

**Wasserheizgerät
Water heater
Appareil de chauffage**

**Einbauanweisung
Installation Instructions
Notice de montage**

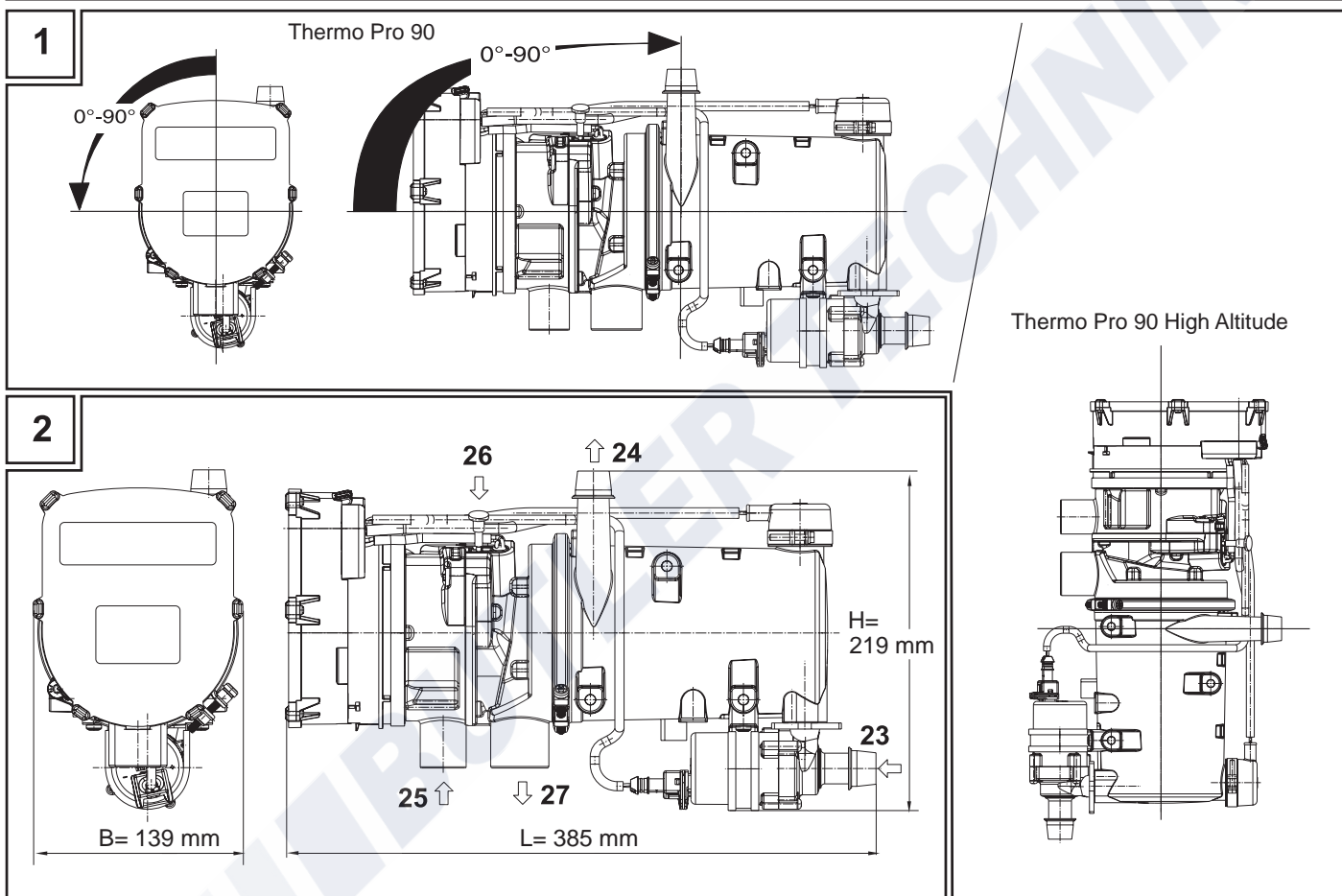
Thermo Pro 90

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

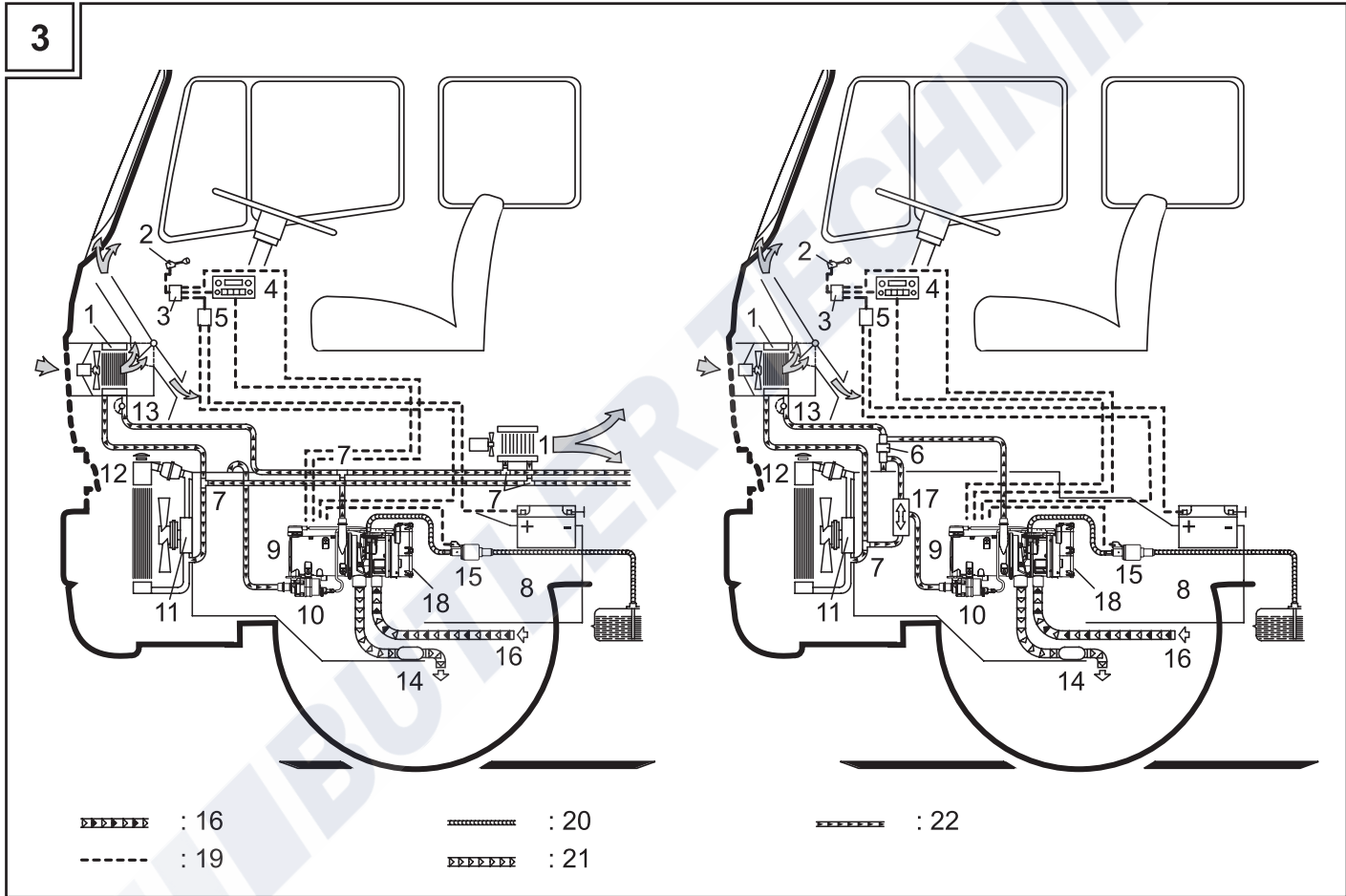
**Thermo Pro 90 24 V Diesel - ADR
(Gefahrguttransport)
(Transport of dangerous goods)
(Transport des marchandises dangereuses)**

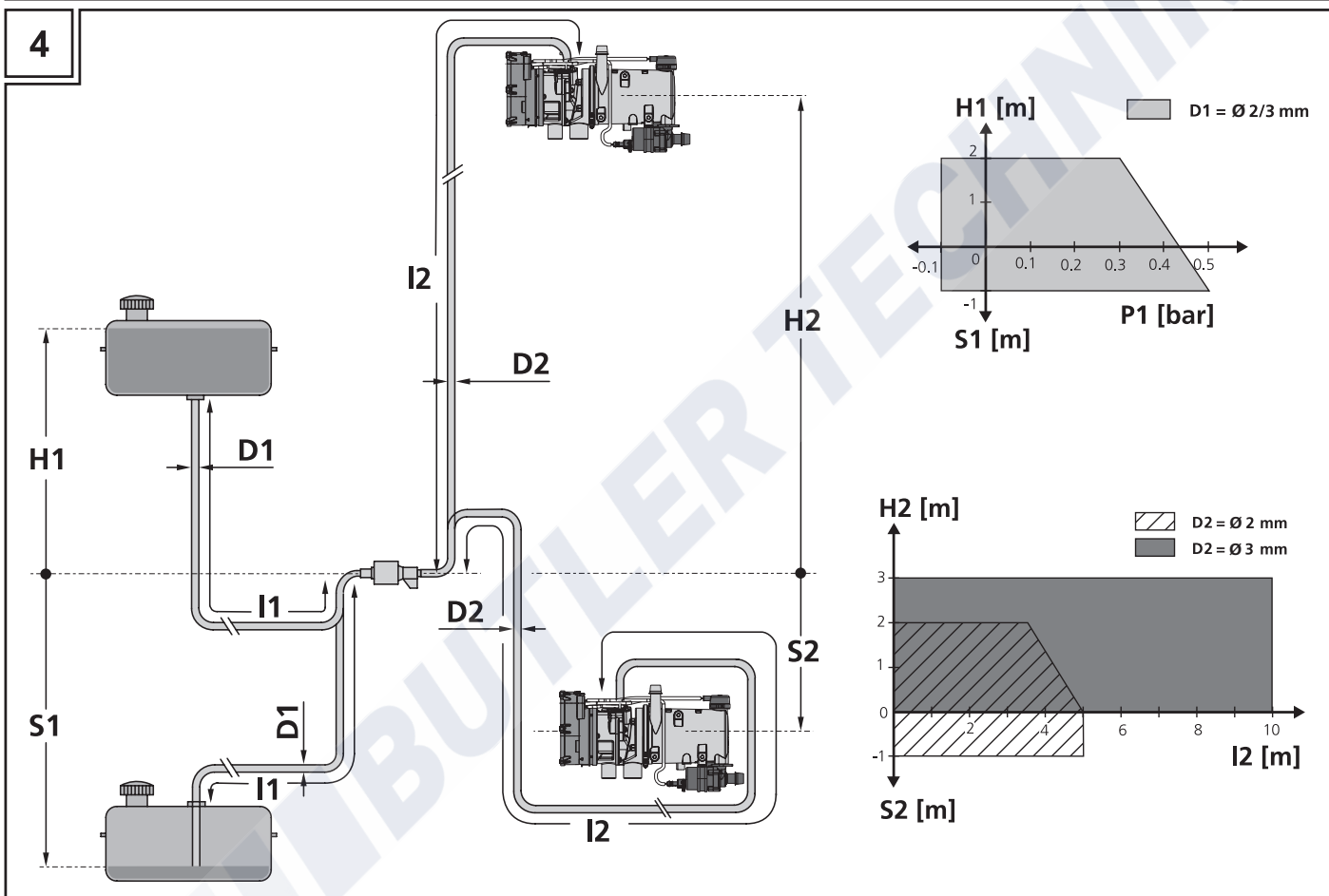
Thermo Pro 90 High Altitude 24 V Diesel

Thermo Pro 90

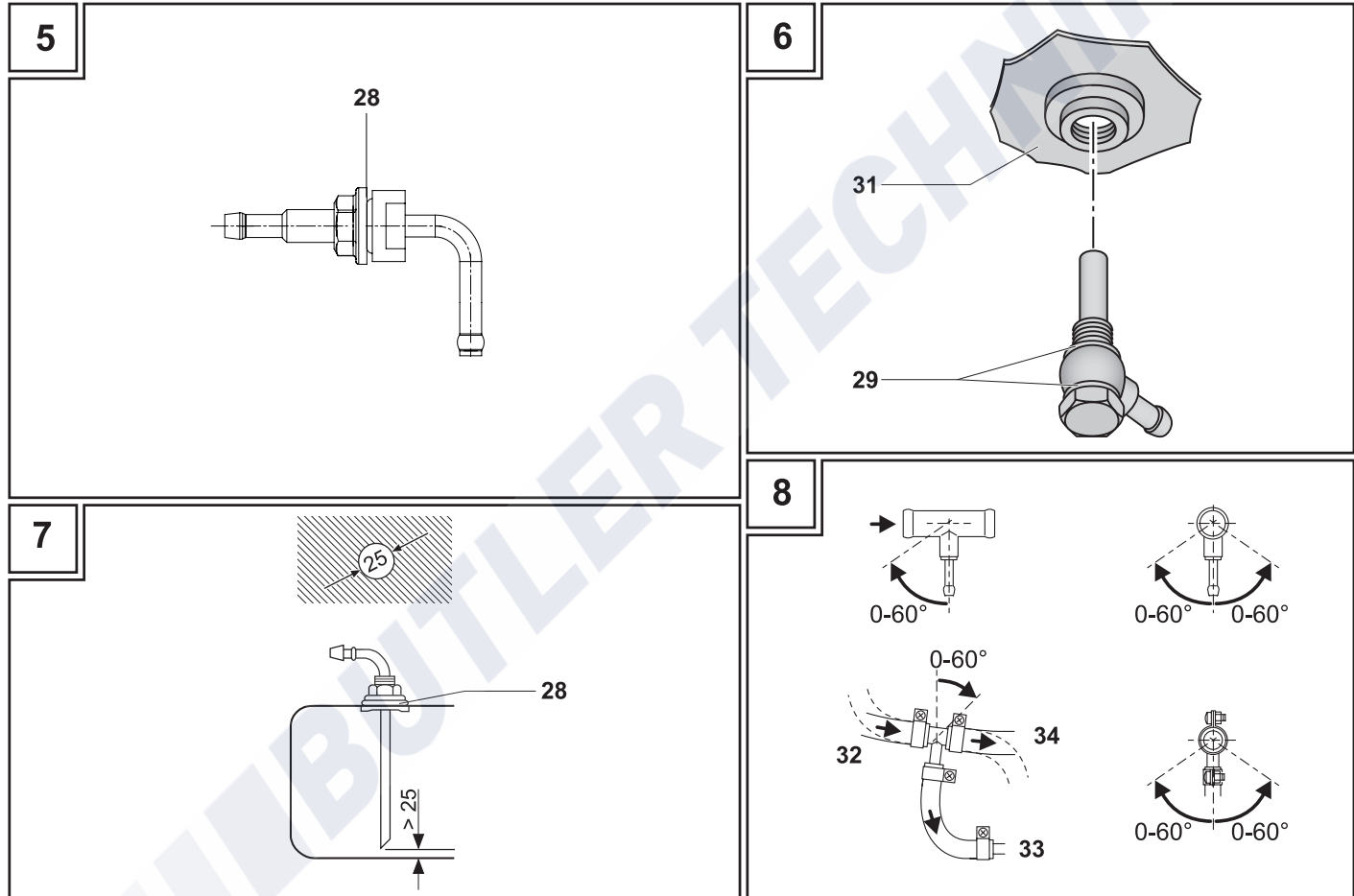


Thermo Pro 90

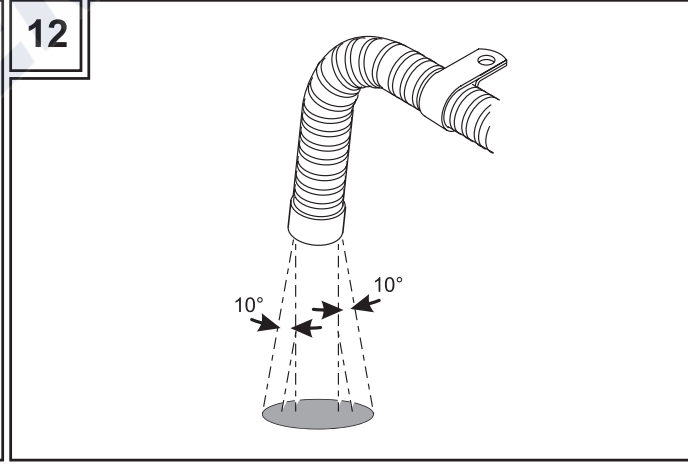
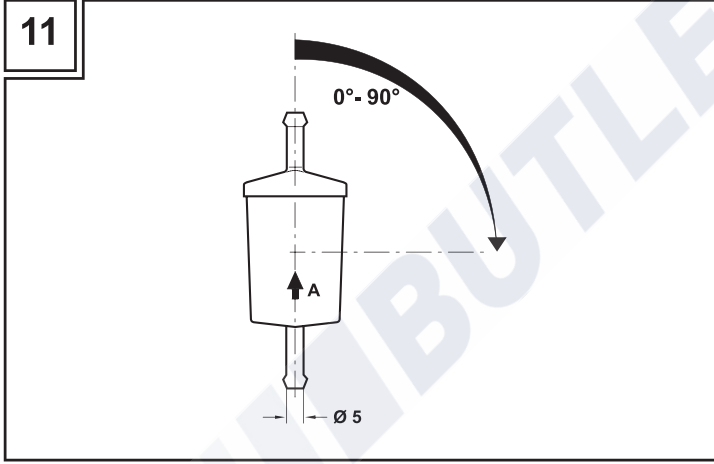
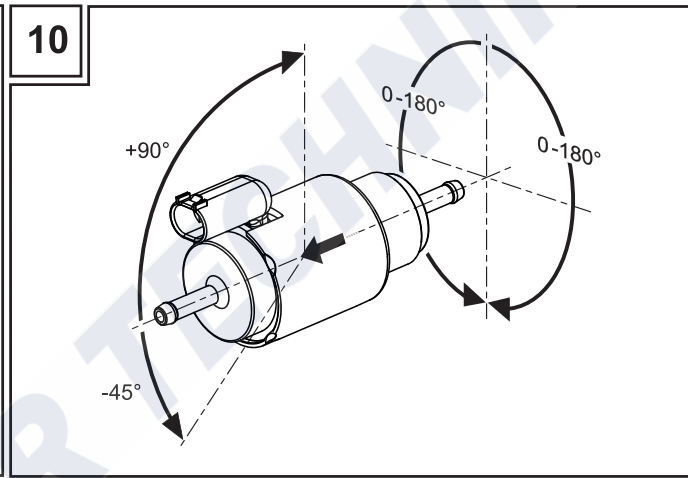
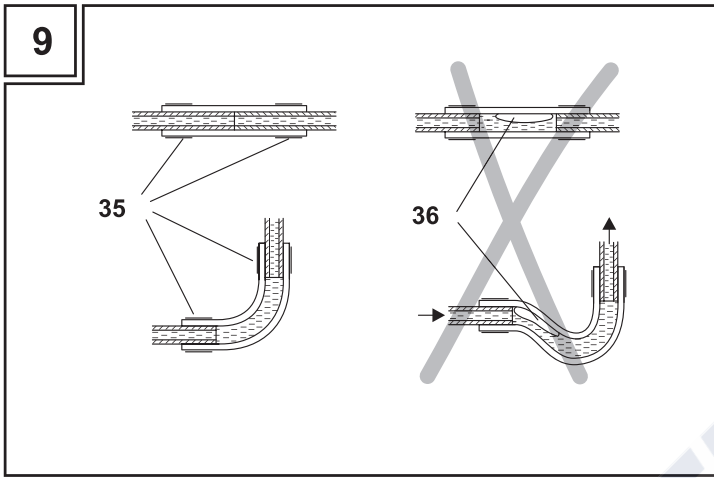




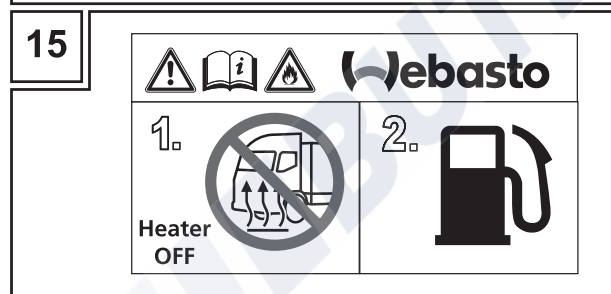
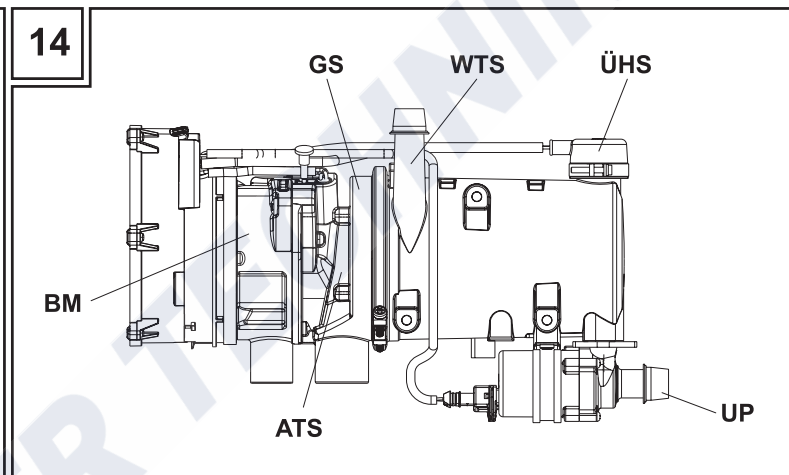
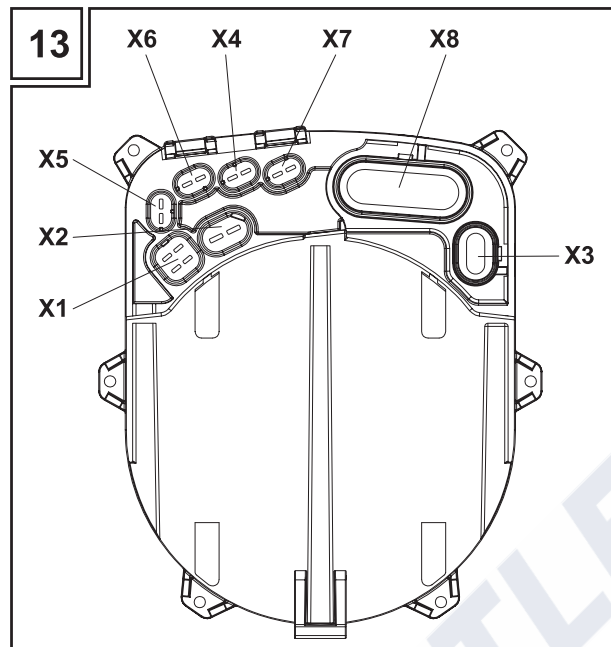
Thermo Pro 90



Thermo Pro 90

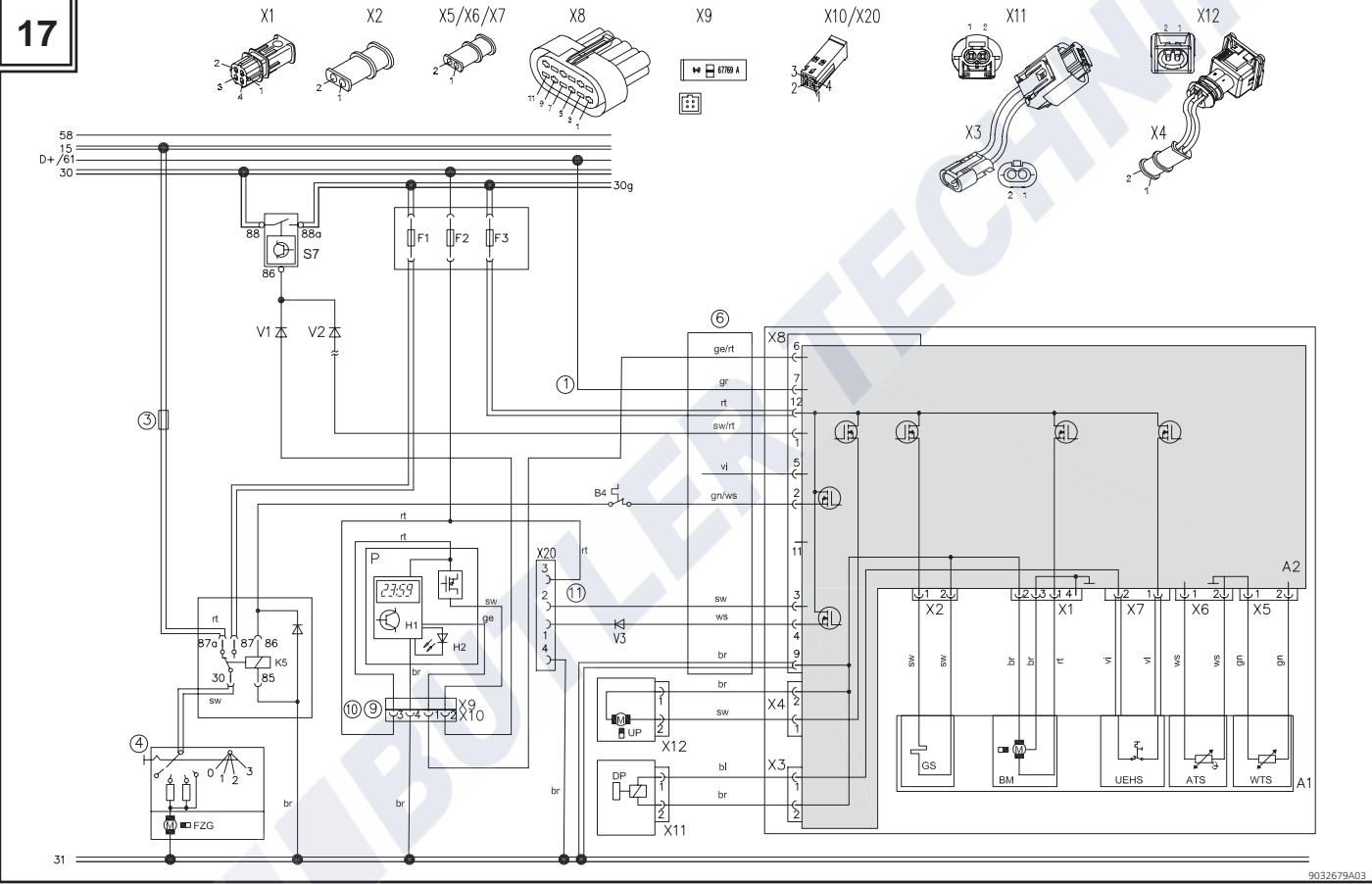


Thermo Pro 90

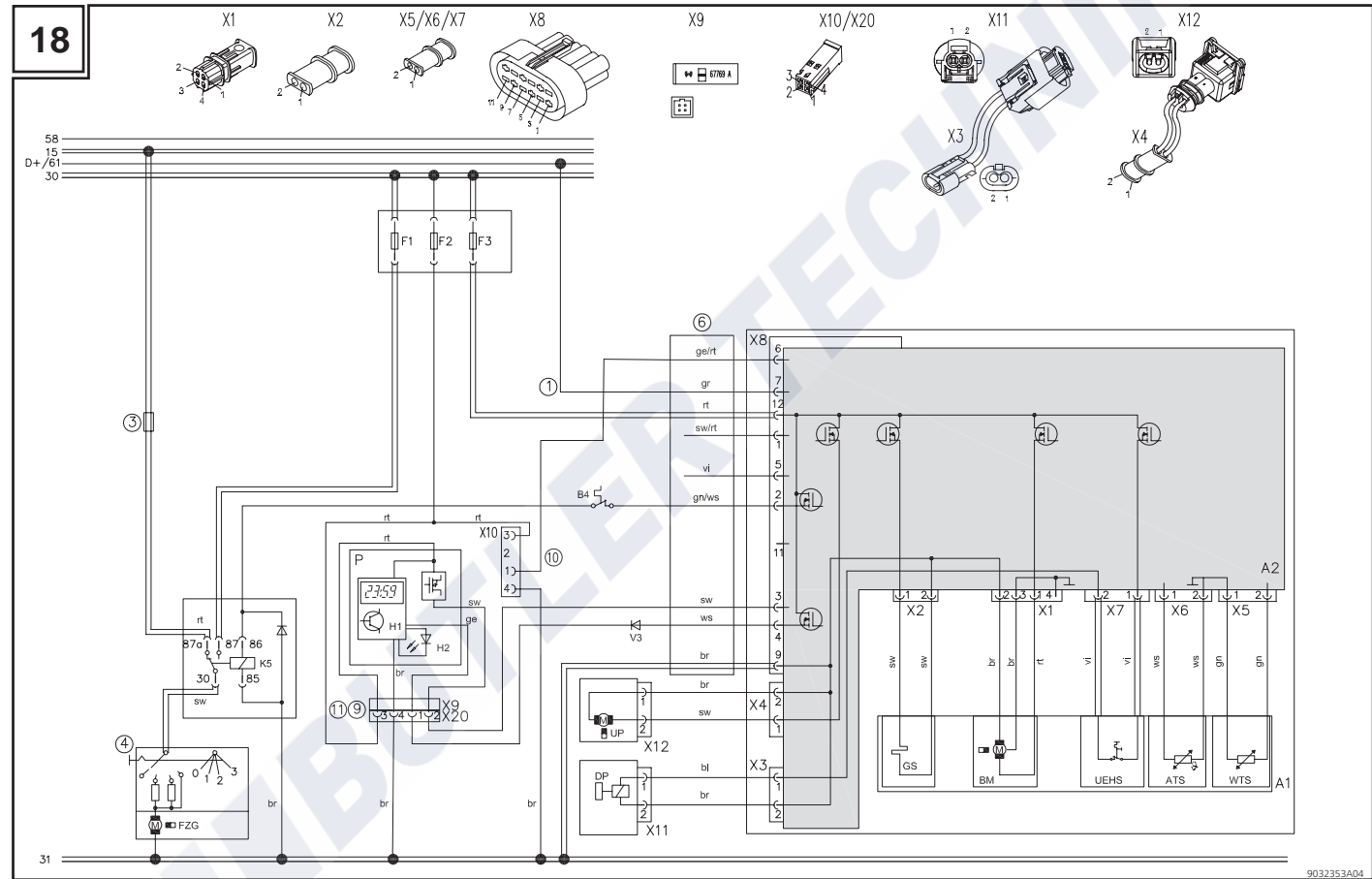


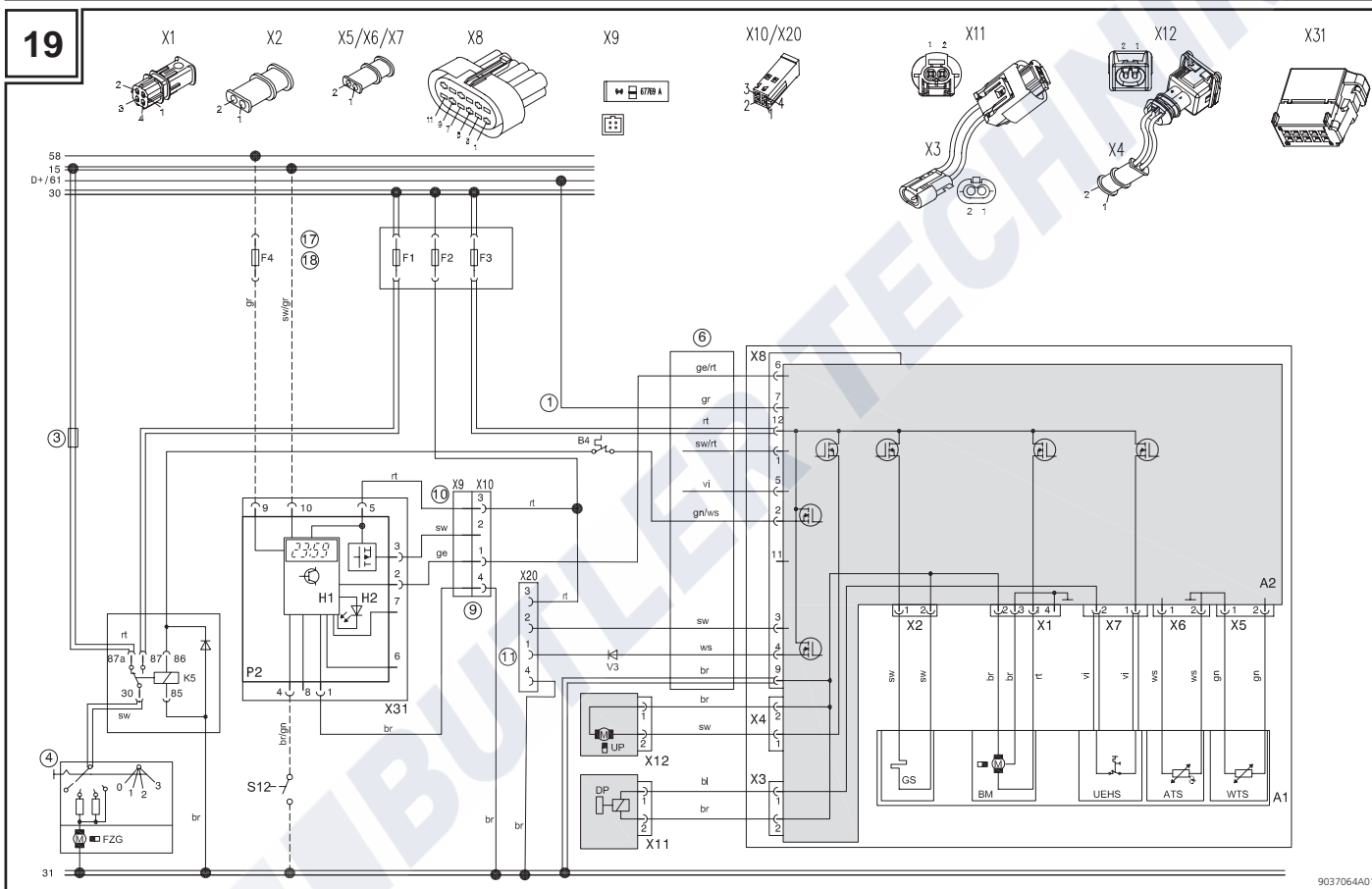
16

Webasto		E1 122R 10R
Made in Germany	CE	
Model Type	Thermo Pro 90	
Operating Voltage/Rated Output	12 V / 9,1 kW	
Fuel Type	Diesel	
Max. Working Overpressure	2,0 bar	
Part No. %%%_%	Serial No. XAJJXXXXXXXX	
Year of Manufacture	YYYY	YYYY YYYY



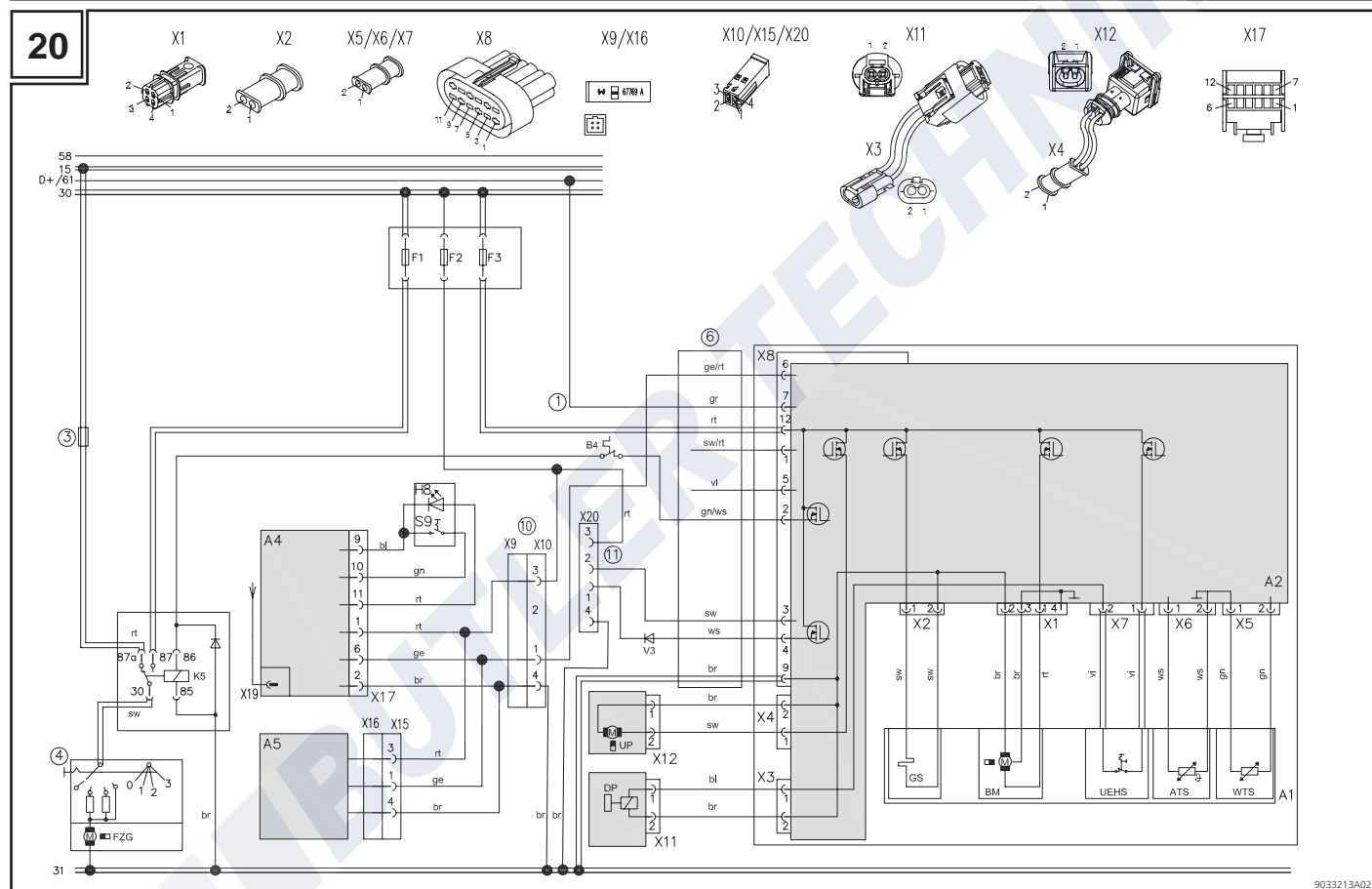
Thermo Pro 90

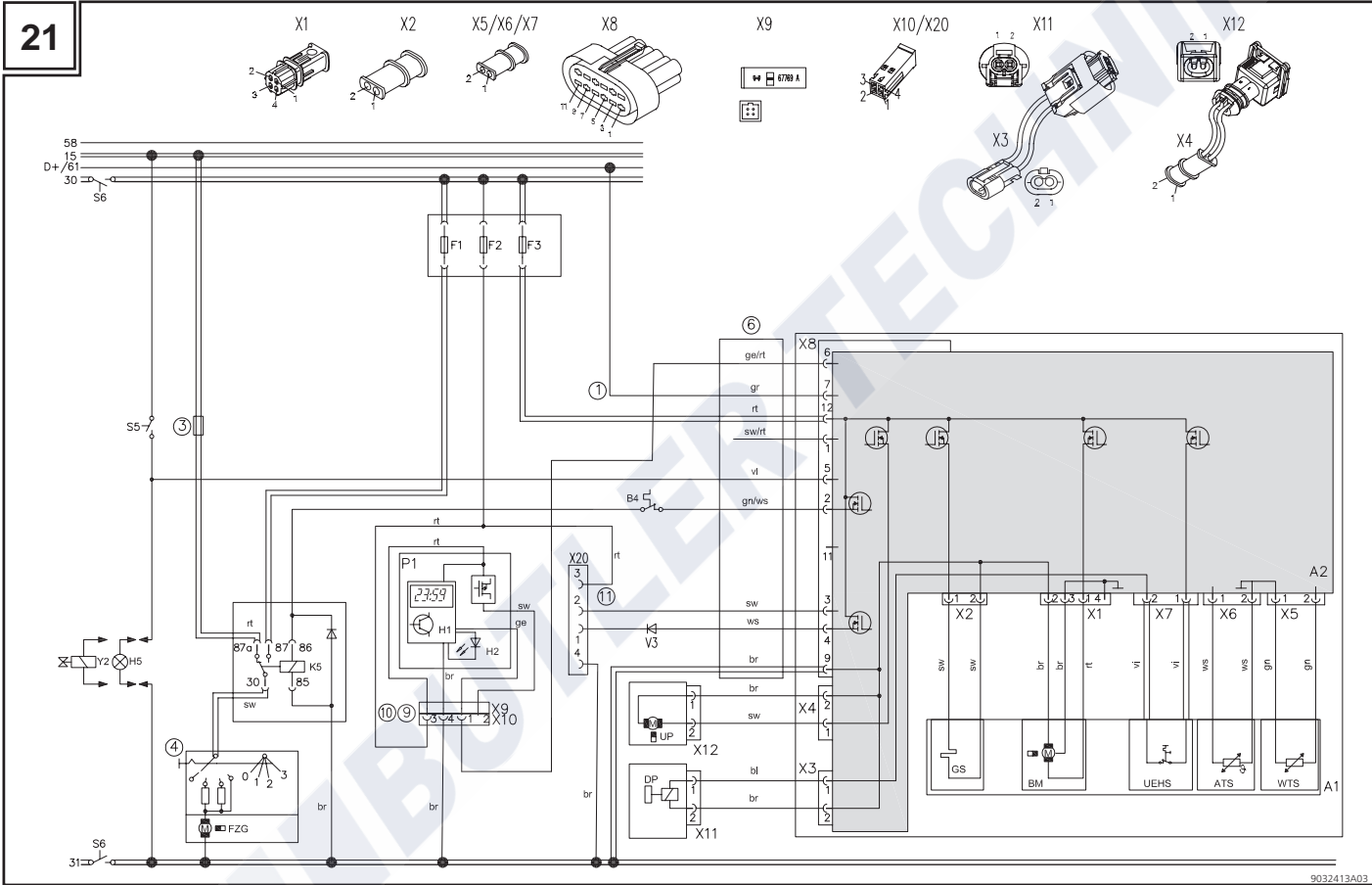




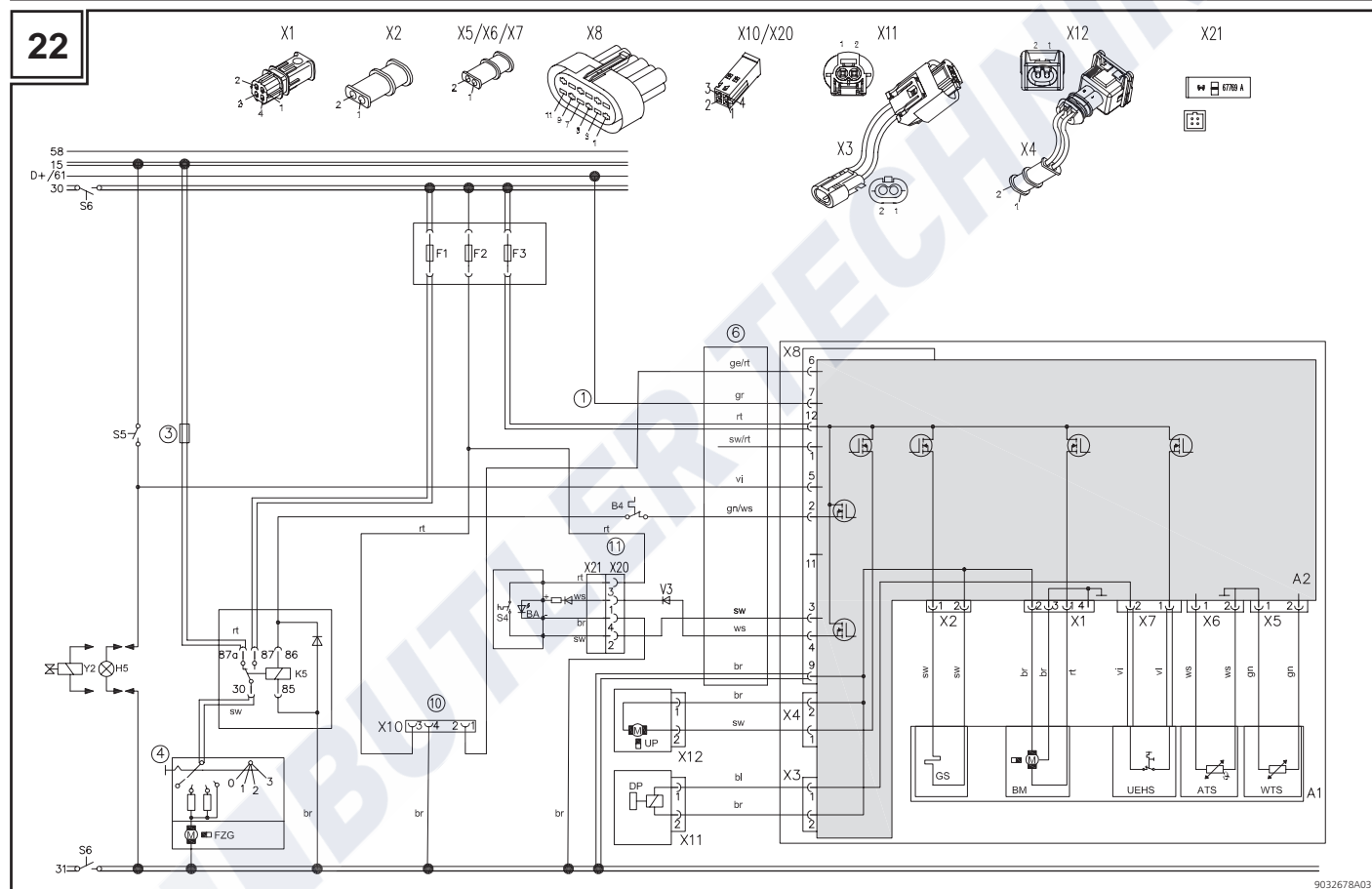
9037064A01

Thermo Pro 90





Thermo Pro 90





The improper installation or repair of Webasto heating and cooling systems can cause fire or the leakage of deadly carbon monoxide. This can lead to serious injury or death.

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

Only use genuine Webasto parts. See also the Webasto air and water heaters accessories catalogue for this purpose.



NEVER try to install or repair Webasto heating or cooling systems if you have not successfully completed a Webasto training course and have not acquired the necessary technical skills, or if you do not have the technical documentation, tools and equipment available necessary for correct installation and repair.

ALWAYS follow all Webasto installation and repair instructions and observe all warnings.

Webasto does not accept any liability for defects and damage due to installation by untrained personnel.

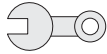
EN Table of Contents

1	Regulations governing installation	40	9	Exhaust system	50
1.1	Statutory regulations governing installation	40	9.1	Exhaust pipe	50
1.2	Application of combustion heaters in vehicles for the transportation of dangerous goods.....	40	9.2	Exhaust silencer	50
2	Use / variants	41	9.3	Notes on installation	50
2.1	Intended use.....	41	10	Electrical Connections	51
2.2	Variants	41	10.1	Connecting control unit/heater	51
3	Installation	42	10.2	Connection when installing Thermo Pro 90-ADR in a vehicle for transporting dangerous goods (ADR)	51
3.1	Installation location/installation position	42	10.3	Installing and connecting the control elements	51
3.2	Installing the heater	42	10.4	Vehicle blower	51
4	Type label	43	10.5	Electrical connection of the wiring harness	52
5	Installation example	44	10.6	Setting the control temperatures for the heater	52
6	Integration in the coolant system	45	11	Wiring diagrams	52
6.1	Connection	45	11.1	Cable cross-sections.....	53
6.2	Inspection	45	11.2	Cable colours.....	53
7	Fuel integration	46	11.3	Legend to wiring diagrams	53
7.1	General	46	11.4	Legend for comments	54
7.2	Integration in vehicle tank.....	46	11.5	Legend for X8 connector, 12-pin	54
7.3	Integration in motor return line	47	11.6	SmartControl / MultiControl / UniControl initial start-up.....	54
7.4	Fuel line	47	12	Initial start-up	55
7.5	DP42 fuel pump.....	48	13	Malfunctions	55
7.6	Fuel filter	48	14	Technical data	56
7.7	Sticker	48	14.1	Electrical components	56
7.8	Cold-resistant fuels	48	14.2	Fuel	56
8	Combustion air supply	49			

About This Document

To enable quick reference to the individual procedures you will find a descriptive symbol on the top outer edge of each page.

Mechanical system



Electrical system



Coolant circuit



Fuel



Exhaust gas



Combustion air



Technical Information



Attention



Note





1 Regulations governing installation

1.1 Statutory regulations governing installation

The Thermo Pro 90 heater has been type-tested and approved in accordance with ECE-R 10 (EMC) and ECE-R 122 (heater).

For approval number see Section 14 Technical data (page 56).



The stipulations of these regulations are binding in the area covered by EU Directive 70/156/EEC and/or 2007/46/EC (for new vehicle models from 29/04/2009) and should also be observed in countries where there are no specific 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 the transportation of dangerous goods.

Vehicles used for the purpose of transporting dangerous goods are type approval tested in accordance with ECE-R 105. The following measures are derived for our combustion heaters.

- The electrical cable/wiring harness must be sufficiently dimensioned to prevent overheating. The electrical cable/wiring harness must be sufficiently insulated. All electrical circuits must be protected by fuses or automatic circuit breakers.
- The cables must be installed and firmly secured such that the wirings are adequately protected against mechanical and thermal stress.
- The combustion heaters must be type-tested in accordance with ECE-R 122 and comply with Annex 9 - Additional regulations for vehicles used for transporting dangerous goods.
- The combustion heaters and their exhaust gas piping system must be designed, arranged, protected or covered so as to prevent any unacceptable risk of heating or ignition of the load.

- In the event of a leak in the fuel line, the fuel must 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 must have a clearance of 100 mm or be protected by a heat shield.
- It must only be possible to switch the combustion heater on manually. Programming devices shall be prohibited. The combustion heater may be switched back on manually after switching off the vehicle engine.

Requirements relating to the basic unit:

When switched off, it is permissible for combustion heaters to continue running for max. 40 seconds. Only combustion heaters are to be used with heat exchangers that are not damaged during their standard operating period by the reduced afterrunning time of 40 seconds.

Additional documentation to be used

These installation instructions contain all the information and instructions necessary to install a Thermo Pro 90 heater.

The following must additionally be observed:

- The Operating Instructions for the heater,
- The Operating and Installation Instructions for the control element

Detailed technical information is provided in the service manual for the heater.

2 Use / variants

2.1 Intended use

The water heater has been designed for installation in commercial vehicles. If it is installed in special-purpose vehicles, the applicable regulations must be taken into account. Alternative applications are possible in agreement with Webasto.

Parking heating

In parking heating mode, the water heater works together with the vehicle's heating system for

- cab and engine preheating,
- use of residual heat from the vehicle engine.

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

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

Auxiliary heating

The water heater works during engine operation and provides thermal assistance to the cooling system. The water heater is integrated in the cooling system, the fuel system and the electrical system of the vehicle.

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

2.2 Variants

- Thermo Pro 90 12 V diesel - ADR

Water heater for diesel fuel. The water heater is designed for 12 volts.

- Thermo Pro 90 24 V diesel - ADR

Water heater for diesel fuel. The water heater is designed for 24 volts.

- Thermo Pro 90 High Altitude 24 V Diesel

Water heater for diesel fuel, variant for high altitudes of up to 4500 m above sea level. Depending on the altitude, the heating capacity may be reduced.

The water heater without ADR approval is designed for 24 volts.

This variant is an alternative to the two standard units mentioned above.

For technical information see Chapter 14 Technical data (page 56).

3 Installation



- The water heater may only be installed outside the passenger compartment.
- The requirements stipulated in the current version of the ADR must be additionally observed when installing the corresponding heater in vehicles used to transport dangerous goods.



Where there are specifications from the vehicle manufacturer, these must be observed.



The water heater must not be installed:

- In the direct radiated heat range of exhaust systems
- Below the wading line of the vehicle
- Above the coolant expansion tank.

3.1 Installation location/installation position



For Thermo Pro 90 High Altitude:

Only install the Thermo Pro 90 High Altitude vertically. See Fig. 1.

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.)

It should be installed as low as possible in order to ensure automatic bleeding of the heater and coolant pump.

This is particularly relevant for the coolant pump which is not self-priming.

Permissible installation positions for the heater:

See Fig. 1

Connection positions for the heater:

See Fig. 2

Dimensions of heater:

See Fig. 2 and Chapter 14 Technical data (page 56).

Legend for Fig. 2:

- 23) Heat exchanger inlet
- 24) Heat exchanger outlet
- 25) Combustion air inlet
- 26) Fuel inlet
- 27) Exhaust outlet

3.2 Installing 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.)

For ADR only:

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:

- Each fuel tank for supplying the heater must comply with the following regulations:
 - a) In the event of a leak, the fuel must 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 heater 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).

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 combustion heater is installed in the vehicle.

(Requirement from ECE-R 122, point 5.3.2.4.).

The type label must be positioned in a location where it is protected from damage.

The non-applicable years should be removed from the type label, retaining the current year.

For an example, see also Fig. 16.

5 Installation example

Fig. 3 shows two installation examples of the heater in a vehicle.

Legend:

1. Heat exchanger for vehicle heating system
2. Switch for fan of the vehicle heating system
3. Relay for vehicle blower
4. Control element
5. Fuse block in vehicle
6. Non-return valve with seepage hole
7. T piece
8. Motor vehicle engine
9. Water heater
10. Coolant pump
11. Coolant pump in vehicle
12. Radiator
13. Regulating valve
14. Exhaust silencer
15. Fuel pump
16. Combustion air intake line
17. Thermostat
18. Control unit
19. Wiring harness
20. Fuel line
21. Exhaust pipe
22. Coolant circuit

6 Integration in the coolant system

6.1 Connection

Only thermostats which start to open at $< 65^{\circ}\text{C}$ should be used in thermostat circuits.

The heater is connected to the vehicle cooling system as shown in Fig. 3. The amount of coolant in the circuit must be at least the volume specified in Chapter 14 Technical data (page 56).

Coolant:

Mix ratio 50:50 (e.g. Glysantin®/water).

Permissible water/glycol (monoethylene glycol) mixes:

	Glycol [%]	Water [%]
Minimum	33	40
Maximum	60	67

The heater should preferably be integrated in the coolant system at the inlet of the vehicle heat exchanger.



Coolant running out of the system should be collected in a suitable container.

The coolant hoses supplied by Webasto should always be used. If this is not possible, the hoses must comply with DIN 73411 material class B as a minimum. The hoses should be installed without kinks and – for problem-free bleeding – as far as possible with an upward slope away from the heater. Hose connections must be secured against slipping using hose clips.



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

Before initial start-up of the heater, or following replacement of the coolant, the cooling system should be bled carefully. The heater and lines should be installed in such a way that static bleeding is ensured.

Correct bleeding can be identified by the fact that the coolant pump is making very little noise.

Insufficient bleeding can lead to a malfunction resulting from overheating in heating mode.

6.2 Inspection

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

7 Fuel integration

7.1 General

The extraction of fuel has safety implications.

Please comply with the legal requirements of your country and region in relation to fuel extraction and vehicle type. Additional tests and/or approvals from a technical inspection organisation may be required.

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 neck must be clearly labelled.

(Requirement from ECE-R 122, point 5.3.3.2.).

The fuel line is divided into an intake and a pressure line. Here, the intake line forms a connection between tank and fuel pump, and the pressure line forms a connection between fuel pump and heater.

Information about the permissible pressure at the fuel take-off point and permissible line lengths can be found in Fig. 4 and the tables.

Intake side:

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

H1: Distance from tank filling level - fuel pump (tank above fuel pump [m])

S1: Distance from tank filling level - fuel pump (tank below fuel pump [m])

I1: Length of fuel line:

if $D1 = 2 \text{ mm} \Rightarrow I1 \leq 3 \text{ m}$

if $D1 = 3 \text{ mm} \Rightarrow I1 \leq 5 \text{ m}$ where $(I1 + I2) \leq 8 \text{ m}$

P1: relative fuel pressure at the take-off point

Pressure side:

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

H2: Dimension of heater above fuel pump [m]

S2: Dimension of heater below fuel pump [m]

I2: Length of fuel line

For ADR only:

EX/II, EX/III, AT, FL and OX vehicles: see chapter 3 Einbau (page 23).

The legal requirements of the ADR for fuel tanks must be observed; see ECE-R 122, Annex 9, point 3.



Risk of fire caused by fuel escaping from leaking plastic tank: burns to the skin

- Do not drill into a plastic fuel tank.
- When retrofitting the fuel take-off system on a plastic tank: Install the Webasto tank extracting device only on the vehicle's fuel-tank sending unit

7.2 Integration in vehicle tank

The safeguarding measures specified by the vehicle manufacturer must be observed.

Make sure that the installation location meets the following requirements:

- Fuel can be taken directly from the fuel tank.
- Fuel must be extracted from the vehicle tank or a separate tank (see Fig. 5, 6 and 7).
- Only use the genuine Webasto tank extracting device.
- Make sure that the swirl pot is not completely emptied during operation.

See also Chapter 5 Einbaubeispiel (page 25).

Extracting fuel from a plastic fuel tank

The tank extracting device (standpipe) must under no circumstances be mounted in the tank body, but only in the vehicle's fuel-tank sending unit.

- Fig. 5: Webasto tank extracting device (standpipe): The length of the standpipe should be selected such that, in the installed state, a minimum clearance of 10 mm above the floor of the tank or 20 mm above the floor of the fuel delivery unit is ensured. Legend for Fig. 5:
 - 28) Tank extracting device
- Fig. 6: Taking off fuel using tank drain plug. Legend for Fig. 6:
 - 29) Sealing ring
 - 31) Fuel tank

Extracting fuel from a metal fuel tank

- After sawing off, deburr the interface to the tank extracting device and remove fragments of metal.
- Use tank extracting device only with unpressurised metal fuel tanks.
- A hole is only permitted in the top of the fuel tank
- The tank extracting device must always be used in a vertical position.
- See Webasto-accessories catalogue for suitable tank extracting device for metal fuel tanks.
- Separate fuel extraction has no influence on the pressure.

- Fig. 6: Taking off fuel using tank drain plug. Legend for Fig. 6:
 - 29) Sealing ring
 - 31) Fuel tank
- Fig. 7: Webasto tank extracting device standpipe. Legend for Fig. 7:
 - 28) Tank extracting device
 Hole diameter 25 mm.

7.3 Integration in motor return line

Fuel take-off from the return line may only be carried out using the special Webasto fuel extractor, and care must be taken to ensure that the return line runs almost to the tank bottom and is not closed by a non-return valve.

The fuel extractor must be installed in such a way that any air or gas bubbles are automatically expelled towards the fuel tank. See Fig. 8.

Legend for Fig. 8:

- 32) from fuel tank
- 33) to fuel pump
- 34) to motor

Fuel must not be extracted in the vicinity of the engine as gas bubbles can form in the lines in this area due to the heat radiated from the motor. This can cause malfunctions in the burner operation.

7.4 Fuel line

Since it is not usually possible to ensure that the line is installed with a gentle slope, the internal diameter must not exceed a specified dimension. Above an internal diameter of 4 mm, air or gas bubbles start to collect, which lead to malfunctions if the lines are installed with a sag or a droop. The diameters specified in Fig. 4 make sure that no troublesome bubble formation occurs.



Ensure lines are free of burrs and do not crimp.

Installing lines

When installing the fuel line make sure that it is kept as short as possible. See Chapter 7.1 General on page 46.

The fuel line must be protected against damage (e.g. stone chips) in all areas. It is essential that the fuel line is installed in cool areas to avoid bubbles being formed by the effect of heat. High fuel temperatures can cause the heater to malfunction. The line must therefore not be directed past heat sources (e.g. exhaust gas) and also not in the region of trapped heat zones.

Moreover, the fuel line should be installed with as much of an incline as possible from the tank to the heater.

Fuel lines must be secured in accordance with the state of the art so that sag-

ging of the lines is avoided.

An abrasion guard should be fitted at transition points with sharp edges.

Pipe material



Use only steel or plastic fuel lines made from light and temperature-resistant PA12/ETFE, PA12/EFEP, PA9T/PA12 in accordance with DIN 73378.

Connecting 2 lines using a hose



Risk of cavitation:

Fig. 9 shows the correct connection of fuel lines to a hose.

Legend for Fig. 9:

35) Hose clip

36) Air bubble



Make sure there are no leaks.

7.5 DP42 fuel pump

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

The Thermo Pro 90 heater must only be operated with the fuel pump DP 42.

Installation location

Before installing the fuel pump, care must be taken to ensure that the permissible pressure at the take-off point is not exceeded. The pressure values are given in chapter 7.1 General on page 46.

The fuel pump must not be installed within the radiated heat range of hot vehicle components. If necessary, a heat shield should be fitted. The fuel pump should be preferably installed close to the fuel tank.

Permissible ambient temperature depending on the fuel used: see Chapter 14 Technische Daten on page 37.

Installation position and fixing

The fuel pump must be secured with a vibration-damping mounting. The

installation position is limited as shown in Fig. 10 to ensure effective automatic bleeding.

The arrow shows the direction of flow of the fuel.

7.6 Fuel filter

Only a Webasto strainer is to be fitted if poor-quality fuel is used. Install vertically if possible, maximum deviation not exceeding 90°. See Fig. 11.



Pay attention to installation position and direction of flow.

7.7 Sticker

A notice, indicating that the heater must be shut down before refuelling, must be affixed to the filler neck. [...]

(Requirement from ECE-R 122, point 5.3.3.3.)

Use the sticker supplied (see Fig. 15 for an example).

7.8 Cold-resistant fuels

When switching to cold-resistant fuels, the heater must be run in burner operation for approx. 15 minutes so that the fuel line and fuel pump are also filled with new fuel.

See also Chapter 14.2 Brennstoff (page 37).

8 Combustion air supply

The air inlet (\varnothing 30 mm) 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 persons.

The fuel intake opening must be arranged in such a way that it cannot become clogged with dirt. It must not face in the direction of travel.

The take-off point for the combustion air must be positioned in a splash-proof, cool position above the wading line of the vehicle.

A combustion air intake line is required.

A combustion air line with a minimum length of 0.5 m and a minimum internal diameter of 30 mm should always be used.

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

The combustion air line may have a number of bends, but the sum of the bend angles must not exceed 360°.

The smallest permitted bending radius is 45 mm.

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



If it is not possible to install the combustion air intake line with a continuous incline from the outlet opening to the heater, a condensation drain hole with a diameter of 4 mm must be installed at the lowermost point.

When installing the heater in the vicinity of the vehicle fuel tank in a common installation space, the combustion air intake must come from the open air and the exhaust gas must be expelled to the open air. Through holes must be made splash-proof.

If the heater is in an enclosed casing, a ventilation opening is required. This opening should be at least twice the diameter of the combustion air intake line. If the temperature in the casing exceeds the permissible ambient temperature for the heater (see Chapter 14 Technical data, on page 56), the ventilation opening must be enlarged accordingly.

9 Exhaust system

9.1 Exhaust pipe

The exhaust pipe (internal diameter 38 mm) can be installed with a number of bends (totalling 360°, smallest bend radius 85 mm). The total pipe length must be between 0.5 and 5 m.

The pipes approved by Webasto must be used for the exhaust pipe.

9.2 Exhaust silencer

Operation of the Thermo Pro 90 heater is only approved with the use of an exhaust silencer.

The exhaust silencer should preferably be installed in the vicinity of the heater and must not be installed in the vicinity of the combustion air intake.



When installing the exhaust silencer, care must be taken to ensure that the condensation can escape through the condensation drain hole in the silencer.

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

9.3 Notes on installation



Do not install parts of the heater exhaust system in the vicinity of the heater control unit.

The exhaust silencer and the exhaust pipe may not be secured to temperature-sensitive vehicle parts (e.g. brake line, electrical lines, vehicle control units, headlamps, underbody coating, plastic parts, etc.) and must be positioned at a suitable spacing from these of at least 40 mm.

The exhaust pipes should be adequately fixed in order to prevent vibrations while travelling.

We recommend that the exhaust system is installed so as to be splash-proof.

The exhaust pipe is secured to the heater using clamping clips.



Accumulations of condensation in the exhaust pipe must be discharged immediately. If necessary, a condensation drain hole may be fitted at the lowermost point.

Condensation drain holes must not blow onto temperature-sensitive vehicle

parts.

The exhaust gas 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 vent freely. It should not be directed towards vehicle parts. The exhaust outlet may not be in the area in which the wheels throw up matter.

Care must be taken to ensure that the exhaust outlet cannot be blocked and **cannot be damaged under any usage conditions.**

The exit of the exhaust pipe must not face in the direction of travel.

Attachment no further than 150 mm, measured from the exit of the exhaust pipe, is required to achieve the required angle of $90^\circ \pm 10^\circ$.

See Fig. 12: Exhaust outlet.

The exhaust pipe must continue for 10 mm after passing through the underbody cover.

For ADR only:

EX/II, EX/III, AT, FL and OX vehicles: see Section 3.2 on page 23.

The legal requirements of the ADR for installing the exhaust pipe must be observed; see ECE-R 122, Annex 9, point 3.

10 Electrical Connections

10.1 Connecting control unit/heater

The electrical connection of the heater is carried out as shown in Fig. 13 and Figs 17 to 22.

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.).

The requirements stipulated in Regulation ECE-R 122, Annex 9 – Combustion Heaters – must be additionally observed when installing Thermo Pro 90-ADR heaters in vehicles used to transport dangerous goods. Electrical connection in accordance with the wiring diagram (depending on control panel, e.g. Multi-Control/SmartControl (ADR), ON/OFF switch (ADR) or UniControl, see Chapter 11 Wiring diagrams (page 52)).



If the auxiliary drive is present, the switch S7 must be installed in such a way that, when a pumping device is started up, the positive potential is connected to the corresponding input in the control unit.



If no earth is present at the control unit input X8/5 (auxiliary drive) via Y2 or H5 on switch-on, all ADR functions are inoperative.

After connecting the plus potential to the control unit input X8/5 (auxiliary drive on) or after the generator signal D+ stops, there is a brief run-on for 40 seconds and the control unit is then in the “ADR locking” operating mode.



In accordance with the ADR Regulations, heaters may only be started up with a special manually operated switch installed in the driver's cab.

The heater can thus only be started up using the instant heat button (wiring diagram on request).

The use of other timers in ADR vehicles is not permitted.

10.3 Installing and connecting the control elements

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, Annex 7, point 7.1).



Installing the control element: follow the Operating Instructions and Installation Instructions for the control element.

The heater can be connected (and switched on or off) using the following Webasto control elements:

- MultiControl (W-bus or analogue)
- UniControl
- ThermoCall TC4
- SmartControl (ADR) (W-bus or analogue)
- On/off switch (ADR)

Connect the control element as shown in the wiring diagram, see Chapter 11 Wiring diagrams (page 52).

10.4 Vehicle blower

The vehicle's heater blower is controlled using a relay or a relay with room thermostat.

Connect the electrical connection as shown in the wiring diagram, see Fig. 17 to Fig. 22.

10.5 Electrical connection of the wiring harness



Danger of fire

Oxidation in the cable can lead to hazardous circumstances.



If the connectors are not of water-tight design, this will invalidate the warranty for the heater.

The heater has water-tight connectors. All electrical connections must be designed to be water-tight. Unprotected connectors on the wiring harness such as fuses, relays and diagnostic links must be installed in the dry zone.

10.6 Setting the control temperatures for the heater

If the signal "Motor on"/"Motor off" (terminal D+) is applied to contact 7 of control unit connector X8, different control thresholds are effective.

	Setpoint temperature at the sensor	Control pause	Switching back on following a control pause
"Motor on"	65°C	75°C	60°C
"Motor off"	80°C	90°C	75°C
			(High altitude: 60 °C)

If the signal terminal D+ is not applied, the temperatures correspond to those for "Motor off".



The normal shutdown pause temperature selected for the heater should be below the opening temperature of the radiator thermostat.

11 Wiring diagrams

The wiring diagrams show the possible connections for 12 or 24 volt heaters.

System wiring diagrams for Thermo Pro 90 and control element:

Figure	Wiring diagram	Page
17	SmartControl/MultiControl (and battery disconnecter) in W-bus mode	8
18	Smart- / MultiControl analogue	9
19	UniControl	10
20	ThermoCall TC4	11
21	SmartControl (ADR)	12
22	On/off switch (ADR)	13

Legend for system wiring diagrams: see paragraphs 11.1, 11.2, 11.3 and 11.4.






Pin allocation on the control unit: see Fig. 13.

Positioning of electrical component on the heater: see Fig. 14.

Legend for Fig. 14:

- ATS: Exhaust gas temperature sensor
- BM: Burner motor
- GS: Glow plug
- SG: Control unit
- ÜHS: Overheat sensor
- WTS: Coolant temperature sensor

11.1 Cable cross-sections

Graphic	<7.5 m	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

11.2 Cable colours

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

11.3 Legend to wiring diagrams

No.	Description	Remarks
A1	Heater	Thermo Pro 90
A2	Control unit	Thermo Pro 90
A3	UniBox	Optional
A4	ThermoCall	TC4 Entry or TC4 Advanced
A5	W-bus temperature sensor	Optional, for TC4 only Advanced
ATS	Exhaust gas temperature sensor	PT2000
B4	Room thermostat	Optional
BA	Function display (switch S4)	Light 0.15 W to max 2 W
BM	Burner motor	Combustion air fan
DP	Fuel pump	Fuel pump for heater
F1	Fuse 20A	Blade fuse DIN 72581-3
F2	Fuse 1A	
F3	Fuse 20A	
F4	Fuse 1A	Not included in wiring harness
FZG	Vehicle blower	–
GS	Glow plug	
H1	Symbol on display	

No.	Description	Remarks
H2	LED (green, blue, white, red)	Operation indicator, Ready indicator, ON indicator, fault list
H5	Bulb/LED	ON indicator, pumping device (max. 500 mA)
K5	Relay with free-wheeling diode	Vehicle blower
P	Smart- / MultiControl	(W-bus)
P1	SmartControl	(W-bus)
P2	UniControl	(W-bus)
S4	Switch	On/Off (min. 500 mA)
S5	Switch	Auxiliary drive / pumping device
S6	Switch, 1 or 2-pin	Disconnecter
S7	Battery disconnecter	Electronically controlled disconnecter (max. 500 mA)
S8	Pushbutton	External Quick Heating button (optional)
S9	Pushbutton	ThermoCall TC4
S12	Pushbutton	External Quick Heating button (optional)
UHS	Overheating protection	Sensor on heat exchanger
UP	Coolant pump	Coolant pump
V1 / V2	Diode	Min. 500 mA (optional, not included in wiring harness)
V3	Diode	For analogue SmartControl/MultiControl connection
WTS	Coolant temperature sensor	Coolant temperature in coolant circuit
X1	4-pin plug connection	Item BM to item A2
X2	2-pin plug connection	Item GS to item A2
X3		Item DP to item A2
X4		Item UP to item A2
X5		Item WTS to item A2
X6		Item ATS to item A2
X7		Item UHS to item A2
X8	12-pin plug connection	Vehicle-specific wiring harness
X9	4-pin plug connection	To item P, P1 or P2 or to A4 or to A6
X10	4-pin plug connection	W-bus, Smart- / MultiControl connection, UniControl, Telearstart (12 V only), ThermoCall or diagnosis
X11	2-pin plug connection	To item DP
X12		To item UP
X13	4-pin plug connection	Smart- /MultiControl connection

No.	Description	Remarks
X14	18-pin plug connection	To item A3 (optional)
X15	Plug connection	W-bus temperature sensor connection
X16		To item A5 (optional)
X17	12-pin plug connection	To Item A4
X19	HF plug connection	FAKRA (for TC4 Advanced only)
X20	4-pin plug connection	To item S4 or SmartControl/MultiControl connection, analogue
X21		To Item S4
X31	10-pin	To Item P2
Y2	Solenoid valve / pump	Auxiliary drive / pumping device

11.4 Legend for comments

No.	Remarks
①	D+ signal (vehicle motor ON/OFF) for determining the control temperature
③	Fuse for vehicle blower (fuse present in vehicle)
④	Switch for vehicle blower
⑥	Wiring harness
⑨	Optional extension available (connection to plug connection X10)
⑩	Smart- / MultiControl connection, Telearstart (12 V only), ThermoCall or diagnosis via W-bus
⑪	SmartControl/MultiControl connection or switch (analogue)
⑰	Positive from terminal 15/75 to connection 10: Continuous heating mode is possible in connection with quick heating function provided the ignition is switched on.
⑱	Connection to terminal 30: Continuous heating mode is possible with ignition switched off.

11.5 Legend for X8 connector, 12-pin

No.	Remarks
1	Output, battery disconnecter afterrunning signal
2	Output, vehicle fan relay
3	Input switch-on signal (ON/OFF)
4	Operating indicator/error code output
5	Auxiliary drive
6	W-bus
7	Terminal D+

No.	Remarks
8	Not used
9	Power supply – (terminal 31)
10	Not used
11	Not used
12	Power supply + (terminal 30)


11.6 SmartControl / MultiControl / UniControl initial start-up

The SmartControl or MultiControl control elements can optionally be connected in analogue or W-bus (Webasto bus system) mode. Two interfaces are provided in the wiring harness for this purpose.

- W-bus to connector X10
- Analogue to connector X20

It is only possible to incorporate multiple control elements in the same mode. Connection of multiple control elements in different modes (W-bus/analogue) is not possible.

Thermo Pro 90 with SmartControl / MultiControl / UniControl

W-bus	Analogue	SmartControl	MultiControl MARRV TT	MultiControl MARRV ATE	MultiControl HD	UniControl	MultiControl Car	Selection of heater from menu (on initial start-up)
✓		✓	✓	✗	✓	✓	✗	
	✓	✓	✓	✗	✓	✗	✗	Thermo Pro 50/90 HS
		✓	✓	✗	✓	✗	✗	Thermo Pro 50/90 UB

✓ : Possible selection

✗ : Not supported

12 Initial start-up



- Observe the safety information given in the operating instructions!.
- Carefully read the operating instructions before operating the heater.

Carefully bleed the coolant circuit and the fuel supply system after installing the heater. The vehicle manufacturer's specifications should be followed.

It is useful to operate the heater coolant pump for assistance when bleeding; this can be actuated via the "Component test" function in the Webasto Thermo Test computer diagnostics.



Before initial start-up of the heater, the coolant temperature should be < 60°C since the heater does not commence burner operation at high engine temperatures.

Carry out the initial start-up with Webasto Thermo Test computer diagnostics. Pre-deliver fuel for the heater with Webasto Thermo Test: select the "Fuel priming" button and fill the line until fuel is present at the heater.



The CO2 setting is not necessary for initial start-up since the heater has been preset in the factory. The detailed procedure for setting CO2 is described in the service manual.

All coolant and fuel connections should be checked for leaks and firm seat during the test run of the heater. If the heater encounters a malfunction during operation, perform the troubleshooting procedure to locate the fault.



Fuel pump DP42: max 10V
Operating voltage range 8-10V

13 Malfunctions

Detailed fault localisation and troubleshooting is included in the Thermo Pro 90 service manual.

14 Technical data



Tolerances:

If no limit values are specified, the technical data below will refer to the usual heater tolerances of $\pm 10\%$ at an ambient temperature of $+20^{\circ}\text{C}$ and at the rated voltage.

14.1 Electrical components

Control unit, motor for combustion air fan and coolant pump, glow plug, switch are designed for either 12 volt or 24 volt. The components thermal relay, temperature sensor, fuel pump and exhaust gas temperature sensor are the same for the 12 V and 24 V heaters.

14.2 Fuel

The diesel fuel in accordance with DIN EN 590 specified by the vehicle manufacturer must be used.

The Thermo Pro 90 device is also approved for use with PME (biodiesel) conforming to DIN EN 14214.

If fuel is taken from the vehicle fuel tank, follow the additive instructions issued by the vehicle manufacturer.



There are no known adverse effects of using additives. Please contact your authorised Webasto dealer with any questions.

Compatible with other fuels on request.

CE-Konformitätserklärung CE-Declaration of Conformity	
--	---

Hersteller **Webasto Thermo & Comfort SE**
 Manufacturer **Friedrichshafener Straße 9
 82205 Garching**

Für die Verwendung des Webasto Heizgerätesystems
 For the use of the Webasto heating system

Thermo Pro 90

Richtlinie Directive	Harmonisierte Normen Harmonised Standards
2006/42/EG Maschinenrichtlinie	EN ISO 13445-1:2008-12 EN ISO 3744:2010 EN ISO 12100:2011
2006/42/EG machinery directive	DIN EN 61310-2:2008-09 DIN EN 60335-1:2012-10
2014/30/EU EMV	DIN EN 61000-6-2:2008 DIN EN 61000-6-3:2007
2014/30/EU EMC	DIN EN 13369:2010 EN IEC 14982:2009 EN IEC 13766:2006
2011/65/EU RoHS	

Befolgen Sie die Einbauanleitung
 and die Bedienungsanleitung
 Follow the installation instruction
 and operating instruction

1316605
 1316604
 1316605
 1316604

Ort und Datum der Ausstellung
 Place and Date of Issue

Garching, den 27.08.2014



ppb.
 Dr. W. Forsthuber
 EVP Program Management &
 Product Engineering
 Webasto Thermo & Comfort SE



i.A.
 R. Kaindl
 Certification and Regulation
 Webasto Thermo & Comfort SE

Webasto Thermo & Comfort SE
 Friedrichshafener Straße 9
 82205 Garching
 Telefon +49 (0)89 857 94-2
 Fax +49 (0)89 857 94-44

Webasto
 Webasto Group
 Webasto AG

Verantwortlich für die Einhaltung
 der Konformitätserklärung
 Dr. Jochen Danneberg
 Michael Krawinkel

Webasto Thermo & Comfort SE
 Friedrichshafener Straße 9
 82205 Garching
 Telefon +49 (0)89 857 94-2
 Fax +49 (0)89 857 94-44

Webasto Thermo & Comfort SE
 Friedrichshafener Straße 9
 82205 Garching
 Telefon +49 (0)89 857 94-2
 Fax +49 (0)89 857 94-44

Original in deutscher Fassung.
 Original in german version.

Die alleinige Verantwortung für die Ausstellung dieser
 Konformitätserklärung trägt der Hersteller.
 This declaration of conformity is issued under the sole responsibility of
 the manufacturer.

Heater		Thermo Pro 90 Diesel	
		12 V	24 V
Type approval	ECE R122 (Heating)	E1 122R 00 0320	
	ECE R10 (EMC)	E1 10R 04 6196	
Design		Water heater with vaporising burner	
Heat flow [kW]	Partial load	1.8	
	Full load	7.6	
	Boost (max. 2 h)	9.1	
Fuel		Diesel DIN EN 590, VME DIN EN 14214, Fuel oil EL DIN 51603-1, Paraffinic fuel DIN EN 15940 (HVO, GTL)	
Fuel consumption [l/h]	Partial load	0.2	
	Full load	0.9	
	Boost	1.1	
Rated voltage [V]		12	24
Operating voltage range [V]		10.5 – 16	20 – 31
Rated power consumption with coolant pump and without vehicle blower [W]	Maximum	≤ 90	
	Control range	37 to 83	
Permissible ambient temperature (operation/storage) (including control unit and coolant pump) [°C]	Heater	-40 to +80 / -40 to +125	
	DP42 fuel pump	-20 to +30 / -40 to +85	
Altitude suitability, maximum operational altitude above sea level [m]	Without reduced heating output	< 1500 (high altitude: < 1000)	
	With reduced heating output	≤ 3500 (high altitude: ≤ 4500)	
Max. combustion air intake temperature [°C]		+40	
Permissible working pressure of coolant [bar]		2.0	
Capacity of the heat exchanger [l]		0.15	
Minimum volume in coolant circuit [l]		6.0	
Volume flow of coolant pump at 0.15 bar [l/h]		1650	
Coolant specification		See Chapter 6 Integration in the coolant system (on page 45)	
CO ₂ in exhaust gas (permitted function range) [Vol %]		9 to 12	
CO ₂ -Setting [Vol %] (7.6 kW at full load)		10.1 ± 0.4	
Dimensions of heater (including coolant pump) See Fig. 2.	Length (L) [mm]	385	
	Width (W) [mm]	139	
	Height (H) [mm]	219	
Weight [kg]		4.9	
IP class Heater		IP6K9K	

Bei mehrsprachiger Ausführung ist Deutsch verbindlich.

Die Telefonnummer des jeweiligen Landes entnehmen Sie bitte dem Webasto Servicestellen-Faltblatt oder der Webseite Ihrer jeweiligen Webasto Landesvertretung.

In multilingual versions the German language is binding.

The telephone number of each country can be found in the Webasto service center leaflet or the website of the respective Webasto representative of your country.

Dans le cas d'une version rédigée en plusieurs langues, l'allemand est alors la langue qui fait foi.

Pour trouver le numéro de téléphone du pays concerné, veuillez consulter le dépliant des points-service Webasto ou la page web de la représentation Webasto de votre pays.

Webasto Thermo & Comfort SE

Postfach 1410

82199 Gilching

Germany

Visiting address:

Friedrichshafener Str. 9

82205 Gilching

Germany

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

Nur innerhalb von Deutschland

Tel: 0395 5592 444

E-mail: technikcenter@webasto.com