



# Air heater D8LC

## Troubleshooting and Repair Instructions

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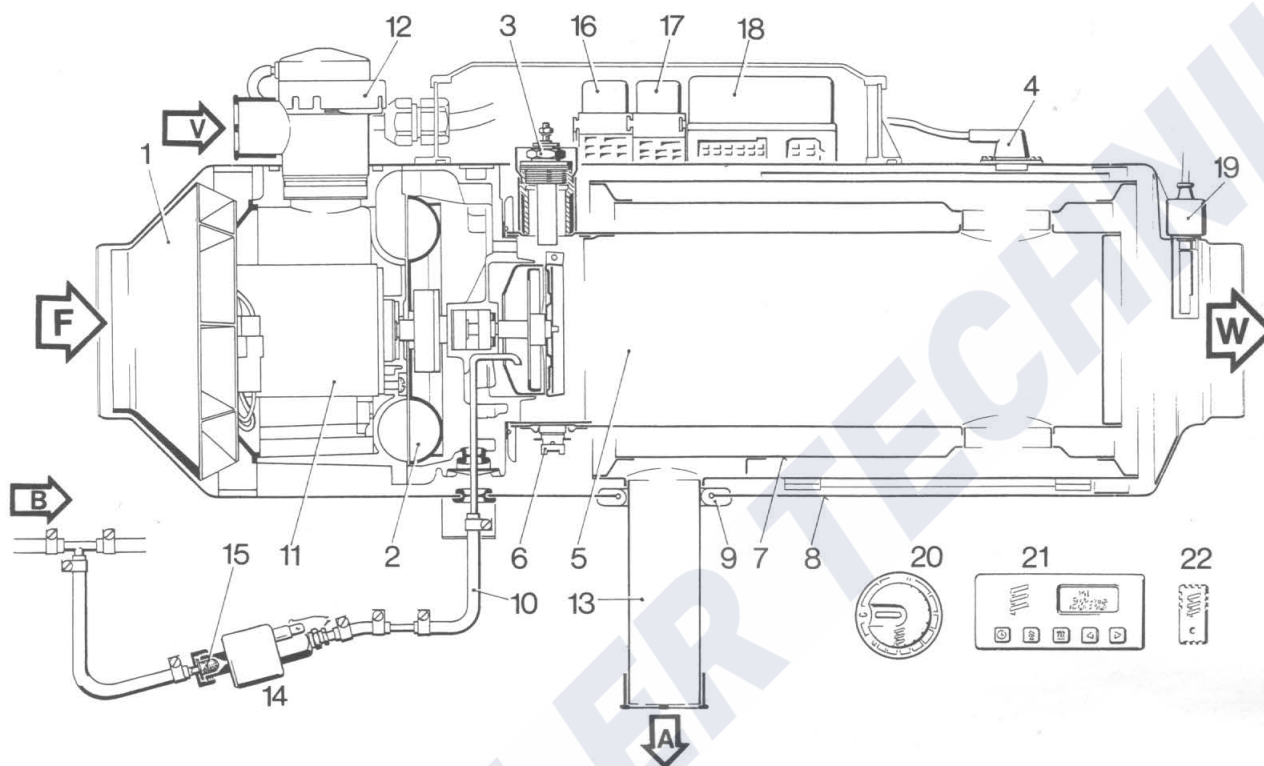
These troubleshooting and repair instructions are valid for the following heater versions:

### D8LC

25 1890 00 00 00 – 12 V  
25 1891 00 00 00 – 24 V

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Sectional view of D8LC



LIST OF PARTS

- |                                |                                  |                                     |                    |
|--------------------------------|----------------------------------|-------------------------------------|--------------------|
| 1 Hot air impeller             | 8 Outer casing                   | 15 Fuel screen                      | F = Fresh air      |
| 2 Combustion air impeller      | 9 Exhaust pipe seal              | 16 Control relay                    | V = Combustion air |
| 3 Glow plug                    | 10 Fuel line                     | 17 Glow plug relay                  | B = Fuel           |
| 4 Safety thermal cutout switch | 11 Blower motor                  | 18 Control unit                     | W = Hot air        |
| 5 Combustion chamber           | 12 Combustion air solenoid valve | 19 Temperature limiter              | A = Exhaust gas    |
| 6 Flame sensor                 | 13 Exhaust pipe                  | 20 Operating device                 |                    |
| 7 Heat exchanger               | 14 Fuel metering pump            | 21 Heater timer                     |                    |
|                                |                                  | 22 External room temperature sensor |                    |



## Description of operation

### Control elements

1. Operating device
2. Heater timer  
A heater timer can be installed in addition to the operating device. The heater timer can be used to switch on the heater immediately or preset a switch-on time from 24 hours to 7 days depending on the version.

### Mode of operation

#### Sequence after switch-on

- Switch-on: Green pilot light on operating device comes "ON"  
Glow coil of glow plug comes "ON".  
(A timing relay ensures that the voltage of the glow plug does not exceed the permissible range.) Blower comes "ON" at max. speed.
- After about 25 sec: Fuel metering pump comes "ON"  
(with fuel feed rate for "High" heat flow.)

Once a stable flame forms, the glow plug is switched off after a delay of approx. 10 sec. The heater is then forced to operate for at least another 30 sec in the "High" setting. Only then can heat controller begin to operate.

### Heat flow/room temperature control

Heat flow and room temperature are regulated by interaction of the external temperature sensor installed in the room to be heated, by the operating device, the control unit and a temperature limiter fitted in the air outlet.  
The heater operates in either the "High" setting or between the "High" and "Low" settings until the room temperature set at the operating device (approx. 10 °C to 30 °C) is reached. Fuel feed and, after a 2-second delay, combustion air feed are reduced in the "Low" setting.

If the room temperature continues to increase despite the fact that the heater is in the "Low" setting, the heater switches to the "Off" setting and the blower continues to run for 3 minutes. The heater then switches to standby mode (green pilot light comes on).

After the room temperature has dropped below the set value, the heater is restarted and runs for 80 seconds in the "High" setting.

The outlet temperature is limited by the temperature limiter to 125 °C to 150 °C regardless of the room temperature.

### Switch-off

When the heater is finally switched off, the green pilot light goes out. The blower then continues to operate at high blower speed to cool the heater down. This is stopped automatically after 3 minutes.

### Control and safety functions

The flame is monitored by the flame sensor, and the max. permissible temperature by the safety thermal cutout switch (4). Both the flame sensor and the safety thermal cutout switch influence the control unit (18), which switches off the heater in the event of a fault.

1. If the heater fails to ignite within 90 seconds after fuel feed has started, start-up is repeated as described above. If the heater repeatedly fails to ignite within 90 seconds after fuel feed has started, a fault cutout is triggered.
2. If the flame goes out by itself during operation, a restart is first performed.  
If the heater repeatedly fails to ignite within 90 seconds after fuel feed has started or if it ignites but goes out again within 10 minutes, a fault cutout is triggered.  
A fault cutout can be cancelled by briefly switching the heater on and off again.
3. In the event of an overheat, the safety thermal cutout switch is triggered (4), fuel feed is interrupted and a fault cutout is then triggered.  
If an overheat is the cause of a fault cutout, the switch-on pilot light (green) on the operating device flashes at a steady rate.  
Other fault display signals can be called using auxiliary equipment.
4. If the voltage drops below approx. 10.5V or 21V or if it rises above approx. 15V or 30V, a fault cutout is triggered after 20 sec. Voltage undershoots or overshoots of shorter duration do not have any effect.
5. When the heater is started up, the blower motor undergoes a functional check. If it fails to start, the heater switches to fault mode.  
The blower motor is monitored cyclically (every 4 min.) during operation. If the motor speed is below the permissible limit, a fault cutout is triggered..

### Please note:

If electrical welding work is to be carried out on the vehicle, disconnect the positive terminal from the battery and connect it to ground in order to protect the control unit.

For a functional check of the heater, turn the rotary knob at the operating device right round to the "High" setting.

**First check the following if faults occur**

- Fuel in tank?
- Fuses OK?
- Electrical leads and connections OK?
- Combustion air and exhaust piping free?

When combustion generates soot, check the following:

Combustion air pipe or exhaust pipe clogged? ..... Clear obstruction.

Fuel metering pump feeding too much? ..... Measure fuel quantity, replace fuel metering pump if necessary.

Deposits inside heat exchanger? ..... Clean heat exchanger, replace if necessary.

**Function and fault test**

**Call diagnostic signals**

Insert a strap between terminals 6 (yellow) and 4 (black & white) on the back of the operating device for 0.5 to 5 sec.

or

Place a jumper to plug B between connection B9 (yellow) and B11 (black & white) on the control unit for 0.5 to 5 sec (see wiring diagram):

To do this, unscrew the cover from the electronics box on the heater and unclip the control unit from the holder. The green pilot light on the operating device flashes and emits diagnostic signals (listed on page 5).

Rectify the fault as described under "Remarks/Remedial Action".

**Check values**

Speed of blower motor (at set voltage)

High: 3400 rpm  $\pm$  10 %

Low: 3200 rpm  $\pm$  10 %

After-ventilation: 3400 rpm  $\pm$  10 %

Flame sensor: 1060 to 1090 (when heater is cold)

Check safety thermal cutout switch for continuity.

External room temperature sensor: 1800 to 2200 at 20 °C

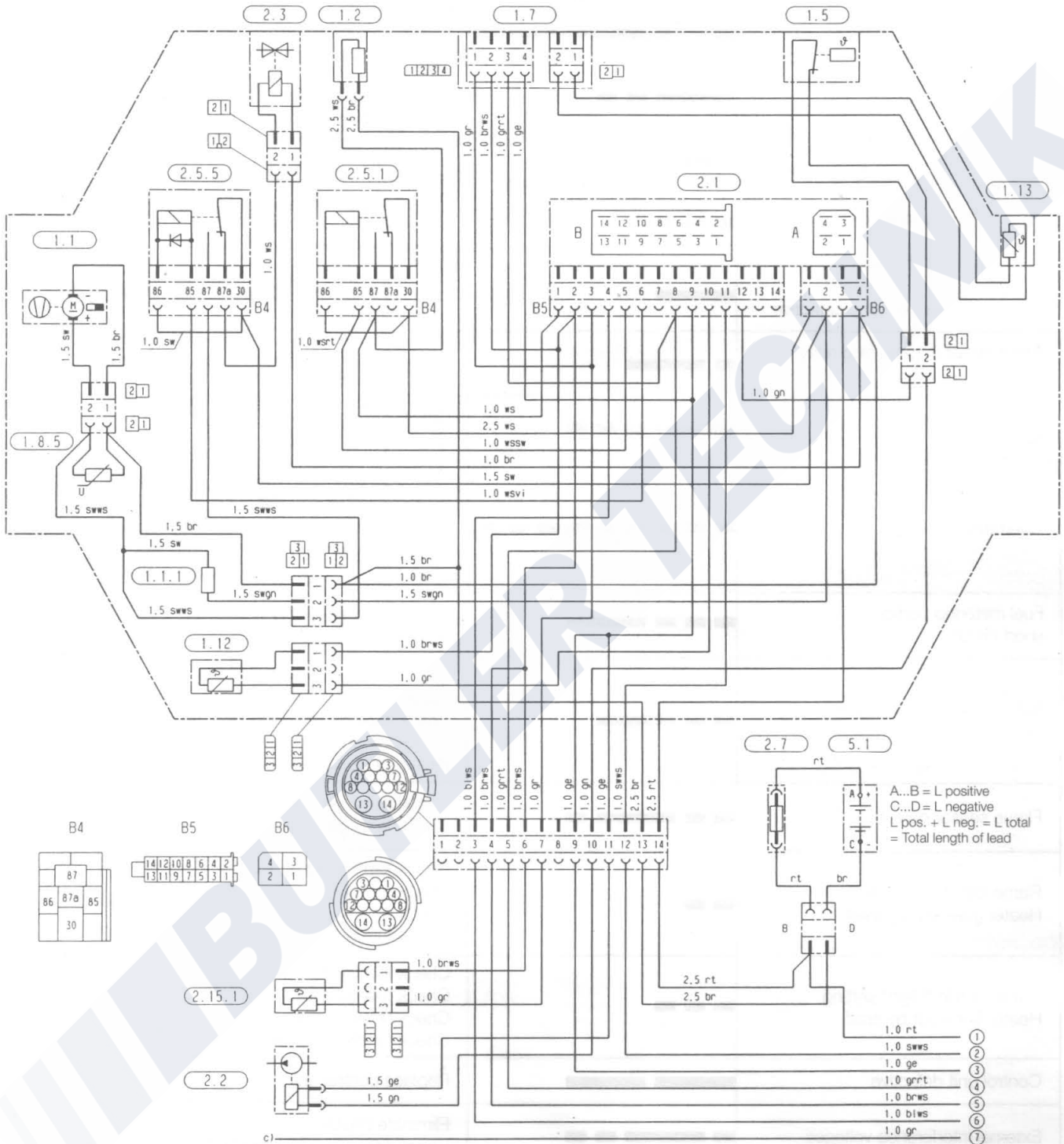
Air outlet temperature limiter: 550 to 570 at 20 °C





Diagnostic signals	0 1 2 3 4 5 6 7 8 sec.	Remark/Remedial Action
Operation	████████████████████	—————
Overtoltage/undervoltage warning	███ ██████████	Check controller, charge battery
Overtoltage cutout	██████████ ████	Check controller, if necessary check battery charger. Heater must be connected directly to the battery
Undervoltage cutout	██████████ █	Charge battery, check controller
Glow plug interruption	███ ███ ███ ███	Check glow plug Check leads and connections Check glow plug relay
Burner motor not turning, speed changeover relay defective	██████████	Check motor speed, Replace blower if necessary Check speed changeover
Short-circuit in glow plug relay contacts	██ ██████████	Replace glow plug relay
Safety time exceeded Non-start	██████████ ████	Check fuel supply Check glow plug, replace if necessary
Overheat	████████████████████	Check heating air piping, inlet and outlet, for clogging, and if necessary clear any obstruction. Check electrical leads and contacts to fuel metering pump. Check safety thermal cutout switch and if necessary check air outlet temperature limiter
Fuel metering pump short circuit	███ ██████████	Check metering pump and supply lines, replace if necessary
External room temperature monitor defective	██ ██████████	Plug connection to external temperature sensor in cable harness plugged in? Check external temperature sensor direct! Check connection of operating device (tester for operating device)
Flame sensor defective	██ ██████████	Check flame sensor or connections Check PCB using test adapter
Flame loss in "Low" setting Heater goes out by itself	██	Check fuel line for leaks, Check fuel filter Check fuel quantity Check blower speed Check function of solenoid valve
Flame loss in "High" setting Heater goes out by itself	███ ███	Check fuel line for leaks, Check fuel filter Check fuel quantity Check blower speed Check function of solenoid valve
Control unit defective	██████████ ██████████	Replace control unit
External interference voltages	██ ██████████	Eliminate cause Check solenoid valve for short-circuit
Air outlet temperature limiter is not monitored by diagnostic unit and has to be checked manually.	No flashing code  Display if provided ████████████████████	Effect of short-circuit: Heater still operates in "High" setting. Effect of interruption: Heater now operates only in "Low" setting.

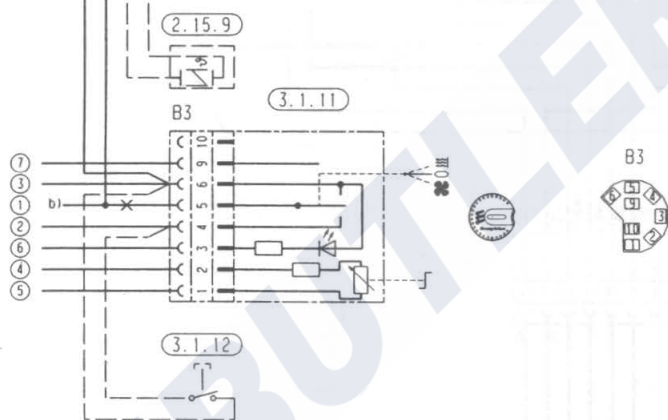
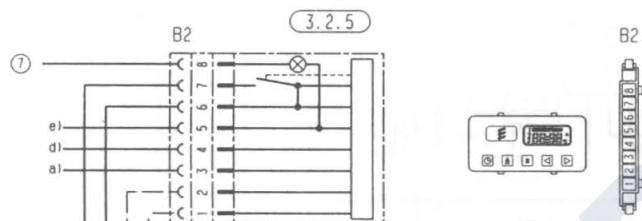
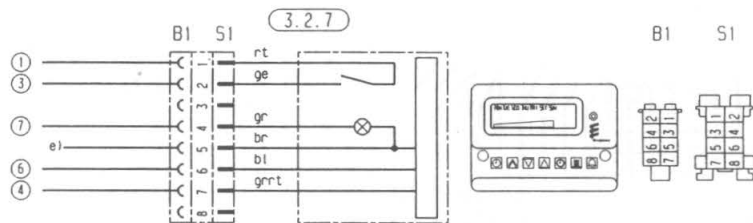
**Wiring diagram – 25 1890 – 12 V** Design up to model year mid-1995  
**25 1891 – 24 V**



A...B = L positive  
 C...D = L negative  
 L pos. + L neg. = L total  
 = Total length of lead

**Parts list**

- |       |  |        |   |  |
|-------|--|--------|---|--|
| 1.1   | Burner motor                             | 2.1    | Control unit                            | Length AB + length CD                        |
| 1.1.1 | Resistor for burner motor (partial load) |        |   | < 5 m, cross-section 4 mm <sup>2</sup>       |
| 1.2   | Glow plug                                | 2.2    | Fuel metering pump                      | > 5 m < 8 m, cross-section 6 mm <sup>2</sup> |
| 1.5   | Safety thermal cutout switch             | 2.3    | Air solenoid valve (for combustion air) |  |
| 1.7   | PCB                                      | 2.5.1  | Glow plug relay                         |  |
| 1.8.5 | Varistor                                 | 2.5.5  | Control relay                           |  |
| 1.12  | Flame sensor                             | 2.7    | 12V/30A main fuse<br>24V/25A            |  |
| 1.13  | Temperature sensor                       | 2.15.1 | Room temperature sensor                 |  |
|       |  | 2.15.9 | Outside temperature sensor              |  |



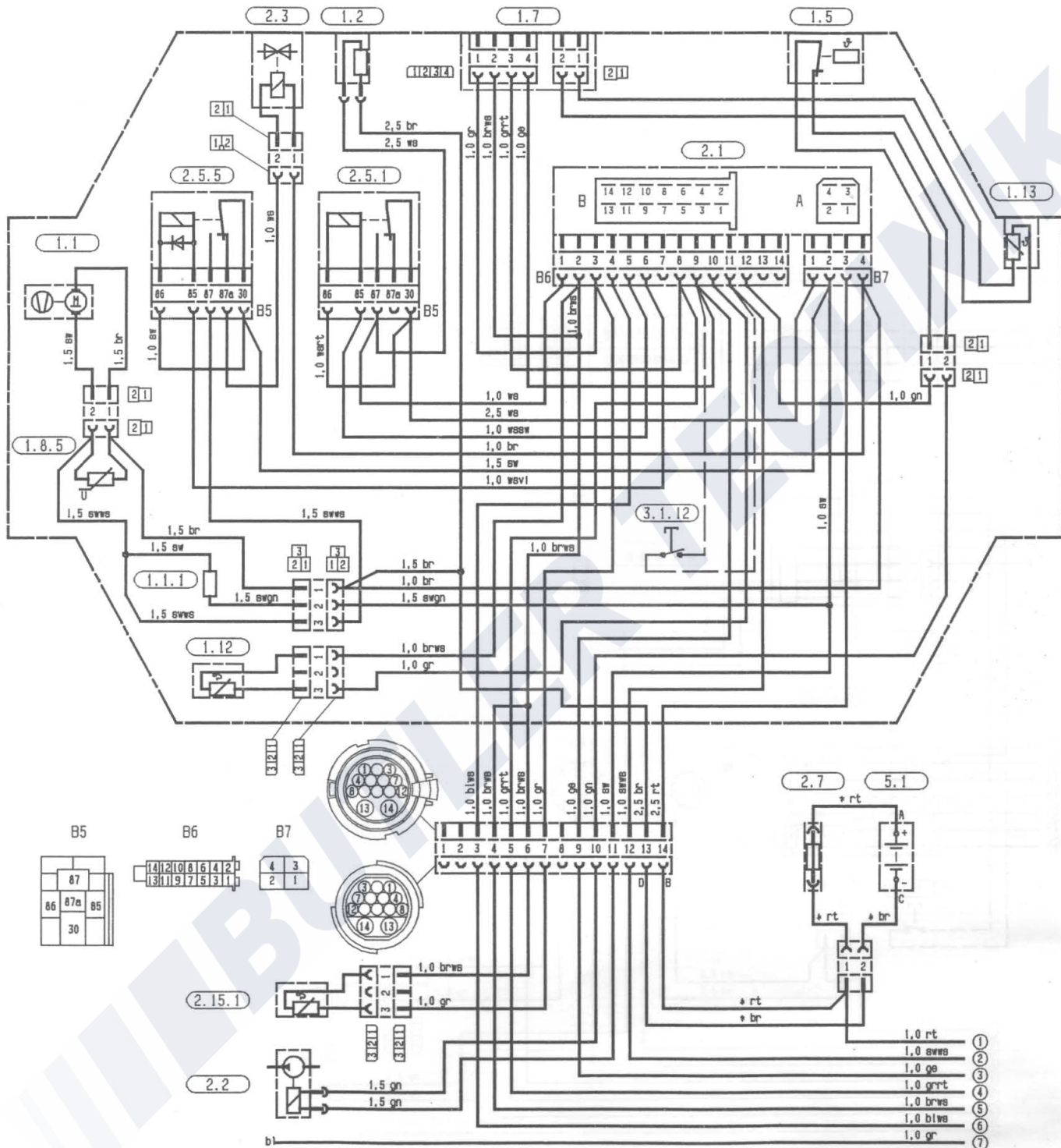
- 3.1.11 Operating device
- 3.1.12 Fault code enquiry
- 3.2.5 Timer, rectangular, 7-day
- 3.2.7 Timer, rectangular, surface-mounted
- 5.1 Battery

- a) Test (garage) digital timer
- b) When connecting timer cut wire here x
- c) Vehicle light terminal 58
- d) Terminal 15
- e) Terminal 31 (battery -)

Plug housing and socket housing are shown from the conductor entry side



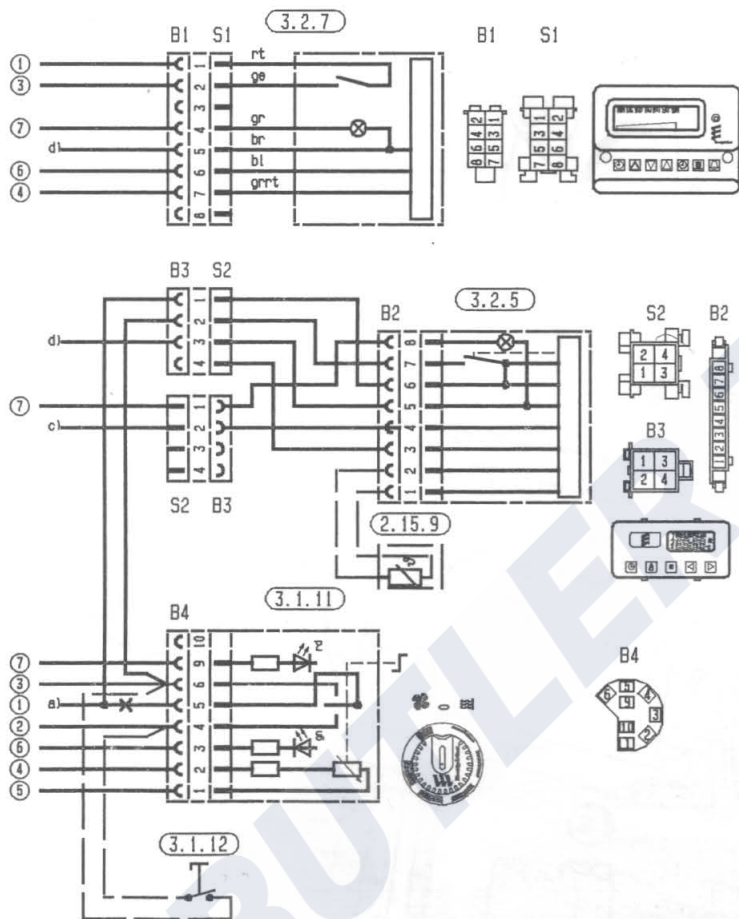
Wiring diagram – 25 1890 – 12 V Design up to model year mid-1995  
25 1891 – 24 V



Parts list

- |       |  |        |   |  |
|-------|--|--------|---|--|
| 1.1   | Burner motor                             | 2.1    | Control unit                            | Length AB + length CD                        |
| 1.1.1 | Resistor for burner motor (partial load) | 2.2    | Fuel metering pump                      | < 5 m, cross-section 4 mm <sup>2</sup>       |
| 1.2   | Glow plug                                | 2.3    | Air solenoid valve (for combustion air) | > 5 m < 8 m, cross-section 6 mm <sup>2</sup> |
| 1.5   | Safety thermal cutout switch             | 2.5.1  | Glow plug relay                         |  |
| 1.7   | PCB                                      | 2.5.5  | Control relay                           |  |
| 1.8.5 | Varistor                                 | 2.7    | 12V/30A main fuse                       |  |
| 1.12  | Flame sensor                             |        | 24V/25A                                 |  |
| 1.13  | Temperature sensor                       | 2.15.1 | Room temperature sensor                 |  |
|       |  | 2.15.9 | Outside temperature sensor              |  |



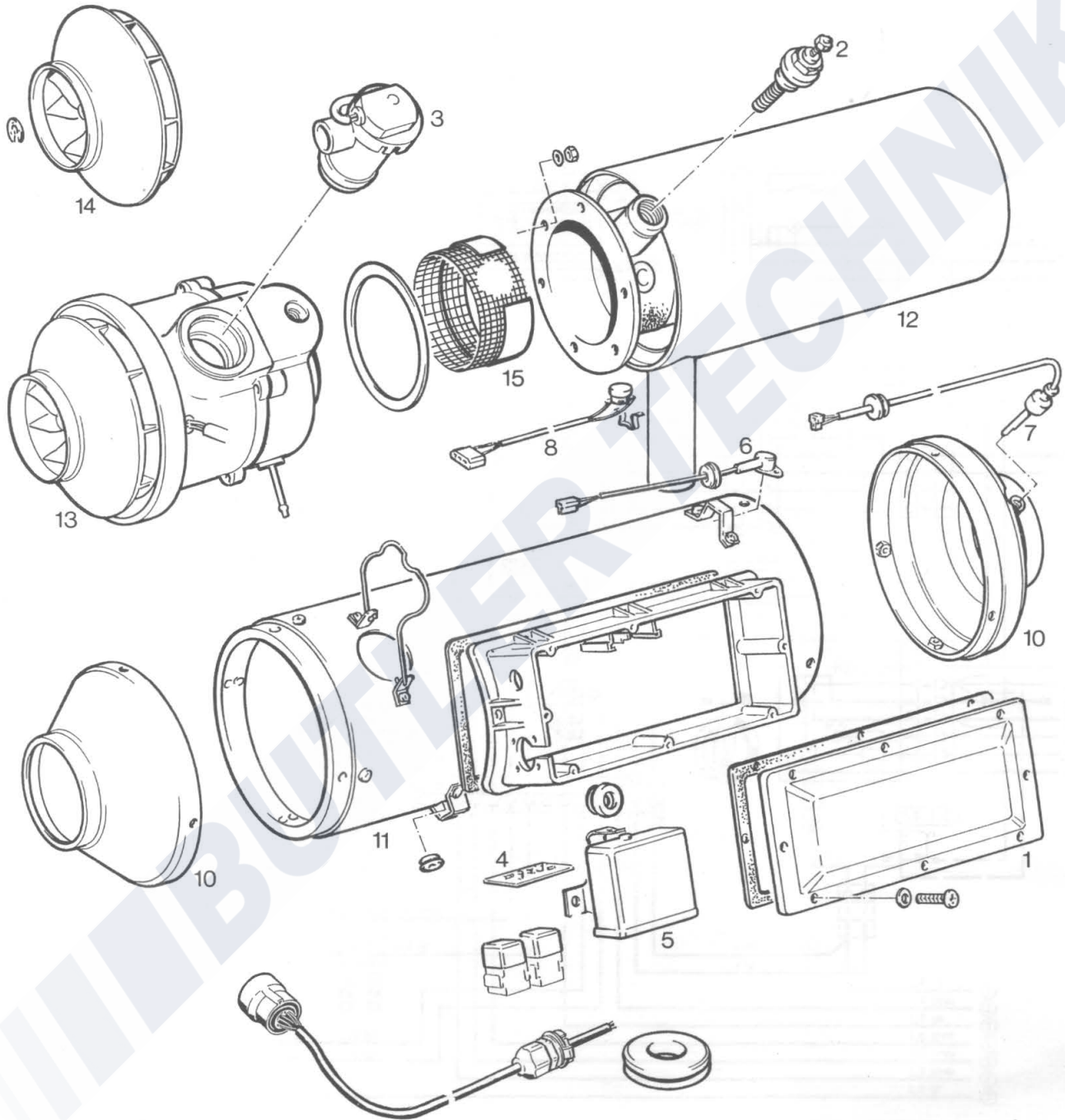


- 3.1.11 Operating device
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Plug housing and socket housing are shown from the conductor entry side

Repair instructions



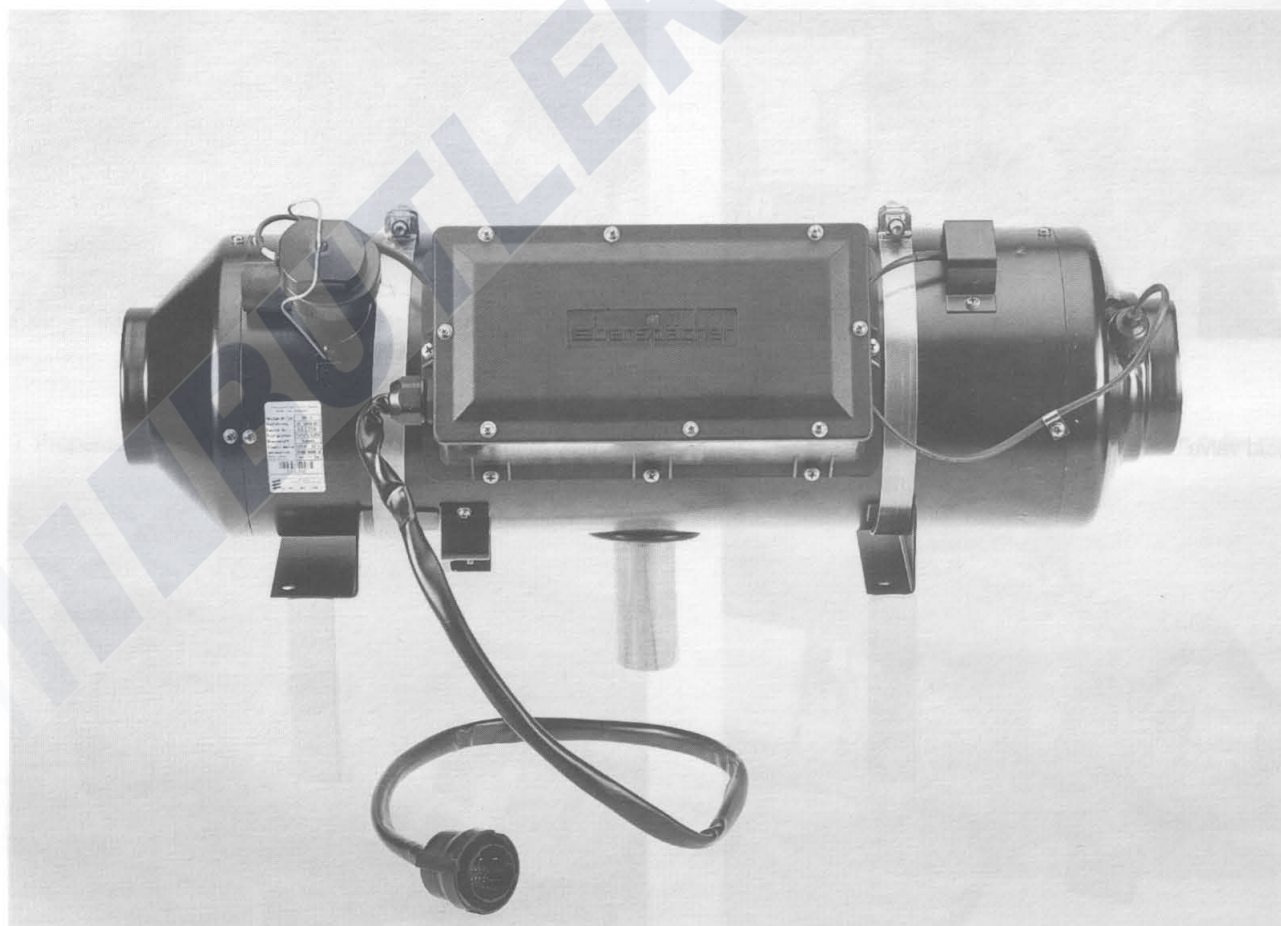
For designation and  
Cat. No. of spare parts,  
see spare parts list

## Repair steps

### Remove / install

1. Cover
2. Glow plug
3. Solenoid valve
4. PCB
5. Control unit
6. Safety thermal cutout switch
7. Temperature limiter
8. Flame sensor
9. Preparations for removal of outer casing
10. Brackets, reducing pieces
11. Outer casing
12. Heat exchanger with blower, remove from outer casing
13. Blower and heat exchanger
14. Blower impeller
15. Combustion chamber lining

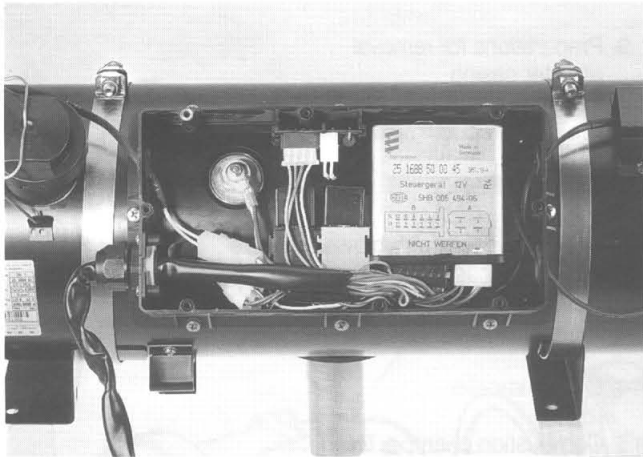
Overall view of heater



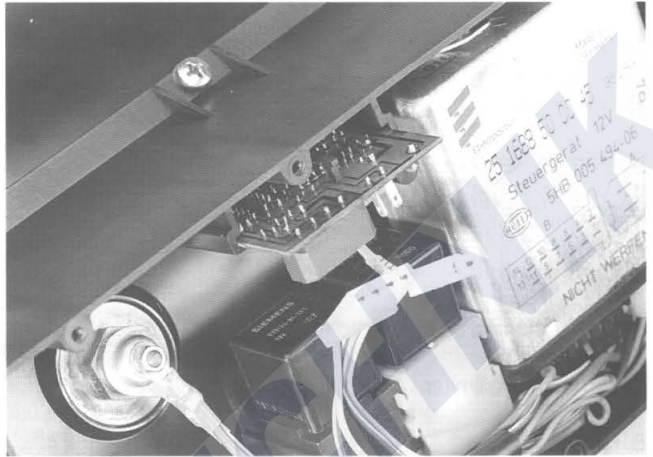


**Remove / install**

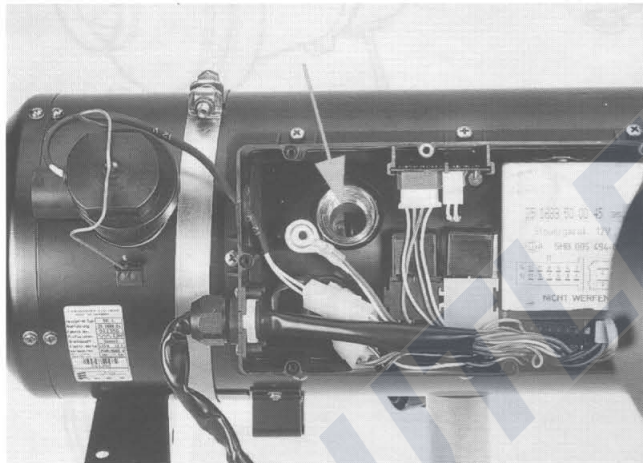
1. Cover



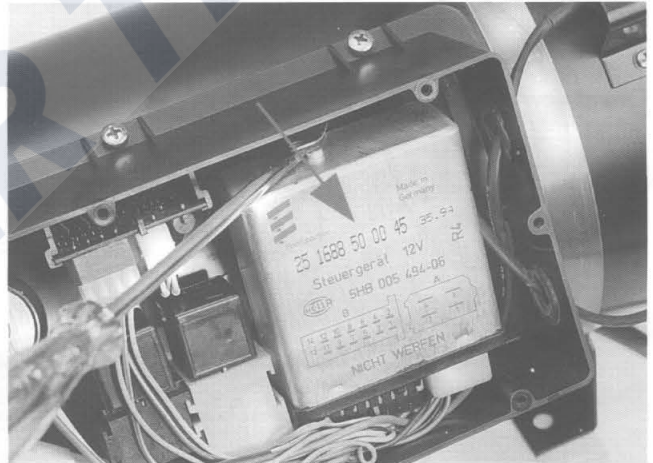
4. PCB



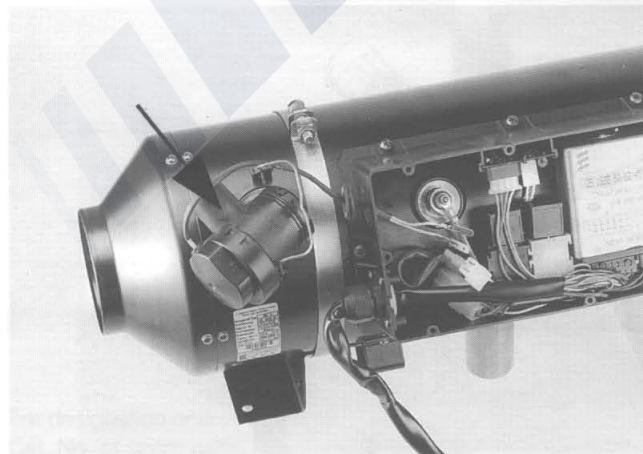
2. Glow plug



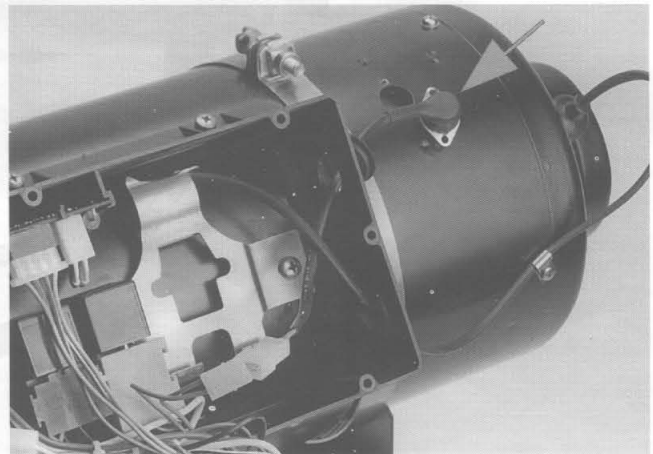
5. Control unit



3. Solenoid valve



6. Safety thermal cutout switch

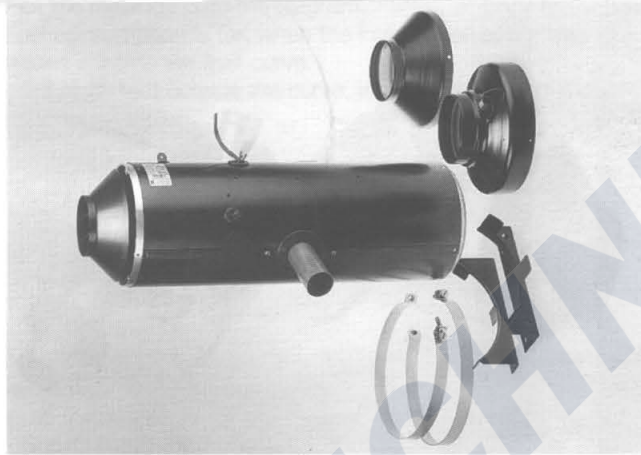




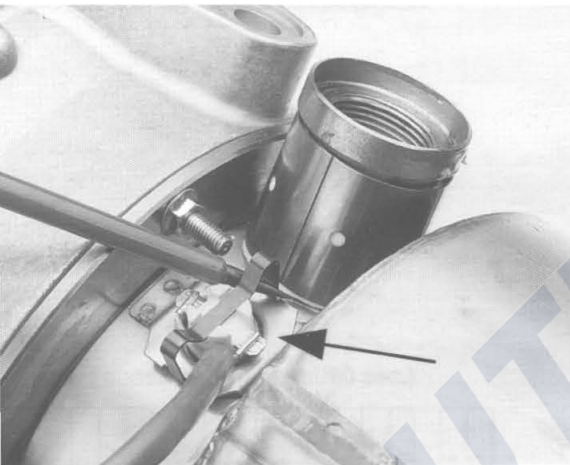
7. Temperature limiter



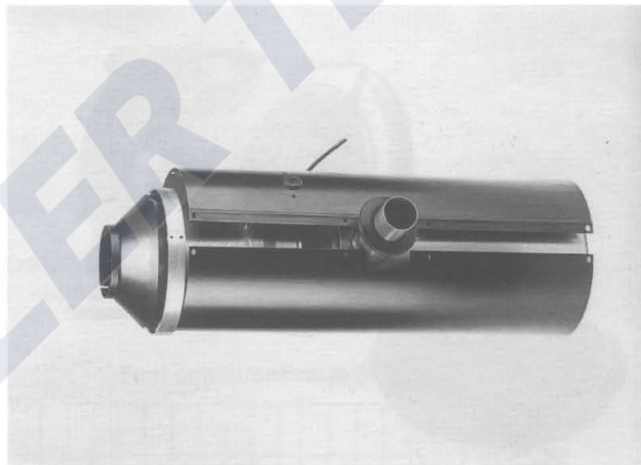
10. Brackets, reducing pieces



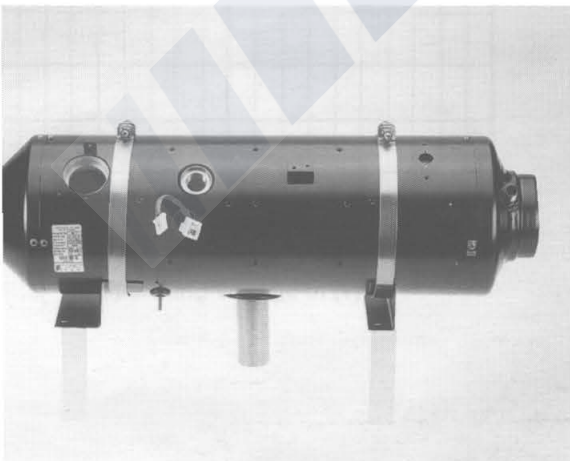
the sensor



11. Outer casing  
When inserting the screws along the longitudinal seam, draw together the casing using tightening strips.



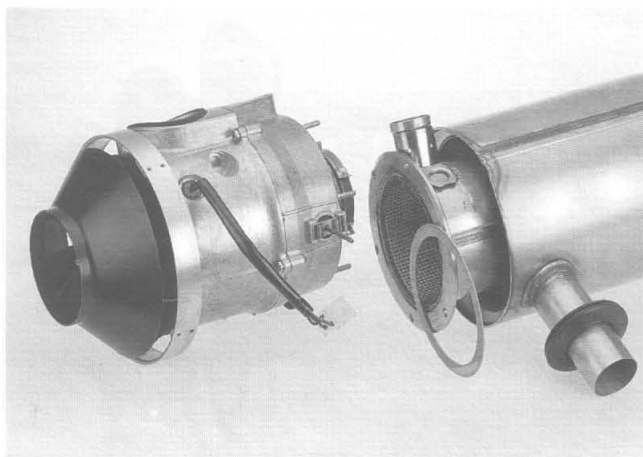
operations for removal of outer casing



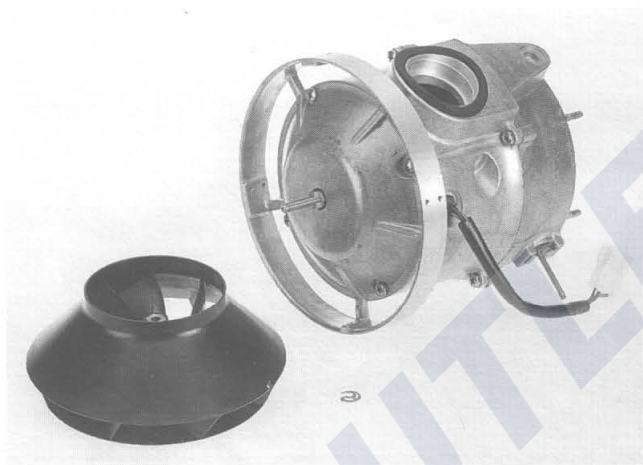
12. Heat exchanger with blower, remove from outer casing



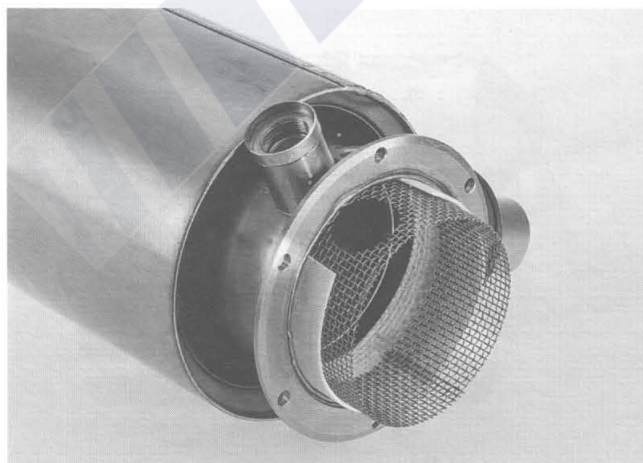
13. Blower and heat exchanger



14. Blower impeller



15. Combustion chamber lining





**Fuel quantity measurement**

**CAUTION!** Only measure the fuel when the battery is sufficiently charged. At least 11/22V and max. 13/26V as appropriate must be applied to the control unit during measurement.

**1. Preparation**

Detach the fuel line from the heater and place it in a measuring glass.  
 Connect a voltmeter to terminals 3 (+) and 4 (-) on the control unit.  
 Switch on the heater. When fuel is fed smoothly (about 25 to 55 seconds after switch-on), the fuel line is filled and bled.  
 Switch off the heater and empty the measuring glass.

**2. Measurement**

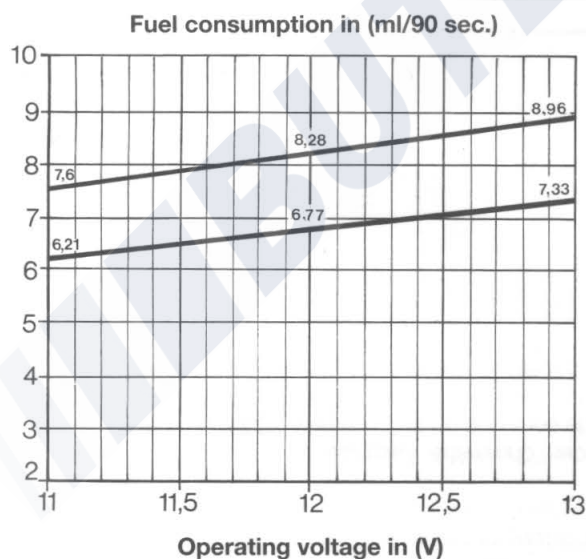
Switch on the heater.  
 Fuel pumping starts about 25 to 55 seconds after switch-on.  
 Keep the measuring glass at the level of the plug during measurement.  
 Read off the voltage at the voltmeter.  
 About 90 seconds of pumping it is switched off automatically.  
 Switch off the heater.  
 Measure the fuel quantity in the measuring glass.

**3. Evaluation**

Plot the readings onto the diagram.  
 Fuel consumption is OK when the intersection of the two values is inside the limit curve.  
 If they intersect outside the curve, the fuel metering pump must be replaced.

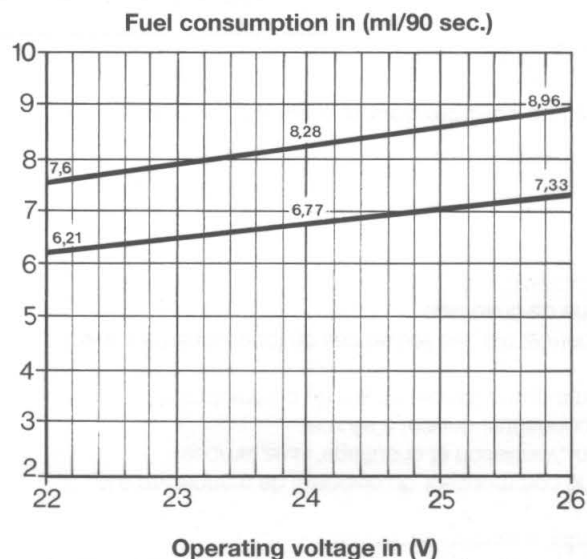
**D8LC (12V)**

Fuel consumption in ml/90 sec.



**D8LC (24V)**

Fuel consumption in ml/90 sec.



**Tester for operating device**

Disconnect the plug from the operating device.  
 Connect the tester to the operating device.  
 Connect the operating voltage.

Set the switch on the operating device to the "Ventilation and Heating" setting. The appropriate lights must come on.  
 The pilot light in the switch must also come on.\*

\* This test is not necessary during operation with heater timer.

Set the operating device to the "0" setting.  
 Call the light.  
 Press key 1 and also key 2.  
 Pilot light must change from **red** to **green**.

Connect the ohmmeter. Turn the rotary knob right round.  
 The set value of 1800 to 2200 must be sustained without interruption.  
 In the event of a fault, replace the operating device.

**Tester for operating deviceg**

1800 - 2200

