Air heaters B 1 L C / D 1 L C

Technical Description
Operating Instructions
Installation Instructions

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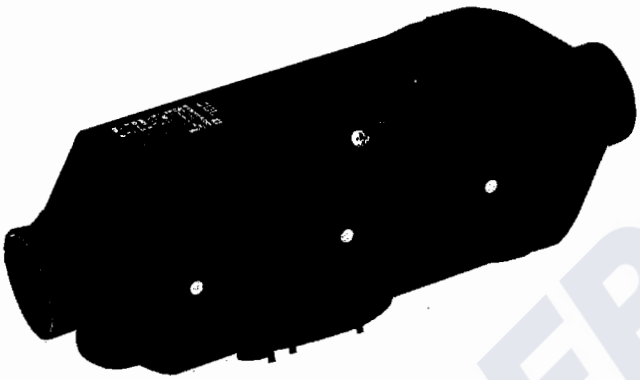
Air heaters of independent,
B 1 L C for Gasoline
D 1 L C for Dieesl fuel



Cat. No.

Basic heater with standard equipment
Heating capacity control: High – Medium – Low

B 1 L C – 12 Volt	20 1719 05 00 00
D 1 L C – 12 Volt	25 1835 05 00 00
D 1 L C – 24 Volt	25 1836 05 00 00

Basic heater with standard equipment
Heating capacity control: High – Medium – Low – Off

D 1 L C – 12 Volt	25 1830 05 00 00
D 1 L C – 24 Volt	25 1831 05 00 00

Specifications

Heating medium	Air		
Heating capacity control	High	Medium	Low
Heating capacity[1]	1800	1200	850 W
Hot air throughput without counterpressure[1]	110	70	70 kg/h
Fuel consumption[1] D 1 L C	0,21	0,14	0,10 l/h
B 1 L C	0,24	0,16	0,12 l/h

Fuel – B 1 L C	Gasoline
Fuel – D 1 L C	Diesel fuel (commercially available)
Rated voltage	12 V or 24 V respectively
Operating range[4]	
Minimum voltage[2]	10 V or 20 V respectively
Maximum voltage[3]	14 V or 28 V respectively

Electric power consumption[1]

at start	12 V = 245 W			
	24 V = 265 W			
in operation	High	Medium	Low	
	25	15	15	W

Ventilation operation	possible with suitable circuits
Radio interference	remote, additional suppression measure possible
Weight	approx. 3.5 kg

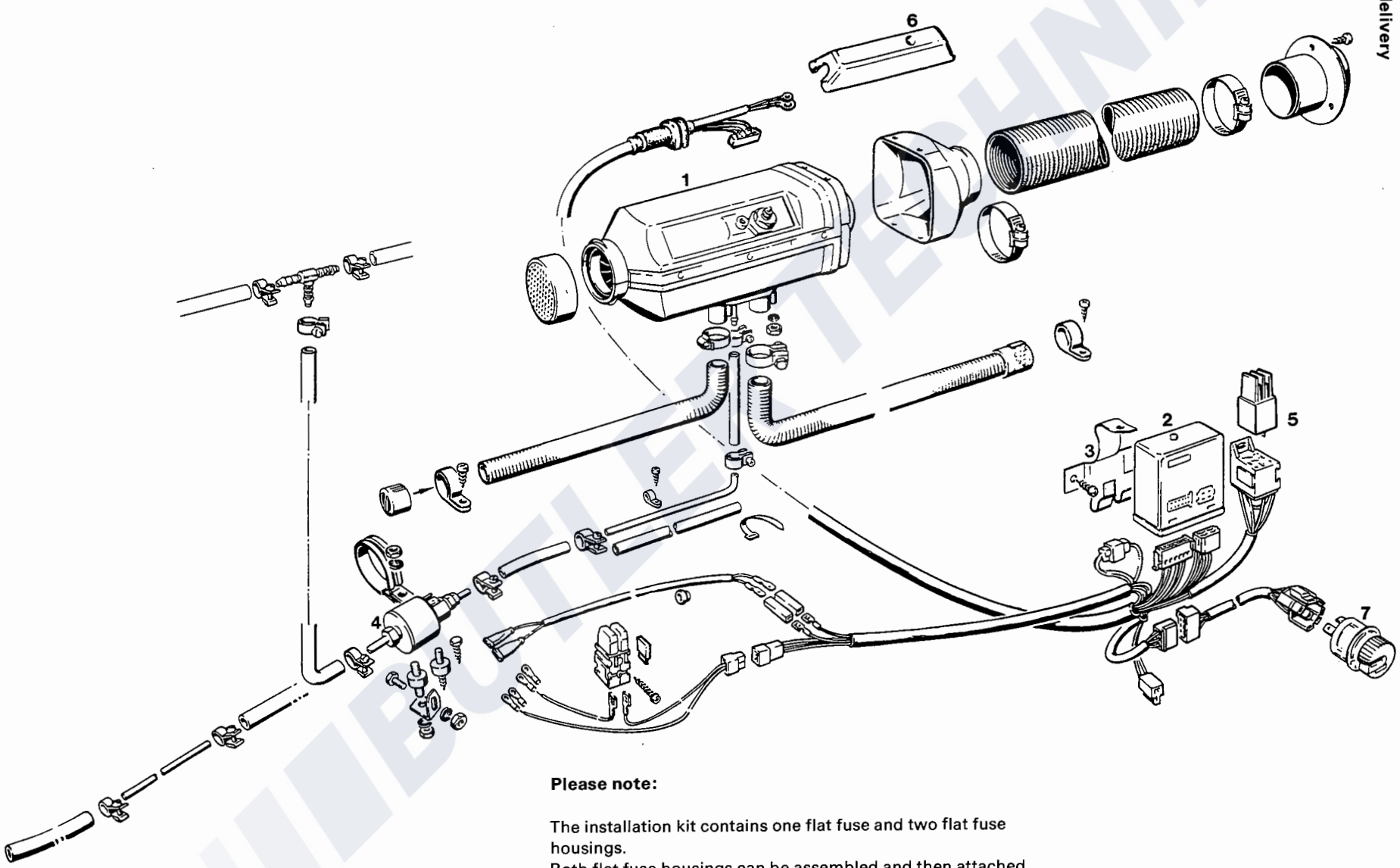
[1] at rated voltage.

[2] an undervoltage safety device built in into the control unit switches off the heater at around 10.5 V or 21 V respectively.

[3] an overvoltage safety device built into the control unit switches off the heater at around 15 V or 30 V respectively.

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

All values ± 10 %



parts without item number
= universal installation kit

Please note:

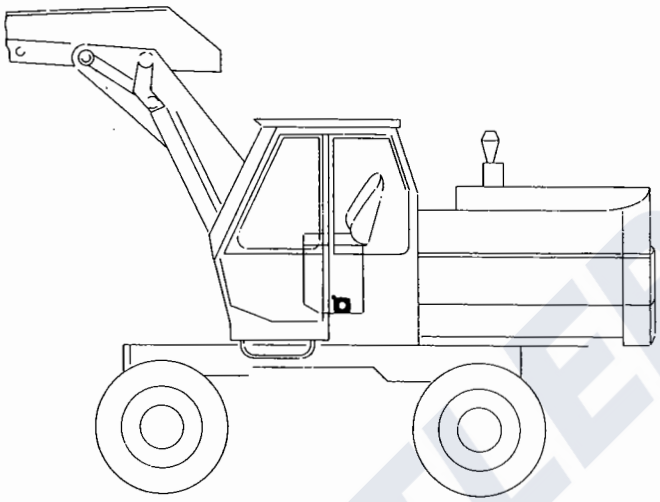
The installation kit contains one flat fuse and two flat fuse housings.
Both flat fuse housings can be assembled and then attached with one screw.
Insert the flat fuse.
One flat fuse housing remains free.

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.

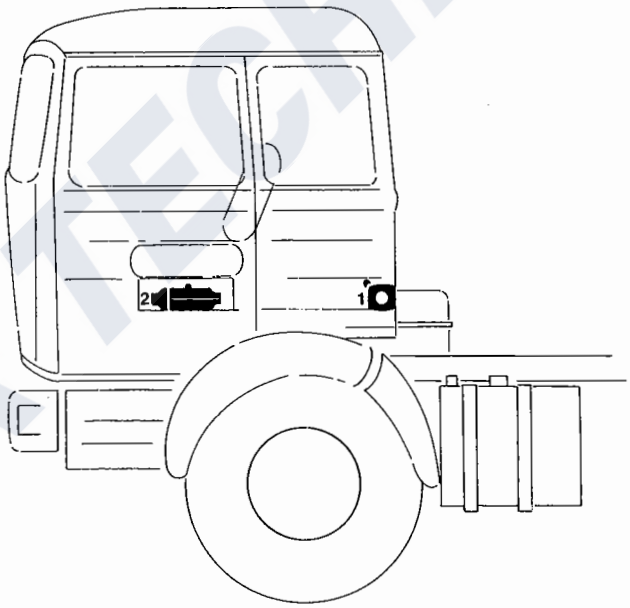
Typical installations/installation position

in the cab of the excavator

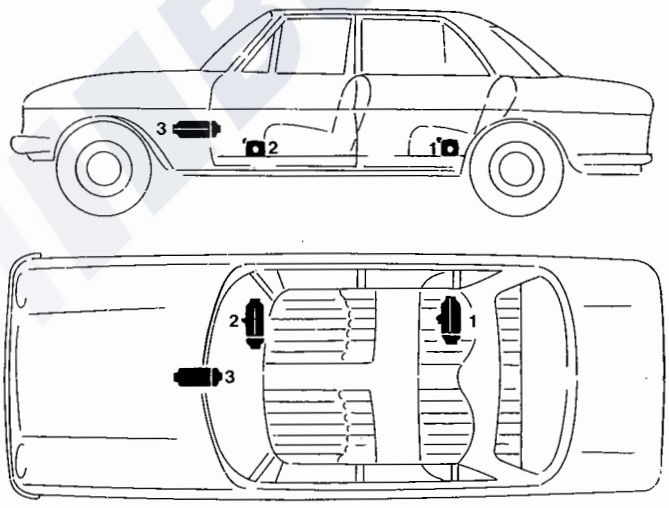


in the truck cab

1. on the rear panel of the cab
2. under the driver's seat



inside a passenger car



1. under the back seat, inside or underfloor
2. in front of the passenger seat
3. on the center console

Installing the heater

The B1LC/D1LC 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.

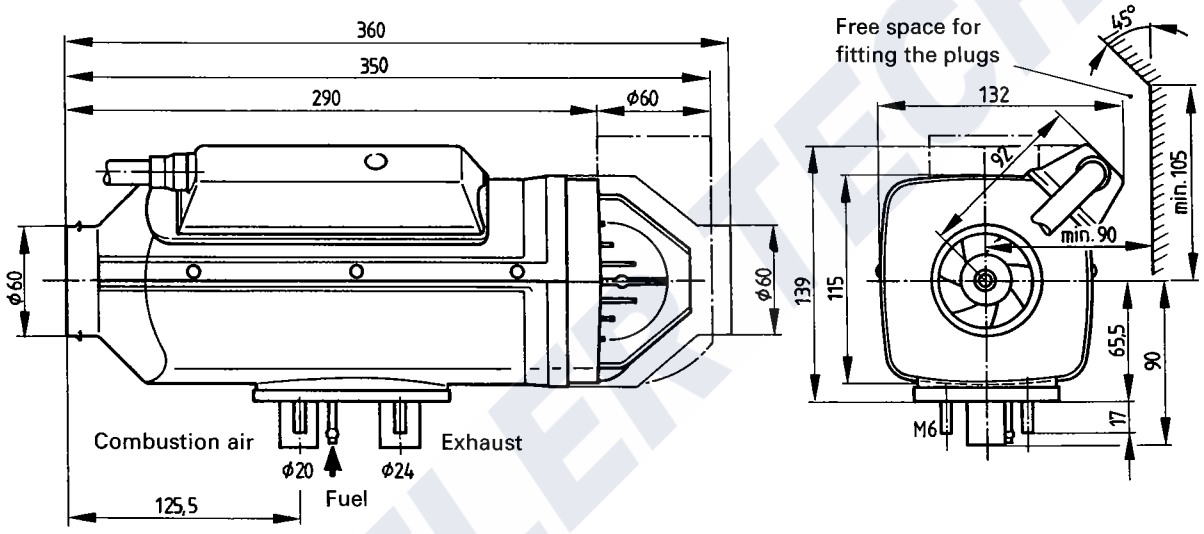
In the case of installation in areas used by persons, the exhaust, combustion air and fuel lines must not have detachable connections inside these areas, and must be laid splash water proof at the penetrations to the outside.

For this reason 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.

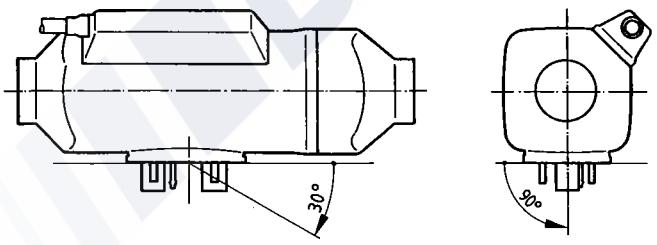
The factory plate must be clearly visible when the heater is installed. If necessary a second plate (duplicate) with the same information as the original can be affixed to a point on the heater clearly visible after installation or to a cover located in front of the heater. A second plate is not necessary 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.

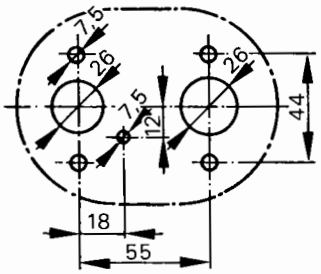
During starting and thermostatic operation a heater installed in the standard position may deviate, due to the inclination of the vehicle during motion, up to ± 15° in both axes from the standard position.

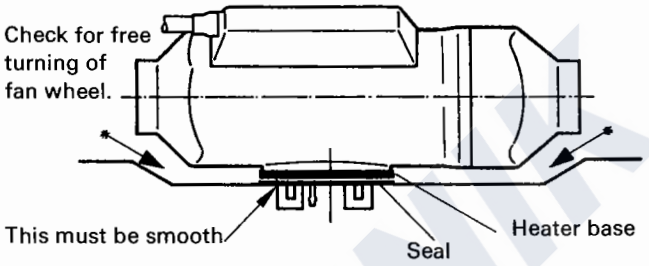
Continuous heating operation after starting is possible at a deviation of up to ± 30° from the standard position. With deviations exceeding ± 30° reliable heating operation is no longer possible. However, this does not lead to damage of the heater if the changes in the operating position are only for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

Important: the plug connection must always point upwards.

Fastening to the vehicle wall/floor

Make penetrations in accordance with the template pattern.





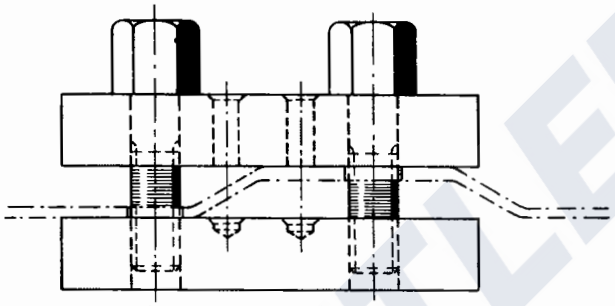
* This must be kept free.

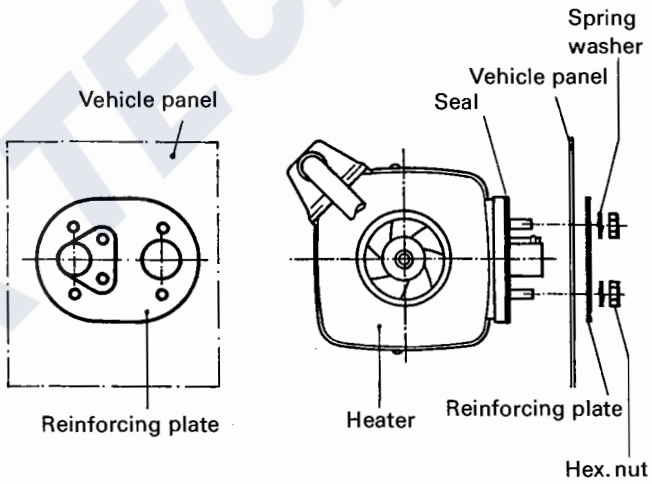
The 10.5 mm dia. hole for the metering pump/control unit cable is not included in the template pattern and must be drilled to suit the installation method.

The mating surface for the heater base must be smooth. To drill the penetrations and if necessary to smooth the mating surface a special tool is available from the manufacturer under Cat. No. 99 1201 46 53 29.

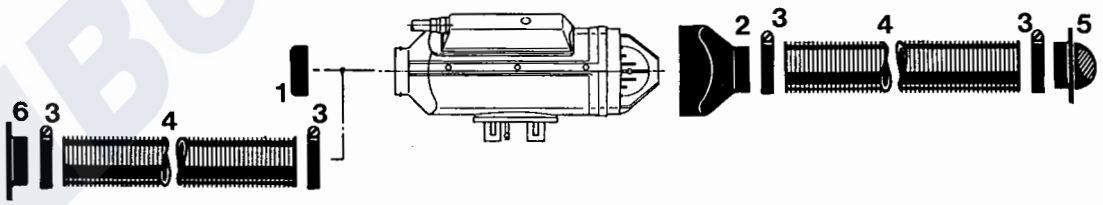
If the mating surface sheet is too thin (criterion: thinner than 1.5 mm), a reinforcing plate, Cat. No. 20 1577 89 00 03 can be installed additionally on the outside.

Special tool





Running the Heating Air – Parts for running the heating air included in the scope of delivery for the universal installation kit



1 Protective grid
2 Reducing piece
3 Hose clip, dia. 50 mm to dia. 70 mm
4 Flexible pipe, dia. 60 mm (1 m + 1 m)
5 Air outlet, rotatable
6 Connection piece, dia. 60 mm

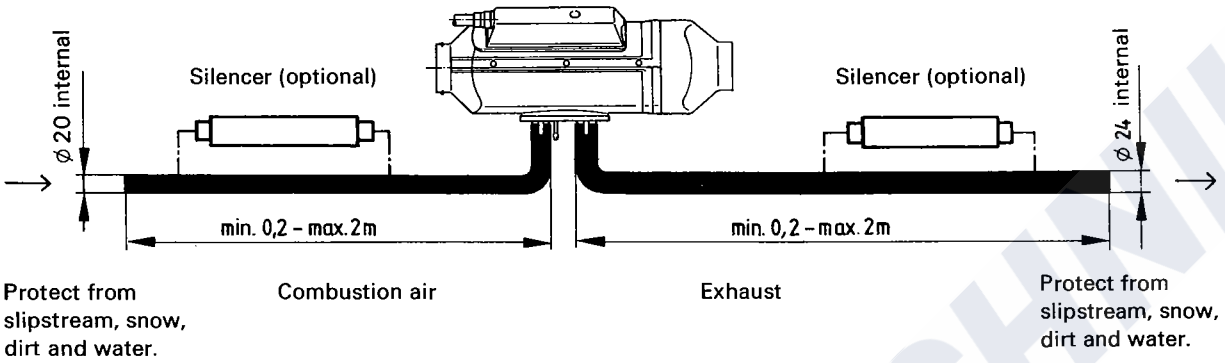
When checking an installation the average output temperature should not significantly exceed 100°C at the output point with an intake temperature of 20°C. This will ensure that the safety thermal cutout switch will not respond under normal operating conditions.

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.

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°.

The scope of delivery includes a flexible exhaust pipe, 24 mm internal dia., 1 m long. This can be shortened as required. For longer pipes see the Additional Equipment Catalog.

The scope of delivery includes a flexible combustion air pipe, 20 mm internal dia., 1 m long. This can be shortened as required. For longer pipes see the Additional Equipment Catalog.

Additional noise suppression is possible by installing an exhaust silencer or combustion air silencer (see Additional Equipment Catalog). The permissible overall length, including silencer, remains unchanged.

The combustion air must be sucked in from the outside, not from the passenger compartment or trunk.

Do not install the intake opening facing the slipstream, but run it in such a manner that dirt and snow cannot enter and that any water which does enter can flow out.

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

Arrange the exhaust outlet and the combustion air opening such that the exhaust cannot be sucked back in directly.

The exhaust outlet must be on the outside. Exhaust lines must be laid in such a way that neither the penetration of exhaust into the vehicle interior nor the intake of exhaust through the vehicle or heater blowers need be expected [1)], and that the operation of essential vehicle parts is not affected (ensure adequate clearance). Place the outlet opening of the exhaust line in such a way that it cannot be clogged by dirt and snow and that any water which does enter can run off. Do not install facing the slipstream.

[1)] This requirement is deemed met when the outlet of the exhaust pipe points upwards or to the side, or – when the exhaust is run under the vehicle floor – is positioned close to the side or rear edge of the cab or vehicle.

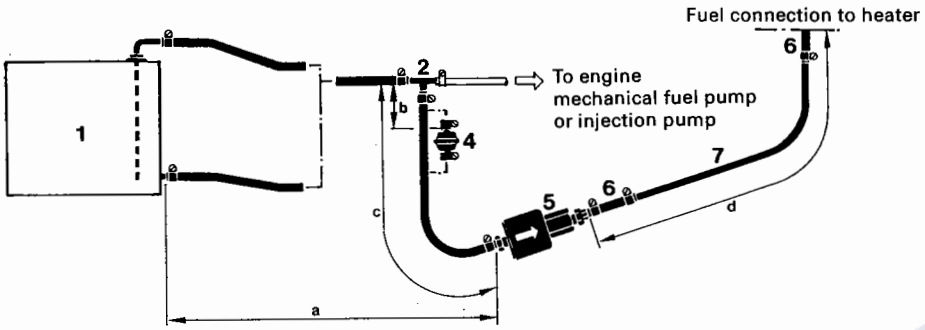
Fuel supply

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.



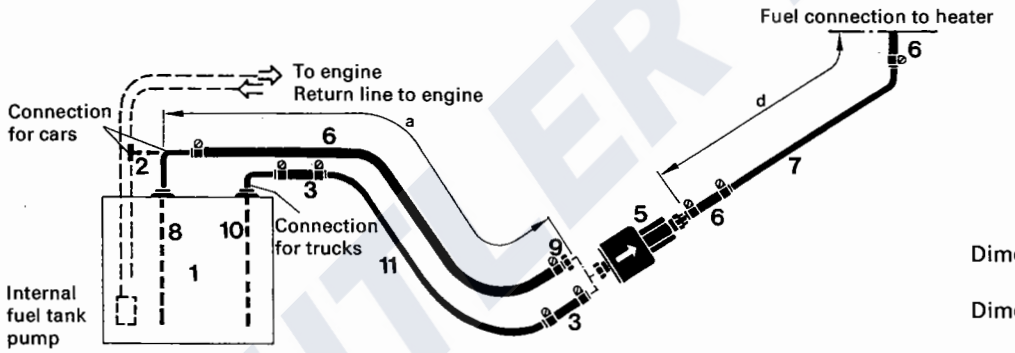
Dimension a = max. 2 m with petrol
max. 5 m with diesel
Dimension b = 50 mm
Dimension c = max. 300 mm
Dimension d = max. 4 m with petrol
max. 6m with diesel

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, an directly into the fuel tank in the case of trucks.



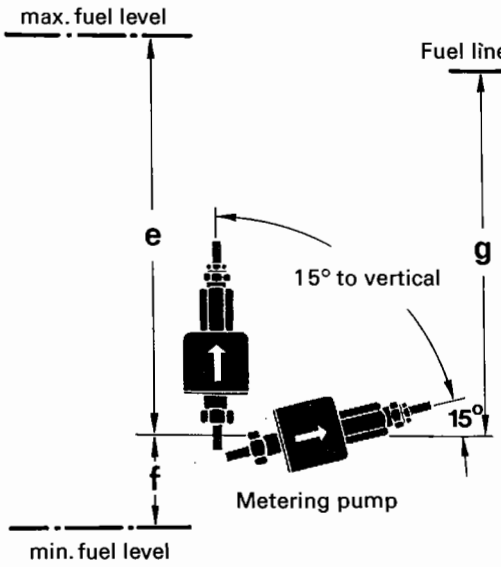
Dimension a = max. 2 m with petrol
max. 5 m with diesel
Dimension d = max. 4 m with petrol
max. 6 m with diesel

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
For D 1 L C also permissible: Fuel pipe, plastic, internal dia. 2 mm, Cat. No. 090 31 117
8 Riser pipe, internal dia. 2 mm, external dia. 4 mm
9 Connection socket, external dia. 4 mm
} Cat. No. 20 1645 89 35 00
10 Riser pipe, internal dia. 2 mm, external dia. 6 mm Cat. No. 25 1226 89 50 00
11 Fuel pipe, internal dia. 2 mm
Cat. No. 090 31 125

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 with gasoline
f = max. 1000 mm with 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 with gasoline
f = max. 400 mm with 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

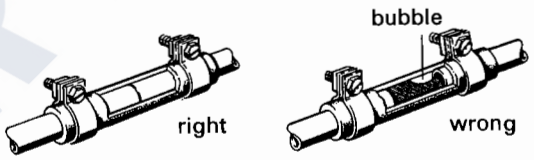
Protect fuel lines, filter and metering pump from overheating; do not install near silencers and exhaust pipes. Temperatures above 30°C lead to gas bubbles and problems with gasoline.

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

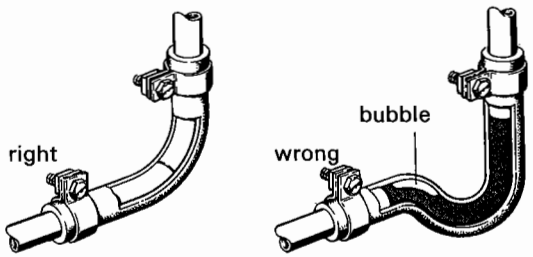
Cut fuel tubes and pipes to length only with a sharp knife. Cuts may not be indented and must be burr-free.

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.



Do not let fuel tube sag.



D1LC

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

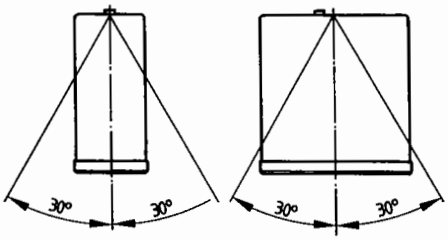
In special cases, the heaters can also be operated on extra light fuel oil (above 0°C) or kerosine. If in doubt consult the manufacturer.

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.

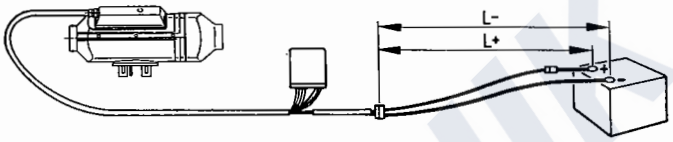
Fit the control unit so that it is protected from splash water (from both its own vehicle and preceding ones). Outside installation is thus not permissible. The unit is best arranged in the vehicle interior, with the plugs pointing downward.

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.



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

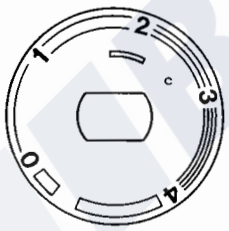
Smear plug and earth connections with contact protection grease outside the vehicle interior.

Operating unit and heater timer

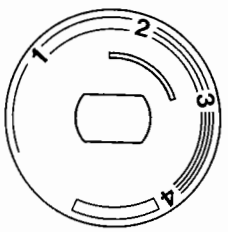
The operating unit (Cat. No. S. 2) includes the On-Off switch with control feature for the heating capacity, a red light for illumination, and a green operating pilot light.
Two scale discs are supplied with the operating unit.

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



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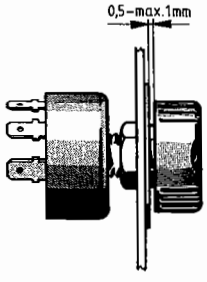
Permissible clearance for operating button 0,5 to max. 1. mm.



Temperature control

A temperature sensor is arranged on the intake side inside the heater, and – in conjunction with the controller of the operating unit – switches the heater to "High", "Medium" or "Low" depending on the intake temperature and the controller setting.

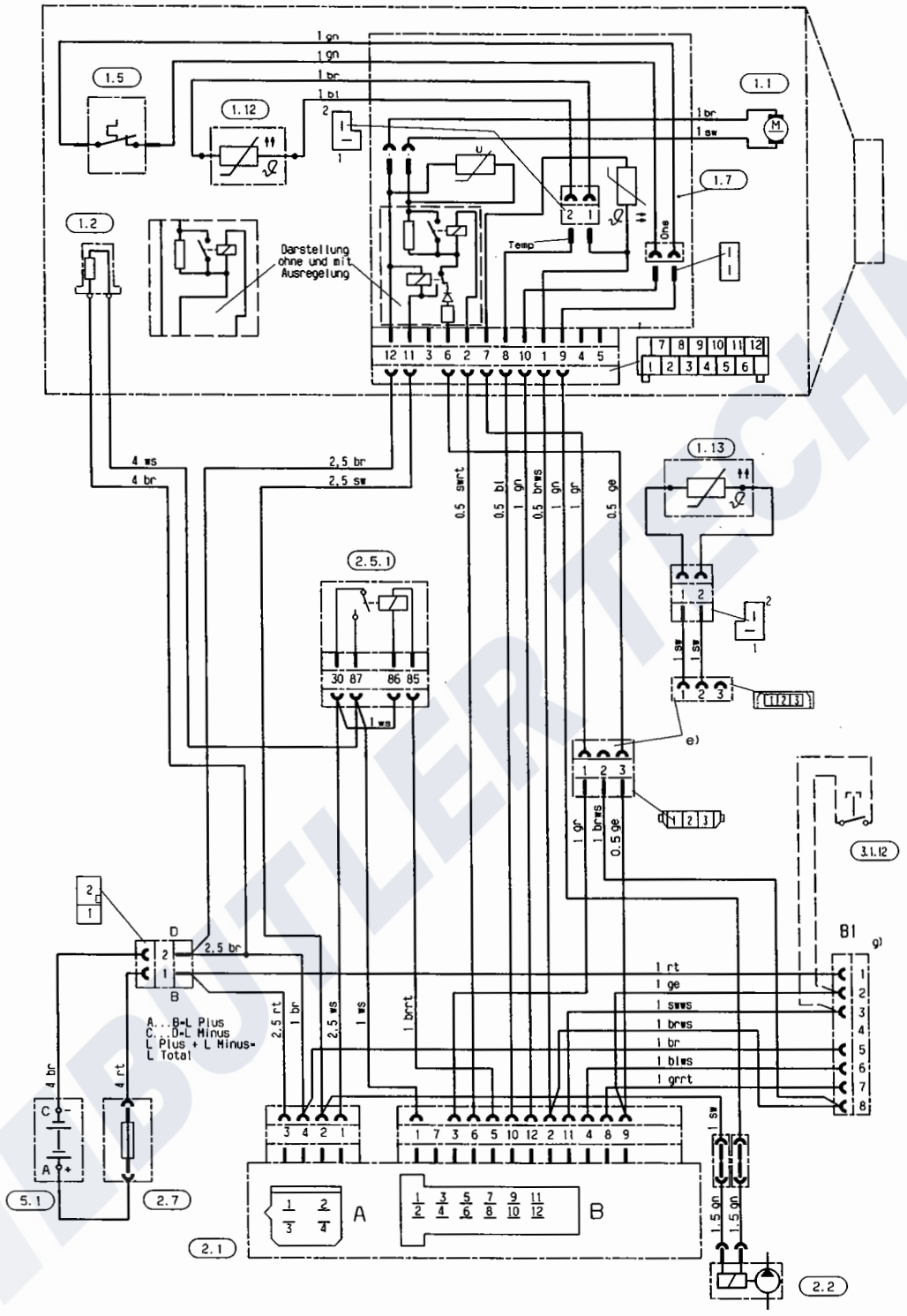
This arrangement of the temperature sensor is only suitable in recirculated-air operation (heating air intake from the area being heated).
If the heater is operated with fresh air (heating air intake from the outside), the built-in temperature sensor must be disconnected, and an external temperature sensor (Cat. No. 25 1774 89 03 00) must be fitted in the interior.

The sensor 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-regulation of the heating capacity using an additional thermostat is not permitted, as it puts an unduly heavy strain on the battery.

Wiring diagram



25 1830 00 96 01

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 Temperatur sensor

2.1 Control unit
2.2 Fuel metering pump
2.5.1 Current regulator
2.7 Main fuse (25 A)

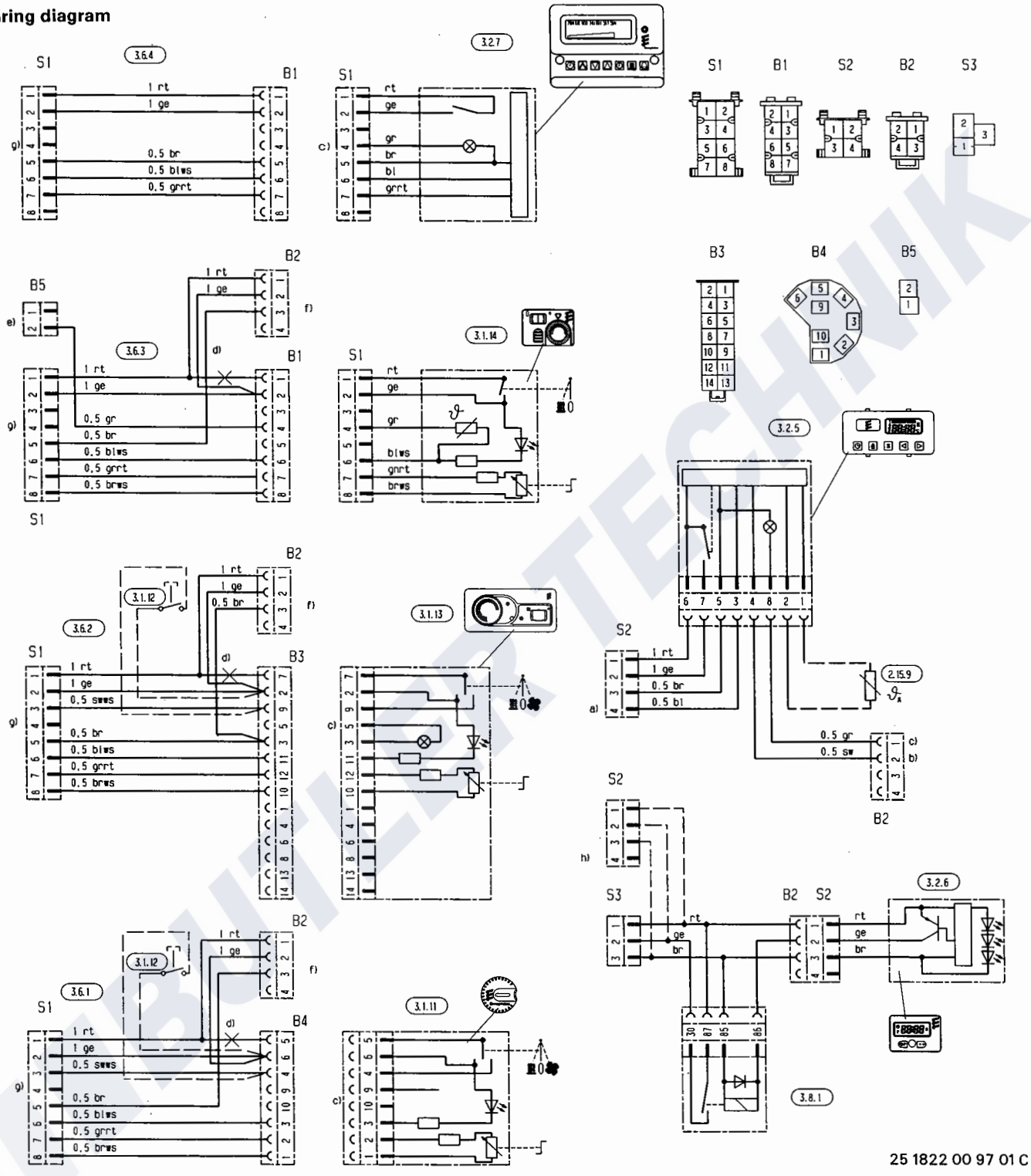
3.1.12 Fault code enquiry (garage)

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.

Wiring diagram



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Parts List

2.15.9 Sensor, external temperature

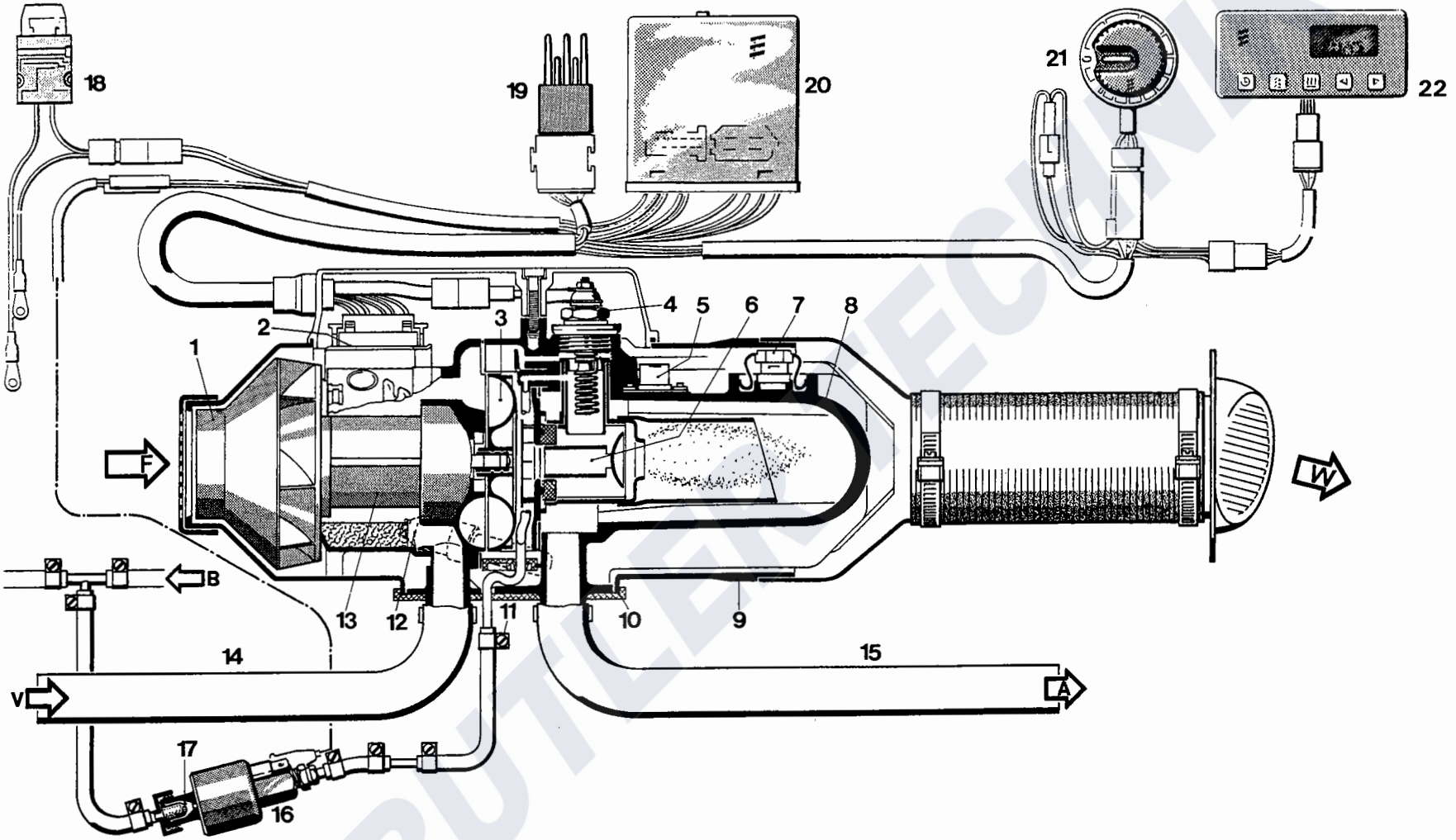
3.1.11 Operating unit
3.1.12 Fault code enquiry (garage)
3.1.13 Operating unit
3.1.14 Operating unit

3.2.5 Timer
3.2.6 Timer
3.2.7 Timer

3.6.1 Cable harness for 3.1.11
3.6.2 Cable harness for 3.1.13
3.6.3 Cable harness for 3.1.14
3.6.4 Cable harness for 3.2.7

3.8.1 Timer relay

a) Test (garage) digital timer
b) to terminal 15
c) lighting terminal 58
d) break line here to connector timer
f) 3.2.5 / 3.2.6 / 3.2.7 to be connected here
g) Connection control elements to heater
h) Remove S 3 and fit S 2



PARTS LIST

1 Hot air blower wheel
2 PCB with controller temperature sensor
3 Combustion air blower wheel
4 Glow plug
5 Safety thermal cutout switch
6 Combustion chamber
7 Flame monitor
8 Heat exchanger
9 Outer casing
10 Flange seal
11 Fuel line
12 Series resistor for glow plug (for 24 V only)
13 Blower motor
14 Combustion air intake line
15 Exhaust line
16 Fuel metering pump
17 Fuel strainer
18 Main fuse, 25 A
19 Current regulator
20 Control unit
21 Operating unit
22 Heater timer

F = fresh air
V = combustion air
B = fuel
W = hot air
A = exhaust