</th>
<th>Preheat</th>
<th>Safety time</th>
<th>After-heat</th>
<th>Breakaway lock</th>
<th>„High“ operation</th>
<th>„Low“ operation</th>
<th>Interval</th>
<th>„High“ operation</th>
<th>Master switch OFF Delayed shut-off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master switch ON</td>
<td>![Table Row]</td>
<td>![Table Row]</td>
<td>![Table Row]</td>
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<td>![Table Row]</td>
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<td>![Table Row]</td>
</tr>
<tr>
<td>Temperature &lt; 55 °C</td>
<td>![Table Row]</td>
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<tr>
<td>Temperature &gt; 55 °C</td>
<td>![Table Row]</td>
<td>![Table Row]</td>
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<tr>
<td>Temperature 80 – 90 °C</td>
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<tr>
<td>Temperature 90 – 80 °C</td>
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<tr>
<td>Temperature &gt; 90 °C</td>
<td>![Table Row]</td>
<td>![Table Row]</td>
<td>![Table Row]</td>
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<tr>
<td>Temperature &gt; 94 °C</td>
<td>![Table Row]</td>
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<tr>
<td>Test 3 – 6 s</td>
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<td>![Table Row]</td>
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<tr>
<td>Preheat 20 – 60 s</td>
<td>![Table Row]</td>
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<tr>
<td>Safety time 90 s</td>
<td>![Table Row]</td>
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<tr>
<td>After-heat 20 – 30 s</td>
<td>![Table Row]</td>
<td>![Table Row]</td>
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<tr>
<td>Breakaway lock 30 s</td>
<td>![Table Row]</td>
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<td>![Table Row]</td>
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<tr>
<td>Motor time-lag 4 s – 10 s (burner motor)</td>
<td>![Table Row]</td>
<td>![Table Row]</td>
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<tr>
<td>Delayed shutoff 120 s</td>
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<tr>
<td>Flame sensor</td>
<td>![Table Row]</td>
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<td>![Table Row]</td>
<td>![Table Row]</td>
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<tr>
<td>Vehicle blower</td>
<td>![Table Row]</td>
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<td>![Table Row]</td>
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</tr>
<tr>
<td>Water pump 2)</td>
<td>![Table Row]</td>
<td>![Table Row]</td>
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<td>Electric motor „High“ (burner motor)</td>
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<td>Glow plug</td>
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<td>Fuel metering pump „High“</td>
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1) not for unit 25 1807 05 00 00
2) for unit 25 1807 05 00 00: no water pump during test
Wiring diagram for units B 7 W 20 1673 05 00 00 – 12 Volt and D 7 W 25 1666 05 00 00 – 12 Volt

Parts list
1.1 Burner motor
1.11 Series resistor for partial load
1.2 Glow plug
1.5 Safety thermal cutout switch
1.5.1 Safety thermal cutout fuse
1.12 Flame sensor
1.13 Temperature sensor

2.1 Control unit
2.2 Fuel metering pump
2.5.7 Relay for switching on vehicle blower
2.7.1 Flat fuse 15 A – heater (8A round fuse)
2.7.4 Flat fuse 20 A – glow plug (16 A round fuse)
2.7.5 Flat fuse 25 A – vehicle blower (25 A round fuse or same as vehicle manufacturer)
2.7.7 Relay for switching on vehicle blower
2.7.10 Fuse box
2.12 Water pump

Cable colours:
rt = red, br = brown, sw = black, gn = green, ge = yellow, vi = violet, gr = grey

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Parts list

1.1 Burner motor
1.1.1 Series resistor for partial load
1.2 Glow plug
1.2.1 Series resistor for glow plug
1.5 Safety thermal cutout switch
1.5.1 Safety thermal cutout fuse
1.12 Flame sensor

2.1 Control unit
2.2 Fuel metering pump
2.5.7 Relay for switching on vehicle blower
2.7.1 Flat fuse 15 A – heater (8 A round fuse)
2.7.4 Flat fuse 20 A – glow plug (16 A round fuse)
2.7.5 Flat fuse 25 A – vehicle blower (25 A round fuse or same as vehicle manufacturer)
2.12 Water pump

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Wiring diagram for unit D 7 W 25 1807 05 00 00 – 12 Volt

Parts list

1.1 Burner motor
1.1.1 Resistance for burner motor (partial load)
1.2 Glow plug
1.5 Overheating switch
1.12 Flame controller
1.13 Temperature sensor

2.1 Control unit
2.2 Fuel metering pump
2.5.4 Switch-on relay
2.5.5 Glow plug timing
2.5.7 Relay vehicle fan
2.5.8 Relay motor speed switch-over
2.7 Main fuse (25 A)
2.7.1 Fuse activation (5 A)
2.7.5 Fuse vehicle fan (25 A)
2.12 Water pump
2.15.9 Sensor, outer temperature

3.1.2 Heating switch (continuous operation)
3.2.5 Timer, 7 days
3.2.6 Timer, mini
3.4.5 “On” control lamp

5.1 Battery
5.1.2 Fuse strip in vehicle
5.9.1 Vehicle fan switch
5.10 Vehicle fan

a) Connection for operator device
b) External triggering for water pump
c) Temperature lowering
d) Switch-over solenoid
e) Illumination terminal 58
f) to terminal 15
g) split lead
h) remove S3 and fit S4

Connector and jack housings are shown from the lead incoming side.

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Repair instructions

Available spare parts: see spare parts list

Repair procedures

1. Removing the glow plug
   Remove glow plug cap.
   Unscrew hexagonal nut and take off plug cable.
   Unscrew glow plug.
   Remove any charring on the glow plug coil, or replace glow plug.

   Important!
   Additional maintenance work when glow plug fails.
   Clean flame sensor.
   Clean combustion air intake in glow plug fitting with a brush or with another suitable tool. To do so, unscrew the glow plug and pull out the plug filter.
   If the heater is fitted with a plug adapter, unscrew the adapter.
   Check the plug filter and replace if severely clogged.

   For D 7 W only
   Measure the glowing time of the glow plug after the flame.
   Install and connect up the glow plug.
   Connect a test lamp to the glow plug and keep a stop clock ready.
   Switch on heater and measure glowing time of the glow plug after the flame.
   The glowing time may be 30 – 60 seconds.
   If the glowing time exceeds 60 seconds, measure fuel quantity, check fuel pipes, if necessary replace flame sensor.

2. Removing the plug filter
   Unscrew glow plug.
   If the heater is fitted with a plug adapter, unscrew the adapter.
   Remove the plug filter from the glow plug fitting.

   Please note:
   During installation, please insert the plug filter in the plug fitting as shown in diagram 1 and 2.

Sketch 1

1. Plug filter
2. Reduction piece
3. Sealing ring

Sketch 2

Visit www.butlertechnik.com for more technical information and downloads.
3. Removing the series resistor

Remove the cap from the series resistor.
Loosen the hex. nut.
Detach the cable.
Unscrew the series resistor.

4. Removing the cover

Unclip the cover from the holder using a screwdriver.

**Note when installing:**
The cover cap must be fitted splash-water tight, so ensure that all grommets are properly positioned.

5. Removing the 12-pin plug

Remove the cover.
Unclip the plug from the holder using a screwdriver.
Dismantle the plug.

**Sketch 3**

- Water pump 1° br
- Combustion air blower 1° vi
- Partial-load resistor 1° rt
- Temperature sensor 0,5° br
- Temperature sensor 0,5° gr
- Safety thermal cutout fuse 0,5° ws
- Safety thermal cutout fuse 0,5° ws
- Flame sensor 0,5° gr
- Flame sensor 0,5° br
- Partial-load resistor 1° rt
- Combustion air blower 1° br
- Water pump 1° sw

* There is no connector pin 4 in unit 25 1807 05 00 00 – 12 volt.

**Note:**
After removing the 12-pin connector, connect cable harness back to connector, then remove connector lid (if cable harness is not connected again, all the connector pins will fall out).
6. Removing the temperature sensor

Before removing the sensor, reduce the excess pressure in the cooling system by opening the radiator filler cap. To prevent the coolant from flowing out pinch the water supply and return hoses shut.
Remove the cover.
Remove the 12-pin plug (note instructions on page 16).
Take the plug pins 8/10 out of the plug housing (see sketch 3 page 16).
Unscrew the temperature sensor.

After installation, bleed the water circuit.
See repair procedure 15.

7. Remove flame sensor
for units B 7 W 20 1673 05 00 00 – 12 Volt,
D 7 W 25 1666 05 00 00 – 12 Volt and 25 1667 05 00 00 – 24 Volt

Remove cover.
Take out 12-pin connector (note instructions on page 16).
Remove connector pins 7/9 from connector housing (see sketch 3 page 16).
Unclip spring retainer.
Remove flame sensor from holder.

7a. Remove flame sensor
for unit D 7 W 25 1807 05 00 00 – 12 Volt

Remove cover.
Take out 12-pin connector (note instructions on page 16).
Remove connector pins 7/9 from connector housing (see sketch 3 page 16).
Unscrew flame sensor from exhaust fitting using wrench size SW 9.
8. Remove overheating switch or overheating fuse for units
B 7 W 20 1673 05 00 00 – 12 Volt,
D 7 W 25 1666 05 00 00 – 12 Volt and 25 1667 05 00 00 – 24 Volt

First the overpressure in the cooling system must be decreased by opening the lid of the cooler cover.
To prevent the coolant from leaking, pinch off the water inlet and water outlet hoses. Remove the cover.
Remove the 12-pin connector (note instructions page 16).
Take connector pins 11/12 out of the connector housing (see sketch 3 page 16).
Unscrew the overheating switch or overheating fuse.

Note when installing:
The thread of the overheating switch or overheating fuse should be greased with Molykote paste and the O-ring with Vaseline or other suitable lubricants.
Screw in the overheating switch or overheating fuse by hand only until you can feel the resistance indicating that it is in contact with the heat exchanger.
Vent the water circuit after installation (see repair stage 15).

8a. Remove overheating switch for unit
D 7 W 25 1807 05 00 00 – 12 Volt

First the overpressure in the cooling system must be decreased by opening the lid of the cooler cover.
To prevent the coolant from leaking, pinch off the water inlet and water outlet hoses. Remove the cover.
Remove the 12-pin connector (note instructions page 16).
Take connector pins 11/12 out of the connector housing (see sketch 3 page 16).
Unscrew the cross-recessed screws.
Remove the (spring-loaded) overheating switch.

Note when installing:
On removing the overheating screw, the O-ring and seal should be replaced. Grease the O-ring with Vaseline or another suitable lubricant.
Vent the water circuit after installation (see repair stage 15).

9. Removing the partial-load resistor

Remove the cover.
Remove the 12-pin plug (note instructions page 16).
Take the plug pins 5/6 out of the plug housing (see sketch 3 page 16).
Remove the retaining clips from the partial-load resistor.
Remove the partial-load resistor.
10. Removing the water pump

Before removing the pump, reduce the excess pressure in the cooling system by opening the radiator filler cap.

To prevent the coolant from flowing out pinch the water supply and return hoses shut.

Remove the cover.

Remove the 12-pin plug (note instructions page 16).

Take the plug pins 1/2 out of the plug housing (see sketch 3 page 16).

Undo the fastening clip of the water pump.

Remove the water pump.

**Note when installing:**

A new O-ring must be fitted when the water pump is removed.

Grease the O-ring with Vaseline or other suitable lubricants.

After installation, bleed the water circuit.

See repair procedure 15.

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11. Removing the combustion air blower

Remove the cover.

Remove the 12-pin plug (note instructions page 16).

Take the plug pins 3/4 out of the plug housing (see sketch 3 page 16).

Loosen the fastening screw and remove the combustion air blower.

**Note when installing:**

Grease the O-ring on the combustion air blower connection with Vaseline or other suitable lubricants.

Before fitting the combustion air blower to the heater, turn the fastening screw into the blower housing to cut the tread.

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12. Removing the burner

Before removing the burner, reduce the excess pressure in the cooling system by opening the radiator filler cap.

To prevent the coolant from flowing out pinch the water supply and return hoses shut.

Remove the heater.

Remove the combustion air blower.

Remove the plug cable and – in the case of 24 V heaters – also the cable from the series resistor.

Remove the flame sensor.

Undo the clamping clip and remove the burner.

**Note when installing:**

Check the O-ring for correct seating.

After installation, bleed the water circuit (see repair procedure 15).

Check for tightness in a trial run.
13. Removing the heat exchanger

Before removing the heat exchanger, reduce the excess pressure in the cooling system by opening the radiator filler cap. To prevent the coolant from blowing out pinch the water supply and return hoses shut.

Remove the heater.
Remove the burner.
Lift the safety thermal cutout fuse or switch off the heat exchanger by one turn.
Remove the temperature sensor.
Lever the heat exchanger out of the water jacket using screwdrivers. Remove the heater exchanger from the water jacket. (Fig. 13a).

**Note when installing:**
Fit a new O-ring when the heat exchanger is removed.
Grease the O-ring with Vaseline or other suitable agents.

14. Removing the cover and bracket

Remove the cover.
Remove the 12-pin plug.
Detach the 2-pin plug.
Remove the partial-load resistor.
Remove all grommets.
Take the bracket off the jacket.

**Note when installing:**
The cover cap must be fitted so that it is splash-water tight, so ensure that all grommets are properly positioned.
15. Bleeding the cooling water system

Se the heater lever fully in the „Warm” setting.
Top up the cooling water.
Start the vehicle engine and run it until the radiator thermostat has opened.

For units B 7 W 20 1673 05 00 00 – 12 Volt,
D 7 W 25 1666 05 00 00 – 12 Volt and 25 1667 05 00 00 – 24 Volt
To vent the cooling water circuit (heater), trigger the water pump at the control unit with +, 6-pin connector, terminal A6 (see sketch 4).

For unit D 7 W 25 1807 05 00 00 – 12 Volt
To vent the cooling water circuit (heater), trigger the water pump at the control unit with +, 13-pin connector, terminal B4 (see sketch 5).

If necessary top up cooling water.
Please refer also to the vehicle manufacturer’s instructions on bleeding the water circuit.

Check for tightness in a trial run.

Measuring the fuel quantity

Important: only measure the fuel quantity when the battery is sufficiently charged. At least 11/22 V and at most 13/26 V should be applied at the control unit during measurement.

1. Preparation

Pull out the plug terminal underneath the cap on the heater and connect a test lamp.
Detach the fuel line from the heater and introduce it into a measuring glass (size 25 cm³).

For units B 7 W 20 1673 05 00 00 – 12 Volt,
D 7 W 25 1666 05 00 00 – 12 Volt and 25 1667 05 00 00 – 24 Volt
Connect voltmeter to the 8-pin connector terminal C6 (+) and to the 6-pole connector terminal A4 (–) of the control unit.

For unit D 7 W 25 1807 05 00 00 – 12 Volt
Connect voltmeter to the 13-pin connector terminal A13 (+) and terminal A12 (–) of the control unit.

Switch on the heater. When fuel is being pumped evenly (approx. 25 – 55 seconds after switch-on), the fuel line is filled and bled. Switch off the heater and empty the measuring glass.

2. Measurement

Switch on the heater.
Fuel starts being pumped some 25 – 55 seconds after switch-on.
Hold the measuring glass at the level of the plug during measurement. Read off the voltage at the voltmeter.
Fuel feed is cut off automatically after 90 sec.
Switch off the heater.
Read off the fuel quantity in the measuring glass.

3. Evaluation

Transpose the readings into the appropriate diagram on page 22.
The fuel consumption is OK if the intersection of the two readings is within the limit curves.
If the intersection is outside the limit curves, a new fuel metering pump is required.

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Fuel diagrams

ml/60 s

B 7 W

ml/60 s

D 7 W

ml/90 s

B 7 W

ml/90 s

D 7 W

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