

Air Heaters B 5 L C / D 5 L C



Technical Description
Installation Instructions
Operating Instructions

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Air heaters independent of engine
B 5 L C for petrol, D 5 L C for diesel fuel



Specifications

Heating medium	Air		
Fuel	B 5 LC – Gasoline D 5 LC – Diesel fuel	} commercial grade	
Regulation of heating capacity	High / Medium / Low / Off		

		Starting power	High	Medium	Low
Heating capacity ¹⁾ ± 10 %	B 5 L C	5500	4800	2700	2000 W
	D 5 L C	5500	4800	2700	1200 W

Heating air throughput without counterpressure ¹⁾ ± 10 %	280	165	165 kg/h
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Fuel consumption ¹⁾ ± 10 %	B 5 L C	0,65	0,37	0,27 l/h
	D 5 L C	0,58	0,34	0,15 l/h

Rated voltage 12 V or 24 V

Operating range⁴⁾

Lower voltage limit²⁾ 10 V or 20 V

Upper voltage limit³⁾ 14 V or 28 V

Cat. No.

Basic heater B 5 L C with standard equipment 12 V 20 1735 05 00 00

Basic heater D 5 L C with standard equipment 12 V 25 1861 05 00 00
24 V 25 1862 05 00 00

Universal installation kit and timers must be ordered separately as additional equipment – see page 2.

Electrical power unit¹⁾

At start B 5 L C 12 V = 320 W ± 10 %
D 5 L C 12 V = 280 W ± 10 %
24 V = 280 W ± 10 %

during operation	High	Medium	Low
	80	40	40 W ± 10 %

Ventilation operation Possible with appropriate circuits

Degree of radio interference suppression Remote, additional suppression measures possible

Weight Approx. 8 kg

¹⁾ at rated voltage

²⁾ an undervoltage protection device built into the control unit switches off the heater at approx. 10,5 V or 21 V as the case may be.

³⁾ an overvoltage protection device built into the control unit switches off the heater at approx. 14 V or 28 V as the case may be.

⁴⁾ Heating operation is possible for altitudes up to 1500 m. For heating operation above 1500 m please consult the manufacturer.

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Extent of delivery

Fig. No.	Name	Order No.
1 – 9	Basic unit with standard fittings Control: Large / Medium / Small / Off	
	B 5 L C – 12 volt	20 1735 05 00 00
	D 5 L C – 12 volt	25 1861 05 00 00
	D 5 L C – 24 volt	25 1862 05 00 00
the standard fittings include:		
1	Basic unit (only available with standard fittings)	
	B 5 L C – 12 volt	20 1735 01 00 00
	D 5 L C – 12 volt	25 1861 01 00 00
	D 5 L C – 24 volt	25 1862 01 00 00
2	Control unit	
3	Mount for control unit	
4	Metering pump with integrated fuel filter	
5	Current regulator	
6	Mount for current regulator	
7	Combustion air silencer	
8	Pipe clamp	
9	Cap	

The following can also be ordered:

–	Universal fitting kit (includes a cable loom heater-control unit, 600 mm long)	25 1861 80 00 00
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Pos. 10, 12 and the necessary line strings can be ordered as optional extras:

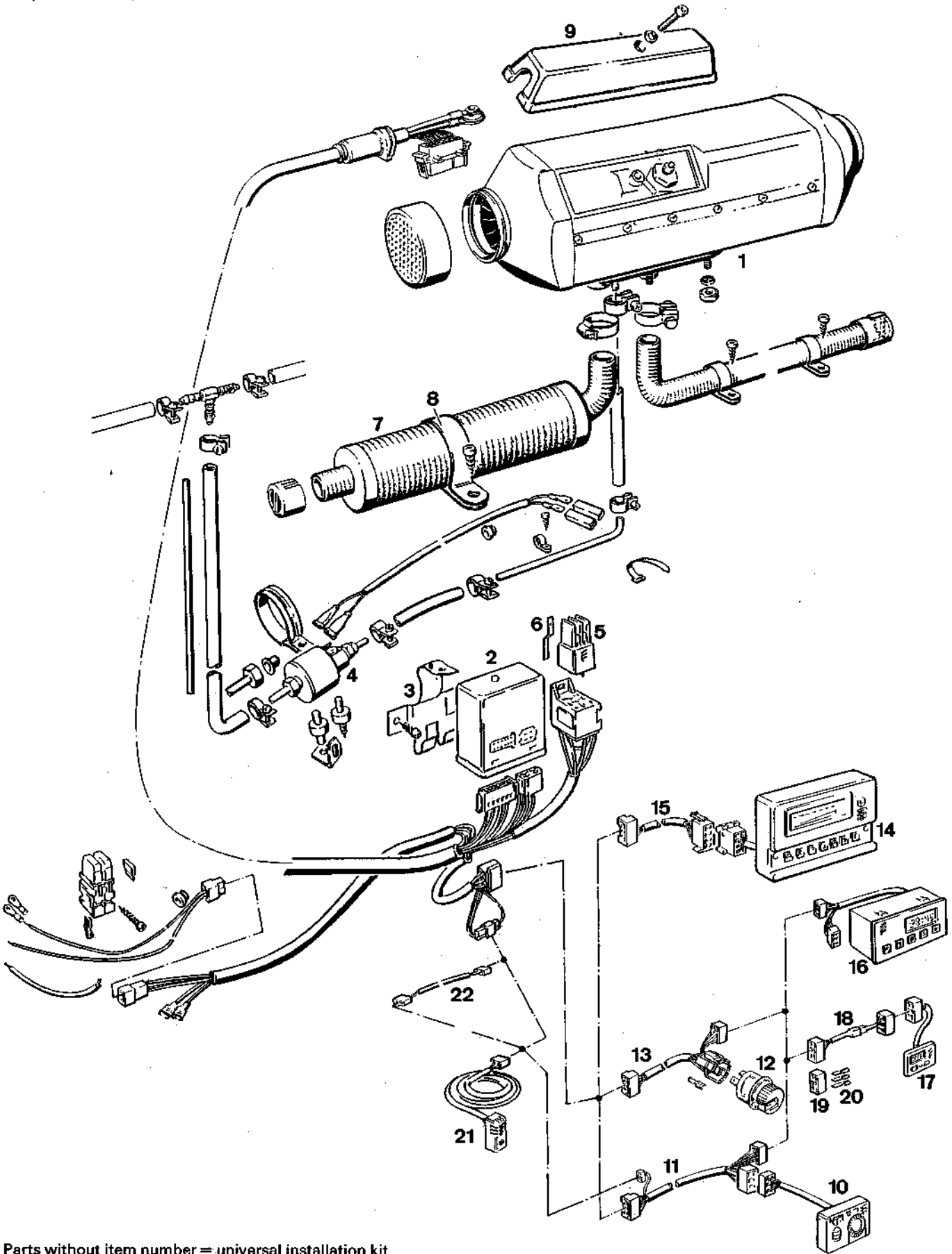
10	Mini controller	12/24 volt	22 1000 30 15 00
11	Line string		22 1000 30 03 00
12	Control unit	12 volt	25 1767 71 00 00
		24 volt	25 1768 71 00 00
13	Line string		22 1000 30 02 00

Additional parts, optional

14	Clock relay	12 volt	22 1000 30 08 00
		24 volt	22 1000 30 09 00
15	Line string		22 1000 30 04 00
16	Clock relay	12 volt	22 1000 30 10 00
		24 volt	22 1000 30 11 00
17	Minitimer	12/24 volt	22 1000 30 14 00
18	Relay	12 volt	22 1000 30 06 00
		24 volt	22 1000 30 07 00
19	Flat-pin guide		206 31 100
20	Flat-pin, Junior-Timer		206 73 001
21	Temperature probe		25 1774 89 03 00
22	Line string (4 m long)		25 1482 89 40 00





Scope of delivery



Government regulations concerning installation

For installation in motor vehicles that are subject to the Regulations Authorising the Use of Vehicles for Road Traffic (StVZO), the air heater has been approved by the (German) Federal Office for Motor Traffic in keeping with the "General Model Approval" (ABG), and the official test symbol is marked on the type plate of the air heater.

B5LC  S 245

D5LC  S 244

The mounting requirements associated with the General Model Approval (ABG) have been printed in the corresponding sections of these mounting instructions. When the air heater is installed in special vehicles, then the regulations governing such vehicles must be taken into account (e.g. TRS 003 for vehicles used to transport dangerous substances).

The year in which the air heater was operated for the first time must be permanently recorded on the type plate. The works must print 3 years in the corresponding field of the type plate. The valid year is identified by removing those years that are not applicable.

Subsequent installation of the heater must be completed in conformity with these mounting instructions and must be accepted by an officially approved vehicle specialist or inspector (Section 7.4a of Annex VIII relating to StVZO) in conformity with § 19 Section 4 StVZO. The specialist / inspector must issue a corresponding written certificate. The effectiveness of model acceptance (ABG) for the heater depends upon this certificate.

The vehicle owner can choose the kind of certificate to be issued:

- A separate "Acceptance Confirmation" must always be kept in the vehicle. Neutral acceptance confirmations of the motor vehicle specialist are also permissible. The vehicle manufacturer, the vehicle type and the vehicle identification number must all be entered in both cases.
- Entry in the vehicle registration book (by the assessing agency) and in the motor vehicle certificate (by the approving agency).

For vehicles that are not subject to StVZO (e.g. ships), it is necessary to observe the specific rules and mounting instructions applicable to the given vehicle; these can differ regionally.

The heater must be installed in keeping with these mounting instructions or possibly other special installation recommendations by a workshop approved by the manufacturer.

The installation points suggested in these mounting instructions are examples. Alternative installation points are permissible provided they conform with the general installation requirements and, possibly, after consulting the manufacturer. This applies particularly to the electrical wiring (circuit diagram), the fuel supply, conducting the combustion air and exhaust gas and the use of alien operating and controlling elements. This is only permissible with the written approval of the manufacturer.

The sticker "Turn off the heater prior to refuelling", included with the heater, must be applied at an appropriate point on the vehicle (near the fuel tank cap).

Further mounting information (e.g. for boats and ships) can be requested from the manufacturer.



Safety instructions concerning installation

Every combustion process produces exhaust gas that contains toxic substances. Consequently, and on account of the high temperatures, the exhaust gas must be conducted in conformity with the requirements specified in these mounting instructions.

Fuel pipes and exhaust pipes must be safely fastened, to avoid damage from vibrations (recommendation: at intervals of approx. 50 cm).

The hot-air emitter (possibly adjustable) must always be arranged in such a manner that the hot air is not directly blown onto heat-sensitive parts of the vehicle. People and loose objects must not be directly exposed to the blown hot air. To avoid damage and burns, people and loose objects must not be directly exposed to the blowing hot air.

If there is no suction hose, then the suction side of the heater must be covered with a protective grille to prevent injury from the hot-air blower.

The heater may only be started up when the maintenance flap is closed.

The maintenance flap may not be open during operation.

Ensure that the insulation of electrical lines cannot be damaged due to abrasion, kinking, squeezing or by exposure to heat.

As a result of their concept for mobile service, the heaters are not suitable as permanent heating installations (for instance to heat living rooms).

Government regulations concerning operation

Subsequent installation of the heater must be completed in conformity with these mounting instructions and must be accepted by an officially approved vehicle specialist or inspector (TUV, DEKRA) in conformity with § 19 Section 4 StVZO (Regulations Authorising the Use of Vehicles for Road Traffic), who must issue a corresponding written certificate, either by entry in the vehicle papers (vehicle registration book or motor vehicle certificate), or as a separate "Acceptance Confirmation" that must always be kept in the vehicle. The effectiveness of model acceptance for the heater (ABG) depends upon this certificate.

The heater must only be used for the purpose specified by the manufacturer with due consideration of the "Technical Description / Mounting Instructions" and the "Operating Instructions" included with each heater.

It is not permissible to operate the heater where combustible vapours or dusts can be formed, e.g. in the vicinity of fuel, coal, wood and grain stores and similar facilities.

The heater must not be used in closed rooms, e.g. in a garage or car park building. This is because of the danger of poisoning since all combustion processes produce exhaust gases that contain toxic constituents.

The heater must be turned off when refuelling.

With vehicles subject to TRS regulations (transport of dangerous products, e.g. road tankers), the heater must be switched off before entering the hazardous area (refinery, petrol station, etc.).

In conformity with StVZO, the heater must be exchanged for an original replacement heater by the manufacturer or an authorised workshop 10 years after the heater was first used. The vehicle owner / operator of the heater is responsible for ensuring replacement. A plate must then be mounted (not detachable) on the replacement heater indicating the date when the replacement heater was installed, together with the designation "Original Part" (the plate is supplied with the replacement heater).

D.I.Y. repairs (on your own and without using original spare parts) are dangerous and therefore not permitted. The General Model Approval (ABG) for the heater and the General Operating Permit (ABE) for the vehicle will both become invalid.

The manufacturer's guarantee for the entire heating system will become invalid if the above instructions are not observed. The Eberspächer Guarantee Conditions are exclusively applicable.

The observance of the pertinent regulations and safety instructions is a precondition for liability claims. The Eberspächer company cannot be held liable if the "Operating Instructions" have not been observed and if repairs have not been competently completed, even if original spares were used.



Safety instructions concerning operation

As a result of its concept for mobile service, the heaters are not suitable as permanent heating installations (for instance to heat living rooms).

The installation space of the heater must remain free and cannot be used as storage space. Reserve fuel tanks, oil cans, spray cans, gas cartridges, fire extinguishers, cleaning cloths, clothes, paper, etc., must not be stored or transported on or alongside the heater.

The protective grille over the suction side should be occasionally inspected, but particularly before the heating period, and cleaned should this prove to be necessary.

An adjustable hot-air emitter must always be arranged in such a manner that hot air is not directly blown onto heat-sensitive parts of the vehicle. People and loose objects must not be directly exposed to the stream of hot air. To avoid damage and burns, people and loose objects must not be directly exposed to the stream of hot air.

Defective fuses must only be replaced by fuses with the prescribed fuse rating.

Should fuel leak out of the heater's fuel system, then the damage must be immediately rectified by an authorised servicing workshop.

The heater should be tested before the beginning of the heating period. The heater must be turned off, and the fuse removed so that it is inoperable, should intense smoke develop for an extended period, if unusual burner noises can be heard, if there is a distinct smell of fuel or if electric / electronic parts become overheated. Renewed operation of the heater is only permissible after it has been checked by trained specialist Eberspächer personnel.

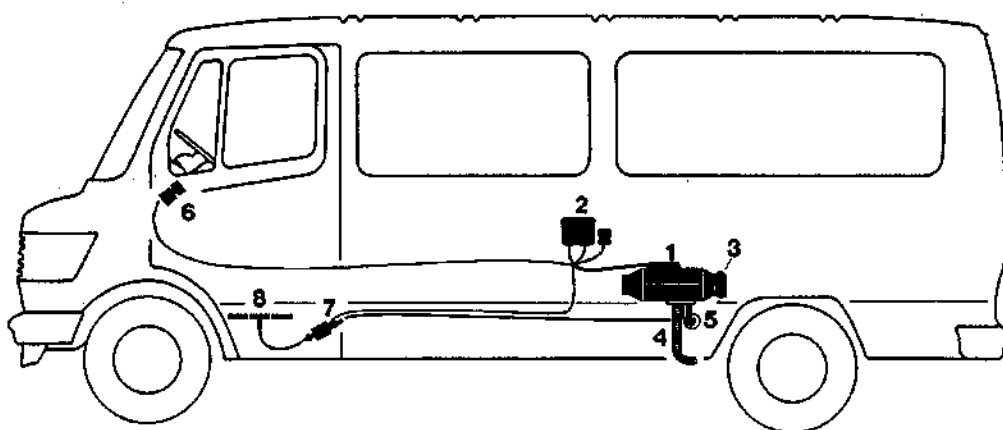
Damage to the actual heater or the heating installation must only be remedied by an authorised servicing workshop which will only use original spare parts.

Installation Instructions

The suggestions put forward in these installation instructions are only examples. Possibilities other than those illustrated (e. g. in the selection of the installation position or means of running air) are also permissible provided they meet the requirements of the West German road traffic regulations (StVZO), and if necessary after consultation with the manufacturer

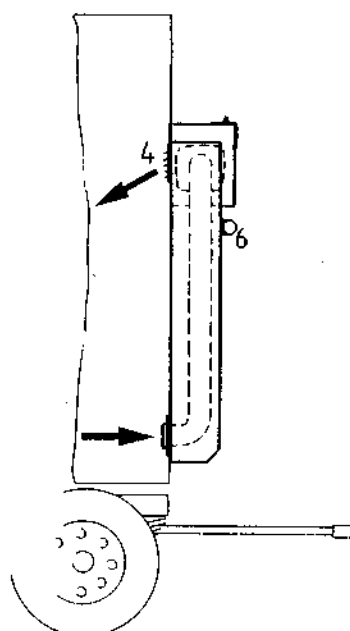
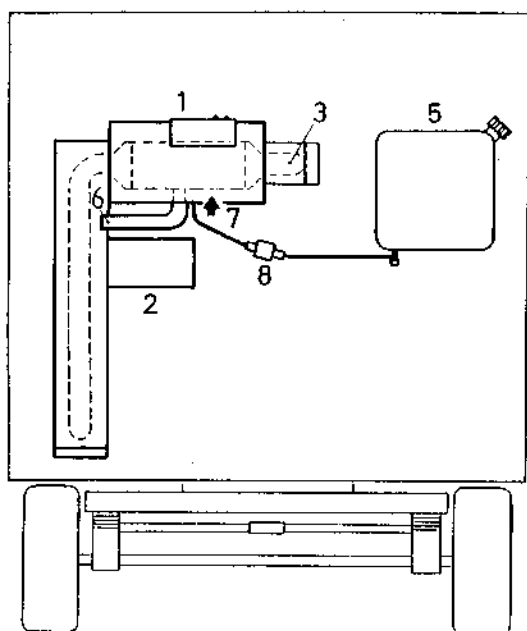
Typical installations

B5 LC in a transporter



- 1 Heater
- 2 Control unit
- 3 Protective grid
- 4 Exhaust pipe
- 5 Intake silencer
- 6 Actuating unit
- 7 Fuel metering pump
- 8 T-piece

D5 LC in a trailer



- 1 Heater
- 2 Battery
- 3 Flexible pipe for heating air
- 4 Outlet for heating air
- 5 Additional fuel tank
- 6 Exhaust pipe
- 7 Combustion air
- 8 Fuel metering pump

Installing the heater

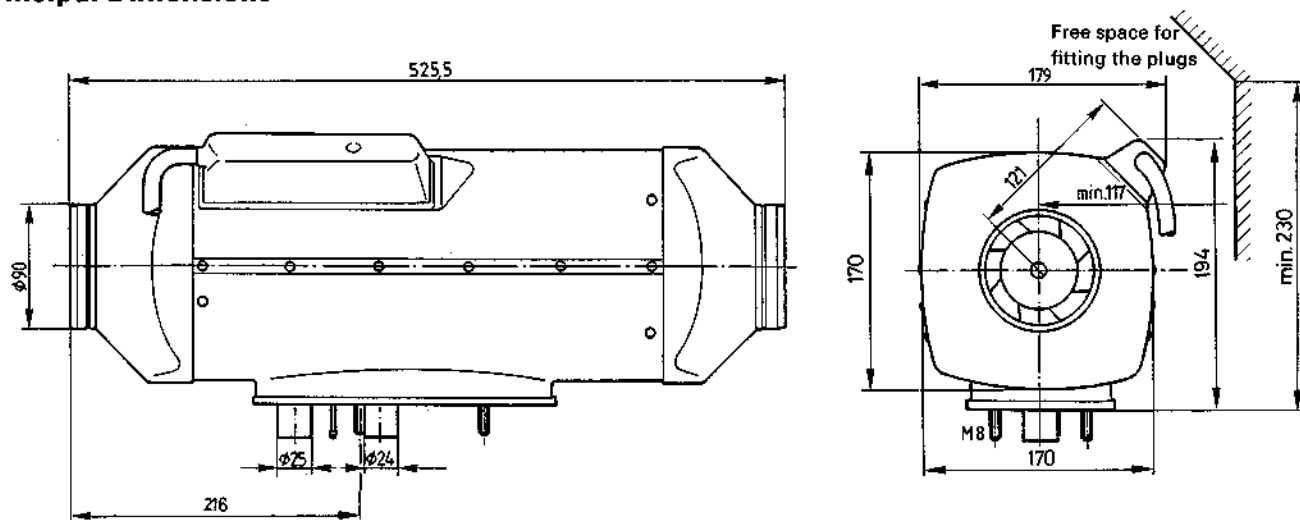
The B5LC/D5LC heaters are suitable and approved for installation in vehicle areas used by persons. Installation in the driver or passenger areas of motor buses* is not permitted.

The heater must be fitted by its base on an outside panel of the vehicle or on the vehicle floor, using the seal seated on the base.

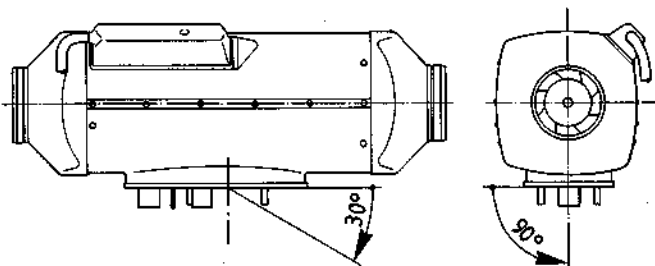
The factory plate must be clearly visible when the heater is installed. If necessary a second plate (duplicate) with the same information as the original can be affixed to a point on the heater clearly visible after installation or to a cover located in front of the heater. A second plate is not necessary if the original is visible after removal of a cover without the aid of tools.

* Vehicles with more than 9 seats.

Principal Dimensions



Permissible installation positions



The heater should be installed in the standard position as shown. See sketch for maximum permissible deviations.

Please consult the manufacturer if further differences are required.

During starting and thermostatic operation a heater installed in the standard position may deviate, due to the inclination of the vehicle during motion, up to $\pm 15^\circ$ in both axes from the standard position.

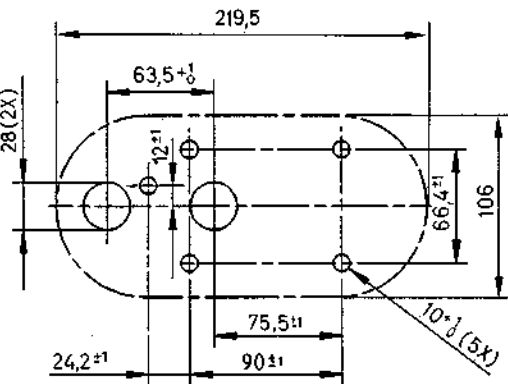
Continuous heating operation after starting is possible at a deviation of up to $\pm 30^\circ$ from the standard position. With deviations exceeding $\pm 30^\circ$ reliable heating operation is no longer possible. However, this does not lead to damage of the heater if the changes in the operating position are only for brief periods.

Important: the plug connection must always point upwards.

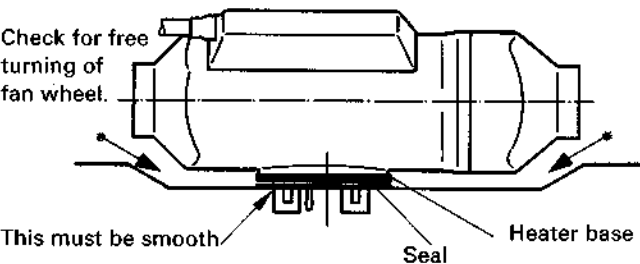


Fastening the heater

Make holes in accordance with the template pattern

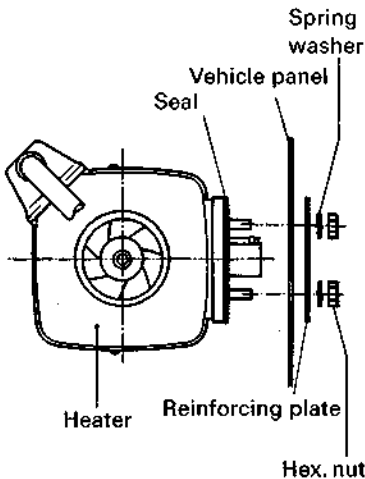


The mounting surface for the heater base must be smooth. The 10.5 mm diameter hole for the fuel metering pump cable is not provided for in the template, but must be drilled to suit the installation conditions.

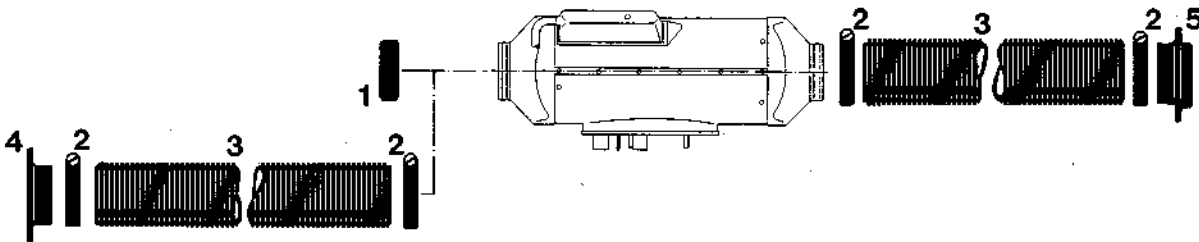


* This must be kept free.

If the mating surface sheet is too thin (criterion: thinner than 1.5 mm), a reinforcing plate, Cat. No. 25 1729 89 00 03 can be installed additionally on the outside.



Running the Heating Air



When checking an installation the average output temperature should not significantly exceed 100° C at the output point with an intake temperature of 20° C. This will ensure that the safety thermal cutout switch will not respond under normal operating conditions.

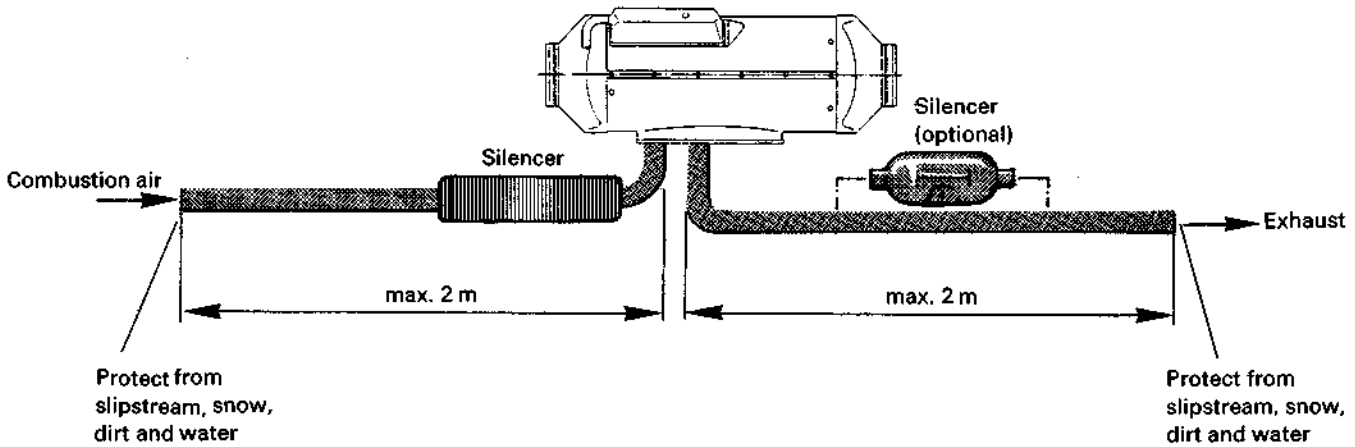
Heating air intake openings shall be arranged in such a manner that exhaust from the vehicle's engine and from the heater cannot be expected to be sucked in under normal operating conditions, and the heating air cannot be contaminated.

When operating as a recirculating heater, locate the inlet for the heating air in such a way that the outflowing hot air cannot be sucked directly in again.

- 1 Protective grid
- 2 Hose clip
- 3 Flexible pipe
- 4 Connection piece
- 5 Air outlet

Running the combustion air / Running the exhaust

Permissible diameters, lengths, bends of combustion air and exhaust lines.



Permissible diversions – exhaust line: max. 180°, combustion air line: max. 180°.

Running the combustion air

The standard equipment contains a combustion air intake silencer, which must be fitted.

The combustion air line can be extended by up to 2 m if necessary using a connecting pipe (Cat. No. 25 1226 89 00 31) and a flexible pipe with 25 mm internal diameter (Cat. No. 10 2114 21 00 00).

Fit a terminal bush on the end of the combustion air line.

Do not install the intake opening of the combustion air line facing the slipstream, but laid such that it cannot clog with dirt and snow, and that any water which does enter can run off.

Running the exhaust

The universal installation kit contains a flexible exhaust hose with terminal bush, internal diameter 24 mm, 1.3 m long. It can be shortened to suit requirements. See the Additional Equipment Catalog for longer lines.

Additional noise insulation is possible by installing an exhaust silencer (see Additional Equipment Catalog). The permissible overall length (inclusive of the silencer) remains valid.

The exhaust line must be laid such that the penetration of exhaust into the vehicle interior need not be expected. The operation of essential vehicle parts must not be impaired. Condensate or any water that has entered must not be able to collect in the exhaust line.

Lay the exhaust line either with a slight slope or with drain holes of 5 mm diameter at the lowest points for the condensate. The exhaust pipe should terminate above, at the side or – in the case of exhaust running underneath the vehicle floor – in the vicinity of the side or rear limit of the cab or vehicle.

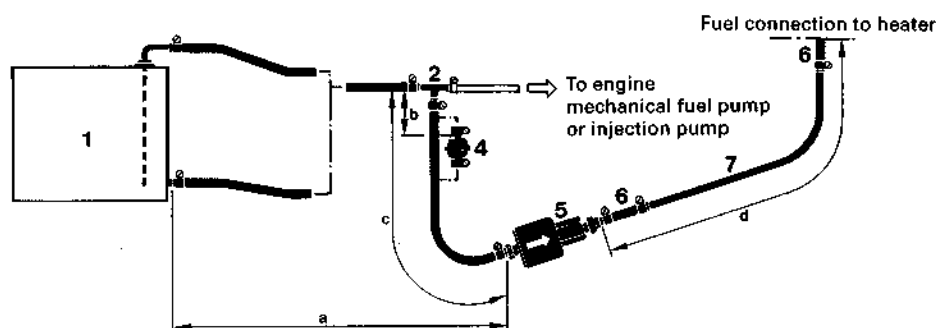
Fuel supply

Divergences from the instructions set forth here are not permitted, as they can lead to malfunctions.

1. For cars with diesel engines, and for cars with petrol engines having mechanical pump.

Fuel tapped from the fuel supply line to the engine.

Precondition: The fuel line from the fuel tank to the engine must be leak-free, so that there is no break in the fuel column when the engine is not running.



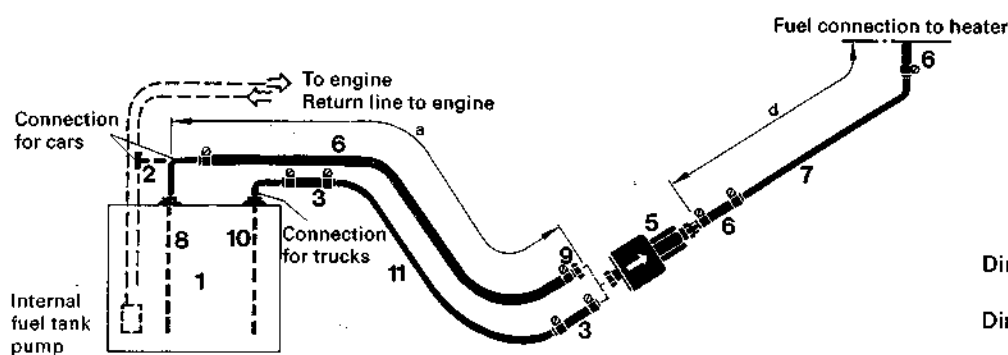
Dimension a = max. 2 m with petrol
max. 2 m with diesel
Dimension b = 50 mm
Dimension c = max. 300 mm
Dimension d = max. 4 m with petrol
max. 6 m with diesel

2. For cars with petrol injection engines and for trucks with diesel engines.

Tapping fuel from the supply line downstream of the delivery pump is prohibited in cars, since pressures of up to 10 bars can occur.

The following possibilities are available:

2.1 Tapping fuel – where possible – using a separate riser pipe, fitted to the fuel tank fitting in the case of cars, and directly into the fuel tank in the case of trucks.



Dimension a = max. 2 m with petrol
max. 2 m with diesel
Dimension d = max. 4 m with petrol
max. 6 m with diesel

2.2 If it is not possible to fit a separate riser pipe in the case of cars with petrol injection engines, the return line can be tapped using a T-piece.

Conditions:

1. There must be no valve installed in the return line of the fuel tank.
2. The pressure in the return line must not exceed 2 bars. For pressures greater than 0.3 bars and up to 2 bars, a pressure reducing valve (additional equipment Cat. No. 20 1645 89 30 00) must be provided upstream of the metering pump.

2.3 If it is not possible to fit a separate riser pipe in the case of trucks with diesel engines, the fuel supply line can be tapped (as shown under 1.).

1 Fuel tank (vehicle tank or separate tank)

2 Fuel branch

3 Fuel hose, internal dia. 5 mm

Cat. No. 360 75 350

4 Fuel pre-filter

(only necessary when contaminated fuel is used)

Cat. No. 25 1226 89 00 37

5 Fuel metering pump (15° to vertically upwards)

6 Fuel hose, internal dia. 3.5 mm

Cat. No. 360 75 300

7 Fuel pipe, plastic, internal dia. 1.5 mm

Cat. No. 090 31 118

8 Riser pipe, internal dia. 2 mm
external dia. 4 mm

9 Connection socket
external dia. 4 mm

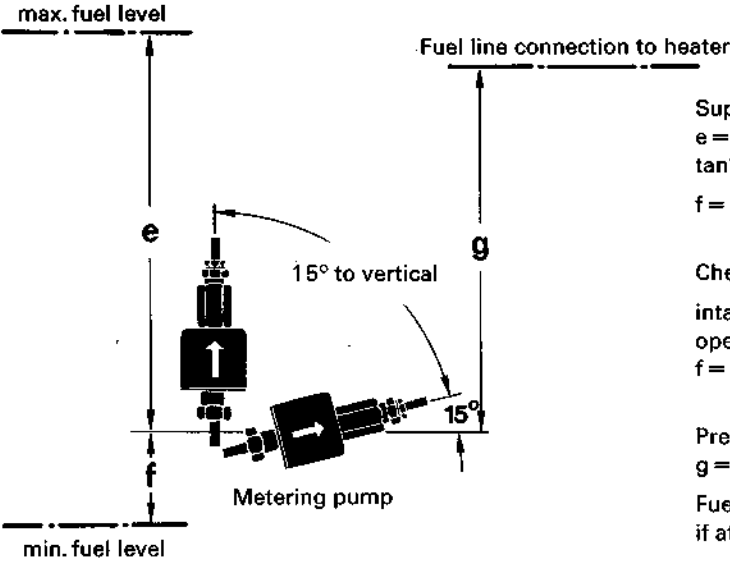
10 Riser pipe, internal dia. 2 mm
external dia. 6 mm

11 Fuel pipe, internal dia. 2 mm
Cat. No. 090 31 125

Cat. No.
20 1645 89 35 00

Cat. No. 25 1226 89 50 00

3. Permissible suction and pressure heads for installation per 1. and 2.; permissible positioning of metering pump



Supply pressure from tank to metering pump:
e = max. 3000 mm suction head:
tank at zero pressure

f = max. 500 mm for gasoline
max. 1000 mm for diesel oil

Check whether tank ventilation works properly
intake from tank when underpressure occurs during
operation (valve 0,03 bar in tank cap)
f = max. 150 mm for gasoline
max. 400 mm for diesel oil

Pressure head metering pump to heater:
g = max. 2000 mm

Fuel line metering pump to heater should not have a slope
if at all possible.

2. Important

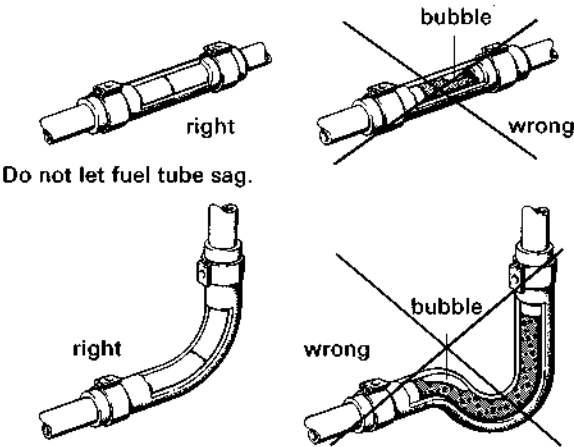
Protect fuel lines, filter and metering pump from overheating; do not install near silencers and exhaust pipes. Temperatures above 30°C lead to gas bubbles and problems with gasoline.

When installing the fuel line, fuel filter and fuel metering pump near the rear axle, be sure to take the spring deflection of the rear axle into consideration.

Cut fuel tubes and pipes to length only with a sharp knife. Cuts may not be indented and must be burr-free.

For connection of the fuel branches, always use rubber tubing, never plastic pipe.

Fuel pipes connected by means of a fuel tube.
Fuel pipe sections must abut.



Fuel grades/Fuel at low temperatures

The heater can take without problem the same fuel you use in your tank. In the USA diesel fuel no. 1 and no. 2. Admixture of used oil is not permitted.

The refineries automatically adapt their fuels to normal winter temperatures (Winter Diesel).

Therefore difficulties can only arise at extremely low temperature (as in the engine – see the vehicle's instruction manual).

If the heater is operated from a separate tank, the following rules must be observed: at temperatures above 0°C any type of diesel fuel can be used.

If no special cold-weather diesel fuel is available at low temperatures, mix kerosine or gasoline according to the adjacent table.

Temperature	Winter diesel oil	Additive
From 0°C to -15°C**	100%	–
From -15°C to -25°C	50%	50% kerosine or gasoline
From -25°C to -40°C	–	100% kerosine*

* or special winter diesel oils

** or in accordance with fuel manufacturer's specifications

The fuel line and the fuel pump must be filled with new fuel by operation for 15 minutes.

Fuel for special cases

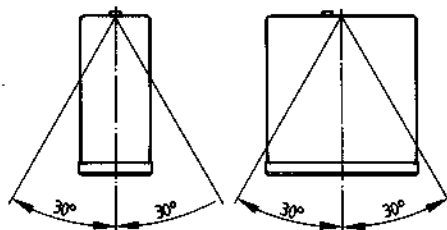
In special cases, the heaters can also be operated on extra light fuel oil (above 0°C) or kerosine. If in doubt consult the manufacturer.

Electrics

Arrange electric cables, switches and control units in the vehicle in such a way that their correct functioning cannot be impaired under normal operating conditions.

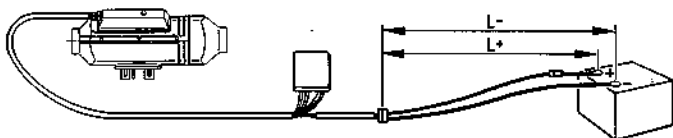
Fit the control unit so that it is protected from splash water (from both its own vehicle and preceding ones). Outside installation is thus not permissible. The unit is best arranged in the vehicle interior, with the plugs pointing downward.

Control unit



The pilot light (built into the operating unit) should be within the field of vision of the driver, or at least be visible to him without great effort.

The following cable cross-sections must be observed between battery and heater, in order that the maximum permissible voltage losses in the cables (0.5 at 12 V rated voltage and 1 V at 24 V) are not exceeded.



$$L^+ + L^- < 5 \text{ m} \rightarrow \text{cross-section } 4 \text{ mm}^2$$

$$L^+ + L^- 5 \text{ to } 8 \text{ m} \rightarrow \text{cross-section } 6 \text{ mm}^2$$

If the positive cable is to be connected to the fuse box (e. g. terminal 30), the vehicle's cable too from the battery to the fuse box must be included in the calculation of the total line length, and if necessary redimensioned in accordance with the above.

Smear plug and earth connections with contact protection grease outside the vehicle interior.

Temperature control

A temperature sensor is provided on the intake side of the heater. The sensor, in conjunction with the control on the actuating unit, switches the heater to "High", "Medium", "Low" or "Off" depending on the intake temperature and on the setting of the control.

This arrangement of the temperature sensor is only suitable in recirculated-air operation (heating air intake from area to be heated).

If the heater is operated with fresh air (heating air intake from the outside), the built-in temperature sensor must be disconnected and an external temperature sensor (Cat. No. 25 1774 89 03 00) provided on the inside.

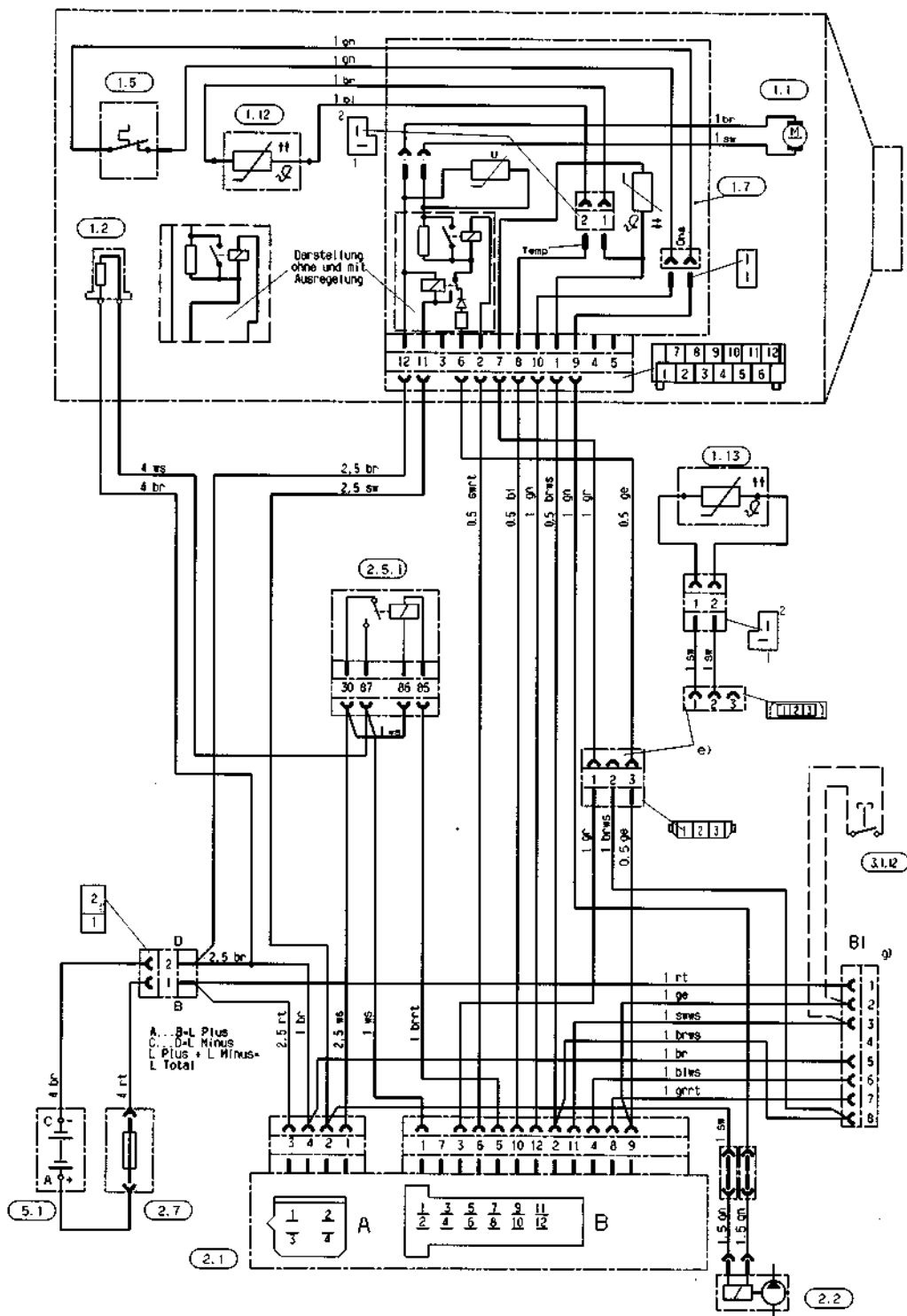
The sensor must not be fitted on uninsulated outer panels, and must be protected from draughts and direct sunlight. See wiring diagram for connection.



Temperature sensor

Important: ON/OFF regulation of the heating capacity using an additional room thermostat is not permitted, as it puts an unnecessarily high strain on the battery.

Wiring diagram



Parts List

- 1.1 Burner motor
- 1.2 Glow plug
- 1.5 Safety thermal cutout switch
- 1.7 PCB with controller temperature sensor, speed regulator and plug distributor
- 1.12 Flame monitor
- 1.13 Temperature sensor

- 2.1 Control unit
 - 2.2 Fuel metering pump
 - 2.5.1 Current regulator
 - 2.7 Main fuse (25 A)
- 3.1.12 Fault code enquiry (garage)
- 5.1 Battery

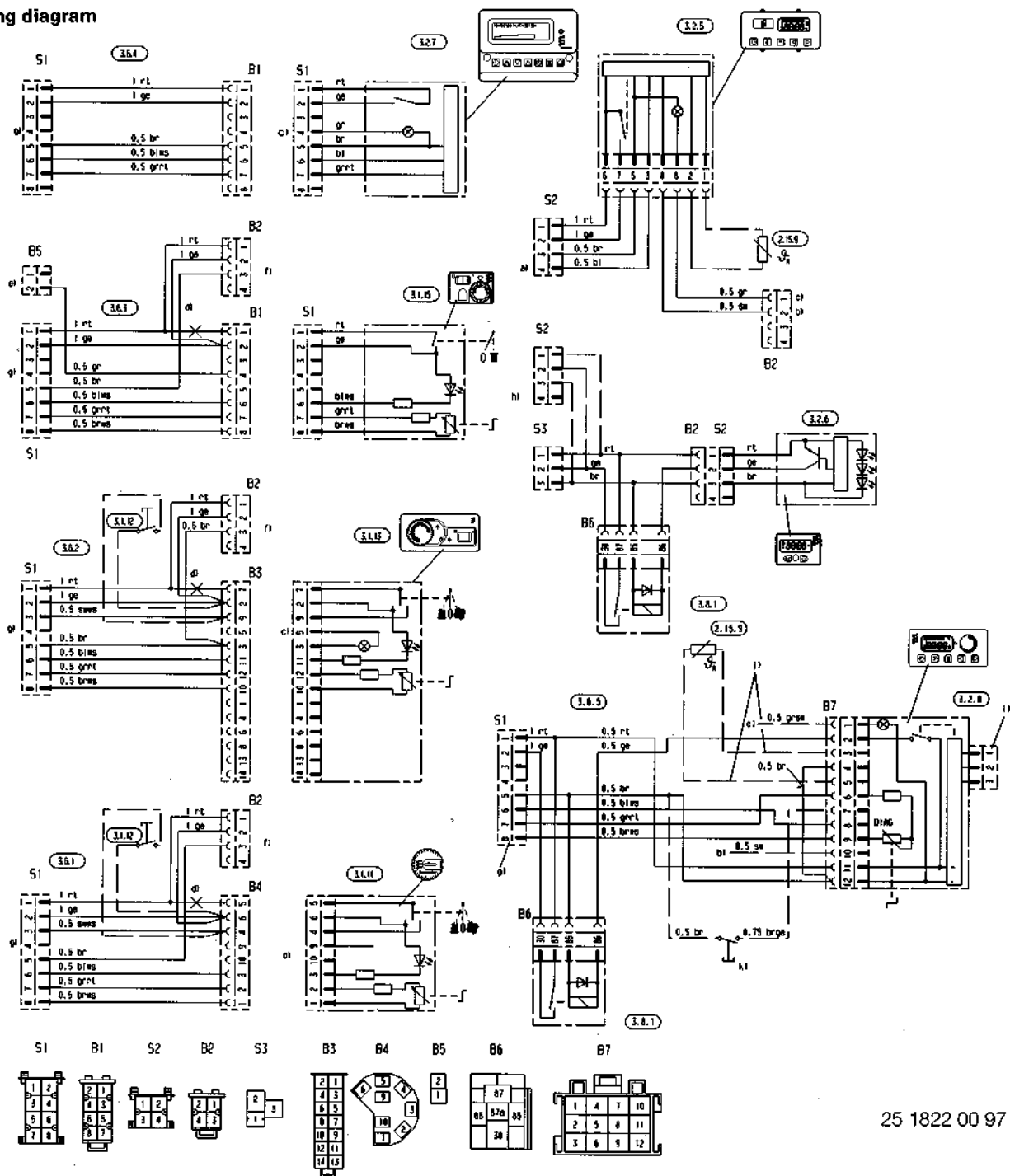
- e) to connect the temperature sensor, detach the receptacle housing provided and fit the receptacle housing of the temperature sensor instead.
- g) Connection control elements to heater

Plug housing and socket housing shown from the side where line enters.

25 1830 00 96 01



Wiring diagram



25 1822 00 97 01 F

Parts List

2.15.9 Sensor, outside temperature

- 3.1.11 Control device
- 3.1.12 Error code request (workshops)
- 3.1.13 Control device
- 3.1.14 Control device
- 3.2.5 Timer
- 3.2.6 Timer
- 3.2.7 Timer
- 3.2.8 Timer
- 3.6.1 Circuit winding for 3.1.11
- 3.6.2 Circuit winding for 3.1.13
- 3.6.3 Circuit winding for 3.1.14
- 3.6.4 Circuit winding for 3.2.7
- 3.6.5 Circuit winding for 3.2.8
- 3.8.1 Timer relay 12 V / 24 V

- a) Digital timer test (workshops)
- b) on terminal 15
- c) Lighting terminal 58
- d) For timer connection: open circuit here X
- e) When connecting the temperature sensor disconnect the existing connector sleeve housing and connect the temperature sensor connector sleeve housing.
- f) Connection facility for 3.2.5 or 3.2.6 or 3.2.7
- g) Connection for control elements on the heater unit
- h) Disconnect S3 and fit S2
- i) Radio module connection
- j) Sensor, outside temperature, connection
- k) Connection for external On/Off key

Connector and socket housings are shown from the circuit entry side.

Wiring colours

- | | |
|----|--------|
| sw | black |
| ws | white |
| rt | red |
| ge | yellow |
| gn | green |
| vi | violet |
| br | brown |
| gr | grey |
| bl | blue |
| li | illic |

Description of operation

Operating elements

1. **Actuating unit**
The actuating unit is essential for operation of the heater (see page 2 for Cat. No.)
2. **Heater timer**
A heater timer can be installed additionally to the actuating unit (see page 2 for Cat. No.).
With the heater timer, the heater can be switched on immediately or the switch-on time can be preset between 24 hours and 7 days depending on design.

Mode of operation

Sequence after switch-on

Switch-on: green pilot light in the actuating unit "ON".

After about 3 seconds: heating coil of glow plug "ON"
blower "ON" at full speed

After 33 – 70 seconds: fuel pump "ON"

Once a stable flame has been obtained, the glow plug is switched off.

To reach the operating temperature of the heat exchanger quickly, the heater is operated at an increased heating capacity of 5.5 kW after being switched on.

Once the heat exchanger operating temperature has been reached, the heating capacity is reduced to 4.8 kW.

The duration of heater operation with increased capacity depends on the ambient temperature.

Regulation in heating operation

Once the intake/room temperature (10°C to 30°C) has been reached at the actuating unit, the heater switches to the "LOW" setting and then continues to run at low blower motor speed.

If the heating capacity of 1.2 kW or 2.0 kW in the "LOW" control setting is insufficient, the heater switches to the "MEDIUM" setting. The blower continues to operate at low speed.

In most cases, the LOW/MEDIUM/HIGH settings at low speed will provide the required heat.

If the heating capacity in the "MEDIUM" setting is insufficient, the heater switches back to the "HIGH" setting. This entails full speed for the blower motor again. If in some cases even less heating capacity is needed than the heater supplies in the "LOW" setting, the heater switches to the "OFF" setting.

The heater continues to run after shutdown as normal followed by constant after-ventilation prior to restart (Only for recirculated-air operation).

Restart is in the "MEDIUM" setting at low blower motor speed.

When the heater is finally switched off, the green pilot light goes out and the blower continues to run until it cools down. This continued operation lasts about 4 – 5 minutes.

The flame is monitored by the flame sensor (7), the maximum permitted temperature by the safety thermal cutout switch (5). Both of them affect the control unit (20), which switches off the heater in the event of faults.

1. If the heater does not ignite within 90 seconds of the start of fuel pumping, starting is repeated as described. If the heater still does not ignite after a further 90 seconds, fault shutdown follows.
2. If the flame goes out by itself during operation, a restart follows first.
If the heater does not ignite within 90 seconds of fuel pumping being switched on, or it does ignite but then goes out within 10 minutes, fault shutdown follows.
The fault shutdown can be cancelled out by briefly switching the heater off and back on again.
3. In the event of overheating, the safety thermal cutout switch (5) reacts, the fuel supply is interrupted, and fault shutdown follows.
If overheating is the cause of a fault shutdown, the switch-on pilot light (green) in the actuating unit flashes steadily.
Further fault indicating signals can be obtained with additional equipment, or see the troubleshooting and repair instructions.
Once the cause of the overheat has been eliminated, the heater can be restarted by switching the heater off and back on again.
4. If the voltage drops below about 10.5 or 21 V, or rises above 15 or 30 V as the case may be, fault shutdown follows.
5. If the glow plug is defective and the electric line to the metering pump has a break, the heater will not start.
6. When the heater is started the functioning of the blower motor is checked once. If it does not start, the heater will undergo fault shutdown.
During operation, the blower motor is monitored in cycles (4 mins.). If the motor speed is below the permitted limit, fault shutdown follows.
7. When the heater is switched off, the glow plug is switched on during the delayed shutoff period for about 30 seconds (after-glow) in order to clean it of combustion residues.

Please note:

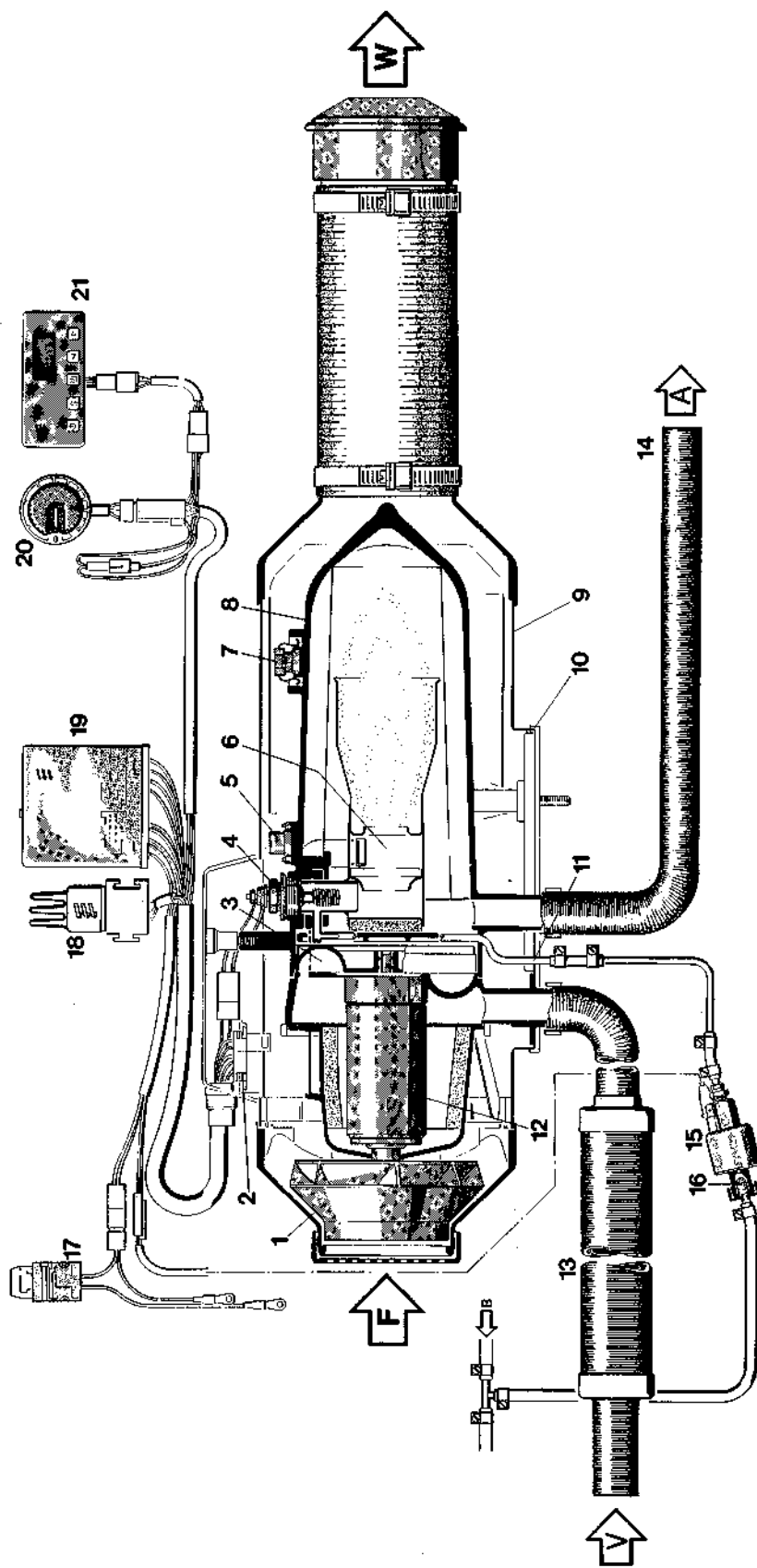
For electric welding work on the vehicle, the positive terminal of the battery must be disconnected and earthed in order to protect the control unit.

When testing the function of the heater, turn the operating unit right to the "High" setting.

The heater must not be positioned on the outlet hood or intake hood.

The heater must not be carried by its hoods.

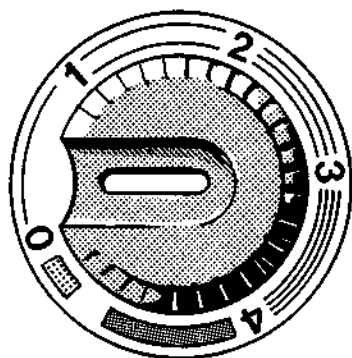
Sectional drawing D 5 L C



TEILELISTE

- | | | | | | | | | |
|---|-------------------------------------|----|--------------------------------|----|--------------------|---|---|----------------|
| 1 | Heating air blower wheel | 8 | Heat exchanger | 14 | Exhaust line | F | = | Fresh air |
| 2 | PCB with temperature control sensor | 9 | Outer casing | 15 | Fuel metering pump | V | = | Combustion air |
| 3 | Combustion air blower wheel | 10 | Flange seal | 16 | Fuel filter | B | = | Fuel |
| 4 | Glow plug | 11 | Fuel line | 17 | Main fuse, 25 A | W | = | Hot air |
| 5 | Safety thermal cutout switch | 12 | Blower motor | 18 | Current regulator | A | = | Exhaust |
| 6 | Combustion chamber | 13 | Combustion air intake silencer | 19 | Control unit | | | |
| 7 | Flame sensor | | | 20 | Actuating unit | | | |
| | | | | 21 | Heating timer | | | |

Operation with the actuating unit



- Blue field** = Ventilation
- 0** = Off – after switch-off automatic delayed shutoff for cooling down
- Red field** = Heating – turning to the right results in higher heat output
- Illuminated field in knob:**
- When vehicle lights are on – red display
 - In heating operation – green display (pilot light)
 - In the event of overheating: steady green flashing
 - Flashing signal: — — — — —

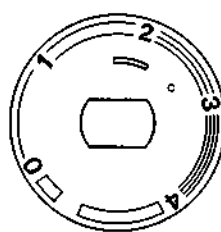
The actuating unit must be ordered separately, which comprises the On-Off switch with control feature for the heating capacity, a red light for illumination, and a green operating pilot light.

Two scale discs are supplied with the operating unit.

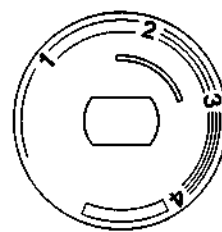
Scale disc 1 is fitted if operation is exclusively with the operating unit. The operating unit then serves as an On switch and temperature controller.

Scale disc 2 is fitted if a timer is used for actuation. Switch-on is then exclusively with the heater timer, and the temperature is selected with the rotary knob. See wiring diagram for connection.

Remove protective film before assembly.

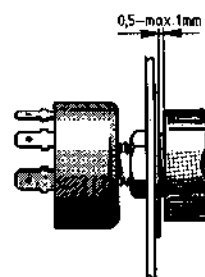


1

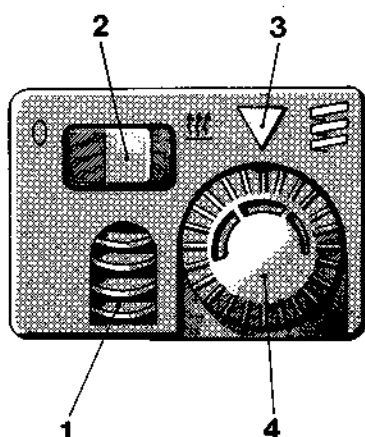


2

Permissible clearance for operating button
0,5 to max. 1 mm.



Minicontroller



- 1 Vent for temperature sensor
- 2 "On/Off" switch
- 3 Switch-on pilot light and reference arrow for the rotary knob
- 4 Rotary knob with marking for removal – the knob can be pulled off when in this position

Switching on the heater and setting the temperature

Set the required temperature using the knob – turn it clockwise for greater heating capacity.

Press the "On/Off" switch to the right. The heater starts and the green pilot light comes on.

Switching off the heater

Press the "On/Off" switch to the left.

The green pilot light goes off.

The heater starts a 3-minute continued operation period to cool it down before cutting out automatically.



Diagnostic signals

By fitting an additional unit (see wiring diagram for connection) further diagnostic signals can be called by pushing a button (1/2 to 2 secs.). Displayed by green LED.

	0	8	16 Sek.
Operation			
Warning over-/undervoltage ¹⁾			
Overvoltage cutout*	— — — — —	— — — — —	
Undervoltage cutout ¹⁾	— — — — —	— — — — —	
Glow ignition plug break*	— — — — —	— — — — —	
Burner motor not turning*			
Short circuit in changeover relay	— — — — —	— — — — —	
Mistaking flame recognition*	— — — — —	— — — — —	
Safety time exceeded ²⁾			
Non-start	— — — — —	— — — — —	
Overheat ³⁾	— — — — —	— — — — —	
Short-circuit in fuel metering pump*	— — — — —	— — — — —	
Temperature sensor defective*	— — — — —	— — — — —	
Flame sensor defective*	— — — — —	— — — — —	
Flame cutout at "Low" setting ²⁾ , Heater goes out by itself	— — — — —	— — — — —	
Flame cutout at "High" setting ²⁾ , Heater goes out by itself	— — — — —	— — — — —	
Control unit defective*	— — — — —	— — — — —	

With faults marked * consult the after-sales service.

¹⁾ Charge the battery at undervoltage.

²⁾ Switch off and back on again, but not more than twice.
Then consult the after-sales service.

³⁾ Remove cause of overheat (e. g. blocked heating air ducts). Switch off and back on again.