Regulus

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RTC 20e

Installation and Maintenance Manual

Air-to-water Inverter Heat Pump

RTC 20e

EN

RTC 20e

OBSAH

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1. SAFETY INSTRUCTIONS

Read this manual carefully before commencing operating and keep it at an easily accessible place for all users. If needed, the manual can be downloaded from the website of Regulus: http://www.regulus.eu/, or obtained from the company. If you have any doubts or uncertainties, please contact your equipment supplier or technical support of Regulus.

This appliance should only be used by persons who have been properly instructed in the safe use of the appliance and understand the risks involved. The appliance should not be used by children and persons with limited physical, sensory or mental abilities or with insufficient experience and knowledge. It is expressly forbidden for children to play with the appliance!

The equipment contains R32 refrigerant falling into flammability category 2L. It is therefore necessary to comply with all applicable regulations for its safe storage, transport, installation, operation, maintenance and servicing, and to ensure its proper recycling after the equipment has been decommissioned.

The equipment shall be stored in a sufficiently spacious and well-ventilated area away from ignition sources and substances that could cause ignition. Note that the refrigerant may not be identifiable by smell.

1.1. Instructions for system design and installation

- The design, location, hydraulic and electrical connections must be designed by a specialist in accordance with the applicable regulations.
- The equipment has been designed for heating or cooling of heating water. Other uses, unless specifically authorised by the manufacturer, is not permitted.
- Heating water or a mixture of water with glycol or glycerine based antifreeze may be used as a heat transfer medium.
- The device is designed for outdoor installation. However, avoid installation in areas with excessive dust or humidity - such as near the hood outlet, etc.
- The device shall not be installed in an environment with volatile, corrosive or flammable substances and gases.
- When handling the heat pump with a crane or other lifting equipment, make sure that the lifting devices, lugs, etc. are not damaged. Never step under the lifted load.
- It is forbidden to leave packaging material within reach of children as this may pose a danger to them.
- The heat pump shall be securely earthed.

1.2. Instructions for operation

- The appliance must be located in an open area where there is no obstruction to the flow of intake or exhaust air.
- The appliance must not be located nor operated near open flames, sources of excessive heat, sources of ignition, or in an environment with explosive or chemically aggressive gases and substances.
- Respect the operating limits of the equipment.
- The equipment contains rapidly rotating parts. Therefore, do not push any objects into the device.
- The heat exchanger lamellas are sharp and can cause injury. Therefore, always use extra caution around the equipment.
- Do not spray water or other liquids on the equipment.
- If the device is installed in an excessively humid environment, corrosion or short circuiting may occur.
- Do not puncture or burn the device.
- It is forbidden to stand on the device, sit on it or place objects on it.
- It is forbidden to pull, twist or disconnect the electrical cables connected to the equipment.

- A damaged power cable may only be replaced by an authorized service organization.
- Do not remove the protective covers of the device. Operation is only permitted when all protective covers are fitted.
- Do not interfere with the refrigerant circuit or electrical wiring.
- It is forbidden to touch the equipment barefoot or with wet body parts.

1.3. Instructions for maintenance, repair and servicing

- Service work on the equipment must be carried out by professional and qualified personnel. The user is authorized to perform only the visual inspection and user maintenance specified in this manual.
- Wear personal protective equipment (goggles, gloves, etc.) when working on the equipment.
- Ensure that the heat pump is switched off before any intervention. It is forbidden to carry out maintenance or cleaning when the equipment is live.
- Before starting work on the equipment, make sure that the necessary conditions for working with flammable refrigerants have been ensured.
- Refrigerant topping up can only be carried out in cooling mode.
- It is forbidden to top up refrigerant other than R32.
- Some parts of the equipment (e.g. the compressor and its outlet pipes) may be very hot even after stopping operation.
- Never disassemble casing, covers, etc. that are bolted together.
- Never disable safety features of the equipment.
- It is forbidden to tamper with or replace any parts of the equipment without the express permission of the manufacturer.

If the instructions in this manual are not followed, the manufacturer does not feel bound by the terms of the warranty or liable for damages.

2. TECHNICAL DATA

Heating output[1)]	9.19 / 12.57 kW
Power input[1)]	1.83 / 3.94 kW
COP[1)]	5.02 / 3.19
Nominal current	9.6 A
Nominal current	3/N/PE ~ 400/230 V, 50 Hz
Recommended circuit breaker	B16A 3f
IP rating	IPX4
Min./Max. flow temperature from HP	5 / 55 °C
Max. heating water temperature at HP inlet	100 °C
Max. working pressure of heating water	3 bar
Heating water volume in HP	3 l
Min. volume of heating system that cannot be shut off	120 l
Min. flow rate through HP	1560 l/h
Min. surface area of heat exchanger in HW storage tank	2.5 m^2
Air working temperature for heating mode	-25 to 43 °C
Air working temperature for cooling mode	0 to 43 °C
Max. airflow rate	7000 m^3/h
Number of fans	2
Fan speed	variable
Max. fan power input	120 W
Compressor type	twin rotary
Refrigerant	R32 (GWP 675)
Refrigerant quantity	2.60 kg
CO_2 equivalent [2)]	1.75 t
Max. refrigerant working pressure	42 bar
Connections	2 × G 5/4“ M
Weight	154 kg

1) For temperatures A+7/W35 at min. speed and A-7/W35 at max. speed by EN 14511.
2) Not subject to mandatory leak checks under EU Regulation No. 517/2014.

2.1. Sound data (by EN 12 102)

Sound power level	61 dB(A)
Sound pressure level at 5 m distance	39 dB(A)
Sound pressure level at 10 m distance	33 dB(A)

2.2. Energy efficiency

Seasonal space heating energy efficiency	191 %
Energy Efficiency Class	A+++
SCOP	4.84

For low-temperature applications under average climatic conditions

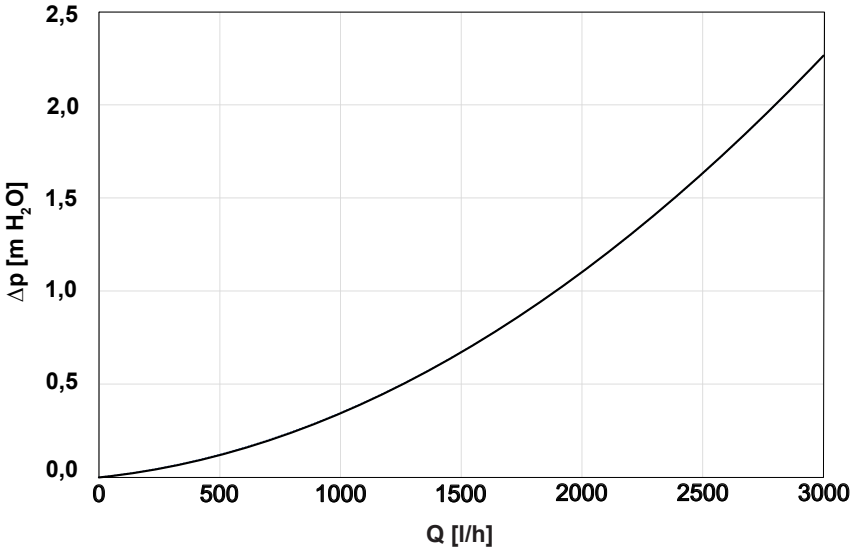
2.3. Performance data

HEATING					
Speed	**Air temperature**	**Flow temperature**	**Output [kW]**	**Power input [kW]**	**COP [-]**
76 Hz	***7 °C***	***35 °C***	18.52	4.14	4.47
		45 °C	18.22	4.99	3.65
		55 °C	17.67	5.95	2.97
	2 °C	***35 °C***	14.97	3.88	3.85
		45 °C	14.15	4.51	3.14
		55 °C	13.47	5.46	2.47
	-7 °C	***35 °C***	12.57	3.94	3.19
		45 °C	11.67	4.60	2.54
		55 °C	10.68	5.46	1.96
	-15 °C	***35 °C***	9.72	3.71	2.62
		45 °C	9.03	4.42	2.04
		55 °C	8.50	5.17	1.64
55 Hz	***12 °C***	***35 °C***	15.51	2.83	5.48
		45 °C	14.79	3.47	1.26
		55 °C	13.68	4.28	3.20
	7 °C	***35 °C***	13.95	2.95	4.73
		45 °C	13.15	3.51	3.75
		55 °C	12.40	4.28	2,90
	2 °C	***35 °C***	12.09	2.84	4.26
		45 °C	11.43	3.44	3.32
		55 °C	9.96	3.90	2.56
	-7 °C	***35 °C***	9.11	2.80	3.25
		45 °C	8.43	3.28	2.57
		55 °C	7.47	3.91	1.91
	-15 °C	***35 °C***	6.72	2.67	2.52
		45 °C	6.24	3.13	1.99
		55 °C	5.51	3.72	1.48
36 Hz	***12 °C***	***35 °C***	10.10	1.75	5.77
		45 °C	9.42	2.27	4.15
		55 °C	8.88	2.80	3.17
	7 °C	***35 °C***	9.19	1.83	5.02
		45 °C	8.51	2.25	3.80
		55 °C	7.60	2.78	2.73
	2 °C	***35 °C***	7.75	1.81	4.27
		45 °C	7.18	2.22	3.23
		55 °C	6.79	2.75	2.47
	-7 °C	***35 °C***	5.75	1.79	3.21
		45 °C	5.36	2.14	2.50
		55 °C	4.49	2.57	1.75
	-15 °C	***35 °C***	4.08	1.73	2.36
		45 °C	3.70	2.07	1.79
		55 °C	3.09	2.40	1.29

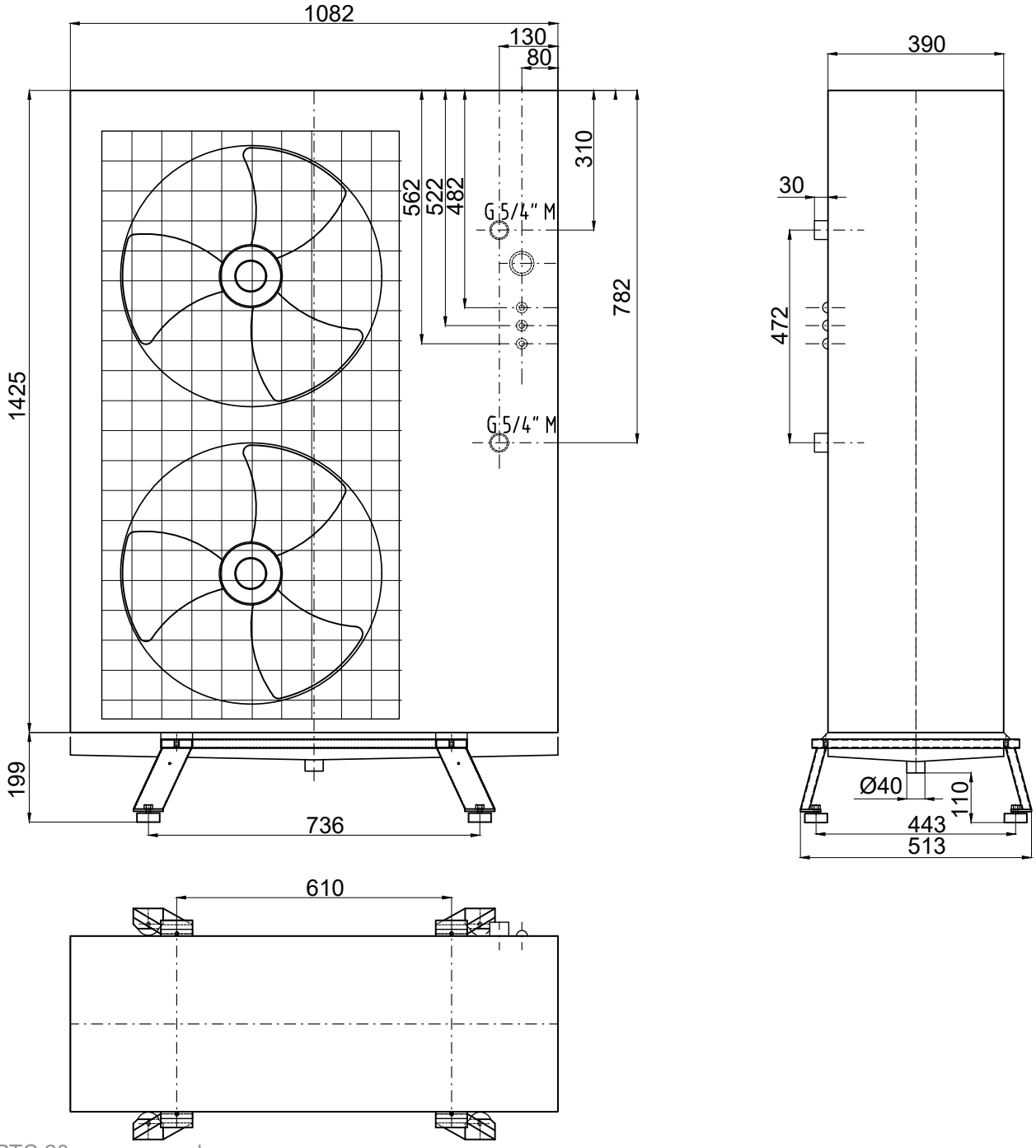
COOLING					
Speed	**Air temperature**	**Flow temperature**	**Output [kW]**	**Power input [kW]**	**COP [-]**
76 Hz	***35 °C***	***7 °C***	15.80	5.38	2.94
	40 °C	***18 °C***	19.38	6.26	3.10

The values of the operating parameters including the defrost cycle are measured on the manufacturer's test bench according to EN 14 511.

2.4. Heat pump pressure drop



2.5. Dimensions

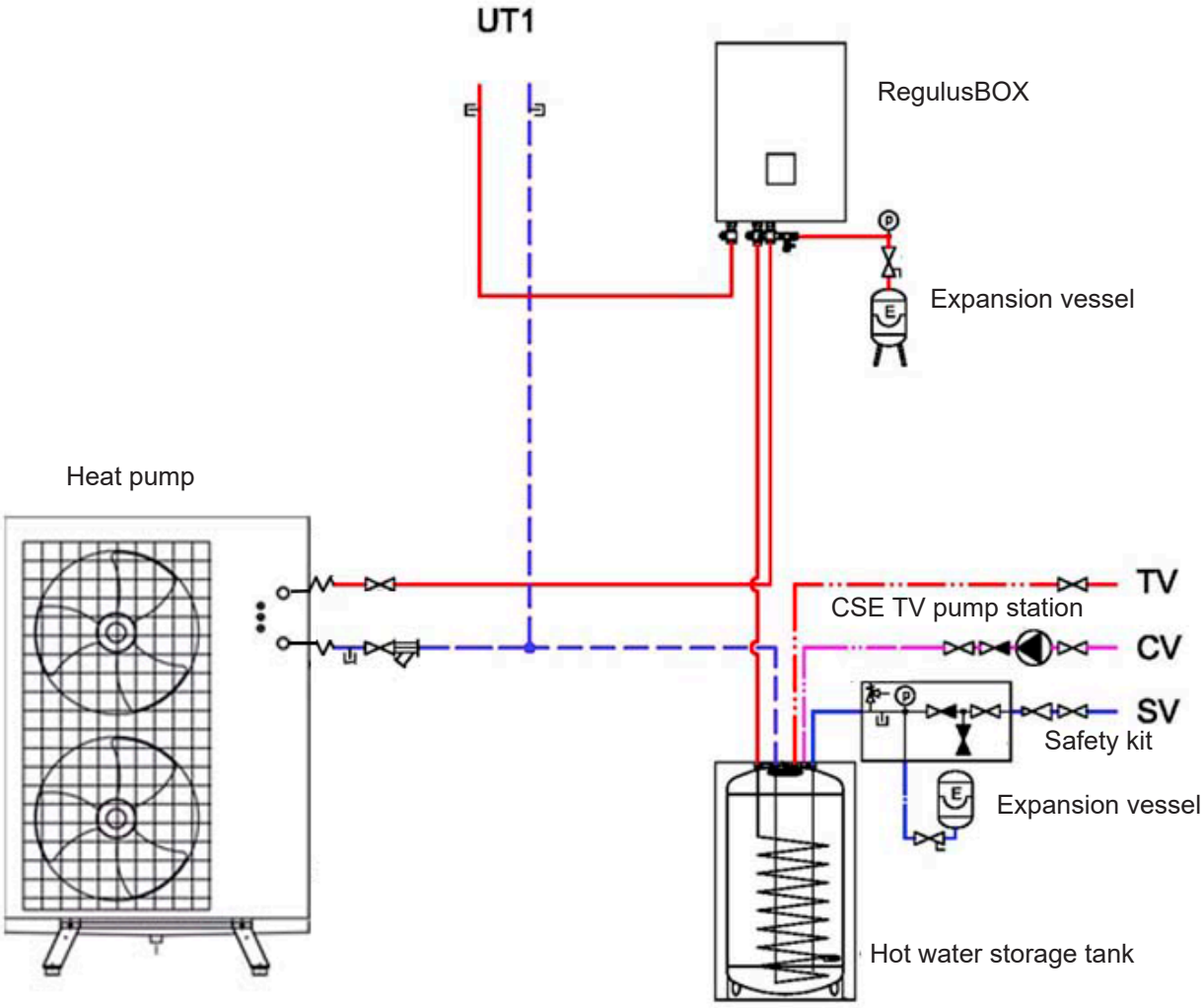


3. CONNECTION ALTERNATIVES

The heat pump is part of the energy system of the house. The correct design of a heat pump depends on the energy needs of the building and should be carried out by a specialist. These methods of connection are the most commonly used and serve as a basis for the project. If project documentation exists, follow it.

The system control is ensured by an IR RegulusBOX smart controller (included in RegulusBOX indoor unit), or a separate IR 14 RTC smart controller can be used. The controller controls the entire heating and hot water system. It is equipped with an integrated web server permitting control through a web browser, or via a smartphone or tablet with the IR Client application (for Android and iOS).

3.1. Direct connection to a heating system, DHW heating in a hot water tank

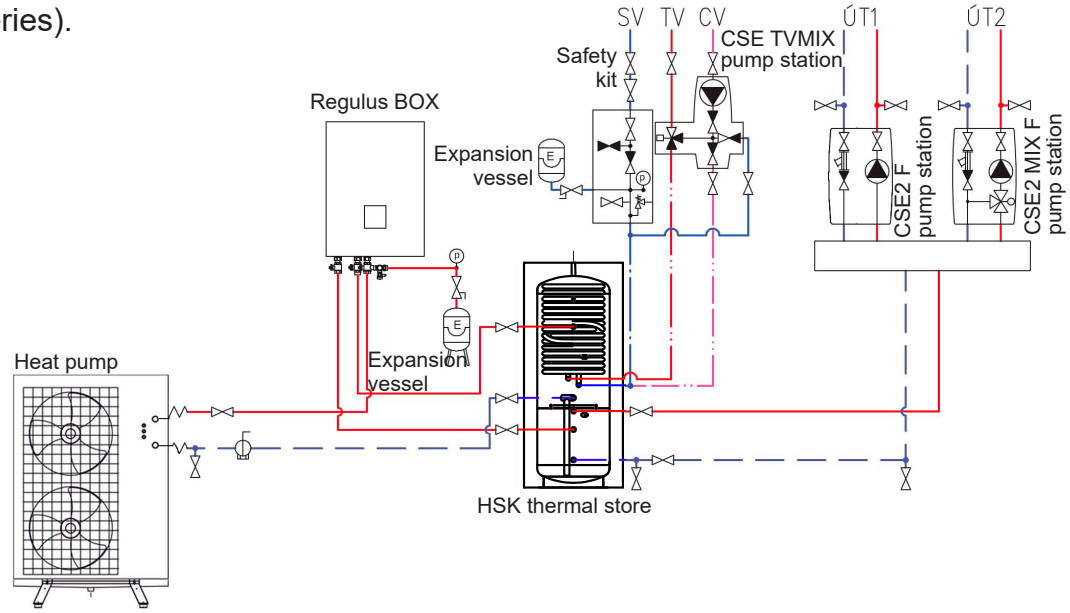


The accessory is represented by RegulusBOX (code 18574) or an additional heat source in the form of an in line heater (code 16166) equipped with an electric heating element of up to 7.5 kW output and an optional indirect heated hot water storage tank with a heat exchanger surface of min. 2.5 sqm. The larger the heat exchange area of the HW storage tank, the faster the DHW heating will be and the heat pump will be able to prepare hot water more economically, or it will be able to heat DHW to a higher temperature.

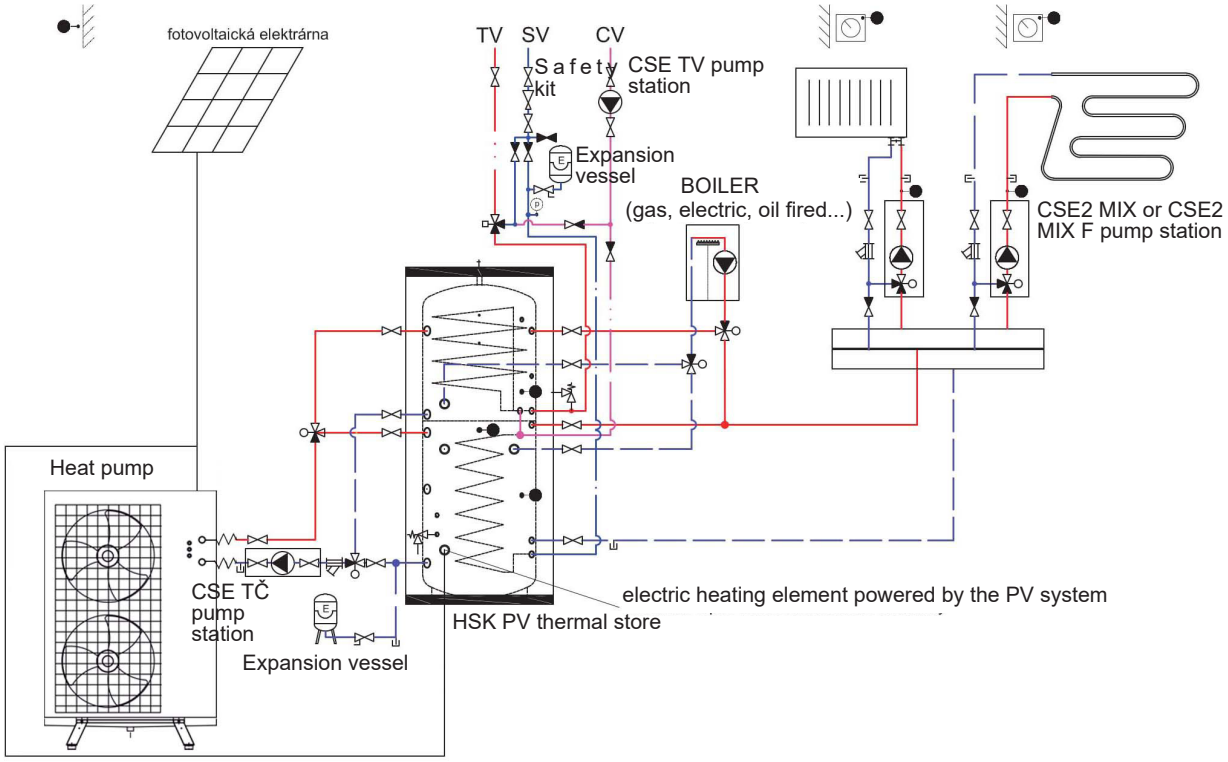
In this direct connection to the heating system, it is necessary to keep the minimum flow through the heat pump at the level of ***min. 1560 l/h*** with sufficient heat supply for defrosting, i.e. it is necessary to have a part of the heating system without shut-off valves (e.g. thermostatic valves) installed.

3.2. Connection with thermal store (combination with other heat sources)

The accessories consist of a thermal store for heating only (Regulus PS series), or a combination thermal store with immersed DHW tank (Regulus DUO series), or a thermal store with continuous hot water heating in a stainless steel DHW heat exchanger (Regulus HSK series).



This connection is suitable for combining a heat pump with other heat sources, such as biomass boilers, fireplace inserts and stoves with a hydronic heat exchanger, solar thermal systems, solar photovoltaic systems, etc. The thermal store shall be sized depending on the selected type and output of the heat source. E.g. for a combination with a PV system the total volume of the thermal store can be calculated using the relationship 180 l / 1 kWp PV output. For example, for an array of PV panels with a peak output of 5 kWp, the tank volume shall be 900 litres. Always have the size and type of the thermal store determined by a specialist!



3.3. Heating system with the use of cooling

RTC 20e heat pumps also allow cooling of buildings. If cooling operation is used, all tanks and chilled water distribution systems must be vapor-insulated. If there are also space heating elements in the building that are not suitable for cooling (radiators, heated towel rails, etc.), it is recommended to shut off these circuits to prevent undesired condensation of air humidity.

4. CONSTRUCTION READINESS, INSTALLATION

The installation may only be carried out by a person with a valid manufacturer‘s authorization. If any of the subsidy titles are used to acquire a subsidy for the heat pump (e.g. boiler subsidies, or the New Green Savings program), the installation company must meet the requirements of current legislation.

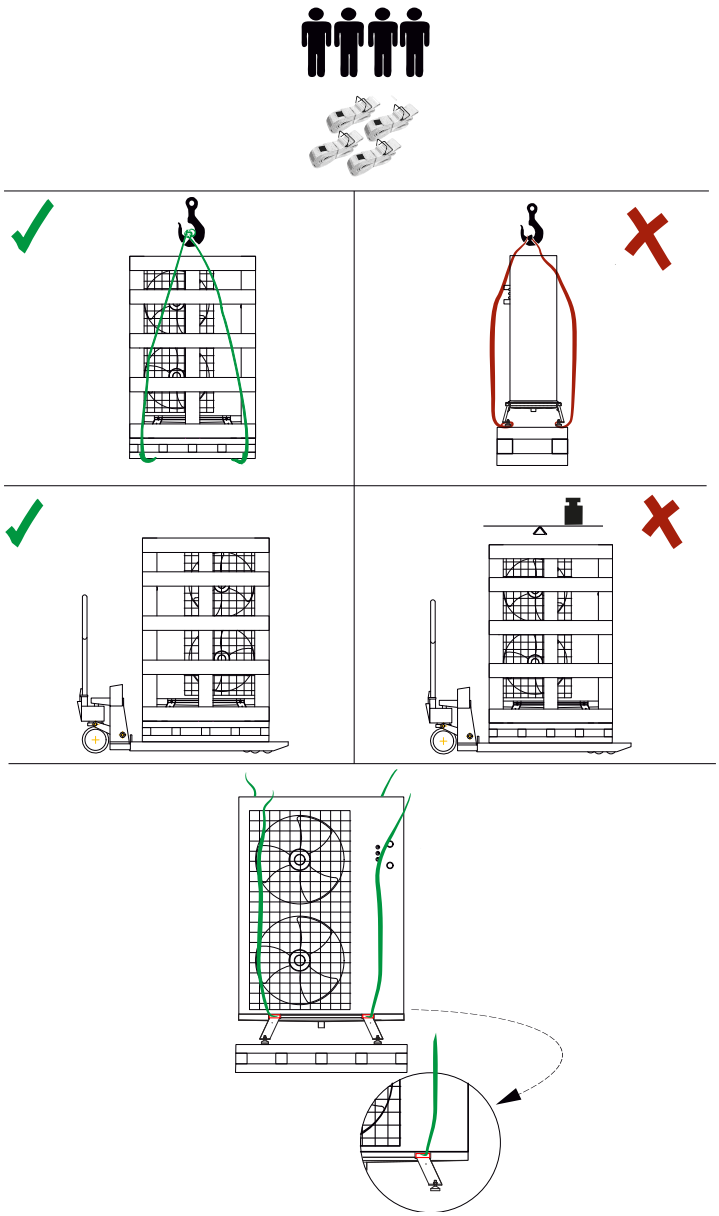
4.1. Scope of supply

- RTC 20e Heat Pump
- Installation and Operation Manual
- 2 compensators to protect the plate heat exchanger in the heat pump against frost rupture

4.2. Installation preparation, transport

The installation must be carried out by a qualified person in accordance with the applicable standards and all regulations concerning occupational safety must be observed.

- The heat pump shall be transported and stored in an upright position only.
- Check that the product has not been damaged in transit. Report immediately any transport damage to the carrier and supplier.
- Transport the unit to the installation site before removing the packaging.
- Move the product with a pallet truck or forklift if possible.
- It is possible to use lifting straps tied around the pallet, however only if the packaging (the wooden frame) had not been removed.
- **MIND THE DIFFERENT WEIGHT OF THE RIGHT AND LEFT SIDE OF THE HEAT PUMP!**
- **Do not lift the heat pump by gripping the condensate tray. It could get deformed.**



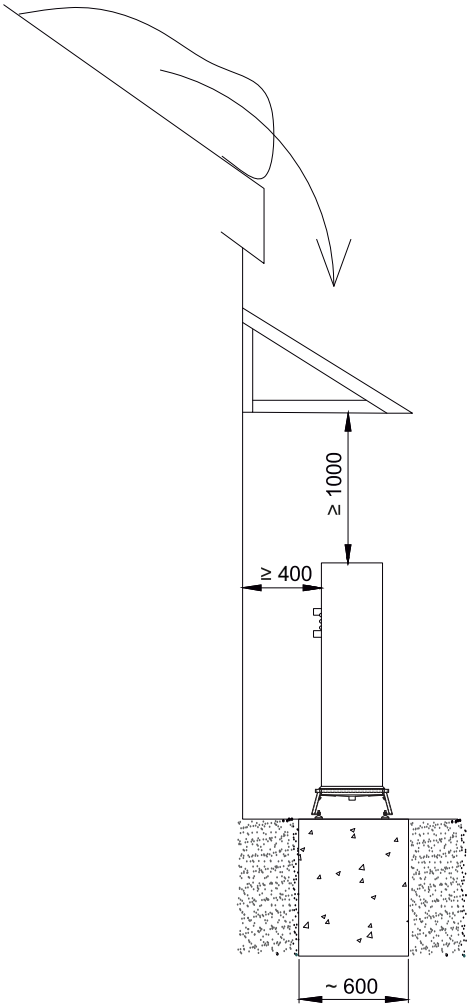
4.3. Heat pump placement and minimum distances

The heat pump is usually placed to the outer wall of the building, with the fan facing away from the building. The location must be chosen so that the air can flow completely freely through the heat pump and at the same time, used cold air is not sucked again into the heat pump.

If there is a risk of damage from snow falling from a roof, the product can be installed underneath a small awning.

Do not place the device on the windward side where strong winds may blow against the fans.

Respect the usual snow depth in the area and adjust the height of the installation above ground level accordingly.

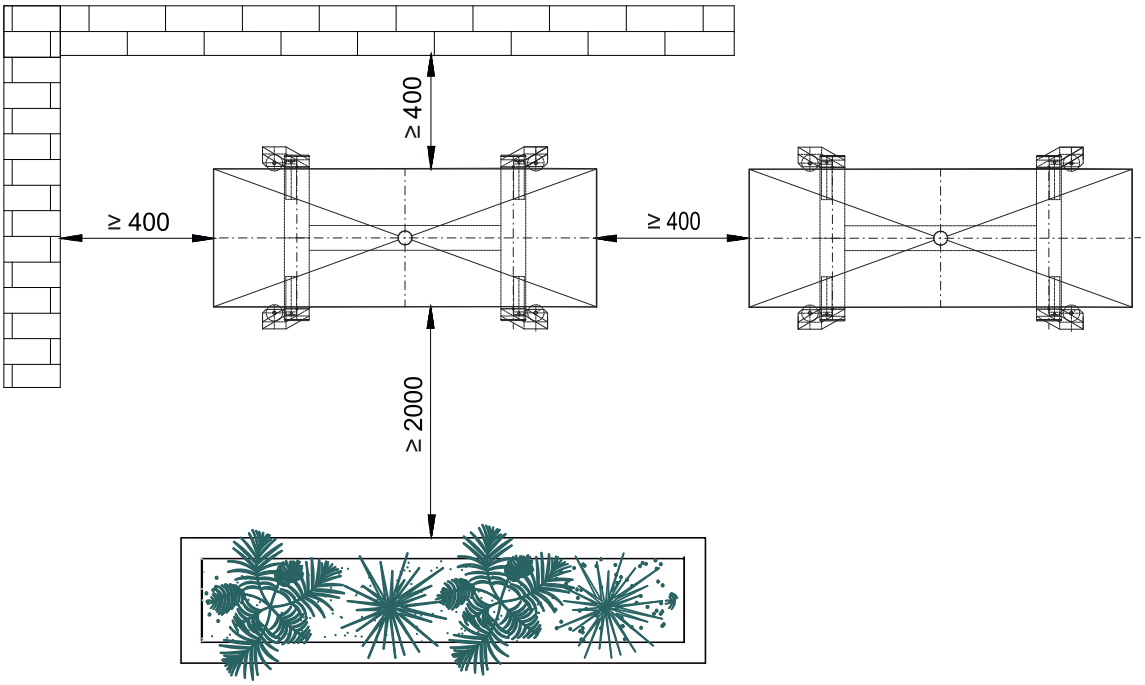


Noise protection

Make sure that the heat pump does not disturb you or your surroundings with noise. Avoid installation at a bedroom window, patio or fence, or close to the boundaries of neighbouring properties.

If possible, we recommend not installing the heat pump in a corner or between two parallel walls because then the resulting sound pressure level may increase due to reflections from the surrounding walls.

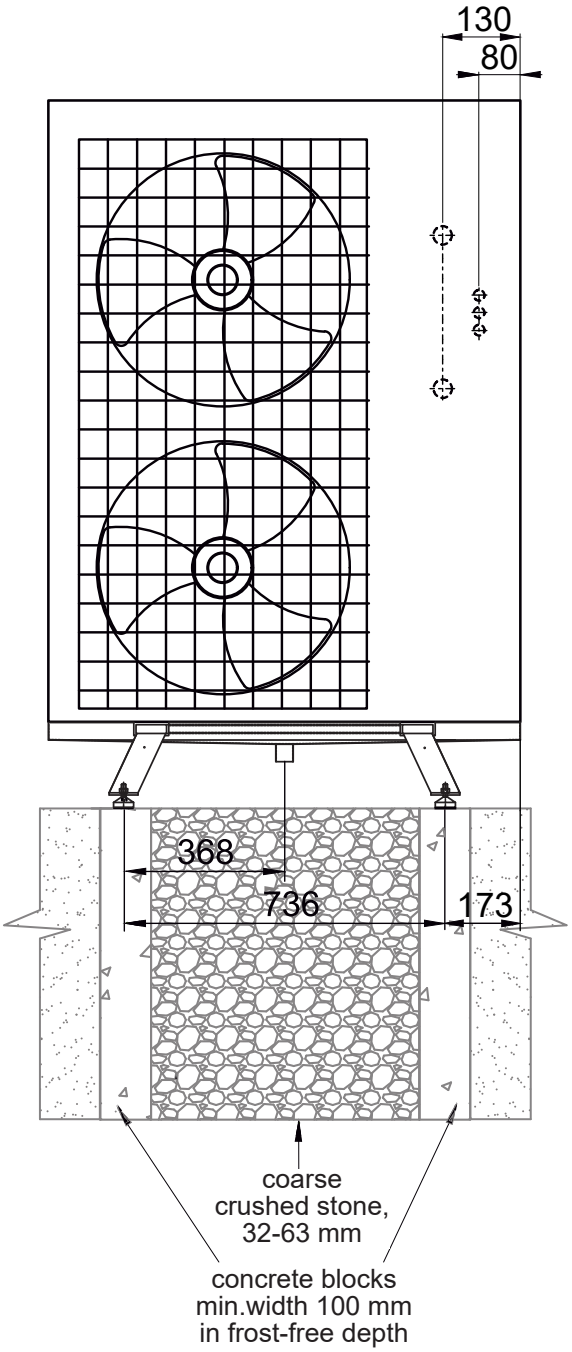
Avoid using materials with increased sound reflectivity near the device; it is unsuitable, for example, to line the surrounding surfaces with ceramic tiles.



Note: dimensions are shown in millimetres.

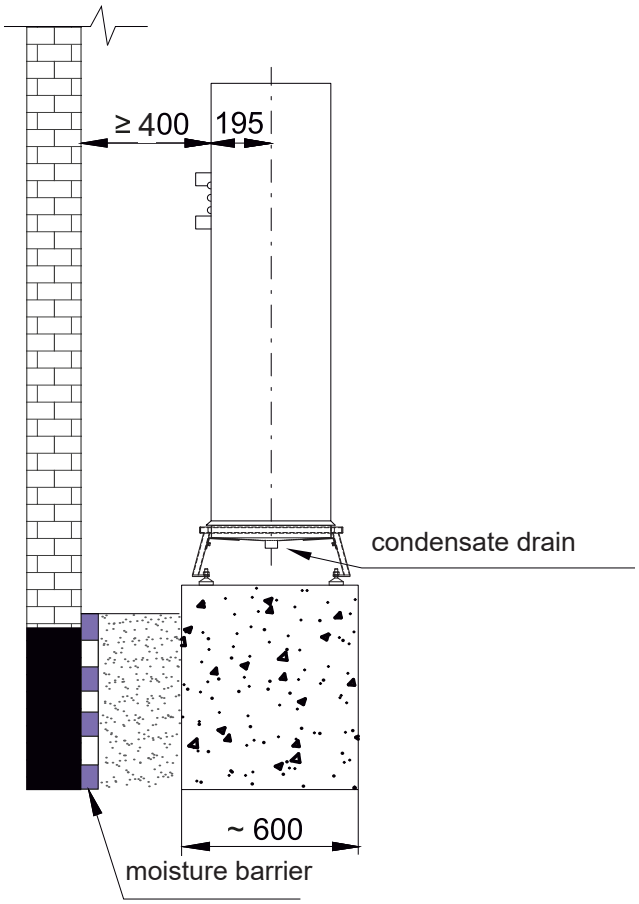
a) Installation on concrete blocks

The heat pump is placed on the legs at the factory. The heat pump supplied in this way shall be installed on concrete blocks.



- The foundations of concrete blocks should reach a frost-free depth.
- At the end, level the equipment with a spirit level.

4.4. Condensate drain



Water condensation normally occurs during heat pump operation; up to 50 liters of condensate can be generated per day, depending on the operating conditions.

The heat pump is equipped with a condensate tray. A heating cable is installed in the condensate tray as a protection against freezing. The condensate tray shall be connected to a drain pipe (40 mm socket) for condensate drainage. If necessary, it is possible to place a heating cable in the drain pipe. The 5 m long heating cable for the drain pipe is not included in supply and can be ordered as an optional accessory (code 18491).

a) **To the ground to a frost-free depth**

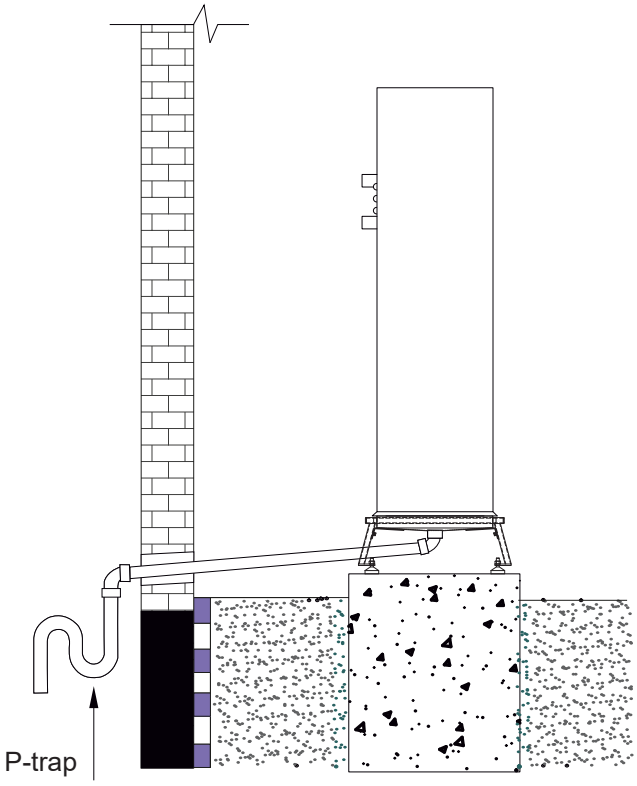
The outlet and the space around the pipe shall be filled with crushed stone to ensure sufficient condensate drain. The underground section of the pipe can be perforated.

b) **Into the building, in its sewage system**

The through-wall passage shall be above the ground and properly insulated or filled with construction PU foam. A water trap shall be installed inside (see fig. on the right).

c) **To the building's sewage system**

The drain pipe can be run e.g. to downpipe drains or eaves.



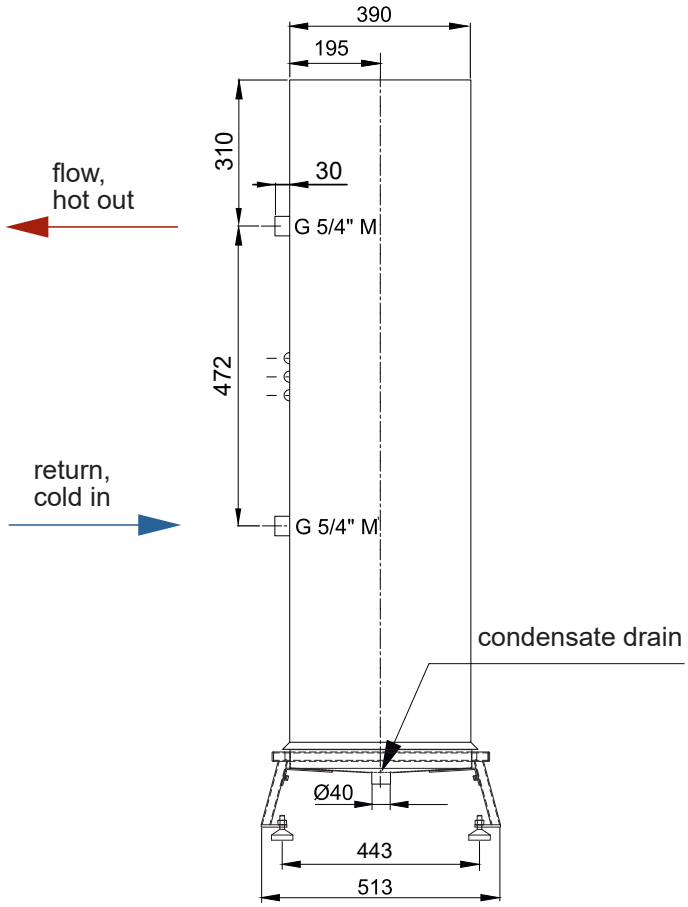
It is recommended to insulate the outdoor section of drain pipe with thermal insulation.

4.5. Pipe connection

The hydraulic connection of the heat pump may only be carried out by a qualified specialist.

The horizontal sections of the connecting pipe shall always be routed so that they can be air bled. Pipes laid in the exterior of the building shall be provided with thermal insulation resistant to moisture with a minimum thickness of 19 mm. Indoors the piping shall be provided with insulation at least 13 mm thick. For cooling, it is necessary to use special pipe insulation that prevents condensation on the pipe surface.

In the case of cooling into the underfloor system, condensation can occur on the floor if too low temperatures are used (or in too humid environment). Therefore, consult experts in this case to avoid damage to the property.



Compensators (included in supply) shall be fitted to the heat pump connecting pipes (G 5/4“ M) to increase the frost protection of the plate heat exchanger of the heat pump.

To limit the transmission of vibrations to the house structure, it is recommended to connect the heat pump using braided diffusion-tight hoses G 5/4“ of suitable length in such a way that they run loose in a slight bend. Hoses are included in the delivery only for heat pumps supplied as a Special Offer, otherwise they must be ordered separately. Braided diffusion-tight hoses with F/F or M/F threads for RTC 20e heat pumps can be ordered in lengths of 300, 500, 700 and 1000 mm. When installing compensators and braided hoses, follow the instructions in the separate Installation Manuals that will come with these products.

Continue after the braided hose with copper, stainless steel or other pipes of suitable size. The appropriate dimension of the pipe is prescribed by the heating designer, the dimension specified by him is binding and must be observed during installation. Below are only indicative recommended pipe dimensions:

Distance (total length of piping)	< 30 m	30 - 40 m	> 40 m
Indicative recommended pipe diameter	Cu 35×1.5 (DN32)	Cu 42×1.5 (DN40)	Calculation needed

For the correct operation of the device, it is necessary to keep the minimum flow through the heat pump at the level of ***min. 1560 l/h.***

In heating systems, use treated water that is properly filtered and free of all impurities. In particular, it is important that the heating water does not contain more than 300 ppm of chlorides and that the pH value is between 6 and 8.

Make sure that the filter with magnet is installed.

Avoid using zinc-plated parts that can cause excessive corrosion of the system.

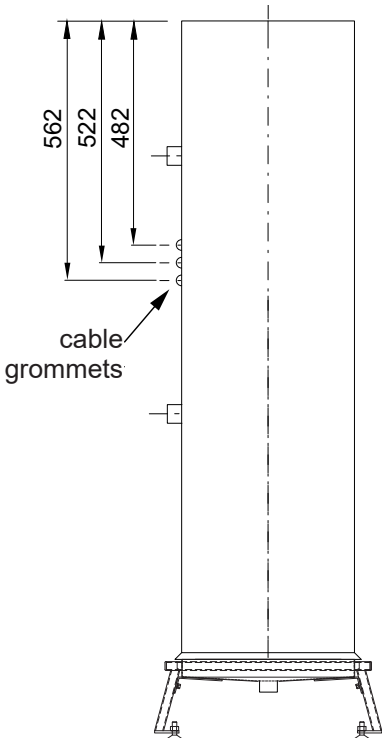
4.6. Electrical wiring

Electrical connection and any interventions in it may only be carried out by a qualified person with the appropriate authorization!

Check that the power supply to the utility room is sufficient and in accordance with the design documentation, resp. according to valid standards and regulations. The cross-section of the supply cable for the entire heating technology depends on the application and the output of the auxiliary heat source.

Connect other devices (IR14 RTC controller, auxiliary heat source, circulation pumps, valve actuators, etc.) according to the relevant instructions or design documentation.

A suitable heat pump circuit breaker for most installations under normal conditions is B16A 3f. If a residual current device is installed in the heat pump circuit, it should be a G-type RCD (delayed).



Communication: 15 m communication cable LiYCY 3×2×0,75 mm^2 is part of the controller supply.

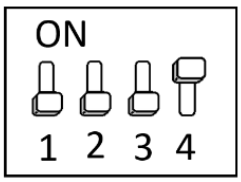
Power supply: the power cable is not included in the delivery, we recommend using a power cable with a cross-section of 5×2,5 mm^2, unless otherwise stated in the design.

4.7. Addressing HPs in cascade

The addressing of the idividual heat pumps installed in the cascade is perrformed via DIP switches 1,2,3 and 4 on the JNP 101 switch, which is located on the printed circuit board.

The setting options are as follows:

JPN 401



1 2 3 4	Adress
	HP 1
	HP 2
	HP 3
	HP 4

1 2 3 4	Adress
	HP 5
	HP 6
	HP 7
	HP 8

5. FIRST START-UP AND COMMISSIONING

Commissioning must be carried out by a service provider with a valid authorization issued by REGULUS spol. s r.o.

Basic steps before the first start-up:

- □ Before the first start up (or after a shutdown of more than 1 day), leave the unit with the power on for several hours to allow the oil in the compressor to warm up sufficiently.
- □ Check that the electrical installation is carried out in accordance with the applicable regulations and with the label on the unit (check in particular the size of the supply cable, values of the circuit breaker, residual current device and correct earthing).
- □ Check the mains voltage at the installation site.
- □ Check that the power cable is not damaged, not located close to a heat source, and that the terminals on the wiring are properly tightened.
- □ Check the correct wiring of electrical components (circulation pumps, valves, temperature sensors, etc.).
- □ Check that the heating system is filled with water, properly air bled and pressurized (1.5-2.5 bar).
- □ Check that the heating system has been properly flushed and filled with clean and treated heating water that meets the requirements of this manual.
- □ Check connections for leaks.
- □ Check piping insulation.
- □ Check that the shut-off valves of the hydraulic circuits are open and that the water flow through the unit is not blocked.
- □ Check that the inlet and outlet pipes of the unit have not been interchanged.
- □ Check that a Magnet Filterball is installed on the return pipe to the heat pump.
- □ Check that the fans rotate freely.
- □ Make sure that the unit has unrestricted air access.
- □ Check that all protective covers are fitted and secured.

Actions following switching on:

- □ Switch on the heat pump through the controller and set all necessary parameters of the control system.
- □ When the system heats up, carry out a pressure and heating test. These activities should be recorded in a heating test and leak test report.
- □ Inform the user about the controller control and user menu.
- □ Inform the user about the location of switches, circuit breakers and their functions.
- □ Inform the user about other safety features and indicators (safety valves, pressure gauges, analogue thermometers, etc.) and their functions.
- □ Check the availability of all documentation of the installed devices.
- □ The service provider shall fill in the Heat Pump Commissioning Protocol and the heat pump owner shall sign it.

6. MAINTENANCE, SERVICING

6.1. User maintenance

It is recommended to perform user maintenance at least once a month:

- **Pressure check of heating system.**
  It is carried out locally or via remote access (in case of installation with the RegulusBOX indoor unit). If you hear a gurgling, hissing or even screeching sound coming from the pipes, circulator or near the outdoor unit, or if you find the pressure in the heating system is too low (usually below 1 bar), then air bleed the system and top up water until the pressure rises to the value specified in the design documentation or as advised by the heating engineer (usually around 2 bar).
- **Visual inspection for leaks of working fluids.**
  Check the heating system for water leaks and the heat pump for oil leaks.
- **Check of the finned heat exchanger for clogging.**
  Carefully remove fallen leaves and other dirt. You can use a vacuum cleaner or a soft brush. The heat exchanger lamellas are sharp and can cause injury - so always take care when cleaning them. If the heat exchanger lamellas are very dirty, we recommend that you have them cleaned by a professional technician.
- **Condensate drain check.**
  Check that the condensate can flow freely and is not trapped.

When cleaning of the outer covers of the device is needed, use non-aggressive and non-abrasive cleaning agents (e.g. a damp piece of cotton cloth). Do not use solvent-containing cleaning agents.

6.2. Professional maintenance

Warning: Risk of electric shock if live parts are touched! Disconnect the device from the power supply before working on live parts!

It is recommended to have professional maintenance performed by an authorized service technician once a year:

- Check of wiring and tightening connections.
- Check of the correct functioning of the safety elements.
- Adjusting the expansion vessel pressure.
- Cleaning the filter in the heating system. (The unit must be turned off when cleaning the filter.)
- Check of fan mounting and balance.
- Check of power input.
- Check of the dry filter and detection of possible leaks.
- Check of working pressures and temperatures in the refrigerant circuit.
- Check of the history of operating values logged by the controller.
- Check of the circulation pump.
- Check of cover fastening.
- Check of the heating water quality.
- Check of the finned and plate heat exchangers for dirt

As of the date of placing on the market, the RTC 20e heat pump is NOT subject to regular refrigerant leakage checks.

6.3. Non-standard conditions and faults

If the system registers some non-standard condition or fault, the controller is informed. The information is shown on the controller display and at the same time, it is available via the controller website. If set, the controller sends an email message about the problem. For more information, please refer to the manual of the respective controller.

The selected fault conditions (e.g. compressor overcurrent, high/low refrigerant pressure, defrosting fault or insufficient heating water flow) will be reset after 10 minutes. If the alarm repeats 3 times in a row, the compressor will shut down permanently.

If a fault occurs, you should always contact the installation company that installed your system with the heat pump. In the communication with your installer or heat pump supplier, always report the serial number of the heat pump (indicated on the heat pump label and in the Heat Pump Commissioning Protocol).

Unusual phenomena

If any unusual phenomenon occurs, especially if there is sparking in the wiring, odour or smoke leakage, then switch off the appliance without delay and call an authorised service centre.

Normal phenomenon – evaporator defrosting

The fan stops during the defrosting cycle, but the compressor is still running. Melted ice flows into the condensate tray under the heat pump. As soon as defrosting is completed, the fan starts up again and a cloud of fumes formed by moist air may form for a short time. This is a perfectly normal phenomenon that disappears after a few seconds.

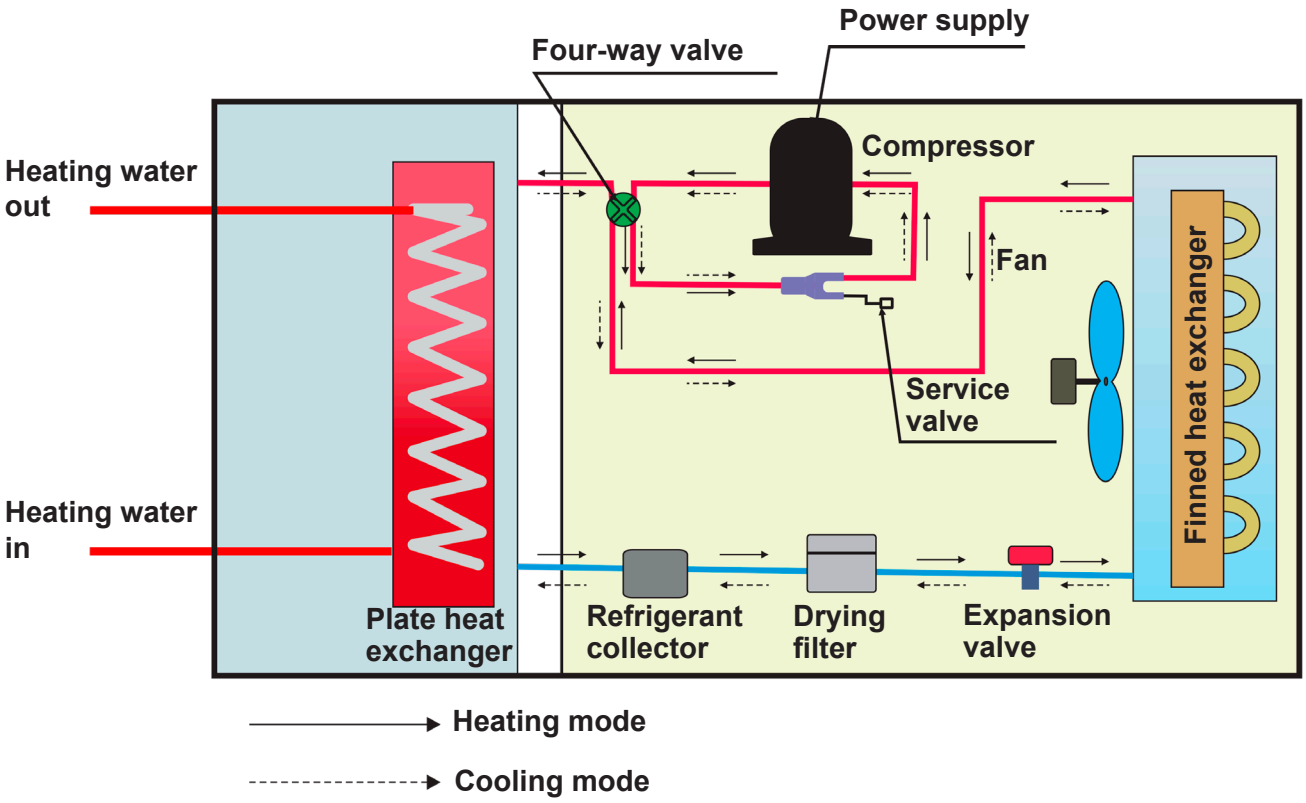
On frosty days, check for ice in unusual places (heat pump legs, condensate tray, fan, etc.). Possible causes can be: blocked condensate drain piping (e.g. when condensate freezes inside the piping), lack of refrigerant or extreme weather conditions.

6.4. Diagnostics and possible causes of fault conditions

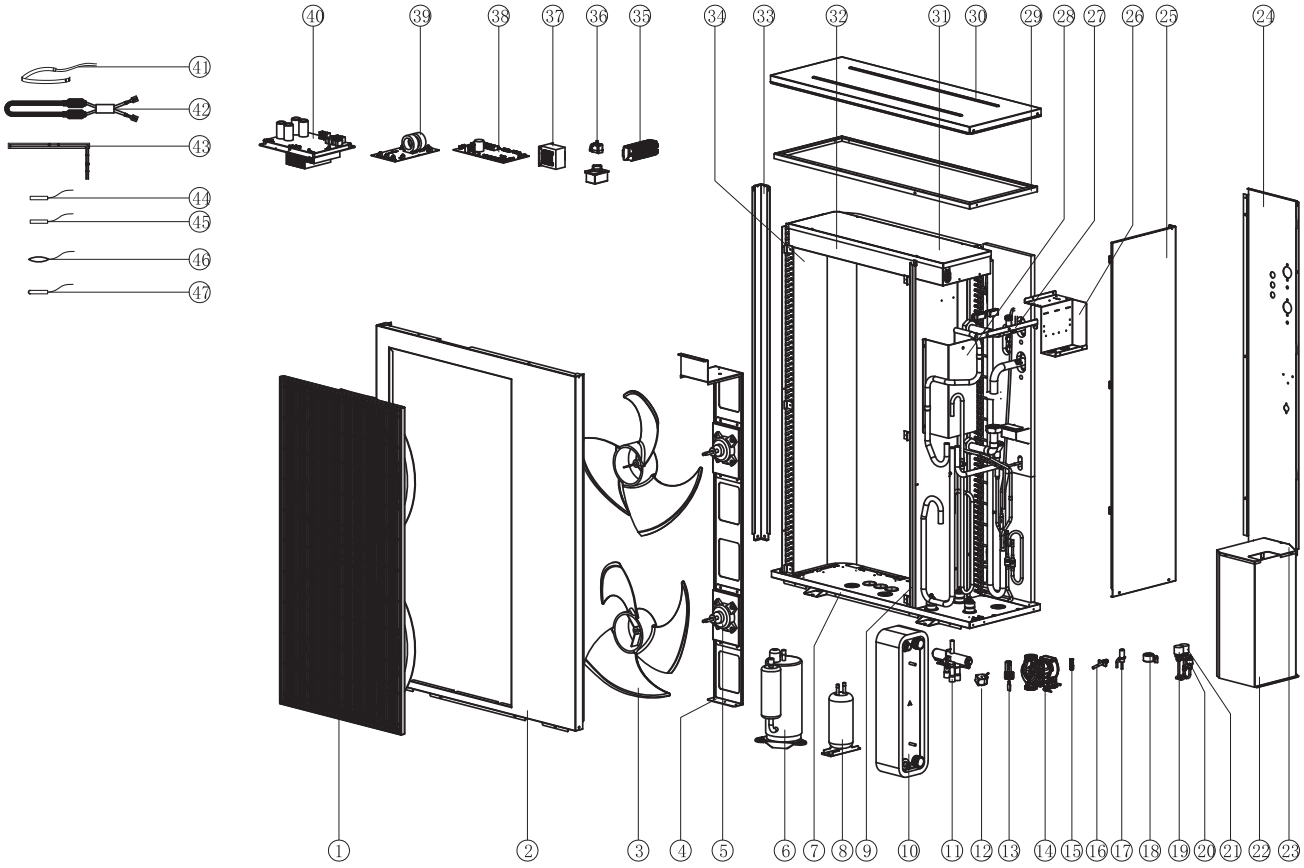
Fault condition	Possible cause / diagnostics
Insufficient flow rate of heating water	Possible causes: • air in system / low pressure • dirty filter • closed valve • impurities settled in plate heat exchanger • other obstacles in water flow • defect circulation pump • too small pipe diameter
Compressor overcurrent	Check: • power supply cable and tightening of terminals • device power consumption • technical condition of the fan • clogging of the finned and plate heat exchangers • heating water temperature and flow and return temperarture difference
Protection of IPM module	This is a compressor speed control error. Check: • compressor inverter board • whether cables aren't interrupted or loose • technical condition of the compressor
Compressor lubrication	If the unit is operated at low compressor speed for a long time, the unit will increase the speed to get more oil into the compressor. This is a normal condition that does not require any intervention.
High/low refrigerant pressure	Check: • technical condition of the fan and circulation pump • filter • cleanliness of the finned and plate heat exchangers • heating water temperature and flow and return temp. difference • refrigerant quantity
Reduction of compressor speed at high refrigerant condensation pressure	Check: • technical condition of the fan and circulation pump • filter • cleanliness of the finned and plate heat exchangers • heating water temperature and flow and return temp. difference
Compressor warm-up	If the compressor has not been running for a long time or if the outdoor temperature is too low, the compressor heater will switch on. This is a normal condition that does not require any intervention.
Compressor high outlet temperature protection	Check: • whether the water outlet temperature isn't set too high (especially at low outdoor temperatures) • whether the heating water flow isn't too low • whether there isn't too little oil in the compressor • whether there is sufficient refrigerant in the unit
Finned heat exchanger temperature sensor protection	Check: • that sufficient airflow through the finned heat exchanger is ensured
Undervoltage / overvoltage of the power supply	Check: • the value of the power supply voltage
Speed limitation or compressor shutdown due to high / low outdoor temperature	This is a normal condition that does not require any intervention.
Reduction of compressor speed at low refrigerant condensation pressure	Check: • whether there is sufficient refrigerant in the unit • that no refrigerant circuit leaks are present • technical condition of the fan and circulation pump • whether the expansion valve is working properly • whether the heating water temperature isn't too low • whether the flow and return temperature difference isn't too big

Fault condition	Possible cause / diagnostics
Temperature sensor error	Check: • sensor resistance • sensor connection and cable
High pressure / low pressure switch error	The error message occurs either if the pressure switch is not closed in standby mode, or 2 minutes after the compressor is switched off. Check: • the connection and the correct function of the pressure switch
Fan error	The fan has not reached the required speed or is not sending a feedback signal. Check: • fan PCB • fan motor • cables
Refrigerant evaporation pressure too low	Check: • whether there is sufficient refrigerant in the unit • that no refrigerant circuit leaks are present • technical condition of the fan and circulation pump • whether the expansion valve is working properly • whether the heating water temperature isn't too low • whether the flow and return temperature difference isn't too big
Refrigerant condensation pressure too high	Check: • whether there isn't too much refrigerant in the unit • whether the water flow is sufficient • filter • technical condition of the fan and circulation pump • whether the expansion valve is working properly • whether the heating water temperature isn't too high • whether the flow and return temperature difference isn't too large • whether the heat exchangers heat transfer surfaces are not clogged
Communication error	Check: • cables • settings of switches on the PCB (see chap. 4.7. Addressing HPs in cascade)
Compressor phase error (current or overload)	Check: • compressor power cable • the inverter board and its connections
Undervoltage / overvoltage of the VDC module	Input voltage is too high or low.
EEPROM error	Turn off the power and use a jumper to connect the JP404 terminals on the outdoor unit PCB. Turn on the power. Turn off the power and remove the jumper on the JP404 terminals. If the error persists, replace the PCB.
The outgoing water temperature is too low	If the outgoing water temperature in cooling mode is lower than 5 °C, the compressor will switch off. Check: • temperature sensor • water temperature • water flow rate
The outgoing water temperature is too high	If the outgoing water temperature in heating mode is higher than 58 °C, the compressor will switch off. Check: • temperature sensor • water temperature • water flow rate
Defrost error	Check: • water temperature
Water temperature too low in heating or DHW mode	If the water temperature is lower than 15 °C, the compressor will switch off. The compressor switches on when the flow temperature exceeds 17 °C. This is a protection that prevents damage to the compressor.

6.5. Refrigerant circuit diagram

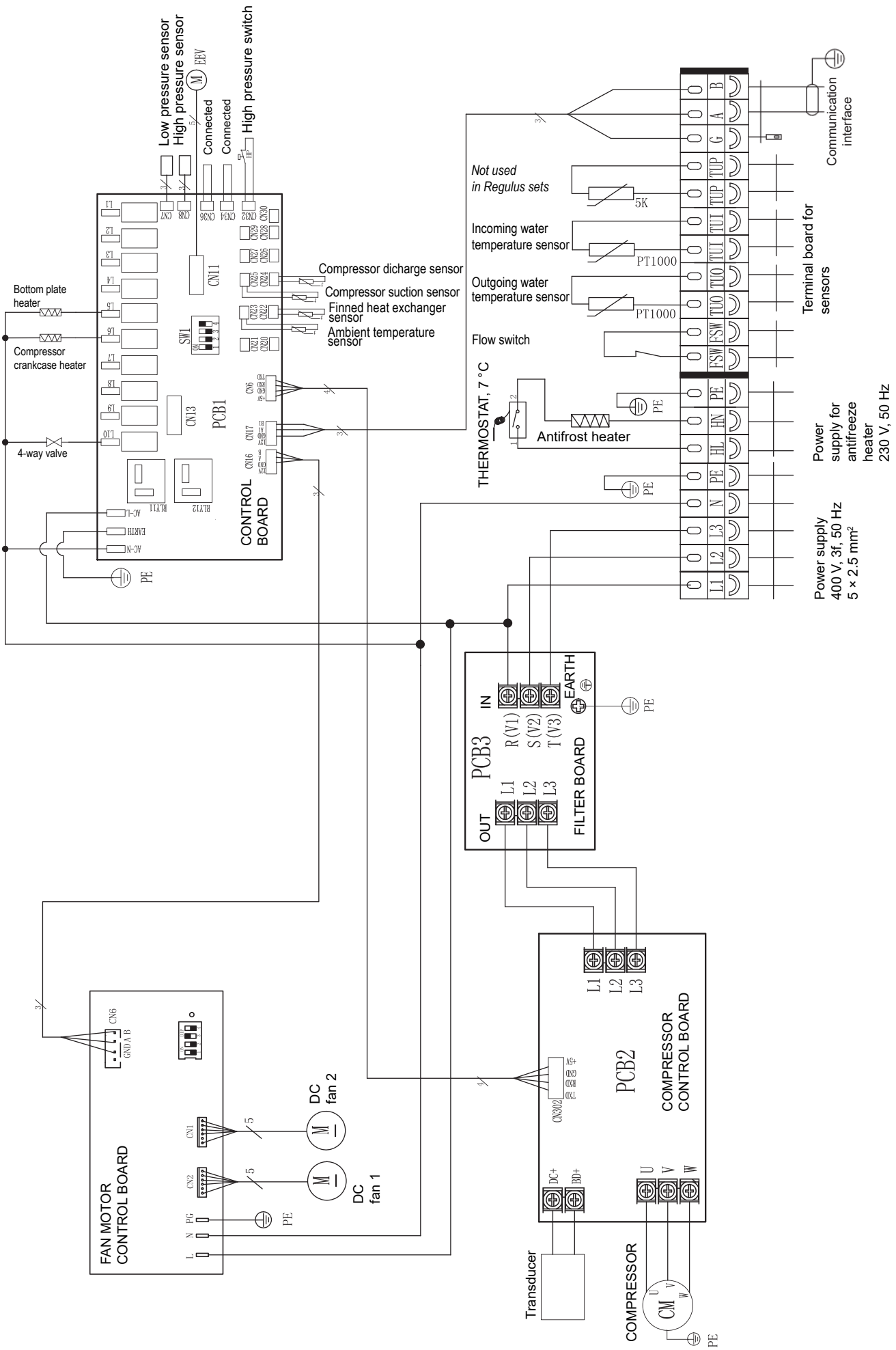


6.6. Component layout diagram



Pos.	Name	Pos.	Name
1	Fan cover grille	**25**	Side panel
2	Front cover	**26**	Fixing plate 1 for terminal block
3	Fan	**27**	Fixing plate 2 for terminal block
4	Mounting bracket for fans	**28**	Fixing plate for plate heat exchanger
5	Ventilator DC fan	**29**	Fixing plate
6	Compressor	**30**	Upper cover
7	Bottom plate	**31**	Electrical enclosure cover
8	Collector of liquid refrigerant	**32**	Electrical enclosure
9	Partition	**33**	Column support
10	Plate heat exchanger	**34**	Evaporator
11	Four-way valve	**35**	Terminal block
12	4-way valve actuator	**36**	End switch
13	Flow switch	**37**	PFC Power Factor Corrector circuit
14	The item is not included in HP supply in Regulus Sets.	**38**	PCBs
15	Air vent valve	**39**	
16	Drain valve	**40**	
17	El. expansion valve	**41**	Bottom plate heater
18	El. expansion valve actuator	**42**	Compressor heater
19	Low pressure sensor	**43**	Plate heat exchanger heater
20	High pressure switch	**44**	Sensor at compressor discharge (50k)
21	High pressure sensor	**45**	Sensor at compressor suction / finned heat exchanger
22	Compressore case	**46**	Ambient temperature sensor
23	Compressor case cover	**47**	Incoming/outgoing water temperature sensor (Pt1000)
24	Side panel		

6.7. Internal electrical wiring diagram



7. RELATED DOCUMENTATION

- Instructions for installation and operation of the heating controller according to the selected application. Wiring methods are given in chapter 2.
- Installation and operating instructions for the components belonging to the appliance (hot water storage tanks, thermal stores, valves and actuators, etc.).
- Heat pump commissioning report - issued by an authorised person authorised by the service organisation.

8. DECOMMISSIONING

In cases where water in the unit may freeze (e.g. when the unit is out of service), drain all water from the heat pump water circuit and piping. After draining the water, also switch off the electrical supply to the equipment with the circuit breaker.

9. RECYCLING / DISPOSAL

The equipment must not be disposed of as municipal waste.
Components made of steel, copper and copper alloys shall be handed over to a sorted metal waste collection site.
Electronic components such as electronic boards must be handed over to a collection point designated for electrical waste.

Warning: Current regulations do not allow refrigerant to escape into the environment. All refrigerant must be professionally extracted by a certified person and handed over to the appropriate collection sites.

ANNEX 1: REPAIR AND INSPECTION LOGBOOK

Date	Action performed	Service company Name, signature, rubber stamp	Customer‘s signature

Date	Action performed	Service company Name, signature, rubber stamp	Customer‘s signature

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