GEBWELL

Installation, operation and maintenance manual

Taurus heat pump

WWW.GEBWELL.COM

Contents

ALWAYS KEEP THE OPERATING MANUAL IN THE IMMEDIATE VICINITY OF THE DEVICE!

Carefully study the manual before installing, adjusting or maintaining the device. Observe the instructions provided. Request a technician to fill out the Commissioning and Warranty Protocoll, which must be returned to the device manufacturer. The protocoll is a requirement for maintaining the validity of the manufacturer's warranty.

Fill out the information below. This information must be available if the device experiences any failures.

Model:	Serial number:
HVAC company:	Name:
Date:	Tel.:
Electrician:	Name:
Date:	Tel.:

1 WARRANTY

Gebwell Ltd.

Patruunapolku 5, 79100 LEPPÄVIRTA, tel 020 1230 800, info@gebwell.fi

issues the product,

Taurus heat pump

a warranty regarding manufacturing and material faults, with the following contents.

Warranty period and start date

A two- (2) year warranty will be issued to this product, counting from the product delivery date.

Two copies of the commissioning and warranty protocol will be delivered with the heat pump. The installer / reseller of the heat pump fills the said protocol in and goes over it with the customer. Both Parties confirm they have gone over the protocol and accept the terms of warranty with their signature. The customer's copy of the warranty protocol must be stored and presented on request. The other copy must be delivered to the factory within 1 month from the product commissioning date. The warranty is not valid in case the commissioning and warranty protocol has not been filled in correctly, or if the factory copy has not been returned to the factory.

Warranty contents

The warranty extends to all manufacturing and raw material faults that have occurred in this product during the warranty period, as well as the direct expenses related to the changing of these devices.

The buyer is responsible for any device malfunctions caused by the storage conditions between the delivery and commissioning date (cf. installation, operating and maintenance manual; storage).

5-year component warranty

In addition to the normal product warranty, a five- (5) year component warranty will be issued to the heat plate exchangers, starting from the product delivery date.

The component warranty does not extend to the direct or indirect expenses caused by the changing of a component. Otherwise, all terms and limitations of the product warranty apply for the component warranty, as well.

Warranty limits

The warranty does not extend to the expenses (travel, power consumption, etc.) caused by a malfunctioning device, the buyer's production loss, loss of earnings or other indirect expenses.

This warranty has been given on the condition that the product is working in normal operating conditions, and that the operating instructions are followed carefully. The liability of the guarantor is limited according to these terms and conditions, and the warranty does not extend to such damage as the product may cause to another item or person.

The warranty does not extend to direct personal injuries or damage to property caused by the delivered product.

The warranty presupposes that the installation has followed all valid regulations, generally accepted methods of installation and installation instructions given by the manufacturer of the product.

The warranty does not extend to or is not valid in case the product is used in any other way than required by the sizing.

The customer is obliged to perform a visual check on the product before the installation, and it is not allowed to install a product that is clearly faulty

The warranty does not cover malfunctions, which have been caused by

- the transportation of the product
- the carelessness of the product operator, the overload of the product, the failure of adhering to the operating instructions or maintenance
- circumstances beyond the guarantor's control, such as voltage fluctuations (the maximum range of voltage fluctuations is +/- 10%), lightning, fire or accidents other than those caused by the repair work, maintenance or structural changes done by authorised resellers
- product installation or positioning on the operating site, which is in contradiction with the installation, operating and maintenance manual, or otherwise incorrect.

The warranty does not extend to the repair of defects that are insignificant as far as the product's operating condition is concerned, such as surface scratches. The warranty does not extend to the normal adjustments of the product as outlined in the operating manual, operation training visits, maintenance and cleaning measures, or such work which is caused by the neglect of safety or installation regulations or the settlement of this on the installation site.

The warranty terms outlined in the joint recommendation of the Association of Finnish Metal and Engineering Industries and the Finnish Competition and Consumer Authority are observed to such an extent which has not been separately mentioned above.

The warranty becomes void, if the product is

- repaired or altered without Gebwell Ltd.'s permission
- used for a purpose, for which it has not been intended
- stored in a humid or otherwise unsuitable location (cf. installation, operating and maintenance manual).

What to do if a malfunction occurs

If a malfunction occurs during the warranty period, the customer must immediately (normally within 14 days) notify the authorised Gebwell reseller from whom the product was bought. The notification must include which product has malfunctioned (product model, serial number), the details of the malfunction in as much detail as possible, as well as the circumstances when the malfunction has developed and/or occurs. The warranty form, correctly filled in at the handover time, must be submitted on request. Appealing to a warranty-period notification is not valid after the warranty period is over, unless the notification has been submitted in writing during the warranty period.

The notification must be submitted immediately after the malfunction has been discovered. If the notification is not submitted immediately once the buyer has noticed the malfunction, or when the buyer should have noticed the malfunction, the buyer loses the right to appeal to this warranty.

Maintenance service in Finland

Maintenance work for this product, during the warranty period and after the warranty period, is performed by the maintenance organization authorised by the manufacturer, throughout the entire estimated economic life of the heat pump.

How to submit a service request

All warranty repairs, service requests and orders for spare parts will primarily be submitted directly to the authorised Gebwell reseller that sold/delivered the product. Before submitting a service request, the following things must be taken into consideration:

- read the installation, operating and maintenance manual carefully and think whether you have used the device in accordance with the instructions in the manuals
- before submitting a warranty repair request, ensure that the warranty period is still valid, read the warranty terms carefully and find out the product's model and serial numbers
- all parts belonging to a device must be included when the device is returned
- the returned product must be closed in such a way, that handling it would not cause health or environmental hazards.

A device replaced on the basis of the warranty is the property of the device manufacturer. Gebwell Ltd. reserves the right to decide how, where and who will perform the repair work or change that is at the manufacturer's responsibility.

Gebwell Ltd. is not liable for the breakdown of a wrongfully installed device.

The device can only be repaired by a professional. Incorrect repair work and settings can cause danger for the user, the malfunction of the device, and weaken the efficiency of the device. The visit of a retailer or a service agent is not free of charge even during the warranty period, in case the device has to be repaired due to incorrect installation, repair or adjustment.

2 INSTALLATION RECORD

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

The installation record should be completed before the equipment is handed over to the end-user. A completed installation record is a precondition for the validity of the warranty.

Inspected	Description	Comment
	COLLECTOR:	
	Circulation direction checked	
	System pressure-tested	
	System rinsed	
	System bled	
	Fluid quantity in the collector	
	Filter emptied	
	Expansion tank	
	Initial pressure of expansion tank (0.5 bar or as planned)	
	Filter / flow direction	
	Safety valve	
	Stop valve	
	Collector length loop 1, length: _____ m	
	Collector length loop 2, length: _____ m	
	Collector length loop 3, length: _____ m	
	Collector length loop 4, length: _____ m	
	Collector length loop 5, length: _____ m	
	Collector length loop 6, length: _____ m	
	Collector length loop 7, length: _____ m	
	Collector length loop 8, length: _____ m	

Inspector _____ Date _____.

	HEATING SYSTEM:	
	System filled	
	Accumulator coil filled / bled (coil accumulator)	
	System pressure-tested	
	System rinsed	
	System bled	
	Safety valve	
	Diaphragm expansion tank	
	Initial pressure of diaphragm expansion tank	
	Filter	
	Pressure measuring device	
	Stop valve	
	Filling valve	
	Buffer accumulator	
	Heating circuit control set	
	Circulation water pumps	
	Rotation direction of pumps	
	Actuators	

Inspector _____ Date _____.

	DOMESTIC HOT WATER:	
	System filled	
	System pressure-tested	
	System rinsed	
	Safety valve	
	Pressure measuring device	
	Buffer accumulator	
	Hot water circulation	

Inspector _____ Date _____.

Inspected	Description	Comment
	ELECTRICITY:	
	Building fuses	
	Heat pump fuses	
	Phase sequence	
	Power supply	
	Regulation groups	
	Supply water sensors	
	Outdoor temperature sensor	

Inspector Date .

	CONTROLLER:	
	Comfort setting value	
	Heating curve gradient	
	Minimum setting value for supply water to the heating circuit	
	Maximum setting value for supply water to the heating circuit	
	Setting value for domestic hot water	
	Heat pump switching difference	

Inspector Date .

	GENERAL:	
	Wiring in accordance with the installation instructions	
	Connection seals	
	Device started up in accordance with the instructions	
	Operation of the machine monitored on site for 30 minutes	

Inspector Date .

	GUIDANCE FOR THE END USER:	
	Adding fluid to the collector	
	Increasing the pressure of the heating system	
	Setting the heating regulation curve	
	Changing the room temperature using the controller	

Inspector Date .

3 INFORMATION ABOUT THE OPERATING INSTRUCTIONS

These operating instructions are a part of the heat pump.

- Read the operating instructions before you use or adjust the heat pump. Always follow the instructions. It is particularly important to read the chapter on safety.
- Keep the operating instructions near the heat pump and give them to the next owner.
- If you have any questions or if any of the instructions are unclear, contact the device manufacturer or local partner.
- Take note of all reference documents and comply with them.

4 SAFETY

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

- Only use the heat pump if it is in good technical condition, and only use if for its intended purpose.
- Heed the warnings and follow these operating instructions.
- Always turn off the device by the main switch before performing any maintenance.
- Never jeopardise safety by bypassing safety devices.
- Maintenance and repairs must only be performed by a qualified person.
- The heat pump must not be rinsed with water.

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

5 HEAT PUMP OPERATING INSTRUCTIONS

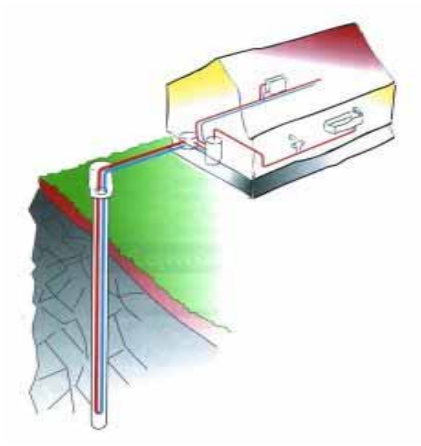
5.1 General

The Gebwell Taurus is a complete heat pump that saves energy and offers efficient technical features. The heat pump system is well designed and correctly proportioned, with low operating costs and good energy efficiency. The heat pump enables you to efficiently heat your indoor air and domestic hot water. In the summer, the system can also cool indoor air in an environmentally friendly way.

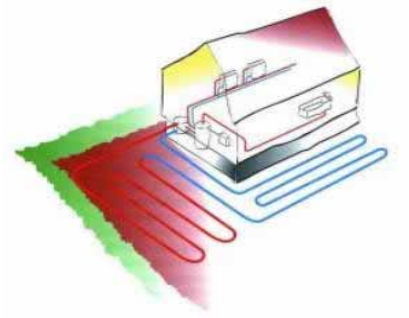
5.2 Heat from the ground

The ground source heat pump collects heat from the ground and brings it into the building. Heat can be collected using a collector, which is embedded in a bored well, installed close to the soil surface, or anchored to the bottom of a body of water.

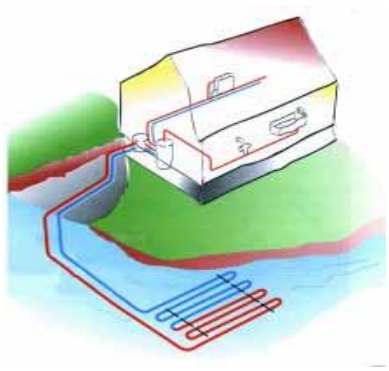
Bored well as a heat source



Soil as a heat source



Bodies of water as heat sources



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

www.gebwell.fi

www.sulpu.fi

5.3 Ground source cooling

The low temperature of brine can also be utilised for domestic cooling. In the summer, free refrigeration energy can be transferred from the ground using only a soil solution pump. The ground source heating system can be connected to the ventilation fan convector or a floor heating/refrigeration system designed for cooling.

5.4 Heat pump's operating principle

There are four main components in the heat pump's refrigerant circuit:

- Evaporator
- Compressor
- Condenser
- Expansion valve
- Superheater (model S)

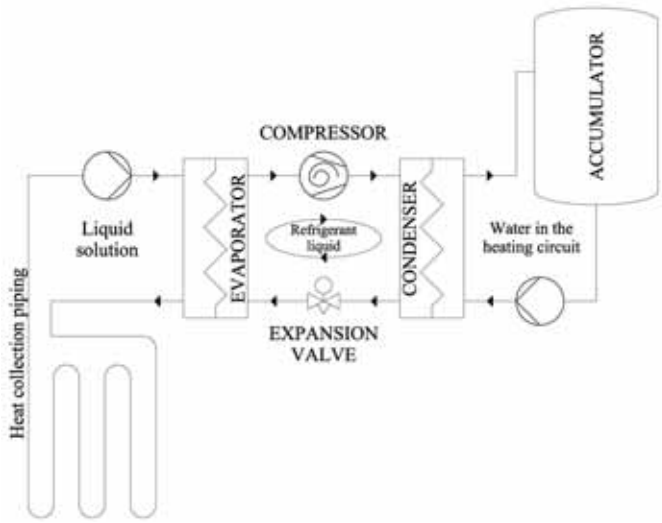
Heat from the soil is absorbed by the fluid solution circulating in the heat collection pipe network.

The heat pump's evaporator enables heat absorbed from the ground to be transferred into the refrigerant, which boils when it heats up and turns into a gas. The fluid solution returns to the ground approximately 3°C cooler than when it came. The fluid solution entering the heat pump can be no colder than -5°C.

In the compressor, the refrigerant gas is compressed, causing the pressure and temperature to rise. The refrigerant also absorbs the heat energy created by the compressor's work.

The warm refrigerant is transferred into the condenser. In the condenser, the heat energy in the refrigerant is transferred to the water circulating in the house's heating system. The refrigerant condenses into a liquid state as it loses heat energy.

The pressure of the refrigerant remains high as the refrigerant is transferred to the expansion valve. The refrigerant's pressure decreases in the expansion valve. The refrigerant is transferred from the expansion valve to the evaporator, where it turns back into a gas and absorbs heat energy from the fluid solution circulating in the heat collection pipe network.



5.5 Heating functions

Domestic hot water

The heat pump outputs domestic hot water on the basis of the B3 measurement sensor. The domestic hot water switching difference is 5 degrees. By default, the compressor starts up when the measurement falls below +50°C and shuts off when the measurement reaches +55°C.

Heating

The heat pump outputs heating water directly into the building's heating network in accordance with a setpoint determined by the outdoor temperature and the set heating curve. An automatic control function initiates charging on the basis of the imputed setpoint for return water provided by the controller and the return water measurement (B71). The heat pump's *return water switching difference (2840)* setting determines the compressor's start-up and shut-off points. When the return water measurement falls below the setpoint by half of the *return water switching difference*, the compressor starts up. The compressor shuts off when the return water measurement reaches the setpoint + half of the *return water switching difference.* The automatic function reduces temperature rises occurring above the condenser in the return water setpoint.

Example: Return water switching difference (2840) 6°C. Setting value for supply water: 30°C. Condenser temperature difference Δt 6 K.

Charging initiates when the return water measurement (B71) reaches 21°C. Charging stops when the return water measurement value is 27°C. The heat pump's charging pump always rotates when in heating use.

Mix heating circuit:

The setpoint for supply water in the heating circuit is determined in accordance with the outdoor temperature measurement and the set heating curve. The controller controls the three-way mixer valve, keeping the temperature of the heating circuit's supply water at the setpoint.

5.6 Tips for saving

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

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.

IMPORTANT:

Floor 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 by causing more electrical energy to be consumed. Thermostats are only intended for adjustments due to "free heat" (from the sun, people, fireplaces, etc.)

6 DELIVERY AND HANDLING

6.1 Delivery contents

- Taurus heat pump
- Outdoor temperature sensor
- Instructions for installation, commissionuing and maintenance
- Spare seals
- 3 external temperature sensors
- Outdoor temperature sensor (B9)
- Domestic hot water accumulator sensor (B3)
- Supply water sensor (B10)

6.2 Optional accessories

- Change-over valve
- Room sensor
- Valve group for the collector
- Pump heating circuit
- Heating control group
- Refrigeration control group
- Remote connection, SMART WEB
- Domestic hot water buffer accumulator
- Heating buffer accumulator
- Domestic hot water control group
- Domestic hot water charging package
- Pool heating series
- Diaphragm expansion tank for the collector
- Diaphragm expansion tank for heating
- Energy measurement
- Control of a solid fuel boiler
- Control of additional heat sources
- Control of refrigeration

6.3 Storage

Before installation, the heat pump should be stored in its shipping package in a warm, dry place.

6.4 Transport

The heat pump can be tilted temporarily but it must not be left in a slanted position for long periods, even during transportation. The maximum tilt angle for the heat pump is 45°. The heat pump must not be turned on its side. If it is necessary to tilt the heat pump, the heat pump must be left in the vertical position for at least two hours before activation to ensure that the lubricating oil in the compressor flows into the right place. The heat pump can be transported to the installation location on a pallet or on a pallet jack without a pallet.

NOTE: The heat pump is tall, so the risk of it falling over is higher than normal. Transport the device to the installation location with care and support the device during transportation.

6.5 Removal of package and transport to final installation location

The product is packaged in protective plastic on a pallet. The device is attached to the pallet by the grooves for the levelling feet on the base of the device. Remove the wooden brackets before lifting the device into the installation location.

- Ensure that you have received the correct product with the correct accessories.
- Remove the packaging material and check that the heat pump was not damaged during transportation before you install it. Notify the freight forwarder of any damage during transportation.
- Place the heat pump near the intended installation location.
- Lift the heat pump off the shipping platform.
- During the lifting phase, fit the levelling feet into the levelling foot grooves. The levelling feet are in the lowest compressor space in the supply box.
- Adjust the heat pump so it is horizontal and stable.
- Make sure the frame is not in contact with the building's structures, with the exception of the levelling feet.
- Remove the machine unit's shipping supports from the compressor base.

6.6 Heat pump placement

In the placement of the heat pump must a few factors related to safety, convenience and serviceability be taken into account.

The temperature of the placement location must be between +5°C and +30°C. The installation space must be adequately ventilated. Water condenses on the cold sections of pipe in the collector if the space is very humid.

The heat pump's compressor generates a noise that can be carried by the house's structures into other areas far away. It is advisable to use flexible components for pipe connections. The heat pump should be placed 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, and additional rubber cushioning can be fitted beneath the heat pump's feet. We recommend placing the heat pump in a separate utility services room. 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.

When facing heat pump's control unit, a service space of 1000 mm should be left on left side of the heat pump. For the same reason, the device must not be installed below the floor surface. 800 mm of space should be left clear in front of the device's control unit. 20 mm of space should be left clear behind the heat pump to prevent vibrations from being transmitted onward.

Two Taurus heat pumps installed with control units facing same direction

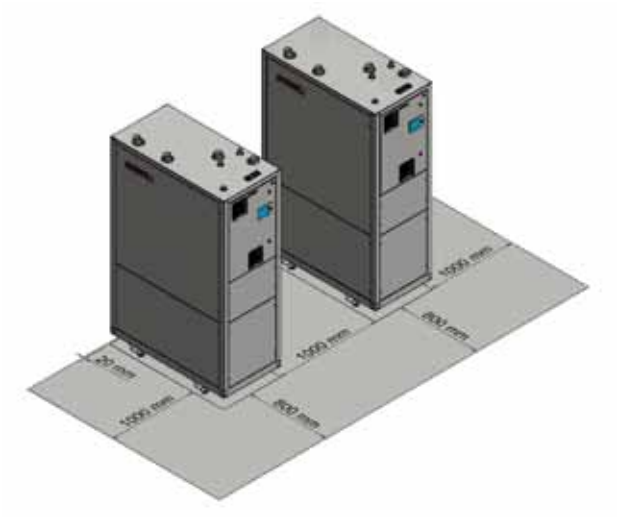
Two Taurus heat pumps can be installed can be installed side-by-side.

If the heat pumps are installed so that the control units are facing the same direction, a service space of 1000mm should be left between the heat pumps as well as on both sides of the heat pump pair.

Two Taurus heat pumps with control units facing opposite direction

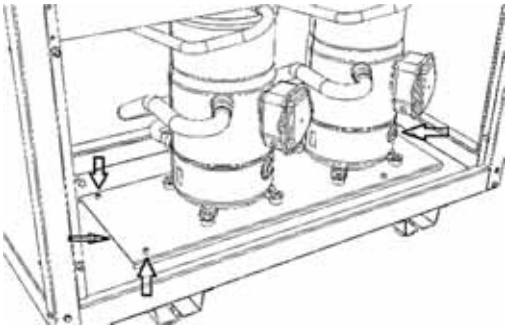
If the two heat pumps can be installed so that the control units face opposite directions, the heat pumps can be installed next to each other with a space of only 50mm between them. On other

sides of the heat pump pair a service space of 1000mm should be left.

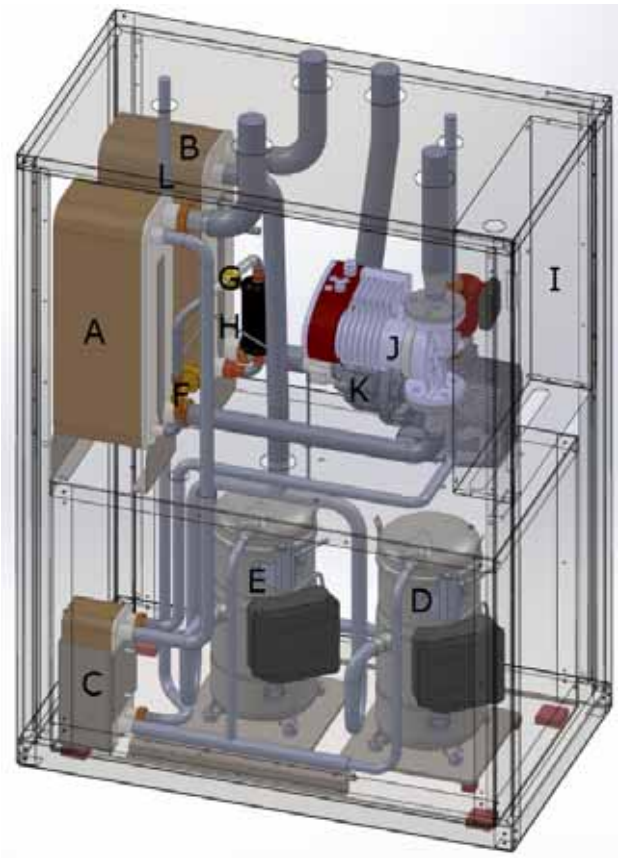


Removing the shipping supports:

Open the device's lower side sheet from one side. Open and remove two locking bolts (the arrows in the image) and remove the wooden plugs from both ends of the compressors.



7 HEAT PUMP STRUCTURE



A. Condenser
B. Evaporator
C. Superheater
D. Compressor 1, K1
E. Compressor 2, K2
F. Expansion valve
G. Fluid glass
H. Filter
I. Control unit
J. Charging pump, Q9
K. Source pump, Q8
L. Superheating pump, Q33 **

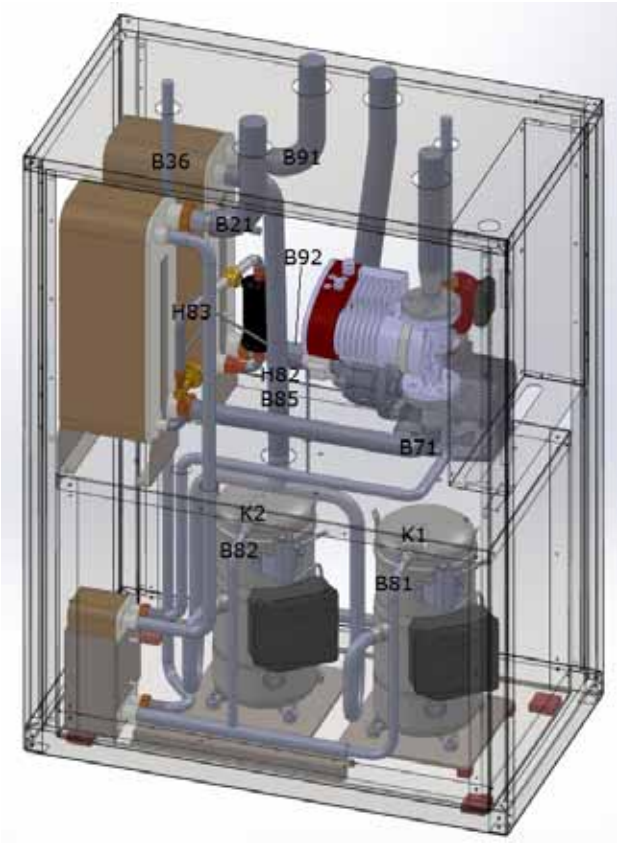
Only in the *Gebwell Taurus 90S*

7.1 Control unit

TC1	Controller, Heat pump
TC2	Controller, Additional unit (AVS)
TC3	Controller, Expansion valve
L1,L2,L3,N,PE	Power supply connections
Q1	Main switch
F1	Motor circuit breaker, compressor K1
F2	Motor circuit breaker, compressor 2 K2
F3	Motor circuit breaker, source pump Q8
F4	Circuit breaker controller / control
F5	Circuit breaker charging pump Q9

F6	Circuit breaker Superheating pump Q33
f 200 mA	Fuse battery + glass pipe 20 mm 200 mA
K1	Status information, Soft starter 1
K2	Status information, Soft starter 2
K5	Relay, Heating circuit pump Q2 (s/s)
K8	Contactor, Source pump Q8
K9	Relay, Charging pump Q9
K10	Alert relay
U1	Soft starter, Compressor 1
U2	Soft starter, Compressor 2
T4	Transformer 230 V/24 V AC expansion valve controller
MB1	Modbus cellular data card
BAT 1	Backup power source for the expansion valve

7.2 Sensor placement



7.3 Sensors

Inside the heat pump:

B81	Hot gas sensor, compressor 1
B82	Hot gas sensor, compressor 2
B91	Collector input sensor
B92	Collector output sensor
B21	Heat pump supply water sensor
B71	Heat pump return water sensor
B85	Intake gas sensor
B36	Superheating supply water sensor
H82	Suction pressure transmitter
H83	High-pressure transmitter

External sensors:

B9	Outdoor temperature sensor
B10	Common supply water sensor

Accumulator sensors:

B3	Domestic hot water accumulator
B4	Additional accumulator 1 (upper)
B41	Additional accumulator 2 (lower)

Heating circuit sensors:

B1	Supply water temperature sensor 1
B12	Supply water temperature sensor 2
B14	Supply water temperature sensor 3

Room sensors:

B5	Room sensor 1
B52	Room sensor 2
B53	Room sensor 3

Other sensors:

B13	Swimming pool sensor
B16	Refrigeration supply water sensor
B22	Solid fuel boiler sensor
B38	Domestic hot water consumption sensor

7.4 Pumps

Inside the heat pump:

Q8	Source pump
Q9	Charging pump
Q33	Superheating pump

Heating circuit pumps:

Q2	Heating circuit pump 1
Q6	Heating circuit pump 2
Q20	Heating circuit pump 3

Domestic hot water pumps:

Q4	Domestic hot water circulation pump
Q34	Domestic hot water heat exchanger charging pump

Other pumps:

Q10	Solid fuel boiler pump
Q19	Swimming pool pump
Q24	Cooling circuit pump

7.5 Controller valves

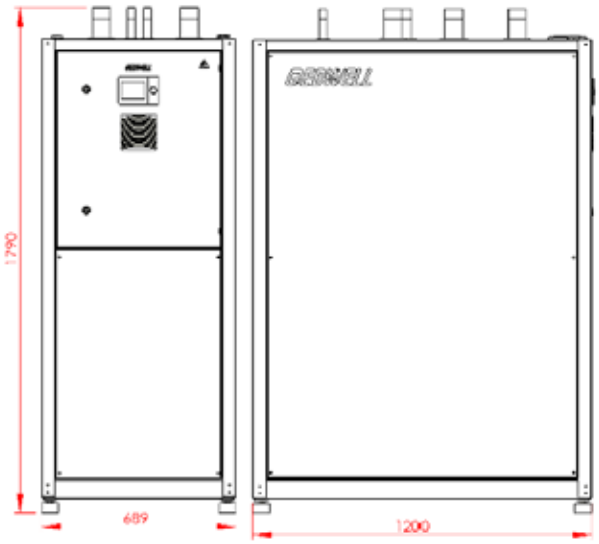
Y1 / Y2	Heating circuit 1 (open/closed)
Y5 / Y6	Heating circuit 2 (open/closed)
Y11 / Y12	Heating circuit 3 (open/closed)
Y23 / Y24	Cooling circuit (open/closed)
Y33 / Y34	Domestic hot water (open/closed)

7.6 Other controls

Q3	Domestic hot water change-over valve
Y21	Refrigeration change-over valve
Y28	Refrigeration pump/change-over valve

8 DIMENSIONS AND PIPE CONNECTIONS

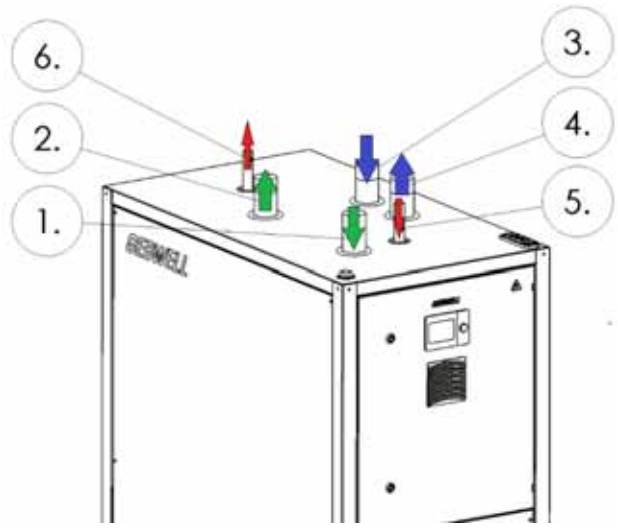
8.1 Heat pump dimensions



8.2 Pipe connections

1	Charging circuit return (inbound)	G2” external thread
2	Charging circuit supply (outbound)	G2” external thread
3	Collector return (inbound)	G2” external thread
4	Collector supply (outbound)	G2” external thread
5	**Superheating return (inbound)	G1” external thread
6	**Superheating supply (outbound)	G1” external thread

** Superheating circuit only in the *Taurus 90S*



9 PIPE INSTALLATION

Pipes should be installed in accordance with the general instructions and regulations in the HVAC industry.

9.1 Collector

The heat pump has an internal source pump. The source pump is a constant speed pump and the flow rate is regulated by the line controller valve. The dimensions of the source pump should be inspected before the device is installed. If the source pump’s flow rate and lifting height do not correspond to the design values, the system must be equipped with an external booster pump. The pump’s output curves are shown in the chapter of the manual entitled *Circulation pump details.*

The heat pump’s collector is not equipped with stop valves – they can be installed in the vicinity of the device to facilitate servicing.

A line controller valve should be installed in the collectors to enable the network to be stabilised. The collector should be stabilised after the system is bled when the circuit is ready to operate.

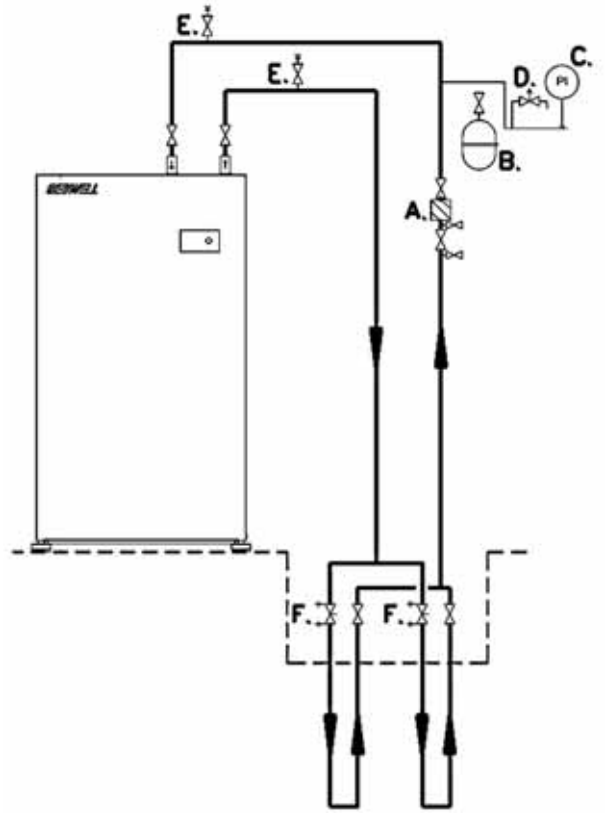
The collecting pipe network should steadily rise towards the heat pump to prevent air pockets. If this is not possible, venting valves should be installed at the high points.

- Take the following into consideration when installing the collector:
- Only connecting components designed for cold conditions should be used in the collector
- Install stop valves in pipe connections as close to the heat pump as possible
- We recommend using flexible components as connecting parts for the heat pump’s collector
- A filter (waste collector) should be installed on the line entering the collector in accordance with the standard connecting pattern.
- Install a filter on both sides of the stop valves to facilitate cleaning of the filter
- Bracket the collecting pipes directly outside the heat pump. The brackets inside the heat pump cannot withstand external pipe loads.
- Use rubber-insulated brackets for pipes
- Record the collector fluid and the alcohol concentration of the fluid in the manual’s installation record
- Make sure that the top of the heat pump and the electrical equipment are entirely free of water during operation
- The collector must be pressure-tested with 3 bars of pressure and the test pressure must be sustained for at least 30 minutes
- Insulate all of the collecting pipes in the building using closed-cell insulation to prevent condensation
- Before installing the heat pump, rinse the pipe network to remove any impurities that may remain after insulation

Collector connection examples:

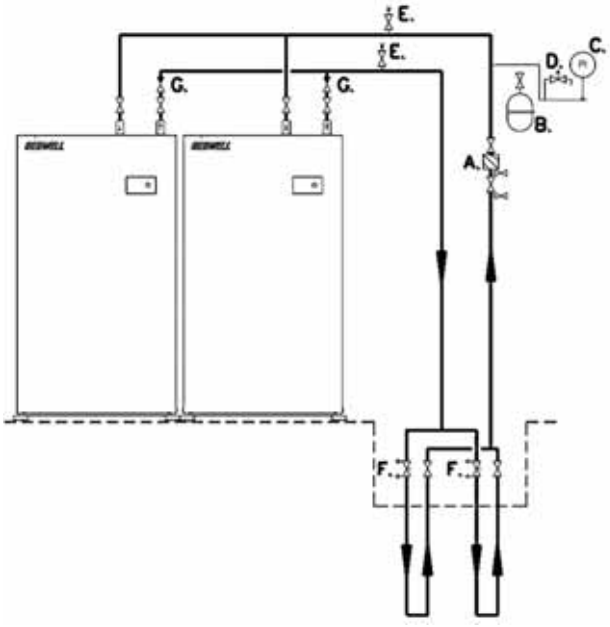
A. Filter
B. Diaphragm expansion tank
C. Pressure measuring device
D. Safety valve
E. Venting valve
F. Line controller valve
G. Non-return valve (one-way valve)

1 heat pump:



2 or more heat pumps:

Non-return valves (one-way valves) should be installed in the collector to prevent fluid from circulating in the wrong direction.



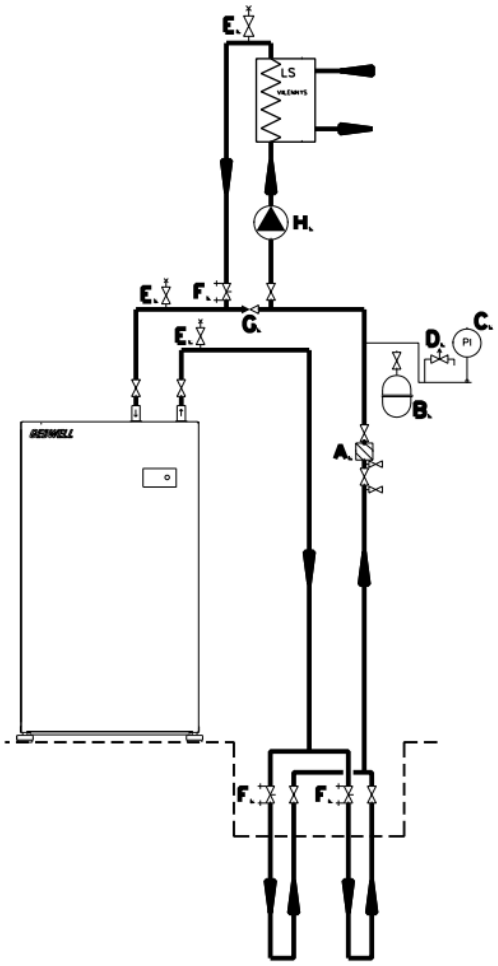
GROUND SOURCE COOLING CONNECTION

Ground source 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.

Take the venting of the collector into consideration when installing cooling. Air within the collector should be allowed to freely rise to the highest point in the circuit. 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 collector, venting should take place via the radiator.

Refrigeration can be controlled/regulated using a refrigeration accessory available for the heat pump. Building automation or ventilation machines can also control the heat pump's internal source pump. See the section entitled *Controlling cooling* for further instructions.

A. Filter
B. Diaphragm expansion tank
C. Pressure measuring device
D. Safety valve
E. Venting valve
F. Line controller valve
G. Non-return valve (one-way valve)
H. Pump for the primary cooling circuit



9.2 Charging circuit (condenser circuit)

The heat pump has an internal charging circuit pump. The charging pump is frequency-controlled, regulated in accordance with the condenser's temperature difference to keep the temperature difference within the setpoint s. The charging pump's display shows the charging circuit's flow rate and lifting height.

See below for connection alternatives for the charging circuits or refer to the specific diagrams.

The heat pump's charging circuit is not equipped with stop valves – they can be installed in the vicinity of the device to facilitate servicing.

Take the following into consideration when installing the charging circuit:

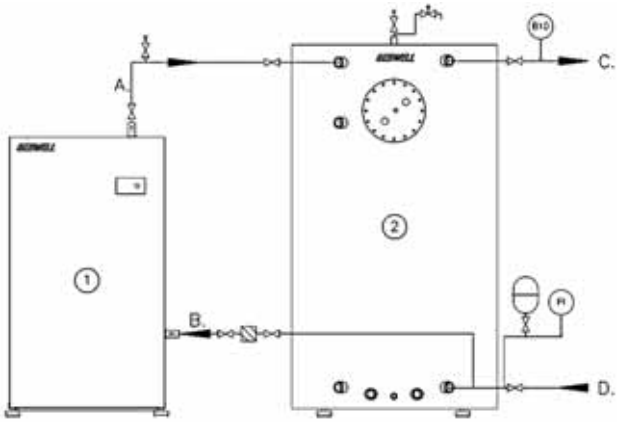
- Install stop valves as close to the heat pump as possible
- We recommend using flexible components as connecting parts for the heat pump's charging circuit
- Install the required protective devices (safety valves), filter (waste collector), stop and non-return valves.
- Before installing the heat pump, rinse the pipe network in the building's heating system to remove any impurities that may remain after installation.
- 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.
- The product must be protected from overpressure using a safety valve. The maximum pressure is stated in the technical table in the manual.
- The safety valve overflow pipe must be led 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.
- If the device is connected to a system equipped with thermostats, a bypass valve should be installed in the system or a minimum flow to the device should be ensured by other means. The minimum flow to the device is stated in the technical table in the manual.

CHARGING CONNECTIONS:

Heat pump, no superheater_HEATING

1. Heat pump
2. Heatinging accumulator
A. Charging supply
B. Charging return
C. Heating supply
D. Heating return

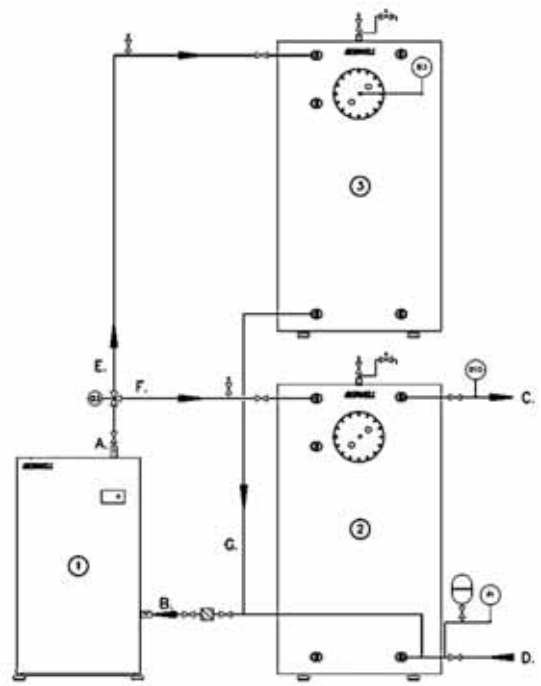
B10 Supply water sensor



Heat pump, no superheater_HEATING/DOMESTIC HOT WATER

1. Heat pump
2. Heatinging accumulator
A. Charging supply
B. Charging return
C. Heating supply
D. Heating return
E. Charging supply_domestic hot water
F. Charging return_heating
G. Charging return_domestic hot water

B10 Supply water sensor
B3 Domestic hot water accumulator sensor
Q3 Change-over valve

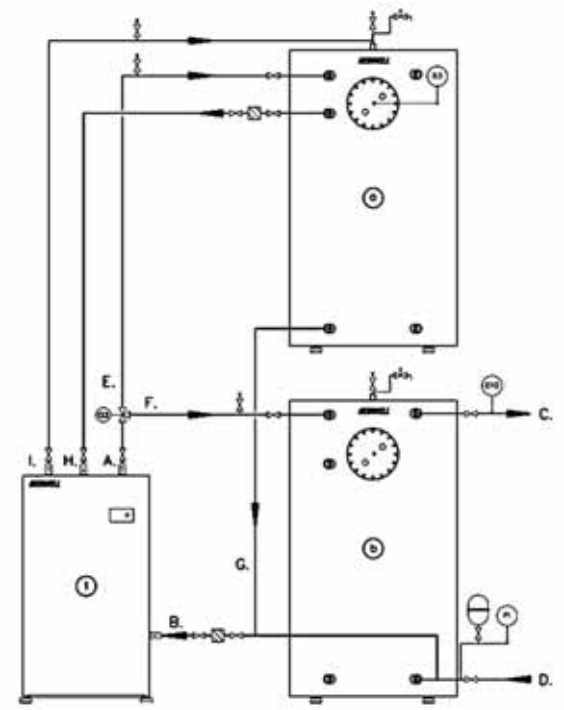


Heat pump, no superheater_HEATING/DOMESTIC HOT WATER

1. Heat pump
2. Heatinging accumulator
A. Charging supply
B. Charging return

C. Heating supply
D. Heating return
E. Charging supply_domestic hot water
F. Charging supply_heating
G. Charging return_domestic hot water
H. Superheating supply
I. Superheating return

B10 Supply water sensor
B3 Domestic hot water accumulator sensor
Q3 Change-over valve



9.3 Superheating circuit (only in the Taurus 90S)

The superheating circuit is only in the Taurus 90S model. The heat pump has an internal superheating discharge shifter and a separate superheating circuit pump. The superheating pump is frequency-controlled, regulated in accordance with the temperature of the superheater's supply pipe and the domestic hot water accumulator.

Refer to the specific designs for the connection of the superheating circuit.

The superheating circuit can be used to heat domestic hot water and for other purposes.

The heat pump's superheating circuit is not equipped with stop valves – they can be installed in the vicinity of the device to facilitate servicing.

Take the following into consideration when installing the charging circuit:

- Install stop valves as close to the heat pump as possible
- We recommend using flexible components as connecting parts for the heat pump's superheating circuit
- Install a filter (waste collector) on the return water side of the heat pump. It is advisable to install stop valves on both sides of the filter to facilitate servicing
- If the superheating circuit has a different water capacity than the charging circuit, a separate diaphragm expansion tank should be installed for the superheating circuit
- Make sure that the top of the heat pump and the electrical equipment are entirely free of water during operation.
- The product must be protected from overpressure using a safety valve. The maximum pressure is stated in the technical table in the manual.
- The safety valve overflow pipe must be led 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.

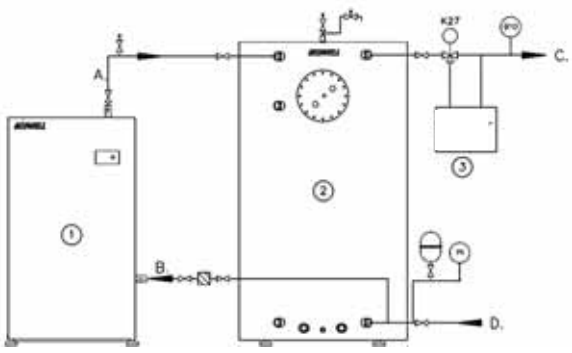
9.4 External additional/backup heat source

Additional heat control, available as an accessory, is required to control the additional heat source. "Additional heat source" refers to a secondary heat source that generates additional heat/power in heat pump hybrid systems. Potential heat sources include oil burners, electric boilers, district heating or natural gas. The heat pump's controller directly controls the addition source using 0–10 V control messages or relay control. If the additional source is controlled by relay control (K27), regulation should take place using 0–10 V regulation messages, using either the circulation pump or a controller valve. The B10 supply water sensor acts as the regulation sensor for the additional heat source. Control of the additional heat source requires the controller's commissioning.

Heat pump_Additional heat source_HEATING

1. Heat pump
2. Heatinging accumulator
3. Additional heat source
A. Charging outbound (supply)
B. Charging inbound (return)
C. Heating supply
D. Heating return

B10 Supply water sensor
B3 Domestic hot water accumulator sensor
Q3 Change-over valve
K27 Additional heat controller valve



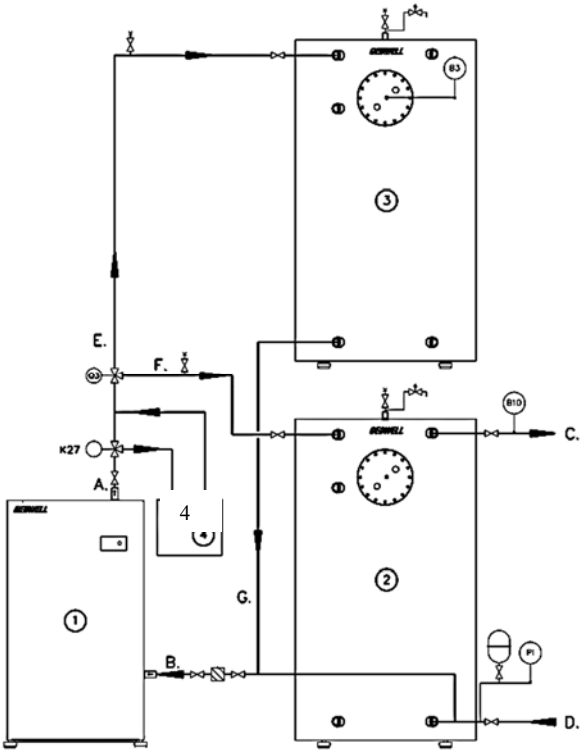
Heat pump_Additional heat source_HEATING/DOMESTIC HOT WATER

An additional heat source can be connected after the ground heat pump and before the change-over valve. This enables the additional heat source to be used for charging both heating and

domestic hot water. Regulation of the additional heat source can be implemented using an adjustable pump control unit, an adjustable additional heat source or a 3-way mixing valve with 0–10 V control.

1. Heat pump
2. Heatinging accumulator
3. Domestic hot water accumulator
4. Additional heat source
A. Charging outbound (supply)
B. Charging inbound (return)
C. Heating supply
D. Heating return
E. Charging outbound (supply)_domestic hot water
F. Charging outbound (supply)_heating
G. Charging inbound (return)_domestic hot water

B10 Supply water sensor
B3 Domestic hot water accumulator sensor
Q3 Change-over valve
K27 Additional heat controller valve



9.5 Domestic hot water system connections

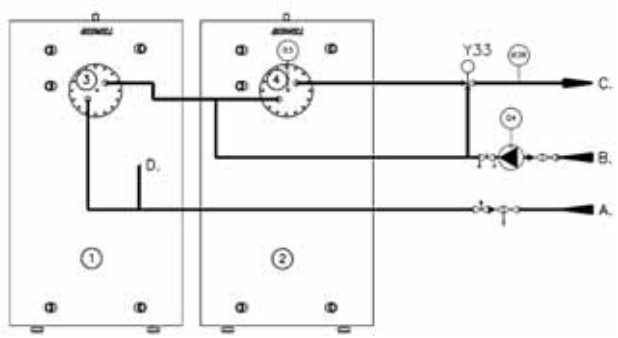
The domestic hot water system should be equipped with a safety valve (max. 10 bar) and it should be installed in the inbound cold water pipe. We recommend that the safety valve overflow pipe be led to the nearest floor drain. The overflow pipe should be installed in such a way that water is able to flow out of the overflow pipe unobstructed.

The domestic hot water safety valve 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.

Two accumulators_domestic hot water coils

1. Heatinging accumulator
2. Domestic hot water accumulator
3. Domestic hot water preheating coil
4. Domestic hot water superheating coil
A. Cold water
B. Hot water circulation
C. Domestic hot water
D. Filling the heating network

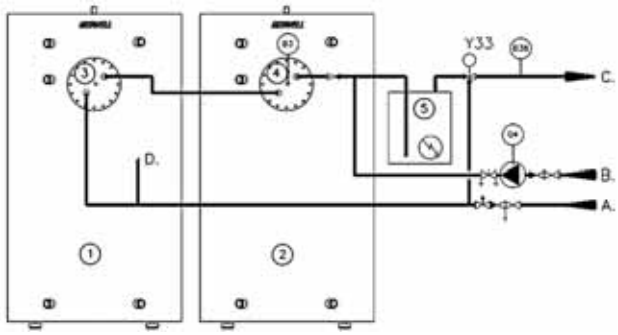
B3 Domestic hot water accumulator sensor
B38 Domestic hot water consumption sensor
Q4 Hot water circulation water pump



Two accumulators_domestic hot water coils_water heater

1. Heatinging accumulator
2. Domestic hot water accumulator
1. Domestic hot water preheating coil
2. Domestic hot water superheating coil
3. Water heater with electric heater
A. Cold water
B. Hot water circulation
C. Domestic hot water
D. Filling the heating network

B3 Domestic hot water accumulator sensor
B38 Domestic hot water consumption sensor
Q4 Hot water circulation water pump

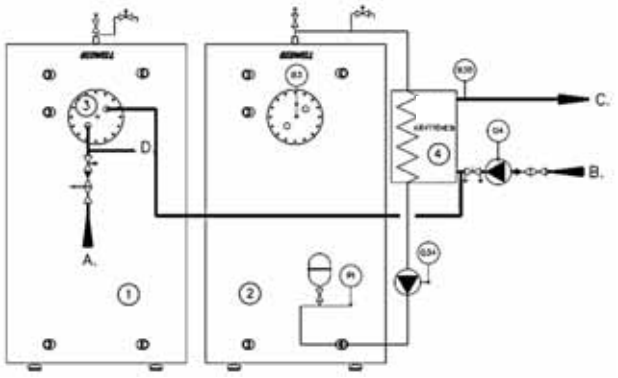


Two accumulators_domestic hot water with a heat exchanger

1. Heatinging accumulator
2. Domestic hot water accumulator
3. Domestic hot water preheating coil
4. Domestic hot water heat exchanger
A. Cold water
B. Hot water circulation
C. Domestic hot water
D. Filling the heating network

B3 Domestic hot water accumulator sensor

B38 Domestic hot water consumption sensor
Q4 Hot water circulation water pump
Q34 Domestic hot water charging pump



Accumulator tank for the domestic hot water system

If domestic hot water consumption is high, the heat pump may be supplemented with a buffer accumulator using electric heating. The heat pump heats cold water, which is led to an external buffer accumulator. The electric heater of the external accumulator keeps the temperature at the desired level. The external accumulator prepares the system for periods of peak consumption when more heat energy is used. If there are radiators on the hot water circuit, the connection should be inspected by an HVAC designer.

9.6 Cascade connections

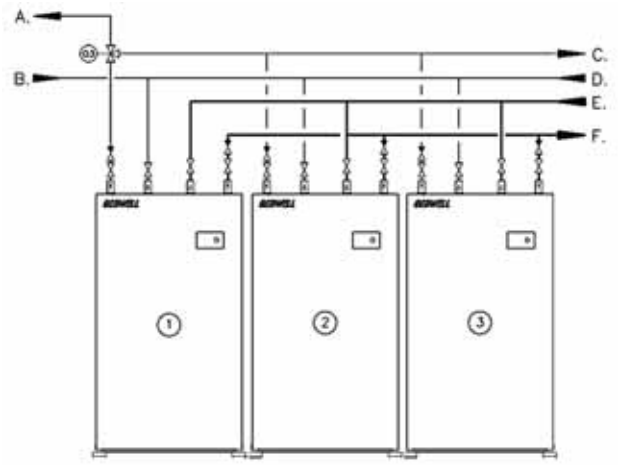
Cascade connection refers to a situation in which several heat pumps are connected to the heating system side-by-side. The heat pumps are connected electronically using a bus cable. *Master device 1* is defined as the device that manages the cascade, turning the other connected devices on and off according to the heat requirement. The master device acts as the producer of domestic hot water. One cascade system can contain 16 devices.

When the cascade pipe connections are made, it is important to keep in mind the non-return and line controller valves shown in the diagrams. These components are important for guaranteeing correct functionality.

Cascade with three heat pumps, Master device 1 acting as the producer of domestic hot water:

1. Heat pump_Master device 1
2. Heat pump_Device 2
3. Heat pump_Device 3

A. Charging supply to the domestic hot water accumulator
B. Charging return from the domestic hot water accumulator
C. Heat pipe supply
D. Heat pipe return
E. Soil solution return from the soil to the heat pump
F. Soil solution supply to the soil from the heat pump



9.7 Installing the change-over valve

The change-over valve controls the charging of domestic hot water and heating.

Consult the supplier's instructions to check the connection directions of the change-over valve before installation.

For cascades, control of the change-over valve is connected to the master device.

Valve and actuator:

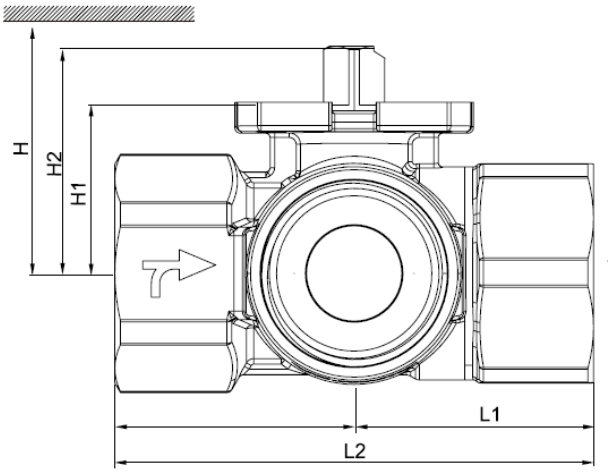
Change-over valve: VBI60.50-73T

Actuator: GMA321, spring return (adjustable drive direction)

Installation dimensions (mm):

H	H2	H1	L1	L2
> 335	62,8	52,8	65,7	131,4

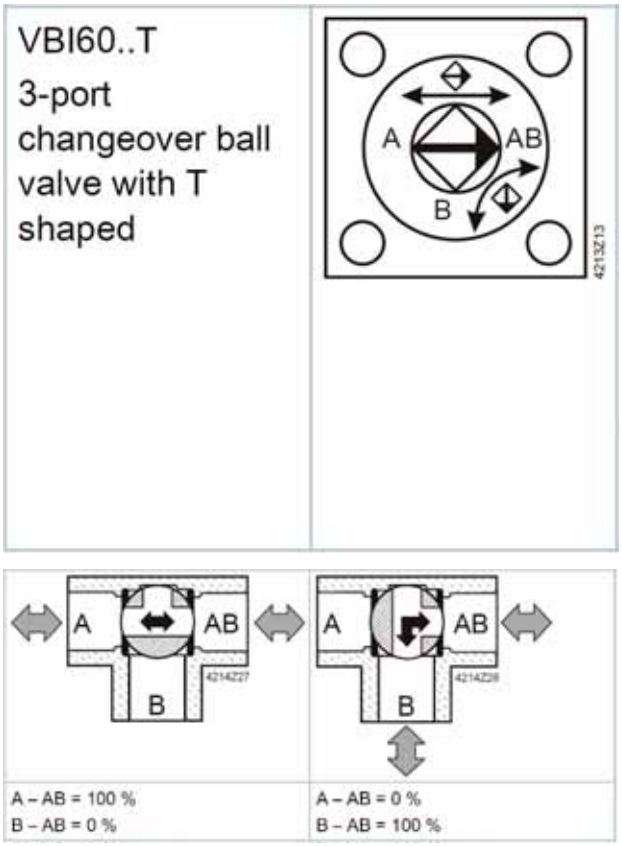
H = the total height of the actuator added with minimum distance to a wall or a ceiling, for installation, connecting, using, maintenance etc.



Flow direction:

FACTORY SETTING:

A = Domestic hot water
B = Heating
AB = Heat pump, charging



The actuator's rotation direction can be changed, see the instructions for changing of rotation direction on the *Change-Over valve installation manual > Actuator drive direction change* delivered with the change-over valve set.

9.8 Heating control group/pump circuit

The heating control group is an accessory designed for pumping and regulating the heating circuit. Heating control groups are available in different sizes according to the heating power. When dimensioning a heating group, keep in mind the building's heating system (radiators, underfloor, air heating), the heating power required, the network's pressure loss and the flow rate. As standard, 1 heating control group can be installed per heat pump, and up to 3 heating control groups can be installed per heat pump, with two of the circuits requiring the *Heating circuit control* accessory. The circuits can be pumping or mixing circuits.

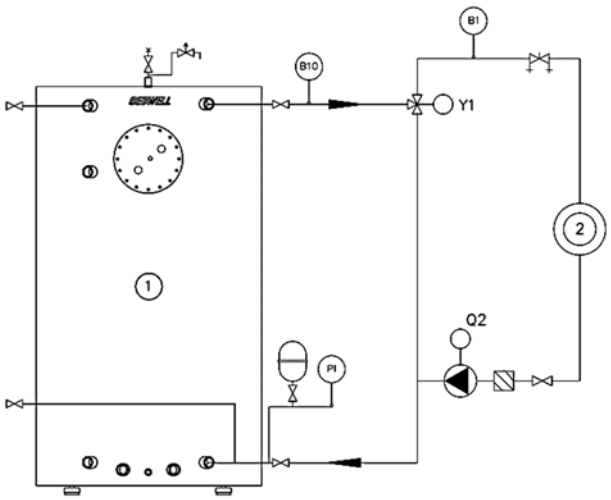
Consult the connection instructions for the diagrams drawn up by the designer or the example diagrams supplied with the device.

1. Heatinging accumulator
2. Heating circuit

B10 Supply water sensor

B1 Heating circuit supply water sensor

Q2 Heating circuit pump



10 ELECTRICAL CONNECTIONS

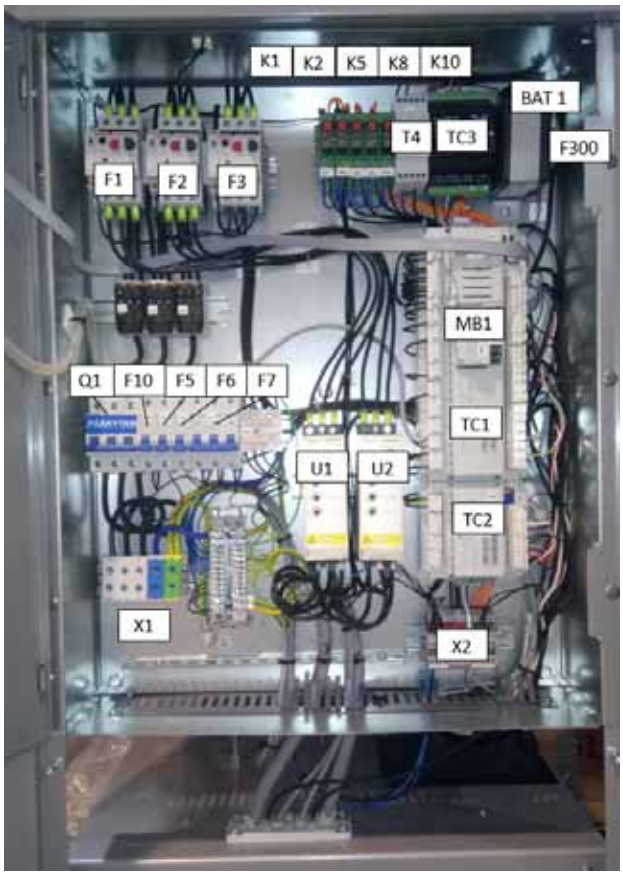
10.1 General

Electrical installations and servicing may only be performed under the supervision of a qualified electrician. The heat pump's power supply enters via a lead-through in the top of the device. The device is connected to a 400 V (50 Hz) electricity network.

The heat pump's power supply must not be switched on until the heat pump's heating system has been filled with water. If the system is not filled with water, the pumps will run dry and may be damaged.

- The heat pump must be disconnected before the building's insulation is tested.
- The heat pump's circuit diagram is shown in the section entitled *Electrical diagrams.*
- The heat pump's fuse should be type C (slow)
- Cabling for electrical accessories used with the heat pump is carried out via the control unit lead-throughs on the top of the device.
- The heat pump's internal circulation water pumps, automation and related cabling are protected by automatic fuses or motor circuit breakers.

10.2 Control unit



TC1	Controller, Heat pump
TC2	Controller, Additional unit (AVS)
TC3	Controller, Expansion valve
X1	Electricity supply connections 400 V
X2	External controls
Q1	Main switch
F1	Motor circuit breaker, compressor K1
F2	Motor circuit breaker, compressor 2 K2
F3	Motor circuit breaker, source pump Q8
F4	Circuit breaker controller / control
F5	Circuit breaker charging pump Q9
F6	Circuit breaker Superheating pump Q33
F300	Fuse battery + glass pipe 20 mm 300 mA
K1	Status information, Soft starter 1
K2	Status information, Soft starter 2
K5	Relay, Heating circuit pump Q2 (s/s)
K8	Contactor, Source pump Q8
K9	Relay, Charging pump Q9
K10	Alert relay
U1	Soft starter, Compressor 1
U2	Soft starter, Compressor 2
T4	Transformer 230 V/24 V AC expansion valve controller
MB1	Modbus cellular data card
BAT 1	Backup power source for the expansion valve

10.3 Power supply

The inbound electricity supply is connected to connectors (2) L1, L2, L3 via the cable lead-through (1).

10.4 Compressor motor protection switch (F1 & F2)

The compressor motor protection switch disconnects the electricity supply to the compressor and acts as the compressor's operating switch.

Reset: Reset the compressor motor protection switch (F1) by pressing the black button to the ON position

The current value for the protective switch for the compressor is shown in the technical table.

10.5 Phase sequence

There is a three-phase motor in the heat pump's compressor and in the source pump. It is important that the heat pump's phase sequence is connected correctly. The device displays the message *355: Asymmetric phase sequence* on the controller display if the phase sequence is incorrect.

10.6 Outdoor temperature sensor, B9

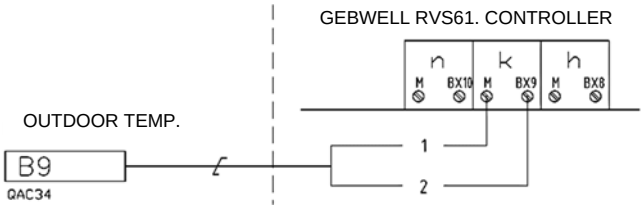
The outdoor temperature sensor is in the control unit when the device is delivered.

Place the sensor in a shaded location on a wall facing north or north-east. The sensor must not be installed near windows or doors.

If a cable lead-through is brought inside the sensor, insulate the lead-through with care to ensure that no incorrect readings occur due to indoor heat being conducted into the sensor.

If the heat pump is controlled using external heat request messages, the heat pump does not require an outdoor temperature sensor in order to function. The outdoor temperature sensor can be replaced with a NTC1k heater. If neither a sensor nor a heater is installed in the sensor input, the controller will report an external sensor failure.

Connecting the sensor to the controller: connector K > BX9



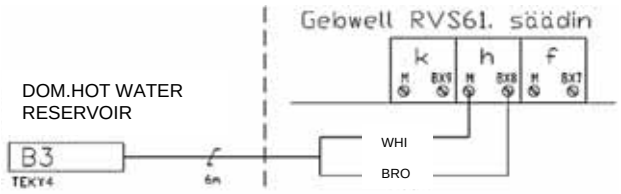
10.7 Domestic hot water accumulator sensor, B3

The B3 domestic hot water accumulator sensor is in the supply box when the device is delivered.

The sensors should be installed in the sensor pocket of the domestic hot water accumulator. Ensure the sensor is attached by sealing the end of the sensor pocket so that the sensor cannot become detached from the pocket.

Connecting the sensor to the controller: connector H > BX8

GEBWELL RVS61. CONTROLLER

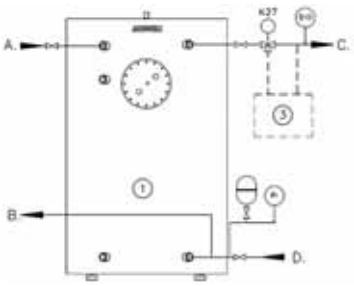


10.8 Common supply water sensor, B10

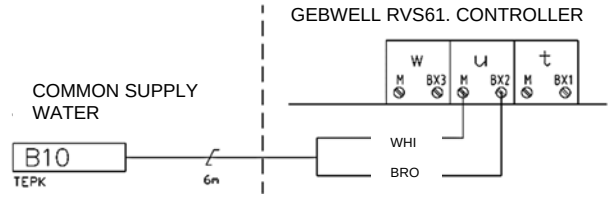
The heat pump's B10 domestic hot water sensor is in the supply box when the device is delivered.

The sensor should be installed in the supply water pipe (C) after the heating accumulator (1). Fix the sensor to the pipe surface with care and insulate the sensor from the effects of external heat.

If an additional heat source (3) is used with the system, the B10 sensor acts as the regulation sensor for the additional heat source. Place the sensor in the supply water pipe (C) after the additional heat source.



Connecting the sensor to the controller: connector U > BX2



10.9 Heating accumulator sensor, B4 (accessory)

The B4 heating accumulator sensor is an accessory delivered in the supply box. If the sensor is not shown on the site-specific system diagram, it should not be connected to the equipment.

The sensor should be installed in the heating accumulator at the same height as the heating supply water connection in the designated sensor pocket. The placement of the sensor is shown on the system diagram.

Connecting the sensor to the controller: connector T > BX1

10.10 Controlling the accumulator's electric heater

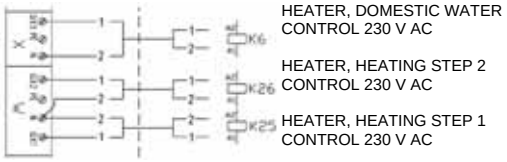
The heat pump can be used to control the electric heater in the accumulator. There are several different means of controlling the electric heaters. Heaters should be programmed for each site individually in accordance with the various equipment diagrams. See the section entitled *Equipment-specific settings/Programming electric heaters* for information on programming.

The heat pump's controller has three heater control relays. Two of the relays (K25 and K26) are for heating use and one (K6) is for domestic hot water. If the system has more heaters than controllers, the resisters should be grouped. The groups for heating use should be constructed so that the K25 control step has a lower power than the K26 control step. This control scheme enables the controller to control the heaters in three stages.

The combination of thermostat/overheating protection supplied with the heater should be connected to each heater. Thermostats should be adjusted to a value above the highest setting for the heat pump.

Connecting heaters directly to the group switchgear may give rise to additional electricity consumption. We always recommend installing a separate contactor unit to control heaters.

NOTE: In cascade systems, the heating heaters should be programmed and connected to the first device that DOES NOT PRODUCE domestic hot water. The control points are shown in the site-specific system diagram.

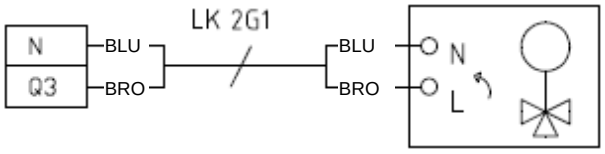


Heater control relays:

QX1	Supply water electric heater K25
Connector W	Control 230 V AC
QX2	Supply water electric heater K26
Connector W	Control 230 V AC
QX3	Domestic hot water electric heater K6
Connector X	Control 230 V AC

10.11 Change-over valve(s):

The change-over valve is connected to the Q3 and N terminal strips in the heat pump's control unit. **In cascade systems, connections are ALWAYS made to the master device.**



Q3 = brown (control 230 V AC)

N = blue

10.12 Heating circuit(s)

The heat pump can be used to control one heating circuit. If the optional *Heating circuit control* module is used, three heating circuits can be controlled. The circuits can be pumping or mixing circuits. If the pump's current is higher than the maximum current permitted by the controller, a separate power supply should be provided to the pump from the building's switchboard or pump control unit. The control unit is equipped with a K5 start relay (start/stop) for external control.

See the section entitled *Electrical diagrams* for more on electrical connections

Heating circuit:

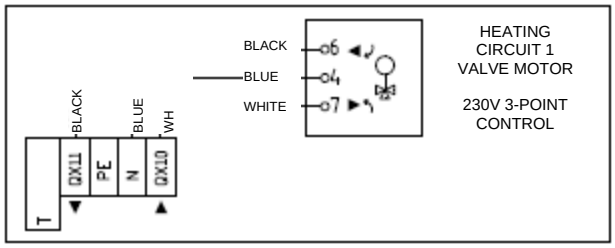
BX11	Supply water sensor B1
Connector P	*NTC10k*
QX10	3-way valve open, Y1

QX11 3-way valve closed, Y2

Connector T Control 230 V AC, 3-point

QX9 / K5 Heating circuit pump

Connector S / K5 Start/stop control



10.13 Hot water package with a mixing valve

The hot water package with a mixing valve is an installation kit intended for regulating the temperature of domestic hot water. The hot water package requires domestic hot water circulation or a domestic hot water flow switch in order to function. If the implementation uses a rotary pump, the flow switch should be replaced by a jumper cable. See the section entitled *Electrical diagrams* for more on electrical connections.

QX21 Mixing valve open

QX22 Mixing valve closed

Connector T Control 230 V AC, 3-point

BX21 Domestic hot water consumption sensor B38

Connector N NTC10k

H2 /M Flow switch or jumper cable

Connector N

10.14 Hot water package with a heat exchanger

The hot water package with a heat exchanger is an installation kit intended for regulating the temperature of domestic hot water. The installation kit comes factory-connected to the GWAVS75.370 expansion module. The hot water package requires domestic hot water circulation or a domestic hot water flow switch in order to function. If the implementation uses a rotary pump, the flow switch should be replaced by a jumper cable. See Appendix 4, *Electrical diagrams,* for more on electrical connections.

NOTE: If the circulation water pump's current is higher than the maximum current permitted by the controller, a separate power supply should be provided to the pump from the building's switchboard or pump control unit.

QX23 Domestic hot water charging pump Q34

Connector S Power supply 230 V AC, max. 0.7 A

UX21 Domestic hot water charging pump Q34 regulation

Connector E 0–10 V / PWM

BX21 Domestic hot water consumption sensor B38

Connector E NTC10k

H21 /M Flow switch or jumper cable

Connector N NTC10k

10.15 Additional heat source

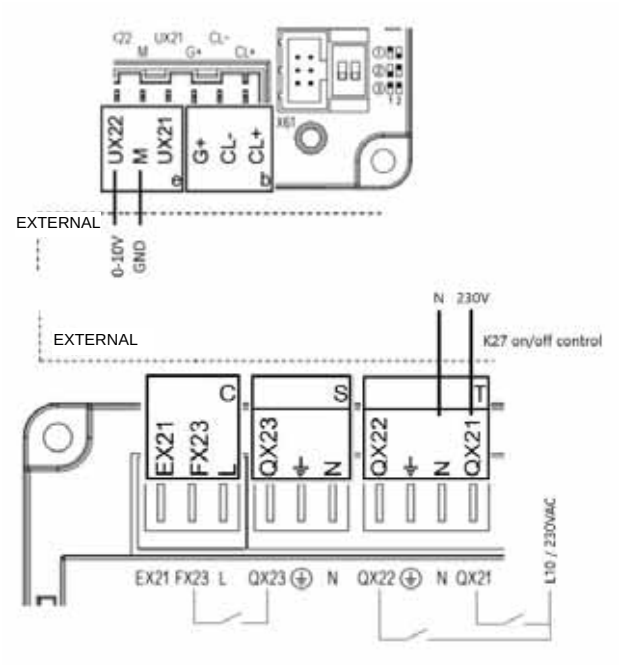
Controlled additional heat sources may be heat sources that can be regulated directly or heat sources at a fixed temperature that are controlled by a controller value. The heat pump provides 230V voltage control on the start-up of the additional heat source, as well as a 0–10 V/PWM regulation message for regulating the temperature. The *B10 common supply water sensor* acts as the regulation sensor for the additional heat source. The sensor should be placed in the pipe network after the additional heat source and on the heating network side. The additional heat source must be taken into use on the Expert menu. See the section entitled *Adjustments/Controlling an additional heat source* for more information on deployment.

Connections to the AVS75.370 module

QX21 K27 start-up, start/stop control

UX21 / M 0–10 V regulation message

Rrelay output maximum load 2 A (230 V AC).



10.16 Continuous alert

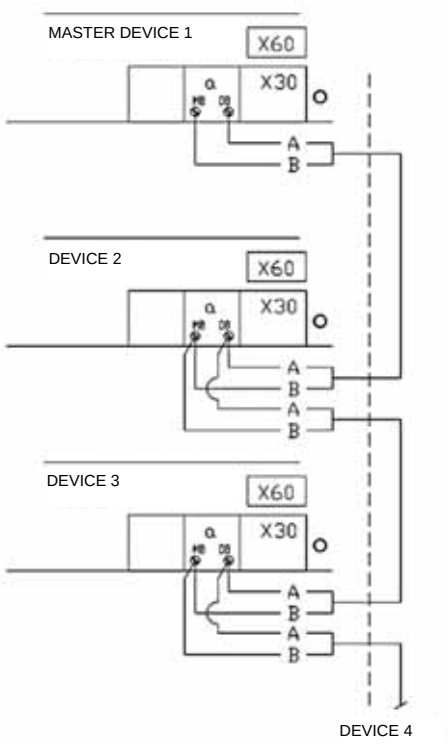
The heat pump can provide a continuous alert in the event of failures. The continuous alert is connected to relay K10 in the control unit. Closing alert information (NO) can be obtained from connector 11/14 and opening alert information (NC) can be obtained from connector 11/12. Use a 2-pole cable with a cross-sectional area of at least 0.5 mm^2

10.17 Heat pump cascade bus

Several heat pumps (Gebwell T, Gemini, Taurus) can be connected together to form a cascade system. The device that manages the system is defined as the master device. There can be 15 slave devices. Device addresses should be set for each device on the LPB system menu.

Connect the data transfer cables between the devices as shown in the image. The cable is supplied with the device (5 m per device).

Bus connection: connector A, MB/DB



10.18 External control to the source pump

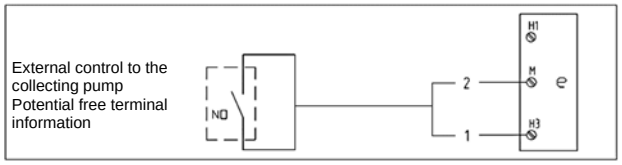
The source pump can be started up using external potential-free contact terminal information. This function can be used for passive cooling.

Closing the contact terminal starts up the source pump.

See the section entitled *Electrical diagrams* for more on connections

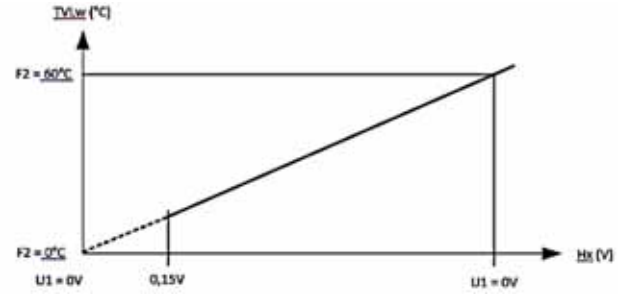
H3 / M Consumer's request VK1

Connector E NO, closing contact



10.19 Analogue heat request (AI)

The heat pump can be controlled using an external heat request control. A 0–10 V regulation message sets a value for the heat pump to output into the heating accumulator.



The function should be activated on the heat pump's *Expert* menu. See the section entitled *Device-specific settings/Heat request VK2 10 V*

H1 / M Consumer's request VK2 10 V

Connector E Control message 0–10 V

Factory setting: 0 V = 0°C / 10 V = 100°C

10.20 Heat request with a fixed setpoint

The heat pump can be controlled using an external heat request control at a fixed setpoint. The setpoint is activated using closing potential-free contact information, and the heat pump charges the accumulator to the setpoint. The value can be set on the *Consumer circuit 2* menu. See the instructions on setting the value in the section entitled *Device-specific settings/Heat request VK2*

H3 / M Consumer's request VK2

Connector E NO, closing contact

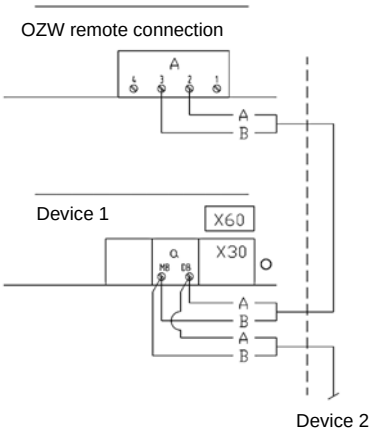
10.21 Remote connection

The heat pump system can be connected to a remote-control system (accessory). Remote control enables the system to be monitored, adjustments to be made and alerts to be received. Remote control can be connected to the building's information system with a static IP address or using a separate router and connection.

Connecting the remote connection to the controller's bus:

OZW server port A 2 > controller connection A DB

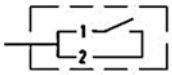
OZW server port A 3 > controller connection A DB



10.22 External start-up prevention / start-up permission

An external potential-free contact can be used to issue a message preventing the heat pump from starting. In such cases, the compressor and electric heaters will enter a locked state. The heat pump returns to its normal state when the message is

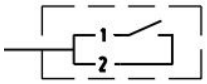
removed. This function can be use as a start-up permission function. One use for this function may be when there is a large simultaneous electrical load in the building. This function prevents the heat pump from operating. See the appendix entitled *Electrical diagrams* for more on connections



COMPRESSOR'S EXTERNAL ACTIVATION PREVENTION E6

10.23 Tariff control

A low-tariff message can be received from the electricity utility via the EX3 input. External control should be a potential-free closing contact. The control unit starts up forced charging of the heating accumulator. See *Appendix 4: Electrical diagrams* for more on connections



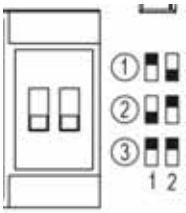
TARIFF CONTROL E5

10.24 Installing the expansion module

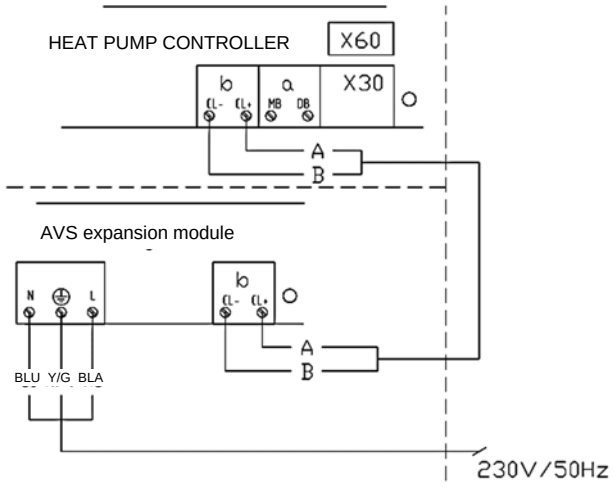
The expansion module is installed into a separate control unit. The power supply (230 V) is connected to the module's supply connector L, N, PE. The module is connected by a cable to the controller's BSB bus. If several modules are added to the heat pump, the addresses must be set using DIP switches.

The address of the module in the control unit is 1.

* DIP switches (in the expansion module)



BSB bus connection:



10.25 Installing the Modbus communication card

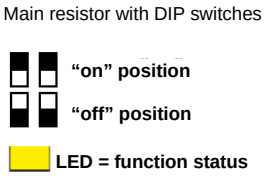
Modbus enables heat pumps to be connected to a higher-level automation system. When the heat pump system has been connected so that all of the sensor connections and the control system are ready, the Modbus connection can be taken into use.

X60	Connecting cable RVS to the controller	Direct HP connector

A+	TxD+ / RxD+	Modbus connector: 3-pole screw terminal
B-	TxD- / RxD-	
REF	Earthing	

Setting the termination heaters:

The termination heaters on Modbus cards should be set to the ON position if the devices are the terminal devices on the bus



A flashing yellow LED on the Modbus card indicates that the bus is functioning.

11 FILLING and VENTING

11.1 Heating system

The heating system is filled with water to the required pressure using a filling valve (not included in the delivery), and the system is then bled.

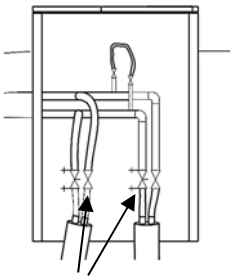
- Bleed the system thoroughly. If there is any air in the heating system, it may cause a system alert.
- Make sure that the system is at the correct pressure to function. When filling, the pressure should be 0.5–1.0 bar. When the accumulator heats up, the pressure should be 1.0–1.5 bar. Check the pressure as the accumulator heats up.
- The system is equipped with a pressure tank and safety valve in accordance with the heating and ventilation design.

11.2 Filling the collector

When using ground heat, fill the collector with a mixture of water and ground heat fluid that can withstand a temperature of -15°C. Environmentally friendly bioethanol is recommended for use as a ground heat fluid. In other system types, such as exhaust air heat pump systems, use the collection fluid specified by the designer and ensure that it can withstand a temperature of -15°C. In the evaporator, the temperature of the fluid may drop below 0°C, so we do not recommend using water as a collection fluid.

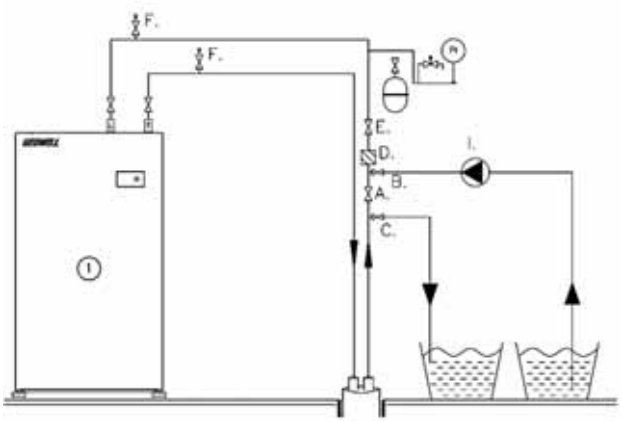
Bored wells are usually filled with ground heat fluid after drilling, when the pipes are inserted into the well. Check the amount of fluid in the wells using the venting valve before you begin venting the horizontal pipes. When venting the collector of a ground source heating system, the horizontal pipes should be bled separately by closing the wells at the venting loop. Keep the wells closed until you have finished venting the horizontal pipes and technical area. Bypass flow should be possible at the end of the wells.

Bypass flow from the wells' venting valves:



CLOSED DURING VENTING

When venting, use two large vessels to prevent fluid containing air from being pumped back into the system. When you have pumped one of the vessels out entirely, stop venting and allow the air bubbles to dissipate from the fluid that has entered the vessel. Swap the hoses in the vessels around and begin venting again. When you have bled the horizontal pipes and circulated fluid in both directions, and when the circulated fluid is completely transparent (not frothy), you can open the wells to enable the heat pump to be started up.



Filling and venting:

- Check that the heat pump's stop valves are open
- Open valves B, C and E
- Close valve A
- Start up the filling pump I
- Fill the system until fluid comes out of valve C
- Continue by venting the system
- Change the venting circulation direction by swapping the places of the hoses in valves B and C
- Bleed the system until there is no longer any air in it.
- After venting, clean filter D. See the instructions in the section entitled *Cleaning the collector filter*
- When venting is complete, close valves C and B
- Open valve A
- Open all of the bored wells (the entire collector)
- Finally, bleed the system from the venting valves (F) at the highest points in the network
- You can continue venting using the source pump inside the device with the controller's pump test function.

11.3 Pressurising the collector

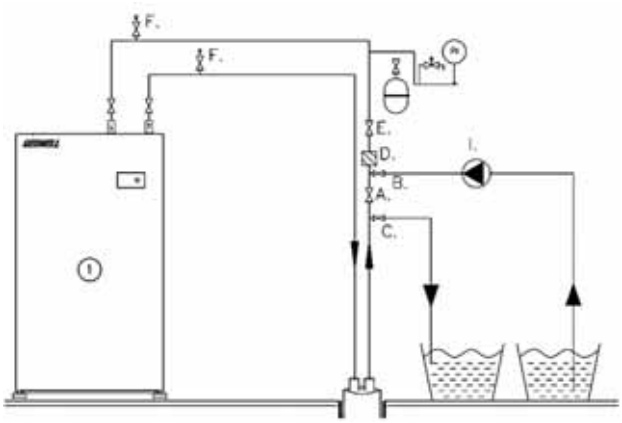
The heat collector is pressurised using an external booster pump. Pump fluid into the system from valve B. Valve C should be closed. Monitor the pressure gauge throughout pressurisation. Close valve B when the pressure has been increased as planned, and turn off the booster pump. The pressure must not exceed 2 bar.

11.4 Pressure-testing the collector

A pressure test should be performed on the filled collector as follows: increase the pressure to 2 bar and check the pressure after half an hour. If the pressure drops over half an hour, there is a leak in the system. Repair any leaks and repeat the pressure test. Log the pressure test in the *Installation record* when the pressure test is successful. Remember to release the high-pressure after the pressure test.

11.5 Cleaning the collector filter

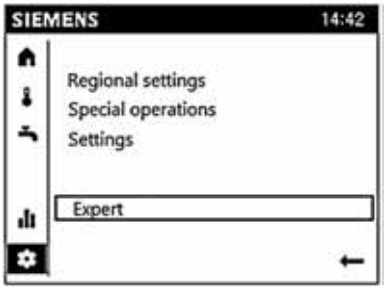
Check filter D by first closing valves A and E and opening the filter cover. After cleaning the filter, first open valve E, which will release the air from the filter chamber into venting valve F. Open valve F to allow the air out of the pipe network. Finally, open valve A.



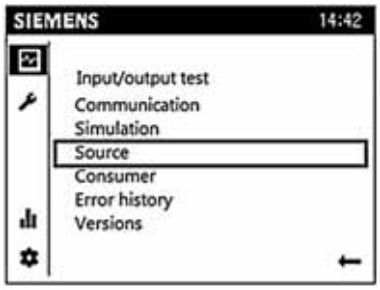
12 ACTIVATING THE HEAT PUMP

Upon delivery, all the electrical switches will be in position 0.

When commissioning, sign in to the controller settings at *Expert* level.



Commissioning menu:



12.1 Before activation

Before activating the heat pump, ensure that:

- The collector has been filled with an appropriate solution
- The collector has been bled thoroughly
- The collector filter has been cleaned after venting
- All of the collector valves are open
- The heating system has been filled with water
- The heating system has been bled
- The temperature of the water in the heating system is below 15°C
- The domestic hot water system has been filled
- The sensors have been installed in accordance with the diagram
- The electrical connections are correct

12.2 Activation

- Put the heat pump's main switch (Q1) in the ON position.
- Put the control switch F4 in the ON position.
- The controller will update information
- Put the charging pump (Q9) switch F5 in the ON position.
- Put the source pump (Q8) switch F3 in the ON position.
- Put the superheating pump (Q33) switch F6 in the ON position.
- On the user terminal, turn off the domestic hot water.
    - Operating mode: Stop
- Put the compressor's motor circuit breakers F1 and F2 in the ON position.
- On the user terminal, set the *Simulation* heating use to a temperature of -20°C. (Perform the activation by simulation if the outdoor temperature is too high and it is preventing the heat pump from activating.)
- If change-over valve(s) have been installed in the device, they should be set to the *HEATING* position (flow to the heating network).
- The collecting and charging pump will start up 30 seconds before the compressor.
- When the compressor has started up, monitor the temperatures of the collector and charging circuits in the *Source* menu. The controller automatically sets the condenser's temperature difference to 5 degrees.

  Heat p. return w. temp. (2/27)

  Heat p. supply w. temp. (2/27)

  Condenser temperature difference (16/27)

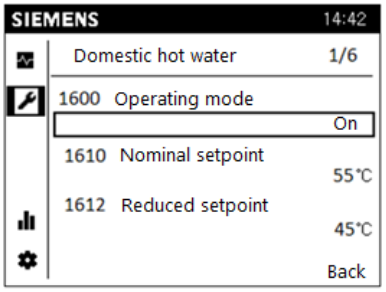
  Source inbound temperature (17/27)

  Source outbound temperature (18/27)

  Evaporator temperature difference (16/27)

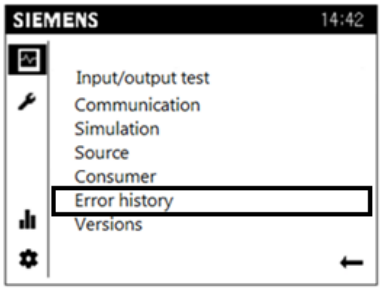
  Allow the heat pump to operate for 10–15 minutes.

- Turn domestic hot water on by selecting *Domestic hot water* on the *Parameter list*. It may take a few minutes to load the list of parameters.
- The Q3 change-over valve will switch to the *DOMESTIC HOT WATER* position.
- Allow the temperature of the domestic hot water to rise to the setpoint.
- Monitor the temperatures of the heat pump's supply and return water while domestic hot water is charging. The temperature difference should be 8 K.



NOTE: The compressor must not be restarted more than once every ten minutes.

The heat pump will not register all alerts after the first notification – they will be stored as status messages. If the compressor does not start up and the symbol is shown on the display, open the Source menu to check the reason for the restriction. See the section of the instructions entitled Troubleshooting/Alerts for more information about failures.

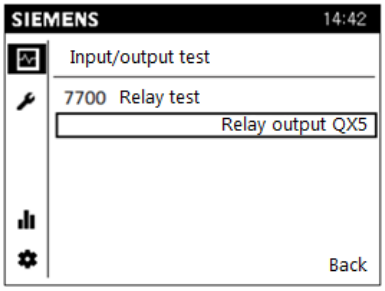


12.3 Venting the collector using the Q8 internal source pump

The collector must be bled with extreme care. Even small amounts of air in the circuit can prevent the heat pump from operating normally and may cause the heat pump to malfunction.

The input and output testing function, which can be found in the heat pump's controller, can be used to rotate the source pump. You must be at *Expert* level to use this function. This function enables the final venting of the collector to be carried out. When the pump has started up, control will be active for 8 minutes, after which it will automatically return to the STOP state.

1. Put the source pump's motor circuit breaker (F3) in the ON position.
2. Turn the source pump on by selecting *Input/output testing* in section *Relay output QX5* and the source pump will start up



3. If the collector makes a noise that indicates the presence of air (gurgling/burbling), turn off the source pump by selecting *All off* on the relay test.
4. Allow the air to rise to the highest point in the collector and open the venting valve. Ensure that the system is pressurised to enable the air to escape from the valve.
5. When venting is complete, continue rotating the source pump (Q8) and repeat the action until the air has been released from the system.

12.4 Venting the charging circuit

1. Put the charging pump (Q9) switch F5 in the ON position.
2. Turn the charging pump on by selecting *Input/output testing* in section *Relay output QX13* and the charging pump will start up at the minimum setting.
3. Select *Output test UX2* from the *Input/output testing* menu
4. Set the desired rotation rate for the charging pump. Allow the pump to rotate for a few minutes.
5. Turn off the pump by setting *Output test UX2* to 0%.
6. Allow the air to move to the highest point in the system and ensure that the venting valves are open.
7. Make sure that the heating system is sufficiently pressurised so that the air can escape automatically from the venting valves.
8. When venting is complete, continue rotating the pump and repeat the action until the air has been released from the system.
9. Finally, turn *Output test UX2* off ("—") and the relay test to the setting "*No test*"

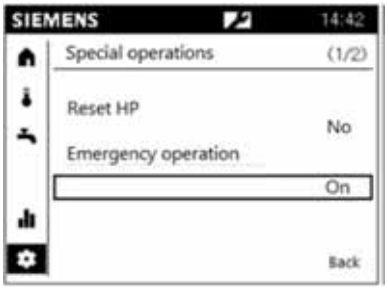
12.5 Operation without the collector and operating during construction

The heat pump can be used for heating before the collector is connected. In such cases, heat is generated by heaters in the accumulator. However, all of the control functions for heating and domestic hot water are available. Note that the heating and domestic hot water circuits should be connected and bled, and that the electrical connections should be completely ready for use.

If a ground source heat pump is to be used for heating during construction, the device should be set in the *Emergency operation* mode to ensure that the compressors (K1 and K2) and the source pump (MLP/Q8) do not start up. This ensures that the heat pump uses heaters for domestic hot water and heating.

When the display is in the basic state:

1. Rotate the navigation roller to the ⚙ symbol.
2. Select Special functions
3. Select *Emergency operation* and turn the function on by pressing the navigation roller and rotating the setting to ON. Confirm by pressing the navigation roller.



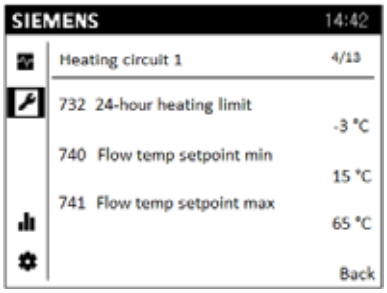
12.6 Activation of a cascade system

Turn on the cascaded devices as normal. Slave devices can be started up by putting the master device in the *Emergency operation* mode. The domestic hot water button does not cause the slave devices to start up. If heating circuits are connected to the slave devices, carrying out the setting procedure for each device. *(see Device-specific settings →Heating circuit*

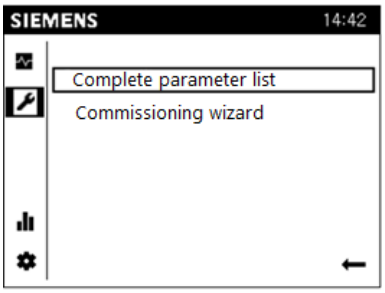
13 ADJUSTMENTS

Device-specific settings should be selected when the heat pump is started up for the first time. Device-specific settings are selected in the *Parameter list* menu at *Expert* level.

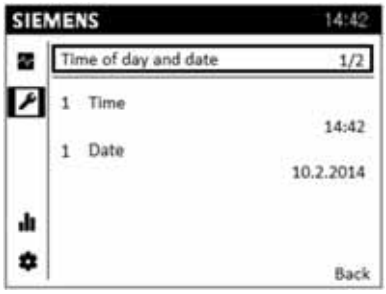
Every setting in the parameter list has a control row number. The manual always refers to the control row number for each setting.



The parameter list menu changes when you make the background to a title row go dark by pressing the selection roller by the open frame. After this, you will be able to proceed on the *Parameter list* menu



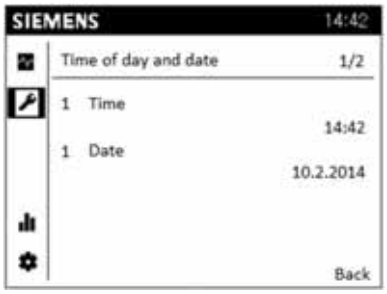
Press the selection roller → you will be taken to the *Time and date* section.



Press the selection roller → the section *Time and date* will change to a dark background and you will be able to select the correct option from the list.

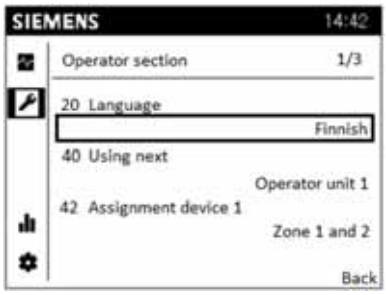
13.1 Time and date

The controller has an annual schedule with the time of day, day of the week and date. To ensure that the heating programme functions correctly, the time and date must be set correctly. The time and date are set on control row 1.



13.2 Language selection

Several language options are available for the user terminal. Use the menu item *User functions,* control row 20, to set the language. By default, Finnish is always selected when the device is delivered.



13.3 Time programmes

There are various time programmes for heating areas and preparing domestic hot water. They are switched on in the *Automatic* operating mode and they control changes in temperature levels (and related setpoint s) in accordance with the set connection times. Settings for heating area time programmes can be adjusted in the *End user* menu or the *Time programme, heating area 1* section of the parameter list

13.4 Heating area (Heating circuit)

Area-specific settings must be made for each area. To take heating areas into use, they must be switched on in the *Configuration* menu. When they have been switched on, the heating circuit will be activated when the supply water sensor (B1/B12/B14) is connected to the controller. Heating circuit 1 is on by default.

TAKING HEATING CIRCUITS INTO USE

Put the desired circuit in the ON state and install the supply water sensor, which will activate your selection.

Menu: Expert → Parameter list

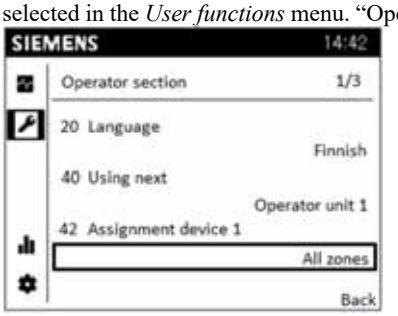
Configuration → 1/43 → 5710 Heating circuit 1

Configuration → 2/43 → 5715 Heating circuit 2

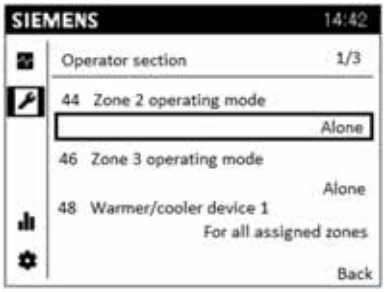
Configuration → 3/43 → 5721 Heating circuit 3

If more than one heating circuit is in use, the areas should be linked to the user terminal in the *User functions* menu. If two or more heating areas are in use, select Device 1 connection on control row 42: *All levels.*

In addition, the operating mode of the heating areas should be selected in the *User functions* menu. “Operating mode” refers to



the effect of setpoint s on the heating areas. To ensure that you are able to alter circuit-specific settings, control rows 44 Area 2 operating mode and 46 Area 3 operating mode should be set to *Independent*.



The heating areas should be marked with stickers to facilitate settings for the areas and maintenance actions.

Area-specific settings can be altered in the menu *Parameter list → Heating circuit 1 / Heating circuit 2 / Heating circuit 3*.

SETTING THE HEATING CURVE

The starting points for the heat curve are the controller’s *damped outdoor temperature* (average temperature over 6 hours) and the heating system’s measured supply water temperature. The gradient of the automation curve can be found at the intersection of these two values. This is set for each heating area separately.

A steeper heating curve gradient means that the temperature of the supply water changes more when the outdoor temperature decreases. In other words, if the room temperature is wrong when the outdoor temperature is low but not when the outdoor temperature is high, the gradient of the curve needs to be changed.

Menu: Expert → Parameter list

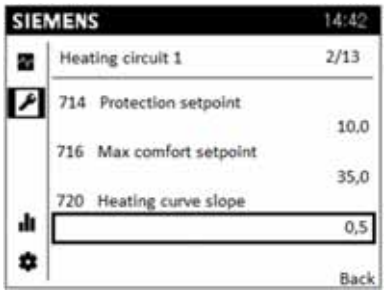
Heating area: Page: Control row:

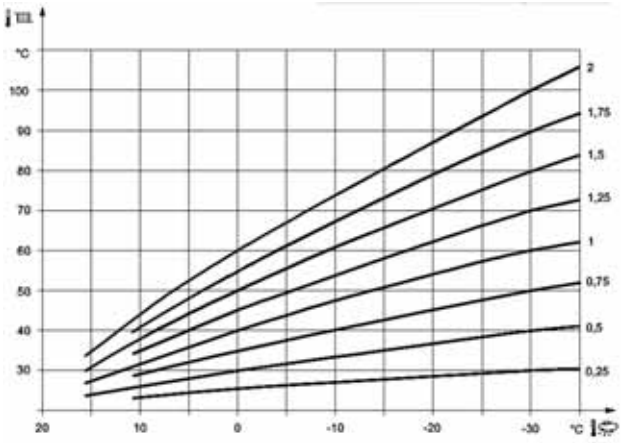
Heating circuit 1 → 2/13 → 720

Heating circuit 2 → 2/13 → 1020

Heating circuit 3 → 2/13 → 1320

Factory setting: 0.5





SUMMER/WINTER HEATING THRESHOLD

The summer/winter heating threshold switches the heating on or off according to seasonal temperature conditions. This cross-connection functions in the *Automatic* operating mode, and the user does not need to switch the heating on or off. The annual periods can be shortened or extended by adjusting the setpoint s.

- The display shows “Saving”
- To take the building’s heat accumulation capacity into consideration, the outdoor temperature is damped

Menu: Expert → Parameter list

Heating circuit 1 → 3/13 → 730

Heating circuit 2 → 3/13 → 1030

Heating circuit 3 → 3/13 → 1330

NOTE: If the system has heating areas that should not be stopped in the summer (humid areas), the heating threshold for such areas should be switched off (---).

The summer/winter heating threshold follows the “damped outdoor temperature”. The damped outdoor temperature is the average temperature over 6 hours.

SUPPLY WATER THRESHOLD VALUES

This restriction can be used to set thresholds for the supply water value range. If the set supply water temperature requested by the heating circuit reaches a threshold value, the setpoint will remain at the maximum or minimum value as the heat request increases or decreases.

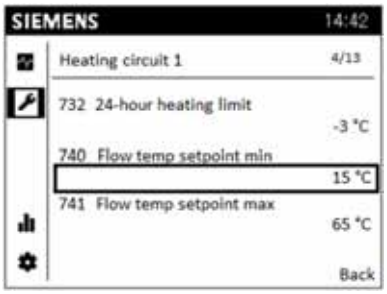
it is very important to set the minimum and maximum temperature of the supply pipe if the building has floor heating. If the building has floor heating and parquet floors, the supply water temperature must not exceed the value recommended by the floor manufacturer.

Menu: Expert → Parameter list

Heating circuit 1 → 4/13 → 740 (min), 741 (max)

Heating circuit 2 → 4/13 → 1040 / 1041

Heating circuit 3 → 4/13 → 1340 / 1341



Heating system, supply water minimum temperature:

Adjustment range: 8–45°C

Factory setting: 12°C

Heating system, supply water maximum temperature:

Adjustment range: 12–95°C

Factory setting: 45°C

Separate minimum and maximum values are set for each heating circuit.

NOTE: When a pump heating circuit is used (without a mixing valve), the maximum value for the circuit should be set on the menu Parameter list → Heat pump → 11/23 → 2855 “Maximum disconnection temperature heating”. When the B21 supply water sensor measurement reaches the 2855 setpoint, the compressor will be switched off.

NOTE: Raise the minimum value for the supply water if you wish to keep the floor heating on in the building during the summer. You should also keep in mind the “Summer/winter heating threshold” when using this feature.

13.5 Domestic hot water

Device-specific settings for domestic hot water are selected at *Expert* level.

The heat pump charges the domestic hot water in accordance with the fixed temperature threshold.

The following settings enable you to alter the domestic hot water functions.

SETTING VALUES FOR DOMESTIC HOT WATER

Domestic hot water is regulated in accordance with various setpoint s. These setpoint s activate in accordance with the

selected operating mode and they ensure each desired temperature in the domestic hot water accumulator.

Factory settings:

Nominal setpoint 55°C

Reduced setpoint 50°C

DOMESTIC HOT WATER RELEASE

The amount of release for which domestic hot water is charged.

Menu: Expert → Parameter list

Domestic hot water → 2/6 → 1620

Factory setting: 24 hours per day

24 hours per day

The domestic hot water temperature is constantly adjusted independently of the time programmes in accordance with the nominal setpoint for the domestic hot water temperature.

Time programme 4/domestic hot water

Time programme 4 on the controller applies to heating domestic hot water. In this case, during the set operating hours, connections are made between the nominal setpoint and the reduced setpoint.

DOMESTIC HOT WATER ANTI-BACTERIA FUNCTION

The controller has an anti-bacteria function that can be configured in detail. This function prevents Legionella bacteria from growing in the accumulator. This function can be activated on the domestic hot water menu. All Legionella settings are adjusted at *Expert* level.

Menu: Expert → Parameter list

Domestic hot water → 2/6 → 1640 (On / Stop)

Factory setting: Stop

Anti-Legionella setpoint (1645)

Factory setting: 55°C

Anti-Legionella circulation water pump (1647)

If a domestic hot water circulation pump is connected to the device, it can be switched on during the anti-Legionella period

Factory setting: OFF

DOMESTIC HOT WATER CHARGING CONNECTION DIFFERENCE

The heat pump outputs domestic hot water for the accumulator with the help of the change-over valve. When charging domestic hot water, the size of the accumulator and the power of the heat pump affect the compressor's operating time. The compressor should operate for the longest period possible to guarantee long-term functionality. The activation connection difference enables you to affect the compressor's operating times when charging domestic hot water. Note that if you increase the setpoint, the amount of available domestic hot water will decrease. This will mean that there is less domestic hot water to consume.

Menu: Expert → Parameter list

Domestic hot water accumulator → 3/11 → 5024

Factory setting: 5°C

If the domestic hot water temperature is lower than the setpoint by more than the switching difference set here, domestic hot water charging will begin.

Domestic hot water charging will end when the temperature reaches the setpoint.

Example: Domestic hot water charging begins when the B3 domestic hot water measurement sensor returns a measurement below the setpoint (1610) of 55°C – the switching difference (5024) 5°C.

- If you increase the *Switching difference* setpoint, the compressor will operate and output domestic hot water for longer periods.
- If you decrease the setpoint, the compressor will operate for shorter periods

13.6 Controlling the domestic hot water circulation pump

Time programmes can be set for the circulation water pump, or the pump can follow domestic hot water time programme 4. If you wish to use these functions, the circulation water pump should be connected to the heat pump's control automation unit.

HOT WATER CIRCULATION PUMP RELEASE

This setting enables you to set the operating mode of the hot water circulation pump

Menu: Expert → Parameter list

Domestic hot water → 5/6 → 1660

Factory setting: Domestic hot water release

Domestic hot water release

The circulation water pump operates when domestic hot water heating has been released

Time programme 4/domestic hot water

The circulation water pump follows time programme 4 on the controller. In such cases, the circulation water pump is on when the time programme is released and off when the time programme is not released.

13.7 Cooling circuit

The *Cooling circuit control* accessory is required to control the cooling circuit. The heat pump can control 3 cooling circuits.

Device-specific settings for cooling circuits are selected at *Expert* level. Settings must be selected for each circuit individually. Cooling circuits should be activated on the *Configuration* menu on the user terminal. When they have been switched on, the cooling circuit will be activated when the supply water sensor is connected to the controller.

When refrigeration operation is released, a bar will appear on the screen beneath the symbol. Refrigeration operation can be selected by pressing the refrigeration operation button. Refrigeration operation is active when the heating operation bar is not shown.

Refrigeration operation features:

- Refrigeration operation in accordance with a time programme
- In accordance with the temperature setpoint, "Comfort value, refrigeration"
- Protective functions active
- Refrigeration threshold in accordance with the outdoor temperature

TAKING COOLING CIRCUITS INTO USE

The cooling circuit should be taken into use on the configuration menu. Set the circuit to the "4-pipe system cool." mode and install the supply water sensor, which will activate the cooling circuit.

Menu: Expert → Parameter list

Configuration → 2/43 → 5711 Cooling circuit 1

Configuration → 3/43 → 5716 Cooling circuit 2

Configuration → 4/43 → 5722 Cooling circuit 3

OPERATING MODE

Menu: Expert → Parameter list

Cooling circuit 1 → 1/11 → 901

Cooling circuit 2 → 1/11 → 1201

Factory setting: Automatic

The operating mode can be set using the room unit's operating mode button or the control rows referred to above.

OFF:

Refrigeration operation is off.

Automatic:

In automatic mode, the room temperature is regulated in accordance with the time programme and between the *Comfort* and *Reduced* setpoint s.

SETPOINT S

Adjust the setpoint s on the *Cooling circuit* menu. When refrigeration operation is in *Automatic* use, the controller follows the *Comfort* and *Reduced* setpoint s.

Menu: Expert → Parameter list

Cooling circuit 1 → 1/11 → 902

Cooling circuit 1 → 1/11 → 1202

Comfort operation setpoint

The room temperature is regulated during refrigeration operation in accordance with the comfort operation value set here. The comfort value for refrigeration can also be adjusted using the room unit's turnbutton.

Factory setting: 23°C

Reduced setpoint

The room temperature is regulated during refrigeration operation in accordance with the reduced value set here.

Factory setting: 25°C

CHARACTERISTIC REFRIGERATION CURVE

The controller determines the required supply water setpoint in accordance with the refrigeration curve on the basis of the outdoor temperature. The characteristic refrigeration curve is determined by setting two fixed points (the supply water setpoint at outdoor temperatures of 25°C and 35°C).

Supply water setpoint at an outdoor temperature of +25°C:

Menu: Expert → Parameter list

Cooling circuit 1 → 2/11 → 908

Cooling circuit 2 → 2/11 → 1208

Supply water setpoint at an outdoor temperature of +35°C:

Menu: Expert → Parameter list

Cooling circuit 1 → 3/11 → 909

Cooling circuit 2 → 3/11 → 1209

Supply water setpoint /OT 25°C

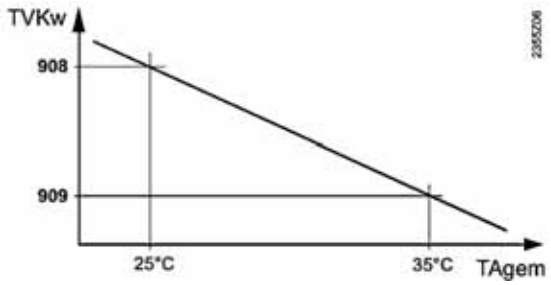
This governs the supply water temperature required for refrigeration at a mixed outdoor temperature of 25°C, without taking summer compensation into consideration.

Factory setting: 21°C

Supply water setpoint /OT 35°C

This governs the supply water temperature required for refrigeration at a mixed outdoor temperature of 35°C, without taking summer compensation into consideration.

Factory setting: 18°C



TVKw Setting value for refrigeration supply water

TAgem Mixed outdoor temperature

The set characteristic refrigeration curve is based on a setpoint of 25°C for the room temperature. If the setpoint for the room temperature is altered, the characteristic refrigeration curve will automatically change to correspond to the new value.

Refrigeration threshold at OT:

If the mixed outdoor temperature is above the refrigeration threshold, refrigeration will be released. if the mixed outdoor temperature decreases by at least 0.5 K below the refrigeration threshold, refrigeration will be prevented.

Factory setting: 20°C

Menu: Expert → Parameter list

Cooling circuit 1 → 3/11 → 912

Cooling circuit 2 → 3/11 → 1212

Heating/refrigeration locking time:

The locking time between heating and refrigeration operation. When heating is connected for summer operation, refrigeration operation will be prevented for a period corresponding to the reference value set here.

Factory setting: 8 hours

Menu: Expert → Parameter list

Cooling circuit 1 → 3/11 → 913

Cooling circuit 2 → 3/11 → 1213

LIMITS TO SUPPLY WATER SETPOINT S

A lower limit can be set for the temperature of the supply water used for refrigeration. The limit curve is determined by setting two fixed points. The resulting setpoint for supply water also has a lower limit, which cannot be below 5°C.

Supply water min. setpoint /OT 25°C

This setting determines the lowest permitted supply water temperature at a mixed outdoor temperature of 25°C.

Factory setting: 18°C

Menu: Expert → Parameter list

Cooling circuit 1 → 5/11 → 923

Cooling circuit 2 → 5/11 → 1223

Supply water min. setpoint /OT 35°C

This setting determines the lowest permitted supply water temperature at a mixed outdoor temperature of 35°C.

If no acceptable outdoor temperature value is available, the controller uses the parameter "Supply water min. setpoint /OT 35°C".

Factory setting: 18°C

Menu: Expert → Parameter list

Cooling circuit 1 → 5/11 → 924

Cooling circuit 2 → 5/11 → 1224

EFFECT OF THE ROOM SENSOR

If a room temperature sensor is used for the system, room compensation can be specified for the controller.

Room effect:

This setpoint should be high if you would like the room temperature to have a greater effect on the temperature of the supply water for refrigeration.

Adjustment range: 0–100%

Factory setting: 80%

Menu: Expert → Parameter list

Cooling circuit 1 → 6/11 → 928

Cooling circuit 2 → 6/11 → 1228

13.8 Heat pump settings

The heat pump settings determine the switching differences and threshold values that activate the device, and the additional heat sources. The factory settings guarantee basic functionality, but the system's functionality can be optimised by inspecting the following settings.

THRESHOLDS FOR THE CHARGING PUMP'S ROTATION SPEED (2792/2793)

The rotation speed of the heat pump's charging pump (Q9/LP) is controlled. When the compressor is active, the pump operates between the set minimum and maximum rotation figures, keeping the charging temperature difference at the setpoint. This function enables the best efficiency for the heat pump.

The pump also rotates when the compressor is turned off; in this case, the controller drives the pump at the minimum rotation speed. When you are selecting thresholds for the pump's rotation speed, keep in mind the minimum flow rate for the heat pump model in question. The charging flow rate must not fall below the heat pump's minimum flow rate. This could cause the device to malfunction. See the section entitled *Technical information* for the minimum flow rate specific to your model.

Menu: Expert → Parameter list

Heat pump → 3/23 → 2792 minimum rotation figure

Heat pump → 3/23 → 2793 maximum rotation figure

Pump minimum rotation figure, 2792:

Permitted adjustment range: 40–70%

Factory setting: 50%

Pump maximum rotation figure, 2793:

Permitted adjustment range: 70–100%

Factory setting: 100%

NOTE: If you reduce the maximum rotation figure, check the minimum flow rate using a flowmeter at the charging line controller valve.

RETURN WATER TEMPERATURE SWITCHING DIFFERENCE (2840)

The setpoint for the return water switching difference determines the heat pump activation limits in systems controlled by return water. Systems controlled by return water are devices where there is no heating accumulator measurement. This setpoint has no effect in systems that have heating accumulator measurement B4.

The compressor switches on and off in accordance with the return water temperature (B71) and the return water temperature switching difference.

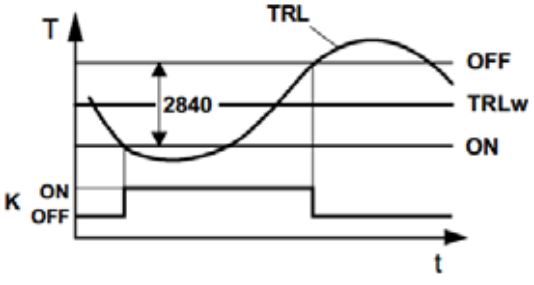
- If you increase the setpoint, the compressor will operate for a longer period in heating operation.
- If you decrease the setpoint, the compressor will operate for a shorter period in heating operation.

Menu: Expert → Parameter list

Heat pump → 9/23 → 2840 Return water temp. switching difference

Adjustment range: 1°C–20°C

Factory setting: 6°C

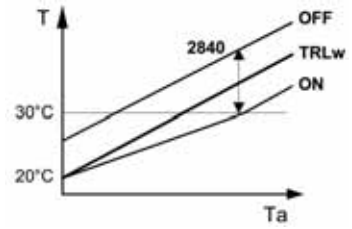


2840 Return water temperature switching difference

OFF	Switch-off point
ON	Switch-on point
TRLw	Return water temperature setpoint
K	Compressor

When the return water temperature exceeds the setpoint by half of the switching difference, the compressor switches off. When the return water temperature falls below the setpoint by half of the switching difference, the controller switches the compressor on.

If the return water temperature falls below 30°C, the switching difference is reduced so that the switch-on point approaches the setpoint. If the return water setpoint is 20°C, the switch-on point is the same as the return water setpoint.



2840 Return water temperature switching difference
TRLw Return water temperature setpoint
T Heat pump return water temperature
OFF Switch-off point
ON Switch-on point
Ta Outdoor temperature

SETTING THE COMPRESSOR SWITCH-OFF TEMPERATURE IN HEATING OPERATION (2855)

This setting is used on systems with a pump heating circuit (without a mixing valve) where the supply water temperature is precisely limited.

Factory setting: 60°C

The controller settings include a setting for the compressor switch-off temperature (2844/65°C), which stops the compressor when the supply water measurement exceeds the setpoint. This setting must not be altered.

If the heating system (such as floor heating) requires a fixed threshold for supply water, a specific threshold for heating operation should be set on control row 2855.

13.9 Compressor 2 control

The heat pump has two compressors, and control of these can be managed in the controller's settings.

COMPRESSOR 2 BLOCK (2860)

The heat pump's second compressor can be prevented from producing domestic hot water. If domestic hot water is charged with two compressors, the volume of the domestic hot water accumulator should be large enough that the compressor can be on for the minimum operation period (15 minutes) during charging.

Menu: Expert → Parameter list → Heat pump → Control row 2860, Step 2 block in DW

Factory setting: On (block active)

COMPRESSOR 2 OUTDOOR TEMPERATURE RELEASE (2861)

The operation of the heat pump's second compressor can be limited in accordance with the outdoor temperature. By setting an outdoor temperature limit for the compressor, the controller controls only one compressor above the set temperature limit and releases the other compressor for use when the damped outdoor temperature falls below the setpoint.

Menu: Expert → Parameter list → Heat pump → Control row 2861, Compr. 2 release below out. temp.

Factory setting: --- (not in use)

COMPRESSOR 2 BLOCK TIME (2862)

The activation of the heat pump's second compressor can be managed using block times and degree minute release settings. As soon as the first compressor activates, the block time for the second compressor begins to count down. The block time determines how long the second compressor waits below the setpoint before it begins to reduce the temperature deficit. Increase the block time to increase the delay before compressor 2 starts up.

Menu: Expert → Parameter list → Heat pump → Control row 2862, Step 2 block time

Factory setting: 10 minutes

COMPRESSOR 2 RELEASE (2863)

The release of the heat pump's second compressor for heating operation is determined in degree minutes from the temperature deficit that must be reduced. The greater the difference between the temperature and the setpoint, the faster the second compressor step will switch on. Increase the setpoint to increase the delay before the second compressor step switches on.

Menu: Expert → Parameter list → Heat pump → Control row 2863, Compr. 2 degree minutes

Factory setting: 100°C min

13.10 Heater control

NOTE: ALL HEATERS MUST BE EQUIPPED WITH THERMOSTATS!

The heating system's heaters can be controlled by the heat pump's controller. Heaters can function in several different ways. When programming, the user should be aware of the intended mode of operation of heaters. Should the heaters only operate in the event of a malfunction, in addition to the compressor to output domestic hot water and heating, for the anti-bacteria function, as additional power when charging domestic hot water or to supplement heating? By default, the heaters are programmed to supplement heating.

NOTE: In cascade systems with several devices, the heaters used for heating (K25 and K26) are controlled by the first device that DOES NOT PRODUCE domestic hot water.

PROGRAMMING HEATERS

The controller has three relay controls for managing heaters. The relay controls should be programmed to correspond to switching.

NOTE: If a heater control is not connected to a relay output, the control row should be programmed "*None*".

Supply water electric heater K25 (relay output QX1)

Menu: Expert → Parameter list

Configuration → 11/43 → 5890

Supply water electric heater K26 (relay output QX2)

Menu: Expert → Parameter list

Configuration → 11/43 → 5891

Domestic hot water electric heater K6 (relay output QX3)

Menu: Expert → Parameter list

Configuration → 12/43 → 5892

MODE OF OPERATION OF HEATERS K25/K26

Heater control (K25/K26) operates in accordance with the *Compensate* function by default. In this case, the heater is not activated when the compressor is operating. The mode of operation can be changed in the menu on the user terminal. Changes are made at *Expert* level.

Operation electricity-supply water

Menu: Expert → Parameter list

Heat pump → 13/23 → 2880

Factory setting: Compensate

Compensate: Heater control is only used in the event of a malfunction.

Alongside compressor, LP: Heater control is used to supplement the compressor in heating use.

Alongside compressor, HDW: Heater control is used to supplement the compressor for domestic hot water. In heating use, the heater operates in accordance with the *Compensate* function.

NOTE: When using this setting, the supply water electric heaters (K25/K26) should be placed in the system so that they are able to heat the domestic hot water.

LP and dom. water. full: Heater control is used to supplement the compressor for domestic hot water and heating.

NOTE: When using this setting, the supply water electric heater (K25/K26) should be placed in the system so that it is able to heat the domestic hot water and heating.

Anti-Legionella function: The heater operates as in the *Compensate* function and the control is active in Legionella operation.

NOTE: When activating the Legionella function, consider whether the supply water heater can heat the domestic hot water hydraulically. If the supply water heaters are connected to the heating line, the K6 heater should assist in heating.

Electrical supply water block time

The heater control is allowed to activate only when the block time set in the parameter has elapsed after the compressor has started up.

The block time is only taken into consideration when the control is used to supplement compressor operation. If the electric heater setting is “Compensate”, the block time is not taken into consideration.

The return water temperature must fall below the switching difference before the controller begins counting down the block time.

Menu: Expert → Parameter list

Heat pump → 13/23 → 2881

Adjustment range: 0–255 minutes

Factory setting: 2 minutes

Electrical supply water release integral

When two- or three-step flow-through resistance is used, the steps are released in accordance with the release and restore integral (2882 and 2883).

Menu: Expert → Parameter list

Heat pump → 13/23 → 2882

Adjustment range: 0–500°C min

Factory setting: 80°C min

Electrical supply water restore integral

If the condition value is above the switch-on point, the controller switches off the (regulated) step that was most recently connected and begins creating a restore integral from any excess heat.
Next, the lower step is switched off when the excess heat reaches the set restore integral (2883).
The release integral must be reached again in order or a new release to occur.

Menu: Expert → Parameter list

Heat pump → 14/23 → 2883

Adjustment range: 0–500°C min

Factory setting: 20°C min

Electrical supply w. rel. below OT

This setting is only taken into consideration when heater control is used to supplement compressor operation (2880). When “Compensate" is set, the electric heater is always released.

The electric heater is only released when the damped outdoor temperature is below the temperature set here.

Menu: Expert → Parameter list

Heat pump → 14/23 → 2884

Adjustment range: (---)** -30–+30°C

Factory setting: ---

**No specified release temperature

DOMESTIC HOT WATER HEATER MODE OF OPERATION

NOTE: ALL HEATERS MUST BE EQUIPPED WITH THERMOSTATS!

Heater control K6 operates in accordance with the *Compensate* function by default. In this case, the heater is not activated when the compressor is operating. The mode of operation can be changed in the menu on the user terminal. Changes are made at *Expert* level.

Menu: Expert → Parameter list

Domestic hot water accumulator → 5/11 → 5060

Factory setting: Compensate

Compensate: The heater control takes care of charging domestic hot water if the heat pump malfunctions.

Summer: When all heating circuits are switched to summer operation, heater control handles domestic hot water charging from the next day on.
When used for heating, the heater control operates in accordance with the *Compensate* function.

Always: Domestic hot water is always charged using heater B3 in accordance with the accumulator's measurement sensor.

Refrigeration use: When the heat pump is used for refrigeration, domestic hot water is charged by the heater.
When used for heating, the heater control operates in accordance with the *Compensate* function.

Anti-Legionella function: If the heat pump has a programmed anti-bacteria function, the function is performed by the K6 heater.

SETTING HEATER THERMOSTATS

Heaters installed in the accumulator should always be equipped with thermostats. Heater thermostats should be set at a value that is high enough to permit the heat pump to complete charging. In the heating accumulator, the thermostat's setpoint should correspond to the highest heating circuit.

Example: domestic hot water:

Heat pump setting for the domestic hot water value: +55°C. The thermostat should be set to +65°C.

This ensures that the heat pump is able to charge domestic hot water to the nominal setpoint.

Example: radiator heating:

The *supply water maximum setpoint* defined for the radiator heating circuit is +60°C. The thermostat should be set to +70°C.

Example: floor heating:

The *supply water maximum setpoint* defined for the floor heating circuit is +40°C. The thermostat should be set to +45°C.

13.11 Control of additional heat sources

Additional heat sources are heating devices operating with the heat pump system to generate additional heat for the heating and/or domestic hot water system. Additional heat sources may include biogas, oil, electricity, pellets or district heating. Additional heat sources can be controlled using terminal information, as well as with 0–10 V regulation messages. The building's heating needs are primarily met by the heat pump. If the power/heat does not meet the setpoint, the heat pump activates the additional heat source.

Additional heat sources can be taken into use at the *Expert* level.

Activating an additional heat source:

Menu: Expert → Parameter list → Configure expansion module

Control row 7303 = Heat request K27

Control row 7348 = Power request

Control row 7349 = Standard

Control row 7350 = 0–10 V

Additional heat source adjustments:

Menu: Expert → Parameter list → Additional source

Setpoint increase main source (3690): When an additional heat source is released, the heat pump's setpoint is increased by the amount of the setpoint. With this setting

Adjustment range: 0°C–10°C

Factory setting: 2°C

Main producer power limit (3691): This setting is not in use.

Domestic hot water charging (3692): The additional heat source is used to charge domestic hot water.

NOTE: Before changing this setting, ensure that charging is hydraulically possible.

Factory setting: Depends on the device diagram

Outdoor temperature threshold HDW charging (3694): If the additional heat source is *locked* during domestic hot water production, this parameter enables the state to be bypassed in accordance with the outdoor temperature.

Factory setting: Alert

Release below outdoor temperature (3700): The additional heat source is only released when the damped outdoor temperature is below the temperature set here.

Factory setting: ---

Release above outdoor temperature (3701): The additional heat source is only released when the damped outdoor temperature is above the temperature set here.

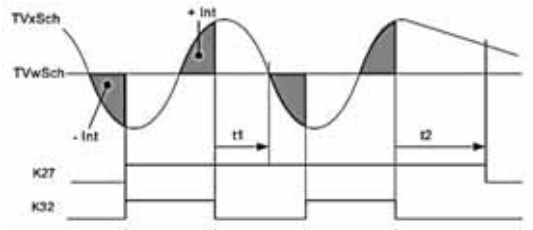
Factory setting: ---

Post-operation (3705): This setting determines how long the K27 control will remain on after the B10 measurement reaches the setpoint.

Factory setting: 5 minutes

Switching integral (3720): When relay control K32 is used to regulate the temperature, the relay is released and restored in accordance with the set integral value.

Factory setting: 50°C min



TVxSch	Common supply water temperature (B10)
TVwSch	Common supply water setpoint
+Int	Restore integral (3720)
-Int	Release integral (3720)
t1 / t2	Post-operation time
K27	Release of additional source K27
K32	Regulation K32

Switching difference Off (3722): If the common supply water temperature exceeds this setting by the switching difference, the additional heat source is immediately switched off regardless of any other factors.

Factory setting: 5°C

Block time (3723): When the common supply water temperature falls below the setpoint, the controller counts down the block time, after which additional heat source control begins.

Factory setting: 30 minutes

13.12 Solid fuel boiler control

Solid fuel boilers are heating devices that operate alongside the heat pump system and generate heat in amounts that cannot be precisely controlled. These include wood boilers or fireplaces. The heat pump requires the *Boiler control (KPAKO1A)* accessory. *Boiler control* includes a supply water measurement sensor (B22) and an accumulator measurement sensor (B4) to enable boiler control. Boiler control is pre-programmed at the factory. Device-specific settings should be selected when this option is taken into use.

Menu: Expert → Parameter list → Solid fuel boiler

Minimum setpoint (4110): The boiler's charging pump (Q10) is taken into use when the B22 measurement sensor reaches the minimum setpoint. However, the temperature must be higher than the accumulator temperature.

Factory setting: 35°C

13.13 Heat request (VAK control)

It is possible to control the heat pump using a higher-level automation system by sending *Heat request* control messages. Control messages (0–10 V) are sent to the heat pump's Hx contact, which should be activated on the *Configuration* menu. When the heat pump is controlled with *0–10 V Heat requests,* all secondary network regulations and controls should be controlled by the building automation system.

0 V = 0°C

10 V = 60°C**

** 10 V value can be changed on control row 5956

Consumer's request VK2 10 V: The heat pump receives a heat request that the device sends to the heating network in accordance with a measurement by the B10 supply water sensor.

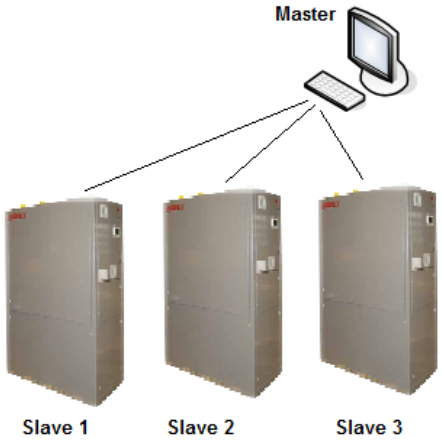
NOTE: When the heat pump is controlled using external heat request messages, the heating circuits should be controlled by building automation. The heating circuits should be set to OFF on the heat pump when messages are used. See the section entitled *Taking heating circuits into use* for more information on settings.

13.14 ModBus communication

The ModBus communication connection (MODBUS350) enables the device's temperatures, status information, setpoint s and malfunctions to be read by a higher-level automation system. With a ModBus350 connection, a setpoint can be specified for the temperature at which the heat pump will output heat to the accumulator or heating network.

MODBUS DESCRIPTION

The master-slave protocol means that one master device and 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 between 1 and 247.



NETWORK TOPOLOGY

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 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.

MODBUS FRAMEWORK (RTU)

There are two Modbus data transfer methods: RTU and ASCII. The data framework for a byte is determined on the basis of the data transfer method. RTU is mandatory, and all Gebwell devices use it by default.

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:

Specify the slave device. Every device must have a unique address. The address can be between 1 and 247.

Function code:

Specify the request that the master device sends to the slave device. The most commonly supported function codes are listed in the following table.

Function code	Description
01	Coils - number
02	Discrete Inputs - number
03	Holding Registers – number
04	Input Registers – number
05	Single Coil – writing
06	Single Register – writing
15	Multiple Coil – writing
16	Multiple Registers - writing

DATA TRANSFER CABLES

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.

SYSTEM ADDRESSES

	ID	Read/Write	Register address	Unit	Resolution (reading distributor)	Lower limit (°C)	Upper limit (°C)	Master device	Slave devices
External measurements:									
Domestic hot water accumulator temperature	B3	R	11264	°C	1/64	0	140	x	
Domestic hot water consumption	B38	R	12302	°C	1/64	-28	350	x	
Common supply water temperature	B10	R	18436	°C	1/64	0	140	x	
Outdoor temperature	B9	R	35851	°C	1/64	-50	50	x	
LP 1, supply water temperature	B1	R	1046	°C	1/64	0	140	x	x
LP 2, supply water temperature	B12	R	4118	°C	1/64	0	140	x	x
Heat pump measurements:									
Heat pump supply water	B21	R	20484	°C	1/64	0	140	x	x
Heat pump return water	B71	R	20480	°C	1/64	0	140	x	x
Collector inbound	B91	R	20871	°C	1/64	-28	350	x	x
Collector outbound	B92	R	20877	°C	1/64	-28	350	x	x
Compressor 1 hot gas	B81	R	20856	°C	1/64	-28	350	x	x
Compressor 2 hot gas	B82	R	20859	°C	1/64	-28	350	x	x
Intake gas temperature	B85	R	20887	°C	1/64	-50	180	x	x
Evaporator pressure	H82	R	20891	bar	1/100	-50	500	x	x
Condenser pressure	H83	R	20865	bar	1/100	-50	500	x	x
Condenser temperature difference	L Δt	R	20867	°C	1/64	-50	140	x	x
Evaporator temperature difference	H Δt	R	20869	°C	1/64	-50	140	x	x
Readable settings:									
*Setpoint for return water	B71	R	20482	°C	1/64	0	140	x	x
**Common supply water setpoint	B10	R	18432	°C	1/64	0	140	x	
Setpoint for domestic hot water	B3	R	11379	°C	1/64	0	80	x	
Setpoint for additional source		R	30724	°C	1/64	0	140	x	
LP1, setpoint for supply water	B1	R	1048	°C	1/64	0	140	x	x
LP2, setpoint for supply water	B12	R	4120	°C	1/64	0	140	x	x
Status information:									
Heat pump status		R	20556	see status information		0	1000	x	x
Compressor 1 status information	K1	R	20834	0=off / 1=on		0	1	x	x
Compressor 2 status information	K2	R	20836	0=off / 1=on		0	1	x	x
Domestic hot water heater status information	K6	R	11371	0=off / 1=on		0	1	x	

	ID	Read/Write	Register address	Unit	Resolution (reading distributor)	Lower limit (°C)	Upper limit (°C)	Master device	Slave devices
Electric heater 1 status information	K25	R	20838	0=off / 1=on		0	1	x	x
Electric heater 2 status information	K26	R	20840	0=off / 1=on		0	1	x	x
~~Additional heat source status~~	~~K27~~	~~R~~	~~30754~~	~~0=off / 1=on~~	-	~~0~~	~~1~~	~~x~~	-
Change-over valve status information	Q3	R	38420	0=heat. / 1=DW		0	1	x	
Source pump status	Q8	R	20842	0=off / 1=on		0	1	x	x
Source pump rotation speed	Q8	R	20844	%		0	100	x	x
Charging pump status	Q9	R	20846	0=off / 1=on		0	1	x	x
Charging pump rotation speed	Q9	R	20848	V	1/100	0	100 (10)	x	x
DW charging pump rotation speed	Q34	R	37906	% (inverse)	1/100	0	100	x	
Additional heat source status	K27	R	30754	0=off / 1=on		0	1	x	
Additional heat source control message	Y27~~/UX1~~	R	37911	V	1~~/10~~	0	10	x	
Additiona heat source status		R	30726	check status information		0	1000	x	
Energy monitoring:									
Cumulative heat generation		R	29696	kWh (32-bit data)	1	0	999999	x	x
Cumulative energy consumption		R	29699	kWh (32-bit data)	1	0	350000	x	x
Cumulative efficiency (COP)		R	29702		1/100	0	10	x	x
Momentary energy generation		R	20823	kWh (32-bit data)	1/100	0	999999	x	x
Momentary energy consumption		R	20826	kWh (32-bit data)		0	999999	x	x
Momentary efficiency		R	20832			0	20	x	x
Operation monitoring:									
Compressor 1 operation time	K1	R	20505	h	1/3600	0	199999	x	x
Compressor 1 activation countdown	K1	R	20507	units	1	0	199999	x	x
Compressor 2 operation time	K2	R	20509	h	1/3600	0	199999	x	x
Compressor 2 activation countdown	K2	R	20511	units	1	0	199999	x	x
Domestic hot water electric heating operation time	K6	R	11272	h	1/3600	0	199999	x	
Domestic hot water electric heating activation countdown	K6	R	11274	units	1	0	199999	x	
Electric heater 1 operation time	K25	R	20517	h	1/3600	0	199999	x	x
Electric heater 1 activation countdown	K25	R	20519	units	1	0	199999	x	x
Electric heater 2 operation time	K26	R	20521	h	1/3600	0	199999	x	x
Electric heater 2 activation countdown	K26	R	20523	units	1	0	199999	x	x

	ID	Read/Write	Register address	Unit	Resolution (reading distributor)	Lower limit (°C)	Upper limit (°C)	Master device	Slave devices
Alerts:									
Alert	K10	R	35887	0=off / 1=on		0	1	x	x
Alert message		R	39040	see alert code		0	65535	x	x
Heat pump reset		R/W	20547	0=no / 1=yes		0	1	x	x
Writable settings:									
Setting value for domestic hot water	B3	R/W	10241	°C	1/64	8	80	x	
Domestic hot water on/off		R/W	10240	0 = OFF / 1 = ON		0	1	x	
Domestic hot water switching difference		R/W	11294	°C	1/64	3	20	x	
***Heat pump setpoint	B10	R/W	14337	°C	1/64	0	140	x	
HP operation prevention / HP start-up permission	EX21	R/W	45085	1=Released 0=Prevented		0	1	x	x
Free cooling	Hx1	R/W	36903	0=Released 1=Stop	1	0	1	x	
****Heat pump step control 1		R/W	36896	1	1	0	1	x	x
****Heat pump step control 2		R/W	36903	1	1	0	1	x	x
Heat pump settings:									
Heat pump min. rotation speed, DHW		R/W	20591	%	1	0	100	x	
Heat pump max. rotation speed, DHW		R/W	20593	%	1	0	100	x	
Charging pump min. rotation speed, HEAT		R/W	20557	%	1	0	100	x	x
Charging pump max. rotation speed, HEAT		R/W	20558	%	1	0	100	x	x
Source pump min. rotation speed		R/W	20583	%	1	0	100	x	x
Source pump max rotation speed		R/W	20582	%	1	0	100	x	x
Heat pump switching difference		R/W	20569	°C	1/64	1	20	x	x
Condenser temperature difference setpoint, HEAT		R/W	20562	°C	1/64	1	20	x	x
Condenser temperature difference setpoint, DW		R/W	20617	°C	1/64	1	20	x	x
Evaporator temperature difference setpoint		R/W	20568	°C	1/64	2	10	x	x
Compressor settings:									
Compressor 2 block for domestic hot water charging		R/W	20668	0 = OFF / 1 = ON	1	0	1	x	
Step 2 block time		R/W	20671	min	1	0	40	x	
Release integral		R/W	20672	°C min	1	0	500	x	

	ID	Read/Write	Register address	Unit	Resolution (reading distributor)	Lower limit (°C)	Upper limit (°C)	Master device	Slave devices
Writable additional heat source setpoint s:									
Release integral		R/W	30729	°Cmin	1	1	500	x	
Locktime		R/W	30732	min	1	1	120	x	
Outdoor temperature release		R/W	30720	°C	1/64	-50	50	x	
Heat pump's set point increase in add. heat source start		R/W	30727	°C	1/64	0	10	x	
Writable heating circuit setpoints:									
Heating circuit 1									
Setpoint		R/W	1025		1/64	4	35	x	
Reduced setpoint		R/W	1026		1/64	4	35	x	
Protection operation setpoint		R/W	1027		1/64	4	35	x	
Heating curve gradient		R/W	1028		1/50	0.1	4.0	x	
Supply water min. value		R/W	1034	°C	1/64	8	95	x	
Supply water max. value		R/W	1035	°C	1/64	8	95	x	
Directional transfer		R/W	1029		1/64	-4.5	4.5	x	
Heating circuit 2									
Setpoint		R/W	4097		1/64	4	35	x	
Reduced setpoint		R/W	4098		1/64	4	35	x	
Protection operation setpoint		R/W	4099		1/64	4	35	x	
Heating curve slope		R/W	4100		1/50	0.1	4.0	x	
Supply water min. value		R/W	4106	°C	1/64	8	95	x	
Supply water max. value		R/W	4107	°C	1/64	8	95	x	
Directional transfer		R/W	4101		1/64	-4.5	4.5	x	

The Modbus registers are 2-byte/16-bit. Registers 42016 and 42017 should be written at the same time (function code 0x10)

***The return water setpoint** is a device-specific setpoint that can be read from the register. The setpoint s can differ from each other. This may occur when domestic hot water and heating are produced simultaneously.

****The common supply water setpoint** is a common setpoint for the entire heating system. If an external setpoint is written to the device, the value in question should be the same as this value.

*****Heat pump setpoint** Writing external values should be activated on the controller's menu. See the section entitled ***Adjustments > External control***

******The heat pump step control** is a control method for a higher-level automation system. When the step control system is used, heat pumps operate as a heat source of the higher-level automation system, in which case each heat pump takes care of its own operation only, based on the specified limit values and safety limits. The higher-level automation system must control the starting and stopping of the step control. In systems with multiple devices, the cascade system regulation must be controlled by a higher-level automation system. In devices with two compressors (Gebwell Taurus), the heat pump is controlled in two steps, in which case the internal automation system takes care of switching between these two steps and the starting order. The power step order must always be taken into account in starts and stops. Starting order is 1-2 and stopping order 2-1. The higher-level automation system must take into account the minimum running times and minimum resting times of the compressors on a device-by-device basis.

SYSTEM STATUS INFORMATION

2	Fault
3	Limiter has tripped
4	Manual control active
5	Chim sweep fct, high-fire
6	Chim sweep fct, low-fire
7	Chimney sweep funct active
8	Locked, manual
9	Locked, automatic
10	Locked
11	Protective start
12	Protective start, low-fire
13	Return limitation
14	Return limitation, low-fire
15	Released
16	Released, low-fire
17	Overrun active
18	In operation
19	Released
20	Min limitation
21	Min limitation, low-fire
22	Min limitation active
23	Frost prot plant active
24	Frost protection active
25	Off
26	Emergency operation
27	Locked, externally
28	Limit source temp min
29	High-press in HP mode
30	Flowswitch heat source
31	Press switch heat source
32	Limit hot-gas compr1
33	Limit hot-gas compr2
34	Limit switch-off temp max
35	Compr off time min active
36	Compens surplus heat
37	Limitation time active
38	Compr run time min active
39	Compensation heat deficit
40	Limit diff condens max
41	Limit diff condens min
42	Limit diff evap max
43	Limit diff evap min
44	Compr and electric on
45	Compressors 1 and 2 on
46	Compressor 1 on
47	Compressor 2 on
48	Frost protection HP
49	Flow active
50	Released, evap ready
51	No request
52	Frost prot collector active
53	Recooling active
54	Max st tank temp reached
55	Evaporation prot active
56	Overtemp prot active
57	Max charging temp reached
58	Charging DHW
59	Charging buffer
60	Charging swimming pool
61	Min charg temp not reached
62	Temp diff insufficient
63	Radiation insufficient
64	El charg, emergency mode
65	El charg, source protection
66	Charg el imm heater
67	Forced charging active
68	Partial charging active
69	Charging active
70	Charged, max st tank temp
71	Charged, max charging temp
72	Charged, forced temp
73	Charged, required temp
74	Part charged, required temp
75	Charged
76	Cold
77	Recooling via collector
78	Recooling via heat gen/HCs
79	Discharging prot active
80	Charg time limitation active
81	Charging locked
82	Charging lock active
83	Forced, max st tank temp
84	Forced, max charging temp
85	Forced, legionella setp
86	Forced, nominal setp
87	El charging, legionella setp
88	El charging, nominal setp
89	El charging, reduced setp
90	El charging, frost prot setp
91	El imm heater released
92	Push, legionella setp
93	Push, nominal setp
94	Push active
95	Charging, legionella setp
96	Charging, nominal setp
97	Charging, reduced setp
98	Charged, legionella temp
99	Charged, nominal temp
100	Charged, reduced temp
101	Frost prot room active
102	Floor curing function active
103	Restricted, boiler protection
104	Restricted, DHW priority
105	Restricted, buffer
106	Heating mode restricted
107	Forced draw buffer
108	Forced draw DHW
109	Forced draw source
110	Forced draw
111	Opt start ctrl+boost heating
112	Optimum start control
113	Boost heating
114	Comfort heating mode
115	Optimum stop control
116	Reduced heating mode
117	Frost protection flow active
118	Summer operation
119	24-hour Eco active
120	Setback reduced
121	Setback frost protection
122	Room temp limitation
123	SLT test active
124	Charging restricted
125	Defrost active
126	Dripping
127	Active cooling mode
128	Passive cooling mode
129	Cooling down evaporator
130	Preheating for defrost
131	Electric charging defrost
132	Forced defrost active
133	Dew point monitor active
134	Cooling limit OT active
135	Locking time after heating
136	Flow temp setp incr hygro
137	Heating mode
138	Cooling mode off
139	Limit switch-off temp min
140	Heating off/cooling locked

141	Boiler frost prot active
142	Recooling via DHW/HCs
143	Charged, min charging temp
144	Cooling mode restricted
145	Limit swi-off temp max cool
146	Cooling mode locked
147	Hot
148	Cooling mode ready
149	Protection mode cooling
150	Cooling mode Comfort
151	Charg DHW+buffer+swi pool
152	Charging DHW+buffer
153	Charging DHW+swi pool
154	Charging buffer+swi pool
155	Heating mode source
156	Heated, max swi pool temp
157	Heated, setpoint source
158	Heated, setpoint solar
159	Heated
160	Heating mode solar off
161	Heating mode source off
162	Heating mode off
163	Assisted firing active
164	Electric charging, forced
165	Electric charging, substitute
166	In operation for HC
167	In part load op for HC
168	In operation for DHW
169	In part load op for DHW
170	In op for HC, DHW
171	In part load op for HC, DHW
172	Locked, solid fuel boiler
173	Released for HC, DHW
174	Released for DHW
175	Released for HC
176	Locked, outside temp
177	Limit flow min dew point
178	Limit flow min OT
179	Flow limit reached
180	3-ph current asymmetric
181	Low-pressure
182	Fan overload
183	Compressor 1 overload
184	Compressor 2 overload
185	Source pump overload
186	Flowswitch consumers
187	Operation limit OT min

188	Operation limit OT max
189	Limit source temp min water
190	Limit source temp min brine
191	Limit source temp max
192	Forced defrost compressor
193	Forced defrost fan
194	Defrost with compressor
195	Defrost with fan
196	Limit source temp min cooling
197	Electric on
198	Locked, Economy mode
199	Consumption
200	Ready
201	Standby charging
202	Frost prot cooling active
203	Full charging active
204	Locked, heating mode
205	Locked, source
206	Locked, buffer
207	Comp run time min activ, cool
208	Compr 1 and 2 on, cooling
209	Compr 1 on, cooling mode
210	Compr 2 on, cooling mode
211	Lockout position
212	Start prevention
213	Shutdown
214	Safety time
215	Startup
216	Standby
217	Home run
218	Prepurge
219	Postpurge
220	Controller stop active
221	Keep hot mode on
222	Keep hot mode active
223	Frost prot instant WH
224	Ignition
225	Settling time
226	Exotic gas operation
227	Drift test active
228	Special operation
229	Setting mode
230	Indiv boiler setting active
231	Start man drift test
232	Flue gas temp, switch-off
233	Flue gas temp, output red
234	Flue gas temp too high

235	Water pressure too low
236	Party function active
237	Transfer, legionella setpoint
238	Transfer, nominal setpoint
239	Transfer, reduced setpoint
240	Transfer active
241	Residual heat usage
242	Restratification active
243	Keep hot mode released
244	Source released
245	SLT limits output
246	Mains undervoltage
247	Temp drop protection active
248	Continuous pump operation
249	Charg opt energy, nominal
250	Charg opt energy, legio
251	Charg opt energy EU, nom
252	Charg opt energy EU, legio
253	Flow too low
254	Pumping off refrig, man
255	Collective state 255
256	Pumping off refrigerant
257	Start delay defrost
258	Compressor locked
259	Locked, source temp max
260	Locked, source temp min
261	Locked, return temp max
262	Locked, return temp min
263	Locked, flow temp max
264	Locked, flow temp min
265	Locked, cond temp max
266	Locked, evap temp min
267	Locked, hot-gas temp max
268	Limitation evap temp min
269	Limitation cond temp max
270	Limitation evap temp max
271	El imm heater locked
272	Hi-temp charging active
273	Fault soft starter 1
274	Fault soft starter 2
275	Flowswitch source int circ
276	Press switch source int circ
277	Air quality control
278	Humidity limitation
279	Ventilation switch
280	Night cooling
281	Stage 1

282	Stage 2
283	Stage 3
284	Boost ventilation
285	Cooling mode Reduced
286	Increase Reduced
287	Increase Protection
288	Locking time after cooling
289	Limit pres diff proc revers
290	Low -pressure compressor 2
291	High-press compr 2 in op
292	Automatic operation
293	Manual operation
294	Disabled, COP min
295	Disabled, energy price
296	Passive cool mode disabled
297	Flow switch suppl source
298	Warmer function active
299	Cooler function active
300	Adverse wind funct active

SYSTEM FAILURE LIST

0	No error
10	Outside sensor
11	Solar sensor
12	Wind sensor
20	Boiler sensor 1
22	Boiler sensor 2
25	Boiler sensor solid fuel
26	Common flow sensor
27	Common flow sensor 2
28	Flue gas temp sensor
30	Flow sensor 1
31	Flow sensor cooling 1
32	Flow sensor 2
33	Flow sensor HP
34	Condenser sensor
35	Source inlet sensor
36	Hot-gas sensor 1
37	Hot-gas sensor 2
38	Flow sensor prim contr
39	Evaporator sensor
40	Return sensor 1
42	Return sensor 2
43	Return sensor solid fuel
44	Return sensor HP
45	Source outlet sensor
46	Return sensor cascade
47	Common return sensor
48	Refrigerant sensor liquid
50	DHW sensor 1
52	DHW sensor 2
54	DHW flow sensor
55	St tank 2 DHW sens 1
56	St tank 2 DHW sens 2
57	DHW circulation sensor
58	DHW thermostat
60	Room sensor 1
61	Room unit 1
62	Room unit 1 type
64	Room unit 1 bus interr
65	Room sensor 2
66	Room unit 2
67	Room unit 2 type
68	Room sensor 3
69	Room unit 2 bus interr
70	Storage tank sensor 1
71	Storage tank sensor 2
72	Storage tank sensor 3
73	Collector sensor 1
74	Collector sensor 2
75	Bypass sensor
76	Special sensor 1
77	Air pressure sensor
78	Water pressure sensor
79	Brine sensor
80	LPB no communication
81	LPB short-circuit/comm
82	LPB address collision
83	BSB short-circuit
84	BSB address collision
85	BSB Radio communication
86	PPS short-circuit
87	PPS 2 short-circuit
88	PPS no communication
90	Data loss in RAM
91	Data loss in EEPROM
92	Device electronics error
93	Change battery
94	Battery memory card
95	Time of day invalid
96	Minor SW failure
97	SW or HW failure
98	Extension module 1
99	Extension module 2
100	2 clock time masters
101	Par clock time source
102	Clock w ithout backup
103	Communication failure
105	Maintenance message
106	Source temp too low
107	Hot-gas compressor 1
108	Hot-gas compressor 2
109	Boiler temp supervision
110	Lockout SLT
111	Shutdow n limit thermost
112	Lockout flue gas SLT
113	Safety shutd flue gas
114	Shutd flue gas thermo
115	Shutd flue gas sensor
116	Shutd flue gas sensor
117	Water pressure too high
118	Water pressure too low
119	Shutd w ater press sw i
120	Fl temp prectrl too low
121	Flow temp HC1
122	Flow temp HC2
123	Flow temp DHW too low
124	Boiler temp too low
125	Boiler temp too high
126	DHW charg temp
127	Legionella temp
128	Loss of flame in op
129	Wrong air supply
130	Flue gas temp too high
131	Burner lockout
132	Safety shutdow n
133	Safety time exceeded
134	Common fault HP
135	Brine circuit
136	Press refrig circuit HP
137	No HP
138	No control sensor HP
140	LPB address not valid
141	LPB config not consist
142	No device on LPB
145	PPS w rong device type
146	146:Configuration error
147	BMU not connected
148	Incompatible LBP unit
149	Configuration FPF
150	BMU
151	BMU internal

152	Parameterization
153	Unit locked
154	Plausibility criterion
155	Reset locked
157	Boiler flow thermostat
158	Condensate
160	Fan speed threshold
161	Max fan speed
162	Air pressure switch
163	Modulation valve
164	Flow press sw itch HC
165	Priority circuit
166	Air pressure switch
167	Heating output limits
169	Sitherm Pro system
171	Alarm contact 1 active Hx1
172	Alarm contact 2 active Hx2
173	Alarm contact 3 active Hx3
174	Alarm contact 4 active Hx4
175	Error out FPF active
176	Water press 2 too high
177	Water press 2 too low
178	Limit thermostat HC1
179	Limit thermostat HC2
180	Chimney sw eep function
181	Controller stop function
182	Sitherm Pro drift test
183	Parameter setting mode
184	Modem function
185	Floor curing function
186	Configuration input
187	Configuration output
191	SLT has tripped
193	Start prevention
195	Water refill time
196	Water refill time/week
200	Fire/smoke alarm
201	Frost alarm
202	Supply air sensor
203	Airflow alarm
204	Fan overload
205	Pump/electric fault
206	Chiller
207	Fault cooling circuit
208	Flow supervision
209	Fault heating circuit
210	Fault SYNERGYR

211	Fault solid fuel boiler
212	Internal comm failure
213	Safety / blocking chain
214	Engine supervision
215	Fan, valve fault
216	Boiler fault
217	Sensor fault
218	Pressure supervision
220	AUX 1 alarm
221	AUX 2 alarm
222	Hi-press on HP op
223	Hi-press on start HC
224	Hi-press on start DHW
225	Low -pressure
226	Compressor 1 overlaod
227	Compressor 2 overlaod
228	Flow sw i heat source
229	Press sw i heat source
230	Source pump overload
231	Sensor B101
232	Sensor B102
233	Sensor B103
234	Sensor B104
235	Sensor B105
236	Sensor B106
237	Sensor B107
238	Sensor B108
239	Sensor B109
241	Flow sensor yield
242	Return sensor yield
243	Sw imming pool sensor
244	Fault source cascade
247	Defrost fault
253	Error cause ambiguous
254	Unknow n error code
255	See other error list
256	Heat exch thermostat
257	Casing sensor
258	Casing overtemp
259	CJC sensor
260	Flow sensor 3
261	Loss of flame Eng bu
262	Loss of fl Supp bu
263	Eng bu BCU failure
264	Supp bu BCU failure
265	BCU failure
266	Fan fault

267	Fan calibration
268	Spool valve fault
269	Spool valve calib
270	Exc temp diff h exch
271	Diffpressure too high
272	Diffpressure too low
273	Conffault pressensor
274	Zero flow protection
275	Zero flow aft deaer
276	Zero flow
277	Zero flow DHW
278	Max temp rise
279	Stirl manifold thermo
280	Inner iron overtemp
281	Dyn absorber tripped
282	G83/ENS/GIM
283	Altern overc trip
284	WCS overtemp
285	Alternat SC
286	Eng head overtemp
287	Eng head undertemp
288	Regenerat overtemp
289	WCS overt + inner iron
290	WCS overt + DA
291	WCS overt + G83
292	WCS overt + Alt
293	WCS overt + SC
294	WCS + eng head overt
295	WCS + eng head undert
296	WCS overt + Reg
298	False flame Eng bu
299	False flame Supp bu
300	Eng head undert SW
301	Eng head overt SW
302	Eng head tcouple diff
303	Eng head tcouple cont
304	Eng head t coupl lim
305	Eng under current
306	Black start failure
307	Engine stall
308	Stop resistor integrity
309	Pow er fail detection
310	Pow er mon comm fail
311	EGC comm failure
312	Bl start fail pump en
313	Bl start fail PSU sw
314	Bl start fail batt sw

315	Bl start fail socket en
316	Grid voltage OOR
317	Grid frequency OOR
318	GSM comm failure
319	Check configuration
320	DHW charging sensor
321	DHW outlet sensor
322	Water press 3 too high
323	Water press 3 too low
324	BX same sensors
325	BX/emodule same sens
326	BX/mgrp same sens
327	Emodule same funct
328	Mix group same funct
329	Emod/mgrp same funct
330	BX1 no function
331	BX2 no function
332	BX3 no function
333	BX4 no function
334	BX5 no function
335	BX21 no function
336	BX22 no function
337	B1 no function
338	B12 no function
339	Coll pump Q5 missing
340	Coll pump Q16 missing
341	Coll sensor B6 missing
342	Solar DHW B31missing
343	Solar integration missing
344	Solar buffer K8 missing
345	Sol sw i pool K18 missing
346	Boiler pump Q10 missing
347	Solid fuel boil comp sens
348	Solid fuel boil addr err
349	Buff valve Y15 missing
350	Buffer address error
351	Prim/sys pump addr err
352	Prless header addr err
353	Casc sens B10 missing
354	Special sensor 2
355	3-ph curr asymmetric
356	Flow sw itch consumers
357	Flow temp cooling 1
358	Soft starter
359	Div valve cool Y21 miss
360	Proc rev va Y22 miss
361	Source sens B91 miss
362	Source sens B92 miss
363	Compr sens B84 miss
364	Cool system HP w rong
365	Inst heater Q34 miss
366	Room temp sensor Hx
367	Room humidity sens Hx
368	Flow temp setp readjHx
369	External
370	Thermodynamic source
371	Flow temp HC3
372	Limit thermostat HC3
373	Extension module 3
374	Sitherm Pro calculation
375	BV stepper motor
376	Drift test limit value
377	Drift test prevented
378	Repetition internal
379	Repetition extran light
380	Repetition flame
381	Repetition startup
382	Repetition speed
383	No Repetition
384	Extraneous ligth
385	Mains undervoltage
386	Fan speed tolerance
387	Air pressure tolerance
388	DHW sensor no function
391	Room controller 1
392	Room controller 2
393	Room controller 3
394	Eng Bu BCU Com fail
395	Supp Bu BCU Com fail
396	Eng head tc cont integ
397	Eng head tc cont rise
398	Eng head tc lim integ
399	Eng head tc lim rise
400	Flow dir heat gen
401	EGC ARL relay defect
402	EGC ext electr missing
403	EGC Dumpload failure
404	EGC Stab Res failure
405	EGC ADC SEG OOR
406	EGC Backdumpl failure
407	EGC Backdumpl failure
408	EGC Backdumpl failure
409	Wrong EGC comm data
410	EGC eng signal failure
411	EGC Backdumpl active
412	EGC Backdumpl active
413	EGC Backdumpl active
414	EGC Backdumpl active
415	Eng frequency low
416	Eng unable to start
417	Eng RPV sensor
418	Eng RPV overtemp
419	Cooling w ater
420	Operation overtemp
421	Temp diff hex eng bu
422	State BCU Eng bu incon
423	State BCU Supp bu inco
424	Rep loss flame Eng bu
425	Rep. loss of fl Supp bu
426	Check flue gas damper
427	Config flue gas damper
428	Boiler flow Eng bu
429	Dyn w ater pres too high
430	Dyn w ater pres too low
431	Primary exch sensor
432	Function ground missing
433	Heat exch temp
434	EGC, no link to grid
435	EGC, ARL in lock state
436	EGC, supply feedb discr
438	Bus conflict LPB/BSB
439	Bus module not detect
441	BX31 no function
442	BX32 no function
443	BX33 no function
444	BX34 no function
445	BX35 no function
446	BX36 no function
447	BX6 no function
448	No messag receiver 1
449	No messag receiver 2
450	No messag receiver 3
451	No messag receiver 4
452	HX1 no function
453	HX3 no function
454	HX31 no function
455	HX32 no function
456	HX33 no function
457	BX7 no function
458	Instant WH sensor
461	Return sensor 3

462	BX8 no function
463	BX9 no function
464	BX10 no function
465	BX11 no function
466	BX12 no function
467	BX13 no function
468	BX14 no function
469	HX21 no function
470	HX22 no function
471	HX2 no function
472	Flow sensor cooling 2
473	Flow sensor cooling 3
474	Flow temp cooling 2
475	Flow temp cooling 3
476	Suction gas sensor
477	Evapor press sensor
478	HX/emodule same sens
479	No refrigerant selected
480	Suction gas sensor EVI

481	Evap press sensor EVI
482	Evapor temp sensor EVI
483	Soft starter 2
484	Div valve cool Y45 miss
485	Div valve cool Y46 miss
486	No EI receiver 1
487	No EI receiver 2
488	Condens press sensor
489	Cascade master miss
490	Cascade source miss
491	Max evaporation temp
492	K2/modulat incompatible
493	Outside air sensor
494	Outside air Q17 missing
495	Modbus no commcation
496	Flow sw source int circ
497	Pres sw sourc int circ
498	Air quality sensor Hx
499	External source missing

500	Modbus configuration
501	Suction gas sensor 2
502	Sourc int circ flow sens
503	Sourc int circ ret sens
504	Pres diff proc reversal
505	Expansion valve evap
506	Suppl source missing
507	Hi-press compr 2 in op
508	Hi-pr compr 2 start HC
509	Hi-pr compr 2 st DHW
510	Low -press compr 2
511	Leg temp circ pipe
512	No trend receiver 1
513	No trend receiver 2
514	Admin passw ord
515	Flow sw itch suppl sourc
516	Heat pump missing

~~The failure codes are shown in the section entitled *Troubleshooting table.*~~

MODBUS TROUBLESHOOTING CHECKLIST

No data transfer:

- Check that the address of the slave device is correct
- Check that the same address has not been used for more than one slave device
- Check the data transfer settings (data transfer method, baud rate, parity, stop bits). The settings must be the same on all of the devices in the serial connection
- Check that the polarity of the signal cables (A, B) is not conflicting
- Check the connections and screw connectors
- Check that the signal reference ground is connected to all the devices

Weak signal

- Check that the serial bus has the appropriate terminal resistances at both ends
- Check the network topology. Stars, rings and trunk buses connected to stars and clusters must be removed from the network
- Check the locations of cables. Do not cross high-voltage cables. Keep cables and devices away from major sources of interference
- Check that the cable's protective earth wire has been earthed appropriately
- Check whether the data transfer cable has adequate shielding

14 SYSTEM INFO

The user terminal shows information about the system's operating mode. The basic view on the user terminal shows the *Heat pump status.* If a room sensor is connected to the device, the user terminal shows the current indoor temperature. Not all of the status information shown on the display is to be treated as an alert. You can browse the device's status information and historical data at *Expert* level on the *Status* or INFO menus.

14.1 Special situations

In exceptional situation, the base unit's screen will show one of the following symbols:

Failure notifications

If this symbol appears on the screen, the device has a failure. See the information page failure notification.

Service or unusual operation

If this symbol appears on the screen, the device has issued a service notification or is operating in an unusual manner.

See the information page failure notification for more information.

14.2 Heat pump status information

The heat pump's status shows how the heat pump is functioning.

TEMPERATURE STATUS:

OFF: The heat pump is on but there is no active heat request

STOP: The heat pump is on but there is no active heat request Newer language version.

HEATING OPERATION: There is an active heat request and the compressor is on. The compressor is generating heating for the building or domestic hot water.

LIMIT PERIOD ACTIVE: A heat request is on but the compressor's minimum stop time is blocking the compressor from activating. The compressor will start up when the minimum stop time has elapsed.

EMERGENCY USE: Due to a failure, the heat pump has entered the emergency operation mode or the heat pump has been set to the emergency operation mode. The heat pump is heating the building using the electric heaters. The user terminal shows the alert clock symbol.

DISCONNECTION MAXIMUM LIMIT: A heat request is active but the compressor's charging has been interrupted as the supply water has reached the setpoint for the maximum limit. Charging will restart after the minimum stop time.

COMPRESSOR LOCKED: The compressor is locked because the temperature of the collector or charging circuit is too high or too low. The compressor will return to its normal state when the temperature is within the correct range.

PASSIVE REFRIGERATION OPERATION: The heat pump has switched to refrigeration operation. The soil solution pump is operating. Passive cooling does not use the compressor.

14.3 Heating circuit status information

The status of the heating circuits shows how the heating circuits are functioning.

COMFORT HEATING OPERATION: The heating circuit is functioning in accordance with the comfort setpoint.

REDUCED HEATING OPERATION: The heating circuit is functioning in accordance with the reduced setpoint.

PROTECTION OPERATION: The heating circuit is functioning in accordance with the protective setpoint.

HEATING OPERATION RESTRICTED: The heating circuit is restricted while domestic hot water is charged. The heating circuit will return to the set heating operation mode when the domestic hot water has been charged.

SUMMER OPERATION: The heating circuit is off due to summer operation. The heating circuit will return to the set heating operation mode when the outdoor temperature falls below the *Summer/Winter heating threshold*.

OFF: The heating circuit has been turned off.

14.4 Domestic hot water status information

CHARGED: The domestic hot water has been charged to the nominal value.

CONSUMPTION: The domestic hot water function is active. An electric regulation valve has been connected to the domestic hot water or the domestic hot water is being produced by a heat exchanger.

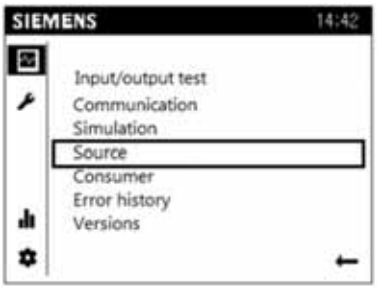
CHARGING ACTIVE: The device is producing domestic hot water.

ELECTRIC HEATER CHARGING: Domestic hot water charging is active using an electric heater.

14.5 Measurements

You can access the device's measurements by logging in at *Expert* level. Open the *Source* menu to see the following status and temperature information.

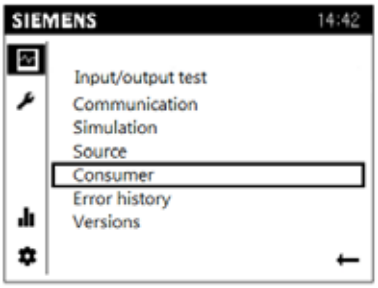
NOTE: Not all measurements are shown in all applications. Some of the measurements require accessories



Row number	Control row	Unit/status
8006	*Heat pump status*	*On / Off*
8400	*Compressor 1*	*on / stop*
8402	*Supply water electric heater 1*	*on / stop **
8403	*Supply water electric heater 2*	*on / stop*
8456	*Supply water electric heater run time Reset*	*h*
8457	*Supply water electric heater activation countdown Reset*	*units*
8404	*Soil solution pump*	*on / stop*
8405	*Soil solution pump rotation speed*	*%*
8406	*Condenser pump*	*on / stop*
8407	*Condenser pump speed*	*%*
8460	*Heat pump flow-through*	*l/min*
8410	*Heat pump return water temperature*	*°C*
8411	*Heat pump setpoint*	*°C*
8412	*Heat pump supply water temperature*	*°C*
8415	*Hot gas temperature*	*°C*
8425	*Condenser temperature difference*	*°C*
8426	*Evaporator temperature difference*	*°C*
8427	*Source inbound temperature*	*°C*
8428	*Source internal temperature minimum*	*°C*
8429	*Source outbound temperature*	*°C*
8430	*Source supply temperature minimum*	*°C*
8440	*Step 1 min. stop time remaining*	*min*
8442	*Step 1 min. run time remaining*	*min*
8450	*Compressor 1 run time*	*h*
8451	*Compressor 1 activation countdown*	*units*
3110	*Heat distribution*	*kWh*
3113	*Energy brought inside*	*kWh*
3116	*Performance factor*	
8395	*Heat produced*	*kW*
8397	*Energy consumption*	*kW*
8398	*Power ratio*	

The following status and temperature information is shown at *Expert* level on the *Consumer* menu:

Activate a title row by pressing the button (dark background) and roll to the desired measurement.



Row number	***Control row***	***Unit/status***
8700	*Outdoor temperature*	*°C*
8701	*Minimum outdoor temperature*	*°C*
8702	*Maximum outdoor temperature*	*°C*
8703	*Damped outdoor temperature (6-hour average temperature)*	*°C*
8704	*Mixed outdoor temperature*	*°C*
8730–8735	*Heating circuit 1 actuators*	*
8740	*Room temperature 1*	*°C*
8740	*Room setpoint 1*	*°C*
8743	*Supply water temperature 1*	--- **
Row number	***Control row***	***Unit/status***
8743	*Supply water setpoint 1*	*°C*
8770	*Room temperature 2*	*°C*
8770	*Room setpoint 2*	*°C*
8773	*Supply water temperature 2*	*°C*
8773	*Supply water setpoint 2*	*°C*
8827	*Flow-through heater pump (Q34) rotation speed*	*%*
8830	*Domestic hot water temperature 1 (B3)*	*°C*
8832	*Domestic hot water temperature 2 (B31)*	--- *
8840	*Domestic hot water pump run time*	*h*
8841	*Domestic hot water pump activation countdown*	*units*
8852	*Domestic hot water consumption temperature (B38)*	*°C*
8853	*Domestic hot water flow-through heater setpoint*	*°C*
8950	*Common supply water (B10) temperature*	*°C*
8951	*Common supply water setpoint*	*°C*

15 FAILURES

In most cases, the controller detects an operating failure and indicates it by showing a failure notification on the display. When a failure appears on the display, record the alert precisely in the maintenance record to facilitate possible service actions.

15.1 Alerts

When an alert is active, the  symbol will appear on the heat pump's display.

See the information page for more information about the alert. Always try to resolve the error yourself using the troubleshooting table first. If you cannot resolve the error, contact an authorised technician.

15.2 Troubleshooting

Follow these instructions if no failures are displayed.

Basic actions:

1. Check all of the connections
2. Check the fuses in the house and the heat pump
3. Check the residual current device

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/floor heating
- Open the thermostats in as many rooms as possible
- Adjust the room temperature on the *Heating circuit* menu instead of closing the thermostats
- The automation setpoint is too low
- Increase the comfort setpoint on the *Heating circuit* menu
- Increase the setpoint for the gradient of the heating curve on the *Heating circuit* menu
- Set the maximum value for supply water to a sufficiently high value on the *Heating circuit* 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
- Release the air from the heating system
- Closed valves between the accumulator and the heat pipe network
- Open the valves
- Activated an external contact for decreasing the room temperature
- Check any external contacts

High room temperature:

- The setpoint s 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 hot water is cold:

- The domestic hot water function is not active.
- Press the domestic hot water selection button until a black bar appears beneath the tap.
- 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 the *Domestic hot water* menu and increase the setpoint for domestic hot 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 on the Info menu
- The compressor's minimum 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 on the Info menu and take the necessary measures with the help of the troubleshooting table.

15.3 Troubleshooting table

No.: Failure message	Location	Description	Reason	Action	Action
10: Outdoor sensor	B9	Fault in the outdoor sensor or sensor not connected.	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
25: Solid fuel boiler sensor	B22	Fault in the boiler sensor.	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
26: Common supply water sensor	B10	Fault in the common supply water sensor for charging	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
30: Supply water sensor 1	B1	Fault in the supply water sensor in heating circuit 1	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
31: Supply water sensor refrigeration 1	B16	Fault in the refrigeration supply water sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
32: Supply water sensor 2	B12	Fault in the supply water sensor in heating circuit 2	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
33: Heat pump supply water sensor	B21	Fault in the heat pump's charging supply water sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
35: Source input sensor	B91	Fault in the collector input sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
36: Hot gas sensor 1	B81	Fault in the compressor 1 hot gas sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
37: Hot gas sensor 2	B82	Fault in the compressor 2 hot gas sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
44: Heat pump return water sensor	B71	Fault in the heat pump's charging return water sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
45: Source output sensor	B92	Fault in the collector output sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
50: Domestic hot water sensor 1	B3	Fault in the domestic hot water accumulator sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
60: Room sensor 1		Fault in the room sensor	Fault in the electrical system	Contact a technician	Check that the room sensor is connected and is not externally damaged. If necessary, contact an authorised technician
70: Additional accumulator sensor 1	B4	Fault in the heating accumulator's upper sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
71: Additional accumulator sensor 2	B41	Fault in the heating accumulator's lower sensor	Fault in the electrical system	Contact a technician	Check that the sensor is intact and correctly connected. Contact Gebwell maintenance if necessary.
81: LPB short circuit		There is a short circuit on the cascade system's internal bus	Fault in the electrical system	Contact a technician	Check that the bus cable is intact and correctly connected.
82: LPB address clash		The same address has been assigned to more than one heat pump in the cascade system	Fault in the control system	Contact a technician	Check the device addresses. Master device = 1, Device 2 = 2 etc… (LPB system)

No.: Failure message	Location	Description	Reason	Action	Action
98: Additional module 1		The controller does not detect expansion module 1 on the bus	Fault in the electrical system	Contact a technician	Check that the ribbon cable between the controllers is attached. Check that current is supplied to the expansion module (green light)
99: Additional module 2		The controller does not detect expansion module 2 on the bus	Fault in the electrical system	Contact a technician	Check that the ribbon cable between the controllers is attached. Check that current is supplied to the expansion module (green light)
100: 2 time hosts		The cascade system has two time hosts	Fault in the control system	Contact a technician	Check the LPB system to ensure that only the master device is set as a host (master) (LPB system)
102: No emergency clock operation		The battery in the controller's user terminal is running out	Fault in the electrical system	Contact a technician	Check that the display's ribbon cable is properly connected to the controller and the display
105: Service notification		A service notification has been programmed on the controller	Scheduled servicing of the heat pump	Contact a technician	Perform annual servicing of the equipment
106: Source temp. too low		The collector's input temperature is lower than the value set in the menu. The controller automatically restores the situation after 4 hours.	Flow rate too low in the collector	Check that the stop valves in the collector are open. Check the collector's sanitary trap. If necessary, contact a technician	Check the functionality of the collector.
107: Hot gas, compr. 1		This alert is triggered when the hot gas sensor shows 130°C. Three alerts are permitted within eight hours for automatic restoration.	Shortage of refrigerant. Expansion valve fault.	Contact a technician	Check the functionality of the refrigeration machinery
108: Hot gas, compr. 2		This alert is triggered when the hot gas sensor shows 130°C. Three alerts are permitted within eight hours for automatic restoration.	Shortage of refrigerant. Expansion valve fault.	Contact a technician	Check the functionality of the refrigeration machinery
117: Water pressure too high		The pressure transmitter programmed in the controller is measuring excess pressure in the system.	The pressure has risen in the system because of the temperature increase caused by charging.	Decrease the system's pressure to the planned level using the safety valve.	If necessary, contact a servicing or installation company
118: Water pressure too low		The pressure transmitter programmed in the controller is measuring low-pressure in the system.	The pressure in the system has fallen due to air release, breakage of the diaphragm expansion tank or a leak in the system.	Increase the system's pressure. If necessary, contact a servicing or installation company.	Perform a visual inspection for leaks. If the pressure repeatedly drops, conduct a pressure test on the system. Check the condition and pressure of the diaphragm in the diaphragm expansion tank
127: Anti-Legionella temperature		The heat pump has not reached the anti-Legionella temperature. The controller retries charging after the minimum stop time.	Domestic hot water has been consumed while the increase function was active.		
222: Heat pump operation overpressure	E10	The high-pressure switch has been triggered	The flow rate in the charging/heat pipe circuit is too low. The radiator or floor heating valves are closed or set too low. Air in the heating network. The pressures in the heating system are too low. Blocked sanitary trap.	Open the radiator/floor heating thermostats. Bleed the heating network. Check the network pressure. Clean the sanitary trap. Check that the charging pump is rotating. If necessary, contact a technician	Check the functionality of the heat pipe network

No.: Failure message	Location	Description	Reason	Action	Action
223: Heating circuit start-up overpressure	E10	The high-pressure switch has been triggered when activating heating	The flow rate in the charging/heat pipe circuit is too low. The radiator or floor heating valves are closed or set too low. Air in the heating network. The pressures in the heating system are too low. Blocked sanitary trap.	Open the radiator/floor heating thermostats. Bleed the heating network. Check the network pressure. Clean the sanitary trap. Check that the charging pump is rotating. If necessary, contact a technician	Check the functionality of the heat pipe network
224: Domestic hot water start-up overpressure	E10	The high-pressure switch has been triggered when activating domestic hot water	Flow rate too low in the charging circuit. Air in the heating network. The pressures in the heating system are too low. Blocked sanitary trap.	Bleed the heating network. Check the network pressure. Clean the sanitary trap. Check that the charging pump is rotating. If necessary, contact a technician	Check the functionality of the change-over valve. Check the functionality of the charging circuit.
225: Underpressure	E9	The low-pressure switch has been triggered	Flow rate too low in the collector. Air in the collector. The collector's stop/line regulation valve is closed. The sanitary trap is blocked. Too little fluid in the collector. The water in the heating system is too cold (below 15°C)	Clean the sanitary trap in the collector. If necessary, add fluid to the collector. If necessary, contact a technician	Check the functionality of the collector. Check the functionality of the soil solution pump.
226: Compressor 1 overload	E11	The protective switch for the compressor has been triggered	The compressor has triggered the protective switch	Put the compressor 1 protective switch (F1) in the ON position. If necessary, contact an electrician.	Check the heat pump's power supply. Check the functionality of the compressor.
227: Compressor 2 overload	E11	The protective switch for the compressor has been triggered	The compressor has triggered the protective switch	Put the compressor 2 protective switch (F2) in the ON position. If necessary, contact an electrician.	Check the heat pump's power supply. Check the functionality of the compressor.
243: Swimming pool sensor	B13	Fault in the swimming pool sensor	Fault in the electrical system		Check that the sensor is correctly connected. Measure the resistance of the sensor and check/compare the value with the nominal curve in the table. Change the faulty sensor
324: BX, same sensors		Sensors with the same ID have been connected to the BX inputs	Fault in the control system	Contact a technician	Correct the sensor addresses
324: BX/additional mod. same sensors		Sensors with the same ID have been connected to the BX inputs	Fault in the control system	Contact a technician	Correct the sensor addresses
353: Cascade sensor B10 missing		The B10 common supply water sensor is missing from the cascade system	Fault in the electrical system	Check that the B10 sensor is connected to the controller's BX2 input	If the sensor is connected, measure the resistance and compare
357: Refrig. circuit 1 supply water temp.		The temperature of the supply water in the cooling circuit is too low	The regulation value is manually operated. Wrong value set.	Check the minimum temperature for the cooling circuit	
358: Soft starter 1	E25	Soft starter 1 has issued an alert	The compressor 1 protective switch is off. The phases of the heat pump's power supply are the wrong way round. Temporary power cut. One phase is missing from the power supply. A fuse has blown.	Put the compressor's protective switch (F1) in the ON position. Check the fuses (the fuse should be type C). Put the heat pump's main switch into the OFF position and then turn it back on. If necessary, contact an electrician.	

No.: Failure message	Location	Description	Reason	Action	Action
476: Intake gas sensor	B85	Fault in the intake gas sensor	Fault in the electrical system	Contact a technician	Check that the sensor is correctly connected. Measure the resistance of the sensor and check/compare the value with the nominal curve in the table. Change the faulty sensor
477: Fault in the suction pressure transmitter	H82	The suction pressure transmitter is faulty.	Fault in the refrigerant circuit	Contact a refrigeration technician	Check the pressure shown by the suction pressure transmitter on the controller screen. Change the faulty pressure transmitter.
483: Soft starter 2	E27	Soft starter 2 has issued an alert	The compressor 2 protective switch is off. The phases of the heat pump's power supply are the wrong way round. Temporary power cut. One phase is missing from the power supply. A fuse has blown.	Put the compressor's protective switch (F2) in the ON position. Check the fuses (the fuse should be type C). Put the heat pump's main switch into the OFF position and then turn it back on. If necessary, contact an electrician.	
488: High-pressure transmitter fault	H83	The high-pressure transmitter is faulty.	Fault in the refrigerant circuit	Contact a refrigeration technician	Check the pressure shown by the high-pressure transmitter on the controller screen. Change the faulty pressure transmitter.

16 HEAT PUMP MAINTENANCE AND SERVICING

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

16.1 Maintenance notice

Service functions can be used as preventive measures for periodically monitoring the equipment. To help you remember to service the equipment, the controller can be programmed to show a service notification. The service notification appears on the controller's screen at selected intervals and can be removed by pressing the *Reset* button.

This action is performed at *Expert* level.

1. Press the OK button to access the menu.
2. Select *Service/special operation* and press the OK button.
3. Select control row 7070, Heat pump interval.
4. Roll a servicing interval (in months) onto the row.
5. Go back by pressing the ESC button.

16.2 Inspections

Servicing must only be performed by a qualified person.

The refrigerant circuit must only be serviced by an authorised refrigeration technician

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.

Collector fluid level and filters

Check the amount of fluid in the collector by looking at the system's pressure measuring device and add fluid if necessary. The pressure should correspond to the design. Check the pressure on the system design. After commissioning, it may be necessary to add fluid for a few days – a few litres is within the normal range. If the collector pressure is too low, allow the pump to operate normally and pump additional fluid into the system using an external filling pump. If it is repeatedly necessary to add fluid, contact an installation or servicing company. 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, the wrong circulation direction or a blocked filter.

Check and clean the collector's filter. The filter should be inspected several times immediately after commissioning. However, avoid opening the circuit unnecessarily.

Inspecting the safety valves

Check the functionality of the valves twice per year by turning the cap. Ensure that water comes out of the overflow pipe.

Control unit filters

The refrigeration fan filters in the control unit should be changed when the heat pump is serviced at least once per year. The filters should be changed more frequently if the device is located in an area with more dust than normal.

If the filters become blocked, the control unit may overheat, and electrical devices may break.

Refrigerant circuit fill level

The heat pump's refrigerant circuit contains a fluid glass that shows the adequate refrigerant fill level. When the compressor

is operating, the fluid glass should be clear and free of froth or bubbles. It is normal for some bubbles to appear after the compressor has started up, but the fluid glass should become clear after a few minutes. If bubbles are visible in the glass, there is not enough refrigerant in the system – contact a qualified refrigeration servicing company. If there is not enough refrigerant, the device will be less efficient and may encounter failures.

16.3 Nominal curves of sensors

NTC10k (all the device's sensors except the outdoor sensor)

T [°C]	R [ohm]	T [°C]	R [ohm]	T [°C]	R [ohm]
-30,0	175 203	50,0	3 605	130,0	298
-25,0	129 289	55,0	2 989	135,0	262
-20,0	96 360	60,0	2 490	140,0	232
-15,0	72 502	65,0	2 084	145,0	206
-10,0	55 047	70,0	1 753	150,0	183
-5,0	42 158	75,0	1 481	155,0	163
0,0	32 555	80,0	1 256	160,0	145
5,0	25 339	85,0	1 070	165,0	130
10,0	19 873	90,0	915	170,0	117
15,0	15 699	95,0	786	175,0	105
20,0	12 488	100,0	677	180,0	95
25,0	10 000	105,0	586	185,0	85
30,0	8 059	110,0	508	190,0	77
35,0	6 535	115,0	443	195,0	70
40,0	5 330	120,0	387	200,0	64
45,0	4 372	125,0	339		

NTC1k (outdoor sensor)

T [°C]	R [ohm]	T [°C]	R [ohm]	T [°C]	R [ohm]
-30,0	13 034	0,0	2 857	30,0	827
-29,0	12 324	1,0	2 730	31,0	796
-28,0	11 657	2,0	2 610	32,0	767
-27,0	11 031	3,0	2 496	33,0	740
-26,0	10 442	4,0	2 387	34,0	713
-25,0	9 889	5,0	2 284	35,0	687
-24,0	9 369	6,0	2 186	36,0	663
-23,0	8 880	7,0	2 093	37,0	640
-22,0	8 420	8,0	2 004	38,0	617
-21,0	7 986	9,0	1 920	39,0	595
-20,0	7 578	10,0	1 840	40,0	575
-19,0	7 193	11,0	1 763	41,0	555
-18,0	6 831	12,0	1 690	42,0	536
-17,0	6 489	13,0	1 621	43,0	517
-16,0	6 166	14,0	1 555	44,0	500
-15,0	5 861	15,0	1 492	45,0	483
-14,0	5 574	16,0	1 433	46,0	466
-13,0	5 303	17,0	1 375	47,0	451
-12,0	5 046	18,0	1 320	48,0	436
-11,0	4 804	19,0	1 268	49,0	421
-10,0	4 574	20,0	1 218	50,0	407
-9,0	4 358	21,0	1 170		
-8,0	4 152	22,0	1 125		
-7,0	3 958	23,0	1 081		
-6,0	3 774	24,0	1 040		
-5,0	3 600	25,0	1 000		
-4,0	3 435	26,0	962		
-3,0	3 279	27,0	926		
-2,0	3 131	28,0	892		
-1,0	2 990	29,0	859		

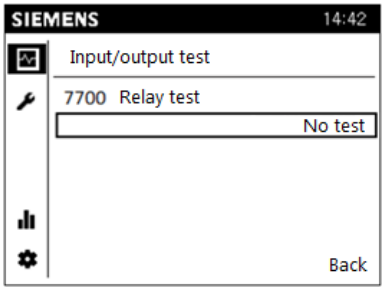
16.4 Testing relay outputs

This section advises you how to test the functionality of devices connected to the controller. Input/output testing (7700) stops all of the controller's normal control functions. Turn off the compressor before starting tests by putting the F1 protective switch in the OFF position.

After testing, always turn testing off by selecting *No test*.

You must be at *Expert* level to perform input/output testing.

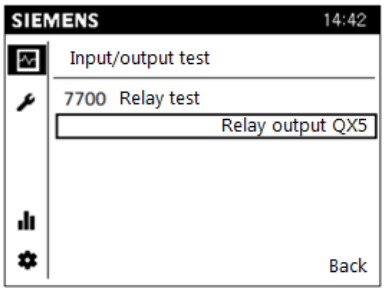
Select the *Stop all* command in input/output testing to stop all of the heat pump's functions.



Output functions:

QX1 = Electric heater 1, K25
QX2 = Electric heater 2, K26
QX3 = Domestic hot water electric heater, K6
QX4 = Control unit fan, K21
QX5 = Source pump, Q8
QX6 = Alert, K10
QX7 = Compressor 1, K1
QX8 = Change-over valve, Q3
QX9 = Heating circuit pump, Q2
QX10 = Heating circuit actuator open, Y1
QX11 = Heating circuit actuator closed, Y2
QX12 = Compressor 2, K2
QX13 = Charging pump, Q9 (speed setting with the UX2 test)
QX21mod1 = free
QX22mod1 = free
QX23mod1 = Start/stop control of additional heat source

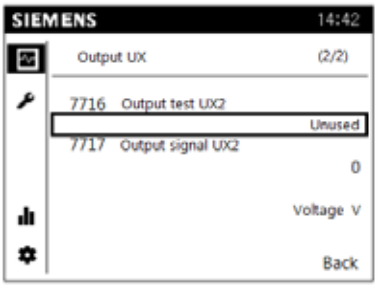
TESTING THE SOURCE PUMP



1. Protective switch F3 should be on
2. Select Input/output testing
3. Select the row *Relay output QX5* and press the button to confirm
4. The source pump will start up
5. Stop the source pump test by setting the control row to 7700 *No test*.

TESTING THE CHARGING PUMP

Charging pump switch F5 should be on



1. Select Input/output testing
2. Select the row *Relay output QX13* and press the button to confirm
3. Select Input/output testing from the menu Output UX (title row, image)
4. Select control row 7716 (Output test UX2)
5. Set the desired rotation speed for the charging pump on this row. (50–100%)
6. The circulation water pump display will show the flow rate and the lifting height
7. Stop the charging pump test by setting the Input/output testing control row to *No test* and the UX output test 7716 to ---.

TESTING THE CHANGE-OVER VALVE

1. Select Relay test (7700) from the Input/output testing menu.
2. Select the row *Relay output QX8* and press the button to confirm. The change-over valve will switch to the domestic hot water charging position. Flow from the heat pump to the domestic hot water accumulator.
3. Select *Stop all* for the row. The change-over valve will switch to the heating charging position.
4. Stop the test by setting the control row to *No test*.

TESTING MIXING VALVES ON THE HEATING CIRCUIT

1. Select Relay test (7700) from the Input/output testing menu.
2. Select the row *Relay output QX10* and press the button to confirm. Mixing valve runs open.
3. Select the row *Relay output QX11* and press the button to confirm. Mixing valve runs closed.
4. Stop the test by setting the control row to *No test*.

TESTING THE MIX HEATING CIRCUIT PUMP

1. Select Relay test (7700) from the Input/output testing menu.
2. Select the row *Relay output QX9* and press the button to confirm. The mix heating circuit pump will start up
3. Stop the test by setting the control row to *No test*.

TESTING THE HOT WATER CIRCULATION PUMP

1. Select Relay test (7700) from the Input/output testing menu.
2. Select the row *Relay output QX13* and press the button to confirm The hot water circulation pump will start up.
3. Stop the test by setting the control row to *No test*.

TESTING HEATER CONTROLS

1. Select Relay test (7700) from the Input/output testing menu.
2. Select the row *Relay output QX1* and press the button to confirm. The K25 heater control will start up.
3. Select the row *Relay output QX2* and press the button to confirm. The K26 heater control will start up.
4. Select the row *Relay output QX3* and press the button to confirm. The K6 domestic hot water heater control will start up.
5. Stop the test by setting the control row to *No test*.

TESTING THE ALERT OUTPUT

1. Select Relay test (7700) from the Input/output testing menu.
2. Select the row *Relay output QX6* and press the button to confirm. The alert relay will activate. The K10 continuous alert relay will receive a control.
3. Stop the test by setting the control row to *No test*.
4. Stop the test by setting the control row to *No test*.
5. Stop the test by setting the control row to *No test*.

TESTING AN ADDITIONAL HEAT SOURCE

1. Select Relay test (7700) from the Input/output testing menu.
2. Select the row *Relay output QX23mod1* and press the button to confirm. The controller will guide the additional heat source control relay FX23>QX23 to close and activate a K27 heat request
3. Select Input/output testing from the Output UXMod1 menu
4. Select control row 7780 (Output test UX21Mod1)
5. Set the desired regulation value (0–100%) on the row and check that the adjustment functions
6. Finally, select *Stop all* for the row.

17 TECHNICAL SPECIFICATIONS

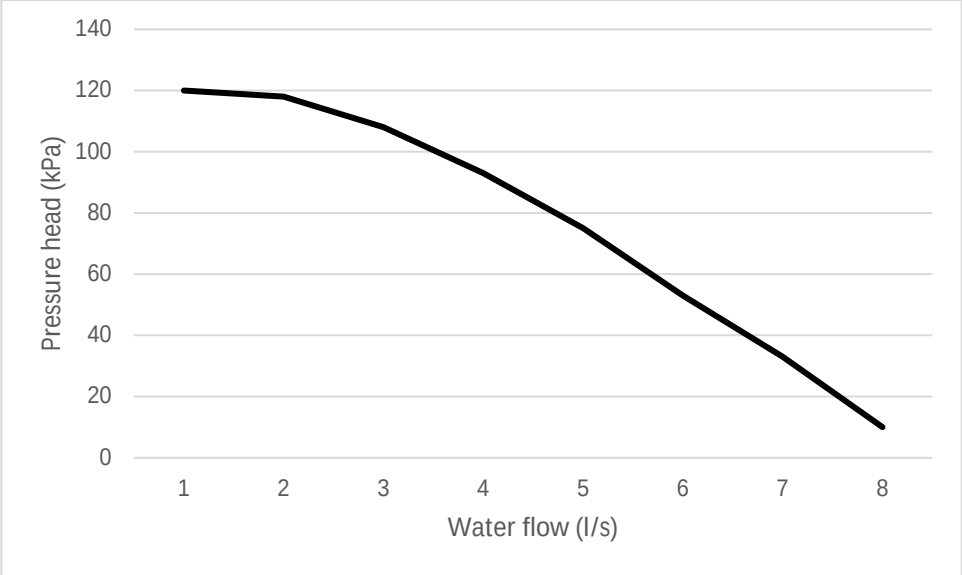
Power information		
0/35		
Output power	kW	87,7
Cooling power	kW	69,2
Input power	kW	19,9
COP		4,4
SCOP		5,1
SPF		4,3
0/50		
Output power	kW	80,6
Cooling power	kW	56,2
Input power	kW	25,8
COP		3,1
SCOP		4,5
SPF		3,9
5/35		
Output power	kW	102,1
Cooling power	kW	83,0
Input power	kW	20,5
COP		5,0
5/50		
Output power	kW	92,4
Cooling power	kW	67,6
Input power	kW	26,3
COP		3,5
Energy efficiency class, intermediate climate conditions, underfloor heating		A+++
Number of compressor units		2
Electrical information		
Rated voltage/electrical connection	V	3~400 V 50 Hz
Recommended fuse size	A	3 x 63 A
Maximum supply current	(A_{rms})	62,0
Start-up current with contactors	(A_{rms})	233,0
Start-up current with a soft starter	(A_{rms})	145,0
Charging pump power	W	500
Source pump power	W	1200
IP classification		IP 21
Motor protection adjustment value of the compressors	A	36
Source pump motor protection adjustment value	A	3,75

Refrigerant circuit		
Contains fluorinated greenhouse gases		Yes
Hermetically sealed		Yes
Refrigerant		R410A
GWP (Global Warming Potential)		2088
Refrigerant volume	kg	9,6
CO_2 equivalence	ton CO_2 e	20,045
Cut-off, overpressure	bar	44,0
Difference, overpressure	bar	-8
Cut-off, underpressure	bar	4
Difference, underpressure	bar	2
Collector		
Energy class, source pump		Low-energy
Built-in source pump		Yes
Maximum pressure	bar	6
Minimum flow	l/s	2,4
Rated flow	l/s	4,20
Maximum external pressure loss at rated flow	kPa	125
Minimum input temperature of brine	°C	-5
Maximum input temperature of brine	°C	30
Charging circuit		
Energy class, charging pump		Low-energy
In-built charging pump		Yes
Maximum pressure	bar	6
Minimum flow	l/s	2,5
Rated flow	l/s	3,5
Maximum external pressure loss at rated flow	kPa	40
Maximum heating water output temperature	°C	65
Sound power level	dB	46
Dimensions		Length: 1200, Width: 690, Height: 1790
Weight	kg	532
Pipe connections		
Brine		G2"
Charging		G2"
Superheat recovery		G1"
Controller		Gebwell Albatros [2]
Compressor		2 x Scroll

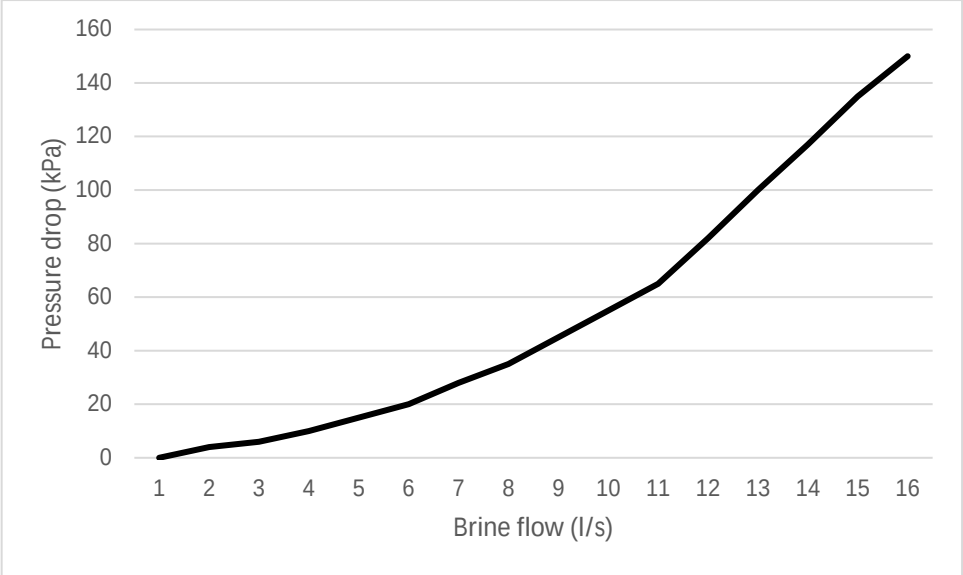
18 PERFORMANCE VALUE GRAPHS

18.1 Source pump flow rate curve

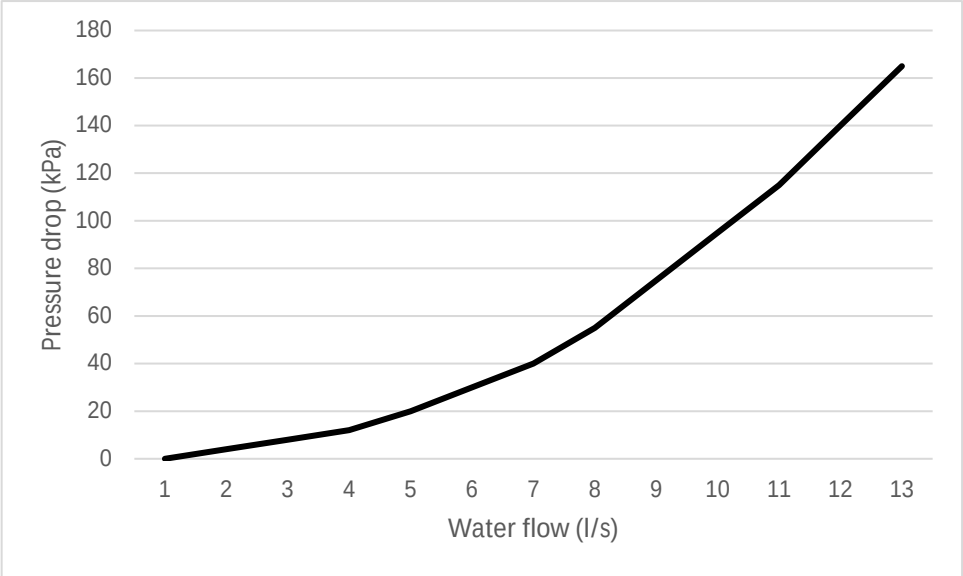
18.2 Charging pump flow rate curve



18.3 Collector internal pressure drop curve



18.4 Charging circuit internal pressure drop curve



19 SETPOINT VALUES FOR HEAT PUMP SETTINGS FOR DIFFERENT HEATING NETWORKS

Heating circuit setpoint s:

Row number			Control row	Factory setting	Floor heating	Radiator heating	Air heating
LP1	**LP2**	**LP3**					
700	1000	1300	Operating mode	Automatic			
710	1010	1310	Comfort operation setpoint	20			
712	1012	1312	Reduced setpoint	19			
714	1014	1314	Freeze protection setpoint	15			
720	1020	1320	Heating curve gradient	0.5	0.5 (0.3–0.5)	0.8 (0.5–1.2)	0.8 (0.5–1.2)
740	1040	1340	Supply water min. setpoint	12	12	12	12
741	1041	1341	Supply water max. setpoint	45	45 (35–45)	55 (45–60)	55 (45–60)
750	1050	1350	Room sensor compensation	20%			
730	1030	1330	Summer/winter heating threshold	16			

Setpoint s for domestic hot water:

Row number	**Control row**	**Factory setting**
1600	Operating mode	On
1610	Nominal setpoint	55°C

Heat pump setpoint s:

Row number	**Control row**	**Factory setting**	**Floor heating**	**Radiator heating**	**Air heating**
2840	Return water temperature switching difference	6	6	8 (8–10)	10

20 MAINTENANCE RECORD

Date:	Action:	*Fault code:	Technician:	Type of servicing: K=repair H=servicing A=changing settings

*Fault code: If the device has an operating failure, enter the fault code reported by the controller in this column.

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
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:

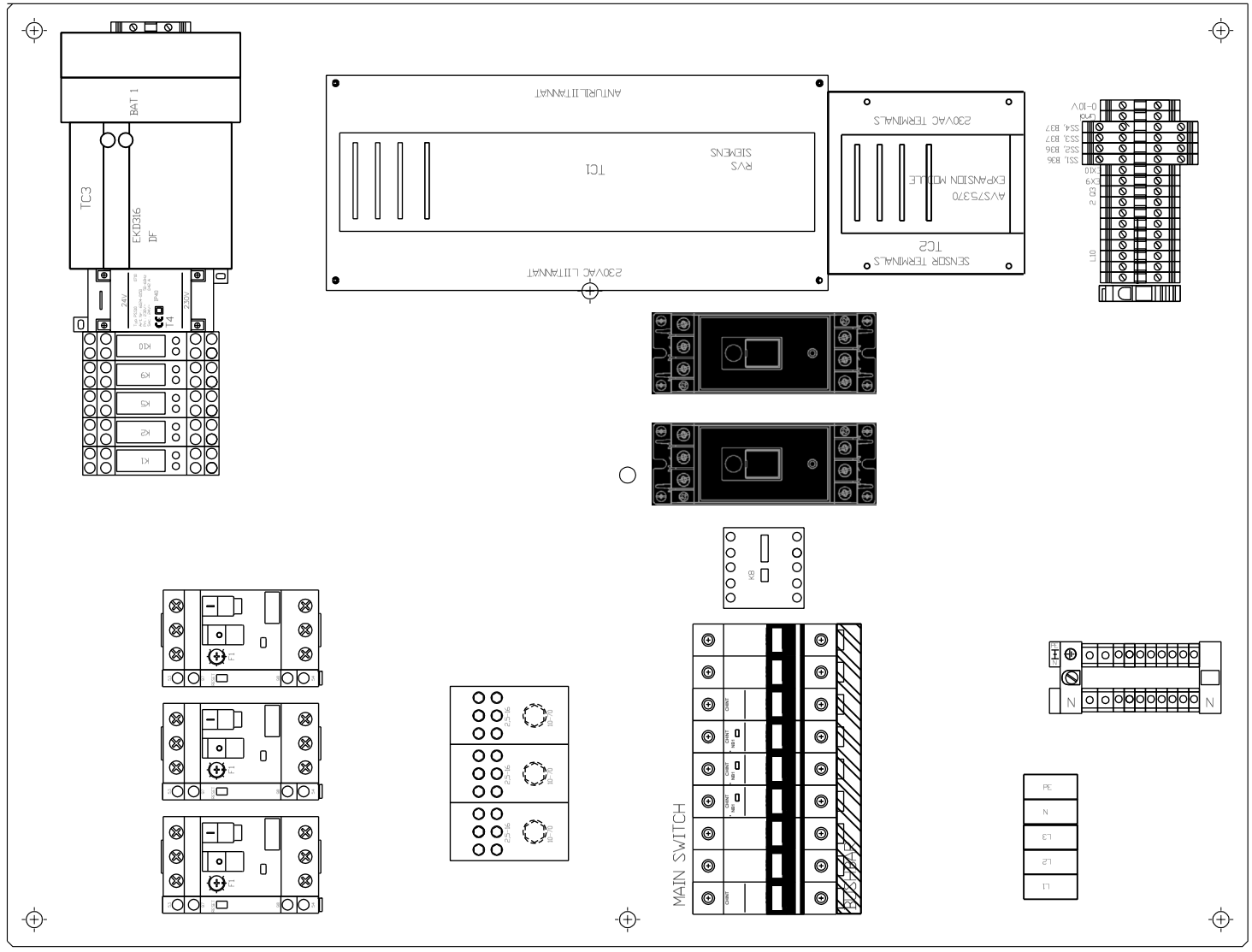
LVD:	EN 61439-1:2011 EN 61439-2:2011 EN 61439-3:2012
EMCD:	EN 61439-1 Annex J, Point J.9.4.2
HD:	60364 Low-voltage electrical installations 384 Electrical installations of buildings
	EN 14511

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 30.10.2019

Tuure Stenberg
Managing Director



D muutos
E muutos
F muutos

A muutos 22022016 Imukaasu-anturi
B muutos 31.32016 Tulistuspumppu ohj
C muutos

GEBWELL

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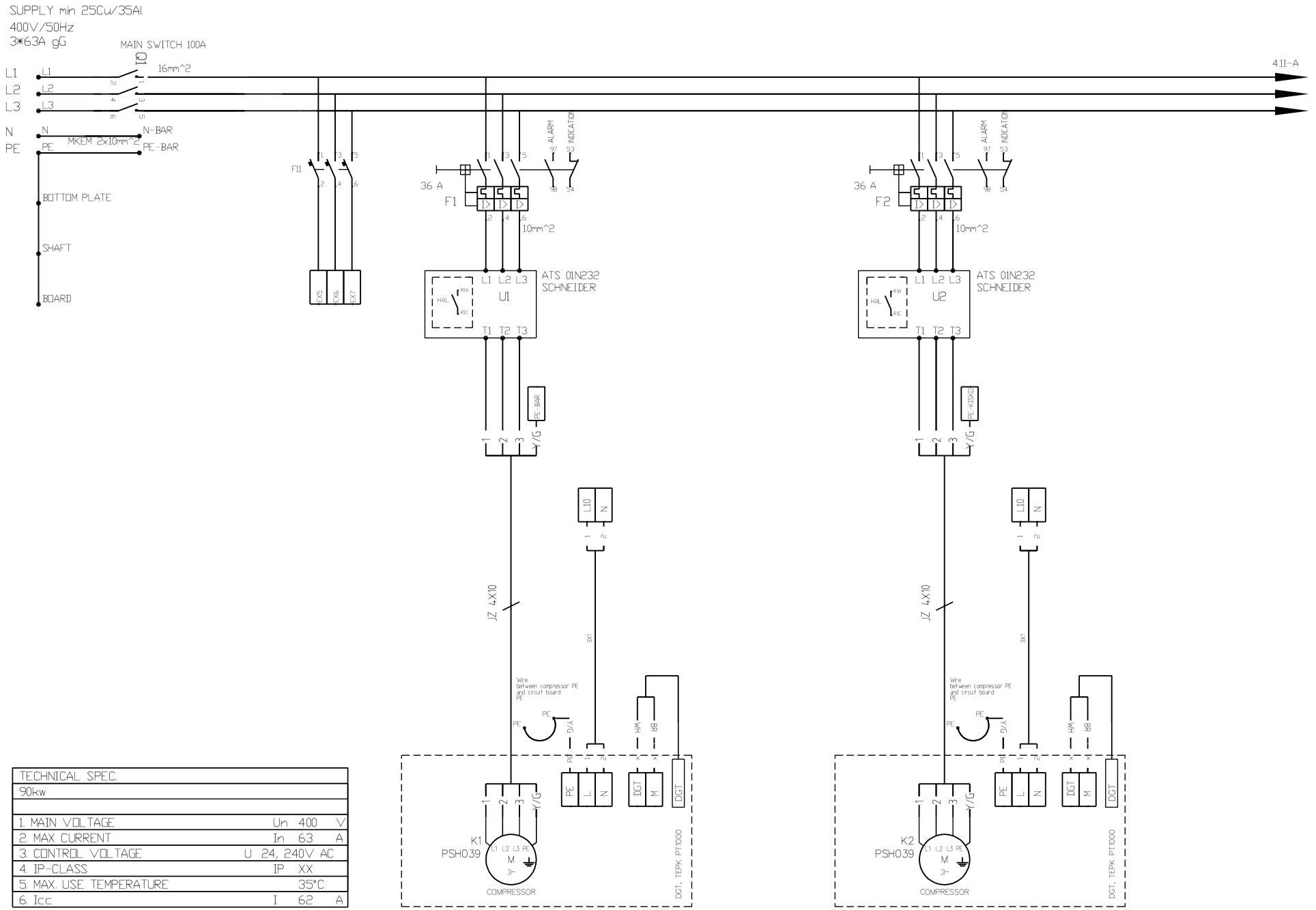
TAURUS, MLK 90kW
LAYOUT

Suunn. /2122016	Kokonaisuus	Sähköpositio	Työnumero
Piirt. RTu	Lehti 1 / 10	Piirustusnumero S'Ä'H	
Tark.			



TECHNICAL SPEC.		
90kw		
1. MAIN VOLTAGE	Un 400	V
2. MAX CURRENT	In 63	A
3. CONTROL VOLTAGE	U 24, 240V AC	
4. IP-CLASS	IP XX	
5. MAX. USE TEMPERATURE	35°C	
6. Icc	I 62	A

A muutos	22.02.2016 Imukaasu-anturi
B muutos	31.3.2016 Tulistuspumppu ohj.
C muutos	
D muutos	
E muutos	
F muutos	

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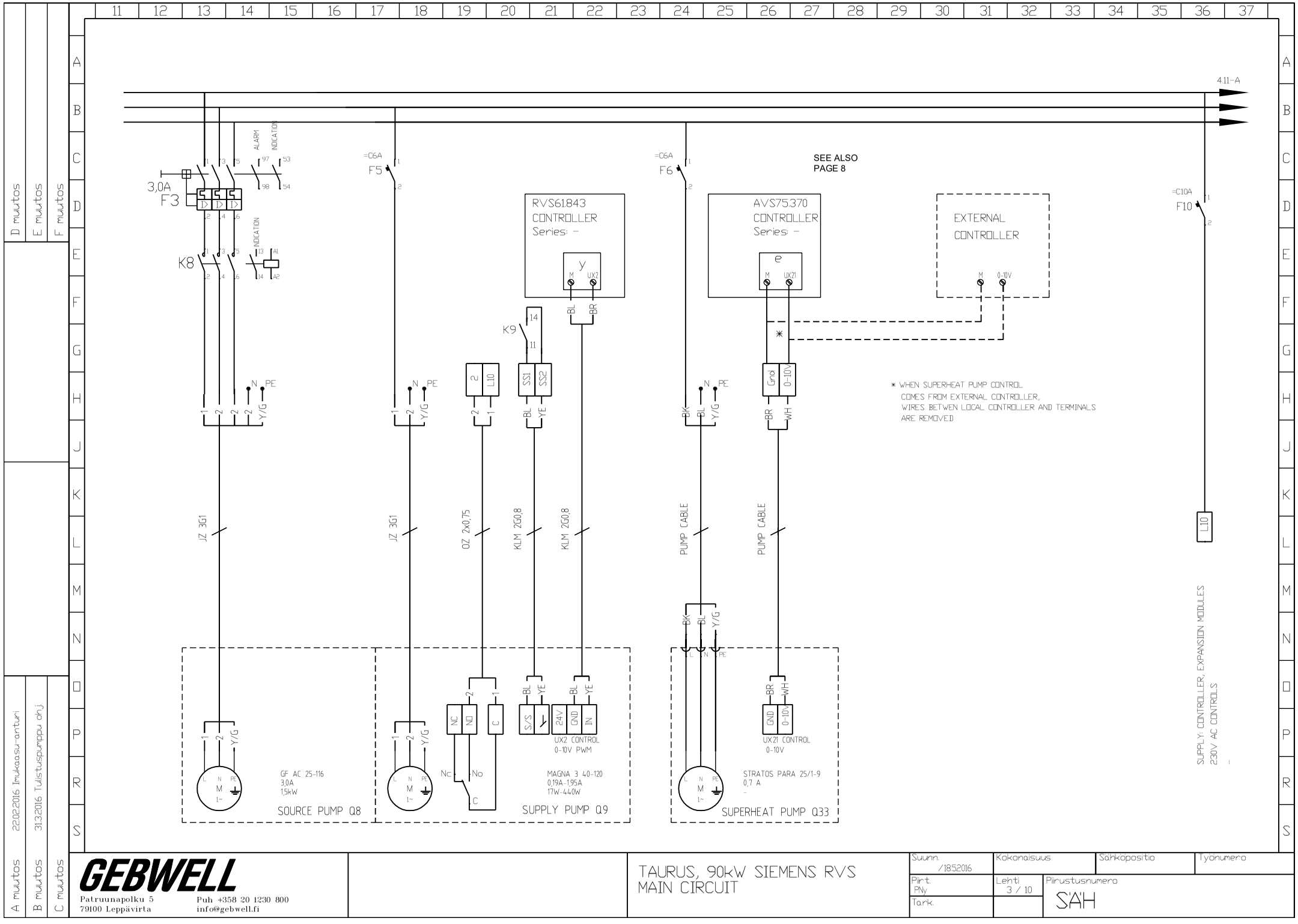
TAURUS, 90kW SIEMENS RVS
MAIN CIRCUIT

Suunn. /18.11.2016	Kokonaisuus	Sähköpositio	Työnumero
Piirt. RTU	Lehti 2 / 10	Piirustusnumero S'Ä'H	
Tark.			



A muutos	22.02.2016	Imukaasu-anturi	
B muutos	31.3.2016	Tulistuspumppu ohj.	
C muutos			
D muutos			
E muutos			
F muutos			

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TAURUS, 90kW SIEMENS RVS MAIN CIRCUIT

Suunn. /18.5.2016	Kokonaisuus	Sähkösopitio	Työnumero
Pirt. PNy	Lehti 3 / 10	Piirustusnumero S'A'H	
Tark.			

A muutos	22.02.2016 Imukaasu-anturi		D muutos
B muutos	31.3.2016 Tulistuspumppu ohj		E muutos
C muutos			F muutos

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TAURUS, 90kW SIEMENS TC1
230V CONTROLS

Suunn. /18.11.2016
Part. RTU
Tark.
Lenti 4 / 10
Kokonaisuus
Pirustusnumero SAH
Sarkkopostio
Työnumero

SIEMENS RVS61.843 F

EXTERNAL ALARM
SOURCE PUMP CONTROL
SWITCHBOARD FAN
SUPPLY PUMP CONTROL
2. COMPRESSOR SOFTSTARTER U2 CONTROL
1. COMPRESSOR SOFTSTARTER U1 CONTROL
1 COMPRESSOR OVERLOAD
PHASE MONITOR L1
PHASE MONITOR L2
PHASE MONITOR L3
2. COMPRESSOR OVERLOAD
2. SOFTSTARTER FAULT E25
SOURCE PUMP OVERLOAD
1SOFTSTARTER FAULT E25
HIGH PRESSURE
LOW PRESSURE
CONTROLLER SUPPLY

Z QX6 PE N QX5
Y QX4 PE N
X QX3 PE N
w QX2 PE N QX1
V QX13 PE N
u QX12 PE N
t QX11 PE N QX10
s QX9 PE N
r QX8 PE N
q QX7
EX11
p EX5 EX6 EX7 EX4 EX3 EX2 EX1
k EX10 EX9
N/PE/L N PE L

K10 N-BAR
K8 F3 S3 S4 H22
FAN1 M 1~
K9
K2 N-KISKO U2 SOFTSTARTER
K1 N-KISKO U1 SOFTSTARTER
F1 ALARM L10
F11 L1
F11 L2
F11 L3
F2 ALARM L10
U1 ALARM L10
F3 ALARM L10 L10
U1 ALARM
L10 EX10 EX9
1 2 3 4
HIGH PRESSURE NC
LOW PRESSURE NO
N-BAR PE-BAR L10

A muutos	22.02.2016 Imukaasu-anturi		D muutos
B muutos	31.3.2016 Tulistuspumppu ohj		E muutos
C muutos			F muutos

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TAURUS, 90kW SIEMENS TC1
230V / AUXILIARY DEVICES

Piirt.	PW	Suunn.	18.5.2016
Tark.			
Lenti	5 / 10	Kokonaisuus	
SAH		Pirustusnumero	
		Sarkkoposti	
		Työnumero	

SIEMENS RVS61.843 F

Z
QX6
PE
N
QX5

Y
QX4
PE
N

X
QX3
PE
N

CONTROL 230VAC
ELECTRICAL HEATER DHW K6
HEAT DEMAND K27 (CONFIGURABLE)

w
QX2
PE
N
QX1

CONTROL 230VAC
ELECTRICAL HEATER K26, STEP-2

CONTROL 230VAC
ELECTRICAL HEATER K25, STEP 1
OPTIONAL ACCUMULATORS ELECTRICAL HEATER K16
(CONFIGURABLE)

V
QX13
PE
N

u
QX12
PE
N

t
QX11
PE
N
QX10

HEATING CIRCUIT VALVE CLOSE
HEATING CIRCUIT VALVE OPEN

s
QX9
PE
N

HEATING CIRCUIT 1 PUMP CONTROL

r
QX8
PE
N

CHANGE OVER VALVE Q3, QS1
(CASCADE MASTER)

q
QX7
EX11

P
EX5
EX6
EX7
EX4
EX3
EX2
EX1

k
EX10
EX9

N/PE/L
N
PE
L

CONTROLLER SUPPLY

N-BAR
PE-BAR
L10

ZZ= KENTTÄ PISTE

CONTROL, 230VAC
ELECTRICAL HEATER DHW K6
K6
ZZ

CONTROL, 230VAC
ELECTRICAL HEATER STEP 2
K26
ZZ

CONTROL, 230VAC
ELECTRICAL HEATER STEP 1
K25
ZZ

TVx
BELIMO
HRC 230-3,7s
HEATING CIRCUIT 1 VALVE MOTOR
BR
BL
WH
ZZ

K5
A1
A2

N
L10
Q3
BL
BR
BK

LK 3G1

ZZ CHANGE OVER VALVE
Q3 ESBE ARA 645 30s

M
1
2
Y/G

JZ 3G1

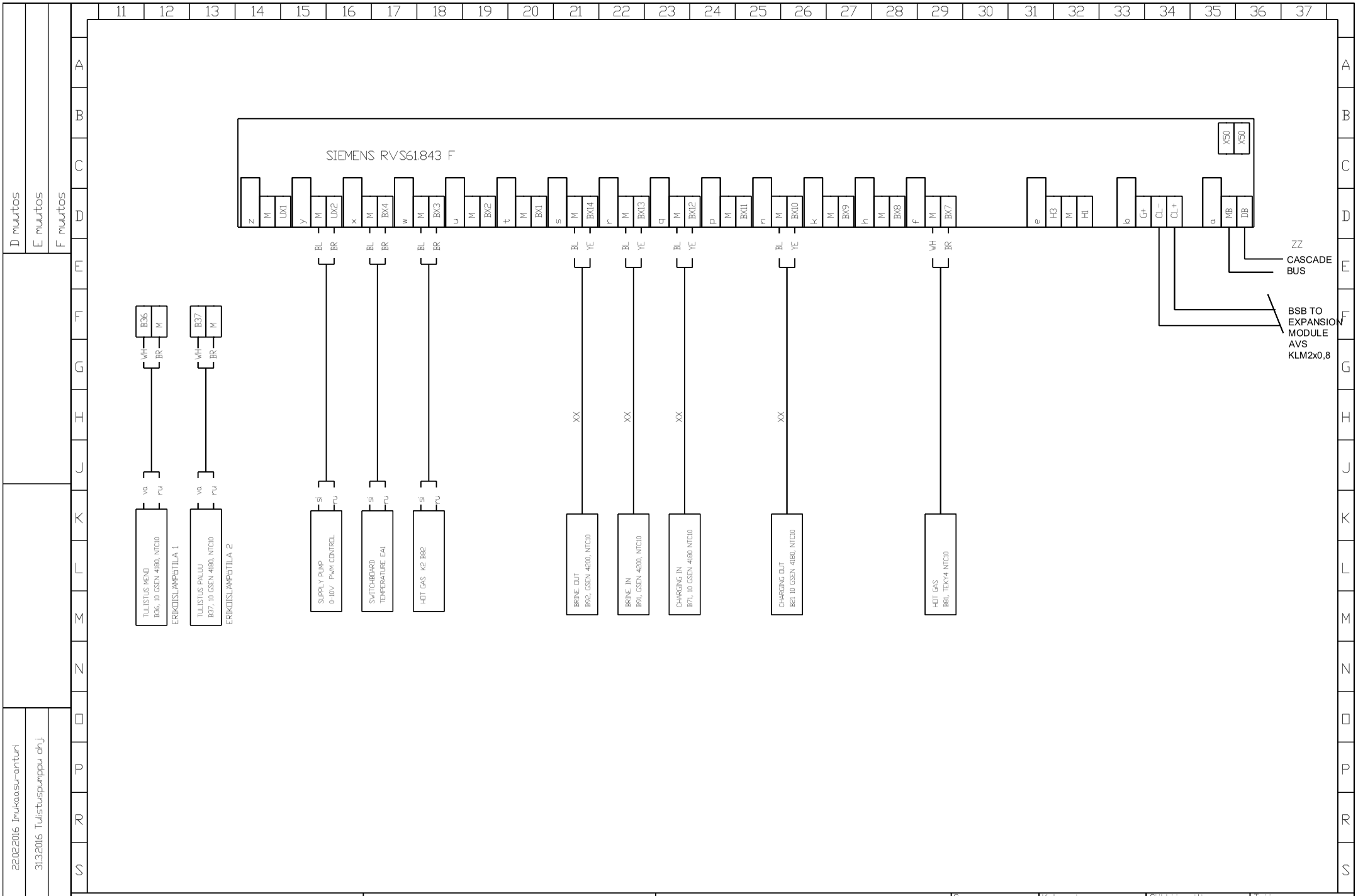
SUPPLY FROM AUXILIARY SWITCHBOARD
N
PE

START/STOP
S/S
BL
YE

KLM 2G0,8

K5
SS3
SS4
11
14
ZZ

HEATING CIRCUIT
1-1 PUMP



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B muutos 31.3.2016 Tulistuspumppu ohj.
C muutos
D muutos
E muutos
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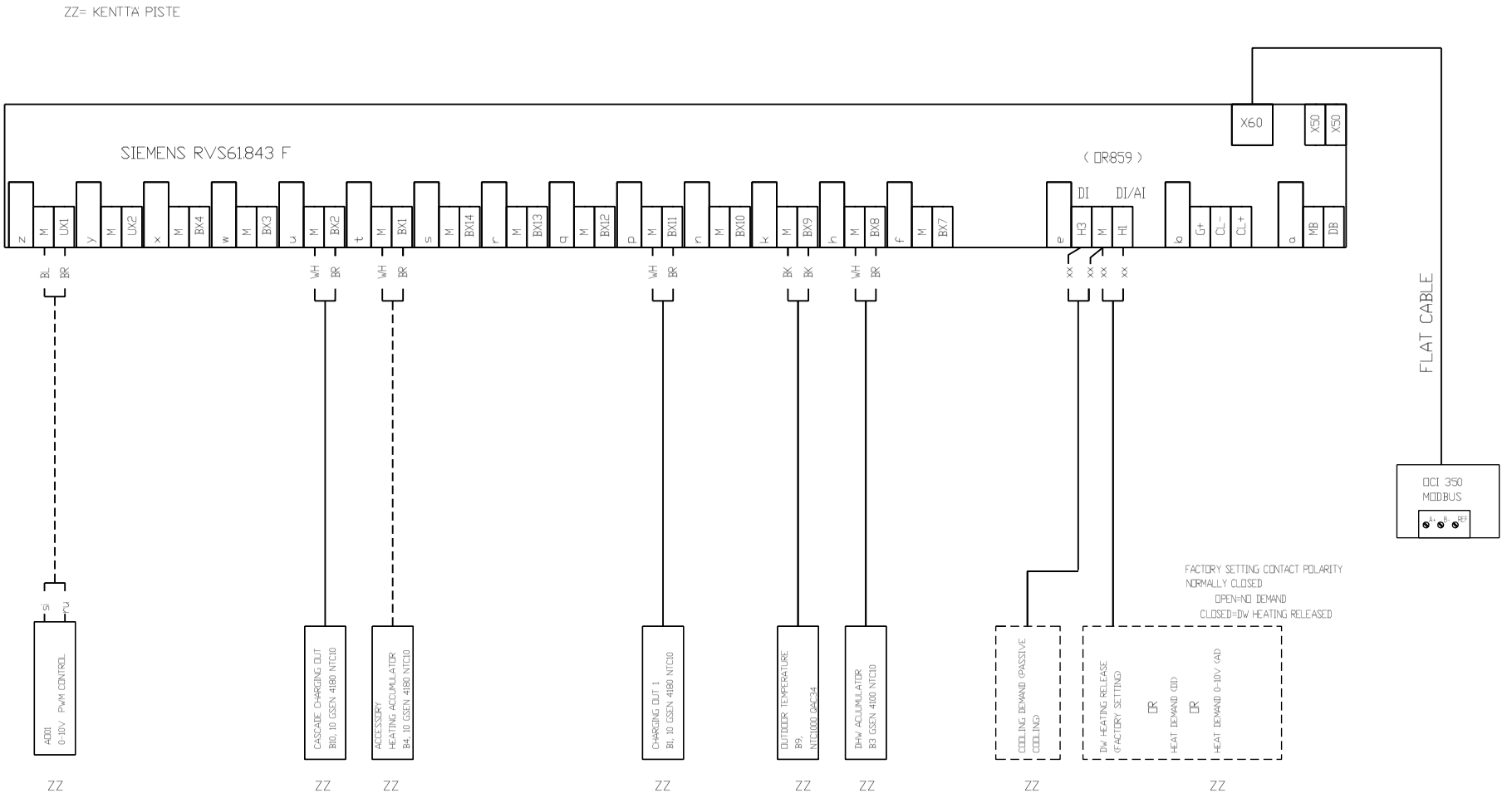
TAURUS, 90kW SIEMENS TC1
INPUT SENSORS
–

Suunn.	Kokonaisuus	Sähköpositio	Työnumero
/22.11.2016			
Pirt. Jth	Lehti 6 / 10	Piirustusnumero	
Tark.		S'A'H –	



A muutos	22.02.2016 Imukaasu-anturi
B muutos	31.3.2016 Tulistuspumppu ohj.
C muutos	
D muutos	
E muutos	
F muutos	

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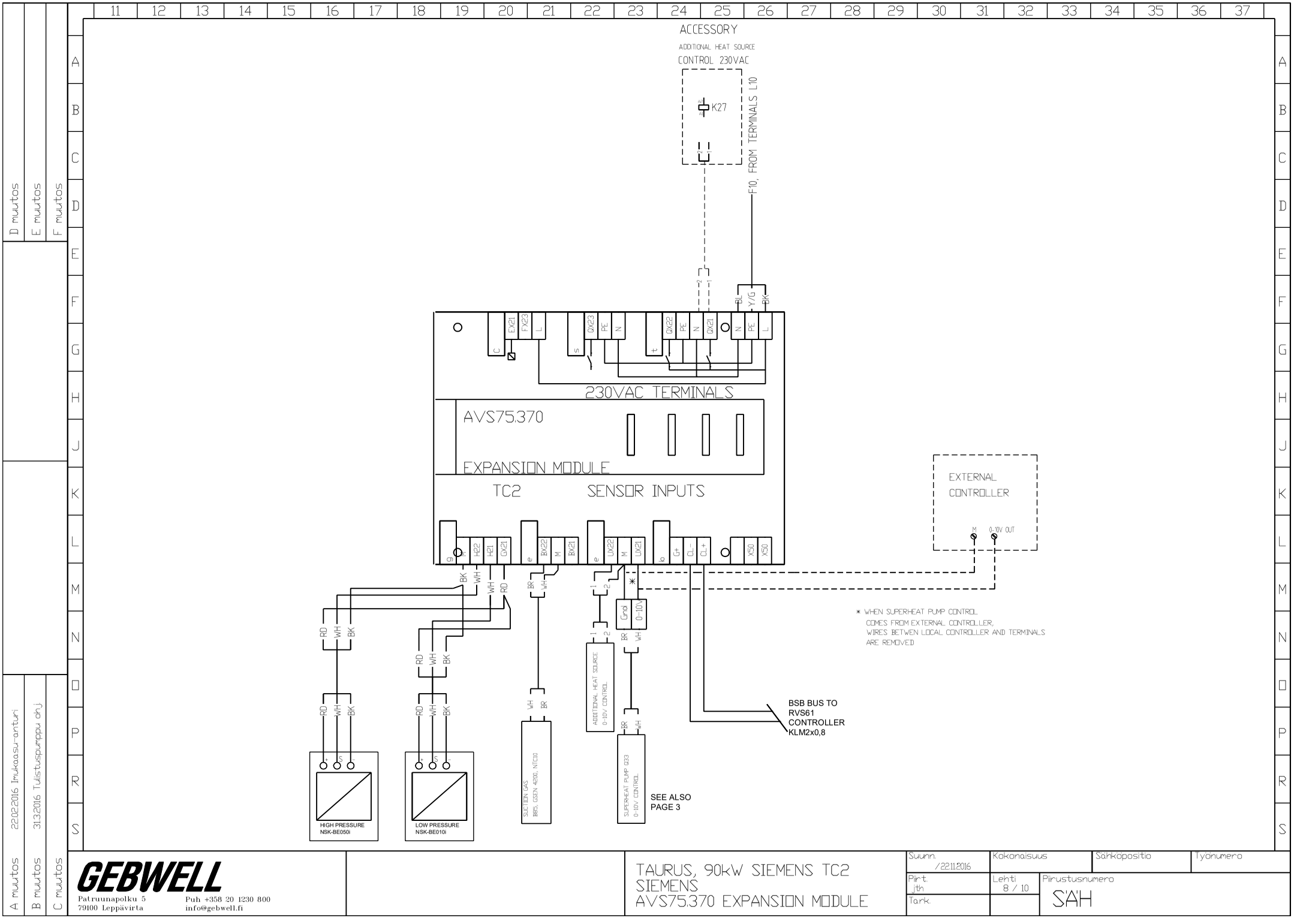
TAURUS, 90kW SIEMENS TC1
EXTERNAL SENSORS/CONTROLS

Suunn. /18.5.2016	Kokonaisuus	Sähköpostio	Työnumero
Piirt. PNy	Lehti 7 / 10	Piirustusnumero S'A'H –	
Tark.			



D muutos
E muutos
F muutos

A muutos 22.02.2016 Imukaasu-anturi
B muutos 31.3.2016 Tulistuspumppu ohj.
C muutos

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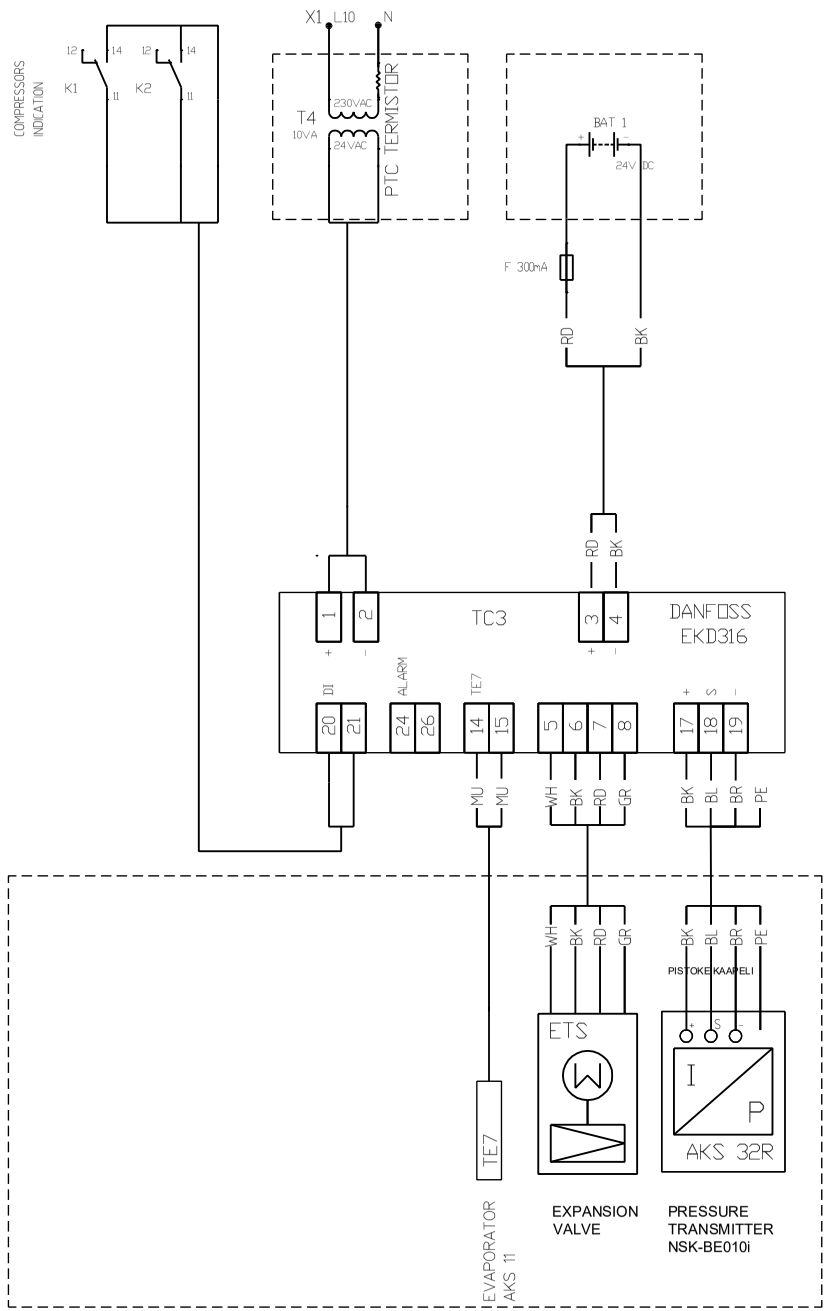
TAURUS, 90kW SIEMENS TC2
SIEMENS
AVS75.370 EXPANSION MODULE

Suunn. /22.11.2016	Kokonaisuus	Sähköpositio	Työnumero
Pirt. jth	Lehti 8 / 10	Piirustusnumero S'A'H	
Tark.			



A muutos 22.02.2016 Imukaasu-anturi
B muutos 31.3.2016 Tulistuspumppu ohj.
C muutos
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TAURUS, 90kW SIEMENS TC3
EXPANSION VALVE CONTROL
EKD316 DF

Suunn. /18.5.2016	Kokonaisuus	Sähköpositio	Työnumero
Pirt. PNy	Lehti 9 / 10	Piirustusnumero S'Ä'H –	
Tark.			

PART		SIGN		PCS
MAIN SWITCH		Q1		1
HANDLE		--		0
CIRCUIT BREAKER		F11		1
MOTOR CIRCUIT BREAKER		F1, F2		2
CIRCUIT BREAKER		F5,F6		2
CIRCUIT BREAKER		F10		1
FUSE TERMINAL		F300		1
SOFT STARTER		U1, U2		2
MOTOR CIRCUIT BREAKER		F3		1
AUX. CONTACT (MCB)		F1,F2,F3		3
BRACHING TERMINALS		SYöTTö		5
EXCHANGE TERMINALS		Q1		0
RELAY 230VAC+SOCKET		K1,K2,K5,K9,K10		5
CONTACTOR		K8		1
AUX. CONTACT (SOFT STARTER)		U1, U2		0
TERMINALS		X1		13
PE/N-BARS		N-PE		2
CONTACTOR		K1, K2		0
FAN+FILTER				1+1
THERMOSTAT				0
TRANSFORMER		T4		1
BATTERY		BAT 1		1
ENERGY METER		EM1		0
CURRENT TRANSFORMER		T1-T3		0
CURRENT BAR		F1,F2,F3		1

D muutos
E muutos
F muutos

A muutos 22.02.2016 Imukaasu-anturi
B muutos 31.3.2016 Tulistuspumppu ohj.
C muutos

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TAURUS, 90kW SIEMENS RVS
PART LIST

Suunn. /22.11.2016	Kokonaisuus	Sähköpositio	Työnumero
Pirt. JTH	Lehti 10 / 10	Pirustusnumero S'Ä'H	
Tark.			

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