GEBWELL

Operating Instructions

Gebwell Heat Pumps

WWW.GEBWELL.COM

Contents

1 General

These instructions are intended for end users and service personnel of heat pumps. The instructions describe the menu structure of the device's user interface, its functions and operating principles. The menu is divided into two user levels:

- **End user**: A menu view intended for basic use, where the user can:
    - Adjust the temperatures in the property
    - View the device's operation using measurements and status information
    - View any alarms
- **Maintenance user**: More extensive user rights, which allow the user to:
    - Change device configuration settings
    - Adjust advanced settings and limit values
    - Perform more in-depth analysis of device operation

Note: The service user must be familiar with the system's operation in order to change the settings safely and correctly.

2 User interface - HEAT PUMP

The heat pump is operated using the built-in user interface or a web-based user interface on a computer or smart device (phone, tablet).

Heat pump user interface

Using the controller

The heat pump controller consists of a display, buttons and a selection wheel. It is mainly operated by turning the wheel and using the buttons. The different parts of the controller and their functions are described below:

Display

- Displays menus, measurement data, alarms and settings.
- The display content changes depending on the selected menu item.

Buttons on the right side of the display (from top to bottom):

1. **INFO button (i symbol)**
    - Takes you **to the** user **overview page**, which shows the status of the device, the most important measurements and any alarms at a glance.
    - Convenient for quickly checking the overall status of the device.

2. **Alarm button (bell icon)**
    - Opens the alarm menu, which shows active alarms and the alarm history.
    - Alarms can be acknowledged from this menu.
3. **Back button (left arrow)**
    - Returns to the previous menu view or cancels the selection.

Selection wheel and confirmation button

- **Scroll**
    - Scroll up and down in menus by turning the wheel.
    - Use the scroll wheel to select the desired menu item or setting.
- **Confirmation button**
    - Press the scroll wheel to select or confirm a menu item or setting.

3 Main menu

The main menu is the central view of the heat pump user interface, from which the user controls the device functions. The menu content is automatically generated based on **the** selected **system configuration**. This means that the menu items displayed may vary depending on which functions and devices are connected to the system and enabled in the service menu.

Main menu structure and functions

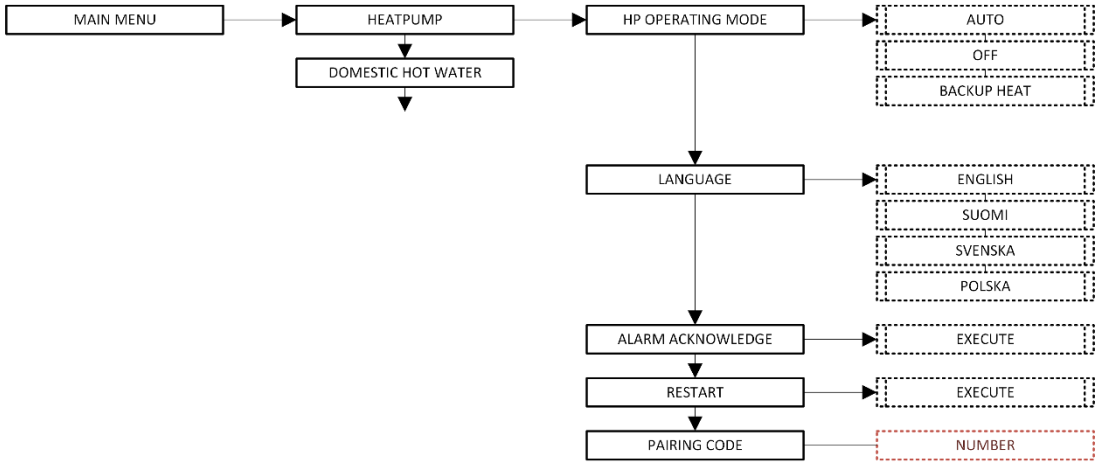
Below is an example of the main menu items:

1. **Heat pump**
    - Starting the heat pump
    - Selecting the user interface language
    - Acknowledging alarms
2. **Domestic hot water** *(only visible if the domestic hot water function is in use)*
    - Domestic hot water temperature setting
    - Selecting the operating mode
    - Setting values
3. **Heating circuits** *(only visible if the heating function is in use)*
    - Indoor temperature setting
    - Supply water temperature
    - Heating circuit status
4. **Cooling circuits** *(only visible if the cooling function is in use)*
    - Cooling control
    - Indoor temperature target

5. **Information**
    - Outdoor temperature
    - Indoor temperature(s)
    - Flow and return temperatures
    - Compressor status
6. **Service menu**
    - Device configuration
    - Equipment testing
    - Advanced settings

🔧 **Note:** The contents of the main menu are automatically updated when functions are added or removed from the system via the service menu. After making changes, the controller must be restarted for the new configuration to take effect.

3.1 Heat pump



3.1.1 Heat pump operating mode

The Heat pump operating mode menu is used to select the operating mode for the heat pump. The heat pump is always delivered **in STOP mode** and will not start until the user selects the appropriate operating mode. Before switching to AUTO mode, all necessary device-specific settings must be made.

Changing the operating mode does not require restarting the controller.

AUTO
AUTO mode is the normal operating mode for the heat pump. In this mode, the device operates automatically according to the set values and system requirements. AUTO mode is selected when the device is ready for normal use.

OFF
In OFF mode, all heat pump functions are turned off. This is the delivery mode of the device, in which it is safely turned off before commissioning.

BACKUP HEAT
In BACKUP HEAT mode, heating is provided solely by additional heat sources, such as electric heating elements. The compressor and collection 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 multiple heat pumps (cascade system), each unit must be set to AUTO mode separately.

3.1.2 Language

In this menu, you can select the language in which the information on the controller display is shown. The available languages are:

- Finnish
- English
- Swedish
- Polish

3.1.3 Alarm acknowledgement

If an alarm occurs in the device, it will be displayed on the screen and can be acknowledged from this menu. Before acknowledging, it is important to:

- **Find out the cause of the alarm**
- **Fix any faults**

Important: Do not acknowledge the alarm if you do not know the cause. Repeated alarms may indicate a device fault and simply acknowledging them may result in damage to the device.

3.1.4 Restart

This function allows you to restart the controller. This may be necessary, for example, after a software update or configuration change.

Before restarting, do the following:

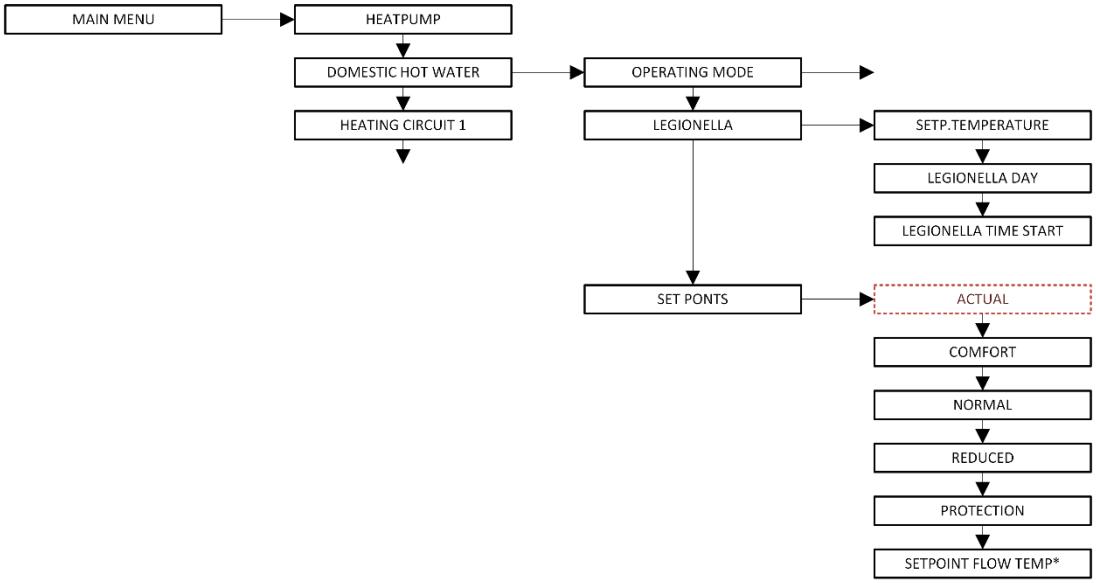
1. Set the device **to STOP mode**
2. Wait for **the compressor to shut down in a controlled manner**
3. Restart the controller

🔧 **Tip:** Never restart the controller while the compressor is running – first set the heat pump to STOP mode, allow the compressor to shut down, and then restart the device.

3.1.5 Pairing code

The controller automatically generates **a pairing code** that is used to connect the device to the mobile app. The code is valid for a limited time and changes on the display at regular intervals.

3.2 Domestic hot water



General

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

The heat pump controls the heating of the water automatically. When the water in the tank cools down, the heat pump starts up and reheats the water. This happens as follows:

- **Heat** is **controlled** by **a changeover valve (Y3)**, which directs the heat either to the heating system or to the domestic hot water tank.
- The tank has **two temperature sensors**:
    - The **top sensor (B2)** measures the temperature at the top of the storage tank. This corresponds to the flow temperature that enters to network
    - **The bottom sensor (B3)** controls the operation of the heat pump. When the temperature measured by the bottom sensor falls below the set value, the heat pump starts up. When the target temperature is reached, the heat pump switches off.

Energy consumption and equipment 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 the electricity bill.
- **High temperatures put more strain on the equipment.**
  Long-term use at high temperatures can shorten the service life of the heat pump.
- **The water is heated according to the measurement of the lower sensor (B3).**
  This means that hot water accumulates at the top of the tank, so that the water at the upper sensor (B2) can be significantly hotter than at the bottom. This allows for efficient use of water without heating the entire tank to a high temperature.

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

3.2.1 Operating mode

The operating mode determines how the heat pump produces hot water. The selection is made from the menu:
MAIN MENU → DOMESTIC HOT WATER → OPERATING MODE

The operating mode selection affects:

- **The temperature to which** the water is heated

A separate temperature setting is defined for each operating mode. These settings can be found in the menu **Settings → Domestic hot water**, where you can adjust the temperatures for different operating modes (e.g. ECO, AUTO, COMFORT).

Operating modes:

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

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

ECO
In ECO mode, the domestic hot water temperature setting is lowered to save energy. This mode is suitable for situations where water consumption is low.

COMFORT
In COMFORT mode, the domestic hot water temperature setting is increased. This mode provides more hot water for greater consumption.

Tip for users: Select the operating mode according to how much hot water you need. AUTO mode is suitable for continuous use, ECO saves energy, and COMFORT provides additional comfort when the need is greater.

3.2.2 Legionella function

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

When is the Legionella function needed?

If the normal temperature setting for domestic hot water is **below +50 °C**, it is **recommended activate** the Legionella function. If the domestic hot water temperature is constantly +55 °C or higher, the Legionella function is not needed, as each time the water is heated, it exceeds the required temperature limit.

Function settings

- **SETPOINT TEMPERATURE**
  Sets the temperature to which the domestic hot water is heated during the legionella function. The setting range is **55–65 °C**. If necessary, the heat pump can use **an electric heater** to reach the target temperature.
- **LEGIONELLA DAY**
  Select the day of the week on which the legionella function is to be performed. The function starts automatically on the selected day.
- **LEGIONELLA TIME START**
  Sets the time when the legionella function starts. Select a time when water consumption is low (e.g. at night) to ensure that heating is as efficient as possible.

3.2.3 Setpoints

This menu is used to set temperatures **for** different **operating modes**. These settings allow you to adjust how hot the domestic hot water is heated in different situations. The display also shows **the current value**, i.e. the temperature setting currently in use.

NORMAL
This is the default setting for domestic hot water when the operating mode is **AUTO**. Select a temperature that corresponds to the normal water consumption in your home. The recommended value is 50–52 °C.

ECO
This sets the lower temperature used **in ECO mode**. This helps to save energy when water consumption is low. An example value is 45–48 °C.

COMFORT
This sets the higher temperature used **in COMFORT mode**. This mode provides more hot water, for example when several people use water in succession. An example value is 53–58 °C.

STOP
In STOP mode, all heat pump functions are turned off and no domestic hot water is heated.

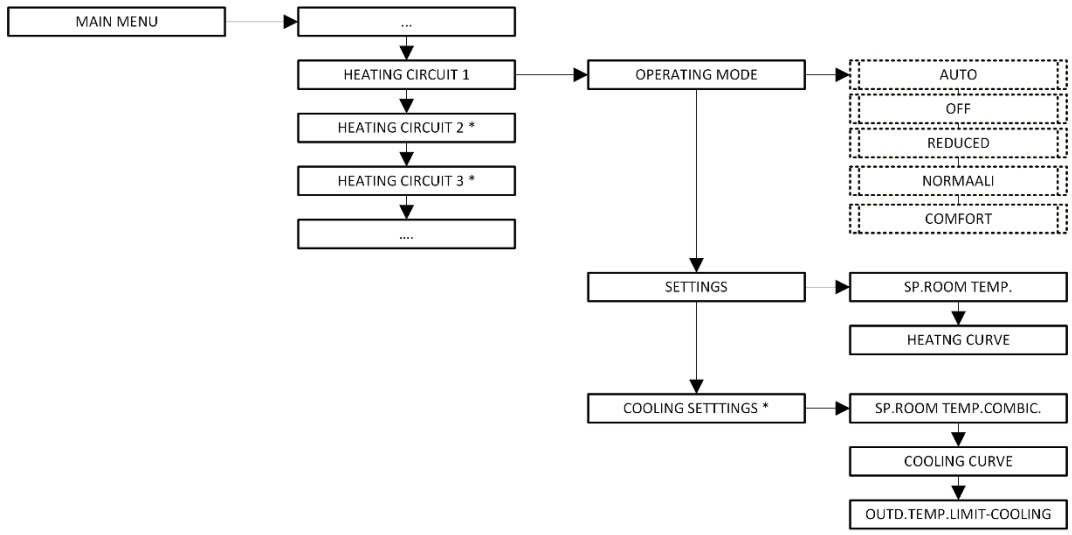
Setpoint flow temp *(only with optional accessory)*

If a mixing valve (TV38) equipped with **sensor B38** is installed in the system, you can also adjust **the flow temperature**. This setting is only visible in the user interface if the sensor in question is activated.

Note: Adjusting the flow temperature requires a separate accessory. If you are unsure whether this is in use in your system, check with your installer using the measurements in the menu.

3.3 Heating circuits

The heating circuit menu is used to adjust the operation of the various heating circuits in the property. Each heating circuit can control, for example, a different floor, room or building, and you can define separate settings and operating modes for them. Most households use a single heating circuit, but larger properties may have several.



3.3.1 Operating mode

The operating mode of the heating circuit determines how and at what temperature the heating works. 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 set separately in the SP.ROOM TEMP menu.

AUTO
In AUTO mode, the heating is on and operates automatically. If no time programmes have been set, the device uses the NORMAL setting. If a time programme is in use, the controller changes the operating mode according to the programme (e.g. COMFORT → NORMAL → ECO) 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 timers.

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

REDUCED
In REDUCED mode, the room temperature setting is lowered to save energy. For example, this mode is suitable for use at night or when you are away from home.

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 permanently affect the set temperatures; instead, the device uses the values specified in the SP.ROOM TEMP menu for each mode.

3.3.2 Settings

SP.ROOM TEMP (Setpoint room temperature)

This menu is used to set **the** desired **room temperature** for the heating circuit. The display also shows **the current value**, i.e. the temperature setting currently in use.

If **a room sensor** is connected to the heating circuit, it measures the actual room temperature and affects the control. In this case, the controller's operation is based on the actual indoor temperature and not just the outdoor temperature. The effect of the room sensor is enabled with the room compensation setting.

Note: If the room sensor is not in use, the default setting is 20 °C, and the control is based on the outdoor temperature and the heating curve.

When the room setpoint is changed up or down (+/−), it affects **the flow temperature** at all outdoor temperatures. This means that the entire heating curve is shifted up or down – this is called **a parallel shift**.

Settings for specific operating modes:

- **COMFORT**
  Used when more heat is needed. The setting is higher.
- **NORMAL**
  Normal everyday temperature. This is the default value when the operating mode is AUTO without time programmes.
- **REDUCED**
  Used to save energy. The setting value is lower.

Room temp comp. (requires room sensor)

Room compensation allows the control to respond more quickly to changes in room temperature. The higher the compensation value is set, the more the deviation measured by the room sensor affects the supply water temperature.

Tip for the user: If the room feels cool even though the settings are correct, increasing the room compensation can help to stabilise the temperature more quickly.

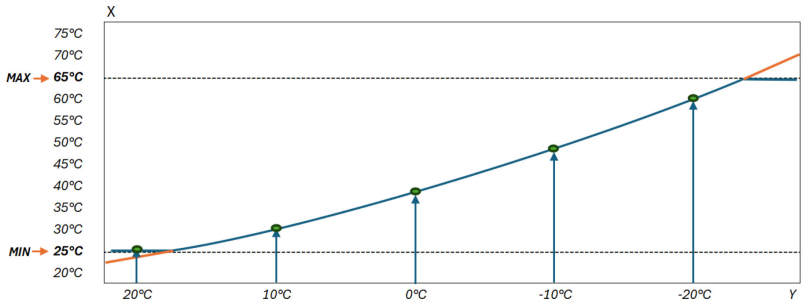
Heating curve

The heating curve determines how the heat pump adjusts **the flow temperature** according to the outdoor temperature. When it gets colder outside, the flow temperature automatically rises to keep the indoor temperature stable.

How does the heating curve work?

The heating curve is created by setting the flow water temperatures for five different outdoor temperatures:

- **+20 °C**
- **+10 °C**
- **0 °C**
- **−10 °C**
- **−20 °C**



Example of heating curve setting

Based on these values, the controller automatically calculates the appropriate flow temperature for 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 indoors during severe frosts, you can increase the flow temperature at −10 °C or −20 °C. If, on the other hand, it is too hot indoors during mild weather, you can decrease the values at +10 °C or +20 °C.

Key concepts

- **OUTDOOR AIR TEMPERATURE FILTERED (Out.temp filtered)**
  This is the outdoor temperature used by the controller for calculation. It is the average value for 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 flow temperature. This ensures that the water is not too hot or too cold, even if the outdoor temperature deviates from the set points.

3.3.3 Cooling settings (combi circuit)

The cooling settings are displayed when **the combi circuit** has been enabled in the service menu. The combi circuit enables both **heating and cooling** in the same circuit. This requires a cooling accessory.

Note: Only one heating circuit can be defined as a combi circuit.

Setpoint room temp compic. (cooling)

When the combi circuit is activated, you can adjust **the cooling room temperature setpoints**. The display also shows **the current value**, i.e. the temperature setting currently in use.

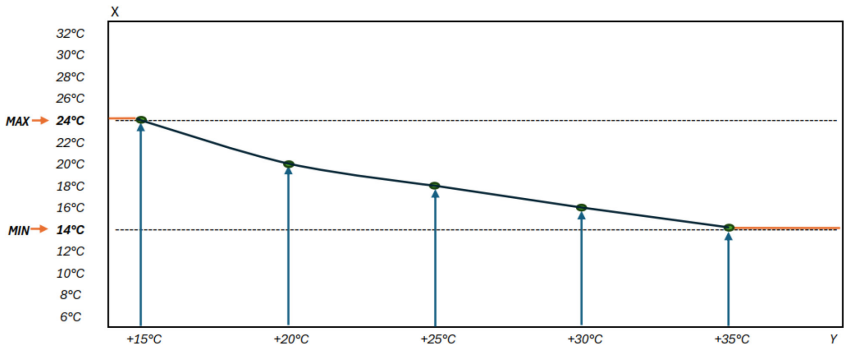
- **COMFORT** – Used when more efficient cooling is desired.
- **NORMAL** – Standard cooling setting. Used by default in AUTO mode.
- **REDUCED** – Used to save energy when cooling demand is low.

Room compensation (requires a room sensor)
Room compensation allows the control to respond more quickly to changes in room temperature. The higher the value, the more the deviation measured by the room sensor affects the supply water temperature.

Cooling curve

The cooling curve is used to determine how cool the supply water is cooled at different outdoor temperatures. You can set the supply water temperatures for the following outdoor temperatures:

- +15 °C
- +20 °C
- +25 °C
- +30 °C
- +35 °C



Example of cooling curve setting

OUTDOOR AIR TEMPERATURE FILTERED
Shows the current outdoor temperature used for control. This value may also include the effect of room compensation.

COOLING POINT
Calculated supply water temperature based on the cooling curve and filtered outdoor temperature.

Tip: If cooling seems insufficient in hot weather, you can set lower supply water temperatures for +30 °C and +35 °C.

Outdoor temperature limit - cooling

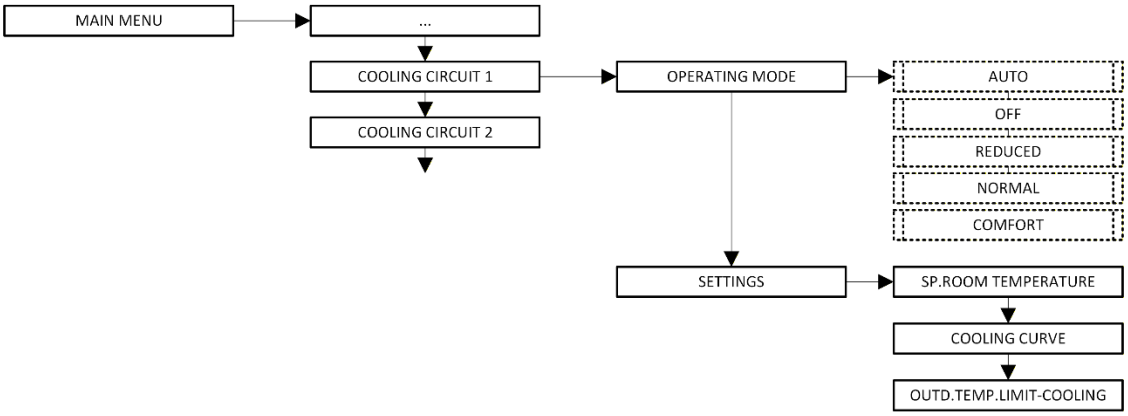
This setting determines when cooling may start. For example:

- If the limit is set to +25 °C, cooling will start when the outdoor temperature exceeds +25 °C.
- Cooling stops when the outdoor temperature falls below +24 °C (1 °C hysteresis).

Note: Cooling only works if:

- The unit is **in summer mode**
- **The outdoor temperature sensor** is connected and selected

3.4 Cooling circuits (-s)



General

The cooling circuit enables rooms to be cooled using a heat pump. When the cooling circuit is in use, the heat pump directs cool water into the system, which transfers the cooling to the rooms via, for example, underfloor heating, ventilation or fan convectors.

The cooling circuit operates based on the outdoor temperature, room temperature (if a room sensor is used) and user-defined settings. Cooling operates automatically when the outdoor temperature exceeds the set limit and the system is in summer mode.

3.4.1 Operating mode

The operating modes of the cooling circuit determine when and at what efficiency the cooling operates. The operating modes are selected from the menu:

- **AUTO**
  Cooling is on and operates automatically. If no time programmes have been set, the NORMAL setting is used. When a time programme is in use, the controller changes the operating mode according to the programme (e.g. COMFORT → NORMAL → REDUCED).
- **NORMAL**
  Cooling is on and operates according to the NORMAL mode setting.
- **OFF**
  The cooling is off. This mode is used, for example, when cooling is not needed.
- **REDUCED**
  Cooling efficiency is reduced to save energy. The setpoint is increased, resulting in more moderate cooling.
- **COMFORT**
  The cooling efficiency is increased. The set value is lowered, resulting in more cooling.

3.4.2 Settings

Sp.room temp. (Setpoint room temperature)

This menu is used to set the desired room temperature for cooling. The display also shows **the current value**, i.e. the temperature setting in use.

- If **a room sensor** is in use, the control is based on the actual room temperature.
- If there is no room sensor, the default value is 20 °C.
- Changing the setpoint affects the supply water temperature at all outdoor temperatures (offset).

Setting values for different operating modes:

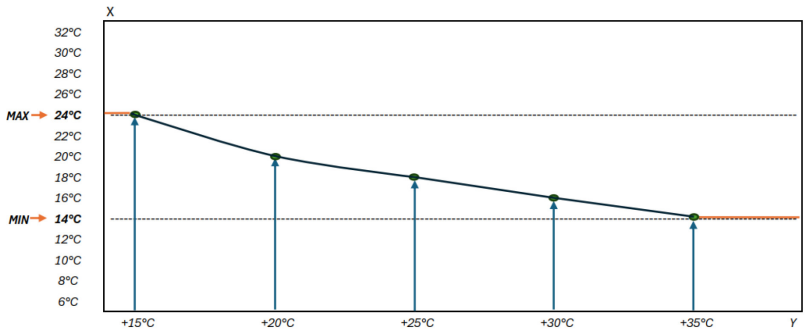
- **COMFORT** – Cooler setting for greater cooling demand.
- **NORMAL** – Standard cooling setting.
- **REDUCED** – Less cooling for energy savings.

Room temp comp. (requires a room sensor)
Speeds up adjustment to changes in room temperature. The higher the value, the more the room temperature deviation affects the supply water temperature.

Cooling curve

The cooling curve determines how cool the supply water is cooled at different outdoor temperatures. You can set the supply water temperatures for the following outdoor temperatures:

- +15 °C
- +20 °C
- +25 °C
- +30 °C
- +35 °C



FILTERED OUTDOOR TEMPERATURE
Average outdoor temperature used for control. It may also include the effect of room compensation.

COOLING POINT
Calculated supply water temperature based on the cooling curve and filtered outdoor temperature.

Outdoor temperature limit for cooling operation

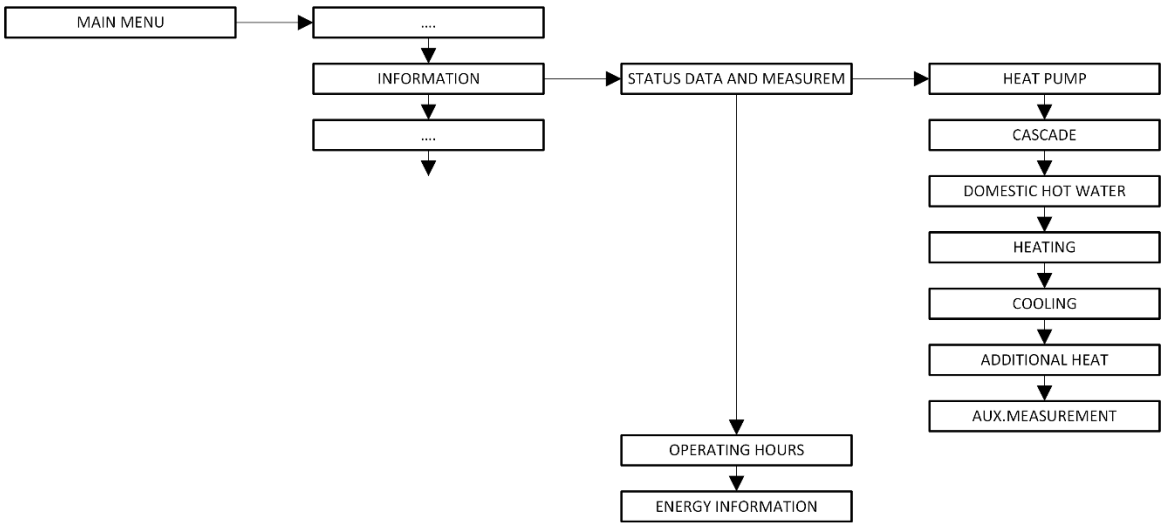
This setting determines when cooling may start. For example:

- If the limit is +20 °C, cooling starts when the outdoor temperature exceeds +20 °C.
- Cooling stops when the outdoor temperature falls below +19 °C (1 °C hysteresis).

🔧 **Note:** Cooling only works if:

- The unit is **in summer mode**
- **The outdoor temperature sensor** is connected and selected

3.5 Information



The Information menu provides a comprehensive overview of the heat pump's operation. No adjustments are made in this menu; it is intended **for monitoring the system status and measurements**. This information allows the user or service technician to check the unit's operation, energy efficiency and any deviations.

The information displayed in the menu may vary depending on the device model and the accessories used.

Markings:

*= requires an accessory
** = standard equipment in some device models only
*** = standard feature in G-Eco devices, not in other models

3.5.1 Status data and measurements

Heat pump

This view shows the status of the heat pump's internal functions and measurement data

- **PLANT MODE** – Shows whether the device is in heating, domestic hot water production or cooling mode.
- **HEAT PUMP CAP.REQUEST** – Indicates how much power the system is requesting from the heat pump.
- **COMPRESSOR / COMPRESSOR 2** – Shows whether the compressor is running, stopped or starting up.
- **COMPRESSOR SPEED** – Real-time rotational speed.
- **OIL TEMPERATURE** – Compressor oil temperature. Too low a temperature will prevent start-up.
- **CRANK CASE HEATER** – Shows whether the compressor oil sump heater is active.

Charging circuit

- **B21 / B71** – Supply and return water temperatures.
- **SUPPLY TEMP.DIFFERENCE** – Difference between these two temperatures.
- **Q9 SUPPLY PUMP** – Pump speed as a percentage.
- **FM1 FLOW METER SUPPLY *** – Flow in litres/minute, if a flow meter is in use.

Superheat circuit (**)

- **B36 / B37** – Superheat circuit flow and return temperatures.
- **SUPERHEAT TEMP. DIFFERENCE** – The difference between these.
- **Q33 SUPERHEAT PUMP** – Pump speed.
- **FM2 FLOW METER SUPERHEAT** /* – Flow if the meter is in use.

Heat collection circuit

- **B91 / B92** – Inlet and outlet temperatures of the collection fluid.
- **SOURCE TEMP. DIFFERENCE** – The difference between these.
- **Q8 SOURCE PUMP** – Pump speed.
- **FS1 FLOW DETECTOR** * – Shows whether the flow is on or off.

Special functions (only on certain models)

- **DIFFERENTIAL PRESSURE** *** – Pressure difference in ventilation. If less than 10 Pa, the device will not start.
- **EXHAUST FAN** *** – Extractor fan speed.
- **GAS SENSOR VALUE** *** – Shows the refrigerant leak detection value as a percentage.
- **FAN MODE** *** – Shows the current operating mode of the fan. For example, normal or temperature boost, if the temperature is above the limit value
- **HIGHEST PRIO** *** – Shows which exhaust air fan has the highest priority. For example, if device 2 in the cascade is boosted due to temperature, the information is given here.
- **EMERGENCY REASON** *** – Shows the reason why emergency control of the fan is in use

Cascade

This view shows general measurements and status information for the entire system. This information is used in particular to understand the overall operation and control of the system.

- **B9 OUTSIDE TEMP** – Temperature measured outside (°C).
- **VK1 / VK2 EXTERNAL SETPOINT** – Heating and cooling requests from the external automation system.
- **FLOW TEMP** – System flow temperature. Selected automatically based on available sensors (B10 or B21).
- **FLOWTEMP SETPOINT** – Flow temperature targeted by the heat pump. Determined based on internal or external requests.
- **Q8C COMMON SOURCE PUMP / SPEED** * – Status and speed of the external collection pump.
- **B10 / B15 HEATING TANK TEMPERATURES** – Upper and lower temperatures of the storage tank.
- **SYSTEM CAPACITY** – Calculated power requested by the system. In a cascade system, this is distributed among several devices.
- **MASTER / SLAVE 1–12** – Indicates which device controls the system (MASTER) and the statuses of other devices (SLAVE).
- **HEATPUMP CAPACITY / REQUEST** – Actual and calculated power percentage.

Domestic hot water

This view shows information related to domestic hot water production and circulation:

- **OPERATING MODE** – Current domestic hot water production mode (AUTO, REDUCED, COMFORT, etc.).
- **SETPOINT** – Target temperature at which the domestic hot water is heated.
- **CHANGE OVER VALVE** – Shows whether the heat is directed to domestic hot water or heating.
- **B2 / B3** – Temperatures of the upper and lower parts of the domestic hot water tank.
- **B95 SUPERHEAT CIRCUIT TANK** ** – Temperature of the reheating tank.
- **B38 / B39** * – Hot water supply and return temperatures.
- **Q4 DHW CIRCULATION PUMP** – Status of the circulation pump.
- **K6 / K90 ELECTRIC HEATER** – Status of the electric heating elements in the storage tank and reheating tank.
- **LEGIONELLA** – Shows whether the legionella function is active, completed or off.

Heating

This view shows the status information and measurements for the heating circuits:

- **B9 OUTSIDE TEMP.** – Outside temperature (°C).
- **HEAT CIRCUIT 1**
    - **B1 FLOW TEMP** – Circuit flow temperature.
    - **FLOW TEMP. SETPOINT** – Target temperature.
    - **B51 ROOM TEMP** * – Current room temperature, if the room sensor is in use.
    - **ROOM TEMP. SETPOINT** – Current room temperature setpoint.
    - **TV1 CONTROL VALVE** – Valve position (%).
    - **Q2 CIRCULTION PUMP** – Pump status.

  Heating circuits 2 and 3 contain the corresponding information if they are enabled.

Cooling

This menu displays status information and measurements related to the operation of the cooling circuits. These can be used to monitor the efficiency and operation of the cooling system under different conditions.

- **FREE COOLING** – Shows whether free cooling (without compressor) is in use.
- **EXTERNAL CONTROL** – Indicates whether external control is active.
- **EXTERNAL SETPOINT** – Cooling temperature request from higher-level automation.
- **B40 COOLING TANK TEMP** – Cooling tank temperature.
- **SETP. TEMPERATURE** – Target cooling temperature.

Cooling circuit 1

- **OPERATING MODE** – Shows the status of the cooling circuit (AUTO, REDUCED, COMFORT, STOP).
- **B16 FLOW TEMP** – Cooling circuit flow water temperature.
- **FLOW TEMP SETPOINT** – Target temperature for the flow water.
- **B51 ROOM TEMPERATURE** – Current room temperature.

- **ROOM TEMP.SETPOIN** – Current room temperature setpoint.
- **TV11 CONTROL VALVE** – Valve position (%).
- **Q24 CIRCULATION PUMP** – Pump status.

Cooling circuit 2 contains the corresponding information if it is in use.

Additional heat

This menu displays the status information for the system's additional and backup heat sources. Additional heat can be an internal electric heater or an external heat source, such as an electric boiler, oil burner or district heating.

Additional heat (*)

- **OPERATION MODE** – Control mode for external heat source.
- **B11 FLOW TEMP** – Temperature measured by the sensor.
- **SETPOINT** – Target temperature.
- **CONTROL OUTPUT** – PID controller counter.
- **ELECTRIC HEATER** – Shows the status of the electric additional heating.
- **K27.ADDITIONAL HEATING STATUS** – Indicates whether additional heating is active.
- **TV27.ADDITIONAL HEAT SIGNAL** – Control signal for valve (TV27).

Flow through heater (**)

- **OPERATING MODE** – Control mode (e.g. automatic or manual).
- **B21.FLOW TEMPERATURE** – Sensor that controls the heater.
- **SETPOINT** – Target temperature.
- **CONTROL OUTPUT** – Controller counter that controls the heater steps.
- **ELECTRIC HEATER** – Shows whether the heater is on.
- **ALARM** – Possible alarm information.

Aux. measurement (*)

If an additional module has been installed in the device and the measurement points have been activated, they will be displayed in this menu:

- **X1–X8 TEMPERATURE** – Shows the measurements of the additional temperature sensors.
- **Q1–Q4 RELAY OUTPUT** – Shows the status of the additional relays (on/off).
- **Y1–Y2 CONTROL SIGNAL** – Shows the values of additional control signals.

3.5.2 Operating hours

In the Operating hours menu, you can view **the operating times and start-up times** of the heat pump and its connected components. This information can be used to estimate the utilisation rate of the device and the need for maintenance.

The menu shows, for example:

- Total operating hours of the compressor

- Number of starts for domestic hot water production
- Operating time of the additional heat source
- Circulation pump operating time

3.5.3 Energy information

In the Energy information menu, you can monitor **the** heat pump's **electricity consumption and the heat energy produced***. The information displayed depends on the configuration of the device and any optional accessories.

Displayed information:

- **ACTUAL HEATING** – Current electricity consumption (kW)
- **HEATING POWER *** – Current heating power (kW)
- **COP *** – Current coefficient of performance (COP), i.e. how efficiently the heat pump converts electricity into heat

Cumulative information:

- **ENERGY HEATING** – Electricity consumption for heating (kWh)
- **ENERGY DHW** – Electricity consumption for domestic hot water production (kWh)
- **ENERGY TOTAL** – Total energy consumption (kWh)
- **GENERATED HEAT HEAT CIRCUIT *** – Thermal energy generated for heating (kWh)
- **GENERATED HEAT DHW *** – Thermal energy generated for domestic hot water (kWh)
- **GENERATED HEAT TOTAL *** – Total thermal energy generated (kWh)

Note: Displaying heating power, efficiency and heat production requires that the appliance has **heating energy measurement** as an accessory.

Tip for the user: Energy data helps you monitor the efficiency of the appliance and compare consumption between different months or years. It can also support your energy saving goals.

4 Service menu

The maintenance menu is used to configure the heat pump for commissioning and to set device-specific parameters. The menu also provides access to extended measurement data and technical settings for the system.

Access to the service menu requires service user level.

- Press **the ROLL button for** 3 seconds
- Scroll **the password** to the display
- Confirm your selection by pressing **the SCROLL button**
- **Password:** 2000

Menu sections

1. **HEATPUMP USE**
   Start the heat pump or set it to a different operating mode during installation or maintenance.
2. **COMMISSIONING**
   Define the configuration of the system and equipment. Select the functions and accessories to be used.

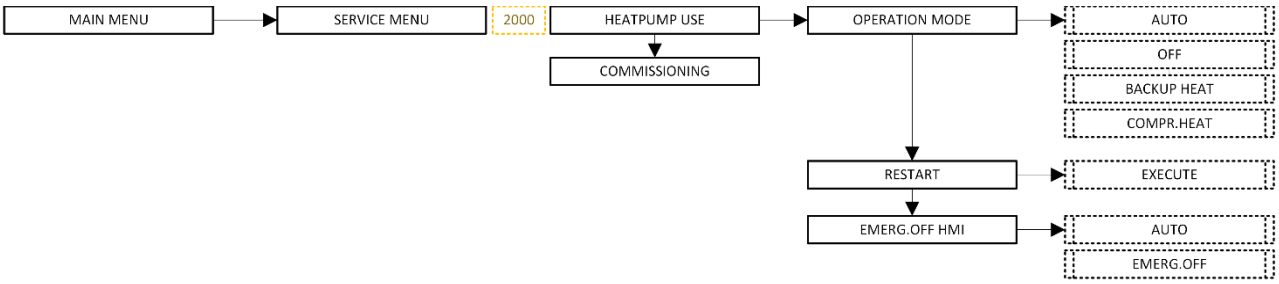
   See section **5.1 Commissioning for** a more detailed description.
3. **FUNCTION TESTING**
   Enables manual testing of the heat pump's functions. Used, for example, during commissioning or maintenance to verify functions.
4. **DEVICE SETTING**
   Define device-specific control values, such as temperature limits, sensor selections and control parameters. The settings directly affect the operation of the device.
5. **MEASUREMENTS**
   Displays real-time measurement values such as temperatures, pressures and flow readings. Measurements are used to monitor device operation and troubleshoot faults.
6. **COMMUNICATION**
   Define bus communication settings (e.g. Modbus). The menu is used to set device addresses, bus speeds and other parameters related to data transfer.
7. **DEVICE INFORMATION**
   Displays the controller software version, device model, serial number and other basic technical information. This information is needed, for example, for maintenance or technical support.
8. **FACTORY SETTING**
   Restores the device settings to factory defaults. This function is only used in special situations, such as to correct incorrect settings.
9. **SAVE / LOAD**
   Saves and loads the controller parameters using an external memory card.

Note Restoring the factory settings will delete all changes made by the user.

4.1 Using the heat pump

The Heat pump operation menu is used to select the operating mode for the heat pump. The heat pump is always delivered **in STOP mode** and will not start until the user selects the appropriate operating mode. Before switching to AUTO mode, all necessary device-specific settings must be made.

Changing the operating mode does not require restarting the controller.



Operating mode

AUTO
AUTO mode is the normal operating mode for the heat pump. In this mode, the device operates automatically according to the set values and system requirements. AUTO mode is selected when the device is ready for normal use.

OFF
In OFF mode, all heat pump functions are turned off. This is the delivery mode of the device, in which it is safely turned off before commissioning.

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

COMPRESSOR HEATING
COMPRESSOR HEATING mode is intended for preheating the compressor before the first start-up. Depending on the ambient temperature, the compressor requires approximately 4–8 hours of heating to reach start-up readiness. When the device is set to AUTO mode, the controller automatically takes care of heating the compressor. In this mode, other heat pump functions will not start.

Note: If the system has multiple heat pumps (cascade system), each unit must be set to AUTO mode separately.

Restart

This function allows the unit to be restarted without turning off the power. Restarting may be necessary, for example, after a software update or change in settings.

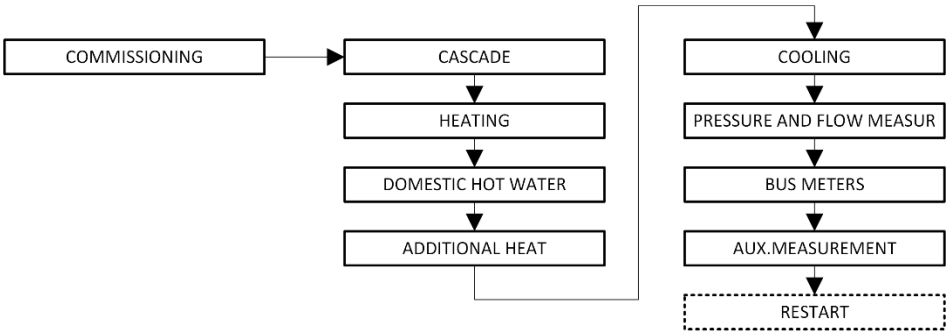
Emergency stop

The emergency stop function stops the device immediately for safety reasons.
Selectable modes:

- **Auto** – automatic mode
- **Emergency stop** – the device is stopped immediately

4.2 Commissioning

Main menu → Service menu → Commissioning



General

The Commissioning menu is used to define **the system and device-specific configuration** of the heat pump system. The menu is divided into different functional areas, which must be reviewed when commissioning the system.

When a function is selected for use, **the required accessories** must be installed and connected to the heat pump. Activating a function requires **restarting the device**, after which the settings for the selected function will be displayed in the menus.

Note! All necessary functions can be configured at once, after which a single restart is performed.

Expansion modules

If the selected function requires **a controller expansion module**, **the** module **address** must **be set with DIP switches** before commissioning.

After commissioning

Once commissioning is complete, proceed to configure the function-specific settings in the menu:

Main menu → Service menu → Device settings

Marking instructions

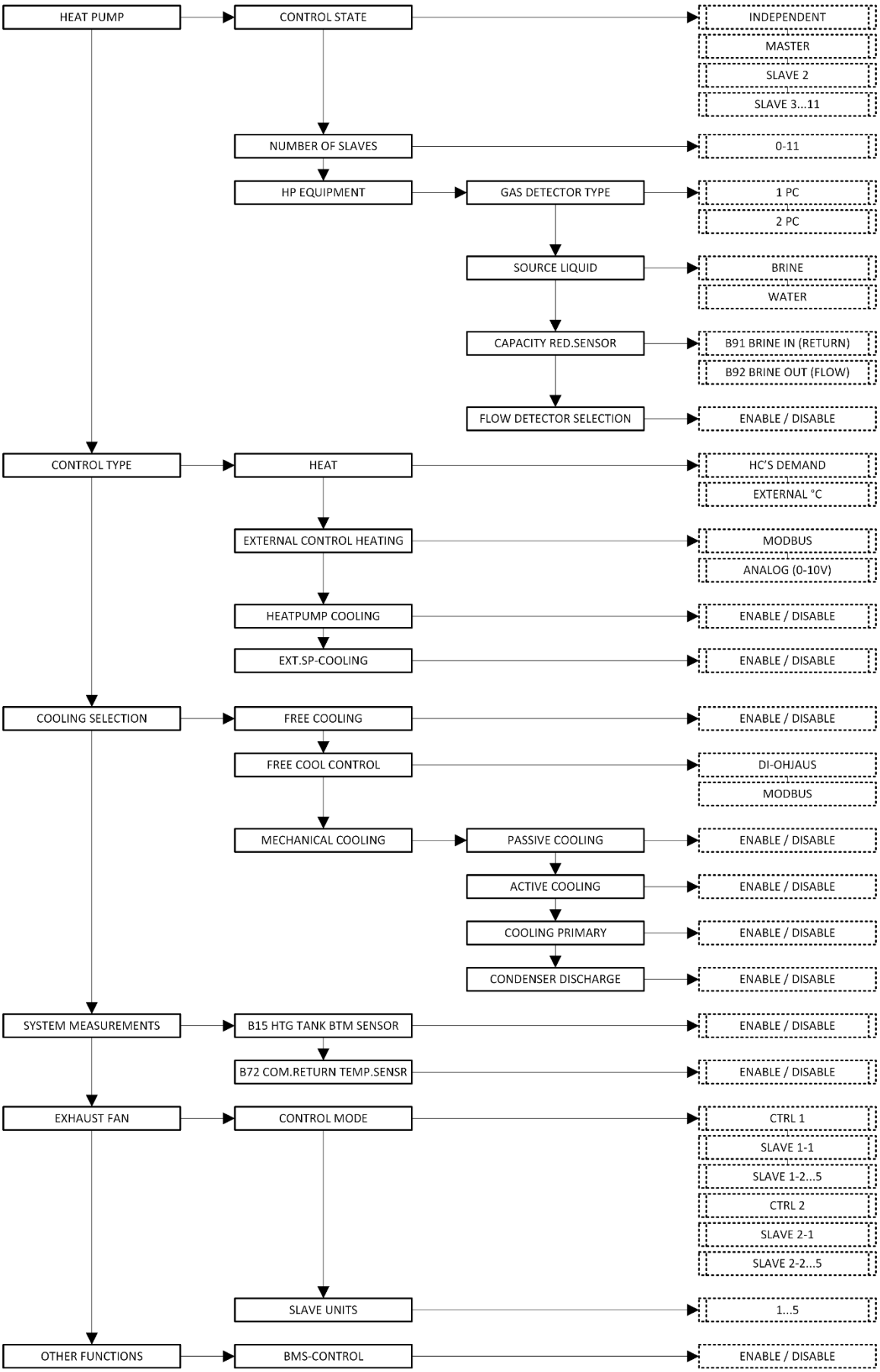
*= requires an accessory

** = standard equipment only in some device models

*** = Standard feature on G-Eco devices, not on other models

4.2.1 Cascade

Main menu → Service menu → Commissioning → Cascade



General

The CASCADE menu is used to define the options related to device control. This menu is used to configure the settings for individual heat pumps, cascade control, external control and cooling control. The options are selected according to the project plan. Some of the settings are defined for each device, while others are defined for the system master device.

4.2.1.1Heat pump

Control mode

The heat pump control mode is selected according to the system configuration:

- **INDEPENDENT**
  A single heat pump system that is controlled independently or by higher-level automation as an independent producer.
- **MASTER**
  One heat pump acts as the master device for the system.
    - Activates the B10 temperature sensor (placed in the buffer tank or in the flow pipe after the accumulator tank).
    - Controls the control of other producers.
    - All external measurements are connected to the master device.
    - Communication with slave devices via the process bus/local area network.
    - The system can be controlled via the Modbus by writing the setpoint to the master device.
- **SLAVE 1…11**
  Slave devices in the cascade system controlled by the master.
    - They produce power within their own limit values according to the master's request.
    - The system can have a maximum of 11 SLAVE generators.

Number of slave devices

Defined only in the master device. Does not affect whether the control mode is INDEPENDENT or SLAVE.

Heat pump equipment

Gas detector type

- One leak detector (permanently on) as standard.
- An additional leak detector can be selected from this menu as an accessory.
- The sensor is installed in the cold module and connected to the electrical system.
- For more information, see *INSTALLATION OF LEAK DETECTOR*.
- **Applies to the G-Eco model series.**

Source liquid

Select the heat transfer fluid to be used:

- **Brine**
    - Uses B91 sensor (inside the evaporator).
    - Allows negative setpoint values.
    - Frost resistance at least -15 °C.
- **WATER**
    - Uses B92 sensor (collection circuit out / evaporator supply).
    - Prevents negative setpoints.
    - Shuts down the device if the temperature drops to +5 °C.
    - **Flow switch is mandatory.**

Capacity red.sensor

Select a sensor that protects the collection circuit or heat pump:

- **COLLECTION CIRCUIT IN (B91, return temp)**
    - Limits capacity according to the incoming temperature.
    - The compressor switches off when the protection value is exceeded.
    - Restart attempt after 1 hour.
- **COLLECTION CIRCUIT OUT (B92, flow temp)**
    - To be used if the liquid is **WATER**.
    - Limits capacity according to the outgoing temperature.
    - The compressor shuts down when the protection value is exceeded.
    - Restart attempt after 1 hour.

Flow detector selection

- Mandatory if WATER is used as the liquid.
- Protects the evaporator from freezing.
- Factory setting ready.
- In retrofit installations, the flow is adjusted during commissioning.
- Can also be used with collection fluid.

4.2.1.2 Control type

The menu is used to define the heat pump control mode **for heating and cooling operation**, as well as **the control signal for heating operation**. If the heat pump is controlled by higher-level automation, familiarise yourself with the control modes in the installation instructions, which describe the different control principles of the controller.

NOTE! If the heat pump is controlled by external automation according to the condenser and evaporator temperatures, the function is activated from: **Other functions → BMS control → Used**
In this case, the **Heating** and **Cooling** control modes are automatically set to external control and do not need to be set separately.

Heat

The control mode is selected according to whether the heat pump controller independently controls the heating of the property or whether the heat pump is controlled by external automation. The selection is **always** made **on the master device** in the case of a cascade system.

The selection of the heating control mode **does not affect** the operation of domestic hot water or cooling.

- **HC´S DEMAND**
  The heat pump sets the heating setpoint according to heating circuits 1–3.
- **EXTERNAL °C**
  The heat pump receives the setpoint from the external automation in the form of a temperature request.

  A start permit must be given for the external setpoint to be activated.

External control – heating

This selection determines how the external automation sends the heat request to the heat pump.

This setting **has no effect** if **CONTROL METHOD → HEATING** is set to **HEAT PUMP**.
Control signals for domestic hot water and cooling are always transmitted via **the Modbus interface**.

- **0–10 V**
  - The external setpoint is fed to the analogue input as a voltage signal.
  - The control voltage activates the charging circuit at 1.5 V.
  - The setpoint is formed linearly between 2.0–10.0 V.
  - The temperature correspondences are set in:
    Service menu → Device settings → System → External control heating
  - The charging circuit is switched off at a voltage of 0.5 V.
  - In a cascade system, the message is sent **to the master device**.
- **MODBUS**
  - The external setpoint is written directly to the controller via the Modbus interface.

Heat pump cooling

The control method is selected according to whether the heat pump controls cooling production independently or via external automation.
The selection is **always** made **on the master device** in the case of a cascade system.

- **Selection: Disable / Enable**
  The heat pump forms the cooling setpoint according to cooling circuits 1–2.

Ext.sp - cooling

The control mode is selected according to whether the heat pump controls cooling production independently or via external automation.
The selection is **always** made **on the master device** in the case of a cascade system.

- **Selection: Disable / Enable**
  The heat pump receives the setpoint from the external automation in the form of a temperature request.

  Operating permission must be given for the external setpoint to be activated.

4.2.1.3Cooling selection

Free cooling

- **Selection: ON / OFF**

Free cooling means that the collection pump controlled by the heat pump operates under the control of an external device or higher-level automation.

Free cool control

- **Selection: DI CONTROL / MODBUS**
- **DI CONTROL:**
  Used when the cooling device (e.g. cooling convector) directly controls the cooling request.
  - A normally open contact (NO) starts free cooling.
- **MODBUS:**
  Used when the request comes from higher-level automation via a bus interface.
  - See *the Modbus description* for a more detailed description of the bus register.

Mechanical cooling

Mechanical cooling is a controller feature that requires **the TC1.5 expansion module as an accessory**.
Mechanical cooling can be:

- **PASSIVE COOLING**
- **ACTIVE COOLING**
- Or both at the same time

The control modes follow the standard control functions of the controller.

See the example connection in section *xxxxxx Mechanical cooling*.

PASSIVE COOLING

- **Selection: Disable / Enable**
- **Instruments:**
  - Cooling accumulator sensor **B40**
  - Return water sensor **B42**

- Mechanical cooling valve **Y41**

Passive cooling utilises the heat collection circuit for cooling without using a compressor.

ACTIVE COOLING

- **Selection: Disable / Enable**
- **Instruments:**
    - Cooling accumulator sensor **B40**
    - Return flow sensor **B42 for** the collection circuit
    - Mechanical cooling valves **Y41** and **Y42**

Active cooling is provided by a heat pump.

Note! Ensure that the condenser discharge is correctly dimensioned.

COOLING PRIMARY

- **Selection: Disable / Enable**
- **Instruments**
    - Protective sensor **B41**
    - Flow sensor **B43**
    - Control valve **TV40**
    - Circulation pump **Q40**

The pre-control circuit is used for control and protection in secondary circuits and cooling networks.

If water is used in the cooling network, a heat exchanger must be used to prevent freezing.

CONDENSER DISCHARGE

- **Selection: Disable / Enable**
- **Instruments:**
    - Condensate return sensor B70*
    - Discharge valve **Y43**
    - Return water control valve **TV45**
    - Discharge circulation pump **Q45**

Condensate discharge enables excess heat to be transferred to the heat collection circuit when there is no heating demand in the building.

*Sensor **B70** is used in cascade systems. An internal return water sensor is used in individual devices.*

4.2.1.4System measurements

B15 Heating tank bottom sensor

- Select the lower sensor for the heating buffer tank.
  Sensor **B15** is placed at the bottom of the storage tank and is used in conjunction with the upper sensor **B10**.
- **Function:** The sensors form an average value that is used to control the power stages of the cascade system.

B72 Com.retrun temp sensor

- Select the system return water sensor **B72** (optional).
- **Location:** The sensor is installed in the heating system's return line to measure the temperature of the water returning from the network.

See the example diagram under *Cascade connection for* the correct location.

4.2.1.5 Exhaust fan

The exhaust air fan can be specified:

- **Per heat pump**
- **System-specific**

The selection is made according to the plan for the site.
The exhaust air fan acts **as a safety device**, and the heat pump must not be used without it.

A system with multiple heat pumps may have **two separate exhaust fan systems**.
Both systems have their own **master device**, and **the slave devices** connected to them are defined under the control of that master.

Control mode

Select the control mode for the exhaust air fan:

- **CONTROL 1** is selected for heat pump-specific control or for the master device in the system.
- **CONTROL 2** is selected for the second master device if the system has two separate exhaust air systems with a shared duct.

Number of slave devices

Specify how many slave devices are connected to the same exhaust air duct as the selected master device.

If the device is a slave device in a shared exhaust air system, the correct system and **device address must be selected for each slave device**. For example, in "SLAVE 1-2", the first number indicates the system number, i.e. the exhaust air fan is controlled by CONTROL 1, and the second number indicates the slave device address, i.e. slave number 2.

- **SLAVE 1–1**, system 1 slave 1
- **SLAVE 1–2 ...**
- **SLAVE 2-1**, system 2 slave 1
- **SALVE 2-2...**

4.2.1.6 Other functions – special use

General

This menu is used to activate **the** heat pump's **special operating mode**, in which the heat pump is controlled entirely by **external automation**. This mode is particularly suitable for systems in which heat pumps operate as part of a larger building automation system and their operation is controlled by BMS.

In special use, the heat pump's own controller does not set the heating or cooling setpoints, nor does it use external temperature sensors. Instead, the heat pump operates **entirely under external control,** and the control is based on the automation system's **operating permit** and **temperature request.**

Operating principle

- Each heat pump operates **as a slave device** that produces the requested heat or cooling:
    - **In heating mode**: control is based on **the condenser temperature (B21)**
    - **In cooling mode**: control is based on **the evaporator temperature (B92)**
- The system can have several heat pumps, all of which operate under external automation control.

Automation control

- **Selection: Not used / Used**

When **AUTOMATION CONTROL** is selected **as Used**:

- The heat pump does not use external sensors.
- The compressor speed is adjusted based on internal measurements.
- The heat pump produces the flow temperature according to the external setpoint when **the run permit** is active.

Modbus controls

External automation must control the heat pump via the following Modbus registers:

- **RUN PERMISSION (register 4x102):**
    - **0 = STOP**
    - **1 = HEATING** (control according to B21)
    - **2 = COOLING** (control according to B92)
- **SETTING VALUES:**
    - **HEATING:** register **4x104**
    - **COOLING:** register **4x1202**

Technical considerations

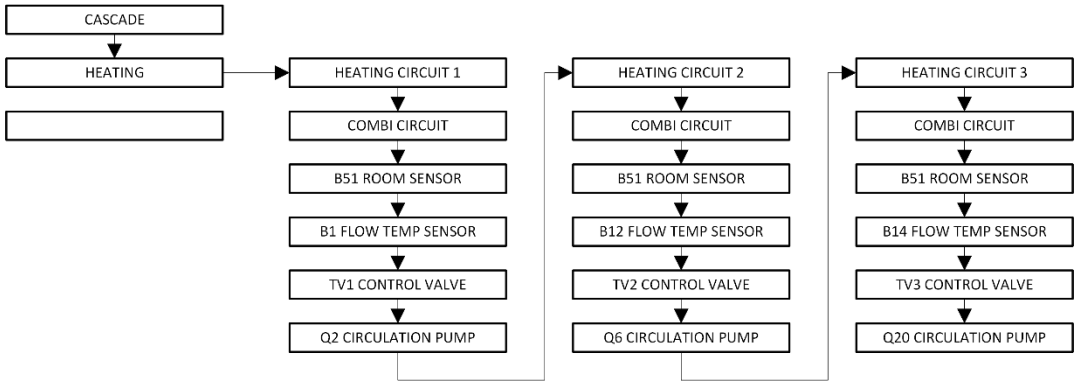
- **In heating mode**:
    - External automation must ensure that **the collection circuit (evaporator)** receives sufficient energy.
    - The heat pump controller protects the evaporator **with set limit values**, which are defined in the menu: **Service menu → Device settings → Source circuit → Souce circuit limit / protection setting value**
- **In cooling mode**:
    - External automation must ensure that **the condenser** does not overheat.
    - **Condensate discharge** must be provided externally.

- The heat pump controller protects the condenser based on **fixed limit values**.

This mode allows the heat pump to be integrated into demanding and flexible automation solutions where the heat pump's operation is to be controlled from external systems.

4.2.2 Heating

Main menu → Service menu → Commissioning → Heating



The heating menu is used to configure the functions used to control the system's heating system.

You can select all the necessary functions at once and then restart the system.

Note! If the heating circuit has not been selected for use, its functions will not be available, even if individual settings have been set to ON.

Heating circuits

Several heating circuits can be enabled in the system.

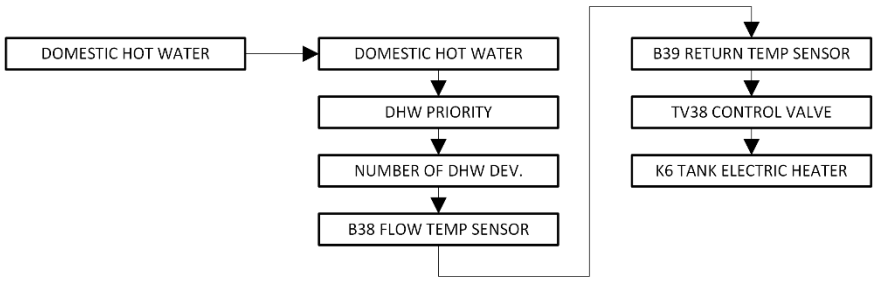
- **Heating circuits 2 and 3** require **the TC1.2 expansion module** as an accessory.
    - **The DIP switches** must be set to address **2**.
- If **heating circuit 1** functions **as a mixing circuit** (with flow sensor **B1** and mixing valve **TV1** in use), **the TC1.2 module** is also required.

Combi circuit

One freely selectable heating circuit can be defined **as a COMBI circuit**.
The Combi circuit controls both heating and cooling, and is selected according to the system requirements.

4.2.3 Domestic hot water

Main menu → Service menu → Commissioning → Domestic hot water



This menu is used to specify whether hot water is to be produced by the heat pump control and, if so, which operating mode is to be used. The domestic hot water function is activated if the heat pump controls a separate domestic hot water tank.

The domestic hot water tank sensors **B2** and **B3** must be connected to the heat pump.

Important! All domestic hot water function accessories require **the TC1.7 expansion module**, whose **DIP switches must be set to address 7**.

Hot domestic water

Selectable modes:

- **NOT IN USE**
  Select this if the system does not have domestic hot water production or if the heat pump does not control domestic hot water production.
  In a cascade system, this is selected **for** all **SLAVE devices**, even if they function as domestic hot water producers.
- **INDEPENDENT**
  Select this option when one heat pump produces domestic hot water.
  In a cascade system, this is selected **for the MASTER device** if it functions as an independent domestic hot water producer.
- **CASCADE**
  Selected when two heat pumps or one **SLAVE device** are involved in domestic hot water production and **the MASTER device** has not been selected as the domestic hot water producer.
  In a cascade, **the MASTER device** controls the selected producers and switches the heat pumps on and off according to the set values.
  Sensors **B2** and **B3** must be connected **to the MASTER device**.
  The changeover valves are connected to the heat pumps selected for each device.

DHW Priority

Producers are only selected if **CASCADE** has been selected as the domestic hot water control method.
The setting is made **for** each heat pump **individually**.

Selectable modes:

- **NA** – does not participate in domestic hot water production
- **ST 1** – produces domestic hot water, first power stage
- **ST 2** – produces domestic hot water, second power stage
- **Op Hours** – produces domestic hot water, balancing operating hours with others

Number of DHW dev.

Set **in the MASTER device** how many heat pumps participate in domestic hot water production.
The selection only has an effect if **CASCADE** is selected as the control mode.

Functions:

Flow sensor B38 *
This option activates the domestic hot water flow temperature sensor.

Return water sensor B39 *
This option activates the domestic hot water return water temperature sensor.

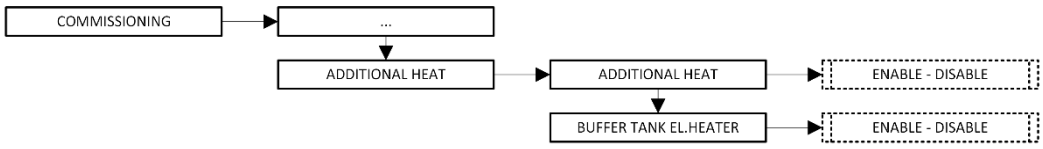
Control valve TV38 *
This option activates the hot water control valve.

Domestic hot water tank electric heater K6
This option activates the control of the domestic hot water tank's electric heater.

* requires an accessory

4.2.4 Additional heat

Main menu → Service menu → Commissioning → Additional heat



Additional heat control refers to the use of an external additional or backup heat source alongside the heat pump system. The additional heat source operates according to the selected control mode, supplementing or replacing the heat pump's heat production.

Possible additional heat sources include, for example:

- electric heating elements in the storage tank
- electric boiler
- gas boiler
- district heating
- oil boiler

Additional heat control requires **expansion module TC1.4**, and the control is always connected **to the master device**.
The additional heat source must have **independent overheat protection** to prevent the device from overheating.

The settings affecting the operation of the additional heat are specified in:
Service menu → Device settings → Additional heat

Stepless additional heat

Selecting stepless additional heat control (K27 – TV27):

- **ENABLE**
- **DISABLED**

Stepless additional heat is controlled:

- **by relay control** (start/stop)
- **analogue control signal** (0…10 V)

The control is based **on the supply water temperature (B11)**.
To activate the function, the following must be connected:

- extension module
- control outputs
- flow sensor

The function is activated when the controller **is restarted**.

Electric heating elements in the storage tank

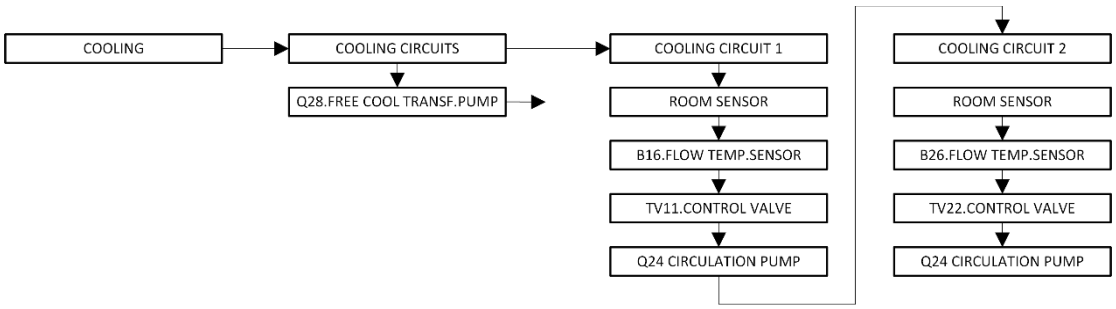
Selection of step-controlled additional heat control (K28 – K29):

- **ENABLE**
- **DISABLE**

This selection activates the control of the electric heating elements in the storage tank. The control is **a three-stage relay control** based on **the supply water temperature (B11)**. All heating elements must be equipped **with overheating protection**.

4.2.5 Cooling

Main menu → Service menu → Commissioning → Cooling



The cooling function options are mainly optional extras, **with the exception of free cooling**.
This menu is used to determine whether it controls the functions of the cooling circuits, such as pumps and control valves.

After commissioning, property-specific settings must be configured for all cooling functions in:
Service menu → Device settings → …

Cooling circuits

The heat pump can control **two separate cooling circuits**.
The cooling circuit must first be selected for use, after which the related functions (sensors, control valves, pumps) are activated.
If the circuit is set to **NOT IN USE**, other settings will have no effect.

The functions are selected according to the plan, and all devices must be connected to the heat pump.

Note! Control of cooling circuits requires **the TC1.6 expansion module**, which is available as an accessory.

Transfer pump Q28

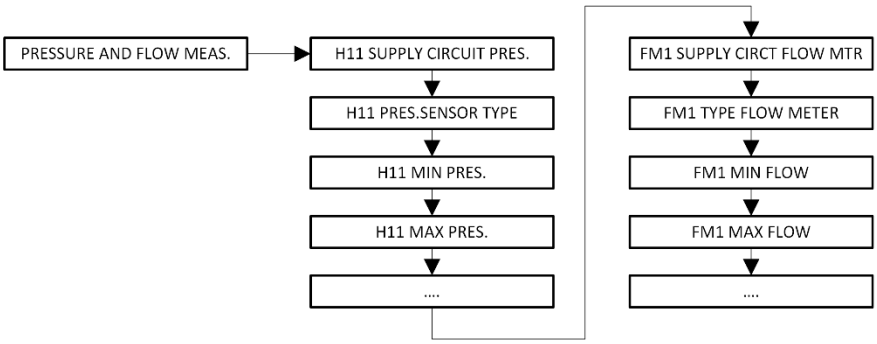
Free cooling transfer pump selection:

- **Disable**
- **Enable**

Transfer pump control can be selected for free cooling.
The transfer pump is installed **in the source circuit** and serves the cooling device or cooling circuits.
When free cooling or the cooling circuit is activated, the transfer pump starts automatically.

4.2.6 Pressure and flow meters

Main menu → Service menu → Commissioning → Pressure and flow meters



All pressure and flow measurements require additional accessories.

- **Pressure transmitters** are connected to expansion module **TC1.7**
- **Flow meters** are connected to module **TC1.2**

See **the connection diagrams** for more detailed connections.

The following pressure transmitters can be installed in the system:

- **H11** – charging circuit
- **H21** – collection circuit
- **H31** – freely definable pressure transmitter

The operating values for each pressure transmitter used must be defined in the controller.
After making the settings, **restart** the controller and make circuit-specific settings in the menu:
Service menu → Device settings

Pressure transmitter settings (example H11 – charging circuit)

H11. Charging circuit pressure
Select whether the pressure transmitter is in use:

- **Disbale**
- **Enable**

H11. Pressure transmitter type
Select the measurement signal type:

- **0–10 V**
- **4–20 mA**

Check the correct setting from the pressure transmitter type information.

H11. Minimum value
Define the lower limit of the pressure transmitter's measurement range (0–16 bar).
The value is set according to the technical data of the pressure transmitter.

H11. Maximum value
Defines the upper limit of the pressure transmitter's measuring range (0…16 bar).
The value is set according to the technical data of the pressure transmitter.

The corresponding settings are also made for the collection circuit (H21) and the freely nameable (H31) pressure transmitter.

Flow meter settings (example FM1 – charging circuit)

FM1. Flow meter for charging circuit
Select whether the flow meter is in use:

- **Enable**
- **Disable**

FM1. Type
Select the type of measurement signal:

- **0.5–4.5 V**
- **4–20 mA**
- **0.5–3.5 V**
- **0–10 V**

Check the correct setting in the flow meter type information.

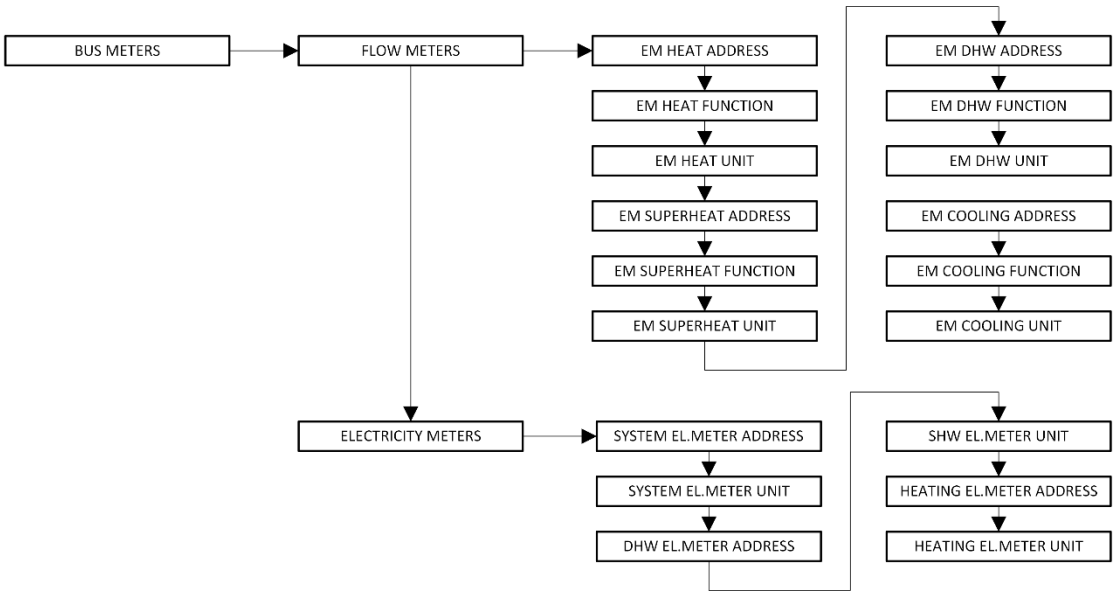
FM1. Minimum value
Defines the lower limit of the flow meter's measuring range (0…5000 l/min).
The value is set according to the technical data of the meter.

FM1. Maximum value
Defines the upper limit of the flow meter's measuring range (0…5000 l/min).
The value is set according to the technical data of the meter.

FM2. Superheater circuit flow meter
Set in the same way as FM1 charging circuit flow meter.

4.2.7 Bus meters

Main menu -> Maintenance menu -> Commissioning -> Bus meters



General – Energy meters and flow meters

Energy meters can be connected to the controller via **the M-Bus data transfer bus**.
The menu is used to define the configurations required for the bus connection for each device separately.

Meters can be added to the following measurement targets:

- heating circuits
- superheating circuits
- cooling circuits
- domestic water circuit

Flow meters

EM Heating address
Defines the bus address of the M-Bus device.

- Address range: **0–256**
- **Value 253** = secondary address
- **Value 255** = indirect addressing

EM Heating function
Select the information you want to read from the meter.
Possible functions:

- Power
- Flow
- Flow temperature
- Return temperature
- Cumulative energy
- Cumulative volume
- Cumulative cooling energy

EM Heating unit
Select the unit in which the energy data is displayed:

- **kWh**
- **MWh**
- **kJ**
- **MJ**
- **GJ**

Note! The corresponding settings are also defined for other selected energy meters **using the same principle**.

Electricity meters

Electricity meters can be connected to the controller via **the M-Bus data transfer bus**.
The menu is used to define the settings required for each meter separately in order to establish a bus connection.

Electricity meters can be used to measure the following electricity consumption:

- total system consumption
- consumption of additional heat for domestic hot water
- additional heating consumption

Settings

System electricity meter (SM) address
Define the bus address of the M-Bus device.

- Address range: **0–256**
- **Value 253** = secondary address
- **Value 255** = indirect addressing

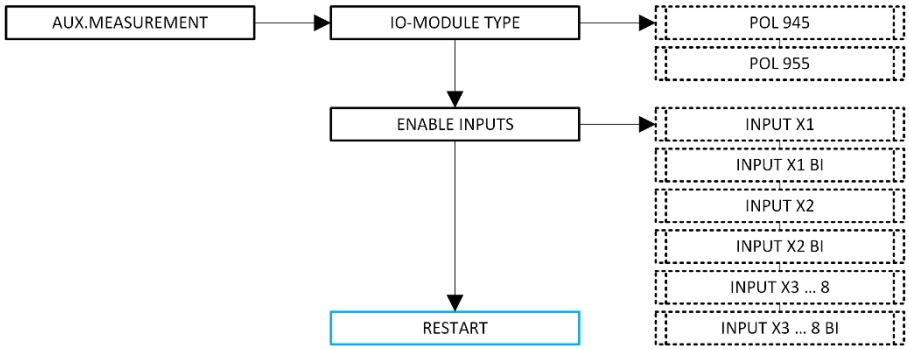
System electricity meter (SM) unit
Select the unit in which energy consumption data is displayed:

- **kWh** (kilowatt hour)
- **MWh** (megawatt hour)

Note Other electricity meters are defined **using the same principle**.

4.2.8 Aux. measurement

Main menu → Service menu → Commissioning → Aux. measurements



Separate additional measurements can be connected to the controller to monitor temperatures or receive status information from external devices. Depending on the expansion module used, **4–8 additional measurements** can be added.

Additional measurements can be:

- **Analogue temperature measurements**, or
- **Binary status data** obtained from a potential-free digital output.

This function requires the TC1.8 expansion module as an accessory.

Settings

IO module type
Select the type of expansion module in use:

- **POL945**
- **POL955**

Check the correct type on the module's type plate before selecting.

Note! The DIP switches on the expansion module **must be set to address 8** for the measurements to work correctly with the controller.

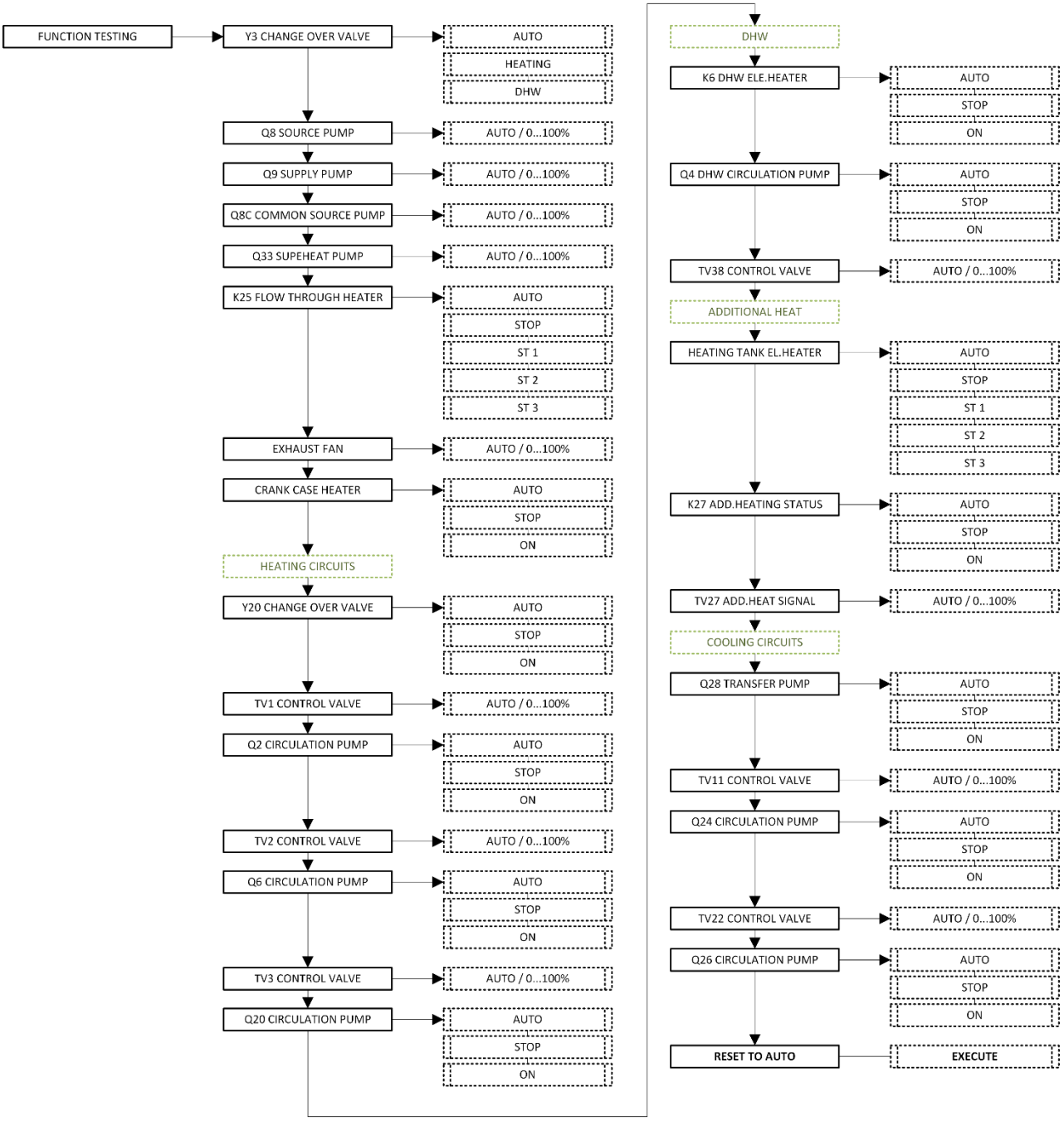
Selecting measurement outputs
The menu is used to specify which measurement inputs are to be used.
The measurement points are universal, i.e. the same input can be used either:

- **Receiving status information** (binary data): e.g. **INPUT X1 BI**, or
- **Temperature measurement** (analogue data): e.g. **INPUT X1**

Note! After changing the settings, the controller must **be restarted** for the changes to take effect.

4.3 Function testing

Main menu → Service menu → Function testing



General

The Function testing menu can be used to manually control various actuators, such as pumps, valves, electric resistors and additional heat sources. This allows you to verify that the installations have been carried out correctly and that all external components are functioning as intended.

Before starting the test, check the following:

- The fluid circuits are filled and vented.
- There are no flow-restricting factors in the circuits.
- The electrical connections have been checked and found to be correct.

All functions to be tested must be enabled **in the commissioning menu**, and the controller must be **restarted** in order for testing to be possible.

NOTE! After testing, all functions must be returned **to AUTO mode**.
At the end of the menu, there is a function **called RESET TO AUTO**, which resets all functions in manual mode to automatic control.

Functions to be tested

Y3 Changeover valve
The valve can be manually set to domestic hot water or heating mode.

Q8 Collection pump
The pump speed can be adjusted between 0 and 100%. After testing, set the value to **zero**.

Q9 Charging pump
The pump speed can be adjusted between 0 and 100%. After testing, set the value to **zero**.

Q8C Common collection pump
The pump speed can be adjusted between 0 and 100%. After testing, set the value to **null**.

Q33 Superheater pump
The pump speed can be adjusted between 0 and 100%. After testing, set the value to **null**.

K25 Supply water electric heater
The operation of the electric heater can be tested step by step:

- Step 1: relay output Q7
- Step 2: relay output Q8
- Step 3: both outputs
  After testing, return the setting **to AUTO mode**.

Exhaust fan
The fan speed can be adjusted between 0 and 100%. After testing, set the value to **zero**.

Testing the heating circuits

Y20 Changeover valve
The valve can be opened manually. After testing, return the setting **to AUTO mode**.

TV1 / TV2 / TV3 Control valves
The valve opening can be adjusted manually between 0 and 100%. After testing, set the value to **zero**.

Q2 / Q6 / Q20 Circulation pumps
The pump can be switched on manually. After testing, return the setting **to AUTO mode**.

Domestic hot water testing

K6 Domestic hot water electric heater
The electric heater can be switched on or off manually. The switch controls the output of the main controller Q2. After testing, return the setting **to AUTO mode**.

Q4 KV circulation pump
The pump can be switched on manually. After testing, return the setting **to AUTO mode**.

TV38 Control valve
The valve opening can be adjusted manually between 0 and 100%. After testing, set the value to **zero**.

Additional heat testing

Electric resistance of the heating accumulator
The operation of the electric heater can be tested step by step:

- Step 1: TC1.4 output Q3
- Step 2: TC1.4 output Q4
- Step 3: both outputs
  After testing, return the setting **to AUTO mode**.

K27 Additional heat
Selecting **ON** activates the stepless additional heat source (TC1.4 output Q2). After testing, return the setting **to AUTO mode**.

TV27 Control valve / analogue additional heat control signal
The valve opening can be adjusted manually between 0 and 100%. After testing, set the value to **zero**.

Testing cooling circuits

Q28 Transfer pump
The pump can be switched on manually. After testing, return the setting **to AUTO mode**.

TV11 / TV22 Control valves
The valve opening can be adjusted manually between 0 and 100%. After testing, set the value to **zero**.

Q24 / Q26 Circulation pumps
The pump can be switched on manually. After testing, return the setting **to AUTO mode.**

4.4 Device settings – advanced settings

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 are used to adjust the operation of the device to meet the technical requirements of the site and the system dimensioning.

The settings determine, among other things:

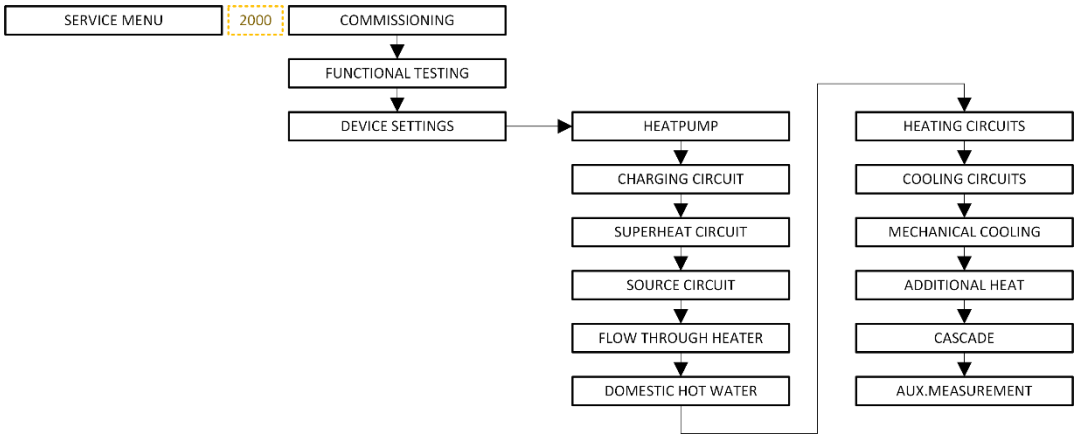
- **setting values** related to functions
- **limit values** and
- **alarm limits**

The settings are correctly defined **during commissioning**, and changing them later requires expertise in the operation of the device.

* = requires an accessory

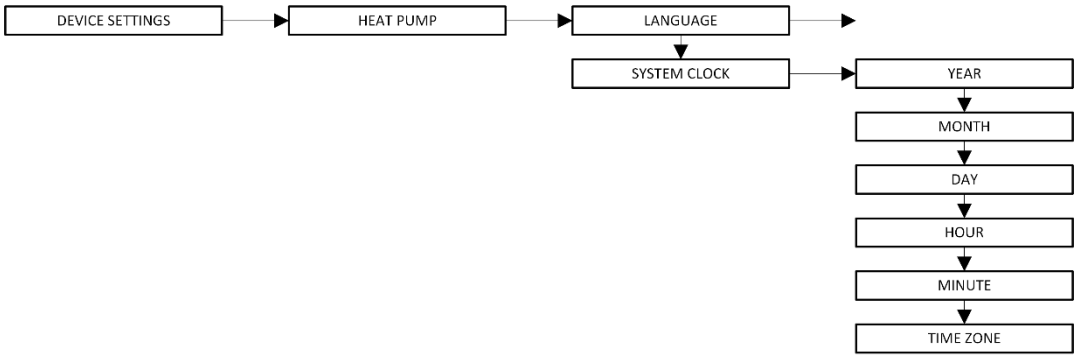
** = standard equipment only in some device models

*** = Standard feature in G-Eco devices, not in other device models



4.4.1 Heat pump

Main menu -> Service menu -> Device settings -> Heat pump



General

The Heat pump menu is used to configure settings that affect the operation of the device, the user interface language and the time display. These settings ensure that the device operates correctly in accordance with local conditions and user preferences.

Language

Select the language for the user interface. Selecting the correct language makes it easier to use the device and understand the settings.

Available language options:

- English
- Finnish
- Swedish
- Polish

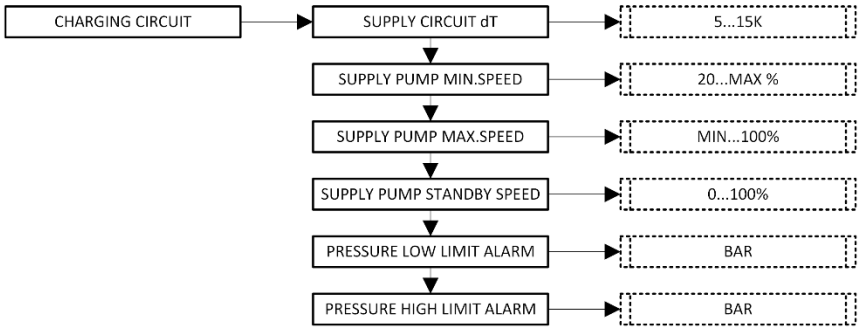
Time

Set the internal clock of the device. The accurate time is important for time-based functions and the correctness of log data, among other things.
Values that can be set:

- Year
- Month
- Day
- Hour
- Minute
- Time zone

4.4.2 Charging circuit

Main menu -> Service menu -> Device settings -> Charging circuit



Charging circuit settings

Supply circuit temperature difference
During heating, the charging circuit aims to maintain the temperature difference between the supply and return water at the level specified in this setting. The charging pump adjusts automatically according to the temperature difference. The temperature difference is measured by sensors:

- **B21** – charging flow
- **B71** – charging return

The setting must correspond to the planned temperature difference in the property's heating network.

Note! During domestic hot water charging, the supply pump is controlled according to the optimal operating range of the cooling device, and the temperature difference setting is not valid at that time.

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

Example values for different heating systems:

- Underfloor heating: 5–7 K
- Radiators: 8–15 K
- Ventilation heating: according to the planned dimensions

Supply pump min. speed
This setting determines the lowest permissible speed of the supply pump in heating mode.

Note! A speed that is too low may cause a high-pressure alarm.
If the setting is too high, the temperature difference in the charging circuit will not be achieved as planned.

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

Supply pump max. speed
Specifies the maximum permissible speed of the supply pump in heating mode.

- **Factory setting:** 100%

Supply pump standby speed
This setting determines the speed of the charge pump when the compressor is **in STOP mode** but the heating function is still active (standby mode).
In this case, the pump circulates fluid through the condenser, and the device's internal temperature sensor monitors the need for start-up.

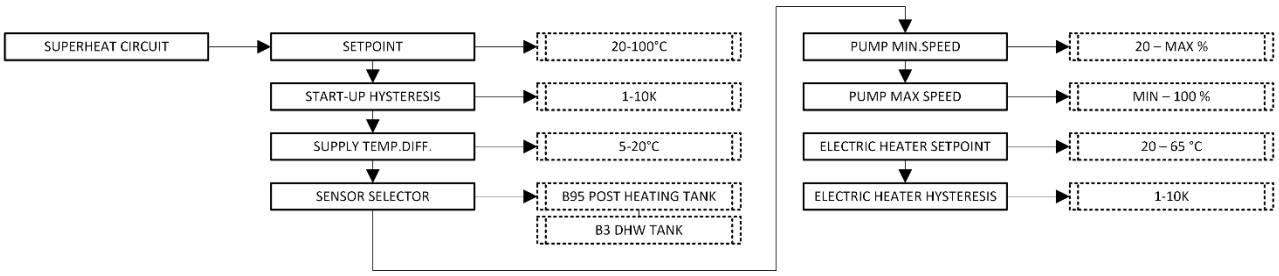
Note! If the **B10** storage tank sensor is in use, the standby speed must be set **to 0**%. In this case, the pump will only start when the storage tank temperature drops and activates the charging need.

Charging circuit pressure alarms - HEATING SYSTEM

- **Pres. low limit alarm**
  Alarm limit from pressure transmitter **H11**.
  - Alarm class: **B**
- **Pres. high limit alarm**
  Alarm limit from pressure transmitter **H11**.
  - Alarm class: **B**

4.4.3 Superheat circuit – post-heating storage tank

Main menu → Service menu → Device settings → Superheat circuit



⚠ **NOTE!** If the superheat circuit is not connected, **the circuit breaker for the superheat pump (Q33) must be locked in the OFF position** and marked accordingly.
The circuit breaker is located **in the** heat pump **switchboard**.

General

The superheating circuit is a built-in feature in **Taurus EVi** devices that utilises the thermal energy obtained from the hot gas of the refrigerant.

- Hot water is charged either **to a separate post-heating accumulator** or **to a domestic hot water accumulator**.
- The controller controls the operation of the superheater circuit based on the set values.
- The superheat circuit operates when:
    - **the compressor is running**, and
    - **the condensation temperature is higher than the temperature of the tank**.

The reheating tank can also be used **as a domestic hot water buffer tank**, in which case superheating **only** takes place **with an electric heater**.

Superheat circuit settings

Setting
The superheating circuit setting value determines the temperature at which superheated water is loaded into the storage tank. When the storage tank temperature reaches this value, the superheating circuit switches off.

Switching difference
The switching difference determines the temperature at which the superheating circuit restarts. The restart occurs when the temperature of the tank falls below the difference between the setting value and the switching difference.
Please note that the superheating circuit does not start the compressor, but operates in parallel with the compressor during heating.

Charging temperature difference
This setting controls the operation of the internal circulation pump (Q33) in the superheating circuit. The pump is controlled based on the temperature difference between the supply water (sensor B36) and the return water (sensor B37).

Sensor selection
Select which storage tank temperature is used to control the superheating circuit:

- **B95**: the superheater is charged to the reheating storage tank
- **B3**: superheating is loaded into the domestic hot water tank

Minimum pump speed
Defines the lowest speed of the superheating pump (Q33) at which the pump starts when the superheating circuit is activated. The speed is adjusted according to the temperature difference.

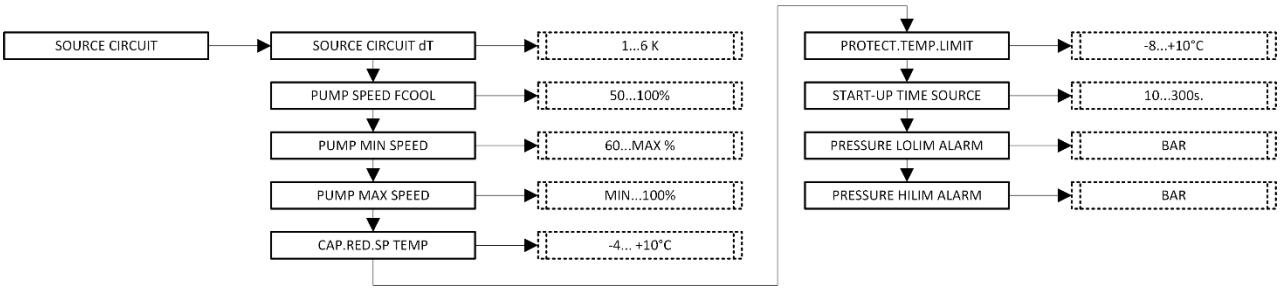
Maximum pump speed
Defines the maximum permissible speed of the superheater pump. The pump automatically adjusts between the minimum and maximum speeds to maintain the set temperature difference.

Resistance setpoint
Defines the target temperature (20–65 °C) for the electric resistance in the post-heating accumulator. The setting only has an effect if the electric resistance (K90) has been enabled in the commissioning menu.

Resistance connection difference
Defines the temperature difference below which the electric resistance is activated. This ensures that the temperature of the storage tank remains at the desired level even when the superheating circuit is not active.

4.4.4 Source circuit

Main menu -> Service menu -> Device settings -> Source circuit



General

The heat pump requires **the source circuit flow** to be as specified in the design.

- Check **the technical data for the minimum flow rate** of the device.
- Too low a flow rate will reduce performance and may cause malfunctions.
- Ensure the minimum flow by setting the collection pump **to minimum speed** and checking the actual flow.

Source circuit settings

- **Source circuit dT**
  Sets the target temperature difference between the incoming and outgoing fluid.
    - **Recommendation:** 2–3 K
    - The controller attempts to maintain the temperature difference at this value.

Collection pump speed settings

- **Pump speed during free cooling**
  Speed setting used during free cooling.
- **Pump min. speed**
  The lowest speed to which the controller can adjust the pump during normal operation.
    - **Note:** The minimum flow must also be achieved at this speed.
- **Pump max. speed**
  The highest permissible speed to which the controller can adjust the pump during normal operation.

Brine circuit limitations and protections

- **Source circuit limitation (Brine control)**
  Temperature limit below which the controller **limits the compressor power**.
    - When using **brine**, the limiting sensor can be:
        - **B91** (collection circuit in) or
        - **B92** (collection circuit out)
    - When using **water**, the limiting sensor is always **B92**.

The sensor is selected:
Main menu → Service menu → Commissioning → Cascade

- **Protect.temp limit**
  Temperature limit below which the compressor stops and the alarm 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**, the compressor stops immediately.
- **Start up time source**
  Time (s) that the collection pump must be running before the compressor starts.

Pressure alarms

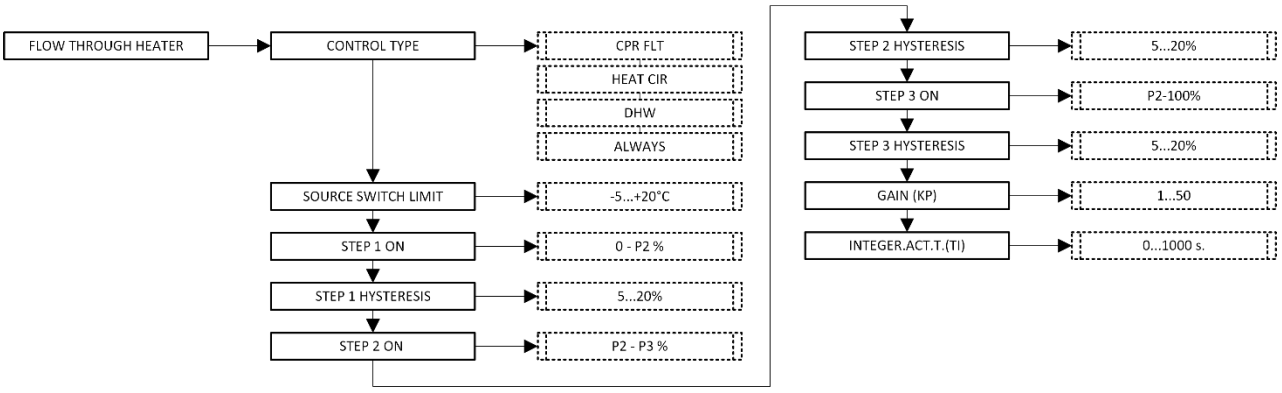
- **Pres.low limit alarm**
  Alarm limit from pressure transmitter **H21**.
    - Alarm class: **B**
- **Pres.high limit alarm**
  Alarm limit from pressure transmitter **H11**.
    - Alarm class: **B**

4.4.5 Flow through heater

The flow water electric heater is an additional heater installed in the condenser flow pipe. In some device models, such as Aries devices, the electric heater is included as standard equipment.

The use of the heater is determined by the selected control mode. The operation of the electric heater is controlled automatically based on the heating power requirement.

Main menu -> Maintenance menu -> Device settings -> Flow through heater



Control type – Floe through heater

The operating mode of the electric heater is selected according to the intended use and dimensioning of the system. The different control modes are described below:

Cpr Fault

- Select this setting if you only want to use the electric heater in fault situations.
- The electric heater is activated when compressor heating is not available.
- **The electric heater does not operate simultaneously with the compressor.**

Heat Cir

- Select this setting if the heat pump or heat collection circuit is designed to cover **only part of the property's heating energy needs.**
- The electric heater is used alongside the compressor when:
    - the maximum temperature of the compressor is insufficient,
    - the compressor power is insufficient,
    - the capacity of the collection circuit limits use.
- **The electric heater is only used for heating.**
- In the event of a fault, the heater takes care of both domestic hot water and heating production.

DHW

- Select this setting if:
    - domestic hot water consumption is high, or
    - the domestic hot water temperature setting is so high that the compressor cannot reach it.
- In the event of a malfunction, the electric heater will take care of both domestic hot water and heating production.

Always

- Select this setting if the electric heater is used alongside the compressor for both domestic hot water and additional heating.
- The controller controls the electric heater as a secondary heat source, with the compressor as the primary source.
- If the compressor's output or operating range is insufficient, the electric heater supplements the heating alongside the compressor.

Source switch limit

determines the lower limit below which the compressor's operation is restricted.

When **the temperature of the fluid entering the collection circuit falls below the set limit temperature**, the controller:

- limits **the compressor's power**
- and **activates the electric heater** to compensate for the missing heating power.

This ensures reliable operation of the system when the heat collection circuit's output is insufficient to heat the building.

Electric heater power stages and control parameters

The operation of the electric heater is controlled by a stepwise adjustable start-up logic. Each power step has its own start-up and shut-down limits, which are adjusted with the following settings:

Power stages

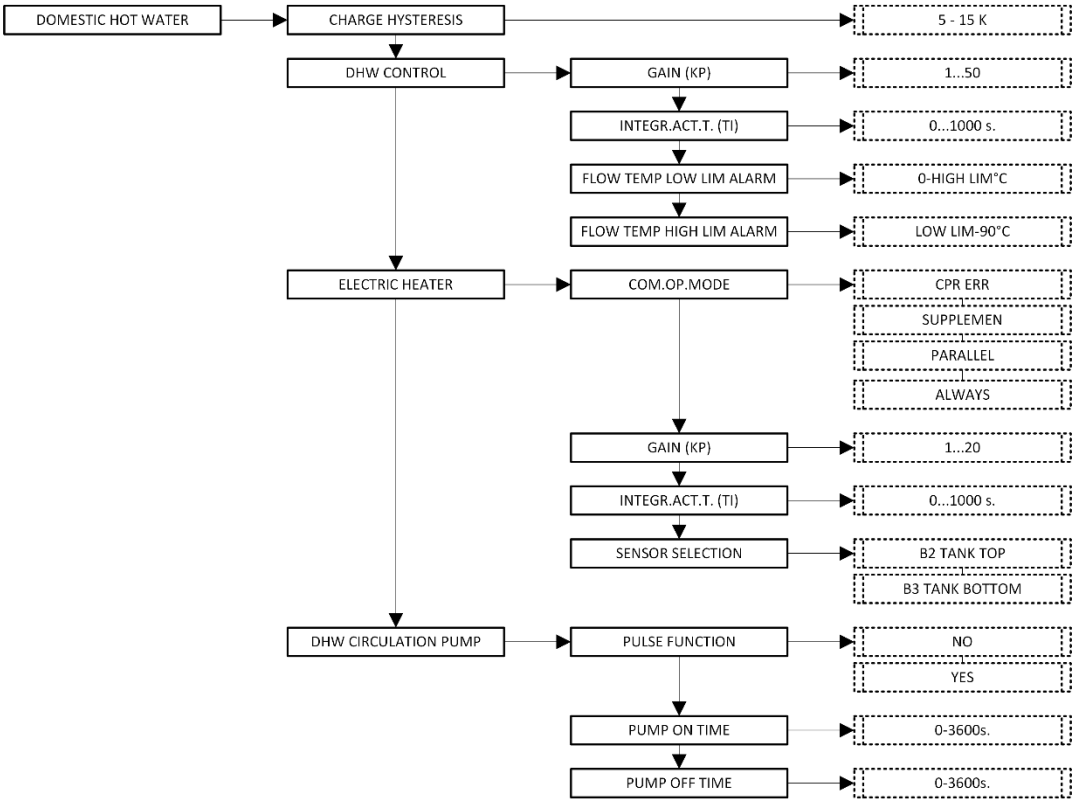
- **Step 1 ON**
  Defines **the start limit** (%) for **the first power stage**.
  When the start-up counter reaches this value, the resistance of the first power stage is activated.
- **Step 1 hysteresis**
  Defines **the switch-off switching difference**.
  The first power stage resistor switches off when the counter falls below the start limit by the amount of the hysteresis.
- **Power stages 2 and 3 operate on the same principle.**

Control parameters

- **Gain (Kp)**
  Determines how **sensitively the controller reacts to changes in temperature difference**.
  - Higher value = faster response.
  - If the resistor reacts too slowly, **increase the value in small increments** (e.g. 0.5 units at a time).
- **Integr.act time (Ti)**
  Determines **the integral time in seconds**, i.e. how quickly the controller attempts to correct the temperature difference.
  - Shorter time = faster correction.
  - The I time affects how much P drive is controlled during each I period.

4.4.6 Domestic hot water

Main menu -> Service menu -> Device settings -> Domestic hot water



Charge hysteresis – Domestic hot water production

Function:
Charge hysteresis determines the temperature difference by which the domestic hot water temperature must drop before domestic hot water production starts. This prevents too frequent starts and improves the efficiency and service life of the heat pump.

Setting:

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

Example:
Set value = 58 °C
Hysteresis = 5 K
→ Charging starts when the temperature drops to 53 °C

Please note:

- The set value, hysteresis and size of the storage tank directly affect the charging time of the domestic hot water.
- In terms of heat pump operation, the running time should be as long as possible.
- Too little hysteresis can cause short operating cycles, which reduces the performance and durability of the device.
- If the storage tank is relatively large in relation to the heat pump's charging capacity, the hysteresis can be safely reduced.

Domestic hot water control – Mixing valve control (TV38)

The domestic hot water control menu is used to define the functional settings and limit values for the domestic hot water mixing valve TV38. This function requires the TC1.7 accessory.

PI controller settings

Domestic hot water temperature control is based on a PI controller, which controls the mixing valve to achieve the target temperature.

- **Gain (Kp):**
  Determines the controller's response speed to the control deviation (target value − measured value).
  → Higher value = faster response
  → Change in small increments, e.g. 0.5 units at a time
- **Integr.act time (Ti):**
  Determines the time (in seconds) during which the control deviation is corrected.
  → Shorter time = faster correction
  → Selectable between 0 and 1000 s

Alarm limits (sensor B38)

The temperature of the domestic hot water supply is monitored by sensor B38. If the temperature exceeds or falls below the set limits, the system will trigger an alarm.

- **FLOW TE.LOW LIM.ALARM**
  Lower limit for domestic hot water entering the network
  → Alarm class B (non-critical, requires attention)
- **FLOW TE.HIGH LIM.ALARM**
  Upper limit for domestic water entering the network
  → Alarm class A (critical, requires immediate action)

Note: The location of the sensor is important for control accuracy. Ensure that B38 measures the actual supply water temperature and is not exposed to local temperature spikes.

Electric heater – Domestic hot water heating

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

Safety requirement:
The electric heater must be equipped with a thermostat and overheat protection combination. The thermostat setting must be determined so that the heat pump can reach the set value without the thermostat limiting the charge.

Operating modes:

- **CPR ERR:**
  The electric resistance is only activated if the heat pump is in fault mode.
- **Supplemen:**
  Used if the maximum temperature of the heat pump is not sufficient to reach the desired domestic hot water temperature.
  → The heat pump heats first, the electric heater finishes the job.
- **Parallel:**
  The electric resistance participates in the production of domestic hot water 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 up to provide additional support.
- **Always:**
  The electric resistance is fully responsible for domestic hot water production.
  → The heat pump does not participate in heating domestic hot water.

PI controller settings (only in parallel operation):

- **Gain (Kp):**
  Gain, selectable between 1 and 20
- **Inegr.act.ti (Ti):**
  Integral time, selectable between 0–1000 s

Sensor selection:

Electric resistance control is based on the temperature measurement of the domestic hot water tank:

- **B2 (tank top)** or
- **B3 (tank bottom)**

Sensor placement instructions:
The sensor must be placed in the tank so that the heat from the electric heating element affects the measurement, but not directly above the heating element, so that the measurement is not distorted.

DHW circulation pump – Control settings

The hot water circulation pump can be controlled via the heat pump controller. You can select continuous operation or intermittent operation (pulse function) for energy savings.

PULSE FUNCTION:
Select whether to enable intermittent control.

→ **YES:** Pulse function enabled
→ **NO:** Pump runs continuously

Time parameters (only if pulse function = YES)

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

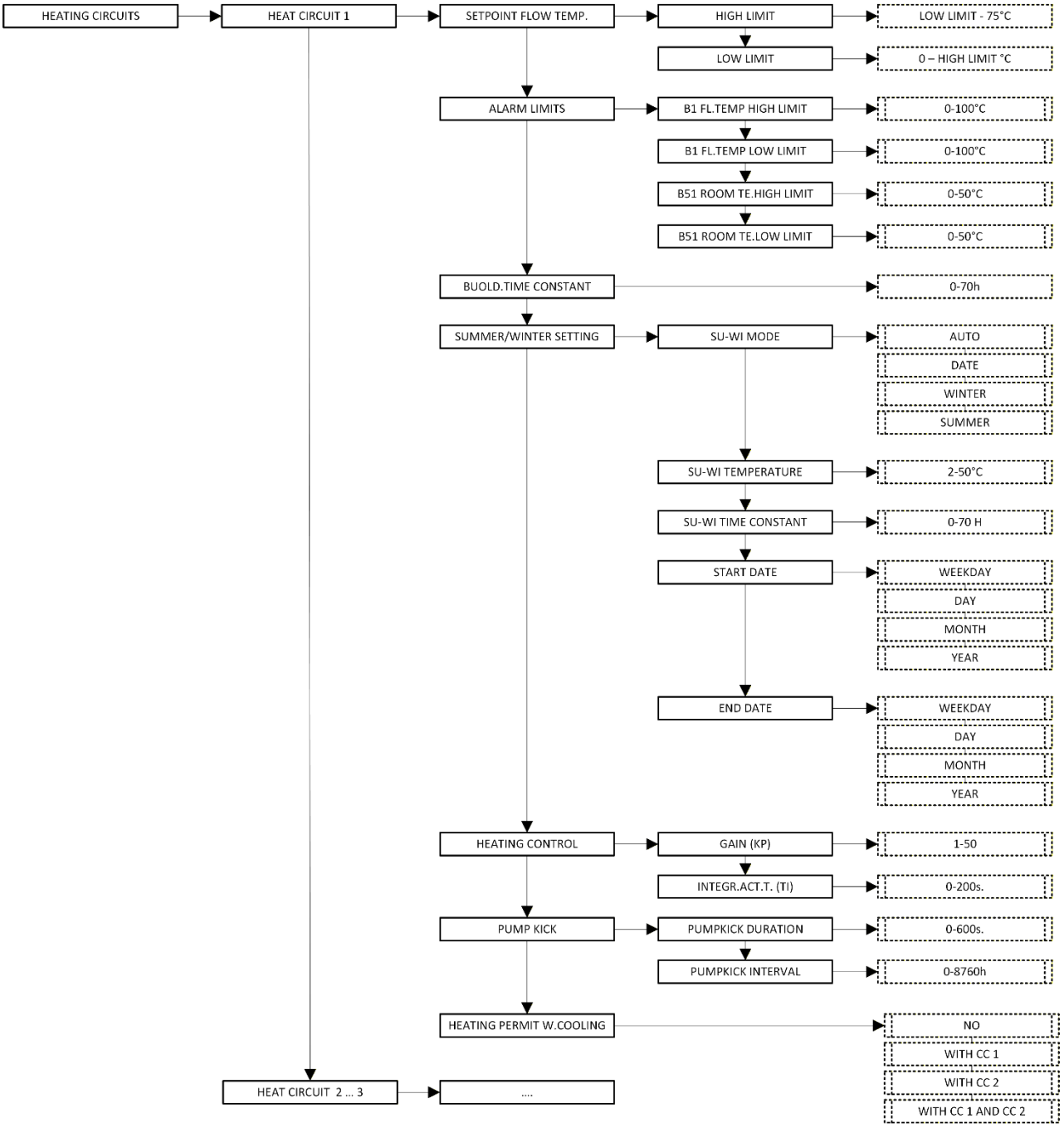
  Example:
  If PUMP ON TIME = 60 s and PUMP OFF TIME = 1,800 s, the pump runs for 60 seconds and is off for 30 minutes before the next cycle.

Note:

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

4.4.7 Heating circuits

Main menu -> Service menu -> Device settings -> Heating circuits 1-3



General

The system can have **1–3 heating circuits**, each with its own menu. The settings are defined **for each 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**. This requires: a separate changeover valve, connection to the heat collection circuit.

Setpoin flow temp – Heating circuit

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

The current value shows the current 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 flow sensor is installed, the heat pump's internal flow sensor is used.*

Setting limits:

- **HIGH 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.
- **LOW LIMIT:**
  The temperature limit below which the set value cannot fall.
  → If there is **a mixing valve** in the circuit, the controller **opens the valve**, preventing excessively cold water from entering the network.

Alarm limits

Alarm limits define the permissible temperature ranges for the heating circuit operation. If the measured value exceeds or falls below the set limit, the system issues an **alarm class B** notification. These alarms are not critical, but require the user's attention.

Supply water temperature

- **FL.TEMP HIGH LIM.**
  Defines the maximum permissible flow water temperature.
  → The alarm is activated if the temperature exceeds this limit.
- **FL.TEMP LOW LIM.**
  Sets the minimum allowed flow water temperature.
  → An alarm is activated if the temperature falls below this limit.

Room temperature

- **ROOM TE. HIGH LIM.**
  Sets the maximum allowed room temperature.
  → The alarm is activated if the temperature rises above the set limit.
- **ROOM TE. LOW LIM.**
  Sets the minimum allowed room temperature.
  → An alarm is activated if the temperature falls below the set limit.

Note: The purpose of alarm limits is to ensure safe and energy-efficient operation of the system. The limits are set according to the intended use and conditions of the system.

Build time constant

Function: The time constant determines how quickly the heating circuit responds to temperature changes. This setting can be used to increase the stability and smoothness of the control, especially in situations where the outdoor or indoor temperature fluctuates rapidly, for example during the day.

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

Note: A larger time constant is recommended in locations where temperatures fluctuate rapidly or where unnecessary system starts and stops are 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, calendar or continuous use.

Summer–winter mode

- **Auto (automatic mode):**
  The heat pump switches between summer and winter mode based on **the attenuated outdoor temperature**.
  - **Winter mode:** The heating circuit regulates the network based on the outdoor temperature, heating curve and room setpoint.
  - **Summer mode:** The heating circuit is **in summer shutdown**. The circulation pump runs intermittently to prevent clogging.
- **Date control:**
  Summer mode is activated and deactivated **based on the calendar**.
  - **START DATE:** Start date of summer mode
  - **END DATE:** End date of summer mode
- **Winter:**
  The heating circuit **always** remains **in winter mode**, regardless of the outdoor temperature or date.
  → Recommended, for example, **for underfloor heating in damp rooms**.
- **Summer + combi circuit:**
  If the heating circuit is defined **as a combi circuit**, it can also cool in summer mode if cooling is in use.

Summer – Winter temperature

- In automatic mode, the heating circuit switches to summer mode when the filtered outdoor temperature exceeds the temperature value set in the parameter. The switch to winter mode occurs when the filtered outdoor temperature falls below the set temperature minus the hysteresis (– 1°C).

Su-Wi time constant

- Determines how quickly changes in the outdoor temperature affect the control and the change between summer and winter mode.
- Works **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 mode changes.

Heating control

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

Gain (Kp) – Gain

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

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

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

Integr.act.t. (Ti) – Integral time

Determines the time (in seconds) during which the controller attempts to eliminate a steady-state 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**.

Circulation pump stop – anti-seize

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

Pumpkick duration

Specifies the time the pump runs to prevent jamming, even if there is no active heating demand.

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

Pumpkick interval

Sets the time the pump is off before the next anti-seizure run.

- **Recommendation:** 24–48 hours
- **Function:** The pump remains off for the specified time, after which it starts according to the "ON TIME" setting.

Note: This function does not affect normal heating operation, but only works when the system is in standby mode. Correctly set values extend the service life of the pump and ensure reliable operation.

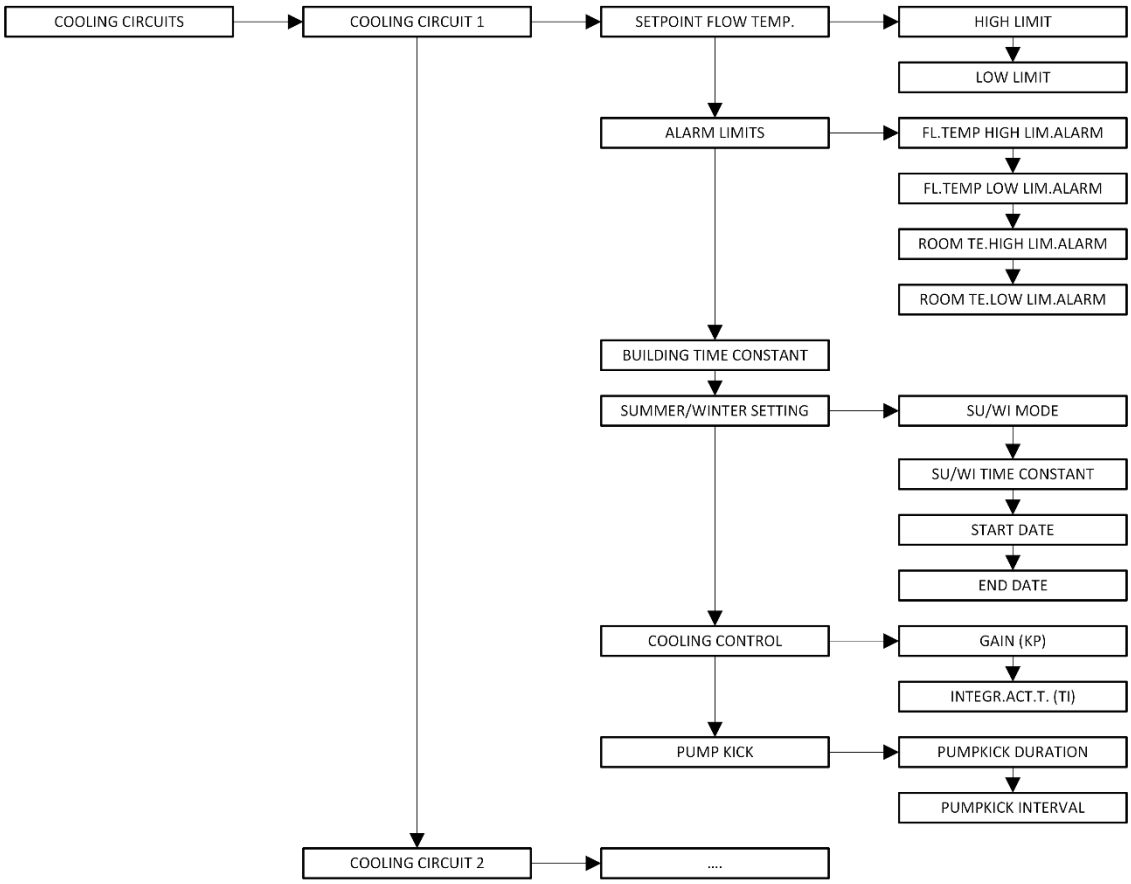
Simultaneous heating and cooling (Comm.cooling)

You can choose whether the cooling and heating circuits operate simultaneously. The selection must be made separately for each heating circuit. If the selection is no and there is a simultaneous request for the cooling and heating circuits, the cooling circuit will have higher priority.

This selection is only relevant if cooling circuits are in use (see section 4.2.5. of the manual). Otherwise, the selection has no effect.

4.4.8 Cooling circuits

Main menu -> Service menu -> Device settings -> Cooling circuits 1-2



General

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

Circuit-specific settings include, for example:

- Supply water temperature settings and limits
- Room temperature alarm limits
- Control curves and time constants
- Summer–winter operation
- Control logic for pumps and valves

Additional equipment requirement

The use of cooling circuits requires the installation of accessory **TC1.6**. This component enables the control and monitoring of cooling circuits via the controller.

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

Setpoin flow temp.

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

- **Current value:** Shows the current flow water temperature setpoint in real time.

Note: Alarm limits are set separately **in the alarm limits menu.**

HIGH LIMIT

- Defines the maximum allowable supply water temperature.
- The cooling setpoint cannot exceed this limit.
- If there is **a mixing valve** in the circuit, the controller **opens** the valve to prevent excess heat from entering the cooling network.

LOW LIMIT

- Defines the minimum allowable flow temperature.
- The cooling setpoint cannot fall below this limit.
- If there is **a mixing valve** in the circuit, the controller **closes** the valve when the temperature approaches the lower limit, preventing excessively cold water from entering the network.

Tip: Set the upper and lower limits according to the system's design and intended use. Limits that are too tight may restrict the cooling capacity, while limits that are too loose may compromise the safety of the system.

Alarm limits

Alarm limits define the permissible temperature ranges for the cooling circuit flow water and room temperature. If the measured value exceeds or falls below the set limit, the system issues an **alarm class B** notification.

Supply water temperature (cooling circuit)

- **Flow te.high lim.alarm**
  Defines the maximum permissible temperature for the cooling circuit flow water.
  → The alarm is activated if the temperature exceeds this limit.
- **Flow te.low lim.alarm**
  Defines the minimum permissible temperature of the cooling circuit flow water.
  → An alarm is activated if the temperature falls below this limit.

Room temperature

- **Room te.high lim.alarm**
  Sets the maximum allowed value for the room temperature.
  → An alarm is activated if the room temperature rises above the set limit.
- **Room te.low lim.alarm**
  Sets the minimum allowed room temperature.
  → An alarm is activated if the room temperature falls below the set limit.

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

Building time constant - cooling

Function: The time constant determines how quickly the cooling circuit responds to temperature changes. This setting can be used to increase the stability and smoothness of the control, especially in situations where the outdoor or indoor temperature fluctuates rapidly, for example during the course of a day.

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

Note: A larger time constant is recommended in locations where temperatures fluctuate rapidly or where unnecessary system starts and stops are 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 the control of cooling based on the outdoor temperature or calendar.

Summer–winter mode

- **Auto (Automatic mode):**
  The heat pump automatically switches between summer and winter mode based on the attenuated 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 circuit is controlled based on the outdoor temperature, the set cooling curve and the selected room setpoint.

Date

- Summer time can be set as **a fixed date**, at which point the system switches between summer and winter modes according to the calendar.
- This option does not take the outdoor temperature into account, but is based solely on the set dates.

Winter

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

Summer (manual selection)

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

Note: Selecting the correct mode has a direct impact on the energy efficiency and user comfort of the system. Automatic mode is recommended in most cases, but date or continuous mode can be used in special cases.

Su-Wi time constant

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

- The setting acts as **a time constant** that dampens sudden changes in the outdoor temperature.
- The aim is to increase **the stability and smoothness** of 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 summer/winter mode is set to operate **according to the date**, the following settings are used:

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

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

Cooling control

Gain (KP): P-value for room temperature control (Kp)

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

Integr.acr.t. (TI): I-time for room temperature control (Ti)

The I time (s) determines the time it takes to correct the temperature deviation in the supply water from the setpoint by controlling the P time during each I period. If the control reacts too slowly, reduce the I time.

Pumpkick – anti-seizure

The circulation pump stop function ensures that the pump does not jam during long periods of inactivity. The function is based on two time specifications:

Pumpkick duration

Specifies the time the pump runs to prevent jamming, even if there is no cooling demand.

- Recommendation: 60–120 seconds

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

Pumpkick interval

Sets the time the pump is off before the next anti-seize run.

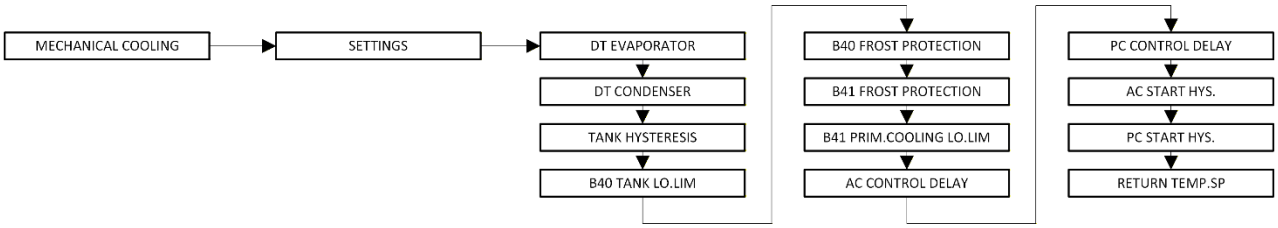
- Recommendation: 24–48 hours

Function: The pump remains off for the specified time, after which it starts according to the "ON TIME" setting.

Note: This function does not affect normal cooling operation, but only works when the system is in standby mode. Correctly set values extend the service life of the pump and ensure reliable operation.

4.4.9 Mechanical cooling

Main menu -> Service menu -> Device settings -> Mechanical cooling



This menu is used to configure the settings for mechanical cooling. Mechanical cooling must be enabled in order to configure the settings. This function requires the TC1.5 accessory.

Mechanical cooling consists of the following controls: PASSIVE COOLING (PC), ACTIVE COOLING (AC), PRIMARY COOLING CIRCUIT and CONDENSATE DISCHARGE.

PASSIVE COOLING (PC): utilises the cold temperature of the heat collection circuit for cooling the building/process.

ACTIVE COOLING (AC): cooling performed by a compressor

PRIMARY COOLING CIRCUIT: adjusts the desired temperature in the property's cooling network and protects the cooling transfer unit from freezing

CONDENSATE DISCHARGE: drains waste heat generated during active cooling into the heat collection circuit

Settings – mechanical cooling

DT EVAPORATOR – Temperature difference in active cooling

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

Sensors:

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

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

Operating logic:

During active cooling, the operation of the collection pump is controlled based on the difference between the evaporator inlet and outlet temperatures.

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

Note: Too small or too large a temperature difference can impair system performance or cause unstable operation.

DT CONDENSER – Temperature difference in active cooling

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

Sensors:

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

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

Operating logic:

- When active cooling is in progress, the charging pump is controlled according to the condenser temperature difference.
- If the unit is simultaneously producing **domestic hot water** or **heating**, the charging pump is controlled based on the priorities of these functions.

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

TANK HYSTERESIS

Function: Hysteresis determines the temperature difference that controls the shutdown of cooling when the cooling demand is active. This prevents excessive starts and stops, which can strain the system.

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

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

Setting: The hysteresis value is set in the system user interface. The following points should be taken into account when selecting the correct value:

- Temperature levels must be sufficiently far from the protection settings.
- Too low hysteresis may cause **the frost protection to trip** or unnecessary disturbances.

Note: It is recommended to maintain a sufficient safety margin with regard to the protection settings to ensure stable and safe operation of the system.

B40 STORAGE TANK LOWER LIMIT

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

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

Note on external control:
If the system is controlled by external automation or by the controller in cooling circuits, **the controller will not allow a setting lower** than the specified 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 and is intended to prevent the accumulator from freezing or other damage caused by temperature.

B40 FROST PROTECTION (STORAGE TANK)

Function: The B40 sensor's freeze protection protects the storage tank from freezing by setting a temperature limit below which protective measures are activated.

The B40 sensor monitors the temperature of the storage tank. If the measured temperature falls below the set freeze protection temperature, the system performs the following actions:

- **The refrigeration system is automatically shut down**
- **The frost protection alarm is activated**

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

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

B41 PRIM.COOLING LO LIM

Function: The lower limit of the preset circuit determines the minimum permissible temperature setting that the controller can use to control the heat exchanger. Settings below this limit cannot be adjusted.

Sensor B41 acts as **a heat exchanger protection sensor**. Its task is to ensure that the temperature set for the exchanger is not too low, 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 preset circuit.

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

B41 FRORST PROTECTION

Function: The freeze protection is used to set a temperature limit below which protective measures are activated 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 control sensor for the freeze protection. If the measured temperature falls below the set freeze protection temperature, the system performs the following actions:

- **The refrigeration equipment is automatically shut down**
- **The freeze protection alarm is activated**

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

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

ACTIVE COOLING (AC) CONTROL DELAY

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

- **Factory setting:** 30 minutes

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

Note: The start delay prevents unnecessary state transitions due to short-term temperature fluctuations and ensures stable system operation.

PASSIVE COOLING (PC) CONTROL DELAY

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

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

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

RETURN TEMP. SETPOINT – B70 / B71

Function: The return water setpoint determines the target temperature that the system aims to achieve for the return water in cooling or heating mode. This value has a direct impact on the energy efficiency of the system and heat transfer control.

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

- **Cooling:** The return water temperature must not exceed the set value in order to maintain the cooling capacity.
- **Heating:** The return water temperature must not fall below the set value in order to maintain heating capacity and avoid condensation damage.

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)

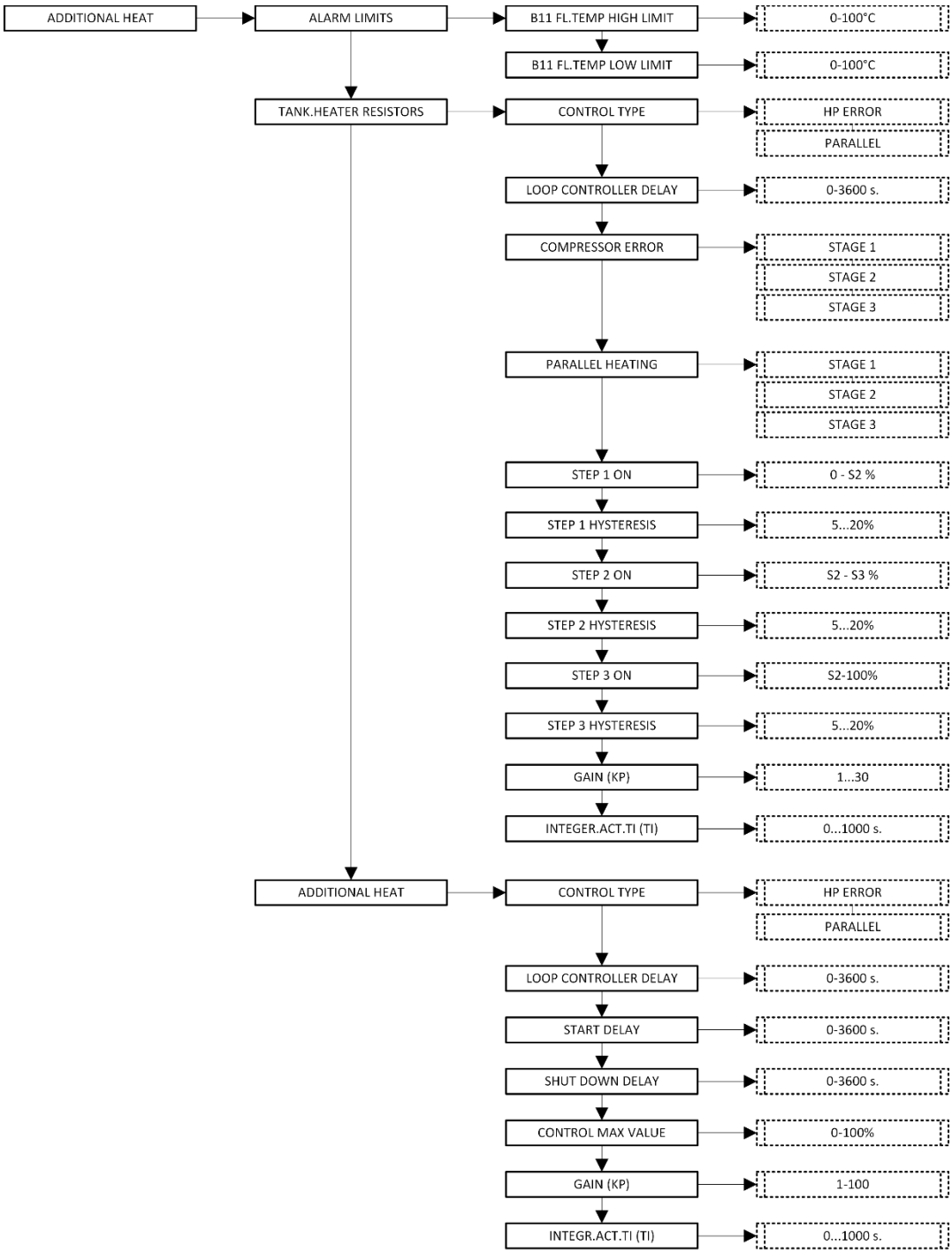
B71 – Used in a single heat pump (internal sensor)

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: An excessively high or low setpoint may reduce system performance or cause alarms (e.g. frost protection).

4.4.10 Additional heat

Main menu → Service menu → Device settings → Additional heat



General

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

- **Electric resistance (3-stage control)**
  → Used in the heating accumulator. Control is via relays (K28, K29).
- **Stepless additional heat (0–10 V control)**
  → Used, for example, in electric boilers or other external heat sources that support analogue control.

Additional heat control is based on **the** system **flow temperature (sensor B11)** and the controller calculation. Control can be defined in two operating modes:

1. **Fault operation**
   → Additional heat is only activated if the heat pump is not working.
2. **Heating as a supplement**
   → Additional heat supports the heat pump when its output is insufficient.

Setting definitions – what and why

The operation of the additional heating is defined in the service menu. The settings control:

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

Correctly defined settings ensure:

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

Supply water alarm settings

Flow water temperature (common flow water after additional heat source)

- **B11 Fl.temp high lim.**
  Defines the maximum permissible temperature of the heating system's supply water.
  → The alarm is activated if the temperature exceeds this limit.
- **B11 Fl.temp low lim.**
  Defines the minimum permissible temperature of the heating system's flow water.
  → An alarm is activated if the temperature falls below this limit.

Tank heater resistor control (3-stage)

Requirements:

- The power supply for the resistors is connected to the building control centre (K28, K29).
- The resistor contactor controls are connected to the heat pump controller (TC1.4).
- Equipped with overheat protection and thermostat.

Control mode selection:

- **Fault operation (CprErr)**: The resistors only start up when the heat pump is in fault mode.
- **Additional heating (Parallel)**: The resistors support the heat pump when its output is insufficient.

Proceed as follows:

1. Select **CONTROL MODE**:
   → *Heating parallel* (most common selection)
2. Set **COUNTER START TIME**: e.g. **600 s**
   → Delay before additional heating starts.
3. Define **the start limits for the power stages**:
   - **STEP 1 ON**: e.g. **30%**
   - **STAGE 1 HYSTERESIS**: e.g. **5%**
   - **STAGE 2 ON**: e.g. **60%**
   - **STEP 2 HYSTERESIS**: e.g. **5%**
   - **STEP 3 ON**: e.g. **90%**
   - **STEP 3 HYSTERESIS**: e.g. **5%**
4. Adjust the controller response:
   - **GAIN (Kp)**: e.g. **2.0**
   - **INTEGR.ACT.T (Ti)**: e.g. **300 s**

Additional heat (0–10 V control)

Requirements:

- Additional heat source controllable with 0–10 V signal (TV27).
- Operating permit K27 in use.

Proceed as follows:

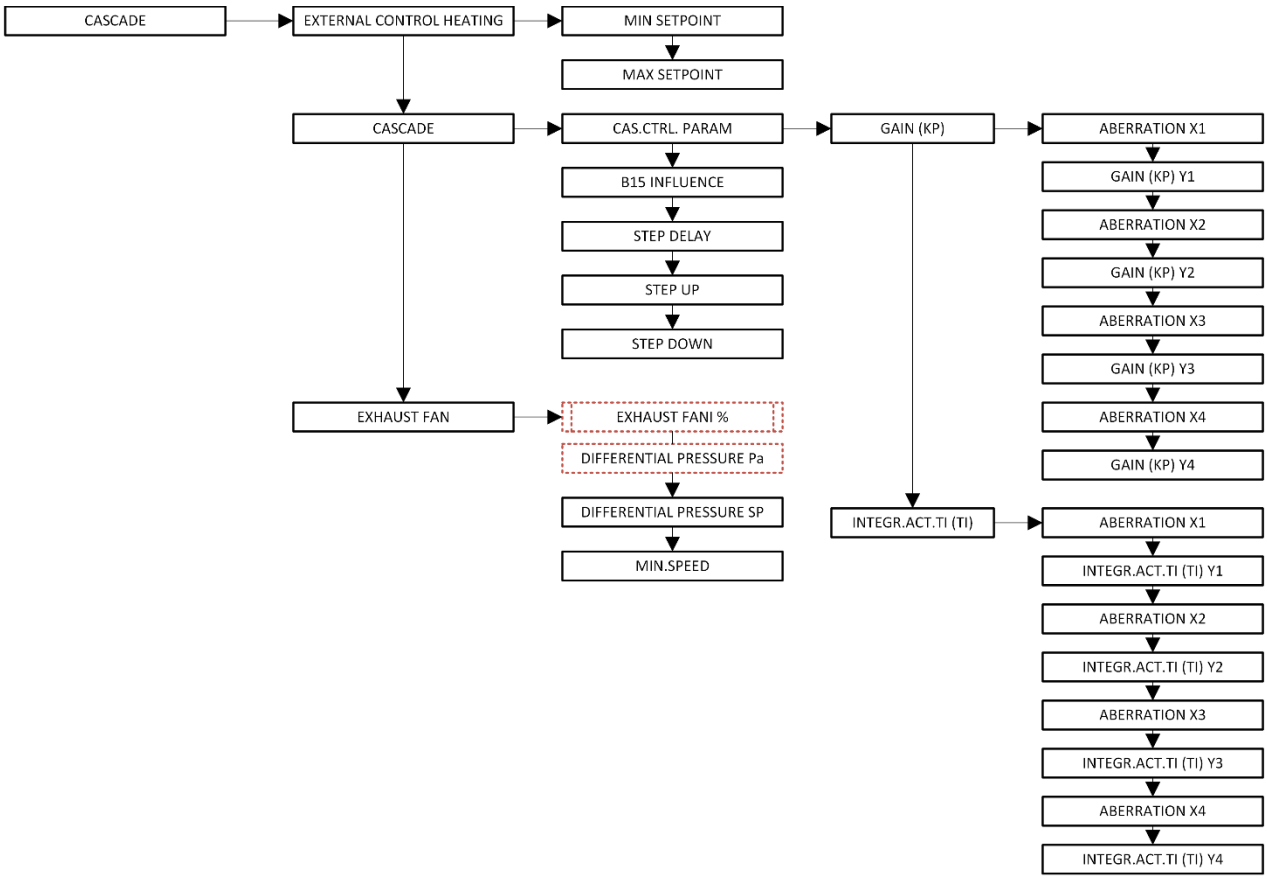
1. Select **CONTROL MODE**:
   → *Parallel heating* or *Fault operation*
2. Set **COUNTER START TIME**: e.g. **1,800 s**
3. Set **CONTROL SHUTDOWN TIME**: e.g. **300 s**
   → Turns off K27 when the control is at 0%.
4. Set **MAXIMUM CONTROL SETTING**: e.g. **100%**
5. Adjust the controller response:
   - **GAIN (Kp)**: e.g. **1.5**
   - **INTEGR.ACT.T (Ti)**: e.g. **240 s**

Tips for defining settings

- **Start with moderate values** and observe the behaviour of the system.
- **Increasing the P value** speeds up the response, but may cause overcontrol.
- **Shortening the I-time** speeds up the correction but may cause instability.
- **After making changes**, **always test** that the additional heating works as expected.

4.4.11 Cascade

Main menu → Service menu → Device settings → Cascade



The System device settings menu is used to define the key control parameters for individual heat pumps and the entire system. The menu includes settings for external control limit values, cascade system control parameters and exhaust air fan operation. Correctly set parameters ensure safe, efficient and planned operation of the system.

External control – Heating (0-10V)

This is where you set the limits for the temperature settings of a heat pump controlled by **an analogue control signal (0–10 V)**.

NOTE! These settings **do not affect bus control (e.g. Modbus)**, only analogue control of heating.

- **MINIMUM SETTING VALUE (°C)**
    - Corresponds to 0 V voltage
    - Defines the lowest temperature that the upper-level automation can request
- **MAXIMUM SETTING VALUE (°C)**
    - Corresponds to 10 V voltage
    - Defines the maximum temperature that the automation can request
    - **Take into account the maximum temperature of the device and the possible effect of additional heat**

The heat pump's internal controller limits operation according to its own technical limits and may not be able to produce the requested maximum value at full power.

Cascade

Main menu → Service menu → Device settings → Cascade

This menu is used to set **the control parameters for the cascade system**, which is used to control the common operation of several heat pumps. Cascade control is based **on dynamic four-point control**, in which the control reacts to both heat deficiency and excess heat with separately definable control values.

CASCADE CONTROL PARAMETERS

GAIN (KP)

- Determines the controller's response speed to control deviations.
- Higher value = faster response.
- **Adjust in small increments (e.g. 0.5 units)**.

X1–X2: negative deviations → reaction to heat deficit
X3–X4: positive deviations → reaction to excess heat

INTEGR.ACT.T (TI)

- Integral time (in seconds) that determines how quickly the control corrects the deviation.
- Shorter time = faster correction.

Used in conjunction with the P value to fine-tune the control speed.

Additional settings

B15 TEMP INFL. (%)

- Determines how much **the lower sensor (B15) of the accumulator** affects the average value together with the upper sensor (B10).
- Higher value = faster response to temperature changes in the network.
- **Recommendation:** 0–30%

STEP DELAY (min)

- The time after which the next heat pump can start.
- **Recommendation:** 5–30 min
    - Small systems → shorter delay
    - Large systems → longer delay

STEP UP (%)

- Compressor capacity after which the next heat pump starts.
- Used in **inverter-controlled** systems.
- All running devices are adjusted in parallel.

STEP DOWN (%)

- Capacity limit below which one heat pump is switched off.
- The remaining devices continue to operate in parallel.

Commissioning checklist

1. **Ensure that all heat pumps are configured correctly (MASTER/SLAVE).**
2. **Set the cascade control parameters (KP, TI) for each deviation point.**
3. **Define the effect of the lower sensor of the accumulator (B15).**
4. **Set the start-up delay and switch-on/switch-off limits.**
5. **Save the settings and record them in the commissioning report.**
6. **Monitor the system operation and adjust if necessary.**

Exhaust air fan ***

Main menu → Service menu → Device settings → Cascade → Exhaust air fan

This menu is used to set **the speed settings for the exhaust air fan** and **the control values for the negative pressure in the device enclosure**. The exhaust air fan is **a mandatory accessory for G-Eco devices** and functions as part of the device's safety system. Its purpose is to ensure adequate ventilation in the device enclosure and to prevent the formation of an ignitable mixture in the event of a refrigerant leak.

Control modes

The exhaust fan is controlled by three different settings:

- **NORMAL** – set speed at which the set pressure difference is maintained
- **BOOST** – higher speed, used e.g. when the temperature of the cooling module rises
- **SAFETY** – maximum speed, activated in the event of an alarm

NOTE! If the control signal is interrupted, the exhaust fan automatically switches **to SAFETY mode** and runs at maximum speed.

Displayed values

- **EXHAUST FAN (%)**
  Shows the current speed of the exhaust fan as a percentage.
- **DIFFERENTIAL PRESSURE (Pa)**
  Shows the difference between the internal and external pressure of the device housing.

Settable values

- **DIFFERENTIAL PRESSURE SETPOINT**
  Defines the target pressure difference according to which the controller controls the fan speed during normal operation.
    - **Factory setting:** 10 Pa
    - **Recommendation:** 10–20 Pa
    - The value is selected according to the ventilation requirements of the room.
- **MIN. SPEED (%)**
  Low limit value for speed control. Set speed is not allowed to go under.
    - **Factory setting:** 20%
    - The value is determined by measurement during commissioning.

Safety requirements

- The exhaust fan must be capable of the following **in all situations**:
    - Change the device-specific air volume (**Qmin**)
    - Maintain a pressure difference of at least **20 Pa**

The air volume (Qmin) is specific to each device and must be checked in **the technical table** or **on the device label**.
The value must **be verified during commissioning** and recorded in the commissioning report.

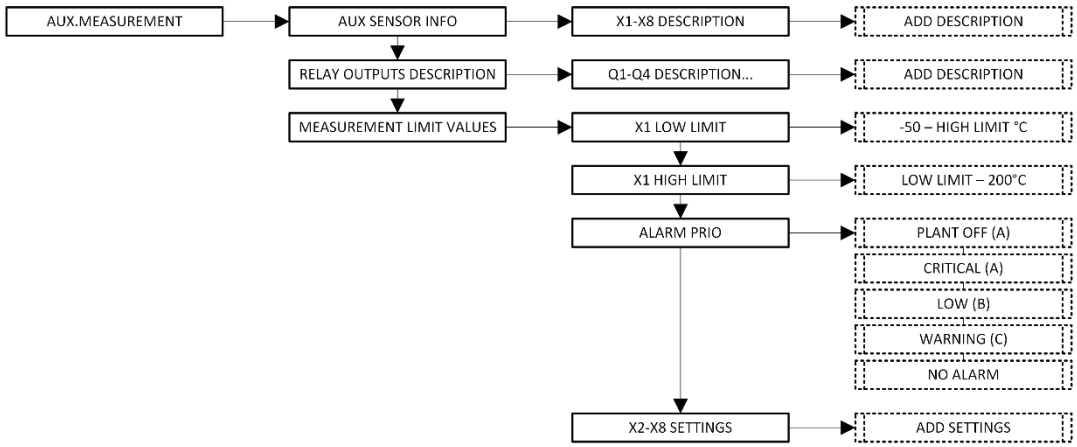
Instructions for setting up the exhaust air fan

1. **Set the replacement air control damper to the preset position and lock it according to the instructions.**
    - The control damper is used to determine the negative pressure of an individual device so that the required air volume (**Qmin**) is achieved **in SAFETY mode**.
    - In systems with multiple devices, the control damper **is used to balance the exhaust air system** so that **the required air volume is achieved in each device**. This ensures that all devices operate safely and as designed, even in a shared duct system.
2. **Ensure that the replacement air filter is clean.**
    - A clogged filter affects the pressure difference and may prevent the correct air volume from being achieved.
3. **Verify the air volume in SAFETY mode and mark it in the commissioning report.**
    - SAFETY mode is a critical safety function in which the exhaust fan runs at maximum speed.
    - The air volume must correspond to **the Qmin value** specified in the technical data for the device.
4. **Set the exhaust fan to AUTO mode.**
    - In this mode, the controller automatically controls the exhaust fan according to the differential pressure setpoint.
5. **Set the differential pressure sentpoint to 10 Pa** (or higher if required by the ventilation of the equipment room).
    - Recommended setting range: **10–20 Pa**
    - This value determines the target negative pressure in the device enclosure during normal operation.
6. **Wait for the negative pressure to stabilise.**
    - The controller adjusts the fan speed until the set pressure difference is achieved.
7. **Check the controller display for the fan speed (%) at which the pressure difference is achieved.**
8. **Set this speed as the MINIMUM SPEED value and mark it in the commissioning report.**
    - This ensures that the exhaust fan never runs at too low speed, which would prevent the required negative pressure from being achieved.

This instruction ensures that the exhaust fan operates correctly in both single and multiple device systems, meeting safety requirements in all operating situations.

4.4.12 Aux.measurement

Main menu → Service menu → Device settings → Aux. measurements



The Aux.measurements menu allows you to enable additional temperature sensors connected to the system, enabling extended measurement and monitoring capabilities. This function requires **the TC1.8 expansion module**, available as an accessory, which provides connections for several external sensors.

Functionality

- Additional measurements can be installed **at freely selectable points** in the system, such as:
    - Different parts of the heating or cooling network
    - Storage tanks, heat exchangers or manifolds
    - External temperature monitoring points
- Each additional sensor can **be named according to its purpose**, which facilitates the interpretation and documentation of measurements.

Alarm limits and priorities

- The following can be defined for each additional measurement:
    - **Upper and lower limit values**, which trigger an alarm when exceeded or not reached
    - **Alarm priority**, which determines the effect of the alarm on system operation:
        - **Informative**: does not affect operation, but is visible in the alarm history
        - **Function-limiting**: may prevent the device from starting or stop it
        - **Critical**: causes immediate shutdown and alarm

4.5 Measurements

Main menu → Maintenance menu → Measurements

The Measurements menu displays the heat pump's internal measurement values in real time. The menu provides the service user with a detailed view of the device's operation without the need for separate refrigeration circuit meters. The measurement data is essential **for commissioning, troubleshooting, optimising operation** and **remote monitoring.**

Measurement values and their significance

The measurements displayed in the menu may include the following information (varies depending on the model):

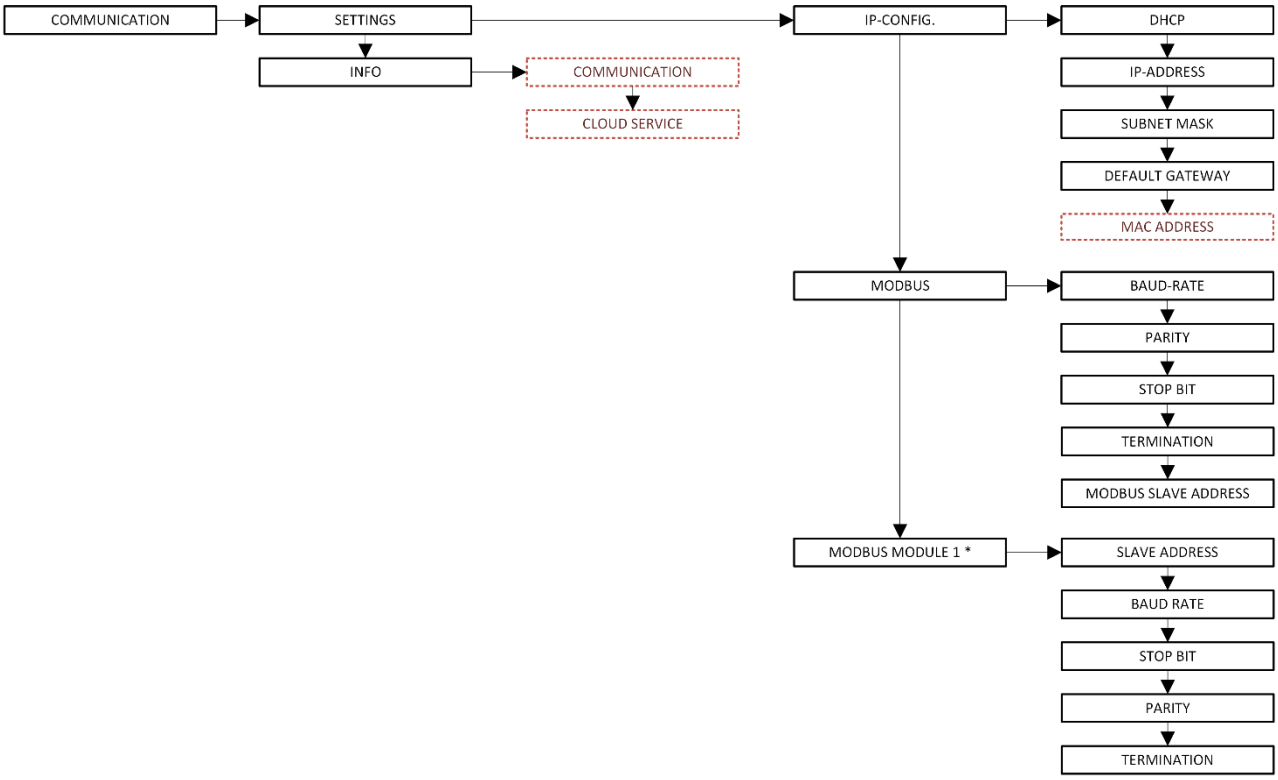
- **Condenser temperature (B21/B71)**
  → Used in heating control and condensate discharge monitoring.
- **Evaporator temperature (B91/B92)**
  → Used to control cooling operation and protect the collection circuit.
- **Buffer tank sensors (B10, B15)**
  → Used for cascade control and monitoring the temperature profile of the accumulator.
- **Flow sensors and flow switches**
  → Ensure sufficient fluid flow to the evaporator and condenser.
- **Pressure measurements**
  → Display the pressures in the refrigerant circuit, which can be used to evaluate the operation of the compressor.
- **Compressor status and speed**
  → Shows whether the compressor is running and at what frequency it is operating.
- **Electrical power and energy consumption**
  → Provide information on the energy consumption and correct operation of the device.

Intended use for maintenance personnel

- **Commissioning:**
  Ensure that all sensors are working and temperatures are at the expected level.
- **Troubleshooting:**
  Abnormal temperature or flow readings may indicate blockages, sensor faults or refrigerant problems.
- **Optimising operation:**
  Measurement data can be used to adjust setpoints and improve the energy efficiency of the system.
- **Remote monitoring and documentation:**
  Measurement values can be recorded or transferred to a monitoring system via Modbus or a cloud service.

4.6 Communication

Main menu → Service menu → Communication → Settings



The Data transfer menu is used to configure settings related to the heat pump's network connections and bus communication. The menu can be used to adjust the settings for both **the TCP/IP network connection** and **the Modbus RTU fieldbus**. Correctly configured data transfer settings enable the device to be connected to building automation, remote monitoring or cloud services.

4.6.1 Settings

TCP/IP – Network connection

The heat pump is supplied with **a fixed network connection**. The network settings correspond to the internal network connection settings. If the device is connected to the building's own network, the network settings must be configured accordingly.

Setting the IP address

There are two alternative ways to establish a network connection:

1. **DHCP (dynamic IP address)**
    - **ON**: The device automatically obtains an IP address from the network's DHCP server.
    - If DHCP fails (e.g. no server or cable not connected), the device uses previous or factory settings.
    - After a successful search, the IP address is displayed on the screen in the format xxx.xxx.xxx.xxx.
2. **Fixed IP address (factory setting)**
    - **OFF**: The device uses a fixed IP address.
    - **IP address**: e.g. 192.168.1.xx (the last digits are determined by the number of devices: 10, 11, 12...)
    - **Subnet mask**: 255.255.255.0
    - **Default gateway**: defined if necessary

MODBUS RTU – Bus communication

The heat pump can be connected **to a Modbus RTU fieldbus**, where it functions **as a slave device**. The bus settings are specified in the menu and must be consistent with all devices on the bus.

Modbus port 1

- **Connection port:** POL698-T6 (RS485:2 – A2+, B2-, REF2)
- **BAUD RATE:** 9,600 / 19,200 / 38,400 / 57,600 / 115,200
- **PARITY:** Even / Odd / None
- **STOP BIT:** 1
- **TERMINATION:** 1
- **DEVICE ADDRESS:** 1

Modbus module 1

- **Connection port:** POL902-T1 (RS485 – A+, B-, REF)
- **DEVICE ADDRESS:** 0
- **BAUD RATE:** 9,600 / 19,200 / 38,400 / 57,600 / 115,200
- **STOP BIT:** 0
- **PARITY:** Even / Odd / None
- **TERMINATION:** Enabled / Disabled

Important

- All bus devices must use **the same baud rate, parity and stop bit settings**.
- **The terminator** should only be enabled at the ends of the bus.
- Correct settings are a prerequisite for reliable data transfer and remote control.

4.6.2 Info

The Info menu shows **the controller connection state to cloud service**

Communication set to OK, connection to cloud service is possible.

Could service parameter indicates current connection status.

4.7 Device information

The Controller information menu displays basic technical information about the heat pump controller, which is useful for maintenance, commissioning or establishing a remote connection, for example. The information in the menu can be read but cannot be edited.

Menu information

- **ACTIVATION KEY**
  A combination of numbers and letters used to connect the controller to the cloud service.
- **HOURS OF USE**
  Total operating time of the controller in hours.
- **CONTROLLER TEMPERATURE**
  Internal temperature of the controller (°C).
- **SERIAL NUMBER**
  The controller's unique serial number.
- **APPLICATION**
  Name of the application in use.
- **VERSION**
  The software version of the application.
- **BSB VERSION**
  Version information for the controller's operating system or software.
- **PAIRING CODE**
  The activation key for the mobile application, which is used to connect the controller to a mobile device.

4.8 Factory settings

The Factory settings menu is used to manage the saving and restoring of heat pump controller settings. The menu functions allow the user to save and restore settings, as well as restore the entire controller to its original factory settings.

Menu functions

- **SETT.SERVICE SAVE**
  Saves all current settings made to the controller permanently to memory.

Recommended to be done after commissioning and configuration.

- **SETT.SERVICE LOAD**
  Restores previously saved settings.

Used, for example, in a situation where settings have been changed incorrectly and you want to return to the previous working configuration.

- **SETT.FACTORY LOAD**
  Restores all controller settings to their original factory settings.

Note This will delete all changes made by the user. Use this function with caution, for example when troubleshooting faults or reinstalling the system.

4.9 Save / Load parameters

In the Save / Load menu, you can save the heat pump parameters and load the saved parameters to the heat pump. Only one parameter package can be stored on the memory card at a time.

- **SD CARD**
  Indicates the status of the inserted memory card.
- **FORMATTING**
  If the card has been used for storage before, we recommend formatting the memory card before saving the parameters. Please note that the files on the card will be deleted during formatting.
- **SETTINGS SAVE→ SD**
  Saves the parameters to the memory card. The memory card must be inserted into the memory card reader in unlocked mode.
- **SETTINGS LOAD← SD**
  Loads the parameters from the memory card to the controller. The memory card must be in locked mode. Restart the controller after loading the parameters.

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