

## TECHNICAL DESCRIPTION

### AIRTRONIC M2 D4R COMMERCIAL AND RECREATIONAL



The technical description and installation instructions are valid for the following engine-independent air heaters:

**Air heaters for diesel fuel**

**Order No.**

Airtronic M2, D4R, 12 V

25.2746.05.0000

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## 1 Introduction

### 1.1 Concept of this document

This document supports the service company or installation company installing the heater and provides the user with all important information about the heater. The document is divided into the following chapters to make it easier to find information quickly:

#### 1 Introduction

Important, introductory information about use and the structure of this document

#### 2 Product information

Information about the scope of supply, technical data and dimensions.

#### 3 Installation

Information and notes concerning installation of the product

#### 4 Operation and Function

Information on operation and function of the product

#### 5 Electrics

Information on the electronics and electronic components.

#### 6 Troubleshooting / Maintenance / Service

Information on possible faults, maintenance and support

#### 7 Environment

Information about certification, disposal of the heater and the EC Declaration of Conformity

#### 8 List

Information about abbreviations used in the document.

### 1.2 General information

This document is used to install the heaters listed on the title page and applies to the exclusion of all liability claims. The installation work may only be carried out by appropriately trained personnel of an Eberspächer service partner.

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

### 1.3 Reference documents

#### Spare parts list

Contains the information necessary for ordering spare parts for the heater.

#### Repair instructions

Contains the necessary information for troubleshooting and for repair of the heater.

#### Installation recommendation

Describes vehicle-specific installation situations.

### Installation Instructions Plus

Supplementary information on heaters and control units.

### 1.4 Special text formats and presentations

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

#### 1.4.1 Lists

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

#### 1.4.2 Cross references

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

### 1.5 Picture symbols

#### Regulation!

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

#### Danger!

“Danger” indicates a situation that can directly result in death or serious injuries if not avoided.

→ This arrow indicates the appropriate measures to avert the imminent danger.

#### Warning!

“Warning” indicates a situation that can potentially result in death or serious injuries if not avoided.

→ This arrow indicates the appropriate measures to avert the potential danger.

#### Caution!

“Caution” indicates a situation that can potentially result in minor or slight injuries if not avoided.

→ This arrow indicates the appropriate measures to avert the potential danger.

### **i** Note

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

## 1.6 Intended use

### 1.6.1 Range of application of the heater

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

- All types of vehicles (max. 8 seats + driver's seat) and their trailers
- Construction machinery
- Agricultural machinery
- Boats, ships and yachts (only diesel heaters)
- Camper vans

### 1.6.2 Intended use of the heater

- Pre-heating, de-misting windows
- Heating and keeping the following warm:
  - Driver and working cabs, ship's cabins
  - Freight compartments
  - Passenger and crew compartments
  - Camper vans

### **i** Note

Only use and operate the heater within the scope of the intended use stated by the manufacturer and in compliance with the documentation enclosed with each heater.

## 1.7 Non-intended use

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

- Long-term continuous operation, e.g. for heating:
  - Residential rooms
  - Garages
  - Work huts, weekend homes and hunting lodges
  - Houseboats, etc.
- Heating or drying of:
  - Living creatures (people or animals) by blowing hot air directly at them
  - Objects
  - Blowing hot air into containers

### **⚠** Warning!

Risk of undercooling!

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

## 1.8 Disclaimer

The manufacturer is not liable for damage caused by improper use or incorrect operation. Failure to comply with the safety instructions makes the guarantee null and void and this leads to the exclusion of any liability of Eberspächer Climate Control Systems GmbH & Co. KG.

## 1.9 Target groups of this document

This document is aimed at the following target groups:

### Service company

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

### Installation company

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

### End user

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

## 1.10 Duty to instruct of the target groups

Each named target group must fulfil their duty to instruct in full. The duty to instruct relates to the passing on of technical documents. Technical documents are all documents published by Eberspächer for the installation, operation, use, maintenance or repair of heaters and air conditioners and their control units, accessories and spare parts.



 **Note**

- If not explicitly defined in the following, the technical documents can be passed on printed out as hard copies, on a data carrier or by internet download.
- Current technical documents can be downloaded from the Eberspächer website.

**Responsibility of the installation company**

The installation company must pass on the following technical documents to the company that employs them, and it in turn is obliged to pass on the documents to the end user:

- Technical description
- Operating instructions

**Responsibility of the service company**

The service company must pass on the following technical documents to the end user, even if they employ a subcontractor:



- Technical description
- Operating instructions

 **Note**

The named target groups must ensure that the operating instructions produced by the manufacturer for the product are made available to the end user in printed form and in their own national language. If necessary this can be a short form of the detailed operating instructions, which are additionally enclosed with the product on a data carrier or are available to download from the internet.

**1.11 Statutory regulations**

The Federal Motor Transport Authority has issued an approval for a component according to ECE-R122 and ECE-R10 for the heater for installation in motor vehicles, with the following official type-approval markings noted on the heater's nameplate.

| Heater type:  | ECE type approval mark:   |
|---------------|---|
| Airtronic S 2 |  122 R – 000523<br>10 R – 058206 |
| Airtronic M 2 |  122 R – 000477<br>10 R – 057672 |

 **Regulation!**

**Excerpt from ECE regulation No. 122 of the European Parliament and the Council**

**General regulations**

Operating state display

- A clearly visible operating display in the user's field of vision must indicate when the heater is switched on and off.

**Regulations concerning installation in the vehicle**

Scope

- Subject to differing stipulations in the following section, combustion heaters must be installed according to the regulations 5.3 of ECE-R122.
- It is assumed that Class <sub>0</sub> vehicles with heaters for liquid fuel conform to the regulations 5.3 of ECE-R122.

**Arrangement of the heater**

- Parts of the structure and other components near the heater must be protected from excessive heat exposure and possible fuel or oil contamination.
- The combustion heater shall not constitute a risk of fire, even in the case of overheating. This requirement shall be deemed to be met if the installation ensures an adequate distance to all parts and suitable ventilation, by the use of fire resistant materials or by the use of heat shields.
- The heater must not be installed in the passenger compartment of class M<sub>2</sub> and M<sub>3</sub> vehicles. However, a heater in a hermetically sealed enclosure which also complies with the aforementioned conditions may be used.
- The nameplate, or a duplicate, must be positioned so that it can be easily read when the heater is installed in the vehicle.
- Every reasonable precaution should be taken in positioning the heater to minimize the risk of injury and damage to personal property.

**Fuel supply**

- The fuel filler neck must not be located in the passenger compartment and must be sealed with a properly closing cover to prevent any fuel leaks.
- In heaters for liquid fuel where the heater fuel supply is separate from the vehicle fuel supply, the type of fuel and filler neck must be clearly marked.
- A warning sign is to be attached to the filler neck informing that the heater must be switched off before refuelling.

**Exhaust system**

The exhaust outlet must be arranged so as to prevent any penetration of exhaust fumes into the vehicle interior through the ventilation system, warm air intakes or open windows.

**Combustion air intake**

- The air for the heater's combustion chamber may not be drawn in from the vehicle's passenger compartment.
- The air intake must be arranged or protected in such a way that it cannot be blocked by other objects.

### Hot air intake

- The hot air supply must consist of fresh air or circulated air and must be drawn in from a clean area, which cannot be contaminated by exhaust fumes from the engine, the combustion heater or any other source in the vehicle.
- The intake pipe must be protected by a grille or other suitable means.

### Hot air outlet

- The hot air pipes within the vehicle must be arranged or protected in such a way that there is no risk of injury or damage if they are touched.
- If there is a risk of the driver and/or passengers touching the heater or hot air system parts during normal vehicle operation, protection against contact must be fitted in these places.
- The air outlet must be arranged or protected in such a way that it cannot be blocked by any objects.

### Automatic control of the heating system

If the engine fails, the heating system must be switched off automatically and the fuel supply stopped within 5 seconds. The heater may remain in operation if a manual device has already been activated.

#### **i** Note

- Compliance with the statutory regulations, the additional regulations and the safety instructions is prerequisite for guarantee and liability claims. Failure to comply with the statutory regulations and safety instructions and incorrect repairs, even if original spare parts are used, make the guarantee null and void and this results in the exclusion of any liability whatsoever of Eberspächer Climate Control Systems GmbH & Co. KG.
- Subsequent installation of the heater must comply with these installation instructions.
- The statutory regulations are binding and must also be observed in countries which do not have any special regulations.
- When installing the heater in vehicles not subject to the German Road Traffic Licensing Regulations (StVZO), for example ships, observe the respective specially valid regulations and installation instructions.
- When installing the heater in special vehicles, comply with the regulations applying to such vehicles.
- Further installation requirements are printed in the relevant sections of these installation instructions.

## 1.12 Additional regulations

### **§** Regulation!

#### **Additional regulations for certain vehicles named in Directive 94 / 55 / EC of the ADR Agreement**

##### Scope

This annex applies to vehicles to which the special provisions of Directive 94 / 55 / EC of the ADR Agreement for combustion heaters and their installation apply.

##### Definition of terms

The vehicle designations "EX / II", "EX / III", "AT", "FL" and "OX" according to Chapter 9.1 of the ADR Agreement Directive are used for the purposes of this annex.

##### Technical specifications

#### **General regulations (vehicles EX / II, EX / III, AT, FL and OX)**

##### **Avoid heating and ignition**

Combustion heaters and their exhaust pipes must be designed, arranged, protected or covered to avoid any unacceptable risk of heating or ignition of the load. This requirement is met if the fuel tank and the exhaust system of the heater comply with the requirements described in the "fuel tank" and "exhaust system and exhaust pipe layout" sections. Compliance with these requirements must be checked on the complete vehicle.

##### **Fuel tank**

Fuel tanks for supply of the heater must conform to the following regulations:

- In the event of a leakage, the fuel must be drained to the floor without coming into contact with any hot vehicle parts or the vehicle's load;
- Fuel tanks which contain petrol must be equipped with a flame arrester or hermetically sealed cap at the filler neck.

##### **Exhaust system and exhaust pipe layout**

The exhaust system and the exhaust pipes must be laid or protected so that dangerous heating or ignition of the vehicle's load cannot occur. Parts of the exhaust system located directly under the fuel tank (diesel fuel) must be positioned at a distance of at least 100 mm from the tank or be protected by a heat shield.

##### **Switch on combustion heater**

The combustion heater may only be switched on manually. Automatic switching on via a programmable switch is not allowed.

##### **EX / II and EX / III vehicles**

Combustion heaters for gaseous fuel are not allowed.

### FL vehicles

Combustion heaters must at least be able to be taken out of service by the procedures named in the following:

- Switching off manually in the driver's cab
- Shutdown of the vehicle's engine; in this case the heater may be switched back on manually by the vehicle driver;
- Starting up an installed fuel pump in the vehicle for transported dangerous goods.

### After running of the combustion heater

After running of the switched off combustion heater is permitted. In the cases named in the "FL vehicles" section under letters b) and c), the supply of combustion air must be interrupted by suitable means following an after-running period of 40 seconds maximum. Only combustion heaters whose heat exchangers are verifiably not damaged by the reduced after-running time of 40 seconds beyond their usual operating period may be used.

### Notes

- Compliance with the statutory regulations, the additional regulations and the safety instructions is prerequisite for guarantee and liability claims.
  - Failure to comply with the statutory regulations and safety instructions and incorrect repairs, even if original spare parts are used, make the guarantee null and void and exclude any liability whatsoever of Eberspächer Climate Control Systems GmbH & Co. KG.
- Subsequent installation of this heater must comply with these installation instructions.
- The statutory regulations are binding and must also be observed in countries which do not have any special regulations.
- When installing the heater in vehicles not subject to the German Road Traffic Licensing Regulations (StVZO), for example ships, the respective specially valid regulations and installation instructions must be observed.
- Installation of the heater in special vehicles must comply with the regulations applying to such vehicles.
- Further installation requirements are printed in the relevant sections of these installation instructions.

## 1.13 Hazard information and safety instructions for installation and operation

### **Danger!**

#### **Risk of injury, fire and poisoning!**

- Only start up the heater if the maintenance flap is closed and the outlet hood is mounted in position.
- Do not open the maintenance flap during operation.
- Disconnect the vehicle battery before starting any kind of work.
- Before working on the heater, switch the heater off and let all hot parts cool down.
- Do not start up the heater in enclosed spaces, e.g. garage or multi-storey car park.

- Always adjust hot air outlets so that they cannot blow hot air directly at living creatures (people, animals) or objects sensitive to temperature (loose and / or fastened).

### **Caution!**

#### **Safety instructions for installation and operation!**

- Mark the year of initial commissioning on the nameplate.
- Replace the heat exchanger of air heaters, a component subject to high thermal loads, 10 years after the initial commissioning of the heater. In addition, enter the installation date on the "original spare part" plate enclosed with the heat exchanger. Then affix the plate next to the nameplate on the heater.
- Have the heater installed only by a service partner authorised by the manufacturer according to the instructions in this manual, possibly according to special installation recommendations; the same applies to any repairs to be carried out in the case of repairs or guarantee claims.
- Only use the control units approved by the manufacturer to operate the heater. Use of other control units can cause malfunctions.
- Repairs by unauthorised third parties and / or not using original spare parts are dangerous and therefore not allowed. They result in expiry of the type-approval of the heater; consequently, when installed in motor vehicles they can cause expiry of the vehicle operating licence.
- The following measures are not allowed:
  - Changes to heating-relevant components.
  - Use of third party parts not approved by the manufacturer.
  - Deviations from the statutory, safety and / or functionally relevant requirements stated in this document regarding installation and/or operation. This applies in particular to the electrical wiring, fuel supply, combustion air system and exhaust system.
- Only use original accessories and original spare parts for installation and repairs.
- When carrying out electric welding on the vehicle, disconnect the positive cable at the battery and attach it to ground to protect the control box.
- It is not permitted to operate the heater where there are readily flammable materials (e.g. dry grass, leaves, paper, etc.) in the area of the exhaust system or where ignitable fumes and dust can form, e.g. near a
  - fuel depot
  - coal depot
  - wood depot
  - grain storage and similar.
- Switch off the heater before refuelling.
- If the heater is installed in a safety housing or similar, the heater's installation box must not be used as storage space and must be kept clear. In particular, do not store or transport fuel canisters, oil cans, spray cans, gas cartridges, fire extinguishers, cleaning rags, items of clothing, paper etc. on or next to the heater.
- Replace defective fuses only with fuses with the specified fuse rating.



- If fuel escapes from the heater's fuel system (leak), arrange for immediate repair of the damage by an Eberspächer service partner.
- Do not cancel the after-running of the heater prematurely, e.g. by pressing the battery isolating switch, except for an emergency stop.

### **i** Note

- All deviations from the safety requirements for installation and operation are to be agreed with the manufacturer in writing before they are implemented.
- Following installation, attach the "Switch off heater before refueling!" sticker near the tank filler neck.

## 1.14 Accident prevention

Observe the general accident prevention regulations and the relevant workshop and operating safety instructions.

## 2 Product Information

### 2.1 Scope of supply, heater

| Heater                  | Order No.       |
|-------------------------|-----------------|
| Airtronic S2, D2L, 12 V | 25.2721.05.0000 |
| Airtronic S2, D2L, 24 V | 25.2726.05.0000 |
| Airtronic M2, D4L, 12 V | 25.2720.05.0000 |
| Airtronic M2, D4L, 24 V | 25.2729.05.0000 |
| Airtronic M2, D4R, 12 V | 25.2746.05.0000 |
| Airtronic M2, B4L, 12 V | 20.1987.05.0000 |

The scope of supply includes

| Figure No. | Designation   |
|------------|---------------|
| 1          | Heater        |
| 2          | Metering pump |

#### Universal installation kit (25.2720.80.0000)

| Figure No. | Designation                                      |
|------------|--|
| 5          | Lead harness, plus / minus (included in Item 22) |
| 6          | Lead harness, operation (included in Item 22)    |
| 7          | Flexible exhaust pipe, length 900 mm             |
| 8          | Combustion air hose, 1 m long                    |
| 9          | Cable tape (2 x 10 pieces)                       |
| 10         | Bracket, metering pump                           |
| 12         | Pipe, 4 x 1.0 – 7.5 m long                       |
| 21         | Exhaust silencer                                 |
| 22         | Cable harness, heater                            |
| 25         | Flexible exhaust pipe with end piece             |

To be ordered separately

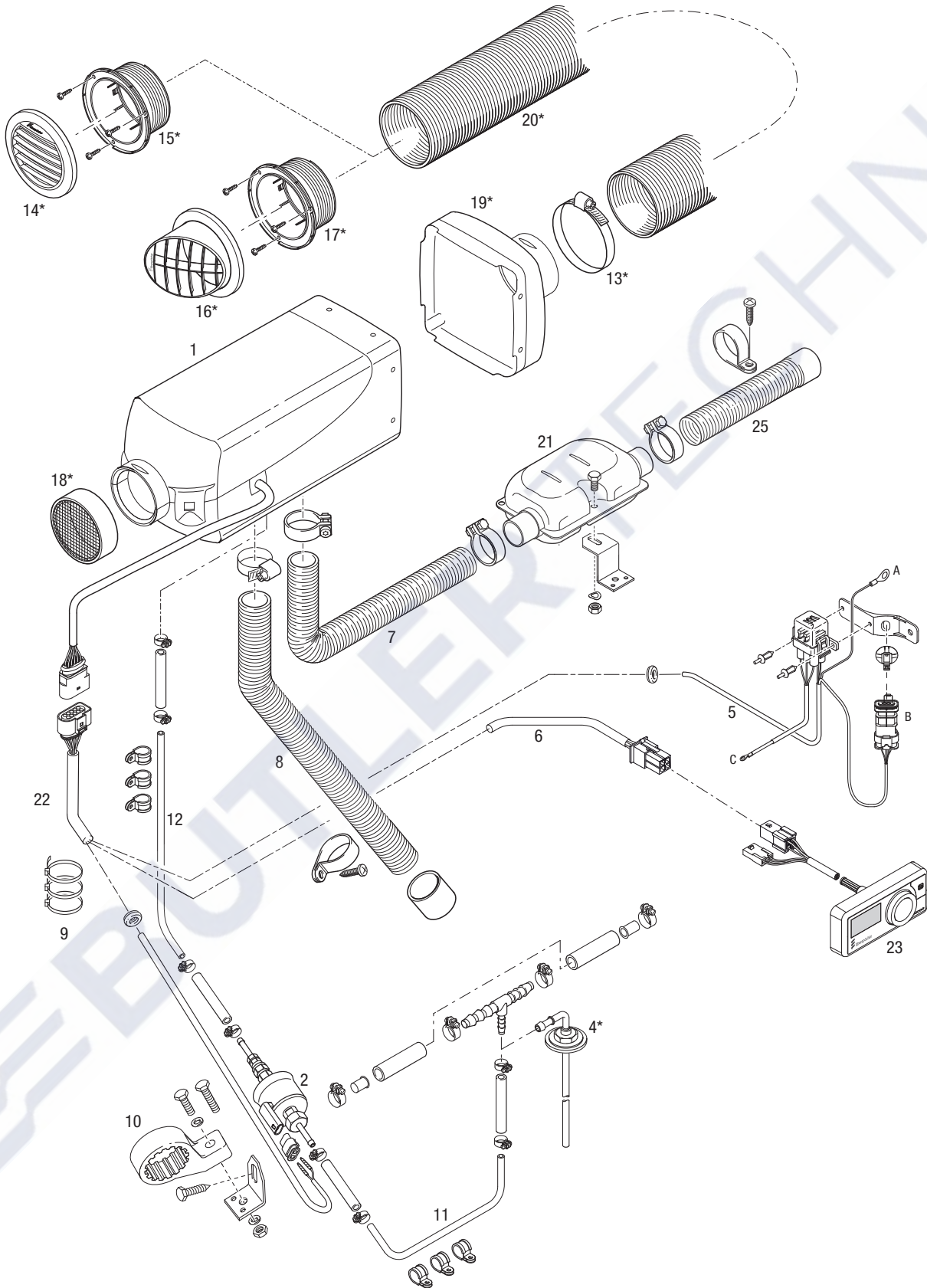
| Figure No. | Designation    |
|------------|----------------|
| 4          | Fuel remover   |
| 13         | Hose clip (1x) |

|    |                                      |
|----|--------------------------------------|
| 14 | Air outlet 30°, Ø 75 mm / Ø 90 mm    |
| 15 | Connection socket, Ø 75 mm / Ø 90 mm |
| 16 | Air outlet, upward 30°, Ø 60 mm      |
| 17 | Connection socket, Ø 60 mm           |
| 18 | Grille                               |
| 19 | Hood                                 |
| 20 | Flexible pipe                        |

### **i** Note

- For details of control units, refer to the price list or product information
- Parts without a figure number are small parts and are packed in a bag.
- Please refer to the production information if any other parts are required for the installation.
- For notes on the unit ratings, refer to the product information.

2.2 Scope of supply – heater, installation kit and additional parts



\* To be ordered separately

## 2.3 Technical data

### 2.3.1 Airtronic S2 D2L

|   |   |                   |                   |
|---|---|-------------------|-------------------|
| Heater type   | Airtronic   |                   |                   |
| Heater  | Airtronic S2  |                   |                   |
| Version   | D2L   |                   |                   |
| Heating medium  | Air   |                   |                   |
| Fuel<br>"Fuel quality" and "Fuel at low temperatures" on page 25.   | Diesel – standard commercially available (EN 590)   |                   |                   |
| Control of the heat flow  | Maximum   | Minimum           | Off               |
| Heat flow (watt)  | 2200  | 850               | –                 |
| Hot air throughput without backpressure (kg/h) with hood 75 mm  | 105   | 42                | 13                |
| Fuel consumption (l/h)  | 0.28  | 0.1               | –                 |
| Average electrical power consumption (watt)   | during operation  | 31                | 6                 |
|   | while starting  | ≤ 100             |                   |
| Closed-circuit power consumption  | 100 µA  |                   |                   |
| Rated voltage   | 12 volt or 24 volt  |                   |                   |
| Operating range   | approx. 10.5 volt or 21.4 volt  |                   |                   |
| Lower voltage limit:<br>Undervoltage protection installed in the control box switches off the heater on reaching the voltage limit. | Undervoltage protection response time: 20 seconds ±1                                      |                   |                   |
| Upper voltage limit:<br>Overvoltage protection installed in the control box switches off the heater on reaching the voltage limit.  | approx. 16 volt or approx. 32 volt<br>Overvoltage protection response time: 20 seconds ±1 |                   |                   |
| Ambient temperature   | Heater  | during operation  | –40 °C to +70 °C  |
|   |   | not in operation  | –40 °C to +85 °C  |
|   | Metering pump   | during operation  | –40 °C to +50 °C  |
|   |   | not in operation  | –40 °C to +125 °C |
| Hot air intake temperature  | max. +40 °C   |                   |                   |
| Combustion air temperature  | max. +50 °C   |                   |                   |
| Interference suppression  | Suppression class 5 to EN 55025   |                   |                   |
| Degree of protection in accordance with ISO 20653   | during operation  | IP5k4k            |                   |
|   | not in operation  | IP5k6k and IP5k9k |                   |
| Weight  | approx. 2.7 kg  |                   |                   |
| Ventilation mode  | possible  |                   |                   |



#### Attention!

##### Safety instructions for technical data!

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



#### Note

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

**2.3.2 Airtronic M2 D4L**

|   |   |                   |                   |
|---|---|-------------------|-------------------|
| Heater type   | Airtronic   |                   |                   |
| Heater  | Airtronic M2  |                   |                   |
| Version   | D4L   |                   |                   |
| Heating medium  | Air   |                   |                   |
| Fuel<br>"Fuel quality" and "Fuel at low temperatures" on page 25.   | Diesel – standard commercially available (EN 590)   |                   |                   |
| Control of the heat flow  | Maximum   | Minimum           | Off               |
| Heat flow (watt)  | 4000  | 900               | –                 |
| Hot air throughput without backpressure (kg/h) with hood 90 mm  | 180   | 60                | 22                |
| Fuel consumption (l/h)  | 0.51  | 0.11              | –                 |
| Average electrical power consumption (watt)   | during operation  | 42                | 6                 |
|   | while starting  | ≤ 100             |                   |
| Closed-circuit power consumption  | 100 µA  |                   |                   |
| Rated voltage   | 12 volt or 24 volt  |                   |                   |
| Operating range   | approx. 10.5 volt or 21.4 volt  |                   |                   |
| Lower voltage limit:<br>Undervoltage protection installed in the control box switches off the heater on reaching the voltage limit. | Undervoltage protection response time: 20 seconds ±1                                      |                   |                   |
| Upper voltage limit:<br>Overvoltage protection installed in the control box switches off the heater on reaching the voltage limit.  | approx. 16 volt or approx. 32 volt<br>Overvoltage protection response time: 20 seconds ±1 |                   |                   |
| Ambient temperature   | Heater  | during operation  | –40 °C to +70 °C  |
|   |   | not in operation  | –40 °C to +85 °C  |
|   | Metering pump   | during operation  | –40 °C to +50 °C  |
|   |   | not in operation  | –40 °C to +125 °C |
| Hot air intake temperature  | max. +40 °C   |                   |                   |
| Combustion air temperature  | max. +50 °C   |                   |                   |
| Interference suppression  | Suppression class 5 to EN 55025   |                   |                   |
| Degree of protection in accordance with ISO 20653   | during operation  | IP5k4k            |                   |
|   | not in operation  | IP5k6k and IP5k9k |                   |
| Weight  | approx. 4.5 kg  |                   |                   |
| Ventilation mode  | possible  |                   |                   |


**Attention!**
**Safety instructions for technical data!**

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


**Note**

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



### 2.3.3 Airtronic M2 D4R

|   |  |                   |                   |
|---|--|-------------------|-------------------|
| Heater type   | Airtronic  |                   |                   |
| Heater  | Airtronic M2   |                   |                   |
| Version   | D4R  |                   |                   |
| Heating medium  | Air  |                   |                   |
| Fuel  | Diesel – standard commercially available (EN 590)                      |                   |                   |
| “Fuel quality” and “Fuel at low temperatures” on page 25.   |  |                   |                   |
| Control of the heat flow  | Maximum  | Minimum           | Off               |
| Heat flow (watt)  | 4000   | 900               | –                 |
| Hot air throughput without backpressure (kg/h) with hood 90 mm  | 185  | 55                | 22                |
| Fuel consumption (l/h)  | 0.51   | 0.11              | –                 |
| Average electrical power consumption (watt)   | during operation   | 65                | 6                 |
|   | while starting   |                   | ≤ 100             |
| Closed-circuit power consumption  | 100 µA   |                   |                   |
| Rated voltage   | 12 volt  |                   |                   |
| Operating range   | approx. 10.5 volt  |                   |                   |
| Lower voltage limit:<br>Undervoltage protection installed in the control box switches off the heater on reaching the voltage limit. | Undervoltage protection response time: 20 seconds ±1                   |                   |                   |
| Upper voltage limit:<br>Overvoltage protection installed in the control box switches off the heater on reaching the voltage limit.  | approx. 16 volt<br>Overvoltage protection response time: 20 seconds ±1 |                   |                   |
| Ambient temperature   | Heater   | during operation  | –40 °C to +70 °C  |
|   |  | not in operation  | –40 °C to +85 °C  |
|   | Metering   | during operation  | –40 °C to +50 °C  |
|   | pump   | not in operation  | –40 °C to +125 °C |
| Hot air intake temperature  | max. +40 °C  |                   |                   |
| Combustion air temperature  | max. +50 °C  |                   |                   |
| Interference suppression  | Suppression class 5 to EN 55025  |                   |                   |
| Degree of protection in accordance with ISO 20653   | during operation   | IP5k4k            |                   |
|   | not in operation   | IP5k6k and IP5k9k |                   |
| Weight  | approx. 4.5 kg   |                   |                   |
| Ventilation mode  | possible   |                   |                   |

**⚠ Attention!**  
**Safety instructions for technical data!**  
 Failure to comply with the technical data can result in malfunctions.

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

### 2.3.4 Airtronic M2 B4L

|   |  |                   |                   |
|---|--|-------------------|-------------------|
| Heater type   | Airtronic  |                   |                   |
| Heater  | Airtronic M2   |                   |                   |
| Version   | B4L  |                   |                   |
| Heating medium  | Air  |                   |                   |
| Fuel<br>"Fuel quality" and "Fuel at low temperatures" on page 25.   | Petrol – standard commercially available (DIN EN 228)                  |                   |                   |
| Control of the heat flow  | Maximum  | Minimum           | Off               |
| Heat flow (watt)  | 3800   | 1300              | –                 |
| Hot air throughput without backpressure (kg/h) with hood 90 mm  | 180  | 85                | 24                |
| Fuel consumption (l/h)  | 0.54   | 0.18              | –                 |
| Average electrical power consumption (watt)   | during operation   | 42                | 7                 |
|   | while starting   | ≤ 100             |                   |
| Closed-circuit power consumption  | 100 µA   |                   |                   |
| Rated voltage   | 12 volt  |                   |                   |
| Operating range   | approx. 10.5 volt  |                   |                   |
| Lower voltage limit:<br>Undervoltage protection installed in the control box switches off the heater on reaching the voltage limit. | Undervoltage protection response time: 20 seconds ±1                   |                   |                   |
| Upper voltage limit:<br>Overvoltage protection installed in the control box switches off the heater on reaching the voltage limit.  | approx. 16 volt<br>Overvoltage protection response time: 20 seconds ±1 |                   |                   |
| Ambient temperature   | Heater   | during operation  | –40 °C to +50 °C  |
|   |  | not in operation  | –40 °C to +85 °C  |
|   | Metering   | during operation  | –40 °C to +50 °C  |
|   | pump   | not in operation  | –40 °C to +125 °C |
| Hot air intake temperature  | max. +40 °C  |                   |                   |
| Combustion air temperature  | max. +50 °C  |                   |                   |
| Interference suppression  | Suppression class 5 to EN 55025  |                   |                   |
| Degree of protection in accordance with ISO 20653   | during operation   | IP5k4k            |                   |
|   | not in operation   | IP5k6k and IP5k9k |                   |
| Weight  | approx. 4.5 kg   |                   |                   |
| Ventilation mode  | possible   |                   |                   |

#### Attention!

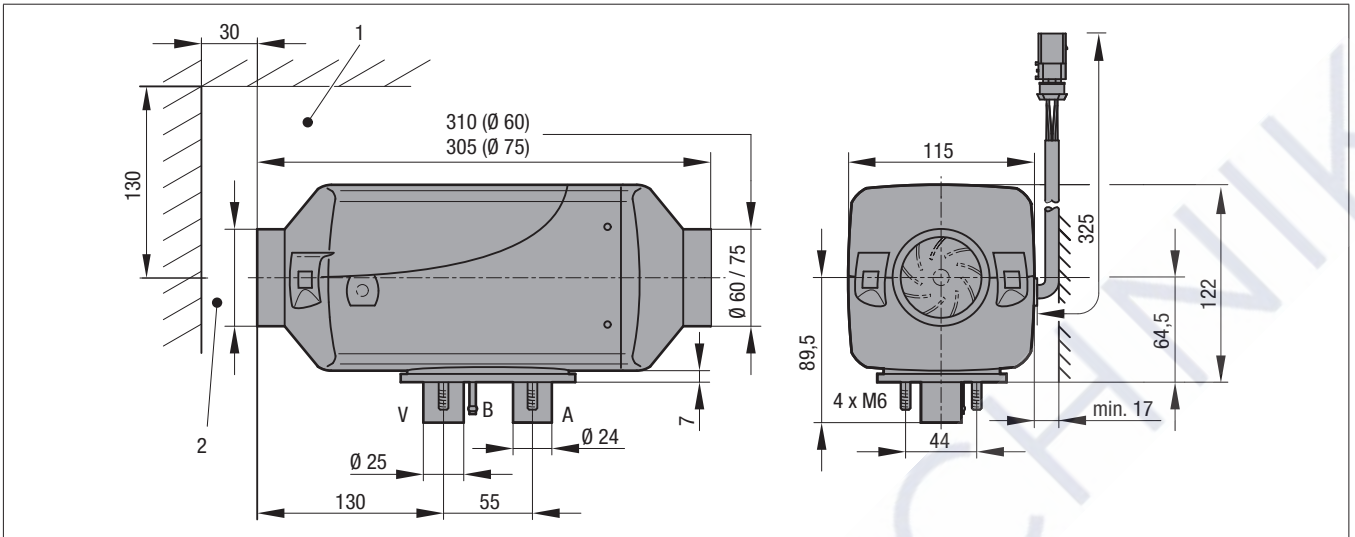
##### Safety instructions for technical data!

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

#### Note

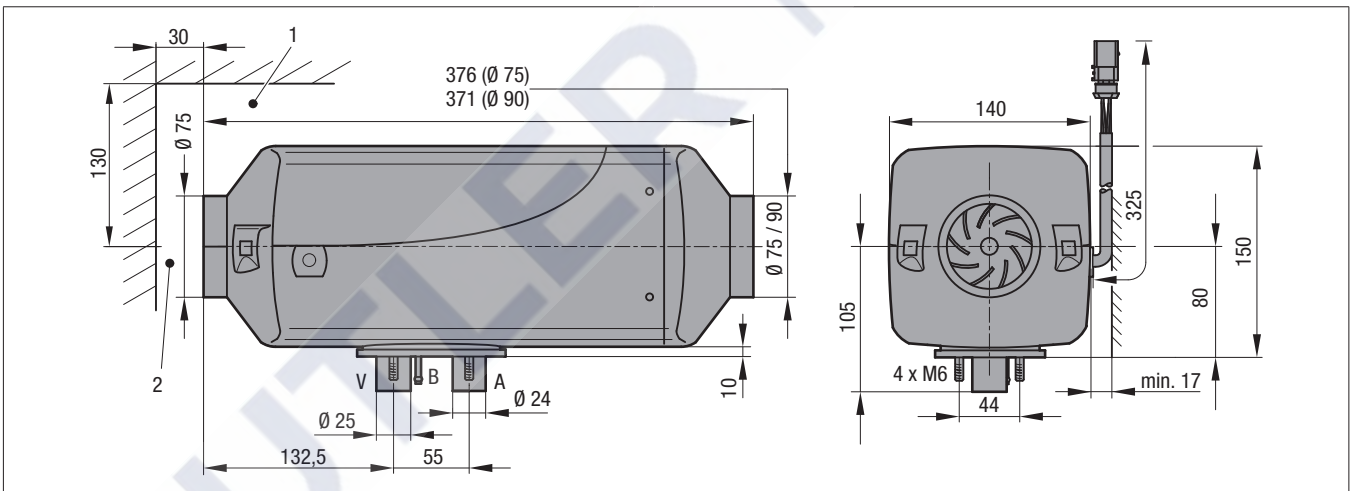
Provided no other values are given, the technical data provided is with the usual tolerances of ±10 % at rated voltage, 20 °C ambient temperature and reference altitude Esslingen.

### 2.4 Main dimensions, Airtronic S2



A = Exhaust  
 B = Fuel  
 V = Combustion air

### 2.5 Main dimensions, Airtronic M2



A = Exhaust  
 B = Fuel  
 V = Combustion air

- 1 Minimum installation distance (clearance) for opening the cover and for dismantling the glow plug and the control box.
- 2 Minimum installation distance (clearance) for intake of the hot air.

Outlet hood of Airtronic S2 D2L:  
 – Ø 75 mm, can be ordered separately  
 Outlet hood of Airtronic M2 D4L/R, M2 B4L:  
 – Ø 90 mm, can be ordered separately

**Note**  
 It is not permitted to mount a connector on the Airtronic M2 D4R.

### 3 Installation

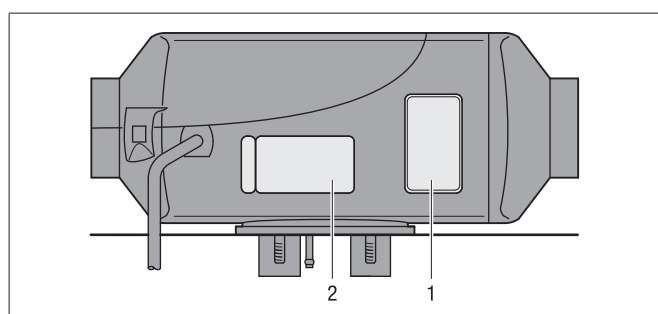
#### 3.1 Nameplate

The nameplate and the 2nd nameplate (duplicate) are fixed to the side of the bottom jacket shell.

The 2nd nameplate (duplicate) is attached to the bottom jacket shell, and can be pulled off; if necessary it can be stuck onto an easily visible place on the heater or in the area of the heater.

#### **i** Note

Note and follow the regulations and safety instructions for this chapter on page 6.



- 1 Original nameplate
- 2 2nd nameplate (duplicate)

#### 3.2 Installation and mounting position

The heater is suitable and approved for installation in vehicle interiors used by people.

The heater is fixed by its heater flange and the mounted flange seal directly onto the floor of the vehicle or onto a suitable place on the rear panel of the vehicle.

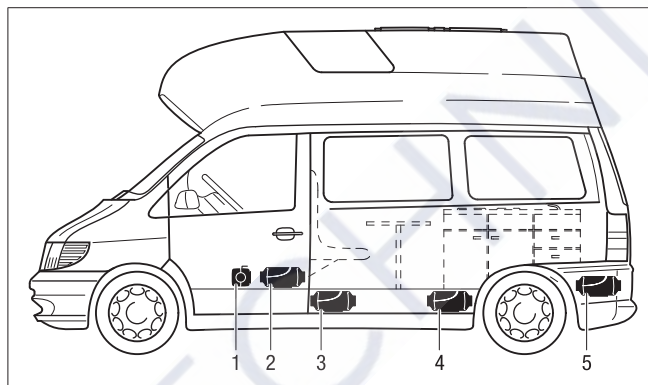
#### **i** Note

- Detachable connections of exhaust, combustion air and fuel lines are not permissible for installation in the vehicle interior.
- The flange seal must be mounted on the heater, to seal the openings for the exhaust, combustion air and fuel lines.
- Installation in the driver's cab or passenger compartment of coaches or buses with more than 9 seats (8 seats + driver's seat) is not allowed.
- When installing the heater, always ensure that there is sufficient clearance left for intake of the hot air and for dismantling the glow plug and control box (on page 15 "Main dimensions").
- Note and follow the regulations and safety instructions for this chapter from page 6.

#### 3.3 Installation in a camper van

In a camper van the heater is preferably installed in the vehicle interior (passenger compartment) or in the boot.

If it is not possible to install the heater in the passenger compartment or boot, the heater can also be mounted, protected from splashing water, on the underside of the vehicle floor.

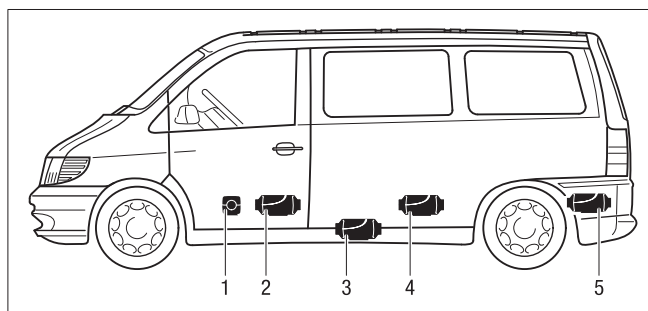


- 1 Heater in front of the passenger seat
- 2 Heater between the driver's seat and the passenger seat
- 3 Heater under the vehicle floor
- 4 Heater in living space
- 5 Heater in the boot

#### 3.4 Installation in a car or people carrier

In a car / people carrier, the heater is preferably installed in the vehicle interior (passenger compartment) or in the boot.

If it is not possible to install the heater in the passenger compartment or boot, the heater can also be mounted, protected from splashing water, on the underside of the vehicle floor.

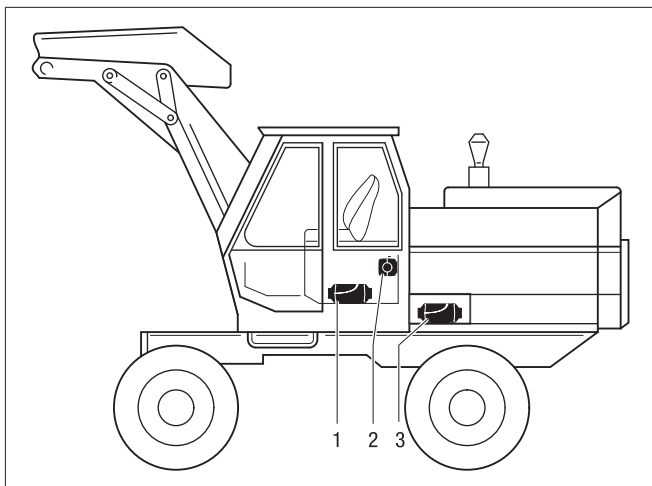


- 1 Heater in front of the passenger seat
- 2 Heater between the driver's seat and the passenger seat
- 3 Heater under the vehicle floor
- 4 Heater under the back seat
- 5 Heater in the boot



### 3.5 Installation in an excavator cab (only diesel heaters)

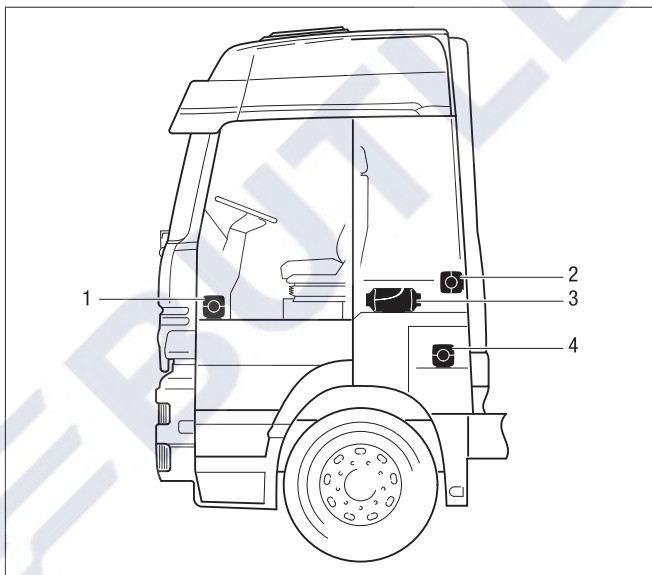
In an excavator, the heater is preferably installed in the cab. If it is not possible to install the heater in the cab, the heater can also be installed in a storage box outside the cab.



- 1 Heater in the seat box
- 2 Heater on the cab rear wall
- 3 Heater in the safety housing

### 3.6 Installation in a truck (only diesel heaters)

In a truck, the heater is preferably installed inside the driver's cab. If it is not possible to install the heater inside the driver's cab, it can also be mounted in the tool box or in a storage box.



- 1 Heater in the passenger's foot room
- 2 Heater on the cab rear wall
- 3 Heater under the bed
- 4 Heater in the tool box

#### **i** Note

- The installation suggestions made in the installation instructions are examples. Other installation locations are possible if they comply with the installation requirements stated in these installation instructions.
- Further installation information (e.g. for boats and ships) is available from the manufacturer on request.
- Note and observe the allowable installation positions together with the operating and storage temperatures.

### 3.7 Permissible installation positions

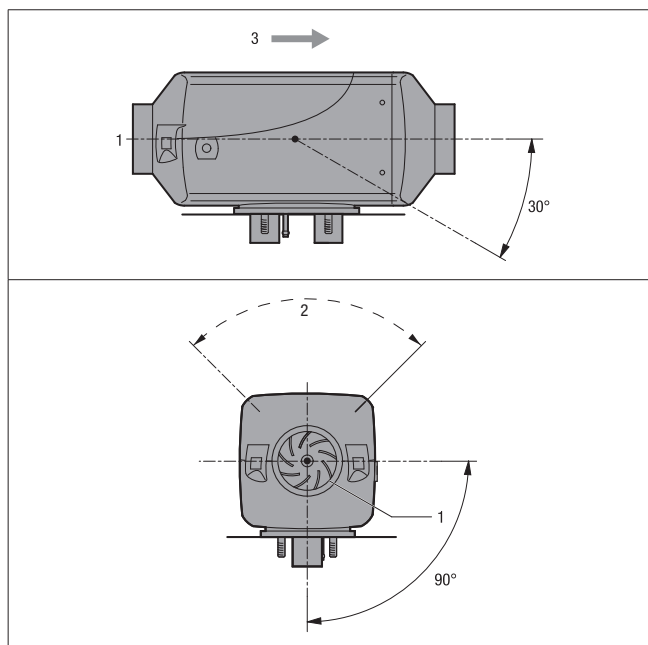
The heater should be preferably installed in the normal position – as shown in the drawing.

Depending on the installation conditions, the heater can be tilted by max. 30° (flow direction to the bottom) or turned by max. 90° around its own longitudinal axis (exhaust connection horizontal, glow plug points upwards!), as shown in the drawing.

#### **i** Note

In heating mode, the standard or maximum installation positions shown can differ by up to +15° in all directions, due to tilted vehicle or boat positions, without impairing the heater's function.

### 3.8 Normal position horizontal (exhaust connection downwards) with tolerable swivel range

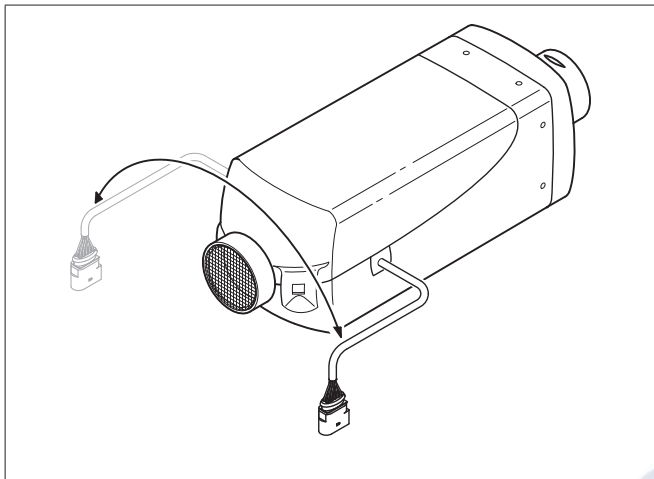


- 1 Hot air intake opening (impeller)
- 2 Position of the glow plug
- 3 Direction of flow

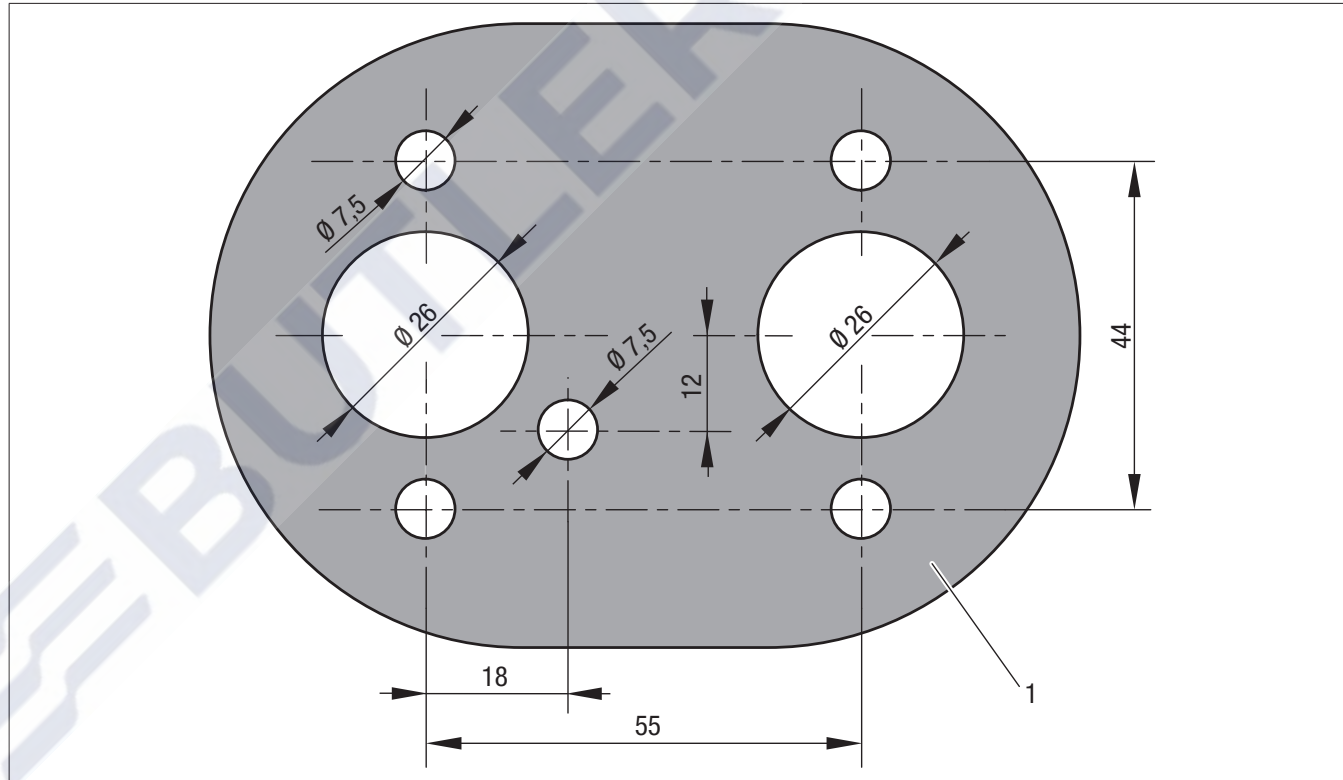
### 3.9 Cable harness connection, optionally right or left-hand

If necessary, the cable harness connection can be changed over to the opposite side of the heater. To do this, the control box must be removed and the bottom semi-circular cable harness cover unclipped.

Then re-install the control box, put on the jacket shell, at the same time inserting the cable harness grommet and the blanking plugs in the corresponding recesses in the bottom jacket shell.



#### Drilling hole pattern



1 Contour of the support surface

#### **i** Note

The hole pattern is used as a drilling template (printout 1:1).

### 3.10 Installation and fixing

Make the through-holes for exhaust, combustion air and fuel to match the drilling hole pattern.

The support surface for the heater base must be flat.

An appropriate tool can be purchased from the manufacturer for drilling the through-holes and also smoothing the support surface.

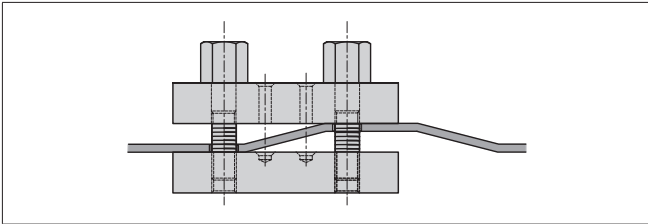
The  $\varnothing 10.5$  mm hole for the “metering pump” cables is not included in the drilling hole pattern and must be drilled depending on the installation.

If the sheet metal of the support surface is  $<1.5$  mm thick, an additional reinforcement must be installed.

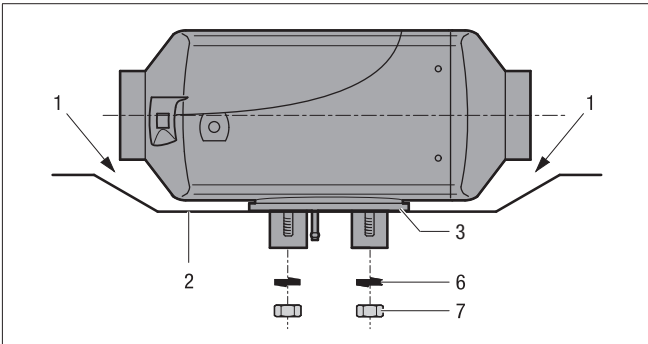
Order No. – reinforcement plate 20 1577 89 00 03

Order No. – special tool 99 1201 46 53 29

### Special tool

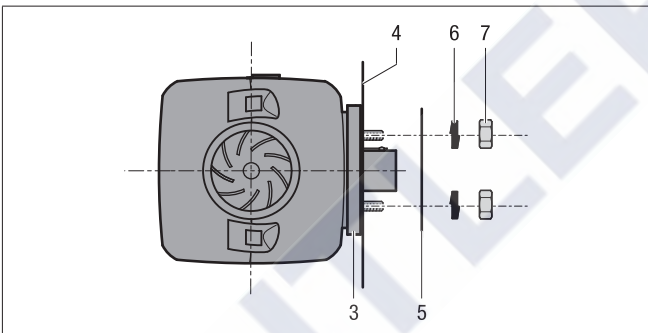


### Mounting the heater on the vehicle floor



- 1 There must be sufficient clearance between the heater and the vehicle floor – also check that the impeller runs freely.
- 2 The mounting surface must be flat.
- 3 The flange seal must be fitted.

### Fasten the heater horizontally to the vehicle wall



- 4 The vehicle wall must be flat.
- 5 Reinforcement plate (if required, for Order No. see above)
- 6 Spring lock washer
- 7 M6 hexagon nut (tightening torque 5+1 Nm)

### 3.11 Hot air system

The scope of supply of the universal installation kit does not include any air system parts. These must be ordered separately.

Order No. see product information.

#### **Danger!**

#### **Risk of burning and injuries!**

- The hot air system hoses and the hot air outlet are to be laid and fastened in such a way that they do not pose a risk to people, animals or materials sensitive to temperature due to radiation / contact or direct blowing. If necessary, a cover is to be fitted over the hot air ducting and / or the hot air outlet.
- The outlet hood must be fitted on the hot air outflow side.
- If no air hoses are fitted, a safety grille must be fitted to the hot air intake side and outflow side, to prevent injuries from the heater fan or burns from the heat exchanger.
- High temperatures occur in the hot air system while the heater is running and immediately afterwards. This is why it is important to avoid working in the vicinity of the hot air system while the heater is running. In such cases, switch off the heater beforehand and wait until all parts have completely cooled down. If necessary, wear safety gloves.

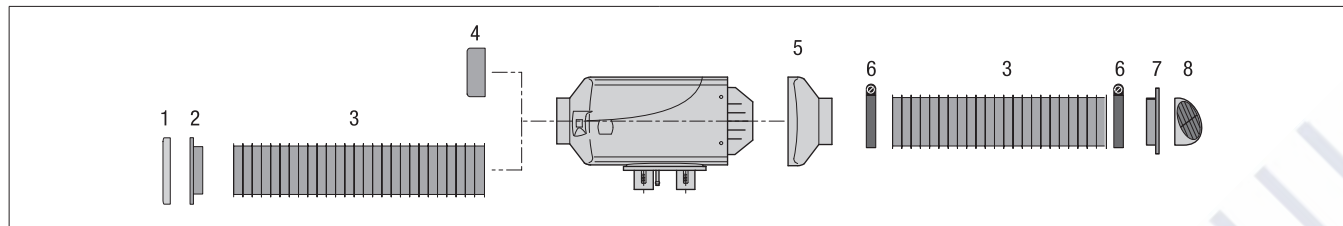
#### **Note**

- It is not permitted to mount a connector on the Airtronic M2 D4R.
- Assembling the Airtronic M2 D4R it is mandatory to mount a flexible heating air hose length of min. 2 m at the hot air outlet.
- Note and follow the regulations and safety instructions for this chapter from page 6.
- When connecting parts which conduct air (air system parts), observe the heater code number given in “Using universal installation kits” on page 9.

#### **Warning**

- The hot air intake openings must be arranged in such a way that under normal circumstances, it is not possible for exhaust from the vehicle engine and heater to be sucked into the system, or for the hot air to be contaminated with dust, salt spray, etc.
- For circulating air mode, position the circulating air intake in such a way that the outflowing hot air cannot be directly sucked in again.
- In the event of a fault due to overheating, local heating air temperatures up to max. 150 °C can occur directly before the shutdown on faults.
- If the driver and/or passengers could come into contact with the heater or parts carrying heating air, suitable protection against contact must be attached in these places.

Hot air system (example)



- 1 Safety grille
- 2 Connection sockets, intake side
- 3 Flexible pipe
- 4 Safety grille

- 5 Connection sockets, discharge side
- 6 Hose clip
- 7 Connection socket
- 8 Air outlet, rotatable

**i Note**

- Note and follow the regulations and safety instructions for this chapter from page 6.
- When connecting air system parts, note the heater rating, on page 9.
- For important notes on the air system, the heater ratings and the ratings for air system parts, please refer to the “Product Information” document.

**i Note**

- In case of critical installation conditions, we recommend securing the flexible tubing with an additional hose clip at the pipe connection socket.
- Plastic sheathed hot air hoses with wire inlay must be fixed onto the pipe connection socket with a hose clip.
- Tightening torque for hose clip = 3 Nm.

3.12 Mounting the air outlets and pipe connection sockets

**Cutting out the opening for the connection sockets**

Use a keyhole saw to cut out an opening for the connection socket at the planned place of installation (vehicle floor or wall).

Pipe connection socket Ø 60 mm – keyhole saw Ø 68 mm

Pipe connection socket Ø 75 mm – keyhole saw Ø 92 mm

Pipe connection socket Ø 90 mm – keyhole saw Ø 92 mm

**Fixing the pipe connection socket**

Insert the pipe connection socket in the drillhole. Mark and drill three fixing holes Ø 2 mm.

Use 3 self-tapping screws DIN 7981 3.9×13 to fix the connection sockets.

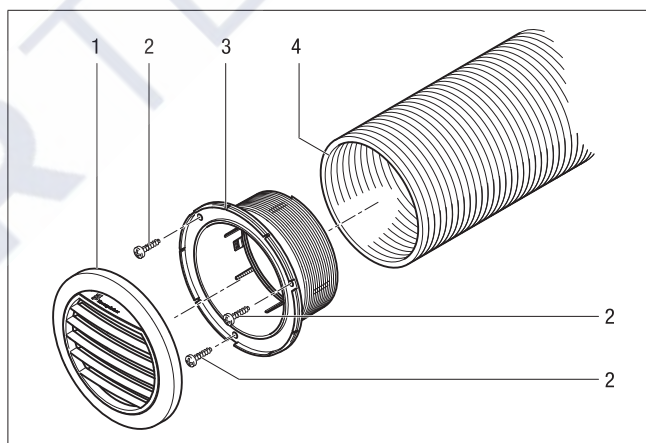
**Fix air outlet onto the pipe connection socket**

Clip the corresponding air outlet onto the pipe connection socket.

**Installing flexible tubing on the pipe connection socket**

Turn or latch the flexible tubing onto the thread of the pipe connection socket.

It is not necessary to use a hose clip to fix the tubing onto the pipe connection socket.



- 1 Outflow
- 2 Self-tapping screw
- 3 Connection socket
- 4 Flexible pipe

3.13 Installing the air blocking element

**⚠ Caution**

**Risk of overheating!**

Blocking the hot air can cause overheating of the heater; the heater is switched off by the protection against overheating.

- The air blocking element may only be used in multi-duct air systems.

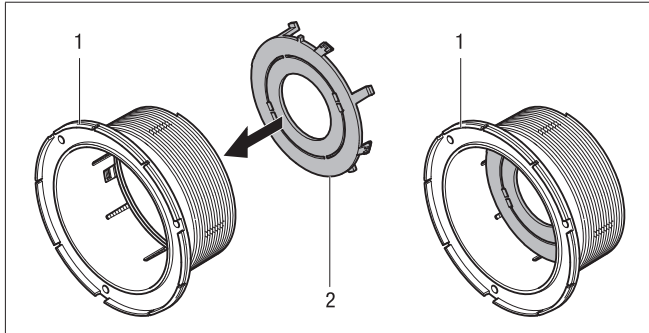
The air blocking element is clipped into the pipe connection socket, discharge side. This reduces the cross-section of the pipe connection socket and reduces the quantity of air flow.



The air blocking element consists of two rings; the inner ring can be broken out.

1 ring = low air blocking / 2 rings = high air blocking

The air blocking element is available in sizes  $\varnothing$  75 mm and  $\varnothing$  90 mm (Order No. see product information).



- 1 Connection sockets, discharge side  
2 Air blocking element

### 3.14 Exhaust system

#### Installing the exhaust system

The universal installation kit includes

- a flexible exhaust pipe, inside- $\varnothing$  24 mm, L = 900 mm,
- a flexible exhaust pipe, inside- $\varnothing$  24 mm, L = 300 mm, with end piece
- an exhaust silencer.

The flexible exhaust pipe can be shortened to 20 cm or lengthened to max. 2 m, depending on the installation conditions.

Fasten the exhaust silencer to a suitable position in the vehicle.

Lay the flexible exhaust pipe from the heater to the exhaust silencer and fasten with pipe clips (tightening torque:  $6 \pm 1$  Nm).

Use a pipe clip (tightening torque  $6 \pm 1$  Nm) to fix a short exhaust end pipe (with end sleeve) to the exhaust silencer.

#### **Warning!**

##### **Safety instructions for the exhaust system!**

The whole exhaust system gets very hot while the heater is running and immediately afterwards.

This is why the exhaust system must always be routed as described in these installation instructions.

- The exhaust pipe must end in the open air.
- Lay the exhaust system so
  - that outflowing exhaust gases cannot be drawn into the fresh air intake of the vehicle or heater.
  - that outflowing exhaust gases cannot be drawn in as combustion air.
- The exhaust outlet mouth must end at a minimum height of 20 cm above the floor. Particular caution is required during installation in areas where readily flammable materials could exist in the area of the exhaust outlet mouth during heater operation, e.g. in forestry machines above dry grass, leaves or similar.

- The exhaust pipe and exhaust outlet mouth may not protrude beyond the limits of the vehicle.
- Lay the exhaust pipe sloping slightly downwards.
- Important functional parts of the vehicle may not be impaired (maintain sufficient clearance).
- Mount the exhaust pipe with sufficient clearance to heat-sensitive parts. Pay particular attention to fuel pipes (made of plastic or metal), electrical cables and brake hoses etc.!
- Exhaust pipes must be safely fixed (recommended clearance of 50 cm) to avoid damage from vibrations.
- The mouth of the exhaust pipe must not become clogged with dirt and snow.
- Do not point the mouth of the exhaust pipe in the direction of travel.
- Always fix the exhaust silencer to the vehicle.

#### **Danger!**

##### **Risk of injuries and burns!**

Every type of combustion produces high temperatures and toxic exhaust fumes. This is why the exhaust system must always be routed as described in these installation instructions.

- Do not perform any work on the exhaust system while the heater is working.
- Before working on the exhaust system, switch off the heater first and wait until all the parts have completely cooled down, wear safety gloves if necessary.
- Do not inhale exhaust fumes.

#### **Note**

Note and follow the regulations and safety instructions for this chapter from page 6.

- The exhaust pipe end should be much shorter than the flexible exhaust pipe from the heater to the exhaust silencer.
- Small arrows indicating the flow direction are cast into the connection sockets to differentiate between the combustion air and exhaust air connection socket at the heater (see sketch on page 22).
- To avoid contact corrosion, the clips for fixing the exhaust pipe must be made of stainless steel. Please refer to the product information for the Order No. of the stainless steel fixing clips.

### 3.15 Combustion air system

#### 3.15.1 Mounting the combustion air system

The universal installation kit includes a flexible combustion air hose, inside  $\varnothing$  25 mm, 1000 mm long.

The flexible combustion air hose can be shortened to 20 cm or lengthened to max. 2 m, depending on the installation conditions.

- Fasten the combustion air intake silencer to the heater with a pipe clip (tightening torque  $3^{+0.5}$  Nm) and at suitable points with hose clips or cable ties.
- After installing the hose, push on an end sleeve.
- Use a pipe clip (tightening torque  $3+0.5$  Nm) to fix the flexible connection hose to the heater and use hose clips or cable ties to fix the combustion air intake silencer in suitable positions.
- After installing the hose, push on an end sleeve.

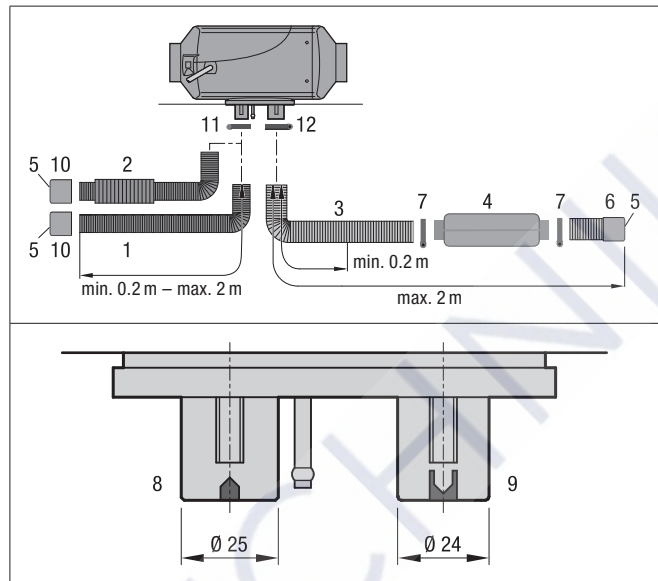
#### Note

- Instead of the combustion air hose, a combustion air intake silencer can be installed for Airtronic S2 and Airtronic M2 heaters to reduce noise. For Order No. please refer to product information.
- Note and follow the regulations and safety instructions for this chapter from page 6.

#### Warning!

##### Safety instructions for the combustion air system

- Lay the combustion air inlet so
    - that exhaust gases cannot be drawn in as combustion air.
    - that fuel fumes that may occur cannot be drawn into the fresh air intake of the vehicle or heater.
  - The combustion air opening must remain free at all times.
- 
- Do not direct the combustion air intake against the vehicle's airstream.
  - The combustion air inlet must not become clogged with dirt and snow.
  - Lay the combustion air system sloping slightly downwards. If necessary, make a drain hole of approx.  $\varnothing$  5 mm at the lowest point to drain off condensation.
  - If necessary, use fastening clips or cable ties to fix the flexible combustion air hose to the vehicle in suitable places.



- 1 Combustion air hose, di = 25 mm
- 2 Combustion air intake silencer
- 3 Exhaust pipe, di = 24 mm
- 4 Exhaust silencer
- 5 Inlet and outlet opening – protect from wind, snow, dirt and water
- 6 End sleeve, exhaust gas
- 7 Hose clip
- 8 Combustion air connection socket
- 9 Exhaust connection socket
- 10 End sleeve, combustion air
- 11 Hose clip
- 12 Exhaust pipe clip

### 3.16 Fuel supply

Installing the metering pump, laying the fuel pipes and installing the fuel connection.

The following safety instructions must always be observed when installing the metering pump, laying the fuel lines and installing the fuel tank.

Deviations from the instructions stated here are not allowed. Failure to comply can result in malfunctions.

#### Danger!

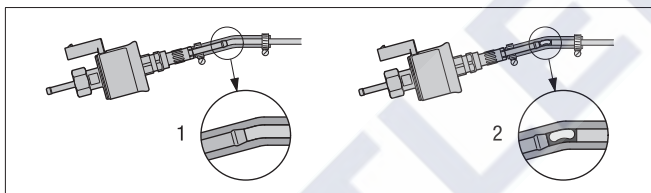
##### Risk of fire, explosion, poisoning and injury!

Caution when handling fuel.

- Switch off the vehicle engine and the heater before refuelling and before working on the fuel supply.
- Avoid naked flames when handling fuel.
- Do not smoke.
- Do not inhale petrol fumes.
- Avoid any contact with the skin.

 **Caution!**
**Safety instructions for laying the fuel lines!**

- Use a sharp knife only to trim the fuel hoses and pipes. Interfaces must not be crushed (pressed in) and must be free of burrs.
- Wherever possible, lay the fuel lines from the metering pump to the heater with a continuous rise.
- Fuel lines must be securely fixed to avoid damage and / or noise due to vibrations (recommended guideline value: clearance of around 50 cm).
- Fuel lines must be protected against mechanical damage.
- Lay the fuel lines so that any twisting of the vehicle, engine movements, etc. do not have a disadvantageous effect on their durability.
- Secure all hose connections in the fuel supply with hose clips (tightening torque  $1^{+0.2}$  Nm).
- Parts carrying fuel must be protected from interfering heat.
- Never route or fasten the fuel lines directly along the heater or vehicle exhaust system. In case of crossing, always pay attention to sufficient thermal spacing; if necessary attach heat deflection plates or attach a protective hose (Order No. protective hose, see product information).
- Dripping or evaporating fuel must never be allowed to collect on hot parts or ignite on electric equipment.
- When connecting fuel lines with a fuel hose, always install the fuel lines with a butt joint to prevent any bubbles from forming.



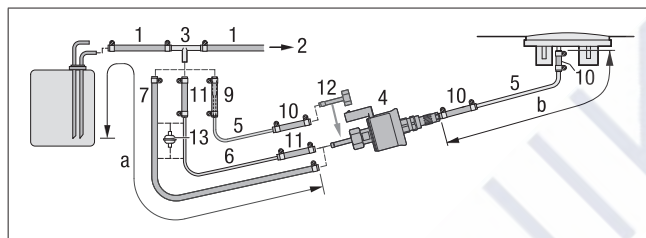
- 1 Correct laying of the fuel lines
- 2 Incorrect laying of fuel lines – bubbles form

**Safety instructions for fuel lines and fuel tanks in buses and coaches**

- In buses and coaches, fuel lines and fuel tanks must not be routed through the passenger compartment or driver's cab.
- Fuel tanks in buses and coaches must be positioned in such a way that the exits are not in immediate danger if a fire occurs.

 **Note**

- Note and follow the regulations and safety instructions for this chapter from page 6.
- For noise reasons, do not rigidly fix fuel pipes to components that transfer structural-borne sound.  
To reduce noise, a sponge rubber hose can be pushed over the fuel pipes.

**Fuel feed point with T-piece from the fuel return line from the tank fitting to the vehicle engine**

- 1 Fuel return line, vehicle tank
- 2 To the vehicle engine, mechanical fuel or injection pump
- 3 T-piece, 8-4-6
- 4 Metering pump
- 5 Fuel pipe, 4 x 1 (di =  $\emptyset$  2 mm)
- 6 Fuel pipe, 6 x 2 (di =  $\emptyset$  2 mm)
- 7 Fuel hose, 5 x 3 (di =  $\emptyset$  5 mm)
- 9 Adapter  $\emptyset$  4.5 / 3.5
- 10 Fuel hose, 3.5 x 3 (di =  $\emptyset$  3.5 mm), approx. 50 mm long
- 11 Fuel hose, 5 x 3 (di =  $\emptyset$  5 mm), approx. 50 mm long
- 12 Connection socket da =  $\emptyset$  4 mm
- 13 Fuel filter – only required for contaminated fuel.

**Permissible line lengths**

## Intake side

Airtronic S2 a = max. 5 m

Airtronic M2 a = max. 2 m

## Pressure side

## Diesel heaters

For intake line di =  $\emptyset$  2 mm, b = max. 6 mFor intake line di =  $\emptyset$  5 mm, b = max. 10 m

## Petrol heater

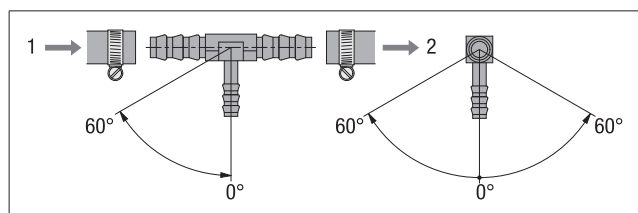
b = max. 4 m

 **Note**

- Insert T-piece 3 into the fuel return line upstream of the fuel pump.
- Item 5 is included in the universal installation kit.
- Item 6, 7 and 13 must be ordered separately. For Order No. please refer to product information.

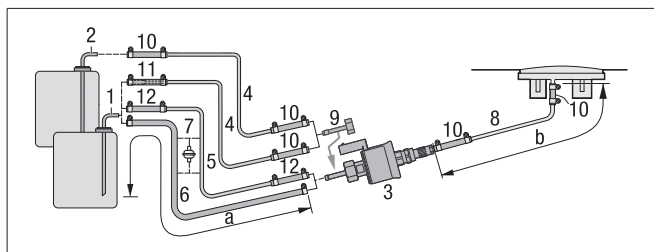
### Installation position of the T-piece

When installing a T-piece, comply with the installation positions shown in the sketch.



- 1 Direction of flow – from the fuel tank
- 2 Direction of flow – to the vehicle engine

### Fuel feed point with tank connection – ascending pipe, integrated in the vehicle tank or in the tank fitting



- 1 Tank connection for metal tank – di = Ø 2 mm, da = Ø 6 mm
- 2 Tank connection for tank fitting – di = Ø 2 mm, da = Ø 4 mm
- 3 Metering pump
- 4 Fuel pipe, 4 x 1 (di = Ø 2 mm)
- 7 Fuel filter – only required for contaminated fuel.
- 9 Connection fitting, da = Ø 4 mm
- 10 Fuel hose, 3,5 x 3 (di = Ø 3.5 mm), approx. 50 mm long

### Permissible line lengths

Intake side

Airtronic S2 a = max. 5 m

Airtronic M2 a = max. 2 m

Pressure side

Diesel heaters

For intake line di = Ø 2 mm, b = max. 6 m

For intake line di = Ø 5 mm, b = max. 10 m

Petrol heater

b = max. 4 m

### Note

- Item 2, 4, 8, 9 and connection parts are included in the "Tank connection" upgrade kit, Order No. 22 1000 20 13 00
- Item 6 and 7 must be ordered separately, refer to product information for the order No.
- When installing tank connection maintain a minimum distance of  $50 \pm 2$  mm from the end of the riser to the bottom of the tank.
- Contact the vehicle manufacturer before installing the tank connection in a metal tank.

### Caution

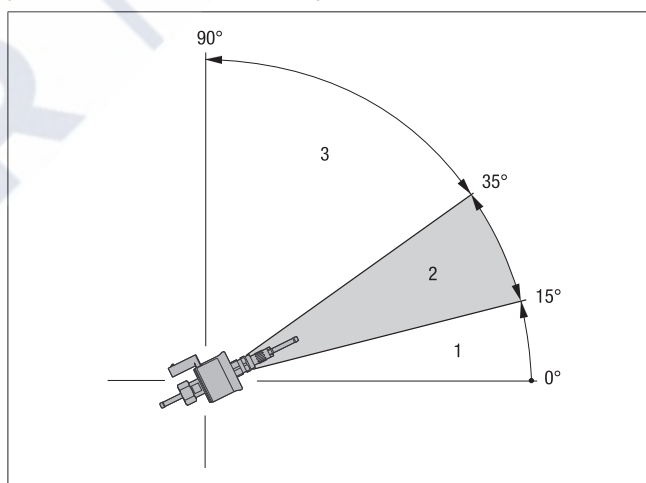
#### Safety instructions for laying the fuel lines!

- The fuel must not be discharged by means of gravity or overpressure in the fuel container.
- It is not permitted to extract fuel downstream of the vehicle's own fuel pump.
- If the pressure in the fuel line is higher than 0.2 bar up to max. 4.0 bar, use a pressure reducer (Order No. 22 1000 20 08 00) or a separate tank connection.
- If the pressure in the fuel line is above 4.0 bar or if there is a non-return valve in the return line (in the tank), a separate tank connection must be used.
- If using a T-piece in a plastic pipe, always insert support sleeves in the plastic pipe. Connect the T-piece and the plastic pipe with the relevant fuel hoses and secure with hose clips.

### Installation position of the metering pump

Always install the metering pump with the delivery side rising upwards.

Any mounting position over 15° is allowed, although a mounting position between 15° and 35° is preferable.



- 1 Installation position between 0° – 15° is not allowed
- 2 Preferred installation position within the range 15° – 35°
- 3 Installation position within the range 35° to 90° is allowed

### Allowable suction and pressure head of the metering pump

Pressure head from vehicle tank to metering pump:

a = max. 3000 mm

Suction head in pressure-less vehicle tank:

b = max. 1000 mm for diesel

b = max. 500 mm for petrol

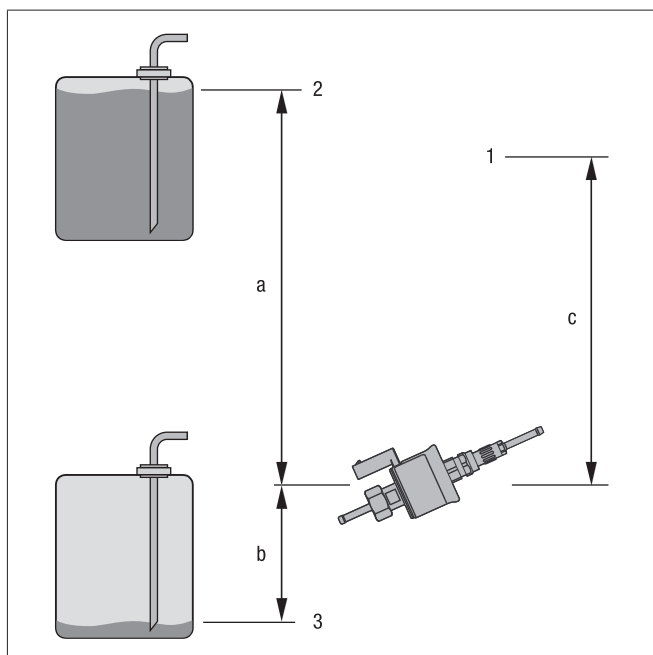
Suction head in a vehicle tank in which negative pressure occurs during extraction (valve with 0.03 bar in the tank cap):

b = max. 400 mm

Pressure head from the metering pump to the heater:

c = max. 2000 mm





- 1 Connection at the heater
- 2 Max. fuel level
- 3 Min. fuel level

**⚠ Caution!**

**Safety instructions for installing the metering pump**

- Always install the metering pump with the delivery side rising upwards – minimum angle 15°.
- Protect the metering pump and filter from impermissible heating, do not install near to silencers and exhaust pipes.

**⚠ Caution!**

**Safety instruction for fuel supply**

It is not permitted to operate the heater with unapproved fuel / fuel blends or to add used oil.

Non-compliance can lead to personal injuries and also to a malfunction or damage to the heater.

Only use fuel approved by the manufacturer or vehicle manufacturer.

### 3.17 Fuel quality for petrol heaters

The heater runs problem-free on standard commercial quality fuel, which you use to run your vehicle engine. Commercially available, maximum blending of ethanol to DIN 51600 and EN 228.

### 3.18 Fuel quality for diesel heaters

The heater runs on standard commercial grade diesel fuel to EN 590 with max. 30 % biodiesel content (FAME). In case of storage periods longer than 30 days it is advisable to use FAME-free products, as ageing effects can have a negative effect on the fuel, especially regarding its flow properties and filterability.

During the winter months the diesel fuel is adapted to the low temperatures of 0 °C to –20 °C. This means that problems can only arise if extreme drops in temperature occur – as is the case for the vehicle engine too – please refer to the vehicle manufacturer's instructions.

### 3.19 Heating oil operation with additional tank

In special cases and at outside temperatures above 0 °C the heater can also be run on EL heating oil according to DIN 51603 (from an additional tank).

If the heater is run from a separate tank, please comply with the following rules:

- at outside temperatures above 0 °C: use diesel fuel to EN 590 or EL heating oil to DIN 51603;
- at outside temperatures of 0 °C to –20 °C: use winter diesel fuel to EN 590;
- at outside temperatures of –20 °C to –40 °C: use Arctic diesel or polar diesel.

**i Note**

- It is **not** permitted to add used oil!
- Following operation with winter or cold diesel, the fuel lines and the metering pump must be filled with the standard diesel fuel after letting the heater run for 15 minutes!
- Heaters B 4 E and B 5 E are **not** approved for operation with biodiesel to DIN 14214.

## 4 Operation and Function

The heater is operated by a control unit. Detailed documentation / CD for operation is enclosed with the control unit.

**i Note**

The service company or installation company gives the documentation / CD to the end user.

### 4.1 Instructions for operation

**Safety checks before starting up the heater**

After a lengthy stoppage, check all components for secure fit (tighten screws where necessary). Carry out a visual check of the fuel system for leaks.

**Heating at high altitudes**

Due to the integrated air pressure sensor, the Airtronic 2 has automatic altitude adjustment up to 3000 m asl.

**External temperature sensor at the heater**

The heater adjusts its output to the value of the internal temperature sensor, in accordance with the factory setting. If the heater is activated via CAN or LIN, an external temperature sensor can be connected, which records the temperature values in any place inside the vehicle and controls the heater.



**i Note**

- The external temperature sensor must be coded via EasyScan.
- For information about the temperature sensor and control unit combination options see "Installation Instructions Plus".

## 4.2 Notes on ADR mode

- When installing the heater and operating it in ADR mode, always note: Annexes A and B of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)
- ADR mode is only possible with 24 V heaters.
- To operate the heater in ADR mode, it must be coded accordingly via EasyScan by a service company.
- Installation of the heater in a vehicle operated in accordance with the ADR Directive is approved by the manufacturer only if the following points are taken into consideration:
  - Maximum period from switching off the engine to falling of the D+ signal: 2 seconds.
  - Maximum period from switching on the secondary drive to application of the secondary drive signal: 2 seconds.
- On installing the heater or replacing the control box, note the following:
  - To prevent switching on of the heater in ADR mode, the control box must be coded with the help of the Eberspächer EasyScan.
  - In case of subsequent replacement of the control box, the coding can be carried out again with the help of the Eberspächer EasyScan.
- Only the CAN-capable EasyStart Pro control unit can be used for ADR mode of the heater.

**i Note**

The timer function of EasyStart Pro is deactivated in ADR mode.

### 4.2.1 Forced shutdown in ADR mode

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 switched on (auxiliary drive for unloading pump, etc.).

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

## 4.3 Initial startup

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

- 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.

**i Note**

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

### Switch output (whrd)

The switch output (whrd) can be coded for the following applications via EasyScan:

- Switching signal ON
  - if heating (incl. afterrun) or ventilation mode active
  - depending on the actual temperature at the control sensor (control values 10 °C – 90 °C; default 25 °C). Switching signal ON on exceeding the lower control value. Switching signal OFF on falling below the upper control value -10 °K
  - on falling below the maximum heating output
- Function display and error output via flashing code (default)

**i Note**

- Further information on the switch output is provided in the EasyScan operating instructions and in the "Installation Instructions Plus".
- The table for error detection via flashing code is given in the repair instructions.

## 4.4 Functional description

### Switching on

When the heater is switched on, the indicator in the control unit lights up. The glow plug is switched on and the fan starts at low speed.

**i Note**

- The heater can only be switched on if the actual temperature value at the temperature sensor is less than the internal temperature setpoint of the heater.
- If there is still too much residual heat in the heat exchanger from when the heater was last used, firstly only the fan starts up (cold blowing). Once the residual heat has been cleared, the heater starts.

### Starting the Airtronic S2

After approx. 65 sec. the fuel delivery starts and the fuel - air mixture in the combustion chamber ignites. After the flame sensor has detected the flame, the glow plug is switched off after 60 sec. The heater is now in normal operation.

### Starting the Airtronic M2

After approx. 60 sec. the fuel delivery starts and the fuel - air mixture in the combustion chamber ignites. After the flame sensor has detected the flame, the glow plug is switched off after approx. 90 sec. The heater is now in normal operation. After a further 120 sec. the heater has reached the maximum heating output (maximum fuel quantity and maximum blower speed).

### Temperature selection with the control unit

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 unit is an empirical value.

#### **i** Note

If a temperature setpoint is not selected at the control unit, the heater heats according to a temperature setpoint specified by the system. The temperature setpoint is 22° C.

### Control in heating mode

During heating mode, the room temperature or the temperature of the hot air drawn in is constantly measured. If the temperature is higher than the temperature preselected at the control unit, the control starts.

The heating output is controlled continuously, so that fine adjustment of the heat flow supplied by the heater to the heat requirement is possible. The fan 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 fan running on for approx. 4 minutes to cool down. Then the fan continues at minimum speed (circulation mode) or is switched off (fresh air mode) until the heater is started again.

### Ventilator mode

For ventilator mode the "Heat / Ventilate" change-over switch must be pressed first and then the heater switched on.

### Switch off

When the heater is switched off, the control lamp goes out and the fuel delivery is switched off. The fan runs on for approx. 4 minutes to cool down. The glow plug is switched on for approx. 40 seconds to clean it during the fan after-running.

Special case:

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

## 4.5 Control and safety devices

- If the heater does not ignite within 90 seconds after the fuel delivery starts, the start is repeated. If the heater still does not ignite after another 90 seconds of fuel delivery, a safety lock-out occurs, i.e. the fuel delivery is switched off and the fan continues to run for approx. 4 minutes.
- If the flame goes off by itself during operation, the heater is restarted first. If the heater does not ignite within 90 seconds after the fuel delivery has restarted, or ignites and goes out again within 15 minutes, a safety lock-out occurs, i.e. the fuel delivery is switched off and the fan carries on running for approx. 4 minutes. The safety lock-out can be cancelled by briefly switching off and on again. Do not repeat the switching off / on routine more than twice.
- In the event of overheating, the combined sensor (flame sensor / overheating sensor) triggers, the fuel supply is interrupted and a safety lock-out occurs. 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, a shutdown on faults takes place after 20 seconds.
- The heater does not start up when the glow plug or the fan motor is defective or when the electric lead to the metering pump is interrupted.
- If the combined sensor (flame sensor / overheating sensor) is defective the heater does not start and the safety lockout (shutdown on faults) takes place.
- The speed of the fan motor is monitored continuously. If the blower motor is not running or if the speed deviates by more than 10 %, safety lockout (shutdown on faults) takes place after 30 sec.
- When the heater is switched off, the glow plug is switched on for 40 seconds (after glowing) while the fan runs on to clean off any combustion residues.

#### **i** Note

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

## 4.6 Emergency stop – EMERGENCY OFF

If an emergency stop – EMERGENCY OFF – is necessary during operation, proceed as follows:  
Switch the heater off at the control unit or  
remove the fuse or  
disconnect the heater from the battery.

## 5 Electrics

### 5.1 Heater wiring

The electronic control box is integrated in the heater, which makes wiring during installation much easier.

#### **Caution**

##### **Safety instructions**

The heater is to be connected up electrically according to the EMC directives.

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

- Ensure that the insulation of electrical cables is not damaged. Avoid: Chafing, kinking, jamming or exposure to heat.
- In waterproof connectors, seal any connector chambers not in use with filler plugs to ensure they are dirt-proof and water-proof.
- Electrical connections and ground connections must be free of corrosion and firmly connected.
- Lubricate connections and ground connections outside the heater interior with contact grease.

#### **Note**

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

- Electrical leads, switch and control boxes must be positioned in the vehicle so that they can function perfectly under normal operating conditions without impairment (e.g. due to heat exposure, moisture, etc.).

- The following cable cross-sections are to be used between the battery and heater. This ensures that the max. permissible voltage drop in the cables does not exceed 0.5 V for 12 V or 1 V for 24 V rated voltage.

Cable cross-sections for a cable length (plus cable + minus cable) of:

- up to 5 m = cable cross-section 4 mm<sup>2</sup>
- 12 V: from 5 m to 8 m = cable cross-section 6 mm<sup>2</sup>
- 24 V: from 5 m to 8 m = cable cross-section 4 mm<sup>2</sup>
- If the positive cable is to be connected to the fuse box (e.g. terminal 30), the vehicle's cable from the battery to the fuse box must also be included in the calculation for the total cable length and re-dimensioned if necessary.
- Insulate unused cable ends.

### 5.2 Parts list for the Airtronic S2 and Airtronic M2 circuit diagrams

- A1 Airtronic Ax2 control box
- A30 Fuse holder, 3 pin
- B1 Air inlet sensor, internal (LEF1)
- B6 Flame and air outlet sensor
- R1 Terminating resistor I
- R2 Terminating resistor 120 Ω
- R3 Terminating resistor, stub line 9.2 kΩ
- F1 Heater fuse: 12 V = 20 A / 24 V = 10 A
- HG Heater
- R1 Glow plug
- M4 Burner motor
- Y1 Fuel metering pump
- p Switch output, see on page 26
- XB6/1 EasyScan bush housing
- XS6/1 Mating connector with terminating resistor
- XB6/4 Bush housing, EasyStart Pro
- d to the ADR acknowledgement button, see on page 26
- n Generator input D+
- o Secondary drive input NA+

#### **Note**

- It must be ensured that if the battery isolating switch is pressed due to EMERGENCY STOP, all the heater's electric circuits are disconnected from the battery immediately (without any consideration of the heater's status).
- If the battery isolating switch is pressed to disconnect the battery from all electric circuits, the heater must be switched off first and if applicable you must wait until the heater's afterrun has finished.

- a to the heater
- c1 to the control unit CAN
- c2 to the control unit LIN / S+
- g to the external temperature sensor / mini controller
- x insulate and tie back any cables that are not needed

#### **Note**

Circuit diagram for Airtronic S2 / Airtronic M2 from page 29.

Circuit diagrams for control units, e.g. EasyStart Pro etc. see from page 32.

#### **Cable colours**

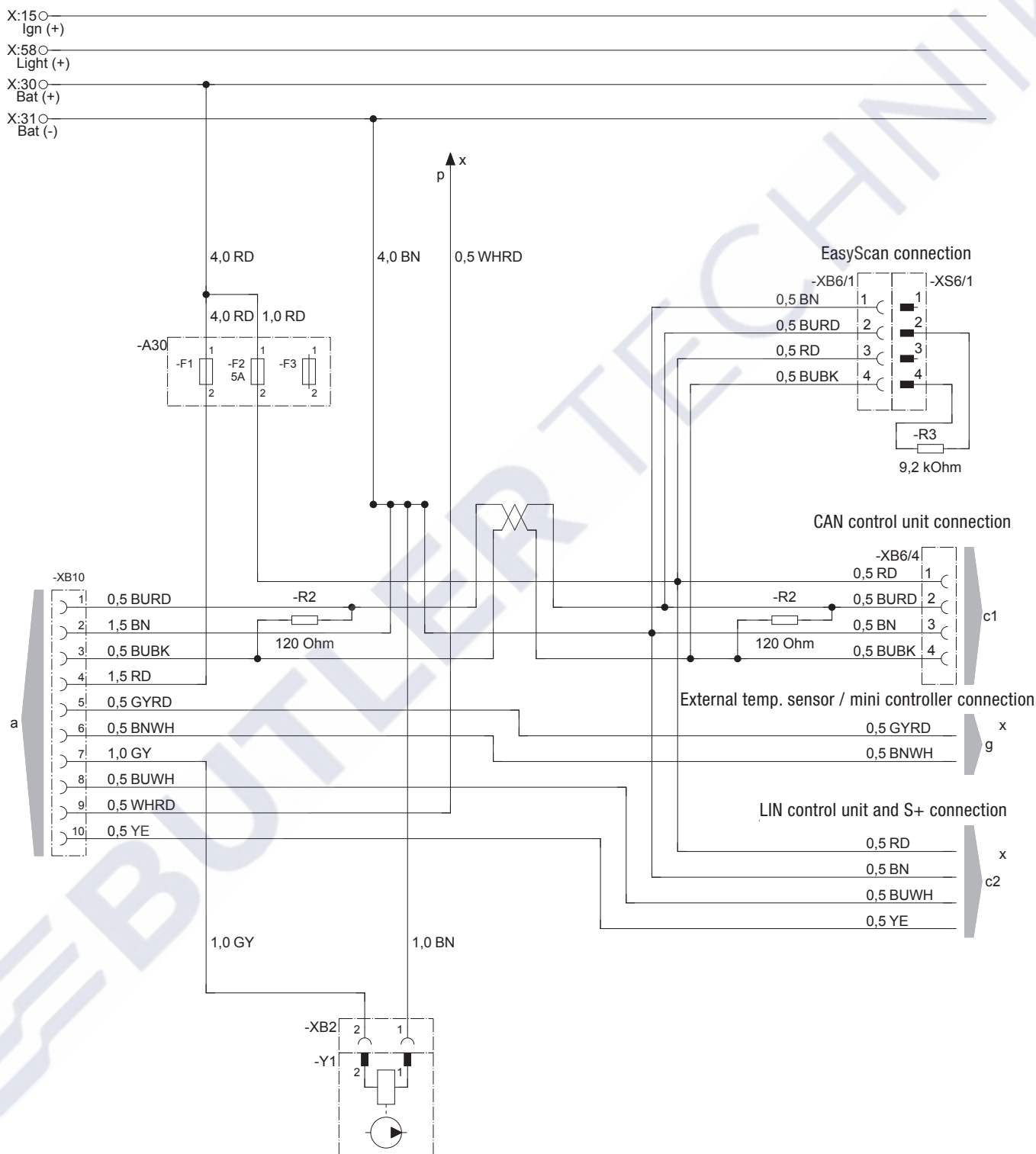
|            |             |
|------------|-------------|
| bk = black | og = orange |
| bn = brown | rd = red    |
| bu = blue  | vt = violet |
| gn = green | wh = white  |
| gy = grey  | ye = yellow |



### 5.3.2 Cable harness 12 V / 24 V

**Note**

Operation via LIN only for Airtronic 2 12 V

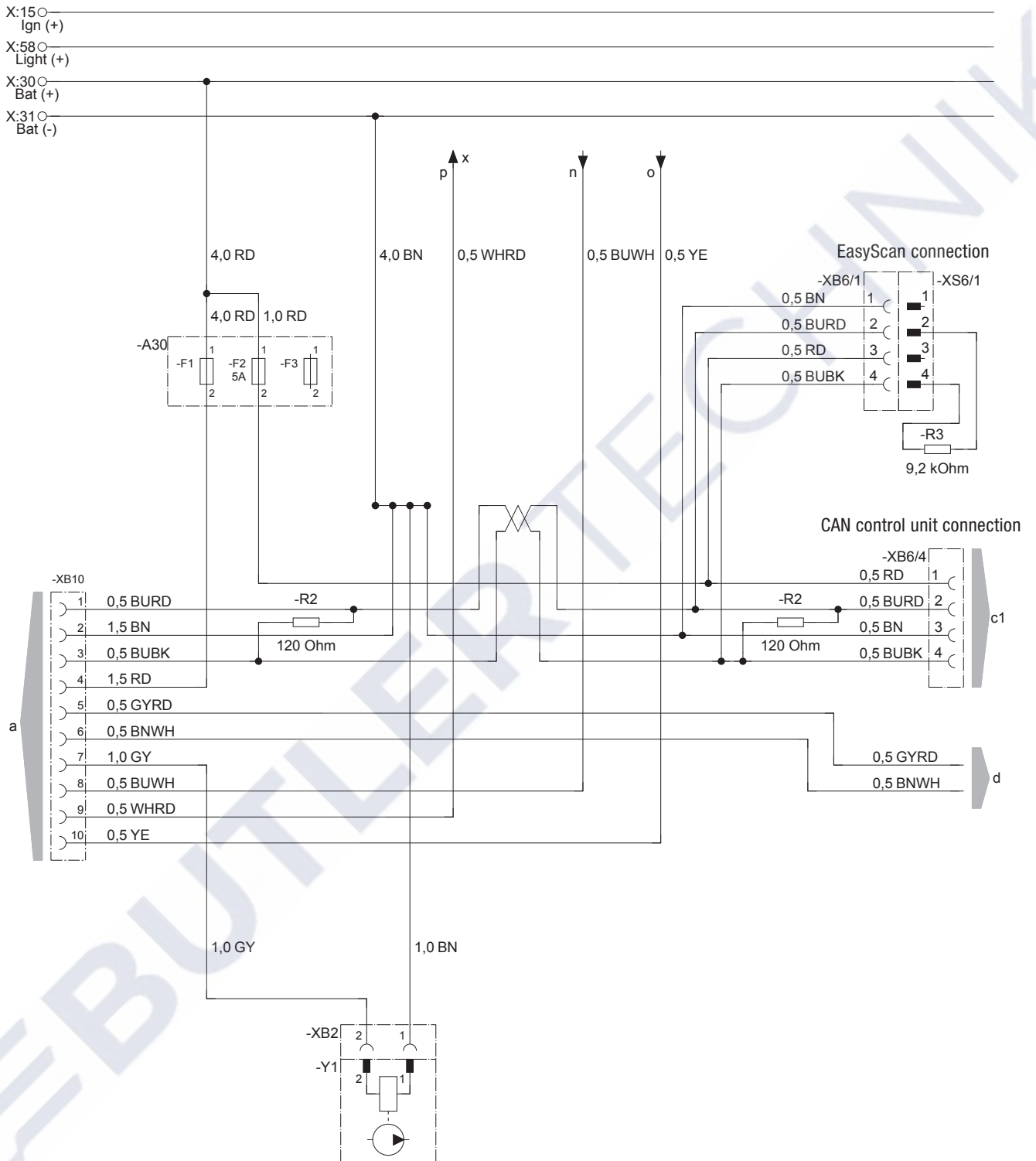


Parts list on page 28

25.2720.00.9602.0A



5.3.3 Cable harness 24 V with ADR

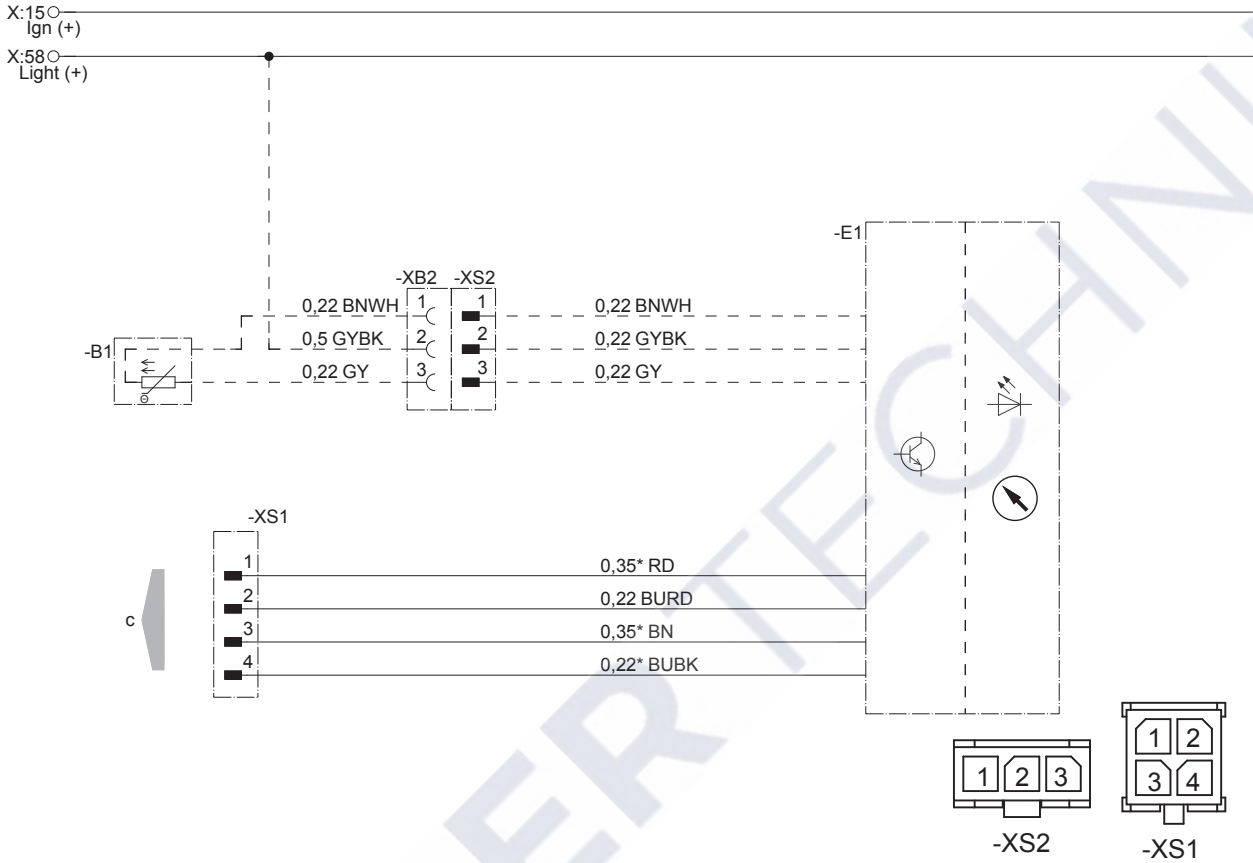


Parts list on page 28

25.2720.00.9603.0A

## 5.4 Circuit diagrams for control units

### 5.4.1 EasyStart Pro



22.1000.35.2210

- B1 Room temperature sensor (optional)
- E1 EasyStart Pro
- c to the heater

**i Note**

- Heater circuit diagrams, from page 29.
- Further circuit diagrams for the EasyStart Pro are printed in the Installation Instructions Plus, these are available to view and download from the Service Portal.

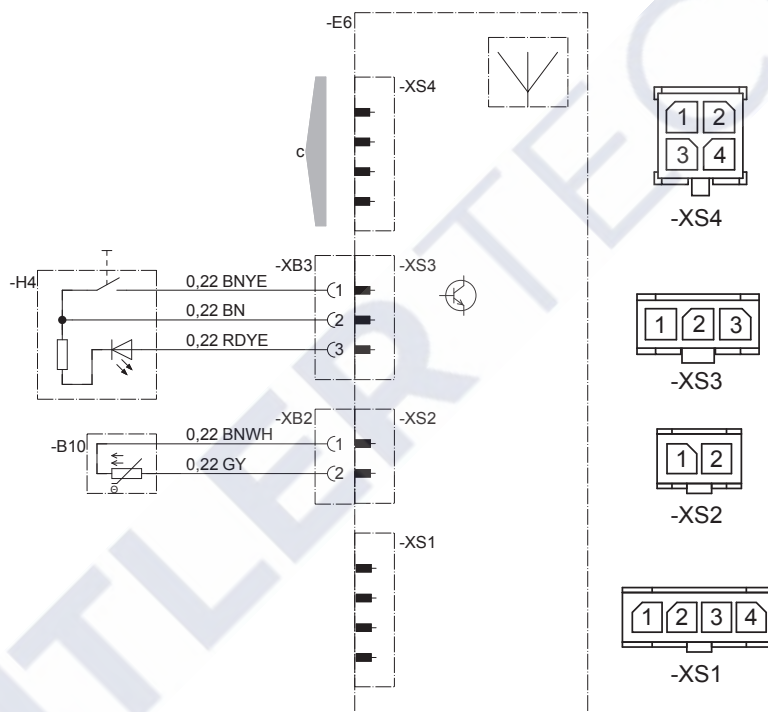
### 5.4.2 EasyStart Web

**Note**

These installation instructions describe the standard configuration. For details of enhanced configuration of the EasyStart Web with control units and for special functions, the “Installation Instructions PLUS – Easy Start / Altitude Kit / Special Functions and Diagnosis” are available to view and download from the partner portal.

X:15  $\bigcirc$   
Ign (+)

X:58  $\bigcirc$   
Light (+)



**Parts list**

- B10 EasyStart Web interior temperature sensor
- E6 EasyStart Web radio remote control
- H4 EasyStart Web button

- c to the heater
- g to the heater
- y Connect cables and insulate

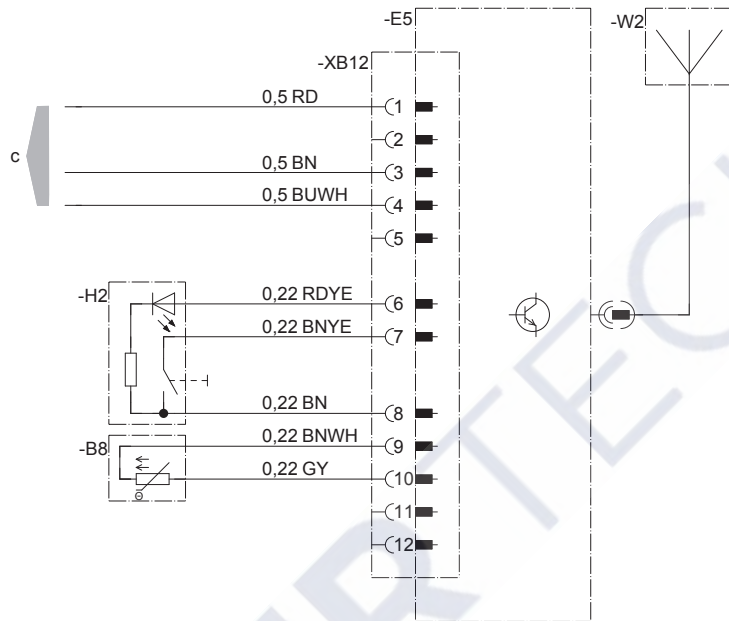
22.1000.34.97x1.0x

**Cable colours**

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

5.4.3 EasyStart Remote+

X:15 ○ Ign (+)  
 X:58 ○ Light (+)



22.1000.34.9729

- B8 Room temperature sensor
- E5 Stationary unit, EasyStart Remote+
- H2 Button
- W2 Antenna
- c to the heater

**i Note**

- EasyStart Remote+ only for Airtronic 2 12 V
- Heater circuit diagrams, from page 29.
- Further circuit diagrams for the EasyStart Remote+ are printed in the Installation Instructions Plus, these are available to view and download from the Service Portal.

## 6 Fault / Maintenance / Service

### 6.1 If any faults occur, please check the following items

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

### 6.2 Troubleshooting

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

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

#### **Note**

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

### 6.3 Maintenance instructions

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

### 6.4 Service

#### **Technical Support**

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

In Canada please contact:  
support-CA@eberspaecher.com

In the United States of America please contact:  
support-US@eberspaecher.com

## 7 Environment

### 7.1 Certification

The high quality of Eberspächer products is the key to our success. To guarantee this quality, we have organised all work processes in the company along the lines of quality management (QM).

Even so, we still pursue a large number of activities for continuous improvement of product quality in order to keep pace with the similarly constantly growing requirements made by our customers.

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

This quality is to be considered in a total sense.

It concerns products, processes and customer - supplier relationships.

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

Eberspächer Climate Control Systems GmbH & Co. KG has already qualified for the following standards:

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

**Environmental management system in accordance with  
ISO 14001:2015**

### 7.2 Disposal

#### **Disposal of materials**

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

Electric motors, control boxes and sensors (e.g. temperature sensors) are deemed to be "electronic scrap".

#### **Dismantling the heater**

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

#### **Packaging**

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

### 7.3 EU Declaration of Conformity

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

EC Directive 2014/30/EU



The full Declaration of Conformity can be viewed and downloaded from the download centre at [www.eberspaecher.com](http://www.eberspaecher.com).



## 8 List

### 8.1 List of abbreviations

#### **ADR**

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

#### **ECE regulation**

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

#### **EMC directives**

Electromagnetic compatibility.

#### **JE service partner**

Eberspächer partner.

#### **CE marking**

With the CE marking, the manufacturer declares in a declaration of conformity, that the version of the heater placed on the market conforms to the relevant provisions of the EU Directive.

BUTLER TECHNİK

BUTLER TECHNİK

 BUTLER TECHNIK

BUTLER TECHNİK

Eberspächer Climate Control Systems  
GmbH & Co. KG  
Eberspächerstraße 24  
73730 Esslingen  
Germany  
[info@eberspaecher.com](mailto:info@eberspaecher.com)  
[www.eberspaecher.com](http://www.eberspaecher.com)

