Liebert® iCOM™

Installer/User Guide

Intelligent Communication and Monitoring for PCW

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit https://www.vertiv.com/en-us/support/ for additional assistance.

TABLE OF CONTENTS

1 Web Pages/Touch Display

1.1 General

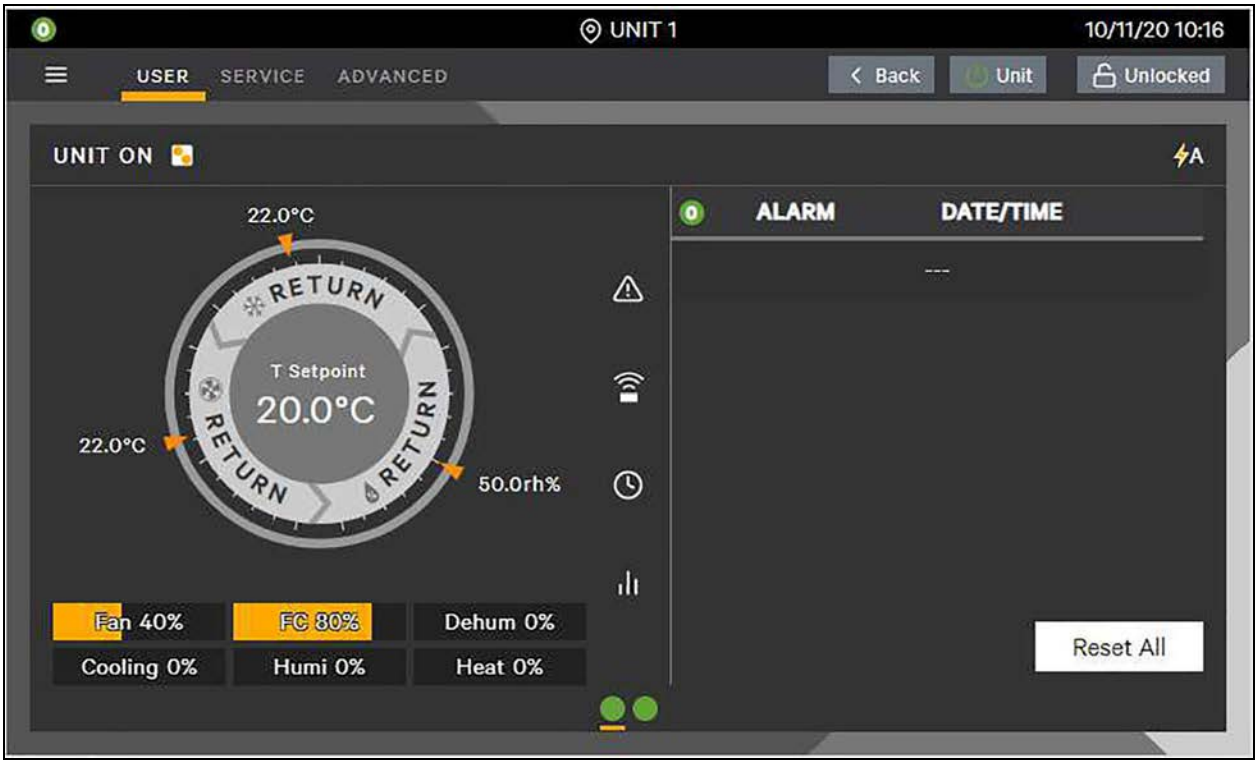
The controller contains a web server and is completely manageable from the web pages/touch display. Google Chrome is the only browser recommended to access the web site.

A maximum of three web browser clients can be connected to the controller's web server (included the Display as physical device).

1.2 Main Page

Figure 1.1 below represents the Home Page for PCW units.

Figure 1.1 Home Page - PCW



- Status Header displays the number of active events, the Unit ID, the Subgroup ID (in case of grouping), and the current date and time.
- Control Header contains menus to access the User, Service, and Advanced settings. Access to these menus is controlled by access level settings.
- Press the Lock/Unlock button to enter Level/Username and Password:

Figure 1.2 Level/Username and Password Screen

Table 1.1 Access Levels

Level / Username	Password	Accessibility
User	1490	User level (low level) allows changing parameters such as temperature setpoint and temperature threshold that are normally used to define the operating point of the unit.
Service	xxxx	Service level (medium level) allows changing parameters that define the operating mode of unit.
Advanced	xxxx	Advanced level (high level) allows identifying the unit in accordance with the type of devices mounted on board.

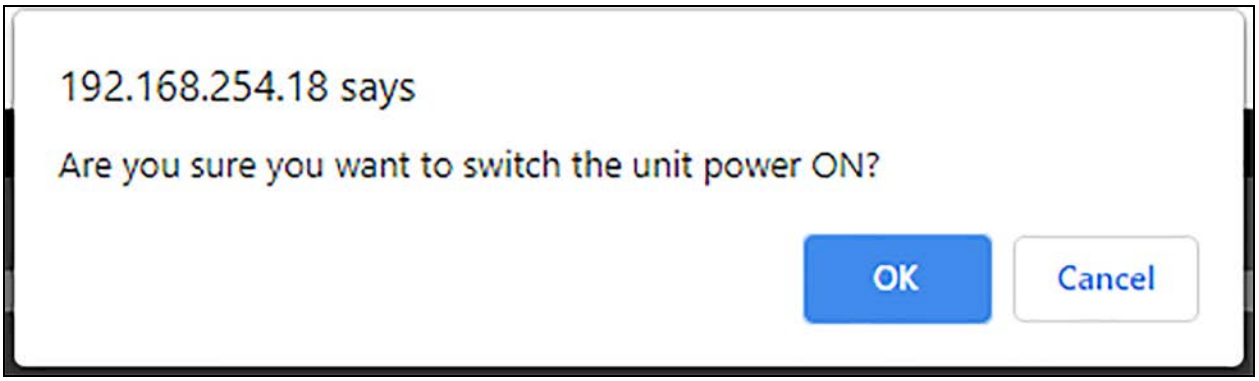
Locked icon: the display is read-only.

Unlocked icon: the user is logged-in and the menus are accessible.

Back button: return to the previous page.

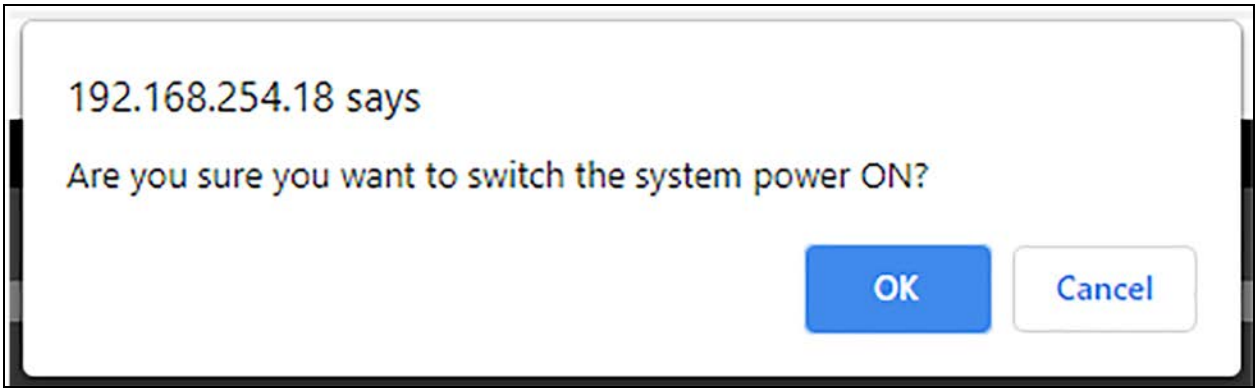
The Unit button allows one to Start/Stop the unit. The pop-up requires confirmation to start/stop the unit. This button is hidden if the user is not logged in.

Figure 1.3 Unit Power Confirmation Screen



The System button displays only if the system is OFF. The system can only be switched ON by this button. The pop-up requires confirmation to start the system. This button is hidden if the user is not logged in.

Figure 1.4 System Power Confirmation Screen



NOTE: The system can be switched OFF (or ON) by the System On/Off button in the User/System Overview menu. This procedure should avoid accidentally stopping the entire system.

In Teamwork Mode 0 (No Teamwork) and without standby units, the System ON/OFF command is ignored by the application.

NOTE: From any menu, press the User icon USER to return to the main window.

The Unit Status (followed by information about particular working conditions, forcing or limitations) is indicated in the left corner of the panel. Table 1.2 below provides information about the available status.

Table 1.2 Unit Status

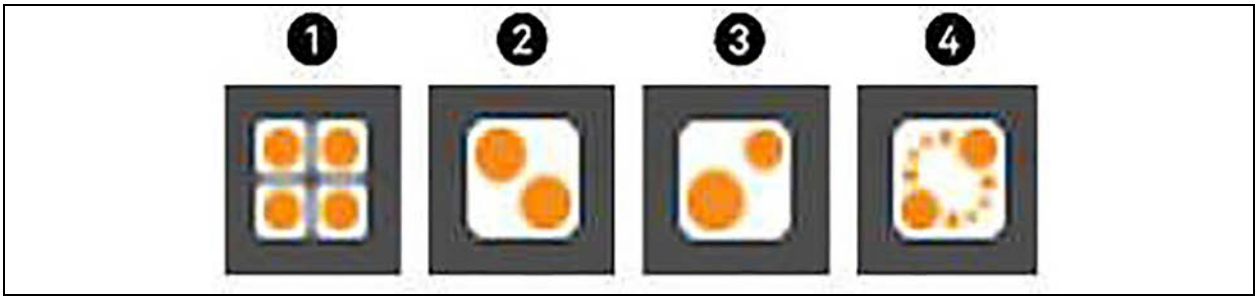
Unit Status	Meaning
DISPLAY OFF	Unit is switched OFF by Display.
REMOTE OFF	Unit is switched OFF by Remote contact (digital input).
3 POS SWITCH OFF	Unit is switched OFF by 3 Positions Switch (digital input).
MONITORING OFF	Unit is switched OFF by BMS.
TIMER OFF	This state appears when the unit is in Sleep mode (OFF by Timer mode).
ALARM OFF	Unit is switched OFF by Alarm.
SHUTDOWN DELAY	The unit is going to switch OFF; only the fan continues to operate for a defined period of time.

Table 1.2 Unit Status (continued)

Unit Status	Meaning
STANDBY	The unit is in Standby mode.
STANDBY BY THR	The unit is in Standby mode by Thermal Runaway (Not yet implemented).
ALARM STANDBY	The unit is in Standby mode due to an Alarm.
FAN BACK DRAFT MODE	The unit is in Standby mode with Fan ON. Fan continues to operate at dedicated fan speed.
UNIT ON	Unit is running in automatic mode.
WARNING ON	Unit is running in automatic mode with active Warning.
ALARM ON	Unit is running in automatic mode with active Alarm.
OPENING DAMPER	Control is waiting for the Air Economizer or Return Damper (time or feedback) opening to activate the unit components.
POWER FAILURE	Main power supply is missing. Unit is running with compressors, heating, humidification, and dehumidification disabled. Fan (if powered) and CW valves continue to run.
MANUAL	The unit is not operating in automatic mode; components (fans, compressors, heaters, etc.) can be activated manually.
RESTART DELAY	Unit is waiting for the restart delay time to start.

The icon  , in a panel with Unit Status content, indicates the current Teamwork Mode:

Figure 1.5 Teamwork Mode Icons



Item	Description
1	No Teamwork
2	Teamwork Mode 1 (Parallel)
3	Teamwork Mode 2 (Independent)
4	Teamwork Mode 3 (Optimized Aisle)

1 = No Teamwork

- In this mode, the units work independently. Sensor values and setpoints are not shared.
- The control drives cooling, heating, ventilation, humidification, and dehumidification are based on local requests. Standby function and unit rotation are possible; cascade is not allowed.

2 = Teamwork Mode 1 (Parallel)

- In this mode, the control utilizes the system PI's for driving cooling, heating, ventilation, humidification, and dehumidification. All of the relevant control parameters are shared; if a value is changed in any of the units, all other units will follow with the same changed setting.
- This mode can be set for Return or Return+Supply Limit or Remote temperature control only.

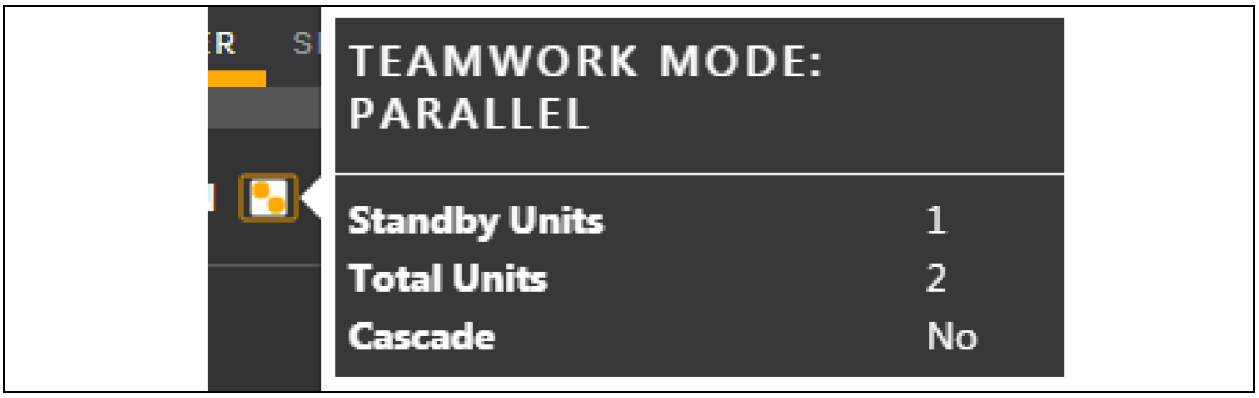
3 = Teamwork Mode 2 (Independent)

- In this mode, the control drives cooling, heating, ventilation, humidification, and dehumidification based on local requests, while avoiding operational conflict with the other units in the network. For example: If one unit is on cooling, no other unit may start heating. If one unit is on dehumidification, no other unit may start humidification.
- In this mode, all the relevant control parameters are shared; if a value is changed in any of the units, all other units will follow with the same changed setting.

4 = Teamwork Mode 3 (Optimized Aisle)

- In this mode, the control uses the system PI's for driving ventilation, humidification, and dehumidification. Local request is used for driving cooling and heating.
- All the relevant control parameters are shared; if a value is changed in any of the units, all other units will follow with the same changed setting.
- This mode can be set for supply temperature control only.

Figure 1.6 Teamwork Mode



The Symbol indicates which power supply line (A or B) is feeding the unit.

This symbol opens the main screen customization menu (see paragraph below for further information).

The status of each connected unit in the system is shown on the bottom line of the Home Page. The color of the symbol indicates the status. See Table 1.3 on the next page , Figure 1.7 on the next page , Figure 1.8 on page 7 , Figure 1.9 on page 7 , and Figure 1.10 on page 8 , and Figure 1.11 on page 8 for colors and their respective status.

Table 1.3 Status

Color	Status
Grey	Unit Off, Offline or Manual Mode
Amber	Standby
Green	Unit ON
Yellow	Warning active
Red	Alarm active

Figure 1.7 Grey Symbol - Unit Off, Offline or Manual Mode

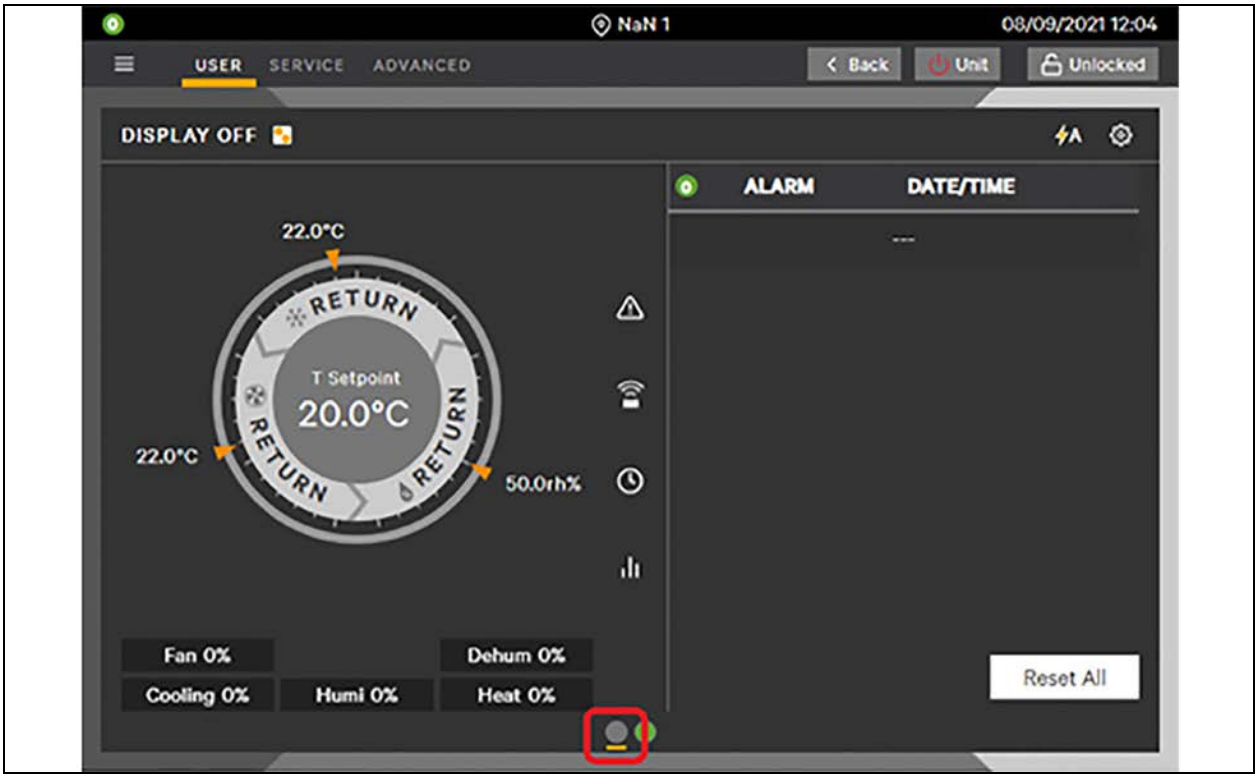


Figure 1.8 Amber Symbol - Standby

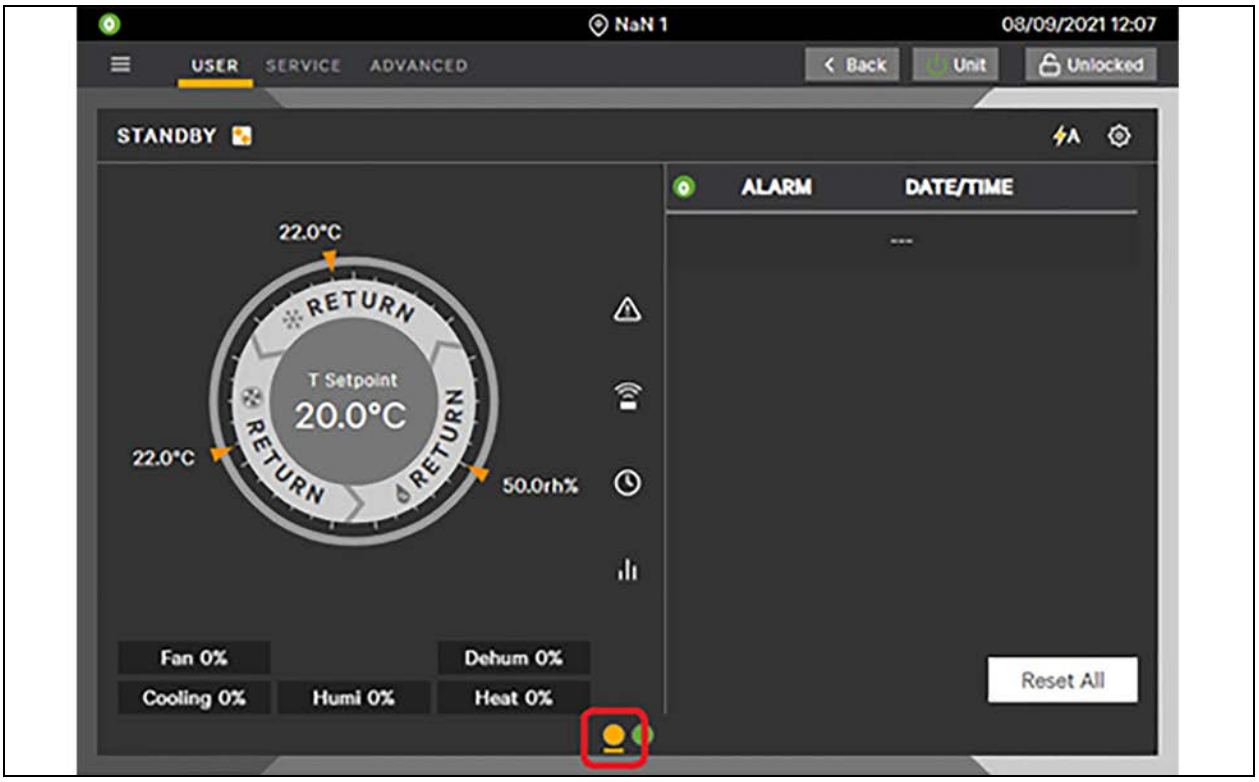


Figure 1.9 Green Symbol - Unit ON

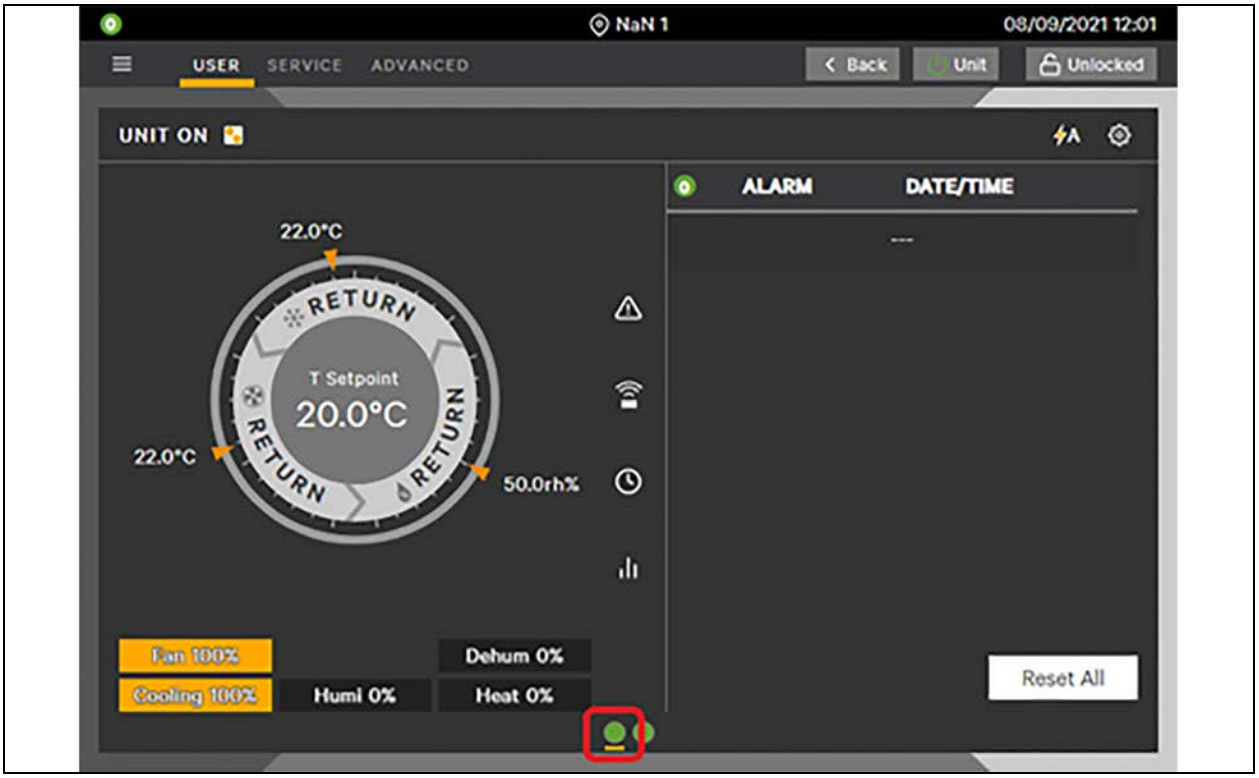


Figure 1.10 Yellow Symbol - Warning Active

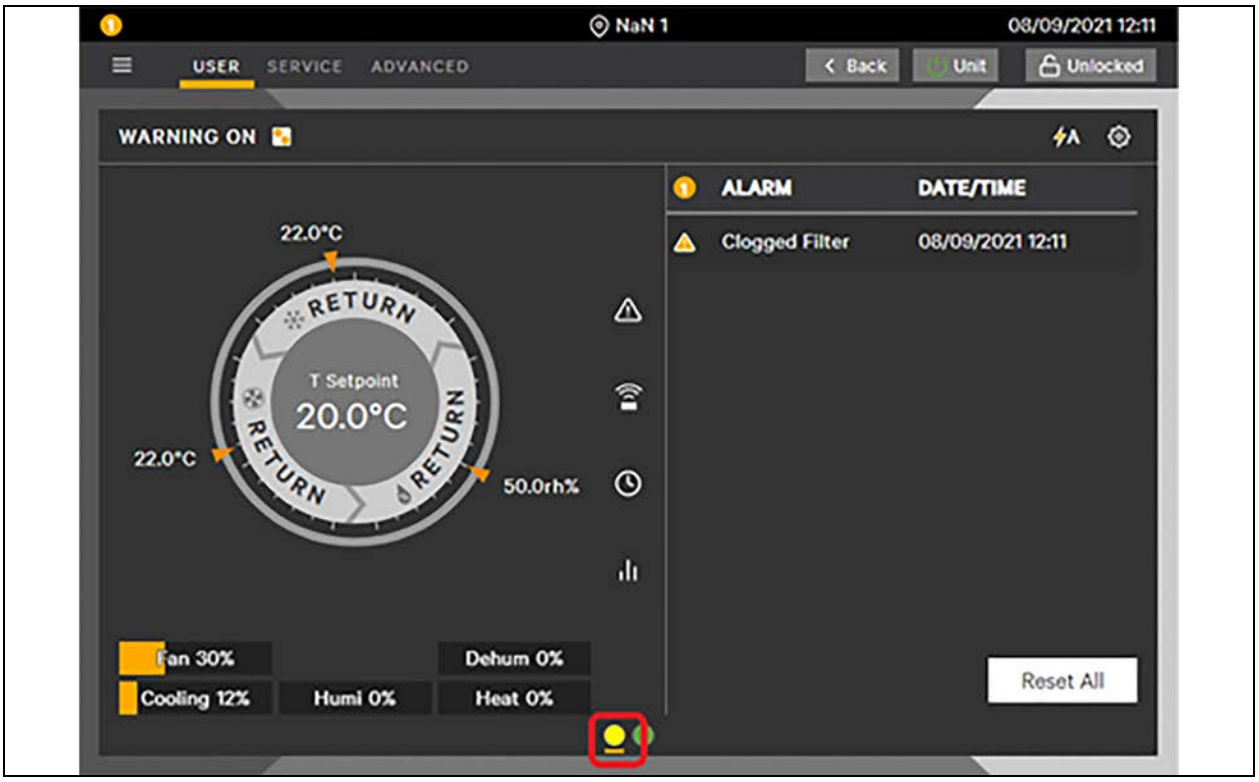
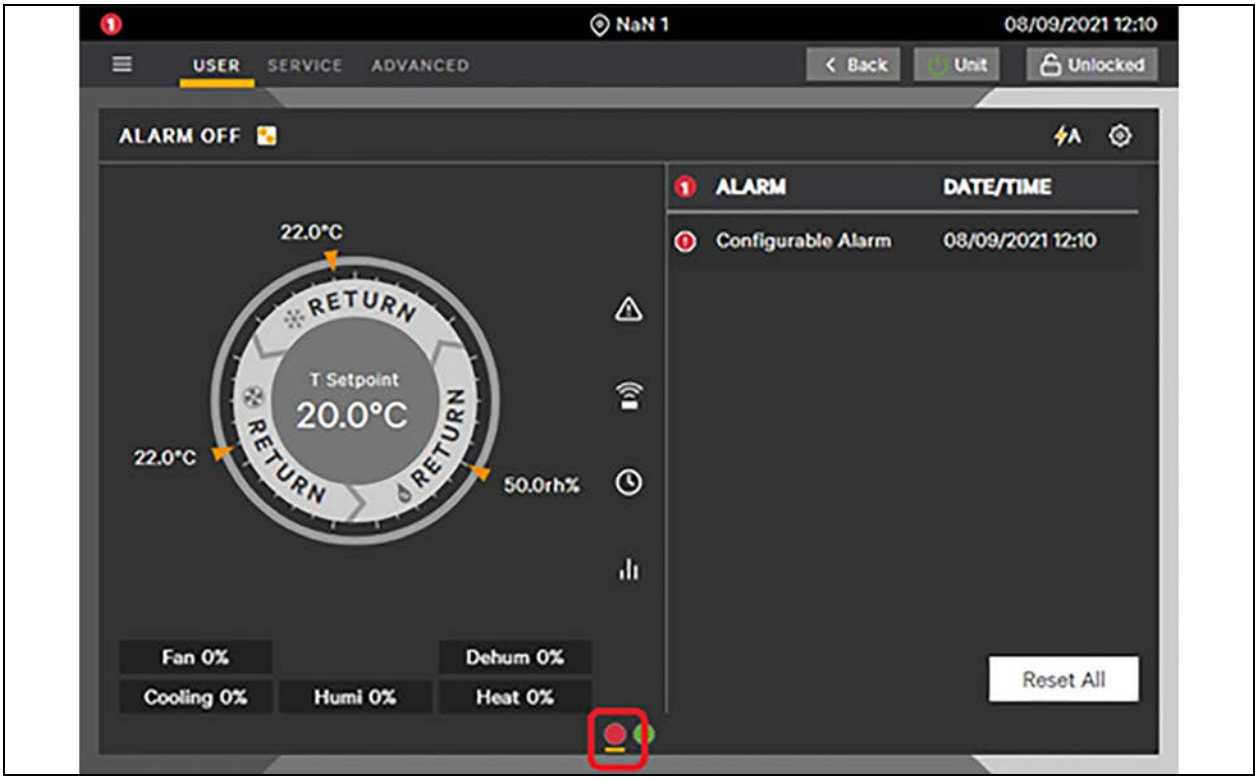
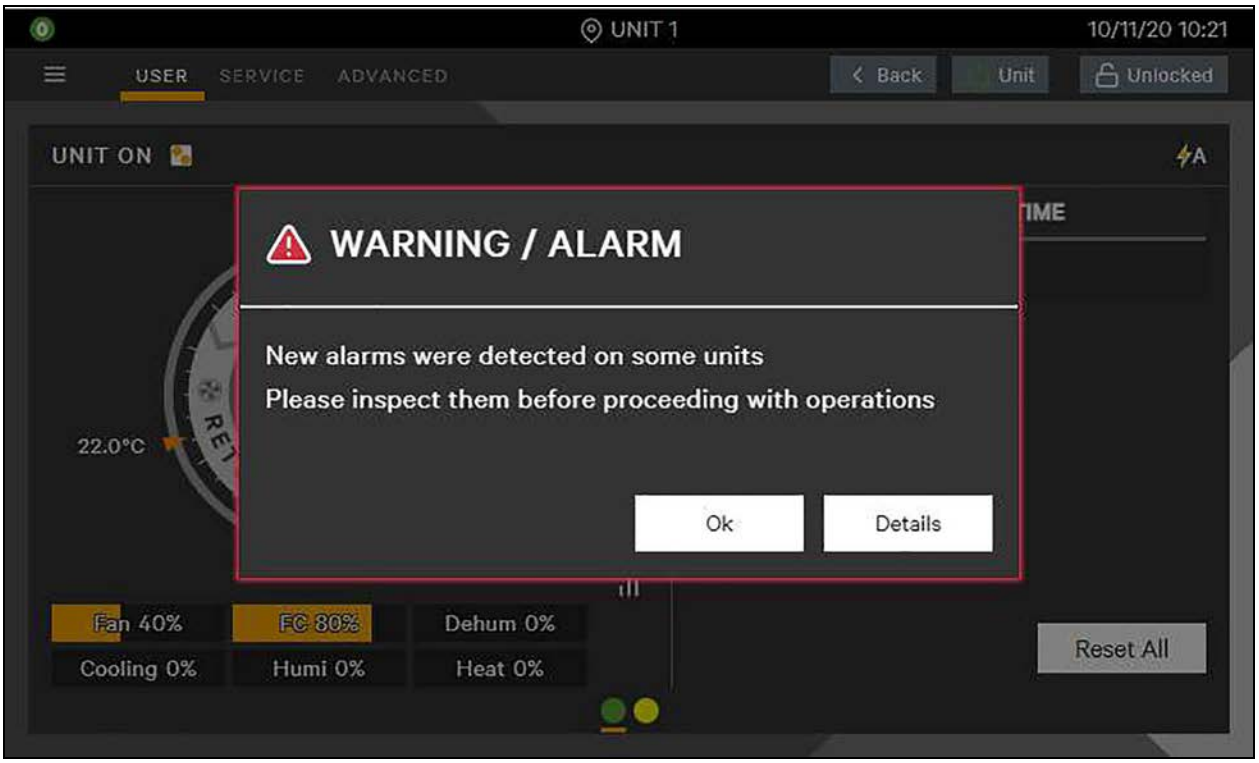


Figure 1.11 Red Symbol - Alarm Active

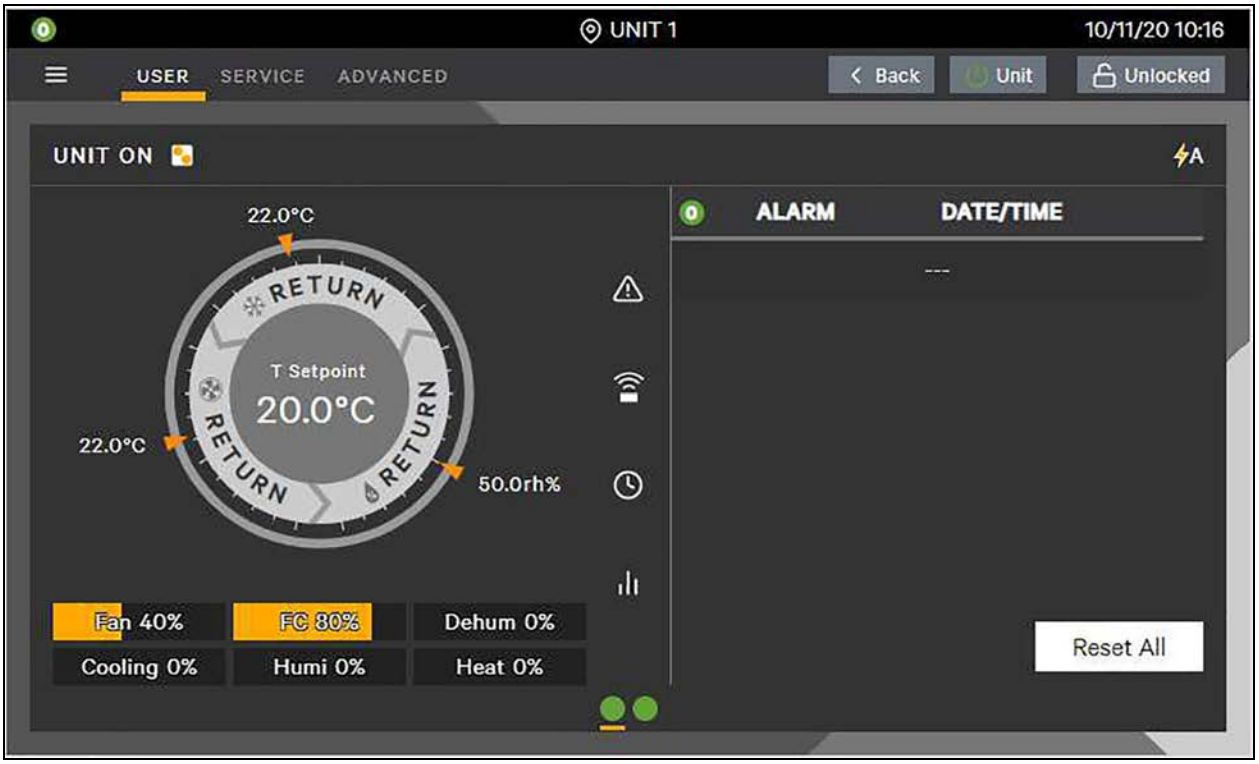


When a new event (alarm or warning) is detected in one of the units in the system, a warning/alarm pop-up displays. See Figure 1.12 below .

Figure 1.12 Unit Warning/Alarm Pop-up



OK closes the pop-up; Details opens the System Overview menu.



The  icon indicates that the unit that is currently being viewed. Selecting the icon displays the System Overview menus. The dial shows the control sensors used by the application for managing the cooling/heating the humidification/dehumidification and the fan speed with their reference values (or setpoints). Outer Dial value type (Display Option menu) defines what to show on the Outer Dial, Sensor readings or Setpoints. Touch the center of the dial to display the following data:

- Current Temperature Setpoint used by the application for managing the cooling devices
- Current Humidity Setpoint used by the application for managing humidification and dehumidification
- Current Fan Setpoint/Request used by application for managing the fan speed
- Supply Temperature
- Return Temperature
- Return Humidity
- Return Dew Point
- Remote Dew Point
- Remote Temperature Average
- Remote Temperature Maximum
- Remote Temperature Minimum
- Remote Temperature
- Remote Humidity
- Static Pressure
- Air Economizer Outdoor Temperature
- Air Economizer Outdoor Humidity
- Outdoor Temperature
- Glycol Temperature
- Airflow

The sensor reading changes color according to alarm thresholds set:

- Green: Sensor reading is within threshold limits.
- Red: Sensor reading is above threshold limit.
- Blue: Sensor reading is below threshold limit.
- Grey: Sensor is not enabled or the Unit is OFF.

In the case of multiple sensors, these values represent the minimum, maximum or average value based on the method set. See **Figure 1.13** on the facing page , **Figure 1.14** on the facing page , **Figure 1.15** on page 12 , and **Figure 1.16** on page 12 .

Figure 1.13 Green Dial: Sensor Reading is Within Threshold Limits

Figure 1.14 Red Dial: Sensor Reading is Above Threshold Limit

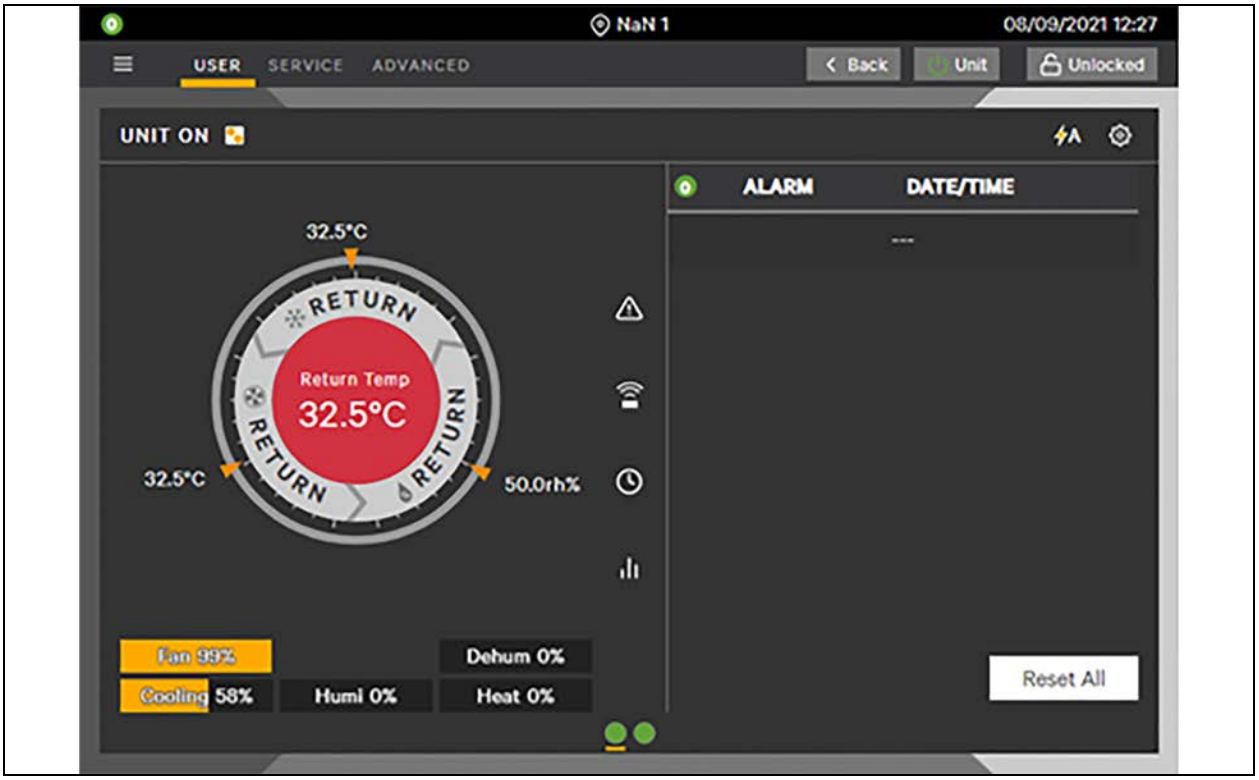


Figure 1.15 Blue Dial: Sensor Reading is Below Threshold Limit

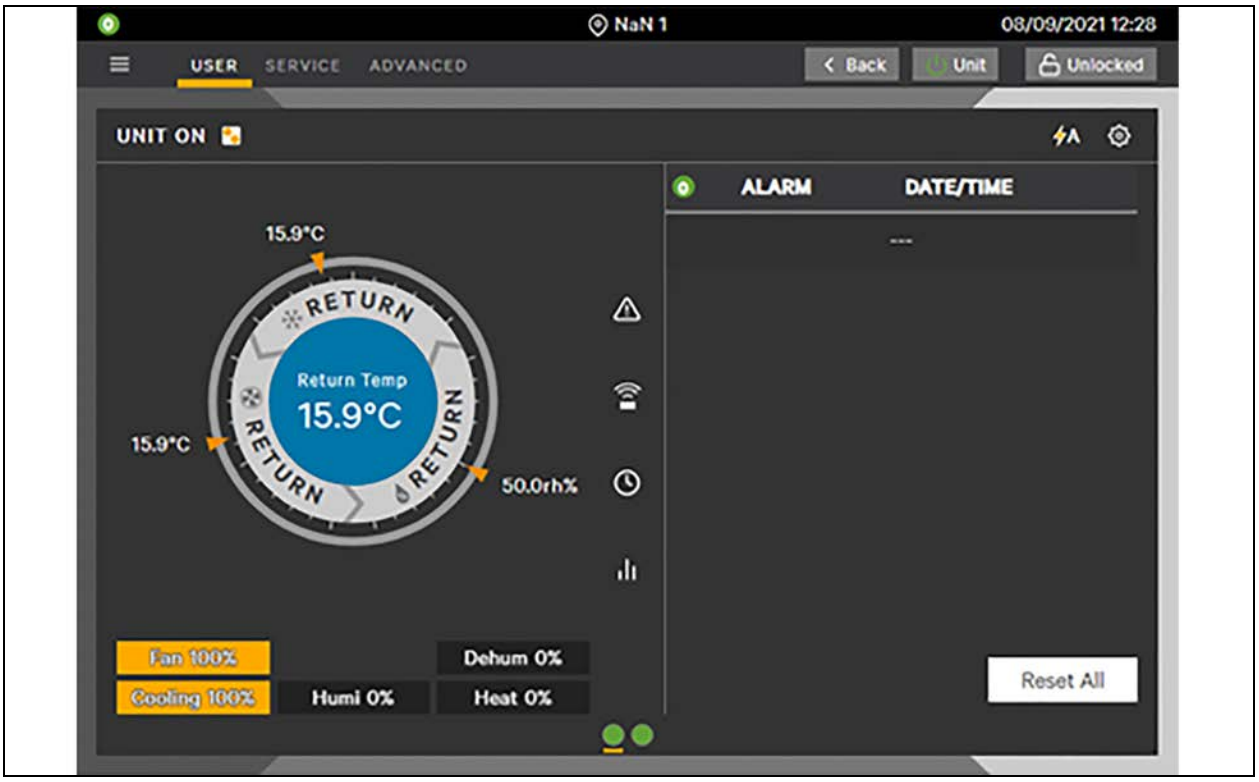
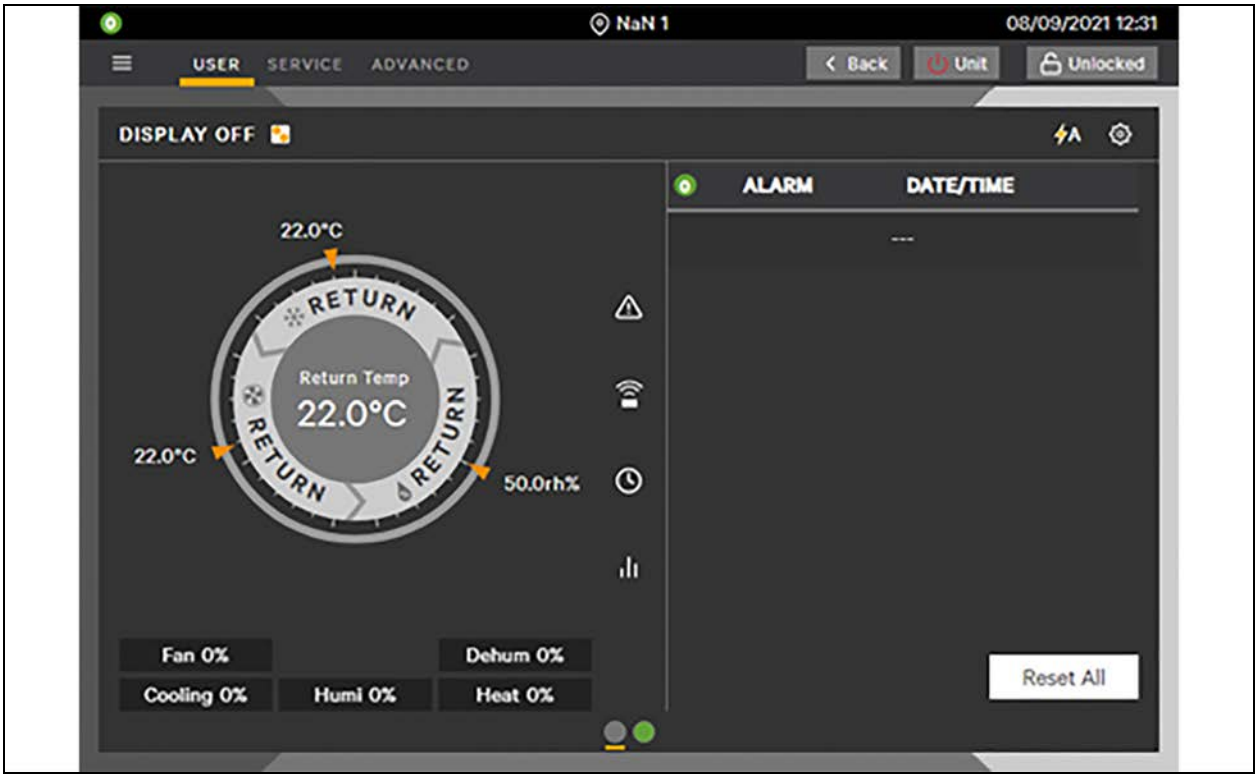


Figure 1.16 Grey Dial: Sensor is not Enabled or the Unit is OFF



The utilization percentages of ventilation, cooling, free cooling, humidification, dehumidification, and heating are displayed in the lower side of the panel. The bar graph will be hidden if the option is not available.

The shortcut icons, on the right, open panels directly instead of browsing through menus:

= Event Log menu

= Sensor Data menu

= Total Run Hours menu

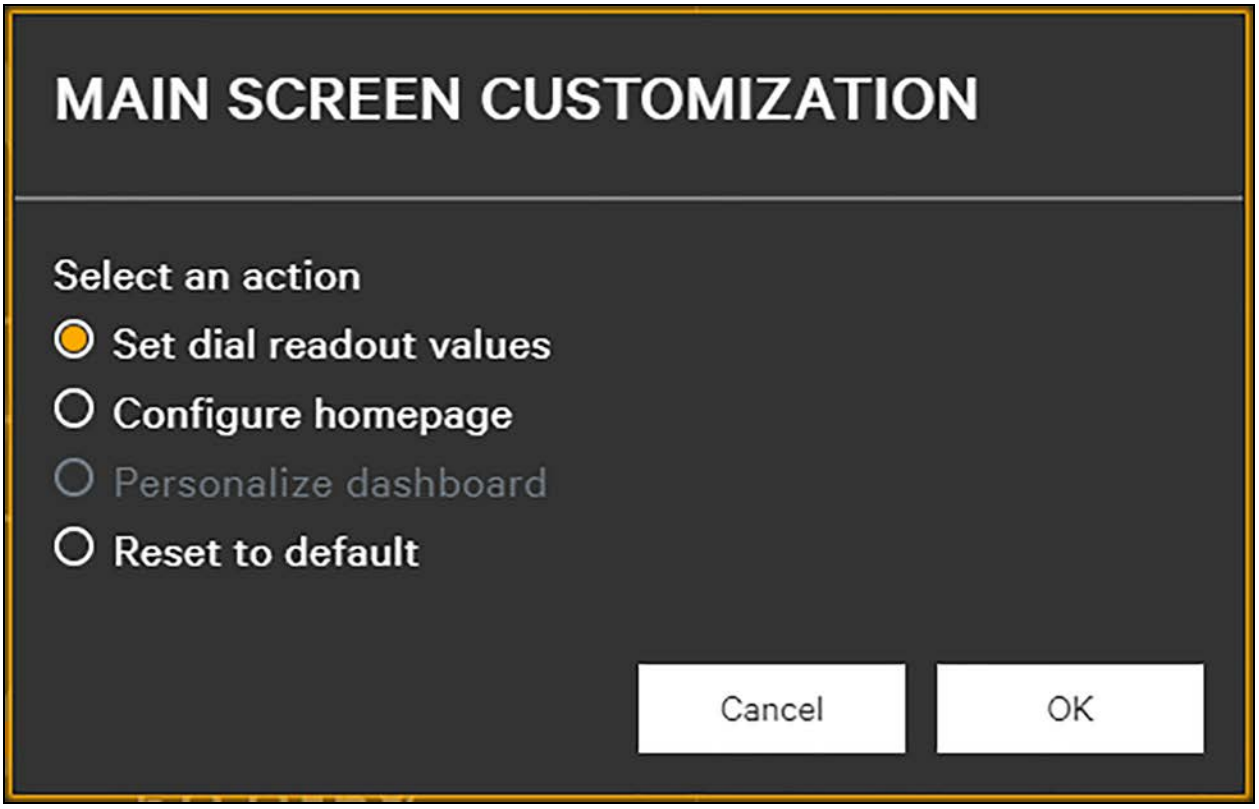
= T/H Graphs

The secondary content panel, on the right, shows the list of the active events (alarms or warnings) with date and time. Reset all sends a reset command for all the active events.

1.2.1 Main Screen Customization

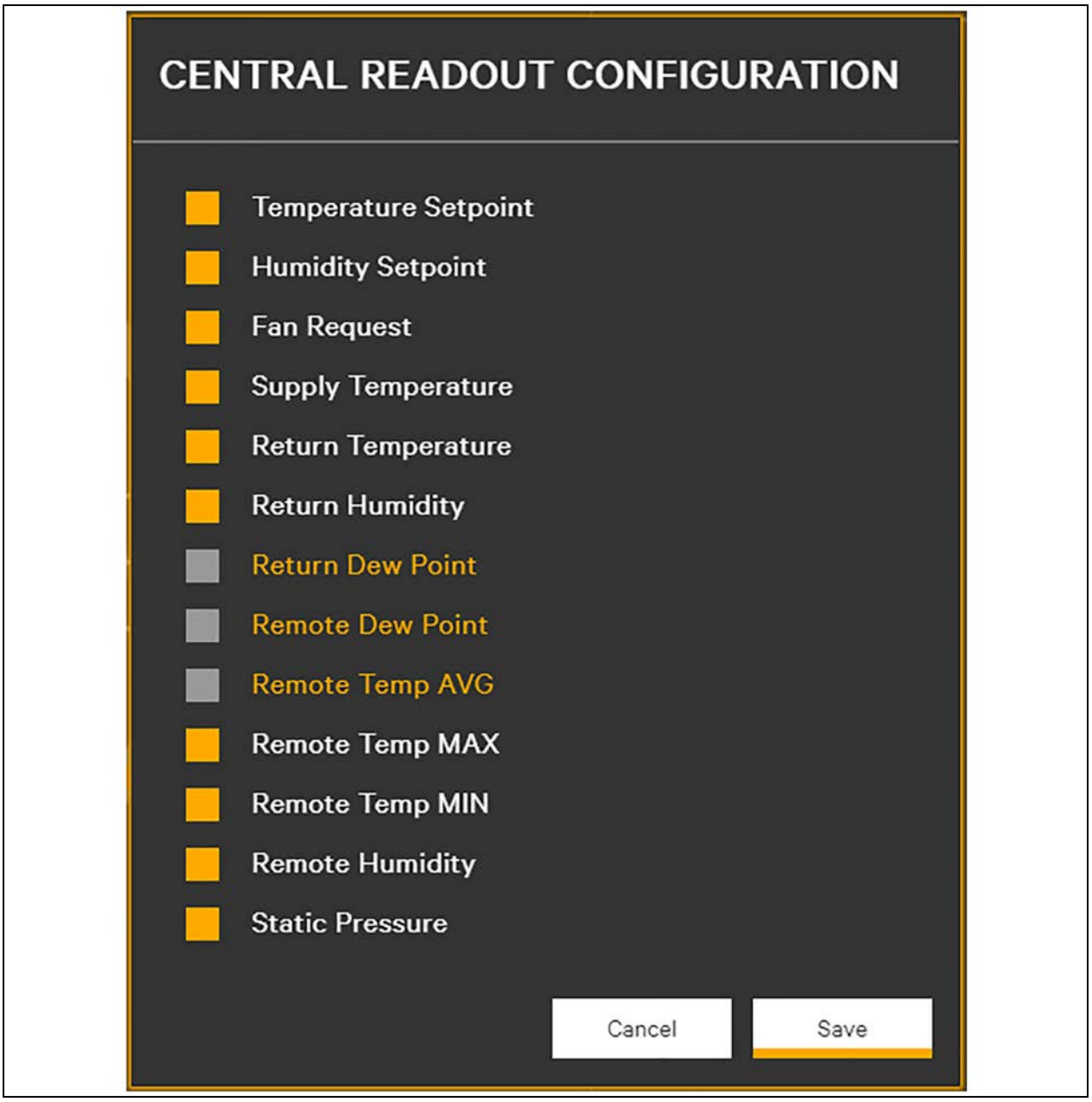
This symbol is located in the upper-right corner of the main screen. This icon opens the customization menu and allows the end-user to customize the information which appears on the main screen.

Figure 1.17 Main Screen Customization Menu



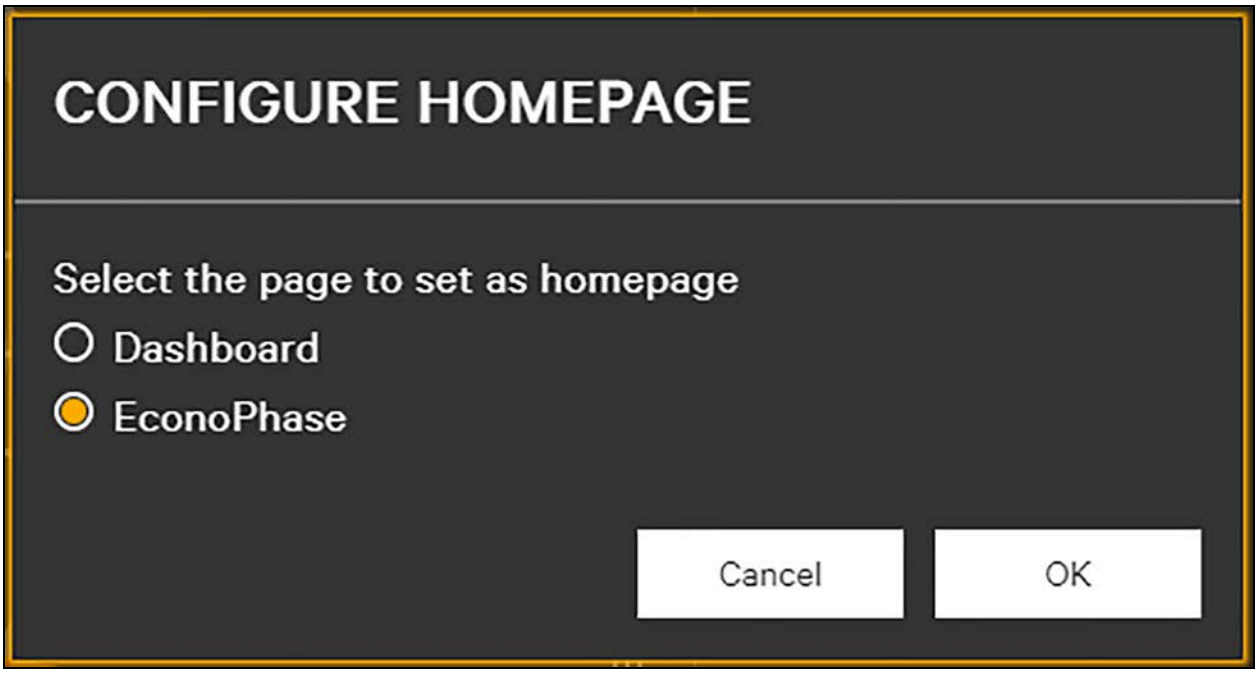
“Set dial readout values” opens the “Central Readout Configuration” mask which allows defining what to show and what to hide in the center of the dial.

Figure 1.18 Central Readout Configuration Screen



"Configure homepage" selects the homepage, "Dashboard" (standard homepage) or "EconoPhase".

Figure 1.19 Configure Homepage Screen

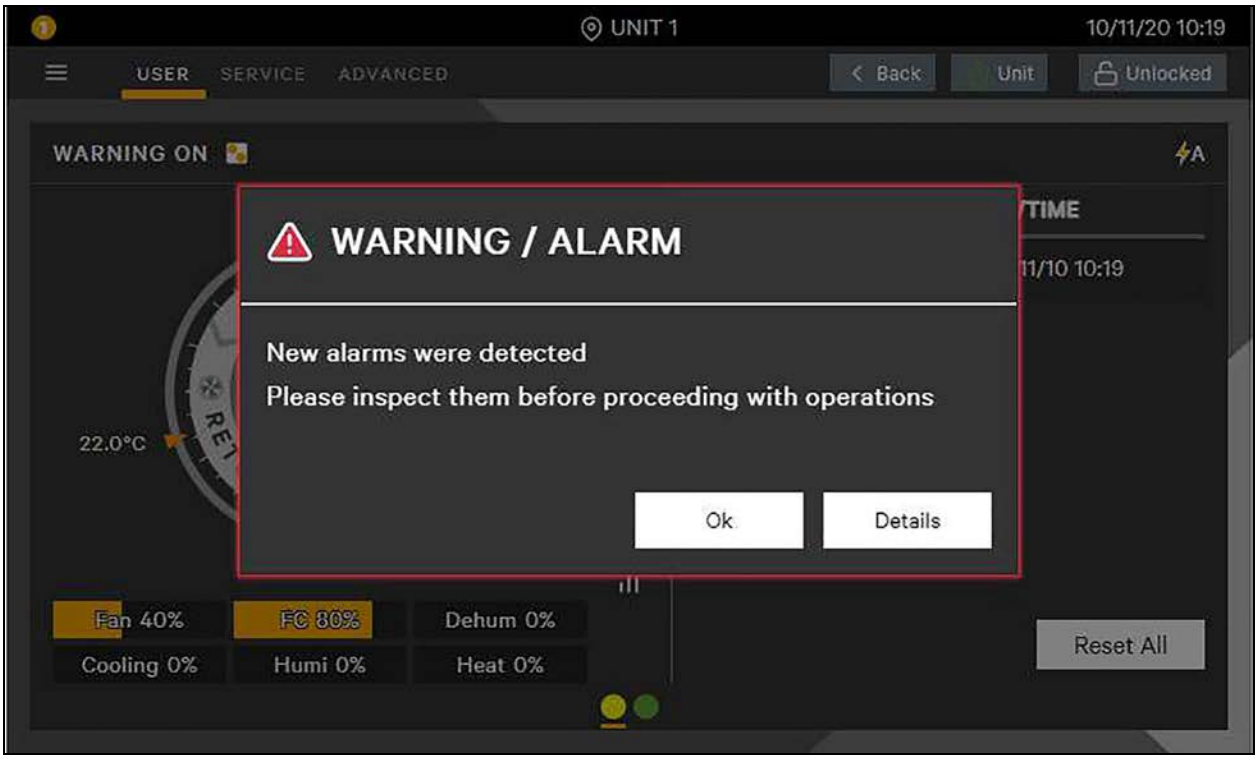


"Reset to default" discards all what has been done, basically goes back to standard homepage.

1.3 Event Detection

When a new event is detected by the application, the following pop-up will be displayed:

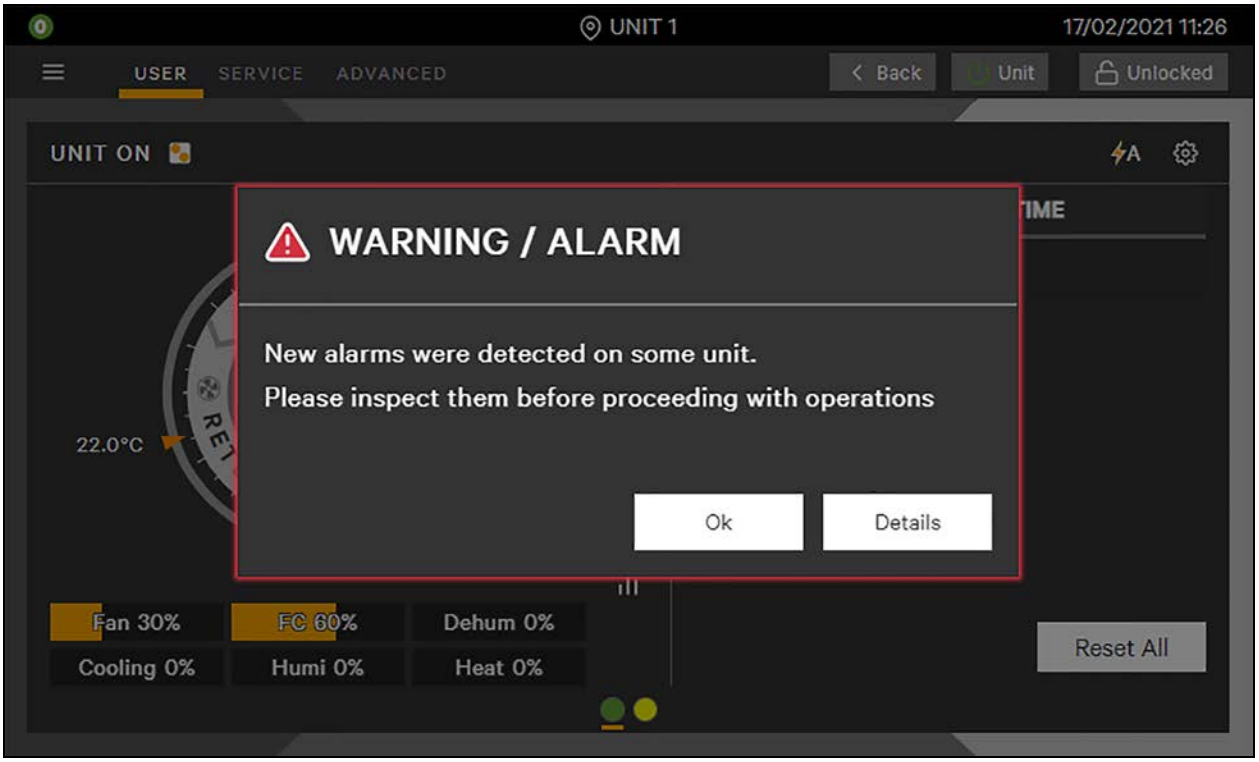
Figure 1.20 Application Warning/Alarm Pop-up



OK closes the pop-up; Details opens the Event Log menu.

When a new event (alarm or warning) is detected in one of the units in the system, the following pop-up will be displayed:

Figure 1.21 Unit Warning/Alarm Pop-up



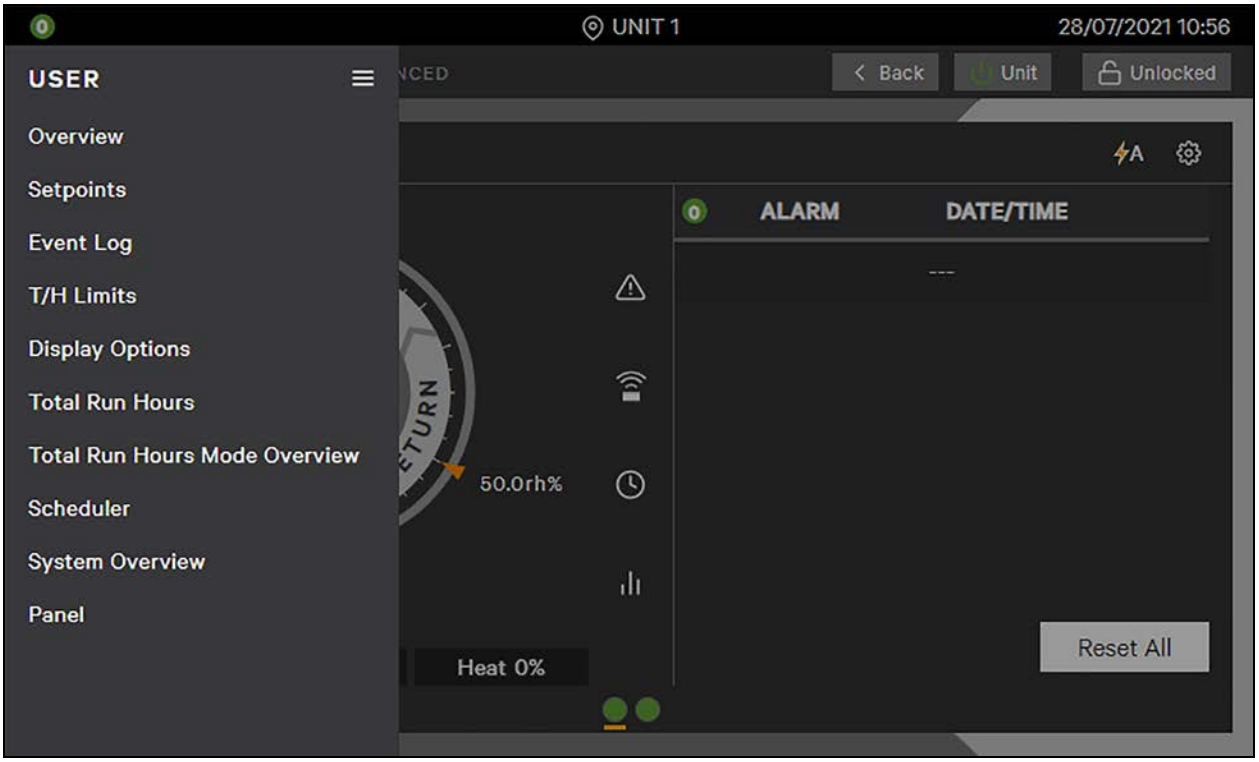
"OK" closes the pop-up; "Details" opens the System Overview menu.

1.4 User Menu

Select the User icon 

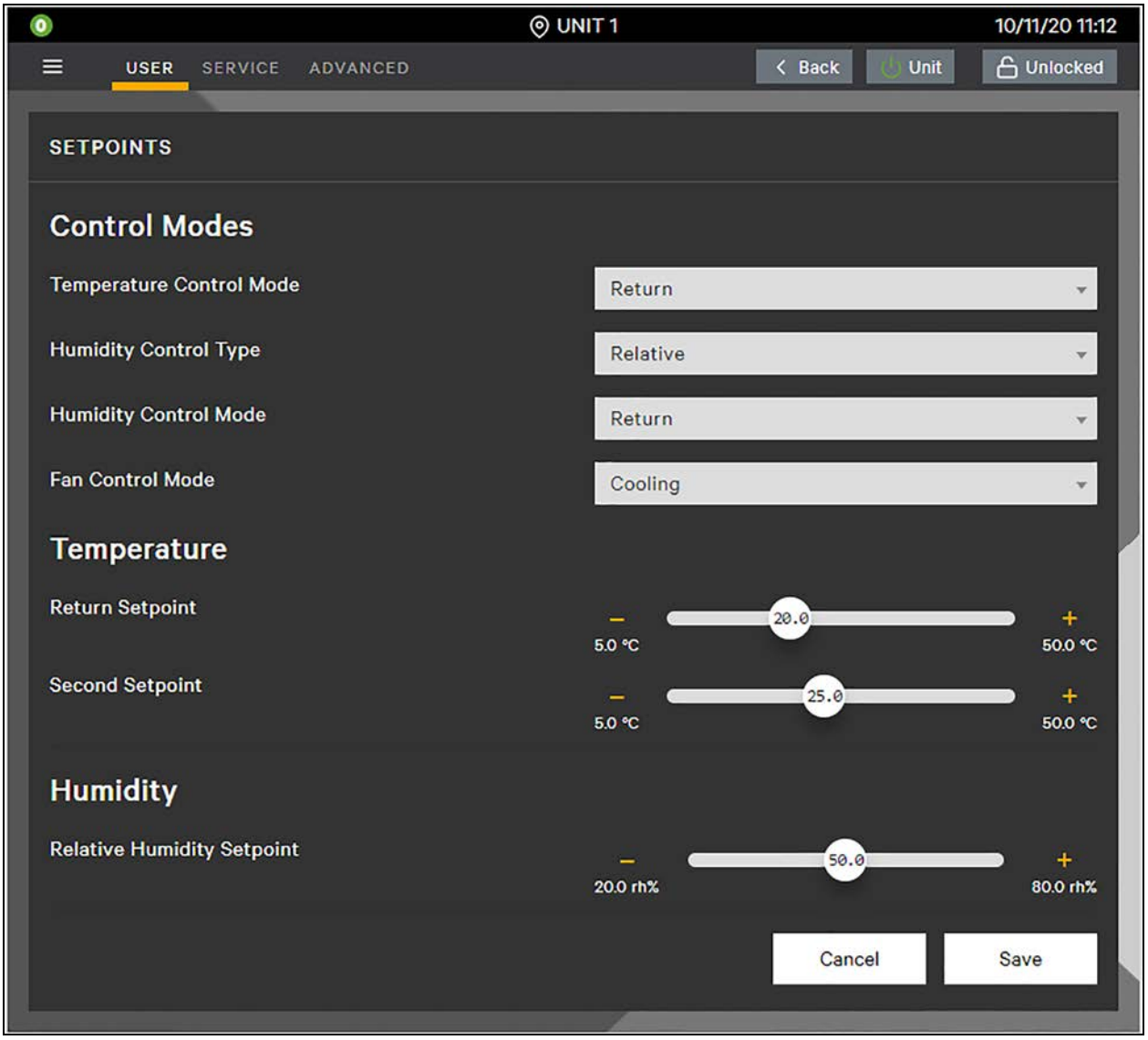
and then press the  button. The user options display on the drop-down menu.

Figure 1.22 User Menu



1.4.1 Setpoints

Figure 1.23 Setpoints



Control Modes

- Temperature Control Mode: This is the desired temperature control method. The options available are Return, Supply, Return + Supply Limit, and Remote.
- Humidity Control Type: This is the desired humidity control type. The options available are Relative, Relative Compensated, Absolute or Dew Point. The options available for the control method are Return and Remote.
- Humidity Control Mode: This is the desired humidity control method. The options available are Return and Remote.

- Fan Control Mode: This is the desired fan control method. The available options are Return, Supply, Remote, Delta, Static Press, “Ret CW Priority, Fixed, and Cooling.
    a. Return: The fan speed is modulated from minimum value to maximum value following the return temperature deviation.
    b. Supply: The fan speed is modulated from minimum value to maximum value following the supply temperature deviation.
    c. Remote: The fan speed is modulated from minimum value to maximum value following the remote temperature deviation.
    d. Delta: The control tries to achieve a constant delta T between Return temperature and Supply temperature. When the delta T is inside the deadband, the fan speed will not change; when the delta T is outside the deadband, the control will change (increasing or decreasing) the speed of the fan trying to put the delta T inside the deadband.
        - If delta Return - If Supply is lower than delta Setpoint, then the fan will decrease the speed.
        - If delta Return - If Supply is higher than delta Setpoint, then the fan will increase the speed.
    e. Static Pressure: The speed of the evaporating fans is modulated in order to keep the static pressure constant. When the pressure is inside the deadband, the fan speed does not change; when the pressure is outside of the deadband, the control increases or decreases the speed of the fan trying to put the pressure inside the deadband.
        - If pressure is lower than the Setpoint band, the fan will increase the speed.
        - If pressure is higher than the Setpoint band, the fan will decrease the speed.
    f. Return CW Priority (PCW unit only): The fan speed starts to modulate from the minimum speed to the maximum speed when the call for cooling, based on return temperature, reaches 50%. This means the fans start to modulate only when the chilled water valve is fully open.
    g. Fixed: During normal operation the fan will operate at the fixed speed set. The fan speed can be limited or overwritten due to pre-defined working conditions or unit safety reasons.

NOTE: Fixed speed can be used for driving the fan speed via BMS (datapoint Cfg_evpFanFixSpeed).

    h. Cooling (coupled mode): The fan speed is modulated from minimum value to maximum value following the call for cooling.

Temperature Control Mode

Temperature Control Mode defines from which sensor cooling and heating will be driven:

- Return
- Supply
- Return + Supply Limit
- Remote

Control Strategy

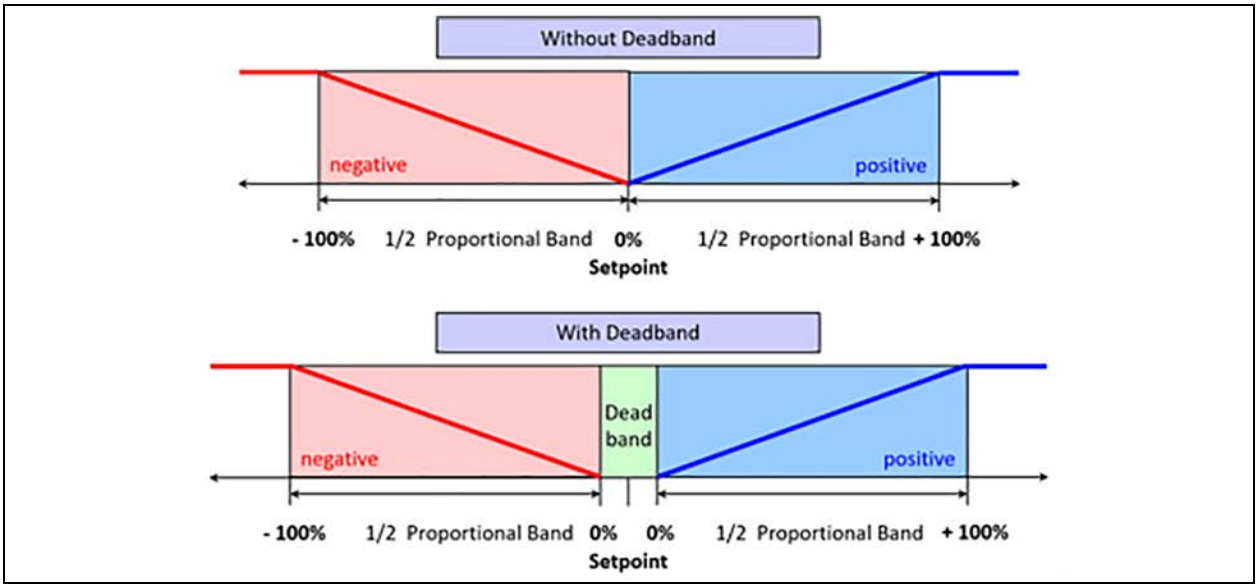
Cooling and heating devices are driven following the control temperature deviation.

The proportional band defines the working range of cooling and heating. It is divided into two equal parts, the left side for heating, the right side for cooling. In the middle is the control temperature setpoint.

The deadband, which is divided 50-50 for both negative and positive area, shifts the negative and positive area apart.

The control temperature Integration, if set to any value, would slowly increase/decrease the temperature deviation, even if the real temperature is stable. It allows for fine control precision. The Integral calculation stops and keeps the same value if the actual proportional deviation is inside a deadband.

Figure 1.24 Temperature Proportional Band



Return Compensation

The return compensation can be used to save energy. For example, when a data center is working with low load, the control will automatically increase the supply setpoint which saves energy.

Return compensation can only be enabled if the control sensor is set to 'Supply'.

As long as the return temperature is above its setpoint, the supply air setpoint remains unchanged.

Between return air temperature setpoint and the left side of the return air proportional band, the supply air setpoint will be increased, reaching the value of supply air setpoint + compensation value at the left end of the return air proportional band.

This function can be enabled or disabled.

Remote Compensation

Remote compensation can help to counteract the hot spots in a data center reducing the supply setpoint.

Remote compensation can only be enabled if the control sensor is set to 'Supply'.

As long as the remote temperature is below its setpoint + proportional band, the supply air setpoint remains unchanged.

When remote temperature is higher than setpoint + proportional band, the supply air setpoint will be decreased, reaching the value of supply air setpoint - compensation value at 150% of proportional band.

This function can be enabled or disabled.

Return + Supply Limit

In combination with the Air Economizer function avoids blowing supply temperatures that are too low.

The control calculates two different temperature deviations; one based on return temperature and another one based on supply temperature. The value used to drive the chilled water valves and free cooling (air or water) will be the smaller one of the two calculations.

This control method avoids blowing supply temperatures that are too low. Supply limit is a local function; only local unit values (return temperature, supply temperature) are used to calculate it.

The heating is not affected by the supply limit. The fan speed is not affected by the supply limit.

Temperature Setpoints and Cooling Operation

Temperature control refers to the cooling unit's response to programmed setpoints and sensed room/load conditions. Temperature control is closely-tied to the primary cooling source. Liebert® Thermal management units employ several types of primary cooling sources:

Second Setpoint

The Second Setpoint will be used, in place of the standard temperature setpoint, if one of the configurable inputs is set to '2nd Setpoint' AND the relative input is open (active). The message 'Second Set Point Active' will be shown.

Backup Setpoint

If enabled, the Backup Setpoint (Service/Temperature Control - BMS) will be used, in place of the standard control temperature setpoint, if the communication with the BMS is lost. The message 'BMS Offline' will be shown.

The BMS lost condition becomes true once the remote management system is not able to refresh the datapoint 'HeartBeat' to '1' within a specified time period (BMS Timeout).

The 'BMS Temp. Control' parameter can be set to:

- 'None' only triggers event 'Monitoring Offline' and does not change the current setpoint.
- 'Setpoint' changes the current control temperature setpoint to the selected value.

Remote Sensors Control/Reference

The Remote sensors can be set as Control sensors or Reference sensors (Service/Sensors Setup/Remote Temperature-Humidity).

The application ignores values of Reference sensors in the minimum, maximum, average or redundancy calculation. The 'Remote x Sensor Failure' event will not be triggered when a Reference sensor is disconnected.

Control Sensor Failure

In the case of control sensor failure, the unit will continue to run.

Cooling

- Return, or Remote Control:
  - Teamwork mode = Cooling will work using the system temperature value. If system value is not available, the cooling will be forced to 100%.
  - No Teamwork mode = Cooling will be forced to 100%.
- Supply Control:
  - Cooling will be forced to 100%.

Fan Speed

- Return, Return CW Priority, Remote or Static Pressure Control:
  - Teamwork mode = Fan will work using the system value. If system value is not available, the fan will run at defined Failure Speed parameter.
  - No Teamwork mode = The fan will run at the speed defined by Failure Speed parameter.
  - In both cases, if a higher call for fan speed occurs, the fan will operate at the higher call.
- Supply or Delta Control:
  - The fan will run at the speed defined Failure Speed parameter. If a higher call for fan speed occurs, the fan will operate at the higher call.

NOTE: The forcing is kept for 90 seconds once the control sensor goes back to being valid.

Multiple Sensors

The control allows management of more than one sensor for:

- Return temperature and Humidity (up to 4)
- Supply temperature (up to 3)
- Remote temperature and Humidity (up to 10)

For each family of sensors, the user can choose the minimum, maximum or average value. This value will be used by the control for managing the unit.

The user can also choose the redundancy option, in this case the control will consider the value of the first sensor only; the second sensor will be used only if the first one is broken or missing. The same rule will be applied for succeeding redundant sensors.

Temperature Proportional Band

Use the proportional and deadband parameters to control how your cooling unit(s) respond based on the calculated need for cooling (or heating). Figure 1.25 on the facing page illustrates temperature control using:

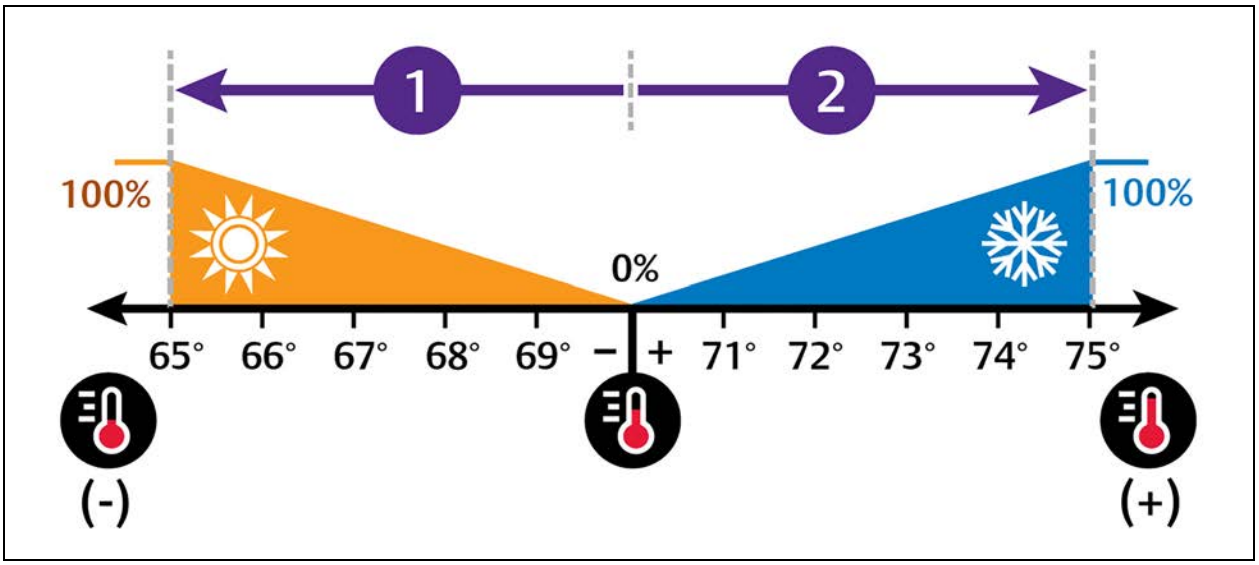
- 70° setpoint
- 10° proportional band
- No deadband

The proportional band is divided evenly on each side of the setpoint:

- 0% cooling capacity is required at 70°.
- As the air temperature increases, cooling also increases along the proportional band.
- If the air temperature reaches 75°, the system operates at 100% cooling capacity.

- If air temperature rises to the end of the proportional band or further, the system operates at 100% capacity to bring the temperature down to the setpoint.
- If your unit includes reheat, the heating capacity operates in the same way as the air temperature falls below the setpoint.

Figure 1.25 Temperature Control without Deadband



No	Description
1	½ of proportional band
2	½ of proportional band

Temperature Deadband

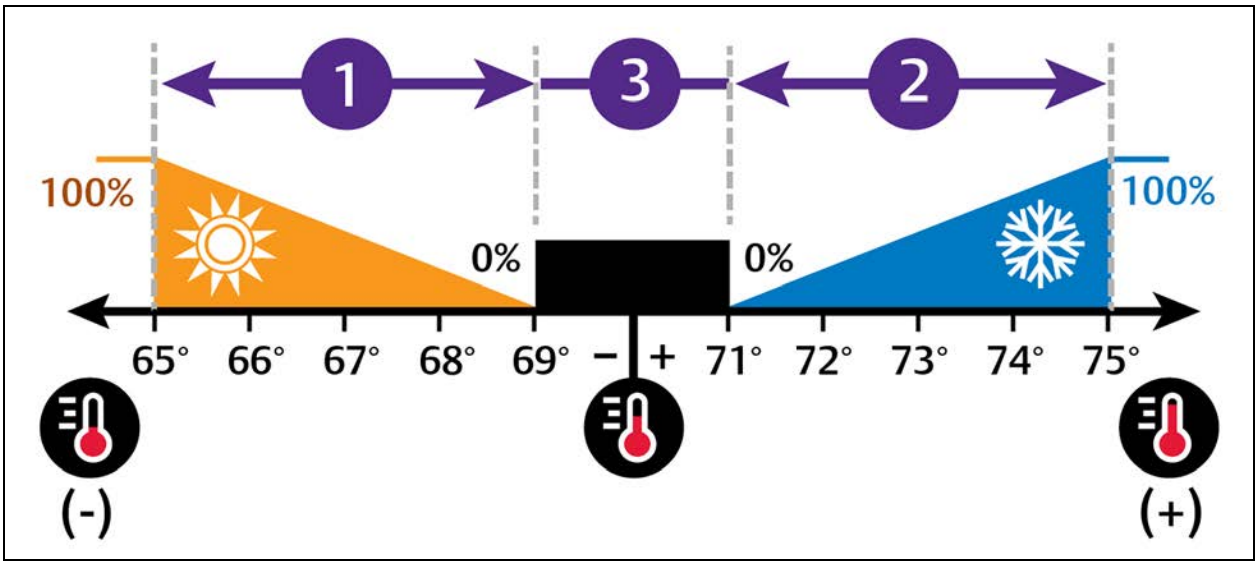
A deadband widens the setpoint to prevent small temperature changes from activating valves and causing excessive component cycling. Figure 1.26 on the next page illustrates temperature control using:

- 70° setpoint
- 10° proportional band
- 2° deadband

Like the proportional band, the deadband is also divided evenly on each side of the setpoint:

- 0% cooling capacity is required from 69° to 71°.
- At 71°, the system operates according to the temperature proportional band.

Figure 1.26 Temperature Control with a Deadband



No.	Description
1	½ of proportional band
2	½ of proportional band
3	Deadband

Considerations When Using PI Temperature Control

Several factors, such as room heat load, external heat gains, and component-specific performance can affect the PI control loop. Adjusting the temperature proportional band and integration time can improve cooling unit performance and avoid problems detailed below.

- Cooling is slow to activate:
  - Decrease the proportional band slightly and monitor operation. Repeat until cooling reaction time is acceptable.
- Excessive valve oscillation or hunting:
  - Increase the proportional band and/or increase integration time.

Humidity Control Mode

Humidity Control Mode defines from which sensor humidification and dehumidification will be driven:

- Return
- Remote

Supply is not supported.

Humidity Control Types are:

- Relative
- Relative Compensated
- Absolute
- Dew Point

The control starts to calculate the humidification/dehumidification request 10 minutes after the unit ON. Humidification can be enabled or disabled via unit code (UC07). Dehumidification can be enabled or disabled via dedicated parameter (Service/Options/Dehumidification).

Relative Humidity Control

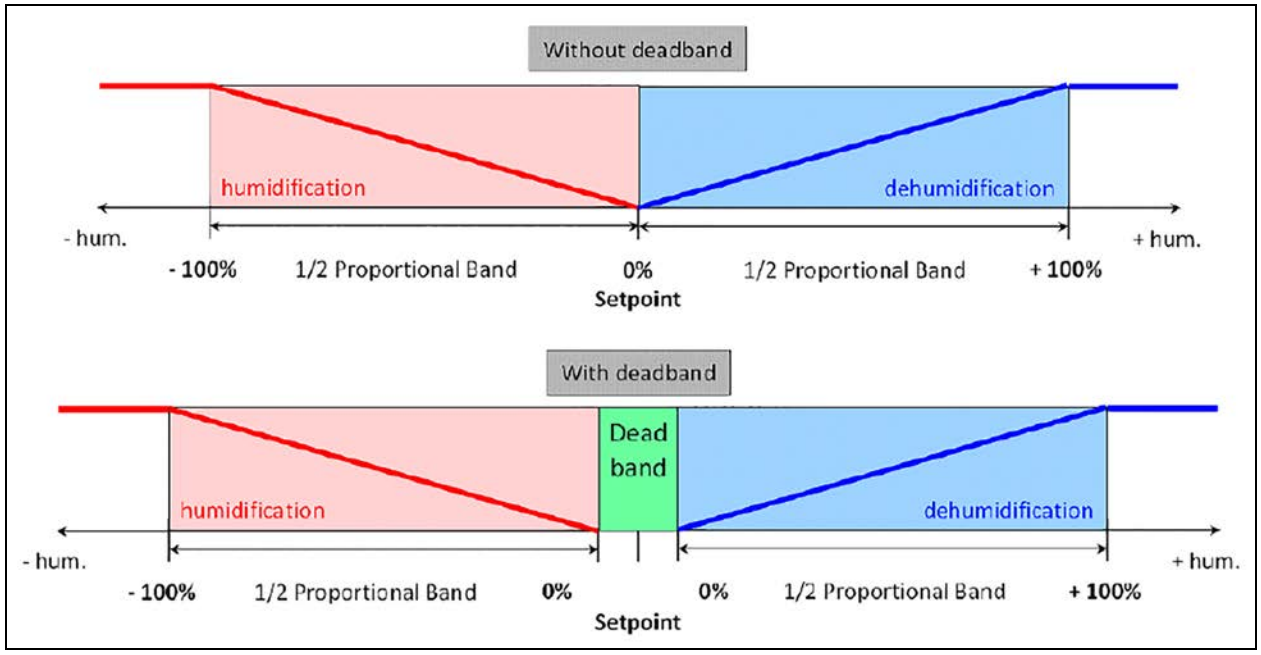
Humidification and dehumidification devices are driven following the return or remote humidity deviation.

The humidity proportional band defines the working range of humidification and dehumidification. It is divided into two equal parts, the left side for humidification, the right side for dehumidification. In the middle is the humidity setpoint.

The deadband, which is divided 50-50 for both negative and positive areas, shifts the negative and positive area apart.

The humidity integration, if set to any value, would slowly increase/decrease the humidity deviation, even if the real humidity is stable. It allows for fine control precision. The Integral calculation stops and keeps the same value if the actual proportional deviation is inside a deadband.

Figure 1.27 Humidity Proportional Band



Relative Compensated Humidity Control

The return or remote humidity setpoint will be recalculated with the actual deviation from the temperature setpoint. For 1K deviation from the temperature setpoint the humidity setpoint will be changed by 3%rH.

If the temperature increases, the humidity setpoint will be decreased and vice versa (indirect proportional). The recalculated setpoint will be shown as actual humidity setpoint. Together with the modification of the humidity setpoint, the thresholds (high/low humidity) will be internally recalculated.

Absolute Humidity Control

The control follows the same logic strategy as relative using the calculated absolute humidity value. All of the related parameters (setpoint, proportional band, deadband, Hi/Low thresholds) show g/Kg instead of %.

Dew Point Control

The control follows the same logic strategy as relative using the calculated dew point value. All the related parameters (setpoint, proportional band, deadband, Hi/Low thresholds) show °C instead of %.

Humidity Control Setpoints

Humidity control refers to the cooling unit's response to programmed setpoints and sensed humidity conditions.

Vertiv™ Liebert® iCOM™ controls humidity based on temperature and humidity sensor readings. The requirement is expressed as a percentage and is calculated using the selected humidity control type.

Humidity Proportional Band

Use the proportional and deadband parameters to control how your cooling unit(s) respond based on the calculated need for humidification/dehumidification. As the return air humidity deviates from the humidity setpoint, Vertiv™ Liebert® iCOM™ responds with a humidification or dehumidification capacity of 0% to 100% in 1% increments.

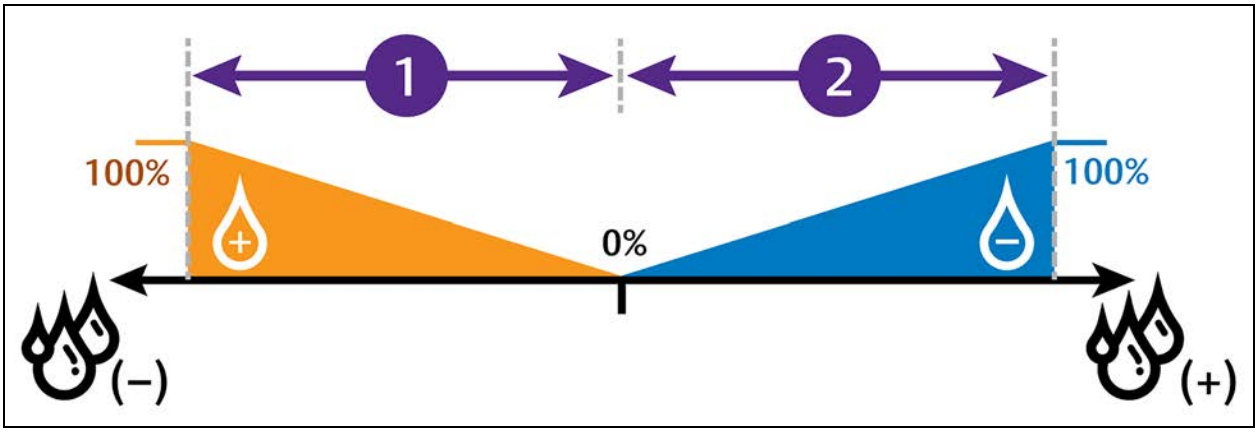
Figure 1.28 below illustrates humidity control using:

- 50% setpoint
- 8% proportional band
- No deadband

The proportional band is divided evenly on each side of the setpoint.

- 0% humidifying capacity is required at the humidity setpoint.
- The humidifier starts operating when the humidification requirement reaches 100% and continues to operate until the humidification requirement drops to 0%.
- The dehumidifying capacity responds in the same way as the return-air humidity rises above the setpoint. Dehumidification is accomplished by a request for cooling that activates as soon as the required dehumidifying capacity reaches 100% and continues operating until the required dehumidifying capacity drops to 0%.

Figure 1.28 Humidity Control without a Deadband



No.	Description
1	½ of proportional band
2	½ of proportional band

Humidity Deadband

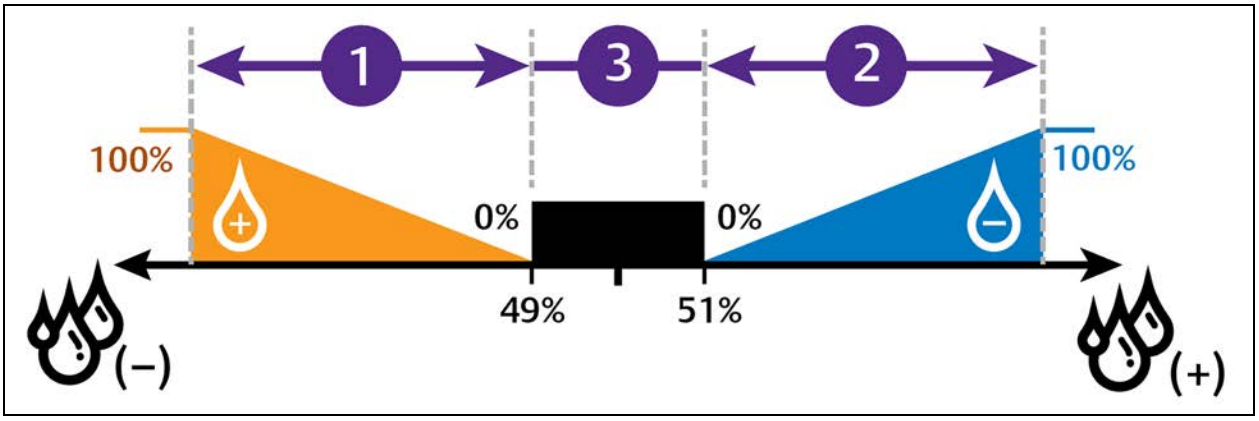
A deadband widens the setpoint to prevent small changes in humidity from activating humidifiers and valves and causes excessive component cycling. Figure 1.29 below , illustrates humidity control using:

- 50% setpoint
- 8% proportional band
- 2% deadband

Like the proportional band, the deadband is also divided evenly on each side of the setpoint.

- 0% cooling capacity is required from 49% to 51%.
- Below 49%, humidification operates according to the humidity proportional band.
- Above 51%, dehumidification operates according to the humidity proportional band.

Figure 1.29 Humidity Control with Deadband



No.	Description
1	½ of proportional band
2	½ of proportional band
3	Deadband

Fan Control Mode

Fan Start-up Routine

When the unit starts, the fan will operate at a defined speed for a defined time (Service/Fans Control/Control Settings). If the time is set to 0 seconds the fan start-up routine will be ignored.

Fan Shut-down Routine

When the unit stops, the fan will continue to run at a defined speed for defined time (Service/Fans Control/Control Settings).

Fan Speed Control Modes

- Return: The fan speed is modulated from minimum value to maximum value following the return temperature deviation.
- Supply: The fan speed is modulated from minimum value to maximum value following the supply temperature deviation.
- Remote: The fan speed is modulated from minimum value to maximum value following the remote temperature deviation.
- Delta: The control tries to achieve a constant delta T between Return temperature and Supply temperature. When the delta T is inside the deadband the fan speed will not change; when the delta T is outside the deadband the control will change (increasing or decreasing) the speed of the fan trying to put the delta T inside the deadband.
  - If delta Return - Supply is lower than delta setpoint, then the fan will decrease the speed
  - If delta Return - Supply is higher than delta setpoint, then the fan will increase the speed
- Static Pressure: The speed of the evaporating fans is modulated in order to keep the static pressure constant.

  When the pressure is inside the deadband, the fan speed does not change; when the pressure is outside the deadband, the control increases or decreases the speed of the fan trying to put the pressure inside the deadband.

  - If pressure is lower than the setpoint band, then the fan will increase the speed
  - If pressure is higher than the setpoint band, then the fan will decrease the speed

  In Teamwork mode all units will use the system pressure value (average) calculated by the master.

  - The system can work with single or multiple static pressure devices.
  - The pressure value of the unit where the event 'STATIC PRESSURE OUT OF RANGE' is active will be not be considered for the average calculation.

  The current fan speed request persists over a power cycle. When the unit starts and is out of the fan start speed duration (reduced to five seconds), the control will apply the stored speed.
- Return CW Priority: The CW valve modulates from 0% and 50% of the call for cooling based on return temperature. The fan speed modulates from 50% and 100% of the call for cooling based on return temperature. This means the fan starts to modulate only when the CW valve is fully open.
- Fixed: During normal operation the fan will operate at the fixed speed set. The fan speed can be overwritten due to pre-defined working conditions (if higher) or unit safety reasons.

NOTE: Fixed speed can be used for driving the fan speed via BMS (datapoint 'Cfg_evpFanFixSpeed').

- Cooling: Fan speed will follow the same strategy (PI) used for the temperature control (coupled mode).

Fan Speed Settings

- Dehum Speed defines the minimum fan speed when the dehumidification is ON (Default setting = 60%).
- Humidification Speed defines the minimum fan speed when the humidifier is ON (Default setting = 100%).
- Heating Speed defines the minimum fan speed when the electrical heating is ON (Minimum value available = 50%; Default setting = 100%).
- No Power Speed defines the minimum fan speed when the No Power event is active (Default setting = 50%).
- Failure Speed defines the minimum fan speed in case of control sensor failure.

NOTE: The forcing is kept for 90 seconds once the control sensor goes back to being valid.

- High Return Temperature: If enabled the 'High Ret T Alarm' parameter defines the minimum fan speed when the High Return Temperature event is active (Default setting = 100%).
- Modbus High Speed: If enabled in case of single fan failure or single fan communication failure (or up to N-1), the remaining fans will be forced to 100%.

NOTE: The higher minimum speed will be applied by the control.

Fan Back Draft Control

When the function is enabled and the unit has been placed into standby mode, the fan shall continue to operate at the speed set by 'Fan Back Draft' parameter (Service/Fans Control/Other Controls) in order to maintain positive air pressure at the discharge of the unit to prevent back-flow through the unit.

The fan back draft control mode can be considered a sort of Off mode:

- With fan ON.
- It does not respect the minimum fan speed limit.
- All temperature/humidity events are ignored.
- Anytime unit goes to Fan Back Draft Control mode the unit status 'FAN BACK DRAFT MODE' will be shown.

Fan Temperature Override

This function shall modify (increase) the fan speed, which is calculated by the fan control sensor, in order to better circulate the air in the room at high temperature values.

Two sensor values can influence the fan speed: return and/or remote temperature; where the currently selected fan control sensor cannot be set as override sensor at the same time.

The higher of the two override percentage values shall be mathematically added to the calculated fan speed percentage of the fan control sensor.

Each override loop reads the selected override sensor. If the value is above the start point the output starts to increase, so that if the override temperature reaches the end point the override value is what is set in 'Max Override' parameter.

The higher of these two override values will be added to the fan speed calculated by the fan control sensor.

Fan BMS Backup Setpoint and Fan BMS Backup Speed

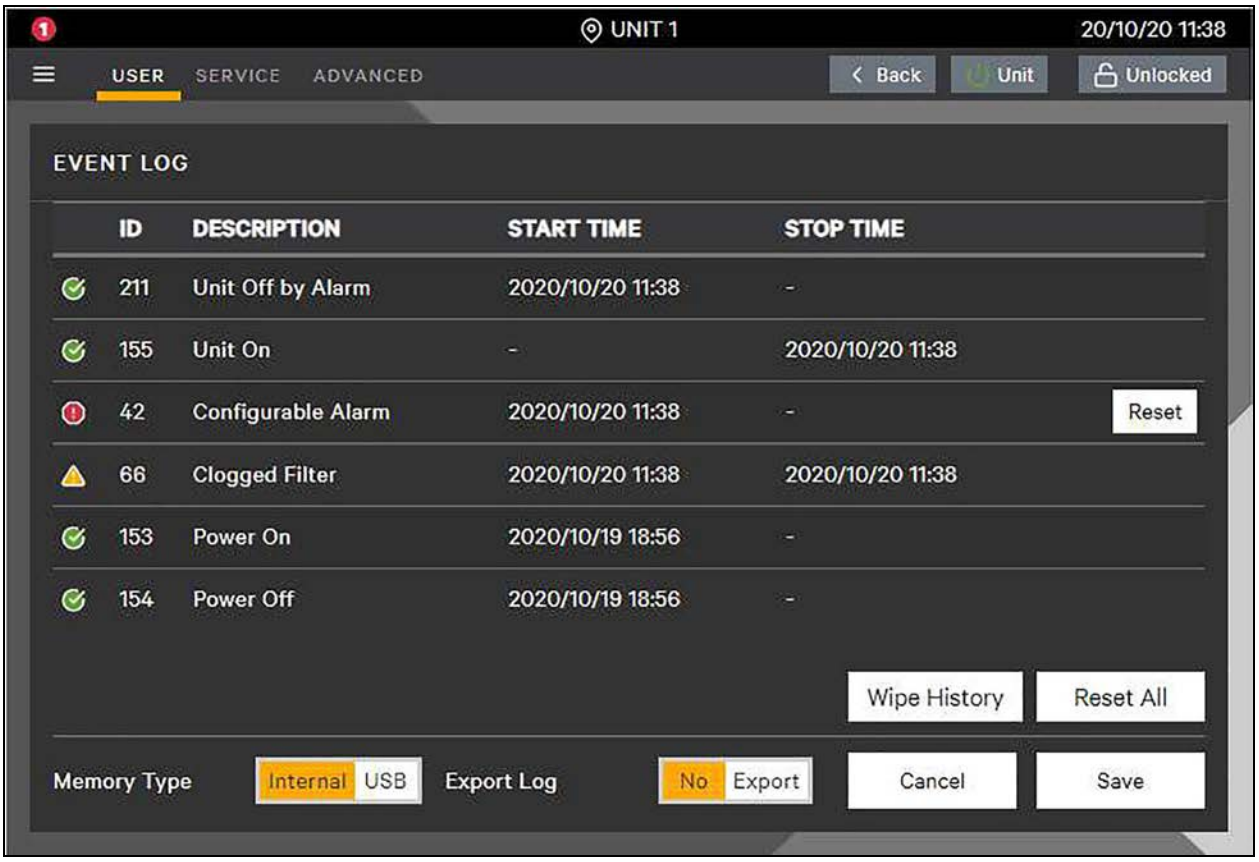
If enabled, the Backup Setpoint or Backup Speed (Service/Fans Control/Control Settings - BMS) will be used, in place of the current fan setpoint or fan speed, if the communication with the BMS is lost. The message 'BMS Offline' will be shown.

The BMS lost condition becomes true once the remote management system is not able to refresh the datapoint 'HeartBeat' to '1' within a specified time period (BMS Timeout).

1.4.2 Event Log

The Event log lists all of the events (alarms, warnings, and messages) that could occur on the unit with Start Time and Stop Time and dates.

Figure 1.30 Event Log



- Reset Allows the reset of a single active event.
- Wipe History Cancels the list of alarms, warnings, and messages.
- Reset All Sends a reset command to all active events.
- Memory Type Defines where to download the events log, Internal Memory or USB.
- Export Log The command for downloading the events log.

The following symbols identify the event type:

Table 1.4 Event Icons

Icon	Description
	Alarm
	Warning
	Message

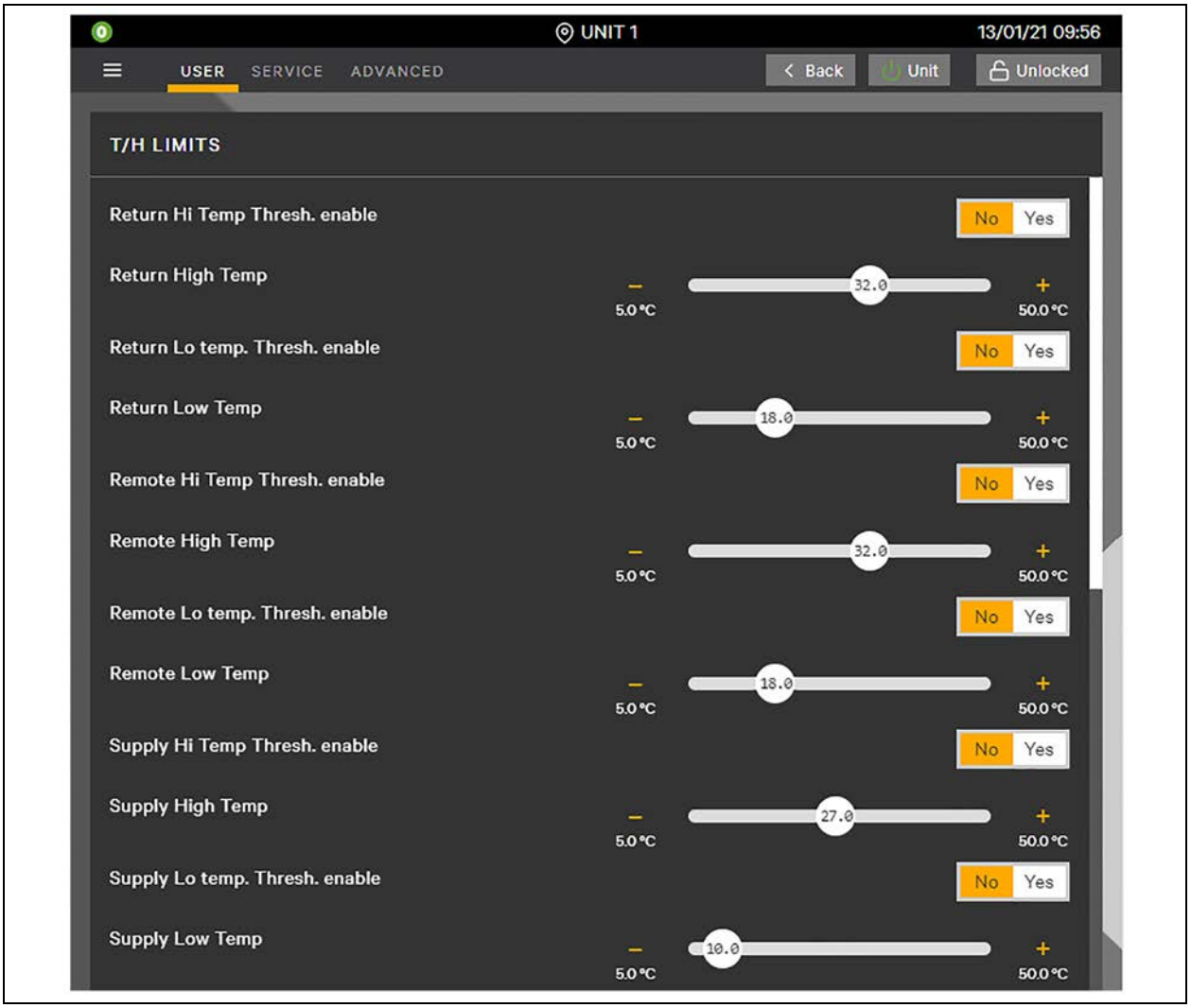
1.4.3 T/H Limits

This menu enables and defines the high and low thresholds for the following:

- Return Temperature
- Remote Temperature
- Supply Temperature
- Return Humidity
- Remote Humidity

Once enabled, if the actual value is out of the limits, the relative event will be triggered. All those events (auto-reset) are ignored at Unit ON for 30 minutes (Return and Remote) or for five minutes (Supply).

Figure 1.31 T/H Limits



Additional parameters display if the static pressure sensor is enabled.

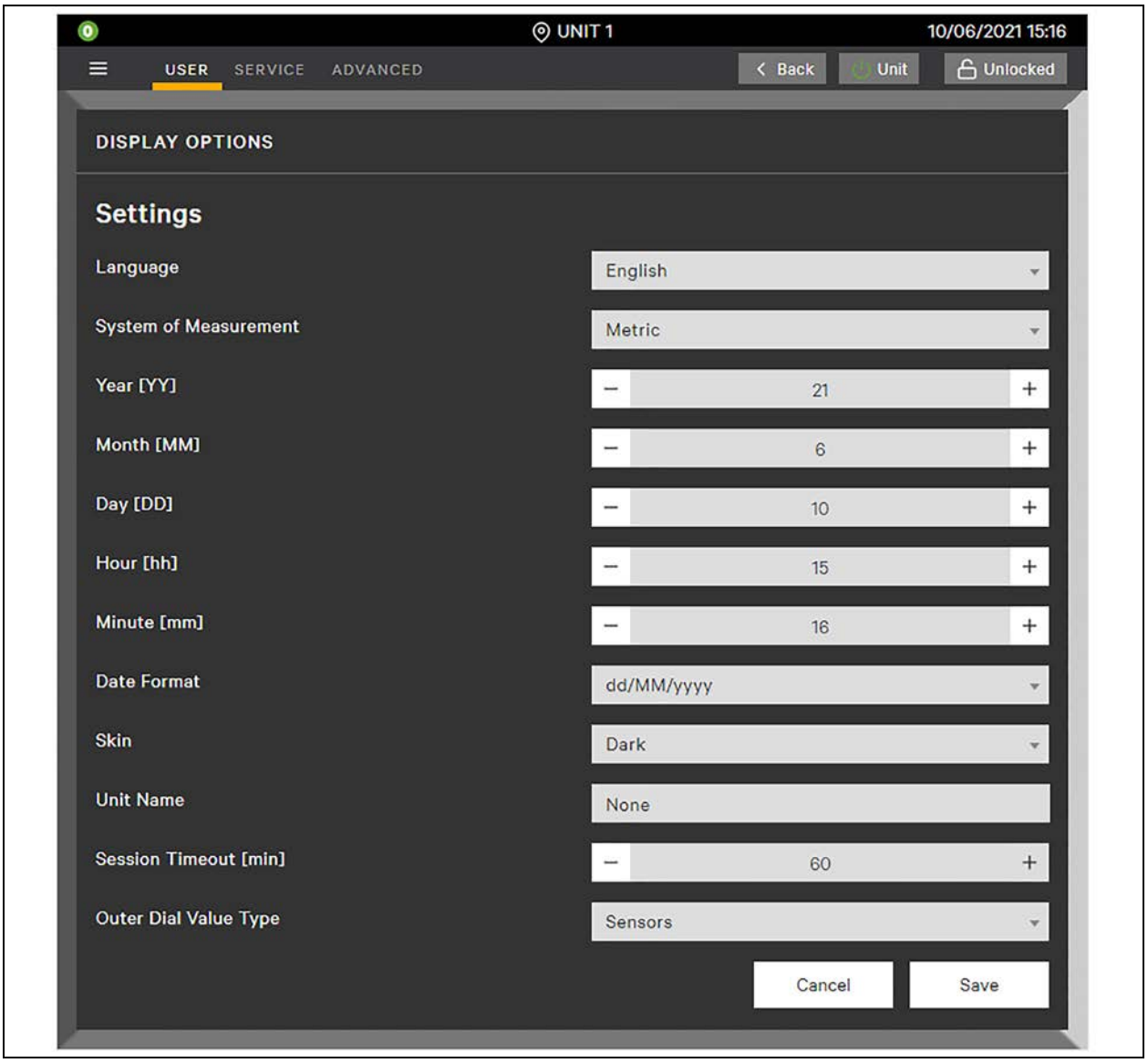
NOTE: The pressure value of the unit where the event STATIC PRESSURE OUT OF RANGE is active will be not considered for the average calculation.

1.4.4 Display Options

This menu defines:

- **Language:** English, Italiano, Deutsch, Francais, Espanol, Türk, Polski, Český, Portugues, Russkiy, Nederlands, and Slovenčina.
- **System of Measurement:** Metric or Imperial.
- **Date:** Year [YY], Month [MM], and Day [DD].
- **Time:** Hours [hh] and Minute [mm].
- **Date Format:** DD/MM/YY (Day/Month/Year) or MM/DD/YY (Month/Day/Year) or YY/MM/DD (Year/Month/Day).
- **Skin:** Defines the background color, Dark or Light.
- **Unit Name:** Allows to change the name of the unit on screen top bar (default name = Unit). The max length can be 12 characters. "#" is not allowed.
- **Session Timeout [min]:** Defines the time (minutes) after which the session ends and the user will be automatically logged out.
- **Outer Dial Value Type:** Defines what to show on the Outer Dial, Sensor readings or Setpoints.

Figure 1.32 Display Options

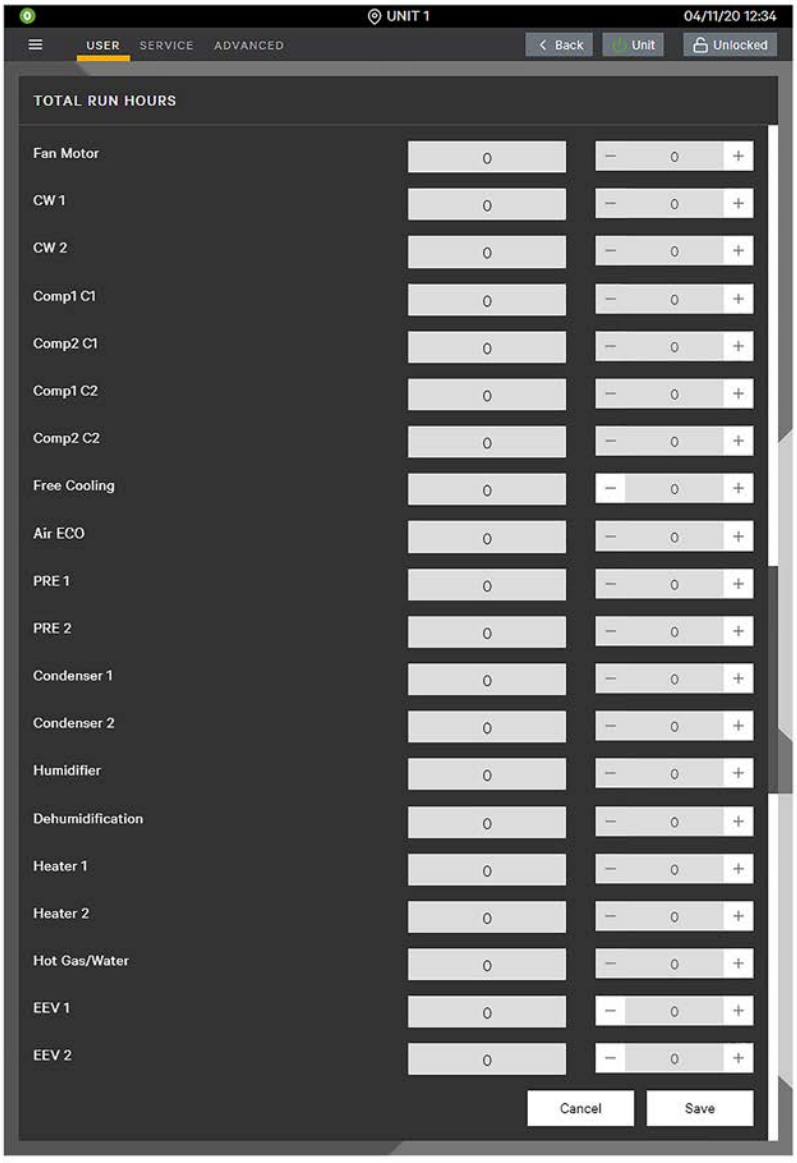


1.4.5 Total Run Hours

The menu shows the actual run hours counter (first column) and the settable limit (second column) for the main components. If the working hours exceed this limit, the relative working hours exceeded event will be triggered. If the limit is set to 0, the event will never be generated.

The actual run hours can be reset to 0 by clicking on the actual hours field.

Figure 1.33 Total Run Hours

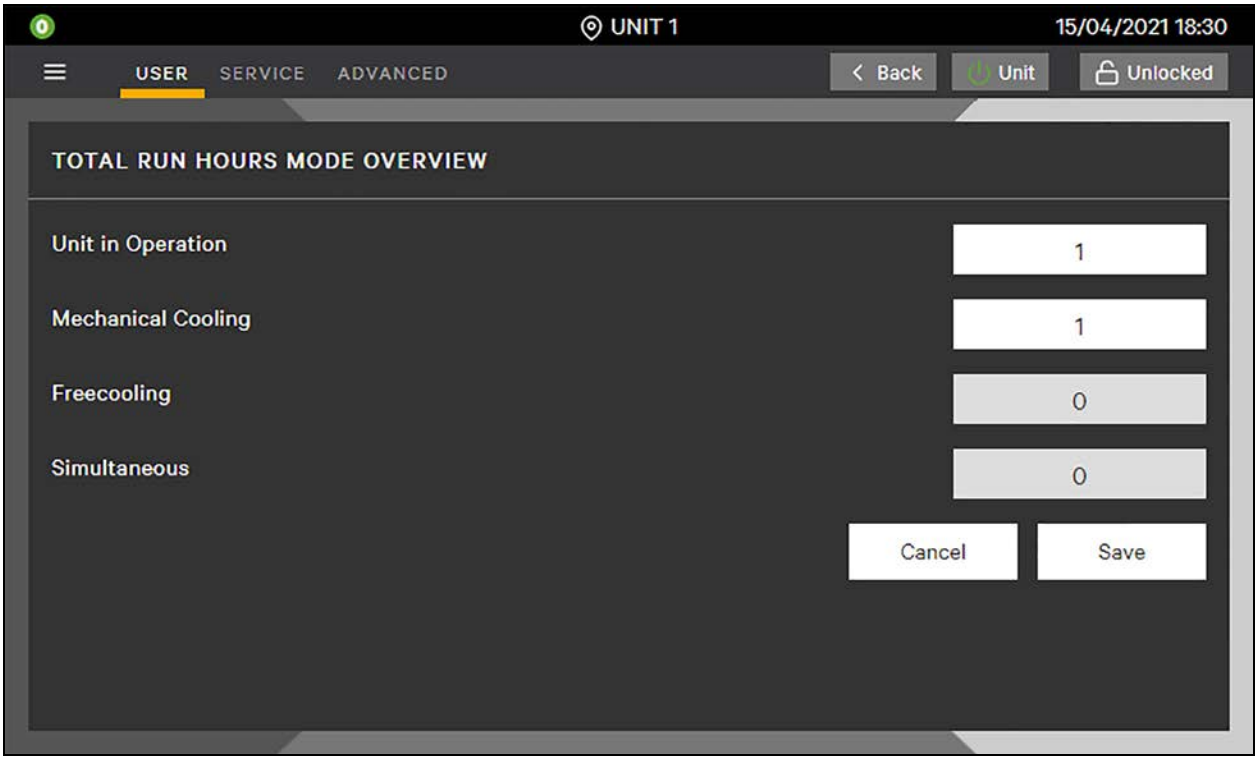


1.4.6 Total Run Hours Mode Overview

This menu shows the overall runtime and lists the run hours of the different operating modes (mechanical cooling, free cooling and simultaneous mode).

There are no thresholds for these counters.

Figure 1.34 Total Run Hours Mode Overview



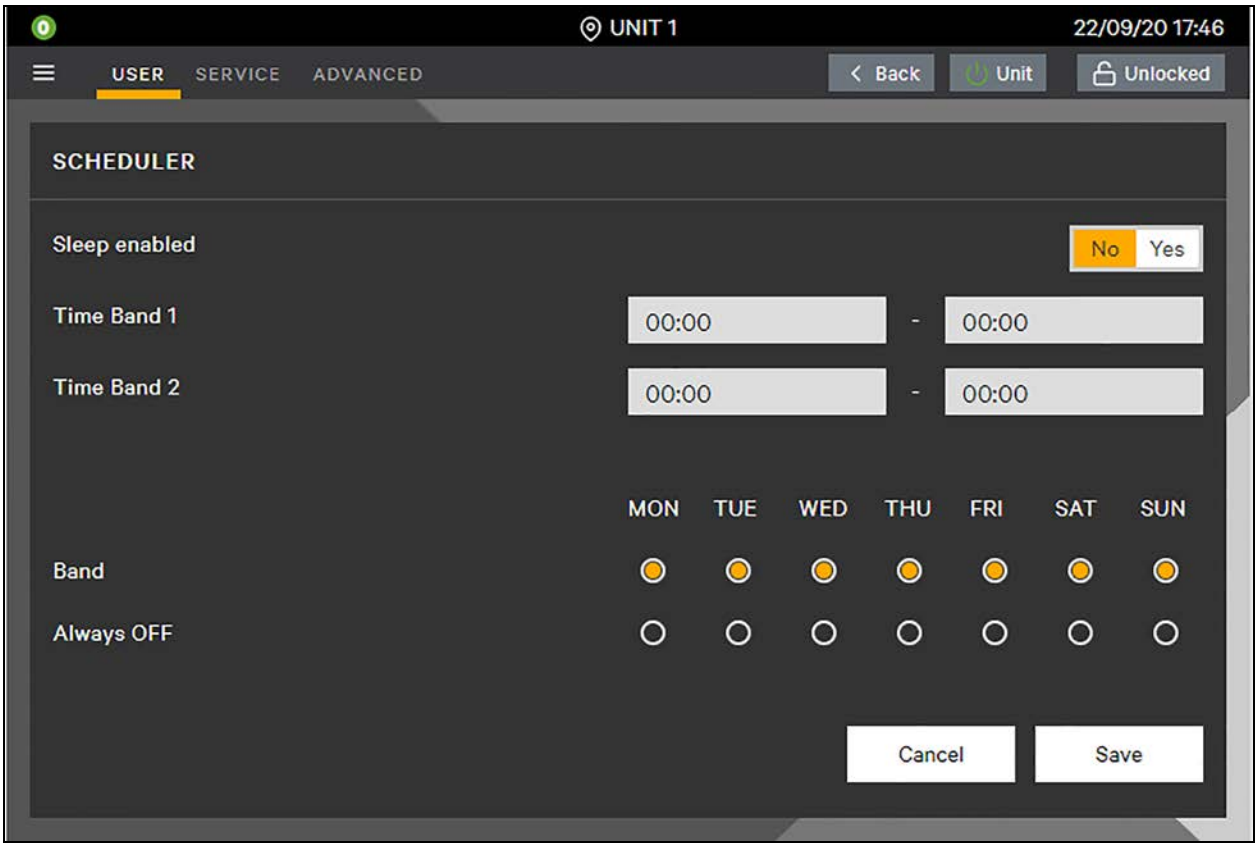
1.4.7 Scheduler

The scheduler allows the end-user to place the unit into Sleep Mode (shutdown) based on specific day and time.

Once enabled, a full day of sleep (**Always Off**) or two sleep intervals (**Band** then **Time Band 1**/**Time Band 2**) per day can be set.

When the time of the day (or the full day) is reached, the unit will go into Sleep Mode. The status Timer OFF and the message UNIT OFF BY TIMER display.

Figure 1.35 Scheduler



1.4.8 System Overview

The entire system can be switched ON or OFF by changing the position of the System On/Off button.

NOTE: At System ON, the units maintain the same status as before the System OFF command.

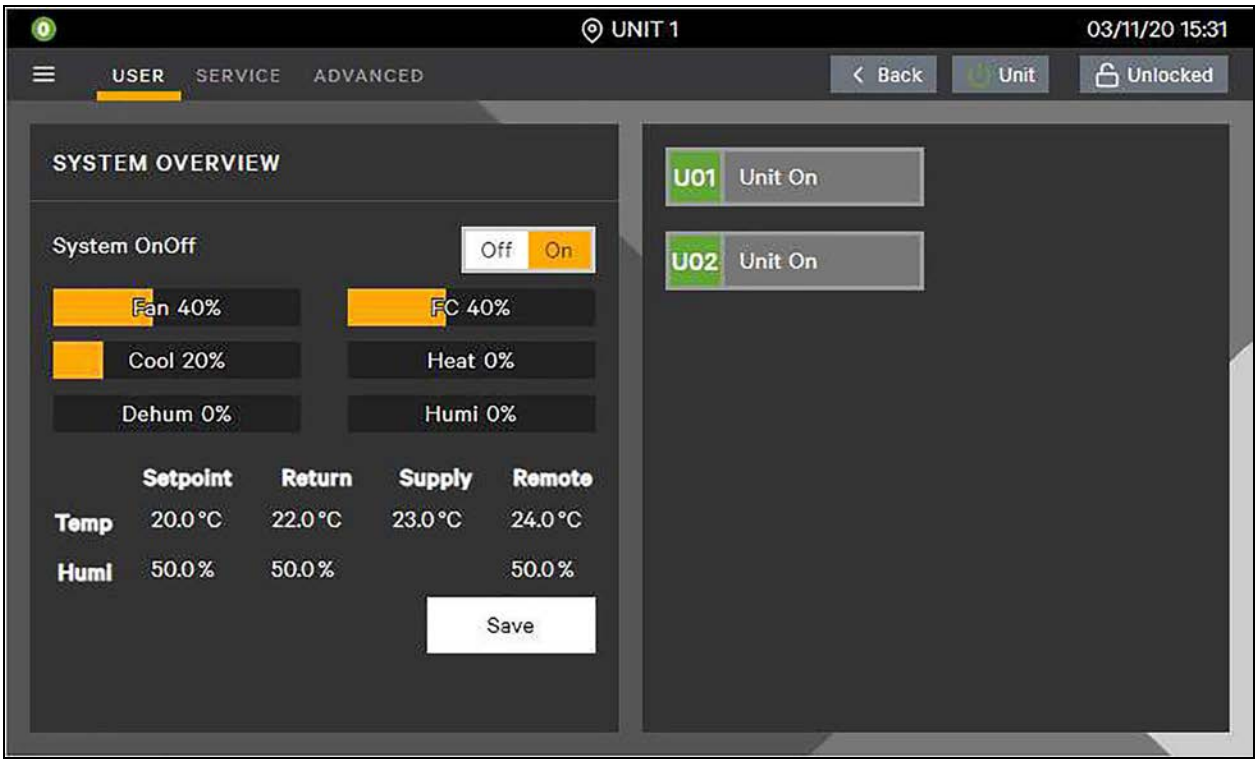
The Teamwork Mode 0 (No Teamwork) and without standby units, the System ON/OFF command is ignored by the application.

System Overview includes:

- The system or subgroup (average) percentage utilization of fans (Fan), free cooling air or water (FC), compressor or CW valve (Cool) and heating (Heat). The system or subgroup (average) percentage deviation of humidification (Humi) and dehumidification (Dehum) when active.
- The current system setpoint for temperature and humidity. In Teamwork Mode 0 (No Teamwork) these values should not be considered.
- The system or subgroup (average) value of return temperature, return humidity, supply temperature, remote temperature, and remote humidity.

The navigation panel, on the right, displays the status of the units in the system or subgroup and allows navigation from one unit to another by pressing the relative button.

Figure 1.36 System Overview



1.4.9 Panel

This menu emulates the Small Display (push-button).

Figure 1.37 Panel Menu

Press the Home to return to the Home Page.

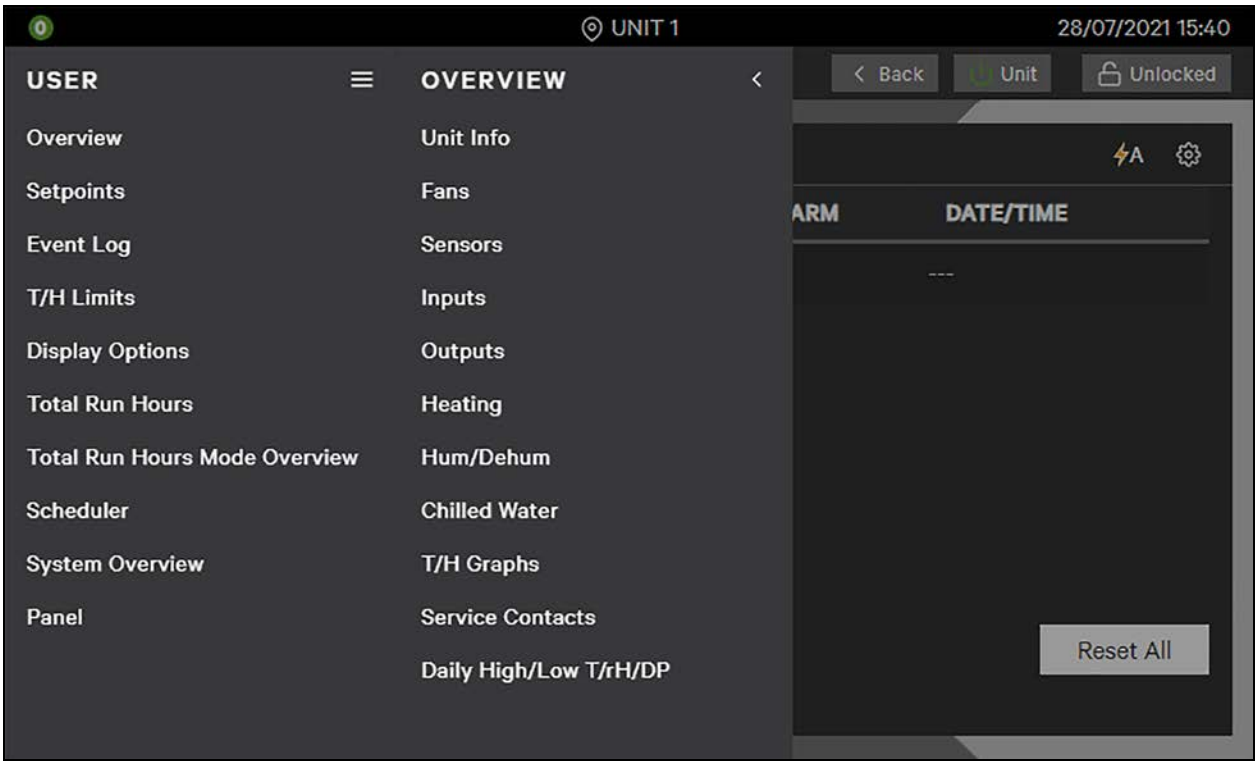
1.5 Overview (Unit)

The Vertiv™ Liebert® iCOM™ color touchscreen display shall allow the end-user to access the Unit Overview sub-menu which provides an overview status of the current unit operation.

Select the User icon

, then press the button and Overview. The overview options display on the drop-down menu.

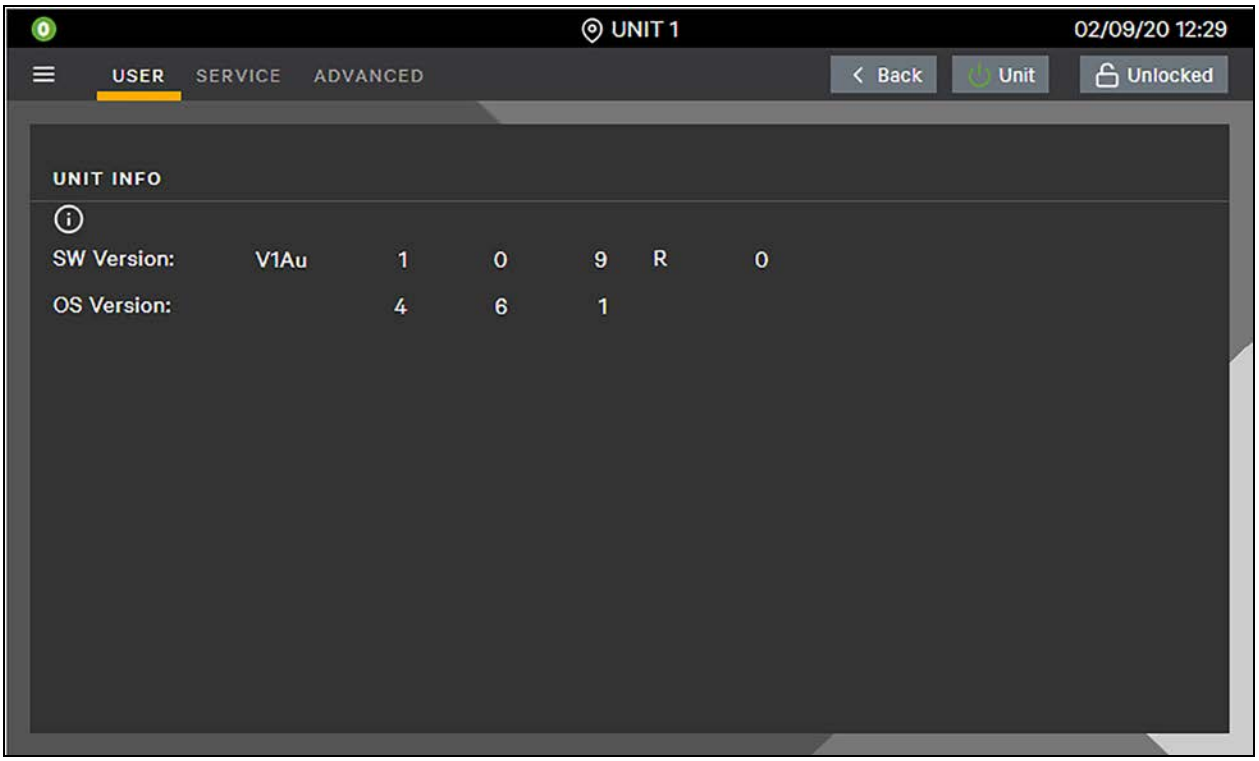
Figure 1.38 Overview (Unit)



1.5.1 Unit Information

Unit Information displays the software version and the operating system version installed in the unit main board.

Figure 1.39 Unit Info Menu



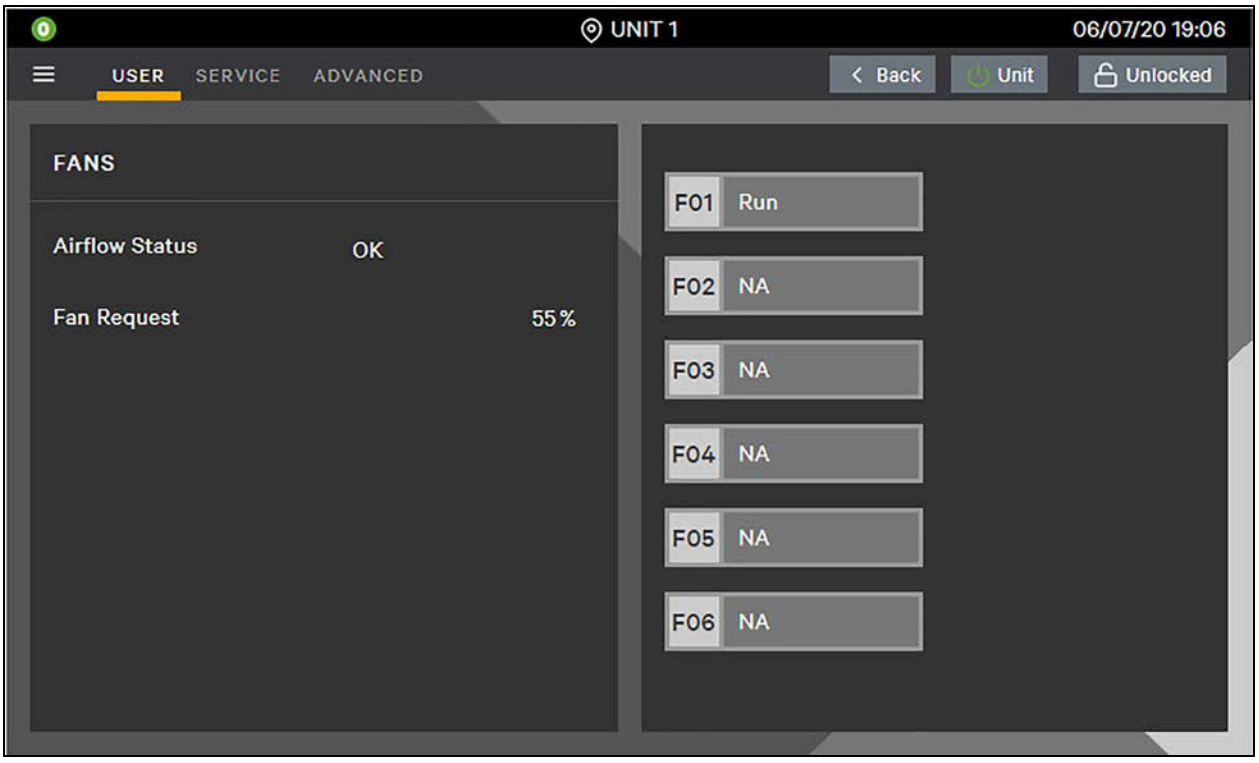
1.5.2 Fans

The Fans menu displays the status of each evaporating fan F01-F06 (Run, Alarm, Off, NoComm, NA), airflow status (OK, NOK), and fan speed request value percentage.

If Static Pressure control is enabled, the pressure setpoint, deadband, and pressure values (local and system) will be available in the Fans menu.

If Airflow Measurement is enabled, the airflow value will be shown.

Figure 1.40 Fans Menu



1.5.3 Sensors

The Sensor Menu displays the temperature and humidity values of the all connected (and enabled) sensors. In the case of multiple sensors, these values represent the minimum, maximum or average value based on the method set.

Figure 1.41 Sensors Menu

1.5.4 Inputs

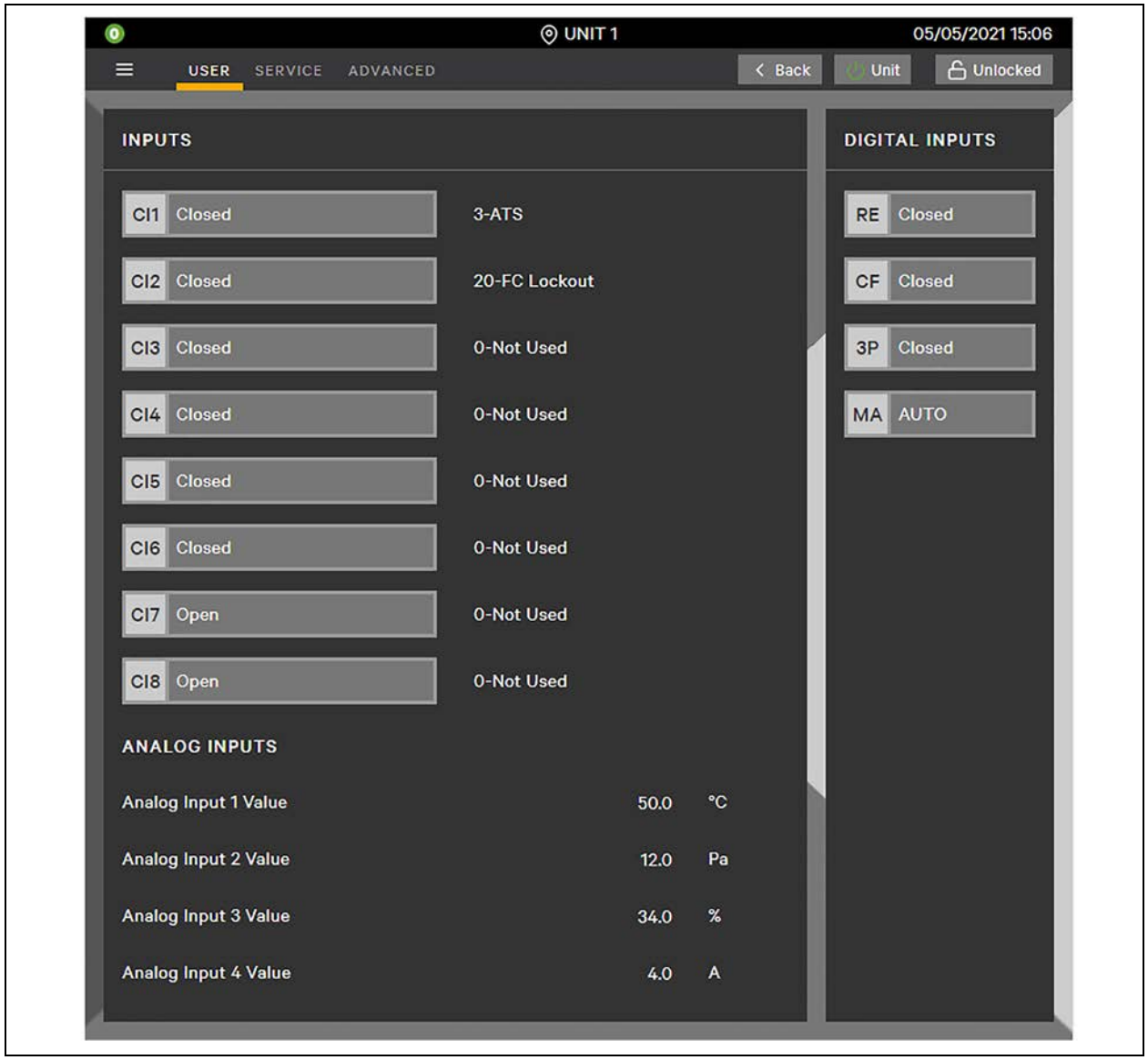
Configurable Inputs include (CI1-CI8) settings and status (Open/Closed).

Digital Inputs status (Open/Closed) includes:

- RE : Remote On/Off: Close = Unit is ON (if the other conditions are satisfied); Open = Unit is OFF (Remote OFF).
- CF : Clogged Filter: Close = OK; Open = Clogged Filter warning.
- 3P : 3 Position Switch ON/OFF status: Close = Unit is ON (if the other conditions are satisfied); Open = Unit is OFF.
- MA : 3 Position Switch status: MAN = Fan and cooling are forced to 100%; AUTO = Unit is running in automatic mode; OFF = Unit is OFF.

“Analog Inputs”: There are up to four analog inputs, which a customer can use to translate an analog signal to physical values. The inputs are read from expansion board #2. The resulting values have no control functionality, no alarms, etc. They are for visualization only.

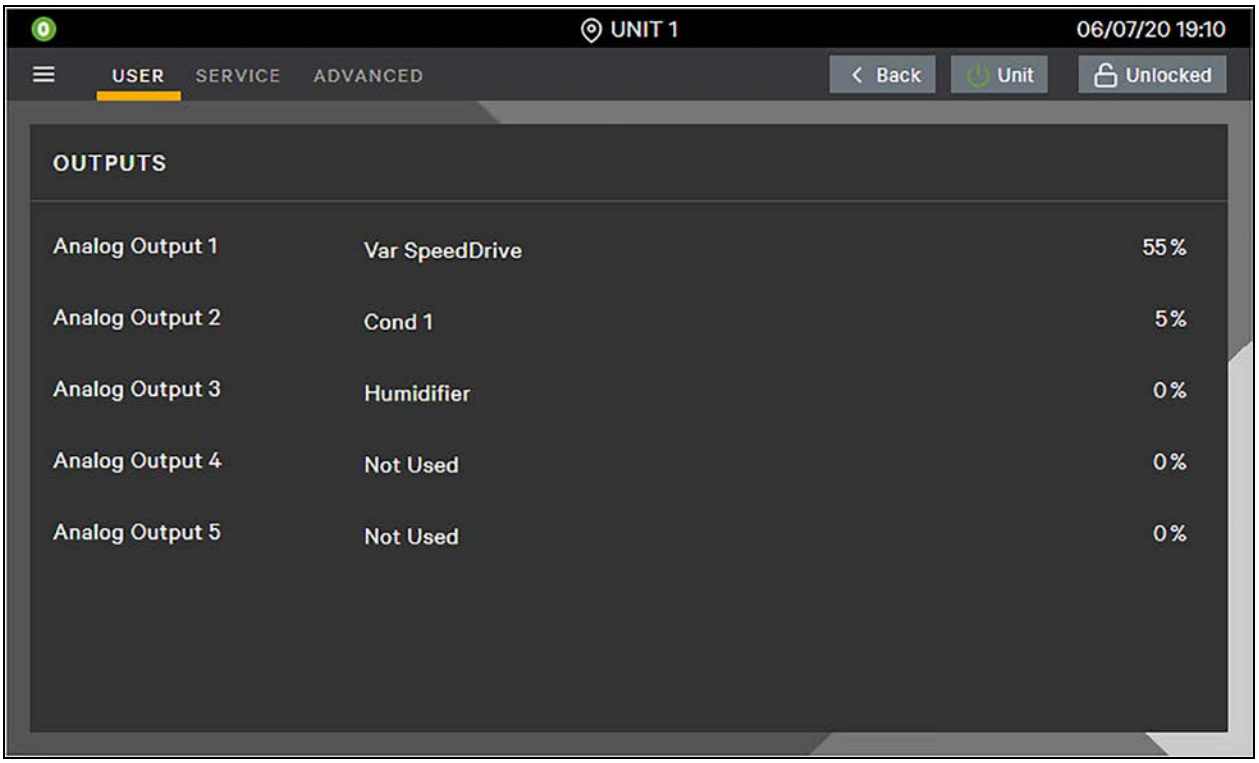
Figure 1.42 Inputs



1.5.5 Outputs

The menu for each analog output shows settings and percentage values.

Figure 1.43 Outputs



1.5.6 Heating

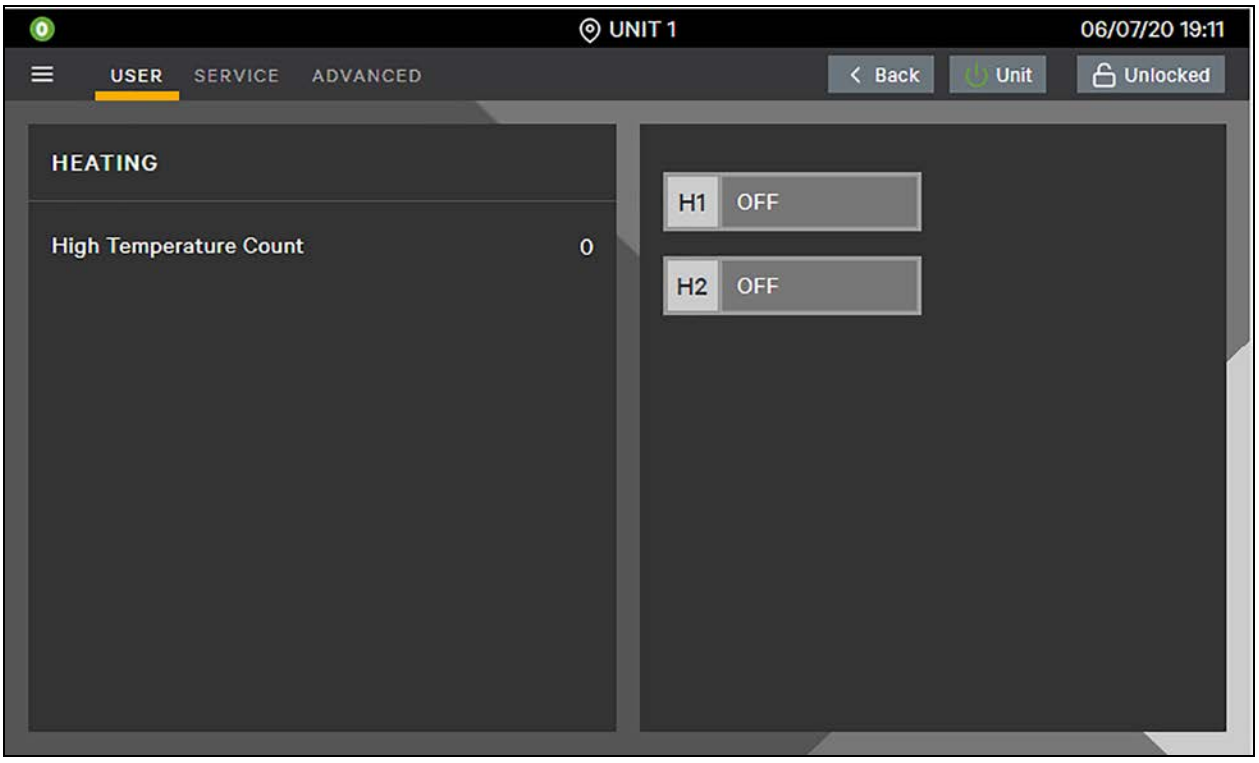
NOTE: The Heating menu will be hidden if the heating option is not enabled.

The menu lists:

Heating First Step H1 Status (ON, OFF), Heating Second Step H2 Status (ON, OFF), and High Temperature Counter.

NOTE: High Temperature Counter: If the current Supply Temperature for Fan Safety is at or above the threshold (40°C), then the electrical heaters will be stopped for two hours, and this counter will be increased by 1. A rolling 24-hour timer will be applied: if this counter reaches 3 within 24 hours, the electrical heater will be turned off; the electrical heaters can restart only if the counter is reset (Service/Options/El. Heater High Supply Temp menu).

Figure 1.44 Heating



Heating Control

Heater Steps

The number of electrical heaters can be:

- 0 = No heater
- 1 = 1 stage heater, linked to output 1
- 2 = 2 stages heater (with the same capacity), where stage 1 is linked to output 1 and stage 2 is linked to output 2.
- 3 = 2 stages heater (with different capacity), where stage 1 is linked to output 1 and stage 2 is linked to output 2.
  - Stage 1 = 1 on
  - Stage 2 = 2 on (and 1 off)
  - Stage 3 = 1 + 2 on

In case of Hot Water, the electrical heaters are considered as a single stage.

- Hot Water linked to output 1
- Electrical heater linked to output 2.

Heaters Rotation

In case of 2 Stages of electrical heaters only, the first step of heater is the one with less working hours. There is no rotation during heater operation, only if both are off and a heater is requested, this rule takes place.

Heater Alarm

The Heater Alarm is used for electrical heaters only. If the dedicated digital input is active, all outputs used for electrical heaters will be switched OFF. Hot Water is not affected and can continue operation when electrical heaters are overheated. Anytime a heater is started, a 10 second delay shall be applied before to announce the Heater Alarm.

Heater High Temperature Lockout

The Heater High Temperature Lockout routine is for electrical heaters only, Hot Water is not affected.

If the current Supply Temperature for Fan Safety is at or above 40.0°C, then the electrical heaters will be stopped for two hours, and the counter value will be increased by one and the message "Heaters Lockout" will be shown. If the current Supply Temperature for Fan Safety falls below 32.0°C, then the electrical heaters may be restarted (still honoring the two hours).

A rolling 24-hour timer will be applied: if the counter reaches 3 within 24 hours, the electrical heater will be turned off and the event “Heater High Temperature Lockout” will be triggered. The electrical heaters can restart only if the counter is reset (Service/Options/El. Heater High Supply Temp).

If the Supply Temperature for Fan Safety is invalid, the electrical heaters shall be locked out. If the value changes back to valid, then normal operation continues.

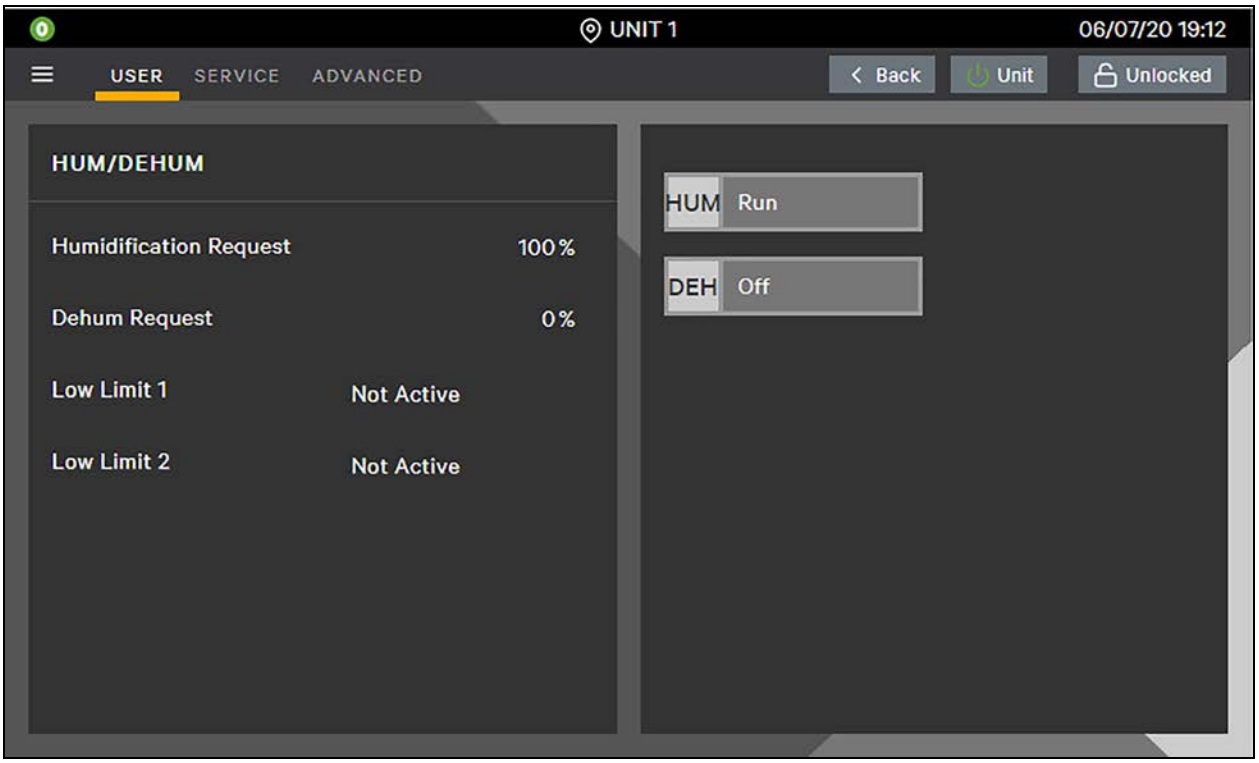
1.5.7 Hum/Dehum

NOTE: The Hum/Dehum menu will be hidden if the option is not enabled.

The menu lists:

- Humidification request in percentage and Humidifier status (HUM). For the electrode or infrared humidifier, additional information will be shown.
- Dehumidification request in percentage, status of the dehumidification (DEH), Low Limit 1 status, and Low Limit 2 status.
- Low Limit 1: This limit will not be considered for PCW.
- Low Limit 2: This limit will disable all the cooling sources set for dehum.

Figure 1.45 Hum/Dehum



Humidifier Control

The control starts to calculate the humidification request 10 minutes after the unit is ON.

Humidifier Control Board (HCB)

HCB is an electronic board for managing the electrode humidifier kits. It features control logic, inputs and outputs for driving the humidifier. The humidification request is provided by the main control board. If communication is missing, the HCB will go in standby mode stopping the steam production and the event HCB Offline will be triggered.

The level of steam production required is maintained automatically by controlling the current input, adjusting the water level in the cylinder. To avoid excessive accumulation of salts, the HCB drains and replenishes the water in the cylinder.

Supply Water Conductivity

The conductivity of the supply water is read by the conductivity meter when the fill solenoid valve is running. The humidifier will be stopped, and the event “Supply Water High Conductivity” will be triggered if the conductivity value exceeds the threshold.

Draining

HCB, evaluating the evaporator speed, performs cycles of draining replacing the water in the cylinder in order to prevent an excessive concentration of salts. During the draining cycles the electrodes can be OFF (HCB default setting) or ON. The water can be drained due to inactivity (three days) in order to avoid stagnation and hygiene risks. This feature can be disabled (HCB setting).

Draining cycles can be executed due to a significant reduction of steam production request. This feature can be disabled (HCB setting). Draining cycles can be used for managing the water or foam high level as well. Periodically draining cycles can be set by the user (HCB setting).

Insufficient Supply Water

HCB is able to recognize an insufficient supply water; in this case the fill solenoid valve will be switched OFF for 10 minutes. The control will repeat the filling routine after this time.

Infrared Humidifier (IR)

There are two types of infrared humidifiers: having three lamps (Humidifier Model = IFS) and six lamps (Humidifier Model = IFL).

Infrared humidifiers are started at 100% hum request and stopped at 0%.

The Humidifier Problem event groups all the events generated by the infrared humidifier. It is detected by dedicated digital configurable input (Hum Problem). When this event becomes active, both the lamps and the fill valve are shut down.

Operation

An auto flush system automatically controls the fill valve and humidifier lamps to maintain proper levels in the infrared humidifier water pan during humidifier operation.

- When there is a call for humidification, the humidifier lamps are held OFF until the valve completes an initial fill of the humidifier pan.
- Therefore, the control will first turn ON the fill valve and start the flush timer.
- Once the flush timer reaches the value set, the control will turn ON the humidifier Lamps.
- The control will continue filling the humidifier pan to flush the system until the flush timer reaches the value set. Once this time has elapsed, the humidifier can be considered flushed and ready for normal operation.

Ultrasonic or External Humidifier

The ultrasonic (or external) humidifier is an external device driven by one of the analog outputs set as “Humidifier”. This output ramps up with the call for humidification.

The Humidifier Problem event groups all the events generated by the humidifier. It is detected by dedicated digital configurable input (Hum Problem). The humidifier will be locked out.

From an application point of view, the control considers the external humidifier ON only when the humidity deviation reaches 100%. In such conditions the humidifier icon is shown and the Humi fan speed is applied. The icon and humi FS remain active until the stop point (humidity deviation = 0%).

1.5.8 Chilled Water

The menu lists:

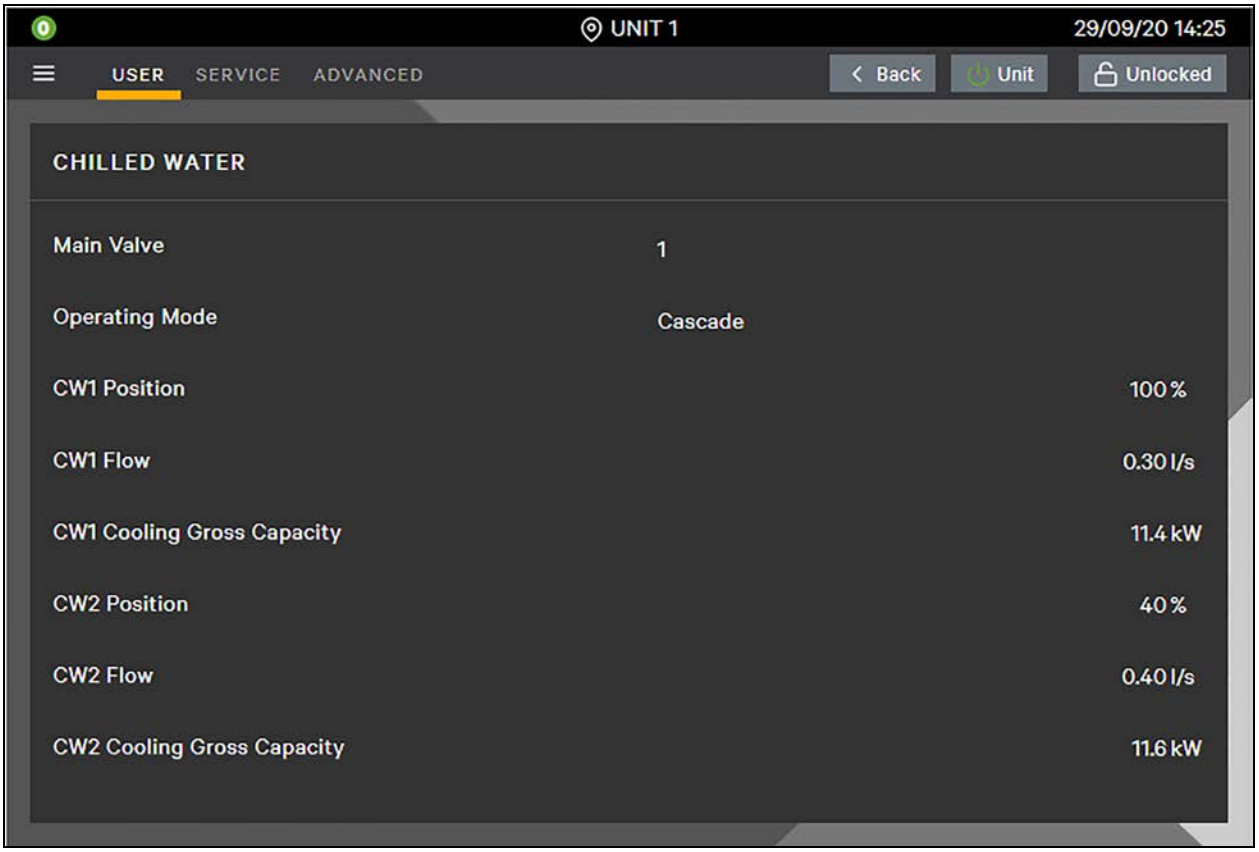
- Main Valve: Indicates the first CW valve (double circuit unit) to be activated in Cascade mode, or the designated CW valve to run in Alternate mode.
- Operating Mode: Indicates the CW operating mode, the options available are:
  a. Single: One CW circuit only.
  b. Parallel (double circuit): Both valves are controlled at the same time with the same logic.

c. Alternate (double circuit): Only one hydraulic circuit can run. The parameter Main Valve defines which valve has priority.

d. Cascade (double circuit): The first 70% of the request will be covered from the main valve (defined by the Main Valve parameter), the second valve will be engaged only if the request exceeds that threshold. If the request decreases lower than 50%, only the main valve continues to work and the second valve will be closed.

- CW Position: Indicates the CW valve 1 and 2 opening position percentage.
- CW Flow: This is the volumetric water flow (per circuit) detected by the flow meter. It can be shown in l/s or m^3/h.
- CW Cooling Gross Capacity: This is the cooling gross capacity (per circuit) calculated by the control considering the volumetric water flow and the inlet/outlet water temperatures.
- In the case of Supersaver, the Supersaver signal will be shown.

Figure 1.46 Chilled Water



1.5.9 Vertiv™ Liebert® Air Economizer

NOTE: Air Economizer will be hidden if this option is unavailable.

The menu lists:

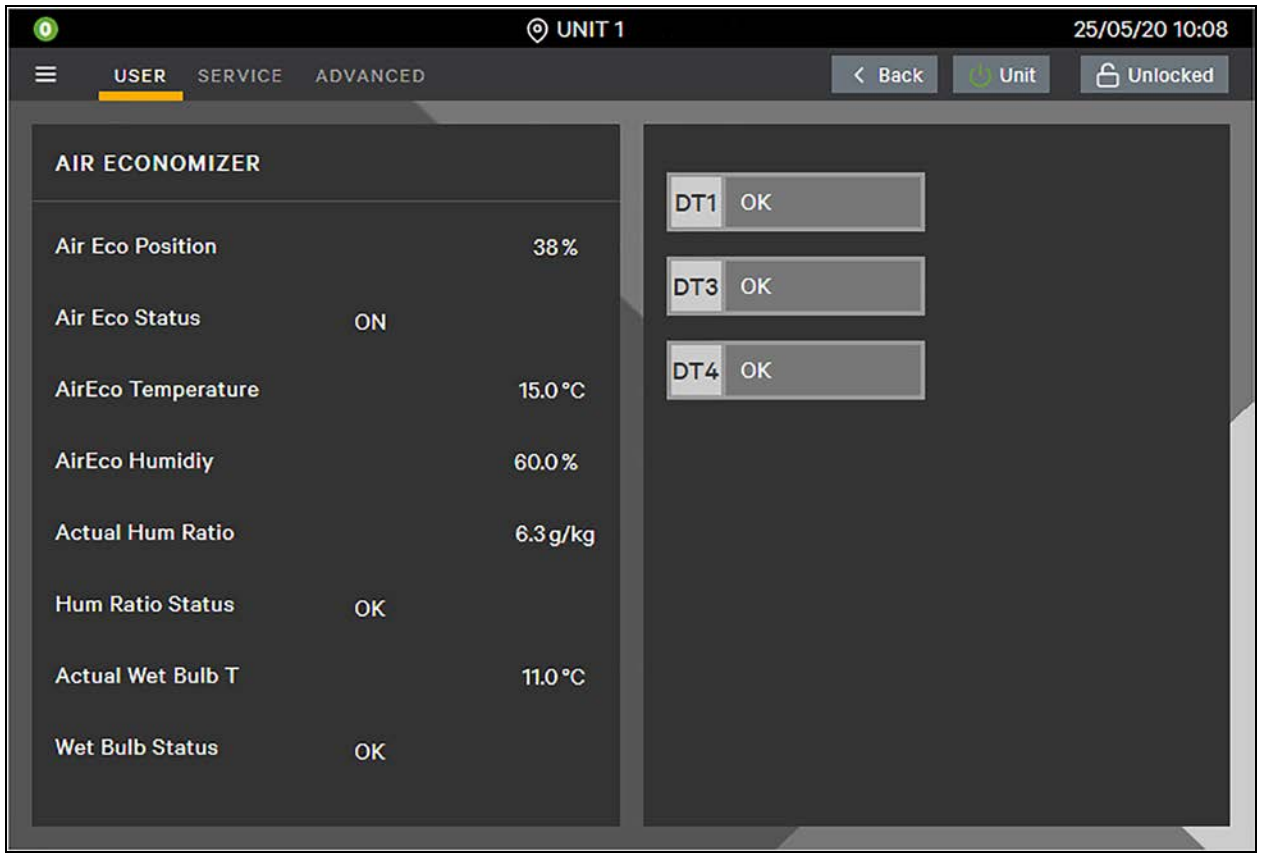
- Air Eco Position indicates the Air Economizer damper (outdoor) opening position (0-100%).
- Air Eco Status indicates the Air Economizer status:
  a. ON: Air Economizer damper (outdoor) is open (>0%).

b. Emerg: Air Economizer damper (outdoor) is open (>0%) due to Emergency Override. The emergency override will open the outdoor air damper and close the indoor air damper when the return temperature exceeds an adjustable high temperature.

c. OFF: Air Economizer damper (outdoor) is closed (0%).

- Air Eco Temperature shows the outdoor temperature value.
- Air Eco Humidity shows the outdoor humidity value.
- Actual Hum Ratio shows the humidity ratio value (g/Kg).
- Hum Ratio Status shows the status of the humidity ratio considering the minimum and the maximum thresholds set.
- Actual Wet Bulb T shows the wet bulb temperature value (°C).
- Wet Bulb Status shows the status of the wet bulb temperature considering the minimum threshold set.
- DT1 represents the status of the difference between room and outdoor temperature. If the Air Economizer is locked out the status NOK will be shown.
- DT3 represents the status of the difference between control temperature and setpoint.
- DT4 represents the status of the humidity ratio and wet bulb temperature. If the Air Economizer is locked out the status NOK will be shown.

Figure 1.47 Vertiv™ Liebert® Air Economizer



Air Economizer Control

Basic

The control checks the external air condition (temperature/humidity) and depending on the conditions controls the dampers system mixing the indoor unit air with cool outdoor air. The control shall use the external air only if the psychometric conditions are satisfied.

Sensors Required:

- Return sensor for room temperature and humidity reading.
- Supply sensor for supply temperature reading. Temperature Control = Return + Supply Limit. Air Economizer damper starts to close at supply setpoint. It is fully closed when supply temperature reaches the supply setpoint – ½ proportional band.
- Outdoor sensor for outdoor temperature and humidity reading. If Outdoor temperature or humidity values are invalid, the Air Economizer shall be locked out. Network: If there are valid shared values, the unit shall use these values, and when inside the ranges, continue with Air Economizer operation.
- Low pressure transducer. The Economizer shall be locked out if the pressure is below the LP limit set in order to avoid freezing the Evaporator.

DT1, DT3, and DT4

Air Economizer mode is eligible only if DT1, DT3, and DT4 are satisfied.

- DT1: Determines if the Outdoor Temperature is low enough to give (at least partial) capacity for Freecooling. DT1 can be set to:
  - Temp = Delta T between Return Temperature minus the Outdoor temperature should be higher than the value set for 10 seconds.
  - EFC = The unit will not go in Air Economizer mode during normal operation, but only in the case of NO POWER operation (Emergency Free Cooling only).
  - Set = The Outdoor temperature shall be compared with the control setpoint. Delta T between setpoint minus the Outdoor temperature should be higher than the value set for 10 seconds.
- DT3: Difference between control temperature and setpoint.
  - If the control temperature reaches the Setpoint + 'DT3 Value' for the time of 120 seconds, the Air Economizer will be disabled for one hour and the other cooling source will be activated. The message 'FC Stopped for 1 Hour by DT3' will be shown.
- DT4: This DT is satisfied if the Humidity ratio is between the Min setting and the Max setting and Wet Bulb Temperature is above the Min setting.

Air Economizer Control

The width of the proportional band is internally doubled in case of return or remote temperature control as soon as the Air Economizer can start (at least one unit in TW Mode1). It is not doubled in the case of supply control or if Air Economizer is not possible.

Air Economizer and CW are both eligible for operation (DT's are OK):

- From 0% to 50% of CFC, the Air Economizer ramps from 0% to 100%.
- From 51% to 100% of CFC, the CW ramp from 0% to 100%.

CW only are eligible for operation (DT's are not OK):

- From 0% to 100% of CFC, the CW ramp from 0% to 100%.

If the Air Economizer conditions are satisfied, humidification and dehumidification requests will be ignored.

The fan is kept OFF at unit ON during the Air Economizer dampers reset time.

When the Unit is ON the return damper should never be closed completely (minimum position = 15%). This feature is available with 0-10V dampers only.

When the Unit is OFF or in standby mode, both dampers (return and external) should be closed.

Air Economizer Override

- Reduced Economizer Airflow: Based on differential pressure switch, it indicates a reduction of airflow > 20%. It has to be connected to Configurable Input set as “ECO Airflow”.
- Economizer Emergency Override: The emergency override will open the outdoor air damper and close the indoor air damper when the return temperature exceeds an adjustable high temperature. The message “Air Eco Emergency Override” will be shown.
- Clogged Filter: If the clogged filter (event 66) is active, the Air Economizer shall be locked out.

All the above routines can be enabled or disabled (Service/Air Economizer/Basic Settings and Emergency Settings).

Economizer Remote Control

If enabled (‘AirEco Type’ parameter = ‘Remote’) the Air Economizer mode shall be forced to ON, ignoring DT1, DT3, and DT4 but still subject to Configurable Input (set as ‘FC Lockout’) to lock out FC.

Air Economizer shall be allowed to operate even with failed Outdoor sensor when Remote Control is active.

Extraction Fan

- The extraction fan can be driven by one of the analog outputs set as “Extraction Fan”. The signal value will be the result of combining the evaporator fan speed and the outdoor damper opening. e.g.:
  - Evaporator fan speed = 80%
  - Outdoor damper opening = 60%
  - Extraction fan speed = (80 * 60) / 100 = 48%

1.5.10 Energy Meter

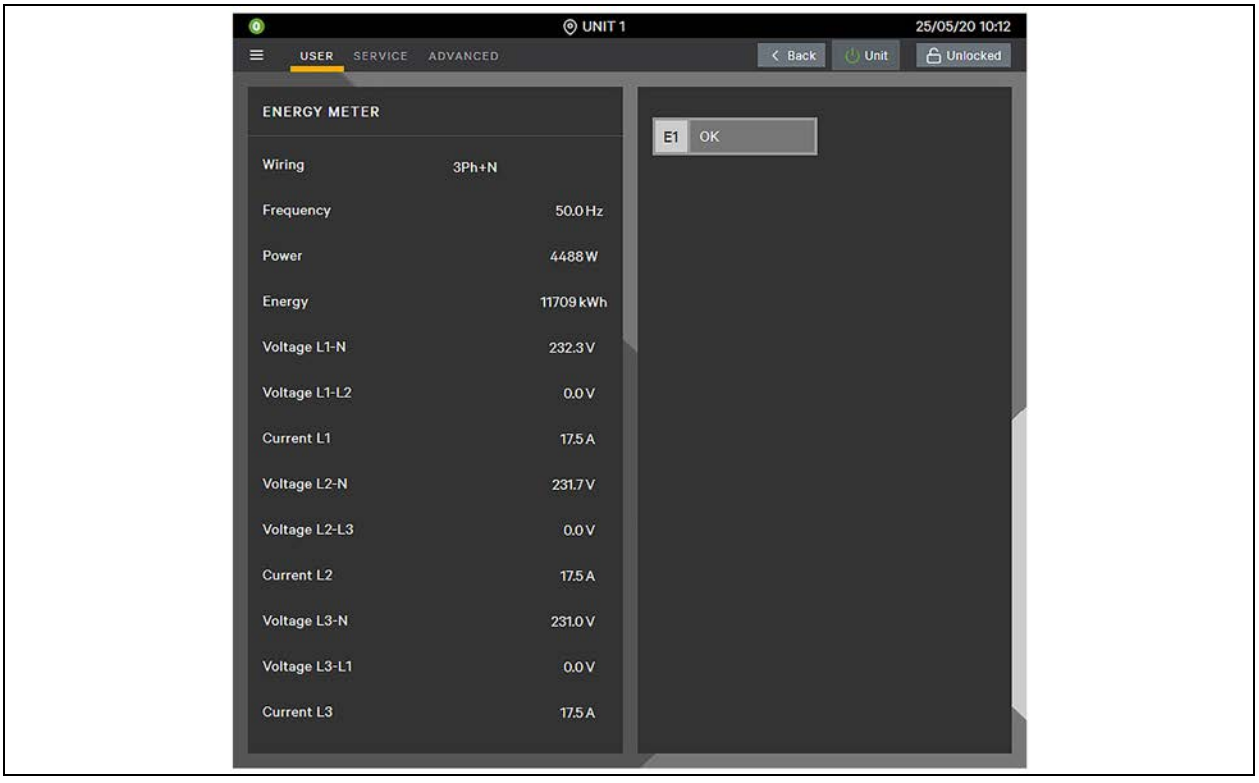
NOTE: The Energy Meter menu will be hidden if the option is not selected.

The menu lists the following data read from the Energy Meter:

- E1 Device Status (OFF, OK, Unknown, CommErr or Disconn)
- Wiring (3Ph+N, 1Ph+N, 2Ph+N or 3Ph)
- Frequency [Hz]
- Instant Power [W]
- Total Energy [kWh]
- Voltage L1-N [V]
- Voltage L1-L2 [V]
- Current L1 [A]
- Voltage L2-N [V]
- Voltage L2-L3 [V]
- Current L2 [A]
- Voltage L3-N [V]
- Voltage L3-L1 [V]
- Current L3 [A]

The Energy Meter Offline event will occur if the Energy Meter is enabled and not connected.

Figure 1.48 Energy Meter



1.5.11 T/H Graphs

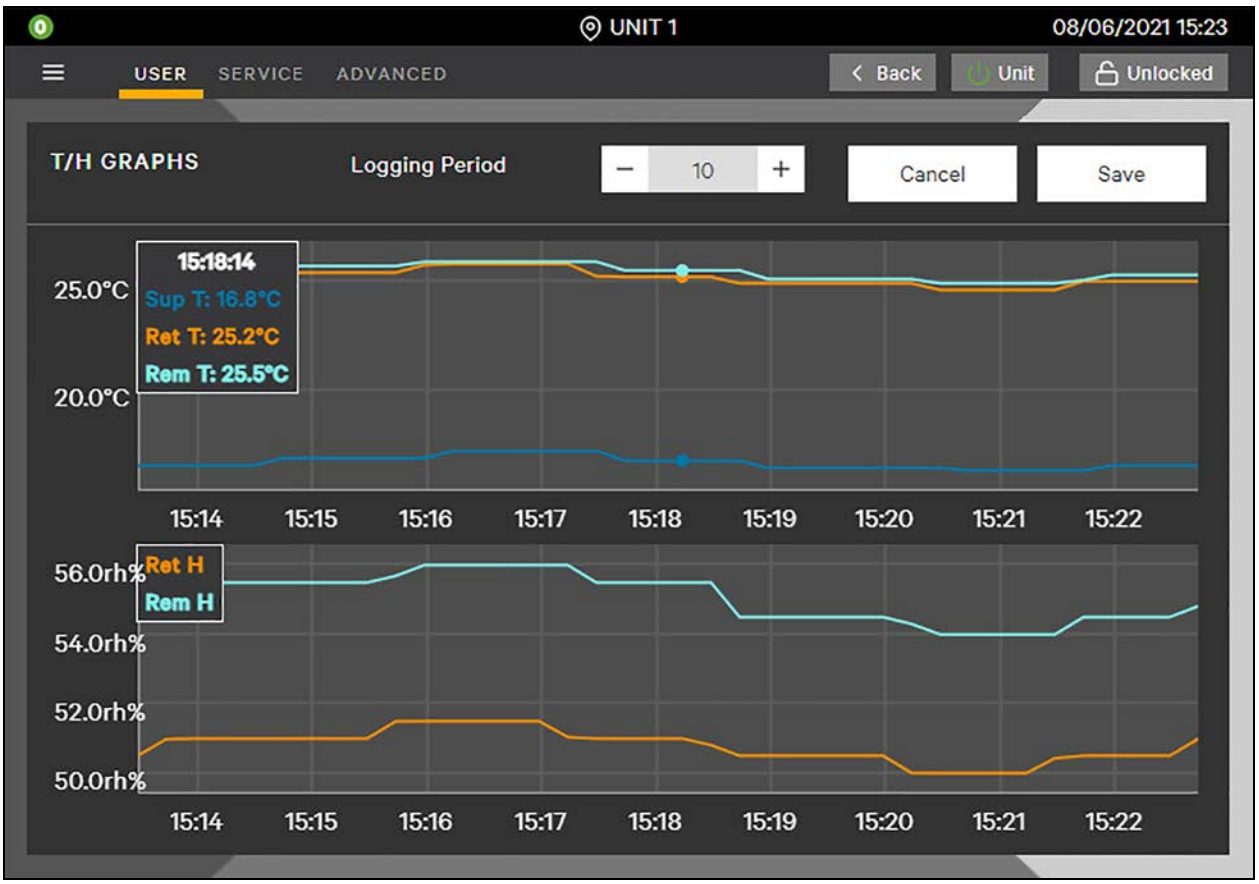
The first graph represents the trend of:

- Return Temperature (orange)
- Remote Temperature (light blue)
- Supply Temperature (dark blue)

The second graph represents the trend of:

- Return Humidity (orange)
- Remote Humidity (light blue)

Figure 1.49 T/H Graphs

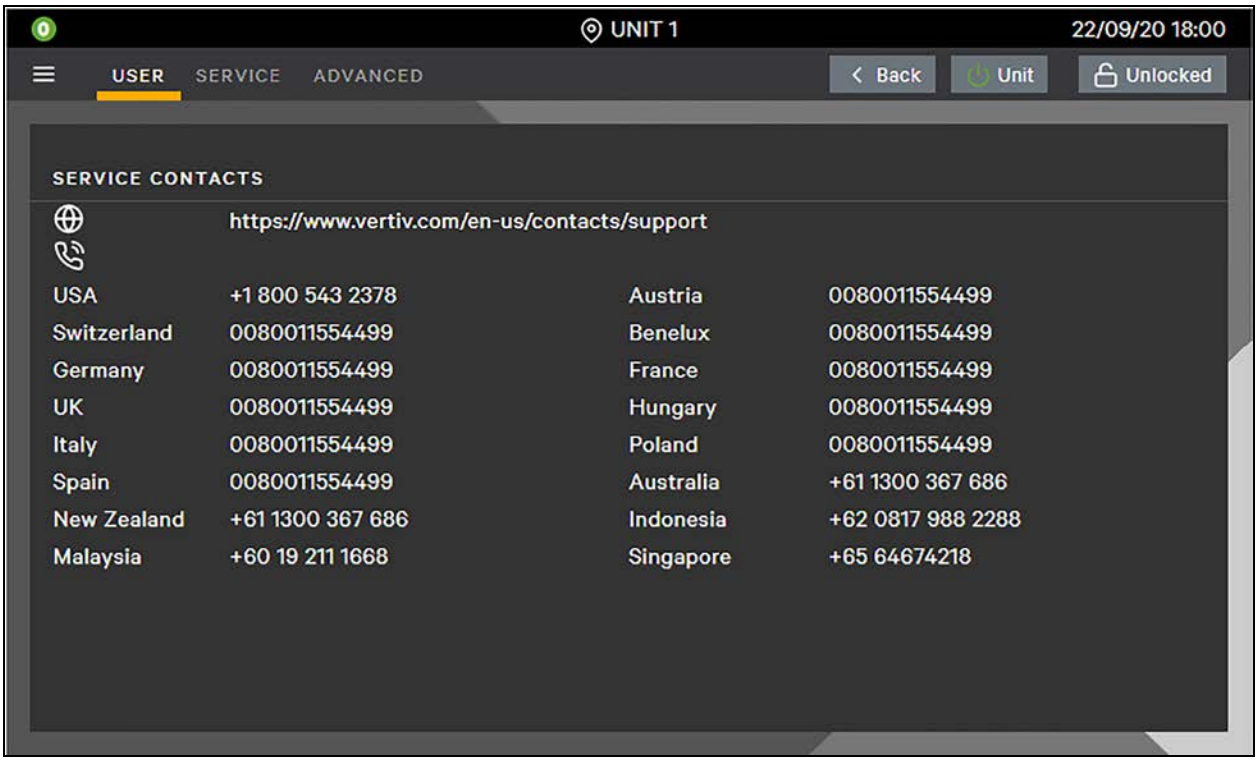


Touch the graph to display the left corner icon which will be populated with the temperature or humidity values in a timeline. The Logging Period defines the duration of logging in minutes (max 1440 minutes = 24 hours).

1.5.12 Service Contacts

Service contacts menu contains the list of local service phone numbers.

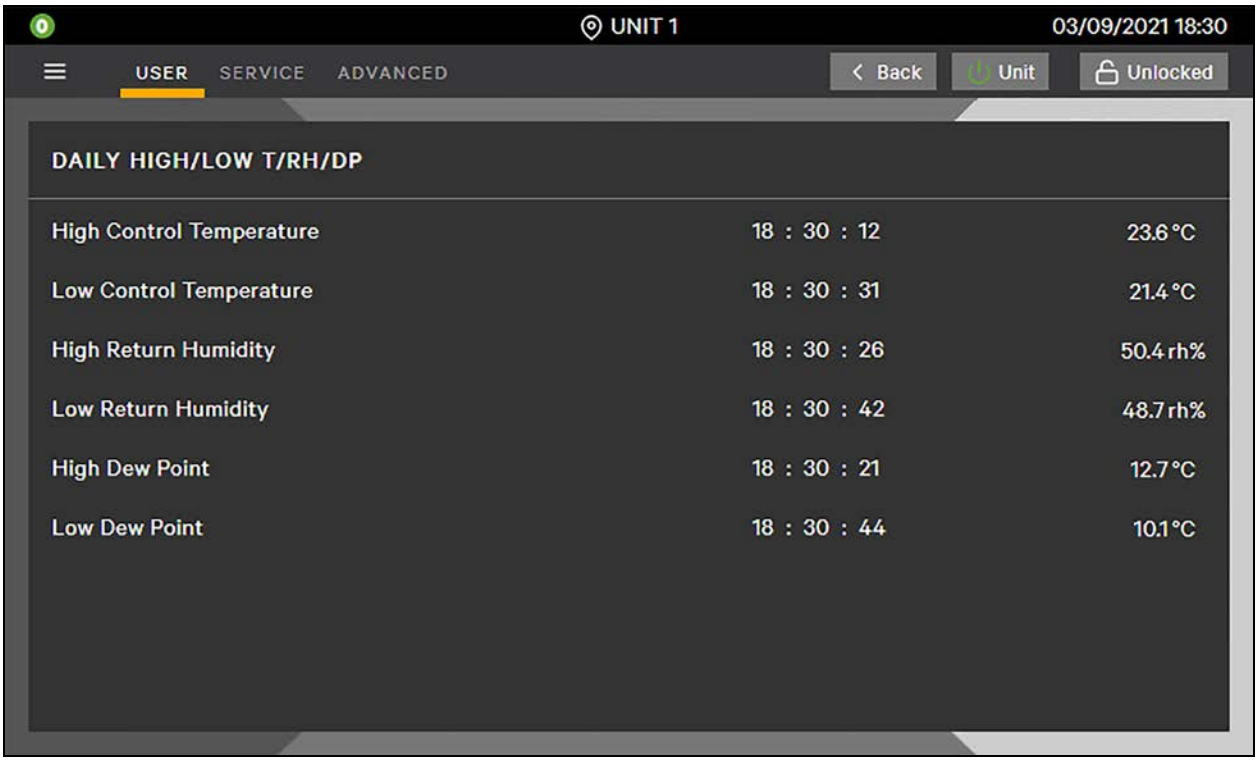
Figure 1.50 Service Contacts



1.5.13 Daily High/Low T/RH/DP

This menu shows the daily high and low values, including time of the day, for the control temperature, return humidity and dew point.

Figure 1.51 Daily High/Low T/RH/DP



1.5.14 ATS

Vertiv™ Liebert® Thermal Management units equipped with the optional Lovato ATS (automatic transfer switch) control will automatically switch over to a secondary power source upon loss of primary power. It will also return to the primary power source when it is determined it is available.

The Lovato ATS will be the primary unit level device for switching between power sources. This control will be capable of the following features:

- Determine if power is available in both primary and secondary sources
- Allow for selection of which source is primary and which is secondary
- Ability to automatically switch from primary to secondary source, in the event of primary power loss
- Ability to automatically switch secondary to primary source when primary power returns
- Visible indication of available power sources
- Visible indication of power source that is currently active

NOTE: The ATS menu will be hidden if the option is not selected.

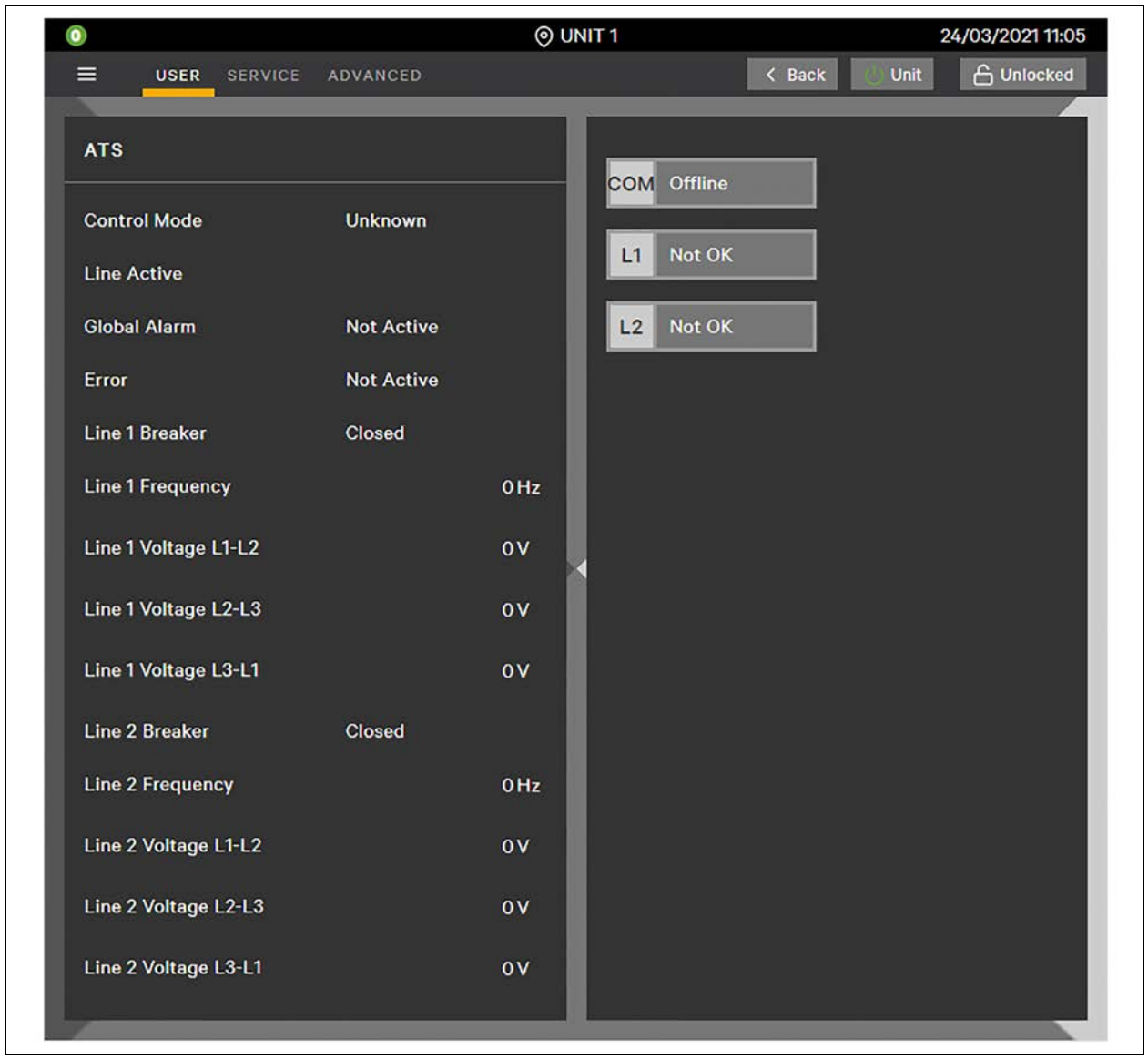
The menu lists the following data read from the ATS:

- Communication Status [COM] (Offline, Online)
- Line 1 State [L1] (Not OK, OK)
- Line 2 State [L2] (Not OK, OK)

- Control Mode (Unknown, Off, Manual, Auto, Test)
- Line Active (Line 1, Line 2)
- Global Alarm (Not Active, Active)
- Error (Not Active, Active)
- Line 1 Breaker (Closed, Alarm, Unknown, Command Status, Close Command, Open Command)
- Line 1 Frequency [Hz]
- Line 1 Voltage L1-L2 [V]
- Line 1 Voltage L2-L3 [V]
- Line 1 Voltage L3-L1 [V]
- Line 2 Breaker (Closed, Alarm, Unknown, Command Status, Close Command, Open Command)
- Line 2 Frequency [Hz]
- Line 2 Voltage L1-L2 [V]
- Line 2 Voltage L2-L3 [V]
- Line 2 Voltage L3-L1 [V]

The ATS Error event will occur if the ATS is enabled and not connected.

Figure 1.52 ATS



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2 Small Display

The **Small Display** (push-button) is a semigraphic terminal with 132x64 pixel resolution. The Small Display provides six buttons to navigate through the screens, and an audible signal generated by a buzzer. Connection to the controller is available over the RJ12 telephone cable.

2.1 Keyboard Icons and Functions

Icon	Key Name	Function
	Alarm Key	Provides access to the Events Report menu. Silences the audible signal. Resets the active event. [Blinking Red when an event is active. Once the Alarm key is pressed the Red LED stops blinking].
	On/Off Key	Provides access to the Unit ON/OFF menu. [Yellow when the Unit is ON].
	Escape Key	Returns to the previous menu. Cancels the entry row.

Icon	Key Name	Function
	Increase Key (Up Arrow)	Moves upward through the pages or moves to the left through the menu icons or increases the value of the selected parameter.
	Enter Key	Confirms all selections, icons, and values.
	Decrease Key (Down Arrow)	Moves downward through the pages or moves to the right through the menu icons or decreases the value of the selected parameter.

2.1.1 Contrast Adjustment

Press Escape () + Alarm () + On/Off () + Increase ()/Decrease () buttons to adjust the contrast.

2.1.2 Audible and Visible Indicators

Alarm/Warning condition activates a red LED indicator () and an audible signal (buzzer). Once the fault condition is fixed, audible and visible indicators can be reset through the Active Events menu and by pressing the Alarm Key () for three seconds.

A single event can be selected and reset by pressing the Enter Key ().

2.2 Password Protection

A password is required to access any configuration menu. Table 2.1 below presents the three levels of access (User, Service, and Advanced) with the main options for each one.

Table 2.1 Access Levels

Level	PSW	Accessibility
User	1490	User level (low level) allows changing parameters such as temperature setpoint and temperature threshold which are normally used to define the operating point of the unit.
Service	xxxx	Service level (medium level) allows changing the parameters that define the operating mode of the unit.
Advanced	xxxx	Advanced level (high level) allows configuring the unit in accordance with the type of devices mounted on board.

Press the Enter Key () to display the Password window. Insert the password using the Increase () or Decrease () key followed by the Enter key () for confirmation.

Figure 2.1 Password

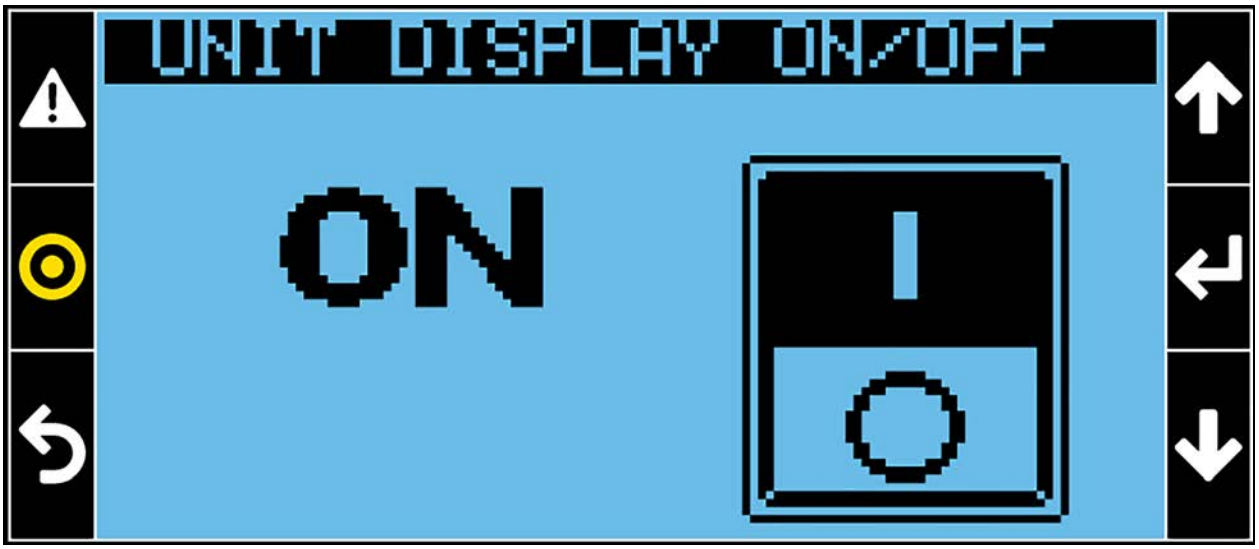
Once one of the three passwords is entered, the user can access the corresponding menu. Higher password levels allows navigation/operation on lower menu level as well. Session will be terminated after five minutes of no key activity. Any time an incorrect password is entered the message “wrong password” is displayed.

2.3 Unit ON/OFF

The unit can be switched ON/OFF from four different sources:

- Remote ON/Off (status indication in case of OFF command = Remote Off): Unit is switched ON or OFF by remote contact (digital input). The message “UNIT OFF BY REMOTE INPUT” will be shown.
- 3 Position Switch ON/Off (Optional) (status indication in case of OFF command = 3Pos Switch Off): Unit is switched ON or OFF by 3 Positions Switch (digital input). The message “UNIT OFF BY 3 POS SWITCH” will be shown.
- Display ON/OFF button (status indication in case of OFF command = Display Off): Unit is switched ON or OFF by Display (Touch Display or Small Display or web browser). The message “DISPLAY OFF” will be shown.

Figure 2.2 Unit On/Off



- Monitoring ON/Off (status indication in case of OFF command = Monitoring Off): Unit is switched ON or OFF by BMS. The message “UNIT OFF BY MONITORING” will be shown.

All four Off possibilities are connected in a series: only if ALL are on, the unit will start, if one is off, the unit will stop.

The unit will be switched OFF by Alarm if one of the following events is active:

- Stop Due to High Temp (Unit Out of Working Range)
- High Supply Temperature (if set)
- Loss of Air Flow (if set)
- Water Alarm (if set)
- Smoke Alarm (if set)
- Loss of Flow (Configurable Input set Flow AL SD)
- Condensing Pump Alarm (Configurable Input set Cond Pump SD)
- Fire Alarm
- Configurable Alarm (Configurable Input set Alarm)
- Wrong Damper Position (Damper Control)

The status Alarm OFF and the message UNIT OFF BY ALARM display.

Unit Auto Restart

If disabled, the unit will NOT restart after a power cycle.

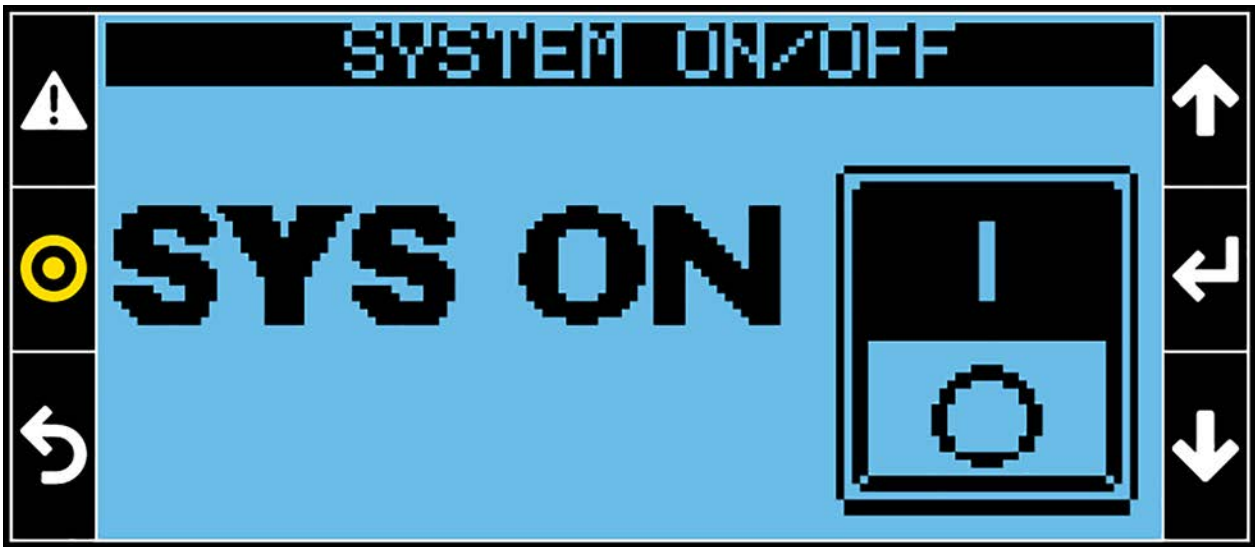
If enabled (default setting) the unit will take over the same status as it had before: ON if it was ON before the power cycle, OFF if it was OFF.

2.3.1 System ON/OFF

The entire system can be switched ON/OFF from two different sources:

- Display ON/OFF button: System is switched ON or OFF by Display (Small Display or web browser/touch display).
- Monitoring ON/Off: System is switched ON or OFF by BMS.

Figure 2.3 System ON/OFF



NOTE: At System ON, the units will maintain the same status as before the System OFF command. In Teamwork Mode 0 (No Teamwork) and without standby units, the System ON/OFF command is ignored by the application.

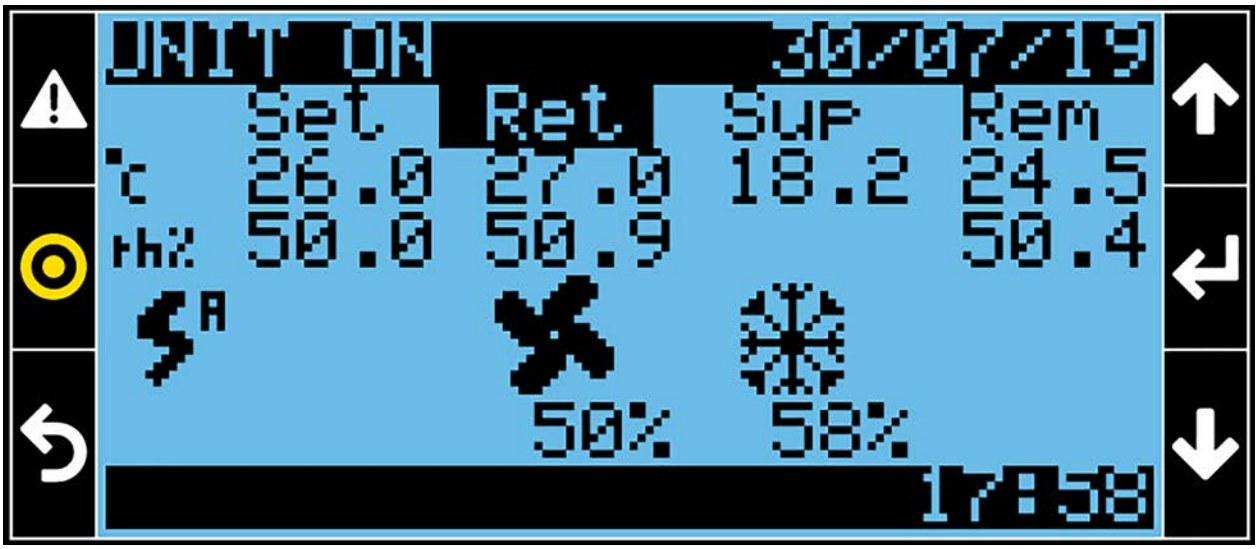
2.4 Main Screen

The main screen on Small Display shows:

- Current date and time
- Status of the unit
- Current temperature and humidity setpoints (Set)
- Return temperature and humidity values (Ret)
- Supply temperature value (Sup)
- Remote temperature and humidity values (Rem) if remote sensors installed

The highlighted field (in this case Ret) indicates the temperature sensor used by the application for managing the cooling source.

Figure 2.4 Main Screen



Icons with percentages appear on the main screen when the relevant working mode is running.

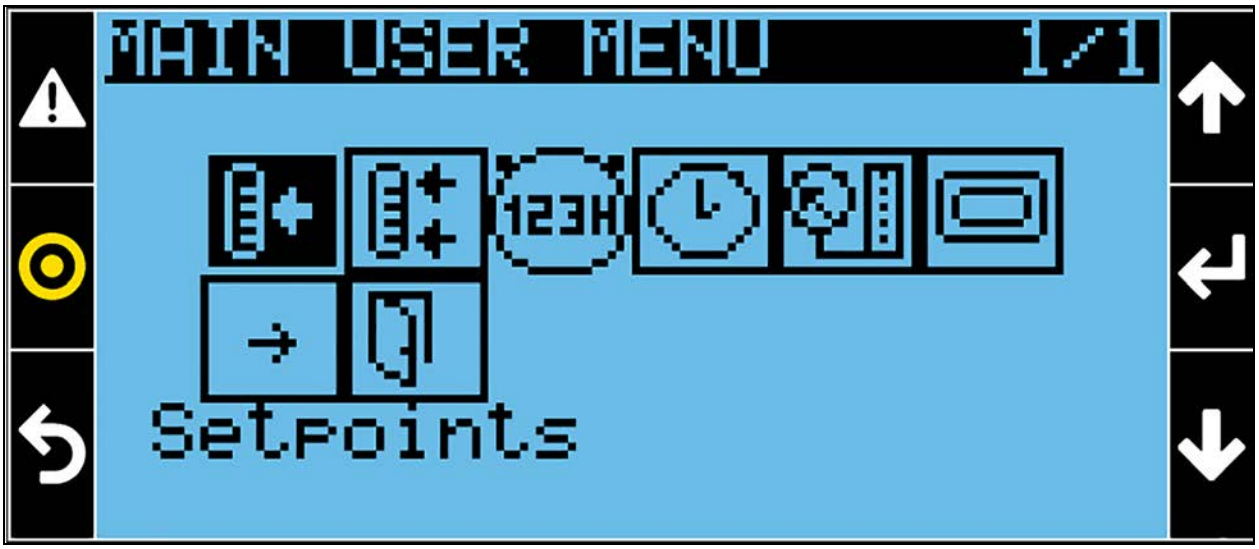
Table 2.2 Icons and Devices

Icon	Device
	Evaporator Fan ON
	CW Valve Open (>0%)
	Air Economizer ON
	PCW (CW+FC): CW Valve Open (>0%) + Air Economizer ON
	Electrical Heating ON
	Dehumidification Active
	Humidifier ON
	ATS: Power Supply A is feeding the unit.
	ATS: Power Supply B is feeding the unit.
	Ultracapacitor is feeding the main control board (with time indication).

System Off status, particular working conditions, forcing or limitations are shown at the bottom of the window.

2.5 User Menu

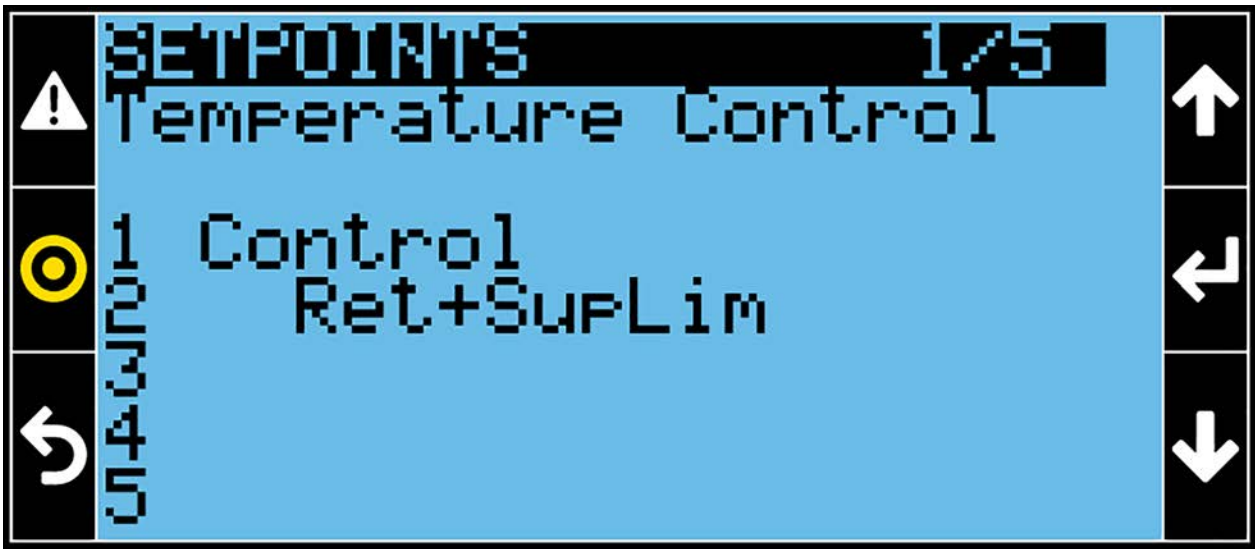
Figure 2.5 Main User Menu Icons View



This icon allows access to the next menu (Service) if the user has the correct permissions set.

2.5.1 Setpoints

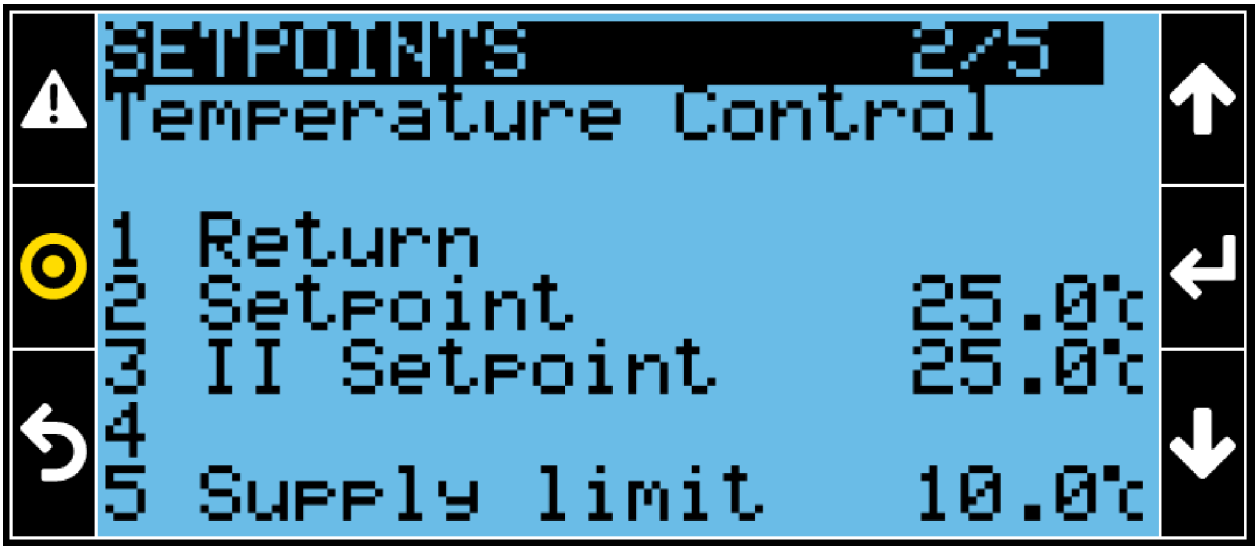
Figure 2.6 Setpoints menu page 1 of 5



Line #1: Text only Control

Line #2: Set the desired temperature control method. The options available are Return, Supply, Return + Supply Limit, and Remote.

Figure 2.7 Setpoints Menu Page 2 of 5



Line #1: Indicates (read only) the temperature control method set (previous page).

Line #2: This is the air desired temperature value. The control will compare the measured value against the temperature setpoint to determine the call for cooling or the call for heating.

Line #3: This is the Second Setpoint value. It is used by the control instead of the main Setpoint, when at least one Configurable Input is set as “2nd Setpoint” (second Setpoint) and the corresponding input is open.

Line #5: This is the low limit for the supply temperature. The control will try to keep the supply temperature always higher than the value set. This row is shown in Return + Supply Limit configuration only.

Figure 2.8 Setpoints Menu Page 3 of 5

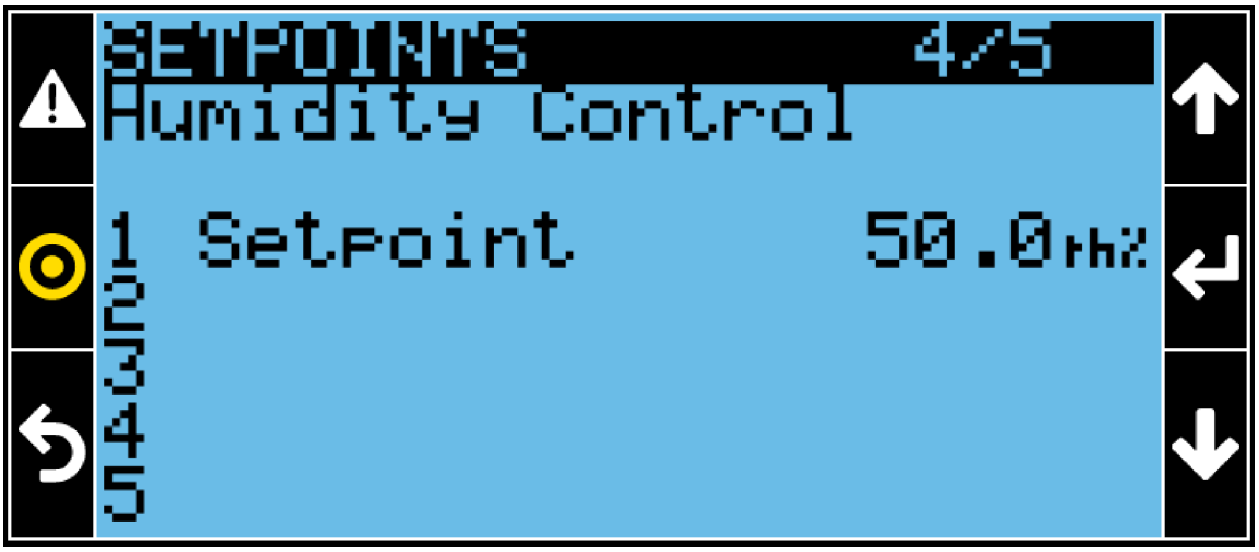
Line #1: Text only Control

Line #2: Set the desired humidity control method. The options available are Return and Remote.

Line #4: Text only Type

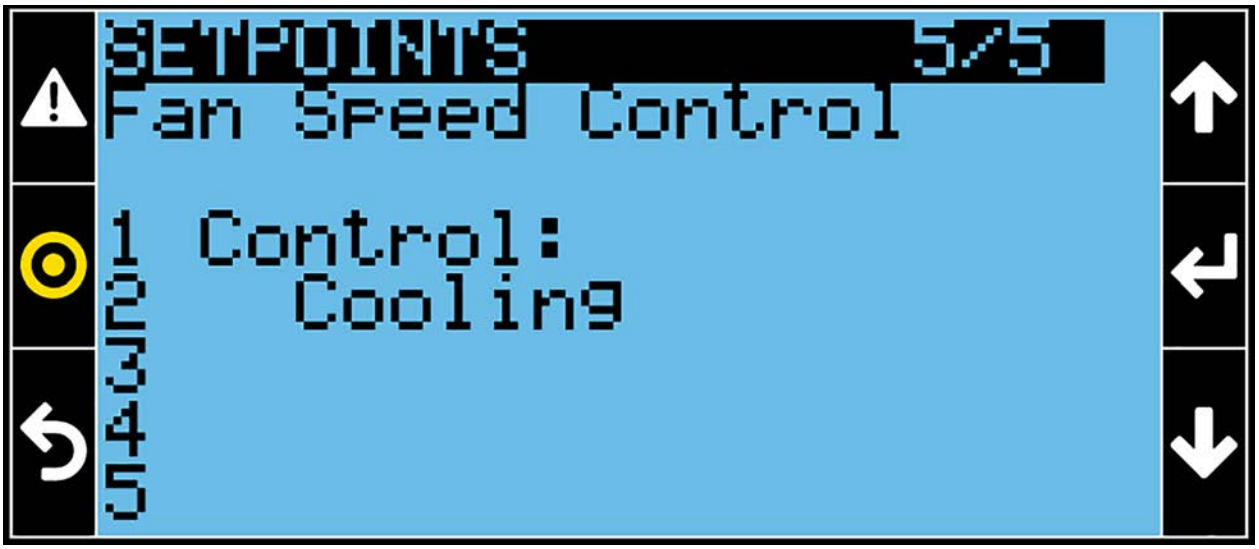
Line #5: Set the humidity control type. The options available are Relative, Relative Compensated, Absolute, and Dew Point.

Figure 2.9 Setpoints Menu Page 4 of 5



Line #1: This is the air desired humidity value. The control compares the measured value against the humidity setpoint to determine the call for humidification or the call for dehumidification.

Figure 2.10 Setpoints Menu Page 5 of 5



Line #1: Text only Control

Line #2: Set the desired fan control method. The available options are Return, Supply, Remote, Delta, Static Press, Ret CW Priority, Fixed, and Cooling. In all cases, except Cooling, an additional mask for setting the desired setpoint or speed will be shown.

- Return: The fan speed is modulated from minimum value to maximum value following the return temperature deviation.
- Supply: The fan speed is modulated from minimum value to maximum value following the supply temperature deviation.
- Remote: The fan speed is modulated from minimum value to maximum value following the remote temperature deviation.
- Delta: The control tries to achieve a constant delta T between Return temperature and Supply temperature. When the delta T is inside the deadband the fan speed will not change; when the delta T is outside the dead band the control will change (increasing or decreasing) the speed of the fan trying to put the delta T inside the dead band.
  - If delta Return - If supply is lower than the delta Setpoint, the fan will decrease the speed.
  - If delta Return - If supply is higher than the delta Setpoint, the fan will increase the speed.
- Static Press: The speed of the evaporating fans is modulated in order to keep the static pressure constant. When the pressure is inside the deadband the fan speed does not change; when the pressure is outside the deadband the control increases or decreases the speed of the fan trying to put the pressure inside the deadband.
  - If pressure is lower than the Setpoint band, the fan speed will increase.
  - If pressure is higher than the Setpoint band, the fan speed will decrease.
- Ret CW Priority (PCW unit only): The fan speed starts to modulate from minimum speed to maximum speed when the call for cooling, based on return temperature, reaches 50%. This means that the fans start to modulate only when the CW valve is fully open.

- Fixed: During normal operation, the fan will operate at the set fixed speed.

NOTE: Fixed speed can be used for driving the fan speed via BMS (datapoint Cfg_evpFanFixSpeed).

- Cooling (coupled mode): The fan speed is modulated from minimum value to maximum value following the call for cooling.

2.5.2 T/H Limits

Figure 2.11 T/H Limits Menu Page 1 of 5

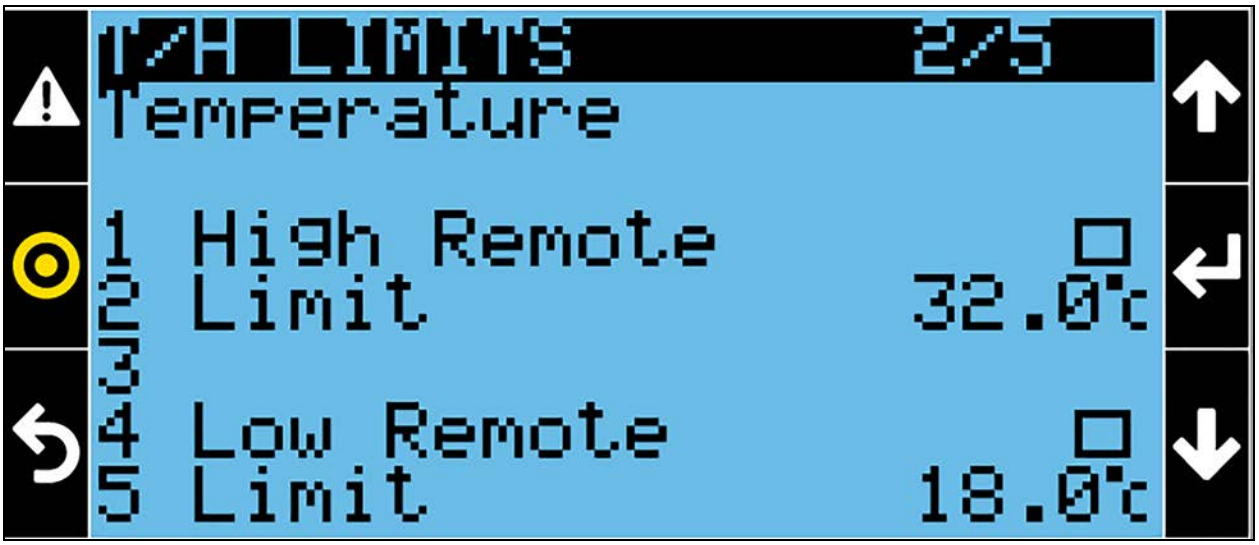
Line #1: Enables the High Return Temperature event.

Line #2: Defines the High Return Temperature threshold. If the actual return temperature value is higher than the threshold set, the High Return Temperature event will be triggered. This event (auto-reset) is ignored at Unit ON for 30 minutes.

Line #4: Enables the Low Return Temperature event.

Line #5: Defines the Low Return Temperature threshold. If the actual return temperature value is lower than the threshold set, the Low Return Temperature event will be triggered. This event (auto-reset) is ignored at Unit ON for 30 minutes.

Figure 2.12 T/H Limits Menu Page 2 of 5



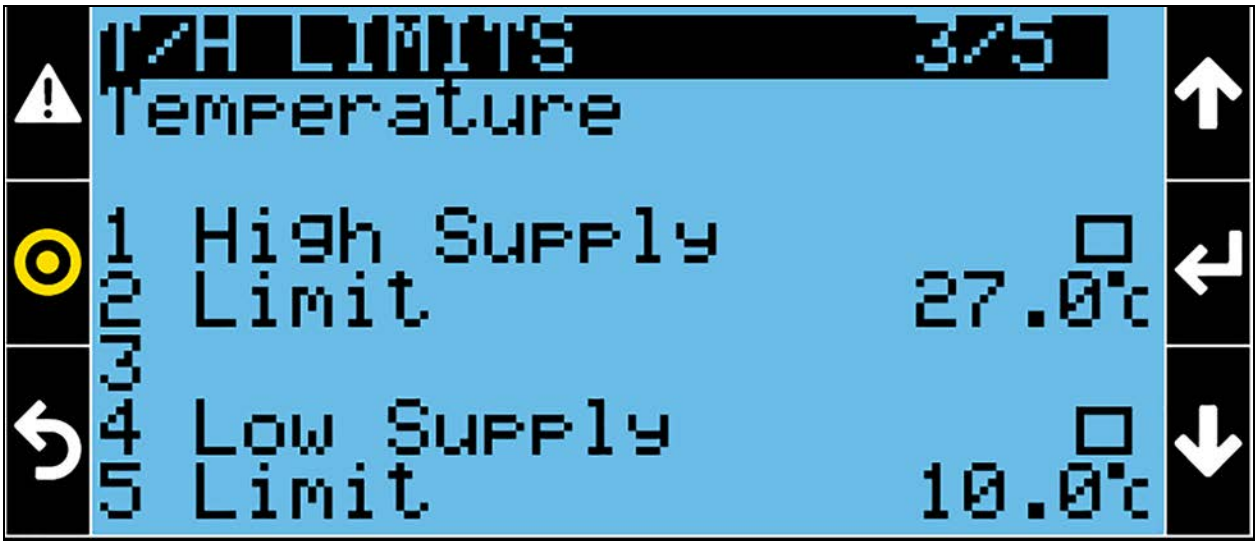
Line #1: Enables the High Remote Temperature event.

Line #2: Defines the High Remote Temperature threshold. If the actual remote temperature value is higher than the threshold set, the High Remote Temperature event will be triggered. This event (auto-reset) is ignored at Unit ON for 30 minutes.

Line #4: Enables the Low Remote Temperature event.

Line #5: Defines the Low Remote Temperature threshold. If the actual remote temperature value is lower than the threshold set, the Low Remote Temperature event will be triggered. This event (auto-reset) is ignored at Unit ON for 30 minutes.

Figure 2.13 T/H Limits Menu Page 3 of 5



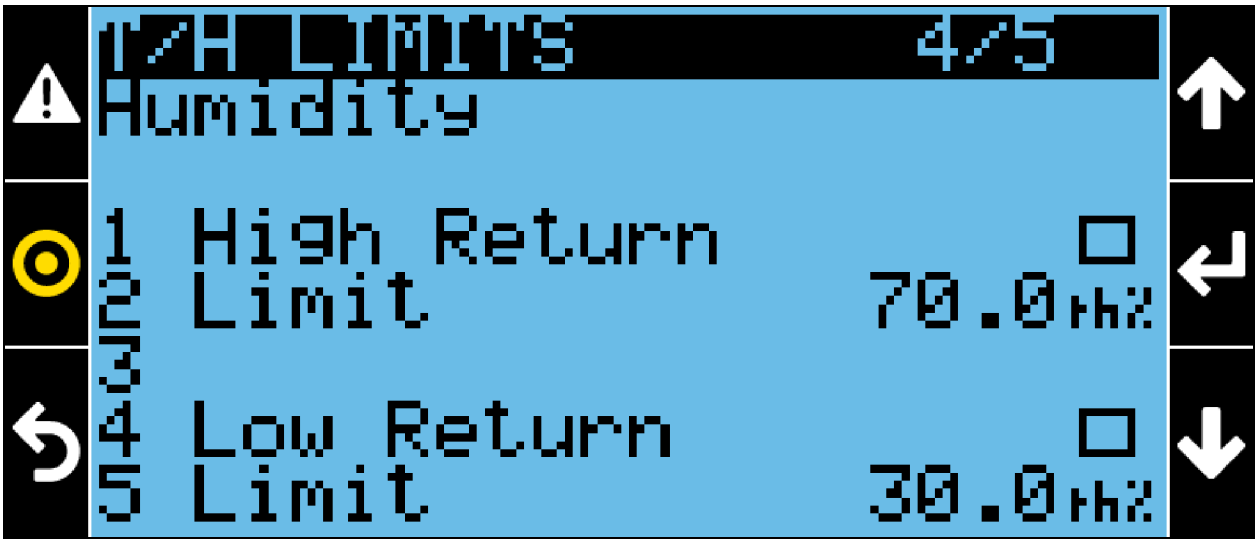
Line #1: Enables the High Supply Temperature event.

Line #2: Defines the High Supply Temperature threshold. If the actual supply temperature value is higher than the threshold set, the High Supply Temperature event will be triggered. This event (auto-reset) is ignored at Unit ON for five minutes.

Line #4: Enables the Low Supply Temperature event.

Line #5: Defines the Low Supply Temperature threshold. If the actual supply temperature value is lower than the threshold set, the Low Supply Temperature event will be triggered. This event (auto-reset) is ignored at Unit ON for five minutes.

Figure 2.14 T/H Limits Menu Page 4 of 5



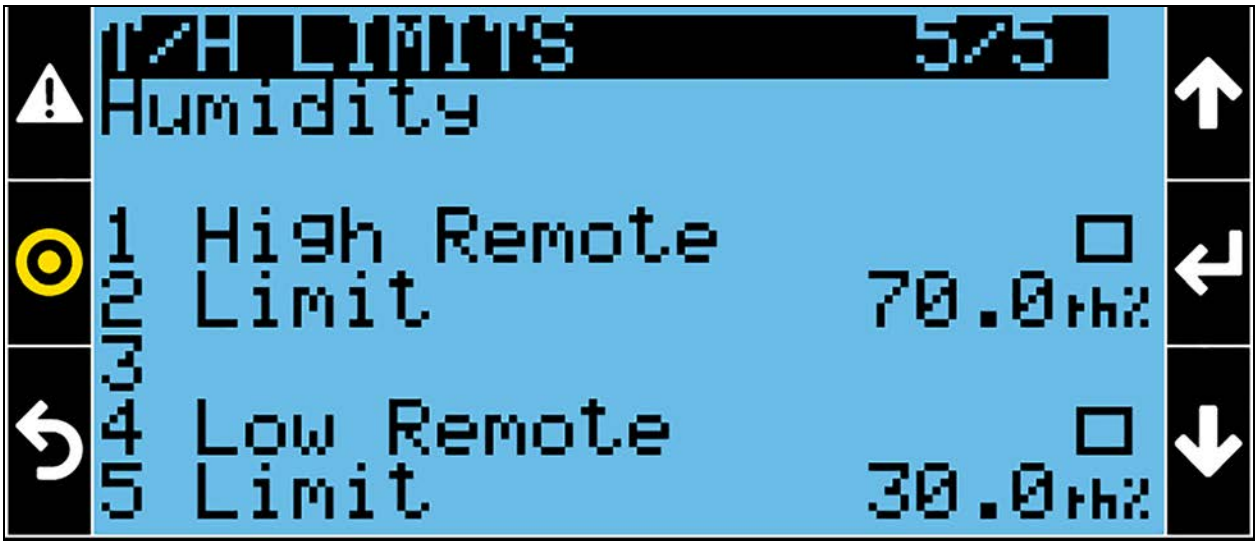
Line #1: Enables the High Return Humidity event.

Line #2: Defines the High Return Humidity threshold. If the actual return humidity value is higher than the threshold set, the High Return Humidity event will be triggered. This event (auto-reset) is ignored at Unit ON for 30 minutes.

Line #4: Enables the Low Return Humidity event.

Line #5: Defines the Low Return Humidity threshold. If the actual return humidity value is lower than the threshold set, the Low Return Humidity event will be triggered. This event (auto-reset) is ignored at Unit ON for 30 minutes.

Figure 2.15 T/H Limits Menu Page 5 of 5



Line #1: Enables the High Remote Humidity event.

Line #2: Defines the High Remote Humidity threshold. If the actual remote humidity value is higher than the threshold set, the High Remote Humidity event will be triggered. This event (auto-reset) is ignored at Unit ON for 30 minutes.

Line #4: Enables the Low Remote Humidity event.

Line #5: Defines the Low Remote Humidity threshold. If the actual remote humidity value is lower than the threshold set, the Low Remote Humidity event will be triggered. This event (auto-reset) is ignored at Unit ON for 30 minutes.

An additional page will be shown when the static pressure sensor is enabled.

NOTE: The pressure value of the unit where the event STATIC PRESSURE OUT OF RANGE is active will be not considered for the average calculation.

2.5.3 Total Run Hours

Figure 2.16 Total Run Hours Menu Page 1 of 6

Line #1: Shows the actual fan run hours counter and the relative settable threshold. If the working hours exceed this threshold, the Conditioner/Fans Working Hours Exceeded event will be triggered.

Line #2: Shows the actual CW valve circuit 1 run hours counter and the relative settable threshold. If the working hours exceed this threshold, the CW1 Valve Working Hours Exceeded event will be triggered.

Line #3: Shows the actual CW valve circuit 2 run hours counter and the relative settable threshold. If the working hours exceed this threshold, the CW2 Valve Working Hours Exceeded event will be triggered.

The actual run hours can be reset to 0 by selecting the Res check box.

If the threshold is set to 0, the event will never be generated.

Figure 2.17 Total Run Hours Menu Page 2 of 6

Line #1: Not Used for PCW.

Line #2: Not Used for PCW.

Line #3: Not Used for PCW.

Line #4: Not Used for PCW.

Figure 2.18 Total Run Hours Menu Page 3 of 6

Line #1: Not Used for PCW.

Line #2: Shows the actual Air Economizer run hours counter and the relative settable threshold. If the working hours exceeds this threshold, the “AirEco Working Hours Exceeded” event will be triggered.

Line #3: Not Used for PCW.

Line #4: Not Used for PCW.

The actual run hours can be reset to 0 by selecting the “Res” check box.

If the threshold is set to 0, the event will never be generated.

Figure 2.19 Total Run Hours Menu Page 4 of 6

Line #1: Not Used for PCW.

Line #2: Not Used for PCW

Line #3: Shows the actual Humidifier run hours counter and the relative settable threshold. If the working hours exceeds this threshold, the “Humidifier Working Hours Exceeded” event will be triggered.

Line #4: Shows the actual Dehumidification run hours counter and the relative settable threshold. If the working hours exceeds this threshold, the “Dehumidification Working Hours Exceeded” event will be triggered.

The actual run hours can be reset to 0 by selecting the “Res” check box.

If the threshold is set to 0, the event will never be generated.

Figure 2.20 Total Run Hours Menu Page 5 of 6

Line #1: Shows the actual Electrical Heater first step run hours counter and the relative settable threshold. If the working hours exceeds this threshold, the El. Heater1 Working Hours Exceeded event will be triggered.

Line #2: Shows the actual Electrical Heater second step run hours counter and the relative settable threshold. If the working hours exceeds this threshold, the El. Heater2 Working Hours Exceeded event will be triggered.

Line #3: Shows the actual Hot Water/Gas run hours counter and the relative settable threshold. If the working hours exceeds this threshold, the “Hot Water/Gas Working Hours Exceeded” event will be triggered.

Line #4: Not Used for PCW.

Line #5: Not Used for PCW.

The actual run hours can be reset to 0 by selecting the Res check box.

If the threshold is set to 0, the event will never be generated.

Figure 2.21 Total Run Hours menu page 6 of 6

Line #1: Shows the actual air conditioner run hours counter.

Line #2: Shows the actual mechanical cooling only run hours counter.

Line #3: Shows the actual free cooling only run hours counter.

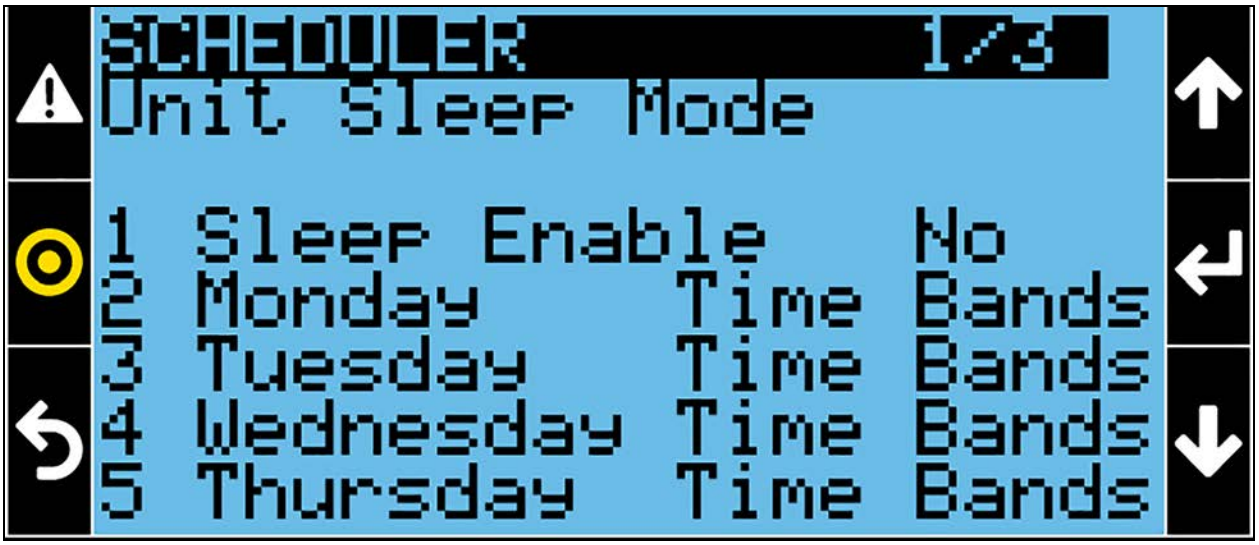
Line #4: Shows the actual mechanical cooling and free cooling at the same time run hours counter.

The actual run hours can be reset to 0 by selecting the “Res” check box.

There are no thresholds for these counters.

2.5.4 Scheduler

Figure 2.22 Scheduler Menu Page 1 of 3



Line #1: Enables/disables the Sleep Mode function. If set to No, the unit will never go into Sleep Mode.

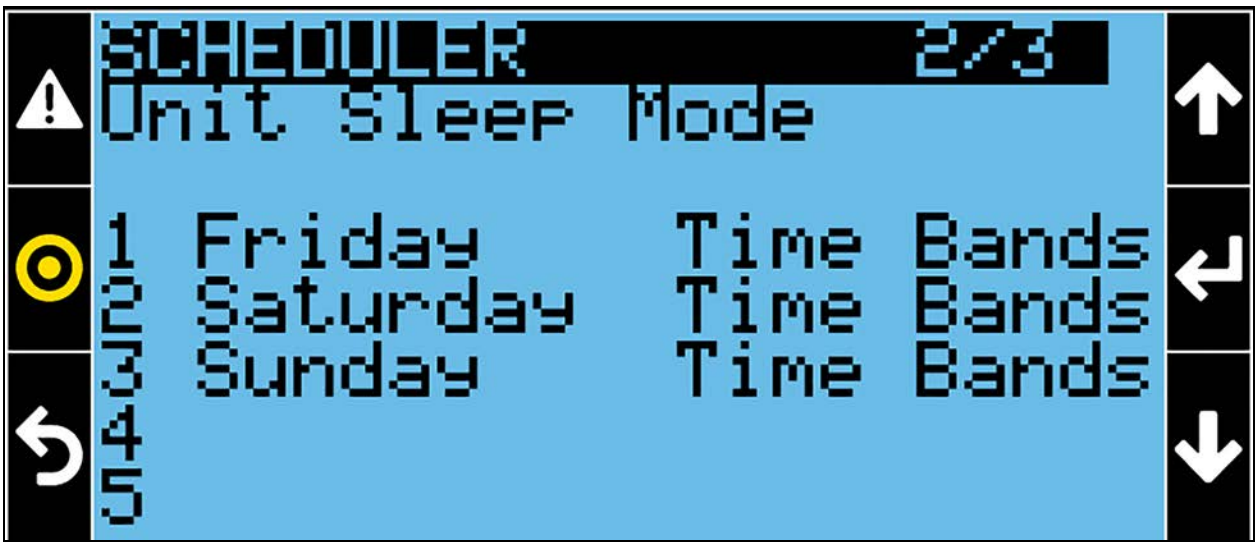
Line #2: If set to Always OFF, the unit will go into Sleep Mode all day long (Monday).

Line #3: If set to Always OFF, the unit will go into Sleep Mode all day long (Tuesday).

Line #4: If set to Always OFF, the unit will go into Sleep Mode all day long (Wednesday).

Line #5: If set to Always OFF, the unit will go into Sleep Mode all day long (Thursday).

Figure 2.23 Scheduler Menu Page 2 of 3

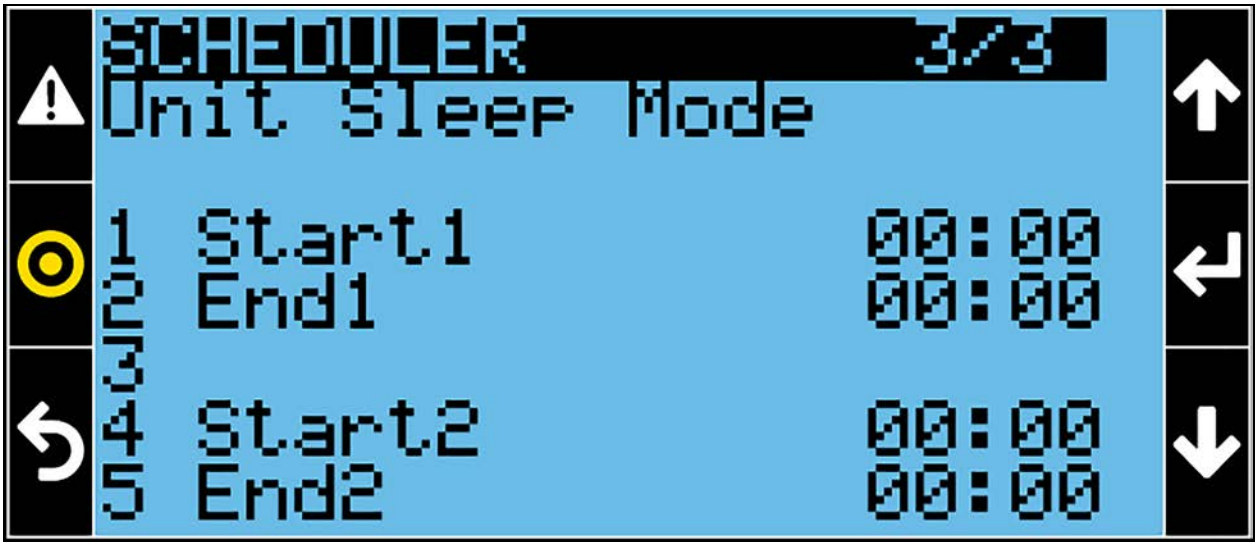


Line #1: If set to Always OFF, the unit will go into Sleep Mode all day long (Friday).

Line #2: If set to Always OFF, the unit will go into Sleep Mode all day long (Saturday).

Line #3: If set to Always OFF, the unit will go into Sleep Mode all day long (Sunday).

Figure 2.24 Scheduler Menu Page 3 of 3



Line #1: Defines for days, set as Time Bands, the time when the sleep mode shall start (first interval).

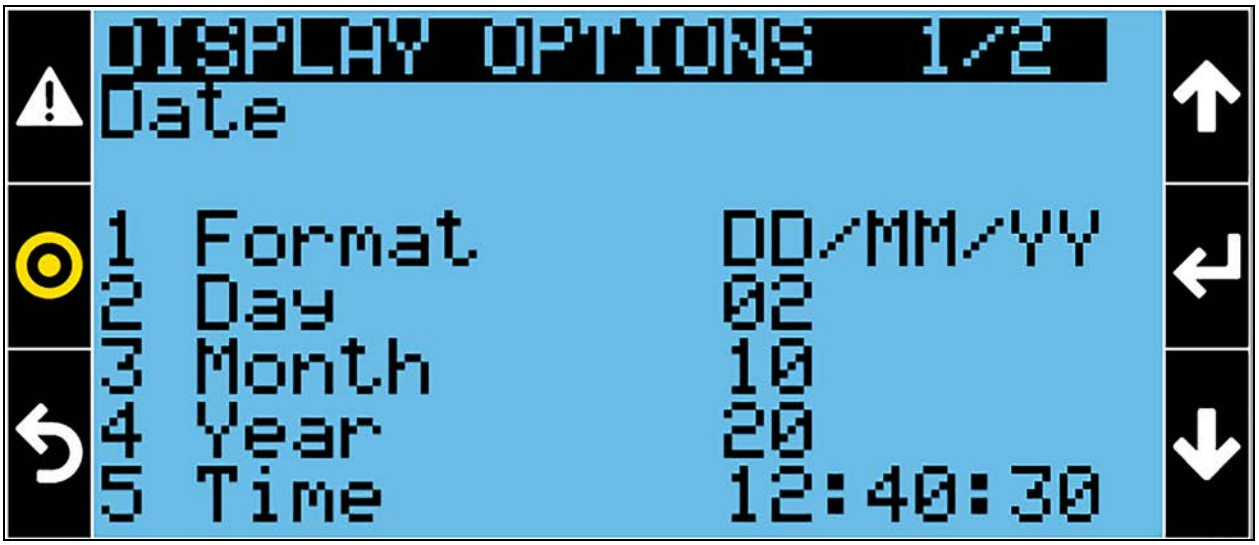
Line #2: Defines for days, set as Time Bands, the time when the sleep mode shall stop (first interval).

Line #4: Defines for days, set as Time Bands, the time when the sleep mode shall start (second interval).

Line #5: Defines for days, set as Time Bands, the time when the sleep mode shall stop (second interval).

2.5.5 Display Options

Figure 2.25 Display Options Menu Page 1 of 2

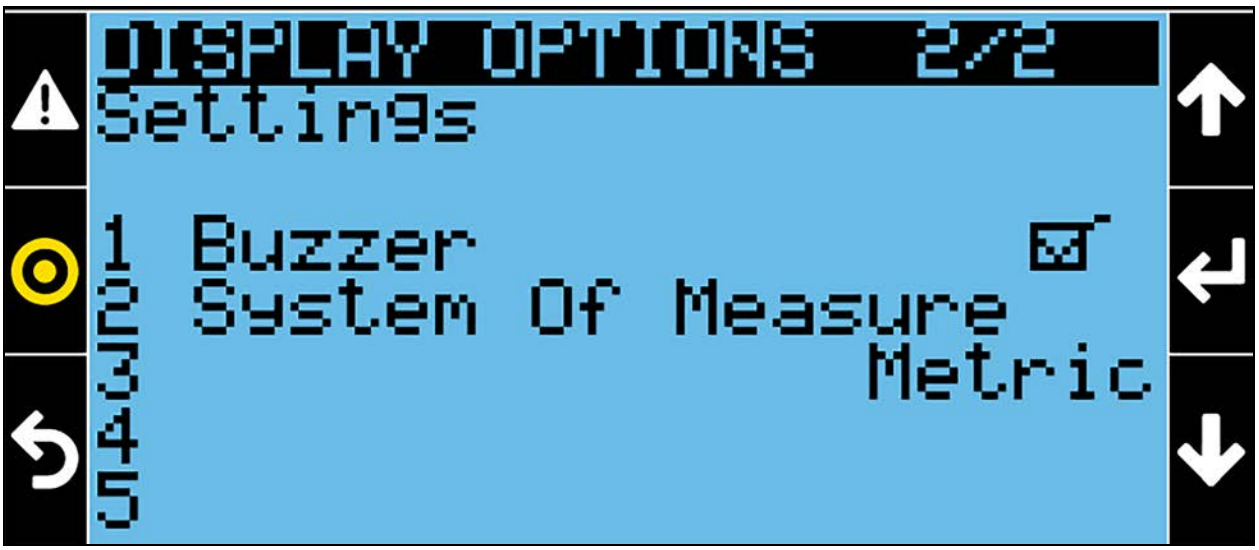


Line #1: Defines the date format type: DD/MM/YY (Day/Month/Year) or MM/DD/YY (Month/Day/Year) or YY/MM/DD (Year/Month/Day).

Lines #2, #3, #4: Set the date (day, month, and year).

Lines #5: Set the time (hours, minutes, and seconds).

Figure 2.26 Display Options Menu Page 2 of 2

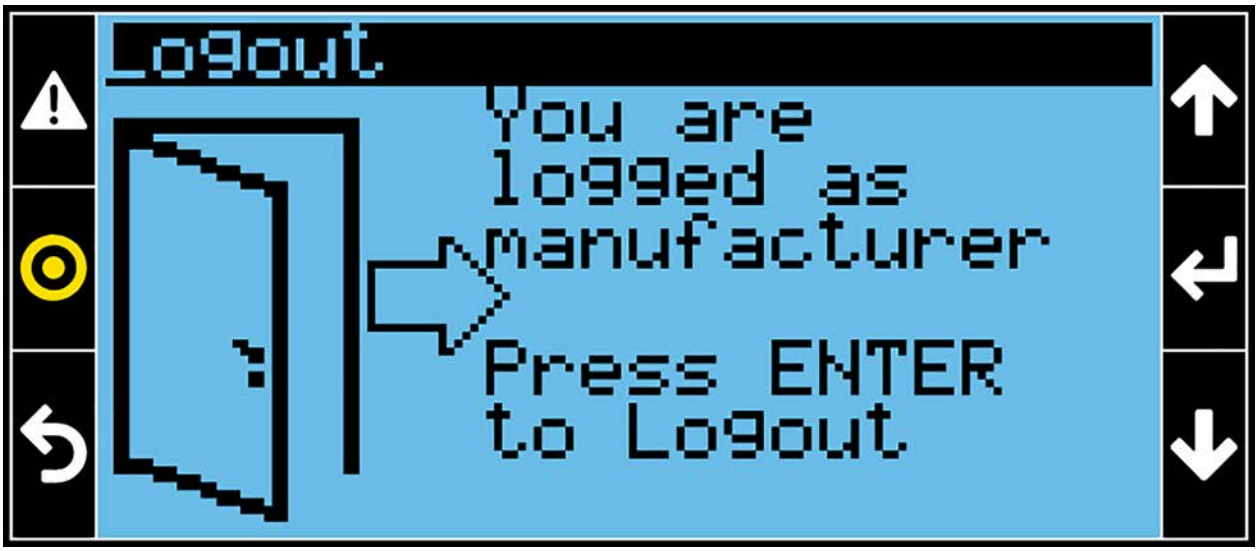


Line #1: Enables/Disables the audible signal (buzzer).

Line #2: Set the unit of measurement (metric or imperial).

2.5.6 Logout

Figure 2.27 Logout Menu



From this menu, pressing the Enter Key (↵), logs the user out.

2.6 Unit Overview

Figure 2.28 Unit Overview Icons View 1 of 2

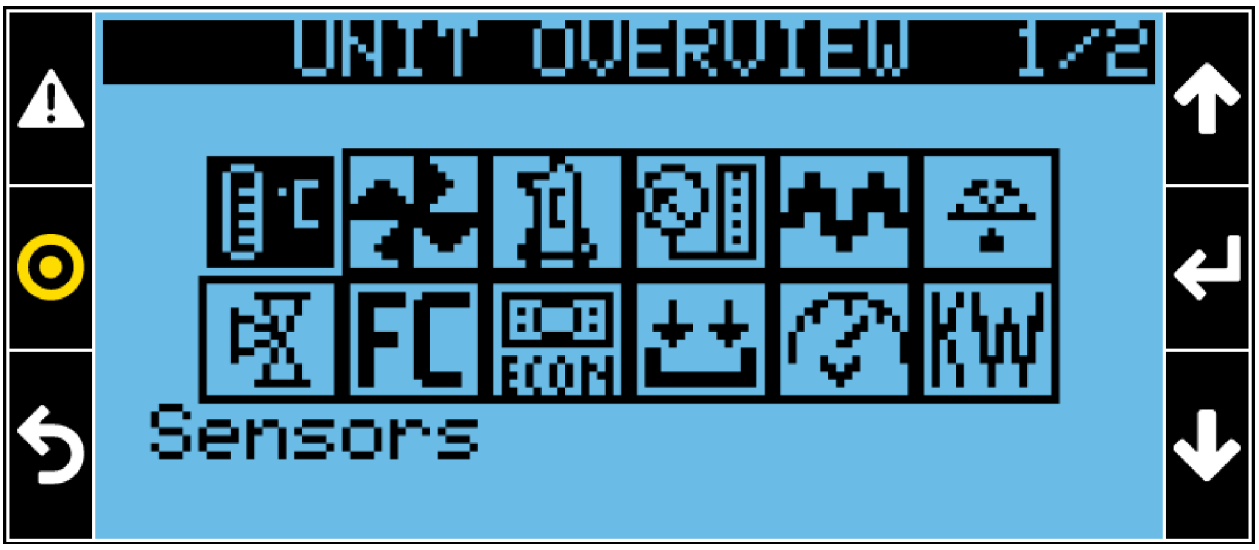
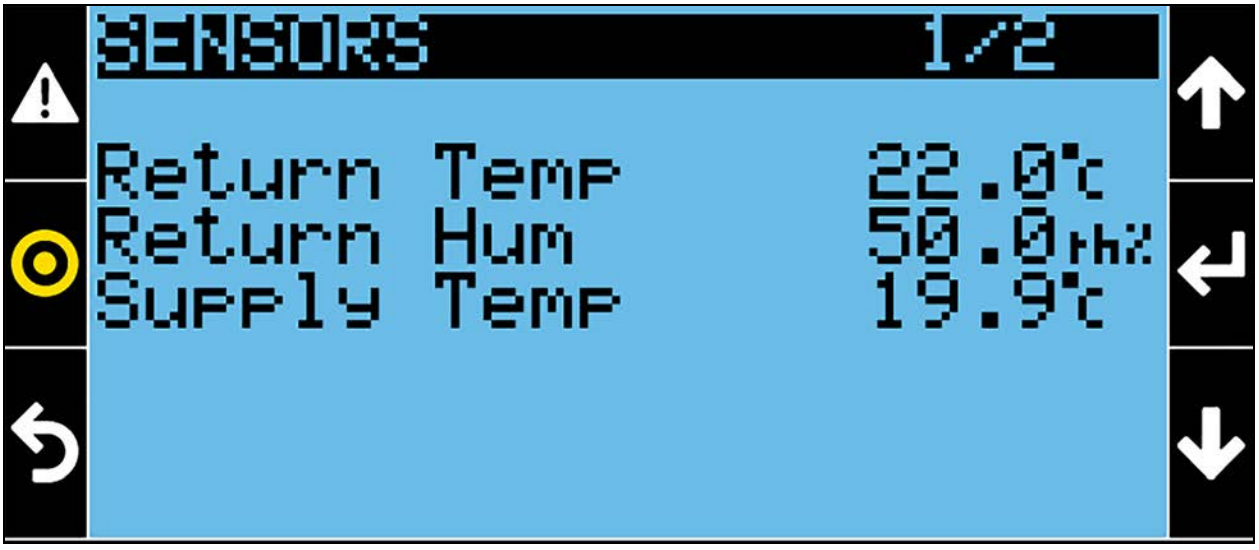


Figure 2.29 Unit Overview Icons View 2 of 2

From the Main Screen, press the Decrease ( ) Key to access the Unit Overview. A password is not required.

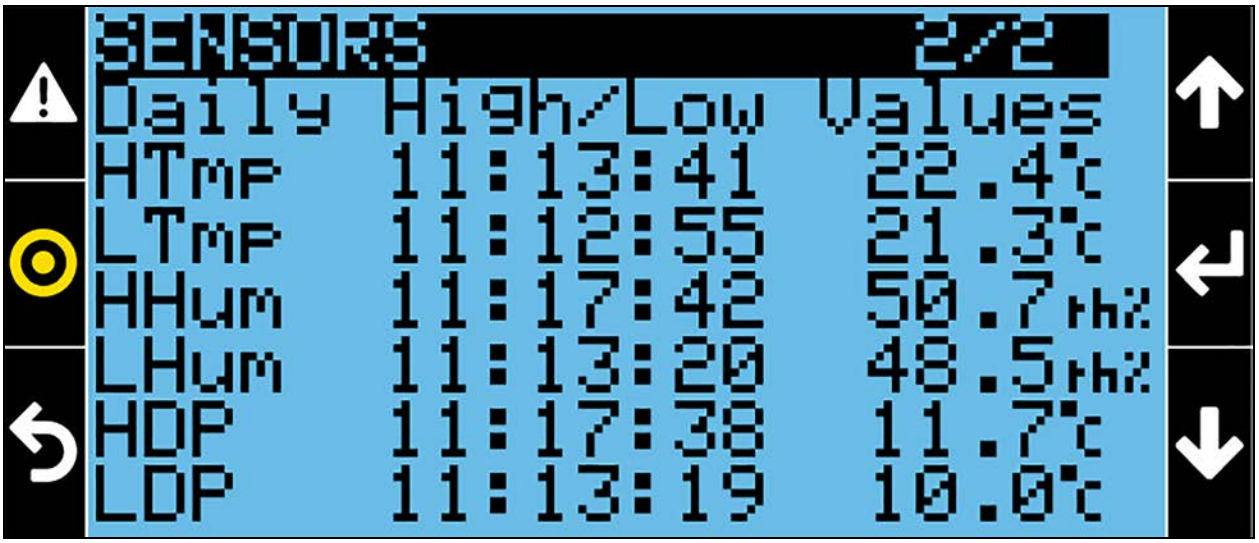
2.6.1 Sensors

Figure 2.30 Sensors Page 1 of 2



Return temperature, return humidity, and supply temperature values are shown on this page. In the case of multiple sensors, these values represent the minimum, maximum or average value based on the method set. Additional values like Remote temperature/humidity or Vertiv™ Liebert® Air Economizer temperature/humidity or CW Inlet/Outlet temperatures or other sensors will be shown if the relative sensor is enabled.

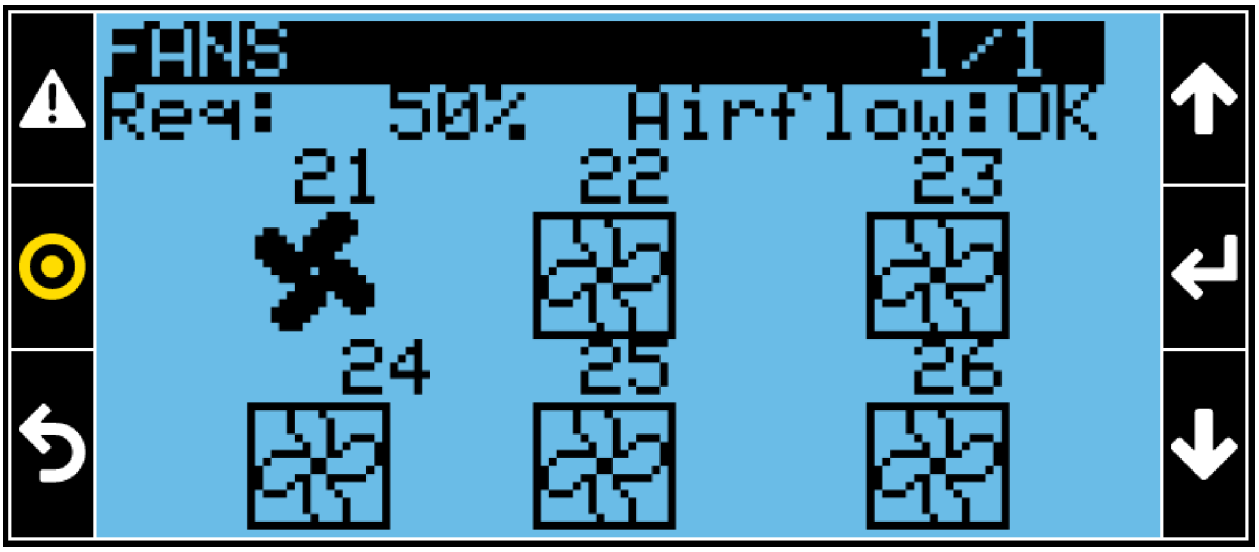
Figure 2.31 Sensors Page 2 of 2



This page shows the daily high (H) and low (L) values, including the time of the day, for the control temperature (HTmp/LTmp), the return humidity (HHum/LHum), and the dew point (HDP/LDP).

2.6.2 Fans

Figure 2.32 Fans Page 1 of 1



The percentage represents the fan speed request.

The airflow contact (OK/NOK), if connected, provides information about the status of the airflow signal. NOK = Fan Failure.

The icons indicate the status of the Modbus fans:

 Evaporating Fan x Ok And Running

 Evaporating Fan x Ok Not Running

 Evaporating Fan x Not Available

 Evaporating Fan x Communication Failure

 Evaporating Fan x Failure

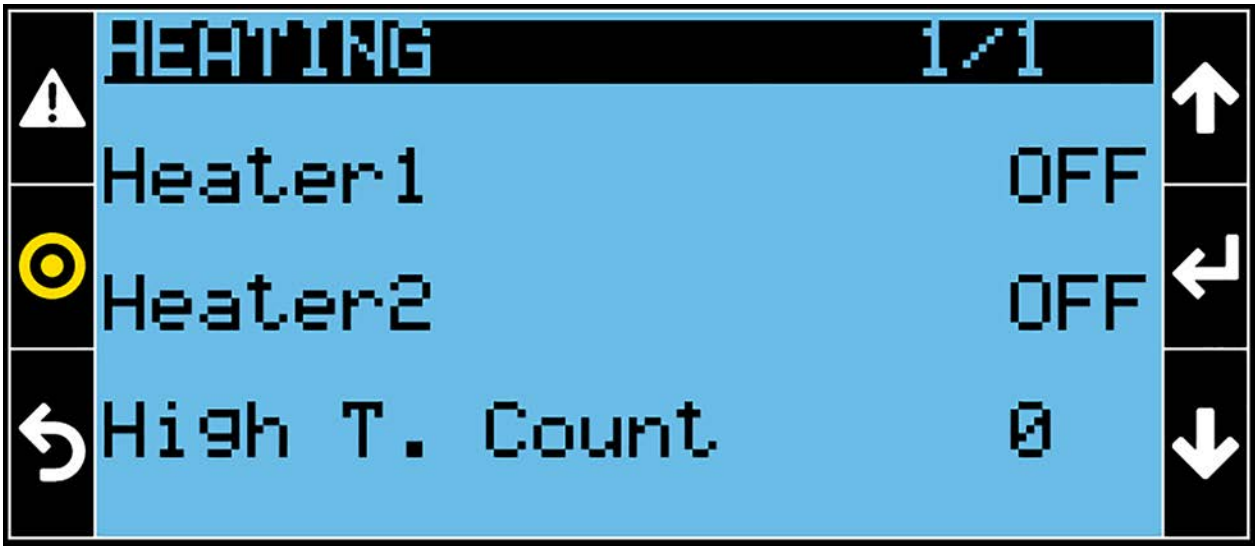
In the case of Static Pressure control enabled, an additional page with pressure value, setpoint, and deadband will be shown.

In the case of Airflow Measurement enabled, an additional page with the airflow value will be shown.

2.6.3 Heating

NOTE: The Heating menu will be locked if this option unavailable.

Figure 2.33 Heating Page 1 of 1



Heater 1 indicates the status of the electrical Heating first step (On or Off).

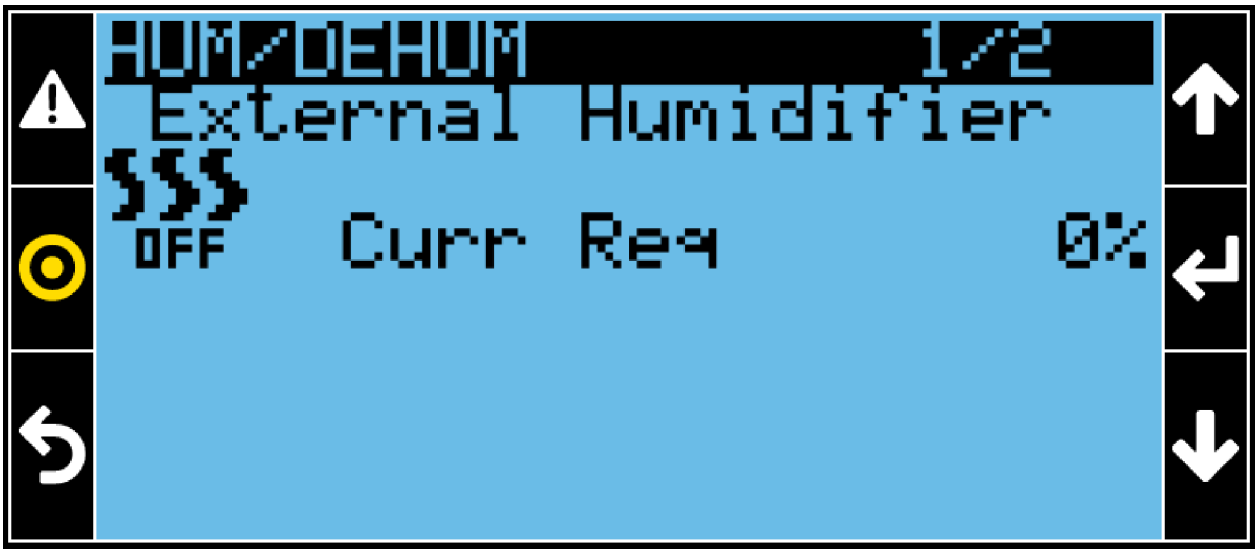
Heater 1 indicates the status of the electrical Heating second step (On or Off).

High T. Count If the current Supply Temperature for Fan Safety is at or above the threshold (40°C), then the electrical heaters will be stopped for two hours, and this counter will be increased by 1. A rolling 24-hour timer will be applied: if this counter reaches 3 within 24 hours, the electrical heater will be turned off; the electrical heaters can restart only if the counter is reset (Service/Options/El. Heater menu).

2.6.4 Hum/Dehum

NOTE: The Hum/Dehum menu will be locked if this option is unavailable.

Figure 2.34 Hum/Dehum (External Humidifier) Page 1 of 2

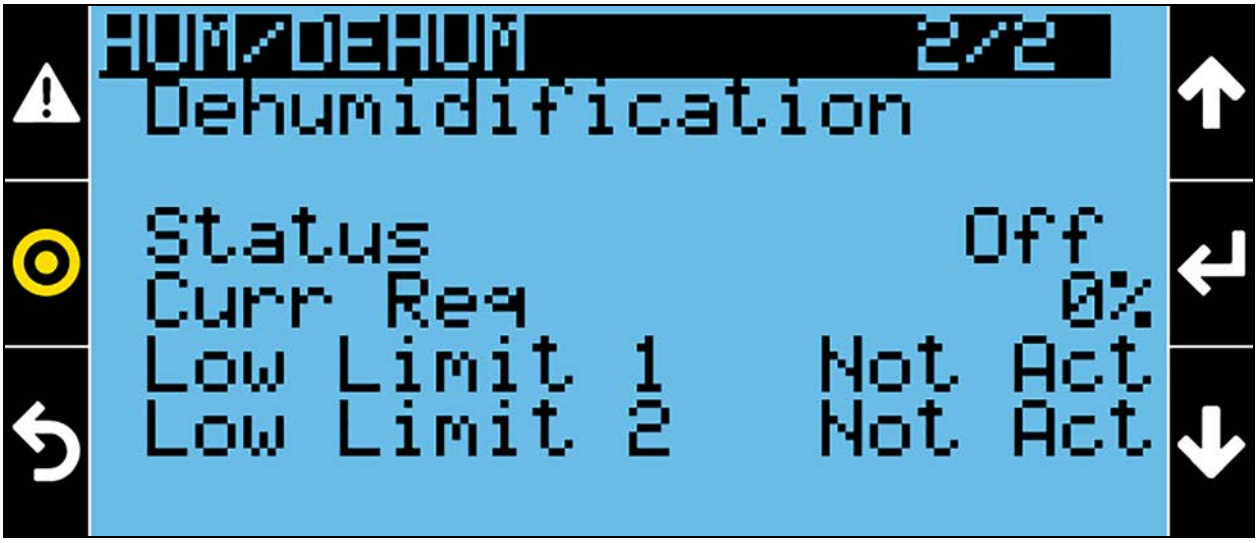


The icon ( ) shows the status of the humidifier (On or Off).

Curr Req indicates the current humidification request in percentage.

In the case of the electrode or infrared humidifier, additional information will be shown.

Figure 2.35 Hum/Dehum (Dehumidification) Page 2 of 2

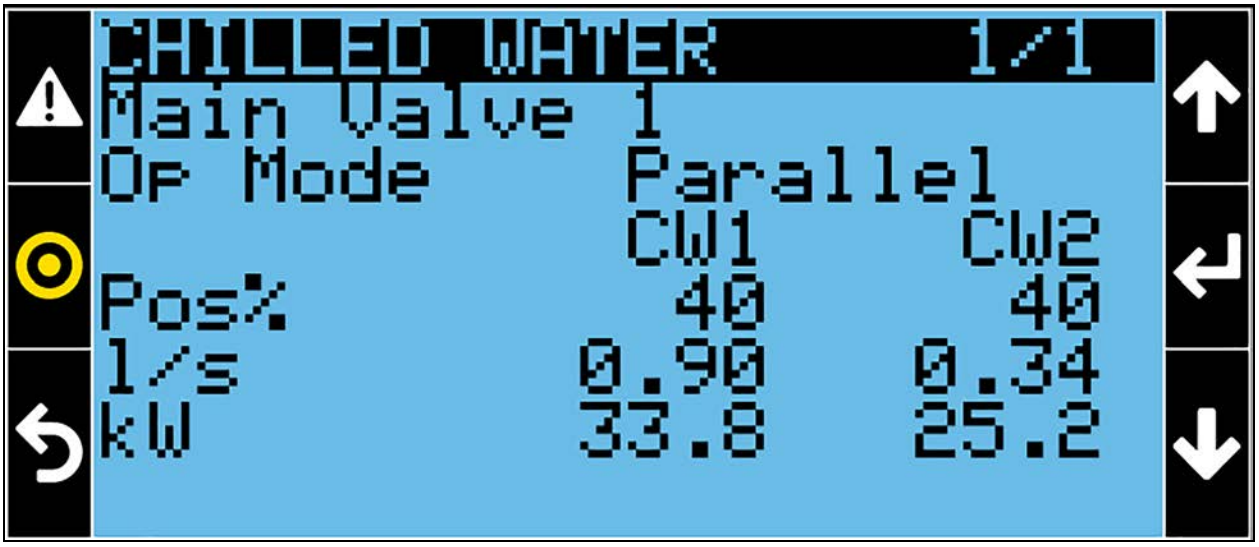


- Status indicates the status of the dehumidification (On or Off).
- Curr Req indicates the current dehumidification request in percentage.
- Low Limit 1 provides information about the status of the Low Limit 1 (Act or Not Act). This limit will not be considered for PCW.
- Low Limit 2 provides information about the status of the Low Limit 2 (Act or Not Act). Low Limit 2 will disable all of the cooling sources (CW) set for dehum.

2.6.5 Chilled Water

NOTE: The Chilled Water menu will be locked for the DX unit.

Figure 2.36 Chilled Water Page 1 of 1



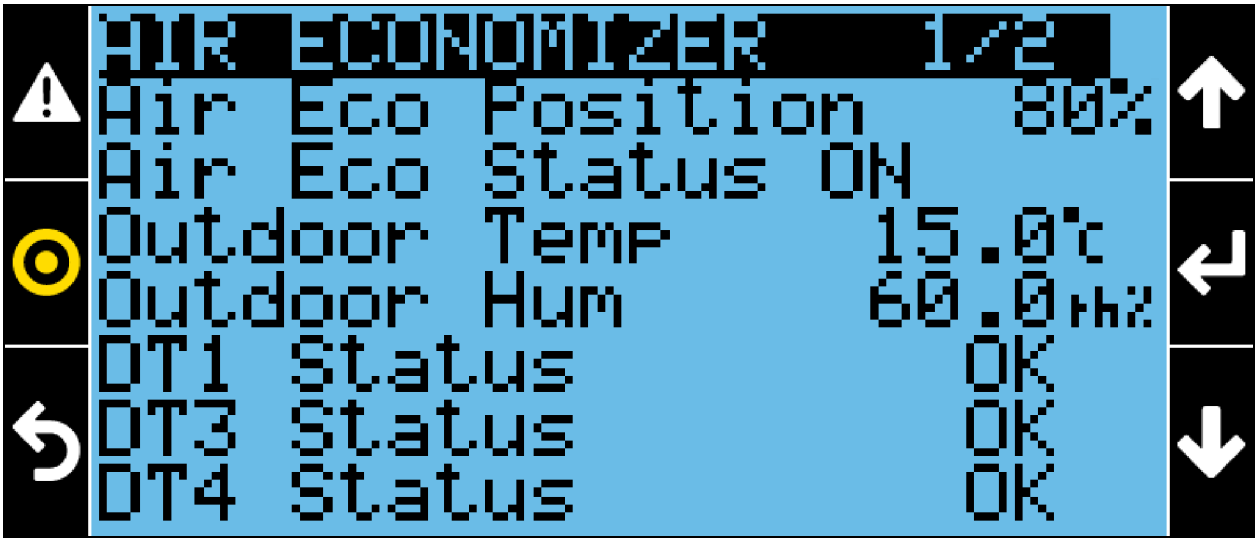
- Main Valve indicates which CW valve (double circuit unit) is the first to be activated in Cascade mode or which is the designated CW valve to run in Alternate mode.
- OP Mode indicates the CW operating mode, the options available are:
  - Single: One CW circuit only.
  - Parallel (double circuit): Both valves are controlled at the same time with the same logic.
  - Alternate (double circuit): Only one hydraulic circuit can run. The parameter Main Valve defines which valve has priority.
  - Cascade (double circuit): The first 70% of the request will be covered from main valve (defined by the Main Valve parameter). The second valve will be engaged only if the request exceeds that threshold. If the request decreases lower than 50% then only the main valve remains to work and the second valve will be closed.
- Pos% indicates the CW valve 1 and 2 opening position in percentage.
- l/s or m^3/h: This is the volumetric water flow (per circuit) detected by the flow meter. It can be shown in l/s or m^3/h.
- kW: This is the cooling gross capacity (per circuit) calculated by the control considering the volumetric water flow and the inlet/outlet water temperatures.

In the case of Supersaver, the Supersaver signal will be shown.

2.6.6 Vertiv™ Liebert® Air Economizer

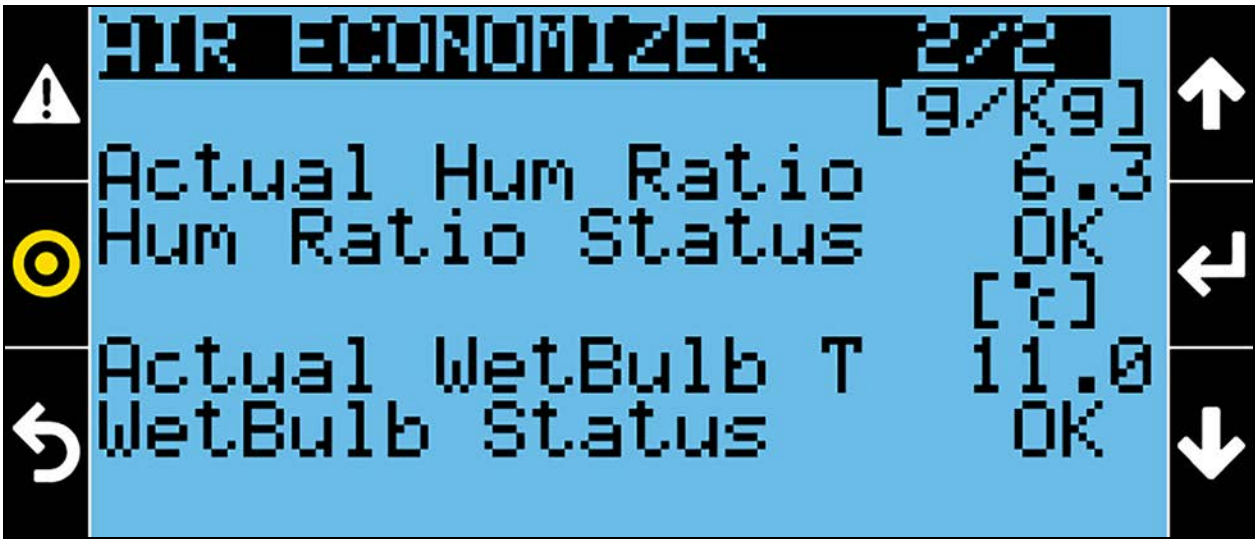
NOTE: The Air Economizer menu will be locked if the option not available.

Figure 2.37 Air Economizer Page 1 of 2



- Air ECO Position indicates the Air Economizer damper (outdoor) opening position (0-100%).
- Air ECO Status indicates the Air Economizer status:
  - ON: Air Economizer damper (outdoor) is open (>0%).
  - Emerg: Air Economizer damper (outdoor) is open (>0%) due to Emergency Override. The emergency override will open the outdoor air damper and close the indoor air damper when the return temperature exceeds an adjustable high temperature.
  - OFF: Air Economizer damper (outdoor) is closed (0%).
- Outdoor Temp shows the outdoor temperature value.
- Outdoor Hum shows the outdoor humidity value.
- DT1 Status represents the status of the difference between room and outdoor temperature. If the Air Economizer is locked out the status NOK will be shown.
- DT3 Status represents the status of the difference between control temperature and setpoint.
- DT4 Status represents the status of the humidity ratio and wet bulb temperature. . If the Air Economizer is locked out the status NOK will be shown.

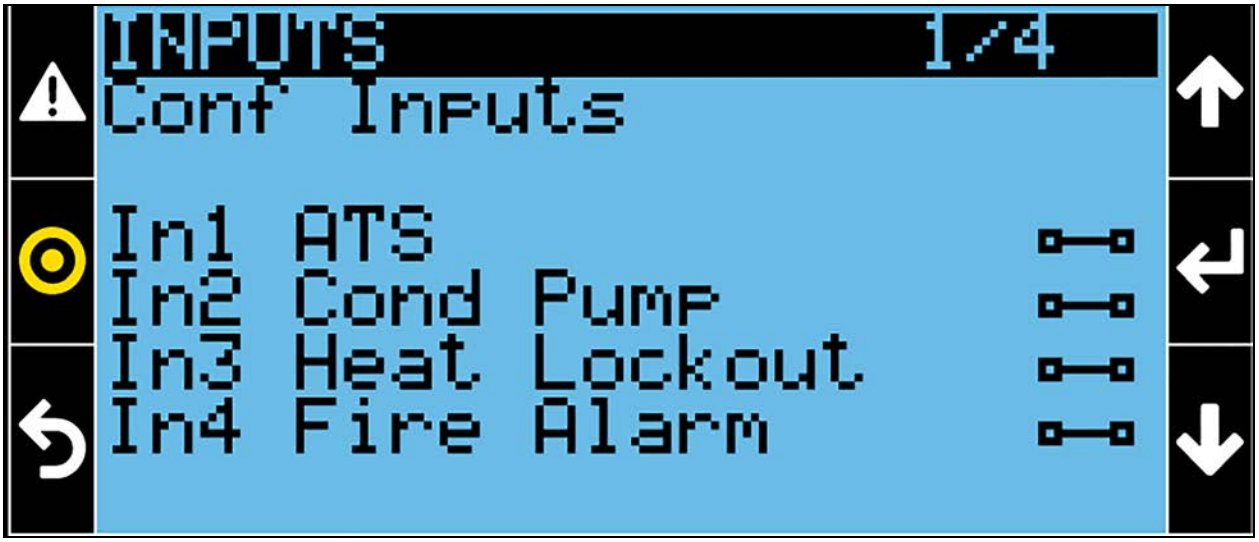
Figure 2.38 Air Economizer Page 2 of 2



- Actual Hum Ratio shows the humidity ratio value (g/Kg).
- Hum Ratio Status shows the status of the humidity ratio considering the minimum and the maximum thresholds set.
- Actual WetBulb T shows the wet bulb temperature value (°C).
- WetBulb Status shows the status of the wet bulb temperature considering the minimum threshold set.

2.6.7 Inputs

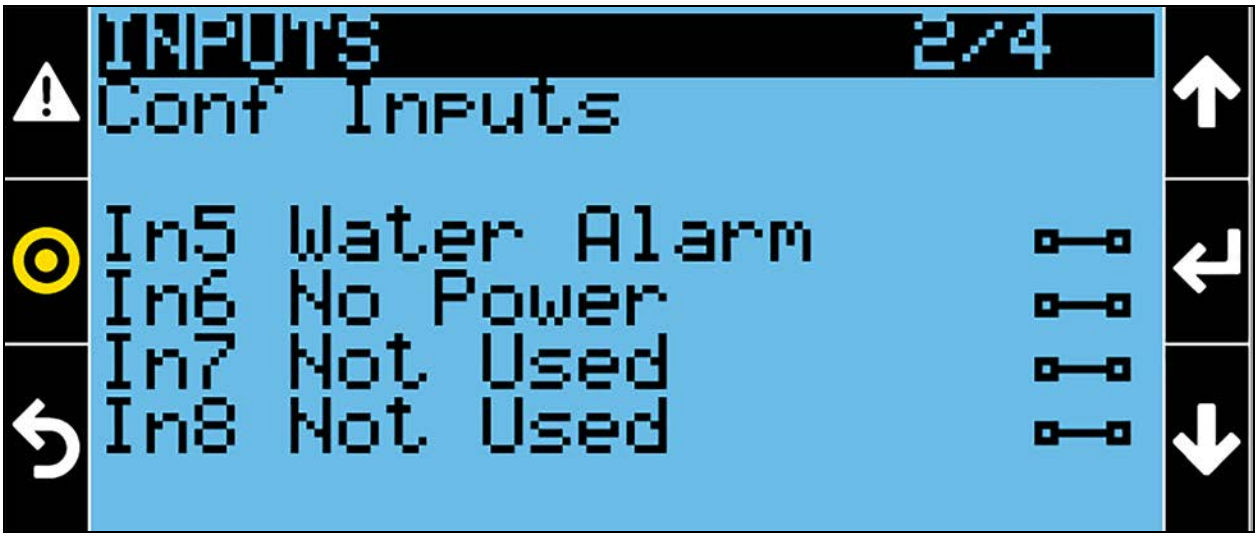
Figure 2.39 Inputs Page 1 of 4



- In1 provides information about the status of the Configurable Input 1 set as ATS ( ). It indicates which power supply (1 or 2) is feeding the unit: Close = Power Supply 1; Open = Power Supply 2. This input is configurable.

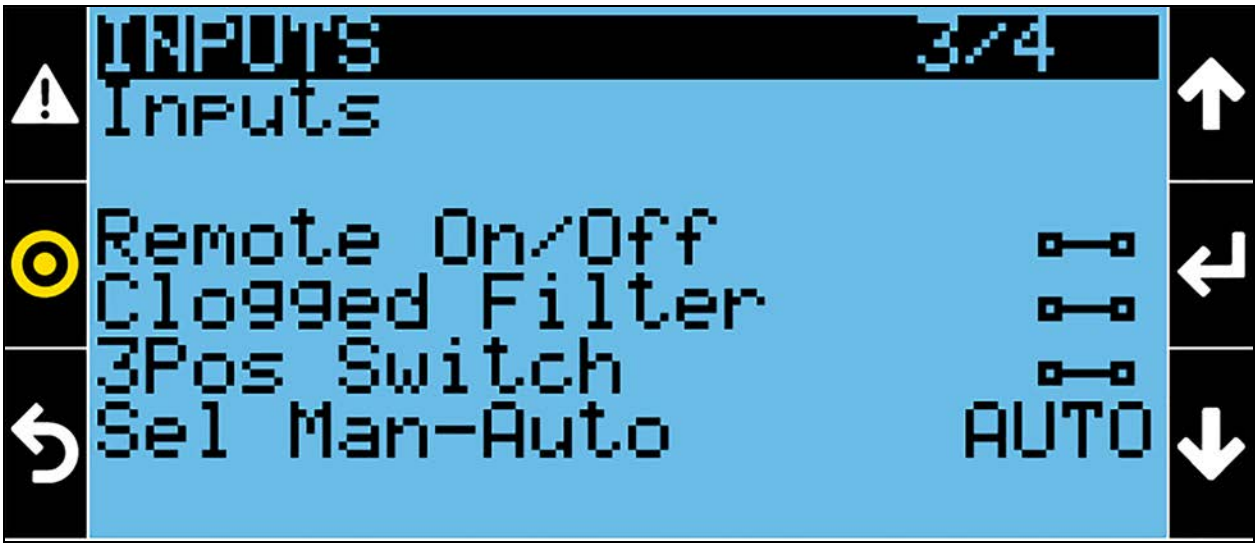
- In2 provides information about the status of the Configurable Input 2 set as Cond Pump (⊶): Close = OK; Open = Condensing Pump Alarm. This input is configurable.
- In3 provides information about the status of the Configurable Input 3 set as Heater Alarm (⊶): Close = OK; Open = Heater Alarm. This input is configurable if the electrical heaters are not installed.
- In4 provides information about the status of the Configurable Input 4 set as Fire Alarm (⊶): Close = OK; Open = Fire Alarm. This input is configurable.

Figure 2.40 Inputs Page 2 of 4



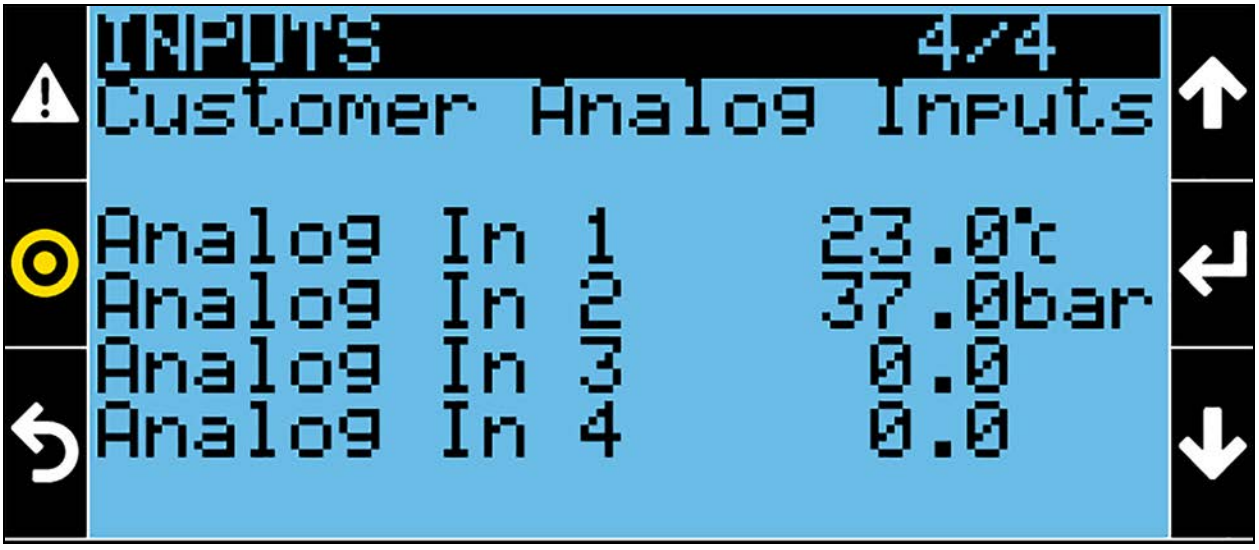
- In5 provides information about the status of the Configurable Input 5 set as Water Alarm (⊶): Close = OK; Open = Water Alarm. This input is configurable.
- In6 provides information about the status of the Configurable Input 6 set as No Power (⊶): Close = Main power supply OK; Open = Main power supply is missing. This input is configurable.
- In7 provides information about the status of the Configurable Input 7 (⊶): Close = Inactive; Open = Active. This input is configurable.
- In8 provides information about the status of the Configurable Input 8 (⊶): Close = Inactive; Open = Active. This input is configurable.

Figure 2.41 Inputs Page 3 of 4



- Remote On/Off provides information about the status of the Remote On/Off switch (⊶): Close = Unit is ON (if the other conditions are satisfied); Open = Unit is OFF (Remote OFF).
- Clogged Filter provides information about the status of the Clogged Filter device (⊶): Close = OK; Open = Clogged Filter warning.
- 3Pos Switch provides information about the ON/OFF status of the 3 Position Switch (⊶): Close = Unit is ON (if the other conditions are satisfied); Open = Unit is OFF.
- Sel Man-Auto provides information about the status of the 3 Position Switch: MAN = Fan and cooling are forced to 100%; AUTO = Unit is running in automatic mode; OFF = Unit is OFF.

Figure 2.42 Inputs page 4 of 4



Customer Analog Inputs: There are up to four analog inputs, which a customer can use to translate an analog signal to physical values. The inputs are read from expansion board #2. The resulting values have no control functionality, no alarms, etc. They are for visualization only.

2.6.8 Outputs

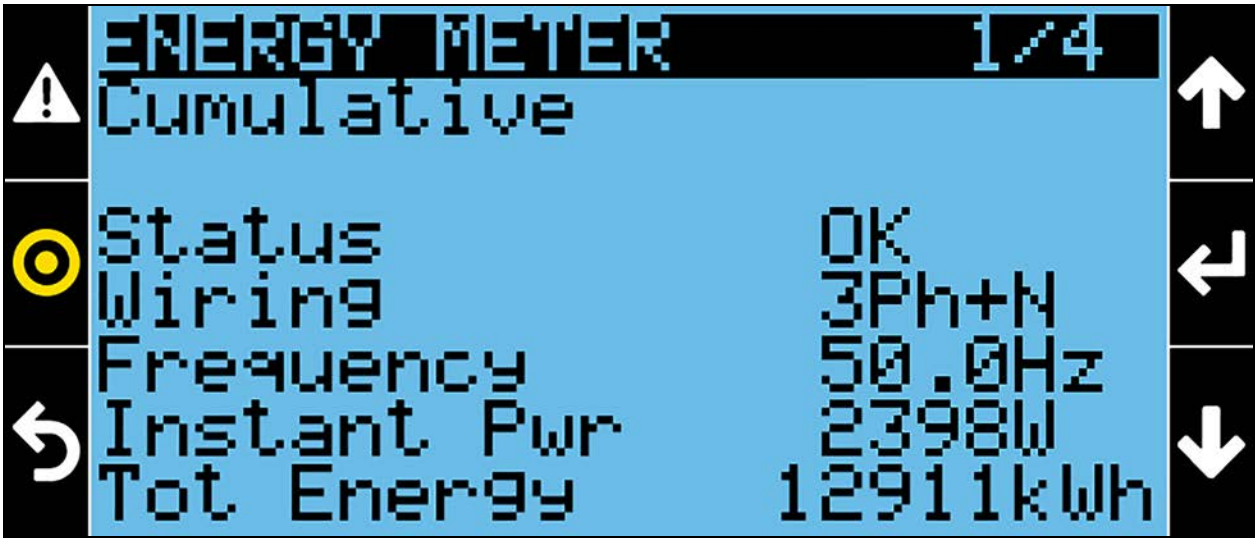
Figure 2.43 Outputs Page 1 of 1

- Out1 shows the analog output 1 setting (FANVSD) and value in percentage (e.g. 40% = 4.0 Volt).
- Out2 shows the analog output 2 setting (COND1) and value in percentage.
- Out3 shows the analog output 3 setting (HUMI) and value in percentage.
- Out4 shows the analog output 4 setting and value in percentage. Not available for PDX single circuit and PCW units.
- Out5 shows the analog output 5 setting and value in percentage. Not available for PDX single circuit and PCW units.

2.6.9 Energy Meter

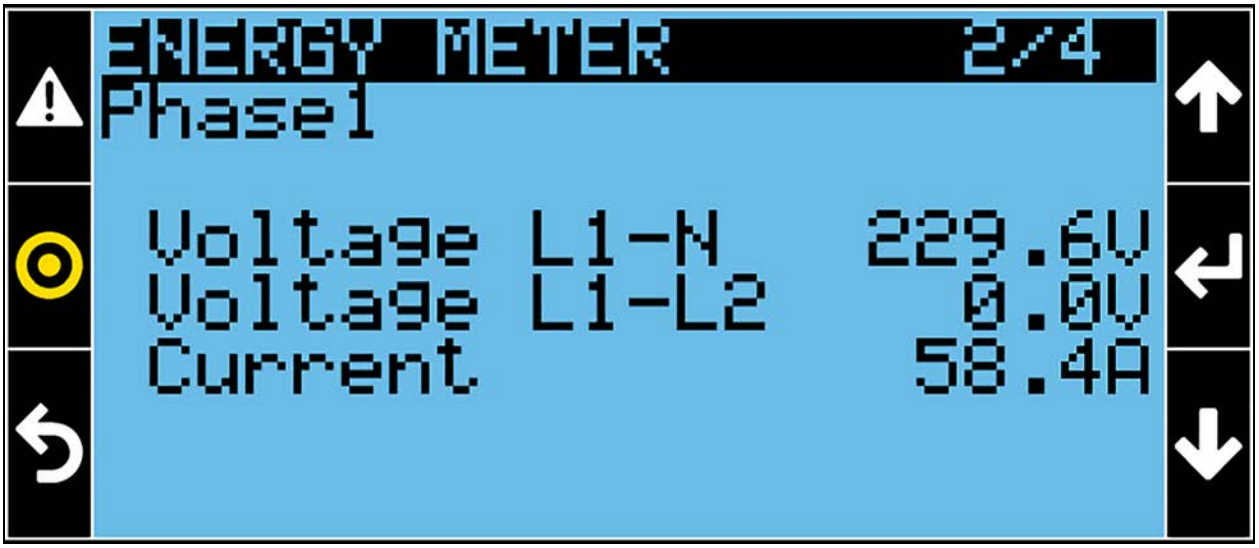
NOTE: The Energy Meter will be locked if the option is not available.

Figure 2.44 Energy Meter Page 1 of 4



- Status indicates the status of the energy meter: OFF, OK, Unknown, CommErr or Disconn.
- Wiring indicates the power supply connection type: 3Ph+N, 1Ph+N, 2Ph+N or 3PH.
- Frequency shows the actual frequency (Hz).
- Instant Pwr shows the instant power consumption (W).
- Tot Energy shows the total power consumption (KWh).

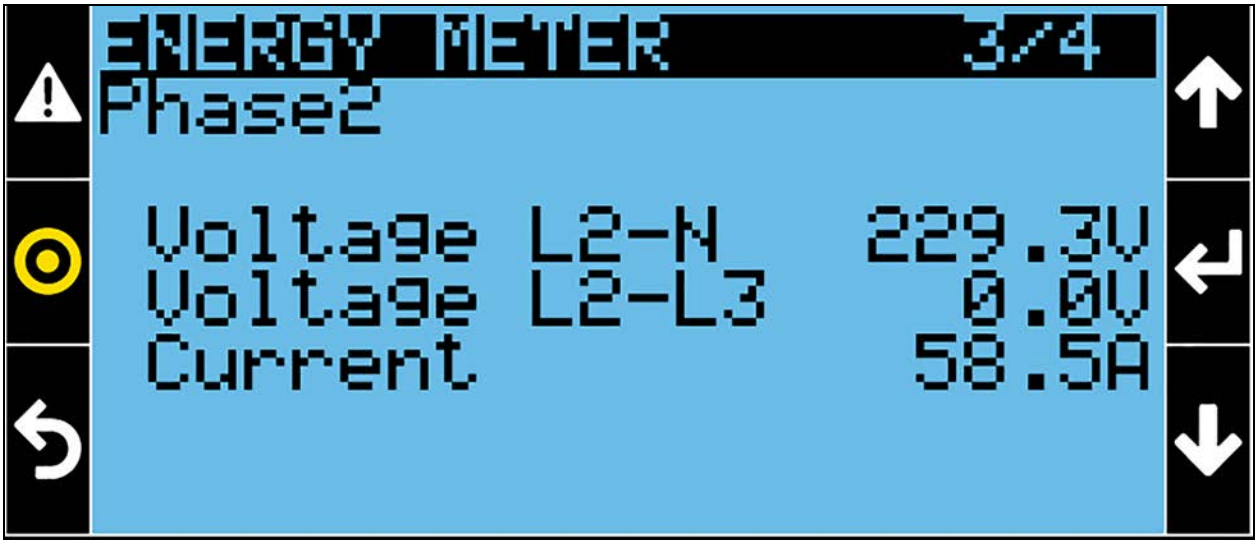
Figure 2.45 Energy Meter Page 2 of 4



- Voltage L1-N shows the actual Line 1 and Neutral voltages (V).
- Voltage L1-L2 shows the actual Line 1 to Line 2 voltages (V).

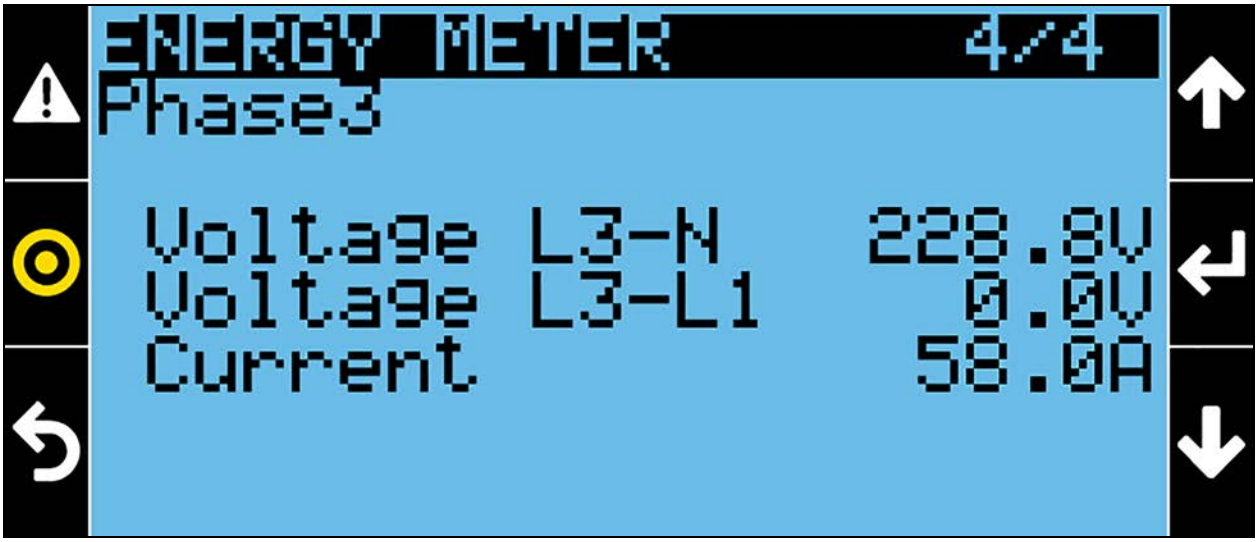
- Current shows the actual phase 1 Current value (A).

Figure 2.46 Energy Meter Page 3 of 4



- Voltage L2-N shows the actual Line 2 and Neutral voltages (V).
- Voltage L2-L3 shows the actual Line 2 to Line 3 voltages (V).
- Current shows the actual phase 2 Current value (A).

Figure 2.47 Energy Meter Page 4 of 4

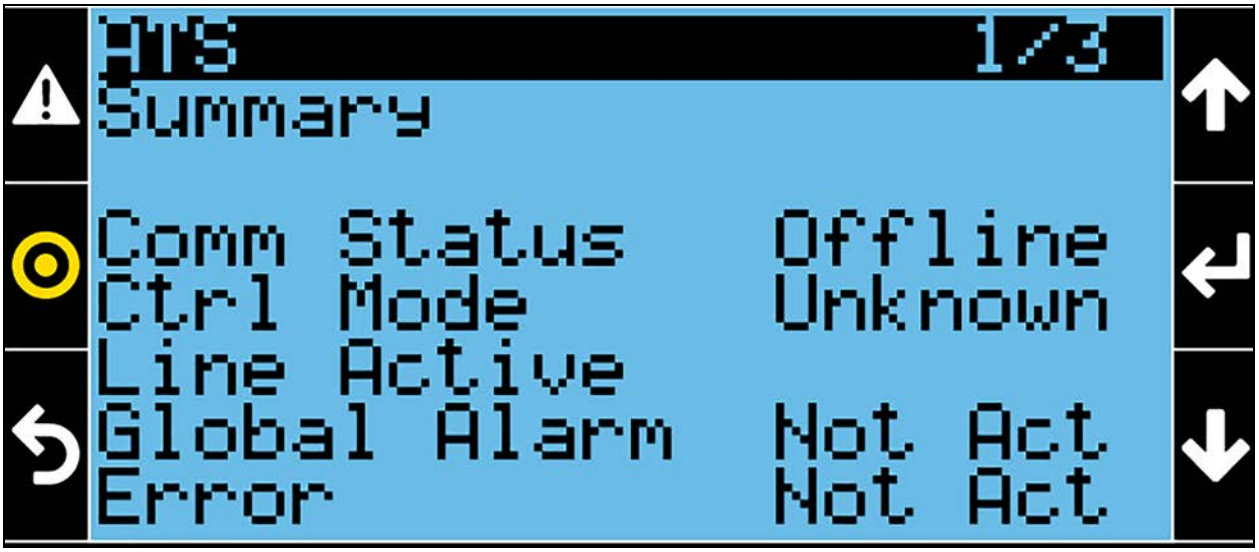


- Voltage L3-N shows the actual Line 3 and Neutral voltages (V).
- Voltage L3-L1 shows the actual Line 3 to Line 1 voltages (V).
- Current shows the actual phase 3 Current value (A).

2.6.10 ATS

NOTE: The ATS menu will be locked if the option is not available.

Figure 2.48 ATS Page 1 of 3



Comm Status indicates the status of the ATS: Offline, Online.

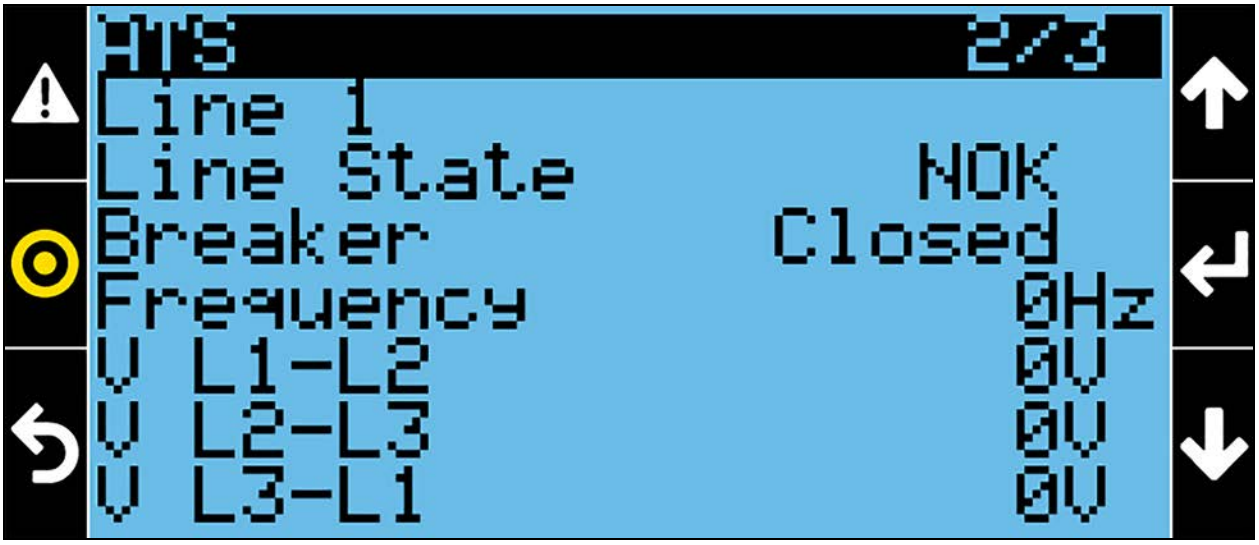
Ctrl Mode indicates the ATS working mode: Unknown, Off, Manual, Auto, Test.

Line Active indicates which power supply line (1 or 2) is feeding the unit.

Global Alarm indicates if the ATS is in alarm (Act).

Error indicates if the ATS is in error (Act).

Figure 2.49 ATS page 2 of 3



Line 1

Line Status indicates if the power supply 1 is present (OK) or not (NOK).

Breaker indicates the status of the breaker: Closed, Alarm, Unknown, Command, Close Cmd, Open Cmd.

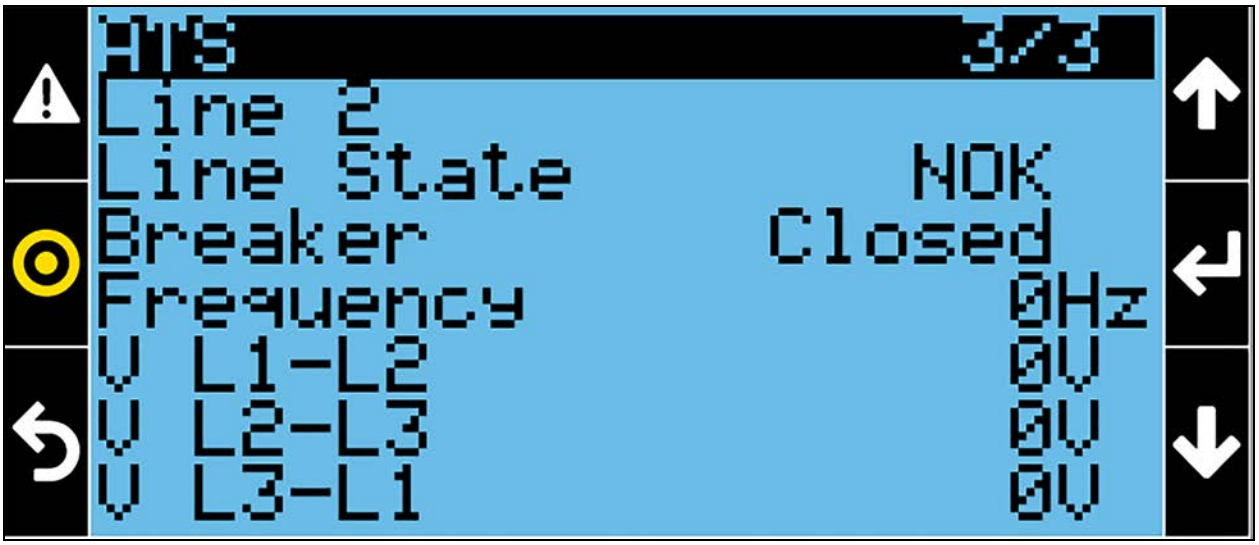
Frequency shows the actual frequency (Hz).

V L1-L2 shows the actual Line 1 to Line 2 voltages (V).

V L2-L3 shows the actual Line 2 to Line 3 voltages (V).

V L3-L1 shows the actual Line 3 to Line 1 voltages (V).

Figure 2.50 ATS page 3 of 3



Line 2

Line Status indicates if the power supply 2 is present (OK) or not (NOK).

Breaker indicates the status of the breaker: Closed, Alarm, Unknown, Command, Close Cmd, Open Cmd.

Frequency shows the actual frequency (Hz).

V L1-L2 shows the actual Line 1 to Line 2 voltages (V).

V L2-L3 shows the actual Line 2 to Line 3 voltages (V).

V L3-L1 shows the actual Line 3 to Line 1 voltages (V).

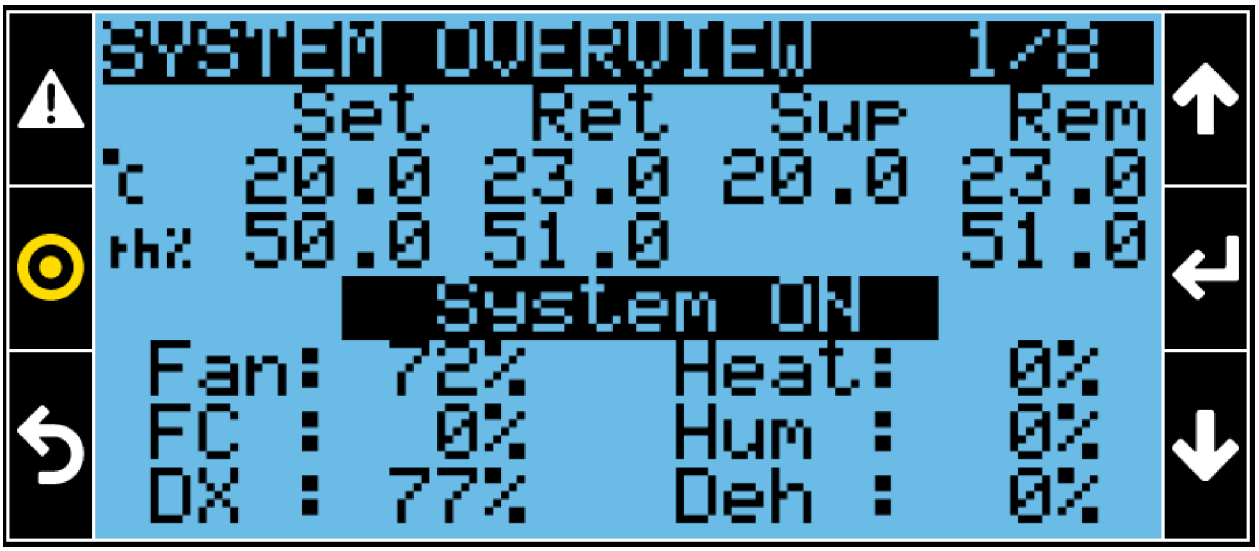
2.6.11 Unit Info

Figure 2.51 Unit Info Page 1 of 1

- Unit Id indicates the Unit Identification number in the case of networking.
- Core Type indicates the core type of the unit main board.
- SW version: shows the software version installed in the unit main board.
- OS version: shows the operating system version installed in the unit main board.
- BOOT version: shows the boot loader version installed in the unit main board.

2.7 System Overview

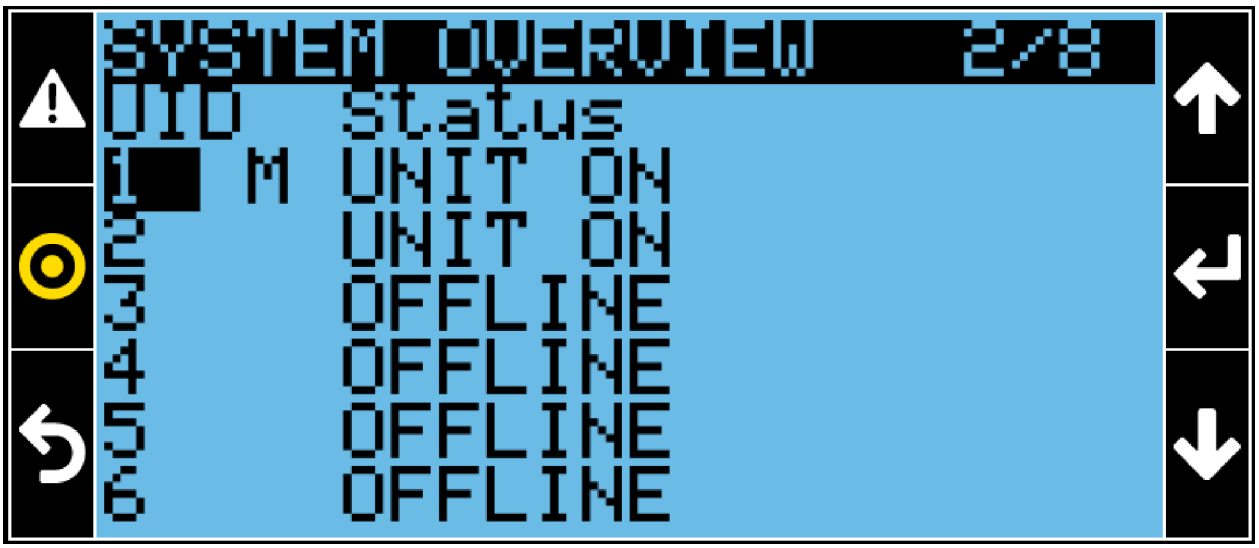
Figure 2.52 System Overview Page 1 of 8



From Main Screen, press the Increase ( ) Key to access the System Overview. A password is not required. This page displays:

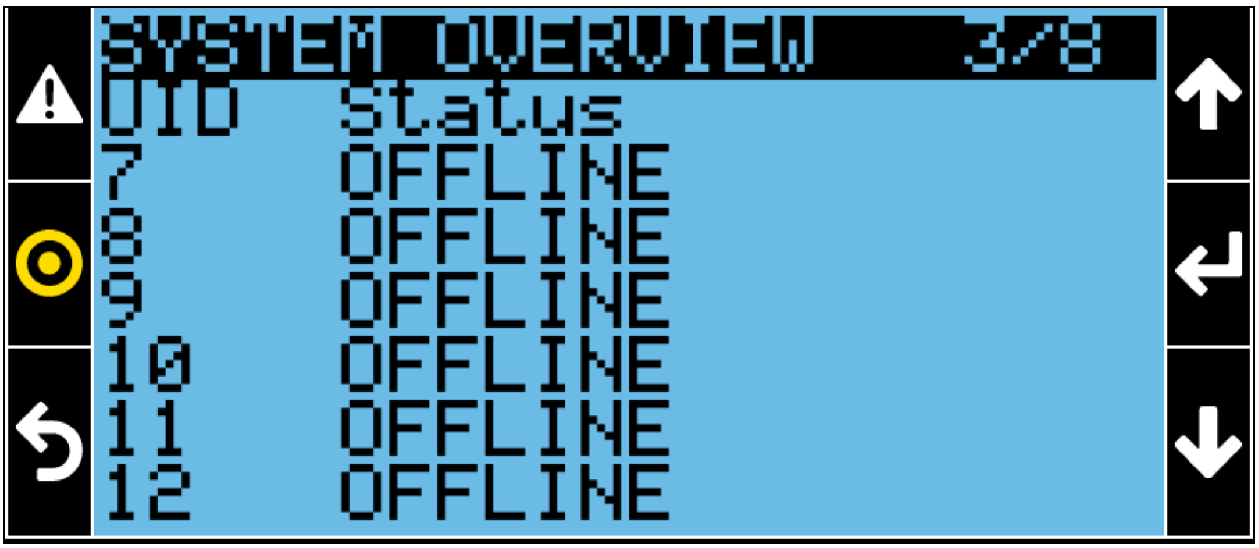
- The system status (ON/OFF). In Teamwork Mode 0 (No Teamwork) and without standby units, this status should not be considered.
- The system current setpoint for temperature and humidity (Set). In Teamwork Mode 0 (No Teamwork) those values should not be considered.
- The system or subgroup (average) value of return temperature (Ret), return humidity (Ret), supply temperature (Sup), remote temperature (Rem), and remote humidity (Rem).
- The system or subgroup (average) percentage utilization of fans (Fan), free cooling (FC), compressor (DX) or CW valve (CW) and heating (Heat). The system or subgroup (average) percentage deviation of humidification (Hum) and dehumidification (Deh), when active.

Figure 2.53 System Overview Page 2 of 8



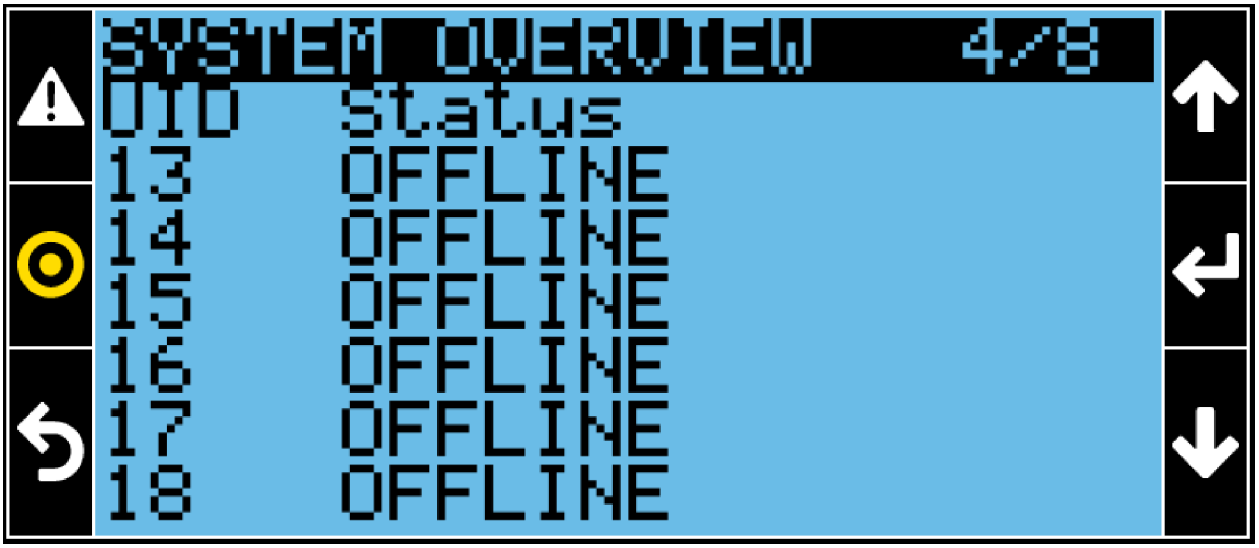
This page shows the status (On, Off, Standby) of each unit (from 1 to 6) in the system or subgroup. “M” indicates the Master unit in the system or subgroup.

Figure 2.54 System Overview Page 3 of 8



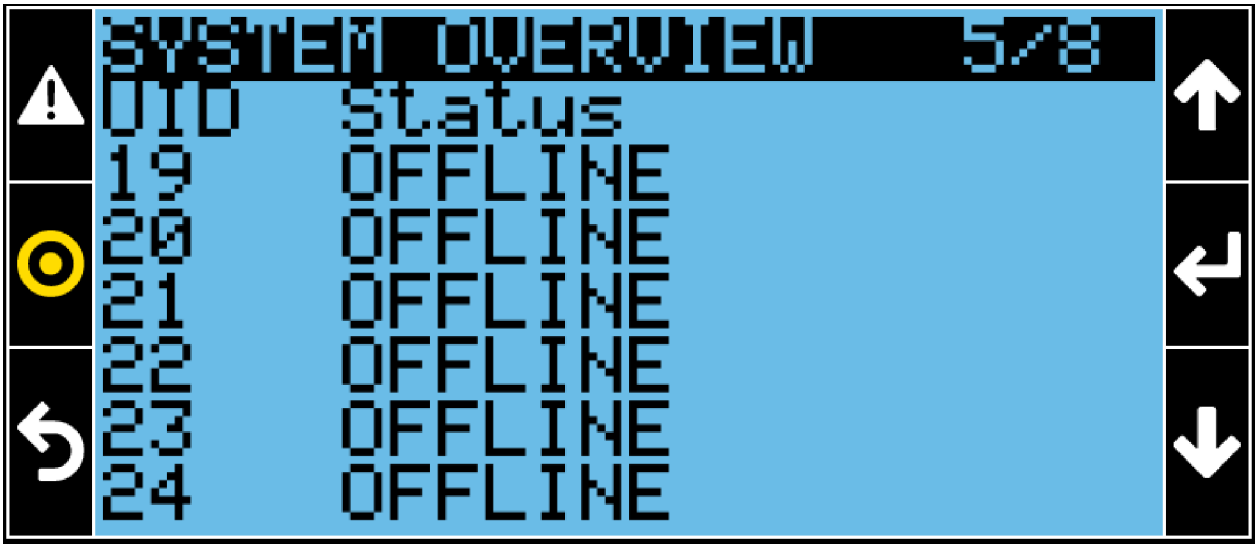
This page shows the status (On, Off, Standby) of each unit (from 7 to 12) in the system or subgroup.

Figure 2.55 System Overview Page 4 of 8



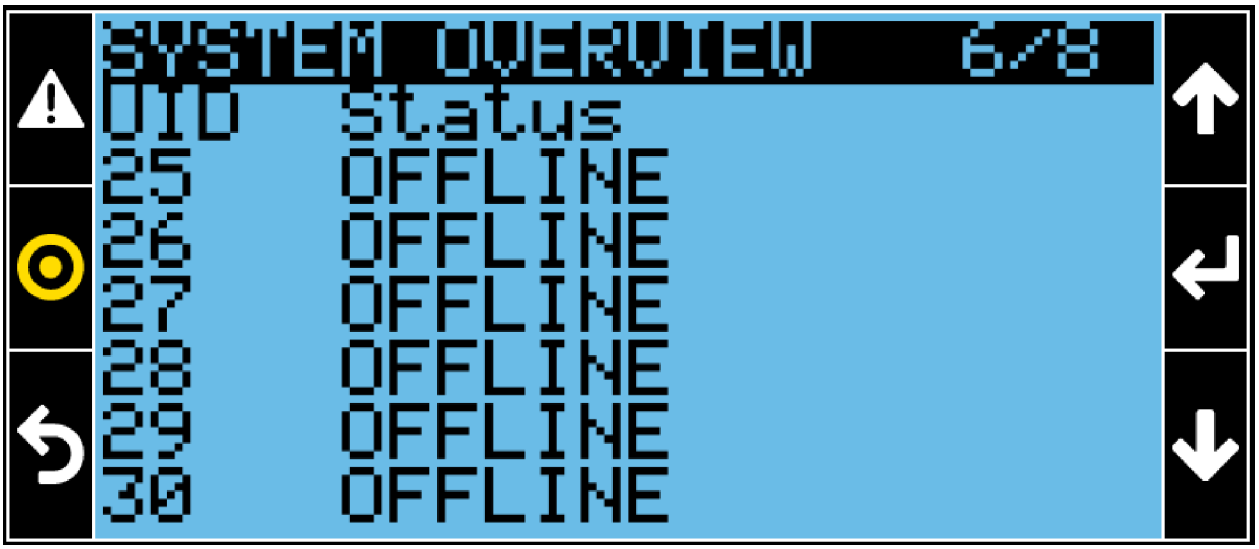
This page shows the status (On, Off, Standby) of each unit (from 13 to 16) in the system or subgroup.

Figure 2.56 System Overview Page 5 of 8



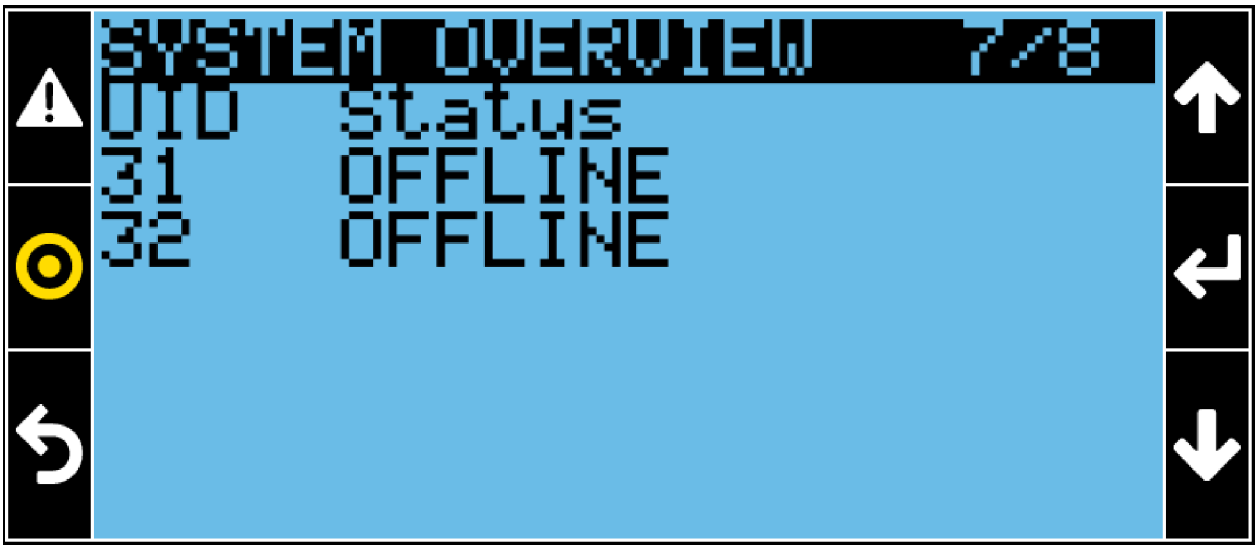
This page shows the status (On, Off, Standby) of each unit (from 19 to 24) in the system or subgroup.

Figure 2.57 System Overview Page 6 of 8



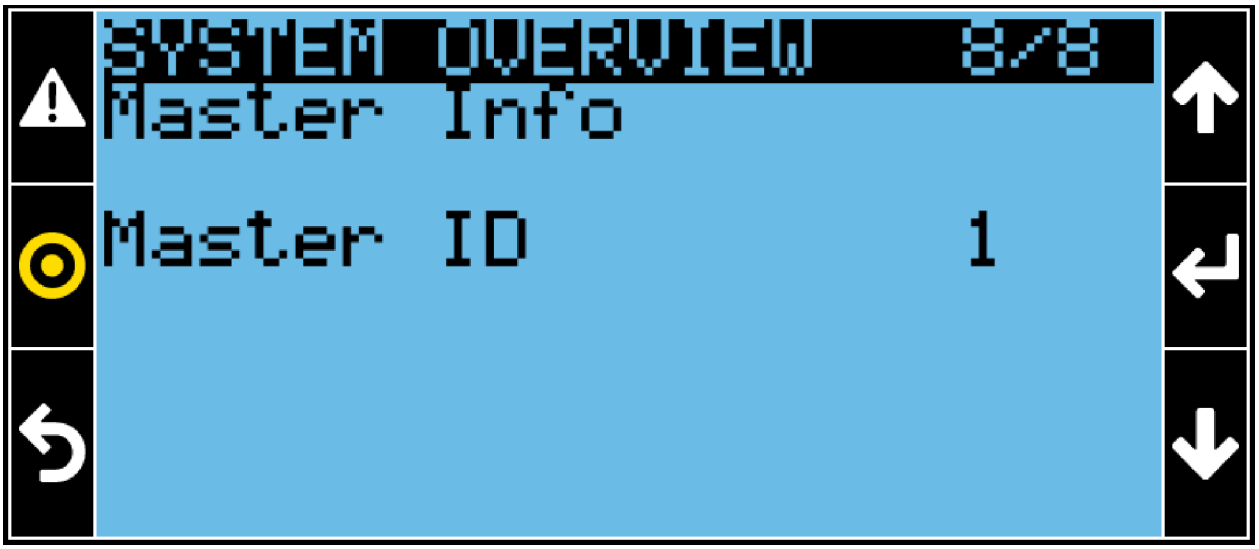
This page shows the status (On, Off, Standby) of each unit (from 25 to 30) in the system or subgroup.

Figure 2.58 System Overview Page 7 of 8



This page shows the status (On, Off, Standby) of each unit (31 and 32) in the system or subgroup.

Figure 2.59 System Overview Page 8 of 8



The Master information indicates which unit is the Master of the system or subgroup.

2.8 Events Report

Figure 2.60 Events Report Icons View

Press the Alarm ( ) Key to access the Events Report window. A password is not required.

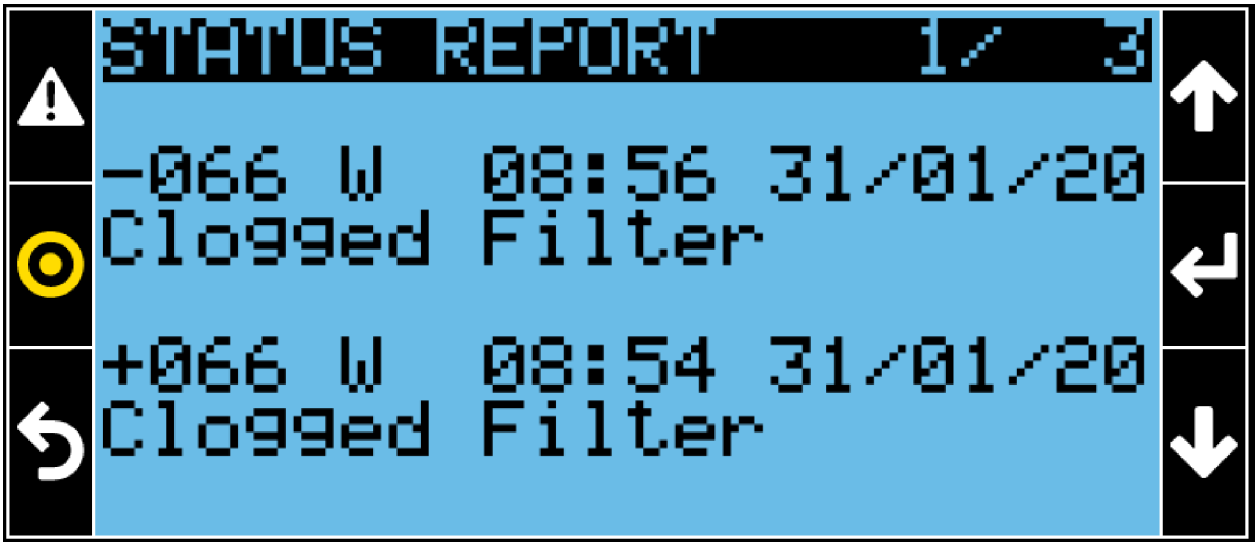
2.8.1 Active Events

Figure 2.61 Active Events List Page 1 of x

Press the Alarm ( ) Key or the Enter Key ( ) to access the Active Events menu. This menu lists all warnings and alarms which are currently active. The first number (066) represents the event ID; follow event type (warning), status (ACTIVE) and description (Clogged Filter). Alarm/Warning condition activates audible and visible indicators. Once the fault condition is fixed, the event can be reset by accessing this menu and keeping the Alarm Key ( ) pressed for three seconds. Press the Enter Key ( ), to select a single event and reset it.

2.8.2 Status Report

Figure 2.62 Status Report Page 1 of x



This menu contains a list of the last 200 events that occurred.

The first two rows show the event ID (066), the event type (W = Warning; A = Alarm; M = Message), when the event has been reset ("-" = Reset) and the event description (Clogged Filter).

The second two rows show the event ID (066), the event type (W = Warning; A = Alarm; M = Message), when the event has been generated ("+" = Generated) and the event description (Clogged Filter).

2.8.3 Export Events

Figure 2.63 Export Events Page 1 of 1

Download the events log from this menu.

- Memory type: Defines where to download the events log, Internal Memory or USB.
- Events Log: This is the command for downloading the events log.
- Clear Events Log: This command clears the events log.

3 Events List

Event ID	Web Description	Type	Reset
1	Retain Memory Error	Alarm	Auto
2	Too Much Retain Writing	Alarm	Auto
3	Heater High Temperature Lockout	Warning	Manual
4	High Return Temperature	Warning	Auto
5	High Supply Temperature	Warning	Auto
6	High Remote Temperature	Warning	Auto
7	Low Return Temperature	Warning	Auto
8	Low Supply Temperature	Warning	Auto
9	Low Remote Temperature	Warning	Auto
10	One (or more) Evaporator Fan in Alarm	Alarm	Auto
11	One (or more) Evaporator Fan Offline	Alarm	Auto
12	All Evaporator Fans Offline	Alarm	Auto
13	Loss of Air Flow	Alarm	Manual
14	---	---	---
15	BMS Offline	Warning	Auto
16	Low Pressure Circuit 1	Alarm	Manual
17	Low Pressure Circuit 2	Alarm	Manual
18	High Pressure Circuit 1	Alarm	Manual
19	High Pressure Circuit 2	Alarm	Manual
20	Soft High Pressure Circuit 1	Warning	Auto (Manual after the threshold set)
21	Soft High Pressure Circuit 2	Warning	Auto (Manual after the threshold set)
22	Thermal Protection Compressor 1 Circuit 1	Alarm	Manual
23	Thermal Protection Compressor 2 Circuit 1	Alarm	Manual
24	Thermal Protection Compressor 1 Circuit 2	Alarm	Manual
25	Thermal Protection Compressor 2 Circuit 2	Alarm	Manual
26	Low Suction Super Heat Circuit 1	Alarm	Manual
27	Low Suction Super Heat Circuit 2	Alarm	Manual
28	High Suction Super Heat Circuit 1	Alarm	Auto
29	High Suction Super Heat Circuit 2	Alarm	Auto
30	Return Sensor Failure (Cumulative)	Alarm	Auto
31	Supply Sensor Failure (Cumulative)	Alarm	Auto
32	Remote Sensor Failure (Cumulative)	Alarm	Auto
33	Outdoor Sensor Failure	Alarm	Auto

Event ID	Web Description	Type	Reset
34	Suction Pressure Sensor Circuit 1 Failure	Alarm	Auto
35	Suction Pressure Sensor Circuit 2 Failure	Alarm	Auto
36	Discharge Pressure Sensor Circuit 1 Failure	Alarm	Auto
37	Discharge Pressure Sensor Circuit 2 Failure	Alarm	Auto
38	Suction Temperature Sensor Circuit 1 Failure	Alarm	Auto
39	Suction Temperature Sensor Circuit 2 Failure	Alarm	Auto
40	Discharge Temperature Sensor Circuit 1 Failure	Alarm	Auto
41	Discharge Temperature Sensor Circuit 2 Failure	Alarm	Auto
42	Configurable Alarm	Alarm	Auto
43	C-Input 1	Alarm	Auto
44	C-Input 2	Alarm	Auto
45	C-Input 3	Alarm	Auto
46	C-Input 4	Alarm	Auto
47	Compressor Lockout (with Pump Down)	Message	Auto
48	Compressor Lockout	Message	Auto
49	Condenser 1 Failure	Warning	Auto
50	Condenser 2 Failure	Warning	Auto
51	Condensing Pump Alarm	Warning	Auto
52	Condensing Pump Alarm	Warning	Auto
53	Condensing Pump Alarm	Alarm	Auto
54	Fire Alarm	Alarm	Manual
55	Loss of Flow	Warning	Auto
56	Loss of Flow	Warning	Auto
57	Loss of Flow	Alarm	Auto
58	Heater Alarm	Alarm	Manual
59	High CW1 Temperature	Warning	Auto
60	High CW2 Temperature	Warning	Auto
61	Humidifier Problem	Warning	Auto
62	Configurable Warning	Warning	Auto
63	Water Alarm	Alarm	Auto
64	No Power	Warning	Auto
65	Smoke Alarm	Warning/Alarm	Auto
66	Clogged Filter	Warning	Manual
67	Stop Due to High Temp	Alarm	Auto
68	Out Of Working Range	Warning	Auto

Event ID	Web Description	Type	Reset
69	High Remote Humidity	Warning	Auto
70	Low Return Humidity	Warning	Auto
71	Low Remote Humidity	Warning	Auto
72	High Return Humidity	Warning	Auto
73	---	---	---
74	---	---	---
75	Force FC	Message	Auto
76	---	---	---
77	---	---	---
78	---	---	---
79	---	---	---
80	---	---	---
81	UC Missing	Alarm	Auto
82	Conditioner/Fans Working Hours Exceeded	Warning	Auto
83	CW1 Valve Working Hours Exceeded	Warning	Auto
84	CW2 Valve Working Hours Exceeded	Warning	Auto
85	Comp1 Circ1 Working Hours Exceeded	Warning	Auto
86	Comp2 Circ1 Working Hours Exceeded	Warning	Auto
87	Comp1 Circ2 Working Hours Exceeded	Warning	Auto
88	Comp2 Circ2 Working Hours Exceeded	Warning	Auto
89	FC Working Hours Exceeded	Warning	Auto
90	AirEco Working Hours Exceeded	Warning	Auto
91	PRE1 Working Hours Exceeded	Warning	Auto
92	PRE2 Working Hours Exceeded	Warning	Auto
93	El. Heater1 Working Hours Exceeded	Warning	Auto
94	El. Heater2 Working Hours Exceeded	Warning	Auto
95	Hot Water/Gas Working Hours Exceeded	Warning	Auto
96	Condenser 1 Working Hours Exceeded	Warning	Auto
97	Condenser 2 Working Hours Exceeded	Warning	Auto
98	Humidifier Working Hours Exceeded	Warning	Auto
99	Dehumidification Working Hours Exceeded	Warning	Auto
100	VSD Circuit 1 Out of Envelope	Alarm	Auto
101	VSD Circuit 1 Generic Event	Alarm	Auto
102	VSD Circuit 1 Offline	Alarm	Auto
103	VSD Circuit 1 Generic Event	Warning	Auto

Event ID	Web Description	Type	Reset
104	VSD Circuit 2 Out of Envelope	Alarm	Auto
105	VSD Circuit 2 Generic Event	Alarm	Auto
106	VSD Circuit 2 Offline	Alarm	Auto
107	VSD Circuit 2 Generic Event	Warning	Auto
108	Network Failure	Warning	Auto
109	No Connection to Unit 1	Warning	Auto
110	---	---	---
111	One (or more) Condenser C1 Fan/Valve in Alarm	Alarm	Auto
112	One (or more) Condenser C1 Fan/Valve Offline	Alarm	Auto
113	All Condenser C1 Fans/Valves Offline	Alarm	Auto
114	One (or more) Condenser C2 Fan/Valve in Alarm	Alarm	Auto
115	One (or more) Condenser C2 Fan/Valve Offline	Alarm	Auto
116	All Condenser C2 Fans/Valves Offline	Alarm	Auto
117	Master Unit not Available	Warning	Auto
118	HCB Offline	Warning	Auto
119	HCB Shut Down	Warning	Manual
120	Energy Meter Offline	Warning	Auto
121	Low Operating Pressure Circuit 1	Alarm	Auto
122	Low Operating Pressure Circuit 2	Alarm	Auto
123	Maximum Operating Pressure Circuit 2	Alarm	Auto
124	Maximum Operating Pressure Circuit 1	Alarm	Auto
125	Generic EEV Circuit 1	Alarm	Auto
126	Generic EEV Circuit 2	Alarm	Auto
127	EEV Driver Offline Circuit 1	Alarm	Auto
128	EEV Driver Offline Circuit 2	Alarm	Auto
129	All Condenser C1 Fans/Valves in Alarm	Warning	Auto
130	All Condenser C2 Fans/Valves in Alarm	Warning	Auto
131	High Discharge Temperature Circuit 1	Alarm	Auto
132	High Discharge Temperature Circuit 2	Alarm	Auto
133	Wrong Damper Position	Alarm	Auto
134	Reduced Eco Air Flow	Warning	Auto
135	VSD Circuit 1 StartUp Failure	Alarm	Auto
136	VSD Circuit 2 StartUp Failure	Alarm	Auto
137	Loss of CW1 Flow	Warning	Auto
138	Loss of CW2 Flow	Warning	Auto

Event ID	Web Description	Type	Reset
139	FC Off by Dehum	Message	Auto
140	FC Stopped for 1 Hour by Hum	Message	Auto
141	FC Stopped for 1 Hour by Dehum	Message	Auto
142	FC Stopped for 1 Hour by DT3	Message	Auto
143	Dehum Stop by Low Limit 1	Message	Auto
144	Dehum Stop by Low Limit 2	Message	Auto
145	FC Lockout	Message	Auto
146	Second Set Point Active	Message	Auto
147	Heaters Lockout	Message	Auto
148	Humidifier and Heaters Lockout	Message	Auto
149	Humidifier Lockout	Message	Auto
150	Standby On	Message	Auto
151	Cool and Fan 100%	Message	Auto
152	Ultracap Active	Message	Auto
153	Power On	Message	Auto
154	Power Off	Message	Auto
155	Unit On	Message	Auto
156	---	---	---
157	Expansion Board 1 Offline	Alarm	Auto
158	Expansion Board 2 Offline	Alarm	Auto
159	Heater High Temperature Probe Fail	Alarm	Auto
160	Optional Probe 1 Fail	Warning	Auto
161	Air Economizer Probe Fail	Alarm	Auto
162	Glycol Temperature Probe Fail	Alarm	Auto
163	Optional Probe 2 Fail	Warning	Auto
164	Optional Probe 3 Fail	Warning	Auto
165	CW1 Inlet Probe Fail	Warning	Auto
166	CW1 Outlet Probe Fail	Warning	Auto
167	CW2 Inlet Probe Fail	Warning	Auto
168	CW2 Outlet Probe Fail	Warning	Auto
169	Local Static Pressure Sensor Fail	Warning	Auto
170	System Static Pressure Sensor Fail	Warning	Auto
171	CW1 Water Flow Sensor Fail	Warning	Auto
172	CW2 Water Flow Sensor Fail	Warning	Auto
173	Return System Sensor Failure	Warning	Auto

Event ID	Web Description	Type	Reset
174	Remote System Sensor Failure	Warning	Auto
175	HCB Disable	Warning	Manual
176	Mb CW Valve 1 Offline	Alarm	Auto
177	Mb CW Valve 2 Offline	Alarm	Auto
178	Mb CW Valve 3 Offline	Alarm	Auto
179	Mb CW Valve 4 Offline	Alarm	Auto
180	Supply Water High Conductivity	Warning	Manual
181	Air Eco Emergency Override	Message	Auto
182	Remote 1 Sensor Failure	Warning	Auto
183	Remote 2 Sensor Failure	Warning	Auto
184	Remote 3 Sensor Failure	Warning	Auto
185	Remote 4 Sensor Failure	Warning	Auto
186	Remote 5 Sensor Failure	Warning	Auto
187	Remote 6 Sensor Failure	Warning	Auto
188	Remote 7 Sensor Failure	Warning	Auto
189	Remote 8 Sensor Failure	Warning	Auto
190	Remote 9 Sensor Failure	Warning	Auto
191	Remote 10 Sensor Failure	Warning	Auto
192	Condenser Refrigerant Sensor T1 Failure	Alarm	Auto
193	Pump1 Outlet Temp Sensor Failure	Alarm	Auto
194	Pump1 Inlet Press Sensor Failure	Alarm	Auto
195	Pump1 Outlet Press Sensor Failure	Alarm	Auto
196	Condenser Refrigerant Sensor T2 Failure	Alarm	Auto
197	Pump2 Outlet Temp Sensor Failure	Alarm	Auto
198	Pump2 Inlet Press Sensor Failure	Alarm	Auto
199	Pump2 Outlet Press Sensor Failure	Alarm	Auto
200	Pump1 Failure	Alarm	Auto
201	Pump2 Failure	Alarm	Auto
202	Condenser 1 Outdoor Temp Sensor Failure	Alarm	Auto
203	Condenser 2 Outdoor Temp Sensor Failure	Alarm	Auto
204	Expansion Board 3 Offline	Alarm	Auto
205	Expansion Board 4 Offline	Alarm	Auto
206	Unit Off by Display	Message	Auto
207	Unit Off by Remote Input	Message	Auto
208	Unit Off by 3 Pos Switch	Message	Auto

Event ID	Web Description	Type	Reset
209	Unit Off by Monitoring	Message	Auto
210	Unit Off by Timer	Message	Auto
211	Unit Off by Alarm	Message	Auto
212	Unit Standby Mode	Message	Auto
213	Unit Manual Mode	Message	Auto
214	Very Low Outdoor Temperature	Warning	Auto
215	Very Low Outdoor Temperature	Alarm	Auto
216	Low SuperHeat Pump 1	Alarm	Manual
217	High SuperHeat Pump 1	Alarm	Manual
218	Low SubCool Pump 1	Alarm	Manual
219	Low Diff Press Pump 1	Alarm	Manual
220	High Diff Press Pump 1	Alarm	Manual
221	Low SuperHeat Pump 2	Alarm	Manual
222	High SuperHeat Pump 2	Alarm	Manual
223	Low SubCool Pump 2	Alarm	Manual
224	Low Diff Press Pump 2	Alarm	Manual
225	High Diff Press Pump 2	Alarm	Manual
226	Pump 1 Alarm	Alarm	Manual
227	Pump 2 Alarm	Alarm	Manual
228	Startup Failure Pump 1	Alarm	Manual
229	Startup Failure Pump 2	Alarm	Manual
230	Startup Lock Pump 1	Warning	Auto
231	Startup Lock Pump 2	Warning	Auto
232	Low Start Pressure Circuit 1	Alarm	Manual
233	Low Start Pressure Circuit 2	Alarm	Manual
234	Stop On Low Pressure Circuit 1	Message	Auto
235	Stop On Low Pressure Circuit 2	Message	Auto
236	Freeze Protection Circuit 1	Message	Auto
237	Freeze Protection Circuit 2	Message	Auto
238	Low Start Pressure Circuit 1	Message	Auto
239	Low Start Pressure Circuit 2	Message	Auto
240	Capacity Derating Circuit 1	Message	Auto
241	Capacity Derating Circuit 2	Message	Auto
242	Static Pressure Out Of Range	Warning	Auto
243	EEV Circuit 1 Working Hours Exceeded	Warning	Auto

Event ID	Web Description	Type	Reset
244	EEV Circuit 2 Working Hours Exceeded	Warning	Auto
245	EconoPhase Prop Lockout	Message	Auto
246	Surge Arrester Failure	Alarm	Manual
247	Clogged Filter Th1	Warning	Manual
248	Clogged Filter Th2	Warning	Manual
249	Clogged Filter Error	Warning	Auto
250	ATS Error	Warning	Auto
251	Airflow Sensor Failure	Warning	Auto
252	Mb Condenser Valve 1 Offline	Alarm	Auto
253	Mb Condenser Valve 2 Offline	Alarm	Auto
254	Mb FC Valve 1 Offline	Alarm	Auto
255	Aux Sensor Disconnected	Warning	Auto

Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2778

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

1050 Dearborn Drive

Columbus, OH, 43085, USA

Europe

Via Leonardo Da Vinci 16/18 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road

Wanchai, Hong Kong

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Appendix B: General Setpoint Settings

Table B.1 Temperature Control

Temperature Control	Default Value	Adjustable Range
Temperature Control Mode	Return	Return Supply Return + Supply Limit Remote
Return Temperature Setpoint	79 °F 26 °C	41 - 122 °F 5 - 50 °C
Return Proportional Band	7 °F 4 K	1.8 - 54.0 °F 1 - 30 K
Return Deadband	0 °F 0 K	0 - 54.0 °F 0 - 30 K
Return Integration Time	0 sec	0 - 900 sec
Supply Temperature Setpoint	70 °F 21 °C	41 - 122 °F 5 - 50 °C
Supply Proportional Band	22 °F 12 K	1.8 - 54.0 °F 1 - 30 K
Supply Deadband	0 °F 0 K	0 - 54.0 °F 0 - 30 K
Supply Integration Time	300 sec	0 - 900 sec
Remote Temperature Setpoint	79 °F 26 °C	41 - 122 °F 5 - 50 °C
Remote Proportional Band	0 °F 0 K	1.8 - 54.0 °F 1 - 30 K
Remote Deadband	0 °F 0 K	0 - 54.0 °F 0 - 30 K
Remote Integration Time	0 sec	0 - 900 sec
Compensation Type	No	No Return Remote
Second Setpoint	77 °F 25 °C	41 - 122 °F 5 - 50°C

Table B.1 Temperature Control (continued)

Temperature Control	Default Value	Adjustable Range
Setpoint Limit Enabled	No	No Yes
Setpoint Limit Low	59 °F 15 °C	41 - 122 °F 5 - 50°C
Setpoint Limit High	77 °F 25 °C	41 - 122 °F 5 - 50°C

Table B.2 Temperature Control - BMS

Temperature Control - BMS	Default Value	Adjustable Range
BMS Time-out Enable	No	No Yes
BMS Timeout	60 sec	10 - 180 sec
BMS Temperature Control	77 °F 25 °C	41 - 122 °F 5 - 50°C

Table B.3 Humidity Control

Humidity Control	Default Value	Adjustable Range
Humidity Control Type	Relative	Relative Relative Compensated Absolute Dew Point
Humidity Control Mode	Return	Remote Return
Relative Humiditiy Setpoint	50 %rh	19.0 - 80.0 %rh
Relative Humidity Proportional Band	10%	0.0 - 30.0 %
Relative Humidity Deadband	0%	0.0 - 30.0 %
Relative Humidity Integration Time	0 sec	0 - 900 sec
Relative Compensated Setpoint	50 %rh	19.0 - 80.0 %rh
Relative Compensated Proportional Band	10%	0 - 30.0 %
Relative Compensated Deadband	0%	0 - 30.0 %
Relative Compensated Integration Time	0 sec	0 - 900 sec
Absolute Humidity Setpoint	10.9 g/kg	0 - 30.0 g/kg
Absolute Humidity Proportional Band	2.2 g/kg	1.0 - 30.0 g/kg
Absolute Humidity Deadband	0 g/kg	0 - 30.0 g/kg
Absolute Humidity Integration Time	0 sec	0 - 900 sec
Dew Point Setpoint	49 °F	41 - 68 °F

Table B.3 Humidity Control (continued)

Humidity Control	Default Value	Adjustable Range
	9 °C	5.0 - 20.0 °C
Dew Point Proportional Band	7 °F 4 K	1.8 - 54.0 °F 1.0 - 30.0 K
Dew Point Deadband	0 °F 0 K	0 - 54.0 °F 0 - 30.0 K
Dew Point Integration Time	0	0 - 900 sec

Table B.4 Fan Control

Fan Control	Default Value	Adjustable Range
Auto Mode	On	Off On
Fan Control Mode	Return	Return Supply Remote Delta Static Pressure Return CW Priority Fixed Cooling
Start Speed	30%	0 - 100 %
Start Time	45 sec	0 - 120 sec
Stop Speed	30%	0 - 100%
Stop Time	30 sec	0 - 120 sec
Supply Setpoint	70 °F 21 °C	41 - 122 °F 5.0 - 50.0 °C
Supply Proportional Band	22 °F 12 K	1.8 - 54.0 °F 1.0 - 30.0 K
Supply Deadband	0 °F 0 K	0 - 54.0 °F 0 - 30.0 K
Supply Integration Time	120	0 - 3600 sec
Remote Setpoint	97 °F 36 °C	41 - 122 °F 5.0 - 50.0 °C
Remote Proportional Band	7 °F 4 K	1.8 - 54.0 °F 1.0 - 30.0 K
Remote Deadband	0 °F 0 K	0 - 54.0 °F 0 - 30.0 K

Table B.4 Fan Control (continued)

Fan Control	Default Value	Adjustable Range
Remote Integration Time	0 sec	0 - 3600 sec
Return Setpoint	96.8 °F 36 °C	41 - 122 °F 5.0 - 50.0 °C
Return Proportional Band	7 °F 4 K	1.8 - 54.0 °F 1.0 - 30.0 K
Return Deadband	0 °F 0 K	0 - 54.0 °F 0 - 30.0 K
Return Integration Time	0 sec	0 - 3600 sec

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