

# Operation manual

## **Importantly!**

This heat pump operation manual \_\_\_\_\_ is the main guiding document for operation. It must be retained until the end of the product's service life.

Please read this operation manual carefully before using your heat pump.

This manual contains instructions for: installation, implementation, maintenance, care and repair of the heat pump.

It is intended for users who operate a heat pump (hereinafter HP). Before starting any work related to the HP, you must read the relevant section of the manual and strictly follow the safety instructions.

Depending on the type of HP model, there will be additional documentation (connection plans, wiring diagrams, etc.).

The manual is an integral part of the HP and must be available to everyone who works with it or maintains it during the entire period of operation. The manufacturer reserves the right to make changes to the HP design, improving the technical characteristics.

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## General information

**Geothermal heat pump HEATKEG** uses the relatively constant temperature of the Earth (groundwater) to obtain thermal energy.

Today, heat pump manufacturers compete with each other on such characteristics as appearance, compactness, adaptability to various systems (water-water, ground-water, water-air). As a result, there is a huge increase in the cost of the heating system. In this regard, it becomes necessary to install a compressor that is several times more expensive than the standard ones used in air conditioners. Such replacements also imply a reduction in the size of the heat exchangers and, consequently, the use of more expensive materials and technologies. Among other things, the design of the plate-type heat exchangers (due to the small distances between the plates) does not allow such devices to connect to groundwater's surface.

**The HEATKEG heat pump** is unique in its segment. It is made of components that are available on the market. The HEATKEG heating system is configured to use the thermal energy, which is located underground (groundwater).

The conventional **compressors** of the air conditioner installed in our heat pumps work perfectly thanks to the stable groundwater temperature.

The "pipe in pipe" **heat exchanger** allows the HP to be used for any water quality. A constant temperature of source allows us to simplify circuit design of the device, while reducing the likelihood of it's failure.

The **electronics** that control all processes are designed and manufactured by our specialists. Such electronics protects the system and allows you to set the desired temperature, and also to control it from your smartphone.

## Operational concept, application, model range

The heat pump \_\_\_\_\_ is manufactured according to the latest achievements of science and technology.

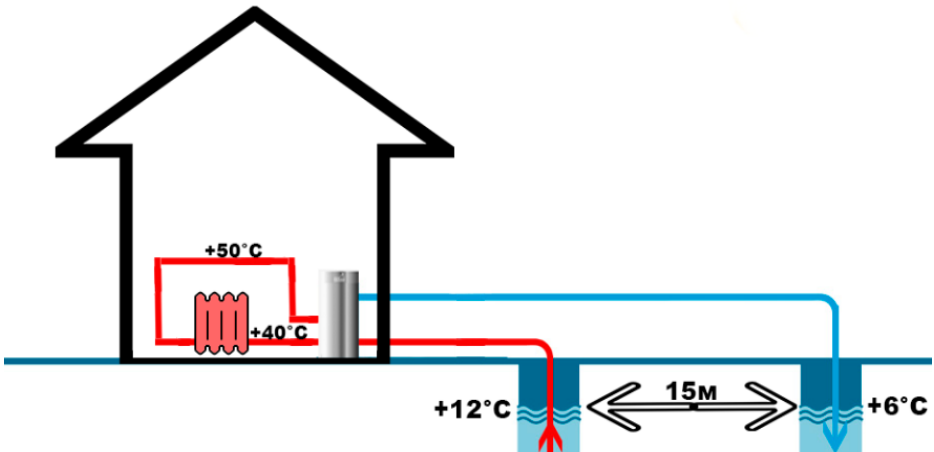
### Application.

The heat pump water/water is designed for the space heating by using: the underfloor heating/walls and radiators of all types. The temperature of the heat transfer reaches 55°C.

HP can also be used for the heating of hot water (DHW) , domestic and industrial needs. The temperature in the tank can reach 45°C.

**The operation of the heat pump is on the principle of water-water.** For the production of 10 kW of thermal energy, 2-3 kW of electricity is spent.

Some water from the head well enters the heat pump and, passing through it, loses temperature, thereby heating the evaporator. The compressor compresses the heat received from the ground water and transfers it through the heat exchanger condenser to heating devices (radiators, heat-insulated floor, fan coil units, warmed walls, etc.)



These head wells are drilled no closer than 15 m from each other. The first one is closer to the boiler house (1-5 m), the second head well is much lower in the area.

The installation of this heat pump becomes impossible if the groundwater in this area is too far away, and the groundwater table is 50 m or more.

Also, difficulties in using HP can arise in those regions where groundwater is too saturated with iron, as it settles on the pipe walls and prevents the heat transfer. The heat pump throws an error message (i.e. an evaporator). With the help of a booster, you can clean this device with nitric or other acid.

## Models

### **HEATKEG HP 6. 60-90 M<sup>2</sup>.**

This model of the heat pump (HEATKEG HP 6) allows you to heat the 60 - 90 m<sup>2</sup> room with a water flow from the well of 700 l/h.

Flow temperature, °C	+40	+50
Power demand, kW	1,2	1,6
Capacity, kW	6,2	6,2
Coefficient of performance (COP)	4,5	3,9
Water flow, m <sup>3</sup>	1	1
Phases	1	1
Power source (V)	220 - 240	

### **HEATKEG HP 8. 90-120 M<sup>2</sup>.**

The COMPRESSOR GMCC has 8 kW. This model of the heat pump (HEATKEG HP 8) allows you to heat the 90 - 120 m<sup>2</sup> room with a water flow from the well of 1500 l/h.

Flow temperature, °C	+40	+52
Power demand, kW	1,7	2,2
Capacity, kW	8,5	7,5
Coefficient of performance (COP)	5	3,75
Water flow, m <sup>3</sup>	1,5	1,5
Phases	1	1
Power source (V)	220 - 240	

### **HEATKEG HP 10. 140-180 M<sup>2</sup>.**

The COMPRESSOR GMCC has 10 kW. This model of the heat pump (HEATKEG HP 10) allows you to heat the 140 - 180 m<sup>2</sup> room with a water flow from the well of 2000 l/h.

Flow temperature,, °C	+40	+50
Power demand, kW	2,8	2,9
Capacity, kW	11	11,3
Coefficient of performance (COP)	4,85	3,85
Water flow, m <sup>3</sup>	2	2
Phases	1-3	1-3
Power source (V)	220 - 240	

### **HEATKEG HP 16. 180-220 M<sup>2</sup>.**

The Panasonic COMPRESSOR has 16 kW. This model of the heat pump (HEATKEG HP 16) allows you to heat the 180 - 220 m<sup>2</sup> room with a water flow from the well of 2500 l/h.

Flow temperature,, °C	+40	+50
Power demand, kW	3,1	4,1
Capacity, kW	15,4	15
Coefficient of performance (COP)	4,95	3,65
Water flow, m <sup>3</sup>	2,5	2,5
Phases	3	3
Power source (V)	380	

### **HEATKEG HP 18. 250-350 M<sup>2</sup>.**

### **HEATKEG HP 35. 600-800 M<sup>2</sup>.**

**HP creates a fairly high level of noise.** It is recommended to install in rooms, which are remote from bedrooms!

## **Configuration**

### **The heat pump:**

- compressor
- heat exchanger
- expansion device
- pressure relay

### **The control box:**

- circuit breakers
- heat pump controller
- magnetic starter
- protection relay of three-phase motor
- set of sensors

### **Rubber liners under the housing of the HP**

(3 pcs.)

**Probe for the heat transfer sensor installation** (it is installed on the heating supply near the heat pump)

### **Operation manual**




## Operating instruction (the controller guidance)

The manufacturer guarantees the proper operation of the HP (only in a case of strict observance of the instruction manual requirements).

### 4.1 Switching on controller

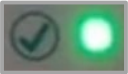
After the turning on of two circuit breakers in the box (of the heat pump control), the controller will boot up and start a pause that you can

skip by pressing the button . After that, the heat pump will start working. Switching of the heat pump on and off is also possible with the

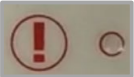
button , without de-energizing the HP.

### 4.2 Operational mode

During normal, regular operation, the green sensor should flash



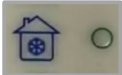
If the HP fails, the red sensor near the exclamation mark flashes




and an error code is displayed on the controller screen. All Interpretation of errors is in paragraph (7.3).

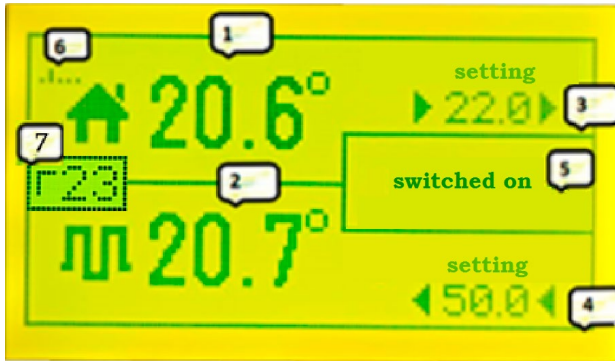
The inclusion of this sensor  indicates that the

compressor is running. This signal  means that the pump is

running. The signal  means that the DHW relay is switched on..

A short pressing of the button "down"  calls up the information menu **-Temperatures** - House, Heat Transfer, Evaporator,

Compressor, Evaporator 2, Compressor 2, and the supply pressure. Returning to the main screen may be done by a short press on any button.



- 1 - The air temperature in the house
- 2 - The heat carrier temperature  
(it's valid only when the compressor is on)
- 3 - The desired temperature in the house
- 4 - Maximum temperature of the heat transfer  
(during DHW operation, ignored)
- 5 - Dialog box
- 6 - Wi-Fi signal level.
- 7 - The temperature of the hot water supply DHW




#### 4.3 The logic of work. Temperature control



After turning on the power, the HP will heat the room (1) until it reaches 22°C (3). If the temperature of the radiators (2) reaches 50°C (4), the heat pump will stop working and turn on a path that the radiators or the warm floor will continue to heat the room. Cause for 12 minutes, after during this time the air in the house does not heat up to the setting temperature of 22°C (3), then the HP will turn on and continue to heat the air.




After reaching the set temperature, the heat pump will turn off and turn on only after the temperature in the room drops by the set step in degrees, which are indicated in the **Air Hysteresis** menu section.

### Switching off

**It is carried out by a red button on the panel, or by an automatic machine in the control box for a complete de-energization of the equipment.**

The main setting of the **room air temperature** is carried out by long pressing the "right" button  and is adjusted by the buttons "up" and "down"  .

Setting the "**Maximum temperature of the heat transfer** "  is carried out by long pressing the "left" button .

Using the buttons "up" and "down"   you can change the value to a larger or a smaller. The button "OK"  is used for confirmation.

*At a lower temperature of the heat transfer, the most economical mode of HP operation is achieved.*

### Entering the settings menu is carried out as follows:

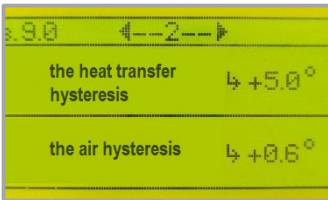
After turning on the HP power, the controller starts a pause countdown (12 minutes by default), we skip this pause by pressing the button "OK".

Then, to enter the menu, press and hold the "OK" button. The turning of pages is carried out using the "right" / "left" buttons. Moving to the next line is carried out with the "OK" button. The changing of the numeric or logical values, you can make with the "up"/" down" buttons.

**Importantly!** After changing the values, press briefly "OK", and save new values in a memory, and only after that, you can exit to the main screen by long pressing the "OK" button.

#### 4.4 Hysteresis setting

In order to set the temperature difference between turning off and turning on the heating, you need to go to the hysteresis settings (menu number 2). The menu will contain the hysteresis of the heat transfer (the radiator temperature) and the hysteresis of the air (the air temperature in the room). To



set up, you need to press "OK" and



using buttons "up" and "down"



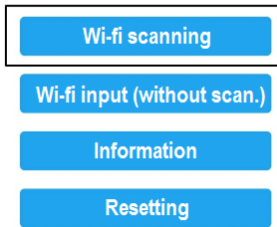
change the values. The air hysteresis menu sets the temperature step. As soon as the air temperature drops by the specified step, the HP will automatically turn on and raise the temperature to the specified level, which is displayed in the main menu section.

#### 4.5 Wi-Fi connection, and online control.

After turning on the heat pump, the controller will automatically create a **Wi-Fi** hotspot named **HEATKEG**. After that, it will be possible to connect to the controller from any device to enter settings.

To connect to the controller, you must select the Wi-Fi network called **HEATKEG** in your device and click **CONNECT**. After connecting the device to the **HEATKEG** network, a page with a menu will appear on the screen of your device on which you need to press the button (**Wi-Fi Scan**).

## HEATKEG Wi-fi manager



The page will display all available access points. We select the network we need, and in the lower field we enter the password from it. After that, (provided that the password is entered correctly), the controller will connect to this network and the signal strength indicator will appear on the controller screen.

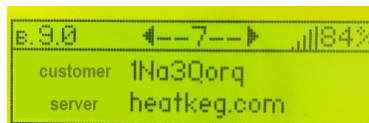


This means that the controller is connected and transmitting data.

If a smartphone (or any other device) connects to the **HEATKEG** access point, but the menu page does not open on its own, then you can display it manually by entering the address into the browser 192.168.4.1.

If the **Wi-Fi** router (to which the controller is connected) is turned off, or the password is changed in it, the controller will not be able to connect and will start working in access point mode, and will also check every 10 minutes whether the previous network has been restored. If the network appears, then the connection will occur automatically. *To change the access point, you need to turn off the old router, then the controller creates an access point and it will be possible to connect to the new router.*

The 7th page of the controller menu contains information with customer data for entering the system settings via the Internet.




The client ID is displayed:


### Controlling the HP by computer.

Controlling of the heat pump via computer is carried out by the link [www.heatkeg.com/data/](http://www.heatkeg.com/data/). You need to enter the name of the customer indicated on the 7th page of the controller menu.

## Controlling the HP by smartphone.

To go to your personal account, we scan the **QR** code from a distance of at least 30 cm. The QR code is called by pressing the “up” button. 








The QR-code contains a link to the personal page of the controller, where you can make the following changes: turn the HP on and off, set the temperature, view all the controller settings. You can save the personal account login page by calling an additional window in the browser (Google Chrome or Safari) (in the upper right corner, click on the button  and select the **Add to the Home Screen**).





The HEATKEG application has been developed for Android users. Also, the installation link for the application is on the website [www.heatkeg.com](http://www.heatkeg.com) (in the upper left corner).

### 4.6 Timer setting

The standard setting of the air temperature can be changed using timers for an adjusted period of time. On the site, during the operation of the timers, the air temperature figures change color from black to green.

Long pressing of the button , and then the button  will help us to go to the page <8>. Short pressing of the button  will help to move the cursor to (timer 1 off). If you press the button  then will switch on the timer 1. After pressing the button  you can set the time



and air temperature using the buttons    . You can set from what time (and until what time) is necessary to work in a given temperature mode. After setting the data, briefly press "OK". The data will be saved. After that you can exit from this page with the help of long



pressing

#### 4.7 Operating delays

**Launch time of the equipment delay** is described on the page <3>. It is used to prevent frequent starts of the equipment. This allows you to increase the life of the compressor. It is recommended to use 10-15 minutes.

**The compressor relay delay.** It is necessary for preliminary pumping of the liquid through heat exchangers, and this also reduces the load on the network, avoiding the simultaneous start of engines.

#### 4.8 Critical compressor and evaporator temperature.

This is set up in the menu on the page <4>. The lower evaporator temperature threshold is necessary to prevent freezing of the heat exchanger in case of a poor liquid flow. The evaporator sensor is mounted on a thick suction tube near the compressor.

The compressor high temperature limit is designed to prevent long operation of the compressor at high temperature.

The compressor temperature sensor is installed on a thin discharge pipe near the compressor.

**4.9 Voltage correction** is described on the page <5>. System voltage is displayed in volts. It is possible to adjust it to the actual voltage using the



button

There are an upper limit and a lower limit for the voltage in the network at which the system will generate an error. This error will automatically reset after 12 minutes. High and low voltage control can be disabled by setting the maximum and minimum values in the settings.

#### 4.10 Customer's information

This section of the menu <7> contains information about the name (login) of the client and the server system. And also, there is the time of communication with the server.

**4.11 DHW mode** is described on the page <9>

- DHW function status (on/off).
- Overheating (of the heat transfer/ boiler coil).
- Pause (when boiler coil is overheating, then the HP will dump excess heat into the radiators for a specified number of seconds)
- DHW hysteresis (temperature switch-on step)
- DHW temperature (switch-off temperature). This parameter can be set by the user!

When the mode is on, the temperature in the DHW tank is displayed on the



main screen

When the DHW function is on, the boiler will be heated. After the temperature in the boiler drops below the set one, the relay (3) turns on. It will simultaneously turn off the heating circulation pump and turn on the DHW circulation pump, the HP will heat the boiler, ignoring the setting of the heat transfer (on the main screen). During the heating of the boiler, if the heat transfer reaches the overheating temperature, the relay (3) will be turned off and the HP will heat the house (if required) for a specified amount of time. After that, it will switch to the boiler heating again until the set DHW temperature is reached.



## 4.12 Controller modes

There are three controller modes (it is described on the page №<10>):

1) Simple mode - the standard installation

2) Master Mode - the relay №4 will energize to turn on the auxiliary or parallel heater.

a) The parallel heater - parallel turning on with the compressor

6) An auxiliary heater - the relay 4 will turn on when the house temperature drops to twice of the house hysteresis value.

3) Driven mode - the heat pump will work only when the OFF and G pins are closed. And it will be possible to enter the identifier of the master controller, in this case, the data of the driven one will appear on the web page of the master controller.

**4.14 Time setting** is described on the page <11>

**Time and date settings** can be set in this menu. The clock continues to work even when the power is turned off. For this purpose, a CR2032 battery is installed in the controller. Failures in the watch operation indicate a dead battery. It is recommended to replace the battery every 3 years.

### **The number of compressors (one/two)**

**One compressor** - the standard installation

**Two compressors** - an additional compressor will be controlled. The controller will require two more sensors (the evaporator-2 and the compressor-2)

**4.15 The page <12>**

**the pressure switch logic** (normally closed and normally open) – This applies to different types of pressostat.

## **controller operation logic** (heating/cooling)


**heating** - the standard setting

**cooling** - the only difference in the logic of operation is that the compressor and the deep pump will turn off when the air temperature in the house drops to the set one, (this can be used in passive cold systems when we dump heat into groundwater or geofield), while the compressor is switched off by a single-pole compressor circuit breaker.

**4.16** Page < 13 >

## **temperature sensors (together / separately)**

**together** - all temperature sensors (ds18b20) are connected in parallel to the pins (G, T In, + 5v) in a three-wire circuit. Swapping the

sensors can be done in the menu <1>, by long pressing the button . We go into the setting, then change the sensor number with the up / down buttons. After that, we should press "Ok" and then move on to the next sensor.

**separately** - temperature sensors (ds18b20) are connected in a two-wire circuit, each to its own pin. We connect the air sensor in the house to (G, T In,). Minus and plus of the sensor to G, information to T In. The remaining sensors are similarly connected to their contacts signed on the board.

## **Overheating errors reset (manual / automatic)**

**manual** - (the default setting) when a compressor or evaporator critical temperature error occurs, the controller will generate an error until the power is turned off.

**automatic** - the critical temperature error will be automatically reset after 12 minutes.

## Security measures

**In the event of a malfunction, you should contact the appropriate specialist to eliminate the breakdown.**

### **5.1 Some operating errors can lead to personal injury or to equipment damage:**

- do not allow children to play with the appliance or use it without adult supervision;
- provide access to the device only to those persons who know how to use it correctly.

**Repairs may be carried out only by specially trained and qualified staff.**

Poorly performed repairs can lead to hazardous situations during the operation and deterioration of the equipment.

Use only original spare parts. Annually carry out an inspection and make necessary maintenance of the HP. Remember! It should be carried out only **by specially educated and trained specialists.**

**To prevent the injury during the HP operation, it is necessary that:**

- the system was grounded;
- the electrical cable had an appropriate design and section, according to SNiP;
- the control box had not been attached to flammable surfaces.

When you are working with electrical elements, it is necessary to de-energize the entire installation. If the insulation is damaged, the device must be switched off immediately. After making work on the electrical installation, it is essential to check the correct direction of rotation of the heat pump compressor.

## 5.2 High temperatures

There is a risk of burns due to hot surfaces and components.

**The risk of burns from a hot liquid.** There is a risk of burns from hot water (when using hot gas cooling and high-temperature heat pumps up to +65 °C or more).

If there is a refrigerant leak from the heat pump, first of all, you should turn off the unit, then you must ensure ventilation and leave the room immediately. After that, it is necessary to contact a specialized refrigeration company for repair work.

## Maintenance and repair. Some errors

**6.1 Repairs may be carried out only by specially trained and qualified staff.**

### 6.2 Installation and implementation

The heat pump installation and implementation is carried out by specialized companies or specialists authorized to carry out such work.

### 6.3 Errors

<b>Error</b>	<b>Description</b>	<b>Solution</b>
"sensor t."	DS18b20 sensor failed	Switch off and on the controller. If the error persists, replace the sensor.
"t. compres "	The overheating of the compressor (freon leak)	To troubleshoot, you should contact a specialist.
"t. evapor"	No water flow from wells	The cleaning of the filter. There is a malfunction in the operation of a deep well pump. There is no flow through the geofield. The heat exchanger is clogged with the iron.
"high pres"	Freon high pressure in the system	Check the circulation pump and air in the heating system, then clean the filter.
"low pres"	The lack of freon	To troubleshoot, you should contact a specialist.
"low volt"	Low voltage in the network	The error is reset automatically after the mains voltage stabilizes. The heat pump will restart itself after 12 minutes.

"high volt"	High voltage in the network	The error is reset automatically after the mains voltage stabilizes. The heat pump will restart itself after 12 minutes.
"380 voltag."	380 network error	The incorrect network parameters 380. Check the presence of phases, or swap two phases for changing the direction of rotation.
"flow switch"	The lack of flow through the heat exchanger	Malfunction of the deep or circulation pump, the clogged filter or the malfunction of the solenoid valve.

To reset all errors, the cause must be eliminated and the controller restarted.

**Before the start of the heating season, once a year, a specialist must check the system for faults. In a case of malfunctions, you should carry out some repair work.**

A qualified specialist should inspect the wires for the heating and, if necessary, tighten the terminals.

#### **6.4 Other malfunctions**

**For three-phase heat pumps.** If the network is normal, then two sensors red and green should be lit on the protection relay.

If the controller is working, the circulation pump and the borehole pump have started, but the compressor is not working, the red sensor (R) is not lit on the TRV08-03 relay. So there is a problem with the network (the loss of phase, rephasing or the large phase imbalance).



# Wiring diagram of HP

## Single phase heat pump

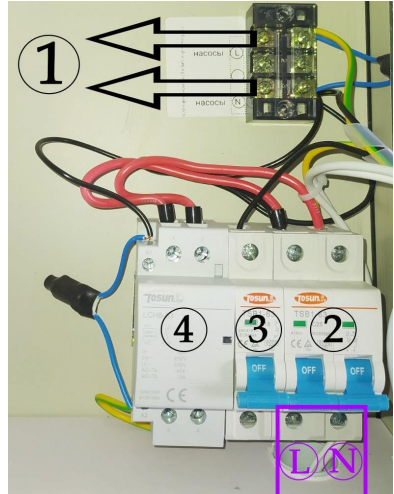
Lilac symbol - input L and N

Connection of a single-phase HP to the network is carried out with an aluminum cable sip  $2 * 16 \text{ mm}^2$  or copper  $2 * 4 \text{ mm}^2$

- 1) the borehole pump and the heating circulation pump. (It is recommended to install a fuse on the line to the pump group.);
- 2) the incoming switch;
- 3) the automatic of compressor;
- 4) the contactor;

The grounding should be mounted on the aluminum casing of the controller box and on the heat pump casing.

**Be sure to ground the depth pump and circulation pump.**

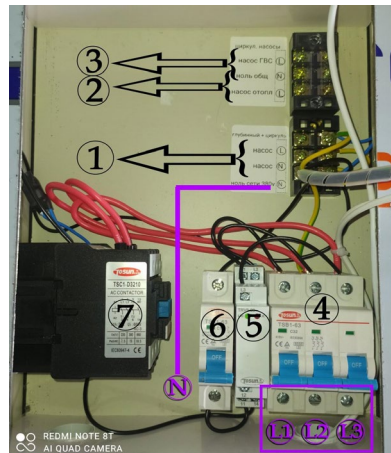


## Three-phase heat pump + DHW

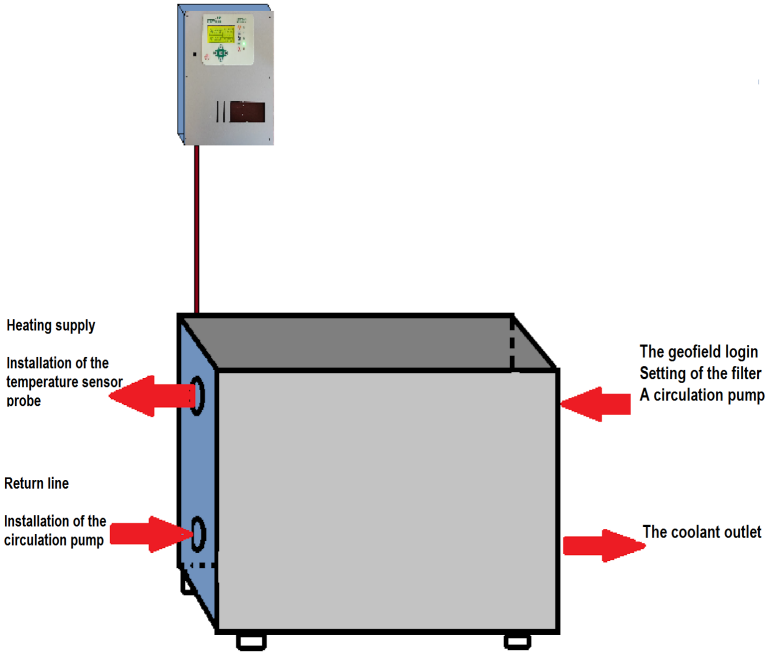
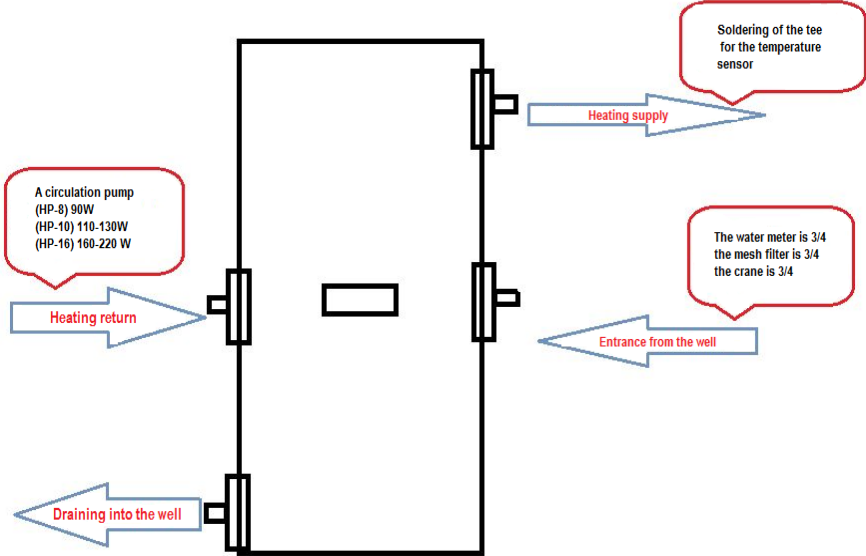
- 1) the borehole pump / or the geofield circulation pump + the heating circulation pump. (It is recommended to install a fuse on the line to the pump group.);
- 2) the heating circulation pump;
- 3) DHW circulation pump;
- 4) the incoming switch;
- 5) the three-phase motor protection relay;
- 6) the automatic of compressor;
- 7) the magnetic starter;

The grounding should be mounted on the aluminum casing of the controller box and on the heat pump casing.

**Be sure to ground the depth pump and circulation pump.**



# The diagram of the HP hydraulic connection (water/water)





## **Guarantee**

In case of failure of any heat pump unit or the entire system during the warranty period, due to the fault of the manufacturer, the manufacturer will either repair the heat pump or the defective unit or replace the entire equipment.

**The manufacturer is not responsible for damages arising from the inappropriate use of the equipment or storing, or its transportation.**

The manufacturer guarantees the correct operation of the HP within 24 months from the date of sales.

The manufacturer guarantees the proper operation of the HP, if the requirements of the instruction manual are strictly followed.

To obtain the rights of warranty service, you must provide: a purchase receipt (receipt of the carrier), correctly completed control and warranty card.

### **The warranty does not cover following:**

- if the warranty card is not issued (lost);
- non-compliance by the consumer with the rules of operation and maintenance;
- negligent storage and transportation of HP, both by the consumer and by any other organization;
- self-repair of the HP by the consumer;
- unauthorized changes in the HP design;
- using of the HP for other purposes;
- in case of improper mounting or installation of the HP;
- the arising of defects caused by the force majeure (natural disasters, deliberate actions, fires, etc.).

## Warranty card

<b>Model</b>	
<b>Serial number</b>	
<b>Date of manufacture</b>	
<b>Date of sale</b>	
<b>Price, UAH.</b>	

<b>The name and address of the seller</b>

<b>Buyer information</b>	
Full name.	
Tel.	
<hr/> Seller's signature	The goods were received in a good condition and it was complete. I am acquainted with the terms of the guarantee and agree on it.  <hr/> Buyer's signature

**Thank you for purchasing a heat pump!**