

AIRTRONIC L

Troubleshooting and Repair Instructions

**Heater**

Airtronic L – B5, 12 Volt

Order No.

20 1859 05 00 00

Heater

Airtronic L – D5, 12 Volt

Airtronic L – D5, 24 Volt

Order No.

25 2361 05 00 00

25 2362 05 00 00

**Air heater for diesel and petrol
operating independently of the engine.**



1 Introduction

List of 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 53.

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1 Introduction

List of Contents

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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.

Important information before starting work

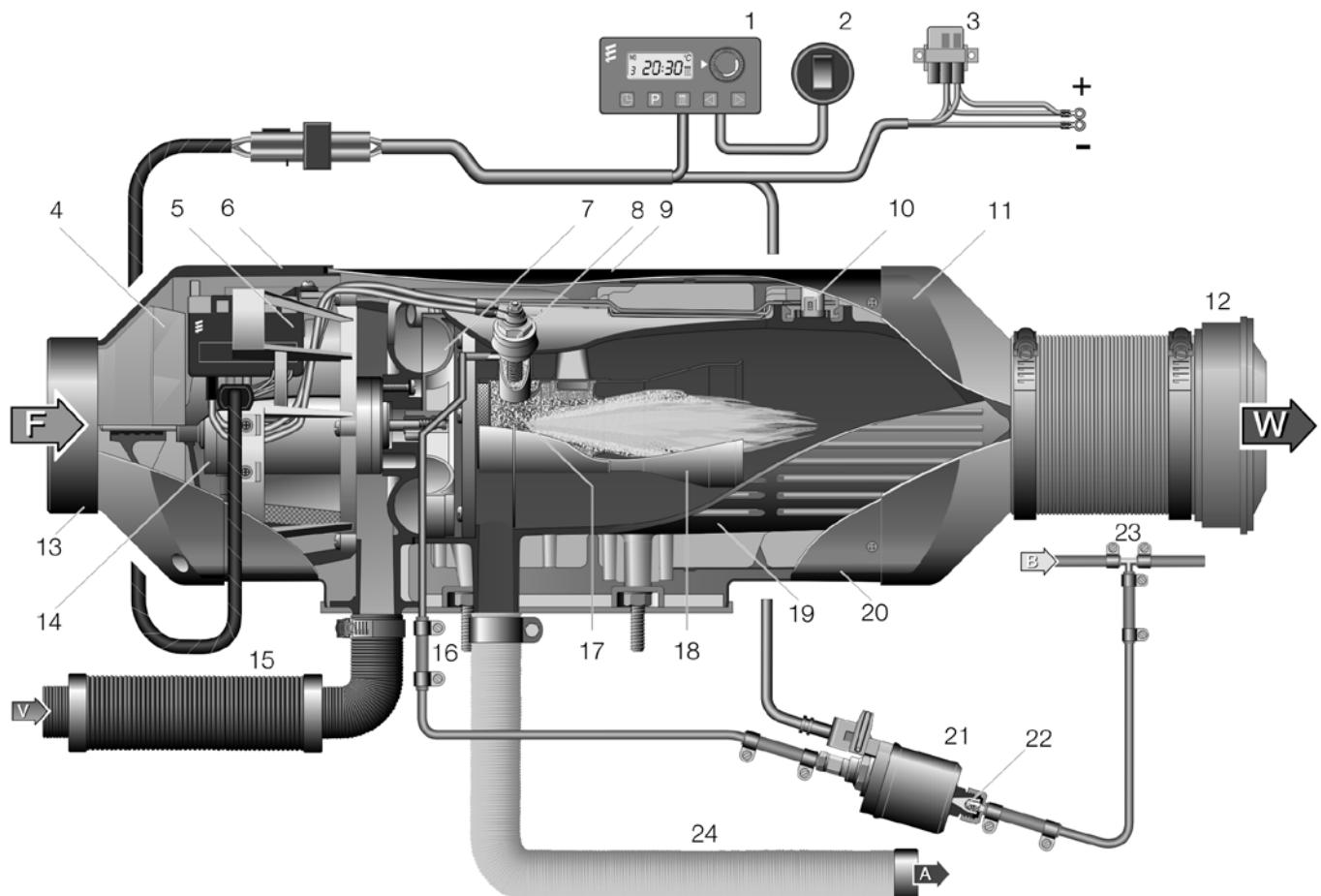
Initial commissioning of the heater or functional test after a repair

- After installing the heater, the whole fuel supply system must be carefully vented: please refer to and follow the vehicle manufacturer's instructions.
- During the heater trial run, all 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



2 Function

Cutaway view



- 1 Module timer
- 2 Changeover switch „heat / ventilate“
- 3 Fuse bracket
 - Main fuse 25 A
 - Fuse, „actuation“ 15 A
- 4 Heater impeller
- 5 Control box
- 6 Intake hood
- 7 Blower
- 8 Glow plug
- 9 Jacket shell, top
- 10 Combination sensor (overheating and flame sensor)
- 11 Outlet hood
- 12 Outflow
- 13 Safety grille
- 14 Electrical motor
- 15 Combustion air intake silencer

- 16 Fuel connection
- 17 Combustion chamber
- 18 Flame pipe
- 19 Heat exchanger
- 20 Jacket shell, bottom
- 21 Metering pump
- 22 Pot-type strainer
- 23 T-piece
- 24 Exhaust pipe

- F = Fresh air
- W = Hot air
- V = Combustion air
- A = Exhaust
- B = Fuel

2 Function

Description of functions

Switching on / starting the heater

When the heater is switched on, the control lamp in the control unit lights up.

The fan starts up in the fan stage „LOW“. The glow plug starts with a 3 second delay. After approx. 55 seconds the fuel supply starts and the fuel / air mixture in the combustion chamber ignites.

The fan switches from fan stage „LOW“ to fan stage „MEDIUM“. The glow plug is switched off after 130 seconds, when a stable flame has formed.

The fan switches from fan stage „MEDIUM“ to fan stage „HIGH“.

The heater is run at an increased heating capacity of 5.5 kW (stage „POWER“) in order to quickly reach the heater's operating temperature. If the heater's operating temperature has been reached, the heating capacity is reduced to 4.8 kW (stage „HIGH“). The length of time for which the heater is run with an increased heating output depends on the ambient temperature.

Switching off

When the heater is switched off, the control lamp goes out and the fuel delivery is switched off.

The blower continues running for approx 4 minutes to cool down.

During the blower after-run, the glow plug is switched on for approx. 30 seconds for cleaning purposes.

Special case:

If no fuel has been supplied or if the heater is in the "OFF" stage until it is switched off, the heater is stopped without any after running.

Control in heating mode

During the heating mode, the room temperature or the temperature of the sucked in heating air is constantly measured. If the temperature is higher than the temperature preset at the control unit the control starts. 4 control stages are provided enabling fine adjustment of the heat flow supplied by the heater to the heat requirements. Blower speed and fuel quantity correspond to the respective control stage.

If the set temperature is still exceeded in the smallest control stage, the heater goes to the "OFF" stage with the blower running on for approx. 4 minutes to cool down.

The blower then continues at minimum speed in "MEDIUM" control stage (circulation mode) until the restart or is switched off (fresh air mode with external temperature sensor).

Temperature selection using the control element

The control unit can be used to preselect the interior temperature.

The resulting temperature can be within the range of +10 °C to +30 °C and depends on the selected heater, on the size of the space to be heated and on the prevailing outdoor temperature.

The setting to be selected at the control is an empirical value.

Ventilating mode

The EasyStart R+ and EasyStart T control units and the mini-controller can be used to activate the „Ventilate“ function.

The „Heat / Ventilate“ switch is also required for the modular timer and control device whereby, for fan mode, the „Heat / Ventilate“ switch must be pressed first and then the heater switched on.

The blower runs at maximum speed in fan mode.



2 Function

Control and safety devices

- If the heater does not ignite within 70 seconds after the fuel starts to pump, the start is repeated. If the heater still does not ignite after another 60 seconds of pumping fuel, the heater is switched off, i.e. the fuel supply is off and the fan runs on for approx. 4 minutes.
- If the flame goes off by itself during operation, the heater is restarted. If the heater does not ignite within 70 seconds after the fuel pump has restarted, or ignites and goes off again within 15 minutes, the heater is switched off, i.e. the fuel supply is off and the fan runs on for approx. 4 minutes. This automatic switching off can be cancelled by briefly switching off and on again. Do not repeat the switching off / on routine more than twice.
- In the case of overheating, the combined sensor (flame sensor / overheating sensor) triggers, the fuel feed is interrupted and the heater switched off. Once the cause of the overheating has been eliminated, the heater can be re-started by switching off and on again.
- If the lower or upper voltage limit is reached, the heater is switched off after 20 seconds.
- The heater does not start if the glow plug, the blower motor or the flame sensor is defective.
- The heater does not start if the electric cable to the metering pump is interrupted.
- If the combined sensor (overheating sensor) is defective or the electric lead is interrupted, the heater starts and the safety lockout (shutdown on faults) does not take place until during the start phase.
- The speed of the blower motor is continuously monitored. If the blower motor does not start up or if the speed deviates by more than 10 %, the heater is switched off after 30 sec.
- When the heater is switched off, the glow plug is switched on for 30 seconds (after glowing) while the fan runs on, in order to clean off any combustion residues.

Please note!

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

Forced shut-down during ADR / ADR99 operation

In vehicles for the transport of dangerous goods (e. g. tankers), 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 automatically switching off if:

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

	Airtronic L – B5				Airtronic L – D5								
Heater	Air				Air								
Control of the heat flow	Stage				Stage								
	Power	High	Medium	Low	Power	High	Medium	Low					
Heat flow (watt)	5500	4800	2700	2000	5500	4800	2700	1500					
Heater air flow rate without counterpressure (kg/h)	280	275	180	125	280	275	180	125					
Heater code	10				10								
Fuel consumption (l/h)	0.75	0.65	0.37	0.27	0.66	0.58	0.34	0.19					
Elect. power consumption (watt)	in operation	85	80	30	15	85	80	30					
		< 250			< 250								
Rated voltage (volt)	12				12 / 24								
Operating range	<p>Lower voltage limit: An undervoltage protector installed in the control box switches off the heater when the voltage limit is reached.</p> <p>approx. 10,5 volt and 20 volt respectively Undervoltage protection trigger time: 20 seconds</p> <p>Upper voltage limit: An overvoltage protector installed in the control box switches off the heater when the voltage limit is reached.</p> <p>approx. 16 volt and approx. 32 volt respectively Overvoltage protection trigger time: 20 seconds</p>												
Fuel	Petrol – standard commercial quality (DIN EN 228)				Diesel fuel – standard commercial quality (DIN EN 590)								
Permissible ambient temperature	Operation	Heater	Metering pump		Heater	Metering pump							
		-40 °C bis +50 °C	-40 °C bis +20 °C		-40 °C bis +70 °C	-40 °C bis +50 °C							
	Storage	-40 °C bis +85 °C	-40 °C bis +85 °C		-40 °C bis +85 °C	-40 °C bis +85 °C							
Maximum air intake temperature	+40 °C												
Interference suppression	Suppression class 5 to DIN EN 55025												
Weight	approx. 9.3 kg												
Ventilation mode	Possible												



Caution!

Safety instructions for technical data!

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

Please note!

Provided no limit values are given, the technical data listed is subject to the tolerances usually applicable to heaters of ±10% for nominal voltage, ambient temperature 20 °C and reference altitude Esslingen.



3 Product information

Check values

Test speed for the blower

Heater 12 volt

At 11.3 volt n = 4650 – 7000 1/min

Heater 24 volt

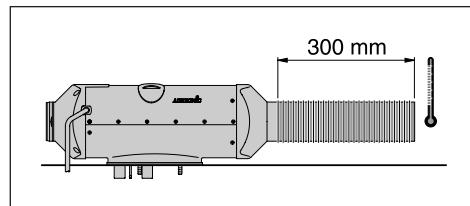
At 23.6 volt n = 4650 – 6500 1/min

Resistance values	12 volt	24 volt
Glow plug (hot test)	approx. 0,6 Ω ± 0,04 Ω	approx. 2 Ω ± 0,02 Ω
Metering pump at 20 °C	9.5 Ω ±0,50 Ω	36.0 Ω ±1,8 Ω

Control unit resistance values	Switch position, left limit stop	Switch position, right limit stop
Control device 12 volt / 24 volt	min. 1720 Ω max. 1760 Ω	min. 2096 Ω max. 2216 Ω
Modular timer and mini-controller 12 volt / 24 volt	min. 1730 Ω max. 1780 Ω	min. 2120 Ω max. 2240 Ω

Switching value

Overheating sensor 140 °C – 170 °C
measured in the "High"
control stage
and at a distance of
300 mm downstream
from the hot air outlet



Exhaust emission specification

CO₂ in exhaust

in control stage "high" 7,5 – 12,5 Vol. %
Smoke spot number according to Bacharach < 4

Check "external" temperature sensor

(Order No.: 25 1774 89 03 00)

The "external" temperature sensor test must be carried out using a digital multimeter. If the resistance value is not the same as the curve in the diagram or the table of values, replace the temperature sensor.

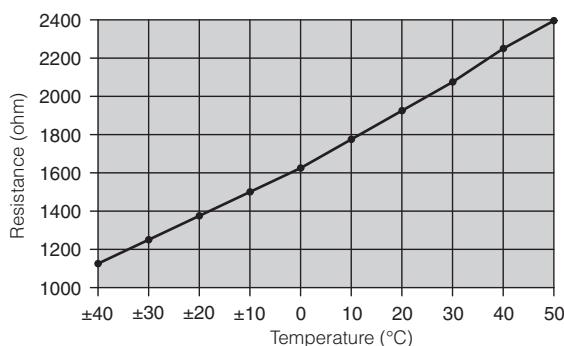


Table of values – "external" temperature sensor

Temperature °C	Resistance Ω	
	min.	max.
0	1600	1660
5	1670	1730
10	1745	1800
15	1820	1870
20	1895	1950
25	1970	2030
30	2050	2110
35	2130	2190
40	2210	2280
45	2295	2370

4 Troubleshooting

What to check first in case of faults

• Check

- Fuel in the tank?
- Fuel pipes leaking? (visual check)
- Summer diesel in the fuel pipe?
- Hot air system blocked?
- Combustion air system or exhaust system damaged or blocked?
- Air pressure sensor installed? If yes, see Chapter »What to do if ...?« and follow the »Altitude Kit« installation instruction.
- New generation control box installed?
Features:
 - > Control box cable loom wound with cable tape
 - > Temperature sensor mounted on the side of the control box (can be seen when cover removed)

• Electrical components

- Cables, connections damaged?
- Contacts corroded?
- Fuses defective?
- Incorrect wiring? (short circuits, interrupted / broken)

• Measure battery voltage

- Battery voltage < 10.5 volt, the undervoltage protection of the 12 volt heater has triggered.
- Battery voltage < 21 volt, the undervoltage protection of the 24 volt heater has triggered.

• Measure voltage supply (CI 30)

Disconnect the 16-pin connector S1 / B1 and measure the voltage applied at connector B1 between chamber 1 (cable 2.5² rt) and chamber 10 (cable 2.5² br).

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).

• Check switch-on signal

Disconnect the 16-pin connector S1 / B1 and then switch on the heater at the control unit.

Check whether voltage is applied in the connector B1 between chamber 4 (cable 0.5² ge) and chamber 10 (cable 2.5² br).

If no voltage is measured, then check the supply cable (cable 0.5² ge), the 5 A fuse (item 2.7.1 in the circuit diagram) and the control unit.

• Check control unit

Control device, mini-timer, mini-controller and modular timer

Disconnect the connector at the control unit; install a jumper between the red 0.5² rt cable and the yellow 0.5² ge cable. If a voltage is measured in connector B1 between chamber 4 (cable 0.5² ge) and chamber 10 (cable 2.5² br), then replace the control unit.

EasyStart R+ / EasyStart R / EasyStart T

Disconnect the connector at the control unit; install a jumper between the black/white 0.5² bl/ws cable and the red 0.5² rt cable.

If a voltage is measured in connector B1 between chamber 8 (cable 0.5² bl/ws) and chamber 10 (cable 2.5² br), then replace the control unit.



4 Troubleshooting

Overview of the test equipment and control units suitable for diagnosis

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

Test equipment	Order No.:
• Testing device for the control device	22 1509 89 00 00
• Diagnostic unit additionally required: Adapter cable	22 1529 89 00 00 22 1000 31 86 00
• EDiTH diagnostic tool – Basic adapter with software additionally required: Airtronic extension	22 1542 89 00 00 22 1537 89 00 00
– ISO-adapter additionally required: Adapter cable	22 1541 89 00 00 22 1000 31 86 00
– „Air pressure sensor“ adapter cable Only for heaters with connected air pressure sensor for reading out the „air pressure sensor“ fault memory.	22 1000 33 31 00

If a diagnostics cable is connected, the following control units can also be used:

Control units	Order No.:
• Module timer	22 1000 30 34 00
• TP5 radio remote control	22 1000 32 01 00
• EasyStart T	22 1000 32 88 00
• EasyStart R+	22 1000 32 80 00

Please note!

If the fault memory cannot be read out, check the diagnostics cable for correct laying and possible damage.

Important notes on diagnosis of heaters with mini-controller control unit

Caution!

When checking the heater with the diagnostics unit or the EDiTH diagnostics tool the order given in the following notes must always be followed as otherwise the heater detects Error 62 (control unit – interruption) and switches to emergency operation.

Mini-controller in stand-alone operation

- Connect adapter cable 22 1000 31 86 00 as described in the operating instruction.
- Select operating mode (Heat / Ventilate) at the mini-controller
- Perform diagnosis using the diagnostics unit or the EDiTH diagnostics tool.
- Switch off the mini-controller after finishing the diagnosis
- Remove the adapter cable

Mini-controller in combination with mini-timer

- Connect adapter cable 22 1000 31 86 00 as described in the operating instruction.
- Press the  button of the mini-timer
- Select operating mode (see mini-timer operating instructions)
- Perform diagnosis using the diagnostics unit or the EDiTH diagnostics tool.
- Switch off the mini-timer after finishing the diagnosis
- Remove the adapter cable

Mini-controller in combination with TP5

- Connect adapter cable 22 1000 31 86 00 as described in the operating instruction.
- Press the  button of the TP5 radio remote control
- Select operating mode (see TP5 radio remote control operating instruction)
- Perform diagnosis.
- Switch off TP5 radio remote control after finishing the diagnosis
- Remove the adapter cable

Please note!

If the operating mode is to be changed during the test the heater must be switched off first using the diagnostics unit or the EDiTH diagnostics tool, otherwise the heater detects Error 62 (control unit – interruption) and switches to emergency operation.

Test mini controller

The mini-controller must be connected to the heater for testing. The setpoint value can be displayed using the EDiTH diagnostics tool. If the rotary knob is at the left limit stop the setpoint value is 8 °C, at the right limit stop it is 34 °C.

Please note!

The resistance of the setpoint value potentiometer cannot be measured directly. The measured values are not meaningful.

4 Troubleshooting

Testing device for the control device

(Order No.: 22 1509 89 00 00)

Prepare for test

Connect the correct operating voltage (12 or 24 volt) to the testing device, with plus at the red connector socket and minus at the blue connector socket.

- Disconnect socket from the control unit.
- Connect cable loom from testing device with the control unit.
- Set the rotary knob of the control unit to "Heat", the corresponding red LED in the testing device must light up.
- Set control unit to "0", then press the "LED – red" button, the red control lamp in the control unit must light up.
- Set control unit to "Heat", then press the "LED – green" button, corresponding red control lamp in the testing device and the green control lamp in the control unit must light up.

Caution!

Safety instructions for checking the control unit!

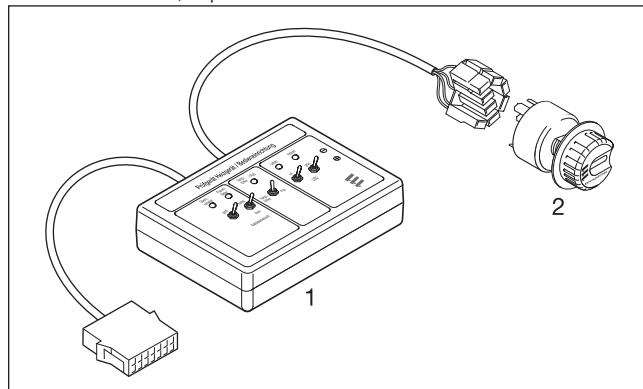
Ensure you use the correct operating voltage, otherwise the connected components can be severely damaged.

Check the setpoint potentiometer of the control unit

Set the "Temperature sensor / Potentiometer" switch in the testing device to the "Potentiometer" setting and slowly turn the rotary knob of the control unit.

The green LED – temperature sensor / potentiometer must light up continuously.

In case of a fault, replace the control unit.



1 Testing device

2 Control device

Diagnostic unit

(Order No.: 22 1529 89 00 00)

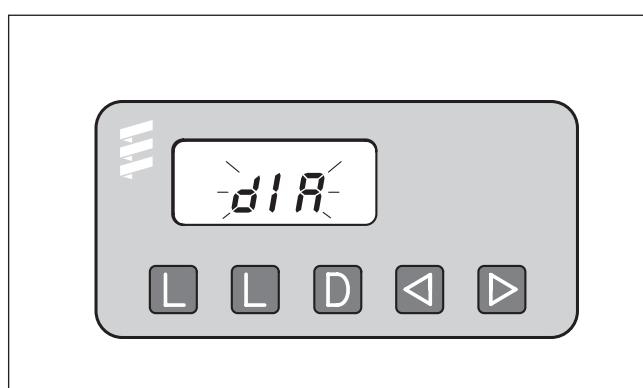
An additional adapter cable is required to connect the diagnostic unit (Order No.: 22 1000 31 86 00).

The current fault is displayed as "AF" and a 2-digit number and is always written in the memory position F1.

Preceding faults are moved to the memory locations F2 – F5, if necessary the contents of memory position F5 is overwritten.

Please note!

- Not only the defective component, but also a defective current circuit results in a fault being displayed.
- In heaters with connected air pressure sensor the diagnostics unit can be used to read out the fault memory of the heater only.
The fault memory of the „air pressure sensor“ can be read out using the EDiTH diagnostics tool only.
- Fault code, fault description, cause / remedial action are described on Pages 20 – 25.



 –Delete fault memory

 –Delete fault memory

 –Switch heater on / off, request diagnosis

 –Reverse, F5 – F1

 –Forward, F1 – F5, current fault (AF)

Connect diagnostics unit, see page 13.



4 Troubleshooting

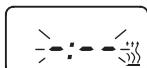
Connect diagnostic unit

- Disconnect the 8-pin connector of the heater's cable harness and connect the adapter cable.
 - Connect the diagnostic unit to the adapter cable.
- Display is as follows:



Query fault memory

- Use the **D** key to switch on the heater.
- Display is as follows:



- After 8 sec the following is displayed:
Display is as follows:



Heater has no malfunction

or



e.g. current error / fault code 64

or



Fault diagnosis not possible

Possible causes:

- Adapter cable is not properly connected.
- Control box is defective or is not capable of diagnosing (not a universal control box).

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

- Press the **L** or **R** button, or press several times, to display the fault memory.
Display is as follows:



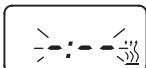
e.g. fault memory 2 / fault code 10

Please note!

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

Delete fault memory

- Press both **L** buttons simultaneously until the following appears in the display:
Display is as follows:



- If the fault memory has been deleted the most recent current fault is displayed. The current fault is not reset to 00 until the heater is restarted – provided there is no new, more recent fault.

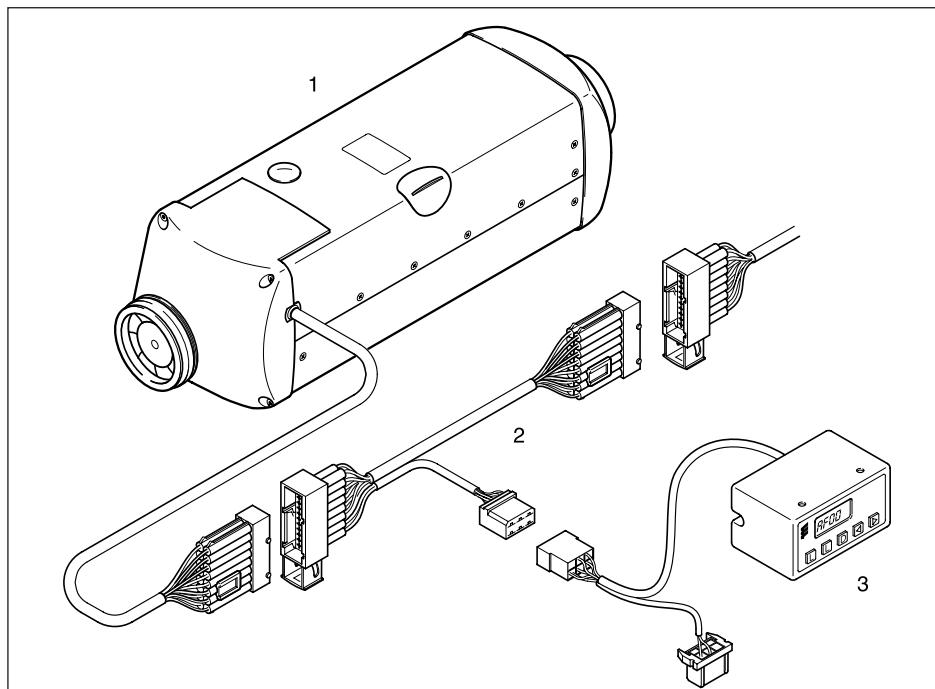
Display is as follows:



Heater has no malfunction

Cancel the control box lock

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



1 Heater
2 Adapter cable
3 Diagnostic unit

4 Troubleshooting

EDiTH diagnostic tool with ISO adapter

(Order No.: 22 1541 89 00 00)

An additional adapter cable is required to connect the ISO adapter (Order No.: 22 1000 31 86 00).

Please note!

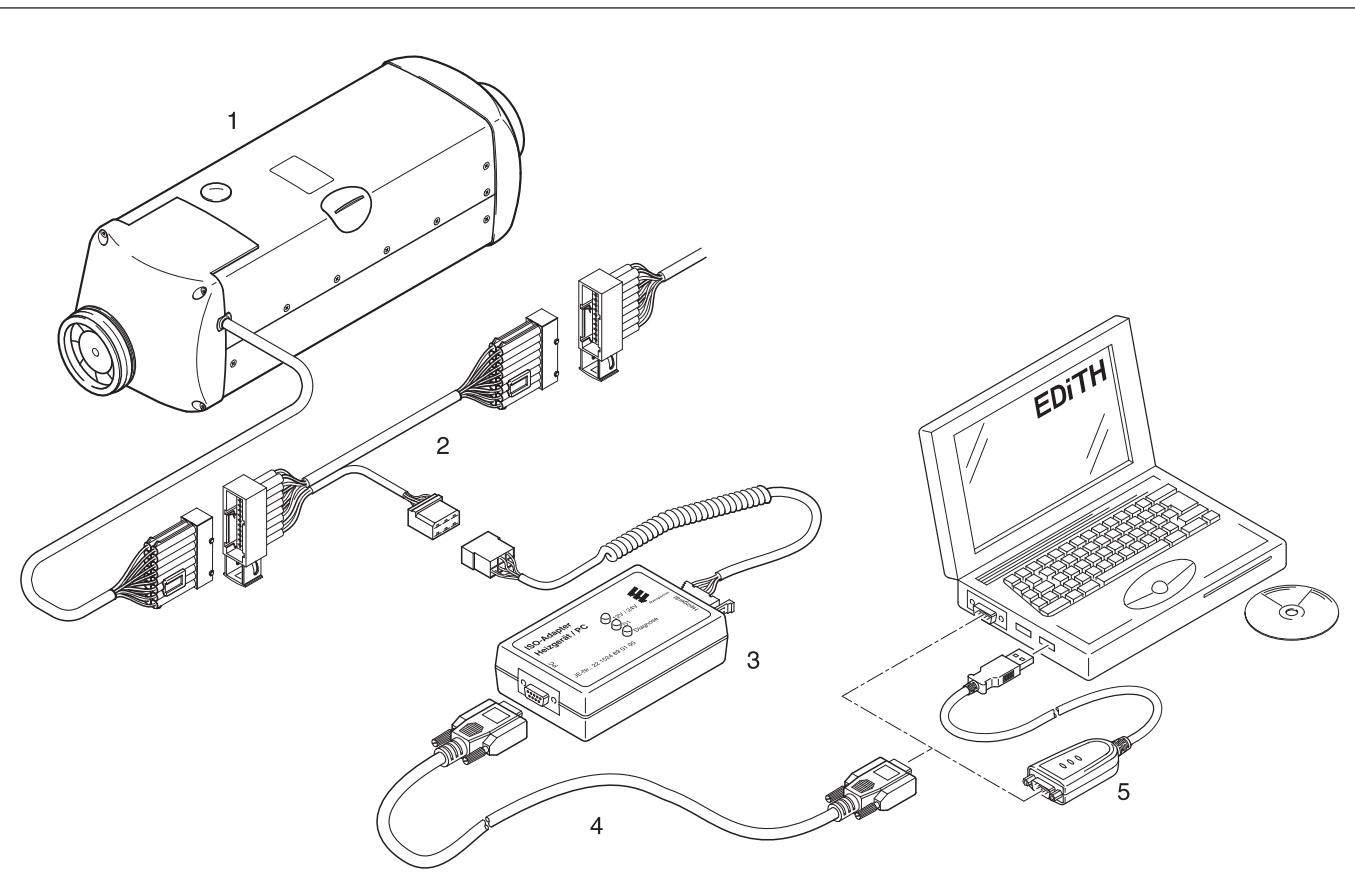
- It is very important to always install in the given order.
- Not only the defective component, but also a defective current circuit results in a fault being displayed.
- Fault code, fault description, cause / remedial action are described on Pages 20 – 25.
- The EDiTH diagnostics tool scope of supply does not include the software; this must be downloaded from the Service Portal.

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.

Installing the software on your PC

- Double click the "setup.exe" file to start the installation and following the SETUP program instructions.



1 Heater

2 Adapter cable

3 ISO adapter

4 SUB-D connection cable

5 USB to Serial RS-232 adapter



4 Troubleshooting

Air pressure sensor diagnosis using EDiTH diagnostic tool and ISO adapter (Order No. 22 1541 89 00 00)

An additional adapter cable is required to connect the ISO adapter (Order No.: 22 1000 33 31 00).

The air pressure sensor connected to the heater can be diagnosed. If faults occur during the altitude adjustment they are stored in the air pressure sensor. If necessary, faults can be read out using the ISO adapter in conjunction with the EDiTH diagnostics tool – from Version S3V7-F – and the additionally necessary adapter cable.

Please note!

- It is very important to always install in the given order.
- Not only the defective component, but also a defective current circuit results in a fault being displayed.
- Fault code, fault description, cause / remedial action are described on pages 20 - 25.
- The EDiTH diagnostics tool scope of supply does not include the software; this must be downloaded from the Service Portal.

Perform diagnosis of the air pressure sensor

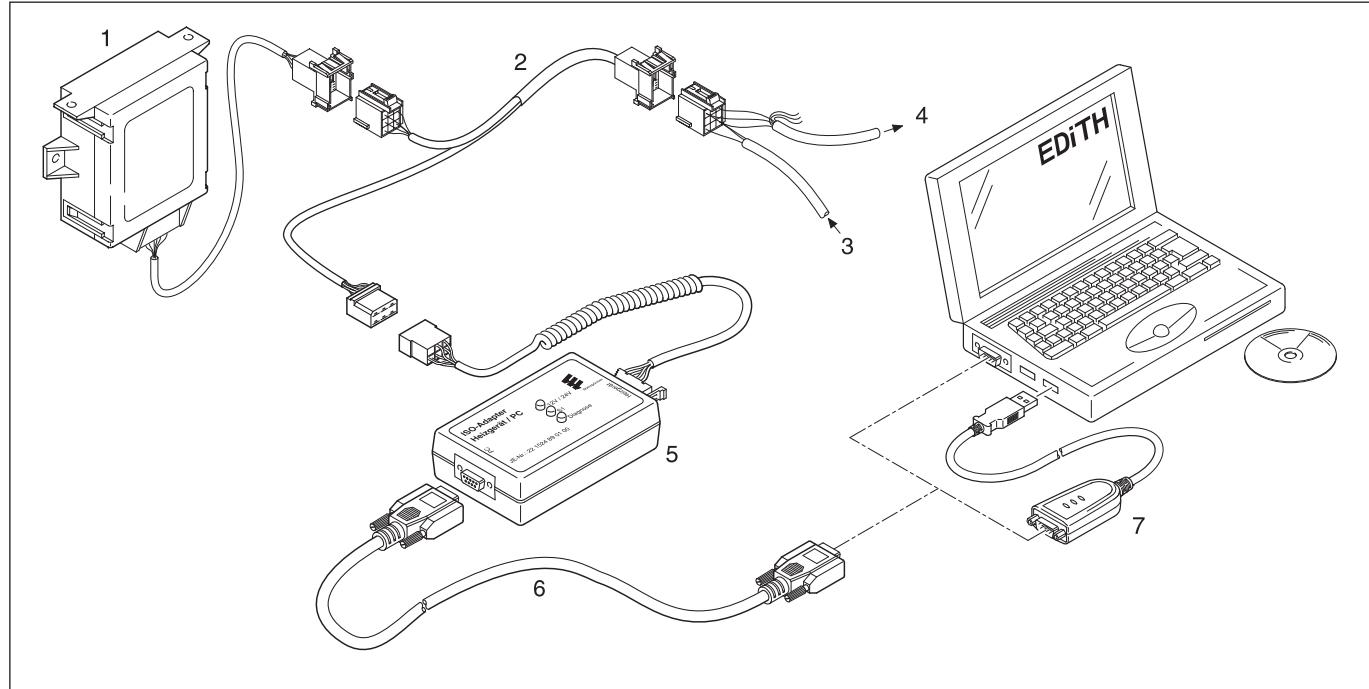
Disconnect the connector between the air pressure sensor / heater, control unit, connect the ISO adapter with the adapter cable (see sketch).

Start the diagnosis of the air pressure sensor.

- Double-click the >>EDiTH<< icon on the desktop.
- Select the air pressure sensor in the »Heater and Test Selection«.

The following actions are possible:

- Read out the current fault and the fault memory.
- Delete the fault memory.
- Query the current measured air pressure.
- Query the operating state.
- Query the general data.
- Print out the fault memory and / or the general data
- Exit the diagnosis with the »Stop« button or by closing all windows.
 - Selection: Save analysis / Do not save analysis
- Remove ISO adapter and adapter cable from the lead harness and reconnect the air pressure sensor / heater, control unit connector.



- 1 Air pressure sensor
2 Adapter cable
3 Cable loom from heater

- 4 Cable loom to control unit
5 ISO adapter
6 SUB-D connection cable
7 USB to Serial RS-232 adapter

4 Troubleshooting

EDiTH customer service program with basic adapter

EDiTH basic adapter

(Order No.: 22 1542 89 00 00)

An additional extension is required to check the control box
(Order No.: 22 1537 89 00 00).

Please note!

- It is important to always follow the precise connection order as given below!
- The Hall sensor integrated in the control box can only be properly tested in the control box if correctly placed on the extension.
- Only push or pull on the connectors, not on the cables!
- Only use the network cable and RS232 cable with snap ferrites included in the scope of supply.
Use original accessories with snap ferrites only to connect the test equipment.
- Not only the defective component, but also a defective current circuit results in a fault being displayed.
- Fault code, fault description, cause / remedial action are described on pages 20 – 25.

Caution! Magnetic field!

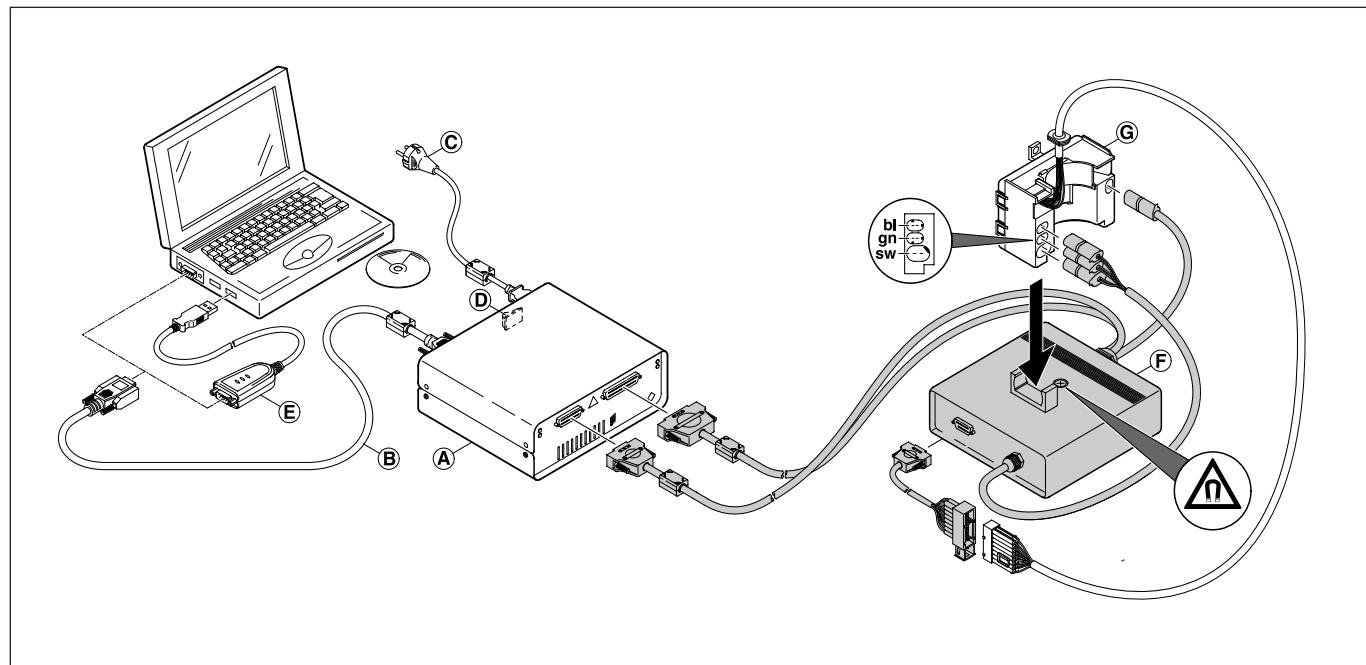
During the test operation a magnetic field develops at the adapter. Therefore, do not place any objects such as data media, credit cards, etc. on the adapter or in its immediate vicinity.

Connect basic adapter

- Start computer and wait until the system has successfully booted.
- Start PC software.
- Insert the unit connector of the mains cable in the basic adapter (A) and connect the mains connection (C) to the mains.
- Connect the SUB-D connection cable (B) with the PC and basic adapter (A).

Connect extension and test control box

- Connect the extension to the basic adapter (A).
- Connect the control box (E) to the extension and the adapter (F).
- Switch on the basic adapter (A) at the mains switch (D).
- Select the control box version and operating voltage (12 V / 24 V) in the PC software.
- Start the control box test with the PC software.
A more detailed description of how to operate the basic adapters (A) is given in the EDiTH online help.



- (A) Basic adapter
(B) SUB-D connection cable
(C) Mains connection
(D) Mains switch
(E) USB to Serial RS-232 adapter
(F) Adapter
(G) Control box

Cable colours

sw	=	black
gn	=	green
bl	=	blue



4 Troubleshooting

Module timer

(Order No.: 22 1000 30 34 00)

The current fault is displayed as "AF" and is always written in memory position F1.

Preceding faults are moved to the memory locations F2 – F5, if necessary the contents of memory position F5 is overwritten.

Please note!

- Not only the defective component, but also a defective current circuit results in a fault being displayed.
- In heaters with connected air pressure sensor the modular timer cannot be used to perform diagnoses. The diagnostics unit or the EDITH diagnostics tool must be used to perform the diagnosis.
The fault memory of the „air pressure sensor“ can be read out using the EDITH diagnostics tool only.
- Fault code, fault description, cause / remedial action are described on pages 20 – 25.



- [Clock] – Time
- [Square] – Preset
- [Wavy line] – Heat
- [Left arrow] – Reverse
- [Right arrow] – Forward

Query fault memory F1 – F5

Condition:

The heater is switched off.

- Press [Heat] key → the heater is switched on.
- Press [Clock] key and keep pressed, then press [Preset] key within 2 seconds.
Display is as follows:
AF = current fault
3 digit number = fault code
[Heat] flashes.
- Press [Clock] key once or several times, fault memory positions F1 – F5 are displayed.

Cancel the control box lock and simultaneously delete the fault memory

Condition:

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

- Press [Heat] key
Display is as follows:
the current fault F15 or F50.
- Press button [Clock], keep it depressed and then press button [Preset] within 2 seconds.

The module timer is now in the "Query fault memory" program.

- Switch off ignition (terminal 15).
- Simultaneously press button [Clock] and button [Preset], 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.

After switching the heater off and on and renewed query of the fault memory, the following appears in the display:



Display flashes,
Heater symbol does not flash

4 Troubleshooting

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.

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.

The current fault “F0” is displayed. The stored faults “F1” to “F5” can be queried. The current fault is displayed.

Please note!

- In order to carry out the diagnosis, the diagnostics cable (blue at heater connector, blue/white at cable harness connector) 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 radio remote control TP5 and the heater.
 - If the diagnostics cable is not connected, the “Diagnosis” menu is blocked.
 - Not only the defective component, but also a defective current circuit results in a fault being displayed.
 - In heaters with connected air pressure sensor the TP5 radio remote control cannot be used to perform diagnoses. The diagnostics unit or the EDiTH diagnostics tool must be used to perform the diagnosis.
- The fault memory of the „air pressure sensor“ can be read out using the EDiTH diagnostics tool only.
- Fault code, fault description, cause / remedial action are described on Pages 20 – 25.



- 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:





4 Troubleshooting

EasyStart R+ radio remote control

(Order No.: 22 1000 32 80 00)

EasyStart T timer

(Order No.: 22 1000 32 88 00)

If faults occur while the heater is running, they are displayed with "Err" after the mobile unit or timer is activated.

The current fault is displayed. The stored faults "F1" to "F5" can be queried.

Please note!

- In order to carry out the diagnosis, the diagnostics cable (bl/ge at heater connector, bl/ws at cable harness connector) 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 radio remote control and the heater.
- If the diagnostics cable is not connected, the "Diagnosis" menu is blocked.
- Not only the defective component, but also a defective current circuit results in a fault being displayed.
- The heater diagnosis can also be performed if the air pressure sensor is connected. The fault memory of the „air pressure sensor“ can be read out using the EDiTH diagnostics tool only.
- Fault code, fault description, cause / remedial action are described on Pages 20 – 25.



- Back control key
- Next control key
- ON / OFF activation key mobile unit / timer
- OK key (symbol selection / confirm input)

Enquire / delete fault memory

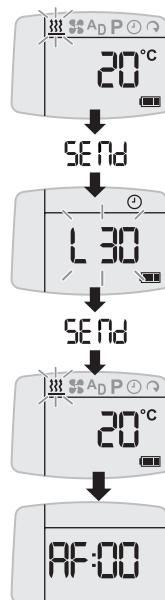
Activate mobile part / timer

(see EasyStart R+ / EasyStart T operating instructions)

Confirm symbol with .

Heater is switched on.

Confirm operating time with .



Briefly press and simultaneously.

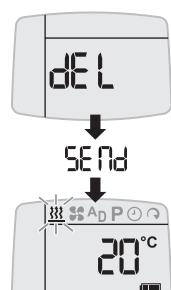
The following actions are possible

- Call up fault memory.
Call up the fault memory positions F1 – F5 with or .
- Call up fault memory again.
Briefly press and simultaneously.
- Delete fault memory
(display dEL)
Press .

Press again.

The diagnosis is completed.

Switch off heater.



4 Troubleshooting

Fault code Display	Fault description	Comments • Remedial action
000	No faults	— —
004	Warning: Short circuit in control box, fresh air output	<ul style="list-style-type: none"> Disconnect connector S1 / B1 at the heater and at the connector B1, PIN 16 check the cable up to the fresh air fan relay for short circuit to negative, if ok → replace control box, see page 28.
005	Warning: Short circuit in control box, car alarm output	<ul style="list-style-type: none"> Disconnect connector S1 / B1 at the heater and at the connector B1, PIN 15 check the cable up to the relay isolating switch or the car alarm input for short circuit to negative, if ok → replace control box, see page 28.
006	Warning: Inexplicable atmospheric altitude information (display only in heaters with "H-Kit" marking on the nameplate.)	<p>Control box has not received any explicable altitude information.</p> <ul style="list-style-type: none"> Read out fault memory in the air pressure sensor using the EDiTH diagnostics tool and correct fault.
009	ADR shutdown	ADR shutdown due to signal change from (+) to (-) at connector S1, PIN 13 (D+) or plus signal at connector S1, PIN 14 (HA+).
010	Ovvoltage cutout	<p>Ovvoltage applied to control box for at least 20 seconds without interruption – heater not working.</p> <ul style="list-style-type: none"> Disconnect connector S1 / B1 at the heater, start the vehicle's engine, measure the voltage at connector B1 between PIN 1 (cable 2.5² rt) and PIN 10 (cable 2.5² br). Airtronic L 12 volt – voltage >16 volt → check generator regulator. Airtronic L 24 volt – voltage >32 volt → check generator regulator.
011	Undervoltage cutout (Combination sensor)	<p>Undervoltage applied to control box for at least 20 seconds without interruption – heater not working.</p> <ul style="list-style-type: none"> Disconnect connector S1 / B1 at the heater, the vehicle's engine is switched off, measure the voltage at connector B1 between PIN 1 (cable 2.5² rt) and PIN 10 (cable 2.5² br). The measured value and the voltage at the battery should be the same. In case of a voltage drop, check the fuses, the supply cables, the negative connections and the positive support point on the battery for corrosion and correct contact.
012	Overheating at the overheating sensor (combination sensor)	<p>emperature of the overheating sensor too high.</p> <ul style="list-style-type: none"> Check hot air pipes for blockage → remove blockage. Sum of the component ratings of air-conducting parts is too large → Check air system, if necessary re-lay – for component ratings, please refer to additional parts catalogue. Check overheating sensor, for diagram and table of values please refer to page 30, if ok → measure fuel quantity, see page 33.
013	Overheating at the flame sensor (combination sensor)	<p>Flame sensor signals temperature at heat exchanger is too high.</p> <ul style="list-style-type: none"> Check hot air pipes for blockage → remove blockage. Sum of the component ratings of air-conducting parts is too large → Check air system, if necessary re-lay – for component ratings, please refer to additional parts catalogue. Check flame sensor, if ok → check overheating sensor, if overheating sensor defective → replace combination sensor, if overheating sensor ok → measure fuel quantity, see page 33, for diagram and table of values for flame sensor and overheating sensor please refer to page 30.

Please note!

If the fan motor or controller is defective, it is necessary to check the number of hours run and, if possible, the number of ignitions (see Page 32).



4 Troubleshooting

Fault code Display	Fault description	Comments • Remedial action
014	Temperature difference between flame sensor and overheating sensor too large	<p>Temperature difference between flame sensor and overheating sensor too large</p> <ul style="list-style-type: none">• Check hot air pipes for blockage -> remove blockage.• Sum of the component ratings of air-conducting parts is too large -> Check air system, if necessary re-lay – for component ratings, please refer to additional parts catalogue.• Check flame sensor, if ok -> check overheating sensor, if overheating sensor defective -> replace combination sensor, if overheating sensor ok -> measure fuel quantity, see page 33, if fuel quantity ok -> replace control box, see page 28. For diagram and table of values for flame sensor and overheating sensor see page 30.
015	Operating lock-out	<p>The fault code 015 is displayed, if the heater was switched back on after the fault code display 017.</p> <p>The hardware threshold value for the overheating sensor has been exceeded -> the control box is locked.</p> <ul style="list-style-type: none">• Switch off control box, see page 28.
017	Overheating	<p>The hardware threshold value for the overheating sensor has been exceeded, because the control box failed to recognise the fault code 012 or 013 -> the control box is locked.</p> <p>If the heater is switched on again, the fault code 015 is displayed.</p> <ul style="list-style-type: none">• Switch off control box, see page 28.
018	Glow plug starting energy too low (display only in heaters with "H-Kit" marking on the nameplate.)	<ul style="list-style-type: none">• Check glow plug (see fault code 020 and 021), if ok.• Check glow plug lead harness for correct laying and damage, if ok -> check lead harness for continuity, if ok -> replace control box, see Page 28.
020	Glow plug – interruption	<ul style="list-style-type: none">• Check glow plug is working and for continuity.• Heater 12 volt – approx. $0.6 \Omega \pm 0.04 \Omega$ (heat resistance)• Heater 24 volt – approx. $2 \Omega \pm 0.2 \Omega$ (heat resistance)• If the values of the continuity test and/or functional test are ok -> check the glow plug's lead harness for damage and continuity, if ok -> replace control box, see Page 28.
021	Glow plug output (-), short circuit, overload or earth short circuit	<ul style="list-style-type: none">• Check glow plug is working and for continuity.• Heater 12 volt – approx. $0.6 \Omega \pm 0.04 \Omega$ (heat resistance)• Heater 24 volt – approx. $2 \Omega \pm 0.2 \Omega$ (heat resistance)• If the values of the continuity test and/or functional test are ok -> check the glow plug's lead harness for damage and continuity, if ok -> replace control box, see Page 28.
022	Glow plug output (+), Short circuit after U_B (battery voltage)	<ul style="list-style-type: none">• Check glow plug lead harness for correct laying and damage, if ok -> check lead harness for continuity, if ok -> replace control box, see Page 28.
025	Diagnostics cable bl/ws – short circuit – after U_B (battery voltage)	<p>This fault code cannot be displayed as the diagnostics cable is probably defective.</p> <ul style="list-style-type: none">• Check diagnostics cable for correct laying and possible damage.

Please note!

If the fan motor or controller is defective, it is necessary to check the number of hours run and, if possible, the number of ignitions (see Page 32).

4 Troubleshooting

Fault code Display	Fault description	Comments • Remedial action
030	EMK blower motor outside the permissible range	<p>Impeller or combustion air blower motor blocked (frozen, soiled, sluggish, lead harness grinds against shaft end ...)</p> <ul style="list-style-type: none"> • Remove blockage. • Check wiring for short circuit. • Speed measurement of the combustion air blower motor: <ul style="list-style-type: none"> – Dismantle combustion air fan, see page 31. – Heater 12 V: carry out test with 11.3 volt ± 0.1 volt. – Heater 24 V: carry out test with 23.6 volt ± 0.1 volt. <p>Remove the connector from the control box and apply voltage. Apply marking (white paint) to the impeller and measure the speed using a non-contact r.p.m. counter:</p> <p>If the measured speed in the "high" heating level is outside the range</p> <ul style="list-style-type: none"> – Heater 12 V: n = 4650–7000 rpm, – Heater 24 V: n = 4650–6500 rpm, <p>then replace the combustion air fan, see page 31.</p> <p>If the measured speed is within the range, then replace the control box, see page 28.</p>
031	Blower motor interruption	<ul style="list-style-type: none"> • Check that the lead harness of the blower motor has been correctly laid and for damage, if ok \rightarrow remove lead harness at control box and check for continuity, if ok \rightarrow replace control box, see page 28.
032	<p>Blower motor – earth short circuit</p> <p>Please note!</p> <p>In the 12 volt heater, carry out the functional check with max. 11.3 volt. In the 24 volt heater, carry out the functional check with max. 23.6 volt. The component is destroyed if the voltage values are exceeded.</p> <p>Ensure the power pack has adequate short-circuit resistance – min. 20 A.</p>	<ul style="list-style-type: none"> • Carry out functional test on the blower motor, to do this remove the connector from the control box. <p>Apply a voltage of 11.3 v or 23.6 V ± 0.1 v to the blower motor and after 40 sec measure the current intensity.</p> <p>Heater 12 volt: current intensity < 9 A or heater 24 volt: current intensity < 4 A – blower motor ok \rightarrow replace control box, see page 28.</p> <p>Heater 12 volt: current intensity > 9 A or heater 24 volt: current intensity > 4 A \rightarrow replace combustion air fan, see page 31.</p> <ul style="list-style-type: none"> • Check wiring for short circuit.
034	Blower motor outlet (+) - short circuit after U_B (battery voltage)	<ul style="list-style-type: none"> • Check that the lead harness of the blower motor has been correctly laid and check for damage, if ok \rightarrow remove lead harness at control box and check for continuity, if ok \rightarrow replace control box , see page 28.
047	Metering pump short circuit or overload	<ul style="list-style-type: none"> • Remove connector from the metering pump, if the fault code 048 (interruption) is displayed the metering pump is defective \rightarrow replace metering pump. • If the fault code 047 continues to be displayed, disconnect connector S1 / B1 at the heater, and at the connector B1, PIN 5 check the cable 1² gn / rt up to the metering pump for short circuit to negative (PIN 10), if ok \rightarrow replace control box, see page 28.
048	Metering pump interruption	<ul style="list-style-type: none"> • Remove connector from the metering pump and measure the resistance value of the metering pump (see Page 9 for values), if resistance value ok \rightarrow reconnect cable loom to the metering pump. • Disconnect connector S1 / B1 at the heater and measure the resistance value between PIN 5 and PIN 10, if ok \rightarrow replace control box, see page 28.
049	Metering pump outlet (+), short circuit after U_B (battery voltage)	<ul style="list-style-type: none"> • Check that the lead harness of the metering pump has been correctly laid and check for damage, if ok \rightarrow remove lead harness and check for continuity, if ok \rightarrow replace control box, see Page 28.

Please note!

If the fan motor or controller is defective, it is necessary to check the number of hours run and, if possible, the number of ignitions (see Page 32).



4 Troubleshooting

Fault code Display	Fault description	Comments • Remedial action
050	Too many failed start attempts (operating lock-out)	The control box locks after too many failed start attempts (max. 255 start attempts). <ul style="list-style-type: none">• Unlock the control box by deleting the fault memory with the timer, the diagnostic unit, the EDiTH customer service program, the TP5 / EasyStart R+ radio remote control and the EasyStart T timer.
051	Flame detected when switching on	If, after being switched on, the resistance value of the flame sensor is 1274Ω ($> 70^\circ\text{C}$) the heater's fan runs for approx. 15 min to cool down, if the resistance does not fall below the aforementioned value within 15 min the heater is switched off. <ul style="list-style-type: none">• Check the flame sensor, for diagram and table of values please refer to page 30, if ok —> replace control box, see page 28.
052	Safety time exceeded	No flame detected during the start phase. <ul style="list-style-type: none">• Check exhaust and combustion air system.• Check fuel supply / measure fuel quantity, see page 33.• Check spark plug (see fault code 020 and 021).• Check flame sensor, for diagram and table of values please refer to page 30, if ok —> replace control box, see page 28.
053	Flame cut-out in the „POWER“ control stage	The heater has ignited (flame detected) and signals flame cutout during a power stage. <ul style="list-style-type: none">• Check exhaust and combustion air system.
054	„HIGH“ control stage	
055	„MEDIUM“ control stage	
056	„LOW“ control stage	
057	Flame cut-out from start phase (display only in heaters with "H-Kit" marking on the nameplate.)	A flame cut-out was detected during the start phase.. <ul style="list-style-type: none">• Check exhaust and combustion air system.• Check fuel supply / measure fuel quantity, see Page 33.• Check glow plug (see fault code 020 and 021).• Check flame sensor, for diagram and table of values please refer to page 30, if ok —> replace control box, see page 28.
060	External temperature sensor – interruption	<ul style="list-style-type: none">• Disconnect the connector S4 / B4 of the external temperature sensor and measure the resistance value at connector B4, for diagram and table of values see Page 30, if temperature sensor ok, reassemble connector S4 / B2.• Disconnect connector S1 / B1 at the heater and measure the resistance value in connector housing B1 between PIN 6 and PIN 12. If interrupted the ohmic value is $> 3 \text{ k}\Omega$. If resistance value ok —> replace control box, see page 28.
061	External temperature sensor – short circuit	<ul style="list-style-type: none">• Disconnect connector S4 / B4 of the external temperature sensor, if fault code 060 is displayed —> check external temperature sensor, diagram and table of values, see Page 30. If temperature sensor ok —> check connection cables 0.5 gr and 0.5 br/ws for short circuit, if ok, reassemble the connector S4 / B4.• Disconnect connector S1 / B1 at the heater and measure the resistance value in connector housing B1 between PIN 6 and PIN 12. In case of short circuit the ohmic value is $< 800 \Omega$. If the error 061 continues to be displayed, then replace control box, see Page 28.

Please note!

If the fan motor or controller is defective, it is necessary to check the number of hours run and, if possible, the number of ignitions (see Page 32).

4 Troubleshooting

Fault code Display	Fault description	Comments • Remedial action
062	Control unit – interruption Please note! Read and follow notes on diagnosis using mini controller on Page 11.	Heater runs in „High“ control stage only <ul style="list-style-type: none"> Remove connector at the control unit and measure the resistance value of the setpoint potentiometer, for connector pins see Page 36 ff. If the resistance value is ok, reconnect connector at the control unit. Disconnect connector S1 / B1 at the heater, measure the resistance value between PIN 6 and PIN 7 in connector housing B1, if resistance value ok → replace control box, see page 28. Resistance value in case of interruption > 3 kΩ. Normal values: see page 9.
063	Control unit – short circuit Fault recognition only works in heating mode. If, on the other hand, the short circuit has already occurred and then the heater is switched on, „Ventilation“ is active (not a fault code).	<ul style="list-style-type: none"> If „Ventilate“ switch is installed, disconnect it and check it is working. If ok → disconnect the connector at the control unit, if error code 062 is displayed, replace control unit. If control unit ok → check connection cables 0.5² gr / rt and 0.5² br / ws for short circuit, if ok → reconnect connector at control unit. Disconnect connector S1 / B1 at the heater, if the error 063 continues to be displayed → replace control box, see Page 28. Resistance value in case of short circuit between PIN 6 and PIN 7 < 800 Ω. Normal values: see page 9.
064	Flame sensor (combination sensor) – interruption	<ul style="list-style-type: none"> Dismantle control box and disconnect green connector from control box. Check flame sensor, for diagram and table of values please refer to page 30, if flame sensor ok → replace control box, see page 28. Resistance value in case of interruption > 3 kΩ.
065	Flame sensor (combination sensor) – short circuit	<ul style="list-style-type: none"> Dismantle control box, remove green connector from control box, if error 064 is displayed → replace combination sensor, see page 29. If error 065 continues to be displayed → replace control box, see page 28. Resistance value in case of short circuit < 500 Ω, see also diagram on page 30.
071	Overheating sensor – interruption	<ul style="list-style-type: none"> Dismantle control box, disconnect blue and green connectors from control box. Measure resistance value at the blue connector PIN 1 (cable 0.5² bl) and at the green connector PIN 2 (cable 0.5² br / ws), if ok → replace control box, see page 28. Resistance value in case of interruption > 1600 kΩ, see also diagram on page 30.
072	Overheating sensor – short circuit	<ul style="list-style-type: none"> Dismantle control box, remove blue connector from control box, if error 071 is displayed → replace combination sensor, see Page 29. If error 072 continues to be displayed → replace control box, see page 28. Resistance value in case of short circuit < 95 Ω, see also diagram on page 30.
074	Control box defective	<ul style="list-style-type: none"> Overheating threshold value is not detected by control box → replace control box, see page 28.
090	Control box defective (internal fault)	<ul style="list-style-type: none"> Replace control box, see page 28.
092	Control box defective (ROM error)	<ul style="list-style-type: none"> Replace control box, see page 28.
093	Control box defective	<ul style="list-style-type: none"> Replace control box, see page 28.
094	Control box defective (EEPROM error)	<ul style="list-style-type: none"> Replace control box, see page 28.
095	Steuergerät defekt	<ul style="list-style-type: none"> Replace control box, see page 28.
096	Internal temperature sensor defective	<ul style="list-style-type: none"> Replace control box, see Page 28, or use an external temperature sensor.

Please note!

If the fan motor or controller is defective, it is necessary to check the number of hours run and, if possible, the number of ignitions (see Page 32).



4 Troubleshooting

Fault code Display	Fault description	Comments • Remedial action
097	Control box defective	<ul style="list-style-type: none">Replace control box, see page 28.
098	Control box defective	<ul style="list-style-type: none">Replace control box, see page 28.
099	Too many resets in sequence	<ul style="list-style-type: none">Voltage short-term < 5 – 6 volt (for 12 volt) or < 7 – 8 volt (for 24 volt).In case of a voltage drop, check the fuses, the supply cables, the negative connections and the positive support point on the battery for corrosion and correct contact.
	Transistor error in control box	<ul style="list-style-type: none">Test control box with testing device, if ok → check lead harness of the external components has been correctly laid and check for damage, if ok → check lead harness for continuity, if ok → replace control box, see page 28.

Air pressure sensor fault code display

Fault code Display	Fault description	Comments • Remedial action
0	No faults	—
11	Communication loss	<p>Interruption of the diagnostics cable between the control box (heater) and the air pressure sensor.</p> <ul style="list-style-type: none">Check wiring and plug-in connections.
12	No altitude adjustmen	<p>Control box (heater) does not support altitude operation with the air pressure sensor.</p> <ul style="list-style-type: none">Use a control box (heater) which supports altitude adjustment.
13	Air pressure sensor faul	<p>The air pressure sensor is defective.</p> <ul style="list-style-type: none">Replace the air pressure sensor.

Please note!

If the fan motor or controller is defective, it is necessary to check the number of hours run and, if possible, the number of ignitions (see Page 32).

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.
- 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 release plug-in contacts in a connector housing.

This release tool can be ordered directly from AMP.

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



- For Junior-Power-Timer: AMP-Bestell-Nr. 1-1579007-6



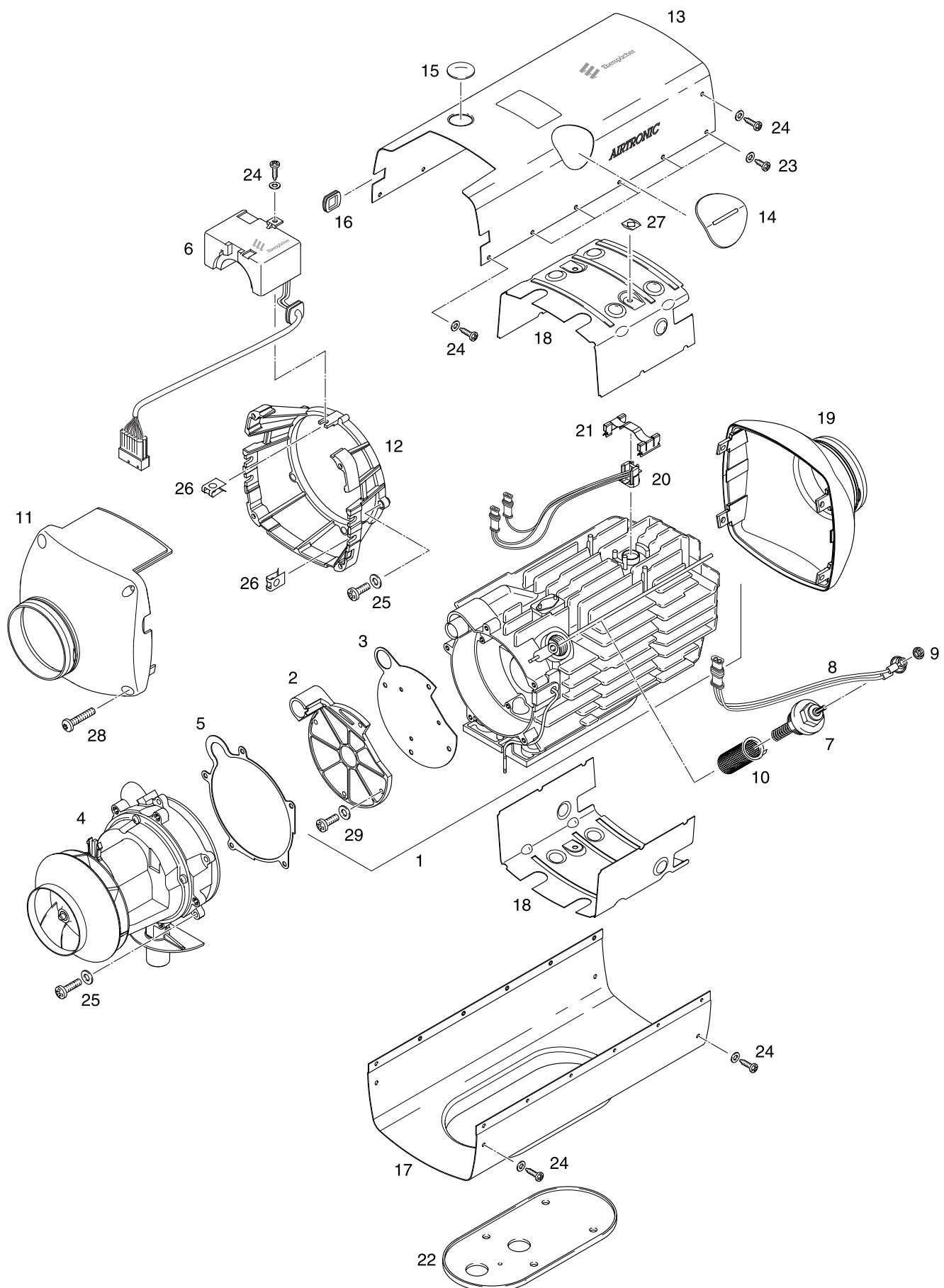
Parts list for assembly drawing

- 1 Heat exchanger, complete with combustion chamber
- 2 Combustion chamber cover
- 3 Seal combustion chamber
- 4 Combustion air fan
- 5 Seal
- 6 Control box
- 7 Glow plug
- 8 Connection cable for glow plug
- 9 Fixing nut M4
- 10 Lining
- 11 Intake hood
- 12 Shell holder
- 13 Upper jacket shell
- 14 Grommet (glow plug)
- 15 Grommet (Rotary valve)
- 16 Grommet (cable harness)
- 17 Lower jacket shell
- 18 Heat shield
- 19 Outlet hood
- 20 Combination sensor (flame / overheating sensor)
- 21 Combination sensor retaining clips
- 22 Sealing, flange
- 23 Single-thread screw B 3,5 x 9,5 Z1 DIN 7981 ZN12FF
- 24 Single-thread screw B 3,5 x 13 Z1
- 25 Fillister head bolt M5 x 20 Z3 DIN 7895 4.8 ZN8
- 26 C-Clip single-thread nut
- 27 DUO-Clip, (retaining clips)
- 28 Screw M5 x 25, TORX DIN 7500 C
- 29 Fillister head bolt M5 x 16 Z3 DIN 7895 4.8 ZN8



5 Repair instructions

Assembly drawing



5 Repair instructions

Repair step 1

Dismantle / assemble glow plug

(Figure 1)

- Remove large angular rubber grommet.
- Unscrew M4 fixing nut of the connection cable and screw out the glow plug using a SW 19 socket spanner.
- Install in the reverse order.
Glow plug torque $20^{\pm 2}$ Nm.
Connection cable nut torque 1.4 Nm.

Please note!

- With the glow plug dismantled, visually check the lining of the installed glow plug support for dirt. If the lining is highly soiled and its surface closed, renew the lining (see repair step 2).
- if necessary, use a wire to carefully clean the ignition hole.
- Ensure the rubber grommet sits securely and tightly!

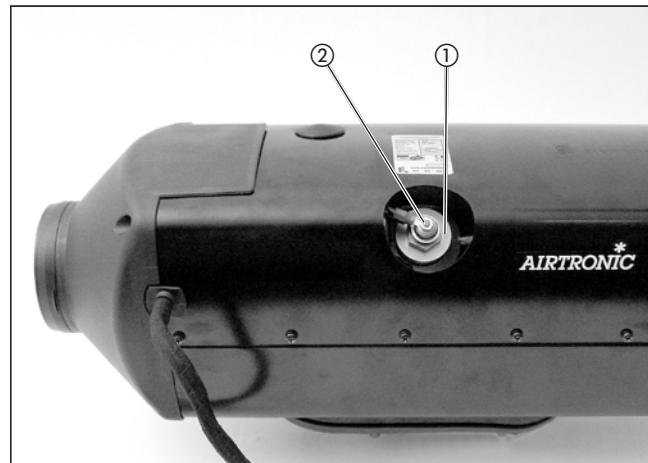


Figure 1

- ① Glow plug
② Fixing nut for connection cable

Repair step 2

Dismantle / assemble lining

(Figure 2)

- Repair step 1, dismantle / assemble glow plug.
- Use long-nose pliers to pull the lining out of the support from above.
- Clean socket.
- If necessary, use a wire to carefully clean the ignition hole.
- Carefully install the new lining. No special tools required.



Figure 2

- ① Lining

Repair step 3

Dismantle / assemble control box

(Figure 3)

- Unscrew the 4 fixing screws of the intake hood.
- Remove intake hood.
- Check inserted seal for damage, replace if necessary.
- Unscrew the fixing screw of the control box.
- Remove grommet from the upper jacket shell.
- Press together the retaining clamps.
- Remove the control box from above.
- Remove all connection cables from the control box. (Note the position of the cables). The control box can now be removed.
- Install in the reverse order.
Torque for intake hood fixing screws $4.0^{\pm 0.5}$ Nm.
Torque for control box fixing screw $1.75^{\pm 0.25}$ Nm.

Please note!

- When assembling the control box ensure that all the connection cables have been inserted in the control box (non-reversible).
- If the fan motor or controller is defective, it is necessary to check the number of hours run and, if possible, the number of ignitions (see Page 32).

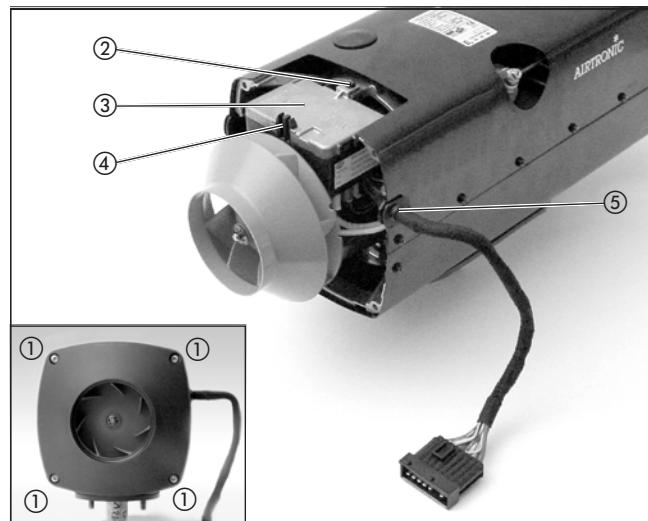


Figure 3

- ① Intake hood fixing screws
② Control box fixing screw
③ Control box
④ Retaining clamp
⑤ Grommet



5 Repair instructions

Repair step 4

Dismantle / assembly combination sensor (overheating / flame sensor)

(Figure 4 – 6)

- Repair step 3, dismantle / assemble control box.
- Unscrew the 4 fixing screws of the outlet hood and remove outlet hood.
- Unscrew the 12 fixing screws of the upper jacket shell and remove the upper jacket shell.
- Use a screwdriver to remove both DUO-clip (retaining clips) at the heat shield and remove the heat shield.
- Pull off the retaining clip of the combination sensor (flame / overheating sensor) from above.
- Install in the reverse order.

Torque for outlet hood fixing screws 1.45 ± 0.5 Nm.
Torque for upper jacket shell fixing screws 1.45 ± 0.5 Nm.

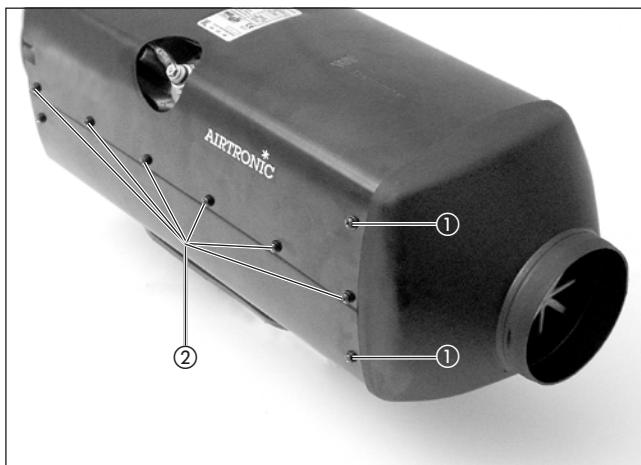


Figure 4

- ① Outlet hood fixing screws (B 3.5 x 13)
(opposite side of unit is mirror image)
② Fixing screws of upper jacket shell
(10 No. B 3.5 x 9.5 and 2 No. B 3.5 x 13)

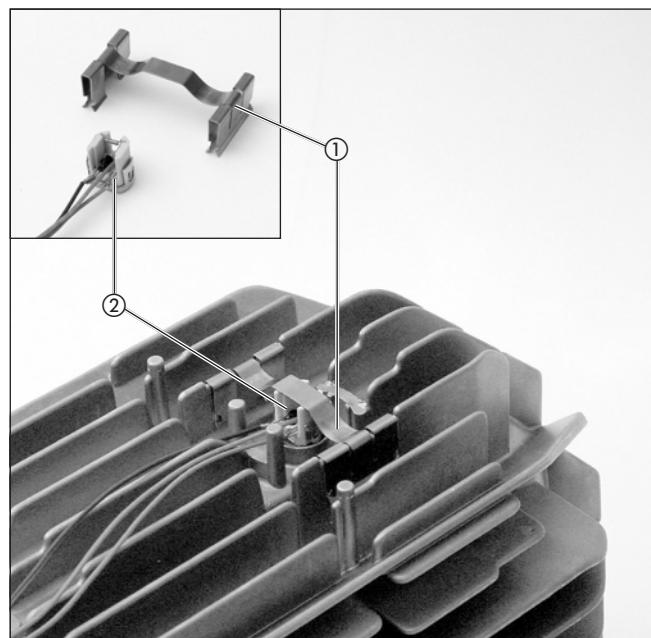


Figure 6

- ① Combination sensor retaining clips
② Combination sensor (flame / overheating sensor)

Circuit diagram for combination sensor (overheating sensor / flame sensor)

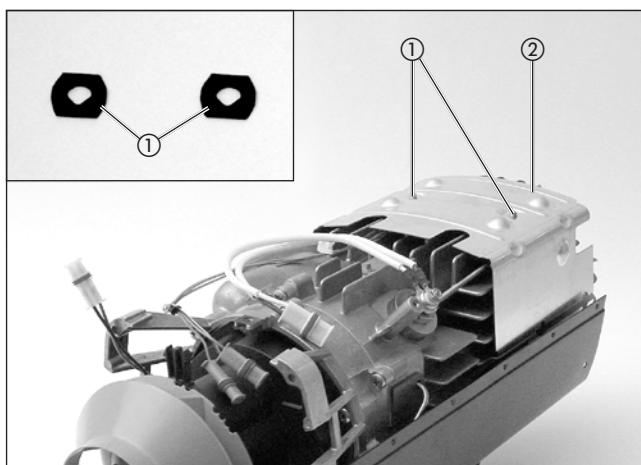
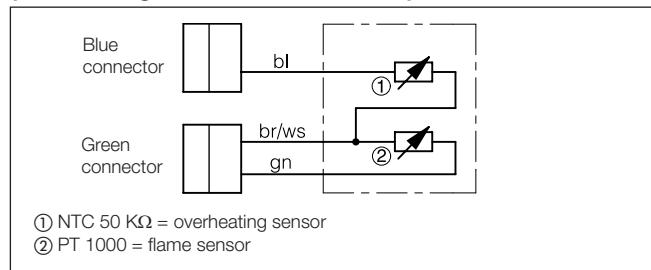


Figure 5

- ① DUO-clip (retaining clips)
② Heat shield

5 Repair instructions

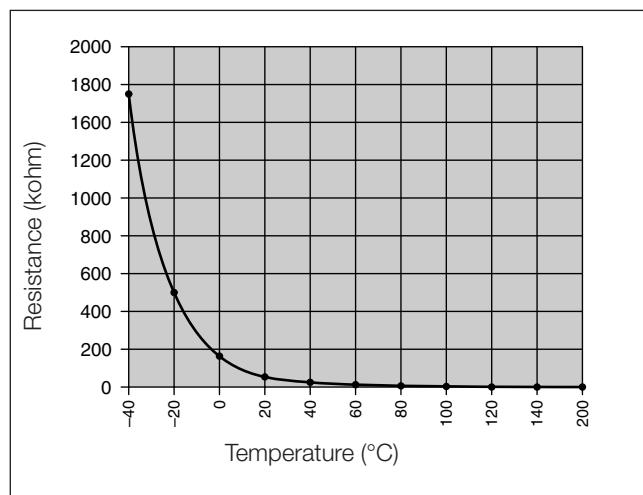
Check combination sensor

The external temperature sensor must be checked using a digital multimeter. If the resistance value does not match the curve in the diagram, replace the combination sensor.

Please note!

Note the max. temperature of 320° for the overheating sensor test.

Overheating sensor diagram



Flame sensor diagram

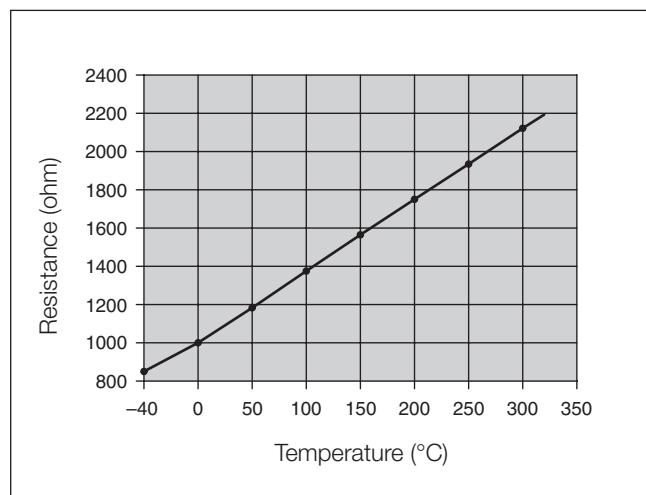


Table of overheating sensor values

Temperature °C	Resistance kΩ	min.	max.
-40		1597.00	1913.00
-20		458.80	533.40
0		154.70	175.50
20		59.30	65.84
40		25.02	28.04
60		11.56	13.16
80		5.782	6.678
100		3.095	3.623
120		1.757	2.081
140		1.050	1.256
160		0.6554	0.792
180		0.4253	0.5187
200		0.2857	0.3513

Table of flame sensor values

Temperature °C	Resistance Ω	min.	max.
-40		825.90	859.60
0		980.00	1020.00
40		1132.30	1178.50
80		1282.80	1335.10
120		1431.50	1489.90
160		1578.30	1642.80
200		1723.40	1793.70
240		1866.60	1942.80
280		2008.10	2090.00
320		2147.70	2235.40



5 Repair instructions

Repair step 5

Dismantle / assemble combustion air fan

(Figure 7 – 11)

- Repair step 3, dismantle / assemble control box.
- Unscrew the 4 fixing screws of the outlet hood and remove outlet hood.
- Unscrew the 12 self-tapping screws of the upper jacket shell and remove the upper jacket shell.
- Remove flange seal.
- Unscrew the 2 self-tapping screws of the lower jacket shell at the shell holder and remove the lower jacket shell.
- Unscrew the 4 screws of the shell holder.
- Unscrew the 5 screws of the combustion air fan.
- Remove the combustion air fan.
- Install in the reverse order.
Torque for outlet hood fixing screws 1.45 ± 0.5 Nm.
Torque for upper and lower jacket shell fixing screws 1.45 ± 0.5 Nm.
Torque for shell holder fixing screws 2.5 ± 0.5 Nm.
Torque for combustion air fan fixing screws 4.0 ± 0.5 Nm.

Please note!

- Always renew the seal between the combustion air fan and the heat exchanger.
- If the fan motor or controller is defective, it is necessary to check the number of hours run and, if possible, the number of ignitions (see Page 32).

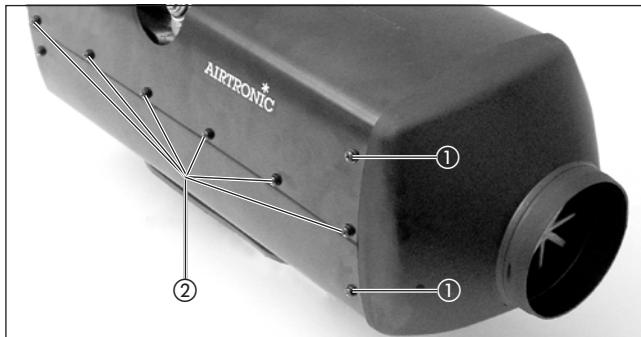


Figure 7

- ① Outlet hood fixing screws (B 3.5 x 13)
(opposite side of unit is mirror image)
- ② Fixing screws of upper jacket shell
(10 No. B 3.5 x 9.5 and 2 No. B 3.5 x 13)

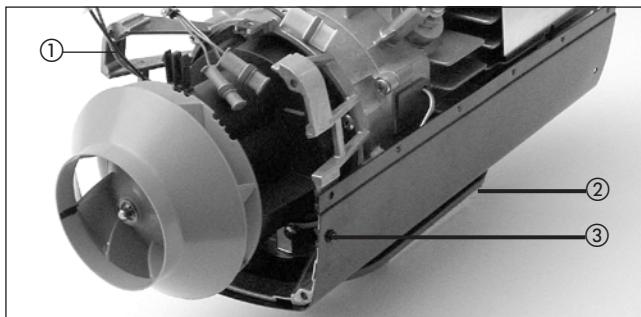


Figure 8

- ① Shell holder
- ② Flange seal
- ③ Fixing screws of lower jacket shell
(2 No. B 3.5 x 13, opposite side of unit is mirror image)

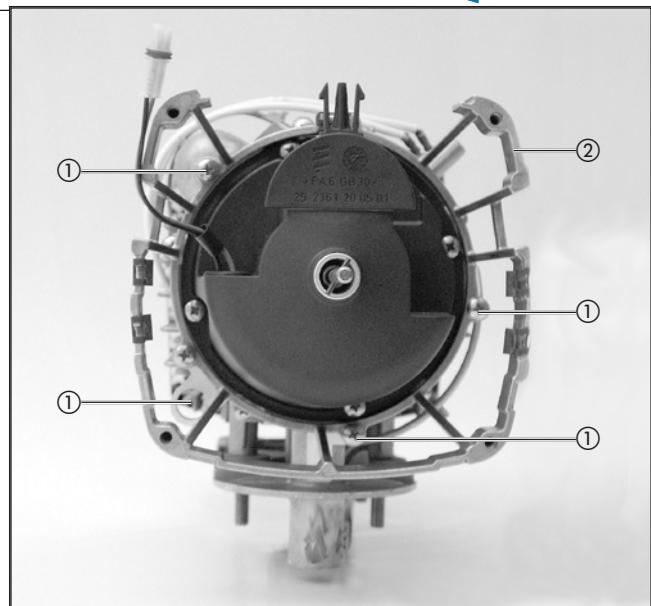


Figure 9 Fan wheel removed for improved view.

- ① Fixing screws for shell holder
(fillister-head screw M5 x 20)
- ② Shell holder

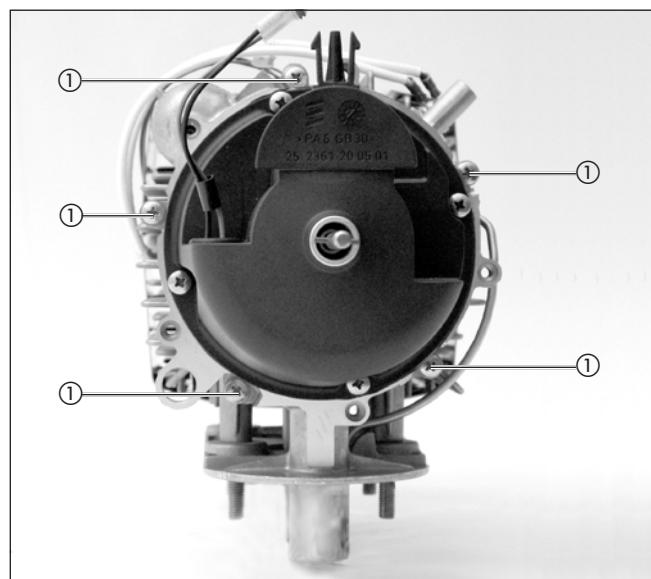


Figure 10 Fan wheel removed for improved view.

- ① Fastening screws of combustion air fan
(fillister-head screw M5 x 20)

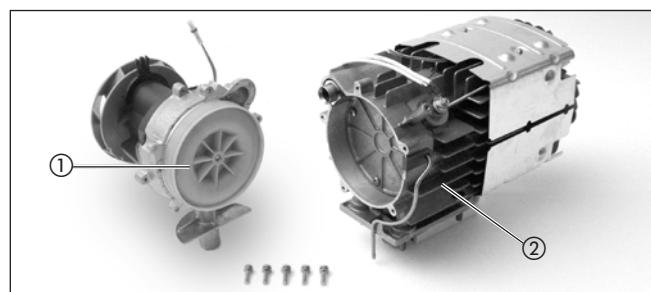


Figure 11

- ① Combustion air fan
- ② Heat exchanger

5 Repair instructions

Repair step 6

Replace the combustion chamber cover seal

(Figure 12)

- Repair step 5, dismantle / assemble combustion air fan.
- Unscrew the 4 screws of the combustion chamber cover.
- Remove the combustion chamber cover.
- Remove seal, clean seal surfaces if necessary, install new seal.
- Install in the reverse order.
Torque of combustion chamber cover fixing screws
 $3.5^{+0.5}$ Nm.

Please note!

Ensure the combustion air duct sits correctly in the combustion chamber cover.

Tighten the fixing screws "crosswise" (i.e. diagonally opposite screws, one after the other).

Additional checks

If a blower motor or control box are defective, the heater's operating hours must be checked.

If »H-Kit« is noted on the side of the heater's nameplate (H-Kit = suitable for altitude kit), the number of ignitions must also be read out of the control box.

If the allowed hours run or ignitions have been exceeded, the components must be replaced as described.

The EDITH diagnostic tool can be used to check the hours run and to read out the ignitions.

If the EDITH diagnostic tool is not available, the owner/operator of the heater must be asked how many hours it has run and the repair carried out as indicated in the following.

If blower motor is defective

- Operating hours < 4000 → renew blower, if possible read out ignitions.
Ignitions > 5000 → renew blower and heat exchanger.
- Operating hours > 4000 → renew blower and heat exchanger.

Recommendation:

With this amount of repair work, it is advisable to replace the complete heater instead of the blower and the heat exchanger.

If the control box is defective

- Operating hours < 4000 → replace control box, if possible read out ignitions.
Ignitions > 5000 → replace complete heater.
- Operating hours > 4000 → replace complete heater.

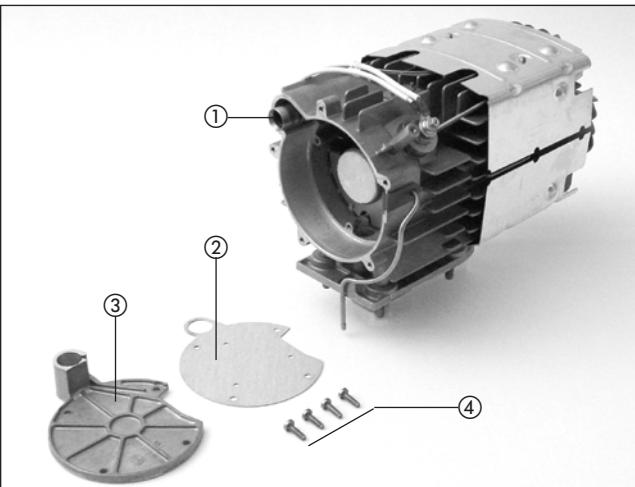


Figure 12

- ① Combustion air duct
- ② Seal
- ③ Combustion chamber cover
- ④ Fixing screws



5 Repair instructions

Check fuel supply

Before measuring the fuel quantity, check the following points in the fuel supply.

- Check the screen in the metering pump.
- Check the laying of the fuel pipes.
- Check fuel pipes for leaks.
- Check and tighten the hose connections.
- Is the fuel removal installed according to the details in the technical description?

Measuring the fuel quantity

1. Preparation

Remove the fuel pipe at the heater and insert a measuring cylinder (size 25 ml).

Switch on the heater, if the fuel is uniformly pumped (begins approx. 55 sec after being switched on), the fuel pipe is full and vented.

Switch off heater and empty measuring cylinder.

Please note!

For precise fuel measurement at least 11 volt and 22 volt or maximum 13 volt and 26 volt should be applied to the control box during the measurement.

2. Measurement

Switch on heater.

The fuel begins to be pumped approx. 55 sec after switching on the heater.

During the measurement, hold the measuring cylinder at the level of the heater.

After 90 sec of the fuel being pumped it is automatically switched off.

⚠ Caution!

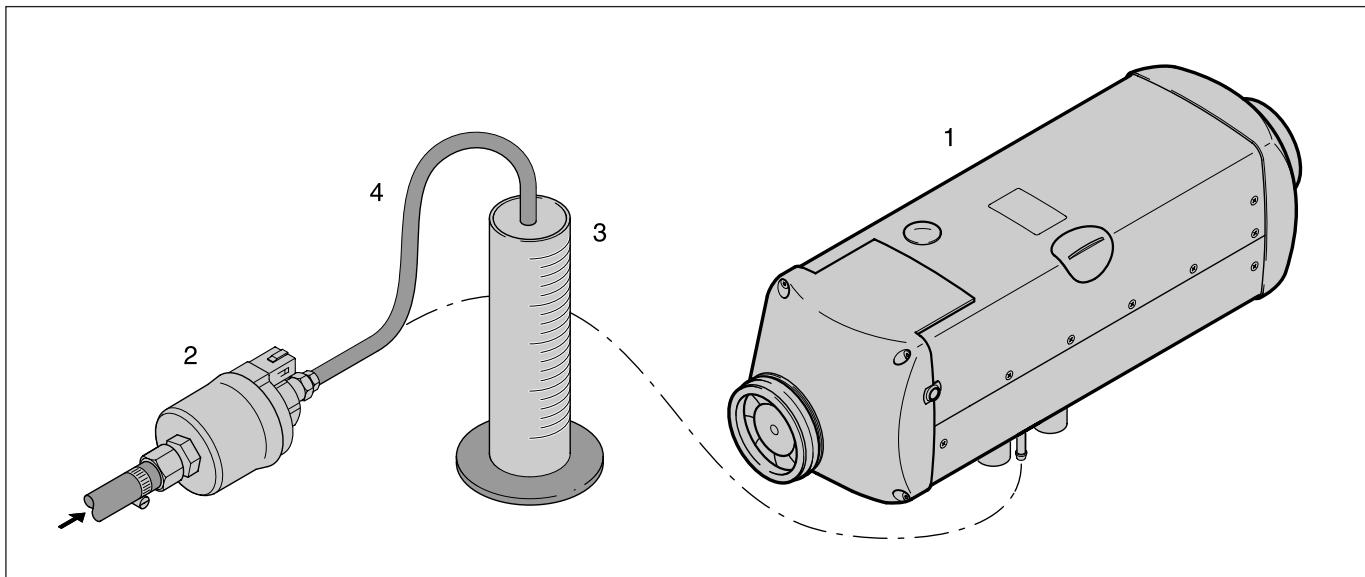
Switch off heater, as otherwise after 50 sec. fuel will be pumped again for 90 sec.

Read off the quantity of fuel in the measuring cylinder.

If the measured fuel quantity lies outside the values given below, the metering pump must be replaced.

Table of values – fuel quantity

Heater	Fuel	Fuel quantity	
		Minimal	Maximal
Airtronic L	diesel	9 ml / 90 sec	11 ml / 90 sec
Airtronic L	petrol	15 ml / 90 sec	17 ml / 90 sec



- 1 Heater
- 2 Metering pump
- 3 Measuring cylinder (size 25 ml)
- 4 Fuel pipe (disconnect at heater and insert in a measuring cylinder).

6 Circuit diagram

Parts list circuit diagrams

Airtronic L / Airtronic L – ADR

- 1.1 Burner motor
1.2 Glow plug
1.5 Overheating and flame sensor
- 2.1 Control box
2.2 Metering pump
2.7 Main fuse 12 volt = 25 A
 24 volt = 20 A
2.7.1 Fuse, actuation (5 A)
- 5.1 Battery
5.2.1 Battery operating switch
(operation, e.g. controlled by the ignition lock) d)
5.2.2 Battery isolating switch
(EMERGENCY OFF function for ADR) d)
5.3 Auxiliary drive (HA+)
5.3.1 Auxiliary drive switch
5.5 Generator terminal (D+)
- a) Control units and room temperature sensor connected according to the „control units“ circuit diagram.
- ge Switch-on signal (- S+)
 - brws Reference signal sensor
 - grrt Temperature (setpoint)
 - blws Diagnosis
 - br Power supply, negative (terminal 31)
 - wsrt Switch off the anti-theft alarm system (ADR – feedback signal for timer)
 - gr Temperature (actual value)
 - rt Power supply, positive (terminal 30)
- b) Option
- Fresh air fan
 - Vehicle fan control
- c) ADR
- Dangerous goods transporter in the area of the utility vehicle (e.g. tanker)
- d) 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 or similar), the switch always breaks contact immediately (regardless of the heater condition) and all the heater's circuits are disconnected from the battery.

Please note!

- Insulate unused cable ends.
- Connectors and bush housings are shown from the cable inlet side.

Parts list circuit diagram control units / control units – ADR

- 2.15.1 Temperature sensor (room temperature)
2.15.9 Temperature sensor (outside temperature)
- 3.1.9 Changeover switch “heat / ventilate”
3.1.16 Radio remote control button
3.1.17 Mini controller Airtronic
3.1.18 Button Calltronic
3.2.8 Module timer (ADR – potentiometer)
3.2.12 Timer, mini – 12 / 24 volt
3.2.14 Lighting, mini timer – 12 volt only
3.3.6 Radio remote control stationary part TP41i
3.3.7 Radio remote control stationary part TP5
3.3.8 Remote control Calltronic
3.8.3 Antenna
3.9.1 Diagnosis, JE diagnosis
- a) Connection of control units at the heater
- rt Power supply, plus – terminal 30
 - ge Switch-on signal – S+
 - gr Temperature – actual value
 - wsrt Switch off the anti-theft alarm system (ADR – feedback signal for timer)
 - br Power supply, minus – terminal 31
 - blws Diagnosis
 - grrt Temperature – setpoint
 - brws Ground connection for external temperature sensor and temperature setpoint
- b) Terminal 15 – necessary for connection TP4i
- c) Lighting, terminal 58
- d) Connection, diagnostic unit
- e) Connection, external temperature sensor
- g) Connection, external heating button
- h) Connection, radio remote control TP4i
- j) Connection, temperature sensor (outside temperature)
- l) Connection, change-over switch “heat / ventilate” (option)
Initial operation: Activate changeover switch “heat / ventilate“ then switch on the heater.
- z) Lighting, terminal 58

Cable colours circuit diagrams

sw	= black
ws	= white
wsrt	= white / red
rt	= red
ge	= yellow
gn	= green
vi	= violet
br	= brown
brws	= brown / white
gr	= grey
grrt	= grey / red
bl	= blue
blws	= blue / white
li	= purple

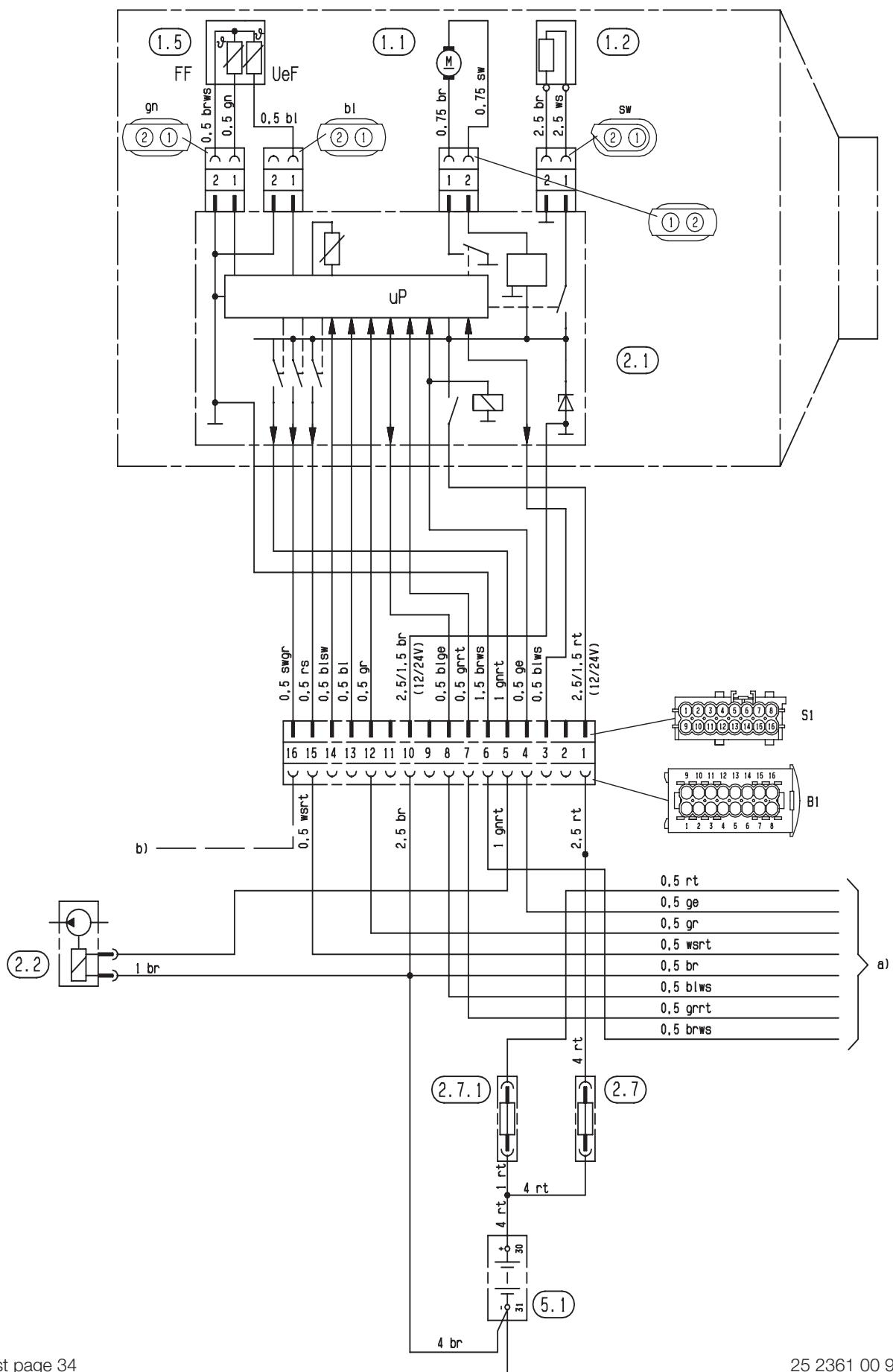
Please note!

- Insulate unused cable ends.
- Connectors and bush housings are shown from the cable inlet side.



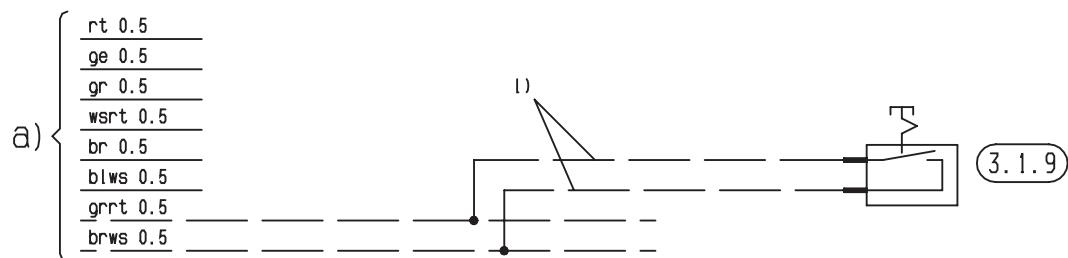
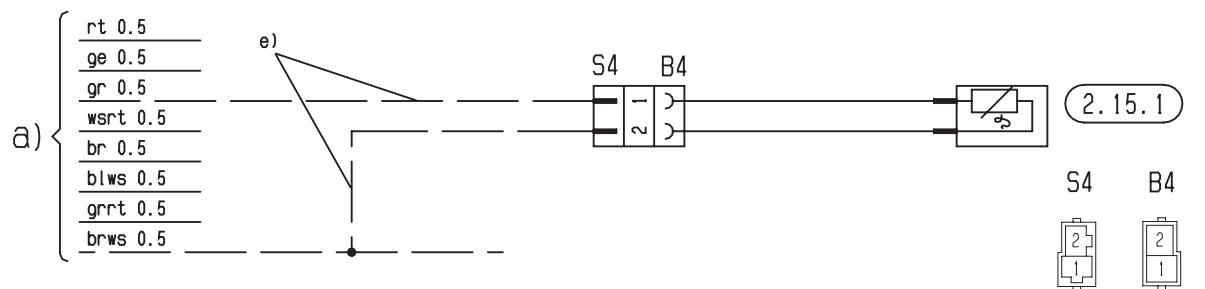
6 Circuit diagram

Circuit diagram Airtronic L- 12 volt / 24 volt

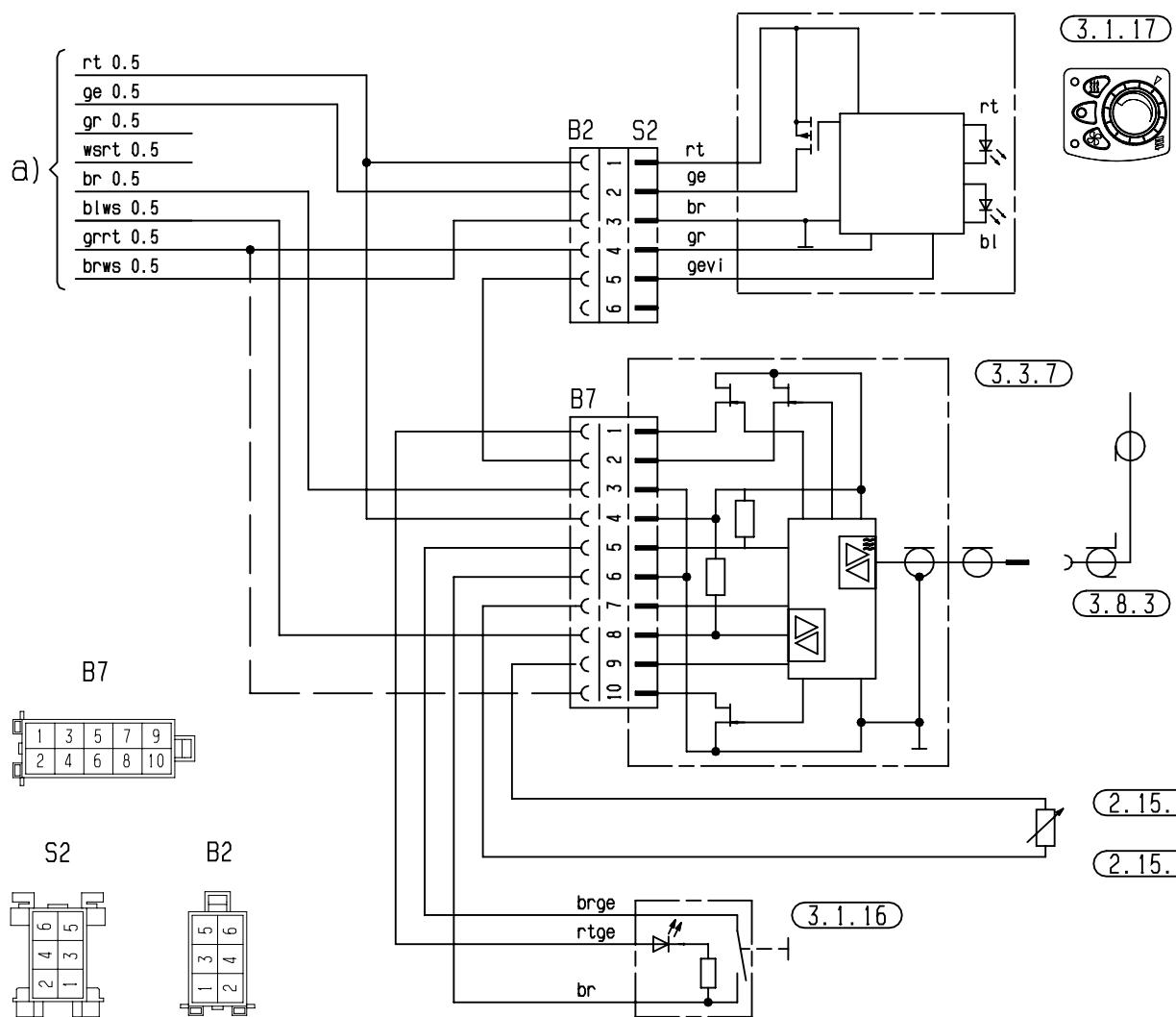


6 Circuit diagram

Circuit diagram for control units



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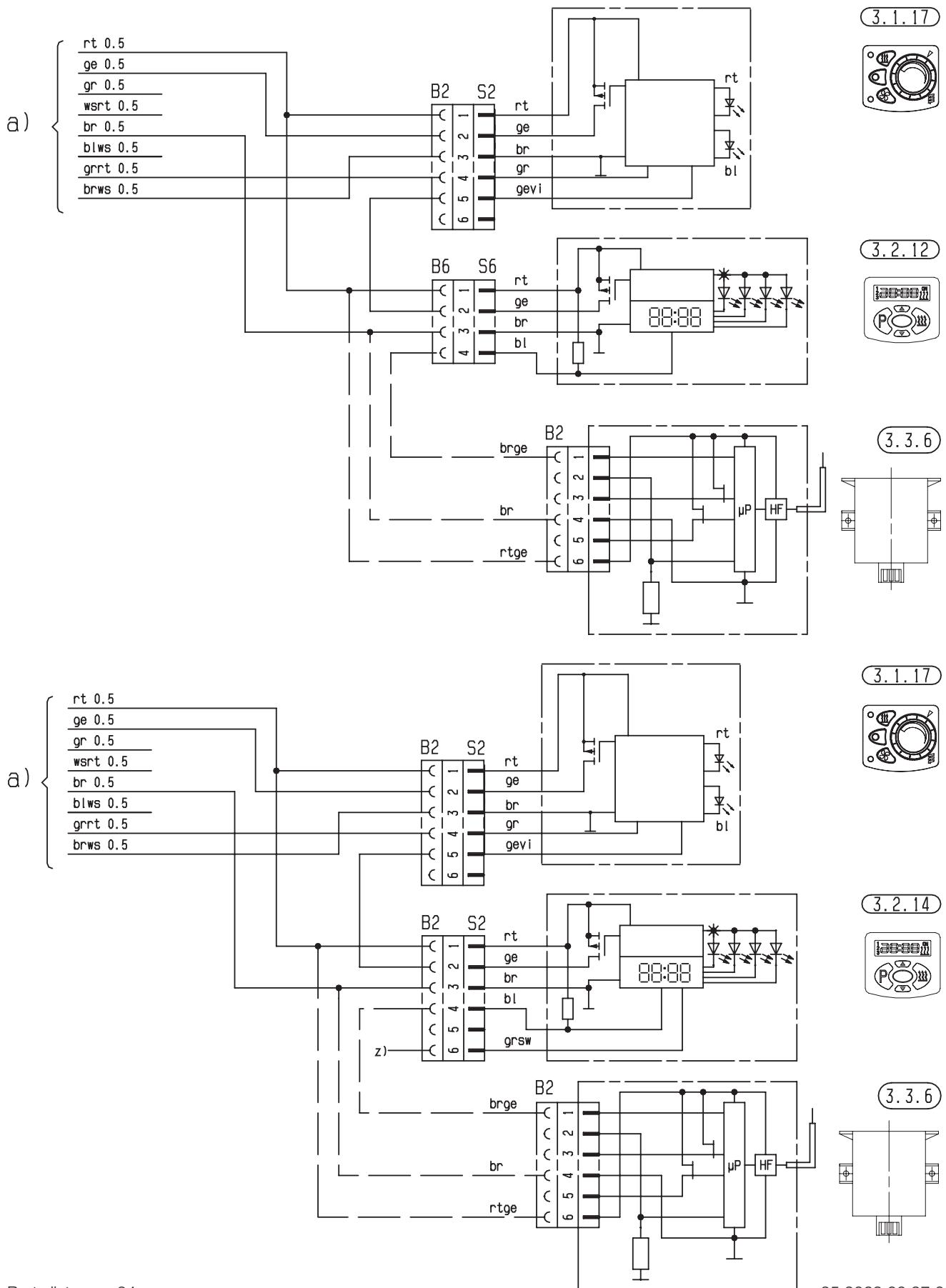
Parts list page 34

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6 Circuit diagram

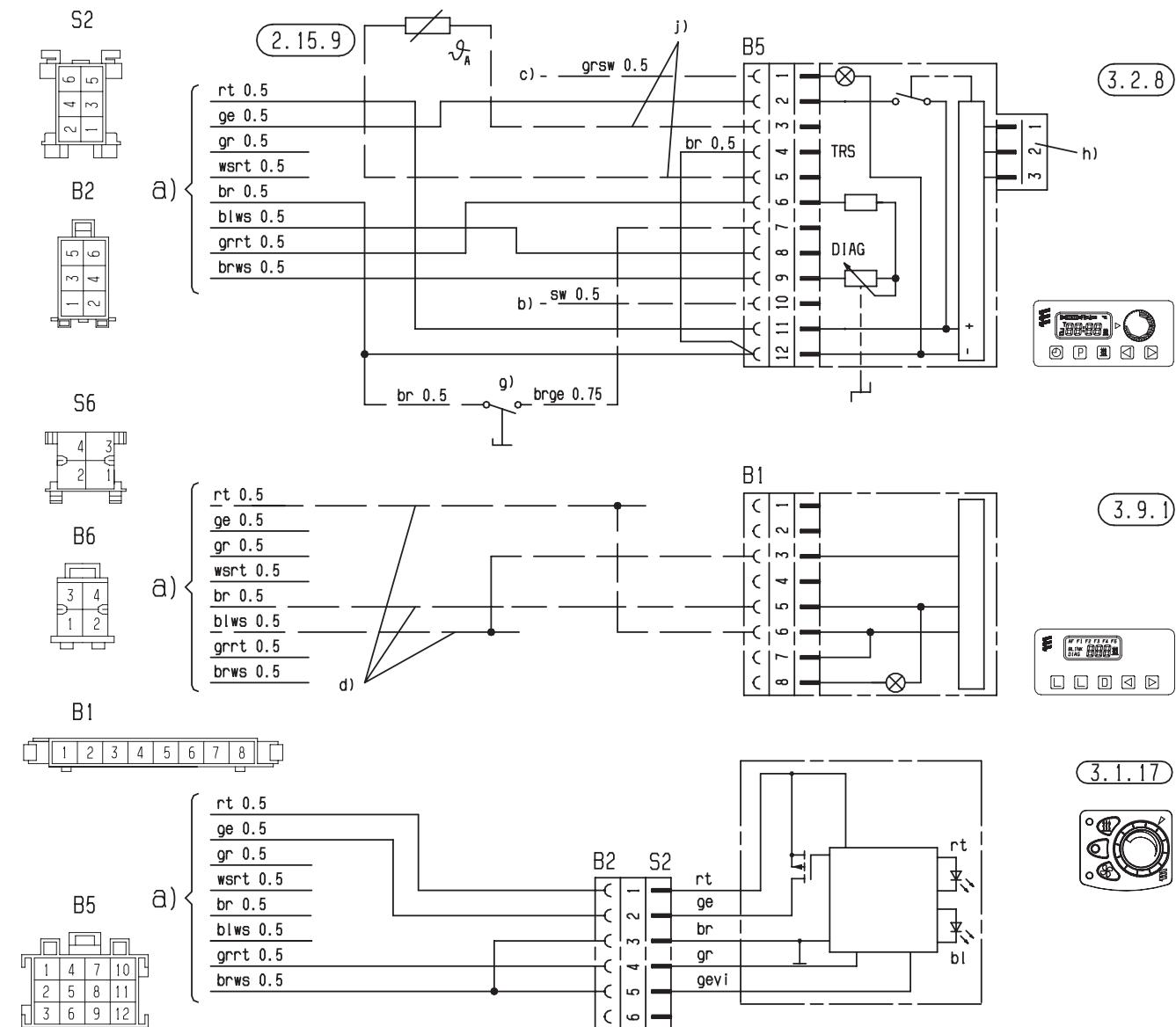


Circuit diagram for control units



6 Circuit diagram

Circuit diagram for control units

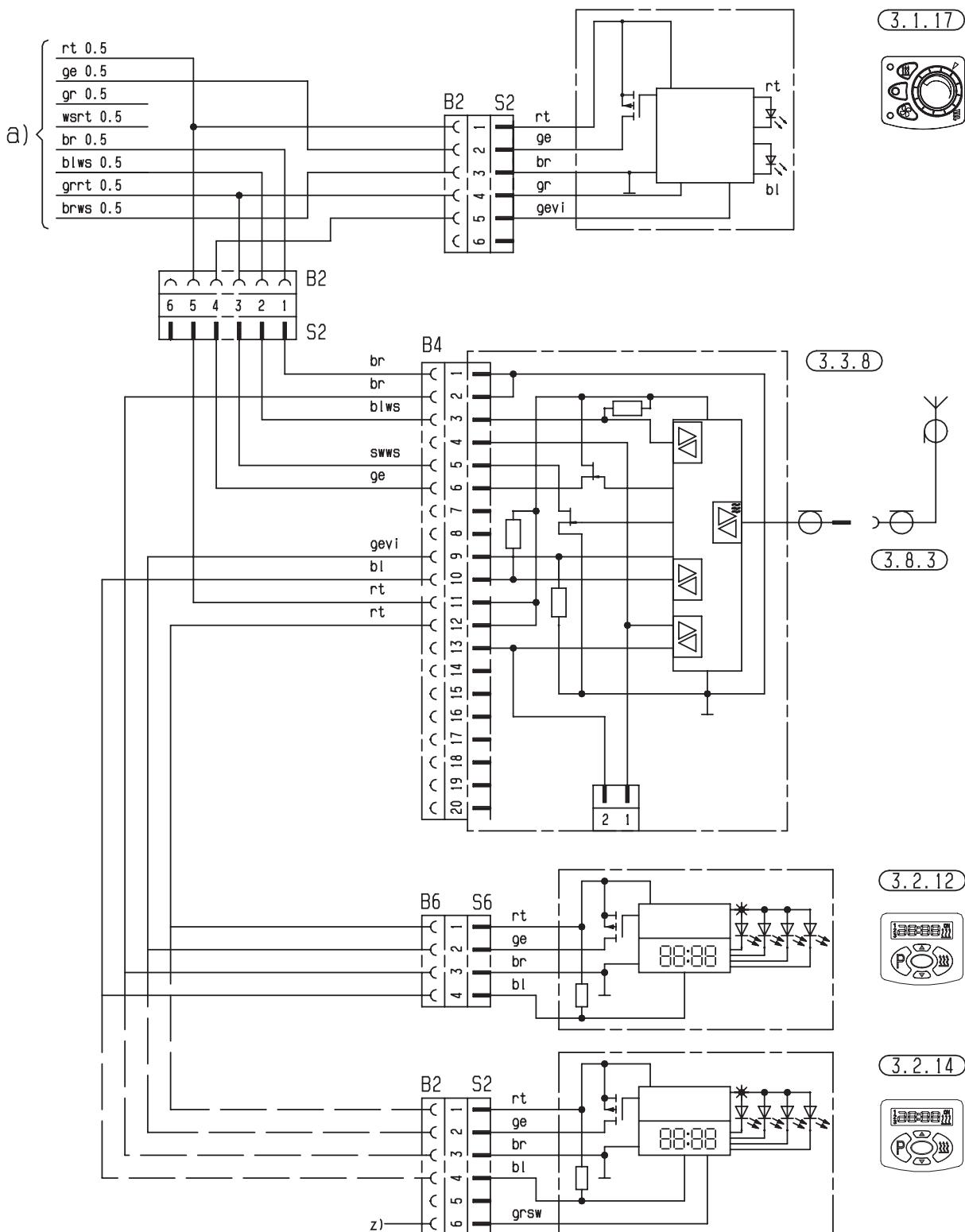


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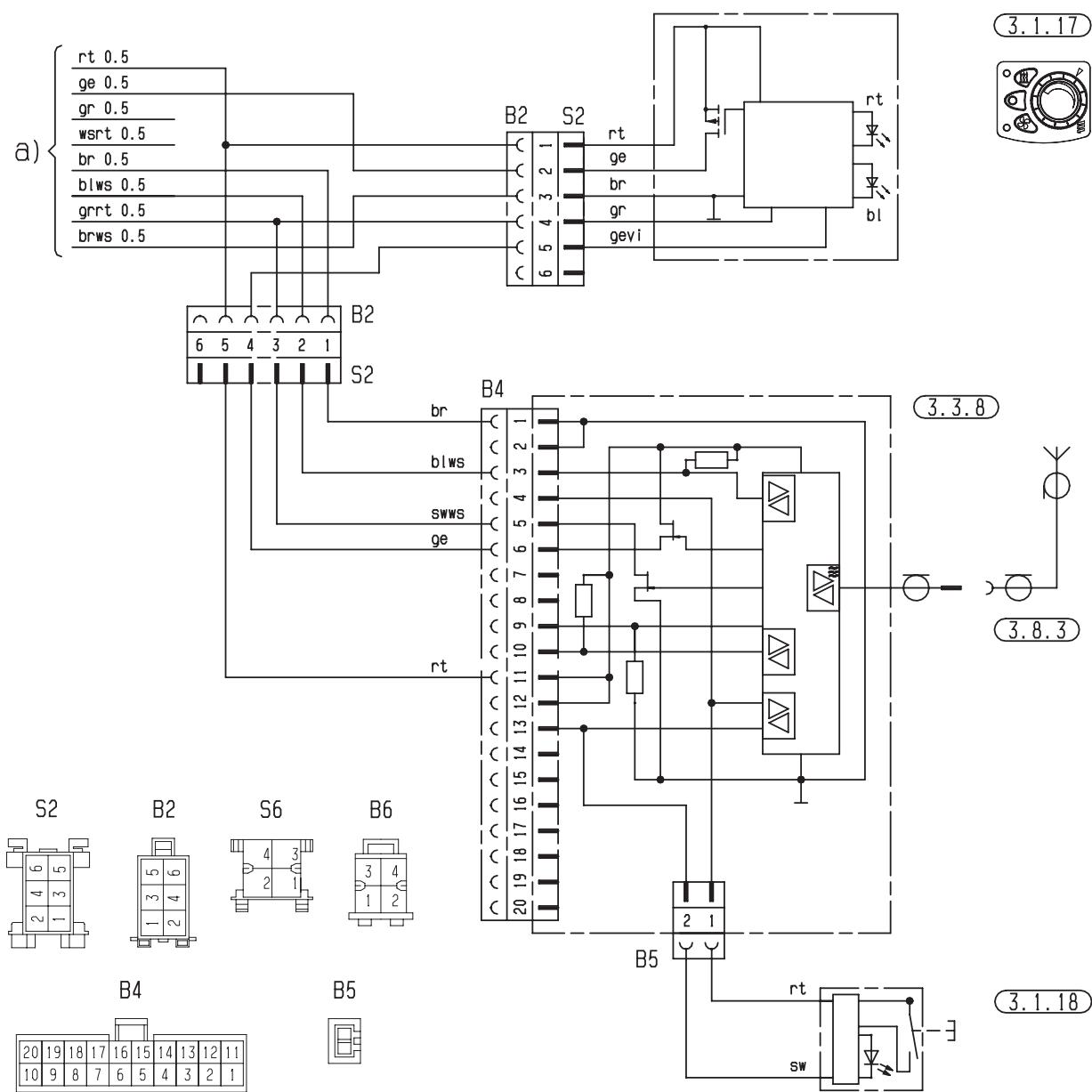
6 Circuit diagram

Circuit diagram for control units



6 Circuit diagram

Circuit diagram for control units

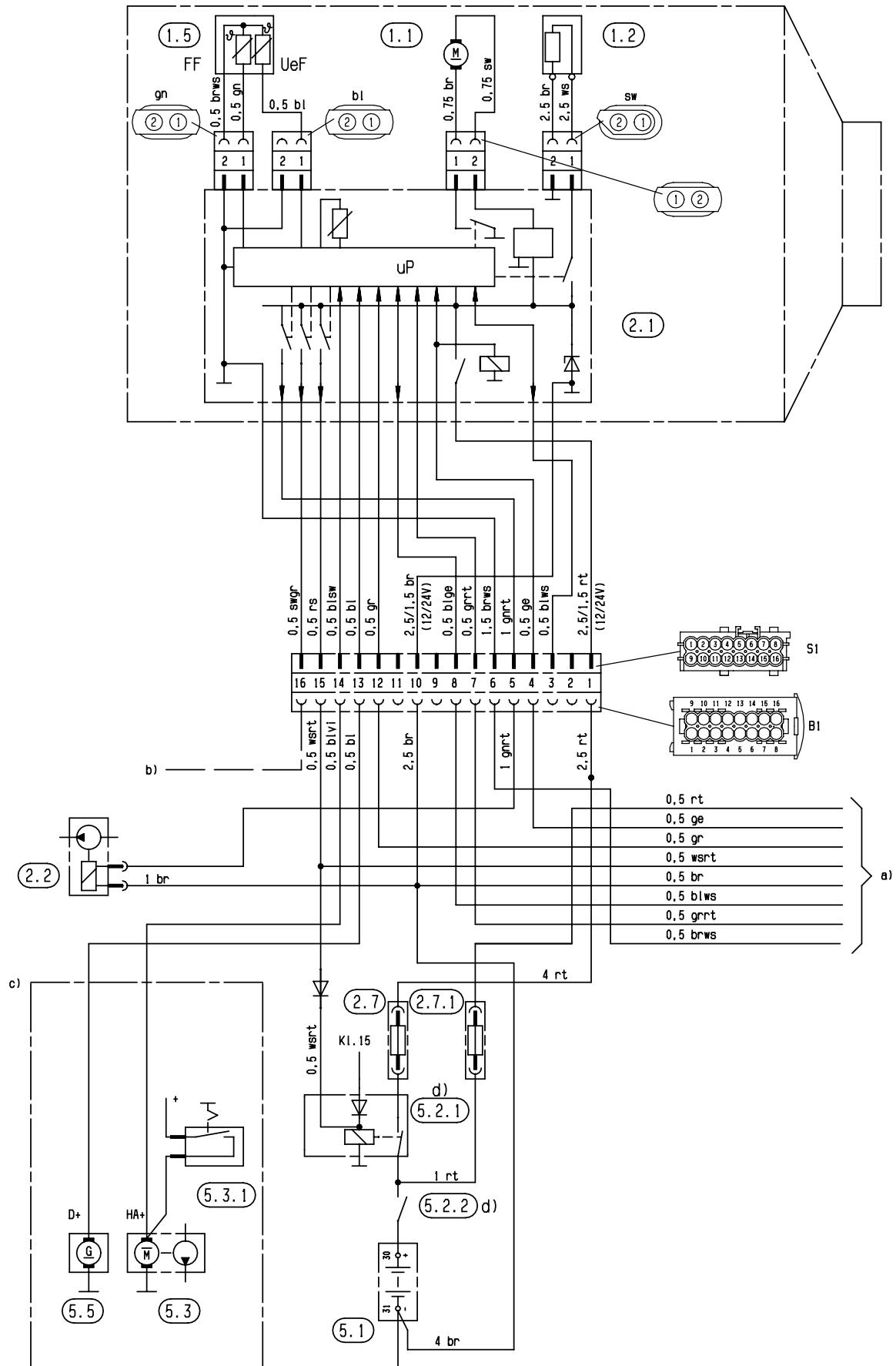


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6 Circuit diagram



Circuit diagram Airtronic L – ADR – 12 volt / 24 volt

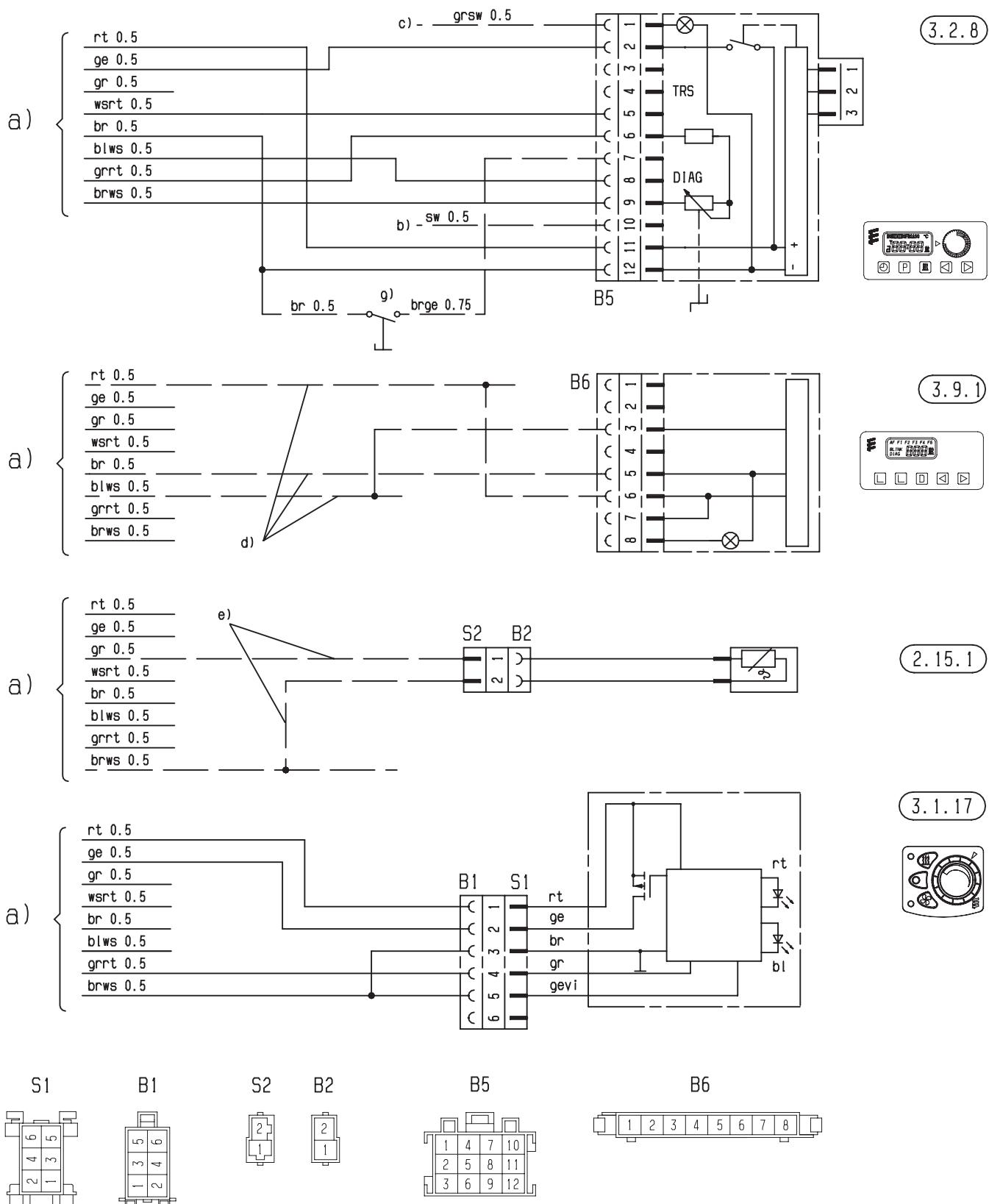


Parts list page 34

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6 Circuit diagram

Circuit diagram control units – ADR



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6 Circuit diagram

Parts list circuit diagram

control unit EasyStart R+ / R / T

2.15.1 Temperature sensor (room temperature)
(included in scope of supply for EasyStart R+,
optional for EasyStart R / T)

2.15.9 Outside temperature sensor (optional)

3.1.7 "OFF" button

3.1.9 "Heat / ventilate" switch

3.1.11 "Round" control unit

3.1.16 Radio remote control button

3.1.17 "Mini controller" control unit

3.2.15 EasyStart T timer

3.3.9 Radio remote control EasyStart R (stationary unit)

3.3.10 Radio remote control EasyStart R+ (stationary unit)

3.6.1 Lead harness

3.8.3 Antenna

a) Connection of control units at the heater

c) Terminal 58 (lighting)

d) Parking ventilation with vehicle fan (optional)

e) Connection of EasyStart T timer timer

g) Connection "ON / OFF" key

(optional e.g. Order No.: 22 1000 32 84 00)

h) Connection of "Ventilate" via EasyStart R+

x) ADR jumper

y) Connect and insulate cables

Please note!

- The timer / radio remote control must be connected in accordance with the circuit diagrams (page 36 – 49).
- Note heater type!
- The jumper labelled with y) in the circuit diagram must always be connected.
- Insulate unused cable ends.
- Connectors and bush housings are shown from the cable inlet side.

Cable colours circuit diagrams

sw = black

ws = white

rt = red

ge = yellow

gn = green

vi = violet

br = brown

gr = grey

bl = blue

li = purple

6 Circuit diagram

Pin assignments

EasyStart R+

Pin assignment at the stationary unit connector

1	Terminal 31 (negative)
2	--
3	Ventilate (switching signal -)
4	DAT cable
5	Pushbutton / LED (negative)
6	Temperature sensor (negative)
7	Terminal 30 (positive)
8	S+ (switching on signal)
9	LED (positive)
10	Diagnosis cable (K line)
11	Pushbutton (negative)
12	Temperature sensor (positive)

EasyStart R

Pin assignment at the stationary unit connector

1	Terminal 31 (negative)
2	--
3	--
4	DAT cable
5	Pushbutton / LED (negative)
6	--
7	Terminal 30 (positive)
8	S+ (switching on signal)
9	LED (positive)
10	Diagnosis cable (K line)
11	Pushbutton (negative)
12	--

EasyStart T

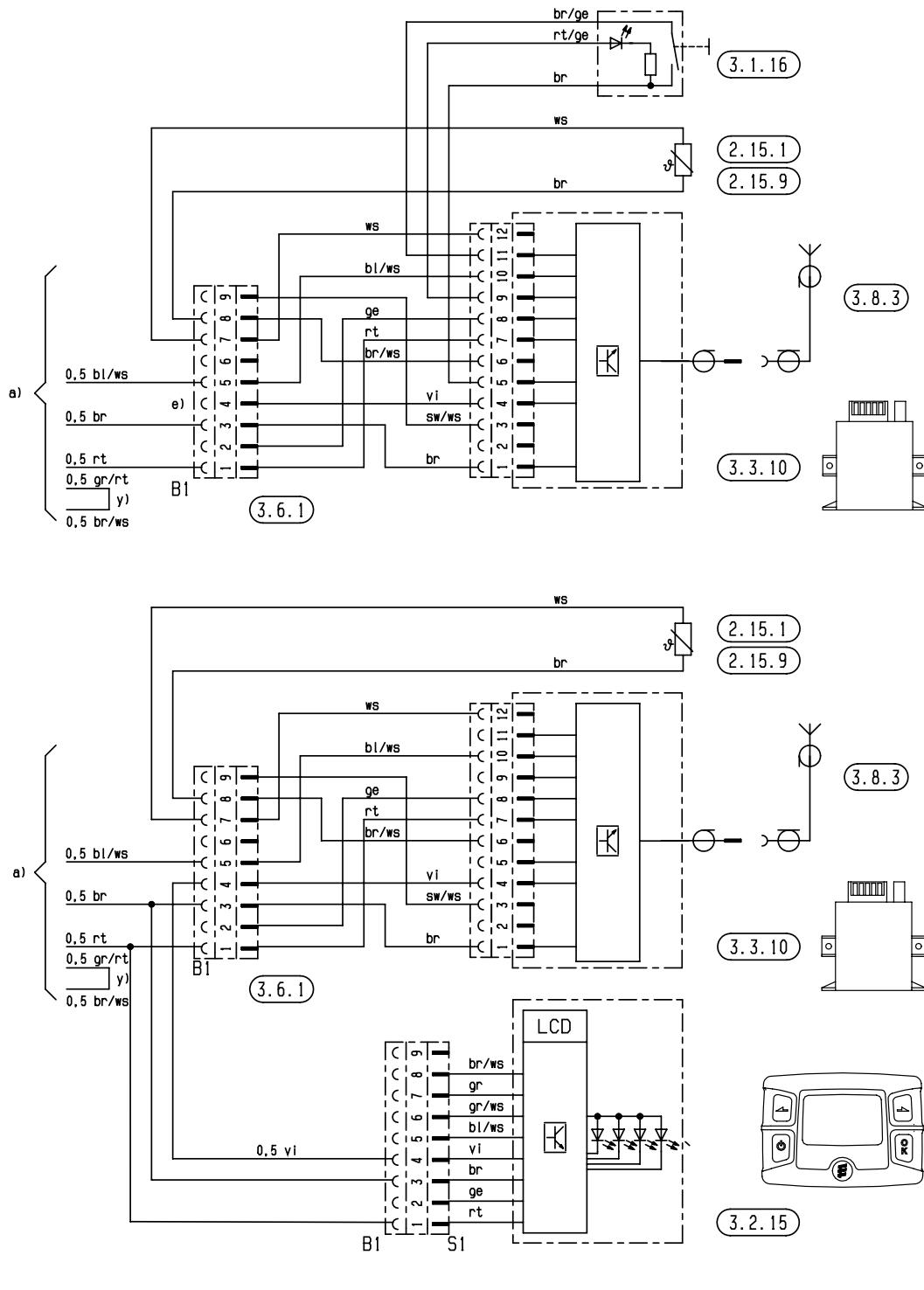
Pin assignment at the EasyStart T-connector S1

1	Terminal 30 (positive)	rt
2	S+ (switching on signal)	ge
3	Terminal 31 (negative)	br
4	DAT cable	vi
5	Diagnosis cable (K line)	bl/ws
6	Terminal 58	gr/sw
7	Temperature sensor (positive)	gr
8	Temperature sensor (negative)	br/ws
9	--	--



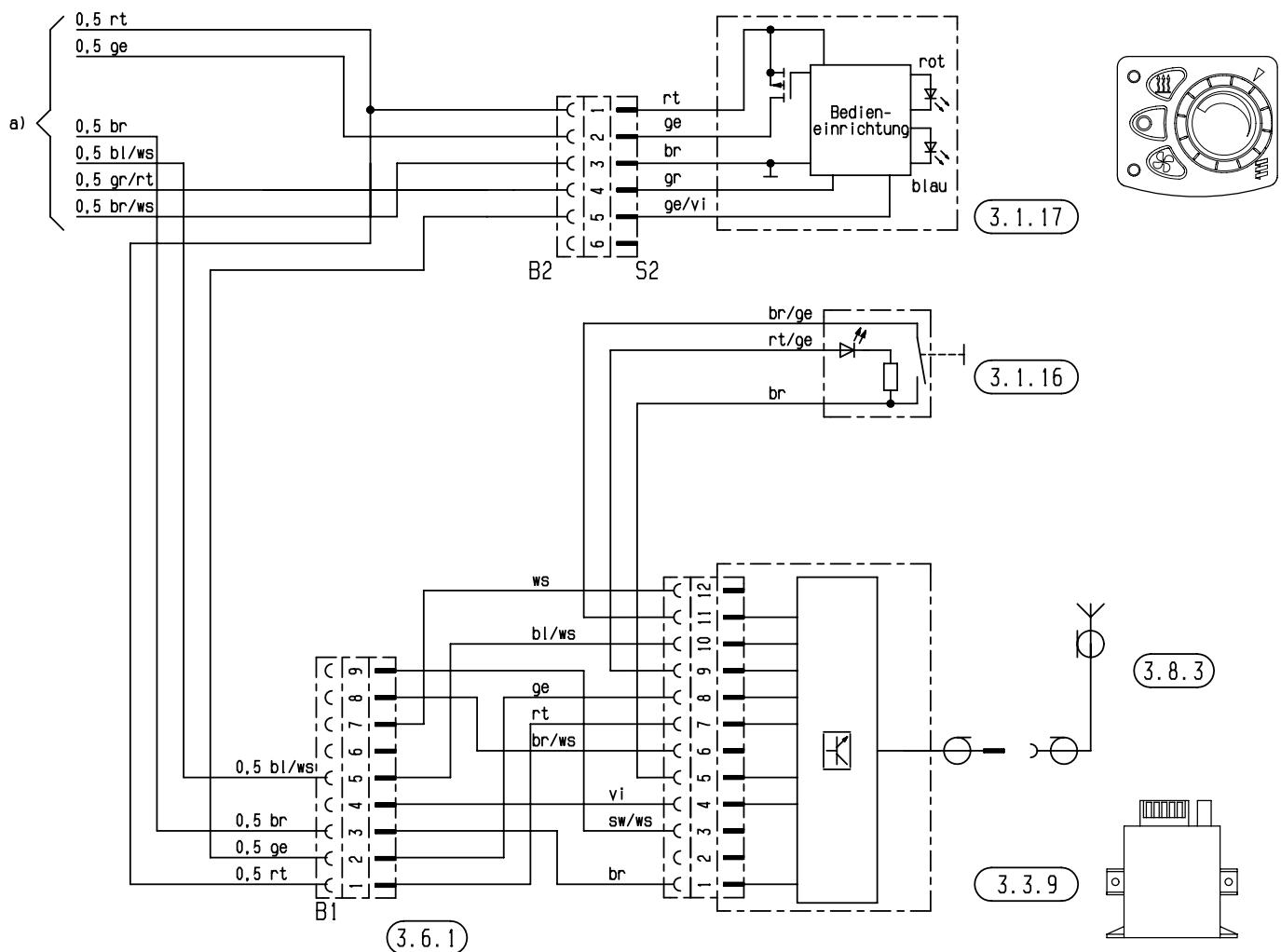
6 Circuit diagram

Circuit diagram control units – EasyStart R+



6 Circuit diagram

Circuit diagram control units – EasyStart R

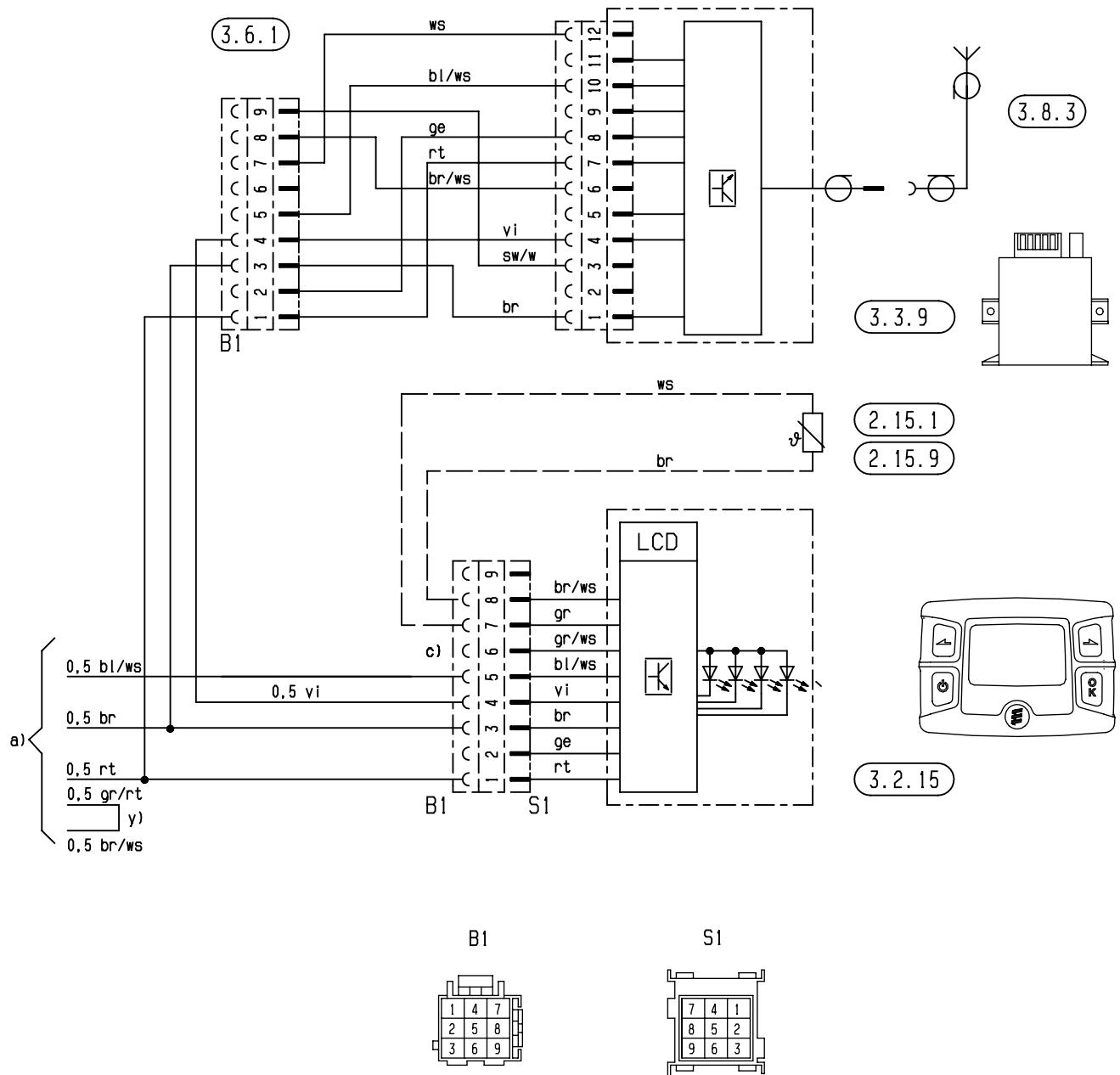


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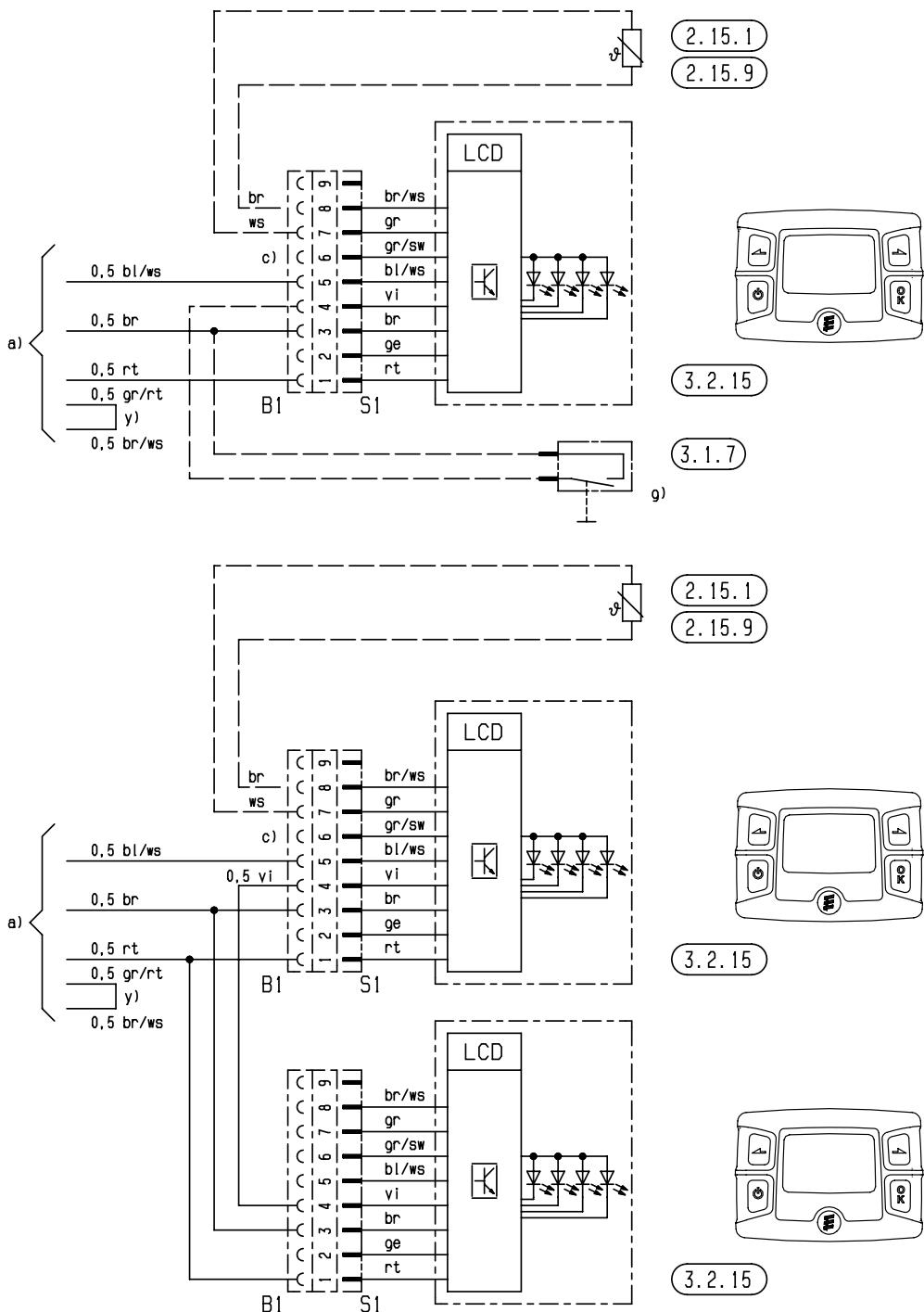
6 Circuit diagram

Circuit diagram control units – EasyStart R

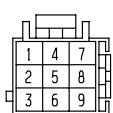


6 Circuit diagram

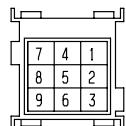
Circuit diagram control units – EasyStart T



B1



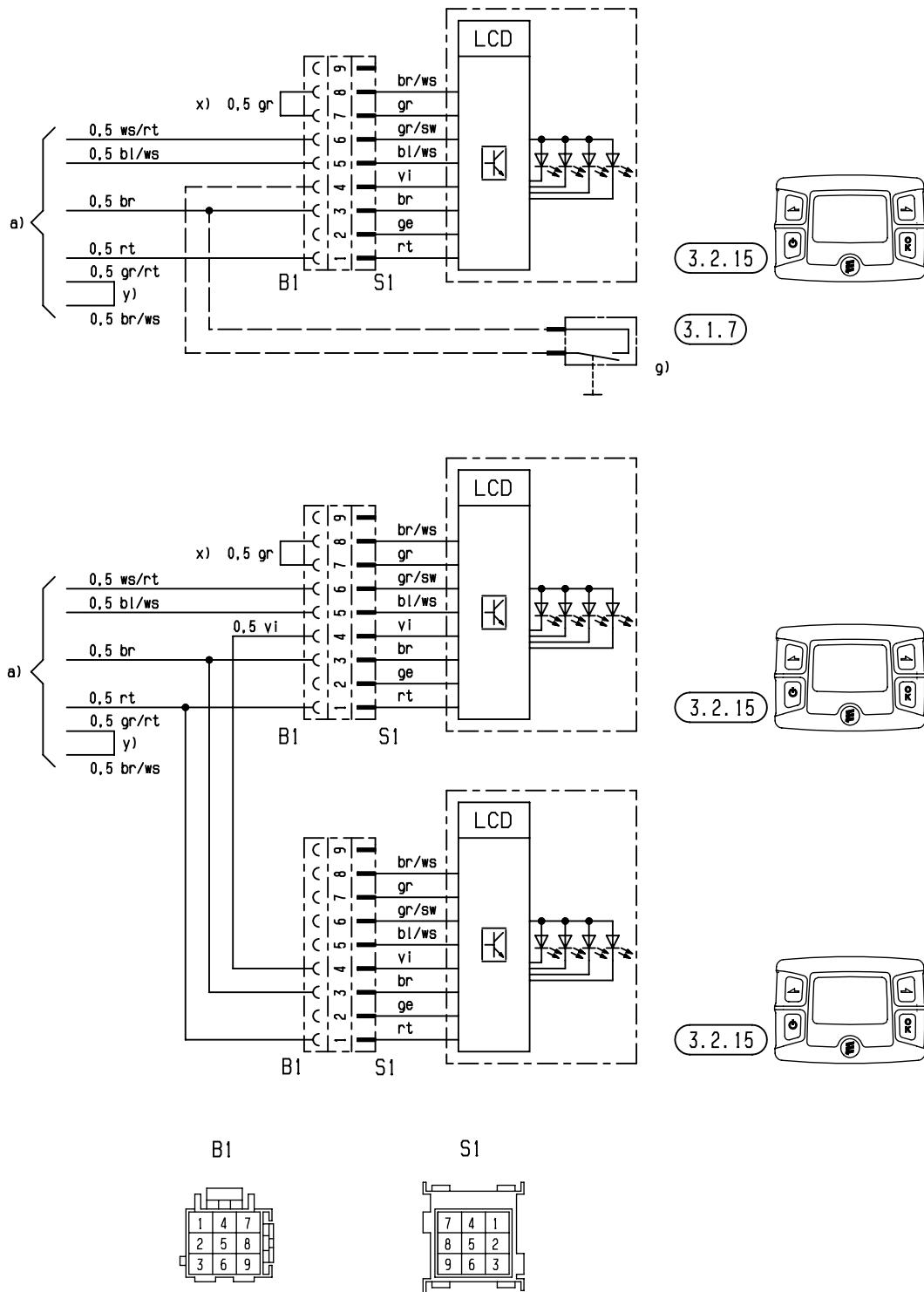
S1





6 Circuit diagram

Circuit diagram control units – EasyStart T – ADR



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7 Service

Certifications

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

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

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

This quality is to be considered in a total sense.

It affects products, procedures and customer / supplier relationships.

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

Eberspächer has already qualified for the following standards:

**Quality management 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 Airtronic L

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 manufactured according to the Airtronic L production drawings, which are an integral part of this declaration.

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

- EN 50081 – 1 Basic form interference emission
- EN 50082 – 1 Basic form of interference immunity
- 72 / 245 / EWG – Modification status 2004 / 104 / EG interference suppression in motor vehicles.



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List of abbreviations

ADR

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

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.

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