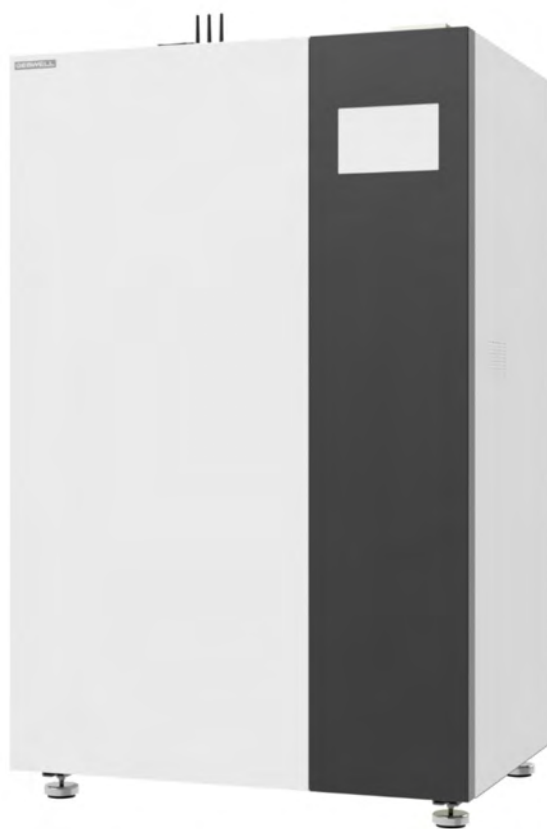


Installation and commissioning instructions

Gebwell G-Eco Core



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Congratulations on an excellent choice!

You have chosen a heat pump that uses the natural refrigerant R290. This solution supports efficient property heating and cooling while utilising a refrigerant with low Global Warming Potential (GWP).

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30 June 2026

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Gebwell Oy makes no express or implied warranties with respect to these operating instructions, including without limitation implied warranties of merchantability or fitness for a particular purpose.

1 General

1.1 Device information and storage of operating instructions



Keep the operating instructions in the immediate vicinity of the device.

Fill in the information below. In the event of a device failure, this information must be available. You will need the heat pump's serial number whenever you contact service or support. You can find it on the rating plate near the control centre.

Heat pump model:	Serial number:
Installation company:	Name:
Installation date:	Tel. no.:
Electrician:	Name:
Installation date:	Tel. no.:



The CE mark is the manufacturer's declaration that the product complies with the requirements of EU legislation. Gebwell Oy declares that the product meets all the requirements of the relevant EU directives. The purpose of the CE mark is to facilitate the free movement of goods within the European internal market.

1.2 Installation record



The heating system must be inspected before commissioning in accordance with current regulations. The inspection may only be carried out by a person qualified for the task.



Fill in the installation record carefully. The installation record is attached to this manual.

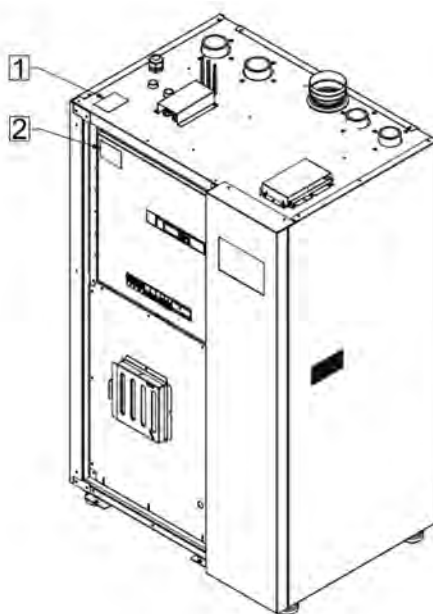


A completed record is a prerequisite for the validity of the manufacturer's warranty.

Mark the following on the annual maintenance sticker:

- Heat pump commissioning date
- The latest date for carrying out the first annual maintenance.

1. Rating plate – serial number
2. Annual maintenance sticker



Heat pump rating plate – serial number

1.3 Device registration



When you register your heat pump within six months of commissioning and the heat pump has a continuous internet connection, you can receive a five-year warranty on the device. For more detailed warranty terms, see Gebwell's general warranty terms.



After commissioning, the heat pump automatically sends telemetry data to the Gebwell Smart cloud. Storing data in the cloud enables the device's history to be viewed in the Gebwell Smart Hub service and the system to be optimised. The data can also be used for technical support and product development.

Register the heat pump you have installed on our website at:

<https://hub.gebwell.fi/register-heatpump/fi>

<https://hub.gebwell.fi/register-heatpump/sv>

<https://hub.gebwell.fi/register-heatpump/pl>

<https://hub.gebwell.fi/register-heatpump/en>

The registration page can also be accessed on a smartphone via the QR code below. If registration is not successful, please contact the Gebwell Oy switchboard on +358 20 1230 800.



Gebwell Oy contact information

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

Technical support contact information

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

1.4 Standards and regulations

Installation work must be carried out in accordance with

- national regulations
- statutory accident prevention regulations
- statutory environmental protection regulations
- industry-specific safety regulations

2 Safety

2.1 Safety symbols

This manual contains danger, warning, caution, and notice statements. They inform the user or representative of an authorised maintenance company of potential harm to the product or to persons.

A hazardous situation means risk of personal injury. Any abnormal use is prohibited, including disregarding the safety information.

Check the safety precautions for each work step in the section for that step!



DANGER indicates an imminently hazardous situation which, if it occurs, will result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if it occurs, may result in minor or moderate injury.



WARNING indicates a potentially hazardous situation which, if it occurs, could result in death or serious injury.



NOTICE indicates a potential situation which, if it occurs, may result in property damage or an undesired outcome or condition.



COMMENT indicates information intended to clarify or simplify a procedure.

2.2 Fire safety



NEVER USE WATER TO EXTINGUISH A HEAT PUMP FIRE!

It is strictly prohibited to use water to extinguish a fire in the heat pump or its immediate vicinity. Using water poses a serious risk of personal injury and explosion for two critical reasons:

1. **Risk of electric shock:** A heat pump is a live electrical device. Water conducts electricity effectively, and spraying it onto the device can create a conductive path between the person extinguishing the fire and the electrical current. This can cause an immediate, life-threatening electric shock.
2. **Flammable refrigerant (R290):** The device's refrigerant circuit contains R290 refrigerant (propane), which is a highly flammable gas. In gas fires (Class C fires), water is ineffective as an extinguishing agent and does not stop the chain reaction caused by the burning gas.

Correct action in the event of a heat pump fire:

1. **Switch off the power:** If possible, immediately disconnect the power supply to the device at the property's distribution board or the device's safety switch. Do not touch the heat pump itself.
2. **Use the correct fire extinguisher:** For initial extinguishing, use only an extinguisher suitable for electrical and gas fires. The best options are:
 - o **Dry powder extinguisher (Class ABC)**
 - o **Carbon dioxide (CO2) extinguisher**
3. **Beware of combustion gases and gas accumulation:** R290 refrigerant is heavier than air and, if it leaks, can accumulate at floor level, forming an explosive mixture. Also avoid inhaling the toxic fumes produced by burning electrical equipment and plastic parts.
4. **Evacuate and call for help:** If the initial extinguishing attempt is not immediately effective, leave the room, close the doors behind you (to deprive the fire of oxygen), and immediately call emergency number **112**.

2.3 Highly flammable refrigerant

Gebwell G-Eco heat pumps contain R290 refrigerant, which is classified as a highly flammable, Class A3 substance.

When installing, operating, and servicing the device, the special safety instructions for flammable substances must be followed to prevent the risk of ignition and refrigerant leaks. However, thanks to the device's safety mechanisms, the risk of leaks is very limited. This requires that the equipment is installed and used in accordance with the instructions. The Gebwell G-Eco heat pump does not in itself create a hazardous area classification in the space where it is used. Note that pressure tests and flushing may only be performed using nitrogen.

Due to its low flash point, it is particularly important to identify and eliminate potential ignition sources before starting maintenance and installation work. Ignition sources can include open flames, hot surfaces, mechanical sparks, and static electricity from clothing, for example. Carefully check for and identify ignition sources before starting work.

2.4 Safety features

The heat pump is equipped with a safety circuit specially designed for R290 refrigerant (propane). Its key function is to ensure that no flammable air-gas mixture can form inside or near the device under any operating conditions.

The safety circuit consists of the following monitoring and extraction components:

- Refrigerant sensor (gas detector)
- Differential pressure transmitter
- Ventilation air extractor
- Ventilation ductwork

2.4.1 Ventilation air extractor

Due to the R290 refrigerant (propane) used in the device, the heat pump is equipped with an external ventilation air extractor. The main purpose of ventilation is to prevent the formation of flammable gas mixtures inside the heat pump and in its immediate vicinity. In addition, continuous ventilation cools the compressor compartment and maintains the underpressure required for safety in the refrigeration equipment compartment.



WARNING The heat pump must not be operated under any circumstances without a functioning ventilation air extractor. The device's automation monitors the pressure difference, and the device cannot be operated or started if the required underpressure is not present in the refrigerant module.

Ventilation air extractor control modes

The ventilation air extractor control has three automatic stages, which activate in accordance with the device's various operating conditions:

- **NORMAL (Basic mode):** The heat pump's automation aims to keep the device's internal underpressure at **10 Pa** during normal operation.
- **BOOST (Temperature control):** When the internal temperature of the device enclosure rises above **40 °C**, BOOST mode is activated. The heat pump's automation increases the extractor's rotation speed until the temperature in the compressor compartment returns to a normal level (below 35°C).
- **SAFETY (Leak situation):** In the event of a refrigerant leak, the heat pump's automation increases the extractor's power to **100 percent**. The ventilation flow then increases above the required $Q_{\min}$ value, and the underpressure rises to at least **20 Pa** so that the propane gas is removed from the device safely and quickly.

Installation and dimensioning responsibilities

It is particularly important to ensure that:

1. The ventilation is correctly dimensioned along the entire length of the exhaust duct.
2. The system operates without obstruction and produces the required underpressure.
3. The ventilation exhaust outlet is positioned in a location where gas discharged in the event of a fault does not pose a hazard to the surroundings.

Carry out all ventilation system checks and differential pressure measurement tests before actual commissioning of the device. **The owner of the device is responsible for the adequate dimensioning of the ventilation system.** For more information, see Section 6.2: *Installing the ventilation air extractor*.



Ensure that the ventilation is designed in accordance with the instructions in **Section 5.4**, so that the minimum ventilation flow rate ($Q_{\min}$) is achieved in **SAFETY** mode.

Replacement air and filtration

For the exhaust ventilation to function correctly, special attention must be paid to ensuring a sufficient supply of replacement air.

- The amount of replacement air is adjusted using the damper located on the inside of the device's lower front panel.
- If replacement air is taken directly from the installation space (e.g. a technical room), it must be ensured that sufficient replacement air is available in that space without creating excessive underpressure.

ATTENTION: Ventilation filter

The replacement air valve is fitted with a filter that protects the internal parts of the device from dust and dirt. The filter must be replaced during maintenance **at least once a year**. If the conditions at the installation site

are dusty and the filter becomes dirtier than normal, the filter must be replaced more frequently. A clogged filter prevents the airflow required by the safety circuit from being achieved.

R290 refrigerant properties and exhaust pipe positioning

R290 refrigerant (propane) is a gas that is heavier than air. In the event of a leak, the gas flows downwards and collects in the heat pump's bottom tray, where the suction end of the exhaust air duct is also located. For this reason, great care must be taken when positioning the exhaust duct leading out of the device:

- The outlet pipe of the exhaust duct must be positioned so that the discharged gas does not pose a hazard to the surroundings or to people.
- There must be no facilities below ground level (e.g. basement windows or doors) in the immediate vicinity of the outlet pipe. It is also not recommended to route the pipe near places where the heavy gas could accumulate, such as rainwater drains or pits in the ground.

For detailed instructions on the safe positioning of the device and installation examples of the exhaust air duct discharge, see the following chapters of this manual:

2.4.2 Differential pressure transmitter

As standard, the heat pump is fitted with an electronic differential pressure transmitter (differential pressure sensor), which is an essential part of the device's safety circuit. Its primary function is to continuously monitor the underpressure inside the heat pump's sealed machine compartment relative to the surrounding room.

Operating principle and safety trip

- The transmitter verifies in real time that the ventilation air extractor generates sufficient underpressure in the machine compartment, as required for safety (in normal operation, the target is 10 Pa). This underpressure is important to ensure that, in the event of a leak, the propane gas is directed into the exhaust duct in a controlled manner and does not leak into the installation space.
- If the underpressure in the machine compartment drops or deviates from the defined safe limit values (for example, due to a clogged filter, a faulty ventilation air extractor, or a service hatch left ajar), the safety circuit is activated.
- The automation stops the compressor and generates an alert on the controller display, which cannot be dismissed until the required underpressure has been restored.

Airtightness of the device

Because the differential pressure transmitter is highly sensitive, it is important to ensure that all of the heat pump's cover panels and service hatches are closed tightly after completing maintenance work. Even a small air leak in the enclosure can prevent the required underpressure from being created and stop the device from starting.



If the panels of the device's machine compartment are opened, the heat pump will shut

2.4.3 Refrigerant leak detector

The heat pump is equipped with an electronic refrigerant leak detector. As part of the safety concept, the device's automation continuously monitors the operation of the sensor and the gas concentration in the machine compartment.

Action in the event of a leak

If a refrigerant leak occurs inside the device and the gas concentration exceeds the safety-critical alert limit, the automation initiates the following safety chain:

1. **Safety stop:** Compressor operation is stopped.
2. **SAFETY mode (Ventilation):** The ventilation air extractor is switched to SAFETY mode (100% power). This maximises the ventilation flow and vents the leaked gas out through the exhaust duct quickly and in a controlled manner.
3. **Alert:** A high-priority alert is generated on the device's controller and in any higher-level automation system (BMS).

SAFETY:

In the event of a refrigerant leak, the device automatically switches to SAFETY mode and increases the exhaust ventilation to maximum. This prevents a dangerous, flammable concentration of gas (R290) from forming in the vicinity of the device. **Exhaust ventilation that is correctly installed and adjusted in accordance with the instructions ensures that a leak poses no danger to the property or to people.**

Alert dismissal and reset

For safety reasons, the device does not recover from a leak situation automatically.

- SAFETY mode and the associated leak alert must always be dismissed manually on the heat pump controller.
- The device should not be restarted until an authorised refrigeration technician has located and repaired the leak.

2.5 Hazardous substances

Refrigerant

The heat pump contains a refrigerant with a low flash point (A3). The refrigerant is contained in a closed refrigerant circuit in the compressor module. Gebwell G-Eco heat pumps do not create a hazardous zone classification in the installation space.



The refrigerant circuits of heat pumps contain both very low (-25°C) and very high (+130°C) temperatures. Working on the heat pump can lead to frostbite and burns.



If the device detects a refrigerant leak, ensure that the backup heating switches on and contact a maintenance company immediately.



Do not perform a pressure test on the refrigerant circuit with any substance other than nitrogen.



Work on the refrigerant circuit may only be carried out by persons with refrigeration qualifications.



Do not use any refrigerant other than the one intended for the device. The refrigerant is specified on the rating plate and in the technical table of this manual.

Brine

Antifreeze mixtures used as brine, such as ethanol, are highly flammable. Avoid splashing the fluid onto the skin.

Compressor oil

The oils used in the compressor are toxic and can cause serious illnesses.

3 Introduction to the heat pump

3.1 System description

A well-designed and correctly dimensioned heat pump system is an energy-efficient solution with very low running costs. The equipment reliably and efficiently heats both the entire property and the domestic hot water it requires.

The basic operation of a heat pump is based on collecting low-temperature thermal energy from an external heat source and transferring it into the heated building at a higher temperature.

The system's heat source can be, for example:

- A **ground source heat well** (an energy well drilled into bedrock)
- **Ground** (a horizontal brine circuit buried in the surface soil)
- A **body of water** (a brine circuit anchored to the bottom)
- **Ventilation** (exhaust air heat recovery)
- **Waste heat** (various waste heat processes from industry or the property)

Cooling feature (Free cooling/Ground source cooling)

In addition to producing heat, the system can also be used for environmentally friendly cooling of the property during the summer. The naturally low temperature of the cool brine coming from the heat source (such as an energy well) is then used directly to cool the building, which makes the cooling highly energy efficient.



More information about brine collection systems and their dimensioning can be found on the websites of Gebwell Oy and the Finnish Heat Pump Association.

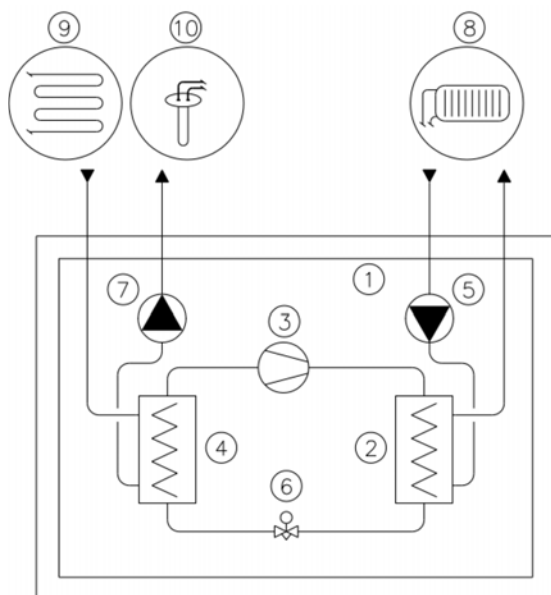
www.sulpu.fi

www.gebwell.fi

3.2 Operating principle of a heat pump

A heat pump consists of four main components:

- evaporator
- compressor
- condenser
- expansion valve



1	Heat pump	6	Expansion valve
2	Condenser	7	Brine pump
3	Compressor	8	Heating circuit
4	Evaporator	9	Surface brine circuit
5	Charging pump	10	Energy well

Operating principle

The operation of the heat pump is based on a closed refrigerant circuit in which the equipment transfers low-temperature energy from the ground into a higher-temperature heating system. The device's refrigeration process consists of four main stages:

1. **Evaporator (4):** Heat stored in the ground is collected into the brine circulating in the collector pipework. In the evaporator, this brine transfers its energy to the device's refrigerant, which evaporates (turns into gas), absorbing heat as it does so. The brine typically returns to the ground approximately 3 °C cooler. The brine entering the heat pump must be no colder than -10 °C.
2. **Compressor (3):** The gaseous refrigerant is drawn into the compressor, which compresses it to a high pressure. This causes the temperature of the refrigerant to rise sharply. At this stage, the refrigerant also absorbs thermal energy generated by the compressor's mechanical work.
3. **Condenser (2):** The hot, high-pressure refrigerant gas flows into the condenser. It transfers its thermal energy there to the water circulating in the heating system. A change-over valve then directs this water either to heating the property or to domestic hot water production. As it gives off heat, the refrigerant condenses back into liquid.
4. **Expansion valve (6):** The liquid refrigerant coming from the condenser is still at high pressure. The pressure is reduced rapidly in the expansion valve, which also causes its temperature to drop (to approximately -10 °C). The valve injects a metered amount of liquid refrigerant back into the evaporator for a new cycle.

Automation, pumps, and power control

The heat pump has a built-in automation system that controls all internal operating and safety functions based on measurement data from temperature sensors and pressure transmitters.

- The device has an inverter-controlled compressor. The frequency converter provides continuously variable adjustment of the compressor's rotation speed and thus of the power produced by the

device. The controller always optimises power control in accordance with real-time heating demand and conditions.

- The speed of the device's internal circulation pumps is dynamically controlled, based on the temperature differences (ΔT) across the condenser and evaporator. The temperature difference settings automatically adapt to what the device is currently heating (e.g. domestic water vs. space heating) or cooling. These values can be managed via the controller's user interface.

Data communication and remote connections

The device's advanced automation enables versatile connections and remote management:

- When several heat pumps are connected in parallel (cascade), the devices communicate seamlessly with each other via an IP bus.
- The heat pump can be connected directly to an external building automation system via Modbus TCP/IP or Modbus RTU interfaces. *(For more information, see Chapter 15: Modbus registers).*
- The heat pump system has a built-in, secure connection to the **Gebwell Smart Hub** cloud server for remote monitoring of the device.

Controller operation and power demand management

Heat pump control is based on the dynamic management of power demand, which is adjusted using temperature measurements. The automation generates a real-time setpoint based on the current operating situation, and the PI controller uses this to calculate the required power demand. When the required power exceeds the compressor's minimum operating range, the device begins the start-up process.

Each operating mode (building heating, domestic hot water production, and cooling) has its own dedicated functional sensor that controls the power demand. *(For the locations of the sensors and components, see Chapter 3.5: Heat pump components and sensors).*

Starting the device

When the value measured by the functional sensor falls below the setpoint and the power counter reaches the start point, the automation performs the following start-up sequence:

1. The **charge pump (Q9)** starts at its defined start speed.
2. The **collector pump (Q8)** starts at its start speed and runs for the required pre-run time.
3. The **expansion valve (EEV)** opens to the start position.
4. The **compressor crankcase heater** switches off.
5. The **compressor (K1)** starts at its start speed and runs for a fixed 60-second start period.
6. After this, the controller switches to dynamic power control. It controls the compressor's rotation speed so that the measurement of the functional sensor remains at its setpoint.

ATTENTION: Minimum run time The compressor's normal minimum run time is 15 minutes. If the device is used for mechanical cooling, the minimum run time must be set to a shorter value (lowest permitted value 10 minutes), so that the temperature of the liquid being cooled does not fall dangerously low.

IMPORTANT: Stability of conditions

To ensure the optimal operation of the device and the durability of the compressor, **rapid and continuous changing of the conditions (e.g. using a change-over valve or building automation control) is strictly prohibited**. Rapid back-and-forth changes in load cause oscillation in the refrigeration process, which shortens the compressor's service life and can lead to failures.

Switching off the device

When the heating demand has been met and the power demand drops to zero (or the shutdown limit is reached), the automation performs a controlled stop:

1. The compressor slows down to minimum speed.
2. The expansion valve closes.
3. The compressor continues at minimum speed, recovering the refrigerant (pump down function), until the suction pressure transmitter (B85) reaches the set limit value, at which point the compressor stops.
4. The crankcase heater switches on if the oil temperature requires it.
5. The collector pump runs for the set run-on time and then stops.
6. The operation of the charge pump depends on the operating mode: it either continues to circulate in standby mode or stops.

(Note: The compressor's minimum rest time after shutdown is 10 minutes. The device will not restart until this time has elapsed.)

Safety features during operation

The device's temperature sensors and pressure transmitters protect the refrigeration process from deviations. If any value approaches a safety limit, the automation first attempts to correct the situation internally by changing the speed of the circulation pumps or the compressor. If the conditions cannot be corrected, the device stops for safety reasons and generates an alert. If electric heaters (backup heat) are connected to the system and there is still a heating demand, the device automatically switches to backup heat mode in the event of a fault.



To ensure the optimal operation of the device and the durability of the compressor, rapid and continuous changing of the conditions, e.g. using an external change-over valve, is prohibited. Rapid back-and-forth changes in conditions cause oscillation in the refrigeration unit, which can affect the durability of the compressor.

External lockout (EVU Lock)

External lockout (EXT ILK) is a feature that allows the heat pump compressor operation to be temporarily disabled. The function is typically used for peak load management in the electricity grid (demand response) or for building automation purposes.

Operation during lockout

When the control system receives an external lockout signal, the automation system shuts down the compressors in a controlled manner and prevents them from restarting. The heat pump control system and user interface remain fully operational throughout the lockout period. The circulation pumps continue to operate normally, and the automation system maintains the operation of all controlled circuits.

Control of auxiliary and backup heat sources

If auxiliary or backup heat sources have been configured in the heat pump control system, their operation during an external lockout can be set individually to either ENABLED or DISABLED, depending on the heat source in question.

For example, if district heating is used as an auxiliary heat source, it can be set to ENABLED so that the heating demand normally covered by the compressors during the electrical lockout period is supplied by district heating.

End of lockout

When the external lockout signal is removed, the heat pump automation system immediately releases the lockout. The unit automatically returns to normal operating mode and resumes space heating and/or domestic hot water production according to the current demand and the normal start-up delays.

3.3 User interface

The heat pump is controlled and monitored using a touchscreen located on the front panel of the device. The display serves as the main local user interface for the equipment, enabling clear and effortless management of the entire system. In systems with multiple devices, the Master device handles the cascade control of the entire system, and all connected devices are managed centrally from the Master device's display.

Logical and real-time view The user interface is designed to be intuitive for both the end user and maintenance personnel. The main view of the display shows the system's most important real-time information at a glance, such as:

- The active operating mode (e.g. heating the property, domestic water production, or cooling).
- Key setpoints, network temperatures, and the output produced by the device.
- Any notifications and alerts generated by the automation.

Menus and changing setpoints Detailed instructions on the touchscreen menu structure, changing setpoints, and the daily management of the device are described in a later chapter of this manual: *USING THE HEAT PUMP*.



3.4 Energy-saving tips and system optimisation

The function of the heat pump is to produce heat and domestic hot water for the property in accordance with the setpoints specified by the user. The system attempts to meet these requirements by all available means, depending on the settings.

Total energy consumption is significantly affected by the selected indoor temperature, domestic water consumption and its set temperature, the quality of the property's insulation, and the desired level of comfort. Always consider these factors when making changes to the device settings. Even a small decrease in indoor temperature (e.g. 1 °C) can bring significant savings in heating costs.

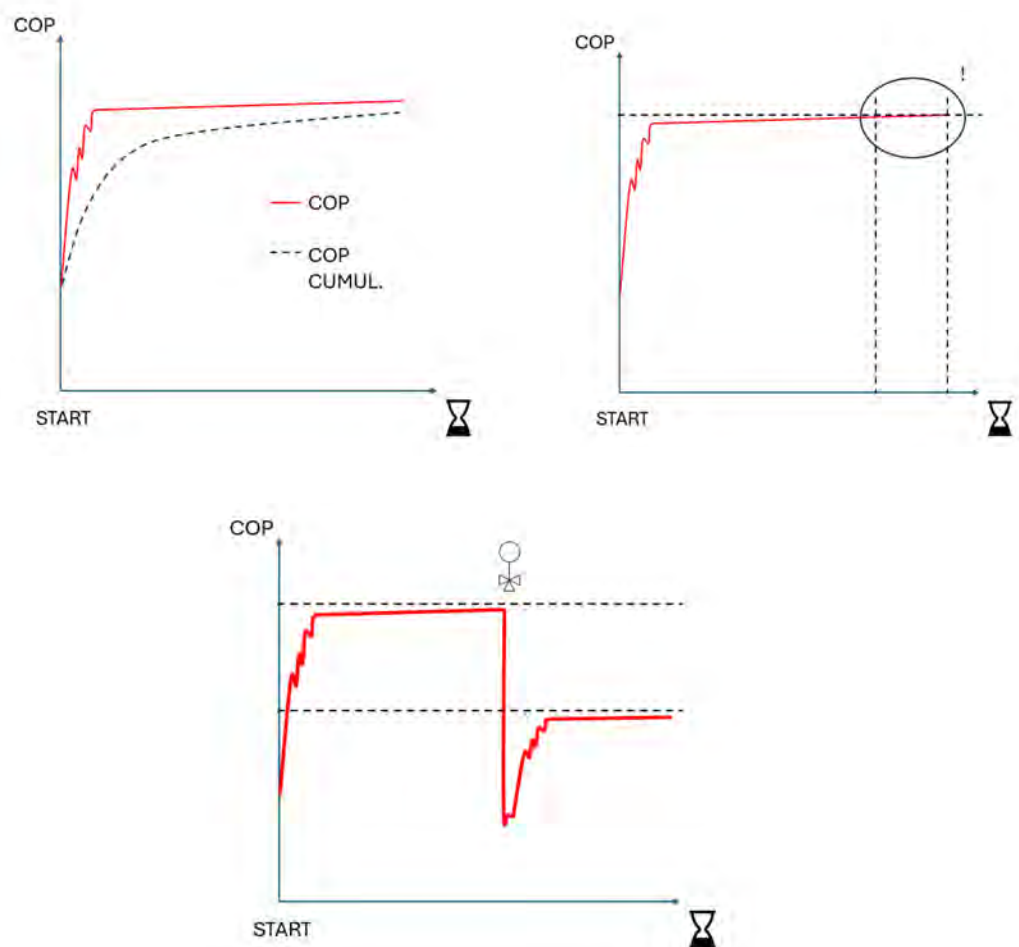
Factors affecting the coefficient of performance (COP) of the device

The efficiency of a heat pump is measured by its coefficient of performance (COP). The following factors are critical to achieving optimal efficiency and long service life for the device:

- **Length of operating cycles:** When the heat pump starts, it takes a moment for the pressures and temperatures of the refrigeration process to stabilise. If the device's operating cycles are repeatedly short (short cycling), the cumulative efficiency during an operating cycle will be significantly lower than the device's nominal efficiency. The longer the compressor runs continuously under stable conditions, the better the device's efficiency over time.
- **Process changes and stability of conditions:** Repeated and rapid process changes, such as constantly switching the change-over valve between domestic water heating and property heating,

temporarily reduce efficiency. Rapid changes in conditions cause oscillation in the control of the refrigerant circuit. If the process is reversed frequently, the equipment will operate unstably and consume more energy.

- **Correct use of room thermostats:** Room-specific thermostats for underfloor heating and radiators can have a negative impact on energy consumption if used incorrectly. If the thermostats are set too low, they throttle and slow down the flow in the heating system. In this case, the heat pump has to compensate for the reduced flow by raising the supply water temperature of the entire network, which consumes an unnecessary amount of electrical energy.
- **Optimal adjustment method:** Adjust the property's base temperature using the heat pump's **heating curve**, keeping the room thermostats fully open. The sole purpose of the thermostats should be to respond to occasional, so-called **free heat** (e.g. sunshine, heat generated by people, or heat from a fireplace) by temporarily closing the circulation in that room.

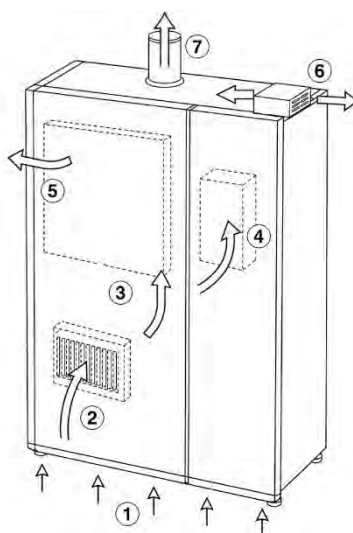


3.5 Internal ventilation and cooling of the heat pump

For the reliable and safe operation of the heat pump, it is important that the internal ventilation of the device and the cooling of the components can operate unhindered. The device has three separate, independent air circulation paths.

Air circulation routes and function

- **Cooling module ventilation (1, 2, 7):** The refrigerant module is a completely sealed unit whose ventilation is controlled by the ventilation air extractor. Replacement air is drawn in through the bottom edge of the front door (1), from where it is led through the damper (2) to the top of the module. Exhaust air is drawn from the bottom of the module through an internal duct, and directed from the roof of the device into the exhaust air duct leading out of the property (7).
- **Control centre cooling (3, 5):** Cooling of the control centre is controlled automatically based on the internal temperature measured by the controller. Cooling replacement air is taken from the space behind the front panel (3), and the heated air is blown out into the technical room from the left side of the device (5).
- **Frequency converter cooling (4, 6):** Cooling air for the frequency converter is taken from the space behind the front panel (4) and blown out through the roof of the device (6).



Clearances and conditions

To prevent overheating of the device and disruption of the safety functions, the following must be ensured:



The air vents must never be blocked or covered.



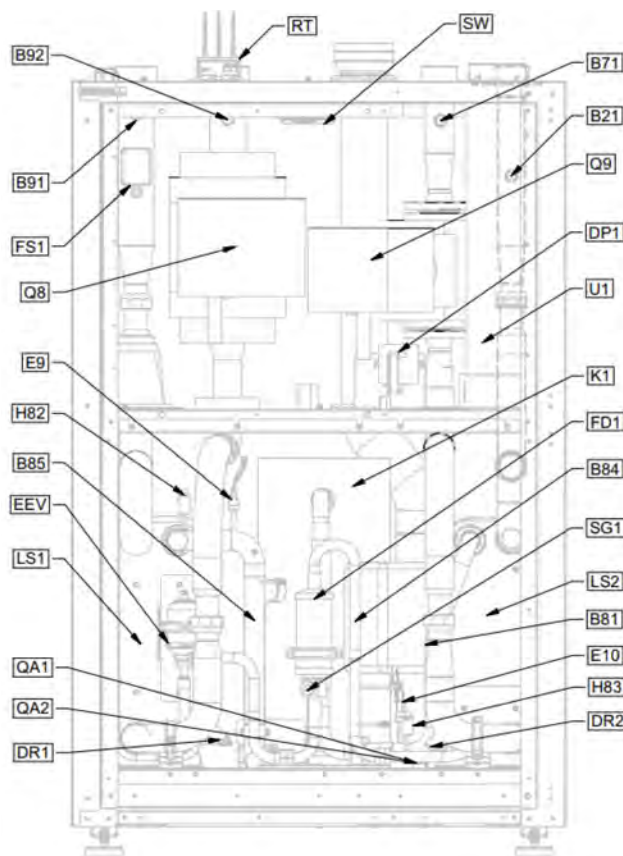
The free maintenance and ventilation clearances specified in the manual must be maintained round the device.



The ambient temperature at the installation site must remain within the recommended limits of +15 ... +25 °C.

3.6 Heat pump components and sensors

The heat pump contains components as well as internally installed functional and measuring temperature sensors. The sensors are attached to the heat pump components and insulated from external heat. Some of the sensors are located inside the heat pump and some outside it.



RT	Router	B71	Charging circuit, return water (immersion sensor)
SW	Network switch	B21	Charging circuit, supply water (immersion sensor)
B91	Brine circuit, in (immersion sensor)	Q9	Charging pump
FS1	Flow switch (accessory)	DP1	Condenser
Q8	Brine pump	U1	Frequency converter
E9	Low-pressure switch	K1	Compressor
H82	Pressure transmitter, low pressure	FD1	Filter dryer
B85	Suction gas (surface sensor)	B84	Liquid line at condenser (surface sensor)
EEV	Electronic expansion valve	SG1	Sight glass
LS1	Evaporator	LS2	Condenser
QA1	Leak detector 1	B81	Hot gas (surface sensor)
QA2	Leak detector 2 (accessory)	E10	High-pressure switch
DR1		DR2	

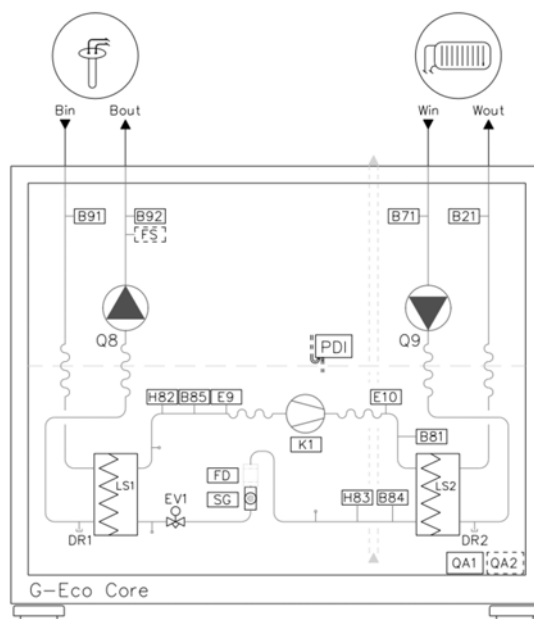
DR1 Drain, evaporator

H83

Pressure transmitter, high pressure

DR2

Drain, condenser



Q8 Brine pump

Q9 Charging pump

B91 Brine circuit, in (immersion sensor)

B21 Charging circuit, supply water (immersion sensor)

B92 Brine circuit, out (immersion sensor)

B71 Charging circuit, return water (immersion sensor)

FS Flow switch (accessory)

K1 Compressor (scroll)

LS1 Evaporator

LS2 Condenser

EV1 Electronic expansion valve, evaporator

B84 Refrigerant liquid (surface sensor)

SG Sight glass

FD Filter dryer

B85 Suction gas 1 (surface sensor)

B81 Hot gas (surface sensor)

E9 Low-pressure switch

E10 High-pressure switch

H82 Pressure transmitter, low pressure

H83 Pressure transmitter, high pressure

QA1 Leak detector 1

QA2 Leak detector 2 (accessory)

PDI Differential pressure transmitter

DR2 Drain, condenser

DR1 Drain, evaporator

4 Delivery and handling



Before unloading the shipment, the recipient must inspect it for possible damage. Damage must be entered in the consignment note and reported to both the transport company and Gebwell Oy. Any damage discovered after opening the package as well as any hidden defects caused by transport must be reported to the supplier without delay, and within 10 days at the latest.

4.1 Delivery contents

- Gebwell G-Eco Core heat pump
- Installation, commissioning, and maintenance manual
- Electrical diagrams
- Maintenance log
- Ventilation air extractor and controller (required accessory**)

***Compliant use of the product requires a ventilation air extractor suitable for the system.*

4.2 Standard equipment

- Router + option for the customer's internet connection (factory-installed on top of the device)
- Outdoor temperature sensor (B9)
- Upper sensor for the domestic hot water tank (B2)
- Lower sensor for the domestic hot water tank (B3)
- Operating, maintenance, and installation manual – includes electrical diagrams

4.3 Optional accessories

- Energy measurement, charging circuit (flow meter)
- Brine circuit flow switch
- Pressure measurement (charging circuit/brine circuit/freely selectable)
- Leak detector 2
- Gas separator for indirect circuits
- Network switch – connection instructions
- TC1.4 - Cascade/additional heat control module -> includes sensors B10, B11, and B15
- TC1.2 – Heating groups / flow measurement control module -> includes B1, B12, and B14
- TC1.5 – Mechanical cooling control module -> includes B40, B41, B42, and B43
- TC1.6 – Cooling groups control module -> includes B16 and B26
- TC1.7 – Domestic water / pressure measurement control module -> includes B38 and B39
- TC1.8 – IO measurement module
- Change-over valves
- Heating groups
- Valve groups
- DHW shunts

4.4 Storage and warehousing

Before installation, the heat pump must be stored in its original delivery packaging in **dry and warm indoor premises**.

IMPORTANT: Risks caused by moisture

Storing the device outdoors or in a cold or damp space must be strictly avoided. Temperature fluctuations and humidity can cause condensation inside the device, which exposes sensitive electrical and automation components to oxidation and short circuits. This can lead to serious malfunctions or component failures as soon as the device is commissioned.

4.5 Recycling

When the heat pump is decommissioned, its refrigerants must be removed by an authorised refrigeration technician. Otherwise, refrigerants must be disposed of as hazardous waste in accordance with local regulations.

Recycle the fluids contained in the brine and charging circuits appropriately. Collect the oils from the heat pump, and dispose of them as hazardous waste in accordance with local regulations.

Return the drained heat pump to a WEEE collection point. More information about collection points is available at www.elker.fi. The appropriate recycling fees have been paid for heat pumps and packaging materials delivered to Finland. You can find the nearest recycling point for packaging materials at <https://rinkiin.fi/>.



5 Installing the heat pump

Points to note during installation and maintenance



Install the system in accordance with this installation manual. Install the device securely on a load-bearing surface so that it cannot fall and cause property damage or personal injury. Ventilation must be started before commissioning!



Do not lift the device from any points other than those indicated in the manual. The metal edges of the heat pump can cause cuts to your hands during handling. Wear cut-resistant gloves during transport.



Disconnect the main power supply to the device before performing any maintenance.



Remove all sources of ignition from the area before starting work. The equipment must not be started in dusty conditions.



Never rinse the heat pump with water.



Do not touch the buttons with wet hands.



Do not touch the refrigerant pipes with bare hands while the device is operating.



Use original accessories and components for installation.



Keep all of the device's cover panels in place during installation. If the panels are removed while the device is running, the device will shut down.



Do not cover the heat pump's air intake or outlet openings (Virhe. Viitteen lähde ei löytynyt. and Virhe. Viitteen lähde ei löytynyt.).



Shut down the device in a controlled manner from the control terminal before disconnecting the main power. Do not switch off the system using the main switch.



Do not disconnect the power supply immediately after shutting down the heat pump. Wait at least five minutes.

5.1 Transporting the heat pump



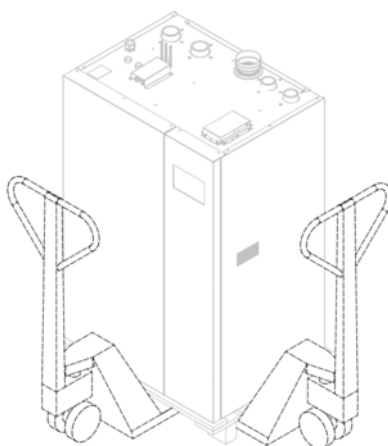
Make sure that the heat pump cannot tip over during transport or lifting. Take the weight of the device into account when planning the lift.

The heat pump is a heavy device, and special care must be taken when moving it to avoid personal injury and damage to the device. Transport the heat pump to the installation site, preferably on its original pallet, using a pallet truck or similar moving equipment.

The heat pump must always be transported and stored in an **upright position**. Laying the device down horizontally or tilting it steeply may damage it. During moving, the device may be temporarily tilted by a maximum of 30 degrees.

Moving with a pallet truck or sack truck

- Note that the device's centre of gravity is high and often off-centre (on the compressor side). The device is highly prone to tipping over sideways during moving.
- Keep the device attached to the delivery pallet for as long as possible. Remove the pallet only when the device is immediately adjacent to its final installation location.
- If the moving route is narrow, it is recommended to remove the protective panels of the device's outer casing for the duration of the move to avoid scratches and dents.

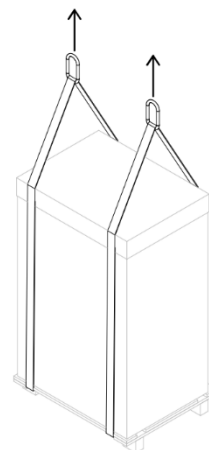


The heat pump can be moved with a pallet truck from either the end or the side

Moving with a crane

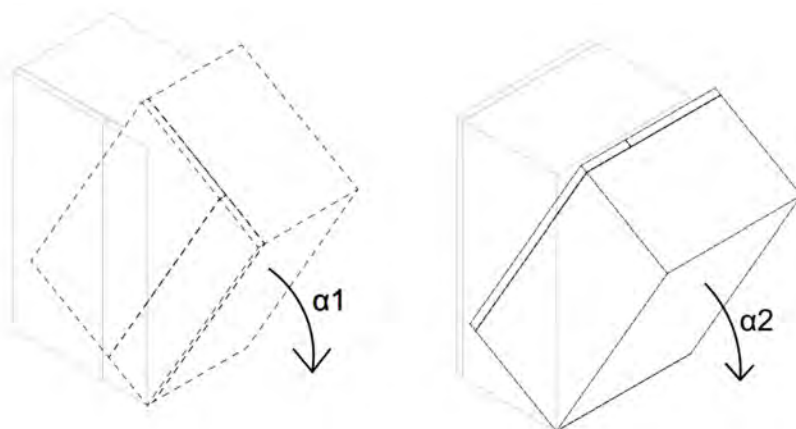
The heat pump can also be moved with a crane. In this case, at least two approved lifting slings or straps rated for the transport weight of the device must be used.

- The lift must always be carried out using a spreader bar (lifting beam) at the top of the slings. Without a spreader bar, the lifting slings will compress the top of the device and break the casing.
- Protect the heat pump's painted surfaces and corners with a soft cloth, cardboard, or similar sheet material to prevent the straps from rubbing against or damaging the surface of the device.
- Carefully ensure that the straps cannot slip out of place under any circumstances during lifting. The lifting slings must be placed securely under the base of the device.
- Lifting safety must always be planned in advance, and it is the sole responsibility of the contractor carrying out the installation work and the site.





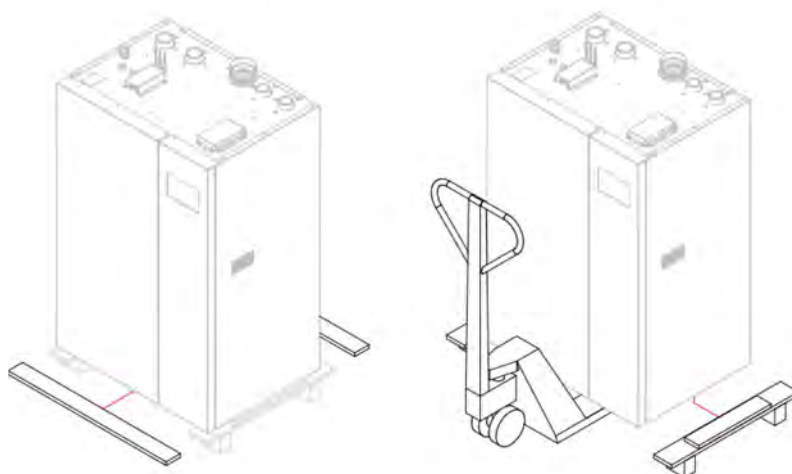
You can tilt the heat pump **temporarily by up to 30°**, but do not leave the pump in a tilted position for a long time, even during transport. If the heat pump has been tilted, it must be left in an upright position for at least two hours before starting, so that the compressor's lubricating oil has time to flow back to the correct place.



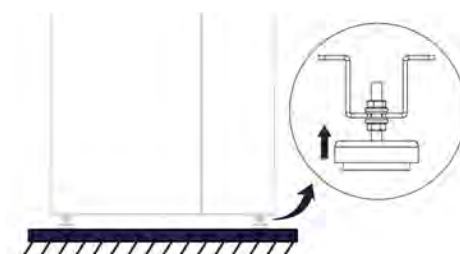
5.2 Unpacking the device

Before moving the heat pump to its final location, it must be removed from its transport pallet. Take care when unpacking and carry out the steps in the order below.

1. **Removing packaging materials:** Carefully remove the protective plastic and other packaging materials. Be careful not to scratch the painted surfaces of the device with sharp tools.
2. **Delivery inspection:** Check the rating plate to ensure that the delivered product is correct. At the same time, check that the packaging contains all the separate accessories included (e.g. adjustment feet, sensors, and manuals).
3. **Lifting the device:** Lift the heat pump slightly upwards, for example with a pallet truck or toe jacks, so that its weight is off the pallet. *Note that the device's centre of gravity is high and off-centre during lifting.*
4. **Removing the transport platform:**
 - o Remove the screws and the side boards of the transport platform on both sides.
 - o Remove the screws securing the heat pump to the wooden transport platform.
 - o Lift the device from the front/rear with a pallet truck and remove the ends of the transport platform



5. **Installing the adjustable feet:** Install the adjustable feet supplied with the device on the bottom of the heat pump in place of the removed transport brackets. At this stage, screw the feet to the desired base height.

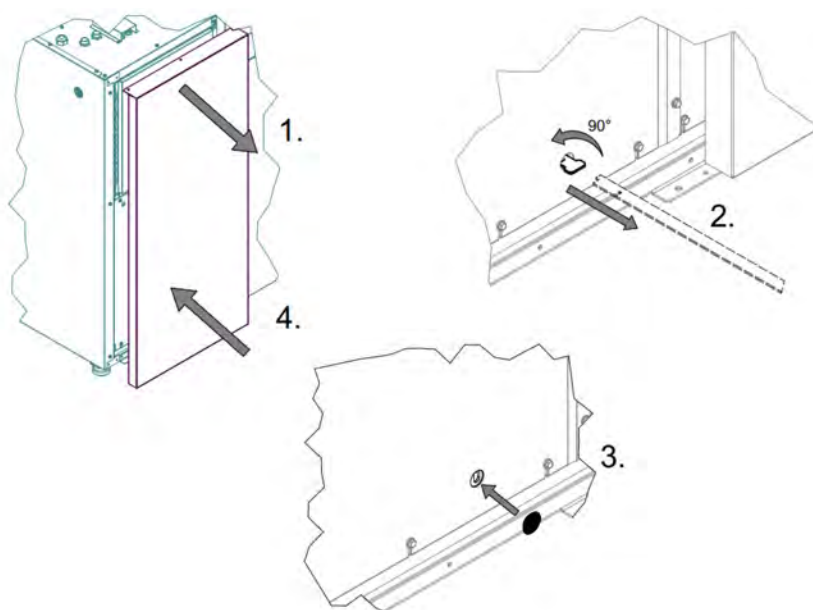


6. **Lowering and levelling:** Lower the heat pump onto its adjustable feet. Using the feet, adjust the device to a completely level and stable position (use a spirit level).
7. **Ensuring vibration isolation:** Once the installation is complete, ensure that the heat pump frame and protective panels are **not in contact with the building's structures (such as walls), with the exception of the adjustable feet**. This is very important to prevent the transmission of compressor vibrations and structure-borne noise.

5.3 Removing the transport support

The heat pump's refrigerant module is secured with a transport support during transport. Remove the transport support before starting the device.

1. Remove the left-hand white front panel.
2. Turn the transport support 90° anticlockwise.
3. Pull the transport support out of the refrigerant module and insert the protective plug into the transport support hole. The protective plug is supplied in the accessories box.
4. Reinstall the front panel.



5.4 Location of the heat pump



The device should not be installed in a location:

- Where flammable gases may leak
- Where corrosive gas may be generated or accumulate
- Where volatile flammable substances are handled
- Where it is very dusty
- Near devices that generate electromagnetic fields or high-frequency harmonics

We recommend always placing the heat pump in a separate technical room or machine room. Gebwell G-Eco heat pumps are designed so that they **do not create an explosive atmosphere classification (ATEX)** in their installation space during normal operation.

However, when choosing and planning the installation location, the following factors affecting safety, comfort, and maintainability must be taken into account.

Conditions and requirements for the area

- The recommended temperature for the installation location is **+15 ... +25 °C** (the maximum permitted temperature is +30 °C).
- The area must have sufficient and continuous ventilation.
- If the device is not placed in a separate machine room, the minimum volume of the installation area must be:
 - o G-Eco Core 30: **2.6 m³**
 - o G-Eco Core 80: **4.7 m³**
- The humidity of the installation location must be low enough to prevent water from condensing on the cold pipe sections of the device and the brine circuit.
- The heat pump's exhaust ventilation ensures the operational safety of the heat pump. The heat pump's exhaust ventilation must not serve as the only ventilation system in the area.

R290 refrigerant and exhaust ventilation

- The R290 refrigerant (propane) used in the device is heavier than air. In the event of a leak, it will sink downwards and collect at floor level.
- When positioning the exhaust duct outlet, it is essential to ensure that the escaping air/gas does not pose a hazard to people or the surroundings.
- If the exhaust duct outlet has to be directed towards an area where people move about or spend time nearby, a warning sign must be installed next to the outlet. The sign must advise against spending unnecessary time in the immediate vicinity of the outlet.

Sound insulation and vibration damping

The heat pump compressor produces noise and vibration that can travel through the building's structures to other rooms. Position the heat pump so that the noise does not disturb residential spaces (e.g. bedrooms).

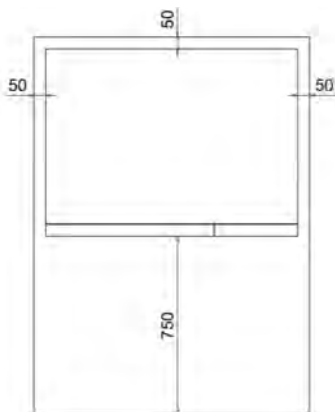
- Sound transmitted through structures can be limited most effectively by the flooring solutions of the area reserved for the device. A separate equipment base (floating floor), cast separately from the other spaces in the building, prevents the transmission of structure-borne noise.

- The transmission of vibration along the pipework is prevented by using flexible installation hoses in the pipe connections.
- Pipework must be supported from wall or ceiling structures so that the fixed pipework does not obstruct or stiffen the device's internal vibration-damping structure.

Maintenance space and safety distances

The heat pump is serviced mainly from the front.

- Leave the required space round the device for ventilation and to prevent contact with surrounding walls/objects.
- Indicative dimensions are shown in the separate dimensional drawings



Maintenance space required for one heat pump

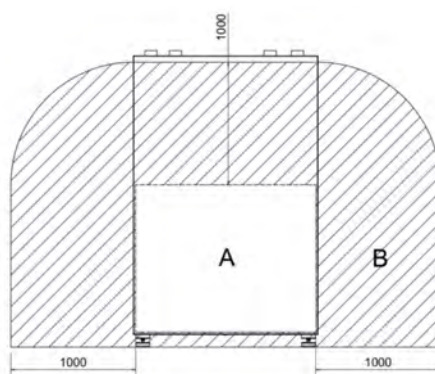


If the heat pump is installed using less than the dimensions stated above, the manufacturer reserves the right to charge the customer for any additional costs of removing and moving the heat pumps during warranty service.

IMPORTANT: Safety area during maintenance (R290)

In normal use, the device does not create an explosive ATEX zone classification. However, when the refrigerant circuit is serviced (opened), a safety area forms round the device for the duration of the maintenance work. The safety area extends to a radius of 1 metre from the device.

The area does not constitute an official explosive hazardous area classification, but the safety requirements for working within the safety area correspond to those of ATEX zone 2. All external and potentially sparking electrical devices (e.g. sockets, switches, and lights) within this radius must be de-energised for the duration of the maintenance work.



Safety area corresponding to zone 2 during maintenance of the refrigerant circuit

A = refrigerant module // B = safety area

5.5 Removing and installing the casing panels

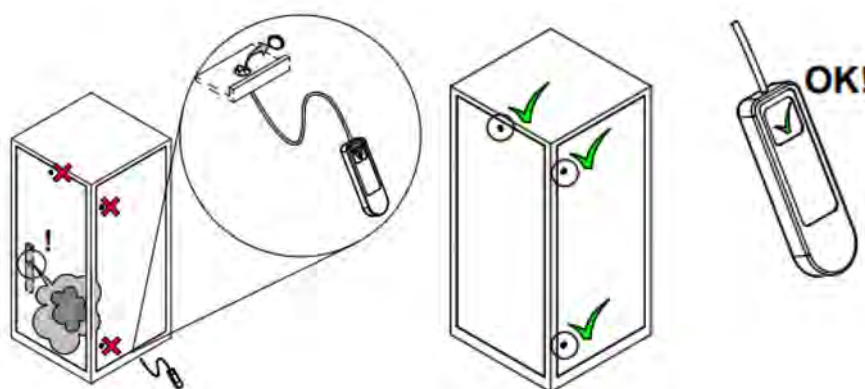


The casing panels must always be in place, except during maintenance work. If the outer panels are open while the device is running, the device will shut down. During installation and commissioning, the outer panels must be kept in place. Before removing the casing panels, check for any leaks using a leak detector. The bottom of the device has a plugged opening through which any refrigerant leak must be measured before the device's other casing panels may be opened.

Safe removal and installation of the heat pump casing panels

Safety and preparations

- Always test the refrigerant concentration of the refrigerant module with a leak detector before opening the casing panels.
- **If the concentration is zero:** You can safely begin removing the casing panels.
- **If you detect refrigerant:** Do not open the device. Immediately increase the ventilation of the device and the room until the measurement result is zero.



Removing the casing panels

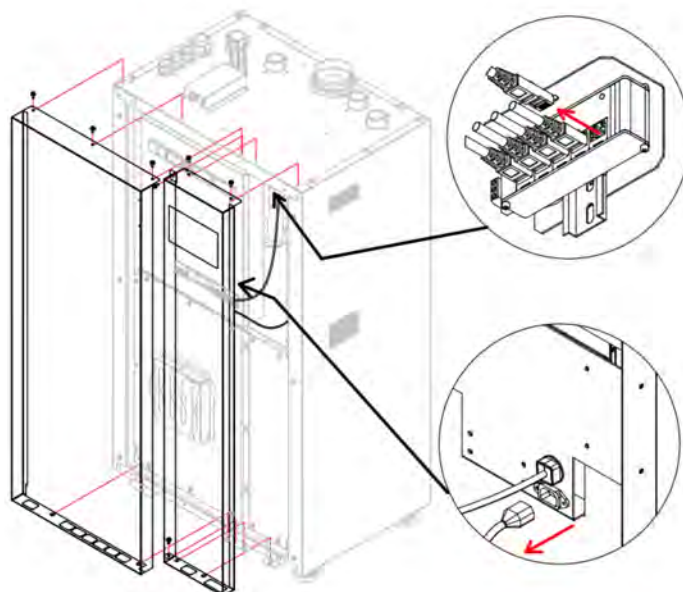
Maintenance and installation work on the device requires removal of the casing panels. Follow the instructions below to avoid damage and hazards.

Removing the front panel

1. Remove the mounting screws from the top edge of the front panel.
2. **First remove the left-hand** (white) front panel.
3. **Then remove the right-hand** (black) front panel.
 - o **NOTE:** Pay attention to the display cables when removing the panel.
4. Lift the panels straight up and out of their mounting slots.
 - o **NOTE:** The front panels are heavy. Take a firm grip when lifting, and set the removed front panel aside so that it cannot fall over.

Removing the display cable

If the right-hand (black) panel has a touchscreen, **be careful with the display cable** when lifting the panel. First lift the panel just enough to gain access to the rear side. Carefully disconnect the display cable from its connector before moving the panel completely aside. This ensures that the cable is not stretched or broken.

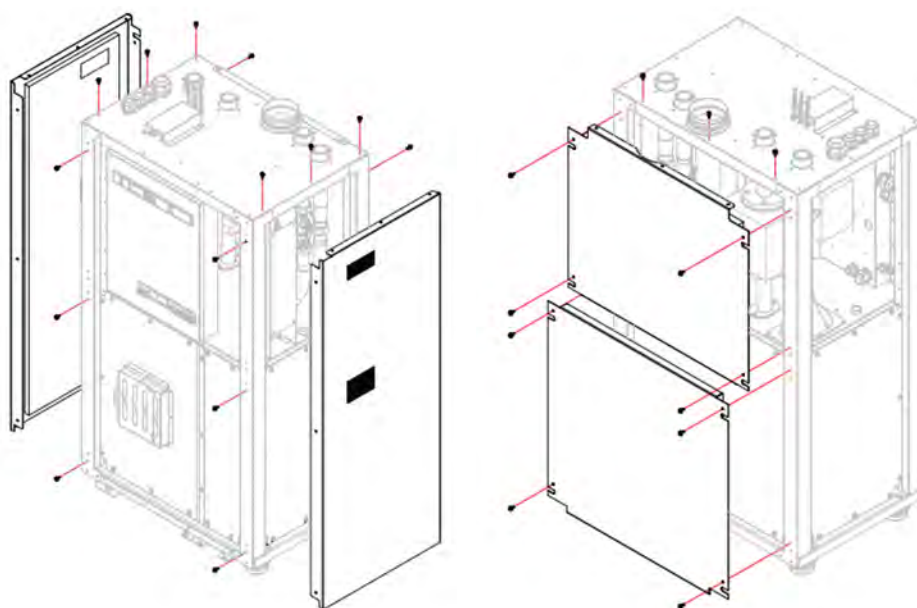


Removing the side panels

1. Remove the mounting screws from the top, front edge, and rear edge of the device.
2. Lift the panel out of position.

Removing the rear panel

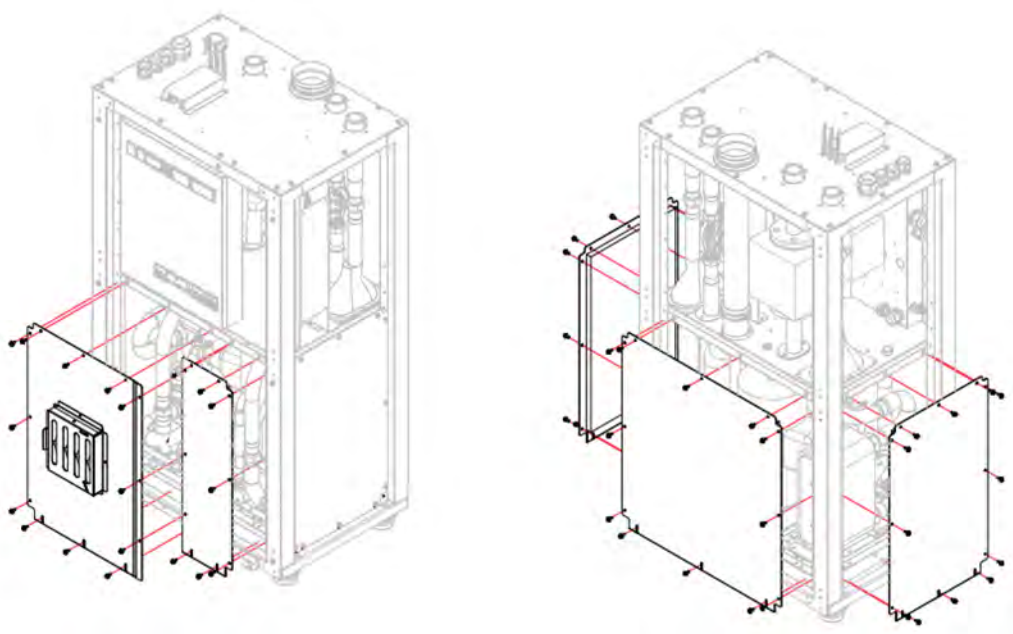
1. Loosen the mounting screws. *(The screws do not need to be removed completely).*
2. Lift the panels up and out of their slots and set them aside.



Removing the protective panels of the compressor unit

Always check the internal refrigerant concentration with a separate, calibrated R290 leak detector before opening the refrigeration module.

1. Measure the gas concentration.
2. Remove the mounting screws and lift the protective panels open.
 - o **ATTENTION:** When the protective panels are opened, the pressure difference in the device changes and the device automatically switches to **SAFETY mode** (ventilation is increased and operation is prevented).



6 Pipe installations

Piping installations must be carried out in accordance with current regulations. Each pipeline must have a shut-off valve and a pair of connectors so that it can be disconnected from the network.

A dirt separator (Virhe. Viitteen lähdettä ei löytynyt.) must be installed in the return water pipe of the charging and brine circuits to prevent impurities from the network from entering the heat exchanger and clogging it. The shut-off valve should be installed near the filter to make cleaning the filter easy.

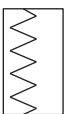
If there are several heat pumps in the system, check valves must be installed for each compressor unit in the charging and brine circuits. The check valves prevent incorrect fluid circulation in the system.

Piping installations must begin with the installation of the ventilation air extractor and the exhaust piping. The ventilation air extractor must be running and must maintain underpressure in the heat pump's frame space throughout the installation of the heat pump. The extractor must be installed as close as possible to the exhaust outlet.



The equipment manufacturer is not liable for problems caused to the heat pump by rust in a network containing air. **Use filters equipped with magnets to protect the heat pump from impurities in the networks.**

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

Symbol	Definition	Symbol	Definition	Symbol	Definition
	Shut-off valve		Line control valve		Dirt separator
	Vent valve		Change-over valve		Circulation pump
	Check valve / one-way valve		Control valve		Compressor
	Expansion valve		Diaphragm expansion tank		Temperature sensor
	Safety valve		Plate heat exchanger		Pressure gauge

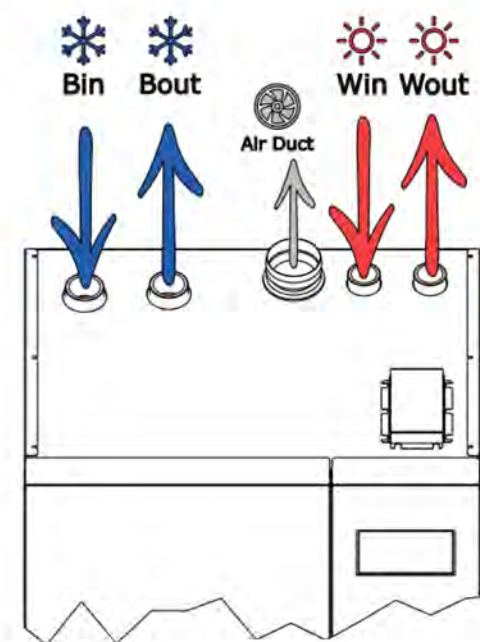
The sensor position labels used in the diagrams are shown below.

B9	Outdoor temperature sensor	B38	Supply water temperature sensor for domestic water
B2	Upper sensor for the domestic hot water tank	B1, B12, B14	Supply water sensor
B3	Lower sensor for the domestic hot water tank	Q2, Q6, Q20	Heating circuit circulation pump
B10	Cascade sensor	Y3	Change-over valve for the domestic hot water tank

B15	Lower sensor for the heating accumulator tank	TV2, TV3	Heating circuit bypass valve
B11	Additional heat control sensor	TV38	Domestic water control valve
B39	Domestic water circulation temperature sensor		

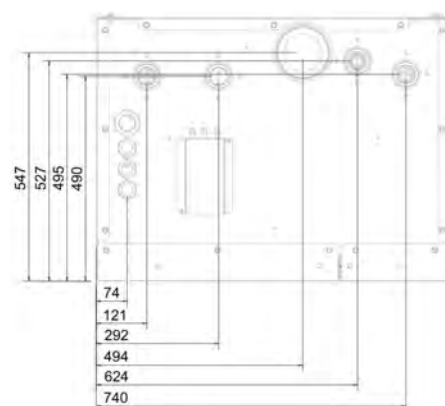
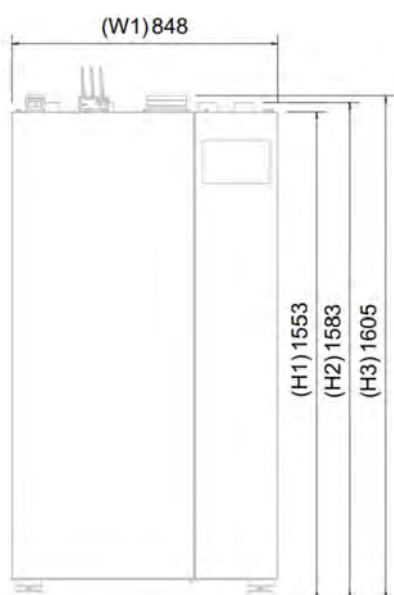
6.1 Pipe connections and dimensions

All the heat pump's external pipe connections have been brought out to make installation of the device easier.

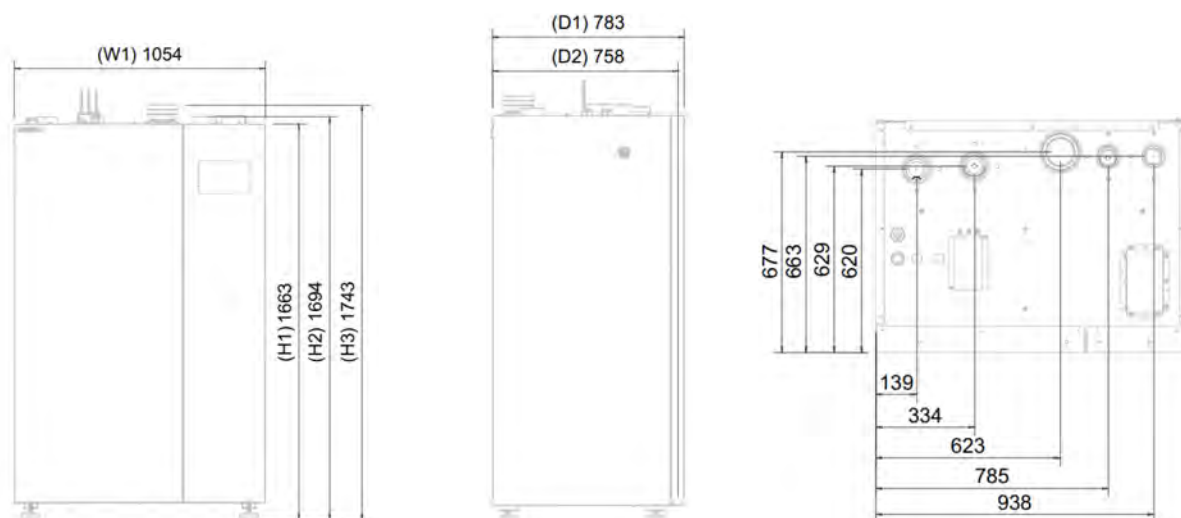


Connection		G-Eco Core	
		30	80
Bin	Brine circuit in / inlet	internal thread	
		G 1 ½"	G 2 ½"
Bout	Brine circuit out / outlet	internal thread	
		G 1 ½"	G 2 ½"
Win	Charging circuit return/in	internal thread	
		G 1 ½"	G 2"
Wout	Charging circuit flow/out	internal thread	
		G 1 ½"	G 2"
Air Duct	Exhaust air duct	125 mm	

Dimensions G-Eco Core 30



Dimensions G-Eco Core 80



6.2 Ventilation – ventilation air extractor

The R290 refrigerant (propane) used in the device requires separate mechanical exhaust ventilation. In the event of a gas leak, the device automatically switches to SAFETY mode, in which the ventilation air extractor boosts extraction and safely vents the gas outside.

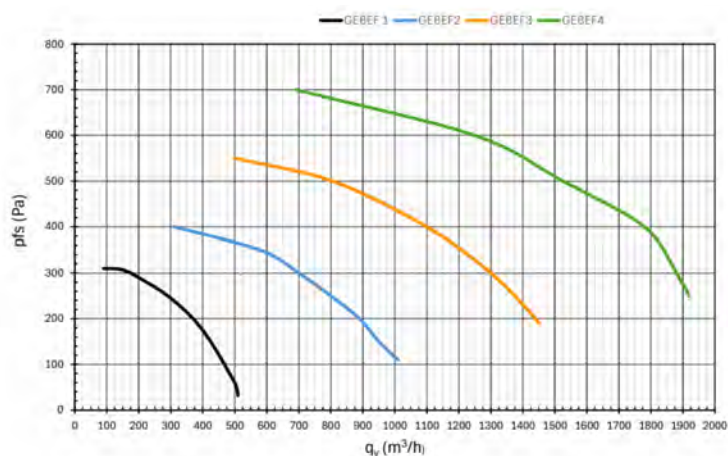
The exhaust air duct and a safe discharge direction must always be **designed on a case-by-case basis**.

Duct sizing and minimum flow rates (Qmin)

The exhaust ductwork must be sized so that the device-specific minimum flow rate (Qmin) is achieved when the ventilation air extractor's SAFETY function is activated.

Recommended duct sizes:

- **Device-specific branches from the main duct:** at least 125 mm
- **Main duct (with GebEF1 extractor):** at least 200 mm
- **Main duct (with GebEF2 extractor):** at least 250 mm
- **Main duct (with GebEF3 extractor):** at least 315 mm
- **Main duct (with GebEF4 extractor):** at least 400 mm



Graph 5.1: Performance curves for ventilation air extractors

Installation of the measuring and control damper

A measuring and control damper equipped with measuring connections must be installed in the outgoing exhaust air duct of each device.

1. During commissioning of the equipment, achievement of the Q_{min} flow rate must be verified by measuring the air volume through this damper.
2. After the measurements and flow verification, the control damper **must be adjusted and locked in the fully open position**. The cross-sectional flow area of the duct must not be restricted, so that maximum extraction during SAFETY mode is not obstructed.

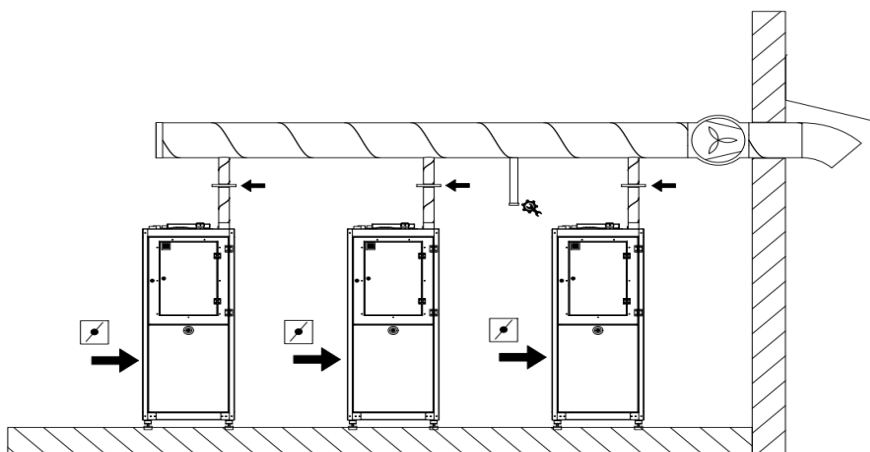


Figure 6.14: Example of the installation of the ventilation air extractor and duct in a

Positioning and gas tightness of the ventilation air extractor

R290 is a gas that is heavier than air and highly flammable. The safe discharge direction outdoors must be designed so that escaping gas cannot accumulate in recesses or basements, or pose a danger to people and other equipment.

- The ventilation air extractor must be installed indoors **as close as possible to the discharge outlet** (e.g. next to an external wall). This ensures that most of the duct running indoors is under negative pressure.
- If it is not possible to install the ventilation air extractor immediately next to the discharge outlet, **the duct on the pressure side of the extractor (from the extractor outwards) must be completely gas-tight** if it runs through the rooms of the property.

Determining the position of the replacement air damper for exhaust air

The replacement air damper is used to adjust the internal flow and pressure drop of the refrigerant module. As a factory setting, the replacement air damper is in **position 3**. The damper must be adjusted for each device and installation site so that the required minimum air volume (Q_{min}) and the device's minimum internal pressure drop (Δp) are reliably achieved in SAFETY mode.

Measurement and verification (SAFETY mode)

The adjustment is carried out in the ventilation air extractor's SAFETY mode (100% rotation speed). When the replacement air damper is set to the selected position, the underpressure in the device's refrigerant module is read from the display, and the result is compared with the device's characteristic curves/table.

Interpretation of the pressure drop (Δp):

- **Δp is less than the value in the table:** The required air volume (Q_{min}) is **not achieved**. The system must be adjusted.
- **Δp is greater than the value in the table:** The required air volume (Q_{min}) is **achieved**.

IMPORTANT: Measurement reliability

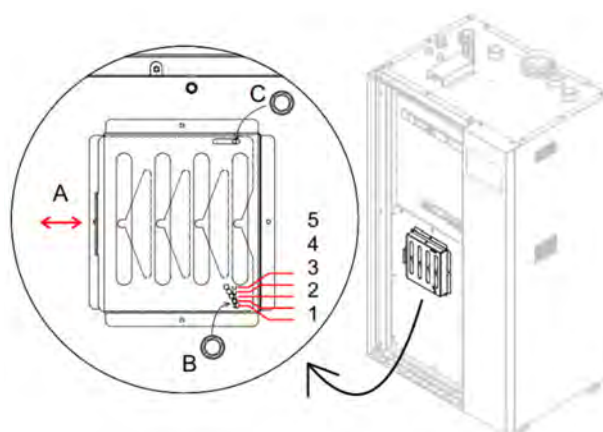
- **Clean filters:** The device's air filters must be completely clean when the measurement is performed, so that the pressure drop measurement is accurate.
- **Ductwork measurement:** In addition to the internal pressure drop, the actual outgoing air volume must always be physically verified via a measuring and adjustment damper installed in the exhaust ductwork.

Normal operation

Once the replacement air damper and ductwork have been adjusted correctly and measurements verify that the flow rates are sufficient, the equipment's automation takes care of the rest. In normal ventilation mode (when SAFETY mode is not on), the heat pump automatically maintains the set underpressure in its refrigerant module (factory setting **10 Pa**).

Adjusting the replacement air:

- Loosen screw C
- Open screw B
- Adjust the damper to position 1...5 by moving adjustment damper A
- Lock the adjustment damper by tightening screws B and C



6.3 Protection of indirect circuits

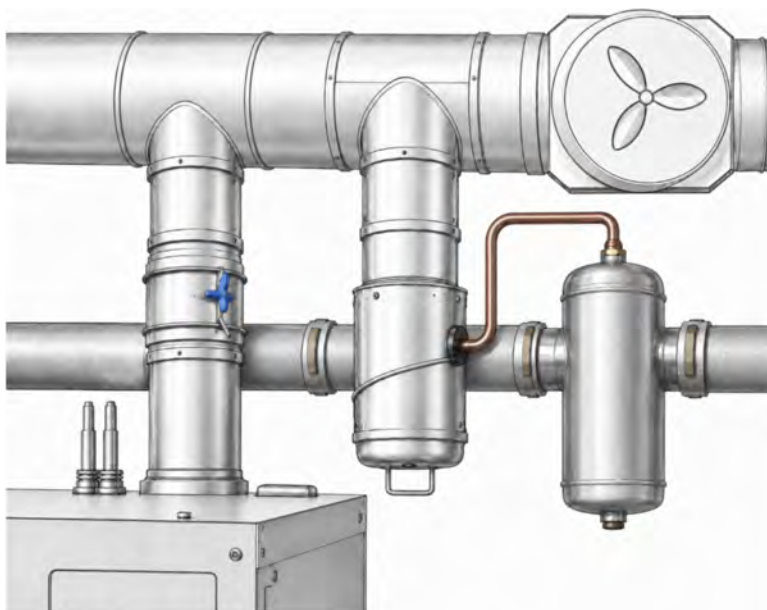
When R290 refrigerant is used in the heat pump, **the indirect circuits connected to the heat pump must be protected in case of equipment failure.** This protection prevents refrigerant from entering systems located in the property's living areas.

Install air vents primarily on the accumulator tanks. If the system does not include an accumulator tank or tanks, the indirect circuits must be protected with gas separators installed in the line leaving the heat pump. The gas separator installed in the pipe must be of a type in which the entire liquid flow passes through the gas separator. If the system has multiple heat pumps, the indirect circuits can be protected with a gas separator installed in the common line.

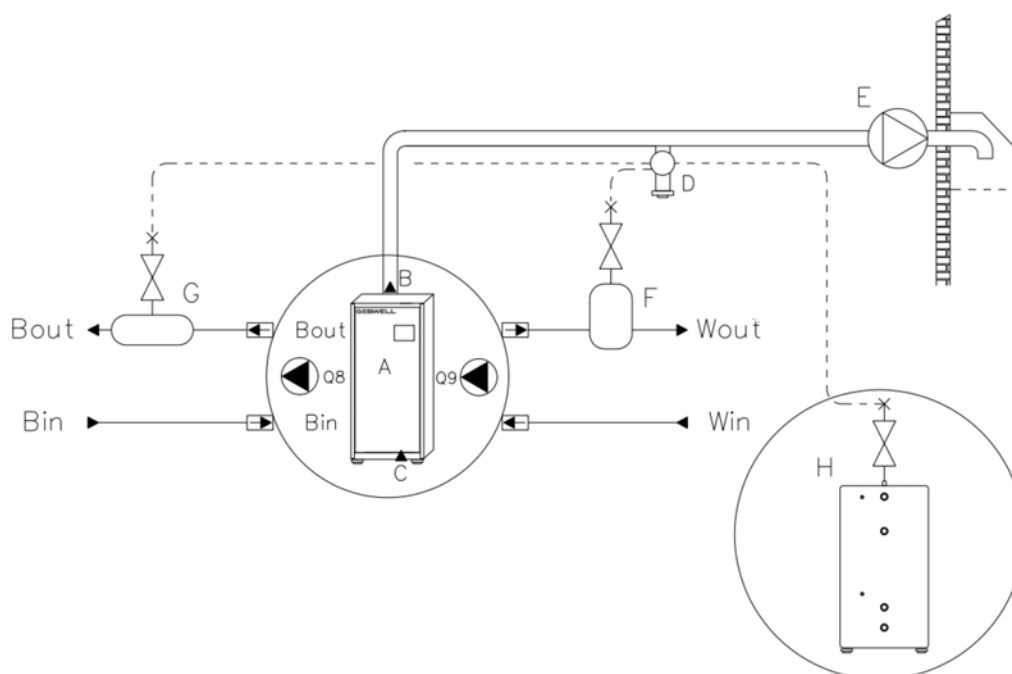
The gas separator installed in the pipe must have a flow class that corresponds to the design flow of the network. The gas separator must be suitable for the liquid used and be of a type in which the escaping gas can be piped to a service connection.

The indirect circuits can also be protected by means of a pipe expansion section when both the expansion section and the gas separator can be installed at the highest point of the system.

Route the pipes from the gas separators into the service duct of the exhaust duct so that any liquid passing through the gas separators cannot travel along the ductwork into the heat pump or the exhaust fan.



Protection of indirect circuits



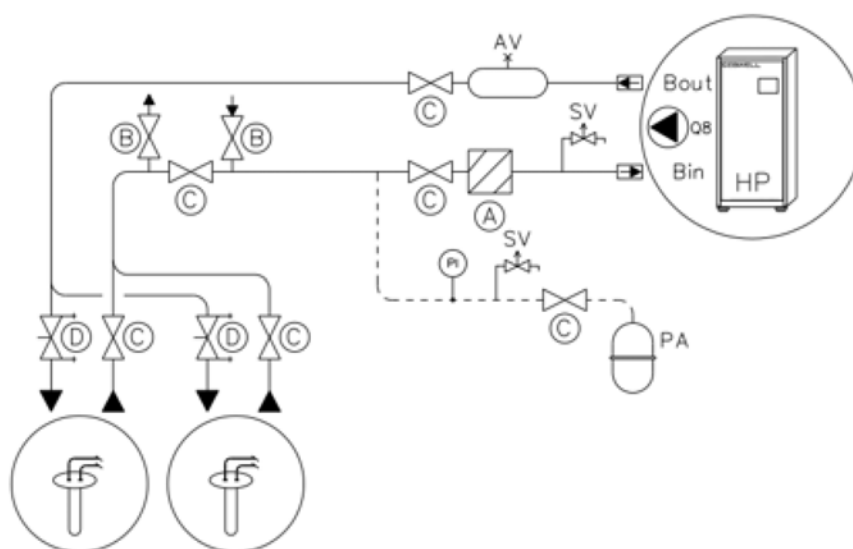
- A. Heat Pump
- B. Exhaust air duct of the refrigeration module
- C. Fresh air inlet
- D. Service connection for the exhaust air duct
- E. Exhaust air fan (GEBEF)
- F. Supply water gas /air extractor
- G. Gas / air extractor for the pipe extension
- H. Heating-, Cooling-,DHW -accumulator

- Bout Brine circuit outlet
- Bin Brine circuit inlet
- Wout Heating circuit outlet
- Win Heating circuit inlet

6.4 Brine circuit

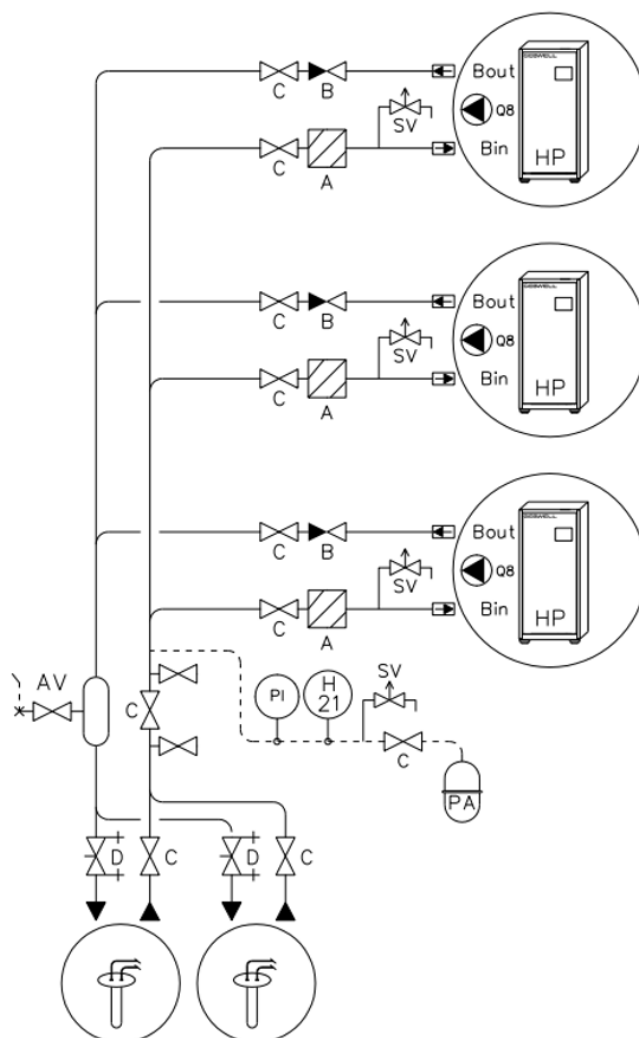
The brine circuit is installed in accordance with the site-specific plan. The brine pipework must rise continuously towards the heat pump to avoid air pockets. If this is not possible, air vents must be installed at the high points. The brine circuit pipework must be flushed to remove any impurities from installation before the heat pump is installed.

- Insulate all brine pipes in the property with closed-cell insulation to prevent water condensation. The pipework must be insulated before the device is started.
- Use only fittings intended for cold conditions in the brine circuit.
- Use rubber-insulated brackets to support the pipes.
- Install shut-off valves on the pipe connections as close to the heat pump as possible.
- Record the type and freezing point of the brine fluid in the installation report.
- The brine fluid must be frost-resistant to at least -15°C. The brine fluid must contain a corrosion inhibitor.
- Ensure that no water can run onto the heat pump or its electrical equipment during operation.
- Use only a diaphragm expansion vessel in the brine circuit. The use of an open expansion vessel is not recommended.
- Check that the pre-charge pressure of the diaphragm expansion vessel matches the design before pressurising the system. Check the pre-charge pressure while the circuit is open.
- Connect the brine circuit valve group with its expansion vessels as shown in the figure. The arrow on the valve body indicates the direction of flow.
- The brine circuit must be pressure tested at 3 bar, and the test pressure must be maintained for at least 30 minutes.



6.5 Brine circuit connection, one heat pump

A.	Filter / dirt separator	Bout	Brine circuit out (outlet)
B.	Vent valves	Bin	Brine circuit in (inlet)
C.	Service shut-off valve (always open in normal operation)	PA	Expansion vessel
D.	Line control valve	AV	Air vent
Q8	Brine pump (external – accessory)	PI	Pressure gauge
		SV	Safety valve



Brine circuit connection, multiple heat pumps connected in parallel

A.	Filter / dirt separator	Bout	Brine circuit out (outlet)
B.	Check valve	Bin	Brine circuit in (inlet)
C.	Service shut-off valve (always open in normal operation)	PA	Expansion vessel
Q8	Brine pump (external – accessory)	AV	Air vent
H21	Brine circuit pressure transmitter (accessory)	PI	Pressure gauge
		SV	Safety valve

Brine circuit expansion vessel

The brine circuit must be equipped with an expansion vessel.

The function of the brine circuit expansion vessel is to manage changes in fluid volume caused by temperature variations in the system. Correct sizing ensures that the system pressure remains within the permitted limits and prevents air from entering the system.

Make sure that the expansion vessel diaphragm can withstand alcohol-based fluid. A diaphragm of the wrong type can become brittle and cause the system to leak.

Always choose the next larger standard-size expansion vessel if the calculated value falls between two sizes.

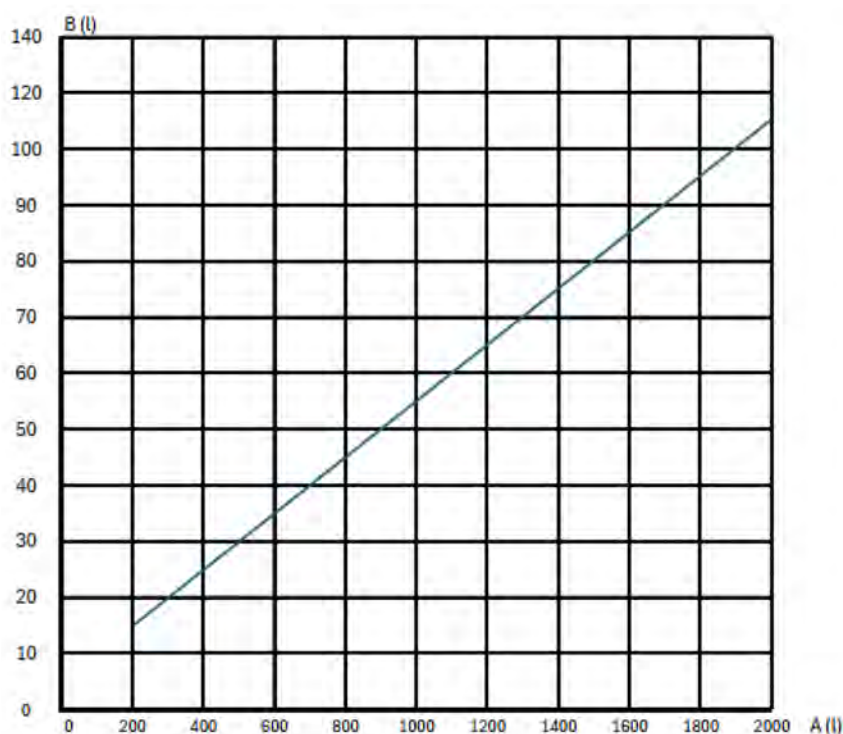
The expansion vessel must be sized in accordance with the diagram when using a 28% ethanol-water mixture (heat transfer fluid). The temperature range in the diagram is -10°C to +20°C, the pre-charge pressure is 0.5 bar (0.05 MPa), and the safety valve opening pressure is 3 bar (0.3 MPa).

When a 3 bar safety valve is used, the expansion vessel diaphragm and the vessel itself must have a suitable pressure rating.

Since the pre-charge pressure (0.5 bar) is relatively low in relation to the safety valve pressure (3 bar), it is very important that the pre-charge pressure of the expansion vessel is measured and adjusted accurately **before** filling the system.

A slightly larger expansion vessel will not impair the operation of the system, but a vessel that is too small can cause the safety valve to open unnecessarily when the temperature fluctuates.

A= Total volume of the brine circuit / B= Volume of the expansion vessel



Sizing of the brine circuit expansion vessel for a 28% ethanol-water mixture.

6.5 Heating system

The heating system regulates the indoor temperature using the heat pump controller and the secondary circuit, for example radiators, underfloor heating, ventilation, or fan coil units.

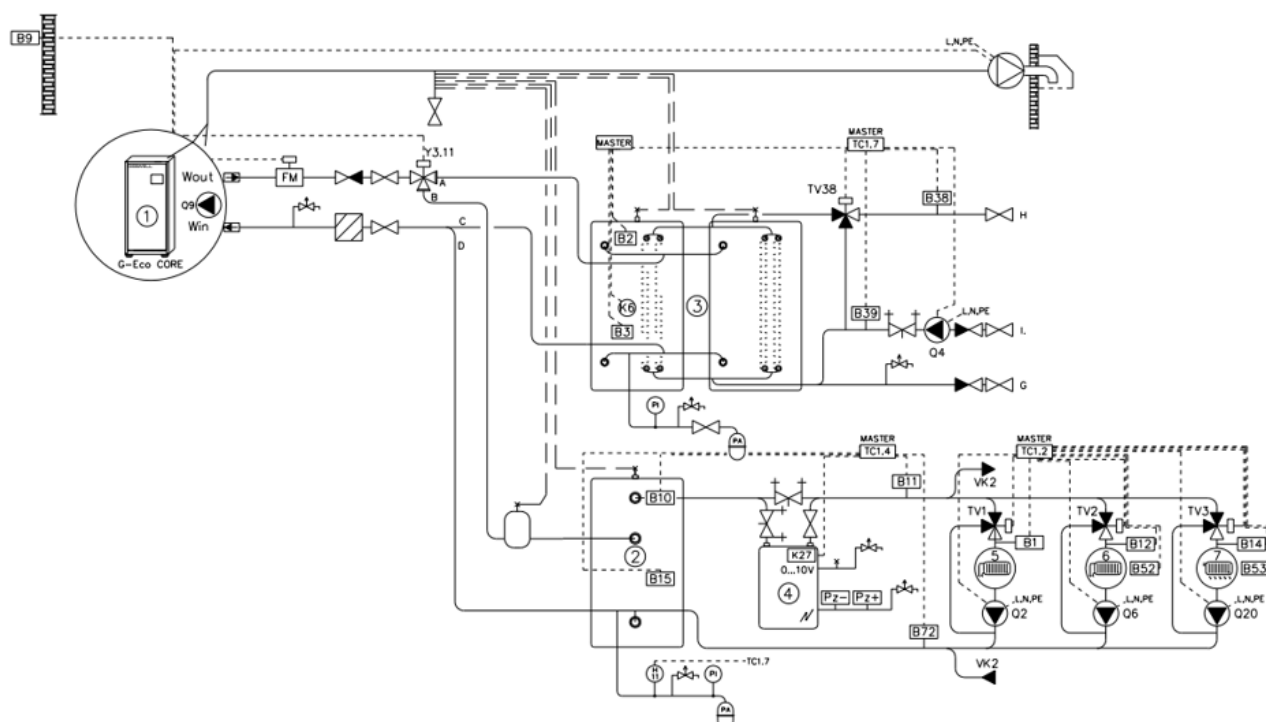
Installation:

- Before installing the heat pump, flush any installation-related impurities out of the pipework of the property's heating system.
- Install the required protective devices, gas separators, filter, and shut-off and non-return valves. Shut-off valves should be installed as close as possible to the heat pump.
- The installation must be carried out in a closed heating system with a diaphragm expansion vessel. The expansion vessel must be sized for each property in accordance with the water volume and the system temperature.
- Ensure that no water can run onto the heat pump or its electrical equipment during operation.
- Protect the heat pump from overpressure with a safety valve. The opening pressure of the safety valve may be a maximum of 0.6 MPa (6.0 bar), and the valve is installed in the return pipe of the heating system. It is recommended that the overflow pipe of the safety valves be routed to the nearest floor drain. The overflow pipe must be installed so that water can drain freely out of it. The safety valve must not be plugged.
- The safety valve must not be installed between the heat pump's heat exchanger and the protection component of the indirect circuit without piping it out of the building.



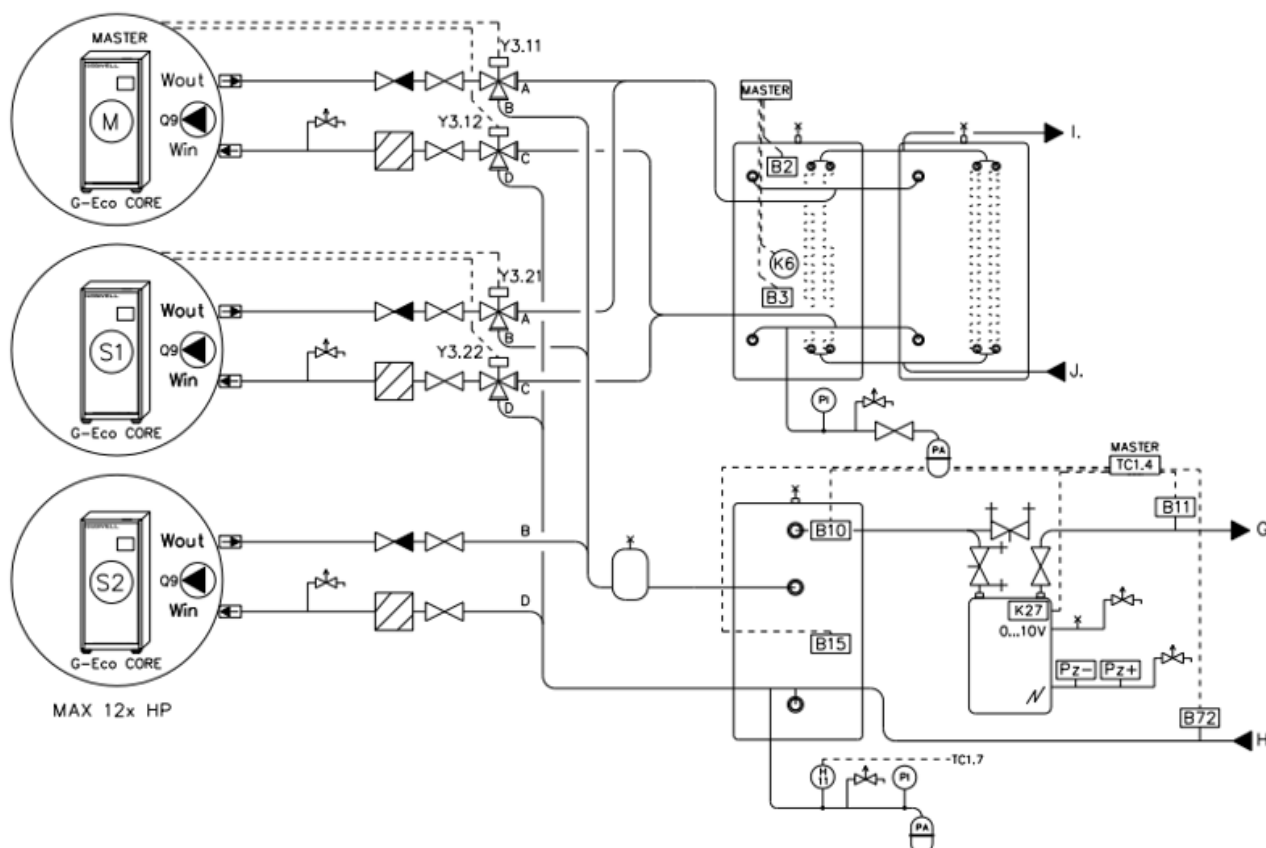
The safety valves must be installed in the return pipe to the heat pump or below the halfway point of the accumulator tank.

- If you connect the heat pump to a heating system without a buffer tank, take into account the minimum flow required by the heat pump in a system equipped with thermostats. Connection to a system equipped with thermostats requires that a bypass valve is installed on all radiators (circulation loops) or that some thermostats are deactivated to ensure a sufficiently high flow. If the minimum flow is not achieved, the operation of the heat pump will be disrupted, reducing efficiency, and this may lead to a fault alert. See the device-specific minimum flow in section **12 Technical data**.



Charging/heating circuit connection example – 1 heat pump

1.	Heat pump	B9	Outdoor temperature sensor
2.	Heating buffer tank	Y3	Change-over valve, heating/domestic water
3.	Domestic hot water tank	B2	Upper sensor for the domestic hot water tank
4.	Additional heat source	B3	Lower sensor for the domestic hot water tank
5.	Heating circuit 1 (pump circuit shown)	B10	Cascade control sensor (accumulator tank, upper)
6.	Heating circuit 2 (mixing circuit shown)	B15	Lower sensor for the heating buffer tank
7.	Heating circuit 3 (mixing circuit shown)	B11	Additional heat source control sensor
Wout	Charging circuit flow (out)	B1	Supply water sensor, LP1
Win	Charging circuit return (in)	B12	Supply water sensor, LP2
A	Charging flow, domestic hot water tank	B14	Supply water sensor, LP3
B	Charging flow, heating buffer tank	TV2	Control valve, LP2
C	Charging return, domestic hot water tank	TV3	Control valve, LP3
D	Charging return, heating buffer tank	Q2	Circulation pump, LP1
G	Cold water	Q6	Circulation pump, LP2
H	Domestic hot water	Q20	Circulation pump, LP3
I	Domestic hot water circulation	K27	Additional heat source operation control
		TV27	Additional heat source control signal
		TC1.2	Expansion module – heating
		TC1.4	Expansion mod. – cascade/additional heat
		TC1.7	Expansion mod. – domestic water



Charging circuit connection, cascade, 4 devices, 2 of which produce domestic water

M	Heat pump – device 1 – MASTER	Y3.1 1	Change-over valve, flow – device 1
S1	Heat pump – device 2	Y3.1 2	Change-over valve, return – device 1
S2	Heat pump – device 3	Y3.2 1	Change-over valve, flow – device 2
A	Charging flow, domestic water	Y3.2 2	Change-over valve, return – device 2
B	Charging flow, heating		
C	Charging return, domestic water	B2	Upper sensor for the domestic hot water tank
D	Charging return, heating	B3	Lower sensor for the domestic hot water tank
G	Heating flow	B10	Cascade control sensor (accumulator tank, upper)
H	Heating return	B15	Lower sensor for the heating buffer tank
I	Domestic hot water		
J	Cold water		

6.6 Cooling system

In ground source heat systems, the heat pump can either utilise the natural coolness of the energy well (free cooling) or produce cold water mechanically using the compressor. The cooling system is always installed in accordance with the site-specific HVAC plan for the equipment.

Cooling can be directed to the property in several different ways:

- With the heat pump's own cooling control groups (maximum of 2).
- With one combined multi-function circuit (the network is used for both heating and cooling).
- Controlled by external automation (BMS), whereby the heat pump produces cool water for a separate cooling accumulator tank.

Pipework installation and insulation

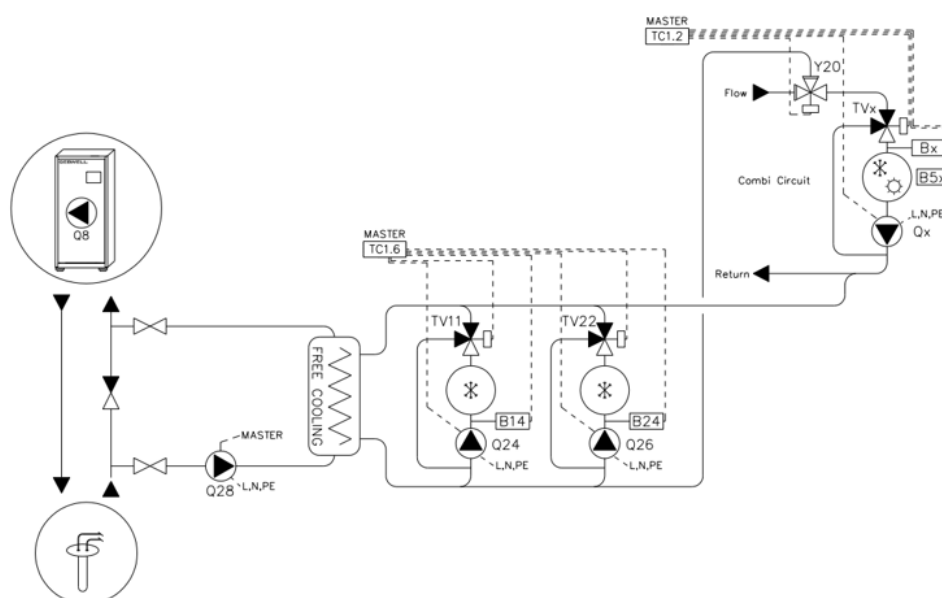
The installation of cooling pipework must comply with current HVAC regulations. In cooling operation, the surface temperature of the pipework often drops below the dew point of the room air, which makes insulation and protection important.

- **Condensation insulation:** Carefully insulate *all* of the property's cooling pipework, valves, pumps, and connections with diffusion-tight closed-cell insulation. This prevents air humidity from condensing on structures and floors. The pipework must be insulated in its entirety before the unit's cooling function is started.
- **Prevention of freezing risk:** Take the extremely cold cooling temperatures into account in the pipe connections and the fluids used. If water circulates in the cooling network, the heat pump's setpoints and minimum temperature limits must be set carefully to prevent the unit and pipework from freezing. If necessary, a heat transfer fluid containing antifreeze must be used in the network.
- **Condensation water removal:** Ensure that the condensation water from the cooling devices installed in the property (such as fan coil units) is properly drained.

Free cooling (ground source cooling)

In the free cooling function, the property is cooled using the natural low temperature of the energy well without starting the compressor, which makes it a highly energy-efficient cooling method.

When the cooling circuit or external automation sends a cooling request to the unit, the heat pump's automation starts the brine pump (Q8) and, depending on the installation configuration, the cooling transfer pump (Q28). The cool brine circulates through the heat exchanger, transferring the coolness to the property's cooling network.



Free cooling, Cooling circuits, Multifunctional circuit

Mechanical cooling

Mechanical cooling is a comprehensive system that ensures sufficient cooling capacity in all conditions. The system intelligently combines energy-efficient passive cooling with active cooling produced by the compressor. The system also includes, as essential elements, the condenser heat discharge functions and a pre-control group that protects the network.

The operating stages and features of mechanical cooling are as follows:

Passive cooling (ground source cooling)

When cooling demand begins, the heat pump primarily uses the natural coolness of the ground (passive cooling). The cool brine coming from the ground is directed through the heat exchanger to the cooling accumulator tank. This is a highly energy-efficient way to cool the property, as it only requires the circulation pumps to be running.

Active cooling

If the natural cooling energy available from the brine circuit or its temperature level is no longer sufficient to meet the property's cooling demand, the heat pump's automation switches seamlessly to active cooling mode. The compressor then starts and begins producing cooling for the cooling network, by means of a mechanical refrigeration process.

Condenser heat discharge (heat rejection)

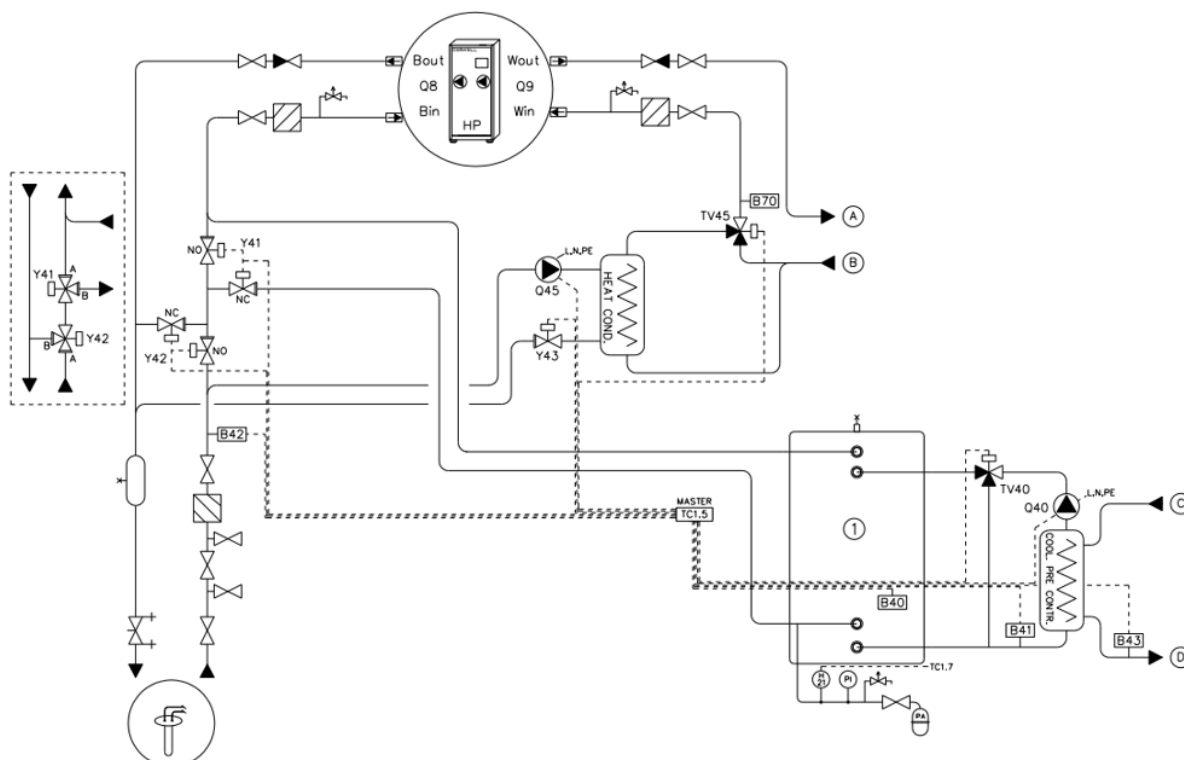
In active cooling (when the compressor is running), the refrigeration process always produces heat, known as condenser heat, as a by-product. In order for the device to produce cooling, this excess heat must be removed from the process:

- The condenser heat should primarily be used in the property's heating system (for example, for domestic hot water production).
- If the property has no heating demand, the heat pump's automation activates the condenser heat discharge function. The excess heat is then directed through the brine circuit and dissipated back into the ground/energy well (which at the same time regenerates the well's thermal field for the coming heating season).

Pre-control group and frost protection

In active cooling, the temperatures produced by the compressor can drop very low. If the property's cooling network uses water (without antifreeze), the network must be protected with a separate **pre-control group**.

- The pre-control group is a connection fitted with a mixing valve, which ensures that liquid that is too cold cannot enter the heat exchanger or the water network. This prevents the heat exchanger from freezing and potentially being damaged.



Mechanical cooling

HP	Heat pump	Y41	Cooling valve(s) 1
A	Heating flow	Y42	Cooling valve(s) 2
B	Heating return	Y43	Condenser heat discharge valve
C	Cooling return	TV40	Pre-control group control valve
D	Cooling supply	TV45	Condenser heat discharge control valve
TC1.5	Cooling control module	Q40	Pre-control group circulation pump
B40	Accumulator tank sensor	Q45	Condenser heat discharge circulation pump
B41	Pre-control group protection sensor	B42	Brine circuit inlet sensor
B43	Pre-control group supply water	B70	Condenser heat discharge control sensor

6.7 Domestic water system

The domestic water system must be installed in accordance with current HVAC industry guidelines and good building practice. All components included in the system must be installed in accordance with their manufacturers' instructions.

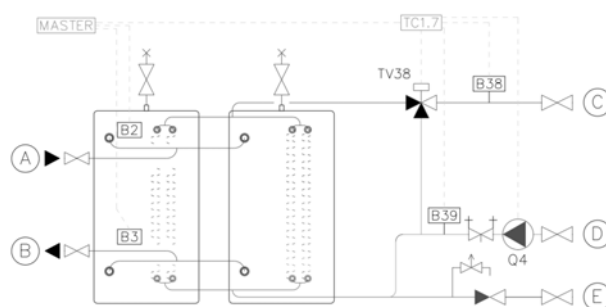
Safety and control devices

- The heat pump is capable of producing water at up to **75°C**. For this reason, the control devices in the domestic water system, such as mixing valves, must be installed and adjusted carefully to prevent scalding and to protect the pipework from excessive heat.
- Safety valves must be selected and installed in accordance with the total system pressure and the pressure requirements specified by the manufacturer of the hot water accumulator tank.
- Ensure that all required check and shut-off valves are installed for maintenance and safety.

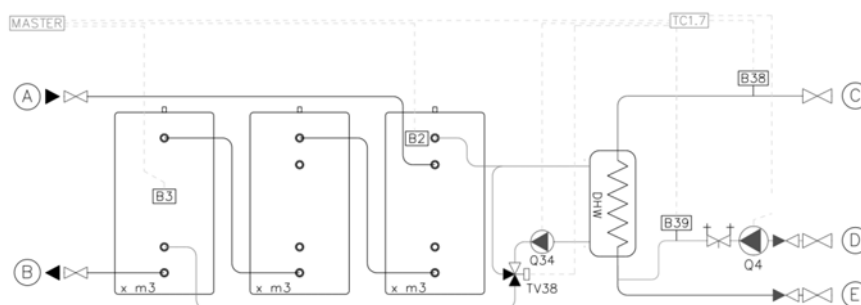
System control

The heat pump controller manages domestic water heating automatically in accordance with the set parameters.

- **Settings:** The target values, time programmes, and any boost functions for the domestic water temperature are defined in the controller menu: **DOMESTIC WATER**.



Parallel-connected domestic water system with COIL accumulator tanks



Series-connected domestic water system with a heat exchanger

A	Domestic water charging supply	B2	Upper sensor for the domestic hot water tank
B	Domestic water charging return	B3	Lower sensor for the domestic hot water tank
C	Domestic hot water	B38	Supply water sensor
D	Hot water circulation	B39	Return water sensor
E	Cold water	TV38	Domestic water control valve
		Q4	Domestic water circulation pump
		Q34	Domestic water charging pump
MASTE	Connection to the Master device	TC1.	Expansion module – domestic water

7 Electrical connections



The electrical components of the heat pump carry a life-threatening voltage.



Before opening the cover panel of the control centre or the compressor module, switch off the device at the main power switch.



Remove all sources of ignition from the area before starting work.



Use only non-sparking tools and clothing when working.



The electrical installation must be carried out by an authorised electrician, and the system must be connected separately.



Never compromise safety by bypassing safety devices.



Use only fuses of the correct rating (correct tripping current) in locations where a fuse is required.



Connection work may only be carried out by an authorised electrician.



The warranty does not cover faults caused by circumstances beyond the guarantor's control, such as excessive voltage fluctuation, lightning, fire, or accidents, or by repairs, maintenance, or structural modifications carried out by unauthorised dealers.

The heat pump is connected to a 400 V (50 Hz) mains supply. Both the standard accessories supplied with the heat pump and any electrical accessories must be installed and connected during installation of the device. The device requires a neutral conductor in order to operate.

The following standard electrical accessories are supplied with the heat pump:

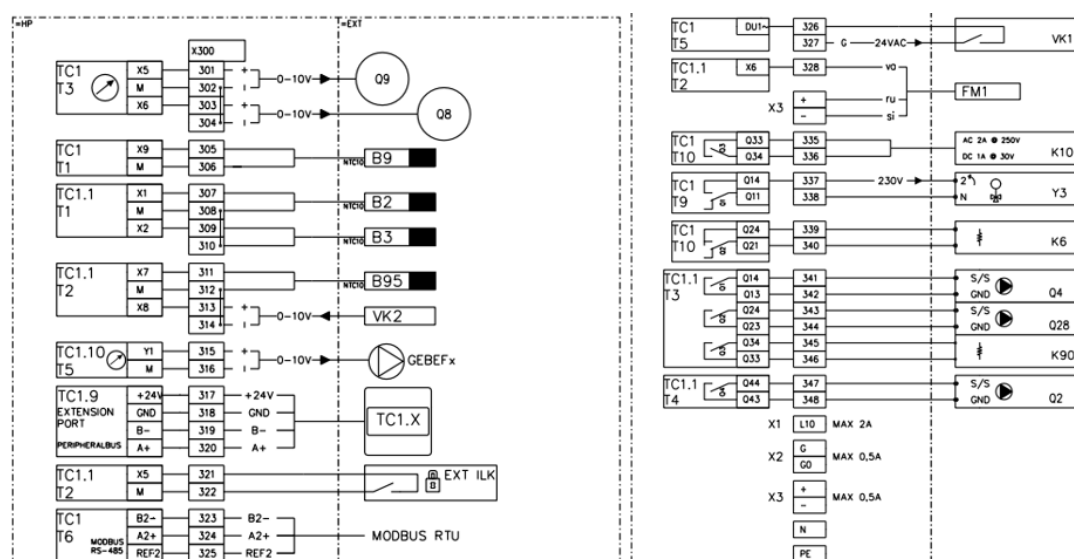
- Outdoor temperature sensor (B9)
- Upper sensor for the domestic hot water tank (B2)
- Lower sensor for the domestic hot water tank (B3)

The complete connections for each heat pump model can be found in the electrical diagrams. Note the following points during the electrical installation:

- Disconnect the heat pump before measuring the insulation resistance of the property.
- Ensure that the heat pump's protection device complies with the electrical plan and that its rated operating current is as specified in section **Technical information – Electrical information**

7.1 External connections

Terminal block connections of the heat pump control centre.



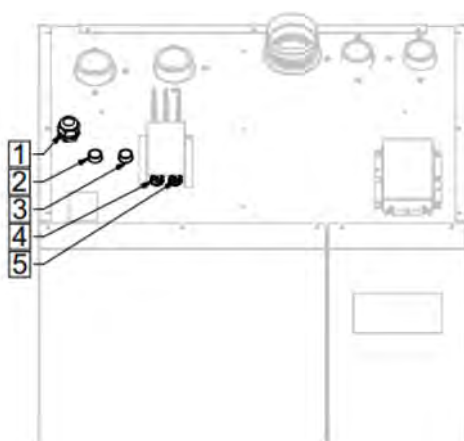
7.2 Electrical cable entries

The entries for the heat pump's electrical and control cables are located on top of the device. The cables are routed into the device and connected to the terminal blocks through the front door.

Location and types of cable entries

Use the cable entry intended for each cable type (see Figure 7.3):

1. **Power supply cable:**
 - o Core 30: equipped with an M32 cable gland.
 - o Core 80: equipped with an M40 cable gland.
2. **Sensor wiring:**
 - o Route of the sensor cables to the control centre.
3. **Control cables:**
 - o Route of the external control cables to the control centre.
4. **Data transfer (router):**
 - o A separate cable entry for the RJ45 cable, as well as the router's power supply.
 - o In single heat pump systems, the router is pre-connected at the factory.
5. **Data transfer (external automation / local network):**
 - o Cable entry for the external automation RJ45 cable.
 - o Cable entry for the LAN RJ45 cable.



Locations of the cable entries

Installation considerations

- Strain relief for all cables must be ensured by tightening the cable glands carefully, so that the cable cannot move or strain the connectors.
- Keep the supply cables (mains power) and the sensor cables (low voltage) separate from each other inside the device to avoid interference.

7.3 Compressor protection

The G-Eco Core heat pump is equipped with an integrated frequency converter that optimises compressor operation and provides comprehensive electrical protection:

- The frequency converter constantly monitors the compressor load. If the limit values are exceeded, the system automatically limits the compressor speed to prevent damage.
- The device monitors the quality of the supply voltage (e.g. voltage spikes, undervoltage, or phase deviations).
- If the frequency converter detects a serious abnormality in the mains supply or in compressor operation, the compressor stops immediately and the system issues a fault message on the control panel.

7.4 Electrical energy measurement and monitoring

The heat pump is equipped with built-in electrical energy measurement, which enables accurate energy monitoring without separate external meters.

- The automation reads the device's instantaneous input power and current consumption.
- The automation stores all consumed electrical energy in memory.
- The automation automatically breaks down consumption by operating mode:
 - o Energy used in the property's heating network.
 - o Energy used for domestic hot water production.
 - o Energy consumed during cooling operation.

You can monitor these counters directly from the heat pump display or via the remote management interface.

7.5 Power supply

The heat pump's power supply is connected to the supply terminals located in the device's control centre, in accordance with the wiring diagrams. The power supply is a 400 V / 50 Hz three-phase supply.

Connection sequence

Connect the supply cable to the following terminals:

- **L1, L2, L3:** Phase conductors (Ensure correct phase sequence!)
- **N:** Neutral conductor
- **PE:** Protective earth conductor (green/yellow)

Supply cable installation and routing

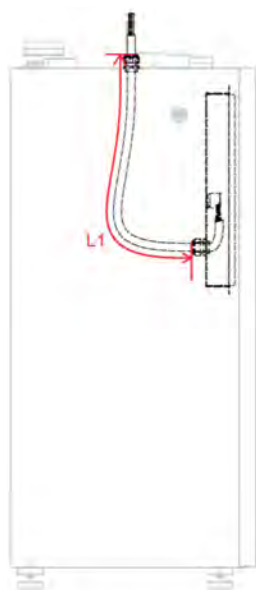
The heat pump's control centre is mounted on a pivoting bracket (hinged) so that the device's internal components can be accessed without obstruction during maintenance work. This moving structure places special requirements on the length and routing of the supply cable inside the device.

Allowing for turning clearance (service loop)

When installing the main power cable, the turning radius of the control centre must be taken into account:

- **Cable length:** Leave sufficient turning clearance (a so-called service loop) inside the heat pump in accordance with the device's installation drawing and dimensions. The cable must be long enough for the control centre to be turned to its extreme position (fully open, in the service position) without mechanical tensile stress on the supply cable or terminals.
- **Strain relief:** Ensure that the cable is securely fastened to the strain relief on the device frame before the actual turning clearance. This prevents the cable from being moved from outside the device.

Cable length

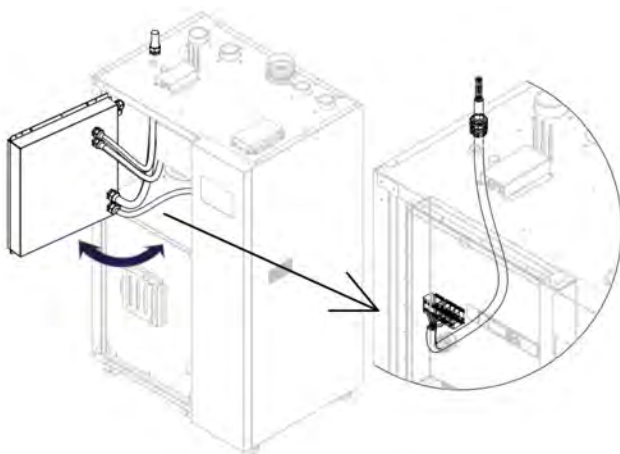


Length L1	Length L2	Length L3
1150 mm	220 mm	170 mm

Closing the control centre and positioning the cable

Because the main supply cable is thick and rigid, make sure it sits correctly inside the device whenever the control centre is closed:

1. Carefully swing the control centre closed while observing how the cable bends.
2. Ensure that the supply cable sits in the free space provided for it and does not form any excessively sharp bends.



Important installation steps

1. Check the phase sequence before connecting the power. If the phase sequence is incorrect, the frequency converter or the compressor's protection relay may prevent start-up and give a fault message.
2. Ensure that all screw terminals are carefully tightened to the torque specified by the manufacturer. Loose connections can cause sparking, overheating, and equipment damage.
 - 4–10 mm²: 5 Nm
 - 16–50 mm²: 10 Nm
3. If you use fine-stranded cable, always use appropriate ferrules to ensure reliable contact.
4. Make sure that the protective earth (PE) conductor is securely connected to the designated earthing bar or terminal before connecting any other conductors.

WARNING: Electrical installation work may only be carried out by a licensed electrician. Always ensure occupational safety and that the power supply is disconnected before starting any connections.

7.6 External circulation pumps and contactor controls

The heat pump's automation can be used to control external components of the property, such as separate network or collector pumps and contactor-controlled additional heat sources (e.g. electric heaters or electric boilers).

Power supply and control principle

- The operating voltage for all external electrical devices must **always be supplied from the property's distribution board** (sub-distribution board). The electrical supply to the devices must never be taken directly from the heat pump's control centre.
- The heat pump controls these external functions via the **potential-free normally open contact (NO)** in its electrical enclosure.

Because the heat pump's control relay is potential-free (voltage-free), the control circuit can be wired in two different ways, in accordance with the installation site's electrical plan.

Option A: Using an external control voltage

This option uses the control voltage produced by an external distribution board. The voltage is brought to the heat pump, routed through the potential-free contact of the selected relay, and returned to the contactor of the external device.

Because this wiring method brings an external, foreign voltage into the heat pump's control centre, a clear warning label must be attached to the heat pump's electrical enclosure: **"WARNING: EXTERNAL CONTROL VOLTAGE"**.

Option B: Using the heat pump's control voltage

This option uses the heat pump's own internal control voltage (230 V).

- Connect a jumper wire from the heat pump's phase terminal (**L10**, 230VAC) to the input contact of the relay selected for control.
- The operating permission or control signal is then sent from the relay's normally open contact directly to the contactor of the external pump or additional heat source.

Since this wiring method feeds voltage produced inside the heat pump to the property's external distribution board, a clear warning label must likewise be attached to that external board: **"WARNING: EXTERNAL CONTROL VOLTAGE"**.

7.7 Connecting the expansion module

Expansion modules are used when the system is extended with, for example, cascade control, controls for several heating circuits, or other additional functions.

Installation and placement

- All expansion modules added to the controller are delivered pre-installed in a separate module centre.
- Install the module centre on the wall of the technical room, in the immediate vicinity of the heat pump.
- All field devices related to this expansion, such as sensors, pumps, and valves, are connected directly to the module centre in accordance with the wiring instructions supplied.

Wiring

The module centre's power supply and communication bus are connected to the heat pump's terminal blocks. Use the following connection points:

Additional module TC1.xx

- **+24V**: terminal block **317**
- **GND**: terminal block **318**
- **B –** : terminal block **319**
- **A +** : terminal block **320**

Power supply for the additional module centre

- **X1**: terminal block **L10** (230VAC)
- **N**: Neutral conductor
- **PE**: Protective earth conductor (green/yellow)
- **X2**: terminal block **G** (24VAC)
- **X2**: terminal block **G0** (GND)

Bus connection and addresses

The expansion modules communicate with the main controller via a bus.

- If there are several modules, they are connected to the bus in series (daisy-chained).
- Each module must have a unique address so that the controller can identify them. The addresses are set using the physical DIP switches on the module.
- The DIP switches must be set before connecting the power. If settings are changed while the power is on, the controller will not recognise the changes made.
- The module-specific DIP addresses are marked in the electrical wiring diagram next to each module.
- DIP-6 on the last module must be set to the ON position, which switches on the bus termination resistor.

There is no need to separately add or register the expansion module in the menus. The module is activated automatically as soon as the function related to that module (for example *Heating circuit 2*) is enabled in the heat pump settings.

7.8 Temperature sensors

The trouble-free operation of the heat pump's automation and control processes is based on accurate temperature measurements. Always check the correct installation location of the sensor in the equipment's example diagram or the site-specific plan.

The basic instructions below must be followed when installing all temperature sensors connected to the system.

Pipe installations

The installation method for sensors fitted in the pipework depends on the pipe size:

- **Pipes DN50 and larger:** The sensors must always be installed in a pipe-mounted **sensor pocket**.
- **Pipes smaller than DN50:** It is possible to use **surface sensors** mounted on the outer surface of the pipe. (*Note: The surface sensor must be carefully thermally insulated after installation so that the surrounding room temperature does not distort the measurement result.*)

Installation in a sensor pocket (accumulator tanks and large pipes)

- In accumulator tanks, the sensor pockets must extend at least **100 mm** into the water space so that the sensor measures the actual average temperature and not the surface layer cooled by the jacket.
- Ensure that the sensor is pushed fully to the bottom of the sensor pocket. It is recommended to use thermal paste between the sensor and the inner wall of the pocket to improve the response time and measurement accuracy.
- Ensure mechanical strain relief for the cable at the installation site. The sensor must not be allowed to slip out of its pocket as a result of pipework vibration or maintenance work.

Wiring

- The conductor area (cross-section) of the sensor cable used must be at least 0.5 mm².
- Temperature sensors have **no polarity**. The wires can be freely connected to either of the terminal blocks reserved for the sensor.

Outdoor temperature sensor (B9)

The outdoor temperature sensor is used when the heat pump controller controls the property's heating and/or cooling circuits in accordance with the control curves.

Installation location

Sensor placement has a significant impact on the system's energy efficiency and living comfort:

- Install the sensor on the north or north-west side of the house.
- Choose a location that is sheltered from direct sunlight (e.g. morning sun) so that the control does not respond incorrectly to an external heat load.
- The recommended installation height is approximately 2.5 metres above ground level or at least half the height of the facade.

Wiring

- **Sensor B9:** Connection to terminal blocks **305** and **306**.

Important installation notes

If the cable is brought into the sensor housing through a conduit, the conduit must be carefully sealed. This prevents warm indoor air from flowing along the conduit into the housing, which could cause condensation and oxidation of the sensor or an incorrect reading.

Domestic hot water tank sensors (B2 and B3)

The heat pump uses two temperature sensors to precisely manage the charge level of the domestic hot water and the need for charging.

The sensors are installed at different heights in sensor pockets located on the side of the accumulator tank:

- **Upper sensor (B2):** Placed at the top of the accumulator tank, at the level of the outgoing domestic hot water. This sensor tells the system the temperature of the available hot water.
- **Lower sensor (B3):** Should be placed in the lower part of the accumulator tank, at a height of approximately $\frac{1}{3}$ of the tank volume from the bottom. This sensor is primarily used to start and stop charging of the accumulator tank.

Wiring

- **Sensor B2 (Top):** Connection to terminal blocks **307** and **308**.
- **Sensor B3 (Bottom):** Connection to terminal blocks **309** and **310**.

The sensors are recognised and activated automatically as soon as the domestic water function is activated in the heat pump's user interface.

System sensors (B10, B15)

The heat pump uses two external temperature sensors (B10 and B15) to control the heating of the property. Depending on the system configuration, the sensors are installed either in the heating tank or in the common supply water pipe.

- **Supply water / Upper part of the accumulator tank (B10):** Placed at the top of the accumulator tank at the level of the water entering the network, or directly in the network's supply water pipe. This sensor controls the system's total power demand in heating mode.
- **Lower part of the accumulator tank (B15):** Placed in a sensor pocket in the lower part of the accumulator tank, at the level of the water returning from the network. The sensor compensates for the heat demand based on the temperature in the lower part of the accumulator tank, especially in situations with a low heating load.

Wiring

The sensors are connected to **expansion module TC1.4**.

- **Sensor B10:** Connected to expansion module terminals **X1** and **M**.
- **Sensor B15:** Connected to expansion module terminals **X6** and **M**.

The sensors are recognised and activated automatically in the control as soon as the system's cascade function is activated in the heat pump controller's user interface.

7.9 External Lock (EVU Lock)

The External Lock function (EXT ILK) enables the heat pump to be blocked from operating by means of an external control signal. The function is typically used to limit peak electricity demand, either under the control of the utility company or the building automation system.

- **Connection type:** External potential-free contact
- **Terminal connections:** 321–322 (EXT ILK)

Operating principle:

When the EVU Lock function is active, operation of the heat pump compressors is temporarily inhibited. The unit's control system remains powered and continues normal operation, automatically resuming heat pump operation once the lock signal is removed. If the heat pump is configured to control supplementary or backup heat sources, their operation is also inhibited during the lock period.

7.10 Extension alert

The heat pump is equipped with an extension alert relay, which allows information about a critical device fault to be transmitted via a wired connection to an external system or indicator. This function is useful in installations where the device's alerts need to be monitored physically outside the technical room.

The extension alarm is implemented with a potential-free closing contact

- **Connection:** terminal blocks **335** and **336**.
- **Alert condition (Class A):** The extension alarm relay is energised (the contact closes) only when the heat pump's automation detects a **high-priority alert** (Class A alert) that stops the operation of the device. Lower-priority information or warning notifications do not activate this relay.

As the contact is voltage-free and potential-free, it allows a variety of connection methods to suit the requirements of the installation site:

- **Building automation system (BAS):** The contact signal can be fed directly into a digital input (DI) on a higher-level automation system for monitoring the device's fault status.
- **External signalling devices:** A separate external indicator light or audible alarm can be connected and controlled via the terminals (note the maximum relay current and voltage stated in the device's electrical diagrams).

Bus-based alerts. In addition to the physical extension alarm contact (Class A alerts), all of the device's alert and status information can be read digitally, and much more extensively, via the Modbus. Detailed information on reading and interpreting bus-based alerts is provided in chapter **Modbus registers** of this manual.

7.11 Change-over valve

The heat pump can be equipped with an external change-over valve (**Y3**) to control domestic hot water charging. The change-over valve directs the heating energy either to the property's heating network or to the domestic water accumulator tank.

Wiring

Connect the external change-over valve to the terminal blocks located in the heat pump's control centre:

- Control: Connection terminal block **337 (L)**, (230V AC)
- Neutral: Connection terminal block **338 (N)**

Connection in a cascade system

If several heat pumps are connected in a cascade system:

- The change-over valve is connected to the device that produces domestic hot water.
- The system's Master heat pump controls the domestic hot water operation via the bus, regardless of which unit the valve is electrically connected to.
- The domestic hot water function is enabled in the Master unit's user interface by setting the domestic hot water function to active.
- The device that produces domestic hot water is selected on a per-device basis, so that the Master device can direct the correct devices to produce domestic hot water.
- If the system has two devices that produce domestic hot water, change-over valves must be installed in the supply and return water pipes to prevent incorrect flows. Control of both actuators from the same connection point.

Attention: Make sure that the operating direction of the change-over valve (open/closed) matches the control signal from the controller. If necessary, turn the valve motor or change the spindle position as described in the installation manual.

7.12 External common brine pump

An external brine pump (Q8C, booster pump) is used in installations where the pressure generated by the heat pump's own circulation pumps is not sufficient on its own to overcome the pressure loss of an extensive brine circuit. This additional pump ensures sufficient flow and optimal heat transfer in all operating situations.

Power supply

- The pump's actual operating voltage is **always** supplied from the property's external distribution board (sub-distribution board). It must never be taken directly from the heat pump's own control centre.
- The sub-distribution board must be equipped with fuses rated for the external pump's electrical power and, if necessary, with an appropriate motor protection switch.

Wiring:

The heat pump gives the external pump permission to run via expansion module TC1.4 in the electrical centre.

- **Run control:** Connection relay **Q1**, contacts **Q13** and **Q14**.
- This is a **potential-free, normally open contact** (NO) that closes when the brine circuit operation is active.

7.13 Cascade system

The cascade system allows twelve (12) heat pumps to be connected in parallel, so that the output can be adjusted flexibly in accordance with the property's energy needs. The system is based on a Master–Slave architecture.

The system is managed centrally via a single device:

- **Primary device (Master):** Manages the combined heat demand for heating and cooling and controls the system as a whole. Only one device is defined as the Master.
- **Secondary device (Slave):** Operates in accordance with the instructions given by the Master.
- **Device addresses:** Each Slave device must be given its own unique device address in the controller settings.

Data transfer

The cascade system communicates via a local area network (LAN).

- The devices are connected to each other with RJ45 cables via a network switch.
- A separate cascade bus cable is not required.

Connecting sensors and actuators

The connection responsibilities in the system are distributed as follows:

- Common external sensors are connected only to the Master device.
- Device-specific change-over valves: Connected to each device's own terminal blocks.
- Device-specific alerts: Connected to each unit individually.
- Modbus (BMS): Connected to each device separately if device-specific data is to be read into a higher-level building automation system.

Before commissioning, ensure that all devices in the cascade are on the same subnet and that the Master device recognises all Slave addresses in the data transfer menu.

7.14 Heating equipment

The heating circuit components are connected either to the heat pump's main controller (TC1) or to the expansion module TC1.2. Always check the site's electrical diagrams for detailed connection points.

Circulation pump control (Q2, Q6, Q20)

The following principles apply to all heating circuit circulation pumps:

- The power supply always comes from the property's distribution board (not directly from the controller).
- The pumps are controlled via the controller's potential-free contact (run signal).
- The pump's flow rate and pressure are adjusted from the pump's own user interface.

Heating circuit 1 (TC1 / TC1.2)

- Circulation pump (Q2): Connection to terminal blocks **347** and **348** (normally open contact).

- Supply water sensor (B1): Connection to expansion module TC1.2, terminal **X3-M**.
- Control valve (TV1): 0...10 V control. Connection to the expansion module: **G** (supply), **G0** (neutral) and **X6** (control signal).

Heating circuit 2 (TC1.2)

- Supply water sensor (B12): Connection to terminal **X1-M**.
- Room temperature sensor (B52): Connection to terminal **X2-M**.
- Control valve (TV2): 0...10 V control. Wiring: **G / G0 / Y1**.
- Circulation pump (Q6): Control via relay Q1, contacts **Q13–Q14**.

Heating circuit 3 (TC1.2)

- Supply water sensor (B14): Connection to terminal **X4-M**.
- Room temperature sensor (B53): Connection to terminal **X5-M**.
- Control valve (TV3): 0...10 V control. Wiring: **G / G0 / Y2**.
- Circulation pump (Q20): Control via relay Q2, contacts **Q23–Q24**.

The supply water sensors (B1, B12, B14) must be installed in contact with the pipe surface under the thermal insulation, approximately 0.5 – 1.0 metres after the control valve, to ensure a stable measurement.

Use shielded low-voltage cable for 0...10 V control signals and sensors. Keep them separate from the 230 V supply cables of the pumps.

7.15 Additional heat source

Control of the additional heat source requires a TC1.4 expansion module. The system uses a separate supply water sensor to control the additional heat source.

- Control sensor (B11): Placed after the additional heat source on the heating network side.
- The B11 sensor is connected to terminal **X2-M** of the TC1.4 module.

Step-controlled additional heat source (e.g. electric heaters)

Step control is typically used for three-step control of electric heaters installed in the accumulator tank, using two control relays.

- Power for the heaters is supplied from the property's distribution board, which must be equipped with starting contactors.
- The heaters must be equipped with their own thermostats and overheat protectors.
- A **MANUAL-0-AUTO** switch must be installed in the control circuit. This allows the heaters to be used with thermostat control alone, for example before the heat pump is commissioned.

The heaters are divided into two groups of different sizes:

1. Step 1 (low output): Controlled by relay K28.
2. Step 2 (higher output): Controlled by relay K29.
3. Step 3 (maximum output): Consists of joint control of steps 1 and 2.

Connection (TC1.4):

- Step 1 control (K28): Relay **Q3**, contact **Q33** and **Q34** (normally open contact, NO)
- Step 2 control (K29): Relay **Q4**, contact **Q43** and **Q44** (normally open contact, NO)

Continuously variable additional heat source (e.g. electric boiler or control valve)

Continuously variable control is used for electric boilers or systems where the additional heat is controlled by a valve.

- Run status (On/Off): The controller controls the additional heat source via relay Q2, contacts **Q23–Q24** (potential-free contact).
 - o *Note:* If you use an external voltage in this circuit, remember to attach a warning label about the external control voltage.
- Control signal (0...10V): The output or valve opening is adjusted using an analogue signal.
 - o Connection (TC1.4): Terminal **Y2-M**.
 - o Control valve connection: **G** (supply), **G0** (neutral) and **Y2** (control signal).

Installation considerations

- When connecting an electric boiler, always follow the manufacturer's own separate instructions.
- For instructions on testing the operation of the additional heat source and performing a test run, see the separate operating instructions for the controller.

7.16 Domestic water equipment

Electric heater for the domestic hot water tank

The heat pump controller can automatically manage the backup or additional heating of the domestic hot water tank. The heater is used, when necessary, to ensure a sufficient supply of domestic hot water and as a backup in the event of failures.

Power supply and distribution board equipment

- The power supply for the electric heater must always come from the property's distribution board.
- The distribution board must be equipped with the following components:
 - o Control contactor: A contactor rated in accordance with the heater output.
 - o Indicator light: To indicate that the heater is on.
 - o MANUAL-0-AUTO switch: Allows the heater to be forced on, switched off, or controlled automatically by the controller.

Safety devices

The heater unit must be equipped with the following local safety functions:

1. **Thermostat:** Prevents the water from overheating beyond the set temperature.
2. **Overheat protector:** A mechanical, resettable protector that cuts the power in the event of a fault.

Wiring

The heat pump controls the heater's control contactor via a potential-free contact.

- Heater control (K6): terminal blocks **339** and **340** (normally open contact, NO)

Domestic water control devices

The domestic water control group is a software function used to control the supply temperature of domestic hot water (DHW). This function requires a TC1.7 expansion module.

The control group uses two temperature sensors to monitor the water temperature:

- **Supply water sensor (B38):** Measures the temperature of the domestic hot water.
- **Return water sensor (B39):** Measures the return temperature of the domestic hot water circulation line (DHW circulation).

The control valve controls the flow to maintain the temperature at the setpoint.

- Control valve, 24V AC operating voltage and 0...10V control signal.

Connection (TC1.7)

Connect the sensors and valve to the TC1.7 expansion module in accordance with the following connection points:

- **Supply water sensor (B38):** Connection to terminal **X1-M**.
- **Return water sensor (B39):** Connection to terminal **X2-M**.
- **Control valve (TV38):**
 - o **G (24V AC):** Operating voltage.
 - o **G0 (0V):** Neutral conductor.
 - o **Y1 (0...10V):** Control signal.

Important during installation

- The B38 supply water sensor must be installed in the outgoing pipe approximately one metre (1m) after the control valve. Ensure good thermal contact and use insulation on the sensor.
- Valve operating direction: During commissioning, ensure that the valve opens and closes in the correct direction in relation to the 0...10V signal provided by the controller.

7.17 Flow meter

The flow meter (FM1) is an accessory used to accurately monitor the system flow rate and calculate energy efficiency. The meter requires a device-specific TC1.2 expansion module to function.

The flow meter is supplied with a ready-made cable. Connect the wires to the TC1.2 expansion module as follows:

- **Brown:** terminal X3 + (24V DC)
- **Blue:** terminal X3 - (24V DC)
- **White:** terminal 328 (0...10V signal)

NOTE! For the measurement to work without interference, the negative pole (-) of the 24V DC power supply must be connected (looped) to the M connector of the TC1.2 module to equalise the potential.

Commissioning and configuration

Commissioning the flow meter requires two steps:

1. **The meter's own user interface:** Activate and check the meter's basic settings directly on the flow meter's own display/user interface.
2. **Heat pump controller:** Configure the flow meter in the heat pump's commissioning menu. The parameters required for reading the flow meter have been preset in the heat pump automation.

Important during installation

- For more detailed instructions on the physical installation (such as the required clearances before and after the meter), see the separate installation manual supplied with the flow meter.

7.18 Cooling equipment

Free cooling

Free cooling is an energy-efficient function that uses the low temperature of the collector loop/brine circuit to cool the property without using the compressor. When the function is activated, the heat pump starts the brine pump at the set free cooling speed.

Free cooling transfers cold energy from the brine circuit directly to the cooling network via a heat exchanger. The heat pump automation controls the speed of the brine pump in accordance with the parameter settings defined for free cooling.

Activation methods

The function can be activated in two ways:

1. The building automation system (BAS) issues the activation command via the Modbus bus.
2. Control is implemented using an external, potential-free, normally open contact.

Connection (External control)

When using an external contact signal, the connection is made using the 24VAC voltage from the heat pump's control centre.

- Terminal **327** (G 24VAC)
- Terminal **326** (DU1, input)

Connect an external normally open contact between these two terminals. When the contact closes, free cooling is activated.

Important notes

- The free cooling circulation speed (pump output) must be set on the heat pump controller in accordance with the requirements of the installation site.
- The automation ensures that free cooling does not interfere with the heat pump's other critical functions, such as domestic water heating.

Cooling transfer pump

The cooling transfer pump (Q28) is used in the primary cooling circuit to transfer cold energy from the brine circuit to the cooling network. The pump starts automatically whenever the heat pump receives a cooling request (free cooling or cooling circuit request).

Power supply

- The pump's power supply must come from the property's distribution board (sub-distribution board). It must not be taken directly from the heat pump's control centre.
- The sub-distribution board must be equipped with a fuse rated for the pump's power and, if necessary, with a motor protection switch.

Wiring

- Pump control (Q28): terminal blocks **343** and **344** (normally open contact, NO)

Mechanical cooling

Mechanical cooling comprises the control of passive and active cooling, as well as the management of the pre-control group and condensate discharge. The function requires the **TC1.5 expansion module** (condensate discharge sensing also requires the **TC1.4** module).

Power supply for circulation pumps

- The power supply for all circulation pumps must always come from the property's sub-distribution board. It must not be taken directly from the heat pump's control centre.
- The sub-distribution board must be equipped with fuses rated for the pump's power and, if necessary, with a motor protection switch.

Passive and active cooling

Passive cooling utilises the low temperature of the brine circuit to cool the property without using the compressor. Active cooling starts the compressor to produce cooling when the passive output is not sufficient.

Sensing (TC1.5):

- **B40 (Cooling accumulator):** Connection to terminal **X1-M**.
- **B42 (Brine circuit temperature):** Connection to terminal **X3-M**.

Valve controls (TC1.5):

- **Y41 (Passive cooling valve):**
 - o **G:** 24V AC (Operating voltage)
 - o **G0:** 0V (Neutral)
 - o **Q14 (relay Q1):** 24VAC control voltage (normally open contact).
- **Y42 (Active cooling valve):**
 - o **G:** 24V AC (Operating voltage)
 - o **G0:** 0V (Neutral)
 - o **Q24 (relay Q2):** 24VAC control voltage (normally open contact).

The valves can be implemented with either one 3-way valve or two 2-way valves.

Pre-control group

The pre-control group controls the temperature of the fluid entering the network and protects the heat exchanger from freezing if water is used in the secondary circuit.

Connection (TC1.5):

- **B41 (Primary circuit supply water):** Connection to terminal **X2-M**.

- **B43 (Secondary circuit supply water):** Connection to terminal **X4-M**.
- **Q40 (Primary circuit pump):** Control via relay **Q4**, contact **Q43–Q44**.
- **TV40 (Control valve):**
 - o **G:** 24V AC
 - o **G0:** 0V (Neutral)
 - o **Y1:** 0...10V control signal

Condenser heat discharge

The condenser heat discharge function transfers the condenser heat generated during mechanical cooling to the brine circuit.

Wiring:

- **B70 (Charging return water):** Connection to expansion module **TC1.4**, terminal **X5-M**.
- **Q45 (Circulation pump):** Control from expansion module **TC1.5**, relay **Q3**, contact **Q33–Q34**.
- **Y43 (Motorised valve):** Control from expansion module **TC1.5**, relay **Q3**, contact **Q33–Q34**.
- **TV45 (Control valve):** Control from expansion module **TC1.5**.
 - o **G:** 24V AC
 - o **G0:** 0V (Neutral)
 - o **Y2:** 0...10V control signal

Important during installation

- Since the pumps are controlled via potential-free contacts, make sure that the external electrical panels have warning labels: "**WARNING: EXTERNAL CONTROL VOLTAGE**".
- Ensure the correct placement and operation of the pre-control group sensors (**B41/B43**) to prevent the heat exchanger from being damaged by freezing.
- The opening of the active and passive cooling valves (**Y41/Y42**) must be verified via the controller's service menu before actual commissioning.

7.19 Connecting the ventilation air extractor

The G-Eco heat pump system includes a ventilation air extractor, which is installed separately for each device. The extractor ensures the airflow needed for the optimal operation of the equipment.

General installation instructions

- The ventilation air extractor must be installed and commissioned **first** during equipment installation, before starting the heat pump.
- Earth the exhaust ductwork along its entire length. Verify the continuity of the earthing before starting the extractor.
- In systems with multiple devices, the ventilation air extractors can be cascade-controlled, in which case they operate synchronously in accordance with the demand of the heat pumps.
- For detailed positioning and mounting instructions, see the ventilation air extractor's separate installation manual.

Power supply

- The power supply for the ventilation air extractor is taken from the property's distribution board.
- Check the required fuse size and cable type in the model-specific technical data.

Wiring

The extractor is controlled by the heat pump's automation with a control signal (0...10V).

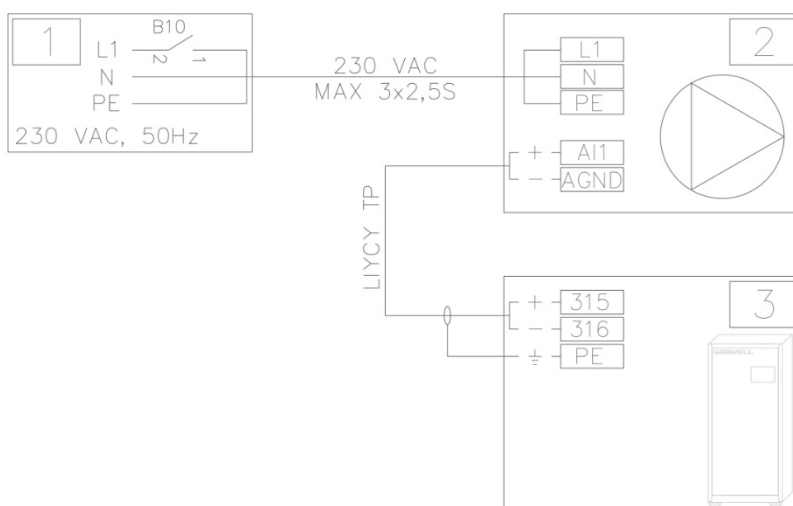
- The control cable must be twisted-pair and shielded (for example JAMAK 2x2x0.5 or an equivalent instrumentation cable).
- Connect the control cable to the terminal blocks in the heat pump's connection box:
 - o Plus (+): Terminal block **315** (0...10V)
 - o Minus (-/M): Terminal block **316** (Earth/Neutral)
- Earth the cable's shielding at one end only, in accordance with the electrical plan, to avoid interference signals.

Note that the extractor's control logic is inverted.

If the control signal is missing (e.g. due to cable damage), the extractor operates at full power for safety reasons.

Diagram legend:

1. **Property's distribution board**
2. **GEBEF control centre**
3. **Heat pump (master)**



GEBEF1...4 - Ventilation air extractor connection

7.20 Data transfer connections

The internal data transfer of the heat pump system, as well as the connection of the equipment to external networks (such as the building automation system and cloud service), is implemented via a local area network (LAN) between the devices.

Local Area Network (LAN)

Connecting a single device

Every heat pump comes as standard with a router placed on top of the device.

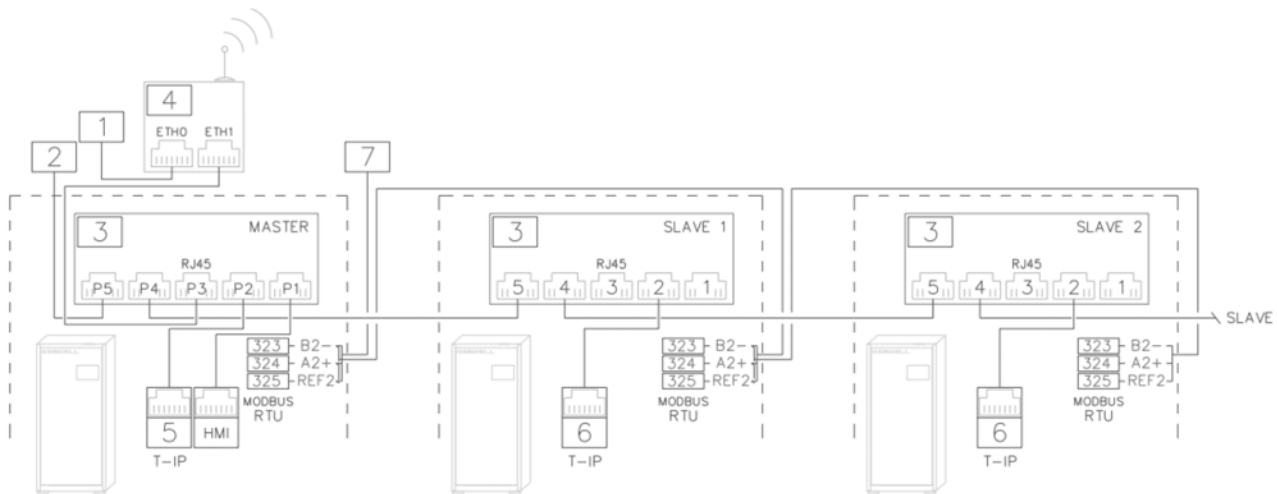
- In systems with a single heat pump, the communication bus is fully connected and configured at the factory, and no internal network connections need to be made at the installation site.

Cascade system LAN network (Parallel connection)

In cascade systems with several heat pumps, the devices are connected to each other using network switches and RJ45 network cables. The cabling between the devices is routed through cable penetrations located on the roof.

Network diagram legend:

1. **Property's WEB connection:** Internet connection provided by the property (router - ETH0).
2. **Building automation system (BAS):** Connection to the property's higher-level automation system (switch-5).
3. **Network switch:** The devices' internal switches, through which the local network is daisy-chained.
4. **Router:** The router connected to the master device.
5. **Master:** The heat pump (controller) that controls the system.
6. **Slave device:** Devices that follow the master device (slave devices).
7. **Modbus RTU (RS-485):** Connection to the property's higher-level automation system.
8. **HMI (touchscreen):** The touchscreen on the Master device, which is used to manage each individual heat pump.



Local network

Connection to the building automation system (BMS)

The heat pump can be integrated into a higher-level building automation system via a Modbus. The connection allows the device's temperatures, status information, setpoints, and failures to be read. In addition, the heat pump can be controlled by sending a heat request setpoint in degrees Celsius (°C).

The heat pump always operates on the bus as a **slave device**. The connection to the automation system can be made using either the Modbus RTU or Modbus TCP protocol. The Modbus settings are configured in the controller's service menu under **Communication connections**.

Modbus RTU (Serial bus)

Modbus RTU communication takes place using the RS-485 protocol.

- Connect the Modbus bus cable to the heat pump controller in accordance with the electrical diagrams.
- Use twisted-pair cables that meet the requirements of the EIA-485 standard. The recommended characteristic impedance is 100 ohms (especially when the baud rate is 19200 bps or higher).
- The devices must be connected directly to a single trunk cable by daisy-chaining. Star, ring, or cluster structures must **not** be used, and all such structures must be removed from the network.

Settings (to be configured on the controller):

- **Address:** Unique slave address on the bus (between 1 and 247).
- **Baud rate:** E.g. 9600 or 19200 bps.
- **Parity:** None / Even / Odd.
- **Stop bits:** 1 or 2. *(All devices on the same bus must have exactly the same communication settings to communicate with the master device.)*

Modbus TCP (Ethernet)

Modbus TCP communication takes place over a TCP/IP network using port **502**.

Connect a shielded Ethernet cable (Cat5e rating or higher) to the network switch box to ensure interference-free data transmission.

- The master and slave devices must be in the same IP space. Typical default addresses for devices are:
 - o Device 1: 192.168.1.101
 - o Device 2: 192.168.1.102
 - o Device 3: 192.168.1.103
 - o Device 4: 192.168.1.104

8 Start-up and adjustments



The device must be commissioned by an expert authorised by Gebwell.



The heat pump is not intended for use by persons with reduced physical/mental health, sensory impairments, or a lack of experience or knowledge of the heat pump, unless they are supervised or instructed in the use of the heat pump by a person responsible for their safety.



Children must not be permitted to play with the device, nor carry out cleaning or maintenance on it.

The heat pump compressor requires preheating before the first start-up or after a long period of inactivity. Preheating ensures that the refrigerant has evaporated out of the oil, which prevents damage to the compressor at start-up.

Compressor preheating

The G-Eco heat pump is equipped with an internal crankcase heating function and an oil temperature sensor. Observe the following limit values before start-up:

- The heater must be on for at least **8 hours** BEFORE starting the compressor.
- The oil temperature must be at least **20 °C** before start-up.

Start-up process step by step

1. Set the device to **COMPRESSOR HEATING** mode in the device's operating mode menu. In this mode, only the crankcase heater is activated; no other equipment (pumps or compressor) will start.
2. Once the preheating has taken effect, set the device to **AUTO** mode.
 - o The controller monitors the crankcase temperature sensor and only allows the compressor to start once the correct temperature has been reached.
 - o The ambient temperature affects the required heating time.

Monitoring and alerts

The automation monitors the progress of the heating process:

- If the correct crankcase temperature is not reached within **300 minutes (5 h)** of switching to AUTO mode, the system issues a low-priority alert (**Class B**).
- The compressor starts automatically as soon as the oil has reached the set safe temperature limit.

8.1 Filling and venting the network

Before commissioning the system, ensure that both the heating circuit and the brine circuit have been filled correctly and carefully vented.

Filling and venting the heating system

1. Make sure that the entire system has been checked for leaks before starting to fill.
2. Open the vent and drain valves to allow air to escape freely during filling.
3. Fill the charging/heating circuit from the system filling valve.
4. Close the vent and drain valves once they release only clean water and no more air. The pressure will start to rise after a while.
5. Close the filling valve when the system pressure has reached the design level.
6. Carefully vent the system once more from all air vent valves. Repeat filling and venting until the air has been removed and the pressure remains stable.

Filling the brine circuit



The brine must be a mixture containing antifreeze and corrosion inhibitor.



Two-stage venting of the brine circuit

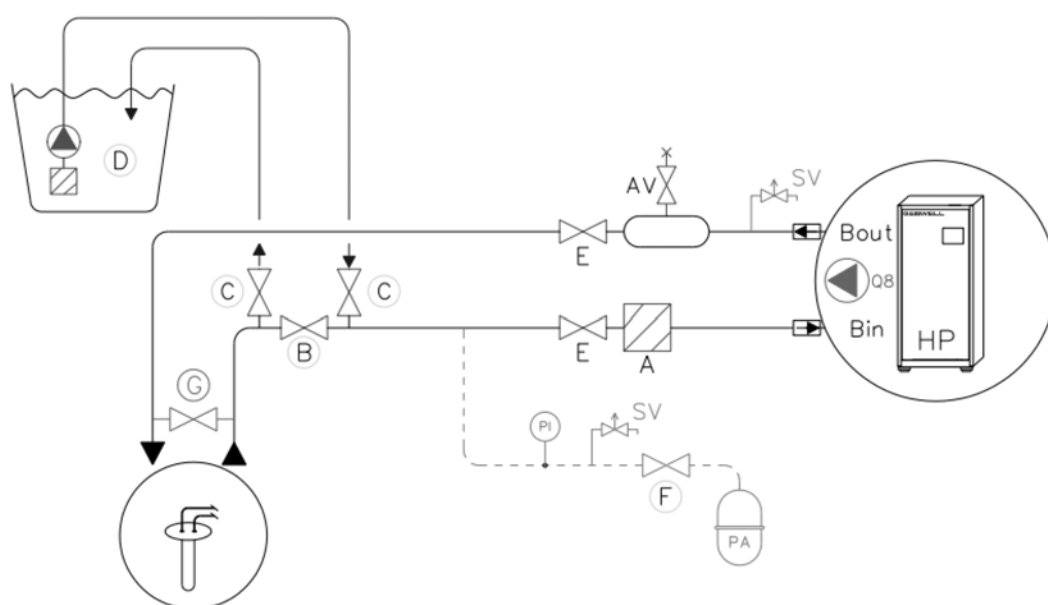
It is recommended to vent the brine circuit in two stages to make air removal easier and faster.

1. **Bypass valve (G):** Install a bypass valve in the brine circuit so that the pipework inside the technical room can be vented completely separately from the actual well field.
2. **Why?** If air in the system is pumped directly into the cold well field, the air mixes into the cold brine as microbubbles. Removing this air afterwards is considerably more difficult.
3. **Normal operation:** Once venting is complete, make sure that the bypass valve (G) is closed. It must always be **closed** during normal operation of the equipment.

The quality of the brine and the prevention of foaming are critical for the trouble-free operation of the heat pump.

- **Liquid mixture:**
 - o **Ground source heat:** Use a mixture of water and ground source heat transfer fluid with a frost resistance of at least **-15 °C**.
 - o **Other applications:** The frost resistance must be **5 °C** below the lowest expected operating temperature.
- **Filling process:**
 1. The heat pump's service valves **E** must be open during operation and filling of the device.

2. Fill the circuit from valve **C** (both open). Keep shut-off valve **B** closed so that the fluid circulates through the entire circuit. In large circuits, you can use the bypass valve **G** in the technical room to make air removal more effective.
3. Use clean liquid. Make sure that no debris from the bottom of the container enters the suction pipe.
4. **Beware of foaming:** If you are using an external pump, make sure that the liquid is not pumped in as foam. Removing microbubbles is difficult. If necessary, use two large containers to separate the microbubbles.
5. **Filters:** Clean filter **A** before pressurising. Also clean the heat pumps' device-specific filters before start-up. If dirt accumulates in the filter, repeat the cleaning until no more dirt accumulates.
6. **Pressurisation:** Pressurise the circuit with an external pump. Monitor the pressure gauge (**PI**) to ensure that the safety valve does not open.



Venting the brine circuit

A	Filter	PA	Expansion vessel
B	Shut-off valve – CLOSED during venting	AV	Air vent
C	Vent valves	SV	Safety valve
D	Filling container	Q8	Brine pump – internal
E	Heat pump shut-off valves	HP	Heat pump
F	Expansion vessel service shut-off valve	PI	Pressure gauge
G	Bypass valve		

Pressure test of the brine circuit

The pressure test verifies that the collector loop connections and pipework are tight before they are covered or commissioned.

1. Raise the pressure in the brine circuit to the design pressure.
2. Wait **30 minutes** and check the pressure gauge.
3. If the pressure has dropped during the monitoring period, there is a leak in the system. Find the leak, repair it, and repeat the test from the beginning.

4. If the pressure remains stable, the pressure test has been passed. Record the result and the pressure used in the commissioning report.

8.2 Checks before starting the heat pump

At time of delivery, all operating switches on the heat pump are in the **STOP position**. Before configuring the equipment setup in the software and starting the compressor, a careful inspection round must be carried out to avoid equipment damage.

Make sure of the following before starting the device:

Pipework and fluid circuits

- **Filling and pressures:** The brine circuit and the charging/heating circuit have been filled with the correct fluid mixture, and the system pressure levels comply with the recommended values (e.g. the pre-charge pressures of the expansion vessels have been taken into account).
- **Venting:** The charging and brine circuits have been vented carefully (including any venting bypasses).
- **Filters:** The dirt separators have been opened and cleaned after the system was filled and vented.
- **Valves:** All shut-off and service valves related to the installation are in their correct positions.
- **Leaks:** The entire system has been visually inspected for leaks, and the tightness of the connections has been verified.

Electricity and automation

- **Electrical connections:** All electrical connections have been made in accordance with the electrical diagram, and the tightness of the screw connections has been checked.
- **Phase sequence:** The phase sequence (L1, L2, L3) of the incoming power supply has been measured and confirmed to be correct.
- **Sensors:** The external temperature sensors have been installed in place, connected in accordance with the electrical diagram, and insulated, and their good contact with the pipe has been verified.
- **Ventilation:** The ventilation air extractor connected to the equipment has been installed, and negative-pressure ventilation is in operation.

Compressor preheating

- **Oil temperature:** The compressor has been preheated to remove refrigerant from the oil.
- **Time and limit value:** The crankcase heater must be on for **at least 8 hours**, or alternatively the oil temperature must be at least **20 °C**, before the compressor is allowed to start.

Commissioning report

It is recommended to acknowledge the above actions as completed in the commissioning report. The report serves as proof of a correctly performed installation in any warranty and service situations.

8.3 Venting the network with the device's own pump

After the system has been filled and vented using external equipment (a filling pump), the venting can be completed using the heat pump's own circulation pumps.

Ensuring the brine circuit is free of air

The brine circuit in particular must be vented very carefully. Even a small amount of air in the brine circuit impairs the device's heat transfer, reduces energy efficiency, and can cause compressor failures.

Starting the pumps manually (Service level)

The device's own pumps can be run manually via the service menu in the controller's user interface. You can control the pumps as follows:

1. **Login:** Press and hold the controller's selection wheel for **3 seconds**.
2. **Code:** Enter the service level password **2000** on the display.
3. **Menu:** In the service menu, navigate to **Function testing**.

Venting the charging circuit

The charging circuit (the circulation between the heat pump and the accumulator tank/network) is vented using the internal charging pump.

- Select **Charging pump** from the test menu.
- Increase the pump speed from the controller to get the air moving. At the same time, monitor the network's air vent valves and the system pressure.

Venting the brine circuit

The final venting of the brine circuit is carried out using the device's internal brine pump.

- Select **Brine pump** from the test menu.
- Start venting at **low power** and increase the speed slowly and gradually. Increasing the flow too quickly can break the air up into a fine foam, which is much slower to remove.



Remember to return all components to **Auto** mode once venting is complete. Otherwise the heat pump will not work properly.

8.4 Starting the heat pump

Once all the preceding checks, venting, and system configuration have been completed, the equipment can be started for normal operation. Follow the steps below carefully.

1. **Main power:** Set the heat pump's main switch (**Q1**) to the **ON** position.
2. **Component power:** Set the other switches on the electrical panel to the **ON** position:
 - o Brine pump (Q8) (**F2**)
 - o Charging pump (Q9) (**F3**)
 - o Control (**F10**)
3. **Start-up:** Wait a moment until the controller has fully started and the basic screen appears.
4. **Service level:** Log in, password ***847293** (touchscreen).
5. **Changing the operating mode:** Set the heat pump to automatic operation (*Operating mode -> Auto*).
 - o **MAIN MENU -> DEVICE -> HEAT PUMP OPERATION -> Select AUTO**

Monitoring operation and test run

6. **Start of charging:** When the operating mode is AUTO, the heat pump starts calculating the heating demand and starts charging as needed.

Attention: If the domestic water function is activated in the system, the automation prioritises it and starts **domestic water charging first**.

7. **Forced test run:** If the property has no natural heat demand at the time of start-up, perform a test run of the equipment by increasing the temperature demand.

8. **Changing the setting:** You can force the device to run by increasing the setting in the controller's **Heating circuit** menu under **Room setpoint** (see the chapter *Heating circuit settings* for more detailed instructions), or alternatively by changing the demand from the external automation system (BMS).
9. **Restoring settings:** Once you have verified during the test run that the device (compressor, pumps, and valves) is working correctly, **remember to return** the heating and domestic water settings to the property's normal needs.

8.5 Operation without the brine circuit

The heat pump's automation can be used to control the heating of the property and domestic water even before the brine circuit (collector loop) is finally connected. Heat is then produced entirely by the electric heaters installed in the heating and domestic water accumulator tanks.

Prerequisites and requirements

All automation control functions are available, but the following must be ensured before starting backup heat operation:

- The heating and domestic water circuits must be physically connected, filled with water, and carefully vented.
- The electrical connections of the equipment must be fully complete. In particular, the controls for the electric heaters in the accumulator tanks must be connected to the heat pump's control centre.

IMPORTANT: Operation of the ventilation air extractor

Even though the refrigeration process is not producing heat, the **ventilation air extractor must be installed and in use** in backup heat mode as well. This ensures the underpressure ventilation required by the heat pump and proper air circulation in the equipment.

Changing the setting

For the device to operate solely on the electric heaters, without the compressor and brine circuit, it must be set to a separate backup heat mode.

1. Navigate to **Heat pump operating mode** in the controller menu.
2. Change the setting to **Backup heat**.

Operation in Backup heat mode

- The controller actively controls the electric heaters in the accumulator tanks in accordance with the property's heating curve and domestic water demand.
- The **compressor (K1)** and **brine pump (Q8)** are disabled in the software and do not attempt to start in this mode.

9 Heat pump control with external automation

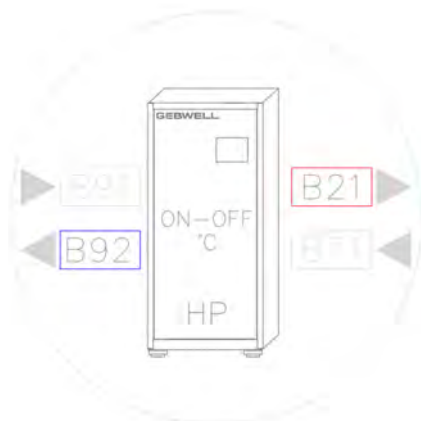
The heat pump/heat pump system can be controlled by external automation in two separate control modes. As an independent or system heat/cold generator. Both control modes follow control logic, based on the temperature setpoint.

As an independent heat/cold generator, the heating and/or cooling run permission and a setpoint (°C) are written to the heat pump. The controller adjusts the compressor in accordance with the requested temperature, and keeps the supply water temperature at the setpoint. In heating charging mode, the functional sensor is the condenser supply water sensor B21, and in cooling charging mode, the evaporator supply water sensor B92.

In a system, the heat pump, or a cascade system of several units, produces heating, cooling, or domestic water for the accumulator tanks in accordance with the heat pump's own automation. The heat pump measures the temperatures of the accumulator tanks, whose setpoints are determined by the higher-level automation. The internal system manages the capacity control of the compressor, or of the compressors in a cascade of several units, and keeps the accumulator tanks at the setpoint temperatures. In cascade systems, the setpoints are written to the leading device (master).

9.1 Independent heat/cold generator

The heat pump is controlled in HEATING or COOLING operating mode. The mode control selects the supply water sensor, in accordance with which the compressor output is adjusted. The heat pump keeps the supply water at the setpoint in accordance with the selected control mode. When switching between heating and cooling modes, the run permission must be removed and a new run permission issued for the other operating mode. The heat pump performs a controlled changeover.



Heat pump setpoint HEATING:

The heat pump receives the heating run permission from register 4x 102 (0=STOP / 1=ON). The run permission starts the device's charging pump. The heat pump setpoint is written to register 4x 104 (°C).

The heat pump produces heating in accordance with the supply water sensor (**B21**). The compressor starts when the supply water measurement is below the setpoint and the capacity calculation exceeds the compressor's minimum speed limit (**10%**). The compressor is continuously variable between **10–100%**. If the system's capacity demand is less than the heat pump's permitted minimum speed (**1–10%**), the compressor runs at minimum speed until the capacity management calculation reaches **0%**.

Heat pump setpoint COOLING:

The heat pump receives the cooling run permission from register 4x 1201 (0=STOP / 1=ON). The run permission starts the device's brine pump. The heat pump setpoint is written to register 4x 1202 (°C).

The heat pump produces cooling in accordance with the supply water sensor (**B92**). The compressor starts when the supply water measurement is below the setpoint and the capacity calculation exceeds the

compressor's minimum speed limit (**10%**). The compressor is continuously variable between **10–100%**. If the system's capacity demand is less than the heat pump's permitted minimum speed (**1–10%**), the compressor runs at minimum speed until the capacity management calculation reaches **0%**.

9.2 System

The system's external temperature sensors are connected to the heat pump's control system. In cascade systems, the temperature sensors are connected to the leading device (master).

Domestic water

The domestic hot water tank has two temperature sensors. The tank's upper sensor (**B2**) measures the temperature of the domestic water supplied from the tank. The tank's lower sensor (**B3**) is the functional sensor, in accordance with which charging starts and stops. Domestic water charging operates in accordance with the setpoint and hysteresis. When the **B3** measurement reaches the setpoint, charging stops. When the temperature falls below the setpoint minus hysteresis, charging starts. During start-up and shutdown, the device follows its own protocol, controlling the circulation pumps internally for optimal operation. The heat pump controls the changeover valve (**Y3**) in accordance with the mode being charged.

The upper temperature of the domestic hot water tank (**B2**) is read from register 3x 701. The lower temperature of the domestic hot water tank (**B3**) is read from register 3x 702.

The setpoint of the domestic hot water tank is written to register 4x 901. The setpoint is the switch-off point for domestic water charging. The start point for domestic water charging comes from the hysteresis difference. The hysteresis for domestic water charging is written to register 4x 706.

The status information of the change-over valve is read from register 3x 704 of the device that produces domestic water. 0=heating 1=domestic water.

If the domestic water sensors are wired to the building automation system, the sensor measurement values can be written to the heat pump's automation. Upper sensor value for the domestic hot water tank 4x 709 (**B2**). Lower sensor value for the domestic hot water tank 4x 708 (**B3**). NOTE! When temperature writing is used, an interruption or loss of data transmission may prevent the heat pumps from operating. Data transmission must be ready for use when the heat pump is commissioned!

Heating

There are two ways to charge the heating: charging directly into the property's heating network or into a buffer tank. In a configuration without a buffer tank, only inverter-controlled heat pump models are used.

In a system without a buffer tank, an individual device uses the internal supply water measurement (**B21**) as its control sensor. In a cascade system, the control sensor is **B10**, which is positioned in the common heating charging supply water line.

The heating tank has two temperature sensors. The tank's upper sensor (**B10**) measures the supply water temperature as the water leaves the tank. The sensor is positioned in the accumulator tank at the height of the outgoing supply water, or slightly below it. The accumulator tank's lower sensor (**B15**) is a compensating measurement that influences (%) the average temperature of the tank. The prediction takes the temperature of the lower part of the accumulator tank into account by compensating the heat pump's setpoint, which keeps the supply water temperature more accurately at the setpoint.

The upper part / upper temperature of the heating tank (**B10**) is read from register 3x 901, and the lower temperature (**B15**) is read from register 3x 908.

If the heating tank sensors are wired to the building automation system, the sensor measurement values can be written to the heat pump's automation. Upper sensor value for the heating tank 4x 901 (**B10**). Lower sensor value for the heating tank 4x 711 (**B15**). NOTE! When temperature writing is used, an interruption or loss of data transmission may prevent the heat pumps from operating. Data transmission must be ready for use when the heat pump is commissioned!

Heat pump setpoint HEATING

The heat pump receives the heating run permission from register 4x 102 (0=STOP / 1=ON). The run permission starts the device's charging pump. The heat pump setpoint is written to register 4x 104 (°C). In normal heating operation, the heat pump's operating permit must be on at all times. The heat pump controller then controls the heating in accordance with the written setpoint. In summer use, or in exceptional situations, the operating permit control can be used to put the device into STOP mode in a controlled manner. NOTE! When the heating operating permit is set to STOP, the heat pump can produce domestic water and cooling.

The heat pump produces heating in accordance with the supply water sensor (**B21**). The compressor starts when the supply water measurement is below the setpoint and the capacity calculation exceeds the compressor's minimum speed limit (**10%**). The compressor is continuously variable between **10–100%**. If the system's capacity demand is less than the heat pump's permitted minimum speed (**1–20%**), the compressor runs at minimum speed until the capacity management calculation reaches **0%**.

Mechanical cooling

It is recommended to charge the cooling into a buffer tank to ensure the best possible functionality. With an inverter-controlled heat pump model, charging can also be carried out directly into the property's cooling network.

In a system without a buffer tank, an individual device uses the internal evaporator supply water measurement (**B92**) as its control sensor.

The cooling accumulator tank has one temperature sensor. The tank's lower sensor (**B40**) measures the supply water temperature at the tank outlet. The sensor is positioned in the accumulator tank at the height of the outgoing supply water (at the bottom), or slightly above it.

The lower part / lower temperature of the cooling accumulator tank (**B40**) is read from register 3x 1205.

Heat pump setpoint COOLING

The heat pump receives the cooling run permission from register 4x 1201 (0=STOP / 1=ON). The run permission starts the device's brine pump. The heat pump setpoint is written to register 4x 1202 (°C). In normal cooling operation, the heat pump's operating permit must be on at all times. The heat pump controller then controls the cooling in accordance with the written setpoint. When cooling is not in use, or in exceptional situations, the operating permit control can be used to put the device into STOP mode in a controlled manner.

The heat pump produces cooling in accordance with the supply water sensor (**B92**). The compressor starts when the supply water measurement is below the setpoint and the capacity calculation exceeds the compressor's minimum speed limit (**10%**). The compressor is continuously variable between **10–100%**. If the system's capacity demand is less than the heat pump's permitted minimum speed (**1–20%**), the compressor runs at minimum speed until the capacity management calculation reaches **0%**.

During commissioning, the limit values used to restrict the operation of the evaporator circuit must be defined in the controller, as well as a protection value that shuts down the compressor. The configuration is done at the service user level in the brine circuit settings menu.

If the cooling accumulator tank sensor is wired to the building automation system, the sensor's measurement values can be written to the heat pump's automation. The cooling accumulator tank's lower sensor value 4x 1216 (**B40**) NOTE! When temperature writing is used, an interruption or loss of data transmission may prevent the heat pumps from operating. Data transmission must be ready for use when the heat pump is commissioned!

10 Using the heat pump

10.1 Getting started

Log in to the device by pressing the **Log in** button. If a PIN code has been set on the device, the PIN code must be entered before you can log in.



The user interface is divided into three sections. This manual will help you understand the main view of the heat pump control panel and the information displayed on it.



1. Top bar: System status and management

At the top of the screen, you will find general information about the device status and user level:

- **Time and outdoor temperature:** In the left corner, you can see the current time and the prevailing outdoor temperature.
- **Alerts and warnings:** The red bar in the middle (exclamation mark symbol) indicates active alerts. The number indicates the number of alerts.
- **Login time:** The minute count on the right (e.g. 13m) shows how long the current login remains valid before automatic logout.
- **User level and lock:** The figure symbol in the top right corner shows the user level, and the "Lock" button lets you log out or lock the screen.

2. Middle section: This section is reserved for changing views, and the information displayed changes, depending on which view is selected.

3. Bottom menu: General menu structure

At the bottom of the screen, you will find shortcuts for managing the system:

- **Home:** Quick return to the front page.
- **Device information:** Information about the system components and version.
- **Settings:** Basic technical settings of the heat pump.
- **System:** System-level configuration, display panel settings, and advanced settings.

- **Alerts:** Alert history and dismissal of active alerts.

10.2 Home view

The heat pump's user interface is designed to provide a clear and logical view of the system's operation.

The front page shows the basic status of the system and allows a quick status check – the user can see in real time whether the heat pump is on or off. If the device is not operating, you can use the info button to check the exact reason why it has not started, such as active alerts or status information restricting start-up.

The home view is divided into several tabs that present status information for different parts of the system. If multiple heat pumps are connected to the system, the home view allows you to browse the information for each heat pump separately. The view shows a maximum of two heat pumps at a time, and the side buttons can be used to move to the next devices.

Front page



Heat pump status

The front page shows the current status of the heat pump. If the heat pump is off, the status indicates that the device is not running. The status gives the user a quick indication of whether the heat pump is running or stopped.

Active alerts

The front page displays information about active alerts. The info button provides the user with additional information about why the heat pump cannot be started. The view shows, for example, whether the system has stopped due to critical alerts and the type of cause behind the stoppage.

R290 refrigerant leak detector

The front page displays the status of the safety circuit. The leak detector function is a pressable feature: selecting it shows the user the current status of the refrigerant leak monitoring.

Heat pump information



The Heat pump information tab shows the current status of an individual heat pump. The view brings together general information on the device's operation, such as the status of key components and the system's measurement data. If there is only one heat pump in the system, the view shows the information for that device. When there are multiple heat pumps in the system, the user can select the desired heat pump from the serial number menu in the middle of the screen.

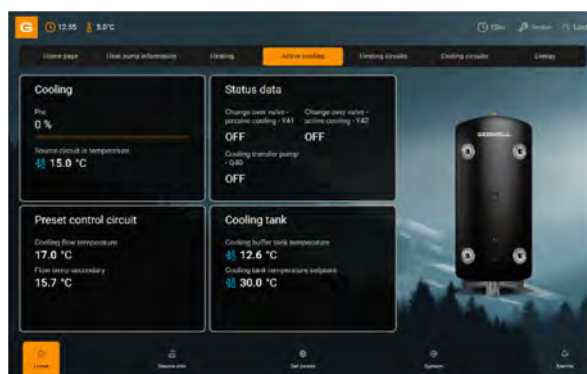
The tab shows the status of the heat pump: the status of the compressor and change-over valve, electrical power data, and the measured values of the brine circuit and charging circuit. The supply water setpoint is clearly displayed, allowing the user to verify that the system is working correctly.

Heating



The **Heating view** shows the operation of the heating system. The status of the change-over valve indicates whether the system is producing heating or domestic hot water. Temperature measurements and their associated setpoints are displayed. If the system has a buffer tank, the temperatures in its upper and lower parts and the operation of the additional heat source are displayed.

Mechanical cooling



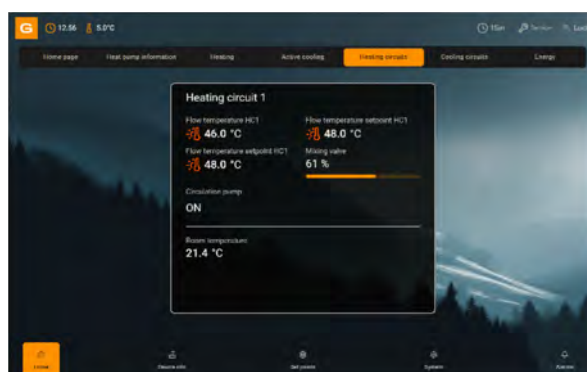
The **Mechanical cooling** tab allows the user to view information about the cooling system, such as the status of the valves and transfer pumps, and cooling-related measurements. The view helps ensure that cooling is working as designed.

Domestic water



The **Domestic water** view shows the accumulator tank information, the set temperature, and the status of the circulation pump and change-over valve. This allows the user to check that hot water is available at the correct temperature.

Heating circuits



The **Heating circuits view** shows the status of the heating circuits. The system supports up to three heating circuits. The view allows the user to monitor the operation of each heating circuit separately. The page shows temperatures, status information, and setpoints for each circuit.

Cooling circuits



The **Cooling circuits** tab shows the status of the system's cooling circuits. The system supports up to two cooling circuits. The view allows the user to monitor the operation of each cooling circuit separately. The page shows temperatures, status information, and setpoints for each circuit.

Energy information



The Energy tab is intended for monitoring energy consumption and production. The information presented in the view should be used to review system operation, not to change operating settings. The view provides an overview of the heat pump's energy efficiency, energy output, and electricity consumption, as well as key overall values related to operation.

Note! If the system is not equipped with additional devices for measuring energy production, the view will not show this information.

Instantaneous COP value

The view shows the system's instantaneous coefficient of performance (COP). The value describes the current energy efficiency of the heat pump. The information requires an optional additional measurement.

Heating output

The Energy tab shows the heating output. The information indicates the output at which the system is producing heat at that moment. The information requires an optional additional measurement.

Electricity consumption

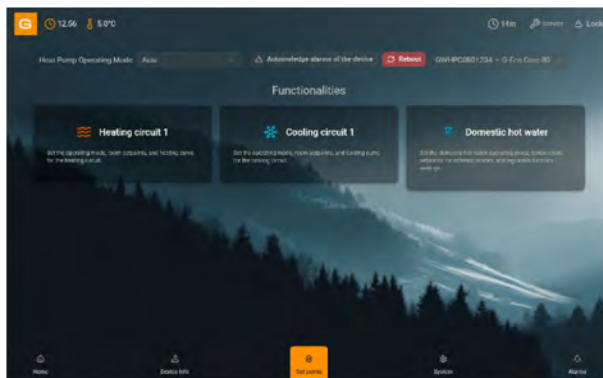
The view shows the system's electricity consumption. The electricity consumption reading is based on a separate electricity consumption meter in the heat pump and is always available.

Operating hours and starts

The view shows the total operating hours and starts of the compressors. The total operating hours of the additional heat sources are also displayed. The data describes the use of the system over a longer period.

10.3 Basic heat pump settings

The basic settings of the heat pump can be changed on the Settings page. The Settings front page adapts in accordance with which functions have been activated in the heat pump.



10.3.1 General settings

The top bar has shortcut buttons

- **Start / Stop**, a button used to start and stop the heat pump.
- **Dismiss device alerts**, which can be used to dismiss active alerts.
- **Restart**, which can be used to restart the heat pump controller.
- **Revert**, which allows the user to revert the settings before saving (visible in views where changes can be made)
- **Save**, which allows the user to save the changes they have made (visible in views where changes can be made)

The heat pump is always delivered in **STOP mode**, and it will not start until the user selects a suitable operating mode. Before switching to AUTO mode, all the necessary device-specific settings must be configured.

Changing the operating mode does not require restarting the controller.

AUTO

AUTO mode is the heat pump's normal operating mode. In this mode, the device operates automatically in accordance with the set values and the needs of the system. AUTO mode is selected when the device is ready for normal use.

STOP

In STOP mode, all functions of the heat pump are switched off. This is the device's delivery state, in which it is safely switched off before commissioning.

BACKUP HEAT

In BACKUP HEAT mode, heating is provided only by additional heat sources, such as electric heaters. The compressor and brine pump do not start in this mode. This mode is used, for example, in the event of a fault or during maintenance.

Note: If the system has more than one heat pump (a cascade system), each unit must be set to AUTO mode separately.

10.3.2 Domestic hot water settings

The heat pump produces domestic hot water, which is stored in the domestic hot water tank.

The heat pump controls the heating of domestic water automatically. When the domestic water in the tank cools down, the heat pump starts and heats the water again.

This happens as follows:

- **Heat control** is carried out using the **change-over valve (Y3)**, which directs the heat either to the heating system (position B) or to the domestic hot water tank (position A).
- The accumulator tank has two temperature sensors:
 - The **upper sensor (B2)** measures the temperature at the top of the accumulator tank. This corresponds to the temperature at which the water enters the domestic water network.
 - The **lower sensor (B3)** controls the operation of the heat pump. When the temperature measured by the lower sensor falls below the set value by the switching difference, the heat pump starts. When the target temperature is reached, the heat pump switches off.

Energy consumption and equipment service life

When heating domestic water, it is important to note that:

- **A high domestic water temperature consumes more energy.**
The hotter the water is heated, the more electricity the heat pump uses. This is directly reflected in energy consumption and electricity bills.
- **High temperatures put more strain on the equipment.**
Prolonged use at high temperatures can shorten the service life of the heat pump.
- **The water is heated in accordance with the reading from the lower sensor (B3).**
This means that hot water stratifies at the top of the tank, so the water at the upper sensor (B2) can be considerably hotter than at the bottom. This allows efficient use of water without heating the entire tank to a high temperature.

Recommendation: Set the domestic water target temperature to **50–55 °C**. This is sufficient for normal use, saves energy, and extends the service life of the equipment.

Operating modes:

AUTO

In AUTO mode, domestic hot water production is on. The heat pump operates automatically in accordance with the set temperature values. If time programmes have been defined for domestic water, the controller follows them and adjusts the temperature in accordance with the programme.

STOP / Off

In STOP mode, domestic hot water production is off. This mode is used, for example, when hot water is not needed (e.g. during a holiday).

LOWERED

In Lowered mode, the domestic water temperature setting is lowered to save energy. This mode is suitable for situations where water consumption is low. An example value is 45–48 °C.

NORMAL

In Normal mode, the domestic water temperature is kept constant at the target temperature set by the user. This mode offers a balanced solution between comfort and energy efficiency, and is suitable for daily use without special needs. The recommended value is 50–52 °C.

COMFORT

In Comfort mode, the domestic water temperature setting is increased. This mode provides more hot water for higher demand. An example value is 53–58 °C.

Legionella function

The Legionella function is an automatic feature of the heat pump that ensures the safety of the domestic water. The purpose of the function is to prevent the growth of legionella bacteria by regularly heating the domestic water to a higher temperature.

When is the legionella function needed?

If the normal domestic water temperature setting is **below +50 °C**, it is **recommended to activate** the legionella function. If the domestic water temperature is constantly +55 °C or higher, the legionella function is not needed, because each heating cycle exceeds the required temperature limit.

Function settings

- **SETPPOINT**
Defines the temperature to which the domestic water is heated during the legionella function.
- **EXECUTION DAY**
Select the day of the week on which the legionella function is performed. The function starts automatically on the selected day.
- **START TIME**
Defines the time at which the legionella function starts. Choose a time when water usage is low (e.g. at night) to ensure the heating is as efficient as possible.

Supply water setpoint

If a mixing valve (TV38) with sensor B38 is installed in the system, you can also adjust the supply water temperature. This setting is only visible in the user interface if the corresponding function is activated.

10.3.3 Heating circuit settings

The Heating circuit menu is used to adjust the operation of the property's heating system. Each heating circuit can control, for example, a different floor, room, or building, and each can be assigned its own settings and operating modes.

The **operating mode** of the heating circuit determines which room setpoint is used for the heating circuit's heating settings. The choice of operating mode affects how warm the interior is and how much energy is consumed. The temperature settings for the operating modes are defined separately.

AUTO

In AUTO mode, the heating is on and operates automatically. If no time programs are set, the device uses the **NORMAL** setting. If a time program is in use, the controller changes the operating mode in accordance with the program (e.g. COMFORT → NORMAL → LOWERED) depending on the time of day or day of the week.

Tip: AUTO mode is the recommended choice for continuous use, as it automatically adapts to your needs.

NORMAL

In NORMAL mode, the heating is on and the heat pump follows the NORMAL mode temperature setting. This mode is suitable for normal everyday use without any timers.

STOP

In STOP mode, the heating is completely switched off. This mode can be used, for example, in summer or when heating is not needed.

LOWERED

In LOWERED mode, the room temperature setpoint is lowered to save energy. This mode is suitable, for example, for night-time or when you are away.

COMFORT

In COMFORT mode, the room temperature setpoint is increased. This mode provides additional heat, for example on cold days or when extra comfort is desired.

Note: Changing the operating mode does not affect any settings made for the heating circuit other than the room setpoint selection, with the exception of STOP mode

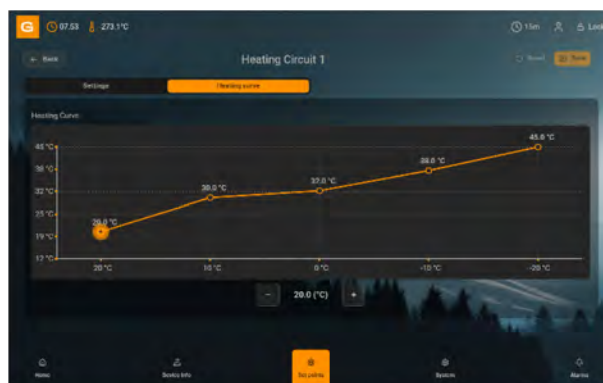
Heating curve

You can find the heating curve adjustment for each heating circuit separately by pressing the arrow button on the right. The heating curve determines how the heat pump adjusts the **supply water temperature** in accordance with the outdoor temperature. When it gets colder outside, the supply water temperature automatically increases to keep the indoor temperature stable.

The heating curve is adjusted by selecting the desired point and then setting it to the desired value using the – and + buttons.

How does the heating curve work?

The heating curve is created by setting the supply water temperatures for five separate outdoor temperatures.



Example of heating curve settings

Based on these values, the controller automatically calculates the appropriate supply water temperature under all conditions. The shape of the curve affects how sensitively the system reacts to changes in the outdoor temperature.

Tip for the user: If it feels cold inside during severe frost, you can increase the supply water temperature at the –10 °C or –20 °C points. If it is too hot inside in mild weather, you can lower the values at the +10 °C or +20 °C points.

Key concepts

- FILTERED OUTDOOR TEMPERATURE**

This is the outdoor temperature that the controller uses in the calculation. It is the average over the last few hours (factory setting: 2 hours) so that the control does not react too quickly to momentary changes.

- **HEATING POINT**

The calculated supply water temperature, based on the heating curve and the filtered outdoor temperature. This is the temperature at which the water enters the heating system.

- **MINIMUM AND MAXIMUM TEMPERATURE**

You can set upper and lower limits for the supply water temperature. This ensures that the water is not too hot or too cold, even if the outdoor temperature deviates from the set points.

10.4 Handling alerts

If the heat pump has active alerts, the alert indicator in the top section is red and the number shown indicates the number of active alerts. The Alerts view is opened by touching the indicator or by selecting the *Alerts* option in the bottom section.

The view shows

- The heat pump raising the alert (useful if the system has several heat pumps)
- Alert description
- Alert importance, i.e. priority (Not defined, Warning, Low, or Critical)
- Alert status (Active or Dismissed)
- Alert time

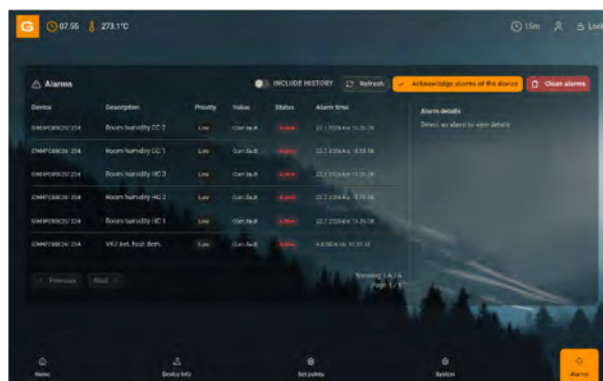
View functions

The *Show history* option, which retrieves and displays the heat pump's alert history (by default, only active alerts are displayed).

The *Refresh* button retrieves the active alerts from the heat pump again

The *Dismiss device alerts* button dismisses the heat pump's alerts if the active alert is one that allows manual dismissal.

The *Clear alert history* button clears the device's alert history, and alerts are no longer displayed in the view.



10.5 Service menu

The Device settings menu is used to define the basic settings of the heat pump, which do not need to be changed during normal use. These settings adjust the device's operation to match the technical requirements of the site and the sizing of the system.

The settings define, among other things, the setpoints, limit values, and alert limits related to the functions.

The settings are configured correctly during commissioning, and changing them later requires expert knowledge of the device's operation.

Access to the service menu requires service user level, meaning the user must log in with a PIN code that has the service user access level.

Service code (controller): 2000

Service code (touchscreen): *847293

To open the service menu:

1. Open the device's user interface with the service user PIN code.
2. Go to the System view.
3. Select Advanced settings.
4. The service menu front page opens

10.5.1 Domestic hot water settings

Charging hysteresis – Domestic hot water production

Function:

The charging hysteresis determines the temperature difference by which the domestic water temperature must drop before domestic hot water production starts. This prevents overly frequent starts and improves the heat pump's efficiency and service life.

Setting:

- **Adjustment range:** 5 – 15 K (kelvin)
- **Operating principle:**
Domestic hot water charging starts when the measured temperature has dropped below the set value by the amount of the hysteresis.

Example:

Setpoint = 58 °C

Hysteresis = 5 K

→ Charging starts when the temperature drops to 53 °C

Please note:

- The setpoint, hysteresis, and accumulator tank size directly affect the domestic water charging time.
- For the heat pump to function properly, the operating time should be as long as possible.
- Too small a hysteresis can cause short operating cycles, which reduces the performance and durability of the device.
- If the accumulator tank is large in relation to the heat pump's charging capacity, the hysteresis can be safely reduced.

Domestic water control – Mixing valve control

The domestic water control menu defines the functional setpoints and limit values for the domestic water mixing valve TV38. This function requires the TC1.7 accessory.

PI controller settings

Domestic water temperature control is based on a PI controller, which adjusts the mixing valve to reach the target temperature.

- **P-VALUE (Kp):**
Defines the controller's response speed to the control deviation (target value – measured value).
→ Higher value = faster response → Change in small steps, e.g. 0.5 units at a time
- **I-TIME (Ti):**
Defines the time (in seconds) within which the control deviation is corrected.
→ Shorter time = faster correction
→ Selectable range 0 – 1000 s

Alert limits (sensor B38)

The domestic water supply temperature is monitored by sensor B38. If the temperature exceeds or falls below the set limits, the system issues an alert.

- **SUPPLY WATER LOWER LIMIT ALERT**
Lower limit for domestic water supplied to the network
→ Alert class B (non-critical, requires attention)
- **SUPPLY WATER UPPER LIMIT ALERT**
Upper limit for domestic water supplied to the network
→ Alert class A (critical, requires immediate action)

Note: The placement of the sensor is important for control accuracy. Make sure that B38 measures the actual supply water temperature and is not exposed to local temperature peaks.

Electric heater – Domestic water heating

The electric heater (K6) is controlled via the heat pump controller based on the selected operating mode and the measurement sensor. The electric heater operates either in support of the heat pump or independently in domestic water production.

Safety requirement:

The electric heater must be equipped with a combined thermostat and overheat protector. The thermostat setting must be configured so that the heat pump can reach the setpoint without the thermostat limiting charging.

Operating modes:

- **Failure operation:**
The electric heater is activated only if the heat pump is in failure mode.
- **Additional operation:**
Used if the heat pump's maximum temperature is insufficient to reach the target domestic water temperature.
→ The heat pump heats first, and the electric heater finishes.
- **In parallel:**
The electric heater participates in domestic water production simultaneously with the heat pump.
→ Start-up is based on the PI controller's calculation.
→ If the heat pump alone is not sufficient, the electric heater starts to provide support.
- **Always:**
The electric heater is fully responsible for domestic water production.
→ The heat pump does not participate in domestic water heating.

PI controller settings (parallel operation only):

- **P-VALUE (Kp):**
Gain, selectable range 1–20
- **I-TIME (Ti):**
Integral time, selectable range 0–1000 s

Functional sensor:

The control of the electric heater is based on the temperature measurement of the domestic hot water tank:

- **B2 (upper sensor)** or
- **B3 (lower sensor)**

Sensor placement instructions:

The sensor should be placed in the tank so that heat from the electric heater affects the measurement, but not directly above the heater, so that the measurement is not distorted.

Domestic water circulation pump

The domestic hot water circulation pump can be controlled via the heat pump controller. The control can be set to continuous operation or to intermittent operation (pulse function), which saves energy.

PULSE FUNCTION:

Selection of whether to enable intermittent control.

→ **YES:** Pulse function enabled → **NO** The pump runs continuously

Time parameters (only if pulse function = YES)

- **PUMP ON TIME (s):**
The time in seconds that the pump is on in each cycle.
- **PUMP OFF TIME (s):**
The time in seconds that the pump is off before the next start.

Example:

If PUMP ON TIME = 60 s and PUMP OFF TIME = 1,800 s, the pump will run for 60 seconds and be off for 30 minutes before the next cycle.

Please note:

- The pulse function reduces energy consumption and extends the pump's service life.
- Continuous operation is recommended if the circulation network has a long response time or if the availability of hot water is critical.

10.5.2 Brine and charging circuit settings

Operation of the heat pump requires the **brine circuit flow** specified in the design.

- Check the **technical data** for the device's **minimum flow**.
- Too low a flow will reduce performance and may cause malfunctions.
- Ensure the minimum flow by setting the brine pump to **minimum speed** and checking that the flow is achieved.

Brine circuit settings

- **Temperature difference**
Defines the target temperature difference between the incoming and outgoing fluid.
 - **Recommendation:** 3 K
 - The controller aims to keep the temperature difference at this value.

Brine pump speed settings

- **Minimum pump speed**
The lowest allowed speed to which the controller can adjust the pump in normal operation.
 - **Note:** The minimum flow must also be achieved at this speed.
- **Maximum pump speed**
The highest allowed speed to which the controller can adjust the pump in normal operation.
- **Pump speed in external control**
The speed setting used when the brine pump (Q8) is operated during external control.

Brine circuit limits and protections

- **Brine circuit limit (Brine control)**
The temperature limit below which the controller **limits the compressor output**. The controlling sensor is BRINE OUT (B92).
- **Protection setpoint**
The temperature limit below which the compressor stops and an alert is activated.
 - If the temperature is below the set value for more than **20 seconds**, the compressor stops.
 - If the temperature drops more than **2 °C below the set value**, shutdown occurs immediately.
- **Pump pre-run time**
The time (s) that the brine pump must run before the compressor starts.

Pressure alerts

- **Brine circuit pressure lower limit**
Alert limit from pressure transmitter H21.
 - Alert class: **B**
- **Brine circuit pressure upper limit**
Alert limit from pressure transmitter H11.
 - Alert class: **B**

Charging circuit settings

Charging circuit temperature difference

During heating, the charging circuit attempts to maintain the temperature difference between the supply and return water at the value defined in this setting. The charging pump adjusts automatically in accordance with the temperature difference. The temperature difference is measured with the following sensors:

- **B21** – charging supply
- **B71** – charging return

The setting must correspond to the designed temperature difference of the property's heating network.

Note! During domestic hot water charging, the charging pump is controlled in accordance with the optimal operating range of the refrigeration unit. The temperature difference setting does not apply during this time.

- **Minimum setpoint:** 5 K
- **Maximum setpoint:** 15 K
- **Factory setting:** 7 K

Example values for different heating systems:

- Underfloor heating: 5–7 K
- Radiators: 8–15 K
- Ventilation heating: in accordance with the designed dimensioning

Charging pump minimum speed

This setting defines the lowest permitted speed of the charging pump during heating.

Note! Too low a speed may cause a high-pressure alert.

If the setting is too high, the charging circuit temperature difference will not be achieved as designed.

- **Factory setting:** 20–40% (depending on the device model)

Charging pump maximum speed

Defines the maximum permitted speed of the charging pump during heating.

- **Factory setting:** 100%

Charging pump standby speed

This setting defines the speed of the charging pump when the compressor is in **STOP mode**, but the heating function is still active (standby mode).

The pump then circulates liquid through the condenser, and the unit's internal temperature sensor monitors the need for start-up.

Note! If the accumulator tank/cascade sensor **B10** is used, the standby speed must be set to **0%**. The pump then starts only when the accumulator tank temperature drops and activates the charging demand.

Charging circuit pressure alerts – HEATING SYSTEM

- **Charging circuit pressure lower limit**
Alert limit from pressure transmitter **H11**.
 - Alert class: **B**
- **Charging circuit pressure upper limit**
Alert limit from pressure transmitter **H11**.
 - Alert class: **B**

10.5.3 Heating and cooling circuits

There is a separate home page view for the heating and cooling circuits. The view shows the heating and cooling circuits that were defined for the system during commissioning.

The system can have **1–3 heating circuits**, each with its own menu. The settings are defined **per circuit**.

Heating circuits 2 and 3 require the TC1.2 accessory. If heating circuit 1 functions as a mixing circuit, it also requires the TC1.2 accessory.

Combi circuit

One of the heating circuits can be programmed as a **combi circuit**, allowing the same circuit to control both **heating and cooling operation**. This requires a separate change-over valve and a connection to the brine circuit.

Heating circuit

The heating circuit supply water temperature is kept within the **upper and lower limits** to ensure that the system operates safely and energy-efficiently.

Current value indicates the currently active temperature setpoint in real time.

Sensors per circuit:

- **Heating circuit 1:** B1 / B21*
- **Heating circuit 2:** B12
- **Heating circuit 3:** B14

** If the system has only one heating circuit and no separate supply water sensor is installed, the heat pump's internal supply water sensor is used.*

Setpoint limits:

- **UPPER LIMIT:**
The temperature limit above which the setpoint cannot rise.
→ If the circuit has a **mixing valve**, the controller **closes the valve**, preventing excess heat from entering the network.
- **LOWER LIMIT:**
The temperature limit below which the setpoint cannot fall.
→ If the circuit has a **mixing valve**, the controller **opens the valve**, preventing water that is too cold from entering the network.

Alert limits

Alert limits define the permitted temperature ranges for the operation of the heating circuit. If the measured value exceeds or falls below the set limit, the system issues a **class B alert** notification. These alerts are not critical, but they require user attention.

Supply water temperature

- **SUPPLY WATER TEMP. UPPER LIMIT**
Defines the maximum permitted supply water temperature.
→ The alert is activated if the temperature exceeds this limit.
- **SUPPLY WATER TEMP. LOWER LIMIT**
Defines the minimum permitted supply water temperature.
→ The alert is activated if the temperature drops below this limit.

Room temperature

- **ROOM TEMP. UPPER LIMIT**
Defines the maximum permitted room temperature.
→ The alert is activated if the temperature rises above the set limit.
- **ROOM TEMP. LOWER LIMIT**
Defines the minimum permitted room temperature.
→ The alert is activated if the temperature drops below the set limit.

Note: The purpose of the alert limits is to ensure safe and energy-efficient operation of the system. The limits are set in accordance with the intended use and conditions of the system.

Heating circuit time constant

Function: The time constant determines how quickly the heating circuit responds to temperature changes. This setting can be used to make the control more stable and steady, especially in situations where the outdoor or indoor temperature varies rapidly; for example, over the course of the day.

- **Small time constant:** Fast response to temperature changes → more responsive control, but may cause unnecessary state transitions.
- **Large time constant:** Slower reaction → more stable operation, but slower response to changes.

Note: A larger time constant is recommended in locations where temperatures vary rapidly or where unnecessary system starts and stops need to be minimised.

Summer–winter settings

The summer–winter function determines how the heating circuit behaves in different seasons. The operating mode can be selected based on the outdoor temperature, the calendar, or continuous use.

Summer–winter mode operation

- **Auto (Automatic mode):**
The heat pump switches between summer and winter mode based on the **damped outdoor temperature**.
 - o **Winter mode:** The heating circuit adjusts the network in accordance with the outdoor temperature, the heating curve, and the room setpoint.
 - o **Summer mode:** The heating circuit is in **summer stop mode**. The circulation pump runs occasionally to prevent it from seizing up.
- **Date control:**
Summer mode is activated and deactivated **based on the calendar**.
 - o **START DATE:** Summer mode start date
 - o **END DATE:** Summer mode end date
- **Continuous heating:**
The heating circuit **always remains in winter mode**, regardless of the outdoor temperature or date.
→ Recommended, for example, for **underfloor heating in wet rooms**.
- **Summer mode + combi circuit:**
If the heating circuit is configured as a **combi circuit**, it can also provide cooling in summer mode if cooling is enabled.

Time effect of the outdoor temperature

- Determines how quickly changes in the outdoor temperature affect the control and the switch between summer and winter mode.
- Acts as a **time constant** that dampens sudden temperature fluctuations.
- **Resets when the controller is restarted.**

Note: A correctly set time effect improves control accuracy and prevents unnecessary state transitions.

Heating control

Heating control is based on PI control, in which the controller aims to keep the room temperature as close as possible to the set target. The operation of the controller is adjusted with two main parameters:

P-VALUE (Kp) – Gain

Determines how strongly the controller reacts to a control deviation (target value – measured value).

- **Higher value** → faster response
- **Lower value** → smoother adjustment

If the control responds too slowly, **increase the P-value**. Make changes in small steps, e.g. 0.5 units at a time.

I-TIME (Ti) – Integral time

Determines the time (in seconds) within which the controller aims to eliminate a permanent control deviation.

- **Shorter time** → faster correction, but may cause instability.
- **Longer time** → more stable control, but slower response.

If the control responds too slowly, **reduce the I-time**.

Stopping the circulation pump – preventing seizing

The circulation pump stop function ensures that the pump does not seize up during long idle periods. The function is based on two time settings:

ON TIME

Determines the time the pump runs to prevent seizing up, even if a heating request is not active.

- **Recommendation:** 60–120 seconds
- **Function:** The pump starts for the defined time at regular intervals.

OFF TIME

Determines the time the pump is off before the next anti-seizing run.

- **Recommendation:** 24–48 hours
- **Function:** The pump remains off for the defined time, after which it starts in accordance with the "ON TIME" setting.

Note: This function does not affect normal heating operation; it operates only when the system is idle. Correctly set values extend the pump's service life and ensure operational reliability.

Cooling circuits

The system can have one or two cooling circuits in use (1–2). Each circuit has its own menu, where the settings are defined for each circuit. This allows individual adjustment for various cooling areas or applications.

Circuit-specific settings include, among others:

- Supply water temperature settings and limits
- Room temperature alert limits
- Control curves and time constants

- Summer–winter operation
- Control logic for pumps and valves

Accessory requirement

Using the cooling circuits requires the installation of the **TC1.6** accessory. This component enables the cooling circuits to be controlled and monitored via the controller.

Note: Without the TC1.6 accessory, the cooling circuit menu is not available, and the control functions cannot be activated.

Supply water setpoints

Function: The supply water setpoints determine the temperature range within which the water entering the cooling circuit network is maintained. This ensures the safe and efficient operation of the system.

- **Current value:** Displays the current supply water temperature setpoint in real time.

Note: Alert limits are defined separately in the **alert limits menu**.

UPPER LIMIT

- Defines the maximum permitted supply water temperature.
- The cooling setpoint cannot rise above this limit.
- If the circuit has a **mixing valve**, the controller drives the valve **open**, thereby preventing excess heat from entering the cooling network.

LOWER LIMIT

- Defines the minimum permitted supply water temperature.
- The cooling setpoint cannot fall below this limit.
- If the circuit has a **mixing valve**, the controller drives the valve **closed** when the temperature approaches the lower limit, preventing excessively cold water from entering the network.

Tip: Set the upper and lower limits in accordance with the system's sizing and intended use. Limits that are too restrictive can hinder cooling capacity, while limits that are too wide can compromise system safety.

Alert limits

Alert limits define the permitted temperature ranges for the cooling circuit supply water and the room temperature. If the measured value exceeds or falls below the set limit, the system issues a **class B alert** notification.

Supply water temperature (cooling circuit)

- **SUPPLY WATER TEMP. UPPER LIMIT**
Defines the maximum permitted supply water temperature for the cooling circuit.
→ The alert is activated if the temperature exceeds this limit.
- **SUPPLY WATER TEMP. LOWER LIMIT**
Defines the minimum permitted supply water temperature for the cooling circuit.
→ The alert is activated if the temperature drops below this limit.

Room temperature

- **ROOM TEMP. UPPER LIMIT**
Defines the maximum permitted value of the room temperature.
→ The alert is activated if the room temperature rises above the set limit.
- **ROOM TEMP. LOWER LIMIT**
Defines the minimum permitted value of the room temperature.
→ The alert is activated if the room temperature drops below the set limit.

Note: Alert class B indicates a non-critical situation that requires the user's attention. The limits should be set in accordance with the intended use and conditions of the system.

Cooling circuit time constant

Function: The time constant determines how quickly the cooling circuit responds to temperature changes. This setting can be used to make the control more stable and steadier, especially in situations where the outdoor or indoor temperature varies rapidly; for example, over the course of the day.

- **Small time constant:** Fast response to temperature changes → more responsive control, but may cause unnecessary state transitions.
- **Large time constant:** Slower reaction → more stable operation, but slower response to changes.

Note: A larger time constant is recommended in locations where temperatures vary rapidly or where unnecessary system starts and stops need to be minimised.

Summer–winter settings

The summer–winter function determines how the cooling circuit behaves in different seasons. There are several operating modes to choose from, which affect cooling control based on the outdoor temperature or the calendar.

Summer–winter mode operation

- **Auto (Automatic mode):**
The heat pump automatically switches between summer and winter mode, based on the damped outdoor temperature.
 - **Winter mode:** The cooling circuit is disabled. The controller starts the circulation pump periodically to prevent it from seizing up.
 - **Summer mode:** The cooling network is controlled according to the outdoor temperature, the set cooling curve, and the selected room setpoint.

Date-controlled mode

- The summer period can be defined as a **fixed date**, in which case the system switches between summer and winter modes in accordance with the calendar.
- This option does not take the outdoor temperature into account, but is based solely on the set dates.

Continuous cooling

- In this mode, the cooling circuit **always remains in summer mode**, regardless of the outdoor temperature or date.
- Suitable for situations where cooling is needed all year round (e.g. technical rooms).

Summer mode (manual selection)

- When summer mode is selected, the **heating circuit is allowed to cool**, provided that cooling functions (e.g. combi circuit) are enabled.
- This also enables cooling via the heating circuit, if the system is configured for this.

Note: Choosing the right mode directly affects the system's energy efficiency and comfort. Automatic mode is recommended for most applications, but date-controlled or continuous mode can be used in special cases.

Time effect of the outdoor temperature

Function: This setting determines how quickly changes in the outdoor temperature affect the cooling circuit control and the switch between summer and winter mode.

- The setting acts as a **time constant** that dampens sudden fluctuations in the outdoor temperature.
- The aim is to add **stability and steadiness** to the control, especially in the variable conditions of spring and autumn.

Note: The effect of the time constant is reset when the controller is restarted.

Date control parameters

If the summer–winter mode is set to operate as based on **the date**, the following settings are available:

- **Start date:**
Specifies the **start date of summer mode**. From this date onwards, the system switches to summer mode regardless of the outdoor temperature.
- **End date:**
Specifies the **end date of summer mode**, after which the system switches back to winter mode.

Note: Date control is particularly suitable for sites where a precise and predictable transition between the seasons is desired, without the influence of the outdoor temperature.

Cooling control

P-VALUE (KP): P-value (Kp) of room temperature control

The P-value determines how strongly the controller's output reacts to a control deviation (target value and measured value). If the control responds too slowly, increase the P-value (Kp). Make the change in small steps. (e.g. 0.5 units at a time)

I-TIME (TI): I-time (Ti) of room temperature control

The I-time (s) determines the time within which any remaining deviation of the supply water temperature from the setpoint is corrected by applying the P drive amount during each I-period. If the control responds too slowly, reduce the I-time.

Stopping the circulation pump – preventing seizing

The circulation pump stop function ensures that the pump does not seize up during long idle periods. The function is based on two time settings:

ON TIME

Determines the time the pump runs to prevent seizing up, even if a cooling request is not active.

- Recommendation: 60–120 seconds

Function: The pump starts for the defined time at regular intervals.

OFF TIME

Determines the time the pump is off before the next anti-seizing run.

- Recommendation: 24–48 hours

Function: The pump remains off for the defined time, after which it starts in accordance with the "ON TIME" setting.

Note: This function does not affect normal cooling operation; it operates only when the system is idle. Correctly set values extend the pump's service life and ensure operational reliability.

10.5.4 Mechanical cooling

This menu is used to define the settings for mechanical cooling. Mechanical cooling must be enabled before the settings can be configured. This function requires the TC1.5 accessory.

Mechanical cooling consists of the following controls: PASSIVE COOLING (PC), ACTIVE COOLING (AC), PRE-CONTROL GROUP, and CONDENSER HEAT DISCHARGE.

PASSIVE COOLING (PC): uses the cold temperature of the brine circuit to cool the property/process.

ACTIVE COOLING (AC): cooling produced by the compressor

PRE-CONTROL GROUP: regulates the desired temperature for the property's cooling network and protects the cooling heat exchanger from freezing

CONDENSER HEAT DISCHARGE: discharges the waste heat generated during active cooling into the brine circuit

Settings – mechanical cooling

DT EVAPORATOR – Temperature difference in active cooling

Function: This setting defines the evaporator temperature difference (ΔT) used to control the operation of the brine pump (Q8) during active cooling.

Sensors:

- B91 – Brine in (temperature entering the evaporator)
- B92 – Brine out (temperature leaving the evaporator)

The controller monitors the temperature difference measured by these sensors and controls the brine pump Q8 to optimise the operation of the evaporator.

Operating logic:

During active cooling, the operation of the brine pump is regulated as based on the difference between the evaporator inlet and outlet temperatures.

A correctly set ΔT value ensures efficient evaporation and energy-efficient cooling.

Note: A temperature difference that is too small or too large can impair system performance or cause unstable operation.

DT CONDENSER – Temperature difference in active cooling

Function: This setting defines the condenser temperature difference (ΔT) used to control the operation of the charge pump (Q9) during active cooling.

Sensors:

- B21 – Charge flow (temperature from the condenser)
- B71 – Charge return (temperature to the condenser)

The controller monitors the temperature difference measured by these sensors and controls the **charge pump** (Q9) on this basis during condenser heat discharge.

Operating logic:

- When active cooling is running, the charge pump is controlled in accordance with the condenser temperature difference.
- If the device is simultaneously producing **domestic water** or **heating**, the control of the charge pump is based on the priorities of these functions.

Note: A correctly set ΔT value ensures efficient heat transfer and prevents overloading of the equipment.

ACCUMULATOR TANK HYSTERESIS

Function: Hysteresis defines the temperature difference that controls when cooling switches off while a cooling request is active. This prevents overly frequent starts and stops, which can strain the system.

Calculation formula: Passive cooling ON = Setpoint (°C) – Hysteresis (K)

When the accumulator tank temperature (B40) drops below the set value by the hysteresis amount, passive cooling is activated.

Setting: The hysteresis value is set from the system user interface. The following points should be considered when choosing the correct value:

- Temperature levels must be sufficiently far from the protection setpoints.
- Too small a hysteresis can cause the **frost protection to trip** or lead to unnecessary failures.

Note: It is recommended to maintain a sufficient safety margin relative to the protection settings so that the system operates stably and safely.

B40 ACCUMULATOR TANK LOWER LIMIT

Function: This setting defines a lower limit for the accumulator tank, below which the temperature setpoints cannot fall. This protects the system from excessively low temperatures and ensures safe operation of the accumulator tank.

Setting: The lower limit is set from the system user interface. The set value acts as a minimum limit that the controller will not fall below in any operating situation.

Note regarding external control:

If the system is controlled by external automation or by the controller via cooling circuits, the **controller does not allow a setpoint lower** than the defined lower limit. This restriction applies regardless of the values given by the external control.

Note: The lower limit is an important part of the system's protection functions. Its purpose is to prevent the accumulator tank from freezing or suffering other temperature-related damage.

B40 FROST PROTECTION (ACCUMULATOR TANK)

Function: The frost protection for sensor B40 protects the accumulator tank from freezing by defining a temperature limit below which protective measures are triggered.

Sensor B40 monitors the temperature of the accumulator tank. If the measured temperature drops below the set frost protection temperature, the system performs the following actions:

- **The refrigeration system is automatically switched off**
- **The frost protection alert is activated**

Setting: The frost protection temperature limit is set from the system user interface. The value is selected in accordance with the system and operating environment so that the accumulator tank remains operational even in cold conditions.

Note: Frost protection is an important safety function that prevents damage to the accumulator tank at low temperatures.

B41 FROST PROTECTION

Function: Frost protection is used to define a temperature limit below which protective measures are triggered in the pre-control circuit. This protects the system from freezing and related damage.

Sensor B41 monitors the temperature of the pre-control circuit and acts as the controlling sensor for frost protection. If the measured temperature drops below the set frost protection temperature, the system performs the following actions:

- **The refrigeration system is automatically switched off**
- **The frost protection alert is activated**

Setting: The frost protection temperature limit is set from the system user interface. The recommended value depends on the system design and operating conditions.

Note: Frost protection is a critical safety function that prevents the heat exchanger and pipework from freezing, especially in cold operating environments.

B43 PRE-CONTROL GROUP LOWER LIMIT

Function: The lower limit of the pre-control group defines the lowest permitted temperature setpoint that the controller can use to control the heat exchanger. Settings cannot be adjusted below this limit.

Sensor B43 acts as the **protection sensor for the heat exchanger**. Its purpose is to ensure that too low a temperature is not set for the exchanger, which could cause malfunctions or damage to the system.

Setting: The lower limit is set from the system user interface and acts as a safety limit for controlling the temperature of the pre-control group.

Note: The purpose of the lower limit is to protect the heat exchanger from excessively low temperatures and to ensure the safe and efficient operation of the system.

ACTIVE COOLING (AC) START DELAY

Function: This setting defines the delay time after which the system switches from passive cooling to active cooling once the transition conditions are met.

- **Factory setting:** 30 minutes

The common brine circuit sensor **B42** measures the temperature coming from the well and acts as the controlling sensor for the changeover. If the measured temperature reaches the set value and remains there for at least the defined **start delay**, mechanical cooling automatically switches to **active mode**.

Note: The start delay prevents unnecessary mode changes caused by short-term temperature fluctuations and ensures stable system operation.

PASSIVE COOLING (PC) START DELAY

The passive cooling start delay defines the delay time after which the system switches from active cooling mode to passive cooling mode.

The common brine circuit sensor **B42** measures the temperature coming from the well and acts as the controlling sensor for the changeover. If the measured temperature drops **one (1) degree** below the set temperature value and remains there for at least the defined **start delay**, mechanical cooling automatically switches to **passive cooling mode**.

Note: The purpose of the start delay is to prevent unnecessary mode changes caused by short-term temperature fluctuations.

RETURN WATER SETPOINT – B70 / B71

Function: The return water setpoint defines the target temperature that the system aims for in the return water during cooling or heating operation. This value directly affects the energy efficiency and heat transfer control of the system.

Adjustment: The setpoint is defined from the system user interface and acts as a guiding factor in, for example, the following situations:

- **In cooling:** The return water temperature must not rise above the set value, so that cooling output is maintained.
- **In heating:** The return water temperature must not fall below the set value, so that heat output is maintained and condensation damage is avoided.

Return water sensors

The return water temperature is measured with the following sensors, depending on the system type:

B70 – Used in systems with multiple heat pumps (multi-pump system)

B71 – Used in a single heat pump (the device's internal sensor)

The controller uses the measurement data from these sensors to control the cooling or heating operation in relation to the set return water temperature.

Note: A setpoint that is too high or too low can reduce system performance or cause alerts (e.g. freeze protection).

10.5.5 Additional heat

Additional heat sources are the system's reserve capacity, used when the heat pump's capacity is insufficient to cover the property's heating needs or when the heat pump is in a failure state. Additional heat can be:

- **Electric heater (3-stage control)**
→ Used in the heating accumulator tank. Control is carried out using relays (K28, K29).
- **Continuously variable additional heat (0–10 V control)**
→ Used, for example, in electric boilers or other external heat sources that support analogue control.

The control of additional heat is based on the system's **supply water temperature (sensor B11)** and the controller's calculation. The control can be set to two operating modes:

1. **Failure operation**
→ Additional heat only starts if the heat pump is not operating.
2. **Additional heat**
→ Additional heat supports the heat pump when its output is insufficient.

Defining settings – what and why

The operation of the additional heat is defined in the service menu. The settings determine:

- **When additional heat starts** (e.g. delay, temperature limits)
- **How many power stages are used** (3-stage control)
- **How quickly the control reacts to deviations** (the controller's P and I values)
- **When additional heat is switched off** (e.g. hysteresis, control reset)

Correctly defined settings ensure:

- Energy-efficient use
- Safe operation of the equipment
- A steady indoor temperature even in severe frost

Supply water alert settings

Supply water temperature (common supply water after the additional heat source)

- **SUPPLY WATER TEMP. UPPER LIMIT**
Defines the maximum permitted supply water temperature for the heating system.
→ The alert is activated if the temperature exceeds this limit.
- **SUPPLY WATER TEMP. LOWER LIMIT**
Defines the minimum permitted supply water temperature for the heating system.
→ The alert is activated if the temperature drops below this limit.

Electric heater control (3-stage)

Requirements:

- The power supply for the heaters is connected to the property's control centre (K28, K29).
- The heater contactor controls are connected to the heat pump controller (TC1.4)
- Equipped with an overheat protector and a thermostat.

Selecting the control mode:

- **Failure operation:** The heaters start only in the event of a heat pump failure.
- **Additional heating:** The heaters support the heat pump when its output is insufficient.

Proceed as follows:

1. Select **CONTROL MODE**:
→ *Additional heating* (most common choice)
2. Set **COUNTER START TIME**: e.g. **600 s**
→ Delay before the additional heat starts operating.
3. Define the **start limits for the power stages**:
 - **STAGE 1 ON**: e.g. **30%**
 - **STAGE 1 HYSTERESIS**: 5%
 - **STAGE 2 ON**: e.g. **60%**
 - **STAGE 2 HYSTERESIS**: 5%
 - **STAGE 3 ON**: e.g. **90%**
 - **STAGE 3 HYSTERESIS**: 5%
4. Adjust the controller response:
 - **P-VALUE (Kp)**: e.g. **2.0**
 - **I-TIME (Ti)**: e.g. **300 s**

Continuously variable additional heat (0–10 V control)

Requirements:

- The additional heat source can be controlled with a 0–10 V signal (TV27).

- Run permission K27 in use.

Proceed as follows:

1. Select **CONTROL MODE**:
→ *Additional heating or Failure operation*
2. Set **COUNTER START TIME**: e.g. **1,800 s**
3. Set **CONTROL OFF TIME**: e.g. **300 s**
→ Switches off K27 when the control is at 0%.
4. Set **MAXIMUM CONTROL SETTING**: e.g. **100%**
5. Adjust the controller response:
 - **P-VALUE (Kp)**: e.g. **1.5**
 - **I-TIME (Ti)**: e.g. **240 s**

Tips for configuring the settings

- **Start with moderate values** and monitor how the system behaves.
- **Increasing the P-value** speeds up the response, but may cause overshoot.
- **Shortening the I-time** makes the correction faster, but may cause instability.
- **Always test after making changes** to confirm that the additional heat works as expected.

10.6 Display panel settings

10.6.1 Protecting the device with a PIN code

The PIN code prevents unauthorised use of the device and ensures that only authorised users can access the system. A PIN code can be used to protect the device effectively against unauthorised use. The protection is enabled in the system settings, and the PIN code must then be entered each time the device is accessed. Careful handling of the PIN code ensures safe and controlled use of the device.

Once the PIN code has been enabled, the device cannot be accessed without entering it. Make sure the PIN code is stored securely.

If the PIN code is forgotten, the device cannot be used until the PIN code is available.

The device can be protected with a PIN code through the system settings. Setting a PIN code is intended for the normal user and is activated directly from the user interface. When the protection is enabled, the PIN code is required to access the device.

The PIN code must be at least 6 digits long.

Setting a PIN code

1. Open the device's user interface.
2. Go to the System view.
3. Valitse toiminto **Set PIN code**.
4. Enter a new PIN code.
5. Confirm the PIN code to enable the protection.

Once the PIN code has been set, the protection is activated immediately.

Disabling the PIN code

1. Open the device's user interface.
2. Go to the System view.
3. Select the function **Delete PIN code**.
4. Enter the current PIN code.
5. Confirm the PIN code to disable the protection.

Once the current PIN code has been entered, the protection is disabled immediately.

10.6.2 Changing the system language

Language selection allows the user interface to be set to a language suitable for the user, making the system easier to use and understand. The system language is changed in the System view by selecting the desired language.

Changing the language only affects the display language of the user interface and does not change the operation of the system.

The system language is selected in the system settings. The language is changed in the System view of the user interface, where other general settings are also managed. The selected language determines the language of the text displayed in the user interface.

Changing the system language

1. Open the device's user interface.
2. Go to the System view.
3. Select the system language.
4. Enable the selected language.

10.6.3 Network settings

The network settings of the display panel and the heat pump can be changed from the display panel. It is important that the display panel and the heat pumps are in the same network address space; otherwise, the display panel will lose its connection to the heat pumps.

Factory settings

Display panel (ETH0): 192.168.1.141

Heat pump (1...20): 192.168.1.101 (...120)

Subnet: 255.255.255.0

Default gateway: 192.168.1.100

DNS1: 8.8.8.8

DNS2: 8.8.4.4

1. Open the device's user interface.
2. Go to the System view.
3. Select Network settings
4. Select the target
 - The list shows the configured devices: eth0 is the display panel, and the heat pumps are identified by serial number
5. Enter the desired network settings and Confirm the changes.

10.6.4 Updating the software version

Updating the display panel software version requires a working internet connection. The new version of the system is downloaded securely in the background when the user requests a software update for the display panel. The user cannot currently update the heat pump's software version on their own.

1. Open the device's user interface.
2. Go to the System view.
3. Select System information.

The system checks whether a newer software version is available. The user can also start the check manually by pressing the **Check for updates** button.

If an update is available for the system, it is shown to the user, who can then accept it. Once the update has been requested, the system installs the new version and automatically restarts the display panel with the new version.

11 Heat pump maintenance and service



If you suspect that the device has a refrigerant leak, ensure safe working conditions before starting work by using a separate leak detection device suitable for R290 refrigerant.



Do not use a cordless drill or a flame at all inside the refrigeration module during disassembly until the refrigerant circuit has been properly drained, flushed with nitrogen, and evacuated, and safe working has been ensured.



Use only non-sparking tools and clothing when working. A leak detector suitable for R290 refrigerant must be in use throughout the procedure.



Do not start work until all supplies and tools are available.



The operation of the safety circuits must be checked during annual maintenance.



Clean up any spilled oil immediately to prevent evaporation and the formation of harmful vapours.



Please note that the heat pump has cold and hot components.



Maintenance and service work must only be carried out by appropriately trained and authorised personnel. Personal protective equipment and tools must be suitable for flammable refrigerants.



All maintenance and inspections performed must be recorded in the maintenance log. Performing the maintenance and inspections described in this document, as well as those required by laws and regulations, is a prerequisite for the validity of the manufacturer's warranty.



All maintenance and inspections performed must be recorded in the maintenance log. Performing the maintenance and inspections described in this document, as well as those required by laws and regulations, is a prerequisite for the validity of the manufacturer's warranty.

Regular maintenance and servicing of the heat pump ensure a long service life, high energy efficiency, and safe operation of the equipment. The user or property maintenance staff can perform routine inspections, but actual maintenance work must be carried out by a maintenance company authorised by Gebwell Oy. The device is maintained in accordance with a device-specific maintenance programme and a separate maintenance manual.

IMPORTANT: R290 refrigerant and safety

The device uses the natural refrigerant R290 (propane). For this reason, the device's ventilation and safety systems are critical to its operation. Always ensure that the device is de-energised during work by switching off the main power at the safety switch before opening the protective covers.

11.1 Regular inspections (property maintenance)

Routine inspections intended to be carried out by property maintenance:

- **Ventilation filters:** Due to the R290 refrigerant, the device is equipped with ventilation in the event of a possible leak. The device's ventilation filters should be inspected and cleaned regularly to ensure the unobstructed airflow required by the ventilation air extractor.
- **Cleaning the filters:** Clogged filters reduce the flow rate in the network and lower the efficiency of the equipment. The filters in the heating network and brine circuit should be cleaned regularly. If the filter is dirty, the temperature difference across the brine circuit increases when the compressor is running, which can cause operational failures. After commissioning a new system, the filters must be cleaned more frequently due to installation debris coming loose from the pipework.
- **Checking system pressures:**
 - o **Heating network:** The recommended pressure is typically **1.0–2.0 bar** (depending on the static head of the site).
 - o **Brine circuit:** The recommended pressure is **1.0–2.0 bar**.
- **Sensory inspection:** The equipment's pipework and connections should be visually inspected for fluid leaks, oil, or other abnormalities. Any unusual running noises from the compressor or circulation pumps should be reported to an authorised service company.

11.2 Annual maintenance (authorised service)

Annual maintenance must be performed on the equipment by a professional at **12-month maintenance intervals**. Annual maintenance is carried out in accordance with Gebwell's official maintenance programme.

1. SAFETY circuit inspection and refrigerant circuit The operation of the device's R290 safety circuit is critical, and its components must be tested during the mandatory annual inspection.

- **Leak detector:** The operation and response sensitivity of the gas leak detector are tested using a separate test gas.
- **Differential pressure measurement:** Checking the differential pressure measurement that monitors airflow and performing the zeroing function.
- **Ventilation air extractor:** Checking the operation, output, and bearing condition of the extractor.
- **Refrigerant circuit:** The refrigerant circuit must be inspected annually in accordance with the maintenance program.
- **Markings:** The inspection date and the date of the next inspection are marked on the refrigeration unit's sticker and in the maintenance log.

2. Maintenance of the heating network and brine circuit

- **Pressures and top-ups:** The pressures of the heating system and the brine circuit are checked to ensure that they match the installation report or plan. If the pressure is low, liquid is added via the network filling valve. *(Note: The brine circuit may need to be topped up with liquid for a few days after commissioning; adding a few litres is normal. A repeated need for top-ups must be investigated).*
- **Monitoring the operation of the brine circuit:** When the brine pump starts, the pressure should drop slightly, and rise correspondingly when it stops. Any other behaviour indicates that there is air in the system or the filter is clogged.
- **Gas separators:** Check that the gas separators are not leaking liquid. A leaking gas separator must be replaced. Avoid opening the brine circuit unnecessarily.

3. Other measures in accordance with the maintenance programme

- **Ventilation duct:** The ventilation duct's maintenance connection is inspected, and any accumulated water is removed.
- **Electrical and automation components:** Checking the condition of components and the tightness of electrical connections.
- **Safety valves and expansion vessels:** Testing the safety valves and measuring the pre-charge pressures of the expansion vessels.
- **Controller:** Reviewing and analysing the device's alert history via the controller.

11.3 Personal protective equipment and tools

All equipment and tools required for maintenance work (opening the refrigerant circuit) must be approved for use in a Zone 2 hazardous area. They must have the Ex symbol and CE marking.

A personal gas detector must be used throughout the work.

Note that pressure tests may only be performed using nitrogen.

Tool	Attention
Gauge set and hoses (R290)	
Vacuum pump	Ex-rated, non-sparking switch and motor, 5 m cable
Fan	Ex-rated, plastic impeller, non-sparking switch and motor, 5 m cable
Scales	
Recovery unit	Ex-rated, non-sparking switch and motor, pressure switch, airtight electrical device, and 5 m cable
Leak detector	
Electronic measuring devices	Ex-rated
Hand tools	Non-sparking, e.g. brass screwdriver / bronze tools
Power tools	Ex-rated
Refrigerant cylinder	Disposable (with special thread), large (red collar, left-handed valve)
Chemical-resistant gloves	
Non-sparking workwear	
Safety goggles	

12 Failures and alerts

When the controller detects a failure, an alert symbol appears on the device's display. For more information about the alert, press the alert button on the controller.

For alerts displayed in the higher-level automation system (BMS), see the chapter *Modbus registers*, section *Alert registers*.

Always record the alert in the site's maintenance log to facilitate any subsequent maintenance work.

Once the cause of the alert has been identified and corrected, you can dismiss it in the controller via the following path: **Alert button** -> **Alert list** -> **Alert dismissal**.

First, try to resolve the situation using the troubleshooting table below. If the alert cannot be dismissed or it recurs, contact the company that installed the device or Gebwell's technical support.

12.1 Troubleshooting

Problem	Possible cause	Corrective action / Inspection
The device has no power / The display is dark	Power failure, a blown fuse, or the main switch is in the 0 position.	Check the fuses and motor protection switches in the property's distribution board. Ensure that the device's safety switch and main switch are in the ON position.
Room temperature low (device's own control)	Heat pump in the incorrect operating mode.	Set the heat pump's heating functions to the correct operating mode.
	Thermostats closed on radiators or underfloor heating.	Open the thermostats in as many rooms as possible. Adjust the room temperature via the <i>Room setpoint</i> menu rather than closing the thermostats.
	Automation setpoint too low.	Raise the Comfort setpoint or raise the supply water setpoint of the heating curve. Also ensure that the maximum supply water setpoint is high enough.
	The time programme is on.	Check <i>Time programme heating circuit</i> and change it if necessary.
	Air in the system or valves closed.	Remove the air from the system and open any closed valves.
Room temperature low (BMS control)	The external automation system (BMS) is sending a request that is too low, or the connection has been lost.	Check the setpoint (°C) sent from the BMS to the heat pump. Check the status of the Modbus connection.
Room temperature high	Heating circuit setpoints too high.	Lower the supply water setpoint of the heating curve at that outdoor temperature point, or lower the room temperature request.
Domestic water is cold	The domestic water function is not active.	Set the <i>Domestic water operating mode</i> setting to the correct value.
	Domestic water consumption has been too high.	Wait until the water has warmed up. If necessary, enable the electric heaters for domestic water production alongside the compressor.

	Setpoint too low.	Go to the <i>Domestic water setpoints</i> menu and raise the domestic water setpoint.
	Supply mixing valve set too low.	Open the supply mixing valve.
Compressor does not start	No heat demand.	Check the device status information in the <i>Information</i> menu.
	The compressor's minimum standstill time is active.	Wait 15 minutes and check whether the compressor starts.
	Crankcase heating in progress.	Ensure that the crankcase temperature has reached the setpoint (> 20 °C).
	The device has a malfunction, or the BMS is preventing operation.	Press the alert button and check the cause of the alert. Also check whether the BMS is sending a compressor blocking signal.
The heat pump does not respond to BMS control	The bus settings are incorrect.	Check that the Modbus address, baud rate, and parity match the settings of the RAU centre. Ensure that the device is in automatic mode.
Compressor short cycling	The flow in the heating or brine circuit is too low.	Clean the filters and check the pump speeds.
	The heating network controls are set too low.	Increase the flow in the network by opening the control devices.
	The heat demand does not match the property's consumption.	If the heat pump's setpoint is too high for the settings of the property's control devices (thermostats), lower the setpoint or increase the setting of the control devices.
Electricity consumption exceptionally high	The device is running in backup heating mode (on the electric heaters).	Check on the controller that "Backup heating" mode is not forced on and that the heat pump is not in a failure state.
	The heat pump is short cycling	See the section Compressor short cycling
System pressures drop	There is a fluid leak in the system, or the expansion vessel's pre-charge pressure is incorrect.	Look for leaks. If you have to add fluid repeatedly, find out the cause of the pressure drop (e.g. have the expansion vessel checked by a maintenance company).

12.2 Alerts and problem codes

When the heat pump's automation detects a fault, it stops the compressor for safety reasons and generates an alert. The most common alerts are listed below, along with their causes and the steps to start resolving the fault.

Note for maintenance personnel: Work requiring the opening or servicing of the R290 refrigerant circuit (propane) may only be carried out by a qualified refrigeration technician.

High-pressure alerts (Condenser side)

A high-pressure alert means that the device cannot transfer the heat it produces to the heating network or the accumulator tank, causing the pressure in the refrigerant circuit to rise too high.

High-pressure switch / High-pressure alert

- **Cause:** The flow rate in the heating network or charging circuit is too low or has stopped completely.
- **Action:**
 1. Check and clean the dirt separator and filters in the charging/heating circuit.
 2. Make sure the charging pump (F3) is running and its speed setting is sufficient.
 3. Check the heating network for air and bleed it if necessary.
 4. Make sure that the shut-off valves between the accumulator tank and the heat pump are open and that no thermostats are restricting the flow too much.

Low-pressure alerts (Evaporator side)

A low-pressure alert means that the device is not receiving enough energy from the ground/brine circuit, causing the pressure in the refrigerant circuit to drop too low.

Low-pressure switch / Low-pressure alert

- **Cause:** The flow rate in the brine circuit is too low, the brine is too cold, or the refrigerant circuit is undercharged.
- **Action:**
 1. Check and clean the filter in the brine circuit. (This is the most common cause of a low-pressure alert).
 2. Make sure the brine pump (F2) is running and its speed setting is sufficient.
 3. Check the pressure and fluid level in the brine circuit. Bleed the circuit if necessary.
 4. Check the temperature sensors in the brine circuit. If the fluid is constantly too cold, the well field may not be working correctly.
 5. If the flow rates are correct and the fault recurs, the cause may be a refrigerant undercharge. Contact an authorised service company.

Electrical and automation alerts

Frequency converter alert

- **Cause:** The frequency converter has detected an electrical anomaly: a supply voltage drop, phase loss, compressor overcurrent (seizure), or overheating of the frequency converter.
- **Action:**
 1. Check the main fuses in the property's distribution board (all three phases).
 2. Dismiss the alert on the screen. If the fault appeared after a thunderstorm or a power cut, it may clear when dismissed.

3. Make sure that the temperature in the technical room is not too high, as this would prevent the frequency converter from cooling down.
4. If the alert recurs immediately, contact a service company (the compressor or frequency converter may need to be replaced).

Sensor fault (e.g. "Sensor fault B3" or "Temperature sensor short circuit/open circuit")

- **Cause:** The temperature sensor cable is broken, short-circuited, disconnected from its connector, or the sensor element itself is damaged.
- **Action:**
 1. Check the physical connection of the sensor mentioned in the alert (e.g. B3, B9) at the controller's terminal blocks and at the sensor end.
 2. Visually inspect the condition of the cable.
 3. If the connections are in order, the sensor must be replaced.

Maximum supply water temperature

- **Cause:** The water supplied to the heating network has exceeded the set safety limit. The flow rate is too low in relation to the output produced by the device, or the heating curve setting is incorrect.
- **Action:**
 1. Check that the controller setting (maximum temperature) is correct (e.g. for underfloor heating, usually max. 35–45 °C).
 2. Ensure unobstructed circulation in the heating network (pumps, valves, filters).
 3. If the fault recurs during domestic hot water production, check the operation of the change-over valve/control valve.

R290 safety circuit alerts

Gas leak detector alert

- **Cause:** The R290 sensor has detected propane inside the device, or the sensor is faulty/in need of calibration. The device has stopped the compressor and started the extractor fan at full power.
- **Action:**
 1. **Do not carry out any work on the device that could cause sparks.**
 2. Ensure that the ventilation in the technical room is working.
 3. Call in an authorised refrigeration service company to inspect the leak with test equipment.

Exhaust ventilation pressure difference alert

- **Cause:** The safety circuit extractor fan is not moving air. The filter is completely blocked, the extractor fan is broken, or the differential pressure transmitter is faulty.
- **Action:**
 1. Check and clean the ventilation filters on the device.
 2. Visually check whether the extractor fan is rotating.
 3. If the filters are clean and the extractor fan is rotating, zero the differential pressure gauge as instructed in the maintenance manual. Otherwise, contact a maintenance company.

13 Specifications

Output data according to EN14511 ⁽¹⁾		G-Eco Core 80:	
Heating output, 0/35	kW		20.5 – 84.5
Heating output, 0/55	kW		26.1 – 80.2
Cooling capacity, 0/35	kW		19.0 – 64.6
Cooling capacity, 0/55	kW		16.9 – 54.1
0/35 – Nominal output ⁽²⁾			
Heating output	kW		38.9
Cooling capacity	kW		31.3
Electrical power	kW		8.0
COP			4.9
0/55 – Nominal output ⁽³⁾			
Heating output	kW		36.1
Cooling capacity	kW		25.0
Electrical power	kW		11.7
COP			3.1
Output data according to EN14825			
P _{designh} +35°C / +55°C	kW		84.5 / 80.2
SCOP cold climate (B0/W35 / B0/W55)			5.6/4.2
SCOP average climate (B0/W35 / B0/W55)			5.4/4.0
Electrical information			
Rated voltage/electrical connection		400V 3N ~ 50Hz	
Rated short-time withstand current I _{cw}	kA	6	
Maximum operating current (incl. control systems and pumps)	A _{rms}		69.0
Recommended operating current of the protective device	A		3 x 80
Maximum input power	kW		38.7
Charging pump power	W	10 – 640	
Brine pump power	W	20 – 1440	
Refrigerant circuit			
No hazardous area classification		yes	
Contains fluorinated greenhouse gases		no	
Hermetically sealed system		yes	
Refrigerant		R290	
Refrigerant GWP (Global Warming Potential)		0.02	
Charge quantity	kg		3.3
CO ₂ equivalent	tonnes of CO2e		0.000066

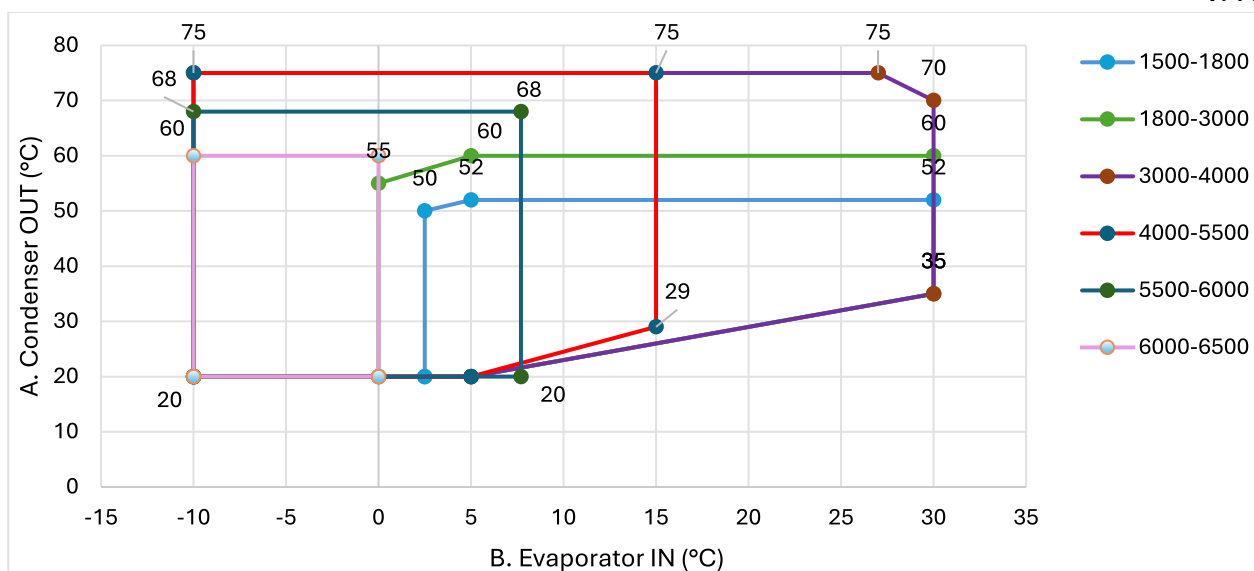
Cut-off, overpressure	MPa	3.2 (32 bar)	
Difference, overpressure	MPa	0.8 (8 bar)	
Cut-off, underpressure	MPa	0.06 (0.6 bar)	
Difference, underpressure	MPa	0.12 (1.2 bar)	
Number of compressors		1	
Compressor type		Scroll	
Compressor speed	rpm		1200 – 6500
Compressor oil		POE RL32-3MAF	
Volume	ltr	2.5	3.7
Brine circuit			
Maximum system pressure	MPa	1.0 (10 bar)	
Brine circuit flow ⁽⁴⁾	l/s		1.6 – 5.5
Nominal flow ⁽²⁾	l/s		2.45
Maximum external pressure drop at nominal flow ⁽²⁾	kPa		152
Minimum brine inlet temperature	°C	-10	
Maximum brine inlet temperature	°C	+30	
Charging circuit			
Maximum system pressure	MPa	1.0 (10 bar)	
Charging circuit flow ⁽⁴⁾	l/s		1.1 – 4.1
Nominal flow ⁽²⁾	l/s		1.82
Maximum external pressure drop at nominal flow ⁽²⁾	kPa		145
Minimum supply water temperature ⁽⁶⁾	°C	20	
Maximum supply water temperature	°C	75	
Ventilation			
Minimum air flow rate in SAFETY operating mode	m3/h		114
Air flow rate in NORMAL operating mode ⁽⁷⁾	m3/h		34
Internal pressure drop in SAFETY operating mode ⁽⁷⁾	Pa		103
Installation location			
Minimum volume of the installation location	m3	4.7	
Recommended ambient temperature	°C	15...25	
Maximum ambient temperature	°C	30	
Sound			
Sound level (0/35 / 0/55) ⁽⁸⁾	dB (A)		43 / 46
Sound level, min-max ⁽⁸⁾	dB (A)		43 – 52
Dimensions and weights ⁽¹⁰⁾			
Depth	mm	783	

Width	mm	1054	
Height	mm	1743	
Weight	kg		650
Pipe connections			
Brine circuit		G2 ½" internal thread	
Charging circuit		G2" internal thread	
Ventilation	mm	125	

1. B0/W35 and B0/W55 in accordance with EN14511, at min...max compressor speed.
2. B0/W35 in accordance with EN14511, at a compressor speed of 3000 rpm.
3. B0/W55 in accordance with EN14511, at a compressor speed of 3000 rpm.
4. B0/W35 compressor min...max speed, brine circuit Δt 3K, brine 28% ethanol-water mixture
5. B0/W35 compressor min...max speed, charging circuit Δt 5K, water
6. The temperature difference between the liquid entering the brine circuit and the liquid leaving the condenser must be at least 15K. The heat pump ensures that the operating limits are met using its own internal automation.
7. Air volume in normal operating mode, measured with the damper in the factory position (3), cooling module underpressure 10Pa
8. Measured sound power level in accordance with EN 12102:2017 and EN 3741:2010 under conditions 0/35.
9. Measured sound power level in accordance with EN 12102 and EN 3741 under conditions 0/35, at min-max compressor speed.
10. Dimensions with adjustable feet installed, from the bottom of the adjustable foot to the top of the pipe connections.

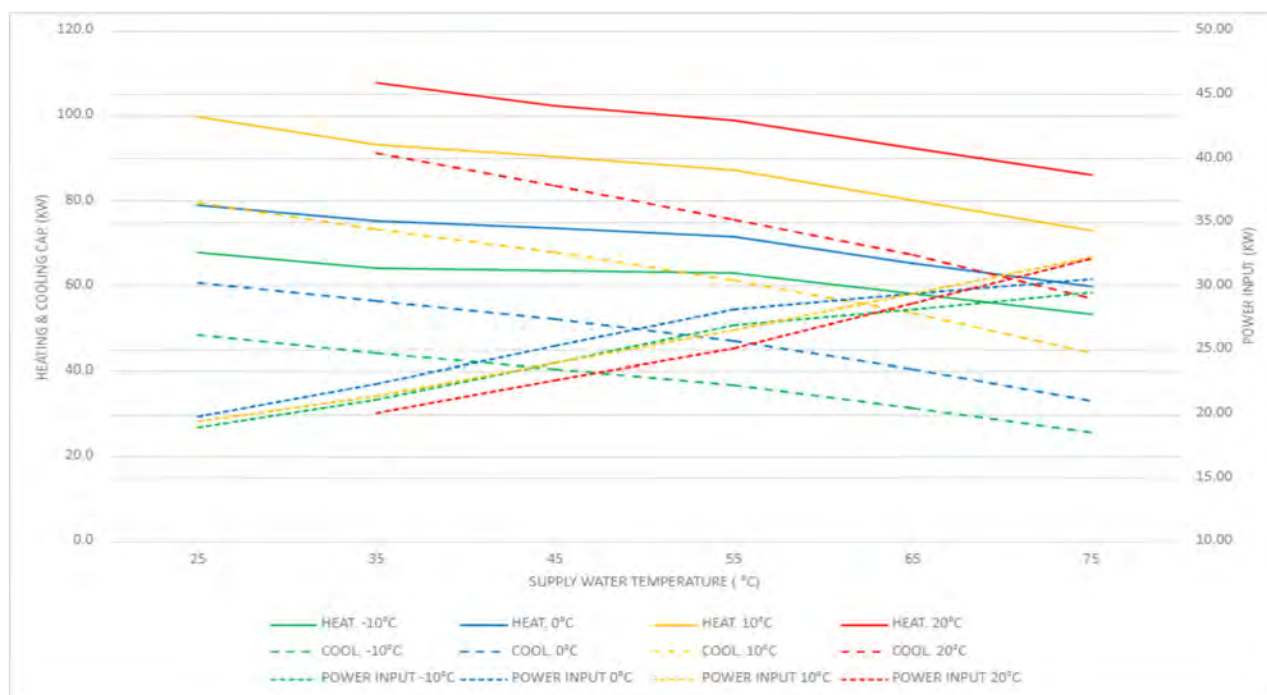
13.1 Operating range G-Eco Core 80

- **A:** Charging supply (condenser) Δt 5K...10K
- **B:** Brine in (evaporator) Δt 3K



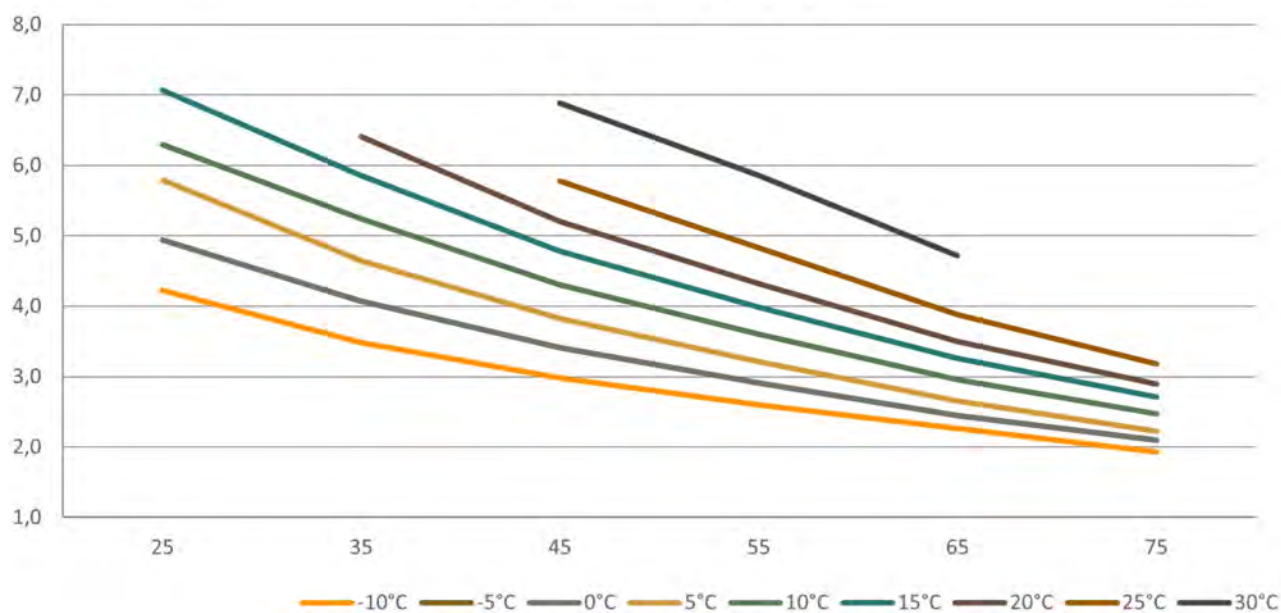
13.2 Performance curves G-Eco Core 80

Cooling, heating, and electrical power (kW) (maximum)

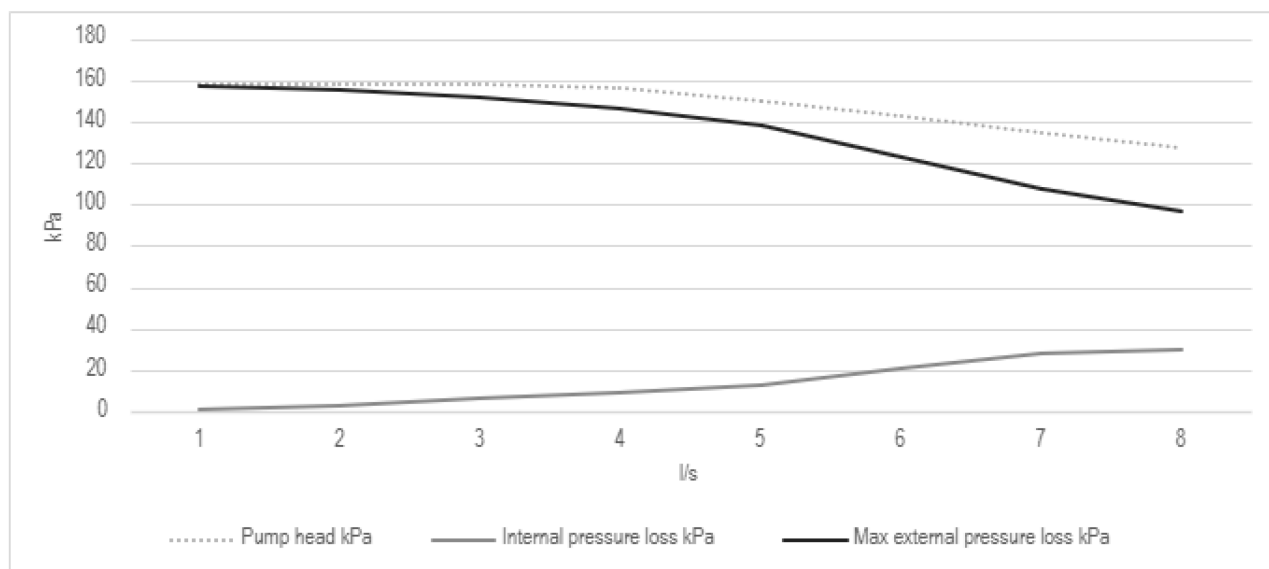


Efficiency (COP)

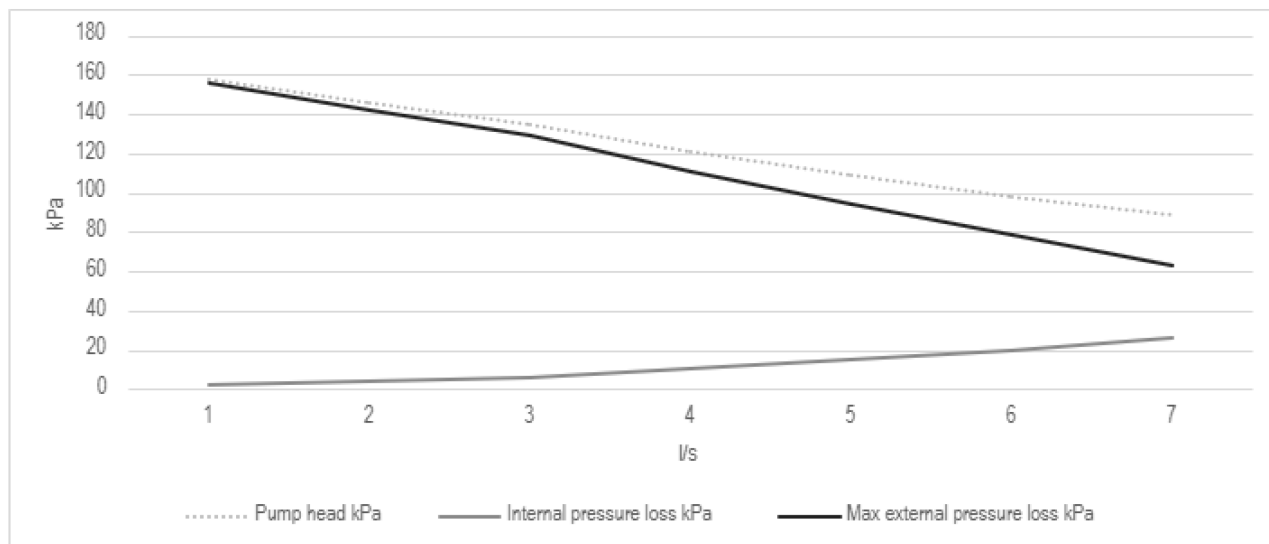
G-Eco Core 80, COP, 65 [Hz]

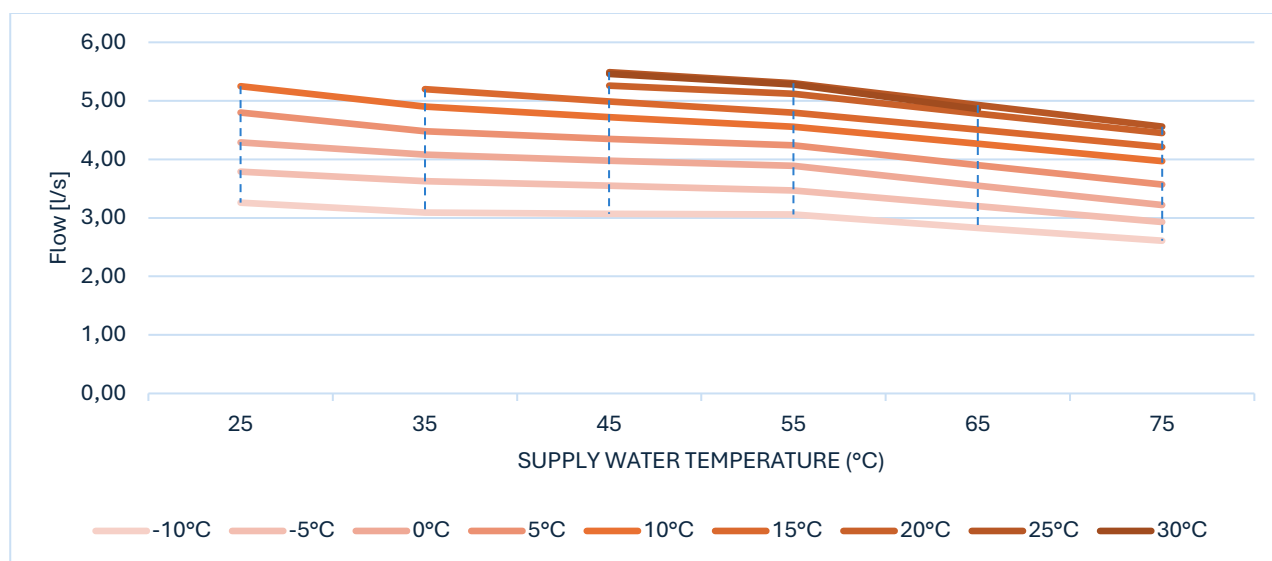
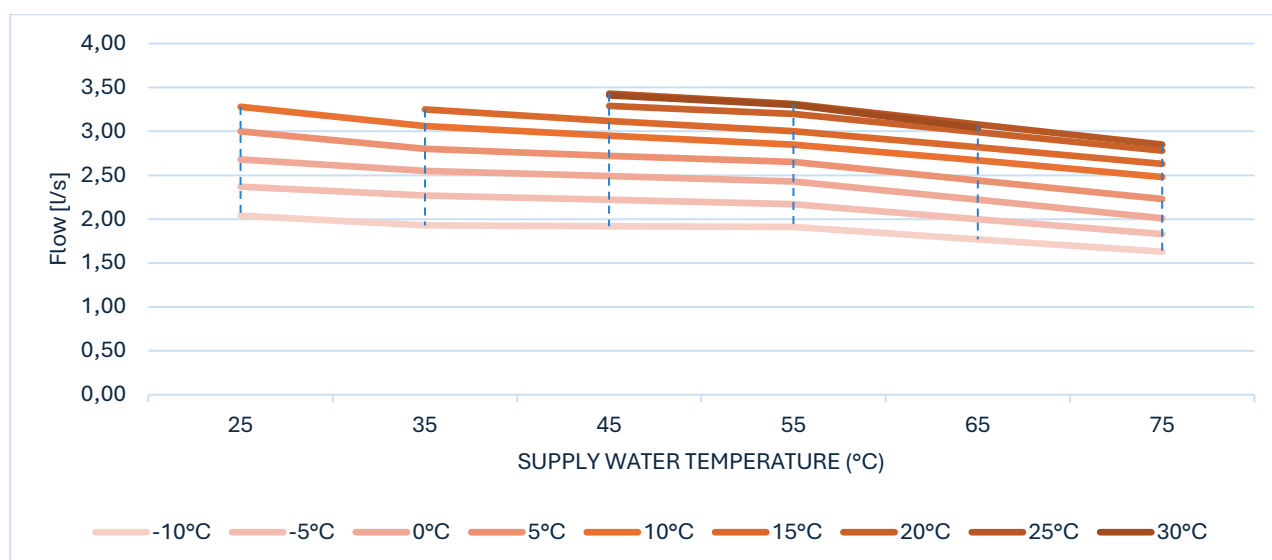
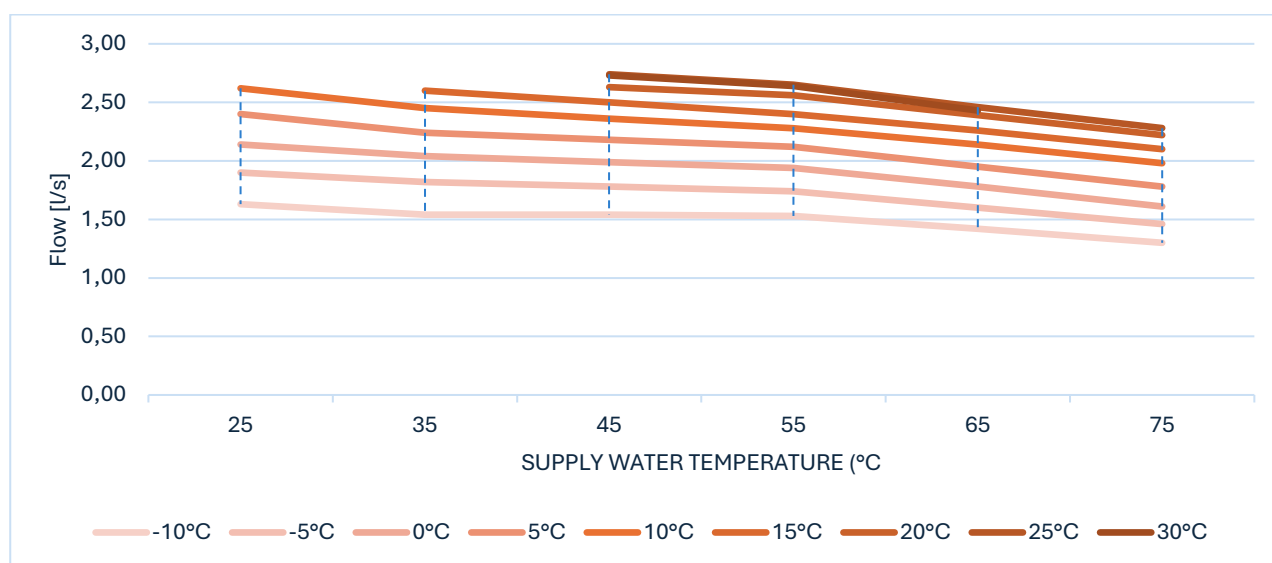


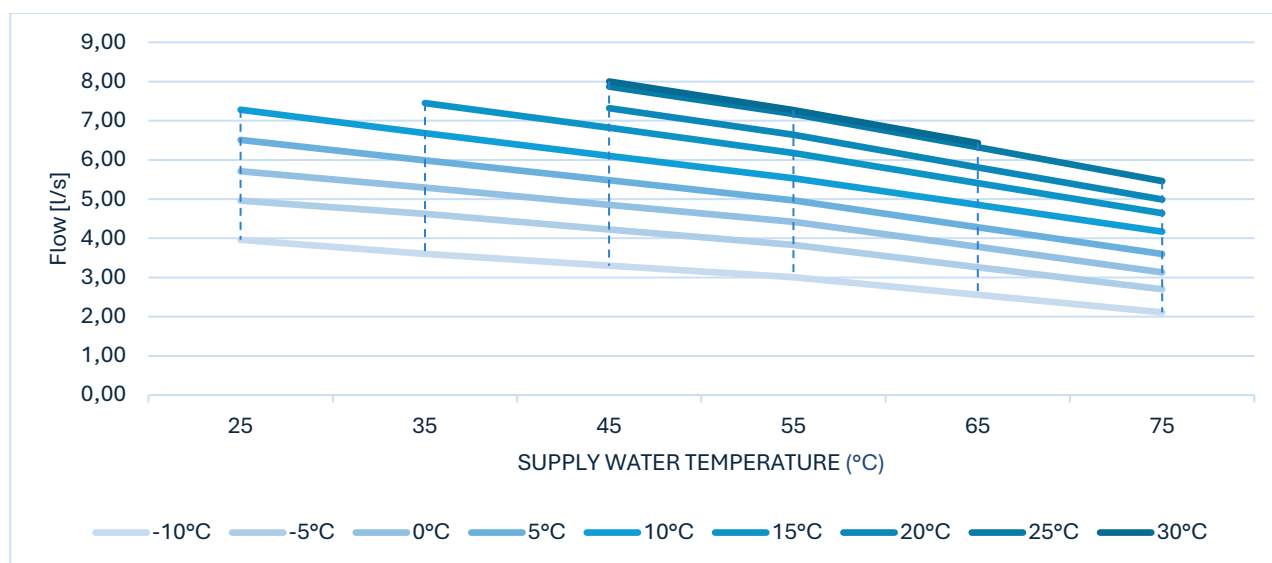
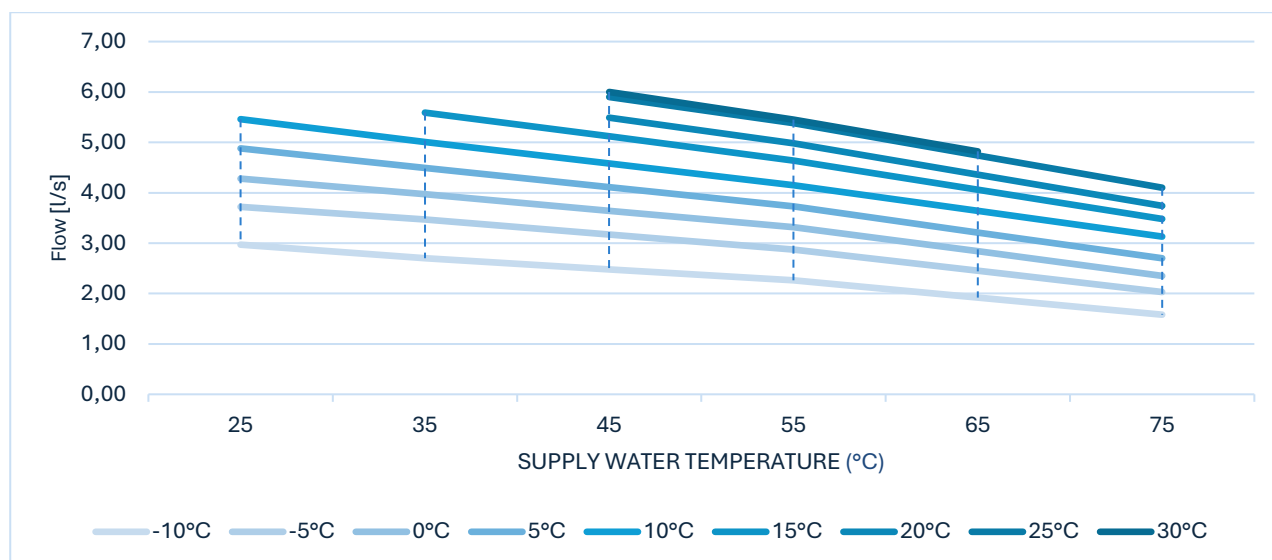
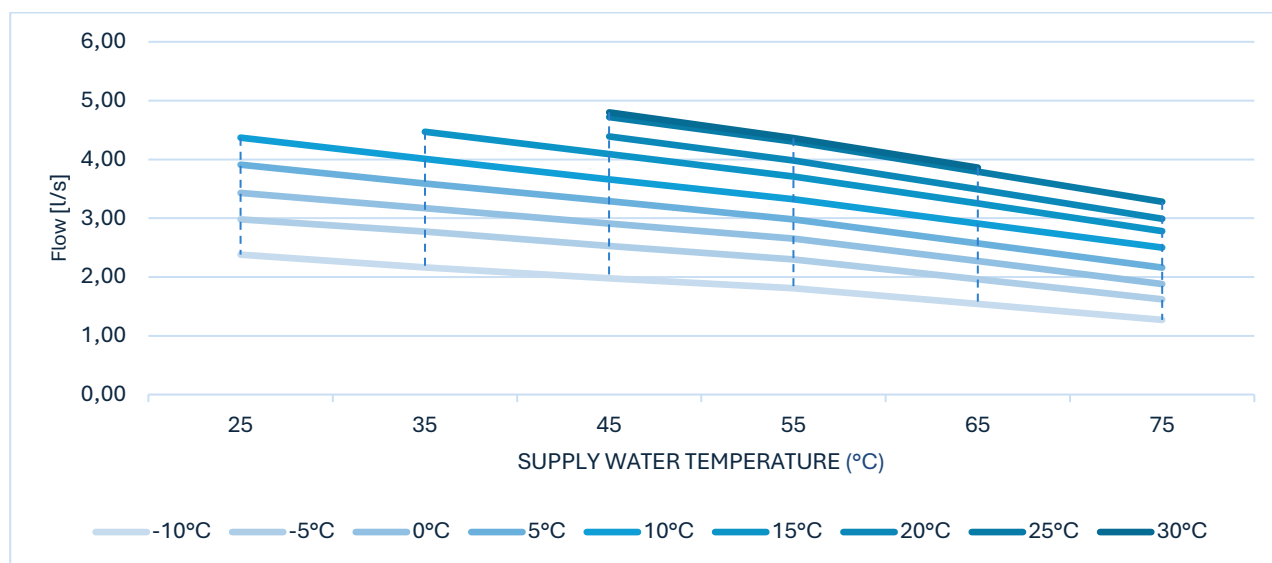
Brine circuit – G-Eco Core 80



Heating circuit – G-Eco Core 80



Condenser – flow - supply water ($\Delta T=5K$, Water) – G-Eco Core 80Condenser – flow - supply water ($\Delta T=8K$, Water) – G-Eco Core 80Condenser – flow - supply water ($\Delta T=10K$, Water) – G-Eco Core 80

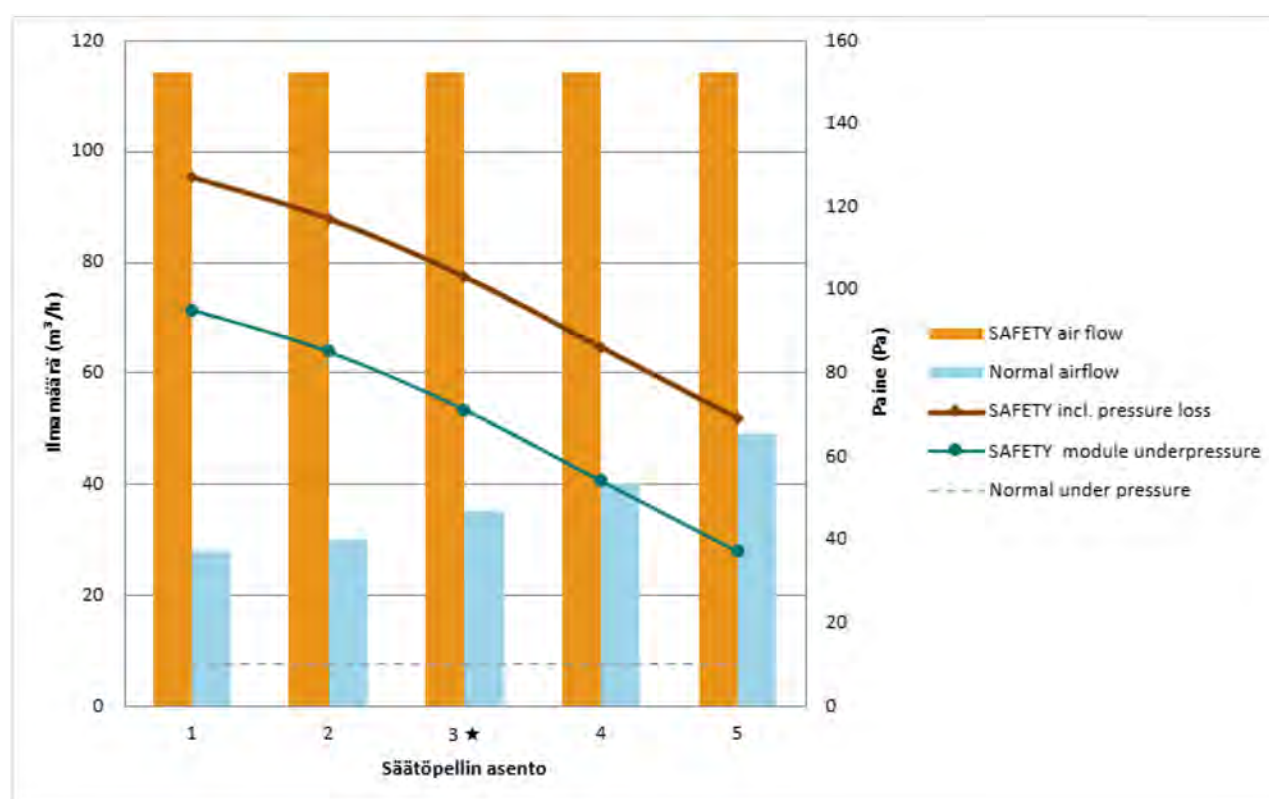
Evaporator – flow - supply water ($\Delta T=3K$, Ethanol-water 28%) – G-Eco Core 80Evaporator – flow - supply water ($\Delta T=4K$, Ethanol-water 28%) – G-Eco Core 80Evaporator – flow - supply water ($\Delta T=5K$, Ethanol-water 28%) – G-Eco Core 80

EXHAUST AIR SYSTEM – Design values (G-Eco Core 80)

★ = Factory setting | SAFETY mode: fan at 100% speed, module underpressure min. 20 Pa

► INFORMATION

	Unit	Position 1	Position 2	Position 3 ★	Position 4	Position 5
Air volume in SAFETY mode	m ³ /h	114	114	114	114	114
Internal pressure drop in SAFETY mode	Pa	127	117	103	86	69
Normal air volume	m ³ /h	28	30	35	40	49
Normal underpressure (setpoint)	Pa	10	10	10	10	10
Module underpressure in SAFETY mode	Pa	95	85	71	54	37



14 Modbus registers

HEAT PUMP – READ (status information, measurements, setpoints, operation monitoring)

Status – Measure ment	ID	R/W	Register	Address	Unit	Divider	Device		Status – Measure ment	ID	R/W	Register	Address	Unit	Divider	Device
Charging supply water	B21	R	3x	201	°C	10	M/S		Compressor status	K1	R	3x	310	0/1		M/S
Charging return water	B71	R	3x	202	°C	10	M/S		Compressor speed	K1	R	3x	311	%	1	M/S
Brine in	B91	R	3x	301	°C	10	M/S		Oil temperature	B80	R	3x	1266	°C	10	M/S
Brine out	B92	R	3x	302	°C	10	M/S		Heater status		R	3x	1268	0/1		M/S
Charging pump status	Q9	R	3x	205	0/1		M/S		Hot gas	B81	R	3x	303	°C	10	M/S
Charging pump speed	Q9	R	3x	204	%	1	M/S		Evaporator pressure	H82	R	3x	304	bar	10	M/S
Brine pump status	Q8	R	3x	309	0/1		M/S		Condenser pressure	H83	R	3x	305	bar	10	M/S
Brine pump speed	Q8	R	3x	306	%	1	M/S		Module temperature	B30	R	3x	1263	°C	10	M/S
Exhaust fan (device-specific)	FA1	R	3x	1267	%	1	M/S		Module underpressure	H01	R	3x	1264	Pa	1	M/S
Leak detector 1	QA1	R	3x	1265	%	10	M/S		Leak detector 2	QA2	R	3x	1281	%	10	M/S
Compressor running time	K1	R	3x	312	h ⁽⁹⁾	1	M/S		Compressor start count	K1	R	3x	314	pcs	1	M/S
Electricity consumption	EM	R	3x	111	kW	10	M/S		Heat output	FM	R	3x	212	kW	10	M/S
									COP		R	3x	112		10	M/S
Electricity consumption, heating		R	3x	102	kWh	1	M/S		Heating produced		R	3x	206	kWh	1	M/S
Electricity consumption, domestic water		R	3x	104	kWh	1	M/S		Domestic water produced		R	3x	208	kWh	1	M/S
Electricity consumption, total		R	3x	106	kWh	1	M/S		Total produced		R	3x	210	kWh	1	M/S
Setpoint, heating operation	B21	R	3x	1283	°C	10	M/S		COP, heating		R	3x	108		10	M/S
Setpoint, cooling operation	B92	R	3x	1284	°C	10	M/S		COP, domestic water		R	3x	109		10	M/S
									COP, total		R	3x	110		10	M/S

SYSTEM – READ (status information, measurements, setpoints, operation monitoring)

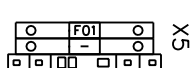
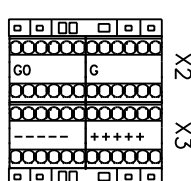
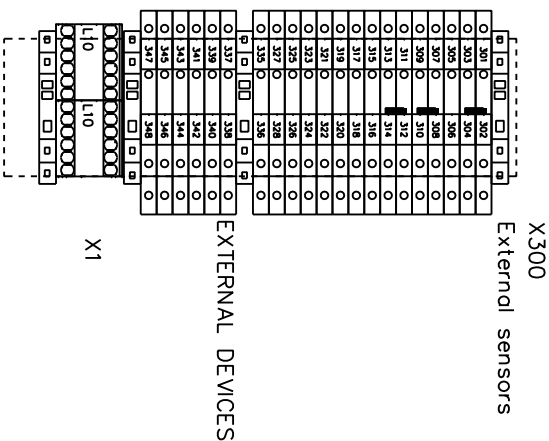
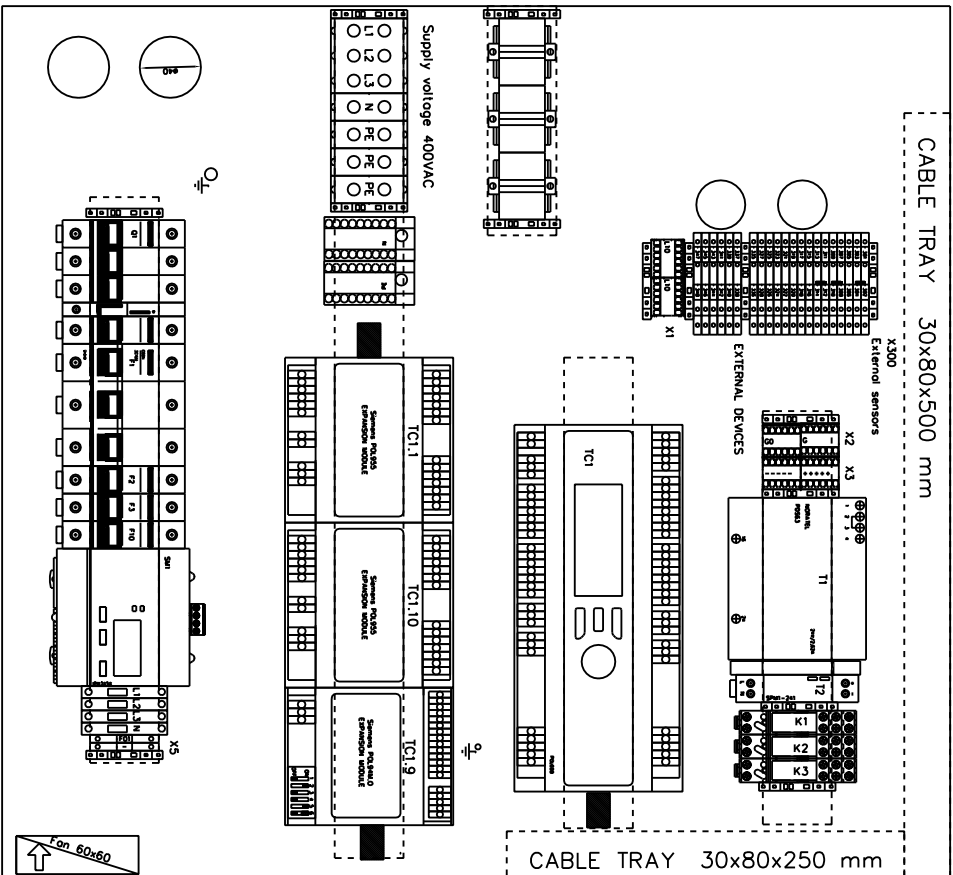
Status – Measure ment	ID	R/W	Register	Address	Unit	Divider	Device		Status – Measure ment	ID	R/W	Register	Address	Unit	Divider	Device
Change-over valve	Y3	R	3x	704	0/1 ^(x)		M/S		Outdoor temperature	B9	R	3x	101	°C	10	M
Exhaust fan (common)	FA1C	R	3x	1267	%	1	M		Cascade/accumulator tank upper temp.	B10	R	3x	901	°C	10	M
Common brine pump status	Q8C	R	3x	904	0/1		M		Accumulator tank lower temperature	B15	R	3x	908	°C	10	M

Common brine pump speed	Q8C	R	3x	903	%	1	M		Common charging return temp.	B70	R	3x	905	°C	10	M
Electric heater for the accumulator tank	K28/ K29	R	3x	808	see ⁽³⁾	10	M		Common heating return temp.	B72	R	3x	906	°C	10	M
Additional heat status	K27	R	3x	806	0/1		M		Additional heat temperature	B11	R	3x	805	°C	10	M
Additional heat control	TV27	R	3x	807	%	1	M		Heating system pressure	H11	R	3x	215	bar	10	M
Brine circuit transfer pump	Q28	R	3x	1252	0/1	1	M		Brine circuit pressure	H21	R	3x	320	bar	10	M
Cooling accumulator tank temperature	B40	R	3x	1205	°C	10	M		Cooling valve 1	Y41	R	R	1209	0/1	1	M
Pre-control group supply water temp.	B41	R	3x	1207	°C	10	M		Cooling valve 2	Y42	R	R	1010	0/1	1	M
Common brine circuit inlet temperature	B42	R	3x	1208	°C	10	M		Pre-control group control valve	TV40	R	R	1203	%	1	M
Cooling supply water temp.	B43	R	3x	1201	°C	10	M		Pre-control group pump status	Q40	R	R	1212	0/1	1	M
Heat rejection pump status	Q45	R	3x	1211	0/1	1	M		Condenser heat discharge control valve	TV45	R	R	1213	%	1	M
Domestic water mixing valve	TV38	R	3x	713	%	1	M		DHW tank upper temperature	B2	R	3x	701	°C	10	M
Domestic water circulation pump status	Q4	R	3x	714	0/1		M		DHW tank lower temperature	B3	R	3x	702	°C	10	M
DHW tank electric heater status	K6	R	3x	703	0/1		M		Domestic water supply water temp.	B38	R	3x	708	°C	10	M
DHW electric heater operating time	K6	R	3x	705	h ⁽⁹⁾	1	M		Domestic water return water temp.	B39	R	3x	709	°C	10	M
DHW electric heater number of starts	K6	R	3x	707	pcs	1	M		Additional heat operating time	K27	R	3x	812	h ⁽⁹⁾	1	M
Electric heaters operating time	K28/ K29	R	3x	809	h ⁽⁹⁾	1	M		Additional heat number of starts	K27	R	3x	814	pcs	1	M
Electric heaters number of starts	K28/ K29	R	3x	811	pcs	1	M									
Setpoint domestic water	B3	R	3x	711	°C	10	M		Setpoint cooling	B40	R	3x	1206	°C	10	M
Setpoint heat pumps	B10	R	3x	902	°C	10	M		Setpoint system	B11	R	3x	815	°C	10	M
EXTERNAL CONTROL – WRITE																
Status – Measurement	ID	R/W	Register	Address	Unit	Divider	Device		Status – Measurement	ID	R/W	Register	Address	Unit	Divider	Device
Heat pump on / off		R W	4x	105	see ⁽⁵⁾	1	M/S		Run permission cooling		R W	4x	1201	0/1		M
Run permission heating		R W	4x	102	0/1		M		External setpoint cooling		R W	4x	1202	°C	10	M
External setpoint heating		R W	4x	104	°C	10	M		External brine pump control	Q8	R W	4x	106	0/1		M/S
External setpoint domestic water		R W	4x	712	°C	10	M									
SETPOINTS – WRITE																

Charging circuit temperature difference	B21/B71	R W	4x	208	K	10	M/S		DHW supply water setpoint	B38	R W	4x	705	°C	10	M
Brine circuit temperature difference	B91/B92	R W	4x	335	K	10	M/S		DHW charging hysteresis		R W	4x	706	°C	10	M
Brine circuit limit temperature	B92	R W	4x	210	°C		M/S									
TEMPERATURES – WRITE see ⁽⁷⁾																
Outdoor temperature	B9	R W	4x	902	°C	10	M		DHW tank upper temperature	B2	R W	4x	709	°C	10	M
Cascade/accumulator tank upper temperature	B10	R W	4x	901	°C	10	M		DHW tank lower temperature	B3	R W	4x	708	°C	10	M
Accumulator tank lower temperature	B15	R W	4x	711	°C	10	M		Cooling accumulator tank temperature	B40	R W	4x	1216	°C	10	M
Additional heat control sensor	B11	R W	4x	903	°C	10	M									
HEATING AND COOLING CIRCUITS (control groups controlled by the heat pump)																
Status – Measurement	ID	R/W	Register	Address	Unit	Divider	Device		Status – Measurement	ID	R/W	Register	Address	Unit	Divider	Device
Heating circuit 1									Cooling circuit 1							
Supply water setpoint	B1	R W	4x	522	°C	10	M		Supply water setpoint	B16	R W	4x	1271	°C	10	M
Supply water temperature	B1	R	3x	504	°C	10	M		Supply water temperature	B16	R	3x	1255	°C	10	M
Room temperature	B51	R	3x	503	°C	10	M		Room temperature		R	3x	1254	°C	10	M
Circulation pump status	Q2	R	3x	501	0/1	1	M		Circulation pump status	Q24	R	3x	1251	0/1	1	M
Control valve	TV1	R	3x	502	%	1	M		Control valve	TV11	R	3x	1253	%	1	M
Heating curve parallel displacement		R W	4x	521	K	10	M		Cooling curve parallel displacement		R W	4x	1270	K	10	M
Heating circuit 2									Cooling circuit 2							
Supply water setpoint	B12	R W	4x	622	°C	10	M		Supply water setpoint	B26	R W	4x	1295	°C	10	M
Supply water temperature	B12	R	3x	604	°C	10	M		Supply water temperature	B26	R	3x	1261	°C	10	M
Room temperature	B52	R	3x	603	°C	10	M		Room temperature		R	3x	1260	°C	10	M
Circulation pump status	Q6	R	3x	601	0/1	1	M		Circulation pump status	Q26	R	3x	1257	0/1	1	M
Control valve	TV2	R	3x	602	%	1	M		Control valve	TV22	R	3x	1259	%	1	M
Heating curve parallel displacement		R W	4x	621	K	10	M		Cooling curve parallel displacement		R W	4x	1294	K	10	M
Heating circuit 3																
Supply water setpoint	B14	R W	4x	1022	°C	10	M									
Supply water temperature	B14	R	3x	1004	°C	10	M									
Room temperature	B53	R	3x	1003	°C	10	M									

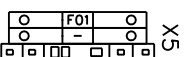
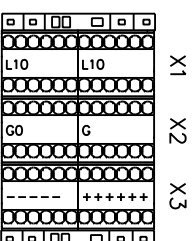
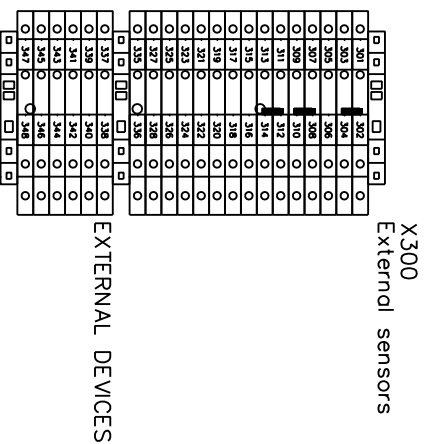
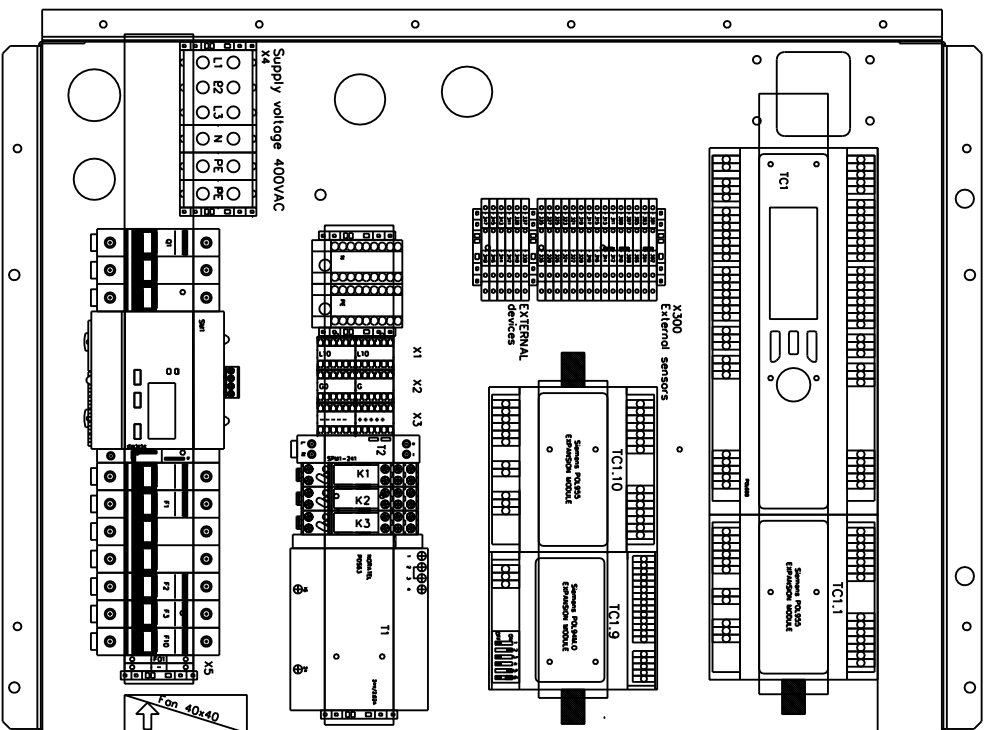
Circulation pump status	Q20	R	3x	1001	0/1	1	M								
Control valve	TV3	R	3x	1002	%	1	M								
Heating curve parallel displacement		R W	4x	1021	K	10	M								
ALERT REGISTERS															
Alert status		R	3x	199	see ⁽⁶⁾		M/S	Refrigerant leak	QA1/ QA2	R	1x	906	0/1		M/S
Alert dismissal		R W	0x	101	1		M/S	Module differential pressure low	DP	R	1x	907	0/1		M/S
High-priority ALERT A		R	1x	191	0/1		M/S	Leak detector 1 connection error	QA1	R	1x	908	0/1		M/S
Low-priority ALERT B		R	1x	192	0/1		M/S	Leak detector 2 connection error	QA2	R	1x	909	0/1		M/S
High pressure	H83	R	1x	305	0/1		M/S	High pressure switch	E10	R	1x	327	0/1		M/S
Low pressure	H82	R	1x	304	0/1		M/S	Low pressure switch	E9	R	1x	328	0/1		M/S
Charging supply water	B21	R	1x	201	0/1		M/S	Charging return water	B71	R	1x	202	0/1		M/S
Brine circuit out (outlet)	B92	R	1x	302	0/1		M/S	Brine circuit in (inlet)	B91	R	1x	301	0/1		M/S
Hot gas	B81	R	1x	303	0/1		M/S	Maximum pressure ratio		R	1x	325	0/1		M/S
Suction gas	B85	R	1x	307	0/1		M/S	Minimum pressure ratio		R	1x	326	0/1		M/S
Frequency converter	U1	R	1x		0/1		M/S	Evaporator superheating		R	1x	332	0/1		M/S
Cooling accumulator tank frost protection	B40	R	3x	1215	0/1		M	Cascade communication		R	1x	902	0/1		M
Pre-control group frost protection	B41	R	3x	1214	0/1		M	LP1, Supply water temperature	B1	R	1x		0/1		M
Domestic water supply water temp.	B38	R	1x	708	0/1		M	LP2, Supply water temperature	B12	R	1x	604	0/1		M
Cascade/accumulator tank upper temperature	B10	R	1x	901	0/1		M	LP3, Supply water temperature	B14	R	1x	1004	0/1		M
Additional heat temperature	B11	R	1x	805	0/1		M	JP1, Supply water temperature	B24	R	1x		0/1		M
								JP2, Supply water temperature	B26	R	1x		0/1		M
1)	0x	Coil register						2)	The read value must be divided by the value of the resolution field to obtain the measured value						
	1x	Discrete input						3)	0=	1 and 2 off					
	3x	Input register							1=	1 on and 2 off					
	4x	Holding register							2=	1 off and 2 on					
	Coil registers (0x) can be read using function code 01 and written using function codes 05 (single) and 15 (multiple)						3=		1 and 2 on						

	Discrete inputs (1x) can be read using function code 02		5)	0=	Auto mode
	Input registers (3x) can be read using function code 04			1=	Stop mode (heat pump is switched off)
	Holding registers (4x) can be read using function code 03 and written using function codes 06 (single) and 16 (multiple).			3=	Backup heating (heat pump controls additional heat)
			6)	0=	No alerts
				1=	Active alert
				2=	Dismissed active alert
			7)	The sensor temperature can be written from the higher-level automation system.	
			9)	32-bit data format: Unsigned integer, little endian, byte swap	

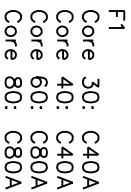


TECHNICAL DETAILS		CORE 60
1. SUPPLY VOLTAGE	Un	400 V
2. CURRENT	In	63 A
3. CONTROL VOLTAGE	U	230 V
4. IP-CLASS	IP	21
5. MAX. TEMPERATURE		35°C
6. Icw		6 kA

TECHNICAL DETAILS		CORE 80
1. SUPPLY VOLTAGE	Un	400 V
2. CURRENT	In	69 A
3. CONTROL VOLTAGE	U	230 V
4. IP-CLASS	IP	21
5. MAX. TEMPERATURE		35°C
6. Icw		6 kA



TECHNICAL DETAILS			CORE 30
1. SUPPLY VOLTAGE	In	400 V	
2. CURRENT	Un	29 A	
3. CONTROL VOLTAGE	U	230 V	
4. IP-CLASS	IP	21	
5. MAX. TEMPERATURE		35°C	
6. I _{cw}		6 kA	
TECHNICAL DETAILS CORE 40			
1. SUPPLY VOLTAGE	In	400 V	
2. CURRENT	Un	40 A	
3. CONTROL VOLTAGE	U	230 V	
4. IP-CLASS	IP	21	
5. MAX. TEMPERATURE		35°C	
6. I _{cw}		6 kA	



GEBWELL

G-ECO CORE
CONTROL CABINET
Inverter—Compressor

Plan.	
KT	/23.10.2026
Draw.	
KT	
Check	

Object ID	
Sheet	3/16

Drawing no.	EL
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EL EL170

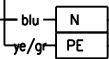
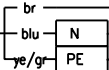
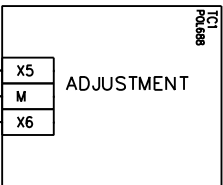
Gebwell standard coupling

U1
L2
L3

Core 30: C6A
Core 40: C6A
Core 60: C10A
Core 80: C10A

F2
c6/c10

F3
c6/c10



W05
JB 3G1,0

W07
JB 3G1,0

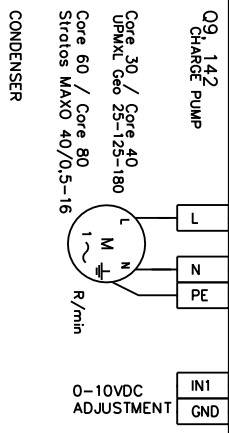
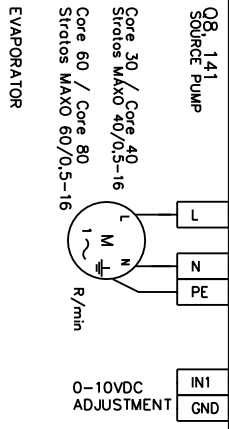


1
2
ye/gr

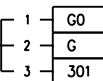
br
wh

br
blu
ye/gr

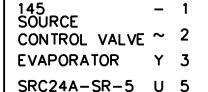
br
wh



Control valve coupling



1
2
3



EXTERNAL DEVICES

A rev

B Rev.

C Rev.

D rev

E rev

F rev

GEBWELL

G-ECO CORE
CONTROL CABINET
Circulation pumps

Pin.
KT /23.10.2026

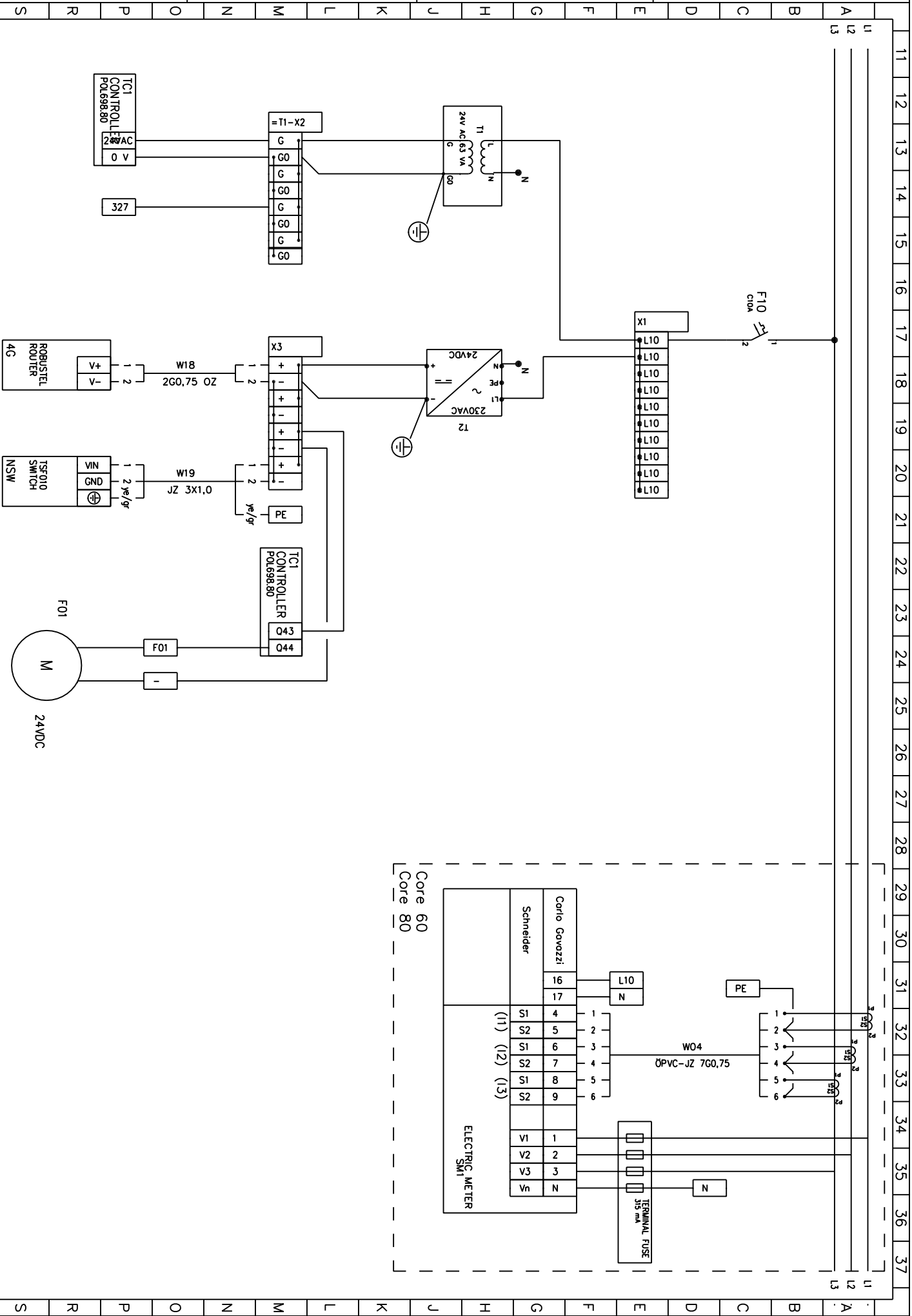
Object ID

CABINET

Job no.

Sheet
4 / 16

Drawing no.
EL EL170

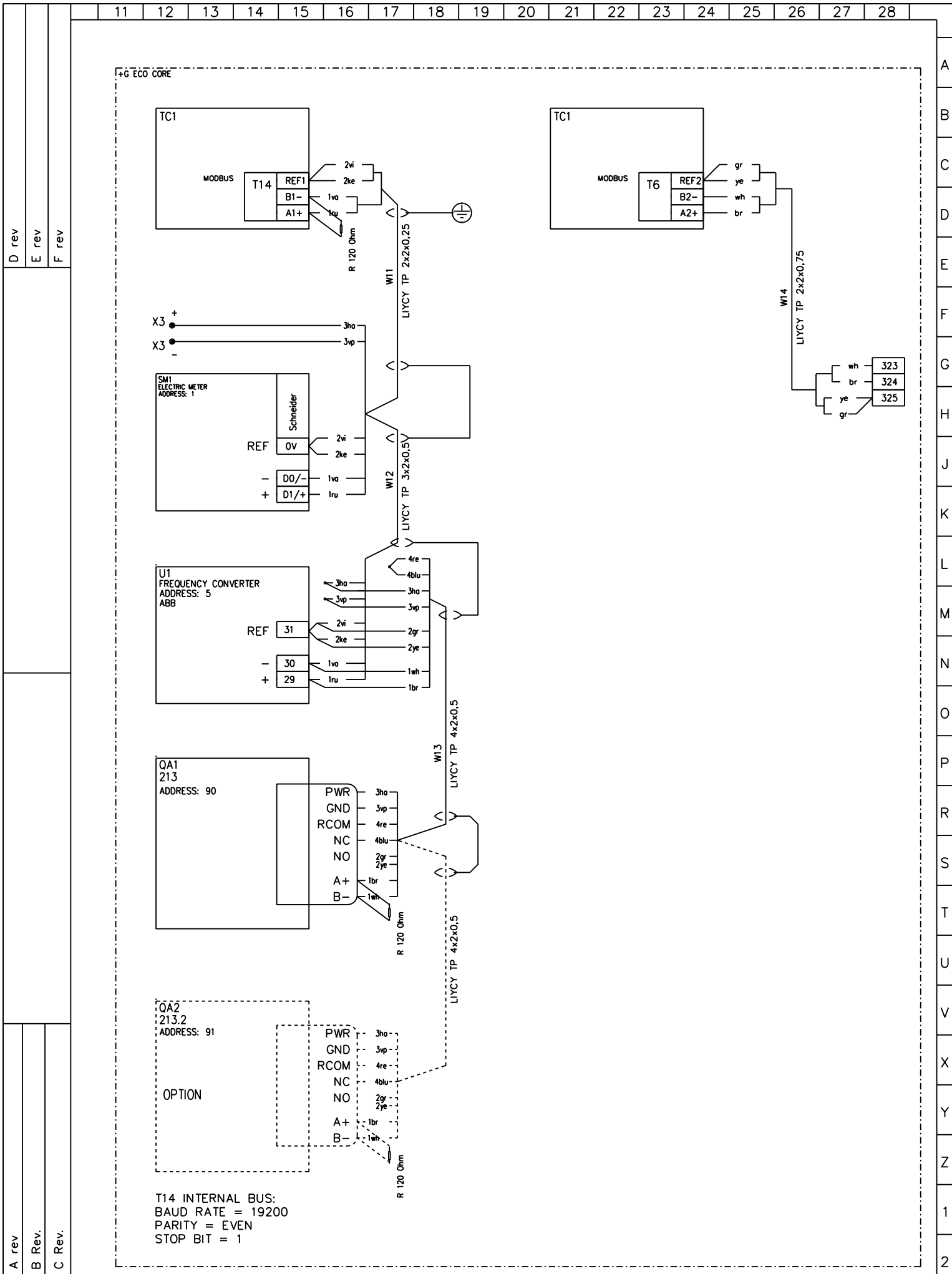


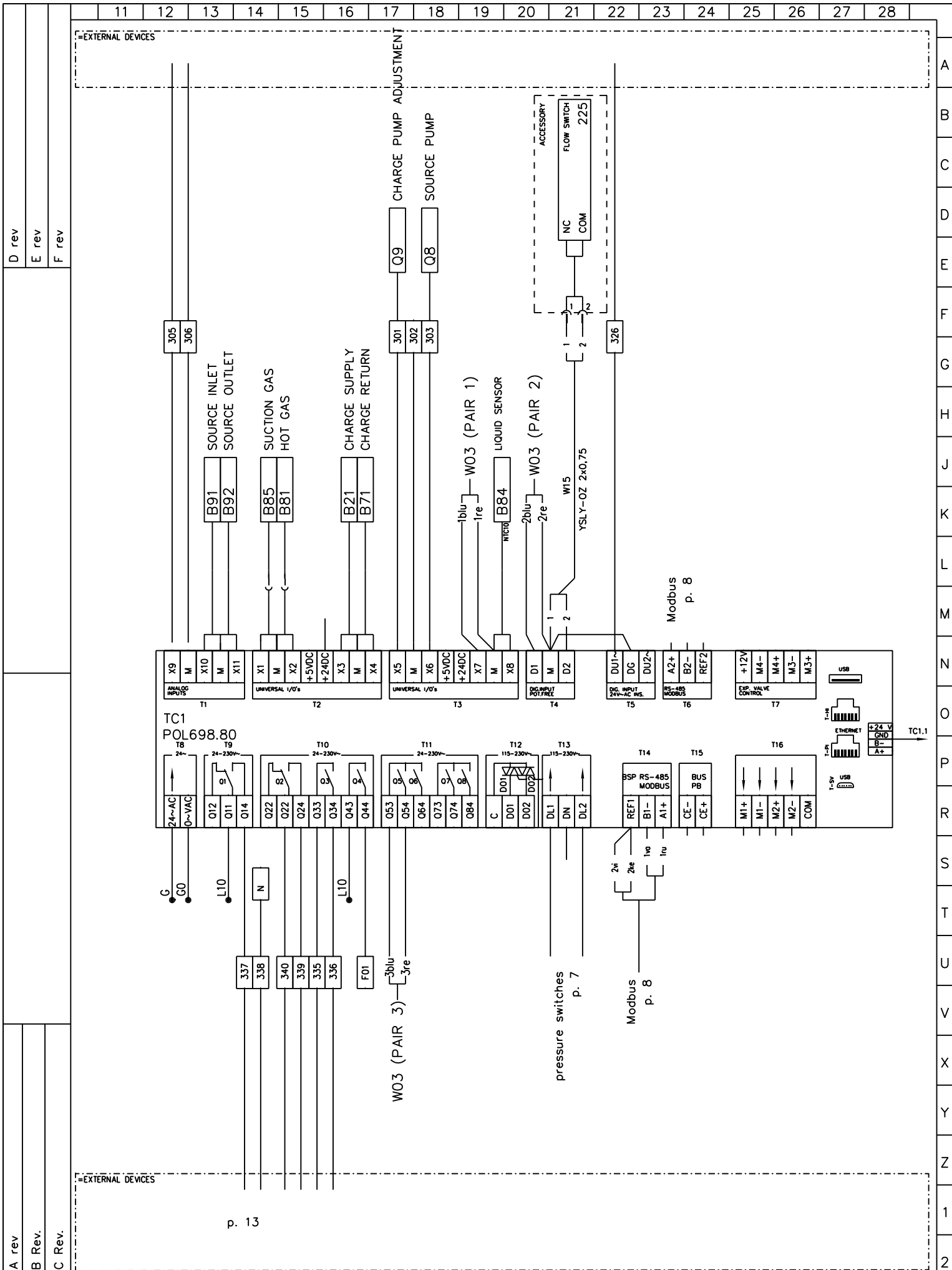
GEBWELL

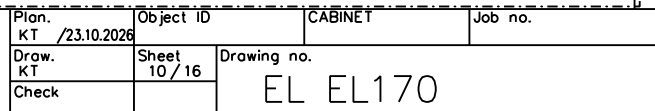
G-ECO CORE
CONTROL CABINET
CONTROL VOLTAGE

Plon.	Ob'ect ID	CABINET	Job no.
K1	7/31.0.2026		
Draw.	Sheet	Drowing no.	
K1	5 / 16		
Check		EL EL170	

[illegible]







GEBWELL

Plan. KT /23.10.2026	Object ID	CABINET	Job no.
Draw. KT	Sheet 12 / 16	Drawing no. EL EL170	
Check			

[illegible]

A rev													D rev																																		
B Rev.													E rev																																		
C Rev.													F rev																																		
			S	R	P	O	Z	M	J	K	J	I	G	F	E	D	C	B	A		11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
GEBWELL			TERMINAL PACKET EXTERNAL CONNECTIONS																																												
G-ECO CORE X300 LAYOUT																																															
Plan. /23.10.2026			Object ID			CABINET			Job no.																																						
D'row. KT			Steel 15/16			Drowing no.																																									
Check						EL EL170																																									

[illegible]

EU DECLARATION OF CONFORMITY**Object of the declaration:**

Gebwell Heat pump

Product Model:

G-Eco Core 80

Name and address of the manufacturer:

Gebwell Ltd.
Patruunapolku 5
79100 Leppävirta, Finland
Tel. +358 20 1230 800
www.gebwell.fi

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- 2014/68/EU – Pressure Equipment Directive (PED)
- 2014/35/EC – Low Voltage Directive (LVD)
- 2006/42/EC – Machinery Directive (MD)
- 2014/30/EC – Electromagnetic Compatibility Directive (EMC)
- 2011/65/EC – Restriction of Hazardous Substances Directive (RoHS)
- 2009/125/EC – EcoDesign requirements for space heaters and combination heaters (No 813/2013)

References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:

- PED – EN 12735-1:2020, EN ISO 13585:2012, EN 14276-1:2020, EN 14276-2:2020
- LVD – EN 61439-1:2021, EN 61439-2:2021
- EMC – EN IEC 55014-1:2021, EN IEC 55014-2:2021
- MD – EN 60 335-1:2012 A11:2014, EN 60335-2-40:2003/A13:2012/AC:2013,
- Product – EN 378-2:2016, EN14511:1-4 :2022, SFS 6000:2022 (HD 60364, HD 60384)

PED conformity assessment procedure according to B (production type) + C2 – EU-Type examination (production type) + conformity to type based on internal production control plus supervised pressure equipment checks at random intervals. A risk assessment has been performed and documented according to Annex I.

Products are marked with CE 0875 and evaluated by:

Dekra Industrial Oy
NoBo 0875
P.O. Box 41
FIN-01621 Vantaa, Finland

**Certificate issued: DA-26-154118
26-154724**

Signed for and on behalf of:

Date: 9 October 2026
Place: Leppävirta, Finland



Kimmo Kedonpää, CEO

Gebwell Ltd.

Business ID: 2008956-7

Patruunapolku 5, FI-79100 Leppävirta, FINLAND

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

