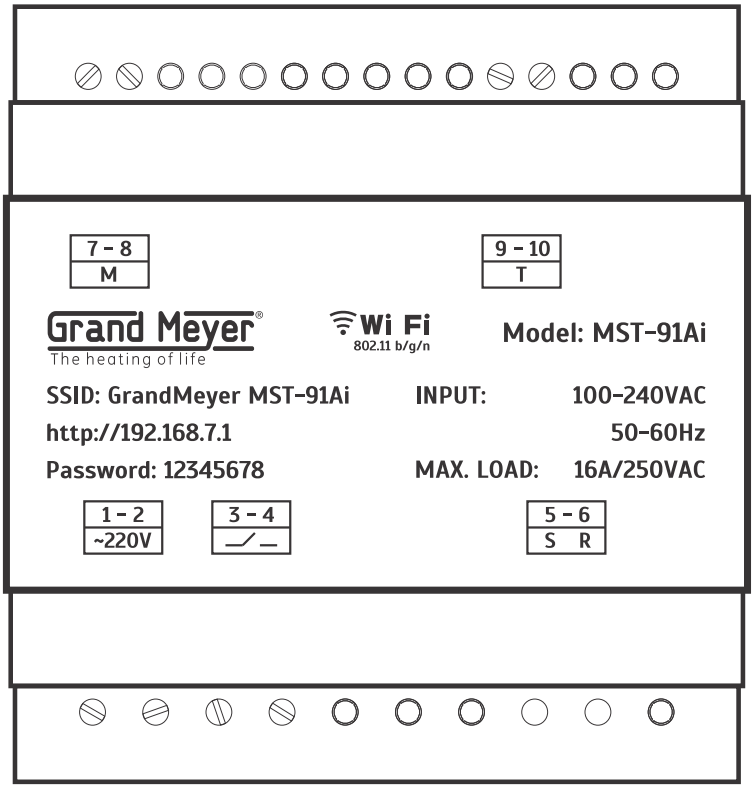
Grand Meyer®

The heating of life

Wi-Fi thermostat-weather station
MST-91Ai



MANUAL

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Purpose.

Wi-Fi thermostat-weather station **MST-91Ai** (hereinafter referred to as the weather station) is designed to control cable anti-icing systems for roofs, open areas, pipelines, and tanks, as well as any other cable systems for electrical heating.

The weather station was designed using dual-core microprocessor technology using the RTOS (real-time operating system), which made it possible to build an exceptionally reliable snow melting system. Using several unique settings and algorithms, our own weather service and technology for remote access to weather station sensor data, we have created a flexible and economical next-gen snow melting system.

The weather station can control one heating system.
The weather station supports the following types of sensors: temperature sensor (air, surface-TS), moisture and precipitation sensor (MPS).

The weather station can work fully autonomously with the Internet weather service (without sensors or using weather service data when the sensors are disconnected/unavailable).

The weather station is configured and managed via the integrated web interface.
This interface allows customers to remotely access to all the functions and settings of the system. It is also possible connecting the weather station to the Telegram messenger for real-time alerts on various events and controlling the weather station (turning the heating zone on and off, etc.).

Starting the operation

To start the weather station, proceed as follows:

1. Connect and configure (menu "Settings \ Sensors") the necessary sensors and (or) weather service ("Settings \ Weather service"). Sensors can be either local, connected directly to the weather station, or remote, receiving measurements via the Internet from sensors of another weather station.

2. When using the weather service and (or) remote, and (or) local sensors, the measurements of which must be transferred to other weather stations, the weather station must be connected to a Wi-Fi network with access to the Internet. To perform this connection, access the corresponding configuration page of the "Settings \ WiFi" menu.

3. Adjust heating settings according to the requirements at the facility (menu "Settings \ Heating").

By default, the weather station is configured to operate the heating system on the roof.

Web interface

Connection to the web interface.

When the device is turned on for the first time, it will be in AP mode.

To connect to the web interface for the first time, please proceed as follows:

1. Connect to a Wi-Fi network with SSID (network name): **GrandMeyerMST-91Ai.**

2. In the address bar of the browser, enter the local IP address of the device: **192.168.7.1.**

3. On the login page, enter the access password: **12345678.**

Connection to the web interface in Station mode (used to connect to the Internet):

1. In the browser address bar, enter the local IP address of the weather station.

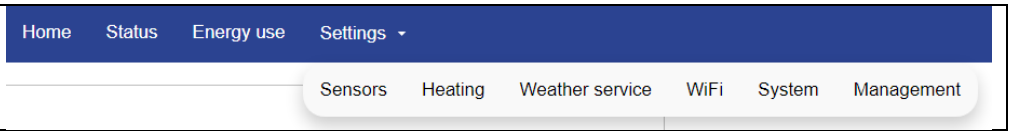
2. On the login page, enter the access password.

Description of the web interface.

The device has an adaptive web interface design, which ensures its correct and convenient display on devices with various screen resolutions, both on a mobile device and a computer.

Supported browsers: Chrome, Opera, Firefox, Safari, IE, EDGE.

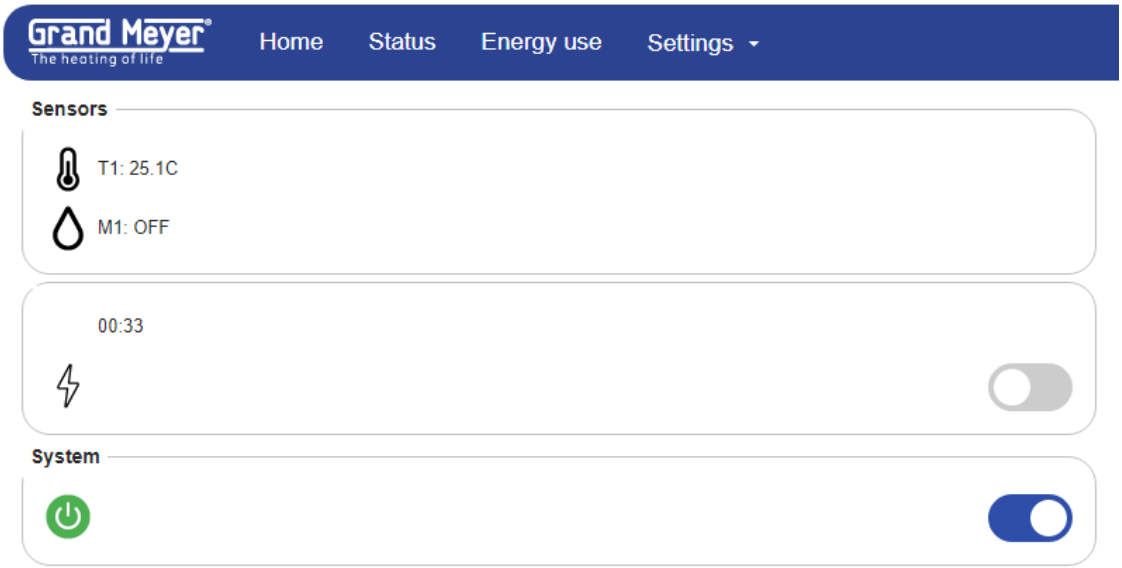
The web interface is used to configure the weather station (automatic and manual control of the heating system).

Web interface menu	

Web UI Pages

Home	The page displays sensor data, weather service data and operating modes of the heating zone. It is possible to manually turn on or off the zone control relay. Activation, deactivation of the heating zone of the system is also performed on this page.
Status	On this page you can see the current system parameters of the weather station, namely: - Name of the weather station model. - Wi-Fi signal strength (relevant only for Station mode). - The MAC address of the weather station. - Current time. - Operating time after the last power-on or reboot. - Internet connection status (relevant only for Station mode). - The temperature inside the micro-controller of the weather station. - The amount of free RAM memory.
Consumption	The page allows you to view graphs of the estimated energy consumption and operating time of the heating system.
Settings \ Sensors	The page allows you to configure weather station sensors.
Settings \ Heating	The page allows you to configure heating algorithms.
Settings \ Weather Service	The page allows you to customize the weather service.
Settings \ WiFi	The page allows you to configure Wi-Fi and select modes of operation.
Settings \ System	The page allows you to configure the TCP port of the web interface, the language of the web interface, updating the firmware of the weather station, the password for accessing the web interface, time zone, reset all system settings to factory defaults, and restart the weather station.
Settings \ Management	The page allows you to configure remote control, connection to the Telegram messenger.

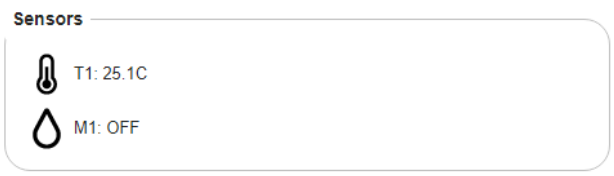
Home page



The page displays the current state of the system: readings of sensor measurements, weather data, current operating conditions of the heating zone. Additionally, you can force the heating, using the manual mode from this interface. In this mode, the control relay will be on, the time set in the heating setting. In emergency situations, it is possible to quickly turn off the operation of all zone modes, for this there is a switch in the "System" section, after it is deactivated, the control relay will be off until the next system activation.

Description of the home page.

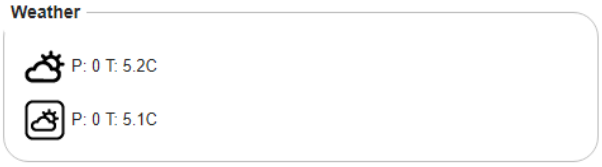
Sensors
The current sensor values and operation status are displayed. If the sensor fails, the value is displayed as E. Example: T1: E
(Only activated sensors are displayed, this section is displayed only when at least one sensor is activated)



Weather.
Weather service data.

	current weather
	3 hours ahead weather forecast

P: rainfall
0-no precipitation; 1-weak; 2-medium; 3-strong; 4-very strong
T: air temperature
(this section is displayed only when weather service is enabled)



Zone.
The current status of the zone.

	current zone mode
	current status of the zone control relay
	enable / disable manual mode
00:03 \ 00:06	operating time of the mode \ remaining operating time of the mode
00:36	mode operation time

The system is activated.
The system is operational.

The system is deactivated.
The operation of all zones is disabled, all control relays are off.

Sensor settings.

When using sensors, proper installation and connection are important. Installation recommendations as well as the wiring diagram can be found in the Installation Guide.

Types of sensors.

	T1	Temperature sensor No. 1 (temperature of air, soil or pipe surface).
	M1	The sensor detects the presence of precipitation and moisture in the elements of the drainage system.

Current sensor data and their status can be seen on the Home page. The E value of the sensor indicates an error or the sensor is in a malfunctioning state.

Sensor Values

Sensors	Value	Description
	0	Dry, without precipitation or moisture.
	1	The sensor detected precipitation or moisture (the entire surface of the sensor is in water).
	ON	The sensor is turned on (switching on occurs in the range from the switching temperature to -20 ° C). The determination of precipitation or moisture occurs only 12 minutes after each switch-on of the sensor.
	OFF	The sensor is off.
	CAL	The sensor is calibrating (calibration time 30 seconds) after each switching on of the weather station.
	E	Error, sensor defective, broken sensor cable, etc.

Parameters Settings\Sensors.

Parameter	Range
Air temperature sensor. The air temperature sensor is indicated. Sensor measurement values are used for heating control algorithms for precipitation and soil sensor.	Off; T1. Default: T1.
Unit of temperature. It is indicated in which units the temperature value will be displayed.	° C or ° F. Default: ° C.
Connection. The type of sensor connection is indicated. When the connection value is “OFF”, this sensor is not used by the system and is not displayed on the main page. *Local* - the sensor is directly connected by a cable to the weather station. *Remote* - the sensor for this weather station is remote, this weather station receives sensor measurements via the Internet from another weather station.	Off; Local; Remote. Default: Off
Share. The switch activates the sensor remote access technology ("Sharing" the sensor). The measurements of this sensor will be transmitted via the Internet to other weather stations.	Off; On Default: Off
Remote address. MAC address of the remote weather station (you can find the MAC address on the page "Status of the remote weather station"). If the weather station does not receive data for more than 20 minutes, then this sensor displays an error E.	
Operation Temperature. The temperature reading that triggers the moisture and precipitation sensor M1 on. The temperature value is measured by the air temperature sensor. If the air temperature sensor is not indicated or is in a malfunctioning state, the M1 sensor will be turned on (moisture and precipitation are not detected).	0 ° C ... 10 ° C. Default: 6 ° C.

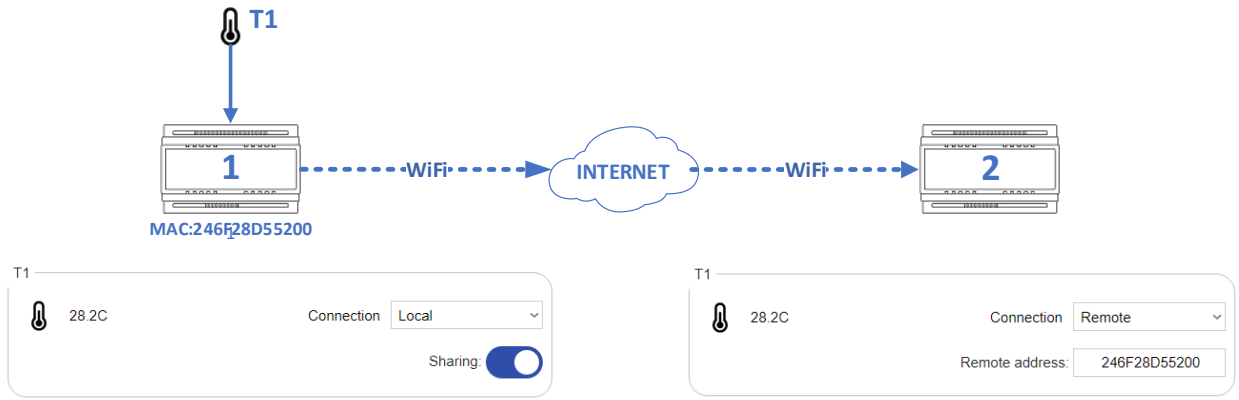
To save the settings, click the "Save" button.

Grand Meyer Sensor Link ("Sharing" sensors).

This technology allows transferring sensor measurement data from one weather station that employs a local cable connection to an unlimited number of other weather stations using the Internet. It is convenient to use the technology at objects with several buildings, making it sufficient installing a precipitation and air temperature sensor connected to the ports of the weather station only on a single building. Weather station(s) on other buildings of the object can receive this information via the Internet without the installation of local sensors.

Example:

Weather stations 1 and 2 are installed at different buildings at the same site. A temperature sensor is connected to weather station 1 to port T1, weather station 2 receives T1 sensor data from weather station 1 via the Internet. See settings and operation diagram in the figure below:

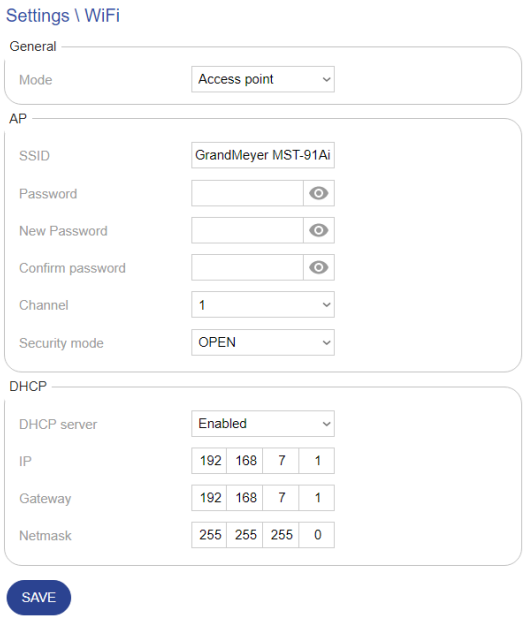


Wi-fi setup.

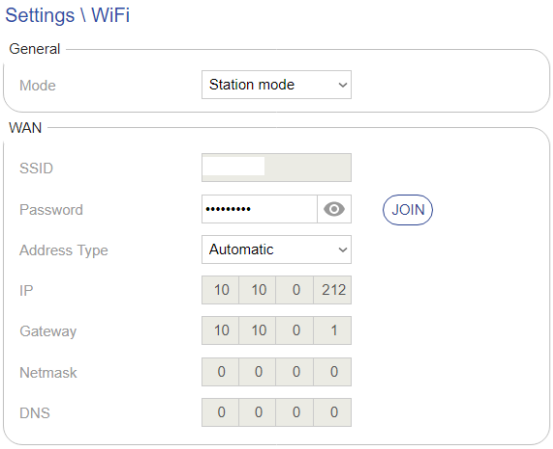
On the Settings \ WiFi page, you can configure the device to operate in Station mode or in AP mode.

The recommended minimum Wi-Fi RSSI signal level is at least -70dBm.

AP Access Point Mode - autonomous work without connecting to the Internet and a router (in this mode, the weather station creates its own Wi-Fi network).

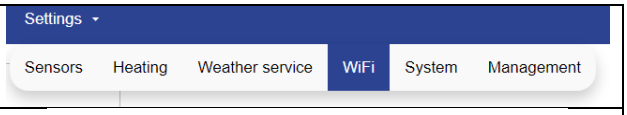
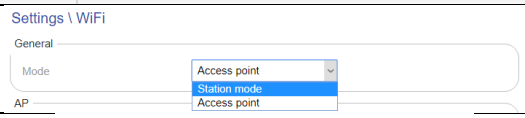
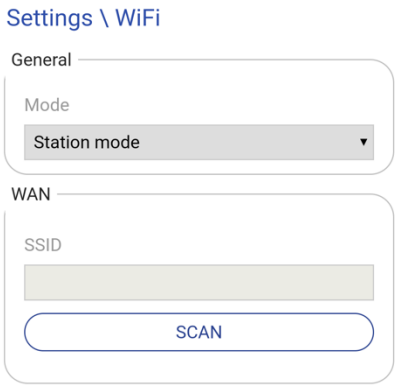
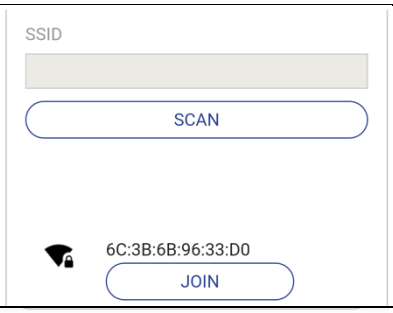
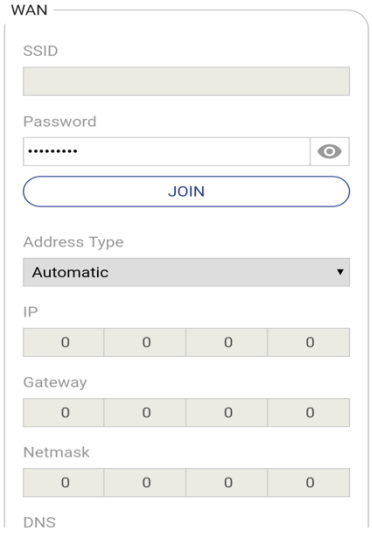


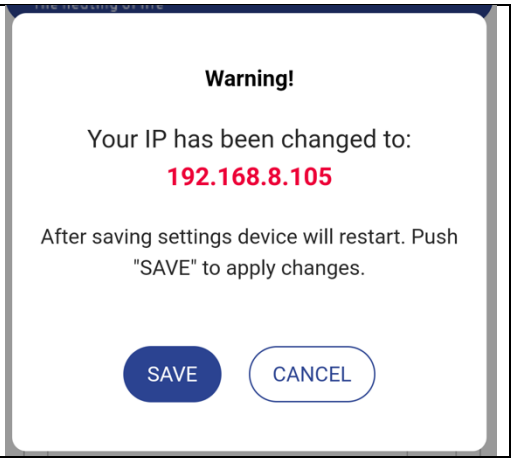
Station Mode – work with connecting to another Wi-Fi network and the Internet.



Connect to an existing Wi-Fi network (transfer to Station mode).

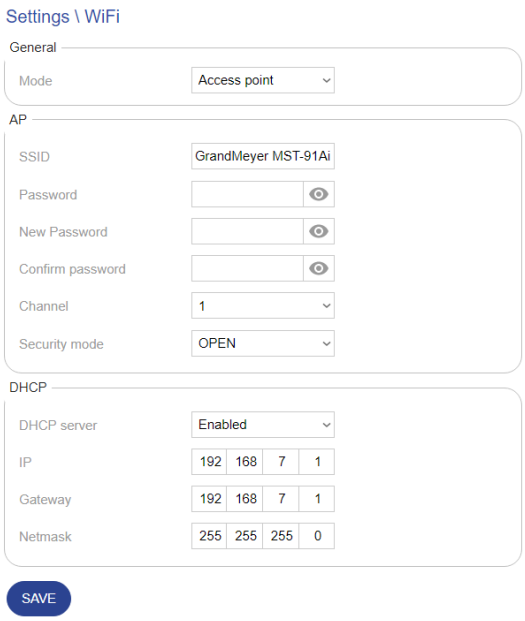
To connect the device to an existing Wi-Fi network and the Internet, you must:

1	Go to the "Settings \ WiFi" page.	
2	Set the “Station mode” in the drop-down list.	
3	Click the “Scan” button.	
4	In the list below Wi-Fi networks find the desired network and click on the "JOIN" button.	
5	Enter the password of the selected Wi-Fi network and press the button "JOIN". If necessary, specify the address type “Manual” when setting the local IP address of the weather station manually. If a DHCP server is disabled on your router, then this type of address and all other parameters (IP, Gateway, Netmask) must be entered manually.	

6	Remember or write down the new local IP address of the weather station in the window that appears for further access to the web interface. Click the “Save” button. The device will save the new Wi-Fi settings and reboot, after which access to the web interface will be possible only at the new local IP address. Reboot time is up to 30 seconds.	

AP mode setting.

SSID - the name of the Wi-Fi network of the weather station (Latin characters are recommended).
Password - password for access to the Wi-Fi network of the weather station.
Channel - the working channel of the Wi-Fi network of the weather station.
Security mode - the security mode of the Wi-Fi network of the weather station.
DHCP - DHCP settings of the weather station server.
IP - local IP address of the weather station in AP mode.

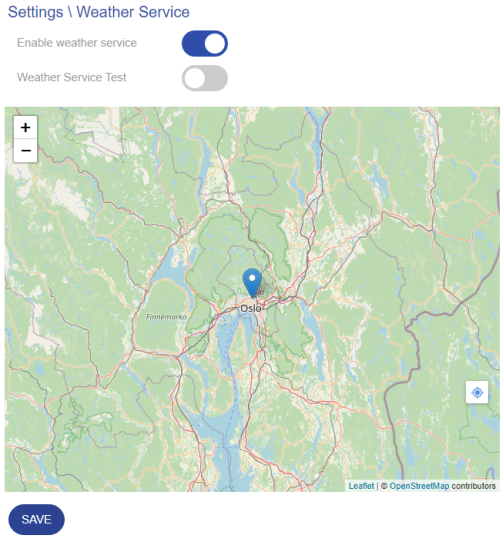


Setting up the weather service.

The weather service uses data from more than 200,000 ground stations located around the world and satellite weather radar data. This allows getting accurate weather information.

To use the system on the ground or to heat pipes, you must use a soil temperature or pipe surface sensor.

The weather service is set up on the page "Settings \ Weather service". On this page, you should indicate on the map the exact location of the weather station (for the weather service to work correctly) and turn on the weather service with the "Enable weather service" switch.
To check the operation of the weather service after its inclusion, you can go to the main page, there the "Weather" section will appear with weather data, which will be updated after activation with some delay (about a minute). To save the settings, click the "Save" button.



In the absence of weather service data for more than 3 hours, the weather station will consider the weather service unavailable and will reflect this on the main page. The weather station will go into Emergency mode.

For checking the operation of weather station algorithms and zone settings, it is possible to enable Test mode. To enable Test mode, turn on the “Weather Service Testing” switch. This will make it possible to send arbitrary weather conditions to the given weather station via the Internet using special software.

Using weather service data.

The weather service provides the following data: air temperature, precipitation, etc.

To use the weather service data, you need to activate it in the heating settings.

There are the following rules for using weather service data (provided that the weather service is activated in the zone and included in the system):

1. If the sensor selection field is set to **“Off”** or **“WS”**, and in the field “Heating temperature” - **“WS”**, then weather service data will be used instead of sensor data. Weather service is the main and only data channel for the sensor for the selected zone.

For example:

“Off” is set in the temperature sensor field or **“WS”**, and in the field “Heating temperature” - **“WS”** - the system uses the air temperature forecast by the geographical location of the weather station.

“Off” is set in the field of the precipitation sensor or **“WS”**, and in the field “Heating temperature” - **“WS”** - the system uses the forecast of precipitation level by the geographical location of the weather station.

2. If a value other than **“Off”** is indicated in the sensor selection field or **“WS”**, and in the field “Heating temperature” the value is different from **“WS”**, i.e. if a really connected sensor is selected, then the data of the selected sensor is used while it is in working condition. If this sensor fails, the system starts using weather service data. Weather service in this case is a backup data channel.

Heating setting.

The weather station provides only one heating zone.
Setting the heating operation is performed on the page "Settings \ Heating".
Heating setting is carried out by activating the necessary operating modes. Thus, flexibility and simplicity of heating settings for different systems are achieved.

It is possible to transfer the settings of the heating zone between weather stations. To do this, use the **"Download"** and **" Loading"** buttons on the "Settings \ Heating" page.

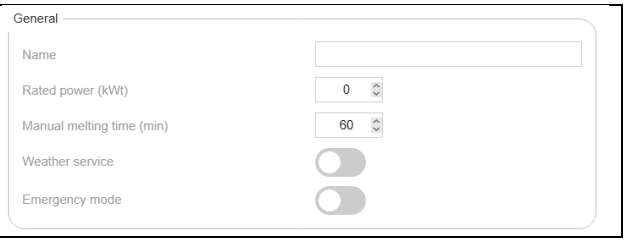
Heating modes and control relay statuses.

	Expectation	In this mode, the zone control relay is off. There is a survey of sensors and receiving weather service data.
	Manual mode	The operation of the system is carried out regardless of the state of the connected sensors and weather service data. Enable / disable manual mode occurs on the Home page. The operating time of the mode is indicated in the zone setting.
	Heat	In this mode, the surface is heated to a predetermined temperature by the parameter **“Heating temperature”**. The zone control relay is on.
	Melting	In this mode, melting of snow, ice from the roof or a heated surface occurs. The zone control relay is on. At the same time, the system can operate in eco-mode in cycles, saving energy.
	Additional heating	After the readings of the sensor (s) of precipitation / roof / soil or weather service have reached a dry state or less than a specified level, the system will maintain heating for the time specified on the "Settings \ Zones" page. At the same time, the system can operate in eco-mode in cycles, saving energy.
	Emergency mode	This mode is activated if the system does not have data from sensors and (or) weather services. Operation in this mode occurs in cycles to save energy.

Control Relay Statuses

	On (control relay is on)
	Off (control relay is off)

Basic heating settings.

This section indicates the main heating parameters.	

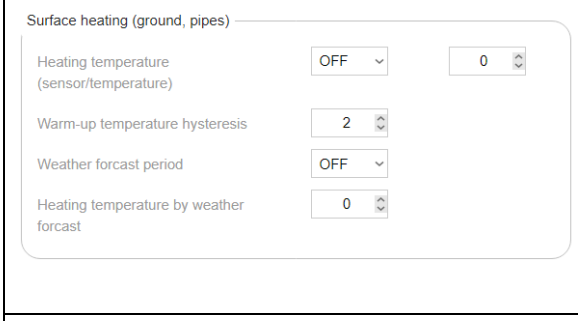
Parameter	Range
Name. The user-defined name of the heating zone is set (displayed on the main page) For example: Roofing	Up to 32 characters
Rated power (kW). It is used to calculate and plot energy consumption graphs on the Energy Consumption page.	0 ... 300kW
Manual operation time (min.). Manual operation time. Turns on / off on the main page. If the value is “0”, manual mode is disabled.	0 ... 1440 minutes (24 hours). Default: 60 minutes.
Weather service. (Activating the “Weather Service” switch for the zone). When activating the weather service in the zone, the weather station can use the data in the following scenarios: -*Basic weather service*. If all the sensors in the zone are in the “OFF” position, then the weather station uses only weather service data for operation. If the weather service data is not available within 3 hours, the system will go into emergency mode, if it is activated, or turn off the control relay. -*Back-up weather service*. If the weather service is activated and the sensors are selected, then the weather station operates according to the data received from the sensors. When a sensor fails, the weather station starts using only the missing data from the weather service.	On; off Default: Off
Emergency mode. (Activating the “Emergency mode” switch on the zone) The zone goes into emergency mode if one of the sensors selected in the zone setup fails or the weather service becomes unavailable. When the zone is in emergency mode, the zone control relay is turned on and off according to the cycles specified in the "Emergency mode" section of this zone (the default cycle time is 240 minutes and the cycle power is 50%, i.e. the zone control relay will be 120 minutes on, then 120 minutes off).	On; off Default: Off

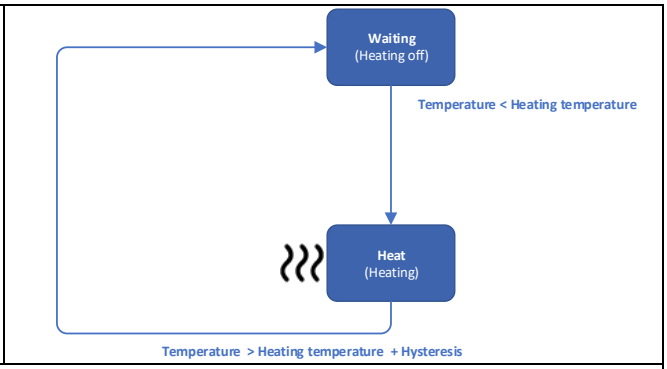
Operational temperature.

The minimum and maximum temperature of the weather station modes are indicated. When the temperature goes beyond this range, the status of the heating zone goes into standby mode, and the control relay goes into off state.

Parameter	Range
Min (sensor / temperature) - indicates the sensor and the minimum temperature value. If the sensor value is set to **“Off”** or **“WS”** and the weather service in the zone is activated, then the system will use the temperature data from the weather service forecast.	-55 ° C ... 125 ° C. Default: -15 ° C.
Max. (sensor / temperature) - indicates the sensor and the maximum temperature value. If the sensor value is set to **“Off”** or **“WS”** and the weather service in the zone is activated, then the system will use the temperature data from the weather service forecast.	-55 ° C ... 125 ° C. Default: 6.

Surface heating.

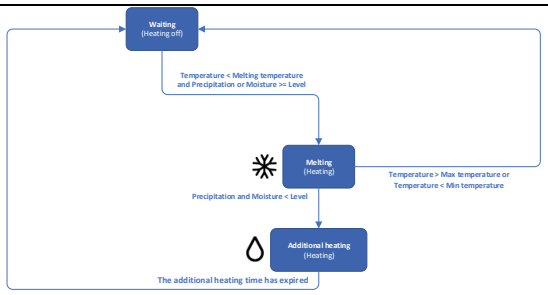




The surface heating mode is utilized for preheating outdoor areas, heating pipes, etc.
(In this mode, for outdoor heating systems, there is the possibility of significant energy savings when using the weather service, namely: do not turn on the surface heating whenever the surface temperature drops below the parameter in the **"Heating temperature"** field, but turn it on only if in the weather service forecast during the time specified in the **“Weather forecast period”** field there is precipitation, the air temperature is lower than the value in the **“Weather forecast heating field”** and the current surface temperature is lower than the one set in the **“Heating temperature”** field.)

Parameter	**Range**
Heating temperature. The sensor and the temperature value below which the heating is switched on are indicated. For outdoor areas, the soil temperature sensor is indicated, for pipes, a sensor mounted on the surface of the pipe. If the sensor value is set to **“WS”** and the weather service in the zone is activated, then the temperature data will be used by the system from the weather service forecast. *To reduce power consumption, a temperature sensor is recommended.*	-5 ° C ... 10 ° C. Default: -3 ° C.
Hysteresis. The temperature hysteresis is set. Using this parameter, the temperature is set at which the surface heating is switched off. For example, the heating temperature is -3 ° C and the hysteresis is 2 ° C. This means that at temperatures below -3 ° C the system will turn on the surface heating, and turn it off when the surface is heated to -1 ° C.	1 ... 10. Default: 2.
Weather forecast period. The forecast period is set in which the system determines the presence of precipitation and a given heating temperature according to the weather forecast. If the value is set to **“Off”,** then this function is considered off. The period is indicated in hours.	Off, 3, 6, 9, 12, 24. Default: Off
The temperature of the weather forecast. The air temperature from the weather forecast is set, below which, in the presence of precipitation and provided that the surface temperature is lower than that indicated in the "Heating temperature" field, the surface preheating will turn on.	-5 ° C ... 10 ° C. Default: 0 ° C.

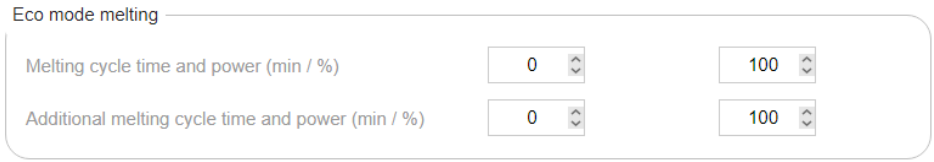
Melting.



The mode is utilized for anti-icing systems for roofs and outdoor areas.
This mode is activated in the presence of precipitation and moisture (when using roof or soil sensors) or in the presence of precipitation in the forecast of the weather service (when using the WS) and when the temperature is lower than that setting in the **"Thaw temperature"** field. If during operation of this mode the system determines the absence (level is 0 or a level below the set) of precipitation and moisture (when using roof or ground sensors) or the absence (level is 0 or a level below the set) precipitation is predicted by the weather service (when using the WS) , the system will go into additional heating mode. If during operation of the Melting mode the value of the parameter in the **"Ambient temperature"** field is outside the specified range, the system will go into standby mode and the zone control relay will be turned off.

Parameter	Range
Melting temperature. The sensor and the temperature value are indicated below which the activation of the mode of presence of precipitation and moisture occurs (when using roof or soil sensors). If the sensor value is set to **"Off"** or **"WS"** and the weather service is activated in the heating setting, then the temperature data will be used by the system from the weather service forecast.	0 ° C ... 10 ° C. Default: 2 ° C.
Moisture and precipitation. The sensor and the value of precipitation or moisture are indicated, equal to and above which the system will determine the presence of precipitation and moisture (values 2, 3, 4 are relevant only when working with weather services. When working with the sensor, the values 2, 3, 4 are treated by the system as 1). If the sensor value is set to **"Off"** or **"WS"** and the weather service is activated in the heating setting, then the system will use precipitation data from the weather service forecast.	1 ... 4. Default: 1.
Additional heating time (min). The time delay for turning off the zone is indicated after the rainfall and moisture sensor levels are lower than those specified in the setting. Additional heating is needed so that snow and ice are likely to be melted.	0 ... 1440 minutes (24 hours). Default: 60 minutes.

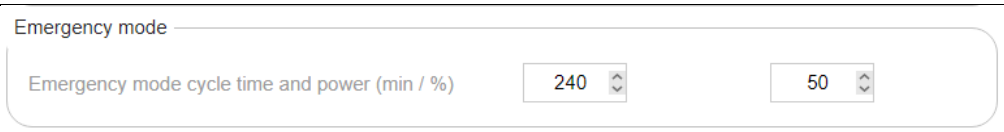
Eco melting mode.



This mode can be used to save energy in the melting and additional heating modes.

Parameter	Range
Melting mode. The cycle time (min.) And power percentage * are indicated. If the cycle duration value is 0, it is considered disabled.	0 ... 1440 minutes (24 hours). Default: 0 minutes.
Additional heating. The cycle time (min.) And power percentage * are indicated. If the cycle duration value is 0, it is considered disabled.	0 ... 1440 minutes (24 hours). Default: 0 minutes.

Emergency mode.



Setting the operation of emergency cycles.

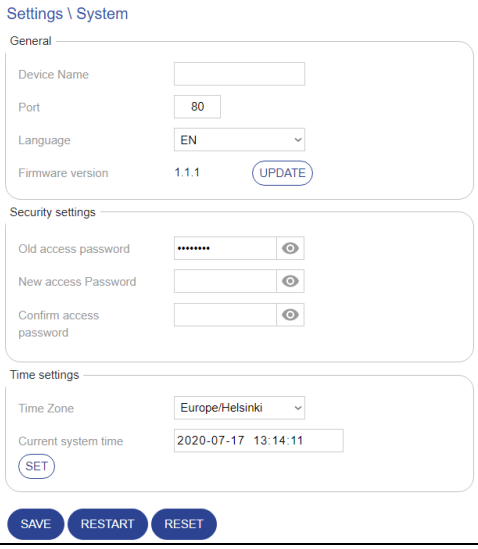
Parameter	Range
Emergency mode. The cycle time (min.) And power percentage * are indicated. If the cycle duration value is 0, it is considered disabled.	0 ... 1440 minutes (24 hours). Default: 240 minutes and 50%.

* Power percentage is the percentage of time of the total cycle time when the zone control relay is turned on.

Example:

Cycle time 100 min. and a power percentage of 30% means that 30 min. the control relay will be on, and 70 min. off, then again 30 minutes. included and 70 min. off etc.

System Setup.

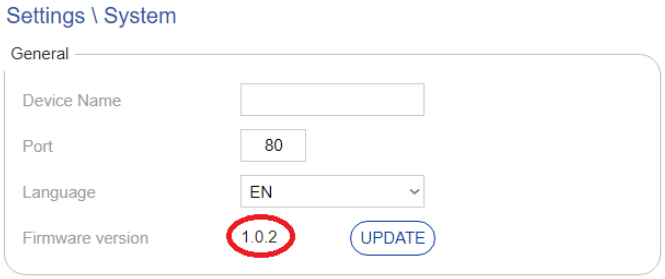
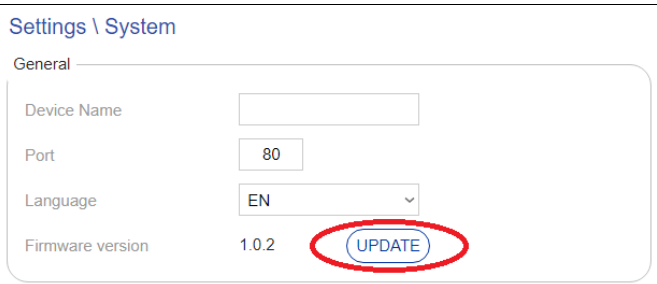
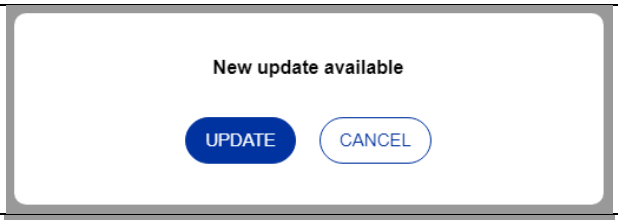
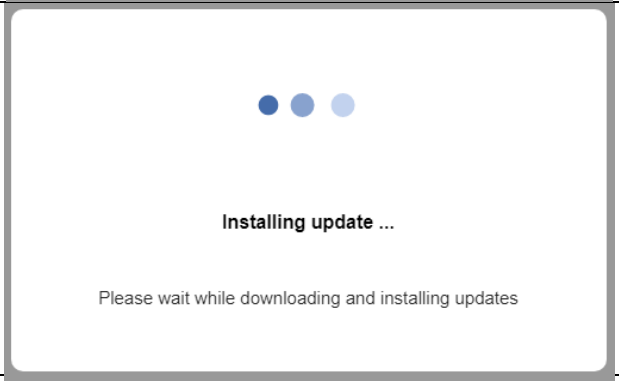
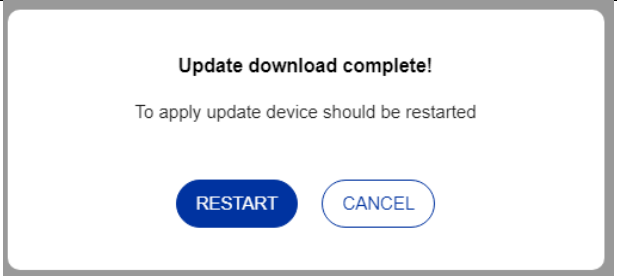
The page allows you to configure the TCP port of the web interface, the web interface language, the firmware update of the weather station, the password for accessing the web interface, time zone, reset all system settings to factory defaults, and restart the weather station.	

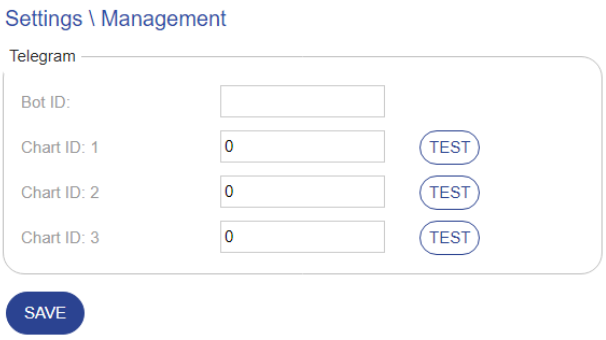
Parameter	Range
The name of the device. Device username	Up to 32 characters.
Port. TCP port of the web interface	1 ... 65536. Default: 80.
Language Web interface language.	Russian English. Default: English.
Software Version (Firmware). Device software version. To update the software, click the “Update” button (the device must be connected to the Internet).	
Password. Web Access Password	The minimum length is 8 characters. Default: 12345678.
Timezone. The time zone of the territory where the device is used.	
Current time. The current system time. To set the current time manually (it makes sense only when working without connecting to the Internet), you need to set the current time and click the **"Install"** button. When connected to the Internet, the device automatically sets the current time according to the time zone.	

SAVE	To save the changed settings. To take effect of the new system settings, the device will reboot.
RESTART	Forced reboot of the device.
RESET	To reset **all** device settings. After that, the settings will be set to the default value, Wi-Fi will work in AP mode (use the settings to access the web interface, as if connecting for the first time).

Firmware update.

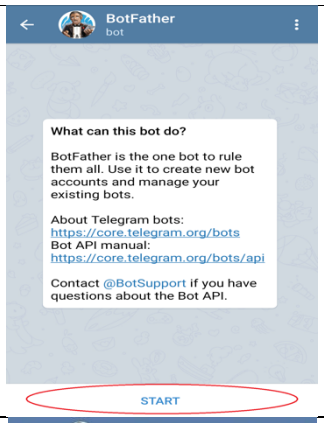
To update the Firmware (FW) of the weather station, you need to go to the "Settings \ System" page of the web interface. To perform the update, the weather station must be connected to the Internet.

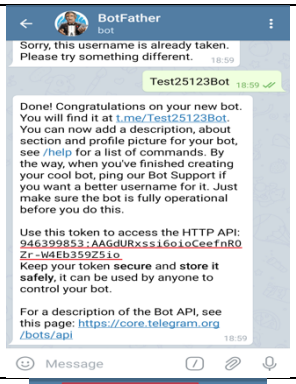
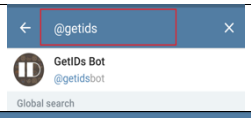
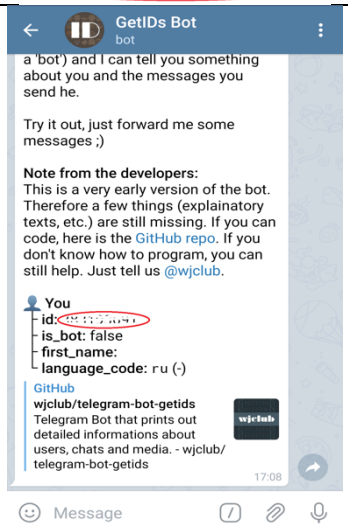
The current software version can be found in the "Software version" field in the "General" section.	
To start the update process, click on the “UPDATE” button in the “General” section.	
If there is an update (new version) of the software, a pop-up window will appear with the inscription **New version available**. You must click on the button “UPDATE”.	
The update may take several minutes (depending on the speed of your Internet connection). **During the update process, you cannot turn off the weather station.**	
If the update is downloaded successfully, a pop-up window will appear with the message **“Update successfully downloaded”**. To complete the update process, click the "RESET" button. When you click "CANCEL" - the weather station will remain on the current software version, but only until the next reboot, after which the weather station will operate on the new software version.	

On this page, configure remote control of the weather station: remote inclusion of the zone's manual mode, emergency shutdown of the system, receipt of alerts about various events (failure of sensors, etc.)	

Connecting to Telegram.

To connect to Telegram, you need to create a bot and bind it and ChatID number (s) (unique user number in Telegram) to the weather station. This is necessary for confidential work with the weather station via Telegram. The bot is created in the Telegram application itself, and the bot and ChatID are mapped to the weather station's web interfaces on the Settings \ Management page. Below is a step-by-step instruction:

1	Launch Telegrammessenger.	
2	Find and add @BotFather to your contacts.	
3	After adding the BotFather bot to the contacts, press the START button below.	
4	Send the command / newbot - this creates a new bot.	

5	Create and enter a name for the bot (always with the end of "Bot" or "_bot") and send this name in the message. After that, a unique token key will come from BotFather, which must be copied. It will need to be specified in the **"BotID"** field on the "Settings \ Management" page.	
5	Find and add @GetIDsBot to your contacts. This must be done in the user's Telegram.	
6	After the GetIDs bot is added to the contacts, click the START button below.	
7	In the received message from the GetIDs bot in the **"id"** field, you will receive the **ChatID** number of the Telegram user. It will need to be specified in the **"ChatID"** field on the "Settings \ Management" page. In total, you can specify up to 3 users.	
8	To check the operation, you can click the "Test" button on the "Settings \ Management" page. Upon successful connection, the user will receive a "Welcome" message from the created bot.	
9	To save the settings, click the "Save" button on the "Settings \ Management" page.	

Management teams and alert messages.

List of commands that can be sent to the Telegram weather station bot:

Commands must be lowercase.

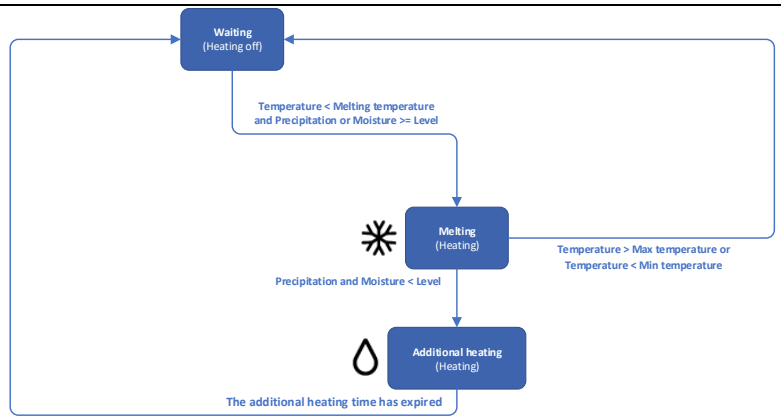
Command	Description
help	Returns a list of all commands.
info	Returns the weather station system information.
sensors	Returns the readings of all weather station sensors.
zones	Returns the status of the heating zone relay (ON / OFF).
z1 on	Turn on manual mode in zone 1.
z1 off	Switching off the manual mode in zone 1.
off	System shutdown. The operation of all zones is disabled, all control relays are off.
on	Turn on the system.

List of alert messages sent by the weather station:

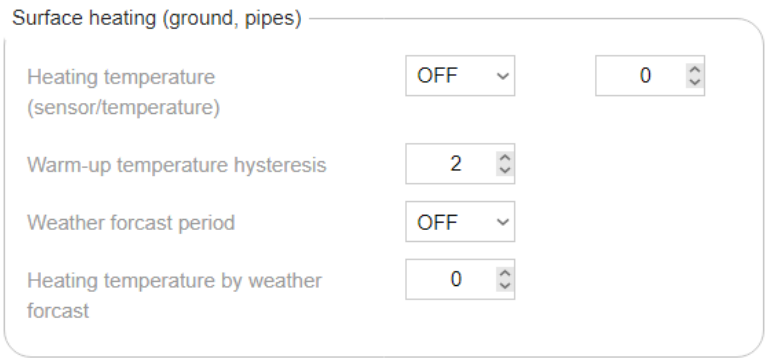
Message	Description
SENSOR ERROR	The message comes when the sensor fails. The message indicates a sensor that has failed.
SYSTEM STARTED	A message arrives at every restart of the weather station.

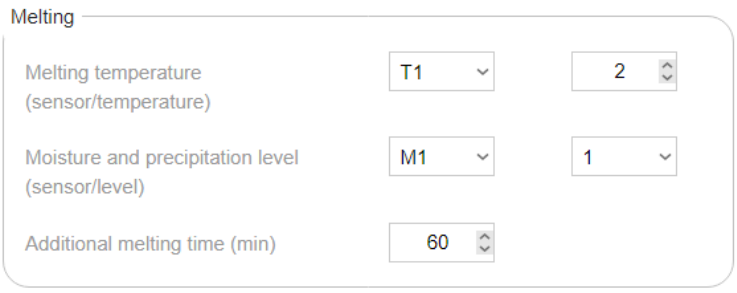
Example No. 1. Roofing system. T1, M1.

For the Roof system using an air temperature sensor connected to port T1, precipitation and moisture to M1.



Operational temperature.		
Min.	T1	-15°C
Max.	T1	6°C
Surface heating.		
Heating temperature	Off	-
Hysteresis	-	-
Weather forecast period	-	Off
Weather forecast heating temperature	-	-
Melting.		
Melting temperature	T1	2°C
Moisture, precipitation	M1	1
Additional heating time	-	60

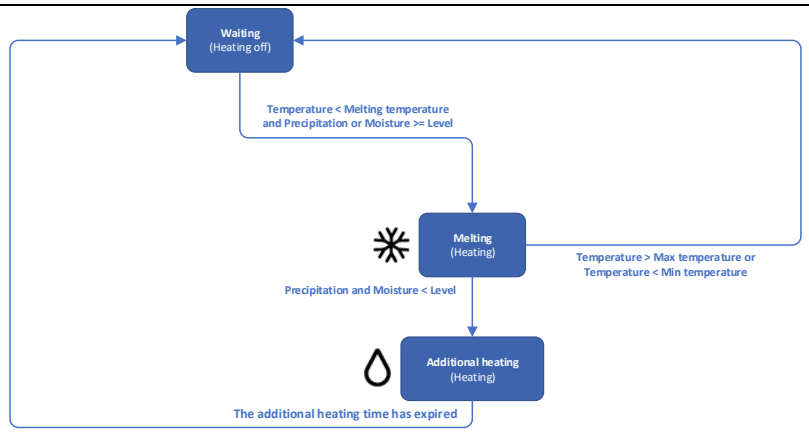




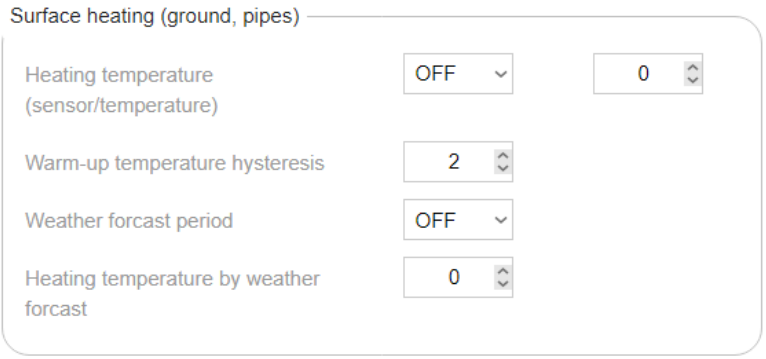
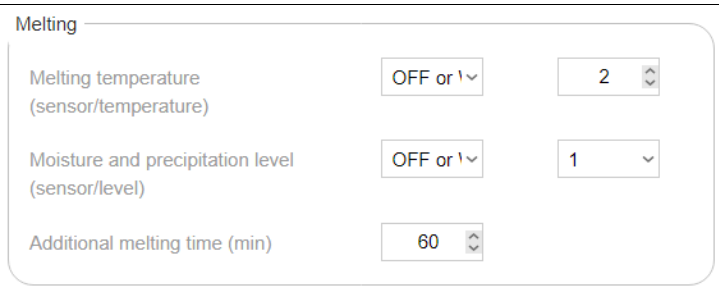
Example No. 2. Roofing system. Weather service

For the Roofing system. Weather service (without the use of sensors).

(The weather service must be enabled in the system and the installation location of the weather station must be indicated. You can do this on the Settings \ Weather Service page).

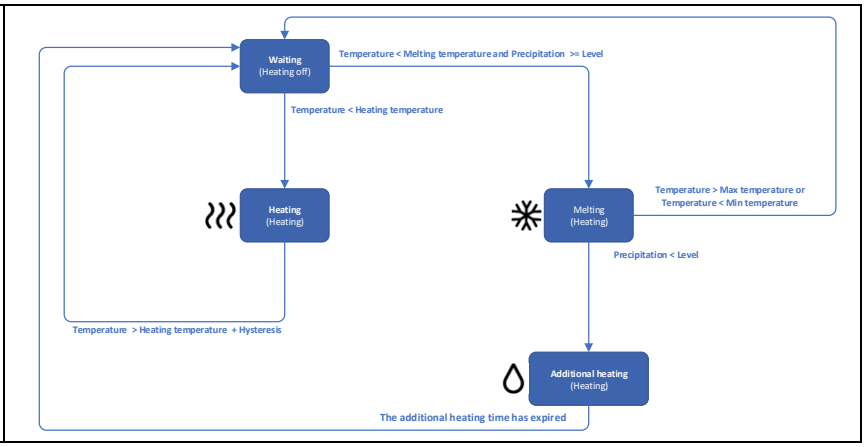


The system will enter the additional heating mode immediately after the precipitation level according to the forecast of the weather service becomes less than the set level in the zone, therefore it is recommended to set the increased **Additional heating time**.

The main ones.			
Weather service	-	ON	
Operational temperature.			
Min.	Off or WS	-15°C	
Max.	Off or WS	6°C	
Surface heating.			
Heating temperature	Off	-	
Hysteresis	-	-	
Weather forecast period	-	Off	
Weather forecast heating temperature	-	-	
Melting.			
Melting temperature	Off or WS	2°C	
Moisture, precipitation	Off or WS	1	
Additional heating time	-	60	

Example No. 3. Ground system. T1, M1.

For soil system using a sensor soil temperature T1 and rain and moisture sensor M1.

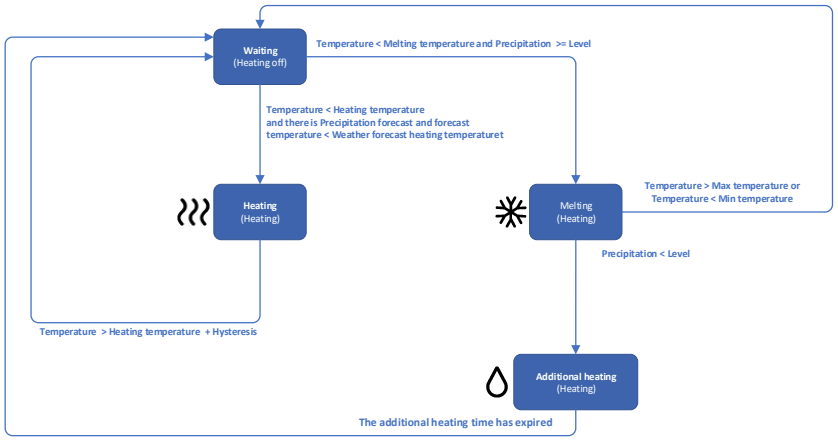


Operational temperature.			
Min.	T1	-15°C	Operational temperatures Min (sensor/temperature) T1 -15 Max (sensor/temperature) T1 6
Max.	T1	6°C	
Surface heating.			
Heating temperature	T1	0°C	Surface heating (ground, pipes) Heating temperature (sensor/temperature) T1 0 Warm-up temperature hysteresis 2 Weather forcast period OFF Heating temperature by weather forcast 0
Hysteresis	-	2°C	
Weather forecast period	-	Off	
Weather forecast heating temperature	-	-	
Melting.			
Melting temperature	T1	2°C	Melting Melting temperature (sensor/temperature) T1 2 Moisture and precipitation level (sensor/level) M1 1 Additional melting time (min) 60
Moisture, precipitation	M1	1	
Additional heating time	-	60	

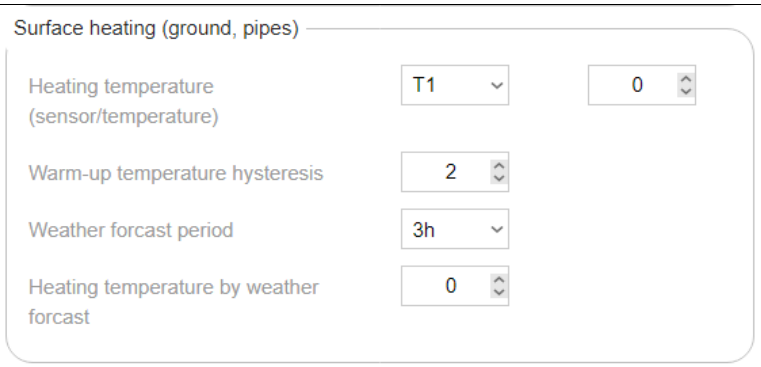
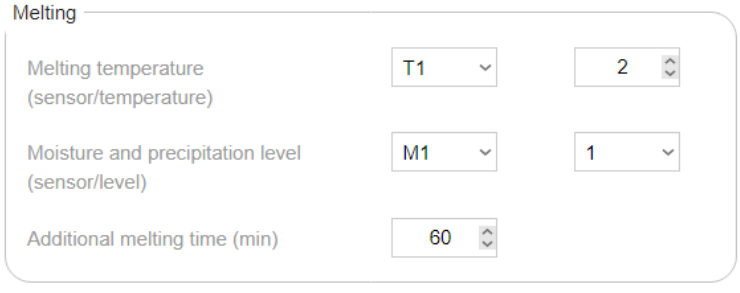
Example No. 4. Ground system. T1, M1, weather service (3-hour weather forecast).

For the Soil system using the T1 soil temperature sensor, the M1 precipitation and moisture sensor and weather service data (weather forecast).

(The weather service should be enabled in the system and the location of the weather station to be set. You can do this on the "Settings \ Weather service" page.)



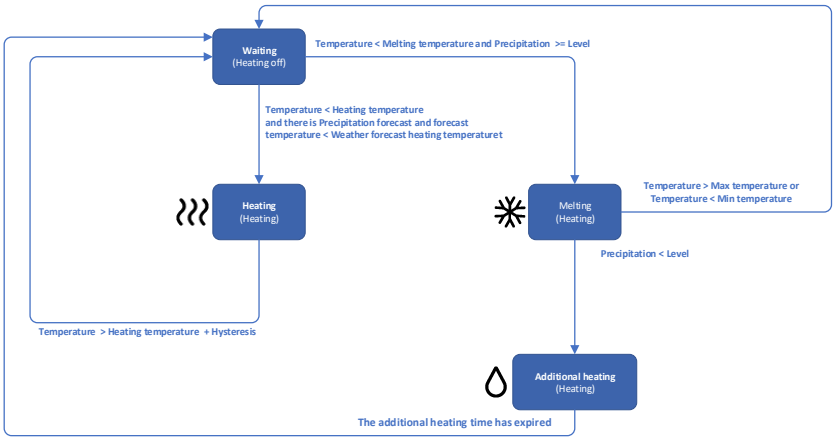
In this example, the system enables surface heating only if there is precipitation in the 3-hour weather forecast and the air temperature is lower than the one set in the **“Heating temperature by weather forecast”** field. Thus, significant energy savings occur. In this case, surface heating occurs to the temperature specified in the **“Heating temperature”** and **“Hysteresis”** fields.

The main ones.			
Weather service	-	On	
Working temperature.			
Min.	T1	-15°C	
Max.	T1	6°C	
Surface heating.			
Heating temperature	T1	0°C	
Hysteresis	-	2°C	
Weather forecast period	-	3h	
Weather forecast heating temperature	-	0°C	
Melting.			
Melting temperature	T1	2°C	
Moisture, precipitation	M1	1	
Additional heating time	-	60	

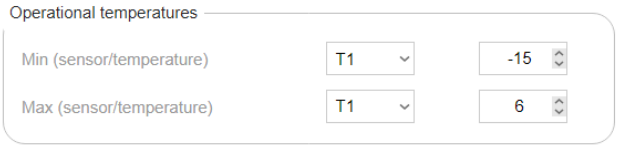
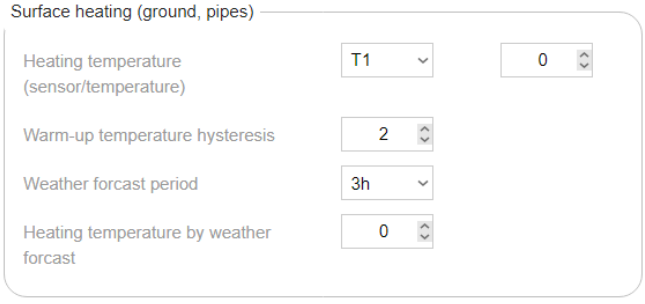
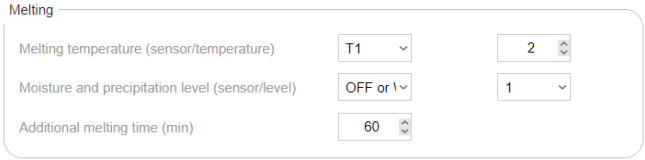
Example No. 5. Ground system. T1, weather service (3-hour weather forecast).

For the Soil system using the T1 soil temperature sensor and weather service data (weather forecast and current weather data).

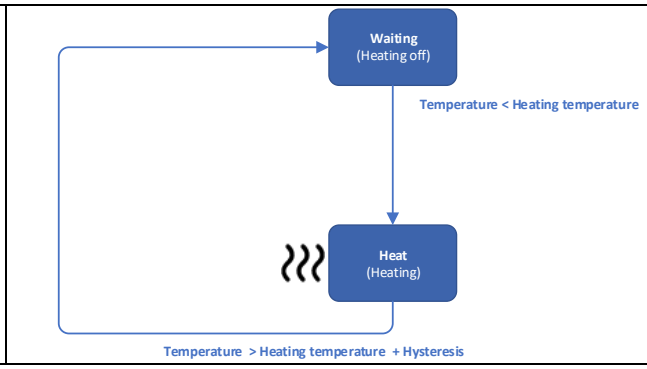
(The weather service must be enabled in the system and the installation location of the weather station must be indicated. You can do this on the "Settings \ Weather Service" page.)

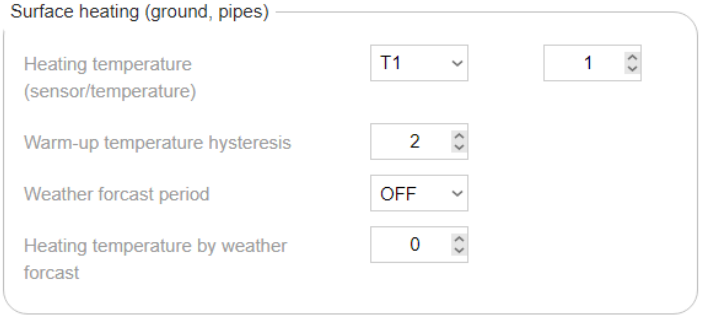
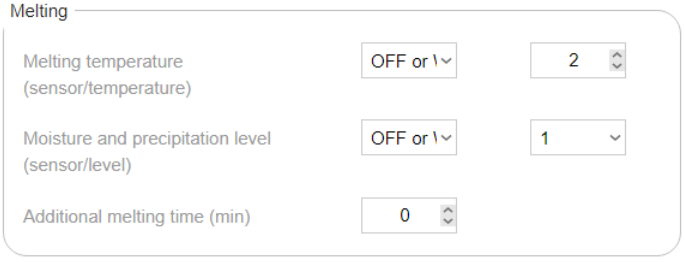


In this example, the system enables surface heating only if there is precipitation in the 3-hour weather forecast and the air temperature is lower than the one set in the **"Heating temperature by weather forecast"** field. Thus, significant energy savings occur. In this case, surface heating occurs to the temperature specified in the **"Heating temperature"** and **"Hysteresis"** fields.
In this example, precipitation sensor data is replaced by a weather forecast.

The main ones.			
Weather service	-	On	
Working temperature.			
Min.	T1	-15°C	
Max.	T1	6°C	
Surface heating.			
Heating temperature	T1	0°C	
Hysteresis	-	2°C	
Weather forecast period	-	3h	
Weather forecast heating temperature	-	0°C	
Melting.			
Melting temperature	T1	2°C	
Moisture, precipitation	Off or WS	1	
Additional heating time	-	60	

Example No. 6. Pipe heating system. T1.

For a pipe heating system using surface temperature sensor T1.	

The main ones.			
Weather service	-	Off	
Working temperature.			
Min.	T1	-15°C	
Max.	T1	6°C	
Surface heating.			
Heating temperature	T1	1°C	
Hysteresis	-	2	
Weather forecast period	-	Off	
Weather forecast heating temperature	-	-	
Melting.			
Melting temperature	Off or WS	-	
Moisture, precipitation	Off or WS	1	
Additional heating time	-	0	