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**The Troubleshooting and Repair Instructions  
are applicable to the following unit versions**

Heater

Order No.

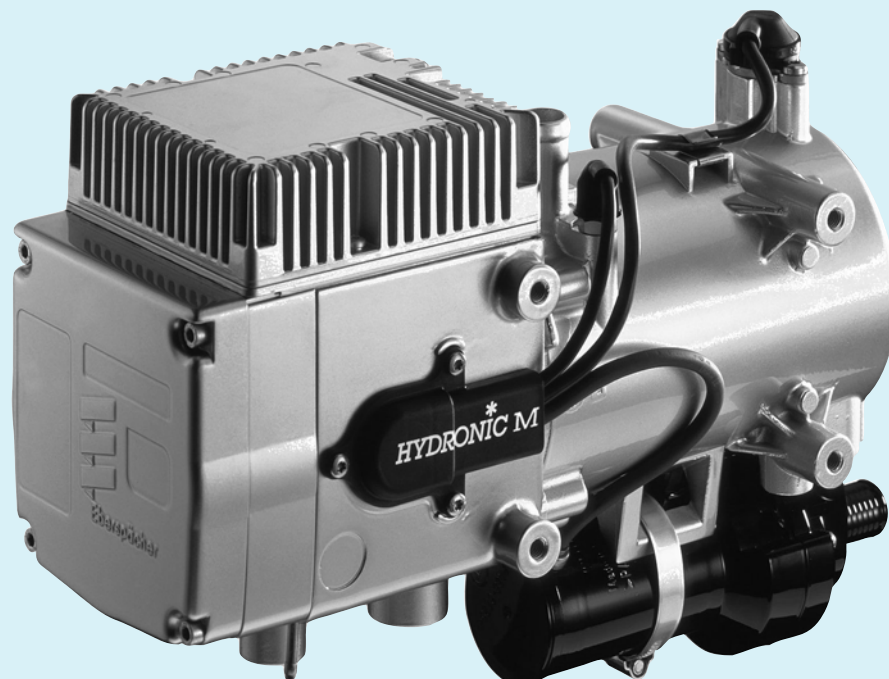
*HYDRONIC M*

D 10 W – 12 V

25 2160 05 00 00

D 10 W – 24 V

25 2161 05 00 00



# 1 Introduction

## Contents

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

If you are looking for a term, technical term or you would like an abbreviation explained, please use the relevant index at the end of the instructions, from Page 47.

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# 1 Introduction

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# 1 Introduction

## Foreword

These Troubleshooting and Repair Instructions are applicable to the heaters listed on the title page, to the exclusion of all liability claims.

Depending on the version or revised status of the heater, there may be differences between it and these troubleshooting and repair instructions.

The user must check this before carrying out the repair work and, if necessary, take the differences into account.



### Caution!

#### Safety instructions for installation and repair!

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

The heater may only be installed according to the specifications in the technical documents or repaired using original spare parts by authorised and trained persons. Installation and repairs by unauthorised and untrained persons, repairs using non-original spare parts and without the technical documents required for installation and repair are dangerous and therefore are not permitted.

A repair may only be carried out in connection with the respective unit-related technical description, installation instructions, operating instructions and maintenance instructions. This document must be carefully read through before / during installation and repair and followed throughout. Particular attention is to be paid to the official regulations, the safety instructions and the general information.

### Please note!

The relevant rules of sound engineering practice and any information provided by the vehicle manufacturer are to be observed during the installation and repair.

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

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

## Accident prevention

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

## Special text structure, presentation and picture symbols

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

### Special text formats and presentations

- A dot (•) indicates a list, which is started by a heading.
  - If an indented dash (–) follows a „dot“, this list is a subsection of the black dot.

### Picture symbols



#### Danger!

This information points out a potential serious or fatal danger. Ignoring this information can result in severe injuries.

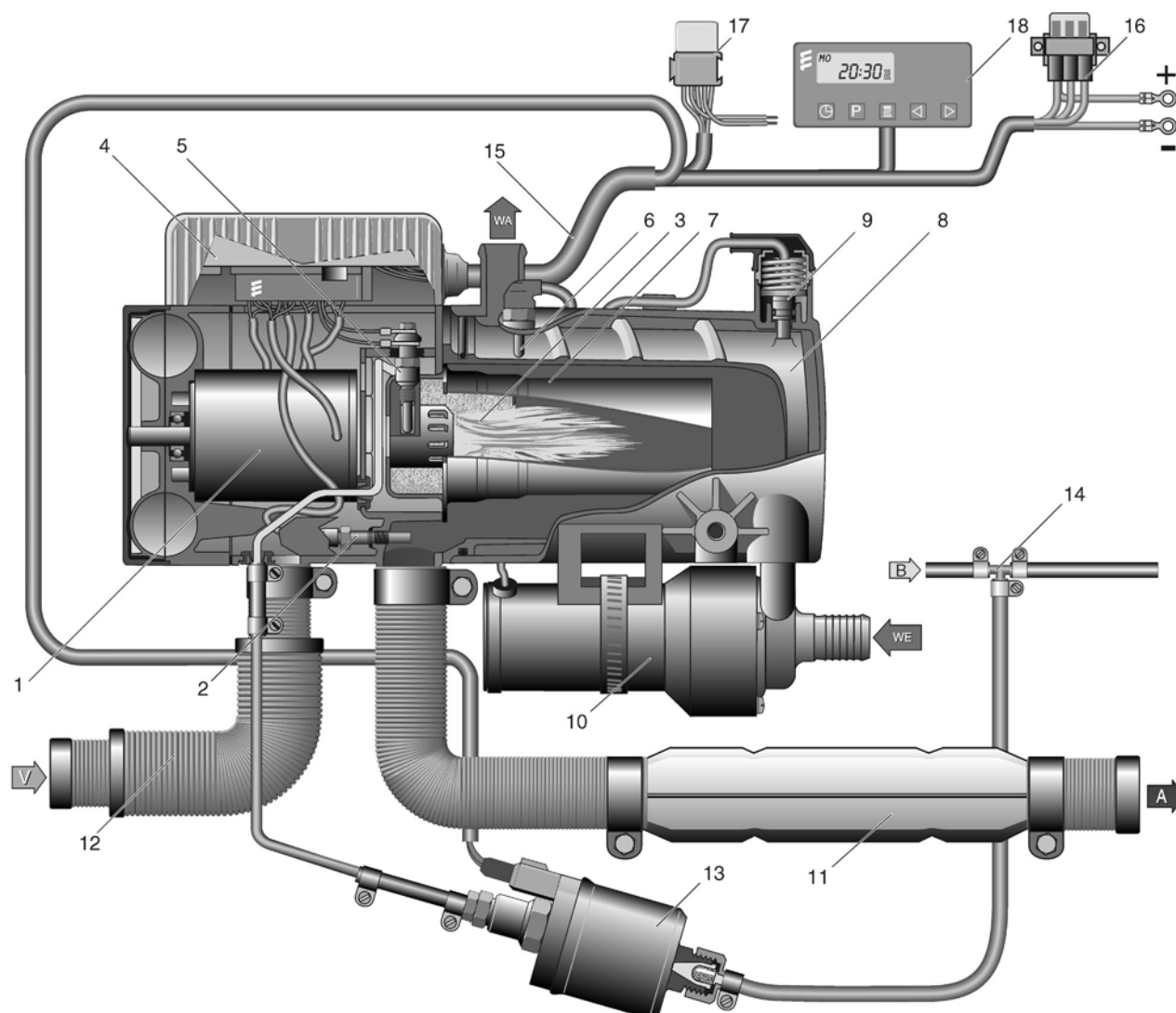


#### Caution!

This information points out a dangerous situation for a person and / or the product. Ignoring this information can result in injuries to people and / or damage to machinery.

## 2 Function

### Cutaway view



- 1 Burner motor
- 2 Flame sensor
- 3 Combustion chamber
- 4 Control box
- 5 Glow plug
- 6 Temperature sensor
- 7 Flame pipe
- 8 Heat exchanger
- 9 Overheating sensor
- 10 Water pump
- 11 Silencer for exhaust
- 12 Silencer for combustion air
- 13 Fuel metering pump
- 14 Fuel branch
- 15 Cable harness
- 16 Fuse bracket
- 17 Relay for switching on the vehicle fan
- 18 Timer

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

## 2 Function

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### Functional description

#### Switching on

When the heater is switched on, the control lamp in the control unit (mini-timer, module timer) lights up. The water pump and the combustion air fan start up and after a certain program with pre-purging and pre-heating, the glow plug and fuel metering pump start the combustion process.

Once a stable flame has formed, the glow plug switches off under time control.

#### Heating mode

During the initial start the heater is operated with the „POWER“ stage until

- the water temperature exceeds the „POWER“ / „HIGH“ change-over threshold,
- or
- the max. operating time of 2h in this stage is exceeded.

Then, depending on the heat requirement, the heater switches into the stages „HIGH – MEDIUM – LOW – OFF“.

If the heating requirement in the „LOW“ stage is so small that the cooling water temperature reaches 85 °C, the heater switches from „LOW“ to „OFF“. The heater runs on for 210 seconds. The water pump continues running until the heater restarts.

After the cooling water has cooled to approx. 68 °C, the heater starts in the „MEDIUM“ stage.

If the cooling water temperature reaches approx. 55 °C the temperature sensor switches the vehicle fan on.

#### Temperature drop

Temperature drop only becomes active while the vehicle is running and if the heater is switched on. The control stages are reached earlier and the heater's control action is adjusted to the lower heat requirement.

The temperature drop is possible by connecting the positive cable (D+) to connector B1, terminal A2, of the heater (see circuit diagrams, Page 33 and 37).



## 2 Function

### Control and safety devices

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

- If the heater does not ignite within 105 seconds after the fuel starts to pump, the start is repeated.  
If the heater still does not ignite after another 75 seconds of fuel being pumped, the heater is automatically switched off. After an unacceptable number of failed start attempts, the control box is locked.\*
- If the flame goes off by itself during operation, the heater is restarted. If the heater does not ignite within 105 seconds after the fuel starts to pump again, the heater is automatically switched off.  
This automatic switching off can be cancelled by briefly switching off and on again.
- In the case of overheating (e.g. lack of water, poorly ventilated cooling water circuit), the overheating sensor triggers, the fuel feed is interrupted and the heater is automatically switched off.  
Once the cause of the overheating has been eliminated, the heater can be re-started by switching it off and on again (provided that the heater has cooled down sufficiently, cooling water temperature < 68 °C).  
After the heater has been switched off due to overheating an unacceptable number of times, the control box is locked.\*
- If the lower or upper voltage limit is reached, the heater is automatically switched off.
- The heater does not start up if the glow plug is defective or if the electric cable to the metering pump is interrupted.
- The speed of the fan motor is continuously monitored. If the fan motor does not start up, if it is blocked or if the speed falls below 40 % of the desired speed, the heater is automatically switched off after 60 sec.

\* The lock can be cancelled and faults read out:

- using the module timer
- with the radio remote control TP5.

For other control units by connecting:

- the diagnostic unit
- the customer service program KD2000.

For operation and fault list, please refer to the enclosed operating instructions or these troubleshooting and repair instructions from Page 12.

#### **Please note!**

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

### Forced shut-down for ADR / ADR99 operation

In vehicles for the transport of dangerous goods (e.g. tanker trucks), the heater must be switched off before the truck drives into a danger area (refinery, petrol station, etc.) Failure to comply results in the heater switching off automatically when:

- The vehicle engine is switched off.
- An additional unit is started up (auxiliary drive for unloading pump, etc.)
- A vehicle door is opened (ADR99 regulation, only in France).

The fan then carries on running briefly for max. 40 seconds.

#### **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
- pull the fuse out or
- disconnect the heater from the battery.

### 3 Product information

#### Technical data

Heater		<b>HYDRONIC M – D 10 W</b>			
Heating medium		Coolant liquid			
Control of the heat flow		Stage			
		Power	High	Medium	Low
Heat flow (watt)		9500	7200	3200	1500
Fuel consumption (l/h)		1.2	0.9	0.4	0.18
Elect. power consumption (watt)					
in operation – 12 Volt		125	80	48	36
in operation – 24 Volt		115	73	45	33
during start up – 12 Volt		139			
during start up – 24 Volt		137			
in pause mode „Off“		24			
Rated voltage		12 Volt		24 Volt	
Operating range					
<ul style="list-style-type: none"> <li>• Lower voltage limit: An undervoltage protection installed in the control box switches off the heater if the voltage limit is reached.</li> </ul>		10.5 Volt		20 Volt	
<ul style="list-style-type: none"> <li>• Upper voltage limit: An overvoltage protection installed in the control box switches off the heater if the voltage limit is reached.</li> </ul>		15 Volt		30 Volt	
Permissible operating pressure		up to 2.0 bar overpressure			
Water flow rate of the water pump		1400 l/h			
Minimum water flow rate of the heater		500 l/h			
Fuel		Diesel – commercially available (DIN EN 590)			
Permissible ambient temperature		Operation			
		–40 °C to +80 °C			
		Storage			
		–40 °C to +85 °C			
Interference suppression class		3 for VFH, 4 for SW, 5 for MW / LW			
Weight with control box and water pump, without metering pump		approx. 6.5 kg			

Technical data ±10 %



#### Caution!

Failure to comply with the technical data can result in malfunctions.





### 3 Product information

#### Technical data

##### Water pump

Rated voltage	12 Volt	24 Volt
Operating voltage	8.5 Volt to 16 Volt	18 Volt to 33 Volt
Electrical power consumption	32 watt	
Water flow rate around 0.3 bar	700 l/h	
Operating temperature	-40 °C to +120 °C	
Interference suppression to DIN VDE 0879, Part 3	3 for all wave ranges	

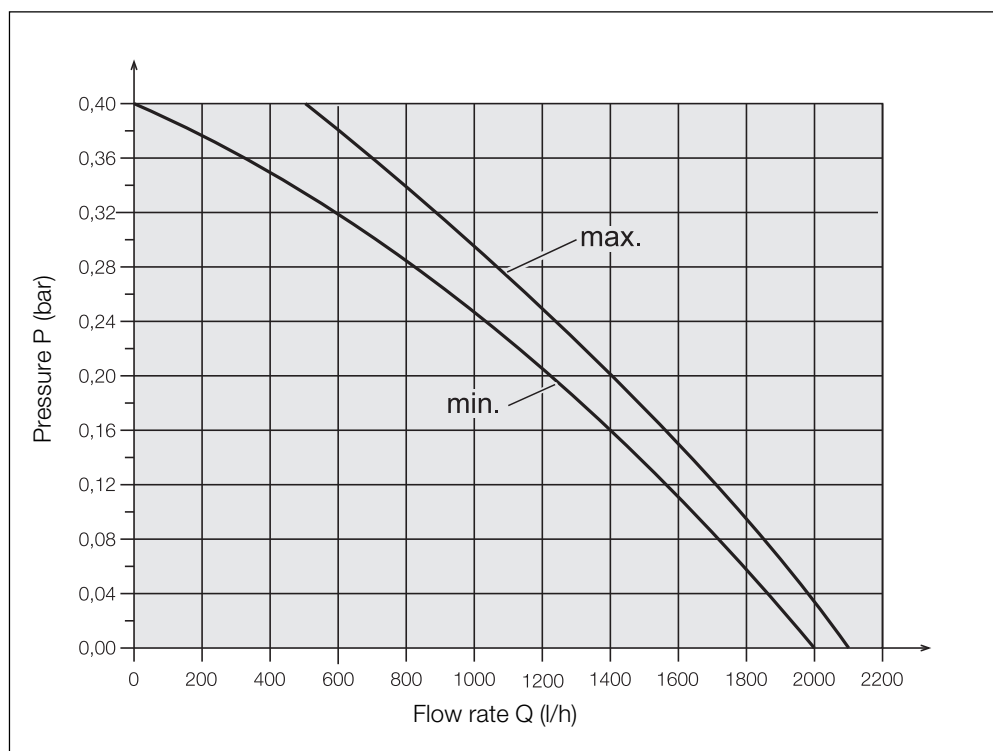
Technical data  $\pm 10\%$



#### Caution!

Failure to comply with the technical data can result in malfunctions.

#### Delivery curve of the water pump




## 4 Troubleshooting

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### What to check first in case of faults

- **Check whether:**
  - Fuel in the tank?
  - Fuel pipes leaking? (visual check)
  - Summer diesel still in the fuel pipe?
  - Heating lever (water valve) fully set to „WARM“?
  - Combustion air system or exhaust system damaged or blocked?
- **Electrical components:**
  - Cables, connections damaged?
  - Contacts corroded?
  - Fuses defective?
  - Incorrect wiring? (short circuits, interrupted / broken)
- **Check battery voltage**
  - Battery voltage < 10.5 Volt, the undervoltage protection of the 12 Volt heater has triggered.
  - Battery voltage < 20 Volt, the undervoltage protection of the 24 Volt heater has triggered.
- **Check voltage supply  $U_{\text{Batt}}$  (terminal 30)**

Disconnect the 12-pin connector (B1) at the control box and measure the voltage in connector B1 between chamber C2 (cable 4<sup>2</sup> rt) and chamber C3 (cable 4<sup>2</sup> br). If it differs from the battery voltage, check the fuses, the supply cables, the negative connection and the positive connection on the battery for voltage drop (corrosion / interruption).
- **Check switch-on signal (S+)**

Disconnect the 12-pin connector (B1) at the control box and then press the button  on the control unit. Measure the voltage in connector B1 between chamber A1 (cable 1<sup>2</sup> ge) and chamber C3 (cable 4<sup>2</sup> br). If no voltage is measured, then check the supply cable (cable 1<sup>2</sup> ge), the 5 A fuse (item 2.7.1 in the circuit diagram) and the control unit.
- **Check the control unit (module time / mini timer)**

Disconnect the connector at the control unit, jumper between the red 0.5<sup>2</sup> cable and the yellow 0.5<sup>2</sup> cable. If a voltage is measured in connector B1 between chamber A1 (cable 1<sup>2</sup> ge) and chamber C3 (cable 4<sup>2</sup> br) then replace the control unit.

### Locking the control box

The control box is locked if the following faults occur:

- **Too many attempted starts**

If the heater carries out several consecutive failed started attempts – fault code 050 is displayed → the control box is locked.
- **Overheating**

If the heater overheats several times consecutively – fault code 015 is displayed → the control box is locked.

### Cancel the control box lock

Cancellation of the control box lock depends on the appropriate test equipment and is described on Pages 12 to 17.

## 4 Troubleshooting

### Overview of testing equipment

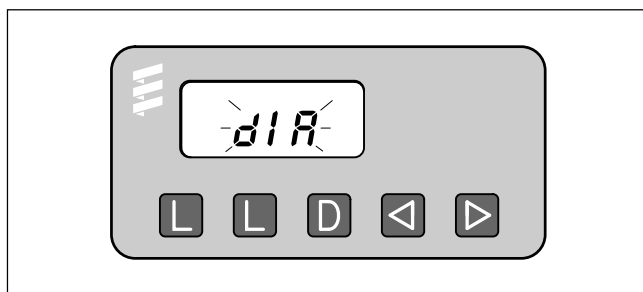
The heater's electronic control box can store up to 5 faults. The faults can be read out of the control box and displayed using one of the following devices. In addition, it is possible to cancel the control box lock.

- **Diagnostic unit**

After connecting the diagnostic unit the function or fault are shown as a number in the display.

For connection and operation of the diagnostic unit, see Pages 12 and 13.

An adapter cable is required to connect the diagnostic unit. For fault code table, see Pages 18 to 20.



Order No.

Diagnostic unit 22 1529 89 00 00

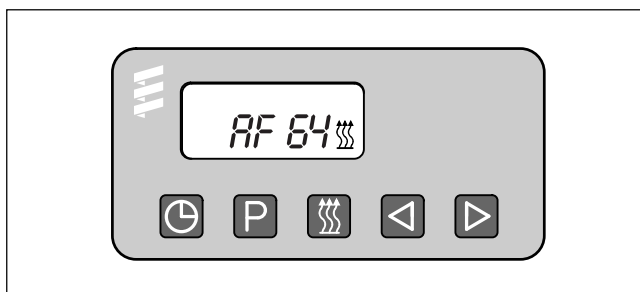
Adapter cable 22 1000 32 52 00

- **Module timer – installed in the vehicle**

The installed module timer can be used to show the function or fault as a number in the display.

For fault diagnosis using the module timer see Pages 14 and 15.

For fault code table, see Pages 18 to 20.



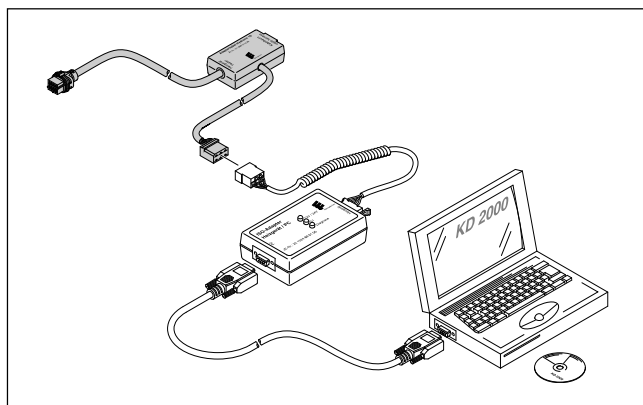
Order No.

Module timer 22 1000 30 34 00

- **KD2000 Customer service program**

After installing the customer service program KD2000 and connecting the ISO adapter the function or fault are displayed on the screen as a number. For connection and operation of the ISO adapter see Page 16. An adapter cable is required to connect the ISO adapter.

For fault code table, see Pages 18 to 20.



Order No.

ISO adapter 22 1524 89 00 00

Adapter cable 22 1000 32 52 00

- **TP5 radio remote control**

The radio remote control TP5 can be used to show the function or fault as a number in the display.

For operation of the TP5 radio remote control see Page 17.

For fault code table, see Pages 18 to 20.



Order No.

TP5 radio remote control 22 1000 32 01 00

# 4 Troubleshooting

## Fault diagnosis using the diagnostic unit

Diagnostic unit  
Order No. 22 1529 89 00 00

An adapter cable is required to connect the diagnostic unit.

Adapter cable  
Order No. 22 1000 32 52 00

### Connect diagnostic unit

1. Disconnect cable loom at the control box.
2. Connect the adapter cable to the control box.
3. Connect the cable loom to the adapter cable, housing connector A.
4. Connect the adapter cable with connector B of the cable loom of the diagnostic unit.

After the adapter cable and diagnostic unit have been connected the following appears in the display.



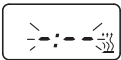
### Please note!

It is very important to always install in the given order. Fault code, fault description, cause / remedial action are described on Pages 18 to 20.

### Enquire fault memory

The current fault is displayed as „AF“ and a 2-digit number and is always written in the memory location F1. Preceding faults are moved to the memory locations F2 - F5, if necessary the content of F5 is overwritten.

- Press button **D** -> the heater is switched on.  
Display is as follows:

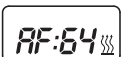


- After 8 sec. the following appears in the display:



No fault

or



e.g. current fault / fault code 64

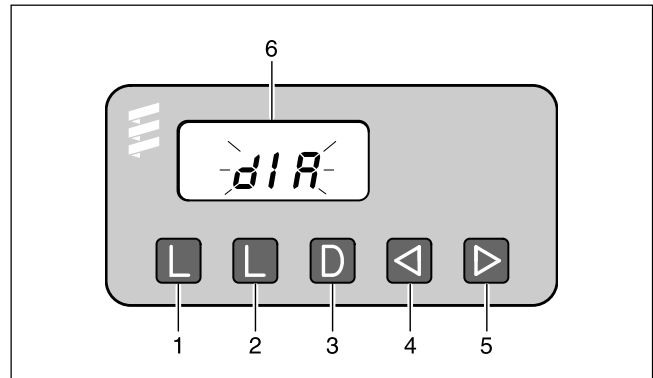
or



Fault diagnosis not possible

Possible causes:

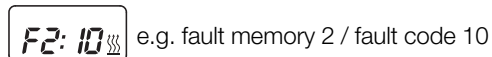
- Adapter cable is not properly connected
- Control box is defective or not diagnosable (not a universal control box)



- ① **L** button – Delete fault memory
- ② **L** button – Delete fault memory
- ③ **D** button – Switch heater on / off, Request diagnosis
- ④ **◀** button – Reverse, fault F5 – F1, AF
- ⑤ **▶** button – Forward, fault AF, F1 – F5
- ⑥ Display

### Display of the fault memory F1 - F5 or F5 - F1

- The heater is switched on.
- Press the buttons **◀** and **▶** once or several times to display the individual fault memory positions, in ascending or descending order.  
Display is as follows:

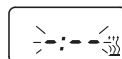


e.g. fault memory 2 / fault code 10

Only the fault memory positions with an error code assigned to them are displayed.

### Delete fault memory

- Correct cause of fault.
- Press button **D** -> the heater is switched on.
- Press both **L** keys simultaneously until the following appears in the display:



Display flashes, heater symbol does not flash

If all the fault memory positions have been deleted the most recent fault is displayed. The most recent fault is not reset to 00 until the heater is restarted.

Display is as follows:



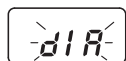
Heater has no malfunction

If a new, most recent fault exists it is displayed.

## 4 Troubleshooting

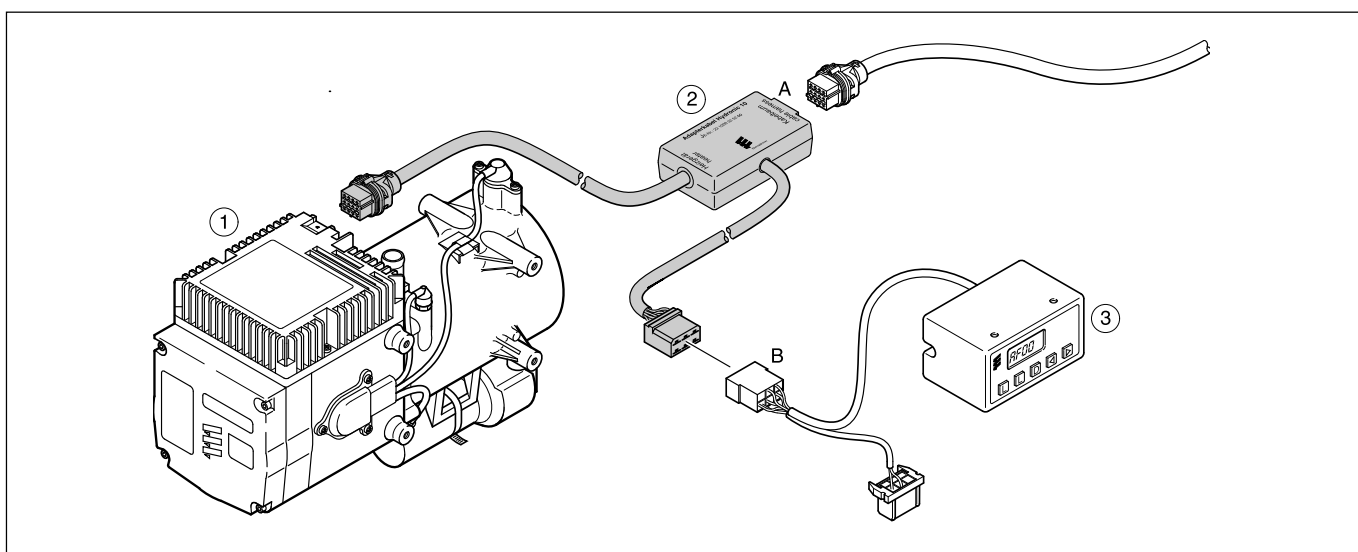
### Cancel the control box lock

- Delete the fault memory as described and switch off the heater using the **D** button.
- The control box lock is cancelled and the diagnosis closed.  
Display is as follows:



#### Please note!

Not only the defective component, but also a defective current circuit results in a fault being displayed.

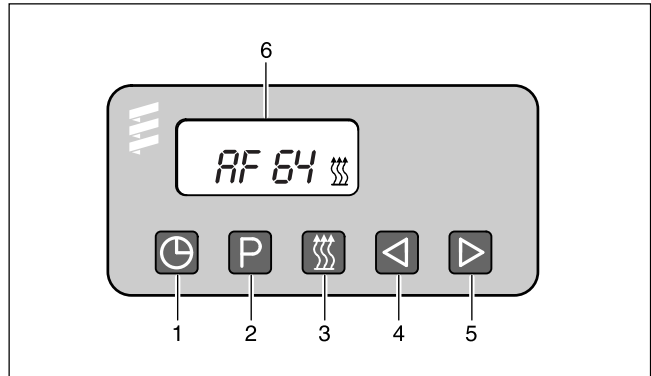


- ① Heater
- ② Adapter cable
- ③ Diagnostic unit

# 4 Troubleshooting

## Fault diagnosis using the module timer

Module timer  
Order No. 22 1000 30 34 00



- ① button – Time
- ② button – Preset
- ③ button – Heat
- ④ button – Reverse
- ⑤ button – Forward
- ⑥ Display fault

### Start diagnosis

The heater must be switched off before the diagnosis is started.

#### Please note!

Fault code, fault description, cause / remedial action are described on Pages 18 to 20.

### Enquire fault memory

The current fault is displayed as „AF“ and is always written in the memory position F1. Preceding faults are moved to the memory locations F2 – F5, if necessary the content of memory position F5 is overwritten.

- Press button -> the heater is switched on.
- Press button and keep it depressed, then press button within 2 seconds.  
Display is as follows:

Current fault (AF)  
e.g. fault code 64

### Display of the fault memory F1 – F5 or F5 – F1

- The heater is switched on.
- Press the buttons and once or several times to display the individual fault memory positions, in ascending or descending order.  
Display is as follows:

e.g. fault memory 2 / fault code 10

Only the fault memory positions with a fault code assigned to them are displayed.

### Delete fault memory

Condition:

An electrical connection exists from terminal 15 (ignition) to the module timer, 12-pin connector, chamber 10.

- Correct cause of fault.
- Press button -> The heater is switched on.
- Press button , keep it depressed and then press button within 2 seconds.

The module timer is now in the „Enquire fault memory“ program.

- Switch off ignition (terminal 15).
- Simultaneously press button and button , in addition, switch on the ignition (terminal 15) and wait until the following appears in the display.

After ignition „ON“ the following appears in the display:

Display flashes, heater symbol does not flash

- Switch the heater off and on -> the control box is unlocked, the heater restarts.

If all the fault memory positions have been deleted the most recent fault is displayed. The most recent fault is not reset to 00 until the heater is restarted.

Display is as follows:


Heater has no malfunction

If a new, most recent fault exists it is displayed.

## 4 Troubleshooting

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### Cancel the control box lock

- Delete the fault memory as described and switch the heater on and off using the  button.
- The control box lock is cancelled and the diagnosis closed. After switching the heater off and on and re-enquiring the fault memory the following appears in the display:



Display flashes, heater symbol does not flash

#### **Please note!**

Not only the defective component, but also a defective current circuit results in a fault being displayed.

## 4 Troubleshooting

### Fault diagnosis using the customer service program KD2000

KD2000 Customer service program  
Order No. 22 1524 89 00 00

An adapter cable is required to connect the ISO adapter.  
Order No. 22 1000 32 52 00

#### Connect ISO adapter

- Disconnect the heater's cable harness.
- Connect the adapter cable to the cable harness – as shown in the sketch.
- Connect the adapter cable to the ISO adapter.
- Connect the SUB-D connection cable with the PC and the ISO adapter.

#### Please note!

It is very important to always install in the given order.

Fault code, fault description, cause / remedial action are described on Pages 18 to 20.

#### Install KD2000 software on the PC

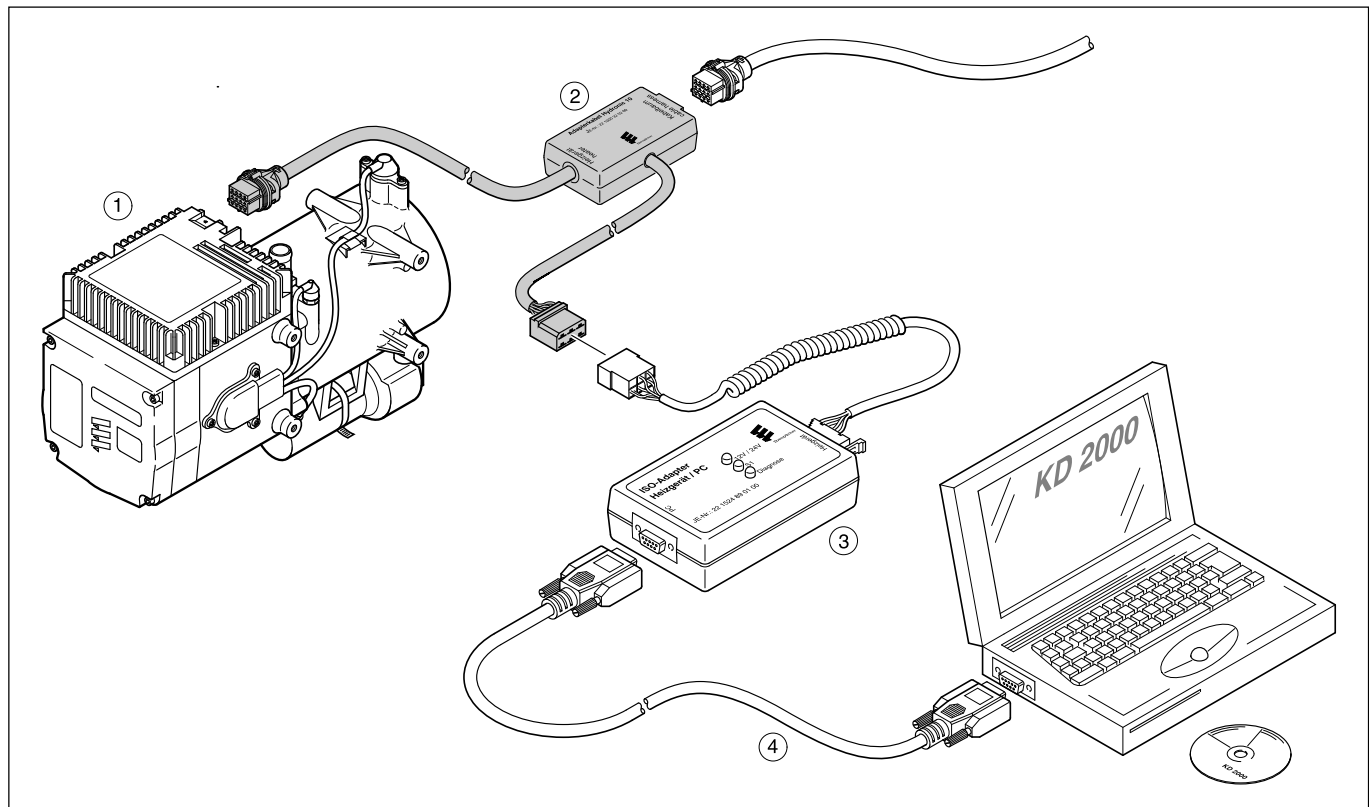
- Place the CD-ROM in the CD-ROM drive.
- To start, double click the „setup.exe“ file and follow the SETUP program instructions.

#### Enquire / delete fault memory F1 – F5 or cancel the control box lock

- Start the KD2000 software at the PC:
  - On the desktop
  - > Double click the „KD2000“ icon
  - Select heater type
  - Press the „GO“ button
- Delete fault memory or cancel the control box lock:
  - Press the „Delete fault memory“ button
  - > the stored faults F1 – F5 are deleted and the control box is unlocked.

#### Quit diagnosis

- Press the „STOP“ button -> fault memory enquiry is ended.



- ① Heater
- ② Adapter cable
- ③ ISO adapter
- ④ SUB-D connection cable



## 4 Troubleshooting

### Fault diagnosis using the radio remote control TP5

TP5 radio remote control  
Order No. 22 1000 32 01 00

If faults occur while the heater is running, they are displayed with „Err“ after the mobile unit is activated.

**Please note!**

In order to carry out the diagnosis, the diagnosis cable (blue / white) must be connected to the stationary unit and the heater cable harness. To this end, please refer to and follow the circuit diagram for the TP5 radio remote control and the heater.

If the diagnosis cable (blue / white) is not connected, the „Diagnosis“ menu is blocked.

After the diagnosis cable (blue / white) has been connected and the first logs have arrived at the stationary unit, the diagnose can be carried out using the mobile unit of the TP5 radio remote control.

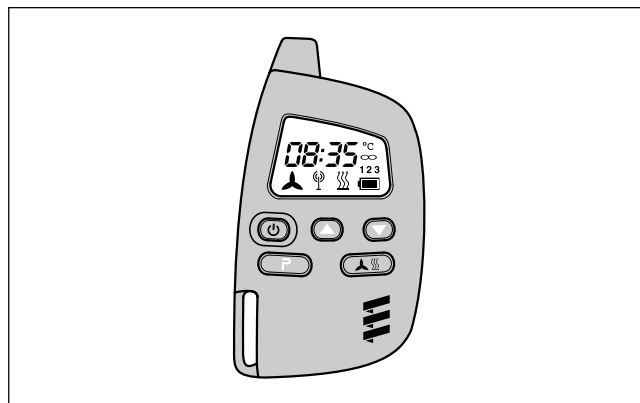
The current fault „F0“ is displayed. The stored faults „F1“ to „F5“ can be enquired.

Correct the fault according to these troubleshooting and repair instructions.

Example:

- F0 -- = undisturbed operation
- F011 = current fault 11
- F110 = Fault 10 stored in fault memory position 1 (F1).

Fault code, fault description, cause / remedial action are described on Pages 18 to 20.



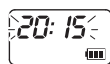
- Button to activate / deactivate the mobile unit
- Button for forward time setting
- Button for backward time setting
- Button for activating the possible settings
- Button for switching heat/ventilate ON / OFF; Activate /deactivate preselected time

#### Enquire / delete fault memory

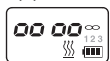
Use the button to activate the mobile unit.

Switch on the heater with the button.

Press the button twice to open the Time setting menu – the time flashes in the display.



Press the button for approx. 2 sec – until the following appears in the display:



Press button.

Press button.

Press button twice.

Press button.

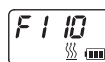
Malfunction in heater:



Heater has no malfunction:

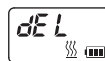


Use the and buttons to call up the fault memory positions 1 to 5.



#### Delete fault memory / cancel the control box lock

Use the button to delete the fault memory.



To confirm, press the button for approx. 2 sec until the following appears in the display:



Fault memory is deleted.

**Please note!**

If the fault memory is to be deleted later, the whole procedure must be repeated.

## 4 Troubleshooting

<b>Fault code Display</b>	<b>Fault description</b>	<b>Comments</b> <b>• Remedial action</b>
<b>000</b>	No faults	--
<b>009</b>	ADR / ADR99 cutoff	<ul style="list-style-type: none"> <li>• Switch heater off and back on again – the cutout by D+ or HA / NA must be cancelled.</li> </ul>
<b>010</b>	Overvoltage cutoff	<p>Overvoltage applied to control box for at least 20 seconds without interruption → Heater not functioning.</p> <ul style="list-style-type: none"> <li>• Disconnect plug-in connector between heater / cable harness, start the vehicle engine, measure the voltage. Connector B1, PIN C2 and C3: <ul style="list-style-type: none"> <li>– If the voltage is &gt;15 Volt or &gt;30 Volt, check the generator regulator or the battery.</li> </ul> </li> </ul>
<b>011</b>	Undervoltage cutoff	<p>Undervoltage applied to control box for at least 20 seconds without interruption → Heater not functioning.</p> <ul style="list-style-type: none"> <li>• Disconnect plug-in connector between heater / cable harness, start the vehicle engine, measure the voltage. Connector B1, PIN C2 and C3: <ul style="list-style-type: none"> <li>– If the voltage is &lt;10.5 Volt or &lt;20 Volt, then check the fuses, the supply cables, the negative connections and the positive connection at the battery for voltage drop (corrosion).</li> </ul> </li> </ul>
<b>012</b>	Overheating	<p>Overheating sensor signals temperature greater than 115 °C.</p> <ul style="list-style-type: none"> <li>• Vent heater (water deficiency), open heater slide valve, check water flow rate.</li> <li>• Measure the ohmic value of the overheating sensor, connector B5, PIN 11 and 17, for measured values see Page 27. <ul style="list-style-type: none"> <li>– If overheating sensor ok, check connection cables.</li> </ul> </li> </ul>
<b>013</b>	Flame sensor overtemperature	<p>Flame sensor signals temperature greater than 700 °C.</p> <ul style="list-style-type: none"> <li>• Measure the ohmic value of the flame sensor, connector B5, PIN 15 and 16, for measured values see Page 26. <ul style="list-style-type: none"> <li>– If flame sensor ok, check connection cables.</li> </ul> </li> </ul>
<b>014</b>	Difference between the overheating and temperature sensor is too large	<p>Difference between measured value in overheating sensor and temperature sensor greater than 70 K.</p> <ul style="list-style-type: none"> <li>• Vent heater (water deficiency), open heater slide valve and check water flow rate.</li> <li>• Measure the ohmic value of the temperature sensor, connector B5, PIN 14 and 18, for measured values see Page 28. <ul style="list-style-type: none"> <li>– If temperature sensor ok, check connection cables.</li> </ul> </li> </ul>
<b>015</b>	Too much overheating	<p>Control box locked due to too frequent overheating (error code 012, 013 or 014) in succession. Vent heater (water deficiency), open heater slide valve, check water flow rate.</p> <ul style="list-style-type: none"> <li>• Unlock the control box by deleting the fault memory with the diagnosis unit / KD2000 / module timer / TP5 radio remote control.</li> </ul>
<b>020</b>	Glow plug interruption	<ul style="list-style-type: none"> <li>• Carry out functional check of the glow plug in installed condition. Apply the appropriate voltage and measure the current intensity after 25 sec or 30 sec. Connector B5, PIN 2 and 7: If the values are as follows the glow plug is ok, if the values differ – replace the glow plug (see Page 24). Measured value: <ul style="list-style-type: none"> <li>• at 8 volts after 30 sec. = 12 A ±1.0 A</li> <li>• at 18 volts after 25 sec. = 5.3 A ±0.8 A</li> </ul> </li> <li>– If the glow plug is ok, check the lead harness from the glow plug for damage and continuity.</li> </ul>
<b>021</b>	Glow plug short circuit	



## 4 Troubleshooting

Fault code Display	Fault description	Comments • Remedial action
033	Combustion air fan motor or speed control defective, speed difference	<p>Speed difference for longer than 60 seconds. Setpoint values: 7300 rpm. (POWER), 5700 rpm. (HIGH), 3600 rpm. (MEDIUM), 2000 rpm. (LOW).</p> <ul style="list-style-type: none"> <li>• Check combustion air fan motor, to do this, apply 8 Volt or 18 Volt supply voltage to the motor. Connector B5, PIN 1 and 4:               <ul style="list-style-type: none"> <li>– Combustion air fan motor does not turn, then replace motor with integrated sensor.</li> </ul> </li> <li>• Switch on heater, check voltage and sensor supply. Connector B5, PIN 10 and 5: Setpoint value = 5 Volt               <ul style="list-style-type: none"> <li>– If difference exists, replace control box (see Page 24).</li> </ul> </li> <li>• Test the sensor:               <ul style="list-style-type: none"> <li>Use an analog voltmeter to measure the voltage while the blower is running Connector B5 PIN 13 and 5</li> <li>Setpoint: 4 volt (+/- 0.3) mean value (8 volt - rectangular signals).</li> <li>– In the event of a deviation, replace the motor combustion air blower with integrated sensor.</li> <li>– If the sensor signal is ok, then the speed governor is defective, replace control box (see Page 24).</li> </ul> </li> </ul>
037	Water pump not working	<ul style="list-style-type: none"> <li>• Check water pump. Apply 12 Volt or 24 Volt voltage to the water pump, connector B5, PIN 3 and 6:               <ul style="list-style-type: none"> <li>– If WP does not turn, replace WP (see Page 29).</li> <li>– If WP ok, replace control box (see Page 24).</li> </ul> </li> </ul>
042	Short circuit in water pump	<ul style="list-style-type: none"> <li>• Check connection at control box and at the water pump for short circuit. Connector B5, PIN 3 and 6:               <ul style="list-style-type: none"> <li>– If ok, check water pump and cables.</li> </ul> </li> </ul>
043	Short circuit in ext. components	<ul style="list-style-type: none"> <li>• Check connection at control box (ext. connector B1) for short circuit against frame. Connector B1, connection C1:               <ul style="list-style-type: none"> <li>– If ok, check the connected components (max. current 6 A), replace if necessary.</li> </ul> </li> </ul>
047 048	Short circuit in metering pump Metering pump interruption	<ul style="list-style-type: none"> <li>• Check connection at control box (ext. connector) and supply leads up to the metering pump for short circuit / interruption. Connector B1, connection C4:               <ul style="list-style-type: none"> <li>– If ok, check the metering pump – setpoint value approx. 20 Ohm.</li> </ul> </li> </ul>
050	Too many attempted starts	<p>Control box locked due to repeated switching on in succession without flame detection (fault code 052).</p> <ul style="list-style-type: none"> <li>• Check fuel supply, exhaust and combustion air system.</li> <li>• Check glow plug → see fault code 020 / 021.</li> <li>• Check flame sensor → fault code 013.</li> <li>• Unlock the control box by deleting the fault memory with the diagnosis unit / KD2000 / module timer / TP5 radio remote control.</li> </ul>
051	Flame signal immediately when switch on heater	<p>Flame sensor signals temperature greater than 80 °C.</p> <ul style="list-style-type: none"> <li>• Check flame sensor → fault code 013.</li> </ul>
052	No start	<p>No flame detected within the start phase. Flame sensor value &lt; 80 °C therefore fault cutoff because safety time exceeded.</p> <ul style="list-style-type: none"> <li>• Check fuel supply, exhaust and combustion air system.</li> <li>• Check glow plug → see fault code 020 / 021.</li> <li>• Check flame sensor → fault code 013.</li> </ul>

## 4 Troubleshooting

Fault code Display	Fault description	Comments • Remedial action
053	Flame cutout in power stage	Heater has ignited (flame detected) and signals flame cutout during a power stage.
054	Flame cutout in high stage	• Check fuel quantity, fan speed, fuel supply, exhaust and combustion air system.
055	Flame cutout in medium stage	• Check flame sensor → fault code 013.
056	Flame cutout in low stage	
059	Water temperature rises too fast	• Vent heater (water deficiency), open heater slide valve, check water flow rate. • Check temperature sensor → fault code 060 / 061
060	Temperature sensor interruption	Temperature sensor signals temperature value outside the measurement range.
061	Short circuit in temperature sensor	• Measure the ohmic value of the temperature sensor, connector B5, PIN 14 and 18, for measured values see Page 28. – If temperature sensor ok, check connection cables.
064	Flame sensor interruption	Flame sensor signals temperature value outside the measurement range.
065	Short circuit in flame sensor	• Check flame sensor → fault code 013.
071	Overheating sensor Interruption	Overheating sensor signals temperature value outside the measurement range.
072	Short circuit in overheating sensor	• Check overheating sensor → fault code 012.
090	Control box defective (internal reset)	Internal control box fault, replace control box (see Page 24).
093	Control box defective (RAM error)	
094	Control box defective (internal relay)	
095	Control box defective (EPROM error)	
097	Control box defective (general error)	

## 5 Repair instructions

### Repair instructions

The permitted repair work to the heater is described in the „Repair Instructions“ chapter. If extensive repairs are necessary, it makes sense to dismantle the heater.

The heater is assembled in the reverse order, if applicable not additional instructions.

**Please note!**

After completing all the work on the heater, you must carry out a functional check.

### Always observe the following safety instructions before working on the heater



**Danger!**

**Risk of injury, burns and poisoning!**

- Always switch off the heater beforehand and leave it to cool.
- Disconnect the battery.
- The heater must not be operated in closed rooms such as garages or workshops.

Exception:

Exhaust suction available directly at the entry to the exhaust pipe.



**Caution!**

- The seals of dismantled components must be renewed.
- During repair work, check all components for damage and if necessary replace.
- Check connector contacts, plug-in connections and cables for corrosion and damage and if necessary repair.
- Only ever use Eberspächer spare parts if replacements are necessary.
- After working on the coolant circuit the level of the coolant must be checked and if necessary topped up according to the vehicle manufacturer's instructions.  
The coolant circuit must then be vented.
- Operation or the after running of the heater may only be stopped in an emergency (see „EMERGENCY OFF“ Page 7) by interrupting the battery current (risk of heater overheating).

### Special tool

#### AMP release tool

The AMP release tool is used to unclip push-on sleeves from a connector housing.

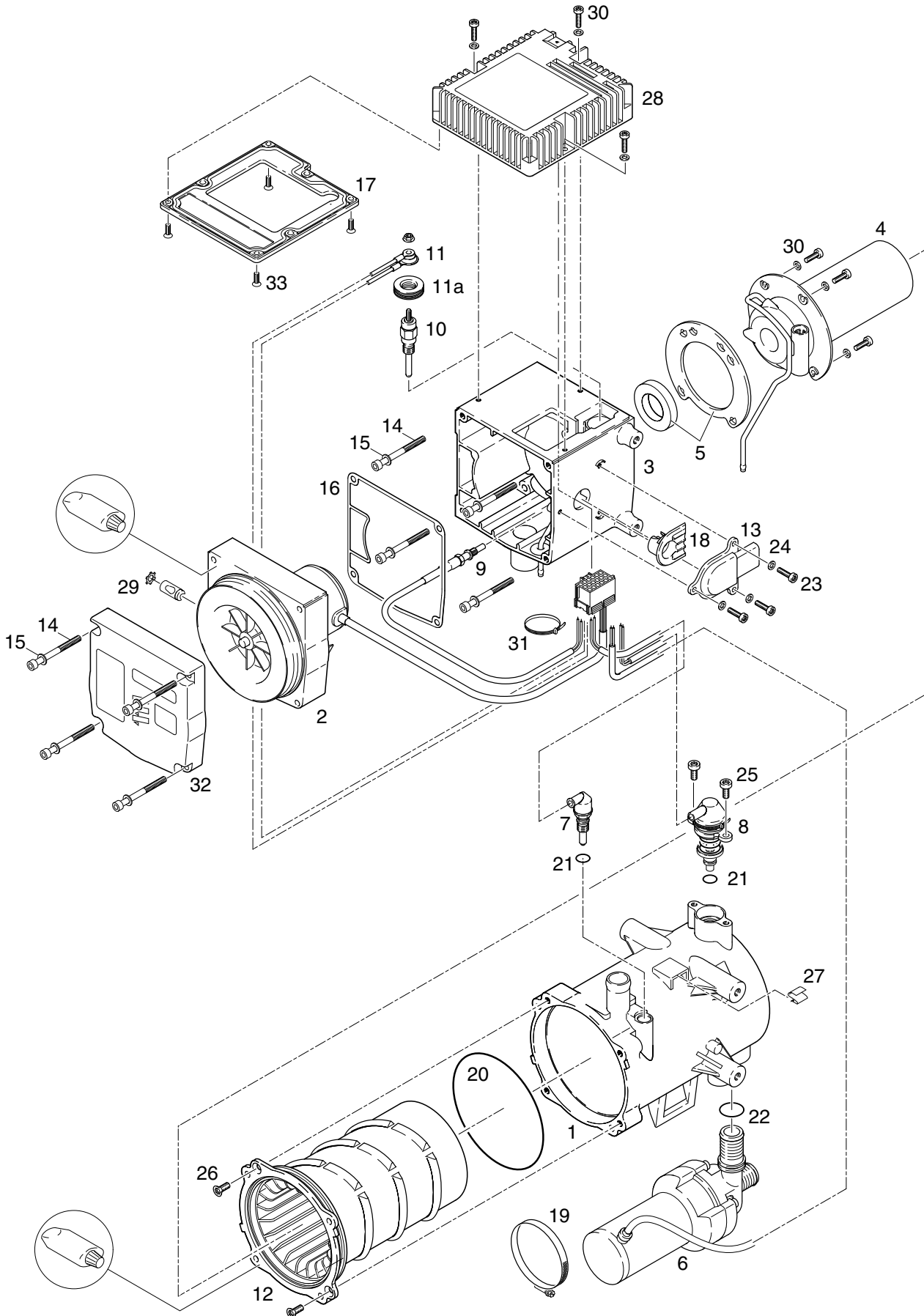
This release tool can be ordered directly from Eberspächer GmbH & Co. KG.

- For Micro Timer Order No. 206 00 205
- For Junior Power Timer Order No. 206 00 204



# 5 Repair instructions

## Assembly drawing





## 5 Repair instructions

### Parts list

- 1 Jacket
- 2 Combustion air fan (apply sealing compound to front side)
- 3 Combustion chamber housing
- 4 Combustion chamber with header pipe
- 5 Seals for combustion chamber
- 6 Water pump
- 7 Temperature sensor
- 8 Overheating sensor
- 9 Flame sensor
- 10 Glow plug
- 11 Cable loom with adapter
- 11a Grommet
- 12 Heat exchanger (apply sealing compound to front side)
- 13 Cover
- 14 Screw M5 x 55 / DIN 912
- 15 Washer A5.3 / DIN 125
- 16 Seal (remove protective foil, glue seal onto Item 2)
- 17 Seal
- 18 Grommet
- 19 Hose clip
- 20 O-ring 107.54 x 3.53
- 21 O-ring 7 x 2
- 22 O-ring 19.8 x 2.3
- 23 Raised cheese (fillister) head screw, M4 x 12 / DIN 7985-1.4301 TORX
- 24 Spring lock washer A4 / DIN 137 ZN 12
- 25 Screw M5 x 12 TAPTITE / DIN 7985 TORX
- 26 Screw M5 x 12 TAPTITE / DIN 965 TORX
- 27 Cable fixing clip
- 28 Control box
- 29 Toothed ring with setting screw
- 30 Screw M4 x 16 TAPTITE / DIN 7985 TORX
- 31 Cable tape 2.5 x 100
- 32 Combustion air fan cover
- 33 Countersunk screw M4 x 12 with internal TORX / DIN 7991-like.

**Please note!**

Fit all O-rings with special grease – assembly aid.

## 5 Repair instructions

### Repair step 1

#### Dismantle / assemble control box

(Figure 1)

- Remove the 12-pin plug-in connection from the heater cable harness at the control box (undo the snap-type locking at the connector).
  - Unscrew 3 fixing screws M4 x 16.
  - Remove the control box.
  - Carefully pull off the 18-pin plug-in connector at the control box (undo snap-type locking).
- Install in the reverse order.  
Torque for fixing screws  $1.4^{+0.5}$  Nm.

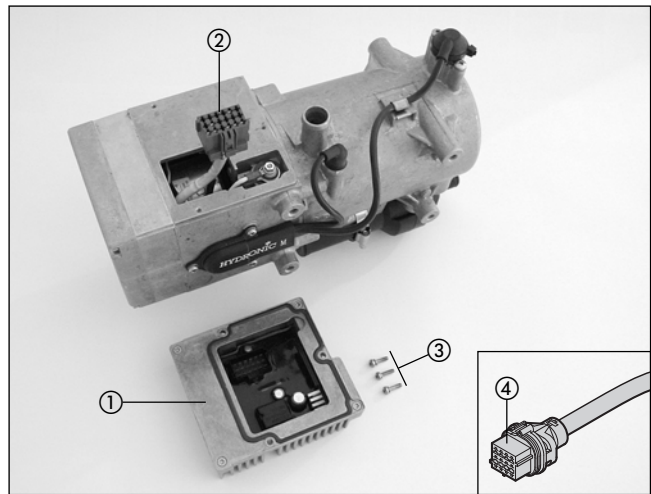


Figure 1

- ① Control box
- ② 18-pin plug-in connector
- ③ M4 x 16 fixing screws
- ④ 12-pin plug-in connector cable harness

### Repair step 2

#### Check / remove / install glow plug

(Figure 2a / 2b)

- Repair step 1, dismantle / assemble control box.
- Check glow plug in installed condition  
– see fault code 020 / 021 on Page 18.

#### Dismantle glow plug

- Undo and remove the fixing nut at the connection cable of the glow plug.
  - Carefully remove grommet. Avoid damage.
  - Unscrew glow plug using special socket spanner.
- Install in the reverse order.  
Installation location of the grommet, see Figure 2a.  
Glow plug torque  $14^{+0.5}$  Nm.  
Connection cable fixing nut torque  $1.4^{+0.5}$  Nm.

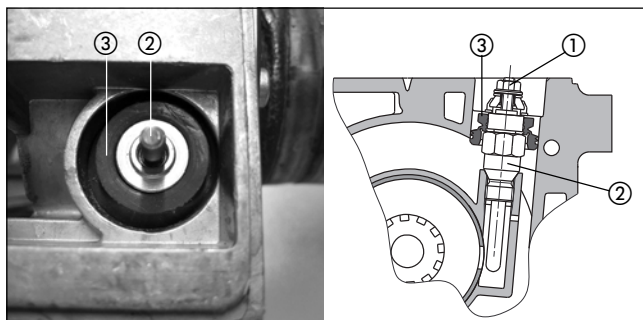


Figure 2a

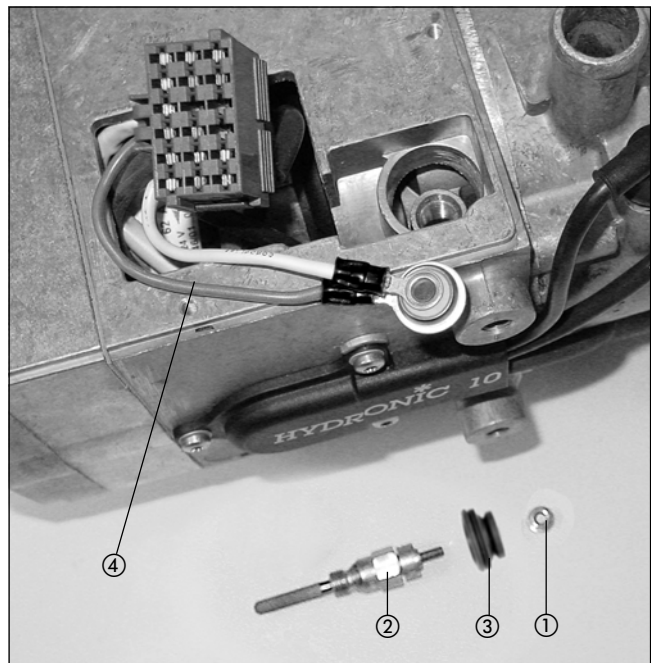


Figure 2b

- ① Connection cable fixing nut
- ② Glow plug
- ③ Grommet
- ④ Connection cable



## 5 Repair instructions

### Repair step 3

#### Dismantle / assemble combustion air fan

(Figure 3)

- Repair step 1, dismantle / assemble control box.
- Unscrew the 4 fixing screws M5 x 55 at the combustion air fan cover.
- Remove the combustion air fan cover.
- Carefully pull the combustion air fan out of the combustion chamber housing.
- Remove the detachable locking clasp at the 18-pin connector.  
Use the AMP release tool (see Page 21) to unclip cable 1.5<sup>2</sup> sw from chamber 1 of the 18-pin connector / cable 1.5<sup>2</sup> or from chamber 4 / cable 0.25<sup>2</sup> gn from chamber 5 / cable 0.25<sup>2</sup> rt from chamber 10 / cable 0.25<sup>2</sup> vi from chamber 13.

- Check combustion air fan motor  
– see fault code 033 on Page 19.

- Install in the reverse order.  
Torque for fixing screws 2.5<sup>+0.5</sup> Nm.

**Please note!**

When assembling, check and if necessary renew the seal between the combustion air fan and the combustion chamber housing.

Clean the sealing surface between the combustion air fan and the combustion air fan cover and apply sealing compound.

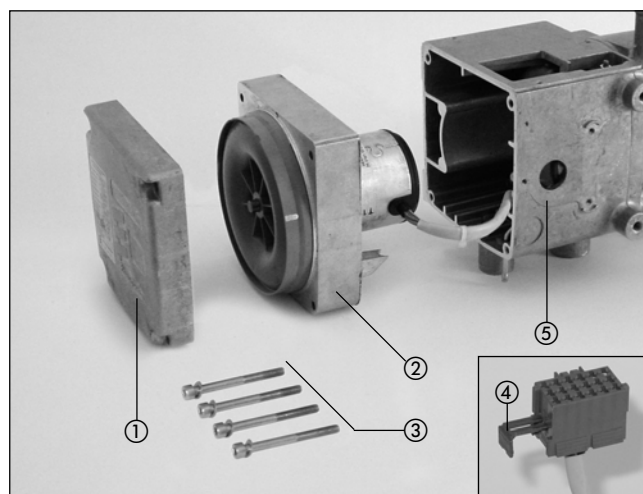


Figure 3

- ① Combustion air fan cover
- ② Combustion air fan
- ③ M5 x 55 fixing screws
- ④ Detachable locking clasp
- ⑤ Combustion chamber housing

## 5 Repair instructions

### Repair step 4

#### Remove / install flame sensor

(Figure 4)

- Repair step 1, dismantle / assemble control box.
- Repair step 3, dismantle / assemble combustion air fan.
- Use the AMP release tool (see Page 21) to unclip cable 0.35<sup>2</sup> gr from chamber 15 of the 18-pin connector, and cable 0.35<sup>2</sup> gr from chamber 16.
- Unscrew the flame sensor.
- Install in the reverse order.  
Flame sensor torque 2.5<sup>+0.5</sup> Nm.

#### Please note!

When assembling, lay the flame sensor's connection cable behind the fuel feed pipe in the housing.

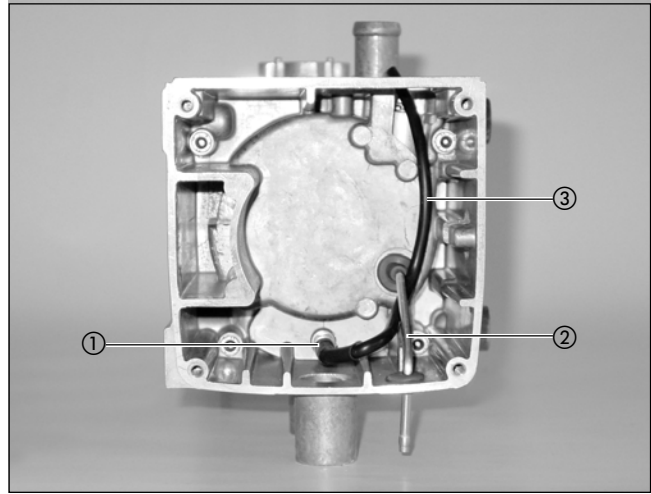


Figure 4

- ① Flame sensor
- ② Fuel pipe
- ③ Flame sensor connection cable

### Check flame sensor

(Diagram 1)

Check the flame sensor using the digital multimeter, if the flame sensor's resistance value lies outside the table of values or the diagram, then replace the flame sensor.

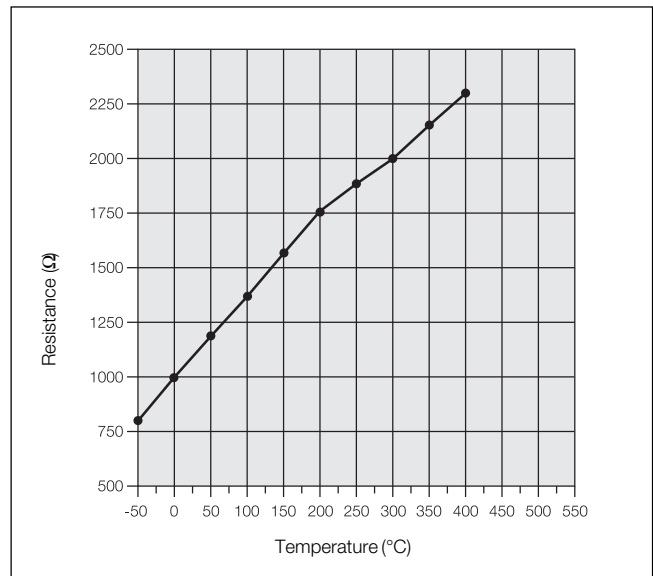


Diagram 1

#### Table of values

Temp[°C]	-50	0	10	20	30	50	80	90	100	130	150	200	250	300	350	400
R [Ω]	803	1000	1022	1062	1097	1194	1309	1347	1385	1498	1573	1758	1810	2000	2160	2300

## 5 Repair instructions

### Repair step 5

#### Remove / install overheating sensor

(Figure 5)

- Repair step 1, dismantle / assemble control box.
- Unscrew the 3 fixing screws M4 x 12 of the cover (HYDRONIC M lettering).
- Remove the detachable locking clasp at the 18-pin connector. Use the AMP release tool (see Page 21) to unclip cable 0.5<sup>2</sup> bl from chamber 11 of the 18-pin connector, and cable 0.5<sup>2</sup> bl from chamber 17.
- Pull out the cable through the rubber grommet on the housing and undo from cable fixing clip.
- Unscrew the 2 fixing screws M5 x 12 at the overheating sensor and pull out the overheating sensor.
- Install in the reverse order.  
Cover fixing screw torque  $3^{+0.5}$  Nm.  
Overheating sensor fixing screw torque  $4^{+0.5}$  Nm.



#### Danger!

#### Risk of injuries and burns!

- Always switch off the heater beforehand and leave it to cool.
- Relieve the overpressure in the cooling system by opening the radiator screw cap.
- Dismantle the hose at the cooling water outlet of the heat exchanger and close off with a plug.
- Dismantle the cooling water inlet hose at the water pump and close off with a plug.

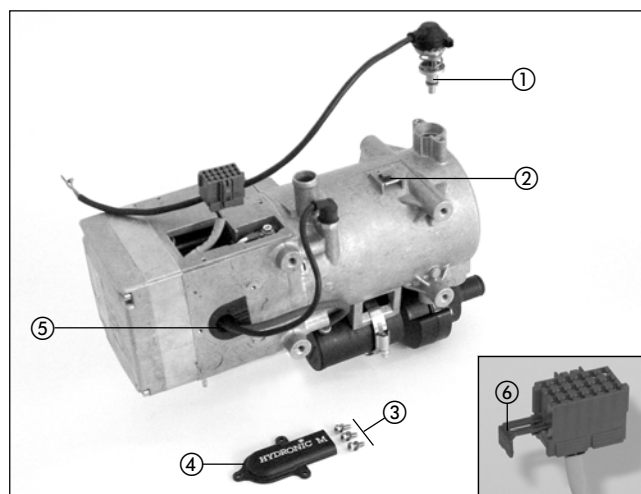


Figure 5

- ① Overheating sensor
- ② Cable fixing clip
- ③ M4 x 12 fixing screws
- ④ Cover
- ⑤ Rubber grommet
- ⑥ Detachable locking clasp

#### Check overheating sensor

(Diagram 2)

Use the digital multimeter to check the overheating sensor. If the resistance value lies outside the table of values or the diagram, then replace the overheating sensor.

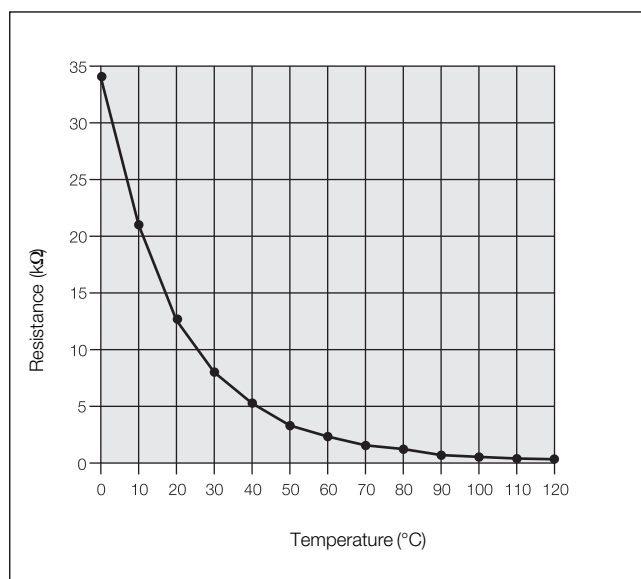


Diagram 2

#### Table of values

Temp[°C]	0	10	20	30	40	50	60	70	80	90	100	110	120
R [kΩ]	34.81	20.66	12.64	7.986	5.165	3.437	2.342	1.631	1.159	0.8395	0.6184	0.4629	0.3516

# 5 Repair instructions

## Repair step 6

### Remove / install temperature sensor

(Figure 6)

- Repair step 1, dismantle / assemble control box.
- Unscrew the 3 fixing screws M4 x 12 of the cover (HYDRONIC M lettering).
- Remove the detachable locking clasp at the 18-pin connector. Use the AMP release tool (see Page 21) to unclip cable 0.35<sup>2</sup> ge from chamber 14 of the 18-pin connector, and cable 0.35<sup>2</sup> ge from chamber 18.
- Pull out the cable through the rubber grommet on the housing.
- Unscrew the temperature sensor.
- Install in the reverse order.  
Temperature sensor torque 2.5<sup>+0.5</sup> Nm.

### Danger!

#### Risk of injuries and burns!

- Always switch off the heater beforehand and leave it to cool.
- Relieve the overpressure in the cooling system by opening the radiator screw cap.
- Dismantle the hose at the cooling water outlet of the heat exchanger and close off with a plug.
- Dismantle the cooling water inlet hose at the water pump and close off with a plug.

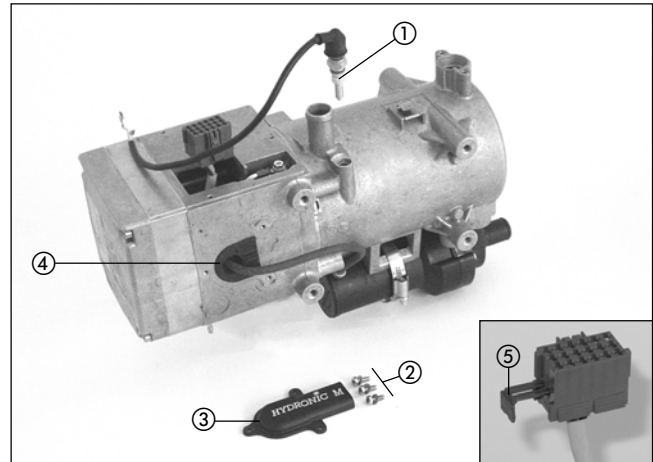


Figure 6

- ① Temperature sensor
- ② M4 x 12 fixing screws
- ③ Cover
- ④ Rubber grommet
- ⑤ Detachable locking clasp

## Check temperature sensor

(Diagram 3)

Use the digital multimeter to check the overheating sensor. If the resistance value lies outside the table of values or the diagram, then replace the temperature sensor.

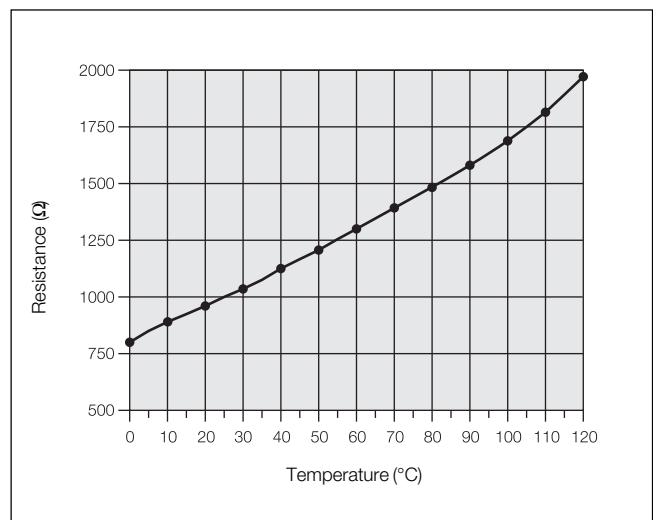


Diagram 3

### Table of values

Temp[°C]	0	10	20	30	40	50	60	70	80	90	100	110	120
R [Ω]	814.9	886.2	961.1	1039.8	1122.1	1208.2	1298.0	1391.5	1488.7	1589.6	1694.2	1802.5	1914.5

## 5 Repair instructions

### Repair step 7

#### Dismantle / assemble water pump

(Figure 7)

- Repair step 1, dismantle / assemble control box.
- Unscrew the 3 fixing screws M4 x 12 of the cover (HYDRONIC M lettering).
- Remove the detachable locking clasp at the 18-pin connector. Use the AMP release tool (see Page 21) to unclip cable 0.5<sup>2</sup> sw rt from chamber 3 of the 18-pin connector, and cable 0.5<sup>2</sup> br sw from chamber 6.
- Pull out the cable through the rubber grommet on the housing.
- Remove the fixing clip on the water pump and pull out the water pump.
- Check water pump
  - see fault code 037 / 042 on Page 19.
- Install in the reverse order.
  - Torque for fixing screws 3<sup>+0.5</sup> Nm.



#### Danger!

#### Risk of injuries and burns!

- Always switch off the heater beforehand and leave it to cool.
- Relieve the overpressure in the cooling system by opening the radiator screw cap.
- Dismantle the hose at the cooling water outlet of the heat exchanger and close off with a plug.
- Dismantle the cooling water inlet hose at the water pump and close off with a plug.

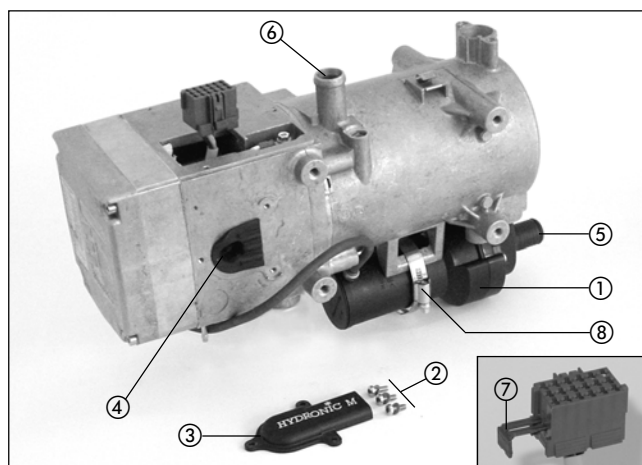


Figure 7

- ① Water pump
- ② M4 x 12 fixing screws
- ③ Cover
- ④ Rubber grommet
- ⑤ Cooling water inlet
- ⑥ Cooling water outlet
- ⑦ Detachable locking clasp
- ⑧ Fixing clip of the water pump

#### Please note!

During assembly, check the O-ring at the outlet connections of the water pump, replace if necessary and apply special grease.

### Repair step 8

#### Dismantle / assemble combustion chamber housing

(Figure 8a, 8b)

- Repair step 1, dismantle / assemble control box.
- Repair step 3, dismantle / assembly combustion air fan (remove side cover, do not unclip the cable for overheating sensor, temperature sensor and water pump, only feed out length).
- Unscrew the 4 fixing screws M5 x 55 in the combustion chamber housing, remove combustion chamber housing from jacket.
- Install in the reverse order.
  - Torque for fixing screws 2.5<sup>+0.5</sup> Nm.

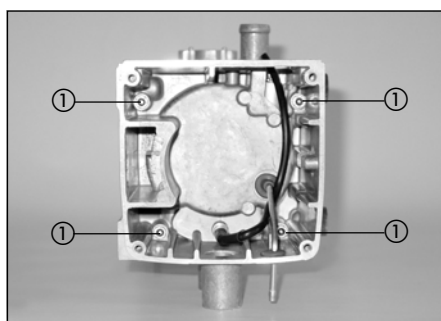


Figure 8a

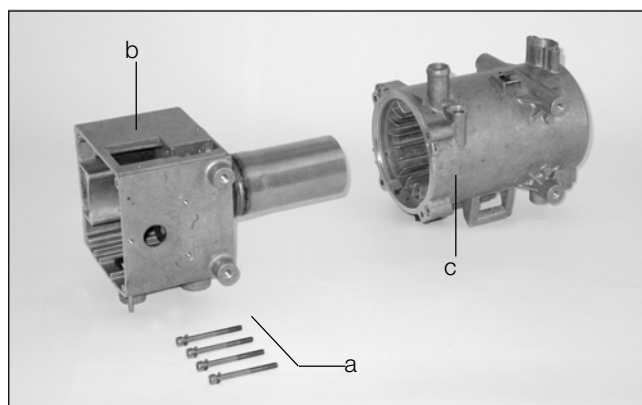


Figure 8b

- ① M5 x 55 fixing screws
- ② Combustion chamber housing
- ③ Jacket with heat exchanger

#### Please note!

When assembling the combustion chamber housing and jacket, clean the sealing surfaces and apply sealing compound.

## 5 Repair instructions

### Repair step 9

#### Dismantle / assemble combustion chamber

(Figure 9)

- Repair step 1, dismantle / assemble control box.
- Repair step 2, dismantle / install glow plug.
- Repair step 3, dismantle / assemble combustion air fan (remove side cover, do not unclip the cable for overheating sensor, temperature sensor and water pump, only feed out length).
- Repair step 8, dismantle / assemble combustion chamber housing.
- Unscrew the fixing screws M4 x 12 at the combustion chamber flange.
- Carefully pull the combustion chamber out of the combustion chamber housing.
- Install in the reverse order  
Torque for fixing screws  $3^{+0.5}$  Nm.

#### Please note!

When assembling the combustion chamber housing and combustion chamber, carefully feed the fuel pipe through the grommet.

It is important not to deform or damage the fuel pipe, the seal on the combustion chamber flange and the rockwool insulation in the combustion chamber housing.

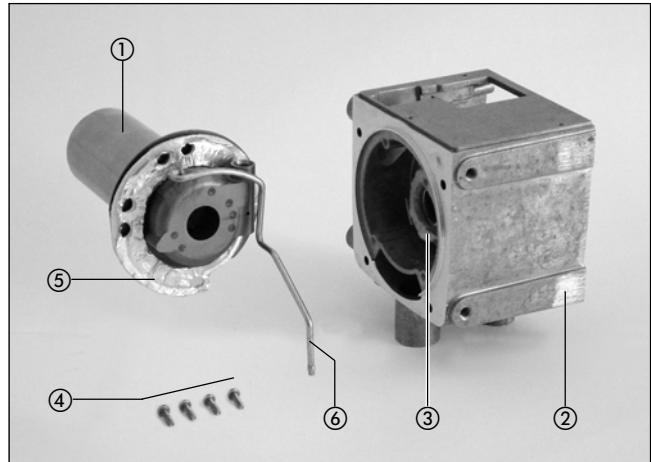


Figure 9

- ① Combustion chamber with header pipe
- ② Combustion chamber housing
- ③ Rockwool insulation
- ④ M4 x 12 fixing screws
- ⑤ Seal
- ⑥ Fuel pipe

### Repair step 10

#### Dismantle / assemble heat exchanger

(Figure 10, 11)

- Repair step 1, dismantle / assemble control box.
- Repair step 3, dismantle / assemble combustion air fan (remove side cover, do not unclip the cable for overheating sensor, temperature sensor and water pump, only feed out length).
- Repair step 8, dismantle / assemble combustion chamber housing.
- Unscrew the 2 fixing screws M5 x 12 at the overheating sensor and pull out the overheating sensor.
- Unscrew the 2 countersunk screws M5 x 9 at the jacket (for position of the overheating sensor, see Page 27).
- Use a screwdriver to carefully lever out the heat exchanger at the notches.

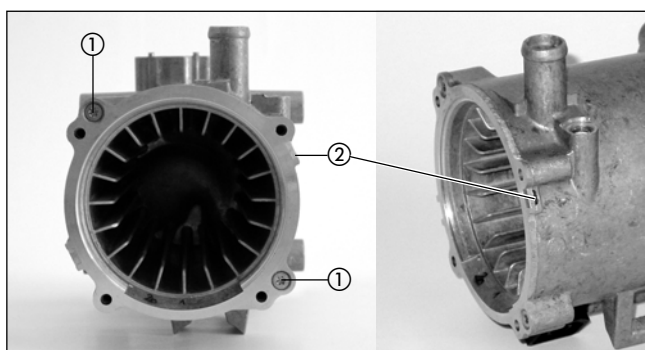


Figure 10

- Install in the reverse order.

Torque for countersunk screws  $6^{+0.5}$  Nm.

Torque for overheating sensor fixing screws  $4^{+0.5}$  Nm.

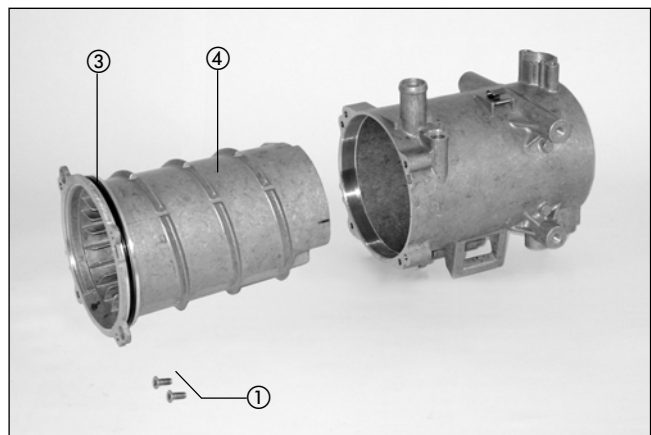


Figure 11

- ① M5 x 9 countersunk screws
- ② Notch for levering out
- ③ O-ring
- ④ Heat exchanger

#### Please note!

While installing the heat exchanger, check the O-ring for damage and if necessary replace.  
Grease the O-ring with special grease.

## 5 Repair instructions

### Measuring the fuel quantity

#### Preparing for the measurement

(Sketch 2)

- Remove the fuel pressure pipe at the heater and insert a measuring cylinder (size 25 cm<sup>3</sup>).
- Switch on heater.  
After 63 sec. the metering pump starts pumping the fuel.  
If the fuel comes out uniformly and free of bubbles, the fuel pipe is filled and vented.
- Switch off heater and empty measuring cylinder.

#### Measurement

- Switch on heater.  
After 63 sec. the metering pump starts pumping the fuel.
- During the measurement, hold the measuring cylinder at the level of the heater.  
After 105 sec. the pumping of the fuel is automatically switched off.
- Switch off heater, as otherwise it will start up again.
- Read off the quantity of fuel in the measuring cylinder.

#### Evaluation

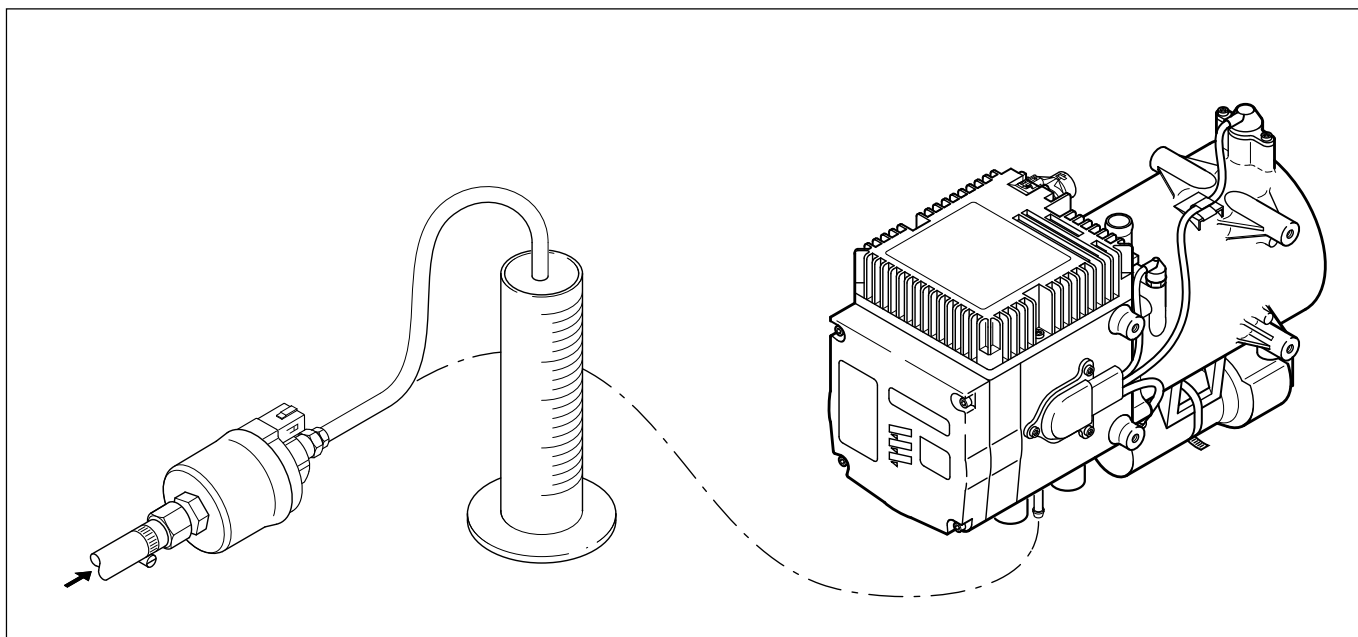
Compare the measured quantity of fuel with the values in the following table.

If the measured quantity of fuel is above the maximum value or below the minimum value, the metering pump must be replaced.

Fuel quantity	<i>HYDRONIC M</i>
Desired	10.2 cm <sup>3</sup> / 105 sec
Maximum	11.3 cm <sup>3</sup> / 105 sec
Minimum	9.1 cm <sup>3</sup> / 105 sec

#### Please note!

Only carry out the fuel measurement if the battery is sufficiently charged. During the measurement at least 11 Volt or 23 Volt and max. 13 Volt or 25 Volt should be applied to the control box respectively.



Sketch 2

## 6 Circuit diagram

### Parts list for the circuit diagrams *HYDRONIC M* – 12 Volt / 24 Volt

- 1.1 Burner motor
- 1.2 Glow plug
- 1.5 Overheating sensor
- 1.12 Flame sensor
- 1.13 Temperature sensor
  
- 2.1 Control box
- 2.2 Metering pump
- 2.5.7 Relay, vehicle fan
- 2.5.18 Relay, change-over water circuit – to be installed by the customer if necessary
- 2.7 Main fuse 12 volt = 20 A  
24 volt = 15 A
- 2.7.1 Fuse, actuation 5 A
- 2.7.5 Fuse, vehicle fan 25 A
- 2.12 Water pump
- 2.15.1 Temperature sensor (room temperature)
- 2.15.9 Temperature sensor (outside temperature)
  
- 3.1.2 Switch, heat (continuous operation)
- 3.1.16 Button, radio remote control
- 3.1.18 Button, *CALLTRONIC*
- 3.2.9 Timer
- 3.2.12 Timer, mini
- 3.3.6 Radio remote control
- 3.3.7 Radio remote control, TP5
- 3.3.8 Remote control, *CALLTRONIC*
- 3.8.3 Antenna
- 3.9.1 Diagnostic unit (JE diagnosis)
  
- 5.1 Battery
- 5.10 Vehicle fan
  
- a) Connection for control unit
- b) Water pump external control (with positive signal)
- c) Water circuit change-over:  
Relay closes at 68 °C and opens at 63 °C water temperature  
(with temperature drop 58 °C / 45 °C)
- d) Ignition (terminal +15)
- f) Lighting (terminal 58)
- g) Heater connection
- h) Ignition (terminal +15)
- i) External heating button connection
- k) Connect cables in connector B2, B3 or B4
- l) Temperature drop (with positive signal)
- x) Disconnect cable
  
- a2) Diagnosis
- a3) Switch-on signal S+
- a4) Positive supply, +30
- a5) Negative supply, -31
- a6) (+) Trigger battery isolating switch  
(Diode: Order No. 208 00 012)

### Cable colours

rt = red	gn = green	Connectors and bush
bl = blue	gr = grey	housings are shown from
ws = white	ge = yellow	the cable inlet side.
sw = black	vi = violet	

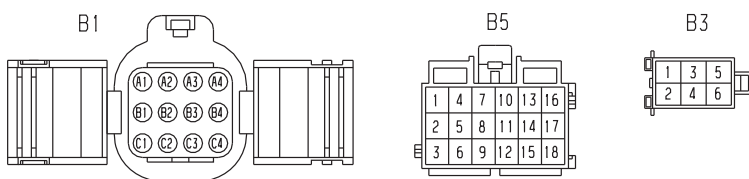
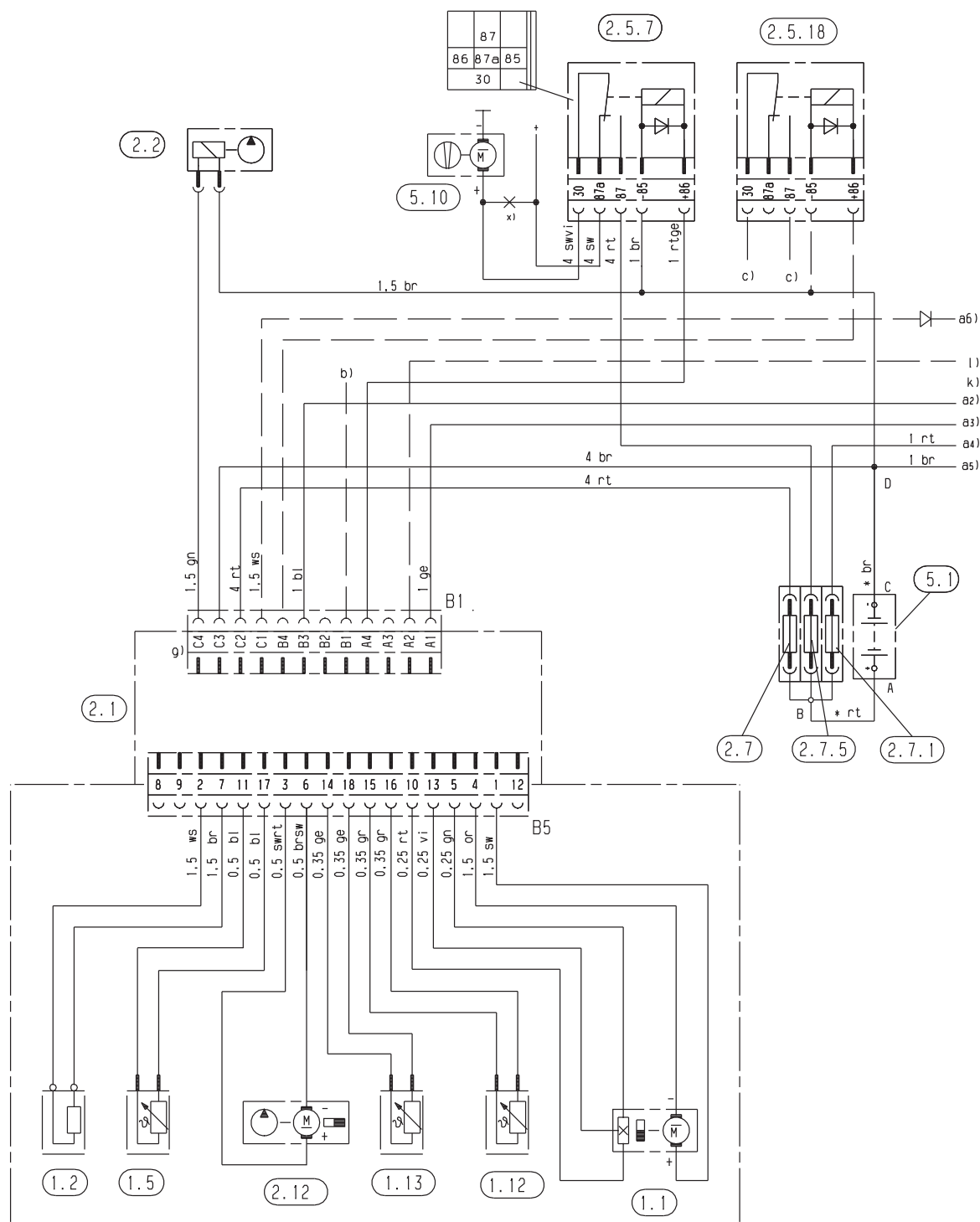
### Parts list for the circuit diagrams *HYDRONIC M* – ADR / ADR99 – 12 Volt / 24 Volt

- 1.1 Burner motor
- 1.2 Glow plug
- 1.5 Overheating sensor
- 1.12 Flame sensor
- 1.13 Temperature sensor
  
- 2.1 Control box
- 2.2 Metering pump
- 2.5.7 Relay, vehicle fan
- 2.5.18 Relay, change-over water circuit – to be installed by the customer if necessary
- 2.7 Main fuse 12 volt = 20 A  
24 volt = 15 A
- 2.7.1 Fuse, actuation 5 A
- 2.7.5 Fuse, vehicle fan 25 A
- 2.12 Water pump
  
- 3.1.2 Switch, heat (continuous operation)
- 3.2.9 Timer
  
- 5.1 Battery
- 5.2.1 Main battery switch  
(operation disconnected e.g. by ignition lock)
- 5.2.2 Battery isolating switch  
(EMERGENCY OFF function in ADR / ADR99)
- 5.10 Vehicle fan
  
- a) Connection for control unit
- b) Water pump external control  
(with positive signal)
- c) In ADR / ADR99 D+ (generator)
- d) In ADR / ADR99 HA- (auxiliary drive / power take-off)  
Positive switch
- e) Water circuit change-over:  
Relay closes at 68 °C and opens at 63 °C water temperature  
(with temperature drop 58 °C / 45 °C)
- f) Ignition (terminal +15)
- k) Connect cables in connector B2 or B5
- l) Heater connection
- m) Lighting (terminal 58)
- n) External heating button connection
- p) Temperature drop (with positive signal)
- r) If only one switching element is used for items 5.2.1 and 5.2.2, it is important to ensure that on activating the „open the battery isolating switch“ function (EMERGENCY OFF function in ADR / ADR99), the switch always breaks contact immediately (regardless of the heater condition) and all the heater's circuits are disconnected from the battery.
- x) Disconnect cable
  
- a1) ADR / ADR99 – feedback
- a2) Diagnosis
- a3) Switch-on signal S+
- a4) Positive supply, +30
- a5) Negative supply, -31
- a6) (+) Trigger battery isolating switch  
(Diode: Order No. 208 00 012)



# 6 Circuit diagram

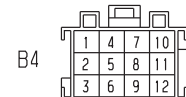
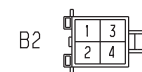
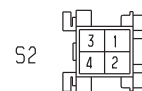
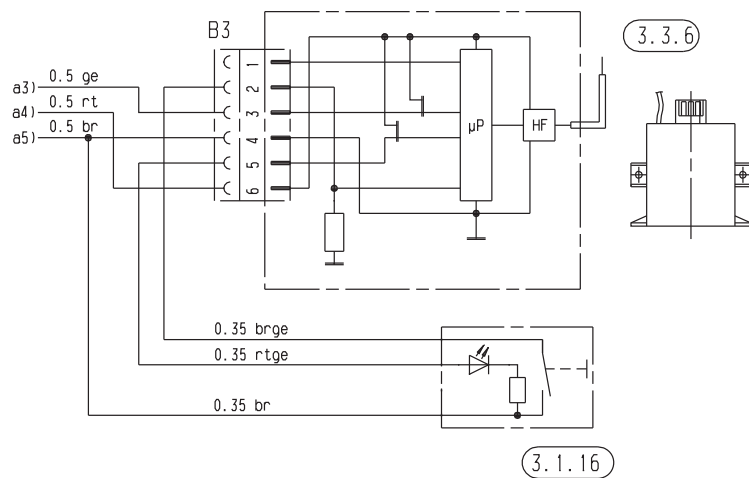
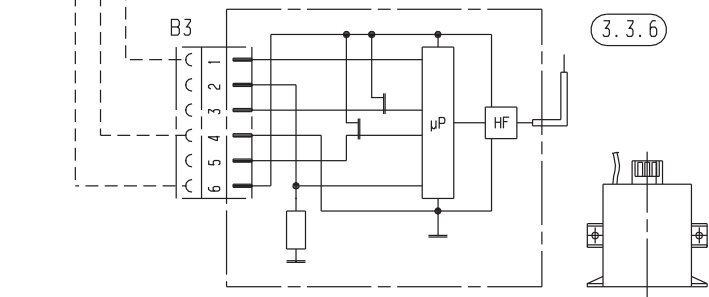
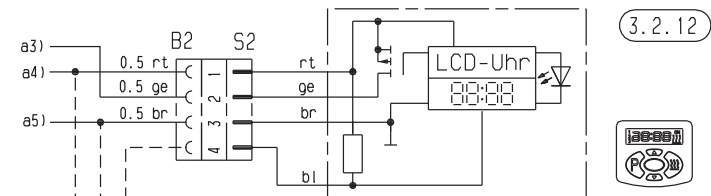
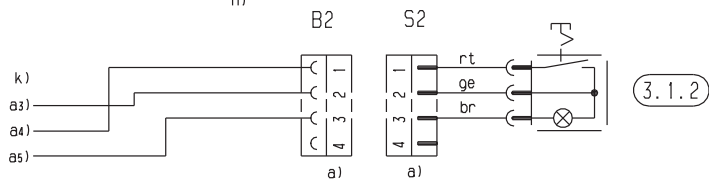
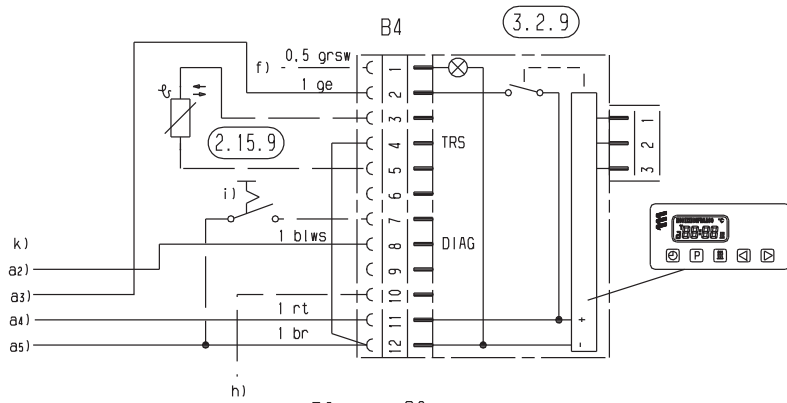
Circuit diagram *HYDRONIC M* – 12 Volt / 24 Volt



25 2160 00 96 02 A

# 6 Circuit diagram

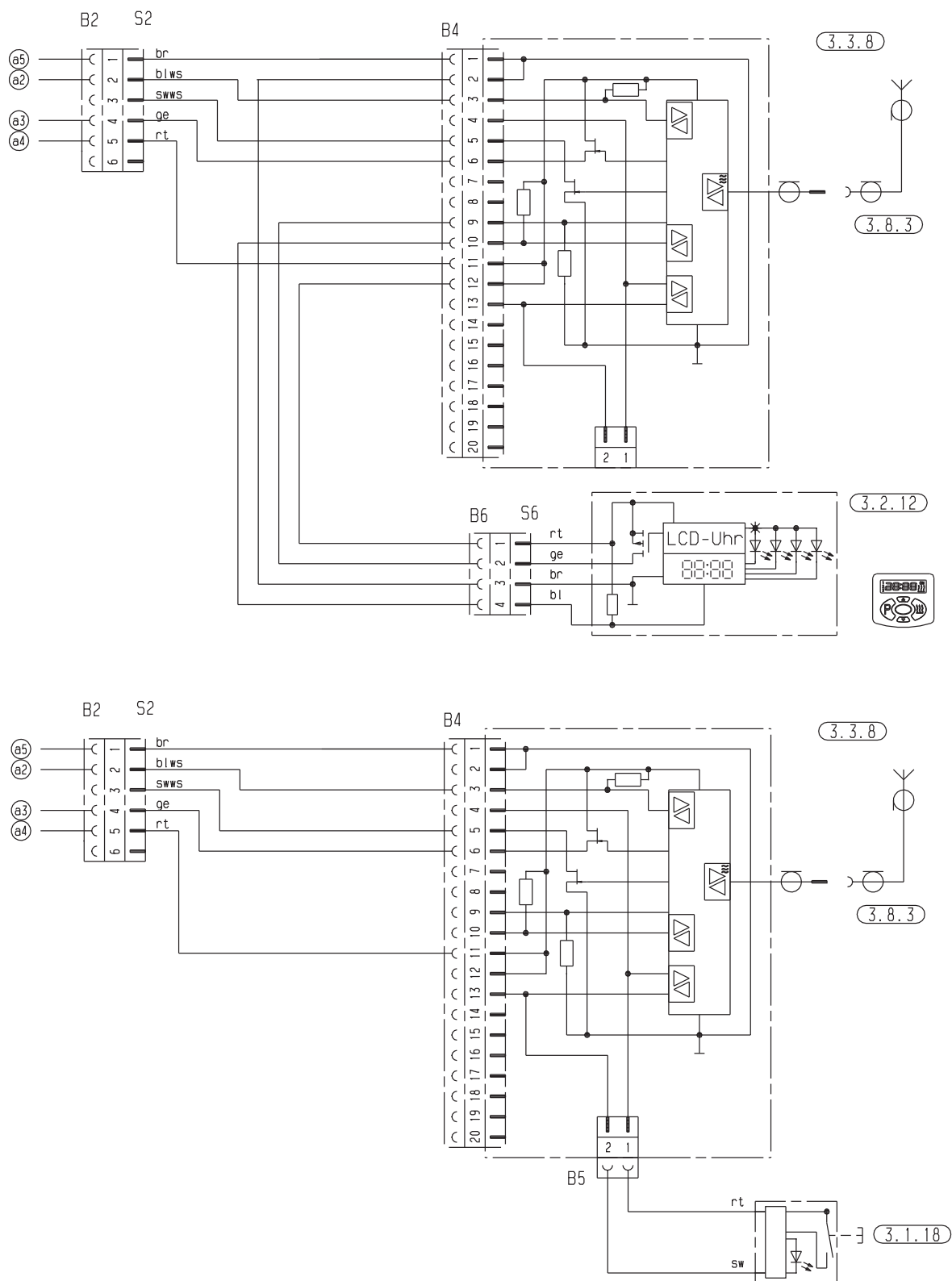
## Circuit diagram – control units, part 1



25 2160 00 96 02 A

# 6 Circuit diagram

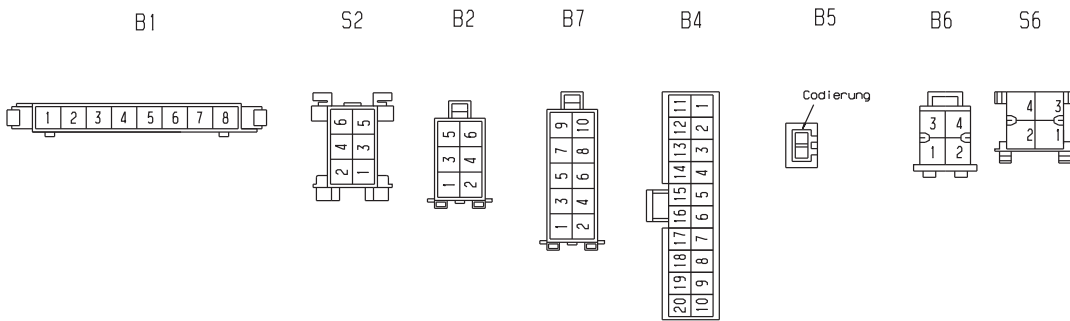
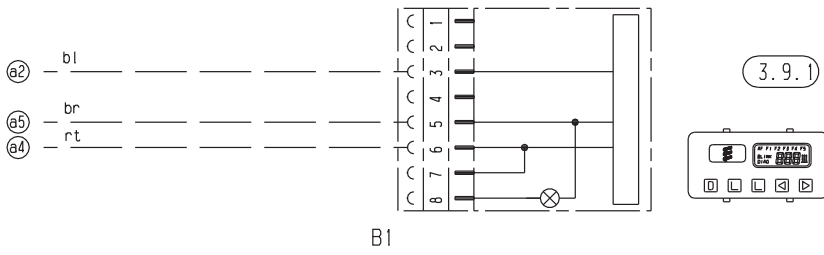
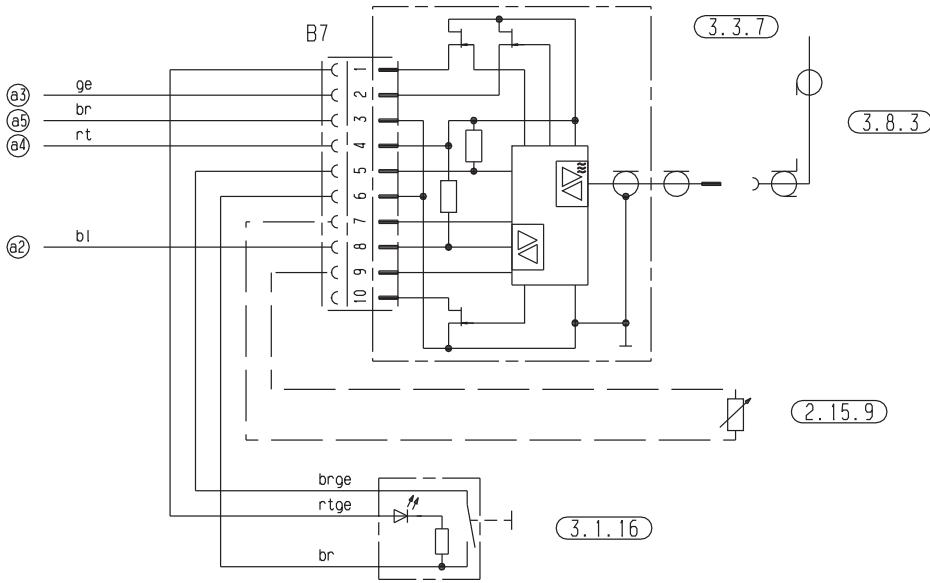
## Circuit diagram – control units, part 2



25 2044 00 96 03 B

# 6 Circuit diagram

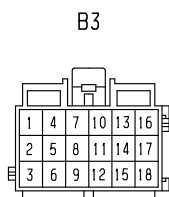
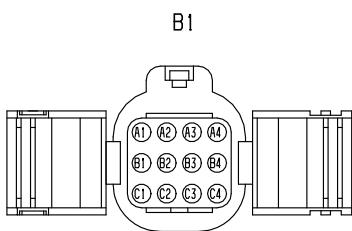
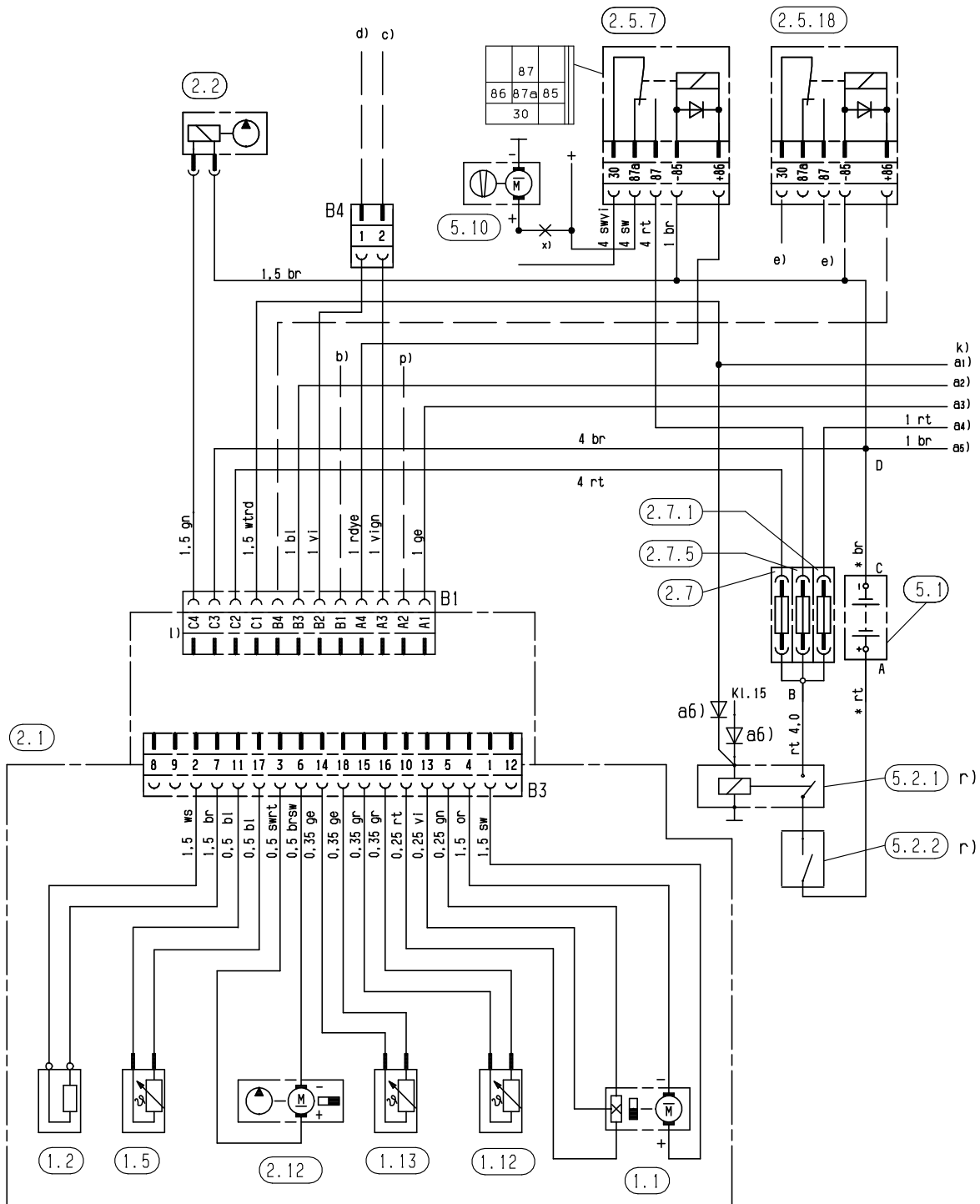
## Circuit diagram – control units, part 3



25 2044 00 96 03 B

# 6 Circuit diagram

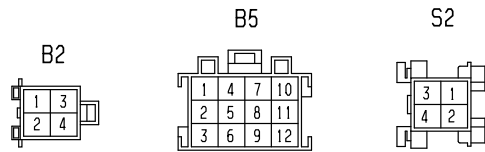
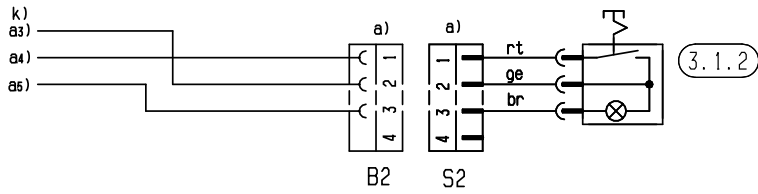
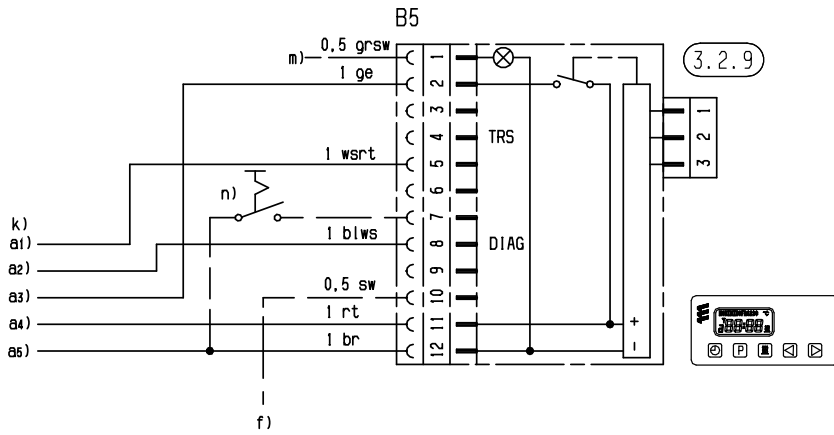
Circuit diagram *HYDRONIC M* – ADR / ADR99 – 12 Volt / 24 Volt



25 2160 00 96 01 B

# 6 Circuit diagram

Circuit diagram – control units ADR / ADR99 – 12 Volt / 24 Volt



25 21060 00 96 01 B



## 6 Circuit diagram

### Parts list for the circuit diagrams for the control elements **EasyStart – ADR**

- 2.15.1 Temperature sensor (room temperature)  
(included in the EasyStart R+ scope of supply,  
optional for EasyStart R and EasyStart T)
- 2.15.9 External temperature sensor
  
- 3.1.7 "ON / OFF" button
- 3.1.16 Radio remote control button
  
- 3.2.15 **EasyStart T** timer
  
- 3.3.9 **EasyStart R** radio remote control (stationary unit)
- 3.3.10 **EasyStart R+** radio remote control (stationary unit)
  
- 3.6.1 Adapter cable
  
- 3.8.3 Antenna
  
- c) Terminal 58 (lighting)
- e) EasyStart T timer connection
- g) External "ON / OFF" button (optional)
- x) ADR jumper

#### **Please note!**

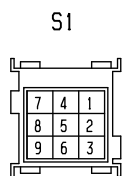
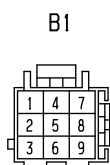
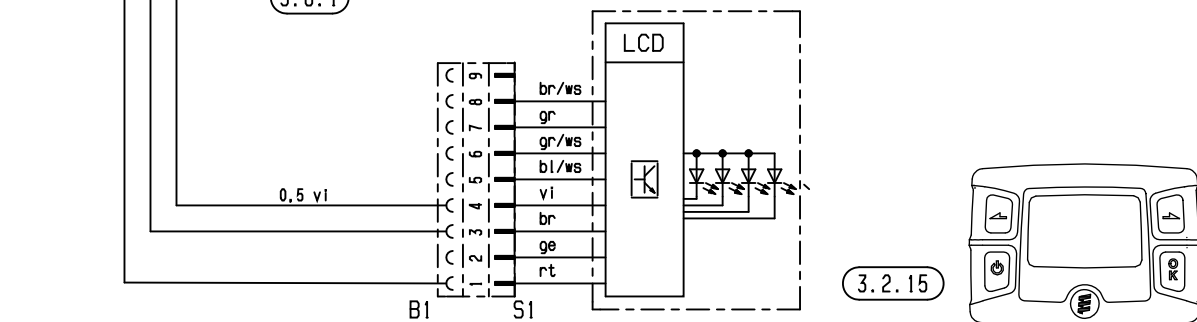
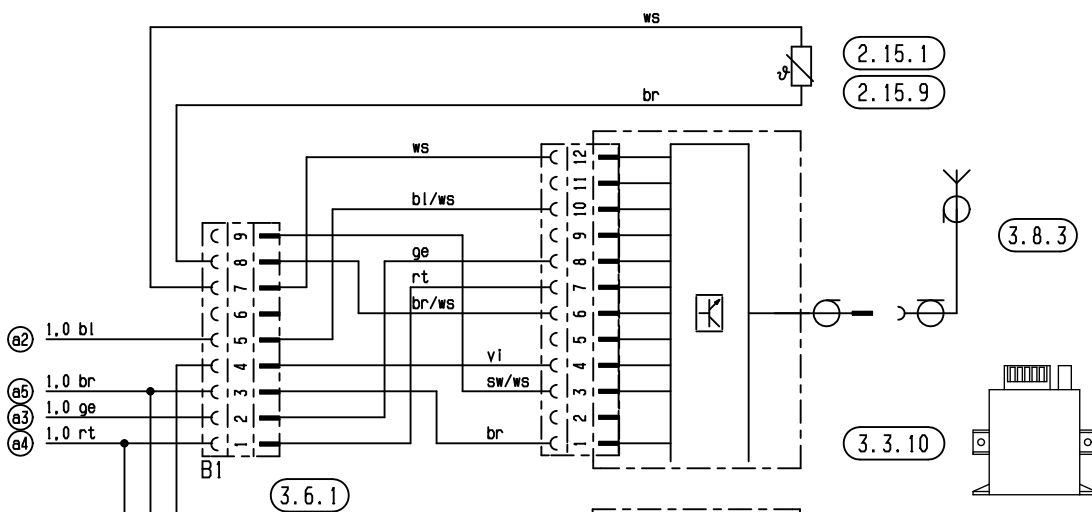
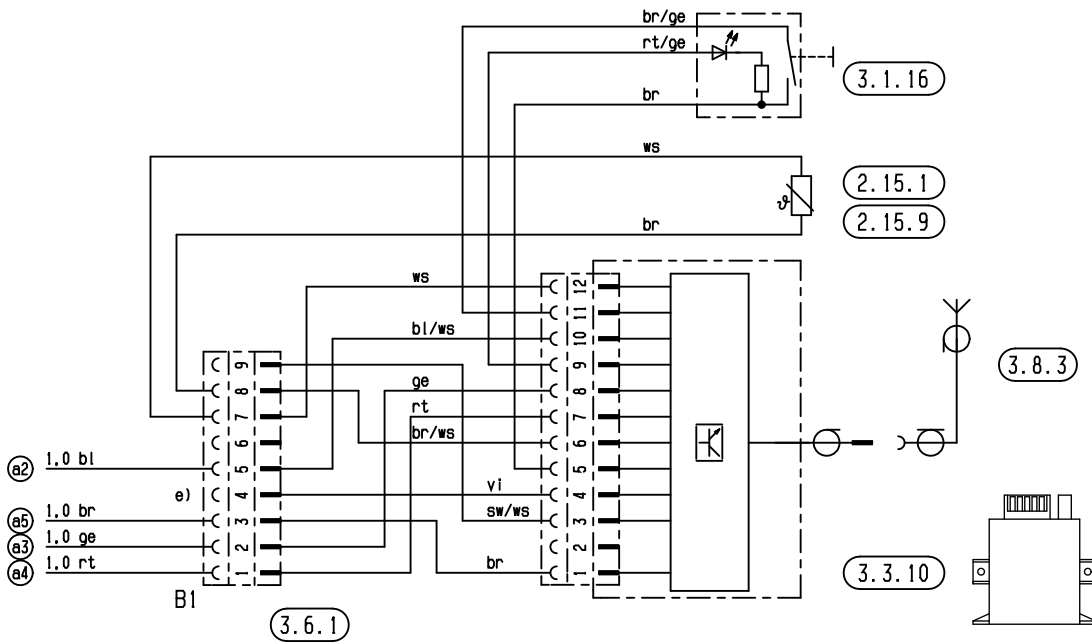
- The timer / radio remote control must be connected in accordance with the circuit diagrams (page 40 – 43).
- The timer must be connected as shown in the circuit diagrams at the end of the installation instructions.
- Note heater type!
- Insulate unused cable ends.  
Connectors and bush housings are shown from the cable inlet side.

#### **Cable colours**

- rt = red
- bl = blue
- sw = white
- sw = black
- gn = green
- gr = grey
- ge = yellow
- vi = violet

# 6 Circuit diagram

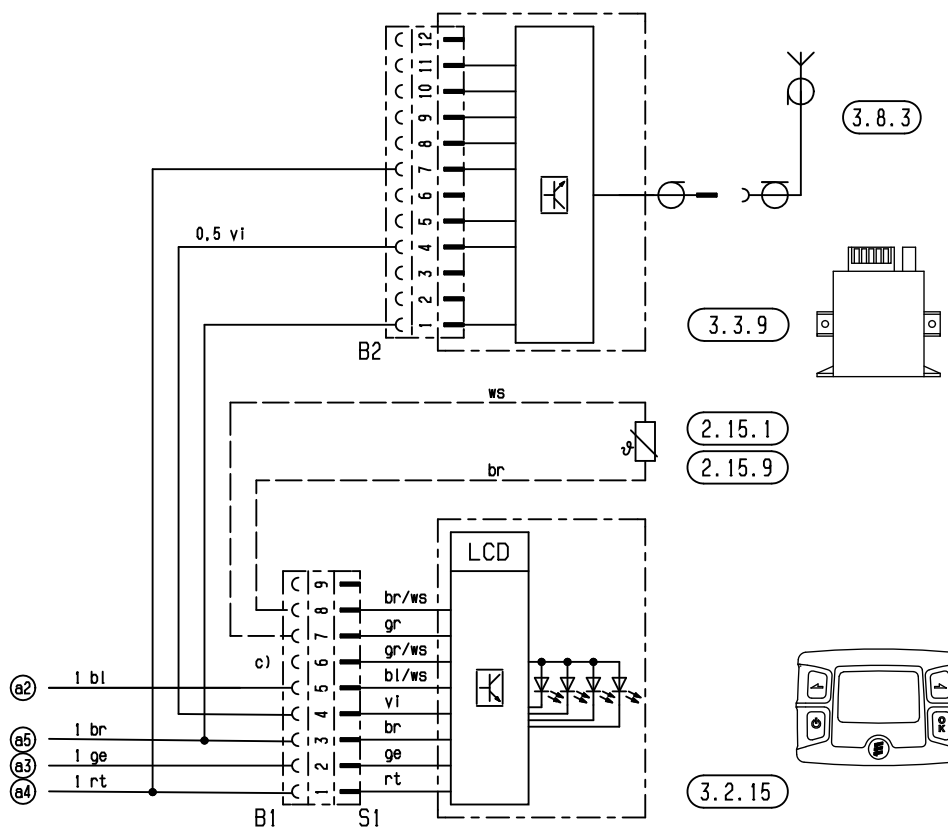
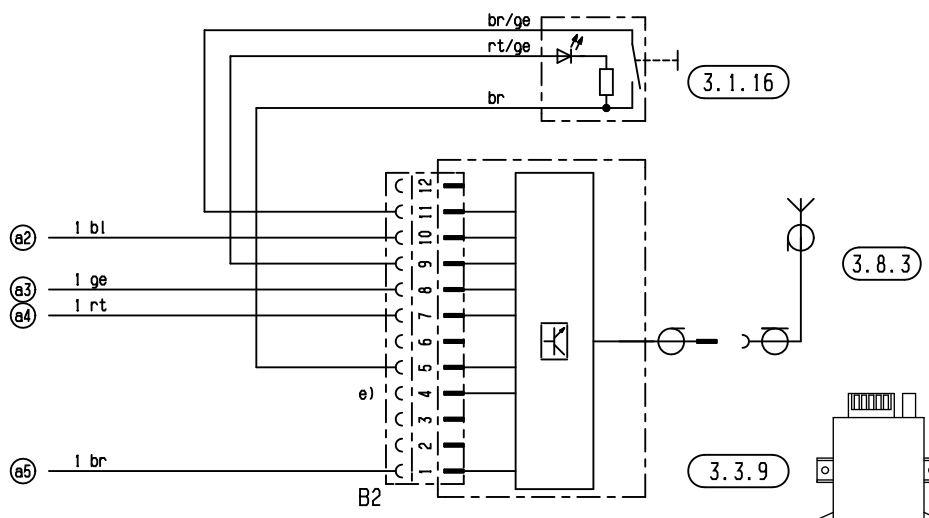
## Circuit diagram – control units, EasyStart R+





# 6 Circuit diagram

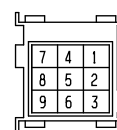
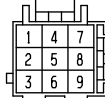
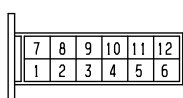
## Circuit diagram – control units, EasyStart R



B2

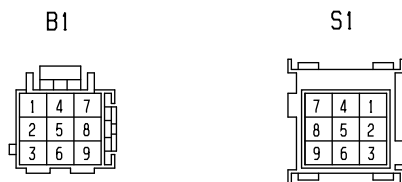
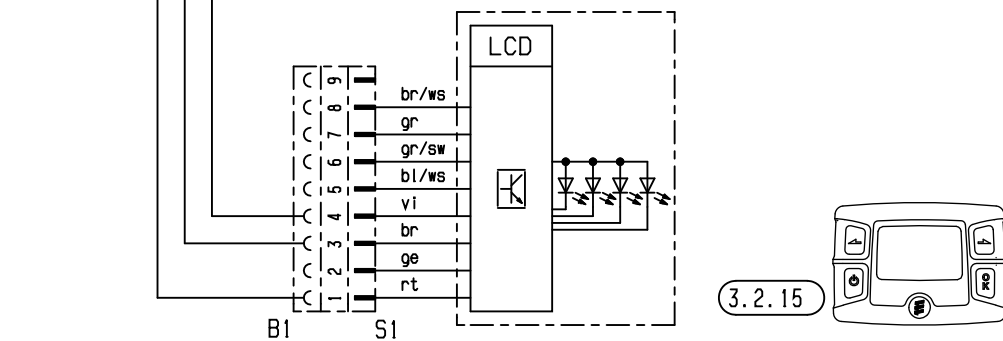
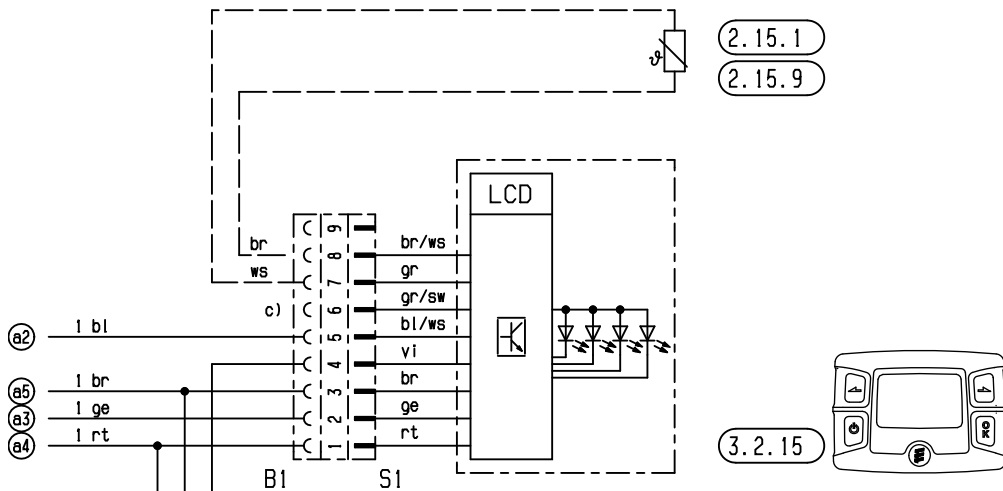
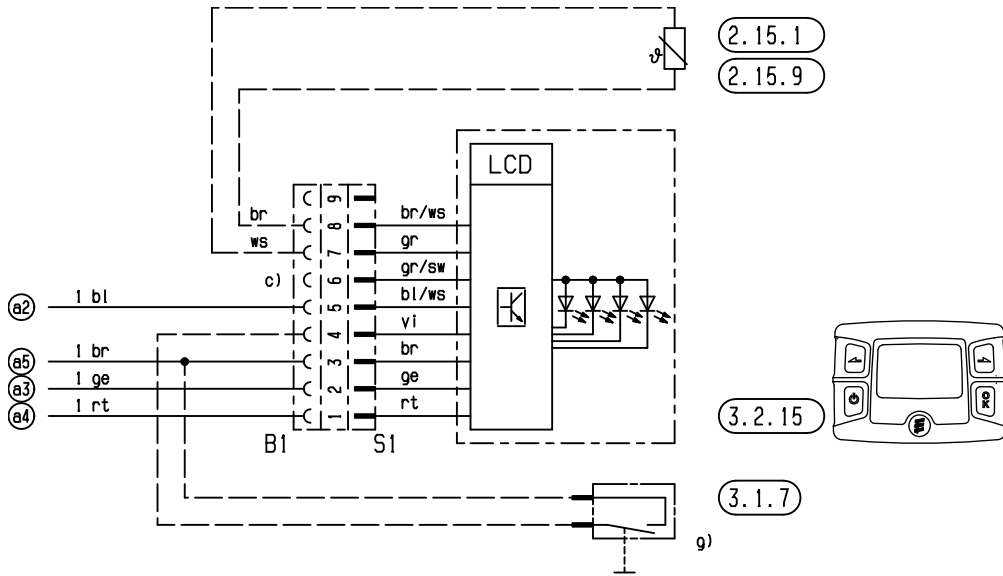
B1

S1



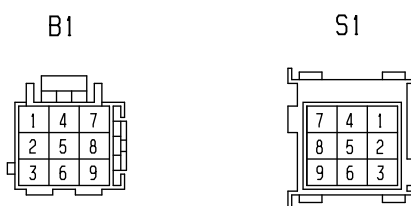
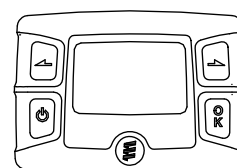
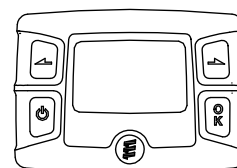
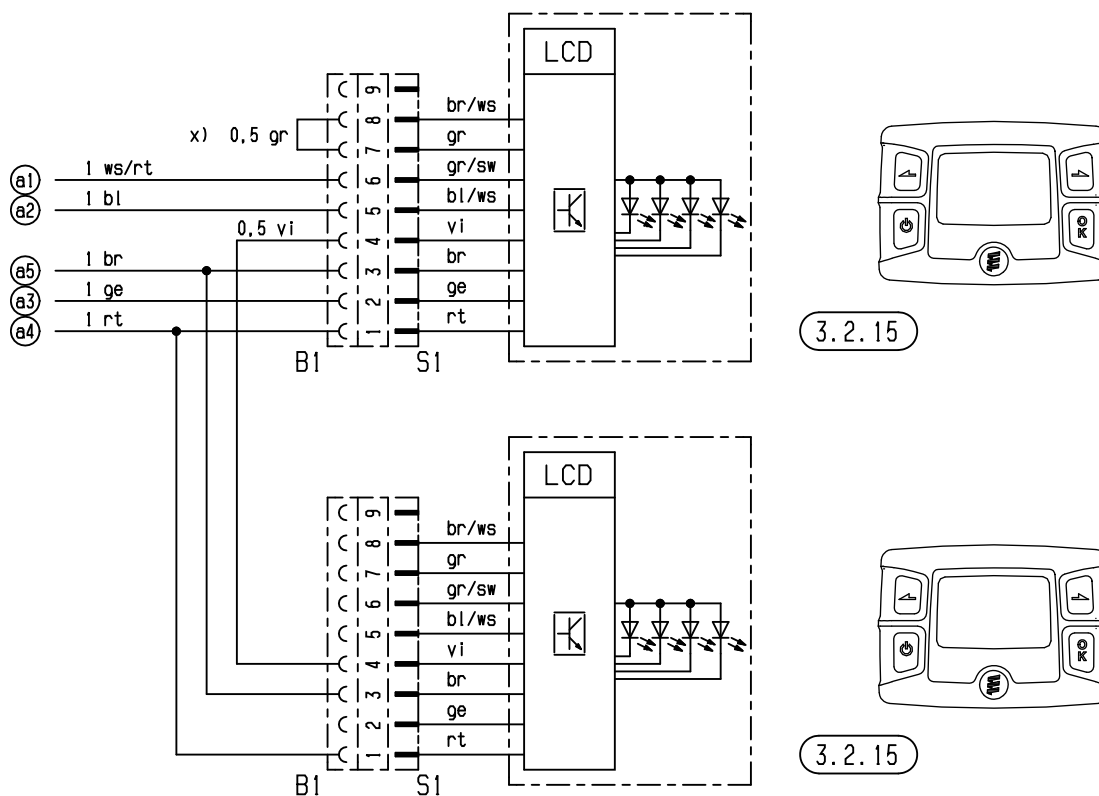
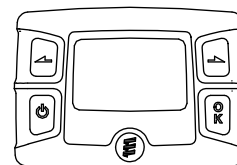
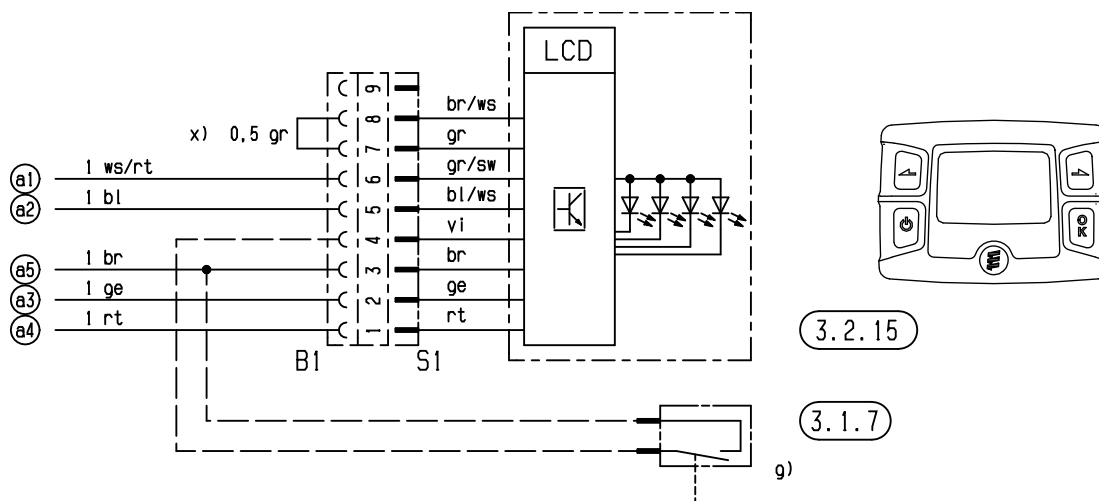
# 6 Circuit diagram

Circuit diagram – control units, EasyStart T



# 6 Circuit diagram

## Circuit diagram – control units, EasyStart T – ADR



## 7 Service

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### Certifications

The high quality of Eberspächer's products is the key to our success.

To guarantee this quality, we have organised all work processes in the company along the lines of quality management (QM). Even so, we still pursue a large number of activities for continuous improvement of product quality in order to keep pace with the similarly constantly growing requirements made by our customers.

All the steps necessary for quality assurance are stipulated in international standards.

This quality is to be considered in a total sense.

It affects products, procedures and customer / supplier relationships.

Officially approved public experts assess the system and the corresponding certification company awards a certificate.

Eberspächer has already qualified for the following standards:

**Quality management in accordance with  
DIN EN ISO 9001:2000 and ISO/TS 16949:1999**

**Environmental management system in accordance with  
DIN EN ISO 14001:1996**

### Disposal

#### Disposal of materials

Old devices, defect components and packaging material can all be separated and sorted into pure-grade fractions so that all parts can be disposed of as required in an environment-friendly manner recycled where applicable.

Electric motors, controllers and sensors (e.g. temperature sensors) are deemed to be „electronic scrap“.

#### Dismantling the heater

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

#### Packaging

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

### EC Declaration of Conformity

With regard to the following products

#### Heater type *HYDRONIC M*

we herewith confirm that it conforms with the prime safety requirements stipulated in the directives of the EU Council for harmonisation of the legal regulations of the member states with regard to electromagnetic compatibility (89 / 336 / EEC). This declaration applies to all heaters produced according to the production drawings *HYDRONIC M*, which are an integral part of this declaration.

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

- EN 50081 – 1 Basic form interference emission
- EN 50082 – 1 Basic form of interference immunity
- 72 / 245 / EEC – Modification status 95 / 54 / EC interference suppression in motor vehicles.



## 8 Lists

### List of key words A – Z

Keyword	Page	Keyword	Page
<b>A</b>		<b>I</b>	
Accident prevention .....	4	Individual parts list .....	23
Adapter cable .....	11, 12, 16	Introduction .....	2 – 4
ADR / ADR99 .....	7	<b>K</b>	
AMP release tool .....	21	KD 2000 Customer service program .....	11, 16
Assembly drawing .....	22	<b>L</b>	
<b>B</b>		Liability claim .....	4
Burner .....	30	List of abbreviations .....	48
<b>C</b>		List of Contents .....	2
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## 8 Lists

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### List of abbreviations

**ADR**

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

**ADR99**

Dangerous goods regulations for France.

**EC type-approval**

Permit awarded by the Federal Vehicle Office for the production of a heater for installation in motorised vehicles.

**EMC Directive**

Electromagnetic compatibility.

**JE-partner**

J. Eberspächer partner.

**PME**

Biodiesel as per DIN V 51606.



