

Air Heater D8LC



Technical Description
Installation Instructions
Operating Instructions

Eberspächer®

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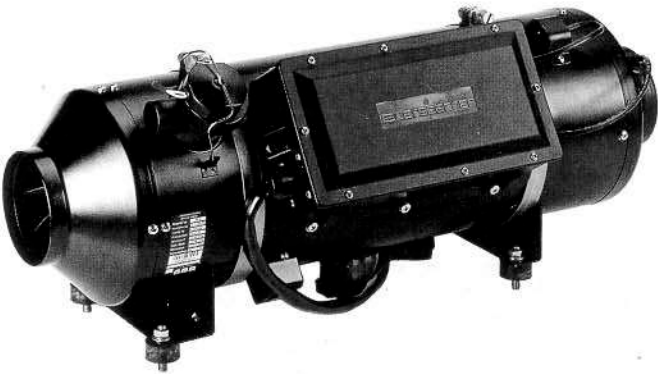
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Engine-independent air heater
D8LC for diesel fuel

Heater

Cat. No.

12 V	25 1890 00 00 00
24 V	25 1891 00 00 00



Specifications

Heating medium:	Air
Hot air throughput without counterpressure, at rated voltage):	310 kg/h \pm 10 %
Heating capacity ¹⁾ :	High 8000 W \pm 10 % Low 3500 W \pm 10 %
Regulation of heating capacity:	High/Low/Off
Fuel	Diesel EL fuel oil (commercial grade)
Fuel consumption	High 1.05 l/h \pm 10 % Low 0.4 l/h \pm 10 %
Rated voltage	12 V or 24 V

Operating range:

A built-in undervoltage/
overvoltage safety device
switches off the heater
at around 10 V/20 V and
14 V/28 V respectively.

Electric power consumption ¹⁾ :	
at start (approx. 50 secs.)	335 W \pm 10%
in operation	115 W \pm 10%
Ventilation operation:	Possible
Degree of radio interference suppression:	3, additional suppression measures possible
Weight	approx. 20 kg

¹⁾ at rated voltage

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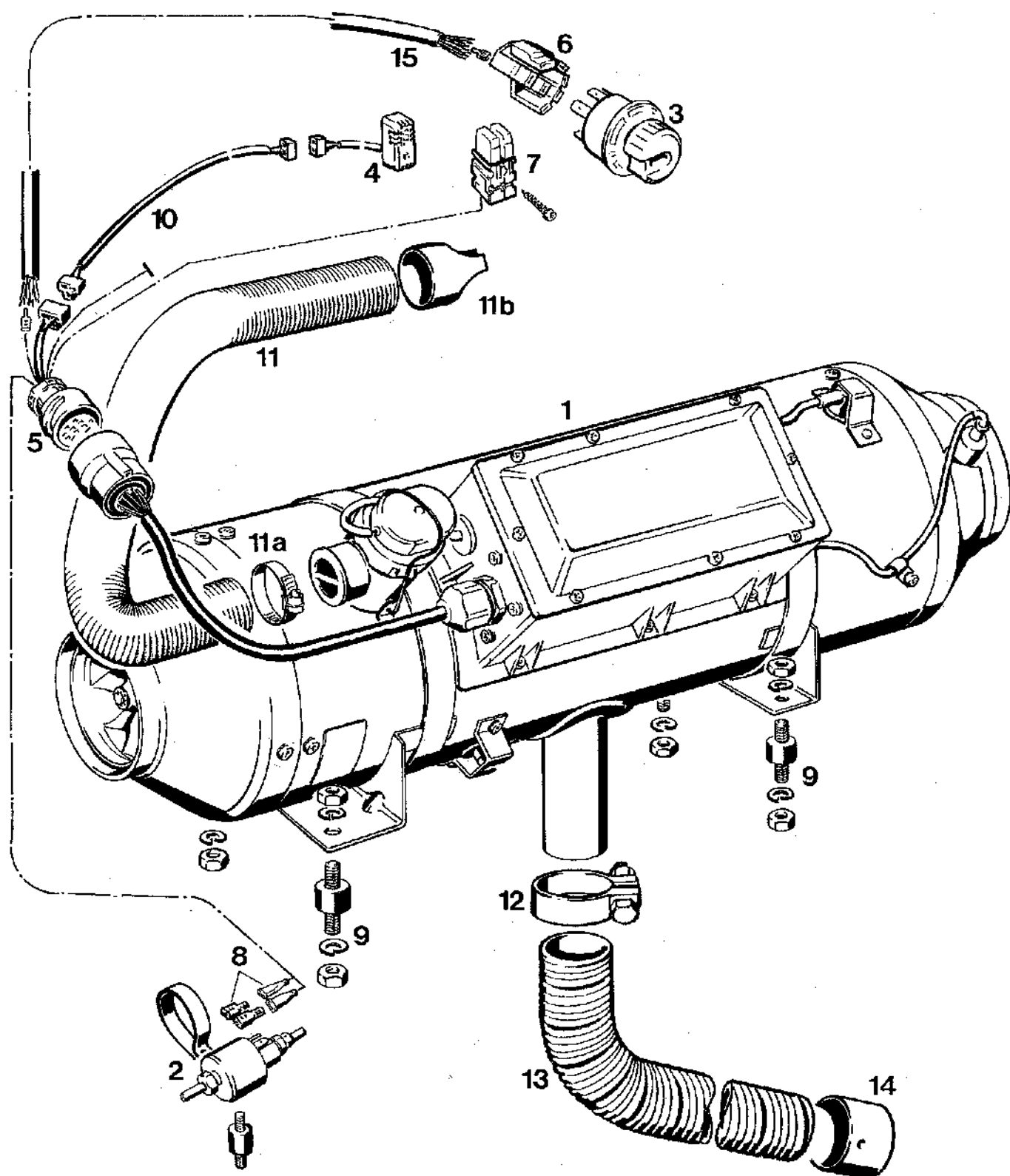
Scope of delivery

Item	Designation	Cat. No.
1	Heater D 8 LC – 12 V	25 1890 00 00 00
	D 8 LC – 24 V	25 1891 00 00 00
containing		
1	Preassembled basic heater	
	D 8 LC 12 V	25 1890 05 00 00
	D 8 LC 24 V	25 1891 05 00 00
–	Standard equipment includes	
2	Fuel metering pump with built-in fuel filter	
	and holder	
3	Control device	
4	Temperature sensor, external	
5	Power line with connecting parts	
6	Receptacle housing with connecting parts	
7	Blade-type fuse with fuse carrier	
8	2 receptacles with cable bushings	
9	4 rubber-metal buffers with fastening parts	
can be ordered separately		
10	Power line temperature	
	sensor	25 1482 89 40 00
11	Combustion air hose	10 2114 25 00 00
11a	Hose clip	10 2064 03 20 50
11b	End socket	25 1480 89 04 00
12	Hose clip for exhaust pipe	152 10 074
13	Flexible exhaust hose	360 61 381
14	End socket	22 1000 40 02 02
15	Power line	available soon
	Yard ware (control device)	

For further additional parts see Additional
Equipment Catalog.



Scope of delivery



Type approval, official regulations, general instructions

1. The heaters have been approved by the German authorities for vehicles subject to the provisions of the German road traffic regulations (StVZO), and provided with an official test mark (WS259) on the factory plate. The installation requirements entailed in the approval procedure are set forth in the appropriate sections of the operating instructions.

Furthermore:

The year of commissioning must be durably entered on the factory plate. The factory has three year-figures printed on the appropriate part of the plate. The valid year must be identified by removing (scraping off or dissolving) the other two years.

The heat exchanger is usable for 10 years in accordance with the provisions of StVZO, and must then be replaced with an original part by the manufacturer or one of his authorised service centers. The operator is responsible for seeing that this is done. The heater must then be provided with an undetachable plate stating the date of sale of the heat exchanger and the words "Original spare part".

If the heater has been retrofitted, the vehicle owner must apply to the responsible administrative authority for a new operating permit (entry in vehicle papers) in accordance with StVZO regulations, submitting a report by an officially recognised expert or tester for motor vehicle traffic. In the case of installation in special vehicles (for example vehicles for transporting dangerous substances), the regulations governing such vehicles shall be complied with.

2. In the case of vehicles not subject to StVZO regulations (for example ships), the special installation instructions applying shall be complied with, as well as — where necessary — special regulations.
3. The heater must not be operated in closed areas, for example garages. The heater must always be switched off before the fuel tank is filled.
4. The heaters must be installed by a specialised garage approved by the manufacturer and in accordance with the installation instructions.
5. The heaters may only be used for the purpose stated by the manufacturer, in compliance with the operating instructions supplied with every heater. The heaters must not be operated where inflammable vapour or dust can build up (for example near fuel, coal, sawdust, grain stores or the like).

6. The installation methods suggested in the installation instructions are only examples. Other installation positions are also permissible, provided that they meet general installation requirements, and if necessary following consultation with the manufacturer. Otherwise, any divergences from the installation instructions, particularly with regard to the wiring (wiring diagrams), fuel supply, combustion air and exhaust routing, and the use of operating and control elements from other manufacturers, shall not be permissible without written approval by the manufacturer. If this is not obtained, all warranty coverage by the manufacturer for the entire heating system shall be invalidated, as well as the general certification of the vehicle.

7. Every combustion process generates waste gas containing toxic substances. For that reason, and in view of the high temperatures occurring, the exhaust piping must in any event be routed in accordance with the installation instructions. In the event of non-compliance or operation of the heater in closed areas (garages), there is a risk of poisoning.

8. In the event of damage to the heater or to the heating system installation, an authorised service center must be called in for proper rectification of the damage using genuine spare parts. Makeshift repairs (on the user's own initiative) or the use of spare parts not supplied by the manufacturer are dangerous, and for that reason not permissible. If installed in motor vehicles, they entail invalidation of the general approval for the heater and hence of the general certification of the vehicle.

9. The warranty conditions are set forth in the heater log-book, which is issued by the service center when the heater is installed. Only our warranty conditions shall apply.

10. Further installation information (e.g. for boats and ships) is available on request from the manufacturer.

Factory plate

The factory plate is attached to the basic heater.

Safety instructions

A trial run of the heater should be performed before the heating period commences. The heater must be switched off if dense smoke is persistently formed and closed down by removing the safety device. The heater should only be operated again after it has been inspected by trained Eberspächer servicing personnel. Observance of these operating instructions is a precondition for liability claims.

Non-observance of the technical description, mounting and operating instructions, as well as unprofessional repairs or the use of non-original spare parts, exclude any liability on the part of Eberspächer.



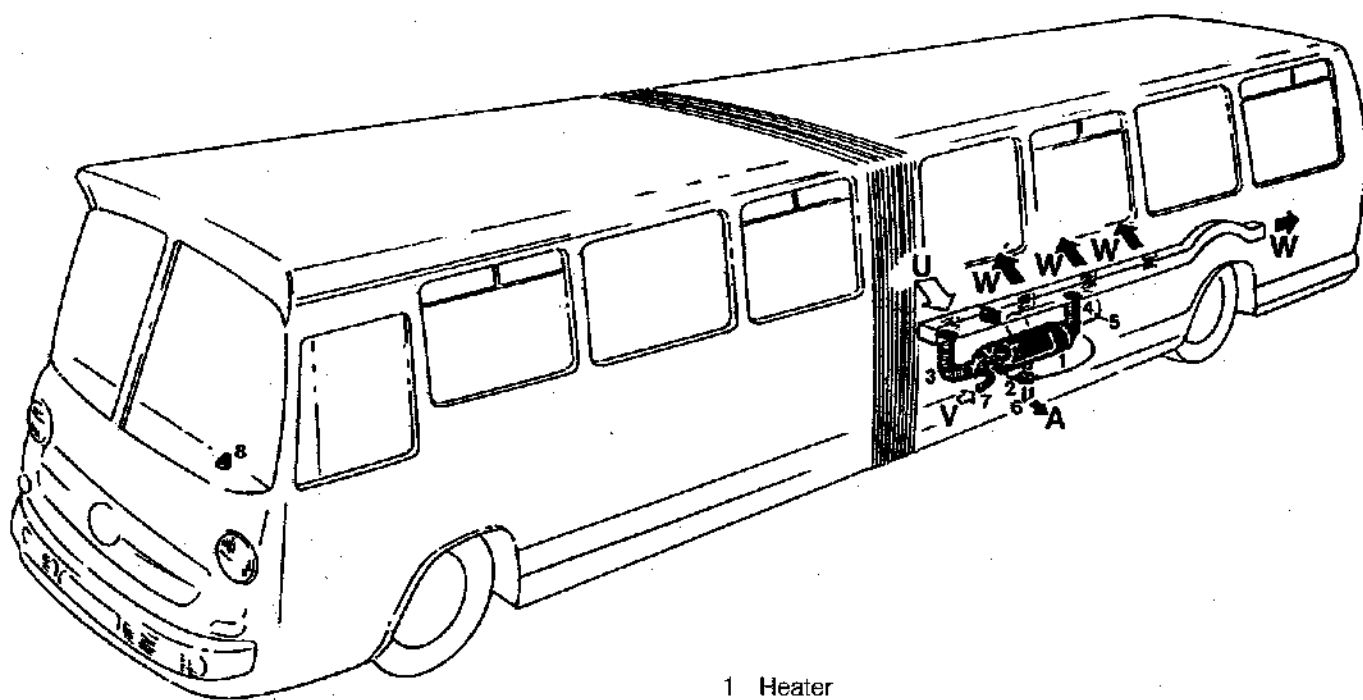
Installation instructions

The D8LC 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 / circulated air routing – BUS



- 1 Heater
- 2 Fuel metering pump
- 3 Heating air intake
- 4 Hot air outlet
- 5 Fuel tank
- 6 Exhaust pipe
- 7 Combustion air pipe
- 8 Operating device

U = Recirculating air

W = Hot air

A = Exhaust

V = Combustion air

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 $\pm 15^\circ$ in both axes out of the standard position. Continuous heating operation after starting is possible at a divergence of up to $\pm 30^\circ$ from the standard position, provided these changes in the operating position are only for brief periods. With inclinations exceeding $\pm 30^\circ$, 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 D8LC 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.

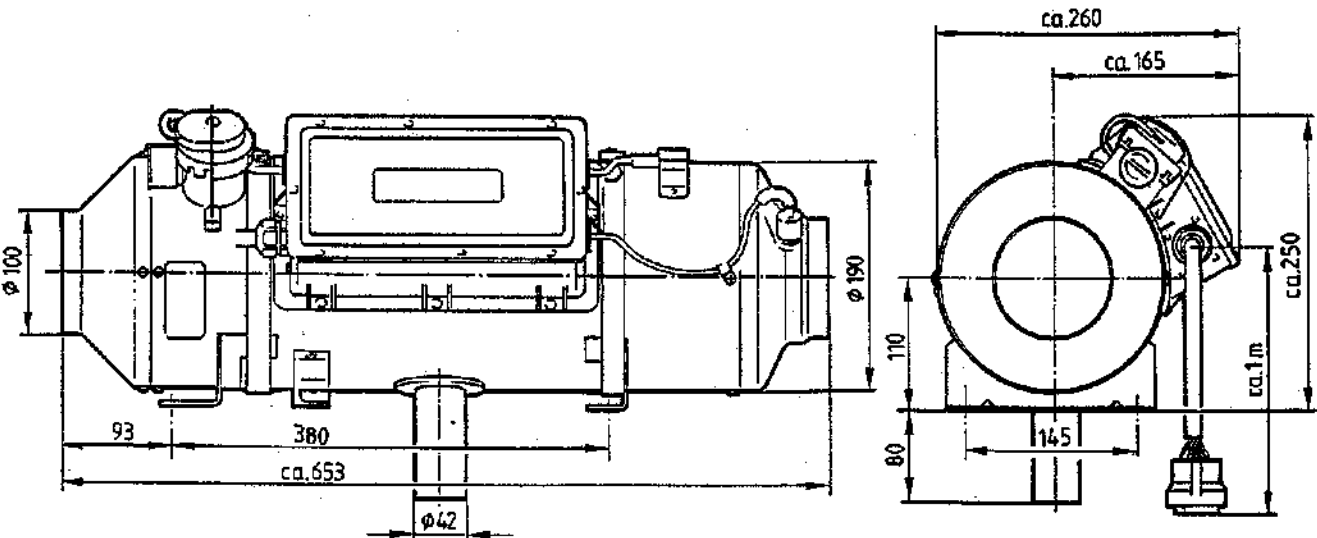
Installation of heaters inside the driver and passenger areas of buses (vehicles with a passenger capacity of more than 8) is not permissible.

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.

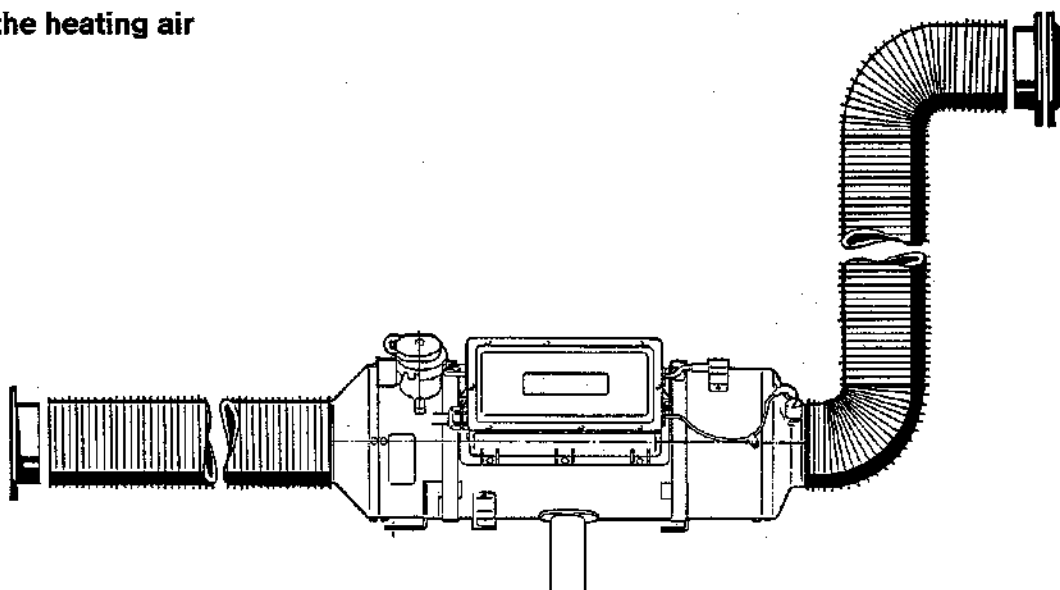
An opening in the box on the vehicle interior side, to be opened solely for maintenance purposes, is permissible.

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.

At about 125°C heating air temperature, the heater switches to "Low".

With long hot air lines, the temperature at the inside of the tube walls can increase up to 150 °C. Please take into consideration when selecting the tube material.

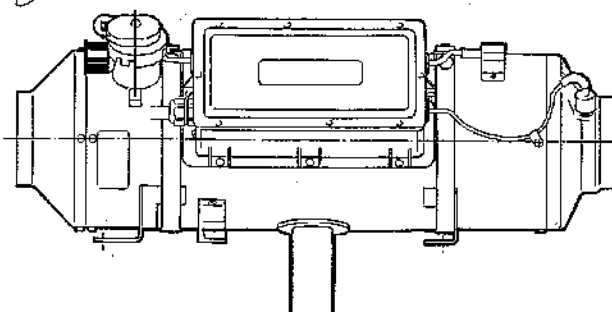
Combustion air supply

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.

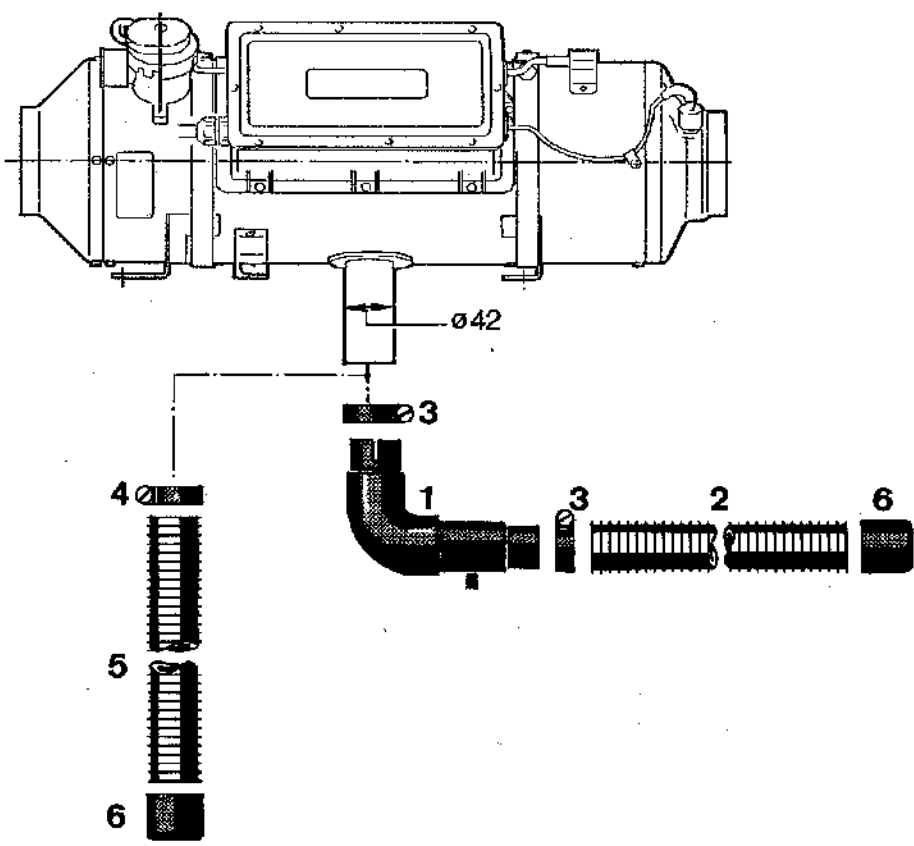
Arrange the exhaust outlet and the combustion air intake such that the exhaust cannot be sucked directly back inside.

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 expected¹⁾, 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.



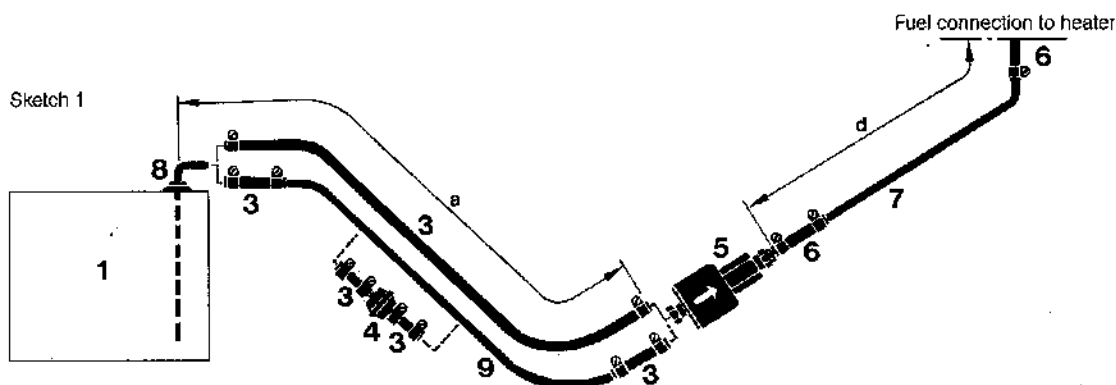
Item	Designation	Order No.
1	Exhaust pipe elbow	25 1226 89 46 00
2	Flex. exhaust hose ø 40	360 61 380
3	Hose clip	152 10 062
4	Hose clip	152 10 064
5	Flex. exhaust hose ø 42	360 61 381
6	End socket	22 1000 40 02 00



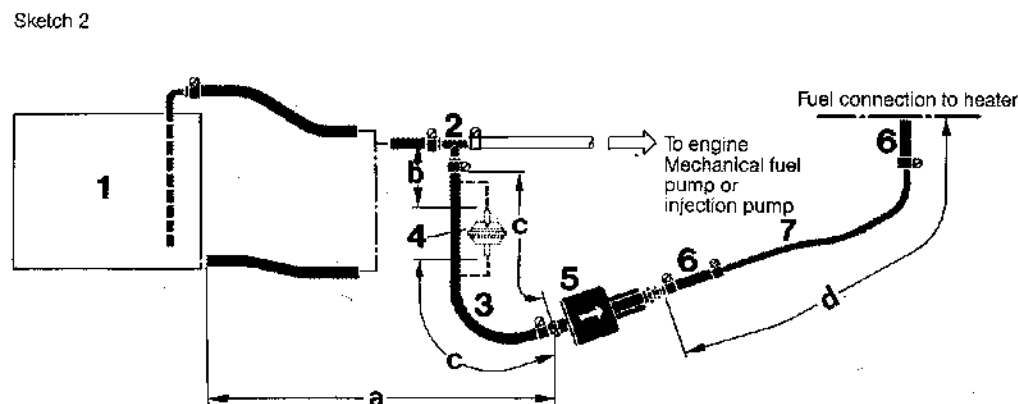
Fuel supply

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.



2. In the event of difficulties in fitting the riser pipe, the supply line can be tapped according to 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. 36075350

4 Fuel pre-filter (only necessary if contaminated fuel is used)
Cat. No. 251226890037

5 Fuel metering pump (15° to vertical, inclined upwards)

6 Fuel hose, internal dia. 3.5 mm
Cat. No. 36075300

7 Fuel pipe, plastic, internal dia. 2 mm
Cat. No. 09031117

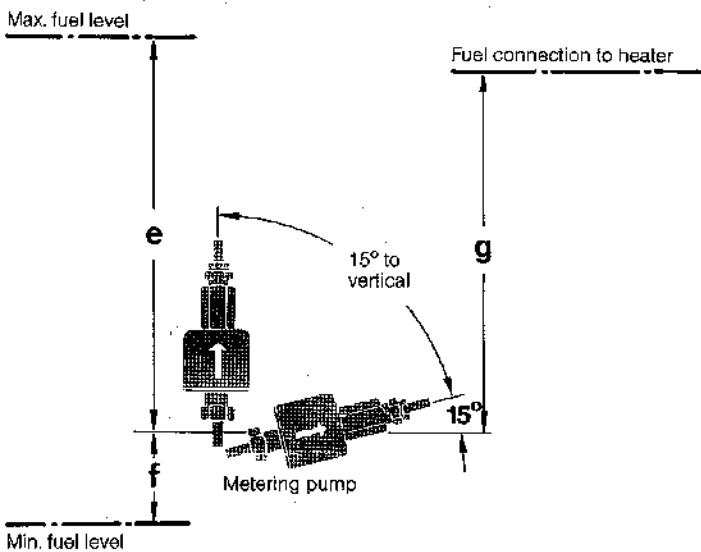
8 Riser pipe (tank connection) internal dia. 4 mm,
Cat. No. 251156300000

9 Fuel pipe, internal dia. 4 mm
Cat. No. 04910030 steel

08016001 copper

09031101 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:
 $e = \text{max. } 1000 \text{ mm}$

Suction head: with zero tank pressure:
 $f = \text{max. } 750 \text{ mm}$

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):
 $f = \text{max. } 400 \text{ mm}$ for diesel

Pressure head metering pump to heater:
 $g = \text{max. } 2000 \text{ mm}$

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.

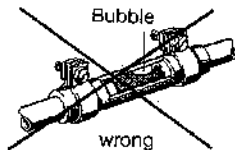
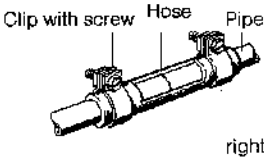
When laying the fuel line, the fuel filter and the fuel metering pump near the rear axle, make allowance for the spring travel of the latter.

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

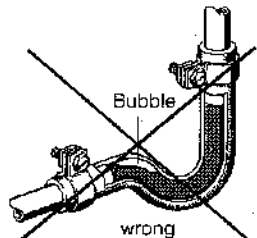
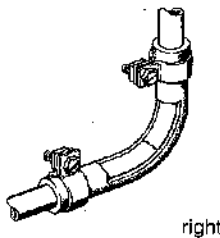
To connect the fuel branches, always use a rubber hose, never plastic tubing.

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.

$L^+ + L^- < 5\text{ m} \rightarrow \text{cross-section } 4\text{ mm}^2$
 $L^+ L^- 5\text{ to } 8\text{ m} \rightarrow \text{cross-section } 6\text{ mm}^2$

If the 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.

Operating device and heater timer

The operating device comprises the On-Off switch with controller for the heating capacity, a red light for illumination, and a green operation pilot light. Two scale discs are supplied with the operating device.

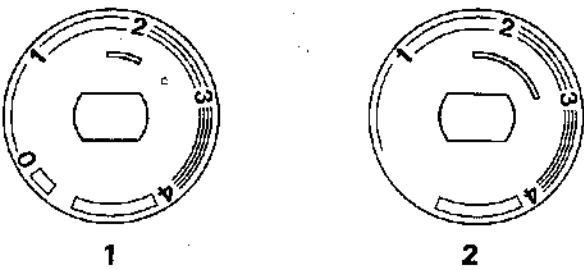
Scale disc 1 is fitted if operation is exclusively with the operating device. The operating device then serves as an On switch and temperature controller.

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 the protective film before fitting.

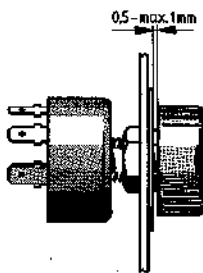
Temperature control

The temperature sensor must be fitted in the interior. It must not be attached to uninsulated outer panels, and must be protected from draughts and direct sunlight. See wiring diagram for connection.

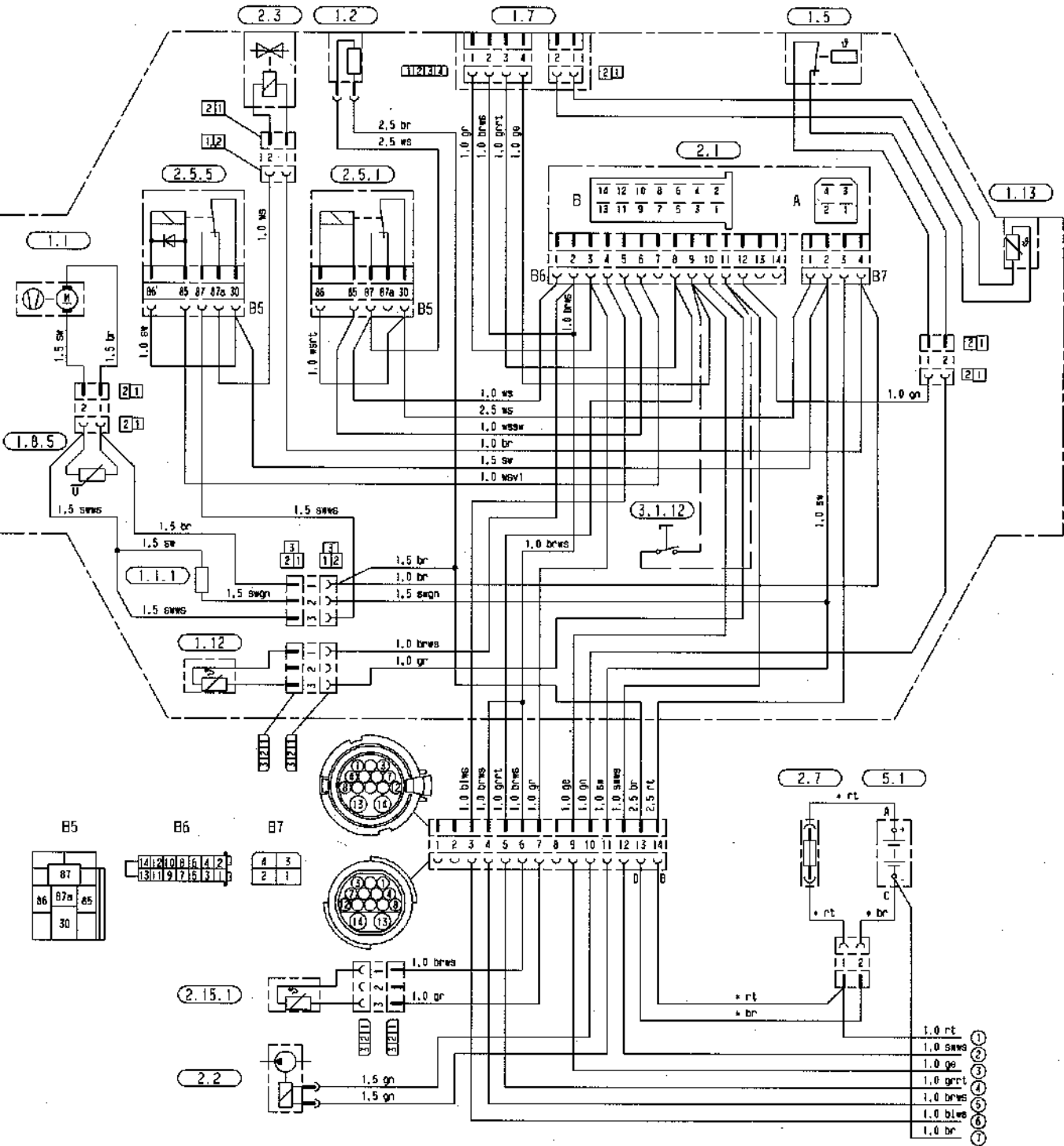
Important: On/Off control of the heating capacity with additional room thermostat is not permissible.



Fitting dimension for the control knob 0.5 to max. 1.0 mm.

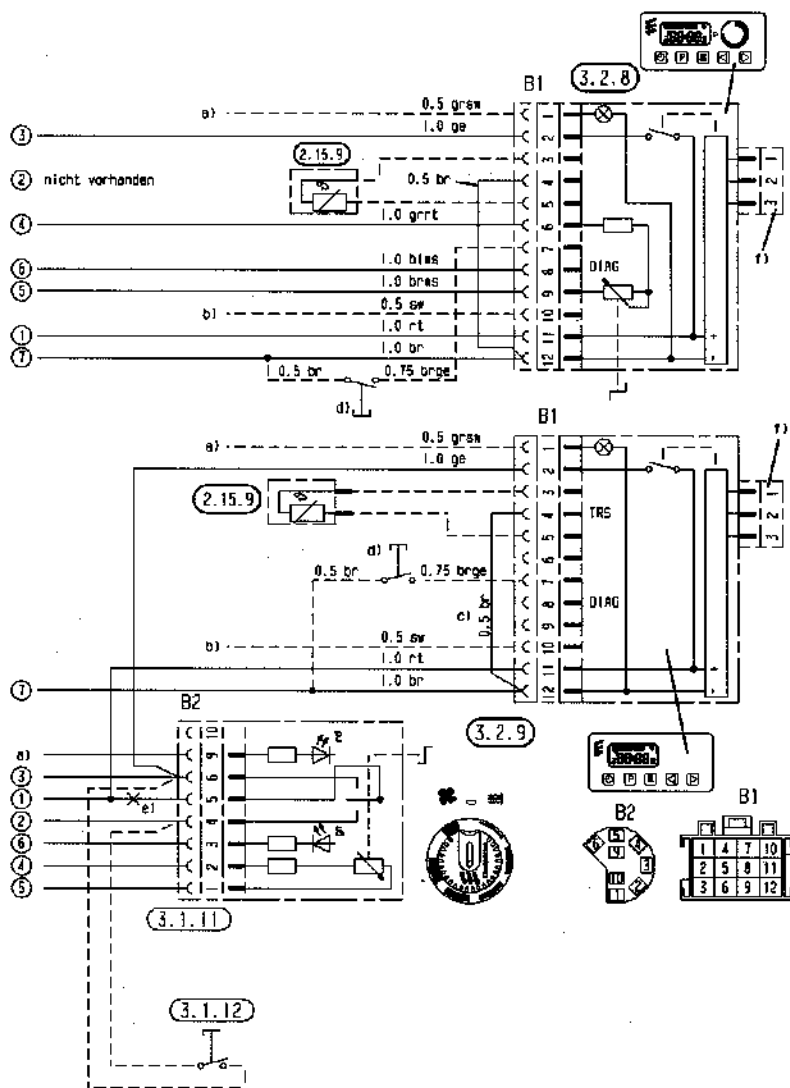


Wiring diagram - 25 1890 - 12 V Design up to model year mid-1995
25 1891 - 24 V



Parts list

- | | | |
|--|--|---|
| 1.1 Burner motor
1.1.1 Resistor for burner motor (partial load)
1.2 Glow plug
1.5 Safety thermal cutout switch
1.7 PCB
1.8.5 Varistor
1.12 Flame sensor
1.13 Temperature sensor | 2.1 Control unit
2.2 Fuel metering pump
2.3 Air solenoid valve (for combustion air)
2.5.1 Glow plug relay
2.5.5 Control relay
2.7 12V/30A main fuse
24V/25A
2.15.1 Room temperature sensor
2.15.9 Outside temperature sensor | Length AB + length CD
< 5 m, cross-section 4 mm ²
> 5 m < 8 m, cross-section 6 mm ² |
|--|--|---|



- 3.1.11 Control device circular
- 3.1.12 Error code request, optional
- 3.2.8 Timer, potentiometer
- 3.2.9 Timer
- 5.1 Battery

- a) Terminal "58" (lighting)
- b) Terminal "15" (ignition)
- d) External On/Off key
- e) When connecting timer: open circuit here X
- f) Radio module connection

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

* Length A - B + length C - D:
 < 5 m 4 mm² diameter
 5 m < 8 m 6 mm² diameter

Wiring colours

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

Function description

Control elements

1. Operating device
2. Heater timer A heater timer can be installed in addition to the operating device. The heater can be switched on at once using the timer, or it can be used to preset the switch-on time between 24 hours and 7 days in advance, depending on version.

Mode of operation

Procedure after switch-on

Switch-on: Green pilot light in the operating device "ON". Heater coil of glow plug "ON". (a timing relay ensures that the voltage at the glow plug does not exceed the permissible range) Blower "ON" at full speed.

After about 25 secs.: Fuel metering pump "ON" (with fuel delivery quantity for "High" capacity).

When a stable flame has been obtained, the glow plug is switched off with a time-lag of about 10 seconds. The heater now continues to run under positive control for at least 30 seconds at maximum capacity. Control of the heating capacity control cannot start before then.

Control of heating capacity/room temperature

The heating capacity and room temperature are influenced by the interaction of the temperature sensors provided in the area being heated, the operating device, the control unit and a temperature limiter provided in the outlet section. Until the room temperature set at the operating device (approx. 10 °C to 30 °C) is reached the heater operates either in the "High" setting or varies between "High" and "Low".

It then operates in the "Low" setting again, or varies between "High" and "Low", or operates at "High", depending on the heat requirement and heating air temperature.

In the "Low" setting, the combustion air is reduced by a solenoid valve and the fuel quantity.

If the room temperature continues to rise in spite of the "Low" setting, the heater switches to the "Off" setting.

Once the room temperature has dropped below the set value, the subsequent restart is achieved at high heating capacity.

The outflow temperature is limited to between 125 °C and 150 °C by the temperature limiter independent of the room temperature.

Switching off

When the heater is finally switched off, the green pilot light goes off. The blower motor continues to run to cool down the heater. This continued operation ends 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 (19), which shuts down the heater in the event of faults.

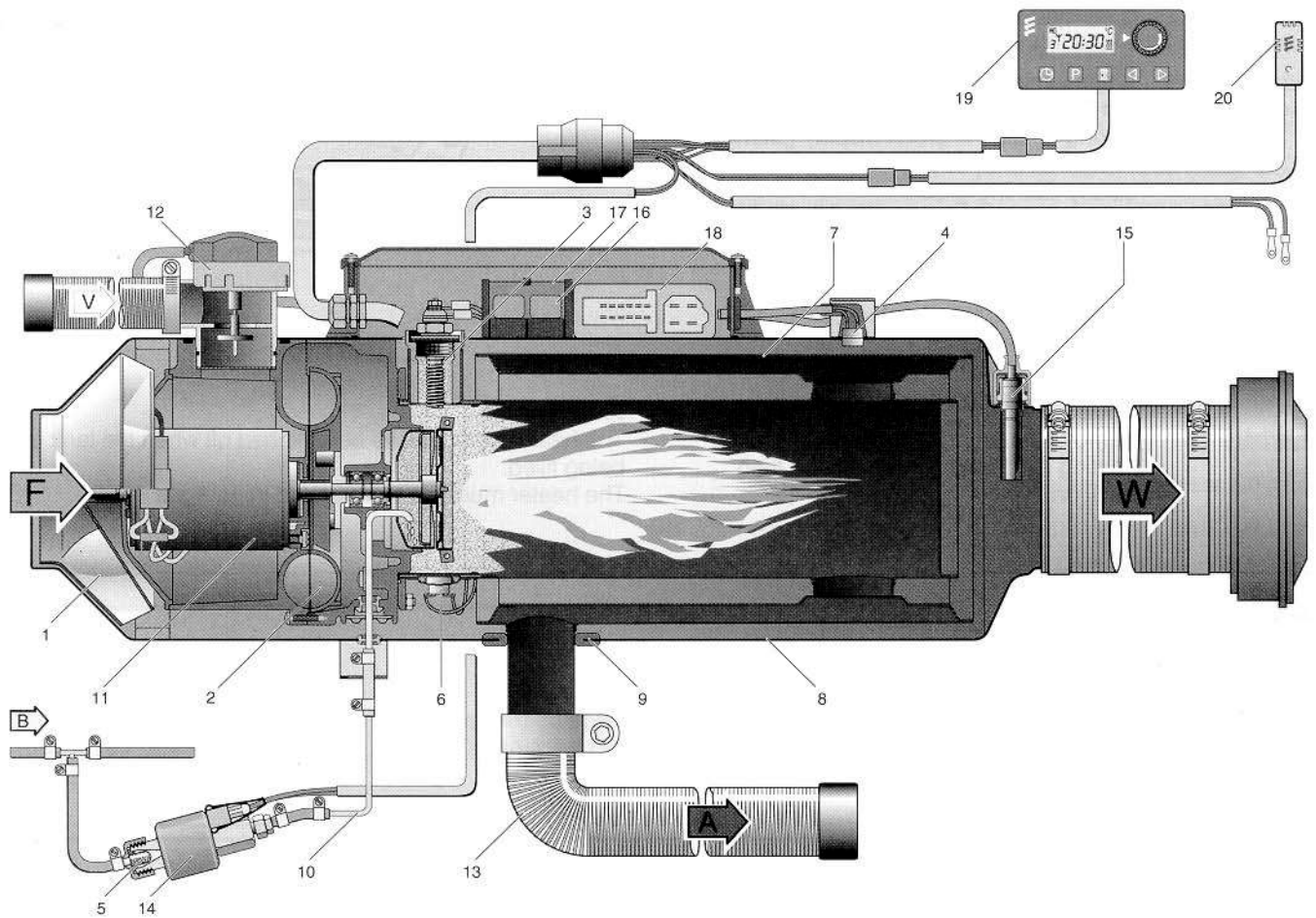
1. If the heater fails to ignite within 90 seconds of the start of fuel pumping, starting is repeated as described. If the heater still fails to ignite after 90 seconds of fuel pumping, fault shutdown takes place.
2. If the flame goes out spontaneously during operation, a restart is first attempted. 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 is 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.

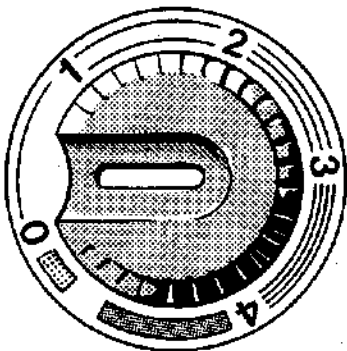
Sectional diagram D8LC



- | | | | |
|----|------------------------------|----|------------------------|
| 1 | Heating air blower wheel | 15 | Temperature limiter |
| 2 | Combustion air blower wheel | 16 | Relay |
| 3 | Glow plug | 17 | Printed circuit board |
| 4 | Safety thermal cutout switch | 18 | Steuergerät |
| 5 | Fuel filter | 19 | Timer |
| 6 | Flame sensor | 20 | Cab temperature sensor |
| 7 | Heat exchanger | | |
| 8 | Outer casing | F | Fresh air |
| 9 | Flange seal | V | Combustion air |
| 10 | Fuel line | B | Fuel |
| 11 | Blower motor | W | Hot air |
| 12 | Combustionair solenoid valve | A | Exhaust |
| 13 | Exhaust pipe | | |
| 14 | Fuel metering pump | | |

Operation using the operating device

- Blue field = Ventilation
- 0 = Off — after switch-off, automatic continued operation to cool down the heater
- Red field = Heating — continued clockwise turning ensures higher room temperature
- Illuminated field in knob: When vehicle lights are switched on — red display
During heating — green display (pilot light)
In case of overheating: steady flashing green
Flashing signal: — — — — —



Self-help in the event of a fault:

- Non-starting: Switch off and then back on, not more than twice. Check the fuse. Then call in a service center.
- Overheating: Remove cause (e.g. clogged heating air ducts). Switch off and then back on.

Please note:
The heater must always be switched off when the tank is being filled.
The heater must not be operated in garages.

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.

	0	8	16 Sec.
Operation			
Overvoltage/undervoltage warning ¹⁾			
Overvoltage shutdown*	— — — — —	— — — — —	
Undervoltage shutdown ¹⁾	— — — — —	— — — — —	
Glow ignition plug break*	— — — — —	— — — — —	
Burner motor not turning*			
Short-circuit in changeover relay	— — — — —	— — — — —	
Erroneous flame detection*	— — — — —	— — — — —	
Safety time exceeded ¹⁾			
Non-start	— — — — —	— — — — —	
Overheat ³⁾	— — — — —	— — — — —	— — — — —
Fuel metering pump short-circuit*	— — — — —	— — — — —	
Temperature sensor defective*	— — — — —	— — — — —	
Flame sensor defective*	— — — — —	— — — — —	
Flame goes out in "Low" stage ²⁾ , heater goes out by itself	— — — — —	— — — — —	
Flame goes out in "High" stage ²⁾ , heater goes out by itself	— — — — —	— — — — —	
Control unit defective*	— — — — —	— — — — —	

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.