Air Heater V 7 S

Technical Description
Installation Instructions
Operating Instructions

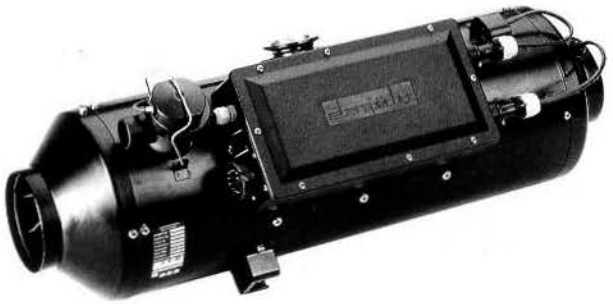
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Engine independent air heater
V 7 S for diesel fuel

Heater	Cat. No.
24 V	25 1728 00 00 00



Specifications (± 10 %)

Heating medium	Air
Hot air throughput without counterpressure, at rated voltage):	310 kg/h
Heating capacity[1]:	High 12000 W[3] Low 3000 W
Regulation of heating capacity:	High/Low
Fuel	Diesel EL fuel oil (commercial grade)
Fuel consumption	High 1.3 l/h Low 0.4 l/h
Rated voltage	24 V
Operating range:	A built-in undervoltage/ overvoltage safety device switches off the heater at around 14 V/28 V respectively.
Electric power consumption[1]:	
at start	360 W
in operation	High 115 W Low 125 W
Ventilation operation:	Possible
Degree of radio interference suppression[2]:	3, additional suppression measures possible
Weight	approx. 14 kg

[1] at rated voltage

[2] DIN VDE 0879/3

[3] 28 V, – 40 °C

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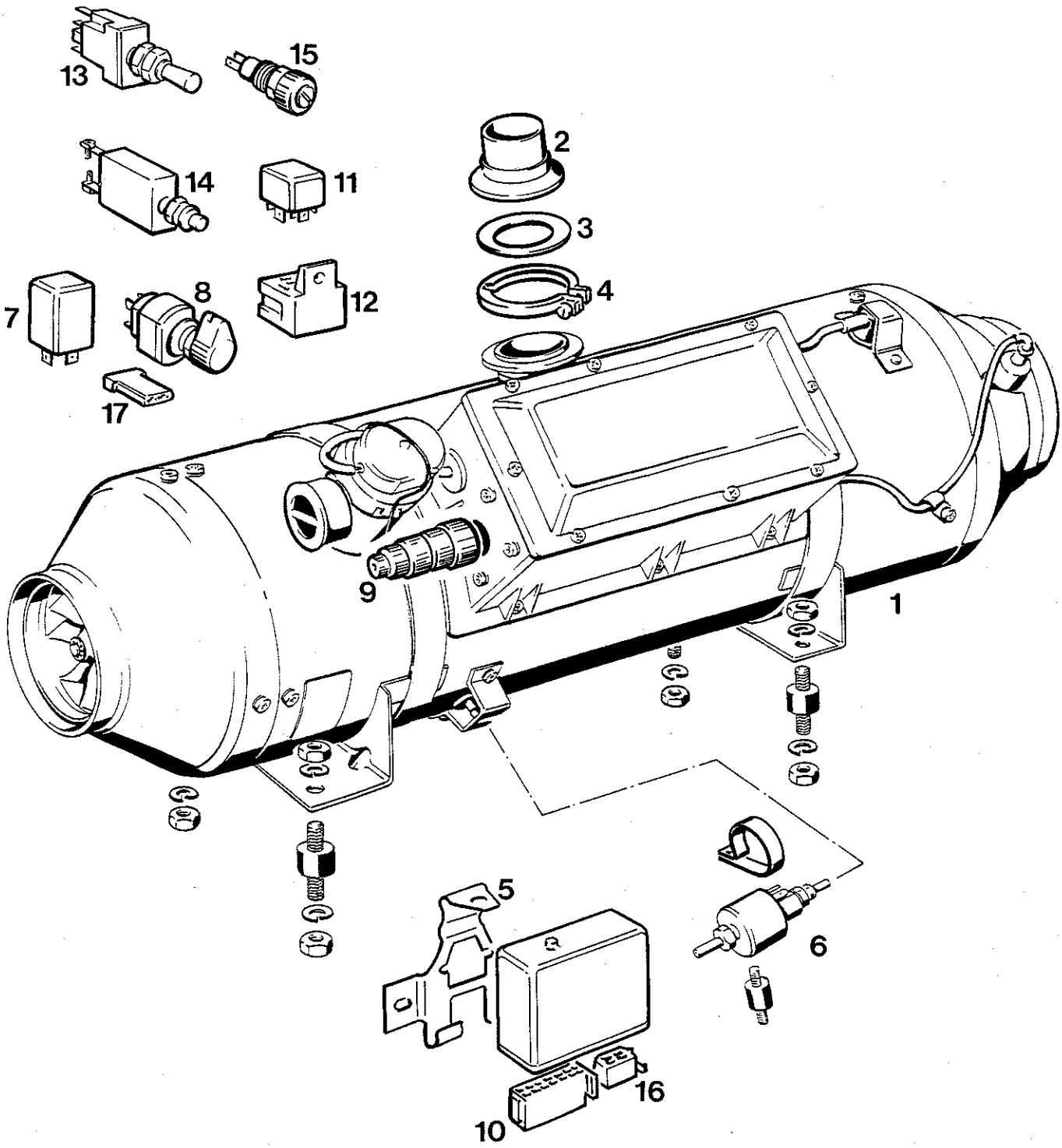
Range of products / Order number

Figure number	Designation	Order Number
–	heating unit V 7 S – 24 V	25 1728 00 00 00
consists of:		
1	pre-assembled basic heating unit V 7 S – 24 V	25 1728 05 00 00
2	pipe fitting	
3	seal	
4	clamp	
–	standard equipment	
consists of:		
5	control unit with support	
6	fuel dosing pump with support	
–	operating panel	
consists of:		
7	amplifier	
8	pre-set potentiometer	
9	pin casing, complete	
10	socket casing, complete	
11	relays	
12	plug, 5pin	
13	toggle switch	
14	automatic circuit breaker	
15	pilot indicator	
16	plug, 4pin	
17	plug, 3pin	
–	Mounting parts	

– Accessories for combustion and exhaust pipe refer to page 8 and 9.

For further additional parts see Additional Equipment Catalog.

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.

Airheater V 7 S ∿∿∿ S 130

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 (TÜV, 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.

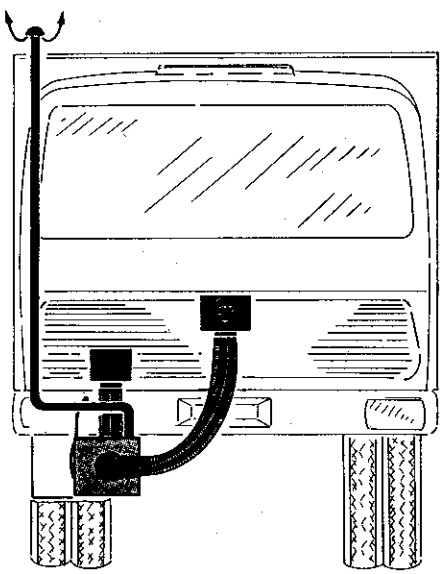
Damage to the actual heater or the heating installation must only be remedied by an authorised servicing workshop which will only use original spare parts.

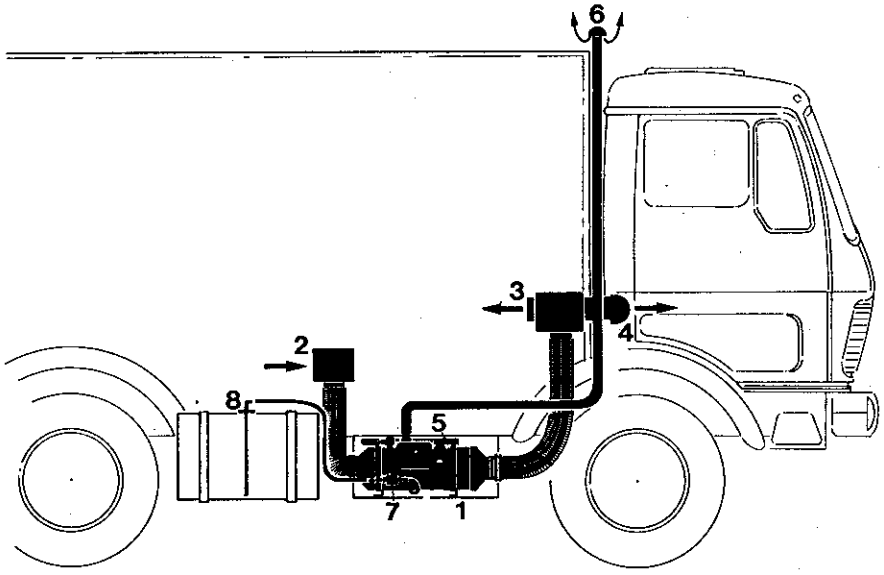
Installation instructions

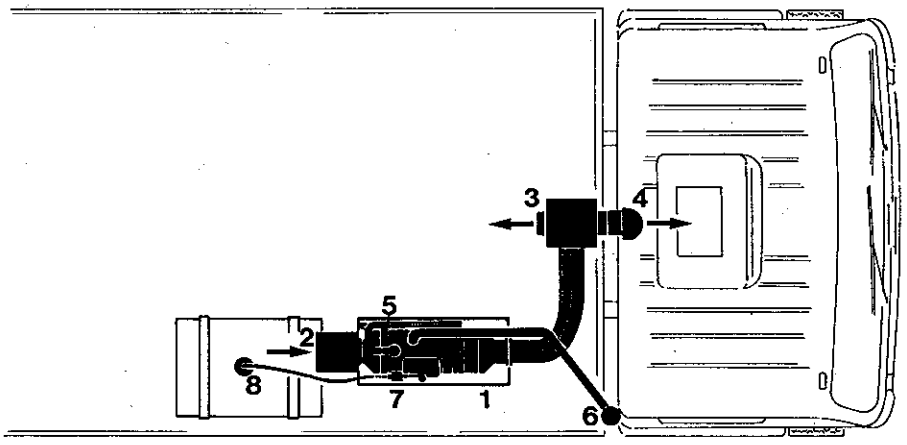
The V 7 S heaters from Eberspächer are diesel-fuelled air heaters for universal installation. They can be operated independently of the vehicle engine and also used for ventilation. Applications: large vehicles (cargo areas of trucks and buses).
Installation in areas used by people is not possible (see page 6 for exception to this rule).

The installation methods suggested in the installation instructions are only examples. Solutions other than those shown (for example as regards the selection of the installation position, routing of the air) are also permissible provided that they comply with StVZO regulations and if necessary following consultation with the manufacturer.

Typical installation







1 heating unit
2 hot-air inlet
3 hot-air outlet, body
4 hot-air outlet, cab
5 combustion pipe
6 exhaust pipe
7 fuel dosing pump
8 refuelling adapter

Installing the heater

Permissible installation positions:

The heater should be installed in the standard position as shown. Please consult the manufacturer if further differences are necessary.

During heating operation, a heater installed in the standard position may be tilted – due to the inclination of the vehicle during motion – up to ± 15° in both axes out of the standard position. Continuous heating operation after starting is possible at a divergence of up to ± 30° from the standard position, provided these changes in the operating position are only for brief periods. With inclinations exceeding ± 30°, heating operation is no longer possible.

Installation location in areas used by people:

In the case of installation in areas used by people in motor vehicles subject to StVZO regulations, the following points must be noted: installation of the V 7 S heater in areas used by people is not possible without special measures. If however there is nowhere else apart from these areas for installation, the heater can be installed inside a box sealed off from the area used by people. This box must be externally ventilated. Penetrations to the outside must be splash-waterproof.

An opening in the box on the vehicle interior side, to be opened solely for maintenance purposes, is permissible.

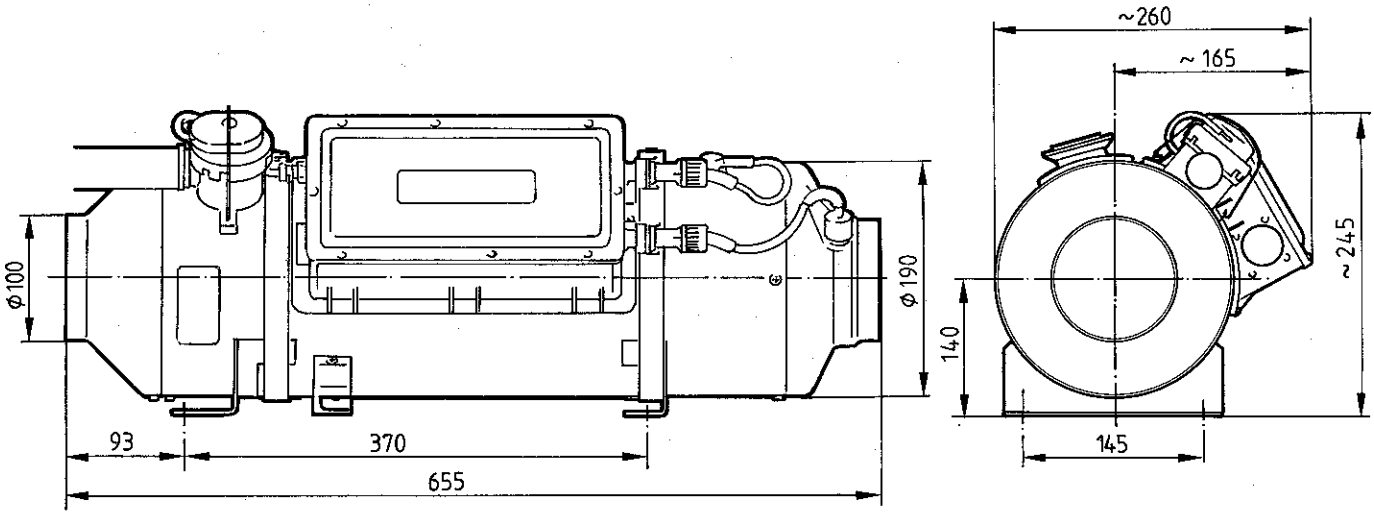
Installation of heaters inside the driver and passenger areas of buses (vehicles with a passenger capacity of more than 8) is not permissible.

If a bus has nowhere except the interior for installation of the heater, the vehicle bodywork must be modified so that the installation location for the heater is outside the vehicle and not inside. This can be achieved by a box permanently connected to the vehicle bodywork, ventilating to the outside and sealed off from the interior, and containing the heater.

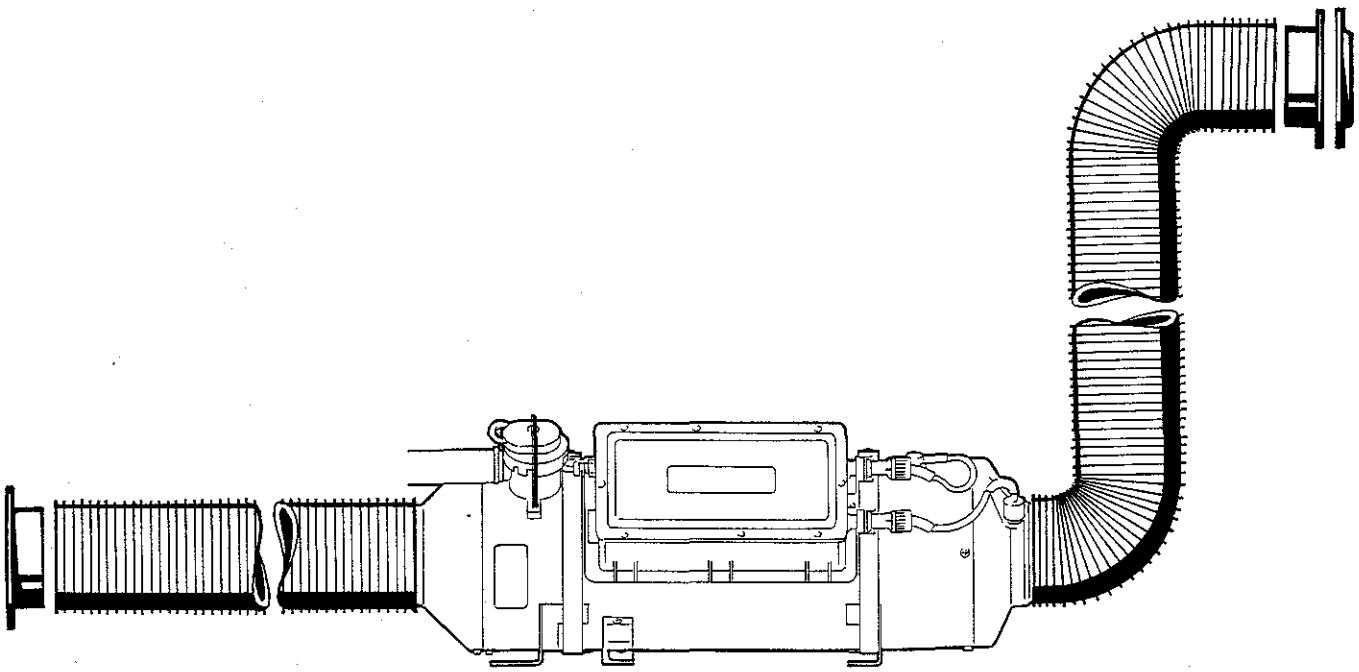
An opening in the box on the vehicle interior side, to be opened solely for maintenance purposes, is permissible.

The factory plate must be clearly visible even after installation. If necessary, a second factory plate (duplicate) with the same information as the original can be provided at a point on the heater clearly visible after installation, or on a cover for the heater. A second plate is not necessary when the original is visible by removal of a cover without the aid of tools.

Principal dimensions



Running the heating air



Heating air intake openings must be arranged such that intake of exhaust from the vehicle engine and from the heater need not be expected, and that the heating air cannot be polluted.

In the case of fresh-air operation (heating air intake from the outside), the intake should be as high up as possible, and not in the vicinity of the exhaust outlet from an area not subject to ram pressure or vacuum.

In the case of recirculating-air operation, position the recirculating air inlet such that the outflowing hot air cannot be sucked directly in again.

A heater has its maximum heating air throughput when it can blow freely. Parts through which the heating air has to flow reduce the heating air throughput, and the heating air temperature increases.

Combustion air supply

The combustion air must be sucked in from the outside (and not from the passenger area or luggage compartment).

Either the intake opening of the solenoid valve is used directly, or an extension hose is connected.

Do not install the intake opening of the combustion air line facing the slipstream, but run it such that it cannot be clogged with dirt and snow, and that any water which does enter can also flow out.

Either fit the end sleeve as supplied to the solenoid valve, or insert another end sleeve (additional part, Cat. No. 25 1480 89 04 00) into the combustion air hose and fasten it there. This ensures that a ball of 16 mm diameter cannot be inserted (requirement in "Technical Requirements for Heaters").

Running the exhaust

Exhaust lines must not project beyond the sides of the vehicle. They must be laid either with a slight slope or provided with 5 mm drain holes at their lowest points for draining off the condensate.

Arrange the exhaust outlet and the combustion air intake such that the exhaust cannot be sucked directly back inside.

The exhaust outlet must be on the outside. Exhaust lines must be laid such that penetration of exhaust into the vehicle interior or the intake of exhaust through the vehicle or heater blowers need not be expected[1], and that the operation of essential vehicle components is not impaired (ensure adequate clearance).

Do not install the outlet opening of the exhaust line facing the slipstream, but run it such it cannot be clogged by dirt and snow, and such that any water which does enter can also flow out.

Position and fasten the end sleeve. This ensures that a ball of 16 mm dia. cannot be inserted (a requirement in the "Technical Requirements for Heaters").

[1] This requirement can be considered met if the outlet opening of the exhaust line is positioned above, at the side of, or – if the exhaust is routed underneath the vehicle floor – near the side or rear of the cab or vehicle.

Combustion pipe / Exhaust pipe

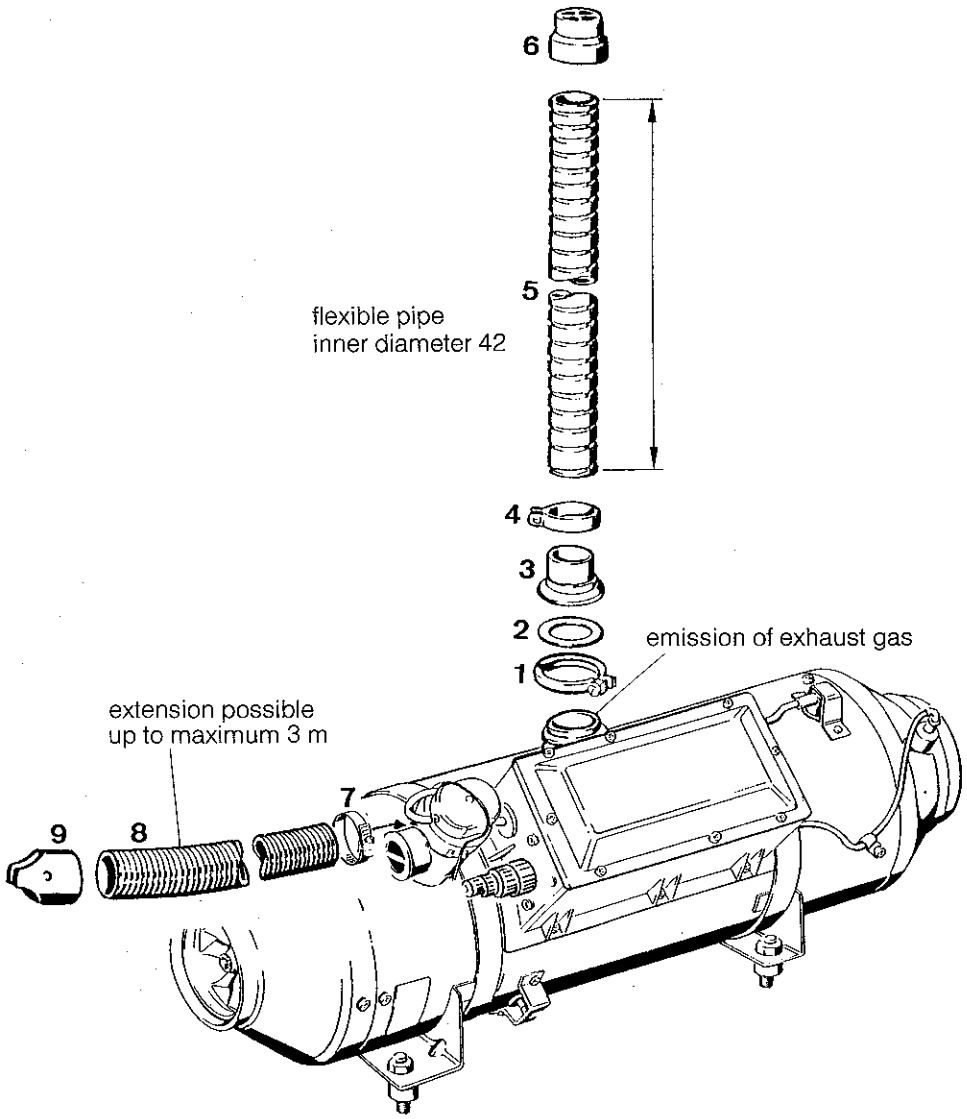


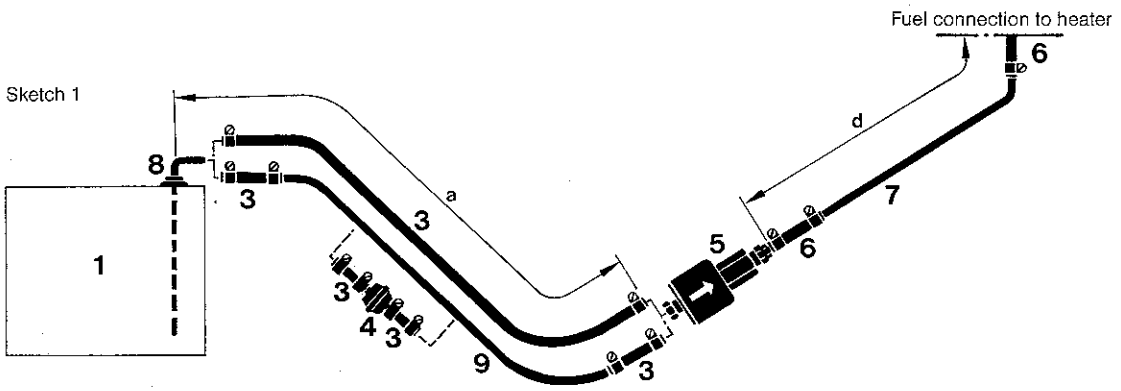
	Figure number	Designation	Order number
	1	clamp	
	2	seal	
	3	pipe socket	
	4	pipe clamp	152 10 062
	5	flexible AS, ws pipe inner diameter 42 mm	360 61 381
additional parts	6	end bush	20 1000 70 02 00
	7	tube clamp	10 2067 03 20 50
	8	flexible combustion pipe	10 2114 25 00 00
	9	end fitting	25 1480 89 04 00

Fuel supply

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

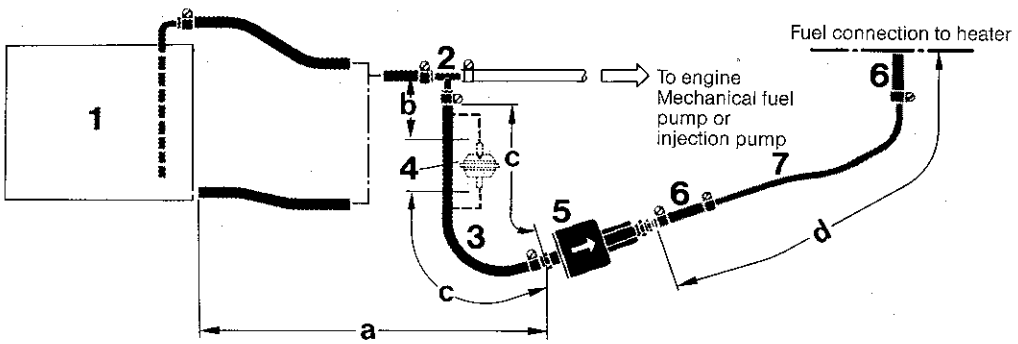
1. **Fuel is tapped from the vehicle fuel tank or separate tank preferably with a separate riser pipe (tank connection) as shown in sketch 1.**

Sketch 1



2. **In the event of difficulties in fitting the riser pipe, the supply line can be tapped according to sketch 2.**

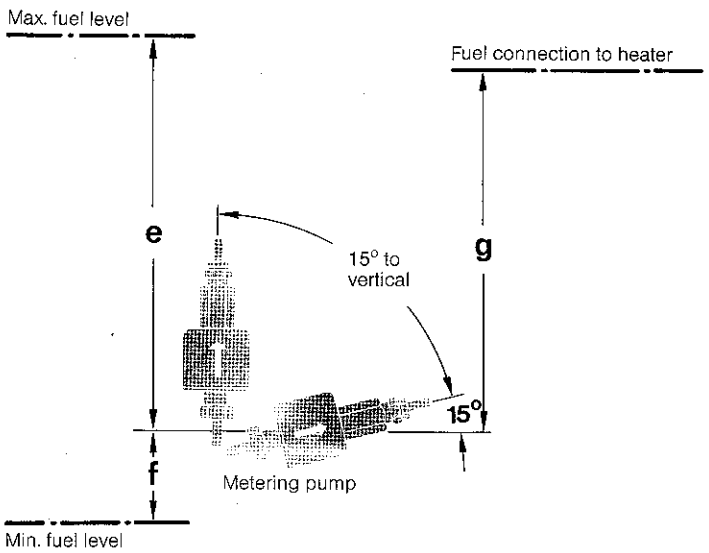
Sketch 2



Dimension a = max. 2000 mm with diesel
Dimension b = 50 mm
Dimension c = max. 300 mm
Dimension d = max. 6 m with diesel

1 Fuel tank (vehicle fuel 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 if contaminated fuel is used)
Cat. No. 25 1226 89 00 37
5 Fuel metering pump (15° to vertical, inclined upwards)
6 Fuel hose, internal dia. 3.5 mm
Cat. No. 360 75 300
7 Fuel pipe, plastic, internal dia. 2 mm
Cat. No. 090 31 117
8 Riser pipe (tank connection) internal dia. 4 mm,
Cat. No. 25 1156 30 00 00
9 Fuel pipe, internal dia. 4 mm
Cat. No. 049 10 030 steel
080 16 001 copper
090 31 101 plastic

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



Supply pressure from tank to metering pump:
e = max. 1000 mm

Suction head: with zero tank pressure:
f = max. 750 mm

Check whether the tank vent is OK.

When tapping fuel from the tank in which a vacuum is generated during operation (valve 0.03 bars in tank cap):
f = max. 400 mm for diesel

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

Fuel line from metering pump to heater should be laid without a slope if at all possible.

4. Important!

Protect the fuel line, the filter and the metering pump from excessive heat, and do not fit them near silencers and exhaust pipes.

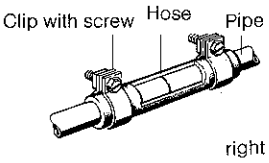
When laying the fuel line, the fuel filter and the fuel metering pump near the rear axle, make allowance for the spring travel of the latter.

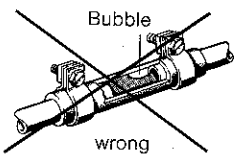
Only use a sharp knife to cut fuel hoses and pipes to length. The cuts may not be indented, and must be burr-free.

To connect the fuel branches, always use a rubber hose, never plastic tubing.

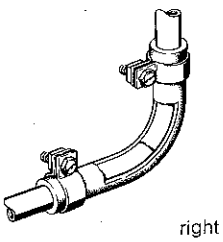
Sections 45 and 46 of StVZO also apply, with due alteration of details, for fuel lines and additional fuel tanks of heaters.

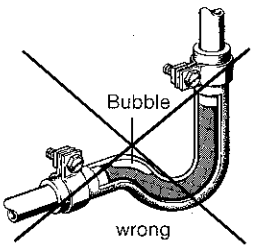
Connections of fuel pipes with a fuel hose. Fit the fuel pipe flush.





Heat and bend the plastic pipe.





Fuel quality at low temperatures

The heater can handle without problem the same commercially available fuel you use for your engine. Used oil must not be admixed.

The refineries automatically adapt their fuels to normal winter temperatures (winter diesel fuel). Difficulties can therefore only arise at extremely low temperatures (as in the engine – see the vehicle's instruction manual).

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

If there is no special diesel fuel available for low temperatures, mix in kerosine or gasoline in accordance with the following table.

Temperature	Winter diesel fuel	Additive
0° C to –25° C	100%	–
–25° C to –40° C	50%	50% kerosine or gasoline*

* or special cold-weather diesel fuels

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

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

Electrics:

Electrical lines and switching and control equipment must be arranged inside the vehicle so that their correct functioning is not impaired under normal operating conditions.

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

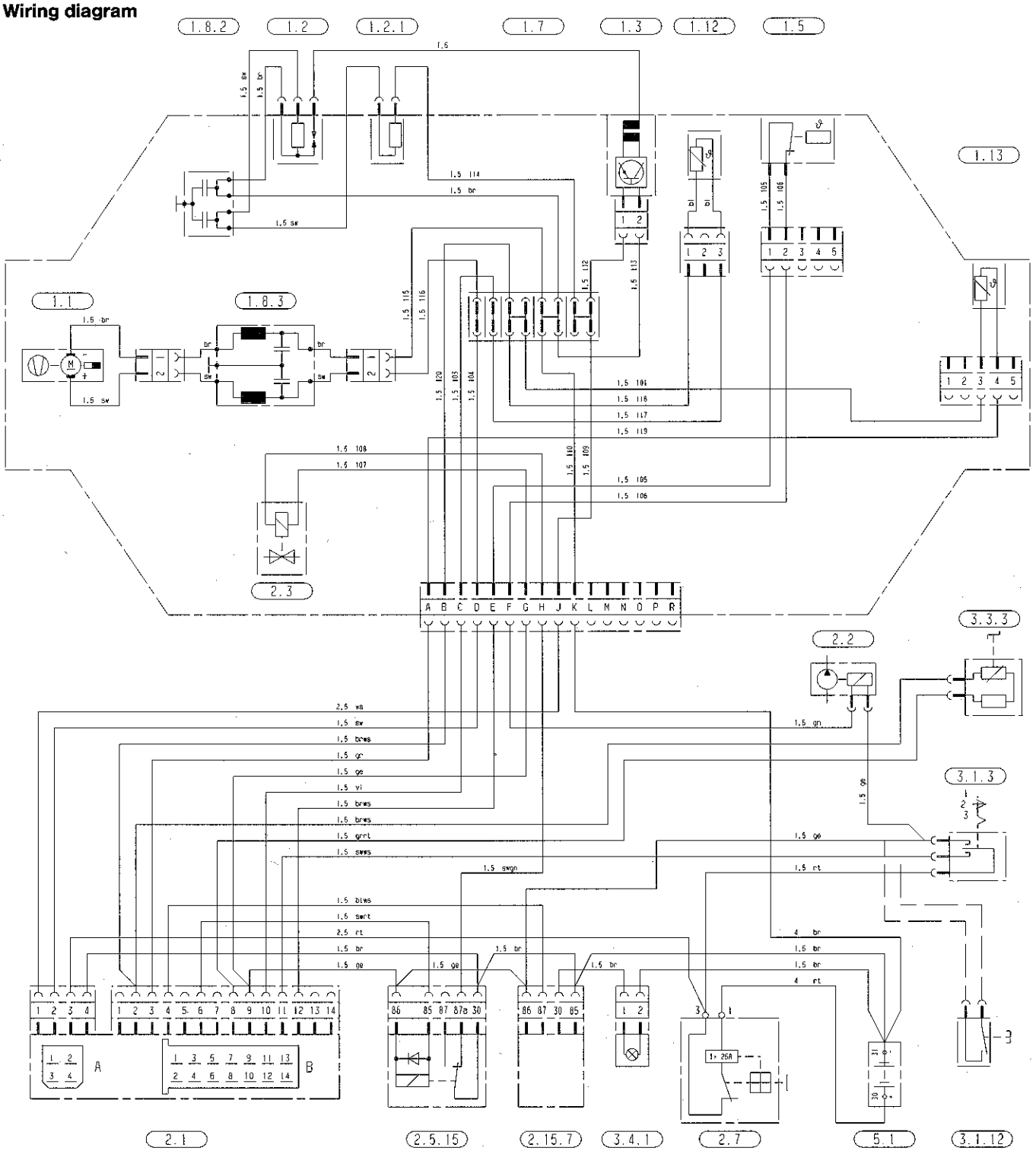
The following line cross-sections must be maintained between the battery and the heater in order not to exceed the maximum permissible voltage loss of 0.5 V with 12 V rated voltage and 1 V with 24 V rated voltage in the lines.

$L^+ + L^- < 5\,m \rightarrow$ cross-section 4 mm^2
L^+ L^- 5 to 8 m → cross-section 6 mm^2

If the connection of the positive line is made at the fuse box (e.g. terminal 30), the vehicle's own line from the battery to the fuse box must be allowed for in the calculation of the overall line length, and if necessary redimensioned in accordance with the above information.

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

Wiring diagram



List of parts

1.1	engine
1.2	glow plug
1.2.1	resistor for glow plug
1.3	ignition coil
1.5	overheat switch
1.6.2	anti-interference condensor
1.6.3	anti-interference filter
1.6.5	varisator
1.7	Distributor
1.12	flame sensor
1.13	temperature sensor
2.1	control unit
2.2	fuel dosing pump
2.3	solenoid valve (for combustion air)
2.5.15	relay for solenoid valve
2.7	fuse 30 A
2.15.7	Amplifier
3.1.3	switch for heating - off - venting
3.1.12	disturbance code sensor
3.3.3	potentiometer
3.4.1	Operation pilot light
5.1	battery

25 1728 00 96 02 B

Technical Description

Venting

By switching to the "Venting" position, only the heater fan will be activated. This conveys fresh air into the space to be vented

Heating

Procedure after turning on

Switching on:	Green pilot lamp on operating panel "On" Glow plug "On" (A time relay prevents the voltage at the glow plug from exceeding the permissible tolerance.) Ventilator with full speed "On"
Approximately 25 sec. later:	Fuel dosing pump "On". Conveying of fuel quantity for heat flow "High"

Once the flame has stabilised the glow plug switches off after a time-lag approximately 10 seconds. The heating unit continues with an extensive forced heat flow for about 30 seconds. Now the control of heat flow can be started.

Controlling of heat flow

During the heating process the required heat flow can be adjusted infinitely by a control button on the temperature control.
The heating unit has two ranges. In the "Low" position the fuel dosage pump operates at a low frequency and uses a small quantity of fuel. The solenoid combustion valve is switched to "Low".

In the position "High" the fuel dosage pump operates at a high frequency and the combustion valve is switched to "High". It is ensured, that at an equal fan speed in both positions the correct mixture of fuel and air is being formed.

The heating unit can be switched in different intervals from "High" to "Low" and vice versa, depending on the heat requirements (outside temperature) and by positioning of the control button (desired venting temperature). The duration of intervals, while the heater is operating at "High" or "Low", is derived from the actual venting temperature, measured by a temperature sensor at the venting outlet and the desired venting temperature in accordance with the positioning of the control button.

Switching off

When the heating unit is finally switched off, the green pilot lamp goes out. The lag of the venting motor follows for cooling. The lag stops automatically after 3 minutes.

Controls and safety equipment

The flame is monitored by the flame sensor (7), and the max. permissible temperature by the safety thermal cutout switch (5). Both affect the control unit, which shuts down the heater in the event of faults.

1. If the heater fails to ignite within 90 seconds of the start of fuel pumping, starting is repeated as described.
   If the heater still fails to ignite after 90 seconds of fuel pumping, fault shutdown takes place.

2. If the flame goes out, spontaneously during operation, a restart is first attempted.
   If the heater fails to ignite within 90 seconds of fuel pumping being switched on, or if it does ignite but goes out again within 10 minutes, fault shutdown follows.
   The heater can be reset by switching it off and then back on again.

3. In the event of overheating, the safety thermal cutout switch (5) is operated, the fuel supply is interrupted, and fault shutdown follows.
   If the fault shutdown is due to overheating, the switch-on pilot light (green) in the operating device flashes steadily.
   Further fault indicating signals can be enquired with additional equipment, or refer to the Troubleshooting and Repair Manual. Once the cause of the overheat has been removed, the heater can be restarted by switching it off and then back on again.

4. If the voltage drops below 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 cable to the metering pump is interrupted, the heater will not start.

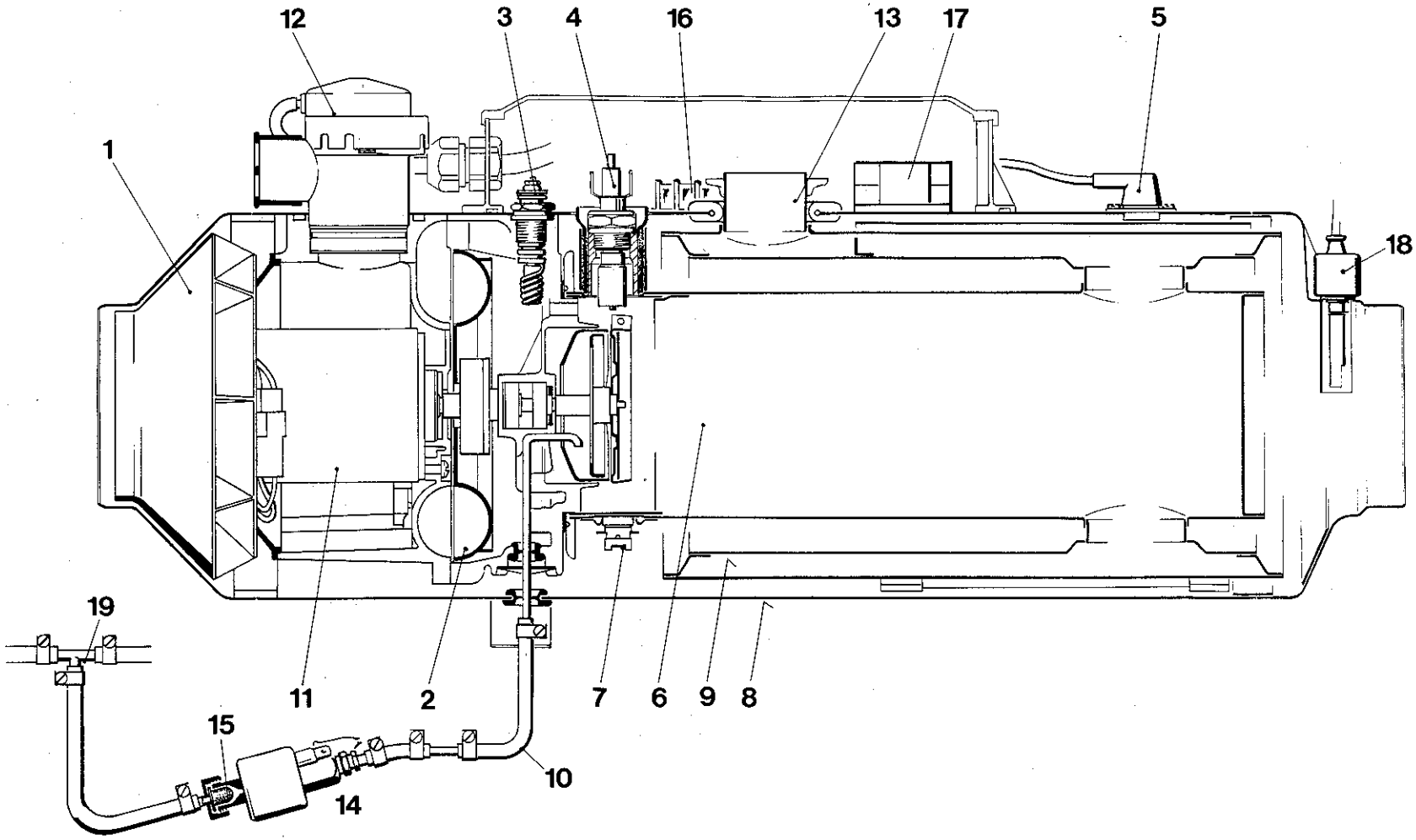
6. When the heater starts, the operation of the blower motor is checked once. If it does not start, the heater reacts as for fault.

   During operation, the blower motor ist monitored in cycles (4 mins.). If the motor speed is below the allowed limit, fault shutdown follows.

Please note:

When carrying out electric welding work on the vehicle, disconnect the positive terminal from the battery and earth it in order to protect the control unit.

When checking the operation of the heater, turn the operating unit right up to the "High" setting.



List of parts

1 wheel of heat fan
2 wheel of combustion fan
3 protective resistor
4 glow plug
5 overheating switch
6 combustion chamber
7 flame sensor
8 outer casing
9 heat exchanger
10 fuel pipe
11 venting motor
12 solenoid combustion valve
13 exhaust pipe
14 fuel dosing pump
15 fuel sieve
16 plug strip
17 ignition coil
18 temperature sensor
19 fuel branch piece

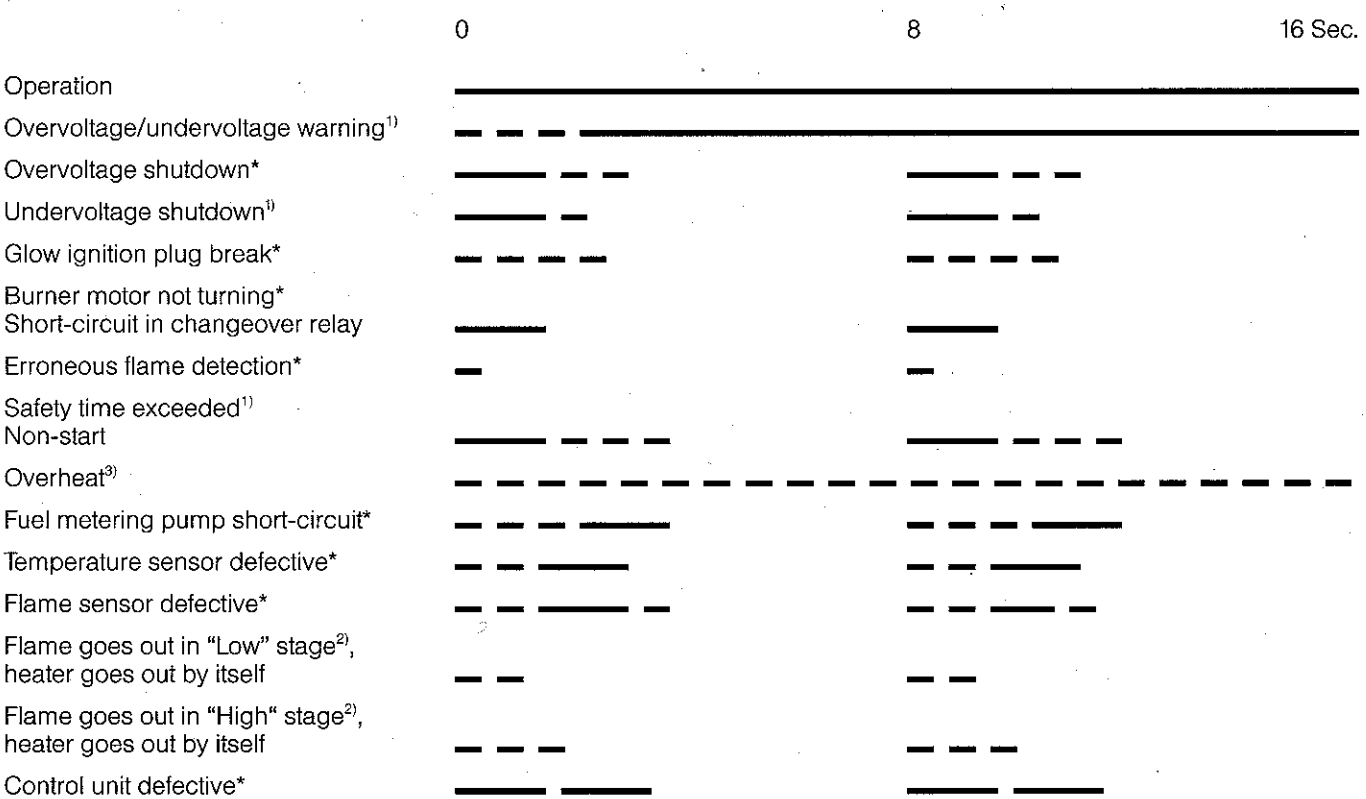
Operation

Venting:	Switch button to "Venting" position.
Heating:	Switch button into "Heating" position.
Off:	Button into middle position. Automatic lag for cooling after switching off.
Adjustment of venting temperature:	Turning the control button to the right results in a higher venting temperature. During heating – green indicator (pilot lamp) In the case of overheating: even green flashing flash signal: ▬ ▬ ▬ ▬ ▬ ▬
Out of reputation:	Switch on and off again. Not more than two times. Check fuses. Contact service technician.
Overheating:	Remove causes (for example blocked heating pipes). Switch on and off again.

Attention:
The heater must be switched off while refuelling.
The heater may not be used inside a garage.

Diagnostic signals

By fitting an additional device (see wiring diagram for connection), further diagnostic signals can be enquired by pressing a button (1/2 to 5 secs.). Display is green LED.



When problems marked * are encountered, call in a service center

1) Charge the battery in the case of undervoltage
2 Switch off and then back on, not more than twice. Then call in a service center.

3) Remove cause of overheating (e.g. clogged heating air ducts). Switch off and back on.