

# TROUBLESHOOTING AND REPAIR INSTRUCTIONS

## HYDRONIC II C



**THE TROUBLESHOOTING AND REPAIR INSTRUCTIONS ARE ONLY VALID FOR THE FOLLOWING ENGINE-INDEPENDENT WATER HEATERS**

Heaters for diesel

D 5 S – 12 V    25 2506 05 00 00

D 5 S – 24 V    25 2507 05 00 00

# 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.

CHAPTER	TITLE	CONTENT	PAGE
1	Introduction	Foreword	5
		Special text structure, presentation and picture symbols	5
		– Special text formats and presentations	5
		– Picture symbols	5
		Heater documentation	5
		– Content and purpose of these troubleshooting and repair instructions	5
		Further documentation	5
		– Technical description, installation, operating and maintenance instructions.	5
		– Spare parts list	5
		Safety instructions for installation and repair	6
		Liability claim / Warranty	6
		Accident prevention	6
		Initial start-up of the heater or functional test after a repair	6
		Emergency shutdown – EMERGENCY OFF	6
		2	Function and operation
Functional description	8		
– Switch on parking heater mode	8		
– Heating mode	8		
– Heating at high altitudes	8		
– Control and safety devices	8		
3	Technical data	Hydronic II C D 5 S diesel heater	9
		Water pump	10
		– Pressure characteristic Water pump, 12 V	10
		– Pressure characteristic Water pump, 24 V	10
4	Troubleshooting	What to check first in case of faults	11
		Locking the control box	11
		– The control box is locked if the following faults occur:	11
		– Cancel the control box lock	11
		Overview of the test equipment and control units	12
		External diagnostics system	12

## CONTENTS

	Fault diagnosis using the EDiTH Basic diagnostic tool	13
	– Connect EDiTH Basic	13
	– Start the diagnosis query.	14
	– Delete the fault memory and at the same time cancel the control box lock	14
	Fault diagnosis using the control unit	15
	– Diagnosis capable control unit	15
	Query / delete fault memory and cancel the heater lock	15
5	Repair instructions	
	Before working on the heater, always follow the relevant safety instructions	21
	Special tool	21
	– AMP release tool	21
	Assembly drawing	22
	Repair steps	23
	Dismantle the heater	24
	Repair step 1	24
	– Remove “control box” cover	24
	Repair step 2	24
	– Remove “blower” cover	24
	Repair step 3	25
	– Dismantling the control box	25
	Repair step 4	26
	– Remove overheating sensor and surface sensor	26
	– Check overheating sensor	26
	– Table of values	26
	– Check the surface sensor	27
	– Table of values	27
	Repair step 5	28
	– Remove the “electric motor” cover and “blower sub-assembly with combustion chamber”	28
	Repair step 5	29
	– Remove the “electric motor” cover and “blower sub-assembly with combustion chamber”	29
	Repair step 6	30
	– Remove flame sensor	30
	– Check flame sensor	30
	– Table of values	30
	Repair step 7	31
	– Check glow plug	31
	– Dismantle glow plug	31
	Repair step 8	32
	– Remove heating element from the combustion chamber	32
	– Install new heating element in the combustion chamber	33

## CONTENTS

		Measurement of the fuel quantity, without EDiTH Basic	35
		– Preparing for the measurement	35
		– Measurement	35
		– Evaluation	35
		– Fuel delivery rate	35
		Measuring the fuel quantity, with EDITH Basic	35
		– Preparing for the measurement	35
		– Measurement / evaluation	35
6	Electrics / circuit diagram	Safety instructions for wiring the heater!	36
		Parts list for heater circuit diagram	36
		– Cable colours	36
		Circuit diagram, heater D 5 S – 12 V	37
		Circuit diagram, heater D 5 S – 24 V	38
		Circuit diagram, control unit – EasyStart R+	39
		Circuit diagram control unit – EasyStart R	40
		Circuit diagram control unit – EasyStart T	41
		Circuit diagram, control unit – EasyStart T – ADR	42
		Circuit diagram for control unit – Calltronic II	43
7	Service	Certifications	44
		Disposal	44
		– Disposal of materials	44
		– Dismantling the heater	44
		– Packaging	44
		EC Declaration of Conformity	44
		List of abbreviations	45
		List of key words	46

# 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 revised 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 started 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



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.



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.



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 perform 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

### CAUTION!

Improper installation or repair of Eberspächer heaters can cause a fire or result 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 / WARRANTY

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 installation 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

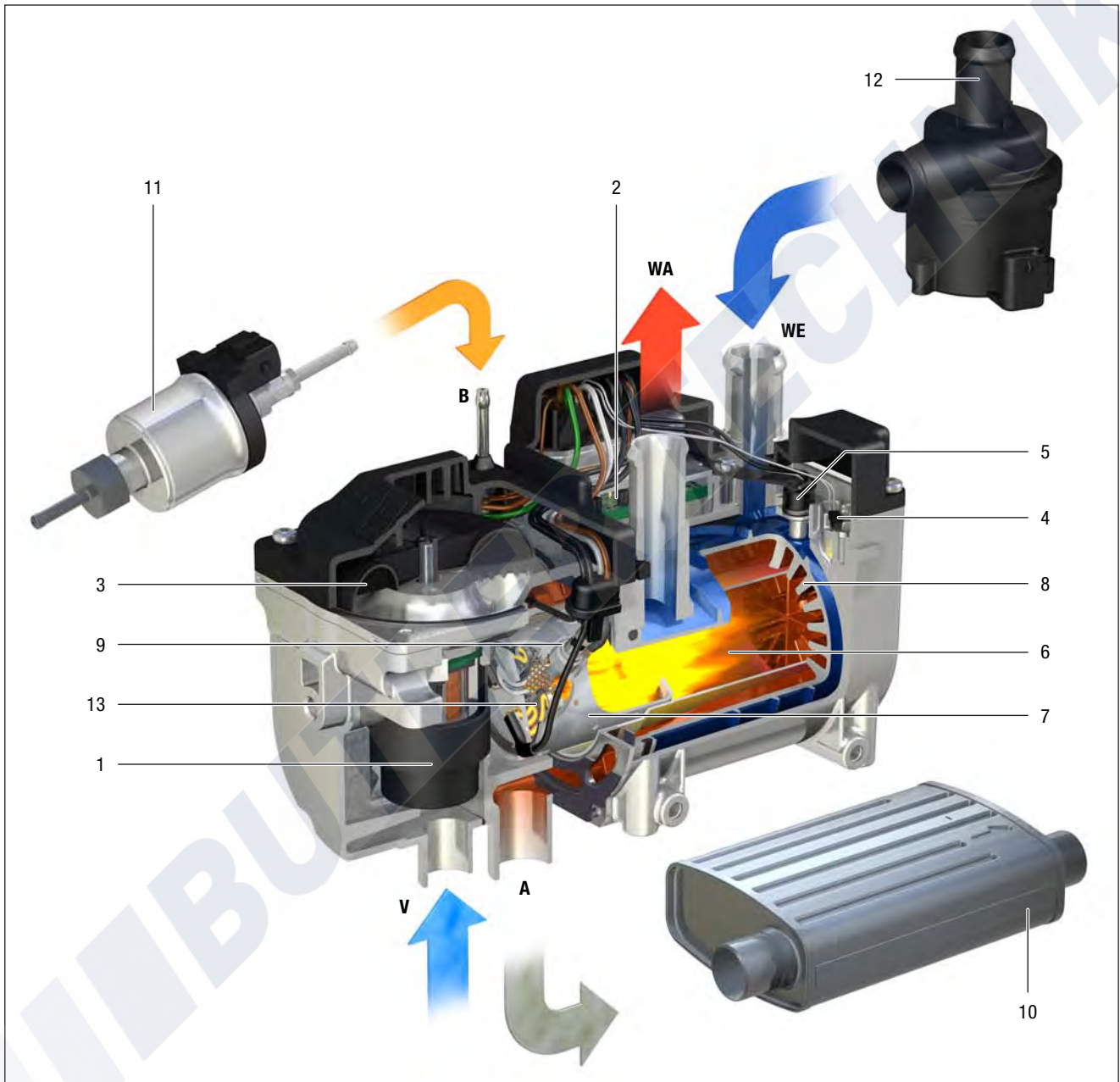
If an emergency shutdown – EMERGENCY OFF – is necessary during operation, proceed as follows:

- 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



- 1 Electric motor
- 2 Control box
- 3 Combustion air fan
- 4 Surface sensor
- 5 Overheating sensor
- 6 Flame sensor
- 7 Combustion chamber
- 8 Heat exchanger
- 9 Glow plug
- 10 Exhaust silencer


- 11 Metering pump
- 12 Water pump
- 13 Heating element fuel supply

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

## 2 FUNCTION AND OPERATION

### FUNCTIONAL DESCRIPTION

#### SWITCH ON PARKING HEATER MODE

When the heater is switched on, the  symbol appears in the control unit.

#### HEATING MODE


The water pump starts up and, following a preset sequence, the combustion air fan, 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.

The heater starts in "Power" control stage. After the cooling water temperature has reached approx. 75 °C – depending on the selected blower setting – the heater switches to "High" control stage.

If the cooling water continues to rise up to 80 °C, the heater switches to "Low" control stage.

- If insufficient heat output is achieved in "Low" control stage, the cooling water temperature drops to 75 °C – the heater switches back to "High" control stage.
- If the heating output in "Low" control stage is inadequate, the cooling water temperature rises to 85 °C. The heater switches to "Off" control stage (pause mode) – an after-run of 180 seconds follows.
  - If the cooling water temperature cools to 75 °C during pause mode, a controlled start occurs in a high 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 asl:
  - Unlimited heating possible.

Heating at altitudes over 1500 m – 3000 m asl:

- 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. This can be done 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 the heater does not ignite within the preset safety time (70 seconds), the start is repeated.  
If the heater still does not ignite after another start attempt within the preset safety time, the heater is automatically shut down. After an impermissible number of failed start attempts, the control box is locked.\*
- If the flame goes off by itself during operation, the heater is restarted.  
If the heater does not ignite or ignites but goes out again within 10 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 case of overheating (e.g. water shortage, poorly ventilated cooling water circuit), the overheating sensor triggers, the fuel feed is interrupted and the heater is automatically shut down. Once the cause of the overheating has been eliminated, the heater can be restarted by switching off and on again (heater ON / OFF).  
Precondition: the heater has cooled down sufficiently, 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 automatically shut down.
- 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 continuously monitored. If the blower motor does not start up or if it is blocked, the heater is automatically switched off.

\* Cancellation of the lock or reading out errors is possible:

- using the EasyStart T timer
- with the EasyStart R+ radio remote control.

For other control units by connecting:

- the diagnostic unit
- the customer service program EDiTH.

For operation and fault list, please refer to the enclosed operating instructions or the troubleshooting and repair instructions for the heater.

#### PLEASE NOTE!

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



### 3 TECHNICAL DATA

#### HYDRONIC II C D 5 S DIESEL HEATER

Heater type		Hydronic II C					
Heater version		D 5 S					
Heating medium		Mixture of water and coolant (max. 50 % coolant)					
Fuel		Diesel – standard commercially available (EN 590) Bio diesel fuel (FAME according to EN 14214)					
Rated voltage		12 V			24 V		
Control of the heat flow		Power	High	Low	Power	High	Low
Heat flow (W)		4800	2100	1200	4800	2100	1200
Fuel consumption (l/h)		0.59	0.26	0.15	0.59	0.26	0.15
Average electrical power consumption (W)		during operation		27	8	5	27
		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.		10.2 V			20.4 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			32 V		
Allowable operating pressure		up to 2.5 bar overpressure max.					
Water volume in the heater		approx. 0.18 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 (5x2 h)	
Coolant water temperature		continuous		-40 °C to +120 °C		-40 °C to +120 °C	
		short time		---		max. 125 °C (1 h)	
Interference suppression class		5 (EN 55025 / VDE 0879 Part 2)					
Weight – without coolant and attachments		approx. 2.4 kg					



#### CAUTION!

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

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



#### PLEASE NOTE!

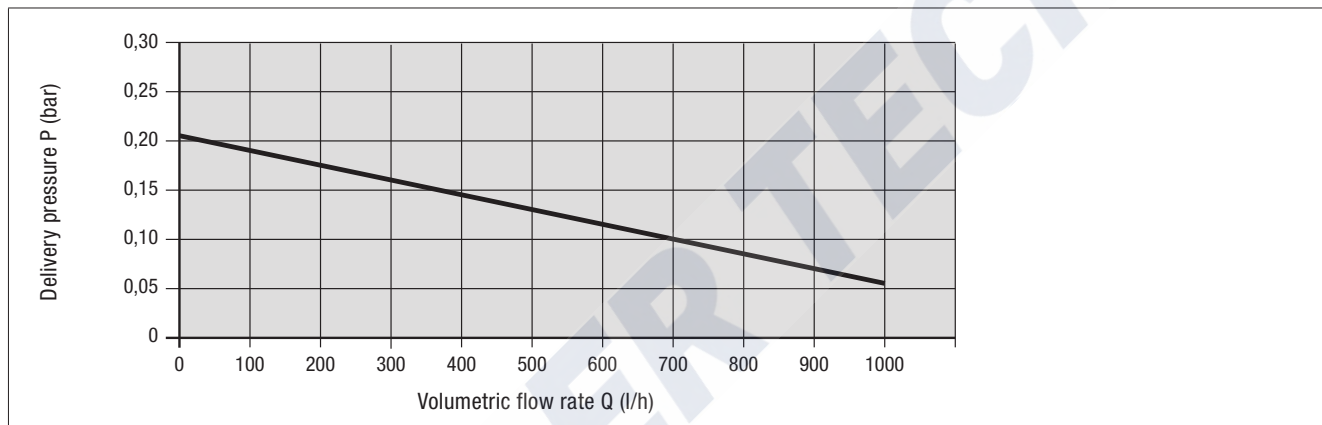
If no limit values are given, the technical data listed is with the usual heater tolerances of  $\pm 10\%$  at nominal voltage and Esslingen reference altitude.

### 3 TECHNICAL DATA

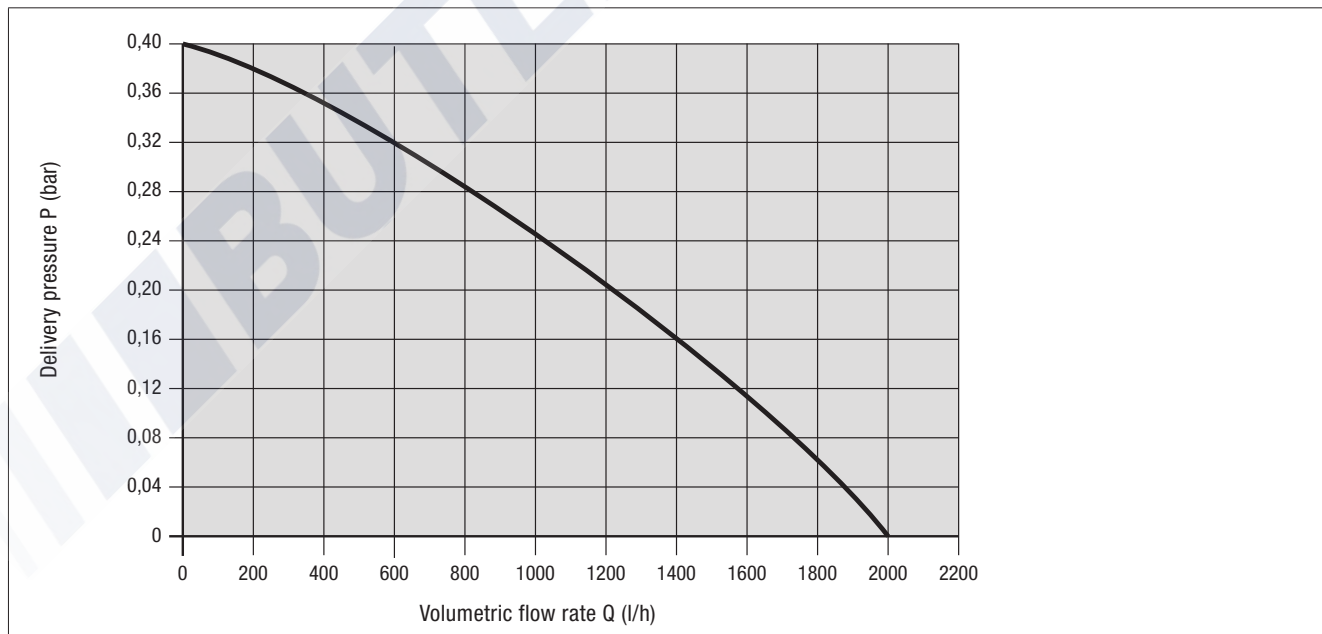
#### WATER PUMP

Rated voltage	12 V	24 V
Operating voltage	9 V to 16 V	18 V to 33 V
Electrical power consumption	<15 W	32 W
Delivery rate	680 l/h	1,600 l/h
Delivery pressure difference	0.1 bar	0.1 bar
Operating temperature	-40 °C to +125 °C	-40 °C to +120 °C

PRESSURE CHARACTERISTIC WATER PUMP, 12 V



PRESSURE CHARACTERISTIC WATER PUMP, 24 V



**⚠ CAUTION!**

Operating the water pump 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.

## 4 TROUBLESHOOTING

### WHAT TO CHECK FIRST IN CASE OF FAULTS

- **Check**
  - Fuel in the tank?
  - Fuel pipes 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  $< 10\text{ V} / < 20\text{ V}$ , the undervoltage protection has triggered.
  - Battery voltage  $> 16\text{ V} / > 32\text{ V}$ , the overvoltage protection has triggered.
- **Check voltage supply  $U_{\text{Batt}}$  (Terminal 30)**

Disconnect the 2-pin connector S4 / B4 and measure the applied voltage in connector B4 between chamber 1 (cable 4<sup>2</sup> rt) and chamber 2 (cable 4<sup>2</sup> br).

If it differs from the battery voltage, check the fuses, the supply cables, the ground connection and the positive 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 started 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 13](#).

## 4 TROUBLESHOOTING

### 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 diagnostic tool	22 1524 89 00 00
can be used from software version S3V10-F.	
The software can be downloaded from the service portal.	
Also required:	
Adapter cable	22 1000 33 78 00

Control unit	Order no.
▪ EasyStart T	22 1000 32 88 00
▪ EasyStart R+	22 1000 32 80 00

#### PLEASE NOTE!

- The diagnostics cable (cable 0.5<sup>2</sup> bl/ws) 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.

## 4 TROUBLESHOOTING

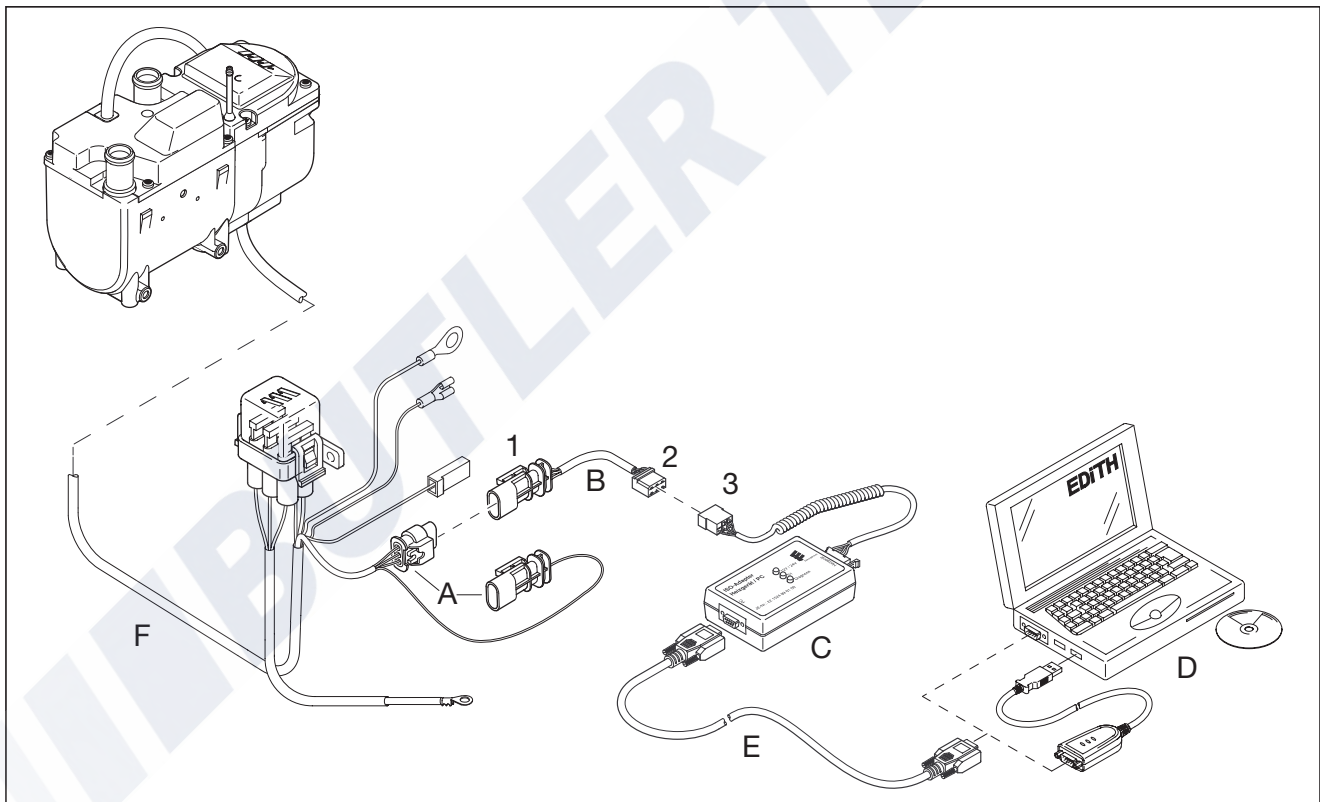
### FAULT DIAGNOSIS USING THE EDITH BASIC DIAGNOSTIC TOOL

#### 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) diagnostic 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 [from page 16](#) described.

#### CONNECT EDITH BASIC

1. Disconnect the plug-in “diagnosis” connection (A) in the heater cable harness.
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 (C) diagnostic tool.
4. Connect the SUB-D connection cable (E) to the EDiTH Basic diagnostic tool (C) and to the PC (D).



- A Plug-in “diagnosis” connection
- B Adapter cable
- C EDiTH Basic diagnostic tool
- D PC
- E SUB-D connection cable
- F Heater cable harness
- 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 diagnostic tool

## 4 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 is and the fault code 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.



## 4 TROUBLESHOOTING

### FAULT DIAGNOSIS USING THE CONTROL UNIT

#### DIAGNOSIS CAPABLE CONTROL UNIT

- EasyStart R+ radio remote control (Order No.: 22 1000 32 80 00)
- EasyStart T timer (Order No.: 22 1000 32 88 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!

- The bl/ws diagnostics cable must be connected in order to perform the diagnosis. To this end, please refer to and follow the circuit diagram for the radio remote control or the timer and for 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 action are described [from page 16](#).
- Ensure sufficient battery voltage (min. 10.5 V / min. 21 V).



- Back control button
- Next control button
- ON / OFF activation button for mobile unit / timer
- OK button (symbol selection / input confirmation)

### QUERY / DELETE FAULT MEMORY AND CANCEL THE HEATER LOCK

Activate mobile unit / timer

(see EasyStart R+ / EasyStart T operating instructions)

Confirm symbol with .



SEND



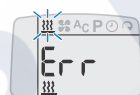
SEND

Heater is switched on.

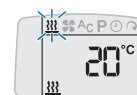
Confirm operating time with .

Following activation, the following can be shown in the display (display appears after approx. 20 sec.):

Display if errors / faults exist



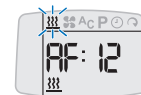
Display if no errors / faults exist



The following actions are possible with both displays:

- Display current fault in fault memory.

and at the same time briefly press .



- Display fault memory F1 – F5

or press .



The current fault is always written in fault memory F1.

- Display fault memory again.

or, at the same time, briefly press .



- Delete the fault memory and as a result, at the same time cancel the control box lock

Confirm current fault or one of the faults F1 – F5 with .



Confirm dEL display again with .


The fault memory is deleted and the control box is unlocked.

- Switch off the heater.




Press .



## 4 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. <ul style="list-style-type: none"> <li>▪ Read out air pressure sensor fault memory (only using EDiTH Basic diagnostic tool, from software S3V7-F).</li> <li>▪ Check wiring and plug-in connections, if ok replace ⇒ air pressure sensor.</li> </ul>
010	Shutdown due to overvoltage (heater not functioning)	Overvoltage applied to control box for at least 20 seconds without interruption <ul style="list-style-type: none"> <li>▪ Disconnect plug-in connection B4/S4, vehicle engine on, connector B4 – measure voltage between chamber 1, cable 4<sup>2</sup> rt and chamber 2, cable 4<sup>2</sup> br. Voltage &gt;15 V / &gt;32 V ⇒ check the generator regulator, check battery.</li> </ul>
011	Shutdown due to undervoltage (heater not functioning)	Undervoltage applied to control box for at least 20 seconds without interruption <ul style="list-style-type: none"> <li>▪ Vehicle engine off, disconnect plug-in connection B4/S4, connector B1 – measure voltage between chamber 1, cable 4<sup>2</sup> rt and chamber 2, cable 4<sup>2</sup> br. Voltage &lt;10 V / &lt; 20 V ⇒ Check fuses, supply cables, ground connections and positive support point at the battery for voltage drop (corrosion).</li> </ul>
012	Overheating – software threshold exceeded	Temperature at overheating sensor >125 °C <ul style="list-style-type: none"> <li>▪ Check water circuit: <ul style="list-style-type: none"> <li>– Heating control in max. position.</li> <li>– Check water circuit for leaks.</li> <li>– Vent water circuit.</li> <li>– If non-return valve / thermostat in the water circuit, check the flow direction.</li> </ul> </li> <li>▪ Check water throughput rate.</li> <li>▪ Check overheating sensor: <ul style="list-style-type: none"> <li>– Check cable for continuity, short circuit and damage.</li> <li>– Measure the resistive value in connector B2 – between chamber 10, cable 0.5<sup>2</sup> sw and chamber 11, cable 0.5<sup>2</sup> sw, see <a href="#">Page 26</a> for measured values.</li> </ul> </li> <li>▪ Check water pump, see <a href="#">Fault code 041</a> and <a href="#">042</a>.</li> </ul>
013	Temperature difference error (before metering pump delivery)	Difference between the temperature values of the overheating sensor and the surface sensor is too large.
014	Possible overheating risk (1. differential evaluation)  <b>PLEASE NOTE!</b> 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.	<ul style="list-style-type: none"> <li>▪ For remedial action see <a href="#">Fault code 012</a>.</li> <li>▪ Check the surface sensor: <ul style="list-style-type: none"> <li>– Check cable for continuity, short circuit and damage.</li> <li>– Measure the resistive value in connector B2 – between chamber 7, cable 0.5<sup>2</sup> ws and chamber 8, cable 0.5<sup>2</sup> ws, see <a href="#">Page 27</a> for measured values.</li> </ul> </li> </ul>
015	Operating lock-out – too many overheating events detected	The control box is locked due to consecutive too frequent overheating ( <a href="#">Fault code 012</a> , <a href="#">013</a> , <a href="#">014</a> , <a href="#">016</a> ). <ul style="list-style-type: none"> <li>▪ For remedial action see <a href="#">Fault code 013</a>.</li> <li>▪ Unlock the control box, see <a href="#">from page 14</a>.</li> </ul>


## 4 TROUBLESHOOTING

FAULT CODE DISPLAY	FAULT DESCRIPTION	COMMENTS
<b>016</b>	Possible overheating risk (2. differential evaluation)  <b>PLEASE NOTE!</b> 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.	<b>REMEDIAL ACTION</b> Difference between the temperature values of the overheating sensor and the surface sensor is too large. <ul style="list-style-type: none"> <li>For remedial action see <a href="#">Fault code 012</a>.</li> <li>Check the surface sensor:               <ul style="list-style-type: none"> <li>Check cable for continuity, short circuit and damage.</li> <li>Measure the resistance in connector B2 – between chamber 7, cable 0.5<sup>2</sup> ws and chamber 8, cable 0.5<sup>2</sup> ws, see <a href="#">Page 27</a> for measured values.</li> </ul> </li> </ul>
<b>017</b>	Overheating, hardware threshold exceeded	Temperature at overheating sensor >130 °C <ul style="list-style-type: none"> <li>For remedial action see <a href="#">Fault code 012</a>.</li> <li>Check the surface sensor:               <ul style="list-style-type: none"> <li>Check cable for continuity, short circuit and damage.</li> <li>Measure the resistance in connector B2 – between chamber 7, cable 0.5<sup>2</sup> ws and chamber 8, cable 0.5<sup>2</sup> ws, see <a href="#">Page 27</a> for measured values.</li> </ul> </li> </ul>
<b>018</b> <b>019</b>	Glow plug – start energy too low Glow plug – ignition energy too low	Glow plug energy input is too low. <ul style="list-style-type: none"> <li>Perform functional check on the glow plug, see <a href="#">Fault code 020</a>.</li> </ul>
<b>020</b> <b>021</b> <b>022</b>	Glow plug – interruption Glow plug – overload Glow plug - short circuit downstream of +Ub or transistor error  <b>CAUTION!</b> The glow plug is irreparably damaged if the voltage values are exceeded. → Perform the functional check with max. 9.5 V / 16 V.  <b>PLEASE NOTE!</b> Ensure the power pack has adequate short-circuit resistance.	Glow plug energy input is too low. <ul style="list-style-type: none"> <li>Check both cables for continuity, short circuit and damage.</li> <li>Perform functional check on the glow plug in installed condition.               <ul style="list-style-type: none"> <li>Connector B2 – chamber 3, cable 1.5<sup>2</sup> br and chamber 6, cable 1.5<sup>2</sup> ws, unclip both cables.</li> </ul> </li> <li>12 V               <ul style="list-style-type: none"> <li>Apply 9,5 V ±0.1 V voltage to the glow plug and after 25 sec measure the current intensity.</li> <li>if 9.5 A (+1 A / -1.5 A) the glow plug is ok.</li> <li>If values are different, renew the glow plug.</li> </ul> </li> <li>24 V               <ul style="list-style-type: none"> <li>Apply 16 V ±0.1 V voltage to the glow plug and after 25 sec measure the current intensity.</li> <li>if 5.2 A (±1 A) the glow plug is ok.</li> <li>If values are different, renew the glow plug.</li> </ul> </li> </ul>
<b>023</b> <b>024</b>	Heating element – interruption Heating element – short circuit	<ul style="list-style-type: none"> <li>Check the heating element:              Check connector B2 – chamber 12, cable 1.5<sup>2</sup> sw – chamber 9, cable 1.5<sup>2</sup> sw for continuity, short circuit and damage, if ok ⇒ replace control box.</li> </ul>
<b>025</b>	K-line – short circuit	<ul style="list-style-type: none"> <li>Check the diagnostics cable:              Check connector B1 and connector B8 (12 v) / B3 (V)– chamber 2, cable 0.5<sup>2</sup> bl/ws continuity, short circuit and damage, if ok ⇒ replace control box.</li> </ul>
<b>026</b>	Heating element – short circuit downstream of +Ub or transistor error	<ul style="list-style-type: none"> <li>Check the heating element:              Check connector B2 – chamber 12, cable 1.5<sup>2</sup> sw – chamber 9, cable 1.5<sup>2</sup> sw for continuity, short circuit and damage, if ok ⇒ replace control box.</li> </ul>
<b>029</b>	Heating element – ignition energy too low	<ul style="list-style-type: none"> <li>Check the heating element:              Check connector B2 – chamber 12, cable 1.5<sup>2</sup> sw – chamber 9, cable 1.5<sup>2</sup> sw for continuity, short circuit and damage, if ok ⇒ replace control box.</li> </ul>

## 4 TROUBLESHOOTING

FAULT CODE DISPLAY	FAULT DESCRIPTION	COMMENTS ▪ REMEDIAL ACTION
030 031 032 033 034 035	Burner motor – EMF outside the allowable range – Interruption – Short circuit – No signal in signal cable / motor blocked – sluggish – Short circuit downstream of +Ub or transistor error	Impeller blocked (frozen, soiled, sluggish, ...) ▪ Remove blockage and check the burner motor for ease of movement by manually turning the impeller. ▪ Check burner motor cable: Check connector B2 – chamber 14, cable 0.75 <sup>2</sup> br, chamber 13 cable 0.75 sw and cable 0.75 <sup>2</sup> gn/bl for continuity, short circuit and damage, if ok ⇒ replace control box, see <a href="#">Fault code 090</a> .
038 039	Vehicle blower – interruption Vehicle blower – short circuit	▪ Check “blower” lead harness: Check connector B1 – chamber 3, cable 0.5 <sup>2</sup> sw/rt and connector B4 – chamber 2, cable 4 <sup>2</sup> br 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 (2.5.7.), if fault code 038 is displayed, the relay (2.5.7.) is defective ⇒ renew relay (2.5.7.).
041 042	Water pump – interruption Water pump – short circuit	▪ Check “water pump” lead harness: Check connector B9 (12 V) / connector B8 (24 V) – chamber 2, cable 0.5 <sup>2</sup> vi and chamber 1, cable 1.0 <sup>2</sup> br 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.
047 048	Metering pump – short circuit Metering pump interruption	▪ Check “metering pump” lead harness: Check connector B1 – chamber 4, cable 1.5 <sup>2</sup> gn and connector B4 – chamber 2, cable 4 <sup>2</sup> br/gn for continuity, short circuit and damage, if ok ⇒ renew metering pump.
049	Metering pump – 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 <a href="#">Fault code 048</a> 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. ▪ Unlock the control box, see <a href="#">from page 14</a> . ▪ Check fuel quantity and fuel supply, see <a href="#">Page 35</a> .
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 <a href="#">Fault code 064</a> and <a href="#">065</a> .
052	Safety time – exceeded	▪ Check exhaust and combustion air system. ▪ Check fuel quantity and fuel supply, see <a href="#">Page 35</a> . ▪ Renew the gauze fuel filter inserted in the connection socket of the metering pump.

## 4 TROUBLESHOOTING

FAULT CODE DISPLAY	FAULT DESCRIPTION	COMMENTS ▪ REMEDIAL ACTION
053	Flame cutout from control stage "Power"	<ul style="list-style-type: none"> <li>▪ Check exhaust and combustion air system.</li> <li>▪ Check fuel quantity and fuel supply, see <a href="#">Page 35</a>.</li> <li>▪ Check flame sensor, see <a href="#">Fault code 064</a> and <a href="#">065</a>.</li> </ul>
054	Flame cutout from control stage "High"	
056	Flame cutout from control stage "Low"	
057	Flame cutout from start process  <b>PLEASE NOTE!</b> If allowable start attempts still remain, in the event of a flame cutout, the heater performs a new start, if applicable with subsequent repeat start. If the restart or repeated start was successful, the fault code display is deleted.	
060	Overheating sensor interruption	<ul style="list-style-type: none"> <li>▪ Check overheating sensor:               <ul style="list-style-type: none"> <li>– Check connector B2 – chamber 10, cable 0.5<sup>2</sup> sw and chamber 11, cable 0.5<sup>2</sup> sw for damage.</li> <li>– Remove the overheating sensor and check, see <a href="#">Page 26</a>.</li> <li>– If fault code 060 continues to be displayed, replace the control box.</li> </ul> </li> </ul>
061	Short circuit in overheating sensor	<ul style="list-style-type: none"> <li>▪ Check overheating sensor:               <ul style="list-style-type: none"> <li>– Check connector B2 – chamber 10, cable 0.5<sup>2</sup> sw and chamber 11, cable 0.5<sup>2</sup> sw for damage.</li> <li>– Remove the overheating sensor and check, see <a href="#">Page 26</a>.</li> <li>– If fault code 061 continues to be displayed, replace the control box.</li> </ul> </li> </ul>
062	Printed circuit board sensor – interruption	<ul style="list-style-type: none"> <li>▪ Replace control box</li> </ul>
063	Printed circuit board sensor – short circuit	
064	Flame sensor interruption	<ul style="list-style-type: none"> <li>▪ Check flame sensor:               <ul style="list-style-type: none"> <li>– Check connector B2 – chamber 1, cable 0.22<sup>2</sup> br and chamber 2, cable 0.22<sup>2</sup> br for damage.</li> <li>– Remove the flame sensor and check, see <a href="#">Page 30</a>.</li> <li>– If fault code 064 continues to be displayed, replace the control box.</li> </ul> </li> </ul>

## 4 TROUBLESHOOTING

FAULT CODE DISPLAY	FAULT DESCRIPTION	COMMENTS ▪ REMEDIAL ACTION
065	Short circuit in flame sensor	<ul style="list-style-type: none"> <li>▪ Check flame sensor:               <ul style="list-style-type: none"> <li>– Check connector B2 – chamber 1, cable 0.22<sup>2</sup> br and chamber 2, cable 0.22<sup>2</sup> br for damage.</li> <li>– Remove the flame sensor and check, see <a href="#">Page 30</a>.</li> <li>– If fault code 065 continues to be displayed, replace the control box.</li> </ul> </li> </ul>
066 067 068	Battery disconnecter – Interruption – Short circuit – Short circuit downstream of +Ub or transistor error	<ul style="list-style-type: none"> <li>▪ Check the battery isolating switch:               <ul style="list-style-type: none"> <li>– Battery isolating switch ok ⇒ Connector B1, – chamber 5, check cable 0.5<sup>2</sup> ws/rt for continuity, short circuit and damage.</li> </ul> </li> </ul>
069	JE communication error	<ul style="list-style-type: none"> <li>▪ Check the diagnostics cable:               <ul style="list-style-type: none"> <li>– Connector B1 and connector B8 (12 V) / B3 (24 V) – chamber 2, check cable 0.5<sup>2</sup> bl/ws for continuity, short circuit and damage, if ok ⇒ check the components connected to the diagnostics cable , if ok ⇒ replace the control box.</li> </ul> </li> </ul>
071	Surface sensor – interruption	<ul style="list-style-type: none"> <li>▪ Check the surface sensor:               <ul style="list-style-type: none"> <li>– Remove the surface sensor and check, see <a href="#">Page 26</a>.</li> <li>– If fault code 071 continues to be displayed, replace the control box.</li> </ul> </li> </ul>
072	Surface sensor – short circuit	<ul style="list-style-type: none"> <li>▪ Check the surface sensor:               <ul style="list-style-type: none"> <li>– Check connector B2 – chamber 7, cable 0.5<sup>2</sup> ws and chamber 8, cable 0.5<sup>2</sup> ws for damage.</li> <li>– Remove the surface sensor and check, see <a href="#">Page 26</a>.</li> <li>– If fault code 072 continues to be displayed, replace the control box.</li> </ul> </li> </ul>
074	Operating lock-out – overheating detected, hardware is defective	<ul style="list-style-type: none"> <li>▪ Check overheating sensor:               <ul style="list-style-type: none"> <li>– Check cable for continuity, short circuit and damage.</li> <li>– Measure the resistive value in connector B2 – between chamber 10, cable 0.5<sup>2</sup> sw and chamber 11, cable 0.5<sup>2</sup> sw, see <a href="#">Page 26</a> for measured values.</li> <li>– If fault code 074 continues to be displayed, replace the control box.</li> </ul> </li> <li>▪ Unlock the control box, see <a href="#">from page 14</a>.</li> </ul>
090	Hardware is defective	Replace control box
091	Too many resets	Check voltage supply
092 – 099	Control box defective	Replace control box



## 5 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, perform a functional check on the heater.

### BEFORE WORKING ON THE HEATER, ALWAYS FOLLOW THE RELEVANT SAFETY INSTRUCTIONS



#### 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” [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.

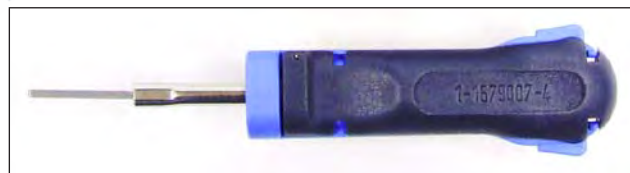
- For Micro Timer AMP Order No. 0-0539960-1



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

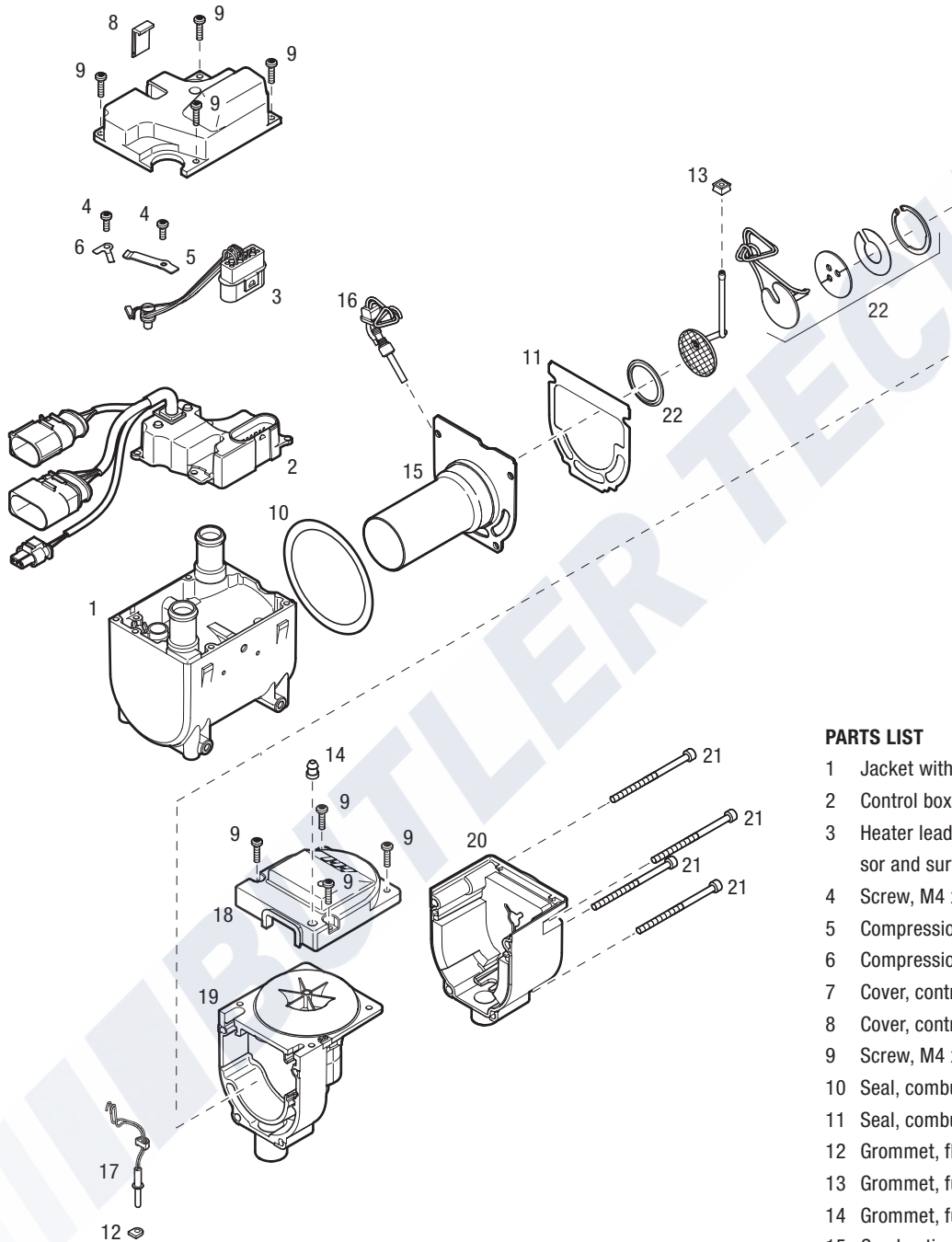


- For standard timer, Junior timer AMP Order No. 1-1579007-4



## 5 REPAIR INSTRUCTIONS

### ASSEMBLY DRAWING



### PARTS LIST

- 1 Jacket with heat exchanger
- 2 Control box
- 3 Heater lead harness with overheating sensor and surface sensor
- 4 Screw, M4 x 12 (2x)
- 5 Compression spring, overheating sensor
- 6 Compression spring, surface sensor
- 7 Cover, control box
- 8 Cover, control box cable
- 9 Screw, M4 x 16 (8x)
- 10 Seal, combustion chamber / heat exchanger
- 11 Seal, combustion chamber / blower
- 12 Grommet, flame sensor
- 13 Grommet, fuel pipe
- 14 Grommet, fuel pipe (blower)
- 15 Combustion chamber
- 16 Glow plug
- 17 Flame sensor
- 18 Cover, blower
- 19 Blower
- 20 Cover, electric motor
- 21 Screw, M5 x 80 (4x)
- 22 Heating element with wick ring, insulation, cover, circlip

## 5 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 performed at the relevant repair steps.

#### Repair step 1

Remove "control box" cover

[Page 24](#)

#### Repair step 2

Remove "blower" cover

[Page 24](#)

#### Repair step 3

Dismantling the control box

[Page 25](#)

#### Repair step 4

Remove overheating sensor and surface sensor

[Page 26](#)

Check overheating sensor

[Page 26](#)

Check the surface sensor

[Page 27](#)

#### Repair step 5

Remove "electric motor" cover and

"Blower sub-assembly with combustion chamber"

[Page 28](#)

#### Repair step 6

Remove flame sensor

[Page 30](#)

Check flame sensor

[Page 30](#)

#### Repair step 7

Dismantle glow plug

[Page 31](#)

#### Repair step 8

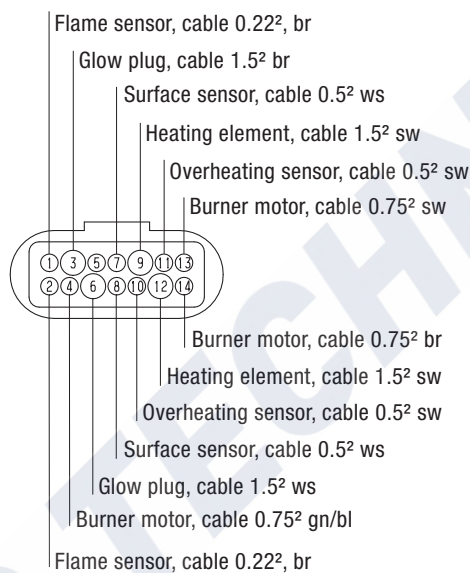
Remove heating element from the combustion chamber

[Page 32](#)

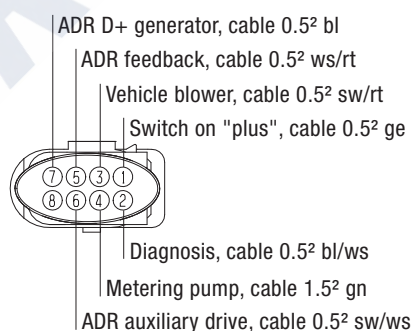
Install new heating element in the combustion chamber

[Page 33](#)

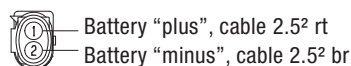
### CONNECTOR PIN ASSIGNMENT – 14-PIN CONNECTOR B2



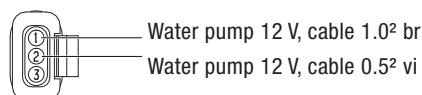
### CONNECTOR ASSIGNMENT – 8-PIN CONNECTOR S1



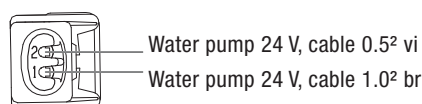
### CONNECTOR PIN ASSIGNMENT – 2-PIN CONNECTOR S4



### CONNECTOR PIN ASSIGNMENT – 3-PIN CONNECTOR B9, WATER PUMP 12V



### CONNECTOR PIN ASSIGNMENT – 2-PIN CONNECTOR B8, WATER PUMP 24 V



Connector housings are shown from the lead entry side.

## 5 REPAIR INSTRUCTIONS

### DISMANTLE THE HEATER

#### REPAIR STEP 1

##### REMOVE "CONTROL BOX" COVER

- Unscrew the 4 fixing screws M4 x 16 in the "control box" cover.
- Unlock cover of "control box cable" by turning in direction of arrow (A), pull out of the "control box" cover from the top.
- Keep the "control box cable" cover in a safe place for the assembly.
- Remove "control box" cover.



- 1 M4 x 16 fixing screws
- 2 "Control box cable" cover
- 3 "Control box" cover

#### PLEASE NOTE!

##### NOTES FOR THE ASSEMBLY:

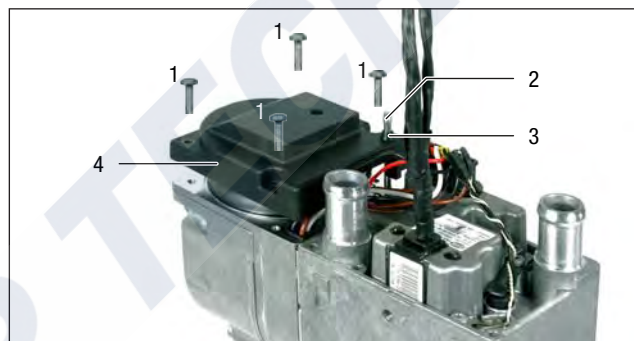
- Insert the "control box cable" cover in the "control box" cover.
- Tightening torque of the fixing screws:  
M4 x 16 =  $2.9^{+0.3}$  Nm

#### REPAIR STEP 2

##### REMOVE "BLOWER" COVER

To dismantle the "blower" cover, perform [Repair step 1](#) first.

- Unscrew the 4 fixing screws M4 x 16 in the "blower" cover.
- Carefully remove the "blower" cover above the fuel connection.



- 1 M4 x 16 fixing screws
- 2 Fuel pipe
- 3 "Fuel pipe" grommet in the "blower" cover
- 4 "Blower" cover

#### PLEASE NOTE!

##### NOTES FOR THE ASSEMBLY:

- Renew the grommet for the fuel connection in the "blower" cover, the grommet is included in the relevant spare parts kit.
- Carefully position the "blower" cover above the fuel connection on the blower housing, do not clamp the cable 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.



- 1 "Electric motor cable loom" grommet
- Tightening torque of the fixing screws:  
M4 x 16 =  $2.9^{+0.3}$  Nm

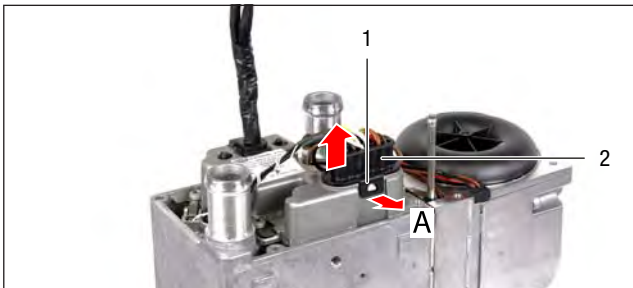
## 5 REPAIR INSTRUCTIONS

### REPAIR STEP 3

#### DISMANTLING THE CONTROL BOX

To dismantle the control box, perform [Repair step 1](#) first.

- Unlock the locking tab at the 14-pin connector (B2) by turning in direction of arrow (A).
- Pull off the 14-pin connector (B2) from above.



- 1 Protective tab
- 2 14-pin connector (B2)

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



- 1 M4 x 12 fixing screw

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



- 1 M4 x 12 fixing screw

- Remove the control box.

#### PLEASE NOTE!

The overheating sensor does not have to be removed to remove the control box

#### NOTES FOR THE ASSEMBLY:

- Tightening torque of the fixing screws:  
M4 x 12 = 3.3<sup>+0.3</sup> Nm



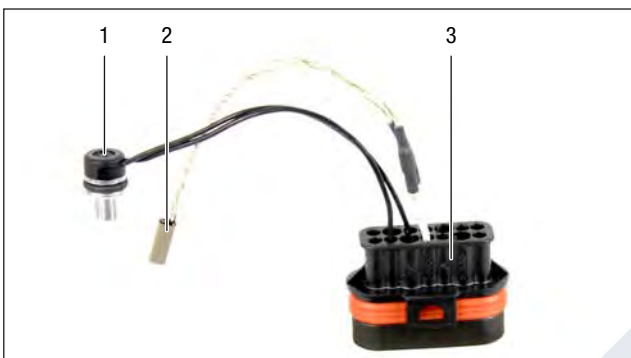
## 5 REPAIR INSTRUCTIONS

### REPAIR STEP 4

#### REMOVE OVERHEATING SENSOR AND SURFACE SENSOR

To dismantle the overheating sensor / surface sensor, perform [Repair step 1](#) and [Repair step 3](#) first.

- Use flat pliers to pull the overheating sensor out of the locator hole in the jacket. Remove overheating sensor, surface sensor and the 14-pin connector (B2).



- Overheating sensor
- Surface sensor
- 14-pin connector (B2)

#### PLEASE NOTE!

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

- If replacing the overheating sensor, surface sensor and 14-pin connector (B2) the plug-in contacts of the
  - electric motor, chamber 13, cable 0.75<sup>2</sup> sw and chamber 14, cable 0.75<sup>2</sup> br
  - flame sensor, chamber 1, cable 0.22<sup>2</sup> br and chamber 2, cable 0.22<sup>2</sup> br
  - glow plug, chamber 3, cable 1.5<sup>2</sup> br and chamber 6, cable 1.5<sup>2</sup> ws
  - heating element, chamber 9, cable 1.5<sup>2</sup> sw and chamber 12, cable 1.5<sup>2</sup> sw
 are disconnected from the existing 14-pin connector (B2).
- It is advisable to label the disconnected cables or to take into account the connector pin assignment on page 23.

#### PLEASE NOTE!

#### NOTES FOR THE ASSEMBLY:

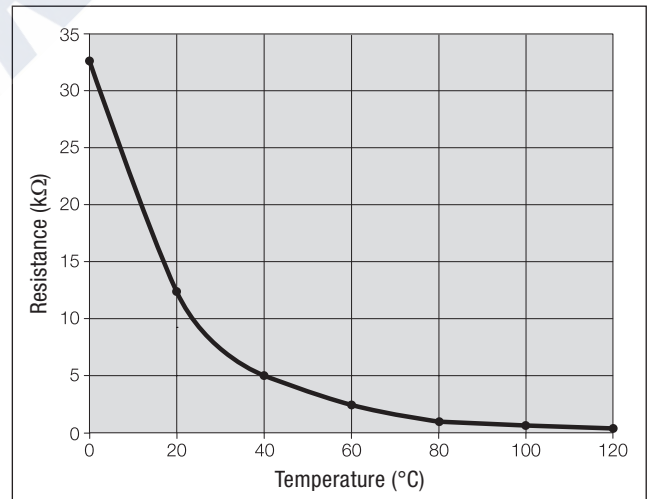
- The following parts are included in the spare parts kit and must be used:
  - Compression spring, overheating sensor
  - Compression spring, surface sensor
  - M4 x 12 screw (2x)
- When installing, twist the overheating sensor lead harness and the surface sensor lead harness.

#### CHECK OVERHEATING SENSOR

- Check the overheating sensor using a digital multimeter in the 14-pin connector (B2) in chamber 10 and 11. If the resistance value lies outside the diagram or the table of values, replace the overheating sensor.



- Overheating sensor
- 14-pin connector (B2)
- Digital multimeter



#### TABLE OF VALUES

Temp [°C]	R [kΩ]	Temp [°C]	R [kΩ]
0	32.54 ± 2.2	70	1.75 ± 0.13
10	19.87 ± 1.0	80	1.25 ± 0.1
20	12.48 ± 0.5	90	0.91 ± 0.08
30	8.06 ± 0.4	100	0.67 ± 0.06
40	5.33 ± 0.3	110	0.50 ± 0.05
50	3.60 ± 0.25	120	0.38 ± 0.04
60	2.48 ± 0.17		



## 5 REPAIR INSTRUCTIONS

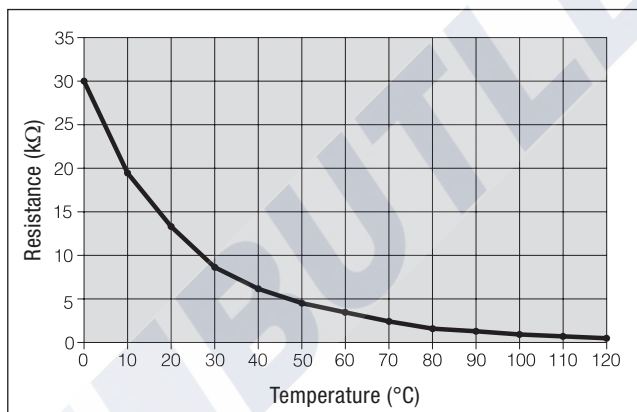
### REPAIR STEP 4

#### CHECK THE SURFACE SENSOR

- Check the surface sensor using a digital multimeter in the 14-pin connector (B2) in chamber 7 and 8. If the resistance value lies outside the diagram or the table of values, replace the surface sensor.



- Surface sensor
- 14-pin connector (B2)
- 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

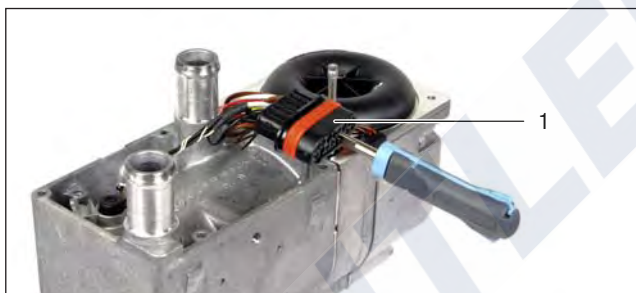
## 5 REPAIR INSTRUCTIONS

### REPAIR STEP 5

#### REMOVE THE "ELECTRIC MOTOR" COVER AND "BLOWER SUB-ASSEMBLY WITH COMBUSTION CHAMBER"

To dismantle the "electric motor" cover and the "blower sub-assembly with combustion chamber", perform [Repair step 1](#), [Repair step 2](#) and [Repair step 3](#) first.

- Use the AMP release tool to unlock the plug-in contacts from the electric motor in the 14-pin connector (B2), chamber 13, cable 0.75<sup>2</sup> sw, chamber 14, cable 0.75<sup>2</sup> br and chamber 4, cable 0.75<sup>2</sup> gn/bl.
- Unlock plug-in contacts from flame sensor in the 14-pin connector (B2), chamber 1, cable 0.22<sup>2</sup> br and chamber 2, cable 0.22<sup>2</sup> br using the AMP release tool.
- Use the AMP release tool to unlock the plug-in contacts from the glow plug in the 14-pin connector (B2), chamber 3, cable 1.5<sup>2</sup> br and chamber 6, cable 1.5<sup>2</sup> ws.
- Use the AMP release tool to unlock the plug-in contacts from the heating element in the 14-pin connector (B2), chamber 9, cable 1.5<sup>2</sup> sw and chamber 12, cable 1.5<sup>2</sup> sw.



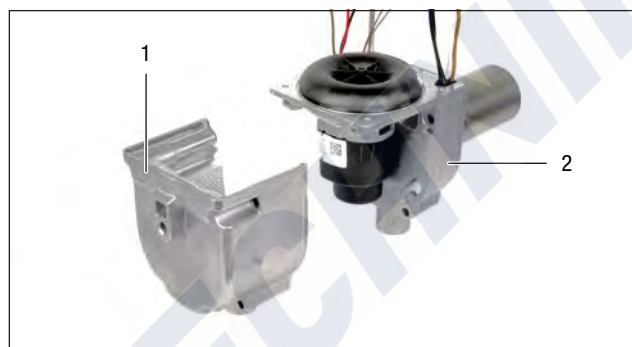
1 14-pin connector (B2)

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



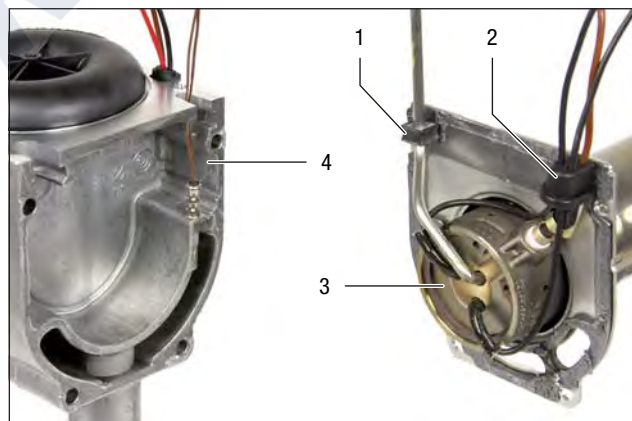
1 M5 x 80 fixing screw

- Remove "electric motor" cover.
- Pull the "Blower with combustion chamber" sub-assembly out of the heat exchanger.



1 Cover, "electric motor"  
2 "Blower with combustion chamber" sub-assembly

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



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

## 5 REPAIR INSTRUCTIONS

### REPAIR STEP 5

REMOVE THE "ELECTRIC MOTOR" COVER AND "BLOWER SUB-ASSEMBLY WITH COMBUSTION CHAMBER"

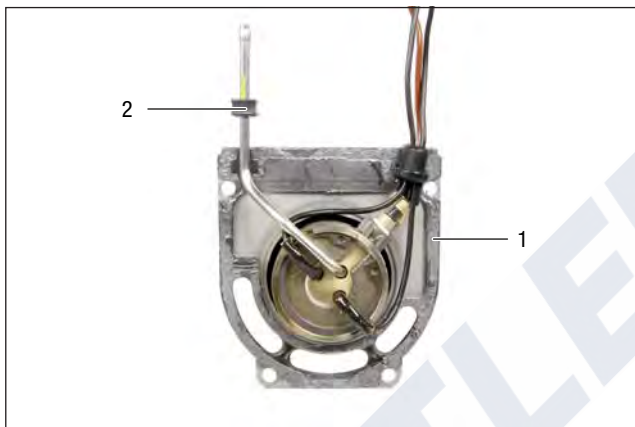
- Remove seal between combustion chamber and blower housing or between combustion chamber and heat exchanger, carefully clean all sealing surfaces.
- Pull off "fuel pipe" grommet.



#### CAUTION!

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

→ Use the specified spare parts kit.



- 1 Seal, combustion chamber / blower housing
- 2 "Fuel pipe" grommet

#### 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 and the blower housing
  - Seal, between combustion chamber and 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 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<sup>+0.5</sup> Nm

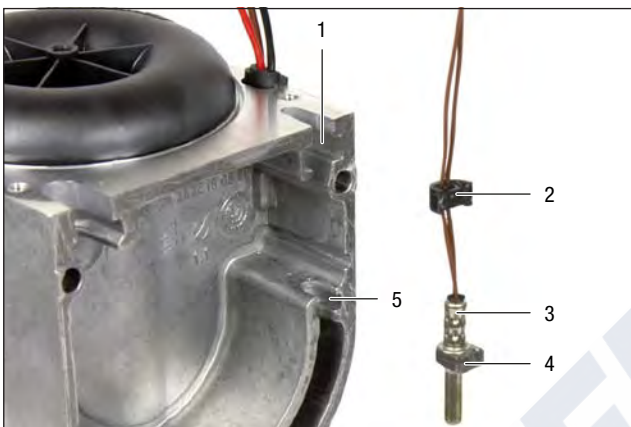
## 5 REPAIR INSTRUCTIONS

### REPAIR STEP 6

#### REMOVE FLAME SENSOR

To dismantle the flame sensor, perform [Repair step 1](#), [Repair step 2](#), [Repair step 3](#) and [Repair step 5](#) 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", 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:

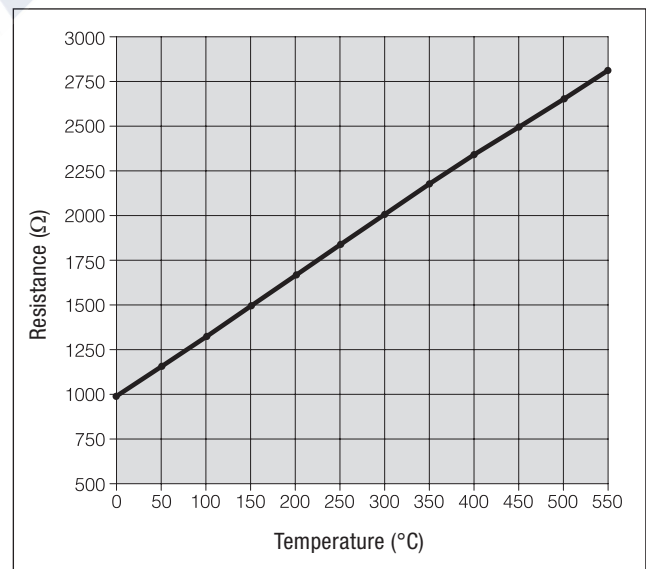
- Insert the flame sensor cable loom grommet with the rounding in the upper housing groove of the fan.
- Push the grommet, flame sensor (graphite grommet) onto the flame sensor.
- Push the collar of the flame sensor and the flame sensor grommet (graphite grommet with rounding) together into the groove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

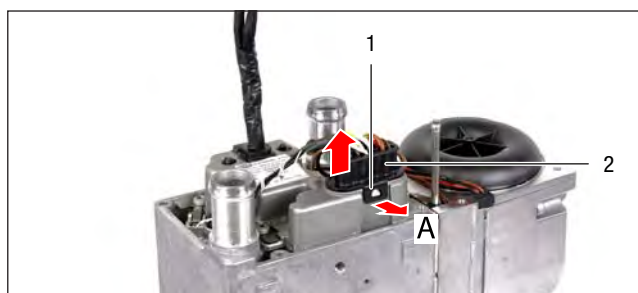
## 5 REPAIR INSTRUCTIONS

### REPAIR STEP 7

#### CHECK GLOW PLUG

To dismantle the glow plug, perform [Repair step 1](#) and [Repair step 2](#) first.

- Unlock the locking tab at the 14-pin connector (B2) by turning in direction of arrow (A).
- Pull off the 14-pin connector (B2) from above.



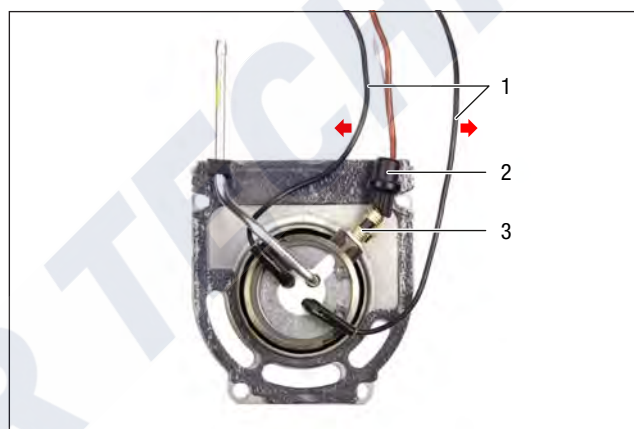
- 1 Protective tab
- 2 14-pin connector (B2)

- Check glow plug in installed condition.
  - 12 V
    - Apply 9,5 V  $\pm 0.1$  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.
  - 24 V
    - Apply 16 V  $\pm 0.1$  V voltage to the glow plug and after 25 sec measure the current intensity.
    - if 5.2 A ( $\pm 1$  A) the glow plug is ok.
    - If values are different, renew the glow plug.

#### DISMANTLE GLOW PLUG

To dismantle the glow plug, perform [Repair step 1](#), [Repair step 2](#) and [Repair step 5](#) first.

- Unclip the heating element connection cables from the “glow plug grommet”.
- Carefully pull the glow plug out of the combustion chamber and renew.



- 1 Heating element connection cables
- 2 “Glow plug” grommet
- 3 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
- Clip the heating element connection cables back into the “glow plug grommet”.
- Connect the glow plug connection cables back in the 14-pin connector (B2).



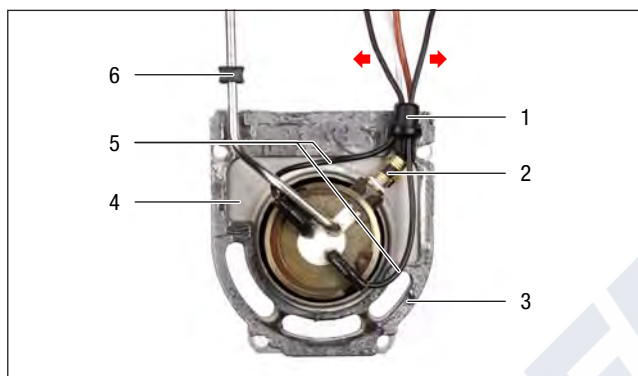
## 5 REPAIR INSTRUCTIONS

### REPAIR STEP 8

#### REMOVE HEATING ELEMENT FROM THE COMBUSTION CHAMBER

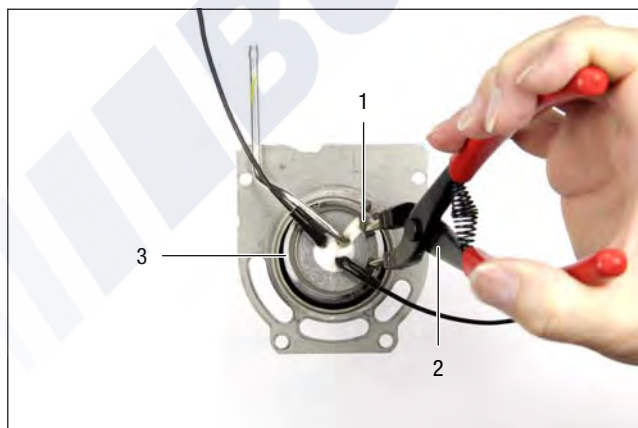
To dismantle the heating element, perform [Repair step 1](#), [Repair step 2](#), [Repair step 3](#) and [Repair step 5](#) first.

- Pull off the “fuel pipe” grommet, unclip the heating element connection cables from the “glow plug cable loom” grommet.
- Remove the glow plug to protect it from damage.
- Remove seal between the combustion chamber flange and blower housing. Carefully clean the combustion chamber flange.



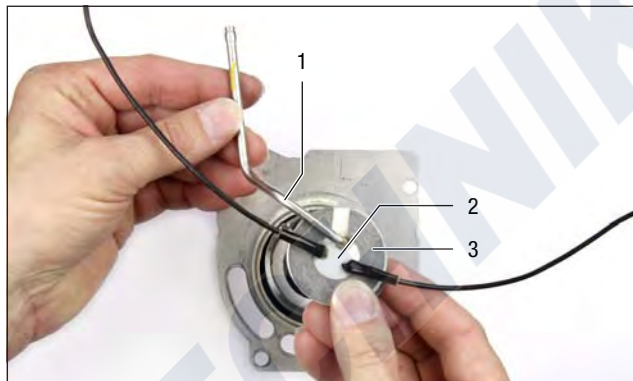
- 1 “Glow plug” grommet
- 2 Glow plug
- 3 Seal, combustion chamber flange / blower housing
- 4 Combustion chamber flange
- 5 Heating element connection cables
- 6 “Fuel pipe” grommet

- Use circlip pliers to undo and remove the circlip in the combustion chamber.



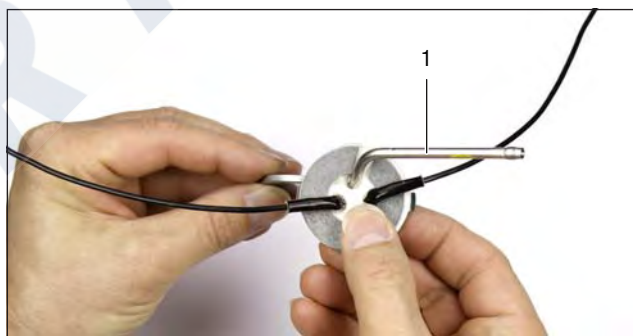
- 1 Circlip
- 2 Circlip pliers
- 3 Combustion chamber

- Remove fuel pipe with heating element, insulation and slotted disc.



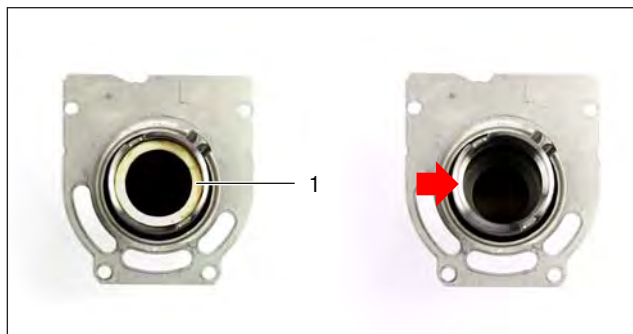
- 1 Fuel pipe
- 2 Heating element with insulation
- 3 Slotted disc

- Pull out fuel pipe through insulation and heating element.



- 1 Fuel pipe

- Remove wick ring from the combustion chamber and carefully clean the support surface



- 1 Wick ring



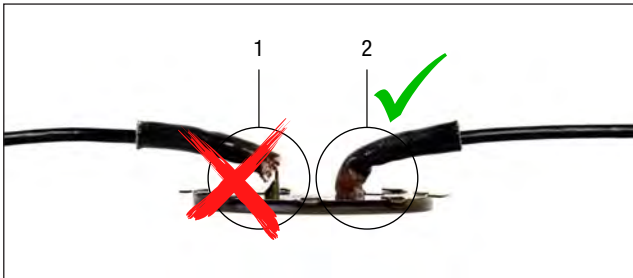
## 5 REPAIR INSTRUCTIONS

### INSTALL NEW HEATING ELEMENT IN THE COMBUSTION CHAMBER

#### **⚠ CAUTION!**

Both cable connection points on the heating element are sensitive to deformation and damage. The protective hoses can slip as a result of external effects and expose the connection points.

➔ Do not deform, bend or damage the cable connection points. If necessary, position the protective hoses on the heating element, take care not to damage them.



- 1 Impermissible connection
- 2 Permissible connection

#### **PLEASE NOTE!**

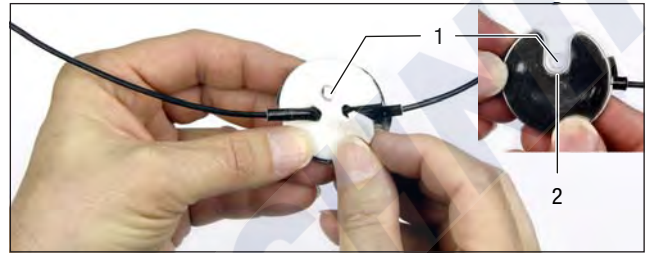
##### NOTE ON THE ASSEMBLY

- The following parts are included in the spare parts kit and must be used:
  - Wick ring
  - Heating element
  - Insulation
  - Slotted disc
  - Circlip
- Insert the wick ring in the combustion chamber; ensure the wick ring is in the correct position.



- 1 Wick ring

- Attach the insulation at the slotted holes above the connection cable of the new heating element. The through-hole for the fuel pipe must be positioned over the heating element recess.



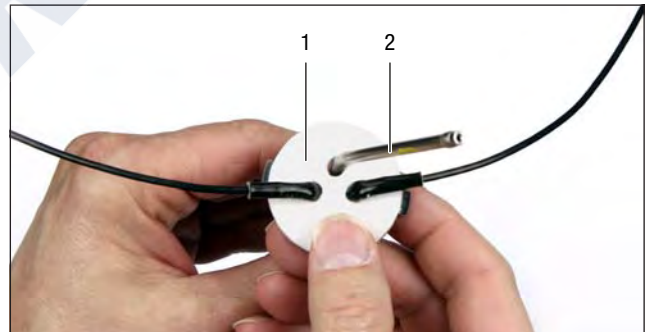
- 1 Insulation
- 2 Recess in heating element

#### **⚠ CAUTION!**

The insulation is a sensitive component and can easily be damaged.

➔ Feed the fuel pipe through the hole provided with extreme caution.

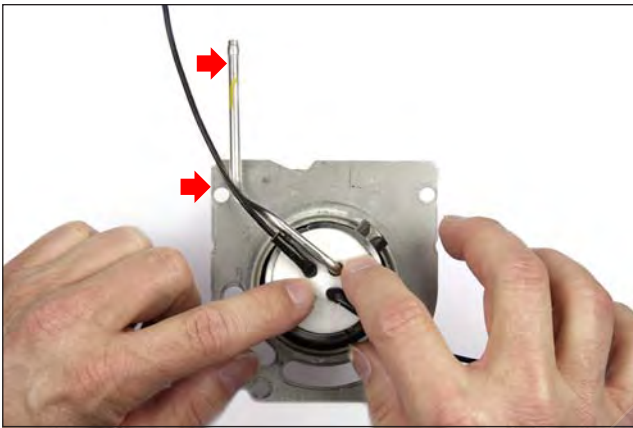
- Guide the fuel pipe through the insulation and heating element.



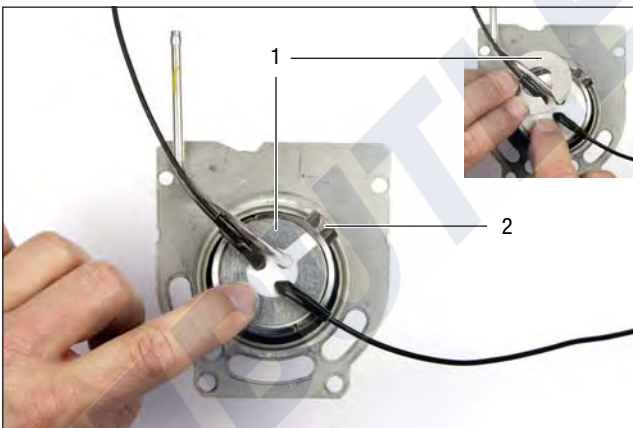
- 1 Insulation
- 2 Fuel pipe

## 5 REPAIR INSTRUCTIONS

- Insert the fuel pipe with heating element and insulation in the combustion chamber, at the same time, insert the tabs on the heating element in the recesses of the combustion chamber.
- The final installed position of the fuel pipe is at the top left-hand side, parallel to the left-hand outer edge of the combustion chamber flange.

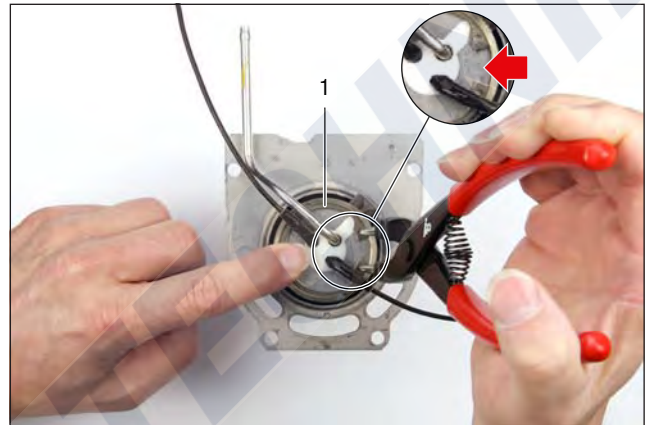


- Inset the slotted disc over the fuel pipe and heating element connection cables. Align the slot with the glow plug socket.



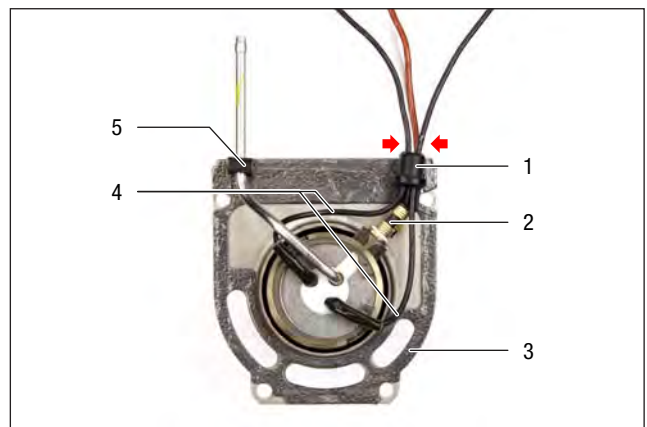
- 1 Slotted disc
- 2 Glow plug socket

- Insert the circlip over the fuel pipe and heat element connection cables in the combustion chamber and install using circlip pliers. The opening of the circlip ring points to 3 o'clock. Press the circlip onto the slotted disc until it audibly latches.



- 1 Circlip

- Feed the left-hand heating element connection cable under the fuel pipe.
- Position new seal, combustion chamber / blower housing. Ensure the recesses match. Position the "fuel pipe" grommet and push onto the installed position; take care not to damage the combustion chamber / blower housing seal.
- Insert the glow plug in the socket and position the "glow plug cable loom" grommet.
- Clip the heating element connection cables into the "glow plug cable loom" grommet. Lay the heating element connection cables as shown in the figure. The cables must **not** lie on the combustion chamber.



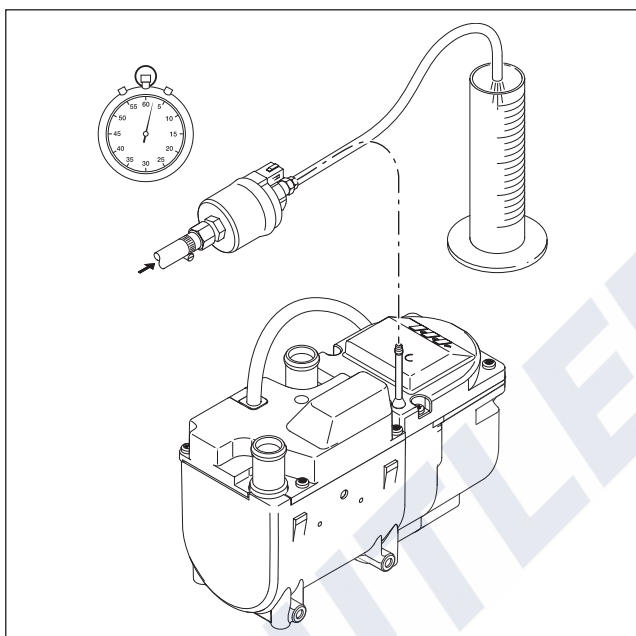
- 1 "Glow plug cable loom" grommet
- 2 Glow plug
- 3 Seal, combustion chamber / blower housing
- 4 Heating element connection cables
- 5 "Fuel pipe" grommet

## 5 REPAIR INSTRUCTIONS

### MEASUREMENT OF THE FUEL QUANTITY, WITHOUT EDITH BASIC

#### PREPARING FOR THE MEASUREMENT

- Position the stopwatch, ready for use.
- Remove the fuel pressure pipe from the heater and insert a measuring cylinder (size 25 cm<sup>3</sup>).
- Switch on heater.
- After 18 sec. (controlled start) or 31 sec. (initial start), the metering pump starts pumping the fuel. If the fuel comes out uniformly and free of bubbles, the fuel pipe is filled and vented.
- Switch off heater and empty measuring cylinder.



#### MEASUREMENT

- Switch on heater.
- After 18 sec. (controlled start) or 31 sec. (initial start), the metering pump starts pumping the fuel.
- During the measurement, hold the measuring cylinder at the level of the heater. After 38 sec. of the fuel being pumped, the metering pump is switched off.

After a pause of 36 sec. the start is repeated and fuel is again pumped for 38 sec.

The heater is then automatically switched off.

- 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.

#### FUEL DELIVERY RATE

Heater type	Hydronic II C	
Heater version	D 5 S, 12 V / 24 V	
	Controlled start	Initial start
Pumping start after heater is switched on in sec.	18	31
Fuel quantity – nominal. [cm <sup>3</sup> ]	9.7	11
Fuel quantity – max. [cm <sup>3</sup> ]	10.7	12.1
Fuel quantity – min. [cm <sup>3</sup> ]	9.1	10.3

#### PLEASE NOTE!

Only carry out the fuel measurement if the battery is sufficiently charged. During the measurement at least 12 V / 24 V or max. 13 V / 25 V should be applied to the control box.

### MEASURING THE FUEL QUANTITY, WITH EDITH BASIC

#### PREPARING FOR THE MEASUREMENT

- Remove the fuel pressure pipe at the heater and insert a measuring cylinder (size 25 cm<sup>3</sup>).
- Connect heater to EDiTH Basic (ISO adapter) and select “switch on component” function at the PC.
- Select “metering pump” component, click “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 C
Heater version	D 5 S, 12 V / 24 V
Delivery period in sec.	30
Fuel quantity – nominal. [cm <sup>3</sup> ]	8.9
Fuel quantity – max. [cm <sup>3</sup> ]	9.8
Fuel quantity – min. [cm <sup>3</sup> ]	8.4
Frequency [Hz]	10

## 6 ELECTRICS / CIRCUIT DIAGRAM

### HEATER WIRING



#### CAUTION!

#### SAFETY INSTRUCTIONS FOR WIRING THE HEATER!

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 damaged.
- 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.

#### → For Hydronic II C – 24 V only

The “metering pump” and “water pump” lead harnesses can be mixed up when connected. Therefore, please note the following characteristics:

- “Metering pump” lead harness
  - 6 m long, 2 connector housings of the same type
- “Water pump” lead harness
  - 2 m long, 2 different connector housings

#### 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 mm<sup>2</sup>.
- 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.

#### PARTS LIST FOR HEATER CIRCUIT DIAGRAM

- 1.1 Burner motor
- 1.2 Glow plug
- 1.5 Control - overheating sensor
- 1.12 Flame sensor
- 1.13 Surface sensor

- 1.18 Combustion chamber heating element
- 2.1 Control box
- 2.2 Fuel metering pump
- 2.5.7 Vehicle blower relay
- 2.7 Main fuse, 12 V – 30 A / 24 V – 20 A
- 2.7.1 Activation fuse, 5 A
- 2.7.5 Vehicle blower fuse, 25 A
- 2.12 Water pump
- 5.1 Battery
- 5.1.2 Fuse block in the vehicle
- 5.2.1 Main battery switch
- 5.2.2 Battery isolating switch  
(EMERGENCY STOP function for ADR, ADR99, etc.)
- 5.9.1 Vehicle blower switch
- 5.10 Vehicle fan

- a) Connection of control unit according to the control units circuit diagram

yellow	Switch-on signal “S” *
red	Power supply “positive” (terminal 30)
brown	Power supply “negative” (terminal 31)
blue / white	JE diagnosis
white / red	ADR feedback

\* Optional switch-on signal:

Simultaneous use of the switch-on signal and a control unit of the EasyStart family is **not** allowed.

- b) If only one switching element is used for Item 5.2.1 and 5.2.2, it is necessary to ensure that on activating the ADR, ADR99, etc. function, the switch always immediately breaks contact (opens) (regardless of the heater condition) and all the heater's electric circuits are disconnected.
- c) Activate battery isolating switch (diode: Order No.: 20800012)
- d) Disconnect cable

#### PLEASE NOTE!

For circuit diagram, see [Page 37](#).

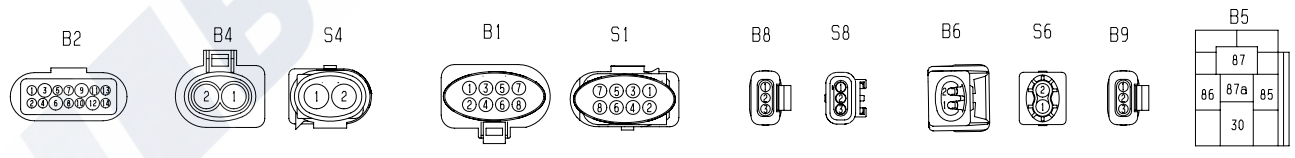
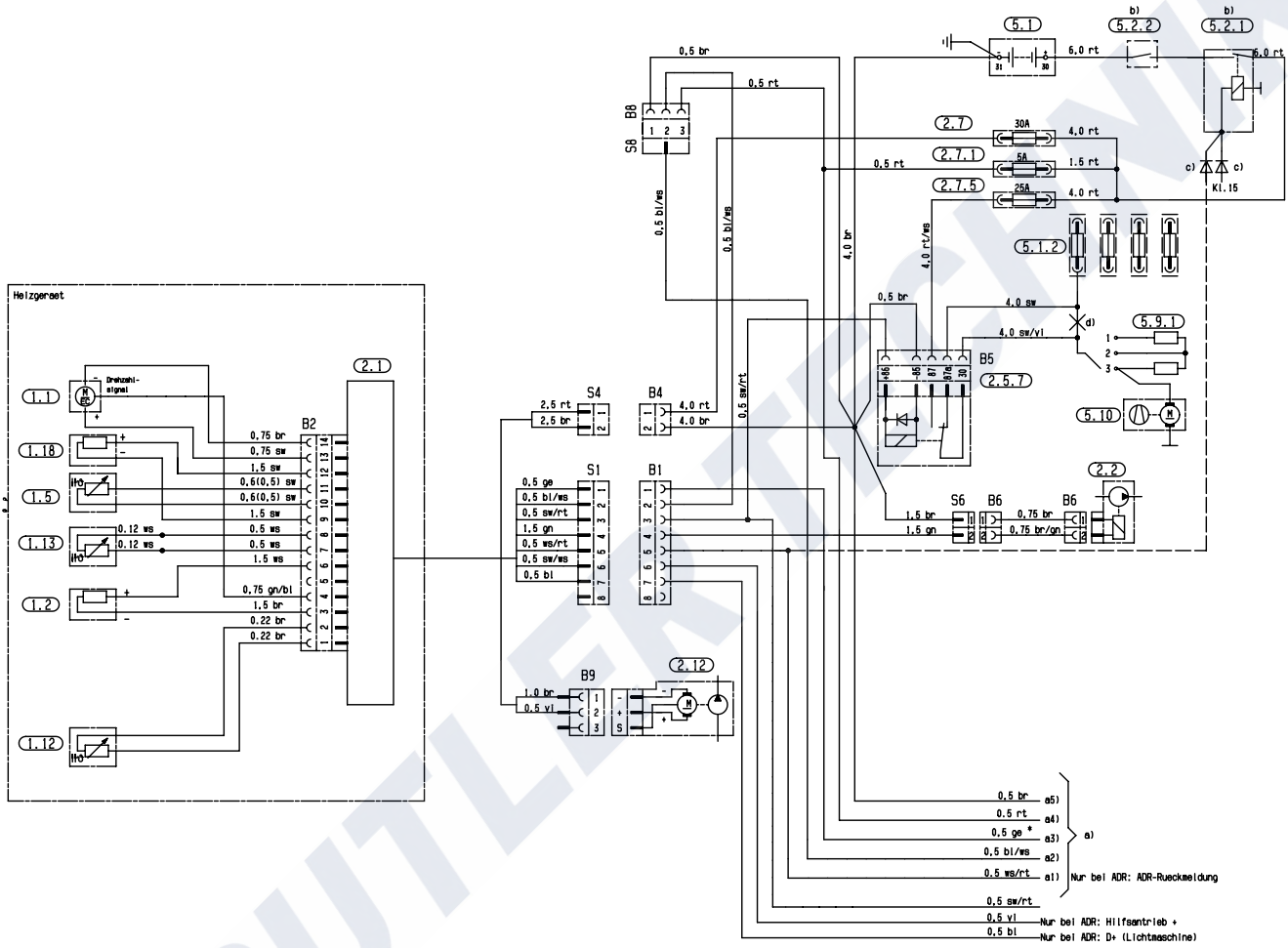
#### CABLE COLOURS

rt	red	gn	green
bl	blue	ge	yellow
ws	white	vi	violet
sw	black	br	brown

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

## 6 ELECTRICS / CIRCUIT DIAGRAM

### CIRCUIT DIAGRAM, HEATER D 5 S – 12 V NORMAL VERSION AND ADR VERSION



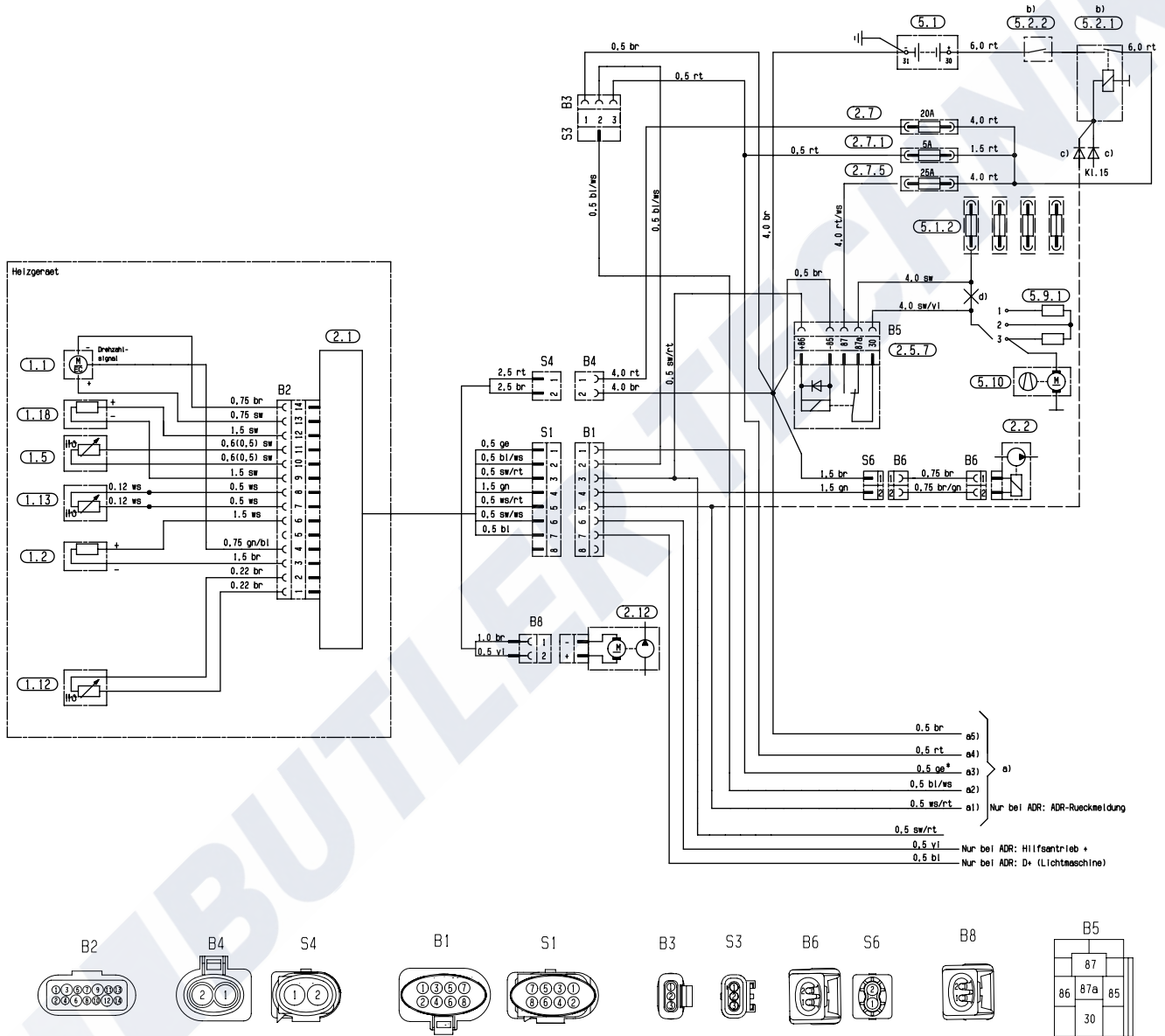
25 2506 00 96 01

For parts list, see [Page 36](#)



# 6 ELECTRICS / CIRCUIT DIAGRAM

## CIRCUIT DIAGRAM, HEATER D 5 S – 24 V NORMAL VERSION AND ADR VERSION

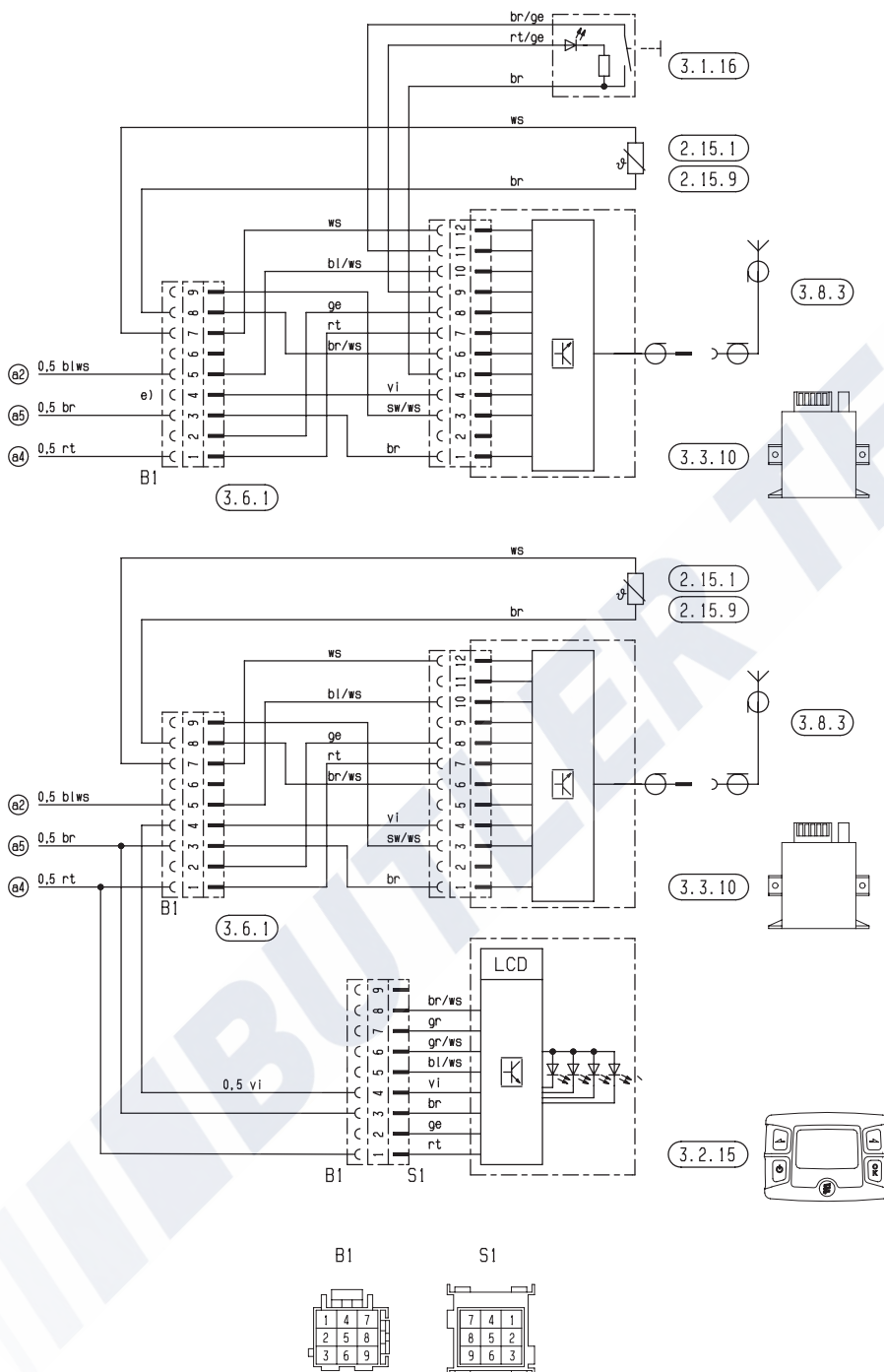


25 2507 00 96 01



## 6 ELECTRICS / CIRCUIT DIAGRAM

### CIRCUIT DIAGRAM, CONTROL UNIT – EASYSTART R+



#### PARTS LIST

- 2.15.1 Room temperature sensor
- 2.15.9 Temperature sensor (outside temperature) (optional)
- 3.1.16 Radio remote control button
- 3.2.15 EasyStart T timer
- 3.3.10 EasyStart R+ radio remote control (stationary unit)
- 3.6.1 Lead harness

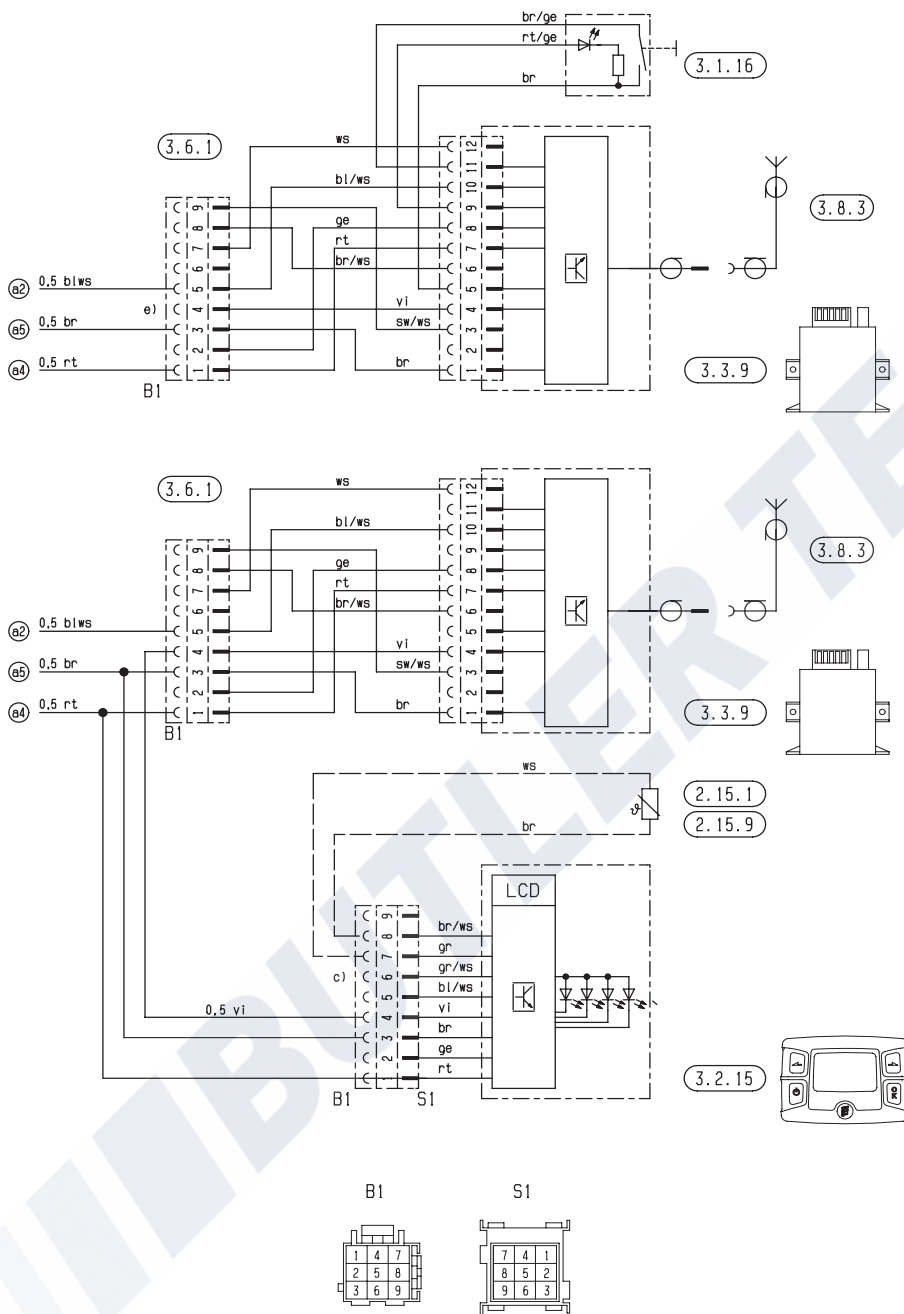
- 3.8.3 Antenna
- e) Connection, EasyStart T timer

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

25 2435 00 97 01

## 6 ELECTRICS / CIRCUIT DIAGRAM

### CIRCUIT DIAGRAM CONTROL UNIT – EASYSTART R



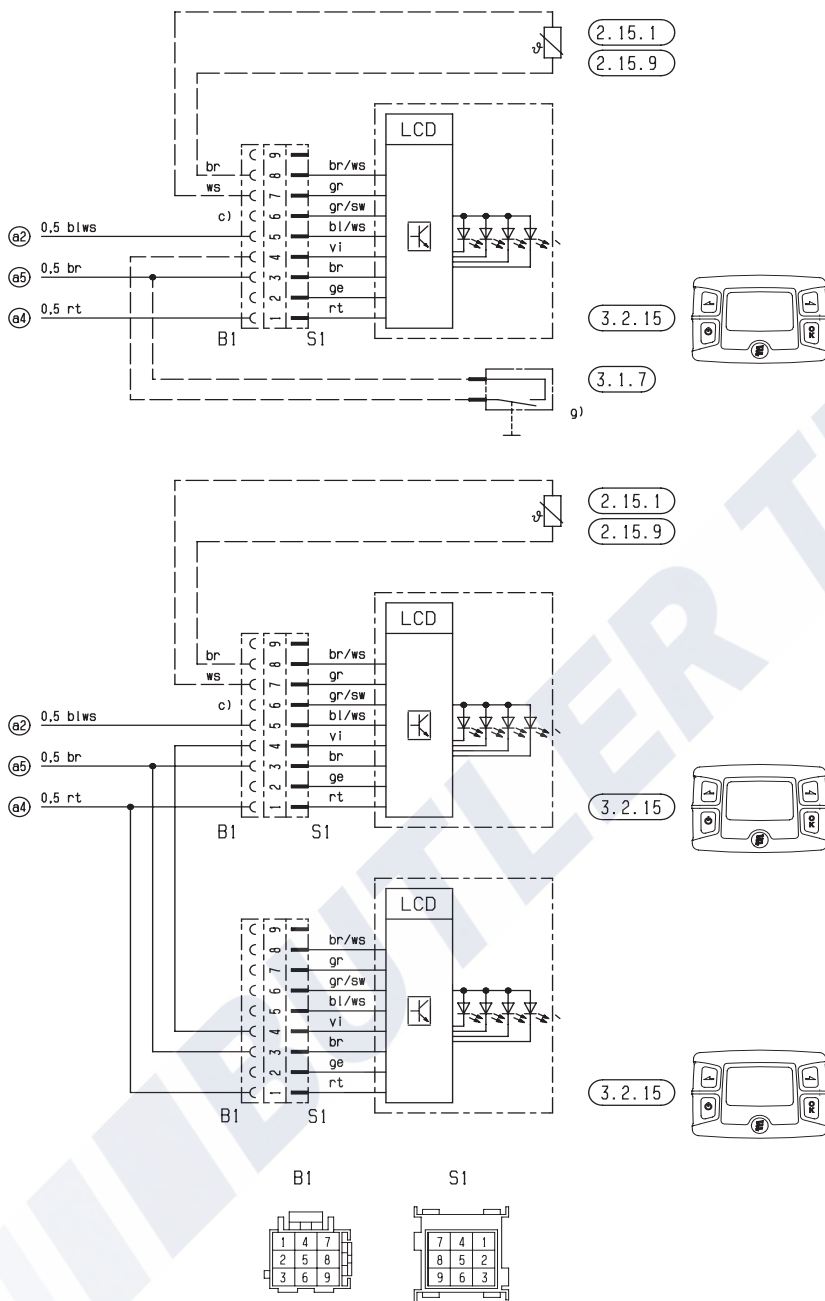
#### PARTS LIST

- |  |  |
|--|--|
| 2.15.1 Room temperature sensor (optional)                  | 3.8.3 Antenna  |
| 2.15.9 Temperature sensor (outside temperature) (optional) | c) Terminal 58 (lighting)  |
| 3.1.16 Radio remote control button                         | e) Connection, EasyStart T timer                                 |
| 3.2.15 EasyStart T timer                                   |  |
| 3.3.9 EasyStart R+ radio remote control (stationary unit)  | Connector and bush housings are shown from the cable inlet side. |
| 3.6.1 Lead harness   |  |

25 2435 00 97 02

## 6 ELECTRICS / CIRCUIT DIAGRAM

### CIRCUIT DIAGRAM CONTROL UNIT – EASYSTART T



#### PARTS LIST

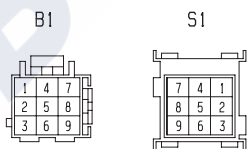
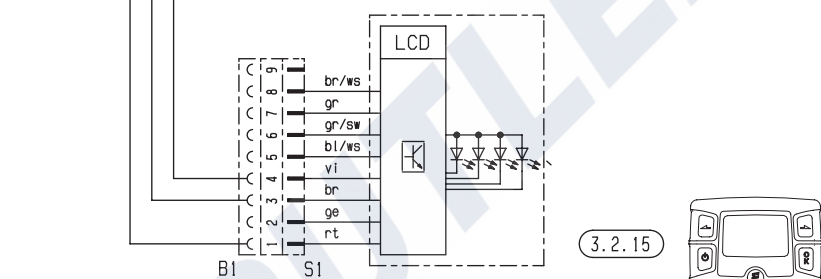
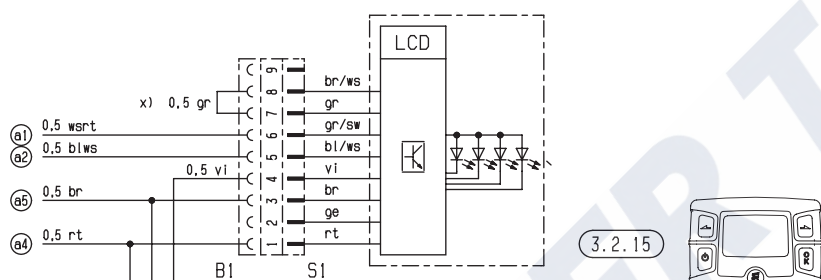
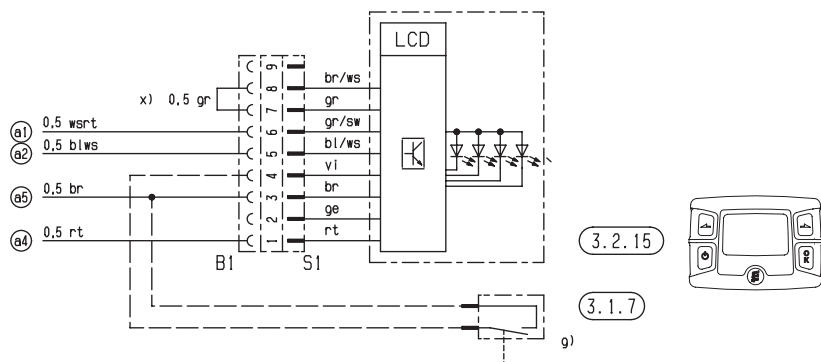
- |  |  |
|--|--|
| 2.15.1 Room temperature sensor (optional)                  | c) Terminal 58 (lighting)                |
| 2.15.9 Temperature sensor (outside temperature) (optional) | g) External "ON / OFF" button (optional) |
| 3.1.7 "OFF" button   |  |
| 3.2.15 EasyStart T timer                                   |  |

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

25 2435 00 97 03

## 6 ELECTRICS / CIRCUIT DIAGRAM

### CIRCUIT DIAGRAM, CONTROL UNIT – EASYSTART T – ADR



#### PARTS LIST – ADR

3.1.7 “OFF” button

3.2.15 EasyStart T timer

g) External “ON / OFF” button (optional)

x) ADR jumper

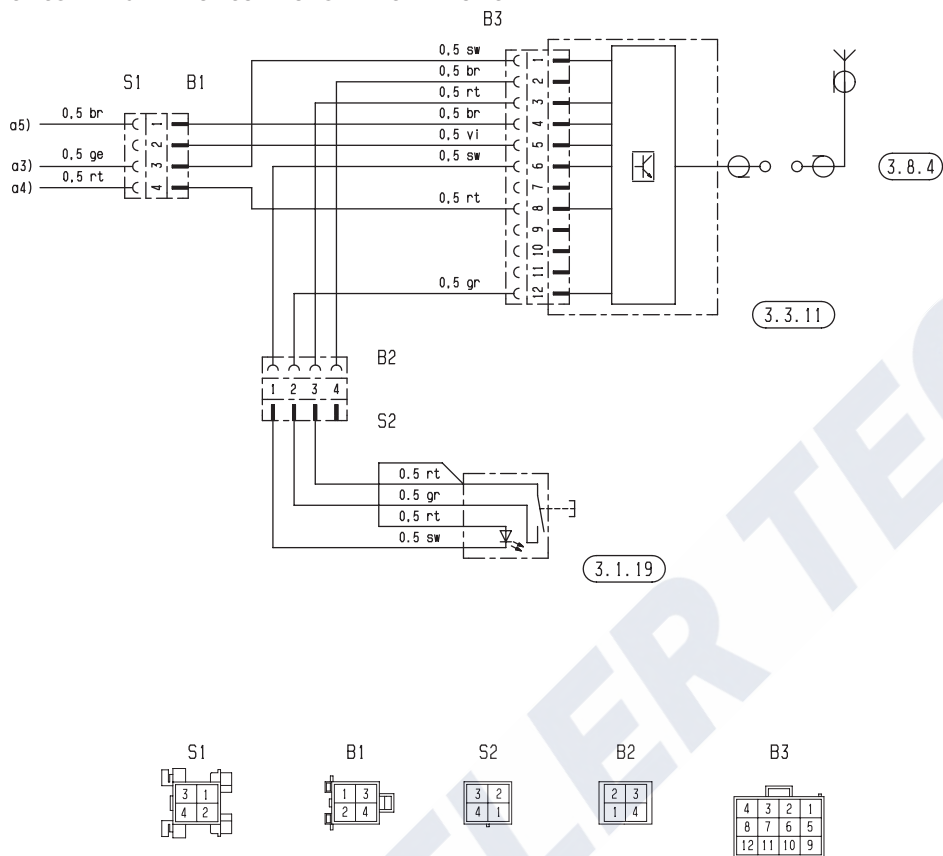
#### PLEASE NOTE!

- The timer / radio remote control is to be connected in accordance with the circuit diagrams from page 37.
- Insulate unused cable ends.
- Connector and bush housings are shown from the cable inlet side.

25 2435 00 97 04

## 6 ELECTRICS / CIRCUIT DIAGRAM

### CIRCUIT DIAGRAM FOR CONTROL UNIT – CALLTRONIC II



25 2507 00 97 02

**PLEASE NOTE!**

The "ventilation" function is not available.

**PARTS LIST**

- 3.1.19 Button, Calltronic II
- 3.3.11 Calltronic II
- 3.8.4 Antenna, screwed

## 7 SERVICE

### 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 has already qualified for the following standards:

### QUALITY MANAGEMENT AS PER

**EN ISO 9001:2000 AND ISO/TS 16949:1999**

### ENVIRONMENTAL MANAGEMENT SYSTEM AS PER

**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.

### EC DECLARATION OF CONFORMITY

With regard to the product named in the following

#### HEATER TYPE HYDRONIC II C

we herewith confirm that it conforms with the prime safety requirements stipulated in the directives of the EU Council for harmonisation of the legal regulations of the member states with regard to electromagnetic compatibility (89 / 336 / EEC).

This declaration applies to all heaters produced according to the Hydronic II C production drawings – which are an integral part of this declaration.

The following standards / directives have been used to assess the product with regard to electromagnetic compatibility:

- EN 50081 – 1 Basic form interference emission
- EN 50082 – 1 Basic form of interference immunity
- 72 / 245 / EEC – Modification status 2009 / 19 / EC  
Interference suppression in motor vehicles.



## 7 SERVICE

### LIST OF ABBREVIATIONS

#### **ABG**

General type approval

#### **ADR**

European agreement about the international transport of dangerous goods on the road (ADR).

#### **EMC**

Electromagnetic compatibility

#### **JE SERVICE PARTNER**

J. Eberspächer service partner

#### **FAME**

Biodiesel to EN 14214.

#### **STVZO**

Straßenverkehrs-Zulassungs-Ordnung (German road traffic licensing regulations)

#### **A**

Current intensity in ampere

#### **V**

Voltage in volt

#### **W**

Power in watt

## 7 SERVICE

### LIST OF KEY WORDS

#### A

ABG [45](#)  
 Accident prevention [6](#)  
 Adapter cable [12](#)  
 ADR [45](#)  
 AMP release tool [21](#)  
 Assembly drawing [22](#)  
 Assignment of connector S1 [36](#)

#### B

Battery voltage [11](#)  
 "Blower" cover [24](#)  
 Blower sub-assembly [28, 29](#)

#### C

Cable colours [36](#)  
 Calltronic II [43](#)  
 Cancelling the lock [11](#)  
 Certifications [44](#)  
 Check [11](#)  
 Check flame sensor [30](#)  
 Check overheating sensor [26](#)  
 Check the surface sensor [27](#)  
 Circuit diagram, control unit [39 – 42](#)  
 Connector B2 [23](#)  
 Connector pin assignment [23](#)  
 Connector S1 [23](#)  
 Contents [2, 2 – 4](#)  
 Control and safety devices [8](#)  
 "Control box" cover [24](#)  
 Controlled start [35](#)  
 Control units [12](#)  
 Cover, "electric motor" [28](#)  
 Current fault [15](#)  
 Cutaway view [7](#)

#### D

Delete fault memory [14](#)  
 Diagnosis capable control unit [15](#)  
 Diagnosis query [14](#)  
 Dismantle glow plug [31](#)  
 Dismantling the control box [25](#)  
 Dismantling the heater [44](#)  
 Disposal [44](#)

#### E

EasyStart R+ [12](#)  
 EasyStart R+ radio remote control [15](#)  
 EasyStart T [12](#)  
 EasyStart T timer [15](#)  
 EC Declaration of Conformity [44](#)  
 EDiTH Basic [35](#)  
 EDiTH Basic diagnostic tool [12, 13](#)  
 Electrical components [11](#)  
 Electrics [36](#)  
 Electromagnetic compatibility [45](#)  
 EMC [45](#)  
 EMERGENCY OFF [6](#)  
 Emergency shutdown [6](#)  
 EN ISO 9001:2000 [44](#)  
 EN ISO 14001:1996 [44](#)  
 Enquire / delete fault memory [15](#)  
 Environmental management system [44](#)  
 Evaluation [35](#)  
 External diagnostics system [12](#)

#### F

FAME [45](#)  
 Fault code display [16](#)  
 Fault description [16](#)  
 Fault diagnosis [13, 15](#)  
 Fault memory [15](#)  
 Fault memory F1 – F5 [15](#)  
 Fuel delivery rate [35](#)  
 Functional check [6](#)  
 Functional description [8](#)  
 Function and operation [7](#)

#### G

Graphite grommet [31](#)  
 Guarantee [6](#)

#### H

Heater circuit diagram [36](#)  
 Heater documentation [5](#)  
 Heater wiring [36](#)  
 Heating mode [8](#)

## 7 SERVICE

### LIST OF KEY WORDS

#### I

Initial commissioning [6](#)  
 Initial start [35](#)  
 Interference suppression class [9](#)  
 Introduction [5](#)  
 ISO/TS 16949:1999 [44](#)

#### J

JE service partner [45](#)

#### L

Liability claim [6](#)  
 List of abbreviations [45](#)  
 Locking the control box [11](#)

#### M

Measurement [35](#)  
 Measuring the fuel quantity [35](#)

#### O

Overheating [11](#)  
 Overheating sensor [26](#)

#### P

Packaging [44](#)  
 Parking heater mode [8](#)  
 Parts list [36 – 41](#)  
 Picture symbols [5](#)  
 Preparation [35](#)

#### Q

Quality management [44](#)  
 Quantity of fuel [35](#)

#### R

Release tool [21](#)  
 Remedial action [16](#)  
 Remove flame sensor [30](#)  
 Repair instructions [21](#)  
 Repair steps [23](#)  
 Representations [5](#)  
 Representatives abroad [48 – 50](#)

#### S

Safety information [6, 21, 36](#)  
 Safety instructions for installation [6](#)  
 Service [44 – 50](#)  
 Spare parts list [5](#)  
 Special text formats [5](#)  
 Special tool [21](#)  
 Start attempts [11](#)  
 StVZO [45](#)  
 Surface sensor [26](#)

#### T

Table of values [26, 27, 30](#)  
 Technical data [9](#)  
 Technical description [5](#)  
 Testing equipment [12](#)  
 Troubleshooting [11](#)

#### V

Voltage supply [11](#)

#### W

Water pump [10](#)  
 Water pump characteristic curve [10](#)  
 Weight [9](#)  
 What to check first in case of faults [11](#)  
 Work on the heater [21](#)

BUTLER TECHNİK

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