Webasto

Wasserheizgerät
Water heater
Appareil de chauffage

Einbauanweisung
Installation Instructions
Notice de montage

Thermo Pro 90

Thermo Pro 90 12 V Diesel - ADR	**(Gefahrguttransport) (Transport of dangerous goods) (Transport des marchandises dangereuses)**
Thermo Pro 90 24 V Diesel - ADR	**(Gefahrguttransport) (Transport of dangerous goods) (Transport des marchandises dangereuses)**

Thermo Pro 90

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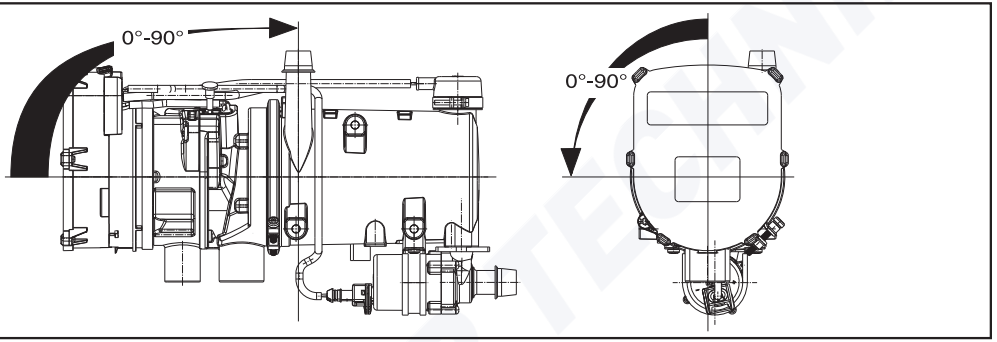

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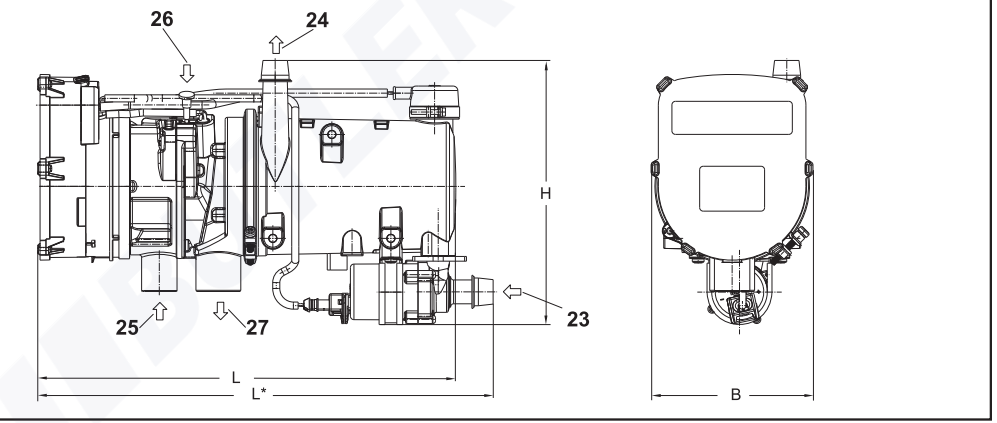

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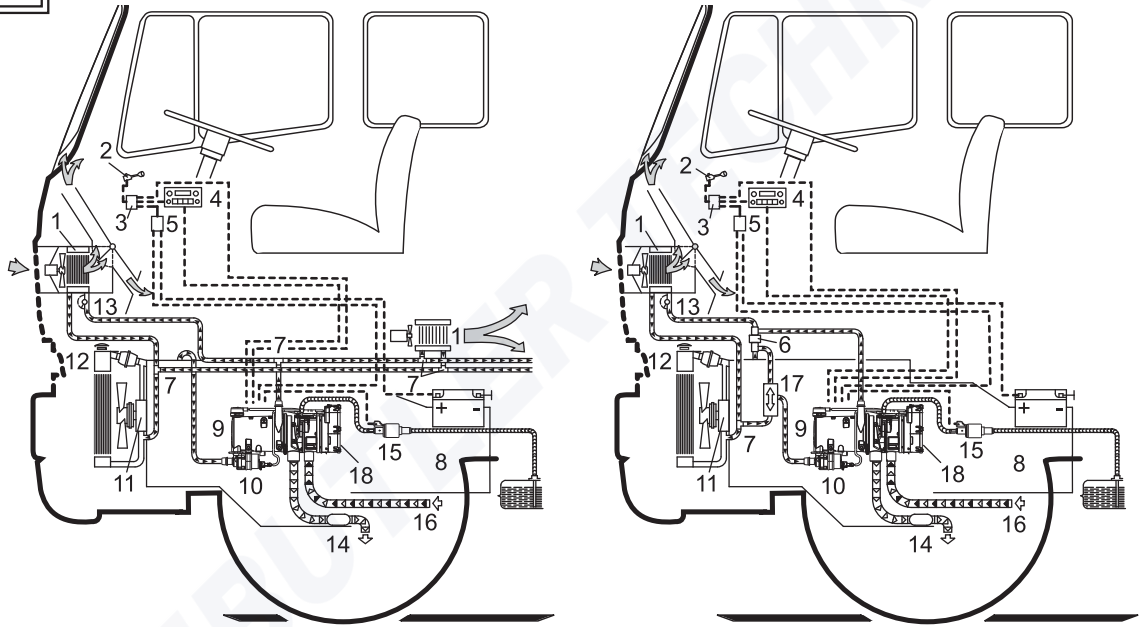

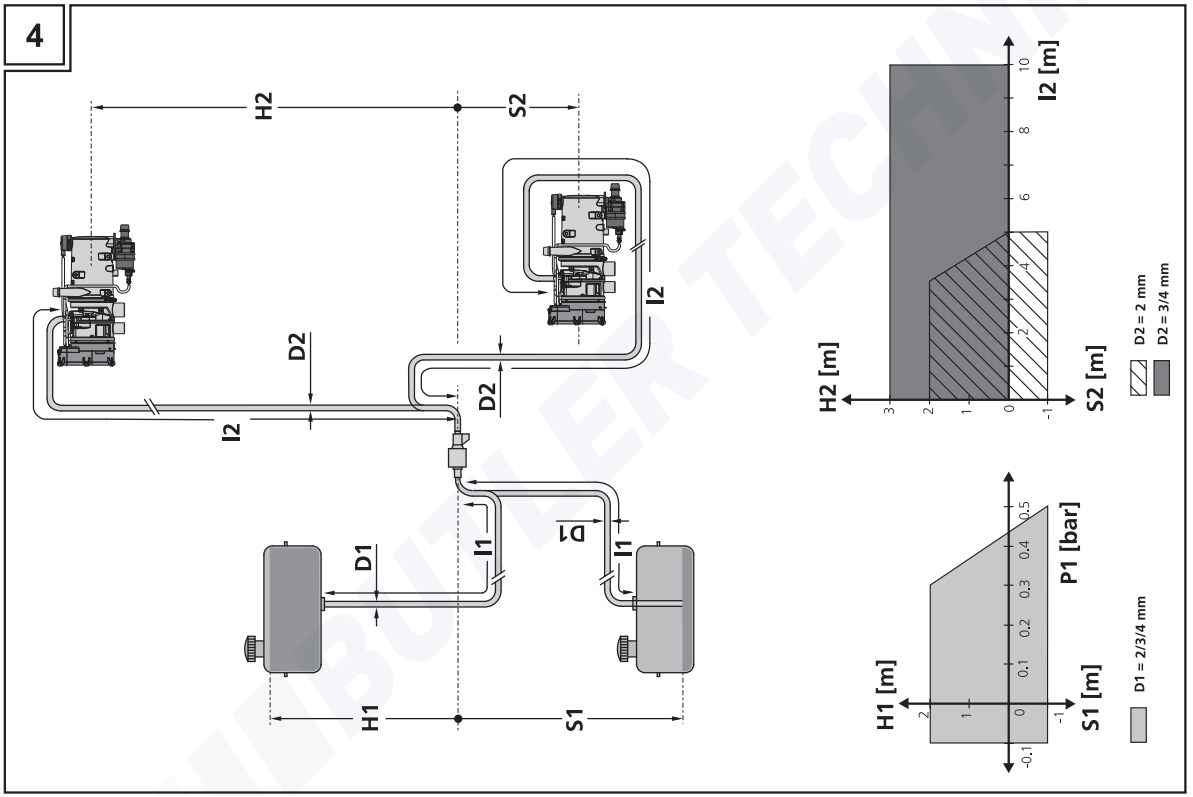

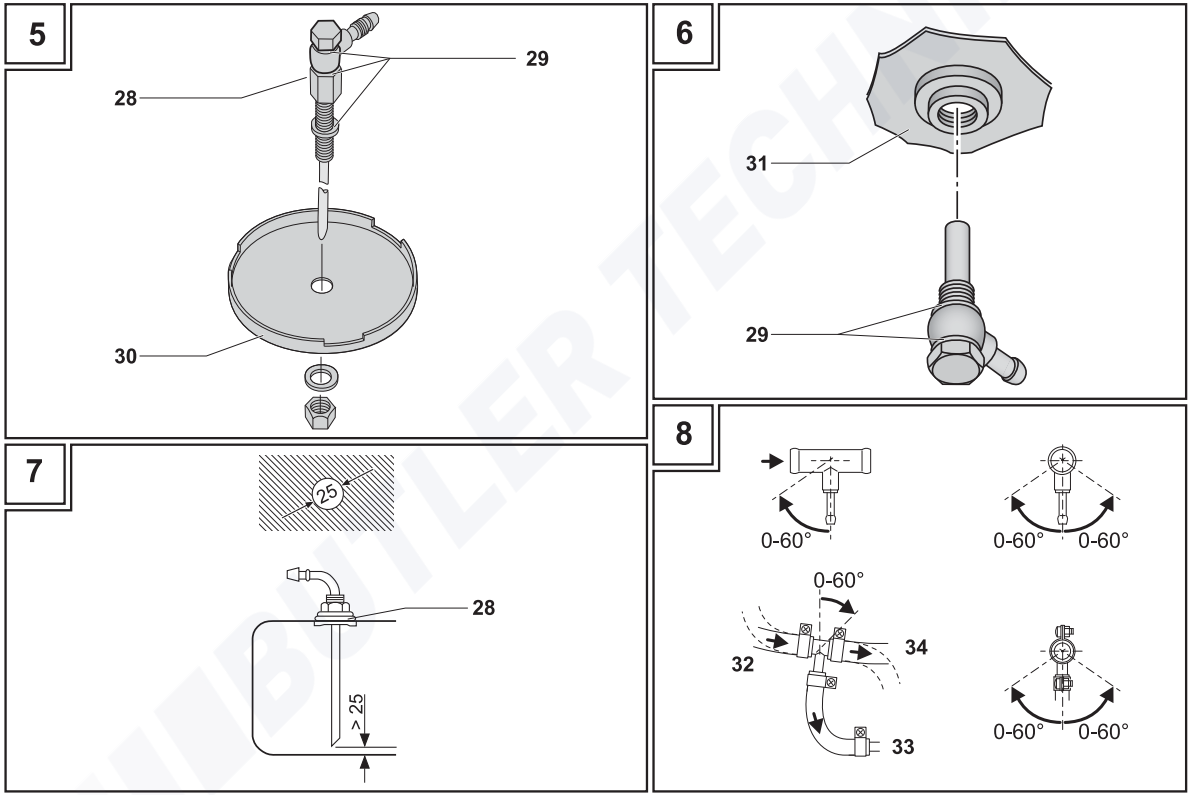

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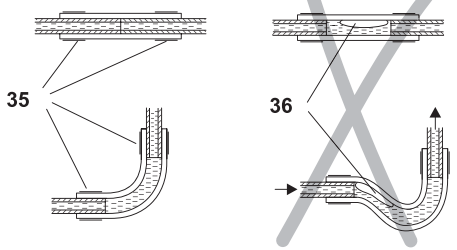

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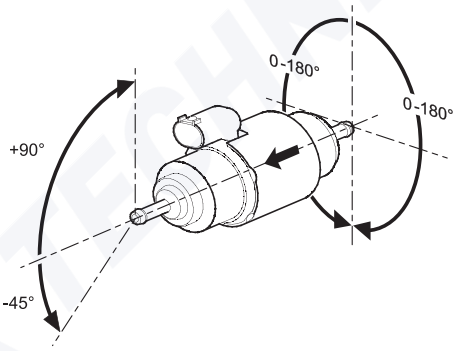

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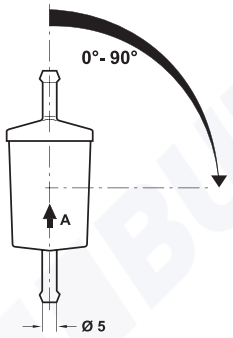

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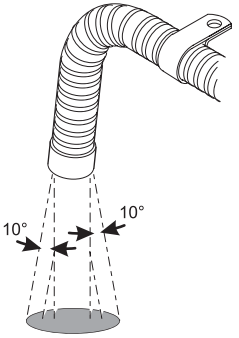

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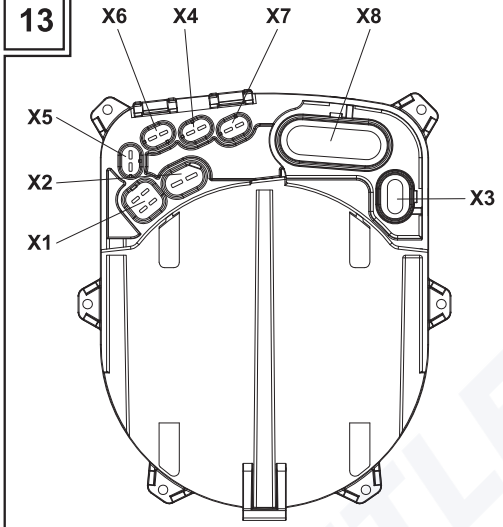

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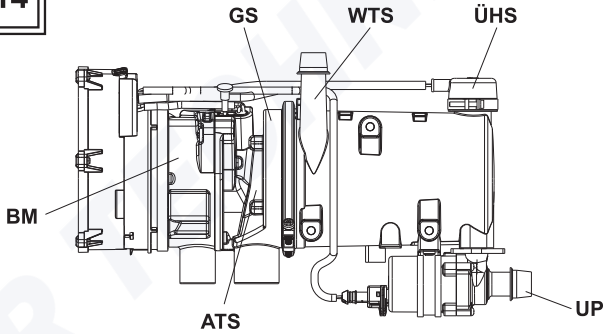

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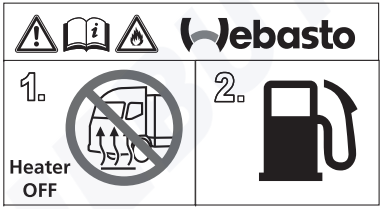

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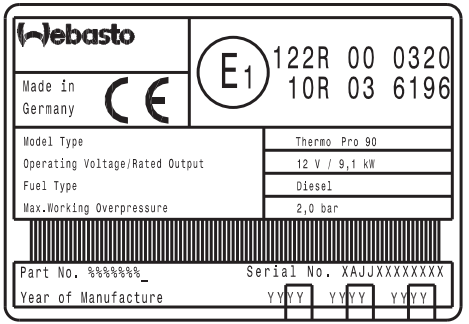

Thermo Pro 90

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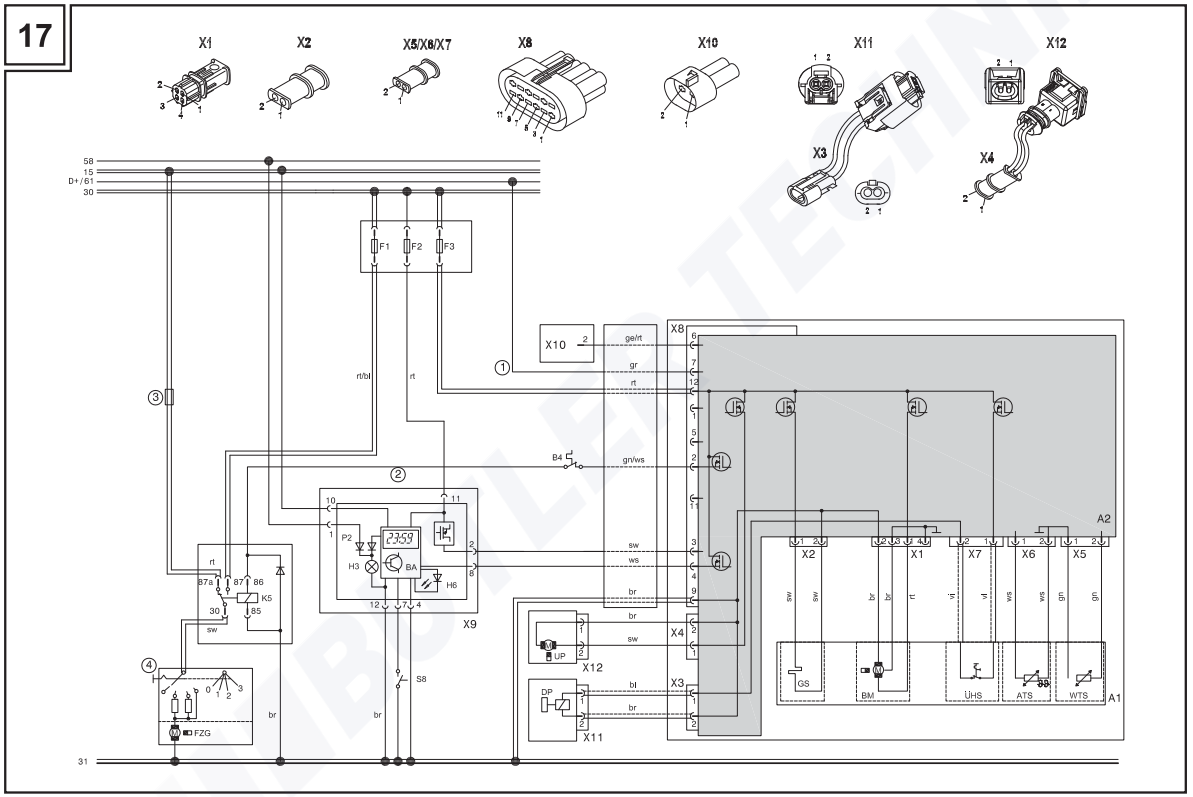

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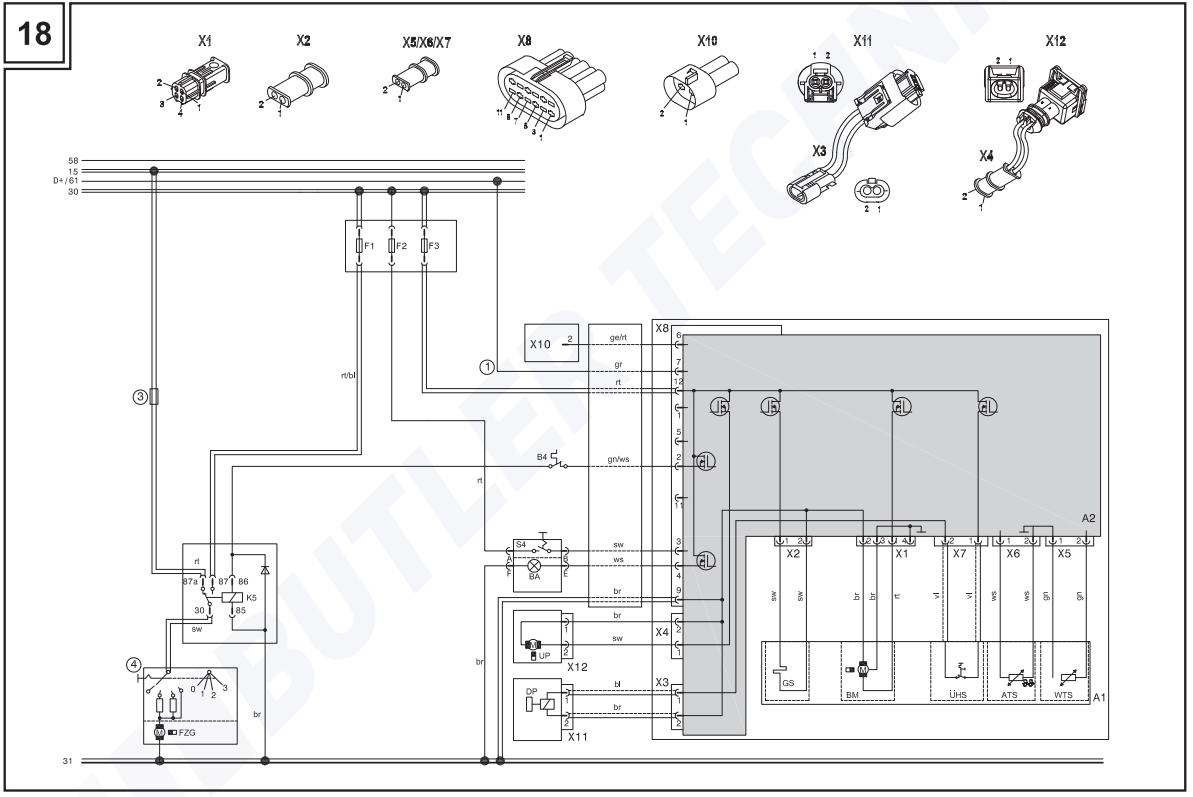
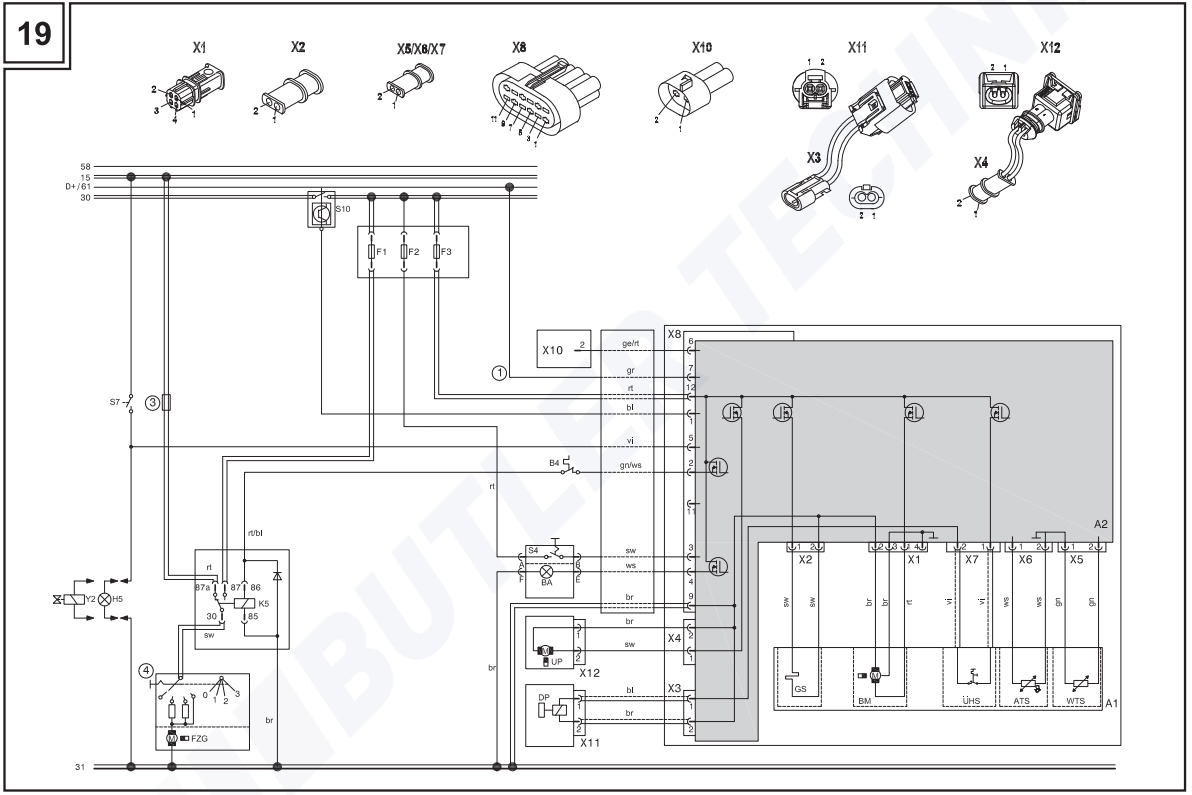


Thermo Pro 90



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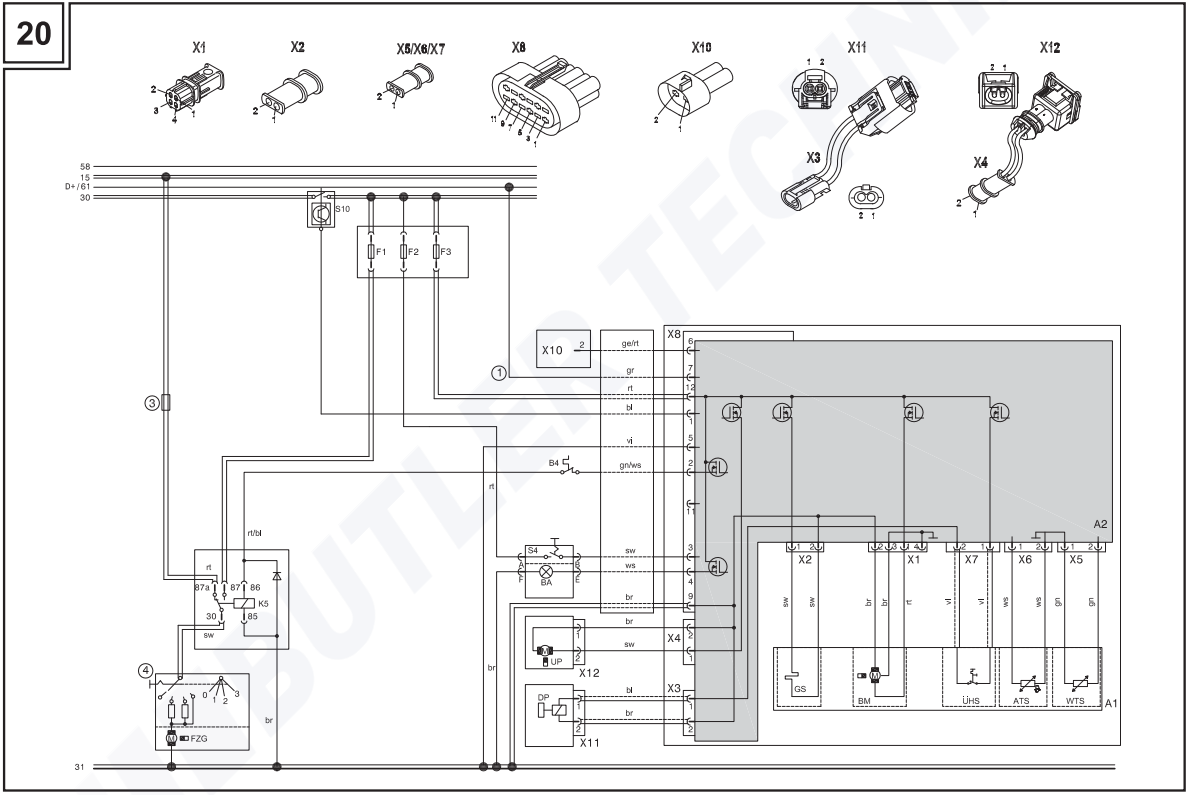


Improper installation or repair of Webasto heating and cooling systems can cause fire or the leakage of deadly carbon monoxide leading to serious injury or death.

To install and repair Webasto heating and cooling systems you need to have completed a Webasto training course and have the appropriate technical documentation, special tools and special equipment.

Only genuine Webasto parts may be used. See also Webasto air and water heaters accessories catalogue.

NEVER try to install or repair Webasto heating or cooling systems if you have not completed a Webasto training course, you do not have the necessary technical skills and you do not have the technical documentation, tools and equipment available to ensure that you can complete the installation and repair work properly.

ALWAYS carefully follow Webasto installation and repair instructions and heed all WARNINGS.

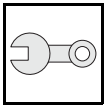
Webasto rejects any liability for problems and damage caused by the system being installed by untrained personnel.

GB Table of Contents

Explanatory Notes on Document

To provide you with a quick overview of the individual working steps, you will find an identification mark on the outside top corner of the page in question. Sections in italics contain an excerpt from the Directive ECE-R 122.

Mechanical system



Electrical system

Coolant circuit

Fuel

Exhaust gas

Combustion air

Technical information

Caution

Note

1 Regulations governing installation

1.1 Statutory regulations governing installation

Type approvals according to ECE-R 10 (EMC) and ECE-R 122 (Heater) exist for the Thermo Pro 90 heater.

See chapter 14, "Technical data" for the approval number.

The provisions of these Directives are binding within the territory governed by EU Directive 70/156/EEC and/or EC/2007/46 (binding for new vehicle types as of 29/04/2009) and should also be observed in countries in which there are no special regulations!

Failure to follow the installation instructions and the notes contained therein will lead to all liability being refused by Webasto. The same applies if repairs are carried out incorrectly or with the use of parts other than genuine spare parts. This will result in the invalidation of the type approval for the heater and therefore of its homologation / EC type licence.

1.2 Application of combustion heaters in vehicles for transporting dangerous goods

Vehicles intended for transporting dangerous goods are type-tested in accordance with ECE-R 105. The following measures have been derived for our combustion heaters:

- The electrical wiring harness must be sufficiently dimensioned to prevent overheating. The electrical wiring harness must be sufficiently insulated. All circuits must be protected with fuses or automatic circuit-breakers.
- The cables must be securely fastened and routed so that the lines are sufficiently protected against mechanical and thermal loading.
- The combustion heaters must be type-tested in accordance with ECE-R 122 and must comply with Appendix 9 – Additional regulations for vehicles for transporting dangerous goods.
- Combustion heaters and their exhaust lines must be designed, arranged, protected or covered so that any unacceptable risk of the load heating up or igniting is avoided.
- If the fuel line is leaky, the fuel must be routed to the ground without it coming into contact with hot vehicle parts or with the load.
- The exhaust system and the exhaust lines must be arranged or protected so that no dangerous heating up or ignition of the load can occur. Parts of the exhaust system located below the fuel tank must be positioned at a distance of 100 mm from it or must be protected by a heat shield.
- The combustion heater may only be switched on manually. Automatic switch-on with a programmable switch is not permissible. The combustion heater may be switched on again manually after the vehicle engine has been switched off.

Requirement for the basic unit:

A maximum run-on of 40 seconds is permitted with a combustion heater switched off. Only those combustion heaters my be used with heat exchangers which are not demonstrably damaged by the reduced run-on time of 40 seconds beyond their usual operating time.

1.3 Additional documentation to be used

These installation instructions do not contain all necessary information and instructions with regard to the installation of Thermo Pro 90 heaters.
In addition, the operating instructions must also be used.

2 Use / version

2.1 Use of the water heaters

2.1.1 Parking heater

The Thermo Pro 90 water heater was designed for use in commercial vehicles. When installing in special vehicles, the applicable regulations must be taken into account. Other uses are possible in consultation with Webasto.

The Webasto Thermo Pro 90 water heater is used in conjunction with the original vehicle heating system in the parking heating mode for

– cab and engine preheating,
– utilisation of residual vehicle engine heat.

Depending on the equipment, the ADR function is intended for the 12 V and 24 V variant.

The water heater operates independently of the vehicle engine and is integrated in the vehicle's cooling system, fuel system and electrical system.

2.1.2 Auxiliary heater

The water heater operates in dependence on the vehicle engine and is integrated in the vehicle's cooling system, fuel system and electrical system.

When the engine is switched off, the water heater is automatically also switched off and the fuel supply is cut off within 5 seconds.

2.2 Version

Thermo Pro 90 12 V Diesel ADR
Water heater for "diesel" fuel.
The heater is designed for 12 V.

Thermo Pro 90 24 V Diesel ADR
Water heater for "diesel" fuel.
The heater is designed for 24 V.

See chapter 14, "Technical data" for the technical design.

3 Installation

The water heater must be installed outside the passenger cabin.

The requirements of the latest version of the ADR must also be observed for the installing the heater into vehicles used to transport hazardous substances.

If the vehicle manufacturer has issued instructions, they must be followed.

3.1 Installation site / Installation position

Body sections and any other components in the vicinity of the heater must be protected from excessive heat and the possibility of fuel or oil contamination.
(Requirement from ECE-R 122, Point 5.3.2.1.).

The heater shall not constitute a risk of fire, even in the case of overheating. This requirement shall be deemed to be met if the installation ensures an adequate distance to all parts and suitable ventilation, by the use of fire resistant materials or by the use of heat shields.
(Requirement from ECE-R 122, Point 5.3.2.2.).

Installation should be carried out as low as possible to ensure automatic bleeding of the heater and circulation pump. This is particularly important as the circulation pump is not self-priming.

Fig. 1 shows the permissible installation position of the heater.

For the position of the heater connections, see Fig. 2.
For dimensions of heater, see chapter 14, "Technical data".

Legend Fig. 2:

23) Heat exchanger inlet
24) Heat exchanger outlet
25) Combustion air inlet
26) Fuel inlet
27) Exhaust outlet
L) Length
L*) Length from control unit to inlet connection piece of circulation pump
B) Width
H) Height

The heater may not be installed:
– in the direct area of radiation of exhaust systems
– below the wading line of the vehicle.
– above the coolant expansion tank.

Exhaust temperature sensor

The exhaust-temperature sensor cable is designed as a high-temperature-resistant line.
The material is resistant to continuous effects of temperatures of up to 185 °C, however it is sensitive to external mechanical influences.
Before the final decision about specification of the heater installation location, we recommend conducting an analysis for the possible risk of damage to the cable due to stone impact.
If stone impact is possible at the heater installation location, then precautionary measures must be taken for direct protection of the exhaust temperature sensor cable, e.g. with suitable covers.

The exhaust temperature sensor must be handled carefully - it is a sensitive electronic ceramic component!
Tensile loading of the exhaust temperature sensor cable on the sensor head must always be avoided during installation and heater operation.
Sharp bends in the cable at the sensor head are not permitted in order to prevent damage to the Teflon insulation of the cable.
Do not pull on the cable after the exhaust temperature sensor is installed!
Should a sensor be dropped during maintenance work, then a new sensor must be installed.
The proper condition of the mica disc (insulation) on the sensor, the force-free seating of the cable clips of the exhaust temperature sensor and the loose routing of the exhaust temperature sensor cable to the control unit must be ensured during installation.

3.2 To install the heater

Every reasonable precaution should be taken in positioning the heater to minimize the risk of injury and damage to personal property.
(Requirement from ECE-R 122, Point 5.3.2.5.).

Only for ADR:

EX/II, EX/III, AT, FL, and OX vehicles:
The combustion heaters and their exhaust gas routing shall be designed, located, protected or covered so as to prevent any unacceptable risk of heating or ignition of the load. This requirement shall be considered as fulfilled if the fuel tank and the exhaust system of the appliance conform to the following provisions:

- *Any fuel tanks for supplying the appliance shall meet the following requirements:*
  - *a) In the event of any leakage, the fuel shall drain to the ground without coming into contact with hot parts of the vehicle or the load;*

[...]

- *The exhaust system as well as the exhaust pipes shall be so directed or protected to avoid any danger to the load through heating or ignition. Parts of the exhaust system situated directly below the fuel tank (diesel) shall have a clearance of at least 100 mm or be protected by a thermal shield.*

Compliance with this paragraph shall be verified on the completed vehicle.
(Requirement from ECE-R 122, Annex 9, Point 3.1.1).

FL vehicles
The combustion heaters shall be put out of operation by at least the following methods:

- *a) Intentional manual switching off from the driver's cab;*

b) Stopping of the vehicle engine; in this case the heating device may be restarted manually by the driver;
c) Start up of a feed pump on the motor vehicle for the dangerous goods carried.

[...]
(Requirement from ECE-R 122, Annex 9, Point 3.3.1).

The heater must be secured on the bracket with at least 3x M8 bolts with 18 Nm.

3.3 Compatibility

The heater is reverse compatibly with previous models regarding installation points on the vehicle.
The peripherals of the Thermo Pro 90 are also compatible with the previous model Thermo 90 ST. This makes it possible to retrofit a Thermo Pro 90.

When the Thermo 90 ST is replaced with a Thermo Pro 90, the metering pump of the Thermo 90 ST (DP2 or DP30) must also be replaced with the Thermo Pro 90 metering pump (DP42)!

When the metering pump is replaced (from DP2 or DP30 to DP42), the Webasto wiring harness adapter must be used for connecting the DP42 to the existing Thermo 90 ST wiring harness.

4 Type label

The label referred to in Annex 7, paragraph 4, or a duplicate, must be positioned so that it can be easily read when the heater is installed in the vehicle.
(Requirement from ECE-R 122, Point 5.3.2.4.).

The type label must be located in an area protected against damage. Inapplicable years must be erased from the type label and the current year must be retained.

Example see also Fig. 16.

5 Installation example

Fig. 3 shows an installation example of the heater in the vehicle.

Legend:

1) Heat exchanger of vehicle heater
2) Switch for fan of vehicle heater
3) Relay for vehicle fan
4) Standard clock
5) Fuse block in vehicle
6) Check valve with leakage hole
7) T-piece
8) Vehicle engine
9) Water heater
10) Circulation pump
11) Water pump
12) Radiator
13) Control valve
14) Exhaust silencer
15) Metering pump
16) Combustion-air intake pipe
17) Thermostat
18) Control unit
19) Wiring harness
20) Fuel line
21) Exhaust pipe
22) Coolant circuit

6 Integration in coolant system

6.1 Connection

In thermostat circuits, only use thermostats which start to open at < 65 °C.

The heater is connected to the vehicle cooling system as shown in Fig. 3. The coolant quantity present must at least be equivalent to the volume specified in chapter 14, "Technical data".

It is preferable to integrate the heater in the coolant system at the vehicle heat exchanger inlet.

Any coolant running off should be collected using an appropriate container.

The coolant hoses supplied by Webasto must always be used. If other hoses are used, they must at least comply with the standard DIN 73411, material class B. The hoses must be routed without kinking and preferably uphill from the heater to ensure perfect bleeding.

Hose connections must be supported by hose clips to prevent them slipping.

The hose clips must be tightened with a torque of 4 Nm.

Care must be taken to bleed the cooling system before the heater is taken into service for the first time or after refilling with fresh coolant. Heater and lines should be installed in such a way as to ensure static bleeding.

Perfect ventilation can be identified by the circulation pump operating almost silently.

Malfunctions due to overheating may occur during operation if the heater and lines have not been bled correctly.

6.2 Checking

After the heater and all coolant-carrying components have been installed, the entire coolant system must be checked for leaks with the system pressure specified by the vehicle manufacturer.

7 Fuel integration

7.1 General Information

The fuel filler must not be situated in the passenger compartment and must be provided with an effective cap to prevent fuel spillage.
(Requirement from ECE-R 122, Point 5.3.3.1.).

In the case of liquid fuel heaters, where a supply separate from that of the vehicle is provided, the type of fuel and its filler point must be clearly labelled.
(Requirement from ECE-R 122, Point 5.3.3.2.).

The fuel line is divided into the intake and the delivery line. As a result, the intake line is a connection between the fuel tank and the metering pump, while the delivery line produces the connection between the metering pump and the heater.

The values for the maximum pressure at the fuel extraction point and the permissible line lengths are shown in Fig. 4.

Intake side:

D1: Inside diameter of fuel line = 2, 3 or 4 mm.

H1: Dimension for fuel tank over metering pump [m]

S1: Dimension for fuel tank under metering pump [m]

l1: Length of fuel line
with D1 = 2 mm => l1 ≤ 3 m
with D1 = 3 or 4 mm => l1≤ 5 m with (l1 + l2) ≤ 12 m

P1: Relative fuel pressure at removal point

Pressure side:

D2: Inside diameter of fuel line = 2, 3 or 4 mm.

H2: Dimension for heater over metering pump [m]

S2: Dimension for heater under metering pump [m]

l2: Length of fuel line

Only for ADR:
EX/II, EX/III, AT, FL and OX vehicles: see section 3.2, "To install the heater", excerpt from the directive.

The statutory regulation of ADR (Accord européen relatif au transport international des marchandises dangereuses par route) governing fuel tanks, part 9 section 9.2.4.7, must be adhered to.

7.2 Integration in vehicle fuel tank

The fuel must be taken from the vehicle fuel tank or from a separate tank (see Figs. 5, 6 and 7).

Also see chapter 5, "Installation example", with Fig. 3.

The specified securing measures of the vehicle manufacturer must be complied with.

Deburr the cut on the tank connector after sawing it off and remove any metal chips.

Fig. 5: Fuel removal from a plastic fuel tank; removal via fuel-tank sending unit.

Legend for Fig. 5:

28) Fuel standpipe
29) Sealing ring
30) Fuel-tank sending unit

Fig. 6: Fuel removal from a plastic fuel tank; removal via fuel-tank drain screw.

Legend for Fig. 6:

29 Sealing ring
31) Plastic fuel tank

Fig. 7: Webasto fuel standpipe.

Legend for Fig. 7:

28) Fuel standpipe

Only use fuel standpipe with metal fuel tank.
Hole diameter: 25 mm.

Fig. 7: The fitting and/or fuel tank must be made from metal!

7.3 Integration in engine return line

Fuel may only be removed from the return line with the special Webasto fuel standpipe. In this case, it must be ensured that the return line reaches almost up to the bottom of the fuel tank and is not closed by a check valve. The fuel extractor must be fitted in such a way that any air or gas bubbles are automatically discharged towards the tank (see Fig. 8).

Legend for Fig. 8:

32) from fuel tank
33) to metering pump
34) to engine

The fuel extractor must not be located near the engine, as gas bubbles may form in the lines on account of heat radiated from the engine. This may cause problems during combustion.

7.4 Fuel line

Since the lines normally cannot be routed with a constant rising gradient, the internal diameter must not be allowed to exceed a certain size. Air or gas bubbles will accumulate in lines with an internal diameter of more than 4 mm and these will cause malfunctions if the lines sag or are routed downwards. The diameters specified in Fig. 4 will ensure that bubbles do not form.

7.4.1 Line installation

When installing the fuel line, it must be kept as short as possible.
See Section 7.1, "General Information".

The line must be installed protected against damage (e.g. stone impact) in all areas.

The fuel line must always be routed in cool areas to prevent the formation of bubbles due to warming. High fuel temperatures can cause heater malfunctions. As a result, the line may not be routed either past strong heat sources (e.g. exhaust gas) or near stored heat zones.
In addition, the steepest possible routing of the fuel line must be ensured from the fuel tank to the heater.

Fuel lines must be fastened in accordance with the latest technology so that, for example, line sag is avoided.

Rub protection must be installed at sharp-edged transitions.

Do not route fuel lines through the vehicle interior.

7.4.2 Line design

Only lines approved by Webasto may be used as fuel lines.

Cut lines without burr and do not crush them.
Do not cut them with side-cutting pliers.

7.4.3 Connecting two lines with a hose

The correct connection of fuel lines with a hose is shown in Fig. 9.

Legend for Fig. 9:

35) Hose clamp
36) Air bubble

Ensure freedom from leaks!

7.4.4 Metering pump

The metering pump is a combined delivery, metering and shut-off system and is subject to specific installation criteria (see Fig. 4 and 10).

The Thermo Pro 90 heater may only be operated with the DP42 metering pump.

7.4.5 Installation location

Before the metering pump is installed, it must be ensured that the permissible occurring pressure at the removal point is not exceeded. The pressure values are shown in Section 7.1, "General Information".

The metering pump may not be installed in the radiation area of hot vehicle parts. A heat shield must be used if necessary. The pump should preferably be installed near the tank.

The permissible ambient temperature is dependent on the fuel used, see chapter 14, "Technical data".

7.4.6 Installation position and attachment

The metering pump must be secured with a vibration-damping mounting. The installation position is restricted as shown in Fig. 10 (maximum inclination of metering pump, axial installation position of metering pump) to ensure good self-bleeding.
The arrow indicates the direction of flow of the fuel.

7.4.7 Fuel filter

Only a Webasto filter, order no. 487 171, is allowed to be used if the fuel is expected to be contaminated. Install vertically if possible, however at least horizontally. See Fig. 11.

Note the installation position and direction of flow.

7.5 Label

A notice, indicating that the heater must be shut down before refuelling, must be affixed to the fuelling point.
(Requirement from ECE-R 122, Point 5.3.3.3.).

Fuel

Use the stickers provided (see Fig. 15 for an example).

The sticker "Switch off heater when refuelling" must be applied near the filler neck.

7.6 Cold-resistant fuels

If you change to low-temperature fuel, the heater must be operated in the boost mode (full load) for approx. 15 minutes so that fuel line and fuel pump are also filled with the new fuel.
We know of no negative influences due to additives.

8 Combustion air supply

The air inlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.
(Requirement from ECE-R 122, Point 5.3.5.2.).

Under no circumstances may the combustion air be taken from areas occupied by people.
The intake opening for combustion air must be located so that it cannot become clogged with dirt. It must not point in the direction of travel.

The withdrawel point for the combustion air must be located in a cool place where it is protected from splashing water and above the fording line of the vehicle.

An intake line is required for combustion air.
A combustion air pipe with a minimum length of 0.5 m and a minimum inside diameter of 30 mm must be used.

The maximum permissible length of the combustion air pipe is 5.0 m.

The combustion air pipe may have several bends; the total bending angles may not exceed 360°.

The smallest bending radius is 45 mm.

The combustion air intake must not be routed above the exhaust outlet.

If the combustion-air intake pipe from the outlet opening to the heater cannot be routed with a continual upward incline, then a 4 mm dia. condensed-water drain hole must be drilled at the lowest point.

If the heater is installed in a general installation space near the vehicle's fuel tank, the combustion air must be taken in from the outside and the exhaust fumes discharged into the atmosphere. The openings must be splash-proof.

A ventilation opening measuring at least 7 cm^2 is required if the heater is installed in an enclosed box. The size of the ventilation opening must be increased accordingly if the temperature in the box exceeds the permitted ambient temperature of the heater (see chapter 14, "Technical data").

9 Exhaust System

9.1 Exhaust pipe

The exhaust pipe (inside diameter 38 mm) can be routed with several bends (360° altogether, minimum bending radius 85 mm).
The total line length must be between 0.5 and 5 m.
Lines approved by Webasto must be used as exhaust pipes.

9.2 Exhaust silencer

It is not permissible to operate the Thermo Pro 90 heater without exhaust silencer.
The exhaust silencer must be installed near the heater and must not be installed near the intake opening for the combustion air.

When installing the exhaust silencer, it must be ensured that the condensed water can run off through the condensed-water drain hole of the silencer.

Fig. 3 (Pos. 14) shows the exhaust silencer.

9.3 Recommendations for installation

The exhaust silencer and the exhaust pipe may not be fastened to temperature-sensitive vehicle parts (e.g. brake line, electr. lines, vehicle control units, headlights, underbody protection, plastic parts, etc.) and must be a sufficient distance of at least 40 mm from them.

Only approved Webasto spacer brackets may be used with this application.

The exhaust pipes are sufficiently fixed in place to ensure the minimum distances even during driving.

It is recommended that the exhaust application be installed splash-water protected.

The exhaust pipe is secured to the heater using a clamping collar, for example.

Collections of condensed water in the exhaust pipe must be drained off directly. If necessary, a condensed-water drain hole may be drilled at the lowest point.

Condensed-water drain holes may not blow onto temperature-sensitive vehicle parts.

The exhaust outlet must be located so as to prevent emissions from entering the vehicle through ventilators, heated air inlets or opening windows. (Requirement from ECE-R 122, Point 5.3.4.1.).

The exhaust outlet must be unobstructed. It must not be directed at vehicle parts. The exhaust outlet may not be located within the range of throw of the wheels.

Watch the maximum steering angle of the front wheels. It must be ensured that the exhaust outlet is not clogged and cannot be damaged under any operating conditions.

The opening of the exhaust pipe must not point in the direction of travel.

The exhaust pipe should be secured no further than 150 mm from the end of the exhaust pipe to ensure that the angle of 90° ± 10° is achieved

See Fig. 12: Exhaust outlet.

After passing through the underbody cover, the exhaust pipe must be extended by another 10 mm.

Only for ADR:

EX/II, EX/III, AT, FL and OX vehicles: see section 3.2, "To install the heater", excerpt from the directive.

The statutory regulation of ADR (Accord européen relatif au transport international des marchandises dangereuses par route) governing the routing of the exhaust line, part 9 section 9.2.4.7, must be adhered to.

10 Electrical Connections

10.1 Connection of control unit / heater

The electrical connection of the heater is designed as shown in Fig. 13, 17, 18, 19 and 20.

10.2 Connection when installing Thermo Pro 90 ADR in a vehicle for transporting dangerous goods (ADR)

EX/II, EX/III, AT, FL and OX vehicles:
The combustion heater shall be switched on manually. Programming devices shall be prohibited.
(Requirement from ECE-R 122, Annex 9, Point 3.1.2.).

When installing Thermo Pro 90 ADR heaters in vehicles for transporting dangerous goods, the requirements of the standard ADR/RID Part 9 Section 9.2.4.7 - Combustion heater must also be met. The electrical connection of the heater is designed as shown in the wiring diagram in Fig. 19 or Fig. 20.
Fig. 19: Circuit diagram Thermo Pro 90, parking heater with On/Off switch with ADR with auxiliary drive.
Fig. 20: Circuit diagram Thermo Pro 90, parking heater with On/Off switch with ADR without auxiliary drive.

If the auxiliary drive is installed, the switch S7 must be installed in such a way that a positive potential is connected to appropriate input of the control module when a pumping device is switched on.

If no earth is available via Y2 or H5 at the control unit input X8/5 (auxiliary drive) when switching on, then all ADR functions are inactive.

After connecting positive potential at the control unit input X8/5 (auxiliary drive On) or the alternator signal D+ is eliminated, a short run-on is carried out for 40 seconds and then the control unit is in the "ADR lock-out" operating mode.

According to the ADR guideline, heaters may only be put into operation with a special, manually operated switch mounted in the cab.
If the system is equipped with a standard clock, ensure that contact 4 on the standard clock remains free. The heater can then only be taken into service using the immediate heat button (circuit diagram available on request).
The use of other timers in ADR vehicles is not permitted.

10.3 Installation and connection of the heater controls

A clearly visible tell-tale in the operator's field of view shall inform when the combustion heater is switched on or off.
(Requirement from ECE-R 122, Appendix 7, Point 7.1.).

The heater can be switched on and off using the following Webasto controls:

- The standard clock is connected as shown in the circuit diagram in Fig. 17.
- The switch is connected as shown in the wiring diagram in Fig. 18, 19 or 20.

Do not press the display during installation. This can result in damage to the LCD display.

10.4 Vehicle fan

The vehicle's own heater fan is controlled using a relay, see circuit diagram Figs. 17, 18, 19, 20 or using a relay with a cabin thermostat.

10.5 Setting control temperatures of Thermo Pro 90

When the signal "Engine on"/"Engine off" (Terminal D+) are connected to the control unit connector X8, contact 7, different control thresholds are effective.

	Nominal temperature on sensor	Regulating pause	Switch on again after regulating pause
"Engine on"	65 °C	75 °C	60 °C
"Engine off"	80 °C	90 °C	75 °C

If the terminal D+ signal is not applied, the temperatures are the same as those at "Engine off".

The selected regulating pause temperature of the heater should be lower than the opening temperature of the radiator thermostat.

11 Circuit Diagrams

The wiring diagrams show the possible circuits with 12 or 24 V:

- System wiring diagram for Thermo Pro 90 with standard clock without ADR: Fig. 17
- System wiring diagram for Thermo Pro 90with On/Off switch without ADR: Fig. 18
- System wiring diagram for Thermo Pro 90 with On/Off switch with ADR with auxiliary drive: Fig. 19
- System wiring diagram for Thermo Pro 90 with On/Off switch with ADR without auxiliary drive: Fig. 20

For the legend for wiring diagrams, see Table 1, Table 2 and Table 3.

For connector assignment on control unit, see Fig. 13.

For positioning of electrical components on heater, see Fig. 14.

Table 1 Cable cross-sections

	Length < 7.5 m	Length 7.5 - 15 m
———	0.75 mm^2	1.0 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

Table 2 Cable colours

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

Table 3 Legend for wiring diagrams (Section 1 of 2)

Item	Description	Comment
①	Temperature coding	D+ signal (vehicle engine ON/OFF) for determination of the control temperature
②	Standard clock P2	– with ignition (Terminal 15) on connection 10: Continuous operation with immediate heating and ignition on – Connection 10 open: Heating duration is programmable (10 to 120 min.), basic setting 120 min.
③	Vehicle fuse	for vehicle fan
④	Vehicle fan switch	
A1	Heater	Thermo Pro 90
A2	Control unit	
ATS	Exhaust temperature sensor	PT2000
B4	Room thermostat	optional
BA	Operation indicator	Light max. 2 W
BM	Burner motor	Combustion air fan
DP	Metering pump	Fuel pump for heater
F1	20 A fuse	Flat fuse SAE J 1284
F2	5 A fuse	Flat fuse SAE J 1284
F3	20 A fuse	Flat fuse SAE J 1284
FZG	Vehicle fan	
GS	Glow plug	
H1	"Heating" symbol in the display	Operating indicator (in item P2)
H3	Symbol light	Light (in item P2)
H5	Switch-on indicator pumping device	Light max. 1.2 W
H6	Lighting of immediate heat button, BA, switch-on check	Red LED (in Pos. P2)
K3	Relay	Circulation pump remote control

Table 3 Legend for wiring diagrams (Section 2 of 2)

Item	Description	Comment
K5	Vehicle fan relay	
P2	Standard clock	For programmed operation
S4	On/Off switch	with BA, in place of standard clock
S6	Emergency-Off switch, mechanical or pneumatic	Isolating switch
S7	Pumping device switch	ADR
S8	Immediate heating signal	Momentary-contact switch (optional via remote control)
S10	Electronic battery switch	
ÜHS	Overheating protection	Sensor on heat exchanger
UP	Circulation pump	
WTS	Coolant temperature sensor	Coolant temperature in coolant circuit
X1	Plug connector, 4-pin	Pos. BM to Pos. A2
X2	Plug connector, 2-pin	Pos. GS to Pos. A2
X3	Plug connector, 2-pin	Pos. DP to Pos. A2
X4	Plug connector, 2-pin	Pos. UP to Pos. A2
X5	Plug connector, 2-pin	Pos. WTS to Pos. A2
X6	Plug connector, 2-pin	Pos. ATS to Pos. A2
X7	Plug connector, 2-pin	Pos. ÜHS to Pos. A2
X8	Plug connector, 12-pin	Wiring harness, vehicle-specific
X9	Plug connector, 12-pin	Pos. P2
X10	Plug connector, 2-pin	W bus PC diagnosis
X11	Plug connector, 2-pin	to Pos. DP
X12	Plug connector, 2-pin	to Pos. UP
Y2	Solenoid valve for pumping device	

12 Initial start-up

The safety precautions in the operating instructions must be observed!
The operating instructions must be read through without fail before starting the heater.

After the heater has been installed, the coolant circuit and the fuel supply system must be carefully bled. Follow the instructions supplied by the vehicle manufacturer for this purpose.
It is recommended that the heater circulation pump be put into operation with the component test function of the Webasto Thermo Test PC Diagnosis to support bleeding.
Before the heater is operated for the first time, the coolant temperature should be < 60 °C, as the heater does not go into combustion operation at high engine temperatures.

Carry out first-time operation with the Webasto Thermo Test PC Diagnosis.
Prime the heater with fuel using the Webasto Thermo Test:
Press the "Fuel prime" button and fill the lines until fuel is present at the heater.

Example:

11 sec. filling time with 1 m line length, 9 Hz metering pump frequency, 2 mm inside diameter of fuel line.
The CO_2 setting is not necessary as part of initial start-up, as the heater has been preset at the factory.
The detailed procedure for CO_2 setting is described in the workshop manual.
All coolant and fuel connections must be checked for leaks and secure attachment during the trial run of the heater. If the heater suffers a fault during operation, the fault must be located and remedied.

13 Malfunctions, Troubleshooting

Detailed troubleshooting is described in the workshop manual.

14 Technical data

14.1 Technical Data Thermo Pro 90

Except where limit values are specified, the technical data below refer to the usual heater tolerances of ± 10 % at an ambient temperature of +20 °C and at the rated voltage.

14.2 Electrical Components

Control unit, motor for combustion air fan and circulation pump, glow plug, switch and standard clock (no time preselection in ADR mode) are designed for either 12 V or 24 V. The temperature limiter, temperature sensor, metering pump and exhaust temperature sensor are identical on 12 V and 24 V heaters.

14.3 Fuel for Thermo Pro 90

The diesel fuel according to DIN EN 590 specified by the vehicle manufacturer is suitable. The Thermo Pro 90 device is also approved for operation with PME (biodiesel), which complies with DIN EN 14214. We know of no negative influences due to additives. If fuel is extracted from the vehicle's tank, follow the additive instructions issued by the vehicle manufacturer. If you change to low-temperature fuel, the heater must be operated in the boost mode (full load) for approx. 15 minutes so that fuel line and fuel pump are also filled with the new fuel.

Heater	Operation	Thermo Pro 90	
		12 V	24 V
Approval symbol		E1 122R 00 0320 (Heater) E1 10R 03 6196 (EMC)	
Model		Water heater with evaporator-type burner	
Heat output	Max. Regulating range	9.1 kW 1.8 to 7.6 kW	
Fuel		Diesel DIN EN 590 PME DIN EN 14214	
Fuel consumption +/- 10%	Max. Regulating range	1.14 l/h 0.21 bis 0.92 l/h	
Rated voltage		12 V	24 V
Operating voltage range		10.5 to 16 V	20 to 31 V
Nominal power consumption without circulation pump +/- 10% (without vehicle fan)	Max. Regulating range	≤ 80 W ≤ 37 W	
Perm. ambient temp.: Heater incl. control unit: - Operation - Storage Metering pump: - Operation - Storage		-40 to +80 °C -40 to +125 °C (heater off, operating voltage may be connected) -40 bis +30 °C -40 bis +85 °C	
Perm. operating pressure (heat medium)		2.0 bar	
Capacity of the heat exchanger		0.15 l	
Max. combustion-air intake temperature		+40 °C	
Minimum quantity of coolant circuit		6.00 l	
Delivery rate of the circulation pump against 0.15 bar		1,650 l/h	
CO_2 in exhaust gas (perm. function range)		8 to 13 vol. %	
CO_2 adjustment values at approx. +20 °C and geodetic altitude of 0 m above sea level		10.5 vol. %	
Heater dimensions * From control unit to inlet connection piece of circulation pump Also see Fig. 2. (Tolerance ± 3 mm)		L = Length: 355 (381*) mm W = Width: 131 mm H = Height: 232 mm	
Weight		4.9 kg	

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Webasto Thermo & Comfort SE
Postfach 1410
82199 Gilching
Germany

Visitors' address:
Friedrichshafener Str. 9
82205 Gilching
Germany

Internet: www.webasto.com

Technical Extranet: http://dealers.webasto.com

Nur innerhalb von Deutschland
Tel.: 01805 93 22 78
(€ 0,14/Min. aus dem deutschen Festnetz)
E-mail: technikcenter@webasto.com

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