GEBWELL

Installation, Commissioning and Maintenance Manual

Taurus Inverter Pro and Taurus EVI Heat Pumps

WWW.GEBWELL.FI

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1 General

1.1 Device information and storing the instruction manual

NOTICE Keep the instruction manual in the immediate vicinity of the device.

Read the instructions carefully before installing, adjusting or servicing the device. Always follow the instructions.

The installation technician must complete the installation record. A completed record is a precondition for the validity of the manufacturer's warranty.

Fill in the details below. If there are problems with the device, these details must be available.

Heat pump model:	Serial number:
Installation firm:	Name:
Installation date:	Phone:
Electrician:	Name:
Installation date:	Phone:

CE

The CE mark is the manufacturer's declaration that the product conforms to EU legal requirements. Gebwell Ltd affirms that the product meets all of the requirements of relevant EU directives. The purpose of the CE mark is to facilitate the free movement of goods on the internal market in Europe.

1.2 Warranty

Warranty period and entry into force

Heat pumps come with a warranty of two (2) years starting from the purchase date. In addition, the warranty can be extended by three (3) years. The extended warranty does not apply to any additional equipment, accessories or other system parts of heat pump systems. The start date of the warranty must be verified by presenting a purchase receipt. If no receipt is presented, the warranty start date is considered to be the delivery date from the factory. If there is more than one month between the delivery date of the device and the invoice date, the warranty is deemed to start one month after the delivery date.

The technician/retailer of the heat pump completes the installation record and reviews it with the end user. The end user is familiarised with the use of the equipment, after which the equipment is registered

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using the registration form found on the Gebwell Ltd's website. Registration will extend the warranty period by three years. The end user will be sent an email confirmation upon successful registration. If no confirmation is delivered, the end user can ask for it directly from Gebwell Ltd. If the installation record has not been properly completed and the equipment has not been registered, the extended warranty will not be valid.

Warranty content

This warranty covers manufacturing or material defects detected in this product within the warranty period, as well as direct costs resulting from repairing the device.

The buyer is liable for all defects caused due to the storage conditions during the period between the delivery date and the commissioning date (see the installation, operation and maintenance manual; storage).

Warranty limitations

The warranty does not cover costs resulting from a defective device (travel, energy, etc. costs), damage caused by a defective device, the buyer's production losses, profits not realised, or other indirect costs.

This warranty has been provided on the grounds that the product functions correctly in normal use conditions and that the instruction manual is carefully followed. The liability of the warrantor is limited in accordance with these terms and shall not, therefore, cover any damages caused by the product to another object or person.

The warranty does not apply to direct personal injuries or damages to property caused by a defective product delivered.

The warranty is granted on the condition that all effective regulations, generally accepted installation methods and product mounting instructions provided by the manufacturer have been complied with.

The warranty does not cover and is invalid if the product is used in any other way than required by the dimensions.

The customer is liable for visually inspecting the product before installation. A product that is clearly defective must not be installed.

A requirement for the extended warranty is that the product is registered within six months of installation.

The warranty does not include damage caused

- during transportation
- by negligence of the user of the product or overload of the product, failure to observe the instruction manual or to carry out care or maintenance
- by circumstances not dependent on the guarantor, such as fluctuations in power supply voltage (voltage fluctuations can be no more than ±10 %), thunderstorms, fires or accidents; by service, repairs or structural alterations performed by parties other than authorised repair services
- by installation or placement of the product in contravention of the installation, operation and maintenance manual, or otherwise incorrectly.

Moreover, the warranty does not cover the repair of faults that are insignificant in terms of the operation of the equipment, such as superficial scratches. The warranty does not include normal adjustments described in the instruction manual, user guidance visits, service and cleaning, or tasks due to negligence of the precautions and installation instructions or investigations of the same.

Some features of the heat pump require a mobile data connection (such as 3G or 4G). If the heat pump is installed in a location with a poor or non-existent mobile data connection, Gebwell cannot guarantee the proper operation of all the features (such as remote access).

Gebwell is not liable for the operation of mobile data or the costs incurred due to measures taken to improve mobile data functionality, such as the costs of signal boosters.

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The warranty becomes void if:

- The product is modified or repaired without Gebwell Ltd's consent.
- The product is installed or the product is used or serviced contrary to the manufacturer's instructions (see the installation, operation and maintenance manual).
- The product is used for a purpose for which it is not intended.
- The product is stored in humid or otherwise inappropriate conditions (see the installation, operation and maintenance manual).
- The control automation of the product is replaced or its properties are modified from the original (for example, by installing an accessory that affects the control).

Actions in the event of a fault

If a fault is detected during the warranty period, the customer must immediately (normally within 14 days) report it to the Gebwell retailer that sold the product. The information to be provided includes the equipment model and serial number of the product and a detailed description of how the fault was found and the conditions under which it occurred and/or arises. The warranty form properly completed in relation to the purchase must be presented upon request. After the warranty has expired, it shall not be considered valid to invoke a defect reported during the warranty period unless the defect was reported in writing during the warranty period.

Defects must be reported as soon as they are detected. If a defect is not reported as soon as the customer detects the fault, or when the customer should have detected the fault, the buyer will lose his/her right to a claim based on this warranty.

Servicing

Servicing for this product during and after the warranty period is performed by the servicing organisation authorised by the manufacturer throughout the economic service life of the heat pump.

How to make a service request

Repairs under warranty, servicing requests and orders for spare parts must be directed to the installation firm that installed the product. Before making a service request, please ensure the following:

- Read the installation, operation and maintenance manual carefully and consider whether you have followed the manual when using the device.
- Ensure that the warranty period is still valid, you have carefully read the warranty terms and you know the product's model and serial numbers before making a warranty repair request.
- All parts belonging to the device to be returned must be packed with the device.
- The device to be returned must be packed in such a way that handling it does not have adverse effects on health or the environment.

The device replaced under warranty is the manufacturer's property. Gebwell Ltd reserves the right to decide how, where and who will perform repairs or replacements for which the manufacturer is liable.

Gebwell Ltd is not liable for breakdown of an incorrectly installed device.

The device may only be repaired by a professional designated by Gebwell Ltd. Faulty repairs and settings may cause danger to the user, damage to the device and weaken the efficiency of the device. Please bear in mind that a visit by a retailer or service technician is not free, even during the warranty period, if repairs are required due to faulty installation, repair or adjustment.

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1.3 Installation record and registration

The heating system must be inspected in accordance with applicable regulations before commissioning. The inspection must be performed by a qualified person.

Fill in the installation record supplied with the device carefully and leave it to the owner of the device.

NOTICE A completed installation record is a precondition for the validity of the warranty.

Enter the following information on the label glued to the control unit of the equipment:

- commissioning date of the equipment
- first annual service not later than.

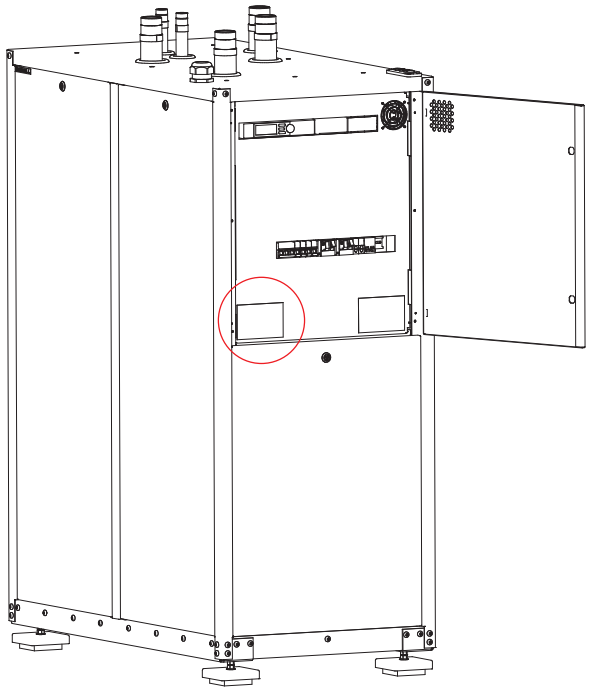

Figure 1.1 - Control unit label

Registration of the device

By registering the heat pump within six months from its installation, you will get a five-year warranty for it.

Register the installed heat pump on our website at **https://gebwell.fi/rekisteroi-maalampopumppu/** .

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You can also access the registration page on a smartphone by using the QR code below. If you are unable to register the heat pump, **call Gebwell Ltd on +358 20 1230 800.**

Gebwell Ltd contact information

Gebwell Ltd (2008956-7)

Patruunapolku 5, FI-79100 Leppävirta, Finland

Tel. +358 20 1230 800 | info@gebwell.fi | www.gebwell.fi

Support contact information

https://gebwell.fi/tuen-yhteystiedot/

1.4 Important

These installation instructions should be given to the customer in the manual folder.

These installation instructions describe installation and maintenance measures that should only be carried out by a professional.

⚠ ATTENTION Any work on the refrigerant circuit may only be carried out by persons qualified in the refrigeration sector. Electrical work should only be carried out by an electrician.

⚠ ATTENTION The commissioning of the device must be carried out by the equipment installer or by an expert authorised by the installer.

⚠ ATTENTION The heat pump is not intended for use by persons with impaired physical/mental condition, impaired senses or lack of experience or knowledge of the heat pump, unless they are supervised or guided in using the heat pump by a person responsible for their safety.

⚠ ATTENTION Children must not play with the device or carry out cleaning or maintenance work without adult supervision.

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After commissioning, the heat pump sends telemetry data to the Gebwell Smart cloud automatically. Data storage in the cloud enables the display of the device's history data in the Gebwell Smart control room and system optimization. The data can also be used for maintenance and product development purposes.

1.5 Serial number

Keep in mind that you will need to know the device's serial number whenever you contact the manufacturer, maintenance or support services.

The serial number of the heat pump is on the ID plate glued under the control unit.

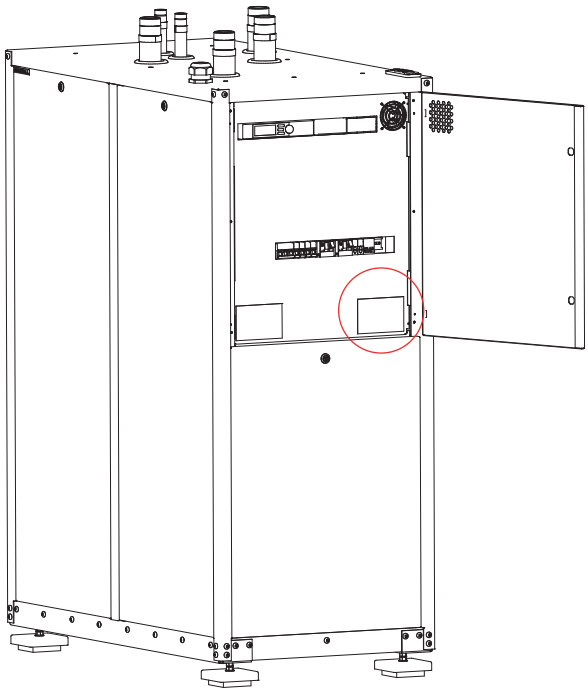

Figure 1.2 - Serial number

1.6 Standards and regulations

When performing the installation, the following must be complied with:

- national provisions
- statutory accident prevention regulations
- statutory environmental protection provisions
- profession-specific safety regulations.

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2 Safety

2.1 Safety symbols

This manual contains information indicated with signal words “danger”, “warning”, “attention” and “notice”. They inform the user or a representative of an authorised repair service of potential harm to the product or persons.

Hazardous situation means a risk of personal injury.

Any abnormal use is prohibited, including ignoring safety information.

⚠ DANGER **DANGER** indicates an immediate hazardous situation which, if not avoided, **will result in death or serious injury**.

⚠ WARNING **WARNING** indicates a potential hazardous situation which, if not avoided, **could result in death or serious injury**.

⚠ ATTENTION **ATTENTION** indicates a potential hazardous situation which, if not avoided, **could result in minor or moderate injury**.

NOTICE **NOTICE** indicates a potential situation which, if not avoided, could result in **damage to property or an undesirable outcome or condition**.

Comment indicates information intended to clarify and simplify a procedure.

2.2 Safety instructions

Handling and installation

The following safety instructions must be kept in mind when handling, installing and operating the device.

⚠ WARNING Follow these installation instructions to install the system. Install the device firmly on a load-bearing surface to prevent the device from falling and causing damage to property or personal injuries.

⚠ ATTENTION Only lift the device at the locations shown in the instructions. The metallic edges of the heat pump could injure your hands when you are hauling the unit. Use slash-resistant gloves to move the heat pump.

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⚠ ATTENTION The device should not be installed in a location:

- where flammable gases may leak, or
- where corrosive gas may be generated or accumulated, or
- where volatile flammable substances are handled, or
- near devices that generate an electromagnetic field or high frequency overtones.

⚠ ATTENTION Use original accessories and components when installing the device.

⚠ ATTENTION During installation, keep all of the device's housing panels intact to prevent water from splashing onto the device's electrical components.

Electrical installation

⚠ WARNING Electrical installation must be carried out by an authorised electrician and the system must be connected separately.

⚠ WARNING Never jeopardise safety by bypassing safety devices.

⚠ WARNING Use only fuses of the correct value (correct trigger current) in places where the fuse should be used.

Refrigerant circuit

⚠ WARNING Stop the compressor before opening the refrigerant circuit.

⚠ ATTENTION The refrigeration compressor unit in the device must only be serviced or repaired by a qualified person.

⚠ ATTENTION Check after installation and maintenance that no refrigerant leaks in gas form from the system.

⚠ ATTENTION Use pipes and tools suitable for the refrigerant in the device.

⚠ ATTENTION Refrigerant may leak during maintenance, so ensure that there is adequate ventilation. Monitor the measured values and ensure that the concentration limits of the refrigerant are not exceeded.

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Considerations during installation and maintenance

⚠ DANGER Always turn off the main power of the device before performing any maintenance.

⚠ DANGER Do not rinse the heat pump with water.

⚠ DANGER Do not touch the buttons with wet hands.

⚠ ATTENTION Do not touch refrigerant pipes with your bare hands while the device is in operation.

NOTICE Switch off the device in a controlled manner using the operating terminal before cutting the main power. Do not switch off the system using the main switch.

NOTICE Do not switch off the power supply immediately after switching off the heat pump. Wait for at least 5 minutes.

2.3 Hazardous substances

Electricity

The electrical components inside the heat pump contain a potentially fatal voltage.

⚠ DANGER Before opening the protective cover of the control unit or the compressor module, switch off the device using the main switch.

Refrigerant

The heat pump contains a refrigerant that is harmful and hazardous to the environment. The refrigerant is in a hermetically sealed refrigerant circuit in the compressor module.

⚠ WARNING The refrigerant circuits of heat pumps contain very low (–25 °C) and very high (+130 °C) temperatures. Work on the heat pump can lead to frost and burn injuries.

⚠ ATTENTION If the refrigerant leaks into indoor premises, the room must be thoroughly ventilated.

⚠ ATTENTION

- The use of other refrigerants than specified for the device is prohibited. The refrigerant is indicated on the ID plate and in the technical specifications table of this manual.
- When refrigerant is added, it must be in liquid form.

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Heat collecting liquid

⚠ ATTENTION The mixture of antifreeze agents, including ethanol, used as the heat collecting liquid are highly flammable. Avoid splashing the liquid on your skin.

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3 Presenting the heat pump

3.1 Heat pump system

A well-designed heat pump system with the correct power values offers low operating costs and good energy efficiency. The heat pump enables you to efficiently heat your building and domestic water.

The heat pump collects heat from a heat source and brings it into the building. Potential heat sources include a geothermal heat well, body of water, soil or waste heat of a process.

During the summer, the temperature of cold collecting liquid can also be used for cooling the building in an environmentally friendly way.

Further information about heat collection systems and their dimensioning can be found on the websites of Gebwell Ltd and the Finnish Heat Pump Association (SULPU).

www.gebwell.fi

www.sulpu.fi

3.2 Operating principle of a heat pump

The heat pump consists of four main components:

- evaporator
- compressor
- condenser
- expansion valve.

The solar energy stored in the soil is collected by the brine circulating in the brine circuits. In the evaporator (4), energy contained in the heat collecting liquid is transferred to the refrigerant, which absorbs the heat energy as it evaporates. The heat collecting liquid returns to the ground approximately 3 °C cooler than when it came. The brine entering the heat pump can be no colder than –5 °C.

The pressure and temperature of the refrigerant increase in the compressor (3). The refrigerant also absorbs the heat energy created by the compressor's work.

Hot gas is transferred into the condenser (2). The condenser transfers the heat energy from the refrigerant into the water circulating in the heating system, which distributes it to heat the building and the domestic water with the help of a change-over valve. The refrigerant condenses into a liquid state in the condenser as it loses heat energy.

The pressure of the refrigerant remains high as the liquid refrigerant is transferred to the expansion valve (6). The pressure of the refrigerant decreases in the expansion valve, and its temperature drops to approximately –10 °C. The expansion valve injects the correct amount of refrigerant into the evaporator, where the heat energy transferred from the brine causes the refrigerant to evaporate.

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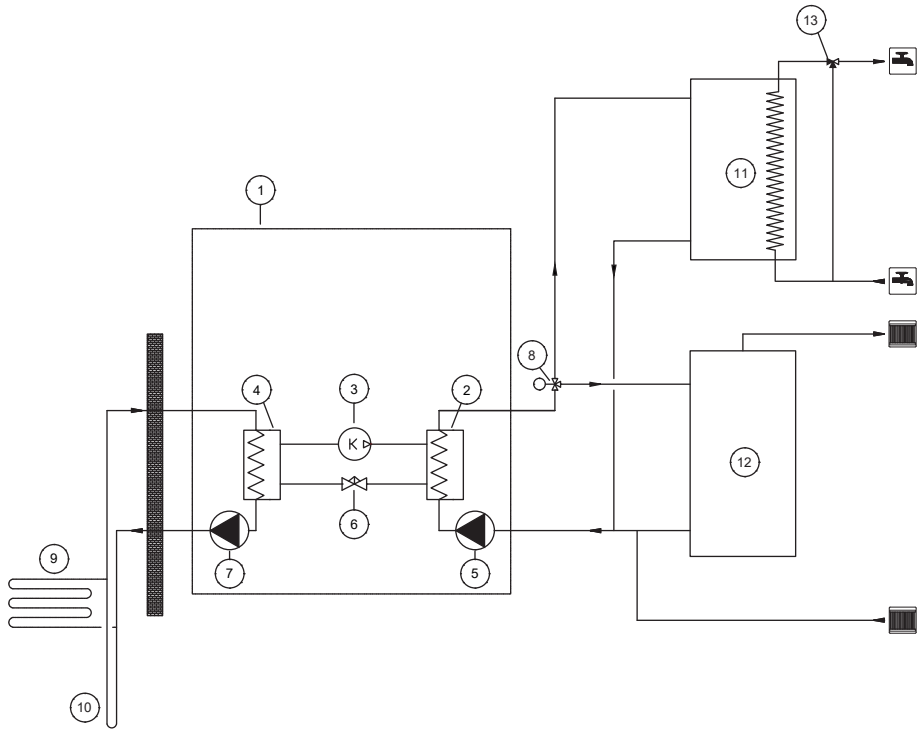

1 Heat pump
2 Condenser
3 Compressor
4 Evaporator
5 Charge pump
6 Expansion valve
7 Source pump
8 Change-over valve
9 Heat collection pipe, ground loop
10 Heat collection pipe, bored well
11 Domestic water accumulator
12 Heating accumulator
13 Domestic water control valve

Figure 3.1 - Functional description (Taurus Inverter Pro)

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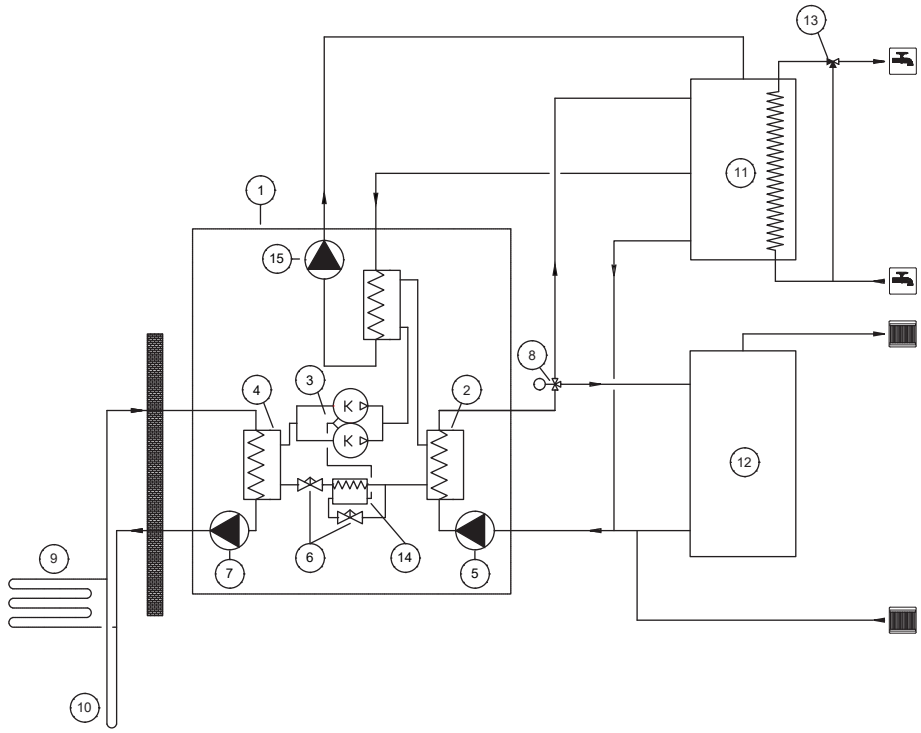

1 Heat pump
2 Condenser
3 Compressor
4 Evaporator
5 Charge pump
6 Expansion valve
7 Source pump
8 Change-over valve
9 Heat collection pipe, ground loop
10 Heat collection pipe, bored well
11 Domestic water accumulator
12 Heating accumulator
13 Domestic water control valve
14 Economizer
15 Superheating pump

Figure 3.2 - Functional description (Taurus 80/110 EVI)

3.3 Heating functions

Domestic water

The heat pump charges the domestic hot water to the domestic water accumulator using the change-over valve (Q3). The domestic water accumulator has two temperature sensors that control the charging process.

The measurement (B2) at the top of the accumulator indicates the temperature of the domestic water and the functional sensor (B3) at the bottom turns the charging process on and off. The domestic water temperature is set to the heat pump's controller via the Gebwell Smart Control Hub, application or controller. Based on the set temperature, the heat pump produces domestic water for the accumulator.

This selection affects the amount of domestic hot water. When the set value is 55 or more, the heat pump also uses an electric heater to heat domestic hot water.

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Heating

The heat pump produces heating water directly into the building's heating network. Automatic adjustment determines the setpoint for the supply water from the heating circuit based on the set heating curve and the outdoor temperature measurement.

The controller uses the supply water setpoint to determine the heat pump setpoint, based on which the heat pump produces heating energy and keeps the temperature of the supply water at the setpoint. The room temperature sensor also affects the setpoint.

In order for the heat pump to operate at maximum efficiency, the heating system and the brine circuit must be under ideal conditions. The difference between the heating system's output and return temperatures must be 5–8 °C, and the difference between the collector's output and return temperatures must be 3–4 °C. If the temperature differences deviate from these values, the efficiency will decrease, along with the savings. The heat pump controller controls the charge and source pumps to achieve the desired temperature difference.

Factory settings:

- Heating temperature difference: 5 °C
- Preparation of domestic water: pressure control
- Collector temperature difference: 3.5 °C

3.4 Tips for making savings

The heat pump is intended to generate the desired heat and domestic water. The system attempts to meet these desires by all available means within the limits of the setpoints.

Important factors affecting energy consumption are the indoor temperature, the domestic hot water consumption, the temperature of the domestic hot water, the quality of the house's insulation, and the desired level of comfort.

Keep the aforementioned factors in mind when changing the device's settings.

Underfloor heating and radiator thermostats can have a negative impact on energy consumption. They reduce the flow rate in the heating system, and the heat pump compensates for this by raising the temperature of the network. This affects the device's operation and consumes more electrical energy.

Thermostats are only intended for adjustments due to "free heat" (the sun, people, fireplaces).

3.5 Heat pump's components and sensors

Functional and measuring thermal sensors are installed in the heat pump. The sensors are attached to components and insulated from external heat. Some of the sensors are located in the compressor unit module.

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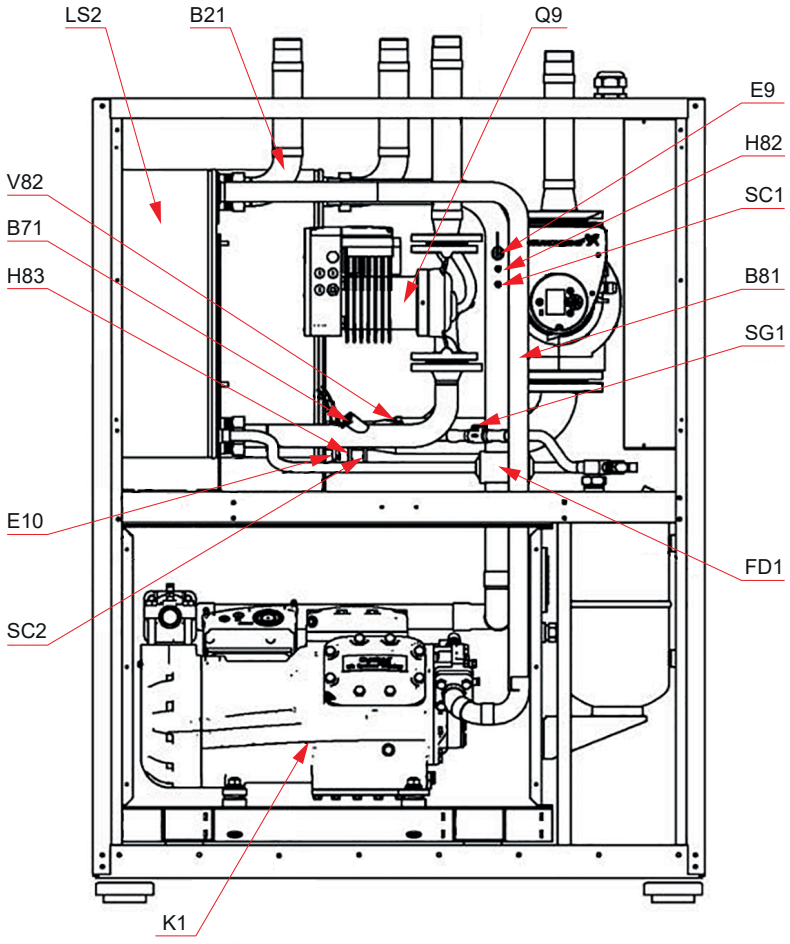

B21	Charge circuit, supply water (submersible sensor)	K1	Compressor
B71	Charge circuit, return water (submersible sensor)	LS2	Condenser
B81	Hot gas (surface sensor)	Q9	Charge pump
E9	Low pressure switch	SC1	Service connection, low pressure
E10	High pressure switch	SC2	Service connection, high pressure
FD1	Filter dryer	SG1	Fluid sight glass
H82	Pressure transmitter, low pressure	V82	Expansion valve
H83	Pressure transmitter, high pressure		

Figure 3.3 - Taurus Inverter Pro (left side viewed from the control unit)

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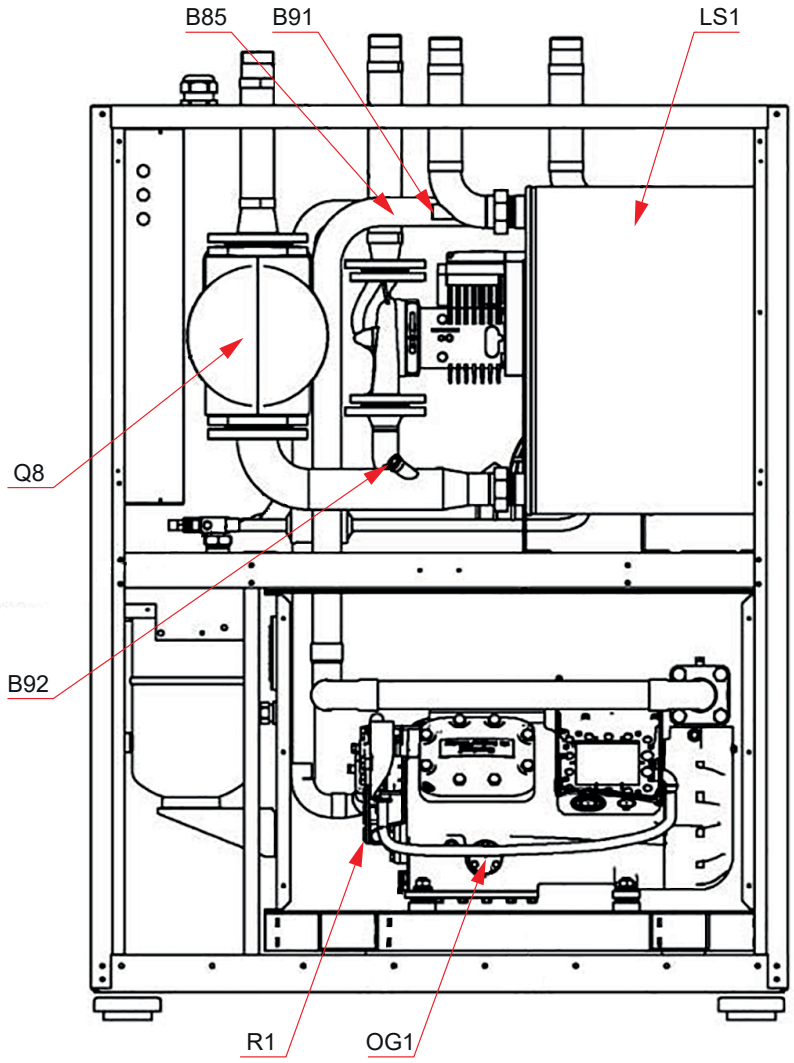

B85	Suction gas (surface sensor)	K1	Compressor
B91	Collector, inbound (submersible sensor)	OG1	Oil sight glass
B92	Collector, outbound (submersible sensor)	Q8	Source pump
FD1	Filter dryer	Q9	Charge pump
LS1	Evaporator	R1	Crankcase heater
LS2	Condenser		

Figure 3.4 - Taurus Inverter Pro (right side viewed from the control unit)

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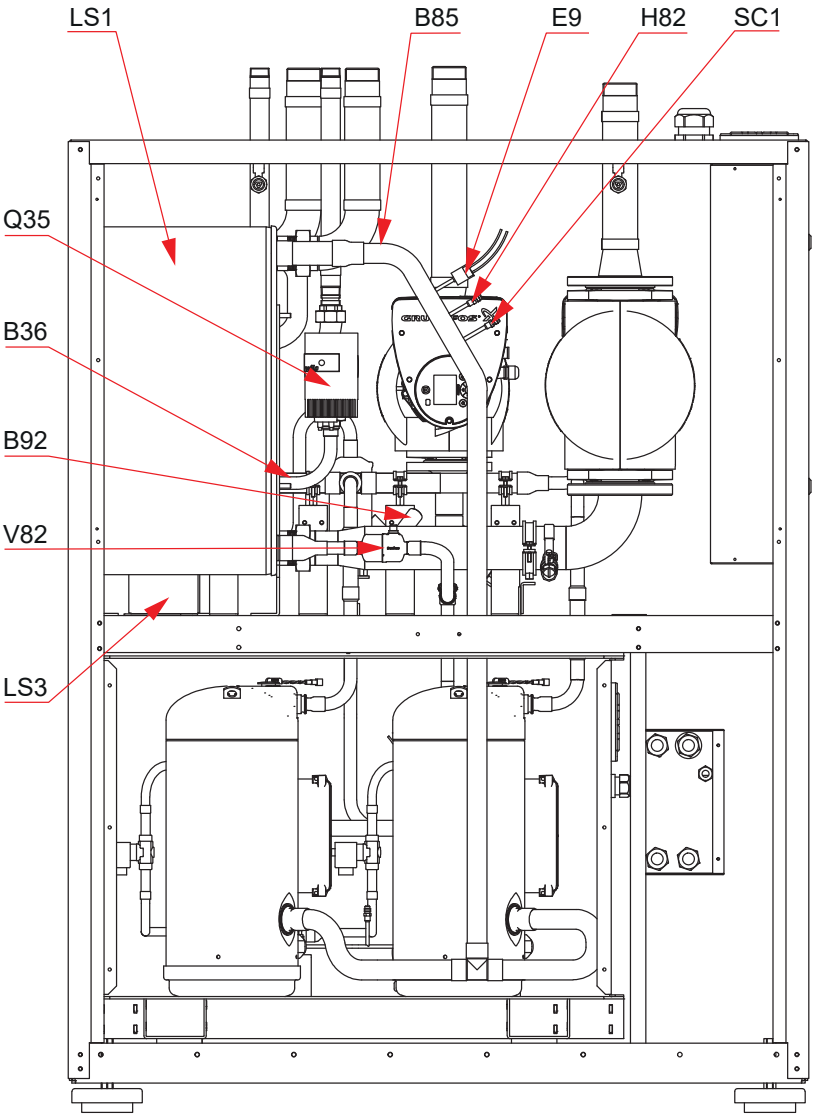

B36	Superheating circuit, supply water (submersible sensor)	LS3	Superheater (between the condenser and evaporator)
B85	Suction gas (surface sensor)	H82	Pressure transmitter, low pressure
B92	Collector, outbound (submersible sensor)	Q35	Superheating pump
E9	Low pressure switch	SC1	Service connection, low pressure
LS1	Evaporator	V82	Expansion valve

Figure 3.5 - Taurus 80/110 EVI (left side viewed from the control unit)

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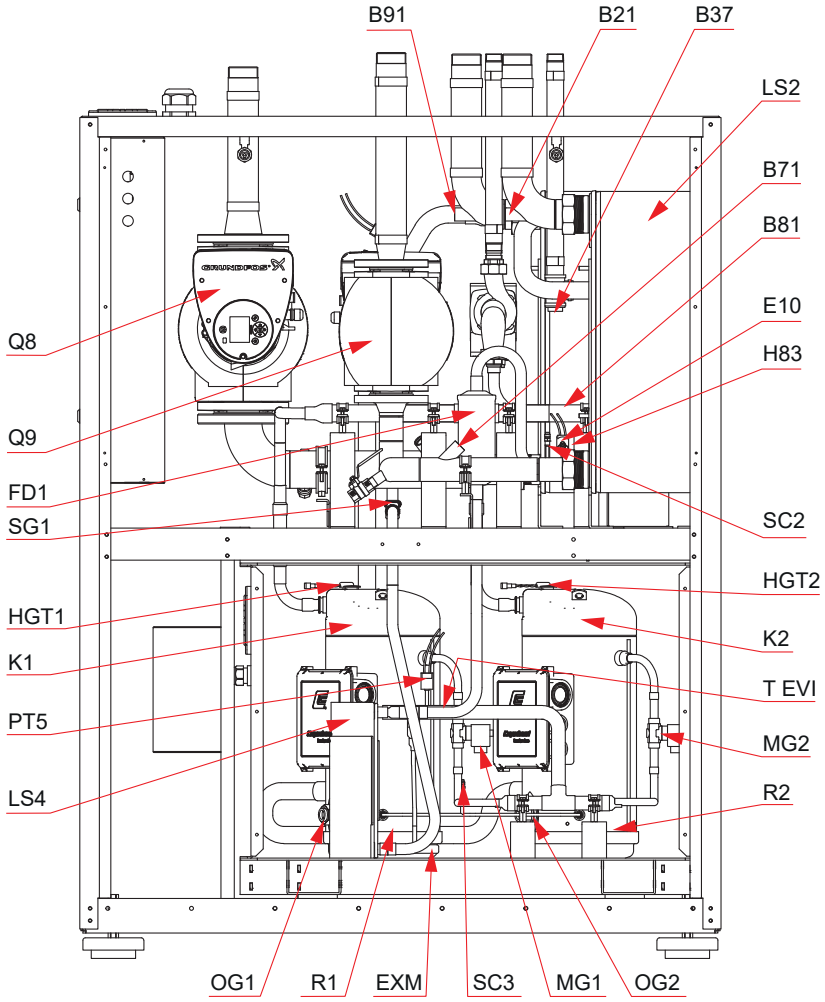

B21	Charge circuit, supply water (submersible sensor)	K2	Compressor 2
B37	Superheating circuit, return water (submersible sensor)	MG1	Solenoid valve 1 (Economizer)
B71	Charge circuit, return water (submersible sensor)	MG2	Solenoid valve 2 (Economizer)
B81	Hot gas (surface sensor)	OG1	Oil sight glass 1
B91	Collector, inbound (submersible sensor)	OG2	Oil sight glass 2
E10	High pressure switch	PT5	Pressure transmitter (Economizer)
H83	Heat pump sensor	Q8	Source pump
EXM	Expansion valve (Economizer)	Q9	Charge pump
FD1	Filter dryer	R1	Crankcase heater (compressor 1)
HGT1	Hot gas (compressor 1)	R2	Crankcase heater (compressor 2)
HGT2	Hot gas (compressor 2)	SC2	Service connection, high pressure
LS2	Condenser	SC3	Oil nipple
LS4	Economizer	SG1	Fluid sight glass
K1	Compressor 1	T EVI	Suction gas sensor (Economizer)

Figure 3.6 - Taurus 80/110 EVI (right side viewed from the control unit)

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3.6 Heat pump dimensions

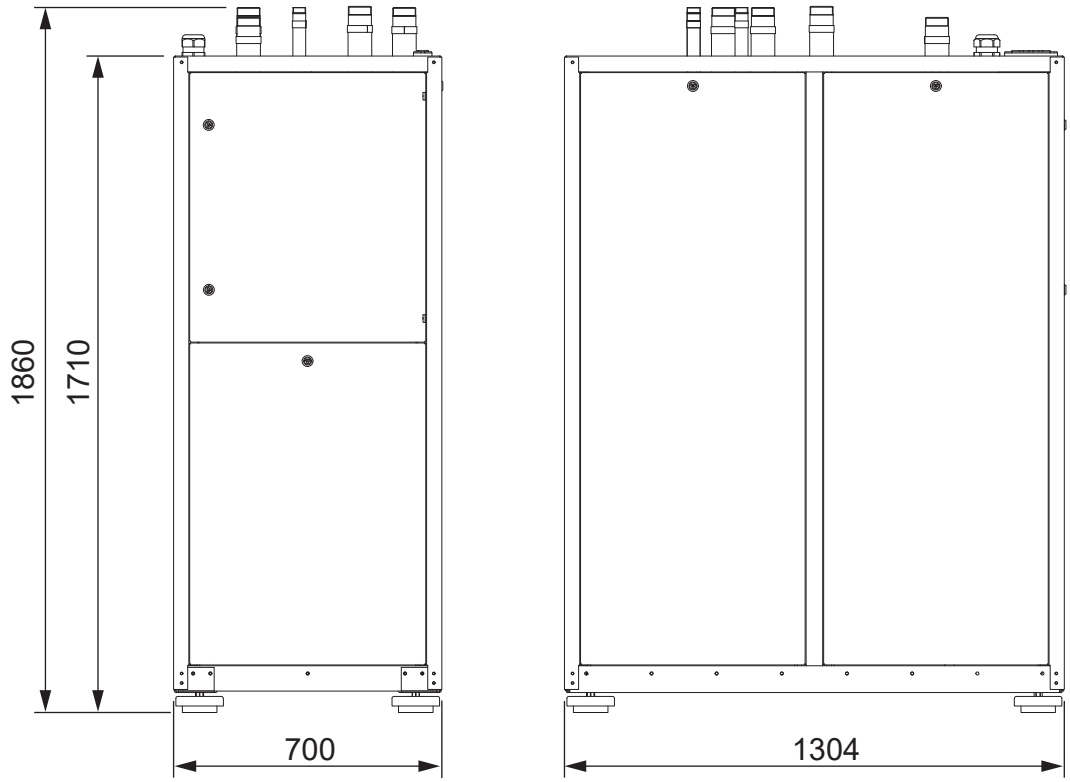

Figure 3.7 - Dimensions of Taurus heat pumps

3.7 Technical specifications

Property	Unit	Taurus Inverter Pro	Taurus 80 EVI	Taurus 110 EVI
Output details (without circulator pump)				
0/35				
Heating output	kW	94.9	71.4	93.6
Cooling capacity	kW	71.8	56.4	74.1
Supplied power	kW	24.3	15.8	20.5
COP		3.9	4.5	4.6
0/55				
Heating output	kW	82.2	74.1	97.8
Cooling capacity	kW	55.4	50.0	65.1

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Property	Unit	Taurus Inverter Pro	Taurus 80 EVI	Taurus 110 EVI
Supplied power	kW	28.2	25.2	32.2
COP		2.9	2.9	3.0
Output details (in accordance with EN14511)				
0/35				
Heating output	kW	95.0	71.5	93.6
Supplied power	kW	24.7	16.1	20.9
COP*		3.8	4.4	4.5
0/45				
Heating output	kW	89.0	72.8	94.8
Supplied power	kW	27.4	20.1	26.0
COP*		3.2	3.6	3.7
10/35				
Heating output	kW	99.7	85.6	108.5
Supplied power	kW	29.8	15.9	21.0
COP*		4.3	5.3	5.2
10/45				
Heating output	kW	89.1	83.6	109.1
Supplied power	kW	32.7	20.3	26.0
COP*		3.6	4.2	4.2
Electrical information				
Rated voltage / electrical connection		400 VAC 3N 50 Hz	400 VAC 3N 50 Hz	400 VAC 3N 50 Hz
Maximum supply current (including the control systems and pumps) – ground source heat use	A_{rms}	78	70	80
Maximum supply current (including the control systems and pumps) – other use		86		
Recommended fuse size – ground source heat use	A	3 x 80	3 x 80	3 x 80
Recommended fuse size– other use		3 x 100		
Charge pump power	W	608	608	608

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Property	Unit	Taurus Inverter Pro	Taurus 80 EVI	Taurus 110 EVI
Source pump power	W	1301	1301	1301
Refrigerant circuit				
Contains fluorinated greenhouse gases		yes	yes	yes
Hermetically sealed		yes	yes	yes
Refrigerant		R513A	R410A	R410A
Global Warming Potential (GWP) of the refrigerant		631	2088	2088
Quantity of refrigerant	kg	23	9.0	9.8
CO_2 equivalence	tonnes CO_2e	14.51	18.792	20.462
Disconnection, overpressure	MPa	2.9	4.4	4.4
Difference, overpressure	MPa			
Disconnection, underpressure	MPa	0.05	0.23	0.23
Difference, underpressure	MPa			
Compressor				
Number of compressors		1	2	2
Compressor type		Piston	Scroll	Scroll
Compressor oil		POE	POE	POE
Amount of oil	L	4.3	6.8	6.8
Collector				
Maximum pressure	MPa	0.6 (6 bar)	0.6 (6 bar)	0.6 (6 bar)
Rated flow	l/s	4.3	3.4	4.4
Maximum external pressure loss at rated flow	kPa	120	130	120
Minimum input temperature of brine	°C	–5	–5	–5
Maximum input temperature of brine	°C	+30	+20	+20
Charge circuit				
Maximum pressure	MPa	0.6 (6 bar)	0.6 (6 bar)	0.6 (6 bar)
Rated flow		3.2	2.4	3.2
Maximum external pressure loss at rated flow		65	85	55

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Property	Unit	Taurus Inverter Pro	Taurus 80 EVI	Taurus 110 EVI
Superheating circuit				
Maximum pressure	MPa	No	0.6 (6 bar)	0.6 (6 bar)
Rated flow	l/s	No	0,22	0.29
Maximum external pressure loss at rated flow	kPa	No	80	80
Dimensions and weights				
Length	mm	1300	1300	1300
Width	mm	700	700	700
Height	mm	1860	1860	1860
Weight	kg	876	700	700
Pipe connections				
Brine / collector		2” ET	G2” ET	G2” ET
Heating / charge circuit		2” ET	G2” ET	G2” ET
Sound power level (Lwa) 0/35	dB (A)	50	52	52
Controller		Gebwell CLI	Gebwell CLI	Gebwell CLI

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4 Delivery and handling

Before unloading the delivery, the recipient must inspect it for any damage. Possible damage must be recorded in the waybill and the transport company should be notified.

4.1 Delivery content

- Gebwell Taurus Inverter Pro or Gebwell Taurus 80/110 EVI heat pump
- Installation, commissioning and maintenance manual
- Electrical diagrams
- Outdoor temperature sensor

4.2 Optional accessories

- Collector valve group
- Heating control group
- Domestic hot water buffer tank
- Heating buffer tank
- Domestic hot water circulator pump set
- Diaphragm expansion tank for heating
- Energy measurement
- Controller expansion modules (for example, I/O module)

4.3 Storing

Before installation, store the heat pump in its shipping package in a warm, dry place. If the device is stored in a cold and humid environment, the electrical components may get wet, causing problems in the operation of the device.

4.4 Recycling

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When a heat pump is decommissioned, its refrigerant charge must be recovered by an authorised refrigeration technician. We recommend that the refrigerants be regenerated. Otherwise, the refrigerants must be disposed of as hazardous waste in accordance with local instructions.

Recycle the liquids inside the solution and charge circuit in an appropriate manner. Recover the oils in the heat pump and dispose them as hazardous waste in accordance with local instructions.

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5 Installing the heat pump

5.1 Heat pump placement

We recommend placing the heat pump in a separate technical room. When planning the placement location, take the following factors affecting to safety, convenience and serviceability into account:

- The temperature at the placement location must be between +5 °C and +30 °C.
- The placement location must be adequately ventilated.
- The humidity at the placement location must be low enough to avoid condensation on the cold sections of pipe in the collector.
- The placement location must have a floor drain.

The heat pump’s compressor generates a noise that can be carried by the structures of the house into other areas far away. Place the heat pump in a location where noise cannot be conducted in a way that adversely affects residential premises. If necessary, supplementary noise insulation can be installed in the wall structures between the heat pump’s installation location and residential premises.

Noise can be prevented from travelling through structures by using solutions such as special floor structures in the area reserved for the heat pump. A cast floor that is separated from the building’s other areas can prevent noise from travelling through the floor and into residential premises. You can also use flexible parts in pipe connections to prevent vibration from transferring into structures. Support the piping in such a way that the internal flexible structure of the device is not prevented.

Reserve at least 800 mm of clearance in front of the heat pump to allow access to the compressor module for servicing. For the same reason, the device must not be installed below the floor surface. Leave adequate clearance behind the heat pump to prevent vibrations from being transmitted onward. Reserve at least 800 mm of clearance on one and at least 300 mm of clearance on the other side of the heat pump for servicing. The service direction can be selected freely, but the recommended direction is the right side of the device when viewed from the direction of the control unit.

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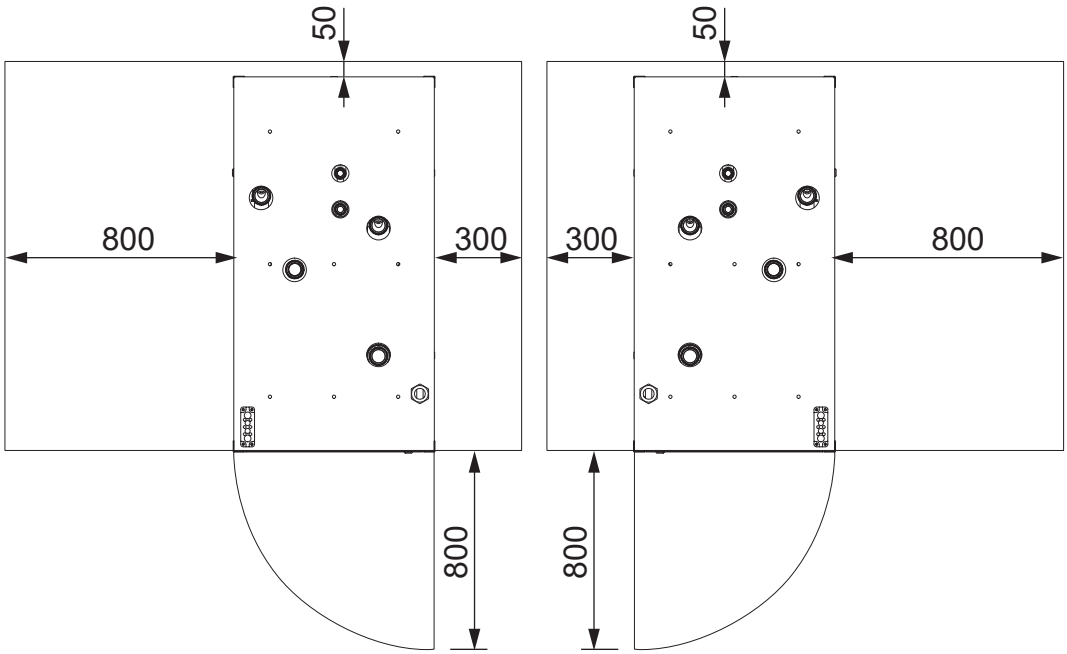

Figure 5.1 - Clearance for service required by the heat pump (both service directions)

If the above dimension requirements are not met in the heat pump installation, the supplier reserves the right to charge the customer for any additional costs incurred in possible warranty repairs and similar work under warranty.

5.2 Transporting the heat pump

⚠ WARNING Make sure that the heat pump cannot tip over during transport or lifting. The Taurus Inverter Pro heat pump weighs 876 kg and Taurus 80/110 EVI heat pump weighs 700 kg.

⚠ WARNING When transporting or lifting the Taurus Inverter Pro heat pump, take into account that the pump is rear-heavy.

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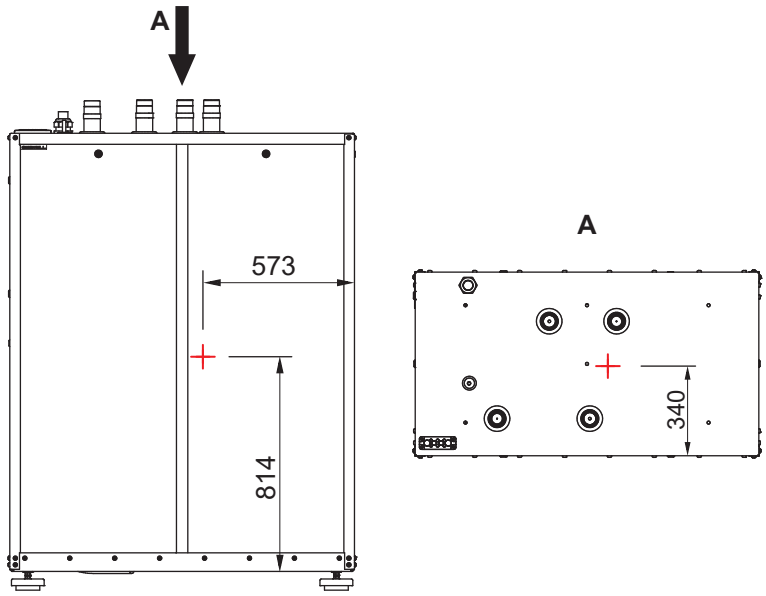

Figure 5.2 - Centre of gravity – Taurus Inverter Pro heat pump

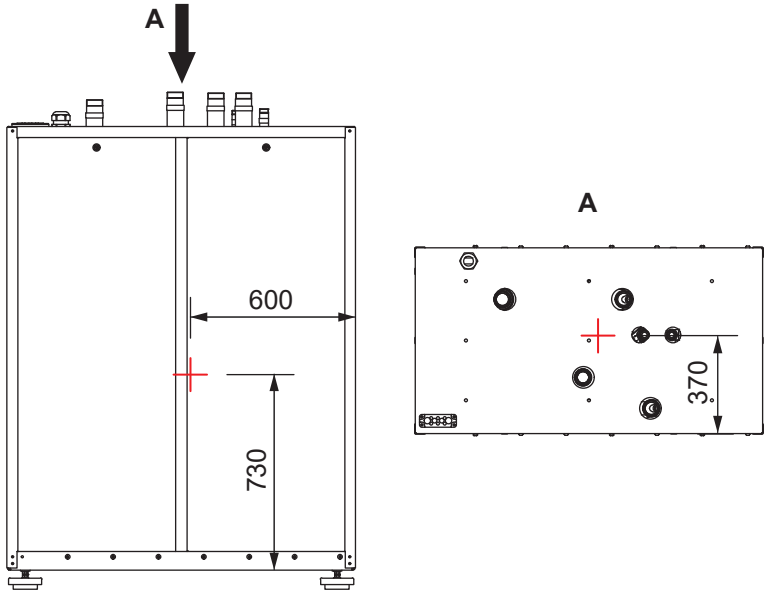

Figure 5.3 - Centre of gravity – Taurus 80/110 EVI heat pump

Whenever possible, use a pallet truck or similar to transport the heat pump all the way to the installation site. The heat pump can also be moved by a crane, using two slings or straps suitable for the transport weight. Place a guard in the corners between the strap and the heat pump. You can use a double or triple corrugated board, for example, to prevent the straps from damaging the paintwork of the heat pump.

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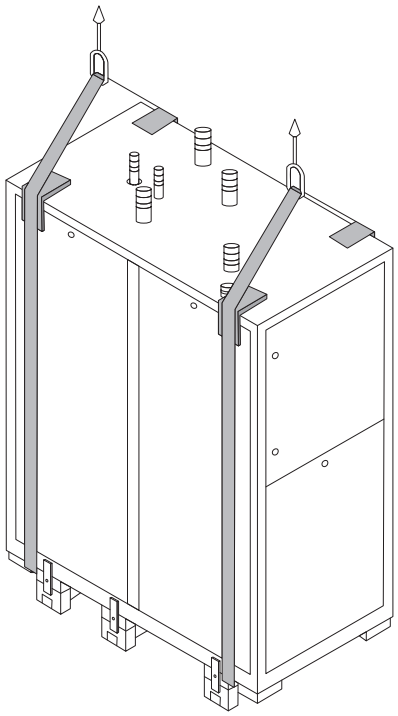

Figure 5.4 - Lifting with slings

NOTICE

Remove the heat pump housing panels for the duration of transport if it takes place in confined spaces. You can also tilt the heat pump temporarily up to 45°, but it must not be left in a tilted position for a long period of time, not even during transportation. If the heat pump has been tilted, it must be left in the vertical position for at least two hours before starting up to ensure that the lubricating oil in the compressor flows into the right place.

5.3 Removing the heat pump packaging

1. Carefully remove the protective plastic without scratching the device.
2. Make sure that the product is correct and includes the correct accessories.
3. Lift the heat pump with, for example, a pallet truck or claw jacks.
   Take into account the centre of gravity of the device.

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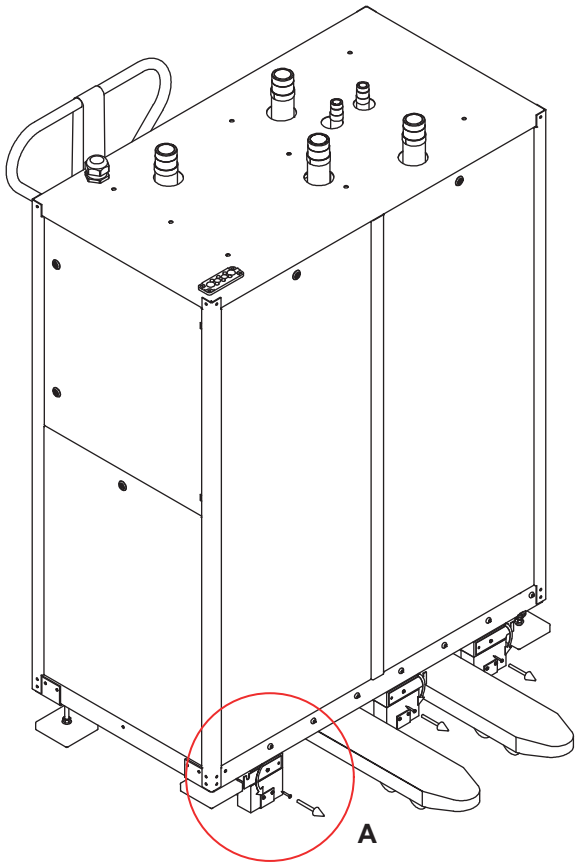

Figure 5.5 - Lifting the heat pump and the location of transport brackets

4. Fit the leveling feet of the heat pump in place and adjust them close to the desired height.
5. Turn the transport brackets.
   a) Open the screw located in the frame by 1–2 mm.
   b) Remove the lower screw of the bracket.
   c) Turn the bracket horizontally.
   d) Re-tighten the screw in the frame.

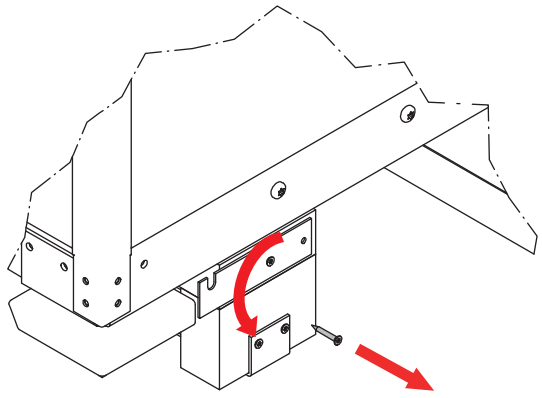

Figure 5.6 - Turning the transport brackets

6. Pull the transport pallet out from under the heat pump.

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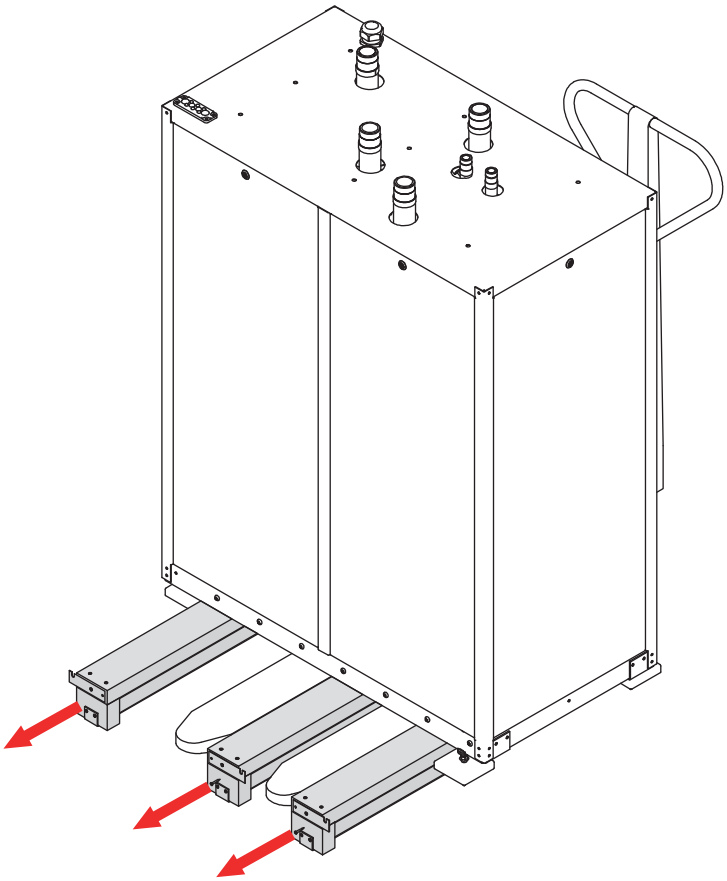

Figure 5.7 - Removing the transport pallet

7. Lower the heat pump on the leveling feet.
8. Use the leveling feet to get the heat pump into a horizontal and stable position.
9. Make sure that the heat pump frame is not in contact with the building's structures, with the exception of the leveling feet.

5.4 Removing and installing the housing panels

The heat pump housing panels must be removed for any work carried out inside the device.

Remove the heat pump housing panels by opening the locks of the panels and pulling the panels outwards. The locks open by turning the key counterclockwise.

To reinstall the panels, lift the bottom edge of the panel in position so that the lip at the bottom edge of the panel goes in the opening made for it in the bottom plate of the heat pump. Lock the panels in place by turning the key clockwise.

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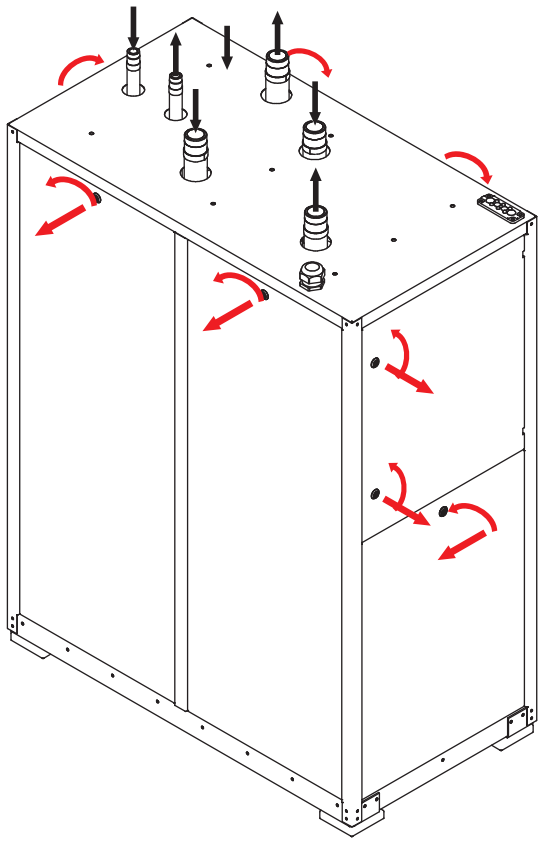

Figure 5.8 - Removing and installing the housing panels

5.5 Removing the transport supports

The inner frame of the heat pump is supported because of vibration caused during transport. The transport supports must be removed before the heat pump is started. Make sure that there is enough space for removing the transport supports at the heat pump installation site.

The inner frame is supported by two brackets on both sides of the heat pump.

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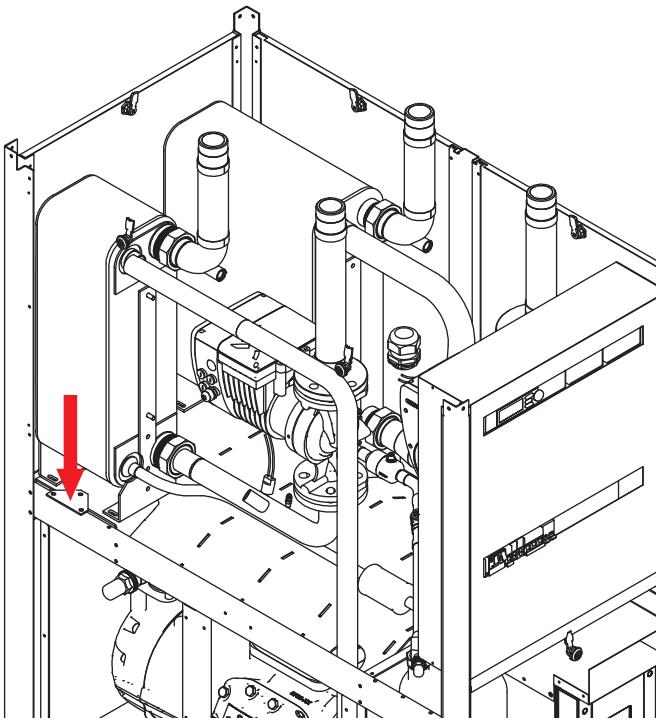

Figure 5.9 - Removing the brackets

In addition to these brackets, the sprung compressor base of the Taurus Inverter Pro heat pump is supported by four transport supports.

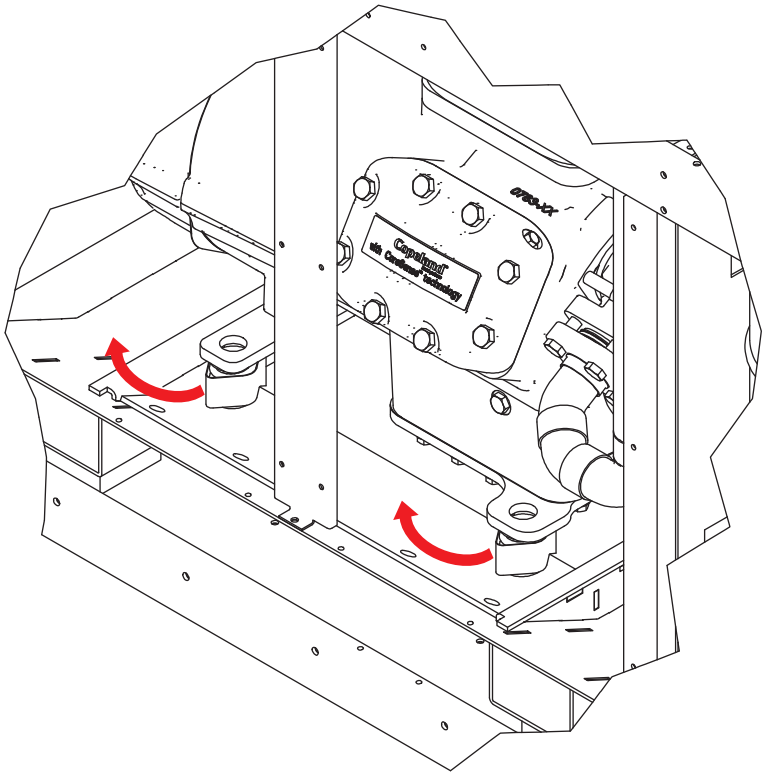

Figure 5.10 - Compressor supports (Taurus Inverter Pro)

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To remove these supports, proceed as follows:

1 . Open the compressor's mounting nuts evenly at all four corners.

Make sure that there is a gap of 2 mm between the nut and rubber sleeve as shown in the figure.

2 . Remove the transport support in between.

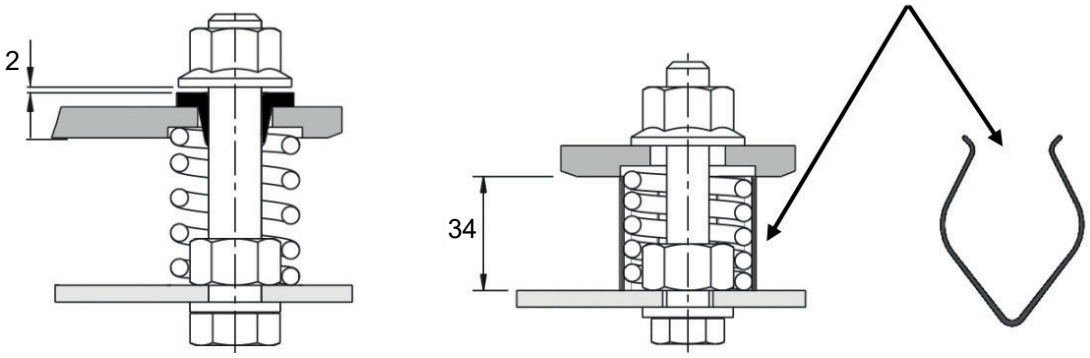

Figure 5.11 - Removing the compressor supports (Taurus Inverter Pro)

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6 Installing the pipes

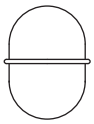
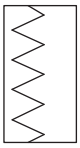
Pipe installations must be carried out in accordance with the regulations in force. All connections to the heat pump must be made by using approved threaded couplings only.

Taurus heat pumps are not equipped with shut-off valves. These valves must be installed immediately outside the device to facilitate maintenance.

Install a strainer (dirt separator) in the return water pipes of the charge circuit and the collector to prevent any impurities in the network from entering the heat exchanger and causing a blockage in the exchanger. To facilitate the cleaning of the strainer, install a shut-off valve near the strainer.

If the system contains more than one heat pump, or a Gemini heat pump, non-return valves must be installed in the superheating circuit, charge circuit and the collector for each compressor unit. Non-return valves prevent incorrect fluids circulation in the system. For information on how to install non-return valves, please see the connection instructions.

The symbols used in the diagrams are explained in the table below.

Symbol	Description	Symbol	Description	Symbol	Description
	Shut-off valve		Balancing valve		Dirt separator
	Vent valve		Change-over valve		Circulator pump
	Non-return valve		Control valve		Compressor
	Expansion valve		Diaphragm expansion tank		Temperature sensor
	Safety valve		Heat exchanger		Pressure gauge

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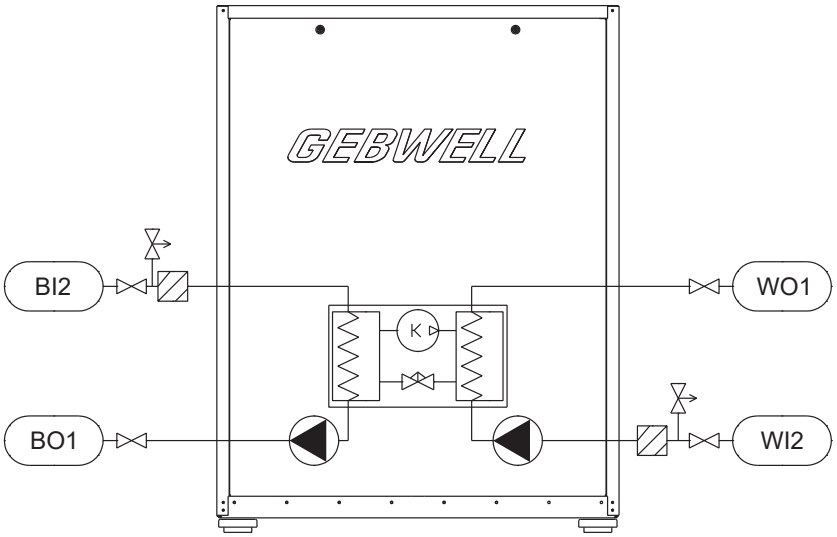
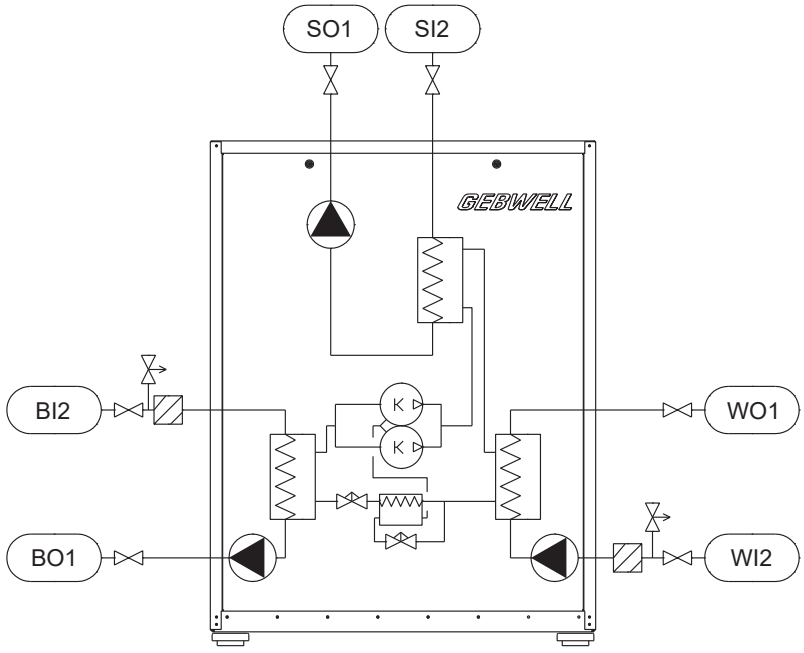


BO1 Collector outlet/out
BI2 Collector return/in
WO1 Charge circuit supply/out
WI2 Charge circuit return/in

Figure 6.1 - The principle of the Taurus Inverter Pro heat pump system



BO1 Collector outlet/out
BI2 Collector return/in
WO1 Charge circuit supply/out
WI2 Charge circuit return/in
SO1 Superheating circuit supply/out
SI2 Superheating circuit return/in

Figure 6.2 - The principle of the Taurus EVI heat pump system

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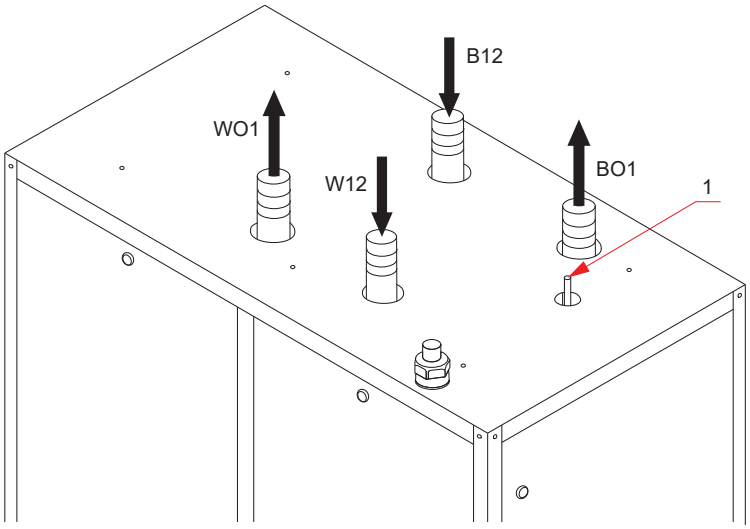
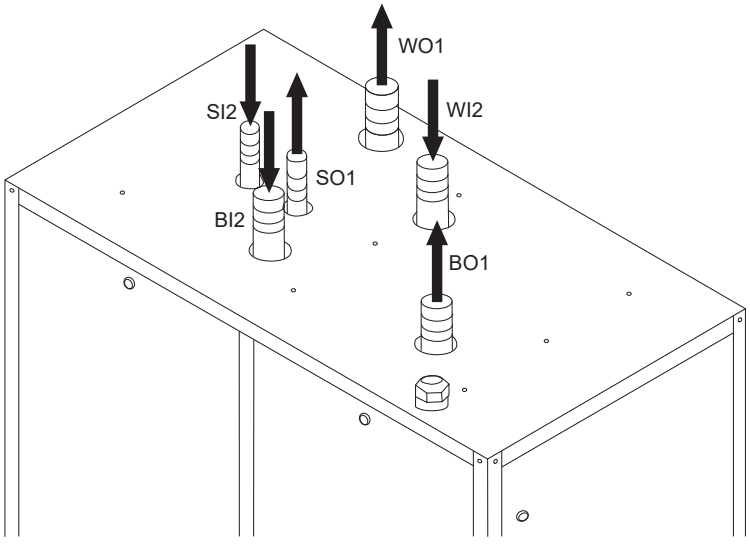
6.1 Heat pump pipe outputs



1	Safety valve exhaust pipe (see section *Safety valve piping*)	WO1	Charge circuit supply/out, 2” ET
BO1	Collector outlet/out, 2” ET	W12	Charge circuit return/in, 2” ET
B12	Collector return/in, 2” ET		

Figure 6.3 - Pipe outputs, Taurus Inverter Pro



BO1	Collector outlet/out, G2” ET	W12	Charge circuit return/in, G2” ET
B12	Collector return/in, G2” ET	SO1	Superheating circuit supply/out, G2” ET
WO1	Charge circuit supply/out, G2” ET	S12	Superheating circuit return/in, G2” ET

Figure 6.4 - Pipe outputs, Taurus 80/110 EVI

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Installation dimensions of the pipe connections

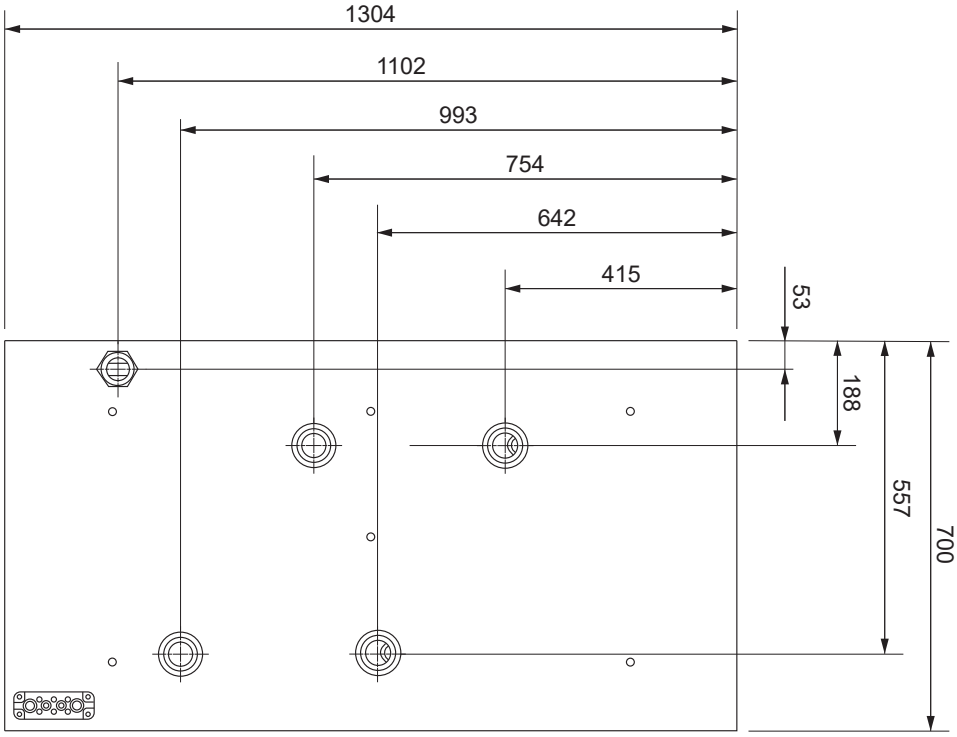

Figure 6.5 - Taurus Inverter Pro

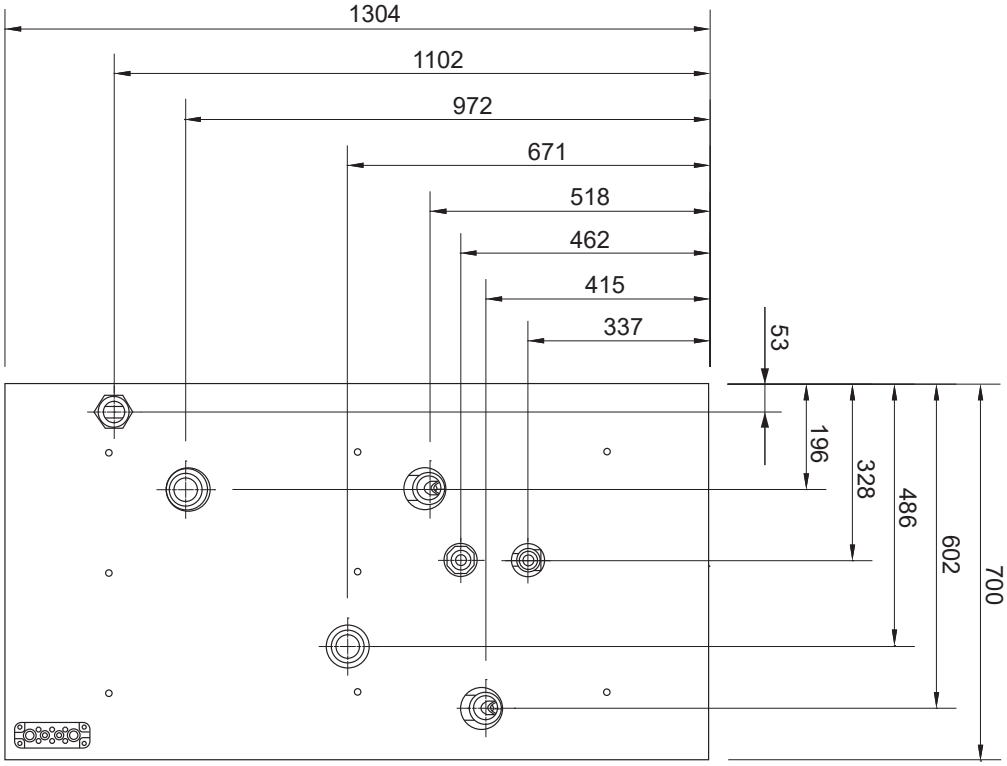

Figure 6.6 - Taurus 80/110 EVI

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6.2 Safety valve exhaust piping

The refrigerant circuit of the Taurus Inverter Pro heat pump has a safety valve that protects the device from overpressure. The safety valve opens in the event of a fire, or if the high pressure pressostat and electronic pressure monitoring malfunction. The opening pressure of the safety valve is 3.3 MPa (33 bar).

The exhaust pipe of the safety valve has been brought on top of the device and marked with a label (see the relevant figure in section *Heat pump pipe outputs*). Route the pipe outside the property in accordance with the instructions of the refrigeration sector. If there are several heat pumps in the system, you can combine their exhausts provided that the size of the pipe used is sufficiently large.

⚠ ATTENTION Realise the exhaust in such a way that, in case of a malfunction, the refrigerant discharge does not pose a risk to persons.

6.3 Brine circuit

The maximum recommended length of one loop of the collector is 600 m. If a longer brine circuit must be installed, it should be divided into several loops and connected in parallel. The connection should be made in such a way that it is possible to balance the flows in the loops. The collector pipe network should steadily rise towards the heat pump to prevent air pockets. If this is not possible, vent valves should be installed at the high points. Before installing the heat pump, rinse the collector pipe network to remove any impurities that may remain after installation.

- Insulate all of the collector pipes in the building using closed-cell insulation to prevent condensation.
- Only use connecting components designed for cold conditions in the collector.
- Use rubber-insulated brackets for pipes.
- Install shut-off valves in pipe connections as close to the heat pump as possible.
- Enter the type of collecting liquid and the freezing point in the installation record.
- Make sure that the top of the heat pump and the electrical equipment are entirely free of water during operation.
- Only use a diaphragm expansion tank in the collector. The use of a flat expansion tank is not recommended.
- Check the pre-charge pressure of the diaphragm expansion tank in accordance with the plan before pressurising the system. Check the pre-charge pressure when the circuit is open.
- Connect the collector valve group with the related expansion tanks as shown in the figure. The arrow on the poppet seat indicates the flow direction.
- The collector must be pressure-tested with 3 bars of pressure and the test pressure must be sustained for at least 30 minutes.

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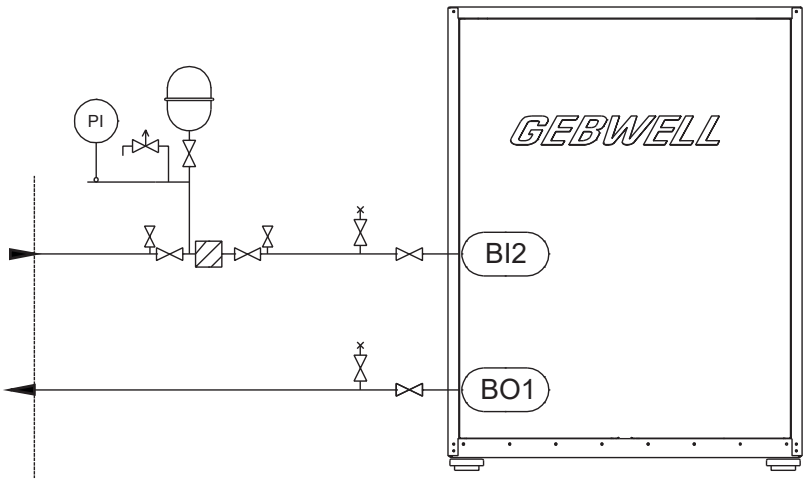

Figure 6.7 - Connecting the brine circuit to the heat pump

Installing the collector onto several loops

If you are using several collector loops, every circuit must have shut-off and control valves. Follow the valve manufacturer's instructions when you install control valves. The valve must be installed in such a way that it is easy to adjust and inspect, and it does not freeze. Vent the circuits one at a time and regulate the flow rate in relation to the lengths of the circuits. Try to use collection loops of equal length.

- A: Collector inbound to the heat pump
- B: Collector outbound from the heat pump
- C: Shut-off and control valve

Passive cooling

Passive cooling functions best when heat collection is arranged using a bored well. During the summer, loops installed in the soil or in lakes may be at such a high temperature that the required cooling power cannot be obtained. Air within the collector should be allowed to freely rise to the expansion tank. Venting should always take place at the highest point in the collector. If it is necessary to connect the cooling radiator to the highest point in the circuit, venting should take place via the radiator.

Refrigeration can be controlled or regulated using a cooling accessory available for the heat pump. Building automation or ventilation machines can also control the heat pump's internal source pump. See the electrical diagrams for instructions.

6.4 Heat supply circuit

The heating system adjusts the indoor temperature using the heat pump controller and a secondary circuit, such as radiators, underfloor heating, ventilation or convector fans.

- Before installing the heat pump, rinse the pipe network in the building's heating system to remove any impurities that may remain after installation.
- Install the required protective devices, strainer, shut-off and non-return valves. The shut-off valves must be installed as close to the heat pump as possible.
- It is advisable to install the heat pump in a closed heating system with a diaphragm expansion tank.
- Make sure that the top of the heat pump and the electrical equipment are entirely free of water during operation.

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- Protect the heat pump from overpressure with a safety valve. The opening pressure of the safety valve can be a maximum of 0.6 MPa (6.0 bar), and it should be installed in the return pipe of the heating system.

  It is advisable to lead the safety valve overflow pipe to the nearest floor drain. The overflow pipe should be installed in such a way that water is able to flow out of the overflow pipe unobstructed. Do not plug the safety valve.
- If you connect the heat pump to the heating system without a buffer tank, take the minimum flow rate required by the heat pump in a system equipped with thermostats into account. Check the device-specific minimum flow rate in section *Technical specifications*.

6.5 Domestic water system

If there is a domestic water system, connect it in accordance with the relevant plan.

Equip the domestic water system with a safety valve (max. 10 bar) and install it in the inbound cold water pipe as shown in the diagram. It is advisable to lead the safety valve overflow pipe to the nearest floor drain. Install the overflow pipe in such a way that water is able to flow out of the overflow pipe unobstructed.

The safety valve for domestic hot water may leak almost constantly when domestic hot water is no longer consumed in large volumes. The overflow is due to the heat expansion of cold water and pressure shocks. The safety valve can be prevented from leaking by installing an expansion tank in the domestic water network to level out pressure fluctuations and prevent pressure shocks.

6.6 Examples of heating systems

Gebwell Taurus heat pumps can be used to realise several types of heating systems. This section provides some examples.

Always make installations in accordance with the planned diagram. If the diagrams have abnormal connections, check with your Gebwell specialist to ensure the correct connection.

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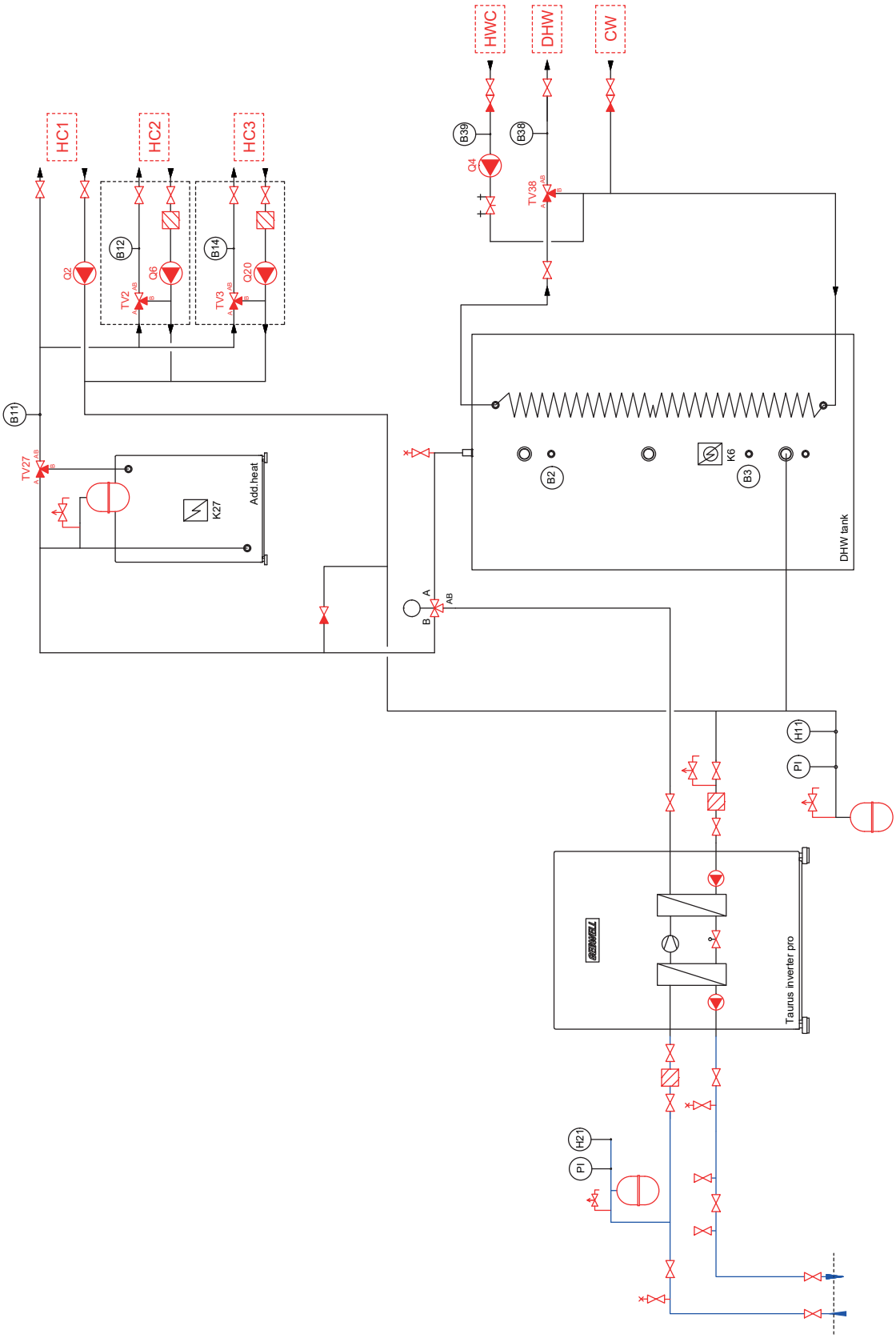

Figure 6.8 - Taurus Inverter Pro – additional heat source – 3 heating circuits – domestic water system

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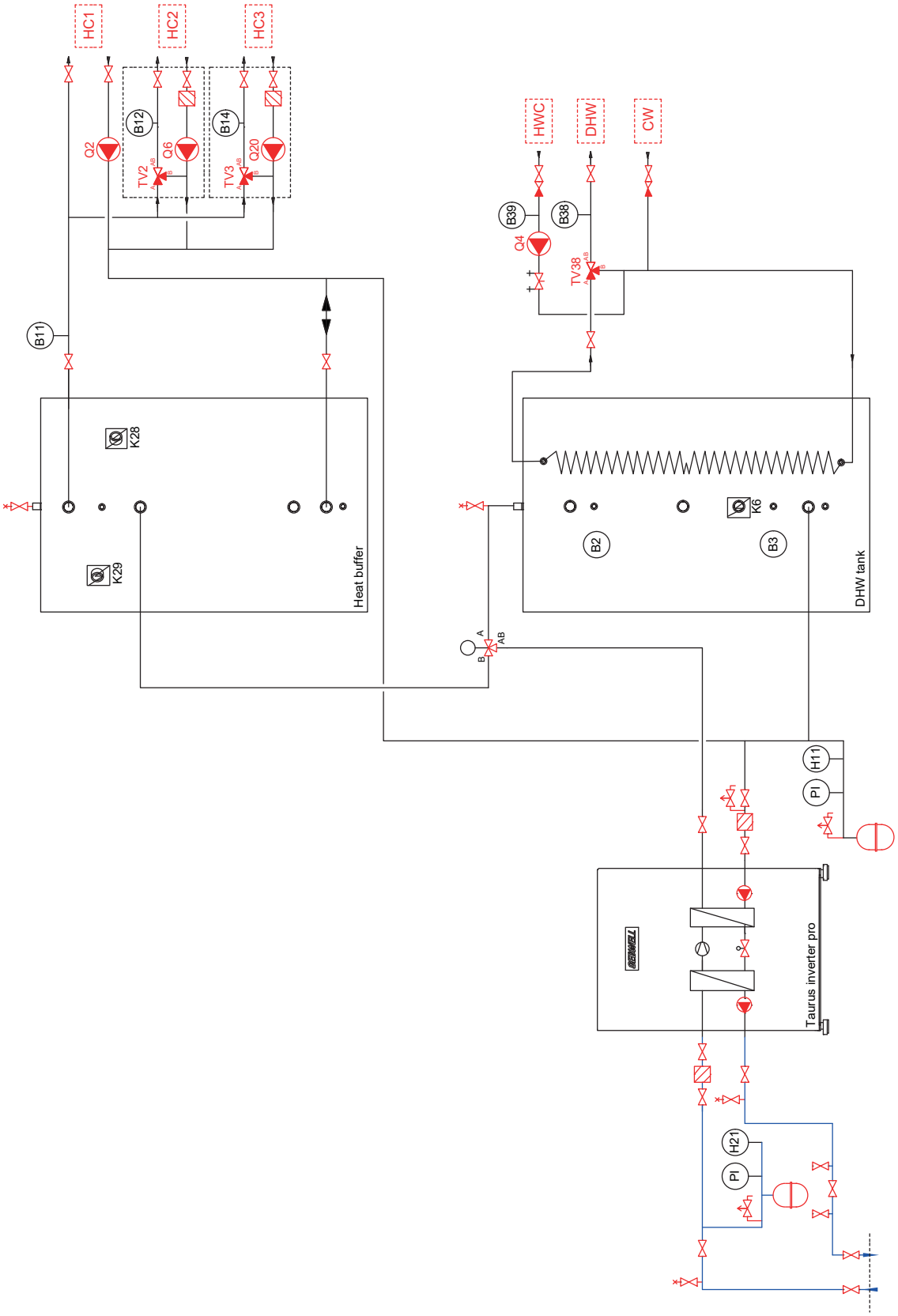

Figure 6.9 - Taurus Inverter Pro – electric heaters of the heating accumulator – 3 heating circuits – domestic water system

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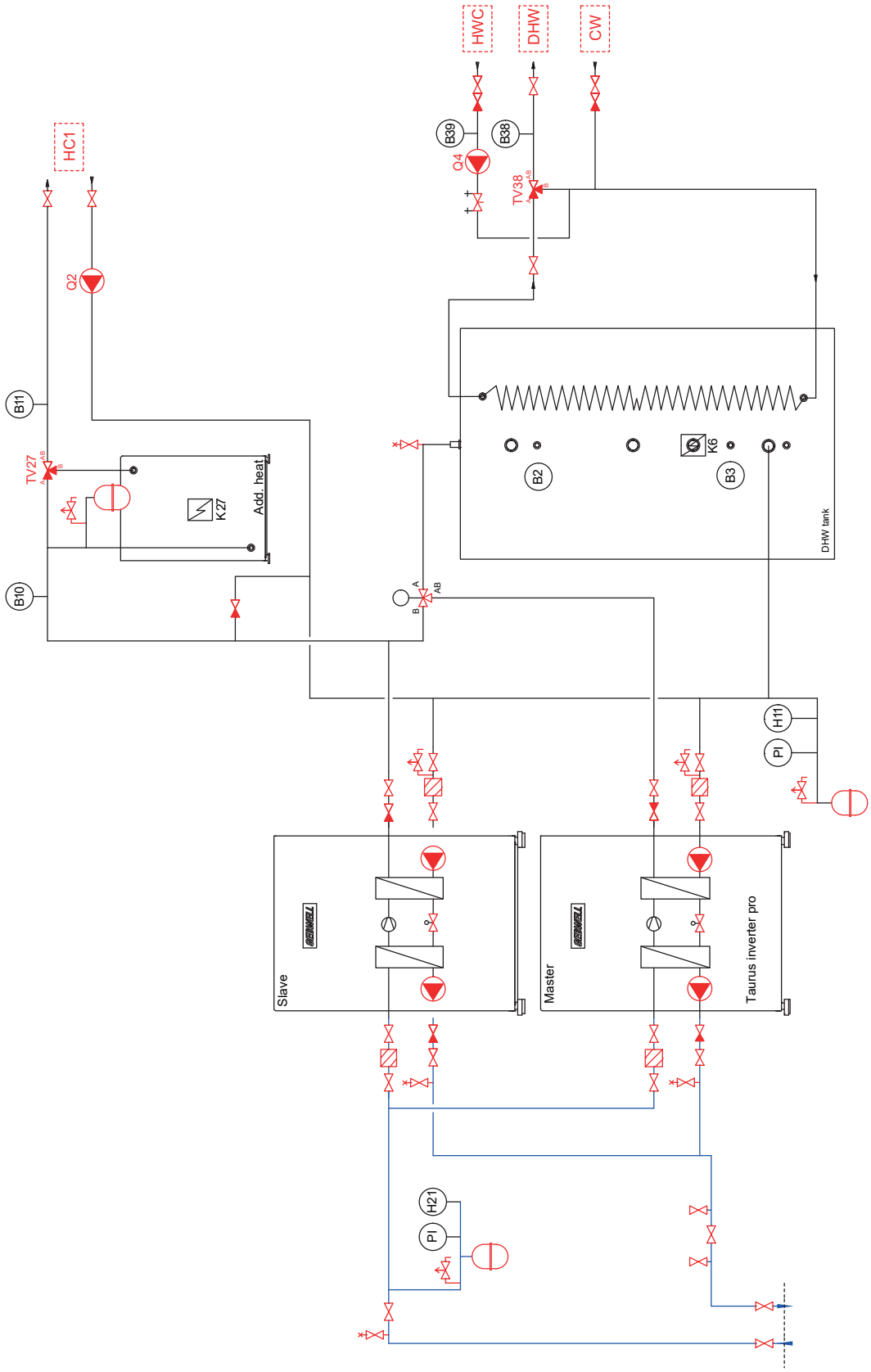

Figure 6.10 - 2 Taurus Inverter Pro units – additional heat source – pump heating circuit – domestic water system

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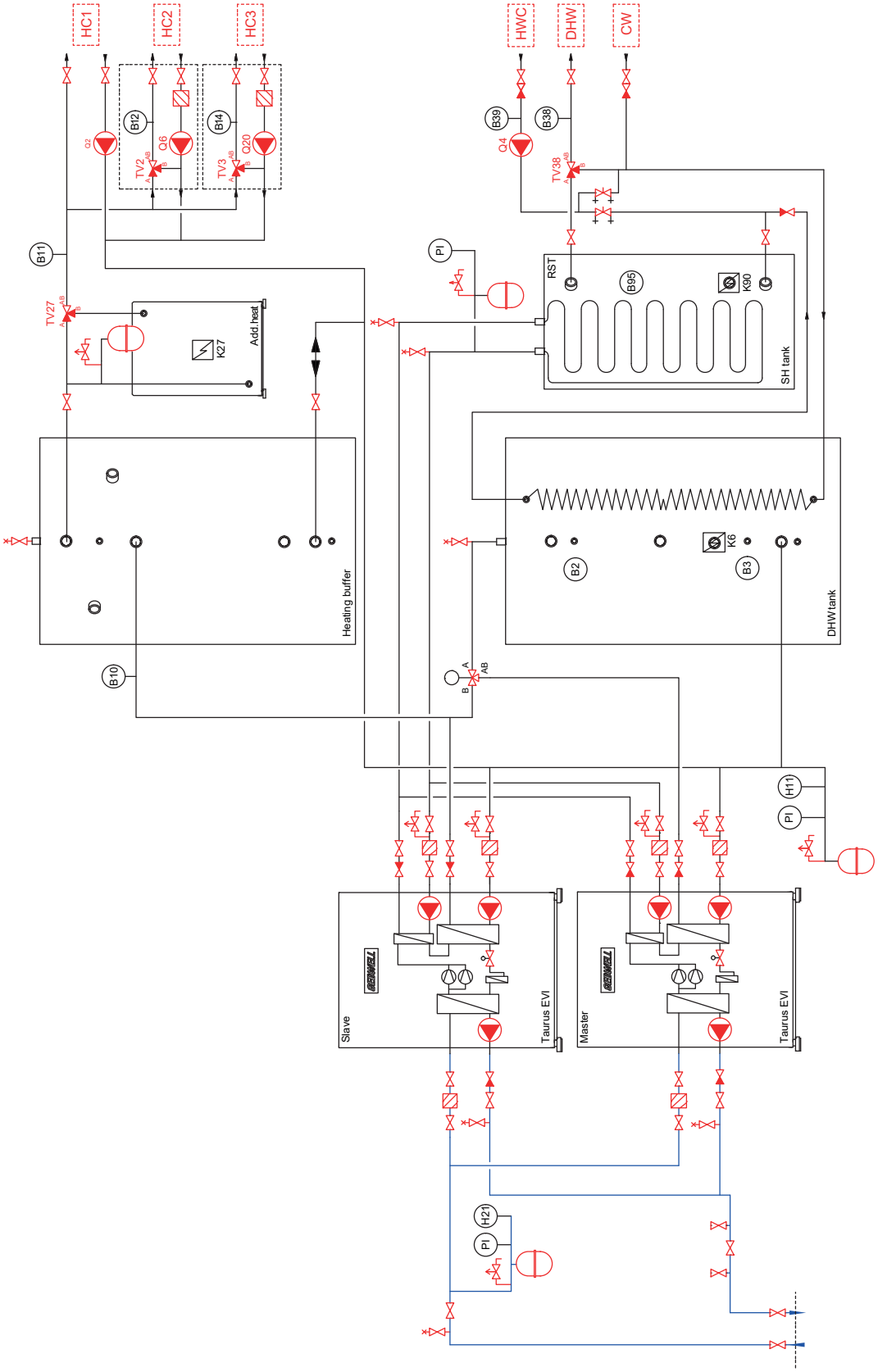

Figure 6.11 - 2 Taurus EVI units – additional heat source – pump heating circuit – 2 mixing heating circuits – domestic water system – superheating accumulator

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7 Carrying out electrical installations

⚠ WARNING Electrical installations may only be carried out by a qualified electrician.

The heat pump is connected to a 400 V (50 Hz) electricity network. Both the standard equipment supplied with the heat pump and any electrical accessories must be installed and connected when installing the device. The following standard electrical equipment is supplied with the heat pump:

- Outdoor temperature sensor (B9)
- Upper and lower sensor of the domestic water accumulator (B2, B3)
- Cascade sensor (B10)
- Additional heat control sensor (B11)

See the electrical diagrams for complete connection details for each heat pump model.

When carrying out electrical installations, take the following points into account:

- Disconnect the heat pump before the conducting the insulation resistance test on the building.
- Make sure that the heat pump fuse is of type C (slow).
- Route the cabling of electrical accessories through the control unit lead-throughs at the back of the device.
- Do not install sensor or data transmission cables near power cables.
- The order of wires is not important when connecting temperature sensors.

7.1 Connecting the power supply

NOTICE Do not connect power to the heat pump before the collector and charge circuit are filled with heat collecting liquid and water. Otherwise, the pump, compressor or protective devices may get damaged.

1. Route the power supply cable to the control unit.

   A lead-through is reserved for the cable both from the top of the heat pump and from the ventilation room below. If the supply cable comes from above, bend the cable to the control unit according to the cable manufacturer's instructions. For the installation dimensions of the lead-through on top of the heat pump, see section *Heat pump pipe outputs*.
2. Tighten the bushing seal to ensure that the cable is not strained.
3. Attach the cable to the rail of the control unit.

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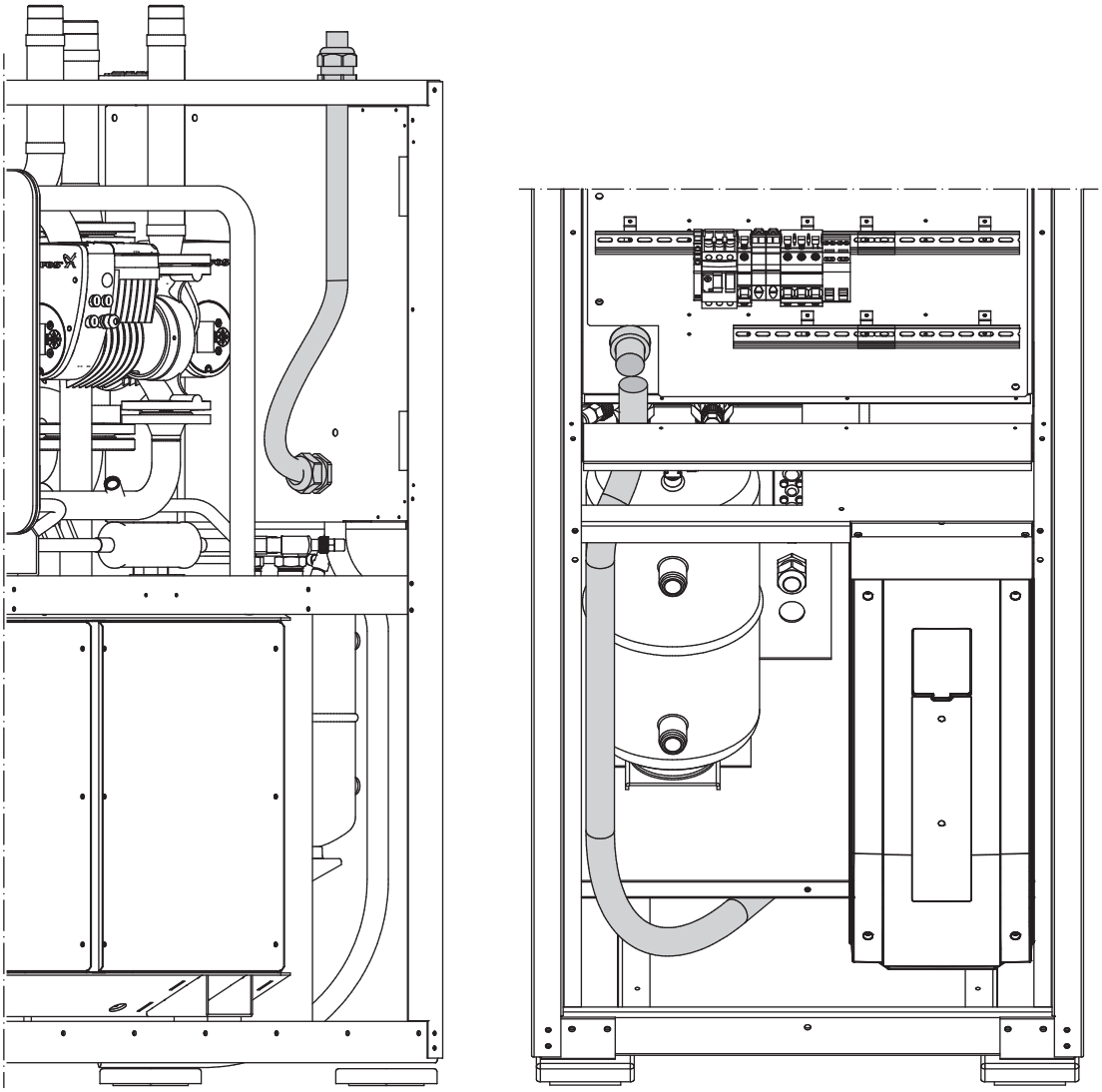

Figure 7.1 - Routing the power supply cable from the top and bottom

7.2 Installing and connecting the sensors

Install the sensors and connect them to the heat pump controller before starting the heat pump. The controller is in the control unit behind the cover plate. The sensors are in the manual folder of the delivery and they are marked by the position.

Outdoor temperature sensor (B9)

Install the outdoor temperature sensor in a shaded location on a wall facing north or north-east. Do not install the sensor near a window or door.

Connect the outdoor temperature sensor (B9) to the connectors X9 and M of the controller TC1.

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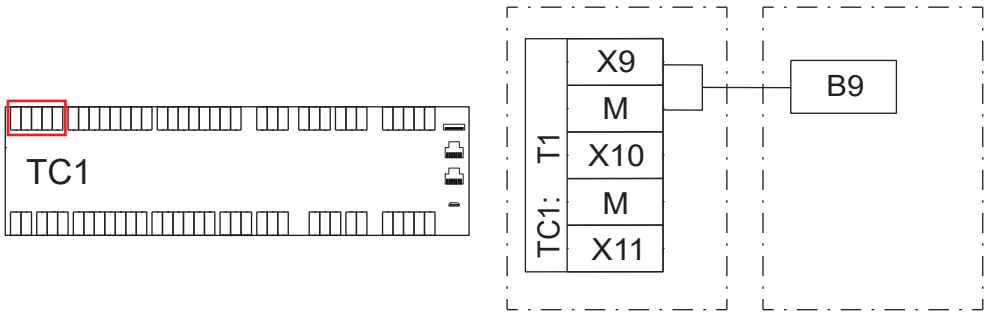

Figure 7.2 - Connecting the outdoor temperature sensor

Upper sensor of the domestic water accumulator (B2)

Install the upper sensor of the domestic water accumulator (B2) in the sensor pocket at the top section of the accumulator.

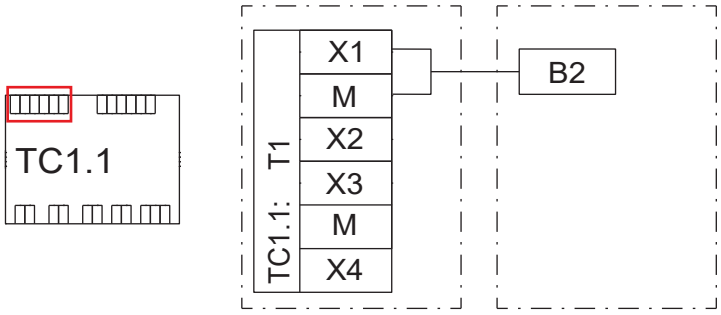

Figure 7.3 - Connecting the upper sensor of the domestic water accumulator

Lower sensor of the domestic water accumulator (B3)

Install the lower sensor of the domestic water accumulator (B3) in the sensor pocket at the middle or bottom section (1/3 from below) of the accumulator.

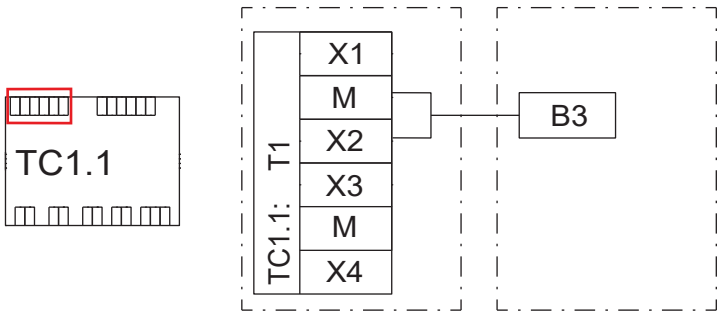

Figure 7.4 - Connecting the lower sensor of the domestic water accumulator

Common flow sensor (B11)

The common flow sensor (B11) is installed in systems that involve accumulator resistors or an external additional heat source (such as oil, gas, district heating or electric boiler). The sensor acts as a sensor for controlling additional heat.

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Install the sensor in the common supply pipe of the heating system after the additional heat source. The sensor is an 80 mm water sensor that does not require a separate sensor pocket. The sensor has a 4 m cable with connector. You can extend the sensor in the junction box.

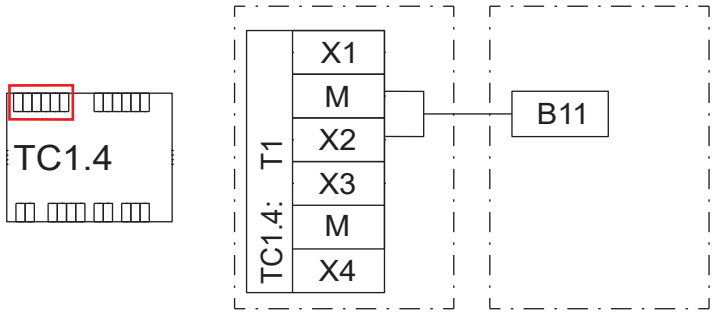

Figure 7.5 - Connecting the common flow sensor

Cascade system supply temperature sensor (B10)

The cascade system supply temperature sensor (B10) is installed in systems with several heat pumps producing heat. The sensor acts as a measurement that controls the cascade system.

Install the sensor in the common supply pipe of the cascade heating system before any additional heat sources. The sensor is an 80 mm water sensor that does not require a separate sensor pocket. The sensor has a 4 m cable with connector. You can extend the sensor in the junction box.

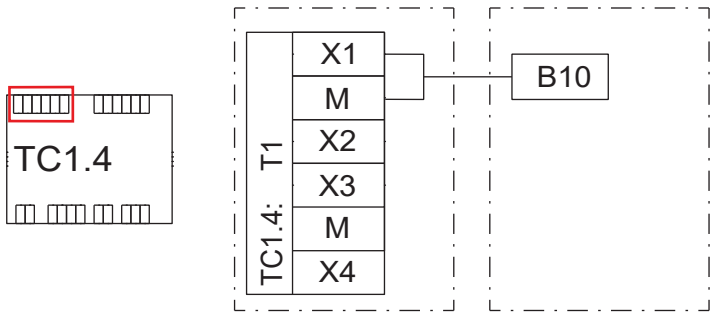

Figure 7.6 - Connecting the cascade supply temperature sensor

7.3 Adding and connecting expansion modules

Accessories that require an IO expansion module (TC1.2, TC1.4, etc.) should be connected to the controller using either a connector or cable attached to the end of the module.

1. Attach the connector to the expansion module that is not attached.
2. Mount the module to the DIN rail.
3. Remove the protective plastic in front of the controller connector.
4. Push the module connector into the controller.
5. Set the address of the module with the DIP switches.

   The correct DIP switch positions for each expansion module can be found in the electrical diagram of the module in question.

   Set the DIP switch 6 to the ON position on the last expansion module.

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7.4 Connecting the change-over valve

The heat pump can be equipped with an external change-over valve that controls heating and the production of domestic water. A cascade systems can have more than one change-over valve. Change-over valves are connected to devices producing domestic water.

Connect the external change-over valve (Y3) to the heat pump controller as shown in the figure.

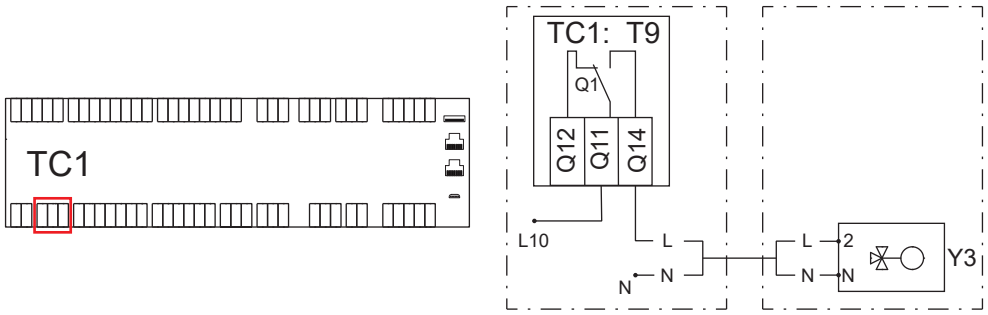

Figure 7.7 - Connecting the change-over valve

7.5 Connecting the domestic water circulator pump

The heat pump controller can be used to control the domestic water circulator pump (Q4). By default, the circulator pump operates whenever the domestic hot water operating method is in the ON state. In the heat pump's user interface, you can change the circulator pump control method so that the pump operates by a certain schedule.

Connect the circulator pump to the relay Q1 and contact Q14 (230 V) of the expansion module TC1.1.

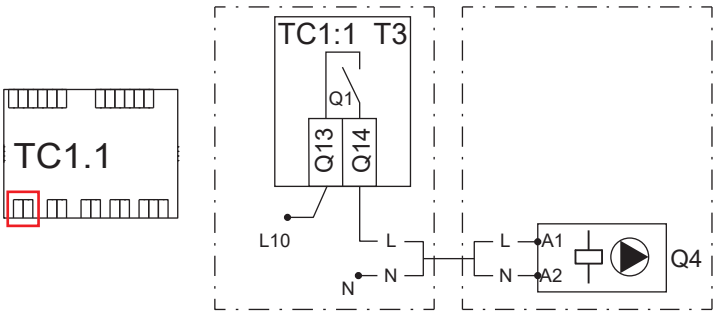

Figure 7.8 - Connecting the domestic water circulator pump

7.6 Connecting the domestic water resistor

An electric heater can be installed in the domestic water accumulator to heat the domestic water as additional or reserve heat.

Connect the domestic water resistor (K6) to the relay Q2 and contact Q24 of the controller TC1.

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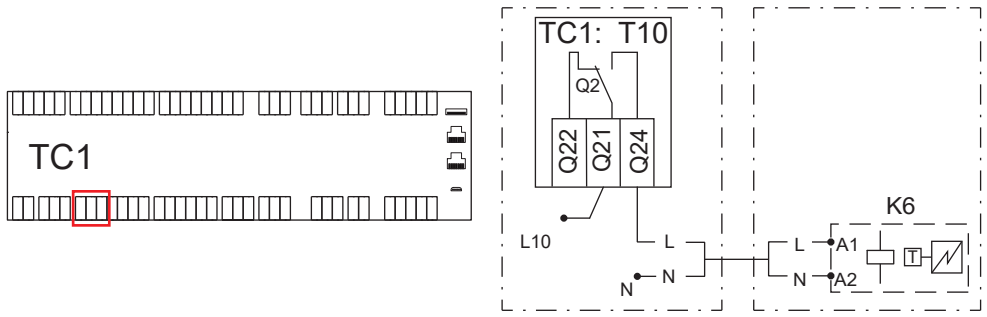

Figure 7.9 - Connecting the domestic water resistor

7.7 Connecting the domestic water mixing group

Connect the domestic water mixing group to the expansion module TC1.7 as follows:

- supply temperature sensor (B38): X1 and M
- return temperature sensor (B39): X2 and M
- mixing valve actuator (TV38):
  - G: 24 VAC
  - G0: 0 VAC
  - Y1: 0–10 V

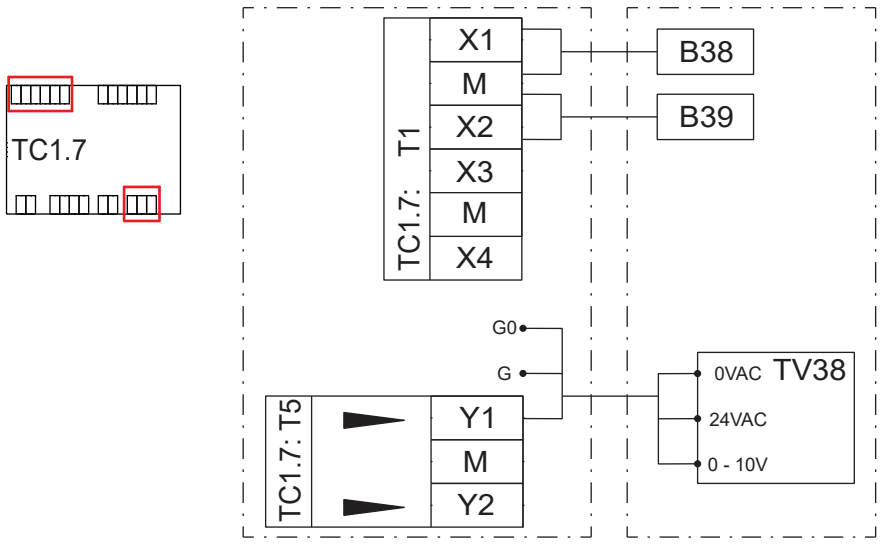

Figure 7.10 - Connecting the domestic water mixing group

7.8 Connecting the heaters of the heating accumulator

Connect the controls of the heating accumulator's sequence-controlled electric heaters (K28 and K29) to the expansion module TC1.4 as shown in the figure.

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NOTICE

Make sure that the heaters are equipped with thermostats and overheating protectors.

Set the thermostat to a temperature that is up to 10 °C higher than the highest request temperature in the heating network.

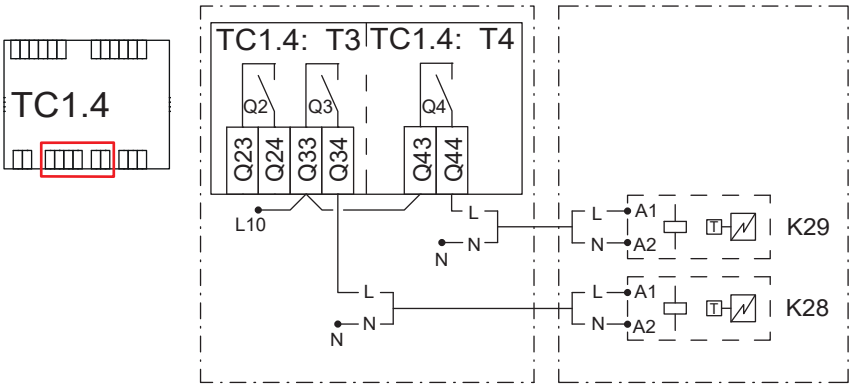

Figure 7.11 - Connecting the heaters of the heating accumulator

7.9 Connecting the adjustable additional heat source

The adjustable additional heat source (K27) can be turned on and off with a potential-free relay, and it can be adjusted with 0–10 V regulation messages. Connect the additional heat source to the expansion module TC1.4 as follows:

- On and off: relay Q2, contacts Q23 and Q24
- Regulation message: Y2 and M, power supply G (24 V).

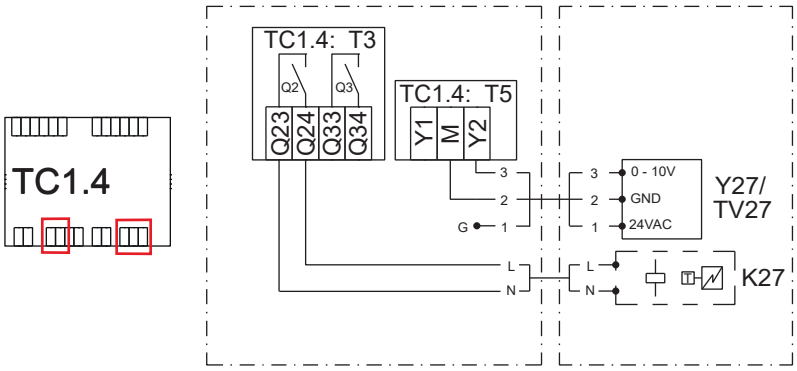

Figure 7.12 - Connecting the adjustable additional heat source

7.10 Connecting the continuous alert

A device-specific class A alert can be forwarded from the heat pump for higher-level automation system in the event of failure.

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Connect the continuous alert (K10) to the potential-free relay Q3 of the controller TC1 as shown in the figure. Use a 2-pole cable with a cross-sectional area of at least 0.5 mm^2.

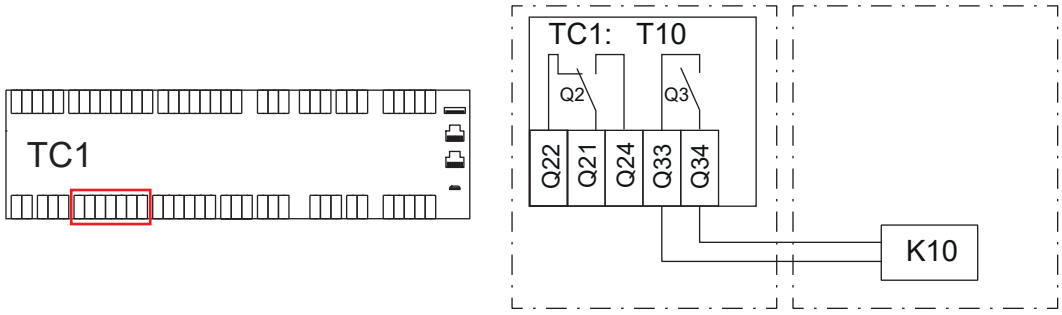

Figure 7.13 - Connecting the continuous alert

7.11 Connecting the source pump external control

You can start the heat pump's source pump using an external potential-free contact. This way the source pump can be used for passive cooling (DU1).

Connect the contact information to the controller TC1 as shown in the figure.

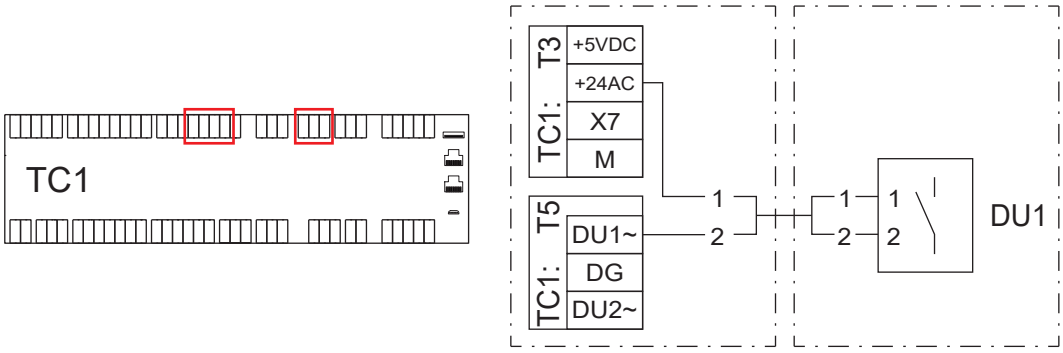

Figure 7.14 - Connecting the source pump external control

7.12 Connecting the external source pump

If the system has a common external source pump (Q8C), you can control it with the heat pump controller. Connect the source pump to the expansion module TC1.4 as follows:

- Control (230 V): relay Q1, contact Q14
- Regulation message (0–10 V): X3 and M
- Alert (DI): X4 and M

Connect the power supply of the external source pump always to the group centre of the property.

If the external source pump is not of the normal type, connect the control to the Q8 terminal strip and regulation message to the UX1 output (AO). If the control must be potential-free, add an auxiliary relay to the control unit.

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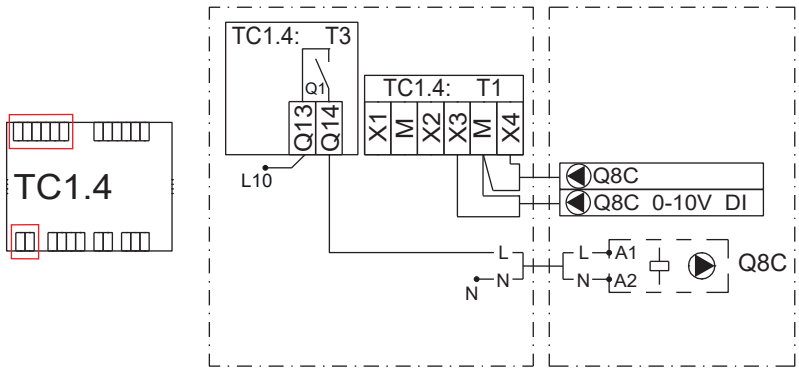

Figure 7.15 - Connecting the external source pump

7.13 Connecting the cooling transfer pump

Connect the cooling transfer pump to the expansion module TC1.5 as shown in the figure.

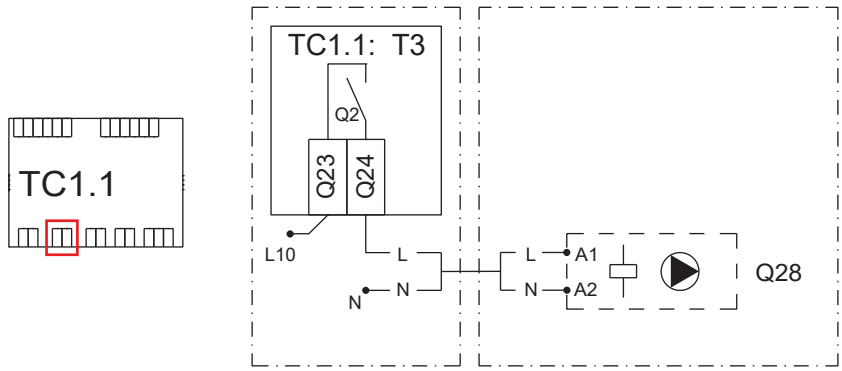

Figure 7.16 - Connecting the cooling transfer pump

7.14 Connecting the external circulator pump

You can connect the external circulator pump (Q2) to heating circuit 1. Connect the pump control to the expansion module TC1.1 as shown in the figure.

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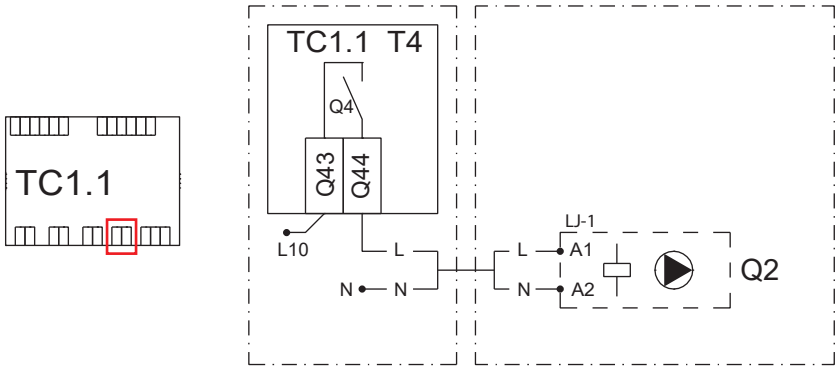

Figure 7.17 - Connecting the external circulator pump

7.15 Connecting the heating control groups

Connect the heating control groups to the expansion module TC1.2 as follows:

Heating circuit 2

- Supply temperature sensor B12: X1 and M
- Room temperature sensor B52: X2 and M
- Pump alert Q6: X3 and M (if the pump has a potential-free alert contact)
- Pump control Q6 (230 V): relay Q1, contact Q14
- Actuator TV2:
  - 0–10 V: Y1
  - 24 VAC: G
  - 0 VAC: G0

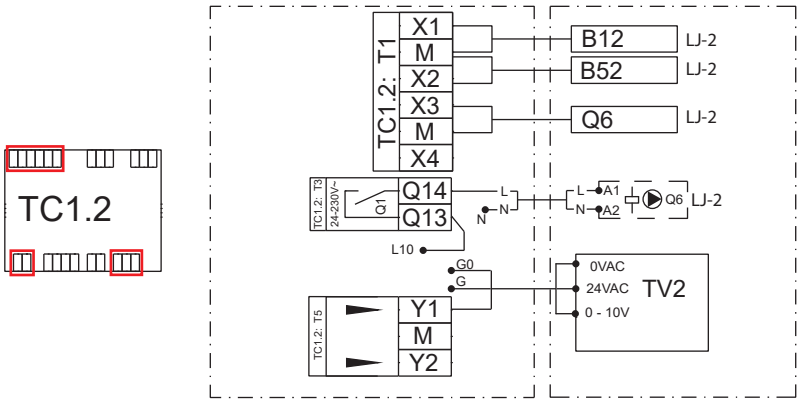

Figure 7.18 - Connecting the heating circuit 2

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Heating circuit 3

- Supply temperature sensor B14: X4 and M
- Room temperature sensor B53: X5 and M
- Pump alert Q20: X3 and M (if the pump has a potential-free alert contact)
- Pump control Q20 (230 V): relay Q2, contact Q24
- Actuator TV3:
  - 0–10 V: Y2
  - 24 VAC: G
  - 0 VAC: G0

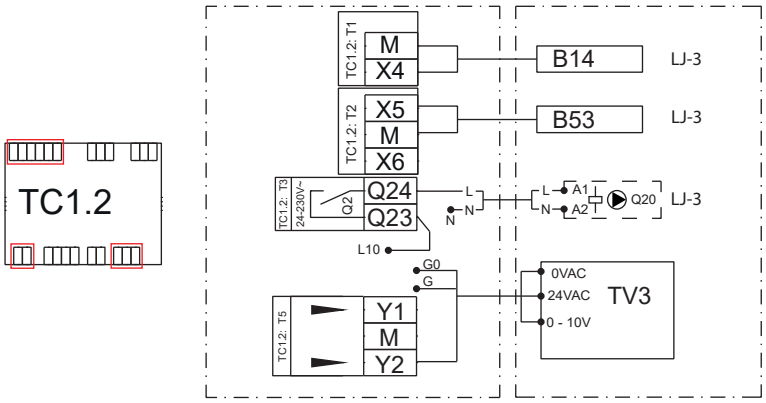

Figure 7.19 - Connecting the heating circuit 3

7.16 Connecting the cooling circuits

Connect the cooling circuits to the expansion module TC1.6 as follows:

Cooling circuit 1

- Supply temperature sensor B16: X1 and M
- Pump control Q24 (230 V): relay Q1, contact Q14
- Actuator TV11:
  - 0–10 V: Y1
  - 24 VAC: G
  - 0 VAC: G0

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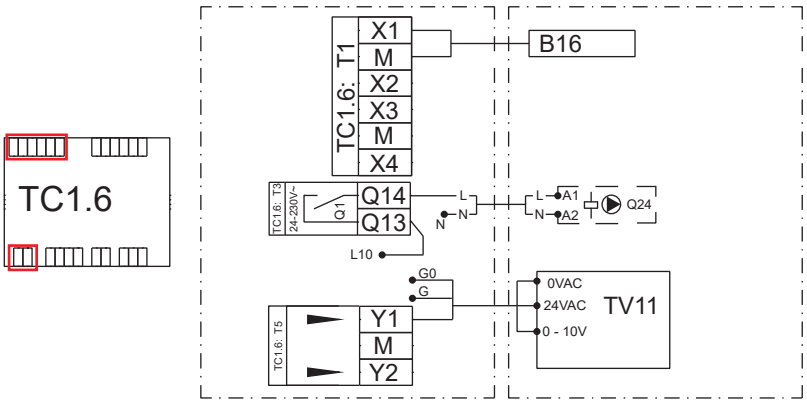

Figure 7.20 - Connecting the cooling circuit 1

Cooling circuit 2

- Supply temperature sensor B26: X2 and M
- Pump control Q26 (230 V): relay Q2, contact Q24
- Actuator TV22:
  - 0–10 V: Y2
  - 24 VAC: G
  - 0 VAC: G0

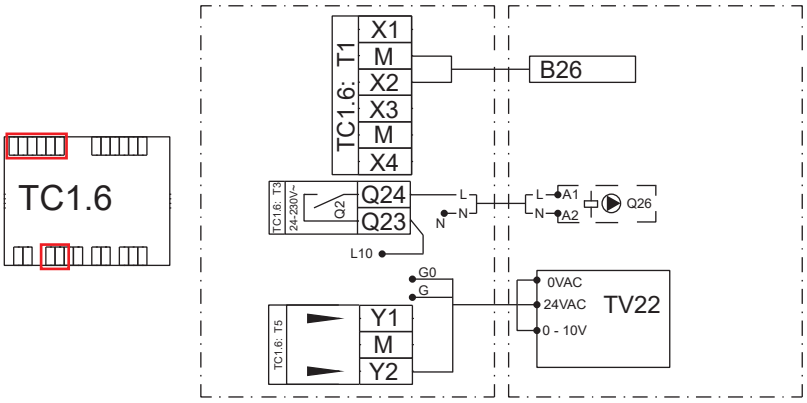

Figure 7.21 - Connecting the cooling circuit 2

7.17 Connecting the pressure transmitters

You can connect a pressure transmitter to both the heating circuit and the collector. Transmitters allow you to monitor circuit pressures and set limit values for alerts.

Connect the pressure transmitters to the expansion module TC1.7 as follows:

Heating circuit pressure transmitter (H11):

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- 24 VAC: G
- GND: M
- 0–10 V: X6

Collector pressure transmitter (H12):

- 24 VAC: G
- GND: M
- 0–10 V: X7

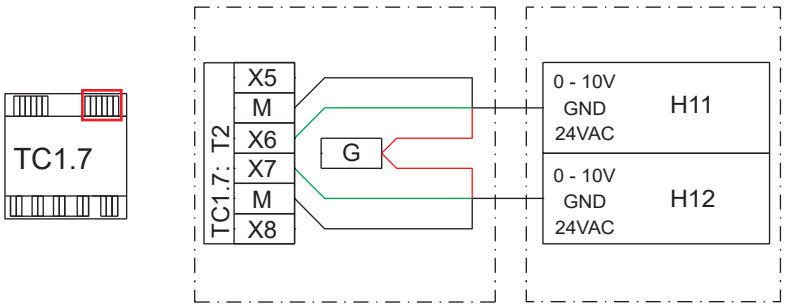

Figure 7.22 - Connecting the pressure transmitters

7.18 Connecting the superheating circuit

The superheating circuit has supply and return water sensors and an adjustable circulator pump. Connect the sensors (B36 and B37) and pump adjustment (0–10 V) to the higher-level automation system as shown in the figure.

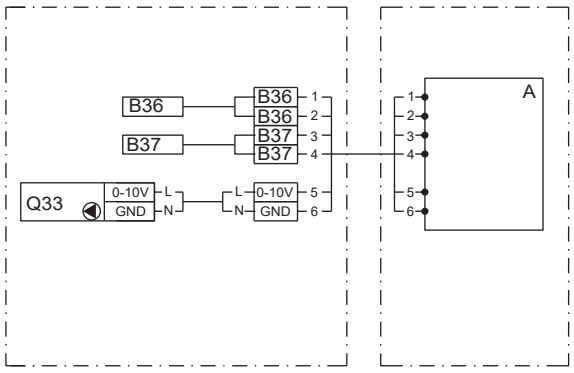

Figure 7.23 - Connecting the superheating circuit

7.19 Connecting the flowmeter

The device-specific flowmeter is an accessory to measure the flow in the condenser. This measurement provides information on the amount of energy produced and efficiency.

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The flowmeter (FM1) is installed outside the heat pump in the return water pipe. Connect the meter to the expansion module TC1.2 as shown in the figure.

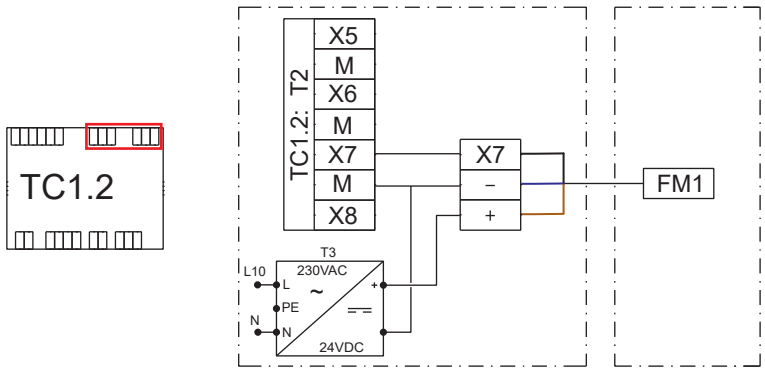

Figure 7.24 - Connecting the flowmeter

7.20 Connecting the external control

A single heat pump or a cascade system with multiple pumps can be controlled with an external request sent to the analogue input.

The request can be based on the setpoint or the power needs. Specify the analogue input setpoints in the service menu, under *Device settings*.

Connect the external request (VK2) to the expansion module TC1.1 as shown in the figure.

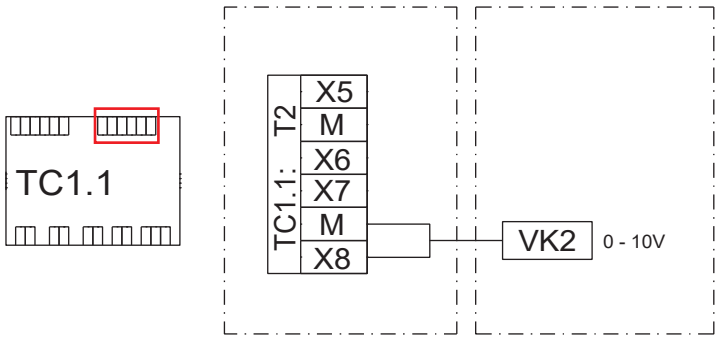

Figure 7.25 - Connecting the external control

7.21 Connecting wireless sensors

You can connect wireless sensors to the heating circuits.

Connect the sensor base station to the Modbus RTU connector T6 (RS-485) of the controller TC1 as shown in the figure.

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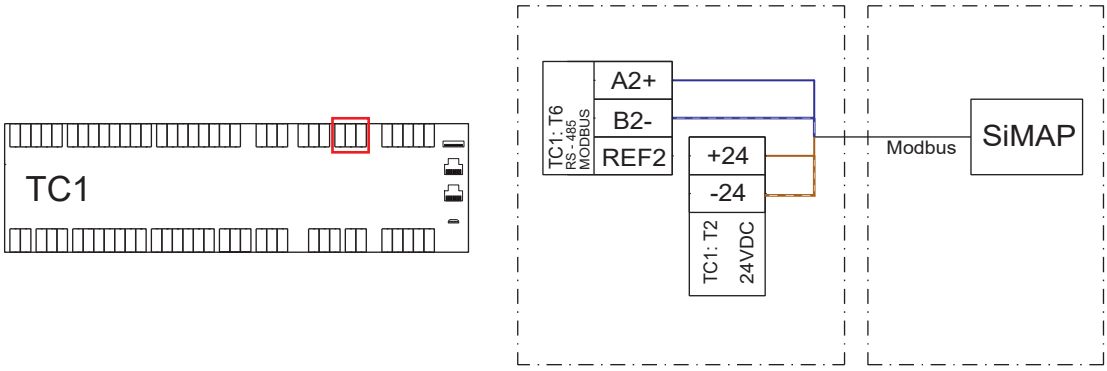


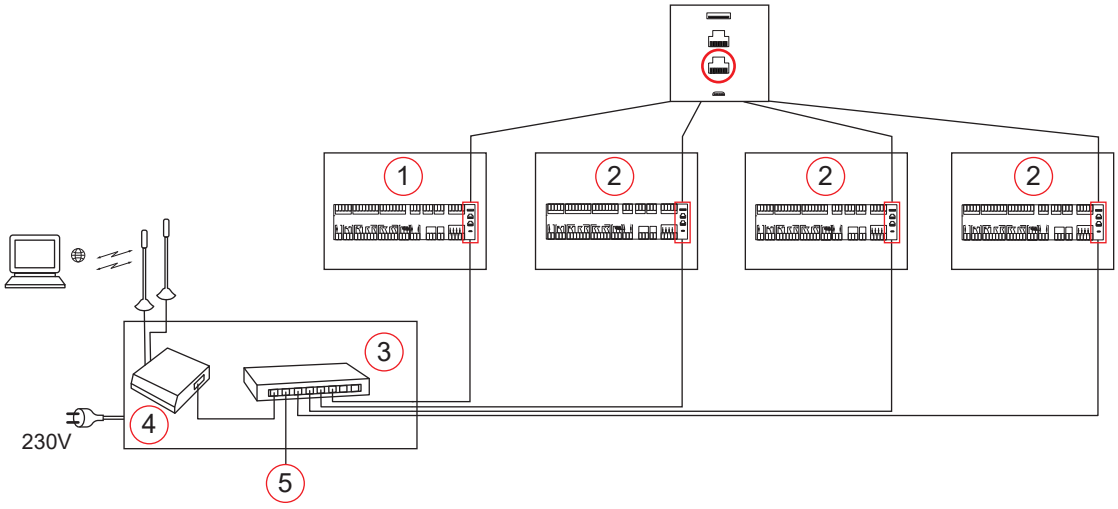
Figure 7.26 - Connecting wireless sensors

7.22 Creating the LAN network

The system comes with a ready-made network connection. Connect the network to each heat pump.

The delivery includes a router, a network switch, and network cables. Cascade systems also include an external network box that must be connected to a power supply (socket 1~230 V / 50 Hz).

See the electrical diagrams for examples of systems with two and three or more heat pumps.



1 Master
2 Slave
3 Router
4 Modem
5 Modbus TCP/IP

Figure 7.27 - Creating the LAN network

7.23 Connecting the cascade system

You can connect several heat pumps together as a cascade system. Set one device as master and other devices as slaves. Give each slave device its own device address.

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Connect all external sensors to the master device. Device-specific change-over valves, external controls of compressors, alerts and the Modbus bus are connected to each device.

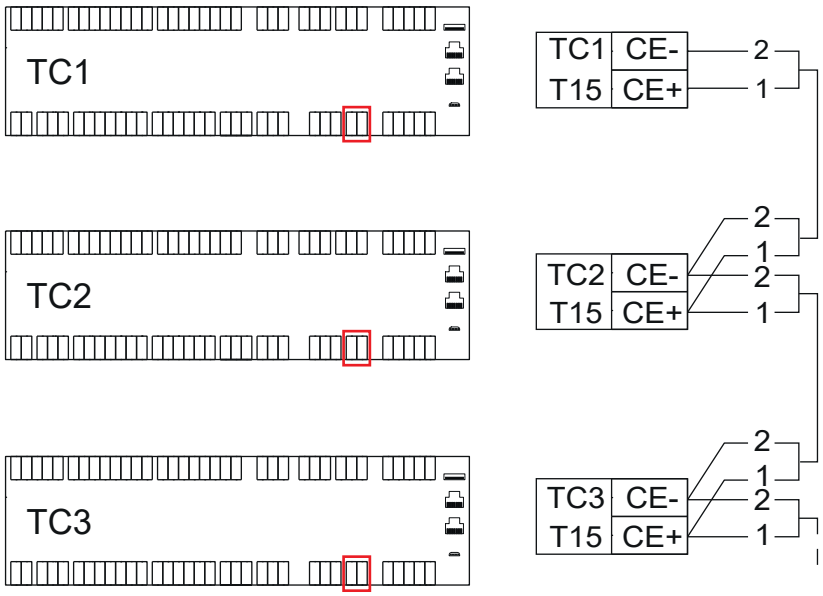

Figure 7.28 - Connecting the cascade system

7.24 Connecting the Modbus RTU bus

Gebwell Taurus can be connected to a Modbus RTU fieldbus as a slave device.

Connect the Modbus bus cable to the RS-485 connector (T6) of the heat pump controller. Set the Modbus communication settings (slave address, baud rate, parity and stop bits) in the heat pump controller.

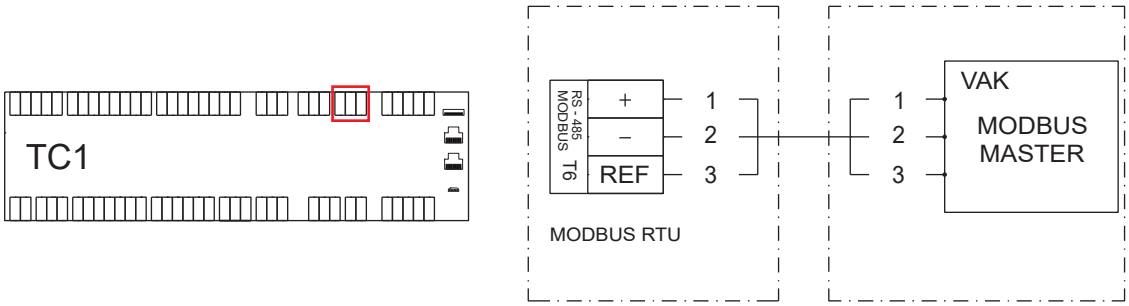

Figure 7.29 - Connecting the Modbus RTU bus

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8 Starting up the heat pump

8.1 Filling and venting

Filling and venting the heating system

1. Make sure that a leak test is performed on the system.
2. Open the vent valves to allow air to get out of the system during filling.
3. Fill the charging/heating circuit using the filling valve of the system.
4. Close the outlet valve when no more air comes out of the outlet valve.

   The pressure starts to pick up after a few minutes.
5. Close the filling valve when the pressure is at the correct level.
6. Carefully vent the system using the vent valves.
7. Repeat the filling and venting process until all air is removed from the system and the pressure is at the correct level.

Filling the collector

1. Ground source heat applications: Fill the collector with a mixture of water and geothermal fluid that can withstand a temperature of –15 °C.

   Other applications: Fill the collector with fluid that can withstand a temperature that is 5 °C lower than the lowest collector temperature during use.

   Environmentally friendly bioethanol is recommended for use as a geothermal fluid.
2. Fill the collector via valves A.

   Valve B must be closed during filling so that the collecting liquid circulates through the entire circuit.
3. Fill the system with pure geothermal fluid.

   Be careful not to get debris from the base of the container into the suction hose (strainer).

   If you recycle liquid with an external filling or vent pump, make sure that the liquid is not pumped as foam into the system. It might be difficult to get foamy microbubble liquid out of the system and it may cause malfunctions. If necessary, you can prevent microbubbles from entering the collector by using two large containers.
4. Pressurise the collector using an external booster pump.

   Monitor the collector’s pressure gauge to ensure that the pressure does not exceed the opening pressure of the safety valve.
5. Clean the heat pump’s strainer before the heat pump is started.

The collector can also be vented in two stages. A bypass valve (C) must be installed in the collector so that the internal piping can be vented separately from the well field. When pumping into the well field, the air is mixed with cold collecting liquid, making it more difficult to remove the air. The valve C must be closed during normal operation.

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Pressure-testing the collector

Perform a pressure test on the filled collector as follows:

1. Increase the pressure up to the design pressure and check the pressure after 30 minutes.
   If the pressure drops during these 30 minutes, there is a leak in the system.
2. Repair any leaks and repeat the pressure test.
3. If the test is successful, mark the test as completed in the *Commissioning log*.

8.2 Checks before the heat pump start-up

When the heat pump is delivered, all of the operational switches will be in the “OFF” position. Before setting the hardware configuration and starting up the heat pump, make sure of the following:

- The collector is filled.
- The charge circuit of the heat pump is filled with water.
- The charge circuit and the collector have been thoroughly vented.
- External temperature sensors are installed and connected to the system in accordance with the electrical diagram.
- All electrical connections are correctly connected.

8.2.1 Venting the charge circuit and the collector with the built-in pump of the device

Once the system is vented using external equipment, venting can be completed with the internal pumps of the heat pump. Especially the collector must be vented with extreme care. If there is even a small amount of air in the collector, the device will not operate optimally and may malfunction.

Start the pumps from the service menu in the controller’s user interface, under *Function testing*. To log into the service level, press the knob for 3 seconds and enter code 2000.

Charge circuit

The charge circuit is vented with the charge pump. Go to *Charge pump* and increase the pump speed to facilitate venting.

Under *Change-over valve,* you can also toggle the valve position between *On* and *Off* a few times. This removes air from the charging coil.

Collector

The collector is vented with the source pump. Go to *Source pump* and increase the pump speed to facilitate venting.

Start with a low setting and increase the speed slowly.

NOTICE After the venting is completed, be sure to set all components back to the *Auto* mode. Otherwise, the heat pump will not work properly.

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8.3 Hardware configuration

System configuration must be set up before the system is started.

1. Make sure that the expansion modules are installed and their DIP switches are properly set.
2. Make sure that all electrical connections are made.
3. Log into the service level by pressing the knob for 3 seconds and entering code 2000.
4. Set the hardware configuration in *Service menu*► *Commissioning*.
5. Restart the system from *Service menu* ► *Commissioning*.
6. Once the system has restarted, check the hardware configuration again in the same menu.

8.4 Starting up the heat pump

1. Set the heat pump's main switch (Q1) in the ON position.
2. Set the other switches to the ON position:
   - Frequency converter (F1), Taurus Inverter Pro only
   - source pump (F2)
   - charge pump (F3)
   - superheating pump (F5), Taurus EVI 80/110 only
   - control (F10).

   Wait for a while for the controller to start.
3. If you are not at the service level, log in by pressing the knob for 3 seconds and entering code 2000.
4. In the *Cooling circuit* menu, set *Op.mode HMI* to *Auto*.

   The heat pump starts calculating the heating need and starts charging as needed. If the system has domestic water, the charge is started there first.
5. If there is no need for heat in the property, perform a test run by increasing the temperature setting from the *Heating circuit* menu.

   You can increase the setting in the *Sp.room temp.* field. See section *Heating circuit settings*.
6. After the test run, specify the heating and domestic water settings by the needs of the property.

8.4.1 Operation without the collector (operating during construction)

You can use the heat pump for controlling external heat sources already before the collector is connected. In this case, heating takes place with the electric heaters in the heating and domestic water accumulators. All control functions for heating and domestic water are available. However, please note that the heating and domestic water circuits must be connected and vented, and that the electrical connections must be completely ready for use. The controls of electric heaters must be connected to the heat pump control.

If you want to operate the heat pump without the collector, set the *HP operating mode* to *Backup heat* mode. In this mode, the compressor (K1) and source pump (Q8) will not start.

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9 Heat pump settings

Some of the settings can only be changed at the service level. To log into the service level, press the knob for 3 seconds and enter code 2000. See section *User interface menu structure* for the location of the settings in the heat pump's user interface.

NOTICE Before changing a setting, make sure that you understand how the change affects the operation of the system.

9.1 Basic settings for the heat pump

The basic settings can be found in the *Heat pump* menu.

Time and date

For the heating programme to work as desired, the year, date and time of the controller clock must be set correctly under *System clock*.

The heat pump will not start until the clock is properly set.

Language selection

You can change the interface language under *Language selection*. By default, the heat pump's language is Finnish.

The language options are Finnish, English and Swedish.

If the user interface is in Finnish, the language selection can be found under *Lämpöpumppu►Kielenvalinta*.

Heat pump operating mode

You can start the heat pump under *HP operating mode*. When delivered from the factory, the device is set to *Off*. When you set the mode to *Auto*, the heat pump automatically starts heating the domestic and heating water as needed.

9.2 Domestic water system settings

The heat pump produces domestic hot water by using change-over valve control. When the domestic water request is activated, the change-over valve turns to domestic water accumulator and charging starts. The heat pump charges the domestic water by the setpoint and returns to the heating position. If heating is active, the charging continues to heat the property.

The domestic water accumulator has two temperature sensors: B2 at the top section is the measuring sensor and sensor B3 below it is the control sensor. The charging of domestic water is started when the value measured by sensor B3 is lower than the difference between the setpoint and charging hysteresis. Charging ends when the setpoint is reached.

In the *Domestic hot water* menu, you can view the following information:

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- *Status*: charging status of domestic hot water
- *DHW operating mode*: selected operating mode
- *Top temp. tank*: temperature at the top section of the domestic water accumulator (sensor B2)
- *Bottom temp. tank*: temperature at the bottom section of the domestic water accumulator (sensor B3)
- *Change-over valve*: control position of the change-over valve
- *Circulation pump*: status of the domestic water circulator pump.

Domestic water setpoints

You can set a functional stop point for two different domestic water operating modes: *Comfort* is the basic level of domestic water, and *Reduced* is the reduced level of domestic water.

The controller changes the operating mode according to the time control set in the weekly calendar. By default, the heat pump operates at the *Comfort* level.

Legionella function

The Legionella function raises the temperature of the water in the domestic water accumulator to the set temperature with the electric heater once a week. This prevents the growth of Legionella bacteria in the domestic water. Set the function to a time when there is presumed to be no load (consumption) of domestic water.

- *Setp.temperature*: temperature to which the heat pump charges the domestic water (factory setting 55 °C)
- *Legionella mode*: weekday when the charging takes place
- *Start time leg.function*: time of day when charging starts.

9.3 Heating circuit settings

The heat pump controller is capable of controlling three heating circuits. In menus *Heating circuit 1*, *Heating circuit 2* and *Heating circuit 3* you can specify the settings separately for each circuit.

Heating circuit 1 is always the pump heating circuit for which a mixing function cannot be configured. An external circulator pump can be installed into the heating circuit 1 for controller control. Heating circuit 2–3 are optional mixing heating circuits that can be used to adjust a lower temperature. If you use two or three heating circuits, circuit 1 must always have the higher temperature.

HC operating mode indicates the status of the heating circuit.

Room temperature and room temperature sensor compensation

Sp.room temp. allows you to set two different values for room temperature: *Comfort* is the basic heating level, and *Reduced* is the reduced level that is valid during the time control drop period. *Actual* indicates the valid temperature setting of the heating circuit at the time.

The room temperature sensor must be placed in a central part of the building in order for adjustment to function optimally. If the heating circuit does not include a room temperature sensor, disable the sensor in the service menu. In this case, the controller will use a reference value of 20 °C for heat control.

Room temp. comp. allows you to set how much the room temperature sensor compensation affects the supply water setpoint. The higher the value, the greater the effect. If you set the value to 0, the room temperature sensor acts only as a measuring sensor and does not affect the control of supply water.

Room influence indicates the compensation effect of the room temperature sensor on the supply water temperature. Compensation is affected by the deviation between the setpoint and measured room temperature.

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Heating curve

The heating curve is used to calculate the setpoint for the supply water temperature, and this setpoint is used to adjust the supply water temperature according to the prevailing weather conditions. By adjusting the curve, the heating output and room temperature will adapt to you individual needs.

You can change the Y value of the curve at five different outdoor temperature points (20 °C, 10 °C, 0 °C, –15 °C and –30 °C). In the example, the outdoor temperature (°C) is indicated on the X-axis, and the supply water temperature (°C) is indicated on the Y-axis.

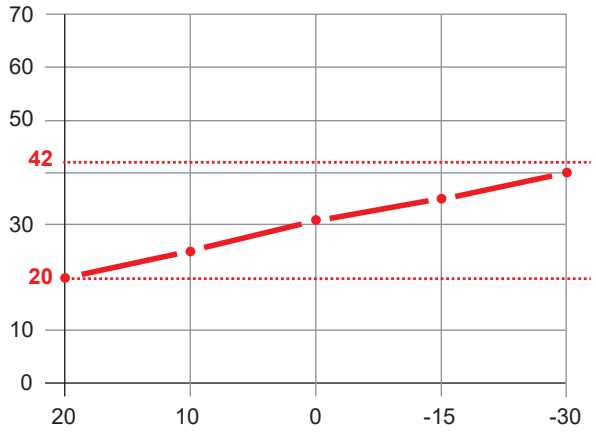

Figure 9.1 - An example of a heating curve

Setpoint supply water

For each heating circuit, the upper and lower limit values must be set for supply water. The supply water temperature will remain within these values even if the heating curve exceeds the setpoint.

Example values for underfloor heating and radiator heating are shown in the table. If you use underfloor heating to heat wet rooms, please note the minimum temperature increase when setting the lower limit.

Form of heating	Upper limit	Lower limit
Underfloor heating	40–45 °C	18–25 °C
Radiator heating	50–80 °C	15–18 °C

Present value indicates the supply water temperature.

Summer-winter change threshold

The *Summer-winter switch temperature* setting allows you to set the outdoor temperature value at which the heating switches on or off. The factory setting is 16 °C. If the heating is in the *Auto* mode, switching takes place automatically.

NOTICE If the system has areas whose heating you do not want to stop in the summer (such as wet rooms), set the circuit to the *Winter* mode in the service menu.

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Weekly calendar

In the weekly calendar, you can set time control for the heating circuits. In time control, the heating circuit changes the mode between the *Comfort* and *Eco* modes. Please note that there is a delay in changing temperatures and that time control does not work on all systems.

9.3.1 Additional heating circuit settings

The settings can be found in the service menu under *Device settings*►*Heating circuit 1-3*. Specify settings separately for each heating circuit.

Alarm limits

Set the upper and lower limit alarms for the supply temperature sensor and room temperature sensor.

Summer/winter mode setting

The heating is off in the *Summer* mode and on in the *Winter* mode.

- *Auto/Temp*: the mode switches automatically according to the outdoor temperature.
- *Date*: the mode switches automatically according to fixed dates.
- *Summer*: heating is permanently off.
- *Winter*: heating is permanently on.

Su/Wi Time const. specifies a filtered temperature time interval to the heating circuit for measuring the change of the heating circuit.

If you set *Date* as the summer/winter mode setting, specify the heating start and end dates to the *Start date* and *End date* fields.

Reset outside temp. resets the filtered outdoor temperature.

Room temperature sensor compensation ratio

In the *Room temp. comp.* field, you can set a compensation ratio for the room temperature sensor. The higher the value, the more the deviation between the measured room temperature and the room setpoint will affect the supply water temperature.

Room influence indicates the effect of compensation on the supply water temperature.

9.4 Cooling circuit settings

The heat pump controller is capable of controlling one mixing cooling circuit, whose settings you can change in the *Cooling circuit* menu. *Operating mode* indicates the status of the cooling circuit.

Room temperature and room temperature sensor compensation

The settings are set in the same way as for the heating circuits.

Cooling curve

The cooling curve is used to calculate the setpoint for the supply water temperature, and this setpoint is used to adjust the supply water temperature according to the prevailing weather conditions.

You can change the Y value of the curve at five different outdoor temperature points:

X1 = +15 °C

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X2 = +20 °C
X3 = +25 °C
X4 = +30 °C
X5 = +35 °C

Setpoint supply water

The settings are set in the same way as for the heating circuits.

NOTICE Check the limit values for the cooling device. Too cold supply water could cause condensation in piping or equipment.

Summer-winter change threshold

The settings are set in the same way as for the heating circuits.

Weekly calendar

The settings are set in the same way as for the heating circuits.

9.5 Charge circuit settings

The settings can be found in the service menu, under *Device settings* ► *Charge circuit*.

Charge temperature difference

Sp.dT determines the condenser temperature difference (dt) between the supply and the return water sensors. Values from 4 to 15 K are allowed (factory setting = 5.0 K). Example values are listed in the table.

Form of heating	Example value
Underfloor heating	5 K
Radiator heating	7–10 K
Accumulator charge	7–10 K

Charge pump speed

You can set the minimum and maximum speed values for the condenser circulator pump, within which the speed will remain during charging.

Values from 20 to 60 % are allowed for the minimum speed (factory setting = 40 %), and values from 70 to 100 % are allowed for the maximum speed (factory setting = 100 %).

9.6 Brine circuit settings

The settings can be found in the service menu, under *Device settings* ► *Source circuit*.

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Source pump speed

You can set the minimum and maximum speed values for the brine circuit circulator pump, within which the speed will remain during charging.

Values from 20 to 70 % are allowed for the minimum speed (factory setting = 40 %), and values from 70 to 100 % are allowed for the maximum speed (factory setting = 100 %).

Free cooling (passive cooling)

Free cool pos src specifies the circulator pump speed in free cooling. Values form 20 to 100 % are allowed (factory setting = 100 %).

Free cooling is activated using external contact information (see *Connecting the source pump external control*).

9.7 Collector frost protection settings

If necessary, set the collector frost protection on in the service menu, under *Device settings* ► *El. heater*.

Operating mode indicates the operating mode of the electric heater.

Collector's temperature limit for electric heater operation

Under *Src.temp limit*, you can set a limit value for the collector's incoming water temperature (sensor B91); at this temperature the electric heater starts to heat the charge circuit supply water alongside the compressor.

Set the value based on the application in question. The factory setting is –4 °C.

Power sequence settings

You can set the start and hysteresis values for up to three power sequences. Moreover, you can set the P value and integral time for capacity calculation.

9.8 Additional heat source settings

The heat pump controller is capable of controlling two different types of additional heat sources: the electric heaters of the accumulator and the adjustable additional heat source. The settings can be found in the service menu, under *Device settings* ► *Additional heat*. You will only see the settings of the additional heat sources that are set in the hardware configuration.

Supply water temperature limits

In *Flow temp,* you can set the high and low temperature values for the joint supply water. These control the operation of the additional heat sources.

Control method

Under *Control mode Heat. ele. heater,* you can set the control method separately for both additional heat sources to specify how they participate in the heating of the property:

- *Parallel operation*: the additional heat source is started in parallel to the compressor if the compressor's power or the set temperature is not realised (partially powered system).
- *HPErr*: the additional heat source completely replaces the compressor in the heating of the property in case of, for example, a malfunction.

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Changing the order

If both additional heat sources are used, you can specify which one starts first:

- *K28-K27*: the electric heaters of the accumulator are the primary additional heat source.
- *K27-K28*: the adjustable additional heat source is the primary additional heat source.

9.9 External temperature request settings

The heat pump can be controlled by a higher-level automation system, either via an analogue input (AI) or a Modbus interface. The control can be based on either the temperature setpoint (°C) or heat request (%).

External temperature request is activated when setting the hardware configuration. After a restart, the settings can be found in the service menu, under *Device settings* ► *External temperature request*.

Setpoint settings

When the request is based on the setpoint from the higher-level automation system, the minimum and maximum heat pump setpoints – *ExtSpMin* (factory setting = 20 °C) and *ExtSpMax* (factory setting = 100 °C) – are specified in the settings. This function is controlled by the supply temperature sensor, which depends on the heating system:

- single heat pump: internal supply temperature sensor (B21)
- cascade system: cascade supply temperature sensor (B10)
- heat pump controls additional heat sources: common flow sensor (B11).

When controlled via an analogue input (AI), the heat request is given at a 2–10 V control voltage. The controller generates the request linearly based on the minimum and maximum setpoints, after which the controller calculates the capacity need and controls the compressor. The operation at different control voltage values is as follows:

- 0 V: the device is in STOP mode
- 0.5 V: charge pump (Q9) shuts down
- 1.5 V: charge pump starts
- 2 V: minimum setpoint
- 10 V: maximum setpoint.

When controlled via the Modbus interface, the device is switched to start mode from the registry 102 (activation of the charge circuit) to start the charge pump. The controller then receives the setpoint in the registry 104 (the heat pump's setpoint °C).

Heat request settings

When the request is based on the heat request, the minimum and maximum heat request values – *ExtDmdMin* (factory setting = 0 %) and *ExtDmdMax* (factory setting = 100 %) – are specified in the settings.

The higher-level automation system monitors the temperatures of secondary circuits and controls the heat pump as needed. The heat pump takes care of the internal functions of the device and controls the circulator pumps according to the values set.

With the Taurus Inverter Pro heat pump, the device starts when the minimum speed of the compressor is exceeded, and shuts down when the request is removed (0 %). The device rotates at a minimum speed when the request is 1 % – *Compressor's min speed*.

The Taurus EVI heat pump operates at different control voltage values as follows:

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- 0 V: the device is in STOP mode
- 0.5 V: charge pump (Q9) shuts down
- 1.5 V: charge pump starts
- 2 V: heat request 0 %
- 6 V: heat request 50 %, the first compressor starts
- 10 V: heat request 100 %, the second compressor starts

The second compressor shuts down when the capacity drops to 50 %, and the first compressor shuts down when the capacity drops to 0 %.

9.10 Wireless sensor settings

An optional wireless measurement system for indoor conditions is available to Gebwell's heat pumps. The system includes a Modbus base station and wireless sensors. The sensors can be used to read the temperature and relative humidity of a space. The controller's software currently supports ten sensors.

You can enable the system in the service menu, under *Commissioning / Wireless sensors*.

The Modbus settings of the base station (address, parity and stop bit) can be found in the installation instructions that come with the system.

- *Nr. of wireless sensors*: number of sensors (factory setting = 0)
- *Addr. wireless base station*: address of the base station (factory setting = 1)
- *Baud rate* (factory setting = 9600)
- *Parity* (factory setting = *None*)
- *Stop bits* (factory setting = One)

These settings will take effect when you restart the controller.

9.11 Settings for communications links

You can set the Modbus settings in the service menu, under *Communication*.

Modbus communication

The Modbus communication link enables the device's temperatures, status information, setpoints and malfunctions to be read by a higher-level automation system. Via the Modbus connection, Gebwell's heat pumps can be controlled by sending a heat request in percentages (%) or a setpoint in Celsius degrees (°C).

The master-slave protocol means that one master device and at least one slave device are connected to the same bus at the same time. The master always begins data transfer. Slave devices do not communicate with each other, nor do they send requests or other messages to the master device unless the master specifically requests this. In a precise transmission, the master first sends a request to one particular slave device and waits for a response. The slave device has a unique address from 1 to 247.

Taurus heat pumps support the following Modbus versions: serial port (RTU) and Ethernet (TCP).

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Modbus RTU

Modbus communication takes place using the RS-485 protocol. The recommended network structure is to connect the devices directly or in short branches to a single trunk cable. “Branch” refers to the distance between a device and the trunk cable. Branches should be as short as possible to avoid signal reflection. According to the Modbus guidelines, branches should never be longer than 20 metres. The network topology cannot be a star or ring. It also cannot be a trunk bus with connected stars or clusters. All such structures must be removed from the network.

Twisted pair cables should be used for Modbus RTU data transfer, and the cables must meet the requirements specified in the EIA-485 standard for double-wire systems.

The cable’s maximum standardised length depends on the data transfer rate and the cable’s properties, such as its characteristic impedance and thickness. The Modbus guidelines specify a maximum length of 1,000 metres if the cable’s cross-sectional area allows for this. At baud rates of 19,200 or more, the recommended characteristic impedance is 100 ohms.

Data transfer settings

For serial traffic, the required parameters are the baud rate, the parity and the stop bits. The data transfer settings of all devices on the same bus must be the same, and they must be set for each device individually. If the parameters are set incorrectly, the slave device will not be able to respond to requests sent by the master device.

Address

The address specifies the slave device. Every device must have a unique address. The address can be from 1 to 247.

Modbus TCP

Modbus TCP communication takes place over the TCP/IP network using port 502. As a communications media, a standard Ethernet cable (e.g. CAT5 twin cable) is used. Master and slave devices must be within the same IP space.

The IP addresses of Gebwell’s heat pumps are usually as follows:

- 1st device: 192.168.1.10
- 2nd device: 192.168.1.11
- 3rd device: 192.168.1.12, etc.

See section *Modbus registers*.

Modbus settings

Set the settings in *Modbus module* so that they match the settings of the higher-level automation system.

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10 Heat pump maintenance and servicing

To ensure the long life and trouble-free operation of your heat pump, the following sections should be checked every year. Also remember to maintain and inspect accessories in accordance with these instructions.

It is the responsibility of the holder and the owner of the equipment to carry out periodical maintenance and to keep an updated record of inspections and servicing.

⚠ ATTENTION Maintenance and service must only be carried out by a person with appropriate training.

10.1 Annual inspections

Item	Actions
General appearance and leaks	Check whether there are any visible fluid leaks, oil or anything else that appears abnormal inside and outside the heat pump. It is normal for a small amount of water to drip from the safety valves due to pressure fluctuations.
Refrigerant circuit	Check the refrigerant circuit in accordance with a separate inspection protocol. Annual inspection of the refrigerant circuit is imposed by law. Enter the date of the inspection and the date of the next inspection on the label of the refrigeration device.
Heating system	Check the heating system pressure. Check the correct operating pressure from the installation record or plan. If the pressure is too low, add liquid using the network filling valve. If you need to add liquid often, find out the reason for the decrease in pressure.
Collector	Check the collector pressure. Check the correct operating pressure from the installation record or plan. If the pressure is too low, add liquid using the network filling valve. After commissioning, it may be necessary to add liquid for a few days – a few litres is within the normal range. When the source pump starts up, the pressure should decrease slightly. The pressure will then increase correspondingly when the pump shuts off. Any other behaviour is indicative of air in the system or a blocked strainer.
	Check and clean the strainer in the collector. The strainer must be checked after commissioning. However, avoid opening the collector unnecessarily. If the strainer is dirty, the collector's temperature difference will increase when the compressor is running. This may cause malfunction.

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10.2 Draining the heat pump

If the compressor unit needs maintenance, close the shut-off valves on the charge circuit and the collector outside the heat pump and drain the fluids from the lower drains of the heat exchangers. If fluid flows inside the compressor unit, dry the unit thoroughly.

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11 Malfunctions and alerts

When the controller detects a malfunction, an alert symbol and alert code appear on the display. See the *Info* menu for more information about the alert. See also section *Modbus registers* , *Alert registers*.

Make a note of the alert in the service log to facilitate possible service actions. After the cause of the alert has been determined and corrected, you can delete the alert in the *Heat pump* menu, under *Acknowledgement of alerts*.

Try to resolve the situation yourself using the troubleshooting table first. If you cannot resolve the situation that way, contact an authorised technician.

11.1 Troubleshooting

If there are no special alerts on the display, perform the following basic actions:

1. Check all switches.
2. Check the fuses of the building and the heat pump.
3. Check the residual current device.

Problem	Possible cause	Corrective action
Low room temperature	The heat pump is in the wrong operating mode	Set the heat pump's heating functions to the correct operating mode.
	Thermostats closed on the radiators or underfloor heating	Open the thermostats in as many rooms as possible.
		Adjust the room temperature in the *Setpoint room* menu instead of closing the thermostats.
	The automation setpoint is too low	Increase the comfort setpoint in the *Setpoint room* menu.
		Increase the gradient of the heating curve by changing the values of the Y points in the *Heating curve* menu.
		Set the maximum setpoint for supply water to a sufficiently high value in the *Set value output water temp.* menu.
	The heating circuit's time programme is on	Go to the *Time programme heating circuit* menu and adjust the time programme.
	Air in the heating system	Remove the air from the heating system.
	Closed valves between the accumulator and the heat supply network	Open the valves.
	Activated an external contact for decreasing the room temperature	Check any external contacts.

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Problem	Possible cause	Corrective action
High room temperature	The setpoints for the heating circuits are too high	If the room temperature is only too high during cold weather, decrease the gradient of the heating curve.
		If the room temperature is too high during mild weather, decrease the comfort setpoint.
Domestic water is cold	The domestic hot water function is not active	Set the correct value for the *Domestic water operating mode* setting.
	Domestic hot water consumption too high	Wait until the water warms up. When a temporary period of high consumption begins, you may select forced charging of domestic hot water by pressing the domestic hot water button on the user terminal for 3 seconds.
	Setpoint too low	Go to *Domestic water setpoints* and increase the setpoint for domestic water.
	Supply mixing valve setting too small	Open the valve.
Compressor does not start up	No need for heat	Check the device's status information in the *Info* menu.
	The minimum compressor stop time is active	Wait 20 minutes and check whether the compressor starts up.
	The device has a failure	Check the reason for the failure in the *Info* menu and take the necessary measures with the help of the troubleshooting table.

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12 Performance value graphs

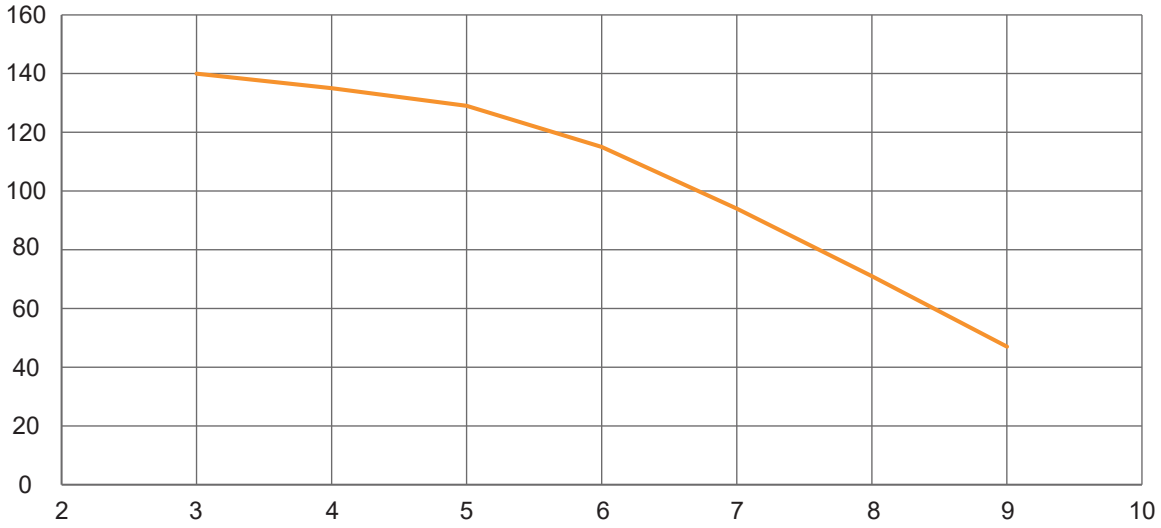

Figure 12.1 - Taurus Inverter Pro, free lifting height, collector [kPa – l/s]

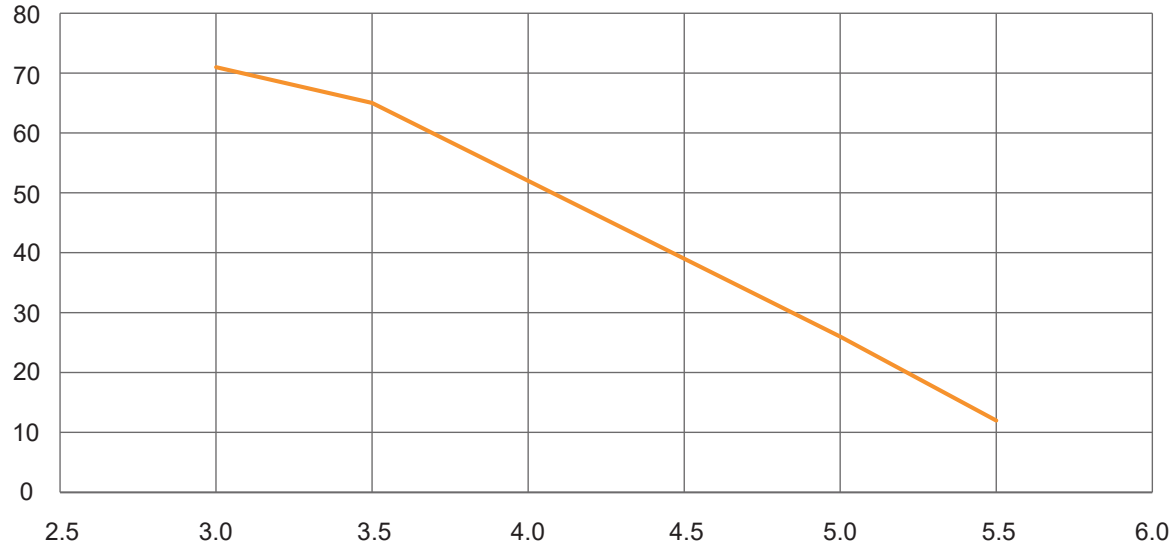

Figure 12.2 - Taurus Inverter Pro, free lifting height, charge circuit [kPa – l/s]

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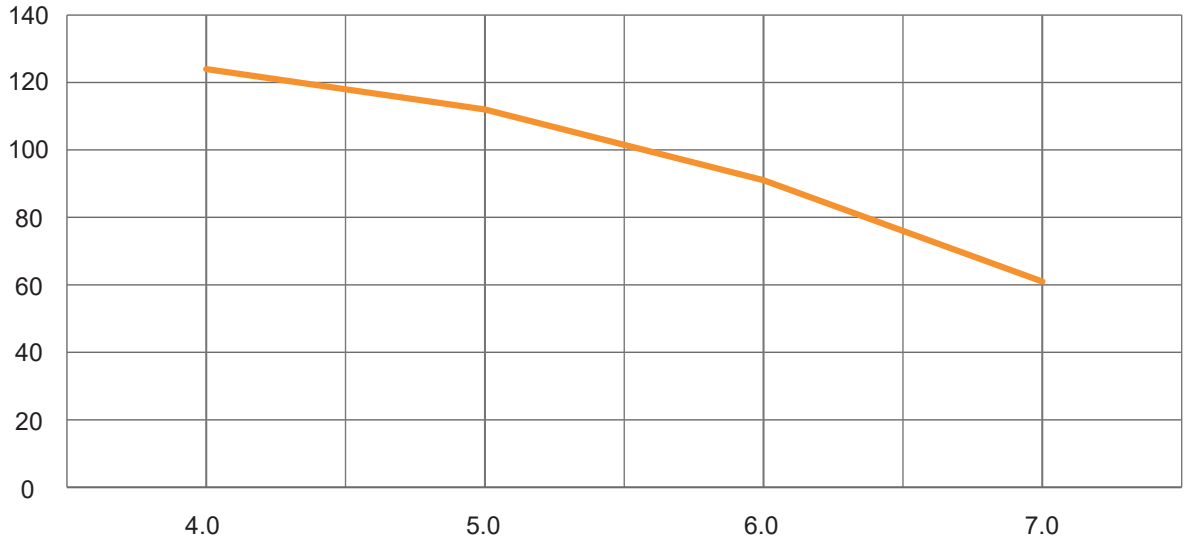

Figure 12.3 - Taurus 80/110 EVI, free lifting height, collector [kPa – l/s]

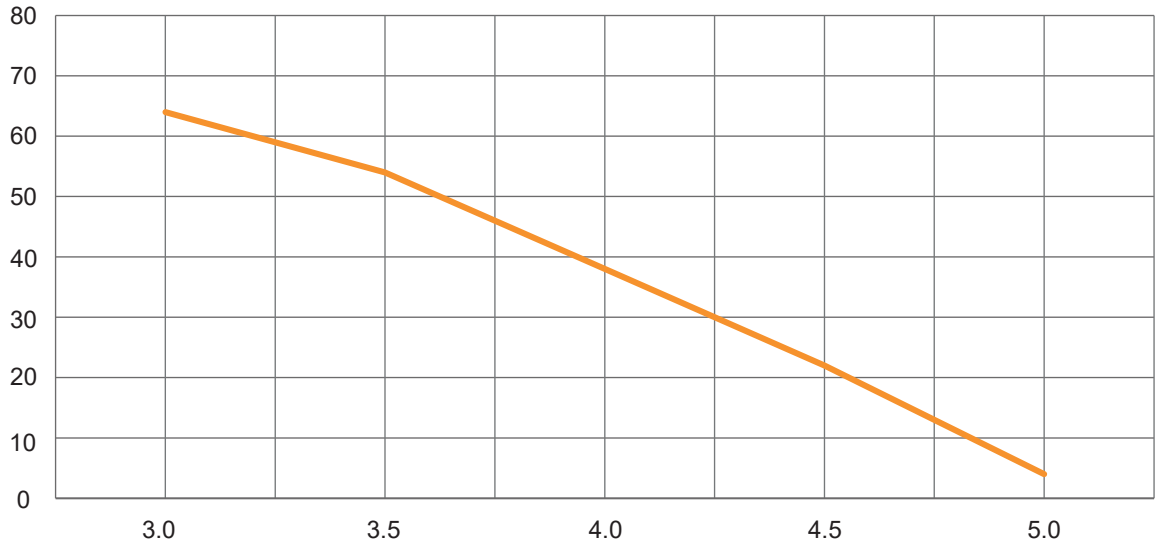

Figure 12.4 - Taurus 80/110 EVI, free lifting height, charge circuit [kPa – l/s]

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13 User interface menu structure

► Main menu	► Heat pump
	► Domestic hot wateri
	► Heat circuit 1-3
	► Cool circuit 1
	► Information
	► Service menu

Heat pump

► Heat pump	**► System clock**	Year	
		Month	
		Day	
		Houri	
		Minute	
		Second	
	Language selection		*suomi, English, svenska*
	HP operating mode		*Auto, Off, Backup heat*
	Alarm acknowledge		*Execute*

Domestic hot water

► Domestic hot water	**Status**		Value is read-only
	DHW operating mode		*Auto, Off/Prt, Recuced, Comfort*
	Top temp. tank		Value is read-only
	Bottom temp. tank		Value is read-only
	Change over valve		Value is read-only
	► DHW SP temperatures	Actual	*˚C*, Value is read-only
		Comfort	*˚C*
		Reduced	*˚C*
	► Legionella	Setp.temperature	*˚C*
		Legionella mode	*Mo,Tu,We,Th,Fr,Sa,Su*
		Start time leg.function	*h*
	Circulation pump		Value is read-only

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Heat circuit 1-3

► Heat circuit 1-3	HC operating mode		*Auto, Off/Prt, Recuced, Comfort*
	► **Sp.room temp.**	Actual	*˚C*
		Comfort	*˚C*
		Reduced	*˚C*
		Protect	*˚C*
		Sp.correction	*K*
		Room temp. control	Value is read-only
		Room temp. comp.	
		Ti room	*min*
		Room influence	*K*, Value is read-only
	► **Heating curve**	Out.temp.filtered. X	*˚C*
		X1	*-30˚C*, Value is read-only
		Y1	*˚C*
		X2	*-15˚C*, Value is read-only
		Y2	*˚C*
		X3	*0˚C*, Value is read-only
		Y3	*˚C*
		X4	+10*˚C*, Value is read-only
		Y4	*˚C*
		X5	*+20˚C*, Value is read-only
		Y5	*˚C*
		Heating curve Y	*˚C*, Value is read-only
	► **Setpoint flow temp.**	Present value	*˚C*, Value is read-only
		High limit	*˚C*
		Low limit	*˚C*
	Summer-winter switch temperature		*˚C*
	► **Week calender HC1**	Present value	Value is read-only
		Monday	*Time-1* *Value-1: Off/Pro., Comfort, Eco* . . . . . *Time-6* *Time-6: Off/Pro., Comfort, Eco*
		Tuesday	
		Wednesday	
		Thursday	
		Friday	
		Saturday	
		Sunday	

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► Heat circuit 1-3	► Week calender HC1	Exception	
		Start time	*Day of week, Day, Month, Year*
		End time	*Day of week, Day, Month, Year*
		Selection-1	*Day, Area, Day of week, Calendar*
		(Start)day	*Day of week, Day, Month, Year*
		End day	*Day of week, Day, Month, Year*
		Weekday	*Day of week, Day, Month, Year*
	Copy schedule		*Ma to, Tu-Fr, Tu-Su, Tu, We, Th, Fr, Sa, Su, Ecpt*

Cool circuit

► Cool circuit	**Op.mode HMI**		*Auto, Off/Prt, Recuced, Comfort*
	► **Sp.room temp.**	Actual	*˚C*
		Comfort	*˚C*
		Reduced	*˚C*
		Sp. correction	*K*
		Room temp. control	Value is read-only
		Room temp. comp.	
		Ti room	*min*
		Room influence	*K*, Value is read-only
	►**Cooling curve**	Out.temp.filtered X	*˚C*
		X1	*15˚C*, Value is read-only
		Y1	*˚C*
		X2	*20˚C*, Value is read-only
		Y2	*˚C*
		X3	*25˚C*, Value is read-only
		Y3	*˚C*
		X4	30˚C, Value is read-only
		Y4	*˚C*
		X5	35˚C, Value is read-only
		Y5	*˚C*
		Cooling curve Y	Value is read-only
	► **Setpoint flow temp.**	Present value	*˚C*, Value is read-only
		High limit	*˚C*
		Low limit	*˚C*

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	Su/Wi Temperature		*˚C*
	► Viikkokalenteri JP1	Present value	Value is read-only
		Monday	*Time-1* *Value-1: Off/Pro., Comfort, Eco* . . . . . *Time-6* *Time-6: Off/Pro., Comfort, Eco*
		Tuesday	
		Wednesday	
		Thursday	
		Friday	
		Saturday	
		Sunday	
		Exception	
		Start time	*Day of week, Day, Month, Year*
		End time	*Day of week, Day, Month, Year*
		Selection-1	*Day, Area, Day of week, Calendar*
		(Start)day	*Day of week, Day, Month, Year*
		End day	*Day of week, Day, Month, Year*
		Weekday	*Day of week, Day, Month, Year*
	Copy schedule		*Ma to, Tu-Fr, Tu-Su, Tu, We, Th, Fr, Sa, Su, Ecpt*

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Information

► Information	► Status data and measurements	Outside temp.	˚C, Value is read-only
		Supply pump	%, Value is read-only
		Flow temp.	˚C, Value is read-only
		Return temp.	˚C, Value is read-only
		dT supply	*K*, Value is read-only
		Source pump	%, Value is read-only
		Source temp.	˚C, Value is read-only
		Return temp.source	˚C, Value is read-only
		dT source	*K*, Value is read-only
		Operating mode	Value is read-only
		Request	*%*, Value is read-only
		Present capacity	*%*, Value is read-only
		Compressor 1	*On*, Value is read-only
		VSD Compr. 1	*%*, Value is read-only
		Heat circuit 1	
		HC operating mode	*Auto, Off/Prt, Recuced, Comfort*
		Oprating mode	Value is read-only
		+Room temp.	˚C, Value is read-only
		+Flow temp.	˚C, Value is read-only
		Set point	˚C, Value is read-only
		Heat circuit 2	
		…..	
		Domestic hot water	
		DHW operating mode	*Auto, Off/Prt, Recuced, Comfort*
		Operating mode	Value is read-only
		Change over valve	Value is read-only
		Top temp. tank	˚C, Value is read-only
		Bottom temp. tank	˚C, Value is read-only
		Legionella mode DHW	Value is read-only
		Additional heat	
		K27 command	Value is read-only
		Control mode Add. heat	*HPErr, Parallell*
		Heat. ele. heater	Value is read-only
		Add. heat control signal	*%*, Value is read-only

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► **Information**	► **Status data and measurements**	Setpoint	*°C*, Value is read-only
		Present value	*°C*, Value is read-only
		Control output	*%*, Value is read-only
	► **Operating hours,** Values read-only	Automation stat.	*h*
		Compressor 1	*h*
		Compressor start-ups	
		Hot water charges	
		Supply pump	*h*
		Source pump	*h*
		El.heater Add. heat	*h*
		El.heater start-ups Add.heat	
		K27 command Add. heat	*h*
		K27 start-ups Add. heat	
	► **Energy,** Values read-only	Energy total	*kWh*
		Generated heat total	*kWh*
		Energy heating	*kWh*
		Energy DHW	*kWh*
		Generated heat Heat.circuit	*kWh*
		Generated heat dhw	*kWh*

Service menu

► **Service menu**	► **Funtion testing**	Change over valve			*Heating, DHW*
		Source pump			*%*
		Source pump			*%*
		Charge pump			*%*
		Circulation pump DHW			*Off, On*
		DHW Ele. heat			*Off, On*
		Flow through heater			*Auto, Off, St 1-3*
		Valve HC2			*%*
		Valve HC3			*%*
		El.heater Add. heat			*Auto, Off, St 1-3*
		Add. heat			*Off, On*
		Add. heat control signal			%

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► **Service menu**	► **Measurements** (Values read-only)	+Circuit 1			
		Cond.press.			*bar*
		Evap.press.			*bar*
		Cond. temp.			*°C*
		Evaporatr temp.			*°C*
		Suct.gas temp.			*°C*
		Superheat			*K*
		Capacity request			*%*
		Present capacity			*%*
		Compressor 1			
		VSD Compressor 1			*%*
		Compressor 2			
		VSD Compressor 2			*%*
		Discharge templ.			*°C*
		Feedb.esxp.val.			*%*
		+EXD-TEVI			
		Valve			*%*
		SuctionT1			*°C*
		Superheat			*K*
		HotGasT1			*°C*
		HotGasT2			*°C*
		Pressure			*bar*
		Supply pump			*%*
		Flow temp.			*°C*
		Return temp.			*°C*
		dT supply			*K*
		Source pump			*%*
		Source temp			*°C*
		Return temp. source			*°C*
		dT source			*K*
		Flow temp. System			*°C*
		Ext. control			
		Ext. heat demand			*%*
		Ext. setpoint			*°C*

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► Service menu	► Commissioning	Restart			*Execute*
		► **Heat circuit 1-3**	Heat circuit 1-3		*Enable, Disable*
			Room sensor		*Disabled, Wired, Wireless 1, Wireless 2, Wireless 1&2*
		► **Cool circuit 1**	Cool circuit 1		*Enable, Disable*
			Room sensor		*Disabled, HC1, HC2*
			Transfer pump (Q28)		*Enable, Disable*
		► **Flow through heater**	Flow through heater		*Enable, Disable*
			Number of stage		*One, Two, Three*
		► **Additional heat**	+K27/TV27		
			Add.heat		*Enable, Disable*
			+K28/K29		
			Heat. ele. heater		*Enable, Disable*
		► **Cascade settings**	Heat pump type		*Independent, Master, Slave1*
			Number of slaves		*0, 1*
			Common source pump type		*None, 1-stage, 0-10V*
		► **Wiresell sensors**	Nr. of wireless sensors		
			Addr. wireless base station		
			► **Modbus**	+Inbuilt RS485:2	
				Baud rate	*9600, 19200, 38400, 57600, 115200*
				Parity	*Even, Odd, None*
				Stop bits	*One, Two*
		► **Ext.heat demand**	Supl. cont.		*Heat pump, Ext. %, Ext. ˚C*
			ExtDmdTyp		*AI, Modbus*
	► **Device settings**	► **Charging circuit**	Sp.dT		*K*
			Supply pump min.		*%*
			Supply pump max.		*%*
		► **Source circuit**	Source pump min.		*%*
			Source pump max.		*%*
			Free cool pos src		*%*
		► **El.heater**	Operating mode		Value is read-only
			Src.temp limit		*˚C*

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► Service menu	**► Device settings**	**► El.heater**	Switch on		*%*
			Switch hys.		*%*
			Switch on 2		*%*
			Switch hys 2		*%*
			Switch on 3		*%*
			Switch hys. 3		*%*
			Gain (Kp)		
			Ti Integr.act.t.		*s*
		► Domestic hot water	Circulation pump		*Off, On*
		► Heat circuit 1-3	► Alarm limits	Flow temp. – HihgLimit	*˚C*
				Flow temp. - LowLimit	*˚C*
				Room temp. – HighLimit	*˚C*
				Room temp. – LowLimit	*˚C*
			► Summer / Winter setting	Su/Wi mode	*Auto/Temp, Date, Summer, Winter*
				Su/Wi Time const.	*h*
				Start date	*Day of week, Date*
				End date	*Day of week, Date*
				Reset outside temp.	*Execute*
			Room temp. comp.		*Value is read-only*
			Room influence		*K*

Service menu → Device settings → Additional heat

Service	**Device**	**► Additional heat**	Operating mode			*Value is read-only*
			Flow temp.			*Value is read-only*
			El.heater			*Value is read-only*
			K27 command			*Value is read-only*
			Add. heat control signal			*Value is read-only*
			► +Settings	**► Flow temp.**	High limit	*˚C*
					Low limit	*˚C*
			Control mode Heat. ele. heater			*HPErr, Parallell*
			Sequence selector			*K28-K27, K27-K28*

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Service menu → Communication

► Service menu	**► Communication**	**► Modbus module 1**	State	Value is read-only
			Comm.failure	Value is read-only
			+Kanava 1:	Value is read-only
			Slave	Value is read-only
			Slave address	
			Baud rate	
			Stop bits	*1,2*
			Parity	*Parill., Pariton, Ei mitään*
		► IP-Config.	DHCP	*Active, Passive*
			IP address	
			Subnet mask	
			Default gateway	
			Preferred DNS server	
			Alternate DNS server	
► Service menu	**► Device information**	Activation key		
		Operating hours		*h*
		Internal temp.		*˚C*
		Serial number		Value is read-only

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14 Modbus registers

	ID	Read/ Write	Register type[1)]	Register address	Unit	Resolution (divider)[2)]	Device 1 (master)	Devices 2, 3, etc. (slave)
Operating temperatures:								
Cascade flow temperature	B10	R	3x	901	°C	10	x	
Cascade flow temperature from BAS[7)]	B10	R/W	4x	901	°C	10	x	
System flow temperature	B11	R	3x	805	°C	10	x	
Common return temperature	B70	R	3x	905	°C	10	x	
Common return temperature	B72	R	3x	906	°C	10	x	
Outside temperature	B9	R	3x	101	°C	10	x	
Tank bottom temperature	B15	R	3x	908	°C	10	x	
Readable setpoints:								
Cascade temperature setpoint	B10	R	3x	902	°C	10	x	
System temperature setpoint	B11	R	3x	815	°C	10	x	
Heat pump information:								
Heat pump flow temperature	B21	R	3x	201	°C	10	x	x
Heat pump return temperature	B71	R	3x	202	°C	10	x	x
Source circuit in	B91	R	3x	301	°C	10	x	x
Source circuit out	B92	R	3x	302	°C	10	x	x
Hot gas	B81	R	3x	303	°C	10	x	x
Hot gas 1 (EVI)		R	3x	321	°C	10	x	x
Hot gas 2 (EVI)		R	3x	322	°C	10	x	x
Evaporator pressure	H82	R	3x	304	bar	10	x	x
Condenser pressure	H83	R	3x	305	bar	10	x	x
Source pump status	Q8	R	3x	309	0=Off / 1=On		x	x
Source restriction valve / Source pump speed	Y8/Q8	R	3x	306	%	1	x	x
Suction gas temp	B85	R	3x	307	°C	10	x	x
Condenser temperature difference		R	3x	203	°C	10	x	x
Evaporator temperature difference		R	3x	308	°C	10	x	x
Supply pump speed	Q9	R	3x	204	%	1	x	x
Supply pump status	Q9	R	3x	205	0=Off / 1=On		x	x
Heating request		R	3x	213	%	1	x	x
Current capacity		R	3x	214	%	1	x	x
Heating circuit pressure	H11	R	3x	215	bar	10	x	x
Suorce circuit pressure	H21	R	3x	320	bar	10	x	x
Auxiliary pressure	H31	R	3x	113	bar	10	x	x
Additional heat source information:								
Additional heat source status	K27	R	3x	806	0=Off / 1=On		x	
Additional heat source current capacity	TV27	R	3x	807	%	1	x	

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	ID	Read/ Write	Register type[1)]	Register address	Unit	Resolution (divider)[2)]	Device 1 (master)	Devices 2, 3, etc. (slave)
Status information:								
Compressor status info	K1	R	3x	310	0=Off / 1=On		x	x
Compressor speed (inverter)	K1	R	3x	311	%	1	x	x
Compressor status info	K2	R	3x	315	0=Off / 1=On		x	x
Compressor speed (inverter)	K2	R	3x	316	%	1	x	x
DHW resistor status	K6	R	3x	703	0=Off / 1=On		x	
Electric resistor status	K25/ K26	R	3x	801	[3)]		x	
Electric resistor status	K28/ K29	R	3x	808	[3)]		x	
Change-over valve status	Y3	R	3x	704	0=heating 1=DHW		x	
Common source pump speed	Q8C	R	3x	903	%	1	x	
Common source pump status	Q8C	R	3x	904	0=Off / 1=On		x	
Energy monitoring:								
Cumulative heat production, heating		R	3x	206	kWh (32-bit data)[9)]	1	x	x
Cumulative heat production, DHW		R	3x	208	kWh (32-bit data)[9)]	1	x	x
Cumulative system heat production		R	3x	210	kWh (32-bit data)[9)]	1	x	x
Cumulative energy consumption, heating		R	3x	102	kWh (32-bit data)[9)]	1	x	x
Cumulative energy consumption, DHW		R	3x	104	kWh (32-bit data)[9)]	1	x	x
Cumulative system energy consumption		R	3x	106	kWh (32-bit data)[9)]	1	x	x
Cumulative COP, heating		R	3x	108		10	x	
Cumulative COP, DHW		R	3x	109		10	x	
Cumulative system COP		R	3x	110		10	x	
Momentary heat production		R	3x	212	kW	10	x	x
Momentary energy consumption		R	3x	111	kW	10	x	x
Momentary COP		R	3x	112		10	x	x
Running monitoring:								
Compressor running time	K1	R	3x	312	h (32-bit data)[9)]	1	x	x
Compressor start-up counter	K1	R	3x	314	pcs	1	x	x
Compressor running time	K2	R	3x	317	h (32-bit data)[9)]	1	x	x
Compressor start-up counter	K2	R	3x	319	pcs	1	x	x
Electric resistor running time DHW	K6	R	3x	705	h (32-bit data)[9)]	1	x	
Electric resistor start-up counter DHW	K6	R	3x	707	pcs	1	x	
Electric resistor running time	K25/ K26	R	3x	802	h (32-bit data)[9)]	1	x	x
Electric resistor start-up counter	K25/ K26	R	3x	804	pcs	1	x	x
Electric resistor running time	K28/ K29	R	3x	809	h (32-bit data)[9)]	1	x	
Electric resistor start-up counter	K28/ K29	R	3x	811	pcs	1	x	

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	ID	Read/ Write	Register type[1]	Register address	Unit	Resolution (divider)[2]	Device 1 (master)	Devices 2, 3, etc. (slave)
Domestic hot water:								
DHW storage tank temp (upper sensor)	B2	R	3x	701	°C	10	x	
DHW storage tank temp (lower sensor)	B3	R	3x	702	°C	10	x	
DHW storage tank temp (lower sensor) from BAS[7]	B3	R/W	4x	708	°C	10	x	
DHW flow temperature	B38	R	3x	708	°C	10	x	
DHW circulation temperature	B39	R	3x	709	°C	10	x	
DHW temperature setpoint - protect.	B3	R/W	4x	702	°C	10	x	
DHW temperature setpoint - reduced	B3	R/W	4x	703	°C	10	x	
DHW temperature setpoint - comfort	B3	R/W	4x	704	°C	10	x	
DHW operating mode		R/W	4x	701	[4]		x	
DHW flow temperature set point		R/W	4x	705	°C	10	x	
DHW charge hysteresis		R/W	4x	706	K	10	x	
DHW charge set point correction		R/W	4x	707	K	10	x	
DHW mixing valve	TV38	R	3x	713	%	1	x	
DHW circulation pump	Q4	R	3x	714	0=Off / 1=On	1	x	
Writable setpoints for heat pump(s):								
Heat pump operation mode		R/W	4x	105	[5]	1	x	x
Emergency stop		R/W	4x	101	0=Emerg.stop 1=Normal operation		x	x
Setpoint heat pump °C		R/W	4x	104	°C	10	x	
Setpoint heat pump %		R/W	4x	103	%	1	x	
Supply circuit activation		R/W	4x	102	0=Off / 1=On		x	
External free cooling		R/W	4x	106	0=Off / 1=On		x	x
Heat pump switching differential		R/W	4x	111	°C	10	x	
Source pump minimum speed		R/W	4x	331	%	1	x	x
Source pump maximum speed		R/W	4x	333	%	1	x	x
Source circuit temperature difference (dT) setpoint		R/W	4x	335	K	10	x	x
Supply pump minimum speed		R/W	4x	204	%	1	x	x
Supply pump maximum speed		R/W	4x	206	%	1	x	x
Supply circuit temperature difference (dT) setpoint		R/W	4x	208	K	10	x	x
Source circuit temperature setpoint	B91/ B92	R/W	4x	210	°C		x	x
Heating circuit 1:								
Circulation pump	Q2	R	3x	501	0=Off / 1=On	1	x	
Mixing valve	TV1	R	3x	502	%	10	x	
Room temperature	B51	R	3x	503	°C	10	x	
Flow temperature	B1	R	3x	504	°C	10	x	
Setpoint value		R/W	4x	501	°C	10	x	
Reduced setpoint		R/W	4x	502	°C	10	x	
Protection setpoint		R/W	4x	503	°C	10	x	
Normal setpoint		R/W	4x	523	°C	10	x	
Supply water min. value		R/W	4x	504	°C	10	x	
Supply water max. value		R/W	4x	505	°C	10	x	

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	ID	Read/ Write	Register type[1]	Register address	Unit	Resolution (divider)[2]	Device 1 (master)	Devices 2, 3, etc. (slave)
Summer/winter outside temperature setpoint		R/W	4x	506	°C	10	x	
Summer/winter time constant		R/W	4x	507	h	1	x	
Summer/winter setting		R/W	4x	508	[8]	1	x	
Building time constant		R/W	4x	509	h	1	x	
Heating curve – X1		R/W	4x	511	°C	10	x	
Heating curve – Y1		R/W	4x	512	°C	10	x	
Heating curve – X2		R/W	4x	513	°C	10	x	
Heating curve – Y2		R/W	4x	514	°C	10	x	
Heating curve – X3		R/W	4x	515	°C	10	x	
Heating curve – Y3		R/W	4x	516	°C	10	x	
Heating curve – X4		R/W	4x	517	°C	10	x	
Heating curve – Y4		R/W	4x	518	°C	10	x	
Heating curve – X5		R/W	4x	519	°C	10	x	
Heating curve – Y5		R/W	4x	520	°C	10	x	
Supply water min. value		R/W	4x	504	°C	10	x	
Supply water max. value		R/W	4x	505	°C	10	x	
Setpoint correction		R/W	4x	521	K	10	x	
Flow setpoint		R/W	4x	522	°C	10	x	
Heating circuit 2:								
Circulation pump	Q6	R	3x	601	0=Off / 1=On	1	x	
Mixing valve	TV2	R	3x	602	%	10	x	
Room temperature	B52	R	3x	603	°C	10	x	
Flow temperature	B12	R	3x	604	°C	10	x	
Setpoint value		R/W	4x	601	°C	10	x	
Reduced setpoint		R/W	4x	602	°C	10	x	
Protection setpoint		R/W	4x	603	°C	10	x	
Normal setpoint		R/W	4x	623	°C	10	x	
Supply water min. value		R/W	4x	604	°C	10	x	
Supply water max. value		R/W	4x	605	°C	10	x	
Summer/winter outside temperature setpoint		R/W	4x	606	°C	10	x	
Summer/winter time constant		R/W	4x	607	h	1	x	
Summer/winter setting		R/W	4x	608	[8]	1	x	
Building time constant		R/W	4x	609	h	1	x	
Heating curve – X1		R/W	4x	611	°C	10	x	
Heating curve – Y1		R/W	4x	612	°C	10	x	
Heating curve – X2		R/W	4x	613	°C	10	x	
Heating curve – Y2		R/W	4x	614	°C	10	x	
Heating curve – X3		R/W	4x	615	°C	10	x	
Heating curve – Y3		R/W	4x	616	°C	10	x	
Heating curve – X4		R/W	4x	617	°C	10	x	
Heating curve – Y4		R/W	4x	618	°C	10	x	
Heating curve – X5		R/W	4x	619	°C	10	x	
Heating curve – Y5		R/W	4x	620	°C	10	x	
Setpoint correction		R/W	4x	621	K	10	x	
Flow setpoint		R/W	4x	622	°C	10	x	

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	ID	Read/ Write	Register type[1)]	Register address	Unit	Resolution (divider)[2)]	Device 1 (master)	Devices 2, 3, etc. (slave)
Heating circuit 3:								
Circulation pump	Q20	R	3x	1001	0=Off / 1=On	1	x	
Mixing valve	TV3	R	3x	1002	%	10	x	
Room temperature	B53	R	3x	1003	°C	10	x	
Flow temperature	B14	R	3x	1004	°C	10	x	
Setpoint value		R/W	4x	1001	°C	10	x	
Reduced setpoint		R/W	4x	1002	°C	10	x	
Protection setpoint		R/W	4x	1003	°C	10	x	
Normal setpoint		R/W	4x	1023	°C	10	x	
Supply water min. value		R/W	4x	1004	°C	10	x	
Supply water max. value		R/W	4x	1005	°C	10	x	
Summer/winter outside temperature setpoint		R/W	4x	1006	°C	10	x	
Summer/winter time constant		R/W	4x	1007	h	1	x	
Summer/winter setting		R/W	4x	1008	[8)]	1	x	
Building time constant		R/W	4x	1009	h	1	x	
Heating curve – X1		R/W	4x	1011	°C	10	x	
Heating curve – Y1		R/W	4x	1012	°C	10	x	
Heating curve – X2		R/W	4x	1013	°C	10	x	
Heating curve – Y2		R/W	4x	1014	°C	10	x	
Heating curve – X3		R/W	4x	1015	°C	10	x	
Heating curve – Y3		R/W	4x	1016	°C	10	x	
Heating curve – X4		R/W	4x	1017	°C	10	x	
Heating curve – Y4		R/W	4x	1018	°C	10	x	
Heating curve – X5		R/W	4x	1019	°C	10	x	
Heating curve – Y5		R/W	4x	1020	°C	10	x	
Setpoint correction		R/W	4x	1021	K	10	x	
Flow setpoint		R/W	4x	1022	°C	10	x	
Cooling circuit 1:								
Circulation pump	Q24	R	3x	1251	0=Off / 1=On	1	x	
Transfer pump	Q28	R	3x	1252	0=Off / 1=On	1	x	
Mixing valve	TV11	R	3x	1253	%	1	x	
Room temperature		R	3x	1254	°C	10	x	
Flow temperature	B16	R	3x	1255	°C	10	x	
Room humidity		R	3x	1256	°C	10	x	
Comfort setpoint		R/W	4x	1251	°C	10	x	
Reduced setpoint		R/W	4x	1252	°C	10	x	
Protection setpoint		R/W	4x	1253	°C	10	x	
Normal setpoint		R/W	4x	1272	°C	10	x	
Supply water min. value		R/W	4x	1254	°C	10	x	
Supply water max. value		R/W	4x	1255	°C	10	x	
Summer/winter outside temperature setpoint		R/W	4x	1256	°C	10	x	
Summer/winter time constant		R/W	4x	1257	h	1	x	
Summer/winter setting		R/W	4x	1258	[8)]	1	x	
Building time constant		R/W	4x	1259	h	1	x	

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	ID	Read/ Write	Register type[1]	Register address	Unit	Resolution (divider)[2]	Device 1 (master)	Devices 2, 3, etc. (slave)
Heating curve – X1		R/W	4x	1260	°C	10	x	
Heating curve – Y1		R/W	4x	1261	°C	10	x	
Heating curve – X2		R/W	4x	1262	°C	10	x	
Heating curve – Y2		R/W	4x	1263	°C	10	x	
Heating curve – X3		R/W	4x	1264	°C	10	x	
Heating curve – Y3		R/W	4x	1265	°C	10	x	
Heating curve – X4		R/W	4x	1266	°C	10	x	
Heating curve – Y4		R/W	4x	1267	°C	10	x	
Heating curve – X5		R/W	4x	1268	°C	10	x	
Heating curve – Y5		R/W	4x	1269	°C	10	x	
Setpoint correction		R/W	4x	1270	K	10	x	
Flow setpoint		R/W	4x	1271	°C	10	x	
Superheat circuit:								
Superheat pump		R	3x	1101	0=Off / 1=On		x	x
Superheat circuit flow temperature	B36	R	3x	1102	°C	10	x	x
Superheat circuit return temperature	B37	R	3x	1103	°C	10	x	x
Superheat circuit dT		R	3x	1104	K	10	x	x
Superheat tank temperature	B95	R	3x	1105	°C	10	x	x
Superheat circuit setpoint	B3/ B95	R/W	4x	1106	°C	10	x	x
Superheat circuit demand correction		R/W	4x	1107	K	10	x	x
Startup hysteresis		R/W	4x	1108	K	10	x	x
Superheat circuit pump speed	Q35	R	3x	1109	%		x	x
Superheat circuit pump speed	Q35	R	3x	1110	h (32-bit data)[9]		x	x
Superheat circuit pump dT setpoint	Q35	R/W	4x	1112	K	10	x	x
Superheat circuit pump min. speed	Q35	R/W	4x	1113	%		x	x
Superheat circuit pump max. speed	Q35	R/W	4x	1114	%		x	x
Superheat tank elem. heater setpoint	K90	R/W	4x	1115	°C	10	x	x
Superheat tank elem. heater status	K90	R	3x	1116	0=Off / 1=On		x	x
Superheat tank elem. heater start-up counter	K90	R	3x	1118	pcs		x	x
Superheat tank elem. heater op. hours	K90	R	3x	1119	h (32-bit data)[9]		x	x
Superheat circuit flow	FM30	R	3x	1121	l/min	10	x	x
Superheat circuit heating power		R	3x	1122	kW		x	x
Superheat circuit heating energy (cumulative)		R	3x	1123	kWh (32-bit data)[9]		x	x
Superheat circuit tank temp. from upper level automation[7]	B95	R/W	4x	1124	°C	10	x	x

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	ID	Read/ Write	Register type[1)]	Register address	Unit	Resolution (divider)[2)]	Device 1 (master)	Devices 2, 3, etc. (slave)
Alarm registers:								
Alarm status		R	3x	199	[6)]			
Alarm acknowledgement		R/W	0x	101	1=Ack		x	x
DHW storage tank temperature (upper sensor)	B2	R	1x	701	0=Normal 1=Alarm		x	
DHW storage tank temperature (lower sensor)	B3	R	1x	702	0=Normal 1=Alarm		x	
DHW flow temperature	B38	R	1x	708	0=Normal 1=Alarm		x	
DHW circulation temperature	B39	R	1x	709	0=Normal 1=Alarm		x	
Cascade flow temperature	B10	R	1x	901	0=Normal 1=Alarm		x	
System flow temperature	B11	R	1x	805	0=Normal 1=Alarm		x	
Outside temperature	B9	R	1x	101	0=Normal 1=Alarm		x	
Heat circuit 2 flow temperature	B12	R	1x	604	0=Normal 1=Alarm		x	
Heat circuit 3 flow temperature	B14	R	1x	1004	0=Normal 1=Alarm		x	
Common source pump	Q8C	R	1x	903	0=Normal 1=Alarm		x	
Change-over valve	Q3	R	1x	704	0=Normal 1=Alarm		x	x
DHW resistor	K6	R	1x	703	0=Normal 1=Alarm		x	
Electric resistor	K25/ K26	R	1x	801	0=Normal 1=Alarm		x	
Compressor 1 alarm	K1	R	1x	310	0=Normal 1=Alarm		x	x
Compressor 1 feedback alarm	K1	R	1x	311	0=Normal 1=Alarm		x	x
Compressor 2 alarm	K2	R	1x	315	0=Normal 1=Alarm		x	x
Compressor 2 feedback alarm	K2	R	1x	316	0=Normal 1=Alarm		x	x
Expansion valve		R	1x	314	0=Normal 1=Alarm		x	x
Flow temperature heat pump	B21	R	1x	201	0=Normal 1=Alarm		x	x
Return temperature heat pump	B71	R	1x	202	0=Normal 1=Alarm		x	x
Source circuit in	B91	R	1x	301	0=Normal 1=Alarm		x	x
Source circuit out	B92	R	1x	302	0=Normal 1=Alarm		x	x
Hot gas temperature	B81	R	1x	303	0=Normal 1=Alarm		x	x
Evaporator pressure	H82	R	1x	304	0=Normal 1=Alarm		x	x
Condenser pressure	H83	R	1x	305	0=Normal 1=Alarm		x	x

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	ID	Read/ Write	Register type[1)]	Register address	Unit	Resolution (divider)[2)]	Device 1 (master)	Devices 2, 3, etc. (slave)
Source control valve / source pump	Y8/Q8	R	1x	306	0=Normal 1=Alarm		x	x
Suction gas temperature	B85	R	1x	307	0=Normal 1=Alarm		x	x
Charge pump	Q9	R	1x	204	0=Normal 1=Alarm		x	x
Electricity meter communication		R	1x	102	0=Normal 1=Alarm		x	x
Num. IO out of service		R	1x	193	0=Normal 1=Alarm		x	x
Num. IO manual		R	1x	194	0=Normal 1=Alarm		x	x
Fault ext. IO-m.		R	1x	197	0=Normal 1=Alarm		x	x
Communication module changed		R	1x	198	0=Normal 1=Alarm		x	x
Archive full		R	1x	196	0=Normal 1=Alarm		x	x
High alarm		R	1x	191	0=Normal 1=Alarm		x	x
Low alarm		R	1x	192	0=Normal 1=Alarm		x	x
Max. high pressure		R	1x	321	0=Normal 1=Alarm		x	x
Min. high pressure		R	1x	322	0=Normal 1=Alarm		x	x
MOP		R	1x	323	0=Normal 1=Alarm		x	x
LOP		R	1x	324	0=Normal 1=Alarm		x	x
Pressure ratio max.		R	1x	325	0=Normal 1=Alarm		x	x
Pressure ratio min.		R	1x	326	0=Normal 1=Alarm		x	x
Expansion valve open		R	1x	329	0=Normal 1=Alarm		x	x
High pressure detect.		R	1x	327	0=Normal 1=Alarm		x	x
Low pressure detect.		R	1x	328	0=Normal 1=Alarm		x	x
Evaporator temperature		R	1x	330	0=Normal 1=Alarm		x	x
Condensing temperature		R	1x	331	0=Normal 1=Alarm		x	x
Superheat		R	1x	332	0=Normal 1=Alarm		x	x
Inverter communication (LS Control)		R	1x	333	0=Normal 1=Alarm		x	x
Inverter communication (KOSTAL)		R	1x	334	0=Normal 1=Alarm		x	x

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	ID	Read/ Write	Register type[1]	Register address	Unit	Resolution (divider)[2]	Device 1 (master)	Devices 2, 3, etc. (slave)
No pressure change 1		R	1x	335	0=Normal 1=Alarm		x	x
No compressor available		R	1x	336	0=Normal 1=Alarm		x	x
All compressors in alarm		R	1x	337	0=Normal 1=Alarm		x	x
Cascade master communication		R	1x	902	0=Normal 1=Alarm			x
Cascade slave 1 communication		R	1x	904	0=Normal 1=Alarm		x	
Cascade slave 2 communication		R	1x	905	0=Normal 1=Alarm		x	

[1] 0x = Coil
1x = Input status
3x = Input registers
4x = Holding registers
Coil registers (0x) can be read using function code 01 and written using function codes 05 (single) and 15 (multiple).
Discrete inputs (1x) can be read using function code 02.
Input registers (3x) can be read using function code 04.
Holding registers (4x) can be read using function code 03 and written using function codes 06 (single) and 16 (multiple).

[2] The value read from the register must be divided by the number in the resolution column so that the values will be displayed correctly in the monitoring system.

[3] 0 = 1 and 2 off
1 = 1 on and 2 off
2 = 1 off and 2 on
3 = 1 and 2 on

[4] 0 = Auto
1 = Protection
2 = Reduced
3 = Comfort

[5] 0 = Auto
1= Off
2 = ------
3 = Reserve heat

[6] 0 = No alarms
1 = Active alarm(s)
2 = Active acknowledged alarm(s)

[7] The values of certain temperature sensors can be written to the controller from BAS to avoid double sensors.

[8] 0 = Outside temperature
1 = ------
2 = Summer
3 = Winter

[9] 32-bit data format: Unsigned integer, little endian, byte swap

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15 Declaration of conformity

GEBWELL

Vaatimustenmukaisuusvakuutus
Declaration of Conformity
Försäkran om överensstämmelse

Gebwell Oy vakuuttaa omalla vastuullaan, että tuotteet
We, Gebwell Ltd, hereby declare under our sole responsibility that the product
Gebwell Ab försäkrar under eget ansvar att de produkter

Aries heat pump
Qi heat pump
T2 heat pump
T3 heat pump
Gemini heat pump
Taurus heat pump

joita tämä vakuutus koskee, on seuraavien direktiivien ja asetusten mukainen
to which this declaration relates is in conformity with the
som omfattas av denna försäkran är i överensstämmelse med följande direktiv

ELECTROMAGNETIC COMPATIBILITY (EMC) DIRECTIVE 2014/30/EU
LOW VOLTAGE DIRECTIVE (LVD) 2014/35/EU
ECO-DESIGN REQUIREMENTS FOR ENERGY-RELATED PRODUCTS DIRECTIVE 2009/125/EC
RESTRICTION OF THE USE OF HAZARDOUS SUBSTANCES DIRECTIVE (RoHS II): 2011/65/EU
REGULATION (EU) 2017/1369 ON ENERGY LABELLING
(Pressure Equipment Directive (PED) 2014/68/EU shall not apply to this pressurized equipment according to item 2.f.iii in Article 1.)

ja seuraavia yhdenmukaistettuja standardeja ja teknisiä eritelmiä on sovellettu:
and the following harmonised standards and technical specifications have been applied:
och följande harmoniserade standarder och tekniska specifikationer har tillämpats:

LVD:	EN 61439-1:2011 EN 61439-2:2011 EN 61439-3:2012
EMCD:	EN 61439-1 Annex J, Point J.9.4.2
HD:	60364 Low-voltage electrical installations 384 Electrical installations of buildings
	EN 14511

Commission Regulation (EU) No 813/2013 on eco design of space heaters and combination heaters
Commission Delegated Regulation (EU) No 811/2013 on energy labelling of space heaters and combination heaters.

Tuotteilla on CE-vaatimuksenmukaisuusmerkintä.
Products are provided with a CE marking of conformity.
Produkterna är försedda med CE-märkning av överensstämmelse.

Leppävirta 21.4.2021

Janne Rahunen
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