REPAIR INSTRUCTIONS
HYDRONIC L3

The repair instructions are valid for the following engine-independent water heaters

Water heaters for diesel	purchase order no.	purchase order no. compact version (incl. water pump)
Hydronic L3-16, 24 V	25.3042.02.0000	
Hydronic L3-24, 24 V	25.3043.02.0000	25.3043.05.0000
Hydronic L3-30, 24 V	25.3040.02.0000	25.3040.05.0000
Hydronic L3-35, 24 V	25.3041.02.0000	25.3041.05.0000

1 INTRODUCTION

2 FUNCTION AND OPERATION

3 TECHNICAL DATA

4 DIAGNOSTICS

5 REPAIR INSTRUCTIONS

1 Introduction

1.1 Concept of this document

This document assists the workshop with troubleshooting and repair of the heater.

The document is divided into the following chapters to make it easier to find information quickly.

1 Introduction
Important, introductory information about the structure of this documentation, safety and intended use of the heater

2 Function and operation
Basic information on the function and operation of the heater

3 Technical data
Technical data of the heater

4 Troubleshooting
Information about unlocking the control box and the fault codes of the heater, their meaning and troubleshooting measures / remedies based on a clear table

5 Repair instructions
Information about special tools, dismantling and assembly of the heater's components as well as a component drawing

6 Electrics / Circuit diagram
Information on the electrical components and circuit diagrams of the heater and the cable harness

7 Environment
Information about certification and disposal of the heater

8 Service
Information about setup times and technical support

1.2 General information

This document is used to correct faults and to carry out repairs for the heaters listed on the title page, and is valid to the exclusion of all liability claims. The necessary work may only be carried out by appropriately trained personnel of an Eberspächer service partner.

Depending on the version or revision status of the heater, differences may occur compared to this documentation. Please check this before carrying out the repair and take any possible differences into account.

1.3 Reference documents

Technical description
Describes the function and proper installation and contains all information necessary for safe operation of the heater.

Spare parts list
Contains the information necessary for ordering spare parts.

Installation Instructions Plus
Supplementary information on heaters and control units.

1.4 Special text formats and presentations

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

1.4.1 Lists

- This dot ( ) indicates a list introduced by a heading.
  - If an indented dash (–) follows a "dot", this list is a sub-section of the black dot.
- This angle (>) indicates an action step, introduced by a heading.
  - If an "angle" is followed by an indented dash (–), this action step is subordinate to the black angle.

1.4.2 Cross references

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.

1.5 Picture symbols

§ **REGULATION!**
This information indicates a statutory regulation. Any violation of these regulations results in expiry of the type-approval for the heater and exclusion of any guarantee and liability claims against Eberspächer Climate Control Systems GmbH.

⚠ **DANGER!**
"Danger" indicates a situation that can directly result in death or serious injuries if not avoided.
→ This arrow indicates the appropriate measures to avert the imminent danger.

⚠ **WARNING!**
"Warning" indicates a situation that can potentially result in death or serious injuries if not avoided.
→ This arrow indicates the appropriate measures to avert the potential danger.

! **CAUTION!**
"Caution" indicates a situation that can potentially result in minor or slight injuries or damage to the device.
→ This arrow indicates the appropriate measures to avert the potential danger.

NOTE
This note contains recommendations for use and useful tips for the operation, installation and repair of the product.

1.6 Intended use

1.6.1 Range of application of the heater

The water heater operating independently of an engine is intended for installation in the following vehicles:

- All types of motor vehicles, especially buses and coaches
- Construction machinery
- Agricultural machinery
- Boats, ships and yachts
- Rail vehicles

NOTE
- The heater cannot be installed in vehicles used for the transport of dangerous goods according to ADR.
- The heater is primarily intended for installation in buses and is designed for their specific requirements. At the same time it must be noted that installation in vehicle interiors used by persons (more than 8 passengers) is not permitted. Exception, see page 7: Legal regulations, arrangement of the heater.

1.6.2 Intended use of the heater (via the vehicle's own heat exchanger)

- Pre-heating, de-misting windows
- Heating and keeping the following warm:
  - Driver and working cabs
  - Freight compartments
  - Ship's cabins
  - Passenger and crew compartments
  - Vehicle engines and units

WARNING!

SAFETY INSTRUCTIONS FOR THE RANGE OF APPLICATION AND PROPER, INTENDED USE!
The heater must only be used and operated for the range of application stated by the manufacturer and in compliance with the operation instructions included with every heater.

1.7 Non-intended use

On account of its functional purpose, the heater is not approved for the following applications:

- Long-term continuous operation, e.g. for preheating and heating:
  - Residential rooms
  - Garages
  - Work barracks, weekend houses, hunting lodges, etc.
  - Houseboats, etc.

WARNING!

RISK OF UNDERCOOLING!
- The heater does not replace a temperature-monitored and controlled heating system, which ensures that a constant temperature is maintained and thus ensures survival in adverse weather conditions. It is not suitable for the continuous heating of vehicle interiors at low outdoor temperatures.
- Use, operation and deployment of the product outside the intended use stated by the manufacturer can cause considerable injuries to people and/or damage to machinery and property.

→ Only use the project for the stipulated purpose and in the approved area of use.

1.8 Safety instructions

DANGER!

FIRE HAZARD. RISK OF POISONING DUE TO EXHAUST GASES.
Improper repair or installation can result in toxic exhaust gases getting into the interior of the vehicle or a fire.

→ Repair and installation of the heater by authorised and trained skilled personnel only.
→ Use original spare parts only.
→ Comply with the official regulations.
→ Take into account and follow this document and all applicable documentation.

NOTE
- Comply with the vehicle manufacturer's instructions.
- In case of electric welding work on the vehicle, disconnect the positive pole from the battery and connect it to ground.

1.9 Warranty and liability

Eberspächer Climate Control Systems GmbH does not accept any liability whatsoever for defects and damage, which are due to installation or repair by unauthorised and untrained persons.

Compliance with official regulations and the safety instructions is prerequisite for liability claims. Failure to comply with official regulations and safety instructions leads to exclusion of any liability of the manufacturer.

1.10 Accident prevention

Always follow all general accident prevention regulations as well as workshop and operating safety instructions.

1.11 Functional test following a repair

- After installing the heater, the whole fuel supply system must be carefully vented: please refer to and follow the vehicle manufacturer's instructions.
- Switch on the heater at the control unit and during the trial run, check all water and fuel connections for leaks and tight fit.
- Correct any faults during operation with the help of diagnostic equipment or the control unit.

NOTE
The function of the heater is described in detail in the "Technical Description" document.

1.12 Target groups of this document

This document is aimed at the following target groups:

Service company
The "service company" target group includes all service companies trained by Eberspächer that purchase heaters, air-conditioners and their control units, accessories, and spare parts from Eberspächer and repair or service these on behalf of an end user.

Installation company
The "installation company" target group includes all companies trained by Eberspächer that repair or service heaters, air-conditioners and their control units, accessories, and spare parts from Eberspächer on behalf of another company (usually the automotive / body manufacturer).

End user
The "end user" target group includes all natural persons who operate a heater or air conditioner with the help of a control unit, regardless of whether they act as a consumer or as part of their job.

1.12.1 Duty to instruct of the target groups

Each named target group must fulfil their duty to instruct in full. The duty to instruct relates to the passing on of technical documents.

Technical documents are all documents published by Eberspächer for the installation, operation, use, maintenance, or repair of heaters, air conditioners and their control units, accessories, and spare parts.

NOTE
- If not explicitly defined below, the repair instructions may be distributed in printed form or made available on the Internet for download.
- The latest technical documents are available for download via the Eberspächer website.

2 Function and operation

2.1 Structure of the heater

The heater consists of a heat exchanger and a removable burner. A combustion chamber consisting of a flame tube with integrated mixer is inserted in the heat exchanger. The flame tube can be pulled out of the heat exchanger if necessary.
The control box and electric motor are fixed to the burner flange under the burner hood. The fuel pump is integrated in the burner housing.

The following additional parts are required for operation of the heater:

- Water pump (pre-installed in the compact version)
- Additional parts for connection to the water circuit
- Additional parts for the fuel supply
- Additional parts for the exhaust system
- Control unit

Order no. for additional parts, see page 8, further additional parts, see Product Information.

2.2 Operating instructions

The heater is controlled via the switch installed in the vehicle and/or via an Eberspächer control unit. The control unit includes a printed quick start guide and detailed operating instructions on CD.

NOTE
The service company or installation company provides the operating instructions to the end user.

2.3 Operating modes

2.3.1 Heating

When the heater is switched on using the button in the vehicle or an EasyStart control, the water pump starts, and the combustion air fan, ignition spark generator, and fuel pump are started according to a predetermined sequence. After a flame is detected, the ignition spark generator is switched off. The heat generated in the engine's cooling-water circuit is directed into the interior by the vehicle blower.

2.3.2 Parking ventilation

The vehicle blower is controlled directly via the control unit, bypassing the heating operation, to ventilate the vehicle interior, which has been heated up during summer, with fresh air shortly before the vehicle departs.

2.3.3 Water pump control (external)

Only the heater's water pump is activated (no outputs for relays, operating display, or burner motor, etc.)

- to direct the heat in the cooling-water circuit into the interior via the vehicle blower while the engine is running until the operating mode is terminated.
- to direct the residual heat in the cooling-water circuit into the

interior via the vehicle blower while the engine is switched off until the operating mode is terminated.
- If there is a demand for the water pump at the end of the heating process, the heater switches to this operating mode.

> **NOTE**
> The 'Heating' operating mode has higher priority, so when there is a parallel request (both heating and water pump are activated), only the heating mode is executed.

2.4 Initial commissioning of the heater

> **NOTE**
> Slight smoke and/or odours can develop during the initial commissioning of the heater. This is completely normal during the first minutes of operation and is not an indication of a malfunction.

The following points are to be checked by the company installing the heater during **initial commissioning**.
- Always read the operating and maintenance instructions before starting up the heater.
- After installing the heater, thoroughly bleed the coolant circuit as well as the entire fuel supply system. Comply with the instructions issued by the vehicle manufacturer.
- Before trial running the heater, open the coolant circuit (set the temperature control in the vehicle to "WARM").
- During the trial run of the heater, check all water and fuel connections for leaks and ensure they are securely fastened.
- If the heater displays an error or enters a fault state during operation, use an Eberspächer diagnostic device to identify and rectify the cause of the error.

2.5 Important instructions for operation

2.5.1 Perform a safety check before starting the heater
- After a lengthy stoppage (summer months), check all components for secure fit (tighten screws where necessary).
- Carry out a visual check of the fuel system for leaks.

2.5.2 Before switching on
- Before switching on or pre-programming heating mode, switch the vehicle's heating control to "WARM" (maximum setting) and the fan to "slow level" (low electricity consumption).
- In vehicles with automatic heating, before switching off the ignition, switch the heating control to "MAX" and the required damper position to "OPEN".

2.5.3 Heating at high altitudes
The Hydronic L3, with its integrated air pressure sensor, features automatic altitude adaption up to 3000 meters above sea level.
- Heating mode at altitudes above 3000 m:
  - The heater can be run for short periods during brief stops (e.g. after crossing a pass or taking a break).
  - During longer stays (e.g., winter camping), trouble-free operation of the heater cannot be guaranteed.

2.6 Functional description
- Switching on the heater
  - Upon turning on the heater, the symbol appears on the control unit, or the power indicator lights up.
  - A component test is simultaneously performed.
  - Then the water pump is started.

> **NOTE**
> - On first start, the nozzle pre-heater is activated.
> - The nozzle pre-heater remains on until the heater switches to "OFF" or is manually switched off beforehand.
> - The power of the nozzle pre-heater is continuously regulated based on the fuel temperature (10 W – 80 W ±10%).

2.6.1 Burner start
- The electric motor starts and drives the combustion-air impeller and the fuel pump.
- Shortly after that (see "Function Chart" on page 9), the ignition is turned on, and the fuel solenoid valve opens. During this time, the electric motor is rotation tested. The fuel and combustion air in the combustion chamber form an ignitable mixture.
- The mixture is ignited by a high-voltage ignition spark. The flame failure controller recognises the flame's flicker frequency and switches off the ignition spark generator. The hot fuel gases flow through the heat exchanger and transfer the heat to the heating medium.

> **NOTE**
> - The heater operates depending on the heat requirement, therefore, the length of the burner's on- and off-time differ.
> - The water pump continues to run throughout the whole operating period, even during pause mode periods and during the overrun.

Options
- If the temperature reduction function is activated, the "ON/OFF" control temperatures are lowered by approx 8 K.
  See the circuit diagram on how to connect the temperature reduction ON/OFF switch from page 48.

> **NOTE**
> - Temperature reduction can also be achieved with a CAN control unit.

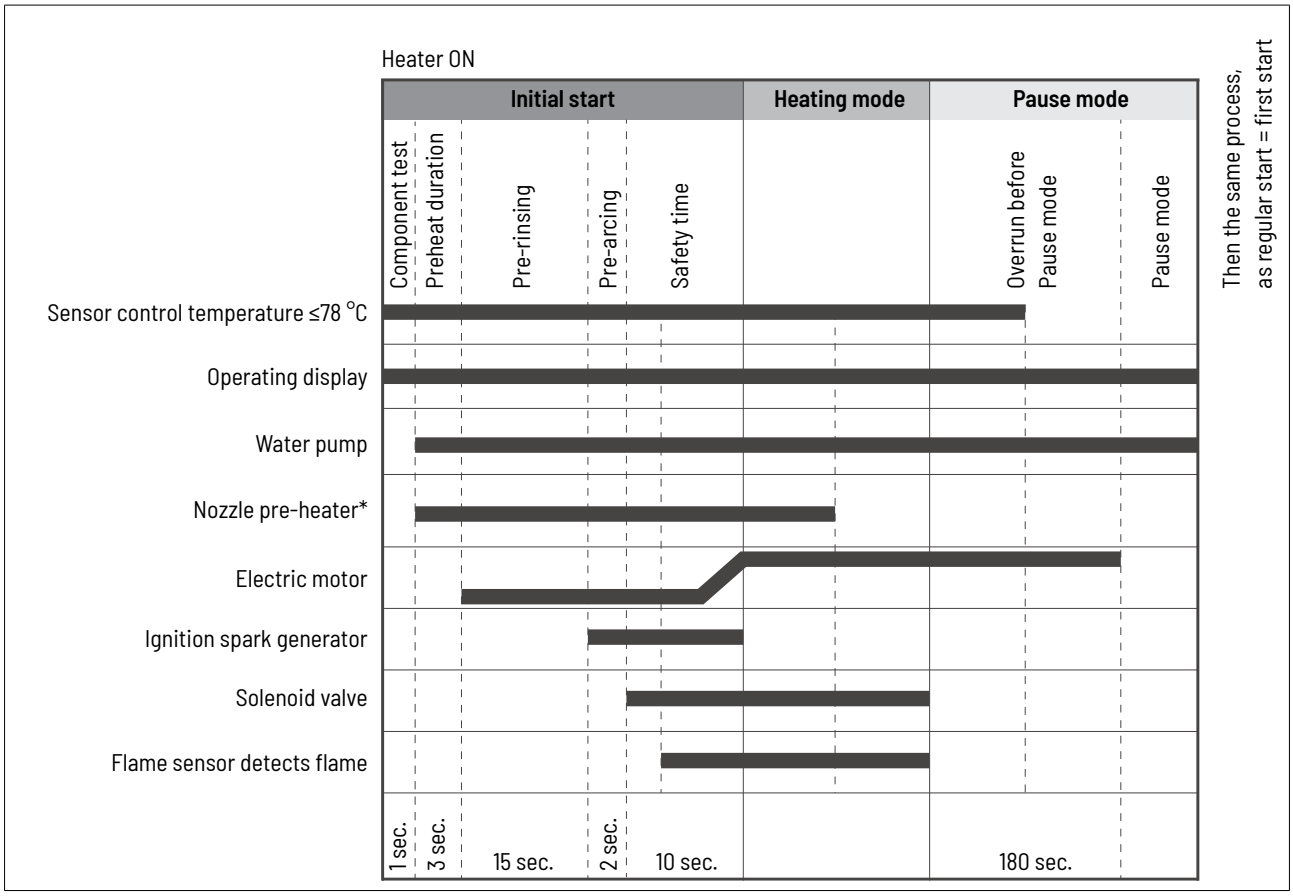
- The water pump can be run independently of the heater if appropriate controls are installed. See the circuit diagram on how to connect the additional "ON/OFF" switch for the separate water pump controller from page 48.
- With control of the vehicle's blower, the vehicle blower is switched on or off at the following water temperatures.
  - Water temperature > 55 °C
    —> Vehicle blower "ON"
  - Water temperature > 45 °C
    —> Vehicle blower "OFF"

See the circuit diagram on how to control the vehicle blower from page 48.

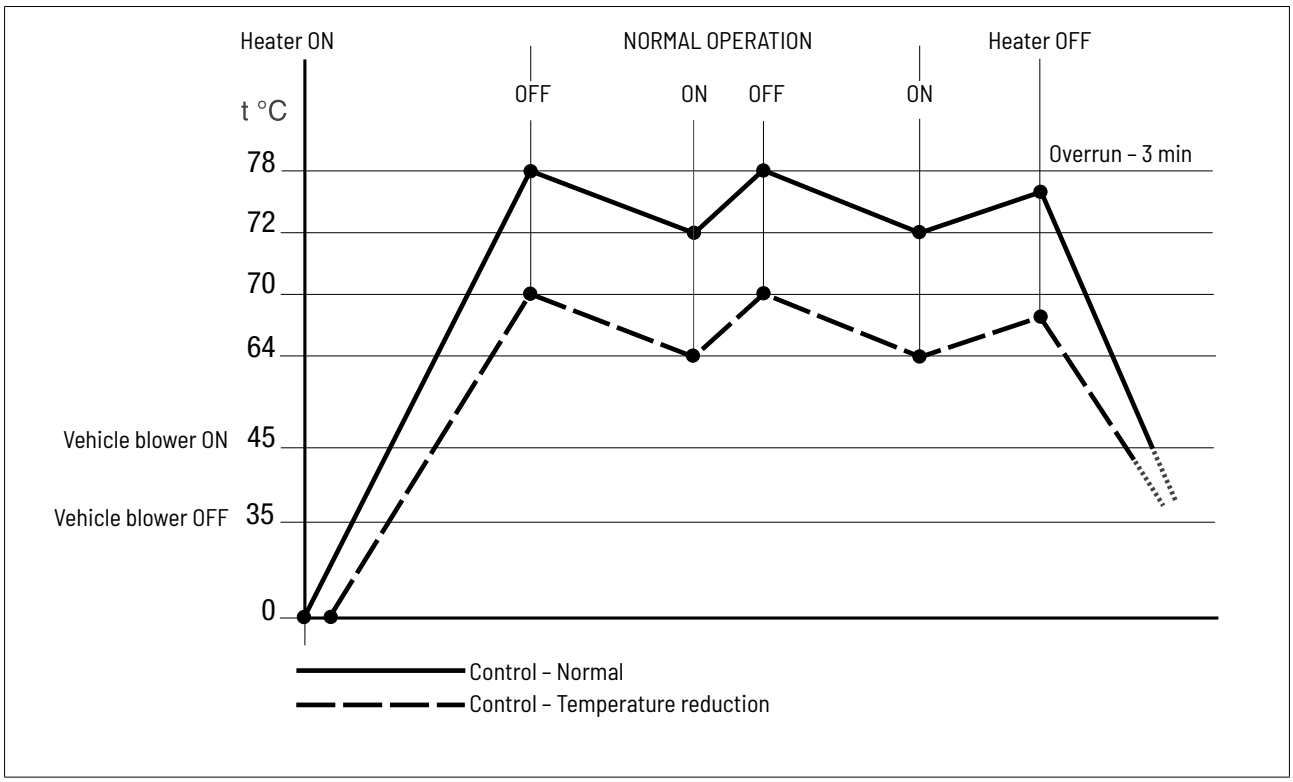
Switching off the heater
When the heater is switched off, the fuel solenoid valve closes and the overrun of approx. 3 minutes begins.
After the overrun has finished, the heater is switched off automatically.

NOTE
The fuel is circulated, also during the overrun, until it is switched off.

Function Chart



Control diagram



2.7 Control and safety devices

The heater is equipped with the following control and safety devices.

- If the heater does not ignite, the control box* is locked after an impermissible number of unsuccessful start attempts.
- 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 shut-down can be cancelled by briefly switching off and on again (heater ON / OFF).
- The overheating sensor responds in case of overheating (e.g., lack of water, poorly bled coolant circuit). The fuel supply is interrupted and a safety shut-down occurs. 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 (water temperature <70 °C). After a maximum of 10 overheating shutdowns, the control unit 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 ignition spark generator is defective or if the electrical line to the fuel pump is interrupted.
- The speed of the fan motor is monitored continuously. If the fan motor does not start up, if it is blocked or if the speed falls below 40% of the set speed, a safety shutdown occurs after 60 sec.
- If the water flow is too low, the water discharge temperature is limited by premature compensation. The temperature rise of the heating medium is monitored over time. If it rises too fast (water flow too low), the heater automatically switches "OFF" and begins with the overrun, the cycle then begins again.
- A constant comparison of measurements between the temperature sensor and the overheating sensor adds an extra layer of safety to the heater, as a premature fault shutdown occurs if the difference between the measurements is too great (indicating insufficient water flow).
- If the lower or upper voltage limit is reached, the heater is shut down automatically.
- If the flame sensor detects a flame during the heater's overrun, a fault shutdown occurs.
- The control box is locked after the permissible number fault shutdowns has been reached*.

NOTE

- The repair instructions for this heater lists the various faults causing fault shutdowns as well as possible remedial measures.
- The control box can be unlocked with a diagnostic device or a control unit. The diagnostic device and control unit are described, including their handling, under "Installation Instructions Plus – EasyStart / Altitude Kit / Special Functions and Diagnosis."
- The operating instructions and the error list for the heater can be found under "Troubleshooting and Repair Instructions" or "Installation Instructions PLUS – EasyStart, Special Functions and Diagnosis."

2.8 Emergency stop – EMERGENCY OFF

If an emergency stop – 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.

3 Technical data

3.8.1 Hydronic L3

Heater			Hydronic L3			
Version			-16	-24	-30	-35
Heat flow (watt) at ambient temperature -10 °C			16,000	24,000	30,000	35,000
Fuel consumption (l/h) at ambient temperature -10 °C			2.0	2.9	3.65	4.2
Average electrical power consumption (watt) with nozzle preheating but without water pump and vehicle blower relay		during operation	65	85	95	110
Fuel			Diesel – commercially available (DIN EN 590)			
					• Heating oil EL (DIN 51603) • HVO/GtL – Hydrogenated Vegetable Oil (DIN EN 15940)	
Heating medium			Mixture of water and anti-freeze (Proportion of antifreeze at least 10% up to 50% maximum)			
Closed-circuit power consumption			100 µA			
Rated voltage			24 volt			
Operating range, lower voltage limit: The undervoltage protection installed in the control box switches the heater off if the voltage limit is reached.[1)]			20.4 volt Undervoltage protection response time: 20 seconds ±1			
Operating range, upper voltage limit: The overvoltage protection installed in the control box switches the heater off if the voltage limit is reached.			32 volt Overvoltage protection response time: 20 seconds ±1			
Allowable operating pressure (bar)			2.5			
Water volume in the heater [l]			approx. 2.4			
Water volume in the heating circuit (l)			min. 10			
Minimum water flow rate of the heater (l/h)			1,200	2,000	2,600	3,000
Ambient temperature °C	Heater	in operation	-40 to +85			
		not in operation	-40 to +100 (briefly +125)			
Combustion air temperature in °C			max. 60			
CO_2 values (Vol.%)			9 – 11.5			
CO in the exhaust			<0.04			
Smoke spot no. (Bacherach)			<4			
Radio interference suppression class			Interference-suppression category 5 to EN 55025			
IP rating to ISO 20653	Heater	in operation	IP5k4k[2)]			
		not in operation	IP5k6k and IP5k9k[2)]			
Weight – without coolant liquid and additional parts (kg)			approx. 16			
Ventilation mode			possible			
External water pump controller			possible			

1) The undervoltage limits of the heater must be taken into consideration in the use and design of a battery management system. An installed battery management system may only switch off the heater's power supply below the voltage limits if the response time of 20 seconds ±1 second is taken into consideration.

2) The heater is protected against harmful quantities of dust, powerful water jet under increased pressure and water during high-pressure/steam cleaning (provided it is not in operation). The control box is dustproof, completely protected against powerful water jet under increased pressure and water during high-pressure/steam cleaning (provided it is not in operation).

CAUTION!
Failure to comply with the ambient conditions stated in the technical data can result in malfunctions.

NOTE
Provided no other values are given, the technical data provided is with the usual tolerances of ±10% at rated voltage, 20 °C ambient temperature and reference altitude Esslingen.

3.8.2 Water pumps

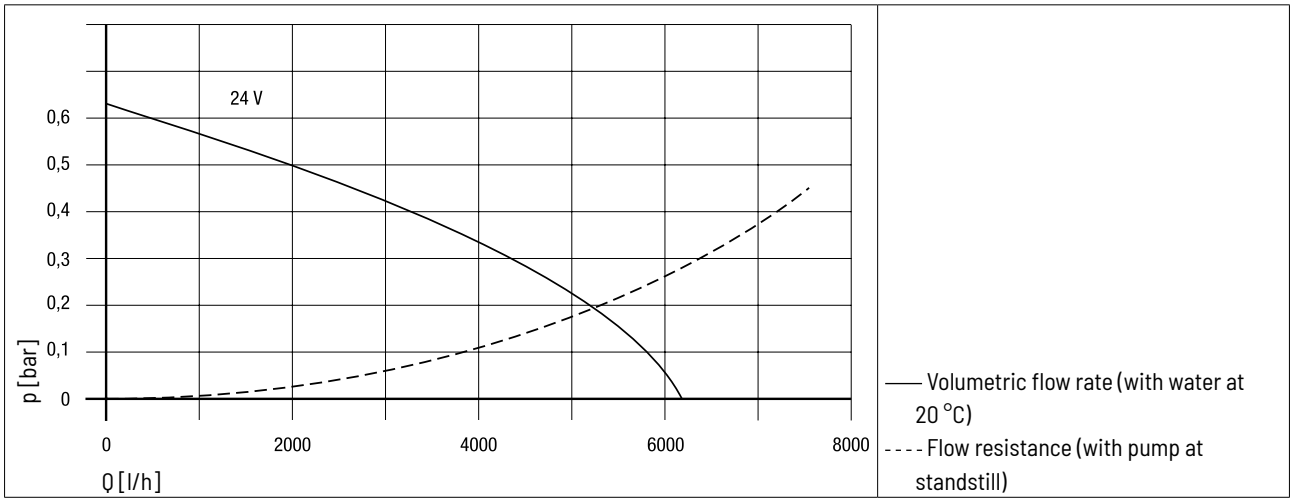
Flowtronic 5000

Pump type		Flowtronic 5000	
Heating medium		Mixture of water and anti-freeze (Proportion of antifreeze at least 10% up to 50% maximum)	
Delivery rate		5200 l/h ±10 % at 0.2 bar discharge pressure	
Operating pressure, water circuit		max 2 bar	
Weight (without bracket, clip and coolant)		2.04 kg	
Rated voltage		24 volt	
Operating range		20 – 28 volt	
Power consumption at 5200 l/h and 0.2 bar discharge pressure		104 watt ±10%	
Short-distance interference suppression		Limit class 3 Interference field strength according to CISPR25 3rd 0.15 MHz – 1000 MHz. according to DIN 57879 / Part 1 VDE 0879	
Degree of protection		IP 5K4	
Electrical fusing for third party controls		15 A	
Temperature conditions	Heating medium	–40 °C to 90 °C	short-term (15 min) +115 °C
	Ambient, operation	–40 °C to 90 °C	short-term (15 min) +115 °C
Dry running		No	
Blocking		The motor will not be damaged for max 6 seconds.	
Shaft - impeller connection		Mechanical seal	

CAUTION!
Failure to comply with the ambient conditions stated in the technical data can result in malfunctions.

NOTE
- Provided no other values are given, the technical data provided is with the usual tolerances of ±10% at rated voltage, 20 °C ambient temperature and reference altitude Esslingen.
- The Flowtronic 5000 water pump is installed in compact heaters.
- The water pumps must be assigned to the heaters according to minimum throughput and coolant volume.

Pumping and pressure loss characteristic curves



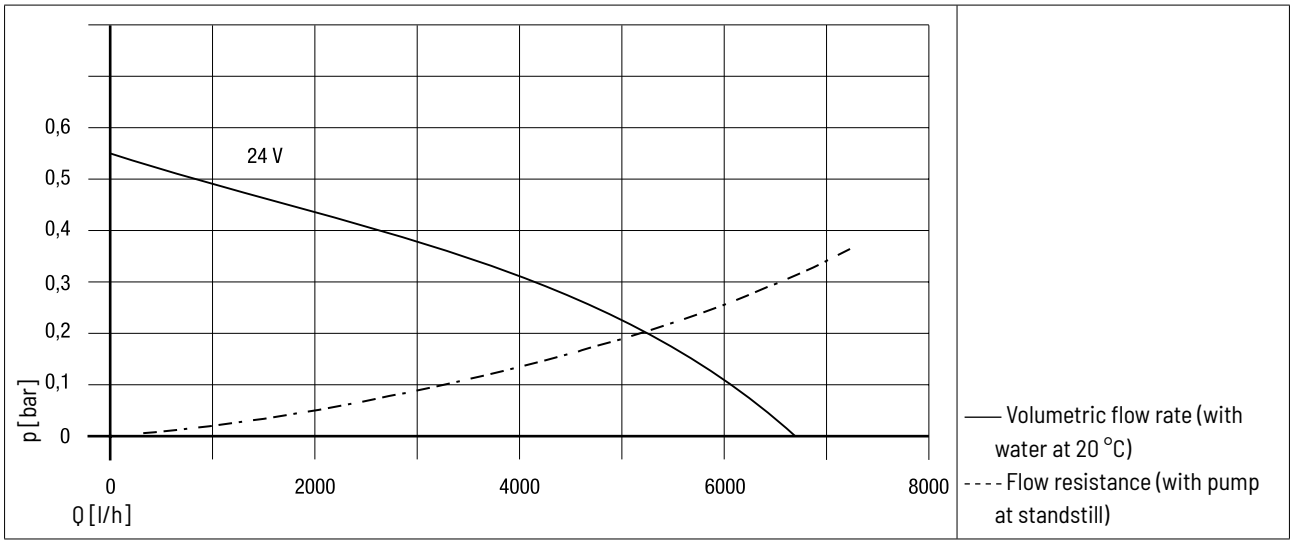
Flowtronic 5000 S

Pump type		Flowtronic 5000 S	
Heating medium		Mixture of water and anti-freeze (Proportion of antifreeze at least 10% up to 50% maximum)	
Delivery rate		5200 l/h ±10 % at 0.2 bar discharge pressure	
Operating pressure, water circuit		max 2 bar	
Weight (without bracket, clip and coolant)		2.2 kg	
Rated voltage		24 volt	
Operating range		20 – 28 volt	
Power consumption at 5200 l/h and 0.2 bar discharge pressure		104 watt ±10%	
Short-distance interference suppression		1 for VHF, 5 for SW, 2 for MW and LW to DIN 57879 / Part 1 VDE 0879	
Degree of protection		IP 54A to DIN 40 050 Sheet 1	
Electrical fusing for third party controls		15 A	
Temperature conditions	Heating medium	–40 °C to 90 °C	short-term (15 min) +115 °C
	Ambient, operation	–40 °C to 90 °C	short-term (15 min) +115 °C
Dry running		No	
Blocking		The motor will not be damaged for max 6 seconds.	
Shaft - impeller connection		Magnetic clutch	

CAUTION!
Failure to comply with the ambient conditions stated in the technical data can result in malfunctions.

NOTE
- Provided no other values are given, the technical data provided is with the usual tolerances of ±10% at rated voltage, 20 °C ambient temperature and reference altitude Esslingen.
- The water pumps must be assigned to the heaters according to minimum throughput and coolant volume.

Pumping and pressure loss characteristic curves



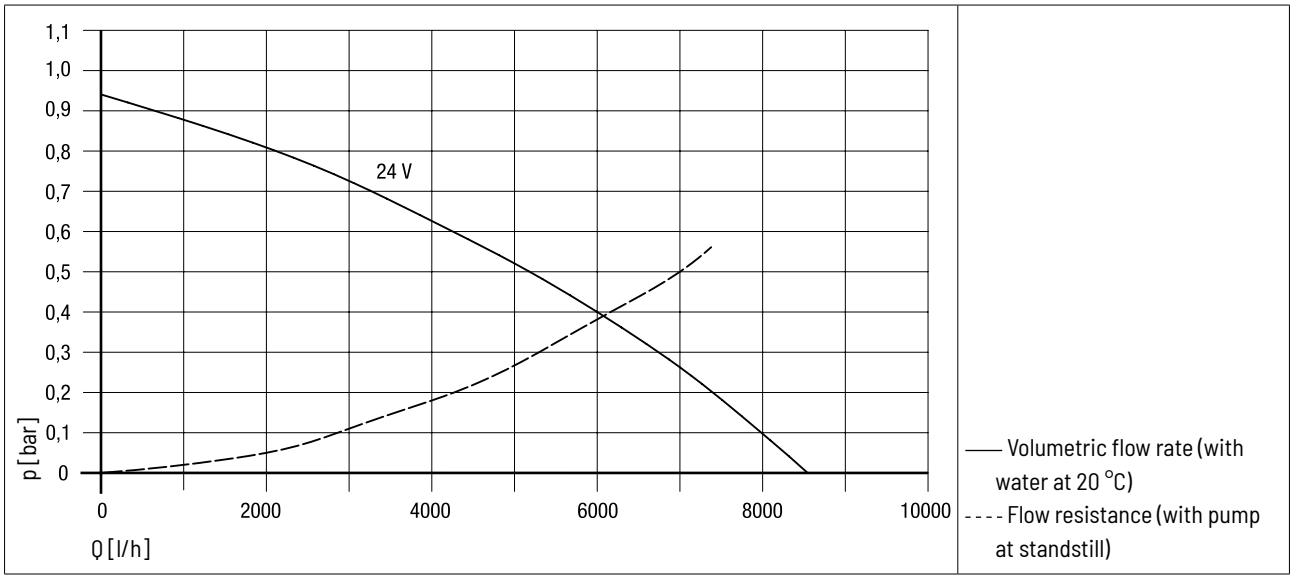
Flowtronic 6000 SC

Pump type		Flowtronic 5000	
Heating medium		Mixture of water and anti-freeze (Proportion of antifreeze at least 10% up to 50% maximum)	
Delivery rate		6000 l/h ±5 % at 0.4 bar discharge pressure	
Operating pressure, water circuit		max 2 bar	
Weight (without bracket, clip and coolant)		2.5 kg	
Rated voltage		24 volt	
Operating range		18 – 32 volt	
Power consumption at 5200 l/h and 0.2 bar discharge pressure		210 watt ±10%	
Short-distance interference suppression		5 for LW, MW, KW1, KW2, UKW according to DIN EN 55 025	
Degree of protection		IP 25 (encapsulated electronics) according to DIN 40 050, Part 9	
Electrical fusing for third party controls		15 A	
Temperature conditions	Heating medium	–40 °C to 90 °C	short-term (15 min) +115 °C
	Ambient, operation	–40 °C to 90 °C	short-term (15 min) +115 °C
Dry running		approx. 45 min. – the motor switches off after approx. 45 min.	
Blocking		Yes – the starting attempts are continued without limit.	

CAUTION!
Failure to comply with the ambient conditions stated in the technical data can result in malfunctions.

NOTE
- Provided no other values are given, the technical data provided is with the usual tolerances of ±10% at rated voltage, 20 °C ambient temperature and reference altitude Esslingen.
- The water pumps must be assigned to the heaters according to minimum throughput and coolant volume.

Pumping and pressure loss characteristic curves



4 Diagnostics

4.1 Flashing code display

4.1.1 What to check first in case of faults

- Faulty wiring (short circuits, interruption).
- Visual inspection for
  - corroded contacts
  - defective fuses
  - damaged electrical leads, connections, and terminals
  - damaged exhaust and combustion air ducts.
- Battery voltage when starting the heater <20volt (measure voltage at control box).
- Check fuel supply.
- When transitioning to winter operation: Is summer diesel fuel still in the fuel line?
- Delayed start –> switch on nozzle assembly heating for 60 seconds.

4.2 Control box is locked

The control box locks if the following faults occur:

- **Overheating**
  If the heater overheats 10 times in a row – fault code P000115 (012) is displayed as P00011A (015).
- **Flame during overrun**
  If the fault "Flame during overrun" is displayed 5 times in a row – fault code P0002DA (058) is displayed as P0002DB (016).
- **Too many starting attempts**
  If the heater makes ten unsuccessful starting attempts in a row – fault code P00012A (052) is displayed as P00012B (050).

4.3 Unlocking the control box

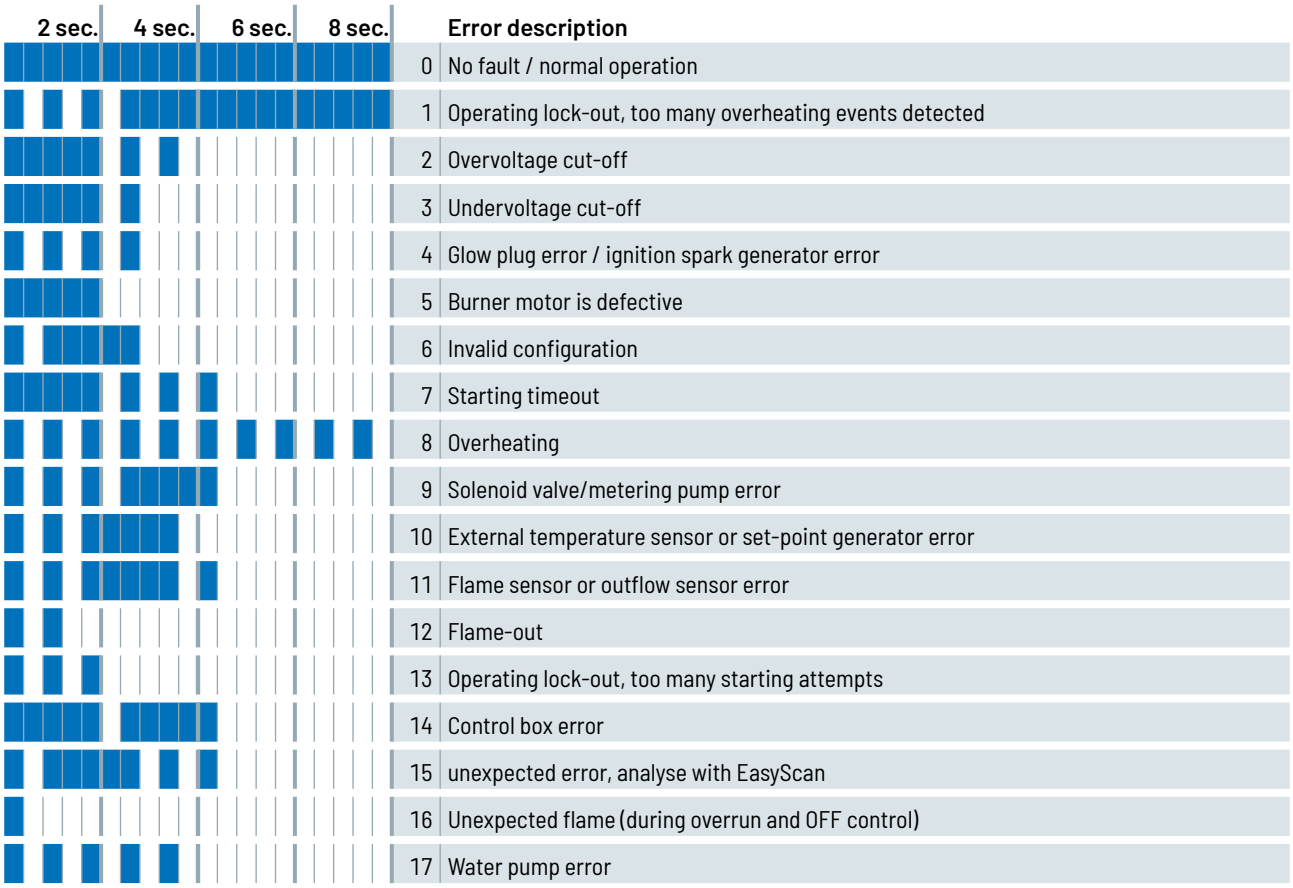
NOTE

The control box can be unlocked with a diagnostic device / control unit. For the procedure and description for diagnostic units and control units, see "Installation Instructions Plus – EasyStart / Altitude Kit / Special Functions and Diagnosis".

4.3.1 Function display and error output via flashing code

Output of the operating display (combustion mode or output control):
→ LED lights up permanently

In case of error:
→ Output of the current error as a flashing code (see table)



	Error description
0	No fault / normal operation
1	Operating lock-out, too many overheating events detected
2	Overvoltage cut-off
3	Undervoltage cut-off
4	Glow plug error / ignition spark generator error
5	Burner motor is defective
6	Invalid configuration
7	Starting timeout
8	Overheating
9	Solenoid valve/metering pump error
10	External temperature sensor or set-point generator error
11	Flame sensor or outflow sensor error
12	Flame-out
13	Operating lock-out, too many starting attempts
14	Control box error
15	unexpected error, analyse with EasyScan
16	Unexpected flame (during overrun and OFF control)
17	Water pump error

Short pulse – flash duration:	0.4 sec.	Pause between pulses:	0.4 sec.
Long pulse – flash duration:	2.0 sec.	Flash sequence period:	8.0 sec.

4.4 Overview of the diagnostic units and control units suitable for diagnosis

The electronic control box can store up to 20 faults, which can be read out and displayed (10 active faults, 10 stored faults). Use the following diagnostic and control units to query the control box's fault memory and if necessary, to unlock the control box:

Diagnostic unit	Order No.
• EasyScan Software diagnostic tool for workshops. View and download the installation and operation documentation for this tool from the Eberspächer partner portal.	22.1550.89.0000

Control units	Order No.
• EasyStart Remote+	22.1000.34.1700
• EasyStart Timer	22.1000.34.1500
• EasyStart Pro	22.1000.35.2200
• EasyStart Web (from 2019)	22.1000.34.7800
• EasyStart Web (from 2021)	22.1000.35.3500

NOTE

- If the readout is made using a LIN control unit, only 1 active and 5 stored faults are displayed.
- Control units connected to the heater via the switch input S+ cannot be used for diagnosis.

4.5 Notes on heater diagnosis with control units

4.5.1 Easy Start Pro

Heater error messages

Display	Description	Remedy / Customer
Service	• There is a fault in the heater that can only be remedied by a specialist workshop.	• Visit an authorised Eberspächer workshop.
Undervoltage	• Uninterrupted undervoltage is applied to the heater control box for at least 20 seconds.	• Check battery for a drop in voltage. • Charge battery or replace, if necessary.
Overvoltage	• Uninterrupted overvoltage is applied to the heater control box for at least 20 seconds.	• Check battery and replace, if necessary.
Fuel Supply or Pump	• Fault in the fuel supply or fuel pump.	• Check cables for continuity, short circuit, and damage. • Pull the plug from the fuel pump and inspect for damage. • Check the fuel level in the fuel tank. • If the fault cannot be remedied, please contact Eberspächer Support.
Water Circuit or Pump	• For water heaters only: Heater water temperature too high.	• Check the water pump for proper function. • Check the water circulation in the water circuit. • The heater can be reset to the delivery condition by removing the heater fuse. • If the fault cannot be remedied, please contact Eberspächer Support.

Display	Description	Remedy / Customer
	• For air heaters only: Heater air temperature too high.	• Check the air lines. Are air lines clogged or kinked? Air all air louvres free? • The heater can be reset to the delivery condition by removing the heater fuse. • If the fault cannot be remedied, please contact Eberspächer Support.
	• Overheating of the heater detected. The heater is interlocked for safety reasons.	• Contact Eberspächer Support.
	• Emergency running of the heater.	• There is a fault in the heater. Restricted operation is still possible, however (with air heaters with target temperature 20°C). • If the fault cannot be remedied, please contact Eberspächer Support.
	• Interlock of the heater in ADR vehicles • when starting the PTO • on turning the vehicle engine off	• Eliminate reason for interlock. • Check heater wiring using the ADR circuit diagram. • If the fault cannot be remedied, please contact Eberspächer Support.

NOTE
The heater must be switched off when the PTO is activated and on turning the vehicle engine off.

Heater error code list

Error code	Error code message	Cause / Remedy
P000301	Watchdog reset	• Delete errors, the heater remains ready for operation. • Replace control box
P000302	Too many watchdog resets	• Delete errors, the heater remains ready for operation. • Replace control box
P00030A	CAN communication error	• Delete error, if it occurs repeatedly check the CAN connection between heater and control unit
P001700	No heater connected to the CAN bus	• Check cable connections and power supply of the heater.
P001701	Change device at the CAN bus (mismatch)	• The system configuration has changed – possible causes: – a heater has been replaced – a control unit has been removed – a control unit has been added • Confirm error message via the operating button. New initialisation starts automatically.
P001702	External temperature sensor is defective (short circuit)	• Check the cable for damage • Check the connection to the external sensor at the control unit • Renew sensor if necessary
P001703	External temperature sensor is defective (interruption)	• Check the cable for damage • Check the connection to the external sensor at the control unit • Renew sensor if necessary
P001707	Internal temperature sensor is defective (short circuit)	• Internal hardware error: The sensor can no longer be used as a display or control sensor. Replace control unit if necessary
P001708	Internal temperature sensor is defective (interruption)	• Internal hardware error: The sensor can no longer be used as a display or control sensor. Replace control unit if necessary

Error code	Error code message	Cause / Remedy
P00170C	Operating button is blocked	• Remove blockage • Check operating button for contamination • Replace control unit if necessary
P001706	Back button is blocked	• Remove blockage • Check Back button for dirt • Replace control unit if necessary
P00170A	Timer is not calibrated	• Production error: Update software with EasyStart Pro or replace control unit.
P001709	Missing data	• Production error: Update software with EasyStart Pro or replace control unit.
P001704	Fatal internal error	• Production error: Update software with EasyStart Pro or replace control unit.
P001705	External flash is defective	• Production error: Update software with EasyStart Pro or replace control unit.
P00170B	Invalid system configuration	• Check connected components (heaters and control units), an impermissible system configuration exists: – more than 2 control units are installed – more than 2 heaters are installed – an ADR heater is installed, the control unit does not support the ADR function.

NOTE
See the ES Pro Installation Instructions for information on generating a heater error readout, and the Workshop menu.

4.5.2 EasyStart Web

- To diagnose possible causes of heater faults, the primary user must send an approval code to their service company so it can access the user's EasyStart Web. This gives the workshop 48-hour maintenance and diagnostics access to the heater.
- The approval code is generated for a particular purpose and is invalid after use. It is generated using the "Options" button.

NOTE
The heater faults are read out via the workshop access of the web application, see also Installation Instructions PLUS

Heater error code list

Error code	Error code message	Cause / Remedy	ES Pro	ES Web
P000301	Watchdog reset	• Delete errors, the heater remains ready for operation. • Replace control box	X	X
P000302	Too many watchdog resets	• Delete errors, the heater remains ready for operation. • Replace control box	X	X
P00030A	CAN communication error	• Delete error, if it occurs repeatedly check the CAN connection between heater and control unit	X	X
P001700	No heater connected to the CAN bus	• Check cable connections and power supply of the heater.	X	X
P001701	Change device at the CAN bus (mismatch)	• The system configuration has changed – possible causes: – a heater has been replaced – a control unit has been removed – a control unit has been added • Confirm error message via the operating button. New initialisation starts automatically.	X	X
P001702	External temperature sensor is defective (short circuit)	• Check the cable for damage • Check the connection to the external sensor at the control unit • Renew sensor if necessary	X	X
P001703	External temperature sensor is defective (interruption)	• Check the cable for damage • Check the connection to the external sensor at the control unit • Renew sensor if necessary	X	X
P001707	Internal temperature sensor is defective (short circuit)	• Internal hardware error: The sensor can no longer be used as a display or control sensor. Replace control unit if necessary	X	X
P001708	Internal temperature sensor is defective (interruption)	• Internal hardware error: The sensor can no longer be used as a display or control sensor. Replace control unit if necessary	X	X
P00170C	Operating button is blocked	• Remove blockage • Check operating button for contamination • Replace control unit if necessary	X	
P001706	Back button is blocked	• Remove blockage • Check Back button for dirt • Replace control unit if necessary	X	
P00170A	Timer is not calibrated	• Production error: Update software with EasyStart Pro or replace control unit.	X	X
P001709	Missing data	• Production error: Update software with EasyStart Pro or replace control unit.	X	X
P001704	Fatal internal error	• Production error: Update software with EasyStart Pro or replace control unit.	X	X
P001705	External flash is defective	• Production error: Update software with EasyStart Pro or replace control unit.	X	X
P00170B	Invalid system configuration	• Check connected components (heaters and control units), an impermissible system configuration exists: – more than 2 control units are installed – more than 2 heaters are installed – an ADR heater is installed, the control unit does not support the ADR function.	X	X

4.5.3 EasyStart Remote+ / EasyStart Timer

- Connection via LIN interface
- If faults occur while the heater is running, they are displayed with "Err" after the mobile unit is activated.
- The current fault is displayed. The stored faults "F1" to "F5" can be enquired.
- To read out the heater error, see Installation Instructions Remote+ - EasyStart Timer or Installation Instructions Plus.

The service functions listed below can be displayed, read out and/or changed in the Workshop menu.

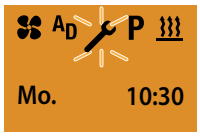
NOTE

- A reset (remove 5A fuse) is necessary to activate some functions. To do this, not and follow the relevant note under "Comments" of the "Service functions overview".

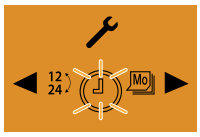
Open the Workshop menu

→ 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.



→ The SET THE TIME symbol 🕘 is displayed flashing.

→ Press ▭ button for more than 5 seconds. The Workshop menu is displayed.

→ Use the ◄ or ► button to select the desired function and confirm with the ▭ button.

→ Press the ▭ button to exit the Workshop menu.

Service functions overview

Menu item	Service function	Comments
1.1.1	Heater 1 – display current fault	The heater must be switched on to detect current faults. "no diag" is displayed if no diagnostics cable is connected.
1.1.2	Heater 2 – display current fault	The heater must be switched on to detect current faults. "no diag" is displayed if no diagnostics cable is connected.
1.2.1	Heater 1 – read out fault memory F1 – F5	Display fault memory F1 – F5 with error code, e.g.: F1: 12. "no diag" is displayed if no diagnostic cable is connected.
1.2.2	Heater 2 – read out fault memory F1 – F5	Display fault memory F1 – F5 with error code, e.g.: F1: 12. "no diag" is displayed if no diagnostics cable is connected.
1.3.1	Heater 1 – delete fault memory F1 – F5	Select the delete → function by pressing the ▭ button, the DEL display appears, flashing, press the ▭ button to confirm. "no diag" is displayed if no diagnostics cable is connected.
1.3.2	Heater 2 – delete fault memory F1 – F5	Select the delete → function by pressing the ▭ button, the DEL display appears, flashing, press the ▭ button to confirm. "no diag" is displayed if no diagnostics cable is connected.
1.4.1	Heater 1 – read out operating hours counter	Operating time is displayed in minutes. "no diag" is displayed if no diagnostics cable is connected.
1.4.2	Heater 2 – read out operating hours counter	Operating time is displayed in minutes. "no diag" is displayed if no diagnostics cable is connected.
2	Select temperature unit, °C or °F	Default: °C
3.1	Set the undervoltage limit (EasyStart Timer only)	Default: 8 volt, Setting range: 8 – 28 volt in 0.1 volt increments.
3.2	Set the undervoltage limit "offset" (EasyStart Timer only)	Default: 0 volt, Setting range: 0 – 6 volt in 0.1 volt increments.
3.3	Set the "fault detection" debounce time (EasyStart Timer only)	Default: 20 seconds, Setting range: 5 – 255 seconds in 1 second increments.

Menu item	Service function	Comments
4.1	Heater 1 – set max. operating time (EasyStart Timer only)	Default: 120 min. Setting range: 10–120 min in 1 min increments, starting at minute 120 – 720 min in 5 min increments. Continuous heating mode is also possible for air heaters. These settings have no effect on the operating time for timer programming.
4.2	Heater 2 – set operating time (EasyStart Timer only)	Default: 120 min. Setting range: 10–120 min in 1 min increments, starting at minute 120 – 720 min in 5 min increments. Continuous heating mode is also possible for air heaters. These settings have no effect on the operating time for timer programming.
5	Reset to as delivered condition	Press the button to select the function, the default display appears, flashing, press the button to confirm. All active timers are deleted.
6.1	Read out control unit hardware version	Function is intended for internal purposes only.
6.2	Read out control unit software version	Function is intended for internal purposes only.
7	Check measurement of the range EasyStart Remote+ only)	Take a check measurement. Operate the mobile unit at a distance of 1 m in front of the vehicle and select item 7 in the Workshop menu by pressing the or button. If a value between 75 and 100 is displayed for R and S the measurement is ok. Note on the check measurement: With an optimum installation the transmission power can reach a maximum value of 100. If the maximum value is not reached, change the location of the antenna so that a value for R and S is reached between the minimum value 75 and the maximum value 100.
8	Select language, DE or EN	Default: EN
9	Set upgrade box mode, On or Off	Default: Off A reset must be performed to activate the function (remove fuse).
10	Select start time (On) or departure time (Off)	Default: Off (departure time) The departure time (Off) is absolutely necessary for heating mode with automatic operating time calculation (Item 11.1:). For heating mode without automatic operating time calculation (item 11.1:) it is possible to choose between start time (On) and departure time (Off). A reset must be performed to activate the function (remove fuse).
11.1	Set automatic running time calculation, On or Off	Default: Off A temperature sensor must be connected to the control unit or stationary unit. Additional settings are required, see Item 11.2: and 11.3: A reset must be performed to activate the function (remove fuse). Automatic running time calculation is not possible for air heaters.
11.2	Set the engine size (cubic capacity)	Default: 1800 cm^3 Setting range: 1000 cm^3 – 4000 cm^3 in 100 cm^3 increments. The engine size can only be set if 11.1: is set to On.
11.3	Set the max. operating time	Default: 60 min, Setting range: 10 min. – 60 min. in 1 min. increments. The max. operating time can only be set if 11.1: is set to On.

Menu item	Service function	Comments
12.1	Configure water heater for activation via the switching output S+ as Additional Device [AD]	Default: Off Selection options: 1. Via JE diagnosis → display flame and ventilate symbol (if supported by the heater) in the AD menu. 2. Second heater via switching signal S+2 (deactivates the functions 1.2.2, 1.3.2, 1.4.2, 9) → S+2 (display of flame symbol and AD Heating menu only are visible). 3. First heater switch-on signal S+1 (deactivates function 1) → S+1 (Display Heating menu only). **NOTE** A reset must be performed to activate the function (remove fuse).
12.2.1	Room temperature control, On or Off	Default: Off
12.2.2	Hysteresis (On / Off difference): 0 – 7 °C	Default: 2 °C
12.2.3	Sampling rate: 0 – 15 seconds	Default: 5 seconds
13.1	Select KL58 or KL15 mode	Default: KL58. Input KL58 = control background lighting of control unit. A reset must be performed to activate the function (remove fuse).
13.2	If KL15 mode is active	Default setting: 15 min. Set afterrun time of heater until shutdown. Setting range: 1 – 255 min Value 0 = heater always remains in continuous operation.
14.1	Show display pixels	Check the individual pixels in test mode. If there are too many defective pixels, replace the control unit if necessary.
14.2	Show display pixels	Check the individual pixels in test mode. If there are too many defective pixels, replace the control unit if necessary.
14.3	Show display pixels	Check the individual pixels in test mode. If there are too many defective pixels, replace the control unit if necessary.
14.4	Show display pixels	Check the individual pixels in test mode. If there are too many defective pixels, replace the control unit if necessary.
14.5	Show display pixels	Check the individual pixels in test mode. If there are too many defective pixels, replace the control unit if necessary.
14.6	Show display contrast	This function changes the contrast of the display. **NOTE** It is also possible to reduce the contrast to such an extent that the screen display is no longer visible. With each PowerOn-Reset (remove fuse) the contrast is reset to the as-delivered condition.

5 Repair instructions

- This chapter describes the permitted repair work on the heater.
- If necessary, remove the heater from the vehicle to carry out repair work.
- The heater assembly is described from page 40.

DANGER!

RISK OF INJURY, BURNS AND POISONING!

Ensure the following before carrying out any work on the heater:

→ Switch off the heater and leave it to cool.
→ Disconnect the battery.
→ Do not operate the heater in enclosed spaces (garage / workshop).
→ Exception: Exhaust suction available directly at the entry to the exhaust pipe.
→ Relieve the overpressure in the cooling water circuit by opening the radiator screw cap.
→ Do not switch on the heater if burner is dismantled.
→ Disconnect the cable harness plug-in connections before removing the ignition spark generator.

CAUTION!

DAMAGE TO THE UNIT

→ Always renew the seals and O-rings of dismantled components.
→ Check all components for damage and replace if necessary.
→ Check plug-in contacts, plug-in connections and cables for corrosion and damage, and repair if necessary.
→ Only use original Eberspächer spare parts.
→ After completing any maintenance or repair of the cooling-water circuit, check the cooling-water level and, if necessary, top up with refrigerant according to the vehicle manufacturer's instructions. Then bleed the cooling-water circuit.
→ Only stop the operation or overrun of the heater in an emergency (see "EMERGENCY STOP" on page 17) by interrupting the power supply from the battery (risk of heater overheating).

5.1 What to check first in case of faults

- Check
  - Fuel in the tank?
  - Fuel lines leaking? (Visual check)
  - Summer diesel fuel in the fuel line?
  - Combustion air system or exhaust system damaged or blocked?
  - Hot air system blocked?
- Electrical components
  - Cables, connections damaged?
  - Contacts corroded?
  - Fuses defective?
  - Incorrect wiring? (short circuits, interrupted / broken)
- Measure battery voltage
  - Battery voltage <10.5 volts: The 12-volt heater's undervoltage protection has been triggered.
  - Battery voltage <21.5 volts: The 24-volt heater's undervoltage protection has been triggered.
- Measure voltage supply (Terminal 30)
  - Disconnect the 10-pin connector XS100/XB100 and measure the voltage applied to the connector XB100 between chamber 3 (red) and chamber 4 (brown).
  - If it differs from the battery voltage, check the fuses, the supply cables, the negative connection, and the positive support point on the battery for voltage drop (corrosion / interruption).

5.1.1 Installation instructions

NOTE

Thread-forming screws are sometimes used to fix the components in the factory. In case of repair the thread is already pre-cut by the initial installation.

- Position screw by hand and screw in.
  - Strictly adhere to the specified tightening torque.
- When screwing for the second time also position by hand and do not cut a new thread.
- The screw is suitable for max. 6 installation attempts.

NOTE

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

5.2 Special tool

5.2.1 Release tool

An AMP or Molex release tool is used to unlock plug-in contacts. This can be ordered directly from the supplier.

- Junior Power Timer — AMP order no. 1-1579007-6
- MCP Series — AMP order no. 1-1579007-2
- Micro-Timer — AMP order no. 0-0539960-1
- Micro-Fit — Molex order no. 11-03-0043
- FastIn-FastOn — AMP order no. 1-1579007-4

5.3 Repair steps

NOTE

Basically, in the repair steps it is assumed that a defective component is removed and a new or functioning old component is installed. The description of the repair therefore omits the name "new".

5.4 Heater fault code table

Fault code P000... for EasyScan and TP 7.1 (if connected via CAN) (...) for TP 7 (LIN)	Error description	Cause Remedial action	Fault class For TP7.1 control units: EasyStart Web Easy Start Pro
P000100 (071) P000101 (072) P000102 (073)	Water outlet temperature sensor • Interruption • Short circuit to ground • Short circuit to battery (+)	Check temperature sensor. Check cables for continuity, short circuit, and damage. • Unplug connector -XB103, measure the resistance between cable RD (chamber 1) and cable BN (chamber 2). • Measured values on page 39, in case of deviating values –> replace temperature sensor.	**1**: Service
P000110 (087) P000111 (088) P000112 (089)	Water inlet temperature sensor • Interruption • Short circuit to ground • Short circuit to battery (+)	Check the temperature sensor for damage in case of visible damage –> replace the temperature sensor • Unplug connector -XB103, measure the resistance between the BU (chamber 3) and the DN cable (chamber 2). • Measured values on page 39 • Delete fault memory. • If the error continues to be displayed –> replace the temperature sensor.	**1**: Service
P00010A (051)	Steaming timeout	The combustion chamber has not cooled sufficiently for a restart. Check whether hot combustion air is drawn in.	**1**: Service
P000114 (014)	Implausible signal from the temperature sensor between the water inlet and outlet.	The temperature difference between the water inlet and outlet temperature sensor is too large. Remedial action see Fault code P000115 (012). Check temperature sensor. • Check water flow. • Check water pump. • Unplug connector -XB103, measure the resistance between the BU (chamber 3) and the DN cable (chamber 2). • Measured values on page 39, in case of deviating values –> replace temperature sensor.	**1**: Service
P000115 (012)	Overheating Software threshold exceeded	Check the coolant circuit. Check overheating sensor Check cables for continuity, short circuit, and damage. • Unplug connector -XB103, measure the resistance between cable RD (chamber 1) and cable BN (chamber 2). • Measured values on page 39, in case of deviating values –> replace the temperature sensor.	**5**: Coolant circuit

Fault code P000... for EasyScan and TP 7.1 (if connected via CAN) (...) for TP 7 (LIN)	Error description	Cause Remedial action	Fault class For TP7.1 control units: EasyStart Web Easy Start Pro
P000116 (017)	Overheating Hardware threshold exceeded	Temperature at overheating sensor >150 °C Remedial action see Fault code P000115 (012). Check the coolant circuit. • Check cables for continuity, short circuit, and damage. • Unplug connector -XB103, measure the resistance between the RD (chamber 1) and BN cable (chamber 2). • Measured values on page 39, in case of deviating values –> replace temperature sensor.	**5**: Coolant circuit
P00011A (015)	Operating lock-out Too many overheating events detected	• Control unit locked due to too many consecutive overheating events (Fault code P000114 (014), Fault code P000115 (012)). • Remedial action see Fault code P000114 (014), Fault code P000115 (012). • Unlock control box, see Chapter 4.3, p. 15.	**6**: Overheating, heater is locked
P000120 (064) P000121 (065) P000122	Flame sensor Interruption Short circuit to ground Short circuit to battery (+)	• Check flame sensor. • Visually inspect the optical flame sensor for contamination of the transparent protective cover, clean the protective cover if necessary. Do not use cleaners containing solvents. • Next message Fault code P000120 (064) and Fault code P000121 (065) –> Replace control unit, see Chapter 5.7.13, p. 37.	**1**: Service
P000125 (057) P000129 (056)	Flame cutout from start process Flame cutout within the control range 75% – 100% **NOTE** In case of flame cutout during the start phase or in normal operation the heater is restarted (max. 5 times). If the restart was successful, the fault code display is deleted.	• Check exhaust and combustion air system. • Check fuel pressure and fuel system, see Chapter 5.7.16, p. 38. • Check flame sensor, see Fault code P000120 (064) and Fault code P000121 (065).	**1**: Service
P00012A (052)	Safety time – exceeded	• Check exhaust and combustion air system. • Check fuel pressure and fuel system, see Chapter 5.7.16, p. 38. • Renew the fuel filter. • Check fuel filter and replace if necessary.	**4**: Fuel supply or fuel pump
P00012B (050)	Operating lock-out, too many safety timeouts	Following 10 unsuccessful start attempts the control box is locked. • Unlock control box, Chapter 4.3, p. 15. • Check fuel pressure and fuel system, see Chapter 5.7.16, p. 38.	**1**: Service

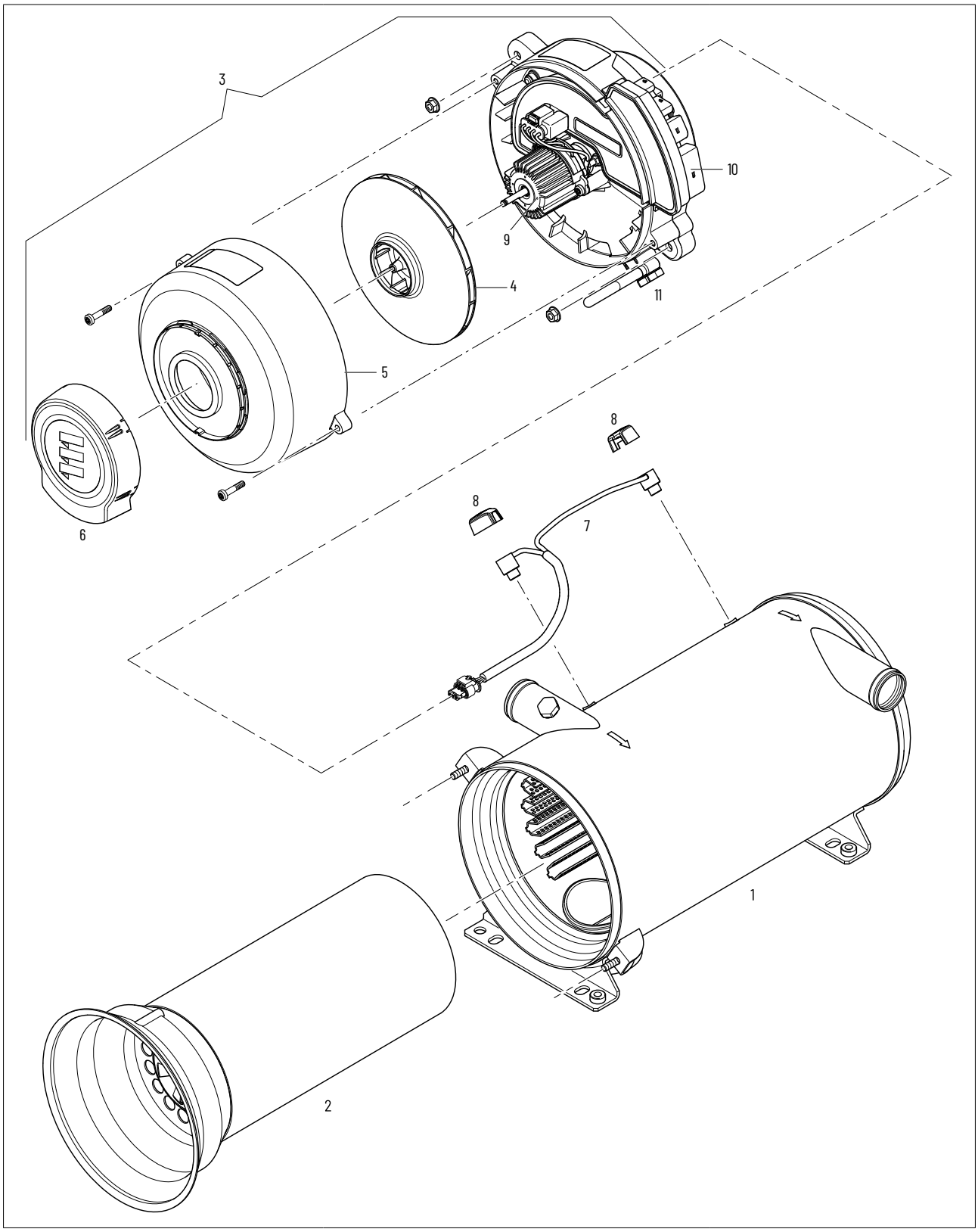
Fault code P000... for EasyScan and TP 7.1 (if connected via CAN) (...) for TP 7 (LIN)	Error description	Cause Remedial action	Fault class For TP7.1 control units: EasyStart Web Easy Start Pro
P000143 (096)	Air pressure sensor on the pcb has implausible signal	Air pressure is outside the characteristic altitude adaption curve (currently: P <598 hPa or P > 1106 hPa)	**7**: Operation under emergency conditions
P000150 (058) P000151 (059) P000152 (060)	Circuit board temperature sensor inside the control box defective • Voltage too high • Voltage too low • Overtemperature detected	• Delete error and try again. • Replacing the control box, see Chapter 5.7.13, p. 37	**1**: Service
P00019A (051)	Optical flame sensor – flame upstream of fuel	• Replace burner.	**1**: Service
P000220 (031) P000221 (032)	Burner motor • Interruption • Short circuit to ground	• Visual inspection of burner motor/control unit (contacting). • Check the burner motor for contamination/corrosion and clean if necessary. • Check the impeller for blockage, remove the blockage if necessary. • Measure blower speed with EasyScan diagnostic tool, see EasyScan operating instructions. • Renew the burner motor if necessary.	**1**: Service
P000223 (033)	Burner motor • Blocking	Impeller blocked (frozen, contaminated, sluggish, etc.) • Remove blockage. – Check the burner motor for smooth and easy running by turning the impeller manually.	**1**: Service
P000226 (097)	Burner motor • Wrong sense of rotation detected	• Replacing the control box, see Chapter 5.7.13, p. 37.	**1**: Service
P000230 (038) P000231 (039) P000232 (040)	Solenoid valve • Interruption • Short circuit to ground • Short circuit to +Ub	Check cables for continuity, short circuit, and damage. • Replace burner if necessary	**1**: Service
P000250 (041) P000251 (042)	Water pump interruption • Interruption • Short circuit to ground	Check lead harness of the water pump: • Unplug -XB101 connector from the heater • Unplug M10 connector from the water pump • Check cable for continuity, short circuit and damage. • Water pump harness OK –> replace water pump.	**5**: Coolant circuit
P000252 (043)	Water pump interruption • Short circuit downstream of +Ub or transistor fault	• Unplug -M10 connector from the water pump – Display fault code P000250 Water pump defective –> replace water pump.	**5**: Coolant circuit
P000254 (045) P000255 (046)	Water pump • Overcurrent switch off • Minimum speed not reached	• Water pump / water circuit contaminated? • If the error could not be eliminated –> replace the control box.	**5**: Coolant circuit
P000256 (075)	Water pump • Dry running	• Check the coolant liquid level in the water circuit. • Bleed the water pump / water circuit.	**5**: Coolant circuit
P000257 (076)	Water pump • Overheating	Water pump ambient temperature too high. • Position the water pump at an adequate distance from hot vehicle parts.	**5**: Coolant circuit

Fault code P000... for EasyScan and TP 7.1 (if connected via CAN) (...) for TP 7 (LIN)	Error description	Cause Remedial action	Fault class For TP7.1 control units: EasyStart Web Easy Start Pro
P000260 (038) P000261 (039) P000262 (040)	Universal output • Interruption • Short circuit to ground • Short circuit downstream of +Ub or transistor fault	Test the switch output. • Test WHRD conductor for continuity, short circuit and damage. • Unplug -XB100 connector Check conductor YE (chamber 5) for continuity, short circuit and damage. • If conductor OK –> replace control box. • Option: Clear error and switch on heater. • If the error occurs again –> replace the control box	**1**: Service
P0002A0 (023) P0002A1 (024) P0002A2 (026)	Fuel preheating • Interruption • Short circuit to ground • Short circuit downstream of +Ub or transistor fault	Check fuel preheating. • Check cables for continuity, short circuit, and damage. • Unplug connector -XB104, unclip cable BK (chamber 1) and conductor BK (chamber 2). • Functional test of the nozzle pre-heater • Connect the ohmmeter to the 2-pin socket housing. –> If the measured value is approx. 3.5 Ω ±20%, the nozzle pre-heater is OK. –> If the measured value is not OK, replace the nozzle pre-heater.	**1**: Service
P0002B0 (020) P0002B1 (021) P0002B2 (022)	Ignition spark generator • Interruption • Short circuit to ground • Short circuit downstream of +Ub or transistor fault	• Check cable loom from ignition spark generator to control box, if necessary remove interruption or short circuit. • Check function of the ignition spark generator only using the burner tester, replace ignition unit if necessary. • Check cables and connections from solenoid valve, remove earth short if necessary.	**1**: Service
	⚠ **CAUTION!** **Plasma arc due to high voltage!** A spark gap with a voltage of approx. 20,000 volt forms between the electrodes. Risk of injury when the power supply is switched on! → Disconnect the heater from the power supply before doing any repair work! → Do not test ignition spark generator without ignition electrodes.		
P0002D0 (048) P0002D1 (047) P0002D2 (049)	Fuel solenoid valve • Interruption • Short circuit to ground • Short circuit downstream of +Ub or transistor fault	• Check cables and connections from solenoid valve, remove earth short if necessary. • Replace the solenoid valve. • If the error occurs again –> replace the control box	**1**: Service
P0002DA (058)	Flame does not extinguish during overrun	The flame failure controller signals that the flame has not extinguished 30 seconds after overrun "ON". • Inspect heat exchanger, clean if necessary, then carry out CO_2 measurements. • Test the solenoid valve using the burner tester, replace if necessary. • If fuel pump continues to pump during overrun –> replace fuel pump. • If the error occurs again –> replace the control box	**1**: Service

Fault code P000... for EasyScan and TP 7.1 (if connected via CAN) (...) for TP 7 (LIN)	**Error description**	**Cause Remedial action**	**Fault class For TP7.1 control units: EasyStart Web Easy Start Pro**
P0002DB (016)	Operation lock-out: too many flames during overrun	Fault code 058 "Flame during overrun" 5 times in a row -> Fault code P0002DB (016) is displayed. • Unlocking the control box, see Chapter 4.3, p. 15 • For remedial action see Fault code P0002DA (058).	**1**: Service
P0002E0 (082) P0002E1 (083) P0002E2 (099)	Fault indicator • Interruption • Short circuit to ground • Short circuit downstream of +Ub or transistor fault	• Delete errors and disconnect heater from the power supply. • In the event of renewed occurrence of the error -> Test the control unit, test the cables to the control unit. • If error occurs again -> replace control unit.	**0**: None Message
P0002F0 (080) P0002F1 (081) P0002F2 (099)	Burner indicator • Interruption • Short circuit to ground • Short circuit downstream of +Ub or transistor fault	• Check cable and connections, if necessary remove short circuit. • Unplug -XB100 connector Check conductor YEWH (chamber 10) and connections for continuity, short circuit, and damage. • Check burner indicator lamp, replace if necessary.	**0**: None Message
P000300 (074)	Overheat detection hardware	Check water outlet temperature sensor. • Check cables for continuity, short circuit, and damage. • Unplug connector -XB103, measure the resistance between conductor RD (chamber 1) and conductor BN (chamber 2). • Measurements on page 39, if the values differ -> replace the water inlet and water outlet temperature sensors. • Next message Fault code P000300 (074) -> Replace control box. • Unlock control box, see Chapter 4.3, p. 15	**1**: Service
P000301 (090) P000302 (099)	• HW Watchdog Reset (Internal error when initialising the control box) • Too many Watchdog Resets	• Delete errors, the heater remains ready for operation. • Test the power supply (voltage drops <8 V for more than 10 ms or <8 V for more than 10 ms, battery cut-off key, battery management system) • Replace control box, see Chapter 5.7.13, p. 37	**0**: None Message **1**: Service
P000303 (099)	Operating lock-out: Too many output stage errors	• Replace control box, see Chapter 5.7.13, p. 37	**1**: Service
P000304 (090)	Too many resets (loose contact)	• Replace control box, see Chapter 5.7.13, p. 37	**1**: Service
P000305 (095)	Control box not calibrated	• Replace control box, see Chapter 5.7.13, p. 37	**1**: Service
P000306 (098)	Second shutdown path for driver defective (KL30S)	• Replace control box, see Chapter 5.7.13, p. 37	**1**: Service
P00030A (080)	CAN communication error (Interruption of the CAN line)	• Delete error. Heater remains ready for operation.	**1**: Service

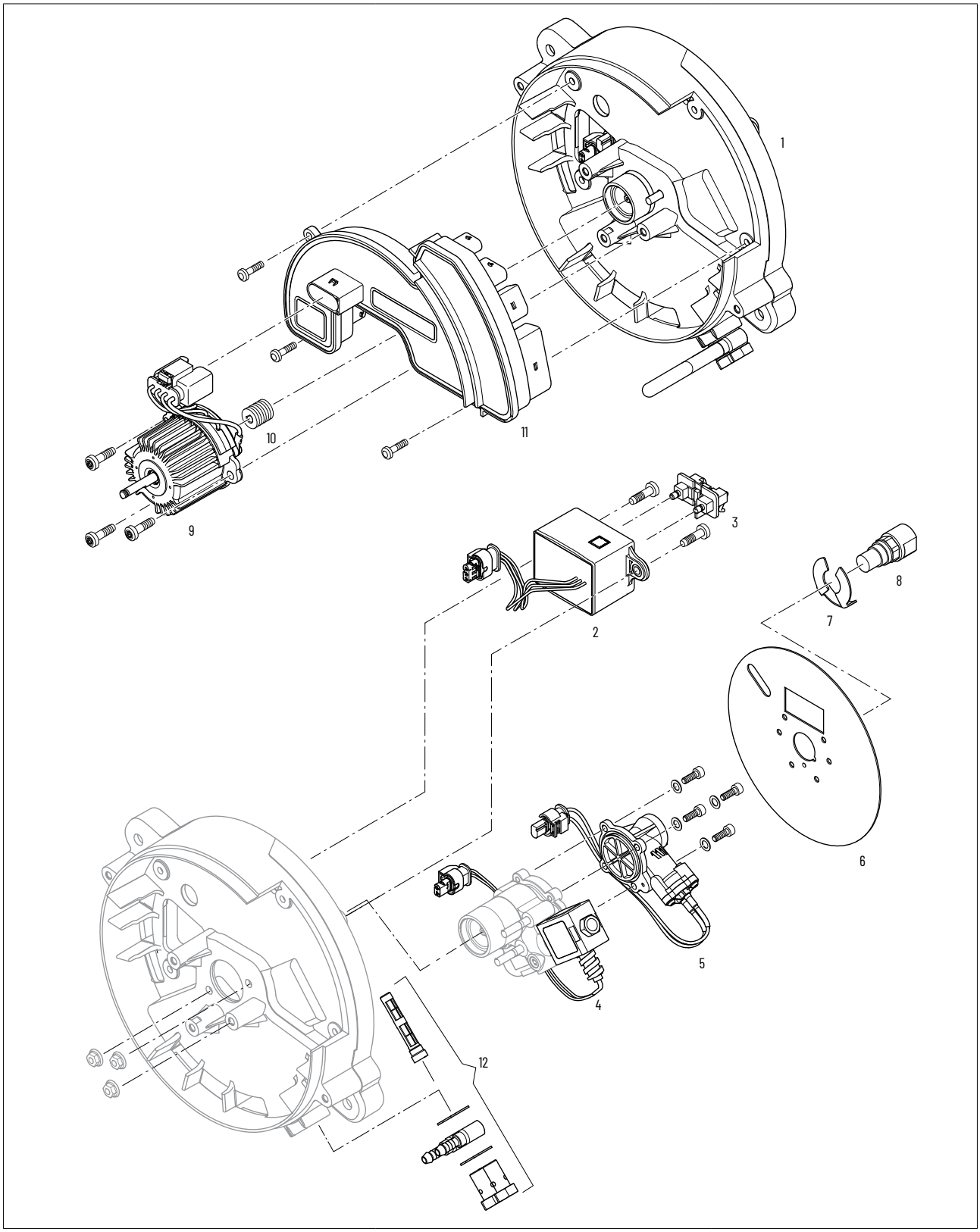
Fault code P000... for EasyScan and TP 7.1 (if connected via CAN) (...) for TP 7 (LIN)	**Error description**	**Cause Remedial action**	**Fault class For TP7.1 control units: EasyStart Web Easy Start Pro**
P000310 (010) P000311 (010)	Shutdown of control box or heater due to overvoltage **NOTE** Heater is not functioning.	Continuous overvoltage applied to the control box for at least 20 seconds (factory setting). • Unplug -XB100 connector from the heater. • Start the vehicle engine. • Measure voltage between cable RD (chamber 3) and cable BN (chamber 4). – Hydronic L3: Voltage > 32 V (factory setting) –> Check alternator regulator – Check the battery.	**3**: Overvoltage
P000312 (011) P000313 (011)	Shutdown of control box or heater due to undervoltage **NOTE** Heater is not functioning.	Undervoltage applied at the control box without interruption for at least 20 seconds (factory setting). • Unplug -XB100 connector from the heater. • Measure voltage between cable RD (chamber 3) and cable BN (chamber 4). – Hydronic L3 24 V – Voltage <21 V (factory setting) –> Check alternator regulator – Check the fuses, the supply cables, the ground connections and the positive terminal post at the battery for voltage drop (corrosion).	**2**: Undervoltage
P000316 (099)	Insufficient heat dissipation via the coolant	• Too many consecutive short heating mode operations. • Check the coolant circuit.	**5**: Coolant circuit
P000330 (092)	ROM error Control box defective	Replace control box, see Chapter 5.7.13, p. 37	**1**: Service
P000331 (093)	RAM error Control box defective	Replace control box, see Chapter 5.7.13, p. 37	**1**: Service
P000332 (094)	NVMEM error (EEPROM, DataFlash) Control box defective	Replace control box, see Chapter 5.7.13, p. 37	**1**: Service

5.5 Exploded drawing of heater



1 Heat exchanger
2 Flame tube
3 Burner head
4 Impeller
5 Hood
6 Cover
7 Wiring harness temperature sensors
8th Temperature sensor caps
9 Burner motor
10 Control box
11 Fuel connection

5.6 Exploded view of burner head



1 Pump
2 Ignition spark generator
3 Ignition electrodes
4 Solenoid valve
5 Nozzle pre-heater
6 Baffle plate
7 Baffle plate fuse clip
8 Fuel nozzle
9 Burner motor
10 Burner motor coupling
11 Control box
12 Fuel connection

5.7 Dismantle the heater

NOTE
- Unless stated otherwise, the figures show the Hydronic L3-30.

5.7.1 Notes for replacing the fuel pump

NOTE
- The fuel pump is a complex and sensitive component. If it falls to the floor during replacement, it can no longer be installed and a new fuel pump must be used.
- The fuel pump is factory set and must not be changed using the pressure regulator.

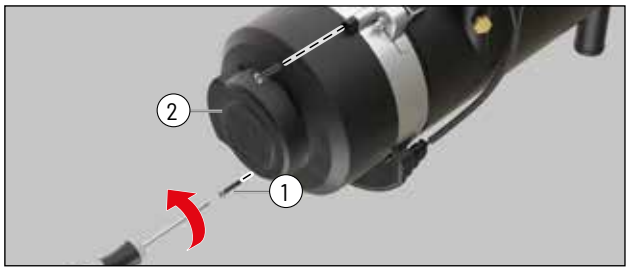
1 Cover

5.7.2 Removing the cover

> Lift off the cover using a wide flat-blade screwdriver or similar tool.

NOTE
- The cover (1) of the heater is available in two versions. The air inlet cross sections differ depending on the performance class of the heater.
- When disassembling and assembling, make sure the correct cover (2) is used:
  Hydronic L3-16 / L3-24: Cover no. 25.3042.15.0902
  Hydronic L3-30 / L3-35: Cover no. 25.3040.15.0902

Next possible repair step:
Remove the hood, see 5.7.4

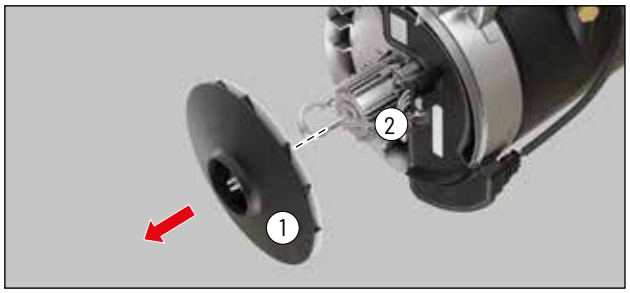


1 2x mounting screws
2 Cover
3 Hood

5.7.3 Removing the hood

> Unscrew two mounting screws (1) of the hood (3) and keep them for reuse (Torx T25).
> Remove the hood (3).

Next possible repair step:
Remove the impeller, see 5.7.4



1 Impeller
2 Motor shaft

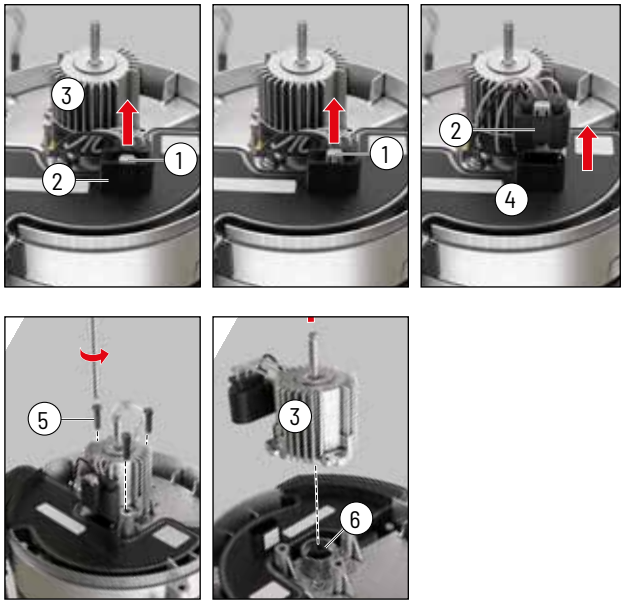
5.7.4 Remove the impeller

> Remove the hood.
> Pull the impeller (1) off the motor shaft (2) by hand.

NOTE

- Do not damage the two impeller spring shackles when removing the impeller.
- The motor shaft is flattened on one side. It guides and holds the impeller in place.

Next possible repair step:
Dismantling the burner motor see 5.7.6



1 Burner motor connector plug fuse
2 Burner motor connector
3 Burner motor
4 Control box
5 3 screws (Torx T25)
6 Motor shaft coupling

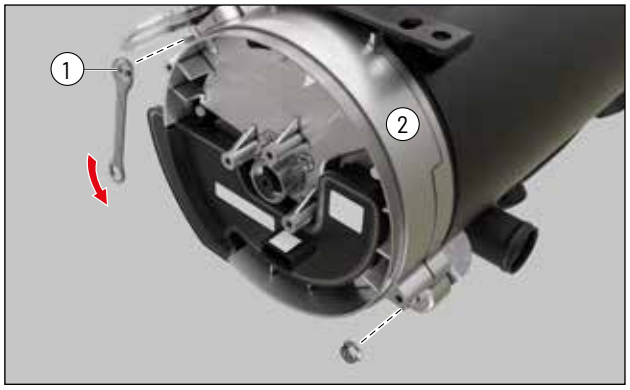
5.7.5 Dismantling the burner motor

> Remove the hood.
> Remove the impeller.
> Pull the burner motor (2) connector off the control box (4). Pull upwards. To do this, first push the grey plug fuse (1) upwards.
> Loosen 3 screws (5) on the burner motor (3) and keep them for reuse (Torx T25).
> Remove burner motor (3).

NOTE

- Be careful when removing the motor. The motor shaft coupling (6) is located underneath. Remove it as well and store it for reuse.

Next possible repair step:
Dismantle the burner, see 5.7.6

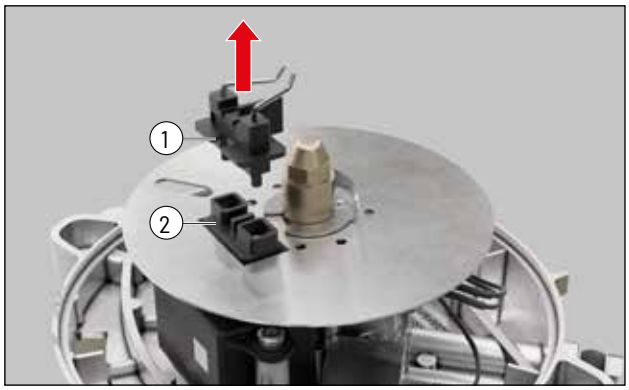


1 2 nuts M10
2 Burner

5.7.6 Removing the burner,

> Remove the hood.
> Remove the impeller.
> Loosen 2x M10 nuts (1) on the burner and keep them for reuse.
> Remove the burner (2).

Next possible repair step:
Remove the igniter electrode, see 5.7.7

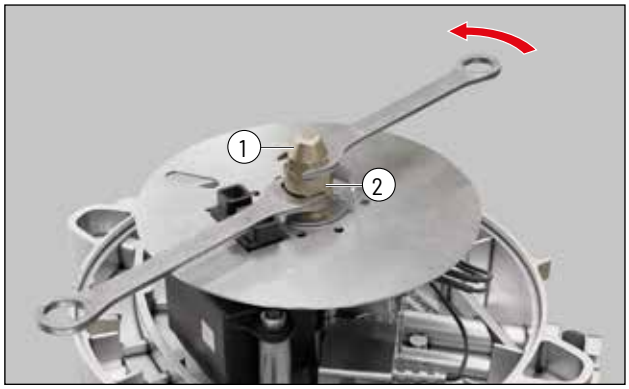


1 Igniter electrodes
2 Ignition spark generator

5.7.7 Pull off the igniter electrode

> Remove the hood.
> Remove the impeller.
> Removing the burner head.
> Remove the igniter electrodes (1) from the ignition spark generator (2).

Next possible repair step:
Remove the fuel nozzle, see 5.7.8

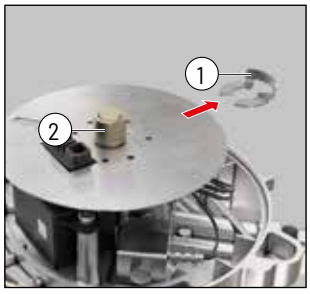


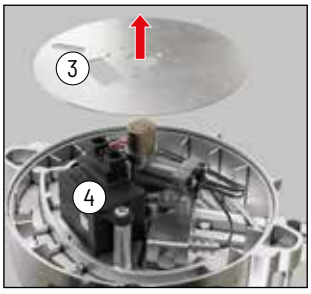
1 Fuel nozzle
2 Nozzle assembly

5.7.8 Remove the fuel nozzle

> Remove the hood.
> Remove the impeller.
> Dismantle the burner.
> Pull off the igniter electrode as needed
> Unscrew the fuel nozzle (1) from the nozzle assembly (2) (SW M14)
> Counter the nozzle assembly with an open-end wrench SW M14.

Next possible repair step:
Remove the baffle plate, see 5.7.9



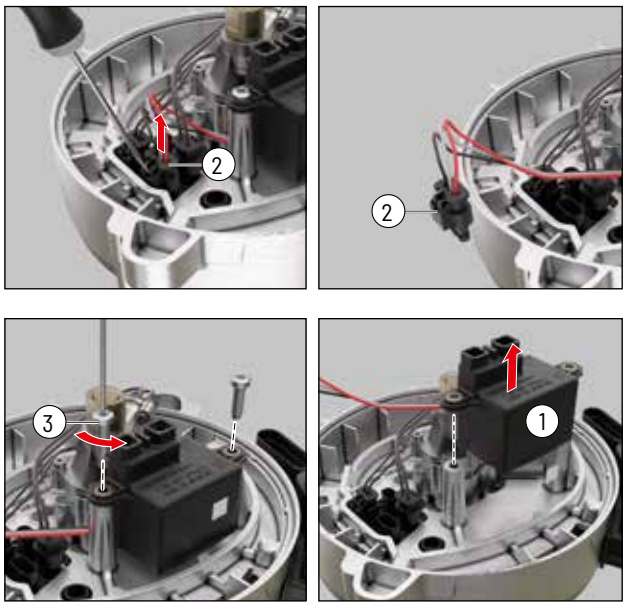


1 Fuse clip
2 Nozzle assembly
3 Baffle plate
4 Ignition spark generator

5.7.9 Remove the baffle plate

> Remove the hood.
> Remove the impeller.
> Dismantle the burner.
> Remove the igniter electrode.
> Remove the fuse clip (1) from the nozzle assembly (2) and keep it for reuse.
> Remove the baffle plate 3].

Next possible repair step:
Disassemble the ignition spark generator, see 5.7.10

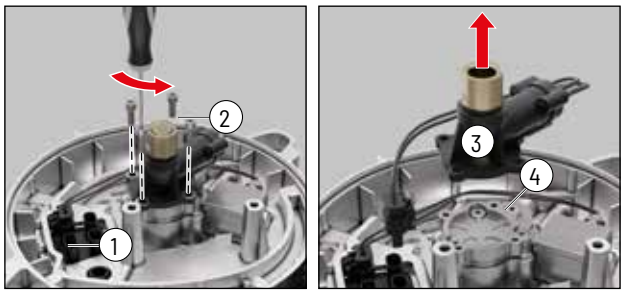


1 Ignition spark generator
2 Ignition spark generator connector
3 2 mounting screws T25

5.7.10 Disassemble the ignition spark generator

> Remove the hood.
> Remove the impeller.
> Dismantle the burner.
> Remove the igniter electrode.
> Remove the fuse clip from the nozzle assembly and keep it for reuse.
> Remove baffle plate.
> If necessary, test the ignition spark generator (1) with the burner tester (see below).
> Disconnect the ignition spark generator (2) connector from the control box.
> Loosen two mounting screws (3) on the ignition spark generator and store them for reuse (Torx T25).
> Remove ignition spark generator.

Next possible repair step:
Remove the nozzle pre-heater, see 5.7.11



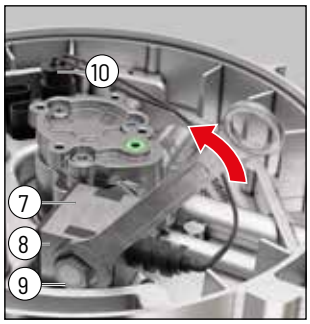
1 Nozzle pre-heater connector
2 4 screws (Torx T20)
3 Nozzle pre-heater
4 O-ring fuel line

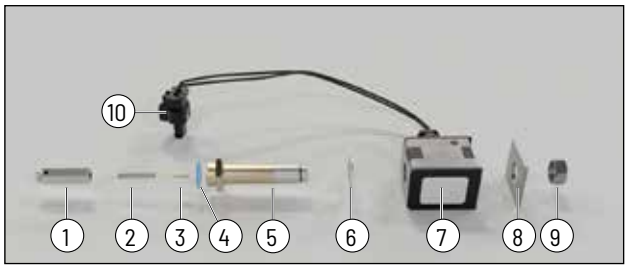
5.7.11 Remove the nozzle pre-heater

> Remove the hood.
> Remove the impeller.
> Dismantle the burner.
> Remove the igniter electrode.
> Remove the fuse clip from the nozzle assembly and store it for reuse.
> Remove baffle plate.
> Unscrew the fuel nozzle from the nozzle assembly (M14), and counter the nozzle assembly with a spanner.
> Pull the nozzle pre-heater (1) connector off the control box.
> Loosen 4x Torx T20 screws and washers (2) on the nozzle pre-heater and store them for reuse.
> Remove the nozzle pre-heater (3).

NOTE
When dismantling the nozzle pre-heater, also remove the small O-ring (4) at the opening of the fuel line and keep it for reuse or replace it if necessary.

Next possible repair step:
Dismantling the solenoid valve, see 5.7.12





1 Swinging lever
2 Spring
3 Valve lifter
4 O-ring
5 Magnet
6 Spring washer
7 Magnet coil
8 Rectangular washer
9 Nut M12
10 Solenoid valve connector

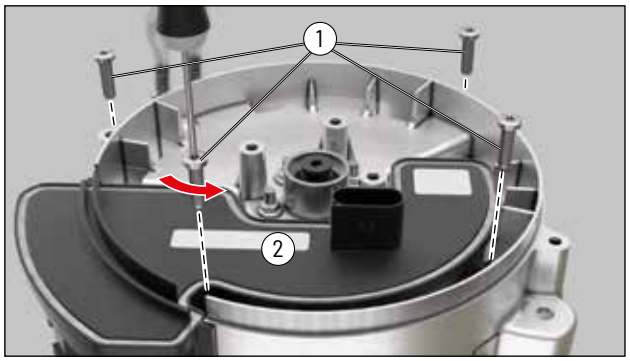
5.7.12 Removing the solenoid valve

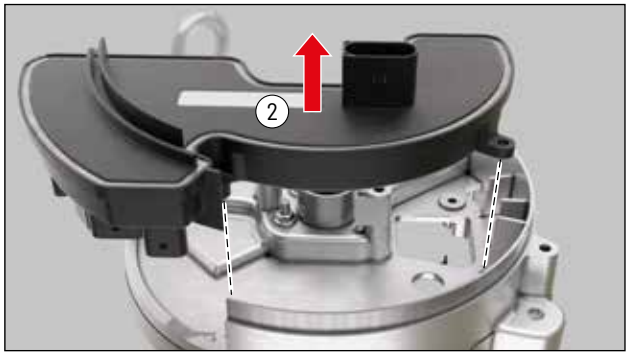
> Remove the hood.
> Remove the impeller.
> Dismantle the burner.
> Remove the igniter electrode.
> Remove the fuse clip from the nozzle assembly and store it for reuse.
> Remove baffle plate.
> Removing the nozzle pre-heater,
> Disconnect the solenoid valve (10) connector from the control box.
> Loosen the M12 nut (9) on the solenoid valve including the rectangular washer (8) and store it for reuse.
> Using an M12 open-end wrench, unscrew the magnet (5, highlighted in blue) from the pump housing.
> Remove the solenoid valve including spring washer (6) and O-ring (4).

NOTE

- The M12 nut (9) attaches the magnetic coil (7) to the pump housing. The internal components can fall out of the magnet coil once the nut has been removed and the magnet has been unscrewed from the pump housing. The picture shows the entire solenoid valve structure so that the components can be put together correctly after removal, if necessary.
- The fuel pump is factory set and must not be changed using the pressure regulator.
- Save the spring washer and O-ring for reuse or replace if necessary.

Next possible repair step:
Removing the control box, see 5.7.13





1 4 screws (Torx T20)
2 Control box

1 Flame tube
2 Heat exchanger

5.7.13 Removing the control box

> Remove the hood.
> Remove the impeller.
> Remove the control unit's collar plug connector from the temperature and overheating sensor. To do this, bend open the tongue on the plug lock.
> Disconnect the burner motor connector from the control box.
> Removing the burner motor.
> Removing the burner head.
> Pull off the ignition spark generator connector, solenoid valve connector, and nozzle pre-heater connector from the control box.
> Loosen 4 screws on the control box and store them for reuse (Torx T20).
> Remove the control box.

Next possible repair step:
Removing the flame tube, see 5.7.14

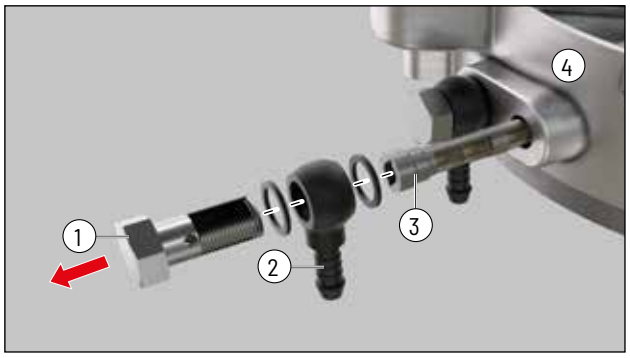
5.7.14 Remove the flame tube

> Removing the burner head.
> Pull the flame tube (1) out of the heat exchanger (2).

NOTE

- When reinserting the flame tube, ensure the click-in lug inside the flame tube engages correctly with the heat exchanger.

Next possible repair step:
Removing fuel strainer, see 5.7.15



1 Hollow bolt
2 Ring connector
3 Fuel strainer
4 Burner head

5.7.15 Removing fuel strainer

> Unscrew the fuel feed line's hollow bolt (1) and ring connector (2) from the burner head (3).
> Unscrew the fuel strainer (4) from the burner head and clean it, replacing it if necessary.

DANGER!

RISK OF FIRE, EXPLOSION AND POISONING!

Caution when handling fuel.

→ Avoid naked flames when handling fuel.
→ Do not smoke. This also applies when fuel is only noticed by its characteristic odour.
→ Do not inhale petrol fumes.
→ Collect any fuel that escapes when removing the fuel feed line.

NOTE

- Install the hollow bolt and ring connector with new sealing rings (A10 x 13.5, DIN 7603 AL). Tightening torque of the hollow bolt 12 ±1.2 Nm.

Next possible repair step:
Removing the temperature and overheating sensor see 5.7.17

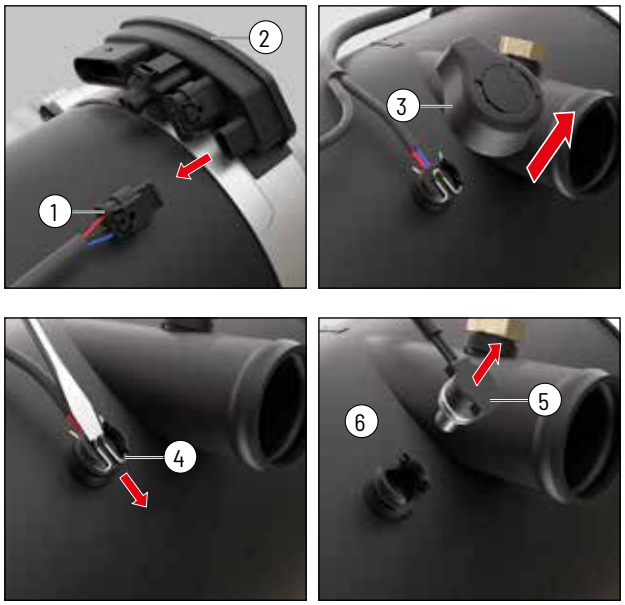
5.7.16 The functional performance of the heater depends on the negative pressure in the fuel system.

To ensure the fuel pump works, make sure that the negative pressure in the fuel system is not too large (see table).

	Fuel pressure (P) Heater inlet	Fuel pressure (P) Filter inlet
Preferred range *	min -0.3 bar	min -0.2 bar
Allowable range **	-0.45 bar to -0.3 bar	-0.35 bar to -0.2 bar
Critical range ***	-0.55 bar to -0.45 bar	-0.45 bar to -0.35
Heating mode not possible	<-0.55 bar	<-0.45 bar

* Preferred fuel supply range
** During operation, deposits in the fuel lines (the filter becomes clogged) can increase the back pressure in the fuel supply lines.
** The heater becomes susceptible to failure (gas bubble formation).

Permissible suction head and line length of suction line (min Ø 5 mm to max Ø 8 mm):
Suction head up to 1.5 m —> max length = 25 m
Suction head 1.5 m to 4.0 m —> max length = 15 m
Permissible line length of the return line (min Ø 5 mm to Ø 8 mm):
max. length = 18 m

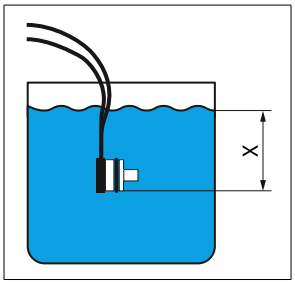


1 Temperature and overheating sensor combination plug
2 Control box collar
3 Cap
4 Fuse clip
5 Sensor
6 Heat exchanger

5.7.17 Removing the temperature and overheating sensor

> Remove the temperature and overheating sensor combination plug (1) from the collar of the control box (2).
> Remove the caps (3) from the temperature and overheating sensors and store them for reuse.
> Use a flat-blade screwdriver to push the fuse clips (4) out of the sensors and store them for reuse.
> Pull the sensors (5) out of the heat exchanger (6).

5.7.18 Inspect the water inlet and outlet sensors



The sensor test is performed in liquid at temperatures up to max 200 °C.
Sensor insertion depth
X = 50 mm ±5 mm

- Check the water inlet sensor

Use a multimeter to measure the resistance in connector -XB103 between cable BU (chamber 3) and cable BN (chamber 2). If the value lies outside the values table, replace the harness of the temperature sensor.

- Check the water outlet sensor

Use a multimeter to measure the resistance in connector -XB103 between cable RD (chamber 1) and cable BN (chamber 2). If the value lies outside the values table, replace the harness of the temperature sensor.

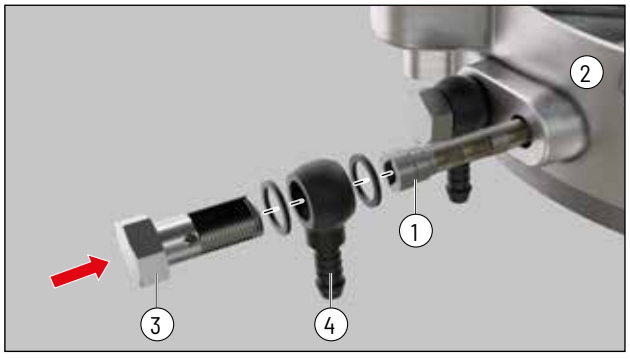
Table of values

ϑ [°C]	R [kΩ]	ϑ [°C]	R [kΩ]
-50	657 ±80 kΩ	80	1.26 ±100 Ω
-40	330.6 ±33 kΩ	100	0.677 ±60 Ω
-20	96.3 ±8 kΩ	120	0.389 ±38 Ω
0	32.55 ±500 Ω	150	0.183 ±20 Ω
25	10* ±11 Ω	180	0.095 ±12 Ω
40	5.33 ±320 Ω	200	0.064 ±0 Ω
60	2.49 ±175 Ω		

5.8 Assembling the heater

NOTE
- The heater is reassembled in reverse order of disassembly.
- Unless stated otherwise, the figures show the Hydronic L3.

1 Sensor
2 Heat exchanger
3 Fuse clip
4 Cap
5 Combination plug
6 Control box collar



1 Fuel strainer
2 Burner housing
3 Hollow bolt
4 Ring connector

5.8.1 Installing the temperature and overheating sensors

> Insert both sensors (1) flush into their respective positions inside the heat exchanger (2).
> Slide the fuse clips (3) into the grooves of the sensor holders and use them to secure the sensors.
> Place the caps (4) onto the temperature and overheating sensors and snap them into place.
> Push the combination plug (5) of the temperature and overheating sensors into the collar of the control unit (6) until it clicks into place.

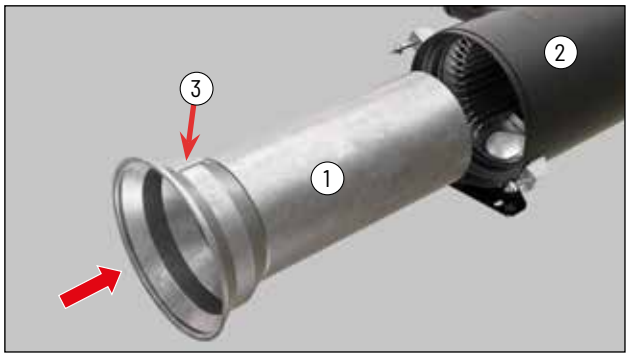
5.8.2 Installing the fuel strainer

> Screw the fuel strainer (1) into the burner head housing (2).
> Screw the hollow screw (3) and ring connector (4) of the fuel feed line into the burner head housing.
Tightening torque of the hollow bolt 12 ±1.2 Nm.

DANGER!

RISK OF FIRE, EXPLOSION AND POISONING!
Caution when handling fuel.
→ Avoid naked flames when handling fuel.
→ Do not smoke. This also applies when fuel is only noticed by its characteristic odour.
→ Do not inhale petrol fumes.
→ Collect any fuel that escapes when removing the fuel feed line.

NOTE
- Install the hollow bolt and ring connector with new sealing rings (A10 x 13.5, DIN 7603 AL).



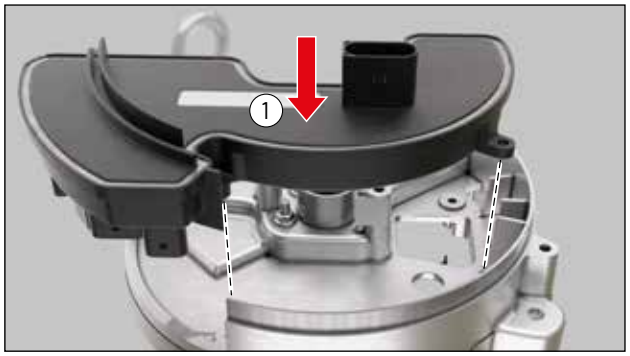
1 Flame tube
2 Heat exchanger
3 Click-in lug inside the flame tube

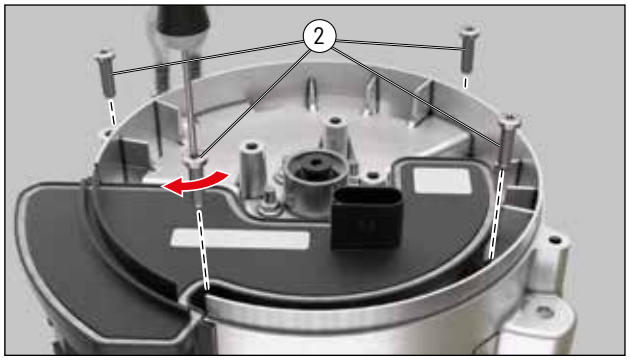
5.8.3 Installing the flame tube

> Insert the flame tube (1) into the heat exchanger (2).

NOTE
When inserting the flame tube, ensure the click-in lug (3) inside the flame tube engages correctly with the heat exchanger.

> Attach and secure the burner (see 5.8.12).

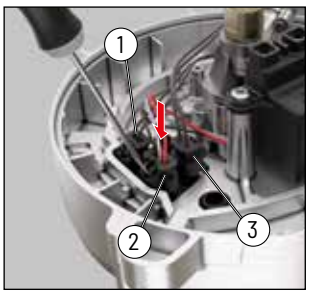




1 Control box
2 4 screws (Torx T20)

5.8.4 Installing the control box

> Insert the control box (1) into the burner from above.
> Insert 4 screws T20 (2) into the control box (1) and tighten evenly.
Tightening torque: 2,5 Nm ±10 %

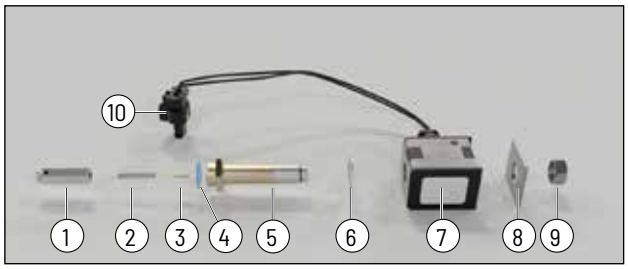


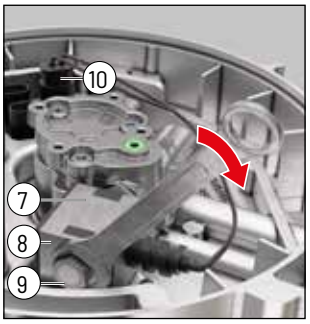
1 Ignition spark generator connector
2 Nozzle pre-heater connector
3 Solenoid valve connector

5.8.5 Plug in the connector at the control box.

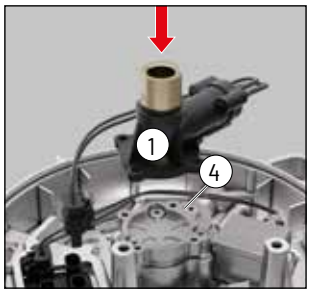
> Installing the control box
> Insert the ignition spark generator plug (1), the nozzle pre-heater plug (2), and the solenoid valve plug (3) into the control box until they click into place.

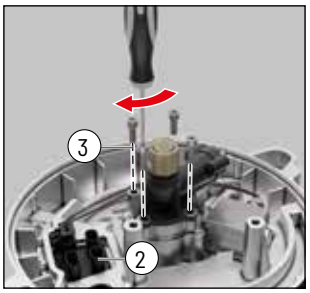
NOTE
To get better access to the plug connections, it may be helpful to remove the igniter electrodes, the fuse clip, and the baffle plate before inserting the connectors into the control box.





1 Swinging lever
2 Spring
3 Valve lifter
4 O-ring
5 Magnet
6 Spring washer
7 Magnet coil
8 Rectangular washer
9 Nut M12
10 Solenoid valve connector





1 Nozzle pre-heater
2 Nozzle pre-heater connector
3 4 screws T20
4 O-ring fuel line

5.8.6 Installing the solenoid valve

> Assemble the solenoid valve correctly (see image on the left).
> Insert the magnet (5, highlighted in blue) with swinging lever (1), the spring (2), the valve lifter (3) and the spring lock washer (6) into the magnet coil (7), place the O-ring (4) on the thread of the magnet (5), and screw the magnet into the pump housing.
Tightening torque:
> On the opposite side of the solenoid coil, place the rectangular washer (8) onto the magnet and screw the solenoid valve tight with the M12 nut (9).
Tightening torque: 2 Nm ±10 %
> Insert the solenoid valve connector (10) into the control box until it clicks into place.

NOTE

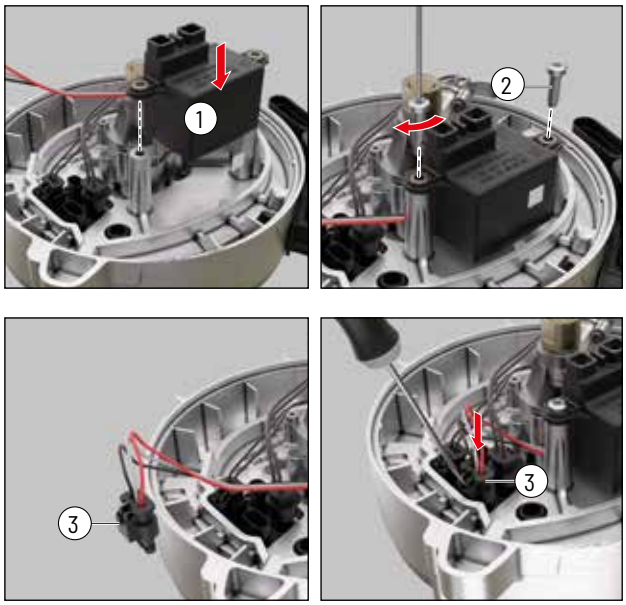
- The M12 nut (9) attaches the magnetic coil (7) to the pump housing. The internal components can fall out of the magnet coil once the nut has been removed and the magnet has been unscrewed from the pump housing. The picture shows the entire solenoid valve structure so that the components can be put together correctly after removal, if necessary.
- The fuel pump is factory set and must not be changed using the pressure regulator.
- Check the O-ring for damage before assembly and replace it if necessary.

5.8.7 Installing the nozzle pre-heater

> Place the nozzle pre-heater (1) onto the fuel pump from above.
> Insert the nozzle pre-heater connector (2) into the control box until it clicks into place.
> Screw the nozzle pre-heater onto the fuel pump using 4 screws (3) and washers (Torx T20).
Tightening torque: 2.5 Nm

NOTE

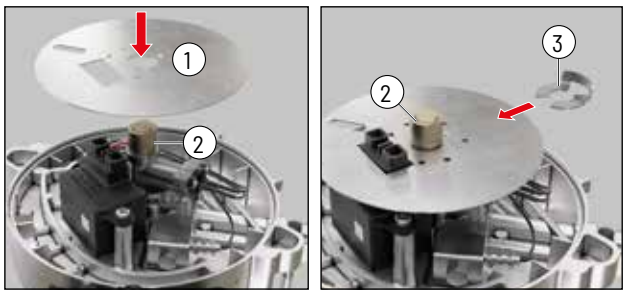
- When installing the nozzle pre-heater, also check the small O-ring at the fuel line opening (4) and replace it if necessary.
- Observe the tightening torque during installation!



1 Ignition spark generator
2 Fixing screws
3 Ignition spark generator connector

5.8.8 Installing the ignition spark generator

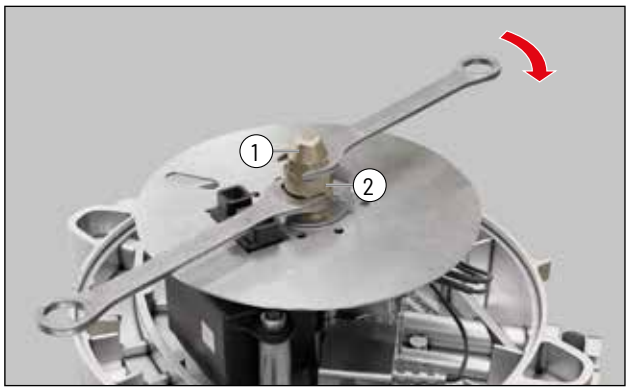
> Place the ignition spark generator (1) from above onto the two burner housing screw bases.
> Mount the ignition spark generator with two T25 screws (2). Tightening torque: 6 Nm ±10 %
> Insert the ignition spark generator connector (3) into the control box until it clicks into place.



1 Baffle plate
2 Nozzle assembly
3 Fuse clip

5.8.9 Installing the baffle plate

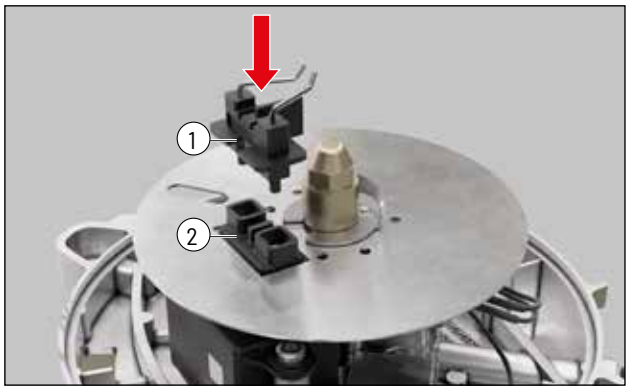
> Place the baffle plate (1) onto the nozzle assembly (2), paying attention to the recess for the ignition spark generator.
> To secure the guide plate, push the fuse clip (3) into the groove of the nozzle assembly (2) until it clicks into place.



1 Fuel nozzle
2 Nozzle assembly

5.8.10 Installing the fuel nozzle

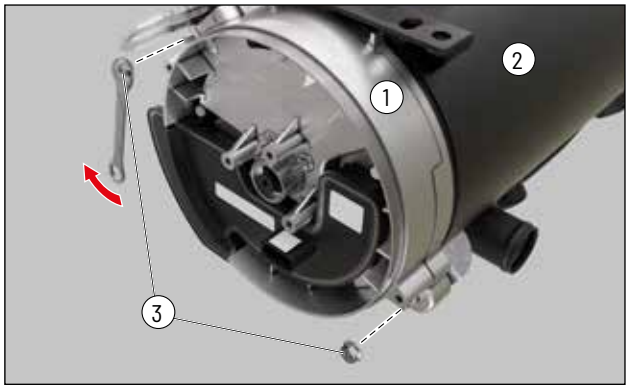
> Screw the fuel nozzle (1) into the nozzle assembly (2) (M14), while countering the nozzle assembly with an SW M14 spanner. Tightening torque: 16 Nm ±1 %



1 Igniter electrodes
2 Ignition spark generator

5.8.11 Installing the igniter electrodes

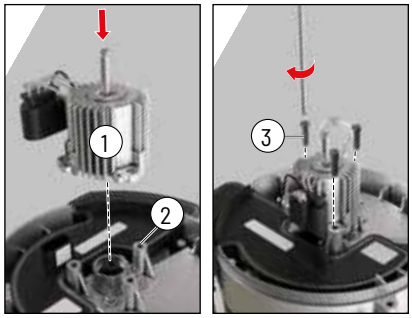
> Insert the ignition electrodes (1) into the ignition spark generator (2).



1 Burner head
2 Heat exchanger
3 Nut M6

5.8.12 Installing the burner head

> Insert the burner head (1) into the heat exchanger (2).
> Attach 2 M6 nuts (3) to the burner and tighten evenly.
Tightening torque: 9 Nm ±10 %



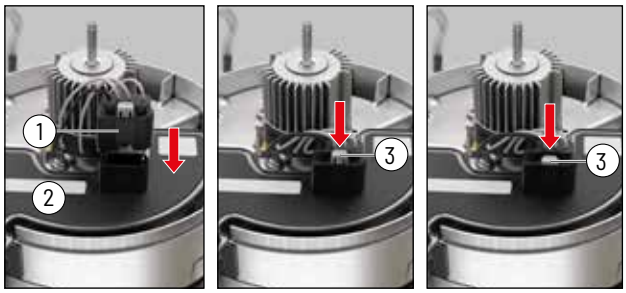
1 Burner motor
2 Screw base
3 3 screws Torx T25

5.8.13 Installing the burner motor

NOTE

- If necessary, place the coupling onto the motor shaft before installing the burner motor.
- The coupling has a narrow and a wide shaft accommodation and therefore cannot be inserted incorrectly.

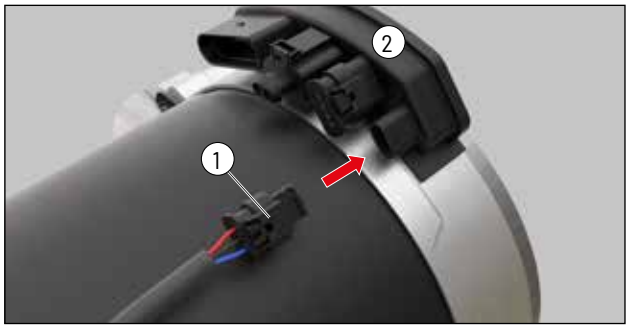
> Place the Burner motor (1) onto the screw base (2) from above.
> Mount the burner motor with 3 screws (3) Torx T25 and tighten evenly.
Tightening torque: 6 Nm ±10 %



1 Burner motor connector
2 Control box
3 Burner motor plug fuse

5.8.14 Insert the burner motor connector into the control box.

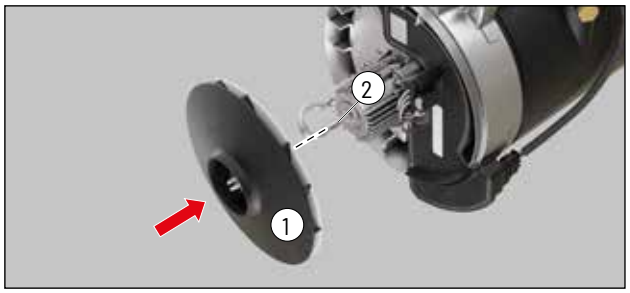
> Insert the burner motor connector (1) into the jack on the control unit (2) and secure it.
> To fix the connector, press the grey plug fuse (3) down, until it clicks into place.



1 Combination plug
2 Control box

5.8.15 Inserting the combination plug into the control box

> Insert the temperature and overheating sensor connector (1) into the collar plug of the control box (2) until it clicks into place.



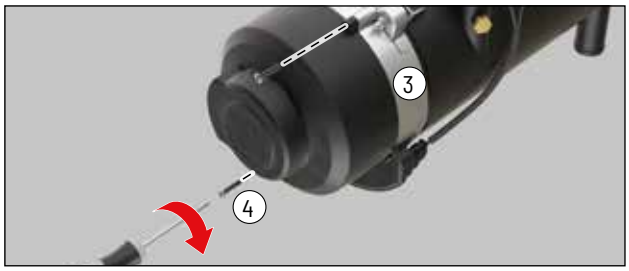
1 Impeller
2 Motor shaft

5.8.16 Installing the impeller

> Place the impeller (1) onto the motor shaft (2) by hand and push it gently until it clicks into place.

NOTE

- Do not damage the two impeller spring shackles when installing the impeller.
- The motor shaft is flattened on one side. It guides and holds the impeller in place.



1 Hood
2 Cover
3 Burner head
4 Screw Torx T25

1 Cover

5.8.17 Installing the hood.

> Place the hood (1) onto the burner head (3).
> Attach two Torx T25 mounting screws (4) to the hood and screw tight.
Tightening torque: 5 Nm ±10 %

5.8.18 Installing the cover

> Install the cover by hand and press it firmly until it clicks into place (increments of 22.5°).

NOTE

- The cover (1) of the heater is available in two versions. The air inlet cross sections differ depending on the performance class of the heater.
- When disassembling and assembling, make sure the correct cover (2) is used:
Hydronic L3-16 / L3-24: Cover no. 25.3042.15.0902
Hydronic L3-30 / L3-35: Cover no. 25.3040.15.0902

6 Electrics

6.1 Heater wiring

DANGER!

DANGER TO LIFE – HIGH VOLTAGE
Before opening the heater, disconnect the plug-in connector from the vehicle.

WARNING!

SAFETY INSTRUCTIONS!
Connect the heater electrically according to the EMC directives. EMC can be affected in case of interventions not carried out properly. 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.
→ In waterproof connectors, seal any connector chambers 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.

NOTE

Comply with the points below when wiring the heater and the control unit:

- The negative and positive poles of the heater's controls are to be directly connected to the vehicle's battery.
- Ask the heater manufacturer about plugs deviating from the standard version.
- Electrical leads, switch and control boxes 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-sections are to be used between the battery and heater. This ensures that the max. allowable voltage drop in the cables does not exceed 1 V for 24 V rated voltage. Cable cross-sections for a cable length (plus cable + minus cable) of:
  - up to 8 m = cable cross-section 2.5 mm^2
  - up to 8 m = cable cross-section 4 mm^2
- 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.
- It must be ensured that if the battery isolating switch is pressed due to EMERGENCY OFF, all the heater's electric circuits are disconnected from the battery immediately (without any consideration of the heater's status).
- If the battery isolating switch is pressed to disconnect the battery from all electric circuits, the heater must be switched off first and if applicable you must wait until the heater's afterrun has finished.

6.2 Parts list for circuit diagram, heater and cable harness

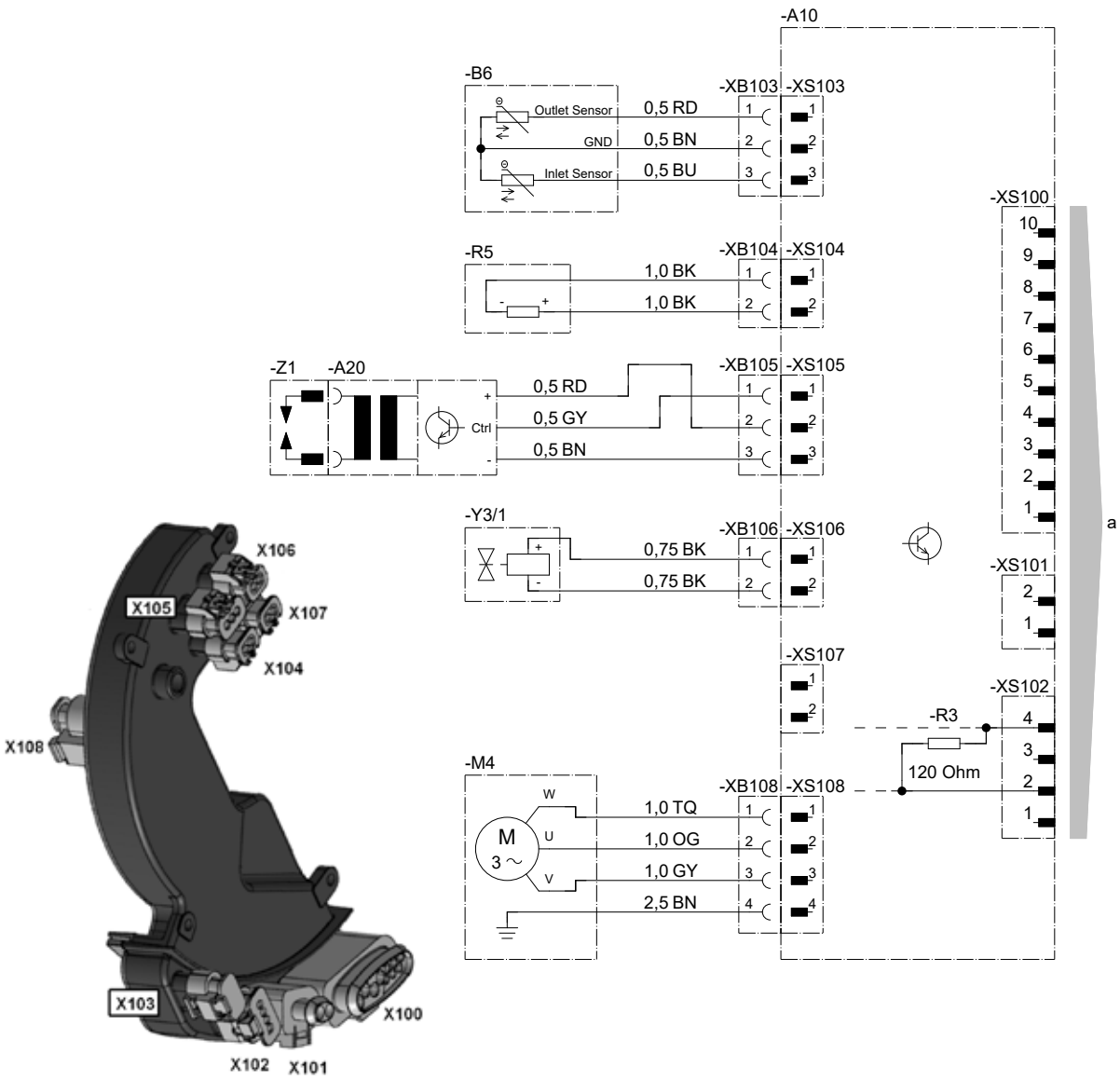
a	Cable harness heater
-A10	Control box
-A20	Ignition spark generator
-A30	Fuse holder 3-pin
-B6	Inlet/outlet sensor
c1	Wiring harness CAN control element
c2	Wiring harness TP7.0 control element
f	Switch cable S+
-F1	Fuse, heater
-F2	Fuse, control unit
-F4	Fuse, water pump
-K1	Fan relay
-M10	Water pump
-M4	Burner motor
-P1	Switch on control
-P3	Fault indicator lamp
-P6	Burner indicator lamp
-R1	Terminating resistor 120 Ω
-R2	Terminating resistor 9.2 kΩ
-R3	CAN terminating resistor in the control unit 120 Ω
-R5	Fuel heater
-S4	Switch, temperature drop
-S5	Switch, water pump
w	Water pump external control
-XB100	Bush housing, heater power supply
-XB101	Bush housing, water pump
-XB102	Bush housing, CAN/diagnostic connection
-XB103	Bush housing water inlet and water outlet temperature sensors
-XB104	Fuel preheating
-XB105	Bush housing, ignition spark generator
-XB106	Bush housing, fuel solenoid valve 1
-XB107	Not used
-XB108	Bush housing, burner motor
-XB6/1	EasyScan bush housing
-XB6/2	Bush housing, TP7.1
-XB7	Bush housing, fan relay
-XS100	Connector housing, heater power supply
-XS101	Connector housing, water pump
-XS102	Connector housing, CAN/diagnostic connection
-XS103	Connector housing water inlet and water outlet temperature sensors
-XS104	Connector housing, heater fuel pump
-XS105	Connector housing, ignition spark generator
-XS106	Connector housing, fuel solenoid valve 1
-XS107	Not used
-XS108	Connector housing, burner motor/fuel pump
-XS6/1	Connector housing with terminating resistor
-XSP1	Welding point
-XSP2	Welding point
-Y3/1	Fuel solenoid valve 1
-Y3/2	Fuel solenoid valve 2
-Z1	Ignition electrodes

NOTE

A CAN terminating resistor is not permitted in the wiring harness on the heater side, as the control unit of the Hydronic L3 already contains a CAN terminating resistor (-R3).

6.3 Heater circuit diagram

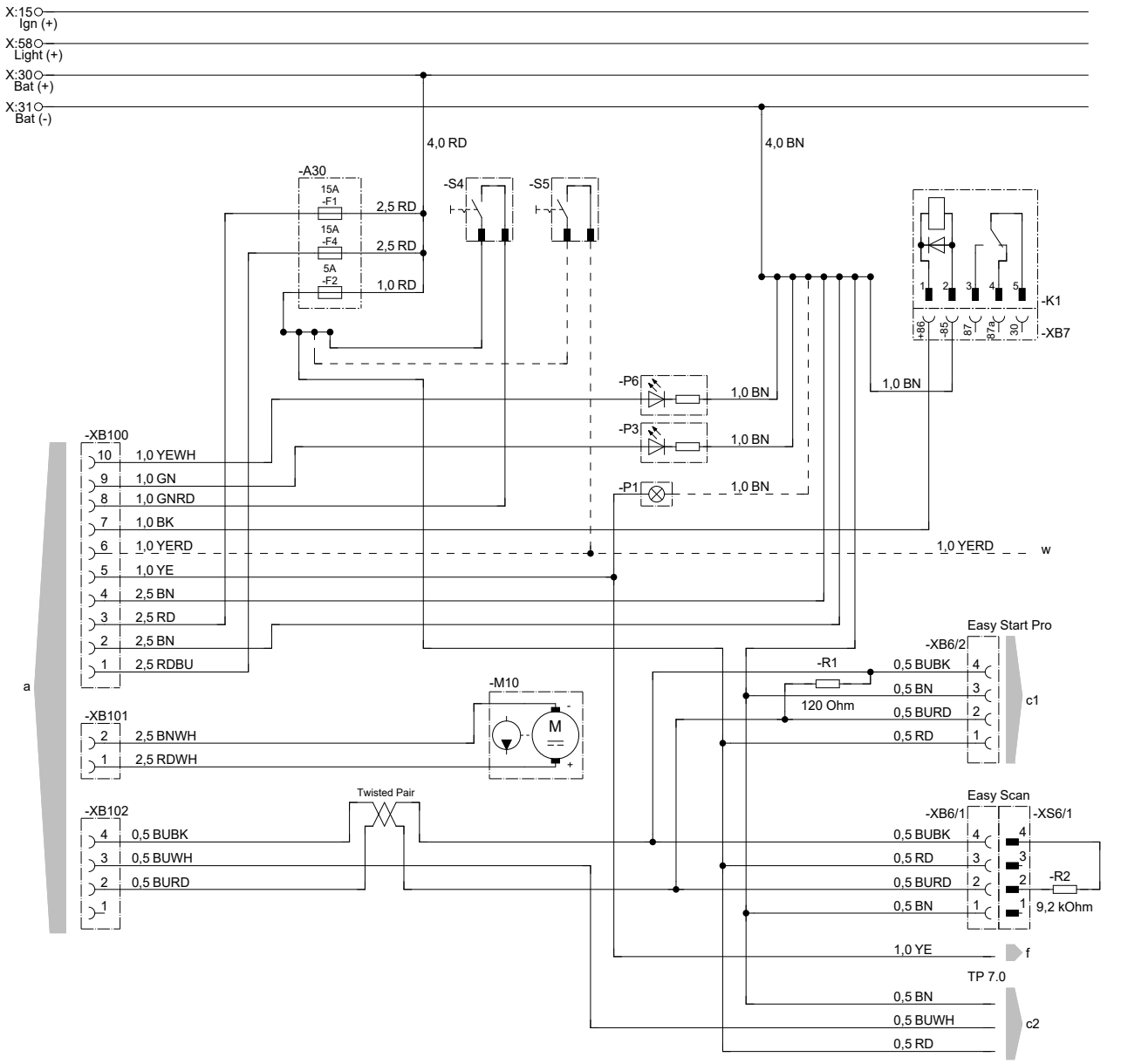
X:15 Ign (+)
X:58 Light (+)
X:30 Bat (+)
X:31 Bat (-)



25.3040.00.9601

-a to the heater
-X102 CAN/diagnostic connection

6.4 Circuit diagram, cable harness



25.3040.00.9602

-a to the heater
-c1 CAN control element
-c2 TP7.0 control element
-XS6/1 Diagnostic connection

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

Cable colours

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

7 Faults / Maintenance / Service

7.1 If any faults occur, check the following items

- If the heater does not start after being switched on:
  - Switch the heater off and on again.
- If the heater still does not start, check whether:
  - The fuses are ok?
  - The electrical cables, connections, terminals, are ok?
  - Is the combustion air system or exhaust system blocked?
  - Fuel supply ok?
  - Fuel in the tank?

7.2 Troubleshooting

If, after checking these items, the heater is still faulty or another malfunction occurs in your heater, please contact:

- If factory-installed, your contract workshop.
- If subsequently installed, the workshop / garage which installed the heater.

NOTE
Please note that guarantee claims can expire if the heater is modified by a third party or if non-original parts are installed.

7.3 Maintenance instructions

- Switch the heater on once a month for about 10 minutes, even outside the heating period.
- Before the heating period starts, the heater should be put through a trial run. If thick, persistent smoke develops, unusual burning noises or a clear fuel smell occurs or if electric / electronic parts overheat, the heater must be switched off and put out of service by removing the fuse.
  In this case, the heater should not be started up again until it has been checked by qualified staff who have been trained on Eberspächer heaters.
- Check the openings of the combustion air system and exhaust system after longer standstills, clean if necessary!

NOTE
Follow the maintenance schedule on page 39 to 41.

7.4 Initial startup

The following points are to be checked by the company installing the heater during initial commissioning.

- After installation of the heater, the coolant circuit and the whole fuel supply system must be thoroughly bled. Comply with the instructions issued by the vehicle manufacturer.
- Open the coolant liquid circuit 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 determine and correct the cause of the fault.

7.5 Changing components

The components listed below must be exchanged at the end of the specified operating period:

- Heat exchanger after 5000 operating hours,
- Burner after 3000 operating hours,
- Nozzle after 600 operating hours or at least once per year.

7.6 Service

Technical Support
If you have any technical questions or problems with the heater, the control unit or the operating software, please contact the following service address:
support-DE@eberspaecher.com

In Austria please contact:
support-AT@eberspaecher.com

In Switzerland please contact:
support-CH-DE@eberspaecher.com

8 Environment

8.1 Certification

The high quality of Eberspächer 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 has already qualified for the following standards:

Quality management in accordance with
ISO TS 9001:2015 and IATF 16949:2016

Environmental management system in accordance with
ISO 14001:2015

8.2 Disposal

Disposal of materials and reuse of recoverable materials
End-of-life devices and their components, defective components and packaging material can all be separated into their constituent materials so that all parts can be disposed of as in an environment-friendly manner or recycled where applicable. Environmentally-friendly disposal includes the possible separation of materials so that recoverable materials can be reused. Ensure that end-of-life devices and their components are disposed of properly and are recycled.

NOTE
Waste products such as used fuel-carrying components and similar wearing parts can harm the environment as well as people and animals and should therefore be disposed of properly. Contact your local recycling company or your specialist dealer to find out how waste products are to be disposed of properly.

Dismantling the heater
The heater is dismantled according to the instructions given in the current repair instructions.

NOTE
Repair instructions Hydronic L3: Mat. no. 25.3042.95.2682
The Eberspächer partner portal
https://partner.eberspaecher.com/de
provides access to viewing and downloading the repair instructions.

Disposal of materials
End-of-life 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 the heater has to be sent back.

8.3 EU Declaration of Conformity

We herewith declare that the version of the heater placed on the market by us conforms to the applicable provisions of the following EU Directive.

EU Directive 2014/30/EU

CE

The full Declaration of Conformity can be viewed and downloaded from the download centre at www.eberspaecher.com.

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73730 Esslingen
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25.3040.95.2682.0A EN 12.2023