INSTRUCTION MANUAL

for

End-User

MasterTherm

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1 Introduction

Dear customer,

Thank you for purchasing a MasterTherm heat pump that includes a pGDx touch screen. The pGDx touch is used for user-friendly control of heat pump, measurement of temperature and humidity in the reference room (if required), connection to the Internet via WiFi or Ethernet, transmission of heat pump operation data and related control via web or mobile applications. We regularly improve the pGDx touch function and design of the graphical user interface itself in the form of online updates.

Your heat pump can be controlled in several ways:

- Online (web/mobile application)
- Via pGDx touch touchscreen
- Via pGD (it is an 8-line digital display, pGDx touch predecessor, now optional equipment on request)
- Control of the required room air temperature via pAD or pADh devices (these devices are used to measure room temperature or temperature and humidity, according to which they can also compensate desired heating water temperature in assigned heating circuits as well, as pGDx touch can do with the main heating circuit)
- Control superior to the heat pump (ModBus RTU / BACnet)

1.1 Online heat pump control

The design of the pGDx touch user interface is adapted to the design of applications for control via the Internet so that it is clear to the user.

Below is a sample web application (available at www.mastertherm.online):

Light mode of application

Dark mode of application

1.2 Names and descriptions of devices used in this manual

pGD (optional equipment)

Figure 1 - pGD control terminal

8-line partially graphic terminal with a resolution of 132x64 pixels supplied with green or white backlight. It has a keyboard with 6 keys. Previously supplied with almost all types of our heat pumps, now these terminals are optional equipment according to customer requirements. With the help of pGD (or its emulation on pGDx touch) more advanced settings are possible, which are used mainly by service companies and more experienced users.

pAD (optional equipment)

Figure 2 - pAD room terminal

pAD is a room terminal that allows users to interact with the heat pump control unit. The pAD room terminal is used to enter the desired room temperature by user. This terminal allows main heat pump controller to precisely control the room temperature and heating water temperature, which contributes to greater comfort and more efficient operation of the heat pump.

pGDx touch (optional equipment)

Figure 3 – pGDx touch control panel

pGDx touch is new main control panel for all Master Therm heat pumps. pGDx touch offers a touch screen with a diagonal of 4.3 ” with a resolution of 480x272 pixels. Enables the room terminal function of main heating circuit. It has 1GHz processor and 512 MB RAM. Of course, there is possibility of connecting to the Internet via Ethernet or WiFi. If required for installation in the reference room, a device with an integrated temperature and humidity sensor is used.

All information regarding the pGDx touch device can be found in this manual.

2 Home screen

Home screen is user's starting point.

After inactivity (no touch), it will automatically return to this home screen after one minute. On this screen, you can find basic information about function and current status of heat pump. At the same time, user is informed about possibility of updating pGDx touch SW (if new version is available).

Home screen contains buttons for entering heat pump/pGDx touch settings and displaying more detailed information. If device is connected to the Internet via WiFi, there is also a graphical indication of signal strength.

Figure 4 - Light mode

pGDx touch also has built-in eye-saving function for darker display at night (or according to the user's choice).

Figure 5 - Dark mode

2.1 Description of home screen icons

You can find a graphical descriptive icon next to each value in the middle of the home screen.

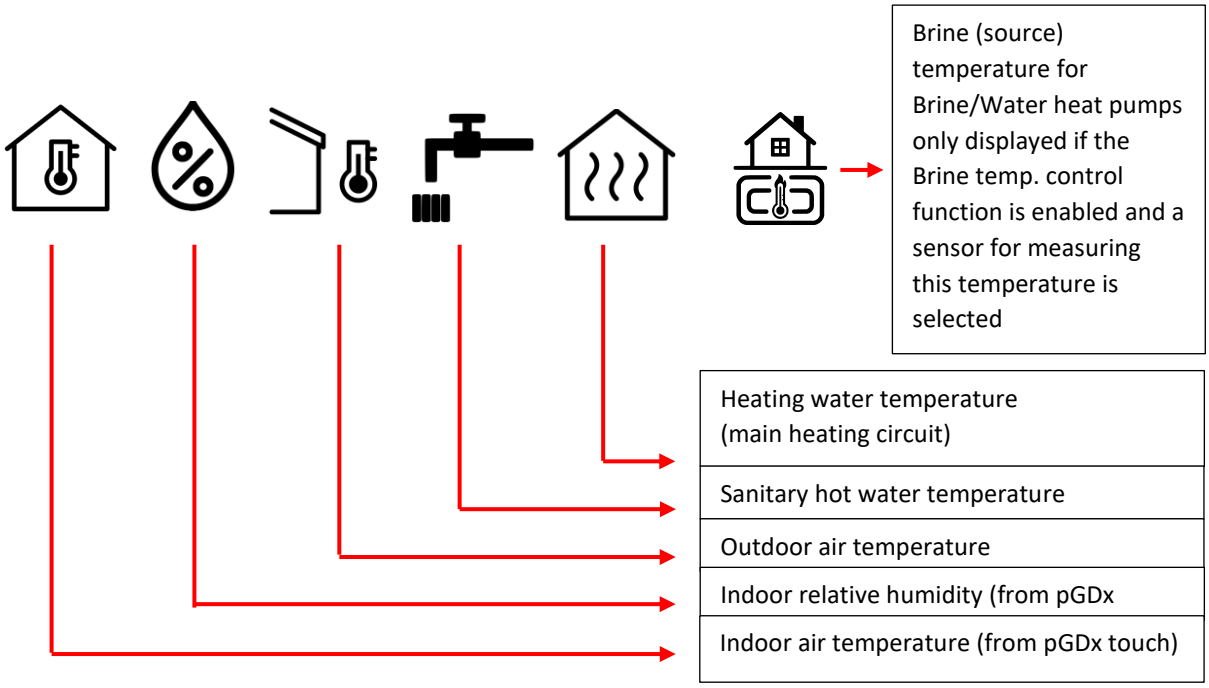


Figure 6 - Description of icons

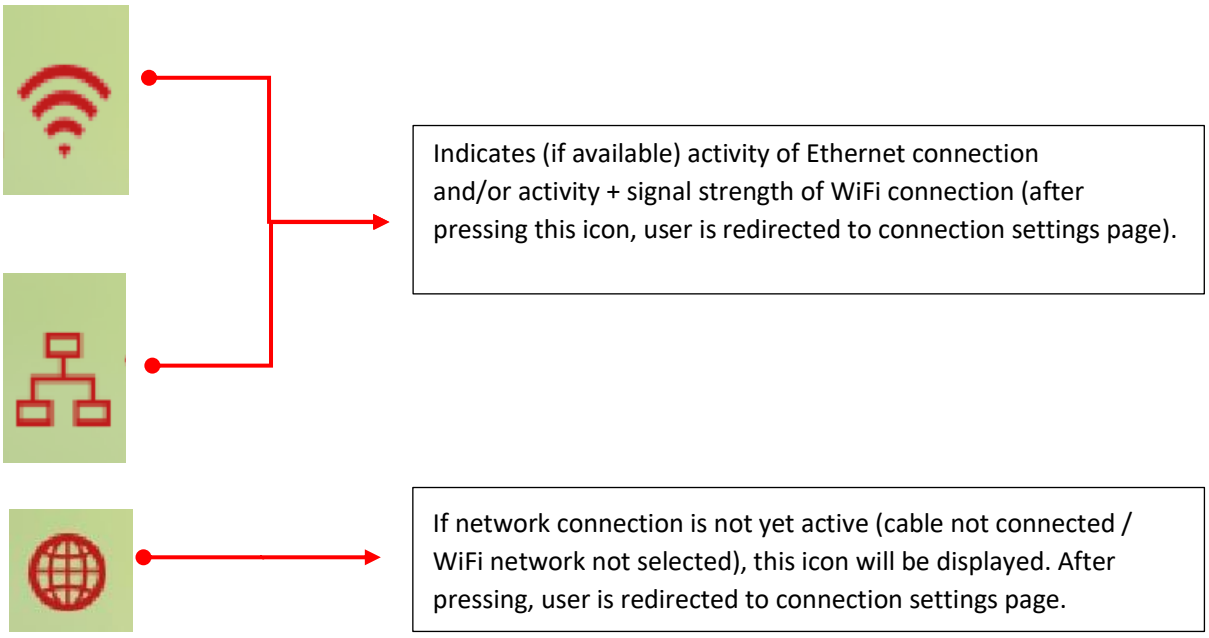
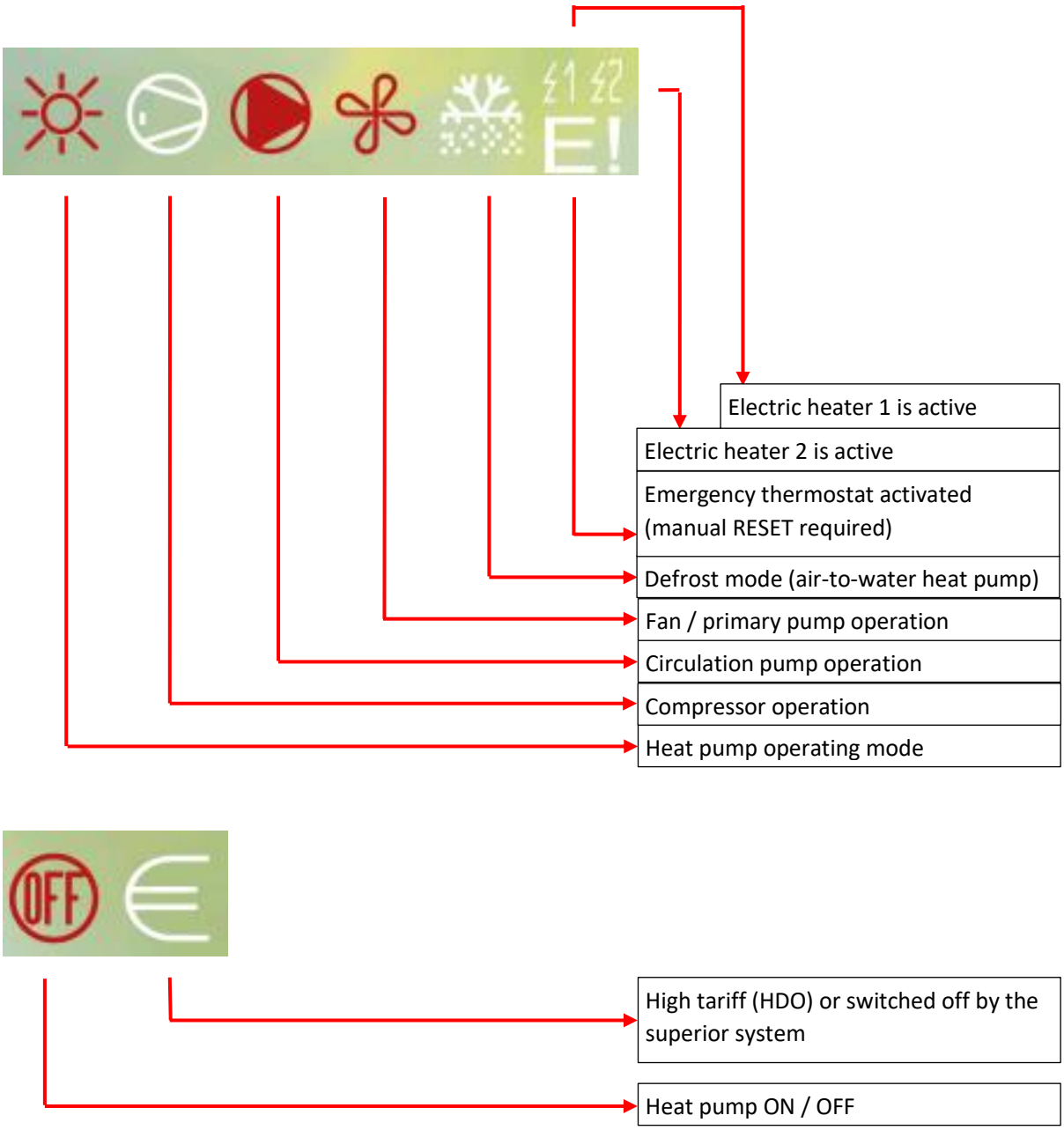


Figure 7 - Network icons

Below you can find status icons well known from pGD. Please see **pGD - FINAL USER'S INSTRUCTION MANUAL** on page 5, chapter 3.1. for detailed description.

Figure 8 - HP status icons



Current heat pump mode is also displayed on the home screen.

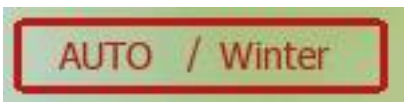


Figure 9 - Current heat pump mode

2.2 Description of operating mode icons

Operating mode (the first icon, if flashing, heat pump is in Summer mode):


Heating


Heating – low outdoor temperature (aux. heaters only, compressor OFF)


Cooling, or Passive Cooling (Brine/water only)


Cooling with Dew Point protection (no humidity condensation possible)


Sanitary Hot Water preparation active


Swimming Pool heating active (optional)

2.3 Description of home screen buttons

There are two groups of buttons on the left and right of the home screen. On the left side, there are mainly buttons for displaying basic information (home screen, counters, info, help) while on the right side there are buttons for heat pump setting (heat pump, temperature, hot water).

- **Home screen**

- **Info** – username, language, unit ID, HC names… By a long press of this button, we are redirected to the service info page for detailed information about the parameters of the heat pump operation.

- **Counters** – pump & compressor runtime, start counter, electric meters, energy consumption section (for units equipped with electric meter), quick entry to the PV section by long pressing the button

- **Help** – description of basic icons for users, quick entry to the QR registration section by long pressing the button

Figure 10 - Buttons on the left

Heat pump

- *Short press* = enter basic settings of the heat pump (ON/OFF, Mode, Function, Heating and Cooling curve).
- *Long press* = enter pGDx touch settings (Languages, Date & Time, Dark & Light, Advanced access, Restart pGDx touch, pGDx settings, SmartGrid, Schedulers...) or then further to the advanced settings.

Temperature

- Temperature settings, heating circuits + equithermal curves
- pAD room terminals (backward compatible)
- Solar, Pool

Hot Water

- ON/OFF hot water
- Setpoint
- Current sanitary hot water temperature

Figure 11 – Buttons on the right

3 Info

Press INFO button from home screen.

This screen contains information about the heat pump (entered on our website) located in the scroll menu. You can find information such as **name, surname, pGDx touch ID, heating circuits labels etc.**

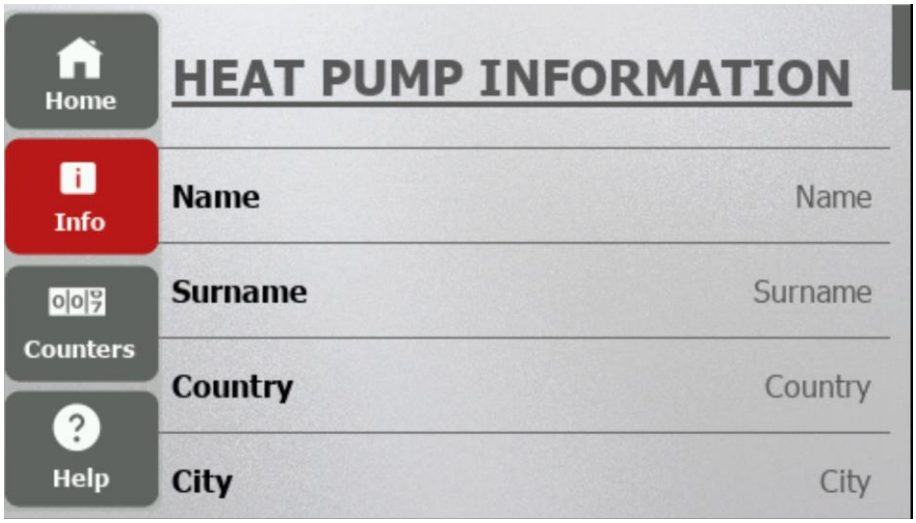


Figure 12 – Info

4 Counters

Press COUNTERS button from home screen.

This page shows status of the basic counters, Alarms management and if the unit is equipped with an electric meter then also Energy management button for entering its menu is displayed here.

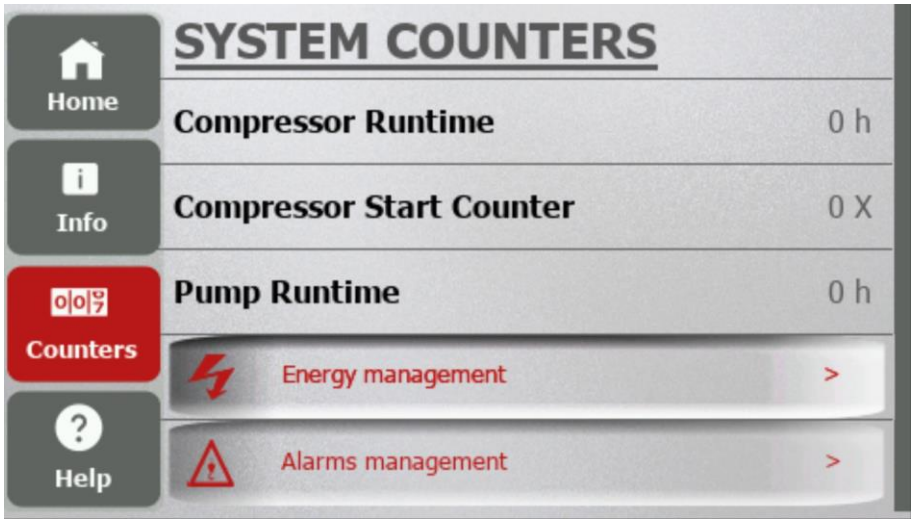
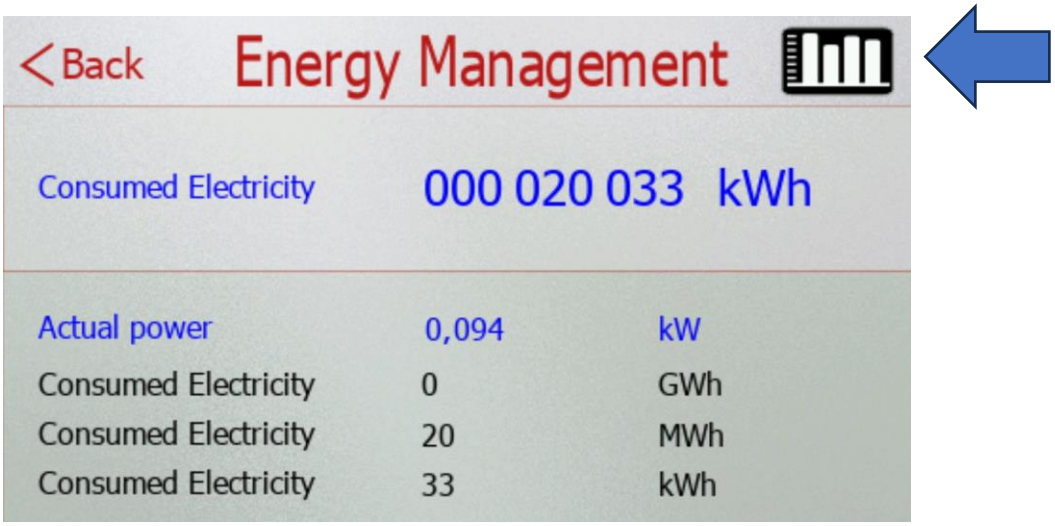


Figure 13 - Counters

4.1 Counters – Energy management (optional equipment)

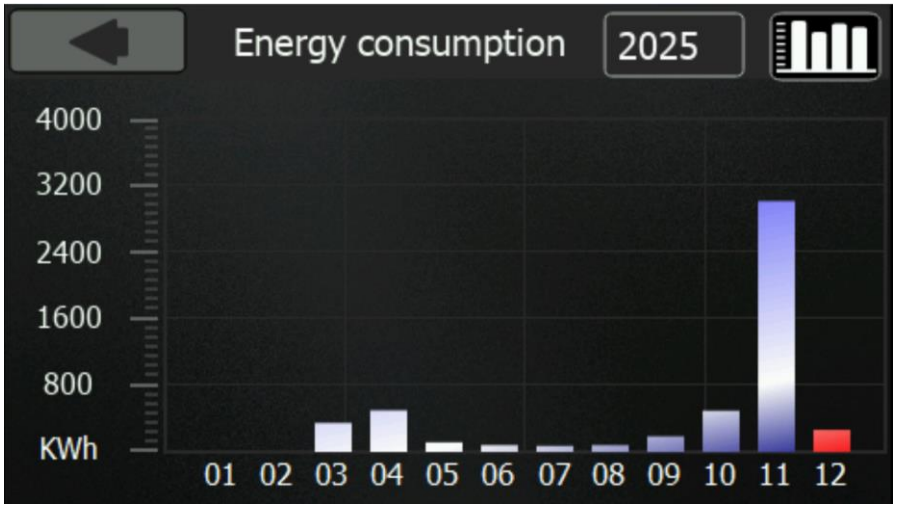
This page shows status of (1-phase / 3-phase) electric meter counters. In the upper right corner you will find a button to enter the energy consumption section.



4.1.1 Energy consumption

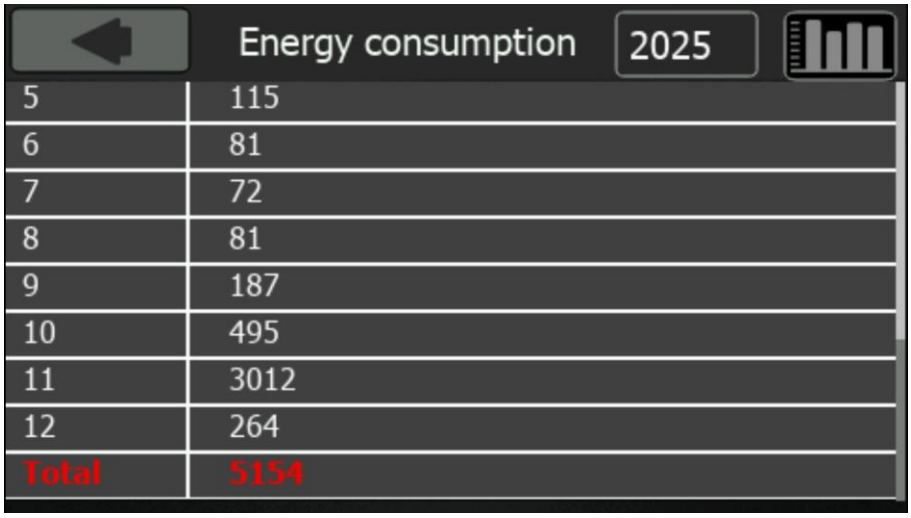
This section provides information about electricity consumption for each month of the year. The current month column shows the ongoing consumption from the 1st day of the current month to the present moment.

A drop-down menu will appear when the button is pressed. This will allow the user to select the year they would like to see. Please note that the selection will only be visible if data for that year is available.



This button can be used to switch between a graph view and a table view with detailed consumption

In the table view, you will find the exact consumption values of your heat pump in KWh read from your heat pump's electricity meter (optional equipment) and also total consumption per selected year.



5 Help

Press HELP button from home screen.

Description of basic icons for end-users. There are approximately 20 icons with descriptions. Help section will gradually expand in future SW updates.

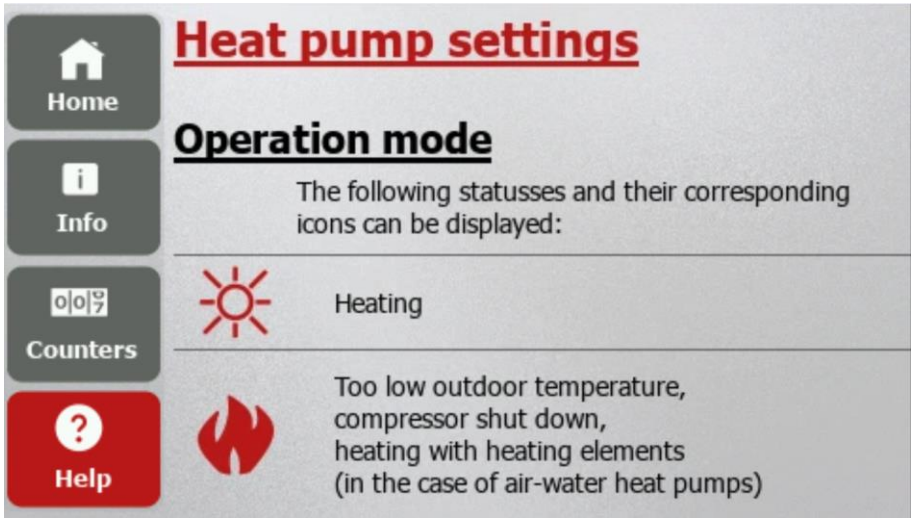


Figure 15 - Help 01

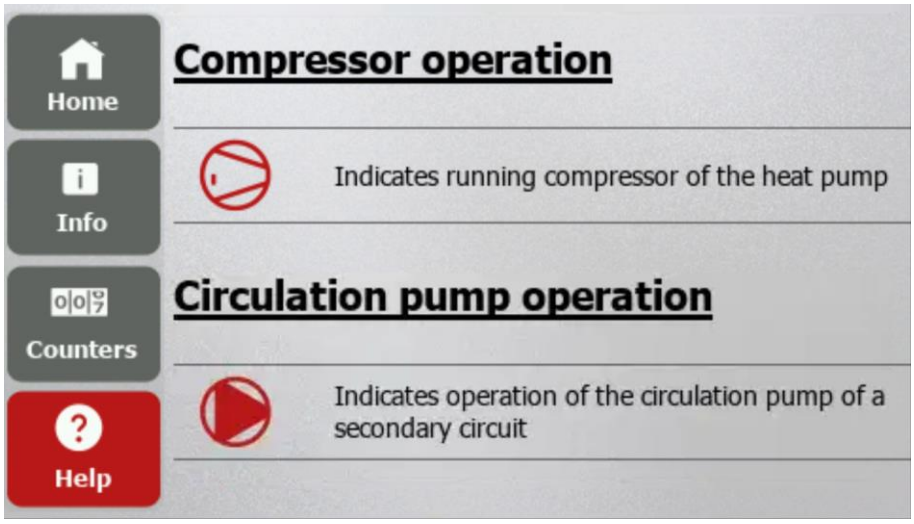


Figure 16 - Help 02

6 Settings

SHORT Press HEAT PUMP button from home screen.

Here it is possible to turn ON / OFF the heat pump and enter other submenus such as: **Mode, Function, Heating + Cooling curve.** In the menu, it is possible to scroll down to other items.

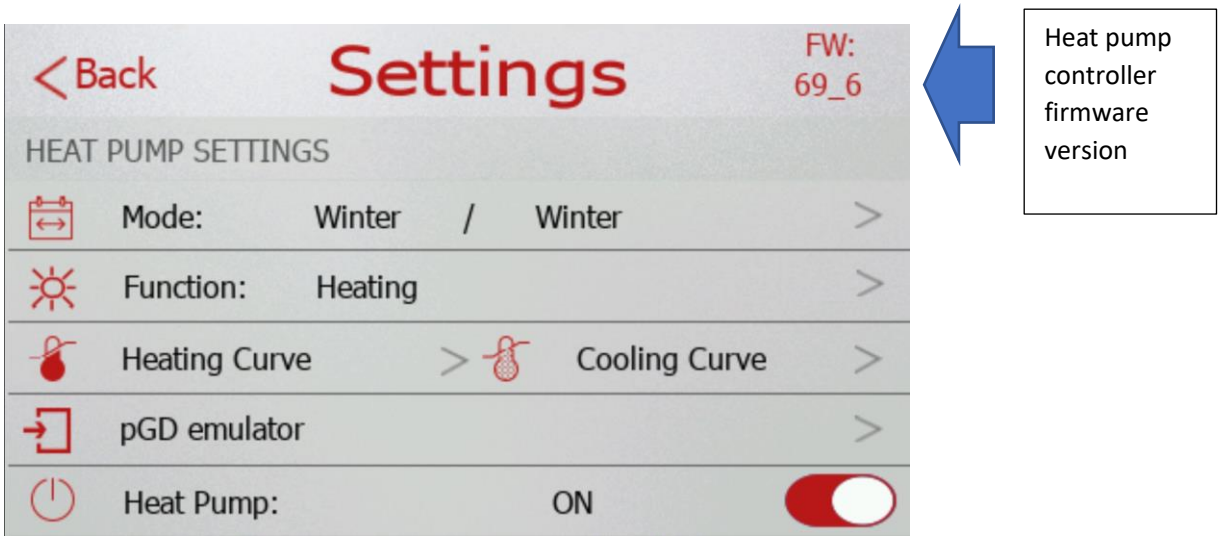


Figure 17 - Settings

6.1 Mode

(enter from settings)

Please use this page to set heat pump mode.
If "**Auto**" mode is selected, it is possible to adjust temperatures for automatic mode switching.
To confirm changes, it is necessary to press "**Save**" button at the top right.

In the Summer mode, only sanitary hot water heating is active, or
pool heating (if activated).

Cooling can be active in Summer mode (option).

Auto mode automatically switches between Winter and Summer mode according to the set geometric (average) outdoor temperature. The preset temperatures for switching to Winter are below 13 ° C and in Summer above 17 ° C. The mode is then displayed as Auto / Summer or Auto / Winter.

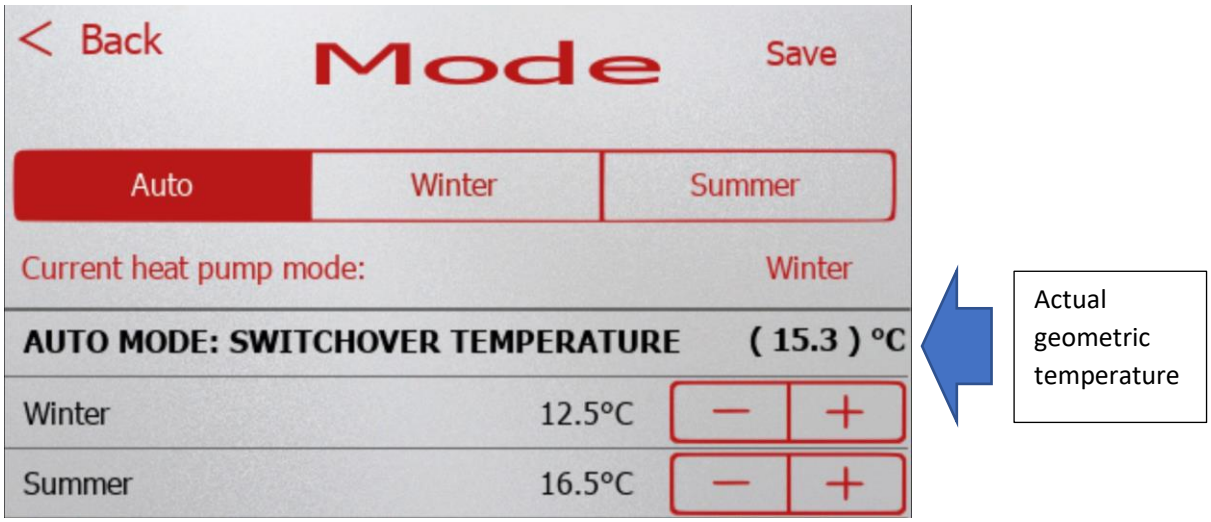


Figure 18 - Mode

6.2 Function

(enter from settings)

On this page, you can change function of the heat pump
(only if unit is equipped with a cooling function).

To confirm changes, it is necessary to press "Save" button at the top right.

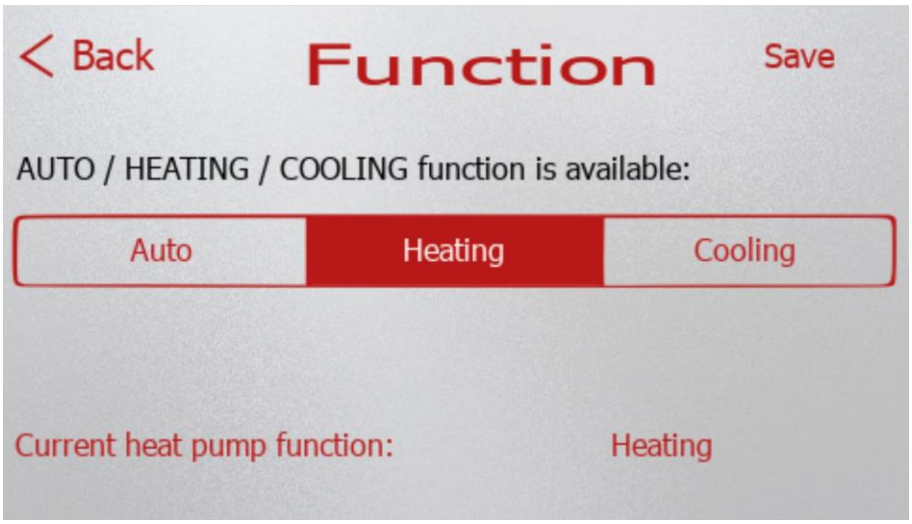


Figure 19 – Function 01

With the **Heating** function, heat pump only allows heating. According to the next setting, the heating and hot water circuits are active.

During **Cooling**, heat pump primarily cools. The cooling circuits are active. DHW and pool heating remains on (if activated).

The **Auto** mode automatically switches between the Heating and Cooling functions according to the outdoor temperature according to the switching between the Winter and Summer modes.

If the unit is switched on, following message is displayed, notifying that the heat pump must be switched off before making the change. Subsequently, it is possible to make the change and turn on the heat pump again.

If the unit is turned on, this screen (below) will appear, prompting us to turn it off.

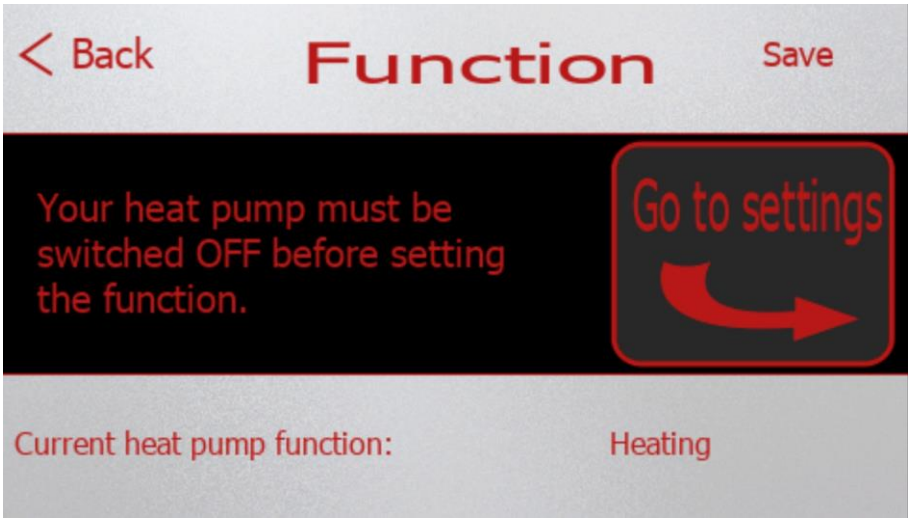


Figure 20 - Function 02

6.3 Heating curve

(enter from settings)

On this page, you can change values of equithermal curve for heating function. Values also change for text fields in image on the right. To confirm changes, it is necessary to press the "**Save**" button at the top right. The upper part also shows the current outdoor temperature and required water temperature according to curve settings.

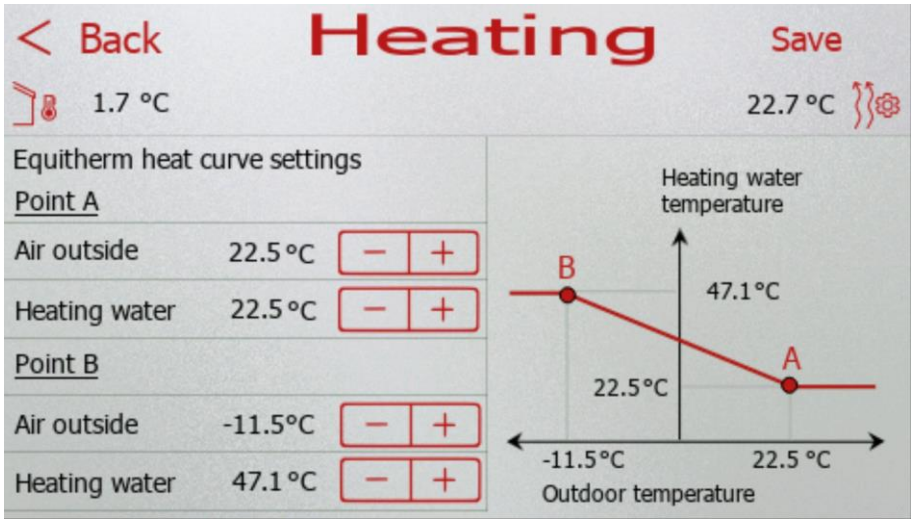


Figure 21 - Heating curve

6.4 Cooling curve

(enter from settings)

This page is only available if the unit is equipped with a cooling function. On this page you can change the values of the equithermal curve for the cooling function. The values also change for the text fields in the image on the right. To confirm the changes, it is necessary to press the "Save" button at the top right. The upper part also shows the current outdoor temperature and the required water temperature according to the curve settings.

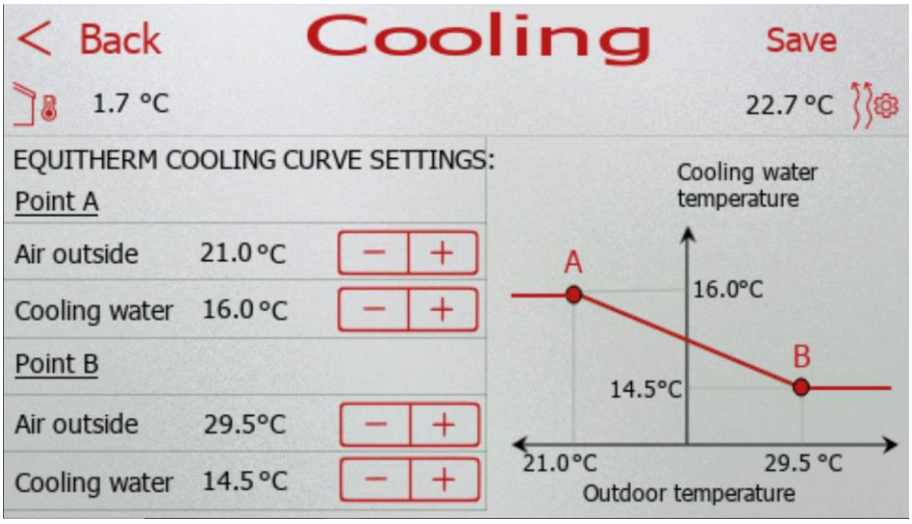


Figure 22 - Cooling curve

6.5 pGD Emulator

pGDx touch supports virtual display of pGD display, which enables service and advanced settings. pGD emulator is application with the same setting possibilities as for classic pGD. Functions at the top are available for pressing / long pressing multiple buttons at once and change of pLan address.

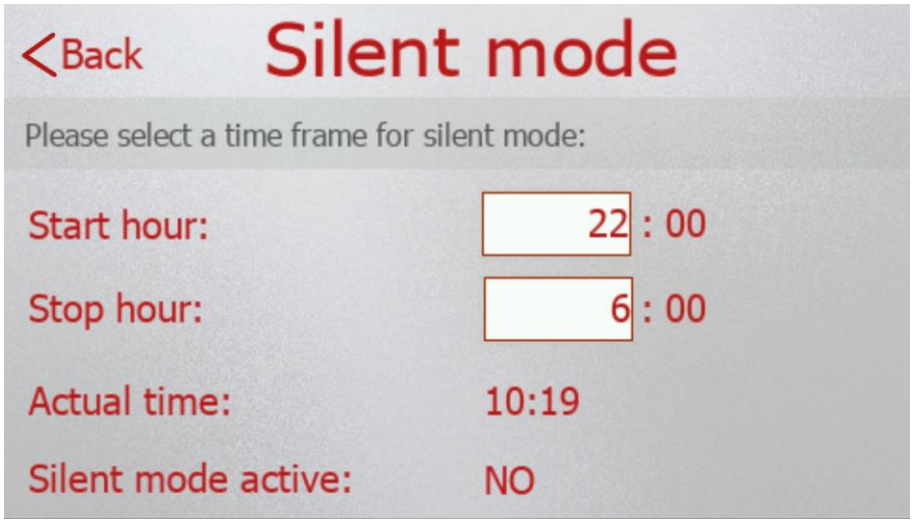
Figure 23 - pGD emulator

A detailed manual describing all available settings can be found in the documentation supplied with your heat pump:

FINAL USER'S INSTRUCTION MANUAL - pCO5/pGD DIGITAL CONTROLLER

6.6 Silent mode

If feature is enabled (requires controller SW 64/164 and higher) this setting is available from **Settings** -> scroll down -> **Silent mode**.



This new function allows night-time sound attenuation (compressor and fan power is reduced) to a minimum level during selected time frame. During this period, an electric heater can be used to replace part of compressor power. This new feature is intended for European countries with the strictest night mode requirements.

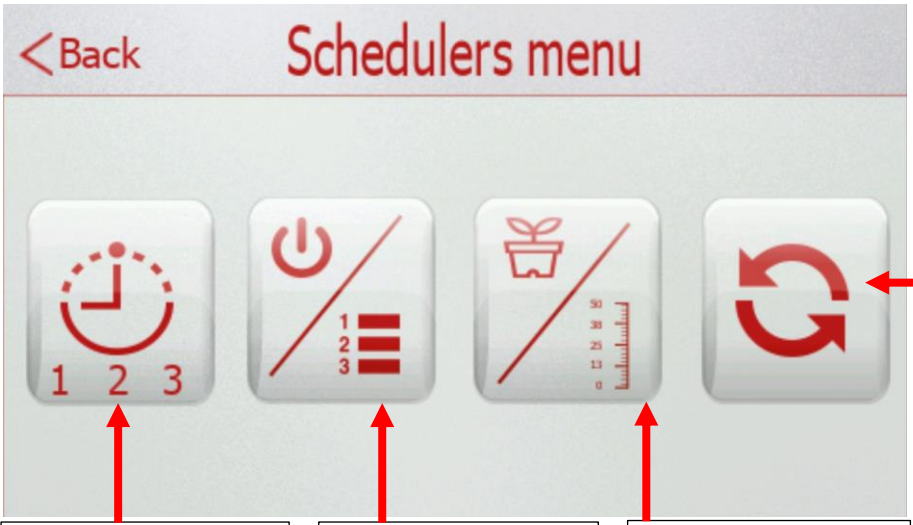
6.7 Schedulers

Schedulers are used for setting time programs for normal operation, power reduction or switching off of selected heating circuits and sanitary hot water. Currently, it is possible to control sanitary hot water, the main heating circuit, heating circuit 1 and heating circuit 2 in this way. The user has the option to set up to 3 different timers and then assign them to the functions as required.

This function is available for SW controller version 65/165 or higher. The SW upgrade can be provided by your distributor or service company during a regular or ordered service inspection.

6.7.1 Schedulers menu

After entering "Schedulers", we get to the Schedulers menu. You can find a description of each button below:



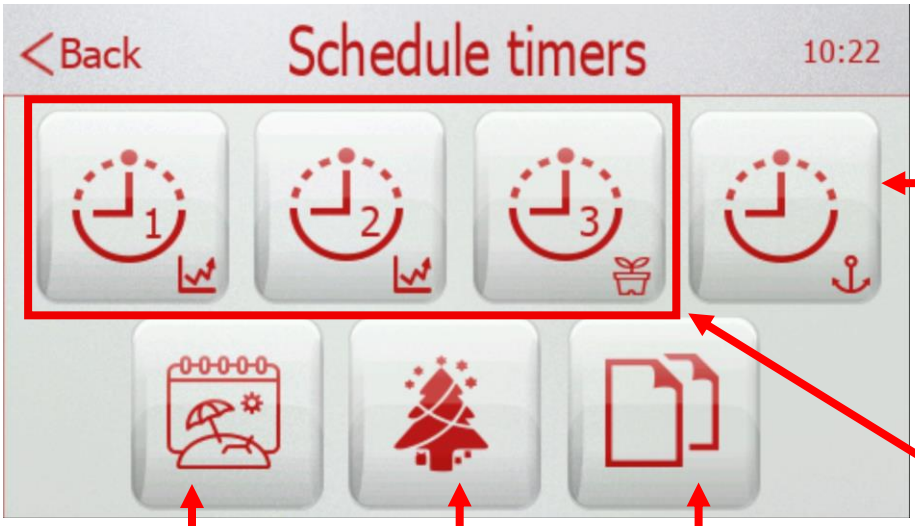
Here it is possible to set the times and modes of individual schedulers, dates for important days, time periods for different operation or copy individual schedulers to each other.

It is used to assign individual schedulers to the required functions or to turn off schedulers for selected functions.

Here it is possible to set the requested room temperature (or the temperature of sanitary hot water) for the ECO mode, which represents the reduced performance of the heat pump based on the user's wishes in time.

Reset schedulers to factory default settings (switching off all schedulers, resetting function assignments, resetting individual scheduler memories, deleting data for selected holidays and special periods)

6.7.2 Schedule timers



Default mode of individual schedulers used outside of selected time periods

Entering the settings of individual schedulers

Setting individual days for different operation of the heat pump

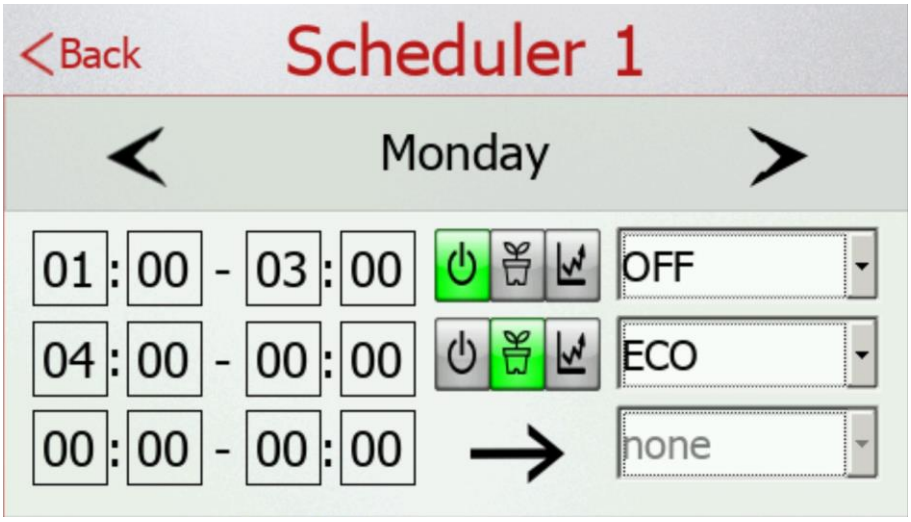
Setting time periods for different heat pump operation

The possibility of copying individual schedulers to each other

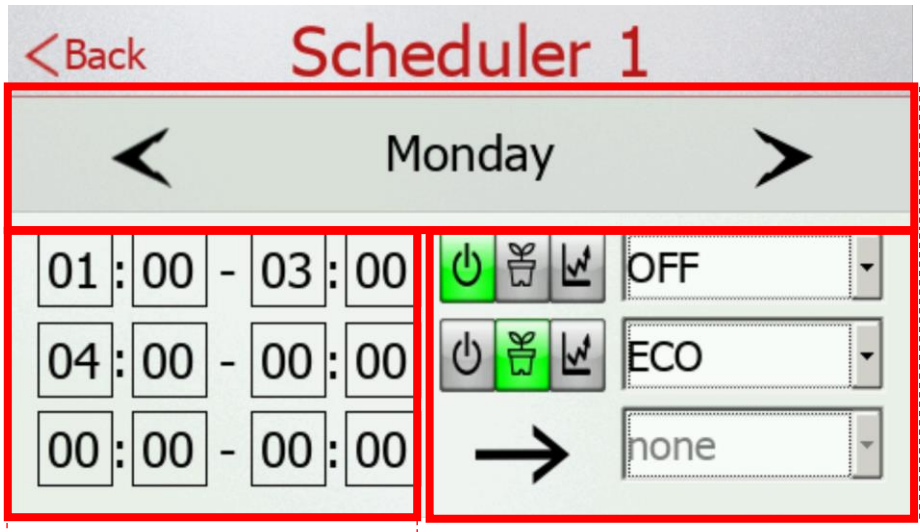
6.7.2.1 Individual scheduler settings

Select the button with the clock icon to set individual schedulers. The number displayed next to the icon distinguishes the individual 3 schedulers from each other (for example, Scheduler 1, Scheduler 2, Scheduler 3). The icon in the lower right corner of each button displays the current scheduler mode according to the user's settings.

The following screen will be displayed:



To begin the setup, please first enter the desired time period and then you can select the mode to be used for this time range.



Day selection (Monday – Sunday + Holidays)

Graphical and textual representation of the currently set mode for the selected time range.

Selected time range

Mode OFF

If this mode is currently active, it means that the function to which this scheduler is assigned is blocked according to the time scheduler.

Mode ECO

If this mode is currently active, it means that the function to which this scheduler is assigned is, according to the time schedule, in ecological mode for reduced consumption according to user-defined limits (see chapter 6.7.4).

Mode COMFORT

If this mode is currently active, it means that the function to which this scheduler is assigned is in normal (comfort) operation mode according to the schedule.

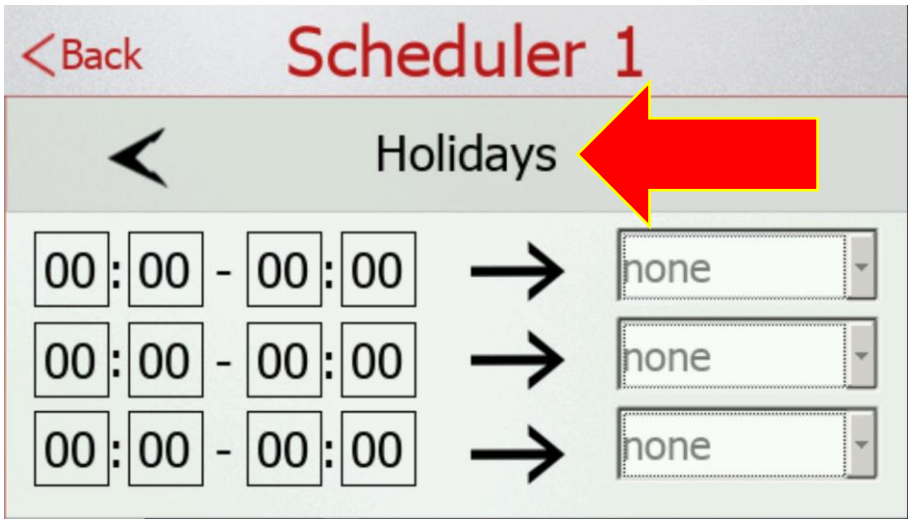
Mode "none"

If this mode is selected, it means that this time period for this individual day is not used. All data regarding the time selection of this time period for this day is reset by pressing "none".

6.7.2.2 Holidays

Here it is possible to select individual days for which different Scheduler settings should be applied (holidays, legal holidays, etc.)

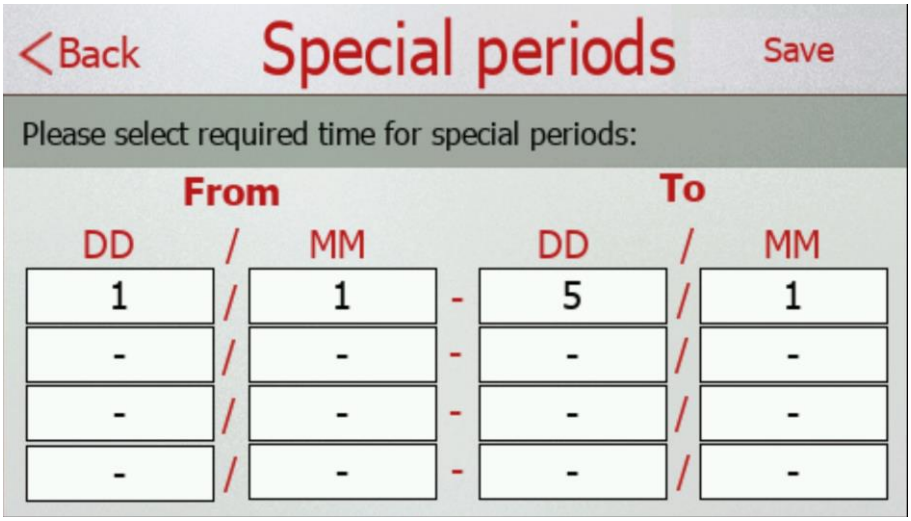
In addition to the days of the week, each Scheduler also has a "Holidays" item available.



Therefore, if the current day corresponds to the day specified in the Holidays (or Special periods) section, the assigned function will be controlled by the "Holidays" time schedule.

6.7.2.3 Special periods

Here it is possible to select special time periods for which different Scheduler settings should be applied (holidays, legal holidays, etc.).



If the current day is in the time range which is specified in the Special periods section, the assigned function will be controlled by the "Holidays" time schedule.

6.7.2.4 Copy Schedulers

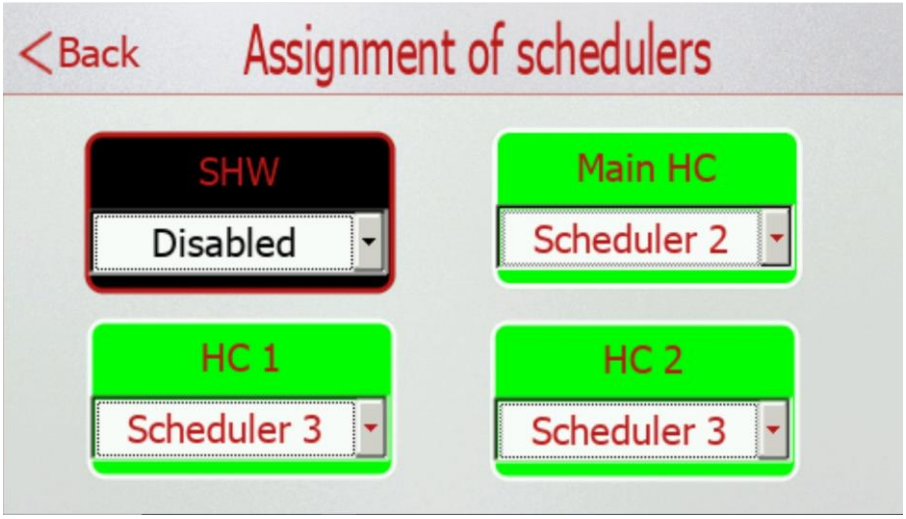
In this section, it is possible to copy individual Schedulers or their parts to each other to simplify the work during setup.

After selecting the source and destination for copying, confirm with the button at the bottom of the screen.

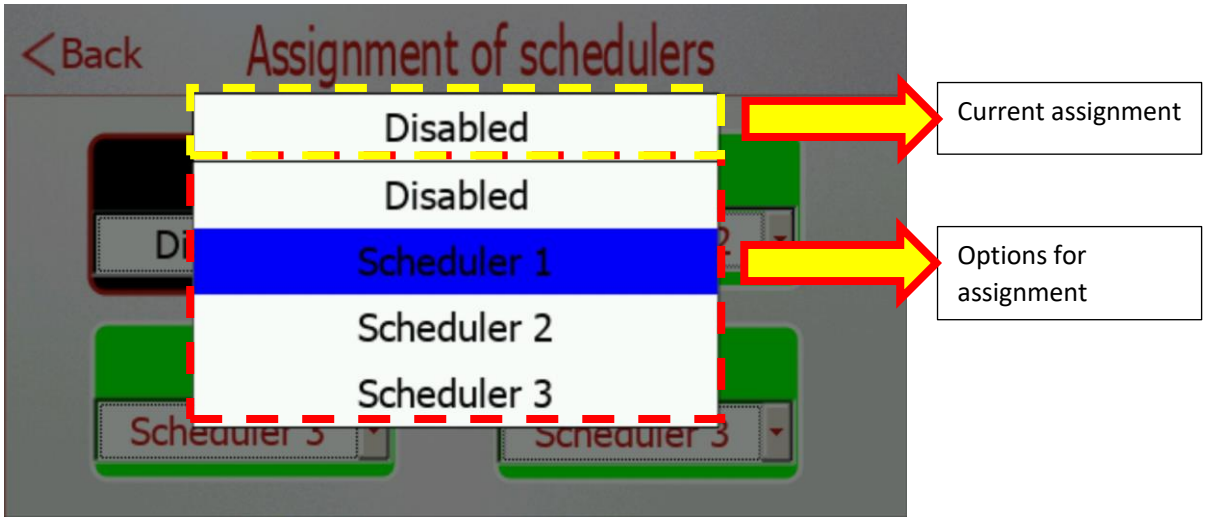
6.7.3 Assignment of schedulers

Switching on/off and assigning the required schedulers to individual functions can be done in this section, accessible by pressing the button from the Schedulers menu.

It is currently possible to assign selected Schedulers (time schedules) to the following functions: Domestic hot water, Main heating circuit, heating circuit 1 and heating circuit 2.



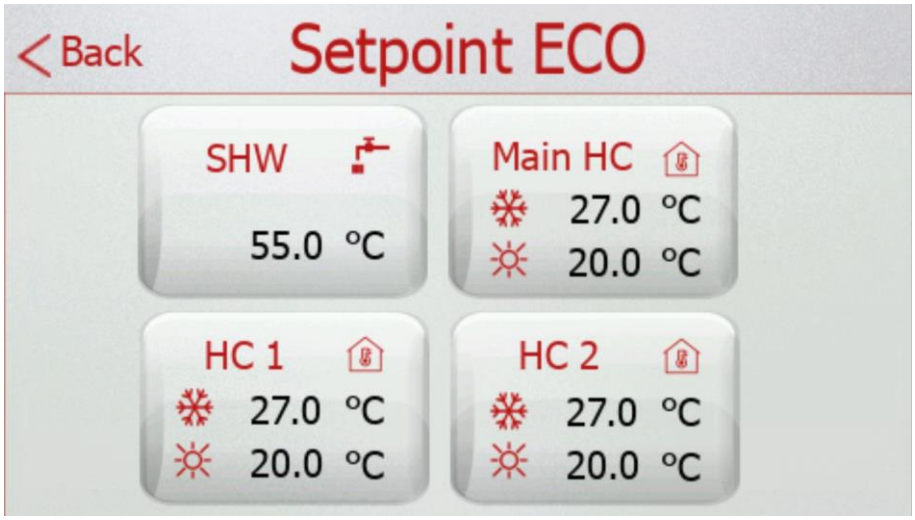
After touching the drop-down menu, it is possible to choose from the following assignment options:



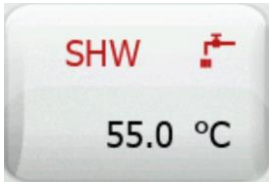
6.7.4 Setpoint ECO

In this section, it is possible enter submenus to set the required temperature of the heating water in the domestic hot water mode, as well as the required room temperature of the main heating circuit, heating circuit 1 and heating circuit 2 for heating and cooling mode.

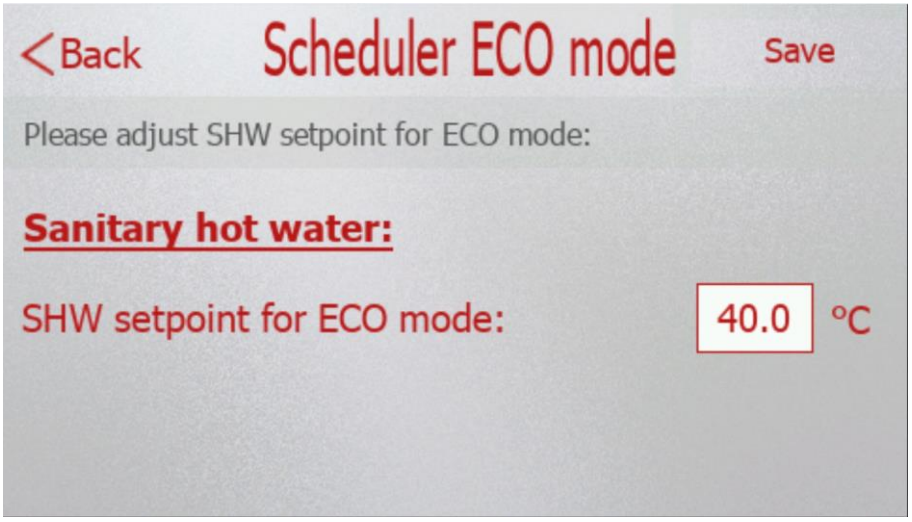
At the same time, this screen also displays an overview of the currently set setpoints for ECO mode.



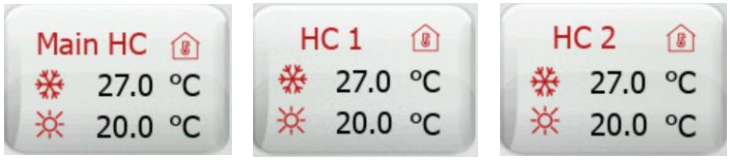
6.7.4.1 ECO mode settings: Sanitary hot water



Here it is possible to set the required temperature of sanitary hot water for ECO mode. This value should be lower than the value set in normal mode.

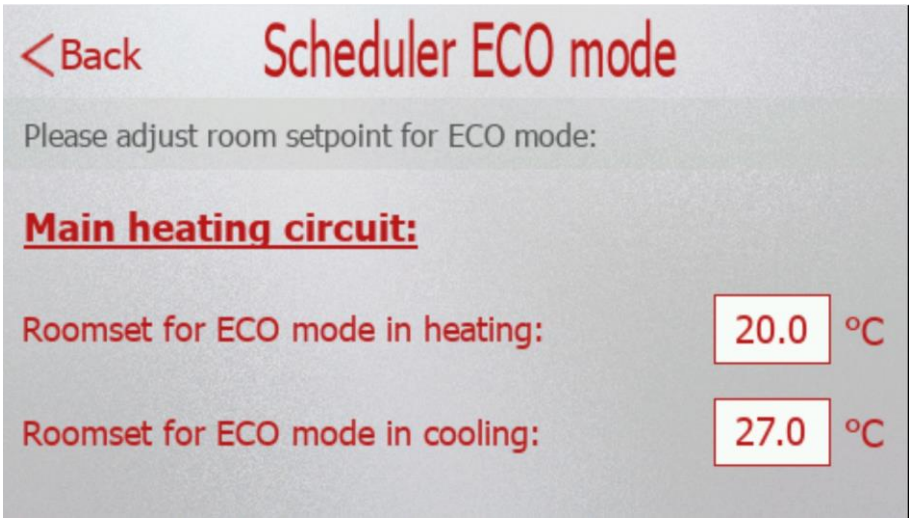


6.7.5 ECO mode settings: Heating circuits



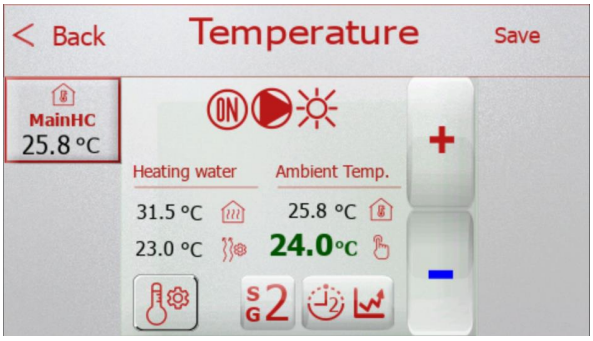
After pressing one of the buttons, you will enter the ECO mode settings page for the selected circuit.

Here it is possible to set the room temperature setpoint during ECO mode, both in heating mode and in cooling mode (if your unit does not support the cooling function, the setpoint value for cooling will not be considered).



6.7.6 Indication of the current mode according to your settings

After assigning the Scheduler to one of the functions (SHW, Main HC, HC1, HC2), in the settings of these functions (for example, the SHW menu or the Temperature section), a button will appear to enter the settings in ECO mode. The button also displays the icon of the current mode and the number of the scheduler assigned to this function. Example below:



6.8 Smart grid

This function is available for SW of controller version 65/165 or higher. SG Ready supports four different operating modes for heat pumps and enables heat pumps to support the grid, have a lower carbon footprint and operate more cost-effectively. This function is available for SW controller version 65/165 or higher. The SW upgrade can be provided by your distributor or service company during a regular or ordered service inspection.

Heat pump control based on Smart grid mode can be realized using 2 digital inputs (dry contacts), writing to the appropriate variable via Modbus RTU or Modbus TCP/IP or using the smart tariff function if this function is available in your country and for your electricity distributor.

6.8.1 Description of smart grid modes

Mode 1

The operation of the heat pump is blocked due to the high price or other influences affecting the convenience of operation.

Mode 2

Normal operation of the heat pump.

Mode 3

Increased operation. The operation of the heat pump is increased due to more favourable conditions for operation (for example, the price of the tariff is lower than usual). The level of room temperature and domestic water temperature is increased to a user-defined value.

Mode 4

Forced operation. The heat pump is forced to operate due to extremely favourable conditions for operation (for example zero or negative tariff price). In this case, the room temperature and the domestic hot water temperature are increased to the maximum level defined by the user. A backup electric heater may also be used during operation.

6.8.2 Enabling and setting up the SmartGrid function

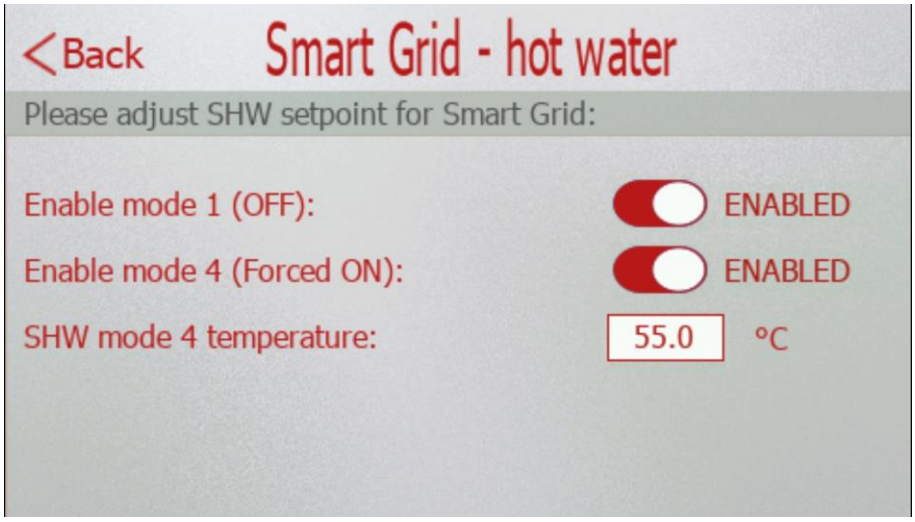
The function can be turned on from the "Settings" menu available after pressing the Heat Pump button from the pGDx home screen. In the scrolling menu you will find the SmartGrid item and in the right part the on/off switch.

If the smart-tariff function is enabled (Agile Octopus, Nordpool API, CZ Market), the smartGrid function is activated automatically together with enabling the smart-tariff function.

6.8.3 SmartGrid user settings

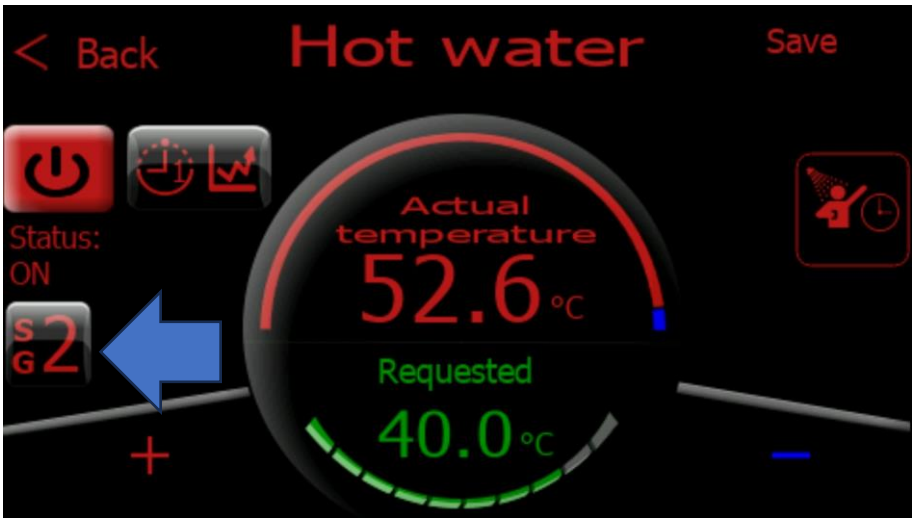
In the settings, it is possible to adjust preferences for the Main heating circuit, heating circuit 1, heating circuit 2 and sanitary hot water.

6.8.3.1 SmartGrid: Sanitary hot water



Here it is possible to enable/disable mode 1 (during which domestic hot water heating is disabled), enable/disable mode 4 (during which the highest possible temperature of domestic hot water is required according to the user limit - the use of a bivalent electric heater is possible) and setting the SHW setpoint for mode 4 (higher than the setpoint for normal operation).

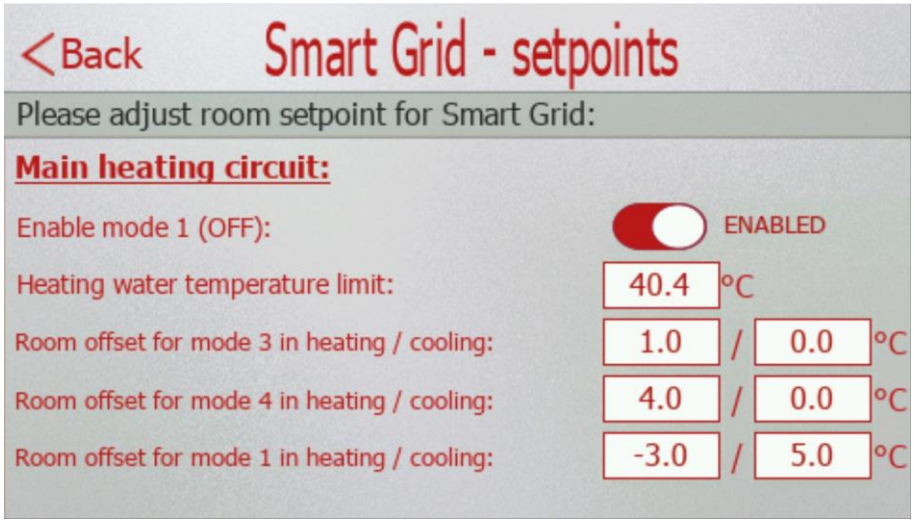
The indication of the current SmartGrid mode is also displayed in the lower left part of the Hot water screen.



At the same time, after pressing this button, it is possible to quickly switch to the settings of the SmartGrid function for SHW.

6.8.3.2 SmartGrid: Heating circuits

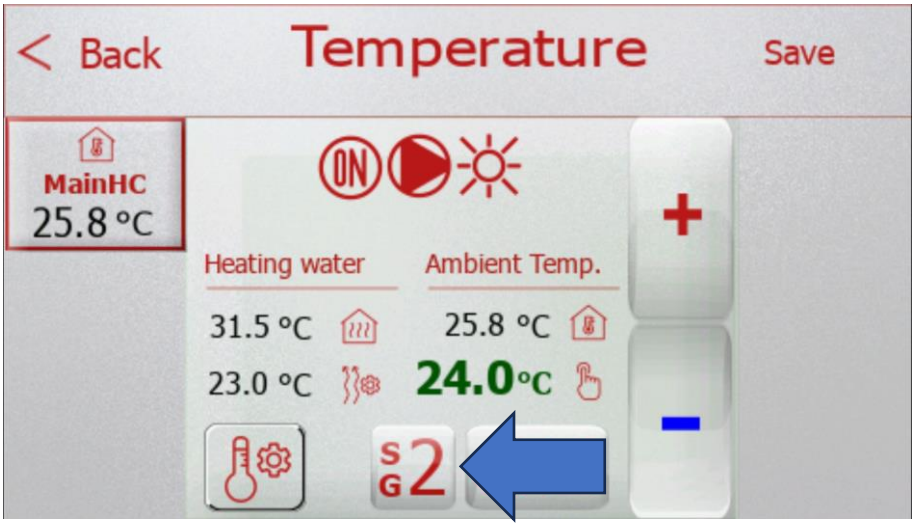
The following setting options are available for setting up the SmartGrid function for the main heating circuit, heating circuit 1, heating circuit 2.



Here it is possible to enable/disable mode 1 (during which heating of the circuit is disabled), adjust the maximum permitted temperature of the heating water of the heating circuit (normally up to 30°C for underfloor heating / higher values can be achieved for radiators), room temperature offset for mode 3 and mode 4 during heating and cooling mode (overheating / undercooling the room by the selected value

in °C), safety offset for mode 1 (off) = if the smartgrid mode is set to 1 for a long time and heating/cooling is blocked, heating/cooling will be restarted after the room temperature is reduced/increased by this value.

An indication of the current SmartGrid mode is also displayed in the lower middle part of the Temperature screen.



At the same time, after pressing this button, it is possible to quickly switch to the settings of the SmartGrid function for selected heating circuit.

7 Temperature

Press **TEMPERATURE** button from home screen.

This page allows normal settings of the heating circuits (including circuits equipped with pAD) and the corresponding equithermal curves, main heating circuit (if no other is active or there is room terminal for main heating circuit enabled), pool and solar. The button for selecting required circuit is only displayed if this function is enabled (for example HC 1 = enabled) in primary setting of heat pump. This button is automatically aligned so that there is no empty space between buttons if it is possible. Currently selected heating circuit (or pool / solar system) is highlighted by a red frame.

7.1 Heating circuits

If you select a button with this icon information about the currently selected heating circuit is displayed.

Figure 24 –HC icon

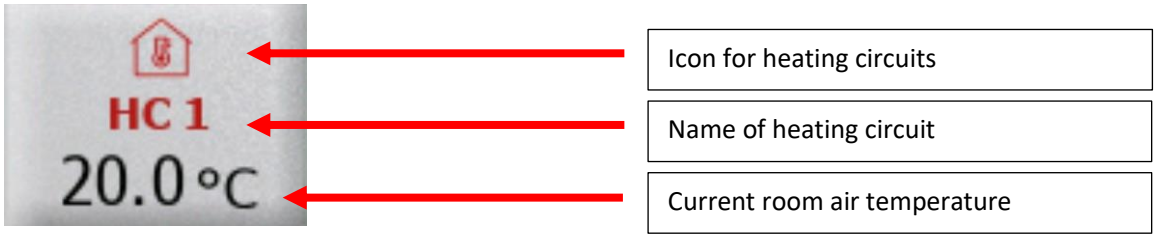


Figure 25 – Description of HC button

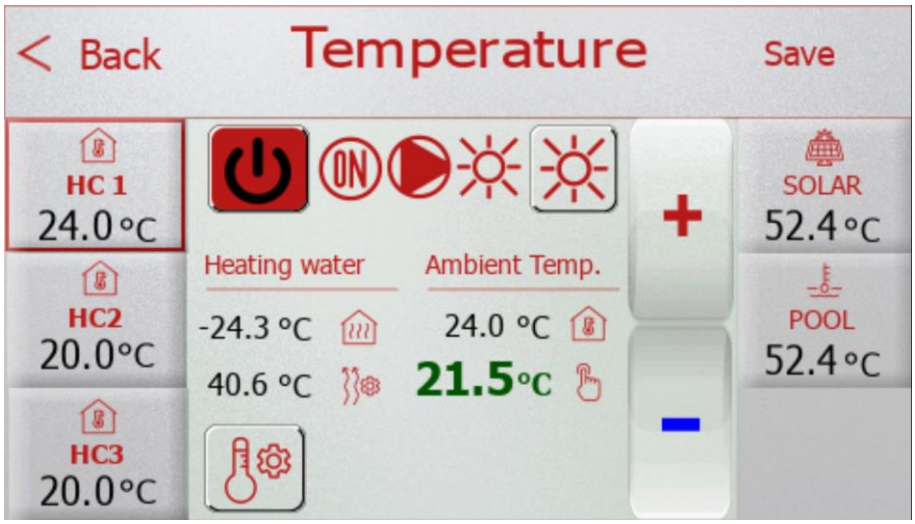


Figure 26 - HC selected

If name of heating circuit is modified in the controller settings, new name is also visible here. The name of heating circuit can also be modified via mobile application.

Different objects (icons, buttons, labels ...) are used for different functions (for example. HC1 vs. SOLAR).

Description of the top icon bar

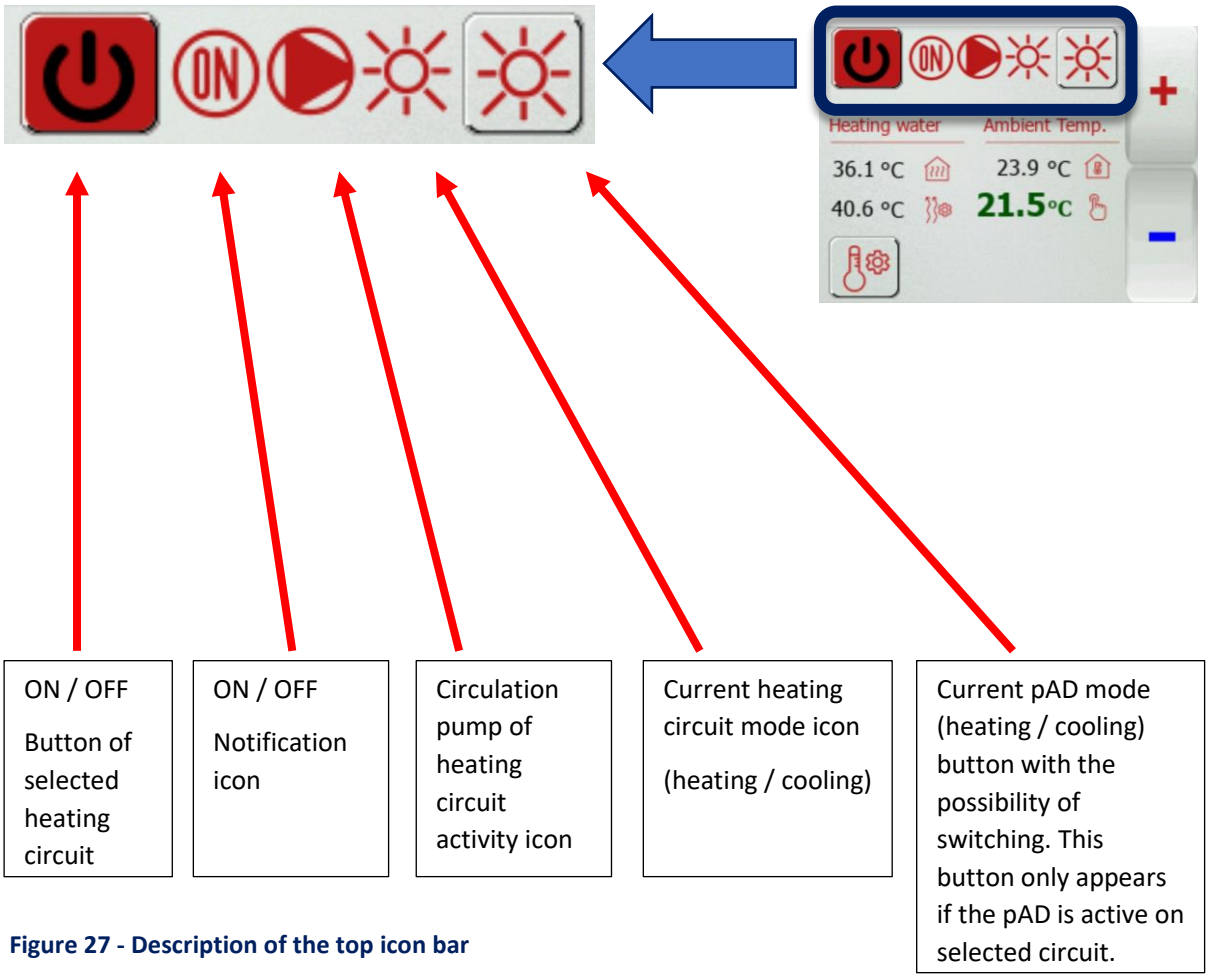


Figure 27 - Description of the top icon bar

How to save changes

After any change of values, the border of "SAVE" button will start flashing in the upper right and it is possible to save changes after press (this will lead to a secure write to heat pump controller).

Figure 28 - How to save changes

Equitherm curve setting for heating circuits

After pressing this button, menu with option to select heating curve or cooling curve (only if cooling function is available) will be expanded

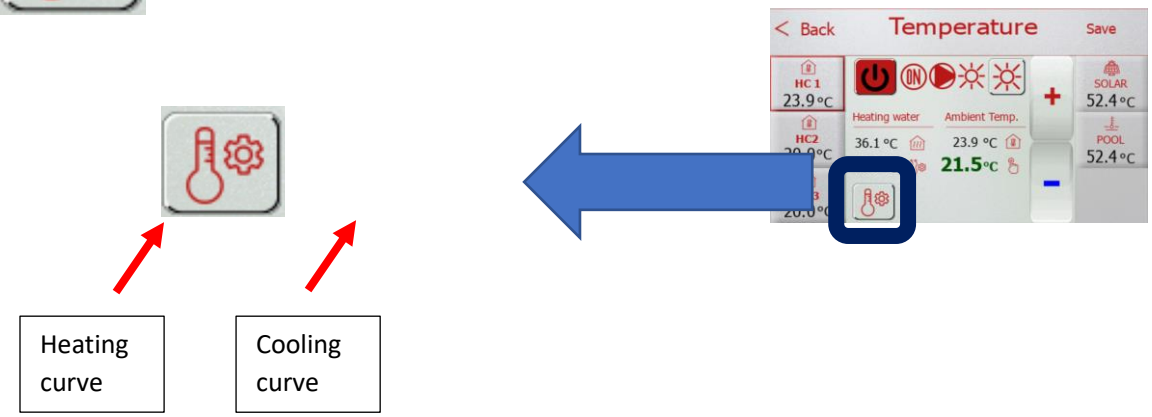


Figure 29 - HC eq. curve setting

Description of icons in the middle of screen

Real heating / cooling water temperature

Requested heating / cooling water temperature

Real ambient air temperature

Required ambient air temperature (can be adjusted using the + / - buttons.)

Figure 30 - Description of icons in the middle of screen

7.2 Pool

If "Pool" function is enabled, button with this icon will be displayed.

Figure 31 - Pool icon

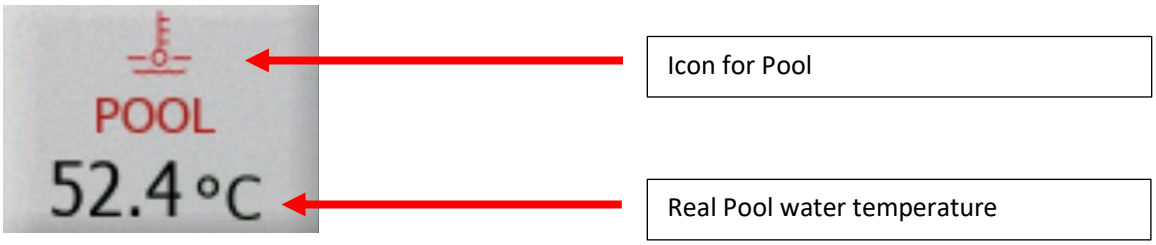


Figure 32 - Description of POOL button

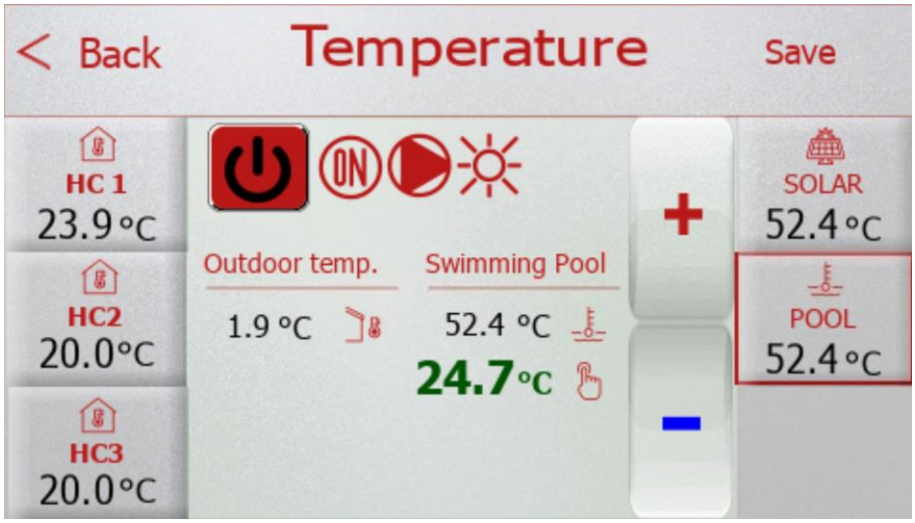


Figure 33 - Pool selected

Description of icons in the middle of screen

Real pool water temperature

Pool water temperature setpoint

Here it is possible to adjust pool water temperature setpoint using the + / - buttons and also to switch the pool heating function on / off

7.3 Solar

If "Solar" function is enabled, button with this icon will be displayed.

Figure 34 - Solar icon

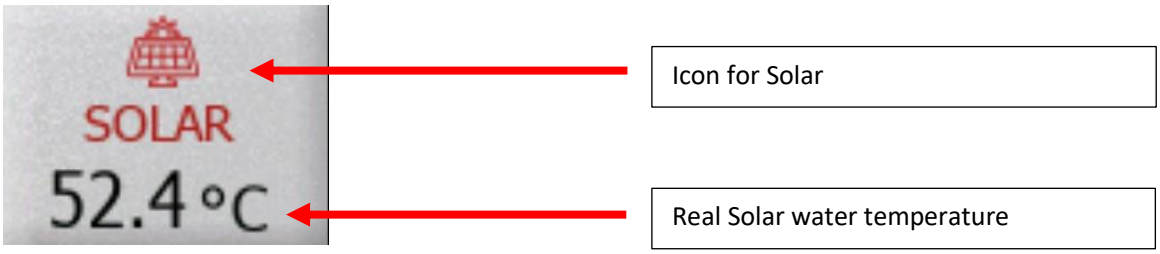


Figure 35 - Description of SOLAR button

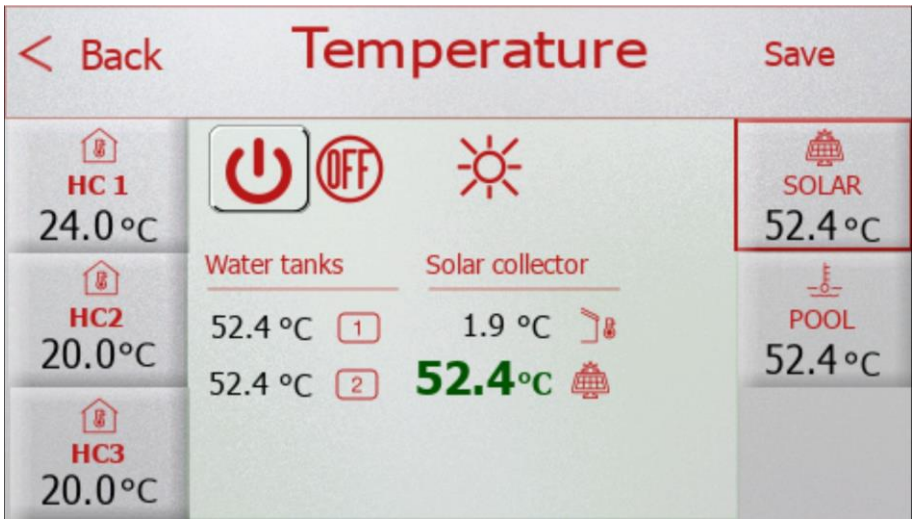


Figure 36 - Solar selected

Description of icons in the middle of screen

Real Solar Panel temperature

Real Storage Tank water temperature charged by Solar Thermal system.

Real Storage Tank no.2, or additional demand side water temperature charged by Solar Thermal system. This value is shown only, when Storage Tank no.2 or additional demand side is configured (an example Swimming Pool)

8 Sanitary hot water

Press HOT WATER from main screen

Figure 37 - Hot water

This page allows graphical display of SHW values (setpoint, real temperature, ON/OFF state).
The lower left and right part (+ / -) is used to set requested temperature.

Setpoint (requested) and real (actual) temperature is graphically displayed on centrally located indicator.
In the left part, we can turn ON / OFF SHW function. Values are saved after pressing "SAVE" button.

Switching on the function of forced priority heating of domestic hot water. After pressing this button, SHW heating will be switched on for a limited time (by default 2h) immediately when temperature drops below required level (setpoint + hysteresis).

8.1 Antilegionella function

Press this button from **Sanitary hot water** page

This page allows you to choose frequency (daily or selected day of the week), time and duration of the **Antilegionella** function.

This page is only displayed if this function is enabled.

During operation, temperature of sanitary hot water is increased to 60°C or more (in the last stage of heating with the help of an electric heater).

9 pGDx touch settings

Long press HEAT PUMP from main screen

On this page, it is possible to change basic settings of pGDx touch device, PV ModBus TCP/IP connection, QR section, restart pGDx touch runtime and enter "Advanced access" section (if you enter password for secure access).

The current SW of the pGDx touch device (for example SW 1117) is displayed at the top right.

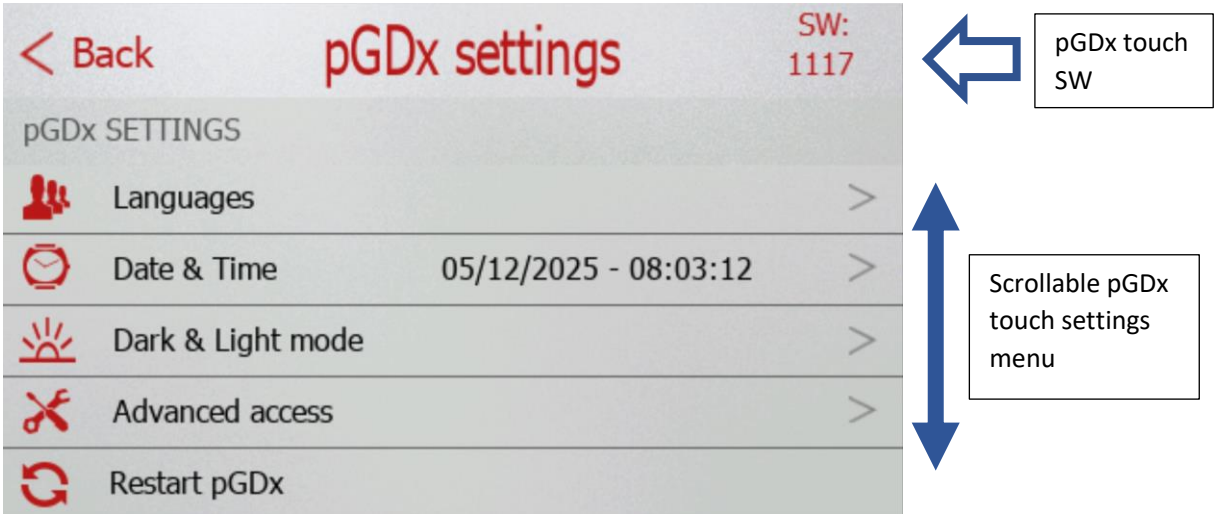


Figure 38 - pGDx touch settings

9.1 Languages

On this page, it is possible to change language.

A graphical user interface (GUI) is currently available in English, Czech, German, French, German, Polish, Estonian, Dutch, Ukrainian, Hungarian, Slovenian, Italian, Lithuanian).

If you are interested in adding other languages or have comments on current translations, please contact us and requirement may be implemented in future SW versions. In this case, we will probably need to help with translation from you.

After selecting language as required, user is redirected to main screen. This completes language change.

Figure 39 - Languages

9.2 Date & Time

Here you can choose your region and time zone for time synchronization or set your time manually.

Time zone is used for accurate online time synchronization. This is necessary when transferring data between server and pGDx touch to verify validity of communication and data. Time synchronization is also necessary, for example, for the correct functioning of Schedulers according to user expectations.

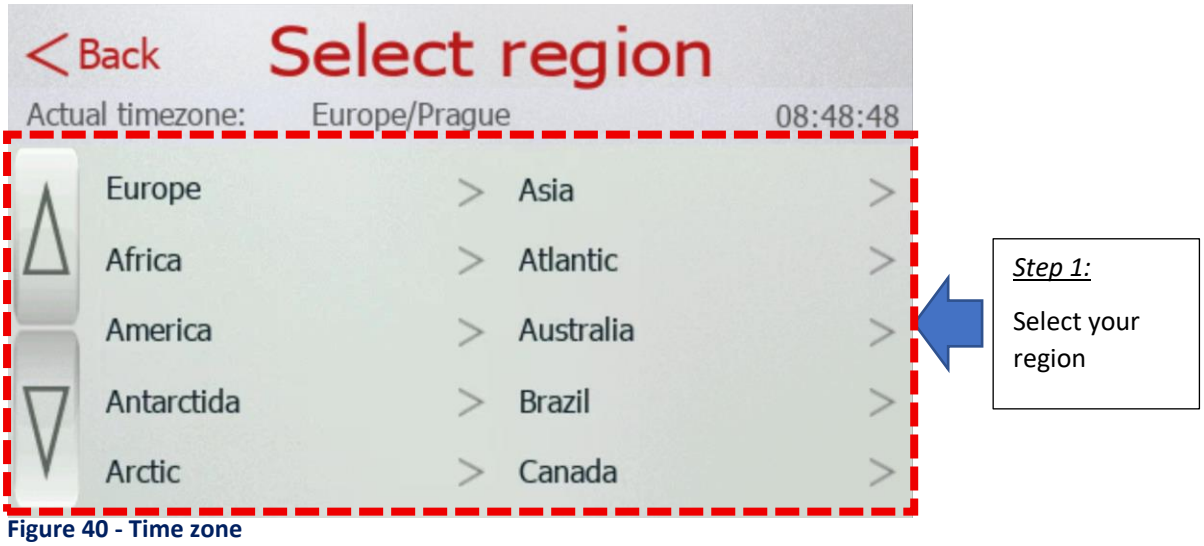


Figure 40 - Time zone

Step 2:

Select your timezone

If it is necessary to set the time manually (for example, the device is not connected to the Internet), this can be done by pressing the area with the current time displayed in the upper right.

Possibility of manual time setting. Confirm with OK button.

9.3 Dark & Light mode

On this page, it is possible to set change of colour composition of whole user interface to "**Dark**", " **Light** " or "**AUTO**" automatically (according to required time) switched mode. Default mode is AUTO.

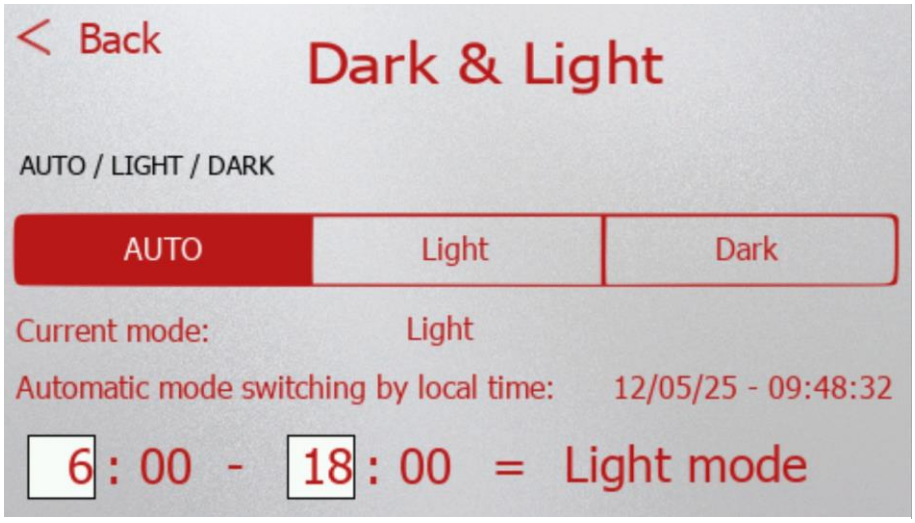


Figure 41 - AUTO selected

Figure 42 - Dark selected

9.4 Restart pGDx touch

It allows restart pGDx touch.

After pressing "**Restart pGDx touch**" button, a dialog will be displayed to confirm whether you really want to restart pGDx touch. If you confirm pGDx touch will be restarted.

Figure 43 - Restart pGDx touch

9.5 Advanced access

This menu is for advanced service settings for which a certified service company is responsible.

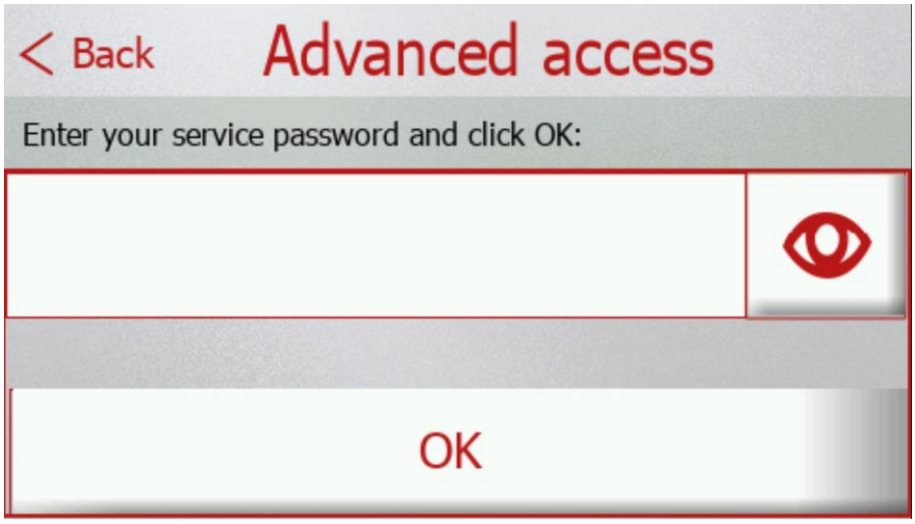
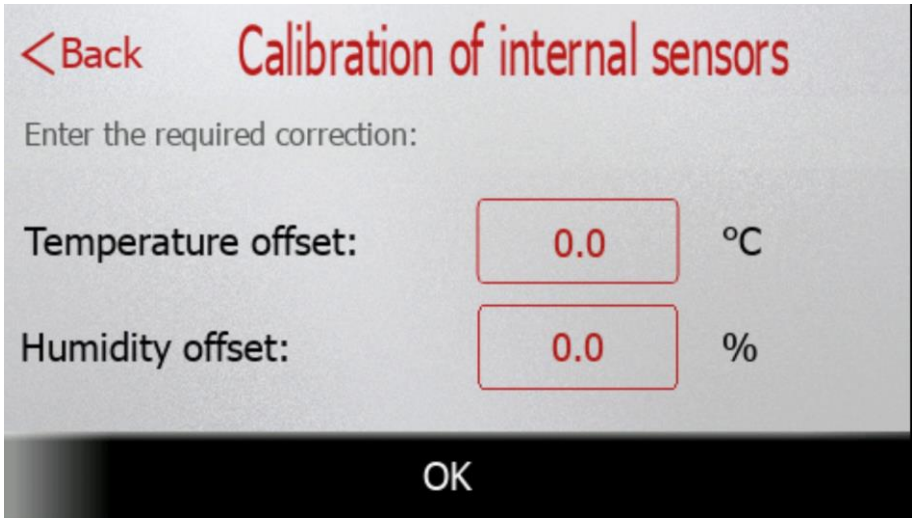


Figure 44 - Advanced access

This menu is protected by a service password and settings should only be made by a qualified person, as they may affect the stability of this device.

9.6 Calibration of internal sensors

Here, it is possible to calibrate the pGDx touch's internal sensors (temperature and humidity) if required. Calibration of the sensors should only be performed by a responsible service technician using accurate temperature and humidity meters to determine the true deviation of the measured values.



After entering the temperature / humidity correction, press the OK button to confirm and then redirect to the home screen.

Figure 45 - Calibration

9.7 Display brightness

On this screen, it is possible to select one of the ten preset backlight intensities of the display.

Figure 46 - Display brightness

9.8 Screen lock

This page is used to secure access to control system using the entered (or default) code. If the function is activated, no settings can be made without entering security code. Only home screen is displayed without the possibility of entering other menus. After a long press on the touch screen, the user is prompted to enter the security code.

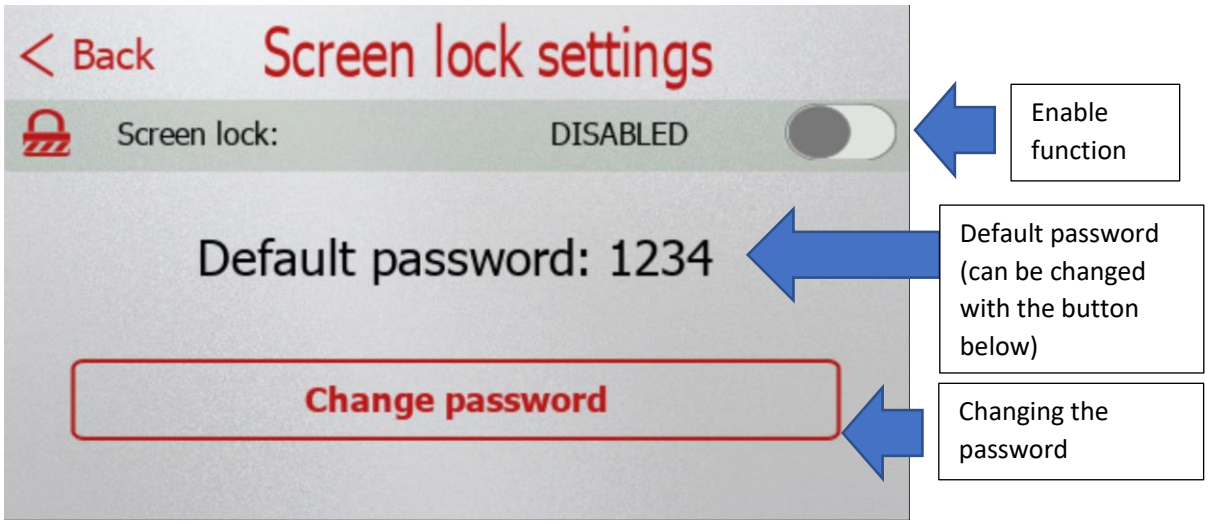
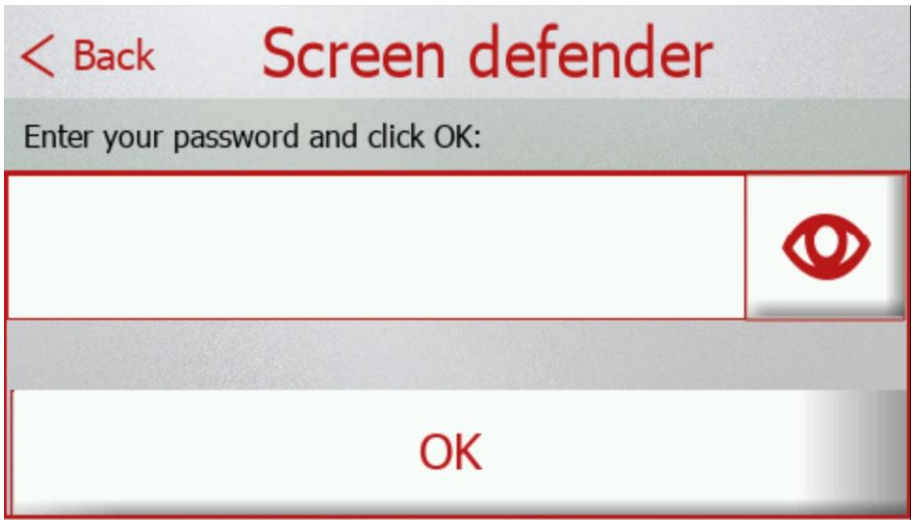


Figure 47 - Screen lock, main screen

The screen is locked. When you tap the screen, the home screen darkens and the lock icon appears. In case of a long press, the user is redirected to the page for entering the password.

Figure 48 - Screen lock, locked screen



Enter your password in the text box and press OK to unlock.

Figure 49 - screen lock, enter password

9.9 QR codes

In QR codes section it is possible to display links in QR format for User online self-registration, downloading current version of the user manual for pGDx touch and mobile (or web) applications.

9.9.1 Self-registration for online control of your heat pump

(This page can also be accessed by long pressing the Help button from the home screen.)

To register, please scan the QR code with your cell phone or copy the URL address at the bottom of the screen into your web browser. Then follow the instructions displayed.

Self-registration is blocked for security reasons after the first successful user registration.

9.9.2 Remote control

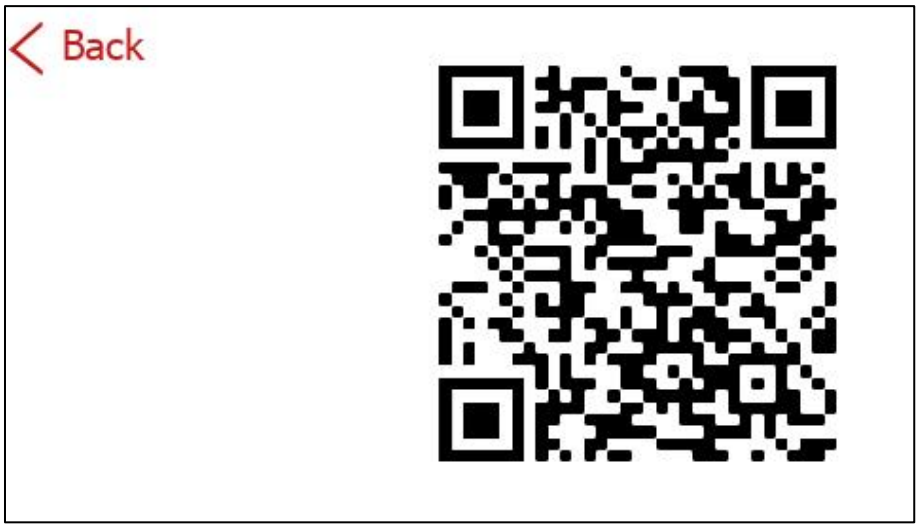
Possibility to display QR code for iOS / Android / Web application for remote control of the heat pump.

Figure 50 - QR codes, remote control

9.9.3 Actual user manual

QR section dedicated to manuals.

Figure 51 - QR codes, manuals



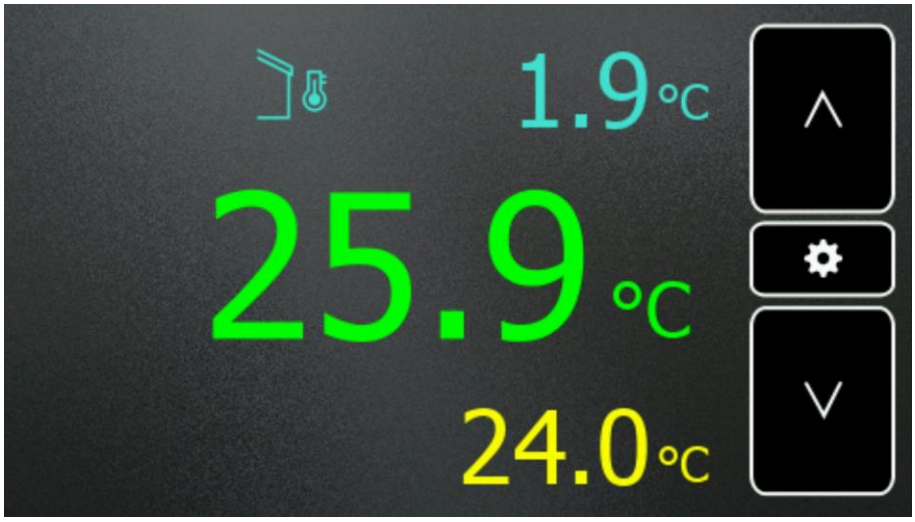
QR code example (download iOS mobile application)

Figure 52 - QR codes, example

9.10 Home screen simplification

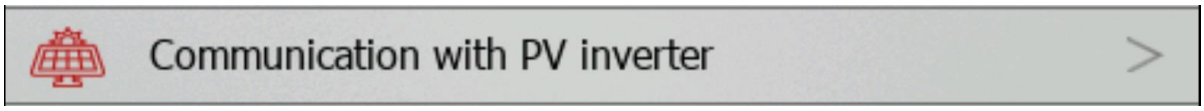
The function is intended for simple setting of the required room temperature (for example for seniors).

- If this feature is enabled, the simplified screen becomes the home screen
- The required air temperature is entered into the heating circuit to which the pGDx is assigned automatically 5 seconds after the last press of the up (+) or down (-) arrow
- Using the button in the middle, the user can go back to the (unsimplified) home screen for a full setup option (a quick return back to the simplified home page can be done with a long press of the **Home** button)

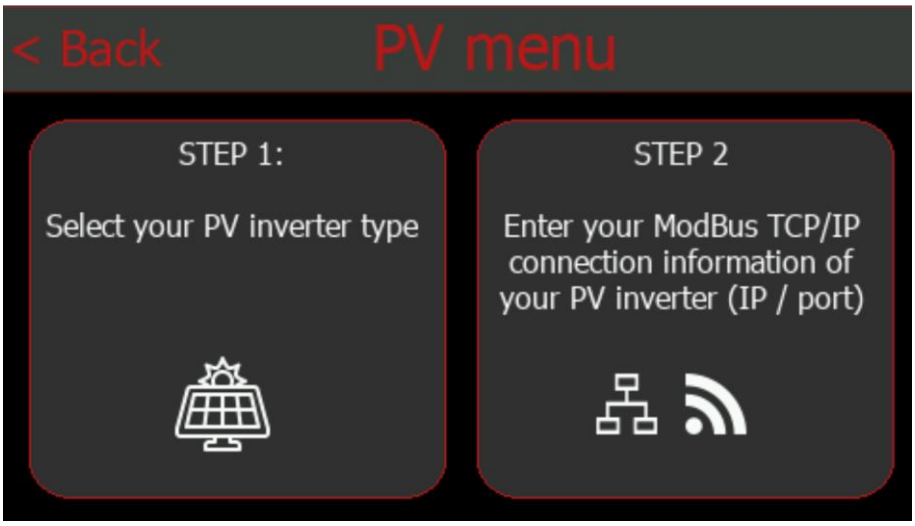


The outdoor temperature, indoor air temperature and desired indoor air temperature are displayed on the screen. Use the up and down arrows to set the value of the desired temperature (in yellow).

9.11 Communication with PV inverter



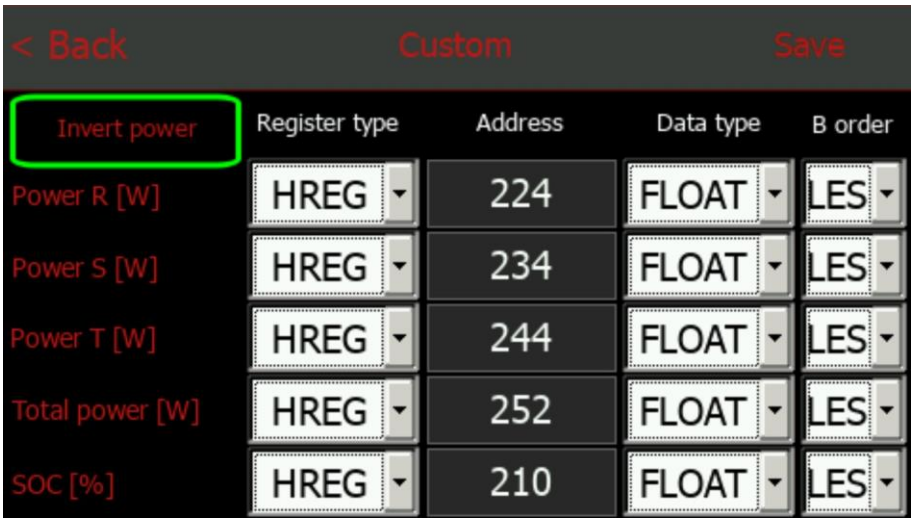
Beta version for the possibility to test the ModBus TCP/IP communication between the pGDx display and your PV inverter. The feature is currently under development and this version contains several preset addressing options according to the manufacturer. In the next versions, the function will be expanded and supplemented with a connection to the SmartGrid functionality for controlling the operation of the heat pump according to the current performance of your photovoltaic power plant.



The first step is to select the PV inverter type (GoodWe, SolarEdge , Solax, Solinteg and Kostal is available in this version) or manually enter ModBus TCP/IP addresses:

After changing the inverter type, the pGDx will reboot to activate the addressing modifications.

If the preset of your inverter is not yet available, it is possible to enter the address manually and possibly also modify the register type, data type, Byte order. It is also possible to modify / invert the data processed by the controller - **positive power value should mean generated power and negative power value consumed power -> this is a prerequisite for the heat pump's SmartGrid logic to function properly.**



9.11.1 Changing the byte order for 32-bit registers

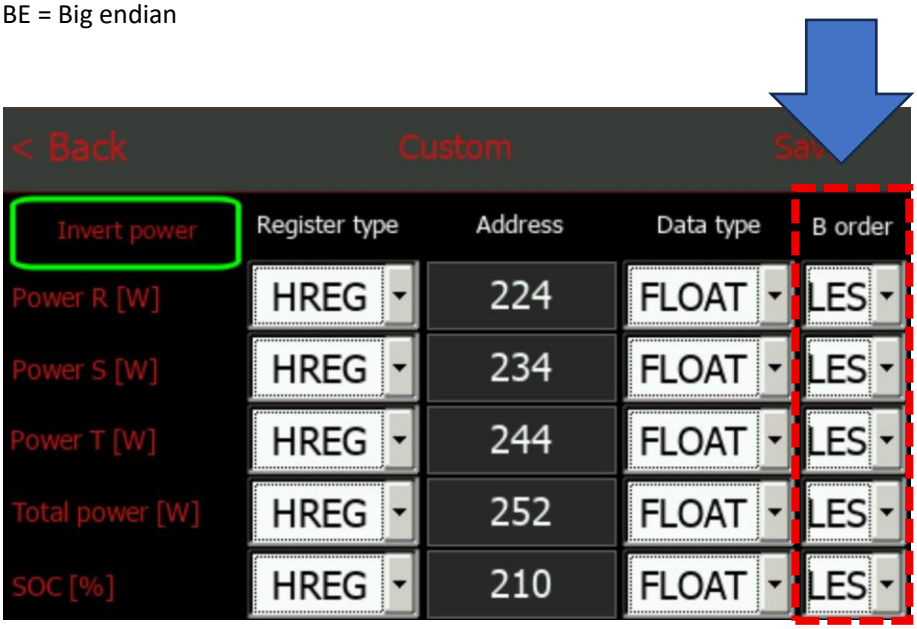
Options:

LES (default) = Little endian swapped

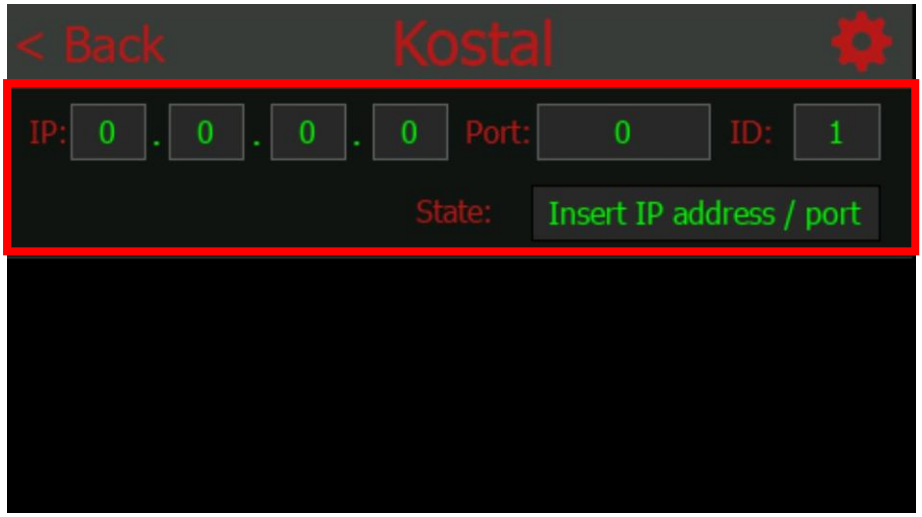
BES = Big endian swapped

LE = Little endian

BE = Big endian



After selecting inverter type (or manually entering the addresses), it is possible to continue to "STEP 2" and enter the parameters (IP address, port (typically 502 or according to your inverter type and settings), Node ID (typically value 1 or according to your inverter type and settings)) to establish ModBus TCP/IP communication. After entering, confirm with the OK button (The OK button is displayed after entering the IP address).



After successful connection following screen with real inverter data is displayed:

10 Network

On this page, it is possible to set up an Internet connection, manage APIs (applications for communication with remote servers), test your internet connection and our cloud server availability.

- This page is accessible from Home screen by pressing one of the connection icons:

Figure 53 - Icons on main screen to enter this page

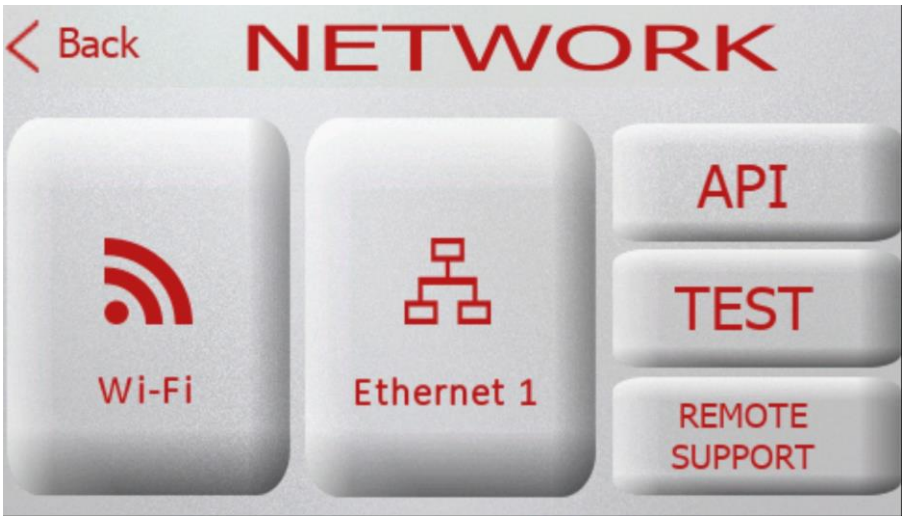


Figure 54 - Network menu

As you can see on the screen above, there are three buttons to choose from to enter each submenu:

- **Wi-Fi**
  Wi-Fi basic and / or advanced screen for Wi-Fi network connection is available
- **Ethernet 1**
  Ethernet connection settings
- **API**
  Applications for communication with remote servers such as latest SW updates, Octopus smart grid application (UK), Weather API for remote outdoor temperature according to GPS location. Applications under development or in testing phase…
- **TEST**
  An application designed to test your network connection in case of problems. The text output can be photographed and sent to your local Mastertherm distributor.
- **REMOTE SUPPORT**
  A page dedicated to advanced options for remote diagnostics of your heat pump.

10.1 Wi-Fi connection

On this page, it is possible to connect to a WiFi network.

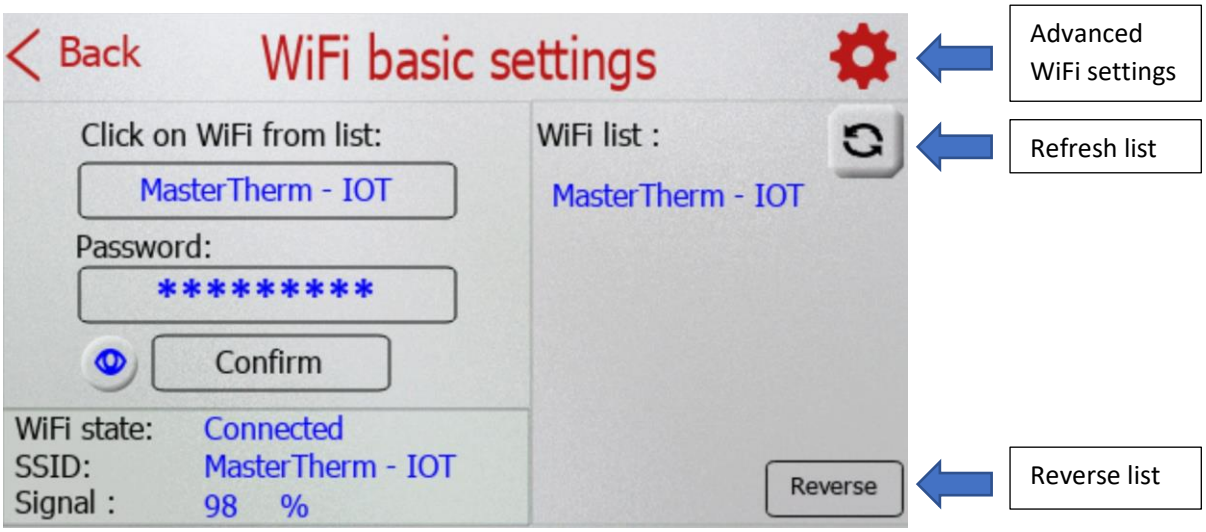


Figure 55 - WiFi connection

Follow these instructions to connect:

1) **Select (press) required WiFi network** to connection from list on right
   (If WiFi network is not displayed, you can use refresh button to refresh WiFi list)
   (requirements: 2.4GHz and WPA2 encryption with password)
2) **Enter password** (press password text field to display graphic keyboard)
3) **Press Confirm** and wait until "**WiFi state**" at the bottom left changes to "**Connected**"

If advanced settings are needed then please press advanced WiFi settings button on the top right.
Following screen will be displayed:

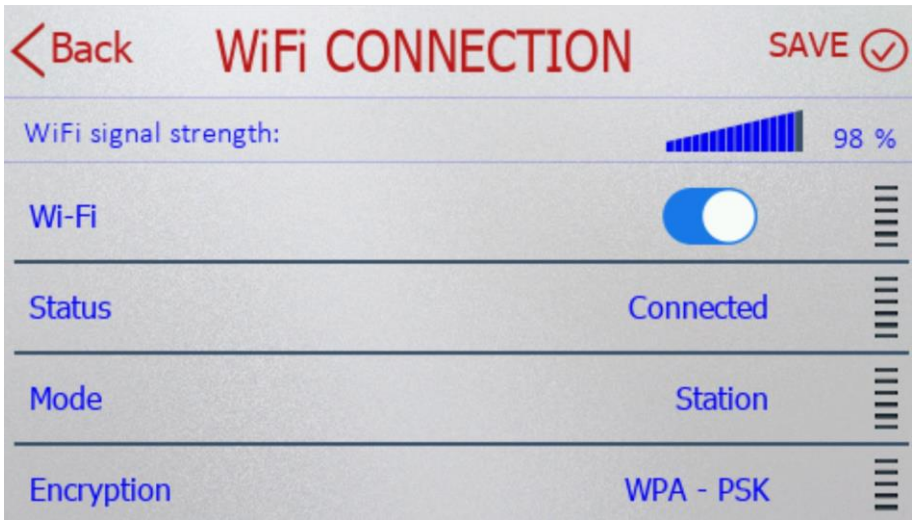
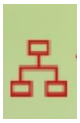


Figure 56 - Advanced settings

10.2 Ethernet connection

If you are using Internet connection via Ethernet cable and DHCP, just connect eth. cable and everything should work.

On main screen ethernet icon will be displayed: 

If you want to configure ethernet connection manually press Ethernet button in Network menu.
(after disabling DHCP, it will be possible to enter the parameters manually)

Following screen will be displayed:

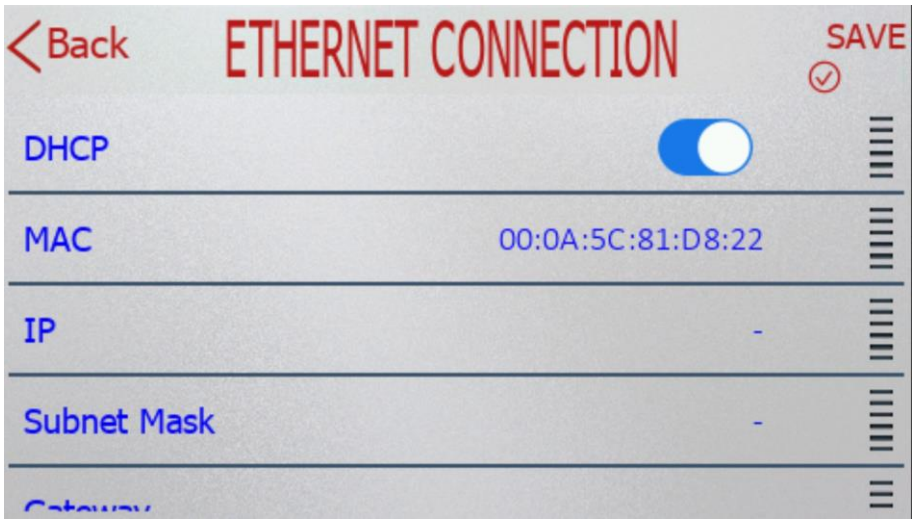
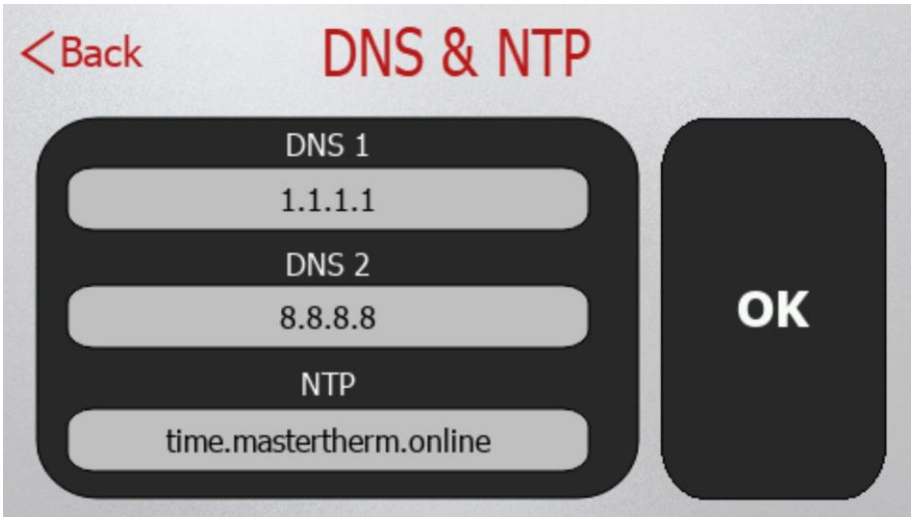


Figure 57 - Ethernet connection

10.3 DNS & NTP settings

If you want to manually configure the DNS or NTP server (with DHCP turned off) It is possible to modify the DNS server after entering the relevant page via LONG PRESS of the Wi-Fi or Ethernet 1 button.

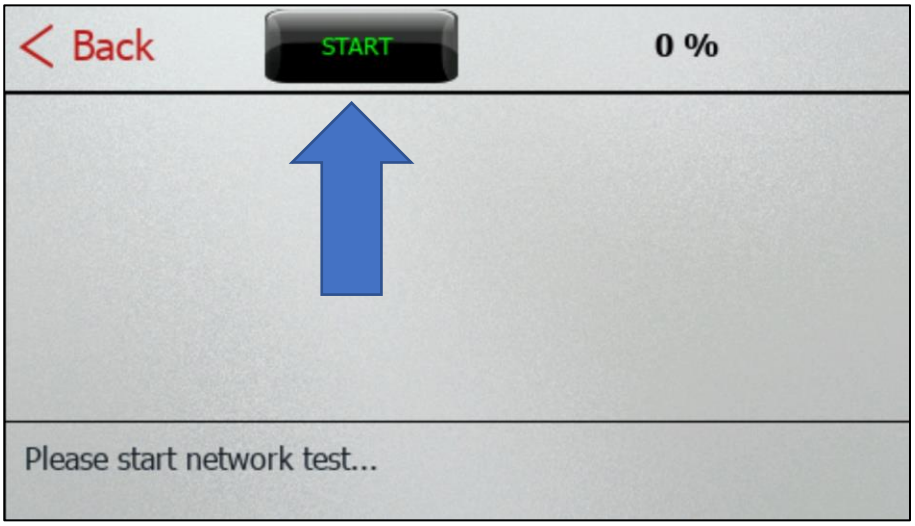


Enter the IP address of the DNS server (+ alternative DNS server) and confirm with OK.

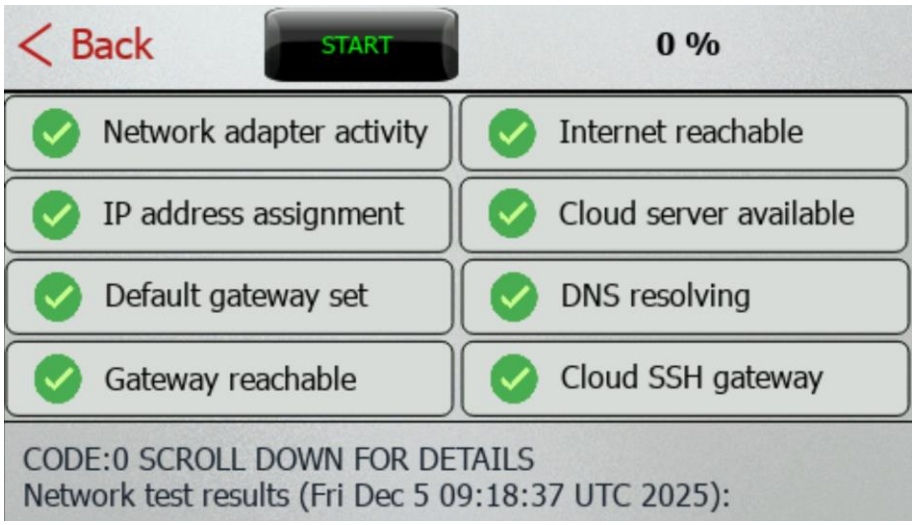
Enter NTP server if necessary.

10.4 TEST

An application intended for network connection diagnostics. After pressing the "**TEST**" button, the Internet connection test and the communication test with our cloud server will be performed.



Below is an example of the text output if the connection is OK.

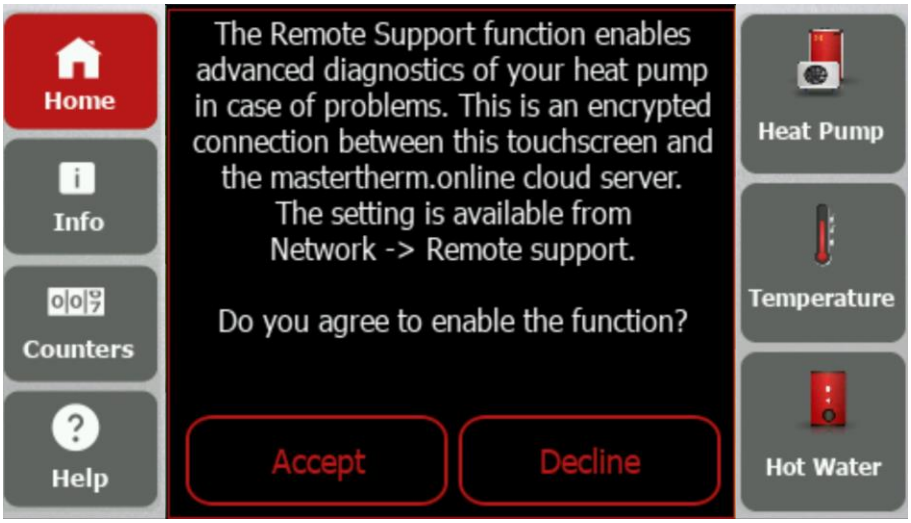


The connection is tested step by step from the local network to the services on our Cloud server. This allows you to find out exactly what the problem is.

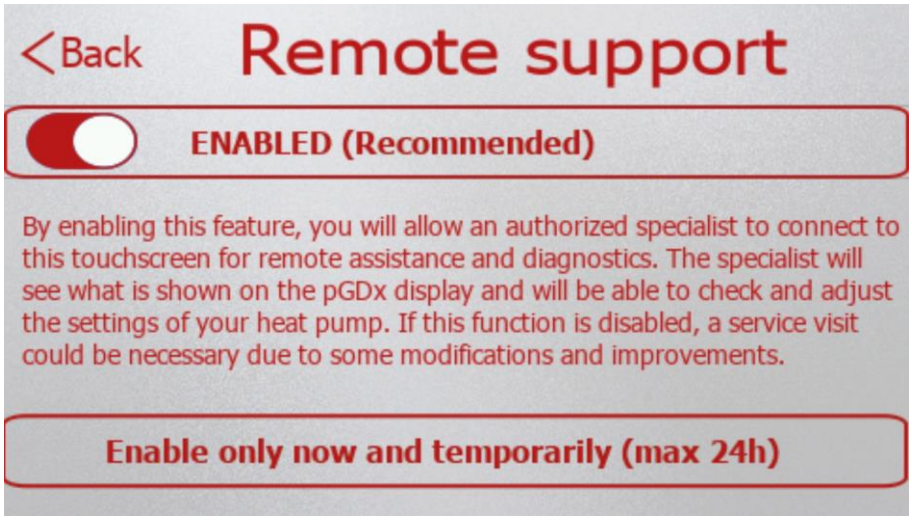
= OK = Problem

10.5 Remote support

From pGDx Touch SW version 1114, a function is available that allows advanced diagnostics of your heat pump by an authorized specialist in case of user consent.



If you agree to the dialog (displayed after updating to version 1114), an authorized specialist will be able to perform advanced diagnostics in case of problems and securely connect to this display and work as if he were standing right in front of it. In case of rejection, it is possible to enable the function in the future or create a secure connection by pressing the appropriate button on the pGDx once.



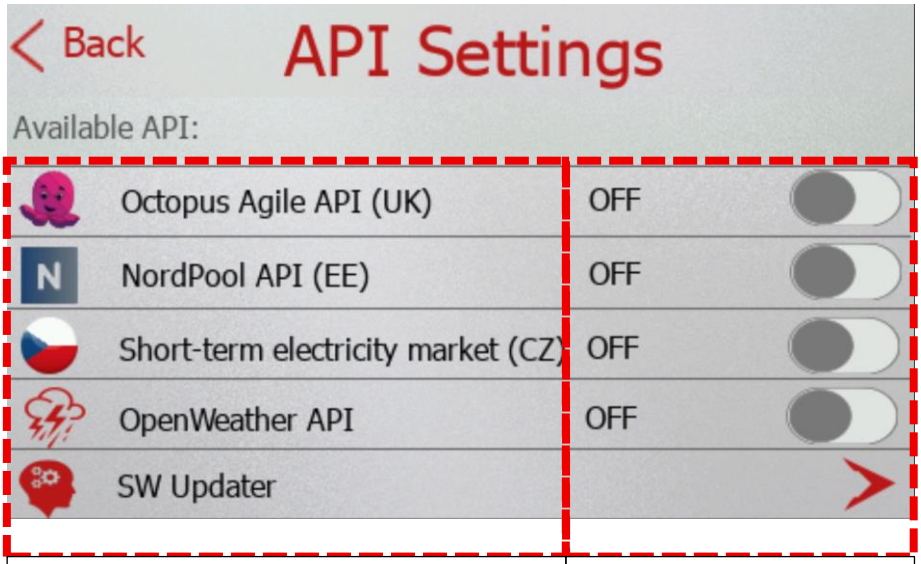
If the feature is **ENABLED**, an authorized technician can connect whenever adjustments, checks or improvements are required.

It is also possible for the customer to start a temporary secure connection manually using the button below, even if the function is disabled.

If the green indicator is flashing, the connection is currently active.

10.6 API

Applications for communication with remote servers such as latest SW updates, Octopus smart grid application (UK), Weather API for remote outdoor temperature according to GPS location.
Applications under development or in testing phase…



Area for entering settings for the selected function	Area for enabling/disabling selected function

On this page, it is possible to enable / disable API:

- Octopus (UK)
- NordPool (EE)
- CZ Market (CZ)
- OpenWeather

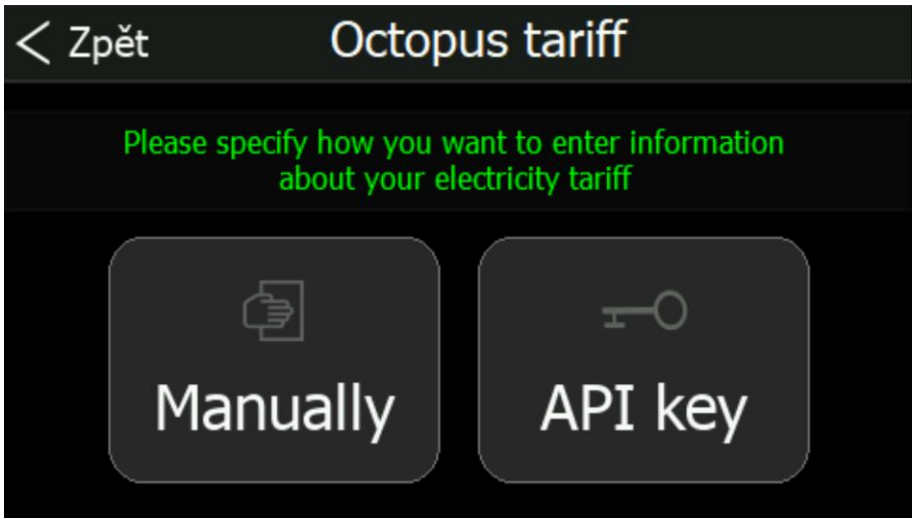
+also back up user's settings or check updates in SW updater section

Figure 58 – API settings

10.6.1 Octopus Agile API (UK)

By turning on the Octopus Agile function, the control of the heat pump will be enabled based on the SmartGrid function in combination with the current tariff price downloaded from the remote server of the electricity distributor.

When the function is enabled, the user is first redirected to the page for specification of tariff:



The current tariff can be specified in two ways.

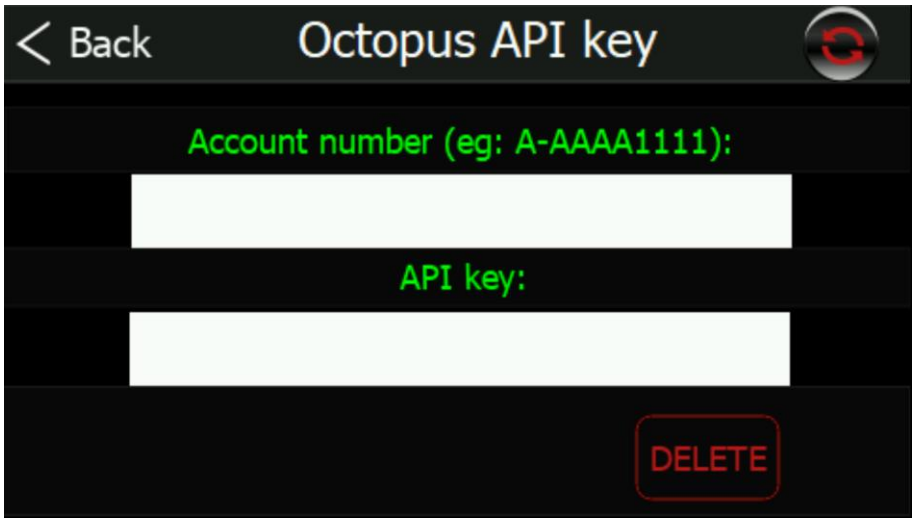
10.6.1.1 Specifying the tariff manually

If you wish to specify the tariff manually, please select the name of the tariff and your region (GSP).

After pressing the CONFIRM button, your selection will be saved and the first data update will occur within a few minutes. If you choose this tariff specification option, you must keep in mind the validity of your contract with the energy supplier and, in the event of a tariff change, also change it in the pGDx settings.

10.6.1.2 Specifying the tariff using API key

Here it is possible to enter the data for the connection generated by the application of your electricity distributor.

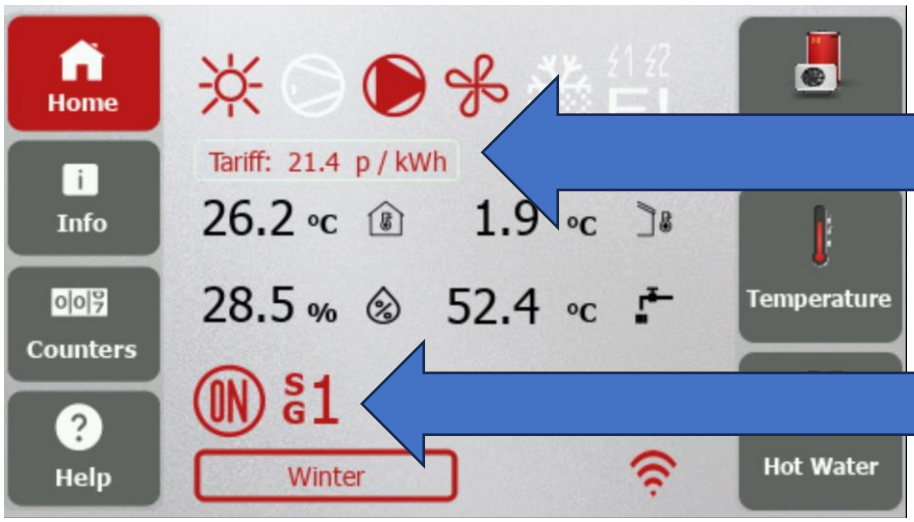


After pressing the CONFIRM button, your selection will be saved and the first data update will occur within a few minutes. If the entered data is correct, a green indication is displayed in the right part of the screen:

10.6.1.3 The logic of the heat pump operation function according to the current price

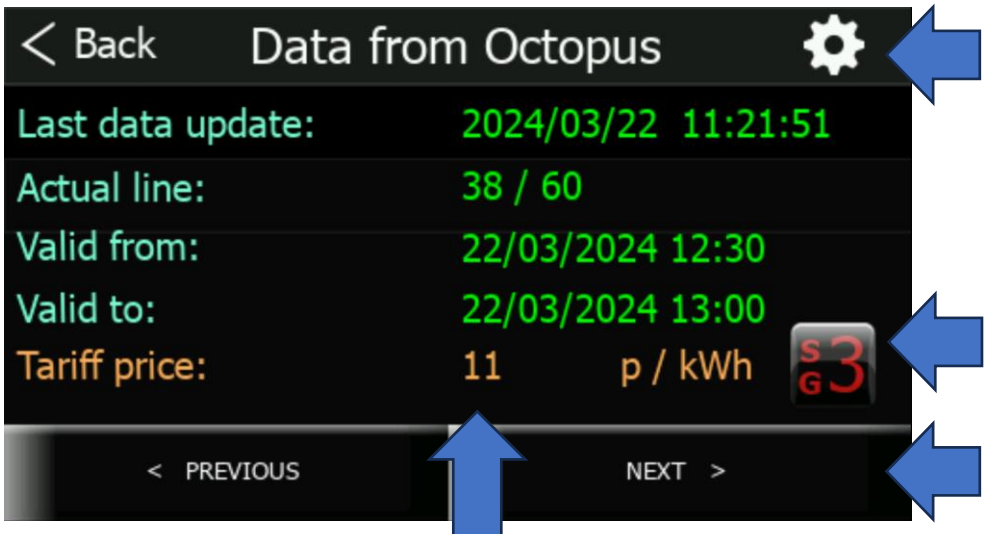
Every day, query is made to remote server and then data (electricity tariff price list) is processed for 30 hours. Data can then be displayed from GUI (price list browsing), current tariff price is displayed on main screen according to time, etc. If function is enabled and data updated, it is possible to see current price of tariff on main screen and after pressing it, go to a more detailed API setting.

API screens are shown below:



After pressing "price of tariff", you will be redirected to a page with more detailed settings.

SmartGrid indication



Advanced settings

Smart Grid mode value assigned to the price currently displayed in

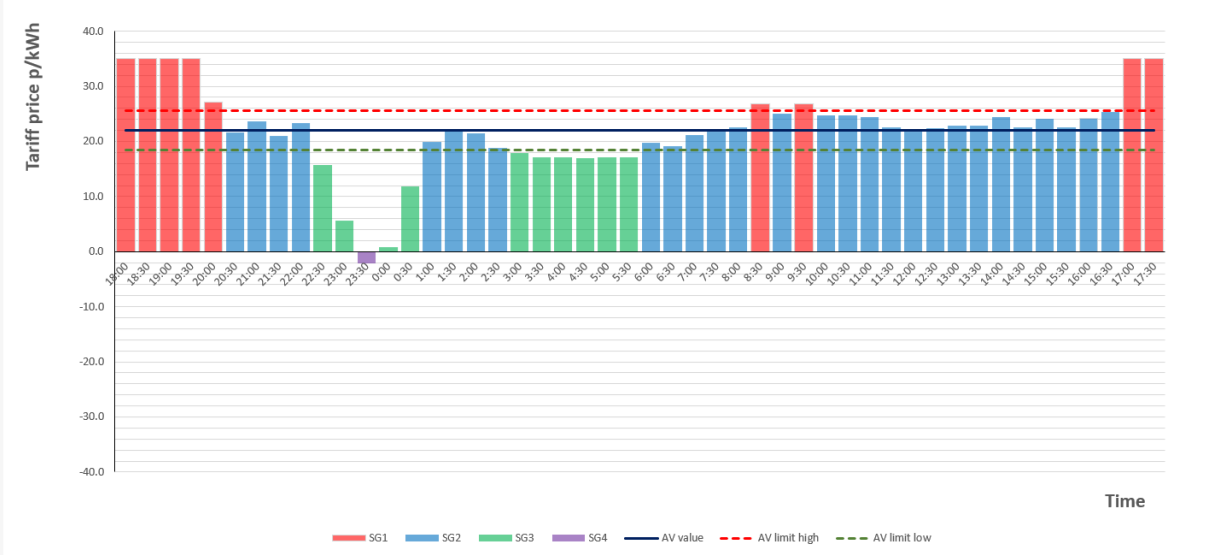
Buttons for scrolling in price list

Tariff price according to selected time

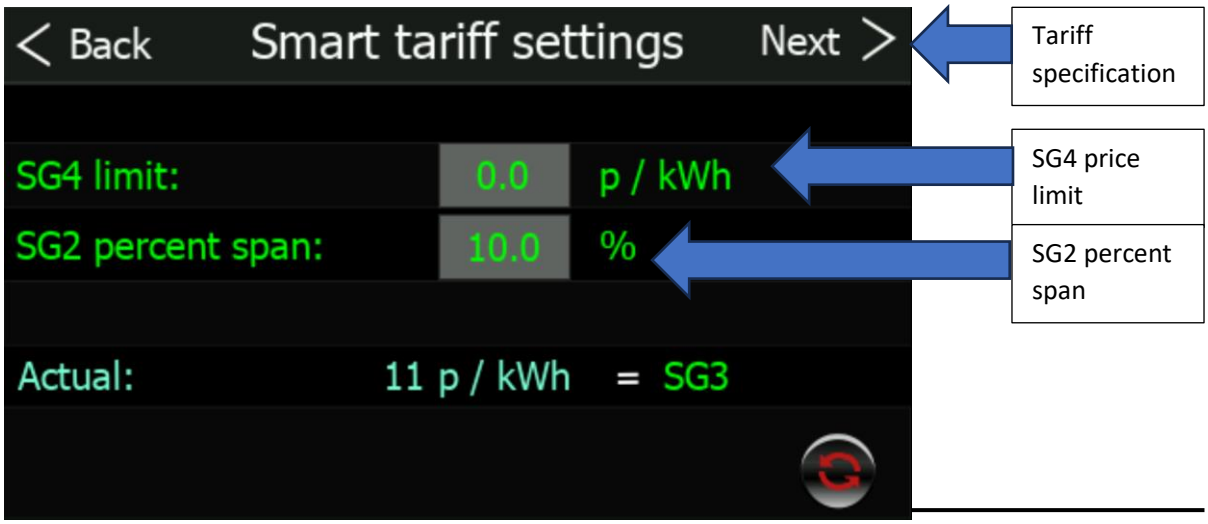
This page provides user with an overview of current, past and future electricity tariff prices using a regularly updated price list. After pressing "Advanced settings" button in the upper right corner of screen, we are redirected to more detailed settings.

The SmartGrid function distinguishes 4 possible operating states of the heat pump depending on the price (or the signal from the superior control). Please read chapter SmartGrid for more information on the SmartGrid feature.

- pGDx queries the server every day for new data regarding the price of the tariff
- The data is processed and the current price level for the whole day is calculated
- Furthermore, each price from the price list is compared with the others and assigned to a mode according to SmartGrid
- After performing the entire operation, the data is displayed to the user and the current SmartGrid mode is transferred to the heat pump controller
- The heat pump works according to the SmartGrid settings

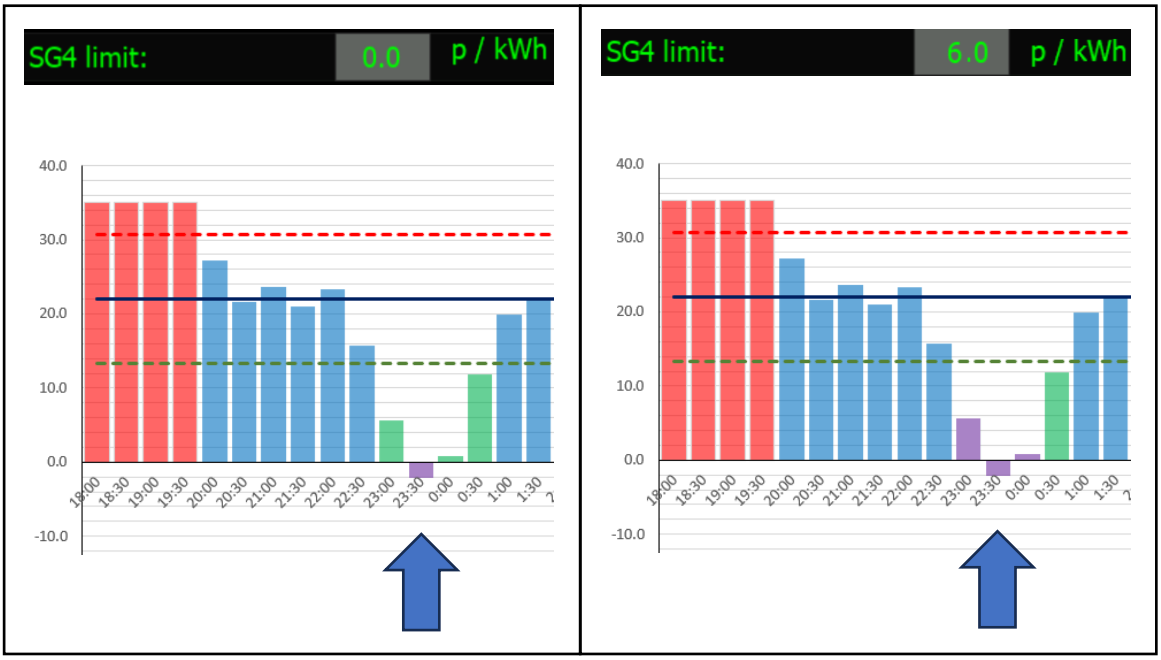


What can a user modify?



SG4 limit

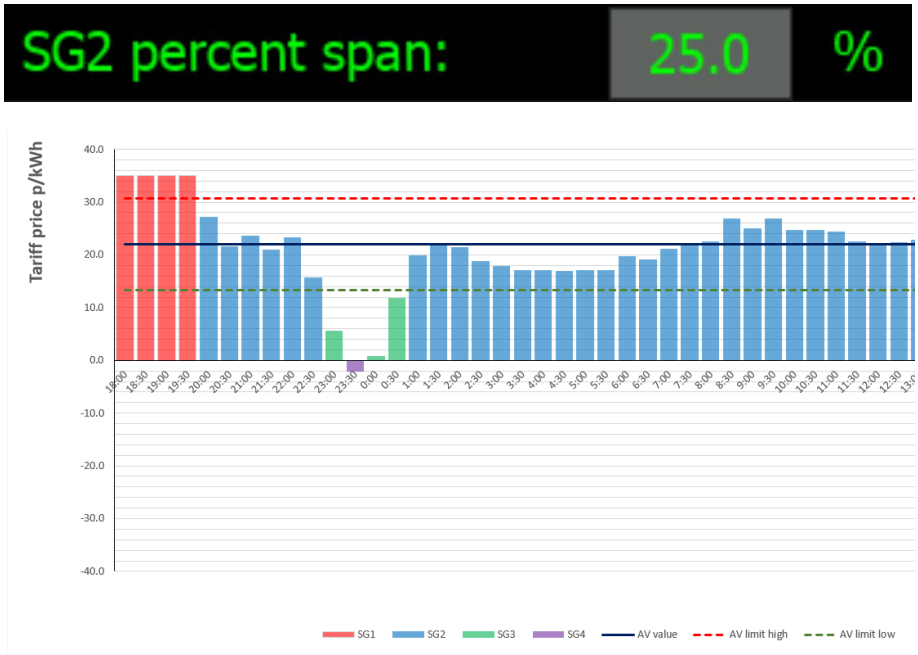
If the tariff price is lower than this value, the time period will be assigned to SG4 mode (default value is 0 p/kWh).



SG2 percent span

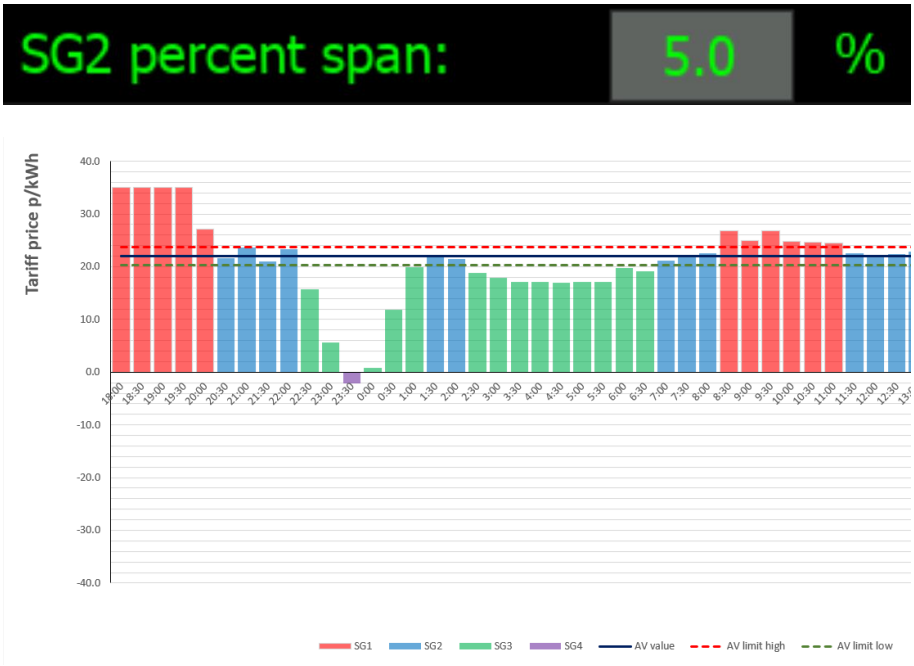
Is range of the total price range in percent for the SmartGrid mode 2 assignment.

EXAMPLE 1



A higher value means more time slots in normal mode (SG2) – in the picture on left in blue.

EXAMPLE 2



A lower value means a stricter division into SG4, SG3 and SG1 mode.

10.6.2 NordPool API (EE)

The logic of the function is identical to the Octopus Agile API, the only difference is that the data is (in this first beta version) collected directly from the Estonian stock exchange. When this function is enabled, the user no longer enters the details of his tariff using an API key, etc. The price is displayed in euro cents.

10.6.3 Short-term electricity market (CZ)

The logic of the function is identical to the Octopus Agile API, the only difference is that the data is (in this first beta version) collected directly from the Czech stock exchange. When this function is enabled, the user no longer enters the details of his tariff using an API key, etc. The price is displayed in crowns.

10.6.4 OpenWeather API

USE OF THIS FUNCTION IS ONLY POSSIBLE FOR BRINE-WATER UNITS !!!

This API queries outdoor temperature information from openweathermap.org according to the entered GPS coordinates and user key obtained from the server during registration. A default key from MasterTherm should be entered in each device (it can be changed if necessary). After enabling this function, outdoor air temperature value will be retrieved periodically (every hour) from server and transmitted to HP controller. After enabling this function, it is possible to go to more detailed setting by pressing outdoor temperature value on main screen as shown in the screen below.

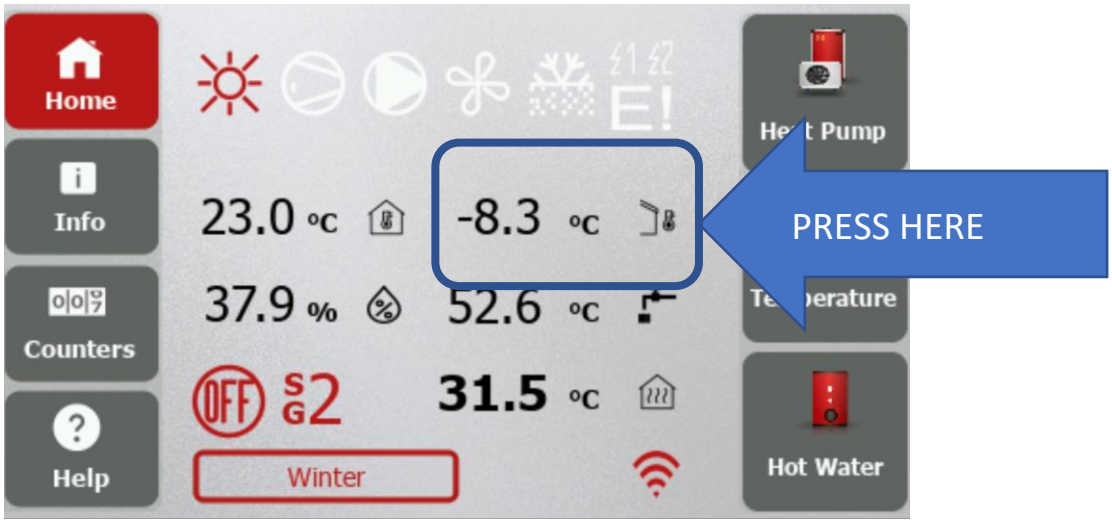


Figure 59 - OpenWeather – main screen

Following screen will be displayed:

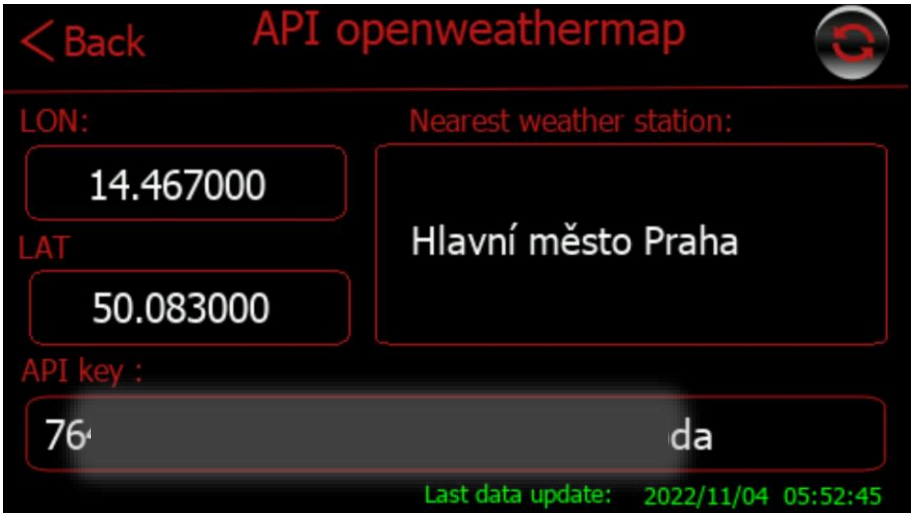


Figure 60 - OpenWeather - settings

Please enter GPS coordinates (LON, LAT) in **same format WITH SIX DECIMAL PLACES!!!**

After the first temperature update from server, location will be displayed here according to entered GPS coordinates (Nearest weather station).

10.6.5 SW Updater

Due to possibility of SW Update to a newer version it is possible to include new features and improvements in the future. pGDx touch periodically asks Cloud server if a newer SW version is available. If so, it will automatically start download, check downloaded package and offer SW upgrade to end-user (it is also possible to perform a forced upgrade - for example, if it is a security update necessary for proper functioning of device, etc.). Installation takes about 1-2 minutes.

When SW update is ready, following icon will appear in notification area of main screen.

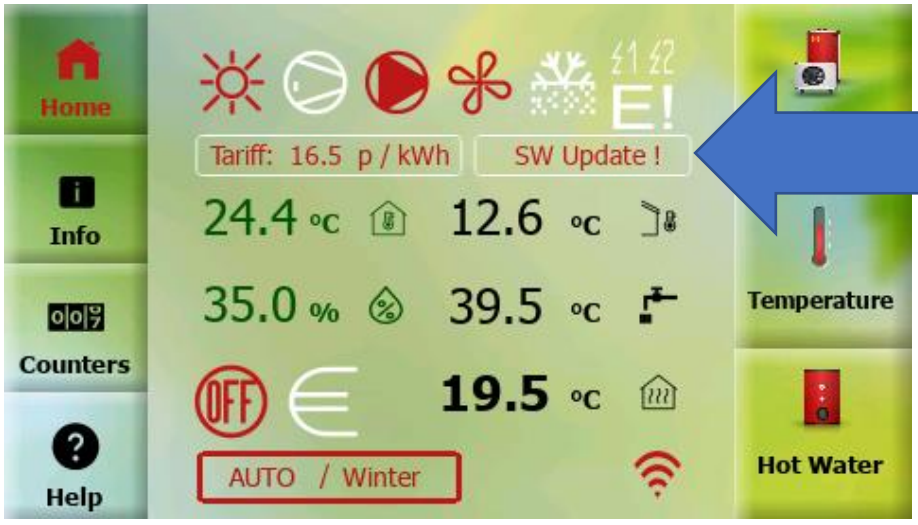


Figure 61 - SW Updater - main screen

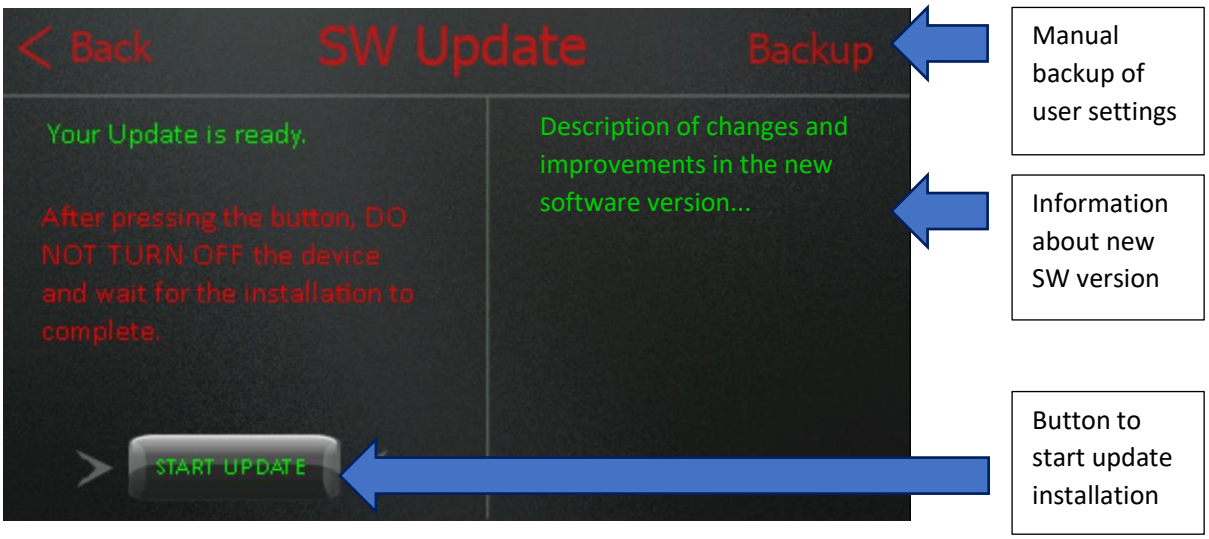


Figure 62 - SW Updater - Update

User data are backed up automatically after pressing "START UPDATE" button. Of course, manual backup can also be performed. SW Update is performed automatically after pressing button and after upgrade system will return to main screen.

In case of problems during this process (eg: power failure of pGDx touch) system will start with the last known functional SW version before this upgrade.

11 Alarms

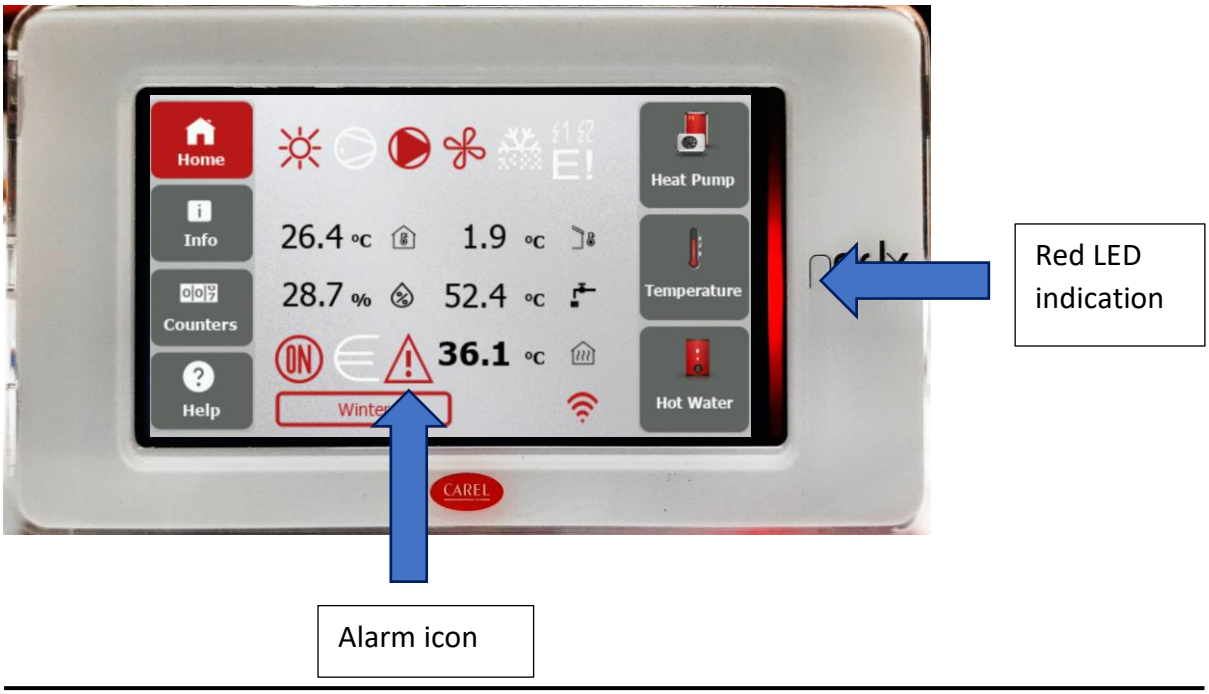
Alarms may occur during unit operation. These are cases where the controller switches off the heat pump because the operating criteria have exceeded the values suitable for long-term proper and safe operation of the unit. Alarms can also occur during normal operation as a result of non-standard operating conditions. In the case of accidental conditions, there is no reason for service intervention. If a "**repeated alarm**" occurs (3 identical repeated alarms for a period of time) or one of the alarms is active for one hour, the unit requires user intervention.

The Alarm Management page is used to display active alarms, in-memory alarms, alarm counters and the manual alarm reset button.

You can use the **Alarms Management** button in the Counters section to enter the page.

If the Repeated alarm is active or one of the alarms is active for one hour, the controller stops the heat pump from operation and waits for the user's action (alarm reset or service intervention). An icon indicating this status will appear on the home screen and the red notification LED on the right side of the display will light up.

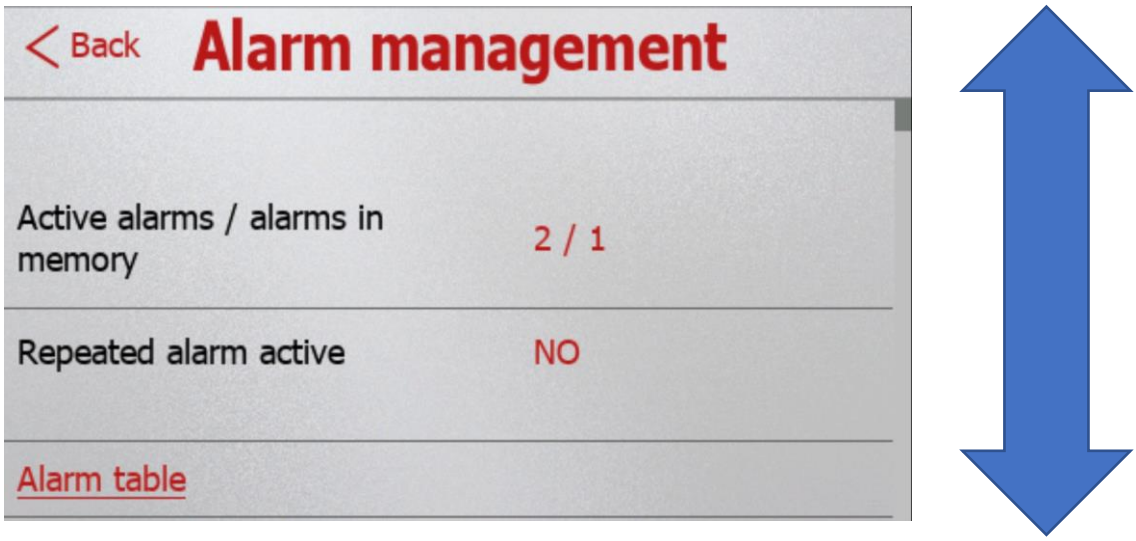
Caution - if alarm icon is active and red notification LED in the right part of the display is lit, the heat pump has been shut down by the controller and requires operator's attention. The function of device is interrupted or heating function is automatically taken over by the built-in electric heater.



11.1 Alarms management

If the alarm icon on home screen or the Alarm Management button in counter section is pressed, you will be redirected to the Alarm Management page.

Below is an example of displaying current alarms:



In the picture above we can see **Alarm Management** page. The total number of alarms according to their type is displayed here (see chapter 11.2 Types of alarms). The second line shows activity of **Repeated alarm** and the button for its **RESET**.

11.2 Types of alarms

11.2.1 Active alarms

The active alarm is one that is currently present (e.g. antifreeze protection, low pressure, fan thermal protection, etc.). When alarm occurs, heat pump shuts down for a short time and writes the alarm status to the alarm counters. Subsequently, controller will try to reset alarm automatically and restore function of the device.

If an alarm is active for one hour or more, status is indicated by alarm icon and a red LED. The device is shut down. It is necessary to diagnose cause of the problem, resp. contact the installation / service company.

11.2.2 Alarms in memory

If the alarm is no longer active (the cause of the alarm has been removed or has been automatically reset), it goes into alarm in memory. The alarm in memory is a preventive protection of the device and blocks the compressor typically for the next 6 minutes. After this time, the alarm is deleted from memory (if it has not been reactivated in the meantime) and the heat pump resumes operation.

11.2.3 Repeated alarm

A repeated alarm appears if the same alarm is repeated 3 times in a row in a given time period. The device is blocked and status is indicated by an alarm icon and red LED. User is allowed to perform a manual reset using the **RESET** button at the beginning of the Alarm Management screen (the button is only available when a **Repeated Alarm** occurs).

After performing a manual reset, alarm will be transferred to the memory, see chap. 11.2.3. and after the protection time has elapsed (typically 6 minutes) to restore the function of the device. If the function of the device cannot be restored, or occurrence of a repeated alarm occurs more frequently, it is necessary to diagnose cause of the fault and contact installation / service company.

11.3 Table of available alarms

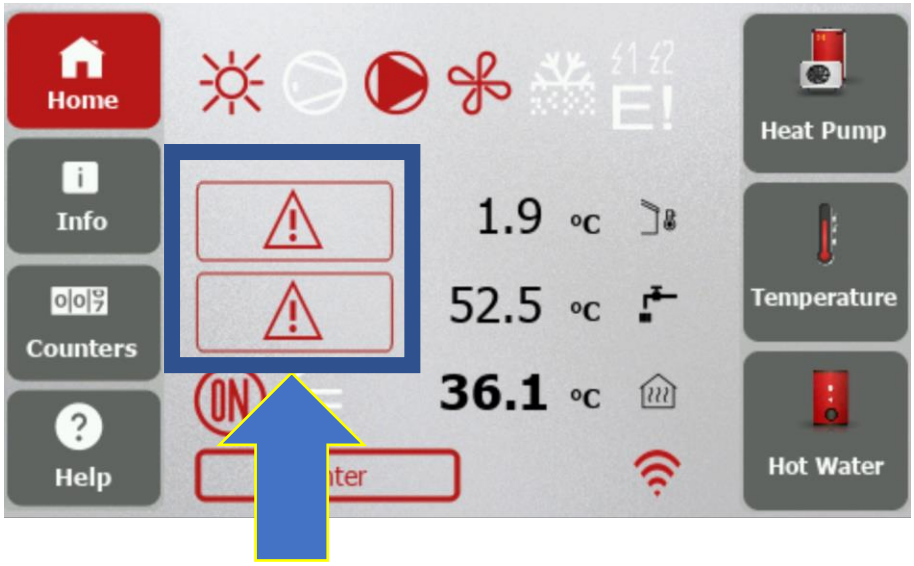
Below you can find table with list of alarms that may occur during operation:

Text on the display	Alarm description
Low pressure	Compressor suction pressure too low
High pressure	Compressor discharge pressure too high (pressure transducer)
High DGT	High compressor discharge temperature
High condensing temperature	High refrigerant condensation temperature
Low evaporation temperature	Low refrigerant evaporating temperature
Antifreeze	Low heating / cooling water temperature - risk of freezing

Fan thermal protection	Fan / pump winding overheated, fan / pump circuit breaker activated
Compressor thermal protection	Compressor overheating / thermal protection activation
Flow	Insufficient or no heating water flow
Probe alarm	Important temperature sensor error
High pressure switch	High compressor discharge pressure detected by the pressure switch
Low pressure on HP side	Low pressure in the high pressure part of the refrigerant circuit
DC Drive alarm	DC drive alarm
EVD EVO alarm	EVD EVO alarm

11.4 Alarm of internal pGDx touch sensors

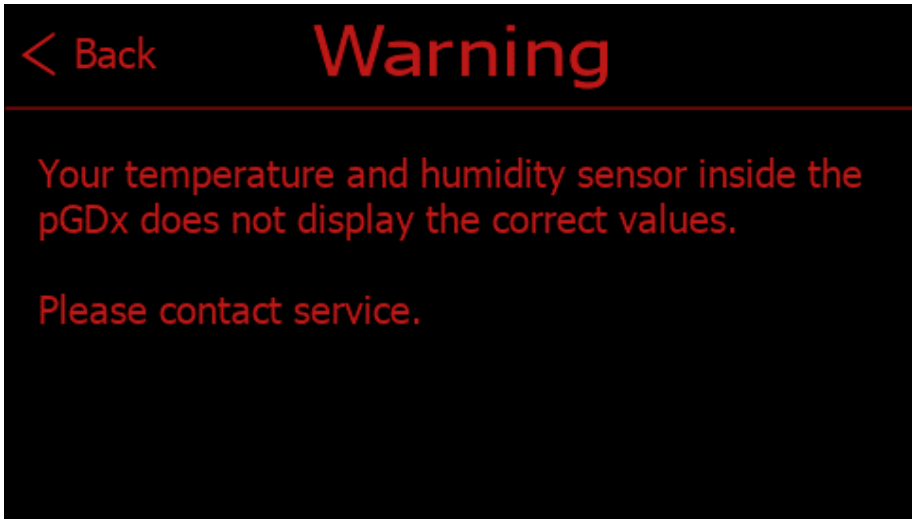
pGDx touch is equipped (if not ordered as a panel version) with an internal temperature and humidity sensor. In the event of a fault in one or both of these sensors, an alarm is triggered informing the user about this fact by red notification LED. In this case, the transfer of "safe" virtual temperature and / or humidity values is started to ensure the correct operation of the device.

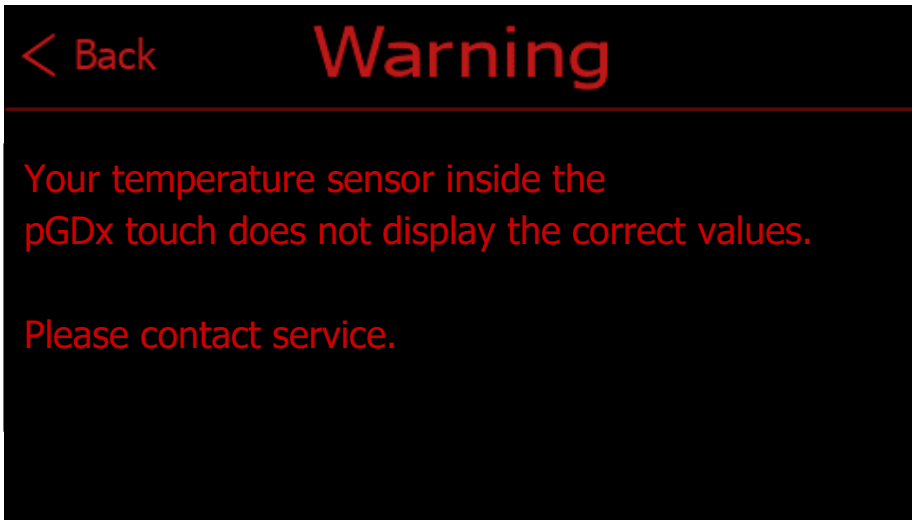


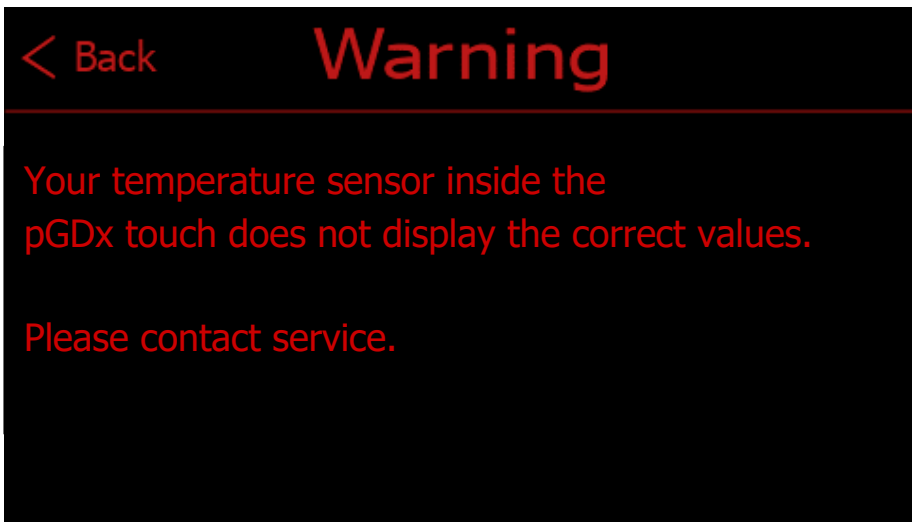
Probe alarm is active

After pressing the alarm button of the sensors, you will be redirected to the page describing this error.

For example:







12 What to do in the case of difficulties

12.1 Water / water, ground / water systems

The following is an overview of alarms and the unit's responses to them in the event of a fault:

CODE	Meaning	Control action	Reason	Before you call service
AL01	Low pressure	Switches off compressor and brine circulator	Low closed loop temperature, evaporator freezing, brine circulator malfunction, full closed loop strainer	Switch off unit, clean closed loop strainer, check brine pressure of the closed loop, repeated problem - call service
AL02	High pressure	Switches off compressor and brine circulator	Too high water temperature, full water strainer, water circulator malfunction	Decrease requested water temperature, check deaerating and water filling, clean water strainer, repeated problem - call service
AL03	Too high compressor discharge temperature	Switches off compressor and brine circulator	Too high water temperature, full water strainer, water circulator malfunction. Could be caused also from slight refrigerant leaking, or temperature probe problem (AL10)	Decrease requested water temperature, check deaerating and water filling, clean water strainer, repeated problem - call service
AL04	Too high condensing temperature in heating/cooling mode	Switches off compressor and brine circulator	Too high water/brine temperature, full water/brine strainer, water/brine circulator malfunction	Decrease requested water temperature, check deaerating and water/brine filling, clean water/brine strainer, repeated problem - call service
AL05	Low evaporating temperature heating/cooling mode	Switches off compressor and brine circulator	Low closed loop/cooling water temperature, evaporator freezing, brine/water circulator malfunction, full closed loop/water strainer	Switch off unit, clean closed loop/water strainer, check brine/water pressure, repeated problem - call service

CODE	Meaning	Control action	Reason	Before you call service
AL06	Antifreeze water protection	Switches off compressor and brine circulator	Low heating/cooling water temperature	Could be caused during long electricity supply problem, or by low water temperature in cooling mode. Wait for heating of the water by bivalent source, increase requested water temperature if cooling mode.
AL07	Brine circulator malfunction (AQ60, 75, 90 only)	Switches off compressor and brine circulator	Brine circulator motor overheating problem	Call service
AL08	Compressor thermal protection	Switches off compressor and brine circulator	Too high water temperature, compressor motor malfunction	Switch on compressor circuit breaker, call service
AL09	Flow	Switches off compressor and brine circulator	Circulator malfunction, full strainer cooling/heating water	Switch unit off, check water strainer. Repeated problem - call service
AL10	Probe alarm	Switches off compressor and brine circulator	Probe malfunction	Call service
AL11	High pressure switch	See AL01, AL02	See AL01, AL02	See AL01, AL02, always call service
AL12	Low pressure on HP side	Viz. AL01, AL02	Viz. AL01, AL02	Viz. AL01, AL02
AL13	DC drive alarm	Switches off compressor and brine circulator	DC drive malfunction	Turn the power off and on. If the problem persists, contact the installation company.
AL14	EVD EVO Alarm	Switches off compressor and brine circulator	EVD EVO malfunction	Turn the power off and on. If the problem persists, contact the installation company.
AL15	R290 Leakage Alarm	Switches off compressor and circulation pumps, operation is blocked	The R290 refrigerant leak sensor has detected an alarm condition	Call service

12.2 Air / Water systems

The following is an overview of alarms and the unit's responses to them in the event of a fault:

CODE	Meaning	Control action	Reason	Before you call service
AL01	Low pressure	Switches off compressor and fan	Extremely low outdoor temp. (below -20 °C), icing on the evaporator, fan failure	In case of too low outdoor temperature, wait until these conditions disappear, in case of strong icing of the evaporator, perform manual defrosting, if the problem persists, contact the installation company
AL02	High pressure	Switches off compressor and fan	Too high water temperature, full water strainer, water circulator malfunction	Reduce the required heating water temperature, check the venting and heating water pressure, clean the heating water strainer, in case of recurrence call service
AL03	Too high compressor discharge temperature	Switches off compressor and fan	Heating water temperature too high, clogged heating water filter strainer, circulating pump fault, small refrigerant leak, temperature sensor problem (AL10)	Reduce the required heating water temperature, check the venting and heating water pressure, clean the heating water strainer, in case of recurrence call service
AL04	Too high condensing temperature in heating/cooling mode	Switches off compressor and fan	Defrost function temperature set too high; fan malfunction in cooling mode	Check the outdoor unit and perform a reset – call service
AL05	Low evaporating temperature heating/cooling mode	Switches off compressor and fan	Extremely low outdoor temp. (below -20 °C), icing on the evaporator, fan failure	In case of too low outdoor temperature, wait until these conditions disappear, in case of strong icing of the evaporator, perform manual defrosting, if the problem persists,

				contact the installation company

CODE	Meaning	Control action	Reason	Before you call service
AL06	Antifreeze water protection	Switches off compressor and fan	Too low heating water temperature	It can be caused by a long-time power failure or a low temperature in cooling mode. Wait for the electric heater to reheat the heating water, or increase the required temperature in cooling mode. In case of recurrence, call for service
AL07	Fan thermal protection	Switches off compressor and fan	Fan overload or failure	Check the outdoor unit and perform a reset – call service
AL08	Compressor thermal protection	Switches off compressor and fan	Heating water temperature too high, power supply problems - missing phase, contactor fault, in extreme case compressor winding fault	Reset the compressor thermal protection – call service if the problem persists
AL09	Flow	Switches off compressor and fan	Circulator malfunction, full strainer cooling/heating water	Switch unit off, check water strainer. Repeated problem - call service
AL10	Probe alarm	Switches off compressor and fan	Probe malfunction	Call service
AL11	HP presostat	See AL01, AL02	See AL01, AL02	See AL01, AL02
AL12	Low pressure in the high-pressure side	See AL08	See AL08	See AL08
AL13	DC drive alarm	Switches off compressor and fan	DC drive malfunction	Turn the power off and on. If the problem persists, contact the installation company.
AL14	EVD EVO Alarm	Switches off compressor and fan	Malfunction of EVD EVO module	Turn the power off and on. If the problem persists, contact the installation company.
AL15	R290 Leakage Alarm	Switches off compressor and circulation pump, fan is running, operation is blocked	The R290 refrigerant leak sensor has detected an alarm condition	Call service

NOTES:

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