Water heater *HYDRONIC* 10

Troubleshooting and repair instructions

Eberspächer ®

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

***HYDRONIC* 10**

25 2081 05 00 00 - 12 V

25 2044 05 00 00 - 24 V

Contents Page

First check the following if faults occur

Fuel in tank?

Heater lever (water valve) is „Hot" setting?

Fuses OK?

Electrical leads and connections OK?

Combustion air pipe or exhaust pipe clogged?

Performance and malfunction test

Possible faults may be read-out by connecting a diagnostic device (order No. 221512890000) to link B2 (see wiring diagram page 9). Operation see operating instructions for the diagnostic device. List of faults below.

- When using the new module dial gauge, it is not necessary to use a diagnostic device.
- When using the mini dial gauge displayed, the adapter cable (order No. 221000300500) has to be used together with the diagnostic device (order No. 221512890000).

Alternatively, a LED can be used instead of the operating device to display the flashing code (h in wiring diagram). Fault signals can be found on the next page.

Fuel quantity measurement

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

1. Preparation

Detach the fuel line from the heater and place it in a measuring glass (size: 50 cm^3).
Switch on the heater. When fuel is fed smoothly (about 63 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 63 seconds after switch-on. After another 105 seconds of pumping it is switched off automatically.
Wait for restart. If fuel pumping is switched off automatically after another 75 seconds, switch off the heater. Measure the fuel quantity in the measuring glass.

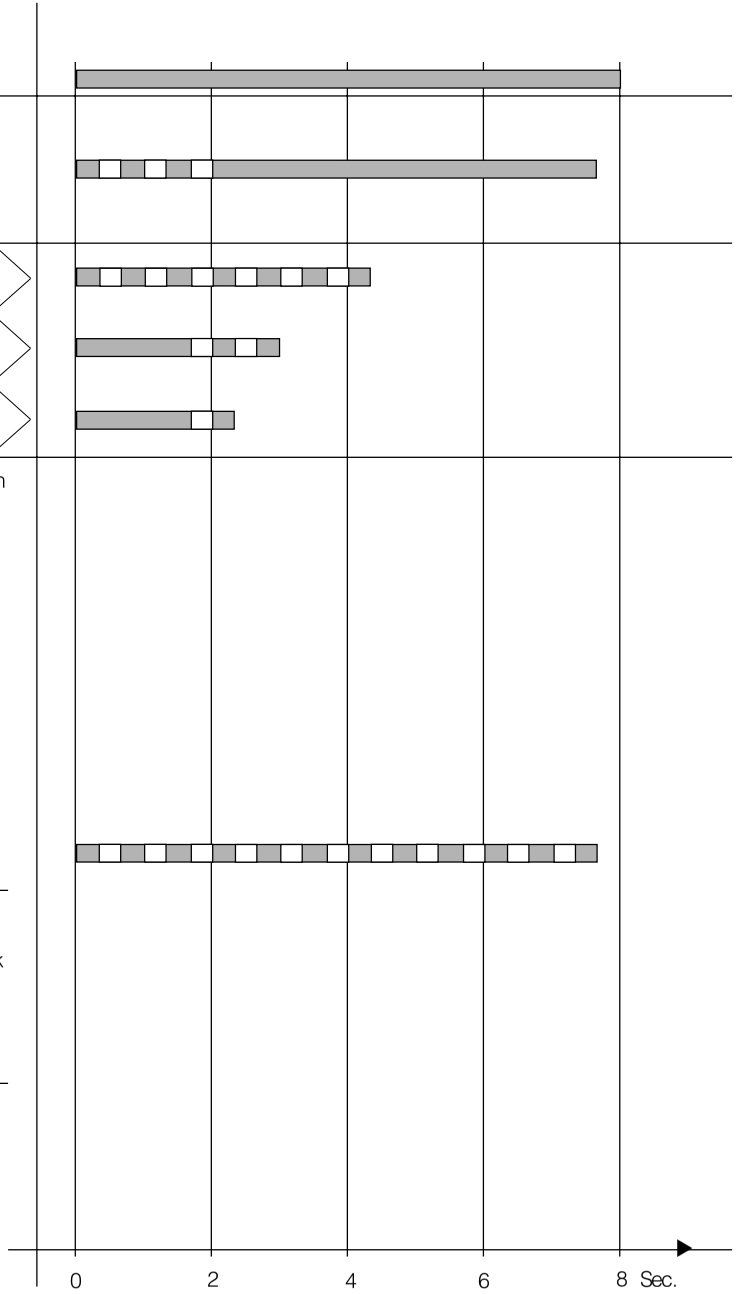
Nominal value: 19 ml +/– 10 %

If the quantity of fuel is outside the tolerance, replace the metering pump.

Function and fault test

Fault code Fault description	Remedy
000 No fault	———
001 Advance warning – overvoltage	Check to see if voltage between 13 and 14 of control unit (external plug) is greater than 15 V or 30 V
002 Advance warning – undervoltage	Check to see if voltage between 13 and 14 of control unit (external plug) is less than 10 V or 20 V
009 TRS 003 cutout	Switch heater off and on again (TRS case due to D+ or HA/NA must be cancelled)
010 Overvoltage cutout	Check to see if voltage between 13 and 14 of control unit (external plug) is greater than 15 V or 30 V
011 Undervoltage cutout	Check to see if voltage between 13 and 14 of control unit (external plug) is less than 10 V or 20 V
012 Overheat	Overtemperature sensor signals temperature of greater than 115 °C. Impedance at overtemperature sensor < 400 ohms. Ventilate heater (water level too low). Open the heater slide valve. Check water throughflow and sensor. Check the impedance at the control unit (internal plug). For this purpose, dismantle the control unit, disconnect the internal plug from the control unit and measure the impedance between 5 and 8. Overtemperature sensor values: 150 kohms at – 25 °C 10 kohms at + 25 °C
013 Excess temperature at flame sensor	Flame sensor signals temperature of greater than 700 °C. Impedance at flame sensor > 3400 ohms. Check the impedance at the control unit (internal plug). For this purpose, dismantle the control unit, disconnect the internal plug from the control unit and measure the impedance between 10 and 12. Flame sensor values: 900 ohms at – 25 °C 1100 ohms at + 25 °C
014 Difference between overheat and water temperatue too large	Temperature difference between measurements of overtemperature sensors is greater than 70 K. Ventilate heater (water level too low). Open the heater slide valve and check water throughflow. Check the overtemperature sensor. Check the impedance between 5 and 8 at the control unit (internal plug). Overtemperature sensor values: 150 kohms at – 25 °C / 10 kohms at + 25°C
015 Too many overheats	The control unit is interlocked after three successive overheats (error codes 012, 013 and 014). Eliminate the case of the overheat. Unlocking by deleting the error memory with diagnosis unit/PC or plus signal for 0.5 to 5 sec. on connection 7 (0.5 v) on the control unit (ext. plug) with heater switched on.

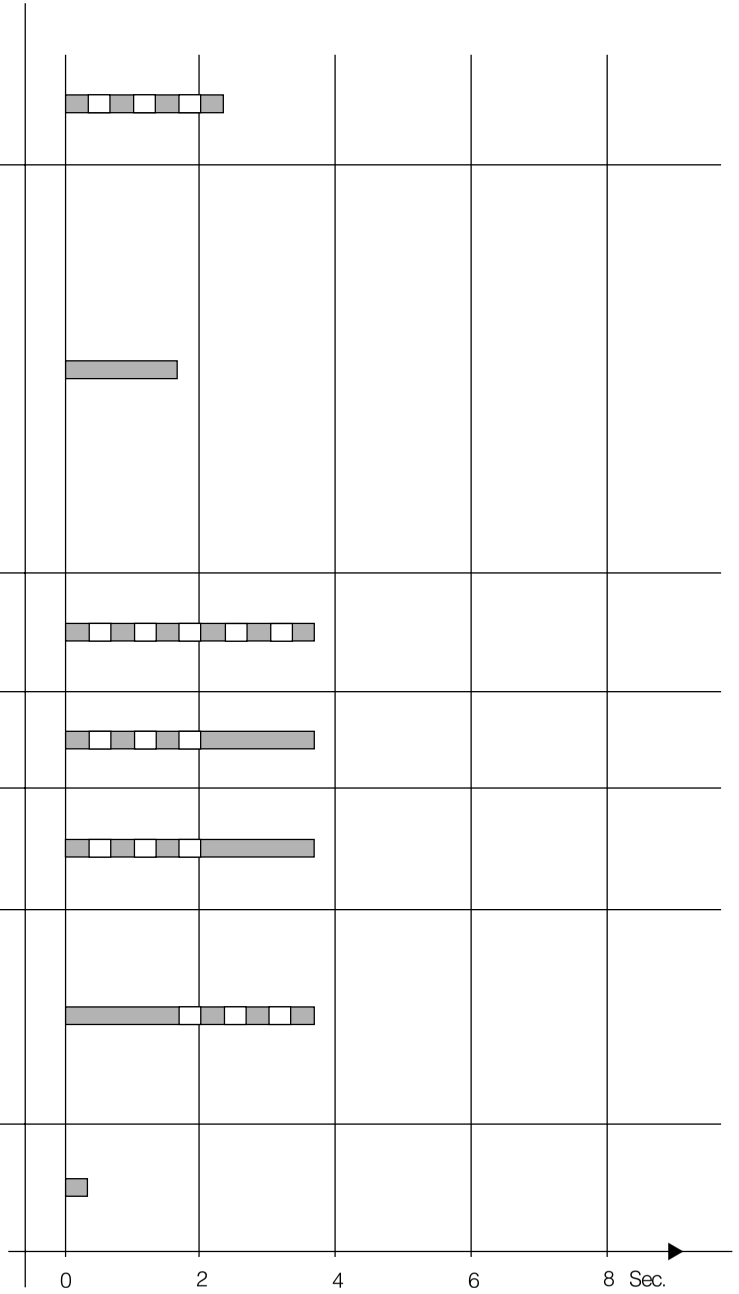
Fault signal / flashing code



Function and fault test

Fault signal / flashing code

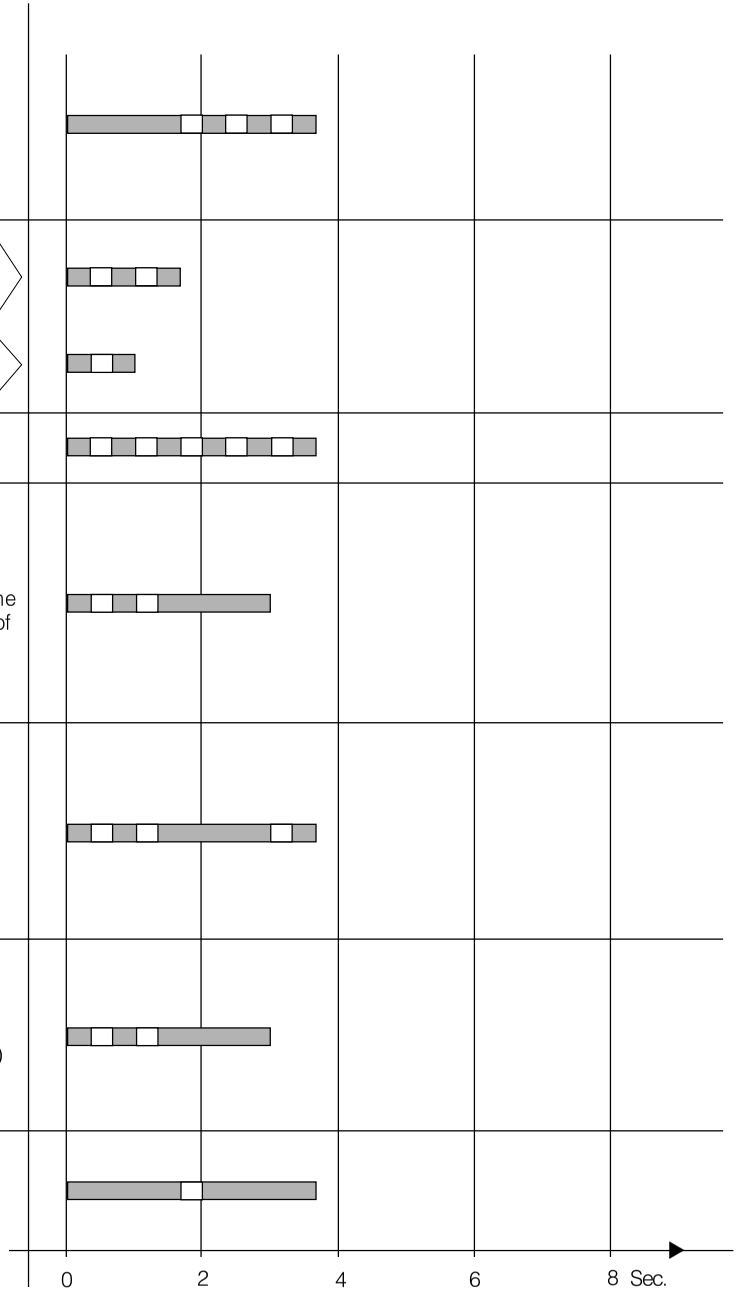
Fault code / Fault description	Remedy
020 Glow plug interruption 021 Short-circuit at glow plug	Check glow plug (nominal value: approx. 2 ohms), replace it if necessary. Check terminal 4 (1.5 white) on the control unit (internal plug) leading to glow plug to terminal 3 (1.5 brown) for continuity/short-circuit. If O.K. → replace control unit.
033 Burner motor or speed controller defective, speed deviation	Speed deviation for longer than 60 seconds. Nominal values: 7300 rpm (POWER), 5700 rpm (HIGH), 3600 rpm (MEDIUM), 2000 rpm (LOW). • Check burner motor: apply supply voltage to motor. Connect + to 1.5 black and – to 1.5 orange. Motor does not turn → replace burner motor with integrated sensor. • Check sensor supply. Switch on heater and measure voltage between output 13 (0.25 red) and 14 (0.25 green) at the control unit (internal plug). Nominal value: 8 V. If deviation → replace control unit. • Check sensor: Measure voltage between terminal 15 (0.25 violet) and 14 (0.25 green) with an analog voltmeter when the blower is running. Nominal value: 4 V (+/– 0.3 V) average value (8 V square-wave signal). If deviation → replace motor with integrated sensor. If sensor signal is O.K., then the speed controller is defective. → Change control unit.
037 Water pump is not working 042 Short-circuit at water pump output	Check water pump (driven externally Test connection 6 (0.5 swrt) on the control unit (int. plug) for short circuit. Test water pumps and cables
043 Short-circuit at external components	Check terminal 2 (1 green) of control unit (external plug) for short-circuit. Check connected components (max. current 6 A), replace them if necessary.
047 Short-circuit of metering pump 048 Metering pump interruption	Check terminal 1 (1 blue) of control unit (external plug) and leads up to metering pump for short-circuit/interruption. Check the metering pump. Nominal value: approx. 20 ohms. Replace if necessary.
050 Too many failed starts	The control unit is interlocked after it has been switched on 10 times in succession (= 20 failed starts) without flame detection (fault code 052). Check the fuel supply, glow plug, exhaust piping, combustion air piping and flame sensor. Unlocking by deleting the error memory with diagnosis unit/ PC or plus signal for 0.5 to 5 sec. on connection 7 (0.5 v) on the control unit (ext. plug) with heater switched on.
051 Flame message is displayed when heater is switched on	Flame sensor signals a temperature of greater than 80 °C despite 4 minutes of cooling with cold air. Impedance at flame sensor >1300 ohm. If no combustion takes place → check the flame sensor, replace it if necessary. Flame sensor values: 900 ohms at – 25 °C 1100 ohms at + 25 °C



Function and fault test

Fault code Fault description	Remedy
052 Safety time exceeded – heater does not start	No flame was detected during the start-up phase. Flame sensor value of less than 80 °C (1310 ohms). Check the fuel supply, glow plug, exhaust piping, combustion air piping and flame sensor. Flame sensor values: 900 ohms at – 25 °C 1100 ohms at + 25 °C
053 Flame loss in „Power" setting 054 Flame loss in „High" setting 055 Flame loss in „Medium" setting 056 Flame loss in „Low" setting	Heater has started (flame detected) and indicates flame loss in a power setting. Check fuel flow rate, blower speed, fuel supply, exhaust pipe and combustion air piping. If combustion is O.K., check flame sensor, replace if necessary. Flame sensor values: 900 ohms at – 25 °C 1100 ohms at + 25 °C
059 Water temperatur rises too quickly	Check water circulation (012) and temperature control sensor (060/061)
060 Temperature control sensor interruption 061 Short circuit in temperature control sensor	Control sensor signals temperature value outside measurement range. Check the connecting leads (0.35 yellow). For this purpose, dismantle the control unit, disconnect the internal plug from the control unit and measure the impedance between 9 and 11. Impedance between terminals 9 and 11 of the control unit (internal plug): greater than 10 kohms (in the event of interruption) less than 100 ohms (in the event of short-circuit) Temperature sensor values: 650 ohms at – 25 °C 1000 ohms at + 25 °C
064 Flame sensor interruption 065 Short circuit in flame sensor	Flame sensor signals temperature value outside measurement range. Check the connecting leads (0.35 green). Impedance between terminals 10 and 12 of the control unit (internal plug): greater than 50 kohms (in the event of interruption) less than 100 ohms (in the event of short-circuit) Flame sensor values: 900 ohms at – 25 °C 1100 ohms at + 25 °C
071 Overheat sensor interruption 072 Short circuit in overheat sensor	Overheat sensor signals temperature value outside measurement range. Check the connecting leads (0.35 blue). Impedance between terminals 5 and 8 of the control unit (internal plug): greater than 700 kohms (in the event of interruption) less than 100 ohms (in the event of short-circuit) Overheat sensor values: 150 kohms at – 25 °C 10 kohms at + 25 °C
090 Control unit defective (internal reset) 093 Control unit defective (RAM fault) 094 Control unit defective (EPROM fault) 097 Control unit defective (general fault)	Internal control unit error in microprocessor/memory detected. Replace control unit

Fault signal / flashing code



Faults which are not displayed:

Faults		Cause	Remedy
Combustion generates soot		Combustion air pipe/ exhaust pipe clogged	Clear obstruction
		Metering pump conveying too much	Measure fuel quantity
		Combustion air blower speed too low	Measure CO_2 content. If ≥ 13% in „High" setting, replace blower.
		Deposits inside heat exchanger	Remove heat exchanger and clean
No hot air in interior		Heater lever closed	Open heater lever
		Vehicle blower not switched on	Switch on vehicle blower
		Vehicle blower relay defective	Replace relay
		Vehicle blower fuse blown	Renew fuse

Mode of operation

Switch-on

The pilot light in the switch or heating timer comes on when the heater is switched on. The combustion air blower and water pump start and the preheating phase of the glow plug begins.
After the preheating phase, which takes approx. 60 seconds, the metering pump starts and fuel into the combustion chamber. The fuel/air mixture ignites. Then the speed of the combustion air fan increases together with the pulse frequency for the dosing pump continuously to the stage „MEDIUM", then to „HIGH", then if necessary to „POWER with 9500 watt", to bring the combustion chamber up to temperature.
Glow plug cutout is time-controlled. If no flame is detected by the flame sensor, the heater is restarted.
If no flame is detected when the heater is started for a second time, the heater cuts out and a fault is displayed.
The blower continues to run cool down the heater.

Heating operation

When the heater is first started up after switch-on, it works in the „Power" setting 9500 W until

- either the water temperature exceeds the changeover limit „POWER"/„HIGH" (e.g. 72 °C),
- or the max. operating time in this setting (2 hours) is exceeded.

The heater then switches to the „HIGH-MEDIUM-LOW-OFF" settings depending on heat demand. If the cooling water reaches 55 °C (for example), the temperature sensor switches on the vehicle blower. The max. cooling water temperature in the individual control steps is 85 °C.

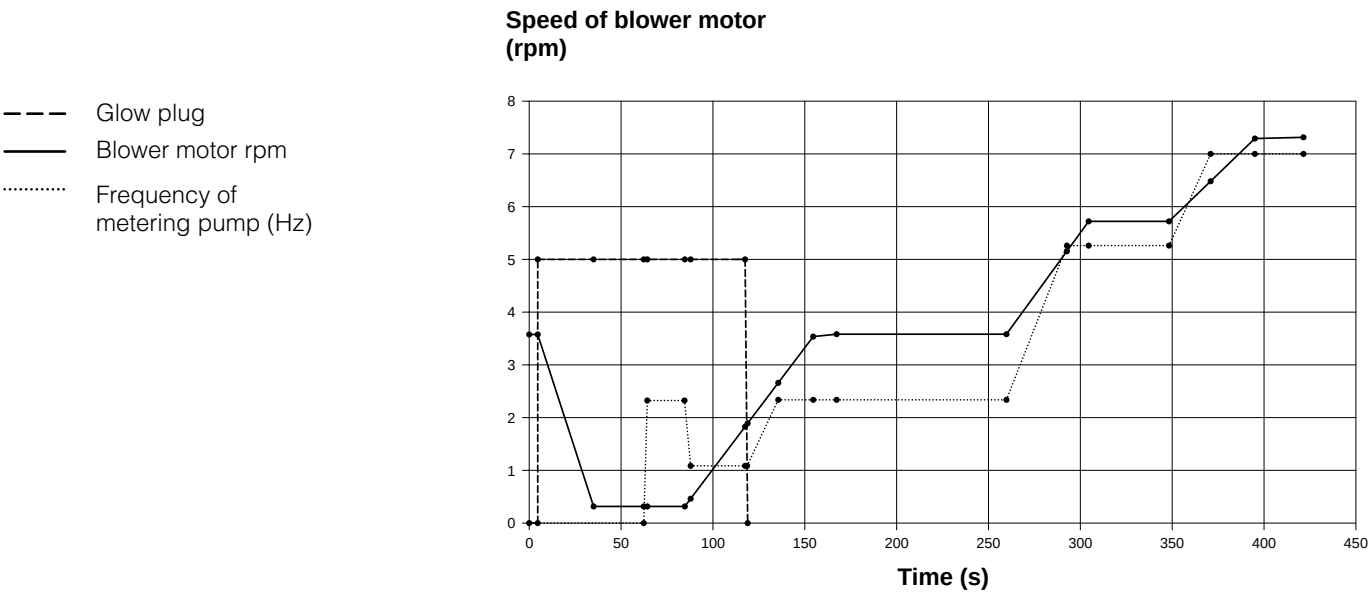
- If heat demand is 7500 Watts or higher, the heater operates in the „HIGH"setting. If the water temperature drops to 60 °C in the process, the heater switches back to the „POWER" setting.

- If heat demand is between 7500 Watts and 3200 Watts, the heater switches between „HIGH and MEDIUM".

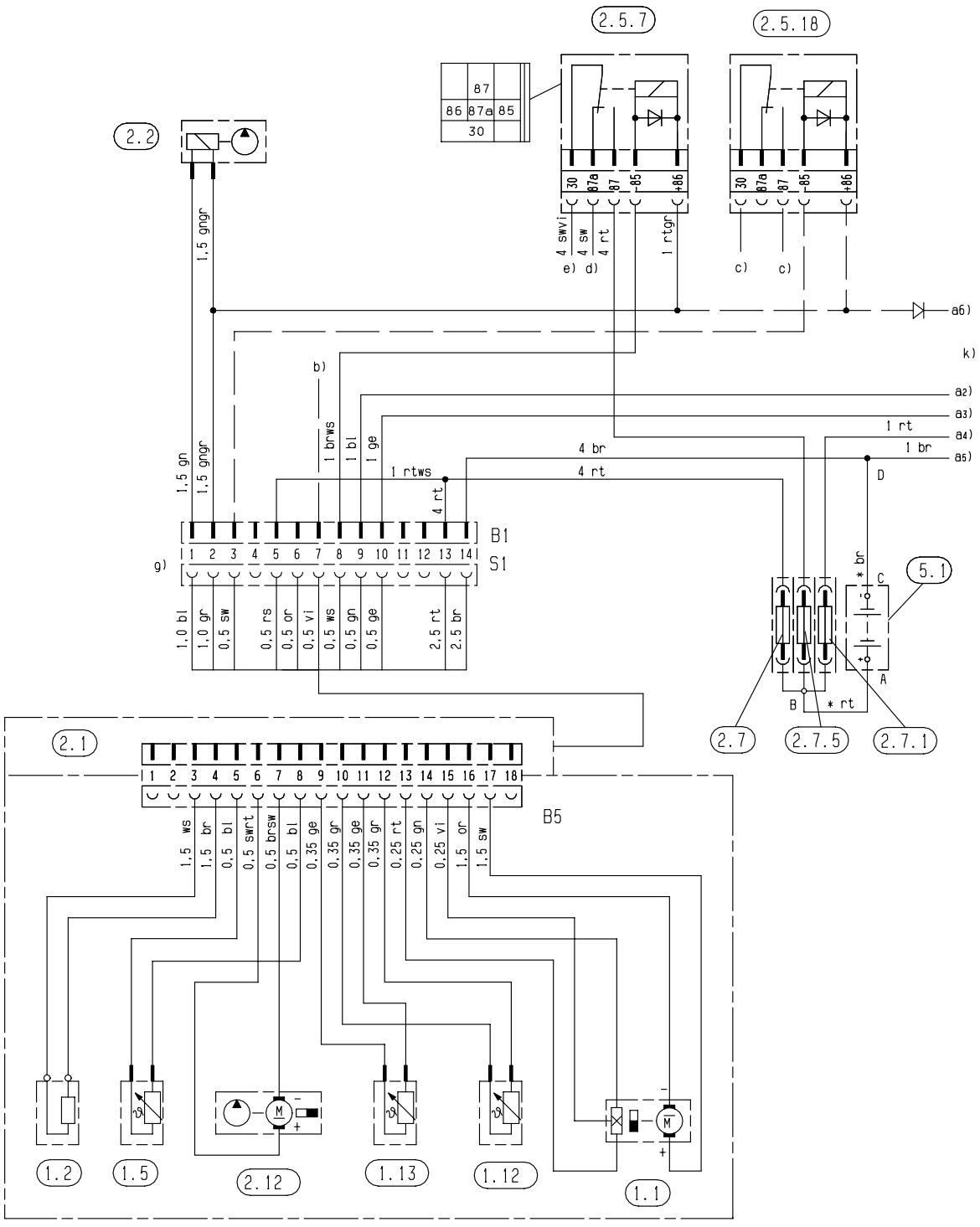
- If heat demand is 1500 Watts or less, the heater operates in the „LOW" setting.
  If heat demand in the „LOW" setting is so low that the cooling water temperature reaches 85 °C, the heater switches from „LOW" to „OFF". The blower continues to run for 210 seconds.
  The coolant pump continues to run until re-start of the heating device and vehicle fan.
  Once the temperature of the cooling water drops to 70 °C (for example), the heater restarts in the „MEDIUM" setting.

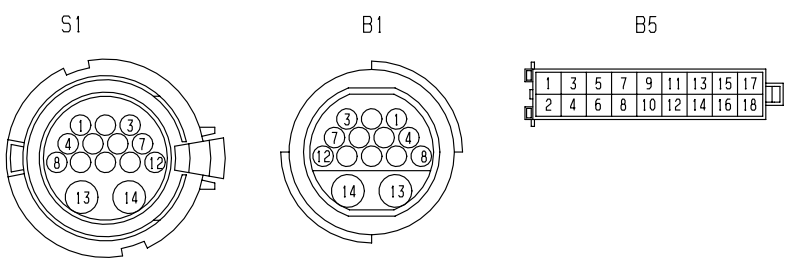
Control temperatures		Speed of blower motor	
VEHICLE BLOWER ON	55 °C	POWER	– 7300 rpm
POWER → HIGH	72 °C	HIGH	– 5700 rpm
HIGH → MEDIUM	78 °C	MEDIUM	– 3600 rpm
MEDIUM → LOW	79 °C	LOW	– 2000 rpm
LOW → OFF	85 °C		
OFF → MEDIUM	68 °C		
MEDIUM → HIGH	68 °C		
LOW → MEDIUM	73 °C		
HIGH → POWER	60 °C		

Startup sequence

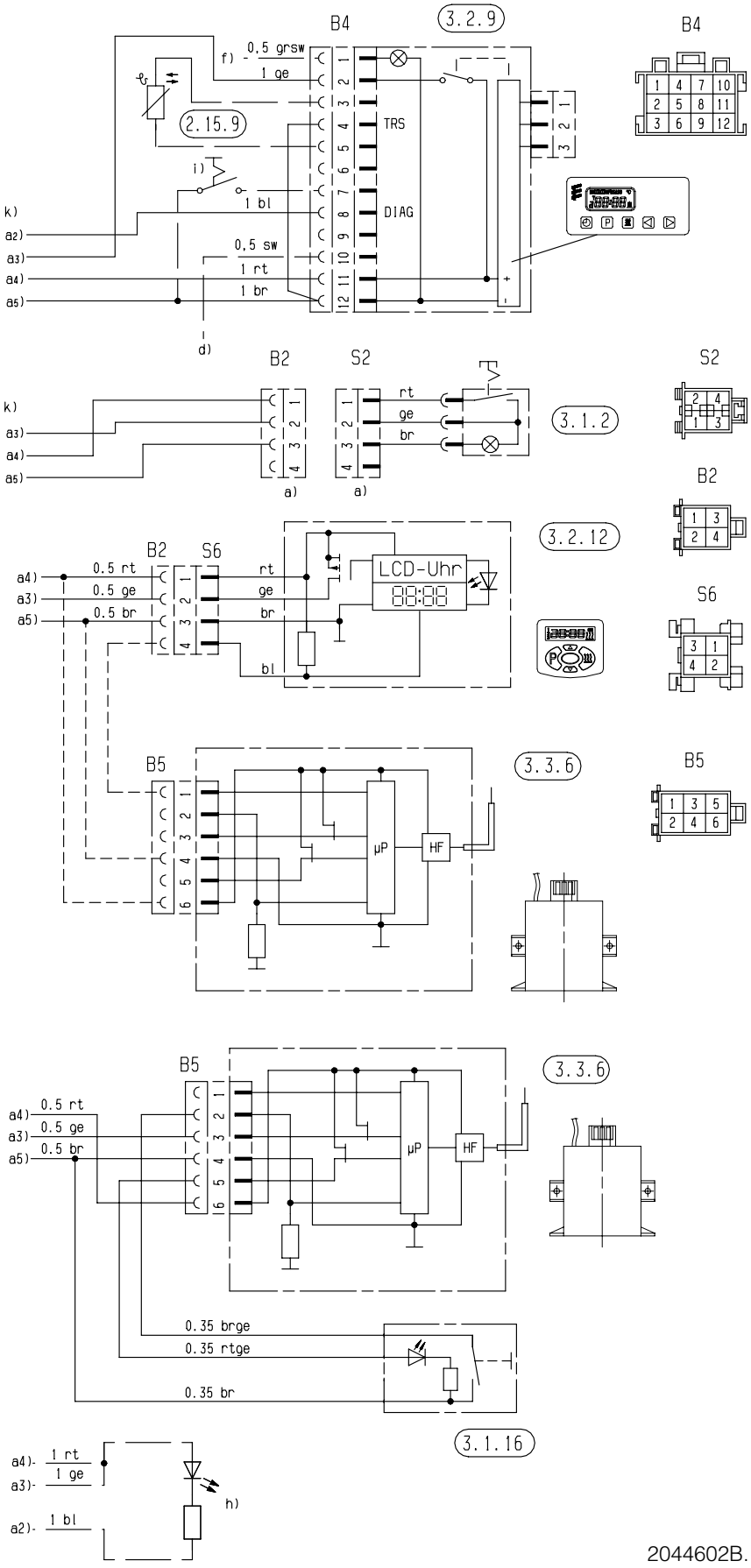


Wiring diagram: Heater, standard version – 25 2081 / 25 2044





Wiring harness and operating elements, standard version – 25 2081 / 25 2044



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Parts list

1.1 Burner motor
1.2 Glow plug
1.5 Safety thermal cutout switch
1.12 Flame sensor
1.13 Temperature sensor

2.1 Control unit
2.2 Fuel metering pump
2.5.7 Vehicle blower relay
2.5.18 Switch-over relay for water circulation system, to be fitted by customer if required
2.7 Main fuse
12 volt = 20 A
24 volt = 15 A
2.7.1 Fuse for control switch 5 A
2.7.5 Fuse for vehicle blower 25 A
2.12 Water pump
2.15.9 Sensor, external temperature

3.1.2 Heating switch (continuous operation)
3.1.16 Key button, radio remote control
3.2.9 Timer
3.2.12 Timer "Mini 98" version
3.3.6 Radio remote control

5.1 Battery

a) Connection for operating device
b) External control for water pump (with plus signal)
c) Water circulation changeover: relay closes at a water temperature of 68 °C and opens at 63 °C
d) Ignition (terminal +15)
e) Vehicle blower step switch
f) Light (terminal 58)
g) Connection for heater
h) Display, flashing code (optional) (LED at choice, series resistor 1.5 kohms)

i) Connection for external heating key

k) Connection leads in plug B2, B4 or B5

a2) Diagnosis
a3) Switch-on signal, S+
a4) Plus supply, +30
a5) Minus supply, –31
a6) Battery separating switch (+) on / off (diode: order number 208 00 012)

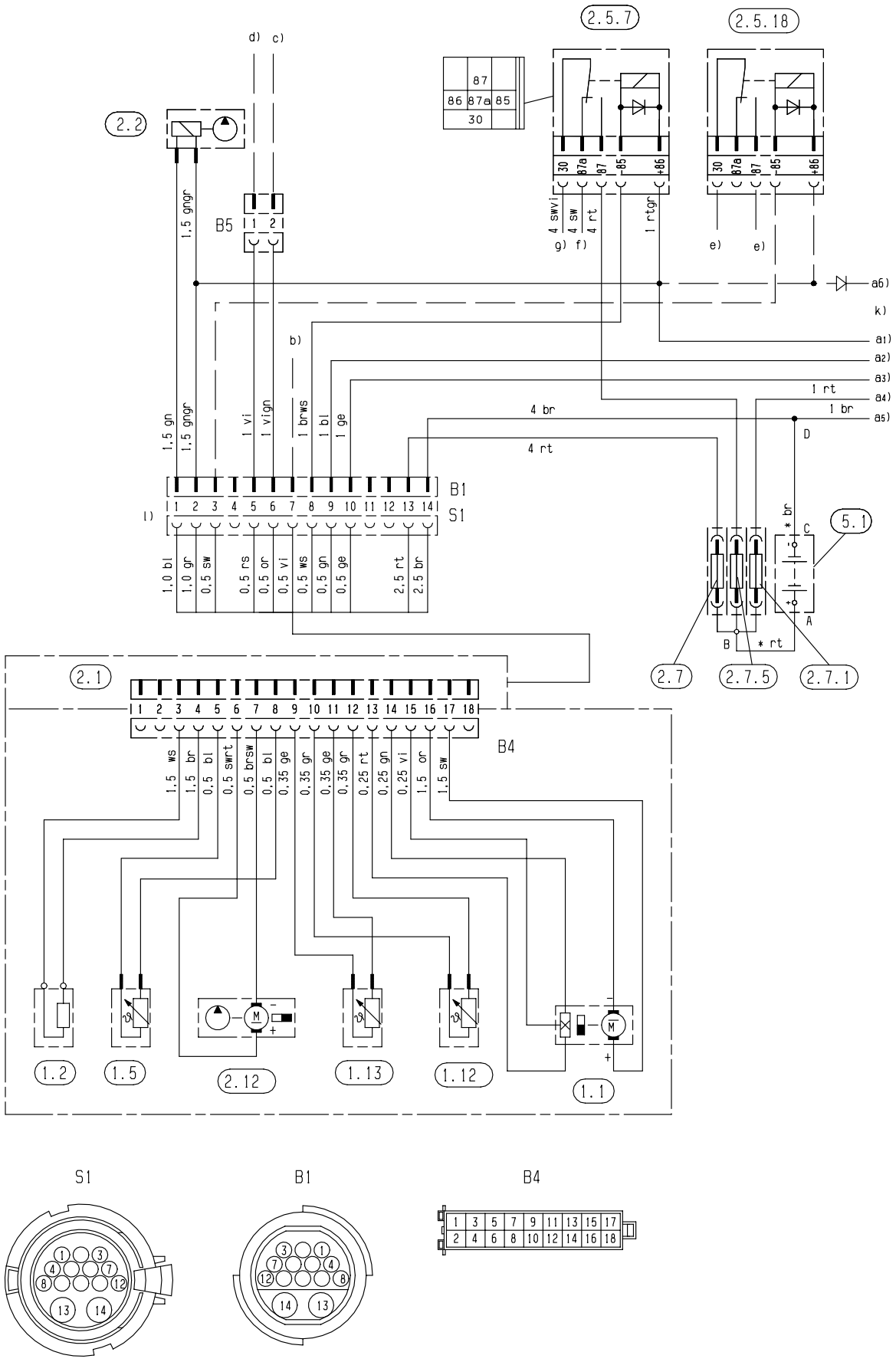
* Length A – B and C – D:
< 5 m: cross-section 4 mm²
> 5 m < 8 m: cross-section 6 mm²

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

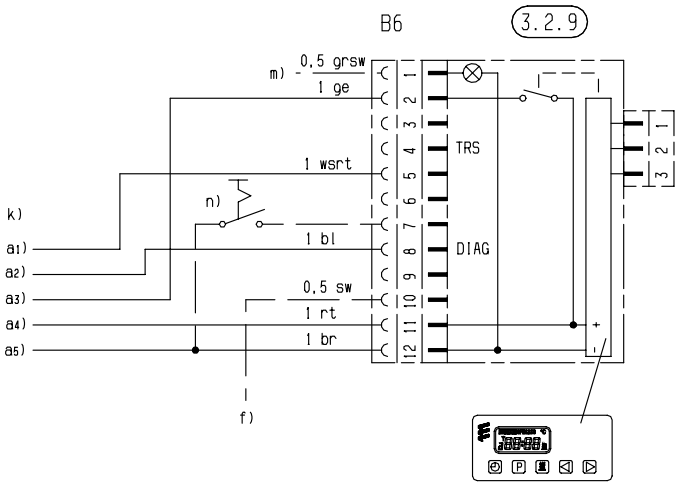
Cable colours

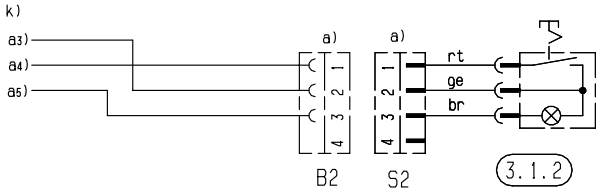
sw = black
ws = white
rt = red
ge = yellow
gn = green
vi = violet
br = brown
gr = grey
bl = blue
li = lila

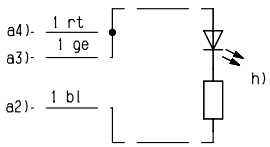
Wiring diagram: Heater, TRS 003 version – 25 2081 / 25 2044

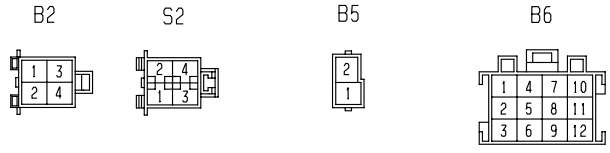


Wiring harness and operating elements, TRS 003 version – 25 2081 / 25 2044









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Parts list

1.1 Burner motor
1.2 Glow plug
1.5 Safety thermal cutout switch
1.12 Flame sensor
1.13 Temperature sensor

2.1 Control unit
2.2 Fuel metering pump
2.5.7 Vehicle blower relay
2.5.18 Switch-over relay for water circulation system, to be fitted by customer if required
2.7 Main fuse
12 volt = 20 A
24 volt = 15 A
2.7.1 Fuse for control switch 5 A
2.7.5 Fuse for vehicle blower 25 A
2.12 Water pump
(max. additional load: 4 A)

3.1.2 Heating switch (continuous operation)
3.2.9 Timer

5.1 Battery

a) Connection for operating device
b) External control for water pump (with plus signal)
c) with TRS D+ (alternator)
d) with TRS HA– (auxiliary drive / secondary drive) / minus switch
Connect lead to + pole if unavailable
e) Water circulation changeover:
relay closes at a water temperature of 68 °C and opens at 63 °C
(with D+ 58 °C / 45 °C)
f) Ignition (terminal +15)
g) Vehicle blower step switch
h) Display, flashing code (optional)
(LED at choice, series resistor 1.5 kohms)
k) Connection leads in plug B2 or B6
l) Connection for heater
m) Light (terminal 58)

n) Connection for external heating key

a1) TRS feedback
a2) Diagnosis
a3) Switch-on signal, S+
a4) Plus supply, +30
a5) Minus supply, –31
a6) Battery separating switch (+) on / off
(diode: order number 208 00 012)

* Length A – B and C – D:
< 5 m: cross-section 4 mm²
> 5 m < 8 m: cross-section 6 mm²

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

Cable colours

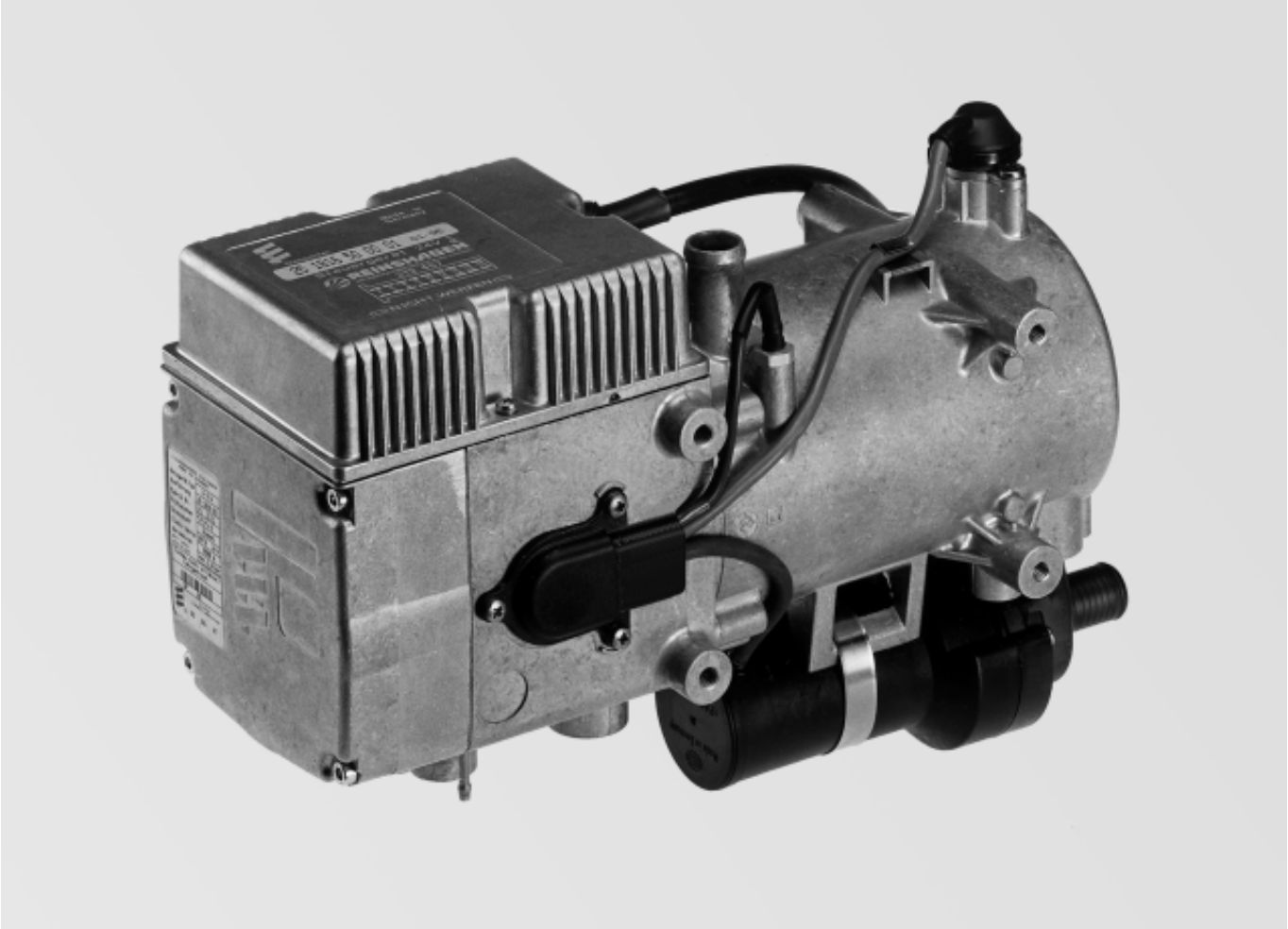
sw = black
ws = white
rt = red
ge = yellow
gn = green
vi = violet
br = brown
gr = grey
bl = blue
li = lila

Repair steps

Remove / install

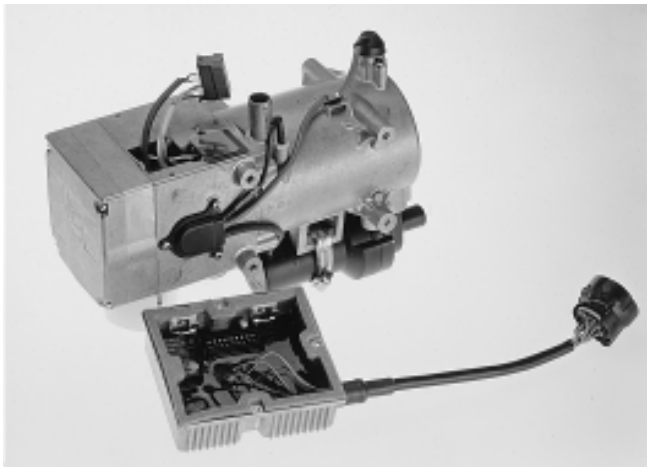
1. Control unit
2. Glow plug cable
3. Glow plug
4. Safety thermal cutout switch/temperature sensor/water pump
5. Cover/blower
6. Flame sensor/heat exchanger fastening screws
7. Housing including heat exchanger, dismantled
8. Burner
9. Burner, dismantled
10. Heat exchanger
11. Heat exchanger, dismantled

Overall view of heater

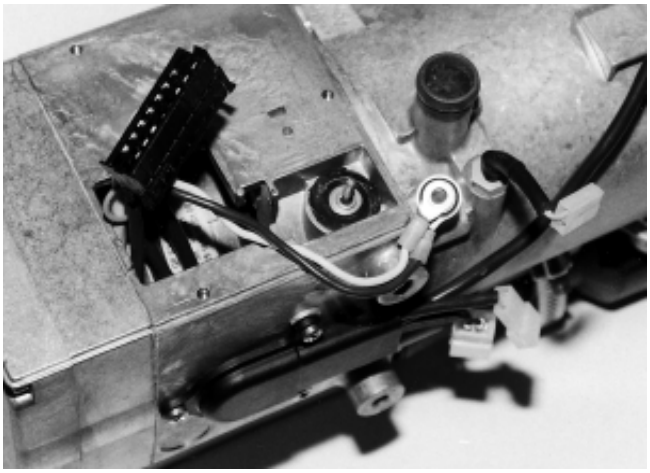


Remove / install

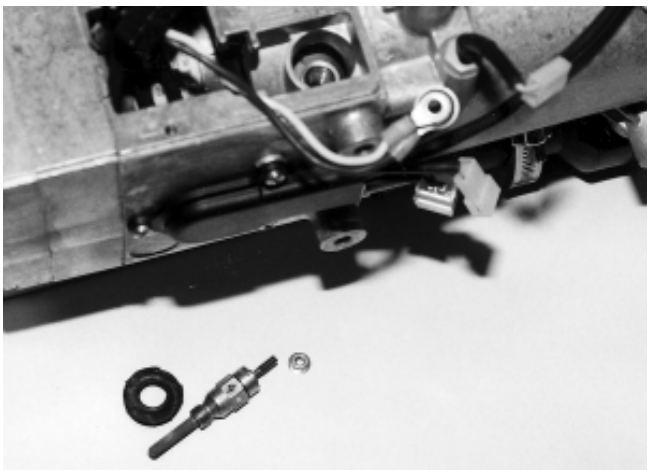
1. Control unit (on installation of the control unit, grease the gasket with sealing paste)



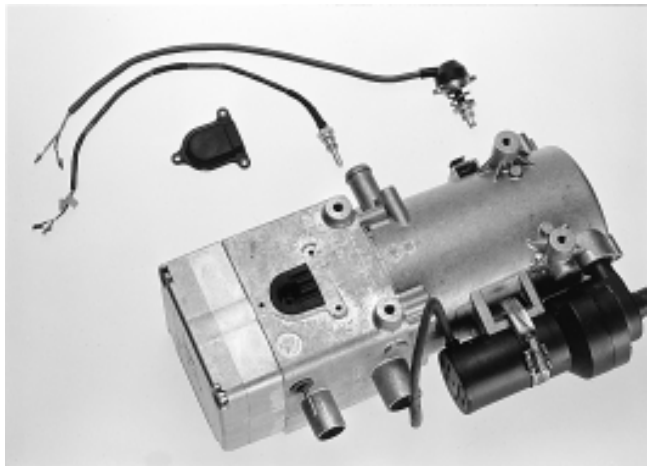
2. Glow plug cable



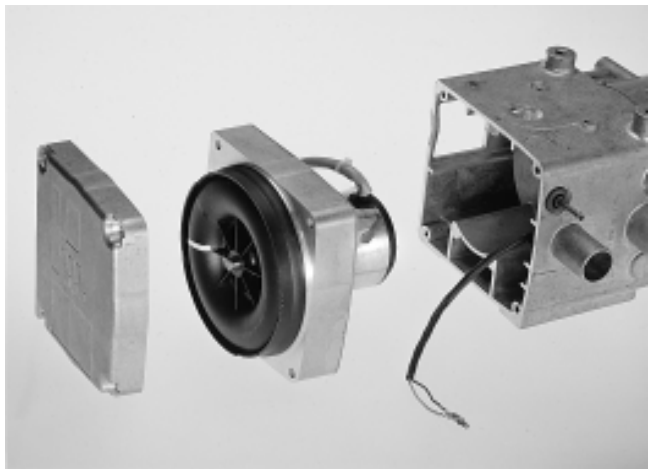
3. Glow plug



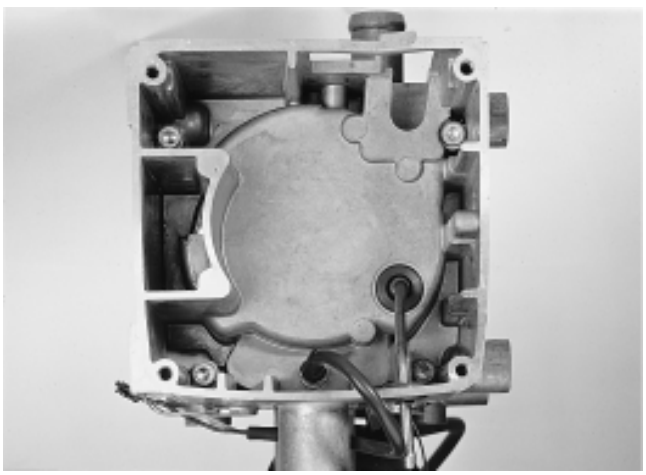
4. Safety thermal cutout switch/temperature sensor/water



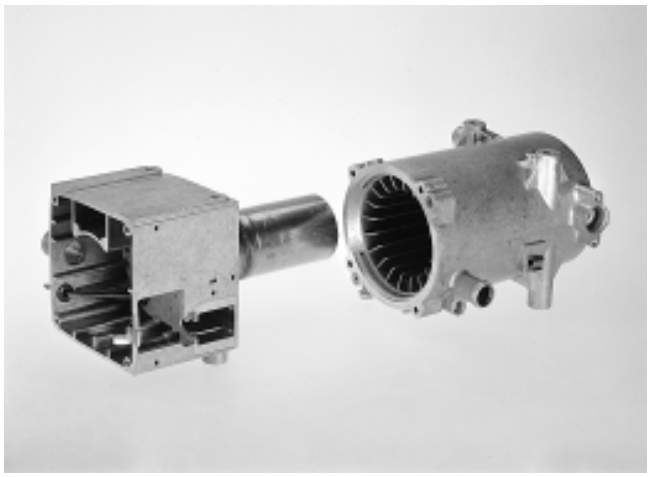
5. Cover/blower (on installation of the cover, clean the sealing surface and apply liquid seal)



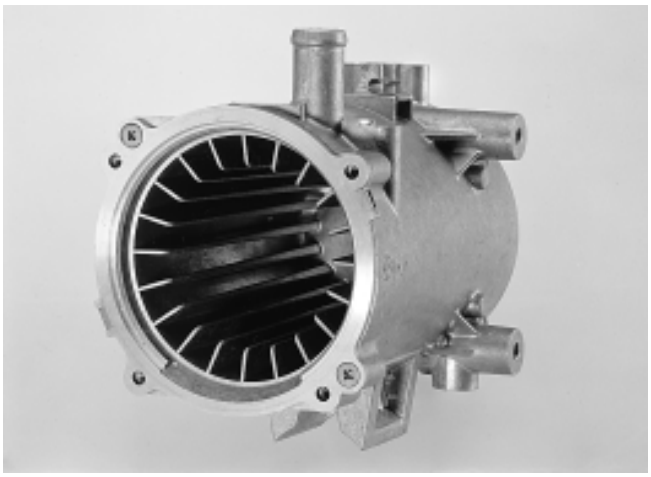
6. Flame sensor/heat exchanger fastening screws



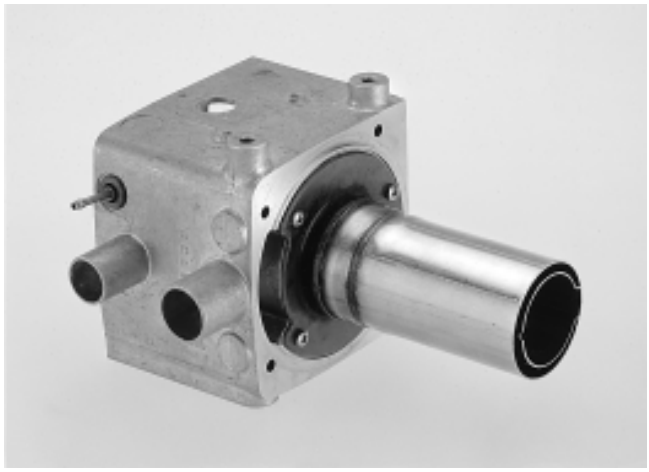
7. Housing including heat exchanger, dismantled



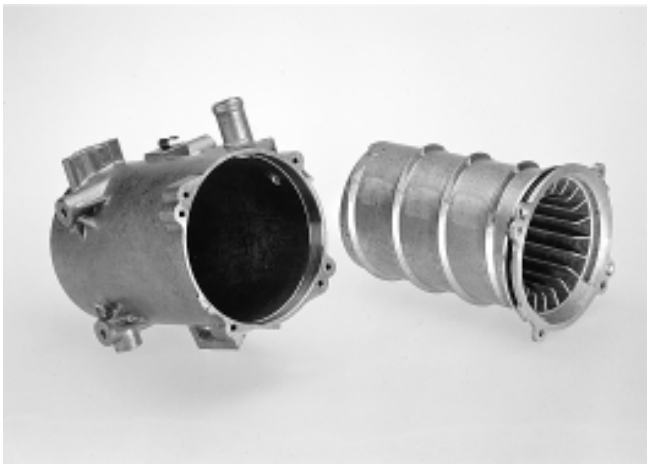
10. Heat exchanger



8. Burner



11. Heat exchanger, dismantled



9. Burner, dismantled