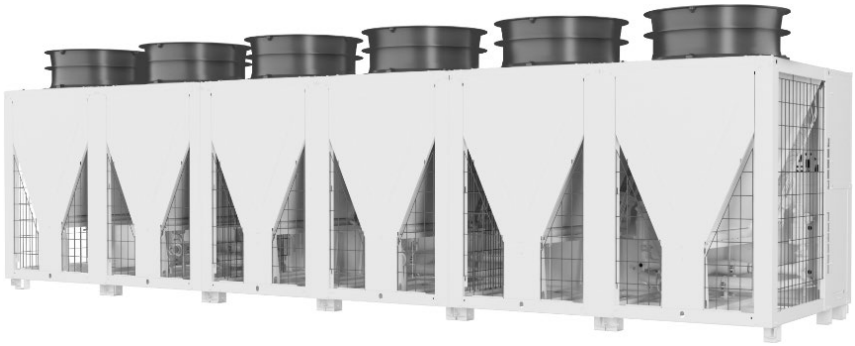
INSTALLATION & OPERATING MANUAL
SYSTEM MANAGEMENT SEQUENCER (SMS) OPTION_275A

PRODUCTS CONCERNED
MODULAR R-290 AIR SOURCE HEAT PUMP



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Original instructions

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1 - SAFETY CONSIDERATIONS

1.1 - Safety guidelines

Installation, start-up and servicing of equipment can be hazardous if certain factors particular to the installation are not considered: electrical components, voltages, and the installation site.

Only qualified installation technicians, qualified electricians, and fully trained technicians are authorised to install, wire, and start the equipment.

All instructions and recommendations provided in the service guide, installation and operation manuals, as well as electrical diagram must be read, understood and followed.

Failure to comply with the instructions provided by the manufacturer may result in injury or product damage.

- **Apply all safety standards and practices.**
- **Use the proper tools to move heavy objects.**
- **Move product carefully and set them down gently.**

CAUTION: Only qualified service technicians should be allowed to service the equipment.

1.2 - Safety precautions

Only personnel qualified in accordance with IEC (International Electrotechnical Commission) recommendations may be permitted access to electrical components.

It is particularly recommended that all sources of electricity to the product should be shut off before any work is begun. Shut off the main power supply at the main circuit breaker.

IMPORTANT: The equipment uses and emits electromagnetic signals. Tests have shown that the equipment conforms to all applicable codes with respect to electromagnetic compatibility.

RISK OF ELECTROCUTION! Even when the main circuit breaker is switched off, specific circuits may still be energised as they may be connected to a separate power source.

2 - CONTROL OVERVIEW

2.1 - Control system

The System Manager Sequencer (SMS) Option 275A is a control cabinet accessory which is designed to control up to 4 Air source heat pumps. SMS cabinet is equipped with 10.1'' Human Machine Interface (HMI) that serves as the user interface and configuration tool for the manufacturer communicating devices. This HMI comes with VNC connectivity.

SMS Option 275A is compatible with any combination of the below heat pumps sizes:

Capacity [kW]	38	48	58	63	76	96	115	125
Sizes Brand 1	40	50	60	70	80	100	120	140
Sizes Brand 2	100	130	160	180	200	260	320	360

The hydraulic configuration must correspond to one of the cases defined in the compatible hydraulic diagrams.

IMPORTANT: This document may refer to optional components and certain functions, options or accessories may not be available for the specific product.

2.2 - System functionalities

The system controls the cascade of the heat pumps needed to maintain the desired common leaving water temperature. Each heat pump runs according to its own internal safeties and controls.

SMS control system:

- Allows users to control the system via the 10.1'' user interface.
- Provides VNC connectivity technology.
- Includes the trending functionality.
- Support native About HVAC Performance (Connected Services) - Remote connectivity, alarm notification, remote access, performance and operation automatic reporting, technical advice).
- Provides direct BMS integration capabilities.

2.3 - Control panel

Navigation through the SMS control is either using the touch screen interface or by connecting to the VNC interface.

2.4 - Operating modes

The control can operate in three independent modes selectable using the front panel 3-position button:

Local Off: The system is stopped by the SMS.

Local On/Remote: The system is started by the SMS. The operating mode (heating/cooling) and the setpoint type (eco/comfort/away) must be selected manually by the user through the local interface.

Automatic mode: The system is started/stopped accordingly to user selection, BMS signal, or schedule. The operating mode (heating/cooling) is set accordingly to user selection, BMS signal, or outside air temperature thresholds. Setpoint type (eco/comfort/away) is set accordingly to user selection, BMS signal, or schedule.

CAUTION: Emergency stop! The Network emergency stop command stops the unit regardless of its active operating type.

2.5 - Features overview

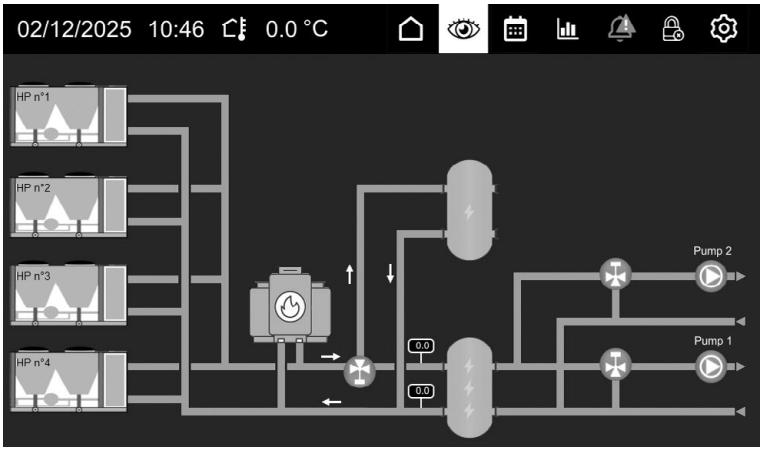
Feature	Standard	Option
Status light indicators	✓	
10.1" touch screen	✓	
VNC connectivity	✓	
Abound HVAC Performance	✓	
Language packs	✓	
Language pack customization	✓	
History trends	✓	
BACnet IP communication (BMS, heat pumps)	✓	
Modbus TCP communication (BMS)	✓	
Mutualize pumps control	✓	
Heat pumps isolation valve control	✓	
Heating / Cooling control	✓	
Boiler control	✓	
Electric heating control	✓	
Electric heaters in buffer tank	✓	
Frost protection	✓	
Diagnostics	✓	
Smart Grid Ready(1)	✓	
Domestic Hot Water control(2)	✓	
Two Heating/Cooling zones control	✓	
Outside Air Temperature	✓	
Optimized control up to 4 units	✓	
Hybrid Heat Pump (not implemented)	✓	

(1) The Smart Grid Ready label is valid only in the DACH region (Germany, Austria, Switzerland).
(2) Diverting valve

2.6 - Compatible hydraulic systems

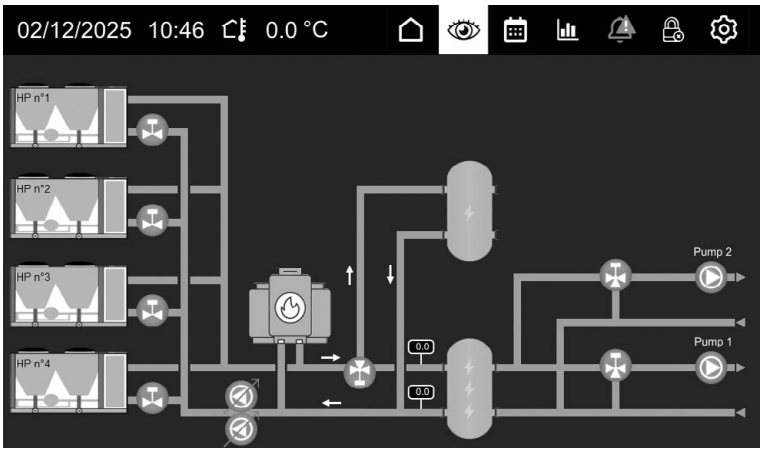
2.6.1 - Heat pumps and boiler in parallel (Configuration n°1)

Up to four heat pumps and a boiler supply a buffer tank or DHW tank. Primary dedicated pumps are managed by the heat pumps or heat pumps are fitted with hydraulic kits. Up to two secondary zones with pump and 3-way mixing valve.



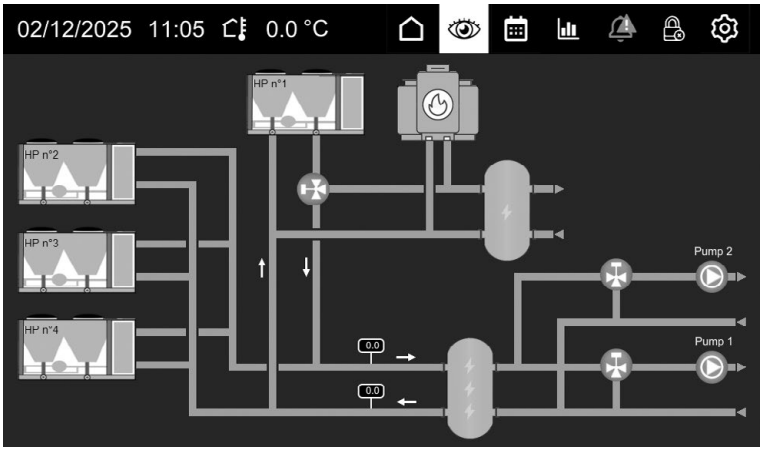
2.6.2 - Heat pumps and boiler in parallel with customer pumps (Configuration n°2)

Up to four heat pumps and a boiler supply a buffer tank or DHW tank. Up to two customer pumps with differential pressure management provide flow to the heat pumps and are managed by the SMS. Isolation valves on each heat pump and controlled by it. Up to two secondary zones with pump and 3-way mixing valve.



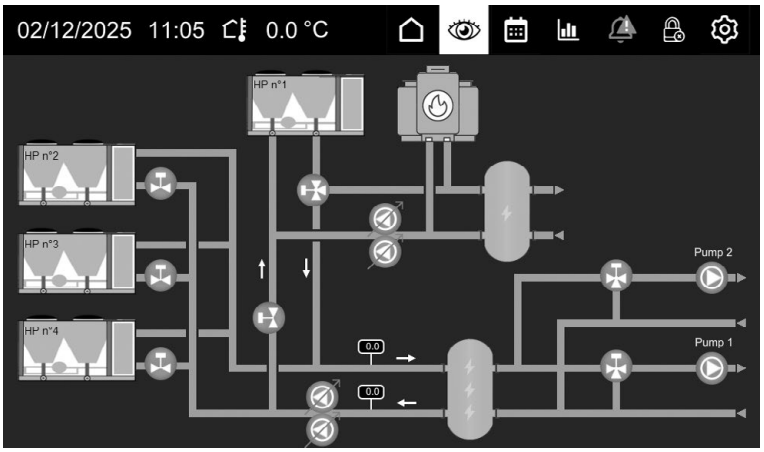
2.6.3 - One heat pump dedicated to DHW (Configuration n°3)

Heat pumps supply a buffer tank. Heat pump n°1 and boiler supply DHW tank. Diverting valve is managed by the SMS. Primary dedicated pumps are managed by the heat pumps or heat pumps are fitted with hydraulic kits. Up to two secondary zones with pump and 3-way mixing valve.



2.6.4 - One heat pump dedicated to DHW with customer pumps (Configuration n°4)

Heat pumps supply a buffer tank. Heat pump n°1 and boiler supply DHW tank. Diverting valve is managed by the SMS. Up to two customer pumps and two DHW customer pumps with differential pressure management provide flow to the heat pumps and are managed by the SMS. Isolation valves on heat pump n°1 is controlled by the SMS, isolation valves on heat pumps n°2 to 4 are controlled by each heat pump. Up to two secondary zones with pump and 3-way mixing valve.



3 - HARDWARE

3.1 - Control cabinet

The SMS is a control/command electrical cabinet and does not include the power supply of the controlled components (pumps, valves, etc.).

On its front side, a 10.1'' touchscreen and several light indicators are used to display the system status and its operation; a 3-positions button is available for control mode selection.

3.2 - Power supply to cabinet

The SMS must be powered by an external 230V source connected to the power supply terminal block XP inside the cabinet.

A 230VAC to 24VDC power supply in the cabinet is used to supply the control boards, local touchscreen, Ethernet switch and modem.

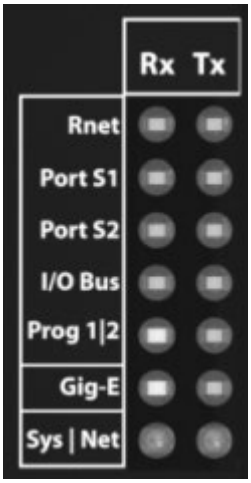
3.3 - Light indicators

The SMS continuously check and indicate the proper operation of the system; the status is given through four light emitting diode (LED) lights located on the front side of the electrical cabinet:

- The white LED indicates presence of voltage on the power supply terminal block XP.
- The green LED indicates that the system is running accordingly to user selection, BMS signal, or schedule, and that no alarm prevents the system to start.
- The yellow LED indicates the presence of one or several faults; faults are minor events that don't prevent the system to run but can limit the capacity available.
- The red LED indicates the presence of one or several alarms; alarms are major events that prevents the system to run or that drastically limit the capacity available.

Controller board continuously check and indicate the proper operation of its electronic circuit. Several light emitting diode (LED) lights when it is operating properly.

- The Net (Network Status) LED green indicates correct operation. A different rate may indicate a protocol or network issue.
- The green Sys (System Status) LED indicates correct operation. A different rate may indicate a firmware issue.



Expander I/O board continuously check and indicate the proper operation of its electronic circuit. Several light emitting diode (LED) lights when it is operating properly.

- The Sts (Status) LED slowly blinking green indicates that expander is functioning normally.

3.4 - Electrical cabinet connections

Cable glands are located on the bottom of the cabinet.

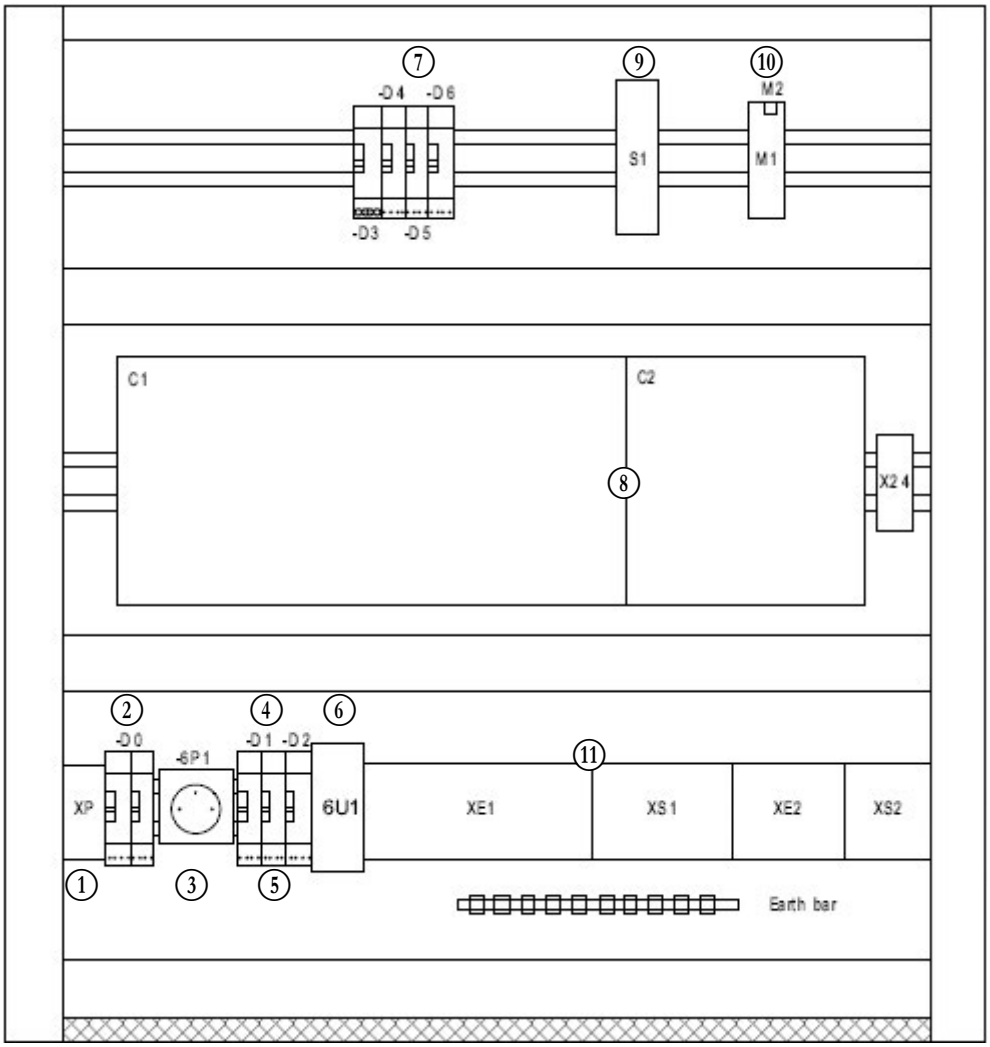
Power supply, inputs, and outputs must be connected to the terminal connection blocks accordingly to the SMS electrical diagram. Terminal connection blocks are located inside the electrical cabinet on the bottom part.

Five Ethernet ports allow for IP communication for heat pumps (BACnet/IP) and BMS (BACnet/IP, Modbus TCP/IP).

3.5 - Electrical box

The electrical box includes all boards controlling the system, the modem for the Abound HVAC Performance, and the user interface.

The main board continuously monitors the information received from various pressure and temperature probes and accordingly starts the program that controls the installation.



Legend:

1. 230VAC power supply connector
2. Main load disconnector switch
3. 230VAC socket
4. Differential circuit breaker
5. Main circuit breaker
6. 230VAC to 24VDC power supply
7. Sub-components circuit breakers
8. Control boards
9. Ethernet switch
10. Abound HVAC Performance modem
11. Terminal connection blocks

3.6 - Terminal block connections

The following table summarizes the connections at the user terminal block.

Description	Input/Output	Connector	Remarks
Remote start/stop	IN-01	XE1 (1/2)	Used as additional remote start/stop by wire when front button position is ON (remove the shunt to connect the cable)
Differential pressure for customer pumps	IN-36	XE2 (15/16)	0-10V differential pressure used to regulate the variable speed of evaporator pumps (hydraulic configuration 2 and 4)
Customer pump 1 running feedback	IN-08	XE1 (13/14)	Used to indicate that the customer pump n°1 is running (hydraulic configuration 2 and 4)
Customer pump 2 running feedback	IN-09	XE1 (15/16)	Used to indicate that the customer pump n°2 is running (hydraulic configuration 2 and 4)
Customer pump 1 command	OUT-09	XS1 (25/26/27)	The control system can regulate one or two variable speed evaporator pumps and automatically change over between the two pumps (hydraulic configuration 2 and 4)
Customer pump 2 command	OUT-10	XS1 (28/29/30)	The control system can regulate one or two variable speed evaporator pumps and automatically change over between the two pumps (hydraulic configuration 2 and 4)
Customer pump variable speed command	OUT-19	XS2 (5/6)	The control can regulate the customer pump via 0-10V signal (hydraulic configuration 2 and 4)
Isolation valve 1 feedback opened	IN-14	XE1 (25/26)	Indicates when the isolation valve of heat pump n°1 is in the open position (hydraulic configuration 4)
Isolation valve 1 feedback closed	IN-15	XE1 (27/28)	Indicates when the isolation valve of heat pump n°1 is in the close position (hydraulic configuration 4)
Isolation valve 1 command	OUT-13	XS1 (37/38/39)	The control system can open/close an isolation valve on heat pump n°1 (hydraulic configuration 4)
Boiler command	OUT-06	XS1 (16/17/18)	Used to control boiler
Entering water temperature	IN-34	XE2 (11/12)	Precon Type 2 Thermistor used to measure the common heat pumps entering temperature
Leaving water temperature	IN-35	XE2 (13/14)	Precon Type 2 Thermistor used to measure the common heat pumps leaving temperature
Running relay	OUT-22	XS2 (11/12/13)	Used to signal a running status (at least one heat pump or the boiler started)
Fault relay	OUT-23	XS2 (14/15/16)	Used to signal the presence of at least one fault on the system
Alarm relay	OUT-24	XS2 (17/18/19)	Used to signal the presence of at least one alarm on the system
Heating/Cooling Zones:			
Zone 1 water temperature	IN-30	XE2 (3/4)	Precon Type 2 Thermistor used to measure the zone n°1 water loop temperature
Zone 1 pump running feedback	IN-12	XE1 (21/22)	Used to indicate that the pump on zone n°1 is running
Zone 1 heating pump command	OUT-07	XS1 (19/20/21)	The control system can regulate one single speed pump on zone n°1
3-way valve for zone 1	OUT-17	XS2 (1/2)	A 0-10V command to open/close the mixing valve to control the water loop temperature in zone n°1
Zone 2 water temperature	IN-31	XE2 (5/6)	Precon Type 2 Thermistor used to measure the zone n°2 water loop temperature
Zone 2 pump running feedback	IN-13	XE1 (23/24)	Used to indicate that the pump on zone n°2 is running
Zone 2 heating pump command	OUT-08	XS1 (22/23/24)	The control system can regulate one single speed pump on zone n°2
3-way valve for zone 2	OUT-18	XS2 (3/4)	A 0-10V command to open/close the mixing valve to control the water loop temperature in zone n°2
Floor temperature	IN-32	XE2 (7/8)	10k Ohms NTC Thermistor used to measure the floor temperature of the heating/cooling system

Description	Input/Output	Connector	Remarks
Domestic Hot Water:			
DHW thermal switch	IN-03	XE1 (3/4)	Domestic Hot Water Thermal Switch
DHW manual command	IN-16	XE1 (29/30)	Domestic Hot Water manual enable command
DHW temperature	IN-29	XE2 (1/2)	Domestic Hot Water Thermistor 5k Ohms NTC thermistor used to measure the internal temperature of the DHW tank
DHW diverting valve feedback opened	IN-06	XE1 (9/10)	Indicates when the DHW diverting valve is in the open position. In this position, the heat pump is able to heat the DHW tank
DHW diverting valve feedback closed	IN-07	XE1 (11/12)	Indicates when the DHW diverting valve is in the closed position. In this position, the heat pump is able to heat or cool the zone(s)
DHW diverting valve command	OUT-01	XS1 (1/2/3)	A command signal to open or close the DHW diverting valve (NO/NC relay)
DHW electric heater	OUT-02	XS1 (4/5/6)	Domestic Hot Water Electric Heater command
Differential pressure for DHW pumps	IN-37	XE2 (17/18)	0-10V differential pressure used to regulate the variable speed of DHW pumps (hydraulic configuration 4)
DHW pump 1 running feedback	IN-10	XE1 (17/18)	Used to indicate that the customer DHW pump n°1 is running (hydraulic configuration 4)
DHW pump 2 running feedback	IN-11	XE1 (19/20)	Used to indicate that the customer DHW pump n°2 is running (hydraulic configuration 4)
DHW pump 1 command	OUT-11	XS1 (31/32/33)	The control system can regulate one or two variable speed DHW pumps and automatically change over between the two pumps (hydraulic configuration 4)
DHW pump 2 command	OUT-12	XS1 (34/35/36)	The control system can regulate one or two variable speed DHW pumps and automatically change over between the two pumps (hydraulic configuration 4)
DHW pump variable speed command	OUT-20	XS2 (7/8)	The control can regulate the DHW pump via 0-10V signal (hydraulic configuration 4)
Smart Grid:			
Smart Grid input 1	IN-04	XE1 (5/6)	Smart Grid SGR0_BST
Smart Grid input 2	IN-05	XE1 (7/8)	Smart Grid SGR1_LCK
Buffer Tank:			
Water tank temperature	IN-33	XE2 (9/10)	5k Ohms NTC Thermistor used to measure internal water tank temperature
Electrical heat stage 1	OUT-03	XS1 (7/8/9)	Used to control electrical heat stage
Electrical heat stage 2	OUT-04	XS1 (10/11/12)	
Electrical heat stage 3	OUT-05	XS1 (13/14/15)	

3.6.1 - Volt-free contact (Remote on/off)

This signal is used to remotely control the start/stop command of the system when the button in front of the electrical cabinet is positioned to “ON”. A shunt on the terminal connection block must be removed to wire the remote contact.

Contact	Stop	Start
Remote start/stop contact	Open	Close

Note: This signal has no impact when front button position is different than “ON”.

3.6.2 - Volt-free contact - DHW Thermal Switch

Use a thermal switch to measure the DHW demand instead of a thermistor sensor.

Contact	DHW demand	No DHW demand
Demand contact	Open	Close

3.6.3 - Volt-free contact - DHW Manual command

1 contact to manually bypass the DHW schedule and enable DHW production.

Contact	DHW manual command Off	DHW manual command On
Demand contact	Open	Close

3.6.4 - Volt-free contact - Smart Grid

Use to manage the four Smart Grid Modes (see section 10).

3.6.5 - Volt-free contact – Valve position

2 contacts per valve are used to determine the position of the diverting valve and isolation valve n°1.

Contact	Valve opened	Valve closed
Open feedback contact	Close	Open
Close feedback contact	Open	Close

3.6.6 - Volt-free contact – Pump running feedback

Used to determine if the pump is running or not.

Contact	Pump stopped	Pump running
Running feedback contact	Open	Close

3.6.7 - Differential pressure transducers

These transducers are located on the customers pumps and DHW pump; Each transducer measure the pump water inlet/outlet water pressure difference to regulate the pump’s variable speed.

These transducers deliver 0 to 10 VDC. They are connected to the terminal block connectors.

3.7 - Temperature sensors

Temperature sensors constantly measure the temperature at various location of the installation, ensuring the correct operation of the system.

- **Domestic Hot Water Temperature sensor (optional).**

This sensor monitors the internal water temperature of the Domestic Hot Water (DHW) tank. If not present, a DHW thermal switch must be connected to the SMS.

- **Zone water loop temperature sensor.**

One sensor per zone is used to measure the Water loop Temperature and regulate the 3-way valve.

- **Floor Temperature sensor (optional).**

This sensor is used to measure the Floor Temperature for a zone with a Heating/Cooling Floor.

- **Water tank temperature sensor (optional).**

This sensor is used to measure the Water Tank Temperature and control the electric heaters.

- **Common Leaving Water Temperature sensor.**

This sensor measures the common leaving water temperature and is used to cascade the heat pumps.

- **Common Entering Water Temperature sensor.**

This sensor measures the common heat pumps entering water temperature.

3.8 - Actuators

The SMS will control equipment with 0-10VDC signals, or through NO/NC relays with the below specifications:

Maximum switching voltage	250 V AC/DC
Minimum switching voltage	5 V (100 mA)
Limiting continuous current	6 A
Minimum switching current	10 mA (12 V)
Interrupting rating (ohmic load) max.	140 W (24 VDC)
	40 W (220 VDC)

- **Domestic Hot Water (DHW) - Diverting Valve.**

The control command directs the valve to switch between the Heating/Cooling Zone and Domestic Hot Water (DHW) production, or the other way around. Use the NO and NC if diverting valve is 3-point control (NO contact to command open, NC contact to command close) or use only the NO contact if valve has an open command with automatic return to close position.

- **Zone(s) circular pump.**

One pump per Zone, the pump is On/Off type. Use the NO contact to send running command to the pump.

- **Customer pump(s).**

One or two pumps to manage flow in the heat pumps, the pumps are variable speed type. Use the NO contact to send running command to the pump. Use the 0-10VDC signal to control the variable speed of the pump (if two pumps are present, the same signal is sent to both pumps).

- **DHW pump(s).**

One or two pumps to manage flow in the dedicated heat pump during DHW production, the pumps are variable speed type. Use the NO contact to send running command to the pump. Use the 0-10VDC signal to control the variable speed of the pump (if two pumps are present, the same signal is sent to both pumps).

- **Isolation Valve n°1.**

The control command directs the valve to open/close allowing or not the water flow from the customer pumps to go through the heat pump n°1. Use the NO and NC if valve is 3-point control (NO contact to command open, NC contact to command close) or use only the NO contact if valve has an open command with automatic return to close position.

- **DHW heaters and Buffer tank Electric Heat Stages.**

The heaters are On/Off type. Use the NO contact to send running command to the heater.

- **Boiler.**

The boiler is On/Off type. Use the NO contact to send running command to the boiler. Setpoint configuration must be managed at the boiler level and will not be sent by the SMS.

3.9 - IP wiring (best practice)

IP wiring is used to connect the heat pumps and BMS to the Ethernet switch located in the SMS electrical cabinet. It is recommended to use category 5e (Cat5e) or better cable, not exceeding 100 meters in length for each Ethernet cable.

4 - USER INTERFACE: OVERVIEW

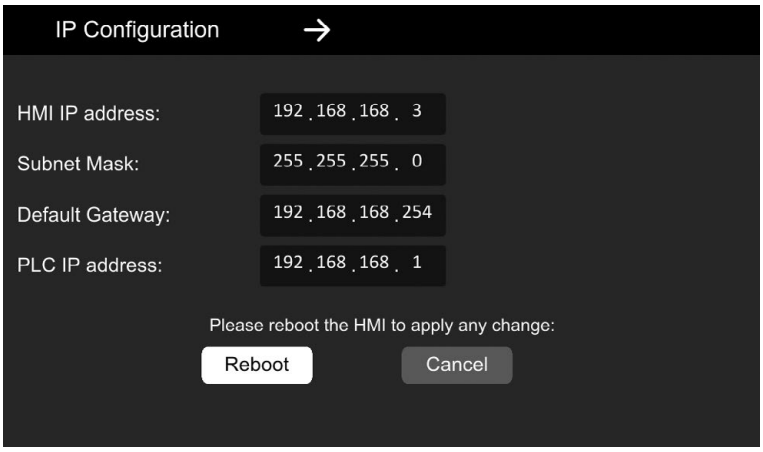
The SMS touch screen is a 10.1'' resistive touch screen. It allows you to control the touch screen with a bare finger or any suitable objects (stylus pen, gloves). Pointed or cutting tools should not be used (e.g. screwdrivers).

4.1 - Quick Configuration - initial settings

During commissioning, the first screen displayed on the touchscreen provides an intuitive configuration wizard to guide you through the setup process.

4.1.1 - IP Configuration

This screen allows you to configure in the HMI IP address, Subnet Mask, Default Gateway addresses, but also to configure the PLC IP address the HMI will have to communicate with.



Beware, once the PLC address has been changed, you may lose communication between the HMI and the PLC if the IP address configured in the PLC controller is not the one you have indicated in the HMI. In this case, click on the settings icon on top right corner to return to the IP configuration page and change the configuration.

4.1.2 - Equipment presence

The first screen of "Equipment presence" allow the description of main components of the system, such as:

- **Hydraulic configuration.**

This function describes the main architecture of the plant, meaning the way the up to four heat pump assemblies connected via the Ethernet network are connected. The mandatory configuration is as follows:

1. Units are in parallel.

2. Diverting valve is common to redirect all the units to zone production of Domestic hot Water; or diverting valve is on heat pump n°1 which is dedicated to Domestic Hot Water production.

- **Customer pumps.**

Disable this function if all units are fitted with hydraulic kits or if the units will directly control dedicated pumps. Enable it, and select the number of pumps, if the SMS will manage shared pumps at the common heat pumps input.

If activated, isolation valves are compulsory and must be connected either on the heat pumps (hydraulic configuration selected previously is with a common diverting valve) or on the SMS terminal blocks (hydraulic configuration selected previously is with a dedicated diverting valve).

- **DHW pumps.**

This function is only available for hydraulic layout with diverting valve on heat pump n°1 and will not be displayed if the other hydraulic layout is selected.

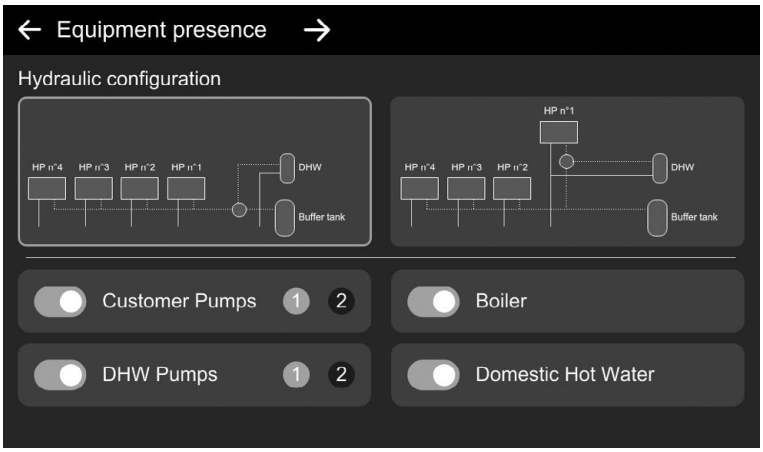
Enable/Disable button is link to the customer pumps button and move accordingly to it. Disable this function if all units are fitted with hydraulic kits or if the units will directly control dedicated pumps. Enable it, and select the number of pumps, if the SMS will manage DHW pumps at the heat pump n°1 input.

- **Boiler.**

Allows the SMS to control a boiler as backup heating.

■ **DHW (Domestic Hot Water).**

Allows the SMS to heat a domestic hot water tank based on a DHW schedule and a Legionella prevention schedule.



The second screen of "Equipment presence" allow the description of other components of the system, such as:

■ **Zones.**

Allows the SMS to control up to two Heating/Cooling Zones. For each zone, an On/Off pump will be controlled, and two operating modes (Comfort and Eco) can be scheduled.

■ **Floor sensor.**

Allows the SMS to monitor the floor temperature and indicates on which zone the sensor is located.

■ **3-way valves.**

For each existing zone, a mixing valve allows to control the zone temperature based on the water temperature setpoint.

■ **Smart Grid.**

Available for DACH countries. It allows an energy supplier to access the SMS and manage four operating states (Normal, Locked, Boost, Forced).

■ **Buffer tank EHS.**

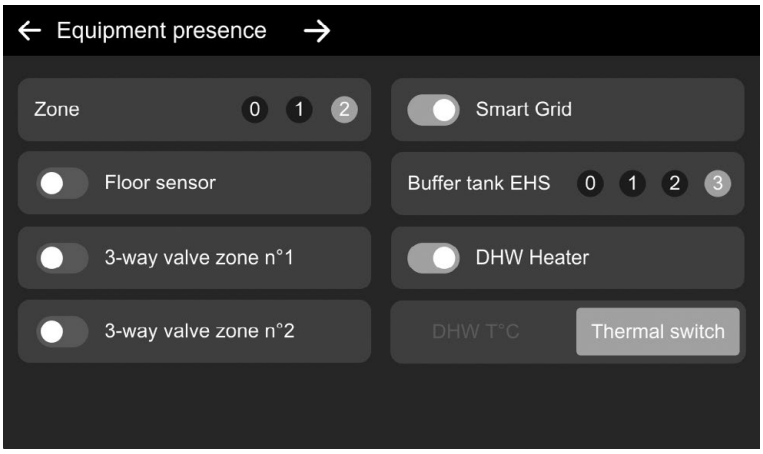
Allows configuration of up to 3 heaters located in the buffer tank. The wiring of the buffer tank temperature sensor is compulsory for the SMS to control these heaters.

■ **DHW Heater.**

Allows the SMS to control one heater located in the Domestic Hot Water tank. This setting is only available if Domestic Hot Water has been enabled.

■ **DHW T°C or Thermal Switch.**

Allows to select which type of measuring equipment (temperature sensor or thermal switch) is used to detect a need of Domestic Hot Water production. This setting is only available if Domestic Hot Water has been enabled.



4.1.3 - Heat pumps

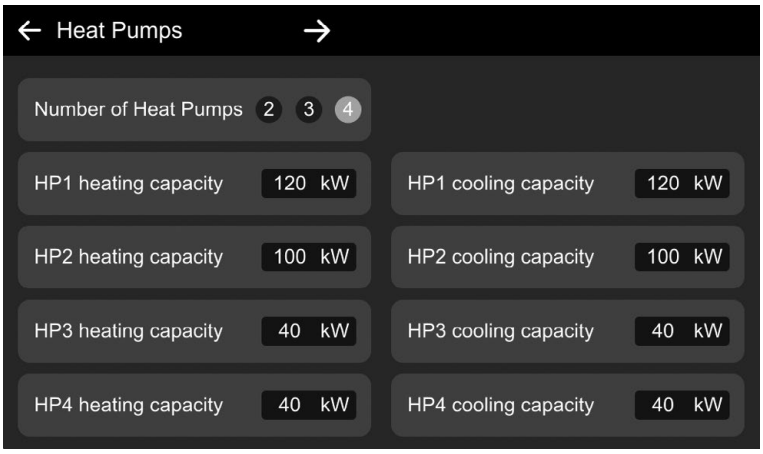
The first "Heat pumps" view allows for the description of the heat pumps:

- **Number of Heat Pumps.**

Allows configuration of up to 4 heat pumps to be controlled by the SMS. Heat pumps must be arranged in parallel configuration and must have a size compatible with the SMS.

- **Heat pumps capacities.**

Allows configuration of heat pumps capacities in heating and cooling production.



The second "Heat pumps" view allows for the description of the heat pumps operation in the cascade:

- **Min./Max. HP setpoint.**

Allows to configure the minimum setpoint value in cooling mode, and maximum setpoint value in heating mode that the SMS will be able to write in the heat pumps.

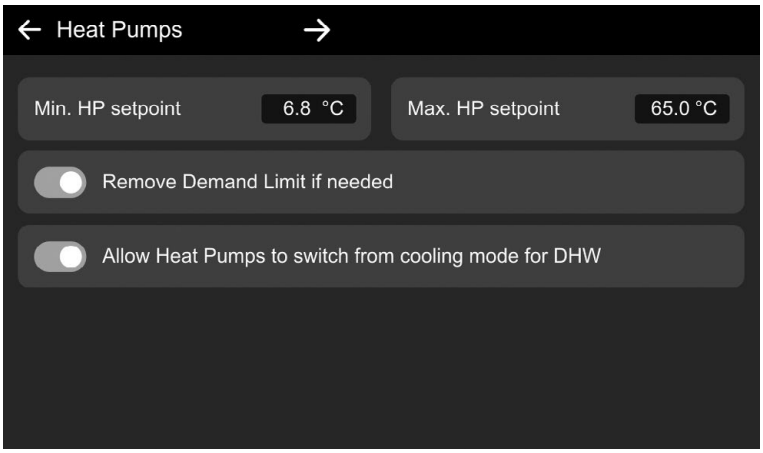
The active heat pumps setpoints will be function of the SMS current production mode (cooling or heating), the current production type (zone, buffer tank, DHW, or Legionella prevention) and the thermal loss compensation in the pipes.

- **Remove demand limit if needed.**

Allows to select if the capacity limitation (demand limits) configured in the SMS and written in the heat pumps must be removed when all available heat pumps are started and heating (or cooling) demand is not sufficient. Or if the capacity limitation must be kept even if it may cause temperature drift.

- **Allow heat pumps to switch from cooling mode for DHW.**

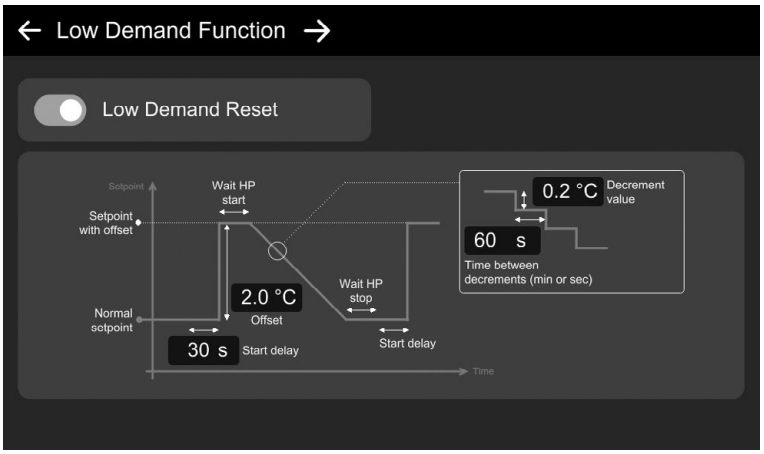
Allows to select, when the SMS is operating in cooling mode, if the heat pumps are allowed to switch to heating mode when DHW production is needed. Beware, this may cause temperature drift to the zone when heat pumps will be back to cooling mode. This setting in only available when hydraulic configuration selected is with common diverting valve.



4.1.4 - Low demand function

Allows to use the low demand function in the SMS to limit the stop-start cycle of the compressors of the heat pumps when there is little or no heating (or cooling) demand in the hydraulic network.

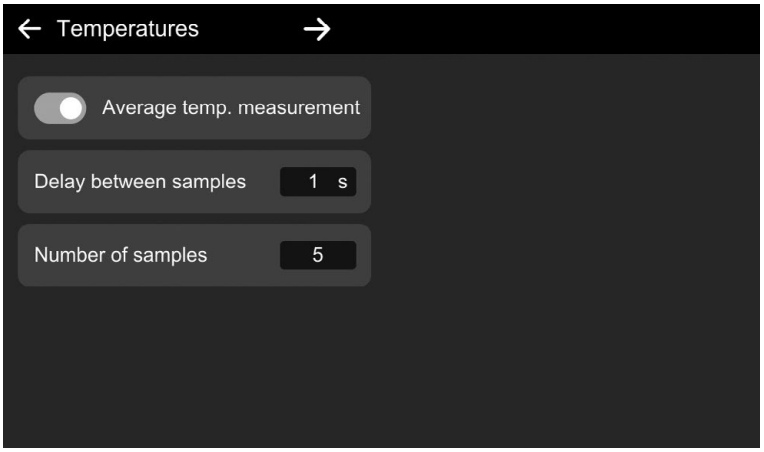
The function is enabled once a heat pump goes in recycle mode. When the function is running, an offset is applied to the heat pump. Then, the function waits for the heat pump to start to gradually decrease the offset applied until zero. Finally, the function waits for the heat pump to goes in recycle mode to restart a cycle.



NOTE: click on the unit of the Time between decrements setting to switch between seconds and minutes.

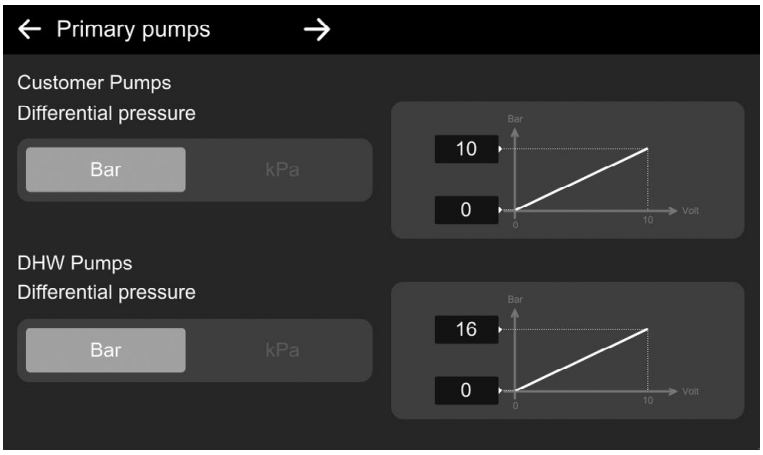
4.1.5 - Temperatures

Allows to set an average in the temperature measurement to overcome unstable temperature readings. Configure the number of samples for the average calculation and the delay between samples.



4.1.6 - Primary pumps

Allow to configure the range of the differential pressure sensors. These sensors are used to control the variable speed of Customer and DHW pumps. These settings are only available if the pumps have been enabled in the equipment presence screen, and depending on the hydraulic configuration selected.

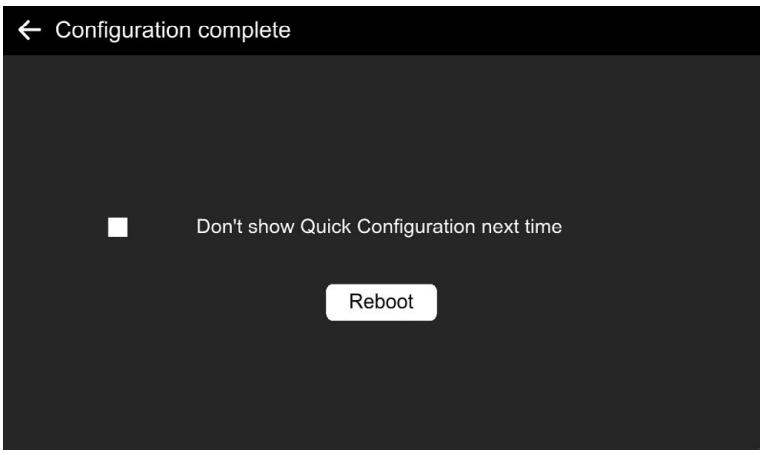


4.1.7 - Validation

Once the initial settings have been made, the configuration is complete.

Regarding the "Don't show Quick Configuration next time" checkbox:

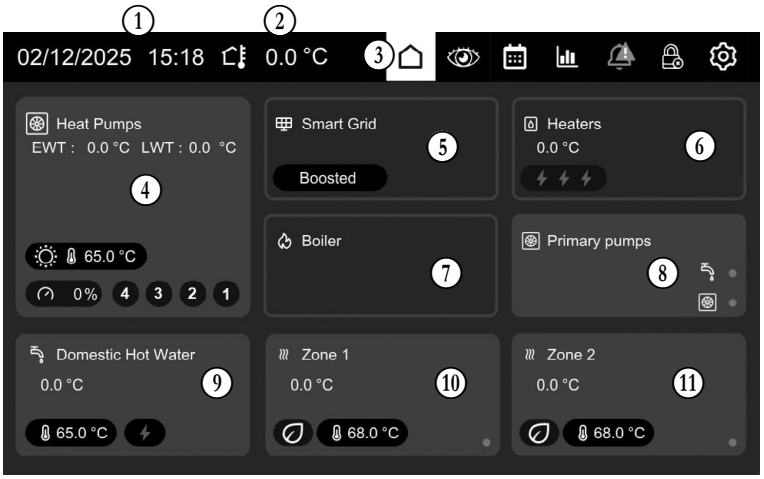
1. Selecting saves the parameters. The SMS home page will be displayed after reboot (commissioning complete).
2. Deselecting saves the parameters. The SMS Quick Configuration page will be displayed reboot (commissioning pending).



NOTE: Once commissioning is complete, the Quick configuration screen is disabled. All configuration changes must be made through Factory settings access. Factory password is required.

4.2 - SMS Home Screen

The home screen is the first screen displayed on the touch screen panel after the commissioning. This screen allows you to monitor basic information about the operation of the SMS and its working conditions. Upon starting the controller, the presets are displayed on the screen.

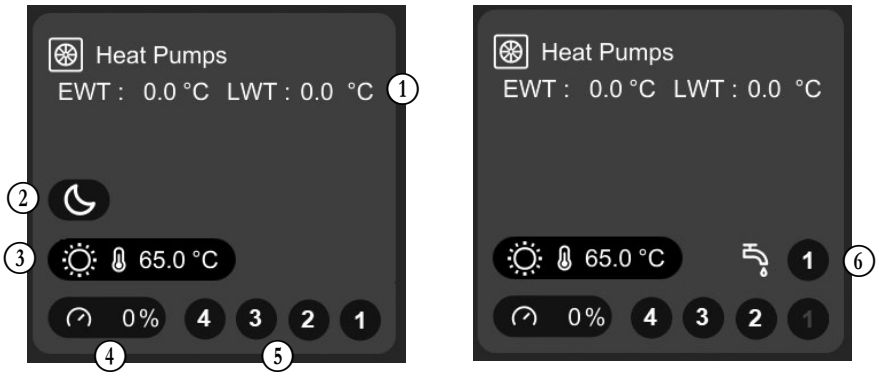


Legend:

1. Date and time
2. Outside Air Temperature
3. Menu icons
4. Heat pumps status
5. Smart Grid status
6. Heaters status
7. Boiler status
8. Primary pumps status
9. Domestic Hot Water status
10. Zone 1 status
11. Zone 2 status

4.2.1 - Heat Pump tile

This tile displays the current heat pumps and cascade status.



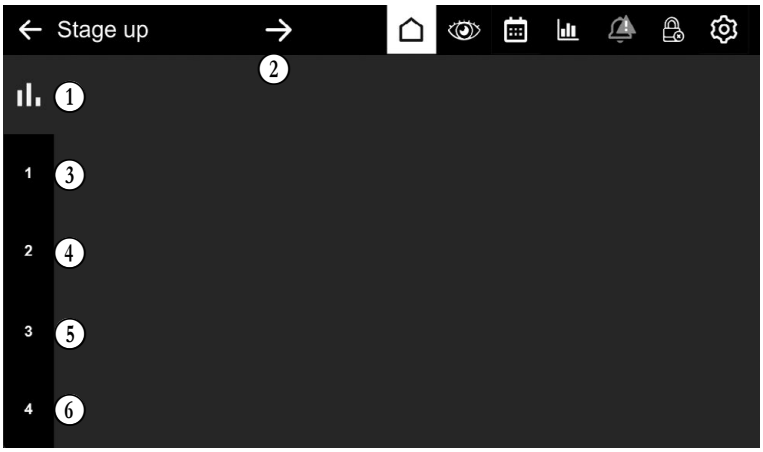
Legend:

1. Common leaving and entering temperature
2. Night mode active
3. Heat/Cool/Standby mode and active cascade setpoint
4. Current plant capacity
5. Heat pumps status
6. Heat pump n°1 status when operating in DHW (hydraulic configuration with heat pump n°1 dedicated to DHW)

Heat pumps status is given by a colour code with the following description:

Colour	Description
	The black colour indicates an off status of the heat pump.
	The part black, part **orange**, indicates an off status of the heat pump but with the presence of a partial failure.
	The **green** colour indicates a running status of the heat pump.
	The part **green**, part **orange**, indicates a running status of the heat pump but with the presence of a partial failure. Full heat pump capacity may not be available.
	The **red** colour indicates an off status of the heat pump due to a full failure or cascade alarm.

After selecting the "Heat Pump" tile, the visualisation screen will be displayed as shown below. This view allows to see the status of the staging up/down conditions and see the detailed information about each heat pumps.



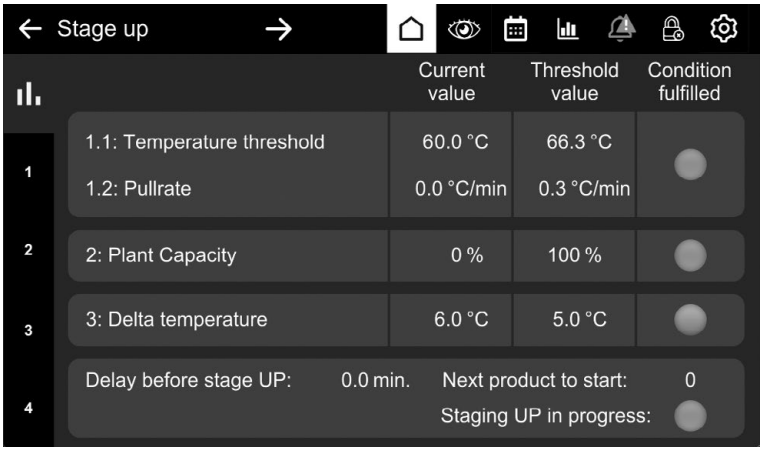
Legend:

1. Access staging up screen
2. Navigate to staging down screen (from staging up screen)
3. Access heat pump n°1 screen
4. Access heat pump n°2 screen
5. Access heat pump n°3 screen
6. Access heat pump n°4 screen

Stage up

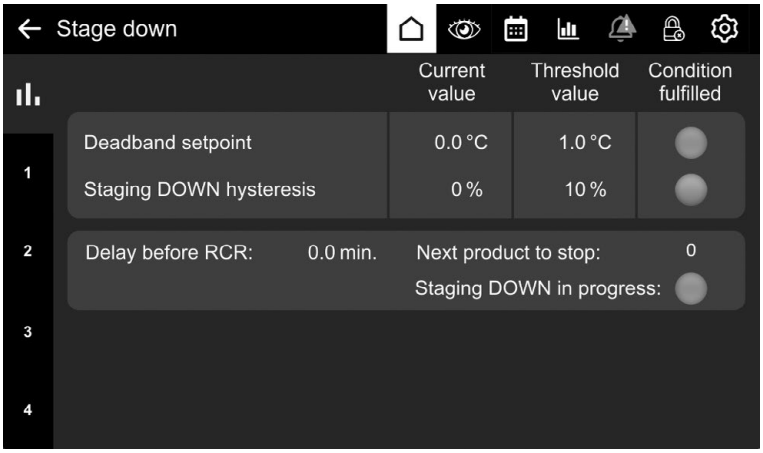
This screen displays the status of the different conditions for a new heat pump to be started by the SMS. The 3 conditions (the first condition is composed of two sub-conditions) are independent and only one that must be fulfilled to start the delay before the heat pump command is sent.

The page displays the next heat pump to be started by the SMS and if a staging up is already in progress.



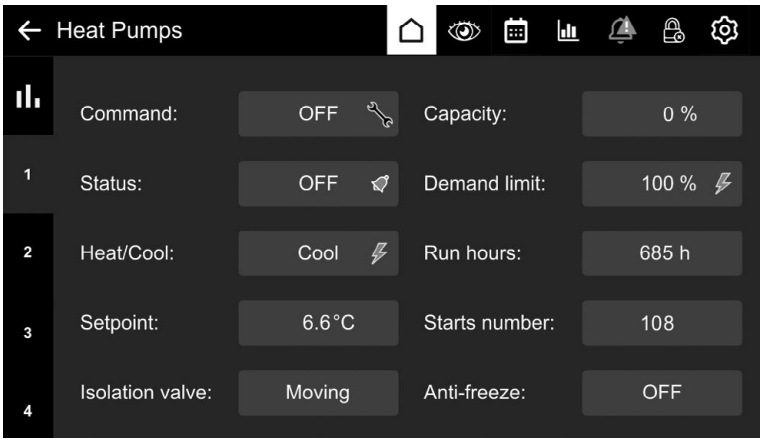
Stage down

This screen displays the status of the condition to be fulfilled during a delay for a heat pump to be stopped by the SMS.
The page displays the next heat pump to be started by the SMS and if a staging up is already in progress.



Heat pump n°x

This screen displays command sent by the SMS to the heat pump and the status it gets from the heat pump. These data are read in the heat pump regulation card which is located on the unit.

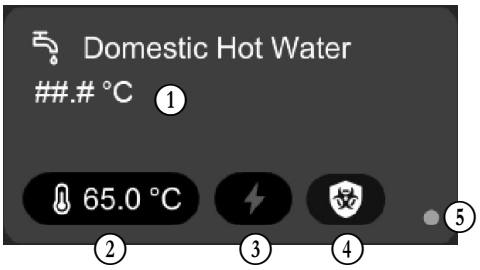


Additional icons may be displayed next to some points:

Icon	Description
	The spanner icon indicates that the unit has been set to maintenance mode by the BMS or through the SMS menu.
	The **orange** bell indicates the presence of a partial failure on the unit. Full heat pump capacity may not be available. Clicking on the icon will display the alarm popup.
	The **red** bell indicates the presence of a full failure that stops the unit. Clicking on the icon will display the alarm popup.
	The lightning icon indicates a manual control. It can be a manual start command, a manual selection of the heating/cooling production mode, or a capacity limitation during night mode.

4.2.2 - Domestic Hot Water tile

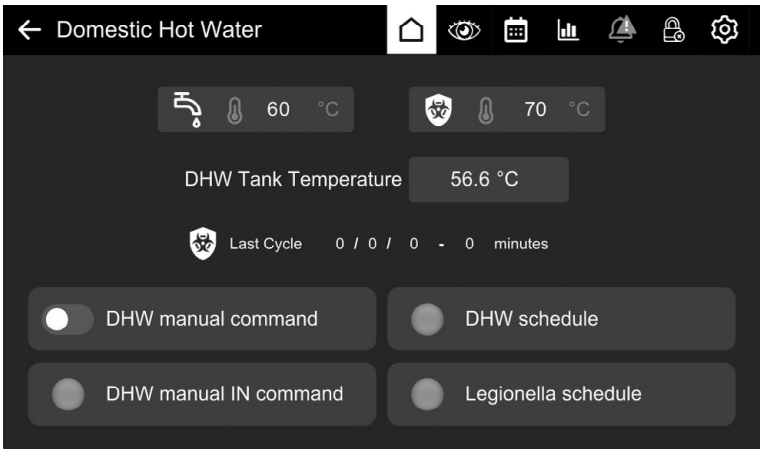
This tile displays the current DHW status.



Legend:

1. DHW tank temperature
2. Active setpoint (DHW or legionella prevention)
3. Heater status
4. Legionella prevention status
5. Green bullet DHW mode on/off

After selecting the "DHW" tile, the settings screen will be displayed as shown below:



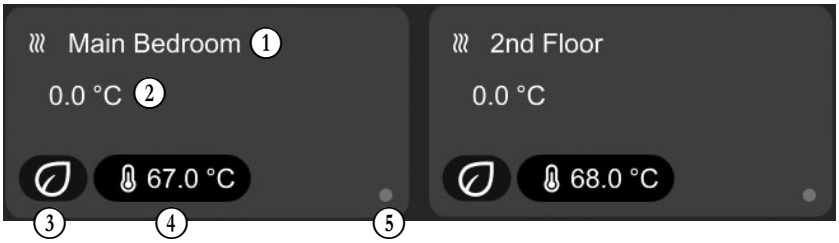
The setpoints displayed are read-only values. If thermal switch is not present, a DHW tank temperature is compulsory; in this case the temperature measured by the temperature sensor will be displayed instead of the thermal switch status.

The date of the last legionella prevention cycle and its duration are displayed on the screen.

The bottom part of the screen allows the user to manually enable Domestic Hot Water production by bypassing the DHW schedule. And visualize the status of the others Domestic Hot Water / Legionella prevention enabling conditions.

4.2.3 - Zone(s) tile

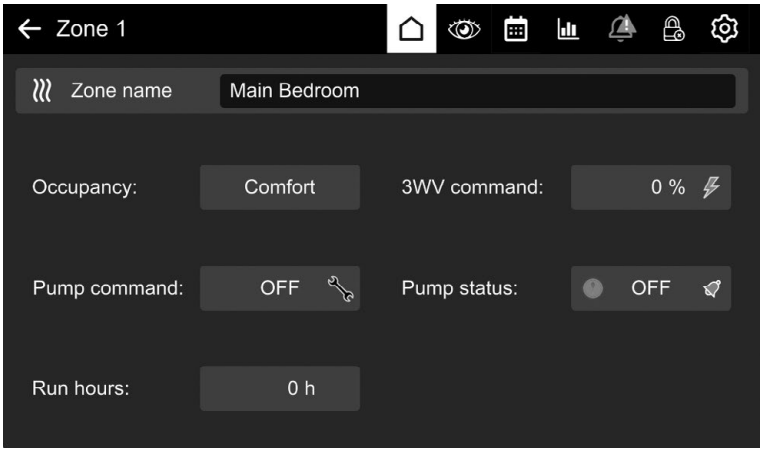
These tiles display the current Zone(s) status.



Legend:

1. Zone name
2. Leaving water temperature
3. Zone status (Eco/Comfort)
4. Active setpoint
5. Status bullet zone off/on/failure/alarm

Clicking on the "Zone #1" or "Zone #2" tile opens a view as shown below. The Zone name can be modified in this view.

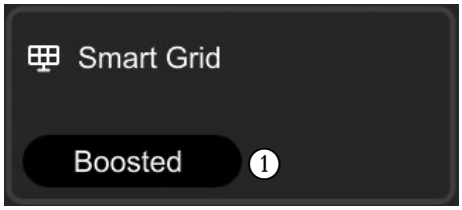


This screen displays command sent by the SMS to the zone pump and 3-way valve. Additional icons may be displayed next to some points:

Icon	Description
	The spanner icon indicates that the pump has been set to maintenance mode by the BMS or through the SMS menu.
	The **red** bell indicates has failed to answer to a start command from the SMS.
	The exclamation point icon indicates that the pump has been stopped due to a floor temperature out of the admissible range.
	The lightning icon indicates a manual control. It can be a manual start command of the pump, or a manual position command for the 3-way valve.

4.2.4 - Smart Grid tile

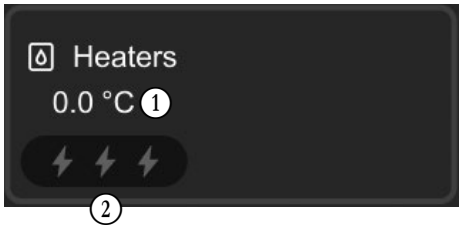
Allows for reading the status of the Smart Grid.



Legend:
1 Smart Grid status

4.2.5 - Heaters tile

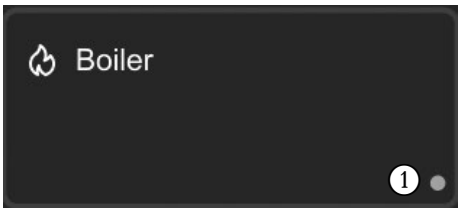
Allows for reading the status of the Electric Heaters.



Legend:
1 Buffer tank temperature
2 Electric Heaters on/off

4.2.6 - Boiler tile

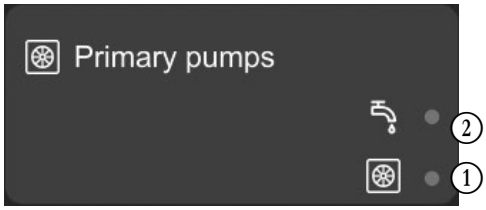
Allows for reading the status of the boiler.



Legend:
1 Boiler on/off

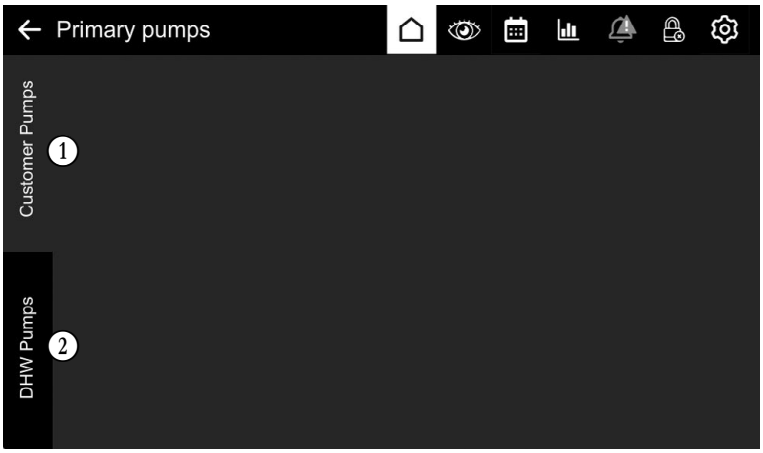
4.2.7 - Primary pump(s) tile

This tile displays the current primary pumps status.



Legend:
1 Customer pumps status off/on/failure/alarm
2 DHW pumps status off/on/failure/alarm

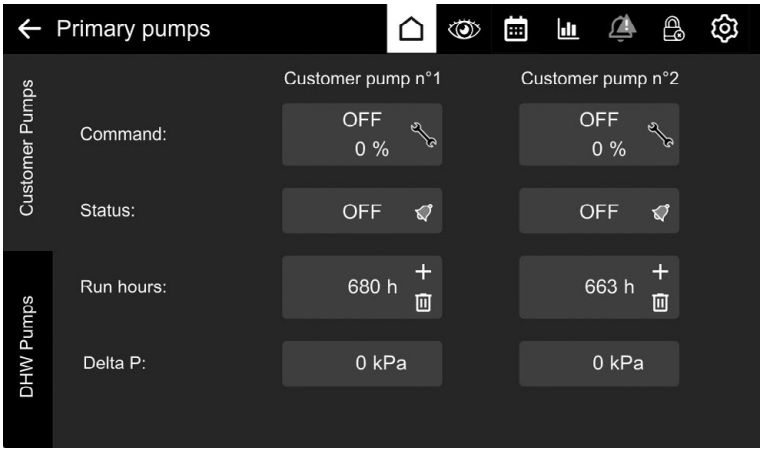
After selecting the "Primary pumps" tile, the visualisation screen will be displayed as shown below. This view allows to see the status of the customer pumps and Domestic Hot Water pumps.



Legend:
1 Access customer pumps screen
2 Access DHW pumps screen

Pumps (customer or DHW)

This screen displays command sent by the SMS to the pump and its status.

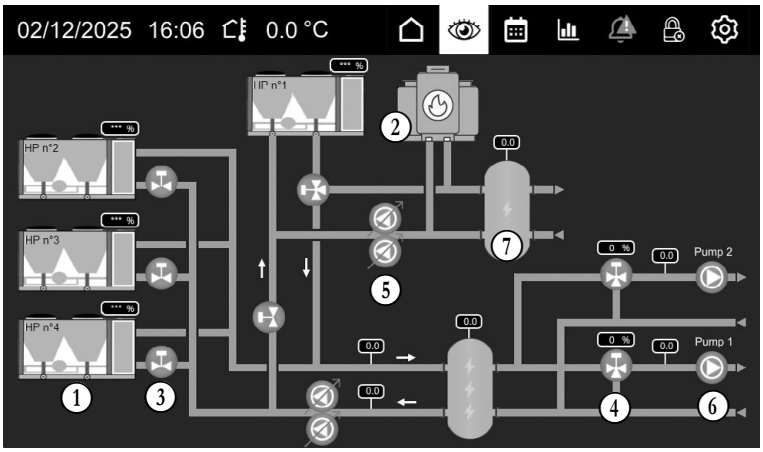


Additional icons may be displayed next to some points:

Icon	Description
	The spanner icon indicates that the pump has been set to maintenance mode by the BMS or through the SMS menu.
	The **red** bell indicates has failed to answer to a start command from the SMS.
	The lightning icon indicates a manual on/off control.
	The plus icon displays a popup allowing to add an offset to the pump operating time.
	The garbage icon allows to reset the pump operating time calculated by the SMS.

4.3 - Synoptic

This screen provides a visualisation of the installation managed by the SMS; it will adapt based of the factory settings. It displays the measured values and the current operating status using colour code.



Legend:

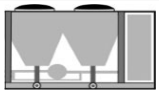
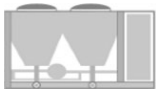
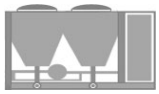
1. Heat pump
2. Boiler
3. 2-way valve (isolation valve)
4. 3-way valve
5. Variable speed pump
6. Fixed speed pump
7. Buffer tank or decoupling bottle

■ **Pipes.**

A grey colour indicates that there is no circulation through the pipes. If a pump is running, the pipes will be displayed in red (in heating) or blue (in cooling).

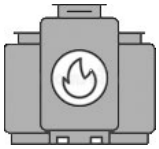
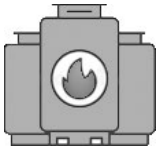
■ **Heat pumps.**

The heat pump icon will change its colour based on the following:

Icon	Description
	The **grey** icon means heat pump is stopped.
	The **green** icon means heat pump is running without failure (It does not mean a compressor is running).
	The **orange** icon means heat pump has a partial failure. Full heat pump capacity may not be available.
	The **red** icon means heat pump has a total failure or is not available (it can be a shutdown status from the unit board, or an alarm tripped by the SMS).

■ **Boiler.**

The boiler icon will change based on the command signal sent by the SMS:

Icon	Description
	Boiler command is off.
	Boiler command is on.

■ **2-way valves.**

The 2-way valve icon will change its colour based on the following:

Icon	Description
	The **grey** icon means valve closing feedback is active.
	The **green** icon means valve opening feedback is active.
	The **red** icon means valve failed to open or close accordingly to the command sent by the SMS.

■ **3-way valves (zone).**

The 3-way valve icon will change its colour based on the following:

Icon	Description
	The **grey** icon means zone production is not running.
	The **green** icon means zone production is running.

■ **3-way valves (diverting valve).**

The 3-way valve icon will change its colour based on the following:

Icon	Description
	The **grey** icon means valve closing feedback is active.
	The **green** icon means valve opening feedback is active.
	The **red** icon means valve failed to open or close accordingly to the command sent by the SMS.

■ **Pumps (fixed and variable speed).**

The 3-way valve icon.

Icon		Description
		The **grey** icon means pump is stopped.
		The **green** icon means pump is running.
		The **orange** icon means pump is running due to an external command.
		The **red** icon means pump has an alarm or is not available.

4.4 - Header buttons

Previous page	Next page	Home page	Synoptic page	Schedule menu	Trend menu	Alarms menu	Login menu	Configuration menu

Button	Description
	Previous screen: Press the button to go back to the previous screen.
	Next screen: Press the button to go to the next screen within the same menu.
	Home screen: Press the button to go to the Home screen.
	Synoptic screen: Press the button to go to the Synoptic screen.
	Schedule screen: Press the button to go to the Schedule screen.
	Trend menu: Press the button to go to the Trend screen.
	Alarm menu: Press the button to go to the Alarms menu.
	The **grey** bell means there is currently no alarm active.
	The **yellow** ringing bell means that there is a partial alarm (system is partially available) or Alert (no action taken on the SMS).
	The **red** bell means there is at least one alarm active on the system or SMS.
	Login menu: Used to login in to the controller in order to access higher configuration level.
	User is not logged in.
	User is logged in.
	Configuration menu: Press the button to go to the configuration menu.

4.5 - Other buttons

Button	Description
	Confirm button: Press the button to confirm the modification.
	Trash button: Press the button to cancel the modification.
	Settings button: Press the button to display setting popup.

5.1 - Schedule menu

Previous page	Next page	Home page	Synoptic page	**Schedule menu**	Trend menu	Alarms menu	Login menu	Configuration menu

The Schedule menu includes seven time schedules, as below:

- **Heat Pump On/Off Schedule.**

Enables the adjustment of Heat Pump operation.

Setting the weekly schedule from 00:00 to 00:00 enables continuous operation of the unit. During the "off" period, the unit's operation is unaffected by other time schedule configurations.

- **Comfort Mode Schedule.**

Enables the adjustment of Comfort Mode operation.

If no zones are configured, this weekly schedule defines the periods for controlling the water loop temperature based on the Comfort or Eco setpoint.

- **Holiday Schedule.**

Enables the adjustment of operation during Holiday periods.

- **Night Mode Schedule.**

Enables the adjustment of Night Mode operation.

This weekly schedule defines the periods during which the unit operates with reduced capacity (Night Mode Limit capacity).

- **DHW and Legionella Prevention Schedules.**

Enables the adjustment of Domestic Hot Water operation.

If DHW is configured, the weekly schedule defines the periods for heating the Domestic Hot Water tank to the configured DHW setpoint.

Enables the adjustment of Legionella Prevention operation.

If DHW is configured, the weekly schedule defines the periods for heating the Domestic Hot Water tank to the configured Legionella prevention setpoint.

- **Zone #1 Schedule.**

Enables the adjustment of Zone#1 operation.

If one or two Zone(s) are configured, the weekly schedule defines the Comfort and Economy periods for the Zone#1 heating and cooling modes.

- **Zone #2 Schedule.**

Enables the adjustment of Zone#2 operation.

If two Zones are configured, the weekly schedule defines the Comfort and Economy periods for the Zone#2 heating and cooling modes.

Occupancy periods

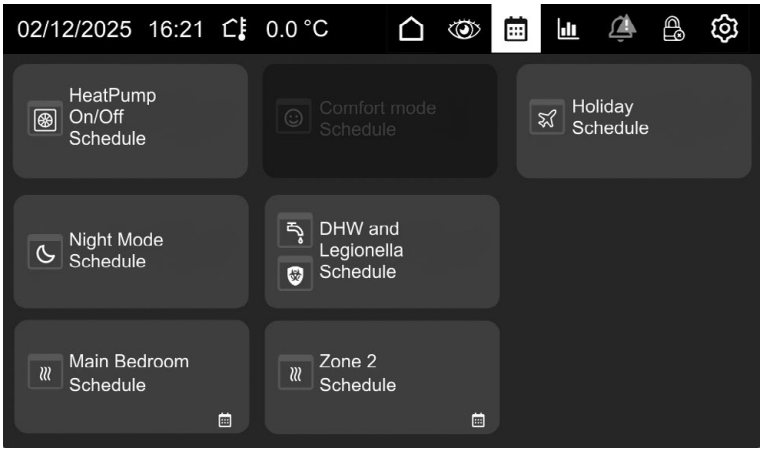
The control offers to the user the possibility of setting eight occupancy periods where each occupancy period includes the following elements to be defined:

Day of the week: Select the days when the period is occupied.

Occupancy time (“occupied from” to “occupied to”): Set occupancy hours for the selected days.

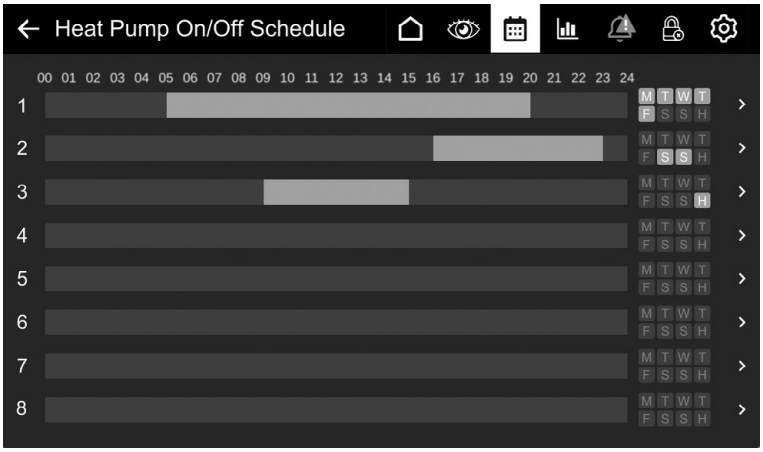
To set the unit schedule

1. Go to the Schedule menu.



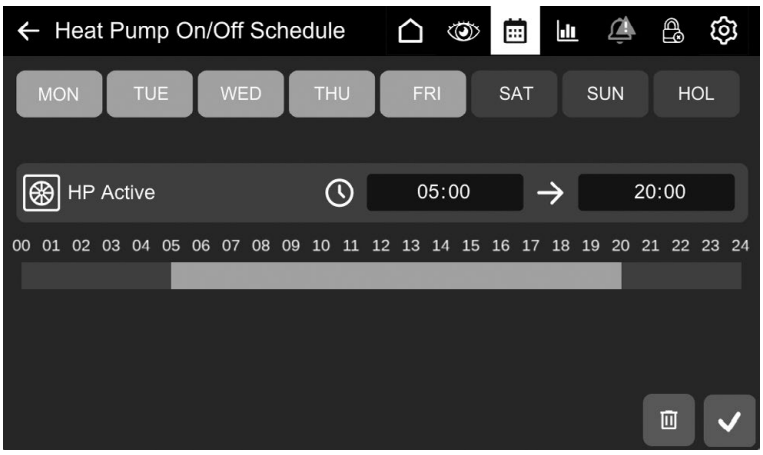
2. Navigate to the selected schedule to adjust. To configure a period (1-8), select the corresponding period.

Example: Status of the Heat Pump On/Off Schedule (analogously for all periods 1-8)



3. Select appropriate check boxes to set the unit occupancy on specific days.

Example: Setting Heat Pump On/Off Schedule



4. Define the time of occupancy.
5. When the time schedule is set, the selected period will be presented in the form of the green band on the timeline.
6. Press the Back button to validate or Trash button to delete the changes.

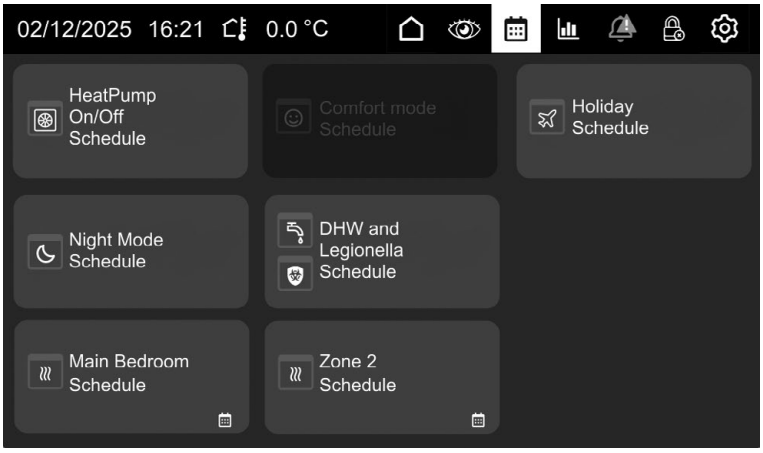
IMPORTANT: The method for setting the schedule is the same for all other time schedules, except for the Holiday Schedule (see section 5.1.1).

5.1.1 - Schedule menu - Holiday Schedule

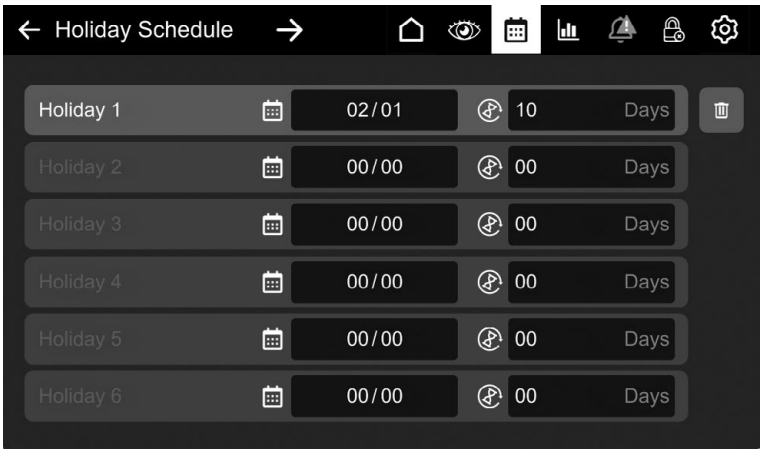
The Holiday Schedule is one of seven Schedule Menu setting options.

To set the unit Holiday Schedule:

1. Go to the Schedule menu.



2. Select the Holiday Schedule for adjustment. There is 16 Holiday Schedules available. To view all content, use the arrow buttons on the top of the page.



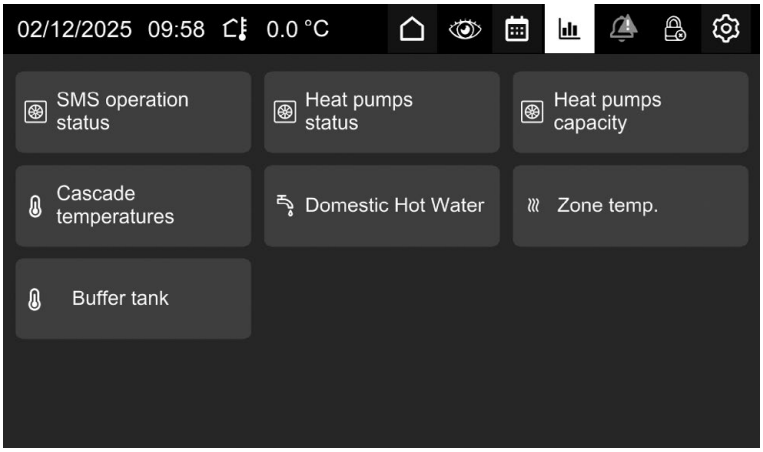
4. Click on the date and use the calendar to define the Start Day and Start Month, then define the holiday duration in days.
5. Press the **Trash** button to delete the changes.

5.2 - Trendings

Previous page	Next page	Home page	Synoptic page	Schedule menu	**Trend menu**	Alarms menu	Login menu	Configuration menu

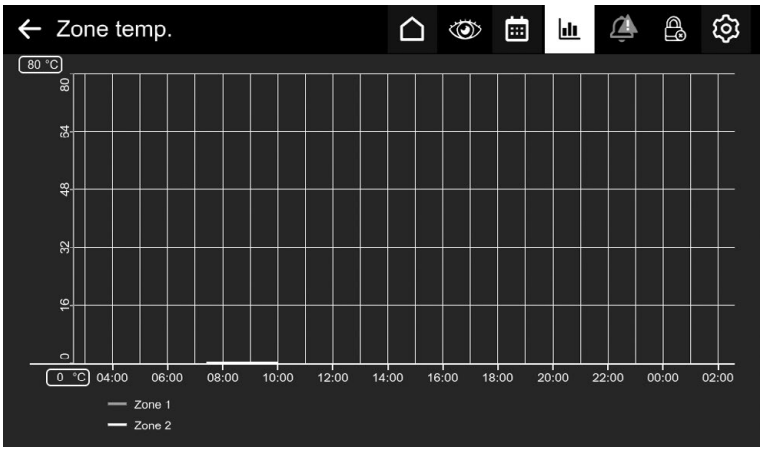
The Trending function is used to visualise the system operations that are displayed in the form of a graph accessed via the SMS user interface (measures are taken each 5 seconds). The Trend menu includes up to seven trend graphs depending on the configuration of the installation, as below:

- **SMS operation status:** Display one graph with the operation status of the System Manager Sequencer, meaning the production mode (Zone production, DHW production, etc.) that have been enabled by the control system in function of all its inputs.
- **Heat Pumps status:** One graph composed of one trend per heat pump. Each trend displays the heat pump status as it is seen and interpreted by the System Manager Sequencer. This status is different than the heat pump status provided by the units as it also takes care of the SMS internal inputs and alarms.
- **Heat pumps capacity:** One graph composed of one trend per heat pump. Each trend displays the heat pump running capacity in percentage.
- **Cascade temperatures:** One graph composed of two trends. One trend is the leaving water temperature LWT which is the value read at the common outlet of the heat pumps and used as a condition for heat pumps staging. The other trend is the entering water temperature EWT which is the temperature read at the common inlet of the heat pumps and used as an information.
- **Domestic Hot Water:** Display one graph with the Domestic Hot Water tank temperature (only available if the DHW tank temperature sensor has been configured during the commissioning).
- **Zone temperature:** Display one graph composed of one trend per zone. Each trend displays the zone leaving temperature.
- **Buffer tank:** Display one graph with the Buffer tank temperature (only available if the Electric Heat Stages have been configured during the commissioning).



On any graph, scroll along the horizontal axis to display previous data.

On graphs that display temperatures, it is possible to adjust the limits of the y-axis by clicking on the top and bottom values.



5.3 - Alarms menu

Previous page	Next page	Home page	Synoptic page	Schedule menu	Trend menu	**Alarms menu**	Login menu	Configuration menu

Alarms Menu

Current Alrms

Alarms Historic

Major Alarms Historic

Acknowledgement

Legend:

Basic access (no password)

Access DHW pumps screen

The **Alarms menu** allows the user to monitor alarms that occurred on the system as well as reset alarms that require manual reset. To access the Alarms menu, press the **Alarms menu** button located in the upper-right part of the Home screen.

The Alarm history is divided into two parts:

Alarm Historic that displays all recent alarms.
Major Alarm Historic that only displays alarms that affect the operation of the system and can limit the plant capacity.
IMPORTANT: For more information about alarms, please go to section 8.

Current Alarms

Date	Hour	Alarm text
DD/MM/YYYY	HH:MM	Alarm text (see section 8.5)
DD/MM/YYYY	HH:MM	Alarm text (see section 8.5)
DD/MM/YYYY	HH:MM	Alarm text (see section 8.5)

(1) Depends on the selected language (English by default).

Alarms Historic

Date	Hour	Alarm text
DD/MM/YYYY	HH:MM	Alarm text (see section 8.5)
DD/MM/YYYY	HH:MM	Alarm text (see section 8.5)
DD/MM/YYYY	HH:MM	Alarm text (see section 8.5)

(1) Depends on the selected language (English by default).

Major Alarms Historic

Date	Hour	Alarm text
DD/MM/YYYY	HH:MM	Alarm text (see section 8.5)
DD/MM/YYYY	HH:MM	Alarm text (see section 8.5)
DD/MM/YYYY	HH:MM	Alarm text (see section 8.5)

(1) Depends on the selected language (English by default).

5.4 - Login menu

Previous page	Next page	Home page	Synoptic page	Schedule menu	Trend menu	Alarms menu	**Login menu**	Configuration menu

5.4.1 - Access control

- Login menu provides access to three different access levels, i.e. user configuration, admin configuration, and factory configuration.
- Multilevel security ensures that only authorised users are allowed to modify critical system parameters.
- Only people qualified to manage the system should be familiarized with the password.
- Configuration menu can be accessed only by logged-in users (user configuration level or higher).

IMPORTANT: It is strongly recommended to change the default password of the user interface to exclude the possibility of changing any parameters by an unqualified person.

User login

Only logged-in users can access basic configurable system parameters. By default, user password is “111”.

Admin login

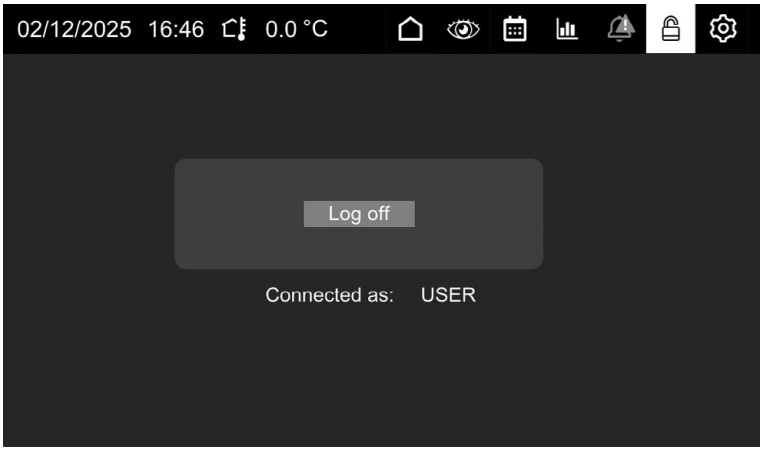
Only logged-in users can access advanced configurable system parameters. By default, admin password is “222”.

To log in

1. Press the **Login** button, and then select User or Admin Login in the list.

2. Press the Password box.
3. Provide the password and press the **Enter** button.

4. Then click on the **Log in** button on the bottom left of the screen.
5. The success or failure, such as the current authentication level are displayed.



5.4.2 - Factory login

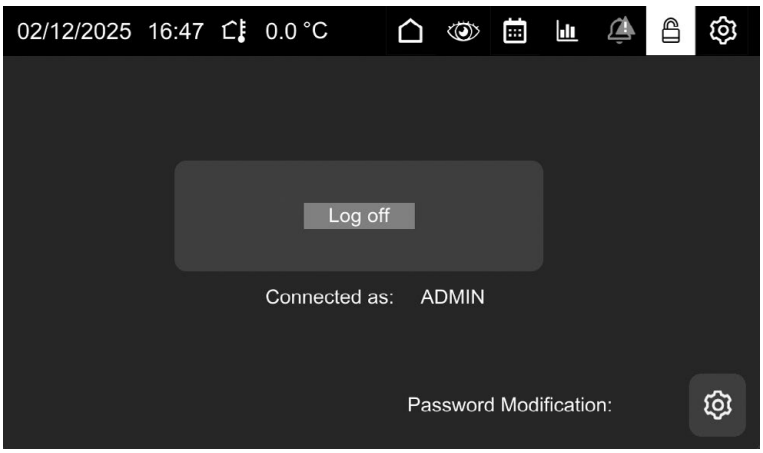
Factory login menus are dedicated to the manuacturer Service technicians and factory line. These menus allow to change the configuration of the installation managed by the SMS.

5.4.3 - Changing user password

It is recommended to change the default user password via the User Login screen.

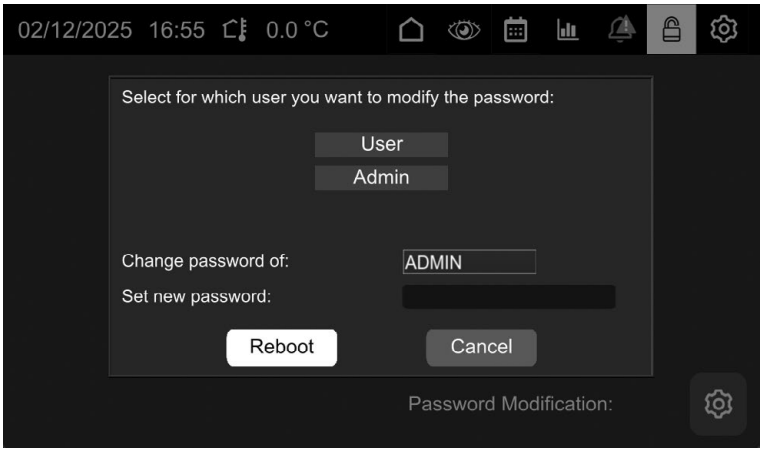
To modify the password via the User Login Screen, do the following:

1. Press the Login button.
2. Log in as ADMIN or FACTORY level.
3. Press the Password Modification button.



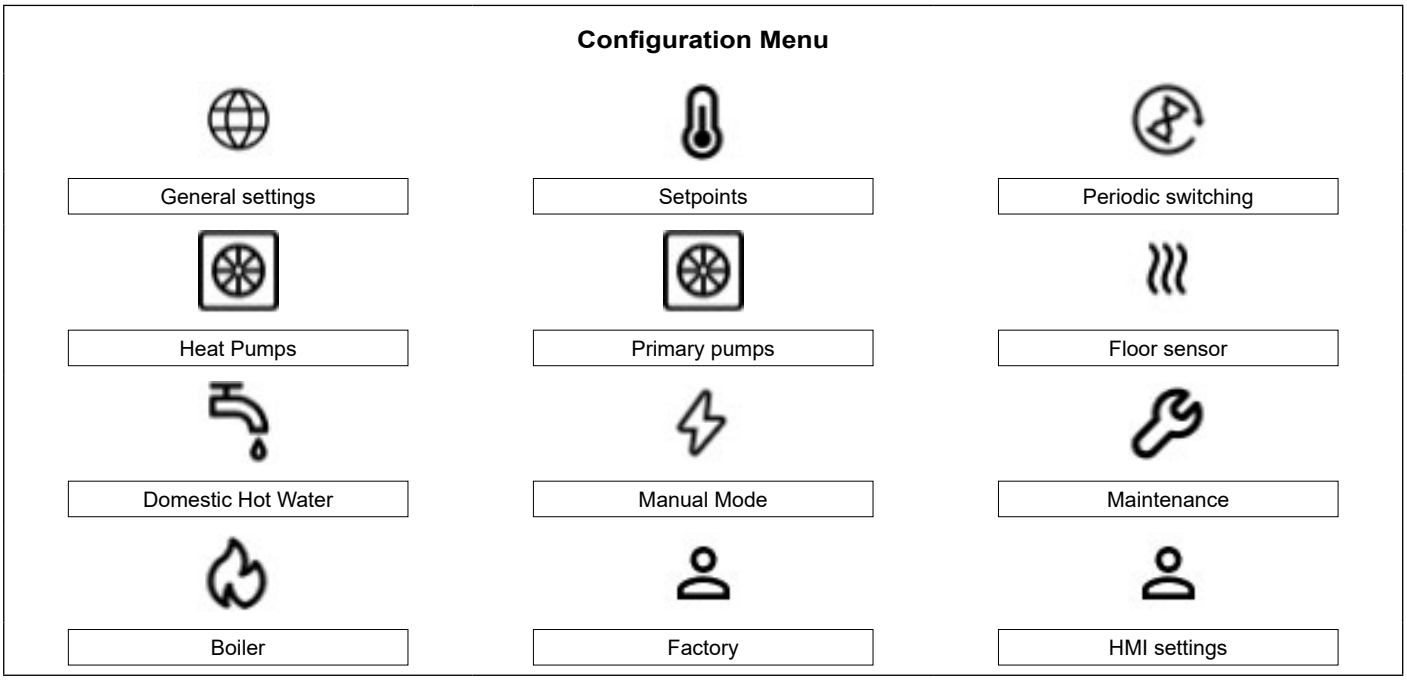
4. Select the password level to be modified.

5. Enter the new password and reboot the HMI to save the modification.



5.5 - Configuration menu

Previous page	Next page	Home page	Synoptic page	Schedule menu	Trend menu	Alarms menu	Login menu	**Configuration menu**



The **Configuration menu** gives access to a number of user-modifiable parameters such as cascade configuration, pump configuration, etc. Items in the configuration menu are protected by a password (user, admin or factory.

To access the menu, press the **Configuration menu** button located in the upper-right part of the screen.

All modification done through these pages are automatically saved and applied to the system.

CAUTION: Some tables may contain parameters that cannot be configured for a given installation.

General settings

Displayed text	Status	Default	Unit	Description
Min HP in function	1 to 4	1	-	Minimum number of heat pumps started by the cascade
Max HP in function	1 to 4	4(1)	-	Maximum number of heat pumps that can be started by the cascade
Stage up				
Condition 1.1: Deadband setpoint	0 to 5	1,5	°C	Difference between the measured system leaving water temperature and the plant setpoint
Condition 1.2: Pullrate threshold	0 to 2,5	0,3	°C/min	Pulldown/up rate limit to be compared with current rate of change of system leaving temperature
Condition 2: Avg cap. Before ACR	0 to 100	100	%	Capacity threshold to be compared with average capacity of running heat pumps
Condition 3: Difference temp max	0 to 15	5	°C	Maximum delta between the system leaving temperature and the cascade
Delay before ACR	0 to 60	8	min	Delay of condition validity to enable stage up
Stage down				
Condition 1: Staging down hysteresis	0 to 60	60	%	The current average plant load is less than the anticipated combined heat pumps capacity of the next stage down adjusted by a coefficient
Delay before RCR	0 to 60	15	min	Delay of condition validity to enable stage down
Buffer tank EHS				
EHS OAT threshold	-15 to 15	-10	°C	OAT threshold on OAT to enable EHS usage
EHS OAT hysteresis	0 to 10	5	°C	Hysteresis on OAT to disable EHS usage
Delta T AHR	0 to 10	6	°C	Temperature difference between the setpoint and the tank temperature to start a heater
Delta T RHR	0 to 10	3	°C	Temperature difference between the setpoint and the tank temperature to stop a heater
Stage up 1 delay	0 to 30	8	min	Delay of temperature condition validity to start first heater
Stage up next delay	0 to 30	4	min	Delay of temperature condition validity to start an additional heater
Stage down delay	0 to 30	4	min	Delay of temperature condition validity to stop a heater

(1) Depends on the number of heat pumps controlled by the SMS.

Setpoint settings

Displayed text	Status	Default	Unit	Description
Zone 1 or no zone				
Fixed/Curve	Fixed/Curve	Curve	-	Heating Climatic Curve Fixed Setpoints/Custom curve (OAT)
Fixed heating setpoint (Comfort)	25 to 75	55	°C	Fixed setpoint during heating mode and occupancy period
Fixed heating setpoint (Eco)	25 to 75	50	°C	Fixed setpoint during heating mode and unoccupancy period
Fixed heating setpoint (Away)	25 to 75	45	°C	Fixed setpoint during heating mode and holiday period
Fixed cooling setpoint (Comfort)	6.5 to 20	12	°C	Fixed setpoint during cooling mode and occupancy period
Fixed cooling setpoint (Eco)	6.5 to 20	15	°C	Fixed setpoint during cooling mode and unoccupancy period
Fixed cooling setpoint (Away)	6.5 to 20	20	°C	Fixed setpoint during cooling mode and holiday period
Curve: Cool Minimum OAT	0 to 30	20	°C	Minimum cool outdoor air temperature
Curve: Cool Maximum OAT	24 to 46	35	°C	Maximum cool outdoor air temperature
Curve: Cool Min Water Setpoint	6.5 to 20	10	°C	Minimum cool water setpoint
Curve: Cool Max Water Setpoint	6.5 to 20	18	°C	Maximum cool water setpoint
Curve: Cool offset y (Eco)	0 to 10	3	°C	Offset during cooling mode and unoccupancy period
Curve: Cool offset z (Away)	0 to 10	8	°C	Offset during cooling mode and holiday period
Curve: Heat Minimum OAT	-30 to 10	-7	°C	Minimum heat outdoor air temperature
Curve: Heat Maximum OAT	10 to 30	20	°C	Maximum heat outdoor air temperature
Curve: Heat Min Water Setpoint	25 to 75	25	°C	Minimum heat water setpoint
Curve: Heat Max Water Setpoint	25 to 75	38	°C	Maximum heat water setpoint
Curve: Heat offset y (Eco)	0 to 15	5	°C	Offset during heating mode and unoccupancy period
Curve: Heat offset z (Away)	0 to 15	10	°C	Offset during heating mode and holiday period

Displayed text	Status	Default	Unit	Description
Zone 2				
Fixed/Curve	Fixed/Curve	Curve	-	Heating Climatic Curve Fixed Setpoints/Custom curve (OAT)
Fixed heating setpoint (Comfort)	25 to 75	55	°C	Fixed setpoint during heating mode and occupancy period
Fixed heating setpoint (Eco)	25 to 75	50	°C	Fixed setpoint during heating mode and unoccupancy period
Fixed heating setpoint (Away)	25 to 75	45	°C	Fixed setpoint during heating mode and holiday period
Fixed cooling setpoint (Comfort)	6.5 to 20	12	°C	Fixed setpoint during cooling mode and occupancy period
Fixed cooling setpoint (Eco)	6.5 to 20	15	°C	Fixed setpoint during cooling mode and unoccupancy period
Fixed cooling setpoint (Away)	6.5 to 20	20	°C	Fixed setpoint during cooling mode and holiday period
Curve: Cool Minimum OAT	0 to 30	20	°C	Minimum cool outdoor air temperature
Curve: Cool Maximum OAT	24 to 46	35	°C	Maximum cool outdoor air temperature
Curve: Cool Min Water Setpoint	6.5 to 20	10	°C	Minimum cool water setpoint
Curve: Cool Max Water Setpoint	6.5 to 20	18	°C	Maximum cool water setpoint
Curve: Cool offset y (Eco)	0 to 10	3	°C	Offset during cooling mode and unoccupancy period
Curve: Cool offset z (Away)	0 to 10	8	°C	Offset during cooling mode and holiday period
Curve: Heat Minimum OAT	-30 to 10	-7	°C	Minimum heat outdoor air temperature
Curve: Heat Maximum OAT	10 to 30	20	°C	Maximum heat outdoor air temperature
Curve: Heat Min Water Setpoint	25 to 75	25	°C	Minimum heat water setpoint
Curve: Heat Max Water Setpoint	25 to 75	38	°C	Maximum heat water setpoint
Curve: Heat offset y (Eco)	0 to 15	5	°C	Offset during heating mode and unoccupancy period
Curve: Heat offset z (Away)	0 to 15	10	°C	Offset during heating mode and holiday period
DHW				
Domestic Hot Water	25 to 75	50	°C	Domestic Hot Water setpoint
Legionella Prevention	50 to 75	60	°C	Legionella prevention setpoint
Primary pumps				
Customer pumps	100 to 400	200	kPa	Differential pressure setpoint for customer pumps
DHW pumps	100 to 400	200	kPa	Differential pressure setpoint for DHW pumps
Thermal loss compensation				
Pipes (Heating)	0 to 7	0	°C	Offset to compensate thermal loss in the pipes in heating mode (between cascade setpoint and heat pump setpoint)
Pipes (Cooling)	0 to 7	0	°C	Offset to compensate thermal loss in the pipes in cooling mode (between cascade setpoint and heat pump setpoint)
Buffer tank (Heating)	0 to 7	0	°C	Offset to compensate thermal loss in the buffer tank in heating mode (between cascade setpoint and buffer tank)
Buffer tank (Cooling)	0 to 7	0	°C	Offset to compensate thermal loss in the buffer tank in cooling mode (between cascade setpoint and buffer tank)
Domestic hot water (Heating)	0 to 7	0	°C	Offset to compensate thermal loss to DHW in heating mode (between cascade setpoint and DHW, or between heat pump n°1 setpoint and DHW)

Periodic switching settings

Displayed text	Status	Default	Unit	Description
Heat pumps				
Rotate heat pumps based on:	Lowest runtime/ Fixed	Lowest runtime	-	Select how next heat pump to stop/stop is selected
Order heat pump n°x	1 to 4	-	-	For fixed order, click the setting icon to display the popup for heat pump order configuration
Force rotation every:	Monday to Sunday	Monday	-	Weekly rotation - Day
	0 to 23	10	h	Weekly rotation - Hour
	00 to 59	0	min	Weekly rotation - Minute
Rotate now:	Yes/No	No	-	Momentary button
Customer pumps				
Rotate pumps based on:	Lowest runtime/ Fixed	Lowest runtime	-	Select how running pump is selected
Order heat pump n°x	1 to 2	-	-	For fixed order, click the setting icon to display the popup for pump order configuration
Force rotation every:	Monday to Sunday	Monday	-	Weekly rotation - Day
	0 to 23	11	h	Weekly rotation - Hour
	00 to 59	0	min	Weekly rotation - Minute
Rotate now:	Yes/No	No	-	Momentary button
DHW pumps				
Rotate pumps based on:	Lowest runtime/ Fixed	Lowest runtime	-	Select how running pump is selected
Order heat pump n°x	1 to 4	-	-	For fixed order, click the setting icon to display the popup for pump order configuration
Force rotation every:	Monday to Sunday	Monday	-	Weekly rotation - Day
	0 to 23	11	h	Weekly rotation - Hour
	00 to 59	0	min	Weekly rotation - Minute
Rotate now:	Yes/No	No	-	Momentary button

Heat pumps

Displayed text	Status	Default	Unit	Description
Demand limit heat pump n°x:	0 to 100	100	%	Heat pump capacity limitation in normal operation
During night mode:	0 to 100	100	%	Heat pump capacity limitation applied when night mode schedule is active

Primary pumps

Displayed text	Status	Default	Unit	Description
Customer pumps				
Minimum speed command	0 to 100	0	%	Minimum speed command sent to the drive when pump is started
Override: Low limit	200 to 400	300	kPa	Decrease the pump speed command when differential pressure exceed the low limit and until it reaches the high limit
Override: High limit	400 to 600	500	kPa	Decrease the pump speed command when differential pressure exceed the low limit and until it reaches the high limit
DHW pumps				
Minimum speed command	0 to 100	0	%	Minimum speed command sent to the drive when pump is started
Override: Low limit	200 to 400	300	kPa	Decrease the pump speed command when differential pressure exceed the low limit and until it reaches the high limit
Override: High limit	400 to 600	500	kPa	Decrease the pump speed command when differential pressure exceed the low limit and until it reaches the high limit

Floor sensor

Displayed text	Status	Default	Unit	Description
Relative humidity	0 to 100	40	%	Relative humidity value used for dew point calculation
High temperature limit	20 to 35	28	°C	Maximum floor temperature allowed before alarm is tripped
Dew point hysteresis	0 to 5	3	°C	Hysteresis above the dew point for calculation of the minimum floor temperature allowed before alarm is tripped

Domestic Hot Water

Displayed text	Status	Default	Unit	Description
Legionella Prevention				
Temperature condition: Disabling threshold	50 to 75	60	°C	Threshold above which legionella prevention temperature will be satisfied (this must remain valid during a certain delay to disable legionella prevention mode)
Temperature condition: Delay	0 to 180	60	min	Validity delay of legionella prevention temperature
Domestic Hot Water				
Temperature condition: Enabling threshold	25 to 75	45	°C	Temperature threshold for enabling DHW production when DHW schedule is active and DHW tank temperature sensor is present
Temperature condition: Disabling hysteresis	0 to 10	5	°C	Hysteresis above the enabling threshold to stop DHW production when DHW tank temperature sensor is present

Manual mode

Displayed text	Status	Default	Unit	Description
System				
On/Off	On/Off/Schedule	Off	-	When SMS front switch is on position “Auto”: Select is the SMS run condition
Heat/Cool	Cool/Heat/Auto	Heat	-	When SMS front switch is on position “On” or “Auto”: Select if the system will run in heating or cooling mode
Heating threshold(1)	0 to 46	17	°C	When “Auto” is selected for Heat/Cool: Click on the setting icon to display the configuration popup
Heating delay(1)	0 to 24	24	h	When “Auto” is selected for Heat/Cool: Click on the setting icon to display the configuration popup
Cooling threshold	4 to 50	24	°C	When “Auto” is selected for Heat/Cool: Click on the setting icon to display the configuration popup
Cooling delay	0 to 24	24	h	When “Auto” is selected for Heat/Cool: Click on the setting icon to display the configuration popup; Auto means defined by the schedule
Zone 1	Eco/Comfort/ Auto	Comfort	-	When “Auto” is selected for Heat/Cool: Click on the setting icon to display the configuration popup; Auto means defined by the schedule
Zone 2	Eco/Comfort/ Auto	Comfort	-	When SMS front switch is on position “On” or “Auto”: Select the setpoint type to be applied to the zone
Heat pump and cascade				
Heat pump n°x	On/Off/Auto	Auto	-	Manual command of a specified heat pump; when “Auto” is selected, the heat pump command is sent by the SMS in function of the staging conditions
Manual ACR	yes/no	No	-	Momentary button, force the sequence to do a staging up
Manual RCR	yes/no	No	-	Momentary button, force the sequence to do a staging down
Primary pumps				
Customer Pumps	P1 On/P2 On/ Off/Auto	Auto	-	Manual command of pumps; when “Auto” is selected the pump is started in function of the sequence, click on the settings icon to setup the variable speed control PID
Customer Pumps: Speed	0 to 100	100	%	When a pump is running in manual mode (P1 On or P2 On), set the variable speed command to be applied
Customer Pumps PID: Proportional	0 to 100	5	-	When a pump is running in auto mode, proportional setting for PID regulation
Customer Pumps PID: Integral	0 to 10	0.1	-	When a pump is running in auto mode, integral setting for PID regulation
Customer Pumps PID: Derivative	0 to 10	0	-	When a pump is running in auto mode, derivative setting for PID regulation
Customer Pumps PID: Update interval	0 to 300	5	s	When a pump is running in auto mode, update interval setting for PID regulation
Customer Pumps PID: Min 0-100% time	0 to 3600	60	s	When a pump is running in auto mode, minimum time for PID regulation to change from 0 to 100%
DHW Pumps	P1 On/P2 On/ Off/Auto	Auto	-	Manual command of pumps; when “Auto” is selected the pump is started in function of the sequence, click on the settings icon to setup the variable speed control PID
DHW Pumps: Speed	0 to 100	100	%	When a pump is running in manual mode (P1 On or P2 On), set the variable speed command to be applied
DHW Pumps PID: Proportional	0 to 100	5	-	When a pump is running in auto mode, proportional setting for PID regulation
DHW Pumps PID: Integral	0 to 10	0.1	-	When a pump is running in auto mode, integral setting for PID regulation
DHW Pumps PID: Derivative	0 to 10	0	-	When a pump is running in auto mode, derivative setting for PID regulation
DHW Pumps PID: Update interval	0 to 300	5	s	When a pump is running in auto mode, update interval setting for PID regulation
DHW Pumps PID: Min 0-100% time	0 to 3600	60	s	When a pump is running in auto mode, minimum time for PID regulation to change from 0 to 100%

Displayed text	Status	Default	Unit	Description
Zones				
Pump Z1	On/Off/Auto	Auto	-	Manual command of pump; when “Auto” is selected the pump is started in function of the sequence
Pump Z2	On/Off/Auto	Auto	-	Manual command of pump; when “Auto” is selected the pump is started in function of the sequence
3WV Z1	Auto/Manual	Auto	-	Manual command of 3-way valve; when “Auto” is selected the valve regulation is started in function of the sequence, click on the settings icon to setup the control PID. When “manual” is selected, the fixed position is applied to the valve
3WV Z1: Position percentage	0 to 100	50	%	Valve position to be applied when “manual” is selected
3WV Z1 PID: Proportional	0 to 100	5	-	When the valve is running in auto mode, proportional setting for PID regulation
3WV Z1 PID: Integral	0 to 10	0.1	-	When the valve is running in auto mode, integral setting for PID regulation
3WV Z1 PID: Derivative	0 to 10	0	-	When the valve is running in auto mode, derivative setting for PID regulation
3WV Z1 PID: Update interval	0 to 300	5	s	When the valve is running in auto mode, update interval setting for PID regulation
3WV Z1 PID: Min 0-100% time	0 to 3600	60	s	When the valve is running in auto mode, minimum time for PID regulation to change from 0 to 100%
3WV Z2	Auto/Manual	Auto	-	Manual command of 3-way valve; when “Auto” is selected the valve regulation is started in function of the sequence, click on the settings icon to setup the control PID. When “manual” is selected, the fixed position is applied to the valve
3WV Z2: Position percentage	0 to 100	50	%	Valve position to be applied when “manual” is selected
3WV Z2 PID: Proportional	0 to 100	5	-	When the valve is running in auto mode, proportional setting for PID regulation
3WV Z2 PID: Integral	0 to 10	0.1	-	When the valve is running in auto mode, integral setting for PID regulation
3WV Z2 PID: Derivative	0 to 10	0	-	When the valve is running in auto mode, derivative setting for PID regulation
3WV Z2 PID: Update interval	0 to 300	5	s	When the valve is running in auto mode, update interval setting for PID regulation
3WV Z2 PID: Min 0-100% time	0 to 3600	60	s	When the valve is running in auto mode, minimum time for PID regulation to change from 0 to 100%

(1) Setpoints for automatic changeover shall be configured observing 4°C between heating and cooling thresholds.

Maintenance

Displayed text	Status	Default	Unit	Description
Heat pump n°x	yes/no	no	-	Heat pump maintenance mode, the heat pump will be stopped if enabled
Customer pump n°x	yes/no	no	-	Pump maintenance mode, the pump will be stopped if enabled
DHW pump n°x	yes/no	no	-	Pump maintenance mode, the pump will be stopped if enabled
Pump Z1	yes/no	no	-	Pump maintenance mode, the pump will be stopped if enabled
Pump Z2	yes/no	no	-	Pump maintenance mode, the pump will be stopped if enabled

Boiler

Displayed text	Status	Default	Unit	Description
Operating authorisation: Temperature	-15 to +15	-10	°C	Temperature threshold to enable boiler usage instead of heat pumps
Operating authorisation: Hysteresis	0 to 10	5	°C	Hysteresis for disabling boiler usage and use the heat pumps

HMI settings

Displayed text	Status	Default	Unit	Description
Language	-	English	-	Click to display the language selection popup
Brightness	0 to 100	100	%	HMI brightness, use the plus and minus icons to change the value
Date	DD/MM/YYYY	-	-	System date
Time	HH:MM:SS	-	-	System time

6.1 - System start/stop control

The system state is determined based on a number of factors, including its operating type, active overrides, schedule, or alarms triggered due to operating conditions.

The table given below summarises the system control type and its running status with regard to the following parameters:

- **Operating type:** This operating type is selected using the 3-position button in front of the electrical cabinet.

Front button position	Description
On	Local On or remote(1)
Off	Local Off
Auto	Network or schedule

(1) By removing the shunt on the input 1 connection block.

- **On/Off input command:** Force command used to control the system state in the “Auto” operating type. This command can be modified locally or remotely by the BMS.
  - Command set to **Off**: The system is halted.
  - Command set to **On**: The system is started.
  - Command set to **schedule**: The system runs in accordance with zone or comfort schedule.
- **Remote start/stop contact status:** Start/stop contact status can be used to control the system state in the “On” operating type.
- **Start/stop schedule:** Occupied or unoccupied status of the system.
- **Network emergency stop command:** If activated, the system shuts down regardless of the active operating type.
- **General alarm:** The system shuts down due to failure.

Active operating type			Parameters status					Result
Off	**On**	**Auto**	**On/Off input command**	**Remote start/ stop contact**	**Start/Stop time schedule**	**Network emergency shutdown**	**General alarm**	**System state**
-	-	-	-	-	-	enabled	-	off
-	-	-	-	-	-	-	yes	off
active	-	-	-	-	-	-	-	off
-	active	-	-	open	-	-	-	off
-	-	active	off	-	-	-	-	off
-	-	active	schedule	-	unoccupied	-	-	off
-	active	-	-	close	-	disabled	no	on
-	-	active	on	-	-	disabled	no	on
-	-	active	schedule	-	occupied	disabled	no	on

6.2 - Smart Grid Ready

The Smart Grid Ready allows the energy supplier to access the system and manage its four energy usage control states:

Lockout state (LOCK).

Normal operating state (NORMAL).

Low current surplus state (BOOST).

High current surplus state (FORCED).

NOTE: The Smart Grid Ready label is valid only in the DACH region (Germany, Austria, Switzerland).

To learn more about the Smart Grid Ready option and Smart Grid operating modes, please refer to Smart Grid Installation Instructions (see Appendix 1).

6.3 - Heating/Cooling/Standby

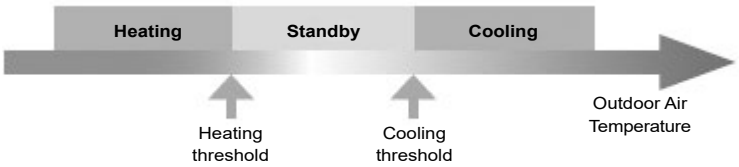
The control determines the heat/cool state of the system and heat pumps. Heat pumps may operate in cooling or heating mode.

When the system is in **Heating mode**, the control may utilise the boiler to satisfy the heating demand. The boiler is used when mechanical heating is impossible or insufficient. Additionally, when the outside air temperature is very low, electric heaters can be used as a form of supplemental heating.

When **Cooling mode** is selected, the heat pumps will operate in the Cooling mode and, as a result, the boiler or electric heating will not be activated. A settings in the HMI menu will allow or not the heat pumps to switch to heating mode to satisfied DHW demand during cooling mode.

If the system is in **Standby mode**, it does not cool or heat and heat pumps are stopped.

Heating/Cooling changeover



Operating mode control

The operating mode, i.e. cooling or heating is determined based on a number of factors, including its operating type, active overrides, or outside air temperature.

The table given below summarises the system operating mode and its running status with regard to the following parameters:

- **Operating type:** This operating type is selected using the 3-position button in front of the electrical cabinet (Off/On/Auto).
- **Heat/Cool input command:** Force command used to control the system state in the “On” or “Auto” operating type. This command can be modified locally or remotely by the BMS.
- **Outdoor air temperature:** Heat/Cool setpoint selection when the automatic changeover has been enabled.

Active operating type			Heat/Cool input command	Outdoor air temperature	Operating mode
Off	On	Auto			
active	-	-	-	-	N/A
-	active	-	cool	-	cooling
-	active	-	heat	-	heating
-	-	active	cool	-	cooling
-	-	active	heat		heating
-	-	active	auto	> cooling threshold + delay	cooling
-	-	active	auto	< heating threshold + delay	heating
-	-	active	auto	heating threshold < oat < cooling threshold	stand-by

Legend
oat outdoor air temperature

6.4 - Heating/Cooling selection

Heating/Cooling selection applies to system and heat pumps. Heating/cooling selection can be controlled in various ways, depending on the active operating type. By default, the heating mode is selected.

Heating/Cooling selection can be determined:

- Locally at the SMS using the Heat/Cool item in the Setting > Manual menu.
- Via a network command if a BMS is available.

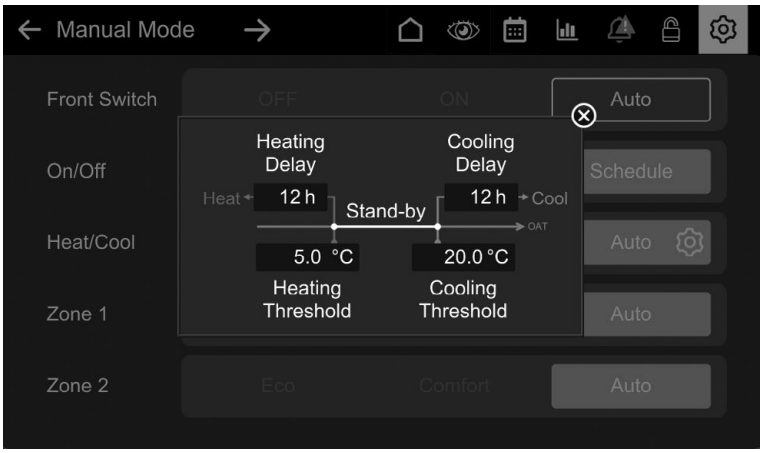
Heating/Cooling mode can be set manually by the user or automatically by the control. When heating/cooling is automatic, the outdoor air temperature determines the heat/cool/standby changeover.

To set cooling / heating / auto changeover

1. Navigate to the Configuration menu.
2. Select Manual settings.
3. Set Heat/Cool/Auto.

To set cool / heat changeover setpoint

1. Navigate to the Settings menu.
2. Select Manual settings.
3. Find the Heat/Cool configuration and click on the settings icon next to Auto.
3. Set Cooling Threshold, Heating Threshold, and the delays.



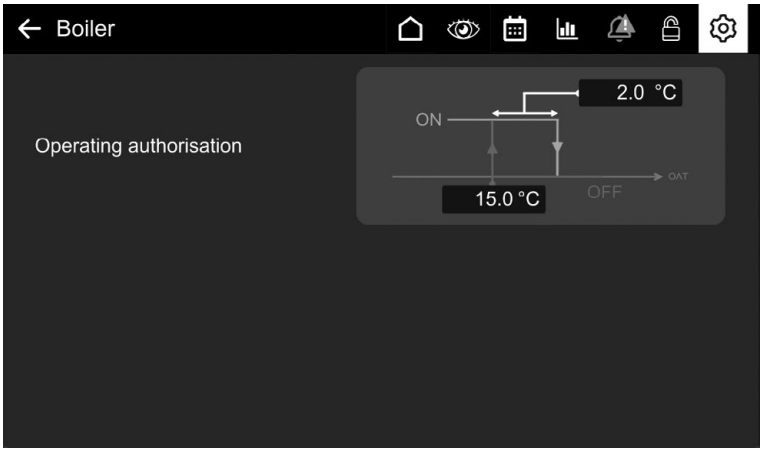
6.4.1 - Boiler control

Boiler is activated when the outside air temperature is below the user-configured boiler outdoor temperature threshold which is by default set to -10°C. Boiler is disabled when the outside air temperature is above the previous threshold plus a user-configured hysteresis which is by default set to 5°C.

To set boiler OAT threshold

1. Navigate to the Configuration menu.
2. Select Boiler settings.
3. Set Boiler OAT Threshold and Hysteresis.

Setting	Range	Default value
Boiler OAT Threshold	-15 to 15°C	-10°C
Boiler OAT Hysteresis	0 to 10°C	5°C



6.4.2 - Electric heating control

Electric heating stages (EHS) are located in the buffer tank. EHS can be activated as additional heating when OAT is below the user-configured electric heating OAT threshold which is by default set to 5°C.

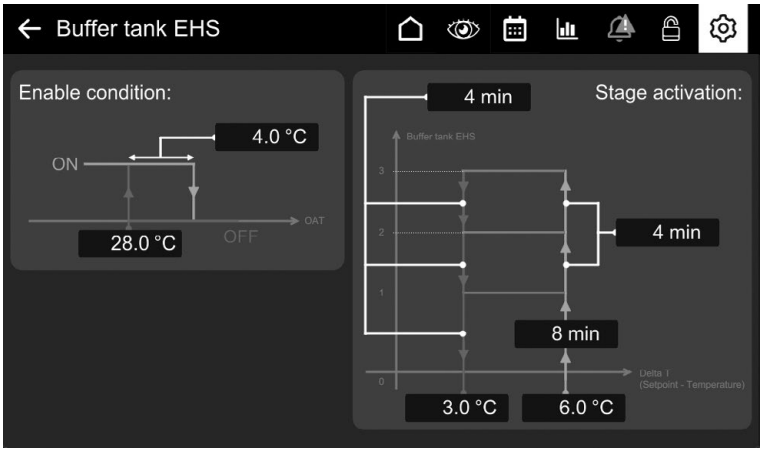
Electric heating is allowed when:

- All available heat pumps are running at their maximum capacity.
- OAT is below the OAT threshold.
- Temperature difference between setpoint and Buffer tank temperature is greater than the user-configured threshold, and the condition is valid during a user-configured delay.

To set electric heating OAT threshold

1. Navigate to the Configuration menu.
2. Select General settings and navigate using the right arrow until Buffer Tank EHS page.
3. Set the Elec Stage OAT Threshold, hysteresis, and stage activation settings.

Setting	Range	Default value
Elec Stage OAT Threshold	-15 to 15 °C	-10°C
Elect stage OAT Hysteresis	0 to 10 °C	5°C
Elect stage Delta T stage up	0 to 10 °C	6°C
Elect stage Delay first stage up	0 to 15 min	8min
Elec stage Delay other stage up	0 to 15 min	4min
Elect stage Delta T stage down	0 to 10 °C	3°C
Elect stage Delay stage down	0 to 15 min	4min



6.5 - Primary pumps control

The control system can manage primary pumps. Depending on the hydraulic configuration of the installation pumps may be needed, refer to the below table for more information:

Hydraulic configuration		Customer pumps	DHW pumps
Heat pumps fitted with hydraulic kits	With common diverting valve	no	no
	With heat pump n°1 dedicated to Domestic Hot Water	no	no
Heat pumps without hydraulic kits	With common diverting valve	yes	No
	With heat pump n°1 dedicated to Domestic Hot Water	yes	yes

Each group of pumps (customer and DHW) can be single or dual pump, determining each pump's motor on/off state and a speed command per group. The motors of the dual pump cannot function at the same time. The pump is turned on and control by a 0.10V signal (Terminal block XS2-5/X2-6 for customer pumps, terminal block XS2-7/XS2-8 for DHW pumps) when the system is running.

Isolation valves on each heat pumps are compulsory in case of primary pumps controlled by the SMS; both opening and closing feedbacks are compulsory; Depending on the hydraulic configuration, all isolation valves (hydraulic configuration n°2) or all isolation valves except isolation valve n°1 (hydraulic configuration n°4) must be wired to the heat pumps; in hydraulic configuration n°4 isolation valve n°1 must be wired to the SMS.

The pumps are turned off when the system is shut down due to an alarm. The pumps can be started to protect the heat pumps against frost.

For dual pumps, if the first pump has failed the SMS will automatically start the second pump. User can select the way pumps are prioritized, it can be based on lowest runtime or based on a manual order. If a single pump is configured and the pump has failed, then the system shuts down.

Water flow management method is as follows:

- One running feedback per pump.

Variable speed pumps control

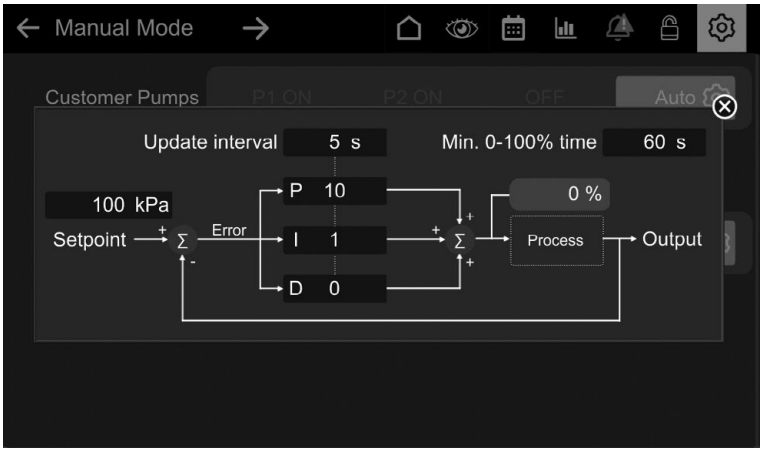
Primary pumps (customer and DHW) are variable speed pumps. Variable speed pumps give the possibility of saving the pumping energy cost, providing precise water flow control and improving the overall performance of the system. The frequency inverter(s) continuously regulates to ensure a correct flow whatever the number of heat pumps running.

Water flow management method is as follows:

- Water flow control based on constant water delta pressure (the control continuously acts on the pump speed to ensure a constant delta pressure).

To verify or modify the settings of the Pump water flow control method

1. Navigate to the Configuration Menu.
2. Select Manual settings.
3. Navigate using the right arrow on top of the page until the primary pumps settings.
4. Click on the settings icon next to “Auto” to display the PID popup and configure the setpoint.



6.6 - Setpoints

6.6.1 - Zone setpoint

The setpoint applied to the system is determined based on a number of factors, including its operating type, the setpoint input commands, the current operating mode, or outside air temperature.

The table given below summarises the setpoint selection with regard to the following parameters:

- **Operating type:** This operating type is selected using the 3-position button in front of the electrical cabinet (Off/On/Auto).
- **Setpoint input commands:** Force commands used to select setpoint to be applied in the “On” or “Auto” operating type. One command per zone is available (or one command if no zone are configured). These commands can be modified locally or remotely by the BMS.
- **Setpoint selection commands:** Force commands used to select if setpoints are fixed or function of the outdoor air temperature. One command per mode (cooling and heating) is available.
- **Outdoor air temperature:** Setpoint determination when the setpoint selection method is set to climatic curve.

Active operating type			Setpoint input command	Setpoint selection type	Setpoint
Off	On	Auto			
active	-	-	-	-	N/A
-	active	-	eco	fixed	fixed eco setpoint
-	active	-	comfort	fixed	fixed comfort setpoint
-	active	-	away	fixed	fixed away setpoint
-	active	-	eco	climatic curve	setpoint function of OAT +/- eco offset
-	active	-	comfort	climatic curve	setpoint function of OAT
-	active	-	away	climatic curve	setpoint function of OAT +/- away offset
-	-	active	eco	fixed	fixed eco setpoint
-	-	active	comfort	fixed	fixed comfort setpoint
-	-	active	auto	fixed	fixed setpoint function of schedule
-	-	active	eco	climatic curve	setpoint function of OAT +/- eco offset
-	-	active	comfort	climatic curve	setpoint function of OAT
-	-	active	auto	climatic curve	setpoint function of OAT and schedule

To change setpoint selection commands

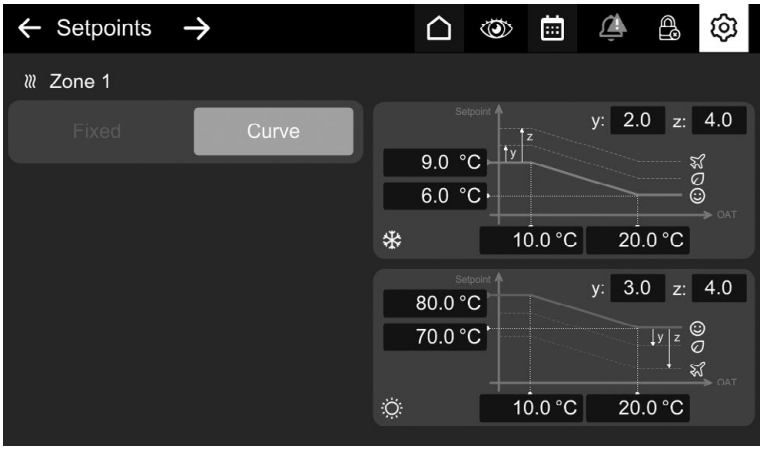
1. Navigate to the Configuration Menu.
2. Select Setpoints settings.
3. For each zone, set the setpoint selection command.

- If “curve” is selected:

For each mode (Cooling and Heating), the zone control point will be determined by the curve which depends on the outdoor air temperature and the current setpoint type. The following values will be configurable through the HMI:

Setting for Heating curve	Range	Default value
Minimum outdoor air temperature	-30°C to 10 °C	-7°C
Maximum outdoor air temperature	10°C to 30°C	20°C
Minimum output setpoint	25°C to 75°C	25°C
Maximum output setpoint	25°C to 75°C	38°C
Offset (Y) for Comfort curve translation to Eco curve	0°C to 15°C	5°C
Offset (Z) for Comfort curve translation to Away curve	0°C to 15°C	10°C

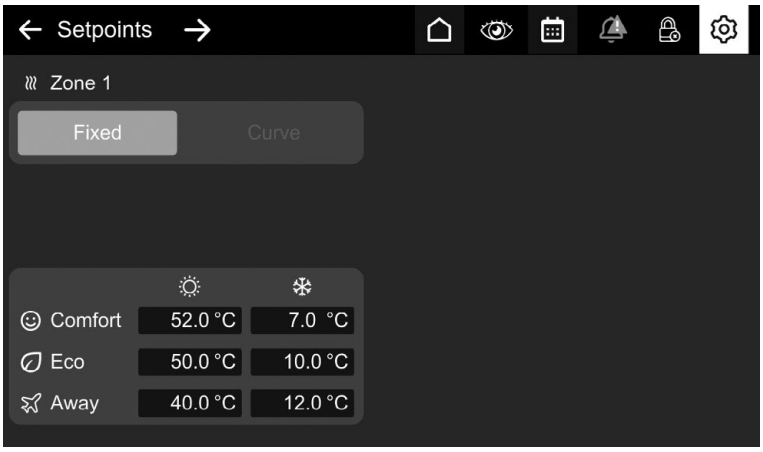
Setting for Cooling curve	Range	Default value
Minimum outdoor air temperature	0°C to 30°C	20°C
Maximum outdoor air temperature	24°C to 46°C	35°C
Minimum output setpoint	6.5°C to 20°C	10°C
Maximum output setpoint	6.5°C to 20°C	18°C
Offset (Y) for Comfort curve translation to Eco curve	0°C to 10°C	3°C
Offset (Z) for Comfort curve translation to Away curve	0°C to 10°C	8°C



■ If “fixed” is selected:

For each mode (Cooling and Heating), the zone control point will be determined by the fixed values configured by the user in the HMI. These setpoints can also be modified remotely by the BMS.

Setting	Range	Default value
Fixed cooling setpoint in eco mode	6.5 to 20 °C	15 °C
Fixed cooling setpoint in comfort mode	6.5 to 20 °C	12 °C
Fixed cooling setpoint in away mode	6.5 to 20 °C	20 °C
Fixed heating setpoint in eco mode	25 to 75 °C	50 °C
Fixed heating setpoint in comfort mode	25 to 75 °C	55 °C
Fixed heating setpoint in away mode	25 to 75 °C	45 °C



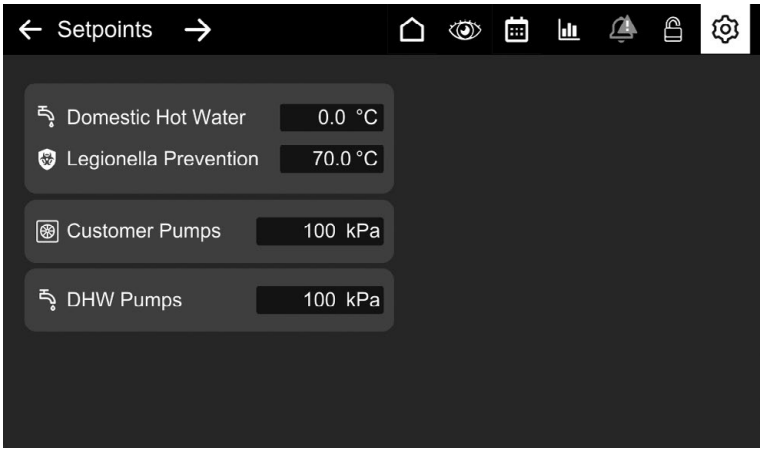
6.6.2 - DHW and Legionella prevention setpoints

These two setpoints are fixed setpoints. There values must be above or at least equal to the enable thresholds + hysteresis for Domestic Hot Water production and Legionella Prevention.

To change setpoint selection commands

1. Navigate to the Configuration Menu.
2. Select Setpoints settings.
3. Use the right arrow on top of the screen to navigate until the DHW setpoints page, then set the setpoints.

Setting	Range	Default value
Domestic Hot Water setpoint	25 to 75 °C	50 °C
Legionella Prevention setpoint	50 to 75 °C	60 °C



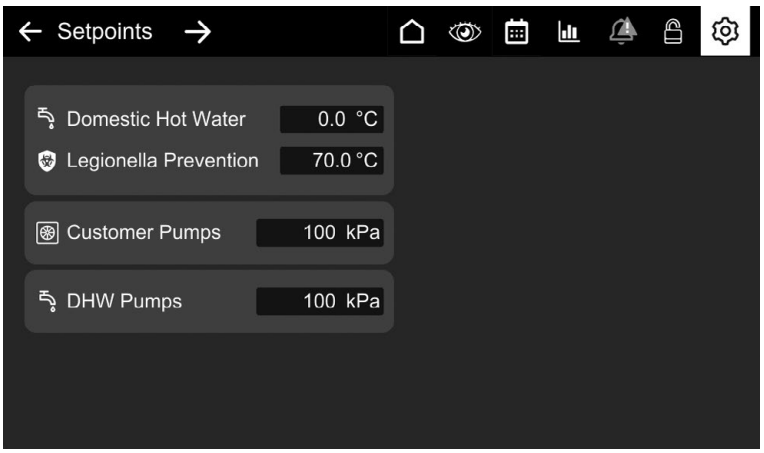
6.6.3 - Primary pumps setpoints

In case of primary pumps managed by the SMS (hydraulic configurations 2 and 4), it is possible to setup the setpoints for the differential pressure regulation.

To change setpoint selection commands

1. Navigate to the Configuration Menu.
2. Select Setpoints settings.
3. Use the right arrow on top of the screen to navigate until the Pumps setpoints page, then set the setpoints.

Setting	Range	Default value
Customer pumps	100 to 400 kPa	200 kPa
DHW pumps	100 to 400 kPa	200 kPa



6.6.4 - Cascade setpoint

The setpoint applied to the cascade of heat pumps is function of the current mode (cooling or heating) and current production mode (Legionella prevention, DHW, or zone production).

In production to buffer tank:

Cascade setpoint is based on the most restrictive zone setpoint (in cooling or heating) adjusted by a configurable offset to compensate the thermal loss in the buffer tank.

- The highest control point will be used in heating mode.
- The lowest control point will be used in cooling mode.

In production to DHW:

Cascade setpoint is equal to the DHW cascade setpoint or legionella prevention setpoint configured by the user.

6.6.5 - Heat pump Control point

Heat pump control point is equal to the cascade setpoint adjusted by a configurable offset to compensate the thermal loss in the pipes.

The control point represents the water temperature that the unit must produce on its outlet.

The control point can also be adjusted by an offset to reduce the number of compressors start/stop on the heat pumps in case of low demand. These features can be enabled during the commissioning by a trained technician.

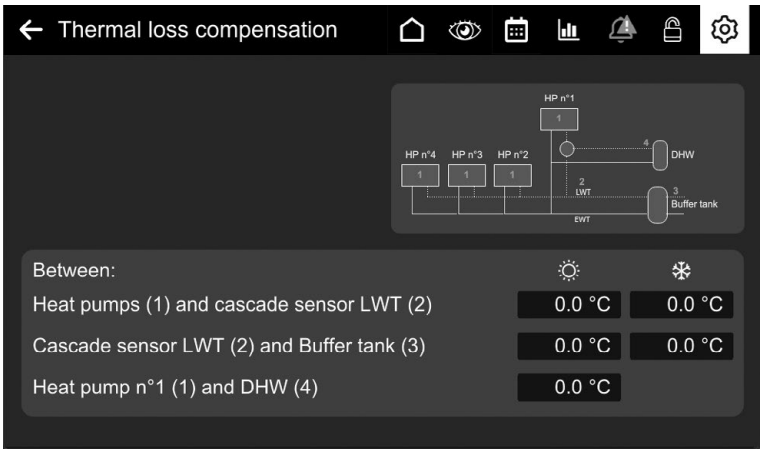
6.6.6 - Thermal loss compensation

To compensate thermal loss in the pipes or buffer tank, several offsets can be defined by the user. These offsets will be removed or added to the normal setpoint in function of the mode (cooling or heating).

To change thermal loss compensation offsets

1. Navigate to the Configuration Menu.
2. Select Setpoints settings.
3. Use the right arrow on top of the screen to navigate until the thermal loss page, then set the offsets.

Setting	Range	Default value
Pipes (Heating)	0 to 7 °C	0 °C
Pipes (Cooling)	0 to 7 °C	0 °C
Buffer tank (Heating)	0 to 7 °C	0 °C
Buffer tank (Cooling)	0 to 7 °C	0 °C
Domestic hot water (Heating)	0 to 7 °C	0 °C



6.7 - Capacity limitation

The SMS allows for the constant control of the heat pumps capacities by setting their maximum allowable capacity.

Capacity limitation is expressed in percentage, where a limit value of 100% means that the heat pump may run with its full capacity (no limitation is implemented).

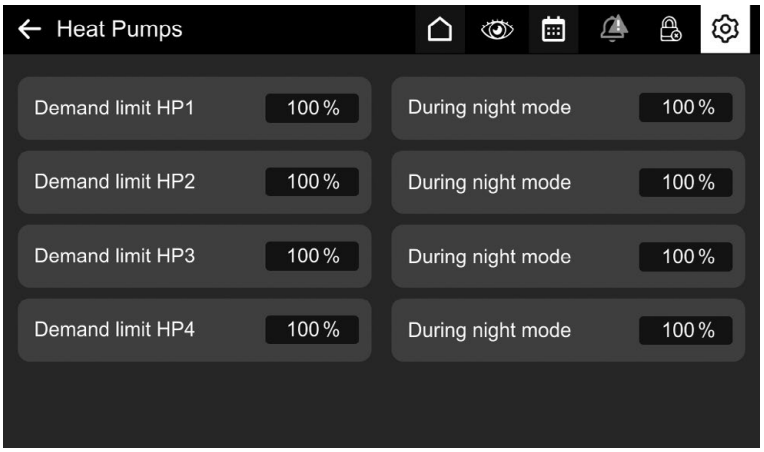
The unit capacity can be limited:

- By means of user-configuration for staging at partial load.
- By night mode limitation control.

To set the demand limits

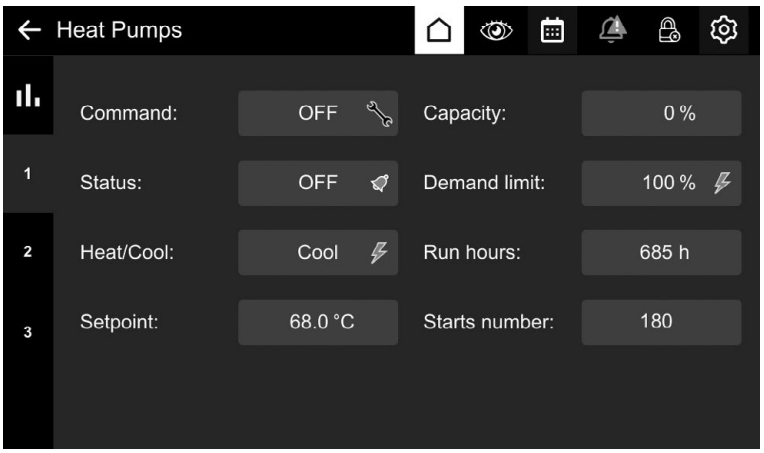
1. Navigate to the Configuration Menu.
2. Select Heat pumps settings.
3. Set Demand Limits and Night Demand Limit.

Setting	Range	Default value
Demand limit heat pump n°x	0 to 100%	100%
Night demand limit heat pump n°x	0 to 100%	100%



To verify active demand limit value

1. Navigate to the Home page.
2. Click on the Heat pump tile.
3. Use the menu on the left to see for each heat pump its active demand limit.



6.8 - Capacity control

The SMS does not control the capacity ramp up or ramp down of each heat pump. This is directly managed by the heat pump controller in function of its internal settings, the setpoint written by the SMS in the heat pump, and the temperature measured by the heat pump.

6.9 - Night mode

Night mode enables the reduction of the unit's noise level by limiting the heat pump's capacity. This power limitation can be activated based on a weekly schedule.

To set the night mode

1. Navigate to the Schedule Menu.
2. Select Night Mode Schedule.

6.10 - Domestic Hot Water

According to DHW Schedule, SMS provides the ability to heat the Domestic Hot Water thanks to a water tank, a 3-way diverting valve and a tank temperature sensor or a tank thermal switch. Depending on the hydraulic installation, all heat pumps will have the ability to heat the Domestic Hot Water, or only heat pump n°1 will be dedicated to Domestic Hot Water.

The hot water produced by the heat pumps will be diverted from the main heating loop to a coil located inside the hot water tank.

A tank temperature thermistor or a tank thermal switch will determine whether or not heating of the tank is required.

According to Legionella Prevention Schedule, Legionella prevention function is provided. Its goal is to kill the bacteria that could grow in the tank.

6.11 - Heating/Cooling Zones

The SMS provides the ability to manage no zone, one zone or two zones, , with the option of naming the zones.

Each zone(s) is equipped with a water temperature sensor, a water (fixed speed) pump and has its own independents setpoints (Comfort/Eco/Away).

Floor Heating sensor can be added and configured for a given zone.

In two zones configuration, each zone shall be equipped with a 3-way 0-10VDC mixing valve.

Depending on the type of zone emitters (underfloor heating, fan coils, radiator), they can be configured with different water temperature setpoints.

For each zone, the occupancy mode can be managed using a schedule (see section 5), Comfort/Economy/Away setpoints are configurable and can be automatically adapted to outside air temperature thanks to climatic curves (customizable).

The control point is determined in each zone, according to fixed setpoints, pre-defined climatic curves and custom climatic curves.

The cascade control point is the highest zone control point in heating mode and the lowest in cooling mode.

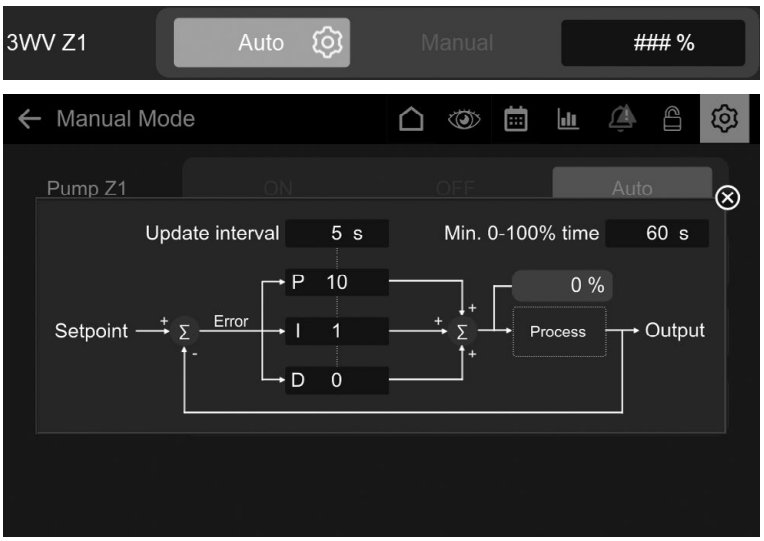
Additionally, the SMS provides a status on the equipment used in each zone, such as water pumps and temperature sensors.

3-way valve management method is as follows:

- Leaving temperature control.

To verify or modify the settings of the 3-way valve control method

1. Navigate to the Configuration Menu.
2. Select Manual settings.
3. Navigate using the right arrow on top of the page until the zone settings.
4. Click on the settings icon next to “Auto” to display the PID popup change the settings.



6.12 - BACnet IP Communication protocol

The BACnet/IP communication protocol is used by a BMS or the programmable controllers to communicate with the SMS. This protocol is also used by the SMS to communicate with the heat pumps.

6.13 - ModBus TCP Communication protocol

The Modbus communication protocol is used by the BMS or the programmable controllers to communicate with the SMS. It is also used for the connectivity with the Manufacturer monitoring platform: Abound HVAC Performance.

7 - VNC CONNECTION

7.1 - General information

The HMI of the SMS provides the functionality to access and control unit parameters from a VNC client.

Pre-requisites:

- Ethernet cable to be connected to the Ethernet switch in the SMS cabinet.
- VNC client (it is possible to use any VNC client, but we recommend using Ultra VNC).

Several users can be connected simultaneously with no priority between them. The last modification is always considered.

7.2 - Connect to the VNC interface

To connect to the HMI via the VNC interface, it is necessary to know the IP address of the HMI. This can be verified on the touch screen (Enter USER password > navigate to Configuration Menu > HMI settings).

HMI default address: 192.168.168.2.

The HMI IP address can be changed from the Configuration Menu.

To connect to the web interface

1. Open the VNC client.
2. Enter the IP address of the HMI in the VNC Server address bar.
3. Click Connect.
4. Enter the VNC password (default: 111111).
5. The HMI interface will be loaded.

All operations, including monitoring system parameters or system configuration, can be performed via the web browser interface.

NOTE: Make sure that your network is protected from malicious attacks and any other security threats. Do not provide open access without proper network security safeguards. The manufacturer does not hold any responsibility or liability for damage caused by security breach.

8 - DIAGNOSTICS

8.1 - Control diagnostics

The control system has many fault tracing aid functions, protecting the system against risks that could result in the failure of the equipment. The local interface gives quick access to monitor all system operating conditions. If an operating fault is detected, the alarm is triggered.

In the event of an alarm:

The bell on the User Interface (SmartUse) starts ringing.

	The **yellow** ringing bell means that there is a partial alarm (system is partially available) or Alert (no action taken on the SMS).
	The **grey** bell means there is at least one alarm active on the system or SMS.

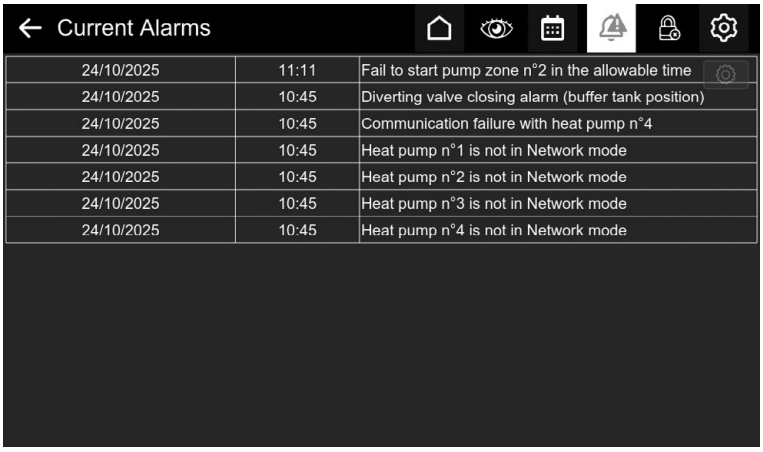
The corresponding alarm output(s) is/are activated as such as the light indicator in front of the electrical cabinet.

8.2 - Displaying current alarms

The Current alarms menu may display all active alarms on the system.

To access the list of currently active alarms

1. Press the Alarms menu button in the upper-right part of the screen.
2. Select Current Alarms.
3. The list of active alarms will be displayed.



8.3 - Resetting alarms

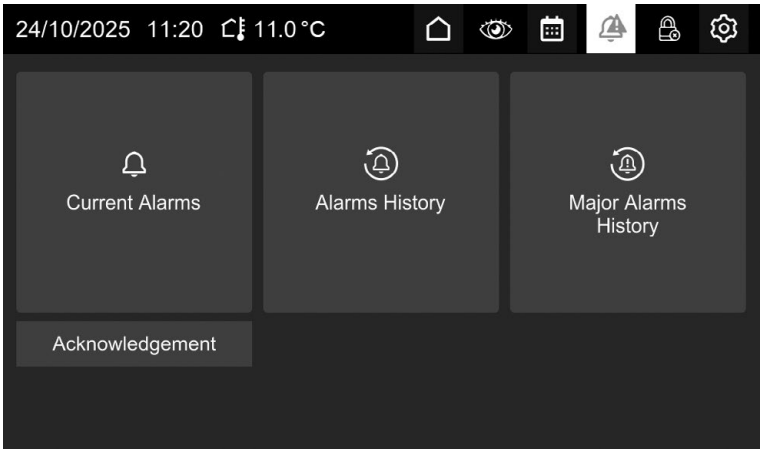
Depending on the alarm can be reset either automatically by the control when the conditions are back to normal, manually through the touch panel display, through the VNC interface, or by the BMS.

Only logged-in users can reset the alarms on the system. An alarm can only be reset if the conditions that triggered it are no longer present.

The SMS can only reset alarms triggered at the SMS level, alarms triggered by the heat pump control must be reset in the heat pump local interface.

To reset the alarm manually

1. Log in as USER.
2. Press the **Alarms menu** button in the upper-right part of the screen.
3. Click on the momentary “Acknowledgement” button.



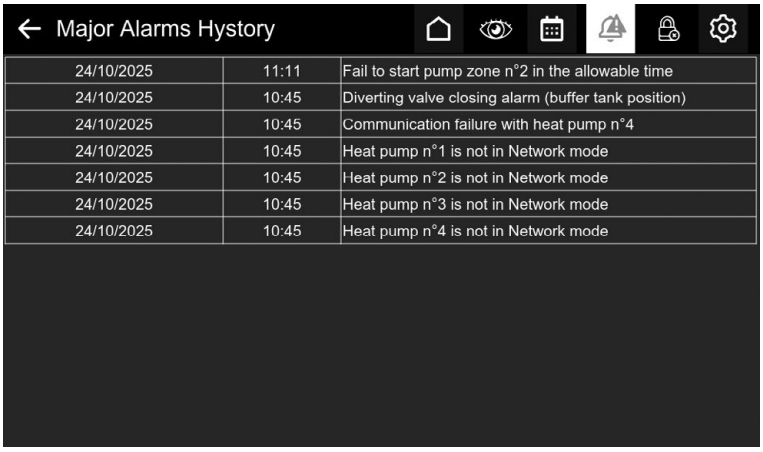
IMPORTANT: Not all alarms can be reset by the user. Some alarms are reset automatically when operating conditions return to normal.

8.4 - Alarm history

Information regarding resolved alarms is stored in the Alarm history menu which is divided into alarms history (all alarms) and major alarms history.

To access the alarm history

1. Press the Alarms menu button in the upper-right part of the screen.
2. Select Alarms History or Major Alarms History.
3. The history of alarms will be displayed.



24/10/2025	11:11	Fail to start pump zone n°2 in the allowable time
24/10/2025	10:45	Diverting valve closing alarm (buffer tank position)
24/10/2025	10:45	Communication failure with heat pump n°4
24/10/2025	10:45	Heat pump n°1 is not in Network mode
24/10/2025	10:45	Heat pump n°2 is not in Network mode
24/10/2025	10:45	Heat pump n°3 is not in Network mode
24/10/2025	10:45	Heat pump n°4 is not in Network mode

8.5 - Alarm description

Event Description	Reset type	Action taken	Possible cause
Cascade			
The capacity has reached the maximum available capacity	Automatic	No action	One or several heat pumps are not available, and the load is above maximum available capacity.
Emergency shutdown from external source	Automatic	System is shut down	The alarm input has been activated by the BMS.
Refrigerant leak shutdown	Automatic	System is shut down	The alarm input has been activated by the BMS.
Diverting valve closing alarm (buffer tank position)	Manual	System is shut down	The valve closing feedback is not active within the specified time. Check the feedback physical contact on the valve, the valve operation, or ask a manufacturer service technician to increase the alarm delay.
Diverting valve opening alarm (DHW position)	Manual	System is shut down	The valve closing feedback is not active within the specified time. Check the feedback physical contact on the valve, the valve operation, or ask a manufacturer service technician technician to increase the alarm delay.
Leaving Water Temperature (LWT) sensor failure	Automatic	Staging based on temperature is not available, only capacity condition will be used	Sensor is sending an out-of-range value. Check the sensor and replace it if needed.
Entering Water Temperature (EWT) sensor failure	Automatic	No action	Sensor is sending an out-of-range value. Check the sensor and replace it if needed.
Heat pumps			
Fail to start heat pump n°x in the allowable time	Manual	Heat pump is removed from the sequence and next available heat pump is started	The heat pump as not returned its running feedback in the specified time after receiving the start command. A heat pump internal override/ event prevent the heat pump to start.
Heat pump n°x is running due to an external command	Automatic	No action	The heat pump running feedback is received whereas it is not started by the SMS. The heat pump is started from its local interface.
Heat pump n°1 isolation valve closing alarm	Manual	No action	The valve closing feedback is not active within the specified time. Check the feedback physical contact on the valve, the valve operation, or ask a manufacturer service technician technician to increase the alarm delay.
Heat pump n°1 isolation valve opening alarm	Manual	Heat pump is removed from the sequence and next available heat pump is started	The valve closing feedback is not active within the specified time. Check the feedback physical contact on the valve, the valve operation, or ask a manufacturer service technician technician to increase the alarm delay.
Heat pump n°x is in maintenance	Automatic	Heat pump is removed from the sequence and next available heat pump is started	The maintenance setting has been enabled in the SMS HMI.
Communication failure with heat pump n°x	Automatic	Heat pump is removed from the sequence and next available heat pump is started	The BACnet/IP communication with heat pump has failed, check Ethernet cable, network and heat pump configuration.
Heat pump n°x is not in Network mode	Automatic	Heat pump is removed from the sequence and next available heat pump is started	Heat pump control mode is not set on “Network” in its local interface.
Heat pump n°x is sending a full failure alarm and cannot start	Automatic	Heat pump is removed from the sequence and next available heat pump is started	Check heat pump local interface for more details about the alarm.
Heat pump n°x is sending a partial failure and can start with limited capacity	Automatic	Heat pump is penalized and will be the last machine to start or the first to stop if already running	Check heat pump local interface for more details about the alarm.
Heat pump n°x is sending a service maintenance notification	Automatic	No action	Service maintenance is needed on the heat pump.

Event Description	Reset type	Action taken	Possible cause
Primary pumps			
Customer pump: Pressure difference too high from setpoint	Automatic	No action	Check PID settings
Customer pump: Pressure difference too low from setpoint	Automatic	No action	Check PID settings
Fail to start customer pump n°1 in the allowable time	Manual	Pump is removed from the sequence another pump is started (if available)	The pump as not returned its running feedback in the specified time after receiving the start command. Check pump power supply and status.
Fail to start customer pump n°2 in the allowable time	Manual	Pump is removed from the sequence another pump is started (if available)	The pump as not returned its running feedback in the specified time after receiving the start command. Check pump power supply and status.
Customer pump n°1 is running due to an external command	Automatic	No action	The pump running feedback is received whereas it is not started by the SMS. The pump may be started manually from the power supply cabinet.
Customer pump n°2 is running due to an external command	Automatic	No action	The pump running feedback is received whereas it is not started by the SMS. The pump may be started manually from the power supply cabinet.
DHW pump: Pressure difference too high from setpoint	Automatic	No action	Check PID settings
DHW pump: Pressure difference too low from setpoint	Automatic	No action	Check PID settings
Fail to start DHW pump n°1 in the allowable time	Manual	Pump is removed from the sequence another pump is started (if available)	The pump as not returned its running feedback in the specified time after receiving the start command. Check pump power supply and status.
Fail to start DHW pump n°2 in the allowable time	Manual	Pump is removed from the sequence another pump is started (if available)	The pump as not returned its running feedback in the specified time after receiving the start command. Check pump power supply and status.
DHW pump n°1 is running due to an external command	Automatic	No action	The pump running feedback is received whereas it is not started by the SMS. The pump may be started manually from the power supply cabinet.
DHW pump n°2 is running due to an external command	Automatic	No action	The pump running feedback is received whereas it is not started by the SMS. The pump may be started manually from the power supply cabinet.
Zones			
Fail to start pump zone n°1 in the allowable time	Manual	Pump is removed from the sequence and zone is stopped	The pump as not returned its running feedback in the specified time after receiving the start command. Check pump power supply and status.
Fail to start pump zone n°2 in the allowable time	Manual	Pump is removed from the sequence and zone is stopped	The pump as not returned its running feedback in the specified time after receiving the start command. Check pump power supply and status.
Pump zone n°1 is running due to an external command	Automatic	No action	The pump running feedback is received whereas it is not started by the SMS. The pump may be started manually from the power supply cabinet.
Pump zone n°2 is running due to an external command	Automatic	No action	The pump running feedback is received whereas it is not started by the SMS. The pump may be started manually from the power supply cabinet.
Floor temperature alarm	Manual	The pump and the zone are stopped	The floor sensor has reached the high temperature limit or the dew point + hysteresis limit. Check the 3-way valve regulation and the different alarm thresholds.
Hardware			
At least one output switch is not set to "Auto" on the hardware C1	Automatic	Depends on the output. Can affect partially or totally the SMS operation	Open the electrical cabinet and set the hardware switch to “Auto” on the card.
At least one output switch is not set to "Auto" on the hardware C2	Automatic	Depends on the output. Can affect partially or totally the SMS operation	Open the electrical cabinet and set the hardware switch to “Auto” on the card.

9 - MAINTENANCE

In order to ensure the optimal operation of the equipment as well as the optimisation of all the available functionalities, it is recommended to activate a Maintenance Contract with your local manufacturer service technician Service Agency.

The contract will ensure your equipment is regularly inspected by manufacturer Service specialists, so that any malfunction is detected and corrected quickly, and no serious damage can occur to your equipment.

The manufacturer Service Maintenance Contract represents not only the best way to ensure the maximum operating life of your equipment, but also, through the expertise of manufacturer qualified personnel, the optimal tool to manage your system in a cost-effective manner.

10 - APPENDIX 1: SMART GRID READY INSTALLATION INSTRUCTIONS

10.1 - Introduction

The increase in renewable electricity generation is leading more and more to load fluctuations. These fluctuations can be intelligently compensated by smart grid systems which combined with heat pumps allow an efficient use of energy. Electrical energy can be converted into thermal energy (heat) and the heat can be stored with the use of a water tank.

The Smart Grid Ready ("SG Ready") label of the SMS allows the energy supplier to access it and manage four heat pumps energy usage control states. These states are activated in the SMS through two inputs (SGR0_BST and SGR1_LCK).

The Smart Grid Ready label is valid only in the DACH region (Germany, Austria, Switzerland).

This document contains information about four “energy usage” control states supported by the SMS and gives instructions on how the system should be configured by an installer.

It is strongly recommended to read the whole document prior to starting any installation or maintenance procedures. Please note that screenshots provided in this manual are solely for the purpose of illustration and they may differ from the actual look.

10.2 - Configuration of Smart Grid Ready option

To set Smart Grid Ready

At commissioning from the Quick Configuration System screen (see section 4.1.1).

From the SMS local interface, with the Factory access:

1. Navigate to the Configuration Menu.
2. Select Factory Settings.
3. In the Equipment Presence screen, enable Smart Grid.

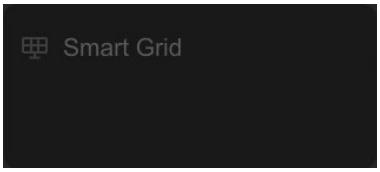
Smart Grid Ready inputs

Two digital inputs (SGR0_BST and SGR1_LCK) are used to allow the energy supplier to control the SMS and enhance load management.

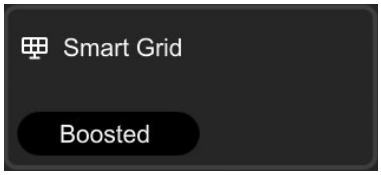
After wiring these two digital inputs (SGR0_BST and SGR1_LCK) to the energy supplier module and enabling the “SG Ready” option, the Smart Grid Ready option offers four energy control modes (1 = LOCK, 2 = NORMAL, 3 = BOOST, 4 = FORCED).

The status of Smart Grid inputs can be verified in the Home screen on the local touch screen, by looking at the tile status.

Smart Grid disabled



Smart Grid Enabled



10.3 - Smart Grid Ready operating modes

For heat pumps with Smart Grid enabled, there are four control states ("energy control modes") available.

The active mode depends on SGR1_LCK and SGR0_BST signals:

	Lock (1)	Normal (2)	Boost (3)	Forced (4)
SGR0_BST (Input 1)	Close	Open	Open	Close
SGR1_LCK (Input 2)	Open	Open	Close	Close

Smart Grid operating modes:

Lockout state (1 = LOCK): In this operating state, all equipment on the primary side (heat pumps, customer pumps) are stopped and are unauthorised to start. If a boiler is present and can supply the buffer tank, then it will be started.

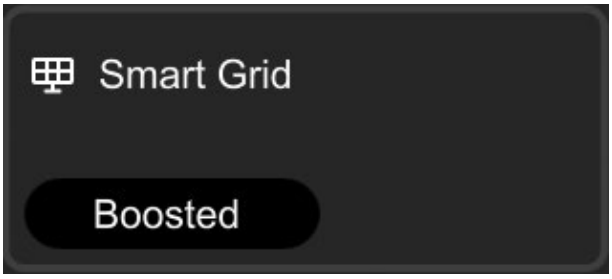
Normal operating state (2 = NORMAL): In this switching operation, the heat pumps run in energy-efficient standard operation. This is the normal operation describes in the functional analysis.

Low current surplus state (3 = BOOST): In this operating status, the heat pumps run in boost mode for DHW production. This does not involve a definitive start-up command, but a switch-on recommendation corresponding to the increase on the day in question. The SMS will write the operating state number in the heat pumps.

High current surplus state (4 = FORCED): In this operating status, all the available heat pumps are stated and run in boost mode for DHW production. The SMS will write the operating state number in the heat pumps.

Smart Grid status

The Smart Grid Status can be found in the Home page in the Smat Grid tile.

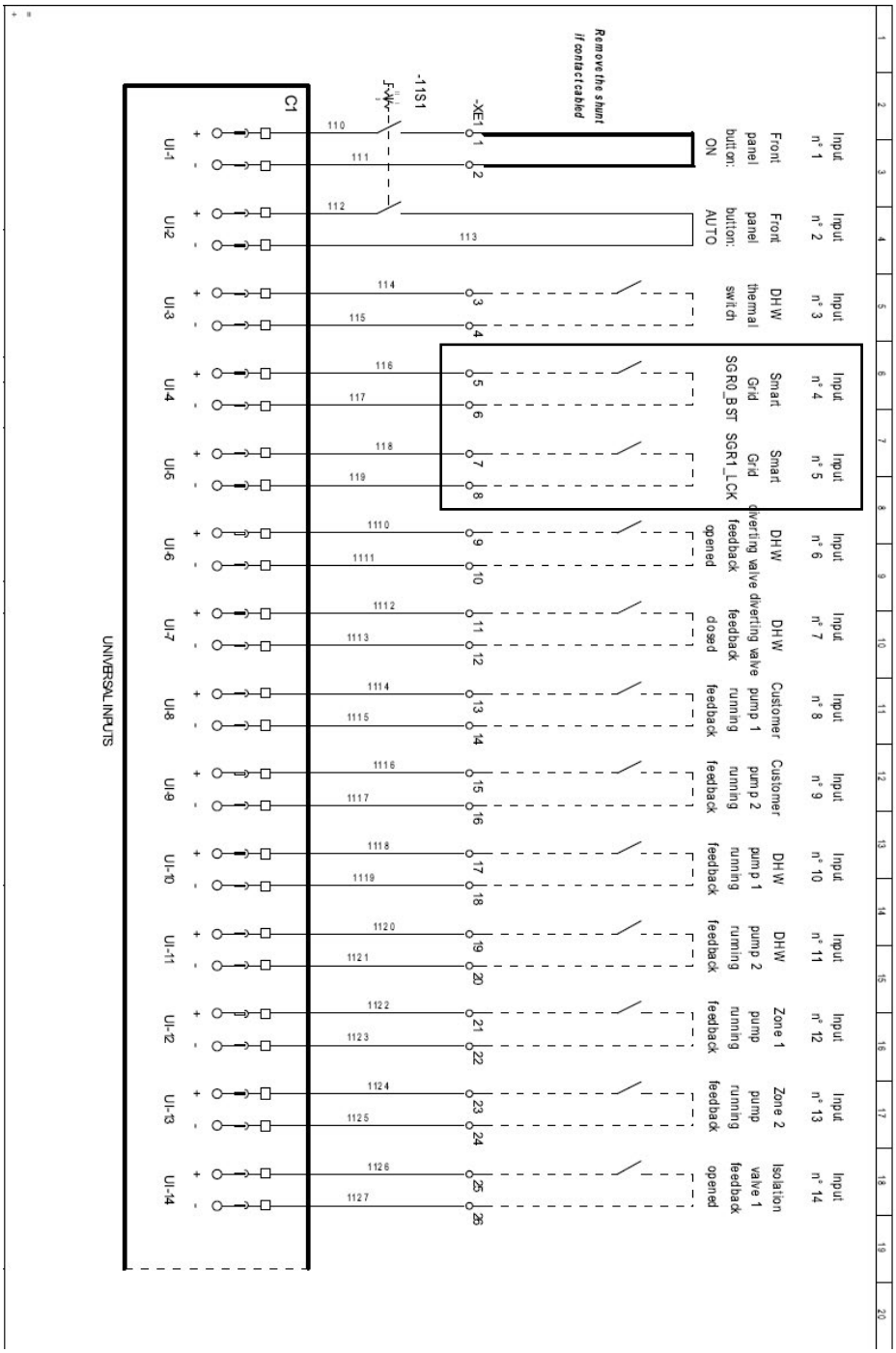


10.4 - Wiring: Smart Grid connections

The Smart Grid Ready module must be connected to “SGR0_BST” and “SGR1_LCK”.

SGR0_BST is wired to XE1:5/6.

SGR1_LCK is wired to XE1:7/8.



The quality management system of the assembly site for this product has been certified as compliant with the requirements of ISO 9001 (latest version) after an audit conducted by an authorised independent third party.
The environmental management system of the assembly site for this product has been certified as compliant with the requirements of ISO 14001 (latest version) after an audit by an independent third party.
The occupational health and safety management system of the assembly site for this product has been certified as compliant with the requirements of ISO 45001 (latest version) after an audit by an independent authorised third party.
Please contact your sales representative for more information.

Order No.: 10991, 12.2025. Supersedes order No.: New.
The manufacturer reserves the right to change the product specifications without notice.

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