VERTIV™

Liebert® iCOM™

Installer/User Guide
Intelligent Monitoring for Liebert® XDM

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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 Getting Started with Vertiv™ Liebert® iCOM™

The Vertiv™ Liebert® iCOM™ offers the highest capability for unit control, communication, and monitoring of Liebert thermal management units. It is available factory installed on new units and assemblies or may be retrofitted in existing units.

1.1 Touchscreen Display and User Interface

The Vertiv™ Liebert® iCOM™ touchscreen and user interface speeds set up and installation and simplifies control of Liebert thermal management units, literally putting cooling system monitoring and management at your fingertips.

- The resistive touchscreen is used with a firm touch, or consider using a stylus when interacting with the touchscreen.
- User and service menus are password protected to prevent unauthorized changes to cooling unit operation.
- The touchscreen is back lit and auto-dims after a period on non-use, then turns off. Touch the screen to illuminate the main screen.
- iCOM™ ships with default settings for efficient and effective operation of most cooling units and is easily configured to meet any need.
- iCOM™ menus and displays are based on the options installed on the cooling units that it monitors and manages.

Figure 1.1 Vertiv™ Liebert® iCOM™ XDM Default Home Screen
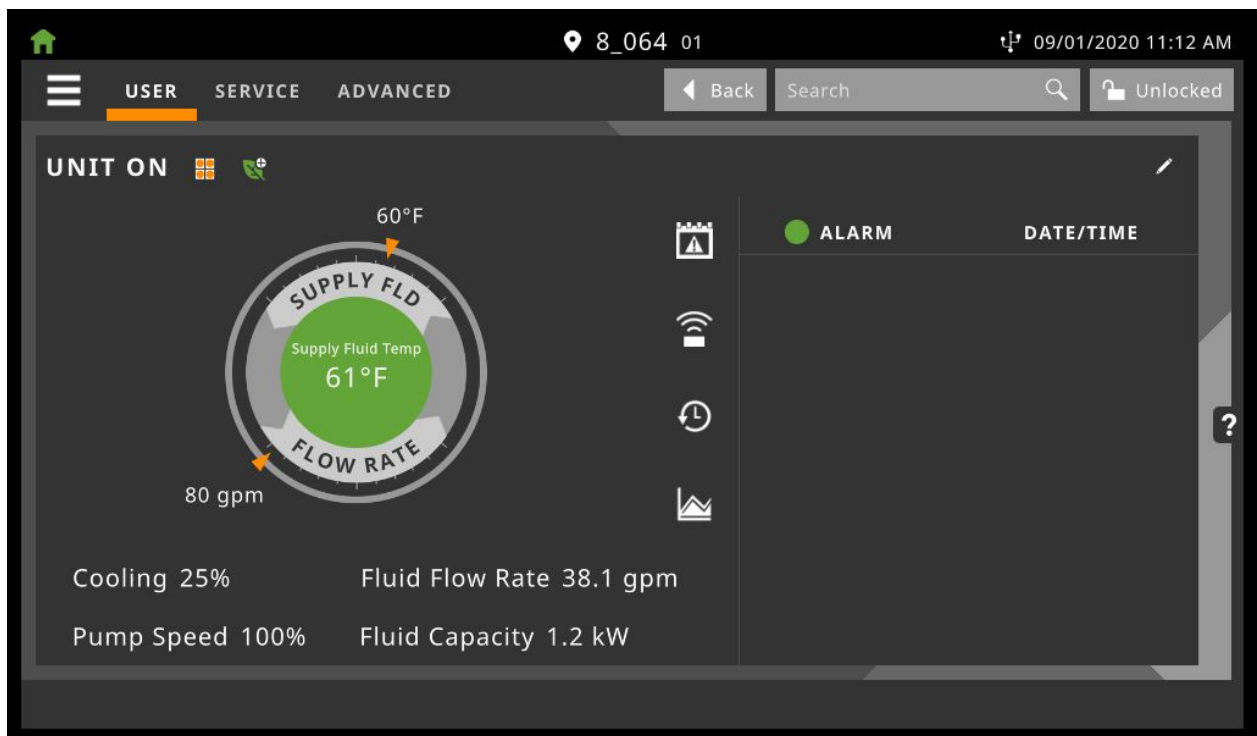
1.2 Touchscreen Status Dial

The dial in the primary control panel displays read-only control sensors, setpoints, and environmental conditions for unit status at a glance. See **Figure 1.2**   below .

The center of the dial displays sensor readings and changes color according to alarm thresholds as the readings rise and fall. See Dial Background Color Status Indication below .

Touching the center of the dial cycles through a set of sensor settings, and you can select the readings displayed. See Adding and Adjusting Content on page 111 .

Figure 1.2   Vertiv™ Liebert® XDM Default Dial on Home Screen
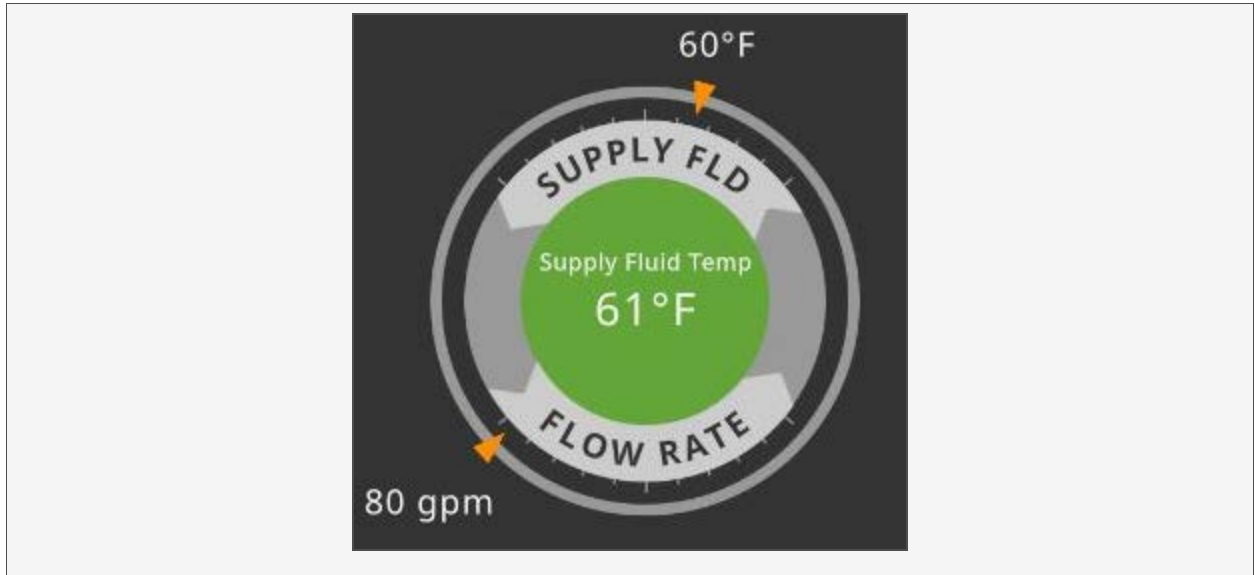
1.2.1 Dial Background Color Status Indication

The background color of the dial indicates whether or not the unit is powered on, and it also responds to threshold settings of the control sensor reading. See **Figure 1.3**   below . **Table 1.1**   on the facing page describes the background color displayed if the selected sensor reading has threshold limits set.

Figure 1.3   Vertiv™ Liebert® iCOM™ XDM Default Dials
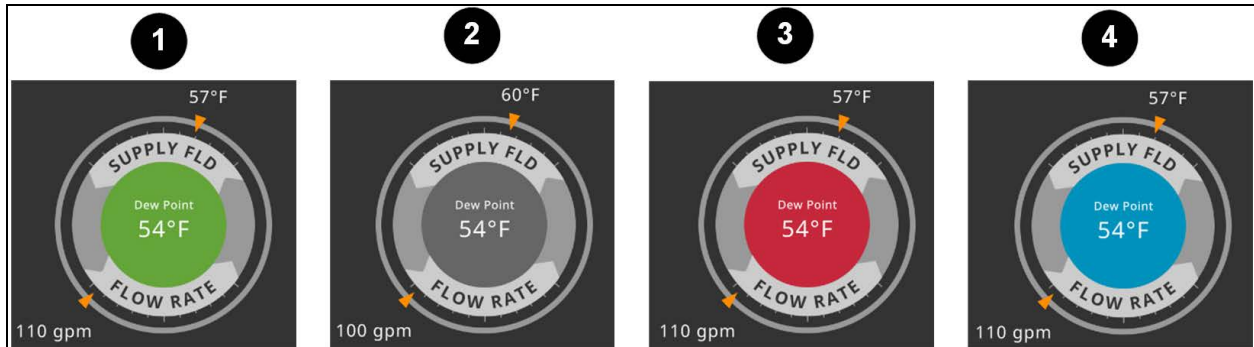
Item	Description
1	Sensor reading is within threshold limits.
2	Unit is powered off.
3	Sensor reading is above threshold limit or the unit is in an alarm condition.
4	Sensor reading is below threshold limit.

Table 1.1   Background Color Displayed by Selected Value and Threshold Limit

Sensor/Value Selected	Threshold Limit	Background Color
Return Temp	None	Blue
	High return temperature	Red
Supply Temp	Low supply temperature	Blue
	High supply temperature	Red

1.3 Control Header

The control header contains the controls to access the user and service settings. The display is locked when started initially and when restarted after a period of inactivity.

1.3.1 Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls

Vertiv™ Liebert® iCOM™ is powered on when power is switched on at the cooling unit's disconnect switch and you activate the display by touching it.

iCOM™ is locked when started and also locks after a period of inactivity to prevent unauthorized changes. A four digit password is required to access the user and service menus and options, and the advance menu displays as read-only when logged in at the service level.

NOTE: The factory default inactivity period is one minute. To change the inactivity period, see Customizing Main Display Views on page 110 .

NOTE: The factory default password for user and service log in are provided. We recommend you change passwords as necessary to prevent unauthorized changes. See Managing Access Permission and Passwords on page 98 .

- Default user password: 1490
- Default service password: 5010

To unlock the controls:

1. On the header, touch [Locked]. The keypad opens.

2. Touch the numbers/characters for your password, then touch [↵].

   Depending on the password entered and your level of access, the User and/or Service options and view only access to the Advanced menu are accessible. See Accessing the User, Service, and Advanced Menus on page 7 .

1.3.2 Powering On the Thermal Management Unit

NOTE: Depending on the operating state, there are start and stop priority switches that may prevent the cooling unit from operating even though power to the unit is switched on and you have turned it on via Vertiv™ Liebert® iCOM™.

The cooling unit operates only when all switches are closed. For example, even though you have turned on the unit through iCOM™, if the BMS remote monitoring system is sending a command to turn off the unit, the cooling unit remains off.

NOTE: You must be logged in to access the menu options. See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on the previous page .

To power on the unit:

1. Touch [USER], then [≡] >*Turn Unit On*. The TURN UNIT ON dialog opens.
2. Touch *Turn Unit On*. The cooling unit starts and the operating status is displayed as shown in **Figure 1.4** below .

Figure 1.4 Vertiv™ Liebert® iCOM™ XDM Home Screen—Alarm ON Example
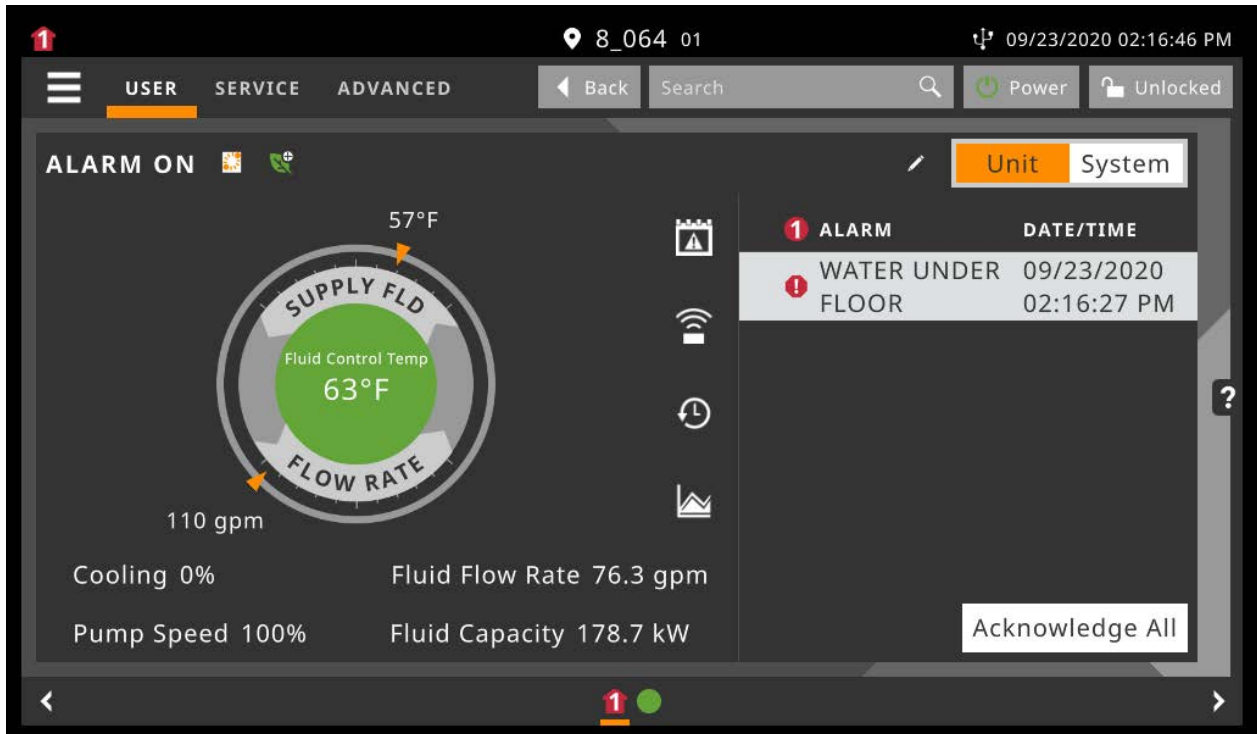
Table 1.2   Cooling Unit Statuses Displayed

Unit Status Text	Description
ALARM OFF	An alarm forced the unit to turn off. See Viewing Unit Alarms on page 12 .
MANUAL	Controlled by a service technician. See Enabling Manual Mode for Diagnostics on page 99 .
DISPLAY OFF	Unit is turned Off at the iCOM™ display. See Powering Off the Thermal Management Unit below .
ALARM STANDBY	In standby because of an active alarm on the unit. See Viewing Unit Alarms on page 12 .
STANDBY	In standby because of service menu setting. See Assigning Cooling Units to Standby (Lead/Lag) on page 35 .
TIMER OFF	Scheduled on a timer and is in sleep mode waiting for the next start interval. See Scheduling Condenser and Cooling Unit Tasks on page 26 .
UNIT ON	Operating normally without alarms or warnings.
WARNING ON	Active warning, but still operating. See Viewing Unit Alarms on page 12 .
ALARM ON	Active alarm, but still operating. See Viewing Unit Alarms on page 12 .
TIMER	Scheduled on a timer to operate, and is in operating mode. See Scheduling Condenser and Cooling Unit Tasks on page 26 .
REMOTE OFF	Turned off by remote shutdown terminal. Occurs when a normally closed set of 24V contacts opens. The Remote On/Off and Display On/Off switches are in series, and the cooling unit will only turn on if both switches are on/closed. If one is off/open, the unit turns off.
MONITORING OFF	Turned off by remote monitoring system. Check the remote monitoring device or call Vertiv technical support for assistance.
BACKDRAFT	Unit is non-operational, but EC fan is operating as a backdraft damper.
RESTART DELAY	Not yet operational after a power cycle because the restart delay timer is active.

1.3.3 Powering Off the Thermal Management Unit

NOTE: You must be logged in to access the menu options. See **Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls** on page 3 .

1. Touch [USER] , then [☰] >*Turn Unit Off*. The TURN UNIT OFF panel opens.
2. Touch *Turn Unit Off*. The unit begins a power off countdown and then powers off.

1.3.4 Logging Out

Log out occurs automatically when the display back light turns off for inactivity.

NOTE: The factory default inactivity period is one minute. To change the inactivity period, see .**Setting General Display Properties** on page 109

- To log out manually, touch the lock icon. The icon indicates locked.

1.3.5 Setting the Date and Time

The correct date and time is critical for warnings, alarms, and scheduling.

1. Touch ![USER], then > *Display Options > Display Properties > Date & Time.*
2. Touch the date field, use the arrows to select the date, and touch *OK*.
   – or –
   Touch the time field, use the arrows to set the time, and touch *OK*.
3. Select the date and time format if necessary.
4. Touch Save.

1.3.6 Searching

When logged in, you can use the display search to find the location of settings options based on a term, service code, or parameter. You can also search by the line ID used in the Vertiv™ Liebert® iCOM™ before the touchscreen model. For a listing of the line IDs, see Setpoints and Alarm Settings by Line ID on page 125 .

NOTE: You must be logged in to access the display search. See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on page 3 .

1. In the control header, touch the search field. The keyboard opens.
2. Type the term and touch ![enter]. A list of locations that contain the searched term opens.
3. To go to a listed location, touch an item, then touch *Go*. The panel for the selected location opens.

   – or –

   To view the service codes and parameter entries related to the searched term, touch View Parameter Directory Entries (the number of related entries is included in the option). The Parameter Directory opens. You may further refine the search in the directory.

1.4 Using Context Sensitive Help

Touching the Help icon, ![?], on the right hand side of the display opens the Help drawer with information about the panel or dialog currently on the display.

You can use search and the topic index to find further information.

To close the Help drawer, touch the close arrow, ![>].

1.5 About Vertiv™ Liebert® iCOM™ Version

The version, build, and other firmware information for the Vertiv™ Liebert® iCOM™ display board may be helpful when servicing or troubleshooting. To locate the firmware version of the iCOM™ control board, see Updating Vertiv™ Liebert® iCOM™ Control Board Firmware on page 95 .

- Touch [USER], then [☰] > *About*. The ABOUT panel opens.

  - or -

- Touch *User>Asset Report*. The Asset Report includes ancillary device software version.

1.6 Accessing the User, Service, and Advanced Menus

Vertiv™ Liebert® iCOM™ operating functions that monitor and control a cooling unit are accessed via the User and Service menus.

NOTE: You must be logged in to access the menu options. See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on page 3 .

1. To access a menu, touch the icon for the menu you want, [USER], [SERVICE] or [ADVANCED], in the control header. See Control Header on page 3 . The orange bar appears below the menu name when selected indicating that this is the menu content that will be displayed.

2. Touch the menu icon, [☰]. The menu opens.

1.7 User Menu

The user menu lets you view system and unit statuses and edit some setpoints.

1.7.1 User Menu Options

Setpoints

Opens the SETPOINTS panel. See Viewing and Editing Setpoints for the Cooling Unit on page 11 .

Alarms

Opens the ALARMS panel. See Viewing Unit Alarms on page 12 .

Event Log

Opens the EVENT LOG panel. See Viewing the Event Log on page 14 .

Sensor Data

Opens the SENSOR DATA panel. See Viewing Sensor Data on page 14 .

Display Options

Opens the DISPLAY OPTIONS menu:

- Customize Layout: See Customizing Main Display Views on page 110 .
- Custom Labels: See Customizing Parameter and Field Labels on page 112 .
- Date & Time: See Setting the Date and Time on page 6 .

Total Run Hours

Opens the RUN HOURS panel.

About

Opens the ABOUT panel. See About Vertiv™ Liebert® iCOM™ Version on the previous page .

Asset Report

Opens the Asset Report that provide information on ancillary device firmware.

Turn Unit On/Off

Depending on unit's status, open the TURN UNIT ON or TURN UNIT OFF dialog. See Powering On the Thermal Management Unit on page 4 or Powering Off the Thermal Management Unit on page 5 .

1.8 Service Menu

The service menu lets you view and edit setpoints and perform many other functions.

1.8.1 Service Menu Options

Setpoints

Opens the SETPOINTS panel. See Cooling Unit Status LED on page 99

Diagnostic/Service

Opens the DIAGNOSTIC/SERVICE menu:

- Diagnostics: See Performing Diagnostics on page 99 .
- Technical Support: Contact information for the cooling unit and iCOM™ display.

Alarm Setup

Opens the ALARMS & EVENTS panel. See Managing Events: Alarms, Warnings, and Messages on page 39

BMS & Teamwork

Opens the BMS & TEAMWORK menu:

- U2U Setup: See Unit to Unit Networking on page 51 .
- BMS Setup: See BMS and Vertiv™ Liebert® IntelliSlot Settings on page 55

Scheduler

Opens the SCHEDULER panel. See Scheduling Condenser and Cooling Unit Tasks on page 26 .

Options Setup

Opens the OPTIONS SETUP panel. See .

Auxiliary Device Setup

Opens the AUXILIARY DEVICE SETUP menu:

- Sensors: See Wired Remote Sensors on page 115 .

Backup & Security

Opens the BACKUP & SECURITY menu:

- Display Backup and Restore: See Backing Up and Restoring Control Board Settings on page 97 .
- Control Backup and Restore: See Backing Up and Restoring Control Board Settings on page 97
- Display Upgrade: See Updating Vertiv™ Liebert® iCOM™ Control Board Firmware on page 95 .
- Control Upgrade: See Updating Vertiv™ Liebert® iCOM™ Control Board Firmware on page 95 .
- Manage Permissions: See Managing Access Permission and Passwords on page 98 .

Turn Unit On/Off

Depending on unit's status, open the TURN UNIT ON or TURN UNIT OFF dialog. See Powering On the Thermal Management Unit on page 4 , or Powering Off the Thermal Management Unit on page 5 .

1.9 Advanced Menu

The advanced menu provides a read-only view of the advanced set up and factory level settings.

1.9.1 Advanced Menu Options

Factory Settings

Unit code and configuration settings.

Diagnostics

Details about control and cooling operation.

Expert Settings

Parameters and settings for use by trained professionals only.

Tandem Info

Provides data about compressors.

Runtime Monitoring

Details about component run times.

Modbus Devices

Read-only information regarding Modbus power meter firmware.

Control Override

Allows simulating events and override of analog outputs beyond normal limits.

EEV Settings

Provides settings for High Superheat.

EconoPhase

Enable/disable EconoPhase operation and modify parameters.

MC Condenser

Setup MC Condenser usage.

Parameter Directory

A searchable list of all parameters in the user interface. See .

2 User Operation

2.1 Viewing and Editing Setpoints for the Cooling Unit

NOTE: User level access allows viewing and editing only a limited number of setpoints. To view or adjust all setpoints, you must have service level access. See Editing Setpoints for the Cooling Unit on page 17 .

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

2.1.1 Editing Temperature Setpoints

1. Touch [USER], then [≡] > *Setpoints > Temperature Control.*

    The TEMPERATURE CONTROL secondary panel opens.

2. Refer to User Temperature Setpoint Options below .

    - Touch *Cancel* to discard the changes.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

2.1.2 User Temperature Setpoint Options

Temperature Setpoint Act

Read-only display of adjusted temperature setpoint when one of the following is active:

- Temperature compensation
- BMS backup temperature setpoint
- Customer input setpoint (remote alarm device)

Temperature Setpoint

Supply fluid temperature setpoint used to calculate call for required cooling component operation.

Temperature Control Sensor

Values are:

- Supply
- Remote
- Return
- Supply Fluid

BMS Backup Temp Setpoint

Selects a temperature setpoint that activates in the event of a BMS timeout. The BMS timer must be configured for this setpoint to activate. See Setting BMS Backup Setpoints on page 57 .

2nd Temperature Setpoint

Alternate setpoint activated by customer input (remote alarm device). When customer input connection is 2nd Setpoint, this value becomes the active temperature setpoint.

2.2 Viewing Unit Alarms

The ALARMS panel lists active alarm and warning events. Table 2.1 below describes the type and state of the alarm shown by indicator dots.

Table 2.1 Alarm Status and Type Indicators

Indicator	Description
Yellow dot	Warning event.
Red dot	Alarm event.
Circle	Event condition has cleared, but still must be acknowledged. See Acknowledging Alarms on the facing page .

2.2.1 To View Alarms

1. Touch [USER], then [≡] > *Alarms*. The ALARMS panel opens.

Table 2.2 Events that Clear without Acknowledgment

Network Failure	Description
UNIT XX DISCONNECTED	The iCOM I/O board assigned as U2U address number XX (two up to thirty-two) has lost communication with the group. Make sure all units are powered-on at the disconnect. Check cable connections and network settings where applicable
NO CONNECTION W/UNIT 1	The iCOM I/O board assigned as U2U address number 1 has lost communication with the group. Make sure all units are power on at the disconnect. Check cable connections and network settings where applicable
BMS DISCONNECT	The BMS/BAS has not completed a handshake within the time defined by the BMS/BAS. Verify monitoring connections and communication to the BMS/BAS panel.
UNIT CODE MISSING	The factory unit code must be confirmed, saved and executed.
UNIT CODE MISMATCH	The factory unit code must be confirmed, saved and executed.
CAN GC 1 or 2 COMM ERR	See Table 5.3 on page 44 .
CAN PB COMM ERR	See Table 5.3 on page 44 .

Alarm Fields

Alarm

Name of the event.

Unit

Cooling unit to which the alarm applies.

Threshold

Senor reading at which an event is triggered.

Value

The current value to which the threshold is compared.

Duration

Time elapsed since event was logged.

Date/Time

Date and time that the event was logged.

2.2.2 Silencing an Audible Alarm

Touch the screen to silence an audible alarm. If the alarm is non-latching, the alarm silences when the condition clears.

NOTE: The audible alarm must be enabled in display options to sound. See Enabling the Audible Alarm Notification on page 47 .

2.2.3 Acknowledging Alarms

Depending on the notification settings, alarms and warnings must be acknowledged or reset. An event is active as long as it is unacknowledged, with the exception of the network failure events described in Table 2.3   on the next page . Once acknowledged, an event remains active until the situation that triggered the event is resolved, see Table 2.1   on the previous page , for event status indicators. When an event is acknowledged and cleared, it is removed from the Alarms panel and the LED stops flashing red.

NOTE: Acknowledging alarm events does not clear them. To clear an issue, it must be corrected, reset automatically by the controller, or reset manually.

To Acknowledge Alarms

1. On the ALARMS panel, touch *Acknowledge All*. A check mark overlays the status indicator of the active alarms and warnings, and these automatically clear when the condition is no longer present.
    - If a critical event must be manually reset, the acknowledged items are listed with a Reset All button on the ALARMS panel.
2. Touch *Reset All* to manually reset the condition.

2.3 Viewing the Event Log

The event log is a list by date/time of the last 400 events generated by iCOM™ for the thermal management unit.

- On the User menu, touch *Event Log*. The EVENT LOG for the cooling unit opens. **Table 2.3**   below describes the color coded status for each event.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

Table 2.3   Event Status/Type Indicators

Indicator	Description
Green dot	Message.
Yellow dot	Unacknowledged warning event. See Acknowledging Alarms on the previous page .
Red dot	Unacknowledged alarm event. See Acknowledging Alarms on the previous page .
White dot with check mark overlay	Acknowledged event, the cause still exists.
White circle	Acknowledged event, the cause is cleared.

2.4 Viewing Sensor Data

The Sensor Data panel lists the standard and optional sensors monitored by Vertiv™ Liebert® iCOM™ and the current reading of each sensor.

- Touch [USER], then [≡] > *Sensor Data*. The SENSOR DATA panel opens.

  The panel is split into two: The first panel contains SENSOR DATA. A secondary panel displays the DAILY SENSOR READING SUMMARY, which shows temperature, humidity, and dew point readings for the cooling unit.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

2.5 Managing Run Hours for a Component

You can view the run hours for components on a cooling unit, set the total run time limit, and reset total run hours to zero.

1. Touch [USER], then [≡] > *Total Run Hours*. The RUN HOURS panel opens and the current hours for each component are listed in the Total Run Hours column.
   To reset the total run hours to zero, see Setting Run Hours to Zero below .
2. Use the slider to set the total run time limit for each component, then touch *Save*. The limits are set.

2.5.1 Setting Run Hours to Zero

1. On the RUN HOURS panel, touch to check each box in the *Total Run Hours* column next to the component(s) to reset. The Set to Zero button becomes available.
2. Touch *Set to Zero*. The total run hours for the selected component(s) is set to zero.

2.6 Viewing the XDM Optimization Teamwork/Standby Status

Touch the Teamwork mode icon located at the top left of the User panel.

The teamwork dialog opens displaying the, number of units in standby, total number of units, and the cascade mode.

NOTE: You must be logged in with the Service PIN to edit teamwork mode. See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on page 3

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3 Service Operation

3.1 Editing Setpoints for the Cooling Unit

Setpoints are the means by which cooling unit operation is controlled.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

3.1.1 Setpoint Options

Temperature Control

Refer to Configuring Temperature Setpoints below .

Temperature Compensation XDM

Refer to Setting Temperature Compensation on page 23

High/Low Limit Control XDM

Refer to Configuring High Limit Setpoints on page 26 .

Pumps Control

See XD Pump Speed Control Settings on page 25

3.1.2 Configuring Temperature Setpoints

1. Touch [SERVICE], then [☰] > *Setpoints > Temperature Control*. The TEMPERATURE CONTROL secondary panel opens.
2. Refer to Temperature Control – Temperature Setpoints and Cooling Operation on page 19 , and Compressor Control by Cooling Requirement on page 21 to adjust the setpoint options, then touch *Save*. The setpoint is updated.

NOTE: Proportional band setting is dependent on the heat load and the components specific to your cooling unit. Additional tuning may be required after start-up when using PI temperature control. See **Considerations when Using PI Temperature Control** on page 20 **.**

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

Temperature Control Options

Temperature Control Sensor

Selects which sensor will be controlling/influencing the cooling capacity. Cooling capacity is either the compressor, PRE, or combination of both. Supply fluid sensor shall be used to control call for cooling.

Temperature Setpoint Act

Read-only display of adjusted temperature setpoint when one of the following is active:

- Temperature compensation
- BMS backup temperature setpoint

Temperature Setpoint

Selects a fluid temperature which the cooling unit will maintain.

Temperature User Limits Low and Temperature User Limits High

Defines the temperature range below or above setpoint; temperature setpoint cannot be adjusted outside of this range. If the setpoint value has been adjusted outside of this range, then the setpoint will automatically default back to its previous setting.

Temperature Control Type

Control when staging cooling operations. There are three options:

- Proportional. The percent cooling/heating requirement, determined by the difference between the selected control sensor reading and the temperature setpoint. The Temperature Proportional Band is a user-defined range that is divided into two equal parts for cooling and heating.
- PI. The percent cooling requirement is calculated by combining two methods, proportional and integral. The proportional term is calculated similar to the previously described Proportional control. The integral term (sometimes called "reset action") is calculated by measuring how much and how long the control temperature has been above or below the setpoint. If the actual supply fluid temperature is above the setpoint, the percent requirement is slowly but continuously increased until the total is sufficient to bring the control temperature back to the setpoint. The control helps to ensure temperature setpoint is achieved while efficiently operating the equipment. The Proportional and Integral concepts work together to prevent excessive valve oscillation, compressor short cycle and temperature fluctuations. From an idle state (no cooling), the call for cooling is based on proportional temperature increase from setpoint. As temperature deviates further from or closer to setpoint, the call for cooling is increased or decreased proportionally. As the temperature remains above or below setpoint over time the integral portion of the call is increased or decreased. As the control adjusts to achieve setpoint the proportional component of the call is replaced by the integral component.

Temperature Proportional Band

Adjusts he activation points of compressors/PRE and rate of change based on the actual sensor values deviation from temperature setpoint.

NOTE: Setting this too low causes short cycling of compressors.

Temperature Integration Time

Adjusts the capacity of the units based on time away from setpoint so that accurate temperature control can be maintained.

Temperature Deadband

Used to help avoid overshooting of the supply fluid temperature setpoint.

BMS Backup Temp Setpoint

Temperature that the cooling unit maintains during BMS backup operation.

3.1.3 Temperature Control – 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:

Temperature Proportional Band

Use the proportional and dead band parameters to control how your cooling unit(s) respond based on the calculated need for cooling (or heating). Figure 3.1   below 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 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.

Figure 3.1 Temperature Control without a Deadband
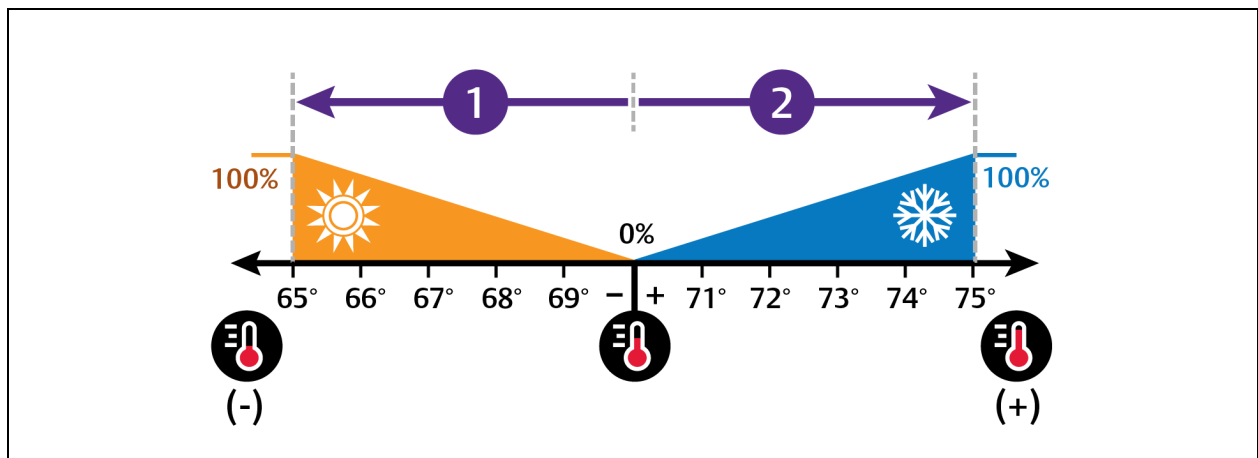
No.	Description
1	1/2 of proportional band
2	1/2 of proportional band

Temperature Deadband

A deadband widens the setpoint to prevent small temperature changes from activating compressors and valves and causing excessive component cycling. Figure 3.2 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 3.2   Temperature Control with a Deadband
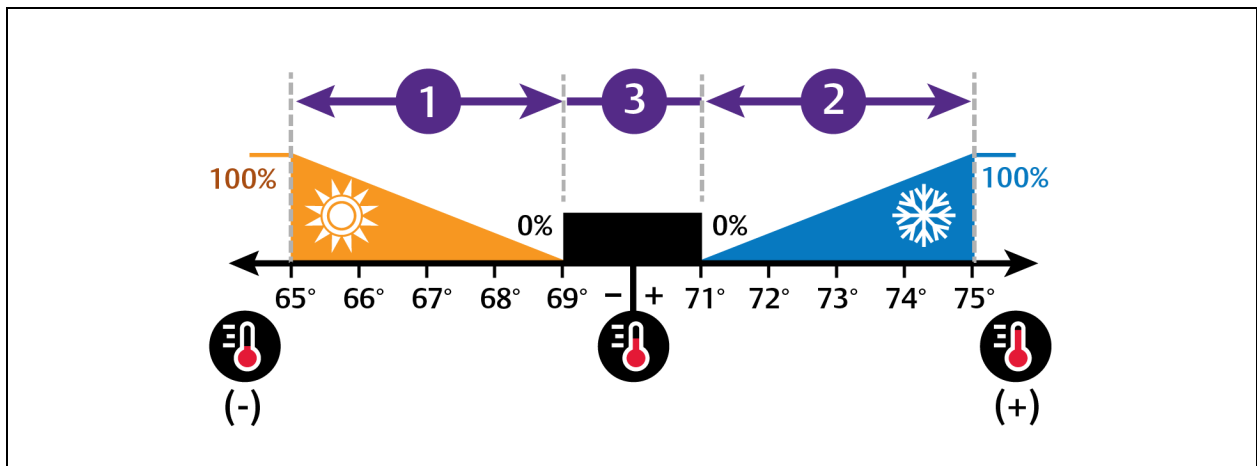
No.	Description
1	1/2 of proportional band
2	1/2 of proportional band
3	Deadband

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 in **Table 3.1**   on the facing page .

Table 3.1   PI Temperature Control Troubleshooting

Problem	Solution
Cooling is slow to activate	Decrease the proportional band slightly and monitor operation. Repeat until cooling reaction time is acceptable.
Compressor short cycle alarm	Increase the proportional band slightly by increasing the integration time between 3 and 5 minutes, and monitor compressor run time. Set the temperature deadband to **2**. Run time must be more than 3 minutes to prevent a short-cycle of the compressor.
Excessive valve oscillation or hunting	Increase the proportional band and/or increase integration time.

3.1.4 Compressor Control by Cooling Requirement

Compressor control is directly linked to temperature control in the cooling requirement determined by the temperature control settings. Depending on the type of cooling unit, the number and type of compressor varies. The following describes operation based on cooling call for an XDM unit with dual tandem compressors.

Digital Scroll Compressors

Digital scroll compressors use time loaded/unloaded to modulate cooling capacity between 10% and 100% to control cooling more precisely than non-digital compressors. Capacity modulation is achieved by opening and closing a digital solenoid valve in 15 second intervals while the compressor runs continuously when the cooling requirement is 10% to 100%.

- When the valve is opened (energized, the compressor is unloaded and capacity is 0% (because the scroll plates are separated so that there is no refrigerant flowing through the compressor).
- When the valve is closed (de-energized), the compressor is loaded and capacity is 100%.
- Capacity is determined by the amount of time that the valve is closed in the 15 second interval. **Figure 3.3**   on the next page illustrates solenoid valve operation when cooling requirement is 66%.
  - The valve is closed for 10 seconds (100% cooling).
  - Then open for 5 seconds (0% cooling).
  - This results in 66% cooling. Essentially, the compressor is partially loaded.

Figure 3.3   Digital Scroll Compressor Operation to Provide 66% Cooling Capacity For a Single Compressor
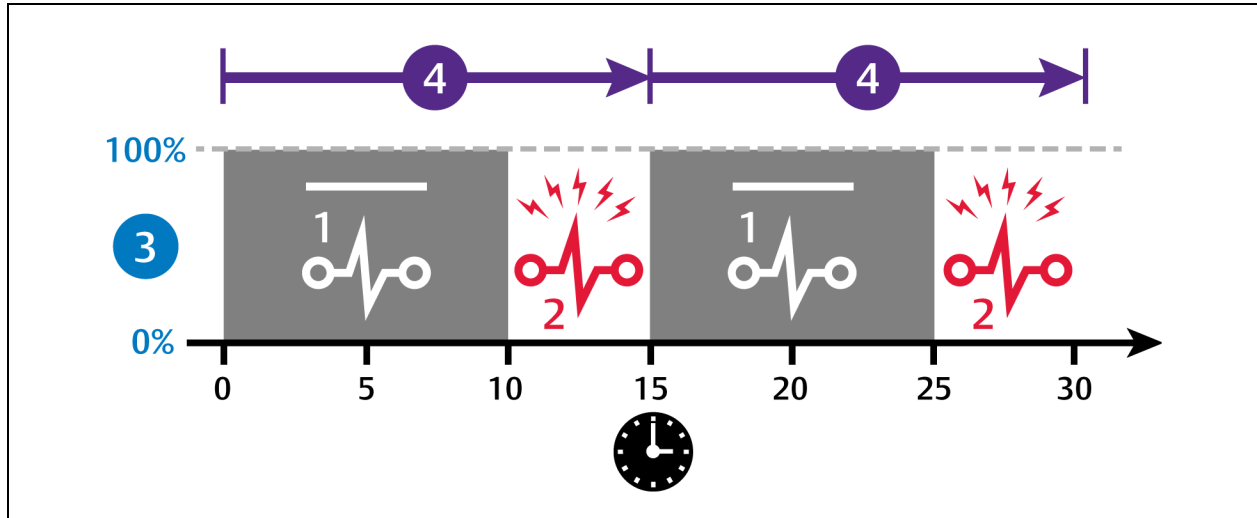
No.	Description
1	Solenoid de-energized.
2	Solenoid energized.
3	Percent loaded.
4	15 second capacity modulation cycle.

Tandem Compressor Sets

A tandem compressor set consists of one digital scroll compressor and one fixed capacity, standard scroll compressor on a circuit.

In Vertiv™ Liebert® iCOM™, tandem compressors use the following naming convention:

- *Compressor 1A* is digital-scroll and *Compressor 1B* is fixed, standard-scroll. These comprise tandem-compressor set 1.
- *Compressor 2A* is digital-scroll and *Compressor 2B* is fixed, standard-scroll. These comprise tandem-compressor set 2.

XDM Tandem Operation Sequence

The compressors operate in stages to maintain the selected temperature setpoint. The stages are defined by the compressors that operate during that stage and ramp up or down based on the call for cooling (CFC) percentage, see **Table 3.2** on the facing page , for typical operation. The loading routine may vary based on transient room conditions, but in the tandem set the compressors operate as follows: The digital scroll compressor in the lead set activates on a call for cooling and ramps between 20% and 100% digital loading to meet the requirement. If the call exceeds the digital scroll's capacity, the fixed capacity compressor activates and the digital scroll ramps down.

Table 3.2   Cooling Stages and Compressor Operation in Dual Circuit System with Tandem Compressors

Cooling Stage	Compressor(s) Operating	Unit Capacity to Meet Room Load
1	Lead digital scroll 1A or 2A modulating	Activates at 15% Deactivates at -10% CFC
2	Lag digital scrolls 1A and 2A modulating	Activates at 45% Deactivates at 15% CFC
3	Digital scrolls 1A and 2A modulating, Lead fixed 1B or 2B)	Activates at 65% Deactivates at 40% CFC
4	Lag Digital scrolls 1A and 2A modulating, Fixed 1B and 2B on	Activates at 90% Deactivates at 65% CFC

Selecting Event Type and Setting Alarm/Warning Notification on page 41 describes the alarm events associated with the tandem compressors. If an alarm condition affects both tandem sets, tandem compressor set 1 acts as the lead until the alarm is reset and the compressors reactivated. Once the alarm is cleared and the compressors activated, the lead-lag settings chosen for Compressor Sequence resume, see Setting Compressor Options on page 31 .

3.1.5 Return Fluid Temperature Compensation

In the event where control settings result in a higher than desired fluid temperature increase, Vertiv™ Liebert® iCOM™ shall provide the return fluid temperature compensation routine which allows for the internal adjustment of the return fluid temperature once the user defined threshold has been crossed.

Return Fluid Temperature Compensation for Pump Speed Control

As the return fluid temperature value increases, the return fluid temperature compensation routine for the pump speed control shall proportionally increase the flow rate or differential pressure setpoint (based on end user selection of pump speed control).

Return Fluid Temperature Compensation for Supply Fluid Temperature Control

As the return fluid temperature value increases, the return fluid temperature compensation routine for supply fluid temperature control shall proportionally decrease the supply fluid temperature actual setpoint, which results in an increase in the call for cooling on the refrigerant side components (compressors/PRE).

NOTE: If Dewpoint Margin Control is enabled, it will have priority to establish the minimum allowable supply temperature setpoint.

Setting Temperature Compensation

Temperature compensation is also tied in to cascade/standby operation during XDM Optimization. See Teamwork Mode XDM Optimization on page 33

1. Touch then > *Setpoints > Temperature Compensation.*
2. Select the Compensation Type, then Touch *Save.* The setpoint is updated.

NOTE: When temperature setpoint compensation is enabled and active, the Temperature Setpoint Act field on the Temperature Control setpoints panel displays the adjusted setpoint value.

NOTE: When pump setpoint compensation is enabled and active, the Pump Control Setpoint Act field on the Pump Control setpoints panel displays the adjusted setpoint value.

Temperature Compensation XDM Options

Return Fluid Temp Setpoint

Use the slide control to set the temperature setpoint for return fluid. The range is from 40.0°F to 140.0°F (4.4°C to 60°C.)

Return Fluid Temp Band

Use the slide control to set the temperature band for the return fluid. The range is from 1.0°F to 10.0°F (.056 to 5.56K).

Supply Fluid Temp Comp Band

Use the slide control to set the comp band for the supply fluid. The range is from 1.0°F to 10.0°F (0.56 to 5.56K).

Pump Flow Comp Band

Use the slide control to set the comp band for the pump flow. The range is from 2.6 gpm to 301.2 gpm (9.842 to 1140.16 l/m).

Pump Diff Press Comp Band

Use the slide control to set the press comp band for the pump diff. The range is 2 psi to 22 psi (0.15 to 1.50 bar).

3.1.6 Indoor XD Pump Control

The Vertiv™ Liebert® XDM shall provide a variable speed pump controlled via a VFD. The XDM desired flow rate or differential pressure setting shall be chosen by the end user based on site requirements.

Indoor Pump Speed Control

Call-for-pump (CFP) calculation is based on one of five possible selections.

1. **System Flow Rate.** A flow meter for monitoring the actual unit flow rate is located within the unit on the leaving (supply) fluid line. The system flow rate is calculated by the Master unit by totaling flow rates from each unit. Flow rate is the default setting for CFP.
2. **System Differential Pressure.** The XDM200 supply and return (S/R) pressures are monitored near the customer connection point. The differential pressure (DP) is calculated at each unit based on these sensors. The Master calculates a System DP aggregated reading based on readings pulled from each unit.
3. **Flow with DP Limit.** Primary control to a specified flow setting:
   - Primary loop controls to flow
   - Secondary loop controls to a DP limit (can increase CFP if DP gets too low)
4. **DP with Flow Limit.** Primary control to a specified DP setting:
   - Primary loop controls to DP
   - Secondary loop controls to a min flow limit (can increase CFP if flow gets too low)
5. **Manual.** Pump speed set to a manual value (and/or BMS setting)

There are three PI loops associated with the CFP calculation, where the control input values are all based upon the local unit measurement. For each loop, there are associated settings (set points, prop band, dead band, integral time, slew-rates for increasing vs decreasing speeds, etc.).

1. Primary PI loop

2. Secondary PI loop for optional limit operation

3. Tertiary PI loop for high supply pressure limiting operation. See Configuring High Limit Setpoints on the next page .

XD Pump Speed Control Settings

Touch [SERVICE] then [≡] > *Setpoints >, Pump Control*

1. Touch then > Setpoints > Pump Control

2. Adjust the setpoint options, then touch Save. The setpoint is updated.

Touch Cancel to discard the changes

Pump Control Sensor

Determines which method of control to be used to control pump speed. Options include:

- Flow Rate

- Differential Pressure

- Flow Rate w/ Diff Pressure Limit

- Diff Pressure w/ Flow Rate Limit

- Manual (controlled via BMS)

Minimum Pump Speed

The end user shall have the ability to specify a minimum pump speed. Use the slide control to set the speed. The range is from 3.0V to 10.0V.

Manual Speed

The end user (or the BMS) shall have the ability to set an operating speed for the pump when the Pump Control sensor is configured for Manual. Use the slide control to adjust the manual speed.

- Default = 100 %

- Adjustable Range = 30 – 100%, actual or reported pump speed shall be limited by the Analog Output High and low Limit settings. If settings are configured outside this range, it shall fall back to the allowable limit value.

Fluid Flow Set Actual

Read-only value of actual fluid flow set.

Fluid Flow Setpoint

Defines the fluid flow rate setpoint, expressed in gallons per minute (gpm) or liters per minute (lpm). Use the slide control to set the value The range is from 3 gpm to 2642 gpm (11.35 lpm to 10,001.05 lpm).

Fluid Flow Proportional Band

Defines the maximum flow deviation from setpoint to require pump operation at maximum or minimum speed. The proportional band setting is divided on both sides of setpoint like temperature control. See Temperature Control without a Deadband on page 19

Fluid Flow Integration Time

Defines the time interval during which the pump speed integral call increases or decreases to reach setpoint. This is the time required for a constant proportional deviation to develop an equivalent integral call. As the speed adjusts to approach control setpoint, the integral call adjusts to offset the proportional deviation. Use the slide control to modify the integration time for fluid flow. The range is from 0 sec to 300 sec.

Fluid Flow Deadband

Defines the band around the setpoint where the pump speed call remains constant to reduce pump speed oscillations. The setting is divided on both sides of setpoint. Use the slide control to adjust the value for the fluid flow deadband. Value range is from 0 gpm to 264 gpm (0 lpm to 11.35 lpm).

Refer to Setpoints and Alarm Settings by Line ID on page 125

3.1.7 Configuring High Limit Setpoints

To Set High Limits

1. Touch [SERVICE], then [≡] > *Setpoints > High Limit Control XDM*. The HIGH LIMIT CONTROL XDM panel opens.

2. Adjust the setpoint options, then touch *Save*. The value ranges is from 15 psi to 145 psi.

    - Touch *Cancel* to discard the changes.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

A High Supply Pressure Limit is the only Limit Control supported by XDM The pump speed is limited to mitigate operations above the limit threshold.

3.2 Scheduling Condenser and Cooling Unit Tasks

The Scheduler configures operating conditions and modes for specific intervals. Tasks to schedule include:

- Condenser set back: See Scheduling Condenser Low Noise Operation below .
- Condenser fan reversal: See Scheduling Condenser Fan Reversal on the facing page .
- Unit sleep schedule: Turns off units during times of low demand and controlled only by temperature. Sleep is interrupted if the return temperature rises above the alarm threshold.

3.2.1 Scheduling Condenser Low Noise Operation

Condenser setback schedules low-noise fan operation on units equipped with Vertiv™ Liebert® MC premium efficiency control. Fans spin more slowly during specified times to reduce noise, and faster when low-noise is unnecessary.

NOTE: Low noise operation is overridden to prevent a high pressure condition.

1. Touch [SERVICE], then [≡] > *Scheduler > Condenser Setback Schedule*. The TASK PROPERTIES panel opens.

2. Adjust the schedule settings, and touch *Save*. The schedule is set up.

    - Touch *Cancel* to discard the changes.

Condenser Setback Task Properties Options

Disabled Day

Selects specific days on which noise reduction operation is disabled when the schedule is enabled.

Interval 1

Start and finish time of day that noise reduction operates.

Interval Day

Selects days on which noise reduction operation for the interval specified in Interval 1.

Max Speed in Low Noise Mode

Sets the maximum speed for the condenser fan during low-noise operation.

Max Speed in Normal Mode

Sets the maximum speed for the condenser fan during normal or high efficiency operation.

Noise Reduction

Enable/disable noise reduction. When checked, the schedule is run. When not checked, the scheduling parameters are ignored.

Status

Indicates if low noise operation is active or inactive.

Whole Day

Selects whole days for which noise reduction operation is available for the condenser fan.

3.2.2 Scheduling Condenser Fan Reversal

Condenser fan reversal schedules a reversal of the condenser fans, reversing air flow to help remove dust, paper, leaves and such from the suction side of the condenser coil.

1. Touch [SERVICE], then [≡] > *Scheduler > Condenser Fan Reversal Schedule*. The TASK PROPERTIES panel opens.
2. Adjust the schedule settings, and touch *Save*. The schedule is set up.
    - Touch *Cancel* to discard the changes.

Condenser Fan Reversal Task Properties Options

Reverse Fans At Duration

Length of time, in seconds, the fans are reversed.

Reverse Fans Every

Selects number of days between fan reversal.

Reverse Fans Now

Enables/disables immediate fan reversal.

3.2.3 Scheduling Sleep Times for Thermal Management Units

Unit sleep schedules turn off units during low demand as long as return temperature remains below the alarm threshold.

1. Touch [SERVICE], then [≡] > *Scheduler* > *Unit Sleep Schedule*. The TASK PROPERTIES panel opens.
2. Adjust the schedule settings, and touch *Save*. The schedule is set up.
   - Touch *Cancel* to discard the changes.

Unit Sleep Schedule Task Properties Options

Interval Day

Selects days on which sleep mode operates for the intervals specified in Interval 1 and Interval 2.

Whole Day

Selects specific days on which sleep mode is active for the entire day when the schedule is enabled.

Interval 1

Start and finish time of day that sleep mode operates for the first interval.

Interval 2

Start and finish time of day that sleep mode operates for the second interval.

Timer Reset

Selects whether or not the sleep mode timer resets. Choices are:

- Yes
- No
- Auto

Timer Mode Type

Selects unit operation when in sleep mode. Values are:

- Unit Off: The unit stops (fans are off).
- Deadband: The unit operates in a limited capacity (fans are on) based on an additional deadband added to the temperature deadband.

3.3 Setting General Thermal Management Unit Options

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

3.3.1 Setting Miscellaneous Options

1. Touch [SERVICE], then [≡] > *Options Setup* > *Misc Settings*. The MISC SETTINGS panel displays.
2. Make adjustments as needed and click *Save*.
   - Touch *Cancel* to discard the changes without saving.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

Miscellaneous Cooling Unit Settings Options

Operation at Temp Control Sensor Failure

- Shutdown. XDM is equipped with a backup sensor located in the fluid piping between the plate heat exchanger (PHE) and pump. In the event of a loss of the supply fluid temp sensor the control will use the backup PHE sensor reading. In the event both sensor readings are lost the control will use the system supply fluid temp value (if there are additional teamwork connected XDM units). If no control temperature reading is available the unit will shutdown.

Auto Restart Enable

When enabled, the cooling unit returns to the status at which it was operating when input power returns after a power failure. (ON if it was powered on and OFF if it was powered off before the failure.)

Single Unit Auto Restart

Selects time elapsed (in seconds) before unit restarts when Auto Restart Enable is enabled. Select the time value using the slide control. Valid time range is from 0 sec to 999 sec.

Capacity Transition Filter

Select the range for the capacity of the transition filter using the slide control Values are 0.01% per second to 99.99% per second.

Warning Activates Alarm Relay

When enabled, a warning event activates the common alarm relay.

K11 Active On

Selects the action of the activated K11 (warning) relay. Options are:

- Warning: A warning is active.
- Emergency Pwr: Emergency power is on.
- Freecooling: Freecooling is on.
- FC Start: Freecooling is in the start phase or is on.

K11 (WA Relay) and AL Relay

- Direct
- Reverse

Cascade after Remote On

Upon a remote request for all units to start, selects whether or not the units start one after another by the Cascade Units Delay.

Loss of Power Auto Reset Delay

Defines that amount of time that the Loss of Power alarm remains active once power has restored after power loss to the unit. When the delay time elapses, the event resets and is cleared automatically.

1. Touch , then > *Options Setup* > *MiscSettings*. The MISC SETTINGS panel displays.

2. Set *AutoRestartEnable* to *Yes*, and use the Loss of Power Autoreset Delay slider to set the number of seconds to delay before restart, then touch*Save*.
Automatic restart is enabled.

   - Touch *Cancel* to discard the changes without saving.

Display Off Enabled

Select whether Display Off is enabled.

Restart at BMS Off and Disconnected

Select whether to restart.

3.3.2 Configuring Quick Start

Optional XDM Quick Start maintains power to the control board during a loss of high volt power to the unit. When power loss duration is less than 30 seconds the Quick Start operation will allow pump and cooling components to restart with less delay than would result if the control board rebooted and activated components with normal start delays. XDM Quick Start requires additional hardware, including capacitive buffer and loss of power relay, which must be provided in the unit configuration. The buffer will maintain power to the control board for up to three minutes with loss of high volt power.

With Quick Start enabled after power is restored the pump will restart as soon as the pump drive has restarted. The unit will restart in compressor mode and the first stage of cooling will start as soon as CAN communications are restored to the condenser. Additional cooling stages are started with delay between stages reduced to a few seconds, typically full cooling can be reestablished within 60 secs of power restore.

Controls are configured for Quick Start operation at the factory. If your unit is equipped with Quick Start but does not appear to follow the normal Quick Start sequence contact Vertiv Technical Support for help confirming the proper advanced Quick Start settings are enabled. Typical indications Quick Start is not operating properly include the control board rebooting after a short duration loss of high volt power or cooling components not starting for longer than 60 seconds after power is restored.

3.3.3 Pump Setting Options

1. Touch , the > Options Setup > Pump Settings. The PUMP SETTINGS panel opens.

2. Make adjustments as needed and click Save.

Inactive XD Pump Operation

The end user shall have the ability to operate inactive pumps. The pump must be operated intermittently to promote the health and prolong the life of the pump. XDM shall have the following adjustable parameters:

Pump Operation if Idle

Sets the unit state for evaluating pump inactivity. Consider inactivity only when the unit is in Standby mode or allows intermittent pump operation if pump is inactive due to any unit off state.

Pump Start if Idle For

Sets the time duration to allow pump to set idle before requiring operation due to inactivity.

Pump Operation Speed

Sets the pump operating speed when started due to inactivity.

Pump Run Duration

Sets pump operating time durations when started due to inactivity.

3.3.4 Setting Compressor Options

1. Touch [SERVICE], then [SERVICE] > *Options Setup* > *CompressorSettings*. The COMPRESSOR SETTINGS panel displays.
2. Make adjustments as needed and click *Save*.
    - Touch *Cancel* to discard the changes without saving.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

Compressor Settings Options

Compressor Sequence

Selects the lead compressor when cooling activates. Values are:

- Auto: Compressor with the lowest run hours leads.
- 1: Compressor 1 leads.
- 2: Compressor 2 leads.

When Auto is selected, the following applies as iCOM attempts to maintain equal run time of the compressors

- If only one compressor is available because of safety delays, it is given first priority to start/stop.
- If both compressors are off, the compressor with fewer run hours is the next to start.
- If both compressors are operating, the compressor operating for the longest time since the last start is the first to shut off.

NOTE: Automatic compressor sequencing will not power off a compressor if it is required to properly condition the space.

Winter Start Delay

Length of time, in minutes, that a low pressure condition is ignored during compressor start-up.

At compressor start-up, a low pressure condition is ignored for a set period to allow compressors to run at initially low pressures encountered during non-operating conditions at low outdoor temperatures.

NOTE: The factory default setting is a three minute delay for air cooled units and a zero to one minute delay for water cooled units.

Compressor Capacity Filter at 0%

Decreases the rate at which cooling capacity changes when close to or at the temperature setpoint to avoid undershooting the setpoint.

Compressor Capacity Filter at 100%

Increases the rate at which the cooling capacity changes for a quicker reaction of cooling at high temperatures.

4 Teamwork, Standby and Rotation for Cooling Units

Vertiv™ Liebert® iCOM™ unit to unit communication via private network and additional hardware allows the following operating features for the cooling units. (See Unit to Unit Networking on page 51)

- Teamwork
- Standby (Rotation)
- Cascade

4.1 Teamwork Mode XDM Optimization

When Vertiv™ Liebert® iCOM™ controlled XDM units are connected to a network in a group or team, use teamwork to optimize performance and efficiency.

By default, XDM Optimization is employed on Liebert XDM. For XDM units in a group configuration, pumps shall operate in parallel (i.e., operate at the same speed (%)).

Pump speed control shall be determined by a flow sensor, differential pressure sensor or a combination of the two, or manually via BMS (see parameter XDM.310 Pump Control Sensor). Cooling capacity (Compressors, Economizer or EconoPhase) is controlled via a supply fluid temperature sensor and is controlled locally at each unit.

For pump speed control, iCOM™ shall calculate an average or worst-case sensor reading (user-selectable aggregation method; see iCOM™ parameter S804.1 Teamwork is Based On) to be used to influence pump speed.

Based on the demand within the group, the master controller shall calculate the system call for pump speed and issue a common pump speed command to the remaining units to operate at. Temperature control shall be decoupled from pump speed control and will operate locally at each unit until fluid temperature conditions are satisfied.

4.1.1 Teamwork Mode Options

When units are connected in a Teamwork group, the master aggregates readings from all connected units to calculate system level values. When operating in XDM Optimization Teamwork Mode, each unit calculates a call for cooling based on its local supply fluid temperature sensor reading for cooling component operation (compressors, EconoPhase pumps). The master unit calculates a call for pump based on the Pump Control settings and requests pumps to run at a common speed for all operating units.

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > Teamwork/Standby > Teamwork XDM*
2. Make the needed selections and touch Save.

The master collects sensor data from all units and calculates a system value based on the aggregation settings outlined below.

Number of Connected Units

Set the number of connected units using the slider control.

XDM Teamwork is limited to 10 connected iCOM controls (10 XDM200 or 5 XDM400 units).

Vertiv™ Liebert® XDM Optimization Settings

Teamwork Mode Based on

This setting is used for the System Temperature Control value aggregation.

- The system supply fluid control temperature can be aggregated to use the maximum value or an average value of all operating units.

The system fluid control temperature is only used for control in the event a unit loses both its supply and PHE (plate heat exchanger) fluid temperature sensors.

See

Diff Press Aggregation Method

An aggregated system differential pressure value is used to calculate a call for pump when operating in Diff Pressure Control Mode or to limit pump speed when operating as a Low Limit control.

- The system differential pressure can be aggregated to use the minimum or median value of all operating units.
- If minimum aggregation is selected the calculation will average the N lowest unit values. Set the N value to 1 only if the single lowest value is to be used.
- If median aggregation is selected the calculation will use the N middle unit values

QTY Units Included in Average

Identifies the number of operating units to include in the Diff Press Aggregation. If the value is less than the number of operating units the aggregation will use the N minimum or median unit values to calculate the average.

Dewpoint Qty to Include (N Max)

An aggregated system dew point is calculated and used for

- The Master evaluates all connected unit dew point values for aggregation whether the unit is operating or inactive.
- If qty N is set to 1 the Master will use the single highest unit dew point value.
- Otherwise the Master will calculate an average of the N highest unit dew point values for the aggregation.

Virtual Master

The Virtual Master function maintains smooth control if group communication is compromised. In these operating configurations, a lead (master) unit is in charge of component staging in teamwork mode, unit staging, and standby rotation. If the lead unit gets disconnected, iCOM™ automatically assigns a virtual master, which assumes the responsibilities of the lead unit until communication is restored.

Minimum CFP at VM Disconnect

This setting identifies the minimum allowable speed the pump will operate at if the control is not providing a valid CFP (Call for Pump). The pump will operate at this speed if the unit loses communication with the Master or all pump speed control sensors are failed. Use the slider to set the desired minimum pump speed.

Unit is Master

This setting indicates whether the unit being viewed is operating as the Group Master.

4.1.2 Teamwork Sensor Aggregation Calculations

Other system sensor values aggregated by the master (with no options for alternative aggregation methods)

System Fluid Flow

Totalized fluid flow from all operating units used to calculate a call for pump when operating in Flow Control Mode or to limit pump speed when operating as a low limit control.

System Return Fluid Temperature

Average of all operating unit return fluid temperatures used for Return Fluid Temperature Compensation on page 23 .

System Supply Fluid Temperature, Supply Fluid Pressure, and Return Fluid Pressure

Average of all operating unit temperature or pressure values. The Master calculates a system value for information only, not used for any control operation.

4.2 Assigning Cooling Units to Standby (Lead/Lag)

Standby assigns some units to operate while others are on standby, which is idle but ready to become active in the event of an alarm condition in one of the operating units or based on a rotation schedule.

When a unit is in standby mode, pumps are off and no cooling occurs. In multiple cooling unit systems, assigning units to standby lets you:

- Configure redundancy in case of failure scenarios (standby).
- Manage cooling unit run time (lead/lag). See Setting a Rotation Schedule on page 37 .
- Modulate for very low loads to full design load (to be temperature reactive) by cascading activation of standby units (configured when setting up teamwork mode).

The U2U network has built in fail over conditions that are automatically employed when standby units have been assigned:

- During single cooling unit or component failure, a standby unit is activated to replace the failed unit.
- Alarm event causes unit shutdown, a standby unit is activated. If the activated unit also has an alarm event, the next available standby unit is activated. If all units have an alarm event, and no more standby units are available, a unit with a non-critical alarm event will be activated.

NOTE: Redundancy is employed if units are assigned to standby regardless of the teamwork mode selected, including no teamwork.

4.2.1 To Setup Lead/Lag Operation

1. Touch [SERVICE], then [≡] > *BMS&TeamworkSetup* > *Teamwork / Standby*. The TEAMWORK/STANDBY panel opens.
2. Touch *Standby*. The STANDBY CONTROL panel displays.
3. Adjust the settings, then touch *Save*.
    - Touch *Cancel* to discard the changes.

Standby Options

Number of Standby Units

Number of units in standby mode. Set the number of units using the slide control.

4.3 Cascaded Units Operation

XDM optimization supports cascade operation based on pump speed. Cascade operation allows standby units to be staged on when pump speed increases above an upper threshold or to stage off as pump speed reduces below a lower threshold. This operation is configured in conjunction with the return fluid temperature compensation control operation.

See Return Fluid Temperature Compensation on page 23 .

- For cascade operation, the system should be configured for a normal average load to operation a minimum number of units at a pump speed between the upper and lower cascade unit thresholds.
- Return fluid compensation settings should be configured to adjust the pump control setpoint to increase the pump speed as the load increases.
- As load increases, the return fluid temperature increases above the compensation threshold causing the pump setpoint to be adjusted and pump speed increases.
- Once the pump speed increases above the Start Next Unit at Pump Speed setting, a standby unit is activated.
- Additional units may be activated until enough units are operating to keep the pump speed below the Start Next Unit setting at the higher load condition.
- When the load reduces the return fluid temperature reduces causing the pump setpoint to adjust back to the uncompensated setting and pump speed decreases.
- With the additional units operating the pump speed may be reduced below the Stop Next Unit at Pump Speed setting causing deactivated units to return to standby.

Cascaded Units Min Run

Length of time in minutes that a cascade on unit must run before returning to Standby.

Cascaded Units Off Delay

Length of time, in minutes, to delay powering off a cascaded unit after pump speed drops below the *Stop Next Unit @ SYS Fanspeed* setting.

Cascaded Units Quick Start

After a Power cycle of the master unit, identical to Cascaded Units Delay except typically shorter to get units to start more quickly after a power cycle.

- This delay remains in effect until all cascaded units have been restarted, then the delay reverts to setting of Cascaded Units Delay.

Start Next Unit at Pump Speed

Pump speed at which the next cascaded unit is activated.

Stop Next Unit at Pump Speed

Pump speed at which the next cascaded unit is returned to Standby may be delayed by *Cascaded Units off Delay*.

Cascaded Unit Off Master Delay

Delay time after a new Master takes over an operating group before units are returned to Standby

4.4 Setting a Rotation Schedule

You can set a rotation schedule to switch operating and standby units to manage runtime of the cooling units.

1. Touch [SERVICE], then [☰] > *BMS & Teamwork Setup > Teamwork / Standby*. The TEAMWORK/STANDBY panel opens.
2. Touch *Unit Rotation*. The UNIT ROTATION CONTROL panel displays.
3. Adjust the settings, then touch *Save*.
    - Touch *Cancel* to discard the changes.

4.4.1 Unit Rotation Options

Touch [SERVICE] > [☰] > *BMS & Teamwork > Teamwork/Standby > Unit Rotation*.

Rotation Frequency

Frequency at which rotation occurs. Options include:

- No: Rotation disabled.
- Daily: Rotation occurs every day.
- Every [Day of Week]: Rotation occurs weekly on the same day.
- Monthly [Day of Week]: Rotation occurs monthly on the same day.

Lead Lag Overlap Timer

Length of time in minutes that cooling units operate in parallel when one begins operating (from standby) and the other goes into standby.

Rotate At

Selects exact time at which rotation occurs. Adjustable, based on 24-hour clock where minutes are 0 to 59 and are 0 to 23.

Rotate By

Number of positions by which the cooling units rotate. For example, rotate by 3 in a group of 10 units and start with unit 1 operating. At rotation, unit 1 goes to standby and unit 4 activates, then 7, 10, 2, and so on. You can select 1 to 8 units in a single rotation schedule.

Rotate Every

Selects rotation period. Valid values:

- 12 hrs
- 24 hrs

Rotate Now

Immediately performs rotation.

4.4.2 Manually Rotating the Operating and Standby Units

You can rotate the operating and standby units outside of the set schedule using Rotate Now.

NOTE: Manual rotation may only be performed at the cooling unit designated as the lead unit, U2U Address = 1, of the group.

NOTE: The Rotate Now button may only be available when a Rotation Frequency is selected.

1. At the cooling unit, verify that it is the lead unit of the group:

   - Touch , then > *BMS&TeamworkSetup > U2USetup.*
   - In the CONTROL BOARD column, verify that the *U2U Address* is **1**.

     If it is the lead unit, continue with step 2 .

     If it is not the lead unit, find the lead unit and start at step 1 .

2. Touch , then > *BMS&TeamworkSetup > Teamwork / Standby*. The TEAMWORK/STANDBY panel opens.
3. Touch *UnitRotation*. The UNIT ROTATION CONTROL panel displays.
4. Touch *RotateNow*, then touch *Save*. The operating and standby units are rotated.

5 Managing Events: Alarms, Warnings, and Messages

Events are notifications of operating status for the cooling unit, its components, and auxiliary devices. All events are recorded in the Event Log, and alarm and warning events are also displayed on the Alarms panel (See Viewing the Event Log on page 14 , and Viewing Unit Alarms on page 12 .)

In some cases, depending on configuration, an alarm event may power off the cooling unit, but not always. However, if a standby unit is configured, all alarm events stop the faulty unit and start the standby unit. Message and warning events do not.

5.1 Event Properties

The ALARMS panel lists all events available on the system. You can view and modify events and the criteria that trigger visual/audible alarms including:

- Critical thresholds
- Time delays
- Enable/disable
- Event type
- Adding custom events

NOTE: Not all event properties may be adjusted, depending on the criticality of the event, which is factory set.

To open the panel:

Touch [SERVICE] , then [≡] > *Alarm Setup*.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

5.1.1 Alarms and Events Panel Fields

Remote Sensor Alarms

Sets a delay time to ignore Remote Sensor Alarms on initial unit start up. Use the slide control to set the delay. Range is 10 to 9999 seconds. Setpoints are:

- Disabled
- Com Set (common setpoint for all remote sensors)
- Sep Set (separate setpoints for each remote sensor)

Room Sensor Alarms

Set properties for the Room Sensor Alarms:

- Dewpoint Alarms: Disabled/Enabled
- Dewpoint Alarms Init Delay: Sets a delay time to ignore Dewpoint Alarms on initial unit start-up. Use the slide control to set the delay. Range is 10 seconds to 9999 seconds.
- Room Sensor Alarms: Disabled/Enabled
- Room Sensor Alarms Init Delay: Set a delay time to ignore Room Sensor Alarms on initial unit start-up. Use the slide control to set the delay. Range is 10 sec to 9999 sec.
- Dewpoint Margin Alarms: Disabled/Enabled.

- Dewpoint Margin Threshold: Set the temperature value to maintain the supply fluid temperature setpoint above the system dew point using the slide control. Value range is from 2.0°F to 18.0°F. Refer to Room Dewpoint Aggregation on page 89 .
- Supply Fluid Setpoint Increase Limit: Set the maximum increase allowed to the supply fluid temperature due to the Dewpoint Margin Control. using the slide control. Value range is from 2.0°F to 18.0°F.
- High/Low Dewpoint. Set the temp alarm threshold using the slide control. Value range is from 34°F to 210°F.
- High/Low Room Temp. Set the alarm threshold using the slide control. Value range is from 34°F to 210°F.

Pump & Fluid Sensor Alarms

Set the Properties for Pump and Fluid Sensor Alarms:

- Return Fluid Alarms Init Display: Sets a delay time to ignore Return Fluid Alarms on initial start-up. Use the slide control to set the value. Value range is 10 sec to 9999 sec.

- Supply Fluid Alarms Init Delay: Sets a delay time to ignore Supply Fluid Alarms on initial unit start-up. Use the slide control set the value. Value range is 10 sec to 9999 sec.

- Minimum Fluid Flow Volume: Set the unit low fluid threshold with the slide control. Value range is 0.3 gpm to 264.2 gpm.

- High Ret Fluid Temp: Set the alarm threshold with the slide control. Value range is 34°F to 210°F.

- Low Ret Fluid Temp: Set the alarm threshold with the slide control. Value range is 32°F to 176°F.

- High Sup Fluid Temp: Set the alarm threshold with the slide control. Value range is 34°F to 210°F.

- Low System Flow: Set the low system flow threshold with the slide control. Value is 20.0 - 2000.0 lpm.

- Low Sup Fluid Temp: Set the alarm threshold with the slide control. Value range is 34°F to 210°F.

- High Fluid Diff Pres: Set the alarm threshold with the slide control. Value range is 29 psi to 102 psi.

- Low Fluid Diff Press: Set the alarm threshold with the slide control. Value range is 1 psi to 35 psi.

- High Sup Fluid Press: This is used in combination with a Minimum Fluid Flow Volume condition to generate an XD Flow Blocked alarm and shut down the unit. Set the alarm threshold with the slide control. Value range is 4 psi to 102 psi.

- Low Pump In Press: Set the alarm threshold with the slide control. Value range is 1 psi to 15 ps

- Loss of Flow Diff Press Threshold: This is used in combination with a Minimum Flow Volume condition to generate a Pump Op with No Flow alarm and shutdown the unit. Set the alarm threshold with the slide control. Value range is 0 psi to 10 psi.

Touch each alarm type to set its settings and notifications.

Supply Sensor Alarms

Enable or disable alarm.

Each alarm type is listed beneath the Supply Sensor Alarms.

Touch each alarm to set its settings and notifications.

Compressor Alarms

Each alarm type is listed beneath Compressor Alarms.

Touch each alarm type to set its settings and notifications.

Remote Alarm Device Inputs

- Customer Input *N* (where *N* is the number for the Customer Input): Touch the pull down menu to select the value of the property.
- Customer Input *N* active if (where *N* is the number for the Customer Input.): Touch the pull down menu to select the value of the property.
- Cascade after Fire Alarm Rest Enabled: Select On or Off.
- Lock Out Compressor: Touch the pull down menu to select the value of the property.
- Misc Events: Select the event and modify its properties.

MC Condenser Events

Touch the event to modify then select the property to modify.

5.2 Enabling Events and Editing Event Settings

In the ALARMS panel, events are grouped into categories for easier management, for example, the factory set remote sensor alarms and humidification/dehumidification events. In some cases, touch the group heading provides edit options for the entire group, like thresholds, delays and enable/disable. Each event includes settings specific for that event and the notification option where event type and alarm notifications are selected (See Selecting Event Type and Setting Alarm/Warning Notification below).

1. Touch [SERVICE], then [≡] > *Alarm Setup*. The ALARMS panel opens.
2. Scroll or search to find the event, touch the set's heading to display the properties and values for the entire set in the EDIT panel.
   – or –
   Touch an individual alarm or event to display it's specific values.

NOTE: To edit the event type and notification, see Selecting Event Type and Setting Alarm/Warning Notification below .

3. Use the EDIT panel to adjust the settings for the selected event or group of events.

5.3 Selecting Event Type and Setting Alarm/Warning Notification

Setting notification delays and disabling visual notification prevents nuisance notifications. Customize to notify of critical events on your cooling system.

NOTE: If the event includes a safety function, such as high pressure, low pressure, main fan overload, etc., the safety function executes regardless of event type or notification setting. However, notification timing delays still apply.

To select event type and notification:

1. Touch [SERVICE], then [≡] > *Alarm Setup*.
2. Scroll or search to find the event and touch the alarm or event.
3. On the EDIT panel, touch *Notifications*. The EDIT panel displays the notification properties.
4. Adjust the notification properties, then touch *Save*. The notification is updated.
   - Touch *Cancel* to discard the changes without saving.

5.3.1 Notification Properties

Enable

Enables/disables notification. Touch the switch to set On or Off.

- When disabled, events are not logged or displayed and visual/audible alarm notifications are not made.

Delay

Time, in seconds, to delay notification after event trigger. Depending on the event, the delay may or may not be adjusted. Table 5.2 below , lists the delays and their default settings.

- If the notification delay for the event is greater than the delay set for the event group, the group's delay includes the event's delay.

Type

Logging and notification level of the event. Table 5.1 below , describes the event type and notification it generates. Table 5.2 below , lists the default types for events.

Table 5.1 Notification Types

Type	Description
Message	Stored in event log only. No visual or audible notification.
Warning	Listed with a yellow status dot on the ALARMS panel and the LED flashes. See Cooling Unit LED Colors and State Meanings on page 99 and Viewing Unit Alarms on page 12 .
Alarm	Listed with a red status dot on the ALARMS panel, the LED flashes, and the audible alarm sounds. See Cooling Unit LED Colors and State Meanings on page 99 , Viewing Unit Alarms on page 12 , and Enabling the Audible Alarm Notification on page 47 .

Table 5.2 below , lists the default settings for each event.

- Internal delay is factory set and not adjustable. It is the time delay after event trigger that notification is sent.
- Default delay may or may not be adjustable and is added to the internal delay of event notification.
- Type may be adjustable or may be fixed.

NOTE: Depending on customization, some events may not be available on your cooling unit.

Table 5.2 Event Notification Defaults

Event	Internal Delay	Adjustable Range	Type
High Room Temp	1 min. after fan on	30 sec/0 – 9999	Fixed to WRN
Low Room Temp	1 min. after fan on	30 sec/0 – 9999	Fixed to WRN
Circuit 1 High Pressure	0 sec	N/A	ALM
Circuit 1 Low Pressure	0 sec	N/A	ALM
Circuit 2 High Pressure	0 sec	N/A	ALM
Circuit 2 Low Pressure	0 sec	N/A	ALM
Comp 1A Short Cycle	10 sec	N/A	ALM
Comp 1B Short Cycle	10 sec	N/A	ALM

Table 5.2   Event Notification Defaults (continued)

Event	Internal Delay	Adjustable Range	Type
Comp 2A Short Cycle	10 sec	N/A	ALM
Comp 2B Short Cycle	10 sec	N/A	ALM
Comp 1A High Temp	10 Sec	N/A	ALM
Comp 1B High Temp	10 sec	N/A	ALM
Comp 2A High Temp	10 sec	N/A	ALM
Comp 2B High Temp	10 sec	N/A	ALM
Comp 1 Overload	Internal Calc	N/A	ALM
Comp 2 Overload	Internal Calc	N/A	ALM
Dig Scroll 1 High Temp	Internal Calc	N/A	ALM
Dig Scroll 2 High Temp	Internal Calc	N/A	ALM
C1 Freeze Protection	0 sec	N/A	ALM
C2 Freeze Protection	0 sec	N/A	ALM
XD Pump Interver Fail 1	10 sec	10 - 9999 sec	ALM
Temp Control Sensor Fail	10 sec	10 -9999 sec	ALM
Working Hrs Exceeded	10 sec	N/A	WRN
Water Under Floor	2 sec	2 sec/0 - 9999*	ALM
Standby Unit On	2 sec	2 sec/0 - 9999 sec	WRN
No Connection w/Unit 1	60 sec	10 - 9999 sec	WRN
Unit X Disconnected	Internal Calc.	-	WRN
Loss of Power	10 sec	N/A	WRN
Customer Input 1	2 sec	2 sec/0 -9999*	ALM
Customer Input 2	2 sec	2 sec/0 - 9999*	ALM
Customer Input 3	2 sec	2 sec/0 - 9999*	ALM
Customer Input 4	2 sec	2 sec/0 - 9999*	ALM
Call Service	2 sec	2 sec/0 - 9999	ALM
No Power	0 sec	2 sec/0 - 9999	WRN
Temp Cntrl Sensor Fail	0 sec	3 sec/0 - 9999	ALM
Power A Failure	0 sec	10 sec/0 - 9999	ALM
Power B Failure	0 sec	10 sec/0 - 9999	ALM
Loss of Flow	0 sec	5 sec - 9999	ALM
BMS Disconnected	10 sec	N/A	WRN
FC Lockout	2 sec	2 sec/0 - 9999*	WRN
Compressors(s) Lockout	2 sec	2 sec/0 - 9999*	WRN
High Dewpoint	0 sec	30 sec/0 - 9999	WRN

Table 5.2   Event Notification Defaults (continued)

Event	Internal Delay	Adjustable Range	Type
Low Dewpoint	0 sec	30 sec/0 - 9999	WRN
High Sup Fluid Temp	30 sec	30 sec/10 - 9999	WRN
Low Sup Fluid Temp	30 sec	30 sec/ 10 - 9999	WRN
High Ret Fluid Temp	30 sec	30 sec/ 10 - 9999	WRN
Low Ret Fluid Temp	30 sec	30 sec/ 10 - 9999	WRN
High Fluid Diff Pres	30 sec	30 sec/ 10 - 9999	WRN
High Fluid Diff Pres	30 sec	30 sec/ 10 - 9999	WRN
Low Fluid Diff Pres	30 sec	30 sec/ 10 - 9999	WRN
Low System Flow	30 sec	30 sec/ 10 - 9999	WRN
Low XD Pump In Press	30 sec	30 sec/ 10 - 9999	WRN
High Sup Fluid Press	30 sec	30 sec/ 10 - 9999	WRN
High Dewpoint	30 sec	30 sec/ 10 - 9999	WRN
Low Dewpoint	30 sec	30 sec/ 10 - 9999	WRN
Dewpt Offset Active	30 sec	30 sec/ 10 - 9999	WRN

Table 5.3   Events Specific to Vertiv™ Liebert® MC Condenser

Event	Description
CAN GC 1 or 2	• The Liebert®iCOM™ board cannot establish communication with the Liebert® MC condenser board for 10 seconds consecutively. • Alarm notification displayed for the corresponding circuit. • EconoPhase pump operation disabled for the circuit affected. • When iCOM™ re-establishes communication with the Liebert® MC board, the event is reset.
GC 1 or 2 Rem Shutdown	• Remote shutdown requested. • Compressor(s) and EconoPhase pump(s) in the corresponding circuit are powered-off. • If event occurs on the lead circuit, then the lead-lag order of the compressors/tandem banks changes. • When the Liebert® MC condenser remote-shutdown circuit returns to inactive state (closed), the event is reset and the compressors in that circuit may be powered-on. • Normal compressor lead-lag sequence resumes when both compressors are Off.
GC 1 or 2 Board Fail	An unrecoverable failure of the Liebert® MC condenser control board has occurred causing a condenser shutdown.
GC Pres Sens Fail C1 or C2	Condenser pressure sensor failure
GC High Cond Press C1 or C2	High condensing pressure
GC Low Cond Press C1 or C2	Low condensing pressure
GC 1 or 2 Amb Sens Fail	Ambient-temperature sensor failure
GC 1 or 2 Amb Temp Limit	High/low ambient temperature

Table 5.3   Events Specific to Vertiv™ Liebert® MC Condenser (continued)

Event	Description
GC Temp Sens Fail C1 or C2	Refrigerant-liquid-line temperature-sensor failure
GC High Cond Temp C1 or C2	High refrigerant liquid line temperature
GC Low Cond Temp C1 or C2	Low refrigerant liquid line temperature
GC 1 or 2 Fan 1 through 4 FAIL	The following events may result from a fan failure alarm. Refer to the specific fan manufacturer's literature for troubleshooting information. • VSD high link current • VSD drive error • VSD earth to ground fault • VSD electronics heat sink thermal overload • VSD hall failure • VSD IGBT failure • VSD line fault • VSD motor locked • VSD motor thermal overload • VSD phase failure • VSD-specific uncategorized alarm detected • VSD electronics high-temperature condition • VSD high link voltage • VSD low link voltage • RS-485 communications failure
GC 1 or 2 TVSS Failure	TVSS alarm

Table 5.4   Events Specific to Vertiv™ Liebert® EconoPhase

Event	Description
PB1 BOARD FAIL	An unrecoverable failure of the pump control board has occurred. Pump shut down. • Pump board must be rebooted to reset event.
PB1 CAVITATE SHUTDOWN	Pump has cavitated and shut down. • Event is reset when iCOM™ requests a new start-up.
PB1 IN PRES SENS FAIL	Inlet refrigerant pressure sensor failure. Pump shut down. • Event is reset when condition clears.
PB1 IN TEMP SENS FAIL	Inlet refrigerant temperature sensor failure. Pump shut down. • Event is reset when condition clears.
PB1 INV DATA SHUTDOWN	Invalid data detected and pump shut down. • Event is reset when iCOM™ requests a new start-up.
PB1 LO DIFF PRESSURE	Pump differential pressure fell below a lower threshold and pump shut down. Event is reset when iCOM™ requests a new start-up.

Table 5.4   Events Specific to Vertiv™ Liebert® EconoPhase (continued)

Event	Description
PB1 LO OUTLET TEMP	Pump outlet-refrigerant temperature fell below a lower threshold and pump was shut down. • Event is reset when iCOM™ requests a new start-up.
PB1 OUT PRES SEN FAIL	Outlet refrigerant-pressure-sensor failure. Pump shut down. • Event is reset when condition clears.
PB1 OUT TEMP SEN FAIL	Outlet refrigerant-temperature-sensor failure. Pump shut down. • Event is reset when condition clears.
PB1 CAN DISCONNECTED	iCOM™ lost CAN communications with pump board. Pump shut down. • Event is reset when condition clears.
PB1 REMOTE SHUTDWN	Remote shut-down requested. Pump shut down. • Event is reset when condition clears.
PB1 STARTUP FAIL	Three pump start up attempts in a row have failed. • Event must be reset manually.
PB2 BOARD FAIL	An unrecoverable failure of the pump control board occurred. Pump shut down. • Reboot pump board to reset event.
PB2 CAVITATE SHUTDOWN	Pump has cavitated and shut down. Event is reset when iCOM™ requests a new start-up.
PB2 IN PRES SENS FAIL	Inlet refrigerant-pressure-sensor failure. Pump shut down. • Event is reset when condition clears.
PB2 IN TEMP SENS FAIL	Inlet refrigerant-temperature-sensor failure. Pump shut down. • Event is reset when condition clears.
PB2 INV DATA SHUTDOWN	Invalid data detected and pump shut down. • Event is reset when iCOM™ requests a new start-up.
PB2 LO DIFF PRESSURE	Pump differential pressure fell below a lower threshold and pump shut down. • Event is reset when iCOM™ requests a new start-up.
PB2 LO OUTLET TEMP	Pump outlet refrigerant temperature fell below a lower threshold and pump shut down. • Event is reset when iCOM™ requests a new start-up.
PB2 OUT PRES SEN FAIL	Outlet refrigerant pressure sensor failure. Pump shut down. • Event is reset when condition clears.
PB2 OUT TEMP SEN FAIL	Outlet refrigerant-temperature sensor failure. Pump shut down. • Event is reset when condition clears.
PB2 CAN DISCONNECTED	iCOM™ lost CAN communication with pump board. Pump shut down. • Event is reset when condition clears.
PB2 REMOTE SHUTDWN	Remote shut-down requested. Pump shut down. • Event is reset when condition clears.
PB2 STARTUP FAIL	Three pump start-up attempts in a row have failed. • Event must be reset manually.

Table 5.4   Events Specific to Vertiv™ Liebert® EconoPhase (continued)

Event	Description
PB1 COMMUNICATE FAIL	Ethernet communications failure. Pump not shut down. • Event is reset when condition clears. USB communications failure. Pump not shut down. • Event is reset when condition clears.
PB2 COMMUNICATE FAIL	Ethernet communications failure. Pump not shut down. • Event is reset when condition clears. USB communications failure. Pump not shut down. • Event is reset when condition clears.
PB1 COND TO PUMP TEMP	Temperature variance from condenser 1 output to pump 1 input exceeds allowed parameters. Pump shut down. • Event is reset when iCOM™ requests a new start-up.
PB2 COND TO PUMP TEMP	Temperature variance from condenser 2 output to pump 2 input exceeds allowed parameters. Pump shut down. • Event is reset when iCOM™ requests a new start-up.
MM Cycle Lock Out	Liebert® EconoPhase operating in Mixed Mode has failed to control cooling 10 times in 6 hours. • Mixed Mode operation is disabled until the event is manually reset.
PB Cycle Lock Out	Liebert® EconoPhase in Pump Mode has failed to control cooling 5 times consecutively at full-pump-capacity temperature conditions. • EconoPhase operation is disabled until the event is manually reset.

5.4 Enabling the Audible Alarm Notification

1. Touch [USER], then [≡] > *Display Options > Display Properties*. The UNIT DISPLAY panel opens.
2. Touch the *Alarm Buzzer Pattern* value, and select a pattern from the drop-down list.
    - Selecting *None* disables the audible notification.
3. Touch *Save* to save the property settings.
    - Touch *Cancel* to discard changes.

5.5 Remote Alarm Device and Customer Input Events

Remote alarm devices are various sensors and detectors outside the cooling unit that provide information about conditions and situations that may affect operation. Remote alarm devices include smoke detectors, filter condition, valve status.

Included in the remote alarm devices (RAD) option are up to four customer input events depending on cooling unit configuration. In some cases, two additional, optional customer-input events are available. See Setting Up Customer Input Events on the next page .

RAD and customer input notifications are set in the same way as other events. See Selecting Event Type and Setting Alarm/Warning Notification on page 41 .

5.5.1 Setting Up Customer Input Events

Input devices must be wired to Terminal 24 through a dry contact to locations 50, 51, 55 and 56 for alarms 1 through 4 respectively (For the terminal location, refer to the cooling unit electrical schematic and installation manual). **Table 5.5** below , maps the customer input to the remote alarm devices (RAD).

Table 5.5 Customer Input Terminals to Remote Alarm Device Terminals

Customer Input	Customer Input Terminal	RAD Number	RAD Terminal
1	24	1	50
2	24	2	51
3	24	3	55
4	24	4	56

1. Touch [SERVICE], then [≡] > *Alarm/Event Setup > Remote Alarm Device Input.* The EDIT panel opens.
2. In *Customer Input X (where X is the input number),* select the input type that best describes the wired device/input.
3. In *Customer Input X Active When,* select whether the input is active (triggers events) when *Opened* or *Closed*.
4. Once input(s) are set, touch *Save.* The customer input settings are saved.

Customer Input Options

Customer Input X

Selects the customer wired input, where X is the input number. See **Table 5.6** below , for a description of available values.

Customer Input *X* Active When

Selects when the input triggers an event. Options are:

- Opened: Events are triggered when the contacts across the corresponding RAD terminal strip are open.
- Closed: Events are triggered when the contacts across the corresponding RAD terminal strip are closed.

NOTE: Depending on customization, some events listed in **Table 5.6** below , may not be available with your system.

Table 5.6 Customer Input Options

Input	Action/Description
Water Alarm	Event only.
Flow Alarm	Event only.
Stdby Unit	Event only.
C-Input 1	Event only.
C-Input 2	Event only.
C-Input 3	Event only.
C-Input 4	Event only.

Table 5.6   Customer Input Options (continued)

Input	Action/Description
Call Service	Event only.
High Temp	Event only.
2nd Setpoint	No event, but switches to the second setpoint.
Emergency Power	Event + Disables unit.
Power A	Event only.
Power B	Event only.
Comp Lockout	Event + Compressor(s) disabled without pump down.
FC Lockout	Event + Freecooling disabled.
D-Scroll Red	Event + Reduces requested compressor capacity by 20%
Comp Lockout	Event + Compressor(s) disabled w/o pump down.
FC Lockout	Event + Freecooling disabled.
D-Scroll Red	Event + Reduces requested compressor capacity by 20%

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6 Unit to Unit Networking

NOTE: Vertiv™ Liebert® iCOM™ controlled thermal management units connected in an Ethernet unit to unit (U2U) network are able to efficiently cool and control humidity in the conditioned space by exchanging data in several modes of operation.

U2U networking is required to set up and control the following operating features:

- Teamwork
- Standby (lead/lag)
- Rotation
- Cascading

NOTE: The U2U network must be separate from other networks. Use a communication card, such as a Vertiv™ Liebert® iCOM™ IntelliSlot Unit, to communicate securely between your building management system or other networks.

6.1 Preparing for U2U Group Set Up

Cooling units in the network will be assigned to groups, which affects how units function in teamwork, standby, rotation, and cascading operations. Especially in large rooms, it is important to consider several factors before setting up groups to balance cooling unit operation with room conditions.

NOTE: For ease of setup and use, we recommend using only one group unless you have multiple rooms, differing software versions, or different types of cooling units.

1. Make a map of the room and indicate the location of all heat generating devices and cooling units to plan for proper heat load management and cooling air distribution.
2. Note the type of units by product/model, size, etc.
3. Determine the number of units to network together to ensure proper fluid flow and environmental control, up to 10 units.
4. Determine number of standby units.
5. Plan U2U address assignments.
   - Refer to the U2U Display and Control Board Settings on the next page , for guidelines assigning cooling-unit control board addresses and iCOM™ display board addresses.
   - Balance/alternate unit address assignments based on room layout and because standby and teamwork operate in numeric order by unit number. Table 6.1   on the next page , shows an example layout assignment with half of the cooling units in standby and half operating. Without a plan, adjacent units could be operating or inactive, which may not provide proper heat load balance or efficient use of cooling capacity.
6. Read and record all programmed settings for each of the individual units.
7. Verify that network cabling and switches are provided, ready to connect, and labeled by unit at the network switch.

NOTE: Cooling units are factory wired for stand alone operation. Do not connect the U2U network cabling before setting the U2U network configuration/groups. Network communication conflicts and unreliable display readings will result. Configure the network using Configuring U2U Network Settings on the next page .

Table 6.1   Example Layout Standby/Operating Unit Address Assignment

Item	Description
1 to 10	Assigned address of the thermal management unit.
11	Operating units.
12	Units on standby.
13	Network switch.

6.2 Configuring U2U Network Settings

NOTE: Always change and save the control board settings first. If you change the display settings first, you could lose access to the control board via Vertiv™ Liebert® iCOM™.

The U2U NETWORK SETTINGS configure iCOM™'s unit to unit communication and includes information buttons, , that display popup field descriptions. The panel also indicates issues with the network settings. To view network issues, touch the Issue(s) button at the bottom of the panel.

6.2.1 To Configure Unit to Unit Networking

1. Touch , then > *BMS&TeamworkSetup* > *U2USetup*. The U2U NETWORK SETTINGS panel opens.
2. Touch the field to edit. The keypad opens.
3. Type the entry and touch . When all fields to edit are updated, touch *Save & Restart*.

NOTE: Depending on the changes made, the Save button updates to indicate the components that need rebooted or restarted. If the control board reboots, the cooling unit suspends operation for 60 seconds, then resumes operating.

6.2.2 U2U Display and Control Board Settings

Broadcast

Logical address at which connected units receive datagrams.

NOTE: Messages sent to the broadcast address is typically received by all network-attached hosts.

NOTE: CB Firmware Version does not alter or affect the firmware running on the control board. It only updates the display configuration. If incorrect, menus and data in the Vertiv™ Liebert® iCOM™ display will be invalid or missing.

Name

Name of the unit. Touch the field to modify/enter name of the unit.

IP Address

Network address of the display and control board.

NOTE: Last 3 digits must be a unique value and need not be sequential. However, we recommend that they match the U2U address for easier reference later.

Netmask

Divides IP addresses in subnet and specifies network available to hosts for the display and control board. Display and control board Netmask must be identical on the U2U network.

Gateway

Routes data and acts as proxy server/firewall for display and control board during network setup.

Broadcast

Facilitates U2U communication between the display and control board.

NOTE: Failure to generate the compatible broadcast address results in loss of communication between the display and control board.

MAC Address

Unique, read-only identifier of the display or control board Ethernet device.

U2U Group

For the display, select the zone/group to which the unit belongs.

For the control board, selects the zone/group with which the unit will be configured in teamwork/standby/rotation scenarios.

NOTE: Units with a specific thermal area of influence should be assigned to the same zone/group, typically when a network spans separate rooms rather than by aisles. Groups are also handy when cooling units vary by cooling type, compressor type, or version of Vertiv™ Liebert® iCOM™ firmware and otherwise do not operate together efficiently or at all.

U2U Address

For the display, a unique identifier for each display on the U2U network. Address range is 33 to 64.

For the control board, a unique identifier for each control board on the U2U network. Address range is 1 to 32 and must be consecutive from the previous control-board address in the U2U group. This is the address used for standby/lead-lag and cascade operation, see Table 6.1 on the previous page .

NOTE: For both board and display, we recommend matching the U2U address to the last 3 digits of the IP address for easier reference later.

6.2.3 Troubleshooting Network Settings Issues

At the bottom of the U2U NETWORK SETTINGS panel, an Issues button indicates whether or not there are problems with the network settings. The button indicates the number of issues and changes color when a problem exists, see Table 6.2 below .

Table 6.2   Issues Button Status Colors

Color	Description
Green	No problems. Number of issues is zero.
Red	Problem(s) detected. Number of issues displays.

To view network issues:

1. When an issue is indicated, touch the Issues(s) button on the U2U NETWORK SETTINGS panel. The ISSUES dialog opens.

2. Note the problems and *Close* the dialog, then address the issue:

   - Touch the setting to correct.
     The on-screen keyboard opens.

   - Make adjustments and touch *Go*.

   - Continue making corrections until no problems are indicated.

3. Verify that unit to unit communication is established, then touch *Save*.

NOTE: Depending on the changes made, the Save button updates to indicate the components that need rebooted or restarted. If the control board reboots, the cooling unit suspends operation for 60 seconds, then resumes operating.

6.2.4 Modifying U2U Network Settings

1. Touch , then > *BMS&TeamworkSetup* > *U2USetup.* The U2U NETWORK SETTINGS panel opens.

2. Touch the setting to edit and make adjustments, then touch.

3. Verify that unit to unit communication is established, then touch *Save*.

NOTE: Depending on the changes made, the Save button updates to indicate the components that need rebooted or restarted. If the control board reboots, the cooling unit suspends operation for 60 seconds, then resumes operating.

7 External Monitoring and Building Management Systems

Vertiv™Liebert®iCOM™ controlled cooling units are equipped with embedded Vertiv™Liebert® IS-Unity-DP software to communicate with external monitoring systems including Building Management Systems (BMS), Network Monitoring Systems (NMS) and Vertiv™Liebert® SiteScan™ Web.

Embedded Unity communicates with multiple third-party protocols to monitor and manage a range of parameters and events. The Embedded Unity software delivers:

- Velocity protocol for Vertiv™ Liebert® *Trellis*™, SiteScan™, and Nform.
- Embedded LIFE™ Technology for Remote Services
- SNMP (v1/v2/v3) for NMS.
- HTTP/HTTPS for web page viewing.
- SMTP for e-mail.
- SMS for mobile messaging.
- Modbus RTU—Remote Terminal Unit. (MODBUS RTU RS-485)
- Modbus TCP Transmission Control Protocol for BMS over Internet or LAN.
- BACnet IP—BACnet over Internet Protocol for BMS over Internet or LAN.
- BACnet MSTP—BACnet Primary-Secondary/Token-Passing communication protocol for BMS over an RS-485 serial network (Modbus MSTP RS-485).

7.1 BMS and Vertiv™ Liebert® IntelliSlot Settings

When communicating with a building management system (BMS) with an optional IntelliSlot Unity card or via embedded Unity function, the BMS settings are identical and include:

- Disconnect fail safe
- Manual pump speed control
- Allowing the BMS to change pump speed
- Backup pump and temperature control

7.1.1 Configuring BMS Communication with Embedded Unity

By default, built-in Unity function is disabled. You must enable communication with the BMS via the IS-UNITY options in iCOM™.

To configure Modbus, BACnet, SNMP, SMS and HTTP communication, see Communication Setup with Embedded Unity on page 58 .

To Enable Embedded Unity Function

1. Touch [SERVICE], then [≡] > *BMS&Teamwork* > *BMS Setup*. The BMS SETUP panel opens.

2. Select *IntelliSlot Card Settings* and one of the following in *Monitoring Protocol*:

    - *Embedded* to use built-in Unity function.

    - *Embedded & IS V4* to use built-in Unity and additional IntelliSlot card or SiteLink connection.

3. Touch *Save & Restart (Unit Only).*

Monitoring Protocol

Protocol used for communication with BMS. Options are:

- Velocity V3: Legacy Velocity communication card

- IGM: IGMNet communication cards

- Velocity V4: Liebert® IS-UNITY card or Vertiv™ Liebert® Sitelink/Vertiv™ Liebert® Sitescan™.

- Embedded: Embedded IS-UNITY function

- Embedded BS IS V4: Both Embedded Unity function and Velocity V4 for an optionally installed IS-UNITY card or Liebert® SiteLink/Liebert® Sitescan™

Monitoring Address

Address used by an optional, installed IntelliSlot card. Factory default is 3.

- Do not modify the monitoring address unless directed to do so by Vertiv technical support.

7.1.2 Setting BMS Control Settings

NOTE: If a Liebert® Sitelink/Liebert™ Sitescan™ Connection and MODBUS RTU or BACnet MSTP is required simultaneously, then the purchase of the RS-485 Expansion Board is required. Contact your local Vertiv sales rep or the factory.

1. Touch , then > *BMS & Teamwork > BMS Setup > Control Settings*. The CONTROL SETTINGS secondary panel opens.

2. Adjust the settings, and touch *Save*. The settings are configured.

NOTE: Use Configure Timeout to configure the setpoints used in the event of an outage and BMS takes control. See Setting BMS Backup Setpoints on the facing page .

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

BMS Control Settings Options

Pump Control Sensor

Indicates what Pump Control option the BMS is instructing the XDM control to use.

- FlowRate

- DiffPrs

- FlowRate w/DP Limit

- DiffPrs w/Flo Limit

- Manual (BMS)

BMS is Connected To

Indicates the input type used by the BMS connection (velocity or one of the available analog inputs).

If the input type is set to an analog input, the Analog Input value will be displayed.

Handshake

Sets a time period, in minutes, in which communication between the BMS and Vertiv™ Liebert® iCOM™ must occur.

7.1.3 Setting BMS Backup Setpoints

Vertiv™ Liebert® iCOM™ provides backup Temperature and Pump Control settings in the event of a loss of communications between the XDM and the Building Management System (BMS). When units are networked together, any unit connected to the BMS shall communicate shared BMS setting updates to other units within the group. Units will only revert to BMS Backup Operation all units in the group are not communicating with the BMS or if the unit is not communicating with both the BMS and other units in the group.

1. Touch [SERVICE], then [≡] >*BMS & Teamwork > BMS Setup > Timeout Settings XDM*.
2. Adjust the values, and touch *Save*. The settings are configured.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

BMS Timeout Settings Options

BMS Backup Temperature

Set value to Yes or No to turn on or off.

BMS Backup Temp Setpoint

If using BMS Backup Temperature, use the slide control to set the setpoint temperature.

BMS Backup Pump Operation

Select Disabled or Enabled.

BMS Backup Pump Operation Type

- FlowRate
- DiffPrs
- DiffPrs w/Flo Limit
- Manual (BMS)

BMS Backup Fluid Flow Set

Use the slide control to set the fluid flow set. Values are from 3 gpm to 2642 gpm.

BMS Backup Pump Speed

Use the slide control to set the backup pump speed percentage. Values are from 30% to 100%.

7.2 Communication Setup with Embedded Unity

The following sections describe the configuration options for embedded Unity function including Modbus, BACnet, SNMP, SMS, and HTTP communication.

NOTE: The Unity configuration is also accessible through the Unity web interface. For details on accessing and using the web interface, refer to the *Liebert® IntelliSlot™ Unity Card Installer/User Guide*, available at www.VertivCo.com.

IS-UNITY setup includes the following options to configure Unity function and communication:

- Connection
    - Connecting to the BMS below
    - Embedded Unity User and Password on page 62
    - Troubleshooting Unity Connection and Set Up on page 60
- Configuration
    - System Configuration on page 63
    - Local Users Configuration on page 64
    - Network Configuration on page 64
    - Web Server Configuration on page 67
    - Velocity Protocol Configuration on page 71
    - Messaging Configuration on page 73
- Protocols
    - BACnet Protocol Setup on page 77
    - Modbus Protocol Setup on page 79
    - SNMP Protocol Setup on page 80
- Unity Status Readings on page 85
- Unity Support Information on page 85

7.2.1 Connecting to the BMS

The embedded Unity software resides on the Vertiv™ Liebert® iCOM™ control board. There are two methods of connecting to a BMS, via Ethernet or RS-485.

For a network connection, connect the Ethernet cable from the BMS to P74 on the iCOM™ control board. **Figure 7.1**   on the facing page , shows the connector location.

For an RS-485 connection, connect the serial cable form the BMS to TB3 on the iCOM™ control board. Pin 1 is the positive terminal on the right in **Figure 7.1**   on the facing page .

If the optional RS-485 Expansion Board is purchased, TB1 on the Expansion Board is then used for BACnet MSTP or MODBUS RTU and TB3 on the ICOM Board is used to connect directly to a Sitelink/Sitescan System.

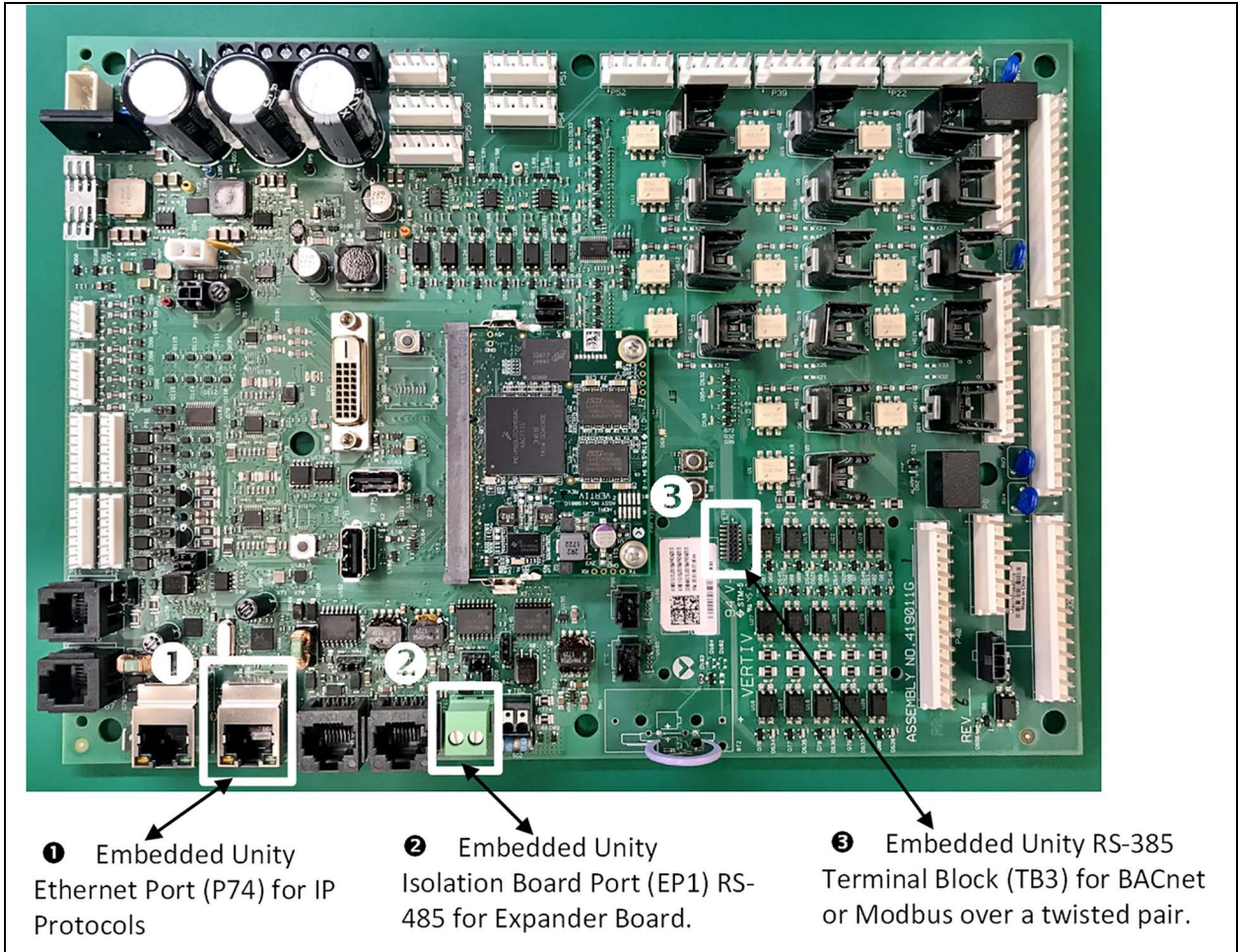Please see **Figure 7.2**   on page 60 for TB1 Pin-outs and description.

Figure 7.1   Control Board Connections
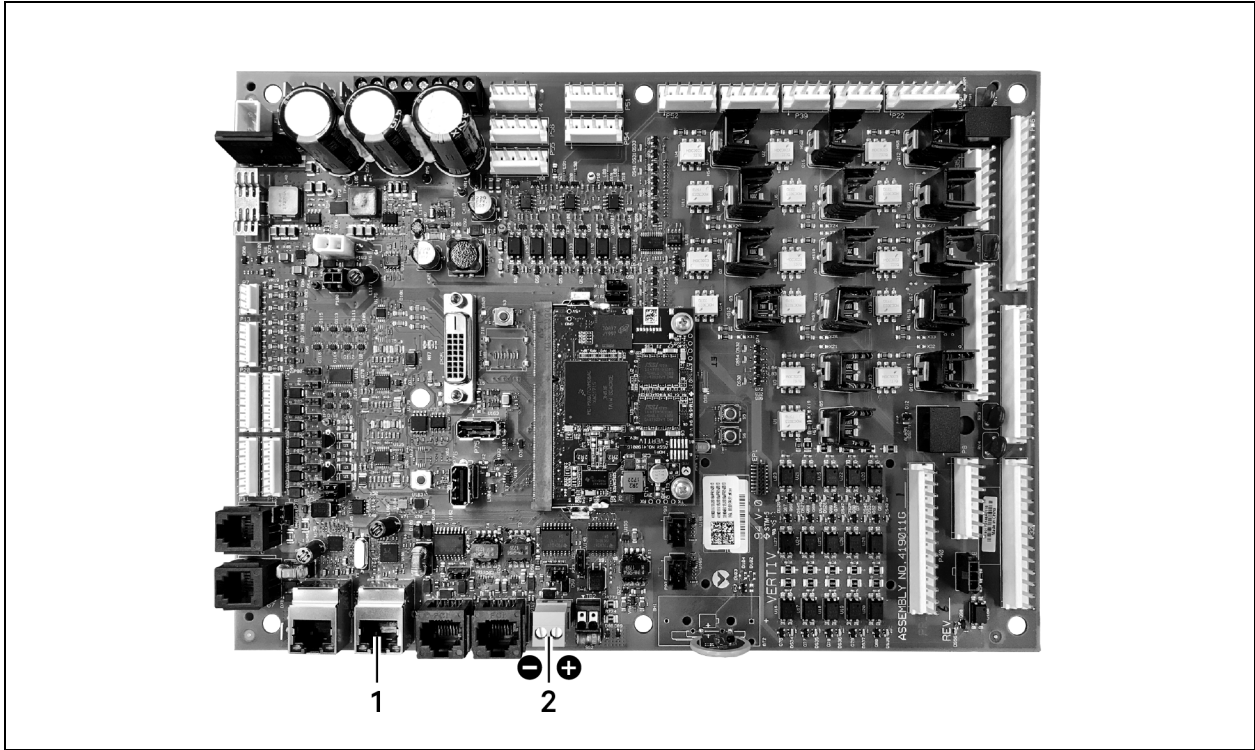
No.	Description
1	P74 Ethernet port
2	485 two wire terminal connector

Troubleshooting Unity Connection and Set Up

Figure 7.2   RS-85 Expansion Board

Item	Description
1	Embedded Unity Ethernet port (p74) for IP protocols
2	Embedded Unity RS-485 Terminal Block (TB3) for BACnet or Modbus over twisted pair
3	Embedded Unit isolation board port (EP1) RS-485 for expander board

The expansion board is needed only if there is a requirement to do Velocity 4 to IntelliSlot based cards and BACnet or Modbus RS-485 simultaneously. See **Figure 7.3**   on the facing page for the expansion board.

Figure 7.3   Expansion Board
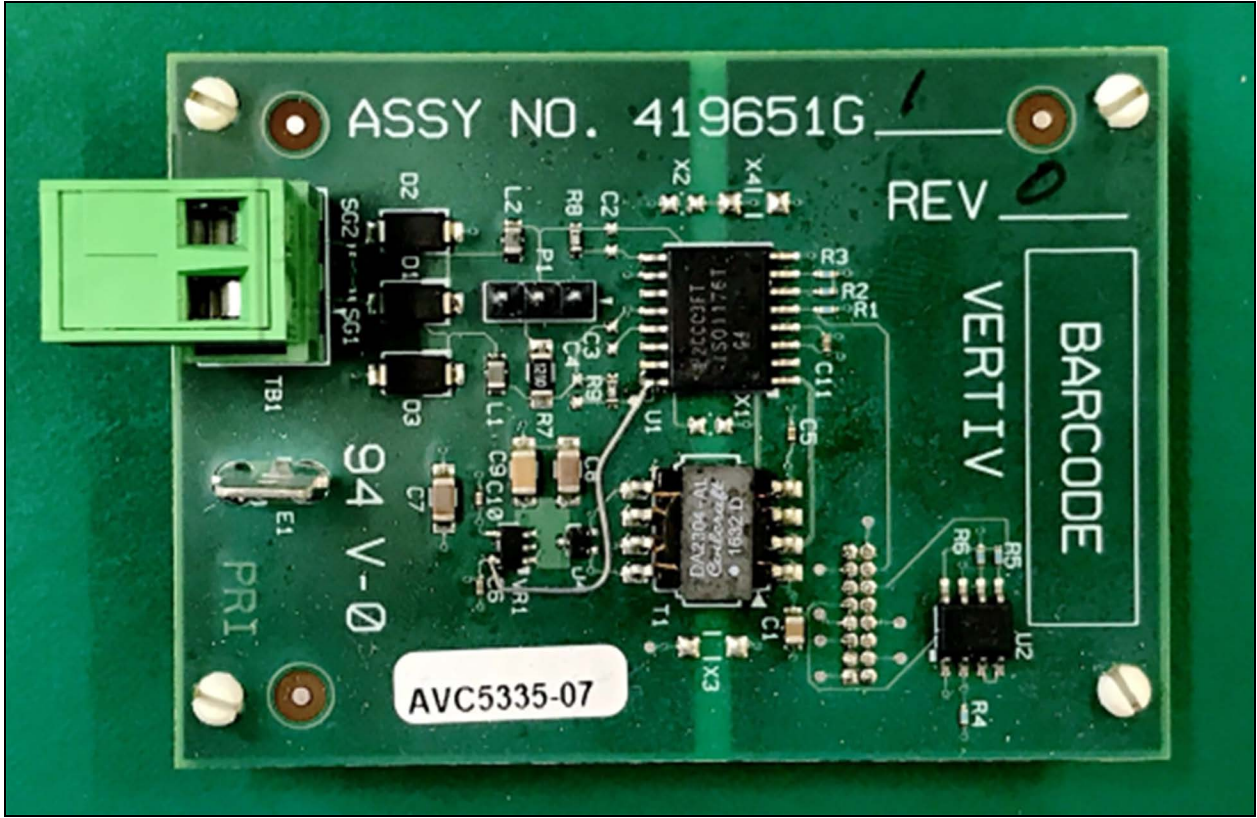
Table 7.1 below , lists problems you may encounter with the Unity software and possible solutions.

Table 7.1 Embedded Unity Troubleshooting

Problem	Possible Cause	Suggested Remedy
Settings are not available in local unit iCOM™ display, show as "*IS-Unity Service is Unavailable*"	Embedded Unity is not enabled.	Make sure the correct monitoring protocol is selected in BMS Setup. See Configuring BMS Communication with Embedded Unity on page 55 .
	Unity software needs more time to boot up since most recent iCOM™ controller or Unity reboot.	Wait no more than 10 minutes to give enough time to boot up.
	The iCOM™ user and password for Unity are incorrect.	Enter a valid user name and password for the iCOM™-to-Unity connection. See Embedded Unity User and Password on the next page .
	Embedded Unity has crashed.	Restart, and wait at least 5 minutes to fully boot up. See Unity Restart and Restore Defaults on the next page .
	Unity configuration had become corrupt.	Restore to defaults, see Unity Restart and Restore Defaults on the next page . **NOTE: All customized Unity configuration settings will be lost. Use this as a last resort.**
Ethernet to BMS network not communicating or connecting	BMS Ethernet drop is connected to the wrong RJ-45 connector on the iCOM™ control board.	Make sure that the cable is connected to P74 on the iCOM™ control board, and corrected if needed.
	Ethernet cable is bad or incorrectly made.	Use a cable tester that gives a quality rating and length (sends a true data packet) to test the cable and correct as needed.

Table 7.1 Embedded Unity Troubleshooting (continued)

Problem	Possible Cause	Suggested Remedy
	Incorrect network settings.	Correct the IPv4 network settings, see IPv4 and IPv6 Configuration on page 65 . **NOTE: If you adjust the settings, you must restart the Unity software for the changes to take effect.**
485 twisted pair to BMS network not communicating or connecting	Incorrect polarity.	Correct the polarity. See Connecting to the BMS on page 58 .
	Incorrect protocol settings.	Verify and correct the settings. Refer to the configuration settings that apply to your system: • BACnet Protocol Setup on page 77 . • Modbus Protocol Setup on page 79 . • SNMP Protocol Setup on page 80 .
	Protocol settings have not been saved.	Save the settings, and restart Unity so the configuration is authorized/applied. See Unity Restart and Restore Defaults below .

7.2.2 Embedded Unity User and Password

Changes to the Unity configuration are authenticated with a user/password that is stored in Vertiv™ Liebert® iCOM™. The stored user name and password must match that of a user account in embedded Unity. See Local Users Configuration on page 64 , for a description of the Unity accounts. By default, the user is Liebert and the password is Liebert (case sensitive).

If you are not using the default combination in Unity, then you must update iCOM™ with the matching user name and password.

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Settings.*

2. Adjust the User Name and Password, and touch *Save*.

7.2.3 Unity Restart and Restore Defaults

Some types of configuration changes require a restart of the embedded Unity software to take effect. Using the Restart IS-Unity option, does not affect the Vertiv™ Liebert® iCOM™ controller.

You also have the option of restoring the configuration to factory defaults if communication problems occur and cannot be remedied with troubleshooting.

To Restart Embedded Unity

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Settings.*

2. Touch *Restart IS-Unity*, then *Save*.

To Reset the Configuration to Factory Defaults

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Settings.*

2. Touch *Default IS-Unity Setup*, then *Save*.

7.2.4 System Configuration

System displays general information about the monitored and managed device. You can select the temperature units displayed, which is Celsius by default.

To Update System Settings

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > System*.
2. Adjust the information, and touch *Save*. The settings are configured.

Time Service Settings

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > System > Time Service*.
2. Adjust the settings, and touch *Save*.

Time Service Setting Options

External Time Source

The external source to use for time synchronization. Default is NTP Server.

Primary NTP Time Server

URL, Hostname, or IP address of the primary NTP time source. Has a 64 character maximum.

Backup NTP Time Server

URL, Hostname, or IP address of the primary NTP time source. Has a 64 character maximum.

NTP Time Sync Rate

The rate at which time will be synchronized with the network time protocol server, if NTP is the external time source.

Time Zone

Time zone where the device is located.

Enable Auto-Sync to Managed Device

Enable automatic writing time to the managed device.

Managed Device Auto-Sync Rate

Rate at which time will be written to the managed device, if an external time source has been selected.

7.2.5 Local Users Configuration

Local Users offers up to 10 users and three access levels described in **Table 7.2**   below .

The default password for all users is *Liebert* (case sensitive).

Table 7.2   User Access Levels

Level Name	Access/ Permission Type	Description
No Access	None	The No Access level is enforced when Password Protected Site is enabled.
General User	Read-only	Able to view all tabs, folders and sub-folders of the user interface. A General User will only need to enter the assigned password if Password Protected Site is enabled, see Web Server Configuration on page 67 . By default, Local User [2] is *User* with the default password *Liebert* (both are case sensitive). The Authorization (access type) for Local User [2] is General User.
Administrator	Read/Write	Able to edit settings using the assigned password, which is always required to edit settings/configuration. By default, Local User [1] is *Liebert* with the default password *Liebert* (both are case sensitive). The Authorization (access type) for Local User [1] is Administrator. Be sure that you always have one administrator user, so you can access and modify configuration and other settings.

IMPORTANT! Record user names and passwords and save them in a secure place where they can be found if forgotten. A lost password cannot be retrieved from the IS-UNITY card. If the administrator password is lost, the card must be reset to factory defaults and reconfigured.

To Change the User Names and Passwords

NOTE: There is a 30 character maximum. All printable characters are valid except: \ : ' < > ~ ? " #

1. Touch [SERVICE] , then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > Users > User [n]*.
2. Enter a new user name and password.
3. Re-enter the password to confirm it.
4. In *Authorization for User*, select the type of access, see **Table 7.2**   above .
5. Touch *Save*.

7.2.6 Network Configuration

1. Touch [SERVICE] , then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > Network.*
2. Adjust the settings, and touch *Save*.

Network Setting Options

Speed Duplex

Selects the speed and duplex configuration of the card's Ethernet port. It is set to Auto by default. If it requires changing, contact the system administrator for the proper settings.

Hostname

Identifies the network node. Default is UNITY-*serial_number_of_card.*

Domain Name Suffix List

Listing of domain name suffixes for resolution of host names. If it requires changing, contact the system administrator for the proper setting.

Telnet Server

Enables/disables telnet access to the card to prevent unauthorized changes. The default setting disables telnet access.

SSHv2 Server

Enables/disables SSHv2 (Secure Shell) access to the card to prevent unauthorized changes. The default setting disables SSHv2 access.

IPv4 and IPv6 Configuration

The IPv4 and IPv6 settings determine which internet protocol will be used for communication over the network connected to the Ethernet port. IPv4 and IPv6 networks will run in parallel (dual stack network), but the protocols are different. See your network administrator to determine which protocol should be enabled and to determine the correct settings.

1. Touch ![SERVICE], then ![menu] > *BMS & Teamwork > IS-Unity Setup > Configuration > Network > IPv4* or *IPv6.*
2. Adjust the settings, and touch *Save.*

IPv4 Settings

Pv4 Protocol

Enables IPv4 in the card.

IP Address Method

Mode the card boots into to be a network ready device (Static, DHCP, BootP). Default is DHCP.

Static IP Address

Network address for the interface.

Subnet Mask

Network mask for the interface which divides a network into manageable segments.

Default Gateway

IP address of the gateway for network traffic destined for other networks or subnets.

DNS Server Address Source

Source of DNS server identification (None, Automatic, Configured).

Primary DNS Server

Network address of the primary DNS server.

Secondary DNS Server

Network address of the secondary DNS server.

IPv6 Settings

IPv6 Protocol

Enables IPv6 in the card.

IP Address Method

Mode the card boots into to be a network ready device (Static, Auto). Default is Auto.

Static IP Address

Network address for the interface.

Prefix Length

Prefix length for the address that divides a network into manageable segments.

Default Gateway

IP address of the gateway for network traffic destined for other networks or subnets. Default is 64.

DNS Server Address Source

Source of DNS server identification (None, Automatic, Configured). Default is Automatic.

Primary DNS Server

Primary DNS Server

Secondary DNS Server

Secondary DNS Server

Domain Name Server Test

The Domain Name Server (DNS) test checks key points of a DNS setup for a given domain.

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > Network > DNS Test.*
2. Adjust the settings, and touch *Save.*

DNS Test Settings

Last Query Response

Response from a DNS to the last query.

Example: *gxtwebdemo.liebert.com* resolved to *126.4.203.251*

Type of Query

Type of DNS query (hostname, IP address).

Query Value

Value for the domain name server (DNS) to resolve.

Example: *gxtwebdemo.liebert.com*

7.2.7 Web Server Configuration

Web Server Settings configures some security settings, such as HTTP or HTTPS, and password enabling.

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > Web Server.*
2. Adjust the settings, and touch *Save.*

Web Server Settings

Web Server Protocol

Select the operation mode of the web server (HTTP, HTTPS).

HTTP Port

Standard web port not encrypted. Required if HTTP is enabled as web server protocol. Default is 80. Must be set to 80 for correct iCOM™ connection.

HTTPS Port

Standard secure web port; all communication is encrypted. Required if HTTPS is enabled as web server protocol. Default is 443. Must be set to 443 for correct iCOM™ connection.

Password Protected Site

When enabled, a log in session is required before any device information is displayed to the user. User level credentials will allow only viewing of device information. Administrator level credentials are required to make any changes.

Remote Write Access

When enabled, all web browsers have write access to data on all Unity card web pages when the user is logged in with Administrator credentials. When disabled, write access is restricted to web browsers connected on an Autoconfiguration IPv4 address. An Autoconfiguration IPv4 address is of the form 169.254.x.x, and is negotiated automatically when a direct connection is made between the Ethernet port of your PC and the Ethernet port of the Unity card. Regardless of this setting, all web browsers always have read access to the web pages (subject to the setting of the Password Protected Site parameter), and the diagnostic information file can be generated when the user is logged in with Administrator credentials (see Unity Support Information on page 85).

NOTE: When remote write access is disabled, an indicator is displayed in the upper right corner of the web page as a reminder, shown in the following figure.

NOTE: Only disable remote write access if you are absolutely sure that you do not need to administer the managed device or the Unity card through a remote web browser session.

Session Idle Timeout

The interval the software will wait before logging off a user unless there is user activity. The default is five minutes.

Certificate Configuration

When the web server protocol is configured to use HTTPS communications, all web server communication with all browsers is encrypted and validated based upon the security algorithms and validity checks specified in the SSL certificate that is currently installed in the card. By default, the card generates its own unique, self-signed SSL certificate when it is first powered up. However, many installations want to install and use SSL certificate files that were generated by their own Certificate Authority (CA).

Selections in Certificate provide commands to Upload SSL Certificate PEM Files or Generate Self-Signed SSL Certificate.

Certificate Commands

Generate Self-Signed SSL Certificate

Generates and installs a new self-signed certificate based on the mode selected for Generate Self-Signed SSL Certificate Mode. See .

Generate Self-Signed SSL Certificate Mode

Method used to generate a self-signed SSL certificate. Options are:

- Use Default Values: The values used in place of the user configurable fields are the same as those used when the original SSL certificate was generated by the card on first power up. The default values are not displayed.
- Use Configured Settings: The user entered values in the configurable fields are used to generate the certificate.

NOTE: When using configured settings, all of the configurable fields, described below, must have an entry to successfully generate a certificate.

Common Name

Fully qualified domain name that browser clients will use to reach the card's web server when it is running with the certificate generated with the name entered here.

Organization

Organization or company identified as the owner of the generated certificate.

Organizational Unit

Organizational unit or company division of the organization identified as the owner of the generated certificate.

City or Locality

City or locality of the organization identified as the owner of the generated certificate.

State or Province

State or province of the organization identified as the owner of the generated certificate.

Country Code

Country code (two letter abbreviation) of the organization identified as the owner of the generated certificate.

E-Mail Address

E-mail address of the contact within the organization identified as owner of the generated certificate.

Generating a Self-Signed SSL Certificate

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > Web Server > Certificate*.
2. In Generate Self-Signed SSL Certificate Mode, select the mode to use.
    - If you select *User Configured Settings*, make entries in all of the configurable value fields (required).
3. Touch *Save*.
4. Follow the instructions in the dialog to generate and install the certificate.

7.2.8 Remote Services Configuration

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > Remote Services*.
2. Adjust the settings, and touch *Save*.

The folder contains sub-folders for connectivity and diagnostics:

Remote Service Options and Settings

Serial Number from Device

Serial number obtained from the managed device. Identifies the device to the system unless *Device Serial Number Override* is enabled.

Reset Remote Services Config

Resets configuration of the remote service back to factory defaults.

NOTE: Does not reset the communication card configuration.

Remote Service

Enables/disables remote service connection.

Device Data Sampling

Enables/disables, data sampling of the device.

Device Serial Number

Serial number used when *Device Serial Number Override* is enabled.

Device Serial Number Override

Enables/disables use of the serial number obtained from the managed device.

Serial Equipment Tag Number

Number from the site equipment tag.

Site Identifier

Site identification number.

Device Instance ID

Manufacturer's device identification number.

Service Center Country

Country in which the device is serviced.

Remote Service Connectivity Options and Settings

Connectivity Test Result

Result of most recent connectivity test.

Test Connectivity

Initiates connectivity test.

Evaluate Remote Services Configuration

Attempt to connect to the remote service to verify the configuration.

Remote Service Platform URL

Length of time to attempt reconnection in the event of a communication failure. Range is 30 to 600 seconds.

Connection Retry Time

Length of time to attempt reconnection in the event of a communication failure. Range is 30 to 600 seconds.

Proxy Enable

Enables use of remote service platform URL to connect with a proxy server.

Proxy Authentication

Enables authentication of the proxy server.

Proxy Address

IP or URL address of the proxy server.

Proxy IP Port Number

Port number of the proxy server. Range is 1 to 65535.

Proxy User Name

User name of the proxy server.

Proxy User Password

Password of the proxy server.

Remote Service Cloud URL

URL address of the remote service cloud. Do not enter the "http://" or "https://" prefix.

Remote Services Diagnostics Settings

Communication Status

Results of the most recent transaction.

Communication Error Count

Number of communication errors since reboot.

Last Communications Error

Most recent communication error message since reboot with date and time stamp.

Monitored Device Rule File Information

Details about the remote service rule file in effect for the monitored device.

Remote Services Operating Status

Status of the remote service.

Managed Device Status

Status of managed device's communication with the card.

7.2.9 Velocity Protocol Configuration

Velocity protocol contains four sub-folders: Managed Device, MSTP, Ethernet, and Internal.

NOTE: With the exception of changing the node ID when multiple cards are used or when disabling Velocity Protocol IP access, the settings in the Velocity Protocol sub-folders should not be modified unless directed by a Vertiv representative.

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > Velocity Protocol*.
2. Adjust the settings and touch *Save*.

Velocity Protocol Options

Velocity Protocol IP Access

When disabled, prevents access from a remote, IP-based system using the Velocity Protocol.

Velocity Protocol Managed Device Options

Connection State

Status of connection to managed device.

FDM Version

Version of the managed device.

Product Sequence ID

Product sequence identifier of the managed device.

LAN Type

Type of interface connection to the managed device. Must be set to MSTP Internal for correct communication with iCOM™.

Node ID (MSTP Only)

Identifier of the managed device on an MSTP LAN.

IP Address (IP Only)

Address of the managed device on an IP LAN.

Velocity Protocol MSTP Options

Interface

Type of MSTP interface.

Data Rate

Communication rate in bps.

Max Master Address

Maximum node ID in-use on the MSTP interface.

Network Number

Network number of the MSTP interface: 1 to 65534.

Node ID

Node ID of the agent card on the MSTP LAN. 0 to 127.

Velocity Protocol Ethernet Options

Velocity Protocol IP Port Number

Port number of the IP interface, 1 to 65535.

Network Number

Network number of the Ethernet interface, 1 to 65534.

Velocity Protocol Internal Options

Network Number

Internal network number used on the agent card. Not available to other interfaces.

7.2.10 Messaging Configuration

Messaging enables and disables e-mail and text messaging about events. It includes a test to determine if e-mail and text messages can be successfully sent. Settings specify message recipients, the format or the messages, and other details.

Messaging Options

E-Mail

May be enabled to send e-mail messages about events.

SMS

May be enabled to send text messages about events.

E-Mail Messaging Configuration

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Configuration > Messaging > Email*.
2. Adjust the settings, and touch *Save*.

E-Mail Settings

E-Mail From Address

Sender's e-mail address. In most cases this will be the e-mail address of the person to whom replies should be sent. For example, *Support@company.com*

E-Mail To Address

E-mail address of the recipient. Multiple e-mail addresses should be separated by a semicolon.

E-Mail Subject Type

Subject of the e-mail. This value will default to the event description. The subject line can be customized.

Custom Subject Text

The subject of the e-mail can be changed.

SMTP Server Address

Fully qualified domain name or IP address of the server used for relaying e-mail messages. If using a server name, a DNS server may need to be configured under Network Settings.

SMTP Server Port

SMTP server port.

SMTP Connection

SMTP server connection type. Determines the capabilities of the SMTP server. Options are:

- Clear: Do not use encryption
- SSL/TLS: Encryption using SSL/TLS connection
- STARTTLS: SSL/TLS encryption initiated using STARTTLS.

SMTP Authentication

Enable or disable e-mail SMTP authentication. An e-mail account must be provided for the SMTP service provider to authenticate.

NOTE: Some e-mail servers may require account configuration changes to allow communication with the Unity card. For example, Gmail only recognizes Google applications as being secure. However, they provide an account setting that allows authentication with what they consider less secure apps. Please see your network administrator or service provider for configuration details.

SMTP User Name

User name of the e-mail account to use when e-mail SMTP authentication is enabled.

SMTP Password

Password for the e-mail account to use when e-mail SMTP authentication is enabled.

Include IP Address in Message

If checked, the IP Address of the agent card will be included in outgoing messages.

Include Event Description in Message

If True, SNMP event description will be included in outgoing messages.

Include Name in Message

If checked, the agent card name will be included in outgoing messages.

Include Contact in Message

If checked, the agent card contact will be included in outgoing messages.

Include Location in Message

If checked, the agent card location will be included in outgoing messages.

Include Description in Message

If checked, the agent card description will be included in outgoing messages.

Include Web Link in Message

If checked, a web link to the agent card and web server listening port number will be included in outgoing messages.

Enable Event Consolidation

If checked, multiple events will be sent per outgoing message.

Consolidation Time Limit

If Event Consolidation is enabled, a message will be sent when Consolidation Time Limit seconds has passed since the first buffered event was received.

Consolidation Event Limit

If Event Consolidation is enabled, a message will be sent when the number of buffered events reaches the Consolidation Event Limit.

SMS Messaging Configuration

1. Touch , then > *BMS & Teamwork > IS-Unity Setup > Configuration > Messaging > SMS*.
2. Adjust the settings and touch *Save*.

SMS Settings

SMS From Address

The sender's SMS address. In most cases this will be the SMS address of the person to whom replies should be sent. For example, Support@company.com.

SMS To Address

The SMS address of the recipient. Multiple SMS addresses should be separated by a semicolon.

Custom Subject Text

The subject of the message. The subject can be customized by the customer.

SMS Subject Type

Subject of the message, either default or custom.

SMTP Server Address

Fully qualified domain name or IP address of the server used for relaying SMS messages.

NOTE: If using a server name, a DNS server may need to be configured under Network Settings.

SMTP Connection

SMTP server connection type. Determines the capabilities of the SMTP server. Options are:

- Clear: Do not use encryption.
- SSL/TLS: Encryption using SSL/TLS connection.
- STARTTLS: SSL/TLS encryption initiated using STARTTLS.

SMTP Server Port

STMP server port.

SMTP Authentication

Enable or disable SMS SMTP authentication. An SMS account must be provided for the SMTP service provider to authenticate.

NOTE: Some messaging servers may require account configuration changes to allow communication with the Unity card. For example, Gmail only recognizes Google applications as being secure. However, they provide an account setting that allows authentication with what they consider less secure apps. Please see your network administrator or service provider for configuration details.

SMTP User Name

User name of the SMS account to use when SMS SMTP authentication is enabled.

SMTP Password

Password for the SMS account to use when SMS SMTP authentication is enabled.

Include IP Address in Message

If True, the IP Address of the agent card will be included in outgoing messages.

Include Event Description in Message

If checked, SNMP event description will be included in outgoing messages.

Include Name in Message

If checked, the agent card name will be included in outgoing messages.

Include Contact in Message

If checked, the agent card contact will be included in outgoing messages.

Include Location in Message

If checked, the agent card location will be included in outgoing messages.

SMS Include Description in Message

If checked, the agent card description will be included in outgoing messages.

Include Web Link in Message

If checked, a web link to the agent card and web server listening port number will be included in outgoing messages.

Enable Event Consolidation

If checked, multiple events will be sent per outgoing message.

Consolidation Time Limit

If Event Consolidation is enabled, a message will be sent when Consolidation Time Limit seconds has passed since the first buffered event was received.

Consolidation Event Limit

If Event Consolidation is enabled, a message will be sent when the number of buffered events reaches the Consolidation Event Limit.

Messaging Test

Tests the set up for e-mail and SMS messages. If the test fails, incorrect settings should be changed to ensure that proper notifications are sent if an event should occur.

1. Touch , then > *BMS & Teamwork* > *IS-Unity Setup* > *Configuration* > *Messaging* > *Messaging Test*.
2. Enter the settings, select the type of test in *Send Test Message*, and touch *Save*.

7.2.11 BACnet Protocol Setup

1. Touch [SERVICE], then [☰] > *BMS & Teamwork > IS-Unity Setup > Protocols > BACnet*.

2. Adjust the settings, and touch *Save*.

3. Configure the BACnet interface chosen.
   See Configuring BACnet IP Protocol below , or Configuring BACnet MSTP Protocol on the next page .

BACNet Settings

Managed Device Write Access

Enable or disable the BACnet server to write to the managed device.

BACnet Interface

BACnet server interface: BACnet IP or BACnet MSTP.

Device Object Instance Number

The instance number (0-4194302) of the BACnet server's device object.

Device Object Name

The name of the BACnet server's device object.

ADPU Timeout

The timeout in milliseconds between APDU retries (1-65535).

ADPU Retries

The number of times to retransmit an APDU after the initial attempt (0-8).

Configuring BACnet IP Protocol

1. Touch [SERVICE], then [☰] > *BMS & Teamwork > IS-Unity Setup > Protocols > BACnet* > BACnet IP.

2. Set the BACnet MSTP Node ID.
   - The Node ID defaults to 1, but must have a value from 0 to 127 that is unique among devices connected through the RS-485 interface.

3. Set the BACnet MSTP data rate.

4. Set the BACnet MSTP max master address.

5. Set the BACnet MSTP max info frames.

6. Touch *Save*.

7. Restart Unity:

   a. Touch [SERVICE], then [☰] > *BMS & Teamwork > IS-Unity Settings*.

   b. Touch *Restart IS-Unity.*, then touch *Yes*.

BACnet IP Settings

BACnet IP Port Number

The port for the BACnet server's UDP/IP connection.

Register as Foreign Device

Enable or disable registration as a foreign device.

IP Address of BBMD

IP Address of the BACnet Broadcast Management Device (BBMD) to be accessed for Foreign Device Registration.

Foreign Device Time to Live

Time to remain in the BBMD Foreign Device table after registration.

Configuring BACnet MSTP Protocol

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Protocols > BACnet* > BACnet IP.
2. Set the BACnet MSTP Node ID.
   - The Node ID defaults to 1, but must have a value from 0 to 127 that is unique among devices connected through the RS-485 interface.
3. Set the BACnet MSTP data rate.
4. Set the BACnet MSTP max master address.
5. Set the BACnet MSTP max info frames.
6. Touch *Save*.
7. Restart Unity:

   a. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Settings*.
   b. Touch *Restart IS-Unity*, then touch *Yes*.

BACnet MSTP Settings

Node ID

The BACnet server's MS/TP node ID (MAC).

Data Rate

The BACnet MSTP communication rate (bits per second).

Max Master Address

The maximum node ID (MAC) in use on the MS/TP network.

Max Info Frames

Maximum number of information frames this node may send before it must pass the token.

7.2.12 Modbus Protocol Setup

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Protocols > BACnet.*

2. Adjust the settings, and touch *Save.*

3. Configure the BACnet interface chosen. See , or Configuring Modbus RTU Protocol on the next page .

Modbus Settings

Managed Device Write Access

Enable or disable the Modbus server to write to the managed device.

Modbus Interface

Select the Modbus interface, either Modbus TCP or Modbus RTU.

Configuring Modbus TCP Protocol

The Modbus TCP permits connection to the card by:

- Any client (open) permits communication by any IP address.
- Clients on the same subnet as the Unity card.
- Clients with specific IP addresses (Trusted IP Lists); only five addresses are permitted.

To configure Modbus TCP

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Protocols > Modbus TCP.*

2. Adjust the settings and touch *Save.*

3. Restart Unity:

   a. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Settings.*

   b. Touch *Restart IS-Unity*, then touch *Yes.*

Modbus TCP Settings

Limit Network Access Type

  IP Access List

- Open
- Same Subnet
- Trusted IP List

Port

The TCP port used by the Modbus server to listen for and respond to Modbus protocol requests based on Limit Network Access Type setting.

Maximum Client Connection

Displays the maximum client connection count.

Configuring Modbus RTU Protocol

1. Touch ![SERVICE], then ![menu] > *BMS & Teamwork > IS-Unity Setup > Protocols > Modbus RTU.*

2. Enter the Node ID and the Baud Rate.

   - The Node ID defaults to 1, but must have a value from 1 to 247 that is unique among devices connected through the RS-485 interface.

   - The default baud rate is 9600. 19200 and 38400 are also available.

NOTE: Contact your system administrator if you are uncertain about the settings.

3. Touch *Save.*

4. Restart Unity:

   a. Touch ![SERVICE], then ![menu] > *BMS & Teamwork > IS-Unity Settings.*

   b. Touch *Restart IS-Unity.*, then touch *Yes.*

Modbus RTU Settings

Node ID

Modbus Server ID for the interface; obtain from network administrator.

Baud Rate

Communication rate.

- 9600

- 19200

- 38400

Parity Check

The communication parity check.

- None

- Even

- Odd

7.2.13 SNMP Protocol Setup

SNMPv1/v2c and SNMPv3 are enabled by default. The protocols may be configured or their default values may be accepted. Authentication traps are not enabled by default. The default heartbeat trap interval is 24 hours. This can be disabled or the interval may be changed.

1. Touch ![SERVICE], then ![menu] > *BMS & Teamwork > IS-Unity Setup > Protocols > SNMP.*

2. To enable Authentication Traps, touch to select *Enabled.*

3. To change the Heartbeat Trap Interval, choose a time from the drop-down list or choose *Disabled* to prevent any heartbeat traps from being sent.

   - The interval times offered are 5 or 30 minutes, or 1, 4, 8, 12 or 24 hours.

4. For each trap, choose whether or not to disable or set the interval to one of the periods on the menu.

5.   Touch *Save*.

6.   Restart Unity:

   a.   Touch , then > *BMS & Teamwork > IS-Unity Settings*.

   b.   Touch *Restart IS-Unity.*, then touch *Yes*.

SNMP Settings

SNMPv3 Engine ID

Read-only. The generated SNMPv3 engine ID.

NOTE: A newly generated ID appears only after rebooting the card.

SNMP v1/v2c Enable

Enable or disable SNMP v1/v2c.

SNMP v3 Enable

Enable or disable SNMPv3.

Authentication Traps

When enabled, an authentication trap is sent if an SNMP host tries to access the card via SNMP, but either the host address is not in the SNMP access settings or it is using the wrong community string.

Heartbeat Trap Interval

Enable or disable and set interval 5 or 30 minutes, or 1 ,4 ,8 ,12, or 24 hours.

RFC-1628 MIB

Enable or disable support for retrieval of data from the RFC-1628 MIB objects.

RFC-1628 MIB Traps

Enable or disable support for sending RFC-1628 traps.

Liebert® Global Products (LGP) MIB

Enable or disable support for getting and setting data using the Liebert® Global Products MIB.

LGP MIB Traps

Enable or disable support for Liebert® Global Products MIB traps.

NOTE: LGP traps will not be sent unless LGP MIB is enabled.

LGP MIB System Notify Traps

Enable or disable support for the LGP System Notification trap. This is a single trap sent each time an alarm or warning is added or removed from the conditions table. It provides a text description of the event in a varbind of the trap message.

NOTE: LGP System Notify traps will not be generated unless the LGP MIB is enabled.

SNMPv3 Engine ID Format Type

Selects method to build the engine ID. Valid values:

- MAC Address (default): Engine ID built from the Unity card's MAC address.
- Text: Engine ID built from text entered in SNMPv3 Engine ID Text. See Select SNMPv3 Engine ID Format below .

SNMPv3 Engine ID Text

Text on which the engine ID is built when SNMPv3 Engine ID Format Type is *Text*.

NOTE: If this field is left blank, the engine ID is built from the Unity card's MAC address.

Select SNMPv3 Engine ID Format

By default, the Engine ID is automatically generated using the MAC address. Optionally, you can select a text based ID instead.

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Protocols > SNMP*.
2. Select the format. Refer to SNMP Protocol Setup on page 80 , for descriptions of the settings and options.
   - In SNMPv3 Engine ID Format Type, select *MAC Address* or *Text*.
   - If you selected Text, type the text on which the generated engine ID will be based.
   - Click *Save* to confirm the changes or *Cancel* to discard them.
     The new engine ID is not displayed until after rebooting the card in Step 3 .
     The text generated engine ID is a hexadecimal representation of ASCII characters similar to that shown in **Figure 7.4** below .

NOTE: If the format type or text for the Engine ID are incomplete or invalid, the Engine ID is generated based on the MAC Address.

3. Restart Unity:

   a. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Settings*.
   b. Touch *Restart IS-Unity.*, then touch *Yes*.

Figure 7.4 SNMP Engine ID Generated Using Text Format Scheme
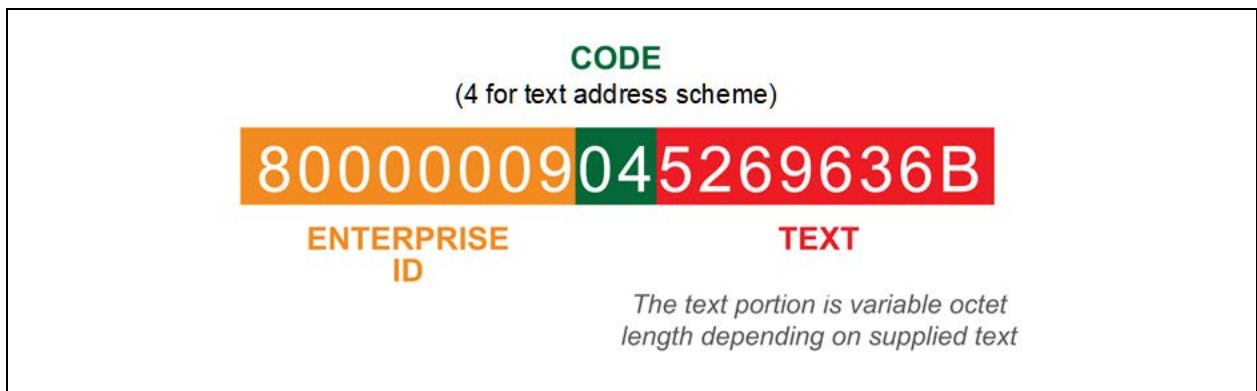
Configuring SNMPv3 Users

IS-Unity supports up to 20 SNMPv3 users. The top level is a list of all 20.

1. Touch ![SERVICE], then ![menu] > *BMS & Teamwork > IS-Unity Setup > Protocols > SNMP > SNMPv3 Users*, then one of the listed users.

2. Enter the information and set the permissions appropriate to the user, and touch *Save*.

3. Repeat steps 1 and 2 for additional users.

4. Restart Unity:

   a. Touch ![SERVICE], then ![menu] > *BMS & Teamwork > IS-Unity Settings*.

   b. Touch *Restart IS-Unity*, then touch *Yes*.

SNMPv3 User Settings

SNMPv3 User Enable

Select to enable read, write or sending notifications with the user's credentials.

SNMPv3 User Name

The user name is the user name that authentication and privacy settings apply to. This string can be composed of printable characters except: colons, tabs, double quotes, and question marks.

SNMPv3 Access Type

Read-only, Read/Write, or Traps only.

SNMPv3 Authentication

Cryptographic algorithm used for authentication: None, MD5 or SHA-1.

SNMPv3 Authentication Secret

Pass phrase or password used for SNMPv3 Get request. This string can be composed of printable characters with the exception of colon, tab, double quote, and question mark. The entry must be from eight to 64 characters.

SNMPv3 Privacy

Cryptographic algorithm used for encryption. Options are:

- None
- DES
- AES

SNMPv3 Privacy Secret

Pass phrase or password used for SNMPv3 Get request. This string can be composed of printable characters with the exception of colon, tab, double quote, and question mark. The entry must be from eight to 64 characters.

SNMPv3 Trap Target Addresses

Network hosts that will receive SNMPv3 traps, identified with either a network name or IP address. Multiple addresses must be separated by commas.

SNMPv3 Trap Port

Port used by the target host for receiving SNMPv3 traps; default is 162.

Configuring SNMPv1 Traps

You may configure up to 20 network hosts that receive SNMPv1 traps. The top level is a list of all 20.

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Protocols > SNMP > SNMPv1 Traps*, then one of the listed traps.

2. Enter the information and set the permissions appropriate to the host/trap, and touch *Save*.

3. Repeat steps 1 and 2 for additional traps.

4. Restart Unity:

    a. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Settings*.

    b. Touch *Restart IS-Unity*, then touch *Yes*.

SNMPv1 Trap Settings

SNMP Trap Target Addresses

Configure network hosts that will receive alert notifications (SNMP Traps). The host can be identified as either an IP address or the host's network name.

SNMP Trap Port

Port used by the target host for receiving notifications; default is 162.

SNMP Trap Community String

String identifying a secret known only by those hosts that want to be notified of device status changes.

Configuring SNMPv1/v2c Access

Unity supports up to 20 network hosts that access data using SNMPv1/v2c. The top level is a list of all 20.

1. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Setup > Protocols > SNMP > SNMPv1v2c Access*, then one of the listed access options.

2. Enter the information and set the permissions appropriate to the network host, and touch *Save*.

3. Repeat steps 1 and 2 for additional users.

4. Restart Unity:

    a. Touch [SERVICE], then [≡] > *BMS & Teamwork > IS-Unity Settings*.

    b. Touch *Restart IS-Unity*, then touch *Yes*.

SNMP v1/v2c Access Settings

SNMP Access IP Address

Configure network hosts interested in device information access. The host can be identified as either an IP address or the host's network name.

SNMP Access Type

SNMPv1/v2C access type: Read-only or Read/Write.

SNMP Access Community String

SNMP Community String.

7.3 Unity Status Readings

The read-only Status page displays the system status of IS-Unity and a list of events that affect its status.

To view the statuses, touch ![SERVICE], then ![menu icon] > *BMS & Teamwork > IS-Unity Setup > Status*.

7.4 Unity Support Information

Support displays information about IS-Unity for troubleshooting.

1. Touch ![SERVICE], then ![menu icon] > *BMS & Teamwork > IS-Unity Setup > Support*.
2. Adjust the settings, and touch *Save*.+

7.4.1 Support Folder Settings

Agent Date and Time

Date and time setting for the card.

Agent Model

The card's model (Unity Platform).

Agent App Firmware Version

The card's firmware version (2.0 or higher).

Agent Boot Firmware Version

The card's boot firmware version.

Agent Serial Number

The card's serial number.

Agent Manufacture Date

The card's manufacture date.

Agent Hardware Version

The card's hardware version.

GDD Version

The card's GDD version, current when the card's firmware was installed; the GDD is a proprietary reference document for device data.

FDM Version

The card's FDM version; the FDM is a data model document that defines data supported by devices that use the Velocity Protocol.

Product Sequence ID

The card's product sequence identifier.

Device Assigned Label

Displays the label assigned to the device.

7.4.2 Configuring Active Networking Settings

Status of the currently active IP network settings for IS-Unity along with some previous values for troubleshooting IP communication issues.

1. Touch ![SERVICE], then ![menu] > *BMS & Teamwork > IS-Unity Setup > Support > Active Networking.*
2. Adjust the settings, and touch *Save.*

Active Network Settings

Ethernet MAC Address

Ethernet MAC Address for the Embedded-Unity Ethernet interface.

IPv4 Address

Presently used IPv4 network address.

IPv4 Default Gateway

Presently used IPv4 network address of the gateway for network traffic destined for other networks or subnets.

Primary DNS

Presently used IPv4 Primary DNS.

Secondary DNS

Presently used IPv4 Secondary DNS.

Last DHCP/BOOTP Address

Last known IPv4 address assigned by DHCP.

Last DHCP Lease

Lease time of last known DHCP address.

IPv6 Global Address

Shows if DHCPv6 or Static address is presently being used.

Stateless Address AutoConfiguration

IPv6 SLAAC is assigned automatically from Router Advertisement, if "A" flag is set, combining Prefix with EUI-64 MAC.

Link Local

Presently used IPv6 Link Local Address.

IPv6 Default Gateway

Presently used IPv6 network address of the gateway for network traffic destined for other networks or subnets.

Primary DNS Server

IPv6 Primary DNS.

Secondary DNS Server

Presently used IPv6 Secondary DNS.

Last DHCPv6

Last known IPv6 address assigned by DHCPv6.

Last DHCPv6 Lease

Lease time of last known DHCPv6 address.

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8 Configuring Auxiliary Devices

With Vertiv™ Liebert® iCOM™, you can manage and control many devices that work with your thermal management unit(s).

8.1 Wired T/H Sensor

XDM is equipped with a CAN connected Room Temp/Humidity sensor to monitor dew point in the space. XDM supports 2 additional room sensors per unit (Sensor A & Sensor B). An offset can be applied to the sensor readings to allow calibration.

1. Touch [icon], then > Auxiliary Device Setup > Sensors > Wired T/H Sensors > Room THB. The setup SENSOR PROPERTIES panel opens.
2. Adjust the settings for the temperature /humidity sensor, and touch Save.

Read-only calibrated Return Temperature and Humidity values are displayed.

Touch the slide control to set the offset value for the temperature or humidity reading.

Offset values can be applied for optional Sensor A and Sensor B in their corresponding Sensor Properties panels.

8.2 Dewpoint Margin Control

XDM shall provide the ability to maintain a safety margin between the fluid temperature and room air dew point via the dew point margin setpoint. As the system dew point reading increases, the Vertiv™ Liebert® iCOM™ shall automatically and proportionally increase the supply fluid temperature setpoint in order to prevent condensation from forming.

The Room Sensor Alarms menu provides the following settings in addition to alarm thresholds for configuration of the THB sensor alarms:

- Dewpoint Alarms Enable/Disable
- Room Sensor Temperature Alarms Enable/Disable
- Dewpoint Margin Alarm Enable/Disable
- Dewpoint Margin Threshold: the minimum offset the supply fluid temperature setpoint is maintained above the dew point
- Supply Fluid Setpt Increase Limit: the maximum value that the supply fluid temperature setpoint can be increased to.

8.2.1 Room Dewpoint Aggregation

XDM units are equipped with a CAN connected Temperature and Humidity sensor (Room THB) in a housing suitable for remote mounting. The sensor should be field mounted in the space where equipment to be cooled by the XDM is located. The sensor is used to calculate a room dew point used for the Dewpoint Margin Control. Two additional CAN connected Temperature and Humidity sensors can also be connected to each XDM unit to provide better coverage for the temperature and dew point measurements. To access the Room Sensor configuration:

1. Touch [SERVICE icon] > [icon]. > Auxiliary Device Setup > Sensors > Room Dewpoint Aggregation> Setup. The SENSOR PROPERTIES panel opens.
2. Select the sensor properties to adjust.

Dewpoint Aggregation Settings

Aggregation Method

Select whether unit sensor dew point values should be averaged or use the maximum value of connected sensors.

Aggregated Dewpoint Temp

Read-only value of the calculated unit dew point based on the aggregation method selected.

Room THB/Sensor A/Sensor B included in Aggregation

Select Yes or No whether to include each sensor in the unit dew point aggregation.

8.3 Power Monitoring

Up to six power meters may be connected to each cooling unit. Power meters are factory programmed to monitor individual components or whole cooling units. For efficient data center control, power meters provide monitoring of:

- Connection status
- Input under voltage
- Input RMS voltage leg to leg and leg to ground
- Input current per phase
- Energy consumption in kilowatt hours
- Instantaneous power in watts
- Power consumption

8.3.1 To Setup Power Monitoring

1. Touch , then > *AuxiliaryDeviceSetup* > *Modbus Devices* > *Power Meters* > *Device X* (where X is the device number). The DEVICE X panel opens.
2. Adjust the power meter settings and touch Save. The power monitoring settings are saved.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

Power Monitoring Device Options

Power Meter Type

Select

- CptAdv
- Yada

Device Enable

Enables/disables the Modbus power meter.

Address

Modbus address for the power meter.

Type

Read-only. The type of power meter.

SysType

Read-only. The type of feedback from the power meter. Valid values are:

- 0: 3Ph+N
- 1: 1Ph+N
- 2: 2Ph+N
- 3: 3Ph

Connection Status

Read only. The connection status of the Modbus. Valid values:

- 0 : Off
- 1 : Connected
- 2: Unknown
- 3: Comm Error
- 4: Disconnect
- 5: Cfg Error

Device X

Editable field to describe the device.

8.4 Pump Drive Modbus Setup

Up to two pump drives can be supported, for XDM there is one fluid pump per unit which can be configured for connection using Modbus. The pump drive is factory programmed to monitor pump drive information including:

- Connection status
- Status Information
- Power
- Current
- Internal Temperature
- Speed %
- Speed RPM

See Diagnosing Pump Issues on page 100

8.4.1 To Setup Pump Drive Modbus

1. Touch ▤ , then > AuxiliaryDeviceSetup > Modbus Devices > Modbus Pumps > Pump X (where X is the device number). The Pump X panel opens.
2. Adjust the Pump Drive settings and touch Save. The Pump Drive settings are saved. NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

NOTE: Depending on the type of thermal management unit, including components and control settings of your system, all of the options listed may not be available on your iCOM™ display.

Modbus Pump Drive Options

Device Enable

Enables/enables the Pump Drive Modbus connection.

Address

Modbus address for the Pump Drive.

Type

Read-only. The type of Pump Drive.

Device xx

Read- only. Version number of the connected device.

Connection Status

Read-only. The connection status of the Modbus. Valid values are:

- 0: Off
- 1: Connected
- 2: Unknown
- 3: Comm Error
- 4: Disconnect
- 5: Cfg Error

8.5 Automatic Transfer Switch Modus Setup

Vertiv™ Liebert® iCOM™ supports a Modbus connected Lovato Automatic Transfer Switch only. The Automatic Transfer Switch is factory programmed to monitor Line 1 and Line 2 switch information including:

- Connection status
- ATS status information
- Power condition information
- Breaker status and information
- Maintenance information

8.5.1 To Setup Automatic Transfer Switch Modus

1. Touch [icon], then > AuxiliaryDeviceSetup > Modbus Devices > Automatic Transfer Switch > Device 21. The Automatic Transfer Switch Device 21 panel opens.
2. Adjust the Automatic Transfer Switch settings and touch Save. The Automatic Transfer Switch settings are saved.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

Automatic Transfer Switch Options

Device Enable

Enables/disables the Automatic Transfer Switch Modbus connection.

Address

Modbus address for the Automatic Transfer Switch.

Type

Setting to specify the Lovato Automatic Transfer Switch model to be connected. Valid values are:

- ATL800/900 - for unit voltages greater than 500 volts
- ATL610 - for unit voltages less than 500 volts

Connection Status

Read only. The connection status of the Modbus. Valid values:

- 0 : Off
- 1 : Connected
- 2: Unknown
- 3: Comm Error
- 4: Disconnect
- 5: Cfg Error

Device xx

Read-only. Displays current Device Type configured.

8.6 XD Fluid Temperature Sensors

XDM units are equipped with NTC sensors to monitor unit supply, unit return, and PHE (temperature leaving Plate Heat Exchanger) fluid temperatures. Sensors can be calibrated to match a reference source if desired.

1. Touch , Auxiliary Device Setup > Sensors > Fluid Sensors > Fluid Temp Sensors. The SENSOR PROPERTIES panel opens.
2. Select the sensor properties to adjust.

8.6.1 Fluid Sensor Options

For each sensor, the current calibrated value is displayed. The user can apply an offset to the reading if desired using the Offset setting, the offset may be a positive or negative value. The current calibrated value displayed will include any offset applied.

8.6.2 Fluid Temp Sensor Settings

Current Fluid Inlet 1 Temperature (Return)

Read-only value of the current temperature of the fluid inlet.

Offset Fluid Inlet 1 Temperature

Touch the slide control to set the offset fluid inlet temperature. Valid values are -18°F to 18°F.

Current Fluid Outlet 1 Temperature (Supply)

Read-only value of the current temperature of the fluid outlet.

Offset Fluid Outlet 1 Temperature

Touch the slide control to set the offset fluid outlet temperature. Valid values are -18°F to 18°F.

PHE Supply Fluid Temperature

Read-only value of the current PHE supply fluid temperature.

Offset PHE Supply Fluid Temperature

Touch the slide control to set the offset PHE supply fluid temperature. Valid values are -18°F to 18°F.

8.7 XD Fluid Pressure Sensors

The Vertiv™ Liebert® iCOM™ shall come standard with three pressure transducers. One transducer shall be mounted on the supply fluid, the second on the return fluid line, & the third at the pump inlet. The supply & return fluid pressures are mounted near the unit field or header connections & are used to calculate a unit differential pressure reading. The differential pressure reading is one of the available options that may be used to influence the unit(s) call for pump (CFP) or pump speed (i.e., pump speed control).

For each sensor, the current calibrated value is displayed. The user can apply an offset to the reading if desired using the Offset setting, the offset may be a positive or negative value. The current calibrated value displayed will include any offset applied.

To view the sensor data:

1. Touch > > Auxiliary Device Setup > Analog Inputs > Fluid Pressure.
2. The ANALOG INPUT PROPERTIES panel opens.

8.7.1 Fluid Pressure Sensor Settings

Read-only calibrated pressure values are displayed for each sensor, Fluid Inlet Pressure (Return), Fluid Outlet Pressure (Supply), and Fluid Pump Inlet Pressure.

Touch the slide control to set the offset value to be applied to each pressure sensor reading.

9 Administering Firmware, Settings and Security

9.1 Vertiv™ Liebert® iCOM™ Firmware Upgrades

9.1.1 Compatibility with Earlier Versions of Vertiv™ Liebert® iCOM™

Versions of iCOM™ control firmware PA2.05.31R are incompatible with earlier firmware versions PA1.XX.XXXSTD.

The firmware versions PA2.05.31R and later cannot communicate with earlier versions. The Liebert® XDM, Liebert® DSE and Liebert® PDX/PCW will not operate with PA1.XX.XXXSTD installed.

Contact your Vertiv representative to upgrade firmware.

9.1.2 Updating Vertiv™ Liebert® iCOM™ Control Board Firmware

The FIRMWARE UPGRADE panel shows the firmware version of the control board of the cooling unit. It also includes settings to use while performing the upgrade.

NOTE: Only personnel who have completed Vertiv training should perform a control board update. The iCOM™ Service Tool (iST) is required to update control board firmware. Contact technical support at 1-888-793-8763 for information on control board updates.

1. Save the iCOM™ software to a USB flash drive formatted with a FAT32 file system.
   - Make sure that the file name extension is all lower case. For example, *.xbp* not *.XBP*.
   - Remove all other files with the .xpb extension from the flash drive.
2. At the iCOM™ control:
   - Touch [SERVICE], then [≡] > *Backup & Security* > Firmware Upgrade. The FIRMWARE UPGRADE panel opens.
   - Make sure the *Lock for Upgrade*, is selected.
   - Refer to Updating Vertiv™ Liebert® iCOM™ Control Board Firmware above , for the reset and retain options.
3. On the iCOM control board:
   - Insert the flash drive into the P76 USB port. After a few seconds, the DS25 LED lights up green.
   - P75 does not work for firmware upgrade.
   - To continue with the upgrade, press the S3 button near the LED within 15 seconds. The LED blinks blue to indicate that the upgrade has commenced. When the upgrade completes, the LED blinks fast green, and the board reboots with the new firmware.
4. Remove the USB flash drive after the board reboots.

Figure 9.1   P76, S3, and DS25 LED on the Board
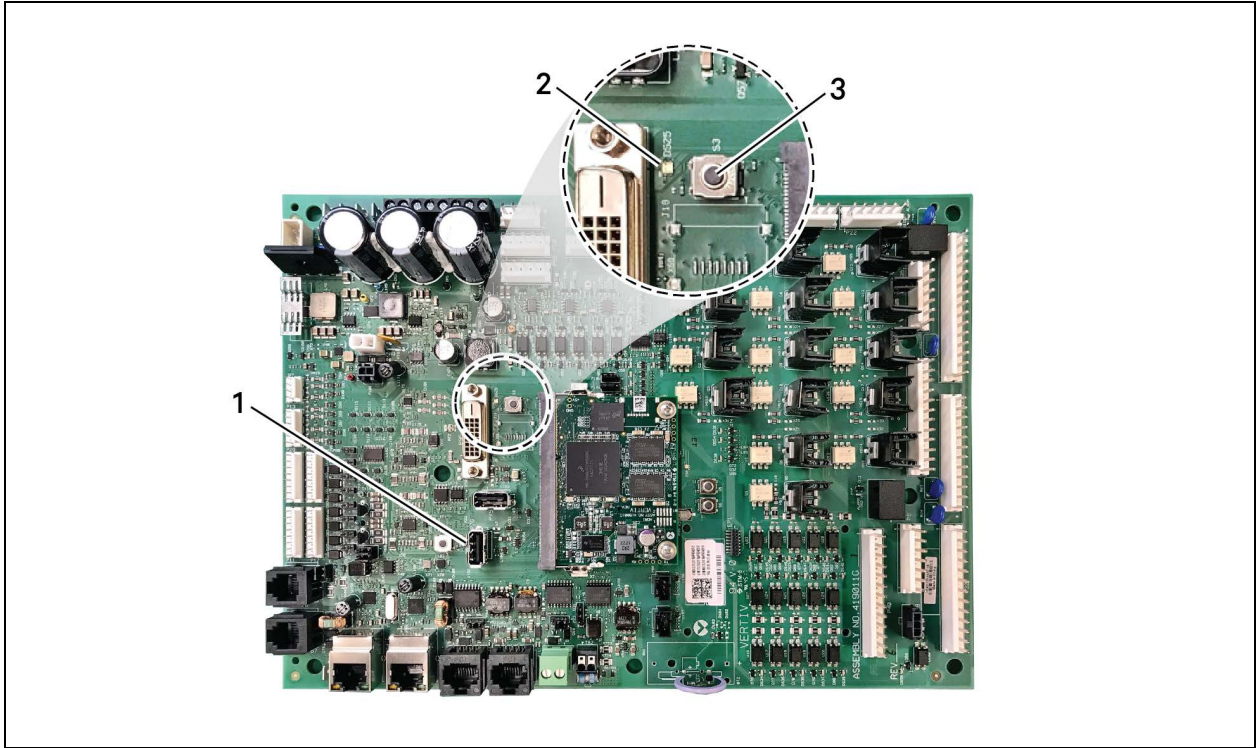
Item	Description
1	P76 port
2	DS25 LED
3	S3 button

Control Board Firmware Upgrade Options

Lock for Upgrade

When selected, the unit is locked for a firmware upgrade and current control parameter and network settings are maintained.

Reset to Default Configuration

When selected, the unit is reset to the factory default configuration during the upgrade.

Retain Network Configuration

If Reset to Default Configuration is selected, you have the option to also reset network settings or maintain current network settings.

When selected, the current network settings and options are retained while all other settings are reset to the factory default configuration.

9.1.3 Reverting to Firmware in Dormant Partition

The iCOM™ control board holds firmware in two partitions:

- The active partition holds the currently running firmware.

- The dormant partition holds the previously installed firmware.

Upon firmware upgrade, the new firmware writes to the dormant partition, which switches to the active partition when the upgrade is complete. If needed, you can revert to the previously installed version that is now in the dormant partition while the board boots after the upgrade.

To return to pre-upgrade firmware:

1. At boot, watch for the DS25 LED to flash red then blue for a second or two, and after it flashes red then blue, press and hold S3 for six to 10 seconds until DS25 lights solid red then release. **Figure 9.1**   on the previous page , shows DS25 and S3 on the board.

2. Upon releasing S3, DS25 blinks for three seconds, and you must press and release S3 during that 3 seconds. If completed correctly, DS25 lights solid green and the board is reverted to the pre-upgrade firmware in the dormant partition. If incorrect, DS25 is not lit and the board boots normally.

NOTE: Use these steps to switch between active/dormant partitions (current/previous firmware) as needed. The switch can only be initiated right after a boot of the system, so power off the unit, wait five seconds, and power on the unit, then start at step 1 above, as the system boots.

9.2 Backing Up and Restoring Control Board Settings

 iCOM™ settings may be saved to a local disk or USB drive, and the saved files may be imported to restore iCOM™ if it is replaced or if a problem occurs and to transfer settings to another iCOM™.

1. Touch ![SERVICE], then ![menu] > *Backup & Security* > *Control Backup/Restore*. The BACKUP & RESTORE panel opens.

2. Touch the *Action Type* drop-down, and select the action to perform.

3. Select the location, site, and system to save back-up files or load restore/replicate files. See Backing Up and Restoring Control Board Settings above , for descriptions.

NOTE: USB drives are automatically detected and displayed as options for Location selection.

4. Touch the action button in the lower-right corner. A notification indicates that the back up/restore/replicate is complete.

5. Remove the USB drive from the port.

9.2.1 Control Board Back Up and Restore Options

Action Type

Selects the back up or restore function. Options are:

- Back up: Saves a copy of the settings in a file named with the IP address of the iCOM™ control board. Use a backup file to restore the unit settings in the event of a failure.

- Replicate: Loads only the configsafe files (general settings/setpoints) from a back-up file from another system.

- Restore: Loads a backup configuration from a previously saved backup file. For example, when a control board fails and must be replaced, you can load the configuration from a backup of the failed board.

Location

Indicates the port to which the USB drive is connected.

Site

Indicates the folder you created on the USB drive to which the back up system file is saved.

System

The back up file named with the IP address of the control board from which it was saved.

9.3 Managing Access Permission and Passwords

NOTICE

Risk of loss of access to iCOM™ can cause operational problems.

When a password is changed, make sure you record the new password and inform authorized users. If problems arise, passwords can be reset by Vertiv Technical Support, visit http://www.VertivCo.com/en-us/support/.

Two four-digit passwords provide two levels of permission to access iCOM™ menus and are set with factory default values. You can change the value of each password so that only those provided with the current password may access the menus that it unlocks.

The factory default password for user and service login are:

- Default User password: 1490
- Default Service password: 5010

NOTE: To change the password, you must use the Service password currently assigned to unlock the Service menu.

1. Touch ▤, then [SERVICE] > *Backup & Security > Manage Permissions*.
   The MANAGE PINS panel opens.

2. Touch the role to change, then touch the *Value* field for the password to change. The keypad opens.

3. Type a new four digit/character password, then touch [↵], and touch *Save*. The password is saved.
   - Touch *Cancel* to discard the change.

10 Performing Diagnostics

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

10.1 Cooling Unit Status LED

Just below the iCOM™ touchscreen display is an LED that changes color and flashes on and off to indicate cooling unit status. See Table 10.1 below , for the LED colors and meanings.

Table 10.1 Cooling Unit LED Colors and State Meanings

State	Color(s)	Meaning
Solid	Green	Powered on and operating.
Solid	Amber	In diagnostic/service mode or powered off.
Solid	Red	Active warning or alarm present and acknowledged.
Flashing	Amber/Green	In sleep or U2U standby mode and available to operate.
Flashing	Red/Green	Operating with an active warning or alarm.
Flashing	Amber/Red	Shut down (not operating) because of an unacknowledged alarm.
Flashing	Red	Active warning or alarm present but unacknowledged.
Flashing	Blue	iCOM™ display is starting up or updating iCOM™ firmware.

10.2 Enabling Manual Mode for Diagnostics

Use manual mode to test components, validate operation, and evaluate performance.

NOTE: When manual mode is enabled, the cooling unit does not operate normally:

- Fan operation depends on the diagnostic category in use.
- Safety routines will prevent the use of some diagnostic features.
- Active alarms may prevent some the use of some diagnostic functions.
- In most cases, all components are turned off.

NOTE: When manual mode is disabled, all components and the cooling unit return to normal operation. See Disabling Diagnostics Manual Mode on the next page . Manual mode will timeout after 30 minutes of inactivity and normal operation resumes.

1. Touch ![SERVICE], then ![menu] > *Diagnostic/Service > Diagnostics > Manual Mode* in the Category list. The MANUAL MODE panel displays.
2. Touch the *Enable* check box in the upper-right of the *MANUAL MODE* panel. The MANUAL MODE confirmation dialog opens.
3. Touch *OK* to enable manual mode. Enable is checked and manual control for diagnostics enabled.
   - Touch *Cancel* to close the dialog and manual mode remains disabled.

10.2.1 Disabling Diagnostics Manual Mode

1. Touch [SERVICE], then [☰] > *Diagnostic/Service > Diagnostics > Manual Mode* in the Category list. The MANUAL MODE panel displays.

2. Remove the check mark from the *Enable* box by touching it. Manual mode is disabled.

10.3 Diagnosing Pump Issues

1. Touch [SERVICE], then [☰] > *Diagnostic/Service > Diagnostics >Pump* in the Category list. The EVAPORATOR FAN panel displays.

2. Refer to Diagnostics—Pump Options below , for descriptions of diagnostic options.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

10.3.1 Diagnostics—Pump Options

Remote Status Pump Shutdown

Read-only value of the shutdown status.

Pump

Enables/disables pump motor during manual/diagnostic mode.

Analog Output 1 Setting

Analog output 1 configuration - XDM Pump 1

Analog Output 1

0V to 10V analog output value to manually set proportional 0-100% pump operating speed.

Pump Speed

Lists the current pump speed output percentage.

Fluid Flow Rate

Displays the current fluid flow rate;

Fluid Diff Press

Displays the current fluid differential pressure.

Status Pump Inverter

Indicates whether pump drive is operating normally or in an alarm condition.

When iCOM™ settings S313 Manual Mode is set to Yes and S314 Motor(s) is set to On, the following alarm events shall still be allowed to annunciate when the underlying condition occurs:

- XD Pump Invrtr Fail 1
- Pump Operation w/ No Flow
- XD Flow Blocked

If one or more of the events noted above are active, Manual Mode shall be disabled and Pump Motors shall revert to Off. If the end user tries to re-enter Manual Mode and the alarm event has not been acknowledged and reset, the unit will not enter Manual Mode. The High Supply Fluid event shall be supported in Manual Mode but will not stop manual mode operation.

10.3.2 Diagnostics Modbus Pump Drive

XDM pump operation is monitored through a Modbus connection to the Pump Inverter Drive. The additional information below is available for diagnosing pump and pump drive operation issues.

Description

User can enter an alpha numeric description for the pump and drive.

Connection Status

Indicates the Modbus connection is enabled and communicating.

Status Code

Indicates the current drive status. A status of 0 indicates normal operation. If a drive issue occurs, the status is set to the initial abnormal condition (in the event of multiple failures) and the status is held until the Pump Inverter Alarm is reset. The table below indicates Status Codes and associated conditions.

Table 10.2   Status Codes and Associated Conditions

Status Code	Description
0	Normal Operation
2	Motor Overload
4	Drive Over Temperature
8	Drive Warning (unidentified)
4096	Phase Loss or Imbalance
8192	Unsupported Device
16384	Comms Failure

Status Code Meaning

Provides a description of the event associated with the active status code.

Power

Indicates pump operating power watts.

Current

Indicates pump operating current amps.

Temperature

Indicates drive internal temperature.

Speed %

Indicates pump operating speed as a percent of max speed.

Speed RPM

Indicates pump operating RPM.

10.4 Diagnosing Compressor Circuit Issues

1. Touch [SERVICE], then [≡] > *Diagnostic/Service* > *Diagnostics* > *Compressor Circuit* N (where N is the circuit number) in the Category list. The COMPRESSOR CIRCUIT panel displays.
2. Refer to Diagnosing Compressor Circuit Issues above , for descriptions of diagnostic options.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM™ display.

Count of times compressor is powered off for high scroll temperature.

10.4.1 Diagnostics—Compressor Circuit Options

Compressor Freeze Protection

Read-only value indicating whether compressor freeze protection is enabled or not.

Compressor Overload

Indicate of compressor overload status.

High Pressure Status

Status of compressor's high pressure switch.

High Pressure Alarm Code

Code of high pressure alarm. To address the alarm condition, see Resetting High Pressure Alarm Code on the facing page .

- Zero: Okay
- Non-zero: High head pressure situation.

Low Pressure Status

Status of compressor's low pressure switch.

Low Pressure Alarm Code

Code of low pressure alarm. To address the alarm condition, see Resetting Low Pressure Alarm Code on page 104 .

- 0 (zero): Okay.
- Nonzero: Low suction pressure condition.

Compressor State

Compressor status, On or Off.

Compressor Mode

Selects compressor operation during manual/diagnostics mode. Options are:

- Run
- Evacuate
- Charge

Compressor Overload

Compress overload status.

Suction Pressure

Suction pressure value.

Low Differential Lockout

Enables low differential lockout, On or Off

Liquid Line Solenoid Valve

Enables liquid line solenoid valve, On or Off.

Compressor Capacity

Enables/disables compressor capacity during manual/diagnostics mode.

Compressor Cycle Ramp

Use the slide control to adjust the cycle ramp from between 0% to 100%.

High Temperature Alarm Counter

Numeric count value for the high temp alarm

Refrigerant Leak Detection

Enable/disable the refrigerant leak detection.

Resetting High Pressure Alarm Code

When a high pressure problem has caused a compressor to lock off, resetting the High Pressure Alarm Code to zero unlocks the compressor for operation.

NOTE: Cycling main power of the cooling unit will also unlock the compressor.

1. Touch ![SERVICE], then ![menu] > *Diagnostic/Service > Diagnostics > Compressor Circuit N*in the Category list (where N is the circuit number).
2. On the COMPRESSOR CIRCUIT panel, touch *Set to Zero* next to High Pressure Alarm Code, then touch *Save*. The code is reset and the compressor can now operate.

Resetting Low Pressure Alarm Code

When a low pressure problem has caused a compressor to lock off, resetting the Low Pressure Alarm Code to zero unlocks the compressor for operation.

NOTE: Cycling main power of the cooling unit will also unlock the compressor.

1. On the Service menu, touch *Diagnostic/Service > Diagnostics*. The DIAGNOSTICS panel opens.

2. Touch *Compressor Circuit N*in the Category list *(where "N" is the circuit number)*.

3. On the COMPRESSOR CIRCUIT panel, touch *Set to Zero* next to Low Pressure Alarm Code, then touch *Save*. The code is reset and the compressor can now operate.

10.5 Diagnosing Electronic Expansion Valve Issues

1. Touch ![SERVICE], then ![menu] *> Diagnostic/Service > Diagnostics > Electronic Expansion Valve N* in the Category list. The ELECTRONIC EXPANSION VALVE panel displays.

2. Refer to Diagnosing Electronic Expansion Valve Issues above for descriptions of diagnostic options.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

10.5.1 Diagnostics—Electronic Expansion Valve Options

Current SH Setpoint

Setpoint for superheat.

EEV Batt Fail Counter C1

Number of battery test failures for the valve control board. To address the alarm condition, see Resetting Electronic Expansive Valve Battery Failure Counter on the facing page .

Firmware Version

Current firmware data.

Manual Valve Control

Sets the valve open percentage during manual/diagnostics mode.

Manual Valve Control Enabled

Enables/disables manual control of the valve in manual/diagnostics mode.

Saturation Suction Temp

Saturated suction temperature of the refrigeration circuit.

Status Battery

Status of the battery on the valve control board.

Status EEV

Current status of the valve control board.

Suction Pressure

Current pressure at valve.

Suction Temp

Suction temperature of the refrigeration circuit.

Superheat

Current superheat reading of the refrigeration circuit.

Valve Opening

Current percentage that valve is open.

Resetting Electronic Expansive Valve Battery Failure Counter

1. Touch [SERVICE], then [≡] > *Diagnostic/Service > Diagnostics > Electronic Expansion Valve N* in the Category list.
2. On the ELECTRONIC EXPANSION VALVE panel, touch *Set to Zero* next to EEV Batt Fail Counter, then touch *Save*. The counter is reset.

10.6 Diagnosing EconoPhase Issues

1. Touch [SERVICE], then [≡] > *Diagnostic/Service > Diagnostics > EconoPhase View*. The ECONOPHASE panel displays,.
2. Refer to Diagnosing EconoPhase Issues above , for descriptions of diagnostic options.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

10.6.1 Diagnostics—EconoPhase Options

Pump Board N Firmware

Firmware version of the pump control board, where N is the pump number.

Pump Board Test

Runs a diagnostic test on the board.

Pump N Diff Pressure

Current differential pressure reading, where N is the pump number.

Pump N Inlet pressure

Current inlet pressure reading, where N is the pump number.

Pump N Outlet Pressure

Current outlet pressure reading , where N is the pump number.

Pump N Speed

Current pump speed, where N is the pump number.

Pump N Test Results

Results of board test, where N is the pump number.

10.7 Diagnosing Digital Output Issues

1. Touch [SERVICE], then [≡] > *Diagnostic/Service* > *Diagnostics* > *Digital Outputs* in the Category list. The DIGITAL OUTPUTS panel displays.
2. Refer to Diagnosing Digital Output Issues above for descriptions of diagnostic options.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

10.7.1 Diagnostics—Digital Output Options

Alarm Relay

Enables/disables alarms during manual/diagnostic mode.

K11 Relay

Enables/disables warnings during manual/diagnostic mode.

10.8 Diagnosing Analog Output Issues

1. Touch [SERVICE], then [≡] > *Diagnostic/Service* > *Diagnostics* > *Analog Outputs* in the Category list. The ANALOG OUTPUTS panel displays.
2. Refer to Diagnostics—Analog Output Options below , for descriptions of diagnostic options.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

10.8.1 Diagnostics—Analog Output Options

Analog Output N (Where *N* is the analog output number)

Controls analog outputs during manual/diagnostic mode.

Analog Output N Setting (Where *N* is the analog output number)

Use the slide control to modify the output for the output setting. Values range from 0% to 100%.

10.9 Diagnosing Customer Input Issues

1. Touch [SERVICE], then [≡] > *Diagnostic/Service* > *Diagnostics* > *Customer Inputs* in the Category list. The CUSTOMER INPUTS panel displays.
2. Refer to Diagnostics—Customer Input Options on the facing page , for descriptions of diagnostic options.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

10.9.1 Diagnostics—Customer Input Options

Input N (Where _N_ is the input number)

Status and description of customer input sensors.

10.10 Diagnosing Water Leak Detection Issues

1. Touch [SERVICE], then [menu icon] > _Diagnostic/Service > Diagnostics > Water Detection_ in the Category list. The WATER DETECTION panel displays.
2. Refer to Diagnosing Water Leak Detection Issues above below, for descriptions of diagnostic options.

NOTE: Depending on the type of thermal management unit, included components, and control settings of your system, all of the options listed may not be available on your Vertiv™ Liebert® iCOM™ display.

10.10.1 Diagnostics—Water Leak Detection Options

LWD Value

Current percentage of resistance measured from the leakage water detection sensor. Range of values across:

- 0%: Maximum resistance, sensor is dry.
- 100%: Minimum resistance, sensor is wet.

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11 Customizing the Vertiv™ Liebert® iCOM™ Display

11.1 .Setting General Display Properties

1. Touch [USER], then [≡] > *DisplayOptions* > *DisplayProperties.*
   The DISPLAY PROPERTIES panel opens.
2. Touch a value to select the setting from the drop-down list
3. Touch *Save* to save the property settings.
   - Touch *Cancel* to discard changes.

11.1.1 Unit Display Options

Language

Selects the display language.

Measurement System

Selects the units of measurement. Options are:

- Imperial (°F)
- Metric (°C)

Skin

Selects the color/background format of the user interface. Options are:

- Dark blue
- White
- Dark grey

Backlight Brightness

Selects the brightness of the display back light.

Inactivity Timer

Time to elapse before display locks and dims.

Alarm Buzzer Pattern

Selects or disables the audible alarm notification. See Enabling the Audible Alarm Notification on page 47

LED Brightness

Percentage brightness of the display.

Touch Beep

Enable/disable sound when display is touched.

Touch Shockwave

Enable/disable visual shockwave when display is touched.

Turn Unit On/Off Without Password

When enabled, a Power On/Off button displays in the upper-right corner of the iCOM™ main display so personnel can turn the unit on or off without logging in and accessing the User/Service menus.

Allow System On/Off

Enables/disables powering on/off the entire system of networked units from the iCOM™ display.

11.2 Customizing Main Display Views

The default Vertiv™ Liebert® iCOM™ display view is essentially a layout of two panels, one with status content and the other with alarms content. You can create custom display views by adding, changing, moving, and resizing the content objects.

NOTE: You must be logged in to customize the view. See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on page 3 .

11.2.1 Moving Content

You can drag and drop content objects anywhere you like on the main display.

1. Touch ![USER], then ![menu] .

2. Touch ![pencil] in the upper right corner of the display and just below the control header.
3. Touch an object to select it (it is highlighted), and drag it to the new location.

11.2.2 Resizing Content

You can resize content objects on the main display.

1. Touch ![USER], then ![menu] .

2. Touch ![pencil] in the upper-right corner of the display and just below the control header.
3. Touch an object to select it (highlighted green), touch and drag a handle to re-size the object, see **Figure 11.1** on the facing page .

Figure 11.1 XDM Customize Home Screen—Customize Dial

Item	Description
1	Content adjustment icon
2	Resizing handles
3	Remove content icon

11.2.3 Adding and Adjusting Content

You can add a variety of content to the main display.

1. Touch [USER], then [≡].

2. Touch [✎] in the upper-right corner of the display and just below the control header, then touch [+]. A menu of content options opens, described in **Table 11.1** on the next page .

3. Touch the Move icon next to the content and drag it onto the display, then use the re-size handles to adjust as needed.

4. To adjust the content object or the way the it displays, touch [⚙], see **Figure 11.1** above .

Table 11.1   Main Use Display Content Options

Content	Description
Separator	Separating line to place between content sections. You can adjust the thickness and orientation of the separator.
Dial	Status dial. You can select the sensor readings displayed in the center of the status dial when you touch to scroll through the readings.
Setpoint Readout	Displays the current reading of a connected sensor, for example: return temperature at 72°F.
Setpoint Bar	Displays a bar graph for a selected setpoint with customizable empty and full limits. For example, if a temperature setpoint bar is empty at 60°F and full at 80°F, and the reading is 70°, the graph will be filled half way.
Sensor Bar	For remote sensors only, functions the same as the setpoint bar, but only offers connected remote sensors, and displays the customer assigned name of the sensor next to the graph.
Shortcut	Shortcut opens panels directly instead of browsing through menus. You can select the destination of the shortcut, whether or not an icon displays, and the size, label, and frame of the shortcut.
Alarms	Alarms panel. You can select whether or not the information may be exported.
Event Log	Event log panel. You can select whether or not the information may be exported.
Run Hours	Run hours panel. Summary of the component run hours and limits.
EconoPhase Diagram	EconoPhase operating diagram.
EconoPhase Status	Compressor/Econophase status bar. Indicates the operating mode and the percentage at which the component is operating.

11.2.4 Removing Content

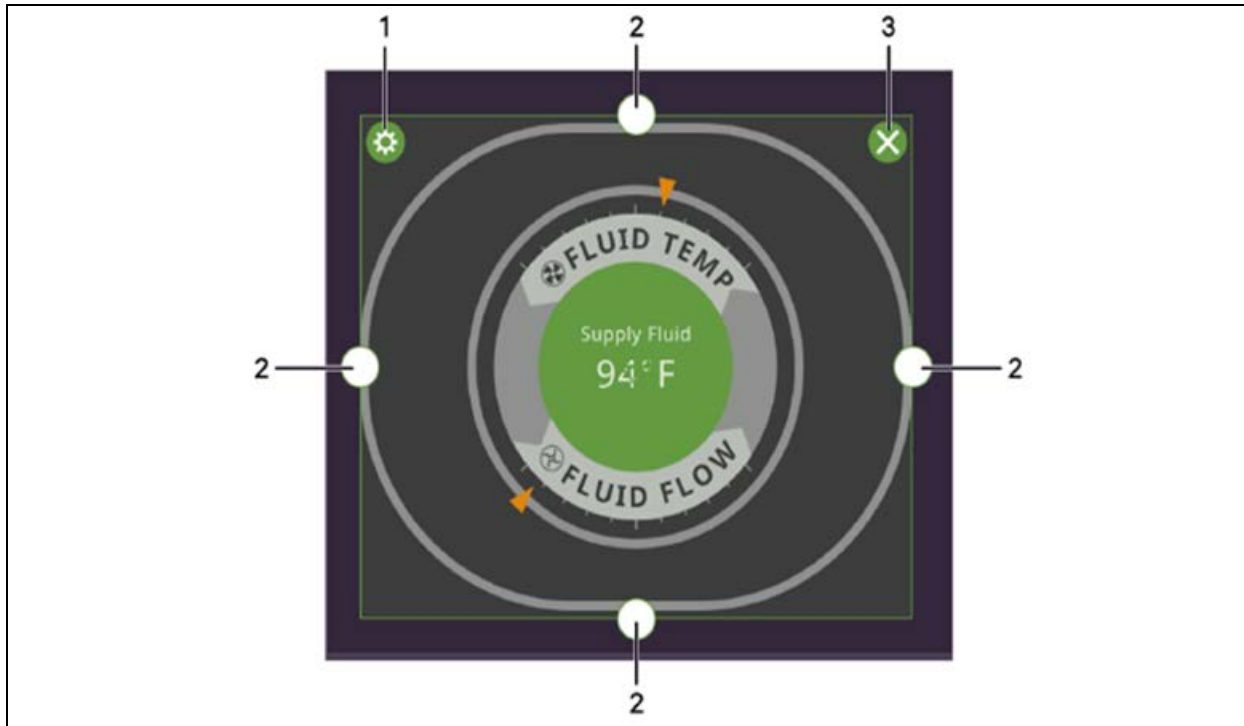You can easily remove content from the main display.

1. Touch , then .

2. Touch in the upper-right corner of the display and just below the control header.

3. Touch an object to select it (highlighted green), then touch , see **Figure 11.1** on the previous page .

11.3 Customizing Parameter and Field Labels

You can customize header labels for parameters in the menus and you can customize field names.

NOTE: You can export labels for back up or to use a text editor to customize the labels. See Exporting, Importing, and Customizing Labels Using a Text Editor on page 114 .

1. Before going to the customization panel, use the search box and on-screen keyboard to find the label(s) that you want to customize. Once you know where they are, you'll be able to find them in the categories on the Customize Labels panel.

2. Touch , then > *Display Options > Custom Labels*. The CUSTOM LABELS panel opens. The labels are divided into categories that represent the names of menus, sub-menus, and screen panels.

3. Locate the category that contains the label(s) to customize that you determined in step 1 , and touch to expand it.

4. In the Custom Text column, touch the text box to edit, make changes and touch ⬚. See **Figure 11.2** below , for an example of changing the column names for Property and Value (in the Analog Inputs panel) to Input and Configuration.

    • Touch *Cancel* to discard the change.

5. When finished editing labels, make sure the *Enable Custom Labels* is selected (or your updates will not display), and touch *Save*. The label(s) are updated. **Figure 11.3** below , shows the Analog Input Properties panel with the custom labels that replaced Property and Value.

Figure 11.2 Custom Text for the Analog Input Properties Labels
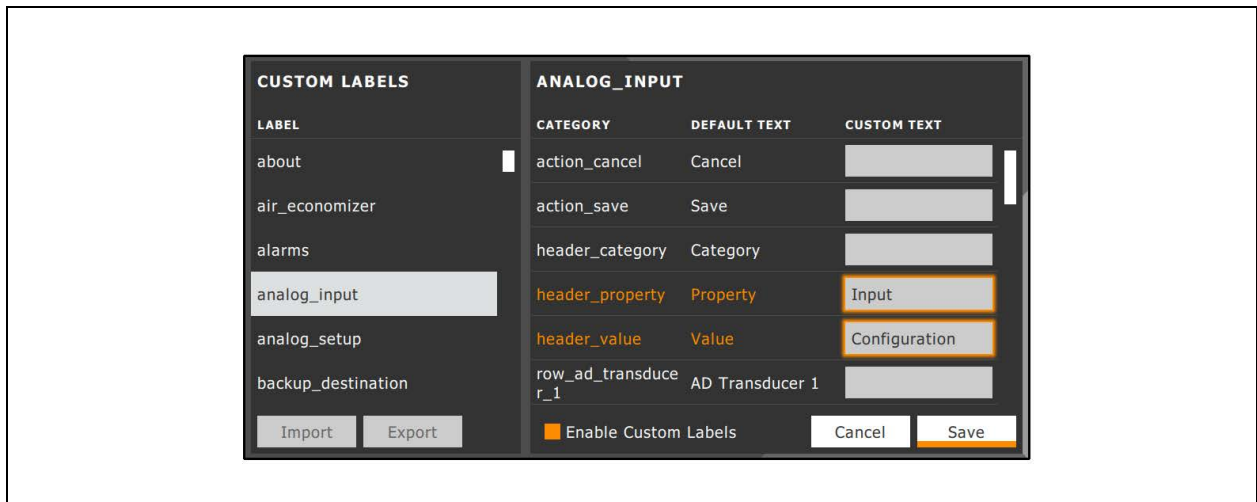
Figure 11.3 Customized Label Text on Analog Input Properties Panel
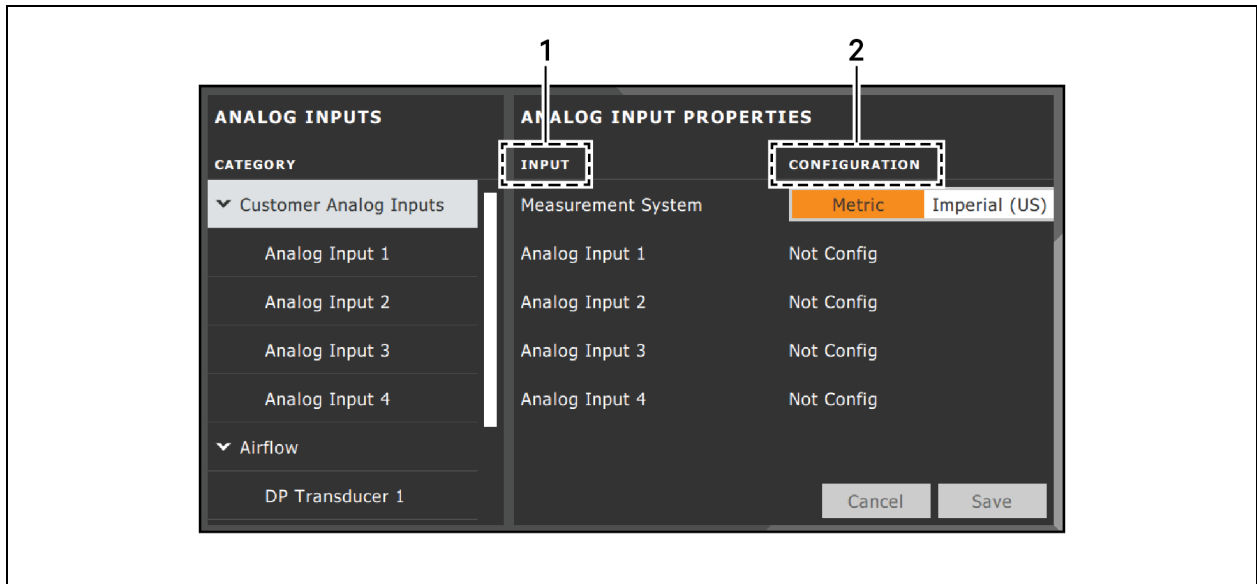
Item	Description
1	Former Parameter heading is now Input.
2	Former Value heading is now Configuration.

11.3.1 Exporting, Importing, and Customizing Labels Using a Text Editor

You can export custom label settings to a text file for back up or to modify the labels using a text editor. The text file is exported and imported using a USB drive.

1. Insert a USB drive into an open USB port on the rear of the touchscreen display, then navigate to the Custom Labels panel and touch *Export*.
   The EXPORT FILE dialog opens, and the connected USB drive is automatically detected.
   - If you are prompted No USB devices are available, check the connection or try re-inserting the drive.

2. Touch *Name* and type a descriptive name for the file, then touch *Go*.

3. Touch *Export* and wait at least 15 seconds, then you can remove the USB drive.

4. Insert the USB drive into a PC or laptop and locate the file, which is named with the Name you entered and the extension cl.txt. For example, if you named your export MyLabels, the file will be MyLabels.cl.txt.

5. Open the file in a text editor. The file contains all of the labels available for customization listed with the menu/panel on which the label is located, the label identifier, and an equal sign (=) as shown in the following example:

NOTE: You must use an editor that interprets Linux line endings, otherwise all of the lines will run together. For example, Microsoft WordPad will interpret the Linux line endings, but Microsoft Notepad will not.

```
analog_input/row_customer_analog_inputs=Unit A Inputs

analog_input_properties/header_property=Property

analog_input_properties/header_value=Value
```

6. To customize, type a new label name to the right of =, and save the text file.
   The following example will result in the same custom labels shown in **Figure 11.3** on the previous page .

```
analog_input/row_customer_analog_inputs=Unit A Inputs

analog_input_properties/header_property=Input

analog_input_properties/header_value=Configuration
```

7. Remove the USB drive with the updated/saved text file from the PC/laptop, insert it into an open USB port on the rear of the touchscreen display, then navigate to the Custom Labels panel and touch *Import*.

8. Locate the updated text file in the drop-down list, and touch *Import*.
   The dialog closes and the customizations display on the menus and panels that you updated.

12 Hardware Installation

Your unit includes the Vertiv™ Liebert® iCOM™ controller. This section describes the installation of connections and cabling to fully utilize the iCOM™ features.

12.1 Wired Remote Sensors

NOTE: Vertiv™ Liebert® iCOM™ Does not support the use of remote sensors for control. Remote sensors can be used for monitoring temperature only.

Wired, remote, rack sensors can function as monitoring only sensors and subsequently, provide input individually at the unit level or at the system level for monitoring temperature only.

Each wired remote rack sensor has two thermistors/probes. In Individual Sensor mode, the higher temperature reading or the average temperature reading of the two probes can be used. In Unit Sensors mode, some or all of the rack sensor's temperature readings are considered for higher (maximum) or average calculation. For example, setting three sensors as control and average for unit mode, averages the three highest temperature readings.

At the system level, using a U2U network, the same maximum or average calculations can be based on readings from all of the sensors in all of the units in group (including those in standby) using Teamwork.

1. Touch [SERVICE], then [≡] > *Auxiliary Device Setup > Sensors > Wired Remote Sensors > Setup*. The set-up SENSOR PROPERTIES panel opens.
2. Adjust the settings for the cooling units sensor array, and touch *Save*. Wired Remote Sensors above , describes the setting options.
3. Touch a specific sensor. The SENSOR PROPERTIES for that sensor open.

NOTE: The sensor number listed corresponds to the DIP switch assignment of the sensor made during installation.

4. Touch *Name*, and use the keyboard to give the sensor a descriptive name.

NOTE: This is the name displayed on the REMOTE SENSORS panel for non-service users.

5. Refer to the Wired Remote Sensors above to adjust the remaining settings, and touch *Save*. The wired-remote sensors for the cooling unit are configured.

12.1.1 Wired Remote Sensor Setup Options

Average Rack Temp

Calculated average of temperature readings from the control sensors.

Individual Remote Sensors Mode

When controlling at the sensor level, selects the method of using the readings from the two temperature thermistors (probes) on the sensor. Options are:

- Maximum: Use the highest temperature reading of the two thermistors.
- Average: Use the average of the readings from the two thermistors.

Max Rack Temp

Highest temperature reading from the unit remote sensors.

12.1.2 Wired Remote Sensor Property Options

Name

Custom, descriptive name to assist in identifying the sensor's location/function in the facility, for example, the name of the rack on which it is installed. The name is limited to:

- Up to 4 alphanumeric characters in length.
- Upper and lower case characters.
- These special characters: & * / . + - : @ \.

Function

Sets the function of the sensor when Unit Remote Sensors Mode is enabled.

- Disable: Sensor readings are ignored.
- Reference: Sensor readings are considered for Max Rack Temp, but are not used in maximum/average calculations.

Left Lead Current Value

Current reading of the left sensor probe. The left probe is always a temperature reading.

Left Lead Offset

Correction (calibration) value added to the reading. Used in the event that the sensor reading is incorrect.

- May be a positive or negative value.

Right Lead Current Value

Current reading of the right sensor probe. May be a temperature or humidity reading, depending on the connected sensor.

Right Lead Offset

Correction (calibration) value added to the reading. Used in the event that the sensor reading is incorrect.

- May be a positive or negative value.

12.2 Room T/H Sensor

The Vertiv™ Liebert® XDM shall come standard with one room (remote) temperature/humidity sensor. XDM shall support a Sensor A & B room T/H sensor configuration which is used for dew point monitoring within the space. These sensors shall support High/Low Temperature, Humidity, and Dewpoint alarm events.

12.3 Return and Supply Fluid Thermistors

The Vertiv™ Liebert® XDM includes insertion NTC fluid temp sensors to monitor supply fluid, return fluid, and plate heat exchanger (PHE) leaving fluid temperatures.

See XD Fluid Temperature Sensors on page 93 for setup and calibration.

12.4 Flow Sensor

The Vertiv™ Liebert® XDM shall come standard with one flow sensor mounted on the unit's leaving fluid line (supply) inside the unit. The flow meter reading is one of the available options that may be used to influence the unit(s) call for pump (CFP) or pump speed (i.e., pump speed control). The flow sensor provides a 4-20 mA output for the flow value connected to Analog Input 3 on the iCOM control.

12.5 Fluid Pressure Transducer

The Vertiv™ Liebert® XDM includes fluid pressure transducers to monitor supply fluid, return fluid & pump inlet pressures.

See XD Fluid Pressure Sensors on page 94 Fluid Temp Sensor Settings on page 93 XD Fluid Temperature Sensors on page 93

12.6 Vertiv™ Liebert® Liqui-tect Leak Detection

12.6.1 Fluid Leak Detection—LT410

The Vertiv™ Liebert® XDM shall provide an LT410 detection sensor at the base pan inside of the unit to monitor the system for leaks. Two corrosion resistant, gold plated probes sense the presence of aqueous liquids. When a leak is detected, dual Form-C relay outputs can simultaneously signal a local alarm panel and a remote monitoring system.

12.6.2 Zone Leak Detection Sensor—LT460

The zone leak detection sensor provides zone protection using the easy-to-install and quick drying Liebert leak detection cable. LEDs on the top cover provide visual indication of the sensor status. A reset button provides optional manual acknowledgment of alarms. Dual Form-C relay outputs simultaneously signal the local alarm panel and remote monitoring system. The sensor is available in packaged kits with 20, 25, 30, 35 or 45 feet of leak detection cable and hold down clips. Note that additional cable cannot be added to packaged kits.

The leak detection sensors are field wired to the low voltage terminal connection points of the electric panel. Each leak detection sensor kit includes complete installation instructions. Consult factory service for questions regarding the installation, connection, and operation of these sensors.

LED Operation

System Normal (Green)

- ON continuously when power is applied to sensor.

Alarm Pending (Yellow)

- ON continuously during leak detect filter delay and cable fault delay.
- FLASHING (with Leak Detected LED) to indicate cable fault condition.

Leak Detected (Red)

- FLASHING to indicate leak detected alarm.
- FLASHING (with Alarm Pending LED) to indicate cable fault condition.

12.7 Installing the U2U Network

12.7.1 Required Network Equipment

Ethernet cable CAT5 or greater

- Maximum cable length is 328 ft. (100 m).
- An Ethernet repeater is required for cable lengths greater than 328 ft. (100 m).

Network switch

- IEEE 802.3; IEEE 802.3u
- 10/100 Mbps speed
- Multiple 10/100 RJ-45 ports, one shared.
- RJ-45 up link port

NOTE: Up to 32 cooling units may be connected in a U2U network.

12.7.2 Plan Wiring Runs

When planning the layout of the conditioned space, consider the following:

- Good wiring practices.
- An Ethernet repeater is required for cable lengths greater than 328 ft. (100 m).
- A private network that only connects and manages the cooling units is required.
- Keep control and communication cables away from power cables to prevent electromagnetic interference.
- Keep cables away from noise introducing devices such as machines, fluorescent lights, and electronics.
- Do not bend cables to less than four times the diameter of the diameter of the cable.
- Do not deform cables when hanging or securing in bundles.
- Do not exceed 25 lb (11 kg) of tension when pulling cables to avoid stretching.
- Do not damage cables when securing them. Use only approved hangers, such as telephone wire/RG-6 coaxial wire hangers.

12.7.3 U2U Wiring Connections

NOTICE

Cooling units are factory wired for stand alone operation. Do not connect the U2U network cabling before setting the U2U network configuration/groups. Network communication conflicts and unreliable display readings will result.

Before you begin, refer to Preparing for U2U Group Set Up, and Configuring U2U Network Settings.

– or –

Contact Vertiv™ Technical Support at 1-888-793-8763 or http://www.VertivCo.com/en-us/support/.

12.7.4 Wiring Cooling Units without Wall Mount Displays

NOTE: Cooling units are factory wired for stand alone operation. Do not connect the U2U network cabling before setting the U2U network configuration/groups. Network communication conflicts and unreliable display readings will result.

NOTE: Before you begin, refer to Preparing for U2U Group Set Up, and Configuring U2U Network Settings.

To connect two cooling units with a touchscreen, a network switch is not needed.

- Connect an Ethernet cable to the P64 connector on each iCOM™ control board as shown in **Figure 12.1** below .

Figure 12.1 Connection Between Only Two Cooling Units—No Network Switch Needed
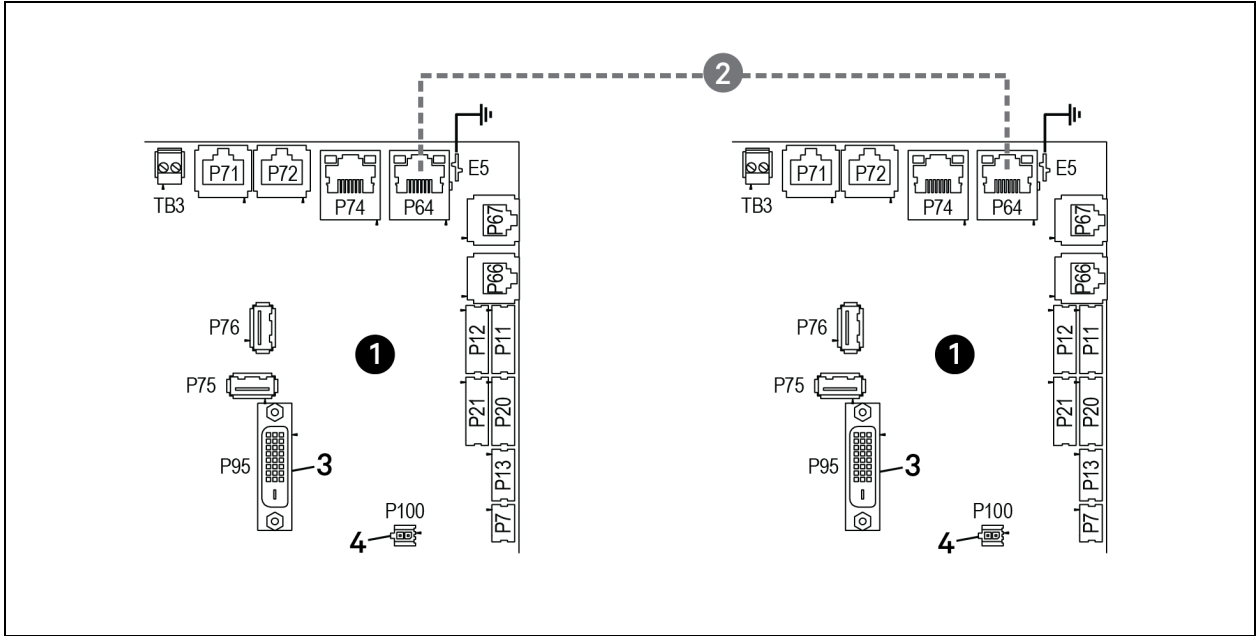
Item	Description
1	iCOM™ microprocessor and I/O board
2	Ethernet cable (field supplied)
3	P95 DVI-D cable connection to iCOM™ display
4	P100, power supply to iCOM™ display

To connect two or more cooling units into one group (maximum of 32 units per group, up to 99 groups), a network switch is required.

- On each unit, connect one end of an Ethernet cable to the P64 connector on each iCOM™ control board, and the other end to the U2U network switch, see **Figure 12.2** below .

Figure 12.2 Connecting Two or More Units with a Network Switch
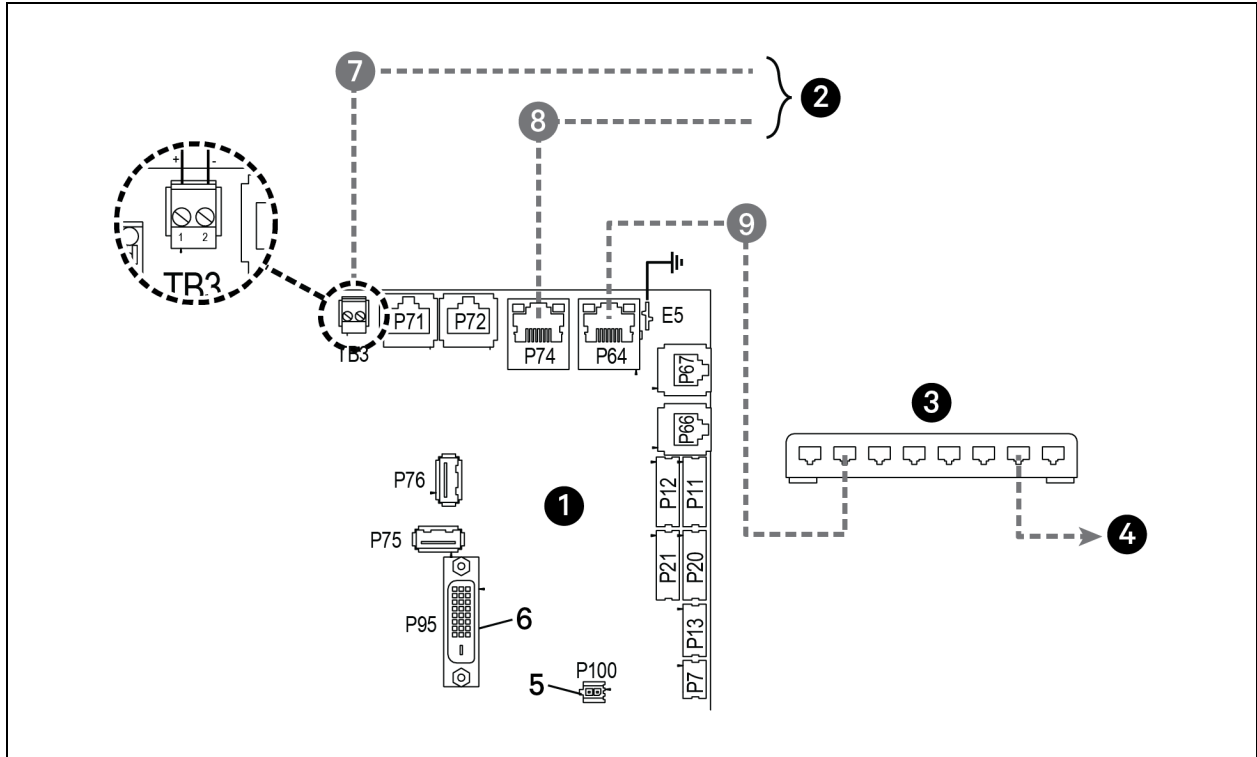
Item	Description
1	iCOM™ microprocessor and I/O board
2	Site and BMS communication connections
3	Network switch (field supplied)
4	To/From other networked units
5	P100, power supply to iCOM™ display
6	P95 DVI-D cable connection to iCOM™ display
7	RS485 cable
8	Ethernet cable
9	Ethernet cable (field supplied)

12.7.5 Wiring Cooling Units with Wall Mount Displays

NOTE: Cooling units are factory wired for standalone operation. Do not connect the U2U network cabling before setting the U2U network configuration/groups. Network communication conflicts and unreliable display readings will result.

NOTE: Before you begin, refer to Preparing for U2U Group Set Up, and Configuring U2U Network Settings.

Large, wall mount displays may be used to remotely configure, control. and monitor all cooling units connected on the U2U network.

- Each display requires 120 VAC or 230 VAC input power.
- An AC-adapter wall plug is factory-supplied.

To connect wiring:

1. On each wall mount display (32 maximum), connect one plug of a straight through Ethernet cable to port P64 on the rear of the display.
2. Connect the other end to the U2U network switch.

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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

1-800-543-2778

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 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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Appendix B: Setpoints and Alarm Settings by Line ID

These tables list the parameters by the line identification assignments employed before the Vertiv™ Liebert® iCOM™ touchscreen. The tables include range/options of the parameter, the factory default setting, and a description of the parameter function.

The line IDs are not listed in the User or Settings menus, only in the parameter directory. You can search the parameter list to find the line ID and it's associated label and value in the iCOM user interface.

To search the parameters list:

1. Log in at the Service level, then touch [ADVANCED] > [≡] > Parameter Directory.

2. Enter a line ID or term in the Search field, and touch [↩] .

Table B.1   XDM Parameters

Parameter	Adjustable Range	Default	Shared in TW Mode	Line ID #	Description
					Temperature Control
Temperature Control Sensor	Supply Fluid	Supply Fluid	1, 2, 3	S102.1	Selects which sensor will be controlling/influencing the cooling capacity of the unit. Cooling Capacity is either the Chilled Water Valve, Compressor (DX), FreeCooling Valve, or Air Economizer.
Temperature Setpoint	41 - 122 °F 5.0 - 50.0 °C	60 °F	1, 2, 3	S103.2	Selects the temperature value the unit will maintain by applying cooling and/or reheats (if applicable)i.e. temperature setpoint value configured by end-user used to control the call for cooling
Temperature User Low Limits	41 - 104 °F 5.0 - 40.0 °C	55 °F	-	S105.1	Defines the temperature range below setpoint; temperature setpoint cannot be adjusted below this value. If the setpoint value has been adjusted lower than this setting, then the setpoint will automatically default back to its previous setting.
Temperature User High Limits	41 - 122 °F 5.0 - 50.0 °C	104 °F	-	S105.2	Defines the temperature range above setpoint; temperature setpoint cannot be adjusted above this value. If the setpoint value has been set higher than this setting, then the setpoint will automatically default back to its previous setting.
Temperature Control Type	Proportional PI Adaptive PID Intelligent	PI	1, 3	S104.1	Defines the type of control used when the unit calculates the call for cooling % (CFC)
Temperature Proportional Band	4 - 200 °F 2.2 - 111.0 K	20 °F	1, 3	S106.1	Adjusts the activation points of compressors/chilled water valves or rate of changed based on the actual sensor values deviation from setpoint. The saller this number, the faster the compressors/chilled water values will increase capacity. Too small of a number may cause the unit to short cycle compressors or excessively reposition the valve.
Temperature Integration Time	0.0 - 15.0 min	5.0 min	1, 3	S106.2	Adjusts the capacity of the units based on time away from setpoint so that accurate temperature control can be maintained. The proportional and integral time settings work together to maintain setpoint. Large p-band and small integral time is typical when controlling to supply air.
Temperature Deadband	0 - 36 °F 0 - 20.0 K	2 °F	1, 3	S109.1	Value used to avoid over/undershooting of temperature setpoint and cycling between cooling and reheat operation. The value entered in this field will be split in half and added & subtracted from temperature setpoint to determine when to activate heating/cooling

Table B.1 XDM Parameters (continued)

Parameter	Adjustable Range	Default	Shared in TW Mode	Line ID #	Description
BMS Backup Temperature Setpoint	41 - 122 °F 5.0 - 50.0 °C	73 °F	1, 2, 3	S121.1	Selects a temperature setpoint that will be activated in the event of a BMS timeout. The BMS timer must be configured for this parameter to be active.
Temperature Compensation XDM					
Parameter	Adjustable Range	Default	Shared in TW Mode	Line ID #	Description
Compensation Type	None PumpSetP TempSetP Pump+Temp SetP	None	1, 3	S113.1	When higher than desired return fluid temperature increases occur, iCOM can be configured to decrease temperature setpoint, pump speed setpoint, or both. **PumpSetP -** as the return fluid temperature increases and crosses the high temperature threshold, the pump setpoint value (flow rate or differential pressure setpoint) shall be proportionally increased resulting in an increase in pump speed. **TempSetP - for cooling (DX)** as the return fluid temperature increases and crosses the high temperature threshold, the supply fluid temperature setpoint shall be proportionally decreased resulting in an increase in refrigerant side loading i.e. increase call for cooling **Pump+Temp SetP -** utilizes both methods described above
Return Fluid Temp Setpoint	40 - 140 °F 4.4 - 60.0 °C	70 °F 21.1 °C	-	XDM.326	Return fluid temperature threshold used to determine the activation of the compensation feature
Return Fluid Temp Band	1.0 - 10.0 °F 0.56 - 5.56 K	5.0 °F 2.77 K	-	XDM.327	The adjustment band used when **PumpSetP** is the chosen compensation type; defines the allowable adjustment range of the pump setpoint value.
Supply Fluid Temp Comp Band	1.0 - 10.0 °F 0.56 - 5.56 K	5.0 °F 2.77 K	-	XDM.332	The adjustment band used when **TempSetP** is the chosen compensation type; defines the allowable adjustment range of the supply fluid temperature setpoint value.
Pump Flow Comp Band	10.0 - 1140.0 l/m	37.9 l/m	-	XDM.330	The adjustment band used when **PumpSetP** is the chosen compensation type and FlowRate is the chosen pump control method; defines the allowable adjustment range to the flowrate setpoint value.
Pump Diff Press Comp Band	2 - 21 psi 0.15 - 1.50 bar	10 psi 0.70 bar	-	XDM.331	The adjustment band used when **PumpSetP** is the chosen compensation type and **DiffPrs** is the chosen pump control method; defines the allowable adjustment range to the differential pressure setpoint value.
High/Low Limit Control XDM					
Parameter	Adjustable Range	Default	Shared in TW Mode	Line ID #	Description
High Sup Press Limit	14 - 145 psi 1.00 - 10.00 bar	87 psi 6.00 bar	-	XDM.317	High Supply Fluid Pressure Limit
Pump Control					
Parameter	Adjustable Range	Default	Shared in TW Mode	Line ID #	Description
Pump Control Sensor	FlowRate DiffPrs FlowRate w/ DP Limit DiffPrs w/ Flo Limit Manual (BMS)	FlowRate	-	XDM.310	Defines method that shall be used to influence the speed of the pump.

Table B.1 XDM Parameters (continued)

Parameter	Adjustable Range	Default	Shared in TW Mode	Line ID #	Description
Minimum Speed	0.0 - 10.0 v	2.5 v	-	XDM.335	Minimum allowable pump speed while operating (vDC).
Manual Speed	0 - 100 %	0%	-	XDM.338	Pump speed % used when manually operating the pump.
Fluid Flow Setpoint	10 - 10000 l/m	150 l/m	-	XDM.305	Fluid flow rate setpoint (used when FlowRate is chosen as pump control sensor).
Fluid Flow Proportional Band	10 - 10000 l/m	100 l/m	-	XDM.307	Value used when **FlowRate** is the chosen pump control sensor; adjusts the activation points of the pump or rate of changed based on the actual flow meter values deviation from flowrate setpoint. The smaller the value, the more aggressively the pump(s) will increase capacity as flow rate deviates from setpoint.
Fluid Flow Integration Time	0 - 300 sec	60 sec	-	XDM.309	Value used when **FlowRate** is the chosen pump control sensor; adjusts the pump speed of the unit(s) based on time away from flow rate setpoint so that accurate flow rate control can be maintained. The proportional and integral time settings work together to maintain setpoint.
Fluid Flow Deadband	0 - 1000 l/m	15 l/m	-	XDM.308	Value used when **FlowRate** is the chosen pump control sensor; used to avoid over cycling of the pump.
Fluid Diff Press Setpoint	4 - 72 psi 0.30 - 5.00 bar	14 psi 1.00 bar	-	XDM.300	Differential pressure setpoint (used when DiffPrs is chosen as pump control sensor).
Diff Press Proportional Band	1 - 145 psi 0.10 - 10.00 bar	29 psi 2.00 bar	-	XDM.302	Value used when **DiffPrs** is the chosen pump control sensor; adjusts the activation points of the pump or rate of change based on the actual different pressure value's deviation from differential pressure setpoint. The smaller the value, the more aggressively the pump(s) will increase capacity as differential pressure deviates from setpoint.
Diff Press Integration Time	0 - 300 sec	60 sec	-	XDM.304	Value used when **DiffPrs** is the chosen pump control sensor; adjusts the pump speed of the unit(s) based on time away from differential pressure setpoint so that accurate differential pressure control can be maintain. The proportional and integral time settings work together to maintain setpoint.
Diff Press Deadband	0 - 10 psi 0.00 - 0.70 bar	1 psi 0.07 bar	-	XDM.303	Value used when **DiffPrs** is the chosen pump control sensor; used to avoid over cycling the pump.

Table B.2 XDM Alarms

Parameter	Adjustable Range	Default	Desired iCOM Setting	Shared in TW Mode	Line ID#	Description
						Remote Sensor Alarms
Remote Sensor Alarms Enable	Disable Com Set Sep Set	Disabled		1, 2, 3	S219.1	Enables/disables remote sensor alarm feature.
Remote Sensor Alarms Init Delay	10 - 9999 sec	180 sec		1, 2, 3	S219.2	Time delay that must surpass before alarm will annunciate.
Rem Sens 1 - 10 Hi Temp	34 - 210 °F 1.0 - 99.0 °C	90 °F 32.3 °C		-	-	Remote sensor high temperature threshold.
Rem Sens 1 - 10 Lo Temp	34 - 210 °F 1.0 - 99.0 °C	55 °F 12.8 °C		-	-	Remote sensor low temperature threshold.
Rem Sens Avg Hi Temp	34 - 210 °F 1.0 - 99.0 °C	90 °F 32.3 °C		1, 2, 3	S220.1	Average remote sensor high temperature threshold.

Table B.2   XDM Alarms (continued)

Parameter	Adjustable Range	Default	Desired iCOM Setting	Shared in TW Mode	Line ID#	Description
Rem Sens Avg Lo Temp	34 - 210 °F 1.0 - 99.0 °C	55 °F 12.8 °C		1, 2, 3	S220.1	Average remote sensor low temperature threshold.
Rem Sens Sys Hi Temp	34 - 210 °F 1.0 - 99.0 °C	90 °F 32.3 °C		1, 2, 3	S220.1	Average system (network) remote sensor high temperature threshold.
Room Sensor Alarms						
Dewpoint Alarms	Enabled Disable	Disabled		1, 2, 3	S215.1	Enable/disable dew point alarms.
Dewpoint Alarms Init Delay	10 - 9999 sec	90 sec		1, 2, 3	S215.2	Delay time that must surpass once dew point-related alarm condition is sensed prior to dew point alarms annunciating
Room Sensor Alarms	Enabled Disable	Enabled		1, 2, 3	S202.1	Enable/disable room sensor alarms.
Room Sensor Alarms Init Delay	10 - 9999 sec	90 sec		1, 2, 3	S202.2	Delay time that must surpass once room sensor-related alarm condition is sensed prior to dew point alarms annunciating.
Dewpoint Margin Alarms	Enabled Disable	Enabled		-	XDM.340	Enable/disable dew point margin alarms.
Dewpoint Margin Threshold	2.0 - 18.0 °F 1.11 - 10.00 K	4.0 °F 2.22 K		-	XDM.318	Dewpoint margin threshold; sets differential between current sensor reading and dew point margin threshold.
Supply Fluid Setpoint Increase Limit	2.0 - 18.0 °F 1.11 - 10.00 K	4.0 °F 2.22 K		-	XDM.337	Fluid temperature limit used to prevent the Dewpoint Margin control routine from increasing the fluid temperature setpoint too high.
High Dewpoint	34 - 210 °F 1.0 - 99.0 °C	59 °F 15.0 °C		1, 2, 3	S216.1	High dew point threshold.
Low Dewpoint	10 - 210 °F - 12.2 - 99.0 °C	39 °F 3.9 °C		1, 2, 3	S216.2	Low dew point threshold.
High Room Temp	34 - 210 °F 1.0 - 99.0 °C	100 °F 37.8 °C		1, 2, 3	S203.1	High room temp threshold.
Low Room Temp	34 - 210 °F 1.0 - 99.0 °C	65 °F 18.3 °C		1, 2, 3	S203.2	Low room temp threshold.
Pump and Fluid Sensor Alarms						
Return Fluid Alarms Init Delay	10 - 9999 sec	90 sec		1, 2, 3	S202.2	Delay time prior to return fluid sensor alarms annunciating.
Supply Fluid Alarms Init Delay	10 - 9999 sec	90 sec		1, 2, 3	S213.2	Delay time prior to supply fluid sensor alarms annunciating.
Minimum Fluid Flow Volume	1.0 - 1000.0 l/m	5.0 l/m		-	XDM.702	Minimum fluid flow volume threshold.
High Return Fluid Temp	34 - 210 °F 1.0 - 99.0 °C	140 °F 60.0 °C		-	XDU.048	High return fluid temperature threshold.
Low Return Fluid Temp	32 - 176 °F 0.0 - 80.0 °C	50 °F 10.0 °C		-	XDM.704	Low return fluid temperature threshold.
High Supply Fluid Temp	34 - 210 °F 1.0 - 99.0 °C	131 °F 55.0 °C		-	XDU.047	High supply fluid temperature threshold.

Table B.2   XDM Alarms (continued)

Parameter	Adjustable Range	Default	Desired iCOM Setting	Shared in TW Mode	Line ID#	Description
Low Supply Fluid Temp	32 - 176 °F 0.0 - 80.0 °C	38 °F 3.3 °C		-	XDM.703	Low supply fluid temperature threshold.
Low System Flow	20.0 - 2000.0 l/m	57.0 l/m		-	XDM.707	Low system flow threshold.
High Fluid Diff Press	29 - 101 psi 2.00 - 7.00 bar	50 psi 3.44 bar		-	XDM.705	High fluid differential pressure threshold.
Low Fluid Diff Press	1 - 35 psi 0.07 - 2.41 bar	5 psi 0.34 bar		-	XDM.706	Low fluid differential pressure threshold.
High Supply Fluid Press	4 - 101 psi 0.30 - 7.00 bar	25 psi 1.72 bar		-	XDM.709	High pump outlet fluid pressure threshold.
Low Pump In Press	1 - 15 psi 0.07 - 1.03 bar	2 psi 0.14 bar		-	XDM.708	Low pump inlet fluid pressure threshold.
Loss of Flow Diff Press Threshold	0 - 10 psi 0.00 - 0.70 bar	1 psi 0.07 bar		-	XDM.711	Loss of flow differential pressure threshold.

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Appendix C: Vertiv™ Liebert® XDM Model Images

Figure C.1   Vertiv™ Liebert® XDM Model 200

Figure C.2   Vertiv™ Liebert® XDM Model 400

Connect with Vertiv on Social Media

https://www.facebook.com/vertiv/

https://www.instagram.com/vertiv/

https://www.linkedin.com/company/vertiv/

https://www.twitter.com/Vertiv/