

***GEBWELL***

# Installation, Operation and Maintenance Manual

## Qi Ground Source Heat Pump



[WWW.GEBWELL.COM](http://WWW.GEBWELL.COM)

## Contents

1	WARRANTY .....	5
2	INSTALLATION RECORD .....	7
3	GROUND SOURCE HEAT AND COOLING .....	8
3.1	Ground source heat energy .....	8
3.2	Ground source cooling .....	8
3.3	Ground source heat pump's operating principle.....	8
3.4	Heating functions .....	9
3.5	Tips for saving.....	9
4	DELIVERY AND HANDLING .....	10
4.1	Safety instructions .....	10
4.2	Delivery contents .....	10
4.3	Optional accessories .....	10
4.4	Storage .....	10
4.5	Transport .....	10
4.6	Removing the compressor unit.....	11
4.7	Hauling the compressor unit module.....	11
4.8	Removing the packaging .....	12
4.9	Ground source heat pump's location.....	12
5	DIMENSIONS AND PIPE CONNECTIONS .....	13
5.1	Pipe Connections.....	13
5.2	Heat pump dimensions .....	13
5.3	Heat pump components .....	14
5.4	Heat pump sensors .....	15
6	PIPE INSTALLATION .....	16
6.1	Collector.....	16
6.2	Connecting ground cooling .....	18
6.3	Heat supply circuit .....	19
6.4	Connecting the domestic water system .....	21
7	ELECTRICAL CONNECTIONS .....	23
7.1	General .....	23
7.2	Power supply .....	23
7.3	Soft starter / phase sequence .....	23
7.4	Outdoor sensor .....	23
7.5	Room sensor (accessory) QAA55 .....	24
7.6	Room unit (accessory) QAA75 .....	24
7.7	External heating circulation pump / pump for heating circuit 2 (accessory).....	24
7.8	Heating control group 2 (accessory) .....	24
7.9	Electric heater (SV1) power .....	24
7.10	Connection of the hot water circulation pump .....	25
7.11	Alarm forwarding.....	25

7.12	External control of the source pump .....	25
7.13	Home / away switch .....	25
7.14	Remote control / SmartWeb (accessory).....	25
7.15	Modbus 350 communication module .....	25
8	FILLING.....	26
8.1	Filling the heating and domestic water circuits .....	26
8.2	Filling the collector, non-pressurised .....	26
8.3	Filling the collector, pressurised .....	26
8.4	Pressure test of the collector.....	27
9	GROUND SOURCE HEAT PUMP'S USER INTERFACE .....	28
9.1	Operating elements.....	28
9.2	Display symbols .....	29
9.3	User levels.....	29
10	ACTIVATING THE GROUND SOURCE HEAT PUMP .....	30
10.1	Before activation .....	30
10.2	Activation.....	30
10.3	Operation without a collector and at a worksite .....	30
10.4	Venting.....	30
11	HEAT PUMP SETTINGS .....	32
11.1	Time and date.....	32
11.2	Language selection.....	32
11.3	Time programme settings.....	32
11.4	Domestic hot water settings .....	32
11.5	Settings for heating functions.....	33
11.6	Settings for the compressor functions .....	35
11.7	Settings for the electric resistor (SV1) .....	36
11.8	Electric resistor's operating method (SV1).....	36
12	HEAT PUMP OPERATION .....	38
12.1	Navigating in the menu .....	38
12.2	Symbols.....	38
12.3	Setting the heating.....	38
12.4	Setting domestic water heating.....	39
12.5	Heating system tracking .....	40
12.6	Special operations .....	40
12.7	The heat pump's measurements.....	41
12.8	Vocabulary .....	42
12.9	Heat pump status information .....	42
12.10	Special situations.....	42
12.11	Heat pump status .....	42
12.12	Heating circuit status information .....	42

12.13	Domestic hot water status information.....	43
13	MAINTAINING AND SERVICING THE GSHP.....	44
13.1	Maintenance notice .....	44
13.2	Inspections .....	44
13.3	Draining the hot water accumulator (LVV1) .....	44
13.4	Draining the heating system.....	44
13.5	Draining the collector.....	45
14	FAILURES .....	46
14.1	Alerts.....	46
14.2	Troubleshooting .....	46
14.3	Troubleshooting table.....	48
15	TECHNICAL SPECIFICATIONS .....	52
16	SET POINT EXAMPLES FOR HEAT PUMP ADJUSTMENTS IN DIFFERENT HEATING NETWORKS.....	53
17	MAINTENANCE RECORD .....	54
18	ENERGY LABELS .....	55

APPENDIX 1: ELECTRICAL DIAGRAM

APPENDIX 2: DECLARATION OF CONFORMITY

**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 Protocol, one copy of which must be returned to the device manufacturer. The protocol 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,

## **QI 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 changed 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 before commissioning following in-force regulations. Only qualified persons may conduct the inspection. The installation record of the operating manual must be filled out before handing the device over to the end user.

<i>x</i>	<i>Description</i>	<i>Note:</i>	<i>Inspected by:</i>	<i>Date:</i>
	<b>Collector:</b>			
	System pressure tested			
	System flushed			
	System vented			
	Brine			
	Expansion vessel			
	Mud separator			
	Safety valve			
	Shut-off valve			
<i>x</i>	<i>Description</i>	<i>Note:</i>	<i>Inspected by:</i>	<i>Date:</i>
	<b>Heating system:</b>			
	System pressure tested			
	System flushed			
	System vented			
	Safety valve			
	Diaphragm expansion vessel			
	Mud separator			
	Pressure gauge			
	Shut-off valve			
	Admission valve			
	Buffer accumulator			
<i>x</i>	<i>Description</i>	<i>Note:</i>	<i>Inspected by:</i>	<i>Date:</i>
	<b>Domestic water:</b>			
	System pressure tested			
	System flushed			
	Safety valve			
	Pressure gauge			
	Buffer accumulator			
<i>x</i>	<i>Description</i>	<i>Note:</i>	<i>Inspected by:</i>	<i>Date:</i>
	<b>Electricity:</b>			
	Property fuses			
	Heat pump fuses			
	Phase sequence			
	32A power socket			
	Outdoor temperature sensor			

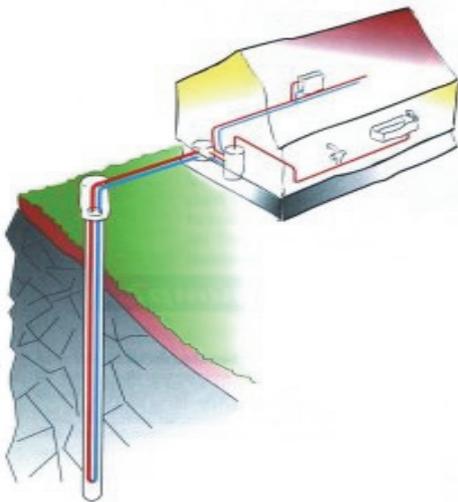
### 3 GROUND SOURCE HEAT AND COOLING

A well-designed and appropriately dimensioned ground source heating system is affordable in terms of operating expenses and energy efficient. With a ground source heat pump, you can efficiently heat both interior air and domestic water. In summer, the system can also be used to cool interior air in an environmentally friendly fashion.

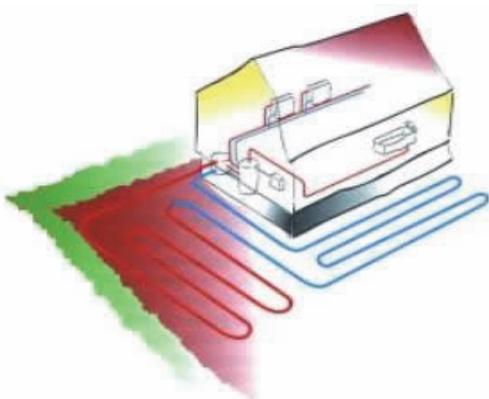
#### 3.1 Ground source heat energy

A ground source heat pump collects heat from the ground and transfers it inside the building. The heat can be collected using pipes sunk in a bored well, heat collection pipes installed near the ground surface or pipes anchored at the bottom of a water system.

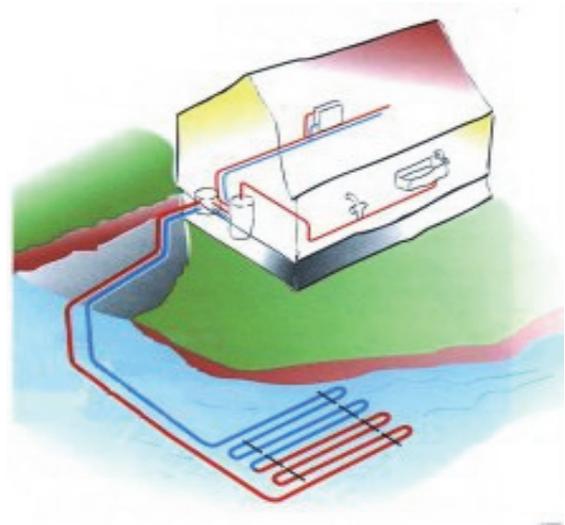
##### Bored well as a heat source



##### Ground as a heat source



##### Water system as a heat source



More information on heat collection systems and their scaling can be found on the website of Gebwell Ltd. and the Finnish Heat Pump Association.

[www.gebwell.com](http://www.gebwell.com)

[www.sulpu.fi](http://www.sulpu.fi)

#### 3.2 Ground source cooling

The cold temperature of the brine can also be used to cool dwellings. In summer, the free cooling energy can be transferred from the ground with just a circulation pump. The ground source heat system can be connected to the convection heaters of the ventilation system or a underfloor heating/cooling system for cooling purposes.

#### 3.3 Ground source heat pump's operating principle

The ground source heat pump's refrigerant circuit includes four main components:

- Evaporator
- Compressor
- Condenser
- Expansion valve

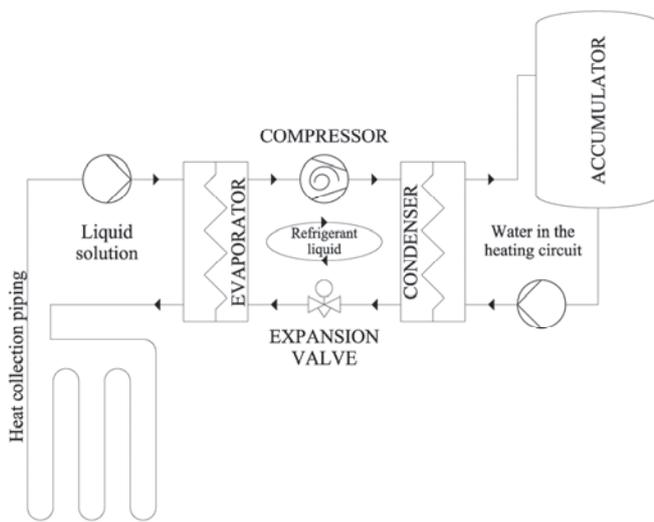
The heat in the ground is absorbed into a liquid solution circulating in the heat collection pipes.

In the evaporator, the liquid comes into contact with the refrigerant that, when vaporised, binds heat energy from the liquid solution that circulates in the ground. The liquid solution returns to the ground about 4°C cooler than when coming out to the surface. The lowest permissible temperature for the liquid solution coming to the heat pump is -5°C.

The compressor increases the pressure and temperature of the refrigerant. The refrigerant also absorbs the heat energy generated by the compressor's operation.

The hot refrigerant is conveyed to the condenser, where the heat energy of the refrigerant is transferred to the water circulating in the building's heating system. The refrigerant condenses into liquid upon releasing heat energy.

The pressure of the refrigerant remains high when being transferred to the expansion valve. In the valve, the refrigerant's pressure decreases rapidly. From the expansion valve, the refrigerant passes on to the evaporator where it is once again evaporate. At this point, the refrigerant absorbs heat from the liquid solution circulating in the heat collection piping.



### 3.4 Heating functions

#### *Domestic water*

The heat pump produces domestic water based on the B3 measurement sensor. Compressor K1 is factory set to activate when the measurement value drops under  $+45^{\circ}\text{C}$  and deactivated when the value reaches  $+50^{\circ}\text{C}$ .

The “domestic water temperature 1” value, which is shown in the control unit menu, is the temperature measured by the domestic water operating sensor. The actual temperature of the domestic water is  $5^{\circ}\text{C}$ – $7^{\circ}\text{C}$  higher.

#### *Heating*

The heat pump produces heating water directly into the building's heating network. The control automation activates the charging procedure when the measurement value for supply water is  $2.5^{\circ}\text{C}$  lower than the supply water set point. Charging is deactivated when the measurement value is  $2.5^{\circ}\text{C}$  higher than the set point.

#### *Heat supply and source pump:*

In order for a heat pump to function at the best possible efficiency, the conditions of the heating system and collector must be ideal. The difference between the heating system's output and input temperatures must be  $6^{\circ}\text{C}$ – $10^{\circ}\text{C}$  and the output and input temperature difference of the collector must be  $3^{\circ}\text{C}$ – $4^{\circ}\text{C}$ . Efficiency and savings are reduced at temperature differences other than those described above.

Factory settings:

Heat supply pump:  $6^{\circ}\text{C}$

Source pump:  $4^{\circ}\text{C}$

### 3.5 Tips for saving

The heat pump's function is to produce heat and domestic hot water according to your wishes. The system aims to fulfil these wishes by all means available, within the framework of the set values.

Important factors affecting the energy consumption are the interior temperature, hot water consumption, hot water temperature level, the insulation level of the real estate, as well as the desired level of comfort. Please note the above points when making changes on the device for settings.

#### **IMPORTANT!**

Thermostats for floor heating and radiators can have a negative impact on energy consumption. They slow down the flow in the heating system and the heat pump will compensate this by raising the temperature of the network. This will affect the operation of your device consuming more electricity. Thermostats are designed to react only to control of so-called free-heat (sun, heat generated by people, fireplaces, etc. ...).

## 4 DELIVERY AND HANDLING

### 4.1 Safety instructions

The following safety instructions are to be taken into account when handling, installing and using the equipment.

- Do not lift the equipment from any other than the points indicated on the manual.
- Remove the plug from the socket before carrying out any maintenance measures.
- Never compromise safety by bypassing safety devices.
- Only qualified personnel should conduct maintenance / repair measures on the cooling unit of the equipment.
- The heat pump is not to be flushed with water.
- Keep all the shell plates in place to prevent water splashing on the electronic components of the equipment.

### 4.2 Delivery contents

- Ground source heat pump
- Installation, operating and maintenance manual 1 pc
- Outdoor temperature sensor 1 pc
- Safety valve for heating circuit  
G1/2" – 2.5 bar 1 pc
- Safety valve for domestic water circuit  
G1/2" – 10 bar 1 pc
- Supply cord with power plug 1 pc

### 4.3 Optional accessories

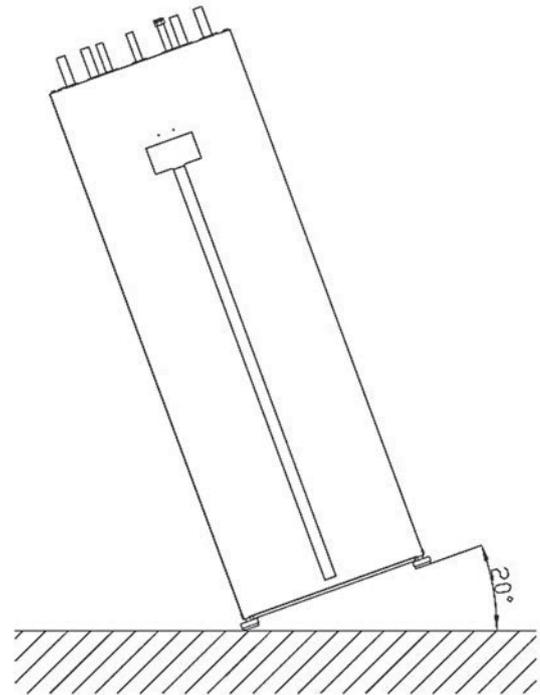
- Collector valve group
- Qi installation set (with or without pump)
- Qi R installation set
- Heating control group
- SMS/WEB server, SMARTWEB
- Cooling control group
- Cooling convector
- Buffer accumulator for domestic water
- Buffer accumulator for heating
- Circulation pump set for domestic water
- Pool heating set
- Diaphragm expansion vessel for collector
- Diaphragm expansion vessel for heating
- Energy measurement

### 4.4 Storage

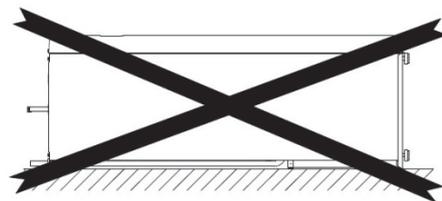
Before installation, the ground source heat pump must be kept in its delivery package in a dry and warm location.

### 4.5 Transport

The heat pump may be temporarily tilted, but it must not be left inclined for a long period of time, not even in transit. The heat pump's maximum tilt angle is 20°. It is not recommended to turn the pump on its side.

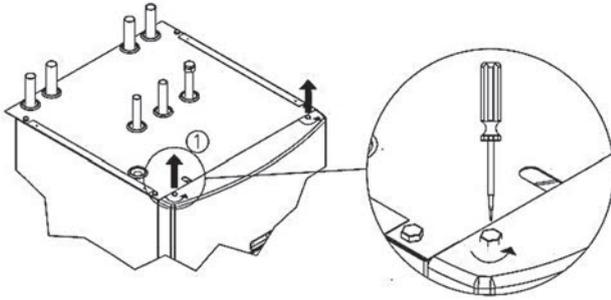


However, if there is a need to turn the heat pump on its side, for transport purposes, for example, the compressor unit must be removed for the duration of transit. In any case the heat pump must not be transported on its back. If the heat pump has been tilted in transit, you must allow the pump to stand upright for at least two hours before activation so that the compressor's (K1) lubrication oil has time to reach the required locations. Only lift the heat pump by the pallet. The pump must be transported on the pallet all the way to the installation location.

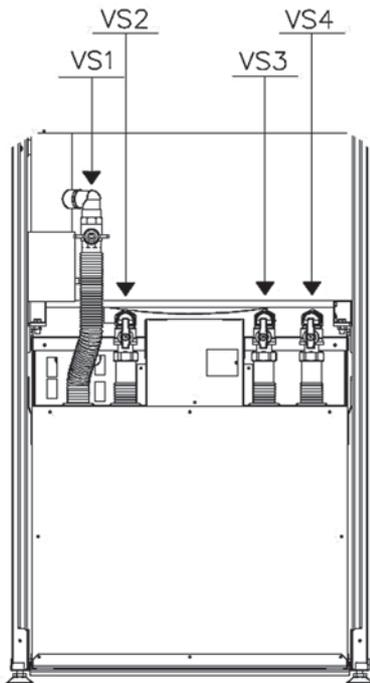


## 4.6 Removing the compressor unit

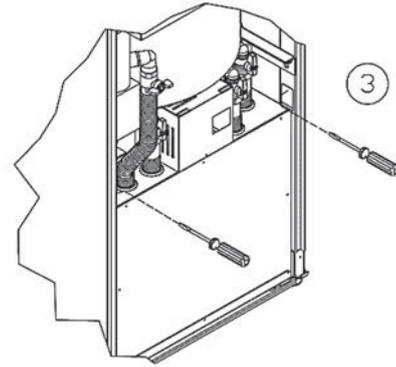
1. First, disconnect the front door of the ground source heat pump by unscrewing the top screws.



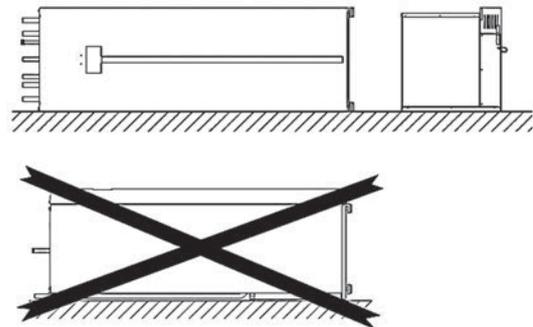
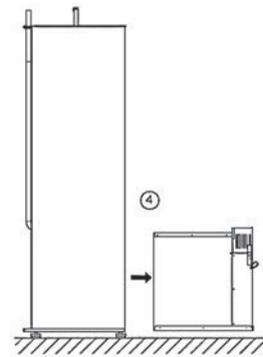
2. Disconnect the pipes from the connections (valves VS1...VS4). *NOTE! If you have to disconnect the unit, ensure that the collector pipes are insulated when the unit is reinstalled in order to avoid condensation.*



3. Open the screws of the compressor unit supports and disconnect the compressor unit plugs from the switchboard and the compressor unit.



4. Pull the compressor unit out.



## 4.7 Hauling the compressor unit module

The compressor unit is equipped with loops for lifting. Shafts can be used to lift up the compressor unit. By threading the shafts through the loops, hauling the compressor unit can be made easier.

*The weight of the compressor unit:*

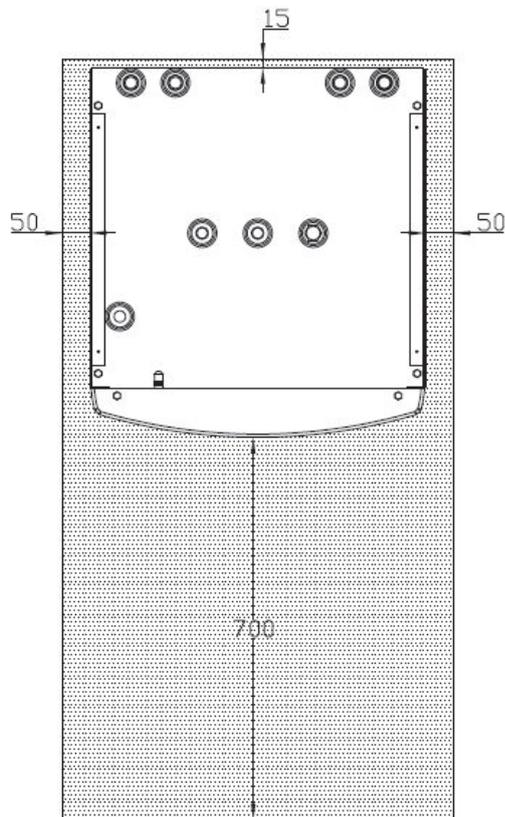
Qi 6	96 kg
Qi 8	103 kg
Qi 10	104 kg
Qi 13	110 kg

## 4.8 Removing the packaging

The product is packaged in protective plastic such that the installation can be performed without removing the plastic. The protective plastic can be kept in place to protect the pump until activation.

- Ensure that you have received the correct products with the correct accessories.
- Transport the heat pump near the planned installation location.
- Lift the pump off its transport pallet.
- Adjust the pump so that it is level and stands firmly on its adjustable legs.
- Ensure that the frame, with the exception of the adjustable legs, is not in contact with the building's structures.

## 4.9 Ground source heat pump's location



A variety of matters related to safety, comfort of use and maintenance must be considered when positioning the ground source heat pump.

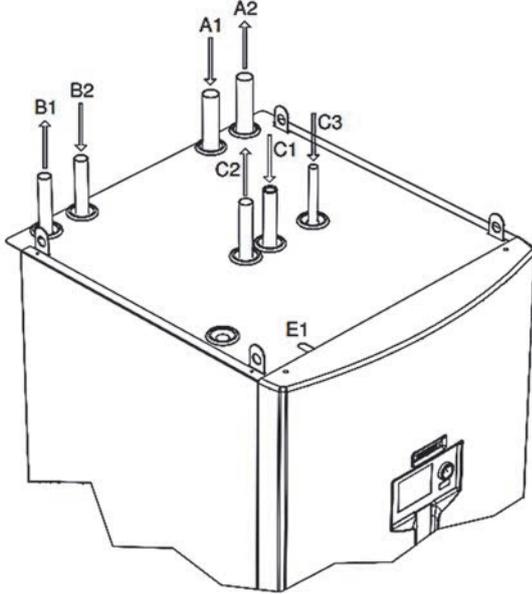
The temperature of the location must be between +5°C and +30°C. The room must be sufficiently ventilated. If the humidity in the room is high, water condenses on the cold pipe sections of the collector.

The heat pump compressor (K1) generates noise that may be conveyed to other spaces via the building's structures. It is recommended to use flexible parts in the pipe connections. The ground source heat pump must be positioned in a way that the sound does not disturb any living areas. If necessary, soundproofing of the wall structures between the room in which the pump is located and the living areas can be reinforced and extra rubber pads installed under the pump's legs. We recommend placing the ground source heat pump in a separate technical room. The sound transmitted through structures can be limited with the floor structures of the pump room and other solutions. A separate cast floor cut off from the building's other spaces prevents noise from being carried to living areas through the floor.

Reserve at least 700 mm of maintenance space in front of the pump so that the compressor unit can be taken out for maintenance. For the same reason, do not install the pump below the floor surface. Leave free space behind the ground source heat pump to prevent the transfer of any vibrations. In addition, reserve at least 600 mm of free space at the sides of the pump if you want to connect the collector pipes to the pump's sides instead of the top.

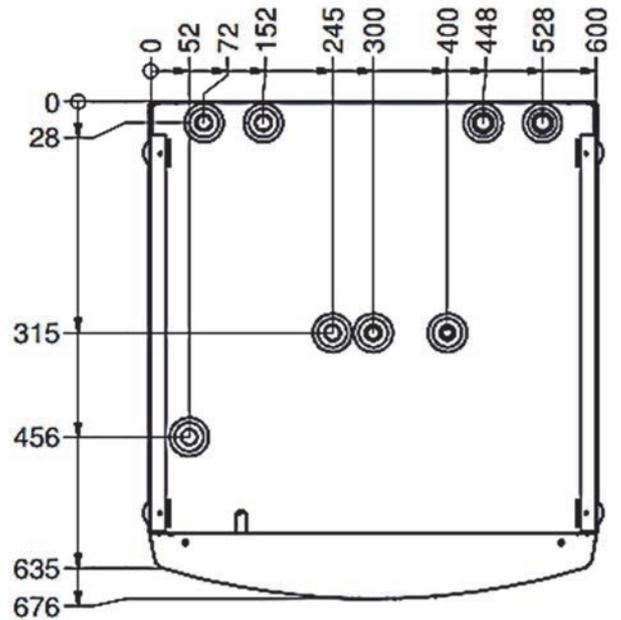
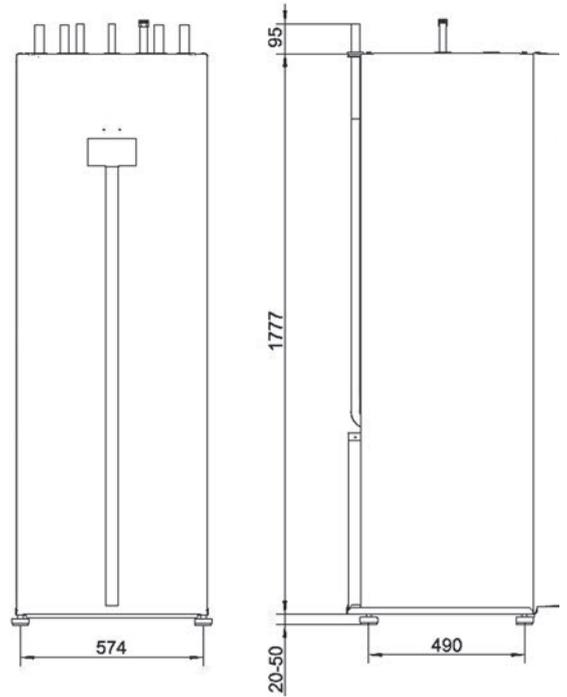
# 5 DIMENSIONS AND PIPE CONNECTIONS

## 5.1 Pipe Connections

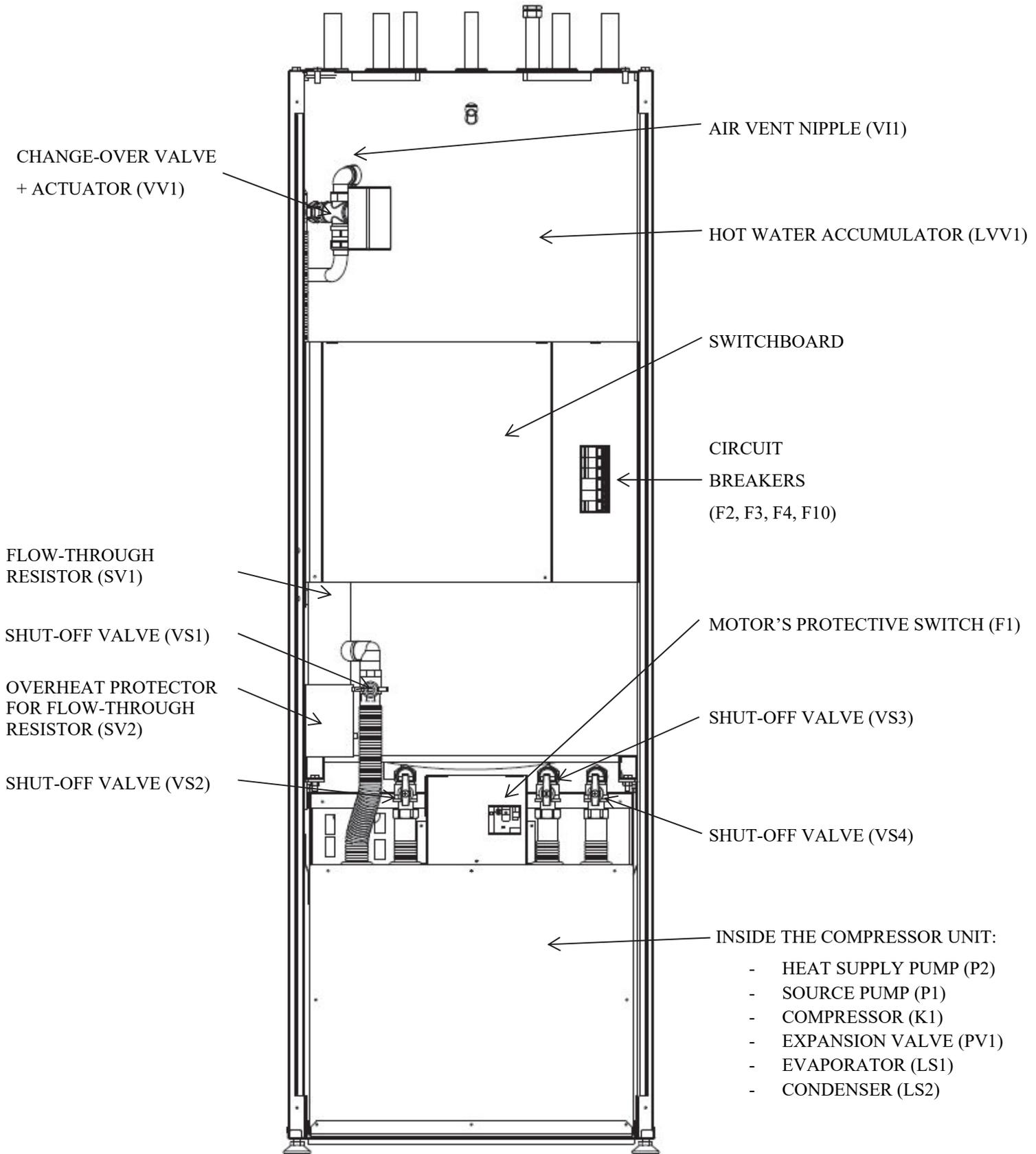


- A1. Brine from the ground  $\varnothing 28$  mm
- A2. Brine to the ground  $\varnothing 28$  mm
- B1. Heating supply  
Qi6-10  $\varnothing 22$  mm, Qi 13  $\varnothing 28$  mm
- B2. Heating return  
Qi6-10  $\varnothing 22$  mm, Qi 13  $\varnothing 28$  mm
- C1. Cold water  $\varnothing 22$  mm
- C2. Domestic hot water  $\varnothing 15$  mm
- C3. Hot water circulation  $\varnothing 15$  mm
- E1. Electrical connections (outdoor sensor, flow sensor, actuators, etc.)

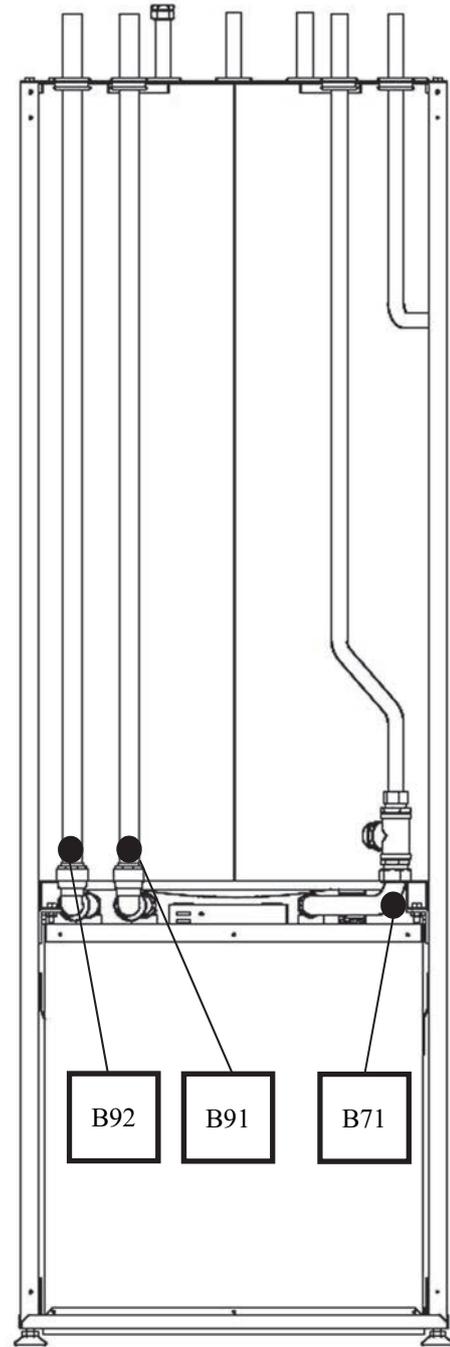
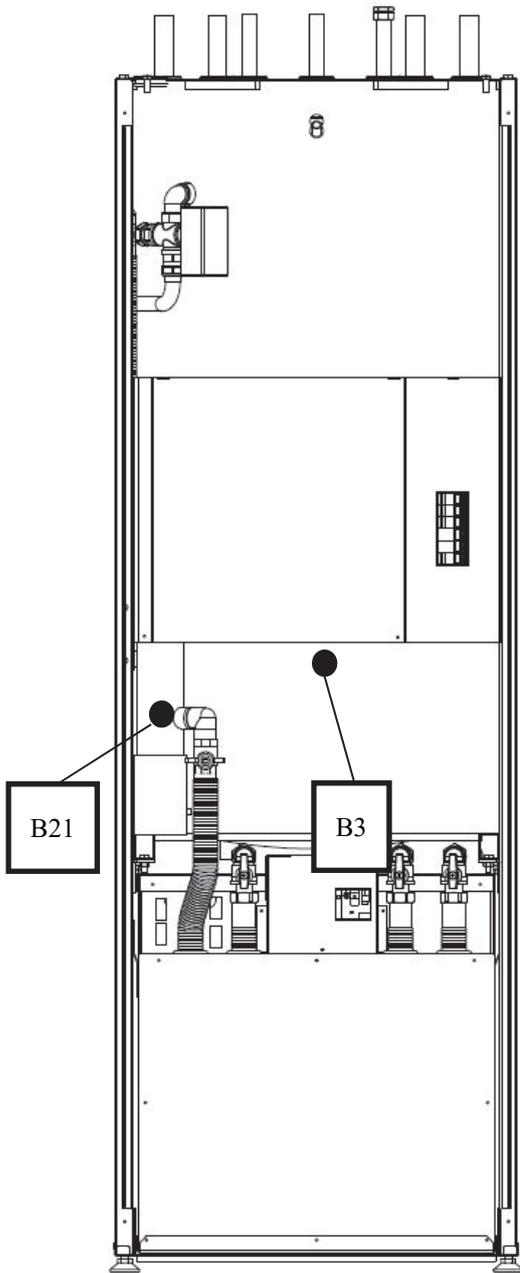
## 5.2 Heat pump dimensions



### 5.3 Heat pump components



## 5.4 Heat pump sensors



B3	Domestic hot water
B21	Charge heating water supply
B91	Brine from the ground
B92	Brine to the ground
B71	Charge heating water return

## 6 PIPE INSTALLATION

### 6.1 Collector

When 40x4.2 PN6.3 PEM hoses are used.

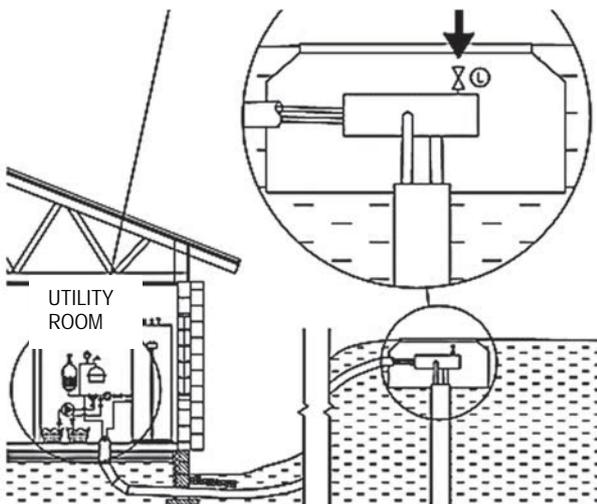
Device	*Recommended length of collection piping (m)	Recommended active drilling depth (m)
Qi6	300–400	110–130
Qi8	350–2x250	130–160
Qi10	400–2x300	160–200
Qi13	2x250 – 3x400	210 x 2x150

\* Depends from soil

The table values are examples intended to be guidelines. Before beginning installation, accurate calculations of the building's heat requirements must be prepared.

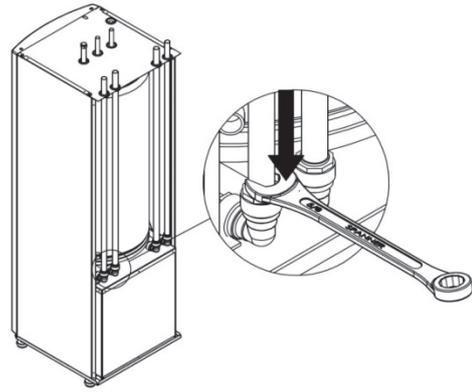
The maximum length for a single collector loop is 400 m. If there is a need to install more piping, the piping must be divided into two loops that are connected in parallel. The connection must be conducted so that the loop flow can be balanced.

The collection piping must rise constantly towards the heat pump in order to prevent air pockets. If this is not possible, venting mechanisms must be installed at the high points.



Residual installation impurities must be flushed from the collector before installing the heat pump.

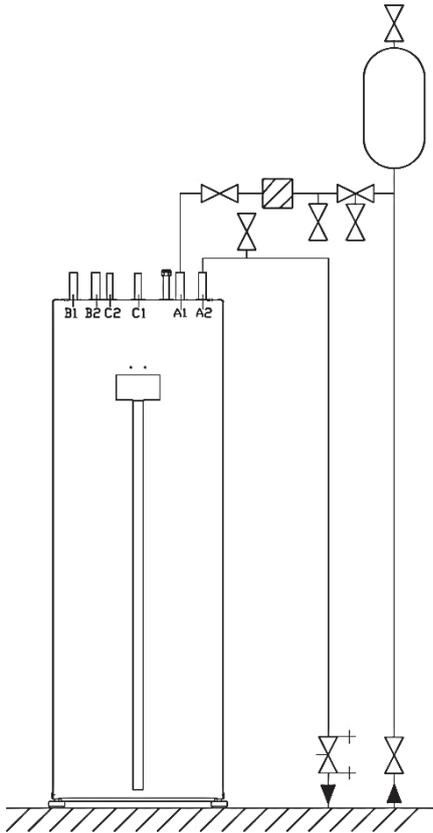
The collector connection must be selected before installing the device in place. The connection can be changed to the right, left or back instead of the top. At least 600 mm of connection space must be reserved in the outgoing direction.



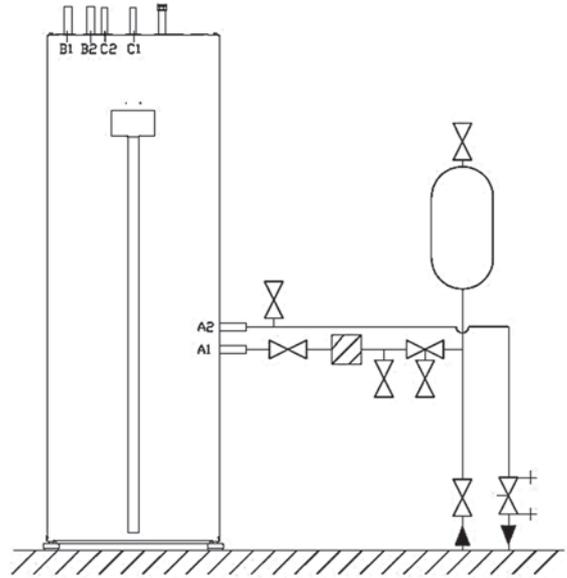
1. Disconnect the collector pipes from the elbow fittings by pressing the plastic collar of the claw coupling with a wrench.
  2. Disconnect the pipe from the top connection and turn the elbow fitting to the desired direction.
  3. Cut the pipe to the desired length, if necessary.
- Insulate all of the building's source/brine pipes with closed-cell insulation in order to prevent water condensation.
  - Use supports insulated with rubber to support the pipes.
  - Place the level expansion vessel in the highest point of the collector, in the incoming pipe before the source pump.
  - Mark the name of the brine on the level expansion vessel.
  - Install shut-off valves in the pipe connections as close as possible to the ground source heat pump.
  - Ensure that water does not spill on the pump or in the electrical devices during operation.
  - Connect the supplied collector valve group, including the expansion vessel, as shown in the figure. The arrow on the valve housing indicates flow direction. The valve group size is DN25. Do not use a pipe size smaller than 28 mm for the connections (bigger is recommended).
  - The collector must be pressure tested at a pressure of 3bar and the test pressure must be maintained for at least 30 min.
  - In the collector/brine, only use connection parts that are intended for cold conditions.

*Connection options*

*Connection from top*

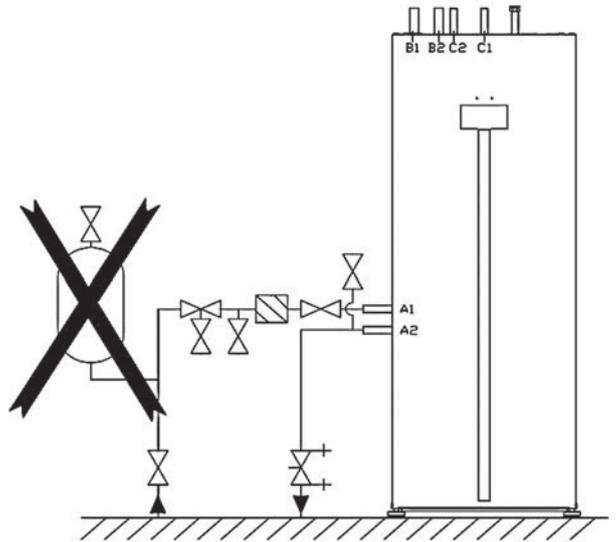
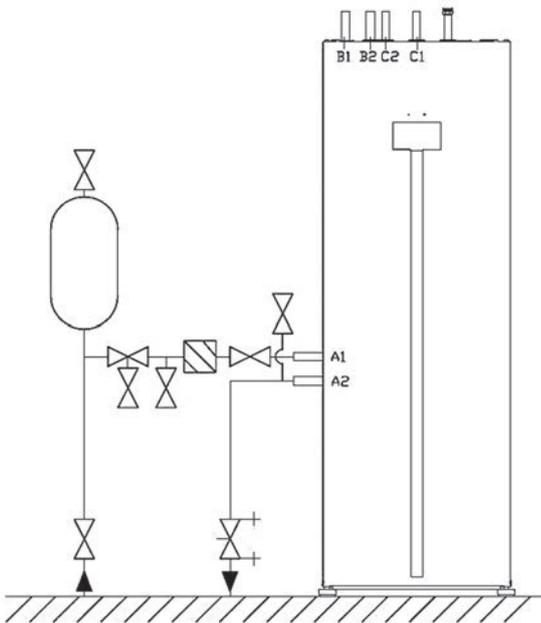


*Connection from right*



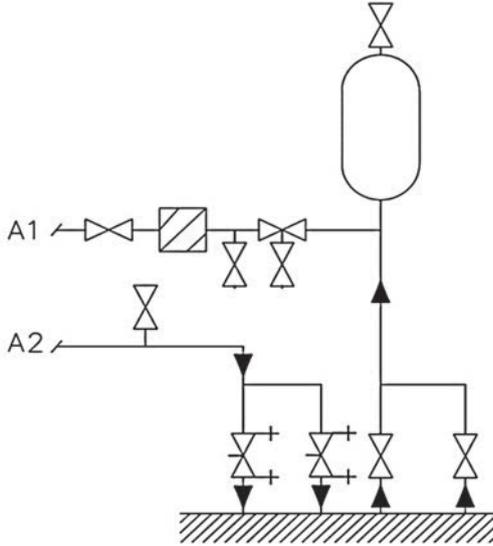
The incoming ground line must be branched to the expansion vessel. The expansion vessel must be at the end of the line rising directly upwards so that air can pass directly into the expansion vessel. **Do not make a connection to the side branch or otherwise so that air is not prevented from rising freely.**

*Connection from left*



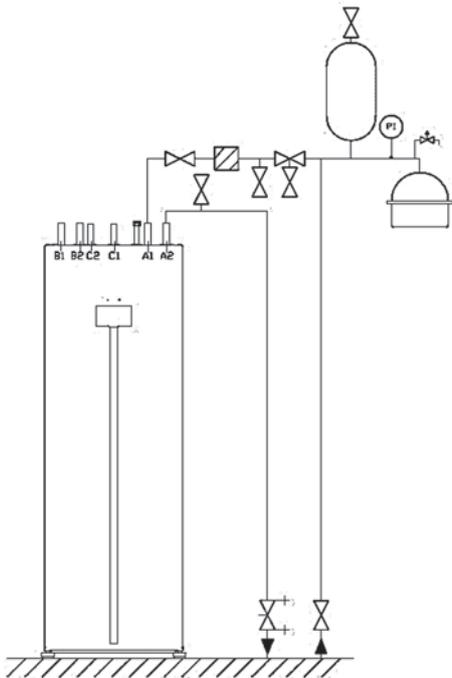
### Collector installation in multiple loops

When using multiple collectors, shut-off and balancing valves must be included in all circuits. Observe the valve manufacturer's instructions when installing the balancing valves. However, the valves must be installed so that adjustment and inspection can be arranged easily and freezing is prevented. Vent the circuits one at a time and adjust the flow in proportion to the each circuit lengths. Try to use collection circuits of a roughly equal length.



### Pressurised collector (Recommended)

A collector can also be pressurised. In this arrangement, the diaphragm expansion vessel, which is available as an accessory, is used.



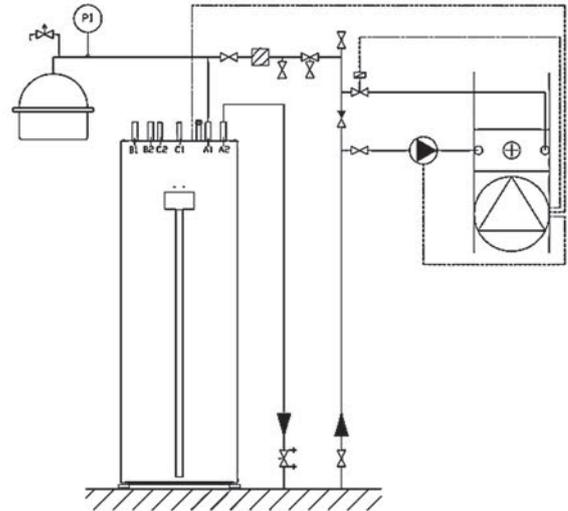
## 6.2 Connecting ground cooling

Ground cooling works best when heat is collected by means of a bored well. The temperature of a loop installed in the ground or in a lake may rise high enough to prevent the extraction of sufficient cooling power. The air in the collector must be able to freely rise to the expansion vessel. Venting must always be arranged at the highest point of the collector. If there is a need to connect a cooling radiator to the highest point of the collector, the venting must be arranged through it.

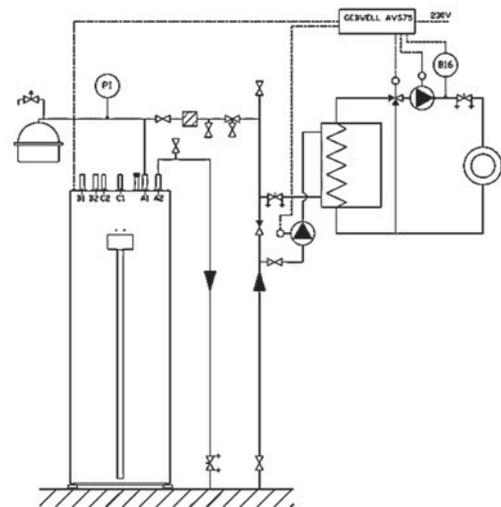
A cooling accessory available for the heat pump can be used to control/adjust the cooling. Building automation or an air supply unit can also control the source pump (P1) inside the heat pump. See instructions in the electrical connection diagram.

### Connection options

#### Direct connection to convection heater



#### Connecting mixing circuit for cooling with a heat exchanger

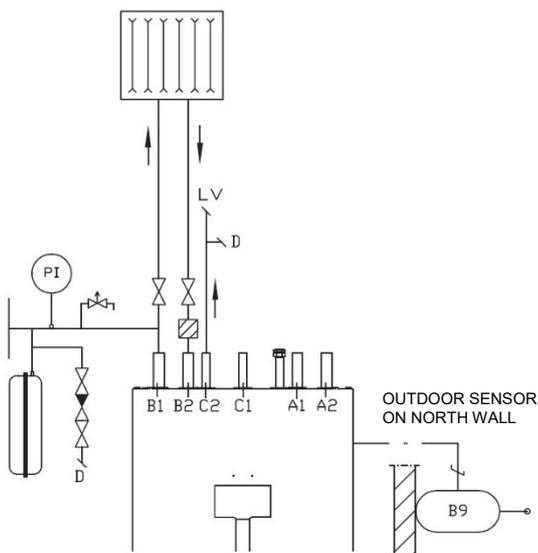


### 6.3 Heat supply circuit

The heating system controls the interior temperature with a control adjuster and, for example, radiators, underfloor heating, ventilation and convection heaters.

- Residual installation impurities must be flushed from the building's heating system pipes before installing the heat pump.
- Install the required protective devices, mud separator (strainer) as well as the shut-off and check valves. Shut-off valves must be installed as close as possible to the heat pump.
- It is recommended to perform the installation to a closed heating system with a diaphragm expansion vessel.
- Ensure that water does not spill on the pump or in the electrical devices during operation.
- The product must be protected against overpressure with a safety valve. The safety valve's maximum opening pressure must be 4.0bar, and the valve must be installed in the heating system's return pipe. It is recommended to lead the overflow pipe of the safety valves to the nearest floor drain. Install the overflow pipe so that the water can flow out of the pipe without obstructions.
- A connection to a system equipped with thermostats requires a bypass valve to be installed in all the radiators or that a few thermostats be removed to ensure sufficient flow. Refer to *Technical specifications* –table for pump's minimum flow.

#### Connecting the heating system

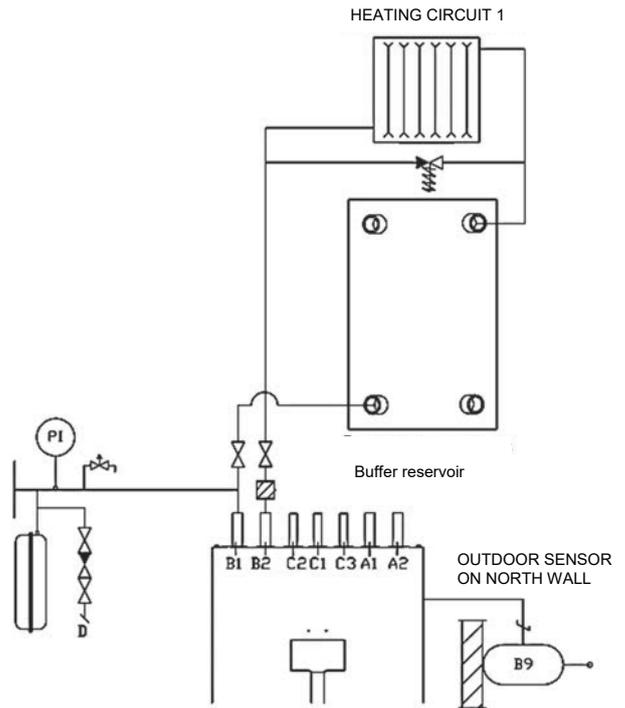


#### Connection options

##### Accumulator tank to heating system

If the liquid volume of the heating system is too small in proportion to the heat pump's power, a buffer accumulator can be used in the heating system.

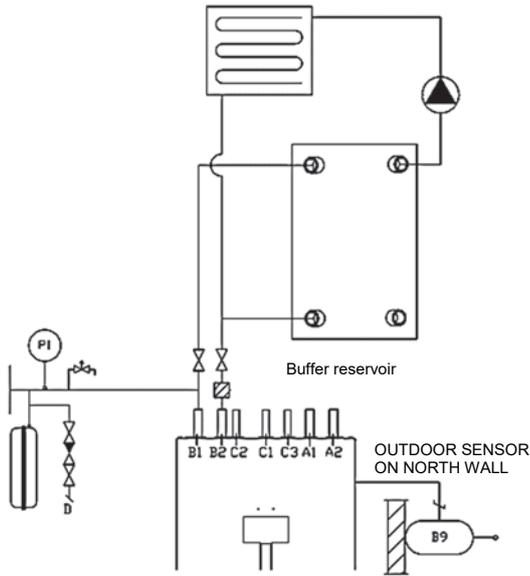
NOTE! Ensure pump's minimum flow with bypass valve or by leaving sufficient amount of open circuits in heating network. Refer to *Technical specifications* -table for pump specific minimum flows.



##### Radiator/underfloor heating system with a buffer accumulator

In radiator heating system, it is recommended to install a buffer accumulator and extra circulation pump to avoid the noise (clicking) in radiators. The accumulator and the circulation pump prevent radiators from cooling down during domestic hot water charging and the noise does not arise.

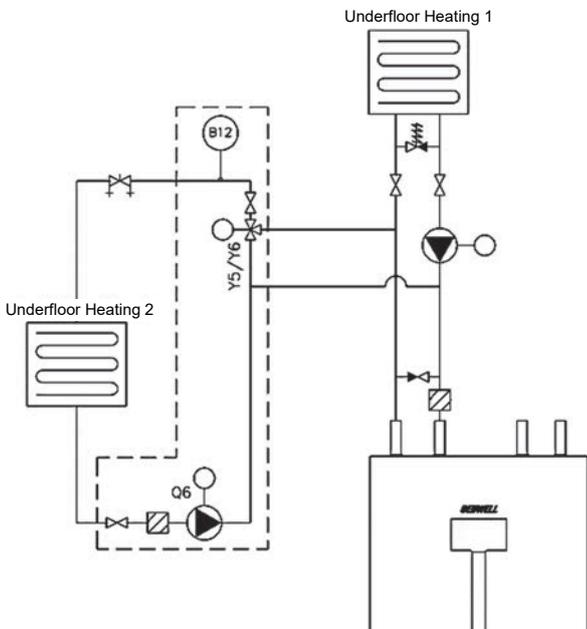
If underfloor heating system requires an external circulation pump, it should be dimensioned to meet the needs of the underfloor heating system. If the liquid volume of the heating system is too small in proportion to the heat pump's power, a buffer accumulator can be used in the heating system.



### Underfloor heating with an external heat supply pump

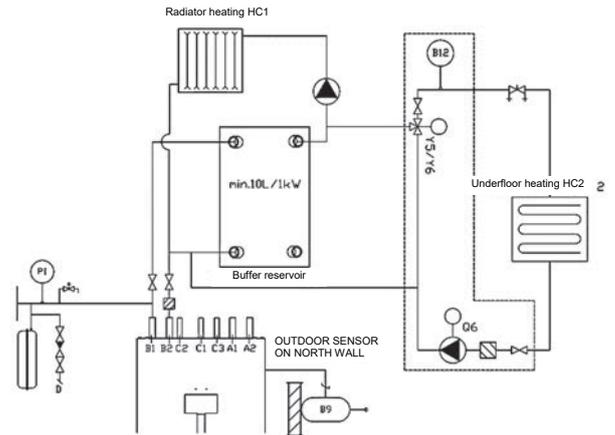
If heat pump's internal heat supply pump is insufficient to underfloor heating, an external heat supply pump is to be installed. The pump has to be dimensioned to correspond to demand of underfloor heating system.

NOTE! Ensure pump's minimum flow with bypass valve or by leaving sufficient amount of open circuits in heating network. Refer to *Technical specifications* -table for pump specific minimum flows.



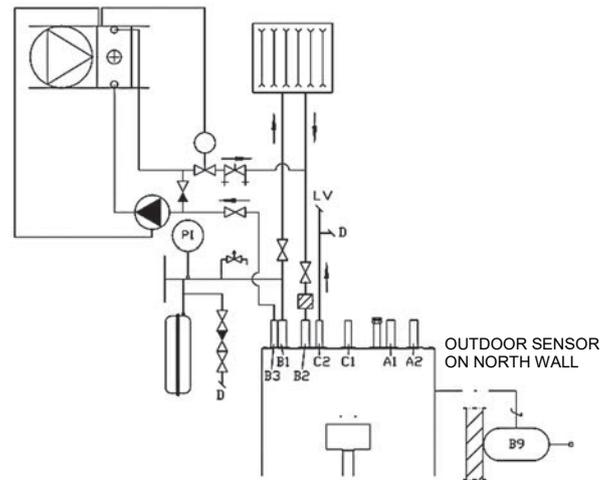
### Multiple heating systems with buffer accumulator

The following connection method is used when a building features heating systems that utilise varying temperatures – radiator heating and underfloor heating, for example.



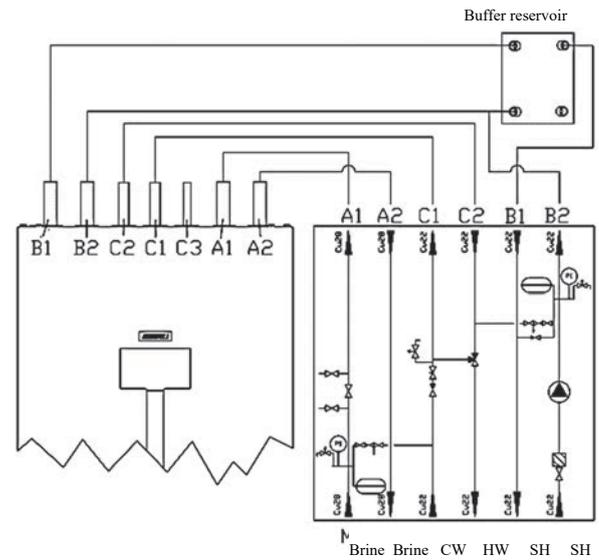
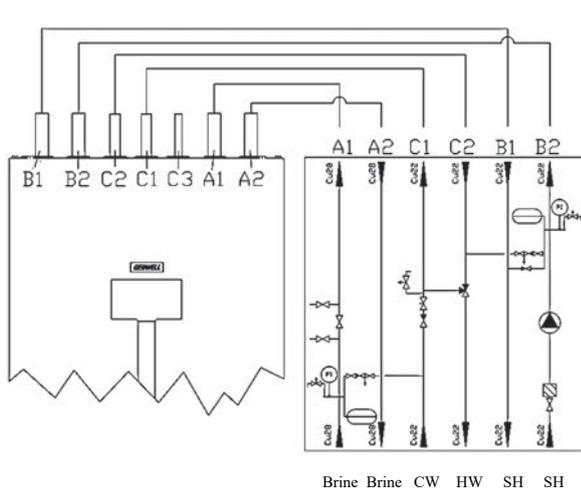
### Connecting an heating convector post-heating radiator

The ground source heat pump can be supplemented with an accessory QiV1, which enables connection of post-heating radiator of water-circulating air convector. This prevents post-heating radiator to freeze during domestic hot water charge. Check the maximum flows and the post-heating radiator's power levels in the technical specifications.



### Mounting of installation set (with or without a pump)

Installation sets sold as accessory for heat pump ease and speed up the installation. This guide to connecting applies to both sets – with and without a pump.

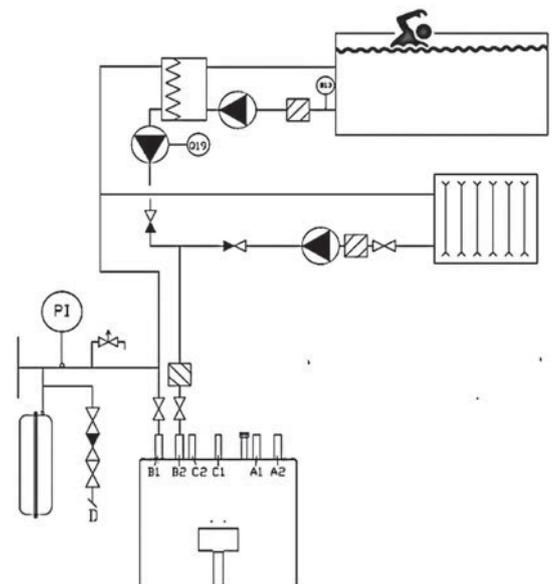
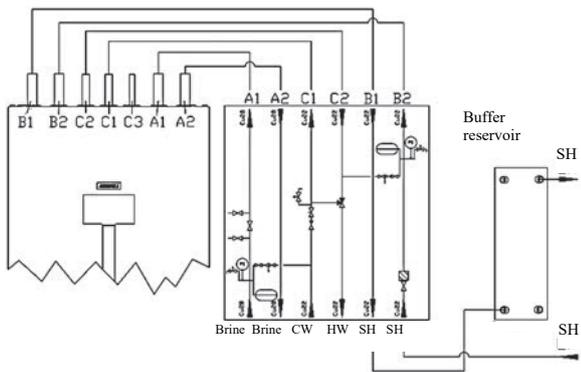


*Mounting of installation set (without a pump), with a buffer accumulator*

In case the liquid volume of heating system is too small compared to the heat pump's power, a buffer accumulator can be used in the heating system.

*Pool heating*

An accessory for pool heating, UIM1Si, is available for the heat pump. The heating circulation pump is controlled with a pool sensor B13.



*Mounting of installation set (with a pump), with a buffer accumulator*

In radiator heating system, it is recommended to install a buffer accumulator and a circulation pump to avoid the noise (clicking) in radiators. The accumulator and the circulation pump prevent radiators from cooling down during domestic hot water charging and the noise does not arise. Furthermore with use of buffer accumulator long operating periods of compressor can be ensured.

If underfloor heating system requires an external circulation pump, it should be dimensioned to meet the needs of the underfloor heating system. If the liquid volume of the heating system is too small in proportion to the heat pump's power, a buffer accumulator can be used in the heating system.

**6.4 Connecting the domestic water system**

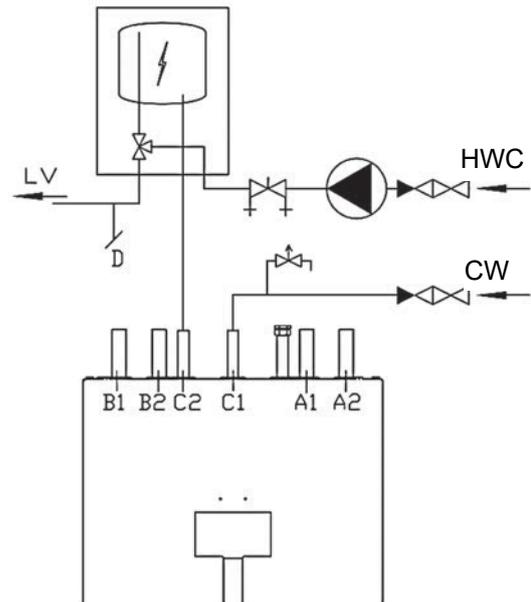
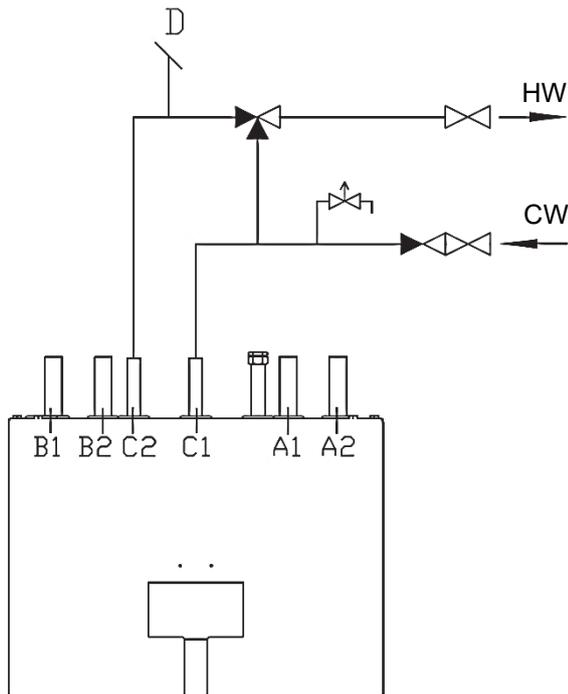
Residual installation impurities must be flushed from the building's domestic water piping before installing the heat pump.

Install shut-off valves in the pipe connections as close to the heat pump as possible.

Water must not spill on the pump or in the electrical devices during operation.

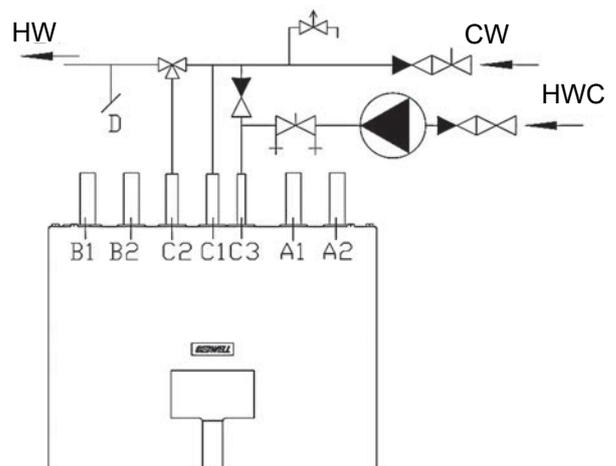
The domestic water system must be equipped with a safety valve (max 10bar) installed in the cold water line as shown in the figure. It is recommended to lead the overflow pipe of the safety valves to the nearest floor drain. Install the overflow pipe so that the water can flow out of the pipe without obstructions.

The domestic water safety valve may leak nearly every time higher consumption of warm domestic water ceases. The overflow is caused by the thermal expansion of cold water and pressure shocks. The safety valve leak can be prevented by installing an expansion vessel in domestic water network. The vessel evens out the pressure changes and prevents pressure shocks.



*Domestic hot water circulation to heat pump's accumulator*

Heat pump's domestic water accumulator is equipped with a connection to domestic hot water circulation. The flow of the circulation is adjusted carefully to ensure proper functioning of the accumulator. Too high flow weakens the thermal layering in the pump's internal accumulator and, thus, increases the number of times the compressor requires activation.



*Accumulator tank for the domestic water system*

If the consumption of domestic water is high, the heat pump can be supplemented with an electrically heated additional accumulator. The heat pump heats the cold water in the internal accumulator, after which the water is led to the external buffer accumulator. The electric resistance of the external accumulator maintains the temperature at the desired level. The system uses the external accumulator to prepare for spikes in the consumption of heat energy.

Use an external accumulator if the building features domestic hot water circulation. Domestic water circulation connected to the heat pump may in some cases weaken the thermal layering in the pump's internal accumulator and, therefore, increases the number of times the compressor requires activation.

## 7 ELECTRICAL CONNECTIONS

### 7.1 General

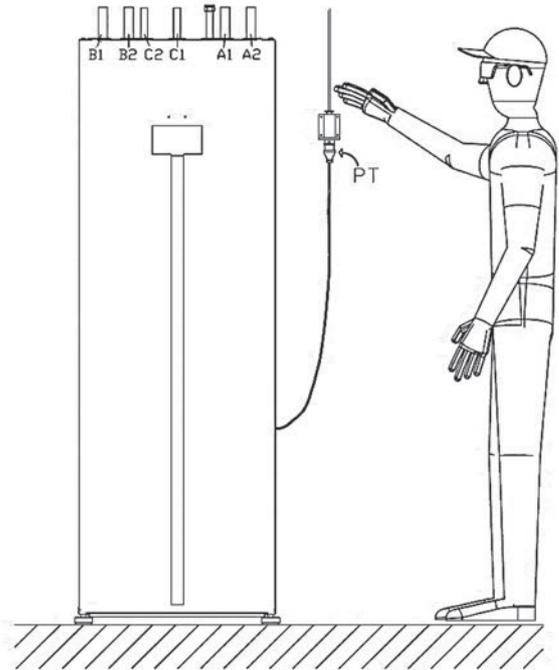
Heat pump is connected to 400V (50GHz) electricity grid. The heat pump's plug must not be connected to an electrical outlet until the heat pump heating system is filled with water. This can cause damage to the electric heater, overheating protection, pumps or compressor.

All electrical equipment has been pre-wired at the factory. If electrical accessories are installed to the heat pump, wiring work must be performed by a qualified electrician.

- The heat pump must be disconnected before insulation measurement.
- Heat pump wiring diagram can be found in appendix *Electrical diagram*.
- If a circuit breaker is used for the heat pump, it should be of type C.
- Cabling of the heat pump's electrical accessories should be made through the lead-through of control centre on the back of the heat pump.

### 7.2 Power supply

The ground source heat pump's power supply is implemented with an easily connectable 32A power plug connection (PT) and a 2 m cable. A 32A power socket is required in the immediate vicinity of the ground source heat pump. Even though the plug size is 32A, the heat pump or supply cable must be equipped with a fuse detailed in the technical specifications table. The plug must be disconnected from the socket during maintenance. Position the socket so that the plug can be easily disconnected when necessary. The socket must be marked with the sticker included in the heat pump delivery "NO GROUND FAULT CIRCUIT INTERRUPTER (GFCI), SOCKET IS TO BE USED FOR GROUND SOURCE HEAT PUMP ONLY"

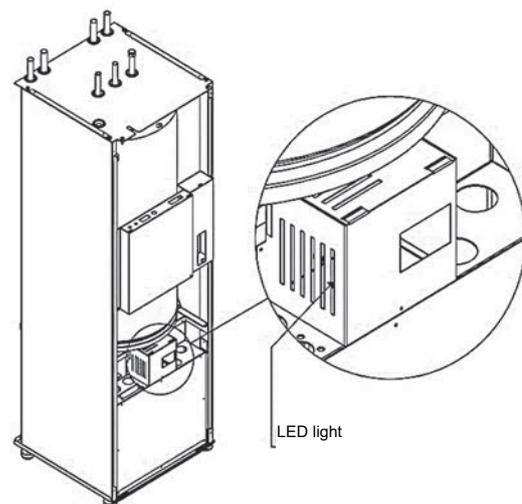


### 7.3 Soft starter / phase sequence

Heat pump's compressor has a three-phase motor. It is important that the phase sequence be connected correctly. Pump notifies of incorrect phase sequence on the controller screen. NOTE! Compressor's motor protection switch (F1) must be ON.

If the pump's phase sequence is incorrect, a LED light begins to flash on the soft starter. NOTE! If the motor protection switch is in the OFF position, the controller will always give a notice: *Soft starter E25 failure*.

The phase sequence can be easily changed by turning the phases in the plug. See soft starter failures in section "Failures."



### 7.4 Outdoor sensor

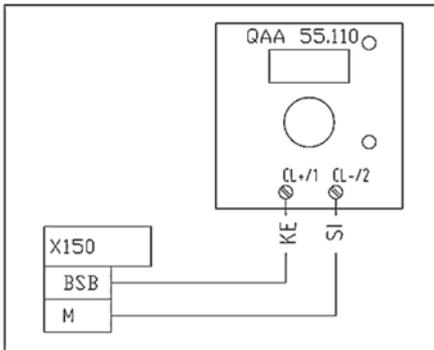
The outdoor temperature sensor is equipped with connector X3. The sensor has been connected to the

control unit and the sensor head. The sensor is equipped with a 15m cable.

The outdoor temperature sensor is already wired to the control centre. Position the sensor in a shaded location on the north or north-east wall. Do not place the sensor near windows or doors.

### 7.5 Room sensor (accessory) QAA55

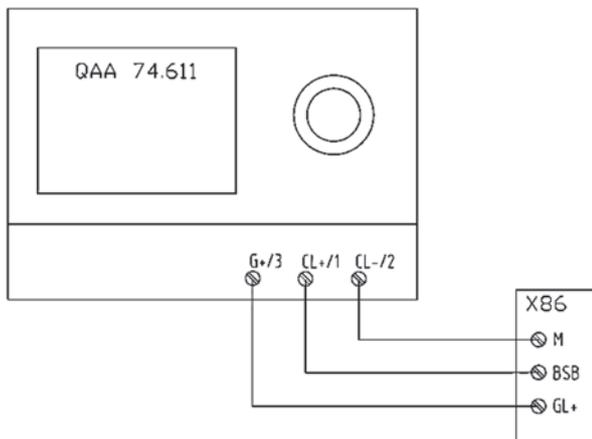
For connection refer to the electrical diagram and the instructions delivered with the room sensor.



The room sensor is connected to the connector X152, BSB/M of the control centre.

### 7.6 Room unit (accessory) QAA75

Room unit QAA74.611 functions as a user interface for the heat pump. The QAA unit is connected to connector X86, BSB/M/G+ on the control centre. The room unit contains an inbuilt room temperature sensor.



### 7.7 External heating circulation pump / pump for heating circuit 2 (accessory)

External heating circulation pump (X9) is equipped with a plug connector, and F4 line protection. Once the plug (X9) is connected to the designated point on the control centre, the pump is ready for operation. The pump can be started from the line protection switch F4. The pump is not connected to the heat pump's control system.

### 7.8 Heating control group 2 (accessory)

Mixing valve (X1) for heating circuit 2 and flow sensor B12 (X2) are equipped with a connector. Heating circuit 2 must be commissioned in controller's menu. In commissioning of the heating circuit 2, site-specific setting should be taken into account.

### 7.9 Electric heater (SV1) power

As factory delivery, the output of the ground source heat pump's electric heater is 6 kW at maximum. The controller switches the resistors on and off in 2 phases depending on the power required. If the resistor power needs to be increased, the resistor control method must be changed to 3-phase control.. The heat pump's fuse size must be selected according to the power of the electrical resistor. The correct fuse size is listed in the device's technical table.

Resistor phase 1: 3 kW (K25)

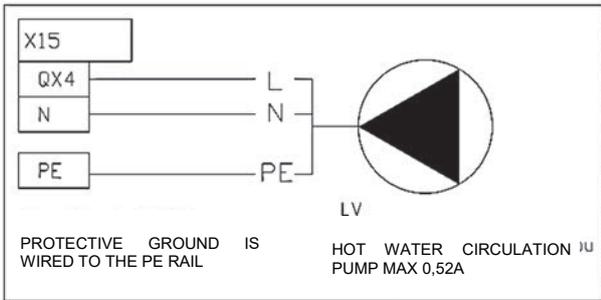
Resistor phase 2: 6 kW (K26)

Resistor phase 3: 9 kW (K25+K26)

If the resistor power must be increased to 3-phase, see instructions in the manual, section "*Heat pump settings > Settings for the electric resistor (SV1)*".

### 7.10 Connection of the hot water circulation pump

Hot water circulation pump can be connected to the electric control of the controller. Circulation pump functions according to factory setting always when domestic water operating mode is ON. Circulation pump control mode can also be changed to function according to a time programme. Change is made on controller's menu. See instructions on "Heat pump settings – Domestic hot water settings"

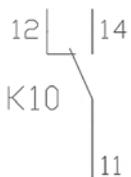


Hot water circulation pump is connected to the X15 connector (orange) on the control centre. QX4/N, Protective ground is wired to the PE rail.

NOTE! The maximum load current of hot water circulation pump is 1A (230VAC).

### 7.11 Alarm forwarding

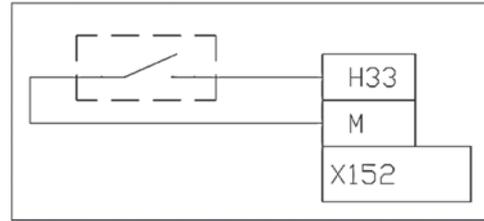
The possible ground source heat pump alarms can be forwarded e.g. to building automation or a modem. The alarm forwarding is connected to the fault relay K10 on the control centre. Closing alarm information (NO) is received from connectors 11/14 and opening alarm information (NC) from connectors 11/12. Use a 2-pole cable with a cross-sectional area of 0,5mm<sup>2</sup> at the minimum.



### 7.12 External control of the source pump

The source pump can be activated by an external potential free switch data. Switch data is connected to the connector X152, H33/M of the control centre.

Turning the switch off will activate the source pump.

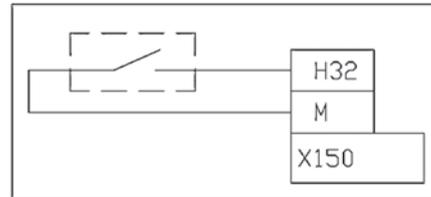


### 7.13 Home / away switch

External home / away switch can be connected to enable heat pump's drop / raise functions. By turning off the switch, domestic hot water operating mode changes to economy and the heating circuits will change to a reduced level. By turning the switch on, domestic hot water heating is activated and the heating circuits will return to the chosen operating mode.

The switch must be potential-free closing switch and it is connected to the X150 connector, H32/M, on the control unit.

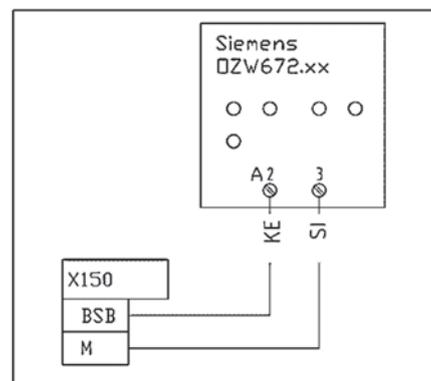
For connection refer to appendix *Electrical diagram*.



### 7.14 Remote control / SmartWeb (accessory)

SmartWeb remote control unit allows the use of the heat pump remotely over the internet or a smartphone application. With the help of remote control you will have access to all the heating control and events in real-time. In case your property heating or hot water settings need to be made changes to, with the help of SMART WEB remote control it is effortless.

Connecting of the OZW remote control device:



### 7.15 Modbus 350 communication module

MODBUS communication module enables the control and monitoring of the heat pump on a computer on your local network. With the help of the Modbus 350

communication module you will get the heat pump connected to your home automation system.

Connection: Connect the ribbon cable of the Modbus 350 communication module to X60 connector.

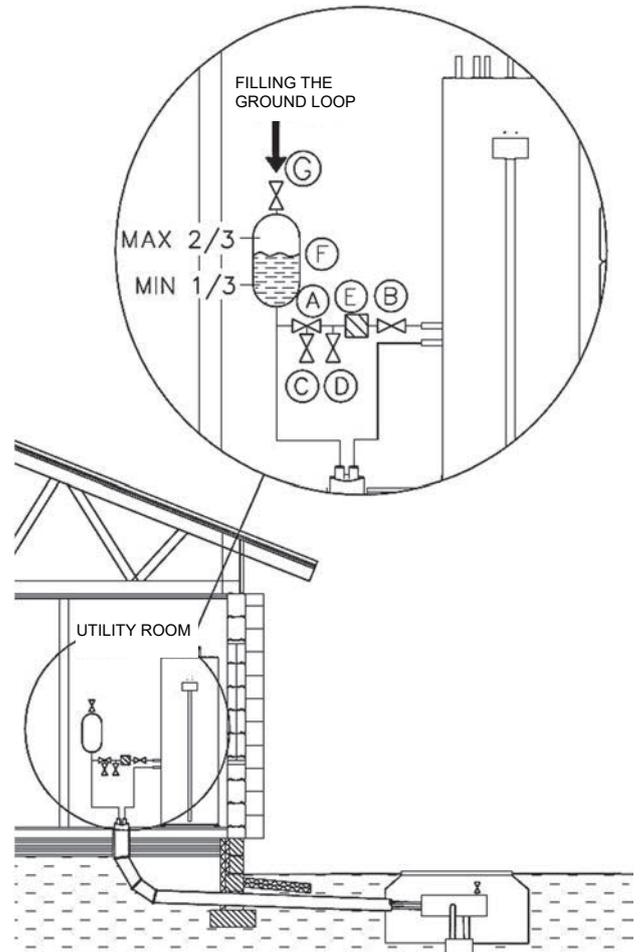
## 8 FILLING

### 8.1 Filling the heating and domestic water circuits

The coil of the heat pump's accumulator contains water of the heating system.

- Fill the accumulator's coil and the heating circuit using the heating system's filling valve.
- Vent the system carefully. When venting the accumulator's coil, place a container under the vent screw (VI1) to ensure that water does not spill on the control centre.
- Ensure that the system pressure is appropriate for operation. The pressure must be 0.5 bar during filling and approximately 0.5–1.0 bar once the accumulator has warmed up. Check the pressure once the accumulator is warm.

The domestic water accumulator does not need to be separately vented after filling. The air is discharged as domestic water is used.



### 8.2 Filling the collector, non-pressurised

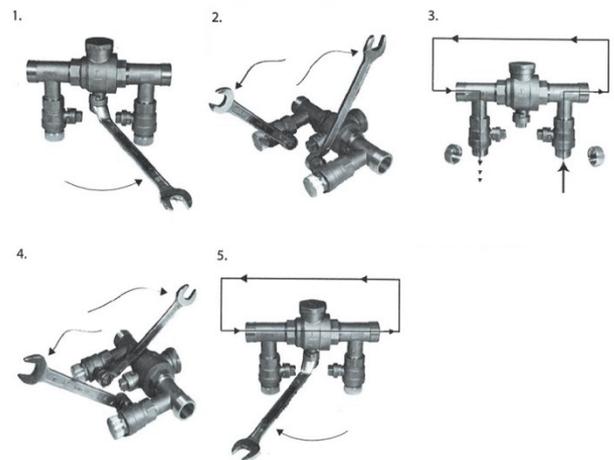
Fill the collector with a mixture of water and brine that can withstand a temperature of at least  $-15^{\circ}\text{C}$ . We recommend **bioethanol**, a liquid which is environmentally friendly.

The filling should be conducted through the **F** level vessel in accordance with the figure shown here. Using a pump for the filling generates microbubbles that disperse slowly and cause low pressure alarms. Therefore, it is recommended to fill the circuit at a steady and reasonable rate.

The liquid pipes for the collector must be installed so that air can exit through valve **G** of the circuit's level vessel. In other words, the expansion vessel must be located at the highest point and the liquid pipes must not form air pockets.

The liquid circuit must be filled at a steady rate through the level vessel. The volume of liquid in the collection circuit is sufficient when the liquid level of the expansion vessel is between 1/3 and 2/3.

Check strainer **E** by first shut-off valves **A** and **B**, and opening the strainer cover. After cleaning the strainer, open valve **A** to release the air from the strainer housing to expansion vessel **F**. Open valve **B**.



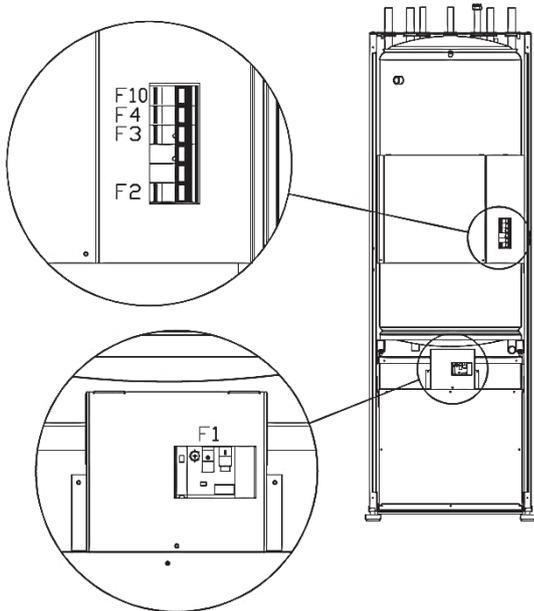
### 8.3 Filling the collector, pressurised

Fill the collector with a mixture of water and brine that can withstand a temperature of at least  $-15^{\circ}\text{C}$ . We recommend **bioethanol**, a liquid which is environmentally friendly.

If the level vessel cannot be installed at the highest point of the collector, a pressurised circuit, including an expansion vessel and level vessel, should be used. Fill the

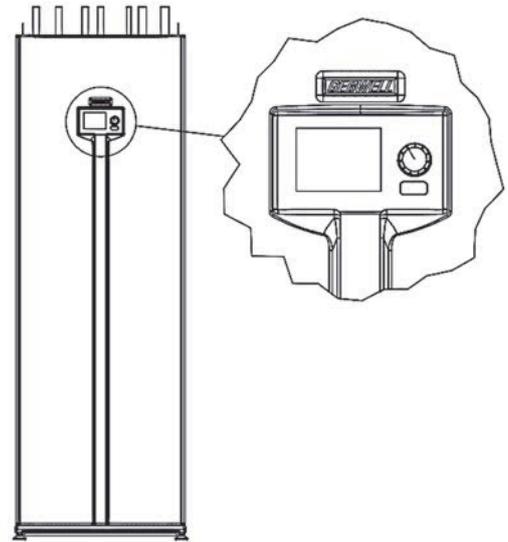


## 9 GROUND SOURCE HEAT PUMP'S USER INTERFACE



### Behind the front door:

- F1: Motor's protective switch  
Compressor
- F2: Circuit breaker  
Flow-through resistor
- F3: Circuit breaker  
Source pump  
Heat supply pump
- F4: Circuit breaker  
External heat supply pump
- F10: Circuit breaker  
Controller



### On the front door:

- E2: Controller

## 9.1 Operating elements

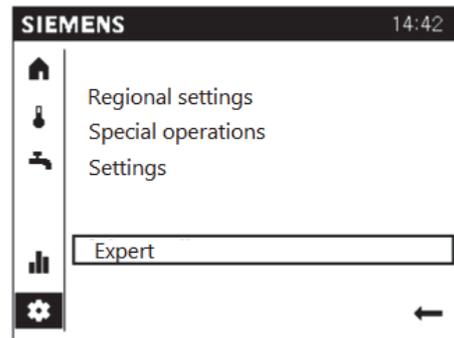
### AVS74 operating terminal



Navigation roller

## 9.2 Display symbols

Rights, user and expert levels:	
	Home, property details
	Temperatures, heating/cooling
	Domestic hot water settings
	Info pages: <ul style="list-style-type: none"> <li>• Notifications (alarms, events)</li> <li>• Property details</li> <li>• Energy monitoring</li> </ul>
	Service/settings: <ul style="list-style-type: none"> <li>• Setting changes</li> <li>• Special settings</li> <li>• *Expert menu</li> </ul>
*For experts only, maintenance companies, requires a password:	
	Diagnostics pages
	Settings/maintenance: <ul style="list-style-type: none"> <li>• Access to all parameters</li> </ul>
	Alarm
	Alarm acknowledgment/requires maintenance
	Notification
	Manual
	Usage rights (1-3)
	Heat source in process (e.g. oil/gas burner, heat pump...)



## 9.3 User levels

The controller features specified user levels, which enables that only corresponding user groups can change settings. The device is mainly used on *End user* –level. The mechanic installing the heat pump uses device on *Expert* –level. Different user levels can be accessed from  Service/settings –menu.

# 10 ACTIVATING THE GROUND SOURCE HEAT PUMP

Upon delivery, all the pump’s motor protection switches and circuit breakers are in the 0 position.

The power switch PT serves as the pump’s main switch.

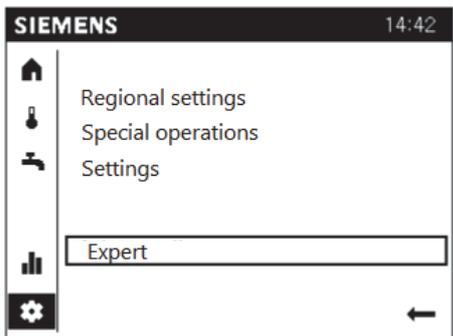
## 10.1 Before activation

Before activating the ground source heat pump, ensure that

- the collector has been filled with heat transfer liquid
- the heat pump accumulator (LVV1) has been filled from the heating and domestic water side
- the accumulator’s (LVV1) outer housing has been vented
- the outdoor sensor has been connected
- the heating sensors have been connected
- the electrical connections are correct
- the compressor’s motor protection switch (F1) is in the OFF position.
- the resistor cartridge’s circuit breaker (F2) is in the OFF position.
- the circuit breaker (F3) of the source and heat supply pumps (P1 and P2) is in the OFF position.

## 10.2 Activation

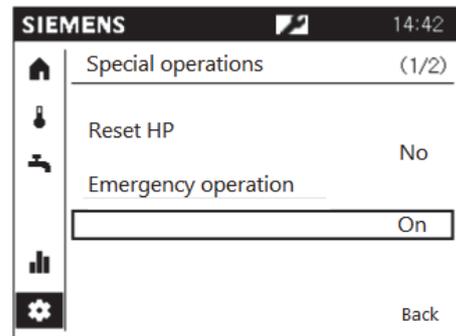
- Insert the heat pump plug (PT) into the socket.
- Set circuit breaker F10 to the I position.
- Perform all plant-specific settings. For this purpose, you must select the *Expert* –user level:



## 10.3 Operation without a collector and at a worksite

The ground source heat pump can be used for heating even before the collector is connected. In this case, all heat is generated using direct electrical resistor power, and the maximum heating power is 3 kW/6 kW/9 kW (see “*Technical specifications - Flow-through resistor power*”). However, all control functions of the heating and domestic water side are available. Please note that the heating and domestic water circuits must be connected and vented, and all electrical connections must be in order.

If you want to use the ground source heat pump for worksite heating, set the device to the “*Emergency operation*” mode, which ensures that the compressor (K1) and source pump (P1) are not activated. The heat pump will then make sure that the domestic water and heat will be produced using the electric resistor (SV1). Emergency operation is activated on *Special operations* –menu. While device is in emergency operation mode, the display will feature  symbol.



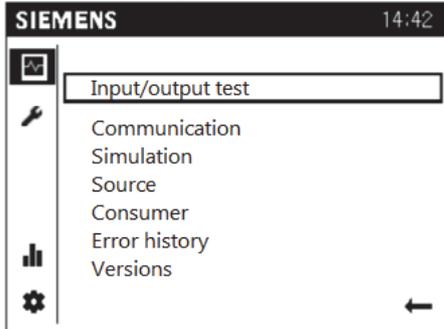
## 10.4 Venting

**The collector must be vented extremely thoroughly. Even a small amount of air in the brine collector will prevent the pump from functioning normally and can cause it to break down.**

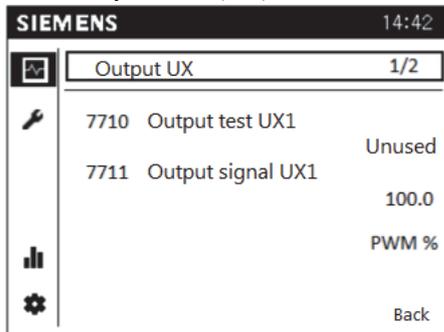
In order to facilitate commissioning and troubleshooting, the controller features an input and output test function. You must be on the “*Expert*” level to use this function. The source and heat supply pumps can be vented using this function.

### Venting the collector

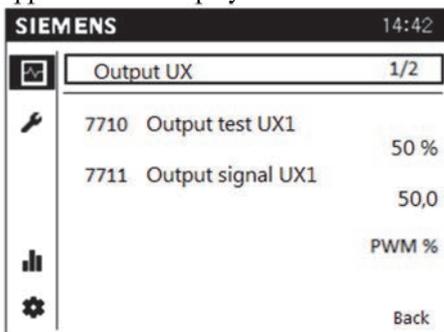
- Set the circuit breaker (F3) of the source and heat supply pumps (P1 and P2) to the **I** position.
- Select *Expert* –level on *Service* –menu
- Select *Input/Output test*



- Select *Output UX 1 (1/2)*



- Activate the row by pressing the roller (dark background), scroll the value on the row down to 50% and accept by pressing the roller → the source pump is activated. The  symbol appears on the display.



- If you hear noise, such as gurgling/bubbling, which indicates the presence of air in the circuit, shut down the source pump (P1). → Activate the row by pressing the roller and scroll the value down to 0%; confirm by pressing the roller.
- Allow the air to rise to the highest point of the collector and open the vent valve.
- Ensure that there is a sufficient amount of liquid in the system's expansion vessel.
- Once the venting is complete, continue running the source pump (P1) and repeat the procedure

until the air has been expelled from the system. You can increase the pump's rotation speed.

- Deactivate the source pump by setting the control row 7710 to --- (not in use/Unused)

NOTE! Pumping at excessively high power will disperse the air in the brine in the form of microbubbles. This may trigger alarms during the operation of the device. Therefore, you should begin the venting in short cycles after which you drain the air out of the vent valves.

### Venting the heat supply circuit

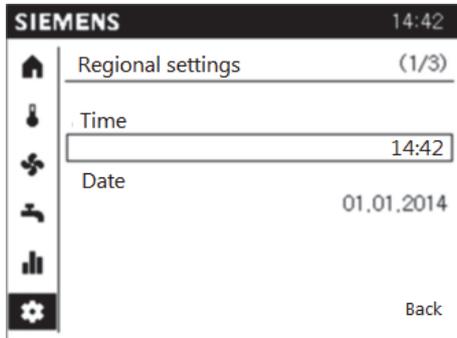
- Select *Output test UX 2 (7716)*.
- Activate the row with the OK button (row flashes), scroll the on the row down to 50% and accept by pressing the roller → the heat supply pump (P2) is activated.
- Allow the pump (P2) to run for a moment and shut it down. Activate the set point with the OK button and scroll the value to 0%. Confirm by pressing the roller.
- Allow the air to rise to the highest point of the system and ensure that the vent valves are open.
- Ensure that the heating system's pressure is at a sufficient level for the air to be discharged through the automatic vent valves.
- Once the venting is complete, continue running the pump (P2) and repeat the procedure until the air has been expelled from the system.
- At the same time perform also the venting of accumulator's charging coil through the valve located above the change-over valve.
- At the end release the pump from the testing mode. Set the control row 7716 to --- (not in use/Unused)

# 11 HEAT PUMP SETTINGS

## 11.1 Time and date

The controller features a year clock that indicates the time, weekday and date. The time and date must be set correctly for the heating programme to function properly.

The time is set in *Regional settings 1/3* –menu.



## 11.2 Language selection

The heat pump is delivered from the factory with Finnish as the controller language. There are several languages to choose from. You can change the language in *Regional settings 3/3* –menu:

*Language options:*

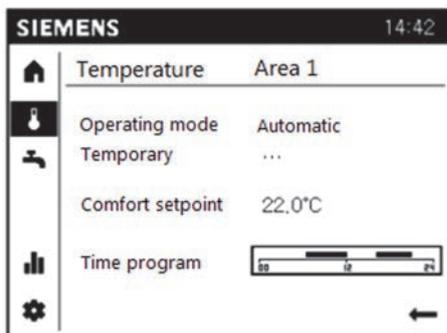
English, German, French, Italian, Dutch, Spanish, Portuguese, Danish, Finnish, Swedish, Russian

## 11.3 Time programme settings

Various time programmes are available for the heating circuits and domestic water production. They are enabled in the “Automatic” mode and control the switching between the temperature levels (and the related set points) according to the set activation times.

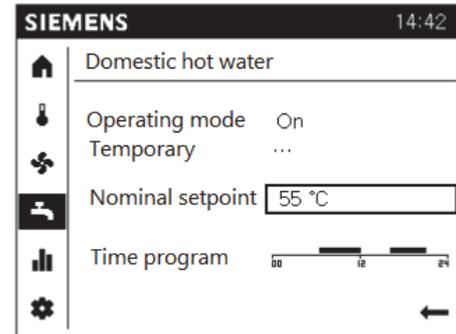
The activation times can be set as combinations for multiple days or separately for individual days. The process of configuring the time programmes can be accelerated considerably by selecting groups of days, such as Mon...Fri and Sat...Sun, for which the same activation times will be used.

Time programmes are set in the end user *Time program* – menu.



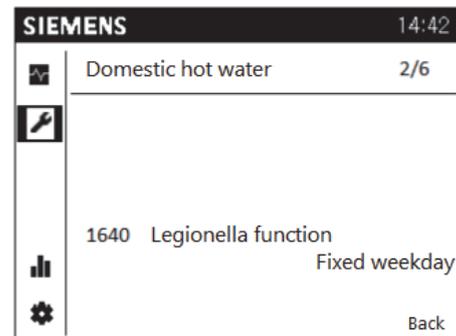
## 11.4 Domestic hot water settings

The unit controls the DHW temperature according to the time program, or constantly according to the current set point. "Hot water temperature 1" on heat pump's menu indicates the temperature at the bottom of the accumulator and functions as an activating sensor for hot water charging. The actual hot water temperature is 5-7°C higher.



### Legionella function

The controller has an elaborately adjustable legionella function, which prevents the growth of legionella in the accumulator. The function is programmed ON as a factory setting on Mondays at 5 a.m. The setting can be changed at the *Expert* -level.



Menu: Domestic hot water, pages 2, 3 and 4

### Periodically

The legionella function is repeated according to the interval set (1641).

### Fixed weekday

The legionella function can be activated on a fixed weekday (1642). When using this setting, heating up to the legionella set point takes place on the selected weekday, independent of previous temperatures of the accumulator.

### Legionella function set point (1645)

Factory setting: 55°C

NOTE! Temperature at the bottom of the accumulator!

*Legionella function circulation pump (1647)*

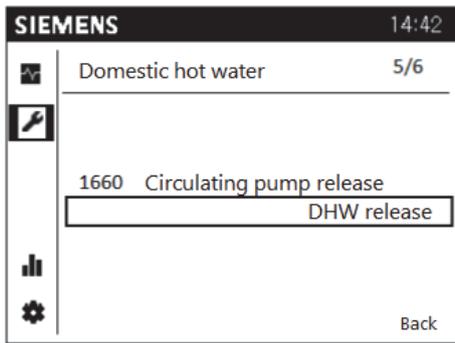
If a DHW circulation pump is connected it can be activated during the period of time the legionella function is performed.

Factory setting: OFF

*Domestic hot water circulation pump*

A time programme can be defined for DHW circulation pump or the pump can follow the time programme 4 set on domestic hot water. If you want to use these functions, the circulation pump is to be connected to the control automation.

The control mode of circulation pump is changed in *Domestic hot water* –menu.



*Controlling the hot water circulation pump*

With this setting you can define the function of hot water circulation pump.

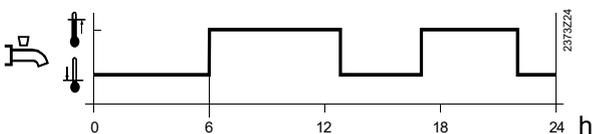
Factory setting: *DHW release*

*Domestic hot water release (1660)*

The circulation pump runs when DHW heating is released.

*Time programme 4 / DHW, FACTORY SETTING*

The circulation pump follows the time program 4. In this case, the circulation pump is switched on (ON) when time programme is released and off (OFF) when the time programme is not released.



**11.5 Settings for heating functions**

Various functions are available for the heating circuits (Heating areas), which can be set for each circuit individually.

*Commissioning of the heating circuits*

The first circuit of the heat pump is the internal circuit of the pump. *Heating circuit 1* is on as a factory setting. If the system is installed with a mixing heating circuit, the

commissioning has to be done on the controller. The commissioning of the heating circuits must be carried out at the *Expert* –level in *Configuration* –menu.

The control rows of the third heating circuit will not be displayed until the additional module AVS75.390 has been connected to the controller (accessory).

Menu: *Expert* → *Parameter list*

*Configuration* → 1/43 → 5710 *Heating circuit 1*

*Configuration* → 2/43 → 5715 *Heating circuit 2*

Row number	Control row	Factory setting
5710	Heating circuit 1 (HC1)	On
5715	Heating circuit 2 (HC2)	Off

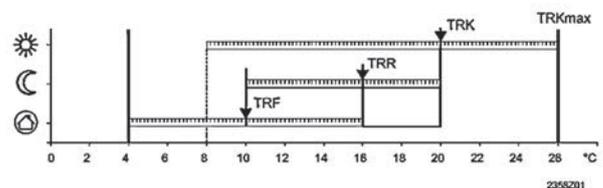
*Set points of operating modes*

Row number		Control row	Factory setting
HC1	HC2		
700	1000	Operating mode	Automatic
710	1010	Comfort set point	20,0
712	1012	Reduced set point	18,0
714	1014	Frost protection set point	10,0

*Room temperature*

The room temperature can be adjusted according to various set points. These values are activated in accordance with the selected operating mode and, therefore, generate different temperature levels in the rooms.

The setting ranges of the set points are formed based on their mutual dependence. This is indicated in the following diagram:



- TRKmax Maximum comfort set point
- TRK Comfort operation set point
- TRR Reduced set point
- TRF Frost protection set point

*Frost protection*

Protection operation automatically prevents the room temperature from dropping too low. The temperature is at the level defined by the frost protection set point.

### Heating curve slope

**The heating curve is used to calculate the set point for the supply water temperature, which is used to adjust the temperature according to the current weather conditions.** The heating curve can be changed with a variety of settings so as to match the heating power and room temperature to specific individual needs.

Menu: Expert → Parameter list

Heating circuit 1 → 2/13 → 720

Heating circuit 2 → 2/13 → 1020

Factory setting: 0,5

The greater the slope of the heating curve, the more the supply water temperature changes as the outdoor temperature drops. In other words, if the room temperature is incorrect at low outdoor temperatures, but correct at higher temperatures, the inclination must be changed.

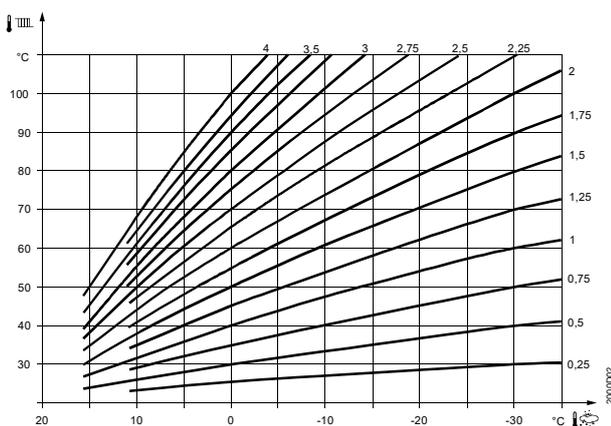
#### Increasing the setting:

Increases the supply water temperature particularly at low outdoor temperatures.

#### Reducing the setting:

Reduces the supply water temperature particularly at high outdoor temperatures.

The heating curve setting is based on a room temperature of 20°C. If the room temperature set point is changed, the heating curve is changed automatically according to the new value. The factory setting for the heating curve is 0.5 (underfloor heating).



End user can make small adjustments on the curve during the first heating season. This is instructed in the user interface quick guide.

### Summer/winter heating limit

The summer/winter heating limit activates or deactivates the heating according to annual temperature differences. In automatic operation, this switch is performed

automatically without the user having to turn the heating on or off. The annual periods can be shortened or lengthened by changing the set values.

Increase: Winter operation begins *earlier*  
Summer operation begins *later*

Reduction: Winter operation begins *later*  
Summer operation begins *earlier*

*NOTE! In case there are heating areas that one wishes not to deactivate during summers (damp spaces), the heating limit of that particular circuit is to be set not in use (---).*

*Summer/winter heating limit follows the “damped outdoor temperature”. Damped outdoor temperature is average temperature of 15 hours*

Menu: Expert → Parameter list

Heating circuit 1 → 3/13 → 730

Heating circuit 2 → 3/13 → 1030

### Setting the supply water temperature limits

This setting defines the limit values for the supply water temperature set point range. If the supply water temperature set point requested by the heating circuit reaches the corresponding limit value, the set point remains at the maximum or minimum limit as the heat demand increases or decreases.

If the building features underfloor heating, it is important to set the maximum and minimum temperatures for the output line. If the building has underfloor heating and a parquet floor, the supply water temperature must not exceed the floor manufacturer’s recommendations.

Menu: Expert → Parameter list

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

Heating circuit 2 → 4/13 → 1040 / 1041

#### 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 set points must be determined for each heating circuit.

**NOTE!** When using a pump mixing circuit (not mixing valve), the maximum set point is to be set in menu Parameter list → Heating pump → 11/23 → 2855 "Maximum switch-of-temperature heating". As flow sensor B21 measurement reaches the value set on 2855, the compressor comes to a halt.

**NOTE!!** The minimum set point for the supply water can be increased if the building's underfloor heating is intended to be on in summertime. For this feature, you must take the "Summer/winter heating limit" into account.

### The room sensor effect

If a room sensor is installed with the heat pump, the compensatory effect can be adjusted on this control row.

Row number		Control row	Factory setting
HC1	HC2		
750	1050	Room effect	20%

Setting	Compensatory way
---	Plain outdoor temperature compensation
1...99%	Outdoor temperature compensation and room effect
100%	Plain room influence

#### Plain outdoor temperature compensation:

The supply water temperature is calculated via the heating curve of the outdoor temperature. This compensation requires that the heating curve is set correctly.

#### Outdoor temperature and room effect:

The system measures the room temperature deviation from a set point and takes it into account in temperature control. This way the free-heat can be taken into account and a more accurate room temperature control can be achieved.

#### Plain room effect:

The supply water temperature is set according to the room temperature set point, the current room temperature and the changes in the room temperature. For example, a small rise in the room temperature immediately results in lowering the supply water temperature.

## 11.6 Settings for the compressor functions

**NOTE!** This menu may only be used to change the control rows advised in this manual. Changing the other values may cause incorrect functions resulting in equipment malfunction.

Menu: Heat Pump

### The heat supply pump speed

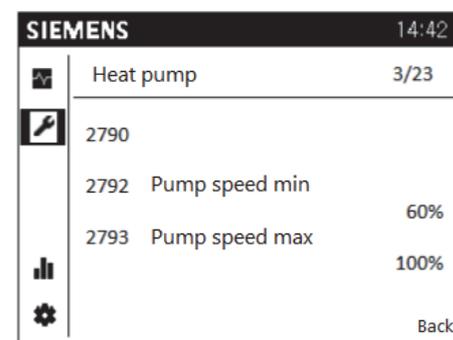
The heat supply pump speed settings are not to be made any changes to, unless the heating network requires it. If you have a radiator network, the network flow can be too high, resulting to cause sound in the network. In this case the minimum pump speed should be lowered. The table below shows the allowed setting ranges.

The heat supply pump runs within the scope of the minimum and maximum speed, keeping the temperature difference in the condenser at the right level.

During the heating season when the compressor is off, the heat supply pump runs at the set minimum speed.

Electrical resistance control being enabled, the heat supply pump runs at the maximum speed.

Row number	Control row	Factory setting	Allowed control range
2792	Pump speed minimum	60%	40-60%
2793	Pump speed maximum	100%	80-100%



### Return water switching differential

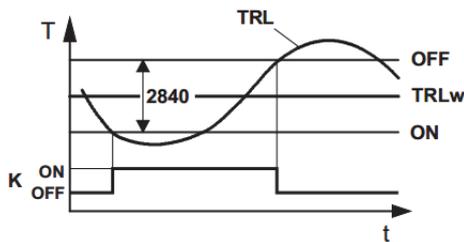
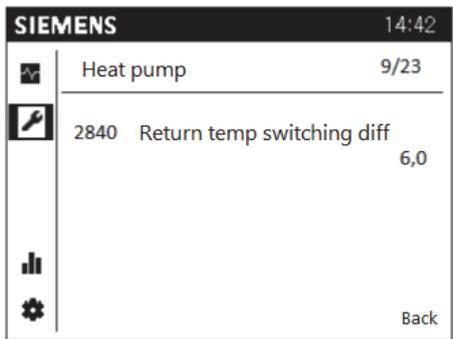
With this set point the values of the heat pump start-up limits are defined in return water controlled system. By return water controlled system is meant a facility where there are no heating accumulator measurements.

The compressor switches on and off according to the return water temperature (B71) and the return water temperature switching differential.

- By increasing the set point, the compressor runs for a longer operating period in heating mode.
- By lowering the set point, the compressor runs for a shorter operating period in heating mode.

Factory setting: 6°C

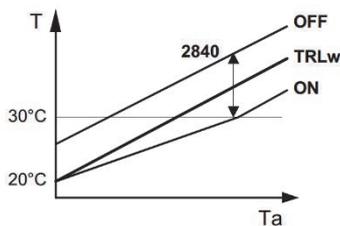
Allowed adjustment range: 4 - 20°C



- 2840 Return temperature switching difference
- OFF Switching off point
- ON Switching on point
- TRLw Return water temperature set point
- K Compressor

Once the return water temperature rises above set point by a half of switching differential, the compressor comes to a halt. Once the return water temperature drops below the set point by a half of switching differential, the controller will turn on the compressor.

If return water temperature drops below 30°C, the switching differential is reduced so that switching on point comes closer to set point. Return water set point being 20°C the switching on point is the same as return water set point.



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

## 11.7 Settings for the electric resistor (SV1)

The electrical resistor of the heat pump operates in 2 phases according to factory settings. 2-phase resistance means that two resistors with different power operate at different times. If more resistor power is needed, the power can be increased to 3-phase. The fuses of the building and the heat pump must be selected according to the heat pump's maximum current. The maximum currents are given in the technical information section of the manual. In the event of failure, the heat pump uses an electrical resistor as well as in partial ground source heating systems alongside a compressor.

Resistor phase 1: 3 kW

Resistor phase 2: 6 kW

Resistor phase 3: 9 kW (requires a change in settings)

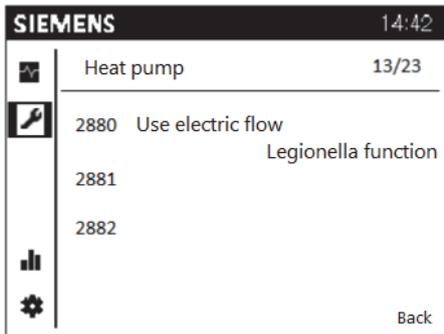
## 11.8 Electric resistor's operating method (SV1)

Set in factory settings, the electrical resistor (SV1) operates alongside the compressor in heating and producing domestic water. This means that if the compressor cannot generate enough power to heat domestic water for the building, the electrical resistor will be turned on automatically.

The electrical resistor is turned on and off depending on the temperature and set value of the return water. If the return water temperature is lower than the set value by one half of the switching differential (factory setting for the switching differential: 6 degrees), the controller will start to count down the prevention time for releasing the electrical resistor. When the prevention time has ended, the controller will calculate the heat deficit by degree minutes. When the degree minute time has ended, the controller will switch on the first resistor phase. After this, the controller will start to count the heat deficit again if the resistor has not raised the return water temperature up to the range between the switching differential. If the release time expires, resistor phase 1 (3 kW) will turn off and resistor phase 2 (6 kW) will turn on. When the return water reaches the switching differential range (set value  $\pm \frac{1}{2}$  of the switching differential), the controller will turn off the electrical resistors.

The settings for starting the electrical resistor can be changed via the menu *Heat pump > Control rows 2881-2884*.

Settings are defined at the "Expert" -level.



**Substitute:** The electric resistor (SV1) is only used in failure situations.

**Complem operation HC:** The electric resistor (SV1) is used to supplement the compressor in heating use.

**Complem operation DHW:** The electric resistor (SV1) is used to supplement the compressor in DHW use.

**Complem operation HC+DHW (factory setting):** The electric resistor (SV1) is used to supplement the compressor in both heating and DHW use.

**End DHW charging: NOT IN USE**

**Emergency operation: NOT IN USE**

**Legionella function: NOT IN USE**

### *Electric supply water prevention time (2881)*

The electric resistor (SV1) is allowed to start no earlier than the prevention time set with this parameter has elapsed from the activation of the compressor (K1).

The prevention time is taken into consideration only when the electric resistor (SV1) is used at setting “*Supplement to heat pump operation*” (2880). If the setting of the electric heating is set to “*Replacement*”, the prevention time is not taken into account.

Adjustment range: 0 - 255min

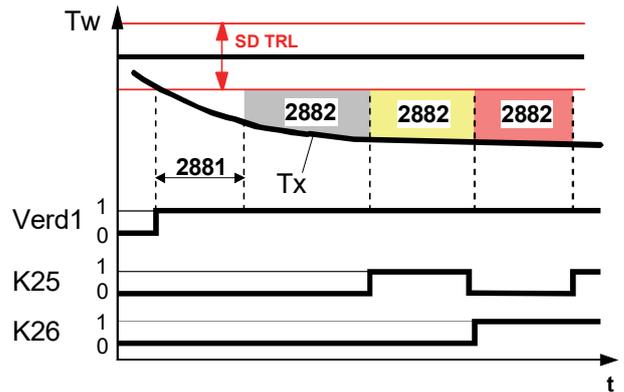
Factory setting: 30min

### *Electric supply water release integral*

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

Adjustment range: 0 - 500°C min

Factory setting: 200°C min



SD TRL	Return water temperature's connection difference
Verd1	Compressor 1
K25	Flow-through resistor relay K25
K26	Flow-through resistor relay K26
Tw	Temperature set point (activation point)
Tx	Temperature's actual value
2881	Electric supply water prevention time
2882	Electric heater's release integral
T	Time

### *Electric supply water return integral*

If the actual value is higher than the activation point, the controller switches the most recently activated (controlling) step off and begins to form a release integral based on the potential heat excess.

Then, once the heat excess reaches the set release integral (2883), the lower step is switched off.

For a new release, the release integral must be met again.

Adjustment range: 0 - 500°C min

Factory setting: 10°C min

### *Electric supply water free ET under*

This setting is taken into account only when the flow-through resistor (SV1) is used at setting “*Supplement to heat pump operation*” (2880). At the “*Replacement*” setting, the electric heater is always released.

The flow-through resistor is only released when the damped outdoor temperature is below the temperature set here.

Adjustment range: (---)\*\* -30 - +30°C min

Factory setting: ---

\*\* No release temperature defined

# 12 HEAT PUMP OPERATION



## 12.1 Navigating in the menu

- ☞ Turn the navigation roller → Select a symbol in navigation menu. Selected symbol features a dark background in the menu.
- ⬇️ Press the navigation roller → Select desired icon. First page of this menu is displayed on screen.
- ⬅️ Go back to main menu from arrow symbol.

The icons on the menu feature the following operation modes:

- Unselected: Icon is displayed normally, black on white background
- Selected: Icon is bordered (with a frame)
- Modified: Icon is displayed white on black background

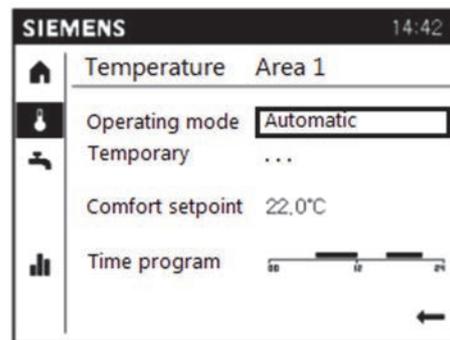
## 12.2 Symbols

Rights, user and expert levels:	
	Home, property details
	Temperatures, heating/cooling
	Domestic hot water settings
	Info pages: <ul style="list-style-type: none"> <li>• Notifications (alarms, events)</li> <li>• Property details</li> <li>• Energy monitoring</li> </ul>
	Service/settings: <ul style="list-style-type: none"> <li>• Setting changes</li> <li>• Special settings</li> <li>• *Expert menu</li> </ul>
*For experts only, maintenance companies, requires a password:	
	Diagnostics pages
	Settings/maintenance: <ul style="list-style-type: none"> <li>• Access to all parameters</li> </ul>

	Alarm
	Alarm acknowledgment/requires maintenance
	Notification
	Manual
	Usage rights (1-3)
	Heat source in process (e.g. oil/gas burner, heat pump...)

## 12.3 Setting the heating

The setting of room temperature is performed in “Temperatures” - menu.



### Operating mode:

#### Automatic operation: Recommended mode

Automatic operation automatically sees to that the best possible setting is always on (e.g. summer/winter settings)

You can change the setting to continuous protective, comfort or reduced operation by pressing the navigation roller while desired operation mode is selected.

#### Protective operation

The controller drops the property set point down to protective level. (factory setting 15°C)

#### Comfort operation

The controller follows the comfort set point in heating regardless of the time. The controller does not regard the summer shut-off function while in comfort operation.

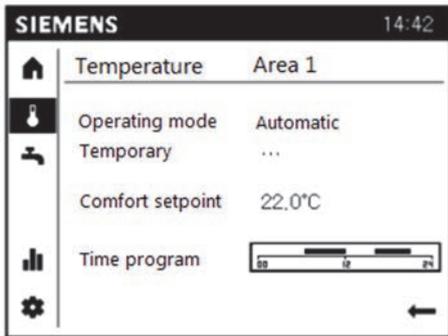
#### Reduced operation

The controller follows the reduced set point in heating regardless of the time. The controller does not regard the summer shut-off function while in comfort operation.

The heating operation set points can be changed in “Service/settings” -menu.

### Setting the room temperature manually

Room temperature change means changing the *Comfort set point* value.



Press the navigation roller on desired set point and roll a new value. Accept by pressing the roller.

- By increasing the value, the room temperature rises.
- By decreasing the value, the room temperature drops.

One degree change corresponds to approximately one degree in room temperature.

**NOTE!** Floor heating or radiator heating thermostats may limit the room temperature rise, so that they must also be adjusted higher.

### Readjusting the default settings

If the desired room temperature is not obtained, it is necessary to re-adjust.

Cold weather:

- If the room temperature is too low, increase the *heating curve slope* value.
- If the room temperature is too high, decrease the *heating curve slope* value.

Warm weather:

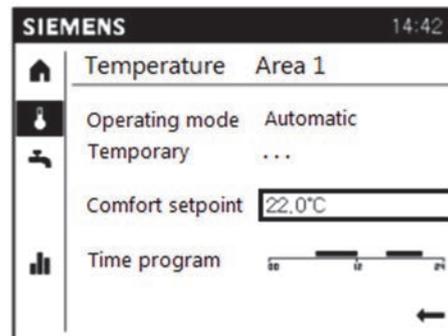
- If the room temperature is too low, turn the roller to *Comfort set point*, heating clockwise 0.5°C, and press the OK button.
- If the room temperature is too high, turn the roller to *Comfort set point*, heating counter-clockwise to 0.5°C, and press the OK button.

**NOTE!** Wait one day between settings so that temperatures have time to settle down.

The room-specific thermostats must be in the OPEN position when you adjust the room temperature to the desired value. If a thermostat is in the control range, it may cause unnecessary consumption of electricity.

### Time program:

Use time program to drop the temperature when you are away from home, on vacation or for nighttime drop, for example. The time program only functions on *Automatic* operation mode.



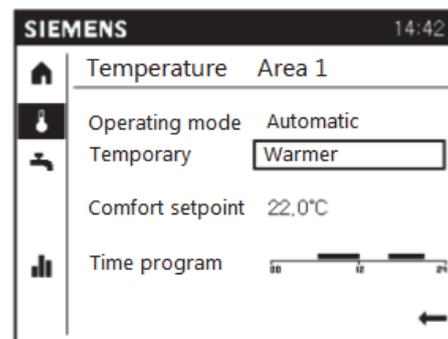
In case you want to use automatic operation mode, but want the temperature to stay at comfort level regardless of the time, make a change on the time program.

Press navigation roller on *Time program*.

Adjust the time program. If you want all the weekdays to follow the same time program, use the *copy* function.

When time program is ON, the controller follows *Comfort set point* in heating. When time program is OFF, the controller follows the *Reduced set point*.

### Area specific room temperature adjustment (temporary):



Use "*Heating*" setting to adjust area specific room temperature temporarily (circuit specific).

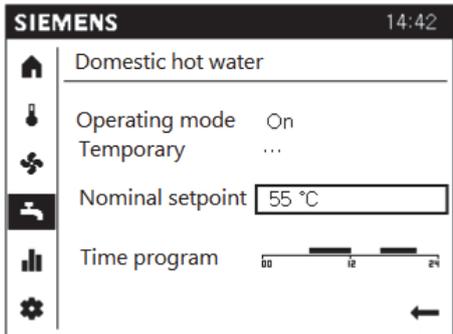
The controller will rise the temperature of the selected heating area (circuit) by one degree. The device will return to normal state once the set point is reached or time program is changed.

## 12.4 Setting domestic water heating

The heat pump produces hot water by using change-over valve. The change-over valve turns the water flow to hot water accumulator, when the heat is not loaded to the heating system of the house.

The hot water accumulator's water temperature varies between the values set (nominal set point - switching differential 5°C).

Domestic hot water temperature is set on “Domestic hot water” -menu

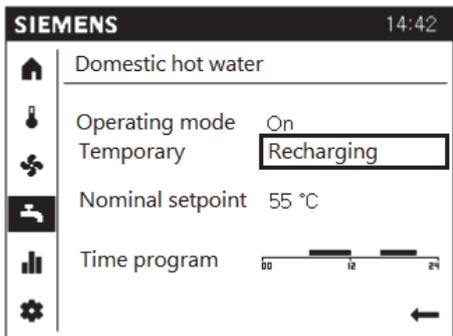


Factory setting: 50°C

Domestic water heating can be activated and deactivated on *Operating mode*.

When operating mode is ON the water is heated according to the selected set point. When operating mode is OFF, hot water charging is not on.

The charging of hot domestic water can be activated by setting *Temporary* to *Recharging*. This action activates charging and loads the domestic water to set value.



## 12.5 Heating system tracking

On *Info* -menu you can see information related to the system, heating areas, domestic hot water and energy monitoring.

By selecting display's -icon you are able to read the current processes. In case of a failure, the user terminal will be the first to tell the cause. On *Info* -menu you can see the system status, set points for heating circuits and temperatures.

### Displays:

- Any failure notifications from the failure code list
- Any maintenance notifications from the maintenance code list
- Any notifications regarding special states

### Other displays:

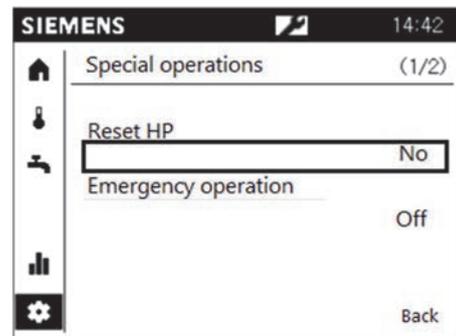
- Heating circuit 1 status
- Heating circuit 2 status
- Outdoor temperature
- Room set point 1
- Supply water set point 1
- Room set point 2
- Supply water temperature 2
- Supply water set point 2

## 12.6 Special operations

### Resetting heat pump alarms:

Resetting the heat pump will acknowledge alarms and reset the system back to activation state.

Preset activation delays is not regarded in order to avoid unwanted waiting periods during commissioning or troubleshooting.



By changing the *Reset HP* value from No to Yes, the alarms will be acknowledged and the system will start again once heating request is activates. If the alarm recurs, see the corrective measures in *FAILURES*.

### Service / special operation (spare use)

By service / special operation function the heat pump can be set on an “*emergency*” mode. In emergency mode the heat pump functions with electric immersion heaters and the compressor will not start. This enables the use of the heat pump before connection of the heat collector.

If heat pump does not function correctly, emergency function can be activated.

Please make sure the following points are taken into account before activating the emergency function

- DHW accumulator is filled up
- Heating circuit is filled up and vented
- DHW accumulator’s (LVV1) outer housing has been vented
- Control fuse F10 is on.
- The circuit breaker F3 for the source and heat supply pumps is on. (ON)
- Flow-through resistor’s fuse F2 on. (ON)

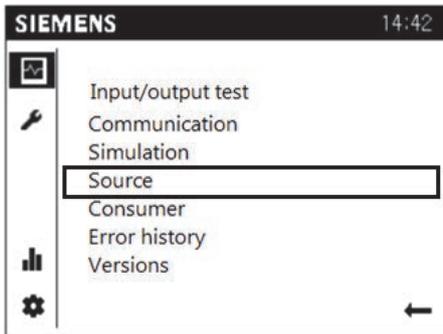
The alarm and service symbols will appear on the display.

**Emergency operation can be deactivated by selecting status OFF on Emergency operation menu.**

## 12.7 The heat pump's measurements

The heat pump measurements can be found in the *Info* – menu.

Comprehensive measurement menus you can get by logging into the controller at the *Expert* level. *Source* - menu allows you to read the following status and temperature information.



Row number	Control row	Unit / state
8400	Compressor 1	on / off
8402	Supply water electric heater 1	on / off *
8403	Supply water electric heater 2	on / off
8404	Source pump	on / off
8405	Source pump speed	%
8406	Condenser pump	on / off
8407	Condenser pump speed	%
8410	Heat pump's returning water temperature	°C
8410	Heat pump set point	°C
8412	Heat pump supply water temperature	°C
8412	Heat pump set point	°C
8415	Hot gas temperature	°C
8425	Condenser temperature difference	°C
8426	Evaporator temperature difference	°C
8427	Source incoming temperature	°C

8428	Source internal temperature minimum	°C
8429	Source outgoing temperature	°C
8430	Source outgoing temperature minimum	°C
8440	Port 1 min idle time remaining	min
8442	Port 1 min running time remaining	min
8450	Compressor 1 running times	h
8451	Compressor 1 start-up counter	pc
8456	The running hours of the electric heater of supply water	h
8457	Start-up counter of the electric heater of supply water	pc

\* Not in use as a factory setting

\*\* NO FUNCTION = The function is not on

While at *Expert* –level you can read the following information on *Consumer* –menu:

Row number	Control row	Unit / status
8700	Outdoor temperature	°C
8701	Minimum outdoor temperature	°C
8702	Maximum outdoor temperature	°C
8703	Damped outdoor temperature	°C
8704	Composite outdoor temperature	°C
8730 - 8735	Actuators of heating circuit 1	*
8740	Room temperature 1	°C
8740	Room temperature set point1	°C
8743	Supply water temperature 1	--- **
8743	Supply water set point 1	°C
8770	Room temperature 2	°C
8770	Room set point 2	°C
8773	Supply water temperature 2	°C
8773	Supply water set point 2	°C
8830	Domestic water temperature 1	°C
8832	Domestic water temperature 2	--- *

8840	Running hours of domestic water pump	h
8841	The start-up counter of domestic water pump	pc

\* Not in use on Qi heat pump

\*\* Supply water temperature 1 is not in use. The temperature of the heating circuit can be seen on control row 8412 when system is in heating mode. When charging the domestic hot water the supply water temperature is not displayed.

## 12.8 Vocabulary

Condenser pump = Ground source heat pump's in-built heat supply pump (charging pump)

Condenser = Heat exchanger, which transfers the heat from refrigerant to property's heating system

Evaporator = Heat exchanger, which transfers heat from the collector to refrigerant

Source = Collector (energy well, lake loop, loop dug in the soil)

The Port. 1 minimum idle time = Controller is defined with the minimum compressor idle time, when the compressor is off before the next start-up, if the heat call is active.

The Port. 1 running time = The controller is defined with the minimum compressor running time, during which the compressor runs, even though the set point is reached.

The composite outside temperature = The average between the damped outdoor temperature and the current outdoor temperature.

Damped outdoor temperature = The average temperature defined on the control row Time constant building.

The supply water electric heater = Electric resistor

## 12.9 Heat pump status information

The heat pump operating status can be seen from the operating terminal. On the basic view of the operating terminal displays the *Heat pump status*. If the heat pump is connected to the room sensor, the operating terminal displays the current indoor temperature. All the status information displaying on the display are not alerts. You can browse heat pump status information and historical data at the *Expert* level in *Mode* or *Info* –menu.

## 12.10 Special situations

In exceptional situation, the display of the basic unit shows one of the following symbols.



Failure notifications

If this symbol appears on the display, the device is suffering from a failure. Press the info button to view additional information.



Maintenance or deviating behaviour

If this symbol appears on the display, the device has issued a maintenance notification or is operating in an abnormal way. Press the info button to view additional information.

## 12.11 Heat pump status

The heat pump status will tell the current operation status of the heat pump.

HEAT PUMP STATUS:

OFF: The heat pump is turned on, but the call for heating is not active

STOP: The heat pump is turned on, but the call for heating is not active. *A newer language version.*

HEATING: The call for heating is active and the compressor is on. Compressor is heating the property or hot water.

LIMITATION OF ACTIVE TIME: Call for heating is on, but the compressor minimum idle time prevents the compressor from starting. The compressor starts after the minimum idle time has expired.

EMERGENCY USE: The heat pump has gone to emergency use operating mode due to malfunction or the heat pump has been set to emergency use operating mode. The heat pump heats the property with the electric heaters. The operating terminal displays alarm clock symbol.

OFF THE MAXIMUM LIMIT: Call for heating is active, but the compressor charging is interrupted as the supply water has reached the maximum set point limit. The charging process starts again after the minimum idle time.

COMPRESSOR LOCKED: The compressor is locked due to too high or too low temperature of the collector or charging circuit. The compressor will return to normal mode once the temperatures return to the correct temperature range.

PASSIVE COOLING USE: The heat pump is switched to cooling mode. Source pump is running. The compressor is not used for passive cooling.

## 12.12 Heating circuit status information

Heating circuit status indicates the current status of the heating circuit operation.

COMFORT HEATING: The heating circuit operates according to Comfort set point.

REDUCED HEATING: The heating circuit operates according to reduced set point.

PROTECTIVE USE: The heating circuit operates according to Protective set point.

HEATING LIMITED USE: The heating circuit is limited during hot water charging. Heating circuit returns to the set heating operation mode after the domestic hot water charging is complete.

SUMMER USE: The heating circuit is switched off due to summer operation mode. Heating circuit returns to the set heating mode as the damped outdoor temperature drops below the summer / winter heating limit.

OFF: The heating circuit is turned off.

### **12.13 Domestic hot water status information**

CHARGED: Hot water is charged to nominal value.

CONSUMPTION: Hot water function is active. An electric control valve is connected to hot domestic water or the hot domestic water is produced in a heat exchanger.

CHARGING ACTIVE: The heat pump produces hot water.

ELECTRIC HEATER CHARGING: Hot domestic water charging is active with the help of electric heater.

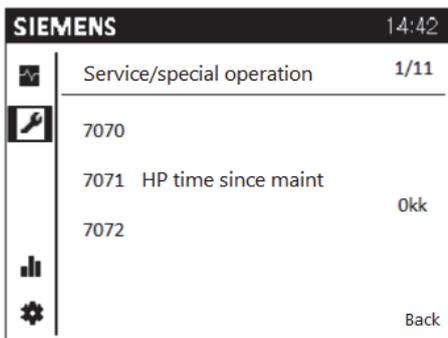
## 13 MAINTAINING AND SERVICING THE GSHP

In order to ensure your heat pump's long service life and uninterrupted operation, the following inspections must be conducted a few times a year, and more frequently during the first year. Remember to also maintain and inspect the accessories in accordance with their instructions.

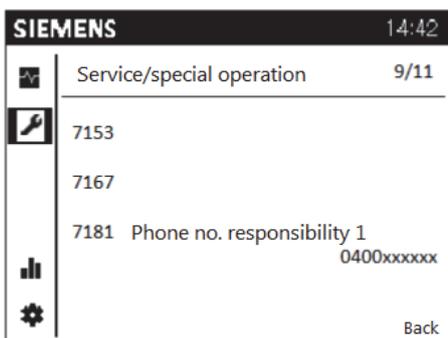
### 13.1 Maintenance notice

Maintenance functions can be used as a method of early prevention on periodical control. To make it easier to remember the equipment maintenance, the controller can be programmed to give a maintenance notice. Maintenance notice will appear on the display of the controller on selected intervals, disappears by pressing the Reset button.

This operation is carried out at the "Expert" level:



In case you want the system to also notify the maintenance company contact info, you can program them on the controller.



### 13.2 Inspections

The plug (PT) must be disconnected from the socket during maintenance.

**NOTE! The refrigerant circuit must only be maintained by an authorised refrigerating equipment technician.**

### *General appearance and leaks*

Check the interior and exterior of the ground source heat pump for liquid leaks, oil and other deviations from normal operation. The safety valves expel some water due to pressure changes as part of their normal operation.

### *Liquid level and strainers of the collector*

Check the liquid level of the collector and add more liquid if necessary. After commissioning, it may be necessary to add liquid over the course of a few days. Having to add a few litres is normal. If the liquid level is too low, allow the pump to run normally, open the admission valve and fill the tank with heat transfer liquid. If you need to repeatedly add liquid, contact an installation or maintenance company. The liquid level in the tank should drop slightly when the pump is activated and rise when the pump is stopped. Diverging behaviour is a sign of air, incorrect circulation direction or a blocked strainer.

Check and clean the collector strainer. The strainer should be checked several times immediately after commissioning. However, avoid unnecessary opening of the collector.

### *Checking the safety valves*

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

### 13.3 Draining the hot water accumulator (LVV1)

The hot water accumulator (LVV1) is drained according to the siphon principle. A drain valve is installed on the cold water line or alternatively, a hose is inserted in the cold water connection.

### 13.4 Draining the heating system

#### *Draining heating water from the compressor unit*

If the compressor unit requires maintenance, the unit's heating system must be drained as follows:

- Close shut-off valves VS1 and VS2
- Connect a hose to drain valve VT1 in the lower connection of the condenser
- Loosen the connection of shut-off valve VS1 so that some air can enter the system

### *Draining the heating water of the heat pump*

If the heat pump requires maintenance, the pump's heating system must be drained as follows:

- Close the shut-off valves of the heat pump's heating system
- Connect a hose to drain valve VT1 in the lower connection of the condenser
- Loosen the connection of shut-off valve VS1 between the heat pump and heating system so that some air can enter the system

### *Draining the entire heating system*

The entire heating system can be drained as follows:

- Connect a hose to drain valve VT1 in the lower connection of the condenser
- Open the venting screw at the highest point of the building's heating system

## **13.5 Draining the collector**

### *Draining the compressor unit's collector*

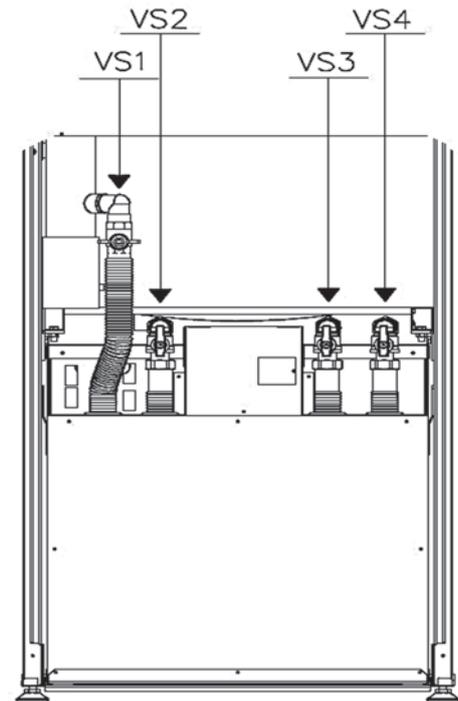
If the compressor unit requires maintenance, the unit's collection circuit must be drained as follows:

- Close shut-off valves VS3 and VS4
- Connect a hose to drain valve VT2 in the lower connection of the evaporator
- Loosen the connection of shut-off valve VS3 so that some air can enter the system

### *Draining the heat pump's collector*

If the heat pump requires maintenance, the pump's collection circuit must be drained as follows:

- Close the shut-off valves of the heat pump's collector
- Connect a hose to drain valve VT2 in the lower connection of the evaporator
- Loosen the connection of shut-off valve VS1 between the heat pump and collector so that some air can enter the system



## 14 FAILURES

In most cases, the controller detects a malfunction of the heating system and indicates this with a failure notification appearing on the display. When failure notification displays on the display, record the alert exactly to the service book to facilitate the maintenance operations

### 14.1 Alerts

When the alert is active, the  symbol appears on the heat pump's display.

You can get more information on the by pressing the Info button. Always try first to find out for yourself the malfunction with the help of the trouble shooting table. If you cannot detect the malfunction, contact a qualified technician.

### 14.2 Troubleshooting

If failures are not displayed on the screen, follow the instructions below.

Basic measures:

- 1 Check all switches
- 2 Inspect the house as well as the heat pump fuses
- 3 Check the fault current circuit breaker

#### Room temperature too low:

- Heat pump in incorrect operating mode
  - Set the heat pump heating functions into the right mode.
- Thermostats of radiators / floor heating are switched off
  - Turn on the thermostats in so many rooms as possible
  - Adjust the room temperature on the menu *Heating area* instead of switching off the thermostats
- The automatic set point is too low:
  - Raise the Comfort set point on the menu *Heating area*
  - Increase the heating curve slope set point on the menu *Heating area*
  - Set the maximum supply water set point sufficiently high on the menu *Heating area*
- Program for heating circuit is switched on
  - Go to menu *Time program heating area* and adjust the time program to wanted level
- Air in the heating system
  - Vent the heating system

- Valves closed between the accumulator and the heating circuit
  - Open the valves
- External switch for the room temperature drop activated
  - Check any external switches

#### Room temperature too high:

- Heating circuit setting values are too high
  - If the room temperature is too high only in cold weather, decrease the heating curve slope.
  - If the room temperature is too high on warm weather, decrease comfort set point.

#### Domestic hot water too cold:

- Domestic hot water function is not active
  - Set domestic hot water *Operating mode* to ON
- Domestic hot water consumption is too high
  - Wait until the water has warmed up. Temporarily at beginning of the higher consumption, you can choose the forced charging of domestic hot water by pressing the terminal's domestic water button for 3 seconds.
- Set point too low
  - Go to menu *Domestic hot water* and increase the set point for domestic hot water
- The feed mixing valve adjusted too low
  - Open the valve

#### *The compressor will not start:*

- No need for heat
  - Check heat pump's status on the Menu *Info*
- Compressor minimum idle time is active
  - Wait for 20 minutes and check if the compressor will start
- Heat pump failure
  - Check *Info* menu for the reason for the failure and make the adjustments needed according to the trouble shooting table.

#### *Soft starter failure notification*

Failure in soft starter shows as Soft starter E25 failure notification on controller's display. The amount of flashes of the red LED light on soft starter indicates the failure.

**NOTE!** If the soft starter function is *Reboot 5min from disorder*, do not reset the alarm of the heat pump. This will cause a new malfunction and the compressor will not start.

*Soft starter*

Number of flashes, red LED	Failure	Operation
2	Incorrect phase sequence	Changing the phase sequence
3	Incorrect voltage	Automatic restart 5 min after the failure
4	Incorrect frequency	Automatic restart 5 min after the failure
5	Rotor is not spinning	Automatic restart 5 min after the failure
6	Start time > 1 s	Automatic restart 5 min after the failure
7	Overheating	Automatic restart 5 min after the failure
8	Over current after start-up	Automatic restart 5 min after the failure
9	Asymmetrical input voltage	Automatic restart 5 min after the failure, if all phases are connected

### 14.3 Troubleshooting table

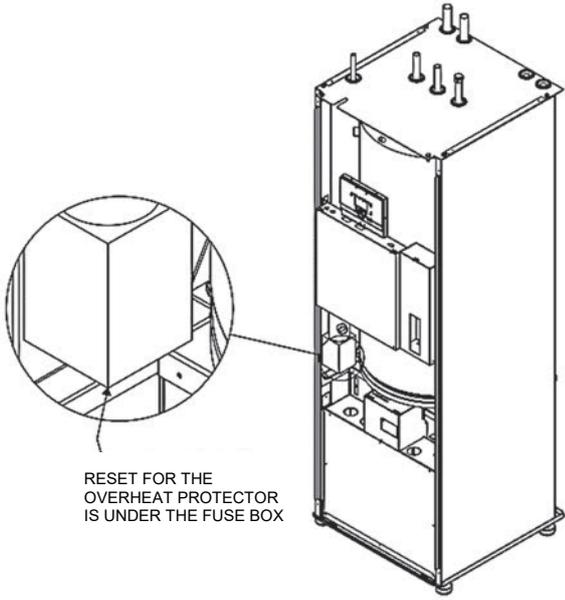
No: Failure message	Sensor	Description	Cause	Measure	Measure
10: Outdoor sensor	B9	The outdoor sensor is damaged or it is not connected.	Failure in the electrical system	Contact a qualified technician.	Check that the connector is intact and correctly connected. If necessary, contact Gebwell service.
31: Supply water sensor cooling 1	B16	The supply water sensor for cooling is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connector is intact and correctly connected. If necessary, contact Gebwell service.
32: Supply water sensor 2	B12	The mixed heating circuit sensor is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connector is intact and correctly connected. If necessary, contact Gebwell service.
33: Heat pump supply water sensor	B21	The heat pump's flow sensor is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connector is intact and correctly connected. If necessary, contact Gebwell service.
35: Source input sensor	B91	The inlet sensor in the heat pump's collection circuit is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connector is intact and correctly connected. If necessary, contact Gebwell service.
36: Hot gas sensor 1	B81	Hot gas sensor is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connector is intact and correctly connected. If necessary, contact Gebwell service.
44: Heat pump return water sensor	B71	The sensor in the heat pump's return water is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connector is intact and correctly connected. If necessary, contact Gebwell service.
45: Source outlet sensor	B92	The outlet sensor in the collection loop is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connector is intact and correctly connected. If necessary, contact Gebwell service.
50: Domestic water sensor 1	B3	The hot water sensor is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connector is intact and correctly connected. If necessary, contact Gebwell service.
60: Room sensor 1		The room sensor is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the room sensor is connected and not externally damaged. If necessary contact a qualified technician.
98: Extra module 1		The controller cannot detect the extra module 1 from the channel.	Failure in the electrical system	Contact a qualified technician.	Check the fastening of the flat cable between controllers. Check that the extra module is connected to power supply (green light).

No: Failure message	Sensor	Description	Cause	Measure	Measure
99: Extra module 2		The controller cannot detect the extra module 2 from the channel.	Failure in the electrical system	Contact a qualified technician.	Check the fastening of the flat cable between controllers. Check that the extra module is connected to power supply (green light).
102: Clock not running reserve		The battery on the controller's operating monitor is running out.	Failure in the electrical system	Contact a qualified technician.	Check that the flat cable is fastened properly both to the controller and the display.
105: Maintenance notification		A maintenance notice is programmed on the controller.		Contact a qualified technician.	Perform annual maintenance of the equipment.
106: Source temp too low		The incoming temperature from the collector is lower than set in the menu. The controller will restore the situation automatically in 4 hours.	Too low flow in the collector.	Check that the shut-off valves on the collector are open. Check the strainer on the collector. If necessary contact a qualified technician.	Check the functioning of the collector.
107: Hot gas, compr. 1		Alarm goes off, when hot gas sensor shows 130°C. 3 alarms per 8 hours are allowed with automatic restoring.		Contact a qualified technician.	Check the functioning of the cooling unit.
127: Legionella temperature		The heat pump has not been able to maintain the requested temperature in the legionella function. The controller will retry charging after minimum idle time.	Domestic hot water has been used during raising operation.		
174: Malfunctions and alarm messages		The electrical resistor's overheating protector has tripped.	The resistor has overheated due to a possible lack of water, a circulation problem, or the presence of air in the system.	Check that the pressure in the heating system is correct > bleed air from the heating system.	Acknowledge the alarm using the button on the bottom of the resistor.
222:Heat pump pressure	E10	High pressure switch has tripped.	Too low a flow in charging / heat supply circuit. Radiator or floor heating valves are shut off or set too low. Air in the heating system. The heating system pressures are too low. A clogged strainer.	Open radiator/floor heating thermostats. Vent the heating network. Check the network pressure. Clean the strainer. Check that the charging pump is running. If necessary contact a qualified technician.	Check the functioning of the heat supply network.
223: Heating circuit start-up pressure	E10	High pressure switch has tripped in connection with the start-up of heating.	Too low a flow in charging / heat supply circuit. Radiator or floor heating valves are shut off or set too low. Air in the heating system. The heating system pressures are too low. A clogged strainer.	Open radiator/floor heating thermostats. Vent the heating network. Check the network pressure. Clean the strainer. Check that the charging pump is running. If necessary contact a qualified technician.	Check the functioning of the heat supply network.

No: Failure message	Sensor	Description	Cause	Measure	Measure
224: Hot water start-up pressure	E10	High pressure switch has tripped in connection with the start-up of domestic hot water heating.	Too low a flow in charging circuit. Air in the heating system. A clogged strainer.	Vent the heating network. Check the network pressure. Clean the strainer. Check that the charging pump is running. If necessary contact a qualified technician.	Check the functioning of the change-over valves. Check the functioning of the charging circuit.
225: Under pressure	E9	Under pressure switch has tripped.	Too low a flow in collector. The shut-off/balancing valves in the collection loop are shut off. A clogged strainer. Too little liquid on the collection loop. The water in the heating system is too cold (under 15°C)	Clean the strainer on the collector. Add more liquid in the collector if needed. If necessary contact a qualified technician.	Check the functioning of the collector. Check the functioning of the source pump.
226: Compressor 1 over load	E11	Compressor motor protection has tripped.	The compressor has tripped the motor protection.	Set compressor motor protection (F1) on ON-position. If necessary contact a qualified electrician.	Check the power supply of the heat pump. Check the functioning of the compressor.
243: Swimming pool sensor	B13		Failure in the electrical system		
324: BX/extramod. same sensors		The sensors with same marking are connected to BX entries.	Failure in the electrical system	Contact a qualified technician.	Change the correct sensor addresses.
357: Cool.circuit 1 supply water temp.		The temperature of the supply water of cooling circuit is to low.	The control valve is in manual mode. Incorrectly set value.	Check the minimum temperature level of the cooling circuit.	
358: Soft starter	E25	Soft starter has given an alarm.	Heat pump motor protection is turned off. The heat pump's power supply phases are reversed. Instantaneous power failure. Power supply is missing a phase. The fuse is blown.	Check that the motor protection is on. Change the phase sequence on the plug. Check that the heat pump's fuses are intact. Contact a qualified technician.	

### *Overheat protector of the flow-through resistor (SV2)*

The purpose of the overheat protector (SV2) is to prevent the flow-through resistor (SV1) from overheating. When the protector trips the controller enters a failure state that must be reset manually. The reset button for the overheat protector can be found under the flow-through resistor (SV2). The controller issues alarm code 174 "Alarm contact 4 act."



RESET FOR THE  
OVERHEAT PROTECTOR  
IS UNDER THE FUSE BOX

# 15 TECHNICAL SPECIFICATIONS

Gebwell Qi	6	8	10	13
<b>Power information</b>				
<b>0/35</b>				
Heating output (kW)	5.3	7.4	9.4	13.3
Cooling capacity (kW)	4.2	5.8	7.4	10.5
Input power (kW)	1.1	1.6	2.0	2.8
COP	4.8	4.6	4.7	4.8
<b>0/55</b>				
Heating output (kW)	4.9	6.8	8.5	12.2
Cooling capacity (kW)	3.2	4.4	5.6	8.1
Input power (kW)	1.7	2.4	2.9	4.1
COP	2.9	2.8	2.9	3.0
System's energy efficiency class, intermediate climate conditions, underfloor heating	A+++			
<b>Flow-through resistor</b>				
Power (kW)	3 / 6 / 9 (can be changed, factory setting 6kW)			
<b>Electrical information</b>				
Rated voltage/electrical connection	400VAC 3N 50Hz			
Max. supply current (incl. control systems and pumps) (A <sub>rms</sub> )	4.9	6.1	8.0	10.7
Start-up current (A <sub>rms</sub> )	15.5	16.1	21.2	30.6
Set point of motor protection	4.0A	5.1A	6.3A	9.2A
Max. supply current, resistance 3 kW (A)	9.2	10.4	12.3	15.0
Max. supply current, resistance 6 kW (A)	13.6	14.8	16.7	19.4
Max. supply current, resistance 9 kW (A)	17.9	19.1	21.0	23.7
Heat supply pump power (W)	70	70	87	175
Source pump power (W)	87	87	175	175
<b>Hot water accumulator</b>				
Capacity, domestic water/heating (l)	182/7			
Maximum pressure (bar)	10			
<b>Refrigerant circuit</b>				
Contains fluorinated greenhouse gases	yes			
Hermetically sealed	yes			
Refrigerant	R407C			
GWP (Global Warming Potential)	1774			
Refrigerant volume (kg)	1.8			2.2
CO <sub>2</sub> equivalence (tonnes, CO <sub>2</sub> e)	3.193			3.903
Cut-off, overpressure	2.8 MPa (28 bar)			
Difference, overpressure	0.7 MPa (7 bar)			
Cut-off, underpressure	0.17 MPa (1.7 bar)			
Difference, underpressure	0.10 MPa (1.0 bar)			
<b>Ground circuit</b>				
Maximum pressure (bar)	4			
Minimum flow (l/s)	0.24	0.32	0.40	0.47
Rated flow (l/s)	0.30	0.41	0.50	0.60
Max external pressure loss at rated flow (kPa)	61	48	90	74
Minimum brine output temperature (°C)	-5			
<b>Heating circuit</b>				
Maximum pressure (bar)	4			
Minimum flow (l/s)	0.14	0.18	0.40	0.47
Rated flow (l/s)	0.30	0.41	0.32	0.45
Max external pressure loss at rated flow (kPa)	57	47	34	75
<b>Dimensions and weight</b>				
Width (mm)	600			
Height (mm)	1.890-1.950			
Depth (mm)	680			
Weight (kg)	240			250
Weight of the compressor unit (kg)	99	103	104	110
<b>Pipe connections</b>				
Ground circuit liquid (mm)	28			
Heating (mm)	22			28
Domestic hot water (mm)	22			
Domestic hot water circulation (mm)	15			
Cold water (mm)	22			
Post-heating of ventilation (mm)	12			
Sound power level (dB)	38.5	38.5	40	40
Compressor	Scroll			
Controller	Gebwell Albatros <sup>2</sup>			

## 16 SET POINT EXAMPLES FOR HEAT PUMP ADJUSTMENTS IN DIFFERENT HEATING NETWORKS.

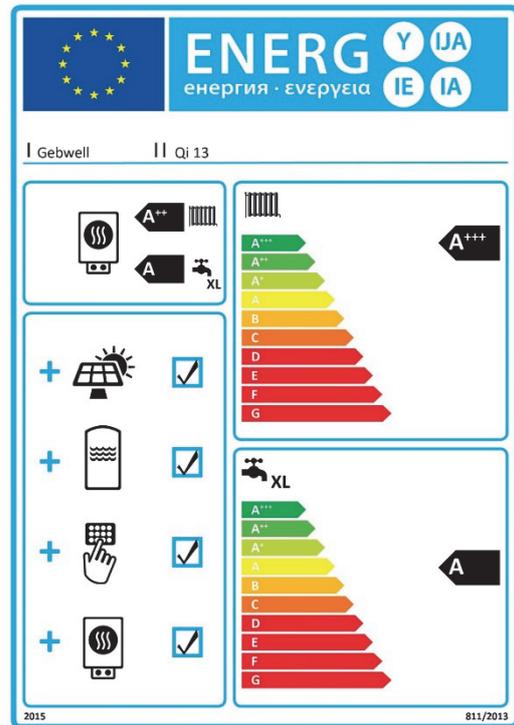
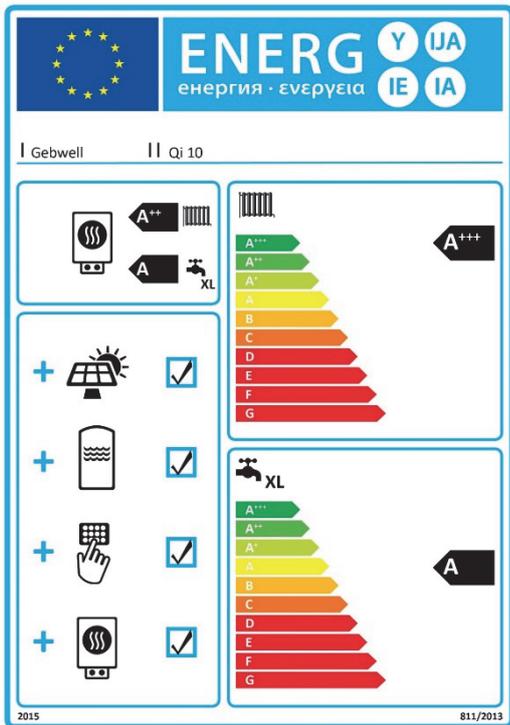
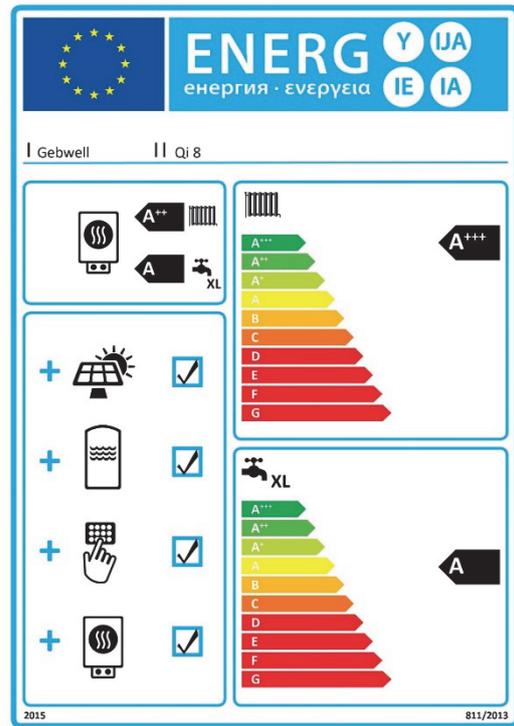
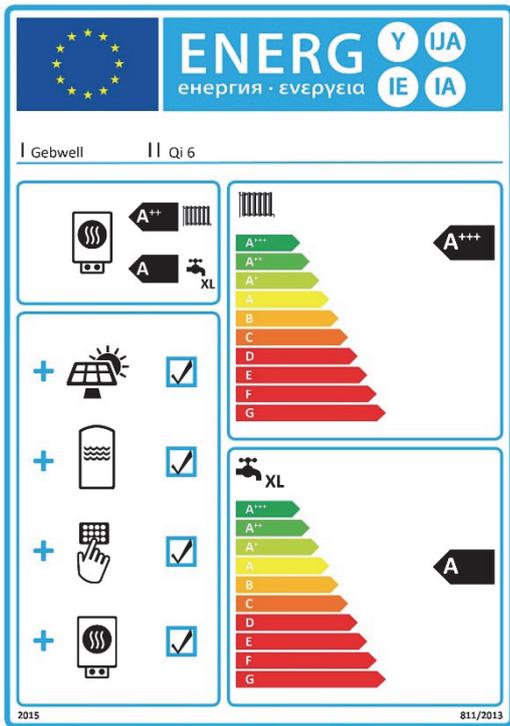
Row number		Control row	Factory setting	Underfloor heating	Radiator heating	Air heating
LP1	LP2					
710	1010	Comfort mode set point	20			
712	1012	Reduced set point	19			
720	1020	Heating curve slope	0.5	0.5 (0.3-0.5)	0.8 (0.5-1.0)	0.8 (0.5-1.0)
740	1040	Flow water minimum set point	12	12	12	12
741	1041	Flow water maximum set point	45	45 (35-45)	55 (45-60)	55 (45-60)
750	1050	Room sensor compensation	20 %			
730	1030	Summer / winter heating limit	16			

### Set points of the heat pump

Row number	Control row	Factory setting	Underfloor heating	Radiator heating	Air heating
2840	Return temperature switching	6	6	8 (8-10)	10



# 18 ENERGY LABELS



A muutos	D muutos
B muutos	E muutos
C muutos	F muutos

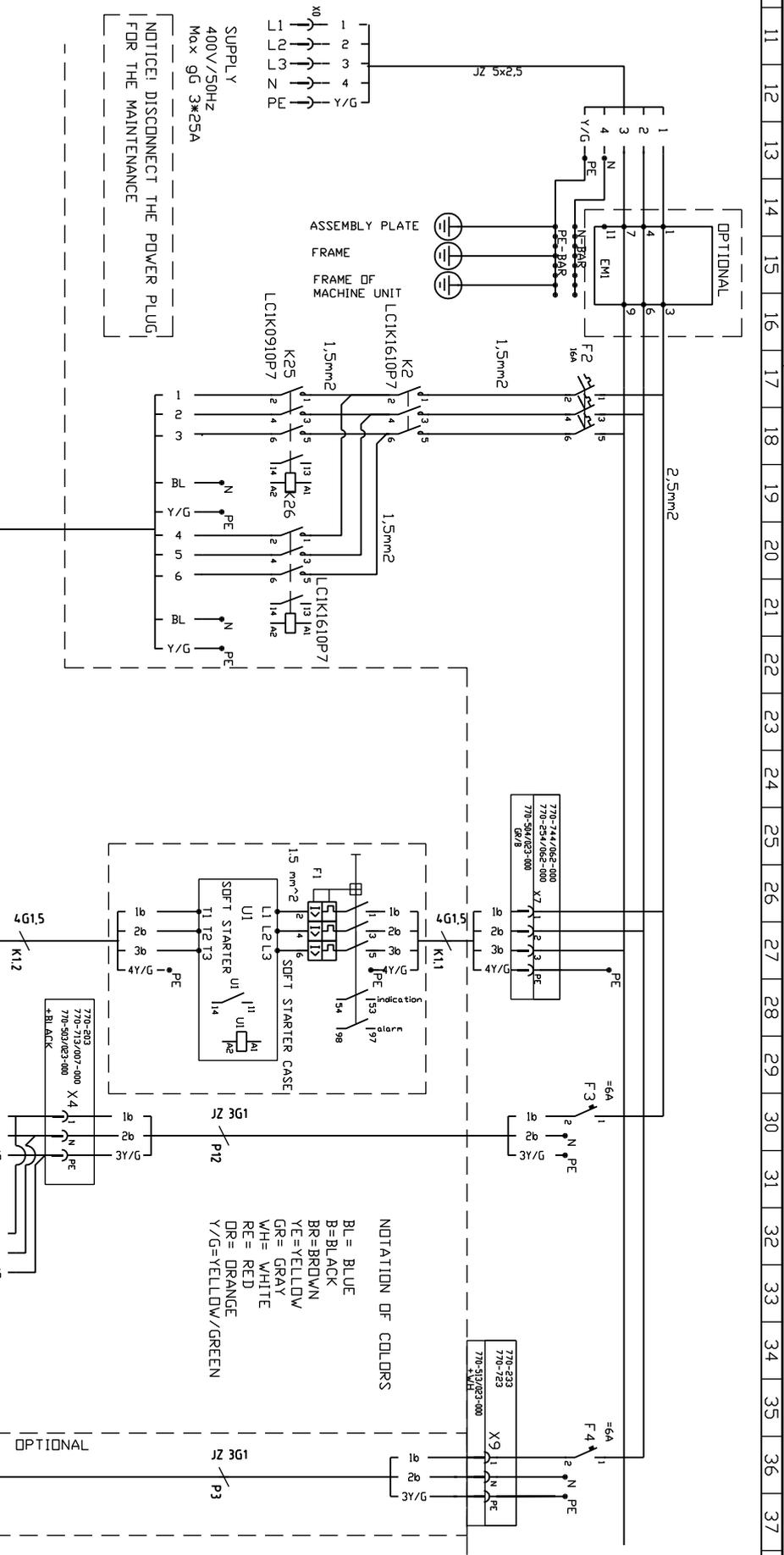
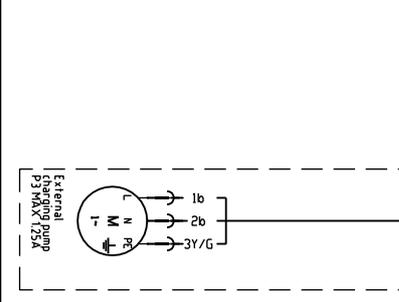
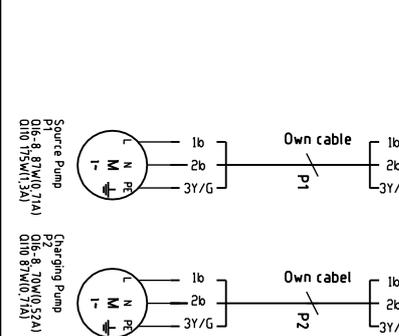
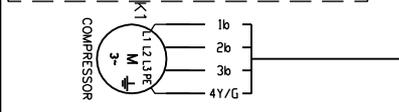
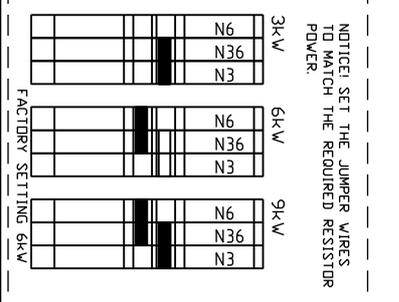
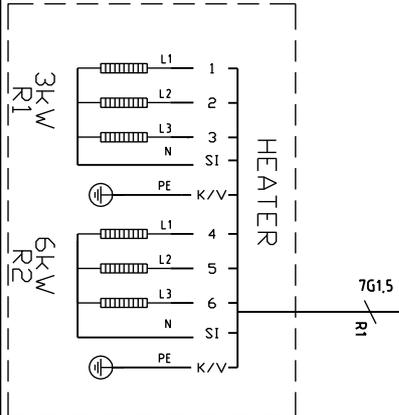
S R P D N M L K J H G F E D C B A

# GEBWELL

HEATING SOLUTIONS

COMPRESSOR MAX CURRENT

Q16 - F1, 4,0A (NS225I)
Copeland ZH15K4E
Q18 - F1, 5,1A (NS225I)
Copeland ZH21K4E
Q110 - F1, 6,3A (NS225I)
Copeland ZH26K4E
Q113 - F1, 9,2A
Copeland ZH38



NOTICE! DISCONNECT THE POWER PLUG FOR THE MAINTENANCE

NOTATION OF COLORS

- BL = BLUE
- B = BLACK
- BR = BROWN
- YE = YELLOW
- GR = GRAY
- WH = WHITE
- RE = RED
- DR = DRANGE
- Y/G = YELLOW/GREEN

Gebwell Oy  
Paturunpolku 5  
79100 Leppävirta

Q1 S6-13  
SIEMENS

Suunn. 1/31.12.2015  
Pihl t. RNY  
Tarkk.

Kokonaistuus  
Lehti 1/6

SÄHKÖKOPPIO  
SAH \*\*\*\*\*

Työnnumero

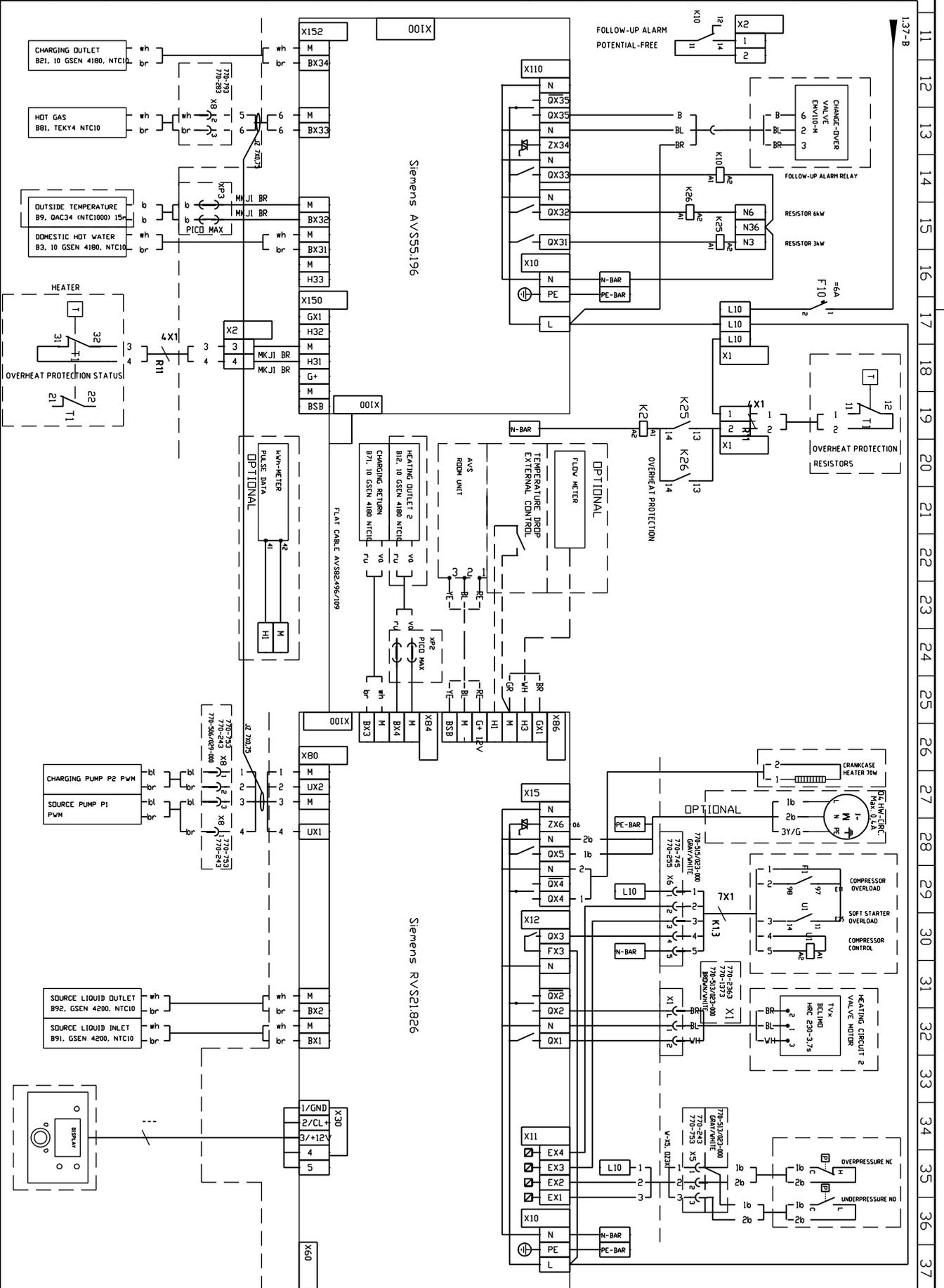
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

A muutos	2.6.2015 HW vaihtoventtiili
B muutos	
C muutos	

D muutos
E muutos
F muutos

# GERB WELL

HEATING SOLUTIONS



Q1: S6-13  
SIEMENS

Suunn.	1/31/2015
Piir.t.	Lehti
Ryv.	2/6
Tark.	

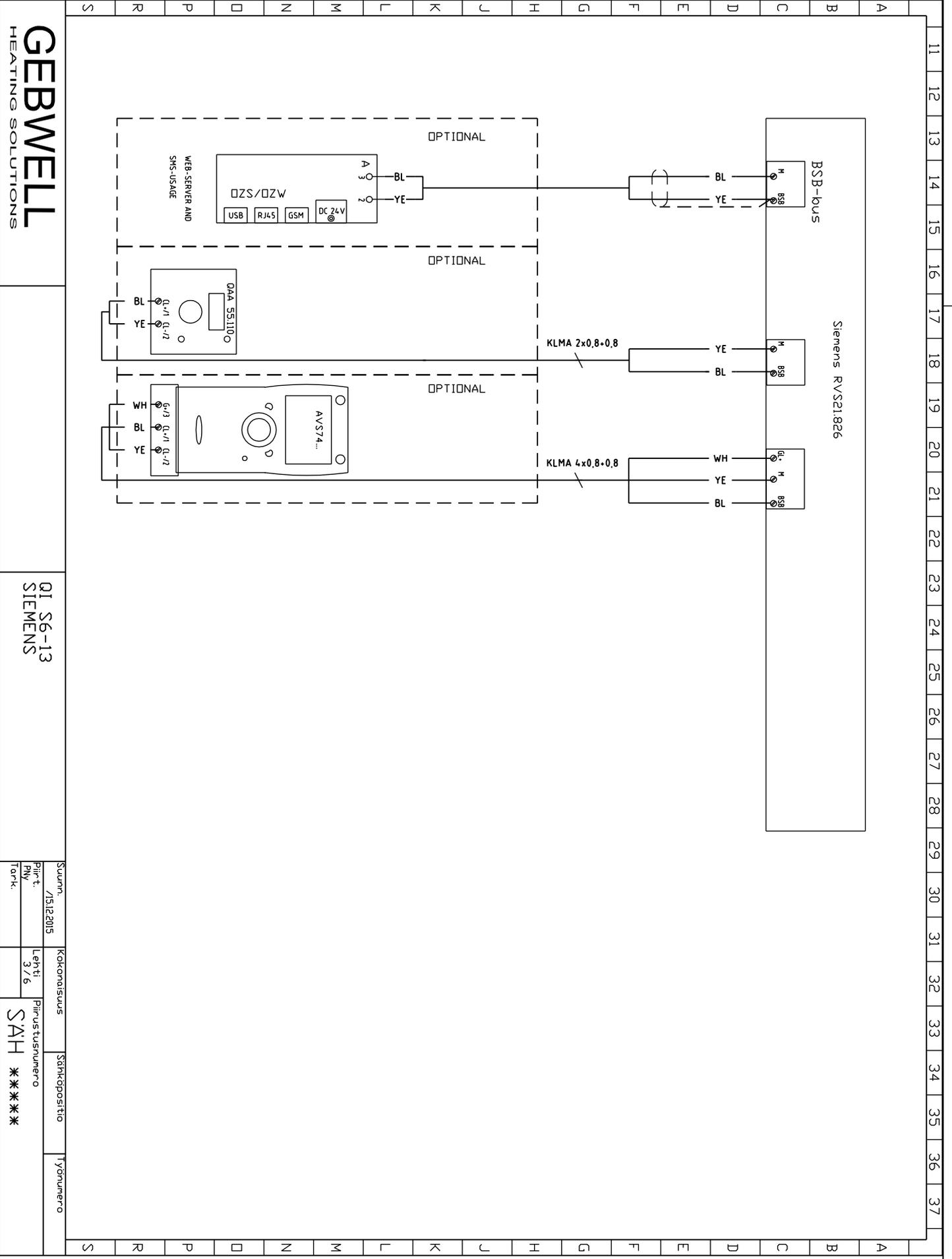
Kokonaistilaus  
SÄHKÖKOPPIO  
Piiustustunnus  
SAH \*\*\*

Työnnumero

137-B  
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

A muutos
B muutos
C muutos

D muutos
E muutos
F muutos

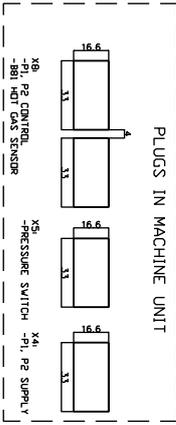
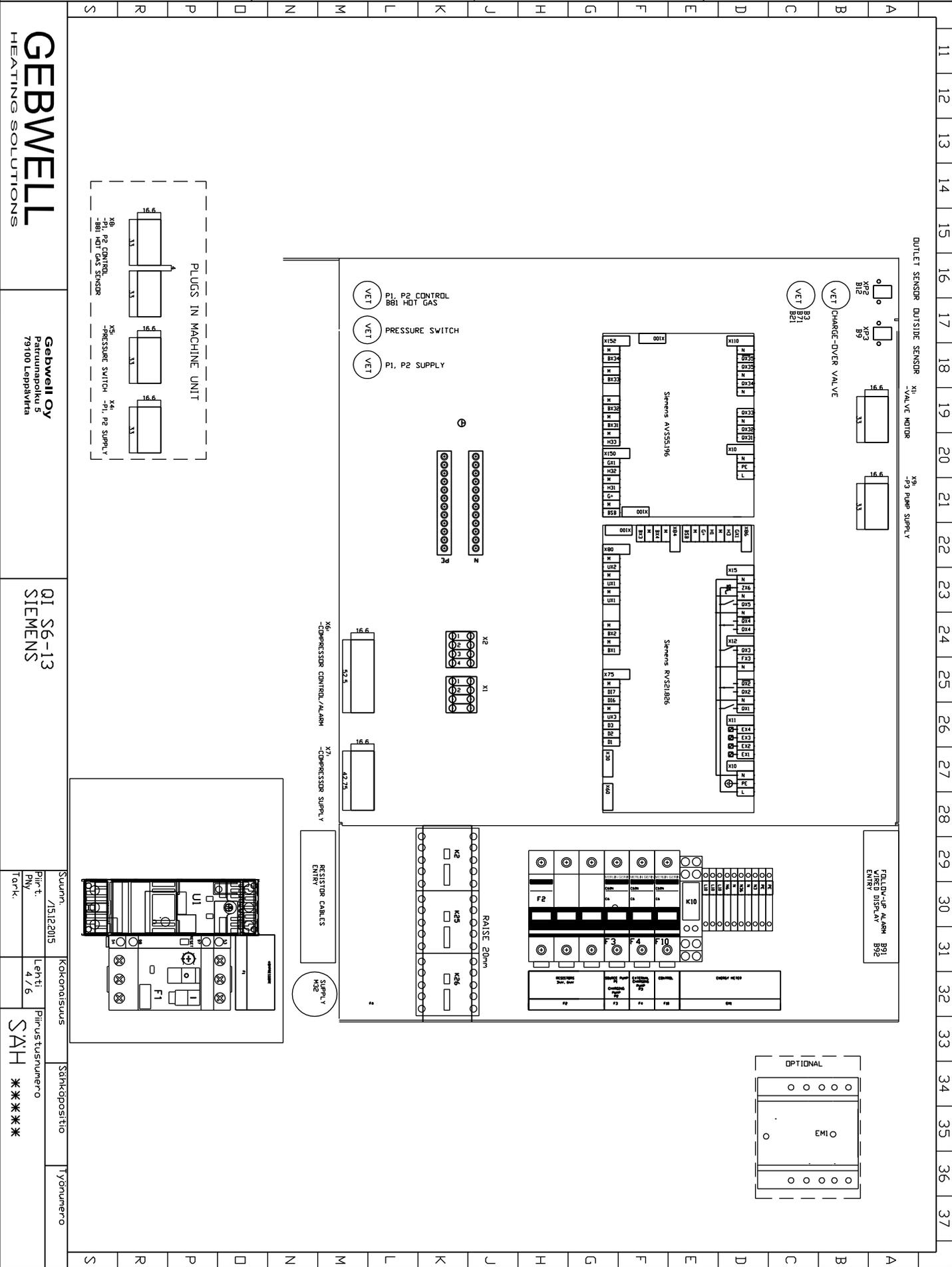


**GEBWELL**  
HEATING SOLUTIONS

Q1 S6-13  
SIEMENS

Suunn.	Kokonaistus	Sähköpostio	Työnumero
1/5/12/2015			
Piir.	Lehti	Piirustusnumero	
RVY	3/6	SAH *****	
Tark.			

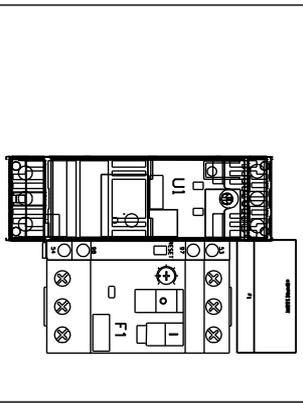
A muutos		D muutos
B muutos		E muutos
C muutos		F muutos



**GEBWELL**  
HEATING SOLUTIONS

Gebwell Oy  
Paturunapolku 5  
79100 Lepäpähkä

Q1 S6-13  
SIEMENS



Suunn.	1/31.12.2015
Piirrit.	Lehti
RY	4/6
Tarkk.	

Kokonaistuus  
Sähkötositto  
Tyy numero

Piirustusnumero  
**SAH \*\*\*\*\***

11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

A muutos	12.09.2014 JTH	D muutos
B muutos		E muutos
C muutos		F muutos

	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
			NAME			CODE			TYPE			MANUFACTURER			PCS													
A			SAADIN						RVSS21.826+AVSS5.196																			
B			CIRCUIT BREAKER			F10, F3,F4			NB1 1P C6																			
			CIRCUIT BREAKER			F2			NB1 3P C16																			
C			SOFT STARTER			U1			RSBT4016EV11HP																			
			AUXILIARY CONTACT			U1			RFPMV00																			
			MOTOR STARTER			F1			4-6.3A																			
D			ENERGY METER			EM1			EM23																			
			AUXILIARY CONTACT			F1			GVAD1010																			
E			TERMINAL BLDCK			PE, 7,8,1,2			--																			
			N-PE-BAR			N, PE			NI2, PE12																			
F			CONTACTOR			K25			LC1K0910P7																			
			CONTACTOR			K26			LC1K1610P7																			
G			CONN. BRIDGE			X1			---																			
			RELAY			K10			230VAC																			
H			Q1 13																									
			SOFT STARTER			A1			RSBT4025EV11HP																			
			AUXILIARY CONTACT			A1			RFPMV00																			
J			MOTOR STARTER			F1			9-14A																			
			AUXILIARY CONTACT			F1			GVAD1010																			
K			P1, P2 SUPPLY			X4			770-713/007-000 + 770-203 + 770-503/023-000																			
			TVx CONTROL			X1			770-770-2363 + 770-1373 + 770-513/023-000																			
L			P1, P2 CONTROL, B81			X8			770-753+770-793 + 770-243+770-283 + 770-506/029-000																			
			PRESSURE SWITCH			X5			770-753 + 770-743 + 770-513/023-000																			
M			COMP SUPPLY			X7			770-744/062-000 + 770-254/062-000 + 770-504/023-000																			
			COMP CONTROL			X6			770-745 + 770-255 + 770-515/023-000																			
N			B9, B12			XP2, XP3			PICD MAX 2NAP, x 2 + LAPIMENDL IITIN																			
			P3 SUPPLY			X9			770-723 + 770-233 + 770-513/023-000																			
			MLK POWER PLUG			32A			DN THE PHASE CHANGER 5X32A																			
O			TECHNICAL DETAILS																									
P			Q1																									
R			1. OPERATING VOLTAGE Un 400 V																									
			2. CURRENT In 20 A																									
			3. CONTROL VOLTAGE U 240 V																									
			4. IP-CLASS IP 20																									
S			5. MAX OPERATING TEMP 35°C																									

**GEBWELL**  
HEATING SOLUTIONS

Gebwell Oy  
Patrunnapolku 5  
79100 Leppävirta

Q1 S6-13  
SIEMENS

Suunn. 1/312/2015  
Pihl t. RNY  
Tark.

Kokonaismäärä 5/6

Pilvustusnumero SAH \*\*\*\*\*

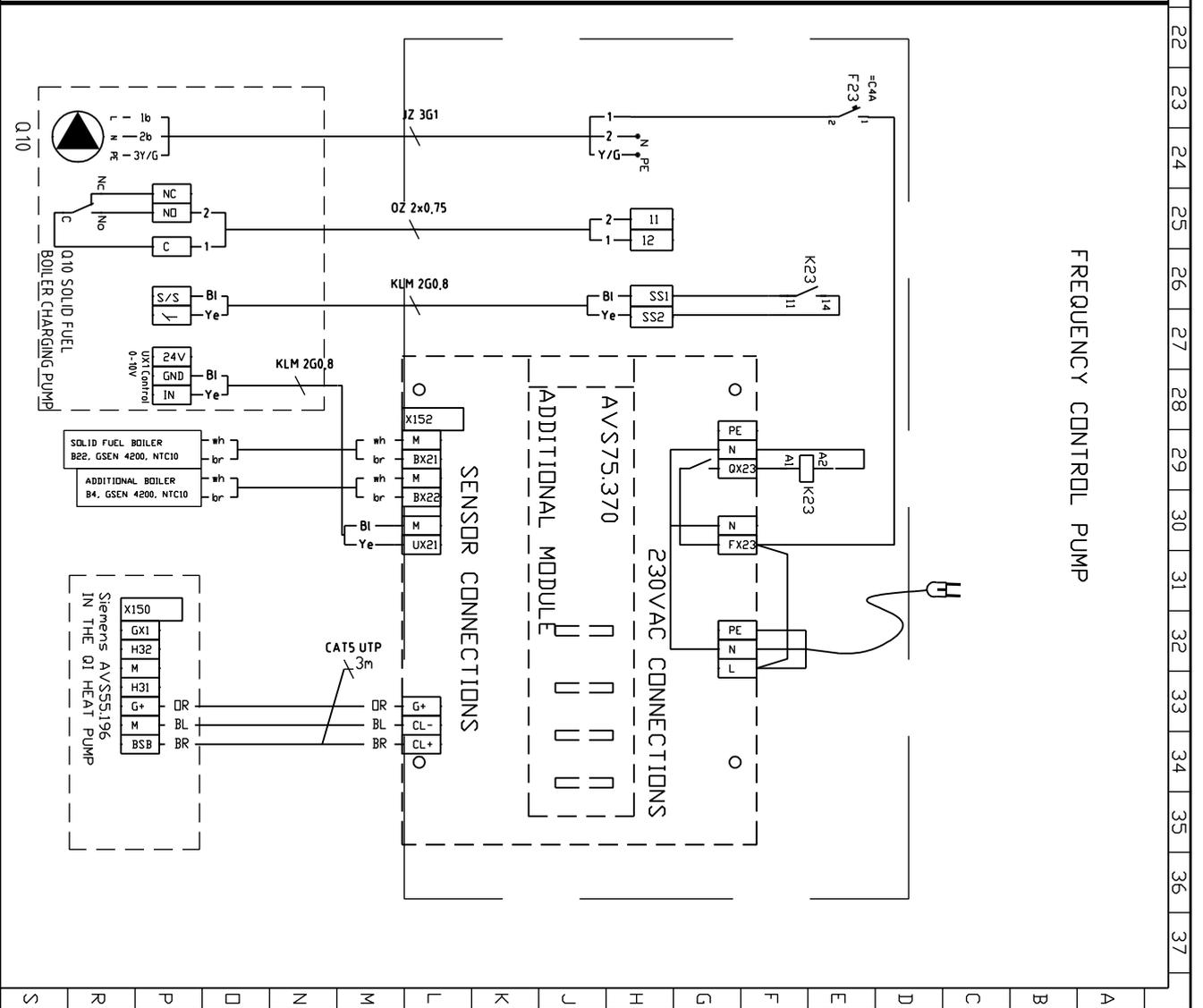
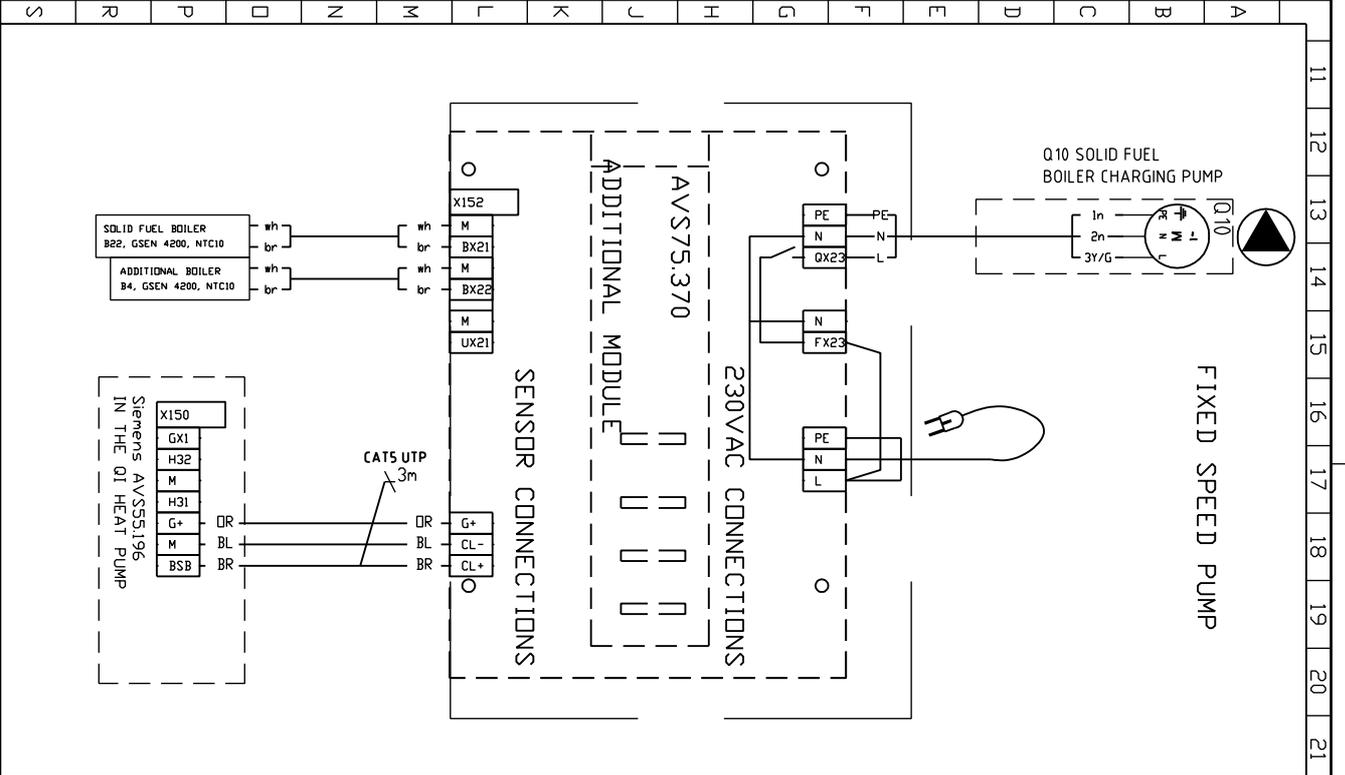
Sähköpostiosoite

Työnumero

A muutos
B muutos
C muutos

D muutos
E muutos
F muutos

**GEBWELL**  
HEATING SOLUTIONS



Q1: S6-13  
SIEMENS AVS75.370  
ADDITIONAL MODULE (Optional)

Suunn.	1/31.12.2015	Kokonaismäärä	Sähköpostiosoite	Työnumero
Piiritt.		Lehti		
RYV.		6/6		
Mark.				

SAH \*\*\*\*\*



## Declaration of Conformity

We, Gebwell Ltd, hereby declare under our sole responsibility that the product

Qi  
T<sup>2</sup>  
Gemini  
E-Flex  
Taurus

to which this declaration relates is in conformity with the

**LOW VOLTAGE DIRECTIVE 2006/96/EC**  
**ELECTROMAGNETIC COMPATIBILITY DIRECTIVE 2004/108/EC**

and the following harmonised standards and technical specifications have been applied:

LVD: EN 61439-1:2011  
EN 61439-2:2011  
EN 61439-3:2012

EMCD: EN 61439-1 Annex J, Point J.9.4.2

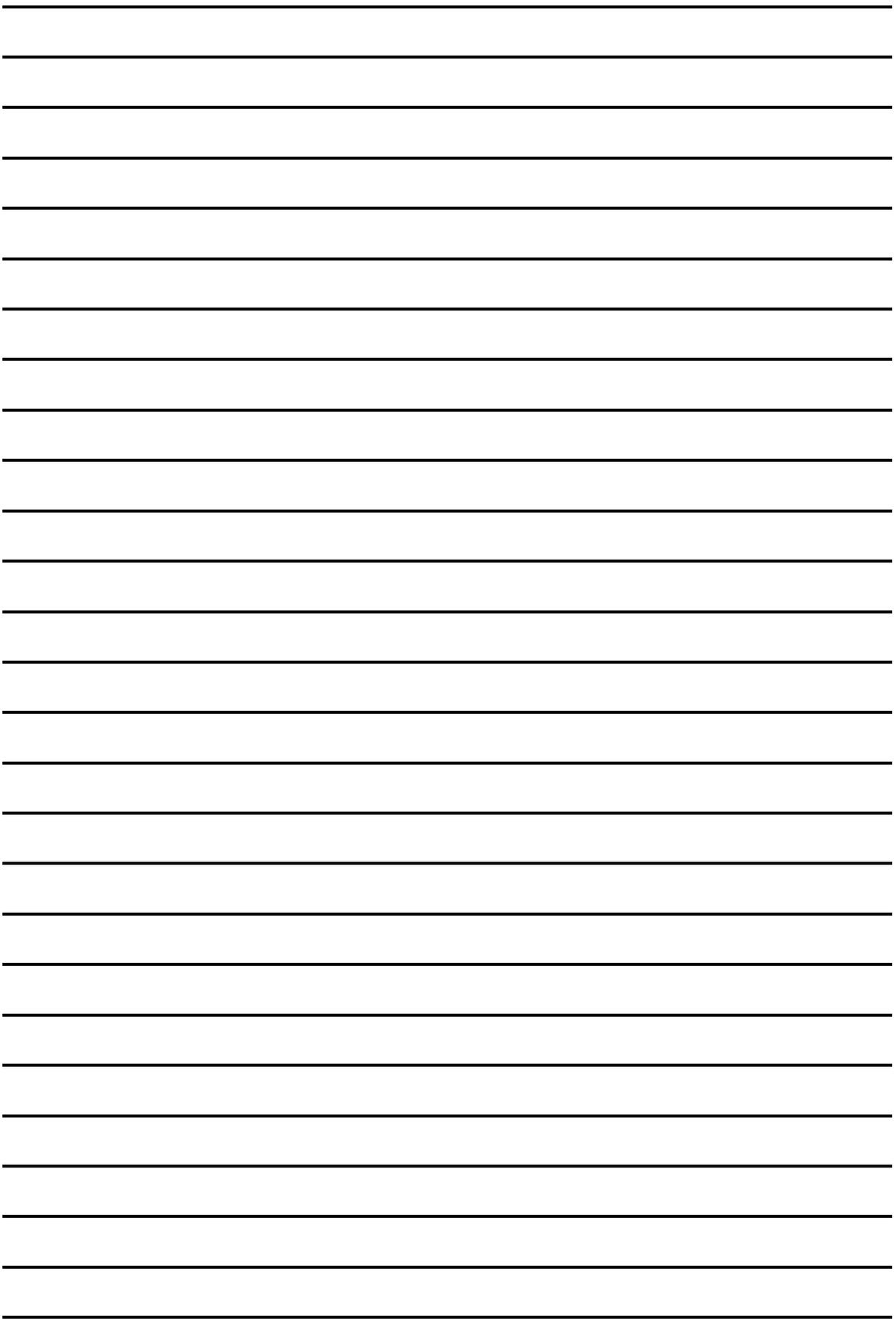
HD: 60364 Low-voltage electrical installations  
384 Electrical installations of buildings

Commission Delegated Regulation (EU) No 811/2013 on energy labelling

Products are provided with a **CE** marking of conformity.

Tuure Stenberg  
Managing Director

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info@gebwell.fi | www.gebwell.fi



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