Liebert® AFC iCOM™ V1C Control Application

User Guide

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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.

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1 Display

The display is equipped with six buttons that can be used to navigate the screens and an audible buzzer. This document describes the different screens available in the V1C application and how to navigate them.

1.1 Keyboard Functions

The display provides six buttons for navigation.

Icon	Key Name	Function
	Alarm	Accesses the Events Report menu. Silences the audible/visible signal. Resets the active event.
	Prg	Accesses the Unit ON/OFF and the System ON/OFF menu.
	Esc	Returns to the previous menu. Cancels the entry row.
	Up – Down	Menu navigation. Parameters value modification.
	Enter	Enters the selected menu/switch from parameters navigation to modification.

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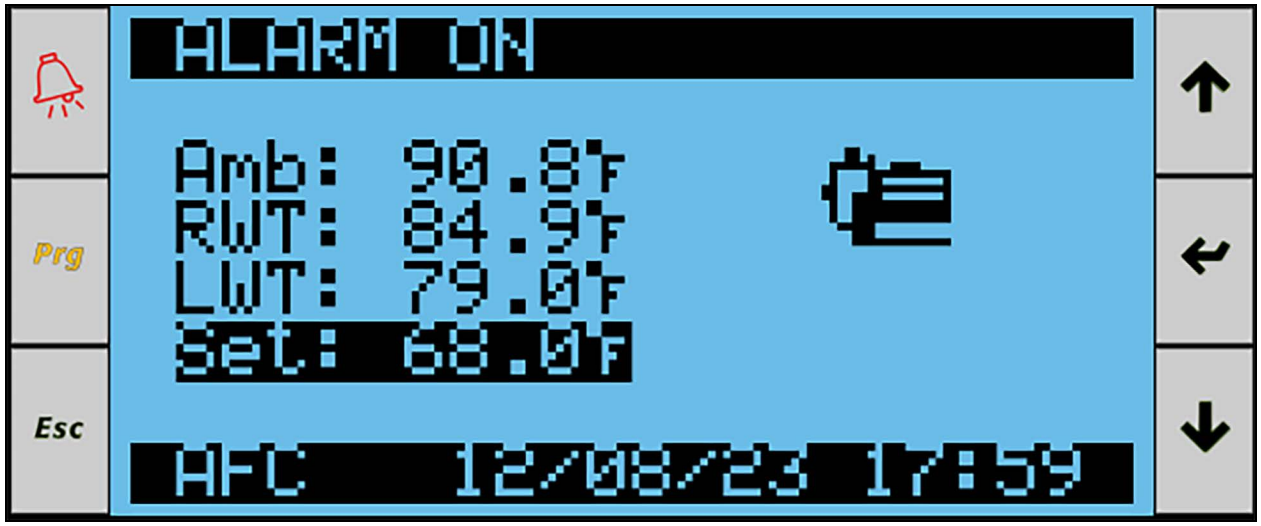
1.2 Main Screen

The Main Screen on the display shows the following information:

Figure 1.1 Main Screen



- Unit Status:
  - DISPLAY OFF: Unit display has been switched OFF.
  - REMOTE OFF: Unit digital input has been switched OFF.
  - BMS OFF: Unit is kept OFF via BMS.
  - ALARM OFF: Unit switched OFF by critical alarm.
  - SHUT DOWN: Unit requested for shut down, waiting for shutdown procedures to complete.
  - STANDBY: Unit is in Standby mode.
  - UNIT ON: Unit is running with no active warnings or alarms.
  - ALARM ON: Unit is running with one or more alarms active.
  - STARTUP: Unit requested for start-up, waiting for start-up procedures to complete.
  - WARNING ON: Unit is running with one or more warnings active and with no alarms.
  - POWER FAILURE: Unit is in power failure.
  - MANUAL MODE: Unit is in manual mode.
  - SYSTEM OFF: Unit is switched off by system off status.
- The current value of:
  - The Ambient air temperature (Amb)
  - The Return Water Temperature (RWT)
  - The Leaving Water Temperature (LWT)
  - The temperature Setpoint (Set)
- The current date and time
- The status of devices and control functions represented by icons

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Icon	Device/Function
	At least one compressor is active.
	Condensing fans are active.
	Free Cooling is enabled with no fans running.
	Free Cooling is enabled and fans are active.
	Power failure event.
	Water pump is running.
	Water pump is shutting down.
	Fast Start is active.
	Anti-freeze function is active.
	Chiller Water Manager (CWM) is enabled.
	Supersaver is enabled.
	Setpoint Shifting by Emergency Mode or Analog User Input is active.

Figure 1.2 on the next page shows how to navigate from the Main Screen to the other menus.

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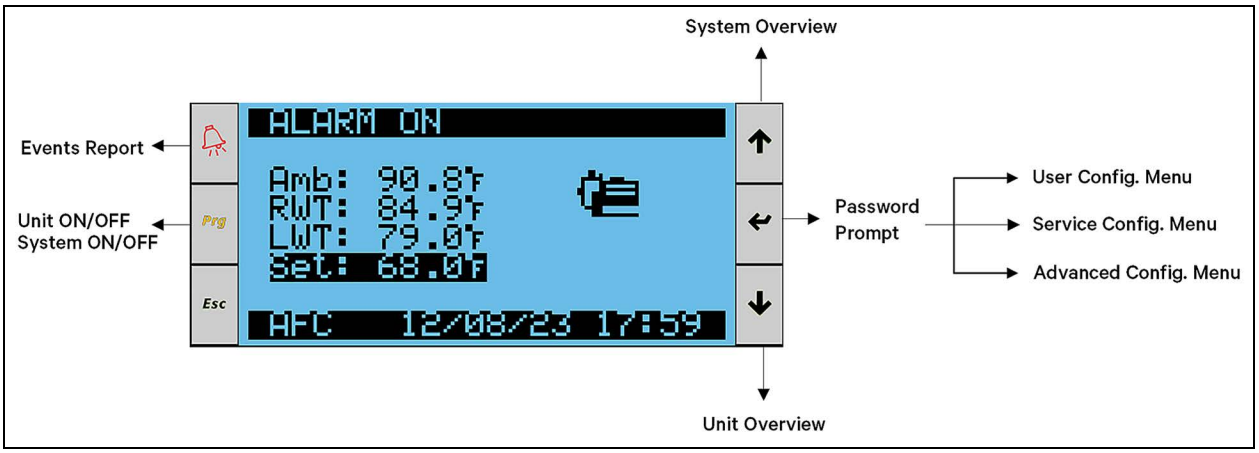
Figure 1.2 Main Screen Navigation



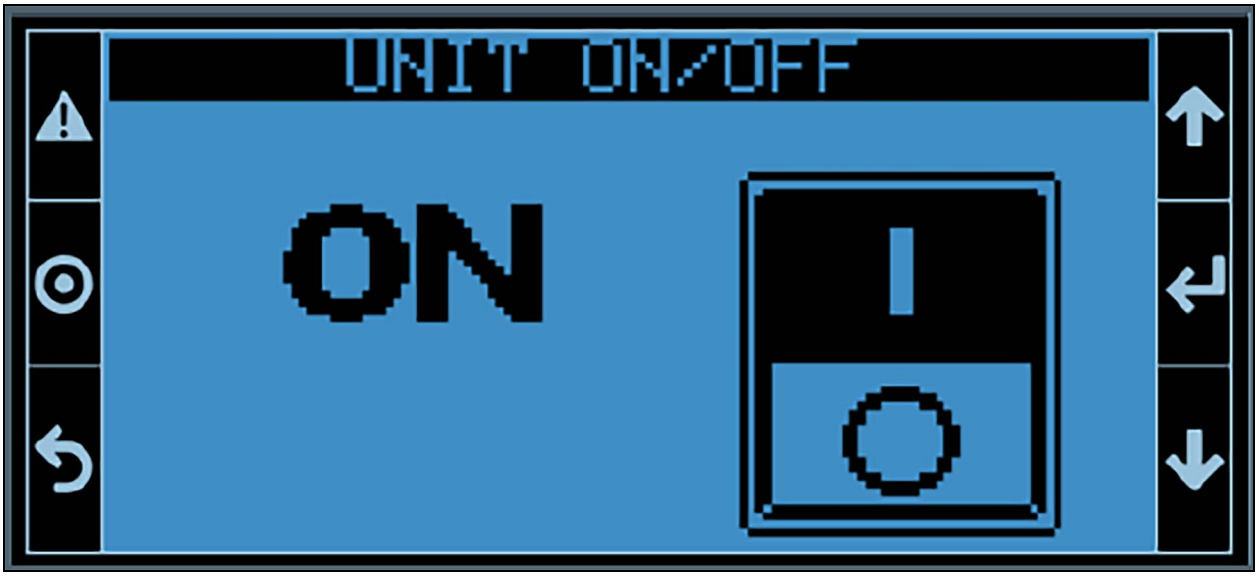
1.3 Unit On/Off

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

- Remote ON/OFF: Unit is switched ON/OFF by a Remote contact (digital input).
- Display ON/OFF: Unit is switched ON/OFF via Display.
- Monitoring ON/OFF: Unit is switched ON/OFF via BMS.

Unit can be switched ON/OFF via Display in the Unit ON/OFF screen, which can be accessed by pressing the Prg key.

Figure 1.3 Unit ON/OFF Screen



The status of the unit can be switched (ON -> OFF or OFF -> ON) by pressing the Enter key for three seconds. See Figure 1.3 above .

The unit will be switched OFF by a critical Alarm if one of the following events occurs:

- Primary Water Flow is missing.
- Unit Configuration is missing.
- Controller Memory Error.

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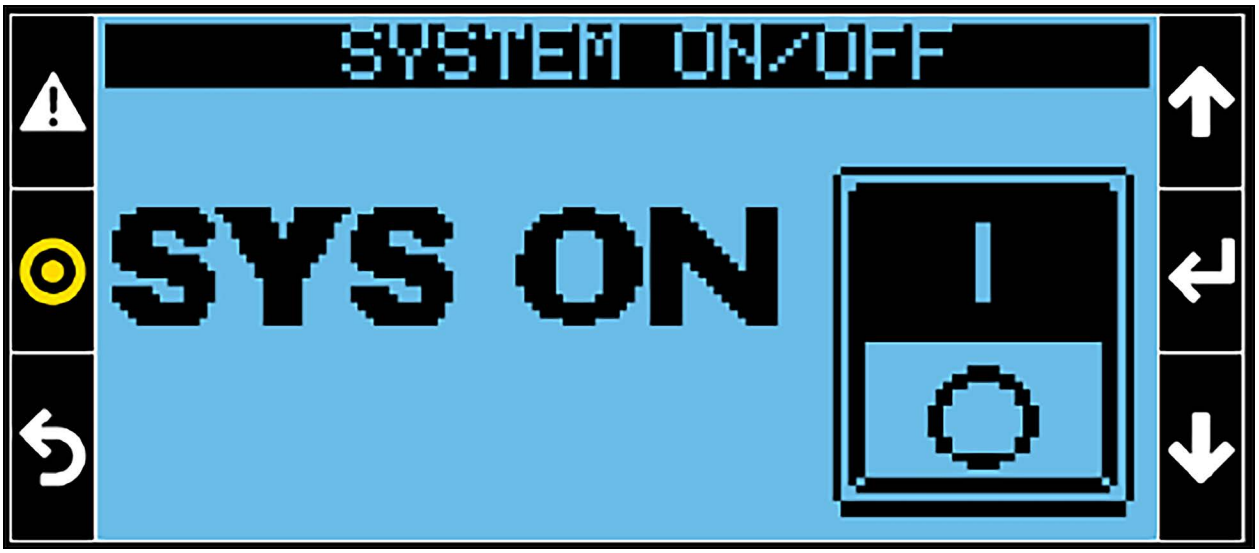
1.4 System On/Off

The entire system can be switched ON/OFF via Display in the System ON/OFF screen, which can be accessed by pressing the Prg key two times. See Figure 1.4 below .

Figure 1.4 System On/Off Screen

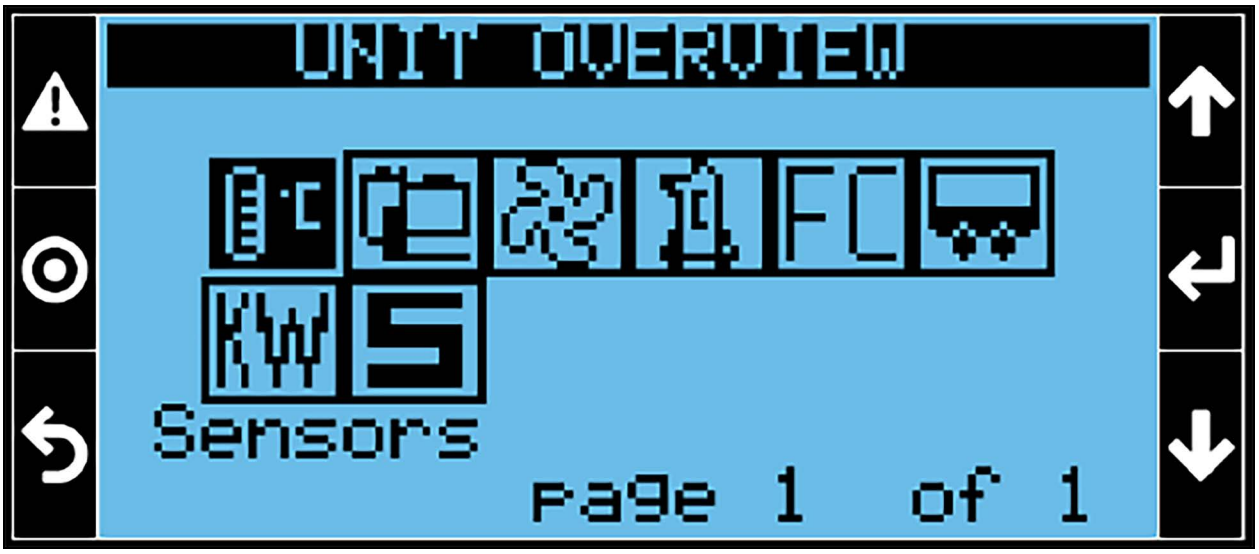


The status of the system can be switched (ON -> OFF or OFF -> ON) by pressing the Enter key for three seconds.

1.5 Unit Overview

The Unit Overview screen can be accessed by pressing the Down arrow key from the Main Screen. From the Main Screen, information from main components and features can be accessed using the Up/Down arrow keys and then the Enter key.

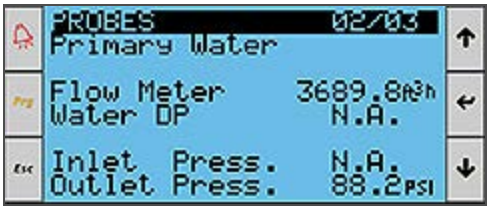
Figure 1.5 Unit Overview Screen



1.5.1 Sensors

Figure 1.6 below shows the current values measured by the sensors installed in the unit.

Figure 1.6 Sensors Menu

	Page 1 shows the values of the ambient air temperature, the unit inlet and outlet water temperatures, and the inlet temperature of evaporator 1 and evaporator 2.
	Page 2 shows the values of the primary water flow (in m3/h), the pressure difference between inlet and outlet sections of the primary water circuit, and the inlet and outlet water pressure.
	Page 3 shows the value of the gas leakage measured by the Leak Detector (in ppm), if present. If the device is not available in the unit, N.A. is shown.

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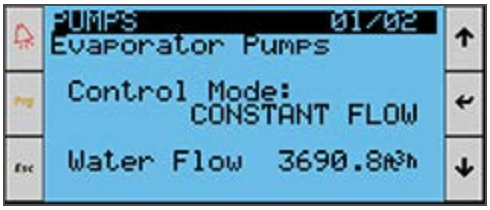
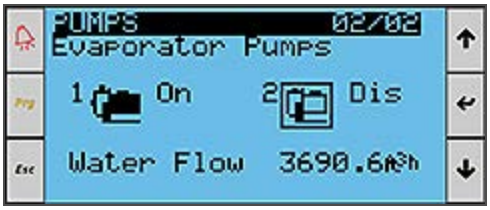
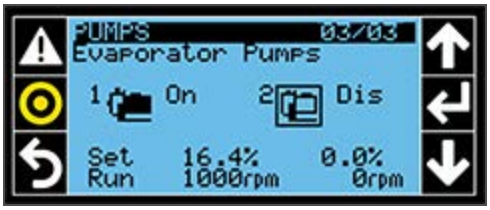
1.5.2 Pumps

Figure 1.7 below shows the status of the evaporator pump(s) installed in the unit.

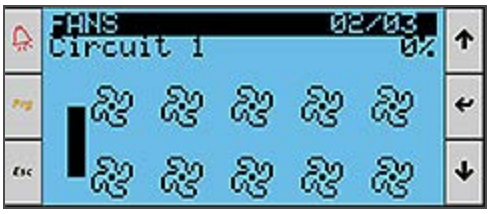
Figure 1.7 Pumps Menu

	Page 1 reports the control mode currently used for the evaporator pumps (CONST. FLOW, VAR. FLOW, DIFF.PRESS.). If Constant Flow or Differential Pressure control are selected, the Setpoint and current DP Value and the Bypass Valve opening are shown. In the case of variable flow control, the water flow current value and setpoint are reported instead.
	Pump on (On) Pump disabled (Dis) Pump in maintenance (Mnt) Pump in alarm (Alarm). Alarm code is shown. The current Water Flow value is reported on the bottom.
	Page 3 is available only if Variable Flow or Differential Pressure control are selected. Set is the setpoint (in %) for the pump speed and Run is the current speed value (in rpm).

1.5.3 Fans

Figure 1.8 below shows the status of the fans for Circuit 1 and other circuits if present.

Figure 1.8 Fans Menu

	The current speed requested for fans of Circuit 1 is shown at the top of Page 1. If the circuit is working in Free Cooling mode, the label Free Cooling Ctrl is shown. Setpoint is the temperature setpoint used for fan regulation. Temp. is the current value of the temperature used for fan control.
	If the circuit is working in DX mode, the Setpoint and Current condensing pressure requests are shown in the middle. The current measured value of the condensing pressure is shown at the bottom (Pressure). The visible symbol ⇵ means that setpoint shifting is enabled.
	Icons on Page 2 indicate the status of each fan for Circuit 1: Fan on Fan off Fan in alarm status Fan communication lost
	Page 3 displays the current speed of each fan for the circuit (F1, F2, ...). The current speed request is the fans speed request (in rpm) on the top.

If the unit has two fans circuits, pages 4, 5, and 6 report the same information as the previous pages, but for Circuit 2.

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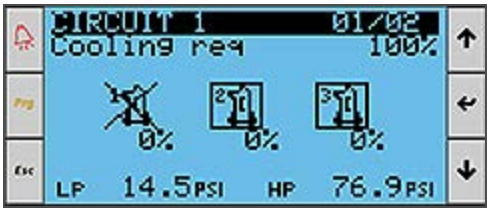
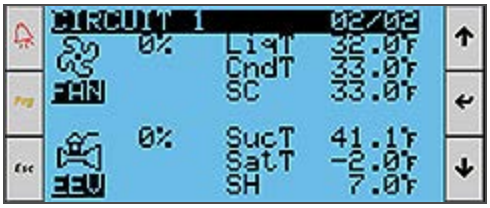
1.5.4 Compressors

Figure 1.9 below displays the status of the compressors on Circuit 1 and other compressor circuits if present.

Figure 1.9 Circuit 1 Menu

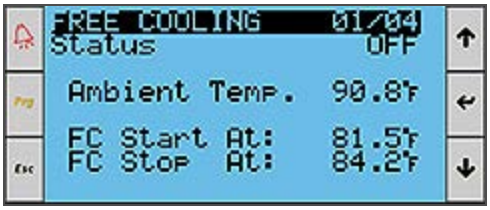
<table>
<tr>
<td> 
</td>
<td>At the top of page 1, the total cooling request is shown. The icons indicate the status of each compressor:
 Compressor not present
 Compressor off
 Compressor on
 Compressor in alarm status
The compressor capacity is shown below the compressor icon (in %) for the inverter or step compressor.
LP and HP are the evaporating and condensing pressures of the circuit.</td>
</tr>
<tr>
<td></td>
<td>DTN and DTC are also shown for screw stepless or scroll compressors.
DTN is the nominal Delta T value, while DTC is the Delta T calculated according to the current water flow and it is used to determine compressor activation and deactivation points.
For screw stepless compressors, each compressor icon also indicates whether the compressor is loading (↑), unloading, (↓), is fully loaded (+) or is fully unloaded (-).</td>
</tr>
<tr>
<td> 
</td>
<td>On page 2, the fan speed and the expansion valve opening (both in %) are reported beside the relative icons.
LiqT and CndT are the liquid and condensing temperatures and SC is the current value of the subcooling.
SucT and SatT are the suction and saturation temperatures; SH is the current value of the superheat.
Under MOP the current MOP temperature is reported.</td>
</tr>
</table>

If the unit has two circuits, pages 3 and 4 report the same information as the previous pages, but for the second circuit.

1.5.5 Free Cooling

Figure 1.10 below displayss information related to Free Cooling.

Figure 1.10 Free Cooling Menu

	Page 1 shows the current status of the Free Cooling (OFF, PURE FC, or MIXED MODE), the current value of the ambient temperature, and the ambient temperature thresholds considered for the activation and deactivation of Free Cooling.
	Page 2 shows information related to the Free Cooling pump. The icon indicates the status of the pump: Pump on (On) Pump disabled (Dis) Pump in maintenance (Dis) Pump in alarm (Alarm) (Alarm code is shown) If the pump is present, the current pump speed (in %) is indicated on the right, otherwise “Not Installed” is shown. If the pump is working in diff. pressure control mode, current and setpoint values of the diff. pressure are reported. If the pump is working in temperature control mode (or if pump is not present), the current evaporator inlet temperature and the leaving water temperature setpoint are shown instead.

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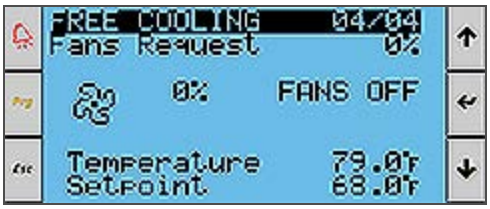
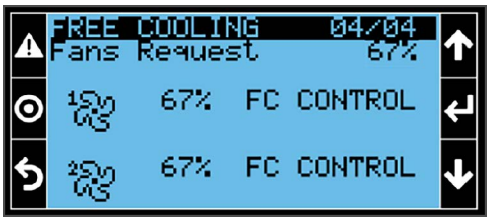
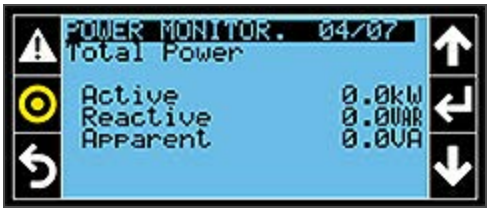
	Page 3 shows information related to the Free Cooling valve. If the valve is not present in the unit, "Not Installed" is shown beside the icon. Otherwise, the FC valve Opening (in %) and the FC Bypass valve opening (in %) are shown. Current and setpoint values of the leaving water temperature are shown below.
 	Page 4 shows information related to the Free Cooling fans. Free Cooling fans speed request (in %) is reported at the top of the page. Beside the icon, the current value (in %) of fans speed is shown. On the right, the fans mode of operation (FANS OFF, FC CONTROL, or COND. CTRL) is indicated. In the case of single circuit, the current value of the evaporator inlet temperature and the leaving water temperature setpoint are reported at the bottom of the page. In the case of two circuits, fans speed and mode of operation are also reported for circuit 2.

1.5.6 Energy Measurement

Figure 1.11 below shows the measured values of the electrical consumption of the unit and the calculated values of cooling capacities and energy efficiency metrics.

Figure 1.11 Energy Measurement Menu

	Page 1 shows the instant values of cooling capacities and energy efficiency indices. Tot is the total cooling capacity provided by the unit, FC is the cooling capacity fraction provided by Free Cooling, and DX is the cooling capacity due to mechanical refrigeration. EER is the Energy Efficiency Ratio, pPUE is the Power Usage Effectiveness, and WUE is the Water Usage Effectiveness.
	Page 2 shows the average values in the last 24 hours of the same quantities present on the previous page.
	Page 3 shows the status of the ATS devices (Not Installed, Line 1, Line 2, Transition, or Comm. Error).
	Page 4 shows instant values of the total active, reactive, and apparent power consumption of the unit.

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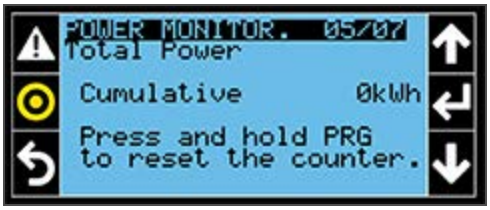
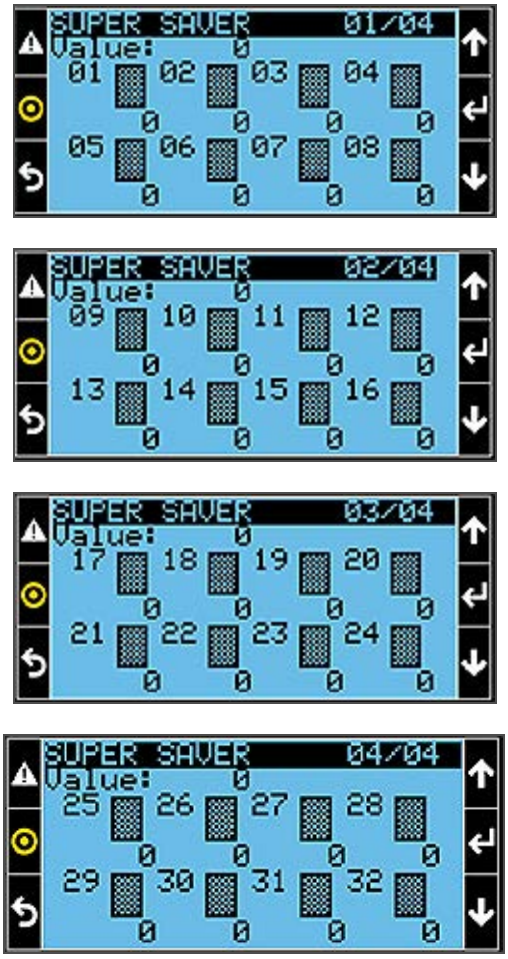
	Page 5 displays the cumulative energy consumption of the unit. The counter of the energy consumption can be reset by holding the Prg key.
	Page 6 shows the values of the current in all three phases (AL1, AL2, AL3), and the frequency of the line.
	Page 7 shows the values of the voltage difference between the three phases (VL1-L2, VL2-L3, VL3-L1), and the total active power.

If two energy meters are present, pages 7 and 8 shows the same information as pages 5 and 6 but for Energy Meter 2.

1.5.7 Super Saver

Figure 1.12 below shows the current Super Saver request and the status of all of the indoor units.

Figure 1.12 Super Saver Menu



The top of each page of this menu shows the Value of the overall Super Saver request currently calculated. For allof the indoor units (up to 32 can be configured), the status is represented by an icon and the current Super Saver request is shown below the icon. The statuses are:

Disabled

Enabled - Communication OK

Enabled - Communication failed

1.5.8 Fast Start Ramp and Control Supply

The Vertiv™ Liebert® iCOM™ for control is fed by direct current for protection from network disturbances. There are a variety of standard power supply options (described below) to guarantee reliability and fast start for differing applications:

Table 1.1 Power Supply Options with Fast Restart

Single line (main line)	The unit is powered by a single three-phase line. The control is powered by a three phase AC/DC converter that insulates the control from the external electrical noises.
Single main line with buffer module and fast restart	The unit is powered by a single three-phase line. A buffer module (ultracapacitor) is installed as a direct power source to the on-board controls. If the main power supply is OFF, the control is powered for 90 seconds (minimum buffer time guaranteed, the amount of time is a function of unit configuration). • If the main supply power restores within the buffer time, the control quickly re-starts the controlled components. • If the main supply power restores out of the buffer time, the control starts the reboot procedure and the ultracapacitor requires 15 minutes to recharge completely. If there are intermittent losses of power or significant supply instability it's possible this could reduce the minimum buffer time of the internal buffer module. The ultracapacitor has a potentially unlimited lifetime, no required maintenance. **NOTE: The ultracapacitor working temperature limits are -40°F (-40°C) ÷ 140°F (+60° C).**
Single main line with 120V USP and fast restart	The unit is powered by two power lines: • A three phases line for the high power components; • A single phase for the control, typically provided by a UPS installed by the customer/user. The control is powered by a AC/DC single-phase converter, connected to the single-phase power line, that insulates the control from the external electric noises. In case of three-phase line power off, the control remains power supplied by its dedicated power supply line, ready to start quickly when the three-phases power on.

1.6 System Overview

The System Overview menu can be accessed by pressing the Up key on the Main Screen.

Figure 1.13 below shows the current status of the system.

Figure 1.13 System Overview Menu

	The top of Page 1 shows the current average Inlet, Evaporator Inlet (Ev.In), and Outlet water temperatures of the system or subgroup. The system status (System ON/System OFF) is reported in the middle of the page. The system or subgroup average percentage utilization of Free Cooling (FC) and compressors (DX) is shown at the bottom of the page. This information is only reported on the Master Unit of the system or subgroup.
   	Pages 2 to 4 show the current status of each unit (from ID 1 to ID 16) in the system or subgroup. The “M” indicates the current Master Unit. The ID of the current unit is highlighted in black.
	Page 5 shows the current Master unit ID.

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1.7 Events Report

The Events Report can be accessed by pressing the Alarm key.

Figure 1.14 Events Report Screen

Three pages can be accessed from the Events Report:

Active Events List

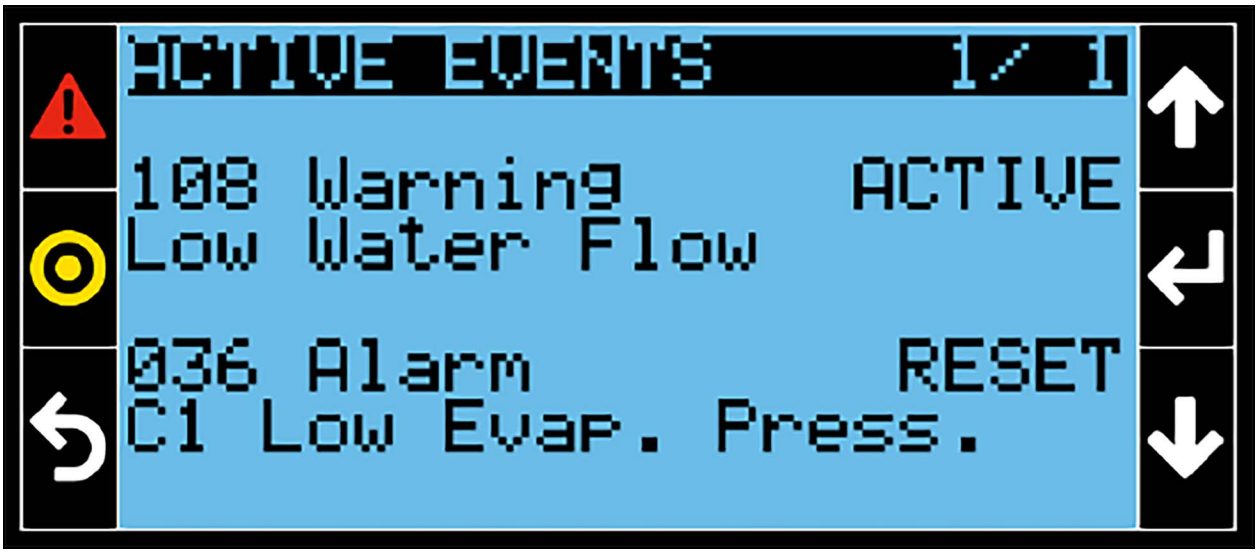
Status Report

Export Events

1.7.1 Active Events List

Figure 1.15 below lists all of the active warnings and alarms.

Figure 1.15 Active Events Screen



For each event, the following information displays:

- Event ID
- Event type (Warning/Alarm)
- Event status (Active/Reset)
- Event description

Each event activation sends notifications via audible and visible indicators. When the warning/alarm condition is not present anymore, the event status changes from Active to Reset. Events can be reset by pressing the Alarm Key for three seconds in this menu. A single event can also be selected and reset by using the Enter Key. After an event is reset, it disappears from the ACTIVE EVENTS list.

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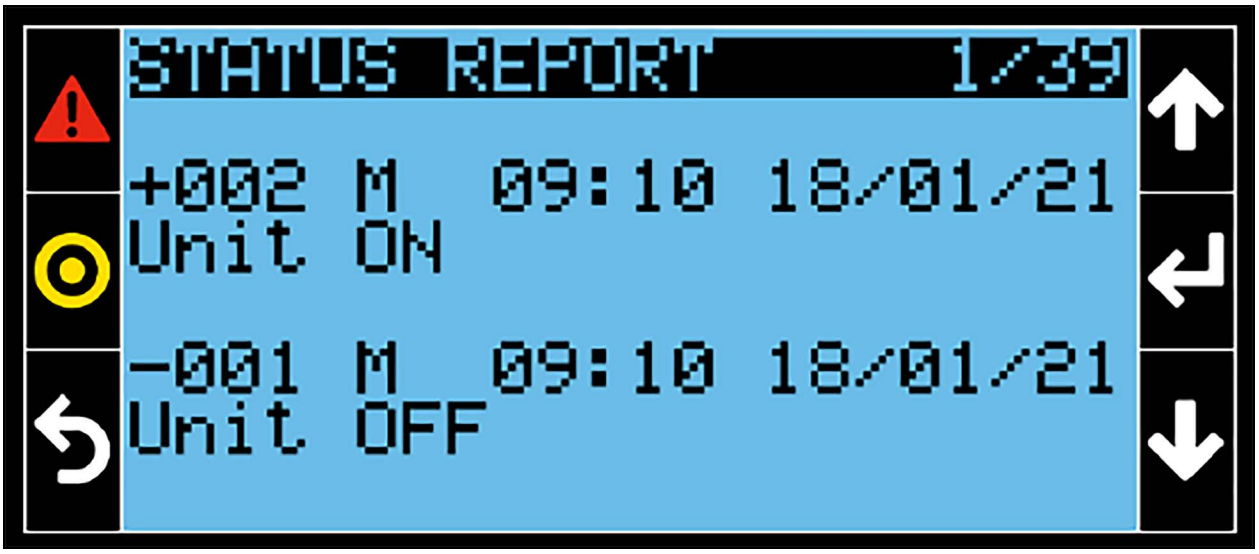
1.7.2 Status Report

Figure 1.16 below shows the history of the occurred events.

Figure 1.16 Status Report Screen



For each event, the following information is shown:

- Event ID
- Event type (W = Warning, A = Alarm, M = Message)
- Time and date
- Event description

For each event, the Status Report records both the event activation (+) and the event reset (-).

1.7.3 Export Events

From Figure 1.17 below the events log can be downloaded.

Figure 1.17 Export Events Screen

Memory Type defines where to download the events log: Internal Flash or USB.

Events Log is the command for downloading the events log (select "Yes" using the Up/Down arrow keys and then the Enter key to force the command).

Clear Events Log is the command to clear the events log (select "Yes" using the Up/Down arrow keys and then the Enter key to force the command).

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1.7.4 Password Screen

A password is required to enter any configuration menu (User, Service, or Advanced configuration). The Password prompt can be accessed by pressing the Enter key from the Main Screen.

Figure 1.18 Password Screen

Each digit can be increased/decreased by using the Up/Down arrow keys. The Enter key is used to switch to the next digit and for password confirmation. If a wrong password is entered, the message “Wrong Password!” displays. Any Session will be terminated after five minutes of inactivity.

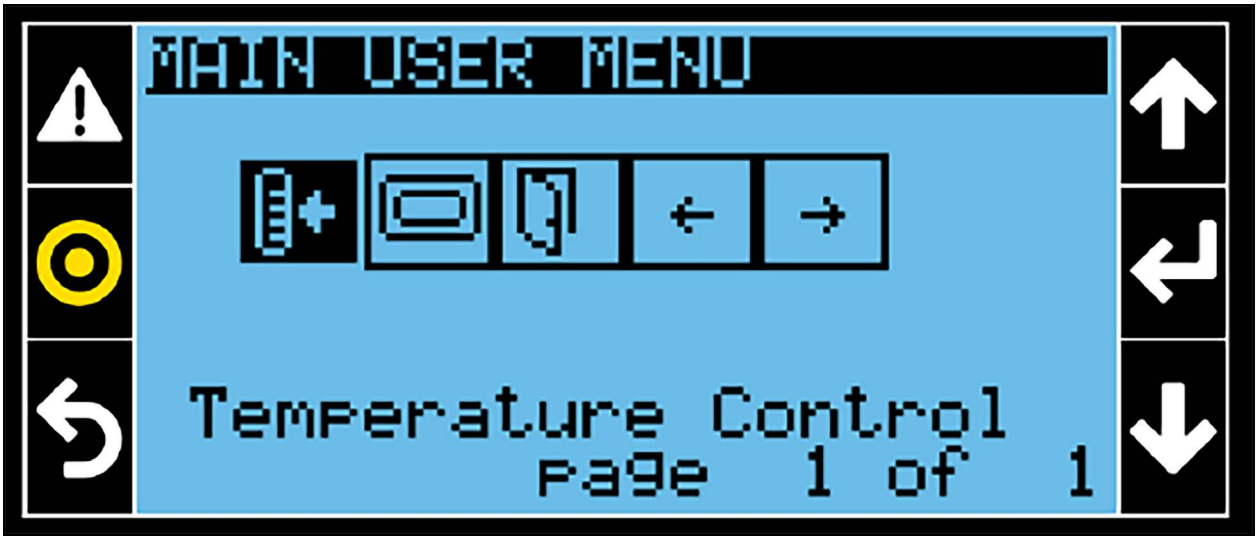
There are three levels of access (User, Service, and Advanced) protected by a dedicated password. A higher level of access allows you to also navigate on the lower configuration menu levels. After entering one of the three passwords, the corresponding configuration menu automatically displays.

Level	Password	Accessibility
User	1490	User is the lowest level of access and allows you to change parameters such as temperature setpoint and temperature limits, which define the unit operating point.
Service	5010	Service is the medium levelof access and allows you to change the parameters that define the operating mode of the unit.
Advanced	****	Advanced level is the highest level of access and allows you to set the parameters that define the unit configuration and the type of devices installed.

1.8 User Configuration Menu

The User configuration menu is organized as follows. The right arrow switches to the Service configuration menu, while the left arrow switches to the Advanced configuration menu. The Logout icon terminates the session.

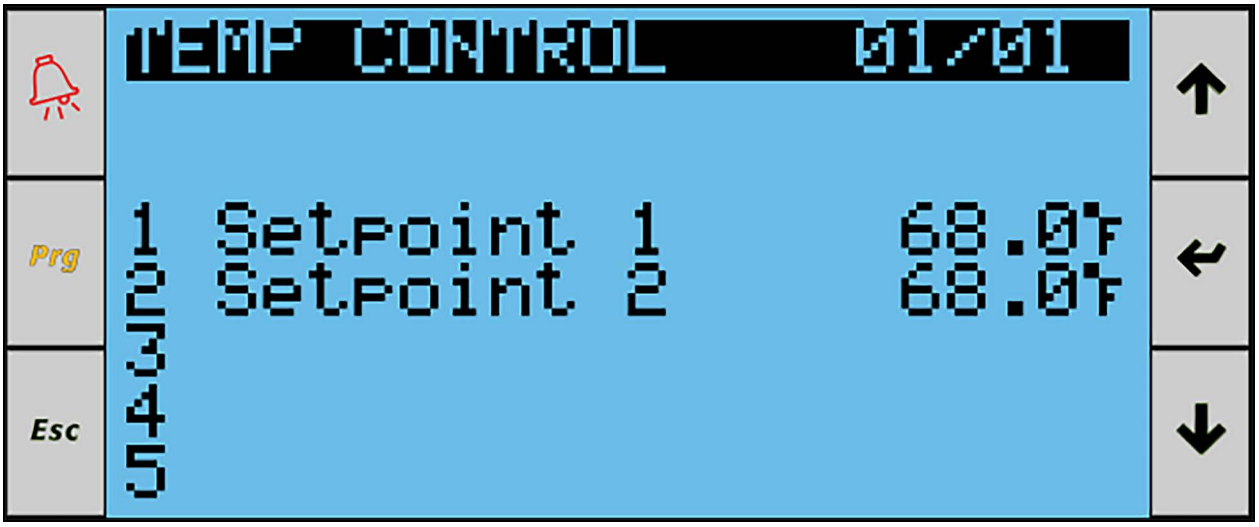
Figure 1.19 Main User Menu



1.8.1 Temperature Control

Figure 1.20 below is used to set the Setpoint 1 and Setpoint 2 values used by the application for the leaving water temperature.

Figure 1.20 Temperature Control Screen



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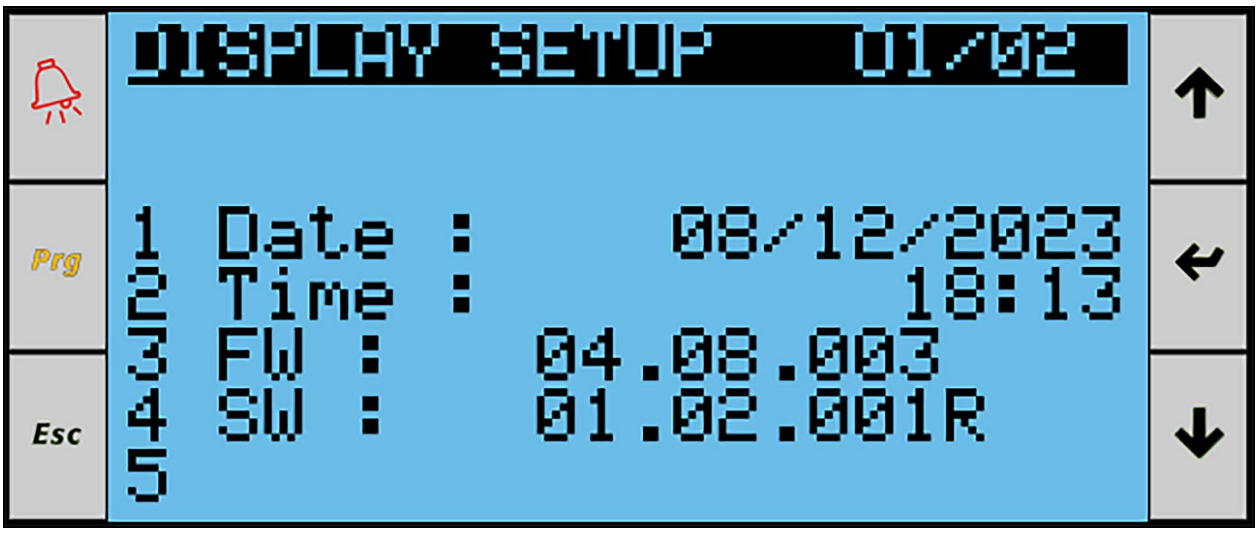
1.8.2 Display Setup

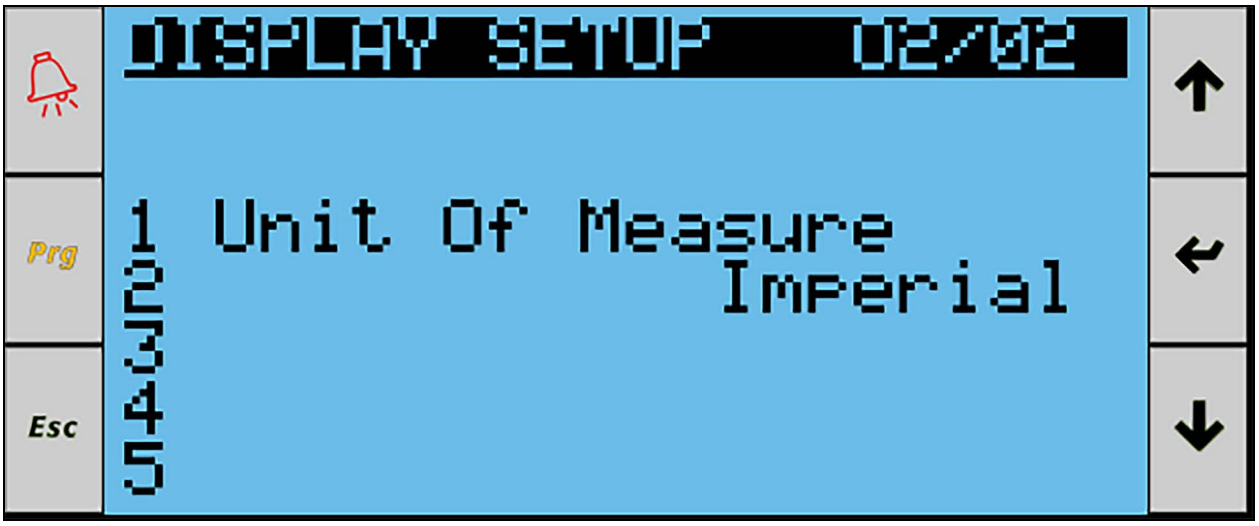
Figure 1.21 Display Setup Screen Page 1 of 2



Lines 1 and 2 set the current date (with format dd/mm/yyyy) and time (with format 24h).

Lines 3 and 4 show the versions of the firmware and the software currently installed on the controller.

Figure 1.22 Display Setup Screen Page 2 of 2



Page 2 sets the system of measure used in the application: SI or Imperial system.

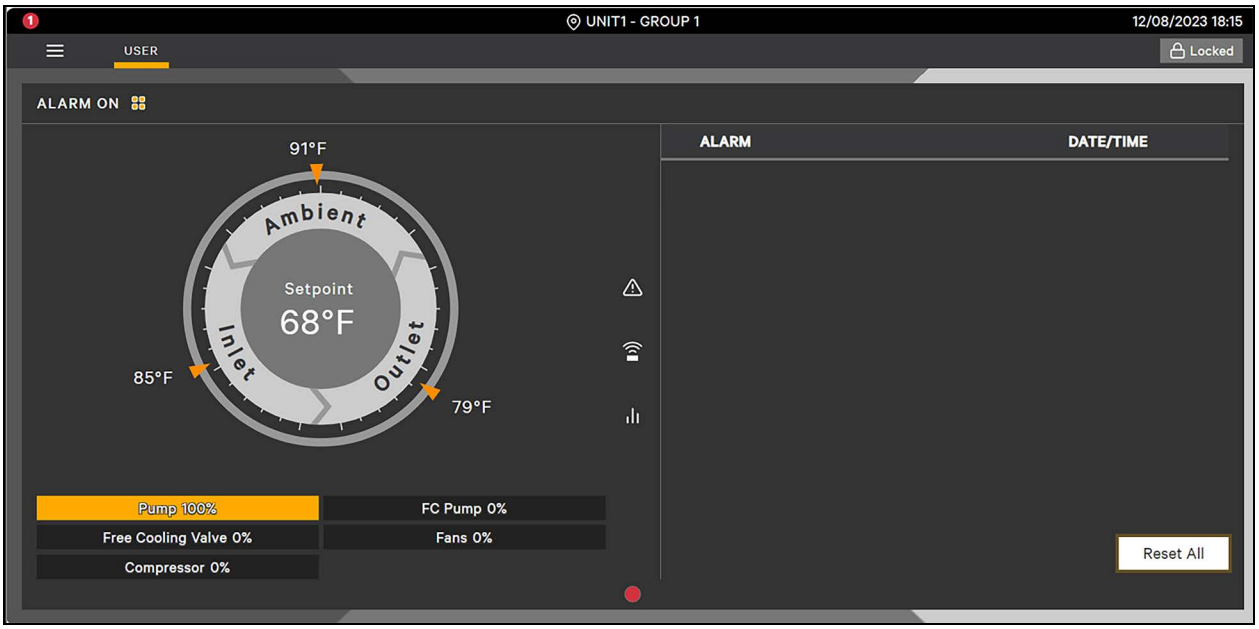
2 Web Pages

The controller provides a web interface that can be accessed via the Ethernet connection by typing the IP address of the control board into the navigation bar of the web browser. Google Chrome is the recommended browser to access the web interface.

2.1 Home Page

Figure 2.1 below is the home page for the web site.

Figure 2.1 Home Page



On the top left of the page, the number of active events is shown inside a circle. The color of the circle indicates the type of active events:

- Green: no active events.
- Orange: at least one warning is active and no alarms are present.
- Red: at least one alarm is active.

The top middle of the page, depending on the system and unit configurations, reports the Teamwork Network information related to the Unit ID and the corresponding Group configured and belonging.

Figure 2.2 Teamwork Network Information

On the Top right, the date and time are shown using the control logic configuration.

The Control Header allows to access to the User, Service, and Advanced menus. The “Locked” state, means no user credentials were set.

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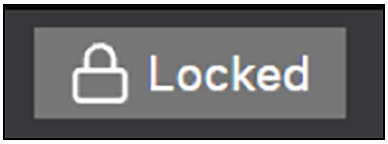
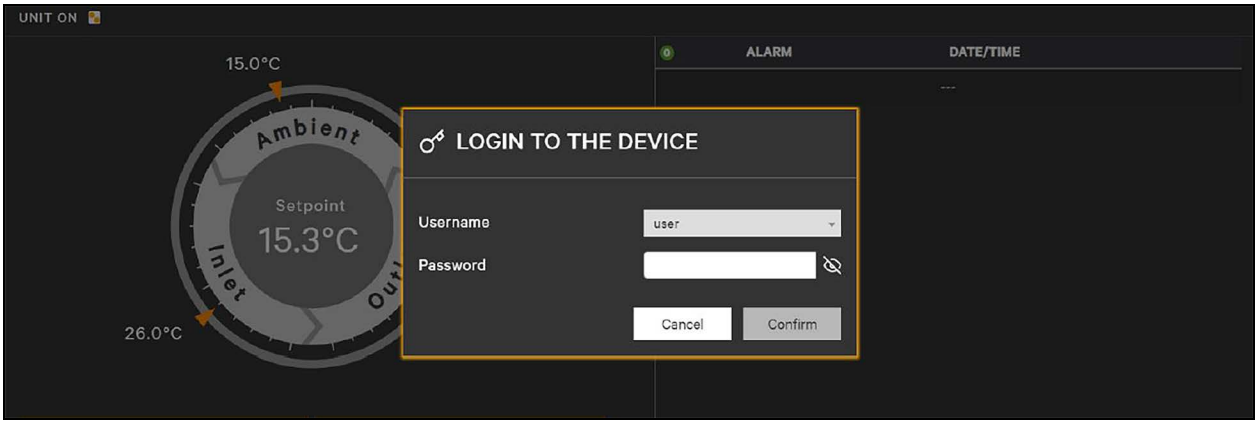


There are three levels of access (User, Service, and Advanced) protected by a dedicated password. Higher level access also allows you to navigate the lower configuration menu levels.

Username (level)	Password	Accessibility
User	1490	User is the lowest level of access and allows you to change parameters such as temperature setpoint and temperature limits, which define the unit operating point.
Service	5010	Service is the medium level of access and allows you to change the parameters that define the operating mode of the unit.
Advanced	****	Advanced level is the highest level of access and allows you to set the parameters that define the unit configuration and the type of the devices installed.

Figure 2.3 Login Screen



Pressing the Lock/Unlock button displays a prompt requiring a username and password. When “Locked” is shown, the display is read-only. When “Unlocked” is shown, the user is logged-in and menus are Accessible.

The “Back” button on the right side returns the user to the previous page.

The “Power” button turns the unit on or off. A pop-up displays to confirm the operation. This button is shown only if the user is logged in.

The unit status is shown immediately below the Control Header. Unit status can be:

- DISPLAY OFF: Unit display has been switched OFF.
- REMOTE OFF: Unit digital input has been switched OFF.
- BMS OFF: Unit is kept OFF via BMS.
- ALARM OFF: Switched OFF by critical alarm.
- SHUT DOWN: Unit requested for shut down, waiting for shutdown procedures to complete.
- STANDBY: Unit waiting for activation, no alarms.
- UNIT ON: Unit is running with no active warnings or alarms.
- ALARM ON: unit is running with one or more active alarms.

- STARTUP: Unit requested for start-up, waiting for start-up procedures to complete.
- WARNING ON: Unit is running with one or more active warnings and no alarms.
- POWER FAILURE: Unit in power failure.
- MANUAL MODE: Unit in manual mode.

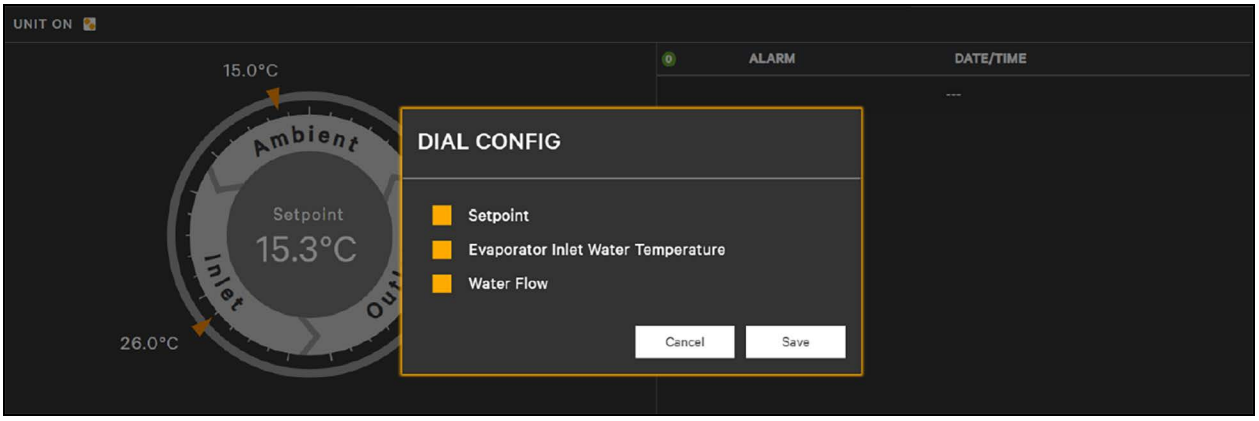
The circular widget on the left side of the home page displays the current values of the main sensors. Unit inlet temperature is shown above the circular widget and the unit outlet temperature is shown below.

The sensor shown in the center of the widget can be changed by clicking in the center area. Options are:

- Setpoint
- Evaporator Inlet Water Temperature
- Water Flow

Press the circular widget for five seconds to access its configuration dialog. Configure the available sensors shown in the center area by selecting or deselecting the available sensor check boxes. See Figure 2.4 below .

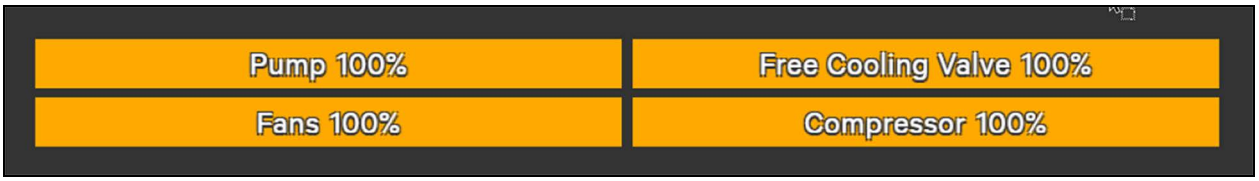
Figure 2.4 Dial Config Screen



Below the circular widget, depending on the unit configuration, five bars indicate:

- Pump -The current evaporator pump speed
- FC Pump -The current FC pump speed (if the pump is installed)
- Free Cooling Valve -The current opening of the Free Cooling Valve
- Fans -The current fans speed
- Compressor - The current compressors cooling request

All these quantities are expressed in percentage.



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The icons to the right of the circular widget, near the middle of the screen, are shortcuts to access the following menus:

Alarms Menu

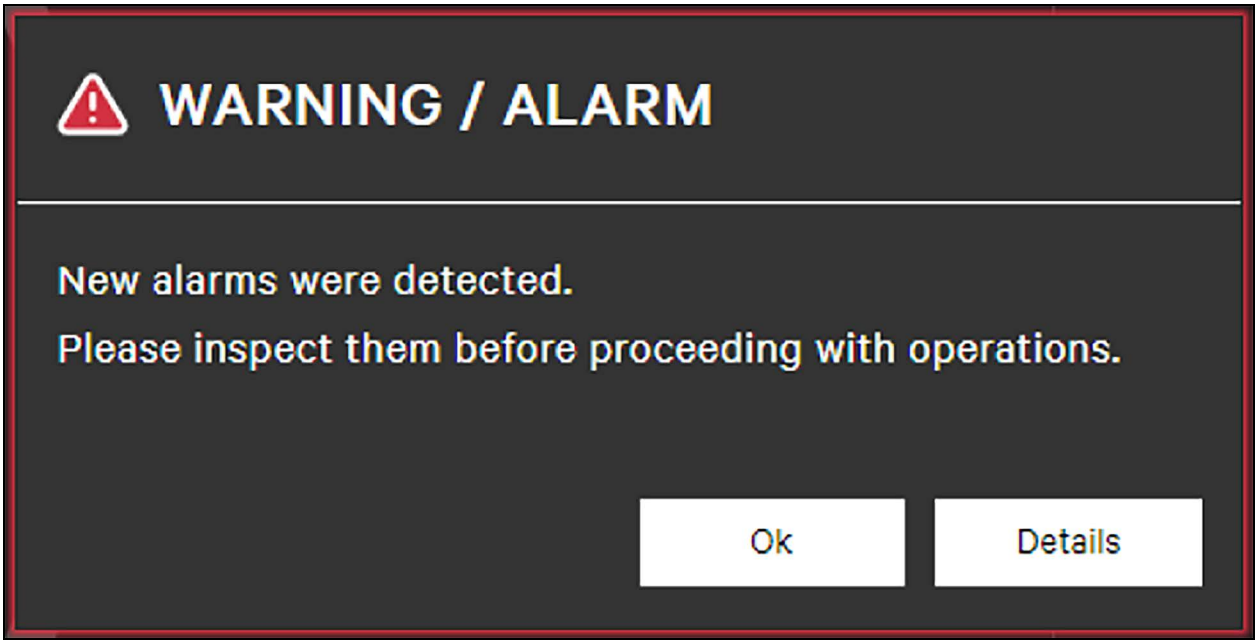
Sensors Menu

The content panel on the right side of the home page shows the list of active events.

The “Reset all” button resets all the active resettable events.

When a new event occurs, Figure 2.5 below displays.

Figure 2.5 Warning/Alarm Screen

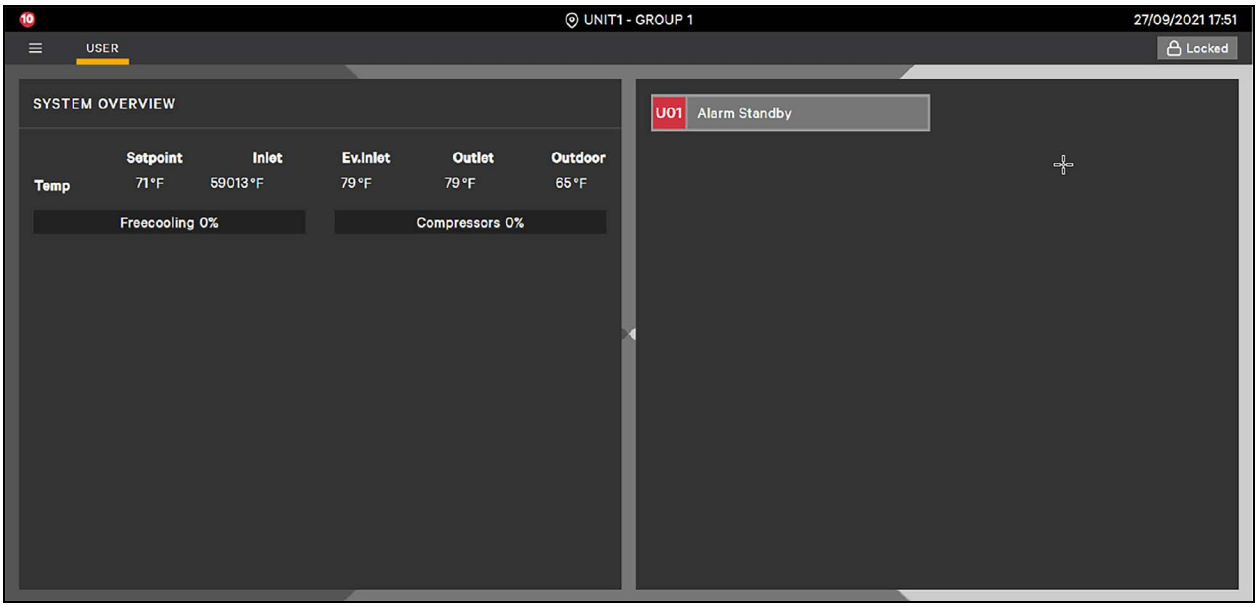


The “OK” button will close the pop-up, the “Details” button will open the Alarms menu.

At the bottom of the page, depending on the Teamwork network settings, there are one or more filled circles representing the unit status configured in the same Group. The color of the circle represents the status:

- Green – Unit Enabled Working
- Orange – Unit Enabled with Warnings
- Red – Unit Enabled on Standby Alarms
- Gray – Unit Standby

Figure 2.6 System Overview Screen



By clicking over a circle, the System Status page will be opened where at the left side it is represented the current Teamwork logic working status, and at the right side the current configured units with the related working status description.

Clicking on each unit shown opens the related Web Page.

2.2 User Menu

Selecting the User icon

and then the Menu icon displays the User Menu. See **Figure 2.7** below .

Figure 2.7 User Menu

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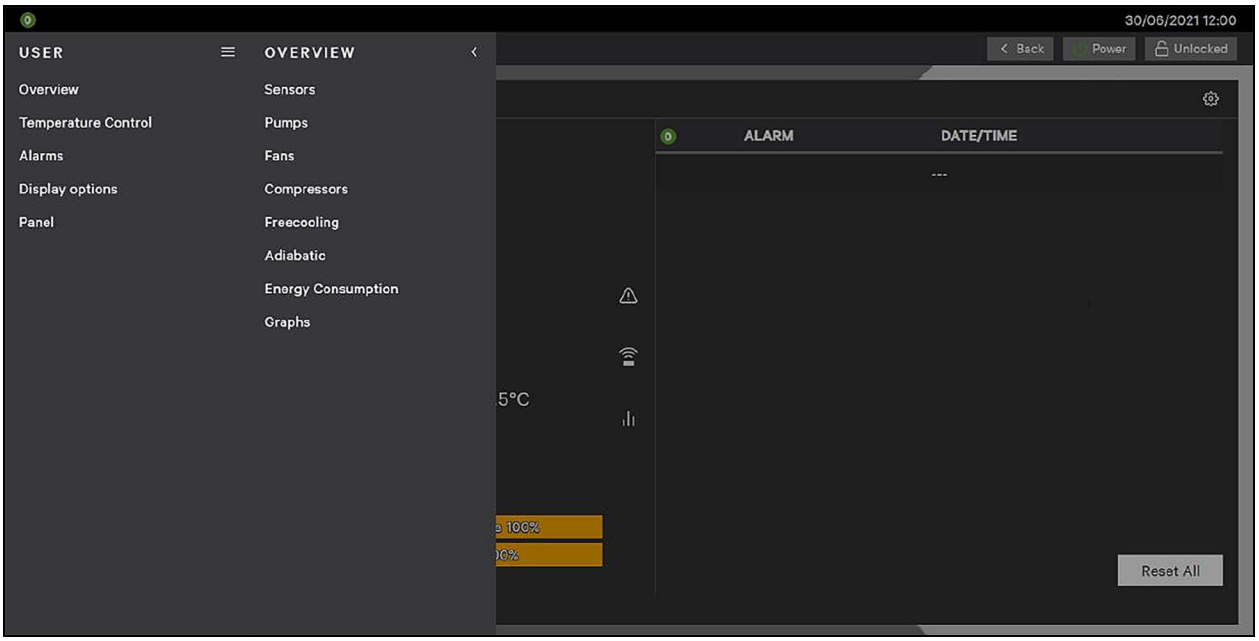
2.2.1 Overview

The Overview menu is organized as follows.

Figure 2.8 Overview Menu



Sensors

The Sensors menu shows the current values provided by the sensors installed in the unit. This menu is divided into four sections. If four circuits are configured, the sensor values associated with all circuits display.

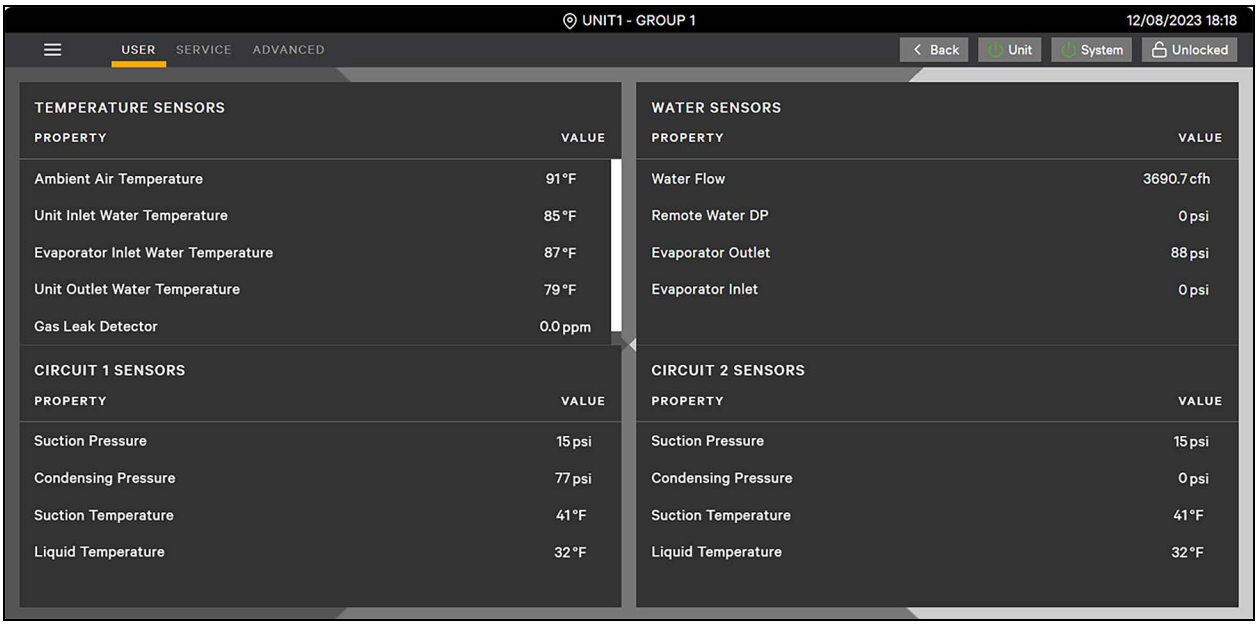
TEMPERATURE SENSOR: This section reports the current values of the Ambient Air Temperature, the Unit Inlet Water Temperature, the Evaporator Inlet Water Temperature, the Circuit 2 Evaporator Inlet Water Temperature, and the Unit Outlet Water Temperature.

WATER SENSORS: This section reports the current values of the Water Flow, the Evaporator Inlet Water Pressure, the Evaporator Outlet Water Pressure, and the Remote Water DP.

CIRCUIT 1 SENSORS: This section reports the current values of Circuit 1 Suction Pressure, Condensing Pressure, Suction Temperature, and Liquid Temperature.

CIRCUIT 2 SENSORS: This section reports the current values of Circuit 2 Suction Pressure, Condensing Pressure, Suction Temperature, and Liquid Temperature.

Figure 2.9 Sensor Menu



Pumps

The Pumps menu shows the status of the evaporator pumps installed in the unit. This menu is divided in two sections.

EVAPORATOR PUMP: This section shows, for each evaporator pump, the current Status, the current pump speed Request (in %), the current pump Speed Feedback (in rpm), and the Alarm Code in case of alarm status.

WATER FLOW CONTROL: This section reports the Control Mode selected for regulating the evaporator pumps, the current Water Flow, the current Water Differential Pressure and the related Differential Pressure Setpoint, and the Bypass Valve Opening Request.

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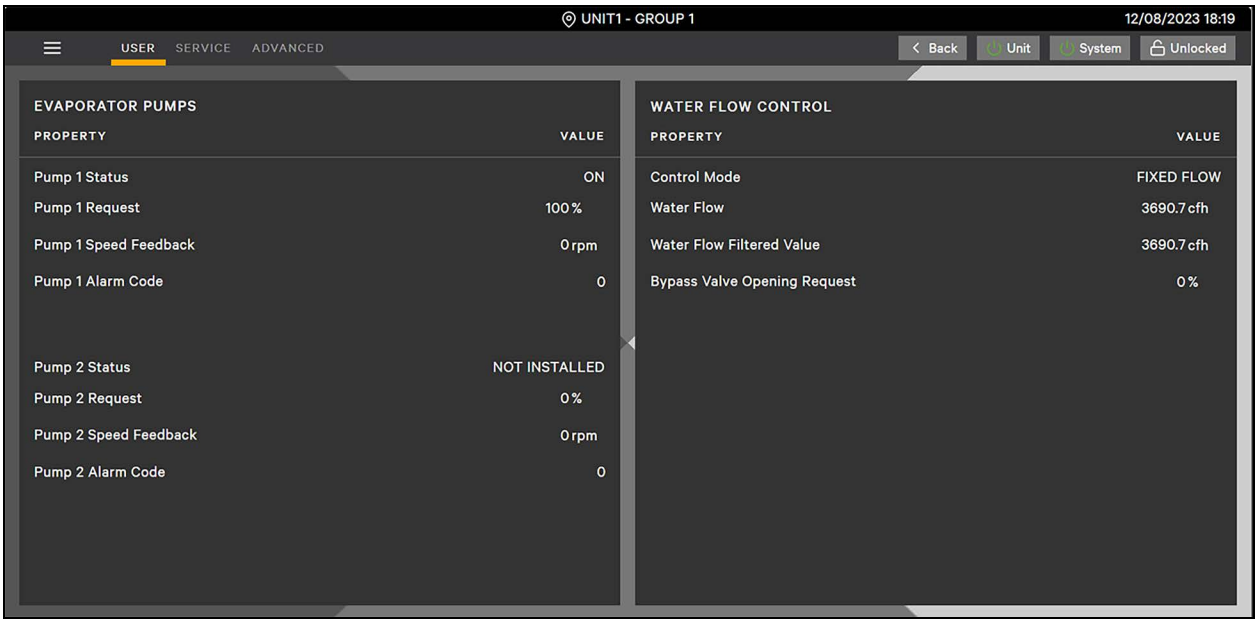
Figure 2.10 Pumps Menu



Fans

The fans menu shows the status of all of the fans installed in the unit. This page is divided in two sections (CIRCUIT 1 and CIRCUIT 2), each related to one of the two circuits of the unit. If four circuits are configured, the sensor values associated with all circuits display.

For each circuit, the current fans Speed Request (in %), the current condensing set point, and the current status and speed feedback (in rpm) of each fan are displayed.

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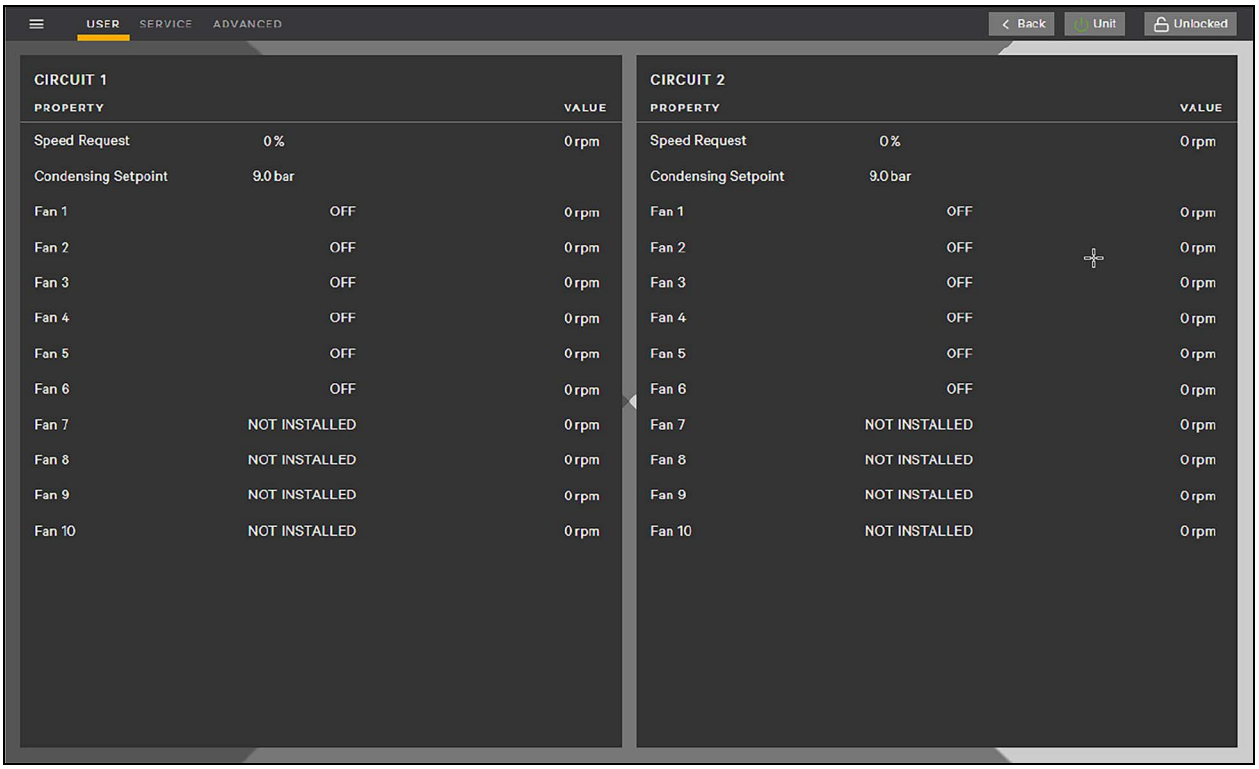
Figure 2.11 Fans Menu



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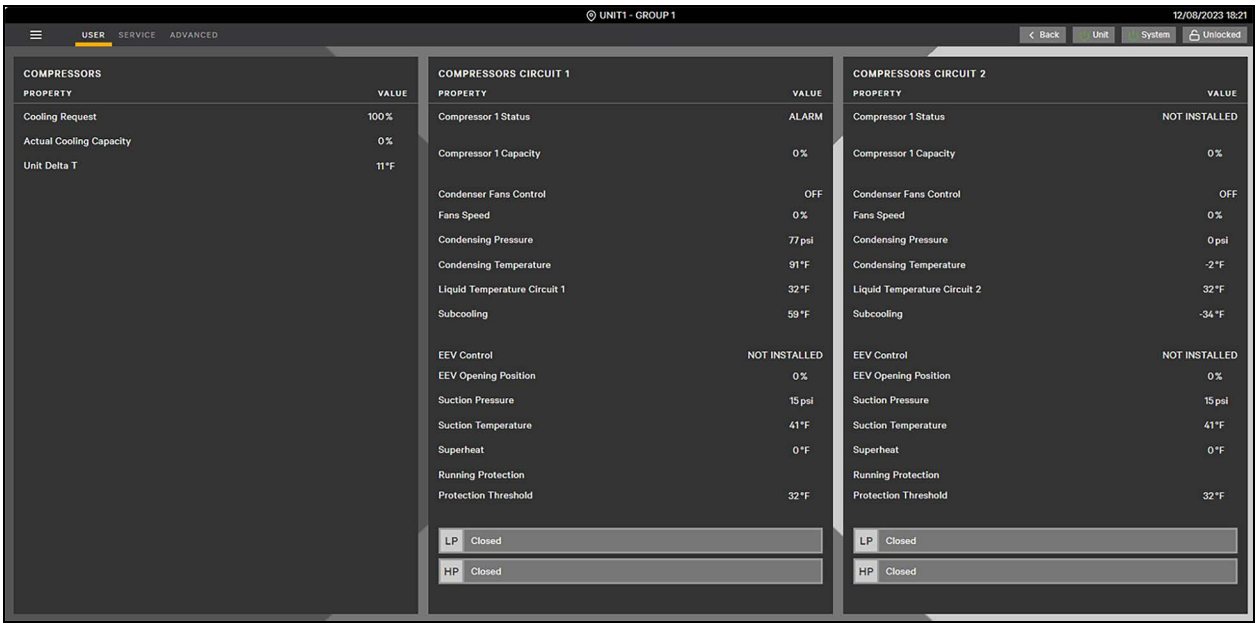
Compressors

The Compressors menu shows information related to the DX circuits present in the unit. This menu is divided in three sections.

Figure 2.12 Compressors Menu



COMPRESSORS: This section reports the current Cooling Request (in %) for the compressors, the Actual Cooling Capacity (in %) provided by the DX circuits, and the current value of the Unit Delta T parameter, which is used to determine the compressors activation and deactivation points.

COMPRESSORS CIRCUIT 1: This section reports all of the information related to Circuit 1. It shows the current Status of each compressor, the current cooling Capacity provided by each compressor, the Condenser Fans Control mode and the current Fans Speed, the current Condensing Pressure, Liquid Temperature, and Subcooling, the EEV Control mode and the current EEV Opening Position, the current Suction Pressure, Suction Temperature, and Superheat, and the current status of the LP (Low Pressure) and HP (High Pressure) digital inputs.

COMPRESSORS CIRCUIT 2: Same as the previous section but related to Circuits 2. If four circuits are configured, the sensor values associated with all circuits display.

Freecooling

The Freecooling menu shows all of the information related to the Freecooling mode of operation.

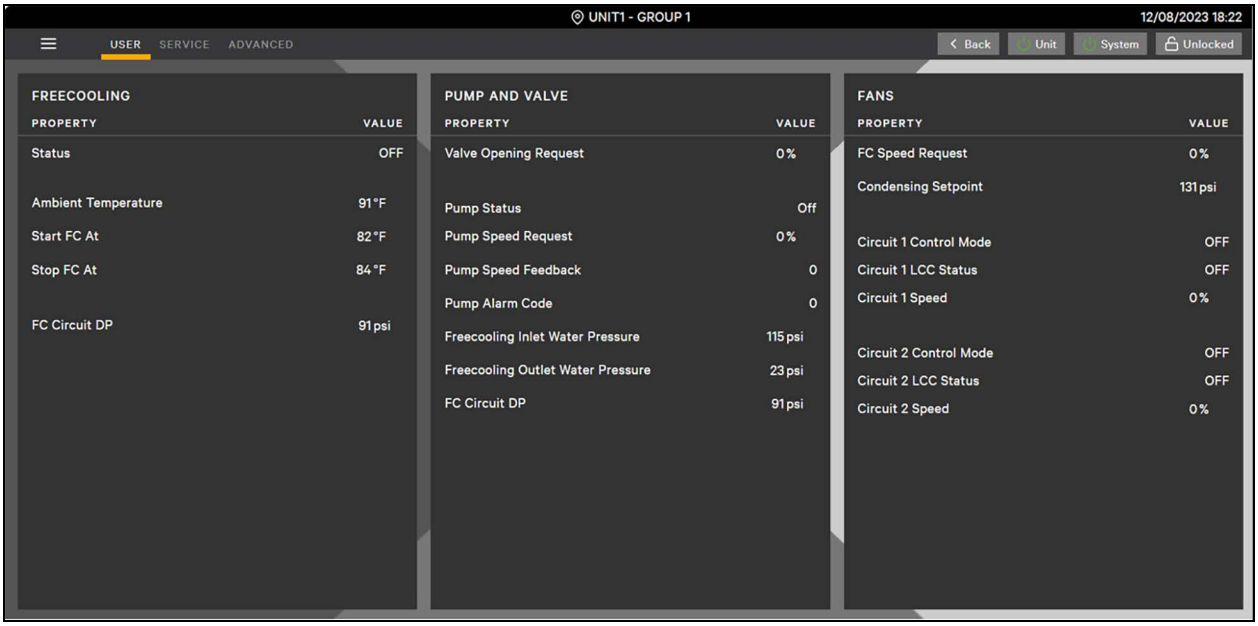
This page is divided in three sections:

FREECOOLING: This section reports the current Status of Freecooling, the current value of the Ambient Temperature, the ambient temperature thresholds used to enable (Start FC At) and disable (Stop FC At) Freecooling, and the delta pressure measured over the FC circuit.

PUMP AND VALVE: This section reports the current FC Valve Opening Request, the current FC Pump Speed Request, the feedback from the FC pump, and the Alarm Code if the FC Pump is in alarm status.

FANS: This section reports the current Fans Speed Request, the condensing setpoint and, for both circuits, the current Fans Control Mode, the status of the LCC function, and the current speed of fans in the circuit.

Figure 2.13 Freecooling Menu



Energy Consumption

The Electric Consumption screen reports all of the information related to electrical power consumptions and energy efficiency. This screen is divided into three sections.

UNIT COOLING CAPACITY - This section reports the instantaneous and 24h average values of the Total, FC, and DX cooling capacities and of the Energy Efficiency Ratio (EER), partial Power Usage Effectiveness (pPUE), and Water Usage Effectiveness (WUE) energy efficiency metrics. An indication on the Cooling Capacity Trend is also indicated (Stable or Unstable).

UNIT ELECTRIC CONSUMPTION - This section reports the Total Active, Reactive, and Apparent Power consumption and the Energy (Cumulative Power) Consumption. The energy consumption counter can be reset by setting the Reset Counter button to Yes and then pressing the Save button.

ENERGY METER 1 - This section reports the Energy Meter 1 readings of the Current in the three lines, the Voltage difference between the three lines, and the Frequency in the three-phase line.

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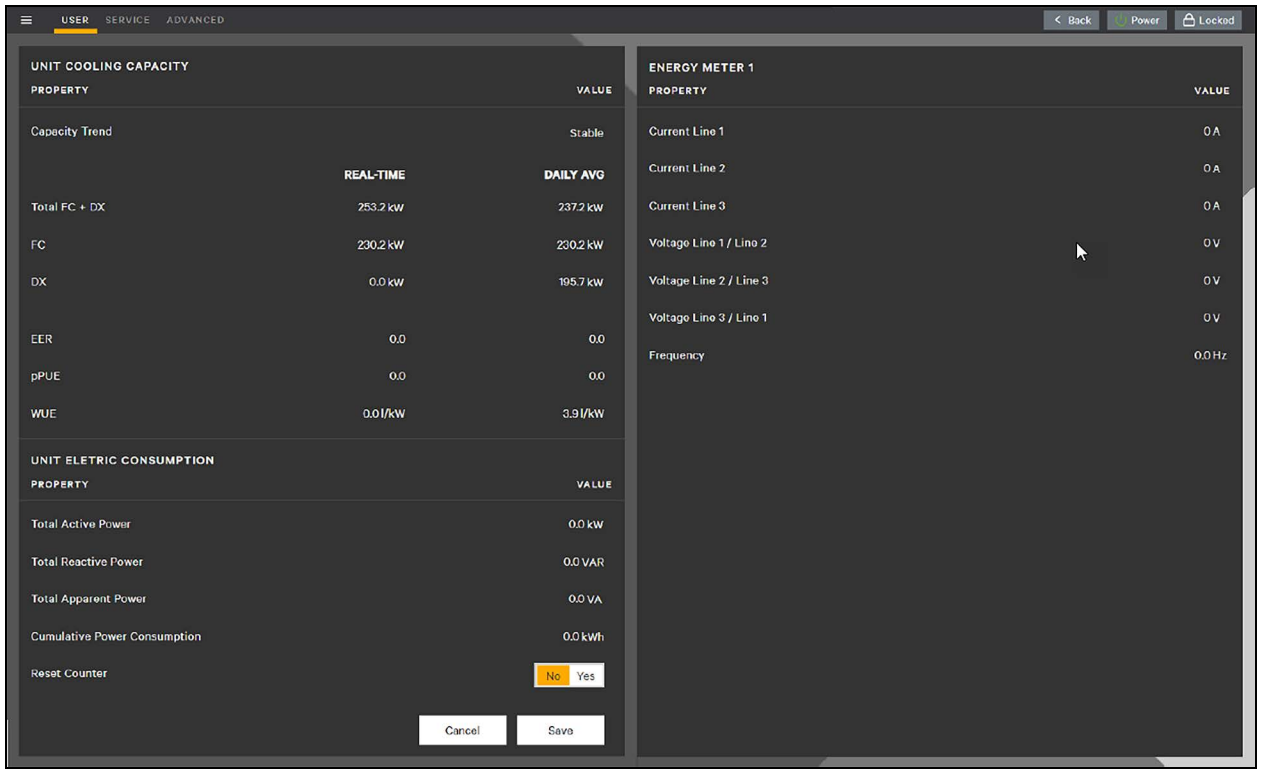
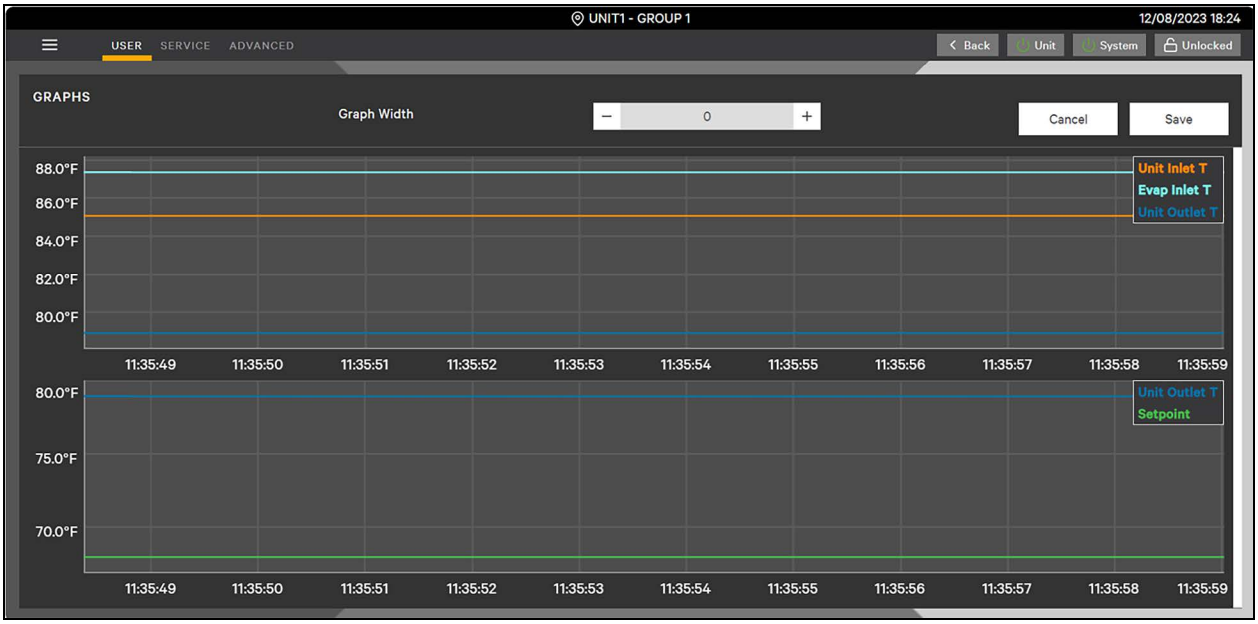
Figure 2.14 Energy Consumption Screen



Graphs

This page reports two graphs showing the time evolution of the main water temperature probes in a given time window. The graph on the top shows the Unit Inlet Temperature (in orange), the Evaporator Inlet Temperature (in light blue), and the Unit Outlet Temperature (in blue). The graph on the bottom compares the Unit Outlet Temperature (in blue) with the Unit Outlet Temperature Setpoint (in green).

Figure 2.15 Graphs Screen



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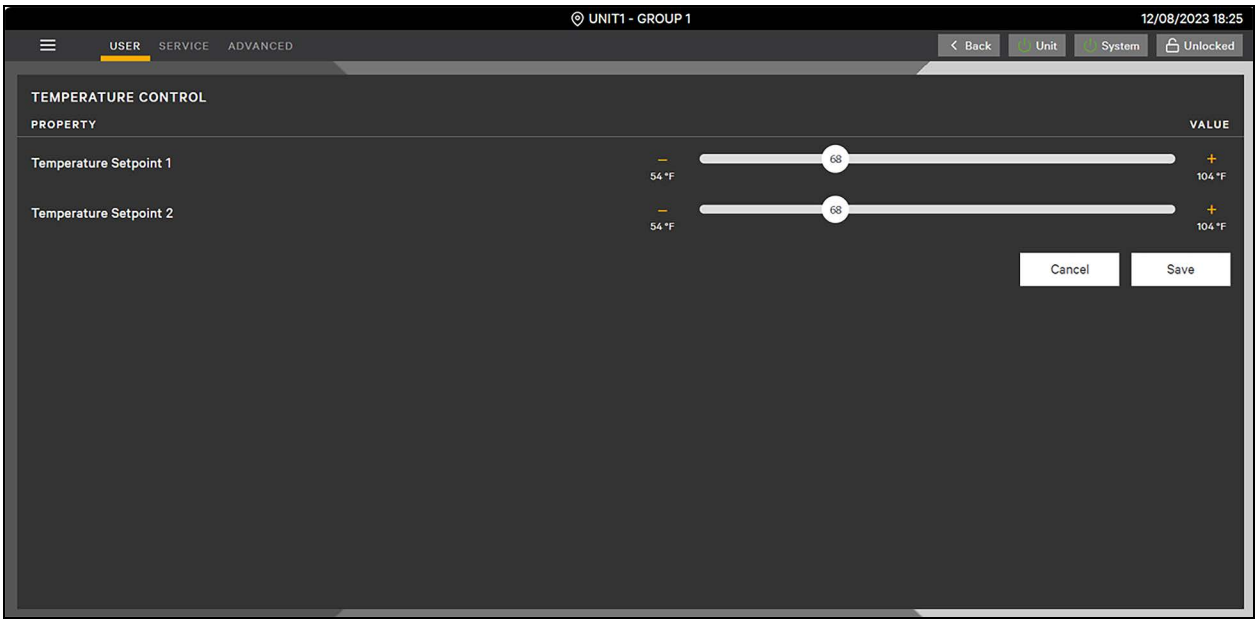
2.2.2 Temperature Control

The Temperature Control menu sets the value of the leaving water Temperature Regulation Setpoint and the a second Setpoint used in Emergency mode, when active.

Figure 2.16 Temperature Control Menu



2.2.3 Alarms

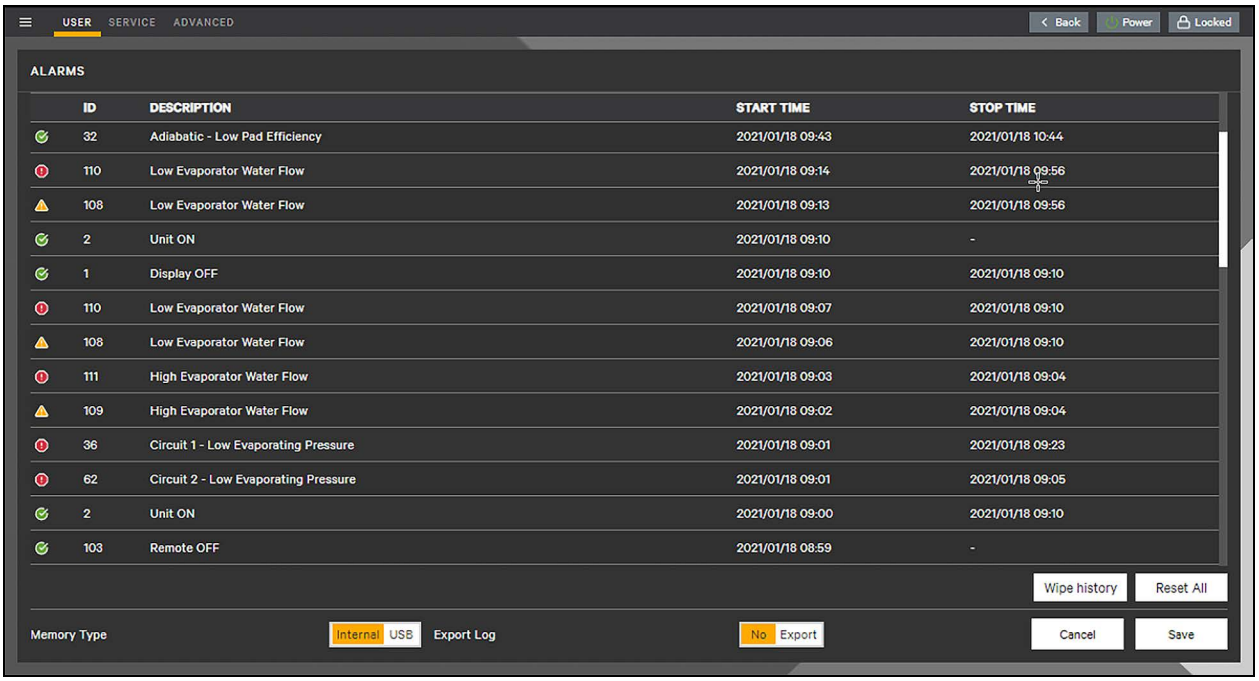
The Alarms menu displays the list of the latest events that have occurred, with event ID, description, and start and stop time. The event type is indicated by an icon:

Message

Warning

Alarm

Figure 2.17 Alarms Menu



A single event can be reset by pressing the “Reset” button at the end of the correspondent line, while all the events can be reset by pressing the “Reset All” button. The “Wipe history” button clears the events list. At the bottom of the page, the Alarms Log can be exported into the local memory of the control board or into a USB device connected to the controller.

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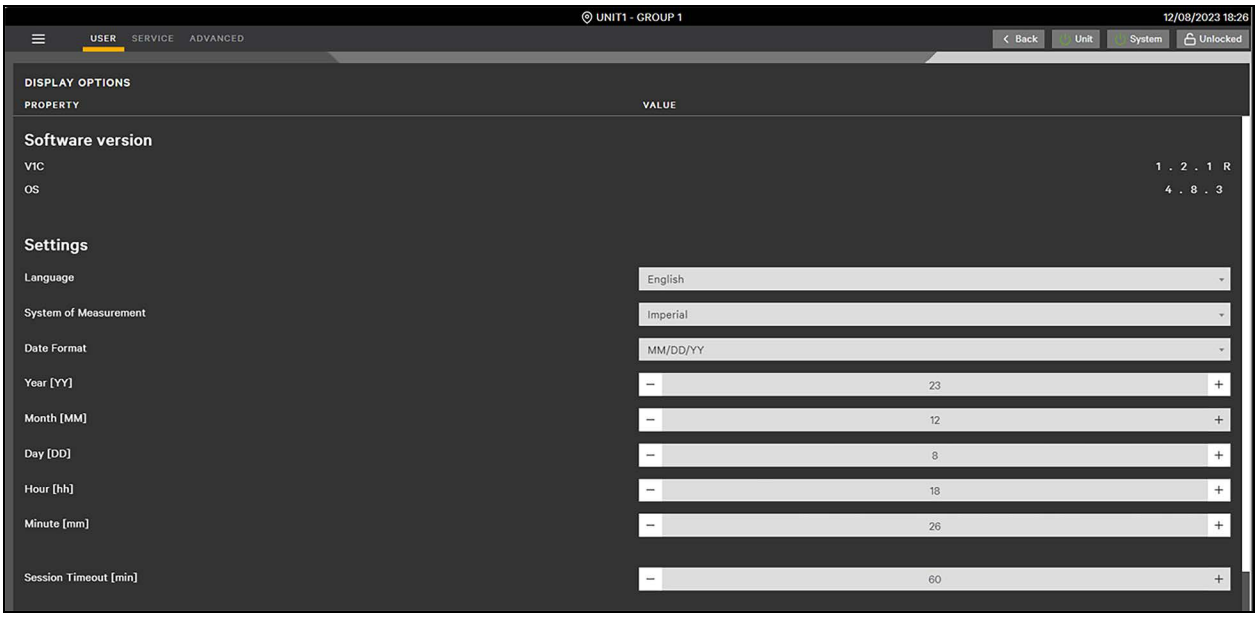
2.2.4 Display Options

The Display Options menu allows you to change the following settings: Language, System of Measurement (Metric or Imperial), Date Format (DD/MM/YY, MM/DD/YY, or YY/MM/DD), current date and time, time for session timeout, minimum password length, days for password expiration, and password complexity. The installed version of the V1C software and the OS version are also reported.

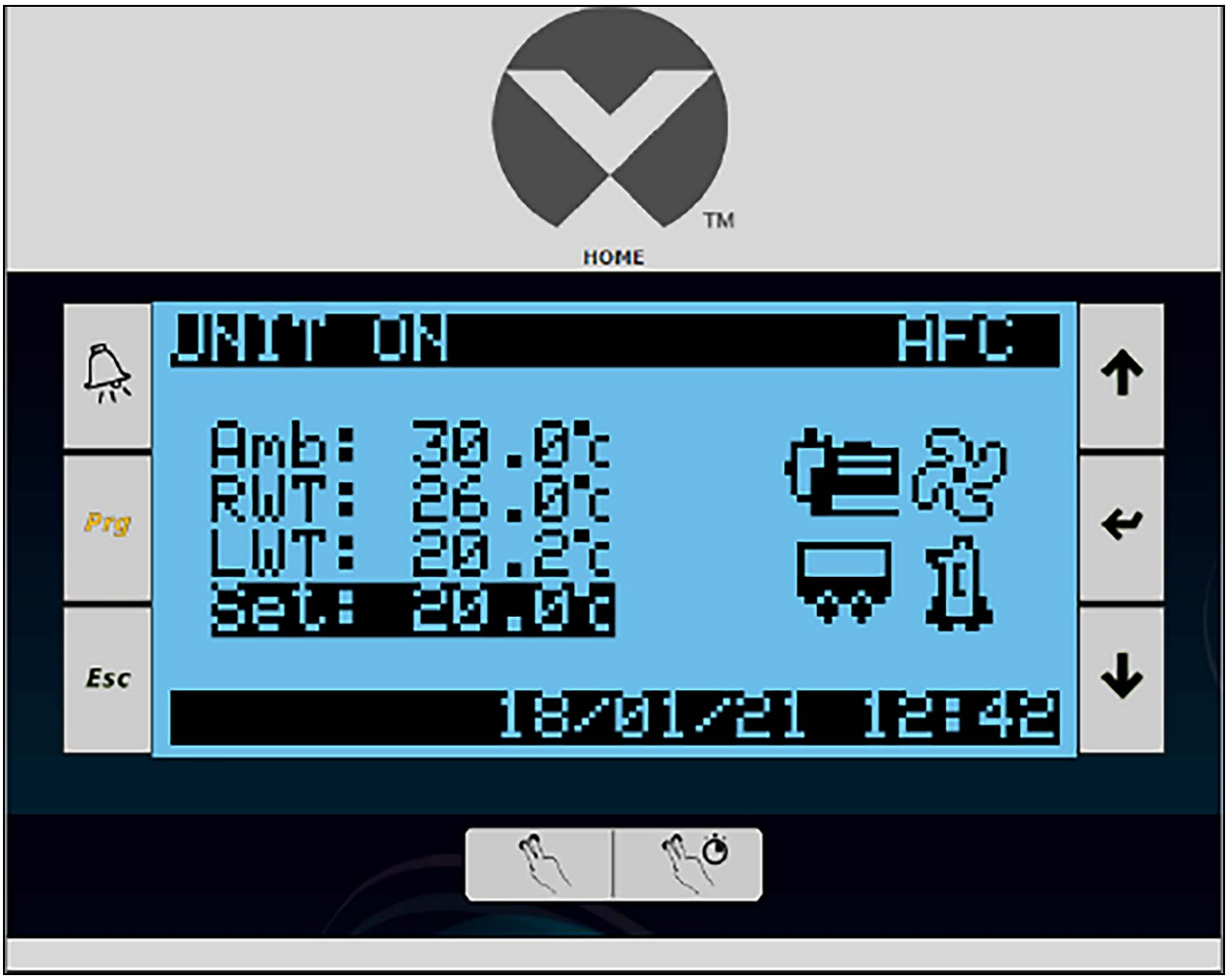
Figure 2.18 Display Options Menu



2.2.5 Panel

The Panel page reproduces the screen currently shown on the display and allows you to interact with it remotely.

Figure 2.19 Panel Screen



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3 Relevant Operations

Below is a list of relevant operations followed by the related menu paths.

- Change Setpoint

  Main Screen -> (Enter Key + User Password) -> User Configuration Menu -> Temperature Control

- Change Date/Time or Units of measure

  Main Screen -> (Enter Key + User Password) -> User Configuration Menu -> Display Setup

- View firmware or software version installed

  Main Screen -> (Enter Key + User Password) -> User Configuration Menu -> Display Setup

- Export Events

  Main Screen -> (Alarm Key) -> Event Report -> Export Events

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4 Events List

The following table contains a list of all of the events managed by the application and the associated ID, Description (the same used in the web site), and Type (Message, Warning, Alarm).

Event ID	Description	Type
1	Display OFF	Message
2	Unit ON	Message
3	System OFF	Message
4	System ON	Message
5	Standby	Message
6	Evaporator Pump 1 Failure	Warning
7	Evaporator Pump 2 Failure	Warning
8	Missing Primary Water Flow	Alarm
9	Manual Mode Enabled	Message
10	Evaporator Freeze Protection	Alarm
11	Unit Inlet Temperature Probe Failure	Alarm
12	Evaporator Inlet Temperature Probe Failure	Alarm
13	Unit Outlet Temperature Probe Failure	Alarm
15	Ambient Temperature Probe Failure	Alarm
24	Fans Communication Failure	Alarm
25	Circuit 1 - Fans Failure	Alarm
26	Circuit 2 - Fans Failure	Alarm
27	Circuit 1 - Single Fan Failures	Warning
28	Circuit 2 - Single Fan Failures	Warning
29	Compressors Off by Low Ambient Temperature	Message
30	Circuit 1 - Fans Working Hours Limit Exceeded	Warning
31	Circuit 2 - Fans Working Hours Limit Exceeded	Warning
34	Free Cooling Valve Feedback Failure	Warning
35	Circuit 1 - High Condensing Pressure	Alarm
36	Circuit 1 - Low Evaporating Pressure	Alarm
37	Circuit 1 - Very Low Superheat	Alarm
38	Circuit 1 - Compressor 1 Thermal Protection	Alarm
39	Circuit 1 - Compressor 2 Thermal Protection	Alarm
40	Circuit 1 - Compressor 3 Thermal Protection	Alarm
41	Circuit 1 - Fans Override Enabled	Warning

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Event ID	Description	Type
42	Circuit 1 - Compressors Unload Enabled	Warning
43	Circuit 1 - Critical Condensing Pressure	Warning
46	Circuit 1 - Compressor 1 Contactors Glued	Alarm
50	Circuit 1 - Condensing Pressure Probe Failure	Alarm
51	Circuit 1 - Liquid Temperature Probe Failure	Warning
52	Circuit 1 - Evaporating Pressure Probe Failure	Alarm
53	Circuit 1 - Evaporating Temperature Probe Failure	Alarm
55	Circuit 1 - High Superheat	Warning
56	Power Failure	Message
57	EEV Driver 1 - Communication Failure	Alarm
58	EEV Driver 1 - Valve Motor Error	Alarm
59	Evaporator Pump 1 Communication Failure	Warning
60	Evaporator Pump 2 Communication Failure	Warning
61	Circuit 2 - High Condensing Pressure	Alarm
62	Circuit 2 - Low Evaporating Pressure	Alarm
63	Circuit 2 - Very Low Superheat	Alarm
64	Circuit 2 - Compressor 1 Thermal Protection	Alarm
65	Circuit 2 - Compressor 2 Thermal Protection	Alarm
66	Circuit 2 - Compressor 3 Thermal Protection	Alarm
67	Circuit 2 - Fans Override Enabled	Warning
68	Circuit 2 - Compressors Unload Enabled	Warning
69	Circuit 2 - Critical Condensing Pressure	Warning
72	Circuit 2 - Compressor 1 Contactors Glued	Alarm
75	Unit Freeze Protection	Alarm
76	Circuit 2 - Condensing Pressure Probe Failure	Alarm
77	Circuit 2 - Liquid Temperature Probe Failure	Warning
78	Circuit 2 - Evaporating Pressure Probe Failure	Alarm
79	Circuit 2 - Evaporating Temperature Probe Failure	Alarm
81	Circuit 2 - High Superheat	Warning
82	Power Failure Line B	Message
83	EEV Driver 2 - Communication Failure	Alarm
84	EEV Driver 2 - Valve Motor Error	Alarm
85	Evaporator Pump 1 Working Hours Limit Exceeded	Warning
86	Evaporator Pump 2 Working Hours Limit Exceeded	Warning
89	Remove Power From Unit	Message

Event ID	Description	Type
90	User Analog Input 1 Failure	Alarm
92	Energy Meter 1 Communication Failure	Warning
94	Energy Meter 2 Communication Failure	Warning
95	Circuit 1 - Compressor 1 Working Hours Limit Exceeded	Warning
96	Circuit 1 - Compressor 2 Working Hours Limit Exceeded	Warning
97	Circuit 1 - Compressor 3 Working Hours Limit Exceeded	Warning
98	Circuit 2 - Compressor 1 Working Hours Limit Exceeded	Warning
99	Circuit 2 - Compressor 2 Working Hours Limit Exceeded	Warning
100	Circuit 2 - Compressor 3 Working Hours Limit Exceeded	Warning
101	Expansion Board Communication Failure	Warning
102	Water Flow Meter Sensor Failure	Warning
103	Remote OFF	Message
104	Variable Water Flow Control Failure	Warning
105	Low External Water Flow	Warning
107	Unstable External Water Flow	Warning
108	Low Evaporator Water Flow	Warning
109	High Evaporator Water Flow	Warning
110	Low Evaporator Water Flow	Alarm
111	High Evaporator Water Flow	Alarm
112	Circuit 1 - Low Refrigerant Charge Warning	Warning
113	Circuit 1 - Low Refrigerant Charge Alarm	Alarm
114	Circuit 2 - Low Refrigerant Charge Warning	Warning
115	Circuit 2 - Low Refrigerant Charge Alarm	Alarm
116	Circuit 1 - Compressors Out of Envelope	Warning
117	Circuit 2 - Compressors Out of envelope	Warning
126	Too Fast Water Flow Variation	Warning
127	Too Fast Water Flow Variation	Alarm
128	Circuit 1 - Compressor Oil Level Alarm	Alarm
129	Circuit 2 - Compressor Oil Level Alarm	Alarm
130	Auxiliary Power Failure	Alarm
131	Circuit 1 - Compressors Off by Envelope Protection	Message
132	Circuit 2 - Compressors Off by Envelope Protection	Message
133	Circuit 1 - Compressors Unload Stop by Envelope Protection	Message
134	Circuit 2 - Compressors Unload Stop by Envelope Protection	Message
135	Circuit 1 - Compressors Out of Envelope (Level 2)	Message

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Event ID	Description	Type
136	Circuit 2 - Compressors Out of Envelope (Level 2)	Message
137	Circuit 1 - Low Differential Pressure	Alarm
138	Circuit 2 - Low Differential Pressure	Alarm
140	Condenser Inlet Temperature Probe Failure	Alarm
141	Condenser Outlet Temperature Probe Failure	Alarm
142	Free Cooling Pump Working Hours Limit Exceeded	Warning
145	Free Cooling By-Pass Valve Feedback Failure	Warning
148	Low Evaporator Water Pressure	Alarm
149	Evaporator Water Pressure Sensors Failure	Warning
151	Evaporator Bypass Valve Feedback Failure	Warning
152	Circuit 1 - Low Evaporating Temperature	Alarm
153	Circuit 2 - Low Evaporating Temperature	Alarm
156	Circuit 1 - Compressor Starts/h Limit Reached	Alarm
157	Circuit 2 - Compressor Starts/h Limit Reached	Alarm
158	Emergency Mode Active	Message
159	CWM Communication Failure	Warning
160	Missing Unit Configuration	Alarm
171	Circuit 1 - Compressor Inverter Communication Failure	Alarm
172	Circuit 2 - Compressor Inverter Communication Failure	Alarm
173	Circuit 1 - Compressor Inverter Alarm	Alarm
174	Circuit 2 - Compressor Inverter Alarm	Alarm
175	EEV Driver 1 - Generic Alarm	Alarm
176	EEV Driver 2 - Generic Alarm	Alarm
177	Free Cooling Inlet Pressure Sensor Failure	Alarm
178	Free Cooling Outlet Pressure Sensor Failure	Alarm
179	Free Cooling Pump Alarm	Alarm
180	Free Cooling Pump Communication Failure	Warning
182	iCOM Memory Error	Alarm
183	Critical Refrigerant Leakage Detected	Alarm
184	Refrigerant Leakage Detected	Warning
185	Gas Leak Detector Communication Failure	Warning
186	Gas Leak Detector Sensor Calibration Required	Warning
187	Circuit 1 - Critical Refrigerant Depressurization	Alarm
188	Circuit 2 - Critical Refrigerant Depressurization	Alarm
189	ATS 1 Communication Failure	Warning

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Event ID	Description	Type
190	ATS 2 Communication Failure	Warning
191	Free Cooling Failure	Alarm
192	Fans Rotation Error	Alarm
193	C3 and C4 Offline	Alarm
194	Network Failure	Warning
195	No Connection to Unit 1	Warning
196	Master Unit Changed	Message
197	Master Unit not Available	Warning
201	Free Cooling Circuit – Glycol Leakage	Alarm
202	Free Cooling Circuit – High pressure	Alarm
410	Evaporator 2 Freeze Protection	Alarm
411	Unit Inlet Temperature Probe 2 Failure	Alarm
412	Evaporator Inlet Temperature Probe 2 Failure	Alarm
413	Unit Outlet Temperature Probe 2 Failure	Alarm
415	Ambient Temperature Probe 2 Failure	Alarm
425	Circuit 3 – Fans Failure	Alarm
426	Circuit 4 – Fans Failure	Alarm
427	Circuit 3 – Single Fans Failure	Warning
428	Circuit 4 – Single Fans Failure	Warning
430	Circuit 3 – Fans Working Hours Limit Exceeded	Warning
431	Circuit 4 – Fans Working Hours Limit Exceeded	Warning
434	Free Cooling Valve 2 Feedback Failure	Warning
435	Circuit 3 – High Condensing Pressure	Alarm
436	Circuit 3 – Low Evaporating Pressure	Alarm
437	Circuit 3 – Very Low Superheat	Alarm
438	Circuit 3 – Compressor 1 Thermal Protection	Alarm
439	Circuit 3 – Compressor 2 Thermal Protection	Alarm
440	Circuit 3 – Compressor 3 Thermal Protection	Alarm
441	Circuit 3 – Fans Override Enabled	Warning
442	Circuit 3 – Compressors Unload Enabled	Warning
443	Circuit 3 – Critical Condensing Pressure	Warning
446	Circuit 3 – Compressor 1 Contactors Glued	Alarm
450	Circuit 3 – Condensing Pressure Probe Failure	Alarm
451	Circuit 3 – Liquid Temperature Probe Failure	Warning
452	Circuit 3 – Evaporating Pressure Probe Failure	Alarm

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Event ID	Description	Type
453	Circuit 3 – Evaporating Temperature Probe Failure	Alarm
455	Circuit 3 – High Superheat	Warning
457	EEV Driver 3 – Communication Failure	Alarm
458	EEV Driver 3 – Valve Motor Error	Alarm
461	Circuit 4 – High Condensing Pressure	Alarm
462	Circuit 4 – Low Evaporating Pressure	Alarm
463	Circuit 4 – Very Low Superheat	Alarm
464	Circuit 4 – Compressor 1 Thermal Protection	Alarm
465	Circuit 4 – Compressor 2 Thermal Protection	Alarm
466	Circuit 4 – Compressor 3 Thermal Protection	Alarm
467	Circuit 4 – Fans Override Enabled	Warning
468	Circuit 4 – Compressors Unload Enabled	Warning
469	Circuit 4 – Critical Condensing Pressure	Warning
472	Circuit 4 – Compressor 1 Contactors Glued	Alarm
476	Circuit 4 – Condensing Pressure Probe Failure	Alarm
477	Circuit 4 – Liquid Temperature Probe Failure	Warning
478	Circuit 4 – Evaporating Pressure Probe Failure	Alarm
479	Circuit 4 – Evaporating Temperature Probe Failure	Alarm
481	Circuit 4 – High Superheat	Warning
483	EEV Driver 4 – Communication Failure	Alarm
484	EEV Driver 4 – Valve Motor Error	Alarm
495	Circuit 3 – Compressor 1 Working Hours Limit Exceeded	Warning
496	Circuit 3 – Compressor 2 Working Hours Limit Exceeded	Warning
497	Circuit 3 – Compressor 3 Working Hours Limit Exceeded	Warning
498	Circuit 4 – Compressor 1 Working Hours Limit Exceeded	Warning
499	Circuit 4 – Compressor 2 Working Hours Limit Exceeded	Warning
500	Circuit 4 – Compressor 3 Working Hours Limit Exceeded	Warning
502	Water Flow Meter Sensor 2 Failure	Warning
512	Circuit 3 – Low Refrigerant Charge Warning	Warning
513	Circuit 3 – Low Refrigerant Charge Alarm	Alarm
514	Circuit 4 – Low Refrigerant Charge Warning	Warning
515	Circuit 4 – Low Refrigerant Charge Alarm	Alarm
516	Circuit 3 – Compressors Out of Envelope	Warning
517	Circuit 4 – Compressors Out of Envelope	Warning

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Event ID	Description	Type
528	Circuit 3 – Compressor Oil Level Alarm	Alarm
529	Circuit 4 – Compressor Oil Level Alarm	Alarm
531	Circuit 3 – Compressors Off by Envelope Protection	Message
532	Circuit 4 – Compressors Off by Envelope Protection	Message
533	Circuit 3 – Compressors Unload Stop by Envelope Protection	Message
534	Circuit 4 – Compressors Unload Stop by Envelope Protection	Message
535	Circuit 3 – Compressors Out of Envelope (Level 2)	Message
536	Circuit 4 – Compressors Out of Envelope (Level 2)	Message
537	Circuit 3 – Low Differential Pressure	Alarm
538	Circuit 4 – Low Differential Pressure	Alarm
545	Free Cooling By-Pass Valve 2 Feedback Failure	Warning
549	Evaporator Water Pressure Sensors 2 Failure	Warning
552	Circuit 3 – Low Evaporating Temperature	Alarm
553	Circuit 4 – Low Evaporating Temperature	Alarm
556	Circuit 3 – Compressor Starts/h Limit Reached	Alarm
557	Circuit 4 – Compressor Starts/h Limit Reached	Alarm
575	EEV Driver 3 – Generic Alarm	Alarm
576	EEV Driver 4 – Generic Alarm	Alarm
587	Circuit 3 – Critical Refrigerant Depressurization	Alarm
588	Circuit 4 – Critical Refrigerant Depressurization	Alarm
591	Free Cooling Failure 2	Alarm

4.1 Protective Functions

The Vertiv™ Liebert® AFC chillers are protected through a series of warnings and alarms designed to alert the user in case of abnormal operation and prevent damaging the unit.

Warnings and alarms currently active (or not acknowledged) are shown on the main page. Refer to Figure 4.1 on the next page .

An Event Log Screen is also available to review both active and past events. See Figure 4.2 on page 53 .

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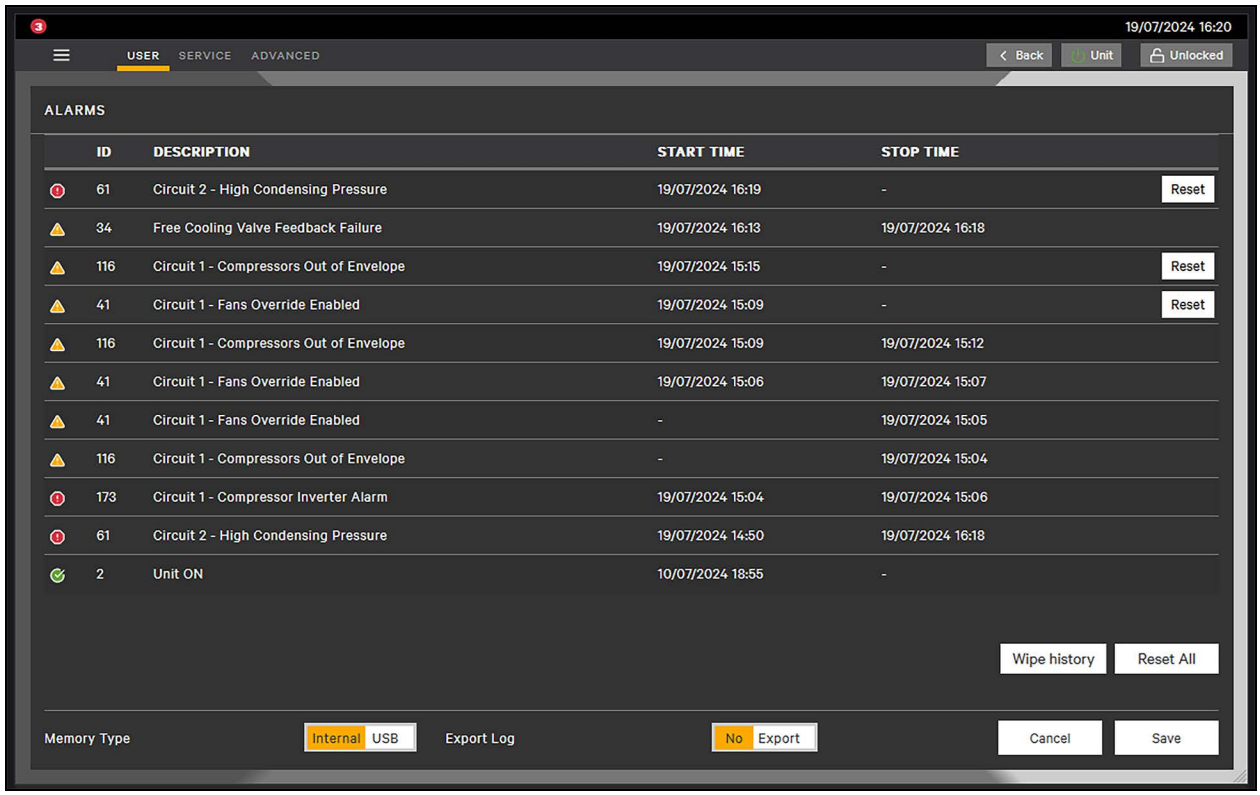
Figure 4.1 Alarm History Screen

Figure 4.2 Event Log Screen



Pressure Control	High pressure and low pressure alarm
Out of Envelope Alarm	Modulation of capacity based on the value of high pressure, low pressure, superheat and subcooling and the operating map of the compressor installed.
Oil Level	Low level alarm
Refrigerant Charge Check Function	Monitoring of the subcooling value with warning or alarm depending on the working conditions
Compressors	The compressors are equipped with an electronic protection device preventing start-up if the phase sequence is not correct, or stopping their operation if a thermal relay intervenes. This device is essential for the integrity of the mechanical and electrical components of the compressors. In the event of compressor stoppage: 1. Isolate this device. 2. Remove the causes of the lock-out. 3. Reset the device by the Vertiv™ Liebert® iCOM™.

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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

1-800-543-2378

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N. Cleveland Ave.

Westerville, OH 43082, USA

Europe

Via Leonardo Da Vinci 8 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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SL-71120_RevB_01-25