GEBWELL

Installation, operation and maintenance manual

T^2 heat pump

WWW.GEBWELL.COM

Contents

1 WARRANTY

Gebwell Ltd.

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

issues the product,

T² 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:

1. read the installation, operating and maintenance manual carefully and think whether you have used the device in accordance with the instructions in the manuals
2. 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
3. all parts belonging to a device must be included when the device is returned
4. 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.

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

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

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

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

2 INSTALLATION RECORD

The heating system must be inspected before commissioning following in-force regulations. Only qualified persons may conduct the inspection. The below installation record must be filled out before handing the device over to the end user. The completed installation record is also a condition for the validity of the warranty.

x	Description	Note:	Inspected by:	Date:
	Collector:			
	System pressure tested			
	System flushed			
	System vented			
	Brine			
	Expansion vessel			
	Mud separator			
	Safety valve			
	Shut-off valve			
	Collector loop 1, length			
	Collector loop 2, length			
	Collector loop 3, length			
	Collector loop 4, length			
x	**Description**	**Note:**	**Inspected by:**	**Date:**
	Heating system:			
	System pressure tested			
	System flushed			
	System vented			
	Safety valve			
	Diaphragm expansion vessel			
	Mud separator			
	Pressure gauge			
	Shut-off valve			
	Admission valve			
	Buffer accumulator			
x	**Description**	**Note:**	**Inspected by:**	**Date:**
	Domestic water:			
	System pressure tested			
	System flushed			
	Safety valve			
	Pressure gauge			
	Buffer accumulator			
x	**Description**	**Note:**	**Inspected by:**	**Date:**
	Electricity:			
	Property fuses			
	Heat pump fuses			
	Phase sequence			
	32A power socket			
	Outdoor temperature sensor			

3 HEAT PUMP OPERATING INSTRUCTIONS

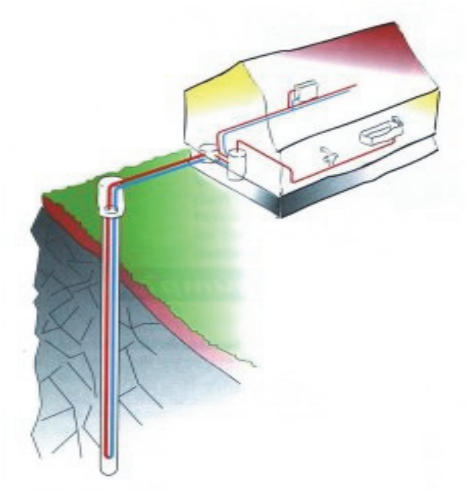
3.1 General

Gebwell T is a perfect heat pump, which saves energy and offers efficient technical possibilities. A well-designed and appropriately dimensioned ground source heating system is affordable in terms of operating expenses and energy efficient. With a 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.

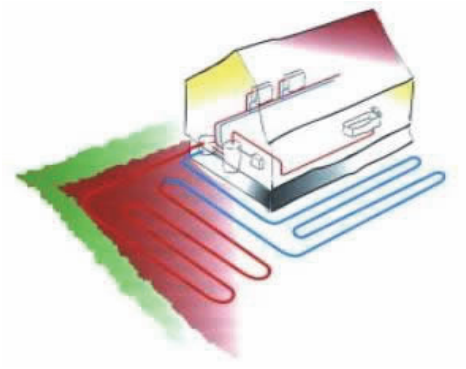
3.2 Ground source heat energy

A 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.

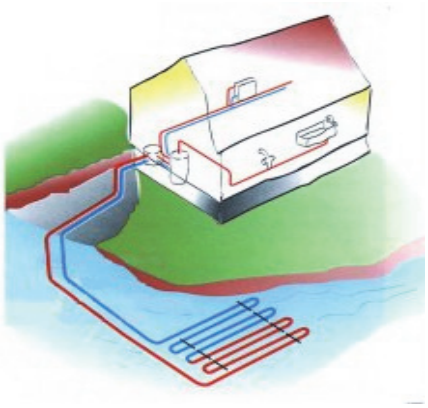
Bored well as a heat source



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

www.sulpu.fi

3.3 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 heat pump system can be connected to the convection heaters of the ventilation system or an underfloor heating/cooling system for cooling purposes.

3.4 Heat pump's operating principle

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

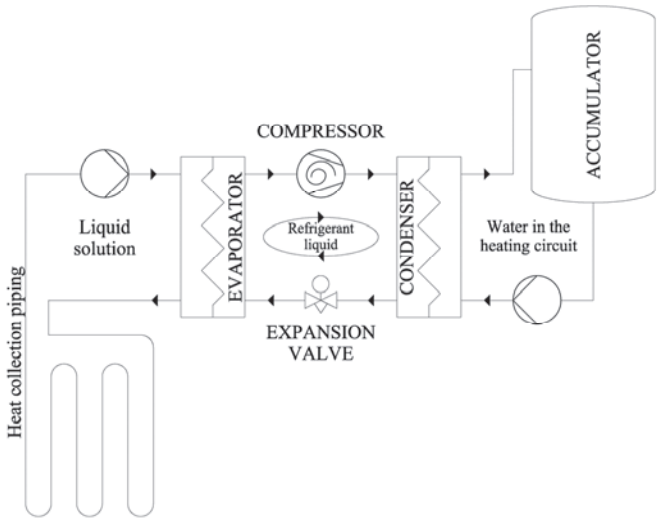
- Evaporator
- Compressor
- Condenser
- Expansion valve

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 evaporated. At this point, the refrigerant absorbs heat from the liquid solution circulating in the heat collection piping.

3.5 Heating functions

Domestic water

The heat pump produces domestic water based on the B3 measurement sensor. The domestic hot water's switching differential is 5 degrees. The compressor is factory set to activate when the measurement value drops under +50°C and deactivated when the value reaches +55°C.

Heating

The heat pump produces heating water directly into the building's heating network in accordance with the set point that is created from the outdoor temperature and the set heating curve. The control automation activates the charging on the basis of the calculated set point and return water measurement (B71) formed by the controller. The heat pump's *return water switching differential (2840)* setting defines the compressor's activation and deactivation points. When the return water measurement value is less than the set point by half of the *return water switching differential*, the compressor is activated. The compressor turns off when the return water measurement value reaches the set point + half of the *return water switching differential*. The automation reduces temperature rise in the return water set point above the condenser.

Example: *Return water switching differential (2840)* 6°C. Supply water set point: 30°C. Condenser's temperature difference Δt 6K.

The charging procedure is activated when the return water measurement value (B71) reaches 21°C. The charging ends, when the return water measurement value is 27°C. The heat pump's charging pump rotates whenever it is in heating mode.

Mixing heating circuit:

The heating circuit's supply water set point is calculated in accordance with the outdoor temperature measurement and the set heating curve. The controller controls the 3-way mixing valve and keeps the heating circuit's supply water temperature at 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°C–10°C and the output and input temperature difference of the collector must be 3°C–4°C. Efficiency and savings are reduced at temperature differences other than those described above.

Factory settings:

Heat supply pump: 6°C

Source pump: 4°C

3.6 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 Delivery contents

- Heat pump
- Outdoor temperature sensor
- Operating, maintenance and installation manual
- Spare seals
- Commissioning and warranty protocoll
- External source pump, devices $T^2$20-$T^2$32

4.2 Optional accessories

- Spare valve
- Room sensor
- Collector valve group
- Pump heating circuit
- Heating control group
- Cooling control group
- SMS/WEB server, SMARTWEB
- Buffer accumulator for domestic water
- Buffer accumulator for heating
- Domestic water control group
- Charging package for domestic water
- Pool heating set
- Diaphragm expansion vessel for collector
- Diaphragm expansion vessel for heating
- Energy measurement
- Fixed fuel boiler control
- Additional heat source control
- Cooling control
- Modbus communication module

4.3 Storage

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

4.4 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 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.

4.5 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.

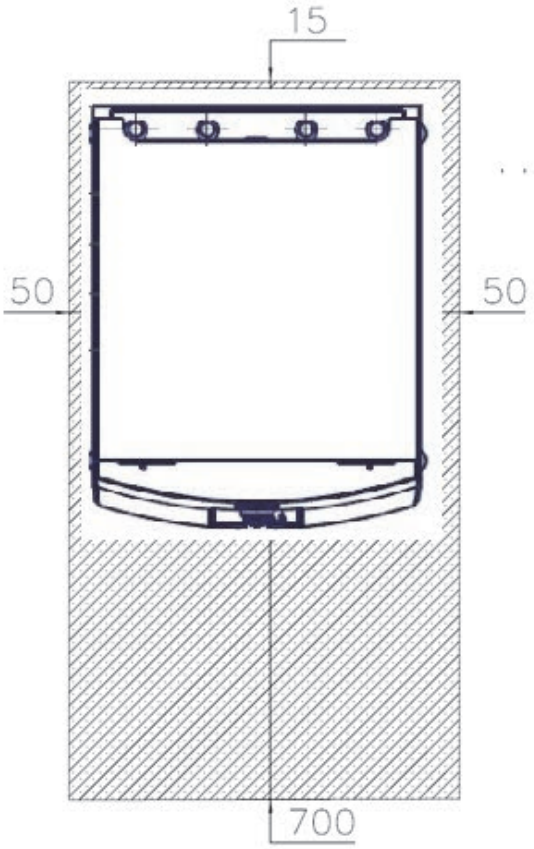
- Ensure that you have received the correct products with the correct accessories.
- Remove the packaging material, and before installation, check that the heat pump has not been damaged during transport. Inform of any possible transport damage.
- Transport the heat pump near the planned installation 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.

4.6 Safety instructions

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

- Turn off the device's main switch before any maintenance procedures
- 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.

4.7 Heat pump's location



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

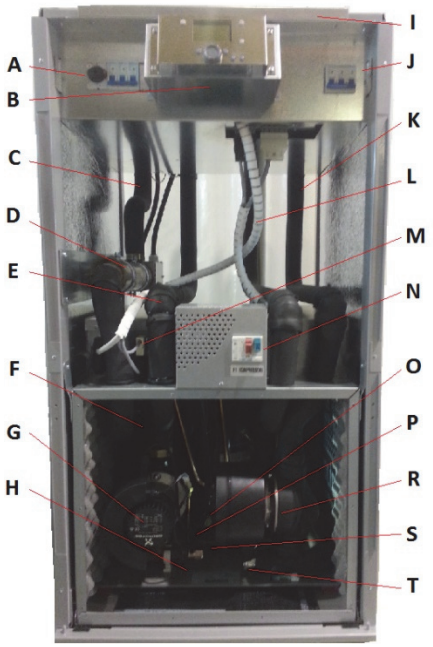
The temperature of the location must be between +5°C and +30°C. The room must be sufficiently ventilated. If the humidity in the room is high, water condenses on the cold pipe sections of the collector.

The heat pump compressor 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 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 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.

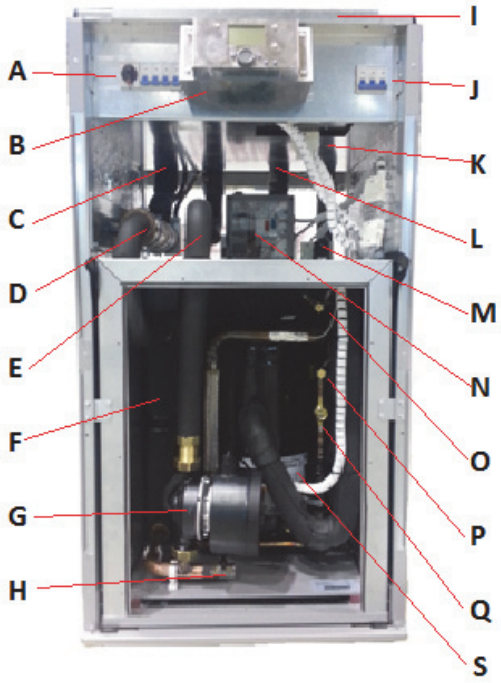
Reserve at least 700 mm of maintenance space in front of the pump so that the compressor unit can be taken out for maintenance. For the same reason, do not install the pump below the floor surface. Leave free space behind the heat pump to prevent the transfer of any vibrations.

5 HEAT PUMP'S STRUCTURE

5.1 T²06 – T²16 structure



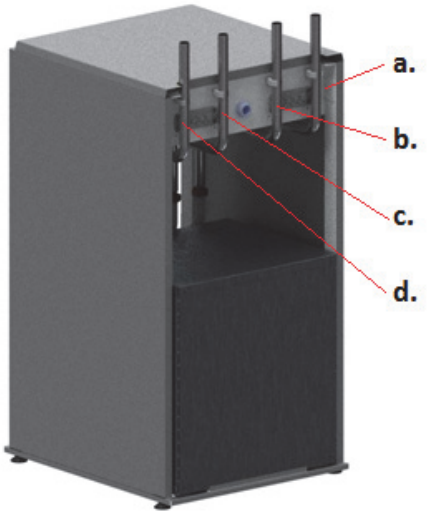
5.2 T²20 – T²32 structure



A. Heat pump's main switch (Q1)
B. Operating terminal
C. Charge output
D. Supply water electrical heater (accessory)
E. Charge return

F. Condenser
G. Charging pump (LP)
H. Drain valve, charging circuit
I. Control centre
J. Supply water electrical heater, operating switch (accessory)
K. Brine to the ground
L. Brine from the ground
M. Cooling unit's electrical connections
N. Compressor's motor protection switch F1 and soft starter
O. Maintenance shut-off low pressure (KP)
P. Maintenance shut-off high pressure (KP)
Q. Liquid inspection glass (KP)
R. Source pump (MLP) ($T^2$20-$T^2$32 external)
S. Compressor
T. Drain valve, collector

5.3 Sensor locations



a. Charge, flow sensor B21
b. Charge, return water sensor B71
c. Collector, inlet sensor B91
d. Collector, output sensor B92

5.4 Sensors

Inside the heat pump:

B81	Hot gas sensor
B91	Collector's inlet sensor
B92	Collector outlet sensor
B21	Heat pump flow sensor
B71	Heat pump return water sensor

External sensors:

B9	Outdoor sensor
B10	Common flow sensor

Accumulator sensors:

B3	Domestic water
B4	Additional accumulator 1 (upper)
B41	Additional accumulator 2 (lower)
B42	Additional accumulator 3 (middle)

Heating circuit sensors:

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

Room sensors:

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

Other sensors:

B13	Pool sensor
B16	Cooling flow sensor
B22	Fixed fuel boiler sensor
B38	Domestic water consumption sensor

5.5 Pumps

Inside the heat pump:

Q8	Source pump (NOTE! T20-T30 external)
Q9	Charging pump

Heating circuit pumps:

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

Domestic water pumps:

Q4	Domestic water circulating pump
Q34	Domestic water exchanger's charging pump

Other pumps:

Q10	Fixed fuel boiler pump
Q19	Pool pump
Q24	Cooling circuit pump

5.6 Control valves

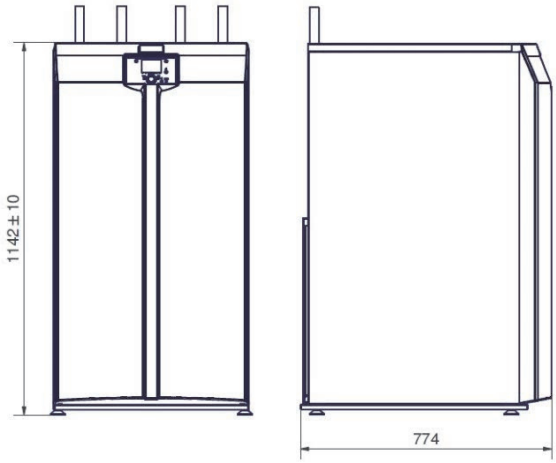
Y1 / Y2	Heating circuit 1 (open / closed)
Y5 / Y6	Heating circuit 2 (open / closed)
Y11 / Y12	Heating circuit 3 (open / closed)
Y23 / Y24	Cooling circuit (open / closed)
Y33 / Y34	Domestic water (open / closed)

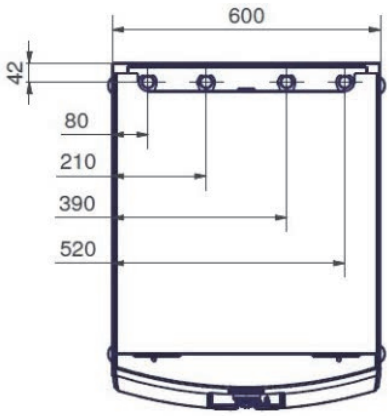
5.7 Other controls

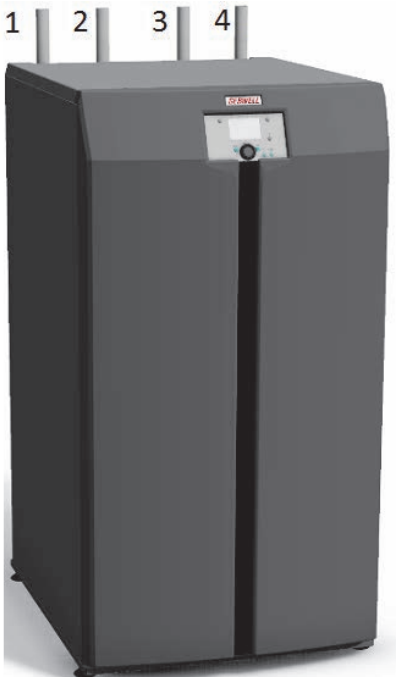
Q3	Domestic water change-over valve
Y21	Cooling change-over valve
Y28	Cooling pump/change-over valve

6 DIMENSIONS AND PIPE CONNECTIONS

6.1 Heat pump dimensions







		T206 – T216	T220 – T232
1	Charge output	cu Ø 28mm	cu Ø 35mm
2	Charge return	cu Ø 28mm	cu Ø 35mm
3	Brine from the ground	cu Ø 28mm	cu Ø 35mm
4	Brine to the ground	cu Ø 28mm	cu Ø 35mm

6.2 Pipe connections

7 PIPE INSTALLATION

7.1 Collector

When viewing from the front, the heat pump's collector pipes are at the right edge of the device.

NOTE! In T²20, T²26 and T²32 devices the source pump must be installed externally. The pump is delivered in conjunction with the equipment delivery. It is recommended that the pump is installed vertically to the line from the ground. In this way, air does not accumulate inside the pump.

- In the collector/brine, only use connection parts that are intended for cold conditions.
- Install shut-off valves in the pipe connections as close as possible to the heat pump.
- Place the level expansion vessel in the highest point of the collector, in the incoming pipe before the source pump.
- A dirt separator (filter) must be installed to the collector's line coming from the ground in accordance with connection diagrams.
- Use supports insulated with rubber to support the pipes.
- Mark the name of the heat collection liquid on the level expansion vessel.
- Ensure that water does not spill on the pump or in the electrical devices during operation.
- The collector must be pressure tested at a pressure of 3bar and the test pressure must be maintained for at least 30 min.
- Insulate all of the building's source/brine pipes with closed-cell insulation in order to prevent water condensation.
- Rinse the pipes of any installation debris prior to installing the heat pump

When measuring the collection circuit, the geographical location, soil type, heat pump's efficiency and the property's heating needs must be taken into consideration.

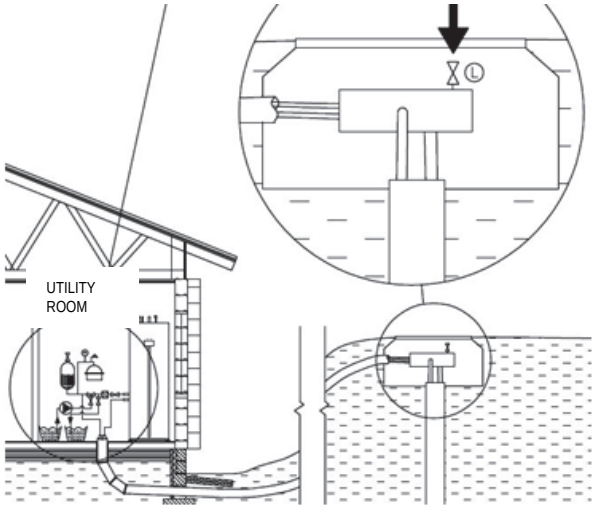
When 40x4.2 PN6.3 PEM hoses are used

Device	Recommended length of collection piping (m)	Recommended active drilling depth (m)
T206	250 – 2x250	100 - 160
T208	300 – 2x300	140 - 200
T210	400 – 2x400	170 – 2x120
T213	2x250 – 3x400	210 – 2x150
T216	2x300 – 4x400	2x140 – 2x190
T220	2x400 – 6x400	2x170 – 3x170
T226	3x300 – 8x400	2x210 – 3x180
T232	3x400 – 10x400	3x180 – 4x200

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

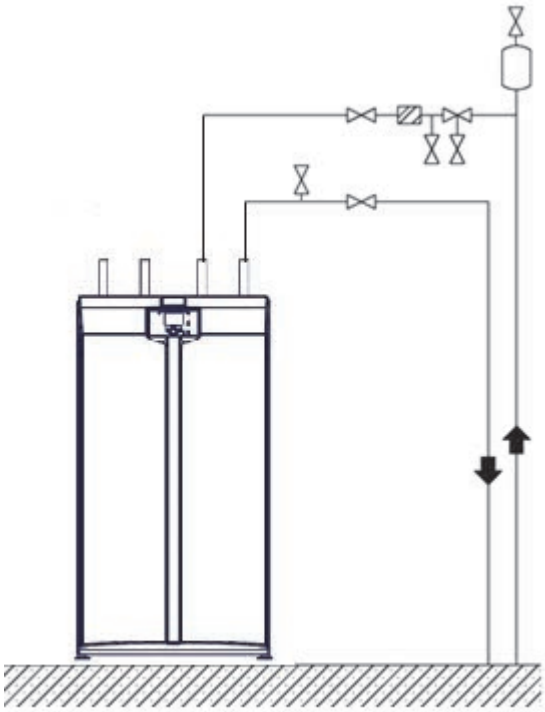
The maximum length for a single collector loop is 400 m. If there is a need to install more piping, the piping must be divided into two loops that are connected in parallel. The connection must be conducted so that the loop flow can be balanced.

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.

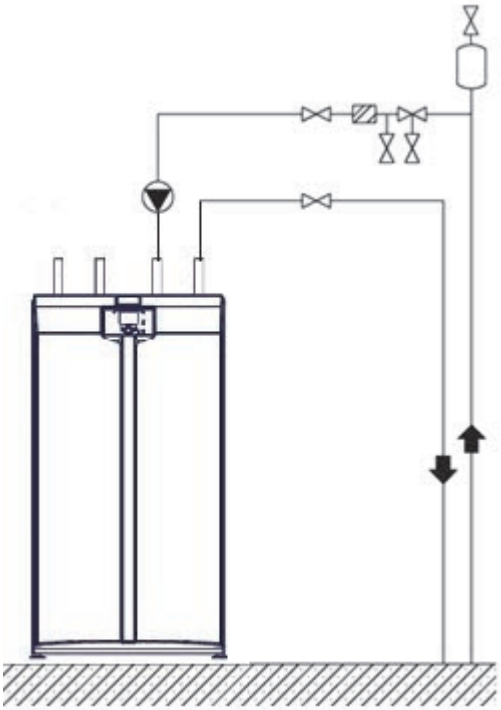


Collector's connection examples:

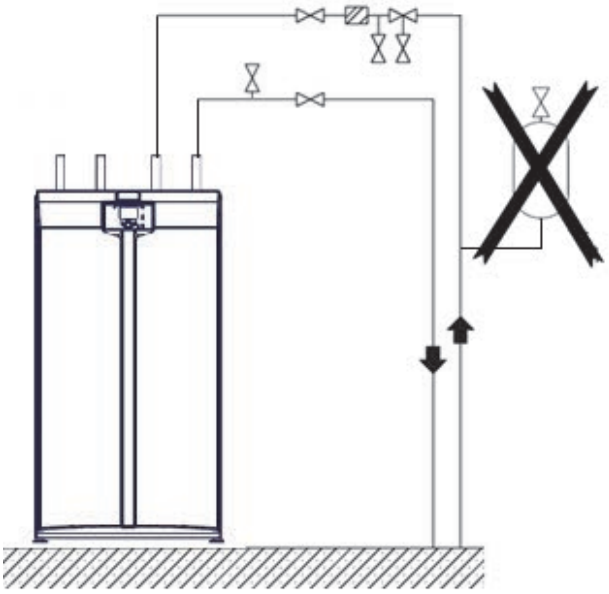
Connection T²06 – T²16



Connection T²20 – T²32

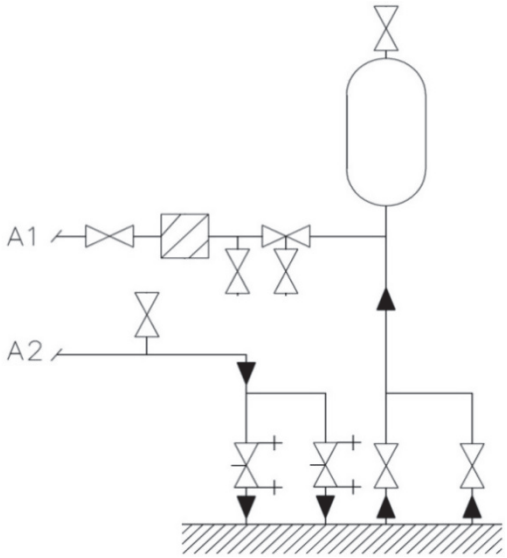


The line coming from the ground must be branched to the expansion tank. The expansion tank must be directly above the line coming upwards, so that air can rise directly into the expansion tank. **Do not make a connection to the side branch or the air is prevented from rising freely.**



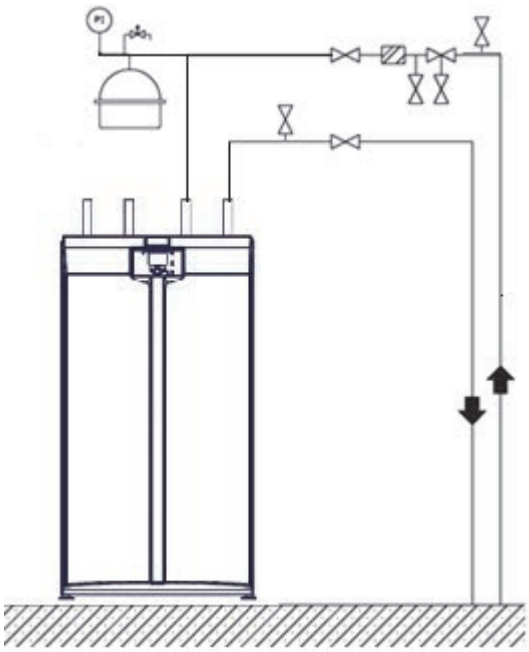
Collector installation in multiple loops

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 each circuit lengths. Try to use collection circuits of a roughly equal length.



Pressurised collector

A collector can also be pressurised. In this arrangement, the diaphragm expansion vessel, which is available as an accessory, is used. If the level expansion vessel does not fit the highest location of the circuit, a pressurised system should be used.



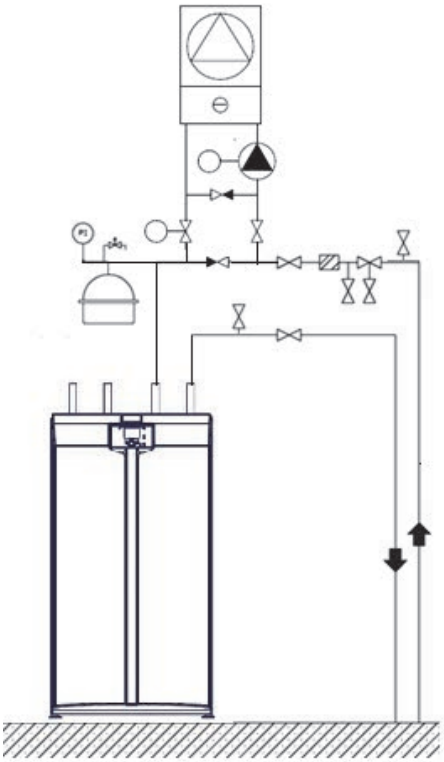
7.2 Connecting ground cooling

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 capacity. 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.

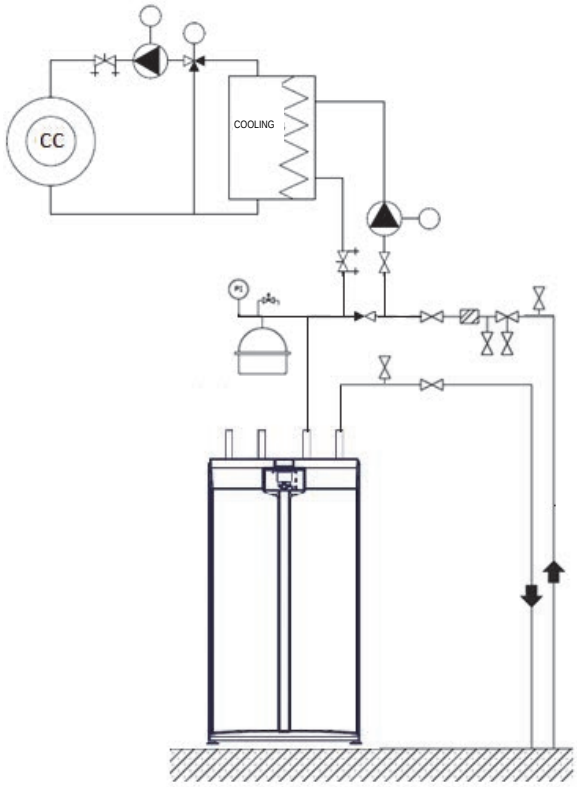
A cooling accessory available for the heat pump can be used to control/adjust the cooling. Building automation or an air supply unit can also control the source pump inside the heat pump. See instructions in the electrical connection diagram.

Connection options

Direct connection to convection heater



Heat exchanger connection with cooling control



7.3 Charging circuit

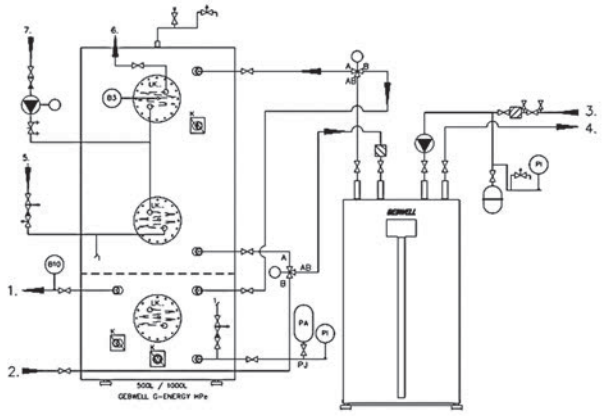
When viewing from the front, the heat pump's charging circuit is at the left side of the device. The charging circuit has had shut-off valves installed at the factory in order to facilitate maintenance work. See the charging circuit's connection in the connection options below or the site-specific diagram.

- Install the required protective devices, mud separator (strainer) as well as the shut-off and check valves.
- Residual installation impurities must be flushed from the building's heating system pipes before installing 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 2.5 bar, 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
- The heating system must have the device's minimum flow, refer to the Technical specifications table for the minimum flow

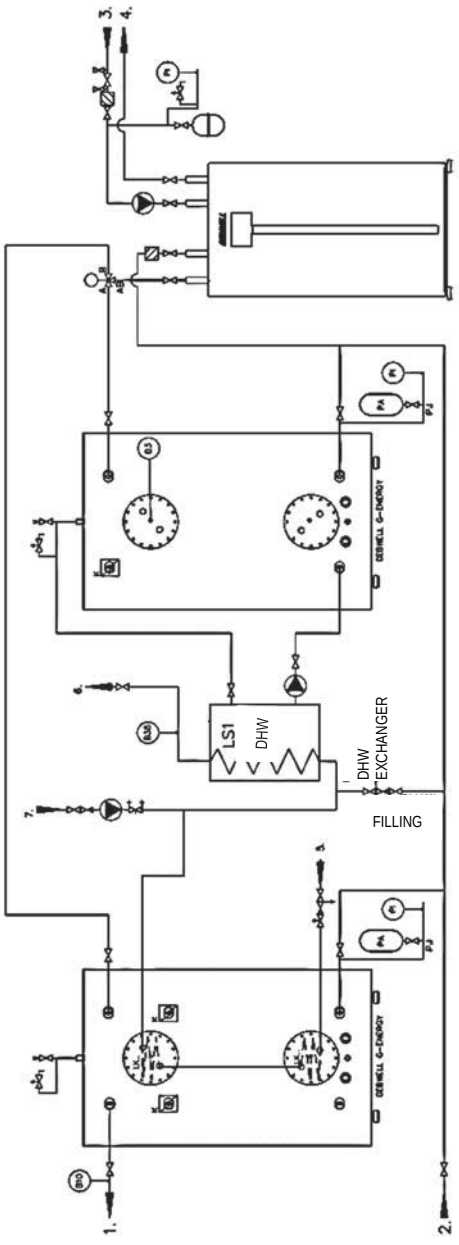
Connection options:

1. Heating supply
2. Heating return
3. Brine in (from the ground)
4. Brine out (to the ground)
5. Cold water
6. Domestic hot water
7. Hot water circulation

Connecting a heat pump system to a HPe accumulator



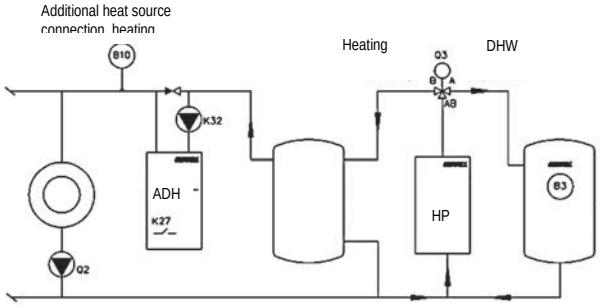
Connecting a heat pump system to two G-Energy accumulators



7.4 Connections of an additional heat source

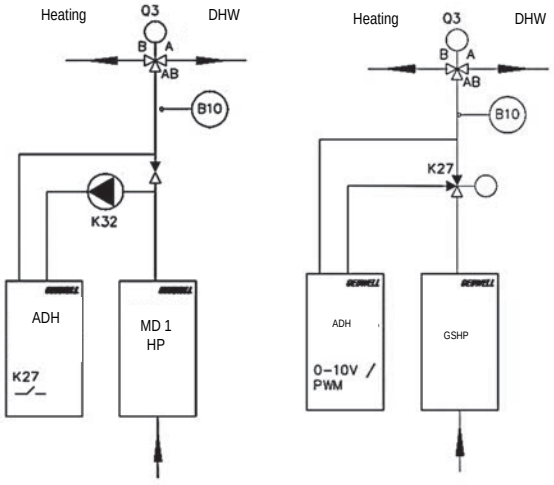
Connection of an additional heat source to the heating circuit

Use of an additional heat source requires the AVS extension module sold as an accessory. An additional heat source refers to a secondary heat source, which produces additional heat / power in the ground source heat hybrid system. The heat source can be, for example, an oil burner, electrical boiler, district heating or natural gas. The heat pump's controller directly controls the additional source with a 0-10V control message or relay control. If the additional source is controlled with relay control (K27), the adjustment must be made with a 0-10V control message, either by using a circulating pump of control valve. The B10 flow sensor is used as the additional heat source's control sensor. The control of an additional heat source requires the introduction from the controller.



Additional heat source with the connection of heating/domestic hot water

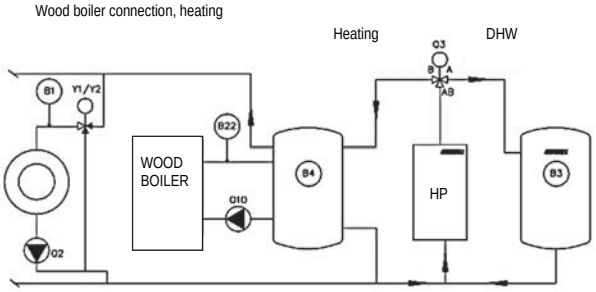
The additional heat source may be connected after the heat pump, before the change-over valve. This allows the use of the additional heat source for charging heating and domestic hot water. The control of the additional heat source can be implemented with an adjustable pump control, adjustable additional heat source or a 3-way mixing valve with 0-10V control.



7.5 Connections of a fixed fuel boiler

Boiler control

Boiler control refers to an uncontrolled heat source, such as a wood boiler or water-circulated fireplace. The use of wood boiler control requires the AVS module sold as an accessory, as well as a accumulator sensor B4. Heat distribution must be implemented with a control group in order to control the temperature of supply water. In the connection example below, the heat pump's controller measures the temperature of the accumulator and the wood boiler, and controls the boiler's charging pump Q10 in accordance to the temperature values set for the controller.



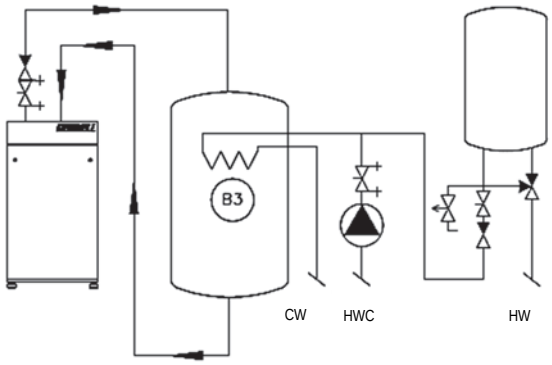
7.6 Connecting the domestic water system

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.

Accumulator tank for the domestic water system

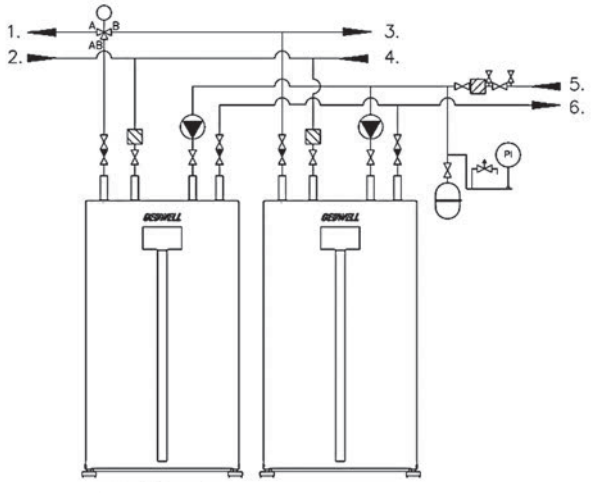
If the consumption of domestic water is high, the heat pump can be supplemented with an electrically heated additional accumulator. The heat pump heats the cold water in the internal accumulator, after which the water is led to the external buffer accumulator. The electric resistance of the external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



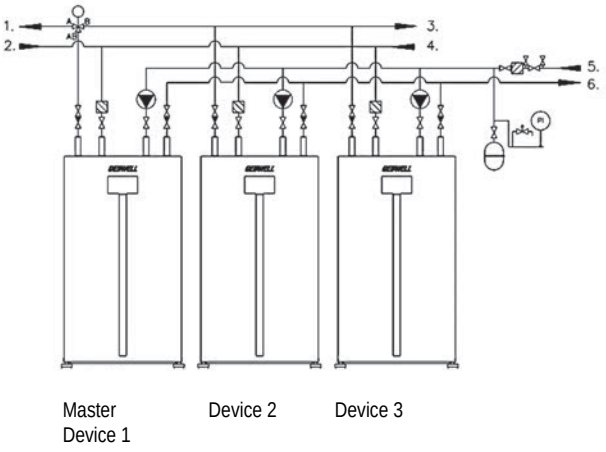
7.7 Cascade connections

A cascade connection refers to the connection of several heat pumps to the heating system. The heat pumps are electronically connected to each other with a bus cable. The device's *master device 1* is defined as the managing device of the cascade, which controls switching the other devices on and off according to the need of heat. The plant's master device operates as the producer of domestic hot water. Up to 16 devices can be connected to one cascade system.

Cascade with two heat pumps, Master device 1 operates at the producer of domestic hot water:



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



1. Charge supply to domestic hot water accumulator
2. Charge return from the domestic hot water accumulator
3. Heating supply
4. Heating return
5. Brine from ground to heat pump
6. Brine to ground from heat pump

** NOTE! The external source pump visible in the cascade connections is inside the heat pump in T²06 – T²16 devices.

8 ACCESSORIES

8.1 General

Accessories are installation accessories and electrical equipment installed at the factory to facilitate installation. The products' electrical pre-programming has been carried out for the heat pump already at the factory. The devices' site-specific definition must be carried out in accordance with the installation instructions.

8.2 Room sensor QAA55.

The room sensor is an accessory available for the control of heating. The use mode of heating can be selected from the room sensor, as well as make any changes to the heating set points.

8.3 Wireless room unit QAA78

The room unit is an accessory available for the control of the heat pump. The room unit can be used to make all settings to the heat pump and changes to the set points. The wireless room unit operates at RF radio frequency 868MHz. The distance between the heat pump and the wireless room unit may not exceed 30m or 2 floors. There must not be PCs, televisions, microwave ovens, etc., near the wireless room unit.

8.4 Wired room unit QAA74

The QAA74 room unit is an accessory available for the control of the heat pump. All the heat pump settings and changes to the set points can be done from the room unit. The room unit also operates as a room sensor, which makes room temperature compensation possible

8.5 Change-over valve

A change-over valve is used to control the charging of domestic hot water and heating. 0, 1 or 2 change-over valves are installed to the charging circuit, according to the site plans. Refer to section *Pipe installation / Charging circuit* or the HV diagram delivered with the device for the amount of required change-over valves. In a cascade system the change-over valve's control is connected to the master device.

Valve's flow direction, devices T²06 – T²20:

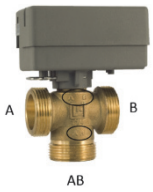
Valve & actuator: LK Armatur.

The change-over valve's frame has the markings A, B and AB. A.

A= Domestic hot water accumulator

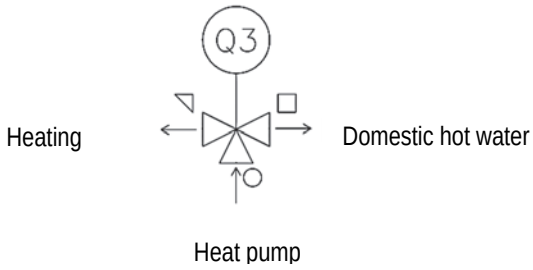
B= Heating

AB= Flow to/from heat pump



Valve's flow direction, devices T²26 – T²32:

Valve ESBE VRG, actuator ESBE ARA635



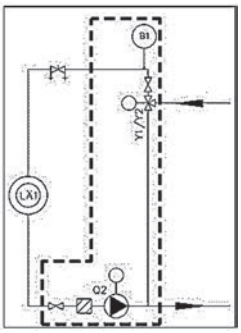
8.6 Heating control group / pump circuit

The heating control group is a pre-equipped package, which can accurately adjust the property's heating supply water temperature to the right temperature. There are different sized heating control groups available depending on the plant's heating efficacy. When measuring for the heating group, the property's heating method (radiator, underfloor, air heating, etc.), need of heating efficacy, network's pressure loss and flow must be taken into consideration. A total of 3pcs of heating control groups can be installed per heat pump. The circuits may be pump or mixing circuits.

The HV connection instructions of the heating control group can be found in the installation instructions delivered with the product.

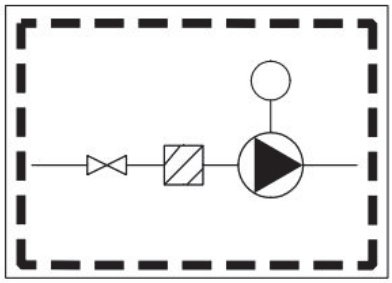
The heating control group includes the following components:

- Heating circulation pump
- 3-way mixing valve
- Actuator
- Dirt separator (filter)
- Shut-off valves
- Flow sensor



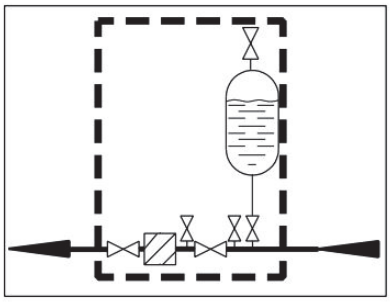
The pump heating circuit includes the following components:

- Heating circulation pump
- Pump connectors
- Dirt separator (filter) / shut-off valve



8.7 Collector valve group

The collector valve group is a pre-equipped package, which enables filling and venting the collector circuit easily. The collector valve groups are available in different sizes according to the efficacy of the pump. The valve group should be selected pump-specifically according to the amount of collectors and in order to ensure the system's comprehensive functioning. There are 1- and 2-circuit valve groups, pressurised and with an expansion vessel.



8.8 Hot water package

With the hot water package, the property's domestic hot water can be adjusted to a suitable temperature. Hot water packages are available in several sizes and in two models, with a heat exchanger or a 3-way mixing valve. The hot water package size is selected according the property's need of domestic hot water efficacy. If the domestic hot water is produced in the property's accumulator via a copper coil, a hot water package with a 3-way mixing valve must be installed to the device. If the transfer is done with a heat exchanger, the domestic hot water temperature is adjusted with the pump's rotation speed controller on the front side of the exchanger, in this case a 3-way mixing valve is not used. The hot water package requires an extension module AVS75, which is available as an accessory...

NOTE! The domestic hot water circulation must always be on, when using domestic hot water control groups. If the property does not have domestic hot water circulation, a flow switch must be installed for the domestic water in order to ensure functionality.

HW package:

- 3-way mixing circuit
- Actuator
- Domestic hot water consumption sensor

HWC package with heat exchanger:

- Plate heat exchanger
- Rotation speed controlled charging pump
- Domestic hot water consumption sensor

8.9 Electrical heater of supply water

The electrical heater of supply water is an accessory that is installed inside the heat pump. The electrical heater is delivered from the factory pre-installed. The electrical heater requires its own power supply from the distribution board. The electrical heater may be used as a substituting interference drag of the compressor, or in addition to the compressor as a partial heating system. If the electrical heater is used in addition to a compressor, it must be ensured that the property's power supply and fuses are appropriate. Refer to *Technical specifications* at the back of the user manual for the required fuse sizes. On delivery, the electrical heater has a power of 9Kw and its control is 3-phased. If the power of the electrical heater is wished to be changed, refer to the instructions in section *ELECTRICAL CONNECTIONS / Electrical heater of supply water*, and to program the resistor section *SITE-SPECIFIC DEFINITION / Electrical resistor control, K25/K26 procedure.*

8.10 Contactor centre

The contactor centre has been designed for the control of electrical resistors in the accumulator. The contactor centres are available for 2, 4 or 6 resistors. You can use the contactor centre to control the accumulator's electrical resistors in a controlled manner according to the controller's measurements, or manually switch the electrical resistors on, when needed. The resistors' power supply is provided from the property's distribution board and is controlled from the heat pump's controller. The control message is 230VAC. The contactor centre must be equipped with a label "WARNING! EXTERNAL CONTROL VOLTAGE". Refer to section *Appendix Electrical diagram* for connections and section *Site-specific definition / Programming of electrical resistors* for programming the resistors.

8.11 SmartWEB remote control

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.

8.12 Cooling control

Cooling control is an accessory available for the heat pump's controller. If you would like to control the property's cooling with the heat pump's automation, the device must be equipped with the AVS75 extension module. The cooling control enables the control of the

control valve according to the outdoor temperature and the cooling curve.

Refer to the manual's section *Site-specific definition / Cooling* for the placement of cooling.

8.13 Cooling control group

The cooling control group includes the cooling control function for the controller, control valve, actuator, circulation pump and the flow sensor. The cooling control group requires site-specific definition, refer to section *Site-specific definition / Cooling.*

8.14 Control of additional heat source

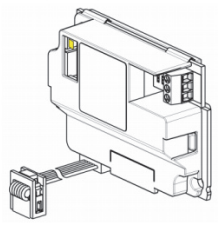
Control of additional heat source is an accessory available for the heat pump's controller. If you would like to utilise an old or nearly new heat source with the heat pump's automation, the device must be equipped with the AVS75 extension module. The additional source control enables the controlled control of temperature according to the heating curve, which is based on the supply water measurement. Refer to *Site-specific definition / Control of additional heat source* for the placement of an additional source.

8.15 Control of fixed fuel boiler

Boiler control is an accessory available for the heat pump's controller. The controller must be equipped with the AVS75 extension module. Boiler control enables you the controlled temperature adjustment of an uncontrolled heat source in the form of the controller. The boiler control enables the heat produced in a fireplace of wood boiler to be directed according to the current need for heat. Refer to *Site-specific definition / Control of fixed fuel boiler* for the placement of boiler control.

8.16 Modbus 350 communication module

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



8.17 Energy measurement

Energy measurement is an accessory available for the heat pump. The energy measurement package must be ordered in connection with the device order. Meters cannot be installed to the device later on. The energy measurement packages have been measured device-specifically. The packages include an electricity meter and a flow meter. The controller forms the produced energy measurement according to the temperature difference and flow.

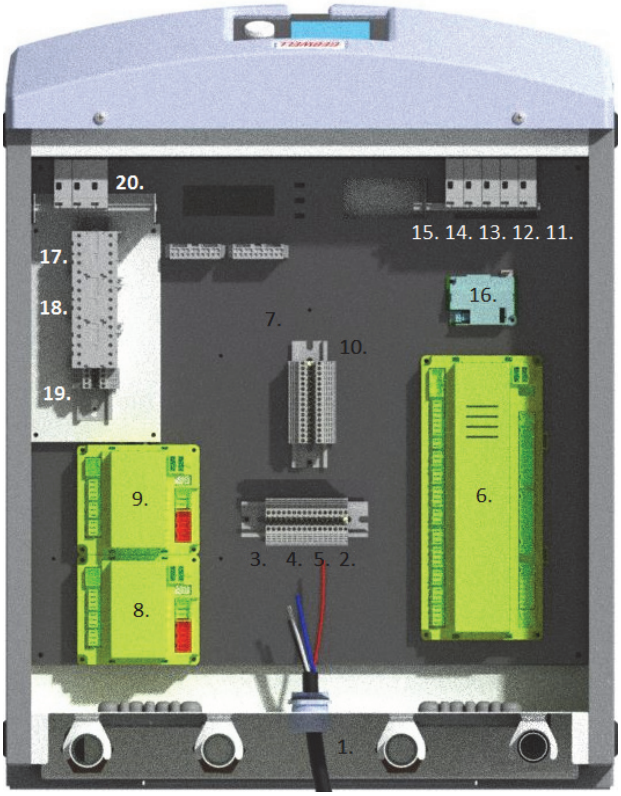
9 ELECTRICAL CONNECTIONS

9.1 General

Electrical installations and possible services may only be carried out under the supervision of an authorised electrician. The heat pump's power supply is brought through the opening at the back of the device. The device is connected to a power grid of 400V (50Hz).

The heat pump's power supply may not be switched on before the heat pump's heating network has been filled with water. This may cause the electrical heater, overheat protector, pumps or compressor to get damaged.

- The heat pump must be disconnected before insulation measurement.
- The 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.
- The heat pump's internal circulation pumps, automation and their cabling are protected with automatic fuses.

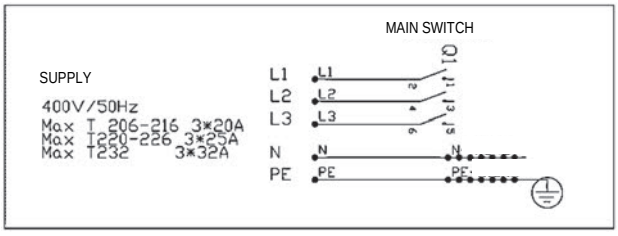


1. Power supply's cable opening
2. Supply connectors (L1, L2, L3)
3. N rail
4. PE rail (grounding)
5. Switch valve's connection couplings Q3/L10
6. Controller
7. 24V transformer (accessory)
8. AVS extension module 1 (accessory)
9. AVS extension module 2 (accessory)
10. Alarm forwarding relay K10
11. Main switch, Q1
12. Source pump's switch, F3**
13. Charging pump's switch, F4**
14. Control switch, F10
15. Source pump's manual switch, S8
16. MODBUS350 communication card (accessory)
17. Supply water's electrical heater's K25 control contactor (accessory)
18. Supply water's electrical heater's K26 control contactor (accessory)
19. Supply water's electrical heater's supply connectors (L1, L2, L3, N, PE) (accessory)

**Devices T²06 – T²16kW, collector and charging pump's use from the same switch, F3.

9.2 Power supply

The power supply is connected to connectors (2) L1, L2, L3 through the cable opening (1).



9.3 Overheat protector of the flow-through resistor

The overheat protector of the resistor cuts off the resistor's power supply, if the temperature rises to 90°C.

Reset: The overheat protector's reset button is under the protection cap at the end of the resistor. Reset the overheat protector by pressing the button.

9.4 Compressor's motor protection switch (F1)

The compressor's motor protection cuts off the power supply to the compressor, and acts as the operating switch for the compressor.

Reset: Reset the compressor's motor protection (F1) by holding down the green button (ON position)

9.5 Phase sequence / soft starter

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 with the text *Soft starter E25 failure.* The compressor's motor protection must be in ON position, so that the phase notice can be reviewed. If the motor protection switch is in the OFF position, the controller will always give a notice: *Soft starter E25 failure*. The soft starter notifies all interferences with a red LED light on the front panel of the soft starter. The amount of LED light flashes indicates the failure. See soft starter failures in section *Failures / soft starter failures*

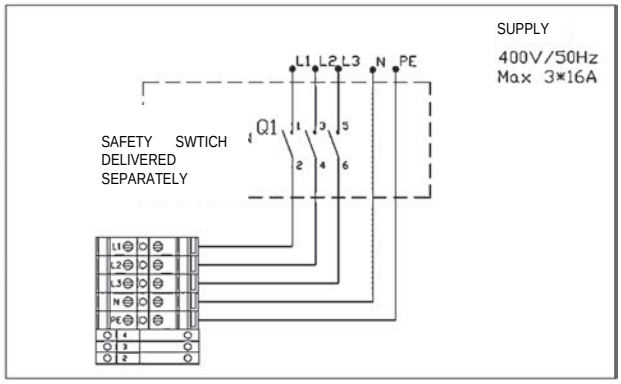
9.6 Outdoor sensor

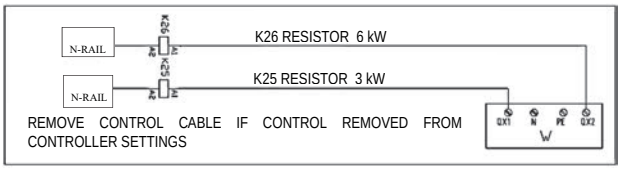
The outdoor temperature sensor is already wired to the control centre. The sensor is equipped with a 15m cable.

Position the sensor in a shaded location on the north or north-east wall. Do not place the sensor near windows or doors.

9.7 Supply water's electrical heater

The electrical heater installed inside the heat pump requires its own power supply from the distribution board. Select the supply fuses according to the selected power resistance. The electrical heater must bi be connected to the same power supply as the heat pump. The electrical heater has been programmed at the factory for 9kW 3-phased control. When changing the electrical heater's power, the controller's control cable must be removed and a programmed change must be made to the heat pump's controller. Refer to section *Site-specific definition / Resistor control, K25/K26 procedure.*





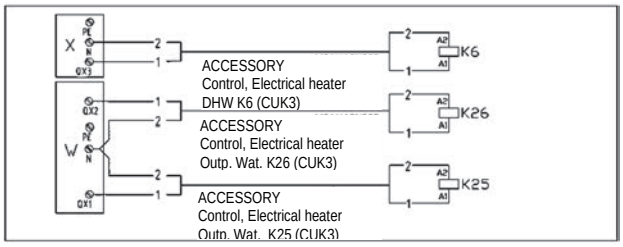
9.8 Accumulator's resistor control

The resistors in the accumulator can be controlled with the heat. There are several different control methods for the resistors. The resistors must be programmed site-specifically in accordance with different pump diagrams. Refer to section *Site-specific definition /Resistor programming.*

The thermostat/overheat protector combination supplied with the resistor must be connected to each resistor. The

thermostats must be set higher that the heat pump's highest set point.

The direct connection of resistors to the distribution board may cause additional consumption of electricity. We recommend that a separate contactor centre is always installed for the control of resistors.



Resistors' control relays:

QX1	Supply water's electrical heater K25
Connector W	Control 230VAC
QX2	Supply water's electrical heater K26
Connector W	Control 230VAC
QX3	Domestic hot water's electrical heater K6
Connector X	Control 230VAC

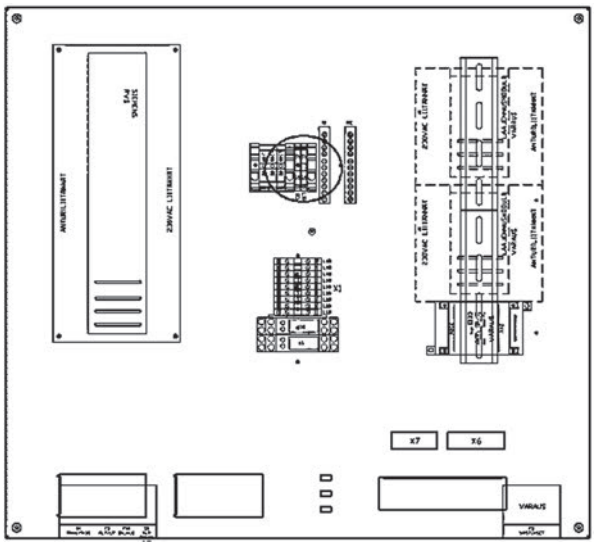
9.9 Change-over valve(s)

Change-over valves are connected to the heat pump control centre's row connectors Q3, N and L10. **In a cascade system, the connection is ALWAYS made to the master device.**

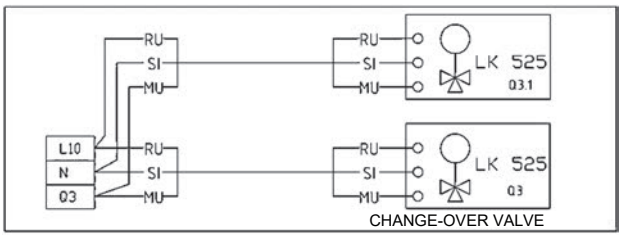
Q3 = black (control 230VAC)

N = blue

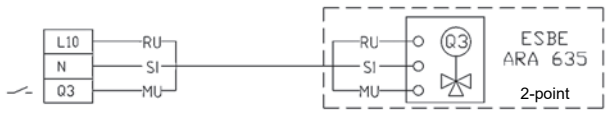
L10 = brown (continuous 230VAC)



LK Armatur actuator connection (devices T206–T220):



ESBE actuator connection (Devices T226 and T232):



9.10 Heating circuits

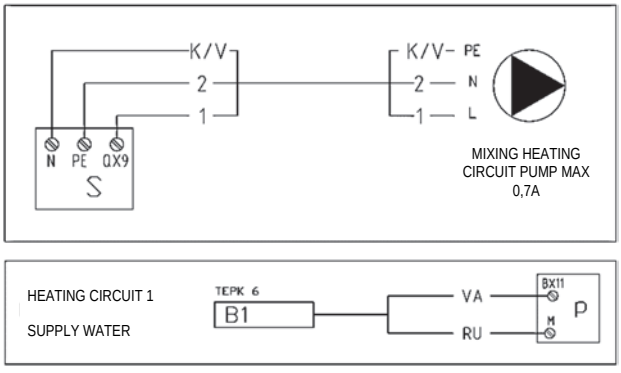
Three heating circuits can be controlled with the heat pump. The circuits can be pump or mixing circuits. Note that when connecting the heating group's pump, the control's maximum current is 1,5A. If the pump's current is greater than the maximum current permitted for the controller, the pump must have a separate pump control centre.

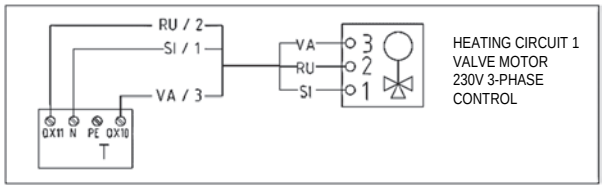
Mixing heating circuit

The heat pump's controller can be used to control one heating control group and one pump heating circuit. The heating's first control group is always connected to the heat pump's controller. If there are more than one control groups, the heat pump must be equipped with an extension module (AVS75...). Refer to section *Appendix 4: Electrical diagrams*

Mixing heating circuit:

BX11	Flow sensor
Connector p	ntc10k
QX10	3-way valve open
QX11	3-way valve closed
Connector T	Control 230VAC, 3-point
QX9	Mixing heating circuit's pump
Connector S	Control 230VAC, max 1,5A

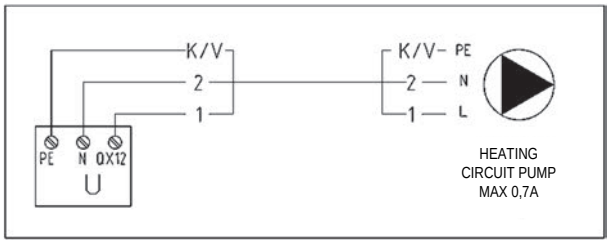




Pump heating circuit

The pump heating circuit's circulation pump is connected to the heat pump's controller. Refer to section *Appendix 4: Electrical diagrams*

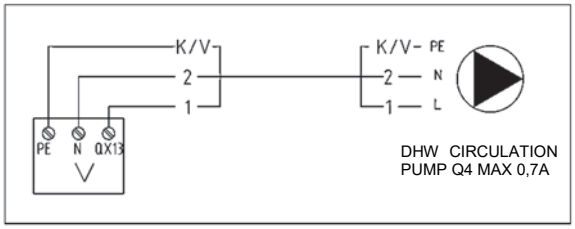
QX12	Pump heating circuit's pump
Connector U	Control 230VAC, max 0,7A



9.11 Domestic hot water's circulation pump

The domestic hot water's circulation pump can be connected to the heat pump's controller.

QX13	Domestic hot water's circulation pump
Connector V	Control 230VAC, max 0,7A



9.12 Hot water package with mixing valve

The hot water package with a mixing valve is an installation set intended for the control of domestic hot water temperature. The installation set is connected at the factory to a pre-equipped AVS75.390 extension module. In order to function, the hot water package requires a hot water circulation or domestic water flow switch. If implementation is carried out with a circulation pump, the flow switch must be replaced with a "jump loop". Refer to section *Appendix 4: Electrical diagrams*

QX21	Mixing valve open
QX22	Mixing valve closed
Connector T	Control 230VAC, 3-point
BX21	Domestic water consumption sensor B38
Connector n	ntc10k
H2 /M	Flow switch or "jump loop"
Connector n	

9.13 Hot water package with heat exchanger

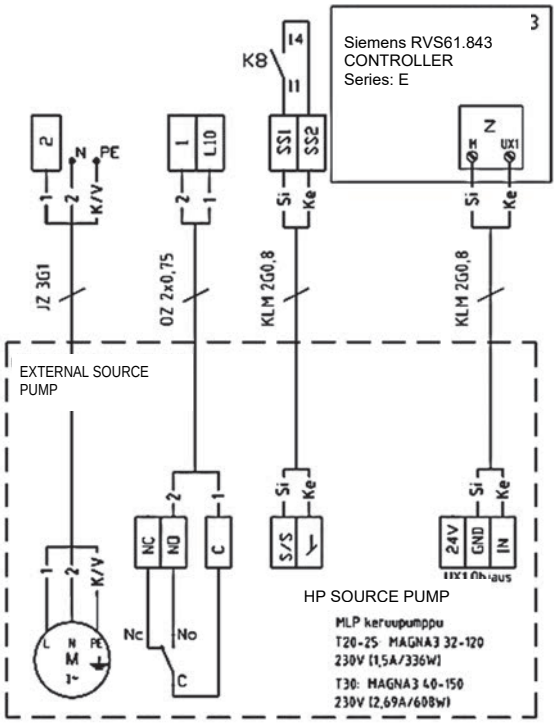
The hot water package with a heat exchanger is an installation set intended for the control of domestic hot water temperature. The installation set is connected at the factory to a pre-equipped AVS75.390 extension module. In order to function, the hot water package requires a hot water circulation or domestic water flow switch. If implementation is carried out with a circulation pump, the flow switch must be replaced with a "jump loop". Refer to section *Appendix 4: Electrical diagrams.*

QX23	Domestic water charging pump Q34
Connector S	Power supply 230VAC, max 0,7A
UX21 control	Domestic water charging pump's Q34
Connector e	0-10V / PWM
BX21	Domestic water consumption sensor B38
Connector e	ntc10k
H21 /M	Flow switch or "jump loop"
Connector n	ntc10k

9.14 Connection of external source pump

Devices: T²20, T²26 and T²32

Connect the external source pump's power supply, alarm, s/s and control according to the connection diagram, between the heat pump and the source pump. The supply and alarm cables are delivered separately with the circuit pump, the 0-10V control and the start/stop is pre-connected to the heat pump's control centre. **The source pump must be programmed in connection with commissioning.** Refer to section *commissioning* for



instructions, or the quick guide delivered with the source pump.

9.15 Room sensor (accessory) QAA55.

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

CL+ / CL- Room sensor

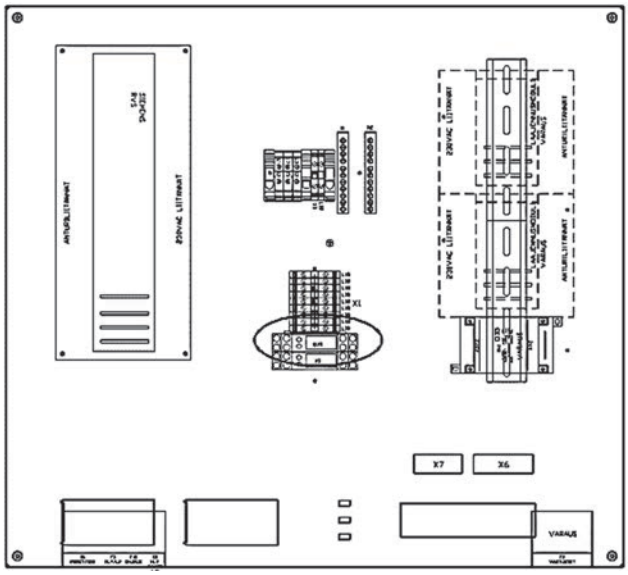
Connector b QAA55

9.16 Room unit (accessory) QAA75.

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

9.17 Alarm forwarding

The possible 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^2 at the minimum.



9.18 External control of the source pump

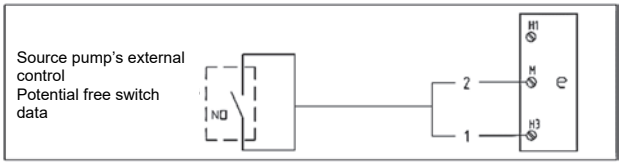
The source pump can be activated by an external potential free switch data. The function can be used when cooling with the collector.

Turning the switch off will activate the source pump.

For connection refer to section *Appendix 4: Electrical diagrams.*

H3 / M Consumer's call VK1

Connector e NO, closing switch



9.19 Home/Away switch

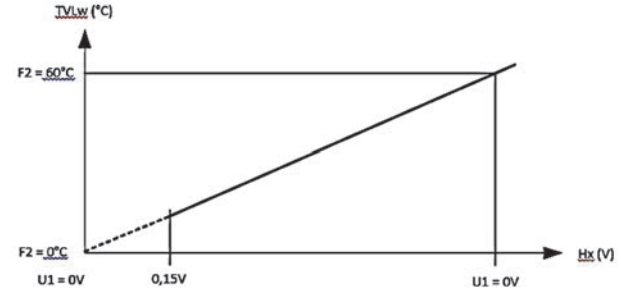
External home / away switch can be connected to enable heat pump's drop / raise functions. By turning off the switch, domestic hot water operating mode changes to economy and the heating circuits will change to a reduced level. By turning the switch on, domestic hot water heating is activated and the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

The switch must be a potential-free closing switch and it is connected to the controller's connector e H1/M

For connection refer to appendix 4 *Electrical diagrams*.

9.20 Call for heating 0-10V

The heat pump can be controlled with an external call for heating control. The 0-10V control message is used to give the heat pump a set point, which is created to the heating accumulator with the heat pump.



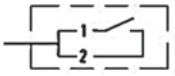
The function must be activated in the heat pump's *Expert* menu. Refer to section *Site-specific definition / Call for heating*

H1 / M Consumer's call VK2 10V

Connector e Control message 0 – 10V

9.21 External prevention of activation

The heat pump can be given a prevention message for activation with an external potential free switch. In this case, the compressor and electrical heaters are locked. The heat pump will return to normal functioning once the message has been removed. The function can be used, for example, if there is a lot of simultaneous electrical load at the property. With this function, the activation of the heat pump can be prevented. For connection refer to section *Appendix electrical diagram*

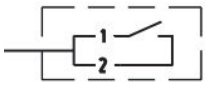


COMPRESSOR'S EXTERNAL ACTIVATION PREVENTION
E6

9.22 Tariff control

The electric utility's low tariff message can be received via the EX3 input. The external control must be a potential

free closing switch. The control activates the forced charging of the heating accumulator. For connection refer to section *Appendix 4: electrical diagrams*

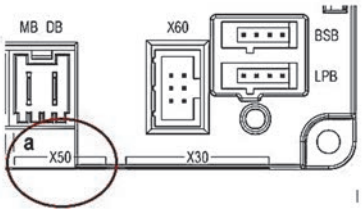


TARIFF CONTROL E5

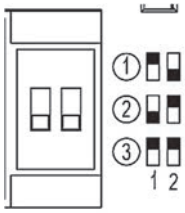
9.23 Installation of extension module

The extension module must be attached to the DIN rail to the locations reserved in the control centre. The power supply is connected to the control centre's row connectors L10, N, PE. The module is connected to the controller's X50 connector with a flat cable. If several modules are being installed to the heat pump, the addresses must be set at the dip switches.

*X50 connector



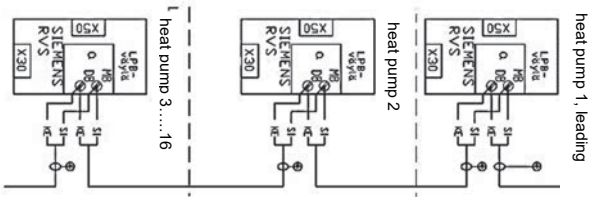
*Dip switches



9.24 Connection of a cascade connection

Several heat pumps (Gebwell T- and Taurus-series) can be connected to one cascade system. The system's main device is defined as the master device. There can be 15 slave devices. Device addresses must be specified for the devices in the LPB system menu.

Connect the data cables in accordance with the image between the devices. The cable is delivered with the device (5m/device).



10 FILLING AND VENTING

10.1 Heating system

The heating system is filled with water up to the required pressure, and vented.

- Vent the system carefully. Air in the heating system may trigger alarms in the system.
- 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 system must be equipped with an expansion vessel and a safety valve in accordance with the HV plan.

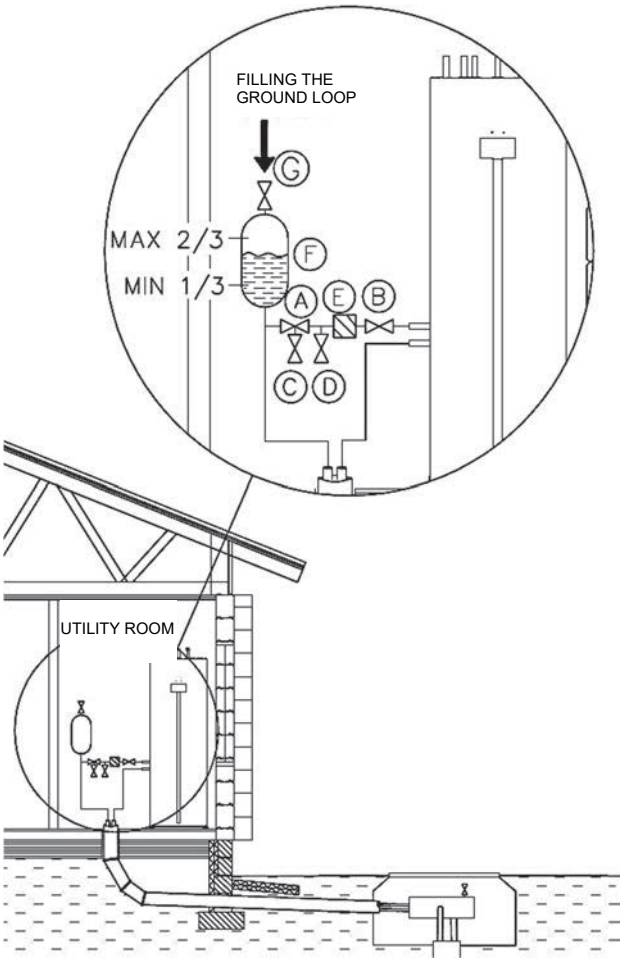
10.2 Filling the collector, non-pressurised

Fill the collector with a mixture of water and brine that can withstand a temperature of at least -15ºC. 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 at 2/3.



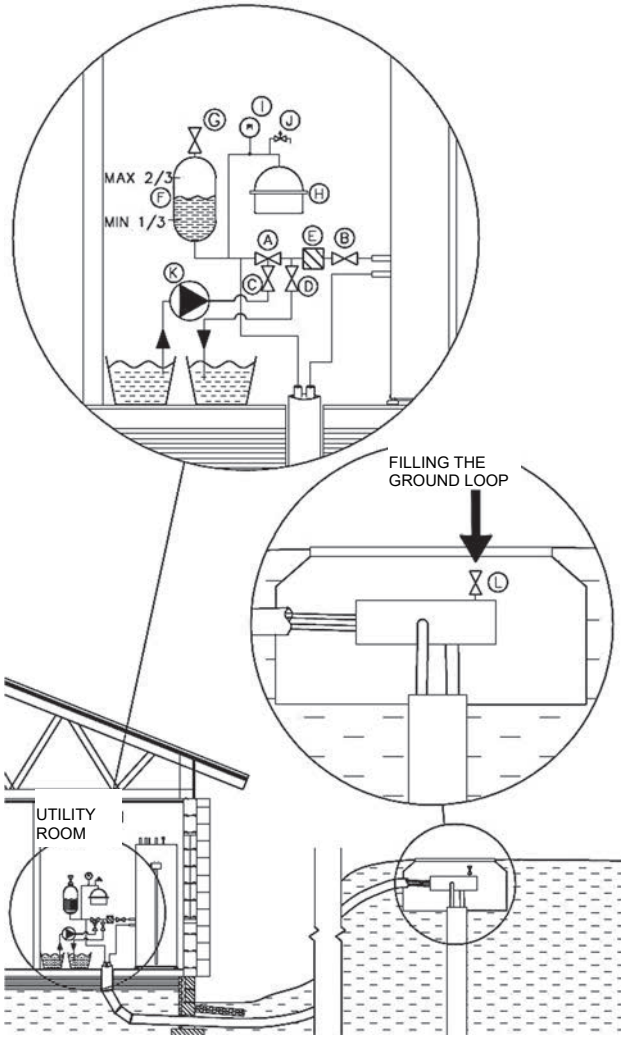
10.3 Filling the collector, pressurised

Fill the collector with a mixture of water and brine that can withstand a temperature of at least -15ºC. 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 circuit at a steady rate through the distribution well's vent valve **L**.

Pressurise the collector by operating the external pressure increase pump. Connect the pump to valves **C** and **D** as shown in the picture provided here. Use a strong hose or pipe with a minimum diameter of 30 mm.

Use two large containers when increasing the pressure. When increasing the pressure of the collector, close valve **A**. Ensure that debris from the bottom of the vessel does not rise into the intake pipe. Monitor the circuit's pressure gauge **I**. The pressure must not rise above 2 bar.

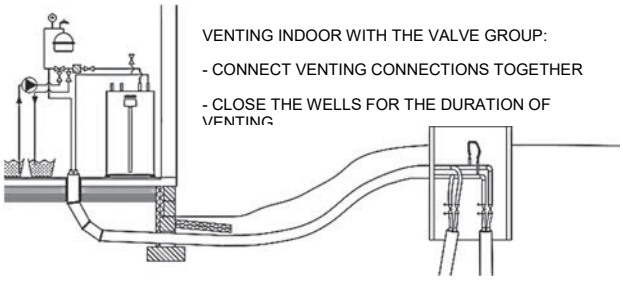


10.4 Pressure test of the collector

Perform a pressure test on the filled collector as follows: Increase the pressure to 2bar and check the pressure in 30 minutes. The system has a leak if the pressure has dropped during this time. Repair any leaks and repeat the pressure test. Enter the pressure test as completed in the *Commissioning and warranty protocol* after a successful test. Remember to release the high pressure after the test.

10.5 Venting of the collector's horizontal piping

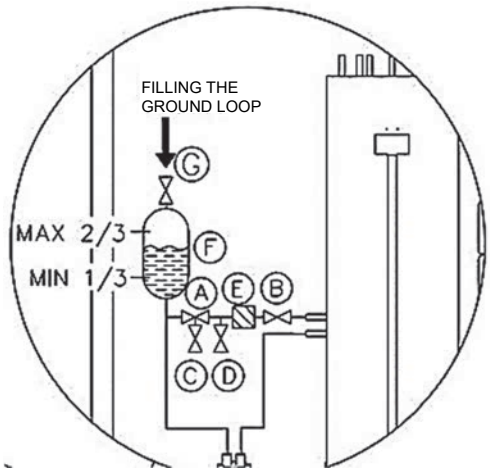
When venting the collector, the horizontal piping must be vented separately by closing the wells out of the venting loop. This prevents air from being circulated via the wells, and thus the air bubble resulting from pumping does not end up in the well. When you have vented the horizontal piping by circulating liquid in both directions, and the liquid is completely clear (not foamy), you can open the wells for the activation of the ground heat source pump.



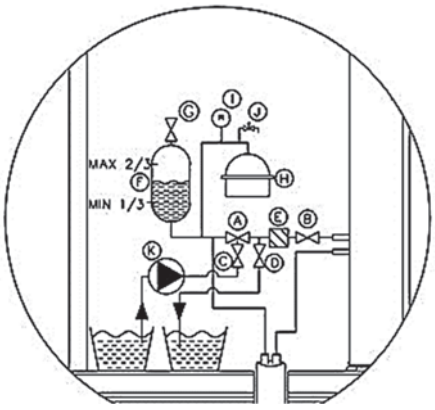
10.6 Cleaning the collector filter

Check filter E by first closing valves A and B, and opening the filter's cover. After cleaning the filter, open valve A first, in which case air exits the filter's nest to the expansion vessel F. Open valve B.

Non-pressurised collector



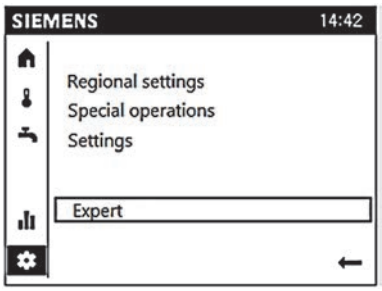
Pressurised collector



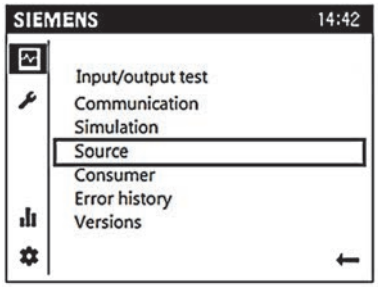
11 ACTIVATING THE HEAT PUMP

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

When commissioning, the controller's settings must be accessed at *Expert* level.



Commissioner's menu:



11.1 Before activation

Before activating the heat pump, ensure that

- the collector has been filled with heat transfer liquid
- the collector has been vented carefully
- the collector's filter has been cleaned after venting
- all the collector's valves have been opened
- the external source pump has been commissioned. NOTE! devices T²20, T²26 and T²32
- the heating system has been filled with water
- the heating system has been vented
- the heating system's water temperature should be <20°C
- the domestic hot water system must be filled
- 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.
- Ensure that the source and charging pumps' line protection switch F3 and F4 are in OFF position.

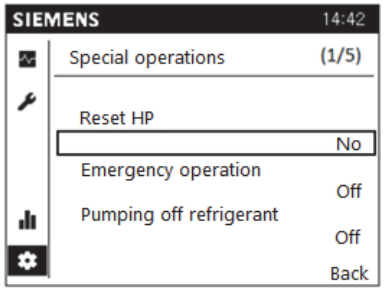
11.2 Activation

1. Set the heat pump's main switch to (Q1) position I.
2. Set the line protection F10 to position I.
   - The controller updates the information

3. Turn the domestic hot water off from the user terminal.
   - Operating mode: Stop
4. Set *Simulation* on from the user terminal, +30°C. With this function, the call for heating is switched off and the symbol appears on the display.
5. Start the venting of the collector and heating network with the device's own circulation pumps. (Refer to section *VENTING: Venting of collector and Venting of charging circuit)*

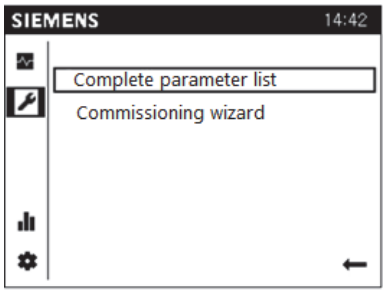
   NOTE! Devices T²20, T²26 and T²32 must be commissioned with an external source pump prior to venting and activating the compressor. Refer to *Commissioning of external source pump* for instructions.

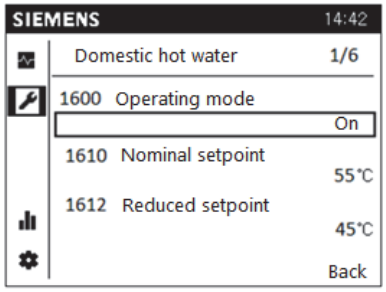
6. In connection with venting the heating network, check on page 2/27 of the user terminal's *Source* menu that the heat pump's return water temperature and the input water temperature correspond to the heating system's water temperature. This indicates that the charging circuit's liquid is flowing.
7. In connection with venting the collector, check on page 17/27 and 18/27 of the user terminal's *Source* menu that the *source's input temperature* (row 8427) and the *source's output temperature* (8429) correspond to the ground temperatures. This indicates that the collector's liquid is flowing.
8. Set the compressor's motor protection F1 to ON position
9. Reset the heat pump from the *Special operations* menu



10. Set the *Simulation* heating mode from the user terminal to a temperature of -20°C.
    - If a change-over valve(s) have been installed to the device, it should turn to position B (flow to heating network)
    - Source and charging pumps activate 1 minute before the compressor.
11. When the compressor has activated, monitor the temperatures of the ground and charging circuits in the *Source* menu. The controller automatically sets the condenser's temperature difference to 6 degrees and the evaporator to 4 degrees.
    - Heat pump's return water temp. (2/27)
    - Heat pump's supply water temp. (2/27)
    - Condenser's temp. difference (16/27)
    - Source's input temperature (17/27)
    - Source's output temperature (18/27)
    - Evaporator's temp. difference (16/27)

    Let the heat pump run for about 10-15 mins.
12. Set the domestic hot water on via the *Domestic Hot Water* menu in the *Parameter List*. Loading the parameter list may take a few minutes.
    - Change-over valve(s) turn to position A
    - Let the temperature of the domestic hot water rise to the set point.

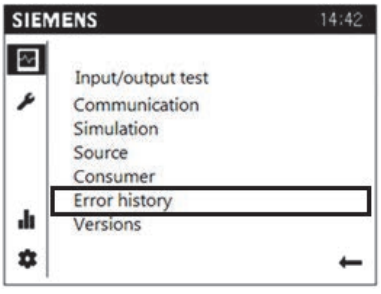




NOTE! The compressor may not be reactivated more often than 1 activation / 10 mins.

In connection with activating, there is often a "Soft starter failure E25" failure message. When the motor protection is in ON position, this usually indicates an error in the phase sequence. By turning the input's phase sequence, the heat pump activates normally.

The heat pump does not register all alarms as alarms after the first notice, but instead as status data. If the compressor does not activate and a -symbol appears on the display, check the current limitation's cause in Error history. Troubleshooting information can be found in the user manual in section TROUBLESHOOTING/ALARMS.



11.3 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

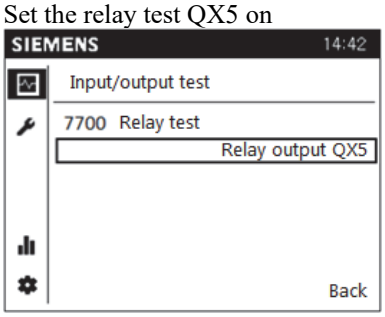
1. Set the circuit breaker (F3) of the source and heat supply pumps (P1 and P2) to the **I** position
2. Set the source pump's manual switch S8 to position I. → The source pump activates to the minimum rotation speed.
3. If you hear noise, such as gurgling/bubbling, which indicates the presence of air in the circuit, shut down the source pump from the S8 switch.
4. Let the air rise to the highest point of the collector and open the vent valve. Ensure that the system's expansion vessel has a sufficient amount of liquid.
5. When the venting is complete, continue rotating the source pump (P1) and repeat until all air has been removed from the system.
6. You can leave the source pump on while venting the charging pump.

NOTE! Pumping at excessively high power will disperse the air in the heat collection liquid 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 collector with stronger pumping can be done with the *Input/output test* function:

NOTE! For devices$T^2$06 – $T^2$16 you can skip sections 2 and 7.

1. Select *Input/output test*
2. Set the relay test QX5 on



3. Roll down with the navigation roller to section *Output UX (1/4).*
4. Select *Output test UX1*
5. Set the desired rotation speed of the pump and accept by pressing the navigation roller.
6. Finally, switch off the *Output test UX1," --"*
7. Switch the Relay test off in section *Input/output testing, (No test)*

11.4 Venting the heat supply circuit

1. Set the charging pump's (LP/Q9) line protection switch to position I. *(Devices $T^2$06 – $T^2$16 have a common line protection switch with the source pump)*
2. Select *Output test UX2* in the *Input/output test* menu
3. Set the desired rotation speed for the heat line pump. Let pump rotate for a few minutes.
4. Turn off the pump by setting the *Output test UX2* to 0%.
5. Let the air rise to the highest point of the system and ensure that the vent valves are open.
6. Ensure that the heating system's pressure is at a sufficient level, so that air can exit through the automatic vent valves.
7. When the venting is complete, continue rotating the pump and repeat until the air has been removed from the system.
8. Finally, switch off the *Output test UX1* "—"

Return to the activation of the heat pump in section 8.

11.5 Commissioning of an external source pump. Devices $T^2$20, $T^2$26 and $T^2$32

1. Set the source pump's line protection automation to ON position.
   NOTE! When the pump is switched on, it activates in Auto adapt mode in about 5 seconds.
2. After a few seconds, the commissioning wizard appears on the display. The commissioning wizard guides you through the general settings of the pump, such as language, date and time.
3. When the general settings have been set, set the pump to *Auto Adapt* mode
4. Go to the *Settings* menu.
5. Select *Operating mode* and change the operating mode to *Standard curve.*
6. Select *Set point* and change the set point to *100%.*
7. Press the button and move to section "Assist" → -with the button.
8. The Assist menu guides the user through the pump's settings
9. Move to section "Setting, analog input" by using the ↓ button
10. Move by using the → button and select "External set point's effect"
11. Move with the → button and select "0-10V"
12. Accept with the OK button.
13. The pump's display will show "Assist has been completed"
14. Go the "Settings" menu
15. Move with the ↓ button to section "Set point's effect"
16. Select "External set point's function" and move with the → button.
17. Select "Linear with MIN"
18. Return to the start with the button.
19. The pump is programmed and ready to be used.
20. Test the operation of the source pump from the Input/output test menu

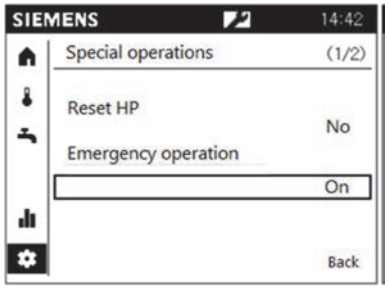
11.6 Use without a collector and use during construction site

The heat pump can be used for heating already before connecting the collector. In this case, all the heat is produced with direct electric energy. All the control functions of heating and domestic hot water are, however, available. Note that the heating and domestic water circuits must be connected and vented, and the electric connections must be fully completed.

If the heat pump is wished to be used for heating at a construction site, the device must be set to *emergency operation* mode, which ensures that the compressor (K1) and source pump (MLP/Q8) are not activated. In this way, the heat pump makes sure that the domestic water and heating is done with an electric resistor.

When the display is in basic mode:

1. Roll the navigation roller to the ⚙ symbol.
2. Select Special operations
3. Select *Emergency operation* and set the function on by pressing the navigation roller and rolling the setting to the ON mode. Accept by pressing the navigation roller.



11.7 Activation of a cascade system

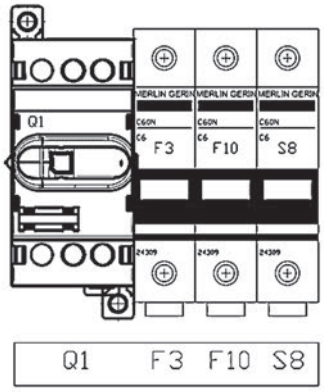
Carry out the activation of cascade devices according to normal activation. The activation of slave devices takes place by setting the master device to *Emergency operation* mode. The domestic hot water button is not significant in the activation of slave devices. If heating circuits have been connected to the slave devices, carry out a site-specific definition. (Refer to *Site-specific definition →Heating circuit)*

12 HEAT PUMP OPERATION

12.1 User interface

All the usual settings are made from the heat pump's user terminal, and the wishes regarding comfort that the heat pump should implement, are determined. The heat pump's optimal utilisation requires that certain basic settings are in force according to instructions. Refer to section *Basic settings*

User interface devices T²06 – T²16



Q1: Main switch

F3: Line protection automation

Source pump (MLP)

Charging pump (LP)

F10: Line protection automation

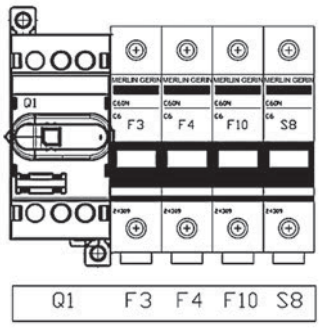
Controller (control)

S8: Source pump's manual use

I = Manual

0 = Automatic

User interface T²20 – T²32



Q1: Main switch

F3: Line protection automation

Source pump (MLP)

F4: Line protection automation

Charging pump (LP)

F10: Line protection automation

Controller (control)

S8: Source pump's manual use

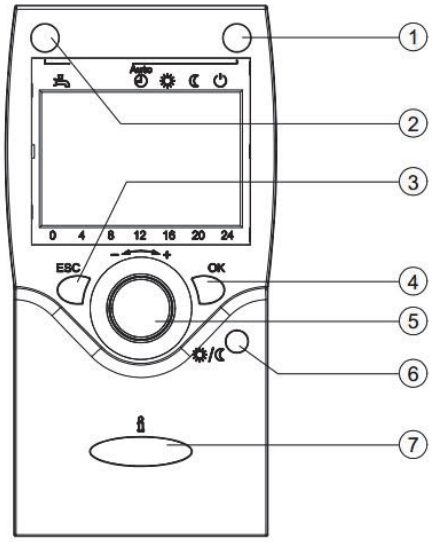
I = Manual

0 = Automatic

12.2 User terminals

GEBWELL UI400 user terminal

Room units QAA78 (accessory)



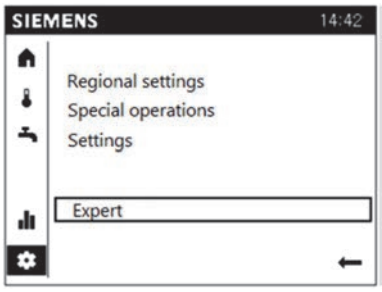
1. Selecting heating mode
2. Selecting domestic hot water mode
3. Exit settings
4. Acceptance of the setting
5. Change room's comfort set point on Navigation settings
6. Presence indication button
7. Information display

12.3 Display symbols

Rights, user and expert levels:	
	Home, property details
	Temperatures, heating/cooling
	Domestic hot water settings
	Info pages: • Notifications (alarms, events) • Property details • Energy monitoring
	Service/settings: • Setting changes • Special operations • *Expert menu
* For experts only, maintenance companies, requires a password:	
	Diagnostics pages
	Settings/maintenance: • Access to all parameters
	Alarm
	Alarm acknowledgment/requires maintenance
	Notification
	Manual
	Usage rights (1-3)
	Heat source in process (e.g. oil/gas burner, heat pump...)

12.4 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.



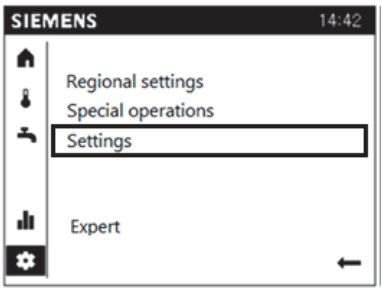
12.5 Heating settings

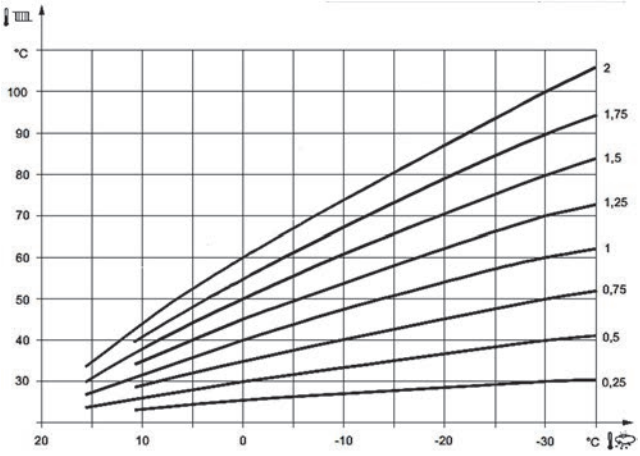
The room temperature is dependent of several factors. During warn seasons, the heat reflected from the sun, and heat given off by people and various devices, often is enough to keep the room temperature at a sufficient level. When the air cools down, a heating system is needed. The colder it is outside, the warmer the water is that circulates in the heating system. For the room temperature to be at the right level, the basic settings must be correct.

Adjusting with a heating curve

The starting point of the heating curve is the heat pump's *damped outdoor temperature* (average temperature of 15h) and the heating system's measured supply water temperature. The slope of the automation's curve can be seen at the intersection point of the two values. This is separately set for each heating area.

The settings are made in the Maintenance/settings menu





NOTE! 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.

Example values for adjusting the slope of the heating curve:

Factory setting: 0,5

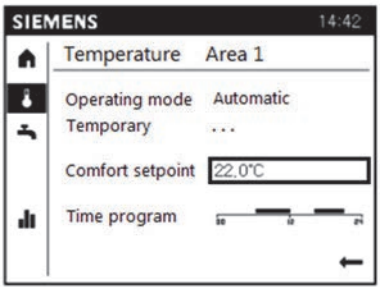
Floor heating: 0,3 – 0,5

Radiator heating: 0,5 – 1,0

Air heating: 0,5 – 1,0

Room temperature change

If you would like to decrease or increase the room temperature either temporarily or permanently, do this by changing the *Comfort set point.*



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:

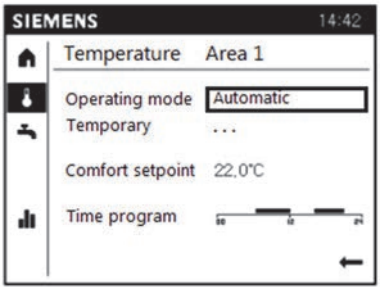
- If the room temperature is too low, turn the roller to *Comfort set point, heating* clockwise 0.5°C, and press the OK button.

- 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.*

12.6 Selecting heating mode

The heat pump can be used with different operating modes. The difference between the operating modes are the temperatures. The operating mode is changed in the *Operating mode* menu



Automatic operation

In automatic operation the room temperature is adjusted according to a time program. Automatic operation's features:

- Heating mode according to time program.
- Temperature set points according to the heating mode type "comfort set point" or "reduced set point".
- Protection operations are always active
- Automatic summer/winter mode switch connection activate.

Continuous comfort or reduced operation

In continuous operation, the temperature is continuously kept at a selected level.

Features of continuous operation:

- Heating mode without time program
- Protection operations active
- Automatic summer/winter mode switch connection is out of use.

Protection operation

In protection operation the heating system is turned off. Its frost protection is, however, active (frost protection temperature), provided that the voltage supply is not cut off.

Features of protection operation:

- Heating areas off
- Temperature according to frost protection temperature
- Protection operations active

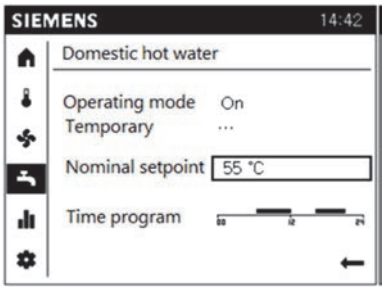
Summer/winter mode switch automation is active.

12.7 Domestic hot water settings

The heat pump produces domestic hot water with the change-over valve. The change-over valve turns the water flow to the domestic hot water accumulator, in which case heat is not charged to the property.

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

The domestic hot water temperature is set in the menu:

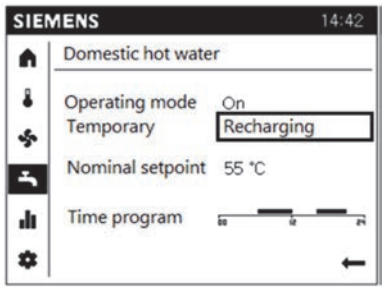


Factory setting: 55°C

The domestic hot water heating can be switched on and off by pressing the *Operation mode Off*

When the domestic hot water's charging operation is active (Operation mode On), the domestic hot water is heated according to the selected set point. When the charging operation is switched off (Operation mode Off), the domestic hot water's charging is not on.

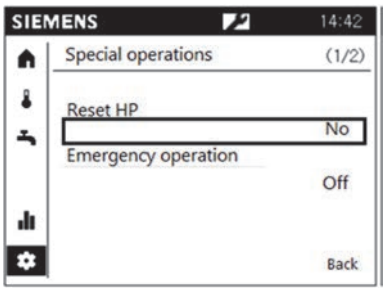
The manual charging of domestic hot water can be activated by setting the *Temporary* setting on the user terminal or room unit to "*Recharge*". This operation activates charging and charges the domestic hot water to the set point.



12.8 Resetting the heat pump

The heat pump's active failure messages from the *Regional settings* menu. The preset activation delay is not taken into consideration, so undesired delays are avoided during commissioning and troubleshooting.

This operation should not be used during normal use. Refer to the maintenance instructions in the troubleshooting table before resetting the device, and record the alarm to the maintenance record.

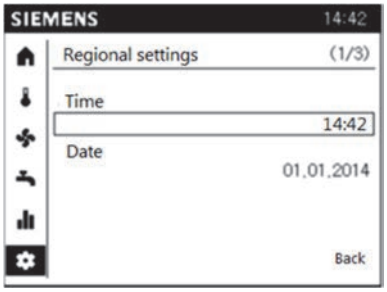


13 SITE-SPECIFIC DEFINITION

13.1 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



13.2 Summer/winter switch connection

The dates set for moving to summer and winter time ensure that on the first Sunday after such date, the time is automatically changed from 02:00 (winter time) to 03:00 (summer time) or from 03:00 (summer time) to 02:00 (winter time).

13.3 Language selection

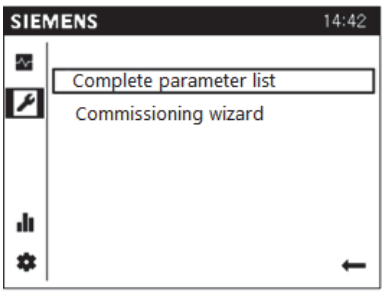
There are several language options for the user terminal. You can change the language in ***Regional settings 3/3*** –menu.

13.4 Time programs

Various time programs 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.

13.5 Heating area (Heating circuit)

The site-specific definition of heating areas is done in *Expert* level. A site-specific definition must be made for each area. The heating areas to be used must be switched on at the user terminal in the *parameter list* menu. When they have been switched on the flow sensor's (B1/B12/B14) connection to the controller activates the heating circuit. Heating circuit 1 has been pre-activated at the factory.



ACTIVATION OF HEATING CIRCUITS

The heating circuit must be activated in the configuration menu. Set the chosen circuit to ON mode and install the flow sensor, which will activate your selection.

Menu: Expert → Parameter list

Configuration → 1/43 → 5710 Heating circuit 1

Configuration → 2/43 → 5715 Heating circuit 2

Configuration → 3/43 → 5721 Heating circuit 3

The heating areas must be marked with stickers in order to facilitate the definition of areas and possible maintenance work.

Site-specific definition is carried on in the menu *Parameter list → Heating circuit 1 / Heating circuit 2 / Heating circuit 3*

DEFINITION OF THE HEATING CURVE

The heating curve's starting point is the controller's *damped outdoor temperature measurement* (15h average temperature) and the heating system's measured supply water temperature. The automation's curve slope is seen at the intersection of these two values. This is defined for each heating area separately.

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.

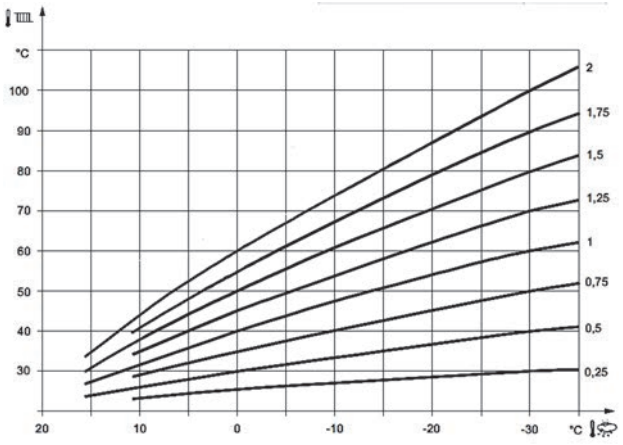
Menu: Expert → Parameter list

Heating circuit 1 → 2/13 → 720

Heating circuit 2 → 2/13 → 1020

Heating circuit 3 → 2/13 → 1320

Factory setting: 0,5



SUMMER / WINTER HEATING 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 the turn the heating on or off. The annual periods can be shortened or lengthened by changing the set values.

- The display shows “Savings”
- In order to take in to account the building’s heat insulation capacity, the damped outdoor temperature is used

Menu: Expert → Parameter list

Heating circuit 1 → 3/13 → 730

Heating circuit 2 → 3/13 → 1030

Heating circuit 3 → 3/13 → 1330

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.

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 circuit 3 → 4/13 → 1340 / 1341

Heating system, supply water minimum temperature:

Adjustment range: 8-45°C

Factory setting: 12°C

Heating system, supply water maximum temperature

Adjustment range: 12-95°C

Factory setting: 45°C

Separate minimum and maximum 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.

13.6 Domestic hot water

The site-specific definition of domestic hot water is done in *Expert* level.

The heat pump charges domestic water according to the fixed temperature limit.

You can affect the domestic hot water operation with the following settings.

DOMESTIC HOT WATER SET POINTS

Domestic hot water is adjusted according to various set points. These set points are activated according to the selected mode of operation, and result in the desired temperature in the domestic hot water accumulator.

Factory settings:

Nominal set point 50°C

Reduced set point 45°C

DOMESTIC HOT WATER RELEASE

The release amount determines when the domestic hot water charging takes place.

Menu: Expert → Parameter list

Domestic hot water → 2/6 → 1620

Factory setting: 24h/day

24h/day

The domestic hot water temperature is adjusted independently of time programs, all the time, according to the domestic hot water temperature’s nominal set point.

Time program 4 / domestic hot water

The controller's time program 4 is complied with in the heating of domestic hot water. In this case, switch connections are made during the set operation times between the nominal set point and the reduced set point.

DOMESTIC HOT WATER'S LEGIONELLA FUNCTION

The controller has an elaborately adjustable legionella function, which prevents the growth of legionella in the accumulator. The function is off as factory setting. Function can be programmed on in the domestic hot water menu. All the legionella definitions are made in *Expert* level.

Menu: Expert → Parameter list

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

Factory setting: OFF

Legionella function set point (1645)

Factory setting: 55°C

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

SWITCHING DIFFERENTIAL OF DOMESTIC HOT WATER CHARGING

Domestic hot water is produced to the accumulator with the heat pump with the change-over valve. When charging the domestic hot water, the size of the accumulator and the power of the heat pump is significant when the compressor is activated. The compressor should run as long period as possible to ensure long service life. With the switching differential of activation, you can affect the running times of the compressor during domestic hot water charging. Note that by increasing the set point, the amount of domestic hot water to be consumed is reduced. This affects the sufficiency of domestic hot water in connection with consumption.

Menu: Expert → Parameter list

Domestic hot water accumulator → 3/11 → 5024

Factory setting: 5°C

If the domestic hot water temperature is lower than the current set point by the switching differential set here, the domestic hot water charging will be activated.

The domestic hot water charging shall end, when the temperature reaches the set point.

Example: The domestic hot water's charging is activated when the domestic hot water's measurement sensor BR is under the nominal set point (1610) 55°C – switching differential (5024) 5°C.

- By increasing the *Switching differential* set point, the compressor runs for a longer time to prepare the domestic hot water.
- By reducing the set point, the compressor runs for a shorter time

13.7 Domestic hot water circulation pump

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

RELEASING THE HOT WATER CIRCULATION PUMP

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

Menu: Expert → Parameter list

Domestic hot water → 5/6 → 1660

Factory setting: DHW release

Domestic hot water release

The circulation pump runs when DHW heating is released.

Time program 4 / DHW

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

13.8 Cooling circuit

Use of the cooling circuit requires the AVS75 extension module sold as an accessory. The heat pump can control three cooling circuits.

The site-specific definition of cooling circuits is done in *Expert*- level. A circuit-specific definition must be made for each circuit. The cooling circuits coming into use must be switched on the *Configuration* -menu of the controller. When the switch is complete, the connection of the flow sensor to the controller will activate the cooling circuit.

When the cooling operation is released, a bar will appear under the symbol on the display. The cooling operation is selected by pressing the cooling operation button. The cooling operation is not active, when the heating operation's bar is not visible.

Features of cooling operation:

- Cooling operation according to time program
- Temperature set point according to "Comf. Set point, cooling" setting
- Protection operations active
- Cooling limit according to outdoor temperature

COMMISSIONING OF COOLING CIRCUITS

The commissioning of the cooling circuits must be carried out at the Expert –level in Configuration –menu. Set the circuit to "4-pipe system cooling" mode and install the flow sensor, which will activate your selection.

Menu: Expert → Parameter list

Configuration → 2/43 → 5711 Cooling circuit 1

Configuration → 3/43 → 5716 Cooling circuit 2

Configuration → 4/43 → 5722 Cooling circuit 3

OPERATING MODE

Menu: Expert → Parameter list

Cooling circuit 1 → 1/11 → 901

Cooling circuit 2 → 1/11 → 1201

Factory setting: Automatic

The operating mode can be determined with the operating mode button on the room unit, or via the control row mentioned above.

OFF:

The cooling function is off.

Automatic:

In automatic mode the room temperature is adjusted according to time program between *Comfort* and *Reduced* set points.

SET POINTS

Set the set points in the *Cooling circuit* menu. When the cooling operation is in use with *Automatic* mode, the control uses the *Comfort* and *Reduced* set points.

Menu: Expert → Parameter list

Cooling circuit 1 → 1/11 → 902

Cooling circuit 1 → 1/11 → 1202

Comfort operation set point

During cooling operation, the room temperature is adjusted in accordance with the comfort operation set point specified here. The comfort set point for cooling can also be changed using the knob on the room unit.

Factory setting: 23°C

Reduced set point

The room temperature is controlled during cooling mode according to the recuced setpoint defined here.

Factory setting: 25°C

COOLING NOMINAL CURVE

The controller utilises outdoor temperature value to define the supply water set point required for cooling curve. The cooling curve is determined by specifying two fixed points (output set point at the temperatures of 25°C and 35°C).

Supply water set point in outdoor temperature +25°C:

Menu: Expert → Parameter list

Cooling circuit 1 → 2/11 → 908

Cooling circuit 2 → 2/11 → 1208

Supply water set point in outdoor temperature +35°C:

Menu: Expert → Parameter list

Cooling circuit 1 → 3/11 → 909

Cooling circuit 2 → 3/11 → 1209

Supply water set point/ET 25 °C

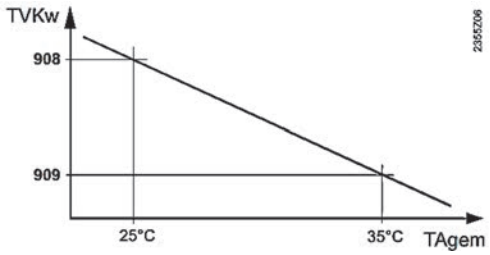
This defines the supply water temperature required for cooling at a mixed outdoor temperature of 25°C without taking summer compensation into account.

Factory setting: 21°C

Supply water set point/ET 35 °C

This defines the supply water temperature required for cooling at a mixed outdoor temperature of 35°C without taking summer compensation into account.

Factory setting: 18°C



TVKw Supply water set point for cooling

TAgem Mixed outdoor temperature

The set cooling curve is based on the room temperature set point of 25°C. If the room temperature set point is changed, the cooling curve is changed automatically according to the new value.

Cooling limit at ET:

If the mixed outdoor temperature is above the cooling limit, the cooling is released. If the mixed outdoor temperature is at least 0.5K below the cooling limit, cooling is prevented.

Factory setting: 20°C

Menu: Expert → Parameter list

Cooling circuit 1 → 3/11 → 912

Cooling circuit 2 → 3/11 → 1212

Heating / cooling lock time:

The lock time between heating and cooling operation. When summer heating operation is engaged, cooling is disabled during the reference value set here.

Factory setting: 24h

Menu: Expert → Parameter list

Cooling circuit 1 → 3/11 → 913

Cooling circuit 2 → 3/11 → 1213

SUPPLY WATER SET POINT LIMITS

A lower limit can be determined for the supply water temperature used for cooling. The limit curve can be defined by setting two fixed points. In addition, a lower limit of 5°C is set for the resulting supply water set point.

Supply water min set point/ET 25 °C

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

Factory setting: 18°C

Menu: Expert → Parameter list

Cooling circuit 1 → 5/11 → 923

Cooling circuit 2 → 5/11 → 1223

Supply water min set point/ET 35 °C

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

If an acceptable outdoor temperature value is not available, the controller will use the setting of parameter "Supply water min set point/ET 35°C".

Factory setting: 18°C

Menu: Expert → Parameter list

Cooling circuit 1 → 5/11 → 924

Cooling circuit 2 → 5/11 → 1224

ROOM SENSOR EFFECT

If a room temperature sensor is used in the system, the controller can be defined a room compensation effect.

Room effect:

The more the room temperature is wished to effect the cooling's supply water temperature, the higher the set point is determined.

Adjustment range: 0 – 100%

Factory setting: 80%

Menu: Expert → Parameter list

Cooling circuit 1 → 6/11 → 928

Cooling circuit 2 → 6/11 → 1228

13.9 Heat pump settings

CHARGING PUMP'S SPEED LIMITS

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

The pump also rotates when the compressor is off, in this case the controller drives the pump at the minimum rotation speed. When setting the pump's rotation speed, the heat pump's model-specific minimum flow must be taken into account. The charging flow must not be lower than the heat pump's minimum flow. This may cause functional failures in the device. Refer to section *Technical specifications* for model-specific minimum flows.

Menu: Expert → Parameter list

Heat pump → 3/23 → 2792 minimum rotation figure

Heat pump → 3/23 → 2793 maximum rotation figure

Pump's minimum rotation figure, 2792:

Permitted adjustment range: 40-70%

Factory setting: 50%

Pump's maximum rotation figure, 2793:

Permitted adjustment range: 70-100%

Factory setting: 100%

NOTE! When reducing the maximum rotation figure, use a flow meter to check the minimum flow at the charging line control valve.

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. This setting does not affect systems, which have heating accumulator measurements.

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

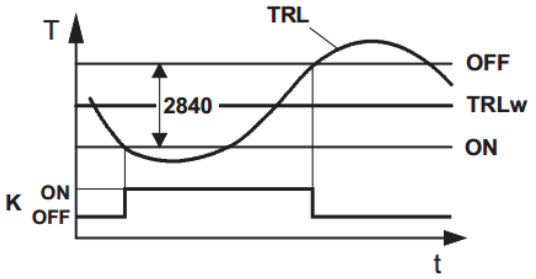
- By increasing the set point, the compressor runs for a longer operating period in heating mode.
- By lowering the set point, the compressor runs for a shorter operating period in heating mode.

Menu: Expert → Parameter list

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

Adjustment range: 1°C - 20°C

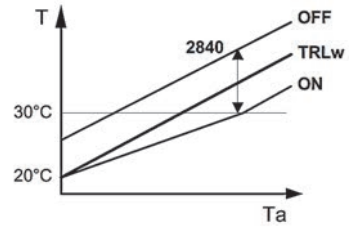
Factory setting: 6°C



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

13.10 Programming the accumulator's resistors and supply water's electrical heaters

The heating system's resistors can be controlled with the heat pump's controller. The resistors' functions have several different operations. When programming, you must know the resistors' intended operation. Should the resistors function only in failure situations, in connection with the use of the compressor for producing domestic hot water and heating, in the legionella function, in connection with charging or in connection with heating. As a factory setting, the resistors have been programmed to function in failure situations, not together with the compressor. If the resistor is programmed to work simultaneously with the compressor (in addition), the property's power sufficiency must be ensured.

The controller has three relay controls for managing the resistors. The relay controls must be programmed to correspond to the connection. If the relay input is not connected to a control, the control row must be programmed to "None".

Supply water's electrical heater K25 (relay input QX1)

Menu: Expert → Parameter list

Configuration → 11/43 → 5890

Supply water's electrical heater K26 (relay input QX2)

Menu: Expert → Parameter list

Configuration → 11/43 → 5891

Domestic hot water's electrical heater K6 (relay input QX3)

Menu: Expert → Parameter list

Configuration → 12/43 → 5892

RESISTOR CONTROL, K25/K26 OPERATION

Resistor control (K25/K26) functions according to the factory setting *Replacement* function. In this case the resistor does not activate simultaneously with the compressor. The operation can be changed in the user terminal's menu. The change is made in *Expert* level.

Use electric supply water

Menu: Expert → Parameter list

Heat pump → 13/23 → 2880

Factory setting: Replacement

Replacement: The electric resistor control is only used in failure situations.

Heat pump full operation: The electric resistor control is used to supplement the compressor in heating use.

DHW full operation: The electric resistor control is used to supplement the compressor is DHW use. In heating use, the resistor functions according to the *Replacement* operation.

Heating and DHW operation.: The electric resistor control is used to supplement the compressor in both heating and DHW use

Legionella function: The electric resistor functions as in the Replacement operation, in addition wo which the control is active in legionella use.

NOTE! In connection with activating the legionella function, it must be considered whether the supply water heater can implement the heating of DHW hydraulically. If the supply water heaters are connected to the heating line, the heating must be done with a K6 resistor.

Electric supply water prevention time

The electric resistor control 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 control is used to supplement the compressor use. If the electrical heating's setting is "Replacement", the prevention time is not taken into account.

Menu: Expert → Parameter list

Heat pump → 13/23 → 2881

Adjustment range: 0 - 255min

Factory setting: 30min

Electric supply water release integral

When a two- or three-phase flow-through resistor is used, the phases are released in accordance with the release and return integral (2882 and 2883).

Menu: Expert → Parameter list

Heat pump → 13/23 → 2882

Adjustment range: 0 - 500°Cmin

Factory setting: 250°Cmin

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.

Menu: Expert → Parameter list

Heat pump → 14/23 → 2883

Adjustment range: 0 - 500°Cmin

Factory setting: 20°Cmin

Electric supply water below ET

This setting is taken into account only when the resistor control is used to supplement the compressor use (2880). At the "Replacement" setting, the electric heater is always released.

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

Menu: Expert → Parameter list

Heat pump → 14/23 → 2884

Adjustment range: (---)** -30 - +30°C

Factory setting: ---

**No release temperature defined

ELECTRIC RESISTOR CONTROL, K6 (DHW) OPERATION

NOTE! ALL ELECTRIC RESISTORS MUST BE EQUIPPED WITH THERMOSTATS!

The electric resistor control K6 functions according to the factory setting *Replacement* function. In this case the resistor does not activate simultaneously with the compressor. The operation can be changed in the user terminal's menu. The change is made in *Expert* level.

Menu: Expert → Parameter list

DHW accumulator → 5/11 → 5060

Factory setting: Replacement

Replacement: The electric resistor control ensures the charging of domestic hot water, if the heat pump fails.

Summer: When all the heating circuits have switched to summer mode, the electric resistor control ensures the charging of domestic hot water from the following day.
In heating use, the resistor functions according to the *Replacement* operation.

Always: Domestic hot water is always charged with the electric resistor.

Cooling operation: When the heat pump is in cooling operation, the domestic hot water is charged with the electric resistor.
In heating use, the resistor functions according to the *Replacement* operation.

Legionella function: If the legionella function is programmed to the heat pump, the operation is carried out with the K6 electric resistor control.

SETTING THE ELECTRIC RESISTORS' THERMOSTATS

The electric resistors installed in the accumulator must always be equipped with thermostats. The resistor's thermostats must be set to such a high set point, so that the heat pump can finish the charging. In the heating accumulator, the thermostat's set point must be set according to the highest heating circuit.

Example, domestic hot water:

Domestic hot water set point defined to the heat pump +55°C. The thermostat must be set to +65°C.

This ensures that the heat pump can charge the domestic hot water to the nominal set point.

Example, radiator heating:

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

Example, floor heating:

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

13.11 Control of additional heat source

Additional heat source refers to a heating device that operates with the heat pump system, which produces additional heat to the heating and/or domestic hot water system. Additional heat sources may be natural gas, oil, electricity, pellets or district heating. The additional heat source may be controlled either with tip data, 230V or 0-10V control. Primarily the property's need for heat is implemented with ground source heat, and if the power / heat remains below the set point, the heat pump switches the additional heat source on. The control of an additional heat source requires an extension module (AVS75.370) available as an accessory, as well as an flow sensor (B10).

Commissioning an additional heat source is done in *Expert* level.

Menu: Expert → Parameter list → Additional source

Increasing set point main source: When the additional heat source is released, the heat pump's set point is increased by the set value.

Adjustment range: 0°C - 10°C

Factory setting: 0°C

Main producer's power limit: Setting is not in use.

In DHW charging: The additional heat source's operation in the production of domestic hot water.

NOTE! Before changing the setting, it must be ensured that charging hydraulically is possible.

Factory setting: Depending on the plant diagram

Outdoor temperature limit DHW charging: If the additional heat source is *locked* to the production of domestic hot water, this parameter can be used to bypass the mode according to the outdoor temperature limit.

Factory setting: Notice

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

Factory setting: ---

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

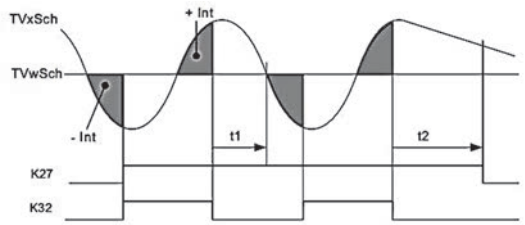
Factory setting: ---

After-run: The setting defines how long K27 control is kept running, when the B10 measurement achieves the set point.

Factory setting: 5min

Connection integral: When relay control K32 is used for the control of temperature, the relay is released and returned according to the set integral value.

Factory setting: 50°Cmin



TVxSch	Common supply water temperature (B10)
TVwSch	Common supply water set point
+Int	Return integral (3720)
-Int	Release integral (3720)
t1 / t2	After-run time
K27	Release of additional source K27
K32	Adjustment K32

Switching difference Off: If the common supply water temperature exceeds the switching difference set here, the additional heat source is turned off immediately, regardless of other factors.

Factory setting: 5°C

Prevention time: When the common supply water temperature is below the set point, the controller calculates a prevention time, after which activates the additional heat source control.

Factory setting: 30min

13.12 Control of fixed fuel boiler

A fixed fuel boiler refers to a heating device that operates in connection with the heat pump system, and the production of heat is not controlled, such as, for example, a wood boiler or fireplace. The heat pump requires an AVS extension module, boiler measurement senor (B22) and a accumulator measurement sensor (B4) to enable boiler control. Boiler control has been pre-programmed at the factory. The site-specific definition must be made in connection with commissioning.

Row number	*Control row*
4102	**Prevents other heat sources**
4110	**Minimum set point**

Prevents other heat sources: When the fixed fuel boiler heats up, the heat pump is locked. Locking occurs as soon as the rise in the boiler's temperature is noted.

Factory setting: On

Minimum set point: The boiler's charging pump (Q10) is activated when the measurement sensor B22 reaches the minimum set point. The temperature must, however, be higher than the temperature of the accumulator.

Factory setting: 35°C

13.13 Call for heating (VAK control)

The heat pump can be controlled with a higher level automation system, with the *Call for heating* control message. The control message (0-10V) is provided to the heat pump's Hx switch, which must be programmed as active in the *Configuration* menu. When the heat pump is controlled with a *0-10V Call for heating* control, all the secondary network's settings and controls must be in the control of the building automation system.

0V = 0°C

10V = 60°C**

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

Consumer call VK2 10V: The heat pump receives a call for heating, which the device produces to the heating network according to the flow sensor's B10 measurement.

NOTE! When controlling the heat pump with an external call for heating message, the control of the heating circuits must be implemented with building automation. The heating circuits must be placed into OFF mode from the heat pump when using the message. Refer to section *Commissioning heating circuits* for the heating circuits' settings.

13.14 ModBus communication

ModBus communication connection (MODBUS350) enables the device's temperatures, status data, set points and failures to be read with a higher level automation system. With the ModBus 350 connection, the heat pump can be set a set point as a temperature, according to which the heat pump produces heat to the accumulator or heating network. The ModBus 350 communication connection is delivered with separate instructions for installation and programming.

14 SYSTEM INFO

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.

14.1 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. Refer to the info page for the failure notice.

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.

Refer to the info page for the failure notice and read more.

14.2 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 OPERATION: The heat pump has gone to emergency operation operating mode due to malfunction or the heat pump has been set to emergency operation 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.

14.3 Heating circuits' 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.

14.4 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.

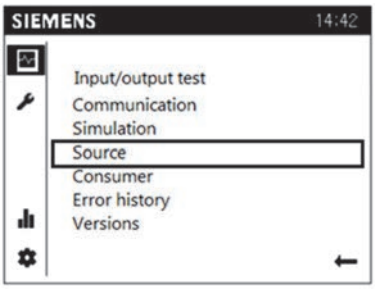
CHARGING ACTIVE: The heat pump produces hot water.

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

14.5 Measurements

To access the comprehensive measurement menus, log into the controller at the *Expert* level. The source menu allows you to read the following status and temperature information.

NOTE! Not all measurements are shown in all applications. Some of the measurements will require additional equipment.

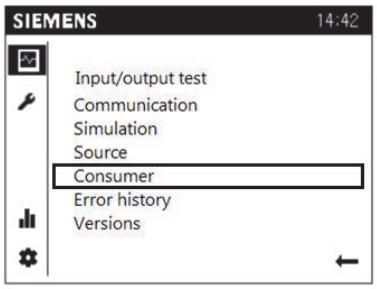


Row number	*Control row*	*Unit/status*
8006	*State heat pump*	*On/Off*
8400	*Compressor 1*	*On/Off*
8402	*El imm heater 1 flow*	*On/Off **
8403	*El imm heater 2 flow*	*On/Off*
8456	*Hours run el flow* *Reset*	*h*
8457	*Start counter el flow* *Reset*	*pcs*
8404	*Source pump*	*On/Off*
8405	*Source pump revolutions*	*%*
8406	*Condenser pump*	*On/Off*
8407	*Speed condenser pump*	*%*
8460	*Heat pump throughput*	*l/min*
8410	*Heat pump return temp*	*°C*
8411	*Setpoint HP*	*°C*
8412	*Flow temp HP*	*°C*
8415	*Hot gas temperature*	*°C*
8425	*Condenser temperature difference*	*°C*
8426	*Temp diff evaporator*	*°C*
8427	*Source inlet temp*	*°C*
8428	*Source inlet temp min*	*°C*
8429	*source outlet temp*	*°C*
8430	*Source outlet temp min*	*°C*
8440	*Port 1 min idle time remaining*	*min*
8442	*Remain stage 1 on time min*	*min*

8450	*Hours run compressor 1*	*h*
8451	*Compressor 1 start-up counter*	*pcs*
3110	*Heat delivered*	*kWh*
3113	*Energy brought in*	*kWh*
3116	*Performance factor*	
8395	*Generated thermal power*	*kW*
8397	*Energy consumption*	*kW*
8398	*Power ratio*	

While at the *Expert* level, you can read the following information in the *Consumer* menu:

To activate the header row, press the button (dark background) and select the desired measurement.



Row number	*Control row*	*Unit/status*
8700	*Outside temp*	*°C*
8701	*Outside temp min*	*°C*
8702	*Outside temp max*	*°C*
8703	*Outside temp attenuated (6h average temperature)*	*°C*
8704	*Outside temp composite*	*°C*
8730–8735	*Actuators of heating circuit 1*	*
8740	*Room temp 1*	*°C*
8740	*Room setpoint 1*	*°C*
8743	*Flow temp 1*	--- **
8743	*Flow temp setpoint 1*	*°C*
8770	*Room temp 2*	*°C*
8770	*Room setpoint 2*	*°C*
8773	*Flow temp 2*	*°C*
8773	*Flow temp setpoint 2*	*°C*
8827	*Instantaneous water heater's pump (Q34) revolutions*	*%*
8830	*DHW temp 1 (B3)*	*°C*
8832	*DHW temp 2 (B31)*	--- *
8840	*Hours run DHW pump*	*h*
8841	*DHW pump start-up counter*	*pcs*
8852	*DHW consumption temp (B38)*	*°C*
8853	*DHW temp setpoint for instantaneous water heater*	*°C*
8950	*Common flow temp (B10)*	*°C*
8951	*Common flow temp setpoint*	*°C*

15 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.

15.1 Alerts

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

More information about the alert can be found on the info page. 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.

15.2 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 circuit* instead of switching off the thermostats
- The automatic set point is too low:
  - Raise the Comfort set point on the menu *Heating circuit*
  - Increase the heating curve slope set point on the menu *Heating circuit*
  - Set the maximum supply water set point sufficiently high on the menu *Heating circuit*
- Program for heating circuit is switched on
  - Go to menu *Time program heating circuit* 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
  - Pres the domestic hot water selection button so that a black bar appears below the tap.
- 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.

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

15.3 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 connecter is intact and correctly connected. If necessary, contact Gebwell service.
25: Fixed fuel boiler sensor	B22	Failure in the boiler's sensor.	Failure in the electrical system	Contact a qualified technician.	Check that the sensor is intact and correctly connected. If necessary, contact Gebwell service.
26: Common flow sensor	B10	Failure in the common flow sensor of charging	Failure in the electrical system	Contact a qualified technician.	Check that the sensor is intact and correctly connected. If necessary, contact Gebwell service.
30: Flow sensor 1	B1	Failure in heating circuit 1's flow sensor	Failure in the electrical system	Contact a qualified technician.	Check that the sensor is intact and correctly connected. If necessary, contact Gebwell service.
31: Flow sensor cooling 1	B16	The flow sensor for cooling is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connecter is intact and correctly connected. If necessary, contact Gebwell service.
32: Flow sensor 2	B12	The mixed heating circuit sensor is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connecter is intact and correctly connected. If necessary, contact Gebwell service.
33: Heat pump flow sensor	B21	The heat pump's flow sensor is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connecter is intact and correctly connected. If necessary, contact Gebwell
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 connecter is intact and correctly connected. If necessary, contact Gebwell
36: Hot gas sensor 1	B81	Hot gas sensor is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connecter is intact and correctly connected. If necessary, contact Gebwell
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 connecter is intact and correctly connected. If necessary, contact Gebwell
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 connecter is intact and correctly connected. If necessary, contact Gebwell
50: Domestic water sensor 1	B3	The hot water sensor is damaged.	Failure in the electrical system	Contact a qualified technician.	Check that the connecter 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.
70: Additional accumulator's sensor 1	B4	Failure in the heating accumulator's upper sensor	Failure in the electrical system	Contact a qualified technician.	Check that the sensor is intact and correctly connected. If necessary, contact Gebwell service.
71: Additional accumulator's sensor 2	B41	Failure in the heating accumulator's lower sensor	Failure in the electrical system	Contact a qualified technician.	Check that the sensor is intact and correctly connected. If necessary, contact Gebwell service.
81: LPB short circuit		Cascade system's internal bus has short-circuited.	Failure in the electrical system	Contact a qualified technician.	Check that the bus cable is intact and correctly connected.
82: LPB address duplication		There are several heat pumps with the same device address in the cascade system	Failure in the control system	Contact a qualified technician.	Check the device addresses. Master device = 1, Device 2 = 2 etc.… (LPB system)

No: Failure message	Sensor	Description	Cause	Measure	Measure
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).
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).
100: 2 time masters		There are two time masters in the cascade system	Failure in the control system	Contact a qualified technician.	Check in the LPB system that only the master device has been defined as master (LPB system)
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.		
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, 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.
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 too 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.	

16 MAINTAINING AND SERVICING THE HEATPUMP

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.

16.1 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.

1. Press the OK button to access the menu.
2. Select Service/special operations, press the OK button.
3. Select control row 7070, Heat pump's interval.
4. Scroll to the row interval in months.
5. Return to the start with the ESC button.

16.2 Inspections

Servicing must only be completed by a person with the required competency.

The refrigerant circuit must only be maintained by an authorised refrigerating equipment technician

General appearance and leaks

Check the interior and exterior of the 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.

16.3 Nominal curves of sensors

NTC10k (all sensors of the device, excluding the outdoor sensor)

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

NTC1k (outdoor sensor)

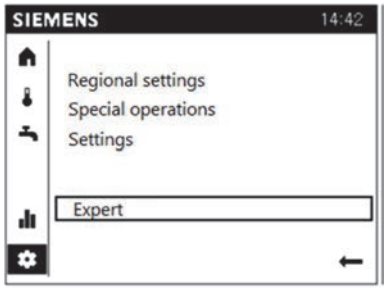
T [°C]	R [ohm]	T [°C]	R [ohm]	T [°C]	R [ohm]
-30,0	13 034	0,0	2 857	30,0	827
-29,0	12 324	1,0	2 730	31,0	796
-28,0	11 657	2,0	2 610	32,0	767
-27,0	11 031	3,0	2 496	33,0	740
-26,0	10 442	4,0	2 387	34,0	713
-25,0	9 889	5,0	2 284	35,0	687
-24,0	9 369	6,0	2 186	36,0	663
-23,0	8 880	7,0	2 093	37,0	640
-22,0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

16.4 Testing inputs and outputs

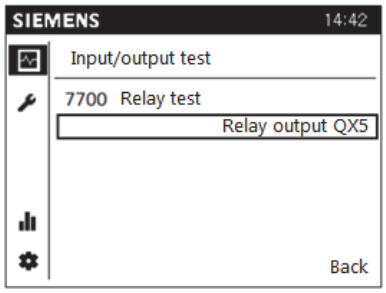
Here we assist on how you can test the operations of devices connected to the controller. The input/output test suspends all the controller's normal control operations.

Turn off the compressor before starting the test, by switching the F1 motor protection to OFF position.

In order to carry out the input/output test, you must be in *Expert* level.



SOURCE PUMP TEST



1. Move to *Expert* level,
2. Select Input/output test
3. Select row *Relay output QX5,* accept with button
4. Next select *Output UX 1/4* control row 7710 (Output test UX1)
5. Set the source pump's desired rotation speed on the row. (50-100%)
6. Ensure the pump's operation by feeling the pump, reducing the shut-off valve of the collector (pipe makes a sound), and by checking the temperatures of the collector. The temperatures should settle between 0-7°C.
7. End the source pump's test by setting row 7710 --- and switch off relay test (No test).

CHARGING PUMP TEST

1. Select Input/output test in menu Output UX 2/4
2. Select control row 7716 (Output test UX2)
3. Set the charging pump's desired rotation speed on the row. (50-100%)
4. Ensure the pump's operation by feeling the pump, reducing the shut-off valve of the charging circuit (pipe makes a sound), and by checking the temperatures of the charging circuit. The temperatures should have settled at the heating network's temperatures.
5. End the charging pump's test by setting to control row 7716 ---.

CHANGE-OVER VALVE TEST

1. Select Input/output test in menu Relay test (7700)
2. Select to row *Relay output QX8,* accept with button. The change-over valve turns to the DHW charging position A. (red triangle points to A)
3. Select to row *Stop all.* The change-over valve turns to the heating charging position B. (red triangle points to B)
4. End the test by setting to control row *No test.*

HEATING CIRCUIT MIXING VALVE TEST

1. Select Input/output test in menu Relay test (7700)
2. Select to row *Relay output QX10,* accept with button. The mixing valve runs open.
3. Select to row *Relay output QX11,* accept with button. The mixing valve runs closed.
4. End the test by setting to control row *No test.*

MIXING HEATING CIRCUIT PUMP TEST

1. Select Input/output test in menu Relay test (7700)
2. Select to row *Relay output QX9,* accept with button. The mixing heating circuit's pump is activated.
3. End the test by setting to control row *No test.*

PUMP HEATING CIRCUIT PUMP TEST

1. Select Input/output test in menu Relay test (7700)
2. Select to row *Relay output QX12,* accept with button. The pump heating circuit pump is activated.
3. End the test by setting to control row *No test.*

HOT WATER CIRCULATING PUMP TEST

1. Select Input/output test in menu Relay test (7700)
2. Select to row *Relay output QX13* accept with OK button. The hot water circulating pump is activated.
3. End the test by setting to control row *No test.*

ELECTRIC RESISTOR CONTROLS TEST

1. Select Input/output test in menu Relay test (7700)
2. Select to row *Relay output QX1,* accept with button. K25 resistor control is activated.
3. Select to row *Relay output QX2,* accept with button. K26 resistor control is activated.
4. Select to row *Relay output QX3,* accept with button. K6 domestic hot water resistor control is activated.
5. End the test by setting to control row *No test.*

ALARM FORWARDING TEST

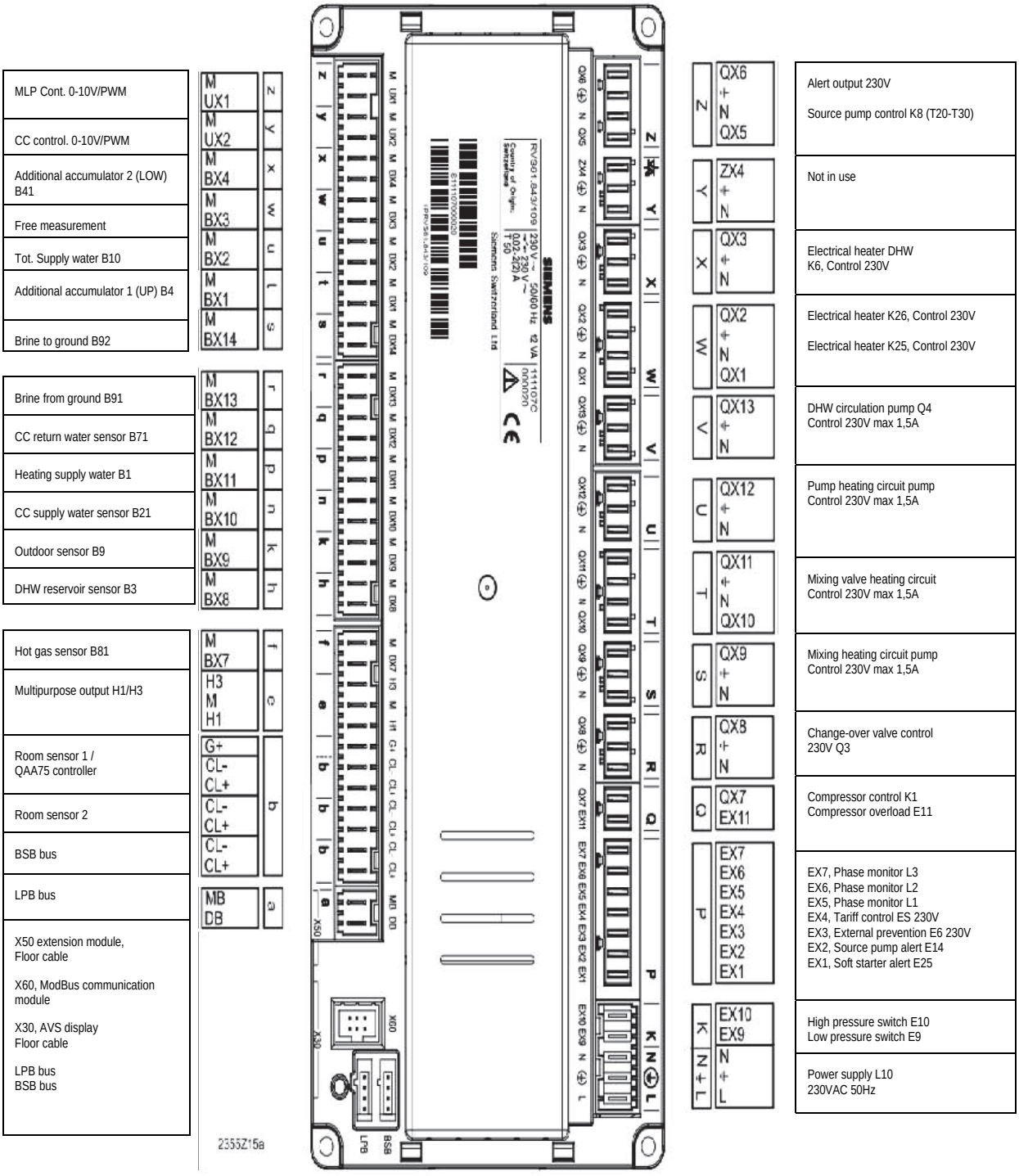
1. Select Input/output test in menu Relay test (7700)
2. Select to row *Relay output QX6,* accept with button. The alarm relay is activated. The K10 further alarm relay receives control.
3. End the test by setting to control row *No test.*

17 TECHNICAL SPECIFICATIONS

Gebwell T²		6	8	10	13	16	20	26	32
Power information									
0/35									
Heating output	kW	5.3	7.4	9.4	13.3	15.9	22.5	30.5	34.6
Cooling capacity	kW	4.2	5.8	7.4	10.5	12.6	17.5	24.0	27.4
Input power	kW	1.1	1.6	2.0	2.8	3.3	5.0	6.5	7.2
COP		4.8	4.6	4.7	4.8	4.8	4.5	4.7	4.8
0/55									
Heating output	kW	4.9	6.8	8.5	12.2	14.6	20.3	27.3	30.9
Cooling capacity	kW	3.2	4.4	5.6	8.1	9.6	12.8	17.6	20.1
Input power	kW	1.7	2.4	2.9	4.1	5.0	7.5	9.7	10.8
COP		2.9	2.8	2.9	3.0	2.9	2.7	2.8	2.9
5/35									
Heating output	kW	6.3	8.8	11.2	15.8	18.7	26.2	35.8	40.3
Cooling capacity	kW	5.1	7.2	9.1	12.9	15.3	21.1	29.1	32.9
Input power	kW	1.2	1.6	2.1	2.9	3.4	5.1	6.7	7.4
COP		5.3	5.5	5.3	5.4	5.5	5.1	5.3	5.4
5/55									
Heating output	kW	5.7	7.9	9.9	14.3	17.0	23.2	31.2	35.3
Cooling capacity	kW	3.9	5.5	6.9	10.0	11.9	15.7	21.4	24.4
Input power	kW	1.8	2.4	3.0	4.3	5.1	7.5	9.8	10.9
COP		3.2	3.3	3.3	3.3	3.3	3.1	3.2	3.2
System's energy efficiency class, intermediate climate conditions, underfloor heating		A+++							
Electrical information									
Rated voltage/electrical connection	V	3~400V 50Hz							
Recommended fuse size	A	3 x 10	3 x 10	3 x 10	3 x 16	3 x 16	3 x 20	3 x 25	3 x 32
Max. supply current (incl. control systems and pumps)	(A_{rms})	4.9	6.1	8.0	10.7	13.0	18.3	21.9	27.7
Start-up current	(A_{rms})	15.5	16.1	21.2	30.6	35.4	51.9	63.2	84.2
Heat supply pump power	W	3-70			6-175				
Source pump power	W	30-87		50-175			100-336		180-608
IP classification		IP 21							
Supply water electric heater (accessory)									
Nominal voltage (requires own power supply)	V	3~400V 50Hz							
Maximum supply current, resistance 3kW (recom. fuse size)	(A_{rms})	4.3 (16A)							
Maximum supply current, resistance 6kW (recom. fuse size)	(A_{rms})	8.7 (16A)							
Maximum supply current, resistance 9kW (recom. fuse size)	(A_{rms})	13.0 (16A)							
Resistor's overheat protection (switch limit)		Yes (90°C)							

Gebwell T²		6	8	10	13	16	20	26	32
Refrigerant circuit									
Contains fluorinated greenhouse gases		Yes							
Hermetically sealed		Yes							
Refrigerant		R407C					R410A		
GWP (global warming potential)		1774					2088		
Refrigerant volume	kg	1.8	1.8	1.8	2.2	2.5	3.8	3.4	3.4
CO_2 equivalence	ton CO_2 e	3.193	3.193	3.193	3.903	4.435	7.934	7.099	7.099
Cut-off, overpressure	bar	28					42.0		
Difference, overpressure	bar	-7					-8		
Cut-off, under pressure	bar	1.7					4		
Difference, under pressure	bar	1					2		
Collector									
Energy class, source pump		low energy							
Integrated source pump		Yes					No		
Maximum pressure	bar	6							
Minimum flow	l/s	0.24	0.32	0.40	0.47	0.59	0.79	0.99	1.19
Rated flow	l/s	0.30	0.41	0.50	0.60	0.74	0.98	1.23	1.48
Max external pressure loss at rated flow	kPa	61	48	90	74	75	81	70	100
Minimum heat collection liquid output temperature	°C	-5							
Maximum heat collection liquid output temperature	°C	20							
Charging circuit									
Energy class, charging pump		low energy							
Integrated charging pump		Yes							
Maximum pressure	bar	6							
Minimum flow	l/s	0.21	0.28	0.35	0.42	0.52	0.69	0.97	1.04
Rated flow	l/s	0.29	0.39	0.48	0.58	0.73	0.97	1.21	1.45
Max external pressure loss at rated flow	kPa	62	52	39	80	82	72	50	43
Max heating water's output temperature	°C	65					68		
Sound power level	dB	38.5	38.5	40	40	42	42	42	43.5
Dimensions and weight									
Width	mm	600							
Height	mm	1200							
Depth	mm	775							
Weight	kg	168	172	180	195	205	230	230	225
Pipe connections									
Brine	mm	28					35		
Charging	mm	28					35		
Controller		Gebwell Albatros ²							
Compressor		Scroll							

18 CONTROLLER'S CONNECTION POINTS



19 SETPOINT EXAMPLES FOR HEAT PUMP ADJUSTMENTS IN DIFFERENT HEATING NETWORKS

Row number			Control row	Factory setting	Underfloor heating	Radiator heating	Air heating
LP1	**LP2**	**LP3**					
700	1000	1300	Operating mode	Automatic			
710	1010	1310	Comfort mode set point	20			
712	1012	1312	Reduced set point	19			
714	1014	1314	Frost protection set point	15			
720	1020	1320	Heating curve slope	0,5	0,5 (0,3-0,5)	0,8 (0,5-1,2)	0,8 (0,5-1,2)
740	1040	1340	Flow water min. set point	12	12	12	12
741	1041	1341	Flow water max. set point	45	45 (35-45)	55 (45-60)	55 (45-60)
750	1050	1350	Room sensor compensation	20 %			
730	1030	1330	Summer / winter heating limit	16			

Set points of the heating circuits:

Domestic hot water set points:

Row number	**Control row**	**Factory setting**
1600	Operating mode	On
1610	Nominal set point	50°C

Heat pump’s set points:

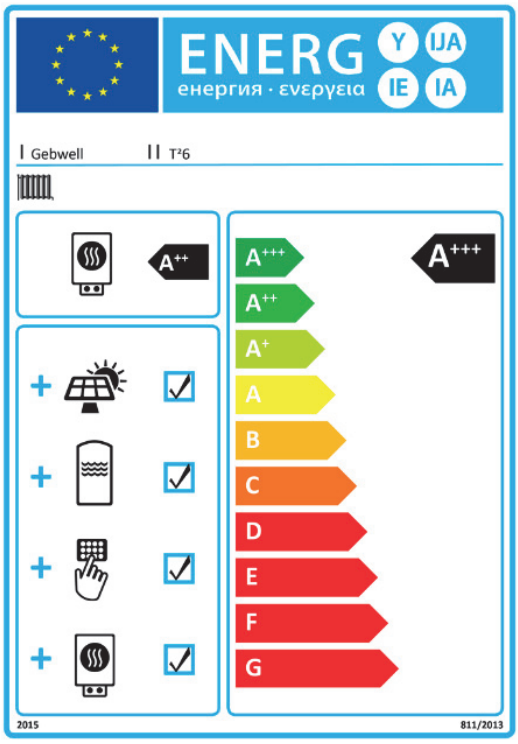
Row number	**Control row**	**Factory setting**	**Underfloor heating**	**Radiator heating**	**Air heating**
2840	Return water temperature switching differential	6	6	8 (8-10)	10

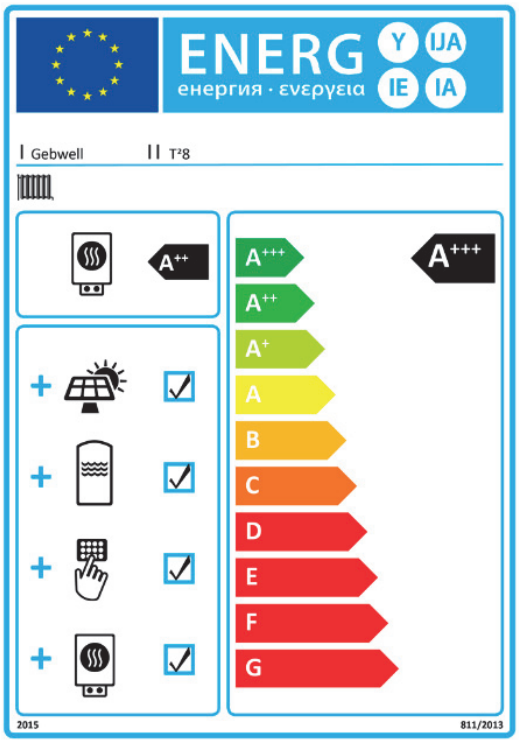
20 MAINTENANCE RECORD

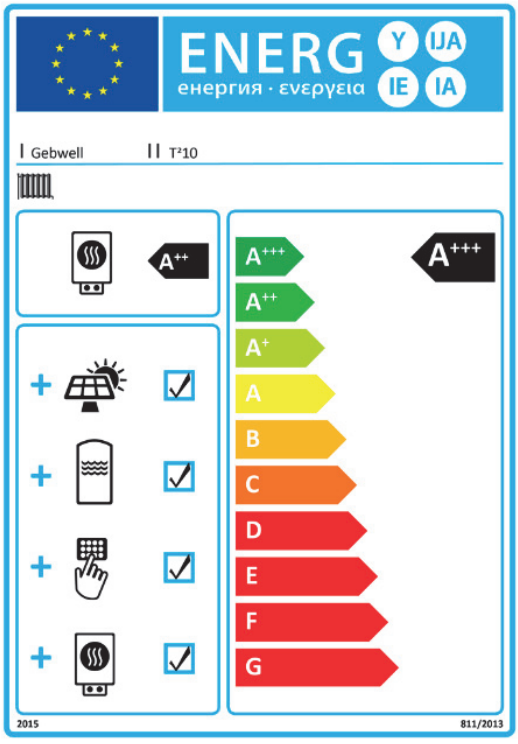
Date:	Measure:	*Fault code:	Performed by:	Nature of maintenance: R= repair M = maintenance S = change of settings

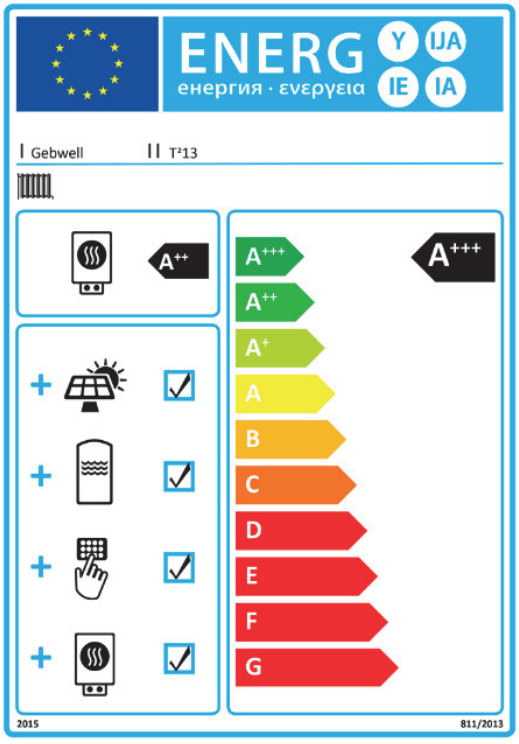
*Fault code: If the device fails, enter the fault code issued by the controller in this column.

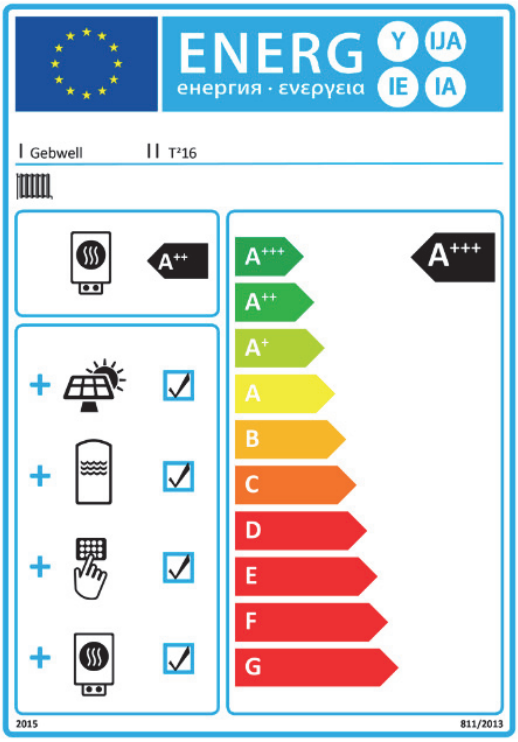
21 ENERGY LABELS










ENERG
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Gebwell
T²16
A++
A+++
A+++
A++
A+
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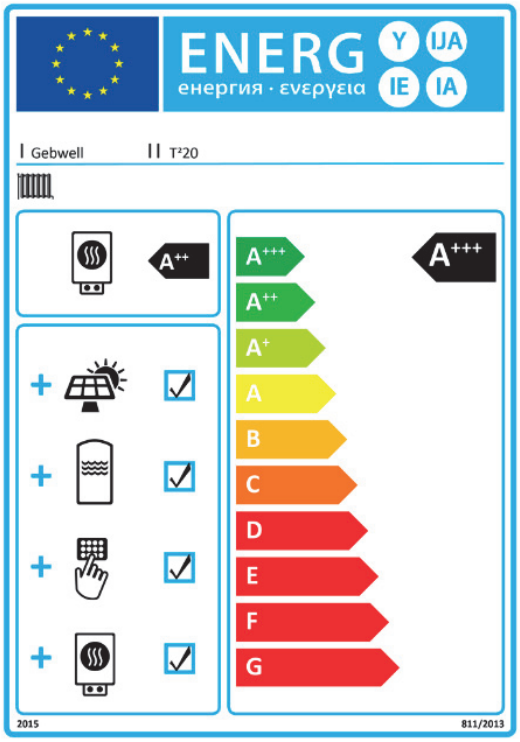
2015
811/2013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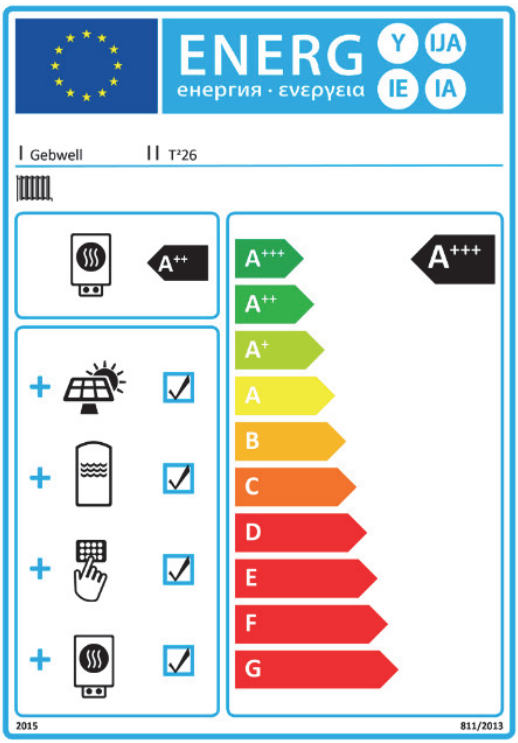
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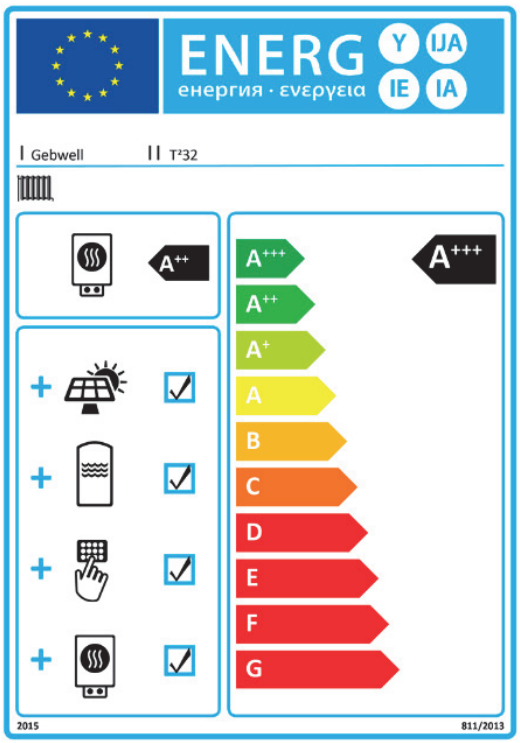
ENERG
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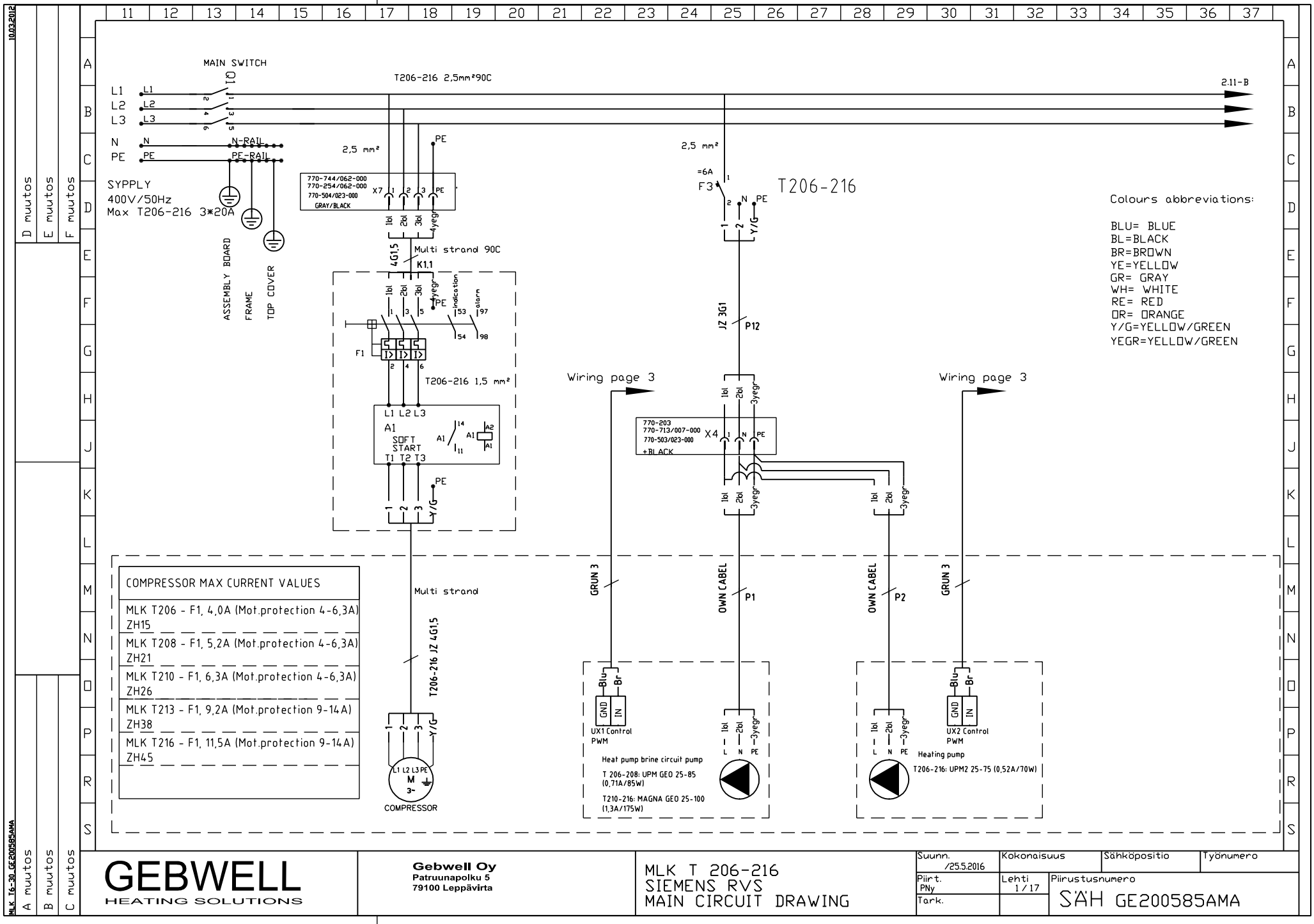
2015
811/2013



COMPRESSOR MAX CURRENT VALUES
MLK T206 - F1, 4,0A (Mot.protection 4-6,3A) ZH15
MLK T208 - F1, 5,2A (Mot.protection 4-6,3A) ZH21
MLK T210 - F1, 6,3A (Mot.protection 4-6,3A) ZH26
MLK T213 - F1, 9,2A (Mot.protection 9-14A) ZH38
MLK T216 - F1, 11,5A (Mot.protection 9-14A) ZH45

D muutos	10.03.2016	
E muutos		
F muutos		
A muutos		
B muutos		
C muutos		

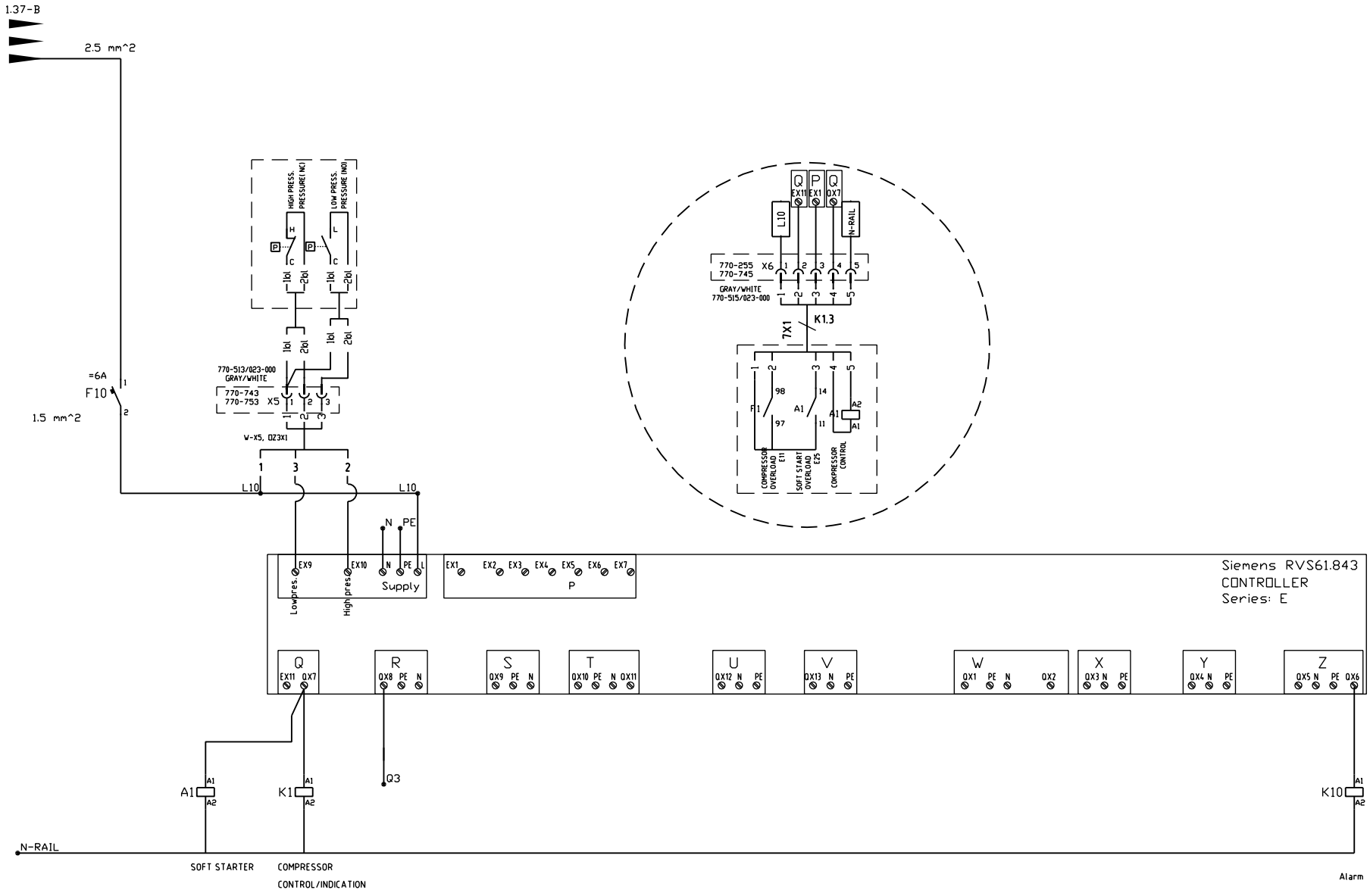
MLK T6-30_GE200585AMA

GEBWELL
HEATING SOLUTIONS

Gebwell Oy
Patruunapolku 5
79100 Leppävirta

MLK T 206-216
SIEMENS RVS
MAIN CIRCUIT DRAWING

Suunn. /25.5.2016	Kokonaisuus	Sähköpositio	Työnumero
Piirt. PNy	Lehti 1 / 17	Piirustusnumero SÄH GE200585AMA	
Tark.			



GEBWELL
HEATING SOLUTIONS

Gebwell Oy
Patruunapolku 5
79100 Leppävirta

MLK T 206-216
SIEMENS RVS
CONTROL

Suunn. /25.5.2016	Kokonaisuus	Sähköpositio	Työnumero
Piirt. PNy	Lehti 2 / 17	Piirustusnumero SÄH GE200585AMA	
Tark.			

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos
10.03.2012
MLK T6-30_GE200585AMA

MLK T6-30_GE200585AMA 10.03.2012

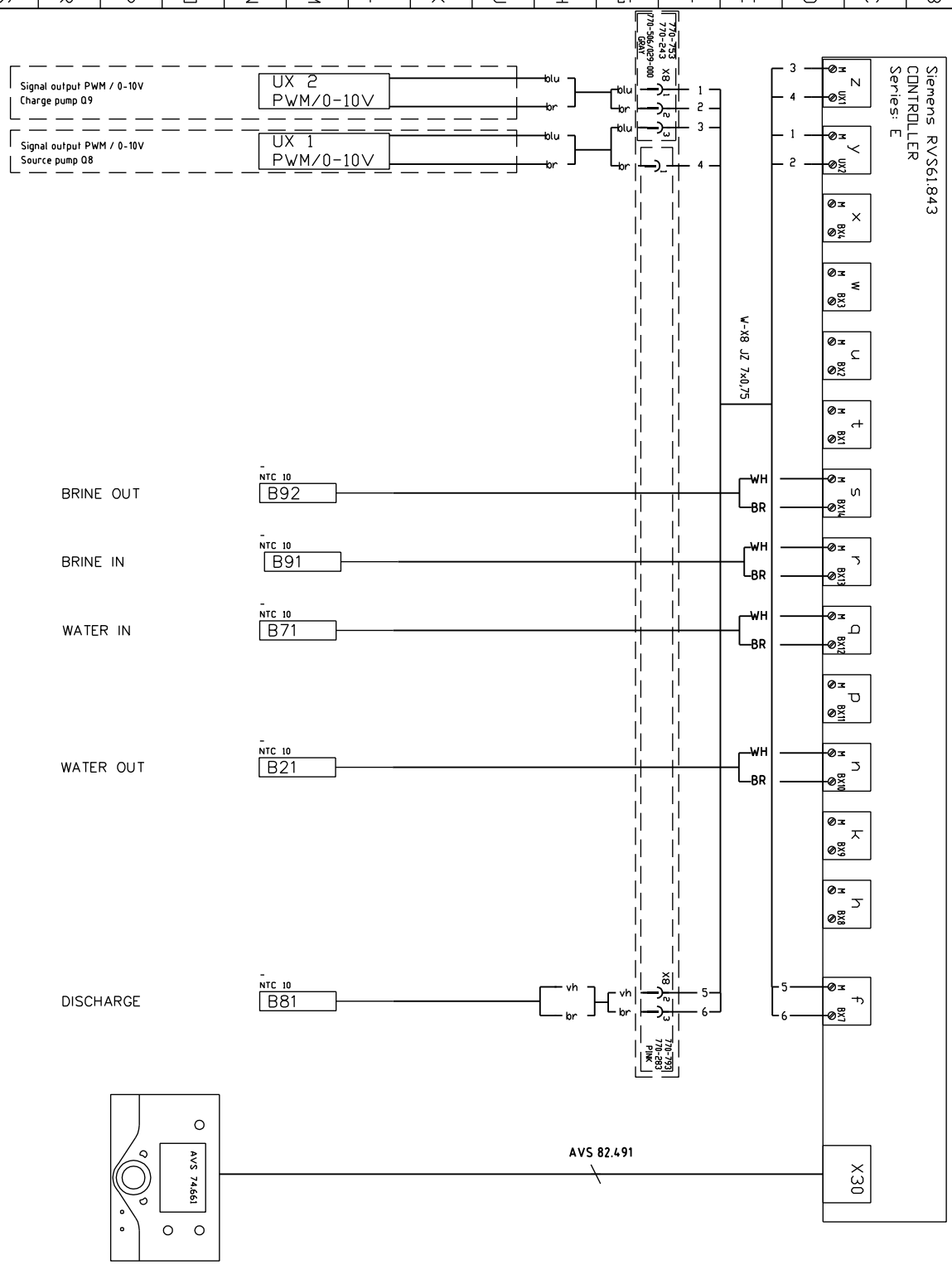
A muutos 2014.29.09 JTH		D muutos
B muutos		E muutos
C muutos		F muutos

GEBWELL
HEATING SOLUTIONS

Gebwell Oy
Patruunapolku 5
79100 Leppävirta

MLK T 206-216
SIEMENS RVS
SENSORS

Suunn. /25.5.2016	Piirt. PNy	Tark.
Kokonaisuus	Lehti 3 / 17	
Piirustusnumero SAH GE200585AMA		
Sähköpositio		
Työnumero		



MLK T6-30_GE200585AMA 10.03.2012

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

GEBWELL
HEATING SOLUTIONS

EXTERNAL DEVICES

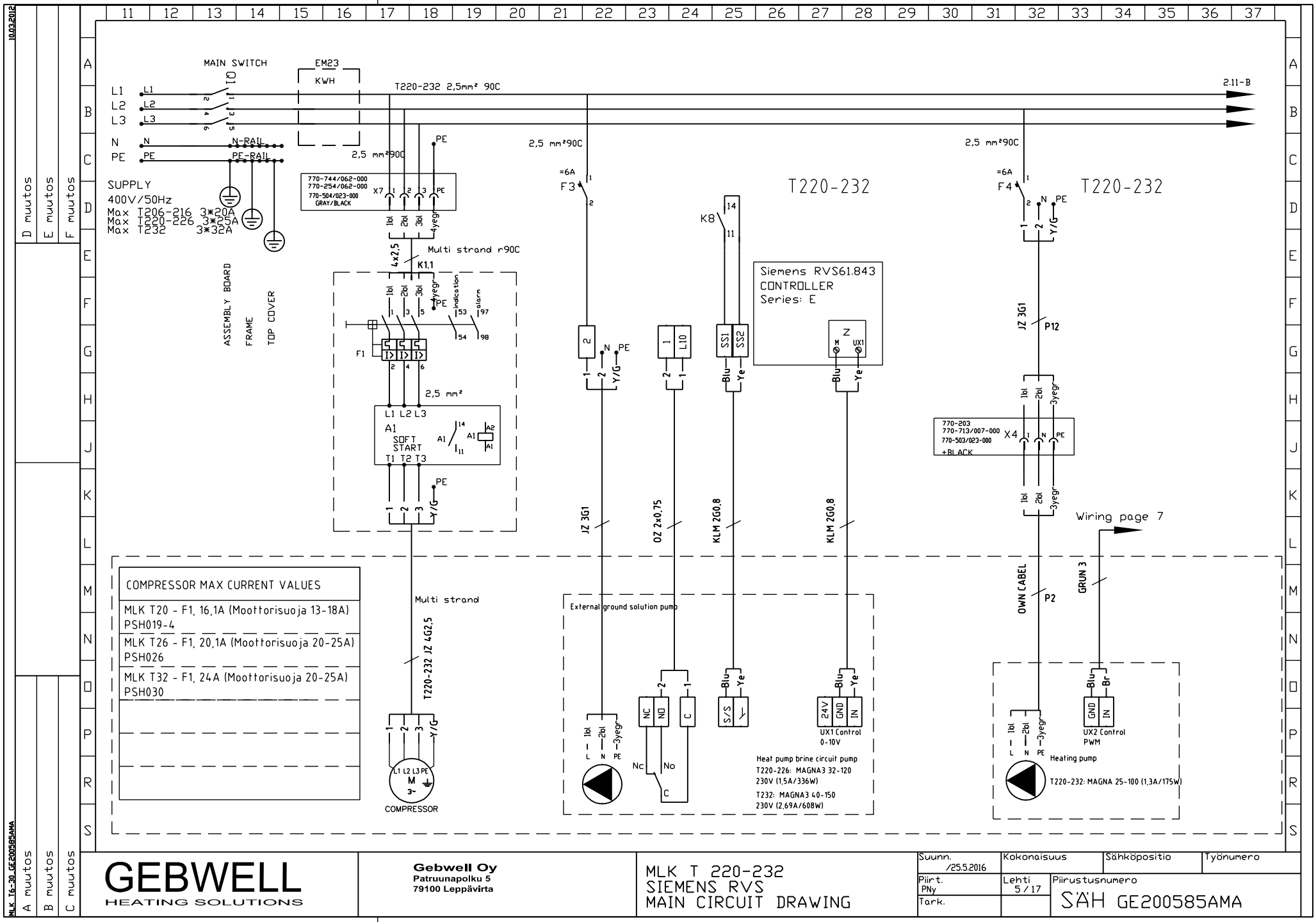
MLK T 206-216
SIEMENS RVS
ACTUATORS AND SENSORS

Piirt. PNy	Suunn. /25.5.2016	
Tark.		
	Lehti 4 / 17	Kokonaisuus
		Piirustusnumero
SA'H GE200585AMA		Sähköpositio
		Työnumero

ACCUMULATOR (HEATING LOWER) – B41 NTC 10 – WH / BR – x BX4
COMMON FLOW – B10 NTC 10 – WH / BR – u BX2
ACCUMULATOR (HEATING UPPER) – B4 NTC 10 – WH / BR – t BX1
OPTION HEATING CIRCUIT 1 FLOW WATER – B1 NTC 10 – WH / BR – p BX11
OUTSIDE SENSOR – QAC 34 B9 NTC 1000 – WH / BR – k BX9
DHW – B3 NTC 10 – WH / BR – h BX8

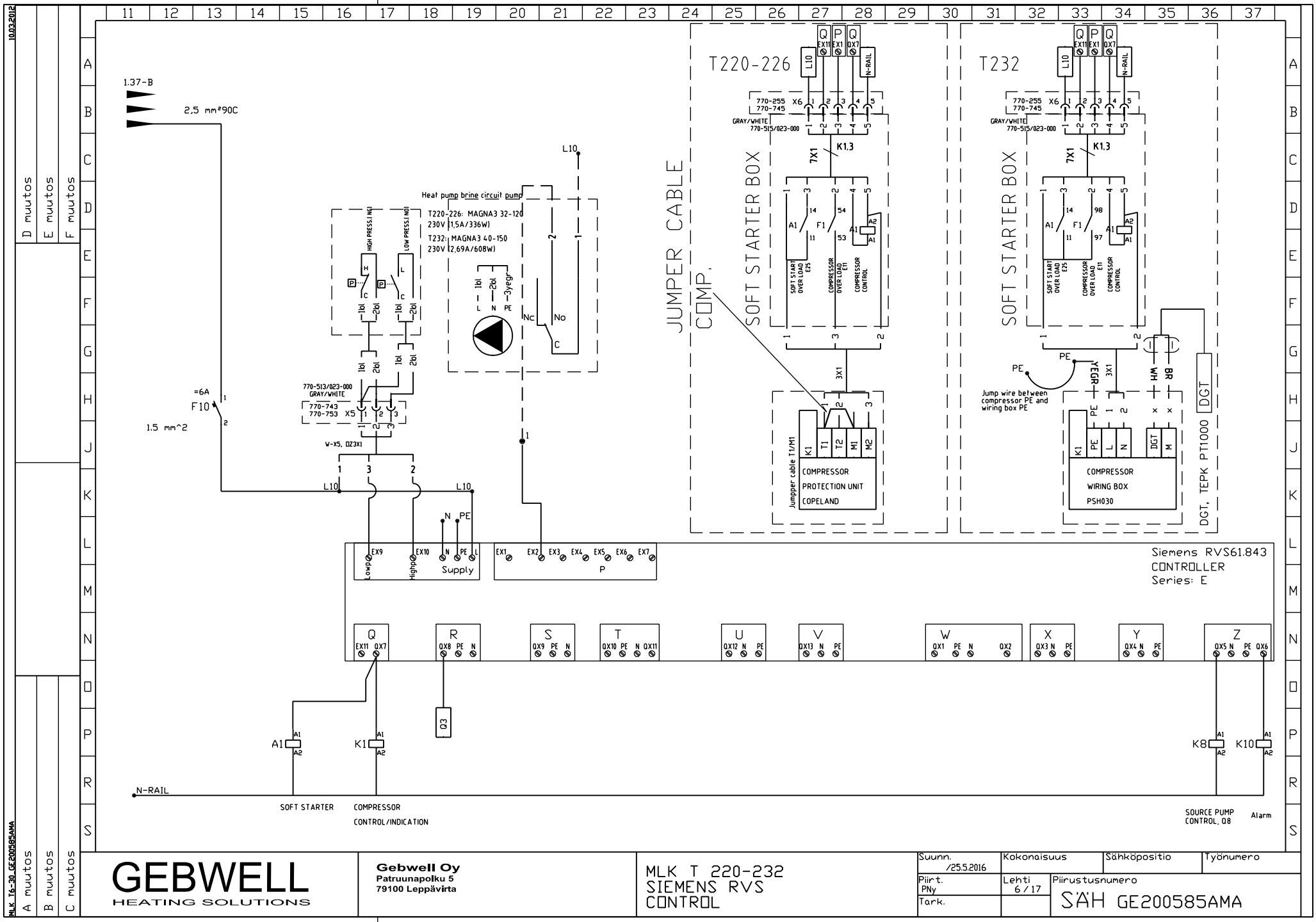
Siemens RVS61.843
CONTROLLER
Series: E

Z – QX6 PE N QX5 – Free time program; Coolin changeover valve Y28 / Cooling primary pump Y28 – MAX 0.4A Control 230VAC
Y – PE N QX4
X – PE N QX3 – OPTION Control, Electric heater DHW K6 (CUK3) – K6
W – QX2 N PE QX1 – OPTION Control, Electric heater Heating water, step 2 K26 (CUK3) / Auxiliary heating control 230V – K26; OPTION Control, Electric heater Heating water step 1 K25 (CUK3) /Optional electric heater K16 Auxiliary heating control 230V – K25/K16
V – PE N QX13 – Y/G 2 1 – OPTION – Y/G- PE N L – DHW CIRCULATION PUMP Q4 MAX 0.7A
U – PE N QX12 – Y/G 2 1 – OPTION – Y/G- PE N L – HEATING CIRCUIT PUMP MAX 0.7A
T – QX11 N PE QX10 – BR / 2, SI / 1, WH / 3 – OPTION – BR BLU VA – HRC 230-3.70s BELIMO Y×/Y× – HEATING CIRCUIT 1 3-WAY VALVE
S – N PE QX9 – Y/G 2 1 – OPTION – Y/G- PE N L – MAX 0.7A – MIXING CIRCUIT PUMP
R – N PE QX8 – N, L10, Q3 – BL BR BL – LK 3G1 – N L L1 L2 – EXHANGE VALVE Q3.1 Q3
P – EX7 EX6 EX5 EX4 EX3 EX2 EX1 – L10 – TARIFF CONTROL E5; EXTERNAL START LOCK E6
X30



GEBWELL HEATING SOLUTIONS	Gebwell Oy Patruunapolku 5 79100 Leppävirta	MLK T 220-232 SIEMENS RVS MAIN CIRCUIT DRAWING	Suunn. /25.5.2016	Kokonaisuus	Sähköpositio / Työnumero
			Piirt. PNy	Lehti 5 / 17	Piirustusnumero SÄH GE200585AMA
			Tark.		

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos
10.03.2012
MLK T6-30_GE200585AMA



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

10.03.2016

MLK T6-30_GE200585AMA

GEBWELL
HEATING SOLUTIONS

Gebwell Oy
Patruunapolku 5
79100 Leppävirta

MLK T 220-232
SIEMENS RVS
CONTROL

Suunn.	Kokonaisuus	Sähköpositio	Työnumero
/25.5.2016			
Piirt. PNy	Lehti 6 / 17	Piirustusnumero	
Tark.		SÄH GE200585AMA	

MLK T6-30_GE200585AMA 10.03.2012

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

GEBWELL
HEATING SOLUTIONS

Gebwell Oy
Patruunapolku 5
79100 Leppävirta

MLK T 220-232
SIEMENS RVS
SENSORS

Piirt. PNy	Suunn. /25.5.2016	Kokonaisuus
Tark.	Lehti 7 / 17	Piirustusnumero SAH GE200585AMA
		Sähköpositio
		Työnumero

Siemens RVS61.843
CONTROLLER
Series: E

Signal output PWM / 0-10V
Charging pump Q9

UX 2
PWM/0-10V

blu
br

X8

770-744
770-254
770-504/023-000
GRAY/BLACK

4x1

BRINE OUT — NTC 10 — B92 — WH / BR
BRINE IN — NTC 10 — B91 — WH / BR
WATER IN — NTC 10 — B71 — WH / BR
WATER OUT — NTC 10 — B21 — WH / BR
DISCHARGE — NTC 10 — B81 — wh / br

AVS 74.661

AVS 82.491

X30

MLK T6-30_GE200585AMA 10.03.2012

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

GEBWELL
HEATING SOLUTIONS

EXTERNAL DEVICES

ACCUMULATOR (HEATING LOWER) B41 NTC 10 — WH / RU — X BX4
COMMON FLOW B10 NTC 10 — WH / RU — U BX2
ACCUMULATOR (HEATING UPPER) B4 NTC 10 — WH / RU — T BX1
OPTION HEATING CIRCUIT 1 MENOVESI B1 NTC 10 — WH / RU — P BX11
OUTSIDE SENSOR QAC 34 B9 NTC 1000 — WH / RU — K BX9
DHW B3 NTC 10 — WH / RU — H BX8

Siemens RVS61.843 CONTROLLER Series: E

X: OPTION Control, electric heater DHW K6 (CUK3) — K6
W: OPTION Control, electric heater HEating water step 2 K26 (CUK3) / Auxiliary heating control 230V — K26
W: OPTION Control, electric heater Heating water step.1 K25 (CUK3) / Optional electric heater K16 Auxiliary heating control 230V — K25/K16

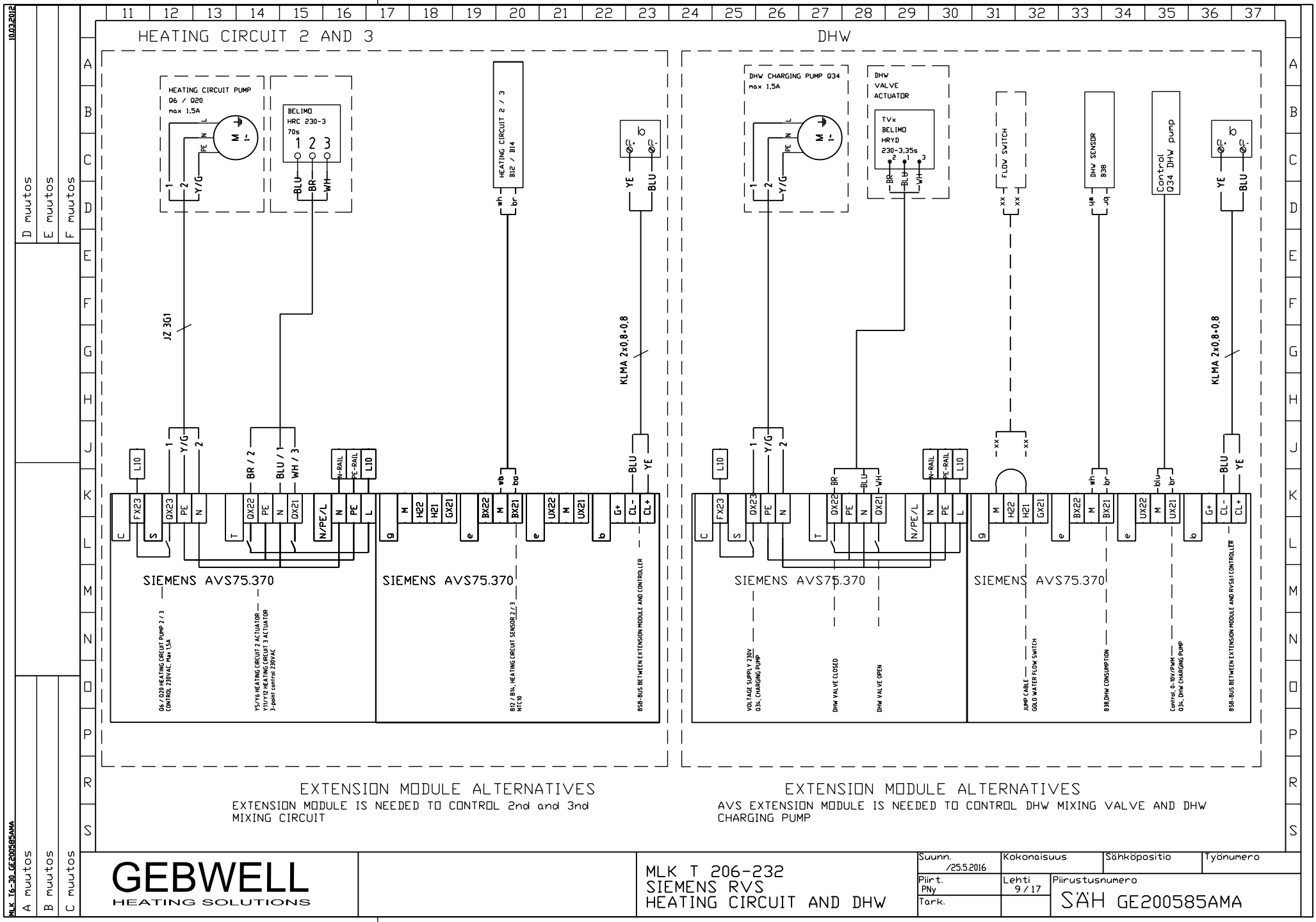
V: OPTION — DHW CIRCULATION PUMP Q4 MAX 0.7A
U: OPTION — HEATING CIRCUIT PUMP MAX 0.7A
T: OPTION — HRC 230-3.70s BELIMO — HEATING CIRCUIT 1 3-WAY VALVE
S: OPTION — MIXING CIRCUIT PUMP MAX 0.7A
R: LK 3G1 — EXHANGE VALVE Q3.1 / Q3

P: TARIFF CONTROL E5 — L10
EXTERNAL START LOCK E6

MLK T 220-232
SIEMENS RVS
ACTUATORS AND SENSORS

Piirt. PNy	Suunn. /25.5.2016		
Tark.			
	Lehti 8 / 17	Kokonaisuus	
		Piirustusnumero	
		Sähköpositio	
		Työnumero	

SAH GE200585AMA

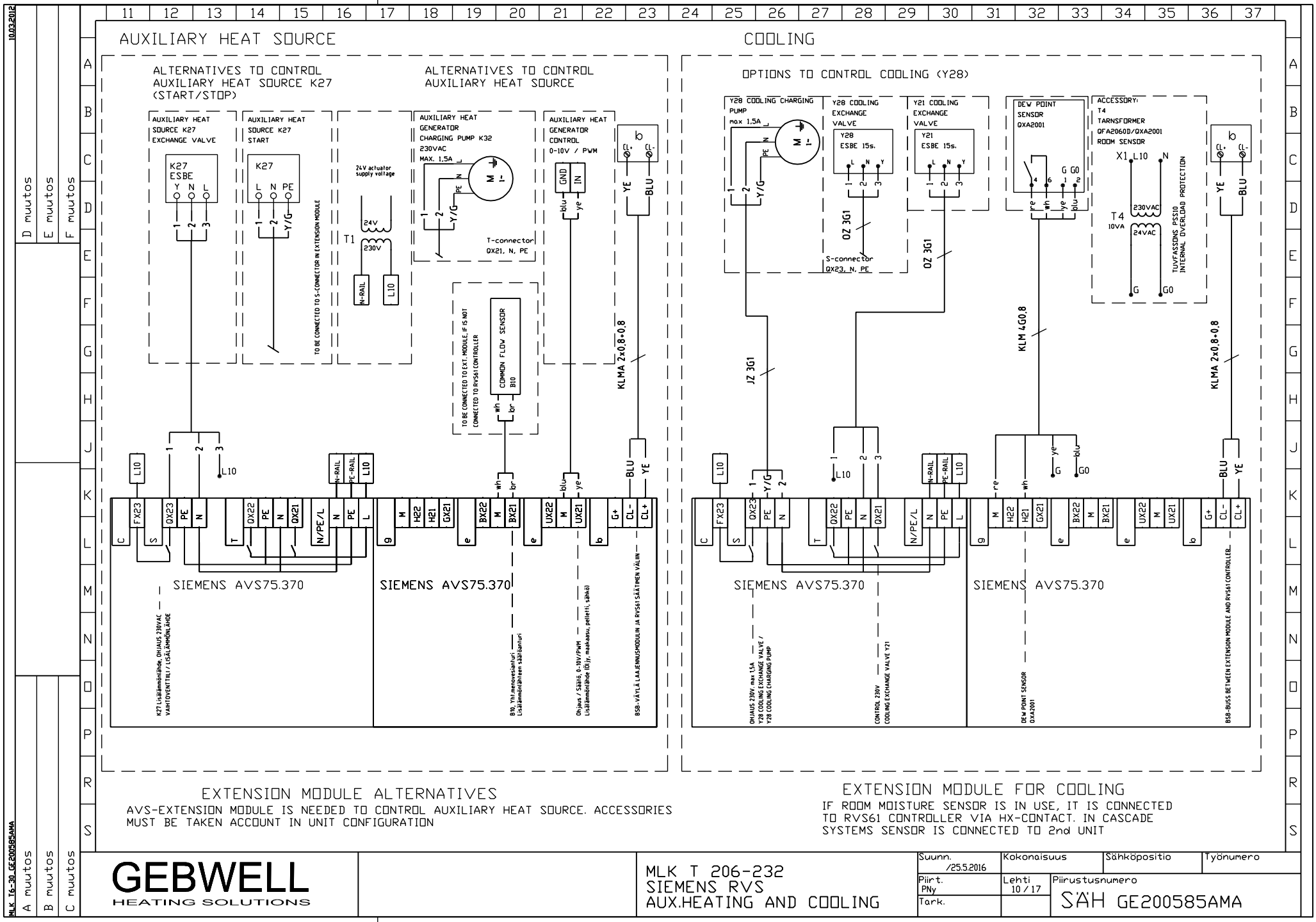


GEBWELL
HEATING SOLUTIONS

MLK T 206-232
SIEMENS RVS
HEATING CIRCUIT AND DHW

Suunn. /25.5.2016	Kokonaisuus	Sähköpositio	Työnumero
Piirt. PNy	Lehti 9 / 17	Piirustusnumero SÄH GE200585AMA	
Tark.			

MLK T6-30 GE200585AMA
10.03.2012
A muutos
B muutos
C muutos
D muutos
E muutos
F muutos



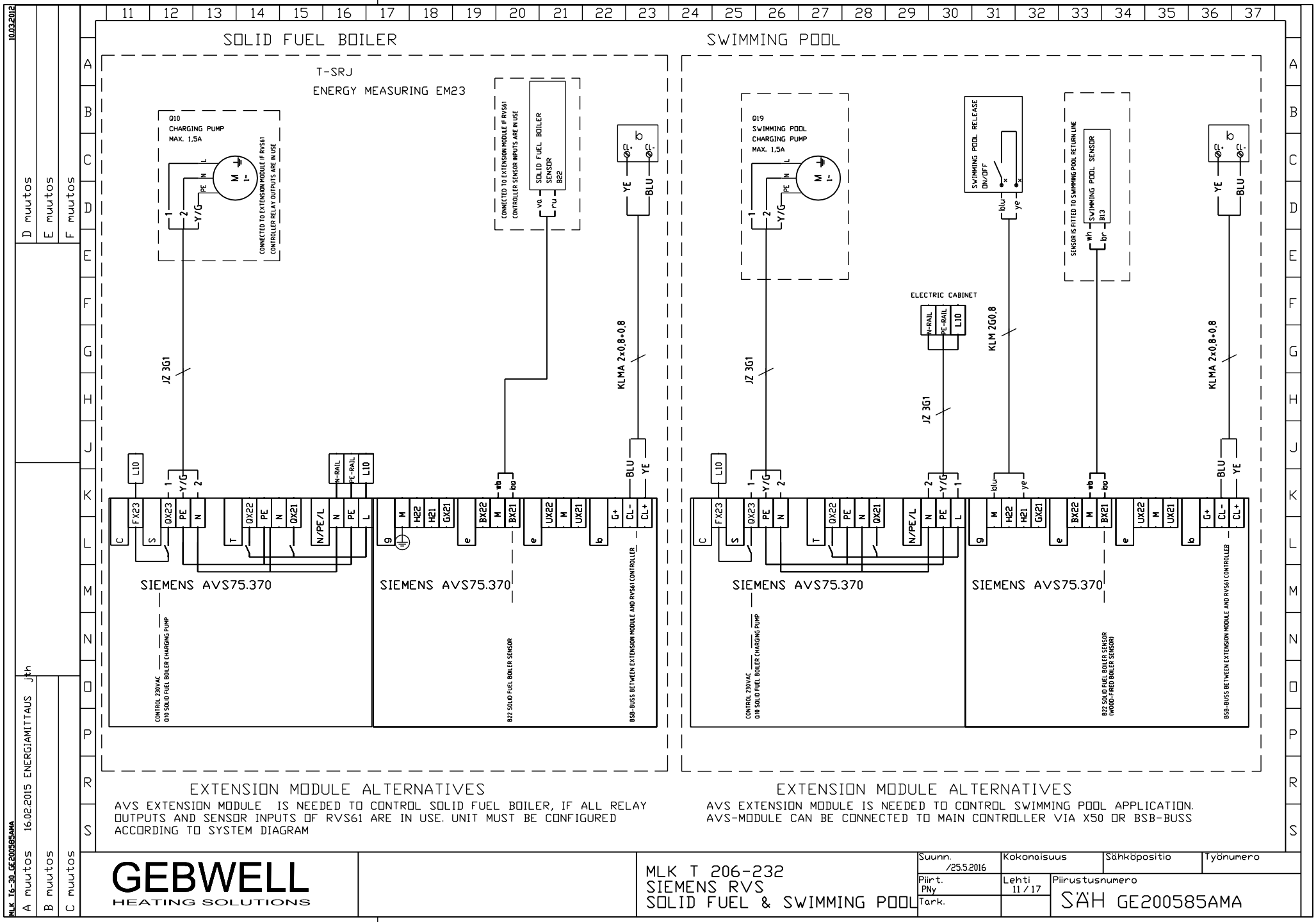
GEBWELL
HEATING SOLUTIONS

MLK T 206-232
SIEMENS RVS
AUX.HEATING AND COOLING

Suunn. /25.5.2016	Kokonaisuus	Sähköpositio	Työnumero
Piirt. PNy	Lehti 10 / 17	Piirustusnumero SÄH GE200585AMA	
Tark.			

A muutos	10.03.2012
B muutos	
C muutos	
D muutos	
E muutos	
F muutos	

MLK T6-30 GE200585AMA



EXTENSION MODULE ALTERNATIVES

AVS EXTENSION MODULE IS NEEDED TO CONTROL SOLID FUEL BOILER, IF ALL RELAY OUTPUTS AND SENSOR INPUTS OF RVS61 ARE IN USE. UNIT MUST BE CONFIGURED ACCORDING TO SYSTEM DIAGRAM

EXTENSION MODULE ALTERNATIVES

AVS EXTENSION MODULE IS NEEDED TO CONTROL SWIMMING POOL APPLICATION. AVS-MODULE CAN BE CONNECTED TO MAIN CONTROLLER VIA X50 OR BSB-BUSS

A muutos	16.02.2015 ENERGIAMITTAUS jth
B muutos	
C muutos	
D muutos	
E muutos	
F muutos	

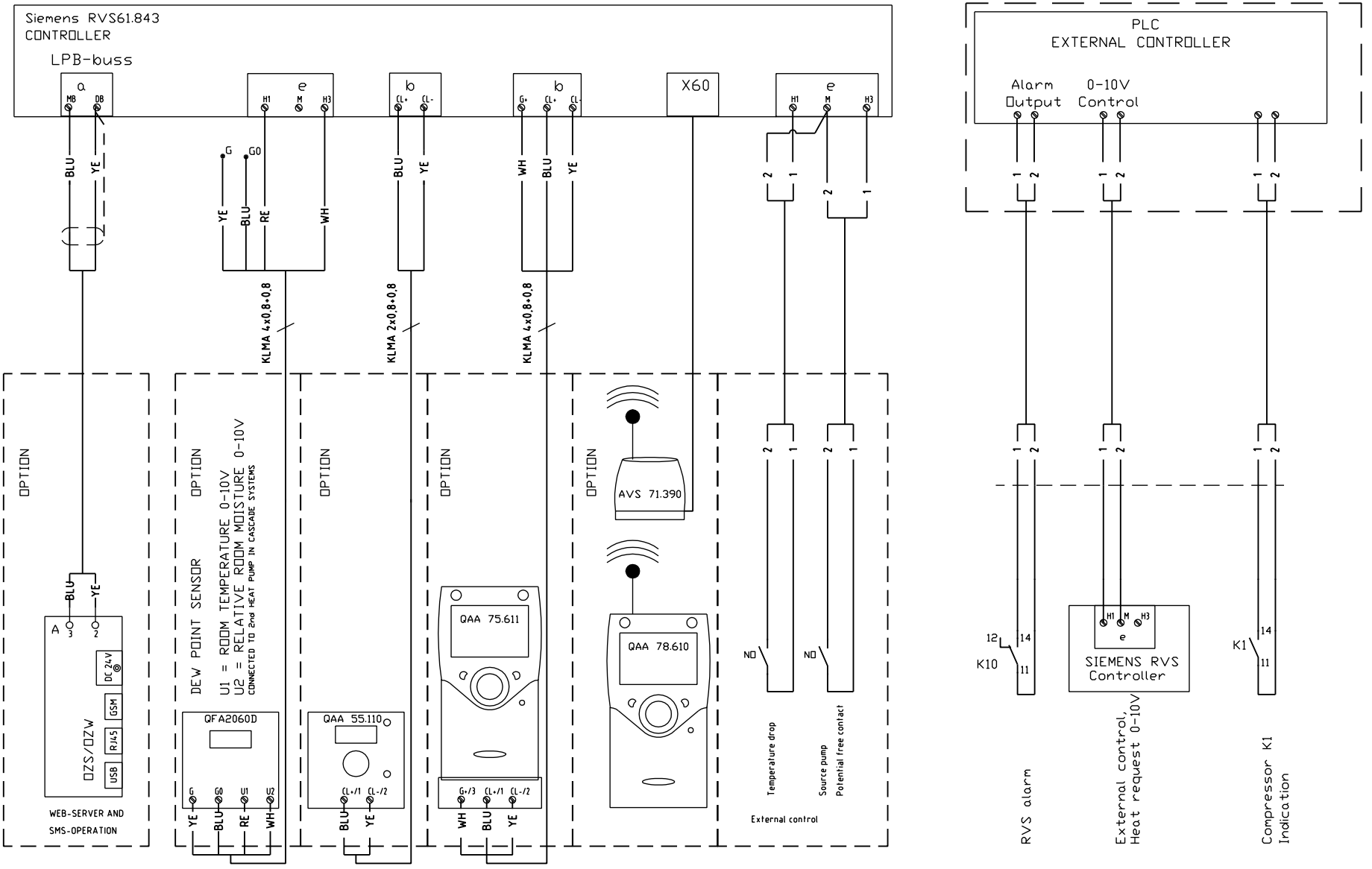
MLK T6-30 GE200585AMA 10.03.2012

GEBWELL
HEATING SOLUTIONS

MLK T 206-232
SIEMENS RVS
SOLID FUEL & SWIMMING POOL

Suunn. /25.5.2016	Kokonaisuus	Sähköpositio	Työnumero
Piirt. PNy	Lehti 11 / 17	Piirustusnumero	
Tark.		SÄH GE200585AMA	

Connetions for external automation system



D muutos
E muutos
F muutos
10.03.2012

A muutos
B muutos
C muutos
MLK T6-30_GE200585AMA

GEBWELL
HEATING SOLUTIONS

Gebwell Oy
Patruunapolku 5
79100 Leppävirta

MLK T 206-232
SIEMENS RVS

Suunn. /25.5.2016	Kokonaisuus	Sähköpositio	Työnumero
Piirt. PNY	Lehti 12 / 17	Piirustusnumero SÄH GE200585AMA	
Tark.			

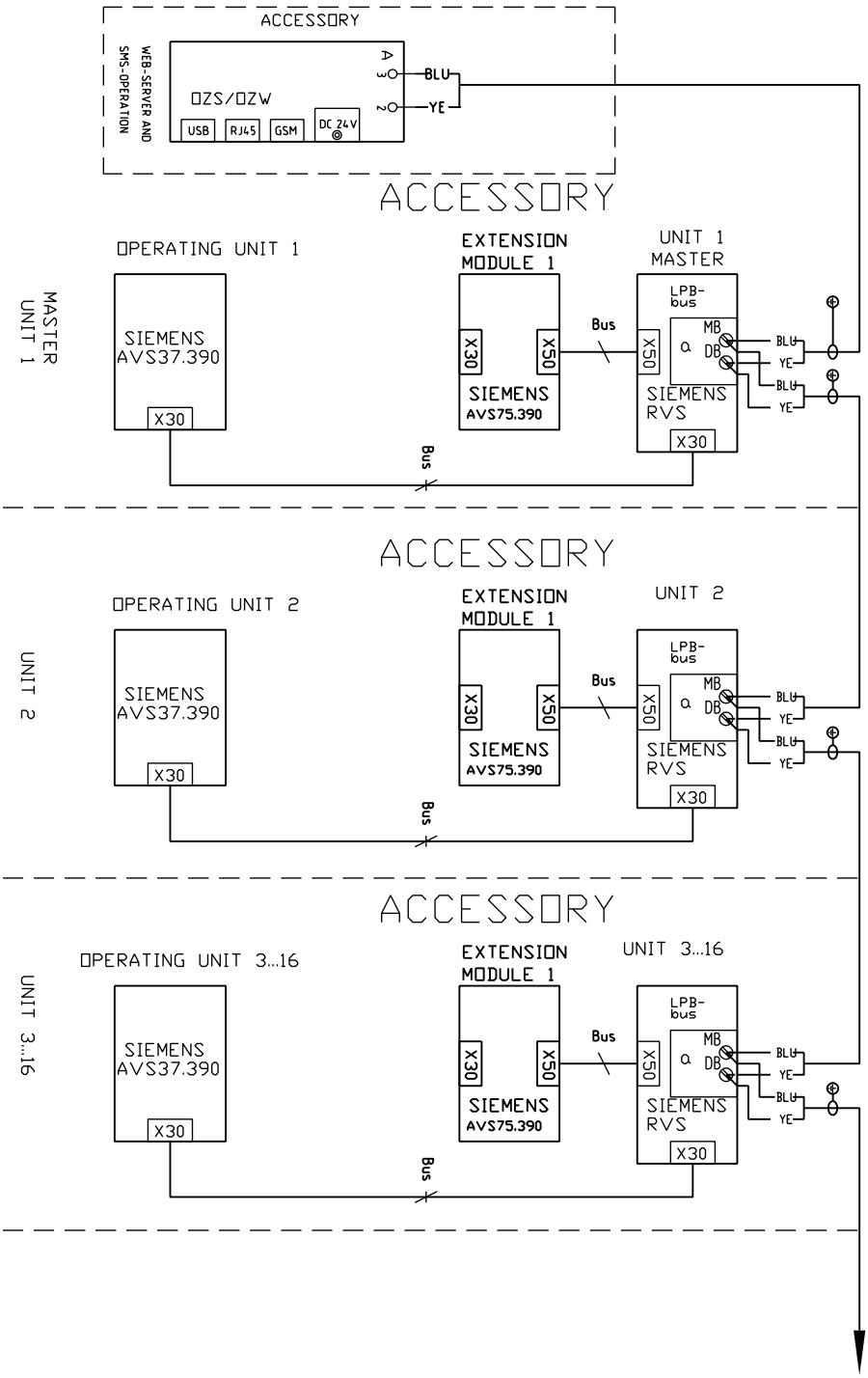
MLK T6-30_GE200585AMA 10.03.2012

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

GEBWELL
HEATING SOLUTIONS

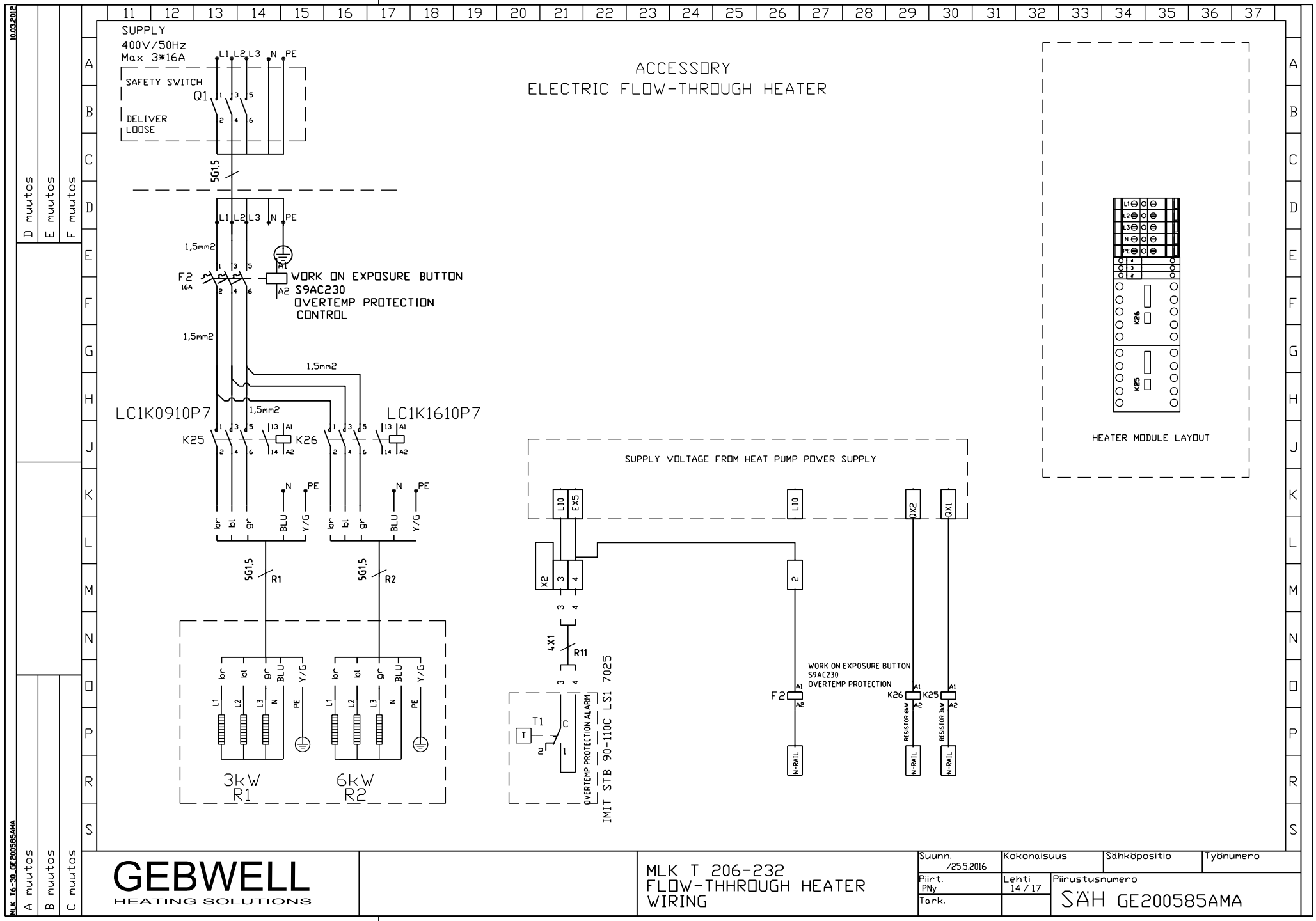
Gebwell Oy
Patruunapolku 5
79100 Leppävirta

MLK T 206-232 BUS CONNECTION FOR MULTIPLE UNITS



Piirt. PNy	Suunn. /25.5.2016	
Tark.		
	Lehti 13 / 17	Kokonaisuus
		Piirustusnumero
		Sähköpositio
		Työnumero

SAH GE200585AMA



GEBWELL
HEATING SOLUTIONS

MLK T 206-232
FLOW-THHROUGH HEATER
WIRING

Suunn. /25.5.2016	Kokonaisuus	Sähköpositio	Työnumero
Piirt. PNy	Lehti 14 / 17	Piirustusnumero SÄH GE200585AMA	
Tark.			

MLK T6-30 GE200585AMA
10.03.2012
A muutos
B muutos
C muutos
D muutos
E muutos
F muutos

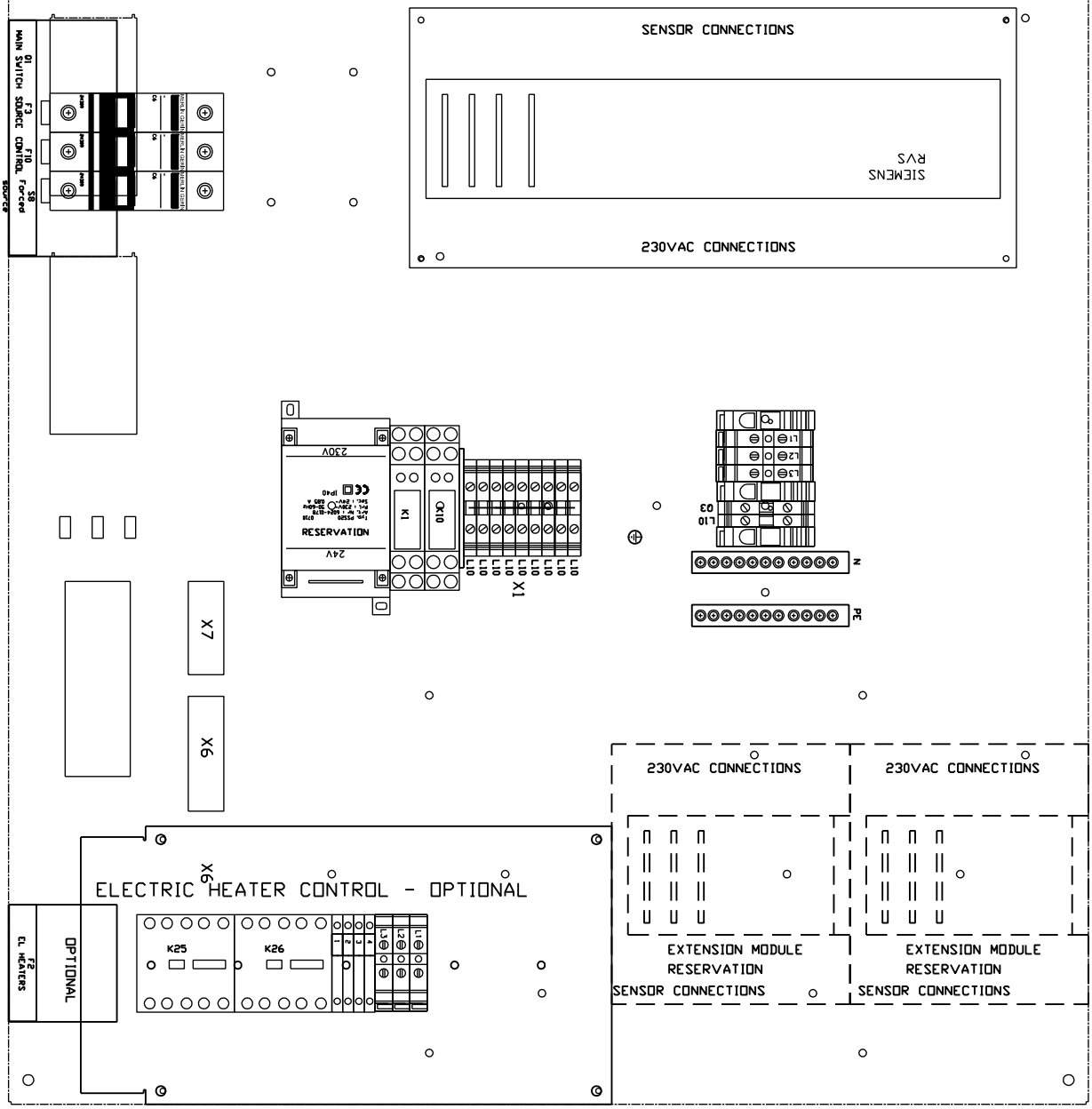
MLK T6-30_GE200585AMA 10.03.2012

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

GEBWELL
HEATING SOLUTIONS

MLK T 206-216
SIEMENS RVS

Piirt.	PNy	Suunn. /25.5.2016
Tark.		
	Lehti 15 / 17	Kokoonpuoss
		Piirustusnumero
SAH GE200585AMA		Sähköpositio
		Työnumero



MLK T6-30_GE200585AMA 10.03.2012

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

GEBWELL
HEATING SOLUTIONS

MLK T 220-232
SIEMENS RVS

Piirt.
PNy
Tark.

Saapunut
/25.5.2016

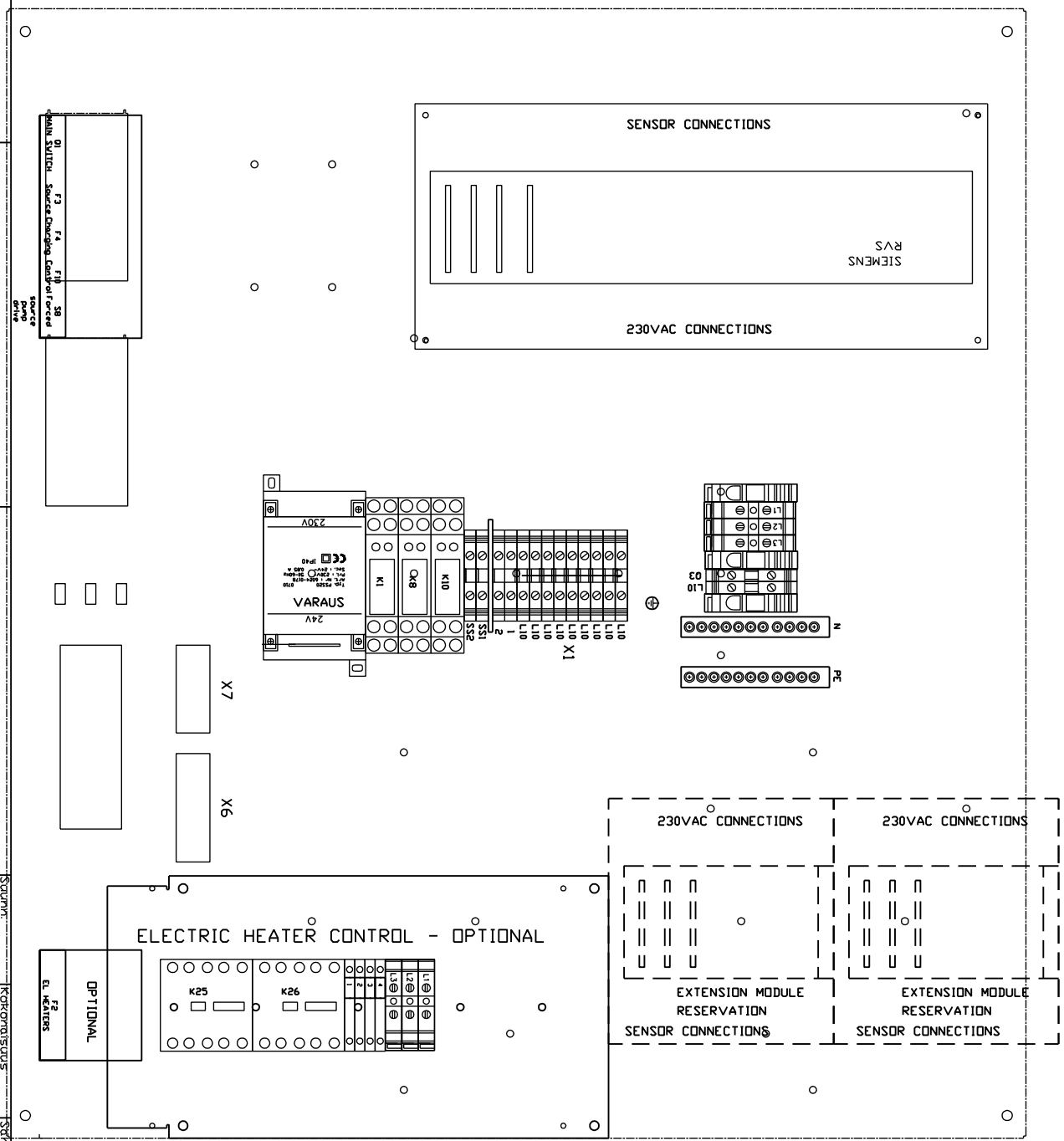
Lehti
16 / 17

Korvaamistieto

Piirustusnumero
SAH GE200585AMA

Sarjakoposition

Tyonumero



T206-216					
NAME	CODE	TYPE	MANUFACTURER	PCS	
MAIN SWITCH	Q1	GA025A	LOVATO	1	
CONTROLLER		RVS	SIEMENS	1	
FUSE	F3,S8,F10	NB1-63 C6A 1p	CHINT	3	
RELAY	K1, K10	2S/A 8A/230VAC	RELPOL	2	
TERMINAL BLOCK	L1, L2, L3	UT 10	PHOENIX	3	
TERMINAL BLOCK	X1, X2	UT 2,5	PHOENIX	n	
PLUG-IN BRIDGE	X1	FBS 5-5	PHOENIX	2	
N-PE-BAR	N, PE	N12, PE12	POLMAN	2	
P1, P2 SUPPLY	X4	770-713/007-000+770-203+770-503/023-000	WAGO	1	
P1, P2 CONTROL,B81	X8	770-753+770-793+770-243+770-283+770-506/029-000	WAGO	1	
PRESSURE SWITCH	X5	770-753+770-743+770-513/023-000	WAGO	1	
COMP SUPPLY	X7	770-744/062-000+770-254/062-000+770-504/023-000	WAGO	1	
COMP CONTROL	X6	770-745+770-255+770-515/023-000	WAGO	1	
T206-T210					
NAME					
SOFT START	A1	RSBT4016EV11HP	CARLO GAVAZZI	1	
HELP RELAY	A1	RFPMV00	CARLO GAVAZZI	1	
MOTOR PROTECTION	F1	4-6,3A	SCHNEIDER	1	
HELP RELAY	F1	GVAD1010	SCHNEIDER	1	
T213					
NAME					
SOFT START	A1	RSBT4025EV11HP	CARLO GAVAZZI	1	
HELP RELAY	A1	RFPMV00	CARLO GAVAZZI	1	
MOTOR PROTECTION	F1	9-14A	SCHNEIDER	1	
HELP RELAY	F1	GVAD1010	SCHNEIDER	1	
T216					
NAME					
SOFT START	A1	RSBT4025EV11HP	CARLO GAVAZZI	1	
HELP RELAY	A1	RFPMV00	CARLO GAVAZZI	1	
MOTOR PROTECTION	F1	9-14A	SCHNEIDER	1	
HELP RELAY	F1	GVAD1010	SCHNEIDER	1	

T220-232				
NAME	CODE	TYPE	MANUFACTURER	PCS
MAIN SWITCH	Q1	GA032A	LOVATO	1
CONTROLLER		RVS	SIEMENS	1
FUSE	F3,F4,S8,F10	NB1-63 C6A 1p	CHINT	4
RELAY	K1, K8, K10	2S/A 8A/230VAC	RELPOL	3
TERMINAL BLOCK	L1, L2, L3	UT 10	PHOENIX	3
TERMINAL BLOCK	X1, X2	UT 2,5	PHOENIX	n
PLUG-IN BRIDGE	X1	FBS 5-5	PHOENIX	2
N-PE-BAR	N, PE	N12, PE12	POLMAN	2
P1, P2 SUPPLY	X4	770-713/007-000+770-203+770-503/023-000	WAGO	1
P1, P2 CONTROL,B81	X8	770-744/062-000+770-254/062-000+770-504/023-000	WAGO	1
PRESSURE SWITCH	X5	770-753+770-743+770-513/023-000	WAGO	1
COMP SUPPLY	X7	770-744/062-000+770-254/062-000+770-504/023-000	WAGO	1
COMP CONTROL	X6	770-745+770-255+770-515/023-000	WAGO	1
T220				
NAME				
SOFT START	A1	RSBT4032EV11HP	CARLO GAVAZZI	1
HELP RELAY	A1	RFPMV00	CARLO GAVAZZI	1
MOTOR PROTECTION	F1	13-18A	SCHNEIDER	1
HELP RELAY	F1	GVAD1010	SCHNEIDER	1
T20-32 ACCESSORY BAG EXT.GROUND SOURCE PUMP GABLES 4 PCS,QUIDE,BAG			----	1
T226				
NAME				
SOFT START	A1	RSBT4032EV11HP	CARLO GAVAZZI	1
HELP RELAY	A1	RFPMV00	CARLO GAVAZZI	1
MOTOR PROTECTION	F1	20-25A	SCHNEIDER	1
HELP RELAY	F1	GVAD1010	SCHNEIDER	1
T20-32 ACCESSORY BAG EXT.GROUND SOURCE PUMP GABLES 4 PCS,QUIDE,BAG			----	1
T232				
NAME				
SOFT START	A1	RSBT4032EV11HP	CARLO GAVAZZI	1
HELP RELAY	A1	RFPMV00	CARLO GAVAZZI	1
MOTOR PROTECTION	F1	20-25A	SCHNEIDER	1
HELP RELAY	F1	GVAD1010	SCHNEIDER	1
T20-32 ACCESSORY BAG EXT.GROUND SOURCE PUMP GABLES 4 PCS,QUIDE,BAG			----	1

TECHNICAL SPECS		
T206 - T216		
1. OPERATING VOLTAGE	Un 400	V
2. CURRENT	In 20	A
3. CONTROL VOLTAGE	U 240	V
4. IP-CODE	IP 20	
5. MAX OPERATING TEMPERATURE	35°C	

TECHNICAL SPECS		
T220- T226		
1. OPERATING VOLTAGE	Un 400	V
2. CURRENT	In 25	A
3. CONTROL VOLTAGE	U 240	V
4. IP-CODE	IP 20	
5. MAX OPERATING TEMPERATURE	35°C	

TECHNICAL SPECS		
T232		
1. OPERATING VOLTAGE	Un 400	V
2. CURRENT	In 32	A
3. CONTROL VOLTAGE	U 240	V
4. IP-CODE	IP 20	
5. MAX OPERATING TEMPERATURE	35°C	

		HEATING RESISTORS CONNECTION PART LIST		
CONTACTOR	K25	LC1K0910P7 9A	SCHNEIDER	1
CONTACTOR	K26	LC1K1610P7 16A	SCHNEIDER	1
FUSE	F2	NB1 3P C16	CHINT	1
WORK ON EXPOSURE BUTTON	F2	S9AC230	CHINT	1
TERMINAL BLOCK	PE,N, L1,L2,L3	6mm2	PHOENIX	5
TERMINAL BLOCK	2,3,4	2,5mm2	PHOENIX	3
THERMOSTAT	T1	STB 90-110C LS1 7025	IMIT	1

GEBWELL
HEATING SOLUTIONS

MLK T 206-232
SIEMENS RVS

Suunn. /14.11.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. JTH	Lehti 17 / 17	Piirustusnumero SÄH GE200585AMA	
Tark.			

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

10.03.2012

MLK T6-30 GE200585AMA

GEBWELL

Declaration of Conformity

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

Qi
T^2
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

Gebwell Ltd.
Patruunapolku 5, FI-79100 Leppävirta, FINLAND
Tel. +358 20 1230 800, Telefax +358 17 554 1102
info@gebwell.fi | www.gebwell.fi

This document was signed electronically

Gebwell Ltd.

Patruunapolku 5
FI-79100 Leppävirta
FINLAND

Business ID: 2008956-7

Tel. +358 (0) 20 123 0800
Telefax +358 (0) 17 554 1102
info@gebwell.fi
www.gebwell.com