



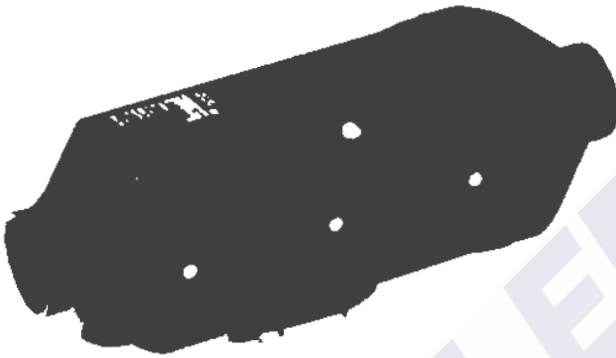
Air heaters D1L E

Technical Description
Installation Instructions
Operating Instructions

Eberspächer

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**Engine-independent air heater
for diesel fuel
with integrated control unit**



D 1 L E	Cat. No.
Basic heater	12 V 25 2019 05 00 00
with standard equipment	24 V 25 2020 05 00 00

The universal installation kit must be ordered separately as additional equipment, see page 2. See Additional Equipment Catalog for further accessories.

Specifications (all values $\pm 10\%$)

Heating medium	Air	Radio interference suppression	3 (KW 0)
Hot air throughput without counterpressure ¹⁾	110 kg/h	Weight	approx. 3.5 kg
Heating capacity ¹⁾	1800 W	Ambient temperature	in operation: -40° to +70°C not in operation: -40° C to +85° C
Fuel	Diesel fuel (commercially available)		
Fuel consumption ¹⁾	0.21 l/h		
Rated voltage	12 V or 24 V		
Operating range		¹⁾ at rated voltage	
– Minimum voltage	10 V or 20 V respectively		
– Maximum voltage	14 V or 28 V respectively		
Electric power ²⁾ consumption	at start: 12 V = 245 W 24 V = 265 W In operation 25 W		

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Scope of delivery

Quantity / Designation	Cat. No.
1 Basic heater with standard equipment	
12 V	25 2019 05 00 00
24 V	25 2020 05 00 00

The standard equipment includes:

1 Basic heater – 12 V or Basic heater – 24 V (not available alone)	25 2019 01 25 2020 01
1 Fuel metering pump with built-in fuel filter	
1 Switch ON / OFF	
1 Cap	

To be ordered in addition:

1 Universal installation kit	25 2019 80 00 00
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Control elements, optional

Quantity / Designation	Order No.
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1 Mini-clock – 12 / 24 volt	22 1000 31 31 00
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The mini-clock can be combined with the TP 41 / TP 41 i radio remote control.
Additionally required:
The control unit to adjust the heat flow and the change-over switch 'heating / ventilating' for ventilation mode.

1 Module clock – 12 / 24 volt with temperature preselection	22 1000 30 38 00
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The module clock can be combined with the TP 4 / TP 4i radio remote control.

1 Mounting parts 'module clock'	25 1482 70 01 00
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only required when installing with panel.

1 Radio remote control TP 4 12 / 24 volt	22 1000 30 63 00 22 1000 30 99 00
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The radio remote control TP 4 / TP 4i can only be used in combination with the module clock.

1 Radio remote control TP 41 12 / 24 volt	22 1000 31 35 00 22 1000 31 39 00
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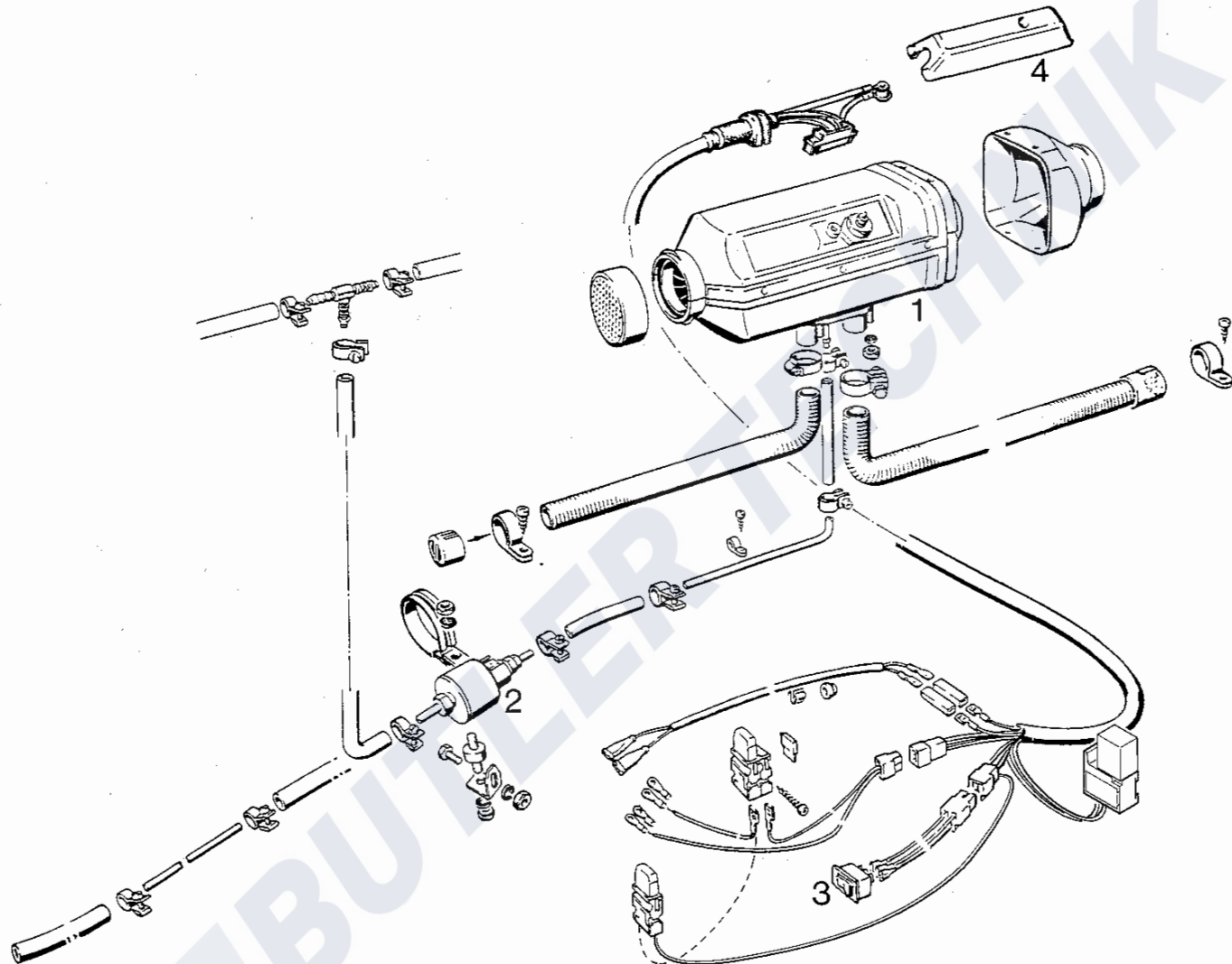


The radio remote control TP 41 / TP 41i can be used on its own or in combination with the mini-clock, order No. 22 1000 31 31 00.

* Outside Germany, only the i-version radio remote controls may be permissible.

Please note!

Control elements must be selected in accordance with the intended use of the heater, distinguishing between air or water heater, simple switching on and off, programme preselection and / or remote control.
The control elements are supplied with operating instructions. These are intended for the customer together with the "Technical Description".



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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.
One flat fuse housing remains free.

Parts without item number = universal installation kit.



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.

D 1 L E  S 258

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.

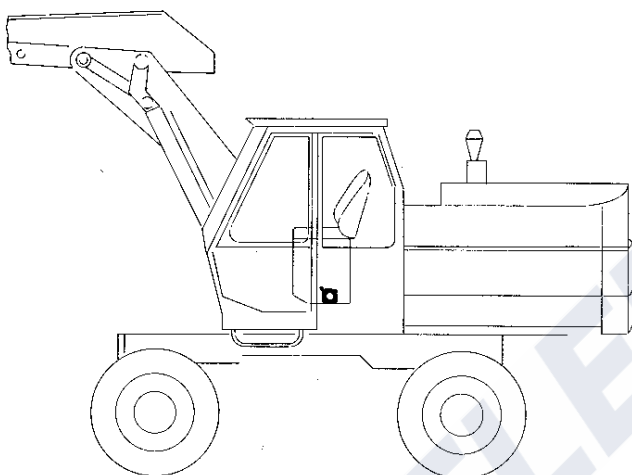


Installation Instructions

The 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

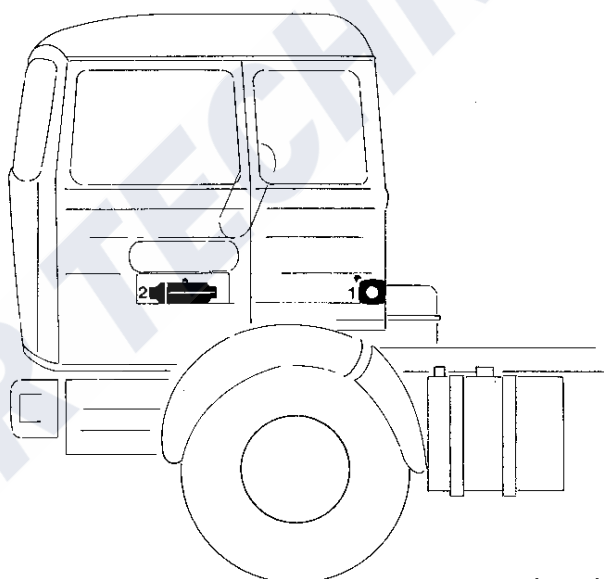
in the cab of the excavator



24/113

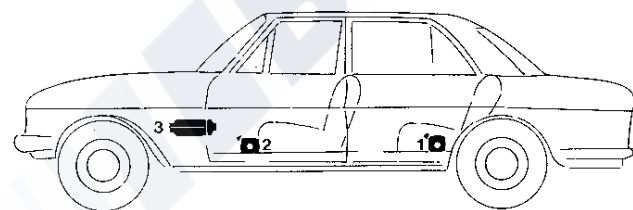
in the truck cab

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

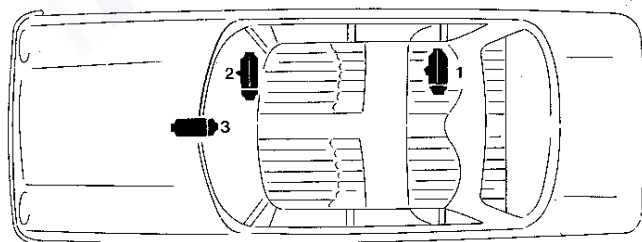


24/112

inside a passenger car



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



24/111a

Installing the heater

The 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.

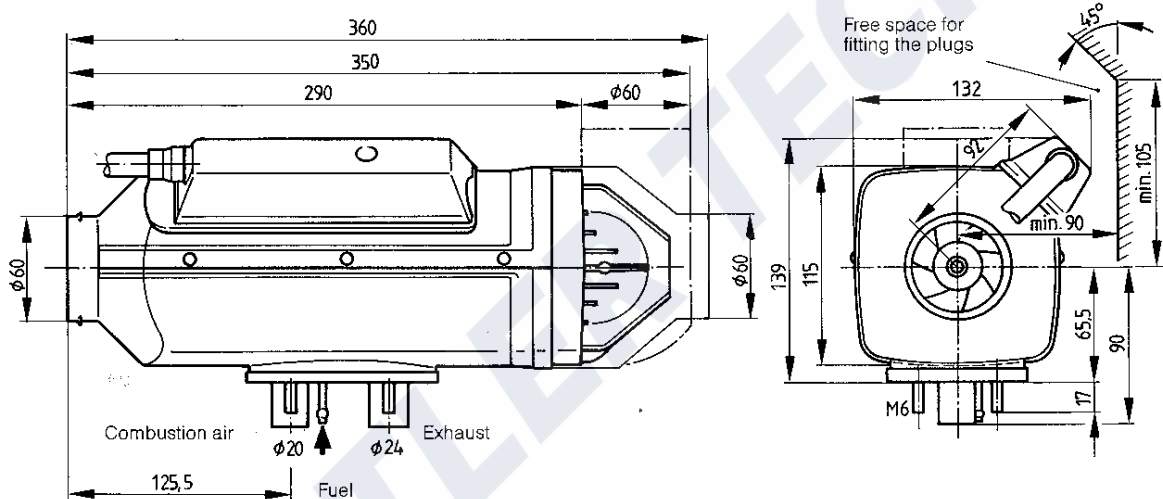
In the case of installation in areas used by persons, the exhaust, combustion air and fuel lines must not have detachable connections inside these areas, and must be laid splash water proof at the penetrations to the outside.

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.

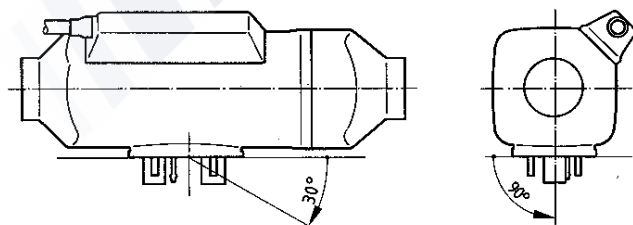
The factory plate must be clearly visible when the heater is installed. If necessary a second plate (duplicate) with the same information as the original can be affixed to a point on the heater clearly visible after installation or to a cover located in front of the heater. A second plate is not necessary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

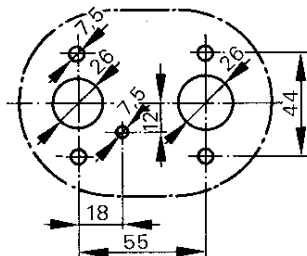
Continuous heating operation after starting is possible at a deviation of up to $\pm 30^\circ$ from the standard position. With deviation exceeding $\pm 30^\circ$ reliable heating operation is no longer possible. However, this does not lead to damage of the heater if the changes in the operating position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

Important: the plug connection must always point upwards.



Fastening to the vehicle wall/floor

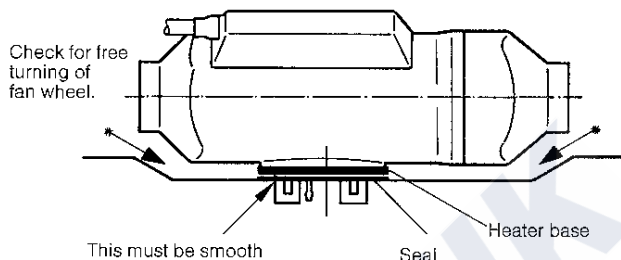
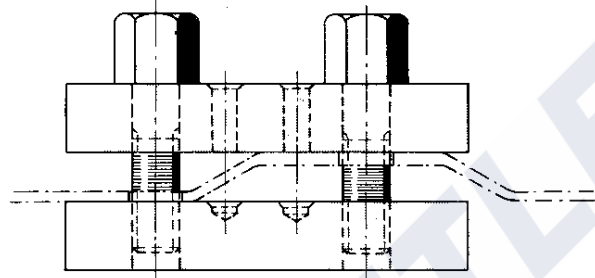
Make penetrations in accordance with the template pattern.



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.

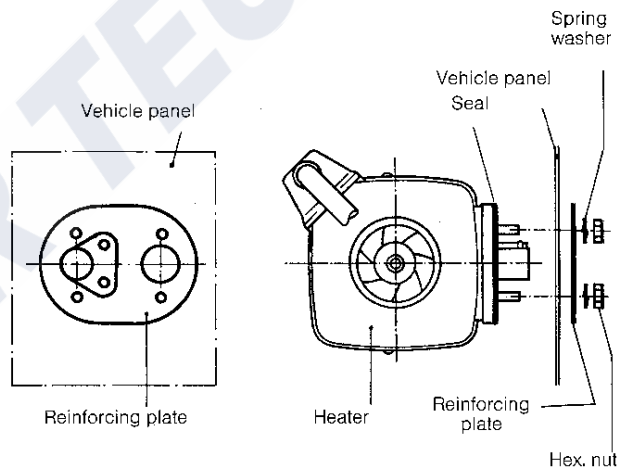
The mating surface for the heater base must be smooth. To drill the penetrations and if necessary to smooth the mating surface a special tool is available from the manufacturer under Cat. No. 991201465329.

Special tool

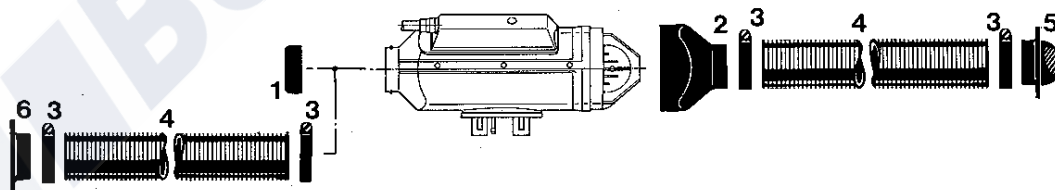


* This must be kept free.

If the mating surface sheet is too thin (criterion: thinner than 1.5 mm), a reinforcing plate, Cat. No. 20157789003 can be installed additionally on the outside.



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 (1m + 1m)
- 5 Air outlet, rotatable
- 6 Connection piece, dia. 60 mm

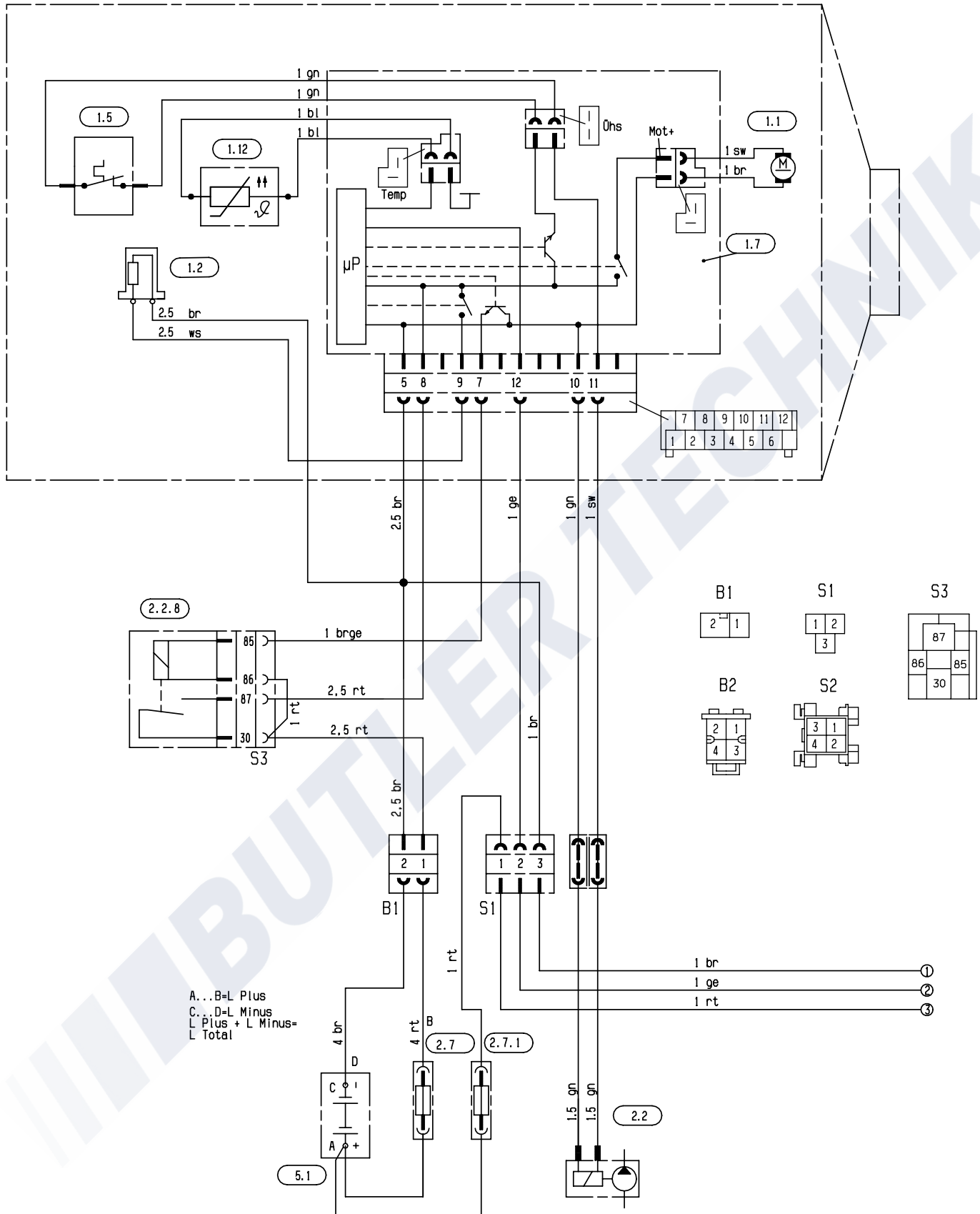
When checking an installation the average output temperature should not significantly exceed 100°C at the output point with an intake temperature of 20°C. This will ensure that the safety thermal cutout switch will not respond under normal operating conditions.

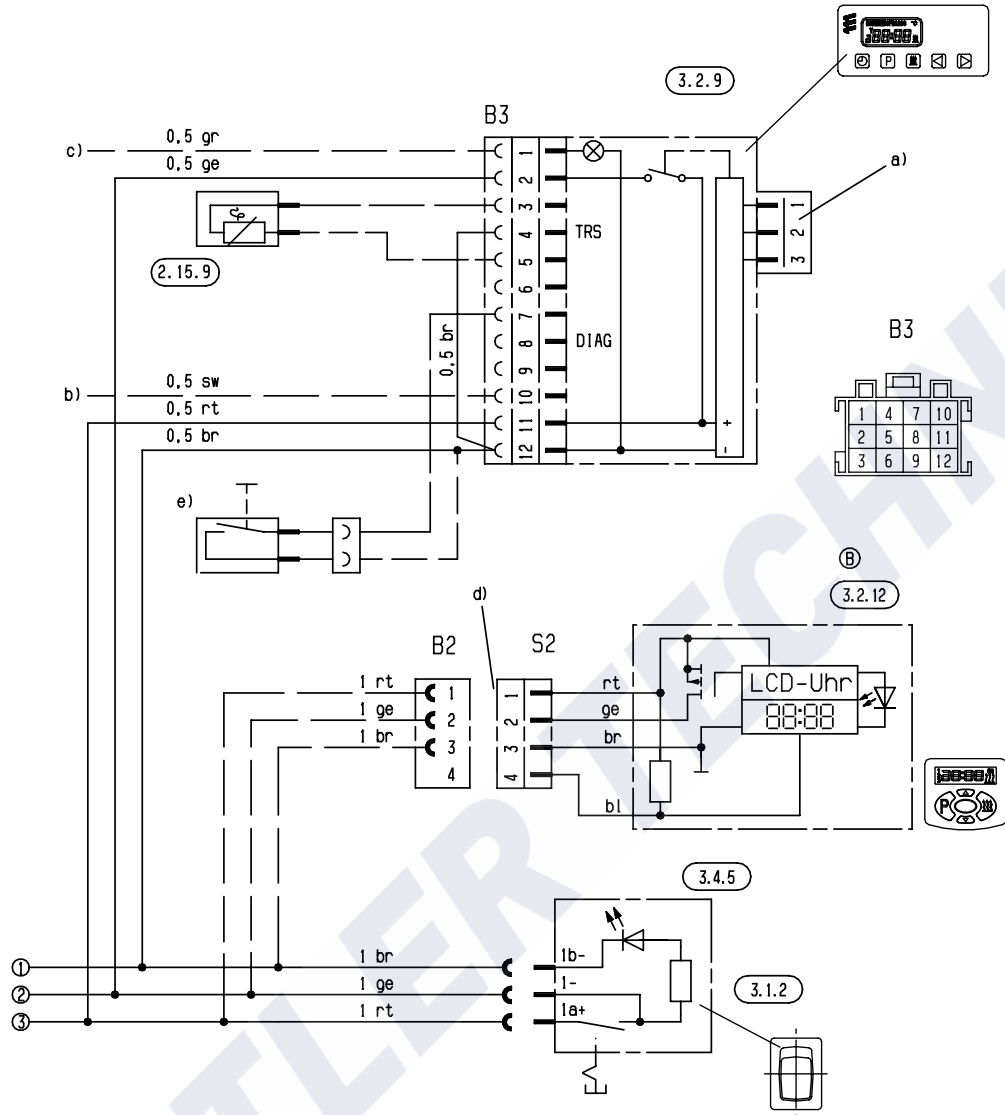
Heating air intake openings shall be arranged in such a manner that exhaust from the vehicle's engine and from

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.
Max. permissible heating air intake temperature 40° C.

Wiring diagram





25 2019 00 96 01 B

Parts List

- 1.1 Burner motor
- 1.2 Heater plugs
- 1.5 Overheating switch
- 1.7 Printed wiring board with controls
- 1.12 Flame sensor

- 2.2 Fuel pump
- 2.7 Main fuse
 - 12 volt = 25 A
 - 24 volt = 15 A
- 2.7.1 5 A fuse (control element)
- 2.15.9 Sensor, outside temperature

- 3.1.2 Heater switch (continuous operation)
- 3.2.9 Module clock
- 3.2.12 Minitimer
- 3.4.5 On indicator light

- 5.1 Battery

- a) Radio module connection
- b) on terminal 15
- c) Lighting terminal 58
- d) optional
- e) External ON / OFF key (optional)

Cable colours

- sw = black
- ws = white
- rt = red
- ge = yellow
- gn = green
- vi = violet
- br = brown
- gr = grey
- bl = blew
- li = purple

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

Electrics:

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.

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

$L^+ + L^- 5 \text{ to } 8 \text{ m} \rightarrow$ 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.

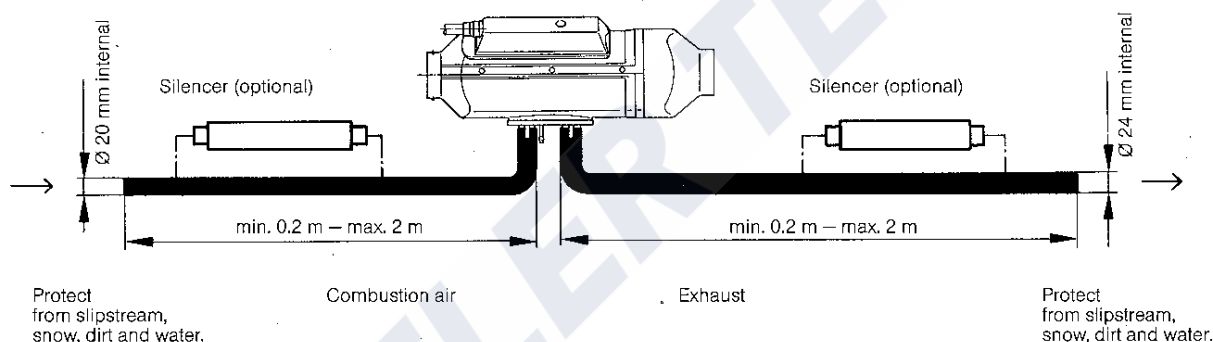
Arrange electric cables, switches and control units in the vehicle in such a way that their correct functioning cannot be impaired under normal operating conditions.

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

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.

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 expected¹⁾, 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.



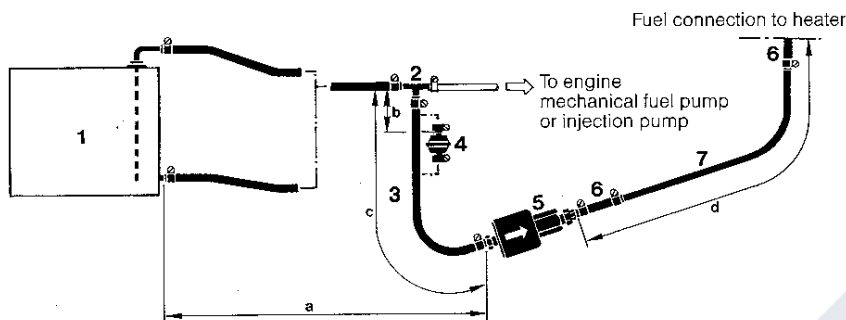
Fuel supply

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

1. For cars with diesel engines.

Fuel tapped from the fuel supply line to the engine.

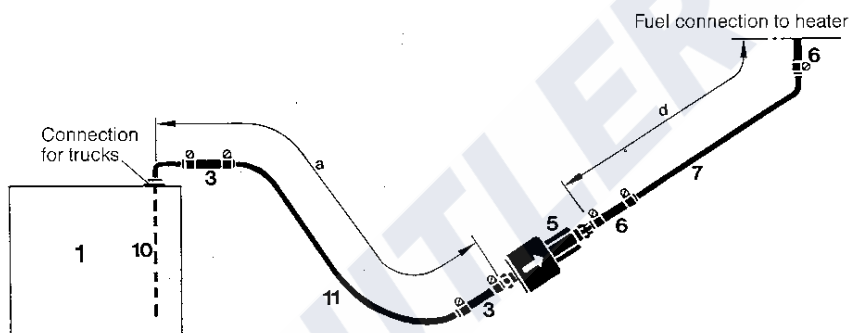
Precondition: The fuel line from the fuel tank to the engine must be leak-free, so that there is no break in the fuel column when the engine is not running.



2. For trucks with diesel engines.

The following possibilities are available:

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



2.2 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. 36075350

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

5 Fuel metering pump (15° to vertically upwards)

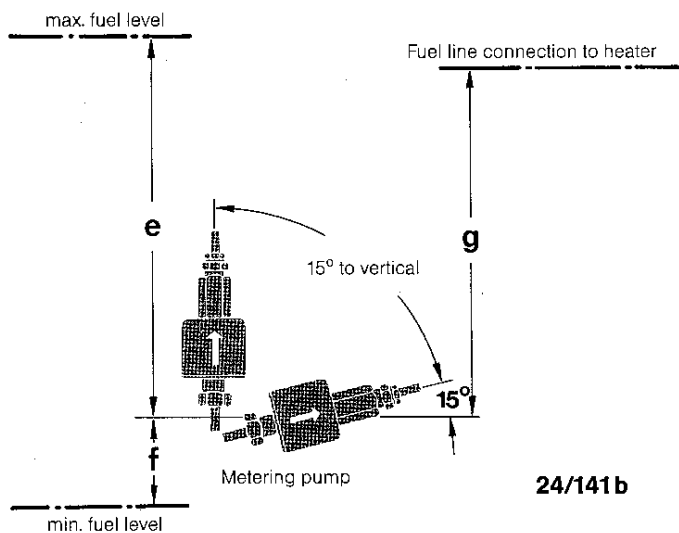
6 Fuel hose, internal dia. 3.5 mm
 Cat. No. 36075300

7 Fuel pipe, plastic, internal dia. 1.5 mm
 Cat. No. 09031118
 or internal dia. 2 mm
 Cat. No. 09031117

10 Riser pipe, internal dia. 2 mm, Cat. No. 251226895000
 external dia. 6 mm

11 Fuel pipe, internal dia. 2 mm
 Cat. No. 09031125

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. 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. 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.

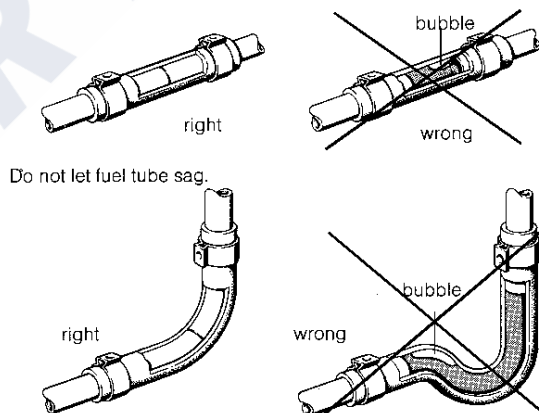
Permissible ambient temperature in operation from -40°C to $+50^{\circ}\text{C}$, not in operation from -40°C to $+85^{\circ}\text{C}$.

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° 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.



Function description/operating instructions

Control elements

1. On/Off switch
2. Heater timer
(additional part, optional, see p. 2). The timers can be used to switch the heater on at once using the timer, or to preset the switch-on time.

Mode of operation

Procedure after switch-on

Switch-on Set On/Off switch to "On".
The pilot light in the On/Off switch comes on.

Further procedure is automatic:

after about 3 secs.: Blower "On"
Heater coil of glow plug "On".

After about 33 secs.: Fuel conveying "On".

When a stable flame has been obtained: Glow plug off.

The heater now operates at full heating capacity (1800 W), and the air heated by the heat exchanger passes through the air outlet into the space to be heated.

Switch-off: Set On/Off switch to "Off".
The pilot light goes off.

The blower continues to operate to cool it down, and finally shuts down automatically after about 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 electronic control unit, which shuts down the heater in the event of faults.

1. If the heater fails to ignite within 180 seconds of the start of fuel pumping, or if the flame goes out by itself during operation, a fault shutdown takes place, with the blower motor continuing to operate for about 3 minutes. Here the glow plug is also "on" during the first 30 seconds. The fault shutdown can be cancelled by switching off and then back on.
2. In the event of overheating, the safety thermal cutout switch (5) is operated, the fuel supply is interrupted, and fault shutdown follows with the blower motor continuing to operate as described above.
Once the cause of the overheat has been removed, the heater can be restarted by switching it off and then back on again.

Note: Depending on the quality of the insulation as the cause of the overheat cut-out, the fuel supply without flame may re-start during the run-on for 1-2 minutes until the device finally comes to a standstill. In this case white smoke may be emitted for a short period after a re-start.

3. If, during start or operation, a short circuit or interruption occurs in motor, glow plug, fuel metering pump or flame monitor, a fault shutdown takes place, possibly with the blower motor continuing to operate as described above.
4. The operation of the blower motor is monitored periodically. If it fails to start or if the motor speed is below the minimum value, fault shutdown takes place.
5. When the heater is switched off, the glow plug is switched on during the delayed shutdown for about 30 seconds (after-glow) to clear it of combustion residues.

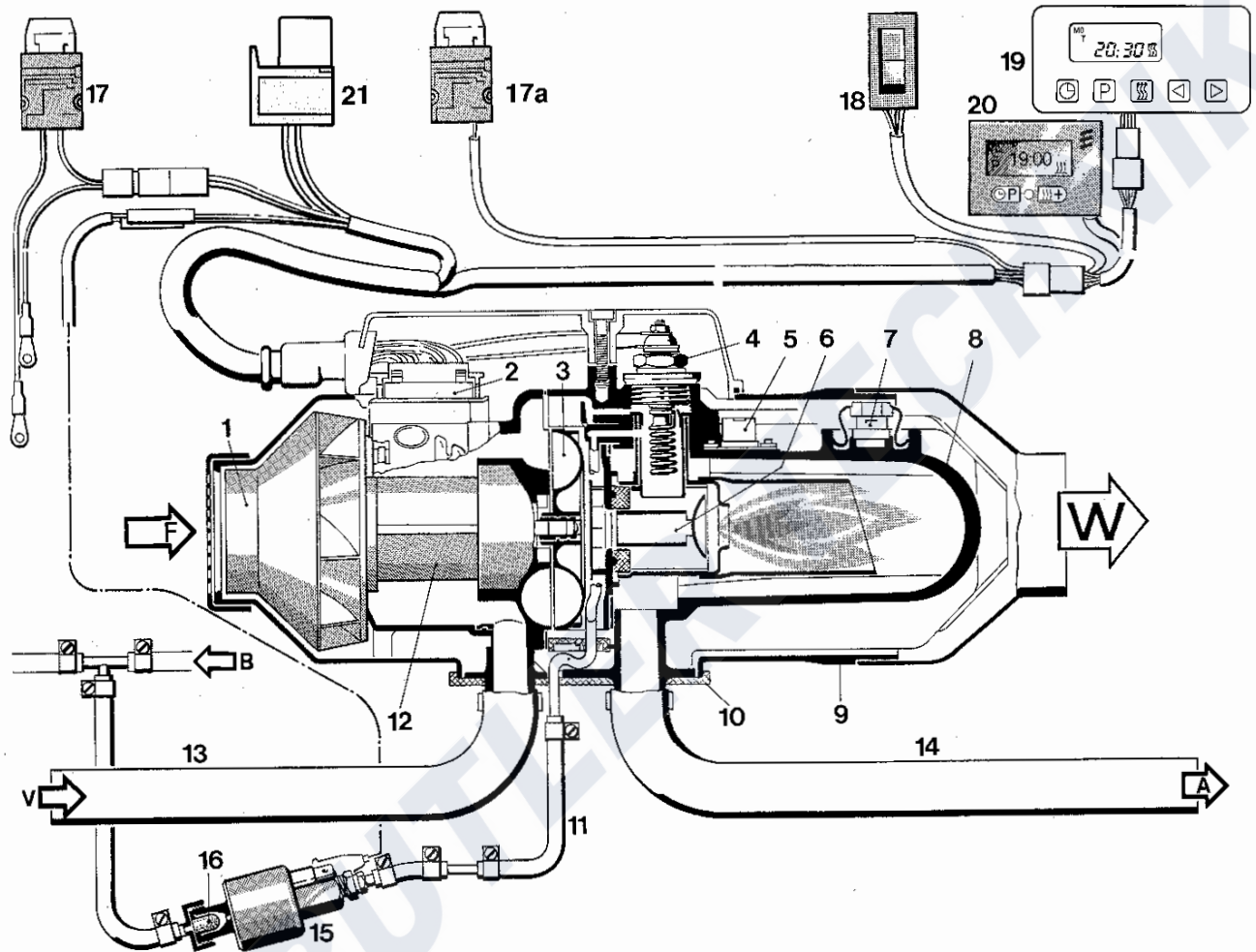
The heater must always be switched off when the tank is being filled.
The heater must not be operated in garages.

In the event of trouble, first check the following:

- Fuel in the tank?
- Fuses OK?
- Electrical lines and connections OK?
- Combustion air and exhaust piping systems free?
- When changing over to winter operation: Is there still summer-quality diesel oil in the lines?

When combustion produces soot, check the following:

- Combustion air and exhaust piping systems clogged?
. Remove cause of clogging
- Fuel metering pump conveying too much?
. Measure fuel quantity, replacing fuel metering pump if necessary
- Deposits in heat exchanger?
. Clean heat exchanger, or replace it if necessary



Parts List

- | | | | |
|--------------------------------|-------------------------------|--------------------------------------|--------------------|
| 1 Heating air blower wheel | 9 Outer casing | 17 Main fuse, 12 V: 25 A; 24 V: 15 A | F = Fresh air |
| 2 Electronic control unit | 10 Flange seal | 17a 5 A fuse (control element) | V = Combustion air |
| 3 Combustion air blower wheel | 11 Fuel line | 18 On / Off switch | B = Fuel |
| 4 Glow plug | 12 Blower motor | 19 Timer | W = Hot air |
| 5 Safety thermal cutout switch | 13 Combustion air intake line | 20 Minitimer | A = Exhaust |
| 6 Combustion chamber | 14 Exhaust line | 21 Relay | |
| 7 Flame sensor | 15 Fuel metering pump | | |
| 8 Heat exchanger | 16 Fuel filter | | |