REPAIR INSTRUCTIONS
HYDRONIC II COMFORT

THE REPAIR INSTRUCTIONS ARE VALID FOR THE FOLLOWING ENGINE-INDEPENDENT WATER HEATERS

Heaters for petrol

B 5 SC – 12 V	20 1928 05 00 00

Heaters for diesel

D 5 SC – 12 V	25 2598 05 00 00

A WORLD OF COMFORT

Eberspächer

CONTENTS

CONTENTS

This list of contents gives you precise information about the contents of the Troubleshooting and Repair Instructions.

If you are looking for a term, technical term or you would like an abbreviation explained, please use the relevant index at the end of the instructions.

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1 INTRODUCTION

FOREWORD

These Troubleshooting and Repair Instructions are applicable to the heaters listed on the title page, to the exclusion of all liability claims. Depending on the version or change status of the heater, there may be differences between it and these troubleshooting and repair instructions.
The user must check this before carrying out the repair work and, if necessary, take the differences into account.

SPECIAL TEXT STRUCTURE, PRESENTATION AND PICTURE SYMBOLS

Special text formats and picture symbols are used in these instructions to emphasise different situations and subjects. Please refer to the following examples for their meanings and appropriate action.

SPECIAL TEXT FORMATS AND PRESENTATIONS

- This dot (▪) indicates a list, which is introduced by a heading.
  – If an indented dash (–) follows a “dot”, this list is a sub-section of the black dot.

Underlined blue text denotes a cross-reference, which can be clicked in the PDF format. The part of the document named in the text is then displayed.

PICTURE SYMBOLS

DANGER!
This information points out a potential serious or fatal danger. Ignoring this information can result in severe injuries.
➔ This arrow indicates the appropriate precaution to take to avert the danger.

ATTENTION!
This information points out a dangerous situation for a person and / or the product. Failure to comply with these instructions can result in injuries to people and / or damage to machinery.
➔ This arrow indicates the appropriate precaution to take to avert the danger.

PLEASE NOTE!
These remarks contain recommendations for use and useful tips for the operation, installation and repair of the heater.

HEATER DOCUMENTATION

CONTENT AND PURPOSE OF THESE TROUBLESHOOTING AND REPAIR INSTRUCTIONS

These instructions are to be used to correct faults and to carry out repairs on the heater. The work required for this may only be done by personnel appropriately trained by a JE service partner.

FURTHER DOCUMENTATION

TECHNICAL DESCRIPTION, INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS

This documentation provides the JE service partner with all the necessary technical information, describes the correct installation in accordance with the regulations and provides the customer with the necessary information for safe operation of the heater.

SPARE PARTS LIST

The spare parts list provides the JE service partner with the necessary information for ordering spare parts in case of repairs.

1 INTRODUCTION

SAFETY INSTRUCTIONS FOR INSTALLATION AND REPAIR

ATTENTION!

Improper installation or repair of Eberspächer heaters can cause a fire or result in toxic exhaust entering the inside of the vehicle.
This can cause serious and even fatal risks.

- ➔ The heater may only be installed according to the specifications in the technical documents or repaired using original spare parts by authorised and trained persons.
- ➔ Installation and repairs by unauthorised and untrained persons, repairs using non-original spare parts and without the technical documents required for installation and repair are dangerous and therefore are not permitted.
- ➔ A repair may only be carried out in connection with the respective unit-related technical description, installation instructions, operating instructions and maintenance instructions.
  This document must be carefully read through before / during installation and repair and followed throughout. Particular attention is to be paid to the official regulations, the safety instructions and the general information.

PLEASE NOTE!

- The relevant rules of sound engineering practice and any information provided by the vehicle manufacturer are to be observed during the installation and repair.
- When carrying out electric welding on the vehicle, the positive cable at the battery should be disconnected and placed at ground to protect the control box.

LIABILITY CLAIM / GUARANTEE

Eberspächer does not accept any liability for defects and damage, which are due to installation or repair by unauthorised and untrained persons.
Compliance with the official regulations and the safety instructions is prerequisite for liability claims.
Failure to comply with the official regulations and safety instructions leads to exclusion of any liability of the heater manufacturer.

ACCIDENT PREVENTION

General accident prevention regulations and the corresponding workshop and operating safety instructions are to be observed.

INITIAL START-UP OF THE HEATER OR FUNCTIONAL TEST AFTER A REPAIR

- After installing or carrying out a repair on the heater, the coolant circuit and the whole fuel supply system must be vented carefully.
- Comply with the instructions issued by the vehicle manufacturer.
- Open all heating circuits before the trial run (set the temperature control to “warm”).
- During the heater trial run, all water and fuel connections must be checked for leaks and secure, tight fit.
- If faults occur while the heater is running, use a diagnostic unit to correct the cause of the fault.

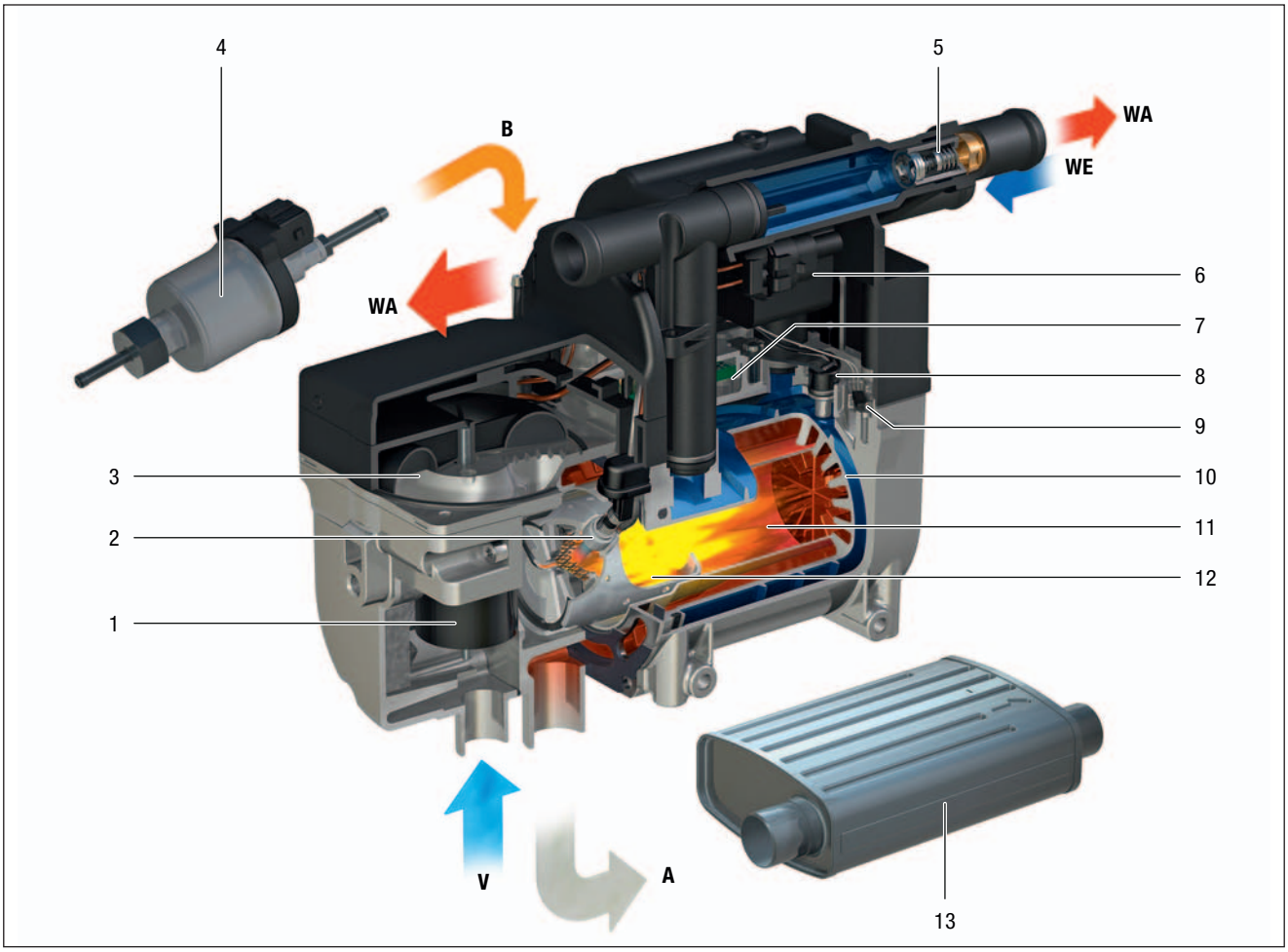
EMERGENCY SHUTDOWN – EMERGENCY OFF

If an emergency shutdown – EMERGENCY OFF – is necessary during operation, proceed as follows:

- Switch the heater off at the control unit or
- remove the fuse or
- disconnect the heater from the battery.

2 FUNCTION AND OPERATION

CUTAWAY VIEW OF THE HYDRONIC II COMFORT B 5 SC

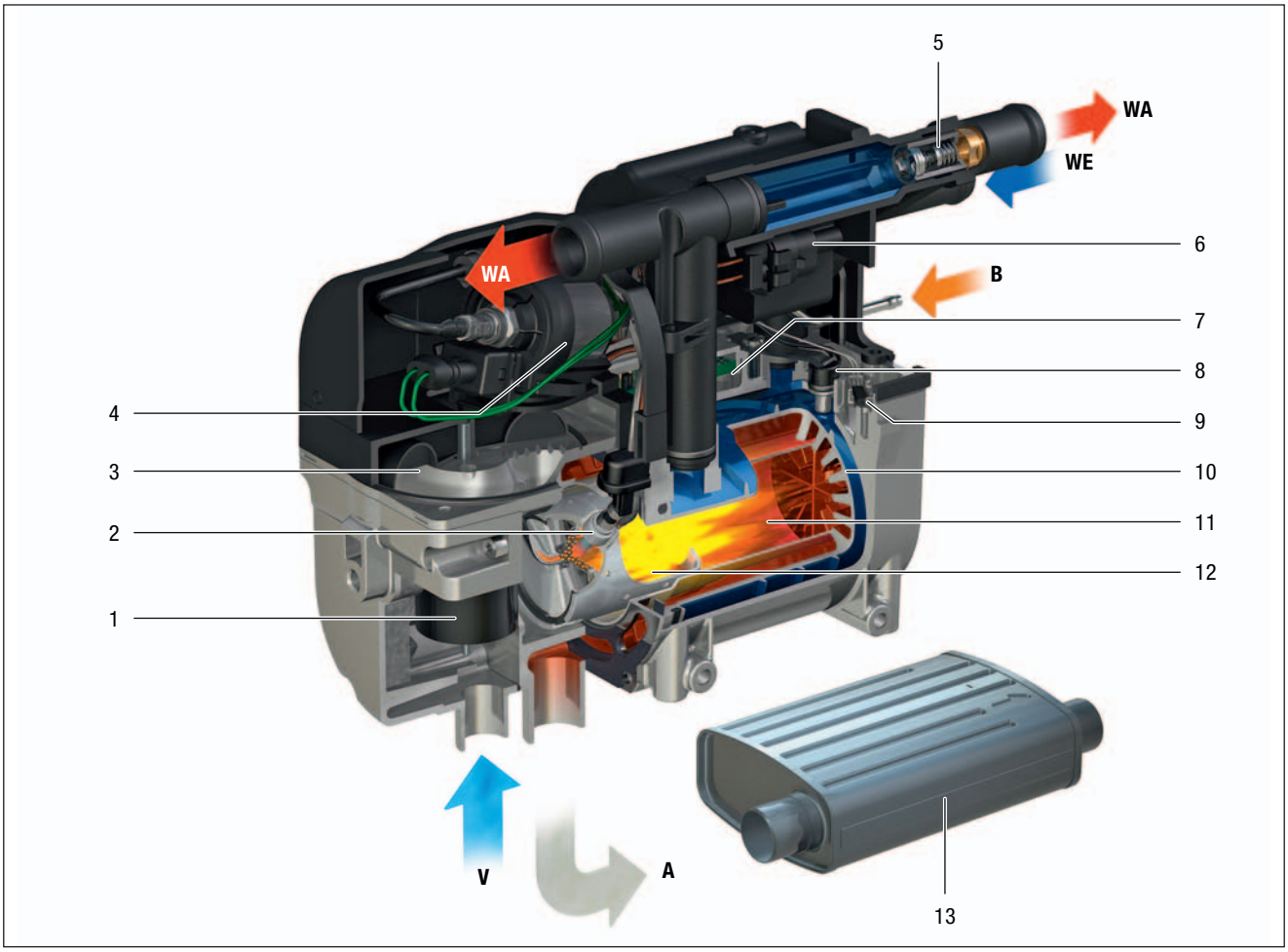


1 Electric motor
2 Glow plug
3 Combustion air blower
4 Metering pump
5 Switching element
6 Water pump
7 Control box
8 Overheating sensor
9 Surface sensor
10 Heat exchanger
11 Flame tube
12 Combustion chamber
13 Exhaust silencer

A = Exhaust
B = Fuel
V = Combustion air
WA = Water discharge
WE = Water inlet

2 FUNCTION AND OPERATION

CUTAWAY VIEW OF THE HYDRONIC II COMFORT D 5 SC



1 Electric motor
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8 Overheating sensor
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2 FUNCTION AND OPERATION

DESCRIPTION OF FUNCTIONS

SWITCHING ON (PARKING HEATER MODE)

PARKING HEATER MODE

When the heater is switched on, the ⁅⁅ symbol appears in the control unit or the operating display lights up.

HEATING MODE

The water pump starts up and, following a preset sequence, the combustion air blower, glow plug and metering pump are started.

The glow plug is switched off once a stable flame has formed in the combustion chamber.

Depending on the heat requirements, the heater runs at the following levels: Power – High – Low – Off (pause mode). The temperature thresholds for these are permanently programmed in the electronic control box.

If the coolant liquid is cold, the heater starts in control stage “High” and if necessary switches to the “Power” control stage. If the coolant liquid is hot, the start takes place in “Low” control stage.

After the water temperature has reached approx. 75 °C – depending on the selected blower setting – the heater switches to “High” control stage.

If the water temperature continues to rise up to 80 °C, the heater switches to “Low” control stage.

- If the heat output achieved in “Low” control stage is insufficient, the water temperature drops to 70 °C – the heater switches back to “High” control stage.
- If the heating output in the “Low” control stage is sufficient the heater remains in “Low” control stage. If the water temperature rises to 85 °C, the heater switches to the “Off” control stage (pause mode) and then starts the afterrun.
- If the water temperature cools to 75 °C during pause mode, a controlled start follows in “Low” control stage.
  During pause mode the water pump continues to run and the On symbol ⁅⁅ continues to be displayed in the control unit.

HEATING AT HIGH ALTITUDES

When using the heater at high altitudes, please note:

- Heating at altitudes up to 1500 m:
  – Unlimited heating possible.
- Heating at altitudes over 1500 m – 3000 m:
  – The heater can be run for short periods (e.g. driving through a mountain pass or taking a break in your journey).
  – During longer stays, e.g. winter camping, the fuel supply must be adjusted to the altitude.
  The altitude adjustment can be made by installing an air pressure sensor. The air pressure sensor is included in the altitude kit – order No. 22 1000 33 22 00.

CONTROL AND SAFETY DEVICES

- If, 100 seconds after being switched on for petrol heaters and 70 seconds after being switched on for diesel heaters, the heater does not ignite, the start is repeated.
  The heater is automatically shut down if, after three further start attempts in the case of a petrol / ethanol heaters and two attempts with a diesel heater, the heater fails to start within the preset safety period (240 seconds).
  After an impermissible number of failed start attempts, the control box is locked.*
- If the flame goes out independently during operation, the heater is restarted and if necessary, a maximum of two further start attempts are made within the preset safety time.
  If the heater does not ignite or ignites but goes out again within 15 minutes, a safety lock-out occurs.
  The safety lock-out can be cancelled by briefly switching off and on again (heater ON / OFF).
- In the event of overheating (e.g. lack of water, poorly vented cooling water circuit), the overheating sensor triggers, the fuel feed is interrupted and the heater is switched off automatically. Once the cause of the overheating has been eliminated, the heater can be restarted by switching it off and on again (heater ON / OFF).
  Requirement: the heater is sufficiently cooled, cooling water temperature < 70 °C. After an impermissible number of shut-downs on overheating the control box is locked*.
- If the lower or upper voltage limit is reached, the heater is shut down automatically.
- The heater does not start up if the glow plug is defective or if the electric cable to the metering pump is interrupted.
- The speed of the blower motor is monitored continuously. If the blower motor does not start up, if it is blocked or if the speed falls below 40 % of the desired speed, the heater is shut down automatically after 60 sec.

  * Cancellation of the lock or reading out errors is possible
  – with the EasyStart Timer,
  – with the EasyStart Remote+ radio remote control,
  – with the EasyStart Call radio remote control
  – with the EasyStart Select control unit,
  – using the EDiTH Basic diagnostics tool.

Operation and fault list from page 9.

PLEASE NOTE!

Do not repeat the switching off / on routine more than twice.

2 FUNCTION AND OPERATION

TECHNICAL DATA OF THE HYDRONIC II COMFORT B 5 SC

Heater type		**Hydronic II**		
Heater version		B 5 SC		
Heating medium		Mixture of water and anti-freeze (Proportion of antifreeze at least 10 % up to 50 % maximum)		
Fuel		Petrol – standard commercially available (DIN 51600 and EN 228) E85 ethanol fuel (EN 51625)		
Rated voltage		12 volt		
Control of the heat flow		Power	High	Low
Heat flow (watt)		5200	5000	2300
Fuel consumption (l/h)		0.72	0.69	0.32
Average electrical power consumption (watt)	during operation	50	47	22
	while starting	130		
Operating range Lower voltage limit: An undervoltage protection installed in the control box switches off the heater if the lower voltage limit is reached.		10.5 V		
Upper voltage limit: An overvoltage protection installed in the control box switches off the heater if the upper voltage limit is reached.		16 V		
Allowable operating pressure		up to 2.5 bar overpressure max.		
Water volume in the heater		approx. 0.25 l		
Minimum water flow rate of the heater		>250 l/h		
Allowable ambient temperature		During operation	Without operation	
	Heater, continuous	–40 °C to +60 °C	–40 °C to +105 °C	
	Heater, short time	– – –	+125 °C (5 x 2 h)	
Temperature, coolant liquid	continuous	–40 °C to +120 °C	–40 °C to +120 °C	
	short time	– – –	+125 °C (1 h)	
Interference suppression class		5 (EN 55025)		
Weight – without coolant and attachments		approx. 2.7 kg		

ATTENTION!

Operating the heater outside the specified technical data can cause malfunctions.

➔ The technical data must be complied with at all times.

PLEASE NOTE!

If no limit values are given, the technical data listed is with the usual heater tolerances of ± 10 % at nominal voltage and Esslingen reference altitude.

2 FUNCTION AND OPERATION

TECHNICAL DATA OF THE HYDRONIC II COMFORT D 5 SC

Heater type		**Hydronic II**		
Heater version		D 5 SC		
Heating medium		Mixture of water and anti-freeze (Proportion of antifreeze at least 10 % up to 50 % maximum)		
Fuel		Diesel – standard commercially available (EN 590) Blending with max. 20 % FAME according to EN 14214 is permitted		
Rated voltage		12 volt		
Control of the heat flow		Power	High	Low
Heat flow (watt)		5200	5000	2100
Fuel consumption (l/h)		0.64	0.61	0.26
Average electrical power consumption (watt)	during operation	50	47	22
	while starting	130		
Operating range Lower voltage limit: An undervoltage protection installed in the control box switches off the heater if the lower voltage limit is reached.		10.5 V		
Upper voltage limit: An overvoltage protection installed in the control box switches off the heater if the upper voltage limit is reached.		16 V		
Allowable operating pressure		up to 2.5 bar overpressure max.		
Water volume in the heater		approx. 0.25 l		
Minimum water flow rate of the heater		>250 l/h		
Allowable ambient temperature		During operation	Without operation	
	Heater, continuous	–40 °C to +80 °C	–40 °C to +105 °C	
	Heater, short time	– – –	+125 °C (5 x 2 h)	
Temperature, coolant liquid	continuous	–40 °C to +120 °C	–40 °C to +120 °C	
	short time	– – –	+125 °C (1 h)	
Interference suppression class		5 (EN 55025)		
Weight – without coolant and attachments		approx. 2.9 kg		

ATTENTION!

Operating the heater outside the specified technical data can cause malfunctions.

➔ The technical data must be complied with at all times.

PLEASE NOTE!

If no limit values are given, the technical data listed is with the usual heater tolerances of ± 10 % at nominal voltage and Esslingen reference altitude.

3 TROUBLESHOOTING

WHAT TO CHECK FIRST IN CASE OF FAULTS

- **Check**
  - – Fuel in the tank?
  - – Fuel lines leaking? (visual check)
  - – In the case of diesel heaters, summer diesel still in the fuel lines?
  - – Heating control (water valve) fully set to “WARM”?
  - – Combustion air system or exhaust system damaged or blocked?
- **Electrical components**
  - – Cables, connections damaged?
  - – Contacts corroded?
  - – Fuses defective?
  - – Incorrect wiring? (short circuit, interruption)
- **Check battery voltage**
  - – Battery voltage < 10 volt, the undervoltage protection has triggered.
  - – Battery voltage > 16 volt, the overvoltage protection has triggered.
- **Check voltage supply U_{Batt} (Terminal 30)**
  Disconnect the 10-pin connector -XS2 / -XB2 and measure the applied voltage in connector -XB2 between chamber 1 (cable 2.5² RD) and chamber 2 (cable 2.5² BN).
  If it differs from the battery voltage, check the fuses, the supply cables, the ground connection and the positive (plus) support point on the battery for voltage drop (corrosion / interruption).

LOCKING THE CONTROL BOX

THE CONTROL BOX IS LOCKED IF THE FOLLOWING FAULTS OCCUR:

- **Too many attempted starts**
  If the heater carries out several consecutive unsuccessful start attempts Fault code 050 is displayed – the control box is locked.
- **Overheating**
  If the heater overheats several times in succession Fault code 015 is displayed – the control box is locked.

CANCEL THE CONTROL BOX LOCK

Cancellation of the control box lock depends on the appropriate test equipment and is described from page 12.

OVERVIEW OF THE TEST EQUIPMENT AND CONTROL UNITS

The electronic control box can store up to 5 faults, which can be read out and displayed.
The following test equipment / control units can be used to query the fault memory in the control box and if necessary to delete the locking of the control box:

Testing equipment	**Order no.**
▪ EDiTH Basic diagnostics tool can be used from software version S3V10-F. The software can be downloaded from the service portal.	22 1541 89 00 00
Also required: for EasyStart T / EasyStart R+ Adapter cable	22 1000 33 78 00
for EasyStart Call Adapter cable	22 1000 34 11 00

Control unit	**Order no.**
▪ EasyStart Timer	22 1000 34 15 00
▪ EasyStart Remote+	22 1000 34 17 00
▪ EasyStart Select	22 1000 34 13 00
▪ EasyStart Call	22 1000 34 01 00

PLEASE NOTE!

- The diagnostics cable (cable 0.5² BUWH) must also be connected if using control units.
  If the fault memory cannot be read out, check the diagnostics cable is properly laid and is not damaged.

EXTERNAL DIAGNOSTICS SYSTEM

If an external, vehicle-specific diagnostics system is used ⇨ please consult the vehicle manufacturer.

3 TROUBLESHOOTING

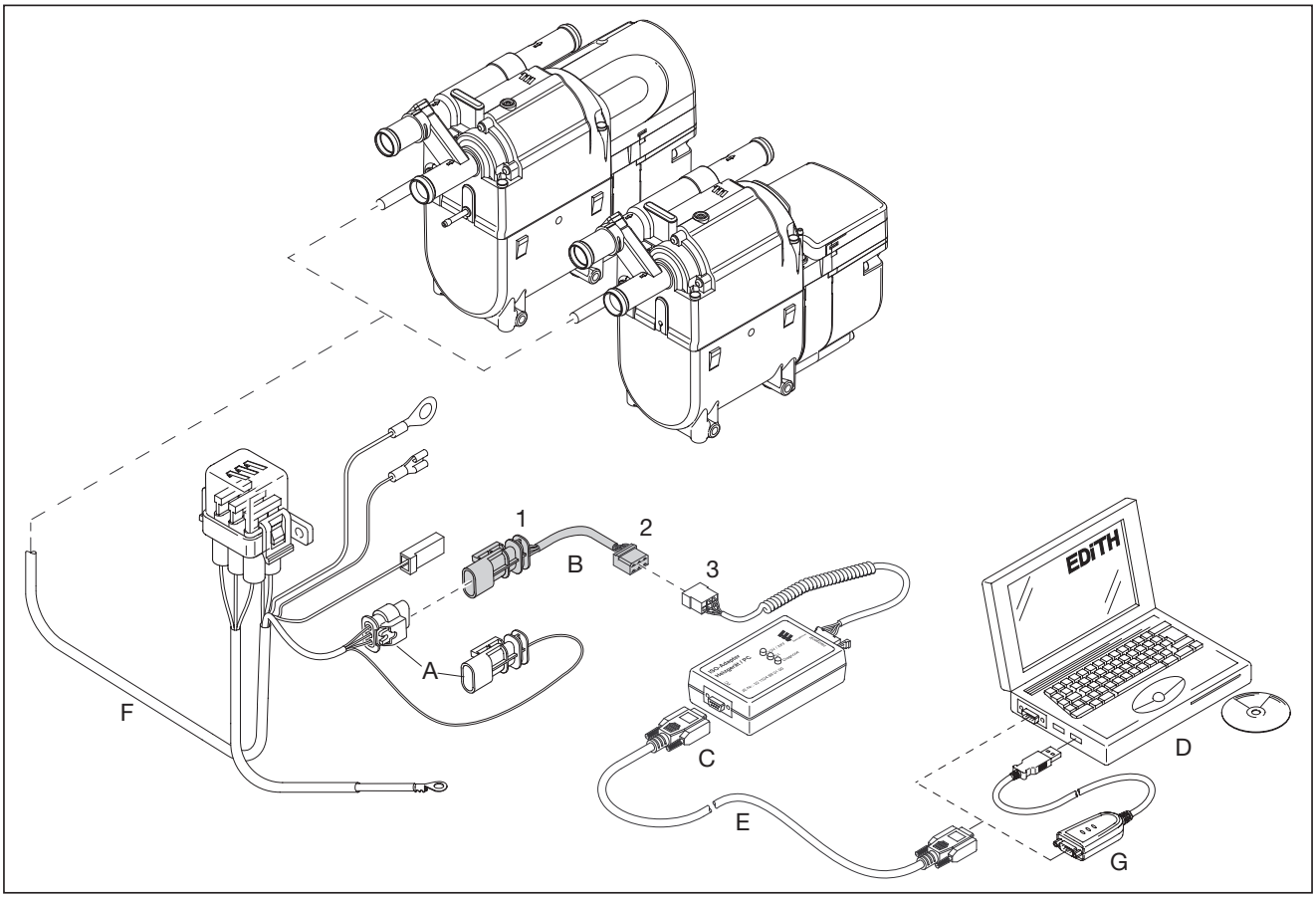
FAULT DIAGNOSIS USING THE EDITH BASIC DIAGNOSTICS TOOL

PLEASE NOTE!

- Always connect in the given order!
- The plug-in “diagnosis” connection may not be disconnected until the heater has been switched off and the after-running has finished!
- Check whether version S3V10-F of the EDiTH software required for the diagnosis has been installed on the PC, if necessary the version can be downloaded from the service portal.
- Follow the operating instructions for the EDiTH Basic (ISO adapter) diagnostics tool.
- When the plug-in “diagnosis” connection (A) is disconnected the voltage supply for the control unit is retained.
- Fault code, fault description, cause / remedial action are described from page 17.

CONNECT EDITH BASIC

1. Disconnect the plug-in “diagnosis” connection (A) in the heater cable harness (F).
2. Connect 3-pin connector housing (1) of the adapter cable (B) to the plug-in “diagnosis” connection (A).
3. Connect the 6-pin receptacle housing (2) of the adapter cable (B) with the 6-pin tab connector housing (3) of the EDiTH Basic diagnostics tool (C).
4. Connect the SUB-D connection cable (E) to the EDiTH Basic diagnostics tool (C) and to the PC (D).



A Plug-in “diagnosis” connection
B Adapter cable
C EDiTH Basic diagnostics tool
D PC
E Sub-D connection cable
F Heater cable harness
G USB adapter
1 3 pin connector housing of adapter cable
2 6 pin receptacle housing of adapter cable
3 6-pin tab connector housing of EDiTH Basic diagnostics tool

3 TROUBLESHOOTING

START THE DIAGNOSIS QUERY.

- Double-click the ‹EDiTH› icon on the Desktop to start the diagnostic software ⇨ The EDiTH Start window opens.
- Double-click the ‹flame› button ⇨ ‹Heaters and test selection› window opens.
  – Select the heater by its ‹Version No.› or via the ‹Automatic search›.
- In the ‹Test› window, double-click ‹General Data +Fault Memory› to open the ‹Fault memory› window.
  – The fault code of the current fault/error and the fault codes of faults/errors F1 – F5 are displayed.

DELETE THE FAULT MEMORY AND AT THE SAME TIME CANCEL THE CONTROL BOX LOCK

- In the “Fault memory” window, press the “Delete fault memory” button in the menu bar.
  – The whole fault memory is deleted and the control box is unlocked.

3 TROUBLESHOOTING

FAULT DIAGNOSIS USING THE CONTROL UNIT

DIAGNOSIS CAPABLE CONTROL UNITS

EasyStart Timer, order No. 22 1000 34 15 00

EasyStart Remote+, order No. 22 1000 34 17 00

EasyStart Select, order No. 22 1000 34 13 00

If faults occur in the heater while it is running, they are displayed with "Err" after the mobile unit or timer has been activated.
The current fault and the stored faults "F1" to "F5" can be queried.

PLEASE NOTE!

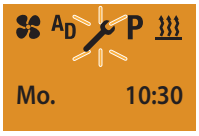
- Further information and current circuit diagrams of the control units are available in the "Installation Instructions Plus", which can be downloaded from www.eberspaecher-standheizung.com/download.
- The BUWH diagnostics cable must be connected in order to carry out the diagnosis. To this end, note and follow the circuit diagram of the control unit and of the heater.

- If the diagnostics cable is not connected, the "Diagnosis" menu is blocked.
- Not only the defective component, but also a defective current circuit results in a fault being displayed.
- Fault code, fault description, cause / remedial actions are described from page 15.
- Ensure sufficient battery voltage (min. 10.5 volt).

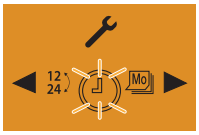
QUERY / DELETE FAULT MEMORY AND CANCEL THE HEATER LOCK

OPEN THE EASYSTART TIMER AND EASYSTART REMOTE+ WORKSHOP MENU

Display ON, the Start display appears.
Use the ◄ or ► button to select the 🔧 symbol in the Menu bar.



Confirm the SETTINGS menu item by pressing the ▭ button.



Press the ▭ LONGPRESS button for longer than 5 sec.; the Workshop menu is displayed.

Use the ◄ or ► button to select menu items.

Use the ◄ or ► button to select settings.

Press the ▭ button to confirm the selection.

Press the ▭ button to exit the workshop menu.

3 TROUBLESHOOTING

EASYSTART TIMER / REMOTE+ SERVICE FUNCTIONS

Menu item	Service function
1.1.1:	Heater 1 – display current fault **Note** The heater must be switched on to detect current faults.
1.1.2:	Heater 2 – display current fault **Note** The heater must be switched on to detect current faults.
1.2.1:	Heater 1 – read out fault memory F1 – F5 Display: Fault memory F1 – F5 with error code, e.g.: F1: 12.
1.2.2:	Heater 2 – read out fault memory F1 – F5 Display: Fault memory F1 – F5 with error code, e.g.: F1: 12.
1.3.1:	Heater 1 – delete fault memory F1 – F5 Press → button ▭ to delete.
1.3.2:	Heater 2 – delete fault memory F1 – F5 Press → button ▭ to delete.

EASYSTART SELECT VEHICLE WORKSHOP MENU

The service functions listed in the following can be displayed, read out and / or changed via the vehicle workshop menu.

OPENING THE VEHICLE WORKSHOP MENU

Display ON, the Start display appears.

Start display water heater

Start display air heater

Press button ◄ and ► at the same time for longer than 5 sec.

The workshop menu is displayed.

Use the ◄ or ► button to select menu items.

Use the ◄ or ► button to select settings.

Press the OK/⏻ button to confirm menu items.

Exit the workshop menu via Timeout.

EASYSTART SELECT SERVICE FUNCTIONS

Menu item	Service function
1_1:	Display current fault **Note:** Heater must be switched on. The AF display and the digits of the current fault are displayed alternately. The current fault is always written in fault memory F1. “ndi” is displayed if no diagnostics cable is connected.
1_2:	Read out fault memory F1 – F5 **Note:** Heater must be switched on. The F1 display and the digits of the error code are displayed alternately. Use the ◄ or ► button to display error memory F2 – F5. “ndi” is displayed if no diagnostics cable is connected.
1_3:	Delete fault memory F1 – F5 **Note:** Heater must be switched on. Press the OK/⏻ button to confirm the DEL display. “ndi” is displayed if no diagnostics cable is connected.

3 TROUBLESHOOTING

FAULT CODE DISPLAY	FAULT DESCRIPTION	COMMENTS ▪ REMEDIAL ACTION
000	No faults	— —
009	Implausible air pressure information	Communication loss between the control box and air pressure sensor. ▪ Read out air pressure sensor fault memory (only with EDiTH Basic diagnostics tool, software S3V7-F and higher). ▪ Check wiring and plug-in connections, if ok replace ⇨ air pressure sensor.
010	Shutdown due to overvoltage (heater not functioning)	Overvoltage applied to control box for at least 20 seconds without interruption. ▪ Disconnect plug-in connection -XB3/-XS5, vehicle engine on, measure voltage at connector -XB2 – between chamber 1, cable 2.5² RD and chamber 2, cable 2.5² BN. Voltage >15 volt ⇨ check the generator regulator, check battery.
011	Shutdown due to undervoltage (heater not functioning)	Undervoltage applied to control box for at least 20 seconds without interruption. ▪ Vehicle engine off, disconnect plug-in connection -XB2/-XS2, measure voltage at connector -XB2 – between chamber 1, cable 2.5² RD and chamber 2, cable 2.5² BN. If the voltage is <10 volt ⇨, check the fuses, the supply cables, the ground connections and the positive support point at the battery for voltage drop (corrosion).
012	Overheating – software threshold exceeded	Temperature at overheating sensor >125 °C ▪ Check water circuit: – Heating control in max. position. – Check water circuit for leaks. – Vent water circuit. – If non-return valve / thermostat in the water circuit, check the flow direction. ▪ Check water throughput rate. ▪ Check overheating sensor: – Check cable for continuity, short circuit and damage. – Measure the resistive value at the control box connector – between chamber 10, cable 0.5² BK and chamber 11, cable 0.5² BK, see see page 31 for measured values. ▪ Check water pump, see Fault code 041 and 042.
013 **014**	Temperature difference error (before metering pump delivery) Possible overheating risk (1. differential evaluation) **PLEASE NOTE!** Fault code 014 is only displayed if the heater is running and the water temperature at the overheating sensor has reached at least 80 °C.	Difference between the temperature values of the overheating sensor and the surface sensor is too large. ▪ For remedial action see Fault code 012. ▪ Check the surface sensor: – Check cable for continuity, short circuit and damage. – Measure the resistive value at the control box connector – between chamber 7, cable 0.5² WH and chamber 8, cable 0.5² WH, see see page 31 for measured values.
015	Operating lock-out – too many overheating events detected	The control box is locked due to too frequent consecutive overheating (Fault code 012, 013, 014, 016). ▪ For remedial action see Fault code 012. ▪ Cancel the control box lock, see from page 12.

3 TROUBLESHOOTING

FAULT CODE DISPLAY	FAULT DESCRIPTION	COMMENTS ▪ REMEDIAL ACTION
016	Possible overheating risk (2. differential evaluation) **PLEASE NOTE!** Fault code 016 is only displayed if the heater is running and the water temperature at the overheating sensor has reached at least 80 °C.	Difference between the temperature values of the overheating sensor and the surface sensor is too large. ▪ For remedial action see Fault code 012. ▪ Check the surface sensor: – Check cable for continuity, short circuit and damage. – Measure the resistive value at the control box connector – between chamber 7, cable 0.5² WH and chamber 8, cable 0.5² WH, see see page 31 for measured values.
017	Overheating, hardware threshold exceeded	Temperature at overheating sensor >130 °C ▪ For remedial action see Fault code 012. ▪ Check the surface sensor: – Check cable for continuity, short circuit and damage. – Measure the resistive value at the control box connector – between chamber 7, cable 0.5² WH and chamber 8, cable 0.5² WH, see see page 31 for measured values.
018 **019**	Glow plug – start energy too low Glow plug – ignition energy too low	Glow plug energy input is too low. ▪ Perform functional check on the glow plug, see Fault code 020.
020 **021** **022**	Glow plug – interruption Glow plug – overload Glow plug - short circuit downstream of +Ub or transistor error **CAUTION!** The glow plug is irreparably damaged if the voltage values are exceeded. ➔ Perform the functional check with max. 9.5 volt. **PLEASE NOTE!** Ensure the power pack has adequate short-circuit resistance.	▪ Check cable for continuity, short circuit and damage. ▪ Perform functional check on the glow plug in installed condition. – Control box connector – chamber 3, cable 1.5² BN and chamber 6, cable 1.5² WH, unclip both cables. – Apply 9.5 V ±0.1 V voltage to the glow plug and after 25 sec measure the current intensity. – If 9.5 A (+1 A / –1.5 A) the glow plug is ok. – If values are different, renew the glow plug.
025	K-line – short circuit	▪ Check the diagnostics cable: Connector -XB2 – chamber 5 and connector S8 – chamber 2, check cable 0.5² BUWH for continuity, short circuit and damage, if ok ⇨ replace control box, see from Fault code 090.

3 TROUBLESHOOTING

FAULT CODE DISPLAY	FAULT DESCRIPTION	COMMENTS ▪ REMEDIAL ACTION
030	Speed of the burner motor is outside the allowable range **⚠ CAUTION!** The motor is irreparably damaged if the voltage values are exceeded. ➔ Perform the functional check with max. 8.2 volt. **PLEASE NOTE!** ▪ Ensure correct connection of the plus (positive) and minus (negative) cables. ▪ Ensure the power pack has adequate short-circuit resistance.	Impeller blocked (frozen, soiled, sluggish, ...) ▪ Remove blockage and check the burner motor for ease of movement by manually turning the impeller. ▪ Make a mark (white paint) on the impeller and measure the speed using a non-contact r.p.m. counter, see page 33. Unclip control box connector – chamber 13, cable 0.75² BK and chamber 14, cable 0.75² BN, take the speed measurement with max. 8.2 volt (+ 0.2 volt). – Speed <10000 rpm ⇨ renew the combustion air blower. – Speed > 10000 rpm ⇨ renew the control box.
031 **032** **035**	Burner motor - interruption Burner motor - short circuit Burner motor - short circuit downstream of +Ub or transistor error **⚠ CAUTION!** The motor is irreparably damaged if the voltage values are exceeded. ➔ Perform the functional check with max. 8.2 volt. **PLEASE NOTE!** ▪ Ensure correct connection of the plus (positive) and minus (negative) cables. ▪ Ensure the power pack has adequate short-circuit resistance.	▪ Check burner motor cable: Check control box connector – chamber 13, cable 0.75² BK and chamber 14, cable 0.75² BN for continuity, short circuit and damage. ▪ Take the speed measurement of the burner motor with max. 8.2 volt (+ 0.2 volt), see Fault code 030.
038 **039**	Vehicle blower - interruption Vehicle blower - short circuit	▪ Check “blower” lead harness: Check connector -XB2 – chamber 3, cable 0.5² BKRD and chamber 2, cable 2.5² BN for continuity, short circuit and damage, if ok ⇨ renew relay (2.5.7.).
040	Vehicle blower - short circuit downstream of +Ub or transistor error	▪ Pull off relay (-K1), if fault code 038 is displayed, the relay is defective ⇨ renew relay (-K1).
041 **042**	Water pump – interruption Water pump – short circuit	▪ Check “water pump” lead harness: Check control box connector – chamber 12, cable 0.75² VT and chamber 9, cable 0.75² BN for continuity, short circuit and damage, if ok ⇨ renew water pump.
043	Water pump - short circuit downstream of +Ub or transistor error	▪ Pull off connector at water pump, if fault code 041 is displayed the water pump is defective ⇨ renew water pump.

3 TROUBLESHOOTING

FAULT CODE DISPLAY	FAULT DESCRIPTION	COMMENTS ▪ REMEDIAL ACTION
047 **048**	Metering pump – short circuit Metering pump interruption	▪ Check “metering pump” lead harness: If petrol heater: Check connector -XB2 – chamber 4, cable 0.75² GN and chamber 10, cable 0.75² BNGN for continuity, short circuit and damage, if ok ⇨ renew metering pump. If diesel heater: Check control box connector – chamber 4, cable 0.75² GN and chamber 5, cable 0.75² BNGN for continuity, short circuit and damage, if ok ⇨ renew metering pump.
049	Vehicle blower – short circuit downstream of +Ub or transistor error	▪ Disconnect connector connection of “metering pump” cable loom or unplug the plug at the metering pump, if Fault code 048 is displayed the metering pump is defective ⇨ renew the metering pump.
050	Operating lock-out – too many safety timeouts	Too many start attempts, the control box is locked. ▪ Cancel the control box lock, see from page 12. ▪ Check fuel quantity and fuel supply, see from page 36.
051	Cold air – timeout	On starting the flame sensor signals a temperature >70 °C for longer than 240 sec. ▪ Check exhaust and combustion air system. ▪ Check flame sensor, see Fault code 064 and 065.
052	Safety time exceeded	▪ Check exhaust and combustion air system. ▪ Check fuel quantity and fuel supply, see from page 36. ▪ Renew the fuel filter inserted in the connection socket of the metering pump.
053 **054** **056** **057**	Flame cutout from “Power” control stage Flame cutout from “High" control stage Flame cutout from “Low” control stage Flame cutout from start process **PLEASE NOTE!** If start attempts are still allowed, in the event of a flame cutout the heater restarts, if necessary with subsequent repeat start. If the restart or repeated start was successful, the fault code display is deleted.	▪ Check exhaust and combustion air system. ▪ Check fuel quantity and fuel supply, see from page 36. ▪ Check flame sensor, see Fault code 064 and 065.
060	Overheating sensor interruption	▪ Check overheating sensor: – Check control box connector – chamber 10, cable 0.5² BK and chamber 11, cable 0.5² BK for damage. – Dismantle and check overheating sensor, see page 31. – If fault code 060 continues to be displayed, replace the control box.

3 TROUBLESHOOTING

FAULT CODE DISPLAY	FAULT DESCRIPTION	COMMENTS ▪ REMEDIAL ACTION
061	Short circuit in overheating sensor	▪ Check overheating sensor: – Check control box connector – chamber 10, cable 0.5² BK and chamber 11, cable 0.5² BK for damage. – Dismantle and check overheating sensor, see page 31. – If fault code 061 continues to be displayed, replace the control box.
062 **063**	Printed circuit board sensor – interruption Printed circuit board sensor – short circuit	▪ Replace control box
064	Flame sensor interruption	▪ Check flame sensor: – Check control box connector – chamber 1, cable 0.22² BN and chamber 2, cable 0.22² BN for damage. – Dismantle and check flame sensor, see page 34. – If fault code 064 continues to be displayed, replace the control box.
065	Short circuit in flame sensor	▪ Check flame sensor: – Check control box connector – chamber 1, cable 0.22² BN and chamber 2, cable 0.22² BN for damage. – Dismantle and check flame sensor, see page 34. – If fault code 065 continues to be displayed, replace the control box.
069	JE communication error	▪ Check diagnostics cable – Connector -XB2 – chamber 5 and connector S8 – chamber 2, check cable 0.5² BUWH for continuity, short circuit and damage, if ok ⇨ check the components connected to the diagnostics cable , if ok ⇨ replace the control box.
071	Surface sensor – interruption	▪ Check the surface sensor: – Check control box connector – chamber 7, cable 0.5² WH and chamber 8, cable 0.5² WH for damage. – Dismantle and check surface sensor, see page 31. – If fault code 071 continues to be displayed, replace the control box.
072	Surface sensor – short circuit	▪ Check the surface sensor: – Check control box connector – chamber 7, cable 0.5² WH and chamber 8, cable 0.5² WH for damage. – Dismantle and check surface sensor, see page 31. – If fault code 072 continues to be displayed, replace the control box.
074	Operating lock-out – overheating detected, hardware is defective	▪ Check overheating sensor: – Check cable for continuity, short circuit and damage. – Check control box connector – chamber 10, cable 0.5² BK and chamber 11, cable 0.5² BK for damage. – Dismantle and check overheating sensor, see page 31. – If fault code 074 continues to be displayed, replace the control box. ▪ Cancel the control box lock, see from page 12.
090	Hardware is defective	Replace control box
091	Too many resets	Check voltage supply
092 – 099	Control box defective	Replace control box

4 REPAIR INSTRUCTIONS

The permitted repair work to the heater is described in the “Repair Instructions“ chapter. The heater must be removed from the vehicle for the repair work to be carried out.
The heater is assembled in the reverse order, note and follow any additional instructions.

PLEASE NOTE!
After completing all the work and installing the heater in the vehicle, carry out a functional check on the heater.

SAFETY INSTRUCTIONS TO BE NOTED AND FOLLOWED BEFORE WORKING ON THE HEATER

DANGER!
RISK OF INJURY, BURNS AND POISONING!
- ➔ Always switch off the heater beforehand and leave it to cool.
- ➔ Disconnect the battery.
- ➔ The heater must not be operated in closed rooms such as garages or workshops.
  Exception:
  Exhaust suction available directly at the entry to the exhaust pipe.

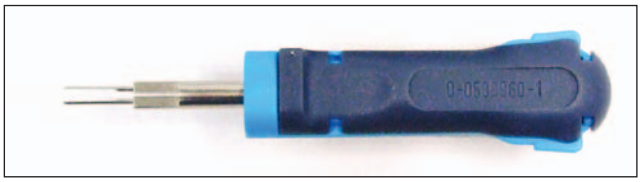
CAUTION!
- ➔ The seals of dismantled components must be renewed.
- ➔ During repair work, check all components for damage and if necessary replace.
- ➔ Check connector contacts, plug-in connections and cables for corrosion and damage and if necessary repair.
- ➔ Only ever use Eberspächer spare parts if replacements are necessary.
- ➔ After working on the coolant circuit, the level of the coolant must be checked and if necessary topped up according to the vehicle manufacturer's instructions.
- ➔ The coolant circuit must then be vented.
- ➔ Operation or the after running of the heater may only be stopped in an emergency (see “EMERGENCY OFF” on page 6) by interrupting the battery current (risk of heater overheating).

SPECIAL TOOL

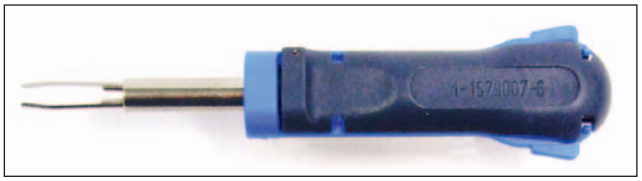
AMP RELEASE TOOL

The AMP release tool is used to release plug-in contacts in a connector housing.
This release tool can be ordered directly from AMP.

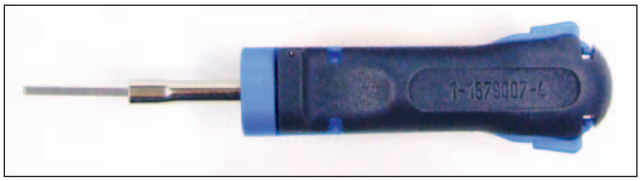
- For Micro Timer — AMP Order No. 0-0539960-1



- For Junior Power Timer — AMP Order No. 1-1579007-6



- For standard timer, Junior timer — AMP Order No. 1-1579007-4

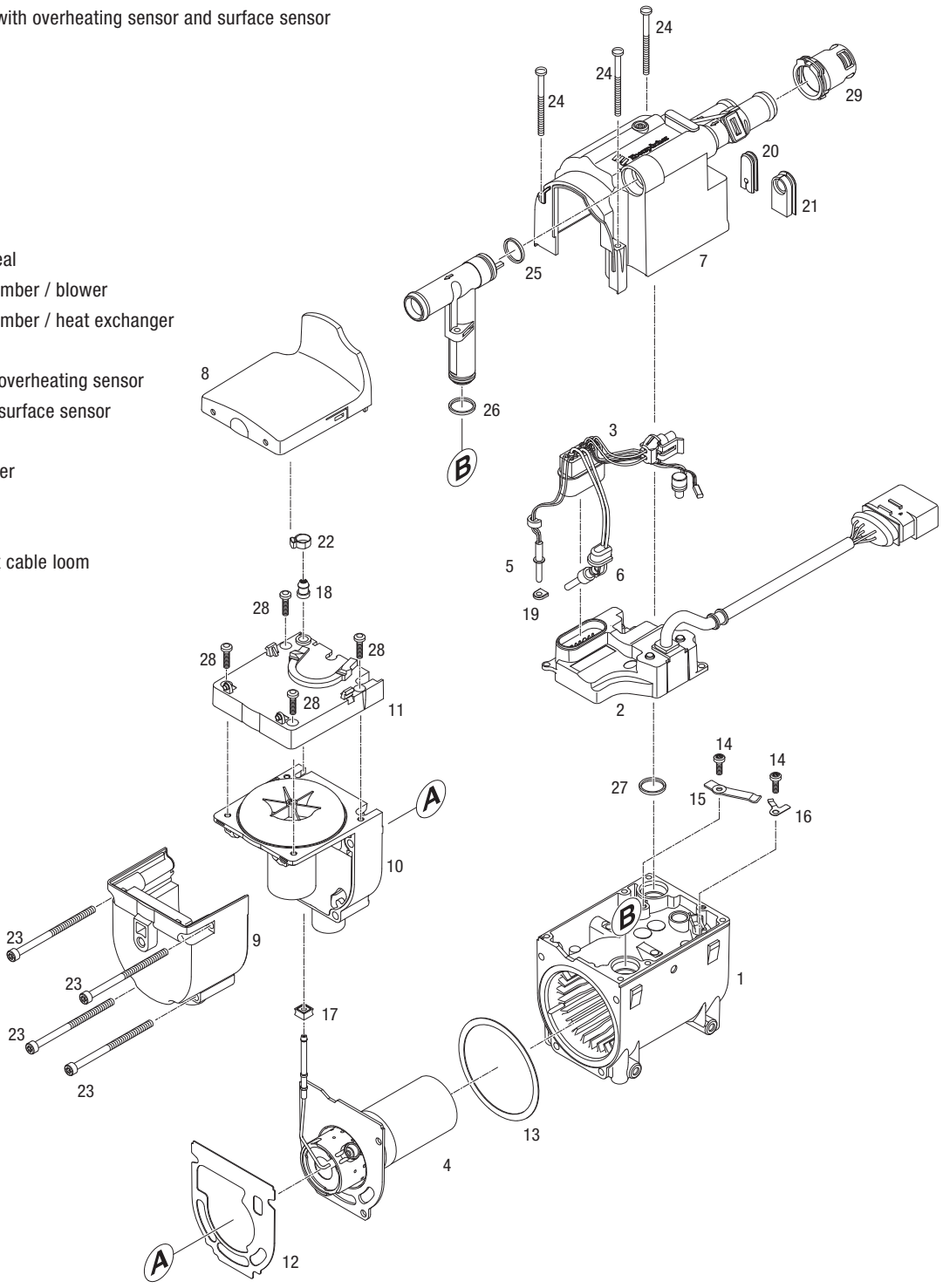


4 REPAIR INSTRUCTIONS

HYDRONIC II COMFORT B 5 SC ASSEMBLY DRAWING

PARTS LIST

1 Jacket with heat exchanger
2 Control box
3 Heater lead harness with overheating sensor and surface sensor
4 Combustion chamber
5 Flame sensor
6 Glow plug
7 Water pump
8 Cover
9 Cover, electric motor
10 Blower
11 Cover, blower, with seal
12 Seal, combustion chamber / blower
13 Seal, combustion chamber / heat exchanger
14 Screw, M4 x 12 (2x)
15 Compression spring, overheating sensor
16 Compression spring, surface sensor
17 Grommet, fuel pipe
18 Grommet, blower cover
19 Seal, flame sensor
20 Grommet
21 Grommet, control box cable loom
22 Hose clamp
23 Screw, M5 x 80 (4x)
24 Screw, M5 x 55 (3x)
25 O-ring, 18 x 2
26 O-ring, 16 x 2
27 O-ring, 14 x 2.6
28 Screw, M4 x 16 (4x)
29 Plug

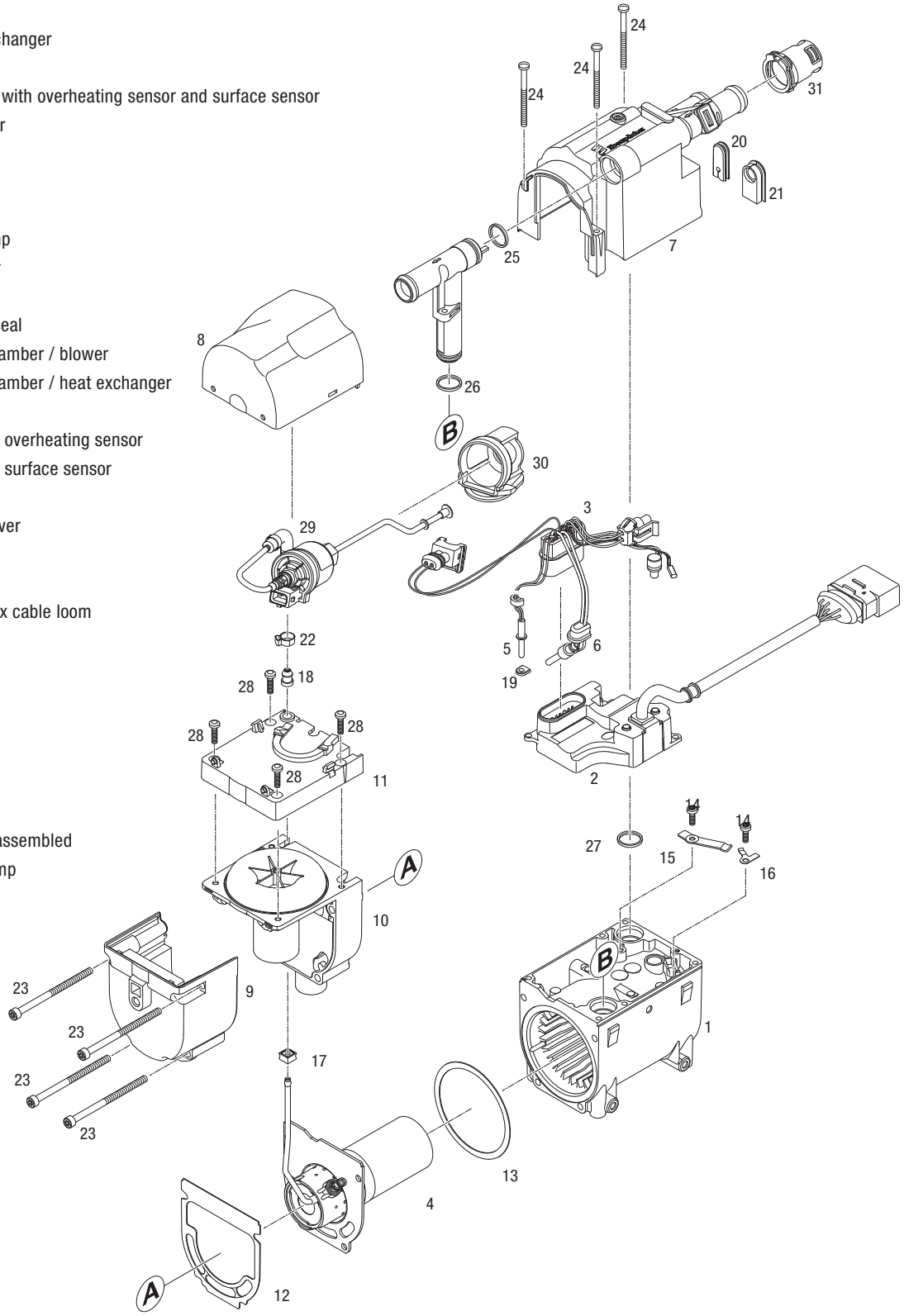


4 REPAIR INSTRUCTIONS

HYDRONIC II COMFORT D 5 SC ASSEMBLY DRAWING

PARTS LIST

1 Jacket with heat exchanger
2 Control box
3 Heater lead harness with overheating sensor and surface sensor
4 Combustion chamber
5 Flame sensor
6 Glow plug
7 Cover, control box
8 Cover, metering pump
9 Cover, electric motor
10 Blower
11 Cover, blower, with seal
12 Seal, combustion chamber / blower
13 Seal, combustion chamber / heat exchanger
14 Screw, M4 x 12 (2x)
15 Compression spring, overheating sensor
16 Compression spring, surface sensor
17 Grommet, fuel pipe
18 Grommet, blower cover
19 Seal, flame sensor
20 Grommet
21 Grommet, control box cable loom
22 Hose clamp
23 Screw, M5 x 80 (4x)
24 Screw, M5 x 55 (3x)
25 O-ring, 18 x 2
26 O-ring, 16 x 2
27 O-ring, 14 x 2.6
28 Screw, M4 x 16 (4x)
29 Metering pump, preassembled
30 Holder, metering pump
31 Plug



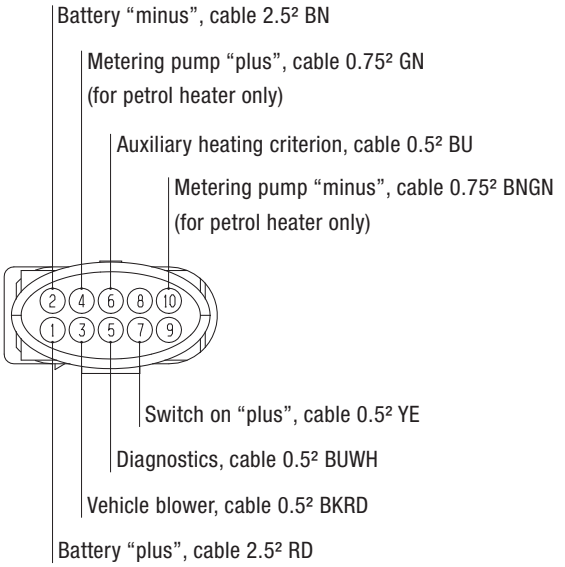
4 REPAIR INSTRUCTIONS

REPAIR STEPS

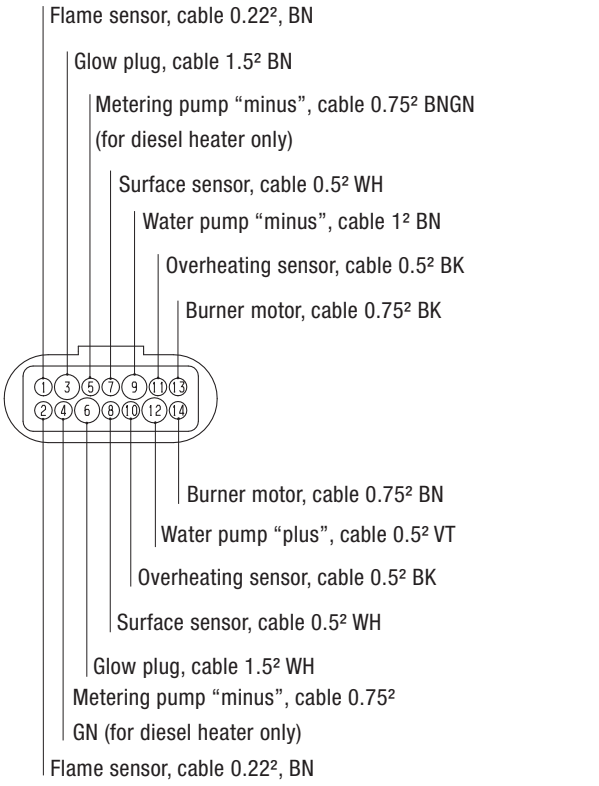
PLEASE NOTE!

This repair instruction describes how to dismantle the heater in individual repair steps. Reference is made to the necessary preceding steps to be carried out at the relevant repair steps.

CONNECTOR ASSIGNMENT – 10-PIN CONNECTOR -XS2



CONNECTOR ASSIGNMENT – 14-PIN CONNECTOR, CONTROL BOX



Connector housings are shown from the lead entry side.

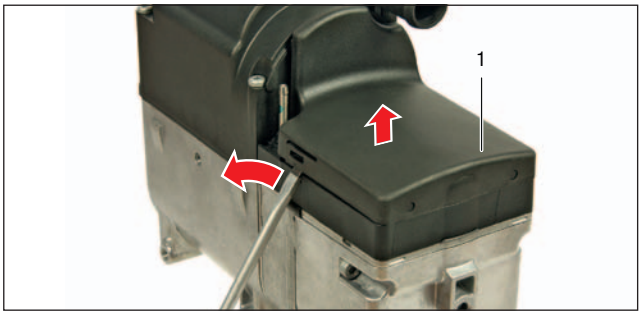
4 REPAIR INSTRUCTIONS

DISMANTLE THE HEATER

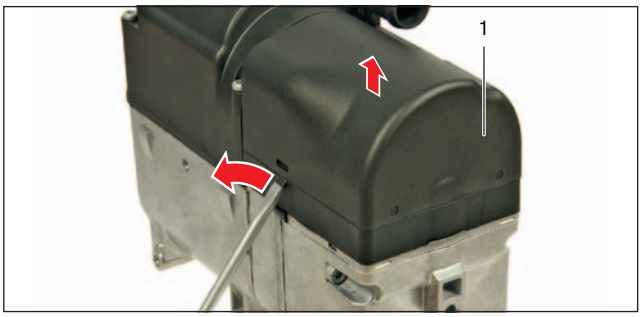
REPAIR STEP 1

REMOVE COVER

- Use a screwdriver to unlock the cover on both sides.
- Remove cover.



Petrol heater



Diesel heater

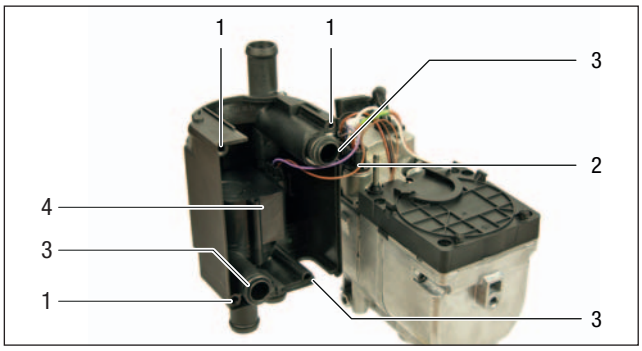
1 Cover

REPAIR STEP 2

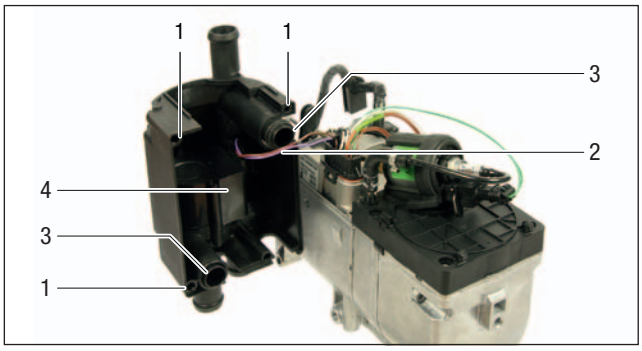
DISMANTLE WATER PUMP

To remove the cover, complete Repair step 1 first.

- Unscrew 4 fixing screws M4 x 55.
- Lift the water pump carefully and, together with the water connection socket, pull out of the jacket.
- Disconnect the lead harness from the water pump.
- Remove the water pump.



Petrol heater



Diesel heater

1 Drillholes for M4 x 55 fixing screws
2 “Water pump” lead harness
3 Water connection
4 Water pump

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

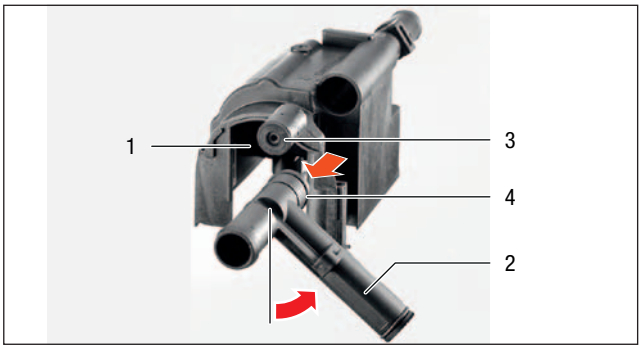
- Before installing the water pump, renew the two O-rings of the water connection sockets.
- Before installing the water pump, ensure that the “fuel pipe” grommet and the “control box cable loom” grommet are positioned correctly.
- Tightening torque of the fixing screws:
  M4 x 55 = $2.9^{+0.3}$ Nm

4 REPAIR INSTRUCTIONS

REPAIR STEP 3

REMOVE WATER CONNECTION SOCKET

Swivel the water connection socket upwards by approx. 45° and pull it out of the water pump.



1 Water pump
2 Water connection socket, swivelled through 45° and pulled out
3 Switching element
4 O-ring

PLEASE NOTE!

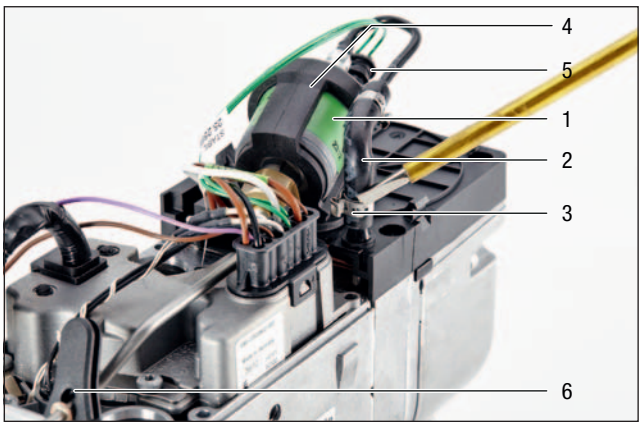
NOTES FOR THE ASSEMBLY:

- Before installing the water pump, renew the O-ring of the water connection socket.
- Before installing the water connection socket, ensure that the switching element is inserted in the correct installation position in the water pump.

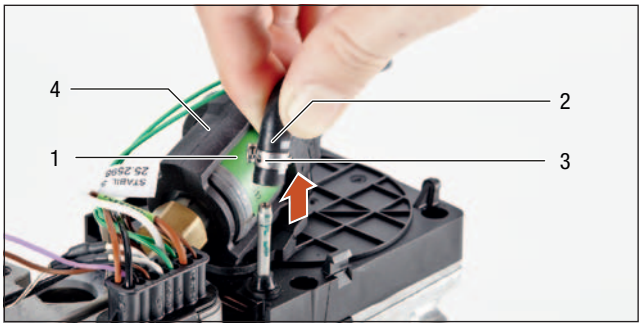
REPAIR STEP 4

DISMANTLE METERING PUMP – DIESEL HEATER ONLY

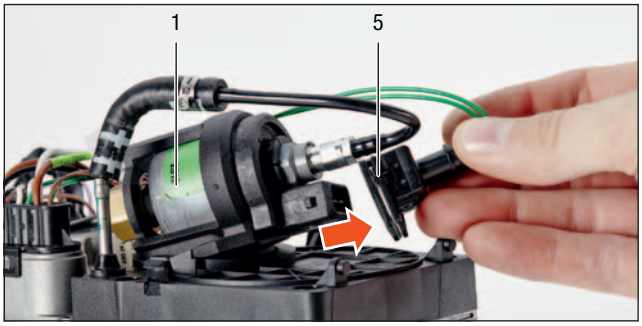
To dismantle the “metering pump”, complete Repair step 1 and Repair step 2 first.



1 Use a screwdriver to open the hose clamp.

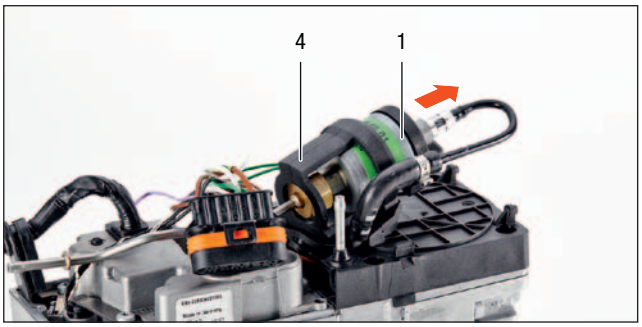


2 Pull the hose bend off the fuel pipe.



3 Pull off the 2-pin connector (5) at the metering pump.

4 REPAIR INSTRUCTIONS



4 Pull the preassembled metering pump out of the holder (4).

1 Metering pump
2 Hose bend
3 Hose clamp
4 Holder, metering pump
5 2-pin connector, metering pump
6 Grommet, metering pump

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

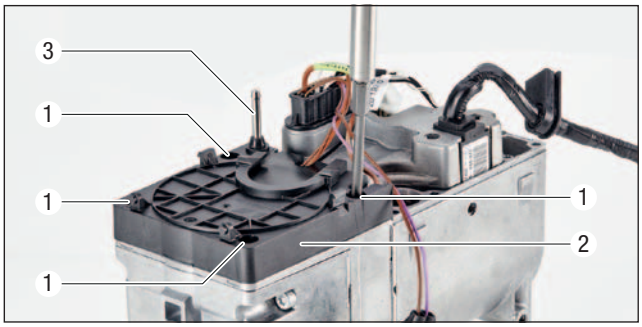
- When installing the metering pump, ensure that the “metering pump” grommet is positioned correctly.

REPAIR STEP 5

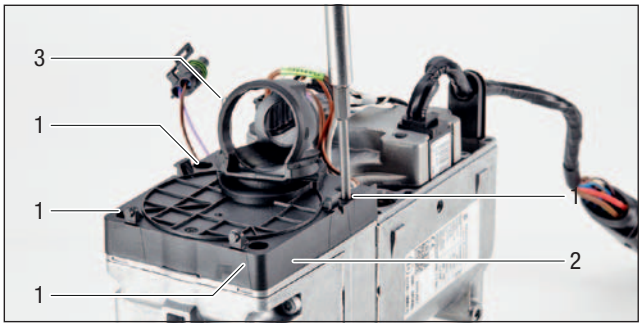
REMOVE “BLOWER” COVER

To remove the “blower” cover, complete Repair step 1 and Repair step 2 first, in case of a diesel heater, complete Repair step 4 also.

- Unscrew 4 fixing screws M4 x 16.
- Remove the “blower” cover carefully above the fuel connection.



Petrol heater



Diesel heater

1 M4 x 16 fixing screw
2 “Blower” cover
3 Fuel connection

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

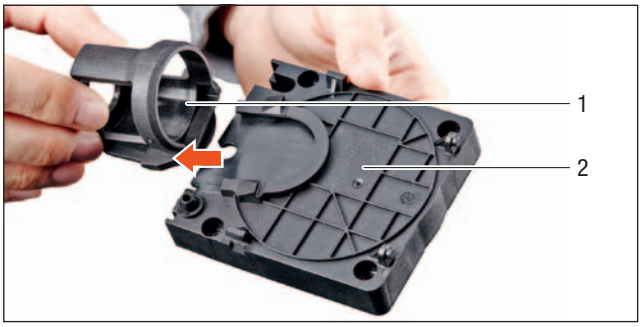
- Renew fuel connection grommet in the “lower” cover. The grommet is included in the corresponding spare parts kit.
- Carefully position the “blower” cover above the fuel connection on the blower cover. Ensure that the motor connection cables do not get clamped between the cover and housing.
- Ensure the “fuel connection” grommet fits correctly in the “blower” cover.
- Ensure the “electric motor cable loom” grommet fits correctly in the blower housing.
- Tightening torque of the fixing screws M4 x 16 = $2.9^{+0.3}$ Nm

4 REPAIR INSTRUCTIONS

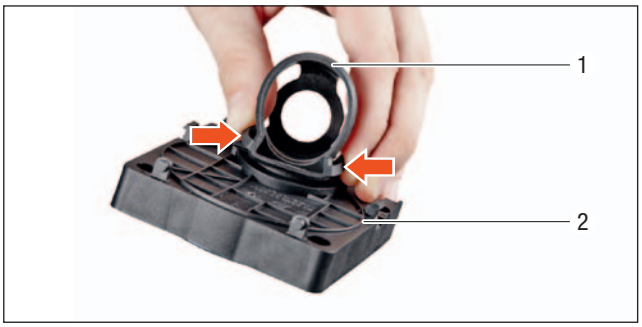
REPAIR STEP 6

DISMANTLE METERING PUMP HOLDER – DIESEL HEATER ONLY

To dismantle the “metering pump” holder, complete Repair step 1, Repair step 2, Repair step 4 and Repair step 5 first.



Remove metering pump holder



Install metering pump holder

1 Holder, metering pump
2 “Blower” cover

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

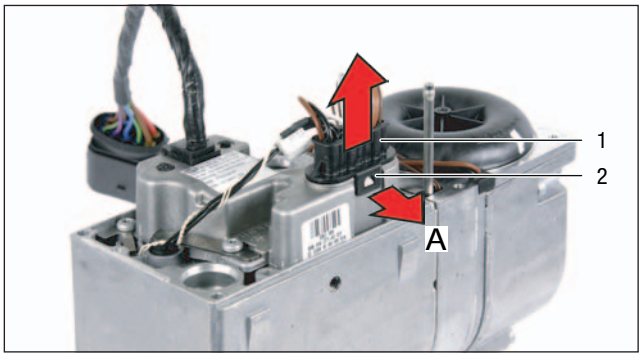
- When installing the “metering pump” holder, press it together slightly and push it into the guide on the “lower” cover.

REPAIR STEP 7

DISMANTLE CONTROL BOX

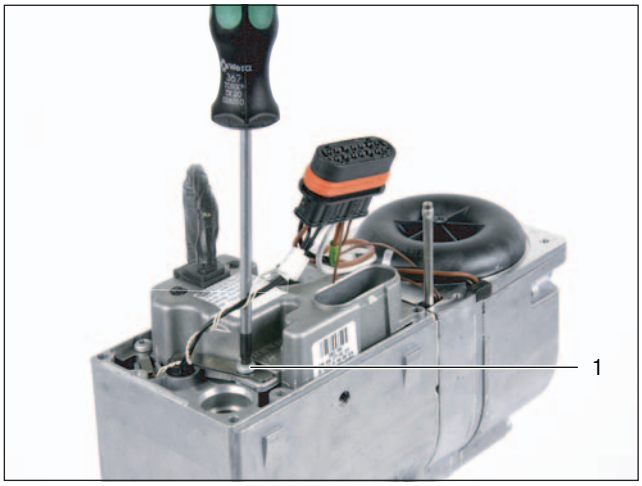
To dismantle the “control box", complete Repair step 1, Repair step 2 and Repair step 5 first.

- Unlock the locking tab at the 14-pin control box connector by turning in direction of arrow (A).
- Pull off the 14-pin control box connector from above.



1 14-pin connector, control box
2 Locking tab

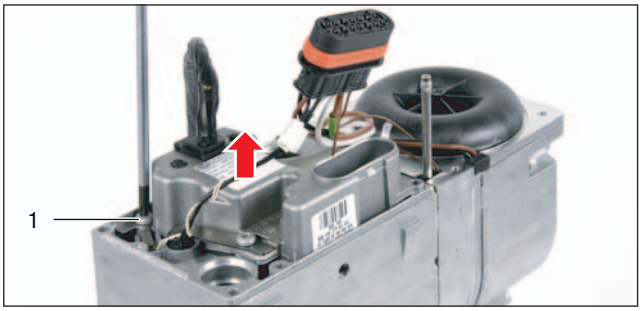
- Undo fixing screw M4 x 12 compression spring overheating sensor / control box. Remove the compression spring.



1 Fixing screw, compression spring, overheating sensor

4 REPAIR INSTRUCTIONS

- Undo fixing screw M4 x 12 compression spring surface sensor / control box. Remove the compression spring.



1 Fixing screw, compression spring, surface sensor

- Remove the control box.

PLEASE NOTE!

The overheating sensor does not have to be removed.

NOTES FOR THE ASSEMBLY:

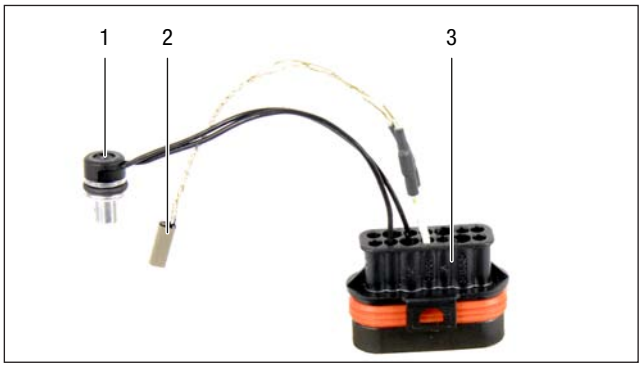
- Tightening torque of the fixing screws M4 x 12 = $3.3^{+0.3}$ Nm

REPAIR STEP 8

DISMANTLE OVERHEATING SENSOR AND SURFACE SENSOR

To dismantle the overheating sensor / surface sensor, complete Repair step 1, Repair step 2 and Repair step 7 first.

- Use flat pliers to pull the overheating sensor out of the locator hole in the jacket. Remove the overheating sensor, surface sensor and the 14-pin control box connector.



1 Overheating sensor
2 Surface sensor
3 14-pin connector, control box

PLEASE NOTE!

The overheating sensor, surface sensor and 14-pin connector are an assembly and are not available as individual parts.

- When replacing the overheating sensor, the surface sensor and 14-pin control box connector, the plug-in contacts of the
  - electric motor, chamber 13, cable 0.75² BK and chamber 14, cable 0.75² BN
  - flame sensor, chamber 1, cable 0.22² BN and chamber 2, cable 0.22² BN
  - glow plug, chamber 3, cable 1.5² BN and chamber 6, cable 1.5² WH must be unclipped from the existing 14-pin control box connector.
- It is advisable to label the unclipped cables or to take into account the connector assignment in on page 25.

PLEASE NOTE!

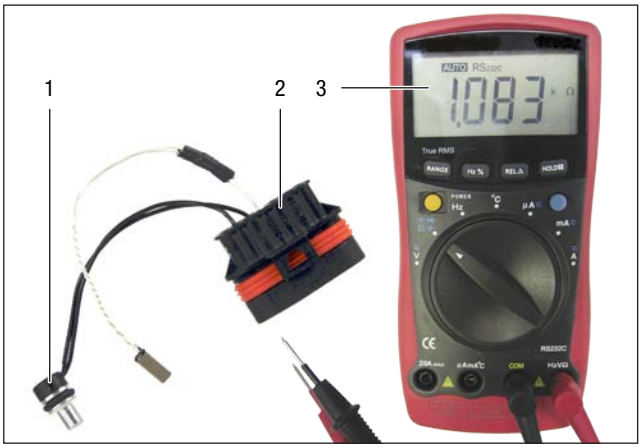
NOTES FOR THE ASSEMBLY:

- The following parts are included in the spare parts kit and must be used:
  - Compression spring, overheating sensor
  - Compression spring, surface sensor
  - M4 x 12 screw (2x)
- When installing, twist the overheating sensor lead harness and the surface sensor lead harness.

4 REPAIR INSTRUCTIONS

CHECK OVERHEATING SENSOR

- Check the overheating sensor using a digital multimeter in the 14-pin control box connector in chamber 10 and 11. If the resistance value lies outside the diagram or the table of values, replace the overheating sensor.



1 Overheating sensor
2 14-pin connector, control box
3 Digital multimeter

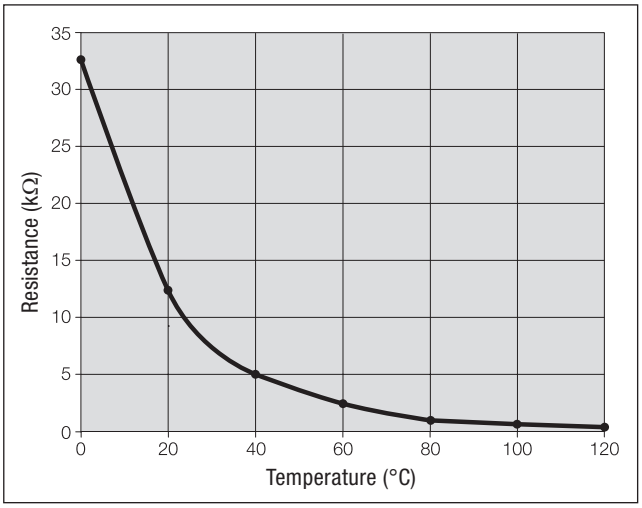


TABLE OF VALUES

Temp [°C]	R [kΩ]
0	32.54 ±2.2
10	19.87 ±1.0
20	12.48 ±0.5
30	8.06 ±0.4
40	5.33 ±0.3
50	3.60 ±0.25
60	2.48 ±0.17

Temp [°C]	R [kΩ]
70	1.75 ±0.13
80	1.25 ±0.1
90	0.91 ±0.08
100	0.67 ±0.06
110	0.50 ±0.05
120	0.38 ±0.04

CHECK THE SURFACE SENSOR

- Check the surface sensor using a digital multimeter in the 14-pin control box connector in chamber 7 and 8. If the resistance value lies outside the diagram or the table of values, replace the surface sensor.

1 Surface sensor
2 14-pin connector, control box
3 Digital multimeter

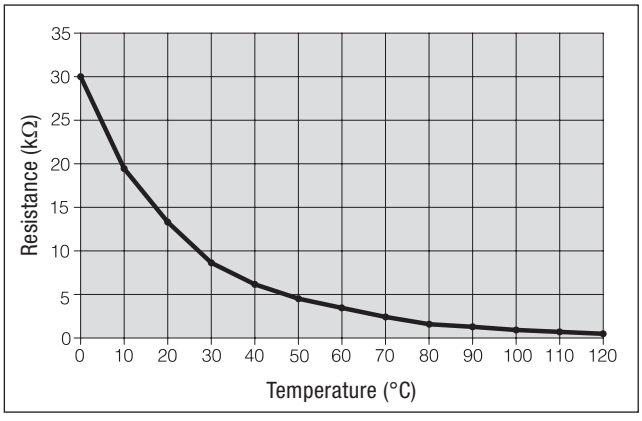


TABLE OF VALUES

Temp [°C]	R [kΩ]
0	30.00 ±1.50
25	10.74 ±0.78
40	6.20 ±0.52
60	3.19 ±0.32
80	1.75 ±0.20
100	1.02 ±0.13
120	0.62 ±0.08

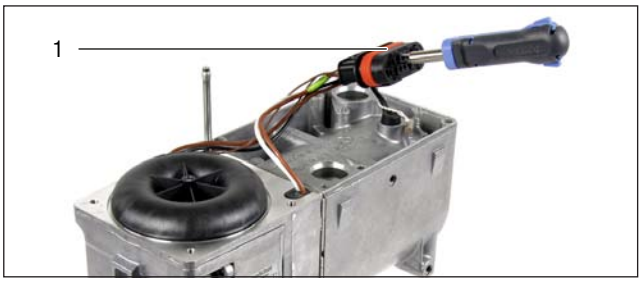
4 REPAIR INSTRUCTIONS

REPAIR STEP 9

REMOVE “ELECTRIC MOTOR” COVER AND “BLOWER ASSEMBLY WITH COMBUSTION CHAMBER”

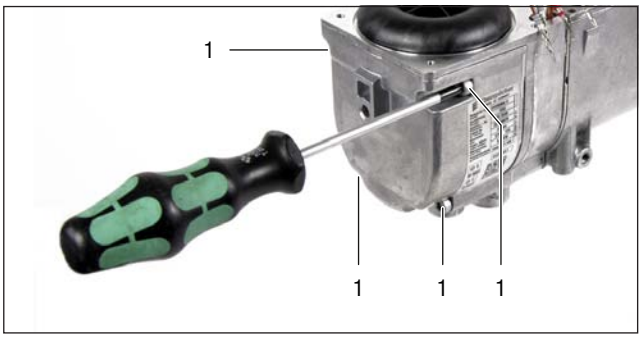
To remove the “electric motor” cover and the “lower assembly with combustion chamber", complete Repair step 1, Repair step 2 and Repair step 7 first.

- Unlock plug-in contacts of the electric motor in the 14-pin control box connector, chamber 13, cable 0.75² BK and chamber 14, cable 0.75² BN using the AMP release tool.
- Unlock plug-in contacts of the flame sensor in the 14-pin control box connector, chamber 1, cable 0.22² BN and chamber 2, cable 0.22² BN using the AMP release tool.
- Unlock the plug-in contacts of the glow plug in the 14-pin control box connector, chamber 3, cable 1.5² BN and chamber 6, cable 1.5² WH using the AMP release tool.



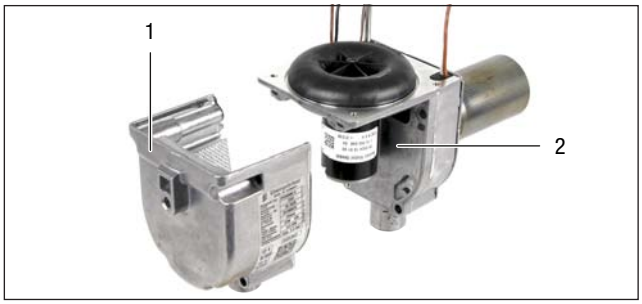
1 14-pin connector, control box

- Unscrew the 4 fixing screws M5 x 80 of the “electric motor” cover and the blower.



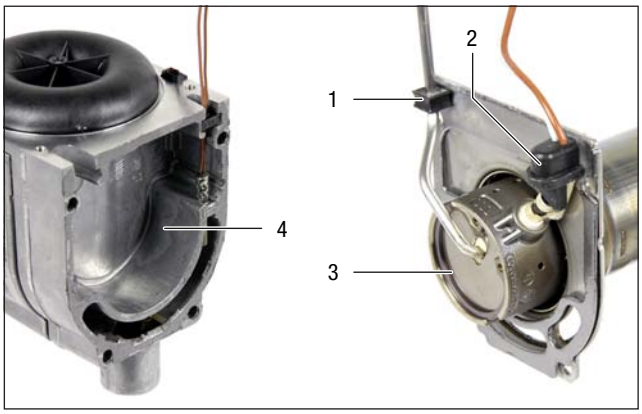
1 M5 x 80 fixing screw

- Remove “electric motor” cover.
- Pull the “blower with combustion chamber” assembly out of the heat exchanger.



1 Cover, electric motor
2 “Blower with combustion chamber” assembly

- Remove the combustion chamber from the blower housing, at the same time pull off the grommet of the glow plug and the grommet of the fuel pipe out of the blower housing together with the combustion chamber.



1 Fuel pipe grommet
2 Glow plug cable loom grommet
3 Combustion chamber
4 Blower housing with flame sensor

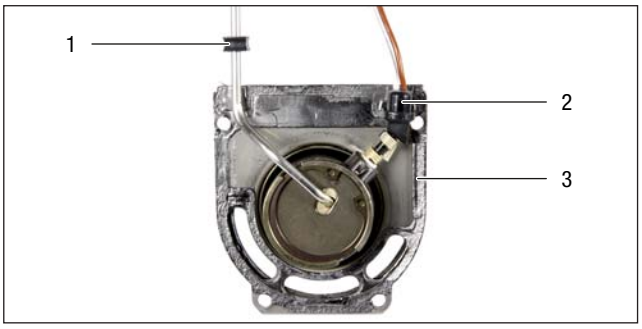
- Remove seal between the combustion chamber flange and the blower housing or between the combustion chamber flange and the heat exchanger, carefully clean all sealing surfaces.
- Pull grommet off the fuel pipe.

ATTENTION!

Reusing the dismantled seals and grommets can result in leaks and malfunctions in the heater.

➔ Use the specified spare parts kit.

4 REPAIR INSTRUCTIONS



1 Grommet, fuel pipe in blower housing
2 Grommet, glow plug in blower housing
3 Seal, combustion chamber flange / blower housing

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

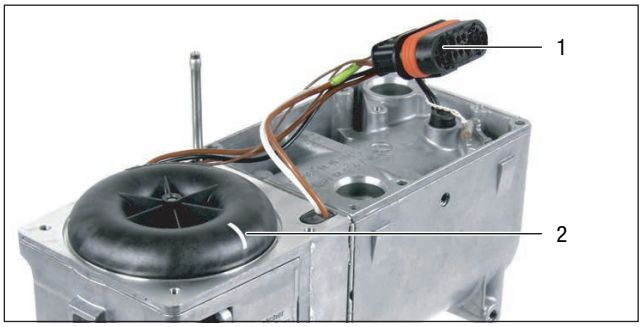
- The following parts are included in the spare parts kit and must be used:
  - Grommet, fuel pipe
  - Grommet, fuel pipe in the “blower” cover
  - Grommet, flame sensor
  - Seal, between the combustion chamber and the blower housing
  - Seal (round), between the combustion chamber and the heat exchanger
- Position new seal between the blower housing and combustion chamber on the combustion chamber flange, note the different cut-outs in the seal.
- Position the “glow plug cable loom” grommet with its flat surface on the seal (combustion chamber flange).
- Push on the grommet for the fuel pipe and position on the seal (combustion chamber flange).
- When assembling the combustion chamber and blower housing, always ensure the grommets sit properly.
- Insert new seal (round) between the combustion chamber and the heat exchanger, in the circular recess of the jacket and heat exchanger.
- Tightening torque of the fixing screws M5 x 80 = $6.5^{+0.5}$ Nm

REPAIR STEP 10

MEASURE BLOWER SPEED

To measure the blower speed, complete Repair step 1, Repair step 2, for diesel heater additional Repair step 4 too, and Repair step 9 first.

- Apply a marking (white paint) to the impeller and measure the speed using a non-contact r.p.m. counter.
- Apply max. 8.2 V at the 14-pin control box connector, chamber 13, cable 0.75² BK and chamber 14, cable 0.75² BN.
- If the measured speed is <10 000 rpm, then replace the combustion air blower.
- If the measured speed > 10 000 rpm, then replace the control box.



1 14-pin connector, control box
2 Marking

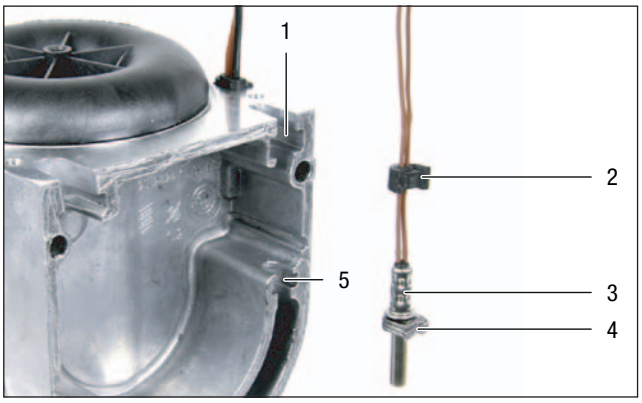
4 REPAIR INSTRUCTIONS

REPAIR STEP 11

DISMANTLE FLAME SENSOR

To dismantle the flame sensor, complete Repair step 1, Repair step 2, for diesel heater additional Repair step 2 too, and Repair step 9 first.

- Pull the flame sensor cable loom grommet out of the groove.
- Pull out the flame sensor together with the grommet (graphite grommet) from the groove in the blower housing.
- Remove the flame sensor.



1 Groove for “flame sensor cable loom” grommet and “fuel pipe” grommet
2 “Flame sensor cable loom” grommet, semi-round
3 Flame sensor
4 Grommet, flame sensor (graphite grommet)
5 Groove for flame sensor collar and graphite grommet

PLEASE NOTE!

NOTES FOR THE INSTALLATION:

- The following parts are included in the spare parts kit and must be used:
  - Grommet, fuel pipe
  - Grommet, fuel pipe in the “blower” cover
  - Grommet, flame sensor (graphite grommet)
  - Seal, between the combustion chamber flange and the blower housing
  - Seal, between the combustion chamber flange and the heat exchanger

NOTES FOR THE ASSEMBLY:

- Insert the flame sensor cable loom grommet with the rounding in the upper housing groove of the blower.
- Push the grommet, flame sensor (graphite grommet) onto the flame sensor.
- Push the collar of the flame sensor and the flame sensor grommet (graphite grommet with rounding) together into the groove of the blower housing.

CHECK FLAME SENSOR

Check the flame sensor using a digital multimeter. If the resistance value of the flame sensor lies outside the diagram or the table of values, replace the flame sensor.

1 Flame sensor
2 Digital multimeter

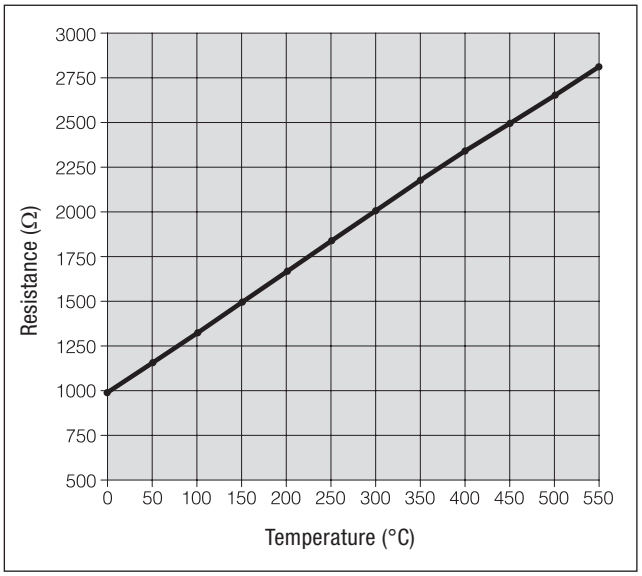


TABLE OF VALUES

Temp [°C]	R [Ω]	Temp [°C]	R [Ω]
0	1000 ±10	200	1758 ±24
50	1194 ±12	250	1941 ±28
100	1385 ±15	300	2120 ±32
150	1573 ±20	350	2297 ±36

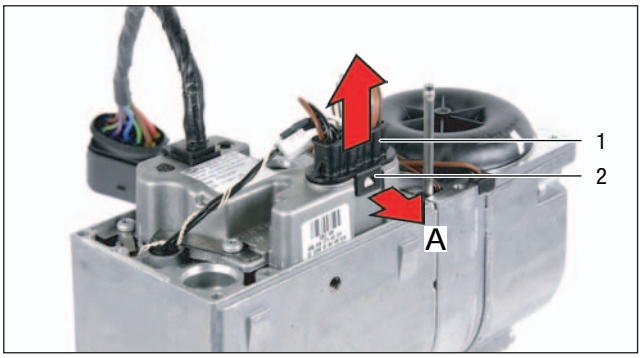
4 REPAIR INSTRUCTIONS

REPAIR STEP 12

CHECK GLOW PLUG

To check the glow plug, complete Repair step 1 and Repair step 2 first.

- Unlock the locking tab at the 14-pin control box connector by turning in direction of arrow (A).
- Pull off the 14-pin control box connector from above.



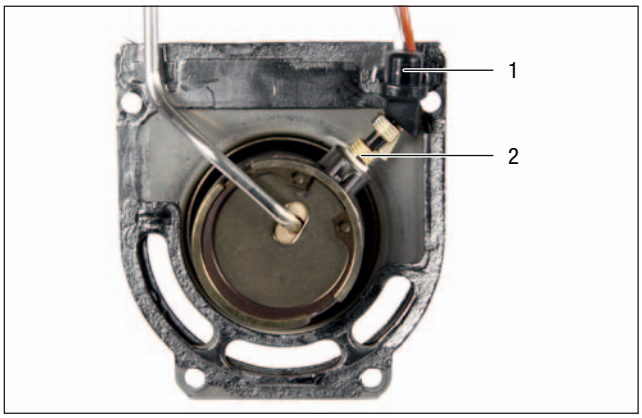
1 14-pin connector, control box
2 Locking tab

- Check glow plug in installed condition.
  - Connector B2 – chamber 3, cable 1.5² BN and chamber 6, cable 1.5² WH, unclip both cables.
  - Apply 8 V ±0.1 V voltage to the glow plug and after 25 sec measure the current intensity.
  - If 8.5 A (+1 A / –1.5 A) the glow plug is ok.
- If values are different, remove the glow plug.

DISMANTLE GLOW PLUG

To dismantle the glow plug, complete Repair step 1, Repair step 2 and Repair step 9 first.

- Carefully pull the glow plug out of the combustion chamber and renew.



1 Grommet, glow plug
2 Glow plug

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

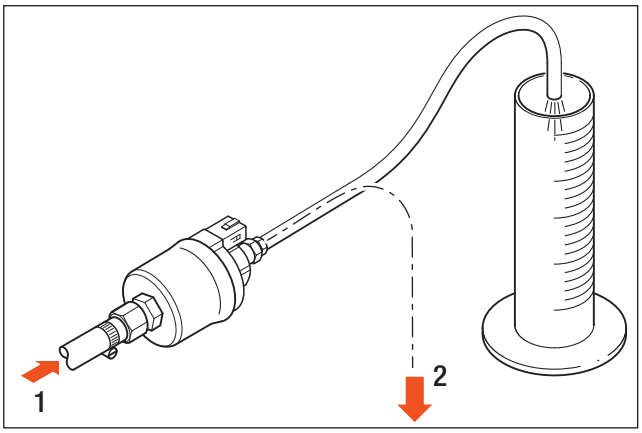
- The following parts are included in the spare parts kit and must be used:
  - Grommet, fuel pipe
  - Grommet, fuel pipe in the “blower” cover
  - Grommet, flame sensor (graphite grommet)
  - Seal, between the combustion chamber flange and the blower housing
  - Seal, between the combustion chamber flange and the heat exchanger

4 REPAIR INSTRUCTIONS

MEASURING THE FUEL QUANTITY, WITHOUT EDITH BASIC

PREPARING FOR THE MEASUREMENT

- Pull off the fuel pressure line from the heater and insert in a measuring cylinder (size 25 cm³).
- Switch on heater.
- Depending on the heater type, the metering pump starts pumping fuel after 17 to 20 sec. If the fuel comes out uniformly and free of bubbles, the fuel line is filled and vented.
- Switch off heater and empty measuring cylinder.



1 from the fuel tank
2 to the heater

MEASUREMENT

- Switch on heater.
- Depending on the heater type, the metering pump starts pumping fuel after 17 to 20 sec.
- During the measurement, hold the measuring cylinder at the level of the heater.
  In the case of petrol heaters, because of the delivery rate, it is sufficient to start once to measure the fuel quantity.
  In the case of diesel heaters, after starting once, two automatic start repeats must take place to obtain sufficient fuel for the measurement.
- After measuring, switch off the heater.
- Read off the quantity of fuel in the measuring cylinder.

EVALUATION

- Compare the measured quantity of fuel with the values in the following table.
  If the measured quantity of fuel is above the maximum value or below the minimum value, the metering pump must be replaced.

Heater type	**Hydronic II Comfort**	
Heater version	B 5 SC	D 5 SC
Discharge period		
one-off start	80 sec.	
one start + two repeats		129 sec.
Fuel quantity, nominal [cm³]	12.4	8.2
Fuel quantity - max. [cm³]	13.7	9.0
Fuel quantity - min[cm³]	11.2	7.4

PLEASE NOTE!

Only carry out the fuel measurement if the battery is sufficiently charged. During the measurement at least 12 volt or max. 13 volt should be applied to the control box.

MEASURING THE FUEL QUANTITY, WITH EDITH BASIC

PREPARING FOR THE MEASUREMENT

- Pull off the fuel pressure line at the heater and insert it into a measuring cylinder (size 25 cm³).
- Connect heater to EDiTH Basic (ISO adapter) and select the “switch on component” function at the PC.
- Select “metering pump” component, click the “run” button and pump fuel into the measuring cylinder.
  Retain setting of 30 sec. delivery period with 10 Hz metering pump frequency.
- After 30 sec. the metering pump switches off, empty the measuring cylinder.

MEASUREMENT / EVALUATION

- Switch on the “metering pump” component again via EDiTH and pump into the measuring cylinder, delivery period 30 sec. with 10 Hz metering pump frequency.
- After 30 sec. the metering pump is switched off, read off the quantity of fuel in the measuring cylinder.

Heater type	**Hydronic II Comfort**	
Heater version	B 5 SC	D 5 SC
Delivery period in sec.	30	
Frequency [Hz]	10	
Fuel quantity, nominal [cm³]	8.2	8.9
Fuel quantity - max. [cm³]	9.0	9.8
Fuel quantity - min[cm³]	7.7	8.4

5 ELECTRICS / CIRCUIT DIAGRAM

HEATER WIRING

ATTENTION!

SAFETY INSTRUCTIONS FOR THE HEATER WIRING!

The heater is to be connected up electrically according to the EMC directives. EMC can be affected if the heater is not connected up correctly. For this reason, comply with the following instructions:

➔ Ensure that the insulation of electrical cables is not damages.

➔ Avoid:

- chafing, kinking, jamming or exposure to heat.
- Seal any connector chambers of watertight connectors not in use with filler plugs to ensure they are dirt-proof and water-proof.
- Electrical connections and ground connections must be free of corrosion and firmly connected.
- Lubricate connections and ground connections outside the heater interior with contact grease.

PLEASE NOTE!

Comply with the following when wiring the heater and the control unit:

- Electrical leads and components must be positioned in the vehicle so that they can function perfectly under normal operating conditions without impairment (e.g. due to heat exposure, moisture, etc.).
- The following cable cross section is to be used between the battery and heater. This ensures that the max. permissible voltage drop in the cables does not exceed 0.5 V for 12 V rated voltage.
  - Cable cross-section for a cable length (plus cable + minus cable) up to 6 m = cable cross-section 4 mm².
- If the positive cable is to be connected to the fuse box (e.g. terminal 30), the vehicle's cable from the battery to the fuse box must also be included in the calculation for the total cable length and re-dimensioned if necessary.
- Insulate unused cable ends.
- For circuit diagrams for the EasyStart control unit refer to the installation instructions of the control unit or the “Installation instructions plus – EasyStart / altitude kit, special functions and diagnosis", which are available to read and download from www.eberspaecher-standheizung.com/download.

PARTS LIST FOR HEATER CIRCUIT DIAGRAM

-A7	Control box
-B1	Control/overheating sensor
-B3	Surface sensor
-B5	Flame sensor
-F1	Fuse, heater
-F2	Fuse, control unit
-F3	Fuse, vehicle blower
-Fx	Fuse block, vehicle
-HG	Heater
-K1	Relay, vehicle blower
-M1	Burner motor
-M11	Water pump
-R1	Glow plug
-S3	Vehicle blower
-S4	Vehicle blower
-XTR1	Disconnect cable
-Y1	Fuel metering pump
a	to the cable harness connector XB2
b	to the heater connector XS2
c	to the control unit
d	Fan activation
e	Auxiliary heating criterion
f	Switch-on signal

PLEASE NOTE!

The 12 volt relay (-K1, from terminal 30 to terminal 87a) has a maximum current carrying capacity of 40 A; i.e. the value of the vehicle's own blower fuse must not be more than 40 A. Circuit diagram see page 39 and 41.

ASSIGNMENT OF -XS2 CONNECTOR

Chamber	Cross-section	Colour	Function
1	2.5	red	Battery “plus” (positive) (terminal 30)
2	2.5	brown	Battery “minus” (negative) (terminal 31)
3	0.5	black / red	Vehicle blower
4	1.0	green	Metering pump “plus”
5	0.5	blue / white	JE diagnosis
6	0.5	blue	Auxiliary heating criterion
7	0.5	yellow	Switch on “plus”
8	0.5	violet	Water pump “plus”
9	1.0	brown	Water pump “minus”
10	1.0	brown / green	Metering pump “minus”

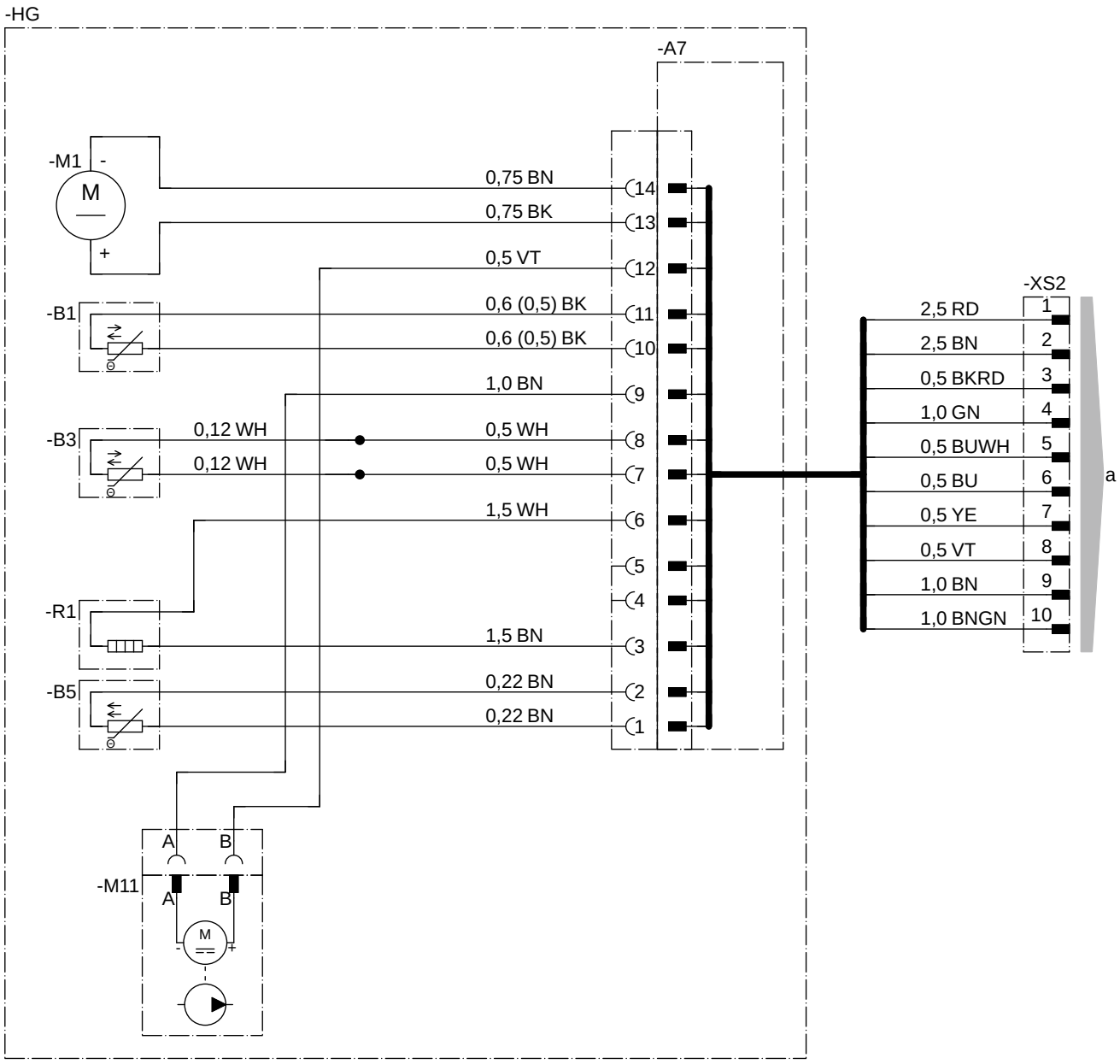
CABLE COLOURS

RD	red	GR	grey	BK	black
BU	blue	YE	yellow	GN	green
WH	white	VT	violet	BN	brown

Connectors and bush housings are shown from the cable inlet side.

5 ELECTRICS / CIRCUIT DIAGRAM

CIRCUIT DIAGRAM, PETROL HEATER



CONNECTOR AND BUSH HOUSING CIRCUIT DIAGRAM, HEATER AND CABLE HARNESS

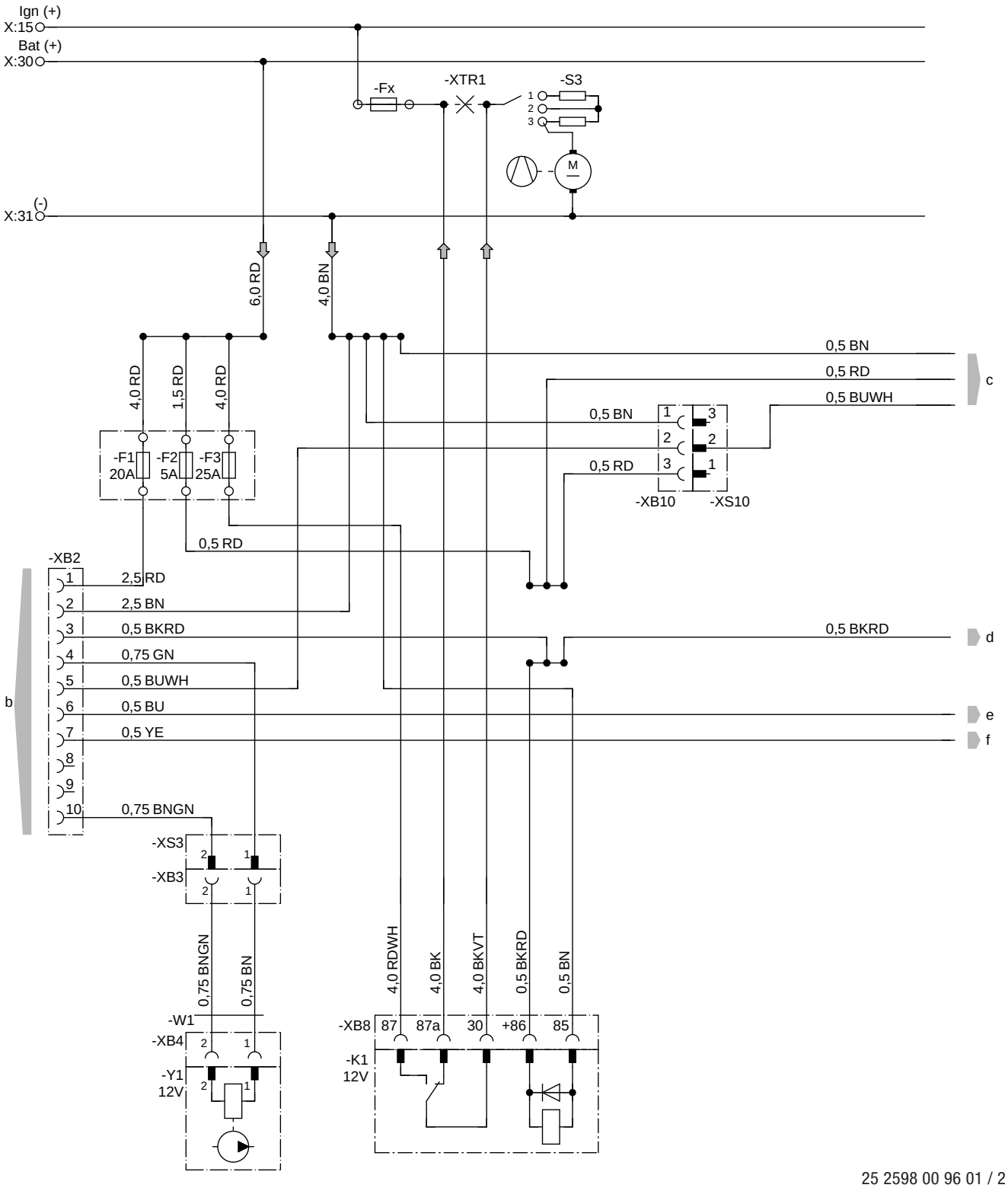
-XB2 -XS2 -XB10 -XS10 -XB3 -XS3

25 2598 00 96 01 / 1

Parts list see page 37

5 ELECTRICS / CIRCUIT DIAGRAM

CIRCUIT DIAGRAM, CABLE HARNESS, PETROL HEATER

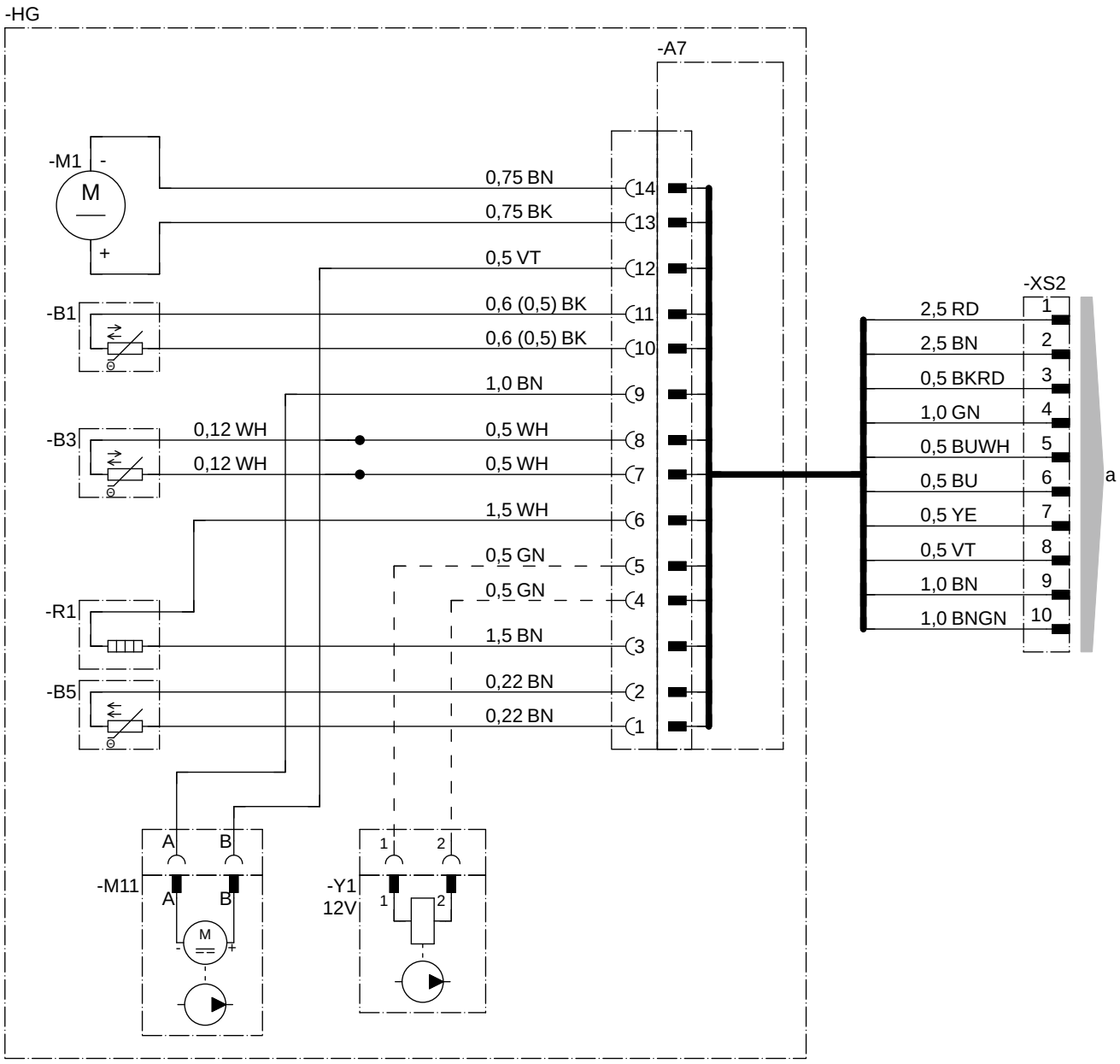


25 2598 00 96 01 / 2

Parts list see page 37

5 ELECTRICS / CIRCUIT DIAGRAM

CIRCUIT DIAGRAM, DIESEL HEATER



CONNECTOR AND BUSH HOUSING CIRCUIT DIAGRAM, HEATER AND CABLE HARNESS

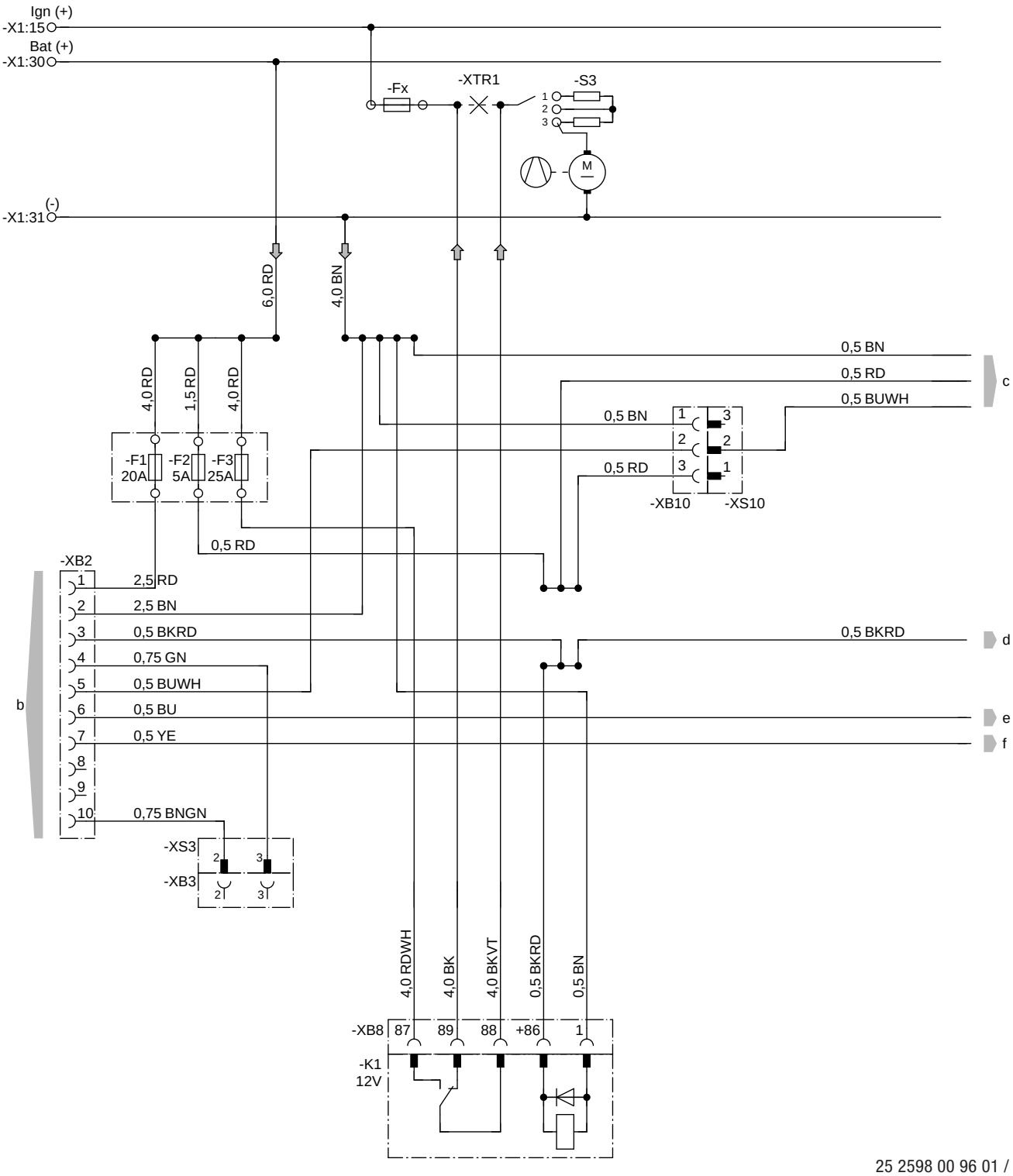
-XB2 -XS2 -XB10 -XS10 -XB3 -XS3

25 2598 00 96 01 / 3

Parts list see page 37

5 ELECTRICS / CIRCUIT DIAGRAM

CIRCUIT DIAGRAM, CABLE HARNESS, DIESEL HEATER



25 2598 00 96 01 / 4

Parts list see page 37

6 ENVIRONMENT

CERTIFICATIONS

The high quality of Eberspächer's products is the key to our success. To guarantee this quality, we have organised all work processes in the company along the lines of quality management (QM). Even so, we still pursue a large number of activities for continuous improvement of product quality in order to keep pace with the similarly constantly growing requirements made by our customers.
All the steps necessary for quality assurance are stipulated in international standards.
This quality is to be considered in a total sense. It affects products, procedures and customer / supplier relationships.
Officially approved public experts assess the system and the corresponding certification company awards a certificate.
Eberspächer Climate Control Systems GmbH & Co. KG has already qualified for the following standards:

QUALITY MANAGEMENT IN ACCORDANCE WITH EN ISO 9001:2000 AND ISO/TS 16949:1999

ENVIRONMENTAL MANAGEMENT SYSTEM IN ACCORDANCE WITH EN ISO 14001:1996

DISPOSAL

DISPOSAL OF MATERIALS
Old devices, defect components and packaging material can all be separated and sorted into pure-grade factions so that all parts can be disposed of as required in an environment-friendly manner recycled where applicable.
Electric motors, control boxes and sensors (e.g. temperature sensors) are deemed to be “electronic scrap”.

DISMANTLING THE HEATER
The heater is dismantled according to the repair stages in the current troubleshooting / repair instructions.

PACKAGING
The packaging of the heater can be kept in case it has to be sent back.

EU DECLARATION OF CONFORMITY

The manufacturer:
Eberspächer Climate Control Systems GmbH & Co. KG

Address:
Eberspächerstraße 24
D-73730 Esslingen

herewith declares that the following product:

Product name	**Vehicle heater**	
Type	**Hydronic II**	
Version	**B 4 S / B 5 S**	**B 4 SC / B 5 SC**
	D 4 S / D 5 S	**D 4 SC / D 5 SC**
	E 4 S	

fulfils the requirements of the following EC Directives:

a) Heating systems directive 2001/56/EC,
Revision status 2006/119/EC

b) Radio interference (EMC) of vehicles 72/245/EEC,
Revision status 2009/19/EC

c) Heater control ECE-R 122,
Revision status 00

d) EMC of vehicles ECE-R 10,
Revision status 03

The following EC Directives and UN regulations have been used to assess the product: 2001/56/EC; 72/245/EEC; ECE-R 122; ECE-R 10

7 SERVICE

LIST OF ABBREVIATIONS

ADR
European Agreement concerning the International Carriage of Dangerous Goods by Road.

ECE REGULATION
Internationally agreed, uniform technical specifications for vehicles, parts and equipment of motor vehicles.

EMC DIRECTIVES
Electromagnetic compatibility.

E85 ETHANOL FUEL
Petrol containing 85 % ethanol.

FAME
Biodiesel to EN 14214.

JE PARTNER
Eberspächer partner.

INDEX

7 SERVICE

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Eberspächer

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