

EN



Autoterm
europe

DIESEL AIR HEATERS
ENGINE PREHEATERS

Installation instructions

Air heaters:



PLANAR-2D-12/24



PLANAR-4DM2-12/24-P



PLANAR-44D-12/24-GP-P



PLANAR-8DM-12/24-P

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Technical Description

Introduction

These Instructions are designed for organizations and users engaged in the installation of PLANAR air heaters. The document describes basic rules of installation of products in heated areas, as well as performance testing of the product after installation. These instructions are used in conjunction with the Operation Manual.



If a fault occurs due to non-compliance with the installation instructions and the information they contain, the manufacturer bears no responsibility therefore. The same applies to the repair specialist who does not have the necessary qualifications, or uses non-original parts without obtaining the permission of the manufacturer.

These installation instructions contain the necessary information and advice on the installation of air heaters PLANAR.

1 Application / modification

Application of air heaters.

Air heaters are designed to heat the driver's cabin or various other interior spaces of limited volume in vehicles at ambient temperatures up to minus 45°C.

Modification

Heaters run on diesel fuel.

Voltage designations in heater labeling:

- «12» designed to operate with power supply voltage of 12V;
- «24» designed to operate with power supply voltage of 24V.

Air heaters are available in different configurations and have the following designations:

PLANAR-2D-12-P-xxxx, PLANAR-2D-24-P-xxxx;

PLANAR-4DM2-12-P-xxxx, PLANAR-4DM2-24-P-xxxx;

PLANAR-44D-12-GP-P-xxxx, PLANAR-44D-24-GP-P-xxxx;

PLANAR-8DM-12-P-xxxx, PLANAR-8DM-24-P-xxxx;

PLANAR-8DM – product designation;

12 or 24 – supply voltage;

P – modification of the heater (modification of control unit);

xxxx – digital designation of the configuration.

2 Safety Instructions



Do not install the fuel line inside the cabin of a vehicle.



Do not install electric wiring (harnesses) of the heater near the fuel line and the exhaust pipe.



The vehicle where the heater is installed must be equipped with a fire extinguisher.



Installation of the heater and its component parts must be carried out by specialized organizations approved by the manufacturer. Installation of the heater must be carried out only by specialists in accordance with the installation instructions.



Do not disconnect the heater from power source until the end of the purge cycle.

- When electric welding is carried out on the vehicle, or repair work is made on the heater, the heater shall be disconnected from the battery.
- During installation and dismantling of the heater, the safety rules specified by regulations for work on electrical circuits and fuel systems of vehicles must be observed.
- The heater should not be connected to the electric circuit of the vehicle with its engine running and no battery installed.
- Do not use fuses rated differently from indicated on the electric circuit diagram.
- Do not use makeshift devices (wires etc.) instead of fuses.
- The heater must be powered from the **battery** regardless of the vehicle *weight*.
- Do not connect and disconnect the heater connectors when the heater power is on
- Do not connect/disconnect electrical connectors of the heater with power ON. After turning off the heater, reconnection should be made at least after 5-10 seconds.

- Install the heater at a height preventing contact with cargo and in a way that the cargo would not obstruct the intake/outlet of the heater.

- In case the heater is installed in a large passenger-carrying van or a bus, it may only be positioned inside the floor/wall without using any pedestals or mounting brackets.

- In case the heater is installed onto a pedestal or a mounting bracket, cover the air intake, exhaust pipe, and the fuel pipe areas with a metal cover.

- Install air lines without excessive bends or narrowed sections. The cross-section area of the air line must not be less than the heater exhaust opening.

- Install the exhaust pipe with the exhaust end down.

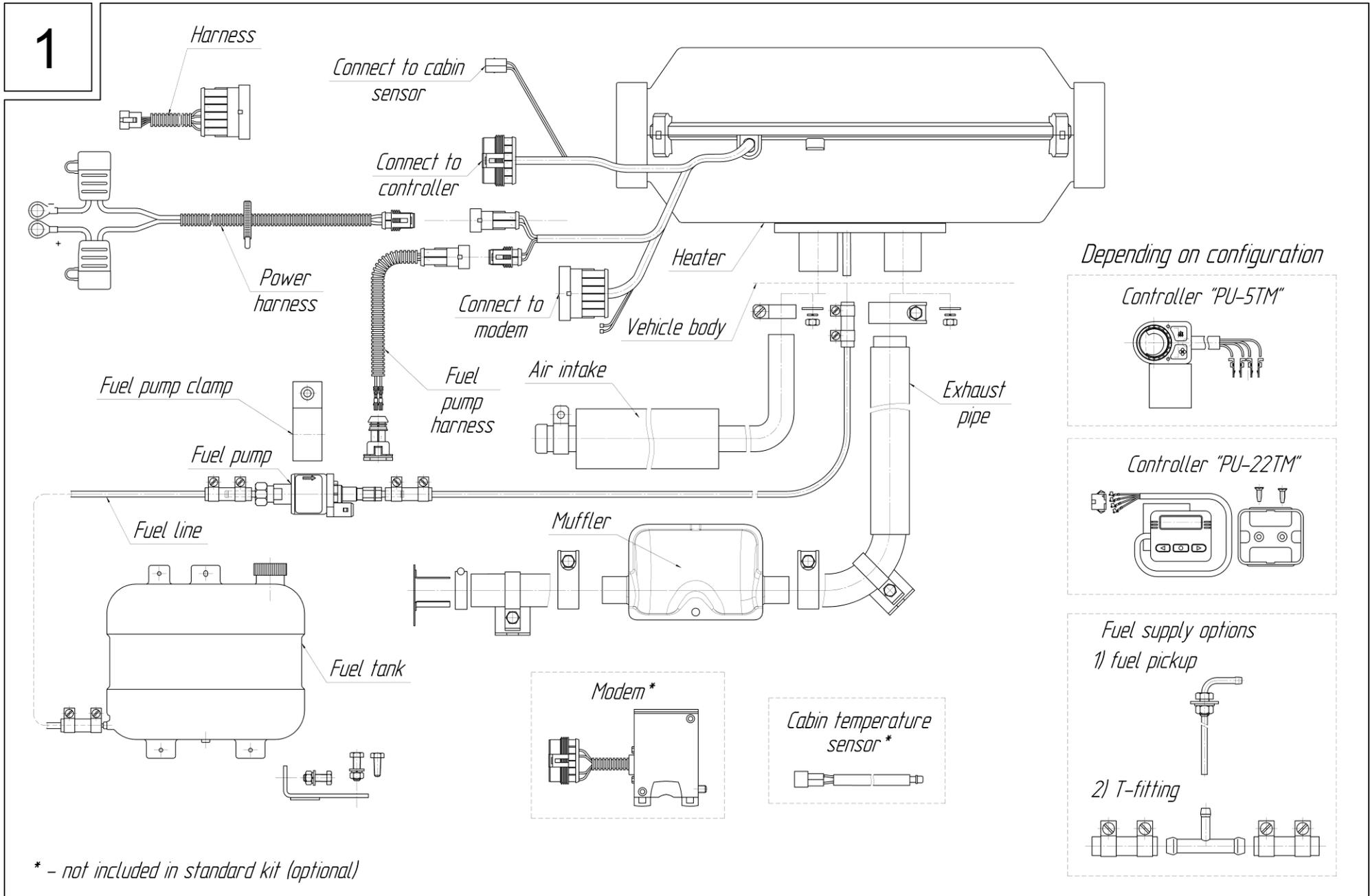
- The installation arrangement must exclude the possibility of contact of the exhaust pipe with the air intake, fuel pipe, or other flammable objects.

- Electric wiring, the air intake, and the fuel pipe must be protected from contact with sharp edges of vehicle structures.

- It is advised to insulate accessible sections of heated air lines.

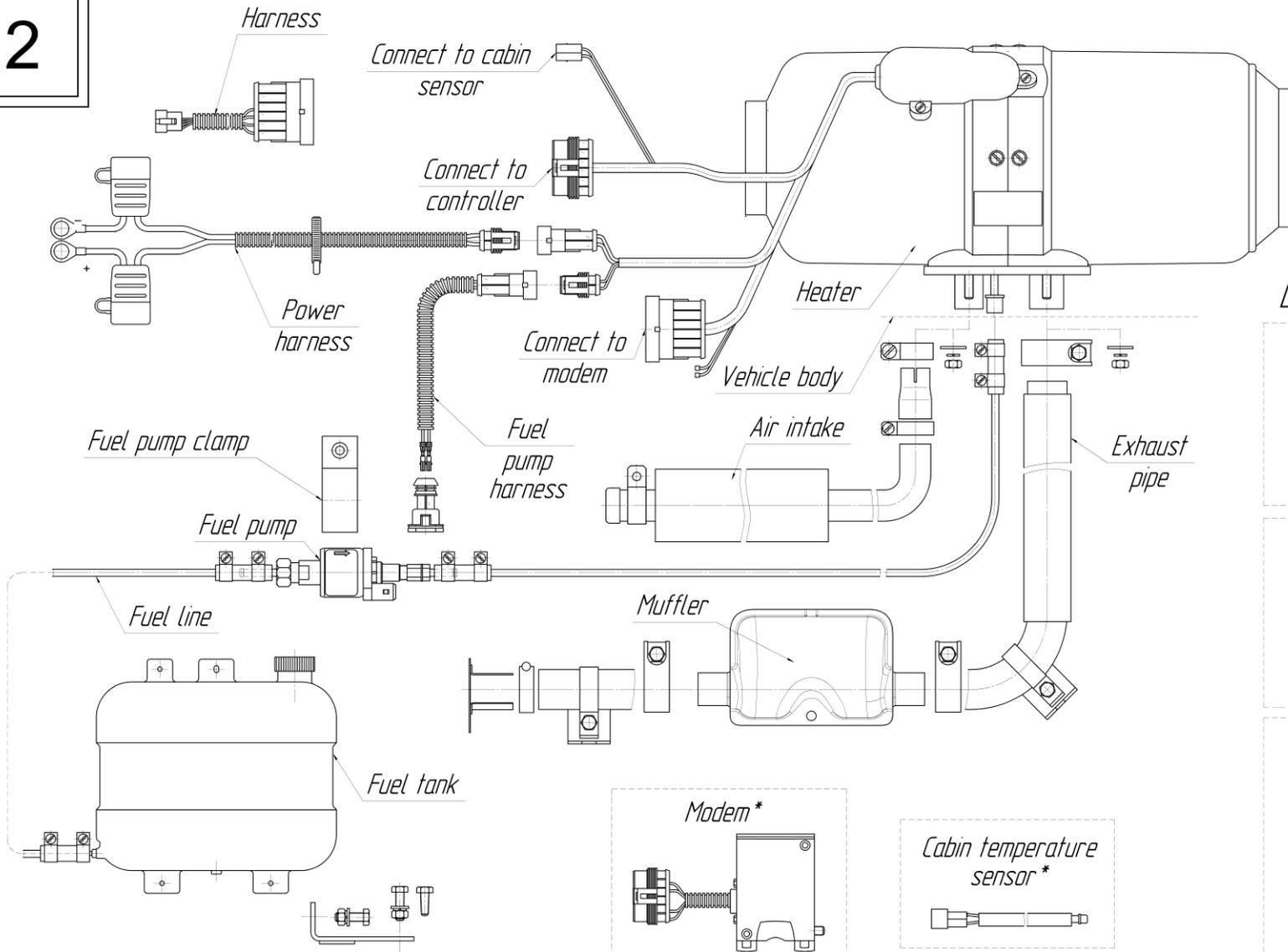
- Install additional heat insulation at places where the exhaust pipe goes through the floor or the side wall of the vehicle.

Connections Diagram. Main Parts and units of PLANAR-2D mod P



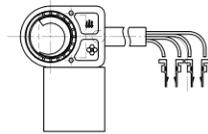
Connections Diagram. Main parts and units of PLANAR-4DM2 mod. P

2

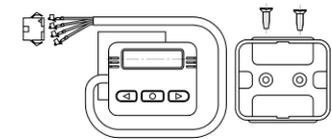


Depending on configuration

Controller "PU-5TM"



Controller "PU-22TM"

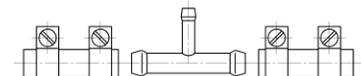


Fuel supply options

1) fuel pickup



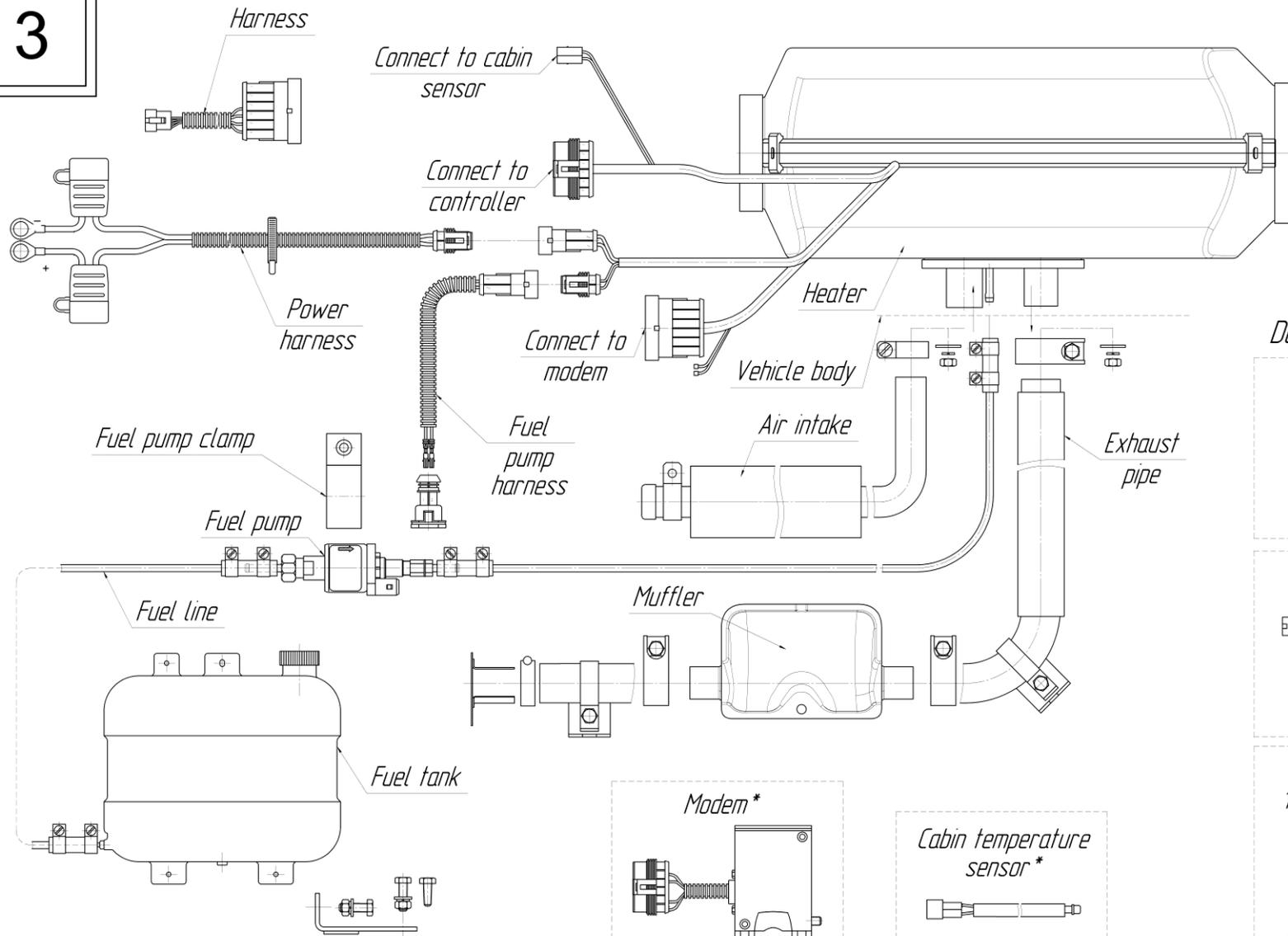
2) T-fitting



* - not included in standard kit (optional)

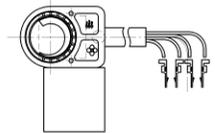
Connections Diagram. Main parts and units of PLANAR-44D mod. P

3

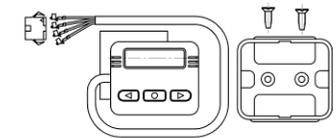


Depending on configuration

Controller "PU-5TM"

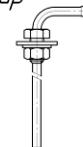


Controller "PU-22TM"

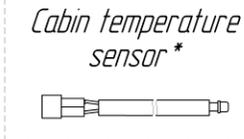
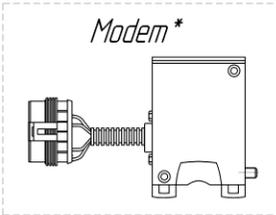
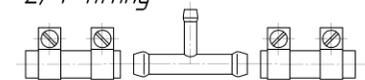


Fuel supply options

1) fuel pickup



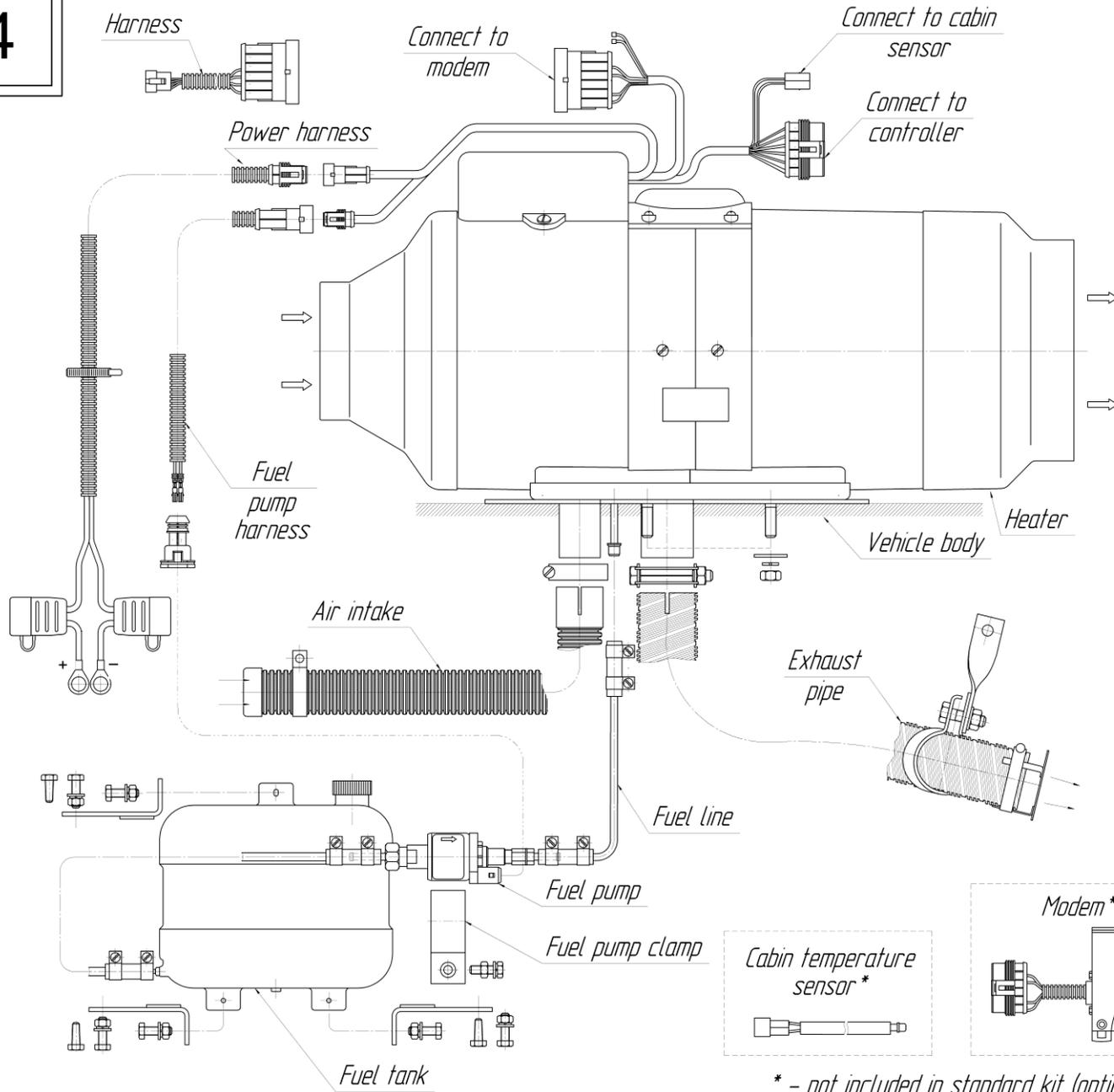
2) T-fitting



* - not included in standard kit (optional)

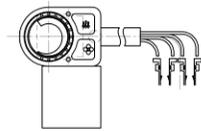
Connections Diagram. Main parts and units of PLANAR-8DM mod. P

4

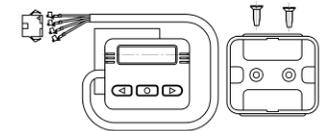


Depending on configuration

Controller "PU-5TM"



Controller "PU-22TM"

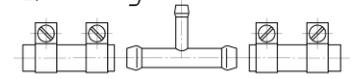


Fuel supply options

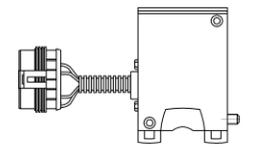
1) fuel pickup



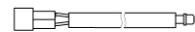
2) T-fitting



Modem*



Cabin temperature sensor*



* - not included in standard kit (optional)

3 Installation



Observe safety requirements during heater installation.

3.1 Mounting Location

The heater may be installed both in- and outside the vehicle, provided it is protected from water ingress.

For outside mounting the heater should be installed in an area protected from water and dirt. The heater must be installed in a way preventing direct water ingress (e. g. when the vehicle crosses water barriers).

Heater dimensions are shown in Figures 5-8.

3.2 Heater Installation

Mounting positions should be in accordance with those shown in Fig.9-12. The intake of the heater should be positioned in such a way that, under normal operating conditions, exhaust gases of the engine or of the heater could not be sucked into it.

During installation and operation of the heater, intake and outlet of the heater should be protected against foreign objects getting into them.

When installing the air ducts to the heater, they should not have deformations, reducing the flow area of the duct. The maximum length of the output duct should not exceed 5 meters in total.



Install the heater in a way to prevent contact with protruding parts of the floor or other cabin structures.



Do not connect air lines to PLANAR-8DM air heaters.

3.3 Mounting Holes.

For heaters PLANAR-2D, PLANAR-4DM2 and PLANAR-44D, holes in the body of the vehicle should be made as shown in Fig.12. The heater may be installed using mounting plates* shown on Fig. 11. In this case, existing studs inside the heater must be replaced with long studs.

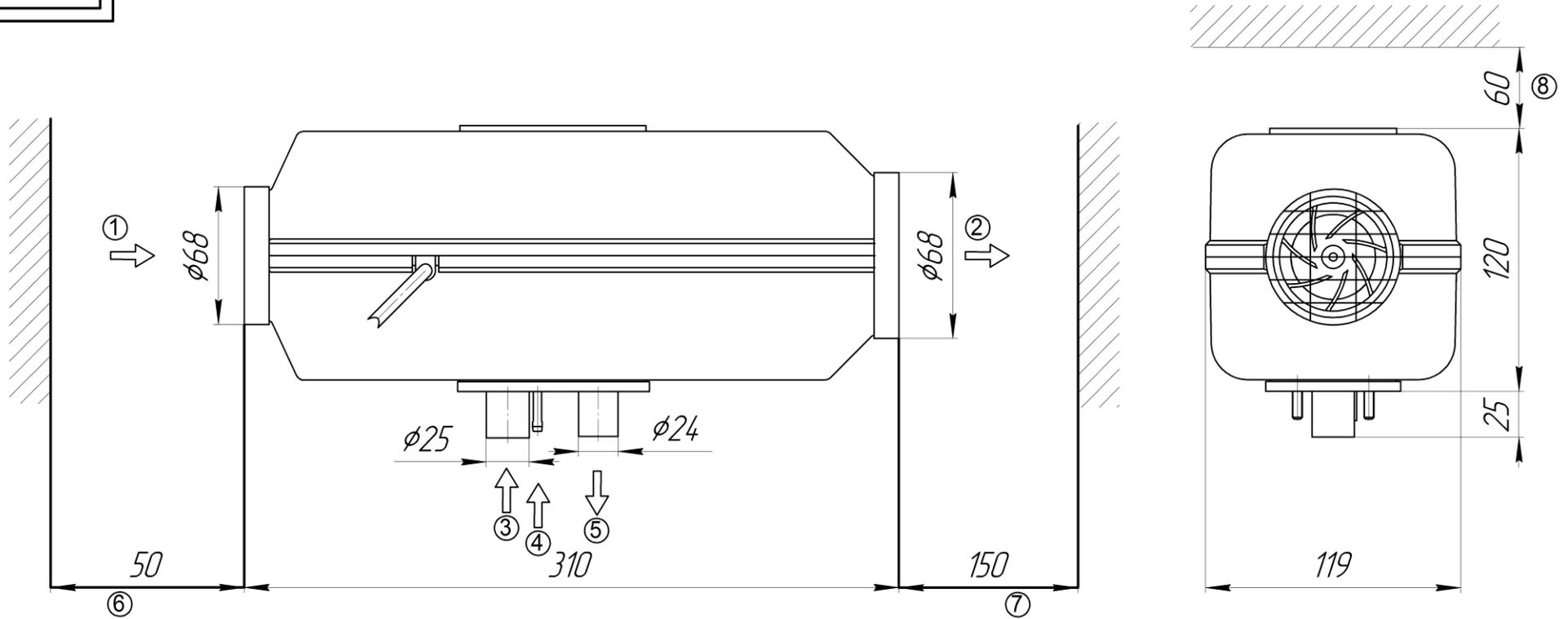
Cut the opening inside the vehicle body (in case the side wall/floor is not thicker than 3 mm) for PLANAR-8DM heater installation as shown on Fig. 12. With the thickness of the vehicle body (floor) of more than 3mm, installation of the heater requires the following:

1. Cut a rectangular hole in the vehicle body sized 180×95 mm
2. To attach a mounting bracket* to the heater (this bracket can be made of steel sheet at least 2.5mm thick, see Fig.12);
3. Install the exhaust pipe, air intake, and fuel line to the heater and fasten the whole assembly to the body of the vehicle

*—*optional part*

PLANAR-2D Heater Dimensions

5

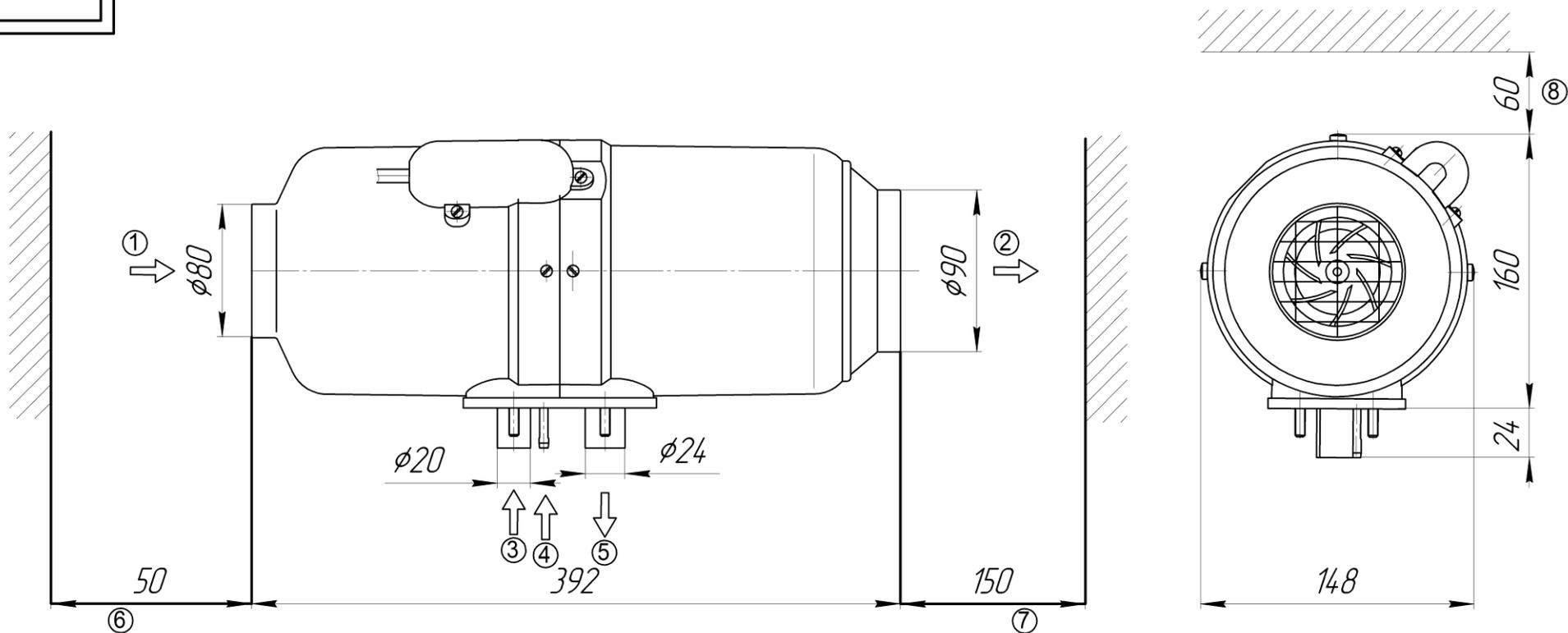


- 1 Heating air intake $\phi 68$
- 2 Heating air output $\phi 68$
- 3 Combustion air intake
- 4 Fuel supply

- 5 Exhaust gas output
- 6 Required gap before the heating air intake, min. 50mm
- 7 Required gap before the heating air output, min. 150mm
- 8 Required gap for technical maintenance, min. 60mm

PLANAR-4DM2 Heater Dimensions

6

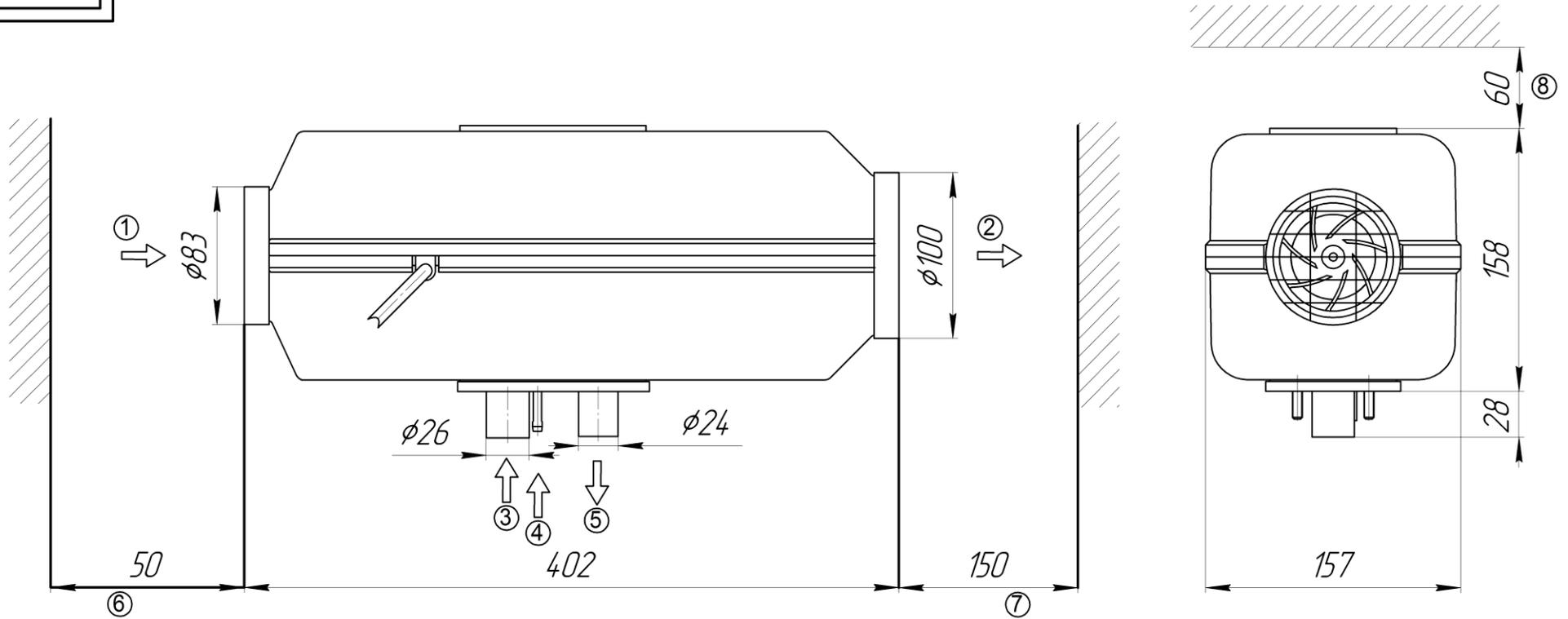


- 1 Heating air intake $\phi 80$
- 2 Heating air output $\phi 90$
- 3 Combustion air intake
- 4 Fuel supply

- 5 Exhaust gas output
- 6 Required gap before the heating air intake, min. 50mm
- 7 Required gap before the heating air output, min. 150mm
- 8 Required gap for technical maintenance, min. 60mm

PLANAR-44D Heater Dimensions

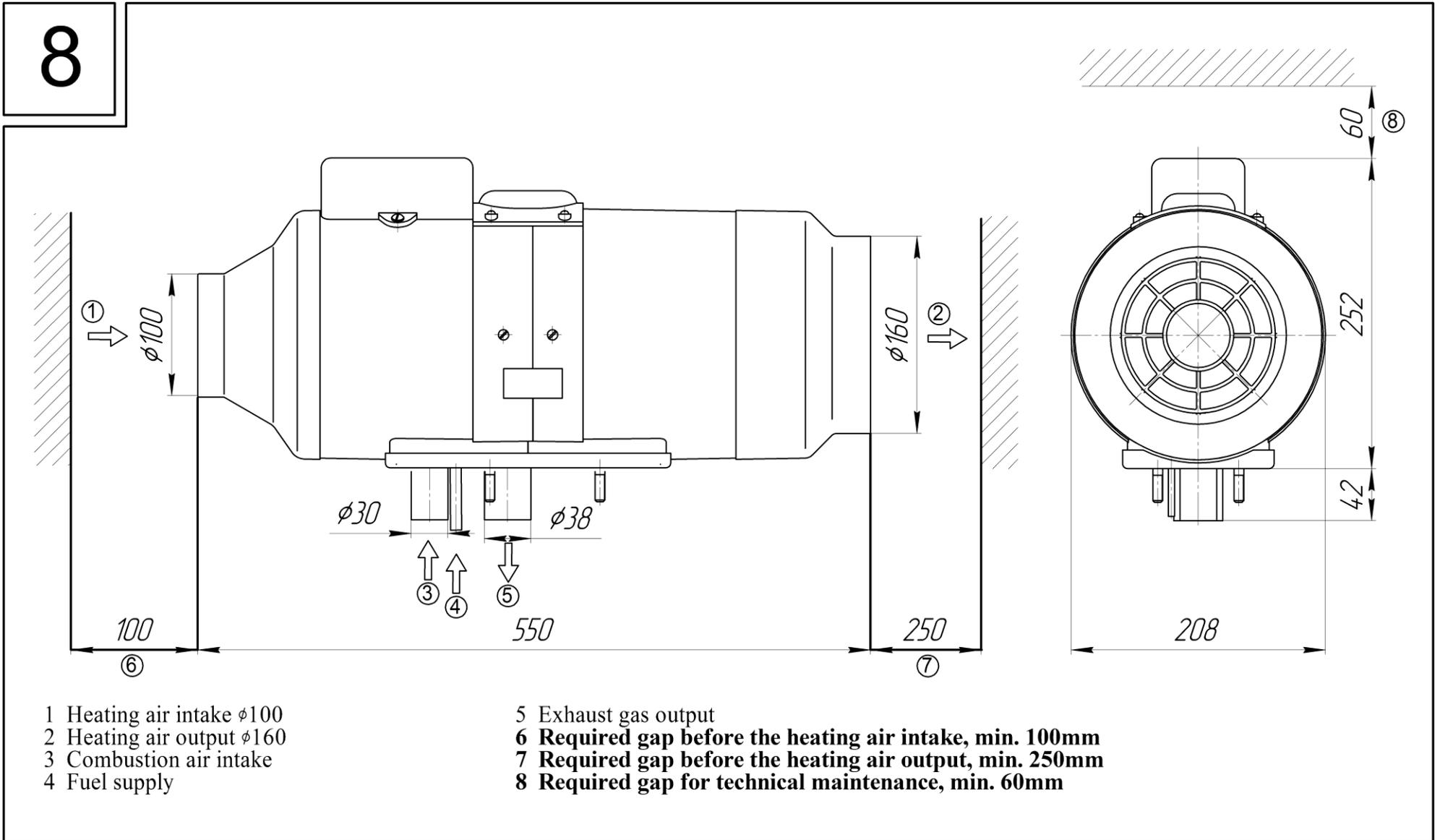
7



- 1 Heating air intake $\phi 83$
- 2 Heating air output $\phi 100$
- 3 Combustion air intake
- 4 Fuel supply

- 5 Exhaust gas output
- 6 Required gap before the heating air intake, min. 50mm
- 7 Required gap before the heating air output, min. 150mm
- 8 Required gap for technical maintenance, min. 60mm

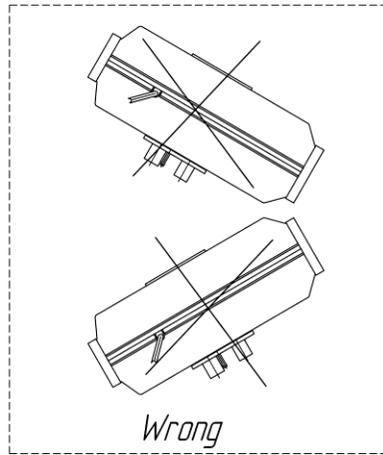
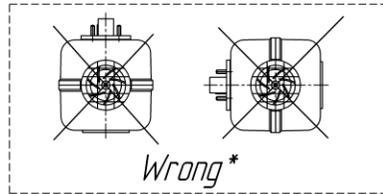
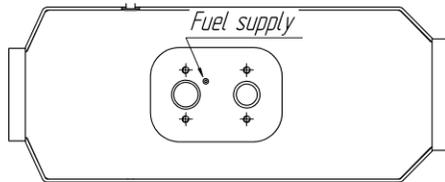
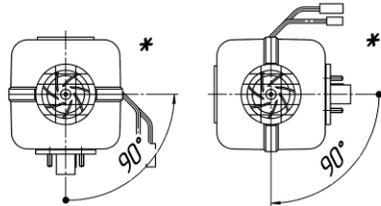
PLANAR-8DM Heater Dimensions



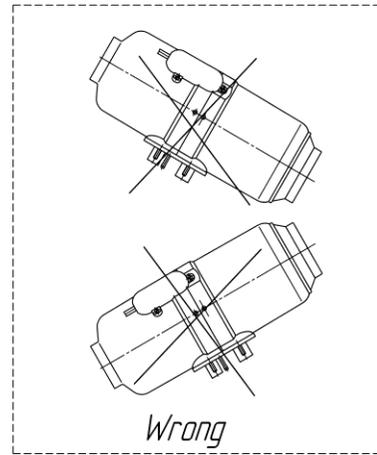
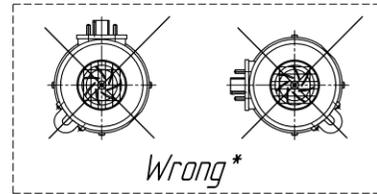
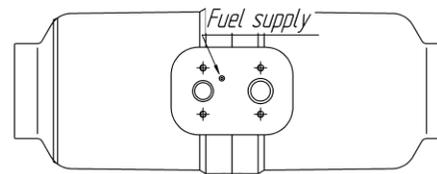
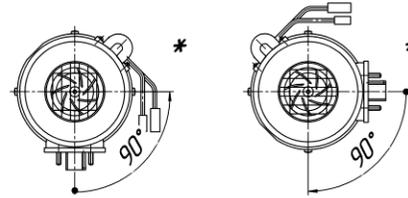
Heater Mounting Position

9

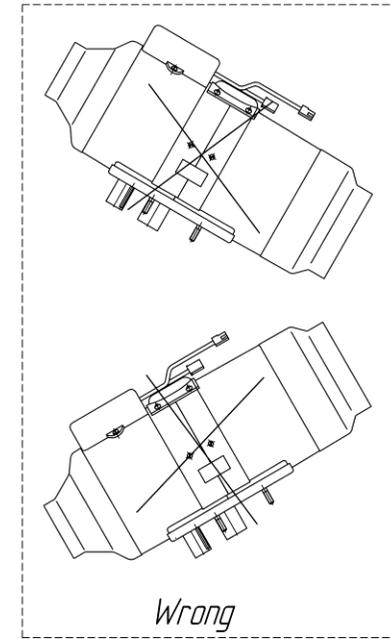
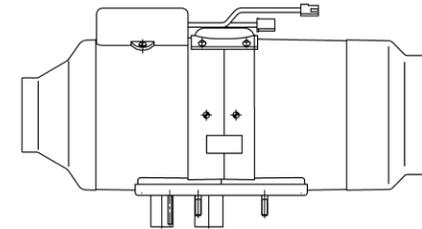
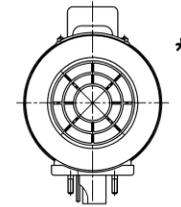
PLANAR-44D
PLANAR-2D



PLANAR-4DM2

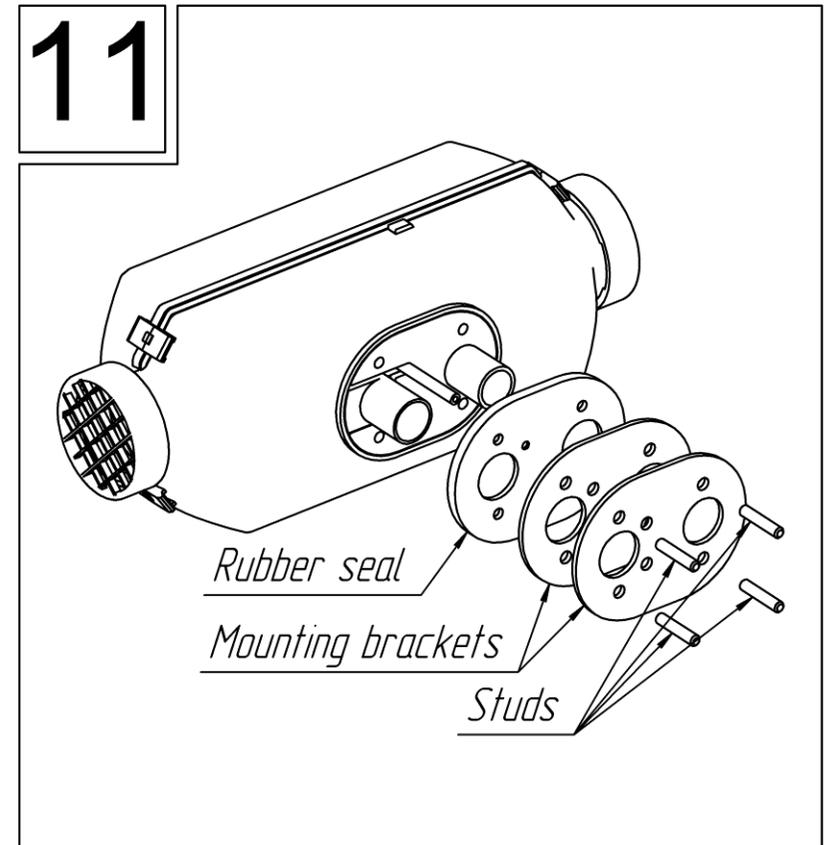
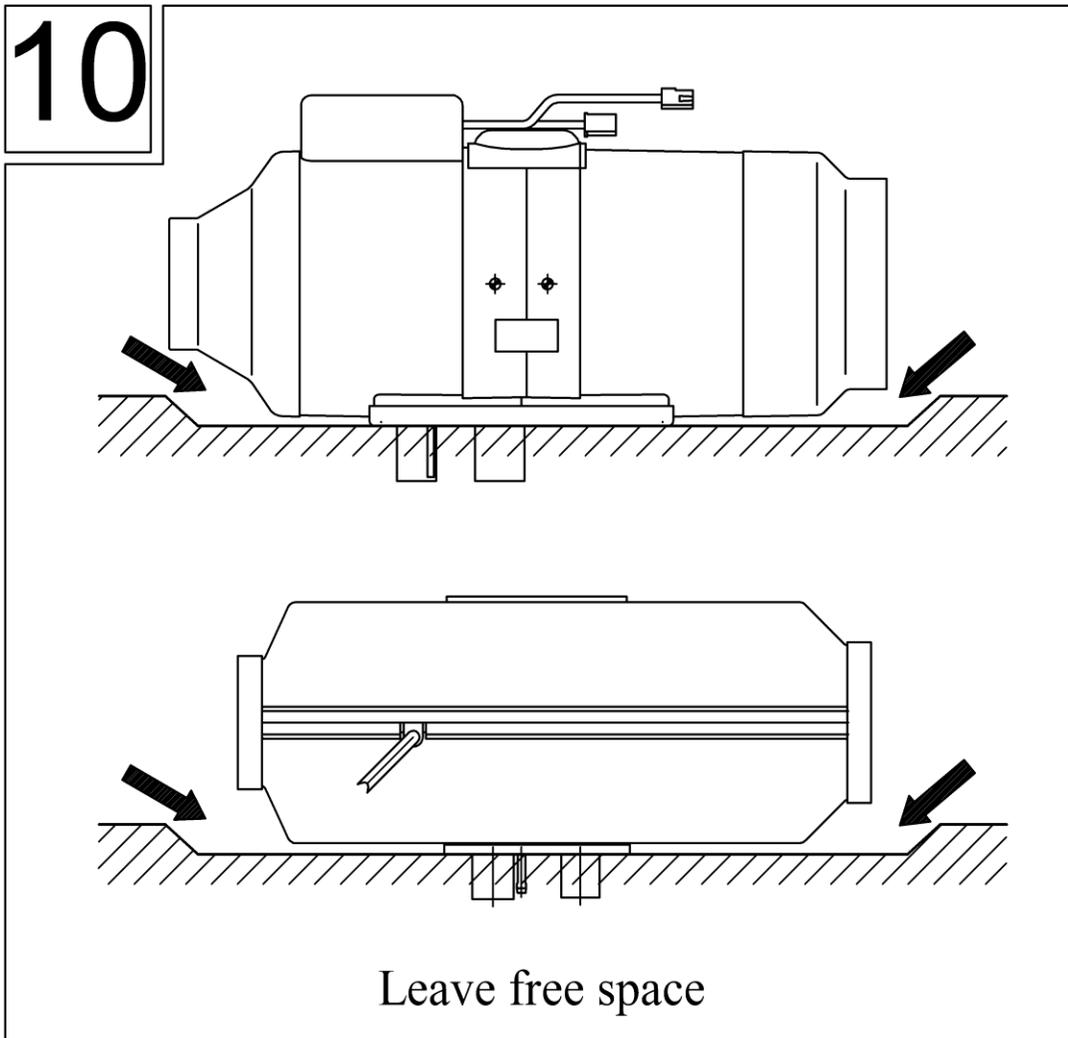


PLANAR-8D



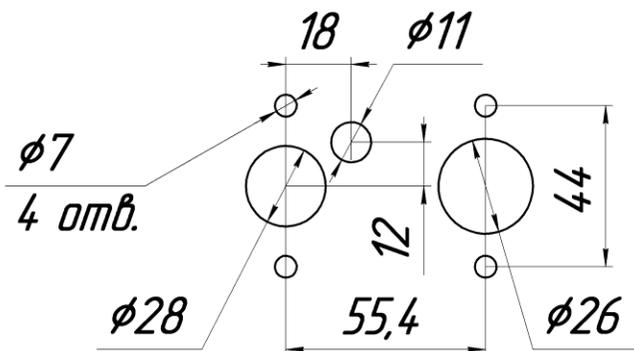
* - view of the heater from the heating air intake side.

Heater Mounting Position

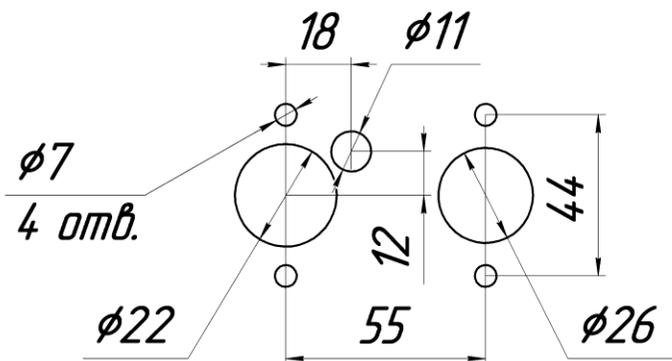


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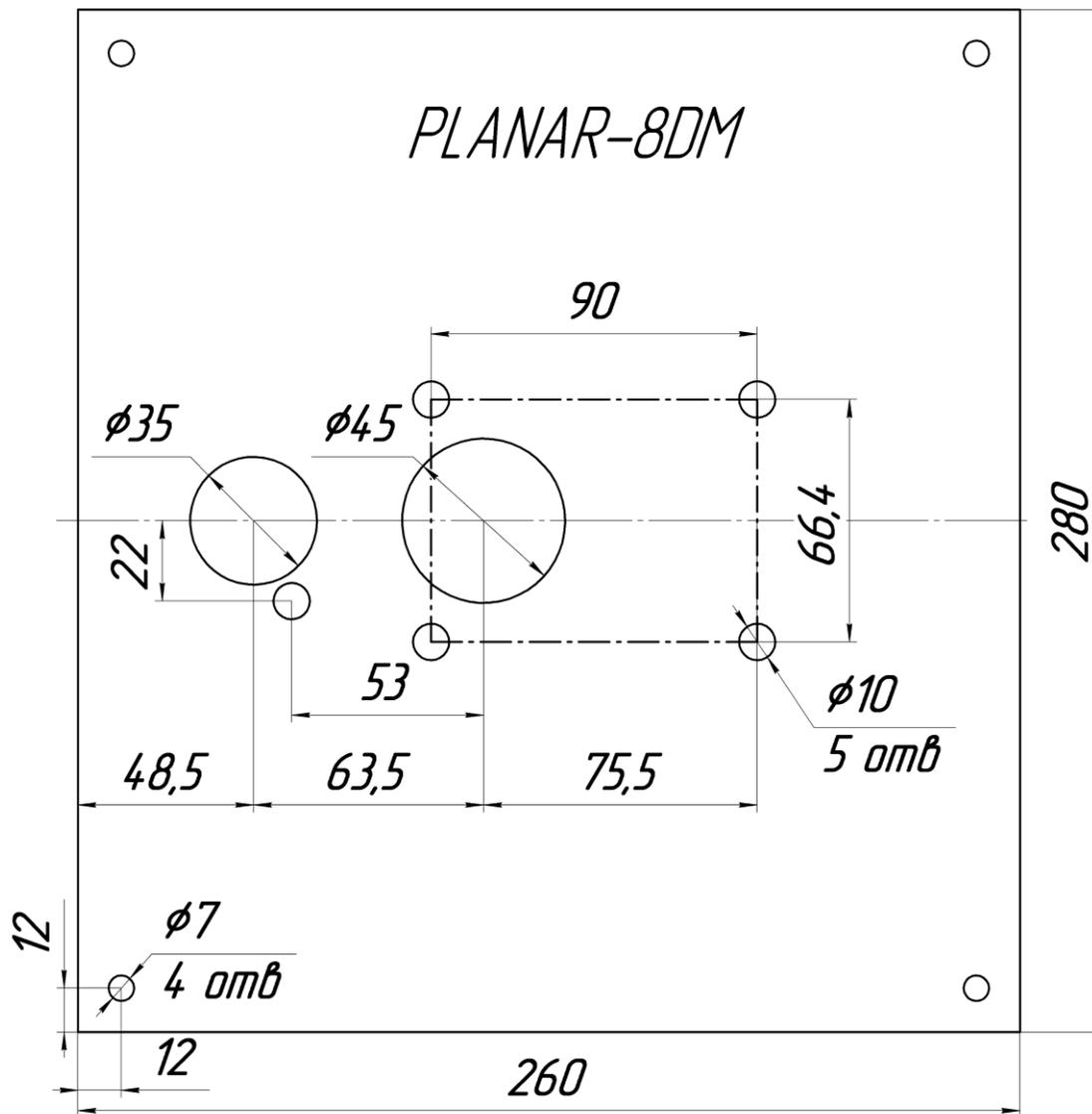
Air flow

PLANAR-44D
 PLANAR-2D



PLANAR-4DM2



3.4 Heating Air Supply

Heating air is taken from inside the room or from outside.

The outside air must come to the air intake from a place protected from rain, splashes, dirt, and water in case of the vehicle crossing a water barrier.



Hot air outlets should be placed in such a way that air does not come in contact with parts susceptible to damage by high temperature.

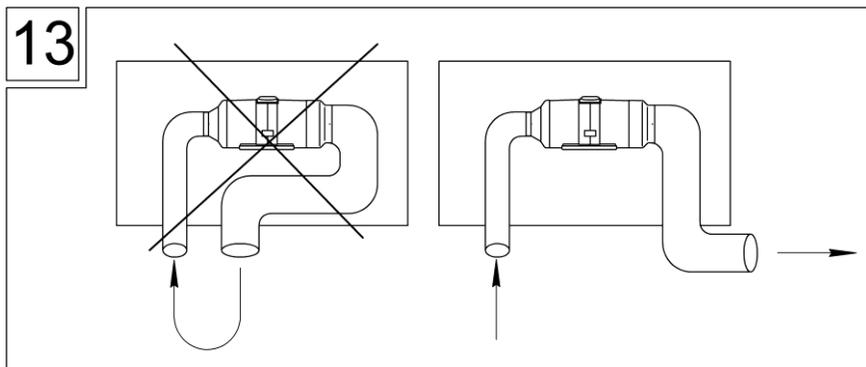


Do not crush or flatten hot air ducting



Only use materials designed for operation under temperatures up to 130 °C for air lines.

If air recuperation is used, do not let the heated air come through the air intake of the heater. See Fig. 13



If the mounting box is used, install the heated air supply nozzle in a way to prevent ingress of hot air into the box.3.5
Combustion Air Supply



The combustion air must not be taken from the inside of the vehicle (cabin, luggage compartment, and other heated spaces).



Do not use the heater without the air intake nozzle

Install the air intake opening so as to prevent clogging or fouling with snow, and for free drainage of trapped water.3.6
Exhaust System

Exhaust pipe, made from flexible corrugated metal, should be cut to the required length.

The exhaust pipe is attached to the heater with a clamp.

The use of high temperature sealant prevents leakage of exhaust gases at connections. For a better contact of the exhaust pipe and the heater fitting, a few cuts of 15-20 mm in length should be made in the pipe, but not beyond the exhaust fitting of the heater.



The end of the exhaust pipe should not touch the rubber sealing of the heater.

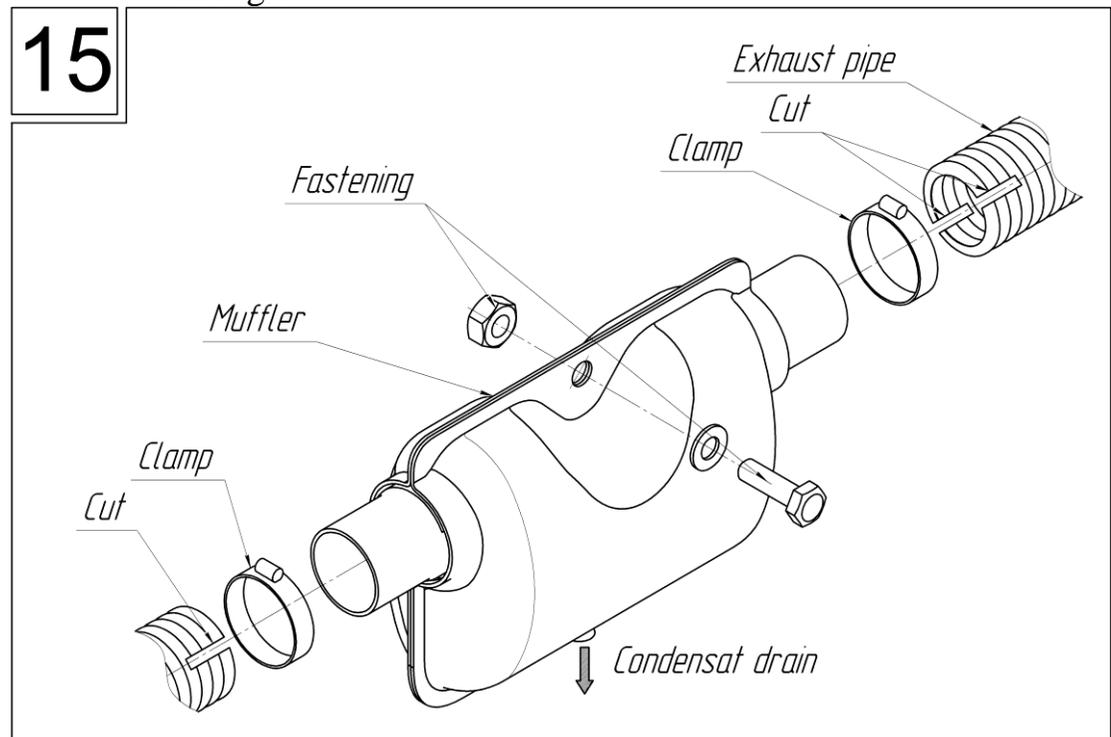
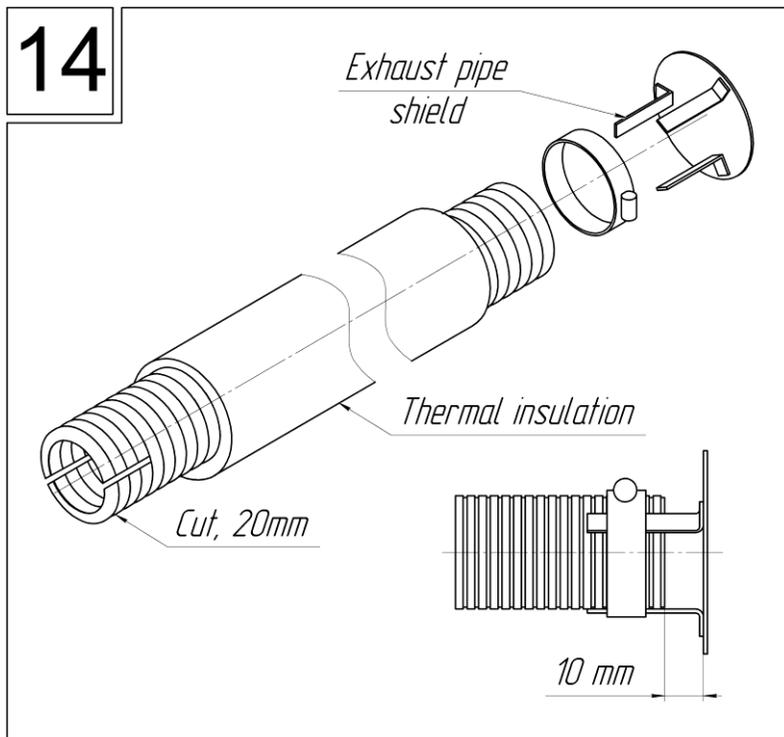


When installing the exhaust pipe, make sure that no exhaust gases enter the interior or are drawn in by the fan through the cab heater radiator.



At the end of the exhaust pipe a shield is installed, which necessary for stable operation at low heating modes (Fig.14).

In absence of the screen, air will be blown back into the exhaust pipe. This leads to increased heater shooting and impairs heat capacity. Exhaust gases have to be removed outside of the vehicle



Exhaust gases must not hinder operation of other vehicle units. Exhaust gases should be discharged to the outside. Furthermore, the gases should not adversely affect the operation of vehicle units. The outlet of the exhaust pipe should be in such a position that would prevent clogging or entering of snow, and also provide for free drain of any water that got into it.

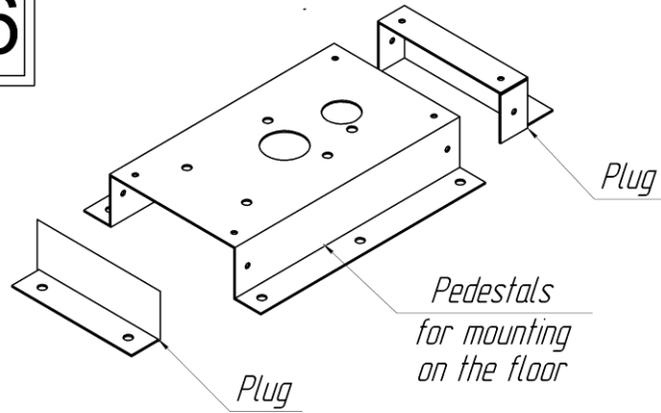
Heaters are equipped with a muffler attached to the exhaust pipe. Depending on the mounting location of the muffler, cuts are made to the exhaust pipe. For better fixation of the exhaust pipe on the fittings of the muffler, it is necessary to make cuts 15-20 mm in length, but not extending beyond the male fittings of the muffler. Installation of the muffler is shown in Fig.15.

3.7 Installation of Air Intake and Exhaust Pipe

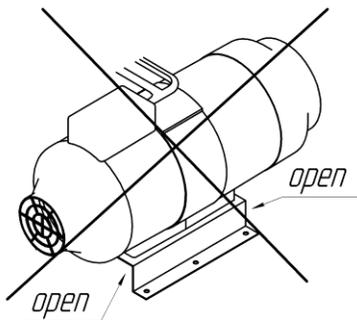


In case the heater is installed onto a pedestal or a mounting bracket, cover the air intake, exhaust pipe, and the fuel pipe areas with a metal cover (Fig. 16–17).

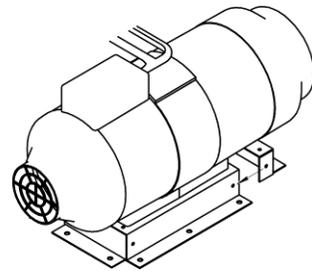
16



Installation example

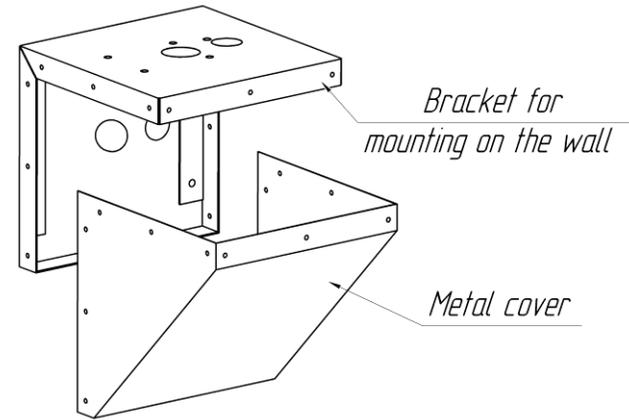


Wrong

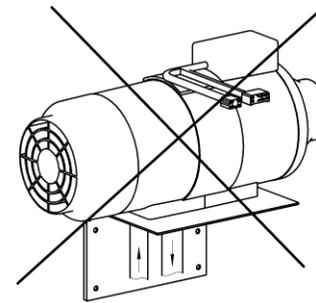


Recommended

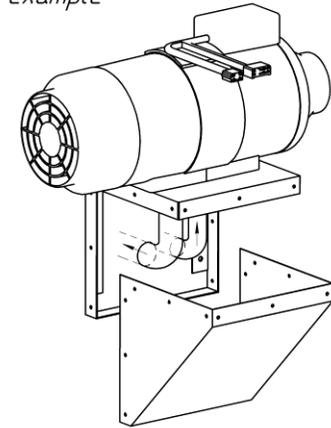
17



Installation example



Wrong

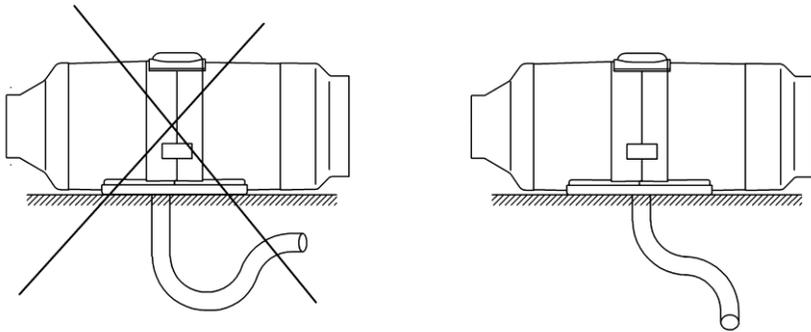


Recommended



Both exhaust and intake pipes should be positioned inclined downward from the heater (Fig.18). If this is not possible, then a hole $\text{\O}3$ mm should be made at the lowest point to drain condensate. Do not cut this opening if the exhaust pipe goes through a room with people inside.

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Exhaust gas outlet and combustion air inlet should be positioned in such a manner as to eliminate the possibility of re-suction of exhaust gases

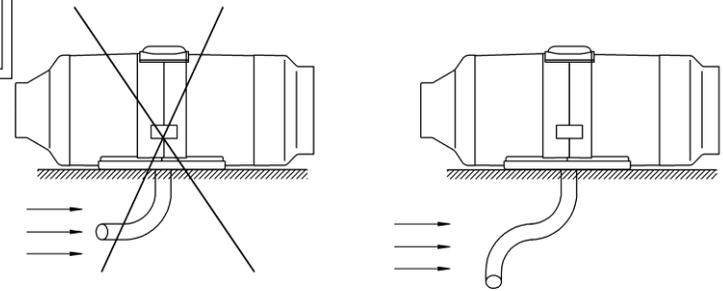


Do not install the air intake inlet and exhaust pipe outlet opposite the incoming airflow during vehicle movement (Fig. 19).

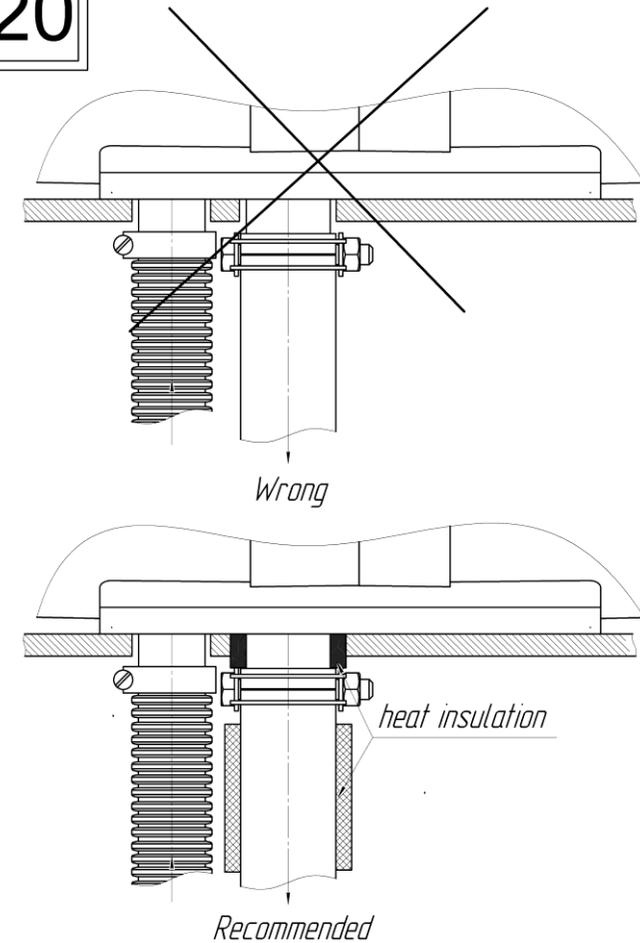


When installing the heater inside van bodies, kung and other areas of vehicle on the exhaust pipe is installed heat insulation. Install additional heat insulation at places where the exhaust pipe goes through the floor or the side wall of the vehicle (Fig. 20).

19



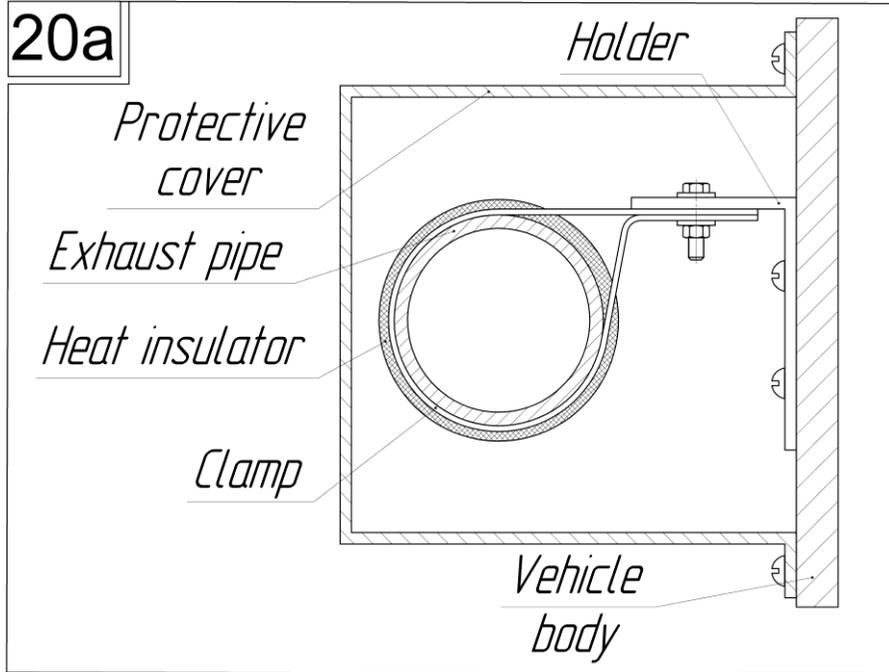
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When installing the heater inside van bodies (insulated vans, box vans, etc.) route the exhaust pipe must be covered with duct or some other type of protection. (Fig.20a)

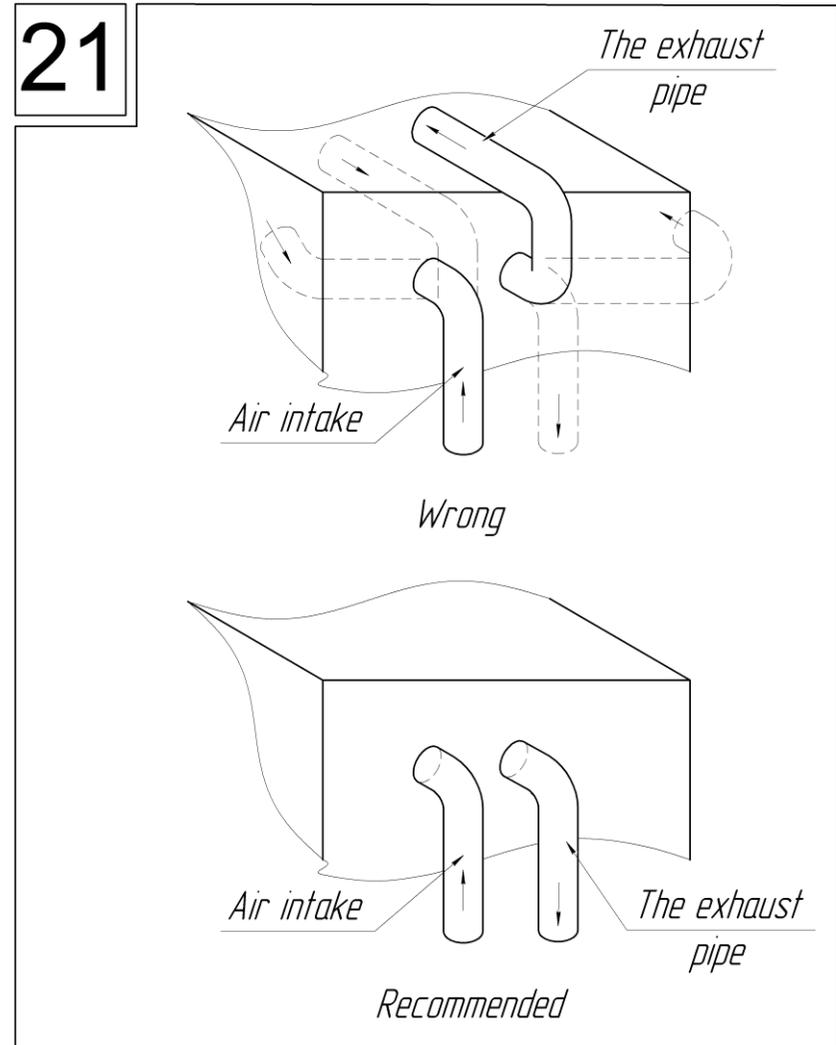
20a



When installing the heater inside van bodies (insulated vans, box vans, etc.), the exhaust pipe outlet and the air intake shall not be placed on the opposite sides of the vehicle (Fig.21-22).

The correct installation of the exhaust and air intake pipes is on one side. The distance between them should exclude re-suction of exhaust gases through the air intake (at least 200mm).

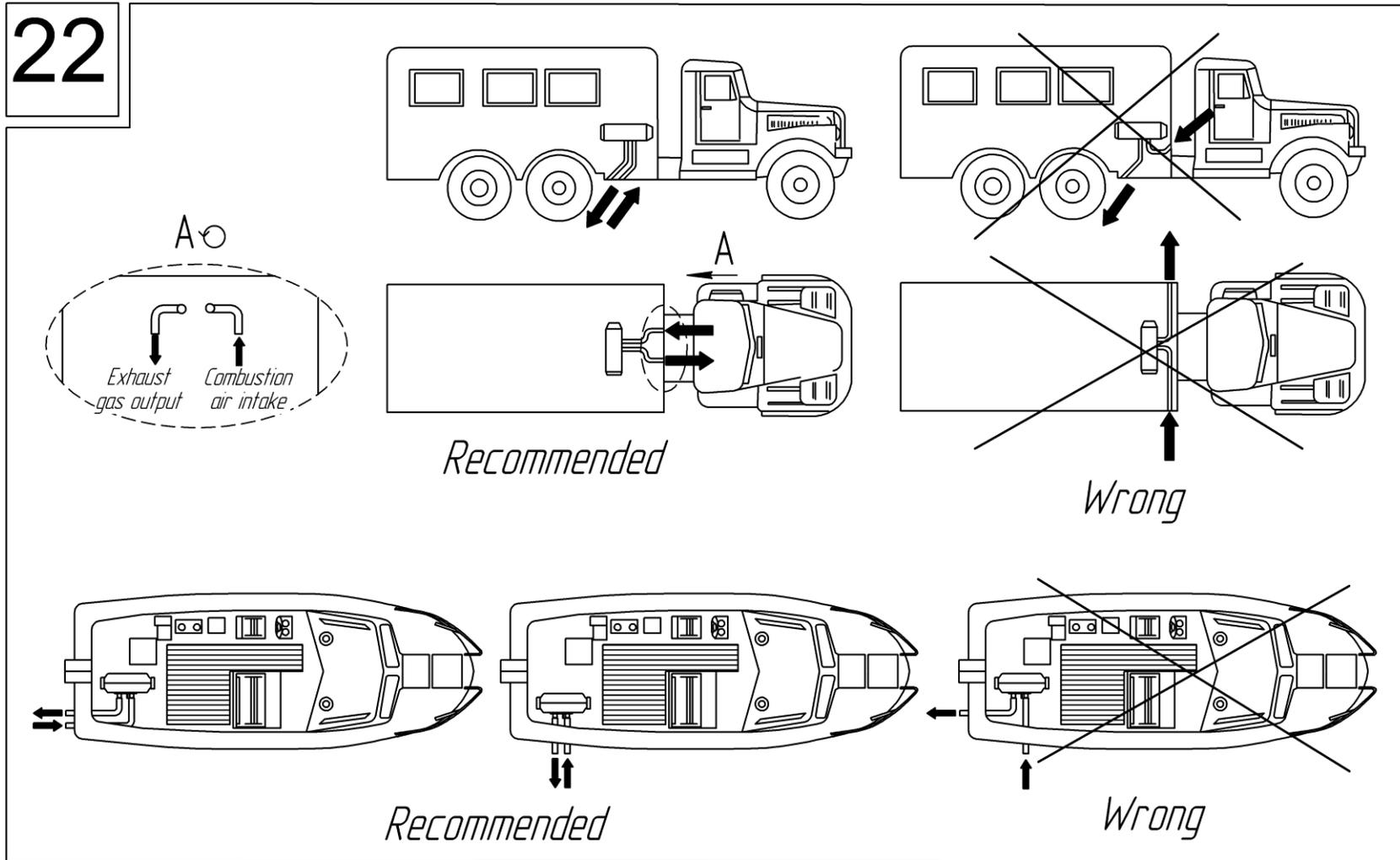
21



As a result, normal operation of the burner is impeded, it gets clogged with soot, and the life of the heater shortens

Under adverse conditions (strong wind, occasional atmospheric pressure changes), failure to comply with these recommendations not only prevents the discharge of exhaust gases, but also creates an additional depression near the air intake.

22



In rare instances, non-performance of this recommendation, can lead to the opposite movement of a flame towards the air pump fan, to melting of air pump fan and **to fire of a heater.**

At installation of a heater in the boat, exhaust and air intake pipes fasten to specialized branch pipes which are bought separately.

3.8 Insulation

Choose the installation site considering the high temperatures (up to 500 °C, depending on capacity) during installation of the exhaust pipe. Install thermal insulation over the exhaust pipe to protect vehicle equipment (electrical wiring and other lines) from high temperatures (Fig. 14).

3.9 Fuel Supply.



Do not operate the heater using biofuel.

3.9.1 Fuel Tank Installation

Installation of the fuel tank is shown in Fig.23.



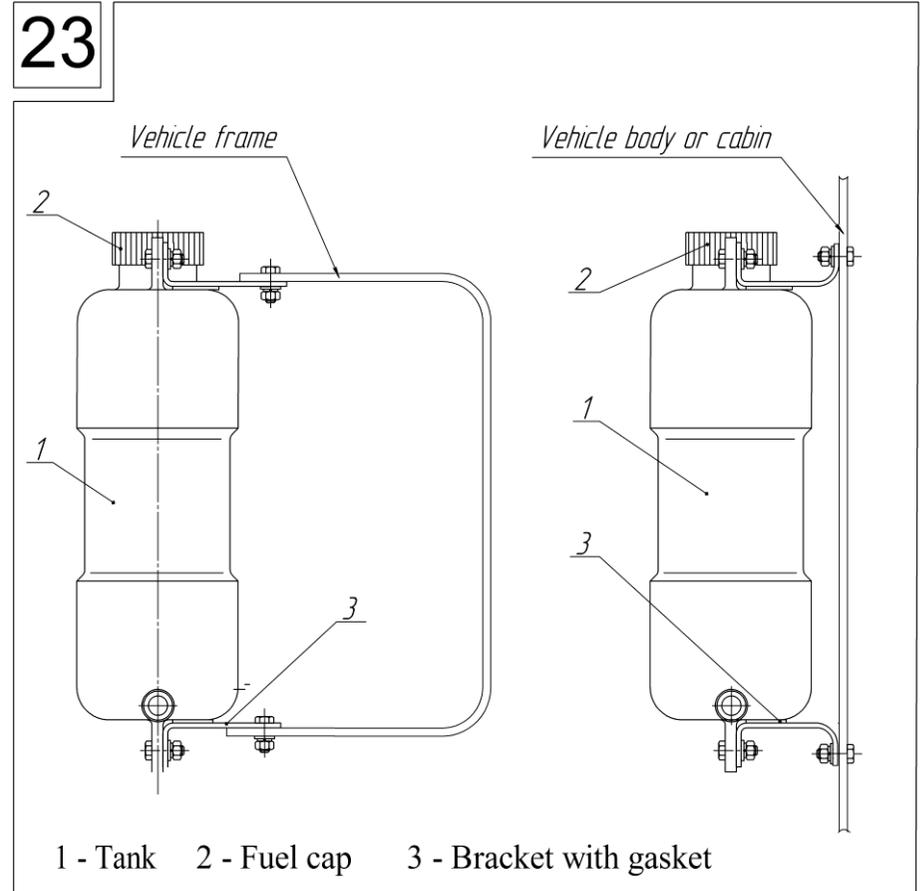
Install the fuel tank in a way so that fuel that may leak during the tank filling will not be spilled onto the exhaust system and electric wiring.



Fuel filler shall not be situated in the passenger compartment, trunk, or engine compartment.

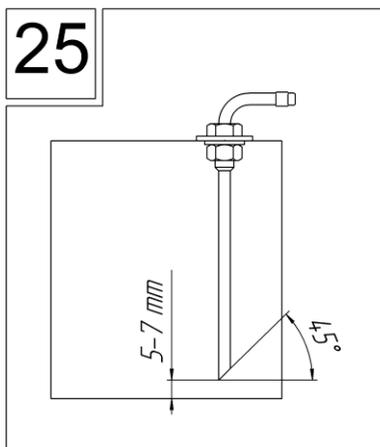
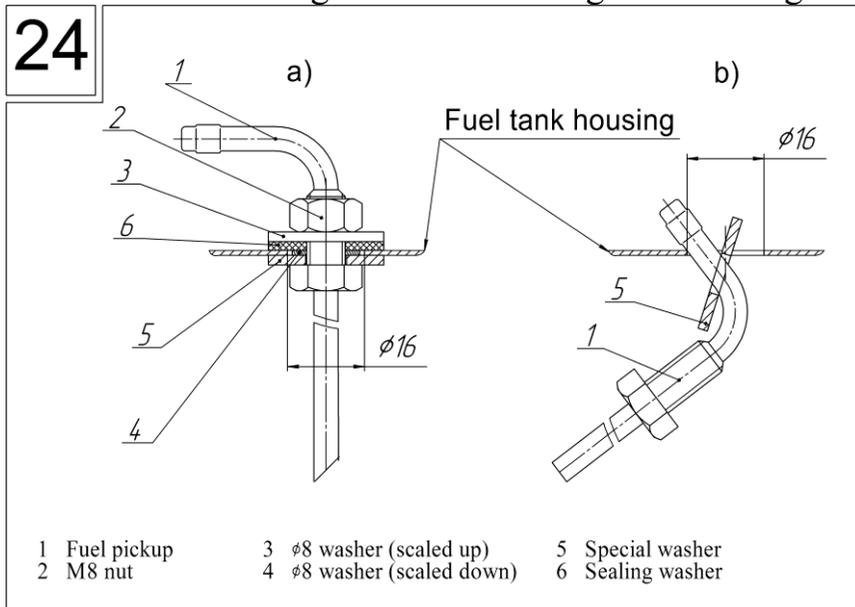
If the fuel tank is positioned on vehicle side, it and its installed plug must not protrude beyond outer dimensions of the vehicle.

In order to avoid leakage of fuel from the fuel tank (by gravity) when the fuel pump loses its tightness, the fuel tank should be preferably placed in such a way that the maximum fuel level is below the cut-off plane of the fuel tube of the heater.



3.9.2. Fuel Pickup Installation

Install the fuel intake into the vehicle fuel tank as shown on Fig. 24 (a). Fig.24(b) shows installation of a special washer with the fuel pickup in the fuel tank hole. Define the fuel intake length before installing (Fig. 25). Cut off the excessive length with a $\approx 45^\circ$ degree bevel edge.



3.9.3 Fuel Pump Installation

The fuel pump is used for metered supply of fuel into the combustion chamber.

The fuel pump is operated by electrical impulses sent by the control unit. The pulse frequency corresponds to the certain performance of the heater.

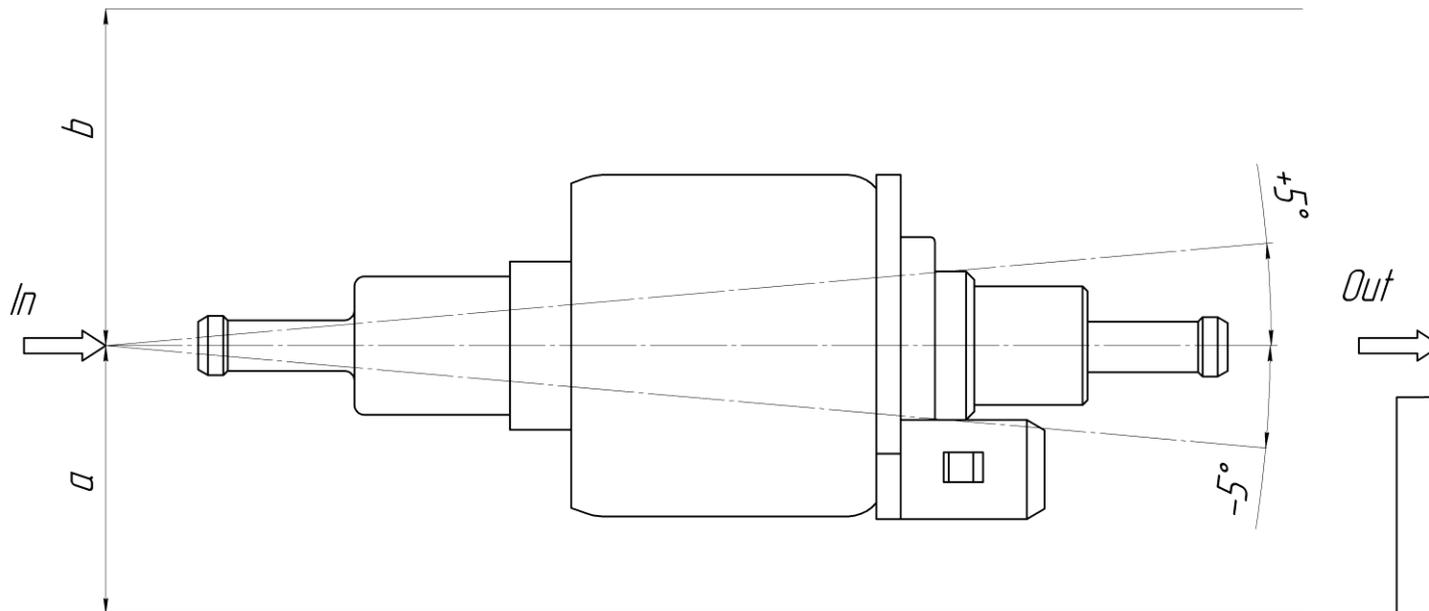
The fuel pump is mounted on a rubber cushion clamp (Fig. 27).

The fuel pump is preferably mounted closer to the fuel tank and below the lower fuel level in the fuel tank.

In case the fuel pump is installed above the fuel tank, fuel must not be pumped up for more than 700 mm. The heater is supplied with Adverse or Thomas Magnete fuel pumps. The correct mounting position of the fuel pump is shown in Fig.26

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Maximum level of the intake pipe inlet



Minimum fuel level

- a Fuel intake up to 700mm
- b Height between fuel tank and heater must be up to 1500mm

27



3.9.4 Fuel Line Installation.

Installation of the fuel line between the fuel pickup and the heater is shown in Fig.28. Sections of the fuel line are connected by means of couplings.

If couplings are not cut off and are delivered as one rubber sleeve, it is necessary to cut it into appr. lengths of 50-70mm.

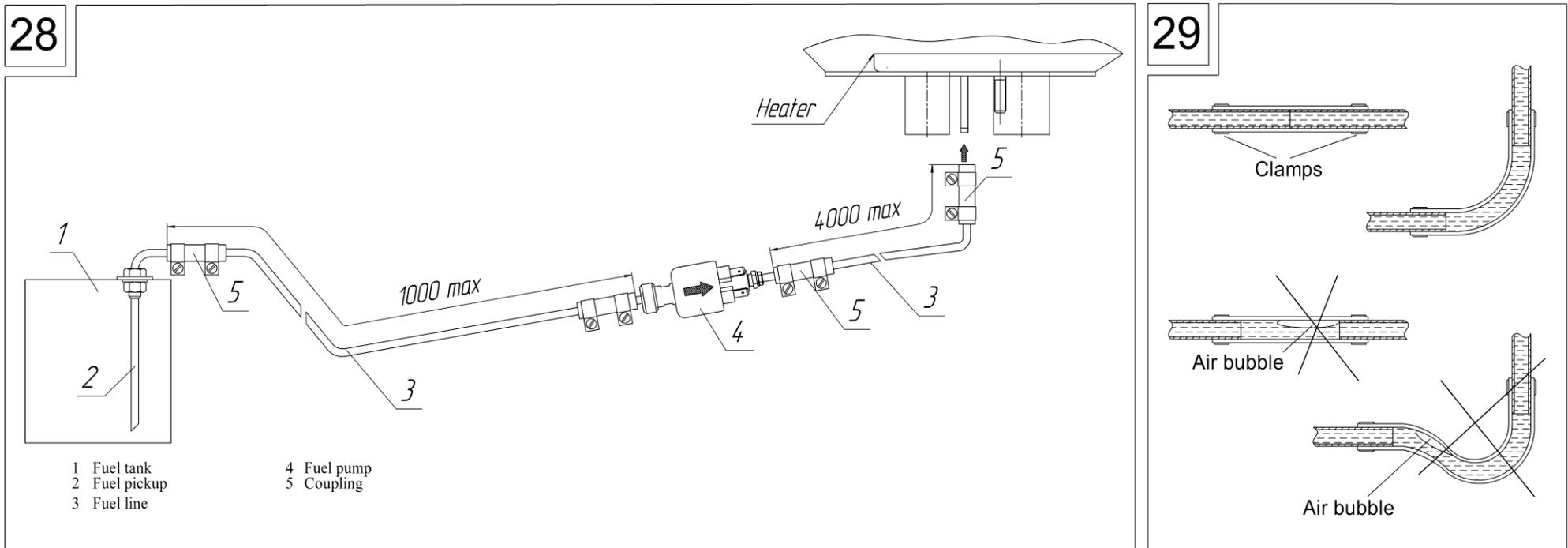
Proper connection of two fuel tubes with a coupling is shown in Fig. 29.



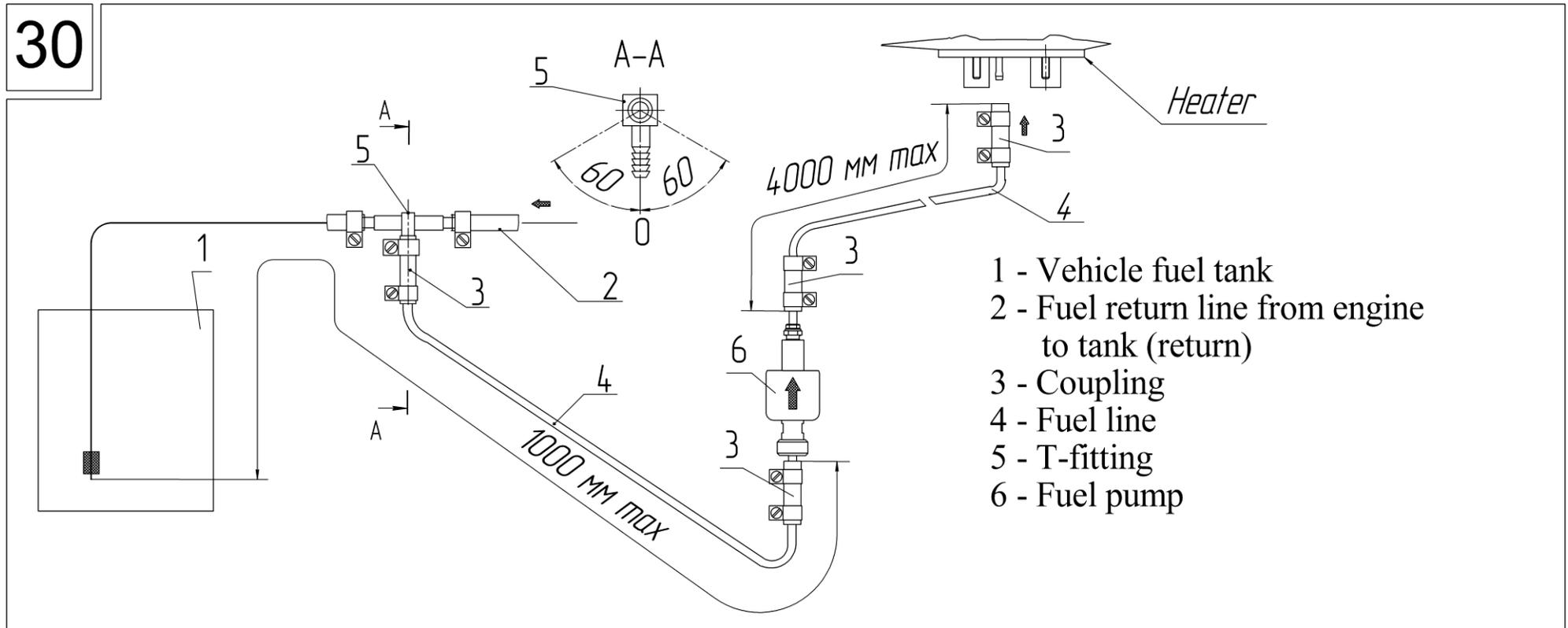
Cutting of couplings and fuel tubes should be done only with a sharp knife. Interfaces shall not be crushed and must be free of burrs or narrowing of the flow cross section.

3.9.5 Heater Fuel Intake with T-Fitting.

Fuel intake from fuel return line from engine to the fuel tank can be carried out using a T-fitting. The fuel return line must be with no pressure with its end at the bottom of the fuel tank. Fig. 30 shows installation of the T-fitting.



30



3.9.6 Heater Electrical Wiring Installation.

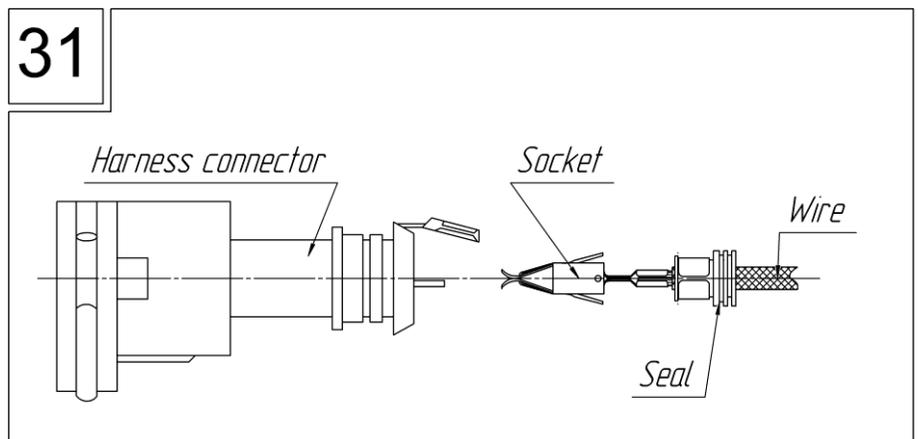
Installation of wire harnesses and other electrical parts of the heater should be made according to the wiring diagram. Install the harnesses so as to prevent their heating, deformation, and movement during vehicle operation. Fix the harness with plastic collars to vehicle parts.

Attention! Mounting shall be carried out with the fuse removed.



If the length of the fuel pump wiring harness needs to be shortened, it is allowed to remove an unnecessary portion from the middle of the harness. The splice should be insulated.

Installation of the fuel pump electrical harness connector is shown in Fig.31.

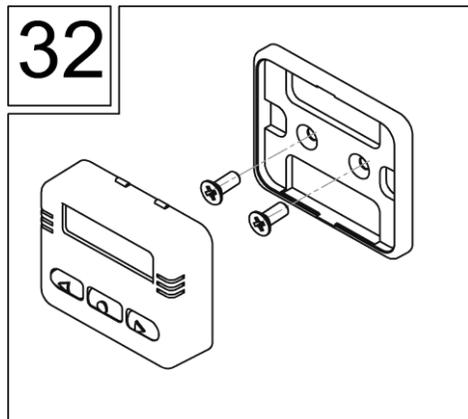


3.9.7 Controller Installation

Controller is mounted in any place convenient for the driver (personnel). Secure the PU-5 panel with double-sided adhesive tape, a bracket, or any other way.

- double-sided tape, attached to the rear surface of the Controller. The connecting wire can be led out of the Controller housing through the back cover, or through the side surface of the housing, by removing the partition. Before installing the Controller, first degrease the installation surface, then remove protective film from the adhesive tape, and attach the Controller to the prepared surface.

- bracket (Fig.28), fastened to the panel with screws. The wire is led out of the Controller housing through the back cover. The Controller snaps to the bracket with an audible click.

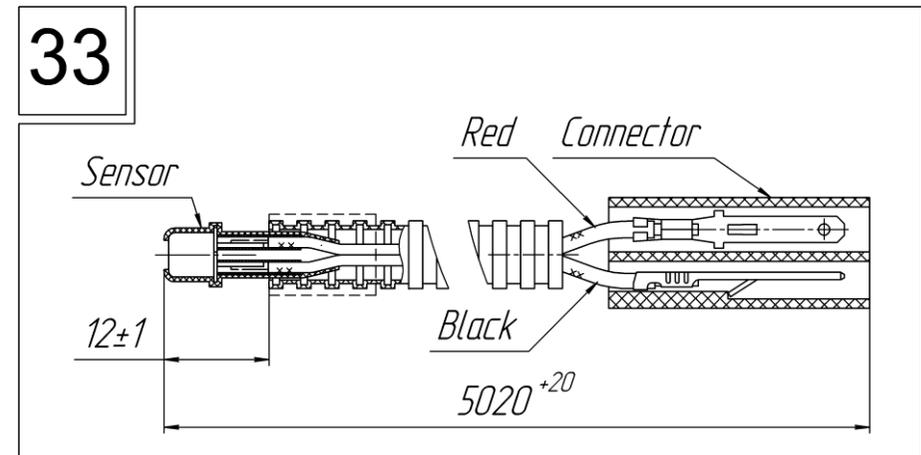


3.9.8 Cab Sensor Installation

The cabin sensor (Fig. 33) measures air temperature in the area of its installation and allows the heater to maintain the set temperature. The maximum length of the cabin sensor cable is 5000mm. The sensor is mounted in a convenient for the driver (personnel) place. The sensor must be installed at an average height, onto a vertical surface inside a heated area or where comfortable temperature needs to be maintained.

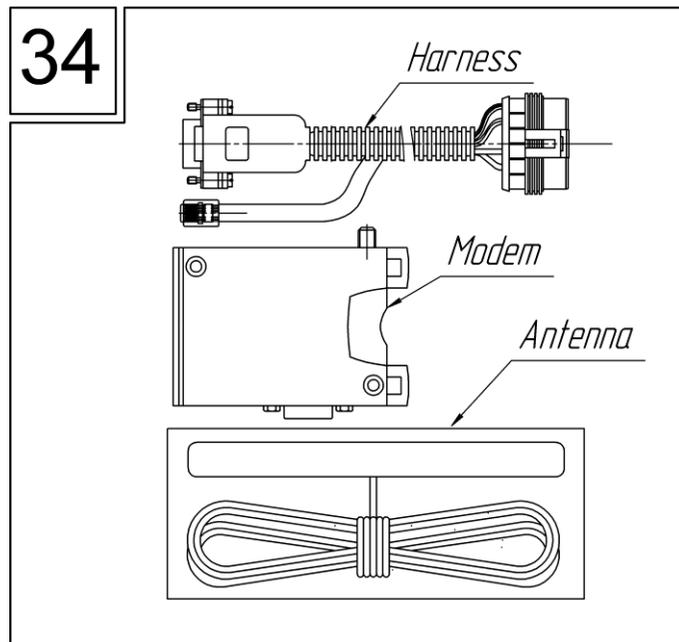
The temperature sensor should not:

- Be located directly in the stream of heated air (from the vehicle heating system or the heater itself);
- Be close to heat sources;
- Be exposed to direct sunlight;
- Be covered with cloth or the like.



3.9.9 Modem installation (for PLANAR-2D only)

GSM modem (Fig.34), which in essence is an analog of cell phone without display and keyboard, is designed for use in harsh environments (cold, vibration, etc.). The modem, same as a cell phone, has a SIM card installed, i.e. the heater acquires a full telephone number of your chosen service provider. The modem can be installed in any convenient, clean place. For more details about the modem see Instructions to the modem.



4 First launch

After installation, carefully check if all wires, harnesses and electric connections are well installed and fastened. Fill the fuel line and vent out air.



The fuel line may be filled using two methods:

- 1) switch the heater on and off several times for five minutes.
- 2) use a fuel priming device*.

The transparent fuel lines are used to monitor the filling of the fuel line.

Supply power to the heater and install fuses on the power wire harness.

During the first launch, check air tightness of all connection and how securely they are fastened. Tighten the collars, if necessary.

During the first launch, the exhaust pipe might emit some smoke.

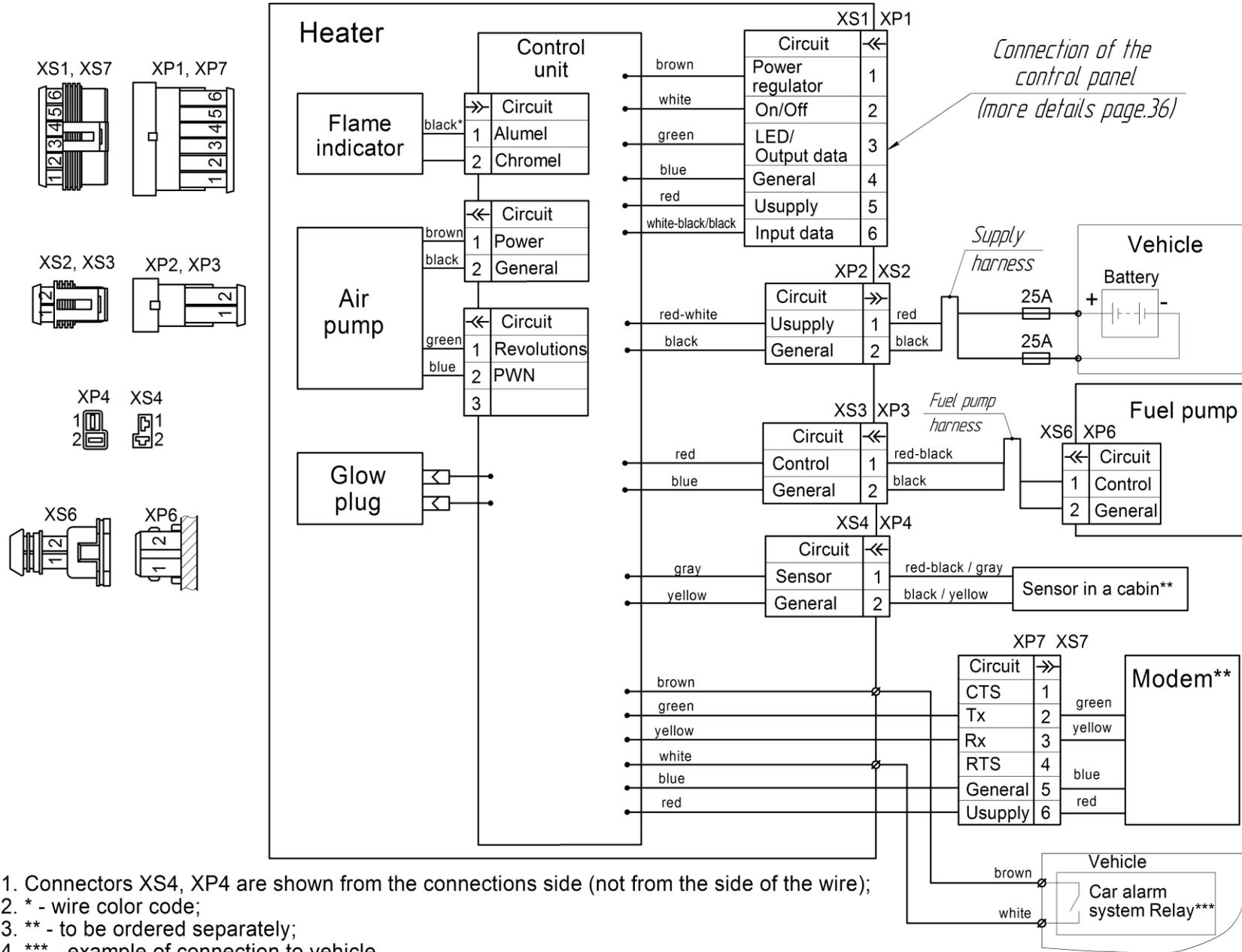
*—*optional part.*

5 Recommendations

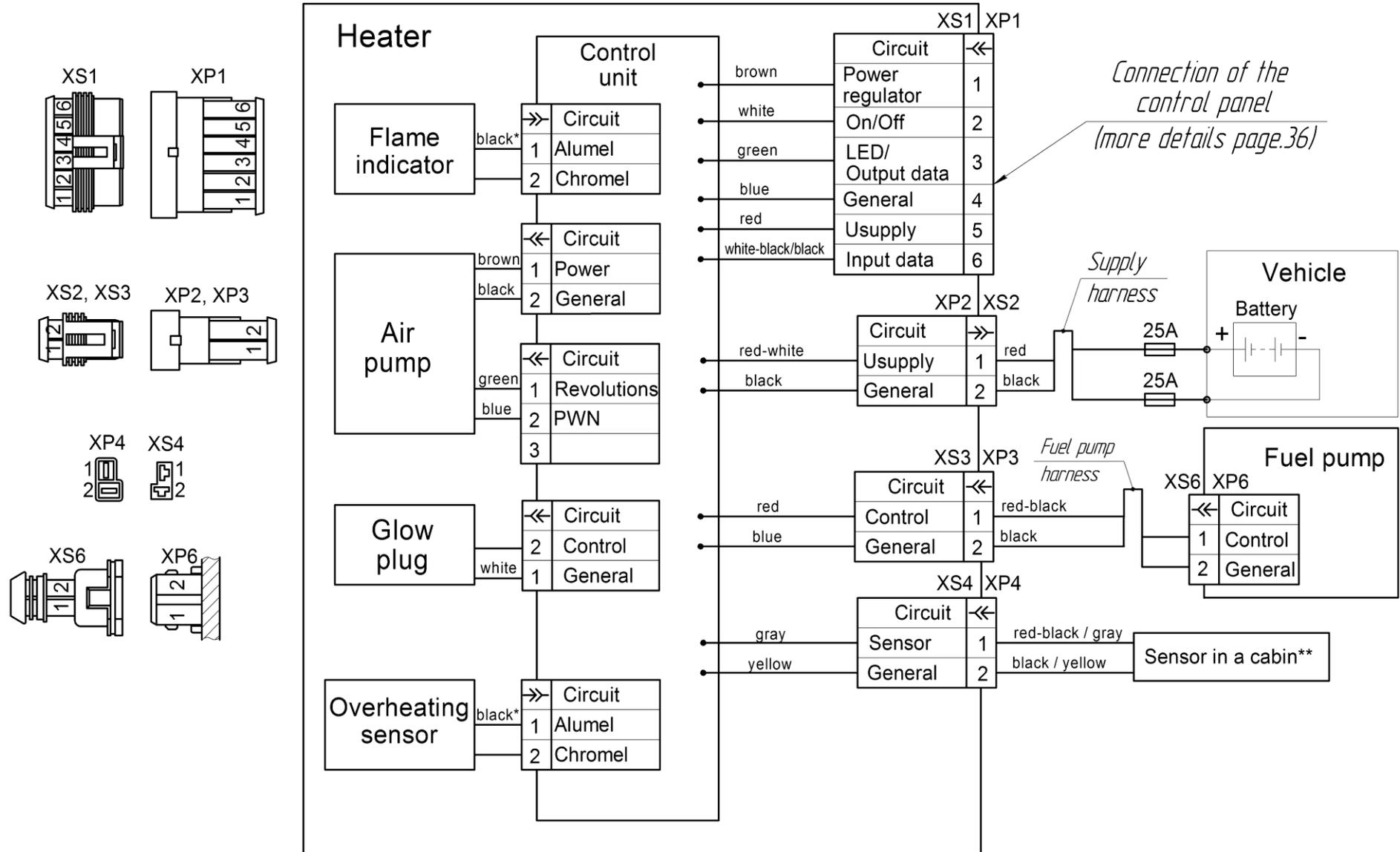
If the heater does not start after switching on, make sure there is fuel in the tank, check the charge of the battery, check if connectors are properly connected and if the 25A fuses are good.

If you were unable to find the root cause of the fault, contact the service center, the dealer you bought the product from or the website www.autoterm-europe.com.

PLANAR-2D Electrical Wiring Diagram

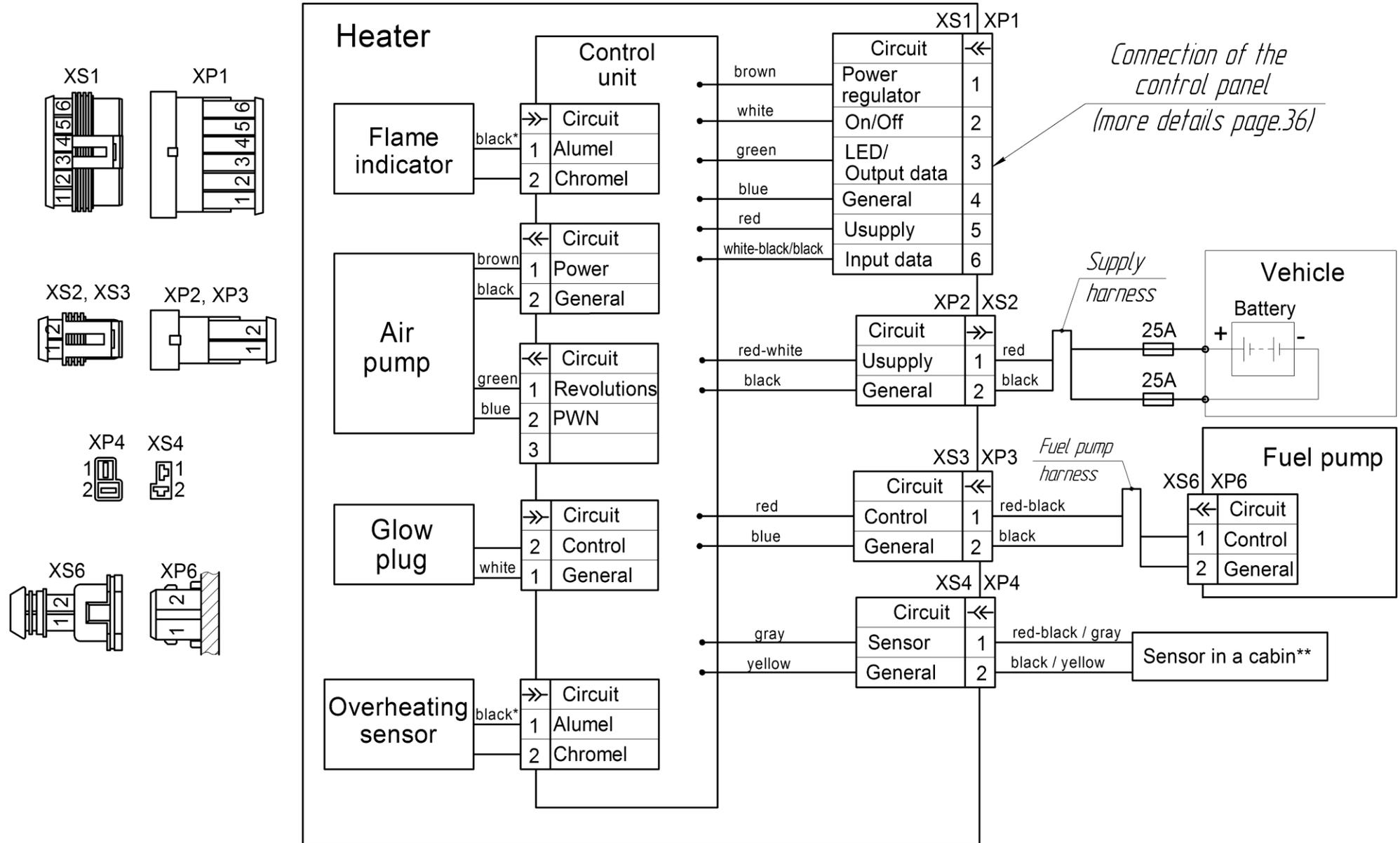


Electrical Wiring Diagram PLANAR-4DM2 mod «P»



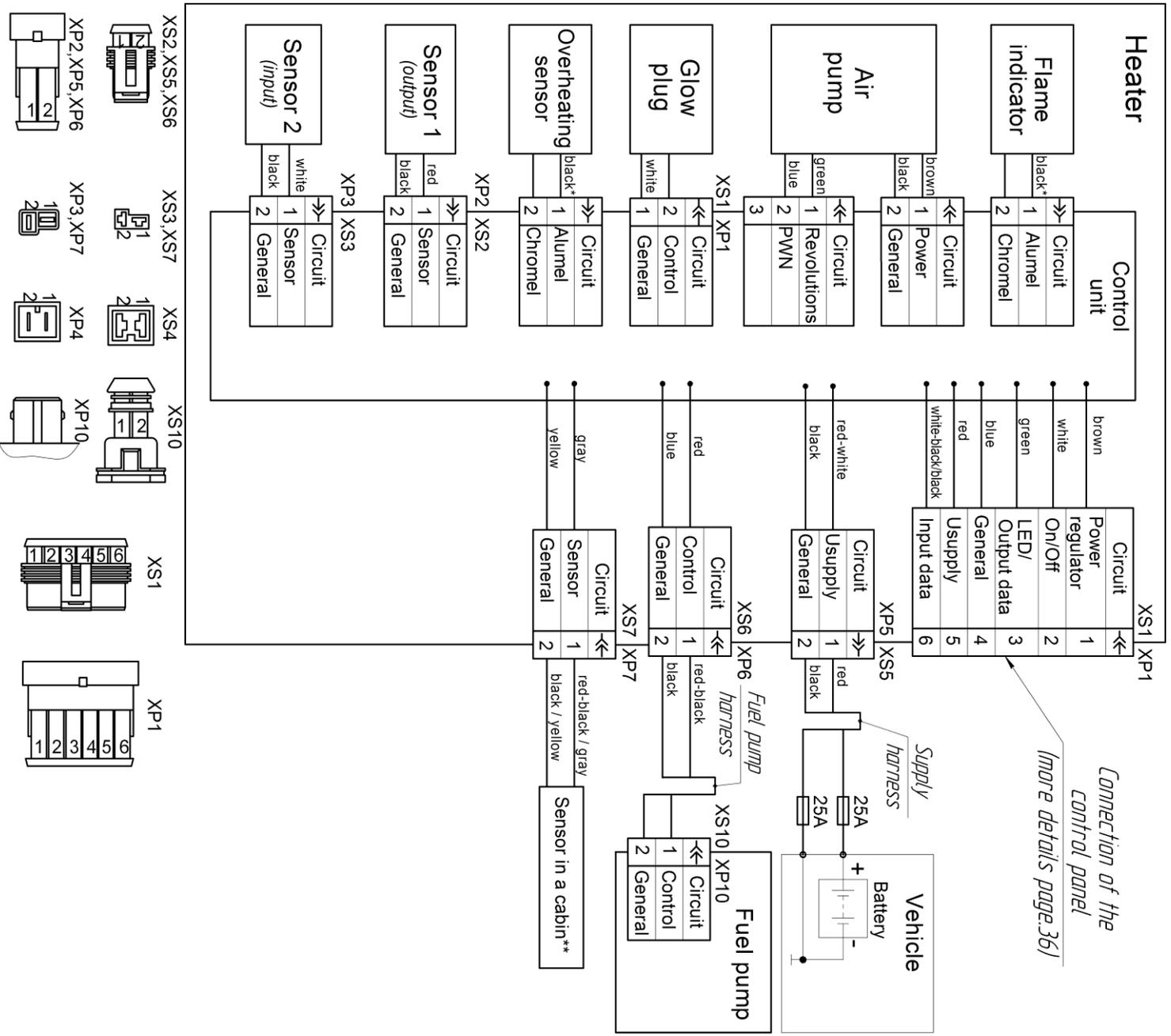
1. Connectors XS4, XP4 are shown from the connections side (not from the side of the wire);
2. * - wire color code;
3. ** - to be ordered separately;

Electrical Wiring Diagram PLANAR-44D mod «P»



1. Connectors XS4, XP4 are shown from the connections side (not from the side of the wire);
2. * - wire color code;
3. ** - to be ordered separately;

Electrical Wiring Diagram PLANAR-8DM mod «P»



Connection of the control panel (more details page.36)

1. Connectors XS3, XS4, XS7, XP3, XP4, XP7 are shown from the connections side
2. * - wire color code;
3. ** - to be ordered separately;

The scheme of electrical connections, connection of the control panel

Connection scheme for the PU-22TM, PU-5TM

