

Water heater D7W

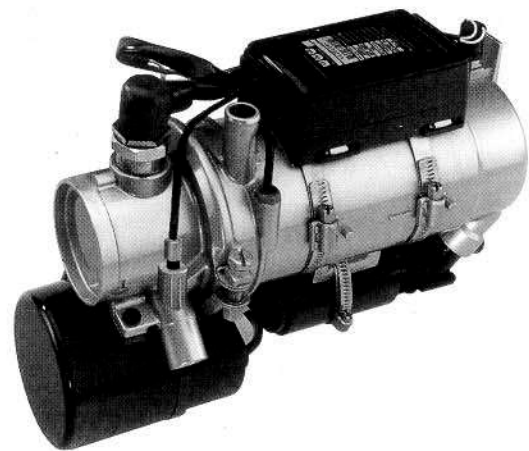


Eberspächer®

Technical description
Installation instructions
Operating instructions

J. Eberspächer
GmbH & Co.
Eberspächerstr. 24
D-73730 Esslingen
Telefon (zentral)
(07 11) 9 39-00
Telefax
(07 11) 9 39-0500

Engine-independent water heater D7W for diesel



Technical data: (± 10%)

Heating medium	water, coolant
Water throughput of water pump against 0.15 bar	approx. 1600 l/h
Min. water throughput	heater approx. 600 l/h
Heat flow ¹⁾	High: 7000 watts (12V), 7500 watts (24V) Low: 1750 watts (12V), 1400 watts (24V)
Control of heat flow	High: full heat flow Low: 1/4 (12V), 1/5 (24V) Off
Fuel (cf. also P.11)	D7W: diesel fuel (com- mercial. Cf. also fuel at low temp. (Page 11)
Fuel consumption ¹⁾	12V: High: 0.9 l/h Low 0.22 l/h 24V: High 0.9 l/h Low 0.18 l/h
Rated voltage:	12 or 24 volts

D 7 W

Basic unit with		Order No.
basic equipment	12 volts	25 18 07 05 00 00
	24 volts	25 18 08 05 00 00

Universal fitting kit	12/24 volt:	25 18 07 80 00 00
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Control elements are to be ordered separately as accessories, cf. Page 2.

Please refer to the accessories catalogue for further accessories.

Operating range

Lower voltage limit ²⁾	10 or 20 volts
Upper voltage limit ³⁾	14 or 28 volts

Electrical power consumption with circulating pump, without heater fan

at start	295 Watts (12 Volts)
approx. 1-2 min	265 Watts (24 Volts)

for continuous	12 V	24 V
	High: 70 Watts	68Watts
	Low: 50 Watts	37Watts

Perm. operating pressure	0.4 to 2.0 bar overpressure
Radioshielding	remote, additional radioshielding possible
Weight silencer, dosing pump	approx. 5 kg (without and controller)
Ambient temp.	-40°C to +80°C allowed

- ¹⁾ at rated voltage
²⁾ An undervoltage protection in the controller switches the device at around 10.5 or 21 volts off.
³⁾ An overvoltage protection in the controller switches the device at around 15 or 31 volts off.

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Scope of delivery (Figure Page 3):

Fig. No.	Units	Name/Order No.
D 7 W		
1-3	1	Basic unit with basic equipment
		12 volts 25 18 07 05 00 00
		24 volts 25 18 08 05 00 00

In the D 7 W the basic equipment contains:

1	1	Basic unit (not available separately)
		D 7 W - 12 volts 25 18 07 01
		D 7 W - 24 volts 25 18 08 01
2	1	Controller
3	1	Dosing pump with built-in fuel filter
4	1	Relay glow plug clocking
5		Relay vehicle fan
6	1	Silencer (24V)
Can also be ordered for D 7 W:		
-	1	Universal fitting kit for D 7 W-12V/24V 25 1807 80 00 00

Optional control elements



In case of a fault:
Code number is displayed.
flashes (workshop).
Can be remote controlled by radio when add-on device is fitted.

Automatic heater switch

12 V and 24 V
Order No.
22 1000 30 34 00
Fastening components only required when fitted with screen)
Order No.
25 1482 70 01 00



Mini clock

Order No.
12 V and 24 V 22 1000 30 14 00

If other common automotive engineering switches are used their load-carrying capacity must be at least 10A.

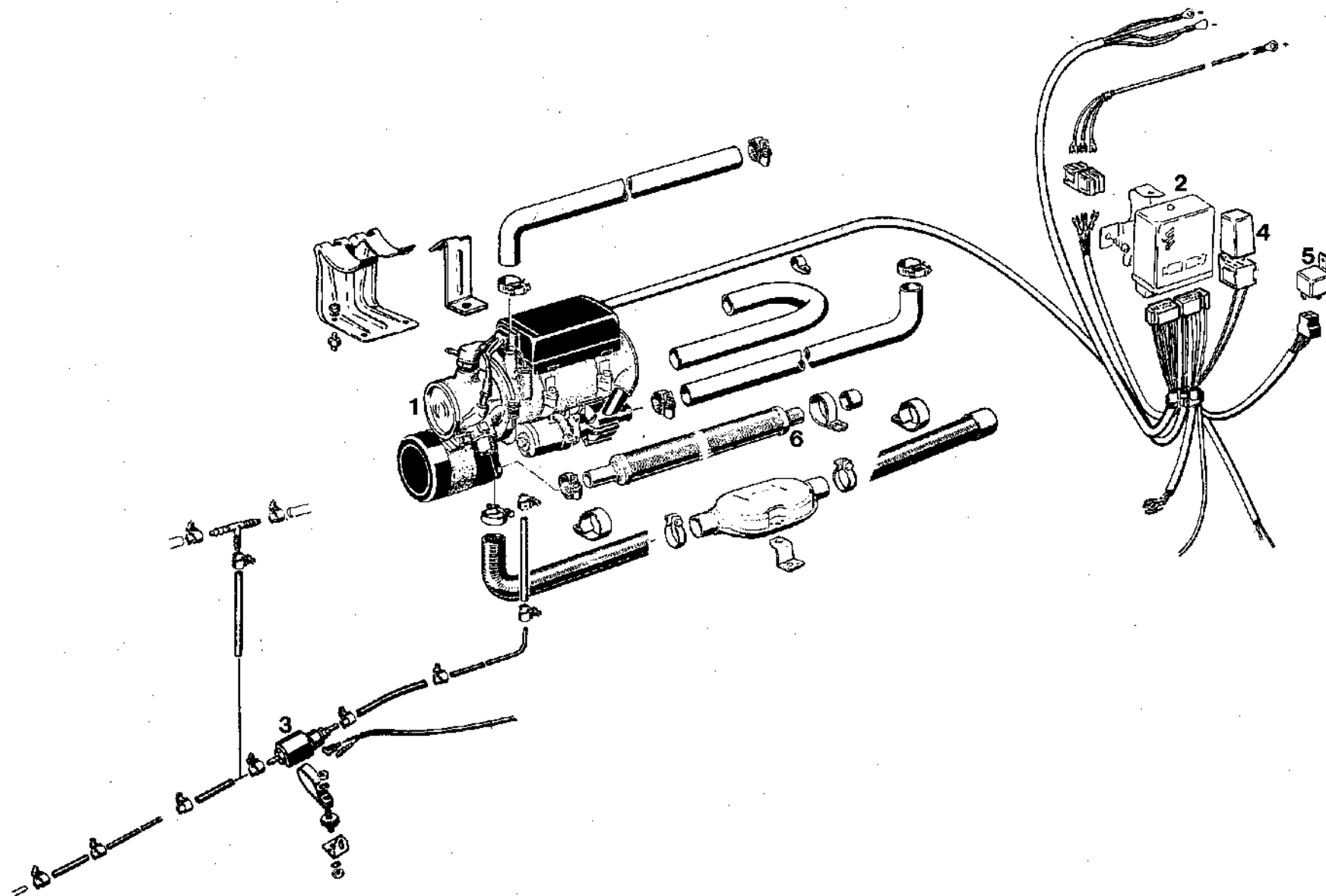
Important:

Before switching on or pre-programming heating operation, set the heater lever of the vehicle to "warm" (maximum position) and the blower switch or lever to the slowest speed (low power consumption).
Operating instructions for timers and switches are supplied with these control elements.

In the case of vehicles with automatic heater, set the heater lever to "Max." and open the heating vent before switching off the ignition.

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.



to tank connection

parts without item number =
universal installation kit




Installation instruction:

Heaters D 7 W are used in conjunction with the vehicle heating system to preheat truck engines, warm cabs and defrost windows.

They are connected up to the cooling water circuit, the electrical system and the fuel system of the vehicle.

Approval, official regulations, general

1. For vehicles registered in West Germany (subject to the road traffic regulations StVZO), the heaters are approved by the Federal Motor Vehicle Office and receive an official test symbol (D 7  S 214) indicated on the name plate. The year of first operation is a requirement of German approval not representing a model number.
- The heater must be retrofitted according to these installation instructions. The installation is to be checked in accordance with § 19 StVZO (Federal Motor Vehicle Safety Standards) by an officially certified expert or tester of motor vehicles, a motor vehicle expert or employee in accordance with Section 7.4a of Enclosure VII to the StVZO following submission of the "Final approval certificate" and this certified on the final approval certificate with details of the vehicle manufacturer, vehicle type and vehicle identification number.

The form "Final approval certificate" and a copy of the "General design certification" are available from the heater manufacturer or through their contractual workshop.

The "Final approval certificate" and the copy of the "General design certification" are to be kept in the vehicle. The validity of the design certification depends on this.

An entry in the vehicle's registration papers - which had been obligatory up to December 1993 - is then no longer necessary.

Alternatively, the installation of the heater can be entered in the vehicle's registration papers - which was common practice up to December 1993. (§ 19 section 4).

2. If the heater is installed in special-purpose vehicles (e.g. vehicles transporting dangerous cargoes), the regulations applicable to such vehicles must be observed.
3. The heater must not be operated in closed rooms, e. g. garages. The heater must always be switched off when the petrol tank is to be filled.
4. The heaters must be installed by a workshop approved by the manufacturer and in compliance with the installation instructions.
5. The heaters may only be used for the purpose specified by the manufacturer and in compliance with the operating instructions supplied with every heater. Operating the heater is not permitted where inflammable vapours or dust can build up (e. g. near fuel, coal or sawdust stores, grain silos etc.).

6. Differences from the installation instructions, particularly with regard to the water supply connection, wiring (wiring diagrams, fuel supply, combustion air and exhaust ducts, and use of operating and control elements not supplied by the manufacturer, are only permissible with the written approval of the manufacturer. Since water heaters are incorporated into the cooling system of the vehicle engine, they form an integral part of the cooling system.

The following points must therefore be borne in mind:

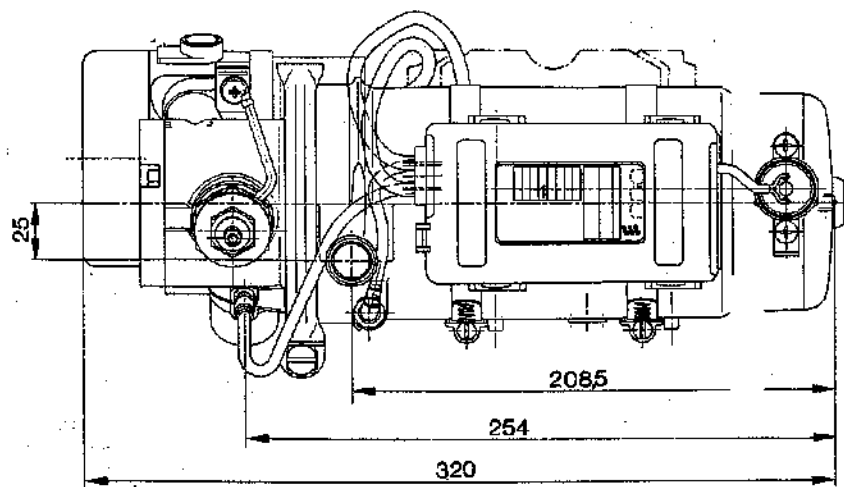
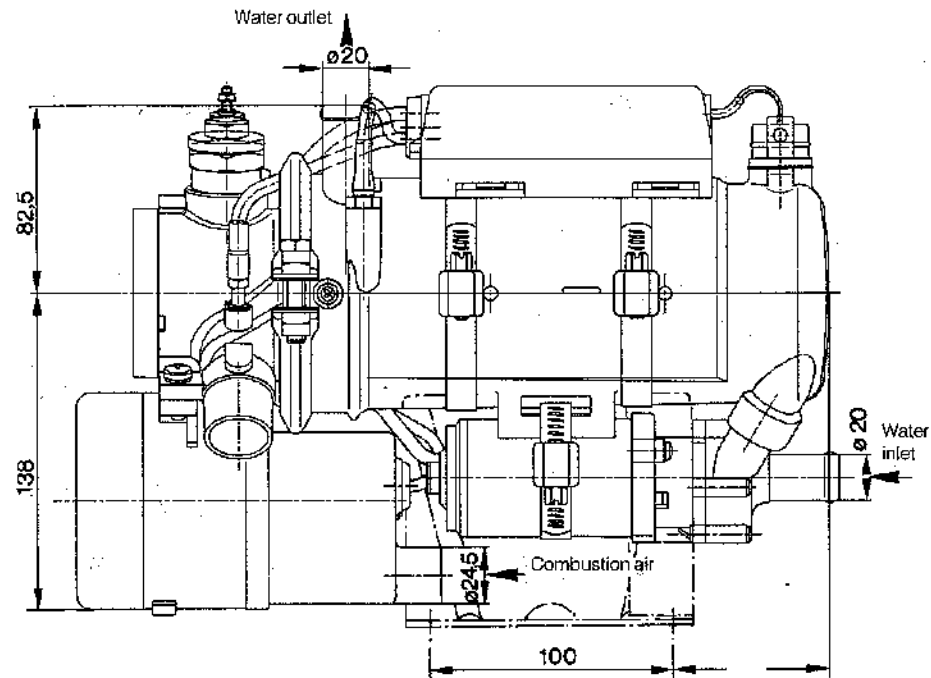
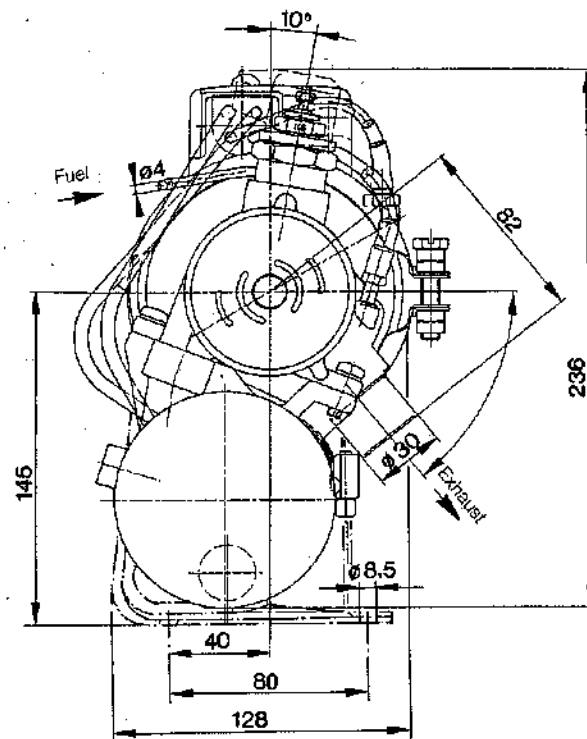
- 6.1 The heater must always be mounted below the cooling water level of the radiator or vehicle heat exchanger in such a way that it operates in the flow direction of the engine circuit.
- 6.2 The entire cooling system including the heater must be bled to free it of bubbles following installation and in accordance with the engine manufacturer's specifications. All water connections (clips) must be tightened sufficiently to prevent all leaks and then retightened after 2 hours of operation or 100 km driving.
- 6.3 All water ducts must be protected against chafing and excessive temperatures (radiated heat from exhaust pipes).
- 6.4 Following any work on the cooling water system (repairs, cooling water change), the system must be bled as set forth in 6.2.
- 6.5 The coolant should contain at least 10% antifreeze all year round as corrosion protection. In cold weather the coolant must contain antifreeze in sufficient quantity. Operating the heater with frozen coolant is not permitted.

If the above instructions are not complied with, the manufacturer's warranty for the entire heater system is null and void, and possibly the general operating permit for the vehicle.

7. Every combustion process generates exhaust gas, which has toxic constituents. Because of this and the high temperatures generated, the exhaust duct must comply without fail with the installation instructions. Failure to comply with the instructions or operation of the heater in closed rooms (garages) harbors the risk of poisoning.
8. When the heater or the heating system is damaged, an authorized workshop must be called in to repair the damage in an expert manner and using genuine spare parts. Makeshift repairs (on one's own initiative) or the use of non-genuine spare parts are dangerous, and therefore not permitted. When carried out in cars, they invalidate the general design approval of the heater and consequently the general permit of the vehicle.
9. The warranty conditions are set forth in the heater booklet given to you by the after-sales service workshop when the heater is installed. Only our warranty conditions shall apply.



Principal dimensions



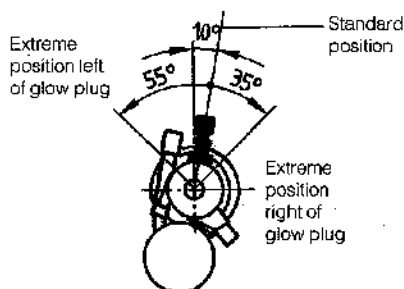
Installing the heater:

The heater is installed in the engine compartment, as low down as possible so that the heat exchanger and water pump can bleed themselves. Note which installation positions are permissible.

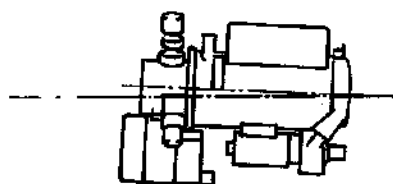
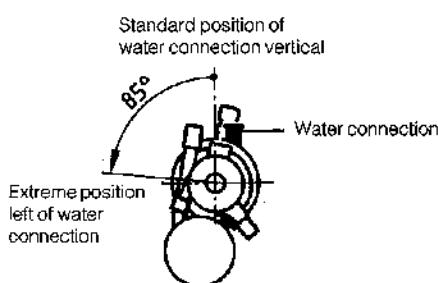
The factory plate must be clearly visible with the heater installed. If necessary, a second plate (duplicate) may be affixed, with the same information as the original, to a place on the heater clearly visible after installation, or to a cover placed in front of the heater. A second plate is unnecessary if the original is visible after removal of a cover without the aid of tools.

Permissible installation positions

Permissible installation position of burner (glow plug)



Permissible installation position of heat exchanger (water connection)



The position of the glow plug in relation to the water connection can be changed within the given installation positions after releasing the clip and turning the burner and heat exchanger.

Standard position:

Install heater at a slight angle to the horizontal as shown in the sketch to ensure complete venting.

Different installation positions are possible following consultation with our factory.

Running the combustion air/exhaust

Supply of combustion air

The combustion air must be taken in from outside (not from the passenger compartment or boot). The heater has a fitted silencer, or this is pushed on in the case of the 24 V model. The end sleeve is slipped onto this.

Do not fit the inlet opening in the opposite direction to the slipstream and position it so that it cannot become clogged with dirt and snow and that water can drain off.

Removal of exhaust gas

The heater comes complete with a flexible exhaust gas hose, inside Ø 30 mm, 1300 mm long.

Cut at a suitable position and insert the exhaust gas silencer between the two halves (see illustration on Page 3). The exhaust gas line can be shortened if required.

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 their lowest points for draining off condensate.

The exhaust outlet and the combustion air inlet must be so arranged that exhaust cannot be sucked in again 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 blower 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.

Connection to the cooling water circuit:

The pressure in the cooling water circuit must be limited by a pressure relief valve (e. g. radiator filler cap) to a maximum of 2 bars gauge pressure.

There are two possibilities to do so:

1. Using a thermostat in the supply line to the heater.

Heating characteristic:

Initially, the heat from the additional heater is supplied only to the driver's cab up to a cooling water temperature of about 70°C = small circuit, rapid heating.

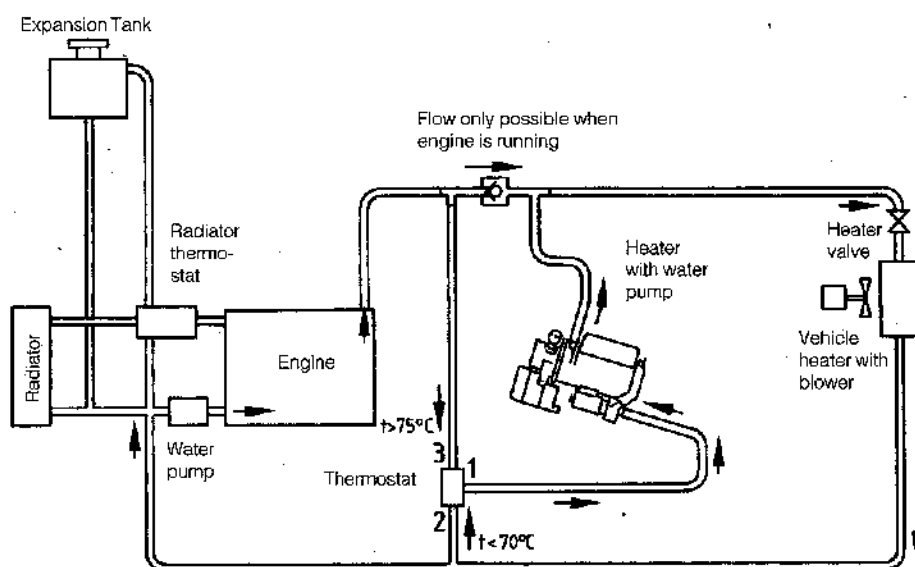
Important:

When operating with an additional heater, the heating valve must always be wide open.

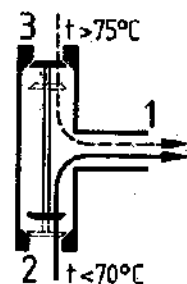
Recommendation: use a switch with an N/C limit position contact for all heating circuits.

If the cooling water temperature rises further, the thermostat changes gradually (changeover completed at 75°C) to the large circuit = additional engine preheating.

Very important: Make the connections 1, 2 and 3 as shown in the sketch.



Thermostat, Ø 20 mm
Cat. No. 330 00 124



$t > 70^{\circ}\text{C}$ = 3 closed
2 opened

$t > 75^{\circ}\text{C}$ = 3 closed
2 opened

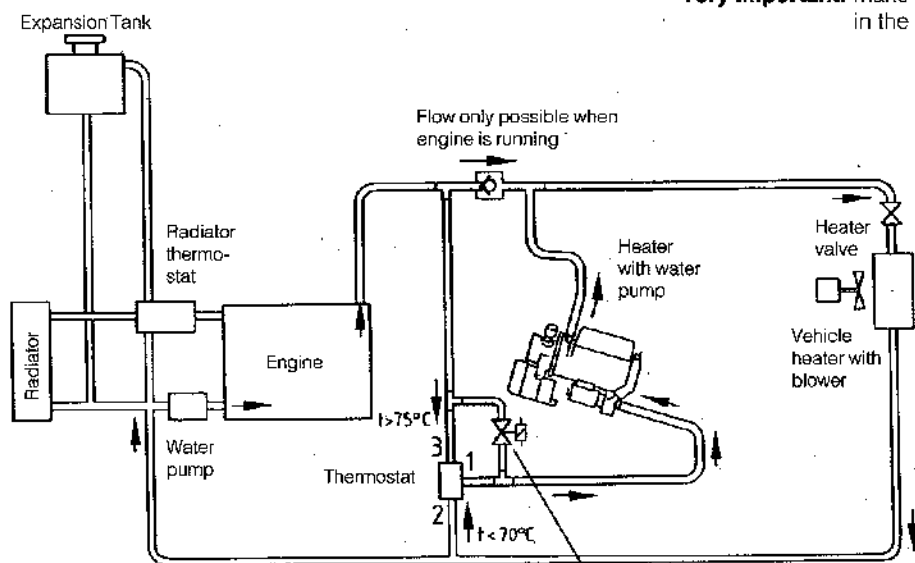
2. With thermostat as in example 1.

Additional solenoid valve bypasses the thermostat when open (voltage applied). This enables the engine too to be preheated right from the start.

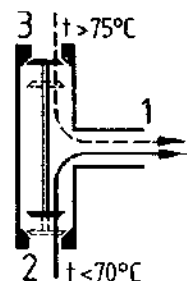
Advantage:

Engine preheating can be activated regardless of temperature.

Very important: Make the connections 1, 2 and 3 as shown in the sketch



Thermostat, Ø 20 mm
Cat. No. 330 00 124



$t > 70^{\circ}\text{C}$ = 3 closed
2 opened

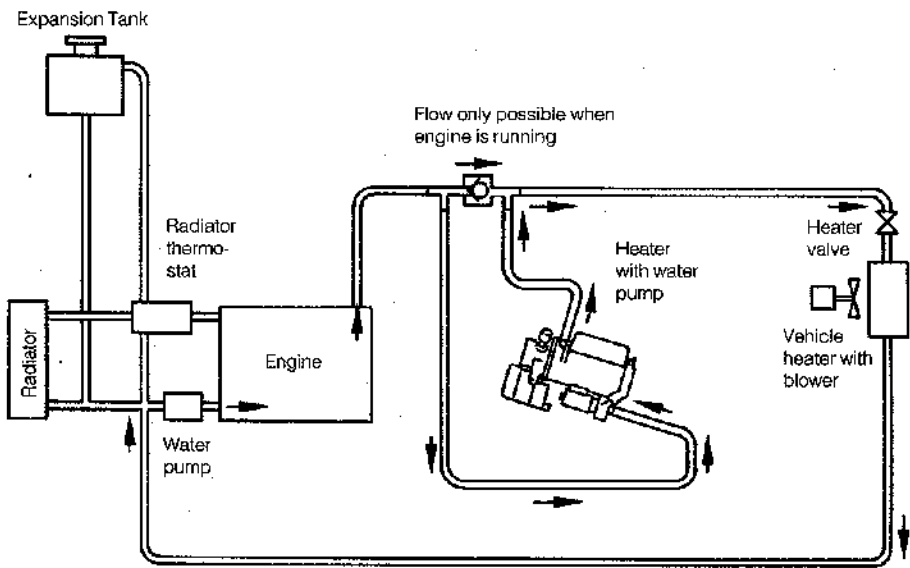
$t > 75^{\circ}\text{C}$ = 3 closed
2 opened

Solenoid valve, Cat. No. 330 00 115

3. Heater in coolant line between engine and heat exchanger of vehicle, with non-return valve installed parallel. No thermostat.

Advantage:
Easy assembly.

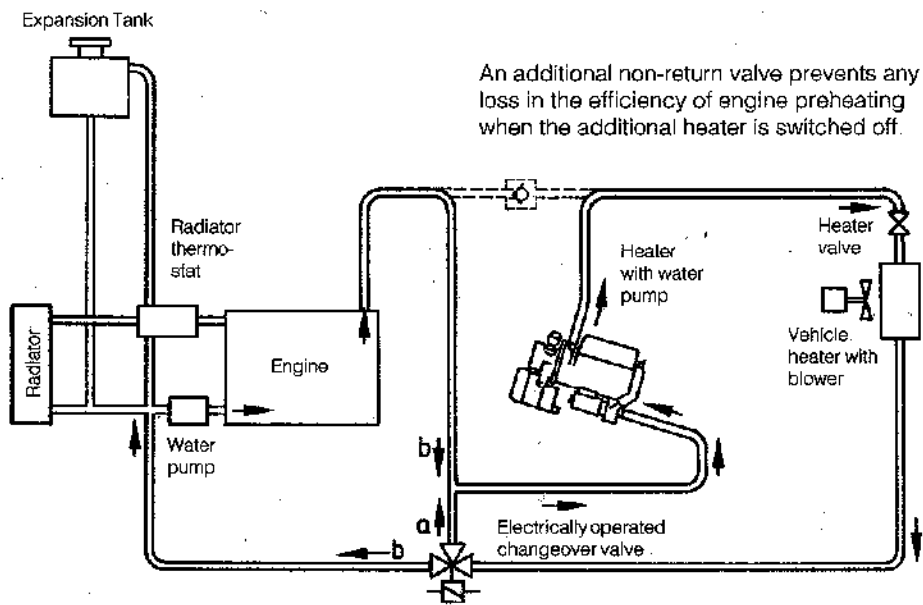
Disadvantage:
Continuous flow through engine. Low cab heating efficiency in the case of large engines. For that reason only recommended for small engines.



4. Instead of the thermostat in Example 1, an electrically operated changeover valve can be used for optional switching to small circuit (cab heating only) or large circuit (cab heating plus engine preheating).

Advantage:
Selection of heating circuit regardless of the temperature.

Disadvantage:
No automatic regulation possible, unlike in thermostat operation (examples 1. and 2.).



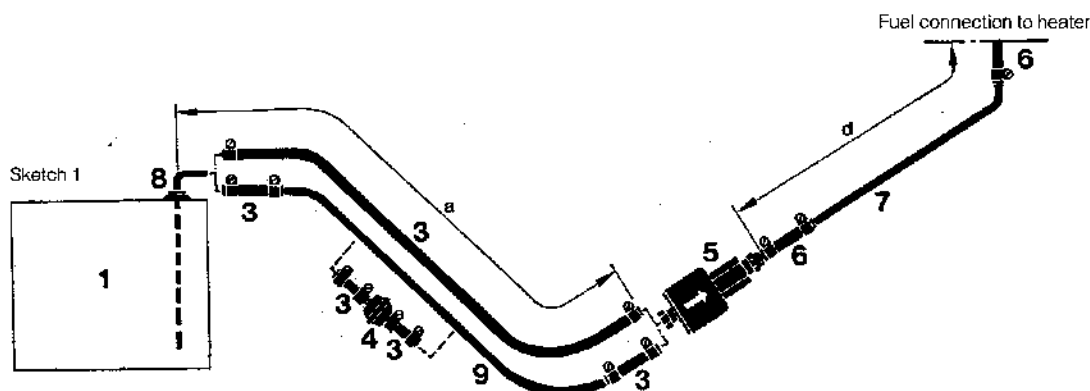
Flow: a = live
b = no voltage



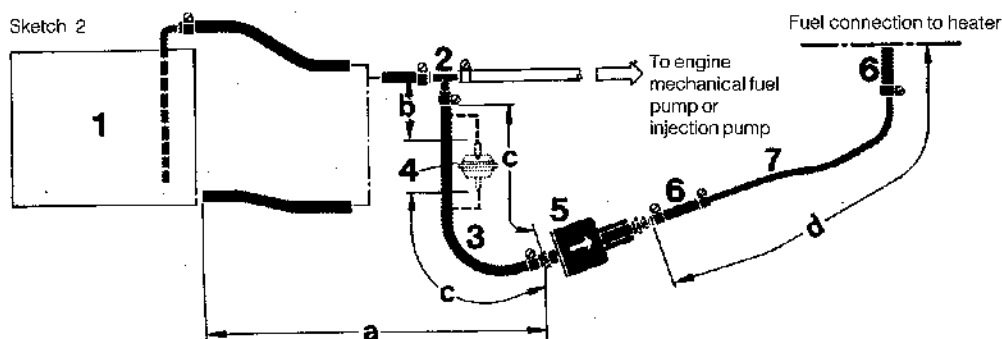
Fuel supply for heaters of more than 5 kW (as a rule trucks, construction machinery etc.)

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

1. Fuel is preferably tapped from the vehicle fuel tank or from a separate fuel tank with 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 as shown in Sketch 2 in the case of diesel-engined vehicles and petrol-engined vehicles with a mechanical fuel pump.



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 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. 2 mm

Cat. No. 090 31 117

8 Riser pipe (tank connection), internal dia. 4 mm

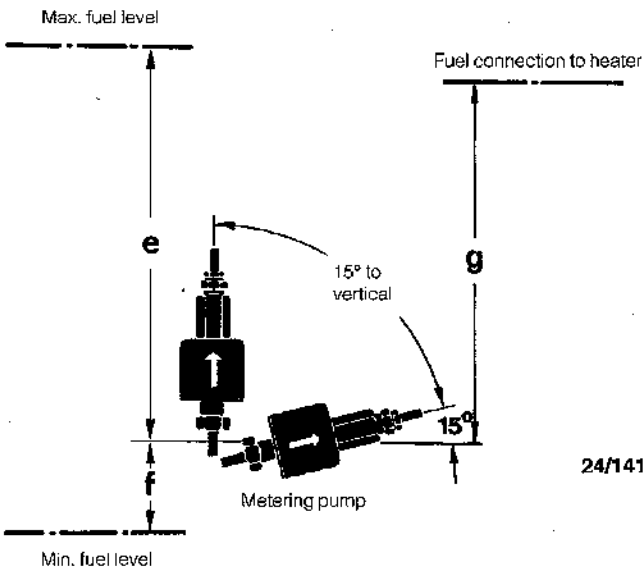
Cat. No. 25 1156 30 00 00

9 Fuel pipe, internal dia. 4 mm

Cat. No. 049 10 030 steel

080 16 001 copper

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



Supply pressure from tank to metering pump:
 $e = \text{max. } 1000\text{mm}$

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

Check whether tank ventilation is working properly

Intake from tank when underpressure occurs during operation (valve 0.03 bars in tank cap)
 $f = \text{max. } 400\text{ mm with diesel oil}$

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

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

24/141 b

4. Important

Sections 45 and 46 of the West German road traffic regulations also apply, with due alteration of details, for the fuel lines and additional tanks of heaters.

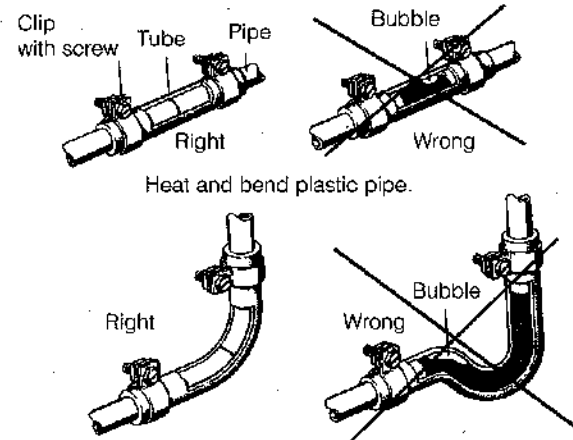
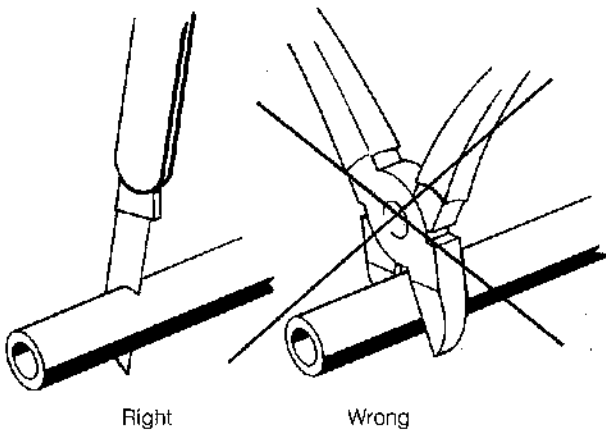
Protect fuel line, filter and metering pump from overheating; do not install near silencers and exhaust pipes. Temperatures above 30°C lead to gas bubbles and problems with petrol.

When laying fuel line, fuel filter and fuel metering pump near the rear axle, allow for the spring deflection of the latter.

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

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

Connect up fuel pipes with a fuel tube. Fit the fuel pipe flush.





Fuel grades

Fuel of D 7 W at low temperatures

The heater can take without problem the fuel you use in your tank and which is commercially available. 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).

Difficulties can therefore only arise at extremely low temperature (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 at low temperatures, mix in petroleum or petrol according to the table.

Temperature	Winter diesel fuel	Additive
0° to - 15°C**	100%	-
- 15° to - 25°C	50%	50% Petroleum or petrol
- 25° to - 40°C	-	100% Petroleum*

* or special winter diesel fuels.

** 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

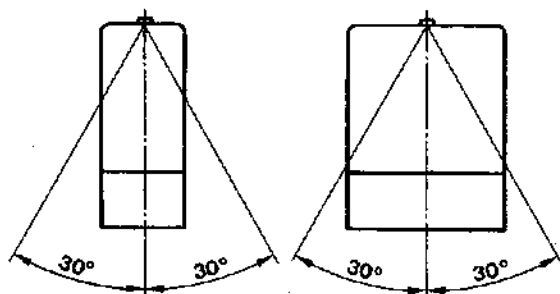
In special cases, the heaters can also be operated with extra-light fuel oil (above 0° C) or petroleum. If in doubt, please consult the manufacturer.

Electrics:

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

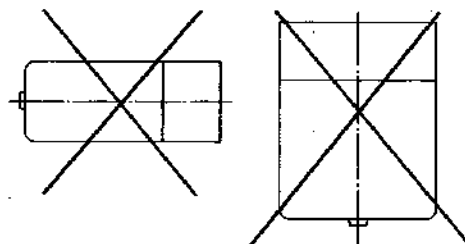
Fit the control unit so that it is protected from splash water (from both its own vehicle and preceding ones). Outside installation is thus not permissible. The unit is best arranged in the vehicle interior, with the plugs pointing downward.

Control unit
Permissible installation angles

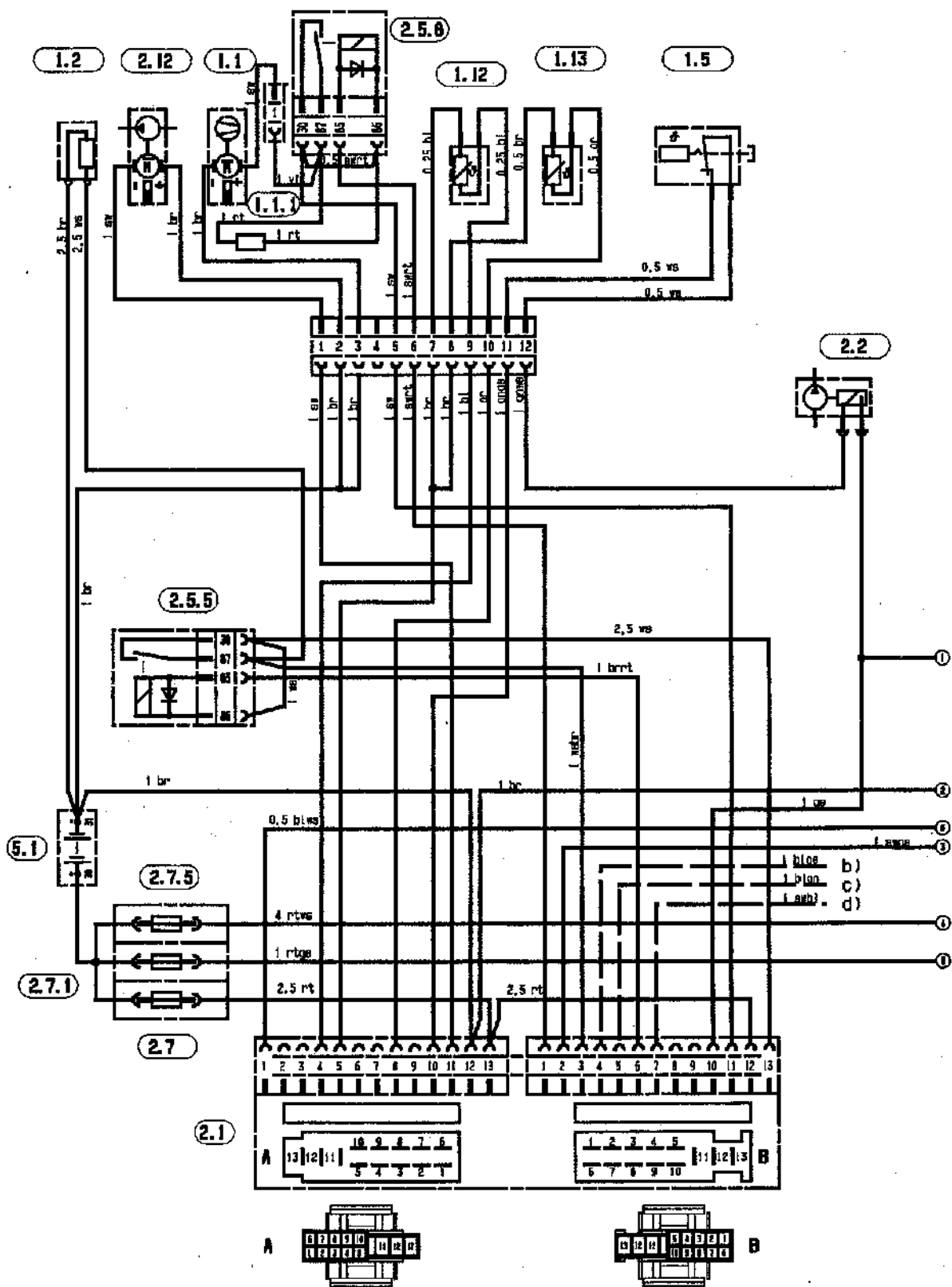


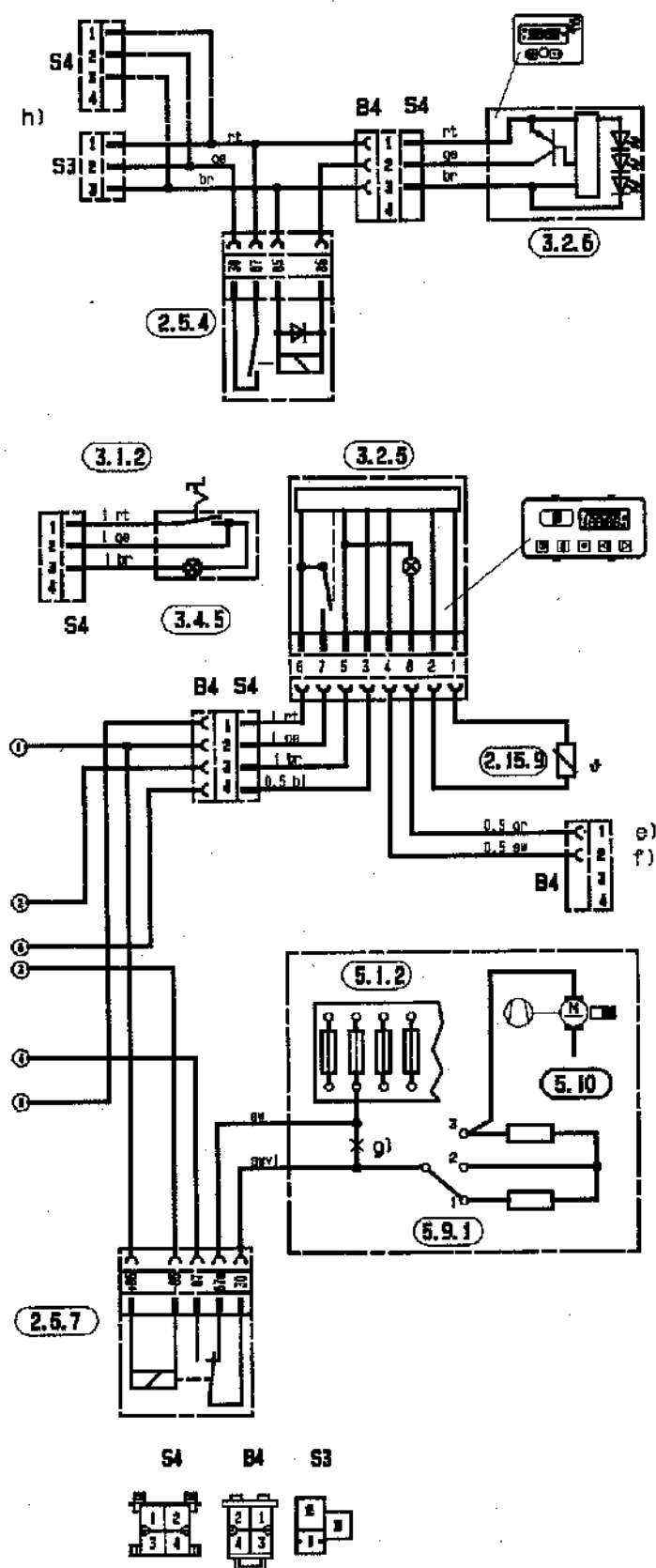
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Control unit
Non-permissible installation angles



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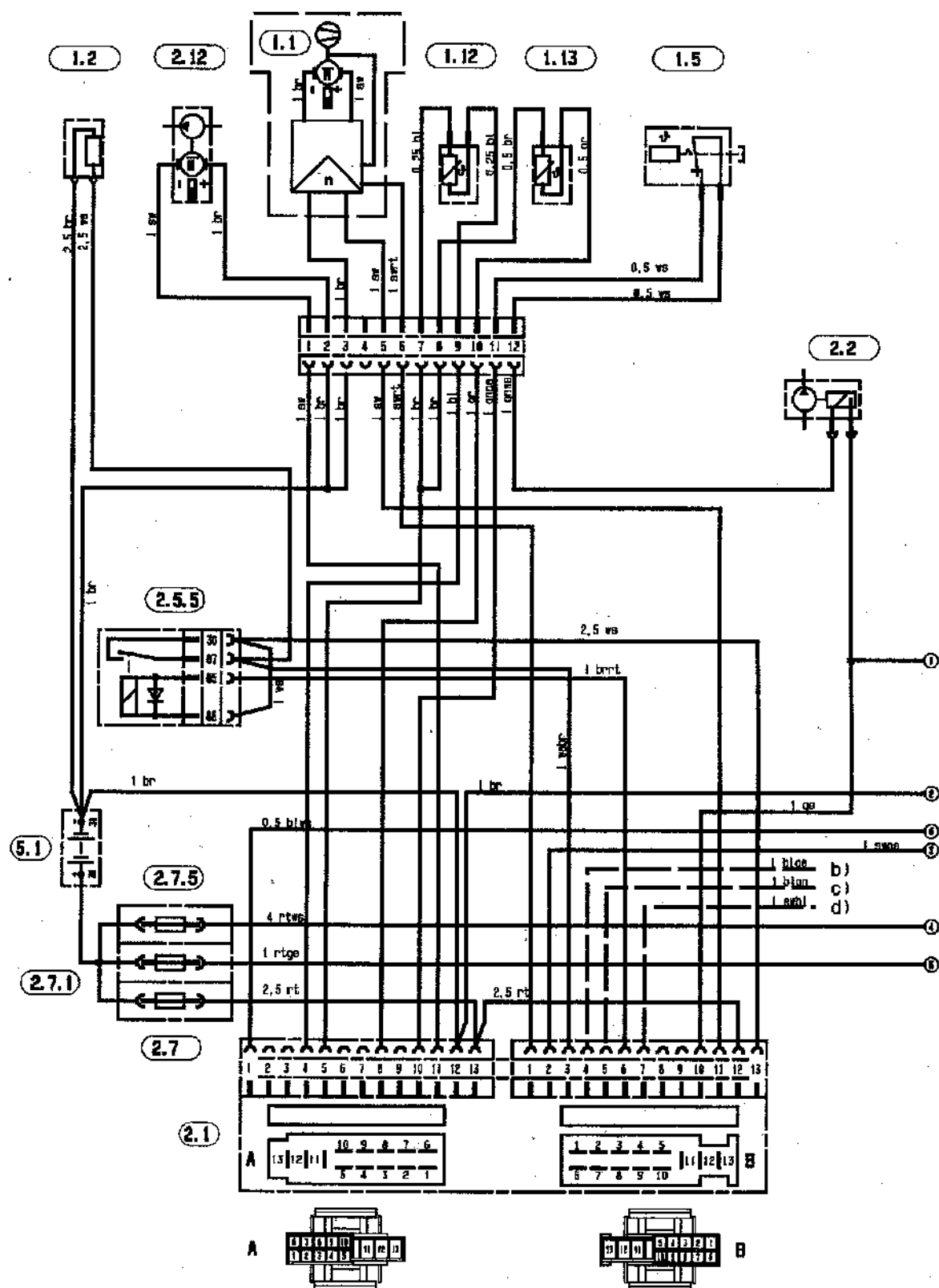


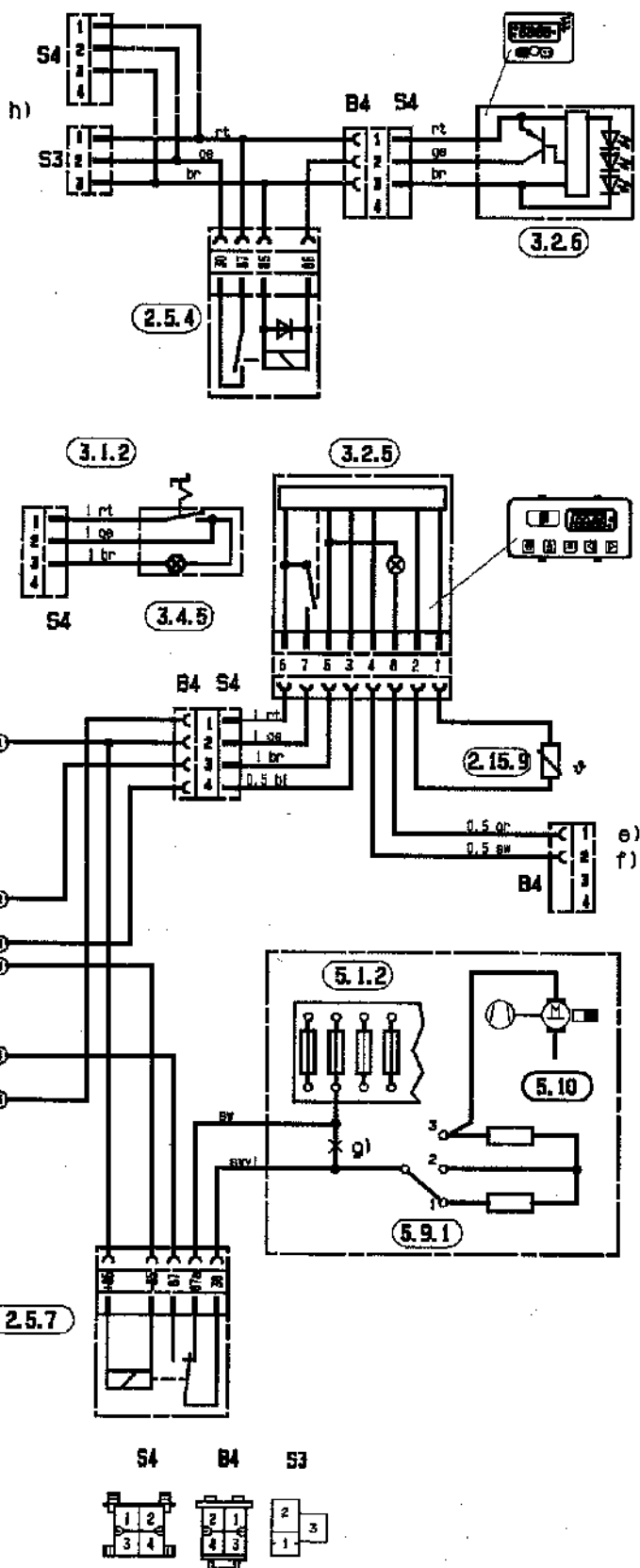
Parts list

- 1.1 Burner motor
- 1.1.1 Resistor for burner motor (partial load)
- 1.2 Glow plug
- 1.5 Overheat switch
- 1.12 Flame guard
- 1.13 Temperature probe
- 2.1 Controller
- 2.2 Fuel dosing pump
- 2.5.4 Relay connect
- 2.5.5 Relay glow plug clocking
- 2.5.7 Relay vehicle fan
- 2.5.8 Relay engine speed switchover
- 2.7 Main fuse (25A)
- 2.7.1 Fuse operation (5A)
- 2.7.5 Fuse vehicle fan (25A)
- 2.12 Water pump
- 2.15.9 Probe, outside temperature
- 3.1.2 Switch heating (continuous duty)
- 3.2.5 Clock timer, 7 day
- 3.2.6 Clock timer, mini
- 3.4.5 Connection control lamp
- 5.1 Battery
- 5.1.2 Fuse strip in vehicle
- 5.9.1 Switch vehicle fan
- 5.10 Vehicle fan
- b) Water pump - external excitation
- c) Temperature lowering
- d) Switchover solenoid valve
- e) Illumination terminal 58
- f) to terminal 15
- g) Line disconnect
- h) Remove S3 and mount S4

Plug and socket housings are shown from line entry side

Wiring diagram D 7 W - 24 volt

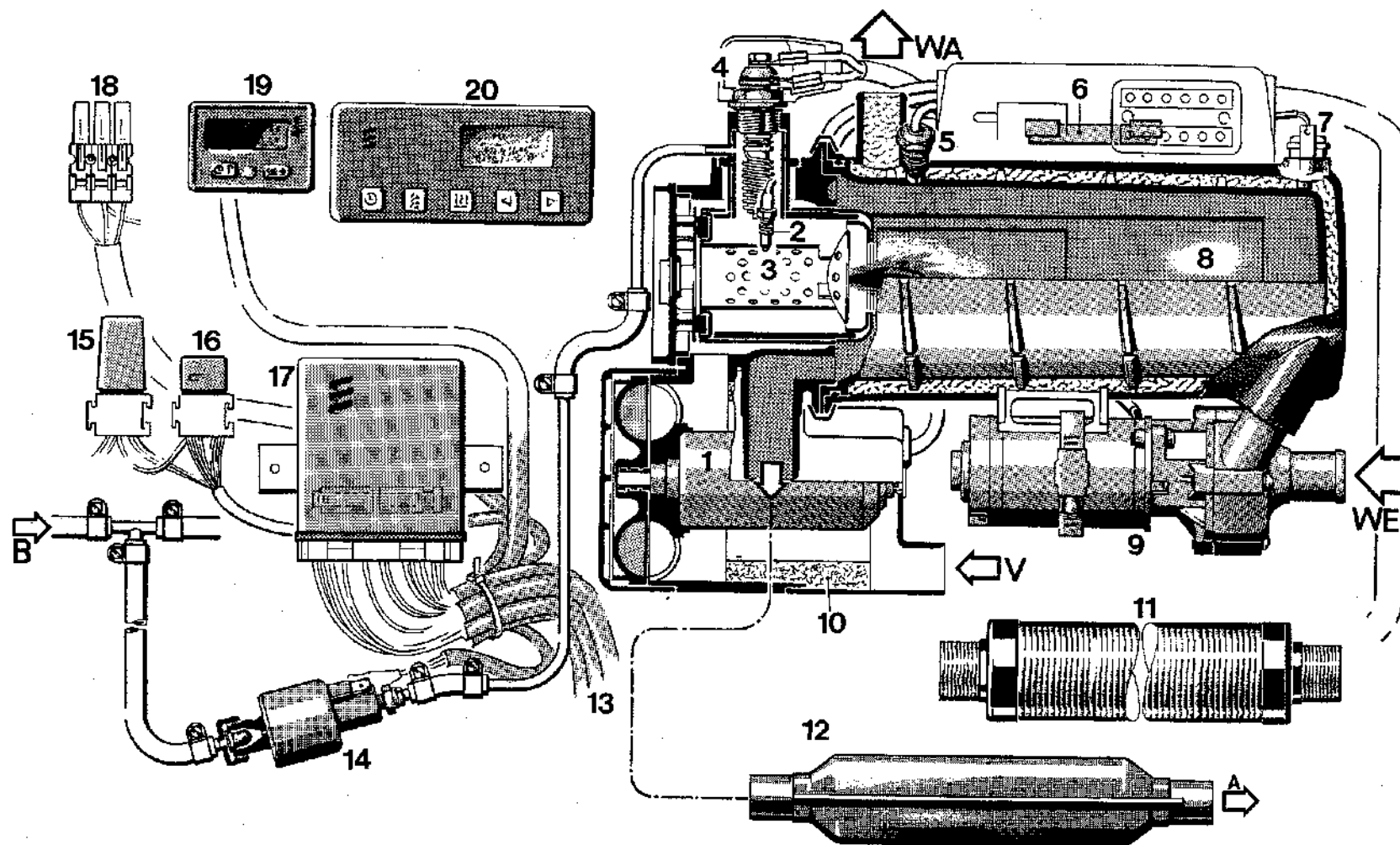




Parts list

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- 1.2 Glow plug
- 1.5 Overheat switch
- 1.12 Flame guard
- 1.13 Temperature probe
- 2.1 Controller
- 2.2 Fuel dosing pump
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Plug and socket housings are shown from line entry side



- 1 Burner motor
- 2 Flame probe
- 3 Combustion chamber
- 4 Glow plug
- 5 Temperature probe
- 6 Additional resistor for partial load
- 7 Overheat switch

- 8 Heat exchanger
- 9 Water pump
- 10 Silencer (12V)
- 11 Silencer (24V)
- 12 Silencer for exhaust gas
- 13 Cable tree
- 14 Fuel dosing pump

- 15 Relay glow plug clocking
- 16 Relay to switch on vehicle fan
- 17 Controller
- 18 Fuses
- 19 Clock timer, mini
- 20 Clock timer

- WE = Water inlet
- WA = Water outlet
- V = Combustion air
- B = Fuel
- A = Exhaust gas



Functional description

Control elements (see also P.2)

If other common automotive engineering switches are used their load-carrying capacity must be at least 10A.

The heater can be switched on immediately or the switch-on time pre-set with the clock timer.

Warning!

Before switching on or pre-programming the heating mode set the vehicle's heating switch to "warm" (maximum position) and the fan switch or lever to "slow speed" (low power consumption). Operating instructions for the timers are supplied with the control elements.

Switching on

The control lamp in the clock timer comes on when the heater is switched on, the combustion air fan and the water pump start, the glow plug glows (preheating). After a preheat time (20 to 50 sec. depending on the operating voltage) the fuel dosing pump starts to pump fuel with the fast pulse frequency for full-load into the combustion chamber and ignition takes place. Once the flame probe signals to the controller that combustion has taken place properly the glow plug is switched off. The device continues to run with the full heat flow.

Heating mode*

If the cooling water reaches a temperature of approx. 55°C the temperature probe switches the vehicle fan on. Various operating modes are now possible depending on the removal of heat in the heating cycle:

1. The removal of heat is 7000 W or above: the heater operates permanently in setting "High", the maximum temperature of the cooling water is 82°C.
2. The removal of heat is between 1750 W (1400 W for 24V) and 7000 W: (the normal case).
The temperature of the cooling water now continues to rise. At around 82°C the temperature probe switches the device to its "Low" setting.
Fuel and combustion air quantity (speed of combustion air fan) are reduced to a heat flow of approx. 1750/1400 W. Since the heat demand is greater than 1750 W/1400 W the temperature of the cooling water drops. The temperature probe switches to the device back to "High" at around 72°C.
3. The removal of heat is lower than 1750 W/1400 W (rare)
At approx. 82°C the temperature probe initially switches the device to the "Low" setting.
On account of the low heat demand the temperature continues to rise. At around 90°C the fuel supply is stopped, the combustion air fan continues to run for approx. 180 sec. (run-on), the water pump and vehicle fan remain in operation during the run-on and subsequent control phase. The control lamp remains on. Once the cooling fluid has cooled down to approx. 70°C the device starts at the "High" setting and only switches back to the "Low" setting when the temperature of the coolant reaches 82°C.

Switching off

The fuel supply is stopped when the device is switched off. The control lamp goes out, the combustion air fan and water pump continue to run for approx. 180 sec. and are then automatically switched off.

- The temperature thresholds quoted are examples. Variations are possible depending on customer requirements.

Safety devices

The flame is monitored by the flame guard, the max. permissible temperature by the overheat switch. Both affect the controller which switches the device off in the event of faults.

1. If the heater does not ignite within 90 seconds of the start of the fuel supply the start is repeated.
If the heater still does not ignite after a further 90 seconds a malfunction shutdown is triggered.
2. If the flame goes out on its own during operation a new start is initially performed. If the heater ignites within 90 seconds of the start of the fuel supply but goes out again within 3 minutes a malfunction shutdown is triggered.
The malfunction shutdown can be reset by switching the device off and then back on again.
3. In the event of overheating (lack of water, badly ventilated cooling water cycle) the overheat probe is triggered, the fuel supply is interrupted and a malfunction shutdown carried out.
Once the cause of the overheating has been remedied the button on the overheat switch can be pushed in and the device restarted by switching off and then back on again.
4. If the voltage drops below approx. 10 or 20 volts or if it rises to over approx. 14 or 28 volts a malfunction shutdown is triggered.
5. If the glow plug is faulty or the electrical line to the dosing pump is interrupted the heater will not start.
6. The function of the burner motor is checked once when the device is started - if this does not start the device signals a malfunction.

You can remedy the following faults yourself:

The heater does not start after being switched on,

1. Check the 3 fuses
25 A for heater
5 A for clock timer
25 A for vehicle fan
(if these are faulty the heater starts but no hot air is conveyed)

in the fuse box between the battery and heater -

2. Check the glow plug and replace if necessary.
3. Switch heater off and back on again
Not more than twice. If the heater still does not start have the fault remedied in a workshop.

Please note:

1. To provide protection against corrosion, the cooling agent should contain at least 10% anti-freeze the whole year round.
2. When carrying out electric welding on the vehicle, the plus pole must be disconnected from the battery and connected to ground to protect the control unit.
3. The heater must always be switched off when filling fuel.
4. The heater may not be operated in garages.
5. Switch on the heater for a short time once a month during periods in which it is not used (for approx. 10 seconds). This will prevent the water pump and combustion engine from seizing.