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Binar 5B, Binar 5D, engine pre-heater for vehicles with liquid cooling system

User Manual

АДВР.102.00.00.000 РЭ

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Introduction

The present User Manual gives information on set-up, operation and servicing of Binar 5B and Binar 5D starting pre-heaters (hereinafter referred to as– pre-heater), which are used for start heating and warming – up of vehicles with liquid cooling system and engine displacement up to 3.5l at ambient temperature as low as minus 45°C. Fuel used for Binar 5B starting pre-heater operation is petrol, for Binar 5D-Conpact diesel fuel is used. Binar 5B-Compact and Binar 5D-Compact have the pump Bosch 0392020034 and leads for connection with vehicle alarm system or for GSM- modem mounting.

The pre-heater functions are following:

1. Fail-safe starting engine operation under low ambient temperature conditions.
2. Additional heating of engine and passenger compartment with the engine running under hard frost conditions.
3. Heating of passenger compartment and windshield at low subzero temperatures (to remove icing) with the engine inactive.
4. Use pump to improve coolant circulation under not running pre-heater.

These functions are supported by the pre-heater basic hardware. Its modular structure makes it feasible to connect with devices supporting the other functions, thus improving functionality of the basic hardware purchased and installed initially. It is possible to operate by the heater with control panel with timer (hereinafter referred to as– control panel) installed on the car dashboard. It is possible to operate by the pre-heater Binar 5B-Compact and Binar 5D-Ccompact by the control panel or remotely with the help of GSM-modem by SMS sent by mobile phone. If there's alarm signaling system installed in the car one can use its free channel to operate by the pre-heater.

The pre-heater's activation time is possible to be programmed by control panel. While operating the control panel indicates the temperature of the cooling system and operation mode of the pre-heater. In case of failure the code of malfunction is indicated.

Minor changes performed on the heater structure by the Manufacturer may not be documented in this Operation Manual.

2Technical data and characteristics.

Performance specifications are given with ±10% tolerance at 20°C ambient temperature and 12V nominal voltage.

Characteristic	model	
	Binar 5B-Compact with Bosch pump	Binar 5D-Compact with Bosch pump
Heat productivity, kW	5±0.5	
Nominal supply voltage, V	12	
Acceptable deviation, V	9.5…16	
Fuel	petrol meeting requirements of GOST 51105	Diesel meeting requirements of GOST 305
Fuel consumption, l / h	0.7	0.6
Power consumption with the pump, max, W	45	
Power consumption on start mode (100 sec),W	65	
Maximum liquid heating temperature, Cº	+85	
Cabin heater fan switching at liquid temperature	+40	
Start mode	Manual or automatic	
Time of one working cycle, min	20…120	
Pre-heater mass in full configuration, kg, max	8	

3. Safety measures.

3.1. The pre-heater and its components shall be installed **only by authorized companies** by reason of it complicated structure: there's a combustion chamber where fuel burns, a heat exchanger which provides heat transfer to the cooling liquid, fuel pump, air pump, control unit, which control and operate the work of the heater according to the program, heat sensors, etc.

3.2. While installation or dismantling the pre-heater, safety measures specified for activities with car wiring harness and fuel supply line must be observed.

3.3. The pre-heater shall be used only for purposes described in the present User Manual.

3.4. It is prohibited to lay the fuel pipe inside the passenger compartment or driver's cab.

3.5. It is prohibited to use the pre-heater in case of leaky fuel system. Vehicle with the pre-heater shall be equipped with a fire extinguisher.

3.6. To avoid possibility of poisoning with the toxic exhaust gas generated by the operating pre-heater, the exhaust pipe shall be set in a manner preventing discharge gas ingress into the driver's cab or its intake by the heat exchanger fan.

3.7. To avoid possibility of poisoning with the toxic exhaust gas generated by the operating pre-heater, it is prohibited to use the pre-heater in enclosed car parks having no ventilation (garage, workshop and etc.)

3.8. It is prohibited to use the pre-heater in areas, where highly inflammable vapors or ample quantity of dust may be generated or accumulated.

3.9. While fueling the truck the pre-heater shall be switched off .

3.10. It is prohibited to use battery master switch in the pre-heater electric circuit.

3.11. The pre-heater shall be disconnected from the accumulator battery when welding is performed with the vehicle.

3.12. It is prohibited to connect the pre-heater to the electric circuit of the vehicle with the engine running and accumulator battery missing.

3.13. It is prohibited to switch off pre-heater power before ending of the purging cycle.

3.14. It is prohibited to connect and disconnect the pre-heater plug when the pre- heater power is on.

3.15. It is recommended to restart the pre-heater after it's switching off not earlier than in 5-10 sec.

3.16. In case of malfunctioning, the pre-heater shall be repaired in service centers, authorized by the manufacturer.

4 Description of pre-heater set-up and operation.

The pre-heater runs independently of the vehicle engine.

The pre-heater is fueled and powered from the vehicle. The pre-heater electric circuit is given in Figure 4.1.

The pre-heater is an autonomous heater (main components are given in Figure 4.2), consisting of:

- Heater (main components are given in Figure 4.3);
- Fuel pump for fuel supply to the combustion chamber;
- Circulation pump for forced circulation of cooling system liquid through the heat-exchanging system of the pre-heater and the vehicle;
- Control unit (part of the heater) to coordinate operation of the above-mentioned systems;
- Pre-heater control panel with timer for manual or automatic start-up of the pre-heater;
- Wiring harness for connection of the pre-heater components to the vehicle systems.

The pre-heater is integrated to vehicle cooling system with its hydraulic frame so that the pre-heater's pump provides circulation of cooling liquid in the engine and in the heater.

The pre-heater principle of operation is based on warming-up of liquid in the engine cooling system with its further forced pumping through the heat-exchanging system of the heater.

Gases generated because of the fuel blend combustion in the combustion chamber warm up the liquid. The heat is transmitted through the walls of the heat exchanger to the coolant fluid, which in its turn is pumped through the cooling system of the vehicle engine.

When the pre-heater is switched on, first of all there is performed functional test of its components, such as: flame detector, heat and overheating sensors, pump, air pump motor, glow plugs, fuel pump and corresponding electric circuits. In case of nonfailed status, there starts ignition. Simultaneously the circulation pump is also activated.

In conformity with the preset program there is performed preliminary purging of the combustion chamber and glow plug warming-up to the desired temperature. Then, there starts fuel and air supply and combustion process is initiated in the combustion chamber. The flame detector controls combustion of the fuel blend in the combustion chamber. Hot gasses heat the walls of the heat-exchanger, which warm up the liquid in the engine cooling system.

The control unit controls temperature of the coolant fluid by two sensors. The sensors are installed close to inlet and outlet nozzles of the heat exchanger. The control unit sets operation mode for the pre-heater according to the temperatures: “full duty”, “low duty” or “cooling down”.

The full duty mode means that the coolant fluid is heated up to 75°C and in case of overheating the pre-heater is switched to the low duty mode. The low duty mode means that the coolant fluid is heated up to 85°C; in case of overheating more than 85°C the pre-heater is switched to the cooling-down mode. The cooling-down mode means that combustion stops, the pump continues its operation. When the temperature of the coolant fluid gets below 70°C and the total cycle hasn’t finished yet the pre-heater automatically starts the full duty mode.

When the coolant fluid has been heated more than 40°C the pre-heater control unit switches on the relay and the passenger cabin heater fan is activated (in case it is switched on).The air in the cabin is warming up and provides comfortable conditions for the passengers. When the coolant fluid temperature goes down 30°C the control unit switches the fan relay off.

Duration of the total cycle is 20 … 120 minutes. Moreover, there is a possibility to switch of the pre-heater any time during the cycle off.

When the pre-heater is switched off manually or automatically, as preset time expires, the fuel supply stops and the combustion chamber is purged with air.

Peculiarities of the pre-heater automatic control under emergency conditions and in contingencies:

1) If the pre-heater has not started for some reason, the starting process will be repeated automatically. After two successive failed starts the pre-heater is switched off;

2) If combustion stops when the pre-heater operates, the pre-heater will be restarted automatically. After 3 failed starts heater will stops its operation;
3) in case of the pre-heater overheating (ex.: abnormal coolant fluid circulation, air block, etc.) heater will go to cooling mode. After cooling heater will be automatically restarted;
4) in case of voltage drop below 9.5V or voltage surge above 16V, the pre-heater switches off;
5) In case of the pre- heater emergency shutdown, a corresponding code of malfunction is indicated on the control panel. Refer to table of malfunctions codes.

Attention!

1. It is allowable to operate the pre-heater with the passenger compartment heater control valve open to full;

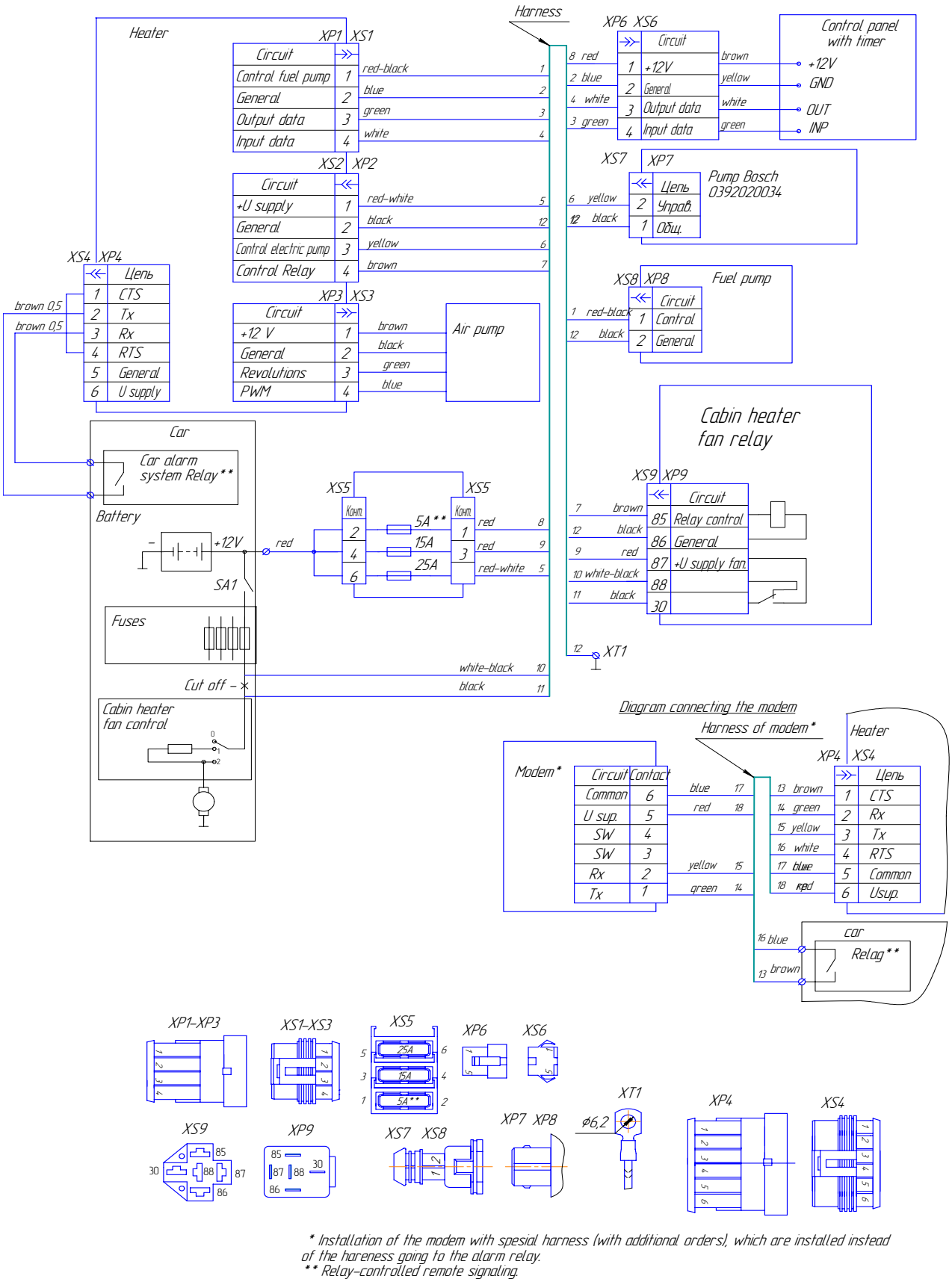
2. With the purpose of energy saving the heater cabin fan speed switch shall be in "Minimal ventilation" position;

3. It is advisable to direct the passenger compartment heater steam line in the face and not on the windshield.

5 Pre-heater control unit.

Control unit operates the activity of the pre- heater according to the set program and fulfill the following functions:

a) pre-heater starting and switching off according to control panel or other control devices(modem, remote control device) command;
b) pre-heater basic components diagnostics before and during the operation;
c) pre-heater work control and choice of the pre-heater operation mode according to the temperature of the cooling liquid;
d) connection of control unit microprocessor with control devices, identification of active device and information transmission;
e) pre-heater switching off:
   - when operation cycle is finished;
   - when one of the controlled basic components failed;
   - when the parameters are out off tolerable limits (temperature, voltage, flame blow off in combustion chamber).



* Installation of the modem with spesial harness (with additional orders), which are installed instead of the hareness going to the alarm relay.
** Relay-controlled remote signaling.

Figure 4.1 – Electric circuit

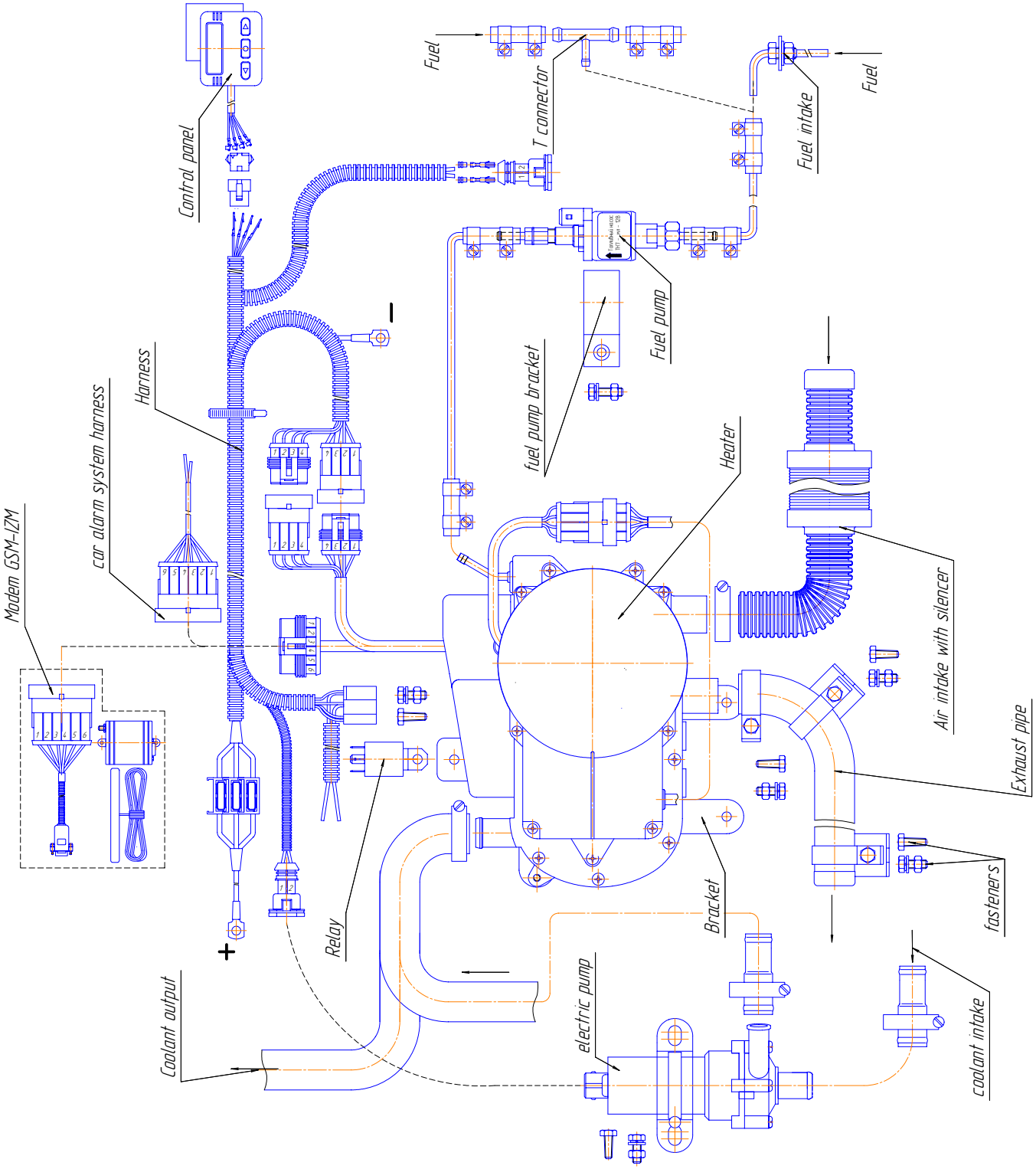


Figure 4.2 – Pre-heater basic components

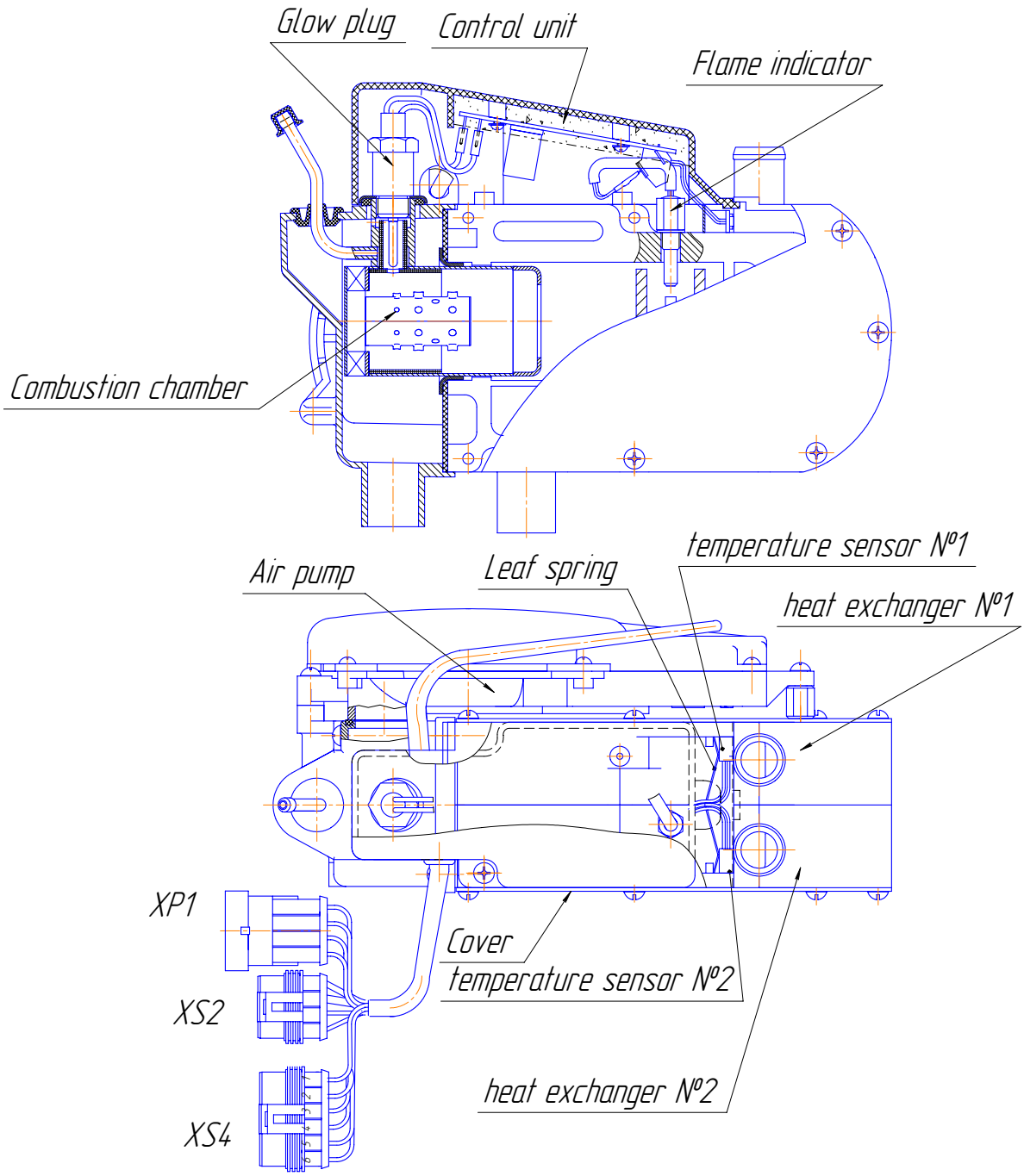


Figure 4.3 – Heater basic components

6 The pre-heater Control devices (according to the choice of the consumer).

6.1 Control panel with timer

6.1.1 Control panel controls the heater

On the surface of the timer there are: four-digit LED indicator, four LEDs - three on the left (lower, middle, upper) and one on the right and three buttons (left, middle, right). Location of digits, LEDs and buttons shown in Figure 6.1.

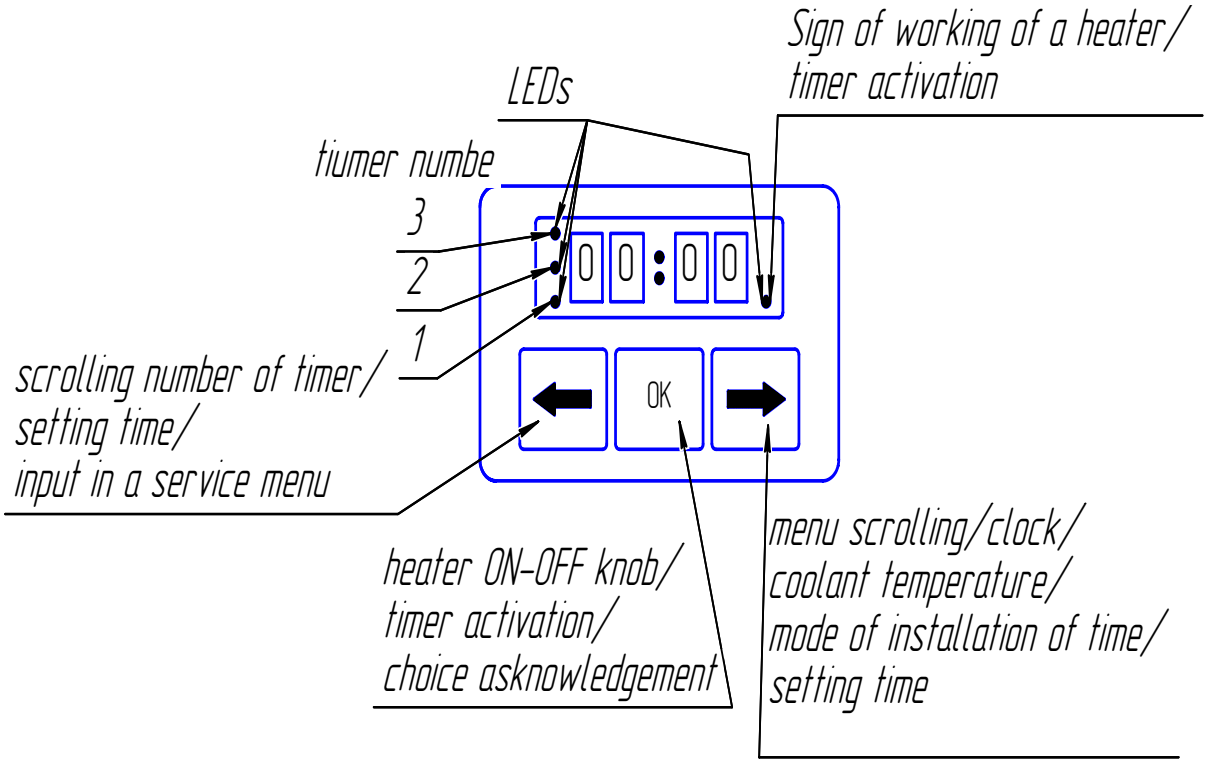


Figure 6.1-Control panel

Clicking on the button in the control panel may be short (less than 2 seconds) and long (more than 2 seconds). It is possible to perform the following operations:
- Set the clock;
- Start the heater;
- Start the pump;
- Stop the heater or pump;
- Set the timer run № 1, № 2 and № 3;
- Activation of only one of 3-timers;
- Deactivation set the timer;
- Set the day of the week;

- Adjustment of the clock;
- Setting the time of LED emission;

- Choice of pump (B - Bosch or A-Russia);
- View on the display:

a) The current time;
b) the temperature of the coolant;
c) the supply voltage to the electronic unit;
g) modes of the heater;
e) the time of working the heater;
e) the time of working the pump;
g) The number of version installed programs in the control unit.

6.1.2 Setting “current time” on the control panel.

While first time pre-heater is connected to the vehicle electric circuit or after breaks in power supply there’s zeroing of the current time on the control panel.

The indicator looks like (fig. 6.1)

In view of energy saving 30 sec after the last press of the knob the indicator stops lightning. To restart lightning it is necessary to press any knob.

To set or change the current time (hour or min) it’s necessary to press and hold on the right knob more than 2 sec, two first digits of the indicator start blinking (See fig. 6.2).

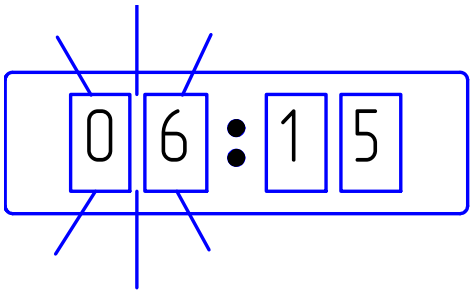


Fig. 6.2 setting current time

Then with continuous or interrupted pressing the right or left knobs set the necessary time. Pressing right knob leads to time increasing to one hour. Pressing the left knob leads to time decreasing to one hour. After setting the necessary time press the knob “OK”, digits 3 and 4 start blinking (See fig. 6.3).With help of right or left knobs set necessary minutes.

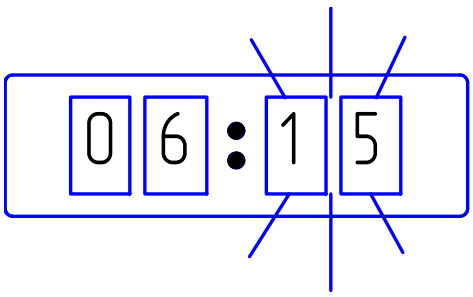


Fig. 6.3 setting current time

After setting minutes press the knob “OK”, the indicator will show “aH” in first digit (correction of the day of week) and the 4th digit of the indicator will be blinking (see figure 6.4.) Required day, you can set the left or right buttons, with the numbers from 1 to 7 days of the week mean 1 - Monday, 2 to 7 Tuesday – Sunday.

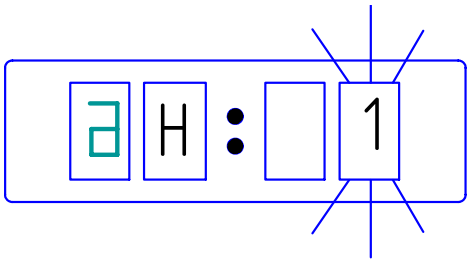


Fig. 6.4. setting day of week

After correction of the day of week press the knob “OK”, the indicator will show “C” in first digit (correction of the clock rate) and the 3d and 4th digit of the indicator will be blinking see figure 6.5. By pressing the right or left buttons set the desired value of the clock correction in the range of 10 ... -10 sec. per hour.

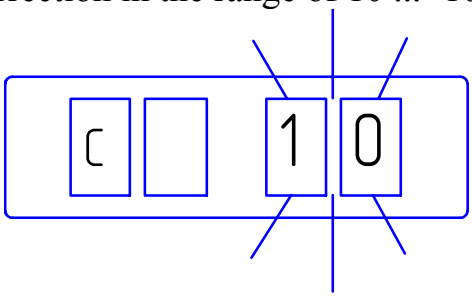


Fig. 6.5 setting clock rate

After correction of the clock rate press the knob “OK”, the indicator will show “ ⊢” (setting the time of lighting of indicator) in first digit 2th and the 3th and 4th digit of the indicator will be blinking (see figure 6.6.).

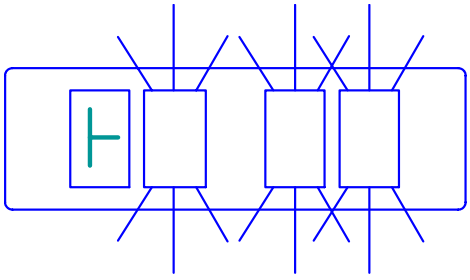


Figure 6.6 setting time of lighting of indicator

The duration of lighting of indicator can be set from 30 seconds and 1 minute to 60 minutes in increments of 1 min, (---) - the constant lighting. Left or right knob set the desired value.

After setting the time of lighting of indicator press the knob “OK” to come back to the mode display the current time(see figure 6.7.)

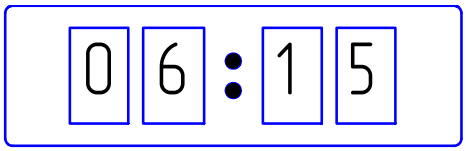


Figure 6.7 current time

6.1.3 Viewing the coolant temperature, voltage and the version number the installed program

When the indicator is displayed the current time, working of heater or working of heater pump, briefly pressing the right button displayed on the indicator value of the coolant temperature at the outlet of the heater. In the first digits of the display will show the sign □, the second digit sign "-" (minus), if the temperature is negative, and 3, and 4 bits value of the temperature in degrees Celsius (see Figure 6.8).

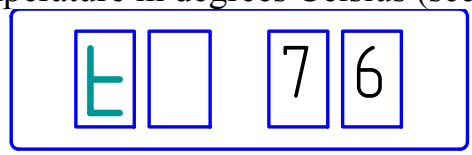


Figure 6.8 temperature of coolant

The next short press the right button displayed on the display supply voltage. In the first digits of the display will show the sign of U in the 2, 3 and 4 digit numeric value of the supply voltage. In the fourth digit shows tenths of a volt (see Figure 6.8a).

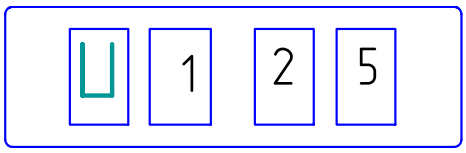


Figure 6.8a supply voltage

The next short press the right button on the remote control returns to the display mode "current time".

In a short press on the left button from the display mode "coolant temperature" or "power supply" on the display will show the version number of program installed in the electronic unit (see Fig. 6.9).

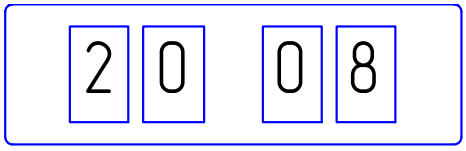


Figure 6.9 programm version number

From this mode, you can return to the temperature display by pressing the left or right button or call the choice of pump installed, clicking the middle button.

When you press the middle button in the first 2 digits of the display will show the characters "По", in the fourth digit has show the characters A or B. The character A represents the pump "Advers". The character B denotes a pump «Bosch» (see Figure 6.10). Choosing the right or left button the desired type of pump (which is installed

on your heater), you need to fix this choice in the memory by pressing the middle button.

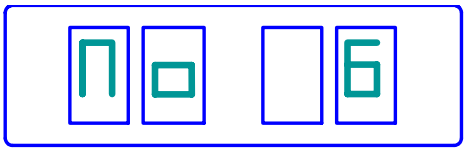


Figure 6.10 setting type of pump

In this case for some time on the display shows dashes (see Figure 6.11), after which control panel returns to the display of the current time.

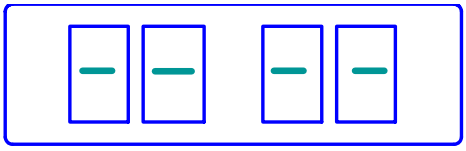


Figure 6.11 exchanging information

6.1.4 Setting the time of working of the heater

From mode "current time" long press the left button allows you to adjust the time of continuous operation the heater. The first digit of indicator displays the Latin letter «L», and in 2, 3 and 4 digits LED indicates the duration of the heater in minutes (see Fig. 6.12). By pressing the left or right buttons, this time can be changed with each press changes the time by 5 minutes. The right button increases the time, the left - reduces. The adjustment range of 20 to 120 minutes.

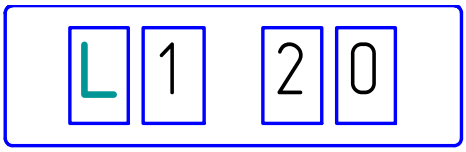


Figure 6.12 setting time of working cycle of heater

By setting time, press the middle button. Information will be memorized and the indicator switches to display the current time.

6.1.5 Manual pre-heater start up.

Manual start of the heater can be done by briefly pressing the middle button if the indicator is displayed the current time, temperature of fluid or power supply. The heater starts to work, with the first digit is mode of working, and 3, and 4 digits displayed time in minutes, and the right LED is lit continuously (see fig.6.13), the indicator shows that the heater works in the "ignition mode" and time of running 2 minutes).

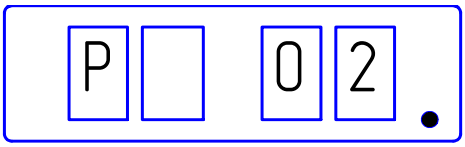


Figure 6.13 heater in “ignition mode”

When the pre-heater is activated the first digit shows the current mode of operation see figure 6.14, 6.15, 6.16, 6.17.

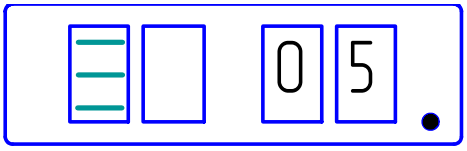


Figure 6.14 Full mode

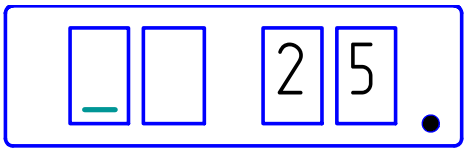


Figure 6.15 Low mode

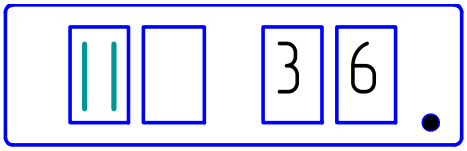


Figure 6.16 cooling-down mode

To switch off the pre-heater press the knob “OK”, the indicator will show operation mode “П”-purging, time counting of the pre-heater operation and frequent blinking of the LED see figure 6.17.

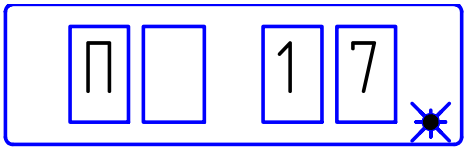


Figure 6.17 Purging mode

When the pre-heater is working you can press the right knob - heater will show the information about the temperature of the cooling liquid, next pressing of the right knob heater will show the voltage and next pressing heater will show mode of working.

6.1.6 Starting the pump (without running the heater)

If you want to turn on the pump without starting the heater, you have to press for a long time the middle button. On the display you will see information (see Figure 6.19), in the first digit - the letter "n", in the 3th and 4th digit – the current time of working pump. Pump will work 40 minutes, after 40 minutes the pump turns off automatically. Stop running the pump can be done manually by re-clicking the middle button.

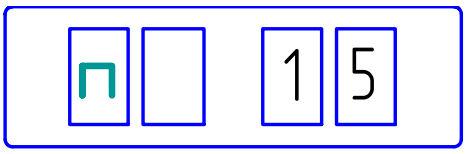


Figure 6.19 pump working without heater

6.1.7 The pre-heater automatic activation.

To automatically start the heater must be installed on startup. Control panel allows you to program three automatic start-up, for this there are three independent timer. Any of the three automatic starts will be made only when it is activated. You can activate only one timer. To set the automatic startup of the heater from the regime "current time" you have to short press the left button. The indicator will be of the form Fig. 6.20.

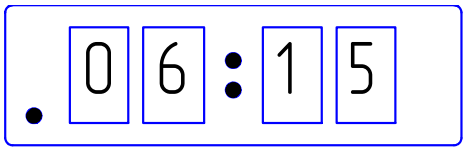


Figure 6.20 setting the 1st timer

Timer number is changed by pressing the left knob and indicated by a LED indicator on the left side. To activate the timer, you have to press the middle button. At the same time illuminates the right LED (see Fig. 6.21,). Pressing the middle button you can cancel the activation timer.

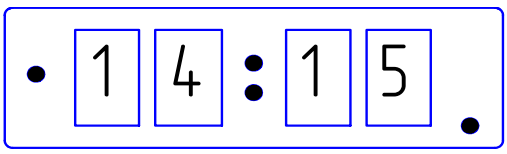


Figure 6.21- activation the 2d timer

In order to correct any run-time timer, press the right button, this will blink first two digits (hours). After setting the desired value, hours of the left or right buttons to press the middle button, and then will be flashing digits 3 and 4, which set the desired value minutes. By pressing the middle button confirms the value of the set time, and at the same time on the display will show the information (see Figure 6.22)

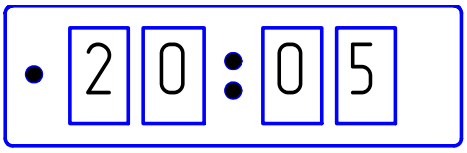


Figure 6.22 – setting the 2d timer

To set the day of the week in which to run the heater must be installed at the 3rd timer press the middle button until the timer information in accordance with Fig. 6.23.

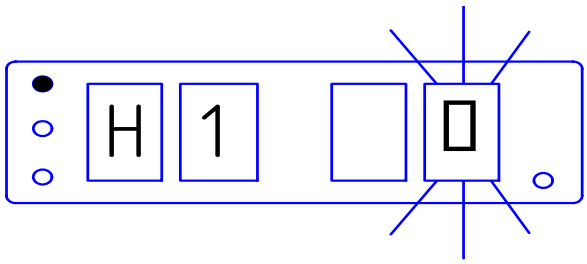


Figure 6.23 – Set the day of the week in which to run the heater

In the first digits of the display will show the letter H, the second digit of the current day of the week, the fourth digit from 0 to 7, depending on the selected day. Fixed to "0" means that the activation timer, the heater will run regardless of what day of the week. The numbers from 1 to 7 days of the week mean 1 - Monday 2 and Tuesday IT d to 7 - Sunday. Select the desired day is right-or left-click. The choice is necessary to fix by clicking the middle button.
After each run the heater (automatic or manual), the activation timer is reset.

6.1.8 Malfunction code indication in case of the pre-heater failure

During start up or operation of the pre-heater the may be malfunctions.

In case of malfunctions the control unit automatically sends command to switch off the pre-heater. Every malfunction is coded and is shown on the indicator see figure 6.24.While this the code of the malfunction and the LED indicating the activity of the pre-heater are blinking rarely. See the codes of malfunctions in table 6.1.

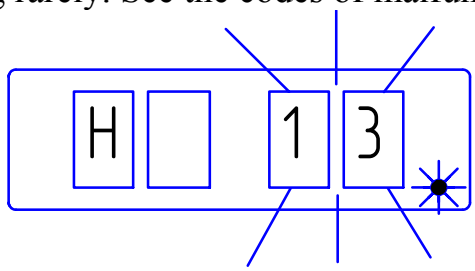


Figure 6.24- indicator shows the pre-heater fault.

Malfunction codes.

Table 6.1

codes	Malfunction description	Notes / Troubleshooting
01	Overheating	1.Check thoroughly the liquid circuit 2.Check circulation pump, replace if necessary 3.Check temperature sensor and overheating sensor ,replace if necessary
02	Overheating is detected. Difference between temperatures measured by the heat sensor and overheating sensor is too big.	1.Check thoroughly the liquid circuit 2.Check circulation pump, replace if necessary 3.Check temperature sensor and overheating sensor ,replace if necessary
03	Faulty temperature sensor №1 on the board sensors	Check connecting leads. Output signal and voltage are in linear dependence from temperature (0°C corresponds to 2.73 V; 1°C temperature rise corresponds 10μV output signal increase).Check the sensors and replace the sensor board with a new one, if necessary.
04	Faulty temperature sensor №2 on the board sensors	Check connecting leads. Output signal and voltage are in linear dependence from temperature (0°C corresponds to 2.73 V; 1°C temperature rise corresponds 10μV output signal increase).Check the sensors and replace the sensor board with a new one, if necessary.
05	Faulty flame indicator	Check connecting leads. Check ohmic resistance between indicator contacts, it must be not more 10 Ohm. Replace the indicator if necessary.
06	Faulty temperature sensor on the control unit	Replace control unite of the pre-heater

Table 6.1

07	Flame failure in low mode	See the description of malfunction code 08
08	Flame failure in full mode	Check air duct, exhaust gas-escape channel and fuel supply, correct troubles, replace fuel pump and flame indicator if necessary.
09	Glow plug malfunction	Check the glow plug, replace if necessary.
10	Air pump motor malfunction	Check the electric wiring of the air pump motor, replace the air pump, if necessary.
11	Overheating. Heating rate is too high	1.Check thoroughly the liquid circuit (airlock is possible before the air pump, cooling liquid cannot be pumped through the heater) 2. Check cooling liquid for fluidity at low temperatures. 3.Check the pump, replace if necessary

12	Shutdown, voltage boost	This malfunction is possible if the pre-heater is switched on when vehicle engine is running. The possible reason of the trouble is vehicle voltage regulator failure
13	No more tries to start the pre-heater are left	In case there are no more tries to start the pre-heater left check fuel supply and amount of fuel supplied. Check the air supply system to the combustion and exhaust gas-escape channel, check ignition plug.
14	Circulation pump malfunction	Check circulation pump wiring for short-circuit fault or disconnection fault. Replace the pump if necessary.
15	Shutdown, low voltage less then 9.5 V	Check voltage on XS2 connector of the pre-heater. Check the battery, regulator and power supply wiring.
16	Excessive ventilation time	The pre-heater is not cooled enough during purging. Check the air duct and exhaust gas-escape channel. Check the combustion detector and replace, if necessary.
17	Fuel pump malfunction	Check the electric wiring of the fuel pump for the short circuit check the pumping capacity and replace the fuel pump if necessary.
20	No connection between control unit ant control panel	Check fuses 5A. Check wiring and connectors.
21	Flame failure at “warming up” mode	See the description of malfunction code 08
27	Air pump failure. Motor won’t rotate	Check the wiring of the air pump. Control unite and motor replace if necessary.
28	Air pump failure. The motor rotates without control	Check the wiring of the air pump, control unite, replace if necessary.

Table 6.1

29	Exhausted attempts to ignite the heater during operation	Check the fuel system. Check tightness of clamp on the fuel line,fuel line leaks, tightness of the input nozzle of fuel pump, the performance of the fuel pump.
30	Breakdown of the flame in the combustion chamber due to undervoltage.	Voltage instability may occur due to long turn electric starter.
78	Fixed the flame failure when the time of pre-haeter work.	It is shown for your information. Check Check tightness of clamp on the fuel line,fuel line leaks, tightness of the fitting on the fuel pump.

6.2 Use and connection to the vehicle remote alarm system for activation and switching off the pre-heater with the help of transmitter.

You can use vehicle remote alarm system to control the pre-heater operation if there is an additional channel. The relay with normally open contact is connected to output

of the channel, contacts must be connected with harness XS4 which is connected to six-pins connector XP4 on the pre-heater control unit board (see figure 4.1).

Control of the heater can be done in two ways: short-circuit contats of relay (time of the closed state 0.5 to 3 seconds), and long-circuit closure (more than 3 seconds). Short first impulse will starts the heater, next short impulse stops the heater.
With long impulse of the contacts of relay a command “Start” will be formed. When contacts will be open - the command "Stop" will be formed.

The operation of the pre-heater in this case doesn’t differ from starting up by others control devices. It is possible to stop the operation of the pre-heater with the help of the transmitter and from the control panel.

To start up the pre-heater next time with the transmitter it’s necessary to switch off the relay and switch it on again.

If there’s a channel of feedback control in the transmitter there will be mark confirming the relay is switched on.

Type of the transmitter has no significant meaning; the only requirement is that the relay current consumption must not exceed current capacity of the remote alarm system channel.

Connector XS4 which is connected with the harness is used for modem connection. The harness XS4 must be disconnected from the control unit and connected with modem.

Simultaneous use of modem and remote control system is impossible!

6.3 Use and install the modem to run the heater.

Operation of the heater can be operated by telephone.

For remote control operation of the heater is possible to connect to the control unit GSM modem, which in essence is an analog cell phone without a display and keyboard, designed for use in harsh conditions (cold, vibration, etc.). In modem, like the phone, SIM card is installed, ie Heater gets a full phone number you selected service provider.

On account of this phone should be a small amount, so that the modem can send SMS to you in response to a status request.

IMPORTANT! To operate the device in the SIM card PIN code to cancel, you just need to insert it in any cell phone and cancel a PIN code.

Heater control by means of a call to the modem, and enter commands voice menu. When dialing the modem two possible situations.

1) The incoming phone number is not known to the modem. You will need to enter the password (last 4 digits of IMEI (International Mobile Equipment Identifier International Mobile Equipment Identity). When done, you will see the commands for working with "Binar5". If the password is entered in error, the modem will ask for the password again. Password numbers needed administered slowly, at a transmission-reception digit requires less than 0.5 seconds .

2) The incoming phone number is known modem. In this case, the commands for working with "Binar5" will be available immediately after the modem answers the

call.

That number to be known, and did not need a password, it should be in the phone's SIM-card in the modem, one of the first five memory cells. This can be done inserting the modem SIM-card in the phone, clear the phone book (to the first cells were guaranteed to empty) and record trusted phones. Trusted phones can not be more than 5.

The fact that the modem is ready to accept commands it is known by "type command".

Commands are entered by pressing the number keys on the phone keypad.

Available commands are:

1 - Run the heater on the time with setted control panel.
2 - Run the heater for 20 minutes.
3 - Run the heater for 30 minutes.
4 - Run the heater for 40 minutes.
5 - Run the heater for 50 minutes.
6 - Run the heater for 60 minutes.
7 - Querying heater. The modem sends the caller's phone number SMS message that contains information about the mode, time, temperature and coolant, if there is a fault, the fault code.
9 - Querying heater. Modem reports: "Heater (correct / faulty)."
0 - Turn off the heater.

Each command entered blurts appropriate phrase.

The modem can connect an additional channel car alarm system. You can control the pulse duration of 0.5-3s or a latch, as well as connecting the alarm to the control heater.

Examples of SMS messages:

Rezhim: ROSZHIG Vremya raboti 00:01 T = 10
Rezhim: PRODUVKA Vremya raboti 00:12 T = 51
Rezhim: OSTANOVLEN Vremya raboti 00:00 T = -30

From the control unit harness connector goes XS4, which are able to supply attached harness connector XR4 for connecting the relay controlled car alarm system. This harness should be disabled.

The kit includes a modem harness connector XP4, which must be connected according to the diagram (see Figure 4.1) and the remote antenna, which is glued with the adhesive side against the glass inside the car. This antenna provides reliable communication modem with a mobile operator.

After installing and fixing the SIM card, antenna and cable modem should be placed somewhere in the car, such as in the glove compartment (glove box) or mounted under the dashboard.

Turn ON and OFF the heater with a remote modem and control panel go independently. Turned ON with your cell phone heater can be switched off by depressing the button on control panel.

7 Installation specification for pre-heater and its assemblies.

7.1 General.

Heater shall be located lower the radiator overflow tank. Motor air pump shall be installed lower the radiator overflow tank and the heater.

Check up fluid flow in the heater and the engine cooling system; be sure it has the same direction.

Remove air blocks from the engine cooling system and the heater on completion of the heater installation. All the pipe junctions shall be leak-proof.

Fuel and coolant pipes shall be assembled in a way avoiding their contact with hot or vibrating components of the vehicle.

It is unacceptable to operate the pre-heater with the cooling fluid frozen.

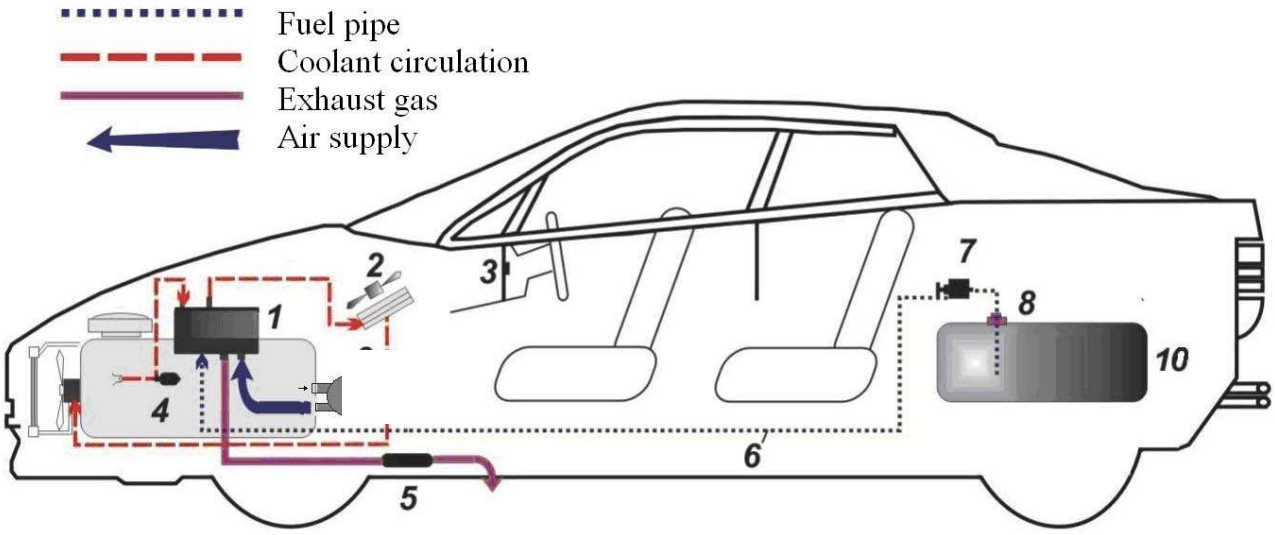
On completion of any activities with the cooling system (repair work, cooling fluid replacement) it shall be purged to remove air blocks as per

7.2. Installation of the pre-heater units and assemblies.

7.2.1 Installation of the heater.

The heater shall be installed under the bonnet as shown in Figure 4. It is unacceptable to install the heater on the engine, passenger compartment or cab of a vehicle.

The heater shall be installed with account of its operating positions (ref, Fig. 7.2, items 7.1.1 and 7.1.2).



1 Heater
2 Parking heater
6 Fuel pipe
7 Fuel pump

3 Control panel
4 Motor pump
5 Exhaust pipe
8 Fuel intake
10 Fuel tank

Figure 4 - Pre-heater installation diagram

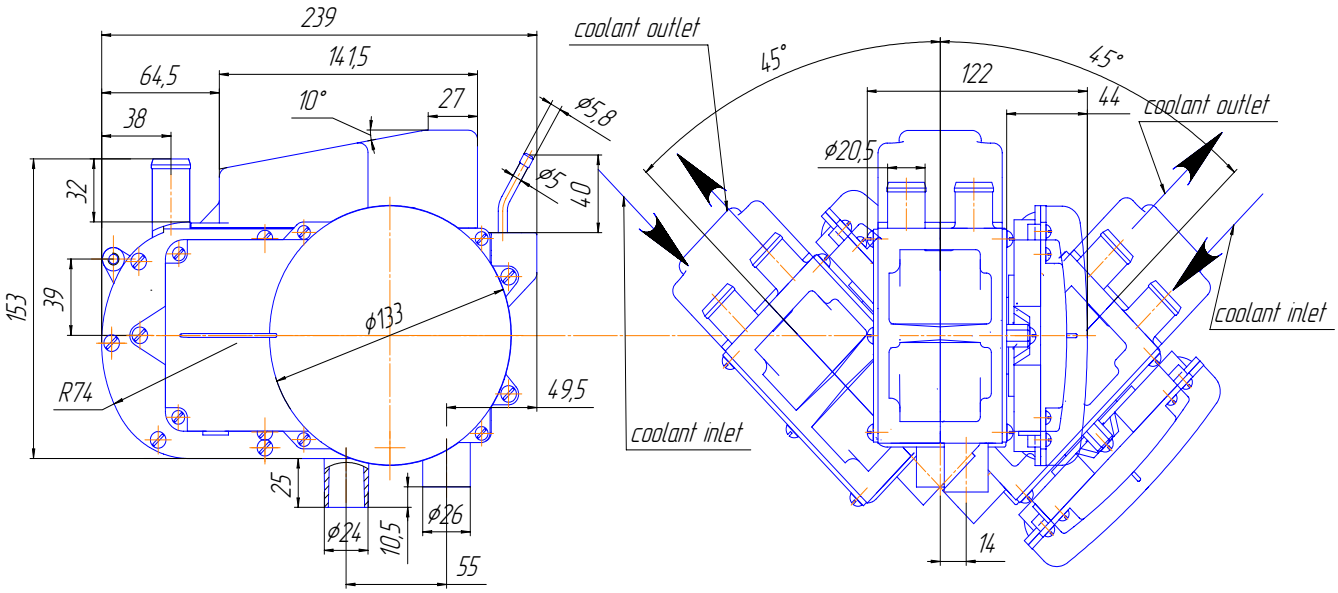


Figure 7.2 – Heater acceptable operating positions

Attention! In case the heater is tilted to be installed on the vehicle, fluid hoses shall be connected to the heater adapters as shown in Figure 7.2.

7.2.2 Installation of the air intake.

The air intake shall be installed on heater as per Figure 4.2. Air for combustion shall not be absorbed from the passenger compartment, vehicle cab or baggage compartment. Suction inlet of the intake shall be assembled so that to avoid its blockage, ingress of snow and free drain of water. It is prohibited to locate the inlet against the incident flow.

7.2.3 Installation of the motor pump.

The motor pump shall be located in conformity with recommendations given in items 7.1.1 and 7.1.2.

Operating position of motor pipe is whatever from horizontal to vertical with the outlet fitting up.

7.2.4 Installation of pipes.

Pipes shall be connected with the pump, pre-heater and engine as shown in Figures 4.2, 7.1 and 7.2. Pipes shall not run in vicinity with the exhaust pipe and engine components having high temperature. Pipe junctions with other components shall be fixed with clamps. Pipe interconnections shall be fixed with fittings.

7.2.5 Installation of the exhaust pipe.

Note that exhaust pipe has high operating temperature. The exhaust pipe (flexible corrugated metal hose) shall be cut to necessary length.

The exhaust pipe is fixed with clamps slightly downwards in the direction of exhaust. Round holes 3mm in diameter for moisture drain shall be made at bends in the lowest points of the pipe.

To optimize connection with the heater fitting and to guarantee better sealing there shall be done a lengthwise cut (about 15mm long) on the exhaust pipe. The cut shall be the same length as the male fitting. The exhaust pipe shall not transcend the overall dimensions of the vehicle. Discharge gas shall be vented out. The exhaust outlet and combustion air inlet shall be located so that to avoid resuction of discharge gas. As well, there shall be taken measures to avoid penetration of this gas inside the passenger compartment or their absorption by the fan. Moreover discharge gas shall not affect operation of the other assemblies of the vehicle.

The exhaust outlet shall be assembled so that to avoid its blockage, ingress of snow and free drain of water. It is prohibited to locate the outlet against the incident flow.

7.2.6 Installation of the fuel supply system of the pre-heater.

Failure to comply with the following recommendation will cause to malfunctions.

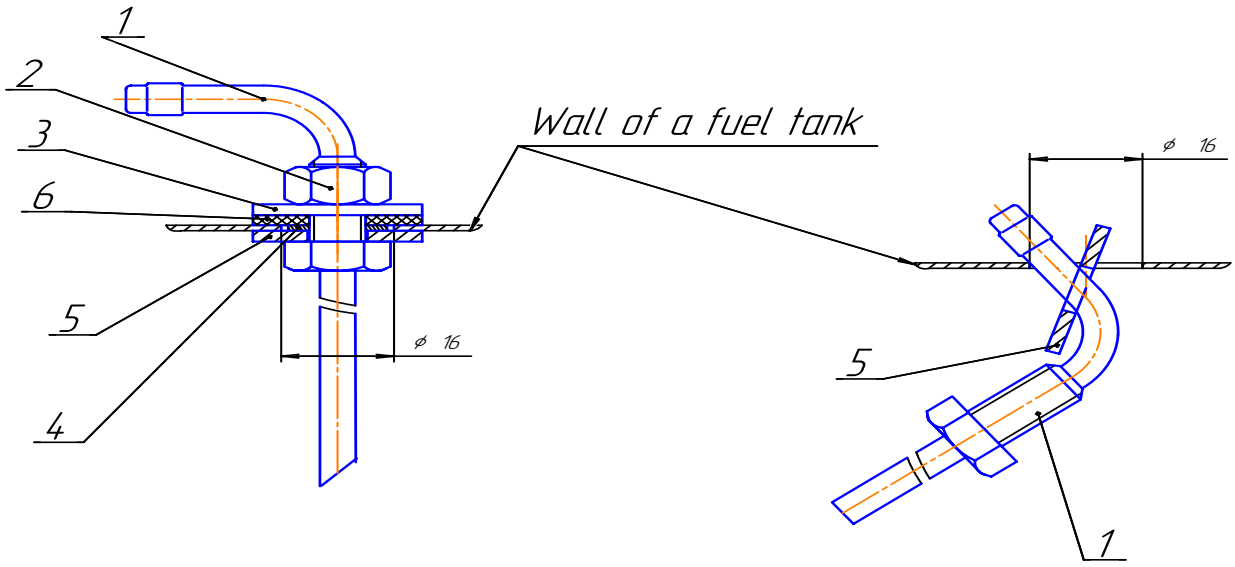
Fuel supply of the pre-heater with fuel intake.

Fuel intake is installed to the fuel tank according to figure 7.5.

a) fuel intake and special washer installation in the fuel tank is performed according to figure 7.5,
b) installation of fuel supply line from fuel intake to the pre-heater is performed according to figure 7.6

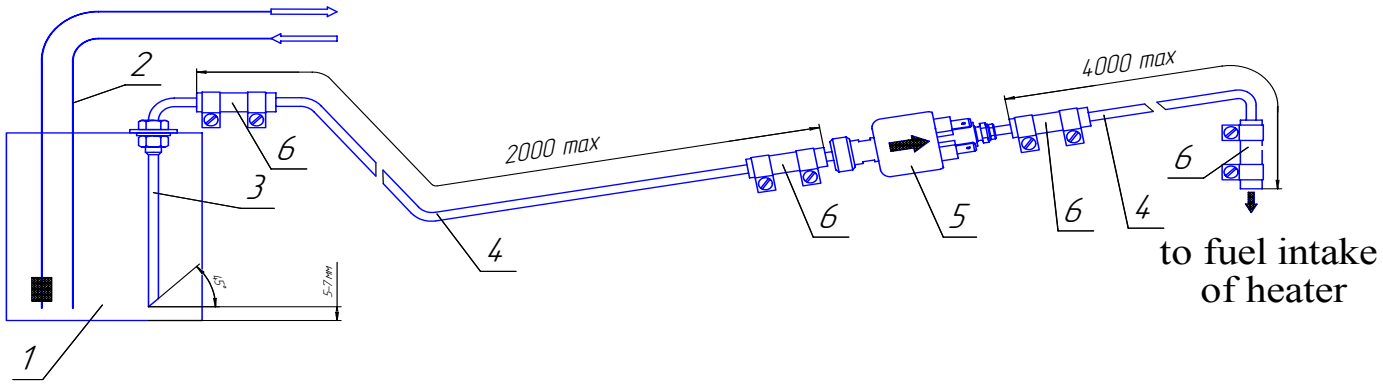
The fuel pipe from the fuel pump to the heater shall have no slope.

Attention!!! While making the inlet in the fuel tank follow safety measures for activities with tanks which were used for inflammable and explosive fuel.



1-Fuel supply intake
2-Nut M8
3-enlarged washer 8
4-washer 8
5-special washer
6-seal ring

Figure 7.5- Fuel intake installation



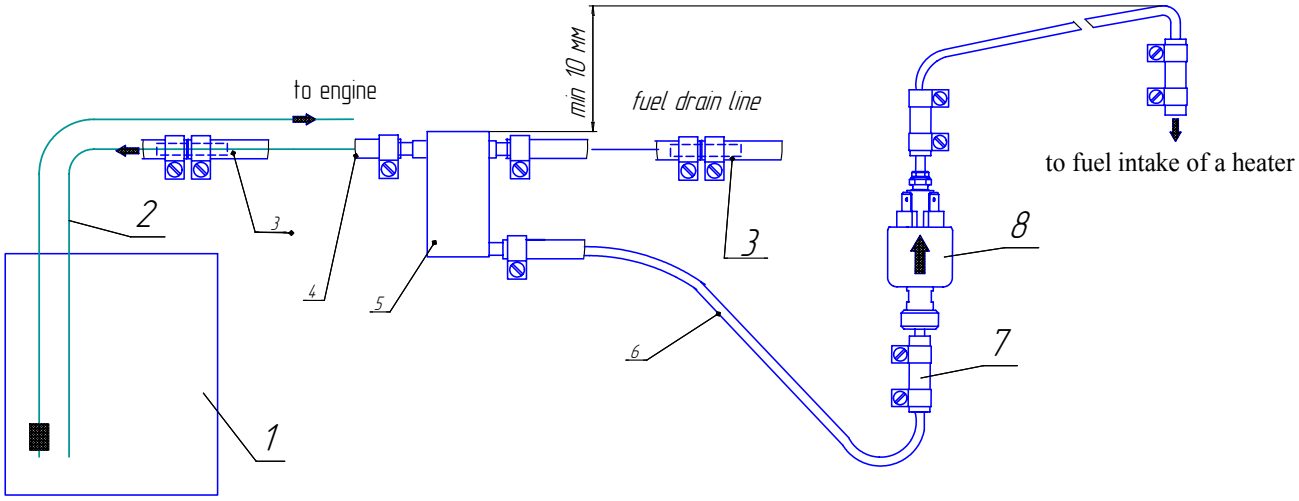
1-fuel tank of the vehicle
2- fuel supply line of the vehicle
3-fuel supply intake
4-connecting pipe(fuel supply line)
5-fuel pump
6-rubber or polyurethane sleeve

Figure 7.6- Installation diagram for the pre-heater connection with fuel supply line

Intake of the fuel for the pre-heater is allowable to perform from fuel drain line from engine to tank on condition that storage tank is installed. Fuel drain line shall have end at the bottom of the fuel tank.

It is advisable to install the tank in engine area close to the pre-heater fuel pump.

Installation shall be performed according to figure 7.7.

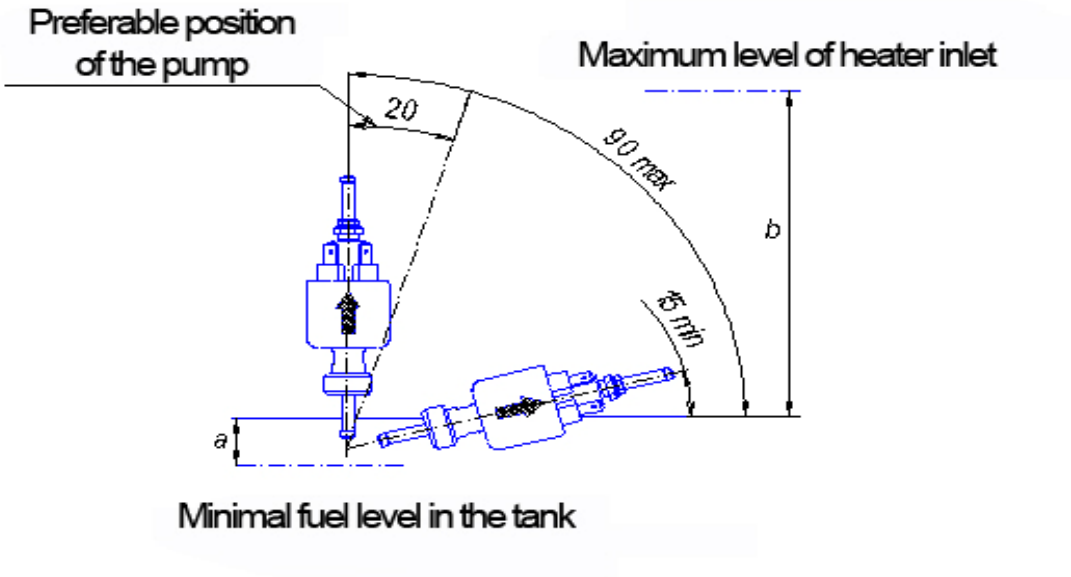


1 - vehicle fuel tank
2 - fuel drain line from the vehicle engine to the tank
3 - adapter
4 - fuel supply line
5 - storage tank
6 - connecting pipe (fuel pipe line)
7 - rubber or polyurethane sleeve
8 -fuel pump

Figure 7.7-Installation diagram of storage tank to the fuel drain line and its connection with fuel pump.

7.2.7 Fuel pump and fuel pipe installation.

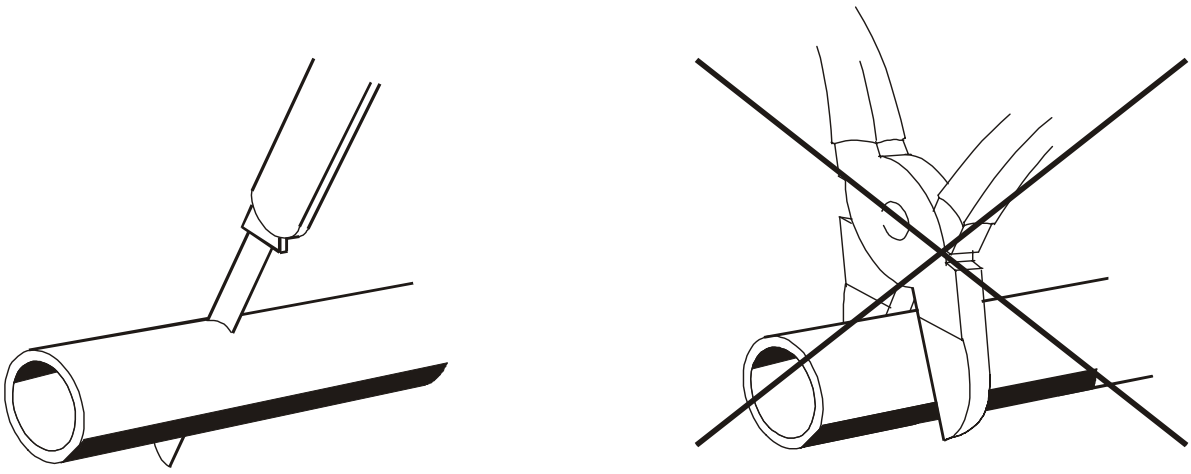
It is advisable to install fuel pump close to the fuel tank and lower fuel level in the tank. Position of the fuel pump is given in Figure 7.8.



a – lifting capacity: up to 500 mm in a free-flow tank при безнапорном баке;
up to 150 mm, in case of underpressure in the tank.
b – pump head between the fuel pump and heater: up to 1500mm

Figure 7.8- Fuel pump acceptable assembling position

While assembling, the fuel pipe shall be cut only with a sharp knife, as shown in Figure 7.9. Cutoffs shall be free of restriction, dents and burrs.



Correct Incorrect

Figure 7.9 – Cutting the fuel pipe before installation

Attention! The fuel pipe and fuel pump shall be protected from heating. It is prohibited to install them close to the exhaust pipe or on the engine.

7.2.8 Assembling of the pre-heater electrical harness.

The pre-heater wiring harness shall be connected as shown in Figure 1 (pre-heater electric circuit) and Figure 1.

While assembling note that heating, deformation or displacement of harness during operation of the vehicle is unacceptable. The wiring harness shall be fixed with plastic clamps to the components of the vehicle.

Attention! Assembling shall be performed with the safety devices dismantled.

7.2.9 Installation of the control panel.

Control panel is installed in the cabin on the dashboard or any other comfortable for the driver place. The control panel is fixed by adhesive tape. Degrease the surface before installation of the panel, remove protective film from the tape.

8 Post-installation checkout.

8.2 On completion of the assembling, the following shall be guaranteed:

- leak profess of the fluid system;
- leak profess of the fuel pipes;
- security of the pre-heater electric contacts attachment

8.3 Open the heater control valve to full. Remove air blocks from the fluid system of the vehicle following instructions of the vehicle manufacturer. Put vehicle heater fan switch in position of min rotation.

8.4 Install 15A, 25A and 5A safety devices, control panel indicator will light.

8.5 To perform the pre-heater operation test press the middle button. The pre-heater shall start combustion; the information will be on the indicator. Further on the pre-heater operates automatically. In 40-45minutes the pre-heater stops its operation automatically. To stop the work of the pre-heater is possible at any time pressing the middle knob on the control panel.

8.6 While performing the pre-heater operation test it is necessary to check if the heater fan switches on. Normally the fan is activated when the cooling liquid reaches 40°C.

8.7 If the pre-heater demonstrates faulty operation during its switching on or in the process of operation, malfunction code will be on the indicator.

8.8 The productivity of the fuel pump is not big, that's why when the fuel line is empty, and it is filled slowly. The pre-heater performs 2 tries of ignition and if there's no fuel yet stops the activity with malfunction code 13- "No more tries to start the pre-heater are left". There's need to switch on the pre-heater until the fuel fills the fuel pipe line.

8.9 Start the pre-heater with the vehicle engine on and verify its operation.

Attention! Note that cooling fluid temperature readings displayed on the vehicle instrument panel and control panel may vary, as temperature is measured in different parts of the fluid system of the vehicle.

9 Recommendations.

9.2 If the pre-heater won't start after switching on, check the fuel in the tank, the battery charged, connectors and fuse 25A are in order.

9.3 If control panel won't work (indicator is not lighting) check fuse 5A

9.4 If vehicle heater fan won't start automatically when the temperature of cooling liquid over 40ºC, check fuse 15A and relay.

9.5 If the pre-heater won't switch on and switch off or after purging of the combustion chamber the fan motor will rotate, take off fuses 5A, 25A and then install them again in sequence first 25A, then 5A.

9.6 All the rest malfunctions are identified automatically and are shown on the control panel indicator.

9.7 See the list of malfunctions and troubleshooting in the Table 6.1 of the present manual.

9.8 In case of malfunction while operation except those described in item 9.1, 9.2, and 9.3. consult with repair centers

9.9 To ensure consistent performance, the heater should be switched on for up to 5 minutes each month throughout the year (warm seasons included). This procedure is necessary to remove sticky film deposited on moving parts of the fuel pump and other units. Ignoring this operation may cause the pre-heater failure.

9.10 Safe performance of the pre-heater depends on the fuel that shall correspond to the season of the year and ambient temperature. See recommended fuel types for diesel pre-heater in the table 6.2

Table 6.2

Ambient temperature, °C	Fuel type or blend
0°C and above 0°C	Diesel Л-0, 2-40 Or Л-02-62 ГОСТ 305-82
0°C - 5ºC	Diesel З-0,2 mines 45 ГОСТ 305-82
-5ºC - 20ºC	Blend diesel З-0,2 mines 45 ГОСТ305-82(50%) with petrol ГОСТ Р511050-97(50%)
Lower then -20ºC	Diesel А-0.4 ГОСТ 305-82 or blend diesel З-0,2 mines 45 ГОСТ 305-82 (50%) and petrol ГОСТ Р51105-97(50%)

9.11 An untimely switch to a winter type of fuel may cause a paraffin blockage in the fuel inlet tube filter (if applicable) located in the fuel tank and in the fuel supply pump filter, which may prevent the heater from starting or cause it to stall in mid-operation.

To fix breakdowns, proceed to the following steps:

a) change the fuel in the fuel tank as according to the ambient temperature,
b) If the heater does not operate properly once the fuel was changed according to the temperature , check the fuel supply pump filter as follows:

- remove the fuel supply pump from the vehicle; using a wrench (F/A 17), fix the pump in place, unscrew the pipe stub and remove the filter (see Figure 10.1). Do not fix the pump in place using surfaces other than Surface A when removing and installing the pipe stub,
- rinse the filter in gasoline and blast it with compressed air,
- install the filter into the fuel supply pump; use sealant when installing the pipe stub,
- install the fuel supply pump and check if the heater works.
-

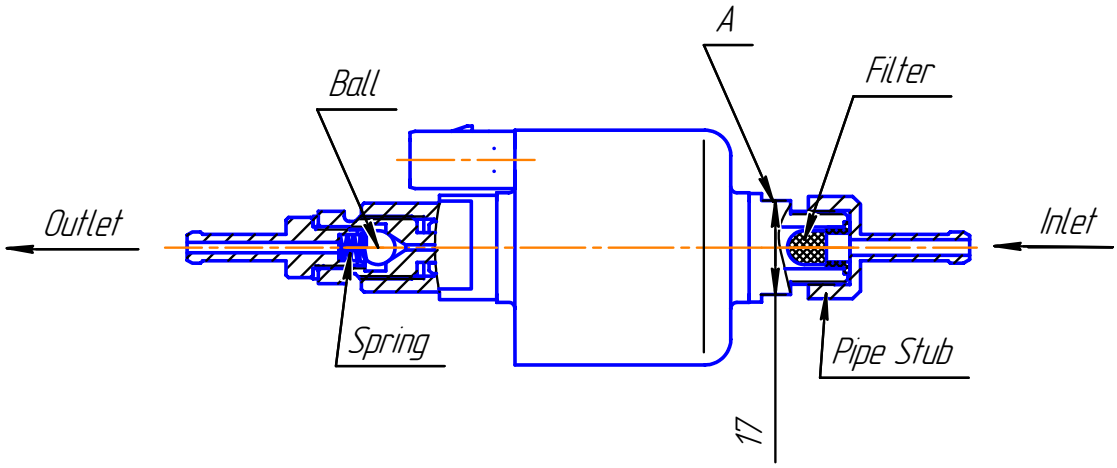


Figure10.1

9.12 Use engine oil, cooling fluid that correspond to the season of the year and ambient temperature.

9.13 Check the battery charge level on a regular basis.

9.14 While long storage of the vehicle it is recommended to switch off the heater from the vehicle battery to avoid its discharging (current consumption in non operation mode 30-40 mA).

10 Transportation and storage.

10.2 The pre-heaters are safe for transportation and may be transported with any vehicles, including air and rail transport, provided that the packaged products are protected from atmospheric precipitation and climatic factors in conformity with requirements 5 GOST 15150-69, and from mechanical effects in conformity with category C requirements GOST 23216 -78.

10.3 As concerns the climatic factors, transportation and storage conditions of the pre-heaters shall correspond to those specified in 5 GOST 15150-69.

11 Warranty.

11.2 The pre-heater warranty life is 24 months from the date of sale, provided that the User followed the operating rules, transportation rules and storage rules, foreseen by the present Manual.

11.3 In case the vendor stamp and date of sale is missing, the warranty life starts from the pre-heater date of manufacture.

11.4 Production malfunctions that may occur during the warranty life are handled by authorized specialists, spare parts are provided by the manufacturer at his expense.

11.5 The manufacturer acts on no complaints regarding incompleteness or mechanical damage of the pre-heater.

11.6 The present warranty does not cover defects occurred as a result of:

- force majeur – lightning stroke, fire, flood, inadmissible voltage oscillation, traffic accident;
- violation of installation, operational, transportation and storage rules foreseen by the present Manual;
- installation, repair or setup of the pre-heater performed by personnel or company, not authorized by the manufacturer;
- pre-heater non-dedicated usage.
-

12 Pre-heater delivery configuration

Pre-heater delivery configuration corresponds to that specified in the packing list.

13 Packing and acceptance certificate.

Binar 5B/D Compact pre-heater serial number _____

Program code……, manufactured and accepted in conformity with Specification ТУ 4591-012-40991176-2009, design documentation in force declared serviceable.

Date of packing_____

Packed by _____
Signature

Packed product accepted by _____
Signature

Quality Department Stamp

14 Sale and installation certificate.

Binar -5B/D Compact pre-heater serial number …….

Place and date of sale ……..

…….

stamp (vendor signature)

Familiarized with the warranty conditions and operating rules, no complaints regarding configuration and outward appearance:

……..

(buyer signature)

Binar 5B/B Compact pre-heater serial number _____ was installed and tested on a vehicle (class / model / registration number).

Belonging to - ……..

by (company) - ……..

Stamp (signature of a person in charge)