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**The Troubleshooting and Repair Manual is valid  
for the following heater versions:**

**D 1 L E**

25 1790 05 00 00 – 12 V  
25 1791 05 00 00 – 24 V

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A detailed technical cross-section diagram of a gas furnace system. The diagram includes the following numbered components: 1. Gas burner assembly; 2. Gas control valve; 3. Gas pressure regulator; 4. Gas inlet pipe; 5. Gas filter; 6. Gas solenoid valve; 7. Igniter; 8. Burner head; 9. Combustion chamber; 10. Exhaust gas outlet; 11. Vent pipe; 12. Draft inducer motor; 13. Draft inducer housing; 14. Vent pipe; 15. Gas supply line; 16. Gas shut-off valve; 17. Gas meter; 18. Gas leak detector; 19. Gas leak detector control unit; 20. Gas leak detector control unit display. Arrows indicate the flow of gas (E), air (A), and exhaust (W). The diagram is labeled with 'E', 'A', and 'W' at the bottom, indicating the flow of gas, air, and exhaust respectively.

1	Heating air blower wheel	8	Heat exchanger	14	Exhaust hose	F	= fresh air
2	PCB with control unit	9	Outer jacket	15	Fuel metering pump	V	= combustion air
3	Combustion air blower wheel	10	Flange seal	16	Fuel filter	B	= fuel
4	Glow plug	11	Fuel line	17	Main fuse, 25 A	W	= hot air
5	Safety thermal cutout switch	12	Blower motor	18	ON/OFF switch	A	= exhaust
6	Combustion chamber	13	Combustion air intake hose	19	Timer		
7	Flame sensor			20	Minutimer		



## Description of operation/operating instructions

### Control elements

1. On/Off switch
2. Heater timer  
(additional part, optional, see p. 2). The timers can be used to switch the heater on at once using the timer, or to preset the switch-on time.

### Mode of operation

Procedure after switch-on

**Switch-on:** Set On/off switch to "On".  
The pilot light in the On/Off switch comes on.

Further procedure is automatic:

after about 3 secs.: Blower "On".  
Heater coil of glow plug "On".  
After about 33 secs.: Fuel conveying "On".  
When a stable flame  
has been obtained: Glow plug off.

The heater now operates at full heating capacity (1800 W), and the air heated by the heat exchanger passes through the air outlet into the space to be heated.

**Switch-off:** Set On/Off switch to "Off".  
(manual) The pilot light goes off.

The blower continues to operate to cool it down, and finally shuts down automatically after about 3 minutes.

### Controls and safety equipment

The flame is monitored by the flame sensor (7), and the max. permissible temperature by the safety thermal cutout switch (5).  
Both affect the electronic control unit, which shuts down the heater in the event of faults.

1. If the heater fails to ignite within 180 seconds of the start of fuel pumping, or if the flame goes out by itself during operation, a fault shutdown takes place, with the blower motor continuing to operate for about 3 minutes. Here the glow plug is also "On" during the first 30 seconds. The fault shutdown can be cancelled by switching off and then back on.
2. In the event of overheating, the safety thermal cutout switch (5) is operated, the fuel supply is interrupted, and fault shutdown follows with the blower motor continuing to operate as described above.  
Once the cause of the overheat has been removed, the heater can be restarted by switching it off and then back on again.
3. If, during start or operation, a short circuit or interruption occurs in glow plug, fuel metering pump or flame monitor, a fault shutdown takes place, possibly with the blower motor continuing to operate as described above.
4. The operation of the blower motor is monitored periodically. If it fails to start or if the motor speed is below the minimum value, fault shutdown takes place.
5. When the heater is switched off, the glow plug is switched on during the delayed shutdown for about 30 seconds (after-glow) to clear it of combustion residues.

The heater must always be switched off when the tank is being filled.

The heater must not be operated in garages.

### In the event of trouble, first check the following:

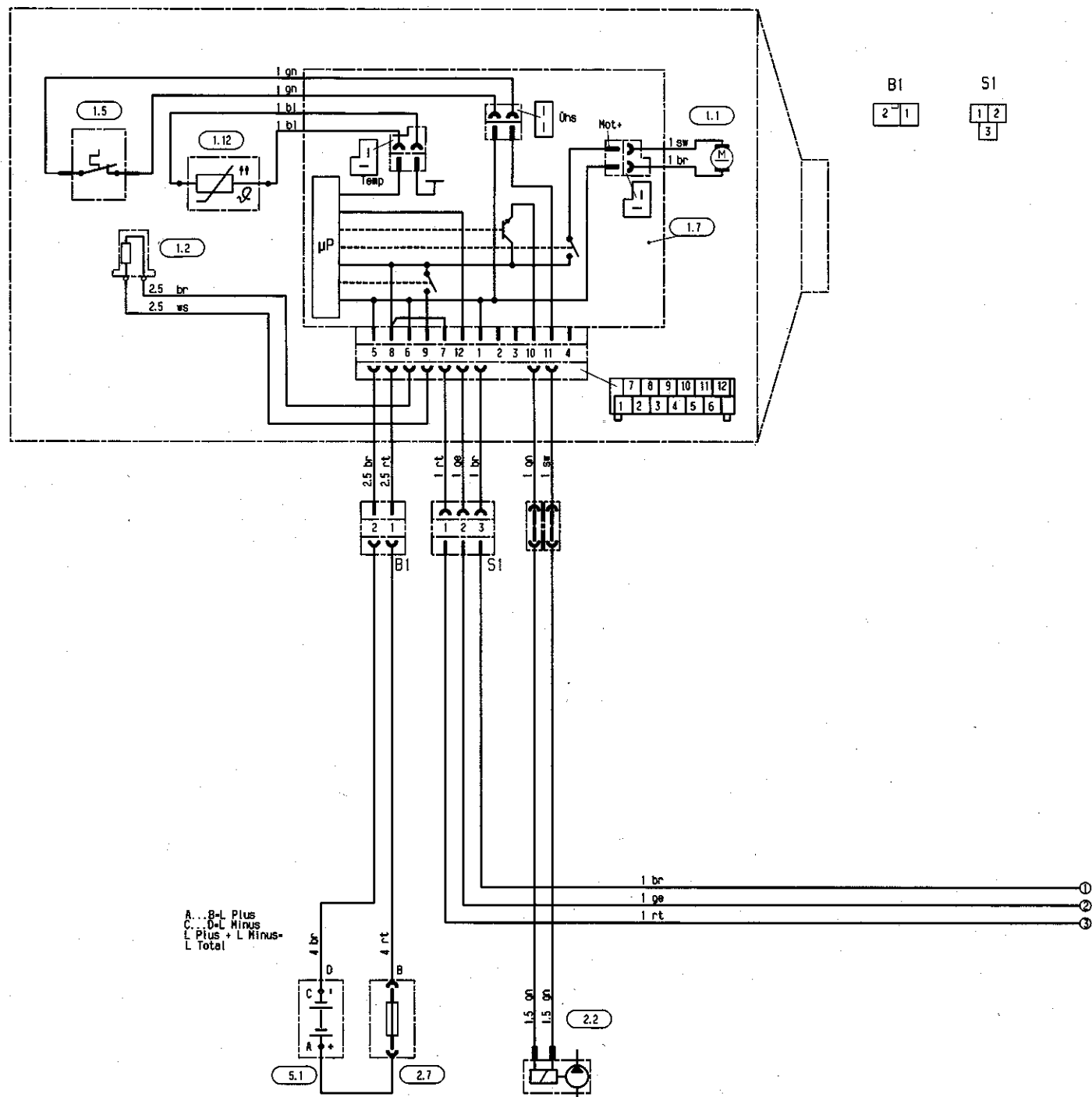
Fuel in the tank?  
When changing over to winter operation:  
Is there still summer-quality diesel oil in the lines?  
Fuses OK?  
Electrical lines and connections OK?  
Combustion air and exhaust piping systems free?

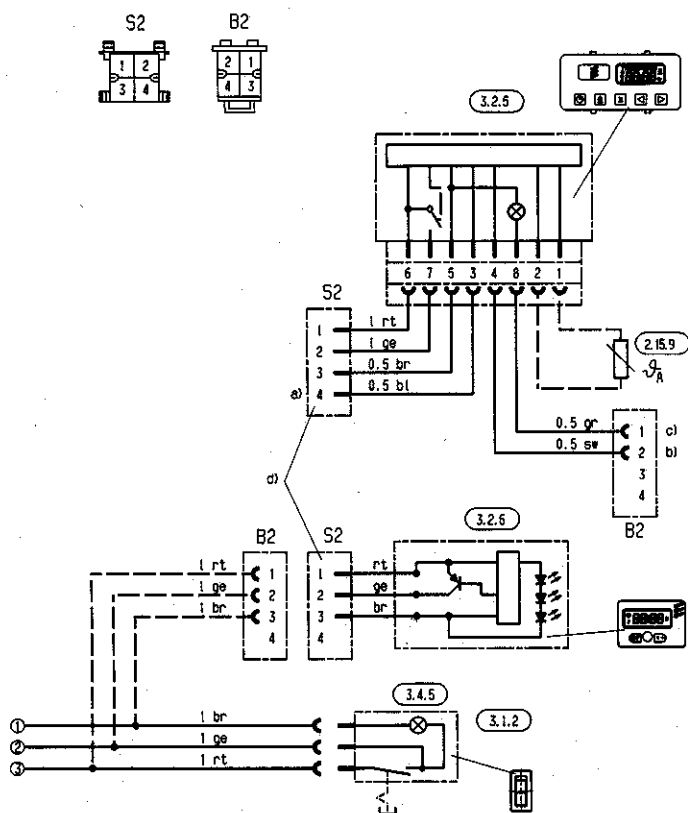
When combustion produces soot, check the following:  
Combustion air and exhaust piping systems clogged?  
Remove cause of clogging.

Fuel metering pump conveying too much or too little?  
Measure fuel quantity, replacing fuel metering pump if necessary. Clean the pot-shaped strainer in the metering pump.

Deposits in heat exchanger?  
Clean heat exchanger, or replace it if necessary.

### Wiring diagram





rt = red  
br = brown  
ws = white  
sw = black

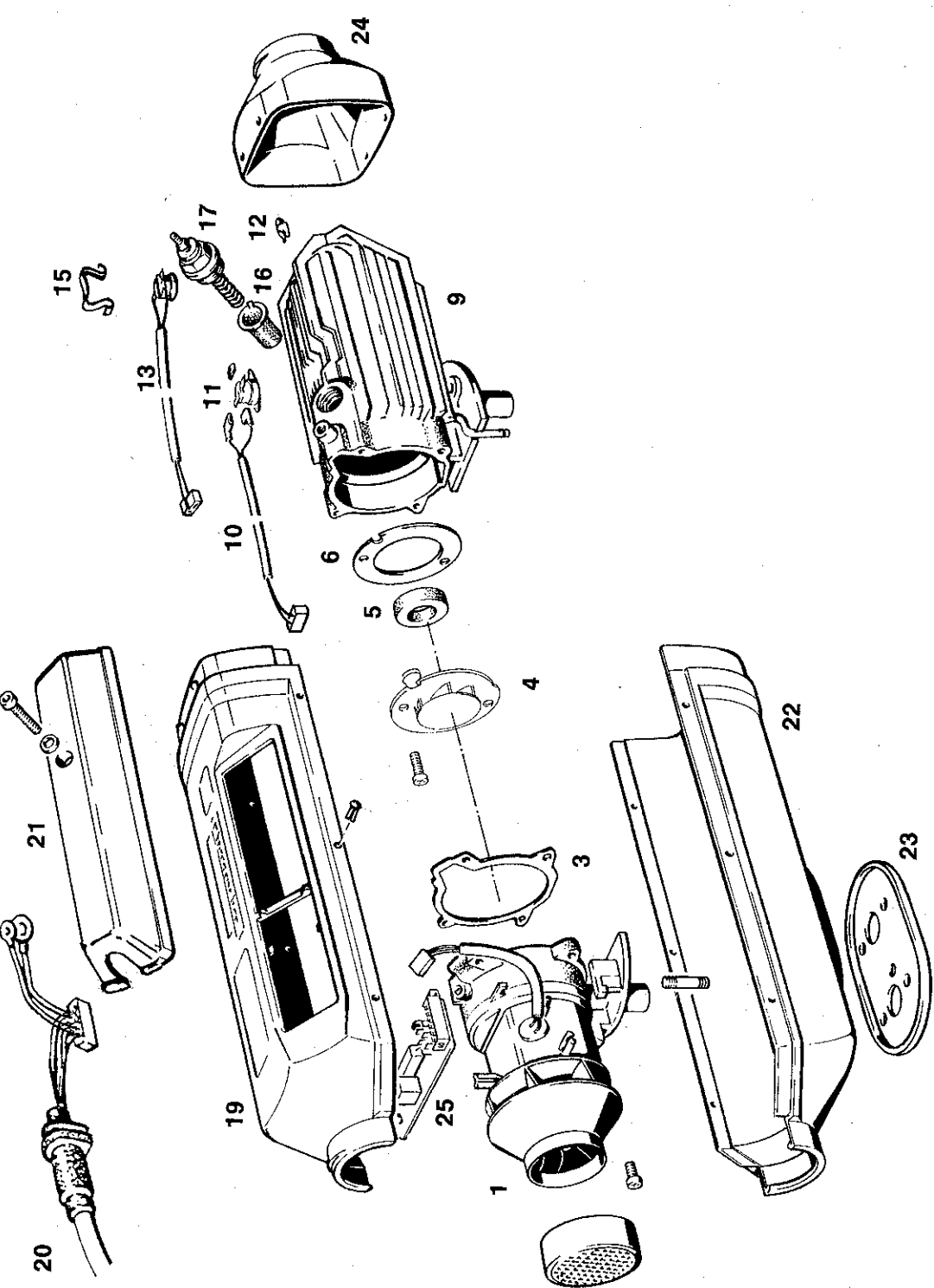
gn = green  
ge = yellow  
gr = grey  
bl = blue

## Parts list

- |        |   |
|--------|---|
| 1.1    | Blower motor  |
| 1.2    | Glow plug   |
| 1.5    | Safety thermal cutout switch                                  |
| 1.7    | PCB with control unit   |
| 1.12   | Flame monitor   |
| 2.2    | Fuel metering pump  |
| 2.7    | Main fuse 25 A  |
| 2.15.9 | Sensor, external temperature                                  |
| 3.1.2  | "Heating" switch (continuous operation)                       |
| 3.2.5  | Timer   |
| 3.2.6  | Timer   |
| 3.4.5  | Switch-on pilot light   |
| 5.1    | Battery   |
| a)     | Test (garage) digital timer (not in use in this heater model) |
| b)     | to terminal 15  |
| c)     | lighting terminal 58  |
| d)     | optional  |

Repair instructions

Spare parts (see spare parts list for Cat. Nos.)



Parts list

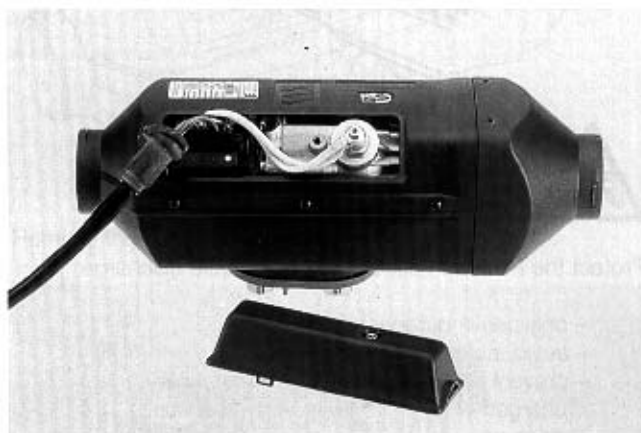
- |   |   |    |                              |    |                       |
|---|---|----|------------------------------|----|-----------------------|
| 1 | Combustion air blower                       | 13 | Flame sensor with cable line | 20 | Cable harness         |
| 2 | Seal  | 15 | Retaining spring             | 21 | Cap                   |
| 3 | Air baffle plate housing (not a spare part) | 16 | Plug filter                  | 22 | Lower casing half     |
| 4 | Air baffle plate housing (not a spare part) | 17 | Glow plug                    | 23 | Flange seal           |
| 5 | Sealing ring                                | 19 | Upper casing half            | 24 | Air outlet section    |
| 6 | Sealing washer                              |    |                              | 25 | PCB with control unit |

## Repair steps

1. Removing/fitting the glow plug
2. Removing/fitting the plug filter
3. Removing/fitting the PCB with control unit
4. Removing/fitting the air outlet section
5. Removing/fitting the upper casing half
6. Removing/fitting the safety thermal cutout switch
7. Removing/fitting the flame sensor
8. Removing the blower from the heat exchanger  
Changing the seals on the heat exchanger
9. Changing the seals on the blower

### 1. Removing/fitting the glow plug

Unscrew cap,  
Detach glow plug connector,  
Unscrew glow plug.

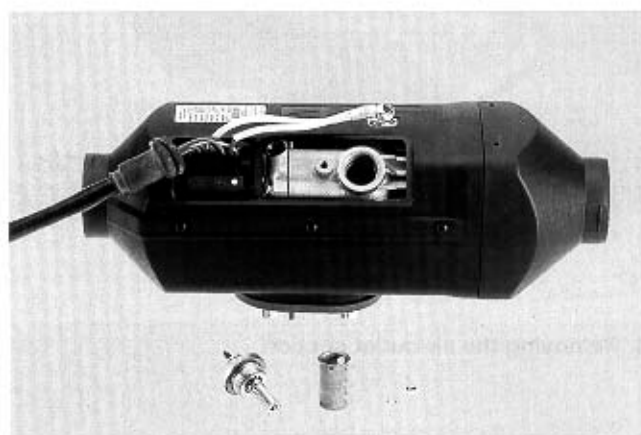


### 2. Removing/fitting the plug filter

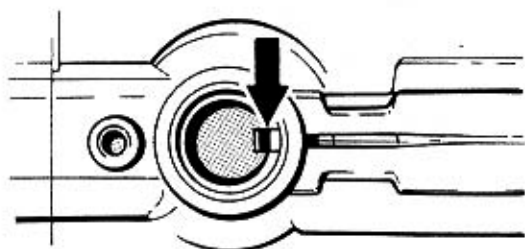
Remove the plug filter from the plug connection  
using pliers.

When putting the plug filter back in, ensure correct  
positioning of the lug.

Carefully slide in the plug filter as far as it will go.

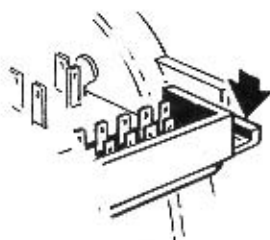


Installation position of plug filter in D 1 L E



### 3. Removing/fitting the PCB with control unit

Detach plug from the PCB.  
Press down the lug.  
Pull out the PCB.

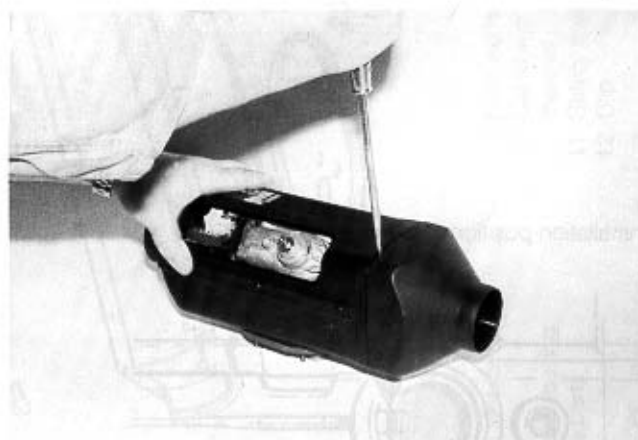


Protect the PCB with control unit from static discharge:

- only use in garages
- avoid surfaces with plastic coating
- prevent yourself from becoming statically charged or, if so, contact earth to ensure discharge.



### 4. Removing the air outlet section

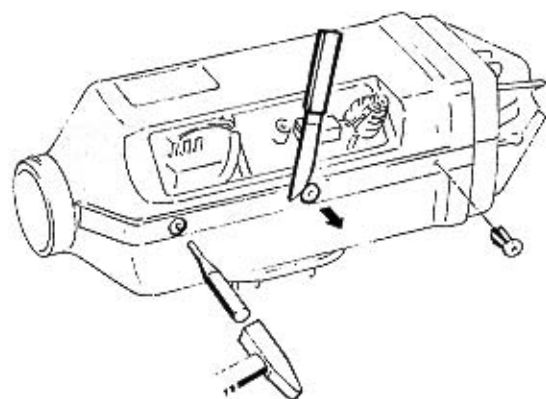




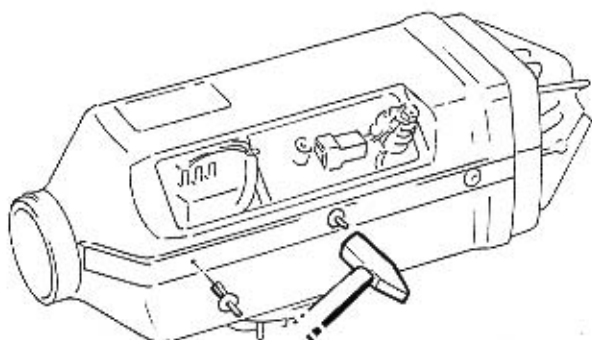


## 5. Removing/fitting the upper casing half

To remove the body-bound rivet, knock the pin through with a small drift.  
Prise out the rivet with a knife.

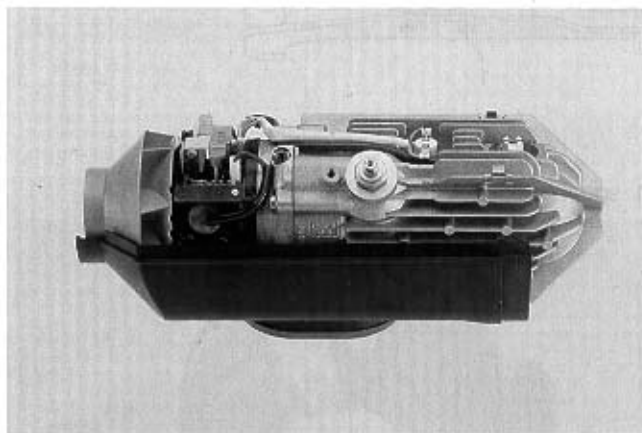
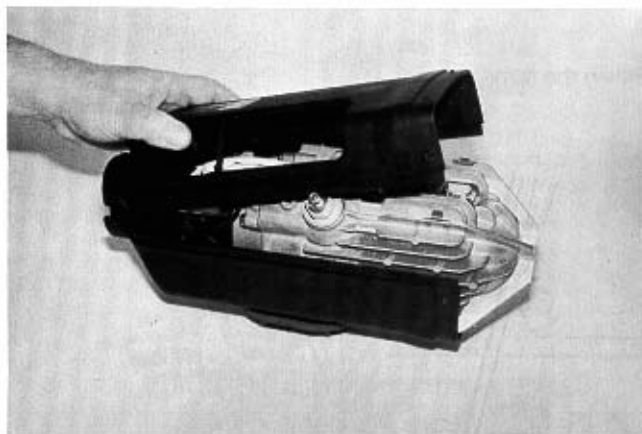
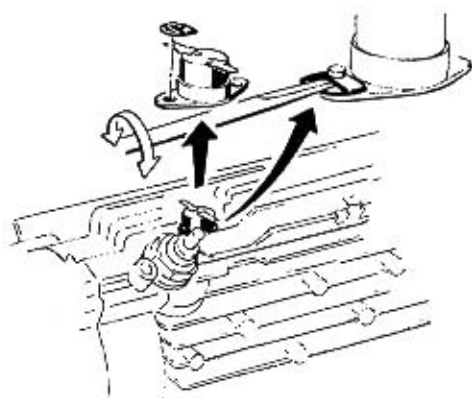


Use a new rivet for reassembly.

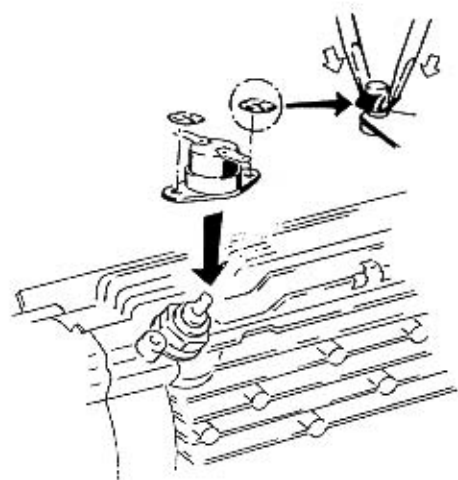


Remove the upper casing half

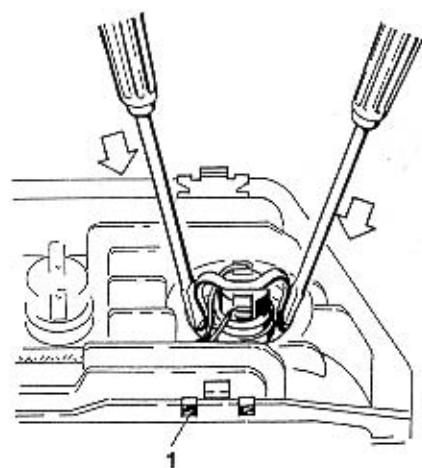
## 6. Removing the safety thermal cutout switch



**Fit the safety thermal cutout switch,**  
using new clamping springs

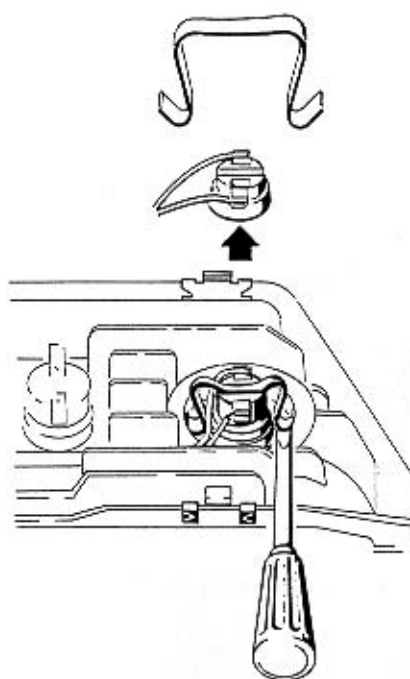


Fitting the flame sensor



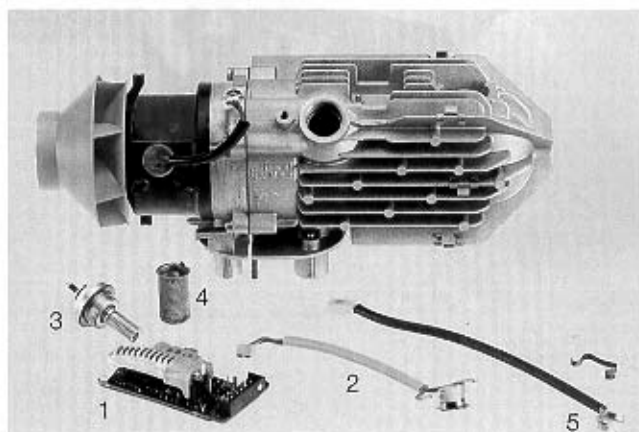
1 spacer clamps for the casing halves

## 7. Removing the flame sensor

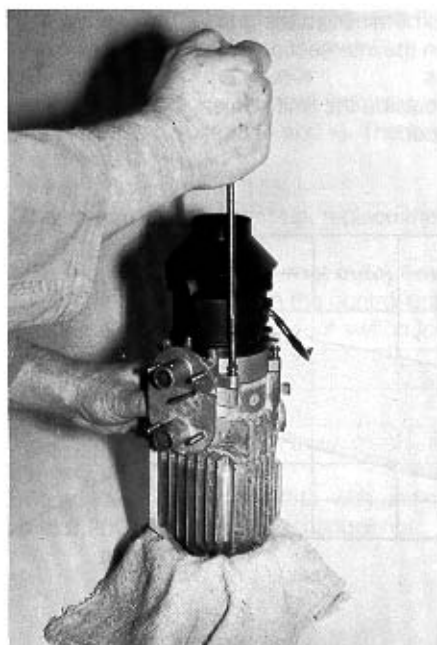


## Removed parts

- 1 PCB with control unit
- 2 Safety thermal cutout switch
- 3 Glow plug
- 4 Plug filter
- 5 Flame sensor



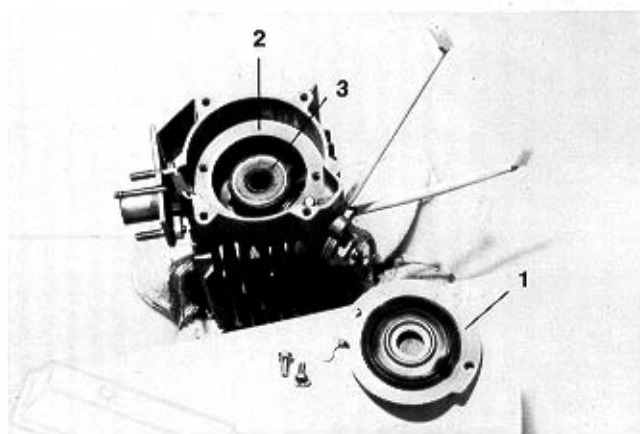
## 8. Unscrewing the blower from the heat exchanger



Remove the blower



Change the seals on the heat exchanger.  
Unscrew the flange (1) from the heat exchanger.  
Fit new seals (2) and (3) as illustrated.

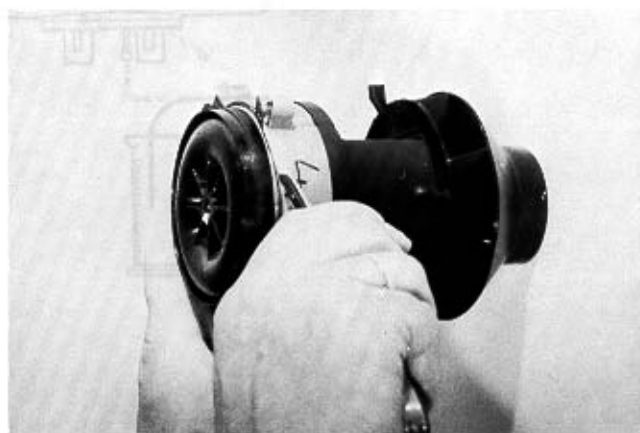


## 9. Replacing the seals on the blower

Remove/scrape the old seal from the blower flange.  
Affix new seal (self-adhesive).

### Note:

When fitting the combustion air blower/heat exchanger into the lower casing half, care must be taken that the fastening hooks of the blower engage in the slots of the casing half, otherwise the blower wheel might catch.



## Measuring the fuel quantity

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

### 1. Preparation

Remove electrical line from glow plug. Caution! Do not contact ground. Detach the fuel line from the heater and place it in a measuring glass (15 or 20 ccm capacity). Connect a voltmeter to the 12-pin plug, terminals 8 (+) and 5 (-) of the control unit. Switch on the heater. After about 30 seconds, the metering pump starts to pump fuel. When the fuel is coming out smoothly and free of bubbles, the fuel line is filled and bled.

Switch off the heater and empty the measuring glass.

### 2. Measurement

Switch on the heater.

Fuel is being pumped approx. 30 secs. after switching on. Hold the measuring glass at the plug level during measurement. Read off the voltage at the voltmeter.

Fuel pumping stops automatically after 180 secs.

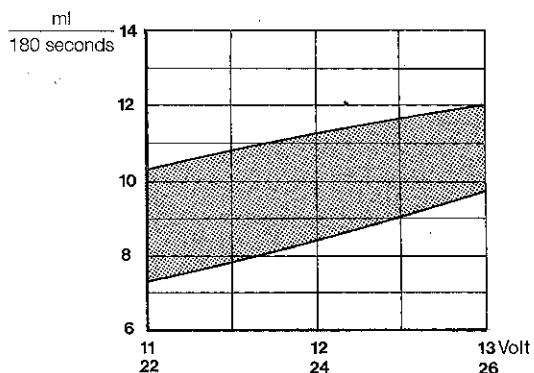
Switch the heater off.

Read off the fuel quantity in the measuring glass.

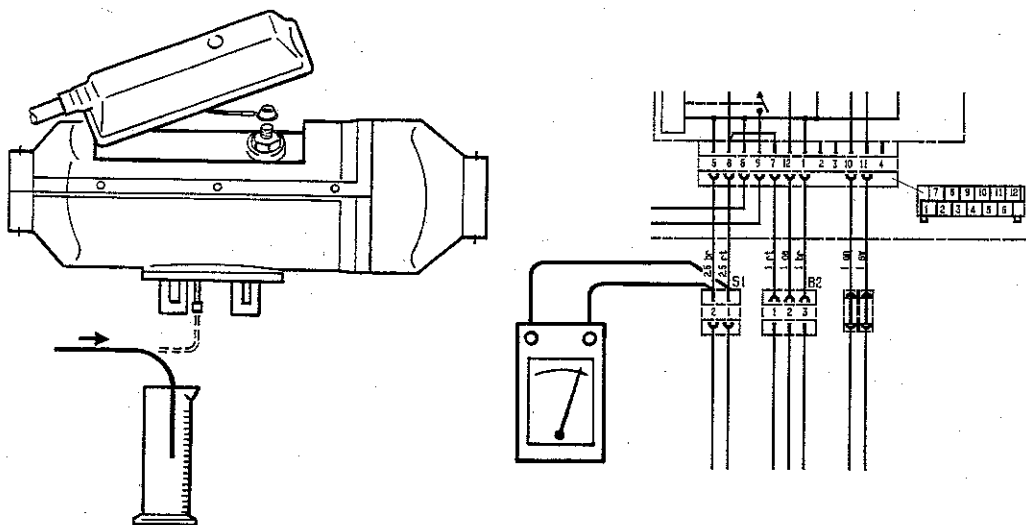
### 3. Evaluation

Transpose the values obtained to the graph. The fuel consumption is OK when the intersection of the two lines is within the limit curves.

If the intersection is outside the limit curves, the metering pump must be replaced.



Connect voltmeter to control unit





## Testing the heater and the components

Remove the PCB with control unit from the heater.

### 1. Testing the burner motor

Detach the 2-pin plug from the control unit (see sketch).  
Apply operating voltage (+ and -). The motor must start up at once.

Speed: 4,500 rpm  $\pm$  10%.

If the motor does not start up, replace the blower.

### 2. Testing the safety thermal cutout switch

Detach the 2-pin plug from the control unit (see sketch).  
Check the safety thermal cutout switch for continuity using a test lamp or ohmmeter.

### 3. Testing the flame sensor

Detach the 2-pin plug from the control unit (see sketch).  
Connect an ohmmeter.

Desired value: 900 to 1,100  $\Omega$ , with unit cold,  
up to 2,200  $\Omega$ , with heat exchanger hot.

PCB with control unit

