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**Autoterm**  
europe

DIESEL AIR HEATERS  
ENGINE PREHEATERS

# Installation manual

Liquid pre-heaters:

BINAR-5S

BINAR-5S (diesel)

BINAR-5S-TM

BINAR-5S-TM (diesel)

BINAR-5S-24-TM (diesel)

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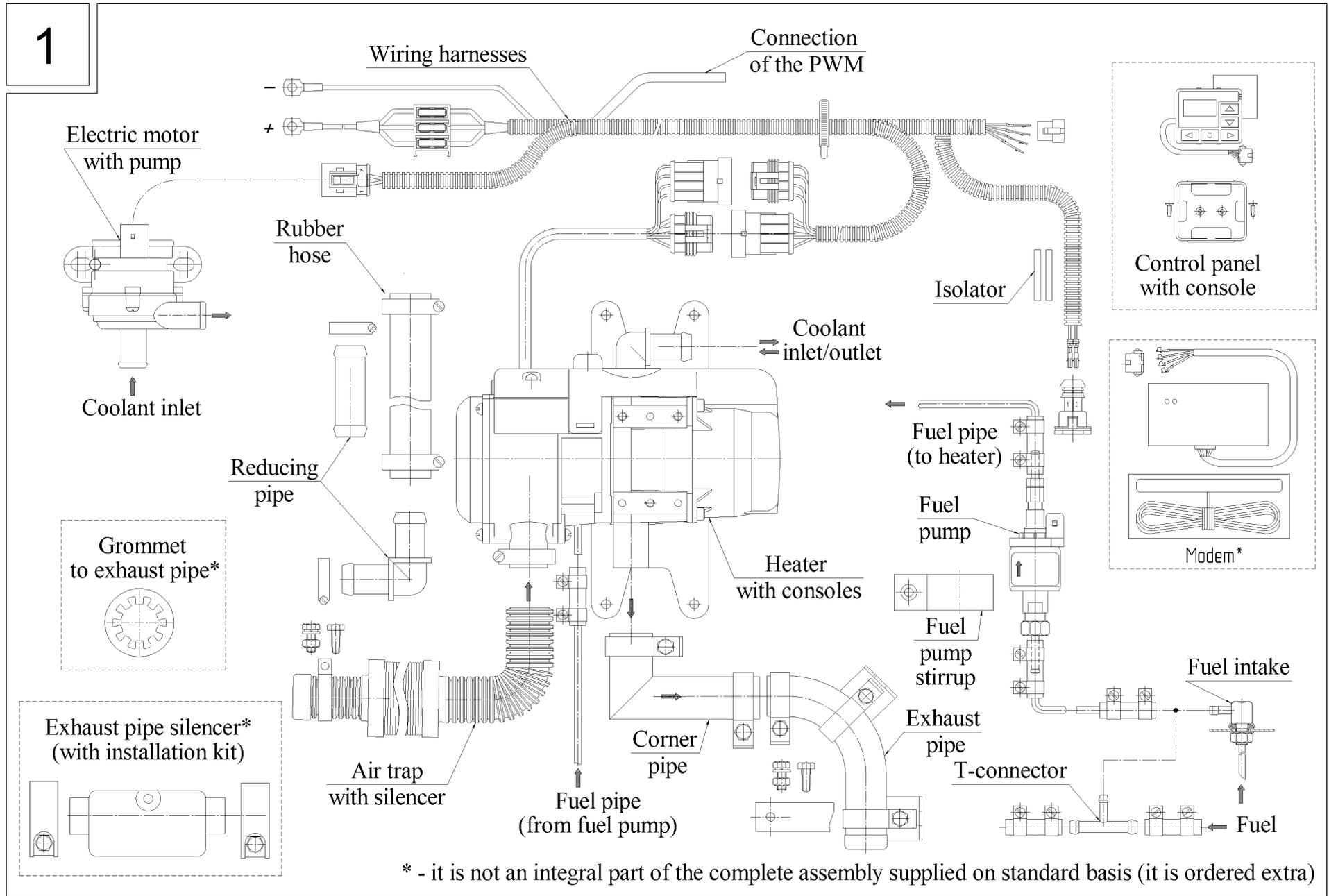
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**Drawing of the connections of the major parts and components of the pre-heater**



## Technical information

### Introduction

This manual is intended for organisations and users who perform the installation of BINAR-5S type pre-heaters. The manual contains the major principles for installation of the product in a means of transport and control of the operability of the product after installation. This manual is used together with the operating manual.



The production plant is not liable for failures, which arise from non-observance of the installation manual and the instructions contained in it. This also applies to unprofessional repairs or repairs in which genuine spare parts have not been used.

This installation manual contains the necessary information and recommendations relating to the installation of the BINAR-5S type pre-heaters.

### 1 Purpose of usage/design

Purpose of the pre-heaters:

The pre-heaters are intended for pre-heating the engines of vehicles with liquid cooling systems at an ambient air temperature of up to minus 45°C.

### Manufacturing

The pre-heating fuel is diesel or petrol.

The products that include the designation “24” in their names are intended for operation in the electricity network at a voltage of 24V.

The pre-heaters have various accessories and have the following contracted markings:

BINAR-5S

BINAR-5S (diesel)

BINAR-5S-TM (diesel)

BINAR-5S-24-TM (diesel)

BINAR-5S.24 (diesel)

BINAR-5S – product markings;

diesel – marking of a product in which motor diesel fuel is used;

TM – designation equipment;

24 – voltage.

## 2 Safety Precautions



It is prohibited to install the fuel pipes in the vehicle interior, cabin of the means of transport or vehicle.

It is prohibited to install the electrical installations (wire strands) of the pre-heater near the fuel pipes.

A vehicle in which a pre-heater has been installed must be equipped with a fire-extinguisher.

- When doing electric-welding work in the vehicle or repair of the pre-heater, the pre-heater must be disconnected from the accumulator battery.
- During installation or uninstallation of the pre-heater, the safety measures stipulated in the safety regulations for work on electrical networks and vehicle systems of vehicles must be observed.
- It is prohibited to connect the pre-heater to the vehicle electrical circuit when the engine is running and when the accumulator battery is missing.



Installation of the pre-heater and its components must be done by a specialist organisation approved by the manufacturer. Assembly of the pre-heater must be done only by experts according to the installation instructions.

- **It is prohibited to disconnect the power supply of the pre-heater before end of the purging cycle.**
- The power supply to the pre-heater must be from **an accumulator battery** independent of the *weight* of the vehicle.
- It is prohibited to connect and disconnect the connectors of the pre-heater when the pre-heater power supply is on.
- After shut-off the pre-heater may not be restarted earlier than after lapse of 5-10 seconds.
- If any work was done on a cooling system (repair or replacement of coolant), it is necessary to bleed (deerate) the system.

### 3 Installation

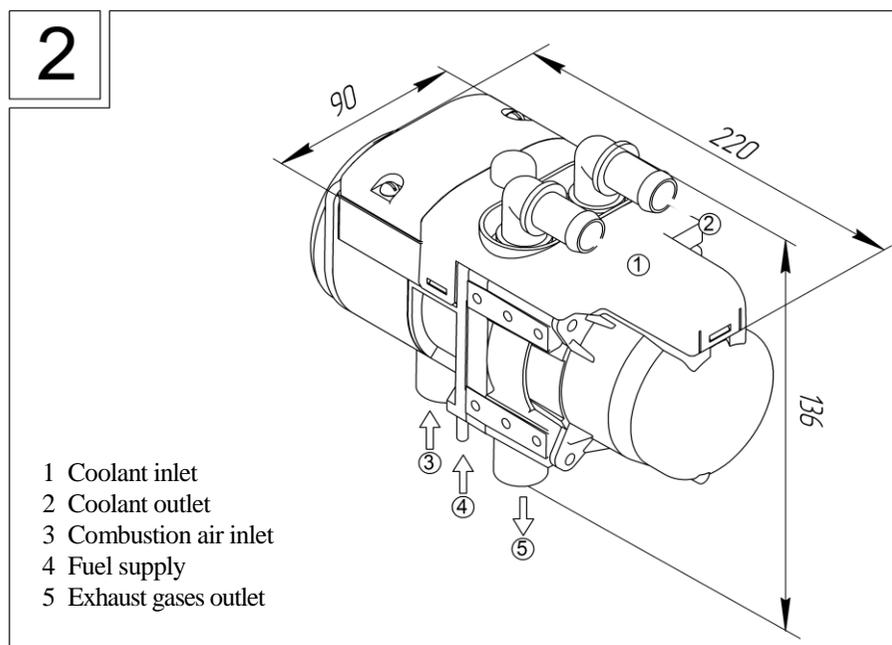


Observe safety measures during installation of the pre-heater..

#### 3.1 Installation location.

We recommend installation of the pre-heater in the engine compartment and locate it at a position that eases installation and maintenance.

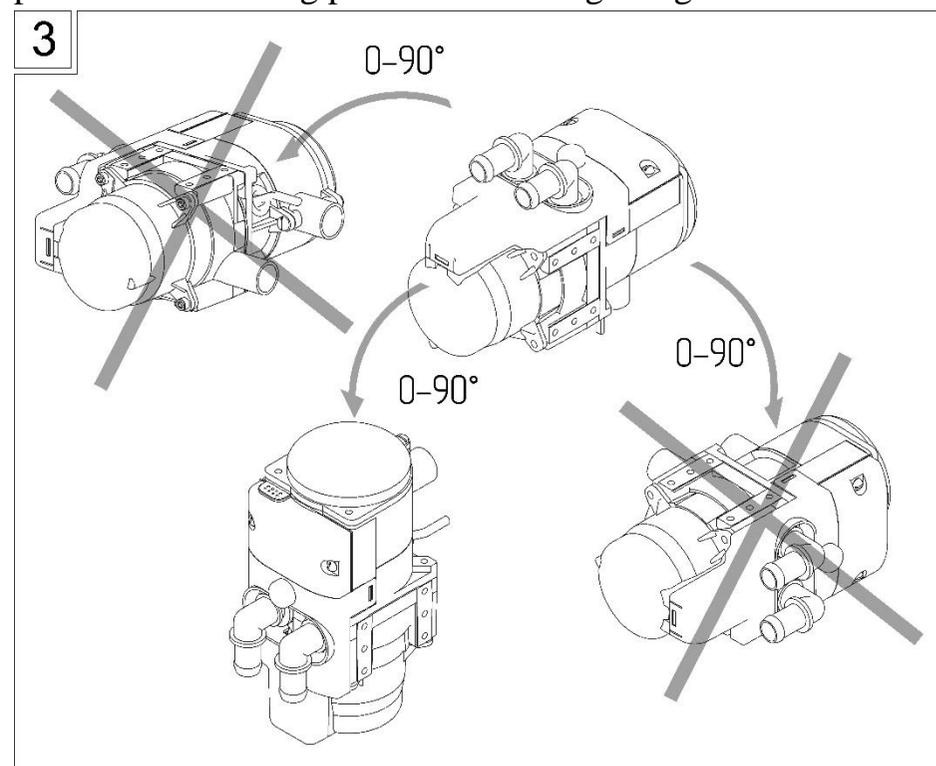
The outer dimensions of the pre-heater are shown in figure 2.



The pre-heater must not be located:

- in an area directly affected by the thermal effects of the vehicle exhaust system;
- below the level of the water wading depth of the vehicles;
- above the coolant expansion tank.

Do the installation with regard to the dimensions and permissible working position according to figures 2-3.

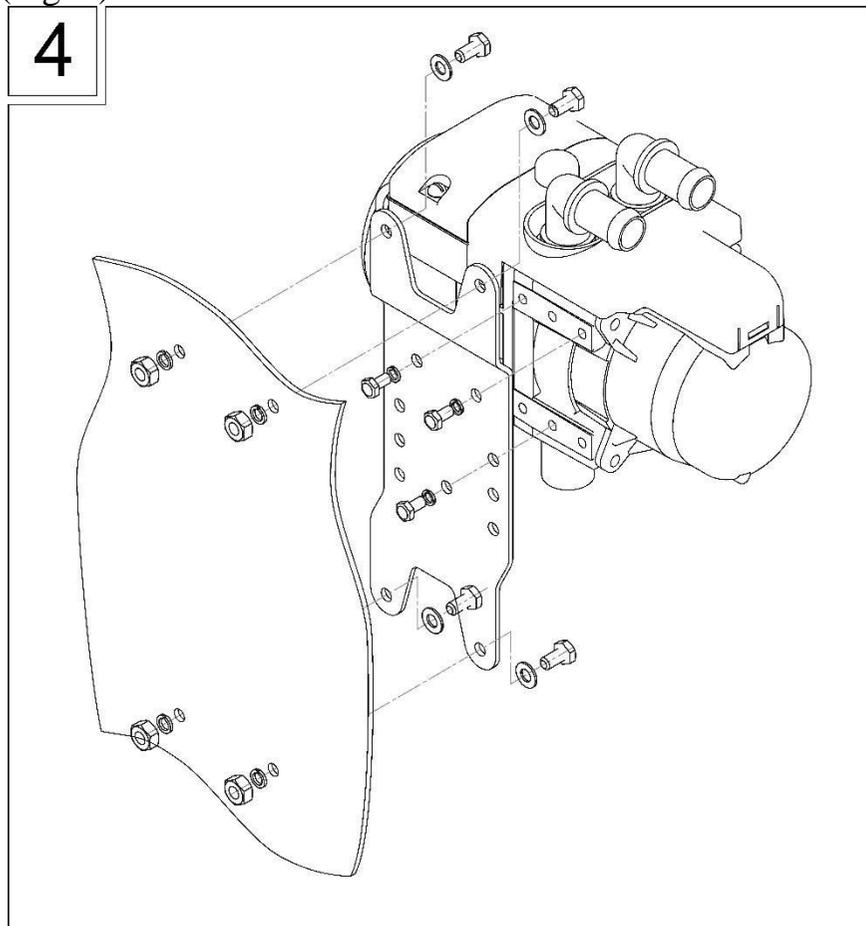


It is unconditionally necessary to respect the installation position!

### 3.2 The installation holes and standard fixing console.

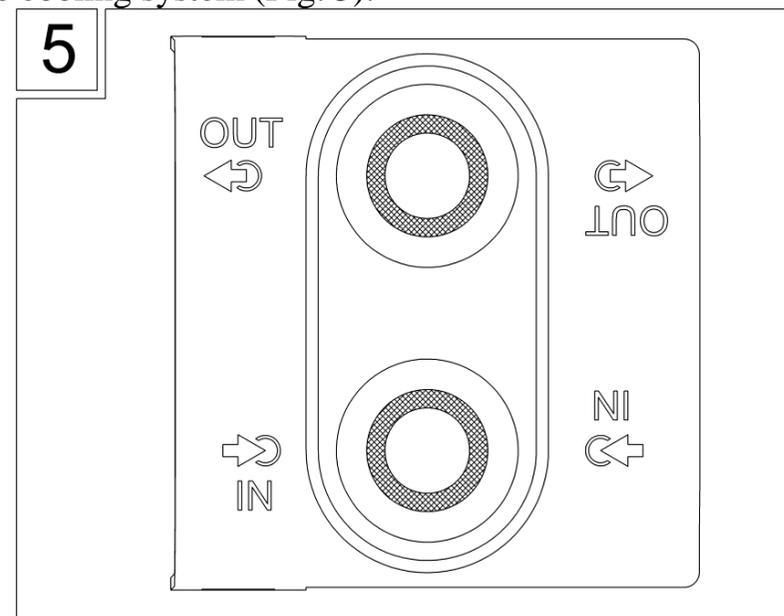
The heater is fixed to the console with a minimum of three M5x12 bolts. The console may be positioned vertically or horizontally.

The standard console is fixed with 4 M6 bolts to the bodywork of the vehicle or to the intermediate console (Fig. 4).



### 3.3 Connection.

Connect the pre-heater to the cooling system of the vehicle so that it is aligned to the coolant flow direction in the cooling system (Fig. 5).



During installation, use rubber hoses and shaped pipes, which are components of the supplied assembly. The hoses must be laid without sharp bends while it must be possible to keep them in a raised position from the heater to ensure unrestricted deaeration. When laying the hoses ensure that they are not installed beside the exhaust pipe and engine parts, which are heated to a high temperature.

Before first start of the pre-heater and after change of coolant, ensure that the device is properly deaerated. Air presence in the system could result in overheating of the pre-heater.

All the pipe joints must be leakproof.

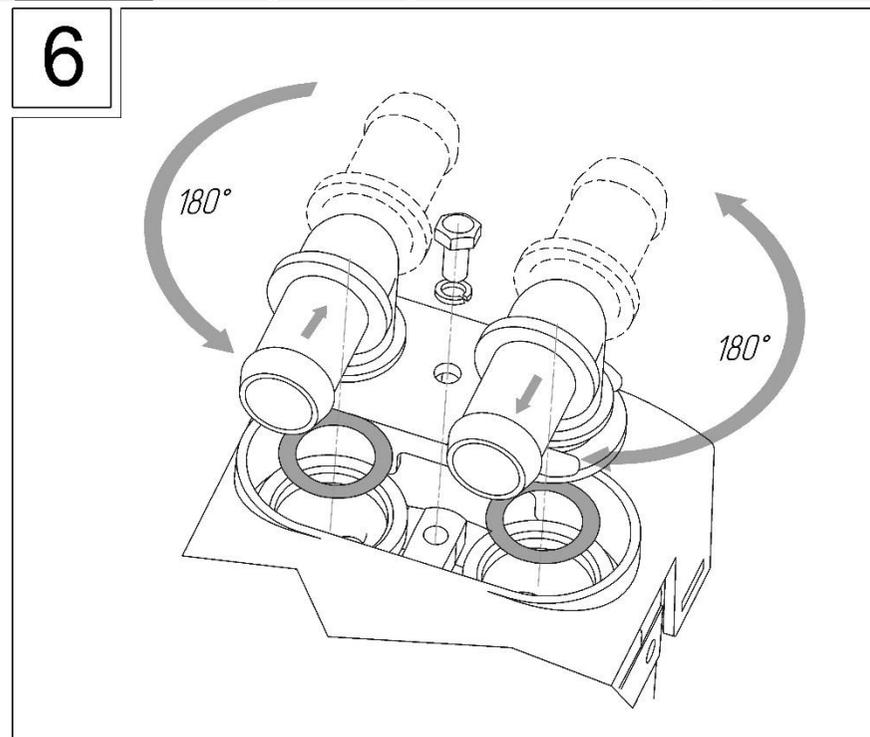
### 3.4 Angle pipe

The angle pipes of the heater are intended to ease installation. The shaped pipes are turned in an angle of 180° (Fig. 6). For this purpose, it is necessary to loosen the fixing plate, turn the shaped pipe to the desired position and tighten the fixing bolt.



Do not rotate the nozzles when the fastening bolt is tightened. This can lead to damage to the gasket and loss of tightness.

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Replacement of the angle pipes with straight one is permissible (*supplied upon ancillary order*).

For autonomous deaeration of the heater, the outlet neck must be turned in an angle of 0-90° upwards according to possibilities.

### 3.5 Installation of electric motor with pump

The pump is installed in the cooling circuit upstream of the pre-heater. The pump must be installed under the expansion tank of the vehicle radiator and under the heater.

Ensure that the coolant flow direction in the pump copies the existing flow direction of the coolant in the cooling system.

The location of the pump necks must not cause creation of an air-lock inside its pumping components.

### 3.6 Intake of air necessary for the combustion process



The air necessary for the combustion process must not be sucked in from the interior, cabin or luggage compartment of the motor vehicle.

The air intake opening is installed at a position that prevents contamination or ingress of snow and guarantees free outflow of water, which gets into it.

If the pre-heater is installed behind the vehicle bumper, then it is necessary to shift its air-intake to a “clean” zone.



In such case, it is prohibited to use a pre-heater with a short air-intake.

### 3.7 Extraction of exhaust gases

The exhaust pipe is a flexible ribbed metal tube, which must be cut to the desired length.

The exhaust pipe (Fig. 7) is fixed to the pre-heater using a bracket (sleeves). For better contact between the exhaust pipe and the neck of the pre-heater, it is necessary to make a cut a slot in the pipe of length 15-20 mm, but this length must not exceed the length of the neck.



During installation, it is possible to use a metallic angle pipe.

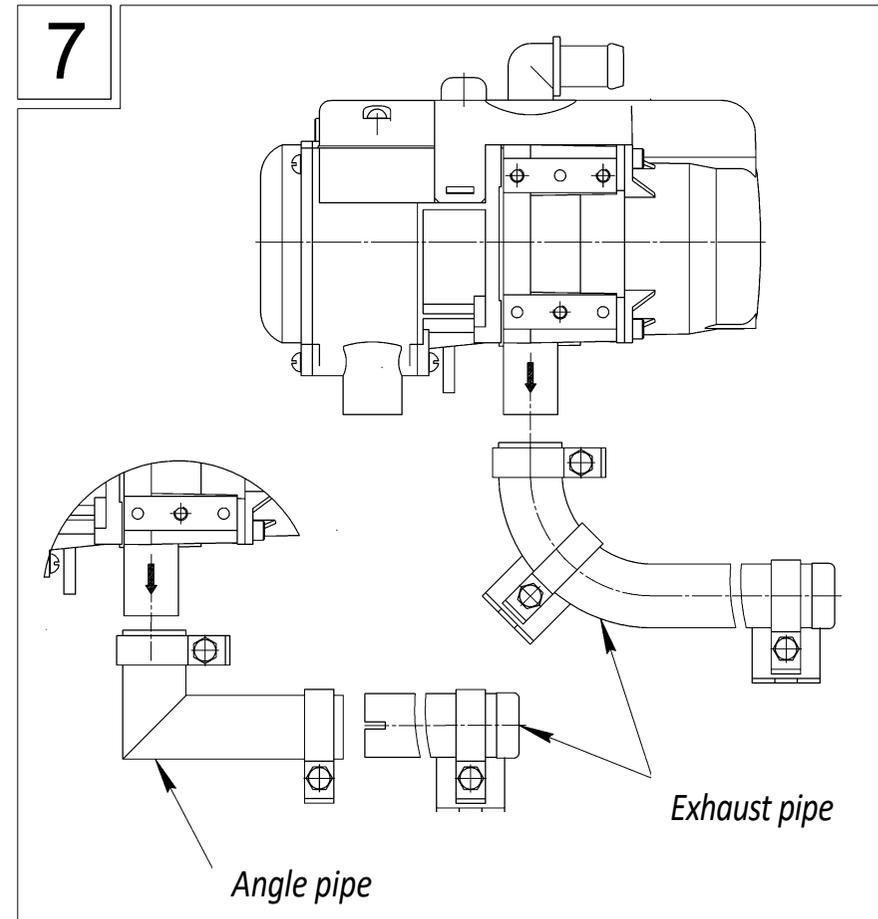


During installation of the exhaust pipe, prevent leak of exhaust gases into the cabin or their suction by the fan into the cabin ventilation and heating system.

Use of a high-temperature gasket prevents leak of exhaust gases at the joint.

The exhaust gases must be extracted to the exterior.

Apart from this, the gases must not negatively affect the functions of the motor vehicle aggregates. The exhaust pipe outlet must be installed at a position that prevents contamination or ingress of snow and guarantees free outflow of water, which gets into it.



The exhaust pipe must be laid in a downward slanting direction from the pre-heater. If this not possible, then it is necessary to make a hole of size  $\varnothing 3$  at the lowest point for discharge of condensate.



To protect the individual parts of the motor vehicle from the action of high temperature, it is necessary to thermally insulate the exhaust pipe.



It is recommended to use a silencer to reduce noise during operation of the pre-heater (*purchased separately*).

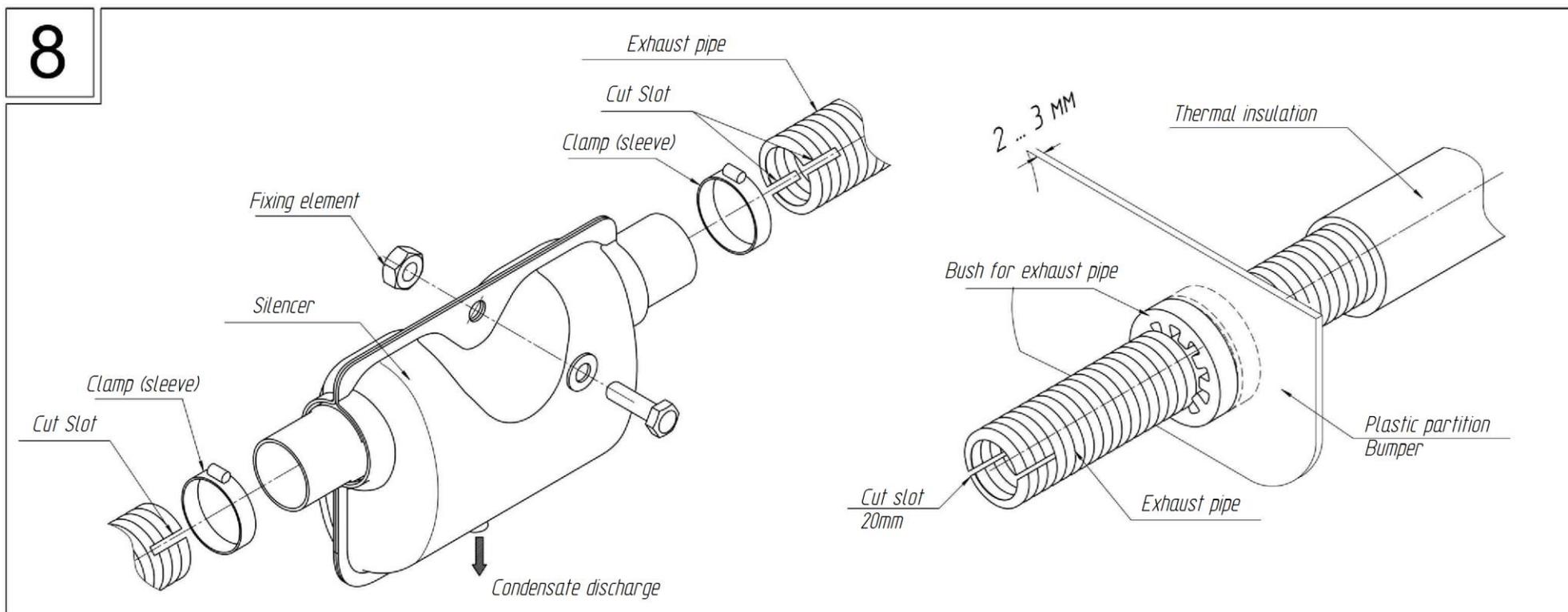
The silencer cannot be positioned near the hole for intake of the necessary combustion air.

The silencer must be installed at a distance of at least 200 mm from the pre-heater.

The silencer has a hole for discharge of condensate. When installing the silencer, ensure that the condensate discharge hole is at the bottom.



The exhaust pipe must not come into contact with plastic components of the motor vehicle (partitions or bumpers). We recommend installation of the exhaust gas extraction system by means of rubber rings – bushes (*purchased separately*).

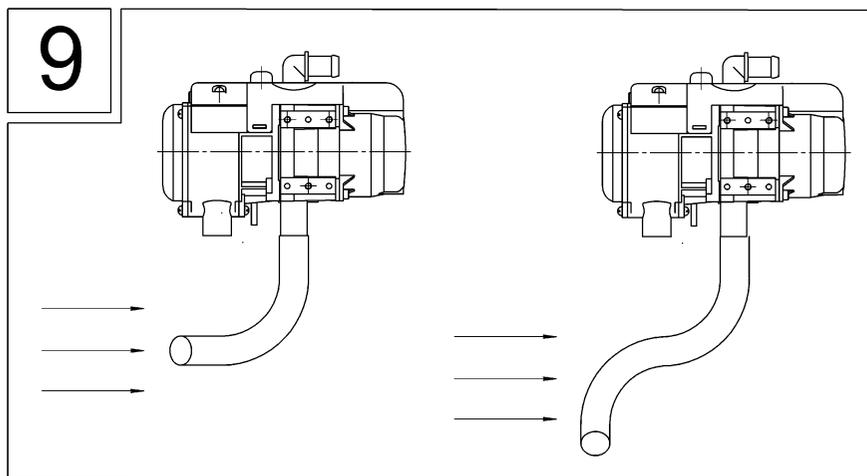


### 3.8 Peculiarities of the installation of the air-intake and exhaust pipe.

The exhaust gas outlet and inlet of the air necessary for combustion must be positioned so as to eliminate the possibility of repeated suction of exhaust gases.



The inlet of the air-intake and the outlet of the exhaust pipe must not be positioned in a direction upstream of the air -flow when motor vehicle is in motion (Fig. 9).



### 3.9 Thermal insulation

When installing the exhaust pipe, it is necessary to take its high operating temperature into consideration.

To protect the individual parts of the motor vehicle (electrical installations and other main lines and pipes) from the action of high temperature, it is necessary to thermally insulate the exhaust pipe.

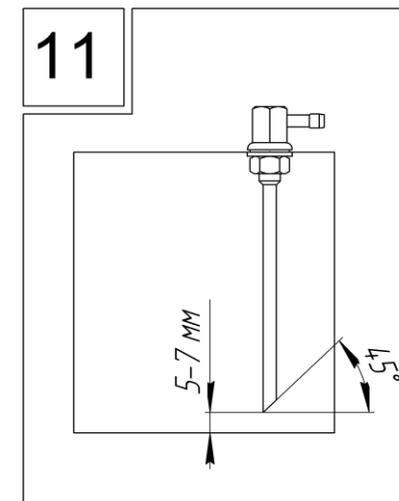
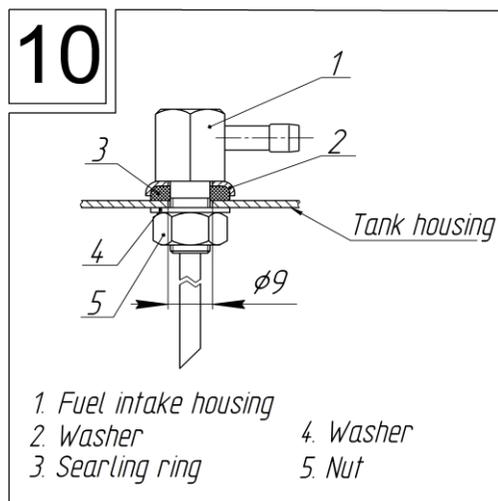
### 3.10 Fuel supply system

#### 3.10.1 Assembly of fuel intake.

The fuel intake is installed in the fuel tank according to figure 10. Before its installation, it is necessary to drill a  $\varnothing 9$  mm hole in the tank and cut the fuel intake to the necessary length. In the process, it is necessary cut it at an angle of  $\approx 45^\circ$  (Fig. 11).



When drilling the hole into the fuel tank, it is necessary to observe rules on safety and protection of health when working on tanks, which were filled with flammables and fuel with a risk of explosion.



### 3.10.2 Fuel pump assembly

The fuel pump is intended to dose fuel to the combustion chamber.

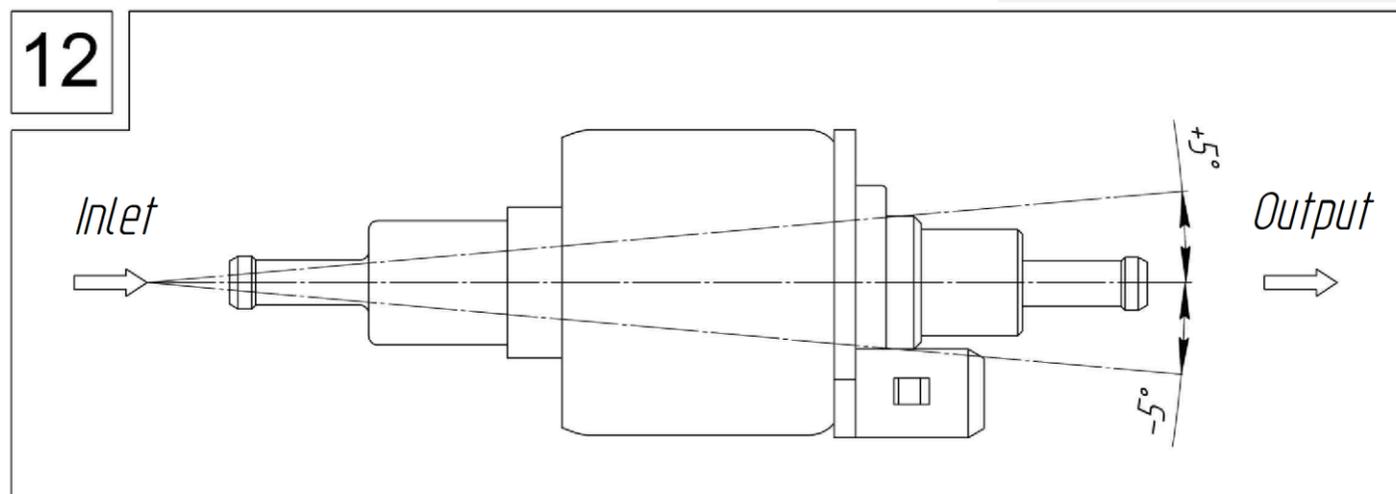
The fuel pump functions on the basis of electric pulses from the control unit. The pulse frequency depends on the actual output of the heater.

The fuel pump is installed in a rubber cushioning bush (Fig. 13).

We recommend priority installation of the fuel pump closer to the fuel tank and at a lower level than the minimum fuel level in the fuel tank.

The pre-heaters are equipped with fuel pumps manufactured by “Advers” or “Thomas Magnete”.

The installation position of the fuel pumps must correspond to Fig. 12.



### 3.10.3 Assembly of the fuel pipes.

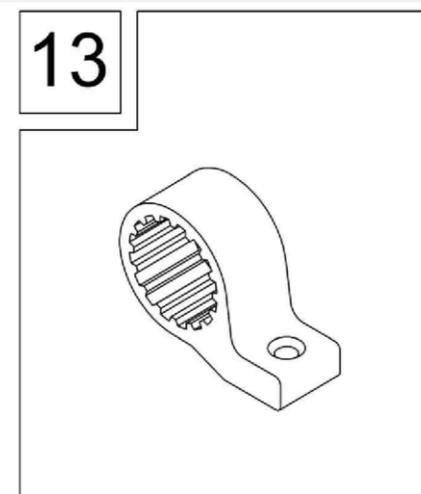
During installation of the fuel pipe from the fuel intake to the heater, it is necessary to proceed according to Fig. 14. The fuel pipe that runs from the fuel pump to the heater must be laid in such a way that it does not slant downwards. The fuel pipe connections are via connectors.

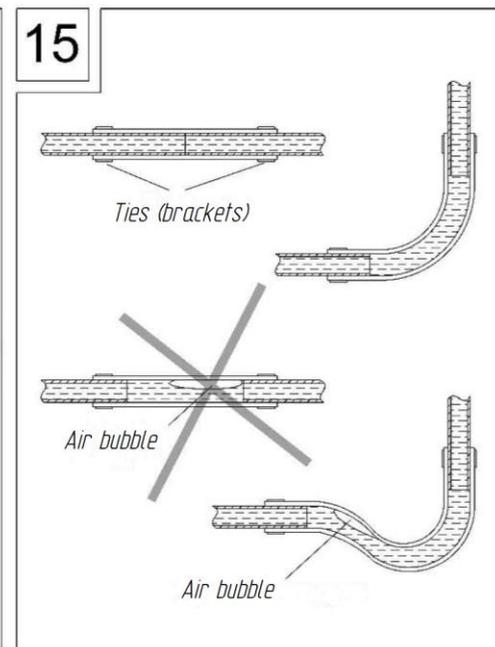
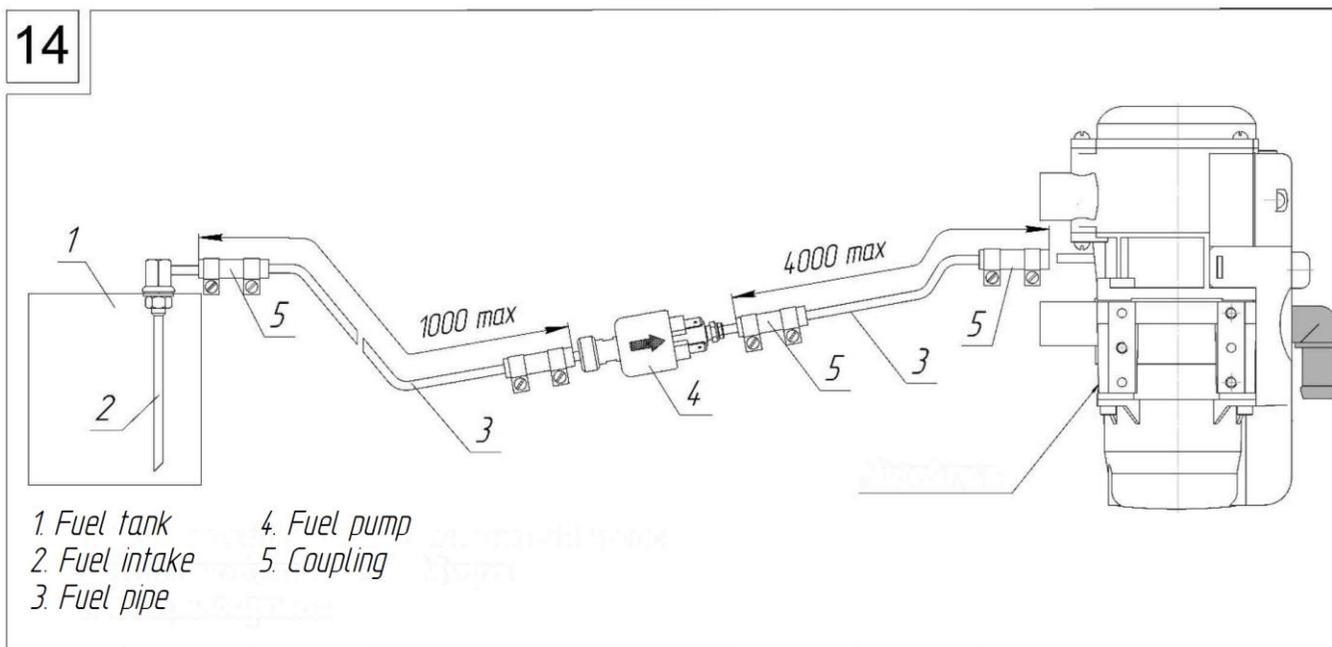
If the connectors are not supplied in already cut sizes and are supplied in the form of a single rubber hose, then it is necessary to cut this hose into individual sections of length  $\approx 70$  mm.

The correct connection of two fuel pipes is via a connector shown in Fig. 15.



Cutting of the connections and fuel pipe must be done exclusively using a sharp knife. At the cutting points ensure that the flow section of the fuel pipe is not narrowed, there are no dents and burrs.





### 3.11 Installation of the wiring circuit of the pre-heater.

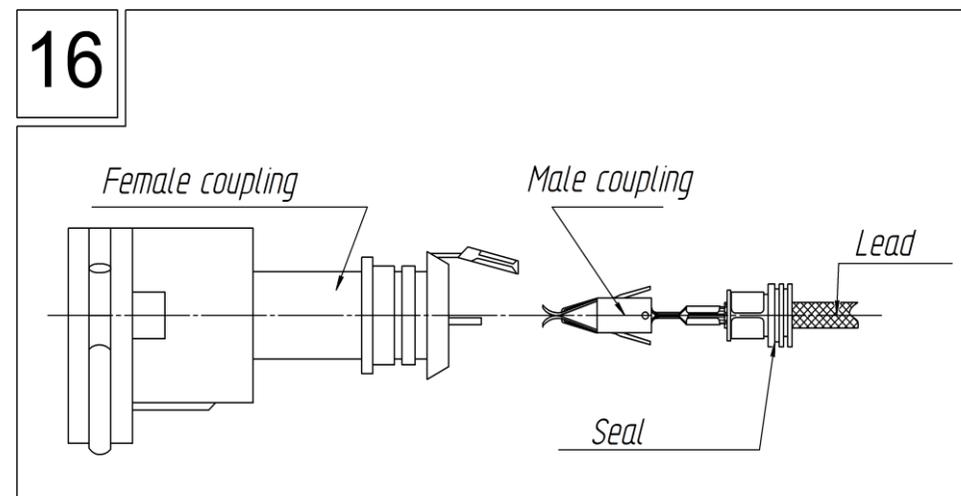
Install the wiring harness and wiring according to the electric wiring diagram. When installing the harnesses, eliminate the possibility of their heating up, deformation and shift during operation of the motor vehicle. Fasten the wiring harnesses with plastic ties/tie wraps to motor vehicle components.

**Caution! Do the installation with circuit-breakers uninstalled.**



If it is necessary to shorten the length of the wiring harness of the fuel pump, it is permissible to remove the incessant part from the centre of the wiring harness. Insulate the connection

When placing the contacts into the coupling for the fuel pump wiring harness, proceed according to Fig. 16.

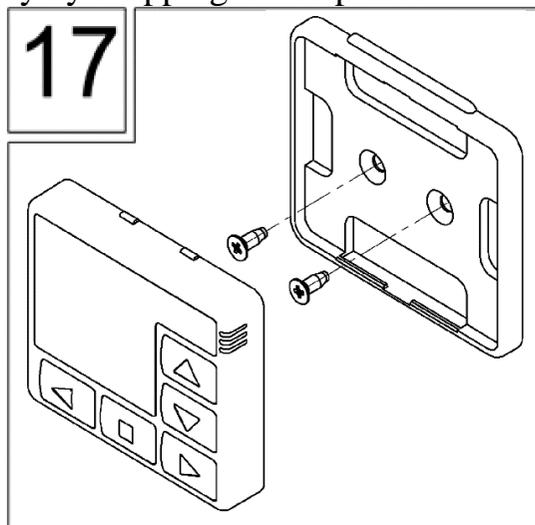


### 3.12 Installation of the control panel

The panel can be installed at an arbitrary point from which the driver (personnel) can comfortably operate it. The panel is fixed in place by means of two strips of double-side adhesive tape or a console:

- double-side adhesive tape is stuck to the back of the panel. The output from the panel housing can be via the back cover, or through the side of the housing with removal of the partition. Before installation, it is necessary to degrease the surface on which the panel shall be installed. After removal of the protective foil from the adhesive tape attach the panel to the prepared surface.

- console (Fig. 17), which is attached to the panel using screws. The wire outlet from the panel housing is through the rear cover. The panel is installed in the console only by snapping it into place.



### 3.13 Installation of the modem

The GSM modem, which in essence is an analogue mobile telephone without a display and keypad, is intended for use in extraordinarily unfavourable conditions (cold, vibrations, etc.). A SIM-card is inserted into the modem as like into a telephone, i.e. the pre-heater gets a full telephone number from the mobile operator of your choice. The modem is installed at an arbitrary comfortable and clean place. Modem details – see modem manual.

## 4 Check of the pre-heater after installation

- Ensure that fuel system is not leaking.

- Ensure that coolant system is not leaking.

- Ensure the reliability of the fixtures of the electric cables and connectors.

- Connect the power supply to the pre-heater and install a circuit-breaker on the wiring harness.

- Fill main fuel pipe with fuel.

- The fuel pipe is filled using a fuel-pumping device or multiple start of the pre-heater. Check filling of the main fuel pipe with fuel on the transparent fuel tubes.

- The fuel pump output is not very large and for this reason it fills up very slowly upon first start when the fuel pipe is empty. The pre-heater shall make two attempts at heating, and if the fuel is still missing, it fails and shows the error message “start-up attempts exhausted”. Then it is necessary to switch-on the pre-heater again and again until the full fuel pipe is filled with fuel.



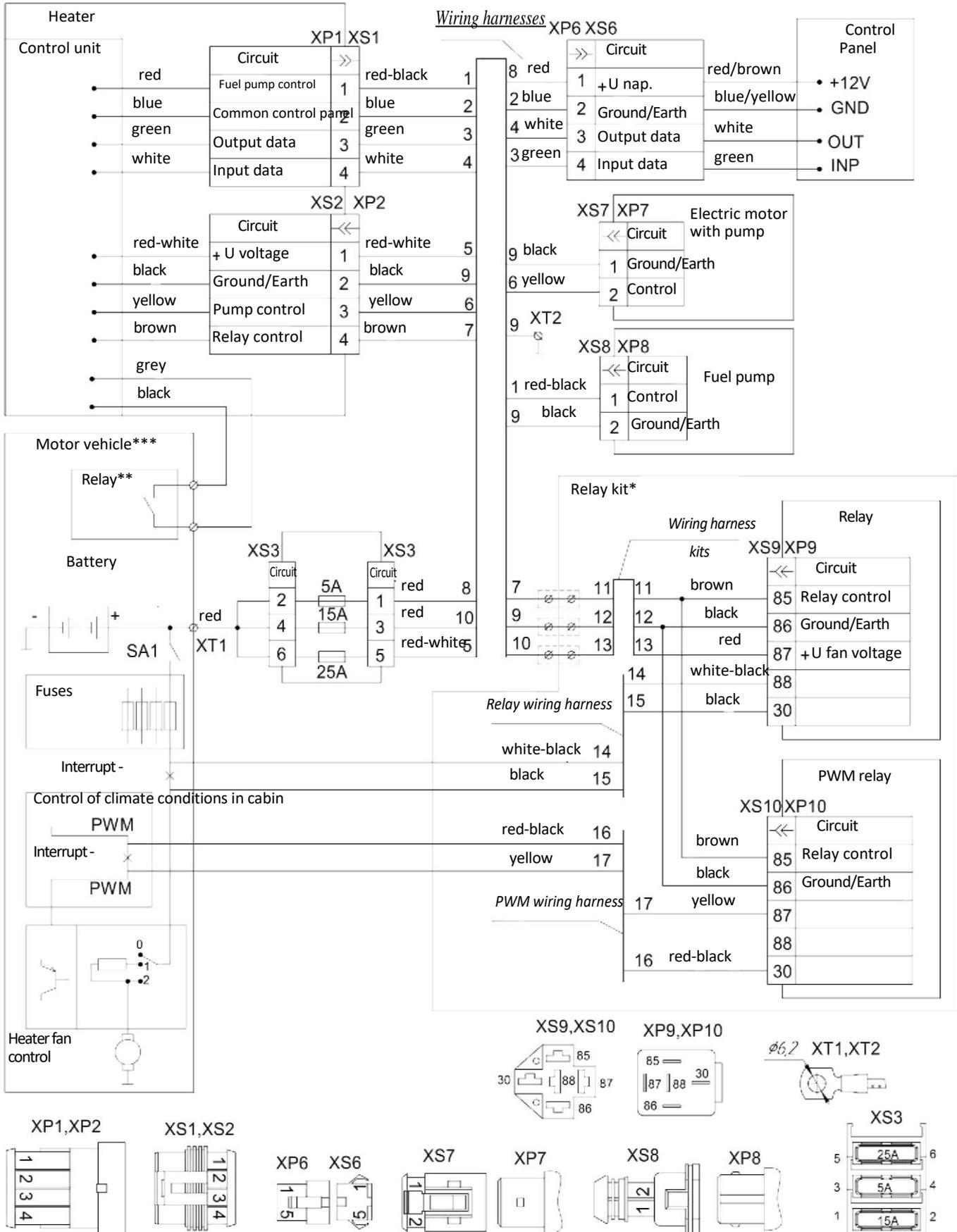
The coolant temperature on the vehicle label must match the data on the control panel for reason of measurement of temperature at various points of the motor vehicle fuel system.

After checking the operability of the pre-heater, it is necessary once more to check the leakproofness of the pipe connection to the pump, heater and engine, and if necessary tighten the clips.

## 5 Recommendations

If the pre-heater fails, it is necessary to ensure that there is fuel in the tank, the battery is charged, all connectors are properly connected and that the 25 A circuit breaker is functional.

# Wiring diagram



- \* In case of additional order, it is possible to install a set of relays consisting of a wiring harness, relays and PWM relay.
- \*\* Relay-controlled remote signalling.
- \*\*\* Example of the connection of a pre-heater to a vehicle.