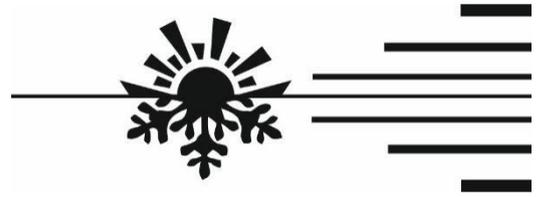


EN



Operating Manual  
Control Panel  
PU-20-12V PU-20-24V



## Introduction

This operating manual is a component of the documentation for fluid pre-heater type BINAR-5S and contains all the necessary information about safe operation that is intended for the users.

In case of any problems, we emphatically recommend that you contact the authorised service centres, whose addresses and telephone numbers are available from the dealer or at the website [www.autoterm.ru](http://www.autoterm.ru)



**Before you start using the pre-heater, it is necessary to read this operating manual and pre-heater operating manual.**

## Warranty and liability

The manufacturer is not liable for faults and damage arising from failure to observe the instructions contained in the installation manual and the pre-heater operating manual.

- The control panel may be used only to control the pre-heater.
- It is prohibited to connect and disconnect the socket of the control panel during operation of the pre-heater.
- After shut-off the pre-heater may not be restarted earlier than after lapse of 5-10 seconds.
- If attempts to start-up the pre-heater fail twice in a row, it is necessary for reason of safe operation of the pre-heater to contact the service centre, which shall repair such faults.

The warranty period for operation of the product and the warranty service conditions are given on the warranty certificate.

## Safety

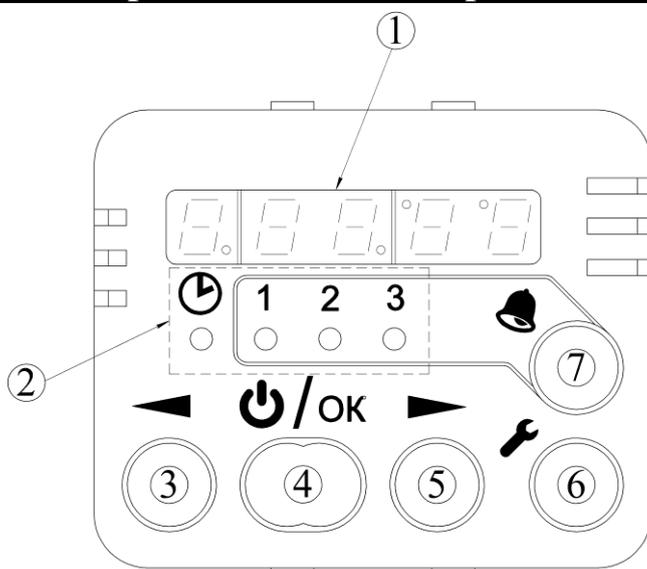
**Do not switch-on and use the pre-heater in places where inflammable vapours and gases or a large volume of dust may be generated (for instance, fuelling stations, diesel tanks, fuel, coal, wood or grain storage facilities). Risk of explosion.**

**Do not start-up and use the pre-heater in confined spaces. There is a risk of poisoning and suffocation from exhaust gases.**

**Do not switch-on and use the pre-heater if the exhaust gases flow contains combustible materials or fluids. Risk of fire.**

**Do not use a faulty pre-heater. Risk of injury from use of a defective device.**

## Description of the control panel



- 1 – digital display.
- 2 – light diodes (display of the clock, timers, adjustment of the clock).
- 3 and 5 – movement between the main displays, movement between the menu items, editing of values (+/-).
- 4 – ON/OFF switching of the pre-heater and pump, editing input, confirmation of selected value, timer activation.
- 6 – setting of the control panel, return to main screen.
- 7 – setting of the pre-heater control unit, setting of the timers.

## Intended use

The panel is intended for:

- start-up and shut-down of the pre-heater in manual mode;
- start-up and shut-down of the pump in manual mode;
- viewing of the values of the coolant temperature and power supply voltage;
- viewing of the actual time data and operating time of the pre-heater/pump;
- timed start-up of the pre-heater;
- setting the coolant heating temperature limit;
- selection of re-heating mode;
- setting of temperature for start-up of the cabin ventilator relay;
- visualisation of the error code in case of product operation failures;
- visualisation of the program version of the control panel and control unit.

## Time sequence of work with the panel

Upon connection of the pre-heater to the electric circuit of the vehicle, the indicator shall show the program version of the control panel. Further, the progress of the installation of the interlink between the control panel and the control unit shall be displayed (in %). After installation of the interlink, the main screen shall appear (current time, fluid temperature or power supply voltage, the current time appears by default).

negative temperature will carry a minus sign.<sup>1</sup>

To enter the menu, press the button



To move within the menu, press the button



The button confirms the selection resulting in start-up of the pre-heater/pump.

After start-up, the default operating time is displayed within 7-15 s, after which time count-down starts (visualised on the indicator).

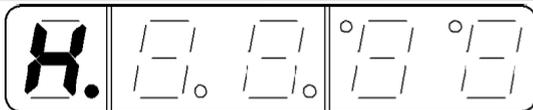
During the operation of the pre-heater, it is possible upon pressing the button to quickly jump to the menu for setting of the operating time of the pre-heater / pump.

If during operation of the pre-heater, you press the button , the pre-heater is shut-down. The fuel supply is cut and the combustion chamber is purged within 3-5 minutes.

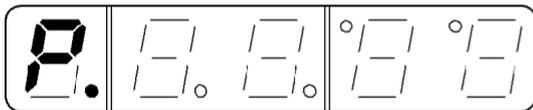


After the last pressing of any arbitrary button, the indicator goes off after the set period in order to save electric energy. For illumination of the indicator it is necessary to press an arbitrary button.

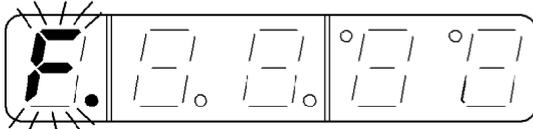
## Indication of operating modes



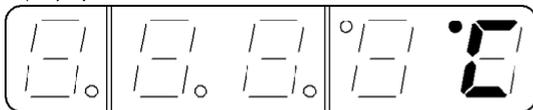
Pre-heater operation



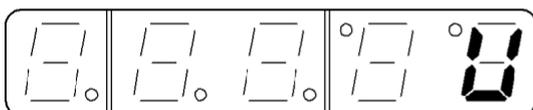
Pump operation



Shut-down of pre-heater operation (purging)



Coolant temperature



Power supply voltage at the input of the pre-heater



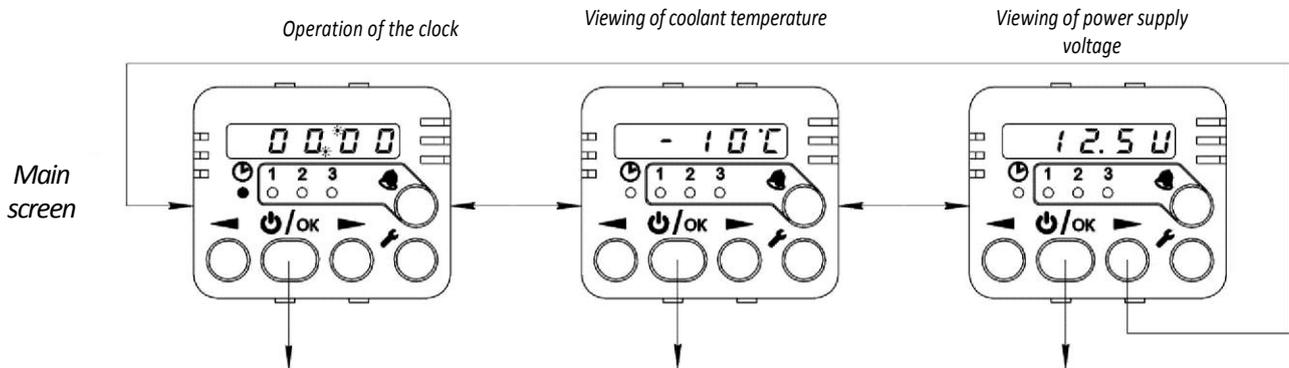
Error

<sup>1</sup>According to the type of control panel cover, the signs and are considered as equal.

## Working with the control panel

Pressing of the buttons ◀ ▶ on the main screen\*:

- viewing the current time;
- viewing of the coolant temperature;
- viewing of power supply voltage.

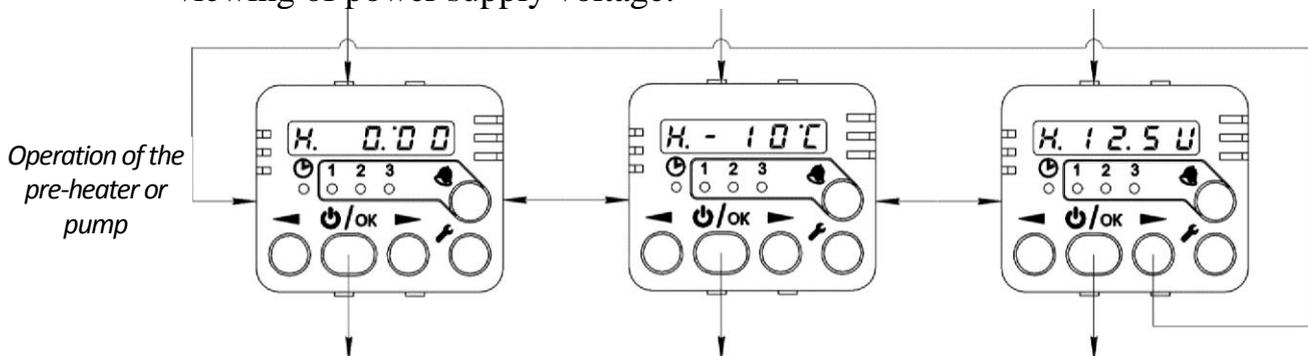


Pressing the button **⏻/OK** on the main screen:

- brief pressing - start-up of the pre-heater (count-down of the pre-heater operating time starts). The screen shows the marking **H.**
- long pressing – start-up of the pump (count-down of the pump operating time starts). The screen shows the marking **P.**

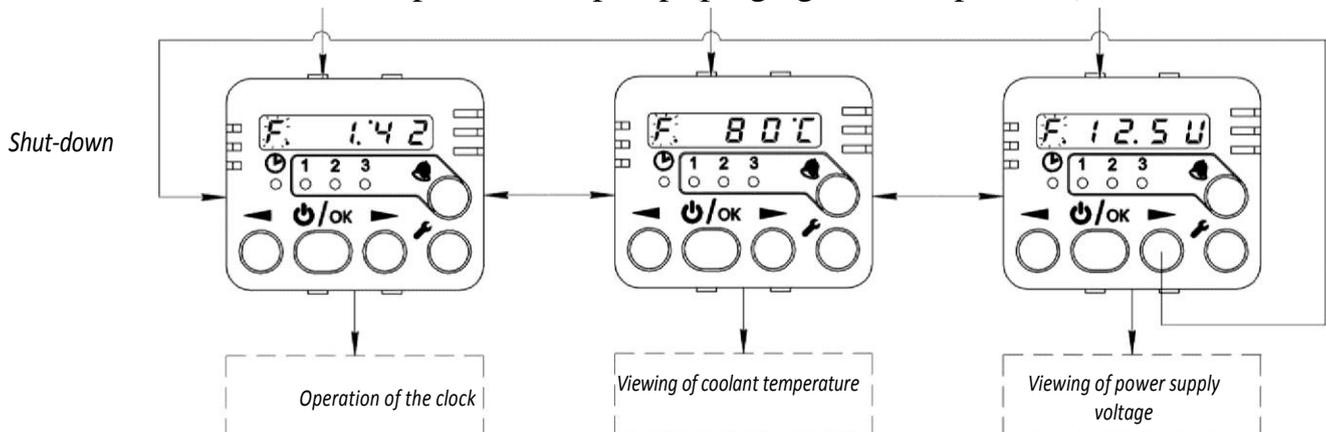
Pressing the buttons ◀ ▶ during operation\* of the pre-heater / pump:

- viewing the operating time of the pre-heater / pump;
- viewing of the coolant temperature;
- viewing of power supply voltage.



Pressing the button **⏻/OK** during operation of the pre-heater / pump:

- shut-down of the pre-heater / pump (purging, end of operation).



\* - Upon pressing the buttons ◀ ▶ the screens are switched continuously.

## Tasks in the settings menu

-  - jumping between the menu items;
-  - switches panel to editing mode;
-  - change of value (reduction);
-  - change of value (increase).
-  - confirmation of selected value;
-  - return to main screen (last changes not saved).



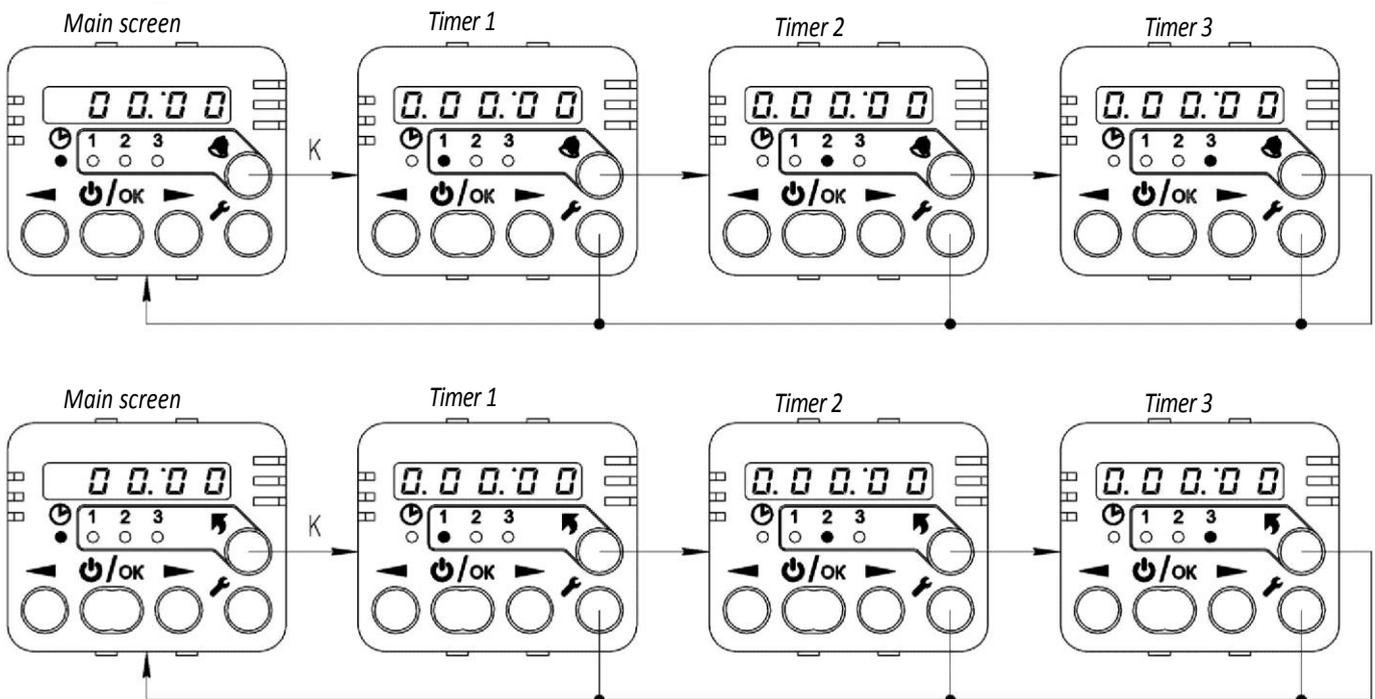
If during the editing (modification) process there is no activity within 20 seconds in relation to each activity, the panel jumps back to the main screen. Last changes shall be saved.

## Settings menu

The control panel has three types of settings:

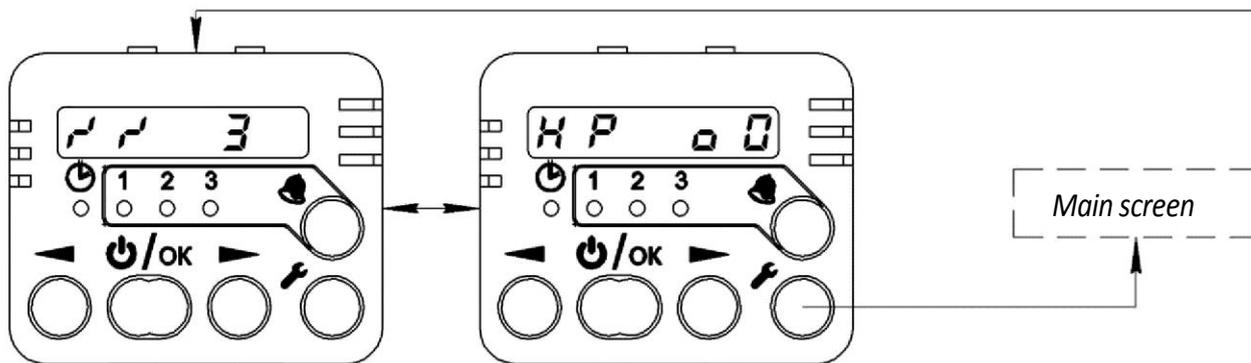
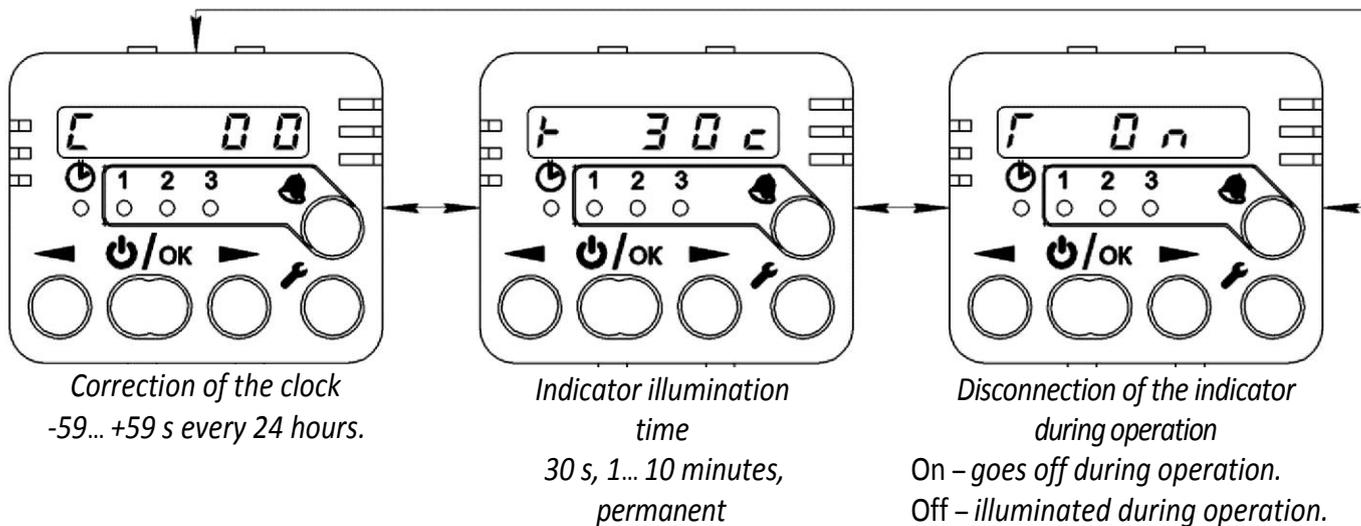
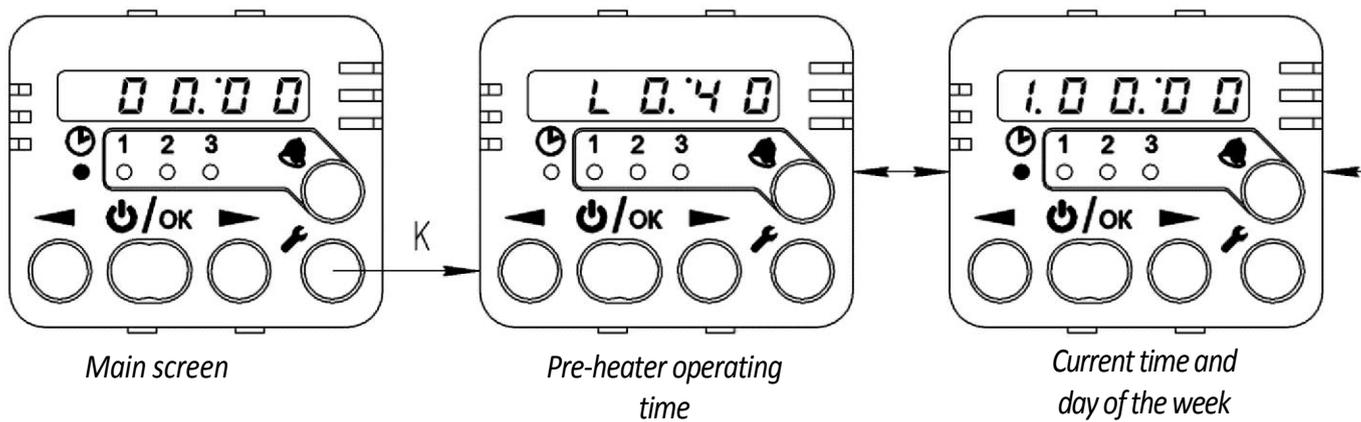
1. Setting of timers is activated by briefly «K» pressing the button  \* on the main screen.

To switch between the timers, press the buttons  or .



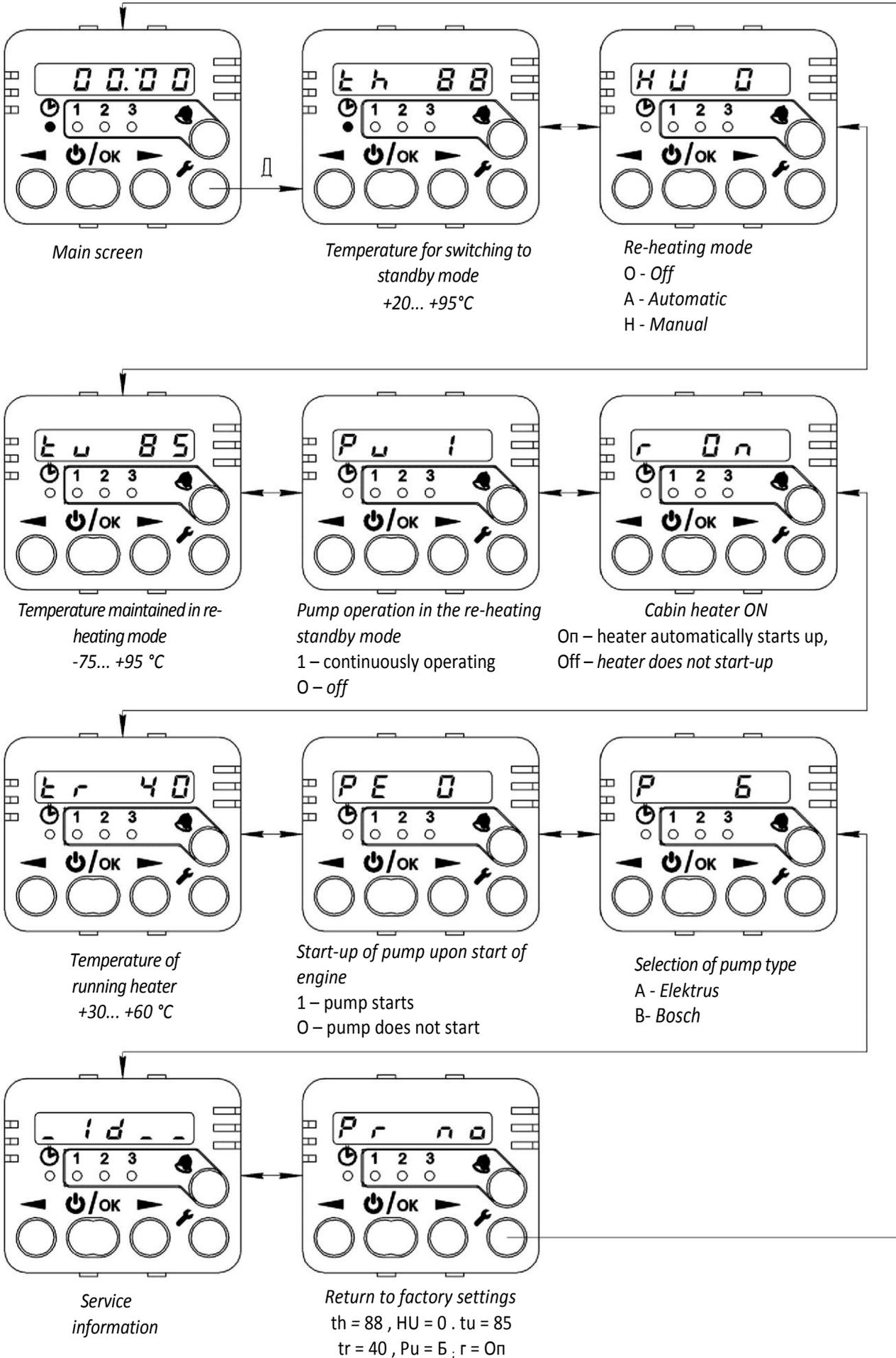
\* According to the type of control panel cover, the signs  and  are considered equal.

2. To change the pre-heater operating mode and setting of the control panel, briefly « K» press button  on the main screen. It consists of:



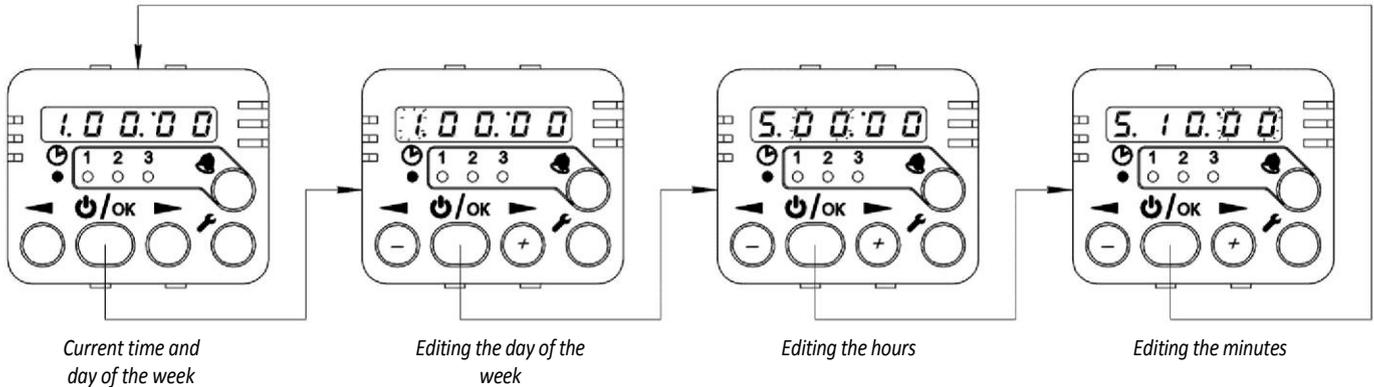
- ⏻/OK**
- Selection of button pressing for start-up of the pre-heater / pump
  - oO – brief pressing – pre-heater ON
  - long pressing – pump ON
  - Oo – brief pressing – pump ON
  - long pressing – pre-heater ON

3. To set the control unit, press and hold « D » the button  on the main screen. It consists of:



## Setting the current time

The current time is set and displayed only in 24-hour format. After power failure, the current time is deleted. The day of the week is indicated by the digits 1 to 7. 1 – Monday, 2 – Tuesday, etc., 7 – Sunday.



## Setting the control timers

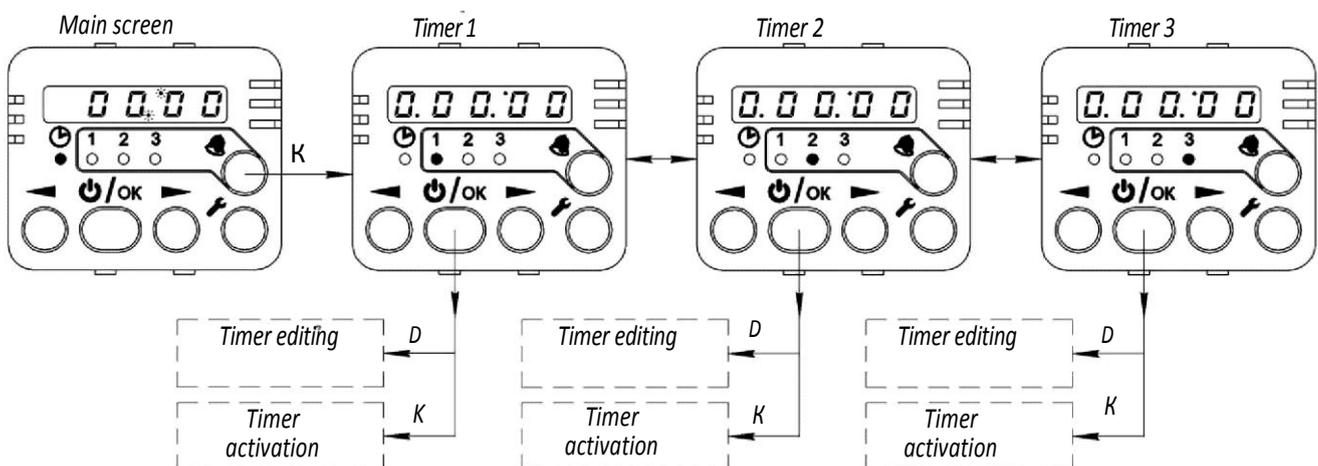
The control panel allows the programming of three automatic start-ups using three independent timers. Any of the three automatic start-ups runs only upon activation. It is possible to activate only one timer.

According to the selected timer, the appropriate diode is illuminated. The light diode starts blinking after activation of timer. After start-up of the pre-heater, the timer activation is deleted.

To change to timer editing, press and hold the button **⏻/OK**. Timer editing is done in the same manner as editing of the current time.

For automatic start-up of the pre-heater using timers 1 and 2, it is necessary to set the start-up time. For Timer 3, it is necessary to set the start-up time and day of the week. The day of the week is set from 0 to 7. If we set "0", this means that upon activation of the timer the pre-heater shall start-up regardless of the day of the week (after start-up, the timer activation is deleted).

Briefly pressing the button **⏻/OK** activates the timer; only in timer display mode (the light diode of the timer starts blinking).



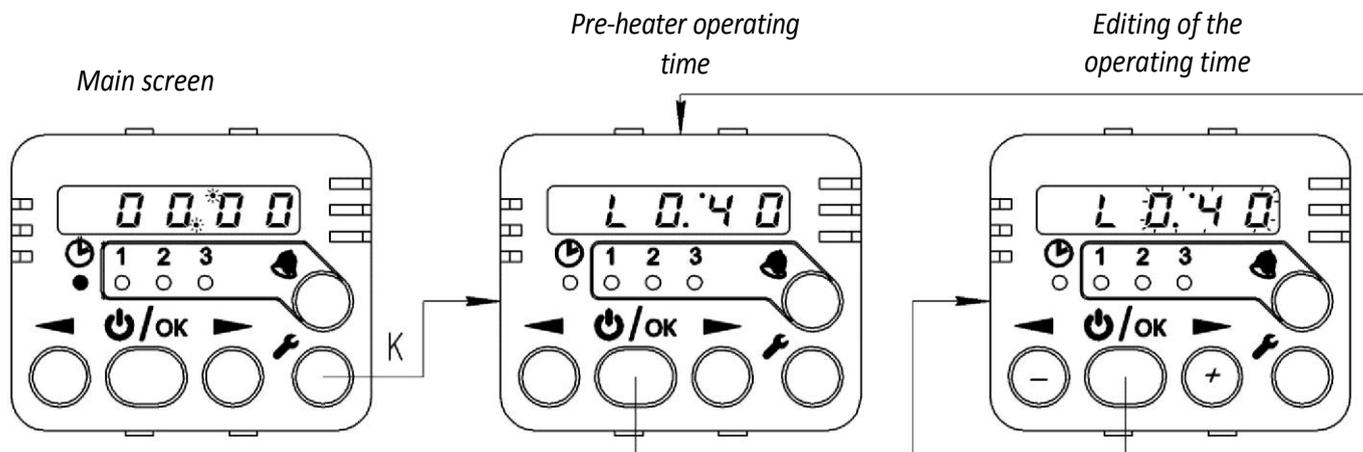
D - long depression of the button  
K - brief depression of the button

## Setting of pre-heater operating time

The default pre-heater operating time is 40 minutes. Changing range between 20 minutes to 2 hours in leaps of 5 minutes.

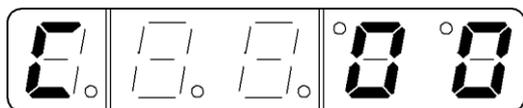


The first position shows the hours, the second and third show the minutes. (Example: 1 hour 20 minutes)



## Correction of the clock

Due to the action of low temperatures, the precision of the clock may change somewhat.



The time correction range for the clock is  $-59 \dots +59$  s for 24 hours. The default time correction is 0 s.

## Setting the indicator illumination time



The default illumination time of the indicator of the control panel is 30 seconds.

The duration of indicator illumination can be set at 30 s and from 1 minute to 10 minutes with a leap of 1 minute, or illumination can be set at permanent, where the screen shows  $\ll - - \gg$ .

After lapse of the set time:

- If the pre-heater is in operation, the indicator will show the symbol of the operating mode. To renew full indication, it is necessary to press an arbitrary button (part from "3" on the left).
- If the pre-heater is off, the control panel changes to standby mode. The indicator illumination goes off, the light diodes indicating the timer continue to be illuminated (if the timer is activated). To renew indication, it is necessary to press the button "4", "5", "6" or "7".

## Setting of the disconnection of the indicator during operation

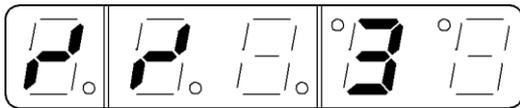


During operation of the pre-heater, the indicator on the control panel goes off after the period set in  $t$ .



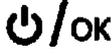
During operation of the pre-heater, the indicator on the control panel shall remain on. Upon end of operation of the pre-heater, the indicator goes off after the period set in  $t$ .

## Setting of the indicator illumination brightness



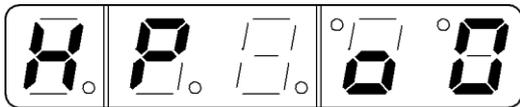
The indicator brightness changes in the range 1 to 5. Default brightness: 3.

## Setting the quick start-up function

The given setting determines the duration of the depression of button  to start-up the pre-heater / pump.

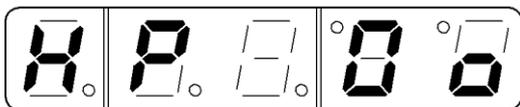
Default value:

- brief depression – start-up of pre-heater;
- long – start-up of pump.



Brief depression – start-up of pre-heater;

Long depression – start-up of pump.

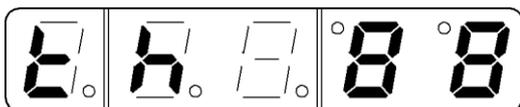


Brief depression – start-up of pump.

Long depression – start-up of pre-heater.

## Setting the temperature for switching to standby mode

The pre-heater operates at full or low output depending on the coolant temperature. The pre-heater heats the coolant until it reaches the set temperature and switches to standby mode (the operation of the heater is interrupted, the pump continues to run). Upon drop of the temperature, the pre-heater restarts.



The default temperature for switching to standby mode is +88°C.

The necessary temperature for switching to standby mode can be set in the range +20 ... +95°C.

## Setting of the activation of the re-heating mode

In re-heating mode, the pre-heater operates together with the engine and keeps the coolant temperature in the range 75...95°C.

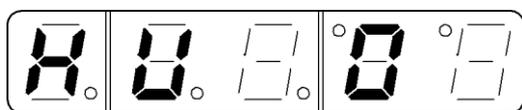
Automatic mode:

- If the pre-heater is off, then it automatically starts upon engine start.
- If the pre-heater is off, then it automatically jumps to “re-heating” mode upon engine start.

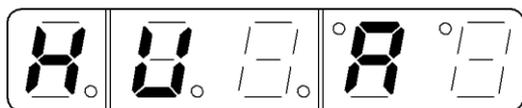
Manual mode:

- If the pre-heater is off, then it does not start automatically upon engine start (it is necessary to start it manually).
- If the pre-heater is off, then it automatically jumps to “re-heating” mode upon engine start.

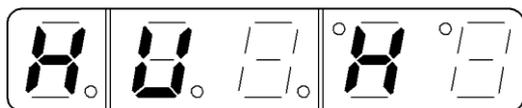
Upon switching off the engine, the pre-heater is also shut-down automatically.



The re-heating mode is off.

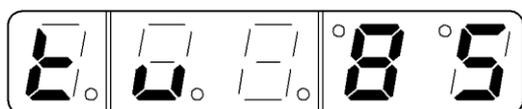


Re-heating mode (automatic).



Re-heating mode (manual).

## Setting of re-heating temperature

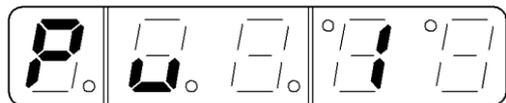


The default temperature is +85°C.  
The necessary temperature can be set in the range +75 ... +95°C.

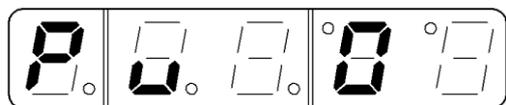
## Setting of pump in standby mode

In re-heating mode, upon switching of the pre-heater to standby mode, the pre-heater is shut-down while the pump continues to run (default setting).

According to the given settings:



The pump remains in operation (from the moment of start-up until shut-down of the pre-heater).



The pump operates simultaneously with the pre-heater and is inoperational during the standby mode.

## Setting of cabin heater start-up



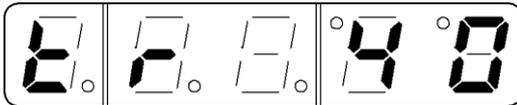
During operation of the pre-heater, depending on the coolant temperature, the cabin heater is automatically started\*.



The cabin heater shall not be started during operation of the pre-heater.

\* - Subject to the condition that the pre-heater is connected to a relay harness (purchased separately).

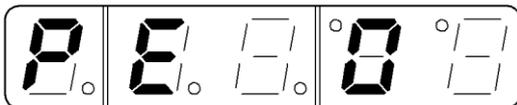
## Setting of the necessary temperature for start of heater in the cabin



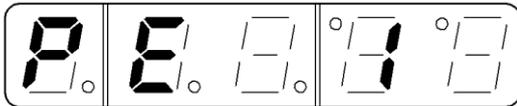
The default relay activation temperature is +40°C. The necessary activation temperature may be set in the range +30 ... +60°C.

## Setting of the start-up of the pump upon engine start

The pump that is supplied with the pre-heater may be used for ancillary circulation of the coolant during vehicle engine operation. The pump automatically starts upon engine start and shuts down upon switching off the engine.



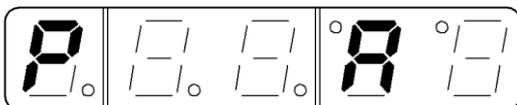
Pump does not start-up.



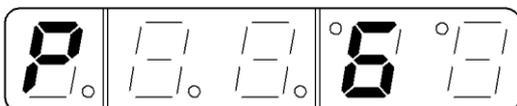
Pump starts upon start of engine.

## Setting of the pump mode

According to the assembly, the pre-heater may be equipped with a pump from “Bosch” or “Elektrus”.



Pump manufactured by “ADVERS”.



Pump manufactured by “Bosch”.

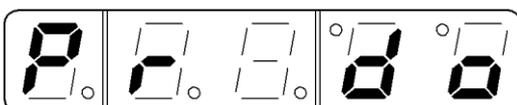
## Service information

The given menu shows the program version information. The menu is opened by pressing the button /ok.

## Resetting the control unit



Reject resetting.

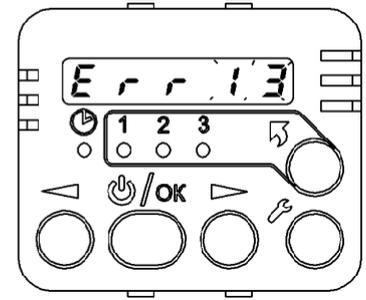


Reset to factory mode.

## Faults

Faults that arise during operation of the pre-heater are coded and automatically displayed on the control panel indicator in the form of an error code, which shall blink slowly.

After the indicator goes off, the display shows a symbol 



### WARNING

**Technical service and repair must be done only by trained and qualified staff!**

Code	Description of the fault	Commentaries Solution of the fault
01	Overheating. High heating rate of temperature sensors.	<ol style="list-style-type: none"> <li>1. Check the full coolant circuit thoroughly.</li> <li>2. Check the pump and replace it if necessary.</li> <li>3. Check the temperature sensor and overheating sensor, replace if necessary.</li> <li>4. Check the quality of the Tosol (anti-freeze), which must be used according to the ambient temperature.</li> </ol>
02	Potential overheating identified. Difference between temperatures measured by the overheating sensor and heat sensor is too big	
03	Failure of temperature sensor 1.	Replace sensors if necessary.
04	Failure of temperature sensor 2.	
05	Flame indicator failure.	Check connecting cables. Check the ohmic resistance between the indicator contacts and it must not be more than 10 Ω. In case of failure, replace the flame indicator.
06	Failure of temperature sensor in control unit.	Replace heater control unit.
09	Glow plug failure.	Check the glow plug, replace if necessary.
10	Air blower failure. The rpm is lower than the nominal value.	Check the electric wiring of the motor. Repair the fault, replace the air blower if necessary.
12	Shut-down, voltage rise above 16V (30.8V).	This fault may occur if the pre-heater is switched on when the vehicle engine is running. The cause may be vehicle voltage regulator failure.
13	Start-up attempts exhausted.	If the permissible number of permissible start-up attempts has been exhausted – check the fuel level and fuel supply. Check air trap, filter and exhaust pipe. Check the ignition plug.
14	Pump failure.	Check the electric leads of the circulation pump for short-circuit or breakage, check the pump and replace if necessary.

15	Shut-down, voltage drop below 10V (20V).	Check the voltage on connector XS2 of the heater. Check battery, vehicle voltage regulator and power supply wiring.
16	Ventilation time exceeded.	Flame detector not adequately cooled during purging. Check air trap, filter and exhaust pipe. Check flame detector and replace it if necessary.
17	Fuel pump failure.	Check the electric leads of the fuel pump for short-circuit, replace if necessary.
20	Connection failure between control unit and control desk.	Check connecting cables, connectors. Control panel does not get data from control unit
22	Fuel pump failure.	Check the electric leads of the fuel pump for breakage, replace if necessary.
24	Overheating of one of the sensors.	Refer to error codes 01 and 02.
26	Air blower overload.	Check the air blower. The impeller of the air blower could have come into contact with the cover of the heater resulting in deformation of the fixtures.
27	Air blower failure. Motor is not running.	Check the electrical leads, air blower and control unit, replace if necessary.
28	Air blower failure. Motor running uncontrollably.	
29	Re-heating attempts during operation of the pre-heater exhausted.	Check the heating system. Check for the tightening of clamps on the fuel line, leakproofness of the fuel line, tightness of the fittings on the fuel pump, output of the fuel pump.
30	Connection failure between control unit and control	Check connecting cables, connectors. The control unit is not getting any data from the control panel.
37*	Pre-heater locked.	Contact the service centre to unlock the pre-heater.
50	Connection failure between control panel and modem.	Check connecting cables and connectors.
78	Flameout detected during operation.	Stated for customer information. Check for the tightening of clamps on the fuel line, leakproofness of the fuel line, tightness of the fittings on the fuel pump.

\* **WARNING!** If error 13 consecutively occurs three times during start-up of the pre-heater, the pre-heater locks up. The purpose of this blocking is to prevent leak of the residual fuel into the combustion chamber. Blocking will be indicated by display of error code 37 on the control panel. To unlock the heater you need to contact the service centre.