

AIRTOP 5000ST Installation Instructions



Air Heaters

Installation instructions

Air Top 3500

Air Top 5000

Type Air Top 3500 B (Petrol

Type Air Top 3500 D (Diesel)

Type Air Top 5000 B (Petrol)

Type Air Top 5000 D (Diesel)

12/1998

The logo for Webasto, featuring a stylized 'W' icon followed by the word 'Webasto' in a bold, sans-serif font.

Table of Contents

	Page
Installation Instructions	
Legal Provisions for Installation	1
Installation	3
Installation Example	5
Heating Air System	6
Fuel Supply	7
Combustion Air Supply	10
Exhaust Pipe	10
Electrical Connections	12
Circuit Diagrams	15
Initial Operation	22
Shut-Down on Faults	22
Technical Data	23
Drilling Template	25
Webasto Service Phone	27

Installation Instructions

Legal Provisions for Installation

For testing the heater in accordance with §§ 19, 20 or 21 StVZO (German Road Licensing Regulations) the following regulations are primarily to be observed (§ 22 a StVZO):

NOTE:

These provisions are binding within the scope of the StVZO and should also be observed in countries where no special regulations are in effect!

Within the scope of the StVZO (German Road Licensing Regulations) "General Design Certifications" have been granted by the Federal Office for Motor Traffic for the Air Top 3500/5000 air heaters with the following design approval numbers:

- ~ S 305 Air Top 3500 B
- ~ S 306 Air Top 3500 D
- ~ S 304 Air Top 5000 B
- ~ S 303 Air Top 5000 D

The installation of the heaters must be performed in accordance with these Installation Instructions. The installation must be checked

- a) upon the homologation of the vehicles in accordance with § 20 StVZO
- b) upon any individual test in accordance with § 21 StVZO, or
- c) upon any examination in accordance with § 19 StVZO by a registered expert or examiner for motor traffic, an expert for automotive vehicles, or any other authorised official, in accordance with paragraph 7.4 a of Appendix VIII to the StVZO

and in the case of item c) the proper installation must be certified on the approval certificate contained on the design certification stating the following:

- vehicle manufacturer
- vehicle type and
- vehicle identification number

The effectiveness of the design certification (homologation) is dependent on this certificate. The approval certification is to be kept in the vehicle.

The year of the initial operation must be durably marked on the type plate of the heater by the installer by removing the years that do not apply.

The heat exchanger of the air heater is not to be used for longer than ten years and must thereafter be replaced by the manufacturer or one of its authorised dealers with a genuine replacement part. If exhaust pipes lead through passenger areas, these pipes must also be replaced with genuine replacement parts after ten years.

Whenever the heater is removed it is imperative that the gasket located underneath be replaced.

The heaters are approved for heating the passenger compartment and the driver's cabin, not however, the cargo space for the transport of hazardous materials.

When using the heater in special vehicles (e.g. "TRS" vehicles for the transport of hazardous materials) or in vehicles not subject to StVZO regulations (e.g. ships) all regulations that may be locally applicable are to be complied with.

When installing the **Air top 3500/5000 D** heater in vehicles for the transport of hazardous materials the requirements laid down in TRS 002 and TRS 003 (Technical Guidelines relating to the ordinance of transporting hazardous materials on the road) must be fulfilled in addition to those of the StVZO.

"Heating air system": Heating air intake openings must be so arranged that the possibility of exhaust fumes from the vehicle engine and the heater being drawn in is remote under normal operating conditions.

Extracting the combustion air from the interior of the vehicle is not permissible.

"Combustion air pipe: The combustion air required must be drawn in from the outside of the vehicle. Inside passenger areas the combustion air lines are permitted to have a maximum of four joints and must be provided with a splash-proof opening leading through the outside wall. These joints must be so sealed that a total leakage rate of 200 l/h at an overpressure of 0.5 mbar is not exceeded.

The pipe including lead-through, joints, material and type of construction must be specified in the installation instructions.

Mounting and removal of the pipe must be possible with tools only, the pipe must be protected against damage and be permanently vibration-proof.

"Exhaust gas pipe": The heaters must be so designed that the exhaust fumes are discharged to the atmosphere. Exhaust pipes must be so routed that the possibility of exhaust gases penetrating the interior of the vehicle is remote. The functioning of any parts of the vehicle essential for its operation must not be impaired. Any condensate or water that may have entered must not be able to collect in the exhaust gas line. Drain holes are permissible; these must discharge the liquid to the atmosphere via lines that are leakproof in relation to the interior of the vehicle. The discharge opening of the exhaust pipe is to point upward, sideways or, in the case of routing the exhaust pipes on the underside of the bottom of the vehicle, it must be positioned near the lateral or rear edge of the driver's cab or vehicle.

Inside areas where people are present, exhaust pipes may have a maximum of one joint, and their lead-through through the outer wall/bottom of the vehicle must be splash-proof. It is permissible to connect a drain pipe provided with a leak-proof metal joint to discharge the water penetrated into the exhaust pipe. The drain pipe is to be passed through the outside wall or the bottom of the ve-

hide through a sealed bush.

The heat exchanger, the connected exhaust pipe as well as any drain pipe that may be connected must be so sealed that in the event of an overpressure equivalent to the twofold overpressure of the exhaust gas at maximum permissible exhaust pipe length – however, at a minimum overpressure of 0.5 mbar – a leakage rate of a total of 30 l/h is not exceeded.

The pipe including lead-through, joints, material and type of construction must be specified in the installation instructions.

Mounting and removal of the pipe must be possible with tools only, it must be protected against damage and be permanently vibration-proof.

Only metal pipes may be used. These must not exceed a temperature of 110 °C if the possibility of accidental contact in the vehicle's interior exists. It is permissible to install a protection against accidental contact.

“Combustion Air Inlet” and “Exhaust Gas Outlet”:

During installation it must be ensured that the openings of the combustion air inlet and exhaust gas outlet pipes are so designed that a spherical object of 16 mm diameter cannot be introduced.

Electric lines, switchgear and controlgear of the heater must be so arranged in the vehicle that their functioning cannot be impaired under normal operating conditions.

All tubes leading from the heater toward the outside must be routed through splashwater-proof openings.

In the case of buses, the heater must be installed neither in the driver's compartment nor in the passenger area.

For the routing of fuel lines and the installation of additional fuel tanks, articles 45 and 46 StVZO are to be adhered to. The most important excerpts therefrom are as follows: Fuel lines are to be designed in such a way that their stability remains unaffected by torsional stresses in the vehicle, engine movement and the like. They must be protected against mechanical damage. All parts of the fuel system must be protected against heat which would impair

their operation, and must be located such that dripping or evaporating fuel can neither collect nor be ignited by hot components or electrical equipment.

In the case of buses, fuel lines and fuel tanks may be located neither in the passenger area nor in the driver's compartment. In these vehicles the fuel tanks must be located such that they do not pose a direct hazard to the exits in the event of a fire. The fuel must not be supplied by means of gravity or gauge pressure in the fuel tank.

Mounting instructions for Webasto fuel tanks for fuel supply of heating units in vehicles:

In the case of buses, installation must not be performed in the passenger area or in the driver's compartment.

The fuel filler neck must not be located inside the passenger area or the driver's compartment in any vehicle.

Petrol fuel tanks must not be located directly behind the front panelling of the vehicle.

They must be separated from the engine in such a manner that the possibility of fuel inflammation is remote even in the event of an accident. This does not apply to tractor vehicles with open cabs.

The operating state of the heater at any given time – i.e. at least whether it is on or off – must be easily recognizable.

Webasto will not assume any liability if the installation instructions and the notes contained therein are not observed. The same applies to improperly performed repairs or those where others than genuine replacement parts have been used. In those cases, the heater's General Design Certification and thus the vehicle's General Operating Permit (homologation) will be invalidated as a consequence.

Scope of Application of the Air Heaters

The Webasto Air Top 3500/5000 air heaters are designed to provide the following features:

- for the heating of driver's cabs, boats, trucks, small buses, vans and ambulance vehicles
- defrosting the vehicle's windows.

The heaters operate independently of the vehicle engine and are connected to the fuel tank and the electrical system of the vehicle.

They can be used in vehicles with water-cooled or air-cooled engines.

Installation

CAUTION:

The legal provisions 1 and 2 relating to the installation are to be adhered to.

It is not permitted to operate the heater without control unit cover (results in overheating of the heater).

Installation Details for Air Top 3500/5000

NOTE:

The different vehicle-specific installation conditions should be taken into account.

Installation Location

The heater can be fitted both inside and outside the vehicle. When installed on the outside, care must be taken that the heater is fitted in a location that is protected against splashwater and spray.

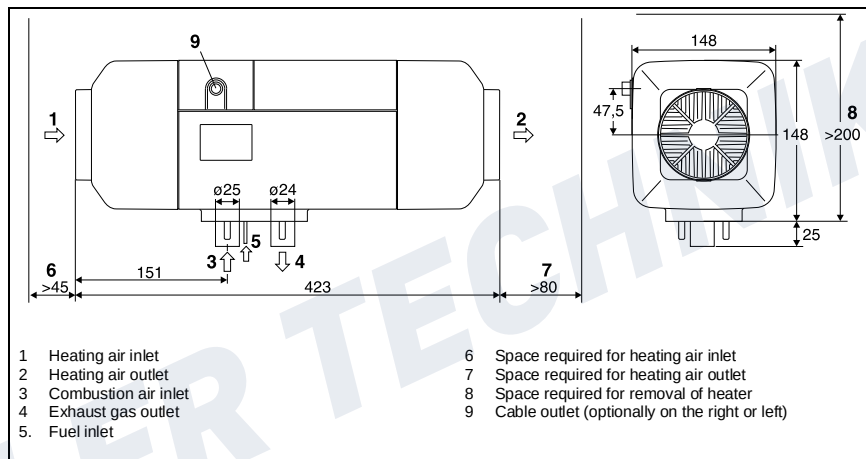


Fig. 1: Dimensions of the Heater

Air Top 3500/5000

If installed in the vehicle's interior, the lead-through openings for combustion air inlet, exhaust gas outlet and fuel pipe must be splash-water protected.

For this purpose, the special gasket supplied with the heater must be used (see Fig. 4). **The gasket must be renewed prior to each re-installation.**

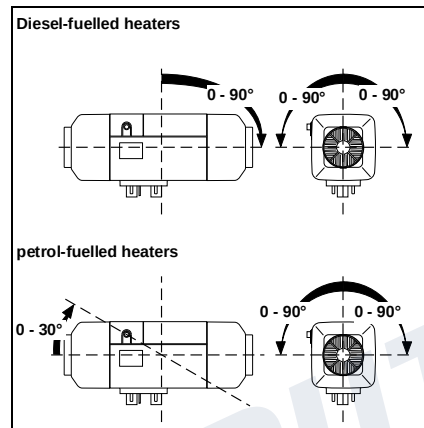


Fig. 2: Permissible Installation Positions

Mounting the Heater

When mounting the Air Top 3500/5000 heater, the M 6 nuts must be tightened to a torque of 6 Nm +1 Nm.

The mounting dimensions as well as the space required for the performance of servicing work are shown in the installation drawing (Fig. 1). The specified horizontal and axial angles of inclination must not be exceeded (Fig. 2).

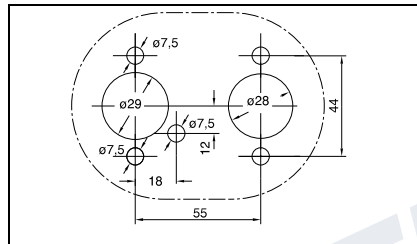


Fig. 3: Hole Pattern

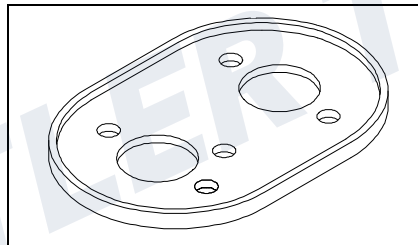


Fig. 4: Gasket

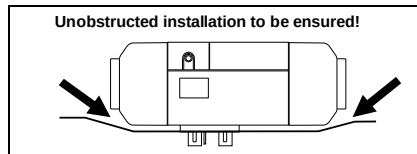


Fig. 5: Installation

A gasket (Fig. 4) must be fitted between heater and car body. **The gasket must be renewed prior to each re-installation.** The support surface for the heater mounting foot **must be level**. A special tool is available from the manufacturer for drilling the holes and levelling the support surface, if necessary. Surface irregularities of up to max. 1 mm can be compensated for by means of the gasket.

CAUTION:

After the installation has been performed, a check must be carried out to verify that no part of the housing is in contact with any surrounding parts. Non-compliance could result in a blockage of the heater fan.

Name Plate

The type plate must be located at a place where it is protected against damage and be easily accessible once the heater has been installed (or else, a type plate duplicate is to be used).

The years not applicable are to be removed from the type plate.

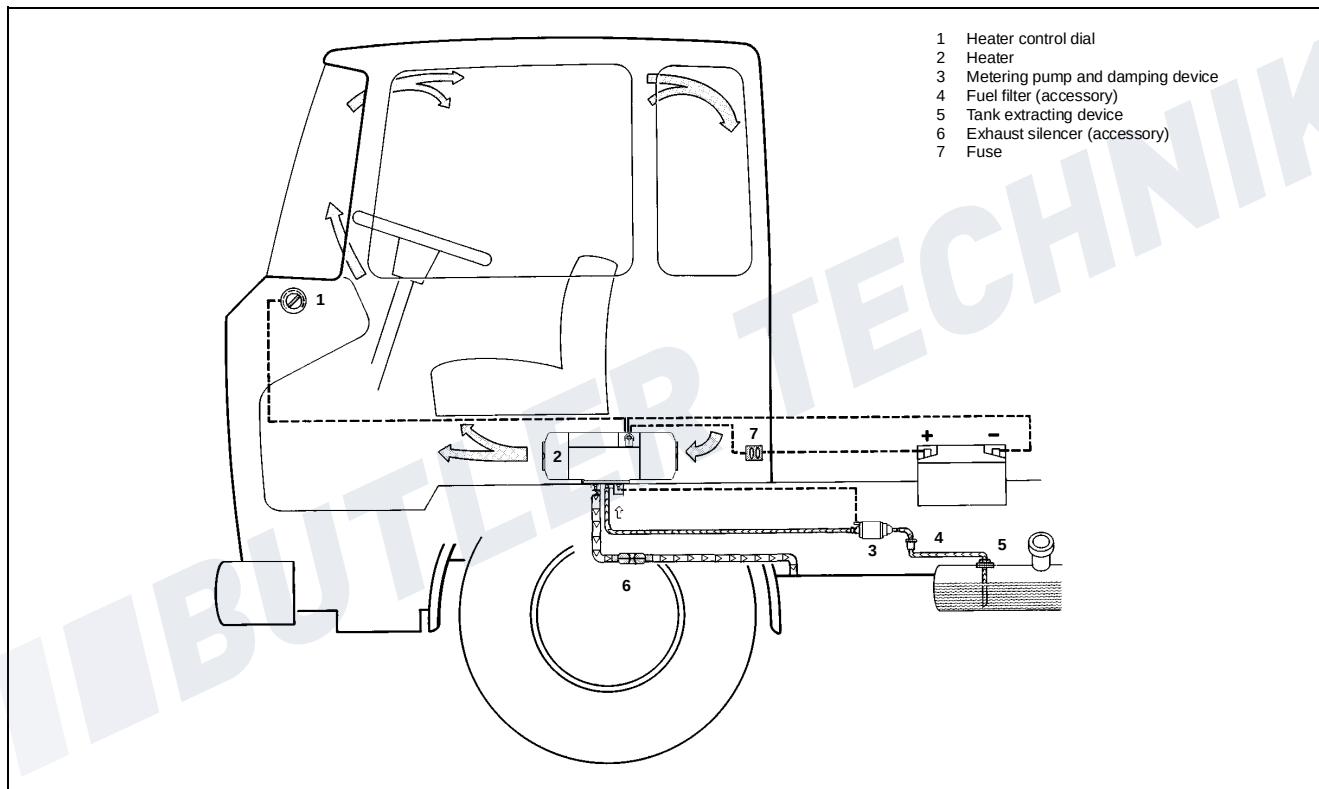


Fig. 6: Installation example of air heater in the recirculating air mode

Air Top 3500/5000

Heating Air System

NOTE:

It is not permissible to integrate the heater into the vehicle's air ducting system.

Both recirculated-air and fresh-air operation is permissible. In the case of fresh-air operation, care must be taken that the heating air is extracted from an area that is protected against splashwater and spray.

NOTE:

In the case of fresh-air operation, an external temperature sensor must be mounted within the space to be heated.

A temperature sensor is installed in the heater on the heating air intake side which, in conjunction with the heater control element and dependent upon the intake temperature and position of the setpoint transmitter, operates the heater within the appropriate heat output range. Heat output is so adjusted that after a quick reaching of the preset interior temperature the same will be maintained at the preset value.

Minimum inside diameter of heating air pipe is

90 mm at Air Top 5000

80 mm at Air Top 3500

may be decreased to 75mm subject to prior approval by the manufacturer.

NOTE:

For heating air ducts only materials capable of withstanding a temperature of at least 150° may be used.

The hot air discharge opening is to be located so that the hot air is not directed onto parts that are not resistant to heat.

CAUTION:

In vehicles designed for the transportation of passengers, the air outlet openings must be arranged in such a way that they cannot be obstructed by passengers.

Maximum air pressure drop between intake and delivery side of the heating air line:

Air Top 3500 2,0 mbar (20 mm WH)

Air Top 3500 Volume Plus 3,0 mbar (30 mm WH)

Air Top 5000 3,0 mbar (30 mm WH)

The test can also be performed by measuring the temperature directly at the heater:

temperature difference between heating air inlet and hot air outlet max. 130 K.

If this value is exceeded, the temperature limiter is expected to trip. The heating air hose is to be secured at the joints.

The hot air stream must be prevented from re-entering the heater, if the heater is operated in the recirculating mode without any hot air ducting

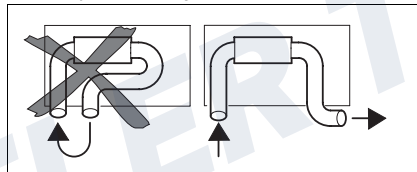


Fig. 7: Heating air inlet and heating air outlet

CAUTION:

If the heater is operated without heating air intake hose, it is imperative that the air intake grille supplied with the heater be mounted!

NOTE:

The installation must be checked for the following:

- "closed circuit" of air between the vehicle heater and the heater air inlet
- "closed circuit" of air between heater air inlet and heater air outlet (fig. 7)
- adequate space for taking in heating air (heating air to be extracted from the cool space of the cabin, e.g. in the case of installation underneath a bunk)

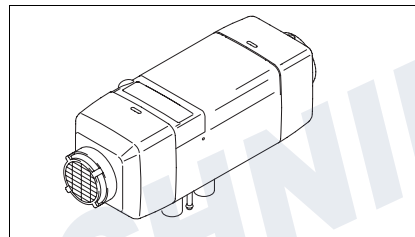


Fig. 7a: Heating air inlet with intake grille

If an installation housing is used, the area around the air discharge nozzle must be tightly sealed so that no hot air can enter the installation box.

External Temperature Sensor

The installation of an external temperature sensor is recommended if the heater is installed in an installation housing or in location with poor ventilation (e.g. underneath bunks). Extremely short cycle times of the heater can thus be avoided.

Mounting of External Temperature Sensor

The external temperature sensor must be mounted on surfaces as vertical as possible, at mid-height in the vehicle cab in the area to be heated.

The temperature sensor must **not**

- be located directly in the hot air stream (vehicle's or heater's heating air).
- be mounted in the vicinity of heat sources (e.g. vehicle's heating system).
- be exposed to direct sun radiation (e.g. on the dashboard).
- be mounted behind curtains or the like.

Fuel Supply

Fuel is extracted from the vehicle's fuel tank or a separate fuel tank. The values relating to the permissible pressure at the fuel extraction point are shown in Fig. 8.

permissible fuel feed height H (m)	at max. permissible overpressure (bar) in fuel line
0.00	0.2
1.00	0.11
2.00	0.03
permissible fuel suction height S (m)	at max. permissible underpressure (bar) in fuel tank
0.00	-0.10
0.50	-0.06
1.00	-0.02

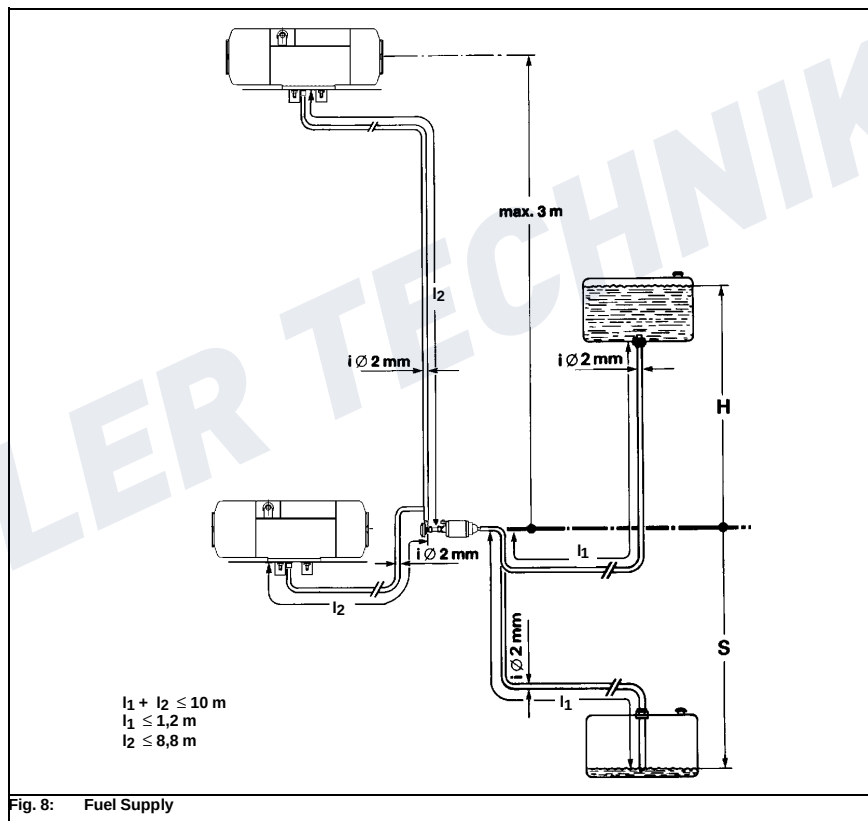


Fig. 8: Fuel Supply

Vehicles with Carburetor Engines

In passenger cars, fuel may only be extracted with the special Webasto fuel pickup (see Fig. 8) and as close to the tank as possible. The connection can be made either in the flow or the return pipe whereby it must be ensured that the return pipe reaches almost to the bottom of the tank. Failing this, the return pipe can be extended.

The fuel pickup is to be so mounted that any air or gas bubbles are automatically discharged into the tank (see Fig. 9).

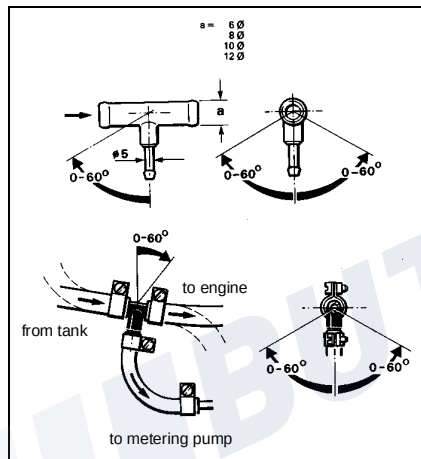


Fig. 9: Webasto Fuel Pickup

Fuel should not be extracted in the vicinity of the engine since here gas bubbles are likely to form in the lines owing to the heat radiation of the engine, which may result in malfunctions of the combustion operation.

Vehicles with Fuel Injection Engines

When installing the heater in vehicles with petrol injection systems it must be determined whether the fuel pump is mounted inside or outside the tank.

Where the fuel pump is located inside the tank, the fuel can only be drawn from the return pipe and only by using the Webasto fuel pickup (see Fig. 8) whereby it must be ensured that the return pipe reaches almost to the bottom of the tank (minimum distance to tank bottom, see Fig. 10). Failing this, the Webasto tank extracting device (see Figs. 9, 10 and 11) can be used.

Where the fuel pump is mounted outside the tank, the fuel may only be extracted between the tank and the fuel pump and also only by using the Webasto fuel pickup (see Fig. 8).

Vehicles with Diesel Engines

Fuel must be drawn from the fuel tank or a separate tank (see Figs. 9, 10 and 11). With this method of fuel being supplied from a separate tank, no pressure-related influence is possible.

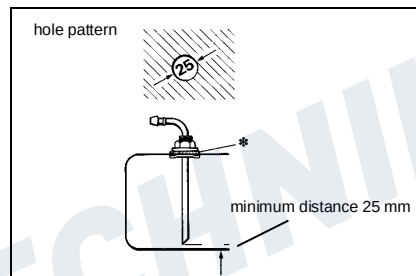


Fig. 10: Webasto Tank Extracting Device

* tank extracting device only to be used with metal fuel tanks

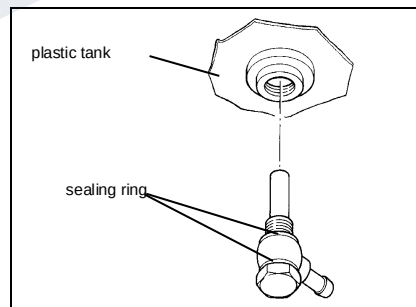


Fig. 11: Fuel Extraction From the Plastic Tank
(Extraction Via Tank Drain Plug)

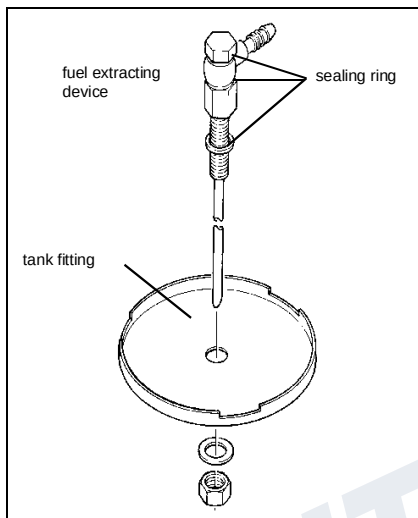


Fig. 12: Fuel Extraction From the Plastic Tank
(Extraction Via Tank Fitting)

NOTE:
The fitting must be made of sheet steel!

Fuel Lines

Only steel, copper and plastic pipes made of plasticized, light-resistant and temperature-stabilized PA 11 or PA 12 (e.g. Mecanyl RWTL) in accordance with DIN 73378 may be used as fuel lines. As in the majority of cases it is not possible to route the lines in a continuous upward pitch,

the inside diameter must not exceed a given dimension. Starting with an inside line diameter of 4mm, air or gas bubbles will accumulate resulting in malfunctions of the combustion operation if lines sag or are routed with a downward pitch. When the diameters shown in Fig. 8 are used, you can be sure that no unwanted bubbles will be formed.

The lines leading from the metering pump to the heater should not be routed in a downward pitch.

To prevent the fuel lines from sagging, freely suspended lines must be secured. Mounting should be performed in such a manner that the lines are protected against flying stones and thermal influence (exhaust pipe). To prevent the fuel lines from slipping off they are to be secured at the joints by means of hose clamps.

Connecting Two Pipes Using a Hose

The proper connection of fuel lines using a hose is shown in Fig. 13.
Check for leakage!

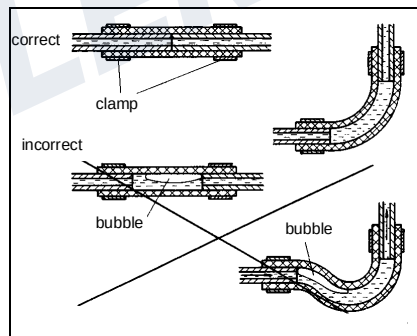


Fig. 13: Pipe/Hose Connection

Metering Pump

The metering pump is a combined delivery/metering and shutoff system and is subject to certain installation criteria (see Figs. 8, 14 and 15).

Air Top 3500/5000, 12-volt Petrol

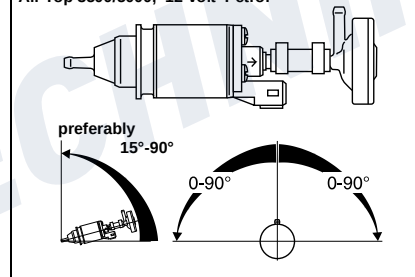


Fig. 14: Metering Pump DP 2
Installation Position

Air Top 3500/5000 D. 12-volt and 24-volt Diesel

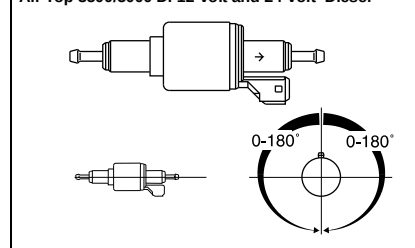


Fig. 15: Metering Pump DP 30
Installation Position

Air Top 3500/5000

Installation Location

The metering pump must be mounted in a cool location as close to the tank as possible (see Fig. 8). The permissible ambient temperature must not exceed a temperature of + 20°C at any given operating state.

Metering pump and fuel lines must not be mounted within the radiation range of hot vehicle parts. If necessary, a radiation protection is to be provided.

Installation and Mounting

The metering pump is to be attached by a vibration-damping suspension device (e.g. rubberized clamp). The installation position is restricted as shown in Figs. 14 and 15 in order to ensure proper self-bleeding of the system. Owing to the hazard of corrosion, only genuine Webasto parts may be used for the plug connection between metering pump and metering pump cable harness.

Fuel Filter

If dirt in the fuel must be reckoned with, only Webasto filter, order no. 487 171, should be used. The filter is preferably be installed in vertical position, where this is not possible, it may also be installed horizontally (direction of flow to be observed).

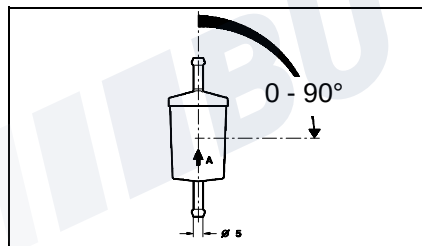


Fig. 16: Fuel Filter

Combustion Air Supply

On no account may the combustion air be extracted from areas where persons are present. The combustion air intake opening must not point in the direction of travel. It must be so located that the possibility of clogging due to contamination is remote.

NOTE:

With an intake duct length < 0.6 m, it is compulsory that an intake silencer be mounted.

NOTE:

Combustion air must be drawn from a splash-water protected location that is as cool as possible. A combustion air line is to be used, if necessary.

Exhaust gas pipes must not be used as combustion air lines as this would cause damage to the metering pump cable emerging from the combustion air intake fitting.

For further regulations refer to the Legal Provisions for the installation.

Exhaust Pipe

Rigid pipes made of unalloyed or alloyed steel with a minimum wall thickness of 1.0 mm, or flexible tubes of alloyed steel only are to be used as exhaust pipes.

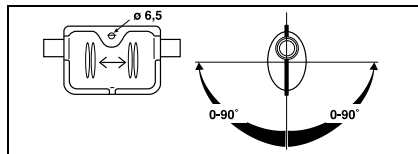


Fig. 17: Exhaust Silencer
Direction of flow optional

The exhaust pipe is to be secured to the heater, e.g. by means of a clamp. For further regulations refer to the Legal Provisions.

The exhaust silencer is preferably to be mounted in the vicinity of the heater.

Operation of the heater is also permissible without exhaust silencer.

Combustion Air Intake and Exhaust Pipes

Both pipes leading away from the heater are to be routed in a downward pitch. If this is not possible, a $\varnothing$ 4mm condensate drain hole is to be provided at the lowermost point.

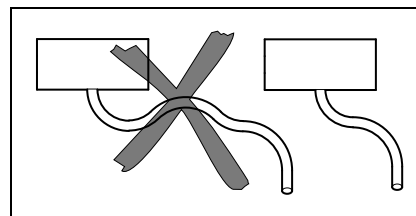


Fig. 18: Prevent condensate from forming

The lines must not point into the direction of travel.

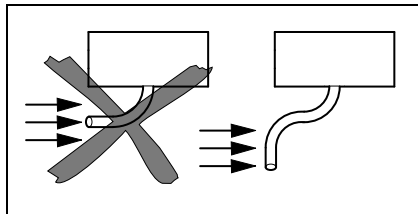


Fig. 19: Pipe discharge openings not in direction of travel

The lines must be so arranged that any clogging due to contamination is not to be expected.

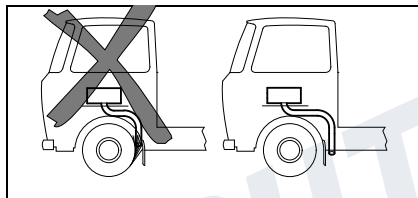


Fig. 20: Avoid areas exposed to water, mud or snow

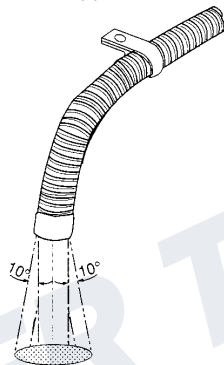
CAUTION:

A fire hazard exists if the installation position of the exhaust pipe discharge opening differs from that shown in Fig. 21.

Length of combustion air intake and exhaust pipes:

- with exhaust gas silencer: max. 2.6 m
- without exhaust gas silencer: max. 5.6 m

To ensure an angle of discharge of $90^\circ \pm 10^\circ$, it is required that the pipe clamp be attached no more than 150 mm, from the exhaust pipe end



direction of discharge approximately vertical $90^\circ \pm 10^\circ$

Fig. 21: Exhaust Pipe Discharge Opening Installation Position

NOTE:

For exhaust pipes lengths of 2 m and more, insulated exhaust pipes are to be used (dew point not reached)

Inside diameter of pipes:

- Combustion air pipe: 25 mm
- Exhaust pipe (metal): 24 mm

Smallest bending radius: 50 mm

Total angle of all bends:

- Combustion air pipe: max. 270°
- Exhaust pipe: max. 270°

Electrical Connections

All pipes that are not required must be insulated!

NOTE:

When using the combination or standard digital timer a remote-control pushbutton may be provided near the bunk for added convenience. The connection is to be performed in accordance with wiring diagram 30 and 31.

The electrical connection is to be performed in accordance with the system circuit (Fig. 29, 30, 31, 32, 33).

Connection in Vehicles for the Transportation of Dangerous Goods (TRS)

When installing the Air Top 3500/5000 D heaters in vehicles for the transport of hazardous materials, the requirements laid down in TRS 002 and TRS 003 (Technical Guidelines relating to the ordinance of transporting hazardous materials on the road) must be fulfilled in addition to those of the StVZO. The electrical connection is to be performed in accordance with wiring diagrams Fig. 32 or 33. On vehicles without auxiliary drives, electrical connection is to be performed in accordance with the system circuit diagram Fig. 33.

NOTE:

Switch S3 must be so installed that in the event of a pumping device being put into operation, a plus potential is applied across the corresponding input of the electronic control unit.

CAUTION:

If no voltage to ground is present at the control unit input X6/1 upon start-up all TRS functions will be inoperative. After the plus potential has been applied across the control unit input X6/1 (auxiliary drive ON) a short after-run period of 20 seconds takes place and subsequently the control unit is in its "fault lock-out" state.

CAUTION:

In accordance with the Technical Guidelines relating to the ordinance of transporting hazardous materials on the road, heaters may only be switched on by means of a special switch installed in the driver's cabin and are to be actuated manually. If the heater is equipped with a combination or standard digital timer, it must be ensured that pin 4 on the combination or standard digital timer remains unassigned. The heater can therefore only be started up by means of the instant heating button. No other digital timers are allowed to be used in TRS vehicles.

Connection of the Heater

To connect the cable harness, remove the control unit cover on the heater and connect the cable harness connectors with the control unit.

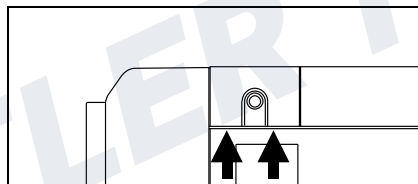


Fig. 22: Removal of Control Unit Cover

NOTE:

Lift off control unit cover applying a blunt edge at its side (see arrows in Fig. 22)

Be sure not to touch the printed conductors of the control unit.

Prior to starting up the heater for the first time, reinstall the control unit cover to prevent any undue escaping of heating air (overheating of heater). Cable lead-through can optionally be located on the left or right.

To ensure that the cable lead-through in the control unit cover provides a tight seal, the cable grommet on the cable harness must be displaced accordingly.

Connection to Supply Voltage

Preferably to be supplied from the vehicle central electrical system.

To provide the heater with adequate protection, an additional flat fuse holder is to be installed (supplied with the heater). The fuse holder may only be installed in the vehicle interior.

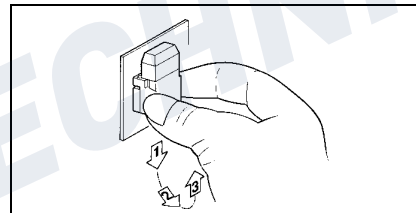


Fig. 23: Removal of Mounting Plate of Fuse Holder

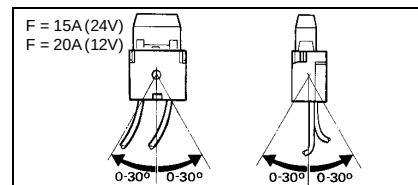


Fig. 24: Fuse Holder, Installation Position

Connection of Heater Control Element

The cable harness is prepared for connection to the heater control.

To withdraw the connector pull at the connector housing only.

If the cable harness is pulled, the connector housing is locked (self-locking).

NOTE:

The optical fiber must be in contact with the rotary knob.

NOTE:

As an option, an external temperature sensor can be installed in the passenger area (see page 6)

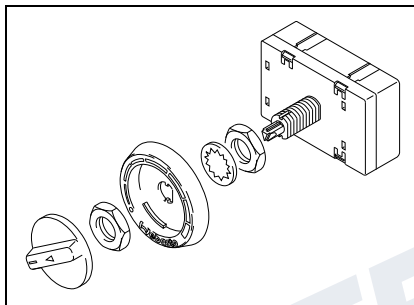


Fig. 25: Heater Control Knob

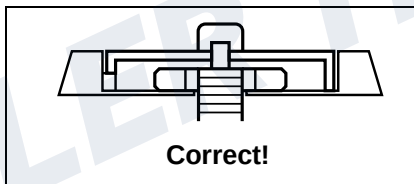


Fig. 26: Mounting of Heater Control Knob

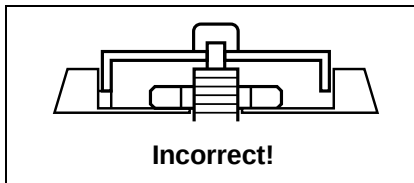


Fig. 27: Mounting of Heater Control Knob (incorrect)

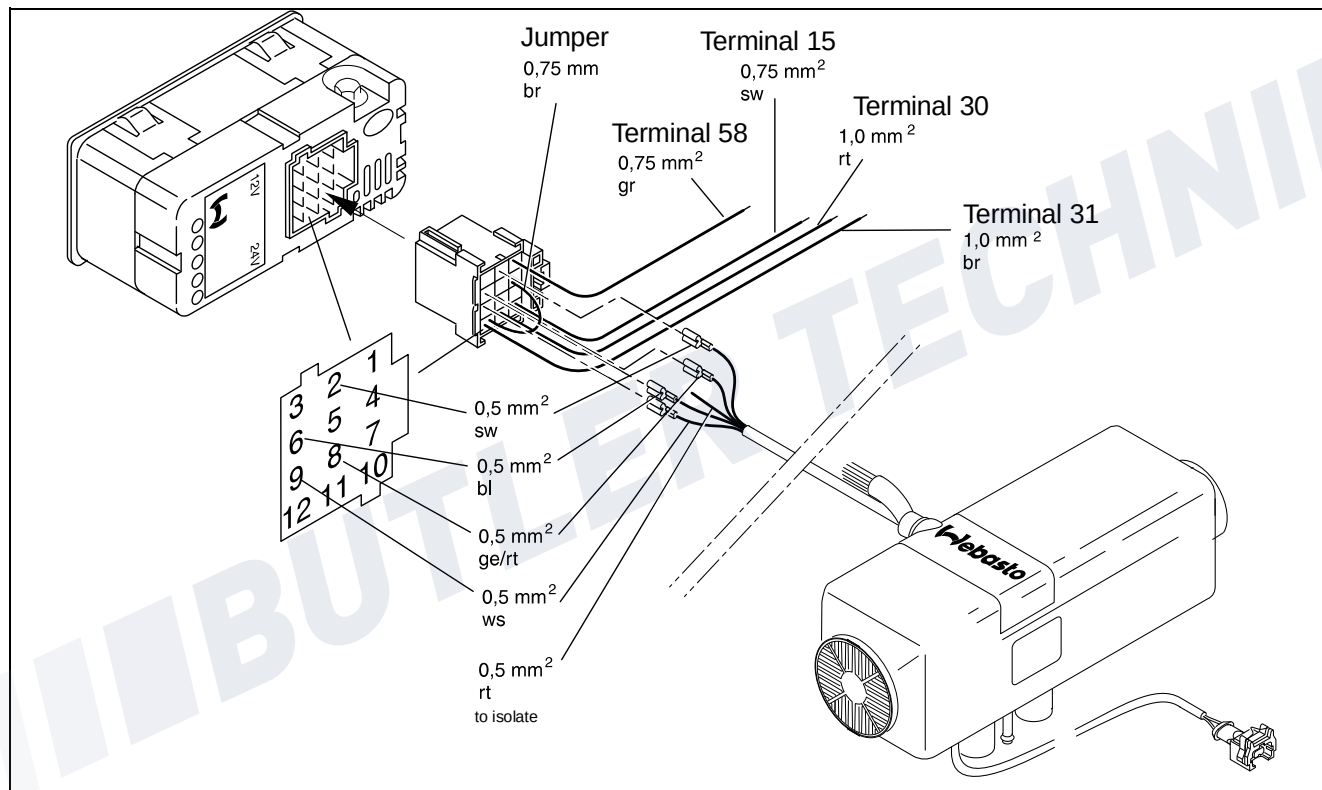


Fig.28: Connection diagram Air Top 3500/5000 ; only connection featuring a combination timer is shown.

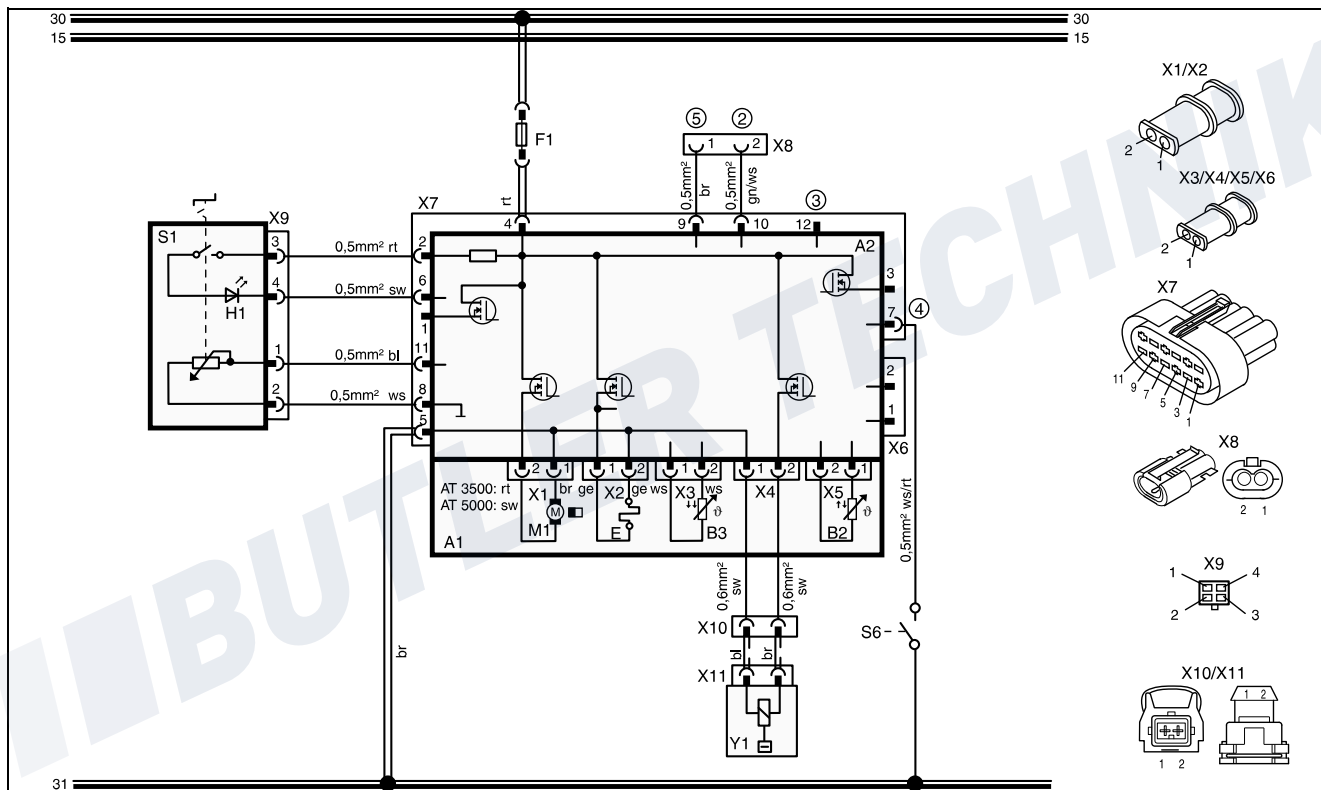


Fig.29: System circuit diagram Air Top 3500/5000, 12V/24V with Control Knob, legend see page 20 and 21

Air Top 3500/5000

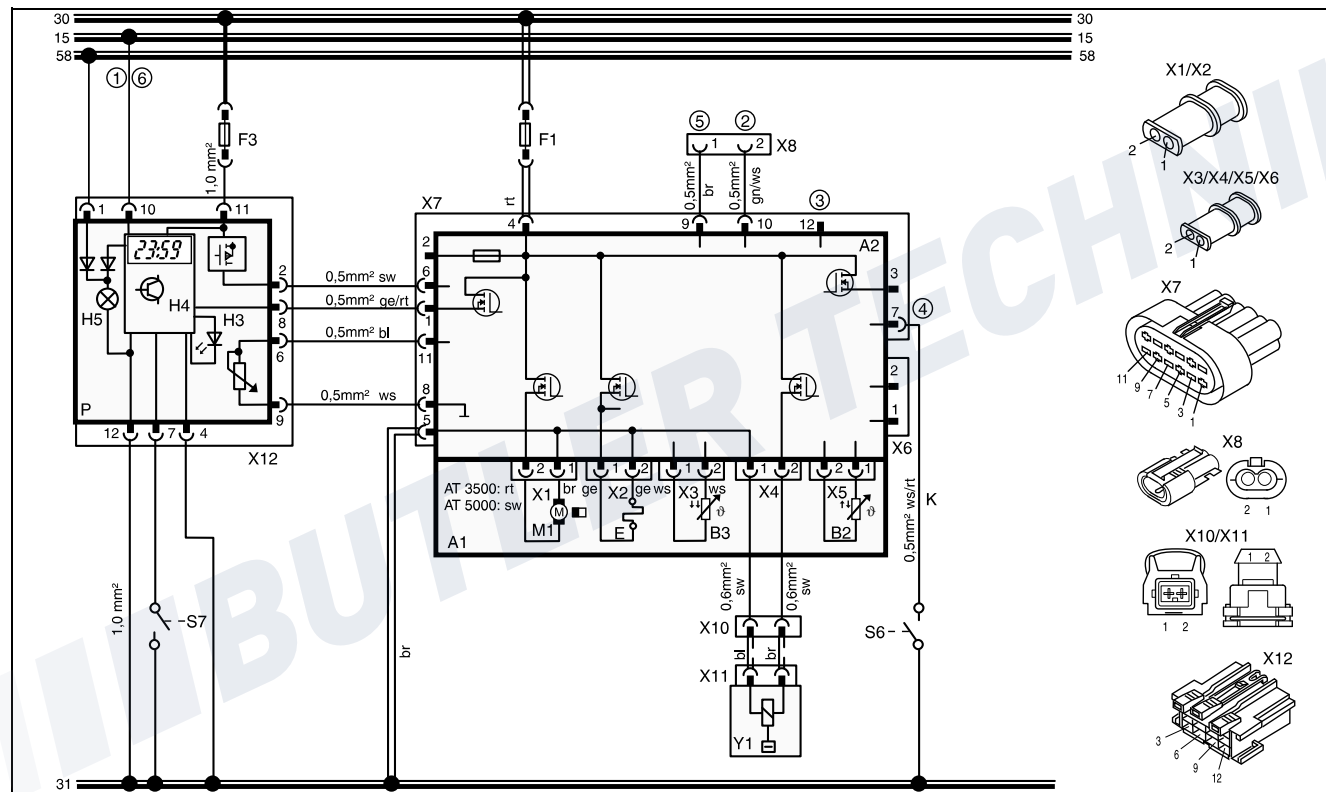
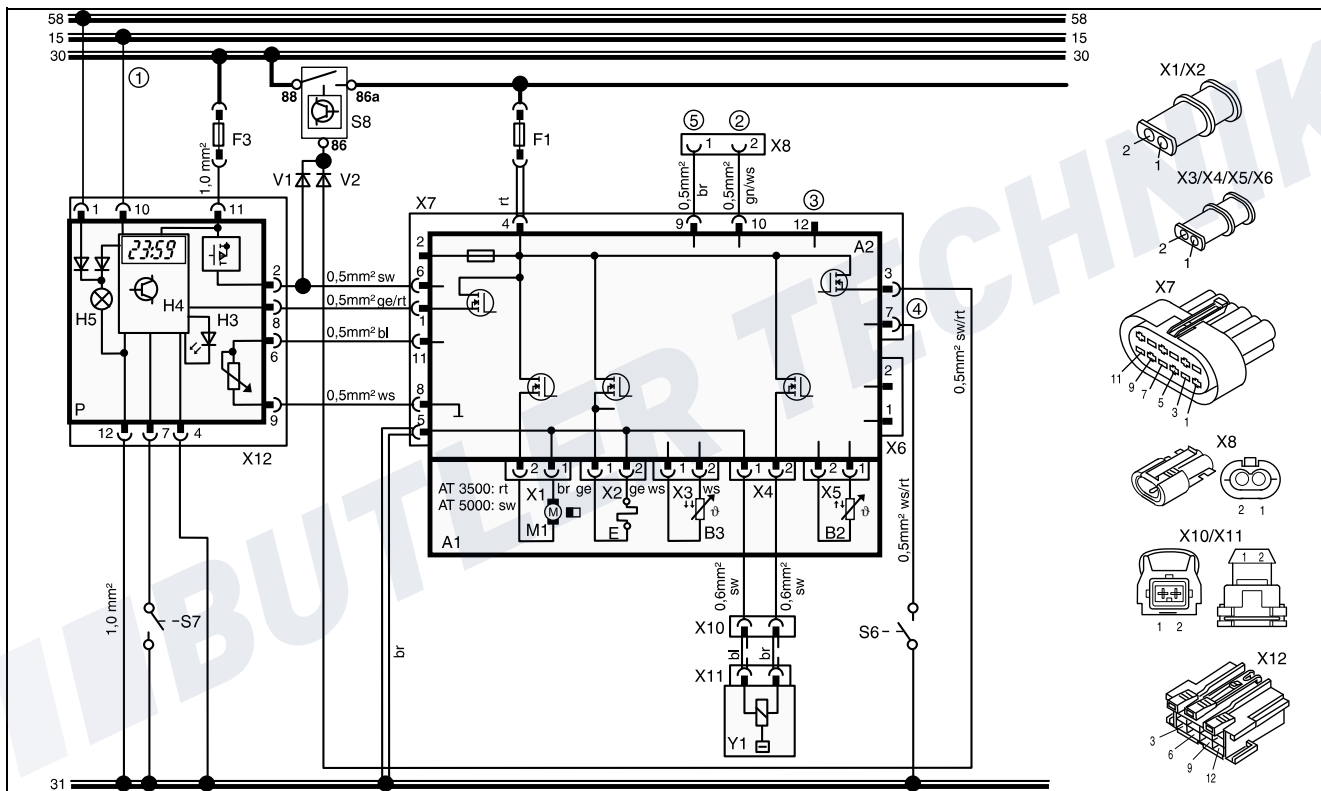


Fig.30: System circuit diagram Air Top 3500/5000, 12V/24V with Combination Timer , legend see page 20 and 21



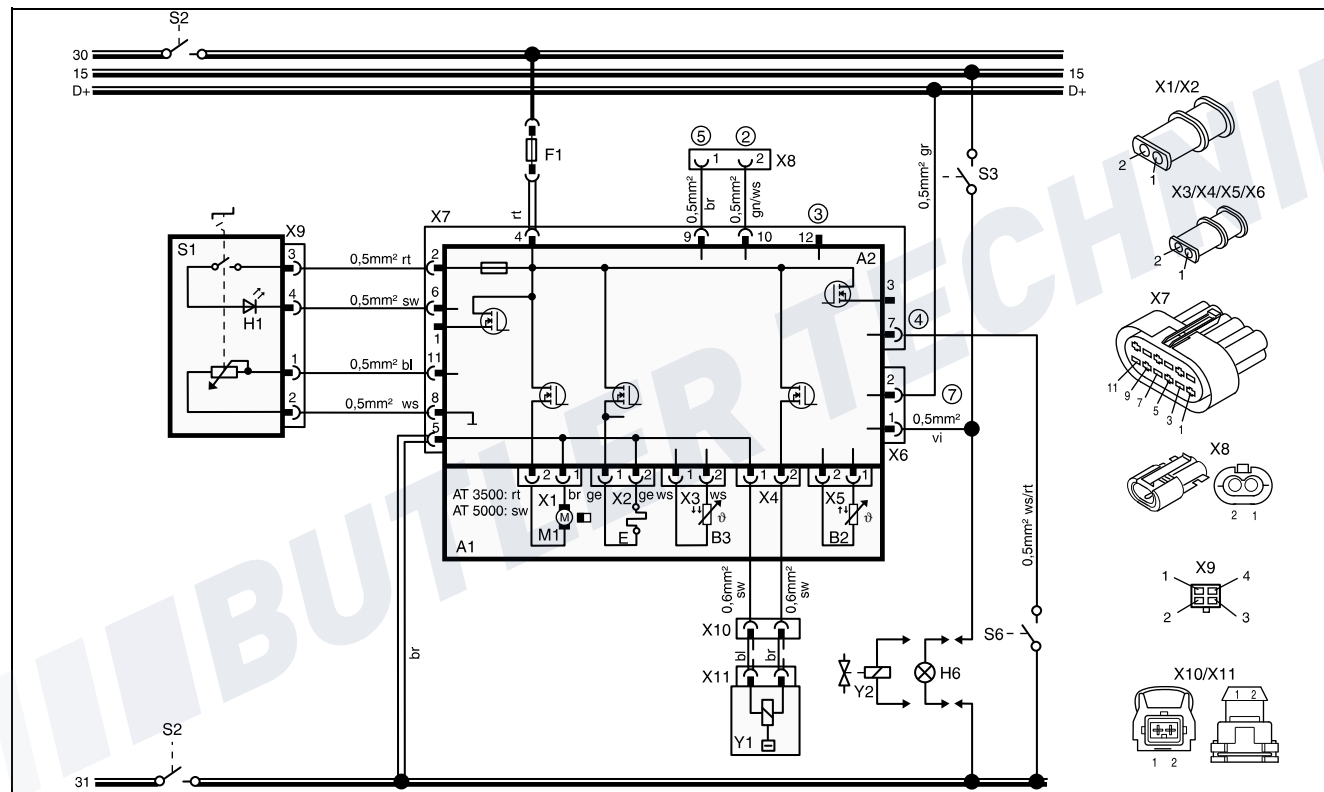


Fig.32: System circuit diagram Air Top 3500/5000 D, 24V TRS-Operation with Heater Control Knob , legend see page 20 and 21

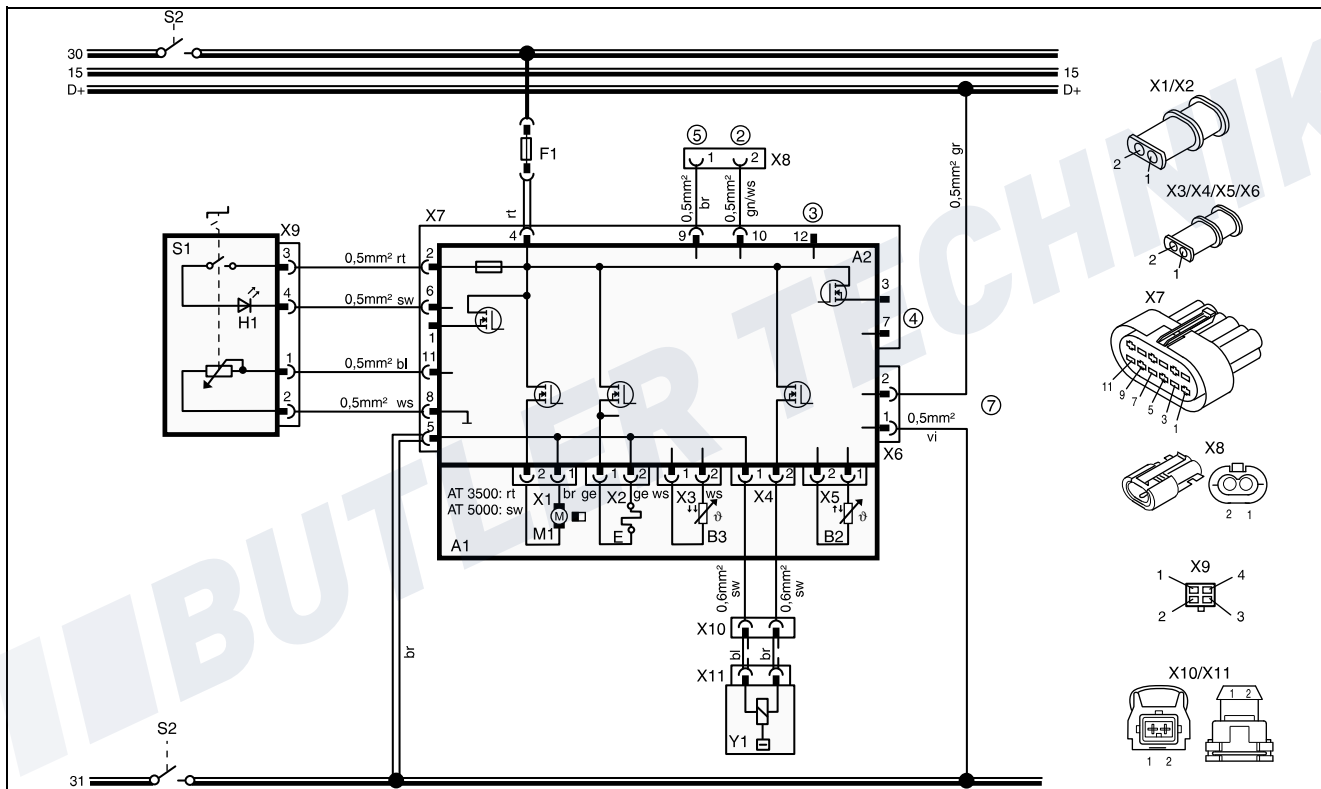


Fig. 33: System circuit diagram Air Top 3500/5000 D, 24V TRS-Operation with Heater Control Knob without auxiliary drive , legend see page 20 and 21

Air Top 3500/5000

Legende for circuit diagrams:

- ① Positive voltage from terminal (15/75) to pin 10:
continuous operation in the instant heating mode as
long as ignition is switched on

No positive voltage at pin 10:
variable heating times can be programmed
(10 min up to 120 min),
basic setting: 120 min

- ② Diagnostic K conductor

- ③ Diagnostic L conductor

- ④ Input pin (pin 7/connector X7, cable color in cable harness: white/red):
"Ventilation" (blower speed is dependent on the heater control position)

- ⑤ CO2 setting (see Workshop Manual)

- ⑥ **NOTE:**
If connection is made to terminal 30, continuous heating operation is
possible with the ignition turned off! In this case, no connection to
terminal 15/75 must be made!

- ⑦ **NOTE:**
For TRS function, gray and purple wires are required.

Min. wire cross sections per circuit		
	< 7.5 m	7.5 - 15 m
—	0.75 mm ²	1.5 mm ²
— — —	1.0 mm ²	1.5 mm ²
— — — —	1.5 mm ²	2.5 mm ²
— — — — —	2.5 mm ²	4.0 mm ²
— — — — — —	4.0 mm ²	6.0 mm ²

Colour of cables	
bl	blue
br	brown
ge	yellow
gn	green
gr	gray
or	orange
rt	red
sw	black
vi	violet
ws	white

Pos.	Designation	Remarks
A1	Heater	Air Top 3500/5000
A2	Electronic control unit	
B2	Temperature sensor	
B3	Temperature sensor (limiter)	Overheating protection
E	Glow plug / Flame detector	
F1	Fuse 24V 15A/12V 20A	flat fuse SAE J 1284
F2	Fuse 20A	flat fuse SAE J 1284
F3	Fuse max. 15A	flat fuse SAE J 1284
H1	LED green (in Pos. S1)	operation indicator
H3	LED red (in Pos. P)	Display illumination instant heating button Operation indicator Operation indicator light
H4	Heating symbol in display (in pos. P)	Operation indicator
H5	Lamps (in pos. P)	Illumination of display and buttons
H6	Lamp (min. 1.2W)	Operation indicator light pumping device
M1	Motor	Combustion and heating air fan
M3	Motor	Vehicle fan
P	Combination timer (1531)	Digital timer and setpoint generator
S1	Control element	Setpoint generator switch
S2	Disconnecting switch 1 or 2 poles.	Emergency Stop switch
S3	Switch	at or for pumping device

Pos.	Designation	Remarks
S6	Switch	Ventilation
S7	Push-button switch	Instant heating button remote control
S8	Battery disconnecting switch.	
V1	Diode	
V2	Diode	
X1	Connector 2pole	at Pos. A2 (ST B)
X2	Connector 2pole	at Pos. A2 (ST V)
X3	Connector 2pole	at Pos. A2 (ST U)
X4	Connector 2pole	at Pos. A2 (ST Z)
X5	Connector 2pole	at Pos. A2 (ST Y)
X6	Connector 2pole	at Pos. A2 (ST X)
X7	Connector 12pole	at Pos. A2 (ST1)
X8	Connector 2pole	
X9	Connector 4pole	at Pos. S1
X10	Connector 2pole	
X11	Connector 2pole	at Pos. Y1
X12	Connector 12pole	at Pos. P
Y1	Metering pump,	
Y2	Solenoid valve	for pumping device

Initial Operation

After the heater has been installed, the fuel supply system is to be bled thoroughly.

NOTE:

Owing to the low fuel consumption it is required that the heater be turned on repeatedly to fill the fuel line leading to the heater.

During a test run of the heater all connections are to be checked for leakage and security. Should a malfunction of the heater occur during operation, fault isolating measures are to be performed.

Shut-Down on Faults

Faults related to individual heater components and malfunctions during the start-up sequence are detected in the control unit.

The heater is shut down (fault lock-out) in the following cases:

- no or unsuccessful start-up
- temperature sensor defective
- temperature limiter (interruption or short-circuit)
- glow plug defective
- insufficient fan speed, short circuit or interruption
- fault in the metering pump circuit or overheat protection circuit (during start-up phase only)
- undervoltage of less than 10 volts or overvoltage of more than 15 volts and for longer than 20 seconds (applies to 12-volt heaters)
- undervoltage of less than 20 volts or overvoltage of more than 32 volts and for longer than 20 seconds (on 24-volt heaters)
- control unit defective
- overheating

Fuel supply will be interrupted in the event of overheating. An after-run cycle is performed as is the case when the heater is shut down manually.

After the after-run cycle has been terminated, the control unit is in the fault lock-out state.

An overheating condition is indicated by 10 flashing light signals of the operation indicator.

Eliminate cause of malfunction.

To deactivate the fault lock-out, the heater is to be briefly (min. 2 seconds) turned off and then switched back on again one time.

Fault Code Display

If the heater is equipped with a combination or standard digital timer, a fault code is indicated on the display of the digital timer whenever a malfunction has occurred:

F 00	Control unit failure / incorrect parameter set / warm start detection
F 01	No start-up (after 2 start-up attempts) no formation of flames
F 02	Flame extinguished (repeated >5)
F 03	Undervoltage or overvoltage
F 04	Premature flame detection
F 06	Temperature sensor interruption or temperature sensor short-circuit
F 07	Metering pump interruption or metering pump short-circuit
F 08	Fan motor interruption or fan motor short-circuit or fan motor incorrect speed
F 09	Pencil-type glow plug interruption or pencil-type glow plug short-circuit
F 10	Overheating
F 11	Temperature limiter interruption or temperature limiter short-circuit
F 12	Setpoint transmitter (interruption / short-circuit)

Technical Data

Unless tolerances are shown within the technical data table, a tolerance of $\pm 10\%$ applies at an ambient temperature of $+20^{\circ}\text{C}$ and at the rated voltage and conditions.

Electrical Components:

Control unit, motor, fuel metering pump, light bulb in the digital timer* and pencil-type glow plug/ flame detector are designed either for 12-volt or 24-volt operation.

The digital timer*, temperature limiter and temperature sensor are voltage-independent components.

* Presetting of heater operating times is not possible for TRS-operation

Fuel for AT 3500/5000 B (Petrol):

The fuel specified by the vehicle manufacturer is suitable as fuel for the heater.

Fuel for AT 3500/5000 D (Diesel/Fuel Oil EL):

The Diesel fuel specified by the vehicle manufacturer is suitable as fuel for the heater. Also EL class fuel oil – not, however, L type fuel oil – can be used provided it conforms to the usual quality on the German market in accordance with DIN 51603.

Any negative effect caused by additives is not known.

When the fuel for the heater is drawn from the vehicle's fuel tank, the vehicle manufacturer's specifications concerning additives are to be observed.

When changing to cold-resistant fuels, the heater must be operated for approx. 15 minutes to ensure that the fuel pump is filled with the new fuel.

Heater	Operation	Air Top 3500 B	Air Top 3500 D	Air Top 3500 D Volume Plus	Air Top 5000 B	Air Top 5000 D
Mark of approval		~S 305	~S 306	~S 306	~S 304	~S 303
Type		air heater with vaporizing type burner				
Heat output	control range	1,5 – 3,5 kW	1,5 – 3,5 kW		1,5 – 5,0(5,5)* kW *booster setting for max. 30 min.	
Fuel		petrol	Diesel		petrol	Diesel
Fuel consumption *booster setting for max. 30 min.	control range	0,17 – 0,46 l/h	0,17 – 0,42 l/h		0,19 – 0,66 l/h (0,73)* l/h	0,17 – 0,60 l/h (0,66)* l/h
Rated voltage		12 volts	12/24 volts		12 volts	12/24 volts
Operating voltage range		10,5 – 15 volts	10,5–15/21–30 volts		10,5 – 15 volts	10,5–15/21–30 volts
Rated power consumption	control range	15 – 36 W	15 – 36 W	15 – 90 W	15 – 90 W	15 – 90 W
Permissible ambient temperature: Heater: - operation - storage Metering pump- operation - storage Heater control - operation - storage		-40°... +40°C -40°... +85°C -40°... +20°C -40°... +85°C -40°... +75°C -40°... +85°C				
Perm. combustion air intake temperature		-40° ... +20°C				
Setting range for interior temperature		+10 ... + 45 °C				
Flow rate of heating air against 0,5 mbar		139 m ³ /h	139 m ³ /h	218 m ³ /h	218 m ³ /h	218 m ³ /h
CO ₂ content in exhaust gas (permissible operating range)		1,5 kW:5,0-8,0% 3,5 kW:9,0-12,5%			1,5 kW:5,0-8,0% 5 kW:9,0-12,5%	
Dimensions of heater		length 425 ± 2 mm width 148 ± 1 mm height148 ± 1 mm				
Weight of heater		5,9 Kg				

Version

Air Top 3500/5000 B (Petrol)

Type Air Top 3500/5000 B
Air heaters for petrol fuel
(12 volts)

Air Top 3500/5000 D (Diesel)

Type Air Top 3500/5000 D
Air heaters for
“Diesel/EL Fuel Oil EL”
(12 or 24 volts)

Air Top 3500 Volume Plus D (Diesel)

Type Air Top 3500 D
Air heaters for
“Diesel/EL Fuel Oil EL”
(12 or 24 volts)

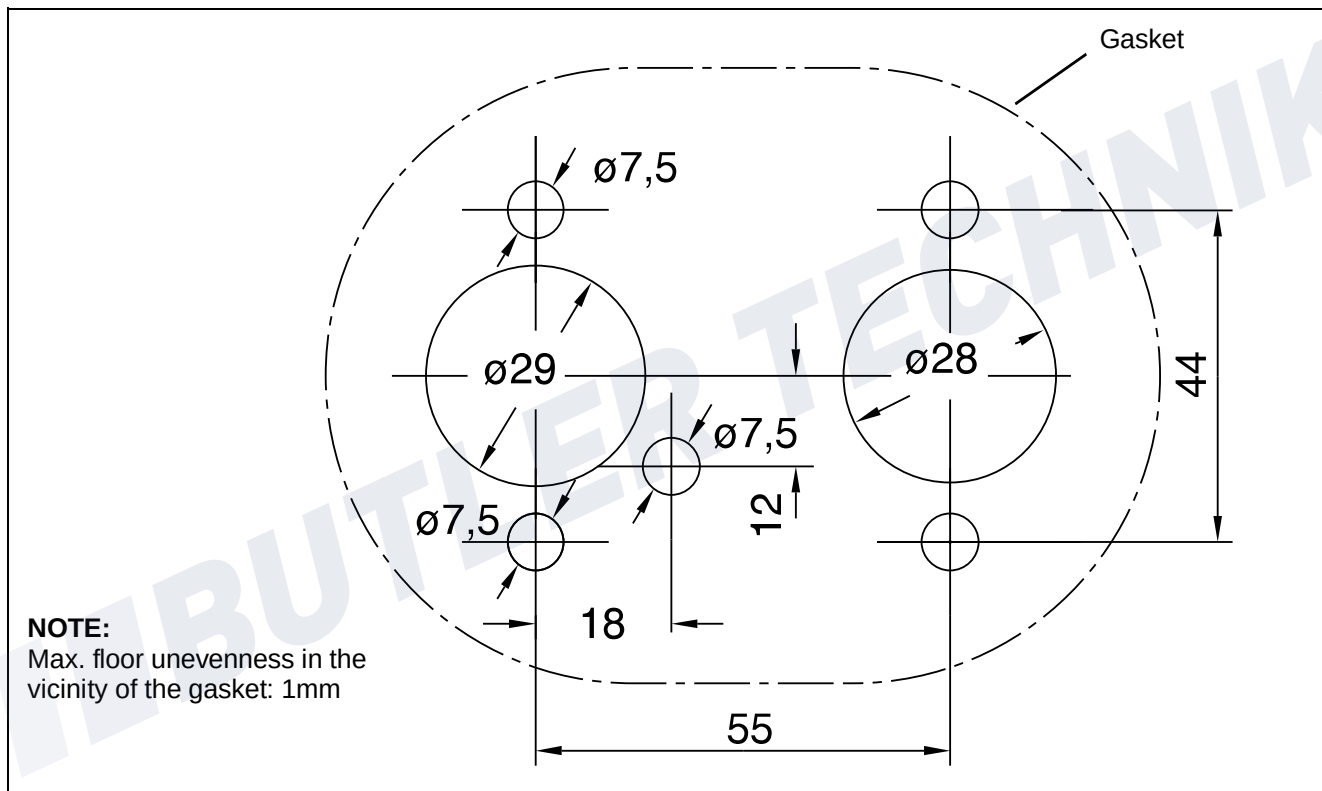


Fig. 34: Drilling template

 BUTLER TECHNIK

Webasto Service Phone Line

In case you encounter technical problems with your auxiliary heater - **Webasto's world-wide Service Network will be glad to assist you!**

Simply dial the **Service Phone Number** for your country as indicated below.

Webasto's Top Service for our customers

America

USA

United States
Madison Heights
0810/545-8770

CND

Ontario
Burlington
0905/335 4143

RA

Argentina
Buenos Aires
01/431-3302

RCH

Santiago de Chile
02/234 4311

A

Austria
Vienna
01-6043780

B

Belgium
Brussels
02/558 06 60

CH

Switzerland
Allschwil
061/48 695 80

CR

Czech Republic
Prag
02/464468

D

Germany
Stockdorf
089/85794512

DK

Denmark
Copenhagen
036/786666

E

Barcelona
93/4731500
93/4731551

F

France
Maisons Alfort
01/45183535

Europe

FIN

Finnland
Helsinki
358 (0) 96 82 71

GB

United Kingdom
Doncaster Carr
01302/322232

GR

Athen
Marconi:
01/2513500

H

Hungary
Budapest
01/2702337

I

Milan
02/48303071
02/48303072

IS

Iceland
Reykjavik
01/33242

L

Luxemburg
Brussels
02/558 06 60

N

Norway
Oslo
47 22 70 80 00

NL

Netherlands
Almere-Haven
036/5359111

P

Portugal
Lisbon
01/3639950

PL

Polen
Warsaw
sat. 391-20690

RF

Russia
Moscow
095/9276141

SLO

Slowenia
Ljubljana
061/553 161

SW

Sweden
Stockholm
08/923000

TR

Istanbul
0212-6232135
0212-5014405

UA

Ukraine
LVIV
322-330280

Asia

J

Japan
Tokyo
03/3432-2176

Afrika

ZA

South Africa
Cape Town
021-735 758
021-735 768

Australia

AUS

South Melbourne
03/6998322

NZ

New Zealand
Wellington
04/783020



Webasto Thermosysteme GmbH
82131 Stockdorf · Krailling Str. 5 · Telefon (089) 85794-0
Telefax (089) 8 57 94-448 · Telex 5 23 647 webas d

subject of modification

BUTLERBUS TECHNIK LTD

Tilbridge Road Garage,

Sturton-by-Stow

Lincoln LN1 2BP

United Kingdom

sales.butlertechnik.com

/// BUTLER TECHNIK / *ONLINE*