HES
HOME ELECTRO SYSTEM

OPERATION AND INSTALLATION

TECHNICAL DATA SHEET

water-to-water/brine-to-water type heat pump

Models:

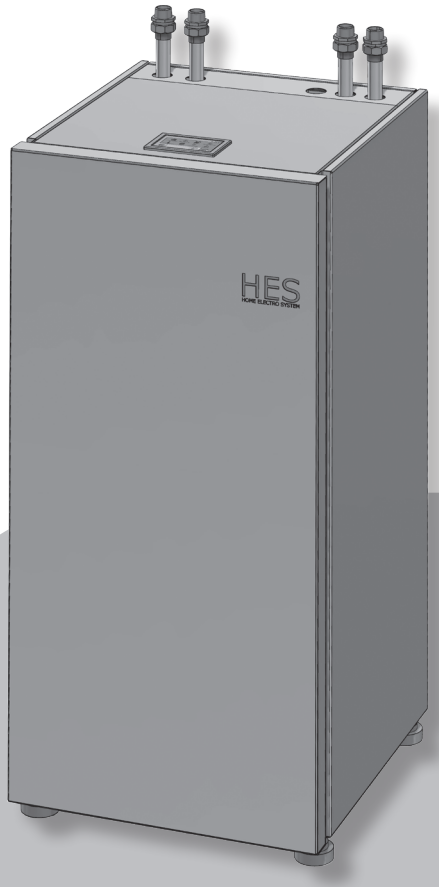
HES ECO 5

HES ECO 7

HES ECO 10

HES ECO 12

HES ECO 16



HES
HOME ELECTRO SYSTEM

CONTENTS | OPERATION

CONTROL

MOUNTING

CONTROL

1. GENERAL INSTRUCTIONS

The «Operation» chapter is intended for users and specialists.

The «Installation» chapter is intended for specialists.

INSTRUCTION
Please read this manual carefully and save it before starting operation. If necessary, hand this manual over to the next user.

1.1 Related documents

Heat Pump Control Device Operation And Installation Instructions Operation And Installation Instructions For All Components Included In The Installation Equipment.

1.2 Safety instructions

Additional components are not included in the device package.

1.2.1 Structure of safety instructions

SIGNAL WORD Type of danger
Here are the possible consequences of non-compliance with the safety instructions and measures to prevent danger.

1.2.1 Symbols, type of danger

Symbol	Type of danger
	Injury
	Electric shock

1.2.2 Сигнальные слова

Signal word	Value
DANGER	Instructions that may lead to serious injury or death if not followed.
WARNING	Instructions that may result in serious injury or death if not followed
CAUTION	Instructions that may result in moderate or minor injuries if not followed.

1.3 Other designations in this documentation

INSTRUCTION
The instructions are limited to horizontal lines above and below the text. General instructions are marked by the symbol next to them.

▸ Read the instructions carefully.

Symbol	Type of danger
	Equipment damage and environmental damage

Symbol	Type of danger
	Disposal of the device

▸ This symbol indicates the need to perform certain actions. The actions required are described step by step.

1.4 Units of measurement

INSTRUCTION
Unless otherwise indicated, all dimensions are given in millimeters.

SAFETY

2. Safety precautions

2.1 Intended use

The device is designed for heating rooms, taking into account the operational specifications given in the «Technical Characteristics» chapter. The device is intended for household use. The user does not need to be instructed for its safe maintenance. It is possible to use the device not only in everyday life but also, for example, in small enterprises, provided that the same operating conditions are met. Any other use of this device not mentioned in this manual is not considered intended use. Intended use also implies compliance with the provisions of this manual. If changes are made to the device or it is upgraded, all warranty obligations become invalid.

The device is designed to heat buildings.

2.2 Safety instructions

The following safety instructions and regulations must be followed:

▸ Electrical and heating circuit installation can only be carried out by certified, qualified specialists or technical staff of our service department.

▸ The specialist is responsible for compliance with the applicable rules during installation and initial commissioning.

▸ The device should only be used fully assembled with all safety devices installed.

▸ The device should be protected from dust and contamination during installation.

RISK of injury

The device should be operated by children or persons with physical or mental disabilities only under supervision or after an appropriate briefing conducted by a person responsible for their safety.

Do not allow children to play with the device!

3. Description of the device

HES ECO is a heat pump for a heating system that can be operated as a water-water/brine-water type heat pump. The heat pump takes heat from the coolant (salt solution) at a low-temperature level, which is then given to the water in the heating circuit at a higher temperature along with the energy absorbed by the compressor. Depending on the temperature of the heat source, the mains water can be heated to a supply temperature of +58 °C.

It is possible to use HES ECO as a module.

4. Control

The heat pump is controlled exclusively by the HES heat pump control system. Therefore, please take into account the instructions given in the «Operation» chapter of the manual for the HES heat pump control system operation and installation.

5. Maintenance and care

DAMAGE TO EQUIPMENT OR SYSTEM
Maintenance work, such as checking electrical fuses, should only be carried out by a specialist.

A wet cloth is enough to ensure proper maintenance of plastic and metal parts. Do not use abrasive or corrosive cleaning products!

Please protect the device from dust and contamination during installation.

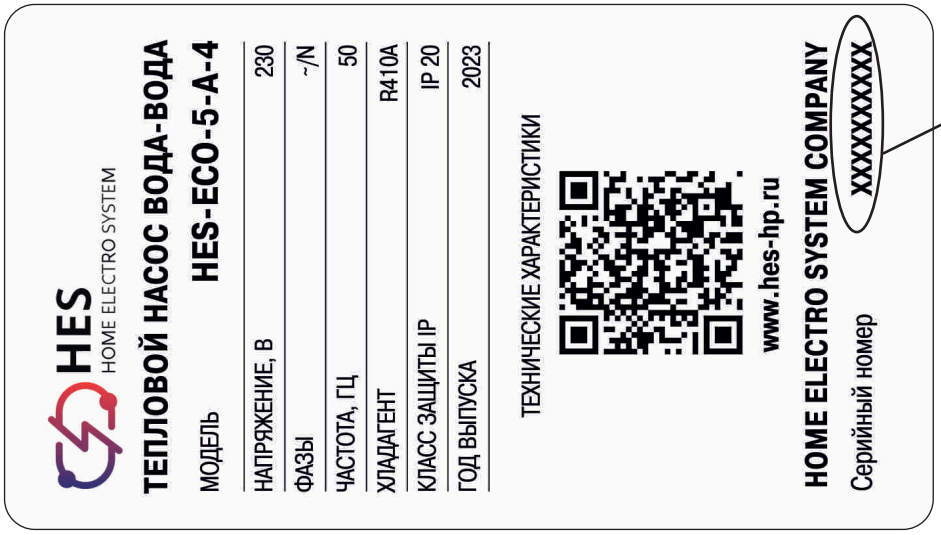
6. Troubleshooting

The fault	Cause	Remedy
There is no hot water or the heating system remains cold.	The fuse is faulty.	Check the fuses of the building's electrical network.

6.1 Other problems

If it is impossible to fix this problem on your own, please contact a specialist. You need to tell him the numbers indicated on the nameplate to get help more quickly. The nameplate is located on the device in front of the right or left side panel of the device.

Example of a nameplate



1 - number nameplate

MOUNTING

7. SAFETY PRECAUTIONS

Installation, start-up, as well as maintenance and repair of the device must be carried out only by a qualified specialist.

7.1 General safety instructions

We guarantee the perfect operation of the device and the safety of operation only if you use original accessories and spare parts.

7.2 Regulations, standards and provisions

INSTRUCTION
You have to comply with all national and regional regulations and rules.

8. DESCRIPTION OF THE DEVICE

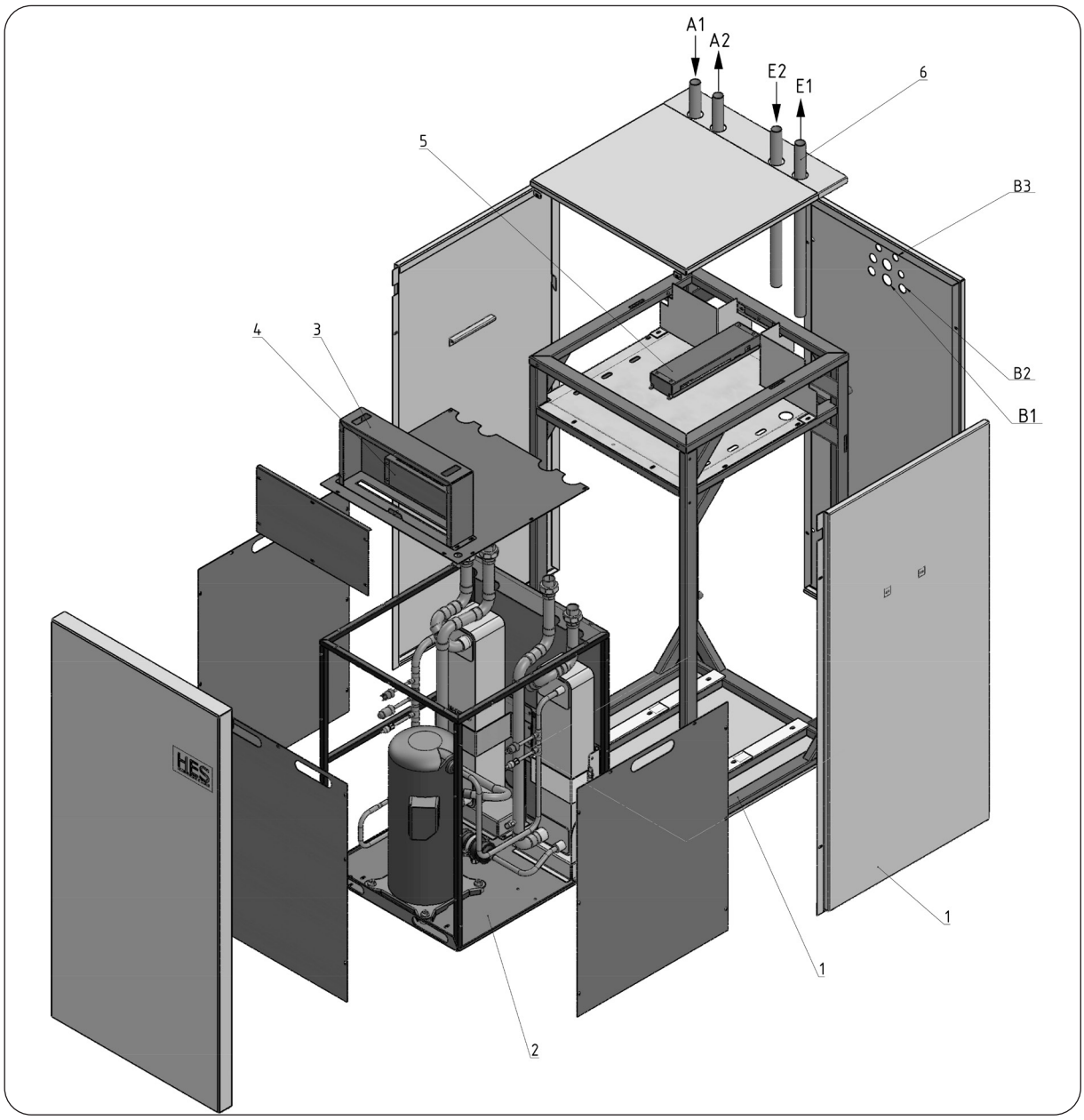
8.1 The principle of operation

The ambient heat is taken from the heat source through a heat exchanger (evaporator) located on the side of the heat source. The energy absorbed in this case, together with the energy of the compressor drive, is transferred to the liquid of the heating circuit in a heat exchanger (condenser) located on the heating side. Depending on the heating load, the mains water of the heating system can be heated up to +58 °C.

Hot water is prepared through a heat exchanger built into the storage water heater.

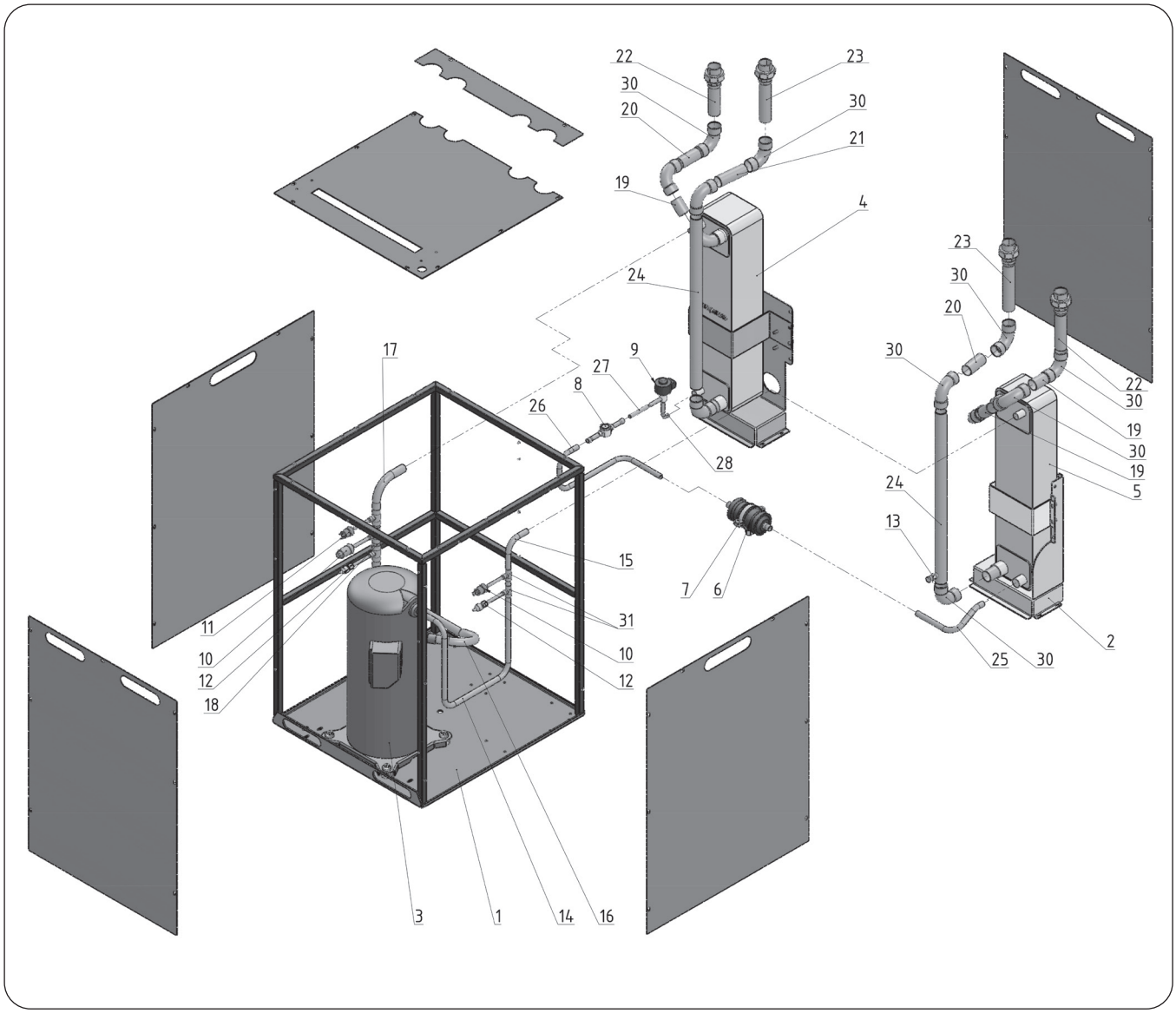
8.2 The scope of delivery

8.2.1 The main components of the heat pump



1 - HES ECO heat pump
2 - «Hydraulic assembly»
3 - Electric switchboard
4 - «Board housing 207x72»
5 - «Board housing 275x72»
6 - Pipe D28
7 - Plug D40

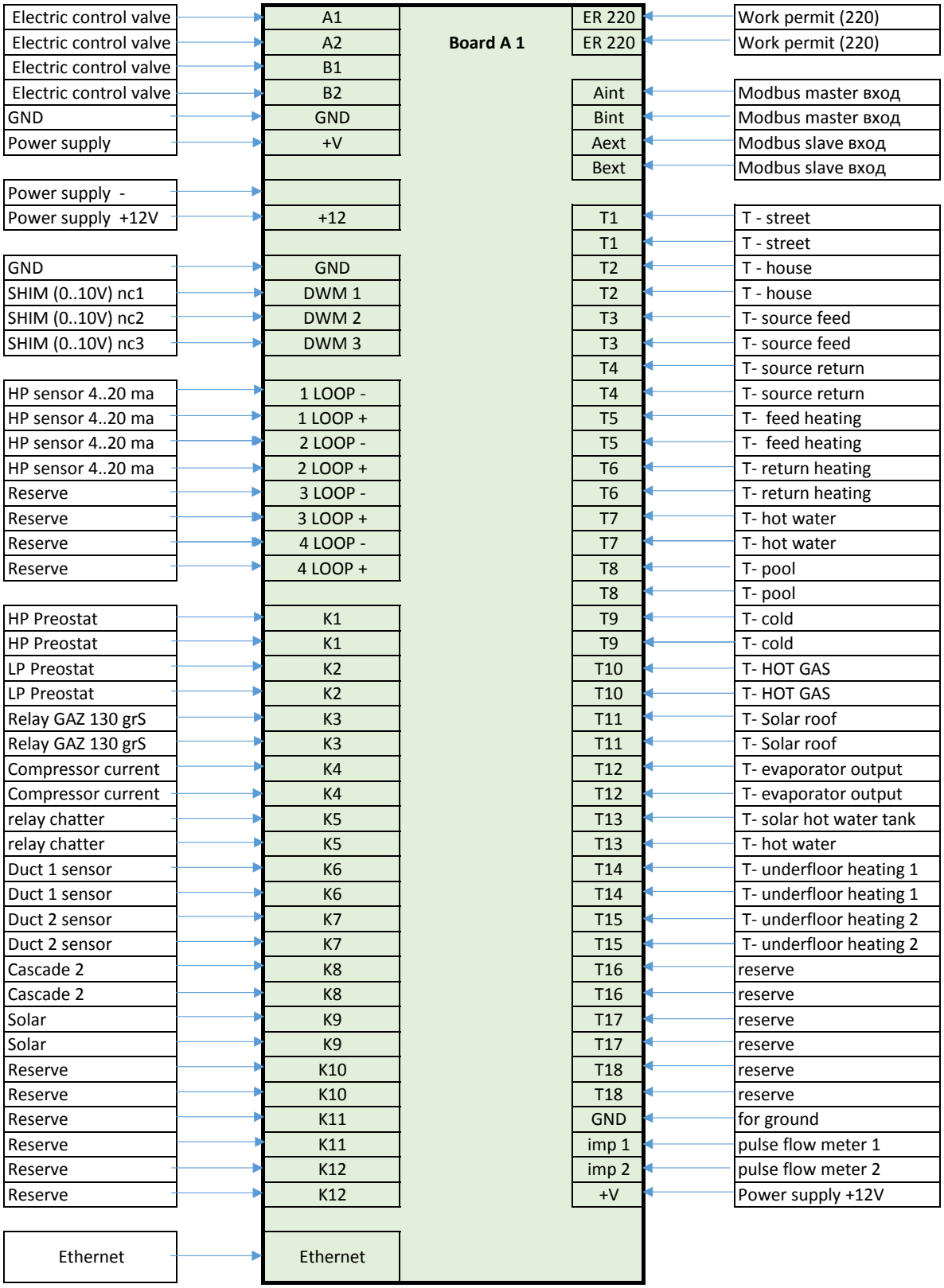
Source of heat
A1 - feed line;
A2 - return line.
Heating
E1 - Refrigerant supply to the condenser;
E2 - Refrigerant return from the condenser.



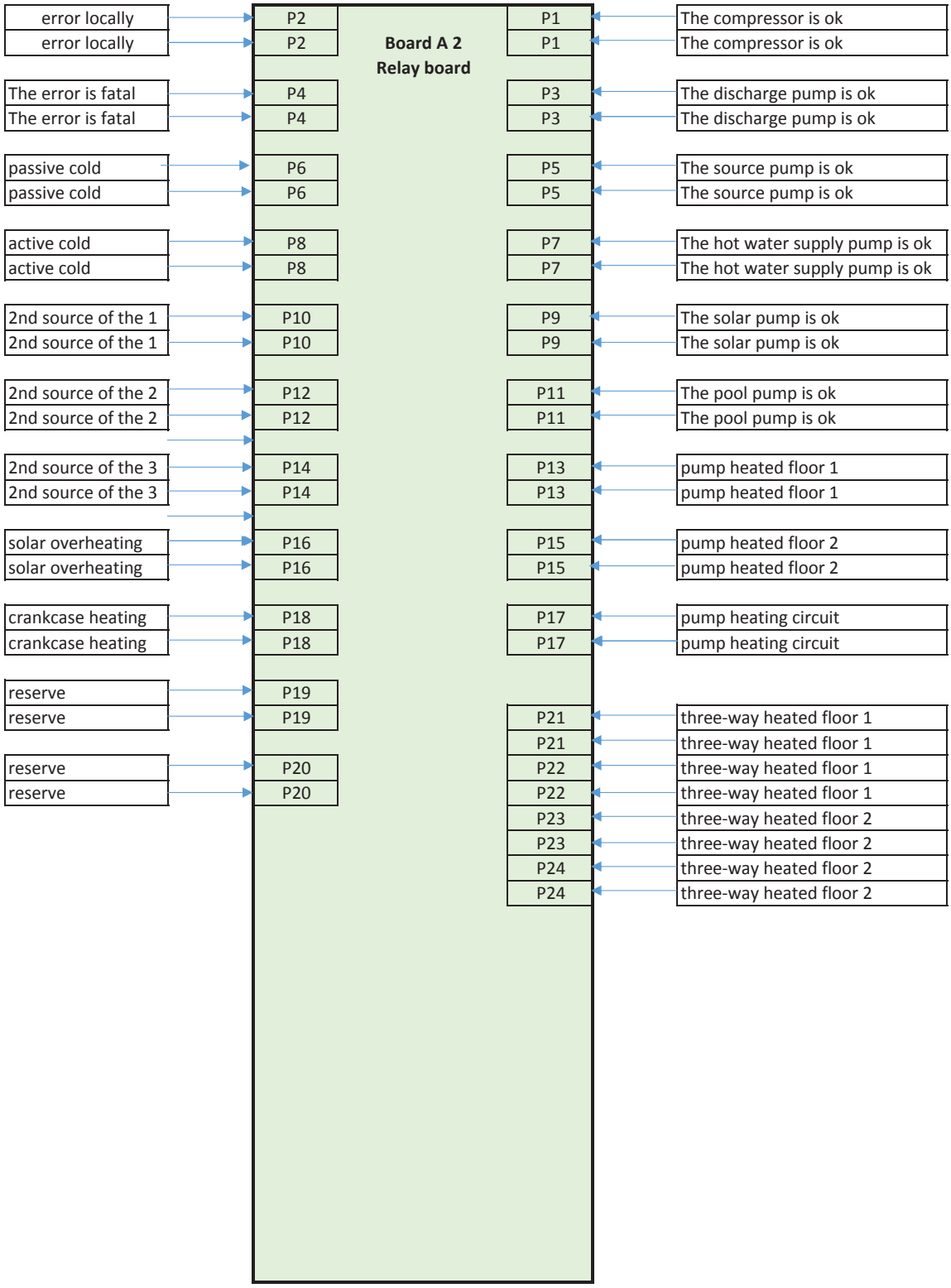
1 - Pallet and frame
2 - «Support for the evaporator»
3 - Compressor
4 - BPHE vaporizer
5 - Ball valve
6 - Filter dryer
7 - Pipe clamp
8 - Sight glass
9 - Electric control valve
10 - Pressure sensor
11 - Pressostat
12 - Schrader valve
13 - Air-purge valve n10
14 - Pipe 1
15 - Pipe 1.1
16 - Pipe 2
17 - Pipe 2.1
18 - Pipe 2.2
19 - Pipe 3
20 - Pipe 3
21 - Pipe 3
22 - Pipe 4
23 - Pipe 4
24 - Pipe 6
25 - Pipe 7
26 - Pipe 8
27 - «Double-pipe tap»
28 - «Double-pipe tap»
29 - «Threaded connection element»
30 - Unequal tee

8.2.2 Pinout of the controller board connectors

A1 board



A2 board


Board A 2
Relay board
error locally
error locally
The error is fatal
The error is fatal
passive cold
passive cold
active cold
active cold
2nd source of the 1
2nd source of the 1
2nd source of the 2
2nd source of the 2
2nd source of the 3
2nd source of the 3
solar overheating
solar overheating
crankcase heating
crankcase heating
reserve
reserve
reserve
reserve
P2
P2
P4
P4
P6
P6
P8
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P10
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P15
P15
P17
P17
P21
P21
P22
P22
P23
P23
P24
P24
The compressor is ok
The compressor is ok
The discharge pump is ok
The discharge pump is ok
The source pump is ok
The source pump is ok
The hot water supply pump is ok
The hot water supply pump is ok
The solar pump is ok
The solar pump is ok
The pool pump is ok
The pool pump is ok
pump heated floor 1
pump heated floor 1
pump heated floor 2
pump heated floor 2
pump heating circuit
pump heating circuit
three-way heated floor 1
three-way heated floor 1
three-way heated floor 1
three-way heated floor 1
three-way heated floor 2
three-way heated floor 2
three-way heated floor 2
three-way heated floor 2

9. PREPARATORY ACTIVITIES

9.1 General information

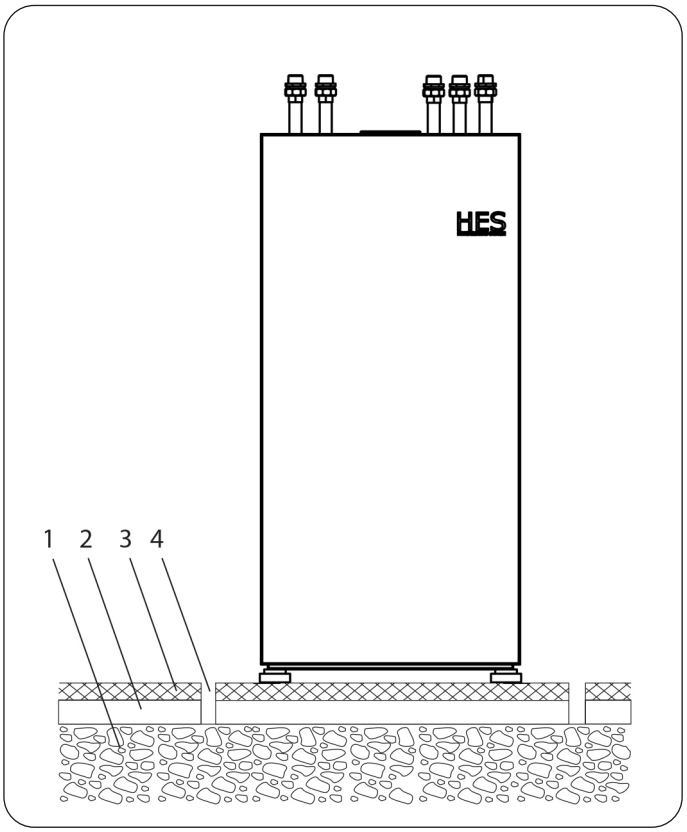
INSTRUCTION

This heat pump is designed for indoor installation, except in humid areas.

The heat pump should not be installed under or next to the bedrooms. Pipe passages through walls and ceilings must be isolated from building noise.

The room in which the device is installed must meet the following requirements:

- ▸ Heated.
- ▸ Have a solid floor (the weight of the device is indicated in the technical specifications).
- ▸ Have a horizontal, level, and solid base to adjust the support legs of the heat pump.
- ▸ In order to ensure the quiet operation of the heat pump when it is installed on a seamless floor with an insulating base, an opening should be made in it along the edge of the connection to the installation site.
- ▸ The room must not be explosion-prone due to the presence of dust, gases, or vapors.
- ▸ The floor area in the installation room should be at least 3 m^2, while its volume should not be less than 6 m^3.
- ▸ When you install the heat pump in the boiler room together with other heating devices, please make sure that this will not adversely affect the operation of other heating devices.



1 - Concrete floor

2 - Isolation from shock noise

3 - Seamless floor on an insulating base

4 - Opening

9.2 ELectrical installation

WARNING: danger of electric shock
Any electrical connection and installation work must be carried out in accordance with national and regional regulations.

WARNING: danger of electric shock
The connection to the power supply must be permanent. The device must be disconnected from the mains with a solution of all contacts of at least 3 mm at all poles. The fulfillment of this requirement is ensured by contactors, linear circuit breakers, fuses, etc.

Damage to the device
The mains voltage must match the one indicated on the plate. The data on the nameplate should be observed.

Taking into account the fuses, please use a cable with a cross section:

Fuse	Cable cross
C 16 A	2,5 mm²

The electrical characteristics are given in the «Parameter Table».

INSTRUCTION
Separate protective circuit breakers should be installed on the electrical circuits of the device and the control unit.

9.3 Intermediate storage

It is recommended to use a buffer accumulator to ensure the trouble-free operation of the heat pump.

The buffer storage is used not only for the hydraulic isolation of volumetric flows in the heat pump circuit and the heating circuit.

10. MOUNTING

10.1 Handling

- ▸ Transport the device in a package to protect it from damage.
- ▸ Protect the device from strong impacts during transportation.

- If the device is tilted during transportation, you can do this only for a short time on one of the sides.

The longer the device is in an inclined position, the more refrigerant oil is distributed in the system.

- Storage and transportation at temperatures below -20 °C and above are not allowed + 50 °C.

10.2 Installation

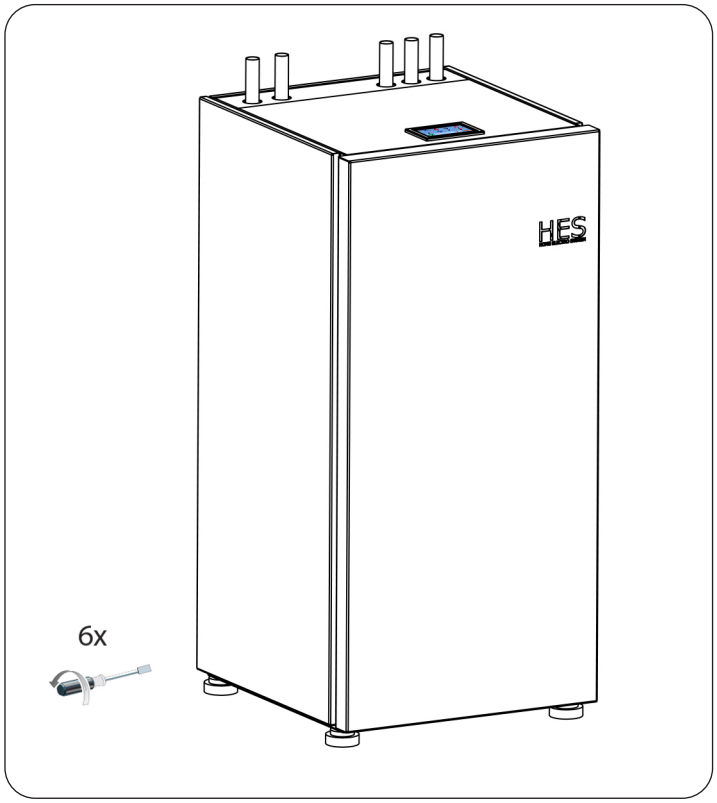
▸ Remove the packaging film and upper and side shock-absorbing pads made of expanded polystyrene.

▸ Tilt the device slightly backward and remove it from the pallet.

▸ Place the device on a prepared base.

▸ Minimum intervals should be observed (see chapter «Connections and measures»).

▸ Unscrew the six screws on the front panel of the device

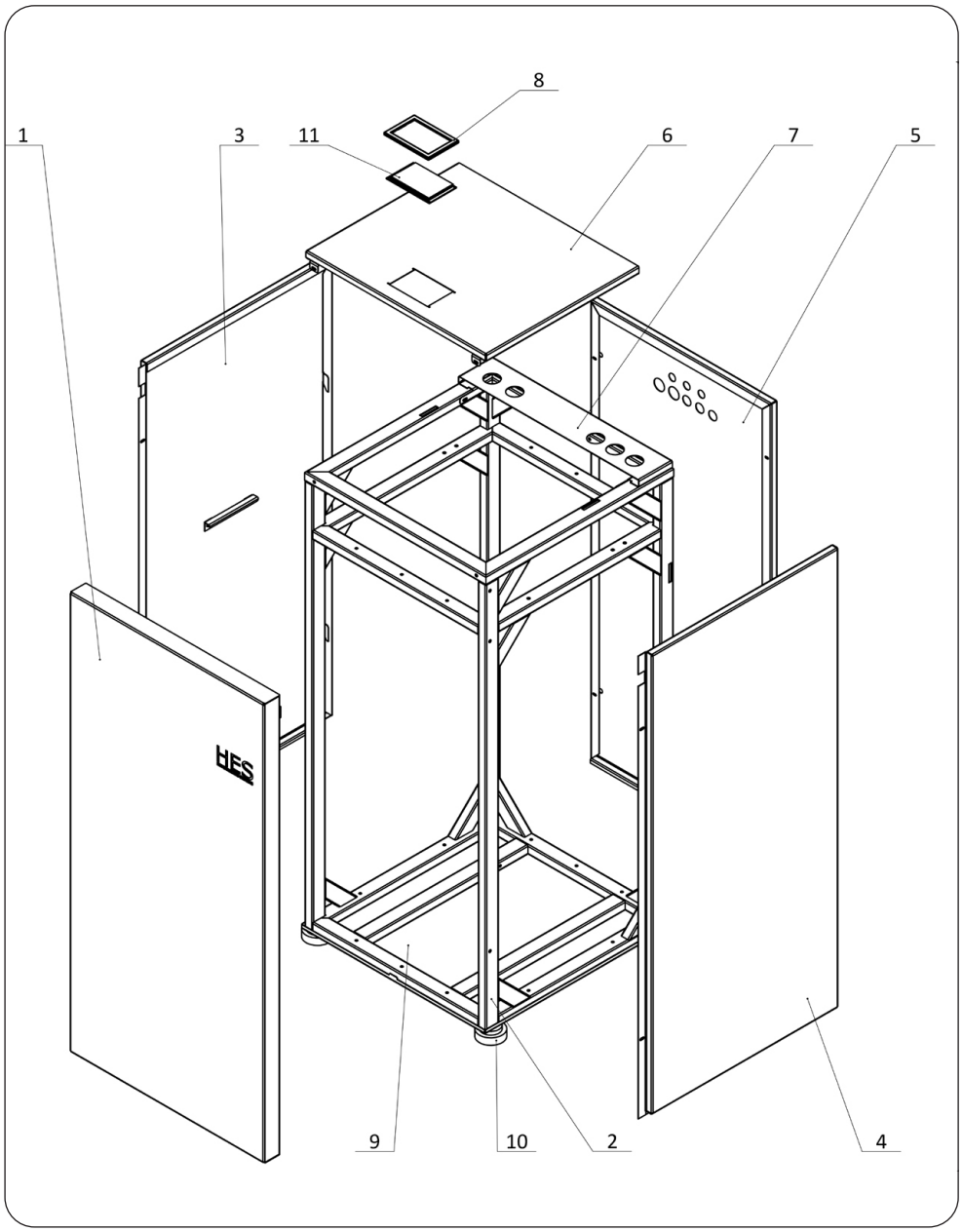


Damage to the device

The housing must be disconnected from the cooling unit plate and left standing on the floor!

10.3 Dismantling of cladding parts

When you remove the front cover, take care not to break the tubes connecting the heat pump control system to the junction box. This also applies to the connection of a protective wire which provides an electrical connection of the front casing to the housing.



1 - front panel
2 - HES frame
3 - left panel
4 - right panel
5 - back panel
6 - top panel - 1
7 - top panel - 2
8 - monitor frame
9 - lower panel
10 - vibration support
11 - HES monitor

10.4 Installation of the heat source circuit (salt solution)

The external contour of the heat source (the brine contour) must be made in accordance with the design documentation.

10.4.1 Circulation pump and required volume flow

A circulation pump with a wet rotor is installed to supply the brine. The circulation pump must comply with the operating conditions of the system, that is, take into account the nominal volume flow and pressure loss (see «Technical characteristics»).

At any brine temperature, sufficient volumetric flow must be ensured, that is: the permissible deviation of the nominal volumetric flow rate at a brine temperature of 0 ° C is +10%.

10.4.2 Connection and filling with brine

Before connecting the heat pump, please check the tightness of the heat source circuit and thoroughly rinse it.

You need to determine the volume of the heat source circuit.

The volume of brine in the HES ECO heat pump is 5 liters. This should be taken into account when calculating the geo contour.

The total volume of the brine after its preparation from undiluted ethylene glycol and water should be checked for the chloride content in the water. This indicator should not exceed 300 ppm (parts per million).

The ratio of the mixture components

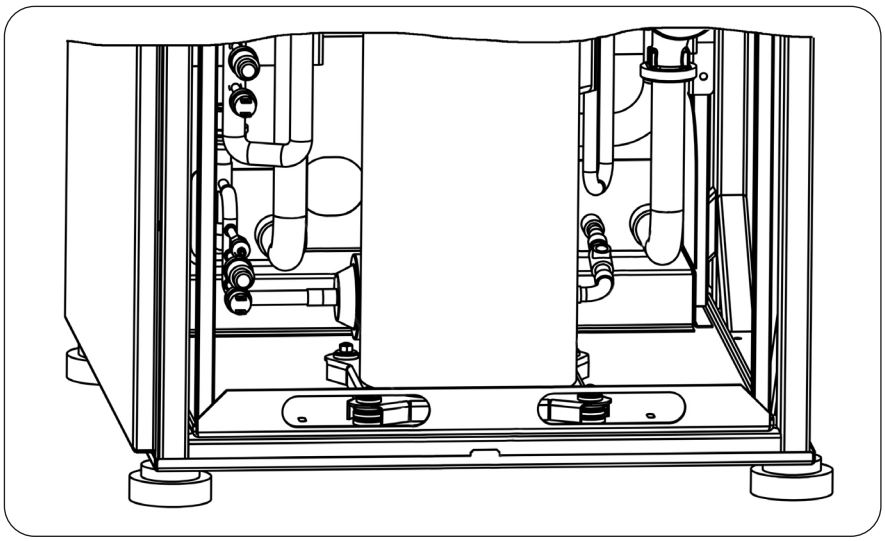
The concentration of brine varies when you use a geothermal collector or a geothermal probe as a heat source.

The ratio of the mixture components is indicated in the following table.

	Ethylene Glycol	Water
Geothermal probe	25 %	75 %
Geothermal collector	33 %	67 %

Filling the brine contour

Fill the device through the valve. See the contour section.



Checking the brine concentration:

INSTRUCTION
The length of the collector hose depends on the composition and water saturation of the rock/soil, the climatic zone, and the climate control system (radiators or floor heating system), as well as the heating requirements of the building. The size of each installation must be selected individually.

The maximum length of one branch for a collector should not exceed 400 m.

In cases when you need to have several collectors, they must be connected in parallel with the possibility of adjusting the flow of the corresponding branch.

To take the heat from the topsoil, the hose should be laid at a depth appropriate to local conditions, and the distance between the hoses should be at least 1 meter.

In the case of drilling several wells, the distance between them must correspond to local conditions.

You have to ensure uniform lifting of the manifold hose in the direction of the heat pump in order to avoid the formation of air pockets. If this is not possible, ventilation holes should be used.

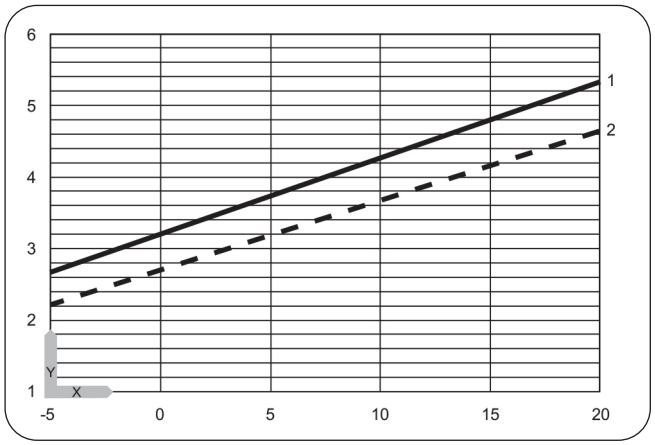
Since the temperature in the brine system can drop below 0 °C, the system should be protected from freezing to a temperature of - 15 °C.

10.4.3 Control of the volumetric flow rate of the heat source

The volume flow rate in the heat source is set by the temperature difference in the circuit of the heat source.

Determine the temperature difference. To do this, turn on the device in heating or hot water preparation mode.

The maximum temperature difference of the heat source circuit.



Y - is the max temperature difference [K]

X - is the temperature of the heat source at the inlet [°C]

1 - 35 °C heating system supply line

2 - 58 °C heating system supply line

INSTRUCTION
When you specify the source according to the device commissioning statement, set «Ethylene Glycol» on the HES controller, otherwise, the frost protection relay will turn off the heat pump at temperatures below 7 °C.

INSTRUCTION
The temperature of the heat source at the inlet can be read on the display of the heat pump control system in the Info Temperatures menu section.

10.5 Connection of heating circuits

The heating system with a heat pump must be performed by a specialist in accordance with the wiring diagram of the heating/water supply system contained in the design documentation.

▸ The piping system should be thoroughly rinsed before connecting the heat pump. Impurities such as welding grease, rust, sand, sealing material, etc. negatively affect the operational safety of the heat pump.

▸ Connect the heat pump from the heating system side. Keep an eye on the tightness.

You need to ensure that the supply line and the return line of the heating system are connected correctly.

Carry out thermal insulation measures in accordance with the applicable regulatory documents.

When you design the heating circuit, please observe the maximum achievable value of the external pressure difference.

10.5.1 Oxygen diffusion

Damage to the device
The use of open heating systems or steel pipes in combination with plastic pipe systems that are not protected from diffusion for floor heating should be avoided.

When you use floor heating systems made of plastic pipes that are not protected from diffusion, or open heating systems, an internal tank, metal radiators, or steel pipes can corrode due to the oxygen diffusion onto steel parts.

Corrosion products, such as rust deposits, can settle in the heat pump condenser and, as a result of the narrowing of the cross-section, cause a loss of heat pump power or shutdown due to the operation of a high-pressure switch.

10.5.2 The second external heat generator

In bivalent heating systems, the heat pump should always be connected to the main line of the second heat generator (for example, a liquid fuel boiler).

The high temperature of the mains water: In the bivalent mode, the reverse flow of water from the second heat generator can be passed through the heat pump directly after its shutdown, but at a maximum permissible temperature of 80 °C.

10.5.3 Water quality

Please observe the following when you fill the system with water for heating to minimize damage from the formation of lime deposits:

The total hardness of the water should be 1 °dH (0.18 mmol/l of alkaline areas).

If it is impossible to fulfill the above requirements, please take measures to soften the water.

Damage to the device
It is forbidden to use completely desalinated or rainwater as this leads to accelerated corrosion. You can buy appropriate equipment for softening water and filling/ flushing heating systems in specialized stores.

10.5.3 Removing air from the heating system

- Carefully remove air from the piping system.

10.6 Electrical connection

INSTRUCTION
Follow the operating and installation instructions provided with the heat pump control module

Connection work can only be performed by a specialist with a permit and in accordance with this manual!

Please obtain technical specifications from the relevant electrical grid company for connecting the device.

▸ Follow the instructions in the «Preparatory work for electrical installation» chapter.

WARNING: Risk of electric shock
Please unplug the device before starting work on the junction box.

INSTRUCTION
The connection terminals are located in the junction box of the device.

INSTRUCTION
After connecting the device, the provisions of the «De-installation of cladding» chapter must be observed.

Cables that comply with the regulations must be used for connection.

▸ Open the hinged lid on the junction box. To do this, unscrew the mounting screws on the side, on top of the junction box.

▸ All connecting wires and sensor wires should be laid through the cable entries provided for this purpose from above in the rear wall (see the «Connections and dimensions» chapter).

▸ Run all wires through the discharge clamp.

▸ Connect the wires according to the illustrations below.

▸ Then check the action of the discharge clamps.

INSTRUCTION
When you close the device case, please follow the instructions in the «Installation of cladding» chapter.

Circulation pumps

The connection of the circulation pumps must be carried out in accordance with the requirements of the design documentation.

Damage to the device
If high-performance circulation pumps are used, they must be connected directly. To do this, an external relay with a breaking power of at least 10 A/250 V AC is required.

Modules

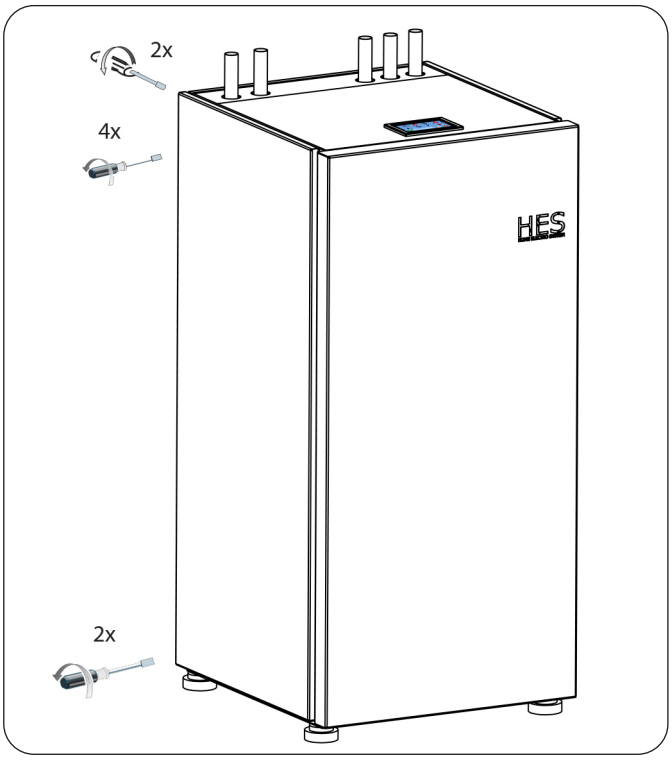
In the modular mode of operation, the connection of individual heat pumps is made through the bus terminal 1,2,3.

It is necessary to make sure that the High, Low and Ground busbars are connected correctly both in the HES heat pump control device and in the heat pump.

10.7 Installation of cladding elements

When you install the cladding, the following instructions must be observed:

- ▸ Close the hinged cover on the junction box.
- ▸ Fix the hinged lid by tightly tightening the mounting screws with toothed elastic washers.
- ▸ Install the cover on the device.
- ▸ After installing the front casing, secure it with screws through the side walls as shown in the figure. When you install the front casing, please install the pads using the appropriate screws and toothed elastic washers. Pads, screws, and toothed elastic washers are included in a separate package.
- ▸ When you install the front cover, the prescribed method of connecting the protective wire must be followed.



11. START-UP

Commissioning of the device, all settings of the thermal pump control device at the commissioning level, as well as teaching the user to operate it, must be carried out by a specialist.

Commissioning must be carried out according to the instructions of this technical data sheet, the heat pump control device operation and installation manual, and the heat pump operation and installation manual.

You can invite our service specialists for commissioning (this service is fee-based).

If this device is used in production, it please take into account the safety regulations provided for during commissioning. Detailed information on this issue can be obtained from the relevant supervisory authority (for example, technical supervision).

After commissioning, please complete the commissioning protocol provided in this manual.

11.1 Monitoring before commissioning of the heat pump control device

Damage to the device
If there is a heated floor heating system, the maximum temperature of the system should be taken into account.

- ▸ Check for the required pressure in the heating system and whether the quick air removal valve is open.
- ▸ Check the correct location and connection of the external sensor and the return line sensor.
- ▸ Check the correct network connections.
- ▸ Check the correct connection of the heat pump connection wire (bus wire).

11.2 Commissioning of the heat pump control device

The commissioning of the heat pump control device and all settings must be carried out according to the operation and installation manual of the heat pump control device.

11.3 Setting up the graphical heating characteristics during initial commissioning

The efficiency of the heat pump decreases as the temperature in the supply line is rising. Therefore, you need to carefully adjust the graphic characteristics of the heating. Overly tuned heating schedules cause the zone or temperature control valves to close, which causes the volume flow to drop below the minimum in the heating circuit.

The graphical characteristics of the heating can be adjusted correctly in the following ways:

- Fully open the temperature control valve(s) or the zone valve(s) in the master room (for example, in the living room and bathroom). We do not recommend installing temperature control or zone valves in the main room. The temperature for these rooms should be adjusted using a remote control.

- Coordinate the graphic characteristics of heating at different outdoor temperatures (for example – 10 °C and 10 °C) so that the desired temperature is set in the main room.

Approximate values for the initial stage:

Parameter	Heated floor	Radiator heating
Heating schedule	0,4	0,8
The dynamics of the regulator	5	15
Room temperature	20°C	20°C

If the room temperature during the transition period (outdoor temperature of about 10 °C) is too low, please increase the «ROOM TEMP» parameter (Indoor temperature).

INSTRUCTION
If the remote control is not installed, increasing the «ROOM TEMPERATURE» parameter (Room temperature) leads to a parallel shift in the heating schedule.

If the room temperature is very low at low outdoor temperatures, please increase the «Heating curve» parameter (Graphical heating characteristic). After increasing the «Heating curve» parameter (Graphical heating characteristic) and at elevated outdoor temperatures, the zone or temperature control valve in the master room must be set to the desired temperature.

INSTRUCTION
Lower the temperature in the entire building using temperature reduction programs rather than by shutting off all central or temperature control valves.

11.4 Device transfer

Explain the principle of the device operation to the user and familiarize him with the rules of the device use.

INSTRUCTION
This operating and installation manual should be handed over to the user for careful storage. Any instructions in this manual must be carefully followed. They contain important information on safety, operation, installation and maintenance of the device.

11.5 Management and operation

Damage to the device

The power supply must not be interrupted even after the end of the heating season. When the power supply is turned off, the active protection of the system from freezing is not guaranteed.

You do not need to turn off the system in summer. The control system of the heat pump automatically switches from winter to summer time.

12. DECOMMISSIONING

If installation decommissioning is required, the heat pump control system should be put into standby mode. At the same time, the functions of ensuring safety and protection against defrosting remain active.

Damage to the device

When the heat pump is completely turned off and there is a risk of frost, you need to drain the water from the system.

13. MAINTENANCE AND CLEANING

If there is a built-in heat meter, you need to regularly clean the sieves, even if they are slightly clogged.

In case of failures in the operation mode of the heat pump (for example, when the VD control relay is triggered) caused by deposits of corrosion products (rust plaque) in the condenser, their removal by chemical means using special solvents can only be performed by the service department.

14. TROUBLESHOOTING

INSTRUCTION

You need to comply with the requirements of the operating and installation instructions supplied with the heat pump control device.

INSTRUCTION

Only a qualified specialist has the right to perform control according to the following instructions.

If the malfunction is not detected using the heat pump control device, control of the elements on the integrated heat pump control should be performed.

▸ Open the junction box.

▸ To fix the problem, read the following sections and follow the instructions.

14.1 Elements on the IHPC module

IHPC (Integrated Heat Pump Control) provides assistance in detecting faults that have not been identified by the HES heat pump control device.

14.1.1 LEDs

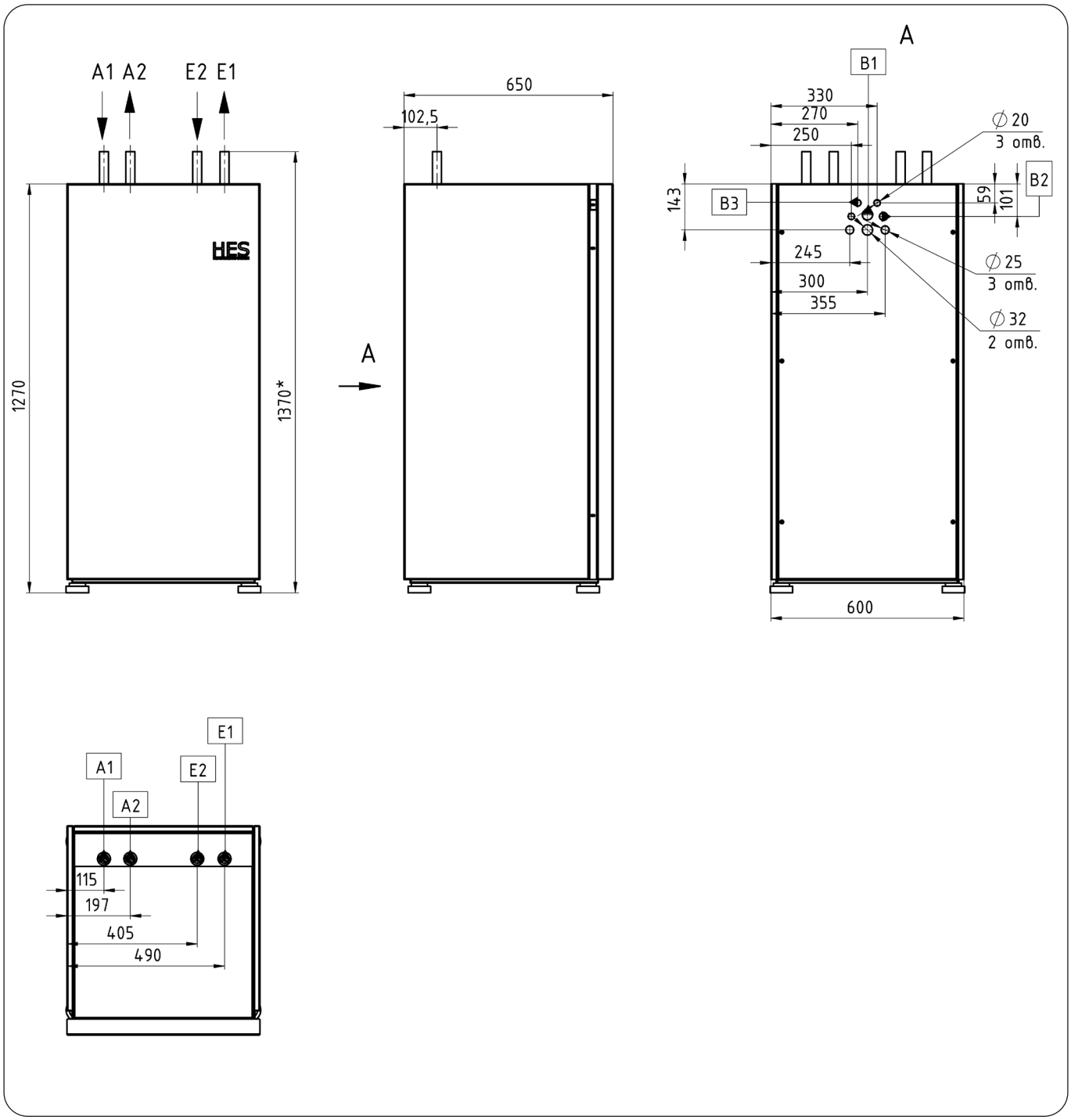
The fault	Cause	Remedy
The device turns off and it turns on again after the idle time has elapsed. The yellow LED is glowing.	The malfunction of the heat pump was detected.	Check the failure message on the HES heat pump control device. To solve the problem, use the manual of the heat pump control device (list of faults). Reset the integrated control of the heat pump (see the HES controller manual).
The device turns off completely. The red LED lights up.	Three malfunctions were detected during an hour and a half of the system operation.	Check the failure message on the HES heat pump control device. To solve the problem, use the manual of the heat pump control device (list of faults). Reset the integrated control of the heat pump (see the HES controller manual).

14.1.2 Reset and restart

A complete error reset, a fatal error reset, or a rollback to factory settings is performed through the service settings menu.

15. TECHNICAL SPECIFICATIONS

15.1 Connections and dimensions



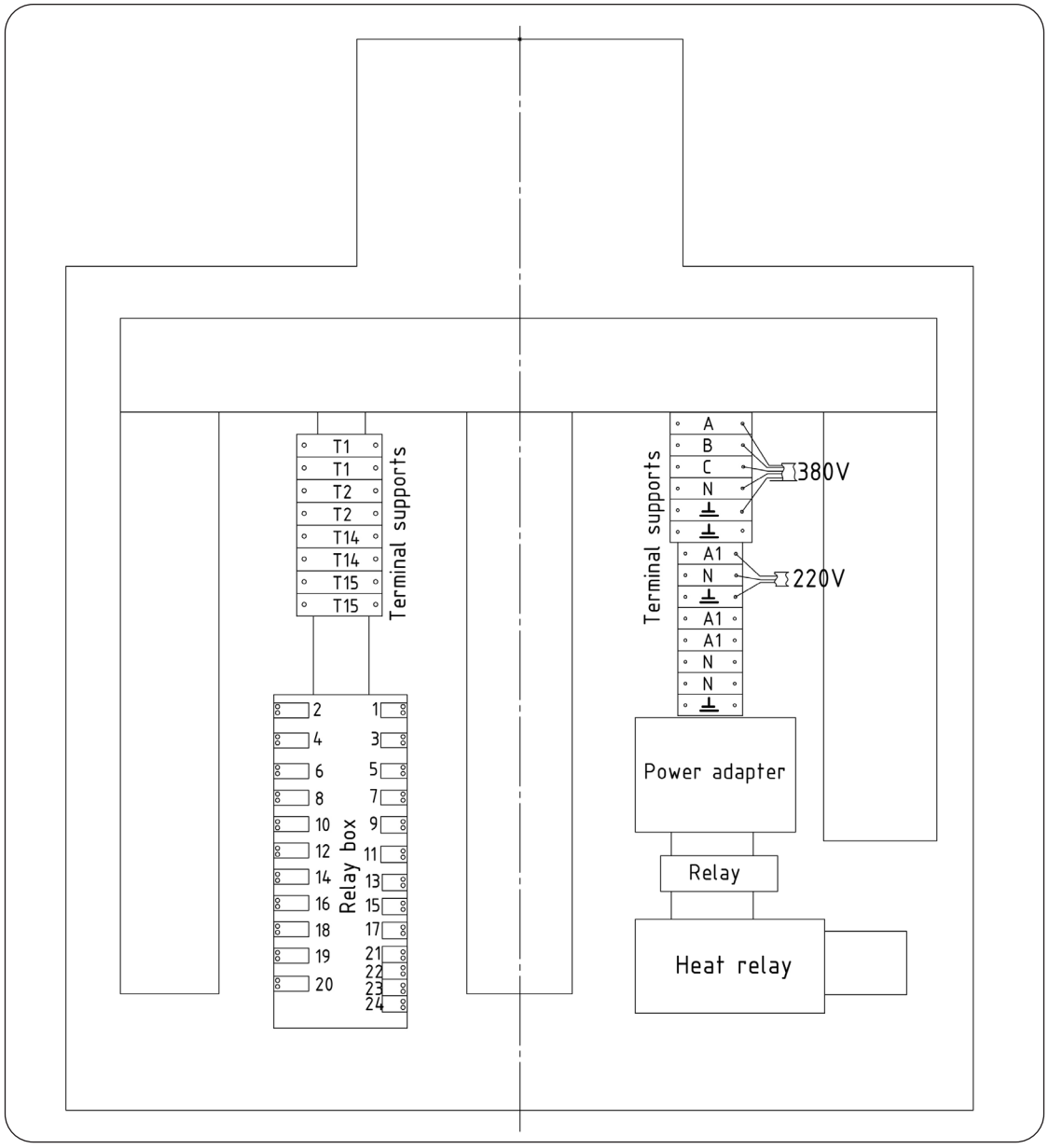
Source of heat
A1 - feed line;
A2 - return line.

Heating
E1 is the feed line;
E2 is the return line.

Electrical Connection
B1 - wiring input;
B2 is the input for the electric cable;
B3 is the safety kit.

15.2 Electrical circuits

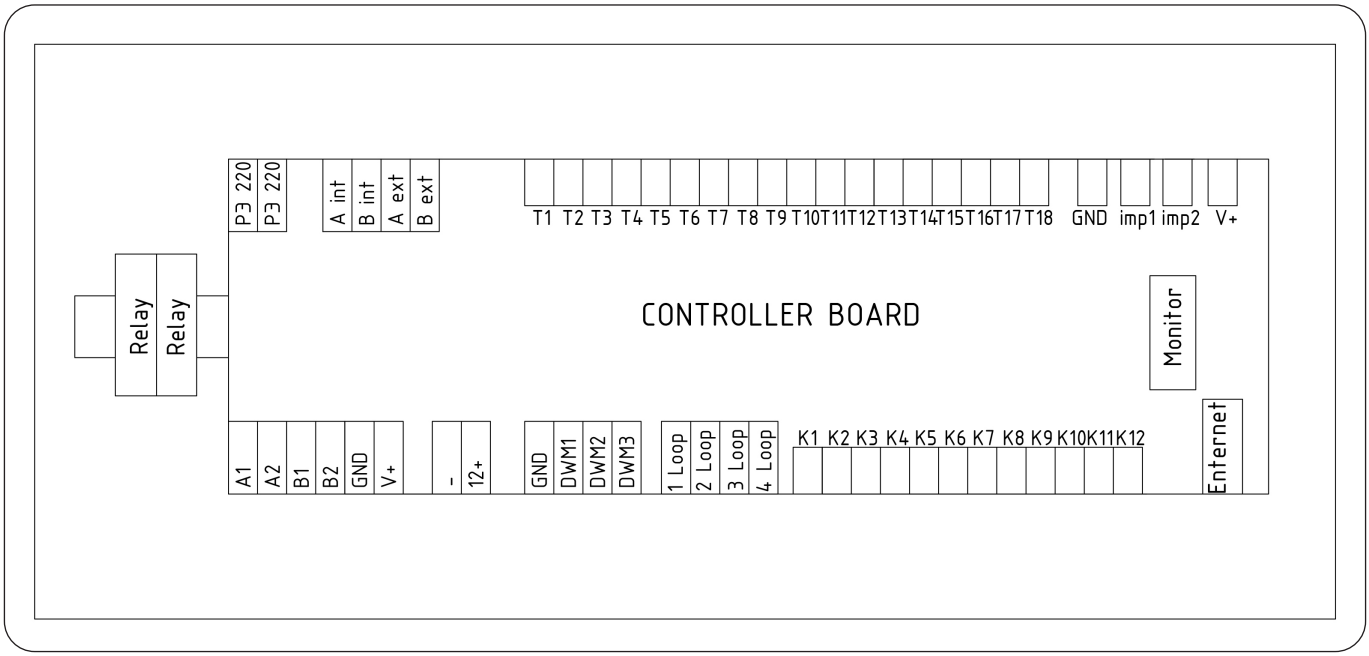
Electrical connection (upper tier)



Symbols

T1 - street temperature
T2 - house temperature
T14 - floor heating temperature 1
T14 - floor heating temperature 2
A,B,C - compressor power supply phase (power part);
A1 - control phase;
N - zero;
⏚ - grounding;
1. Compressor
2. Error (local)
3. Discharge pump
4. Error
5. Pump source
6. Passive cold
7. Hot water supply pump
8. Active cold
9. Solar pump
10. 2nd power supply of the 1st element
11. Pool pump
12. 2nd power supply of the 2nd element
13. Underfloor heating pump 1
14. 2nd power supply of the 3rd element
15. Underfloor heating pump 2
16. Solar overheating
17. Heating circuit pump
18. Crankcase heating
19. Reserve
20. Reserve
21. Three-way valve heated floor 1
22. Three-way valve heated floor 1
23. Three-way valve heated floor 2
24. Three-way valve heated floor 2

Electrical connection (electrical panel above the waterworks)

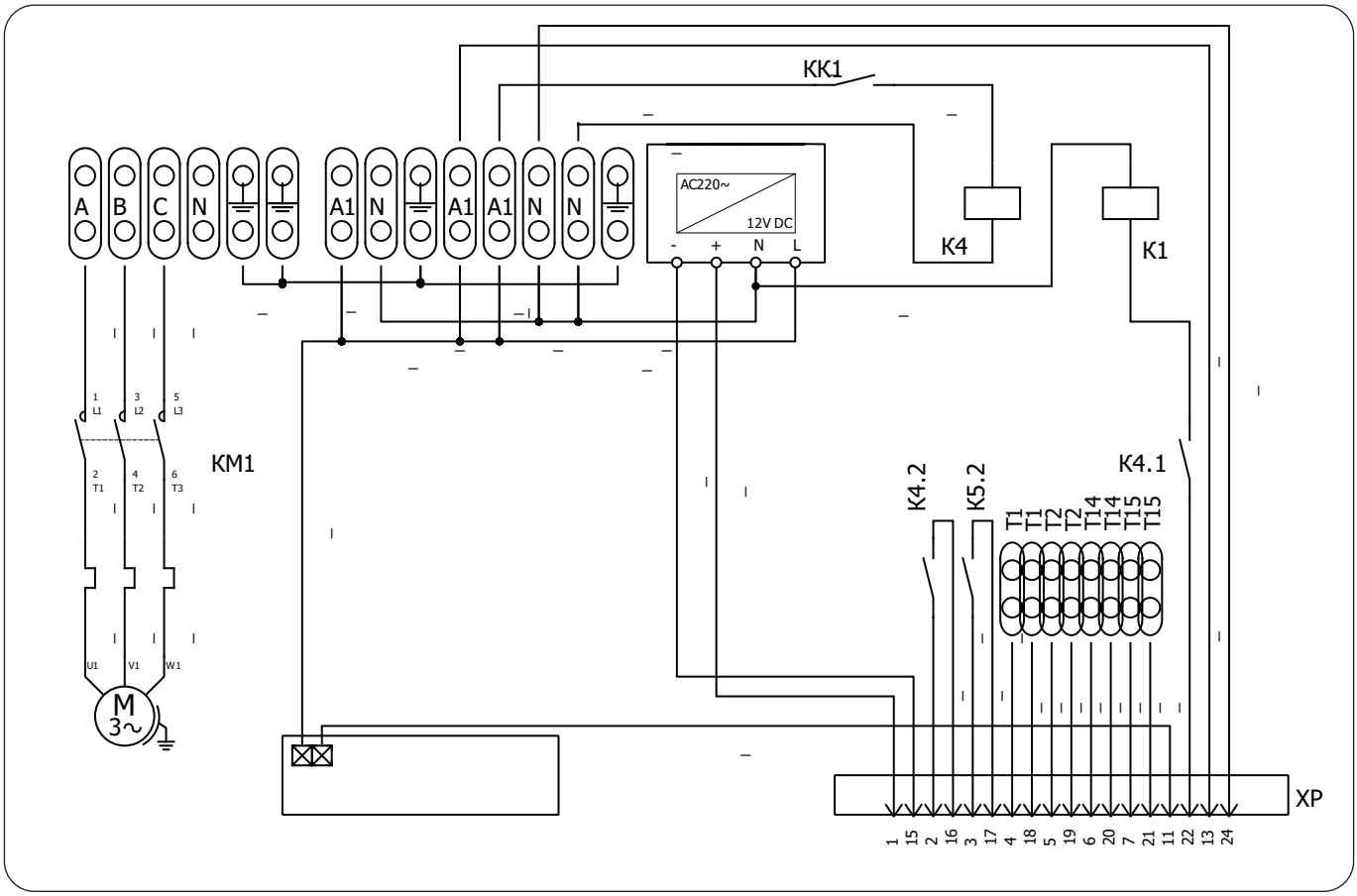


Symbols

A1 - ERV
A2 - ERV
B1 - ERV
B2 - ERV
GND - ground
V+ - power supply+ 12V
- - nutrition -
V+ - power supply+ 12V
DWM1 - SHIM (0..10V) nc1
DWM2 - SHIM (0..10V) nc2
DWM3 - SHIM (0..10V) nc3
Loop 1 - Sensor HP 4..20mA
Loop 2 - Sensor LP 4..20mA
1 Loop - reserve
1 Loop - reserve
K1 - HP pressostat
K2 - LP pressostat
K3 - relay gas 130 C
K4 - compressor current
K5 - relay chatter
K6 - D. duct 1
K7 - D. duct 2
K8 - cascade 2
K9 - Solar
K10 - reserve
K11 - reserve
K12 - reserve
Enternet - the Internet

RE 220 - Operation resolution (220V)
Aint - Modbus master (input)
Bint - Modbus master (input)
Aext - Modbus slave (output)
Bext - Modbus slave (output)
T1 - Dark street
T2 - Dark House
T3 - Source temperature (supply)
T4 - Source temperature (return)
T5 - Heating temperature (supply)
T6 - Heating temperature (return)
T7 - Hot water supply temperature
T8 - Pool temperature
T9 - Cold temperature
T10 - HOT gas temperature
T11 - Solar temperature (roof)
T12 - Evaporator temperature (outlet)
T13 - Solar Hot water supply tank temperature
T14 - Underfloor heating temperature 1
T15 - Underfloor heating temperature 2
T16 - Reserve temperature
T17 - Reserve temperature
T18 - Reserve temperature
GND - ground;
imp1 - pulse flow meter 1
imp2 - pulse flow meter 2
V+ - 12V power supply

Electrical power circuit



15.3 HES ECO 5 Power Diagram

Notation to the power diagram

Y Heating capacity [kW] / Power consumption [kW] / Power factor e [-]

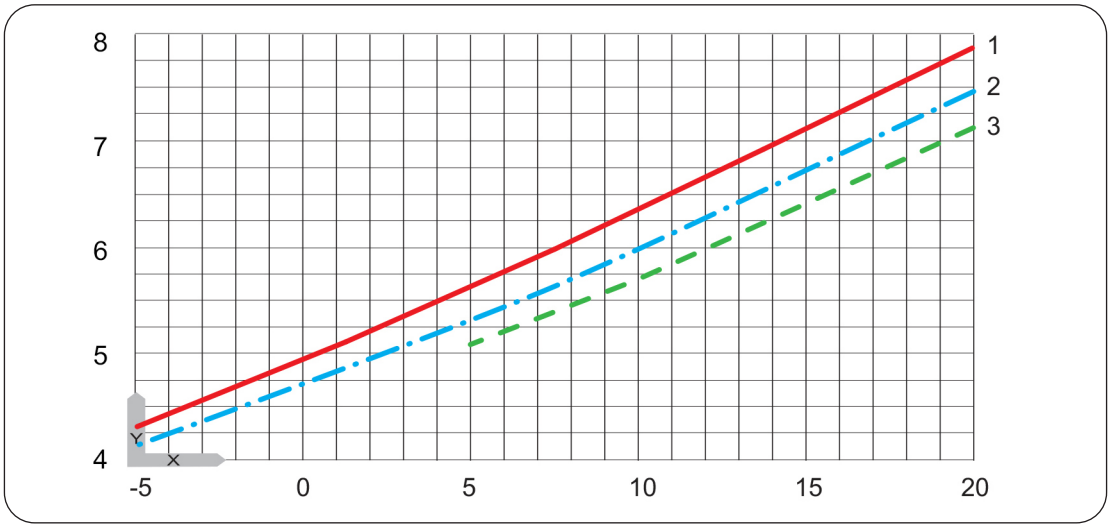
X Inlet medium temperature WQA [°C]

1 Supply line temperature 35 °C, full load

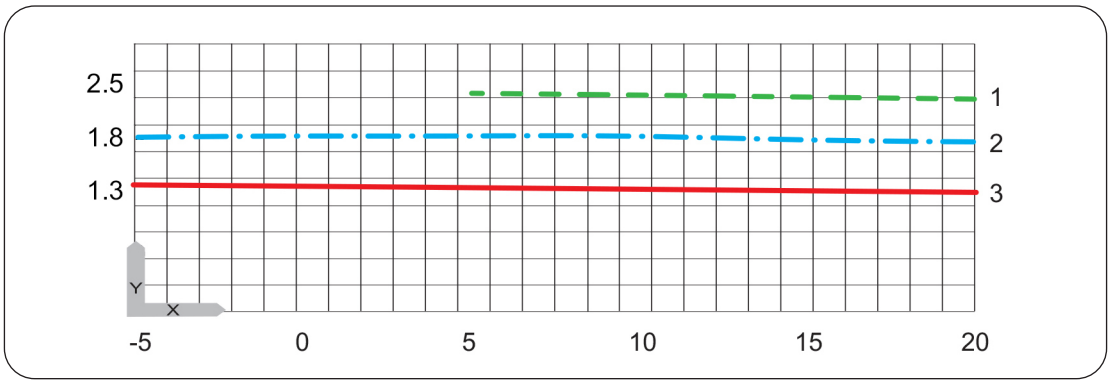
2 Supply line temperature 50 °C, full load

3 Supply line temperature 58 °C, full load

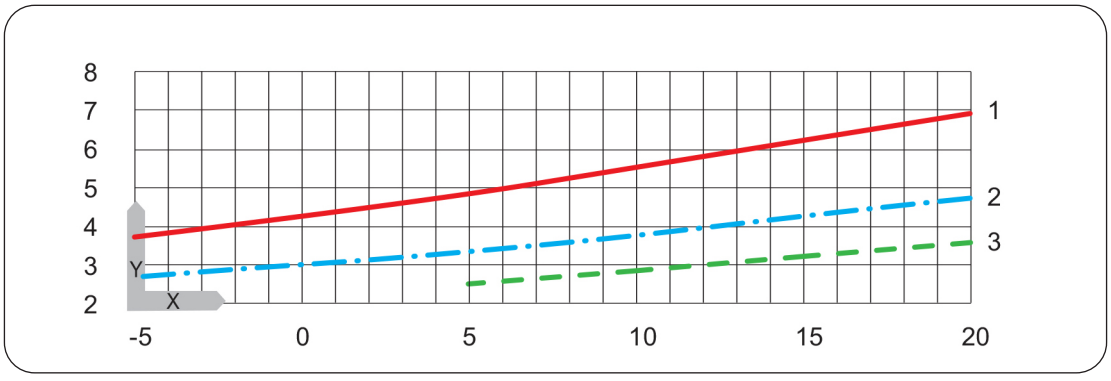
Heating capacity HES ECO 5



Power consumption HES ECO 5



Power factor HES ECO 5



15.4 HES ECO 7 Power Diagram

Notation to the power diagram

Y Heating capacity [kW] / Power consumption [kW] / Power factor e [-]

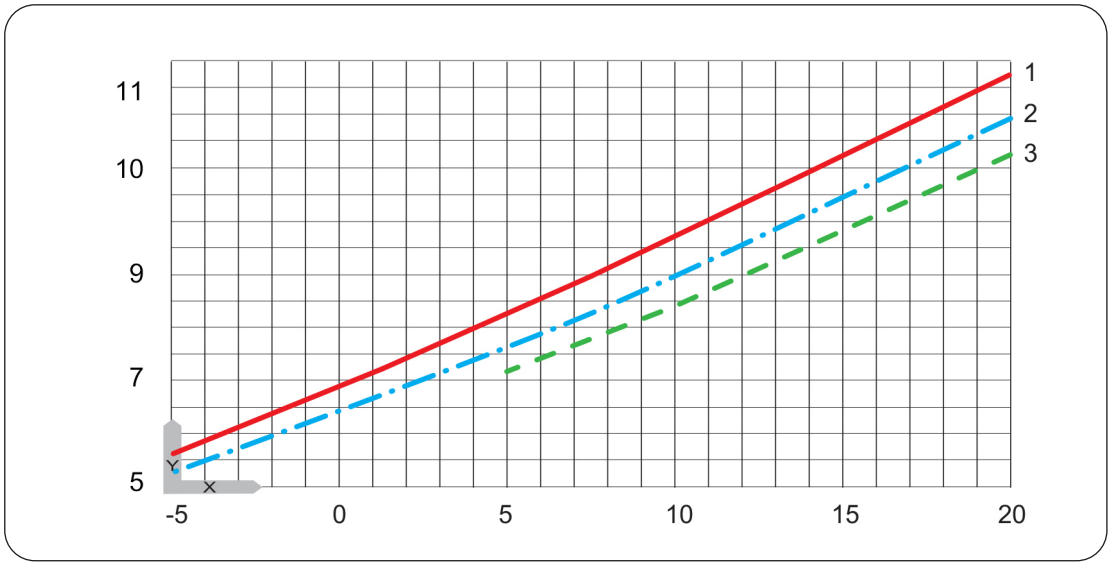
X Inlet medium temperature WQA [°C]

1 Supply line temperature 35 °C, full load

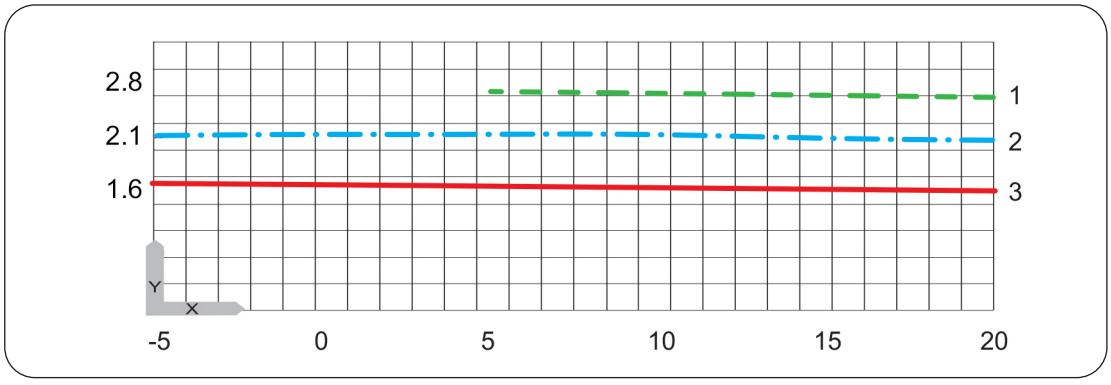
2 Supply line temperature 50 °C, full load

3 Supply line temperature 58 °C, full load

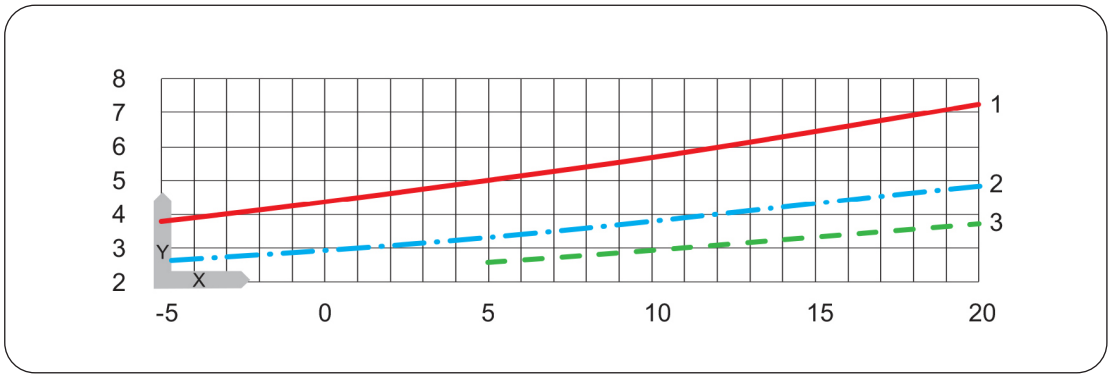
Heating capacity HES ECO 7



Power consumption HES ECO 7



Power factor HES ECO 7



15.5 HES ECO 10 Power Diagram

Notation to the power diagram

Y Heating capacity [kW] / Power consumption [kW] / Power factor e [-]

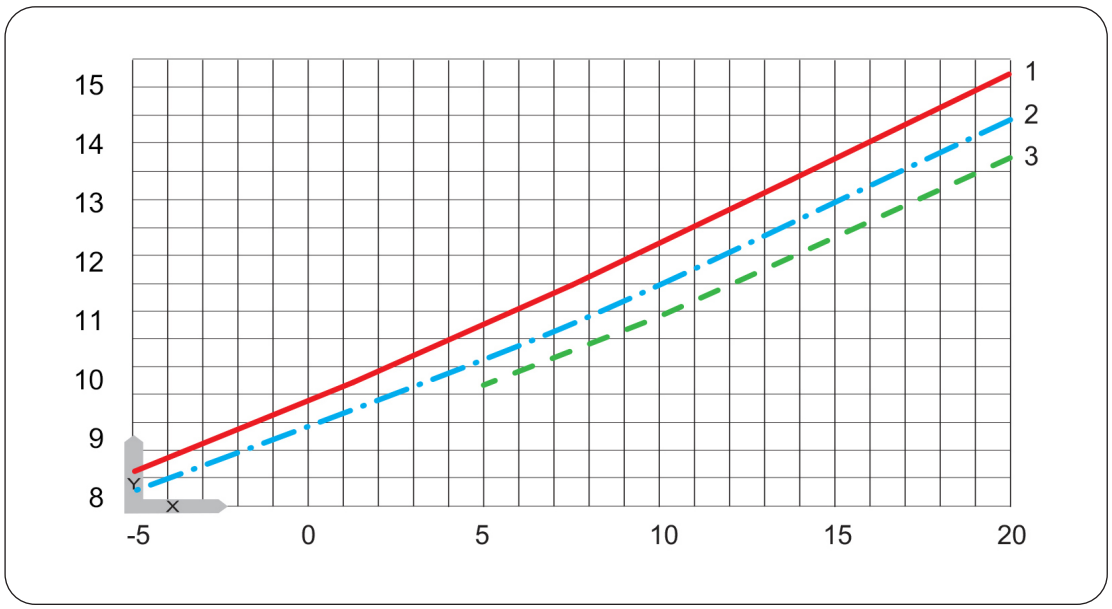
X Inlet medium temperature WQA [°C]

1 Supply line temperature 35 °C, full load

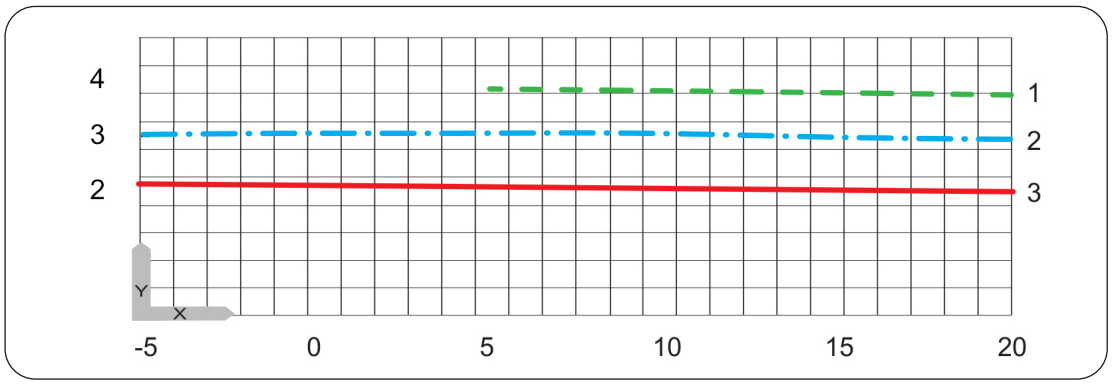
2 Supply line temperature 50 °C, full load

3 Supply line temperature 58 °C, full load

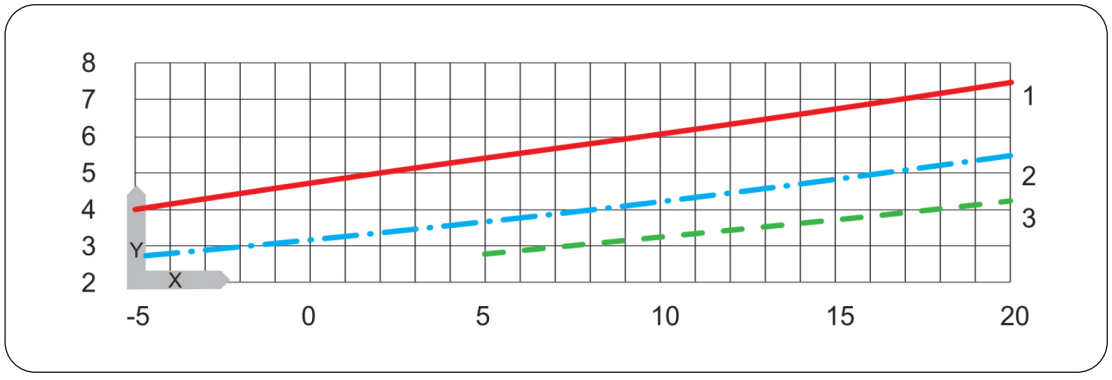
Heating capacity HES ECO 10



Power consumption HES ECO 10



Power factor HES ECO 10



15.6 HES ECO 13 Power Diagram

Notation to the power diagram

Y Heating capacity [kW] / Power consumption [kW] / Power factor e [-]

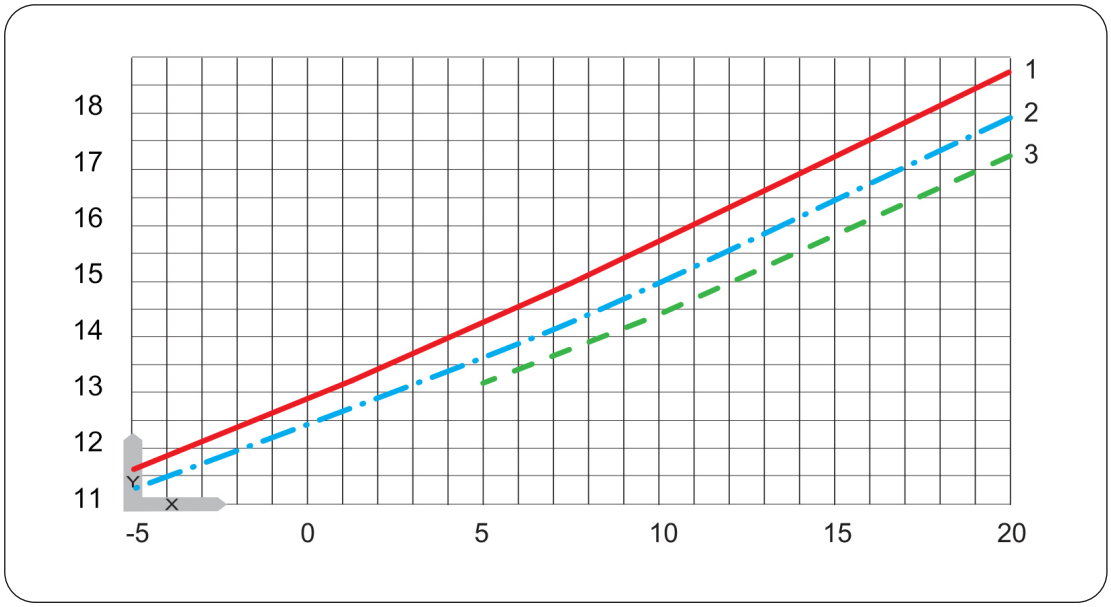
X Inlet medium temperature WQA [°C]

1 Supply line temperature 35 °C, full load

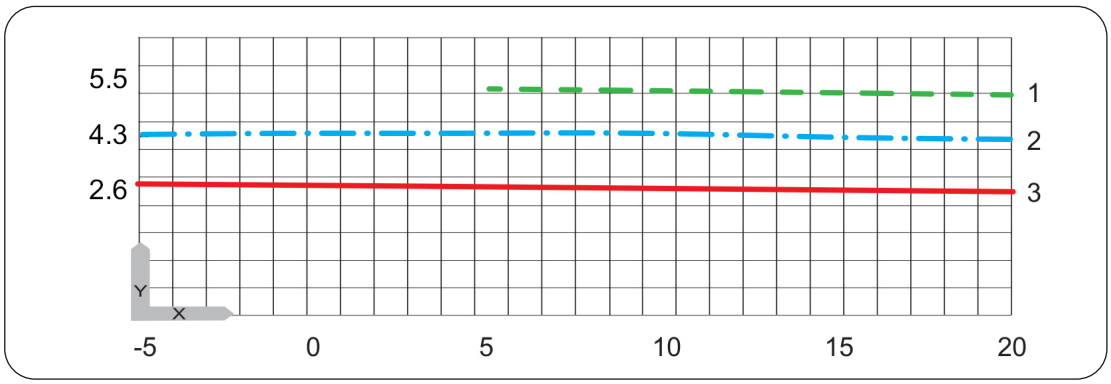
2 Supply line temperature 50 °C, full load

3 Supply line temperature 58 °C, full load

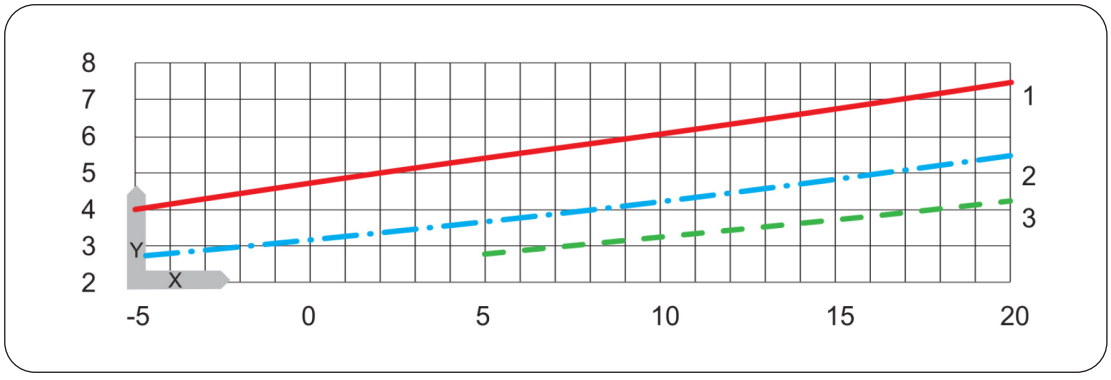
Heating capacity HES ECO 13



Power consumption HES ECO 13



Power factor HES ECO 13



15.7 HES ECO 16 Power Diagram

Notation to the power diagram

Y Heating capacity [kW] / Power consumption [kW] / Power factor e [-]

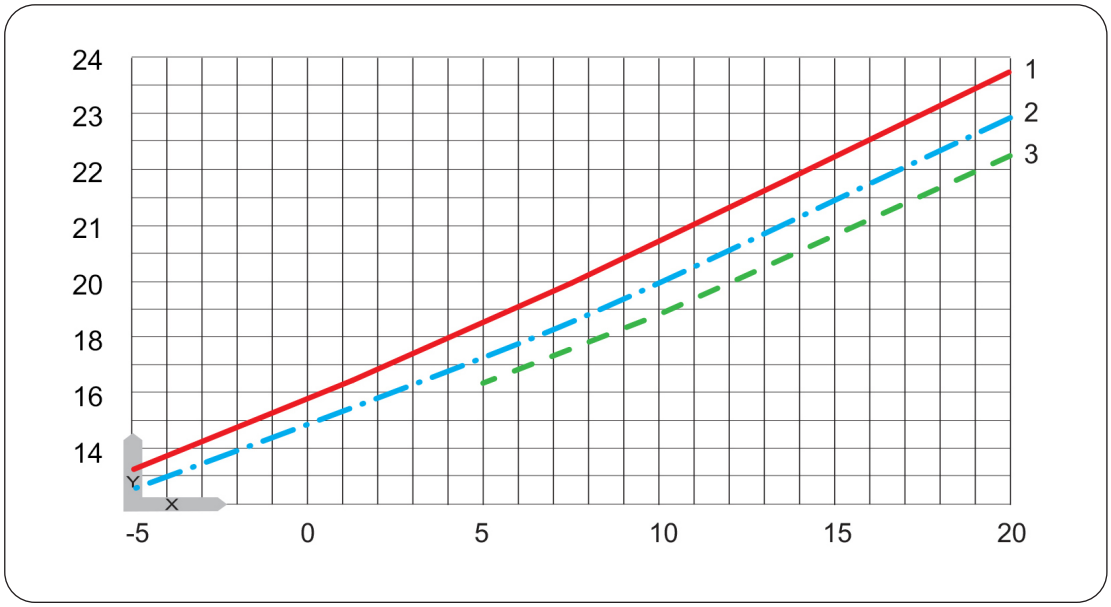
X Inlet medium temperature WQA [°C]

1 Supply line temperature 35 °C, full load

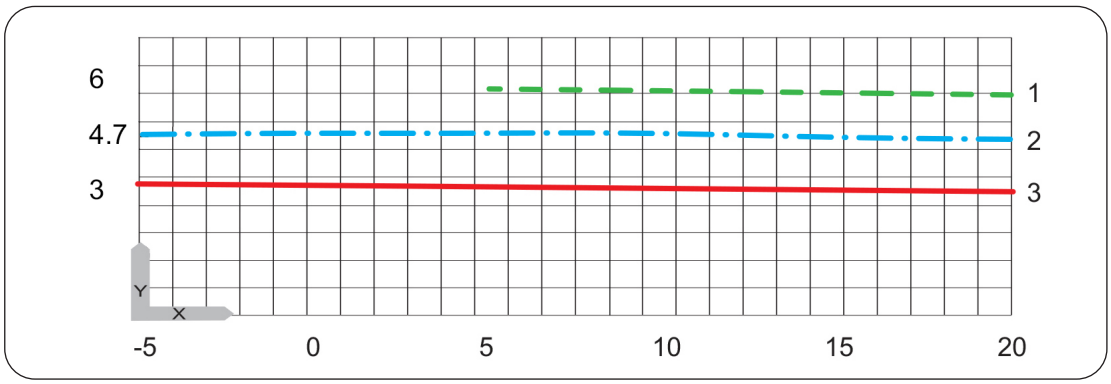
2 Supply line temperature 50 °C, full load

3 Supply line temperature 58 °C, full load

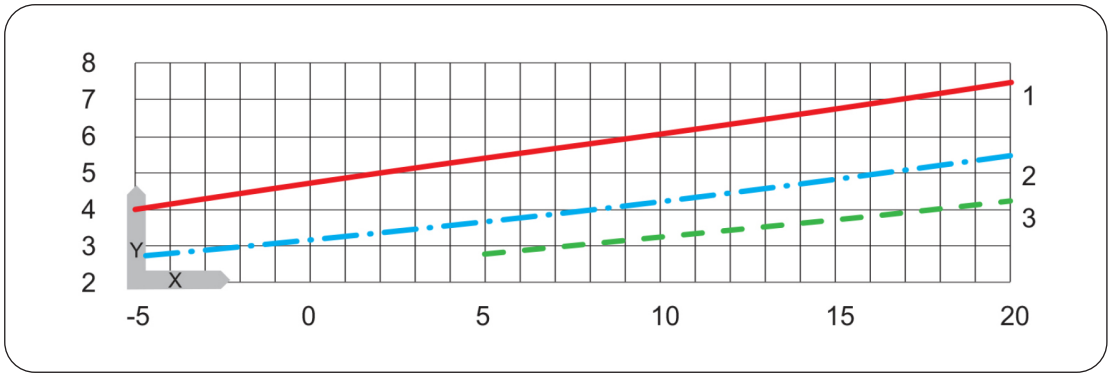
Heating capacity HES ECO 16



Power consumption HES ECO 16



Power factor HES ECO 16



15.8 Parameter Table

The performance characteristics correspond to new devices whose heat exchangers are in a clean state.

		HES ECO 5	HES ECO 7	HES ECO 10	HES ECO 13
		G2011	G3011	G4011	G5011
Performance indicators					
Heating capacity B0/W35	kW	5,77	7,39	9,92	12,6
Power consumption B0/W35	kW	1,41	1,82	2,91	2,91
Coefficient of performance B0/W35		4,09	4,07	4,2	4,34
Heating capacity B0/W50	kW	5,4	6,78	9,29	11,75
Power consumption B0/W50	kW	2,05	2,62	3,53	4,35
Coefficient of performance B0/W50		2,64	2,59	2,63	2,7
Noise characteristics					
Sound pressure level at a distance of 1 m in an open area , not more than	dB(A)	48	48	49	55
Sound pressure level at a distance of 5 m in an open area , not more than	dB(A)	29	29	31	31
Limits of the operating range					
Max permissible pressure	MPa	0,3	0,3	0,3	0,3
The operating limit on the heating side is min	°C	20	20	20	20
The operating limit on the heating side is max	°C	58	58	58	58
The operating limit of the heat source is min	°C	-10	-10	-10	-10
The operating limit of the heat source is max	°C	20	20	20	20
Electrical parameters					
Frequency	Hz	50	50	50	50
Fuse of the control circuit	A	1xC 10	1xC 10	1xC 10	1xC 10
Compressor fuse	A	1xC 16	1xC 16	3xC 10	3xC 20
Rated control voltage	V	230	230	230	230
Compressor rated voltage	V	230	230	380	380
Control phases		1/N/PE	1/N/PE	1/N/PE	1/N/PE
Compressor phases		1/N/PE	1/N/PE	3/PE	3/PE
Heat exchangers					
Refrigerant		R410A	R410A	R410A	R410A
Evaporator material		stainless steel 1.4401/copper	stainless steel 1.4401/copper	stainless steel 1.4401/copper	stainless steel 1.4401/copper
Condenser material		stainless steel 1.4401/copper	stainless steel 1.4401/copper	stainless steel 1.4401/copper	stainless steel 1.4401/copper
Dimensions					
Height	mm	1280	1280	1280	1280
Width	mm	600	600	600	600
Depth	mm	650	650	650	650
Weight indicators					
Weight	kg	207	213	220	228
Connections					
Connection of the heating line		D28 copper	D28 copper	D28 copper	D28 copper
Connection via the heat source line		D28 copper	D28 copper	D28 copper	D28 copper
Compressor					
Compressor type HES EMERSON		HES 24	HES 31	HES 42	HES 54
Technical specifications					
Flow rate in the heat source line	m^3/h	1,7	2,3	2,8	3,5
Flow rate in the heating line	m^3/h	1,4	1,7	2,2	2,8
Pressure drop, in the heating line	gPa	280	280	280	280
Pressure drop, heat source side	gPa	220	220	250	280

The performance characteristics correspond to new devices whose heat exchangers are in a clean state.

		HES ECO 16	**HES ECO 19**	**HES ECO 22**	**HES ECO 25**
		G6011	G7011	G8011	G9011
Performance indicators					
Heating capacity B0/W35	kW	17,2	19,75	21,5	25,2
Power consumption B0/W35	kW	3,94	4,41	4,85	5,59
Coefficient of performance B0/W35		4,38	4,48	4,44	4,51
Heating capacity B0/W50	kW	16,05	18,35	19,8	23,4
Power consumption B0/W50	kW	5,6	6,63	6,67	7,78
Coefficient of performance B0/W50		2,87	2,9	2,97	3,01
Noise characteristics					
Sound pressure level at a distance of 1 m in an open area , not more than	dB(A)	55	55	55	57
Sound pressure level at a distance of 5 m in an open area , not more than	dB(A)	35	35	35	37
Limits of the operating range					
Max permissible pressure	MPa	0,3	0,3	0,3	0,3
The operating limit on the heating side is min	°C	20	20	20	20
The operating limit on the heating side is max	°C	58	58	58	58
The operating limit of the heat source is min	°C	-10	-10	-10	-10
The operating limit of the heat source is max	°C	20	20	20	20
Electrical parameters					
Frequency	Hz	50	50	50	50
Fuse of the control circuit	A	1xC 10	1xC 10	1xC 10	1xC 10
Compressor fuse	A	3xC 25	3xC 35	3xC 35	3xC 35
Rated control voltage	V	230	230	230	230
Compressor rated voltage	V	380	380	380	380
Control phases		1/N/PE	1/N/PE	1/N/PE	1/N/PE
Compressor phases		3/PE	3/PE	3/PE	3/PE
Heat exchangers					
Refrigerant		R410A	R410A	R410A	R410A
Evaporator material		stainless steel 1.4401/copper	stainless steel 1.4401/copper	stainless steel 1.4401/copper	stainless steel 1.4401/copper
Condenser material		stainless steel 1.4401/copper	stainless steel 1.4401/copper	stainless steel 1.4401/copper	stainless steel 1.4401/copper
Dimensions					
Height	mm	1280	1280	1280	1280
Width	mm	600	600	600	600
Depth	mm	650	650	650	650
Weight indicators					
Weight	kg	231	241	253	273
Connections					
Connection of the heating line		D28 copper	D32 copper	D32 copper	D32 copper
Connection via the heat source line		D28 copper	D32 copper	D32 copper	D32 copper
Compressor					
Compressor type HES EMERSON		HES 72	HES 83	HES 91	HES 104
Technical specifications					
Flow rate in the heat source line	m^3/h	4,1	5	5,6	7
Flow rate in the heating line	m^3/h	3,8	4,4	4,8	5,5
Pressure drop, in the heating line	gPa	280	280	280	280
Pressure drop, heat source side	gPa	280	280	280	280

16. COMMISSIONING PROTOCOL

INSTRUCTION
In order to ensure the warranty of the product, the commissioning report must only be completed by a service engineer of an authorized dealer of the manufacturer, Home Electrical Systems Ltd.
A list of authorized dealers of the manufacturer is available on the website www.hes-hp.com.

1. Customer's address _____

_____

2. The address of the installation company _____

_____

3. Type of building

Single-family house ☐
House for several families ☐
Residential building/small-scale production ☐
Industry/production ☐
Public Building ☐

The heat pump comes separately ☐
Heat pump module ☐

4. Type of device

ID number _____

Order No. _____

Production number _____

5. Installing a heat pump

inside ☐
outside ☐
basement ☐

on a concrete base ☐
on a ribbon foundation ☐
on a flat floor surface ☐

horizontally yes ☐ no ☐
noise reduction yes ☐ no ☐

6. Installation and use instructions:

The volume of the installation room _____ m^3

7. Work mode

monovalent ☐
- parallel ☐
- partially parallel ☐
- alternative ☐

Bivalent heater
gas boiler ☐
oil tank ☐
solid fuel tank ☐
heat from the district heating system ☐
electric heating ☐

8. Hydraulic coupling of a heat pump with a buffer storage

no ☐ yes ☐ Contents of the buffer storage _____

9. Water preparation

regardless from the heat pump		with an external heat exchanger		with an internal heat exchanger	
yes ☐	no ☐	yes ☐	no ☐	yes ☐	no ☐
yes ☐	no ☐	yes ☐	no ☐	yes ☐	no ☐

STE products: Types: _____

Foreign manufacturer: Types: _____

10. Heat source:

Air Outdoor air ☐ Temperature min _____ °C

Exhaust air ☐ max _____ °C

Earth's heat probe ☐ Quantity _____

Nominal pipe diameter: _____

Distributor: yes ☐ no ☐ Tichelman connection yes ☐ no ☐

Drilling depth: _____ Ground collector ☐

Pipe length: _____

Nominal pipe diameter: _____

Surface: _____

Distributor: yes ☐ no ☐ Tichelman connection yes ☐ no ☐

Coolant:

Type _____

Concentration _____

Frost protection border: _____

Water Pit ☐

Surface water ☐

Other _____

_____

11. Water distribution system:

Gender ☐ Plates ☐

Convectors ☐ Radiators ☐

Design temperature: VL °C_____ / RL_____°C

12. Components of the device's peripherals:

Source circulation pump Manufacturer/Type _____ /_____

Circulation pump of the heating system Manufacturer/Type _____ /_____

Circulation pump
Heat pump/Heat exchanger Manufacturer/Type _____ /_____

Circulation pump
Heat exchanger/Storage device Manufacturer/Type _____ /_____

Circulation pump
Heat exchanger/buffer storage Manufacturer/Type _____ /_____

Circulation pump
Hot water/circulation Manufacturer/Type _____ /_____

Circulation pump
Heat exchanger/Hot water tank Manufacturer/Type _____ /_____

Mixing valve Manufacturer/Type _____ /_____

Mixing valve actuator Manufacturer/Type _____ /_____

13. Control device:

STE Product: Type: _____

Foreign manufacturer: Type: _____

Determination of parameters according to the control device commissioning protocol.

14. Electrical connection:

Type of conductivity: _____

Number of wires: _____

Diameter: _____

Gasket according to VDE yes ☐ no ☐

Управляющая линия теплового насоса:

Тип проводимости: _____

Количество жил: _____

Диаметр: _____

15. The measured value:
after 10 minutes of operation, it is measured on the heat pump

Salt solution/water/air inlet: _____°C

Output salt solution/water/air: _____°C

Heat pump supply: _____°C

Heat pump recirculation: _____°C

16. Control test according to VDE 0701:

Conducted: yes ☐ no ☐

Values are normal: yes ☐ no ☐

17. Equipment diagram

Place, date

Signature of the installation company representative

WARRANTY

Home Electro System guarantees the original owner the absence of defects in materials during the manufacture of the HES ECO heat pump for 24 (twenty-four) months. The warranty comes into force from the date of the commissioning protocol completion in the technical data sheet. If it is not filled in, it comes into force from the moment of sale by a certified trading organization and a mark on the warranty card. If the warranty card and the commissioning protocol are not filled in, it comes into force from the date of production.

The warranty does not apply in the following cases:

▸ Malfunction or damage as a result of installation, use, or repair that does not comply with the instructions and non-compliance with safety regulations.

▸ Malfunction or damage due to conditions not suitable for the purpose of using the equipment.

▸ Damage caused by negligence, accident, or force majeure.

▸ Malfunction or damage due to the use of unauthorized accessories. Repairs carried out during the warranty period must be approved before they are carried out by an authorized person. The warranty is cancelled if the equipment repair is carried out by a person unauthorized by Home Electric System.

The parts covered by the warranty must be replaced or repaired at the discretion of a certified Home Electric System dealer. Defective parts must be returned to the technical department. The warranty does not cover labor costs or unauthorized replacements. The return of a defective part is not covered by the warranty.

ENVIRONMENTAL PROTECTION AND RECYCLING

Contribute to environmental protection. The used materials should be disposed of in accordance with the norms.

This device is filled with R410A refrigerant.

The release of refrigerant R410A into the atmosphere is prohibited.

HES
HOME ELECTRO SYSTEM

Russian Federation
Home Electro System

info@hes-hp.com

8 (800) 333 63 71
8 (4922) 49 47 70

7, Novatorov str., Dobrograd 1 Special Economic Zone,
Kovrovsky district, Vladimir region, Russia