Liebert® iCOM™

Installer/User Guide

Intelligent Communication and Monitoring for Vertiv™ CoolPhase Row

NOTE: Vertiv™ CoolPhase Row includes the following products: CRV.

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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™ Installer/User Guide

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.
- Liebert® iCOM™ ships with default settings for efficient and effective operation of most cooling-units and is easily configured to meet any need.
- Liebert® 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™ Main Display

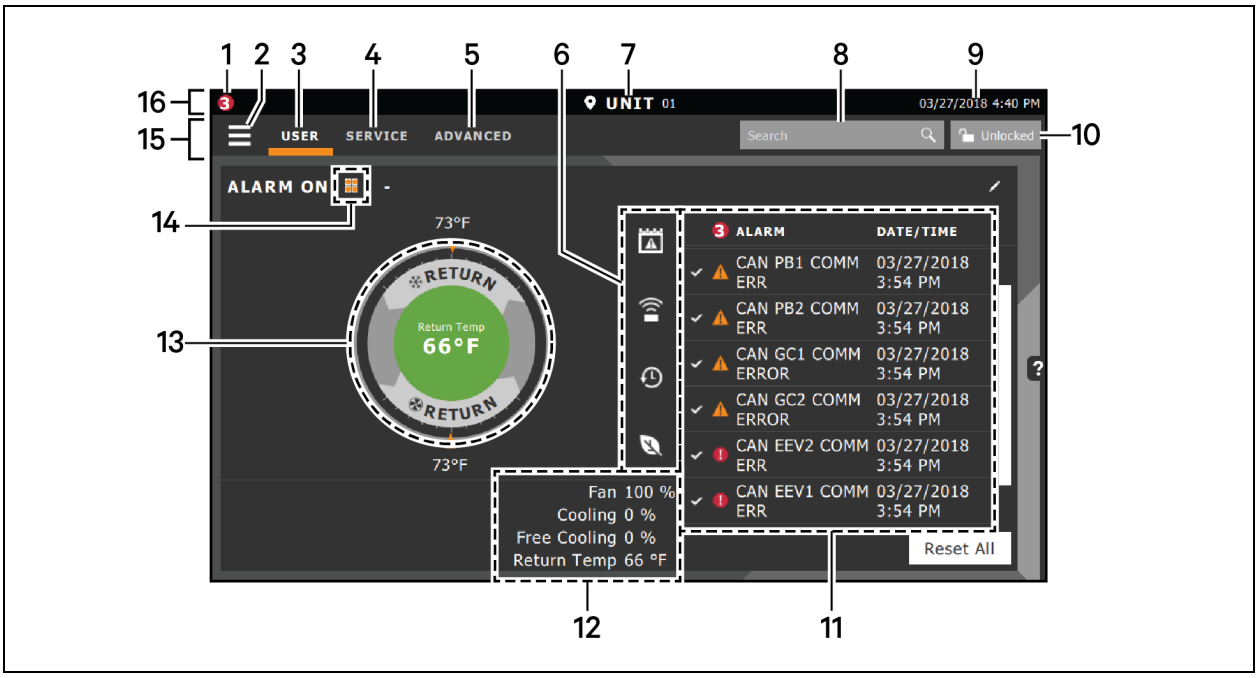


Table 1.1 Main Display Controls and Options

Item	Description
1	Alarms present. Displays the number of active alarms.
2	Menu icon. When unlocked, displays a menu for user or service options depending on which icon is selected.
3	User icon. When selected, the user options are available on the main display and menu. **NOTE: You must unlock the display with the User PIN to access the menu and options.** **See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on page 14 .**
4	Service icon. When selected, the service options are available on the main display and menu. **NOTE: You must unlock the display with the Service PIN to access the menu and options.** **See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on page 14 .**
5	Advanced icon. When selected, the advanced options are available on the main display and menu. **NOTE: You must unlock the display with the Service PIN to access the menu and read-only options.** **See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on page 14 .**
6	Cooling-unit parameters. Status display of selected system parameter settings. See Adding and Adjusting Content on page 141
7	Unit Identification. You may customize the unit name up to six characters/numbers.
8	Search icon. Open the keyboard to search for controls and setting locations. See Searching on page 17 .
9	Date/Time.
10	Lock/Unlock icon. Indicates whether or not the user and service options are accessible. • Locked icon: display is read-only • Unlocked icon: user or service is logged-in and options are accessible. See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on page 14 .
11	Secondary content panel. When accessing settings/configuration via the menus, the settings display in the right, secondary panel.

Table 1.1 Main Display Controls and Options (continued)

Item	Description
12	Summary of current unit function. You can customize to show fan speed, cooling, percentages from any installed device, and any physical (sensor) values.
13	Status Dial. Circular display of setpoints and environmental conditions of the unit. See Touchscreen Status Dial below .
14	Teamwork mode icon. In a panel with Status content, the Teamwork Mode icon indicates the mode selected. For details and descriptions of the teamwork controls, see Teamwork Modes on page 85
15	Control header. Controls to access the user and service menus. See Control Header on page 14 .
16	Status Header. Displays the alarm status, unit identification, and the current date and time.

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** on the next page .

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 on page 13 .

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 141 .

Figure 1.2 Dial Sections

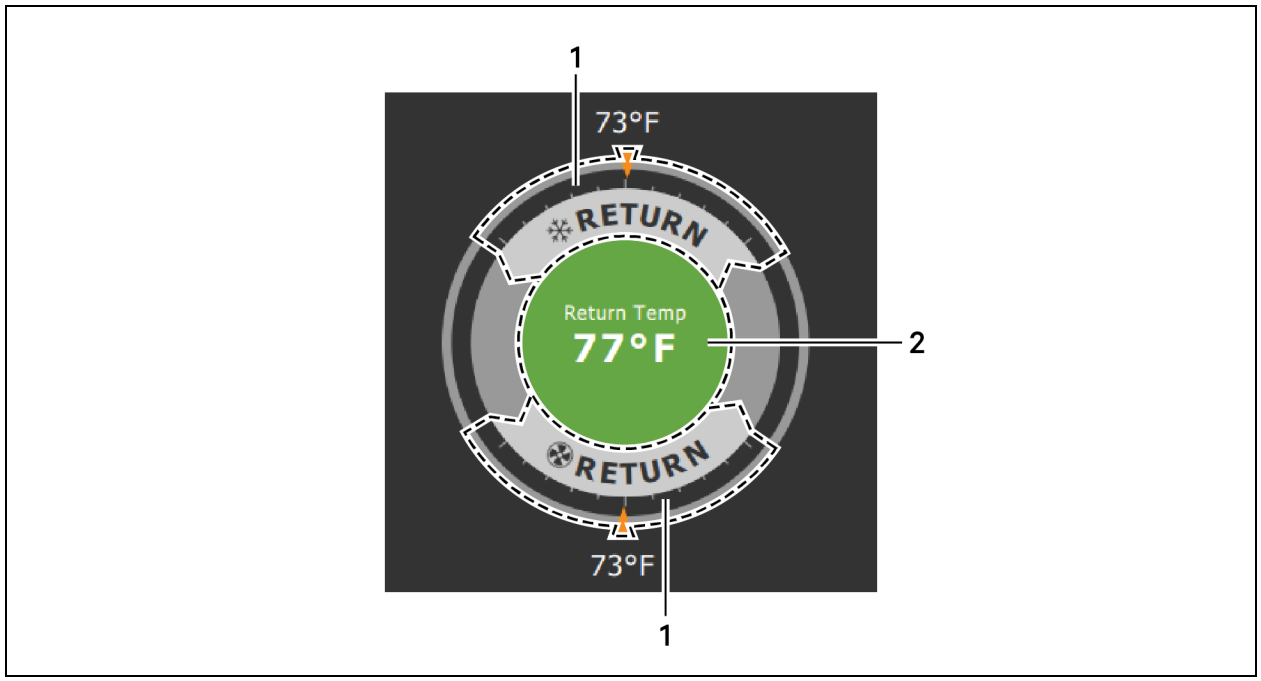


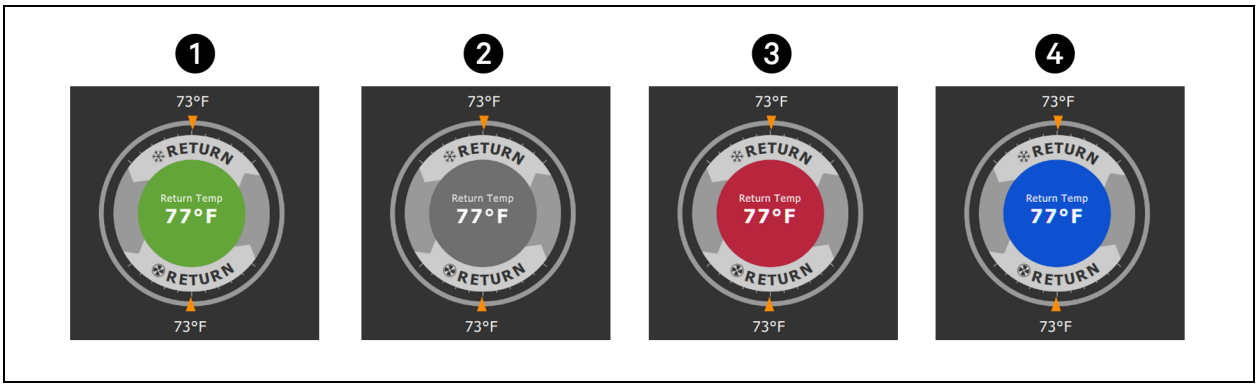
Table 1.2 Dial Sections

Item	Description
1	Control sensor and its setpoint. The sensors and setpoints displayed depend on the configuration of your unit. You may see only temperature-control, or if the unit includes humidity control, that displays on the dial as well. If the sensor selected for fan control is the same as that selected for temperature control, the dial displays the fan control sensor and setpoint, as shown in **Figure 1.2** above .
2	Single or multiple sensor readings. Cycle through readings by touching the displayed reading.

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 1.3 on the next page describes the background color displayed if the selected sensor reading has threshold limits set.

Figure 1.3 Dial Background Colors



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 1.3 Background Color Displayed by Selected Value and Threshold Limit

Sensor/Value Selected	Threshold Limit	Background Color
Return Temp	None	Blue
	High return temperature	Red
Return Humidity	Low return humidity	Blue
	High return humidity	Red
Dew Point	Low dew point	Blue
	High dew point	Red
Supply Temp	Low supply temperature	Blue
	High supply temperature	Red
Average Rack Temp	Low remote temperature	Blue
	High remote temperature	Red
Max Rack Temp	Low remote temperature	Blue
	High remote temperature	Red

Table 1.3 Background Color Displayed by Selected Value and Threshold Limit (continued)

Sensor/Value Selected	Threshold Limit	Background Color
Min Rack Temp	Low remote temperature	Blue
	High remote temperature	Red
Static Pressure	Low static pressure	Blue
	High static pressure	Red
Outdoor Temp	None	Green
Outdoor Humidity	None	Green

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

The 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.

Liebert® 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 140 .

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 125 .

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

To unlock the controls:

1. On the header, touch 

.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 18 .

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™.

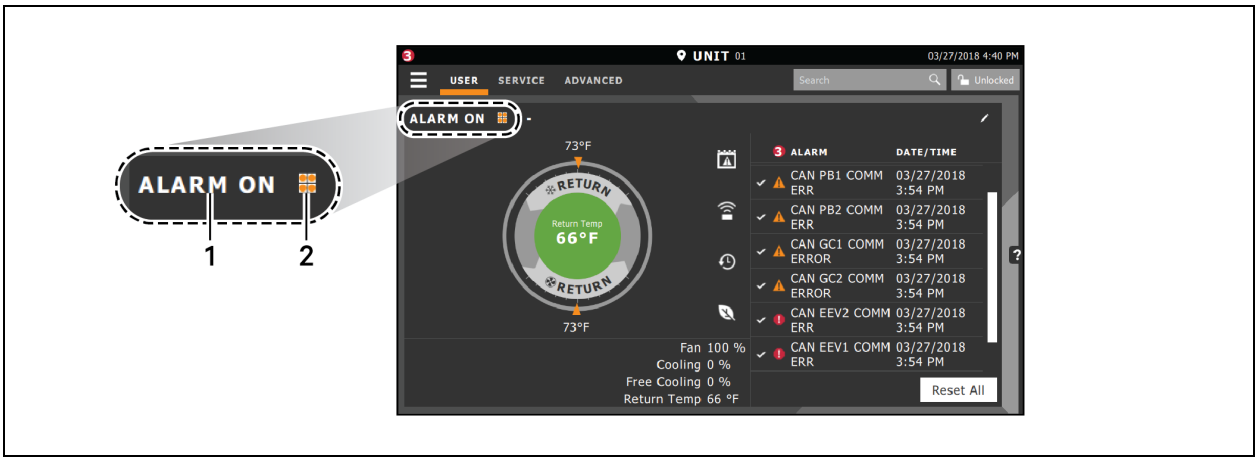
The cooling unit operates only when all switches are closed. For example, even though you have turned on the unit through Liebert® iCOM, if the BMS remote monitoring system is sending a command to turn off the unit, the cooling unit remains off.

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 Unit Status on Liebert® iCOM™ Display



Item	Description
1	Current status of the unit. See Table 1.4 on the next page .
2	Teamwork icon. See Viewing Teamwork, Standby, and Cascade Status.

Table 1.4 Cooling Unit Statuses Displayed

Unit Status Text	Description
ALARM OFF	An alarm forced the unit to turn off. See Viewing Unit Alarms on page 25 .
MANUAL	Controlled by a service technician. See Enabling Manual Mode for Diagnostics on page 127 .
DISPLAY OFF	Unit is turned Off at the Liebert® iCOM display. See Powering On the Thermal Management Unit above .
ALARM STANDBY	In standby because of an active alarm on the unit. See Viewing Unit Alarms on page 25 .

Table 1.4 Cooling Unit Statuses Displayed (continued)

Unit Status Text	Description
STANDBY	In standby because of service-menu setting. See Assigning Cooling Units to Standby (Lead/Lag) on page 90 .
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 48 .
UNIT ON	Operating normally without alarms or warnings.
WARNING ON	Active warning, but still operating. See Viewing Unit Alarms on page 25 .
ALARM ON	Active alarm, but still operating. See Viewing Unit Alarms on page 25 .
TIMER	Scheduled on a timer to operate, and is in operating mode. See Scheduling Condenser and Cooling Unit Tasks on page 48 .
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.
BACK-DRAFT	Unit is non-operational, but EC fan is operating as a back-draft 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 14 .

1. Touch 

, then  >*Turn Unit Off*. The TURN UNIT OFF panel opens.
2. Touch *Turn Unit Off*. The unit begins a power off countdown 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 139

- 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 

, 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 164 .

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 14 .

1. In the control header, touch the search field. The keyboard opens.
2. Type the term and touch  . 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 Liebert® iCOM™ display board may be helpful when servicing or troubleshooting. To locate the firmware version of the Liebert® iCOM™ control board, see Updating Vertiv™ Liebert® iCOM™ Control Board Firmware on page 121 .

- Touch  , then  > *About*. The ABOUT panel opens.

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 14 .

1. To access a menu, touch the icon for the menu you want, 

, 

or 

, in the control header, see Control Header on page 14 . 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.

User Menu Options

Setpoints

Opens the SETPOINTS panel. See Viewing and Editing Setpoints for the Cooling Unit on page 23 .

Active Alarms

Opens the ALARMS panel. See Viewing Unit Alarms on page 25 .

Event Log

Opens the EVENT LOG panel. See Viewing the Event Log on page 28 .

Sensor Data

Opens the SENSOR DATA panel. See Viewing Sensor Data on page 28 .

Display Options

Opens the Display Options menu:

- Customize Layout: See Customizing Main Display Views on page 140 .
- Custom Labels: See Customizing Parameter and Field Labels on page 142 .
- Date & Time: See Setting the Date and Time on page 16 .

Total Run Hours

Opens the RUN HOURS panel. See Managing Run Hours for a Component on page 28 .

About

Opens the ABOUT panel. See About Vertiv™ Liebert® iCOM™ Version on page 17 .

Asset Report

Provides information on the current firmware revisions for various controller hardware.

Turn Unit On/Off

Depending on unit's status, open the TURN UNIT ON or TURN UNIT OFF dialog. See Powering Off the Thermal Management Unit on page 16 , or Powering Off the Thermal Management Unit on page 16 .

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 Editing Setpoints for the Cooling Unit on page 31 .

Diagnostic/Service

Opens the Diagnostic/Service menu:

- Diagnostics: See Performing Diagnostics on page 127 .
- Technical Support: Contact information for the cooling unit and Vertiv™ Liebert® iCOM™ display.

Alarm/Event Setup

Opens the ALARMS & EVENTS panel. See Managing Events: Alarms, Warnings and Messages on page 67

BMS & Teamwork

Opens the BMS & Teamwork menu:

- U2U Setup: See Configuring U2U Network Settings on page 80 .
- Teamwork/Standby: See Teamwork, Standby and Rotation for Cooling Units on page 85
- BMS Setup: See BMS and Vertiv™ Liebert® IntelliSlot™ Settings on page 95
- IS-Unity-Setup
- IS-Unity- Settings

Scheduler

Opens the SCHEDULER panel. See Scheduling Condenser and Cooling Unit Tasks on page 48 .

Options Setup

Opens the OPTIONS SETUP panel. See Setting General Thermal Management Unit Options on page 51 .

Auxiliary Device Setup

Opens the Auxiliary Device Setup menu:

- Sensors: See Wired Remote Sensors on page 116 .

Backup & Security

Opens the Backup & Security menu:

- Display Backup and Restore: See Backing Up and Restoring Control Board Settings on page 123 .
- Control Backup and Restore: See Backing Up and Restoring Control Board Settings on page 123
- Display Upgrade: See Updating Vertiv™ Liebert® iCOM™ Control Board Firmware on page 121 .
- Control Upgrade: See Updating Vertiv™ Liebert® iCOM™ Control Board Firmware on page 121 .
- Manage Permissions: See Managing Access Permission and Passwords on page 125 .

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 15 , or Powering Off the Thermal Management Unit on page 16 .

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.

Compressor Info

Details about compressor state and operating mode.

Runtime Monitoring

Details about component run times.

Modbus Devices

Information about connected Modbus devices such as power meters, 10DI, EEV Controller Board and Compressor VFD.

Control Override

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

Parameter Directory

A searchable list of all parameters in the user interface. See Setpoints and Alarm Settings by Line ID on page 164 .

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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 31 .

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 Humidity Setpoints

1. Touch 

, then 
>*Setpoints.* > *Humidity Control.* The HUMIDITY CONTROL secondary panel opens.
2. Refer to User Humidity Setpoint Options below and Humidity Control on page 43 to adjust the setpoint options, then touch *Save.* The setpoint is updated.
    - 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.

User Humidity Setpoint Options

Dew Point Setpoint

Desired dew point (based on actual return air temperature and humidity) by adding moisture to or removing moisture from the air.

Humidity Control Sensor

Selects sensor used when calculating relative humidity.

Humidity Control Type

Control when staging humidification operations. Valid values:

- Relative: Percent of humidification/dehumidification is determined by the difference between the humidity-sensor reading and the humidity setpoint.
- Compensated: Percent of humidification/dehumidification is determined by considering the actual deviation from the temperature setpoint and adjusts the humidity setpoint accordingly. The recalculated humidity setpoint displays on the screen.
- Predictive: Percent of humidification/dehumidification is determined by considering the actual deviation from the temperature setpoint and adjusts the humidity sensor reading accordingly. The adjusted humidity sensor reading displays on the screen.
- Dew point: Percent of humidification/dehumidification is determined by the difference between the dew point calculated from the humidity sensor reading and the dew point setpoint.

Humidity Setpoint

Desired humidity level by adding moisture to or removing moisture from the air.

Humidity Setpoint 2

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

2.1.2 Editing Temperature Setpoints

1. Touch 

, then  > *Setpoints* > *Temperature Control*. The TEMPERATURE CONTROL secondary panel opens.
2. Refer to User Temperature Setpoint Options below , Temperature Control—Temperature Setpoints and Cooling Operation on page 34 , and Compressor Control by Cooling Requirement on page 37 to adjust the setpoint options, then touch *Save*.
   The setpoint is updated.
   - 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.

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

Temperature that the unit maintains via cooling/reheat.

Optimized Aisle Enabled

Read-only. Indicates that Liebert® iCOM™ is configured for optimized-aisle operation. See Teamwork Mode 3—Optimized Aisle Operation on page 89 .

Temperature Control Sensor

Selects sensor that controls cooling. Values are:

- Supply Sensor: Temperature control is based on maintaining the temperature of the discharge air from the cooling unit. See Supply Sensors on page 118 .
- Remote Sensor: Temperature control is based on the temperature reading(s) from wired remote sensor(s). See Wired Remote Sensors on page 116 .
- Return Sensor: Temperature control is based on maintaining the temperature of the air returning to the cooling unit.

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 next page.

2.2.1 To View Alarms

1. Touch 

, then  > *Alarms*. The ALARMS panel opens.
2. Touch an alarm to display the ALARM DETAILS panel.

Alarm Fields

Alarm

Name of the event.

Date

Date event was logged.

Time

Time event was logged

2.2.2 Alarm Detail Fields

Alarm

Name of the event.

Alarm Type

Number representing the event type.

- 1 : Warning
- 2: Alarm

Date/Time

Date and time the event was logged.

Duration

Time elapsed since event was logged.

Threshold

Sensor reading at which an event is triggered.

Unit

Cooling unit to which the alarm applies.

Value

The current value to which the threshold is compared.

2.2.3 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 74 .

2.2.4 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 2.2 on the facing 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 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.

Table 2.2 Events That Clear without Acknowledgment

Network Failure	Description
UNIT XX DISCONNECTED	The Liebert® 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 Liebert® iCOM I/O board assigned as U2U address number 1 has lost communication with the group. Make sure all units are powered 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.
AMBIENT SENSOR FAILURE	The outdoor temperature / humidity sensor used on the air economizer unit has become disconnected or is no longer working properly.
COMP 1 OVERLOAD	See **4.3** on page 68 .
LOW PRESS CIRCUIT 1	See **4.3** on page 68 .
LOW PRESS SENSOR FAIL	The indoor pressure sensor has become disconnected or is no longer working properly.
HIGH PRESS CIRCUIT 1	See **4.3** on page 68 .
HIGH PRESS SENSOR FAIL	The outdoor pressure sensor has become disconnected or is no longer working properly.
Sensor NTC 1 Failure	The indoor NTC 1 sensor (supply temperature 1) has become disconnected or is no longer working properly.
Sensor NTC 2 Failure	The indoor NTC 2 sensor (supply temperature 2) has become disconnected or is no longer working properly.
Fan Failure	The indoor Fan Failure {n} has become disconnected or is no longer working properly.
Loss of Airflow	When all the indoor fans has become disconnected or is longer working properly.
High Discharge Temperature	High discharge temperature. Compressor is powered off.
High Power Voltage	The power voltage is higher than over voltage alarm value. All of the components are stopped.
Water Under Floor	The alarm occurs when the water leakage switch is closed

2.3 Viewing the Event Log

The event log is a list by date/time of the last 400 events generated by Vertiv™ Liebert® 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 page 26.
Red dot	Unacknowledged alarm event. See Acknowledging Alarms on page 26.
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 

, then 
 > *Sensor Data*. The SENSOR DATA panel opens.

  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, the options on your Liebert® iCOM™ display may differ.

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 

, 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 Teamwork, Standby, and Cascade Status

In the main User panel, the Teamwork Mode icon indicates the mode selected, Figure 2.1 below .

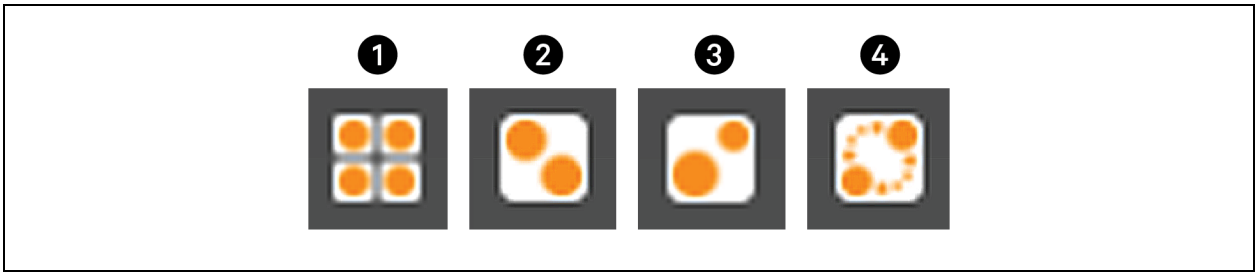
2.6.1 To View the Teamwork Details

Touch the Teamwork mode icon.

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

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 14 .

Figure 2.1 Teamwork Icons



Item	Description
1	No teamwork.
2	Mode 1 - Parallel teamwork
3	Mode 2 - Independent teamwork
4	Mode 3 - Optimized aisle teamwork

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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 Setpoints Options

Fan Control

See Configuring Fan Setpoints on page 44 .

High/Low Limit Control

See Configuring High/Low Limit Setpoints on page 40 .

Humidity Control

See Configuring Humidity Setpoints on page 41 .

Temperature Control

See Configuring Temperature Setpoints below .

Temperature Compensation

See Setting Temperature Compensation on page 38 .

3.1.2 Configuring Temperature Setpoints

1. Touch 

, then  > *Setpoints* > *Temperature Control*. The TEMPERATURE CONTROL secondary panel opens.
2. Refer to Configuring Temperature Setpoints above , Temperature Control—Temperature Setpoints and Cooling Operation on page 34 , and Compressor Control by Cooling Requirement on page 37 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 .

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

AutoSet Enabled

When enabled, the proportional band for temperature and humidity and both integration time factors are set automatically based on the type of cooling unit (single compressor, dual compressor or chilled water).

NOTE: General settings cannot be adjusted or changed when AutoSet is enabled. If you make a change when AutoSet is enabled, the parameter defaults back to its original setting.

BMS Backup Temp Setpoint

Temperature that the cooling unit maintains during BMS backup operation.

Dehumidification Reheat Proportional Band

Sets reheat operation independently from the temperature proportional band. Adjusts the activation point of dehumidification components based on deviation of the selected dehumidification reheat temp control sensor and the dehumidification reheat setpoint by placing half of the selected value on each side of the setpoint. A smaller number causes faster reaction to temperature changes.

Dehumidification Reheat Setpoint

Temperature that the unit maintains via dehumidification reheat.

Dehumidification Reheat Temp Control Sensor

Selects the sensor that controls dehumidification reheat. Values are:

- SUP: Temperature control is based on maintaining the temperature of the discharge air from the cooling unit. See Supply Sensors on page 118 .
- REM: Temperature control is based on the temperature reading(s) from wired remote/rack sensor(s). See Wired Remote Sensors on page 116 .
- RET: Temperature control is based on maintaining the temperature of the room air.

Heater Deadband

Widens the setpoint to prevent small temperature changes from cycling re-heat components.

Temperature Control Sensor

Selects sensor that controls cooling. Values are:

- Supply Sensor: Temperature control is based on maintaining the temperature of the discharge air from the cooling unit. See Supply Sensors on page 118 .
- Remote Sensor: Temperature control is based on the temperature reading(s) from wired remote/rack sensor(s). See Wired Remote Sensors on page 116 .
- Return Sensor: Temperature control is based on maintaining the temperature of the room air.
- Customer input setpoint (remote alarm device)

With regards to Temperature Control and Fanspeed Control, Liebert® iCOM™ controller shall support the following sensor configurations:

- Mode A: Cooling = Supply Sensor, Fanspeed = Supply Sensor
- Mode B: Cooling = Remote Sensor, Fanspeed = Remote Sensor
- Mode C: Cooling = Return Sensor, Fanspeed = Return Sensor
- Mode D: Cooling = Supply Sensor, Fanspeed = Remote Sensor
- Mode E: Cooling = Supply Sensor, Fanspeed = Return Sensor

NOTE: Sensor configurations A-E are supported in Teamwork Mode 2 - Independent and Teamwork Mode 3 - Optimized Aisle.

NOTE: Sensor configurations B & C are supported in Teamwork Mode 1 - Parallel.

NOTE: Prior to enabling any version of Teamwork Mode, the controlling sensors for Temperature Control (cooling capacity) and Fanspeed Control must first be defined within Liebert® iCOM™.

Temperature Control Type

Control when staging cooling and heating operations. Values are:

- Proportional: Percent of cooling/heating determined by the difference between the air temperature sensor reading and the temperature setpoint.
- P: Percent of cooling/heating calculated using the temperature proportional band and temperature-integration time settings. See .
- Adaptive PID: Auto-tuning PID control loop, can be set for cooling. Only available on Liebert® chilled water systems.
- Intelligent: Percent of cooling/heating determined by programmed logic that simulates manual human control.

Temperature Deadband

Widens the setpoint to prevent small temperature changes from cycling compressors and valves maximizing component life. When temperature is within the deadband, no change of the control output (heating/cooling) occurs.

Temperature Integration Time

Adjusts amount of cooling/heating based on the length of time the temperature has deviated from the setpoint. The time selected is the amount of time it will take cooling capacity to reach 100%. For example, if three minutes is selected, cooling capacity will increase to 100% in three minutes.

NOTE: Three to five minutes of integration time is adequate for most applications. See .

NOTE: Only used when Temperature Control Type is PI.

Temperature Proportional Band

Adjusts the activation point of cooling/heating components based on deviation from setpoint by placing half of the selected value on each side of the temperature control setpoint. A smaller number causes faster reaction to temperature changes.

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

Temperature Setpoint

Temperature that the unit maintains via cooling/reheat.

Temperature Setpoint Act

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

- Temperature compensation.
- BMS backup temperature setpoint.

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:

Compressor Operation

Vertiv™ Liebert® iCOM controls the cooling units based on a calculated need for cooling (and heating, if included on your system). The requirement is expressed as a percentage and is calculated using the selected temperature control type.

Temperature Proportional Band

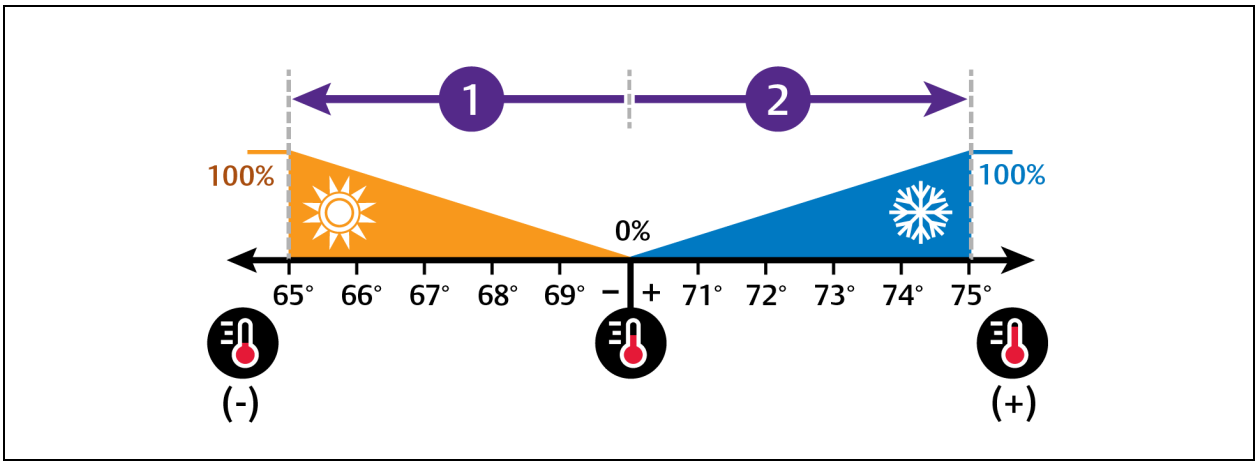
Use the proportional and deadband parameters to control how your cooling unit(s) respond based on the calculated need for cooling (or heating). Figure 3.1 on the facing page , illustrates temperature control using:

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

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

- 0% cooling capacity is required at 70°.
- As the air temperature increases, cooling also increases along the proportional band.
- If the air temperature reaches 75°, the system operates at 100% cooling capacity.
- If air temperature rises to the end of the proportional band or further, the system operates at 100% capacity to bring the temperature down to the setpoint.
- If your unit includes reheat, the heating capacity operates in the same way as the air temperature falls below the setpoint. See Reheat Control on page 62 .

Figure 3.1 Temperature Control without a Deadband



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

Temperature Deadband

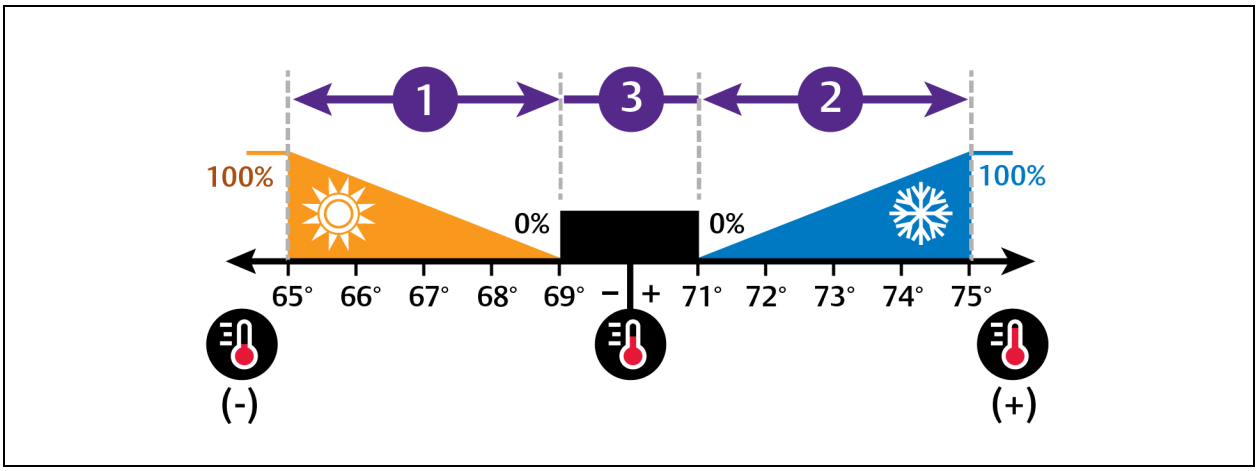
A deadband widens the setpoint to prevent small temperature changes from activating compressors and valves and cause excessive component cycling. Figure 3.2 on the next page , illustrates temperature control using:

- 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	½ of proportional band.
2	½ of proportional band.
3	Deadband.

Considerations when Using PI Temperature Control

Several factors, such as room heat load, external heat gains, and component-specific performance can affect the PI control loop. Adjusting the temperature proportional band and integration time can improve cooling unit performance and avoid problems detailed in Table 3.1.

Table 3.1 PI Temperature Control Troubleshooting

Problem	Solution
Cooling is slow to respond	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 three 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 that the cooling requirement determined by the temperature proportional band determines compressor operation. Depending on the type of cooling unit, the number of inverter scroll compressors varies. The following describes compressor operation along the proportional band for the varying compressor options.

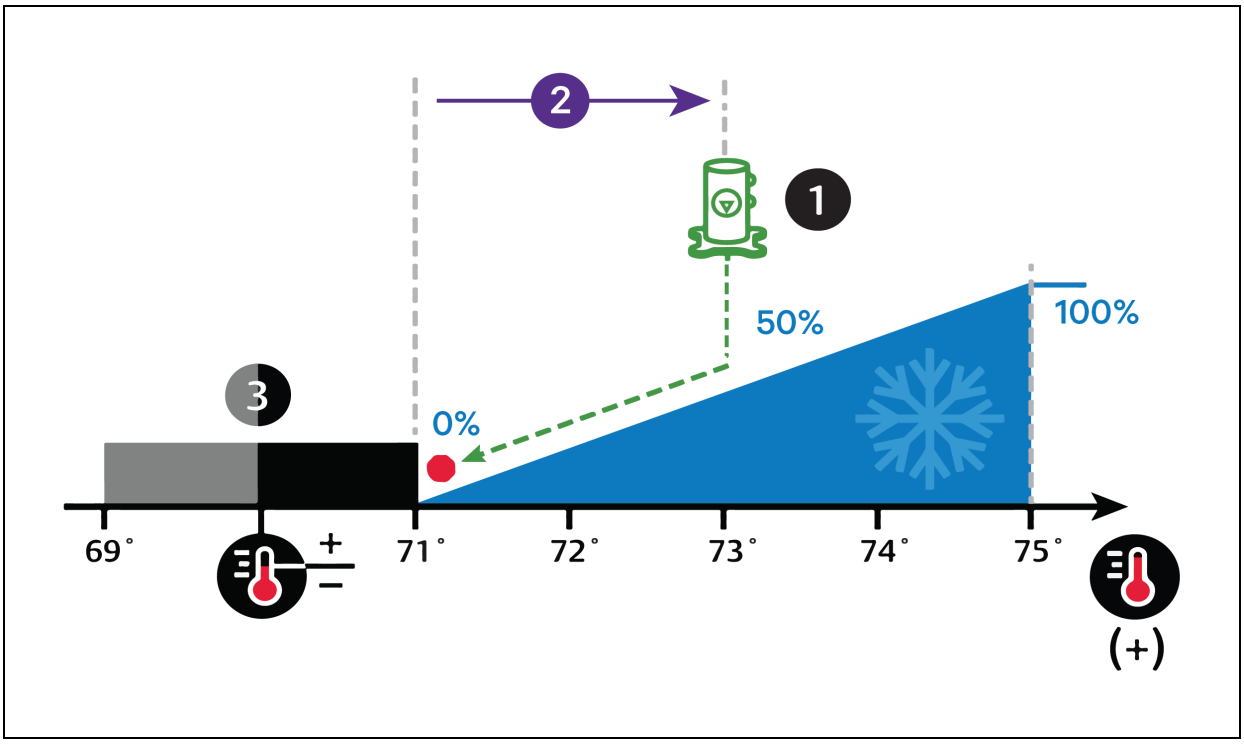
One Inverter Scroll Compressor without Unloaders

- 70° setpoint
- 8° proportional band
- 2° deadband

In 3.1.4 above :

The compressor starts at 73° when the cooling requirement is 50% and continues to operate until 70° is reached when cooling requirement is 0%.

Figure 3.3 Compressor Control—One Step Capacity



No.	Description
1	Single inverter scroll compressor
2	½ of proportional band
3	Deadband

3.1.5 Setting Temperature Compensation

Temperature compensation provides protection from changes that affect capacity and heat load by monitoring temperature conditions and fan speed settings, then automatically adjusting the temperature setpoint. Changes that may cause temperature compensation are floor tile removal in non-cold aisle areas, incorrect supply temperature setpoint, unit failure in a neighboring zone, or unexpected heat load fluctuations at rack equipment.

Temperature compensation is also tied in to cascade/standby operation in Teamwork Mode 3. See Teamwork Mode 3—Optimized Aisle Operation on page 89 .

1. Touch 

, then  > *Setpoints* >*Temperature Compensation*. The TEMPERATURE COMPENSATION secondary panel opens.
2. Select the Compensation Type, then touch *Save*. The setpoint is updated.
    - Return temperature compensation cannot be used when both fan and cooling control is set to Return.
    - Supply temperature compensation requires the following settings:

      Temperature Control Sensor: Supply Sensor

      Fan Control Sensor: Remote Sensor

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

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 Compensation Options

Compensation Type

Selects the compensation routine:

- No: Temperature compensation routine disabled.
- Return: Increases the temperature setpoint when the return air temperature is too cold.
- Supply: Decreases the temperature setpoint when the air flow capacity approaches 100% and the cold aisle temperature remains above the setpoint.
- Supply+Return: Allows both supply and return compensation.

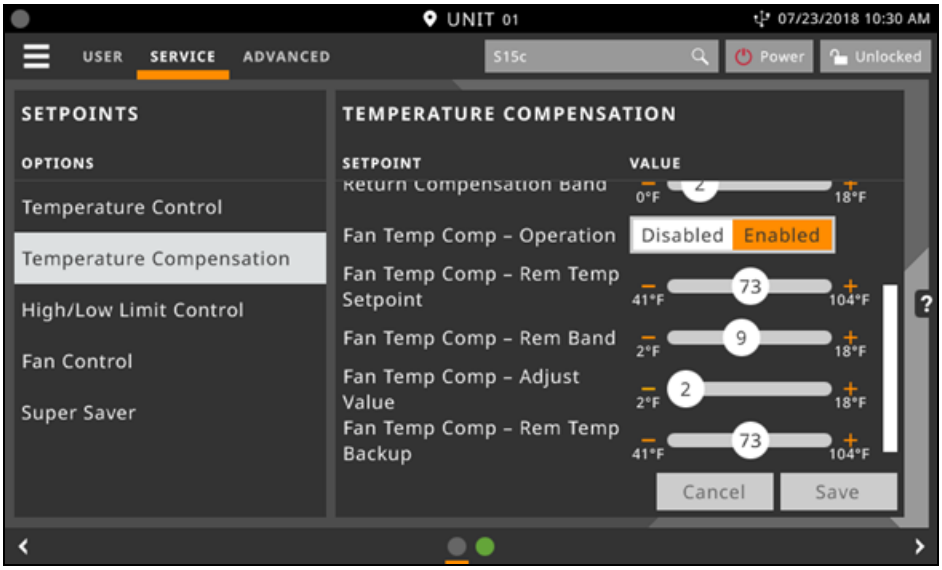
3.1.6 Fan Temperature Compensation

For applications where unit fan speed is being controlled off the return sensor, Vertiv™ Liebert® iCOM™ shall also support the capability of simultaneously utilizing remote 2T sensor values to override the return air temperature setpoint associated with fan speed control. Once enabled, when a high remote temperature is detected, the Fan Temperature Compensation routine shall temporarily increase fan speed output to compensate for the high remote temperature by decreasing the return temperature setpoint by a value specified by the end-user.

The remote 2T sensors required for this feature shall monitor cold aisle temperatures while fan speed is driven by the return air sensor and corresponding setpoint. As the remote temperature increases above the Fan Temp Comp – Remote Setpoint, fan speed control setpoint (return air setpoint) shall begin to decrease starting with 0°F/0.0K adjustment when at the remote setpoint and ending with the maximum adjustment as defined by Fan Temp Comp – Adjust Band (i.e. Fan Temp Comp – Rem Temp Setpoint + Fan Temp Comp – Rem Band). In the event the remote temperature sensor reading is considered invalid, Liebert® iCOM™ shall fall back and use Fan Temp Comp – Rem Temp Backup value for control. When the remote temperature is continuously above the sum of Fan Temp Comp – Remote Setpoint + Fan Temp Comp – Rem Band, the Fan Temp Comp Limit alarm event shall annunciate after the defined delay time has surpassed.

- Fan Temp Comp – Operation – enables/disables Fan Temperature Compensation routine
- Fan Temp Comp – Rem Temp Setpoint – remote temperature threshold at which routine activates
- Fan Temp Comp – Rem Band – adjustment band
- Fan Temp Comp – Adjust Value – value subtracted from return temperature setpoint as remote temperatures rise above
- Fan Temp Comp – Rem Temp Backup – remote temperature backup value which shall be used in the event remote sensor values are considered invalid.

Figure 3.4 Fan Temperature Compensation



3.1.7 Configuring High/Low Limit Setpoints

Setting dehumidification low limits avoids over cooling a room during dehumidification. When a low limit is reached, the cooling source used for dehumidification is disabled. Dehumidification resumes when air temperature rises above the low limit reset value.

NOTE: Dehumidification lock out can occur with improper low limit settings. To avoid lockout, increase heat load for efficient operation, decrease low limit settings slightly, and where applicable, decrease the reheat proportional band to allow reheat sooner.

To Set High and Low Limits

1. Touch 

, then  > *Setpoints* > *High/Low Limit Control*. The HIGH/LOW LIMIT CONTROL secondary panel opens.
2. Adjust the setpoint options, then touch *Save*. The setpoint is updated.
   - 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.

High/Low Limit Control Options

Dehum Low Limit X

Temperature at which dehumidification is interrupted, where X is limit 1 or 2.

Dehumidification Low Limit Sensor

Selects the sensor that is used for the low limit determination.

Dehumidification Low Limit Setpoint

Temperature below which dehumidification is disabled.

High Return Limit

Enables/disables use of additional fan speed based on return air temperature.

Return Limit P-band

Calculates fan speed based on proportional deviation from the return air temperature.

Supply Limit Enabled

Enables/disables use of additional fan speed based on supply air temperature.

Supply Temp Limit Setpoint

Supply air temperature at which use of additional fan speed is enabled.

3.1.8 Configuring Humidity Setpoints

1. Touch 

, then  > *Setpoints* > *Humidity Control*. The HUMIDITY CONTROL secondary panel opens.
2. Refer to Humidity Control Options below and Humidity Control on page 43 to adjust the setpoint options, then touch *Save*. The setpoint is updated.
    - 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.

Humidity Control Options

Control Dew Point

Dew point setpoint.

Dew Point Deadband

Widens the setpoint to prevent small changes from cycling compressors and valves maximizing component life. When temperature is within the deadband, no change of the control output (humidification) occurs.

Dew Point P-Band

Adjusts the activation point of humidifier/dehumidification components based on deviation from setpoint by placing half of the selected value on each side of the dew point setpoint. A smaller number causes faster reaction to humidity changes.

Dew Point Setpoint

Humidity level (based on actual return air temperature and humidity) by adding moisture to or removing moisture from the air.

Humidity Control Sensor

Selects sensor used when calculating relative humidity.

Humidity Control Type

Controls humidification/dehumidification operation. Valid values are:

- Proportional: Percent of humidification/dehumidification determined by the difference between the humidity sensor reading and the humidity setpoint.
- Dew Point: Percent of humidification/dehumidification determined using the measured return temperature and humidity to calculate the dew point and comparing it to the setpoints.

NOTE: When dew point is selected, the humidity setpoint and proportional band units are degrees dew point.

- Relative: Percent of humidification/dehumidification determined using the measured humidity content of the air to calculate the percent relative humidity (RH) and comparing it to the setpoints.

NOTE: Relative humidity control can cause unnecessary humidification/dehumidification from over cooling based on a higher than normal RH reading that causes extended dehumidification, which in turn causes a low RH reading that activates the humidifier.

- Compensated: Percent of humidification/dehumidification determined using the measured humidity content of the air and automatically adjusting the humidity setpoint.

NOTE: Compensated humidity control prevents unnecessary humidification/dehumidification noted with relative humidity control.

- Predictive: Percent of humidification/dehumidification determined using the measured humidity content of the air and automatically adjusting the humidity sensor reading.

Humidity Deadband

Widens the setpoint to prevent small changes in humidity from cycling components and also maximizes component life. When humidity is within the deadband, no humidification/dehumidification occurs.

Humidity Integration Time

Adjusts unit capacity based on the length of time the humidity has deviated from the setpoint. Works in conjunction with the proportional band to maintain tight setpoint control.

Humidity Proportional Band

Adjusts the activation point of humidifier/dehumidification components based on deviation from setpoint by placing half of the selected value on each side of the humidity control setpoint. A smaller number causes faster reaction to humidity changes.

Humidity Setpoint

Humidity level by adding moisture to or removing moisture from the air.

Humidity Setpoint 2

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

3.1.9 Humidity Control

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

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

Humidity Proportional Band

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

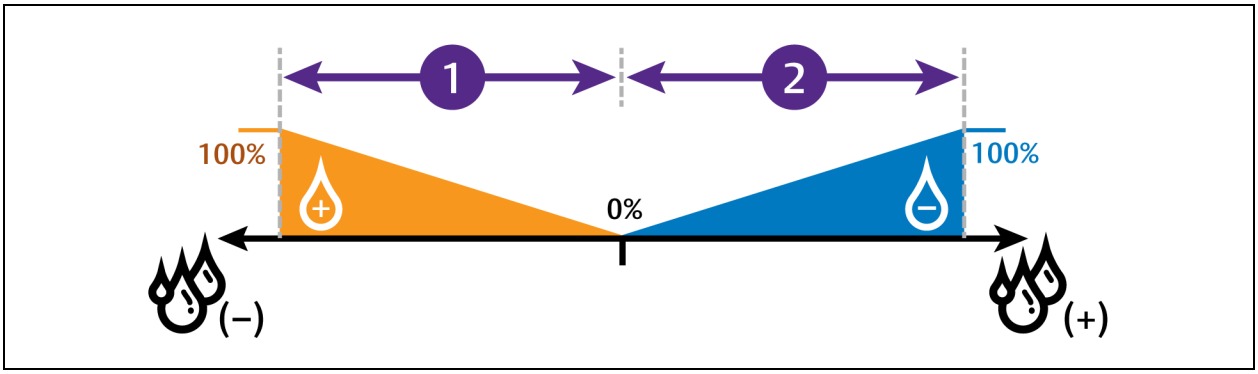
Figure 3.5 below , illustrates humidity control using:

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

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

- 0% humidifying capacity is required at the humidity setpoint.
- The humidifier starts operating when the humidification requirement reaches 100% and continues to operate until the humidification requirement drops to 0%. During this period, the display shows 100% humidification
- The dehumidifying capacity responds in the same way as the return-air humidity rises above the setpoint. Dehumidification is accomplished by a request for cooling that activates as soon as the required dehumidifying capacity reaches 100% and continues operating until the required dehumidifying capacity drops to 0%. During this period, the digital compressor loading scales between a minimum percentage (advanced setting is A557) and 100% depending upon required dehumidifying capacity. The display always shows 100% dehumidification.

Figure 3.5 Humidity Control without a Deadband



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

Humidity Deadband

A deadband widens the setpoint to prevent small changes in humidity from activating humidifiers, compressors and valves and cause excessive component cycling.

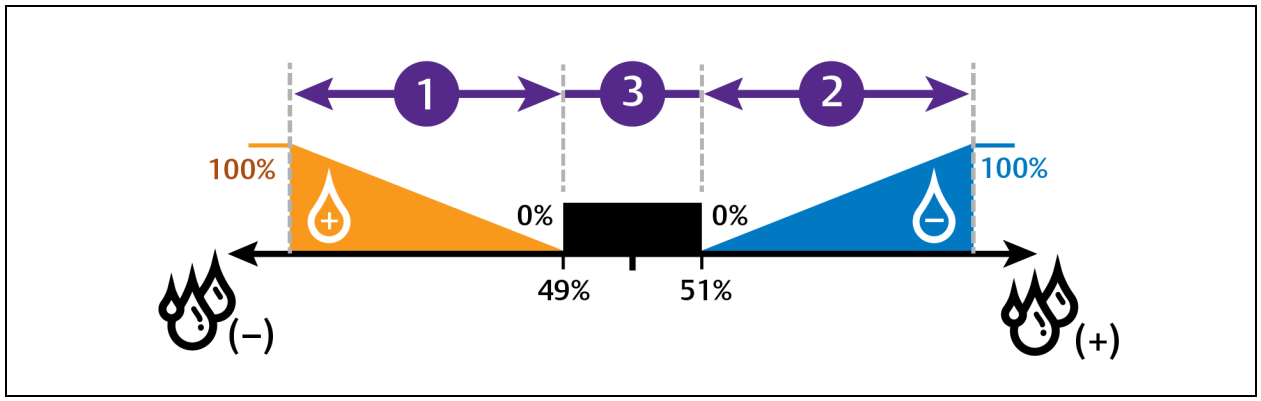
Figure 3.6 below , illustrates humidity control using:

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

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

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

Figure 3.6 Humidity Control with a Deadband



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

3.1.10 Configuring Fan Setpoints

Configures fan-speed control to operate independent of compressor loading (decoupled mode).

1. Touch SERVICE, then ☰ > *Setpoints* > *Fan Control*. The FAN CONTROL secondary panel opens.
2. Adjust the setpoint options, then touch *Save*. The setpoint is updated.
   - 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.

Fan Control Options

Airflow Calibration

Maximum allowed fan output voltage.

Fan Control Sensor

Selects the sensor that controls automatic fan speed, see Automatic Fan Speed Control on the next page ,
– or –
Selects manual control, see Manual Fan Speed Control on the next page . Options are:

- Supply: Air flow/fan speed is adjusted based on reading from the supply air temperature sensor.
- Remote: Air flow/fan speed is adjusted based on reading from a wired, remote temperature sensor.
- Return: Air flow/fan speed is adjusted based on reading from the wired, return air temperature sensor.
- Manual: Air flow/fan speed is adjusted using a building-management system.

Fan Control Type

Selects the method of control for the fan motor.

- Auto: Air flow/fan speed is adjusted using locally installed temperature sensors.
- Proportional: Regulation based on the difference between the fan control sensor reading and the fan setpoint.
- PI: Regulation is based on proportional and integral terms. Provides best temperature control and helps avoid fan speed oscillation.
- Adaptive PID: Auto-tuning PID control loop, can be set for cooling or fan speed.

Fan Delta

Fan temperature setpoint, it is the temperature difference compared to the cooling setpoint.

Fan Speed Proportional Band

Adjusts the fan speed based on the deviation from the setpoint. A smaller number causes faster reaction to temperature changes.

Fan Speed Integration

Adjusts fan speed based on time away from the setpoint to maintain accurate temperature control.

Maximum Fan Speed

Maximum percentage at which the fans will operate.

Minimum Fan Speed

Minimum percentage at which the fans will operate.

Static Pressure Deadband

Widens the setpoint to prevent small changes in static pressure from cycling the fan speed. When static pressure reading is within the deadband, no change in fan speed occurs

Static Pressure Fan Control

Fan speed is controlled based on the static pressure setpoint and the static pressure reading from the sensor.

Static Pressure Fan Speed P-band

Proportional band adjusts fan speed activation point based on a deviation from setpoint by placing half of the selected value on either side of the fan speed control setpoint. A smaller number causes a faster reaction in fan speed.

Static Pressure Lower Range

Minimum threshold for static pressure. Defines the low end of the static pressure range.

Static Pressure Setpoint

Static pressure that the unit maintains via fan speed. Expressed in inWC or Pa, depending on the unit of measurement selected.

Static Pressure Upper Range

Maximum threshold for static pressure. Defines the high end of the static pressure range.

3.1.11 Manual Fan Speed Control

In Manual fan control mode, the speed of the motor can be set in one of the following ways:

- The manual (fixed) fan speed may be set via Vertiv™ Liebert® iCOM™.
- Remotely using a Vertiv™ Liebert® IS-Unity Communications card.

3.1.12 Automatic Fan Speed Control

Temperature sensors can control fan speed using one of three modes based on the type of sensor selected as the fan-control sensor: supply, return, or remote, see Table 3.2 below . Control is based on the selected sensor for both fan control and temperature control and their setpoints as follows:

- Coupled: The fan control and temperature control sensor selection is the same. When coupled, fan speed and cooling capacity share the same temperature setpoint.
- Decoupled: The fan control and temperature control sensor selection is different. When decoupled, fan speed control and temperature control have separate setpoints and tunable PI loops.

Table 3.2 Fan Speed Controlling Sensor Options

		Temperature Control Sensor Selected		
		Supply Sensor	Remote Sensor	Return Sensor
Fan Control Sensor Selected	Supply Sensor	Coupled	Decoupled	Decoupled
	Remote Sensor	Decoupled (Recommended)	Coupled	N/A
	Return Sensor	Decoupled	N/A	Coupled

To set parameters for automatic fan speed control:

1. Touch 

, then  > *Setpoints* > *Fan Control*,
   - Set *Fan Control Type* to Manual
   - Select a *Fan Control Sensor*.
   - Adjust the setpoint options, then touch *Save*.

   Sensor based fan speed control is set.
2. Touch *Temperature Control*.
3. On the TEMPERATURE CONTROL secondary panel:
   - Select a *Temperature Control Sensor*.
   - Adjust the setpoint options, then touch *Save*.

3.1.13 Main Sensor Aggregation

When more than one supply or return air sensor is required to be used for monitoring purposes or influence a form of unit-level control, the Main Sensor Aggregation feature may be enabled. Main Sensor Aggregation feature allows the use of multiple wired sensors to create a single, aggregated temperature value based on the average or maximum of all wired sensors included. The end-user may define whether the given wired sensor connected is defined as a "supply" air temperature used for supply sensor aggregation or "return" air temperature sensor used for return sensor aggregation via the Liebert® iCOM™ user interface. When multiple sensors are configured as a certain style of sensor as determined by the Liebert® iCOM™ data label (ex: Supply or Return in this case), the readings from the corresponding wired sensors may be averaged or based on maximum, worst-case reading as defined by the end-user. These aggregated calculations may ultimately be used to influence cooling capacity control, fan speed control, or simply used for monitoring only.

Vertiv™ Liebert® iCOM™ shall support the connection of up to five additionally wired sensors that may be used to influence Main Sensor Aggregation routines. Main sensor aggregation routine supports both supply and return sensor aggregation calculations as described below:

- Total of six wired sensors may be used to influence supply sensor aggregation calculation (when including wired supply NTC sensor).
- Total of five wired sensors may be used to influence return sensor aggregation calculation.
- Wired sensor style utilized by the end-user may be either 2T or T/H-based.

The end user shall have the ability to determine whether the supply sensor aggregation calculated value is based on the Average of all the sensor values or Maximum (worst case) temperature reading. Invalid sensor readings will not affect the unit calculation (they will be excluded).

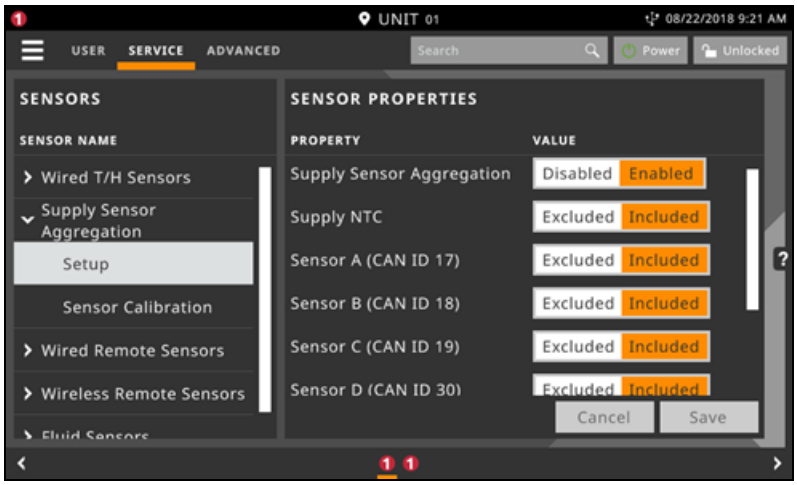
NOTE: Either a wired T/H or 2T sensor may be connected and used with Main Sensor Aggregation.

NOTE: 2T sensors provide two total air temperature values, which are then averaged together and presented as a single air temperature reading per 2T sensor. From there, 2T sensors may be averaged or operated off maximum (worst case) temperature value if desired.

Configuring Main Sensor Aggregation

Via the Liebert® iCOM™ display, navigate to Service Menu > Auxiliary Device Setup > Sensors > Supply Sensor Aggregation Setup.

Figure 3.7 Enabling Supply Sensor Aggregation



The additional wired 2T or T/H sensors must be properly addressed in order to be used in the main sensor aggregation calculations . The standard addressing of these sensors differs from that of the main sensor aggregation calculations Liebert® iCOM™ also supports. The end-user shall have the ability to determine which of the connected sensors may be included/excluded in the supply or return Sensor Aggregation calculations that are supported by the Main Sensor Aggregation feature via the toggle shown in the image above. End-users will also the capability of calibrating each sensor.

The information below represents the CANbus addressing of the additional wired sensors which shall be used for Main Sensor Aggregation calculation:

Table 3.3 Main Sensor Aggregation Calculation

Sensor	CANbus Node	Dip Switch Position SW1-1	Dip Switch Position SW1-2	Dip Switch Position SW1-3	Dip Switch Position SW1-4	Dip Switch Position SW1-5	Dip Switch Position SW1-6
Sensor A	17	ON	OFF	OFF	OFF	ON	OFF
Sensor B	18	OFF	ON	OFF	OFF	ON	OFF
Sensor C	19	ON	ON	OFF	OFF	ON	OFF
Sensor D	30	OFF	ON	ON	ON	ON	OFF
Sensor E	31	ON	ON	ON	ON	ON	OFF

NOTE: Sensors A - E may be wired T/H or 2T based sensors. Liebert® iCOM™ shall populate the applicable sensor readings within the controller UI based on sensor style utilized.

NOTE: Should a given dip switch not possess a position within the chart above, then the default position for this dip switch should be left in 'OFF' position.

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 on page 51 .
- Condenser fan reversal: See .
- 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 Outdoor fan control

The outdoor condenser fan is connected to the VFD device and the iCOM™ controller sends the commands via Modbus.

- When the compressor contactor is closed, the fan runs according to high pressure.
- If the fan does not have demand to run, the fan remains stopped.
- If the high-pressure sensor is faulty, the fan runs at 100% .
- If the compressor contactor is opened, and if the fan is in running state, the fan stops after a certain period of delay.
- When the condenser is running automatically, the fan adjusts its speed according to the preset curve or PID demand.

Table 3.4 Outdoor Fan Parameters

Parameters	Lower Limit	Default Value	Upper Limit
Outdoor fan control mode	1	1	3
Manual control	0	0	3
Manual output frequency (%)	0	0	100
Stop delay (sec)	0	60	300
Start pressure P-start (Bar)	18	21	24
Pressure band P-band (Bar).	6	8	9
Minimum output frequency f-min (%)	15	20	50
Maximum output frequency f-max1 (%)	51	100	100
Maximum output frequency f-max2 (%)	51	75	100
Night mode start (Hour)	0	18	23
Night mode end (Hour)	0	6	23
Sampling interval (sec).	1	10	100
Pressure set point P-set (Bar).	21	27	29
Pressure dead band P-error (Bar).	0	1.0	2.0
Proportional band P-prop (Bar).	2.0	5.0	8.0
Maximum pressure P-max (Bar).	32	34	37
Maximum pressure offset P-maxsd (Bar).	1	2	5

a. F-max 1 is a normal, energy-saving parameter. F-max 2 is a night mode parameter and it needs to be smaller than f-max1. F-min is a shared parameter.

b. P-start and P-band are normal, energy-saving parameters. P-set, P-error, P-prop, and P-max are energy-saving parameters. P-maxsd is a shared parameter.

c. P-max1 in normal, night mode is a calculated value.

d. Fan control mode: 1: normal; 2: night mode noise reduction; 3: energy-saving and pressure reduction.

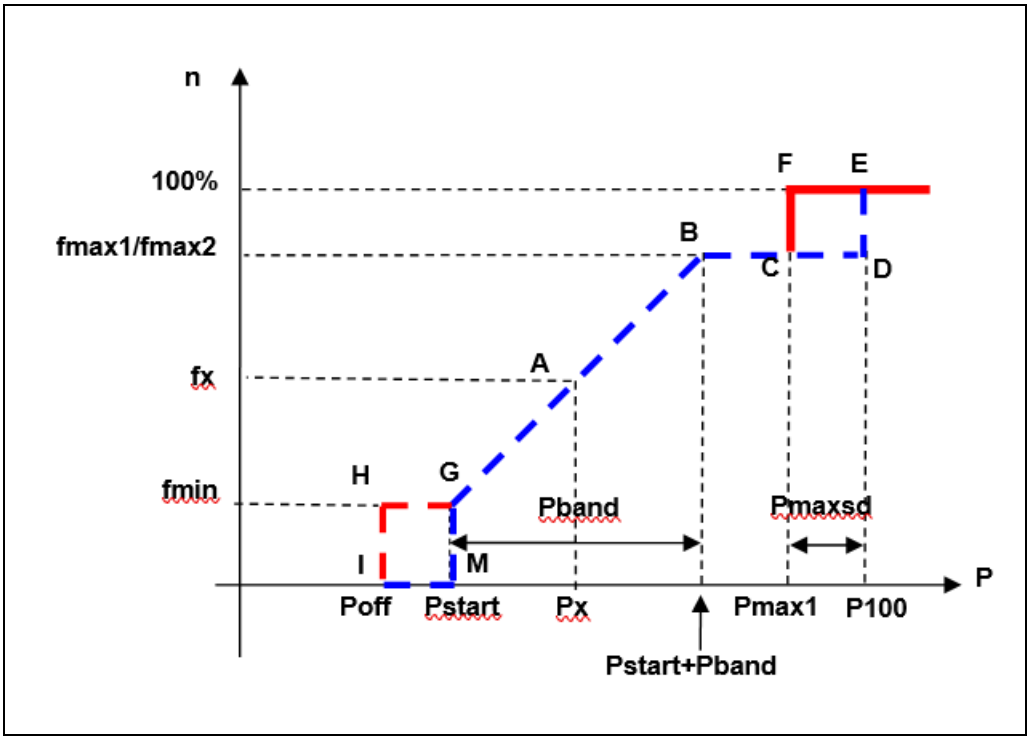
e. Manual mode: 0: disable ; 1: anable.

Normal Mode

The condenser fan is controlled according to the high-pressure transducer, and it work with the PID control

The condenser fan is controlled according to high pressure.

Figure 3.8 Normal Mode and Night Noise Reduction Mode Fan Control



Running curve: I→ M→ G→ A→ B→ C→ D→ E→ F→ C→ B→ A→ G→ H→ I

Where:

- Poff = Pstart - 1
- P100 = Pstart + Pband + 5 (refrigerant is R22/R407C) or P100=Pstart+Pband+7 (refrigerant is R410A)
- Pmax1 = P100 - Pmaxsd

Night mode - Noise reduction

Refer to normal mode for night mode noise reduction. Between “night mode starts at” and “night mode stops at”, the f-max1 Parameter is replaced by f-max2. In other period of time, the fan is controlled according to normal mode.

Table 3.5 Night Mode Parameters

Parameters	Lower Limit	Default Value	Upper Limit
Night mode start at	0	18	23
Night mode stop at	0	6	23

NOTE: The “night mode starts at” must be different from the “night mode stops at”.

Energy saving - Pressure reduction mode

The condenser fan is controlled according to high pressure and PID algorithm. When compressor synchronization signal is changed from closed to opened, the fan runs according to demand.

1. When high pressure is equal to or larger than Pmax, the fan runs at 100%.
2. When high pressure is smaller than or equal to Pmax- Pmaxsd, the fan adjusts based on.
3. When high pressure is between Pmax- Pmaxsd and Pmax, the system maintains the current adjustment mode. (Fixed 100% or PID adjustment).

3.2.2 Scheduling Condenser Low Noise Operation

Condenser setback schedules low noise fan operation on units equipped with Vertiv™ Condensing Units. 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 

, then  > *Options Setup* > *Condenser Fan Settings*. The CONDENSER FAN SETTINGS panel opens.
2. Adjust the schedule settings, and touch *Save*. The schedule is set up.
   - Touch *Cancel* to discard the changes.

Condenser Fan Settings Options

Settings for Night mode only take effect when noise reduction is selected as control mode.

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 

, then  > *Options Setup* > *Misc Settings*. The MISC SETTINGS panel displays.
2. Make adjustments as needed and click *Save*. The option settings are updated.
   - 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

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.) See Automatic Restart after Power Failure on the facing page .

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 set in Teamwork Modes on page 85 , see the Teamwork Control Options on page 87 .

K11 Active on

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

- Dehum: Dehumidification is on.
- 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.

Loss of Power Autoreset Delay

Selects the length of time that a Loss of Power event (that triggers after a power cycle that occurs when the cooling unit is operating) is active when power is restored. When the delay time elapses, the event resets and is cleared automatically.

Operation at Temp Control Sensor Failure

Selects cooling unit operation in the event that the control temperature sensor fails.

- Shut Down: The unit shuts down on sensor failure.
- Cooling: The unit continues operation based on the select Temp Control Sensor Failure Cooling Mode.

Single Unit Auto Restart

Selects time elapsed (in seconds) before unit restarts when Auto Restart Enable is enabled.

Warning Activates Alarm Relay

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

3.3.2 Automatic Restart after Power Failure

Set the cooling unit to return 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.)

1. Touch 

, then 
 > *Options Setup* > *Misc Settings*. The MISC SETTINGS panel displays.
2. Set *Auto Restart Enable* to *Yes*, and use the 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.

3.3.3 Setting Fan Options

Air flow is adjustable via Vertiv™ Liebert® iCOM™ manually using a building management system (BMS) or automatically using locally installed temperature sensors.

NOTE: Thermal management units ship with the factory setting Return Sensor for the temperature control sensor and the fan speed control sensor.

1. Touch 

, then 
 > *Options Setup* > *FanSettings*. The FAN SETTINGS panel displays.
2. Make adjustments as needed and click *Save*. The option settings are updated.
    - 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.

Fan Settings Options

FAN Start delay in seconds:

Time delay before Evaporator Fans start after the unit is turned on and all Fan start conditions are met.

FAN Stop delay in seconds

Time delay before Evaporator Fans start after the unit is turned off and all Fan stop conditions are met.

Curve Gradient

Current gradient (slope) threshold used to detect Evaporator Fan failures when fan doesn't follow control voltage properly.

Frequency Correction

Evaporator Fan frequency correction factor for airflow loss detection.

FAN Minimum Speed CFF

Evaporator Fan minimum speed requirement (Call For Fan).

FAN Standard Speed CFF

Evaporator Fan standard (maximum) speed requirement (Call For Fan).

Speed limit during Latent Adjustment

Evaporator Fan maximum speed limit during "Latent Adjustment" mode.

FAN Idle Speed

Evaporator Fan speed during "Idle" mode when Compressor stops due to low cooling demand.

Analog output lower limit

Minimum analog output voltage for Evaporator Fan control.

Analog output upper limit

Maximum analog output voltage for Evaporator Fan control.

FAN Speed increase, low speed step

Evaporator Fan speed increase step during low speed operation.

FAN Speed increase, high speed step

Evaporator Fan speed increase step during high speed operation.

FAN Speed decrease, low speed step

Evaporator Fan speed decrease step during low speed operation.

FAN Speed decrease, high speed step

Evaporator Fan speed decrease step during high speed operation.

FAN speed decrease delay seconds

Time delay before Evaporator Fans decrease their speed when requested by the system.

Airflow Calibration

Maximum allowed fan output voltage.

Allow Fan Modulation with Comp

Enables/disables fan modulation with compressor operation. Values are:

- No: Fan speed ramps to STD when a compressor starts operating.
- Yes: Fan speed modulates based on CFF while compressor operates.

Dehumidification Fanspeed

Maximum fan speed when dehumidification is in progress, assisting with the dehumidification process.

Fan Back Draft Mode

Enables/disables fan operation in back draft mode.

Fan Back Draft Operation

Defines the variation of back draft operation that shall be utilized. Selectable options include:

- Disabled - Fan Back Draft feature is disabled
- Normal -Outdoor Temp - back draft operation shall duty factor module the fan to operate at 0% (or setting defined by S169 VSD Backdraft Setpoint) where the duty factor operation supports the following:
  - Modulation period is 1 hour
  - Duty factor period is internally computed with results limited to 0% or 10 - 100%.

Once the duty factor period is started, back draft operation continues until the outside temperature becomes invalid or the duty factor 1-hour period completes or standby operation is terminated according to network group .

Return Temperature

Used to prevent overheating: sets fan speed to ramp based on actual return air temperature which overrides setting configured via S169.1 'Backdraft Setpoint':

- Set to 0% when return air temperature is below S178.1 'Fan Duty Min at Ret Temp'
- Set to S178.3 'Fan Ret Min' when return air temperature is at S178.1 'Fan Duty Min at Ret Temp'
- Set 178.4 'Fan Ret Max' when return air temperature is greater than or equal to S178.2 'Fan Duty Max at Ret Temp'
- Set to linearly interpolated value for return air temperature between S178.1 'Fan Duty Min at Ret Temp' and S178.2 'Fan Duty Max at Ret Temp'.

Outdoor + Return Temperature

Used to aid in anti-condensation and anti-overheating routines at the same time, where the higher demand shall determine the fan speed.

Fan Shutdown Delay Timer

Length of time that the fan continues to operate after the cooling unit is turned off via the display, local control or the BMS.

The delay timer does not apply when the unit is turned off remotely.

Fanspeed at Unit Start

Speed at which the fans run on unit start up.

Fanspeed at Unit Start Timer

Length of time fans run at the speed selected in fan speed at unit start.

Maximum Fan Speed

Maximum speed at which the fan will operate.

MIN at CFC for EC Fan

Cooling deviation at which the fan will operate at minimum speed.

Minimum Fanspeed

Minimum speed at which the fan will operate.

STD at CFC for EC Fan

Cooling deviation at which the fan will operate at maximum speed.

3.3.4 Setting Compressor Options

1. Touch 

, then  > *Options Setup* > *Compressor Settings*. The COMPRESSOR SETTINGS panel displays.
2. Make adjustments as needed and click *Save*. The option settings are updated.
    - 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

Comp. Min Off Time Set

Minimum time the compressor must remain off before it can restart.

Comp. Min On Time Set

Minimum time the compressor must remain on once started.

Cooling Start Req. Set

Condition or threshold required to start a cooling demand.

Cooling Stop Req. Set

Condition or threshold required to stop a cooling demand.

Oil Return Stop Time

Maximum time allowed to end an oil return cycle.

Compressor Run Time

Total accumulated compressor operating time.

HP Reg. Enter Val. Set

High pressure value at which high-pressure regulation starts.

Comp. Startup Speed Set

Initial compressor speed during startup.

Oil Return Time Set

Duration that the compressor operates in oil return mode once the oil return cycle is started.

Oil Return Cycle Set

Interval of compressor operation time required before a new oil return cycle can be triggered.

Cooling Std. Speed Set

Standard compressor speed during normal cooling operation.

Oil Return Speed Set

Compressor speed during the oil return cycle.

Cooling Min Speed Set

Minimum allowed compressor speed in cooling mode.

Min Filter Set

Minimum filter value applied to the control signal for smoothing.

Max Filter Set

Maximum filter value applied to the control signal for smoothing.

Speed Dead Band Set

Speed dead band to prevent small, continuous adjustments.

Disch. Temp. Alarm Set:

Discharge temperature limit alarm.

3.3.5 Setting EEV Options

1. Touch 

, then  > *Options Setup* > *EEVSettings*. The EEV SETTINGS panel displays.
2. Make adjustments as needed and click *Save*. The option settings are updated.
   - 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.

EEV Settings

MB EEV 1 Balance Opening

Defines the valve opening position (%) during the balance phase, used to stabilize system pressures before normal operation.

MB EEV 1 Balance Time

Specifies the duration (in seconds) for the balance phase at the defined opening before transitioning to the next control mode.

MB EEV 1 Initial Opening

Sets the initial valve position (in steps or %) when starting the system, prior to superheat control.

MB EEV 1 Initial Time

Determines how long the valve remains at the initial opening before switching to active control.

MB EEV 1 SH Setpoint

Target superheat value for the valve control loop to maintain optimal refrigerant flow.

MB EEV 1 Close SH

Superheat threshold at which the valve begins closing to prevent liquid refrigerant from entering the compressor.

MB EEV 1 Close Step (%/sec)

Rate at which the valve closes when superheat exceeds the close threshold, expressed as percentage per second.

MB EEV 1 MOP Limit

Maximum Operating Pressure limit to protect the compressor; the valve will restrict opening if this pressure is reached.

MB EEV 1 Minimal OD Setting

Minimum valve opening allowed during operation.

MB EEV 1 Maximun OD Setting

Maximum valve opening allowed during operation.

MB EEV1 Low load/temp SH SP Increase Value

Adjustment applied to the superheat setpoint under low load or low temperature conditions to improve stability.

MB EEV1 Dehu Low SH Increase

Superheat increment applied during dehumidification mode at low humidity levels.

MB EEV1 Dehu High SH Increase

Superheat increment applied during dehumidification mode at high humidity levels.

MB EEV 1 SH P Band

Proportional band for superheat control; determines how aggressively the valve responds to superheat error.

MB EEV 1 SH D Time

Derivative time for superheat control; dampens rapid changes to avoid oscillations.

MB EEV 1 SH PID DeadBand

Range around the setpoint where no corrective action is taken, reducing unnecessary valve movement.

MB EEV 1 SH Sample Time

Interval between superheat PID calculations.

MB EEV 1 TE P Band

Proportional band for evaporation temperature control.

MB EEV 1 TE I Time

Integral time for evaporation temperature control.

MB EEV 1 TE D Time

Derivative time for evaporation temperature control.

MB EEV 1 TE PID DeadBand

Range around the setpoint where no corrective action is taken.

MB EEV 1 TE Sample Time

Interval between TE PID calculations.

3.3.6 Setting Condenser Fan Options

1. Touch 

, then  > *Options Setup* > *Condenser Fan SettingsSettings*. The CONDENSER FAN SETTINGS panel displays.
2. Make adjustments as needed and click *Save*. The option settings are updated.
   - 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.

Condenser Fan Settings

Fan control mode

Control to set the Fan Control mode as Normal, Night Mode (Noise Reduction) or Energy Saving.

Night mode start (Hour)

It is the hour when the Night Mode starts.

Night mode end (Hour)

It is the hour when the Night Mode stops.

3.3.7 Setting Reheat Options

If the room air temperature becomes too cold, heating is activated based on the temperature proportional band setting. Depending on the type of cooling unit, there are different types of reheat (configured at purchase/set at factory). There may also be one to three stages of reheat, which are also factory set. The only service operation available is setting the number of heat stages.

1. Touch 

, then  > *Options Setup* > *Reheat Settings*.
The REHEAT SETTINGS panel displays.
2. Refer to Reheat Settings Options below , and Reheat Control to adjust the setpoint options, then touch*Save*.
The option settings are updated.
   - Touch *Cancel* to discard the changes without saving.

Reheat Settings Options

Electric Heat Outputs

Shifts the output steps of the electric heaters.

Electric Heat Staging

Selects the number of stages available during reheat operation.

Enable Hot Gas Heat

Enables/Disables hot gas reheat. (May not be included on your cooling unit.) See Reheat Control. Values are:

- No: Hot gas reheat disabled.
- Comp. 1: Use compressor 1.
- Comp. 2: Use compressor 2

Enable Hot Water Flush

Selects the number of hours between hot water coil flush cycle.

Enable Hot Water Heat

Enables/disables hot water reheat. (May not be included on your cooling unit.)

Enable Rotation

Enables/disables rotation of multiple heaters.

Reheat Operation

Selects when heating is allowed.

- Dehum: Heating only allowed during dehumidification.
- Normal: Heating allowed during all operating modes.

SCR Control Type

Enables/disables SCR reheat. (May not be included on your cooling unit.) See Reheat Control. Values are:

- None: SCR reheat disabled.
- Tight: Use tight control reheat mode.
- Standard: Use standard reheat mode.

Electric Heat Stages

Number of electric stages that may be activated during reheat.

- Depending on your cooling unit, the maximum setting may be 1, 2, or 3.

3.3.8 Reheat Control

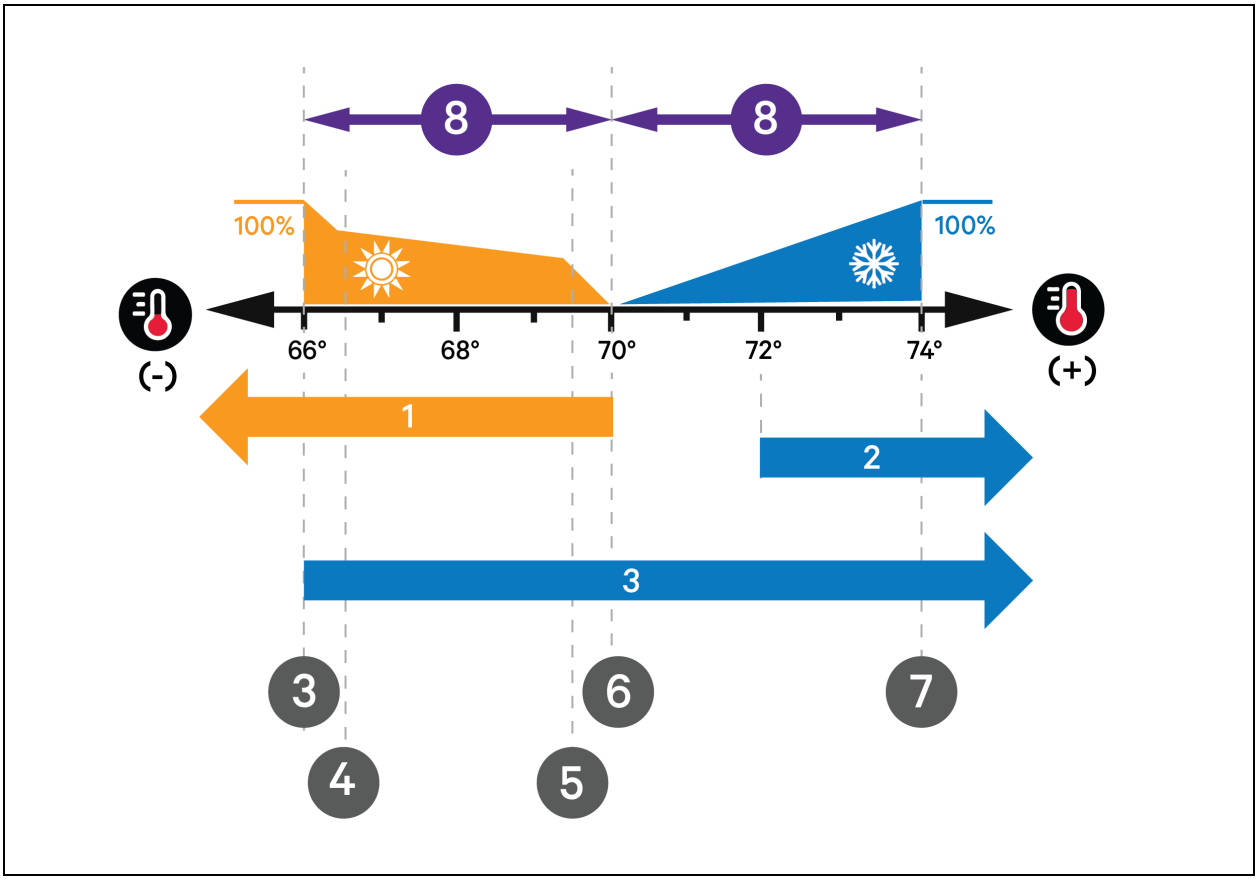
If your cooling units are equipped with a heating option, reheat control is directly linked to temperature control in that the heating requirement determined by the temperature proportional band determines reheat operation. See Temperature Control—Temperature Setpoints and Cooling Operation on page 34 .

SSR Control Type

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

- At 70° air temperature (heating demand 0%), no heating occurs.
- When the heating demand reaches 100%, the SSR heating/reheat activates.
- As air temperature rises and heating demand decreases, the SCR reduces output and stops operating when 70° (0% heading demand) is reached.

Figure 3.9 Temperature Control for Reheat - SSR Control Type



No.	Description	No.	Description
1	SSR Heat/Reheat Operation Range	5	SSR Output is 30% capacity at 10% Heating
2	Compressor 1 starts operating at 50% Cooling	6	SSR Output is 0% capacity at 0% Heating
3	SSR Output begins at 100% capacity at 100% heating and compressor 1 stops operating at 100% heating	7	Compressor 1 Output is 100% capacity at 100% Cooling
4	SSR Output is 60% capacity at 90% Heating	8	½ Proportional Band

Electric Heater Demand Calculation

The heating demand is calculated according to compressor cooling PID demand.

- When the heating PID demand is 0% , the corresponding AO voltage is 0V.
- When the heating PID demand is -10% , the corresponding AO voltage is 3V.
- When the heating PID demand is -90% , the corresponding AO voltage is 6V.
- When the heating PID demand is -100% , the corresponding AO voltage is 10V.
- The AO voltage corresponding to other demand values is calculated according to linear difference.

3.3.9 Setting Humidifier Options

The type of humidifier used depends on the cooling unit model and application requirements for your system.

NOTE: Except for externally mounted humidifiers, humidifier operation is limited by the return air temperature. If return air temperature reaches 80°F (26°C) or higher, the humidifier is disabled. The humidifier will not resume operation until the temperature falls to 75°F (24°C) or remains below 80°F (26°C) for 20 minutes.

1. Touch 

, then  > *Options Setup* > *Humidifier Settings*. The HUMIDFIER SETTINGS panel displays.
2. Make adjustments as needed and click *Save*. The option settings are updated.
    - 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.

Humidifier Settings Options

Humidification System Enabled

Enables/disables group wide (network wide) humidification by the cooling units in the group. Once enabled at the system level, individual units may be enabled using the Humidification Unit Enabled parameter.

Humidification Unit Enabled

Enables/disables humidification at the unit level.

Humidifier Control

Controls humidifier operation.

- Proportional: Calculates based on humidification setpoints.
- On-Off: Sends a start-stop command to a remote mounted humidifier.

Humidifier Model

The type of humidifier installed.

Humidifier Steam Rate

Selects capacity of steam generation.

Infrared Flush Rate

Adjustable rate of flush for the infrared humidifier, range 110 %to 500%.

3.3.10 Setting Dehumidification Options

1. Touch 

, then  > *Options Setup* > *Dehumidification Settings*. The DEHUMIDIFICATION SETTINGS panel displays.
2. Make adjustments as needed and click *Save*. The option settings are updated.
   - 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.

Dehumidification Settings Options

Capacity Increase on Dehum

Capacity increase permitted during dehumidification.

Dehum Fan Ctrl

Enables/disables fan-speed operation during dehumidification.

Dehum System Enabled

Enables/disables whether or not the compressor/valve is used for dehumidification when humidity is above the setpoint.

Dehum Timer

Length of time, in minutes, the dehumidifier may operate.

Dehum Unit Enabled

Enables/disables dehumidification for the cooling unit.

3.3.11 Setting Water Leak Detector Options

1. Touch 

, then  > *Options Setup* > *Water Leak Detector*. The WATER LEAKAGE DETECTOR panel displays.
2. Make adjustments as needed and click *Save*. The option settings are updated.
   - 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.

Water Leak Detector Settings Options

Water Detector

Type of water leak detector installed.

3.3.12 Temperature Control: Setting Loss of Cooling Operation

Loss of cooling is defined as a state where the Liebert® unit can no longer support cooling operation. During a loss of cooling situation, airflow output is still provided. This feature is supported on direct expansion (DX), chilled water (CW), and free cooling (FC) applications. The following scenarios represent the operational situations where a given unit may experience a loss of cooling:

1. Unit is OFF (excluding Standby operation, see A105.1 'Loss of cooling - Fan Operation')
2. Unit is ON but in Manual Mode
3. For Direct Expansion (DX) unit when one or more of the following are considered true:
   a. DX unit is ON with Free Cooling unavailable and all refrigerant circuits are either:
      - Low Pressure Phase 9 (LP w/ 90 min delay)
      - Low Pressure Phase 6 (freeze protection 10 minute delay)
   b. DX unit is ON with Free Cooling unavailable and compressors unavailable due to:
      - Pump down failure
      - High pressure lockout
      - High discharge
      - GC remote shutdown
      - Compressor overload
      - Various EEV alarm(s) preventing EEV operation
      - Unit is ON, all cooling operations are unavailable due to customer alarm input (Comp Lockout, FC Lockout, Flow AL LC, etc).

When the unit is in this state, the end-user may define the desired unit operation.

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4 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 28 , and Viewing Unit Alarms on page 25 .)

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.

4.1 Event Properties

The ALARMS & EVENTS 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 

, then  > *Alarm/Event 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.

4.1.1 Alarms and Events Panel Fields

Property

Lists groups of events, expanding displays the events in each group. See Enabling Events and Editing Event Settings on the next page .

Type

Event type. See Selecting Event Type and Setting Alarm/Warning Notification on the next page .

Ack

Indicates type of acknowledgment required. See Acknowledging Alarms on page 26 . This option is not available with all alarm types.

- Auto: The alarm is acknowledged automatically. It goes away if the situation that triggered alarm event is no longer true.
- Manual: The alarm goes away only when acknowledged, even if the situation that triggered the alarm event is resolved/no longer true.

Reset

Indicates type of reset required for the event. This option is not available with all alarm types:

- Auto: The alarm resets automatically after acknowledgment.
- Manual: The alarm must be reset manually after acknowledgment. See Acknowledging Alarms on page 26 .

4.2 Enabling Events and Editing Event Settings

In the ALARMS & EVENTS 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 

, then  > *Alarm/Event Setup*. The ALARMS & EVENTS 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 in the EDIT panel.

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.

4.3 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.

Table 4.2 on page 73 , lists the default and adjustable notification settings for events. Table 4.3 on page 73 , describes events for the EEV alarm board.

To select event type and notification:

1. Touch 

, then  > *Alarm/Event 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 described in the Notification Properties below , then touch *Save*. The notification is updated.
    - Touch *Cancel* to discard the changes without saving.

4.3.1 Notification Properties

Delay

Time, in seconds, to delay notification after event trigger. Depending on the event, the delay may or may not be adjusted. Table 4.2 on page 73 , 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.

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.

Type

Logging and notification level of the event. Table 4.1 below , describes the event type and notification it generates. Table 4.2 on page 73 , lists the default types for events.

Table 4.1 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 Table 10.1 on page 127 , and Viewing Unit Alarms on page 25 .
Alarm	Listed with a red status dot on the ALARMS panel, the LED flashes, and the audible alarm sounds. See Table 10.1 on page 127 , Viewing Unit Alarms on page 25 , and Enabling the Audible Alarm Notification on page 74 .

Table 4.2 on page 73 , 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 4.2 Event Notification Defaults

Event	Internal delay	Default delay/Range for adjustment	Type
MAIN FAN OVERLOAD	2 sec	5 sec/0 – 9999 *	ALM
LOSS OF AIRFLOW	3 sec	3 sec/0 – 9999 *	ALM
CLOGGED FILTERS	2 sec	2 sec/0 – 9999 *	WRN
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
HIGH ROOM HUM	1 min. after fan on	30 sec/0 – 9999	Fixed to WRN
LOW ROOM HUM	1 min. after fan on	30 sec/0 – 9999	Fixed to WRN
HIGH TEMP SENSOR A	1 min. after fan on	30 sec/0 – 9999	Fixed to WRN
LOW TEMP SENSOR A	1 min. after fan on	30 sec/0 – 9999	Fixed to WRN
HIGH HUM SENSOR A	1 min. after fan on	30 sec/0 – 9999	Fixed to WRN
LOW HUM SENSOR A	1 min. after fan on	30 sec/0 – 9999	Fixed to WRN
COMP 1 OVERLOAD	Internal Calc.	no	ALM
COMP 1 HIGH PRESSURE	Internal Calc.	no	ALM
COMP 1 LOW PRESSURE	Internal Calc.	no	ALM
DIG SCROLL1 HIGH TEMP	Internal Calc.	no	ALM
EL HEAT HIGH TEMP	5 sec	0 sec/0 – 9999	WRN
WORKING HRS EXCEEDED	0 sec	0 sec/0 – 9999	Fixed to WRN
SMOKE DETECTED	2 sec	2 sec/0 – 9999 *	ALM
WATER UNDER FLOOR	2 sec	2 sec/0 – 9999 *	ALM
COND PUMP-HIGH WATER	2 sec	2 sec/0 – 9999 *	ALM
LOSS OF FLOW	5 sec Reset delay: 10 sec	2 sec/0 – 9999 *	ALM
STANDBY UNIT ON	2 sec	2 sec/0 – 9999 *	ALM
HUMIDIFIER PROBLEM	2 sec	2 sec/0 – 9999 *	ALM
NO CONNECTION w/Unit1	Internal Calc.	-	WRN
UNIT X DISCONNECTED	Internal Calc.	-	WRN
LOSS OF POWER	0 sec	no	ALM
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 *	MSG

Table 4.2 Event Notification Defaults (continued)

Event	Internal delay	Default delay/Range for adjustment	Type
HIGH TEMPERATURE	2 sec	2 sec/0 – 9999 *	MSG
LOSS OF AIR BLOWER 1	2 sec	2 sec/0 – 9999 *	ALM
REHEAT LOCKOUT	2 sec	2 sec/0 – 9999 *	WRN
HUMIDIFIER LOCKOUT	2 sec	2 sec/0 – 9999 *	WRN
COMPRESSOR(S) LOCKOUT	2 sec	2 sec/0 – 9999 *	WRN
COMP 1 SHORT CYCLE	0 sec	0 – 9999	MSG
VFD 1 Overcurrent	10 sec	0-9999 sec	ALM
VFD 1 Overvoltage	10 sec	0-9999 sec	ALM
VFD 1 Precharge_fault	10 sec	0-9999 sec	ALM
VFD 1 Undervoltage	10 sec	0-9999 sec	ALM
VFD 1 AC_Drive_Overload	10 sec	0-9999 sec	ALM
VFD 1 Motor Overload	10 sec	0-9999 sec	ALM
VFD 1 Input_PH_Loss	10 sec	0-9999 sec	ALM
VFD 1 Output_PH_Loss	10 sec	0-9999 sec	ALM
VFD 1 Overheat	10 sec	0-9999 sec	ALM
VFD 1 Ext_Fault	10 sec	0-9999 sec	ALM
VFD 1 Prechrg_Circ_Exc	10 sec	0-9999 sec	ALM
VFD 1 Curr_Sampling_Exc	10 sec	0-9999 sec	ALM
VFD 1 Autotune_Exc	10 sec	0-9999 sec	ALM
VFD 1 Encoder_Exc	10 sec	0-9999 sec	ALM
VFD 1 EEPROM_Fault	10 sec	0-9999 sec	ALM
VFD 1 Encoder_Not_Act	10 sec	0-9999 sec	ALM
VFD 1 Output_Short_G…	10 sec	0-9999 sec	ALM
VFD 1 Accum_Run_Reach	10 sec	0-9999 sec	ALM
VFD 1 User_Def_Fault	10 sec	0-9999 sec	ALM
VFD 1 User_Def_Alarm	10 sec	0-9999 sec	ALM
VFD 1 Accum_Pow_On_R…	10 sec	0-9999 sec	ALM
VFD 1 Output_LD_Loss	10 sec	0-9999 sec	ALM
VFD 1 PID_FDBK_Loss	10 sec	0-9999 sec	ALM
VFD 1 Param_Exc	10 sec	0-9999 sec	ALM
VFD 1 Pulse_Curr_Lim_F…	10 sec	0-9999 sec	ALM
VFD 1 Speed_Deviation	10 sec	0-9999 sec	ALM
VFD 1 Motor_Overspeed	10 sec	0-9999 sec	ALM
VFD 1 Motor_Overtemp	10 sec	0-9999 sec	ALM

Table 4.2 Event Notification Defaults (continued)

Event	Internal delay	Default delay/Range for adjustment	Type
VFD 1 Sto_Fault	10 sec	0-9999 sec	ALM
VFD 1 Pole_Pos_Error	10 sec	0-9999 sec	ALM
VFD 1 Mstr_Slv_Ctrl_Fa…	10 sec	0-9999 sec	ALM
VFD 1 Self_Check_Fault1	10 sec	0-9999 sec	ALM
VFD 1 Self_Check_Fault2	10 sec	0-9999 sec	ALM
VFD 1 Self_Check_Fault3	10 sec	0-9999 sec	ALM
VFD 1 Self_Check_Fault4	10 sec	0-9999 sec	ALM
VFD 1 Braking_Overload	10 sec	0-9999 sec	ALM
VFD 1 Braking_Trans_F…	10 sec	0-9999 sec	ALM
VFD 1 External_Alarms	10 sec	0-9999 sec	ALM
VFD 1 Prechrg_Cont_FA…	10 sec	0-9999 sec	ALM
VFD 1 Timing_Fault	10 sec	0-9999 sec	ALM
VFD 1 Motor_Ctrl_Exc1	10 sec	0-9999 sec	ALM
VFD 1 Motor_Ctrl_Exc2	10 sec	0-9999 sec	ALM
VFD 1 Auto_Rst_Fail	10 sec	0-9999 sec	ALM
VFD 1 Modbus_To	10 sec	0-9999 sec	ALM
VFD 1 Canopen_Fault	10 sec	0-9999 sec	ALM
VFD 1 Canlink_Fault	10 sec	0-9999 sec	ALM
VFD 1 Exp_Card_Fault	10 sec	0-9999 sec	ALM
VFD 1 Input_Exc_Prtn	10 sec	0-9999 sec	ALM
Dsch Low Superheat	30 sec	0-60 sec	ALM
No Power	0 sec	0 sec/0 – 9999	WRN
Condensate 1 Failure	0 sec	5 sec/0 – 9999	WRN
EC Fan Fault	0 sec	10 sec/0 – 9999	ALM
HIGH SUP TEMP	0 sec	30 sec/0 – 9999	WRN
Fan Failure	30 seconds	0-60 seconds	ALM
Fan Failure 2	30 seconds	0-60 seconds	ALM
Fan Failure 3	30 seconds	0-60 seconds	ALM
Fan Failure 4	30 seconds	0-60 seconds	ALM
Fan Failure 5	30 seconds	0-60 seconds	ALM
Fan Failure 6	30 seconds	0-60 seconds	ALM
Fan Failure 7	30 seconds	0-60 seconds	ALM
Fan Failure 8	30 seconds	0-60 seconds	ALM
MB 10DI Comm Error	0 seconds	N/A	ALM

Table 4.2 Event Notification Defaults (continued)

Event	Internal delay	Default delay/Range for adjustment	Type
LOW SUP TEMP	0 sec	30 sec/0 – 9999	ALM
TEMP CTRL SENSOR FAIL	0 sec	3 sec/0 – 99999	ALM
HIGH DEW POINT	0 sec	30 sec/0 – 9999	WRN
LOW DEW POINT	0 sec	30 sec/0 – 9999	WRN
HI DEW POINT SENSOR A	0 sec	30 sec/0 – 9999	WRN
LOW DEW POINT SENSOR A	0 sec	30 sec/0 – 9999	WRN
HIGH REMOTE SENSOR	0 sec	30 sec/0 – 9999	WRN
POWER "A" FAILURE	0 sec	10 sec/0 – 9999	ALM
POWER "B" FAILURE	0 sec	10 sec/0 – 9999	ALM
AIRFLOW SENSOR FAILURE	0 sec	10 sec/0 – 9999	WRN
HUM CTRL SENSOR FAIL	0 sec	30 sec/0 – 9999	WRN
LOSS OF FLOW	0 sec	5 sec/0 – 9999	ALM
Comp Driver Lock	0 sec	N/A	ALM
Low Press Lock	0 sec	N/A	ALM
High Press Lock	0 sec	N/A	ALM
Disch High Temp Lock	0 sec	N/A	ALM
Dishc Low SH Lock	0 sec	N/A	ALM
BMS DISCONNECTED	0 sec	ENABLED/DIS - ENAB	WRN

Table 4.3 below , describes events available with the EEV alarm board.

Table 4.3 Events Specific to EEV Alarm Board

Event	Description
EEV 1 Communication Error	Liebert® iCOM lost communication with the EEV board. • The compressor(s) shut-off.
EEV 1 or 2 Driver Failure	EEV unexpectedly closes with the compressor(s) powered on. • The corresponding compressor is disabled until the alarm is reset manually.
LOW PRESS SENSOR FAIL	The indoor pressure sensor has become disconnected or is no longer working properly.
SUCTION TEMPERATURE SENSOR FAILURE	The suction temperature sensor failure has become disconnected or is no longer working properly.
NO REFRIGERANT SELECTED ERROR	Refrigerant not selected
LOSS OF CHARGE ALARM	Valve is not connected to the temperature sensor Valve is not connected to the pressure sensor Refrigerant not selected Loss of charge alarm. No action will be performed except setting the alarm.

4.4 Enabling the Audible Alarm Notification

1. Touch 

, 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.

4.5 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 option are up to four customer input events depending on cooling unit configuration. In some cases, 2 additional, optional customer-input events are available. See Setting Up Customer Input Events on the facing page .

Remote alarm devices and customer input notifications are set in the same way as other events. See Selecting Event Type and Setting Alarm/Warning Notification on page 68 .

4.5.1 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 4.4 below , maps the customer input to the remote alarm devices (RAD).

Table 4.4 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 

, 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, see Table 4.5 on page 77 .
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 4.5 on page 77 , 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: Vents are triggered when the contacts across the corresponding RAD terminal strip are closed.

NOTE: Depending on customization, some events listed in Table 4.5 on the facing page , may not be available with your system.

Table 4.5 Customer Input Options

Input	Action/Description
Smoke	Event only.
Water Alarm	Event only.
C PMP Alarm	Event only.
Flow Alarm	Event only.
Stdby G Pmp	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.
Rht Lockout	Event + Electric heaters disabled.
Hum Lockout	Event + Humidifier disabled.
Rht+Hum Lock	Event + Electric heaters and humidifier disabled.
Comp Lockout	Event + Compressor(s) disabled w/o pump down.
Call Service	Event only.
High Temp	Event only.
Air Loss	Event only.
FC Lockout	Event + Free-cooling disabled.
Heater Alarm	Event + Heaters off.
Flow AL SD	Event + Shut-down the unit.
Flow AL LC	Event + Lockout compressors, no pump down. (Enabled only if at-least one compressor is operating. Auto-reset depends on input status.)
Comp Lock PD	Event + Compressor(s) disabled w/ pump down
Enable FC	Forces free-cooling to “On.”
HTRJ VFD	Activates the HEAT REJ VFD ALARM. No other function.
HTRJ SPD	Activates the HEAT REJ SPD ALARM. No other function.
FIRE ALARM	Event + Shuts-down the unit.
2ND SETPOINT	No event, but switches to the second setpoint.
Emergency Power	Event + Disables unit.
LSI	Event + Activates humidifier-problem Alarm and stop filling bottle when full.
COND 1 FAIL	Event only.
COND 2 FAIL	Event only.
D-SCROLL RED	Event + Reduces requested compressor capacity by 20%.

Table 4.5 Customer Input Options (continued)

Input	Action/Description
SWAP VALVE	No event -Active X valve closes and Y opens/Inactive Y closes and X opens. See 7.3 - Custom Dual Chilled Water Valve Staging.
EC FAN FAULT	Event + Set analog output to 10 V.
ECO AIRFLOW Event + Reduce Liebert® air economizer air flow.	
DAMPERSWITCH	Damper + End switch.
POWER A	Event only.
POWER B	Event only.
Flow AL LFC	Activates event 'LOSS OF FLOW' and stops fluid free cooling operations.
Hand Mode	Activates event 'HAND MODE' when unit is on.
Fan Overrd.	Sets the fanspeed to the value defined by parameter S151 'Airflow Calibration'
Cool Overrd.	Sets call for cooling (CFC) to 100%.
Fluid Source 1	Triggers event 'FLUID SOURCE 1' indicating a loss of flow on supply source 1, no further reaction.
Fluid Source 2	Triggers event 'FLUID SOURCE 1' indicating a loss of flow on supply source 2, no further reaction.
Harmonic Filter Temp	Triggers event 'HARMONIC FILTER TEMP' and shuts the unit down.
Door Open	Triggers event 'DOOR OPEN' and shuts unit down.
Water Leak Internal	Triggers event 'WATER LEAKAGE', no further action.
Max Cool Fan	Drives call for cooling (CFC) and call for fan speed (CFC) to 100% output.
High Power Volt	All the components stop.
Start Cond Pump	Condenser Pump starts draining the tray, no further action.
RLS Alarm	Compressor stops and fans start running at 100%

- MCF.003 'Transition Time to Max Cooling' - Configured time frame that defines how long it will take call for cooling to ramp to full cooling once MAX COOL is enabled.
- MCF.004 ' Transition Time to Normal Cooling' - Configured time frame that defines how long it will take unit to ramp from MAX COOL to normal cooling output.

5 U2U Networking

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® IntelliSlot™ Unity, to communicate securely between your building-management system or other networks.

5.1 Preparing for U2U Group Set Up

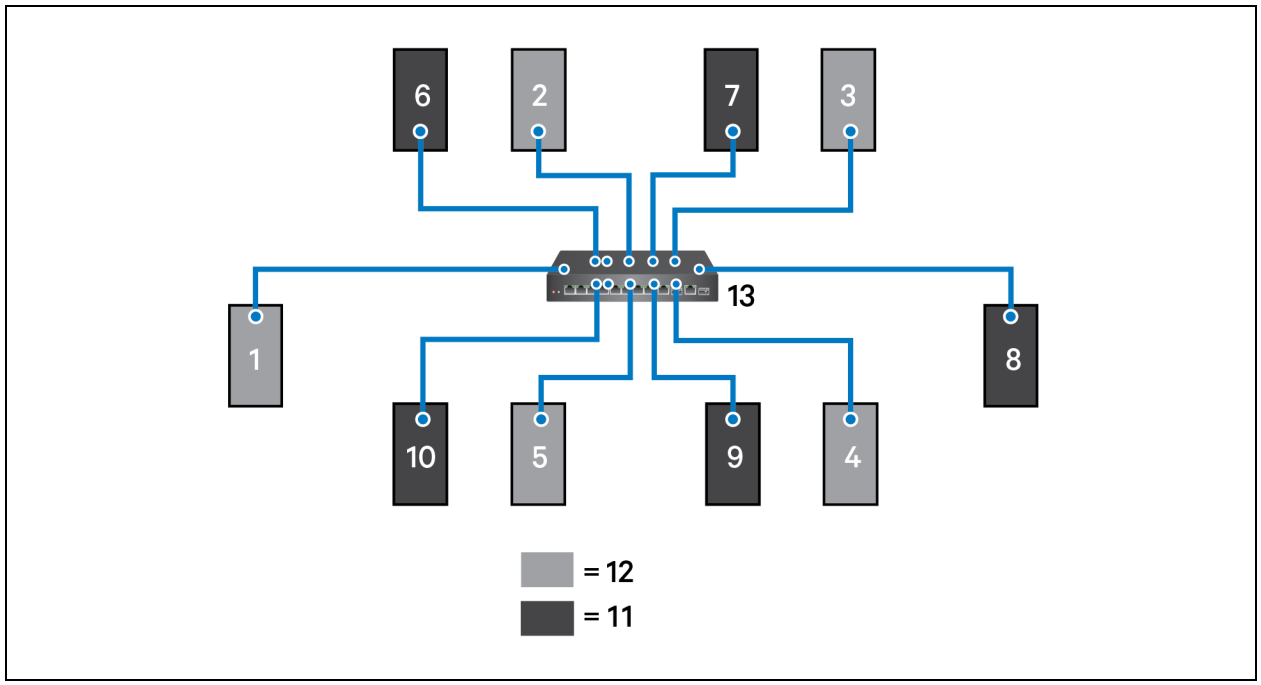
Cooling units in the network will be assigned to groups, which affects how units function in teamwork, standby, rotation, and cascading operations. Especially in large rooms, it is important to consider several factors before setting up groups to balance cooling unit operation with room conditions.

NOTE: For ease of set-up 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 air flow and environmental control, up to 32 units.
4. Determine number of standby units.
5. Determine if using teamwork and if so, which mode.
6. Plan U2U address assignments.
   - Refer to the U2U Control Board Settings on page 81, for guidelines assigning cooling unit control board addresses.
   - Balance/Alternate unit address assignments based on room layout and because standby and teamwork operate in numeric order by unit number. Figure 5.1 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.
7. Read and record all programmed settings for each of the individual units (see Backing Up and Restoring Control Board Settings on page 123).
8. 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, then refer to U2U Wiring Connections on page 159, to connect the network cabling and hardware.

Figure 5.1 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

5.2 Configuring U2U Network Settings

The U2U NETWORK SETTINGS configure Vertiv™ Liebert® iCOM's unit to unit communication and includes information buttons, , that display pop-up field descriptions. The panel also indicates issues with the network settings. For resolution, see Troubleshooting Network Settings Issues on page 82 .

To configure unit to unit networking:

1. Touch SERVICE, then > *BMS & Teamwork Setup* > *U2U Setup*.
   The U2U NETWORK SETTINGS panel opens.
2. Touch the field to edit. The keypad opens.
3. Type the entry and touch .
4. 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.

5.2.1 U2U 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.

CB Firmware Version

Display configuration based on the firmware version of the control board, as follows:

- PA-2.06: CW/DS, DSE, PDX/PCW

Gateway

Routes data and acts as proxy server/firewall for control board during network set up. Display and control board must be identical on the U2U network.

IP Address

Network address of the control board.

NOTE: Last three 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 control board.

MAC Address

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

U2U Address

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 Figure 5.1 on the previous page .

NOTE: We recommend matching the U2U address to the last three digits of the IP address for easier reference later.

U2U Group

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 Liebert® iCOM firmware and otherwise do not operate together efficiently or at all.

5.2.2 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 5.1 below .

Table 5.1 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.

5.2.3 Modifying U2U Network Settings

1. Touch 

, then  > *BMS & Teamwork Setup* > *U2U Setup*.
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.

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6 Teamwork, Standby and Rotation for Cooling Units

U2U communication via private network and additional hardware (see U2U Networking on page 79) allows the following operating features for the cooling units:

- Teamwork
- Standby (Rotation)
- Cascade

6.1 Continuous Control with Virtual Primary

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

6.2 Teamwork Modes

When Vertiv™ Liebert® iCOM™ controlled thermal management units are connected to a network in a group or team, use teamwork to optimize performance and efficiency depending on the mode chose and its application.

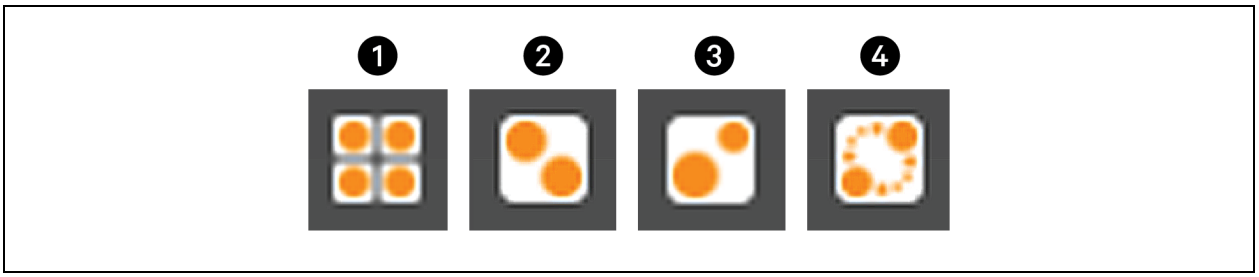
In a panel with Status content, the Teamwork Mode icon indicates the mode selected, **Figure 6.1** on the next page . Touching the icon displays the Teamwork dialog from which you can access the teamwork-control settings.

6.2.1 To Set Up Teamwork

1. Touch the Teamwork-mode icon, then touch *Edit* on the teamwork dialog.
   – or –
   Touch 

, then  > *BMS & Teamwork Setup* > *Teamwork / Standby* > *TeamworkMode*.
2. Select the mode from the *Teamwork Mode* drop down in the TEAMWORK MODE CONTROL panel. The TEAMWORK/STANDBY panel opens.
3. Touch *Save*. Teamwork mode is set.
   - Touch *Cancel* to discard changes.

Figure 6.1 Teamwork Icons



Item	Description
1	No teamwork.
2	Mode 1 - Parallel teamwork
3	Mode 2 - Independent teamwork
4	Mode 3 - Optimized aisle teamwork

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.

Teamwork Control Options

Qty. Units included in Average

Defines the quantity of units sensor values (X) within a given network group that are included within the 'System' average calculation and used for control. The primary unit ranks the units by temperature value of:

- Temperature Control Sensor value (for modes B and C)
- Fan Control sensor values (for modes A, D, and E).

Liebert® iCOM™ shall use the (X) highest sensor values to calculate the system average used for control.

NOTE: This parameter is only available when units are configured for Teamwork Mode and the aggregation method is configured for "average".

NOTE: When Return Sensors are utilized for Fanspeed control, Return Sensor values on units placed in standby will not be used within the weighted aggregation of all Return Sensor values in the network group. Only Return Sensor values on operating units (Fan ON/Cooling ON) shall be included.

NOTE: When Remote Sensors are assigned to Fanspeed Control, Remote Sensor values on units in Standby shall be included within the weighted average and used for control.

Cascade Units

Stages on standby units based on room temperature/humidity load. Available in Teamwork modes 1 and 3, the options differ for each:

- Teamwork mode 1 Parallel options are:
  - Yes: Standby units cascade on based on a call for heating, cooling, humidification, or dehumidification.
  - Cool/Heat: Standby units cascade on with a call for heating or cooling only.
  - Cooling: Standby units cascade on with a call for cooling only.
- Teamwork mode 3 Optimized Aisle options are:
  - Fan P: Standby units cascade on based on the inability of active units to reach setpoint temperature or if using static pressure control, setpoint pressure while operating at full capacity.
  - Fan speed: Standby units cascade on based on the inability of active units to reach setpoint temperature or if using static pressure control, setpoint pressure while operating at full fan speed.

Cascaded Units Delay

Length of time in minutes to delay the activation of a stand-by unit after the previously activated unit starts, to prevent staged cascaded units from starting too close together or at the same time.

Cascaded Units Min Run

Length of time in minutes that an cascade on unit must run before powering off.

Cascaded Units Off Delay

Length of time, in minutes, to delay powering-off a cascaded unit after fan speed drops below the *Stop Next Unit at SYS Fan Speed* setting.

Cascaded Units Quick Start

After a power cycle of the primary unit, identical to Cascaded Units Delay except that it should be 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.

Max. Intermediate System Speed

Limits the fan speed of the group until all units in cascade are powered on. Once all units are operating, the fan speed may increase beyond this setting.

Number of Connected Units

Number of units connected in the group if U2U networked.

Start Next Unit at SYS Fan Speed

Fan speed at which the next cascaded unit is powered on.

Stop Next Unit at SYS Fan Speed

Fan speed at which the next cascaded unit is powered off. Unit power off may be delayed by *Cascaded Units Off Delay*.

Based on

Select the way the sensor readings from each cooling unit in the group are used to control temperature and humidity. Options are:

- Maximum: based on the highest reading from a sensor in the group.
- Average: based on the average readings from the sensors in the group.

Type

Teamwork mode to use for the group.

6.2.2 No Teamwork—Multiple Zones in One Room

When a teamwork mode is not used, cooling units work independently based on their own sensors. Standby and unit rotation may be used, but cascading cannot.

6.2.3 Teamwork Mode 1—Parallel Operation

In Teamwork mode 1, fan speed and cooling capacity are ramped up in parallel, which means that all units operate identically.

Teamwork mode 1 is best for small rooms with balanced heat loads. A primary unit collects the controlling readings for temperature and humidity from all the operating (fan on) units in the group, then determines the average or worst-case reading, and sends operating instructions to efficiently distribute cooling capacity across available units.

In Teamwork mode 1, most parameters are shared and, when set in any unit, are set in all units in the group.

NOTE: Teamwork Mode 1 - Parallel is not supported on the Vertiv™ Liebert® DSE product line.

6.2.4 Teamwork Mode 2—Independent Operation

Teamwork mode 2 works well for most applications, and best in large rooms with un-balanced heat loads by preventing units in a group from operating in opposing modes, some cooling and some heating. All temperature and humidity parameters are shared by the group. The primary unit monitors all available unit-sensor readings and determines the demand for cooling, heating, humidification and dehumidification, then sends operating instructions to address the greatest demand.

In Teamwork mode 2, the setpoints for all units must be identical. The proportional band, deadband, and related settings may differ by unit. Fan speed is modulated per unit. Rotation and cascading is not available, so expect uneven distribution of work hours.

6.2.5 Teamwork Mode 3—Optimized Aisle Operation

In Teamwork Mode 3, the fan speed for all units operates in parallel, which means fan speed operation is identical at each unit. However, cooling capacity operates independently for each unit.

Teamwork mode 3 takes advantage of variable speed fan options and variable capacity component options to maintain rooms with an unbalanced load and to prevent units in a group from operating in opposing modes. All units operate in the same mode based on the average or worst case (maximum) readings from the unit sensors. A local control (cooling capacity supply sensor) provides input to manage and maintain the discharge-air temperature at each unit. In addition, fan speed and operation are controlled based on readings from the unit temperature or static pressure sensors to control air delivery to the cold aisle.

NOTE: Standby and lead/lag are available when using optimized aisle mode, but is not recommended because it requires less power to run all units at reduced capacity.

Setting Up Teamwork Mode 3

Teamwork mode 3 requires the following:

- Vertiv™ Liebert® iCOM connection to a U2U network.
- Variable capacity compressors in the cooling unit.
- Variable speed fans in the cooling unit.
- Supply control air temperature sensors.

In addition, specific settings for wired remote (rack) sensors and setpoints are needed as described in the following steps.

To Set Up Optimized Aisle Operation

1. Set wired remote sensor function and mode:
   - Touch 

, then  > *Auxiliary Device Setup* > *Sensors* > *Wired Remote Sensors*.
   - Touch each sensor name, and select *Control* or *Reference* in *Function* based on rack set-up or preference, then touch *Save*.
   - On the SENSORS panel, touch *Setup* under Wired Remote Sensors, and select *Maximum* or *Average* in *Unit Remote Sensors Mode*, then touch *Save*.
     See Wired Remote Sensors on page 116 , for descriptions of all the wired remote sensor settings.

2. At each unit in the group:
   - Touch 

, then  > *Setpoints* > *Temperature Control*.
   - In *Temperature Control Sensor*, select *Supply Sensor*, then touch *Save*.
   - In *Temperature Setpoint*, select the setpoint based on the cooling unit's area of influence, then touch *Save*.
3. At the primary unit:
   - Touch 

, then  > *Setpoints* > *Fan Control*.
   - In *Fan Control Sensor*, select *Remote Sensor*, then touch *Save*.
     The other units in the group are set automatically.
   - Touch 

, then  > *BMS & Teamwork Setup* > *Teamwork / Standby* > *Teamwork Mode*.
   - In *Teamwork Mode*, select *3 Optimized Aisle*.
   - In Teamwork is based on, select *Maximum* or *Average*, then touch *Save*.

   Teamwork mode 3 is set.
4. Monitor operation of the cooling units and adjust setpoints and control bands as necessary.

6.3 Assigning Cooling Units to Standby (Lead/Lag)

Standby assigns some units to operate while others are on standby, meaning a unit 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, fan(s) 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 the facing page .
- 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 shut down, 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 stand-by 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.

6.3.1 To Set Up Lead/Lag Operation

1. Touch 

, then  > *BMS & Teamwork Setup* > *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

High Temperature Threshold

Temperature at which all standby units are activated.

Number of Standby Units

Number of units in standby mode.

Standby Fan Timer at Reheat/Humidification

Length of time in minutes that the fan continues to operate after the cooling unit enters standby mode if reheat or the humidifier were operating when unit powered-off.

Start All Standby Units by High Temperature

When enabled, all units are activated to cool when a high temperature alarm occurs.

6.4 Setting a Rotation Schedule

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

1. Touch 

, 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.

6.4.1 Unit Rotation Options

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 stand-by 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.

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.

Dynamic Unit Staging Enable: Feature allows the end-user to redefine the unit-to-unit (U2U) staging order of the thermal units all from the Vertiv™ Liebert ™iCOM™-S supervisory layer of controls without having to make changes to the U2U address at each individual unit-level controller.

- Disabled = Traditional staging method based on U2U order defined at the Liebert® iCOM™ unit-level controller.
- Enabled = Dynamic unit staging as defined by U2U order configured via Liebert® iCOM™-S.

Dynamic Unit Staging Order Time Delay:

- Time delay prior to unit transition
- Range = 0 - 600 sec, default = 10 sec

NOTE: Liebert® iCOM™-S is required in order to utilize the Dynamic Unit Staging feature.

6.4.2 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. See Setting a Rotation Schedule on page 91 .

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

, then  > *BMS & Teamwork Setup* > *U2U Setup*.
   - 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 & Teamwork Setup* > *Teamwork / Standby*. The TEAMWORK/STANDBY panel opens.
3. Touch *Unit Rotation*. The UNIT ROTATION CONTROL panel displays.
4. Touch *Rotate Now*, then touch *Save*. The operating and standby units are rotated.

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7 External Monitoring and Building Management Systems

Vertiv™ Liebert® iCOM-controlled cooling units are equipped with embedded 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:

NOTE: Because the Liebert® iCOM U2U network must be separate from other networks, use external monitoring or BMS to communicate securely between networks.

- Velocity Protocol for Vertiv™ Trellis™, Vertiv™ Liebert® SiteScan™ and Vertiv™ Liebert® Nform.
- Embedded Vertiv™ LIFE™ Technology for Remote Service Delivery.
- SNMP (v1/v2/v3) for NMS.
- HTTP/HTTPS for web page viewing.
- SMTP for e-mail.
- SMS for mobile messaging.
- Modbus RTU-Modbus Remote Terminal Unit communication protocol for BMS over an RS-485 serial network (Modbus RTU RS-485).
- Modbus TCP-Modbus 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 Liebert® IntelliSlot™ Unity card or via embedded Unity function, the BMS settings are identical and include:

- Disconnect fail safe
- Manual fan speed control
- Allowing the BMS to change fan speed
- Backup fan 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 Vertiv™ Liebert® iCOM.

To configure Modbus, BACnet, SNMP, SMS, SMTP, and HTTP communication, see Communication Setup with Embedded Unity on page 97 .

To Enable Embedded Unity Function

1. Touch 

, 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)*.

IntelliSlot Options

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.

Monitoring Protocol

Protocol used for communication with BMS. Options are:

- Velocity V3: Legacy Velocity communication card.
- IGM: IGMNet communication cards.
- Velocity V4: IntelliSlot™ Card or Sitelink/Sitescan™. This is the factory default.
- Embedded: Embedded IS-UNITY function.
- Embedded and IS V4: To use built-in Unity and an additional IntelliSlot card or SiteLink/Sitescan connection.

NOTE: If a Sitelink/Sitescan Connection and MODBUS RTU or BACnet MSTP RS-485 connection is required simultaneously, then the purchase of the RS-485 expansion board is required.

7.1.2 Setting BMS Control Settings

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

BMS is Connected To

- Velocity
- Analog Input 1-4

BMS Fan Speed Local Override

Enables/disables local override of the fan-speed set via BMS.

Fan Control Sensor

Currently-selected fan control sensor. Must be set to Manual for BMS control. See Configuring Fan Setpoints on page 44 .

Monitoring Handshake

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

Maximum Fan Speed

Current fan speed setting (set via fan setpoints or by BMS).

7.1.3 Setting BMS Backup Setpoints

1. Touch 

, then  > *BMS & Teamwork* > *BMS Setup* > *Configure Timeout* button on the lower-right of the panel. The CONFIGURE TIMEOUT secondary panel opens.
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 Fan Operation

Enables/disables BMS operation of the fans during back up operation. Options are:

- Disabled - There is no reaction when BMS is disconnected. Unit shall remain as is.
- BMS Backup Spd - Fanspeed shall change to setting defined by parameter S162 "BMS Backup Fanspeed" when the BMS is disconnected.
- Coupled - Links the call for fanspeed percentage (%) to the call for cooling percentage (%). The fan shall still ramp between the minimum percentage and the STD speed percentage (MAX), still respecting the airflow calibration.
- BMS Backup Set - When configured, the current fan setpoint used for control (S147 "Fan Setpoint") shall be replaced by value configured by Liebert® iCOM™ parameter S162 "BMS Backup Fan Setpoint".

BMS Backup Temp Setpoint

Temperature that the cooling unit maintains during BMS back up operation.

7.2 Communication Setup with Embedded Unity

The following sections describe the configuration options for embedded Unity function including Modbus, BACnet, SNMP, SMS, SMTP, 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.vertiv.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 the facing page
  -
- Configuration
  - System Configuration on the facing page
  - Local Users Configuration on page 100
  - Network Configuration on page 101
  - Web Server Configuration on page 101
  - Remote Services Configuration on page 102
  - Velocity Protocol Configuration on page 103
  - Messaging Configuration on page 105
- Protocols
  - BACnet Protocol Setup on page 106
  - Modbus Protocol Setup on page 108
  - SNMP Protocol Setup on page 109
- Unity Status Readings on page 110
- Unity Support Information on page 110

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 Liebert® iCOM control board. 7.2.1 above , shows the connector location.

For an RS-485 connection, connect the serial cable form the BMS to TB3 on the Liebert® iCOM control board. Pin 1 is the positive terminal on the right in .

If the optional RS-485 expansion board is purchased, TB1 on the expansion board is used for BACnet MSTP or MODBUS RTU and TB3 on the Liebert® iCOM™ board directly to a Sitelink/Sitescan system.

Please see Configuring BMS Communication with Embedded Unity on page 95

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 the next page , for a description of the Unity accounts.

You will be prompted to create a new administrator login in the initial setup.

NOTE: CWE-521, Password Complexity requires the following:

Minimum of 8 to a maximum of 30 case-sensitive, printable characters (excluding: \'<>~?#, double quote and space). Also must contain a combination of upper and lower case, digit and special characters. The password cannot contain the username.

If you are not using the default combination in Unity, then you must update Liebert® iCOM with the matching username and password.

1. Touch 

, then  > *BMS & Teamwork* > *IS-Unity Settings*.
2. Adjust the Username 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 

, then  > *BMS & Teamwork* > *IS-Unity Settings*.
2. Touch *Restart IS-Unity*, then *Save*.

To Reset the Configuration to Factory Defaults

1. Touch 

, 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 the System Settings

1. Touch 

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

7.2.5 Local Users Configuration

Local Users offers up to 10 users and three access levels described in Table 7.1 below .

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

Table 7.1 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 the facing page .
Administrator	Read/Write	Able to edit settings using the assigned password, which is always required to edit settings/configuration. CWE-521: Minimum of 8 to a maximum of 30 case-sensitive, printable characters (excluding: \'<>~?#, double quote and space). Also must contain a combination of upper and lower case, digit and special characters. The password cannot contain the username.

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: CWE-521, Password Complexity requires the following:

Minimum of 8 to a maximum of 30 case-sensitive, printable characters (excluding: \'<>~?#, double quote and space). Also must contain a combination of upper and lower case, digit and special characters. The password cannot contain the username.

1. Touch 

, 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 7.1 above .
5. Touch *Save*.

7.2.6 Network Configuration

1. Touch 

, 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.

7.2.7 Web Server Configuration

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

1. Touch 

, 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 Vertiv™ Liebert® 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 Liebert® 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. Default: enabled.

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 110).

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.

7.2.8 Remote Services Configuration

1. Touch 

, 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.

Site 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.

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 

, 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 Vertiv™ Liebert® 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 Primary 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 email and text messaging about events. It includes a test to determine if email and text messages can be successfully sent. Settings specify message recipients, the format or the messages, and other details.

Messaging Options

Email

May be enabled to send email messages about events

SMS

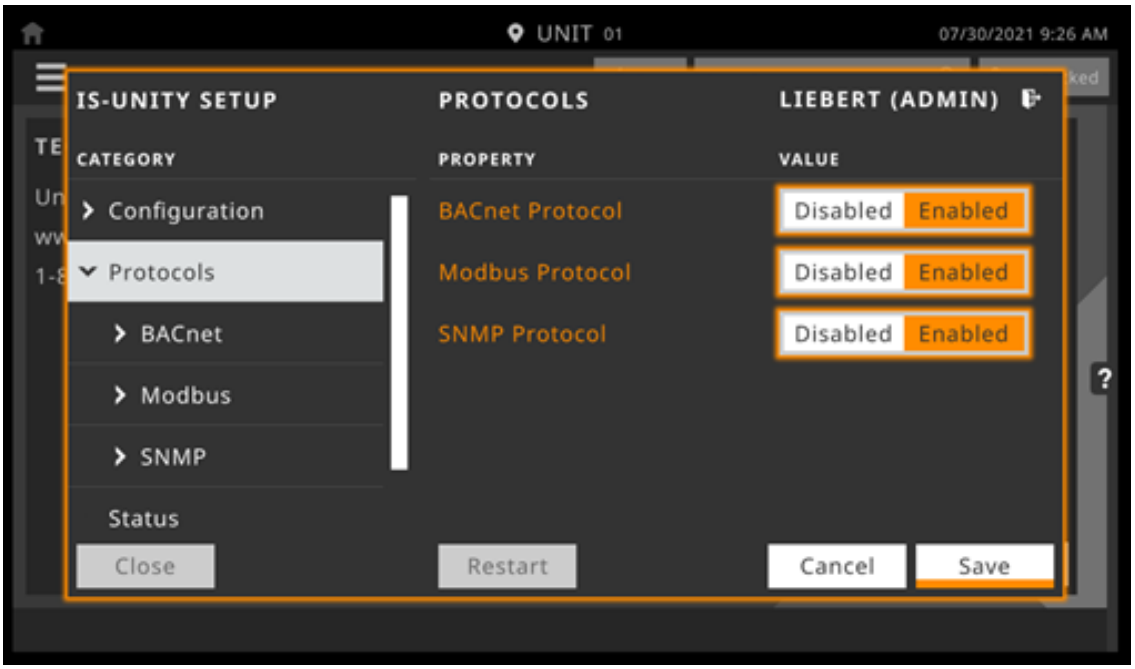
May be enabled to send text messages about events

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 , or .

The BACnet protocol does need to be enabled. See **Figure 7.1** below .

Figure 7.1 IS-Unity Setup, Protocol Enable/Disable



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.

APDU Timeout

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

APDU Retries

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

Configuring BACnet IP Protocol

1. Touch 

, then  > *BMS & Teamwork* > *IS-UnitySetup* > *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 primary address.
5. Set the BACnet MSTP max info frames.
6. Touch Save.
7. Restart Unity:
   a. Touch 

, 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 

, 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 primary address.
5. Set the BACnet MSTP max info frames.
6. Touch *Save*.
7. Restart Unity:
   a. Touch 

, 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 Primary 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 

, then  > *BMS & Teamwork* > *IS-Unity Setup* > *Protocols* > *Modbus*.
2. Adjust the settings, and touch *Save*.
3. Configure the Modbus interface chosen. See , or .

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

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 

, then  > *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 Trap

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 .

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.

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 

, then  > *BMS & Teamwork* > *IS-Unity Setup* > *Status*.

7.4 Unity Support Information

Support displays information about IS-Unity for troubleshooting.

1. Touch 

, then  > *BMS & Teamwork* > *IS-Unity Setup* > *Support*.
2. Adjust the settings, and touch *Save*.

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 App Firmware Label.

The card's firmware label.

Agent Boot Firmware Version

The card's Boot firmware version.

Agent Boot Firmware Label

The card's boot firmware label.

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.

7.4.1 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 

, then  > *BMS & Teamwork* > *IS-Unity Setup* > *Support* > *Active Networking*.
2. Adjust the settings, and touch *Save*.

Active Networking 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 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

To Setup Power Monitoring

1. Touch 

, then  > *Auxiliary Device Setup* > *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.

8.1.1 Power Monitoring Device Options

Address

Modbus address for the power meter.

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 Enable

Enables/disables the Modbus power meter.

Device X

Editable field to describe the device.

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

Type

Read-only. The type of power meter.

8.2 Wired Remote Sensors

Wired, remote, rack sensors can function as control sensors and subsequently, provide input individually at the unit level or at the system level for temperature control and teamwork functions.

For wired remote sensors, either 2T sensors or T/H sensors may be utilized. The Vertiv™ Liebert® iCOM™ controller shall populate the user interface with the applicable data according to the sensor style utilized. For 2T sensors configured for 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. See Teamwork Modes on page 85 .

1. Touch 

, 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 Sensor Setup Options below , 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 Sensor Sensor Property Options on the facing page to adjust the remaining settings, and touch *Save*. The wired-remote sensors for the cooling unit are configured.

8.2.1 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.

REM Sensors Set to Control

Number of sensors set to control.

Unit Remote Sensors Mode

When controlling at the unit level, selects the method of using the inlet rack temperature readings from the control sensors to control fan speed. Options are:

- Maximum: Use the highest temperature reading of the sensors set to Control.
- Average: Use the average of the readings from the sensors set to Control and included in AVG.

Unit Remote Sensors Included in AVG

When Unit Remote Sensors Mode is *Average*, selects the number of sensors used to calculate the average temperature.

- If the number selected is smaller than the number of REM Sensors set to Control, only the highest readings are used for the calculation.

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.

8.2.2 Wired Remote Sensor Sensor Property Options

Function

Sets the function of the sensor when Unit Remote Sensors Mode is enabled.

- Excluded - Remote sensor is not enabled in order to populate controller with applicable sensor readings and is not included in any form of control.
- Included - Remote sensor is enabled and will populate the controller with applicable sensor readings, sensor may be assigned to control as a 'remote' sensor'.
- Reference: Sensor readings are considered for Max Rack Temp, but are not used in maximum/average calculations that drive a form of control.
- Standby - insert description

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.

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: & * / . + - : @ \.

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.

8.3 Supply Sensors

When the supply air sensor is set as the control sensor for temperature, additional supply air configuration parameters (valve pulse, cooling filters and return compensation) can be used to enhance the supply air control. See Main Sensor Aggregation on page 47 for additional information on configuring additional supply sensors.

The valve pulse and cooling filter timer can be adjusted to prevent oscillation around the supply setpoint and still allow for rapid cooling-capacity adjustments to compensate for heat load changes. Contact Vertiv™ technical support for adjustments.

NOTE: Supply control air temperature sensors are required to use Optimized Aisle Teamwork (mode 3).

NOTE: On units equipped with a 3P actuator type valve, response can be improved by using the feedback signal.

8.4 Return Air Temperature/ Humidity Sensor

The return temperature/humidity sensor is located in the unit return air section and is supplied on all Liebert® systems with Vertiv™ Liebert® iCOM™ controls. The assembly connects to plug connection P67 on the Liebert® iCOM™ internal control board on allVertiv™Liebert®iCOM™ -based systems. See P67: Return Air Temperature—Humidity Board on page 187 and Jumper P3 CANbus Termination on page 189 for further information. Troubleshooting is accomplished by observing a green LED located on the sensor internal control board. If the LED is solid green, the sensor is communicating properly with the Liebert®iCOM™ controller. If the LED is continuously flashing green, the sensor is not communicating properly and the P3 CANbus termination should be verified that it is properly terminated. No LED indicates the sensor does not have power present.

8.5 Modbus Devices

Information about connected Modbus devices such as power meters, EEV Valve, VFD and 10DI.

8.5.1 Power Meters

For products equipped with the additional Power Meter device. Device properties include:

- Device Enable
- Power Meter Type
- Address
- Type
- SysType
- Connection Status
- Device Name

8.5.2 EEV Valve

EEV Valve 1

- Device Enable
- Address
- Type
- Device Label
- Connection Status
- EEV Valve 2 (No properties/ No supported Yet)

8.5.3 VFD

VFD 1

- Device Enable
- Address
- Type
- Device Label
- Connection Status

VFD 2 (Not supported yet)

8.5.4 10 DI

10DI1

- Device Enable
- Address
- Type
- Device Label

- Connection Status

10 DI 2 (Not supported yet)

9 Administering Firmware, Settings and Security

9.1 Vertiv™ Liebert® iCOM™ Firmware Upgrades

NOTE: The Liebert® iCOM™ Service Tool (iST) is required to update control board firmware. Contact technical support at 1-800-543-2778, opt. 5 for information on control board updates.

9.1.1 Compatibility with Earlier Versions of Vertiv™ Liebert® iCOM

Versions of Liebert® iCOM™ control firmware PA2.12.01.01R are incompatible with earlier firmware versions.

Contact your Vertiv™ representative to upgrade firmware.

9.1.2 Updating Vertiv™ Liebert® iCOM™ Control Board Firmware

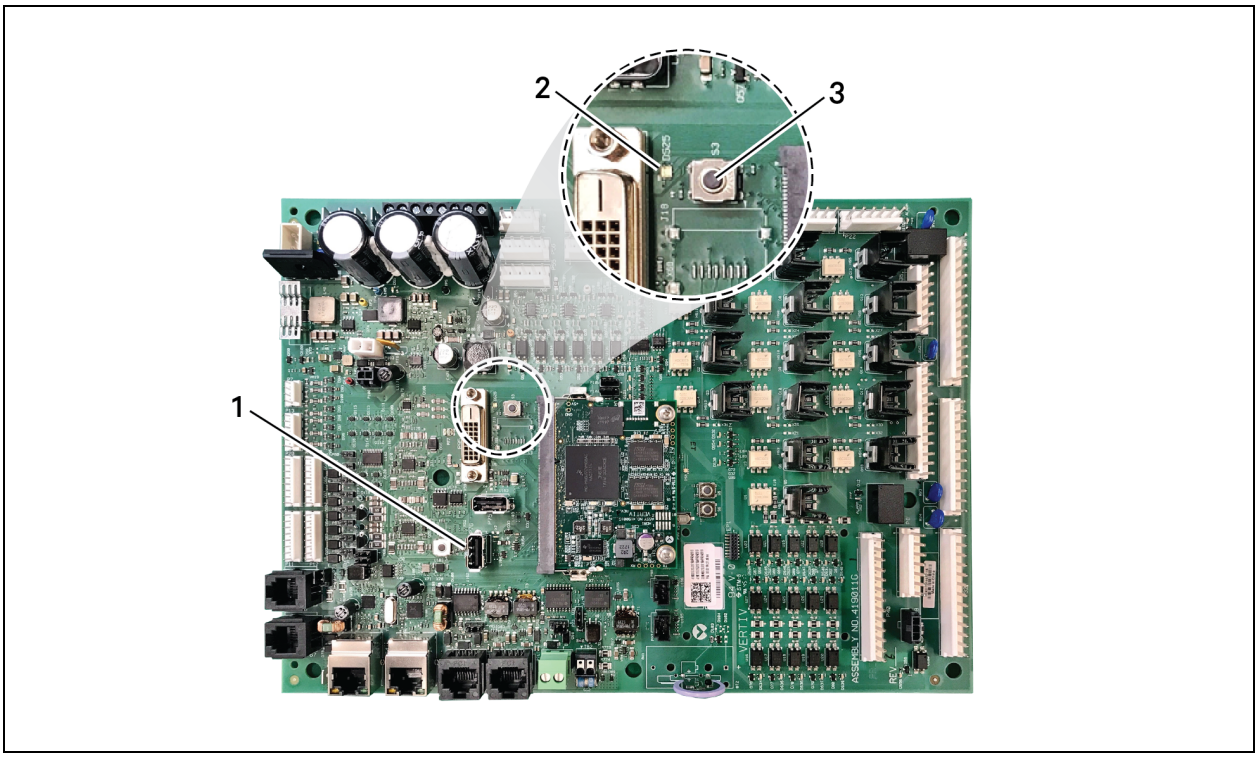
The FIRMWARE UPGRADE panel shows the firmware version of the control board of the cooling unit. It also includes settings to use while performing the upgrade.

NOTE: Only personnel who have completed Vertiv training should perform a control board update. The Liebert® iCOM™ Service Tool (iST) is required to update control board firmware. Contact technical support at 1-800-543-2778, opt. 5 for information on control board updates.

1. Save the Liebert® 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 Liebert® iCOM™ control:
   - Touch 

, then  > *Backup & Security* > Firmware Upgrade. The FIRMWARE UPGRADE panel opens.
   - Make sure the *Lock for Upgrade*, is selected.
   - Refer to Control Board Firmware Upgrade Options on the next page , for the reset and retain options.
3. On the Liebert® 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.

Reset to Default Configuration

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

Retain Network Configuration

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 Vertiv™ Liebert® 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

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

1. Touch 

, then  > *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 Control Board Back Up and Restore Options below , 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 Liebert® 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 Vertiv™ Liebert® 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 https://www.vertiv.com/en-us/support/.

The default four-digit passwords provide certain levels of permission to access the various Liebert® iCOM™ menus levels within the iCOM™ user interface. The end-user may edit the default four-digit passwords based on need so that only those provided with the current configured passwords may be granted access to the appropriate menus. You can change the value of each password so that only those provided with the current password may access the menus that it unlocks.

User Login default: 1490

Service Login default: 5010

Advanced: Contact Vertiv Technical Support

Administrator: Contact Vertiv Technical Support

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

1. Touch  , then 

> *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.

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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 Vertiv™ Liebert® 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 stand-by 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	Liebert® iCOM display is starting up or updating Liebert® 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 

, then  > *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 

, 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 Evaporator Fan Issues

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* >*Evaporator Fan* in the Category list. The EVAPORATOR FAN panel displays.
2. Refer to Diagnostics—Evaporator Fan 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—Evaporator Fan Options

Analog Output 1 – 4

0V to 10V analog output that drives the speed of the evaporator fan. Typically, the evaporator fan is Analog Output 1 by default.

Analog Output 1 Selection

Var SpeedDrive.

Fan Speed

Current speed of fan.

Motor Overload/EC Fan Fault

Indicates status of input feedback. If cooling unit has EC fans, it is the EC-fan fault input. If cooling unit has standard fans (no variable speed drive), it is the motor overload input.

Motors

Enables/disables fan motor during manual/diagnostic mode.

Status Airflow Loss

Indicates if the status of the Air Safety switch is open or closed.

Status Filter

Status of the air filter.

Status Remote Shutdown

Indicates whether remote shutdown is on or off.

Manual

Evaporator Fan

- Status Remote Shutdown
- Motors
- Fan Manual Speed (New)

Compressor Circuit 1

Modbus EEV

- MB EEV 1 Manual Enable
- Manual opening setting
- Opening Setting
- Current Opening Setting
- Suction temp
- Current Sh
- Current Evaporation temperature
- Low Pressure

Modbus VFD1

- Compreassor Manual Control
- Manual Speed
- Protect Signal
- Lock Signal
- Compressor Run State
- Manual Vacuum
- Speed Output Final

Modbus 10Di 1

- 10DI Digital Input 1 reading
- 10DI Digital Input 2 reading
- 10DI Digital Input 3 reading
- 10DI Digital Input 4 reading
- 10DI Digital Input 5 reading
- 10DI Digital Input 6 reading
- 10DI Digital Input 7 reading

- 10DI Digital Input 8 reading
- 10DI Digital Input 9 reading
- 10DI Digital Input 10 reading

Condenser Fan

- Manual Control
- Manual Output Speed
- Current Speed

10.4 Diagnosing Compressor Circuit Issues

1. Touch 

, 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 Diagnostics—Compressor Circuit 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.

10.4.1 Diagnostics—Compressor Circuit Options

10.4.2 Modbus EEV 1

Modbus EEV 1 Manual Enable

Enables the manual mode for EEV controller when the system is in manual mode.

Manual Opening Setting

Setting to be set when the manual mode is enable on the system, and the EEV controller is set in manual mode.

Opening Setting

Value set to the EEV controller.

Current Opening

Value of opening degree read from the EEV Controller

Suction Temperature

Value reported by the EEV Controller temperature sensor

Current Superheat

Superheat calculated by the EEV Controller according with the current Suction temperature and current Low Pressure reading.

Current Evaporation Temperature

Value calculated by the EEV Controller

Low Pressure

Value read by the EEV controller pressure transducer.

10.4.3 Modbus VFD 1

Compressor Manual Control

Enables manual control for compressor

Compressor Manual Speed

Setting for compressor manual mode

Protection Signal

State of the protect signal

Lock Signal

State of the lock signal

Compressor Run State

Current running state for the compressor logic

Compressor Min Off Time Set

Minimal time before starting the compressor after turning off

Compressor Min On Time Set

Minimal time the compressor should be on before turning off

Cooling Start Req. Set

Cooling PID requirement to start the compressor.

Cooling Stop Req. Set

Cooling PID requirement to turn off the compressor

Oil Return Stop Time

Minimal time for the compressor to be stopped if it's on oil return state.

Compressor Run Time

Current compressor running time.

HP Req. Enter Val. Set

Pressure to start HP regulation.

Compressor Startup Speed Set

Compressor startup speed.

Oil Return Time Set

Time that the oil return routine should run (min)

Oil Return Cycle Set

Hours that the compressor ouput is behind the oil return low speed setting to oil return to start.

Driver On/Off

Current status of the compressor

Manual Vacuum

Start vacuum mode

Speed Output Final

Final value to be set to the compressor after validations

Cooling Std. Speed Set

Standard speed

Oil Return Speed Set

Compressor speed while in oil return

Cooling Min Speed Set

Compressor minimal speed

Min Filter Set

Minimal speed change for the compressor

Max Filter Set

Maximum speed change for the compressor.

Speed Deadband Set

Deadband for selecting the current filter set.

Disch. Temp Alarm Set

Setpoint for Discharge temp alarm

10.4.4 Modbus VFD 1

Modbus 10DI 1

Enable MB 10DI

Value that shows is the 10DI is enabled on the system.

10DI Digital Input 1 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row

10DI Digital Input 2 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row

10DI Digital Input 3 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row

10DI Digital Input 4 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row

10DI Digital Input 5 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row

10DI Digital Input 6 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row

10DI Digital Input 7 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row

10DI Digital Input 8 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row

10DI Digital Input 9 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row

10DI Digital Input 10 Reading

Value read on the digital input of the board, this can be logical 0,1 or a counter value, like the number of Hz on the feedback output of the fans on Vertiv™CoolPhase Row.

10.4.5 Condenser Fan

Control Mode

Selection of Normal, Noise reduction, energy saving mode

Manual Control

Control mode when the system manual mode is set.

Manual Output Speed

Setting to override current speed.

Current Speed

Current speed of the condenser fan.

10.4.6 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 

, then 
 > *Diagnostic/Service> Alarm/Event Setup> Lock Alarms>Clear.>Save*

10.4.7 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. Touch 

, then 
 > *Diagnostic/Service> Alarm/Event Setup> Lock Alarms>Clear.>Save*

10.4.8 Resetting High Temperature Alarm Counter

1. Touch 

, then 
 > *Diagnostic/Service> Alarm/Event Setup> Lock Alarms>Clear.>Save*

10.5 Diagnosing Reheat Issues

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* > *Reheat* in the Category list. The REHEAT panel displays.
2. Refer to Diagnostics—Reheat 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.

10.5.1 Diagnostics—Reheat Options

Analog Output 5

0V to 10V analog outputs that operate reheat.

Electric Heat N

Enables/Disables heaters in manual/diagnostic mode. (Where N = electric heat number.).

10.6 Diagnosing Humidifier Issues

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* > *Humidifier* in the Category list. The HUMIDIFIER panel displays.
2. Refer to Diagnostics—Humidifier Options on the next 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 iCOM display.

10.6.1 Diagnostics—Humidifier Options

Hum Cond Protect < 53°F / 11.6°C

Status of low temperature protection.

Hum Cond Protect > 55% RH

Status of high relative humidity protection.

Humidifier

Enables/disables humidification in manual/diagnostic mode.

Local Hum PI

Current humidity PI percentage.

Status Humidifier Problem

Current status of the humidifier. OK indicates that the status is good.

Supply Humidity

Current supply air humidity.

Supply Temperature

Current supply air temperature.

10.7 Diagnosing Digital Output Issues

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* > *Digital Outputs* in the Category list. The DIGITAL OUTPUTS panel displays.
2. Refer to Diagnostics—Digital Output 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.

10.7.1 Diagnostics—Digital Output Options

Alarm Relay

Enables/disables alarms during manual/diagnostic mode.

K11 Relay

Enables/disables warnings during manual/diagnostic mode.

Q15 Output State

Enables/disables Q15 output during manual/diagnostic mode.

10.8 Diagnosing Analog Output Issues

1. Touch 

, 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 iCOM display.

10.8.1 Diagnostics—Analog Output Options

Analog Output N

Controls analog outputs during manual/diagnostic mode. *(Where N is the analog output number.)*

10.9 Diagnosing Customer Input Issues

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* > *Customer Inputs* in the Category list. The CUSTOMER INPUTS panel displays.
2. Refer to Diagnostics—Customer Input 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.

10.9.1 Diagnostics—Customer Input Options

Input N

Status and description of customer-input sensors. *(Where N is the input number.)*

10.10 Diagnosing Water Leak Detection Issues

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* > *Water Detection* in the Category list. The WATER DETECTION panel displays.
2. Refer to Diagnostics—Water Leak Detection 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.

10.10.1 Diagnostics—Water Leak Detection Options

LWD Value

Current percentage of resistance measured from the leakage water detection sensor. See Setting Water Leak Detector Options on page 65 . Range of values across:

- 0%: Maximum resistance, sensor is dry.
- 100%: Minimum resistance, sensor is wet.

11 Customizing the Vertiv™ Liebert® iCOM™ Display

11.1 Setting General Display Properties

NOTE: You must be logged in to adjust the settings. See Powering On the Vertiv™ Liebert® iCOM™ and Logging In/Unlocking Controls on page 14 .

1. Touch 

, then  > *Display Options* > *Display Properties*.
   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

Alarm Buzzer Pattern

Selects or disables the audible alarm notification. See Enabling the Audible Alarm Notification on page 74 .

Allow System On/Off

Enables/disables powering on/off the entire system of networked units from the Vertiv™ Liebert® iCOM display.

Backlight Brightness

Selects the brightness of the display back light.

Inactivity Timer

Time to elapse before display locks and dims.

Language

Selects the display language.

LED Brightness

Percentage brightness of the display.

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

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 Vertiv™ Liebert® iCOM main display so personnel can turn the unit on or off with out logging in and accessing the User/Service menus.

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 14 .

11.2.1 Moving Content

You can drag and drop content objects anywhere you like on 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), and drag it to the new location.

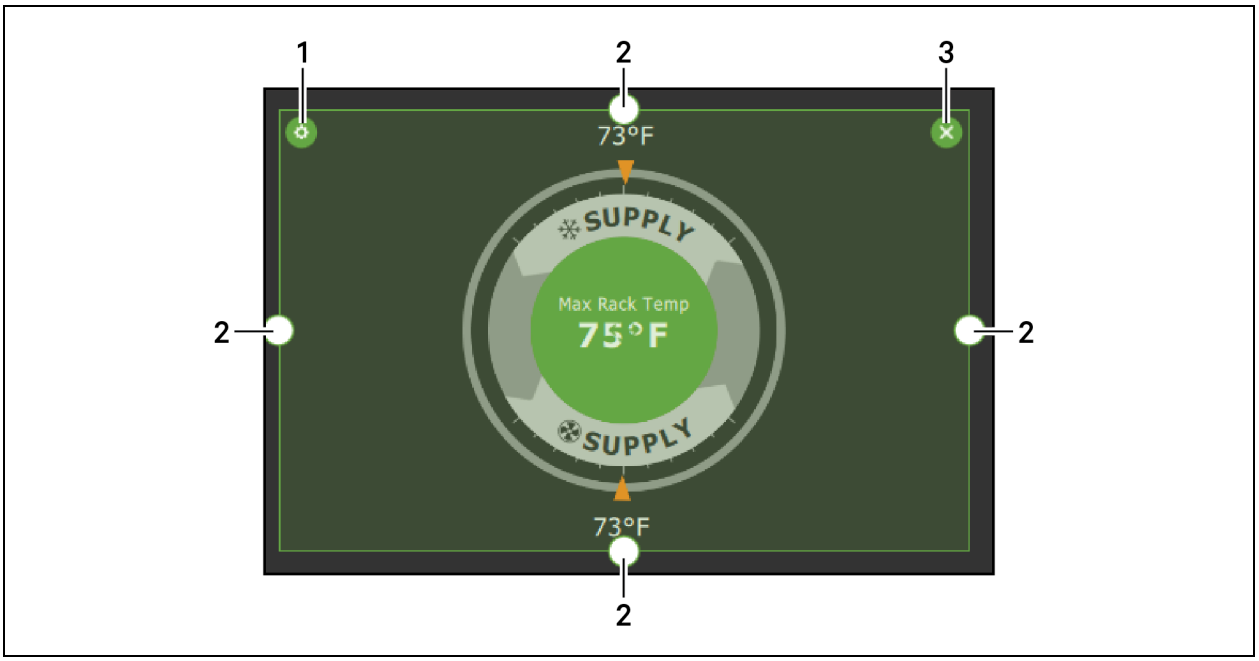
11.2.2 Resizing Content

You can resize content objects on 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), touch and drag a handle to re-size the object, see Figure 11.1 on the facing page .

Figure 11.1 Add/Remove Content Icons and Resizing Handles



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, the 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.

Table 11.1 Main Use Display Content Options (continued)

Content	Description
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	Liebert® EconoPhase operating diagram.
EconoPhase Status	Compressor/Liebert® 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 144.

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

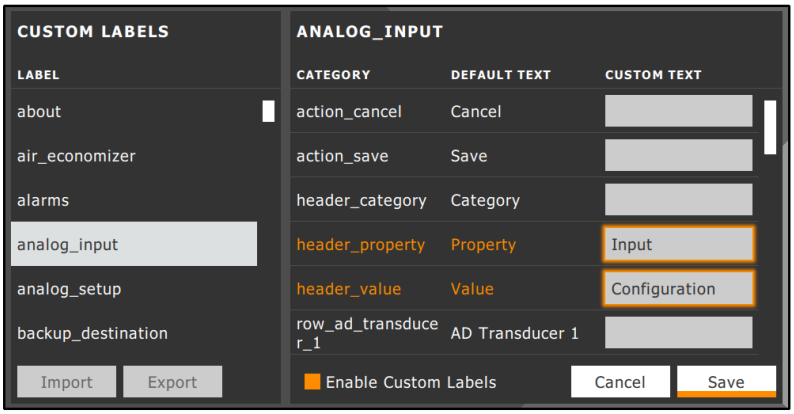
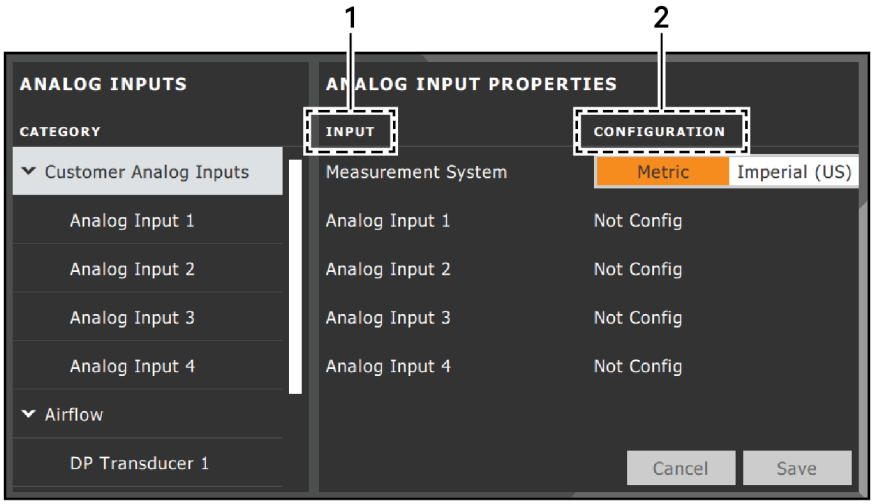


Figure 11.3 Customized Label Text on Analog Input Properties Panel



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 Vertiv™ Liebert® iCOM™ Hardware Installation

Your unit includes the Liebert® iCOM™ controller. This section describes the installation of connections and cabling to fully utilize the Liebert® iCOM™ features.

12.1 P67: Return Air Temperature—Humidity Board

P67-1: CAN communication

P67-6: CAN communication

Figure 12.1 Standard Return Air Sensor

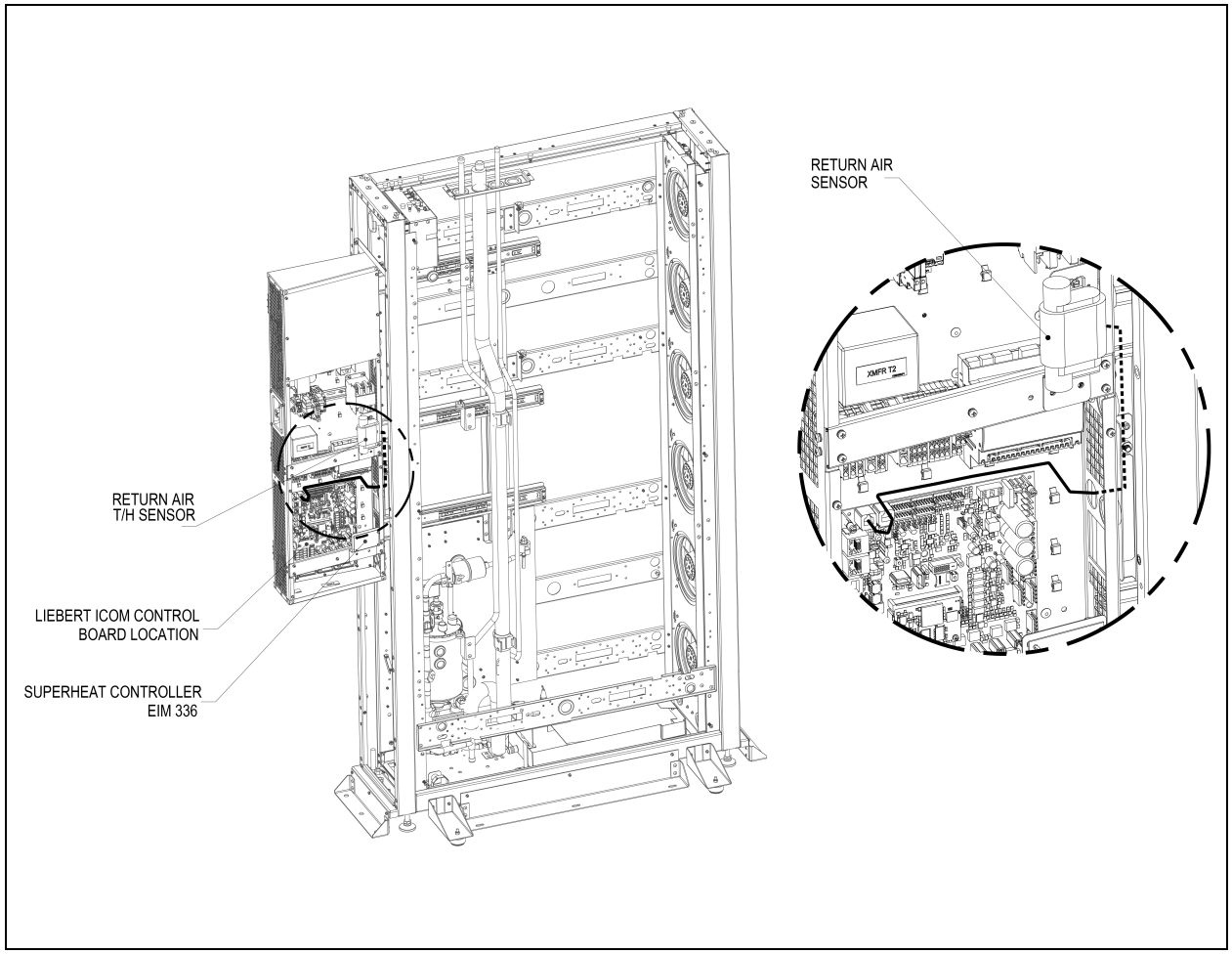


Figure 12.2 Optional Remote T/H Sensor

Table 12.1

Temperature/Humidity Sensor Dip Switch Settings

Sensor	Pos. #1	Pos. #2	Pos. #3	Pos. #4	Pos. #5	Pos. #6	Pos. #7	Pos. #8
Return T/H Sensor	Off	Off	Off	Off	Off	Off	Off	Off

Table 12.2 Temperature/Humidity Sensor Jumper Settings

Jumper Label	Type	Position
P2	BDM Header	*Open
P3	CANbus Termination	*Shunt on Pins 2 and 3
P4	Programming	*Open
E10-E13	Serial Port	*Open

*Factory default positions and settings.

12.2 Jumper P3 CANbus Termination

The correct position of this jumper is dependent on your system configuration. If the sensor is physically the first or last node in the CANbus device loop, the jumper must be terminated or shunted across pins #2 and #3 (default position). If the sensor is a middle node in the CANbus device loop, the jumper must be unterminated or shunted across pins #1 and #2.

12.3 Installing Wired Remote Sensors

Up to 10 remote sensor modules, installed in the monitored racks and connected to the cooling unit, provide control and reference input to Vertiv™ Liebert® iCOM and building-management systems. Using remote, rack sensors combats cooling problems related to recirculation air, uneven rack loading, and air distribution.

The sensor array may consist of either T/H or 2T sensors. A T/H sensor shall provide a single temperature reading and a single humidity reading. A 2T sensor possess two probes attached to 6 ft. (1.8m) cabling **Figure 12.3** below , and requires several steps to prepare, connect, and begin monitoring the racks:

- Set DIP switches in each sensor.
- Terminate final sensor on CANbus link.
- Install sensors on racks.
- Install CANbus cabling between sensors.
- Connect CANbus cable to the cooling unit.
- Configure the sensors in Liebert® iCOM™.

NOTE: The 2T sensor shown in Figure 12.3 below , may differ slightly for your system, depending on equipment installed.

Figure 12.3 2T Sensor for Remote Temperature Monitoring

12.3.1 Setting DIP Switches and Labeling Remote Sensors

Tools required:

- Small, non-conductive tool to set switches.
- Small, Phillips head screw driver to open 2T housing.

Each sensor requires a unique address in the CANbus loop connected to the cooling unit. We recommend that you set the DIP switch sensor number setting to correspond to the sensor's location on the CANbus run. If settings are incorrect, the control will not operate properly.

NOTE: Sensors are connected in a daisy chain via CANbus cabling to the cooling unit control board. You can extend the sensor network (up to 10) by adding sensors to the end of the chain and adjusting the termination settings. Do not run individual wires from the sensors to the cooling unit.

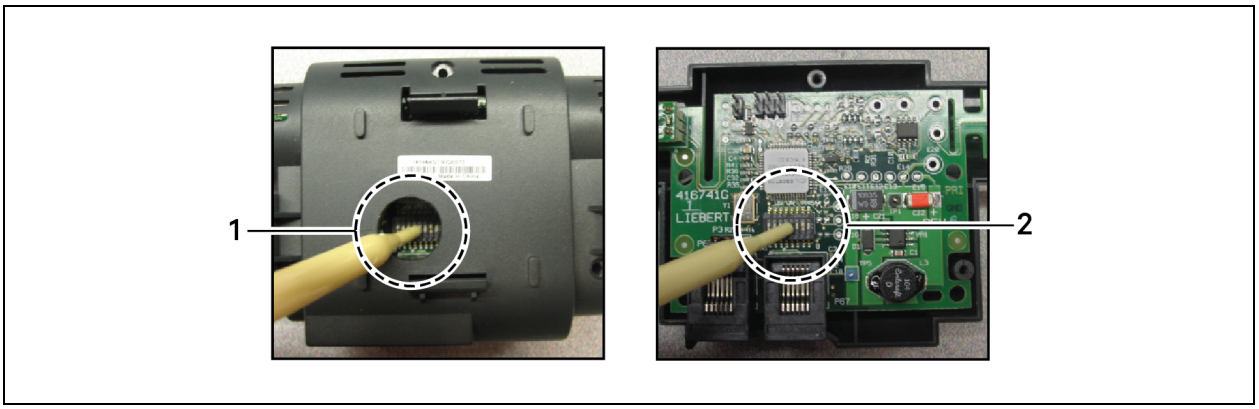
1. Apply numbered stickers to the sensor housing that corresponds to the sensor's position in the chain.
2. Locate the DIP switch hole on the rear of the sensor housing, **Figure 12.4** on the next page .

   – or –

   If the hole is not present, or the settings are difficult to make through the hole, remove the cover by removing the Phillips head screws (typically 3). See **Figure 12.4** on the next page .

NOTE: Use the non-conductive DIP switch tool (included) or a similar tool to set switches. Do not insert any metal object into the sensor case.

Figure 12.4 DIP Switch Opening/DIP Switches Inside of 2T Sensor



Item	Description
1	Hole in sensor housing
2	Cover removed

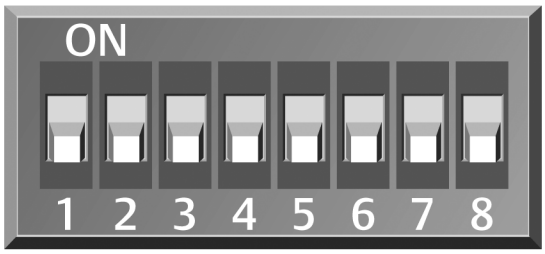
3. Referring to Table 12.3 below , and using the non-conductive tool, set the DIP switches for each sensor to its number in the chain (from sticker applied in step 1).
   Figure 12.5 on the facing page , shows a representation of the DIP switches.
4. Confirm that the DIP switches are set correctly for each sensor, and replace the housing cover if necessary.

Table 12.3 DIP Switch Settings for Wired Remote Sensors

Remote Sensor Number/iCOM Label	CAN ID*	DIP Switch Position							
		1	2	3	4	5	6	7	8
Remote Sensor 1	20	Off	Off	On	Off	On	Off	Off	Off
Remote Sensor 2	21	On	Off	On	Off	On	Off	Off	Off
Remote Sensor 3	22	Off	On	On	Off	On	Off	Off	Off
Remote Sensor 4	23	On	On	On	Off	On	Off	Off	Off
Remote Sensor 5	24	Off	Off	Off	On	On	Off	Off	Off
Remote Sensor 6	25	On	Off	Off	On	On	Off	Off	Off
Remote Sensor 7	26	Off	On	Off	On	On	Off	Off	Off
Remote Sensor 8	27	On	On	Off	On	On	Off	Off	Off
Remote Sensor 9	28	Off	Off	On	On	On	Off	Off	Off
Remote Sensor 10	29	On	Off	On	On	On	Off	Off	Off
*Example: CAN ID 20 corresponds to Remote Sensor 01.									

NOTE: Up is on, down is off on the DIP switch.

Figure 12.5 DIP Switches in 2T or T/H Sensor

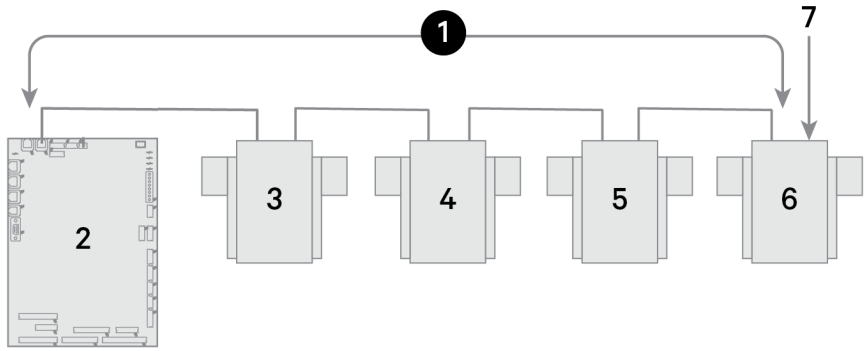


12.3.2 Terminating the Last Sensor on the CANbus link

The remote sensor need not be installed in the numeric-order of their address/sensor number (although it may be easier for later maintenance). However, the last sensor in the chain must be terminated. All others must remain un-terminated. We also recommend that you make a record of the sensor numbers along with the name/number of the rack on which they are installed. Figure 12.6 below , shows an example CANbus arrangement.

NOTE: To add sensors, unterminate final sensor, add sensors to the chain, and terminate the new final sensor.

Figure 12.6 Example Sensor CANbus Arrangement



Item	Description
1	CANbus communication loop
2	Liebert® iCOM™ control board
3	2T sensor
4	2T sensor
5	2T sensor
6	2T sensor
7	Terminated sensor

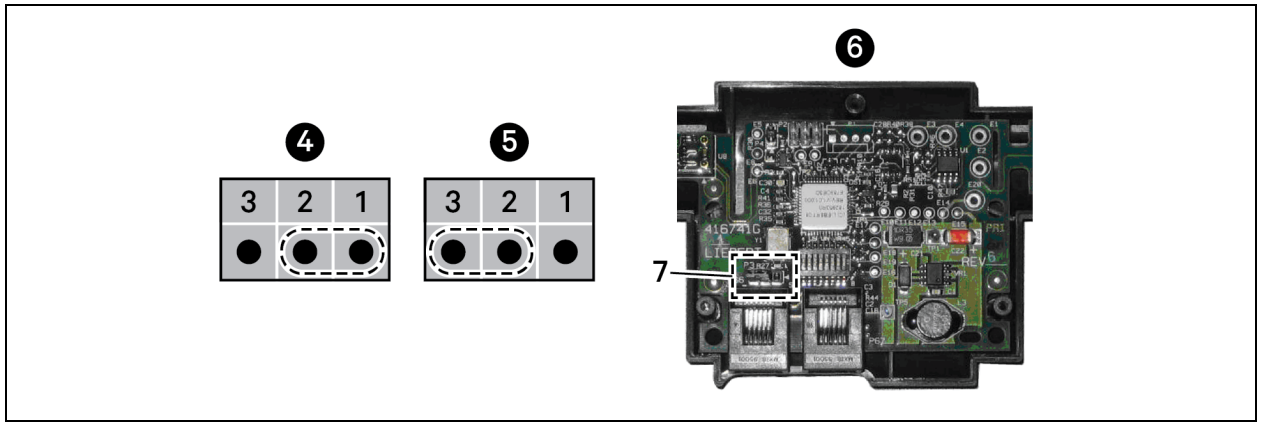
To terminate the last sensor:

1. Locate the sensor that will be last on the network.

NOTE: The last sensor on the network will be the sensor with only one CAN cable after all sensors are connected to the CANbus network. See Connect the CANbus Cable and Ground on page 153 .

2. Open the sensor's case by removing the Phillips head screws (typically 3) on the rear of the housing to access the jumper used for terminating.
3. Remove the black jumper from pins 1 and 2 on the P3 pin connector, and install it on pins 2 and 3 as shown in Figure 12.7 below .
4. Replace the sensor cover. The remote sensor is terminated in the CANbus link.

Figure 12.7 Termination Jumper on 2T or T/H Circuit Board



Item	Description
1	Position 1 (P3 jumper)
2	Position 2 (P3 jumper)
3	Position 3 (P3 jumper)
4	Unterminated
5	Terminated
6	Rear of sensor, cover removed
7	P3 termination jumper

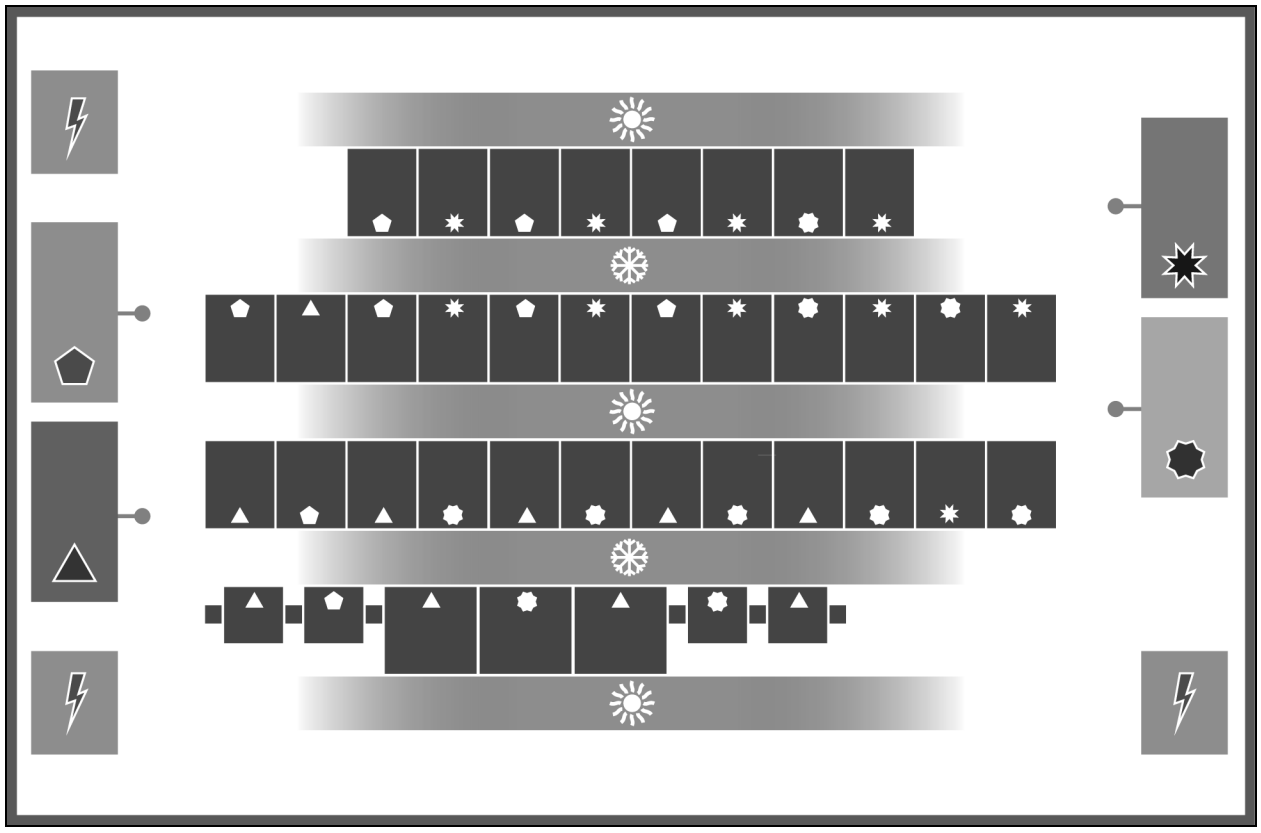
12.3.3 Installing Remote Sensors in the Remote Space to Monitor

Tools required:

- Medium, flat head screw driver to open electric panel dead front
- Cutting tool to trim cable ties

The cooling units and rack sensors in Figure 12.8 below are symbol coded to show how interlacing sensors from different cooling units provides redundancy and effective operation by sharing sensor data from the cooling units in Teamwork mode.

Figure 12.8 Interlacing Sensor Placement



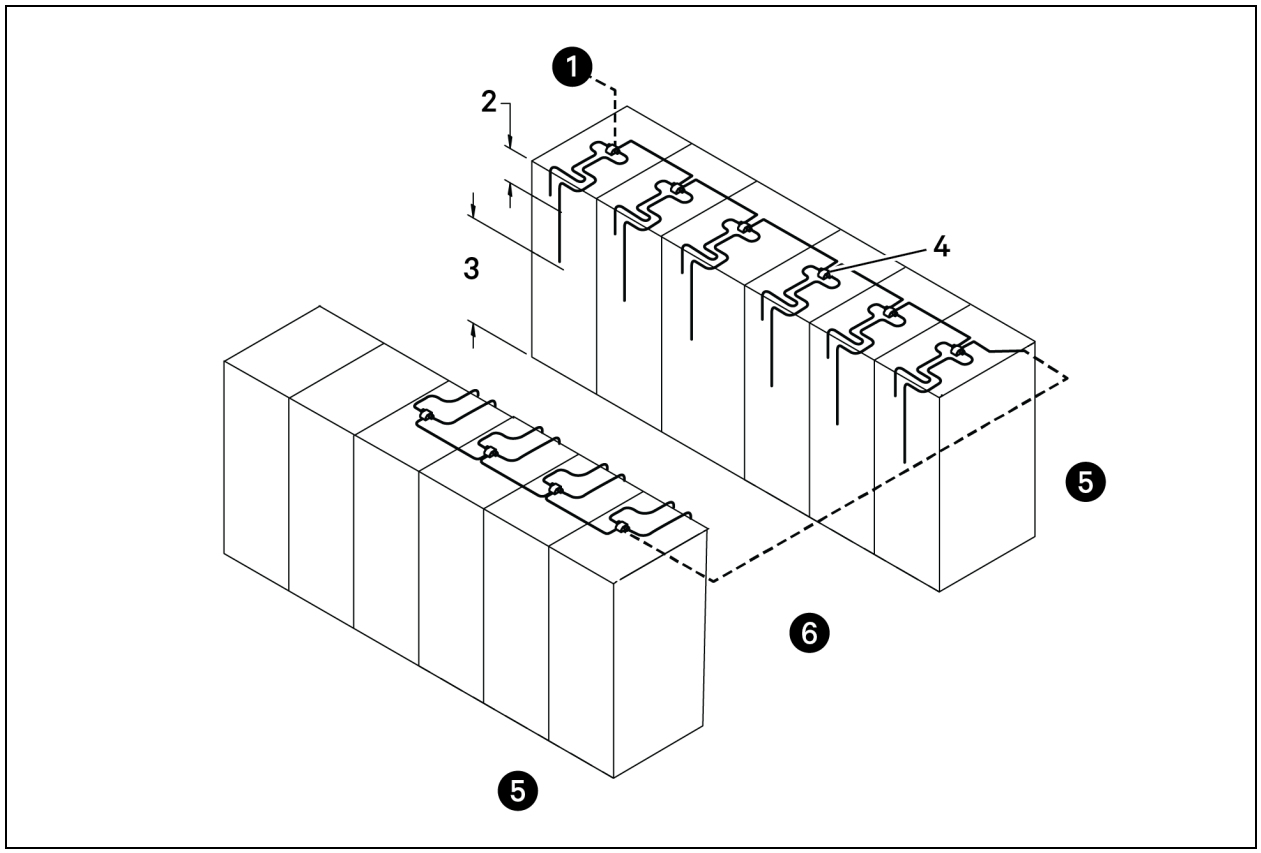
Item	Description	Item	Description
⬟	Unit 1	❄	Cold aisle (front of racks)
▲	Unit 2	☀	Hot aisle (rear of racks)
✸	Unit 3	⊸	Supply (discharge) temperature sensor
✹	Unit 4	ϟ	Power distribution unit

To install the sensors on the racks:

NOTE: Do not leave sensor probes coiled on top or coiled inside of a rack. Do not install a sensor in the hot aisle, or if a sensor is installed in the hot aisle, make sure that it is set to reference to ensure that its readings are not used for fan or cooling control.

1. Install the inlet rack temperature sensors on a rack in the area cooled by its connected unit as shown in Figure 12.9 below .

Figure 12.9 Remote Sensor Placement



Item	Description
1	To cable entry in cooling unit
2	First probe, 12 in. (305 mm) from top
3	Second probe, in approximate center of rack and in front of the equipment
4	2T sensor with label visible
5	Hot aisle
6	Cold aisle

NOTE: Both probes on the 2T sensor must be installed on the same rack.

2. Install the 2T sensor probes the front door of the rack:
    a. Using a cable tie, secure the sensor wire so that a probe is approximately 12 in. (305 mm) from the top and in the center of the front door. This sensor monitors hot air coming over the top of the rack from the hot aisle.

NOTE: Do not wrap cable ties around the actual sensor probe. If the rack has no door, secure the probes to the rack at the side of the front opening.

    b. Use a cable tie to secure the sensor wire of the second probe to the front door so that it is centered in front of the heat generating equipment drawing air.

       If the cabinet is completely filled with equipment, determine the center based on cabinet width and height.

    c. With probes in place, use cable ties to route the wires neatly up the rack door and into the rack leaving enough slack in the wire so that the rack door opens and closes without binding or pinching the wire.
    d. Using the supplied, hook-and-loop fastener, connect the 2T-sensor housing to the rack in an easily accessible location and with the sensor number visible.
3. Repeat step 2 until all sensors are installed.

12.3.4 Connect the CANbus Cable and Ground

WARNING! Risk of electric shock. Can cause equipment damage, injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within any electric connection enclosures. Service and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' specifications. Opening or removing the covers to any equipment may expose personnel to lethal voltages within the unit even when it is apparently not operating and the input wiring is disconnected from the electrical source.

Cabling considerations:

- For cable up to 150 ft. (45-m) long, no special considerations are needed.
- Cable 150 ft. (45 m) to 300 ft. (91 m) require a CANbus isolator.
- For cable longer than 300 ft. (91 m), contact the factory.
- The CANbus cable network requires a ground wire.

To connect the cables:

1. Connect CANbus cable and a ground wire between each sensor for the cooling unit, Figure 12.10 below , taking the following precautions:

NOTE: Remember that the last sensor on the chain must be terminated as described in Terminating the Last Sensor on the CANbus link on page 149 .

- Use only approved hangers, and do not secure cables in a way that could damage them.
- Limit bends to less than four times the diameter of the cable.
- When securing and hanging, avoid deforming the cable.
- Keep cables away from devices that may cause interference such as high voltage wires, machinery, fluorescent lights and electronics.

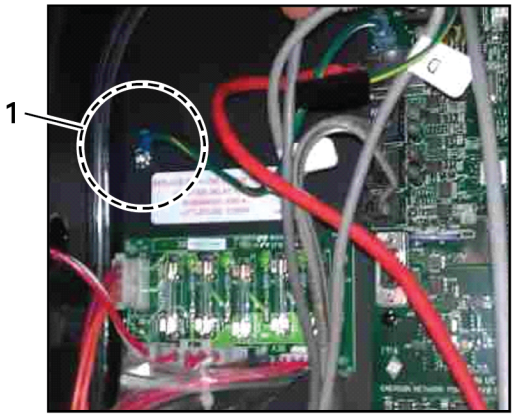
NOTE: High voltage sources much be at least 12 in. (305 mm) from CAN wires.

- Avoid stretching cables.
- Avoid using excess cable between sensors.
- Make sure that cables have the correct pin out. Mismatched pins at the RJ12 connection will damage the CAN device.

Figure 12.10 CANbus and Ground Connection on 2T Sensor

2. Terminate the ground wire to a field installed ground ring in the low voltage electrical panel, as shown in **Figure 12.11** below .
3. Connect the CANbus cable to the cooling unit.
   On most cooling units, the connection points for the CANbus link are P66 and P67.

Figure 12.11 Ground Wire Ring Connection



Item	Description
1	CANbus cable grounding ring connected to grounding screw in unit.

12.4 Installing Supply Air Temperature Sensors

12.4.1 Deploying the Supply Air Temperature Sensor

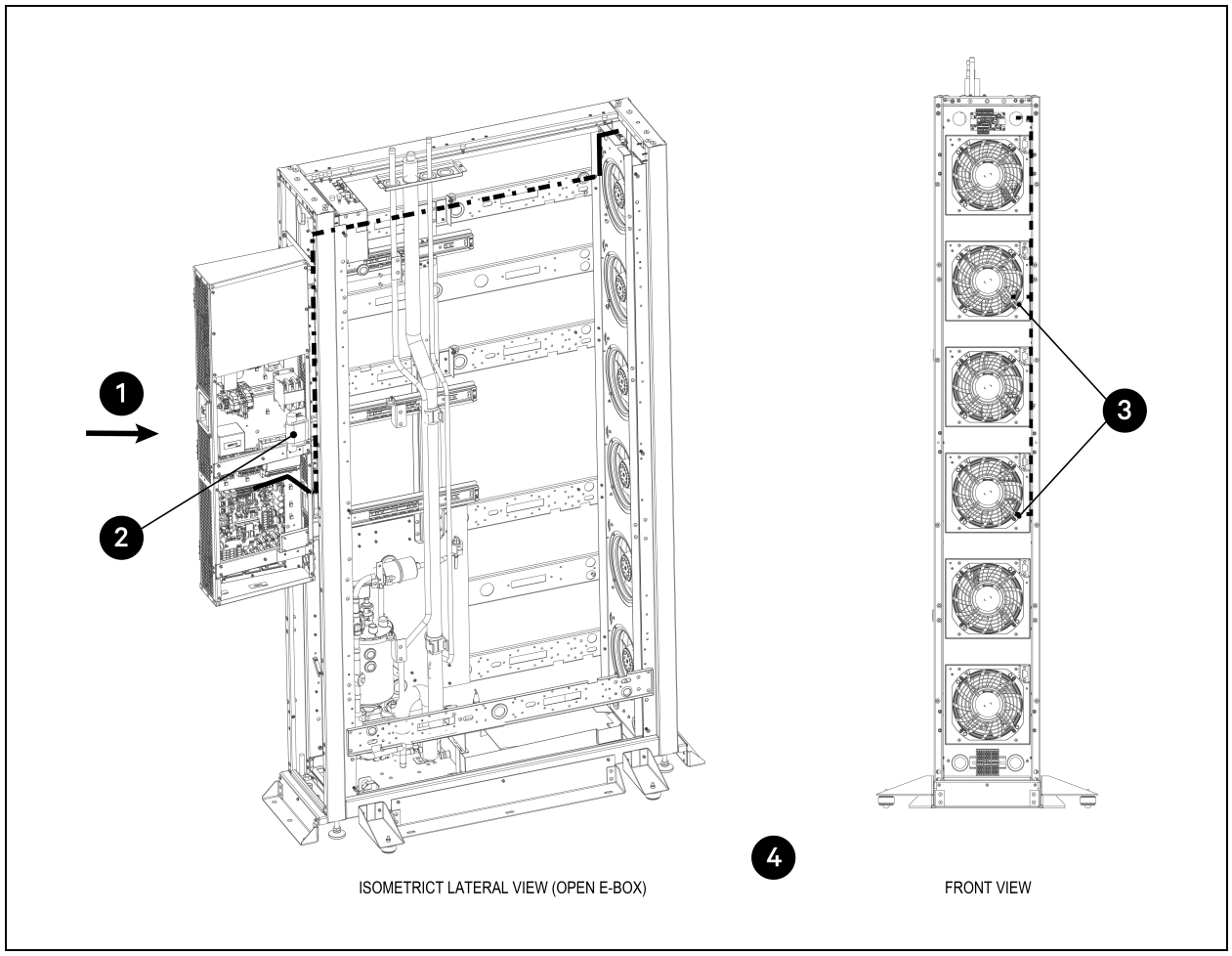
The supply temperature sensor is connected to P8, Pins 1 and 2 at the factory and requires no configuration.

1. Place the sensor in an area that is influenced only by the unit to which it is connected to provide an accurate reading: 5 ft. to 15 ft. (1.5 m to 4.5 m) from the cooling unit, **Figure 12.12** on the next page .

NOTE: A 50 ft. (15 m) extension cable is available from Vertiv™ if the sensor must be more than 15 ft. (4.5 m) from the Vertiv™ Liebert® iCOM unit.

2. Confirm connectivity via SENSOR DATA. See Viewing Sensor Data on page 28 .

Figure 12.12 Placement of the Supply Air Temperature Sensor



Item	Description
1	Return air
2	Temperature/ humidity sensor
3	Supply air
4	Liebert® Thermal Management unit

12.4.2 Installing Additional Aggregated Supply Air Temperature Sensors

On systems with large supply air plenums, up to five additional 2T or T/H sensors may be connected (via CANbus) in addition to the standard supply air sensor. Vertiv™ Liebert® iCOM then aggregates the readings and converts to average or maximum values for supply control.

NOTE: Sensors used for supply sensor aggregation must be programmed as Sensors A-E (iCOM labels). You may utilize either 2T or T/H sensors when configuring Supply Sensor Aggregation. When using T/H sensors, the humidity values will not be utilized in the aggregated calculation.

The sensor array consists of 2T sensors that each have two temperature probes on a 6 ft. (1.8 m) probe connection cable and requires several steps to prepare, connect, and begin monitoring the racks:

- Set DIP switches in each sensor.
- Terminate final sensor on CANbus link.
- Install sensors.
- Install CANbus cabling between sensors.
- Connect CANbus cable to the cooling unit.
- Configure the sensors in Liebert® iCOM.

12.5 Installing Analog Input Devices

External sensors and analog devices may be connected to Vertiv™ Liebert® iCOM using an electrical connection on the iCOM control board to a required, factory-supplied plug, harness and terminal strip. (Contact Vertiv™ technical support for parts.)

When equipped, devices as follows can be connected to terminals 41, 42, 43 and 44, 45 and 46, or 47 and 48. Table 12.4 below , lists available analog inputs depending on the type of cooling unit.

See , to configure the Liebert® iCOM settings for the device.

Table 12.4 Number of Analog Inputs Available by Cooling Unit Type

Cooling Unit	Inputs Available
Liebert® CW and Liebert® PCW with MBV	4 2 may be used for valve feedback on CW, 1 on Liebert® PCW.
Liebert® CW and Liebert® PCW with 3P (floating point actuator)	4 2 may be used for valve feedback on CW, 1 on Liebert® PCW.
Liebert® DS and Liebert® DSE Air-cooled	2 Both used for low pressure transducers.
Liebert® DS Water/Glycol Cooling	0 Models without high pressure transducers may have 2.
Liebert® PDX Air Cooled	3 2 are used for Supply air sensors 1 is used for filter clog
Liebert® PDX Water/Glycol Cooled	2 1 is used for a low pressure transducer. Optionally, a second for a high pressure transducer.

12.6 Installing the U2U Network

12.6.1 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.

U2U Network Requirements

The network must be private:

- Isolated from other network traffic/non-Liebert Thermal equipment.
- Switches connecting the units must be dedicated to Vertiv™ Liebert® iCOM™ communication only.
- Do not connect the U2U network to the building or IT network. If the U2U network experiences a failure, the cooling units continue to operate independently.

Liebert® iCOM™ supports up to 64 nodes on the U2U network. The following are considered nodes:

- Input/output board (one in each cooling unit)
- Nine inch color touchscreen display or vNSA14-iCOM-H

Of the 64 nodes, up to 32 may be cooling unit input/output boards connected as a group. Table 12.5 below , provides U2U network configuration examples.

Table 12.5 Example Liebert® iCOM™ U2U Network Configurations

Configuration Example	No. of Input/Output Boards (Cooling Units)	No. of Wall Mount Displays	Private Switch Required?
A	2	0	No
B	2	1	Yes
C	3	0	Yes
D	8	1	Yes
E	32	5	Yes
F	32	32	Yes

12.6.2 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.

12.6.3 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 on page 79 , and Configuring U2U Network Settings on page 80 .

– or –

Contact Vertiv™ Technical Support at 1-800-543-2778, opt. 5 or https://www.vertiv.com/en-us/support/.

12.6.4 Wiring Cooling Units without Wall Mount Displays

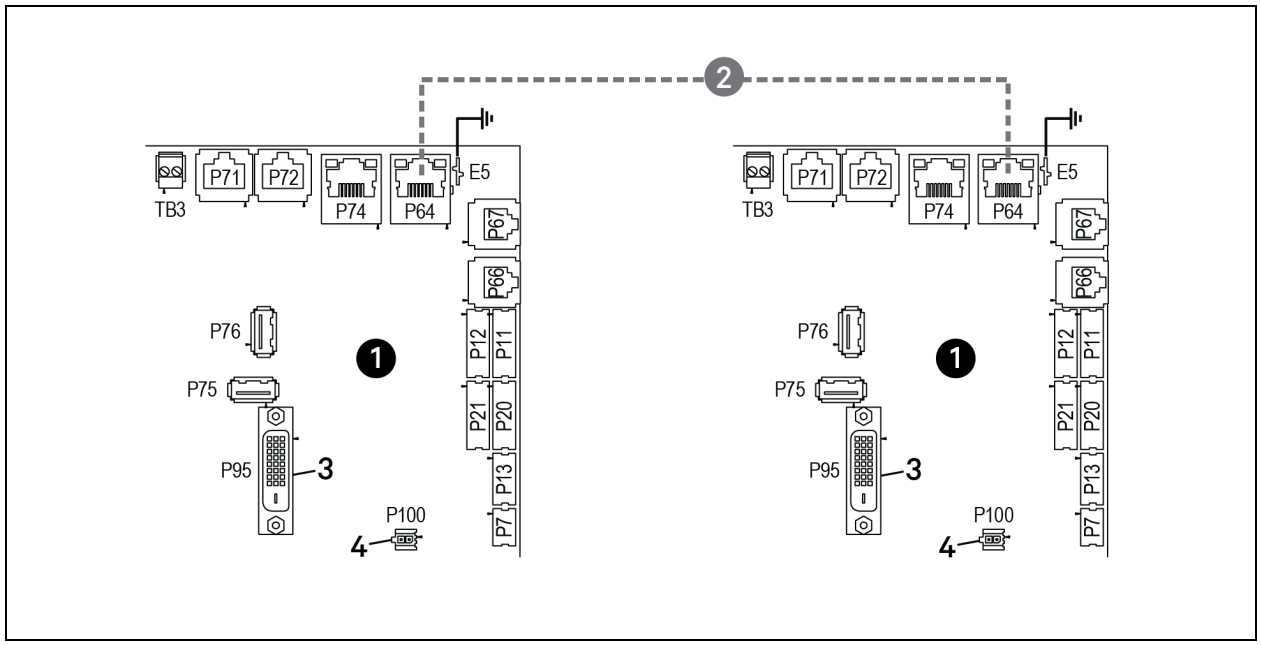
NOTE: Cooling units are factory wired for stand alone operation. Do not connect the U2U network cabling before setting the U2U network configuration/groups. Network communication conflicts and unreliable display readings will result.

NOTE: Before you begin, refer to Preparing for U2U Group Set Up on page 79 , and Configuring U2U Network Settings on page 80 .

To connect two cooling units with a touchscreen, a network switch is not needed.

- Connect an Ethernet cable to the P64 connector on each Vertiv™ Liebert® iCOM control board as shown in Figure 12.13 below .

Figure 12.13 Connection Between Only Two Cooling Units—No Network Switch Needed

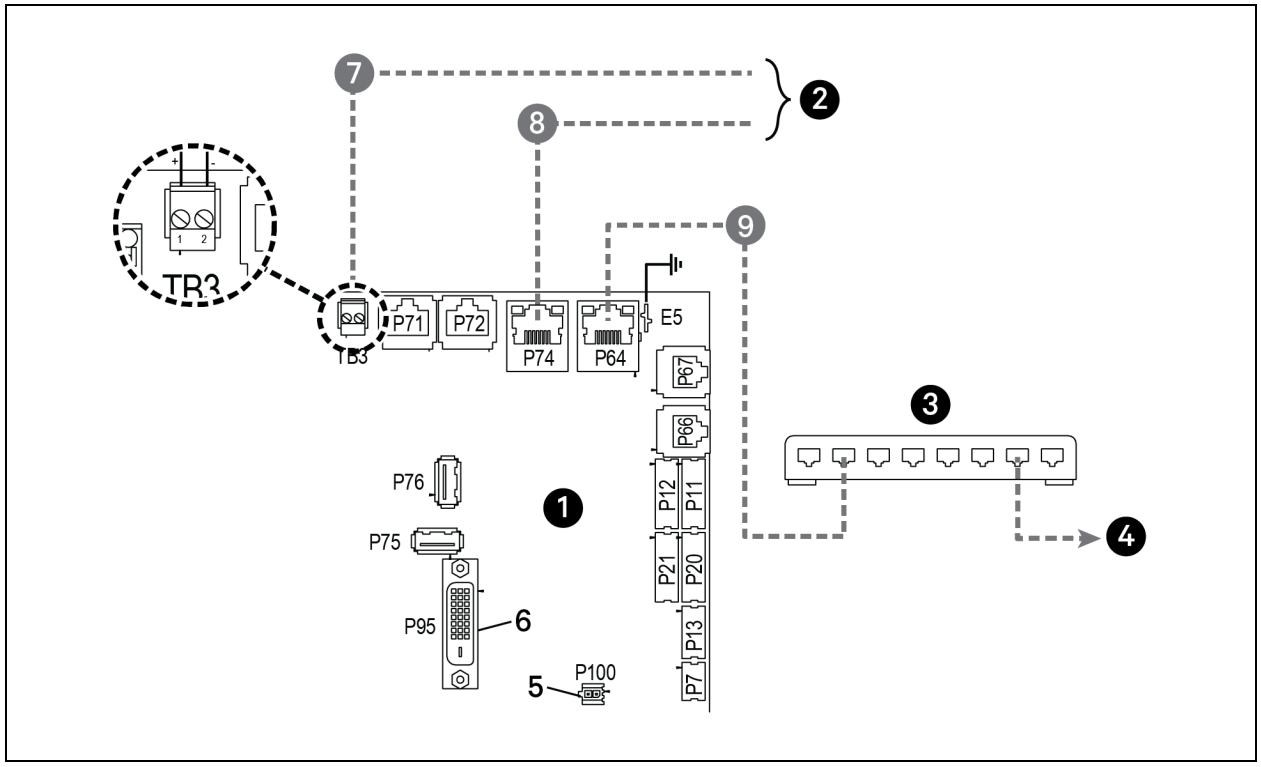


Item	Description
1	Liebert® iCOM microprocessor and I/O board
2	Ethernet cable (field supplied)
3	P95 DVI-D cable connection to Liebert® iCOM display
4	P100, power supply to Liebert® iCOM display

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 Vertiv™ Liebert® iCOM control board, and the other end to the U2U network switch, see Figure 12.14 below .

Figure 12.14 Connecting Two or More Units with a Network Switch



Item	Description
1	Liebert® 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 Liebert® iCOM display
6	P95 DVI-D cable connection to Liebert® iCOM display
7	RS485 cable
8	Ethernet cable
9	Ethernet cable (field supplied)

12.6.5 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 on page 79 , and Configuring U2U Network Settings on page 80 .

Nine inch color touchscreen display or VNSA14-iCOM-H 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.

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.

13 Appendices

Appendix A: Communication Protocol

Table A1. Communication Protocols

Communication Protocol (A though H)										
Third-Party Protocols (B through H)										
Communication Card	LIFE Services Support	Sensor Support	A HTTP/ HTTPS	B Velocity Protocol	C Email	D SMS	E SNMP v1, v2, v3	F BACnet IP/MSTP	G MODBUS TCP/RTU	H YDN23
IS-UNITY-DP	✓	✓	✓	✓	✓	✓	✓	✓	✓	NXL, EXL-S1 & PEX
IS-UNITY-SNMP	✓	–	✓	✓	✓	✓	–	–	–	–
EMBEDDED UNITY	✓	–	✓	✓	✓	✓	✓	✓	✓	–
IS-UNITY-LIFE[2]	✓	✓	✓	✓	✓	✓	–	–	–	–
RDU101	✓	✓	✓	✓	✓	✓	✓	✓[1]	✓[1]	–
SN-Sensor Support	–	–	✓	✓	✓	✓	✓	–	–	–

[1] Please note that BACnet MSTP and Modbus RTU require P/N USB485I, a USB to RS-485 adapter.

[2] The IS-UNITY-LIFE card cannot be ordered. It is provided to customers free of charge as part of a Remote Service Delivery contract.

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 Liebert® iCOM™ user interface.

To search the parameters list:

1. Log in at the Service level, then touch 

>  > Parameter Directory.
2. Enter a line ID or term in the Search field, and touch  .

B.1 Line IDs for Setpoint Parameters

Table B.1 Service Menu Setpoints by Line ID

Line ID	Parameter Name	Range	Default Setting	Description
S102.1	Temperature Control Sensor	Supply Sensor Return Sensor Remote Sensor	Return Sensor	Selects which sensor will be controlling/influencing the cooling capacity. Cooling capacity is either the chilled water valve, compressor, free cooling valve, or air economizer. Unloading type compressors can be set to any sensor type; however, fixed style compressors can only be set to Return or Remote control sensor.
S103.1 S103.2	Temperature Setpoint Actual Temperature Setpoint	32 - 113 °F 0.0 - 45.0°C 41 - 104°F 5.0 - 40.0°C	73°F 23.0°C 73°F 23.0°C	The temperature setpoint actual value is a read-only value that indicates if another routine, such as supply compensation has internally modified the Temperature controlling value. If compensation has not been activated, the ACT and SET will always match. Selects a temperature that the cooling unit will maintain by applying cooling and/or reheats. The temperature setpoint value that has been set by the User to control the temperature.
S104.1	Temperature Control Type	Proportional PI Adaptive PID Intelligent	PI	Sets the type of control to be followed: Proportional, PI, Adaptive PID (auto-tuning), Intelligent
S105.1 S105.2	Temperature User Low Limit Temperature User High Limit	41 - 104°F 5.0 - 40.0°C 41 - 104°F 5.0 - 40.0°C	41°F 5.0°C 10°F 40.0 °C	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. 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.
S106.1	Temperature Proportional Band	4 - 200°F 2.2 - 111.0 K	12°F 6.7 K	Adjusts the activation points of compressors/chilled water valves or rate of changed based on the actual sensor values deviation from setpoint. The smaller 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.
S106.2	Temperature Integral Time	0.0 - 15.0 min	5.0 min	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.

Line ID	Parameter Name	Range	Default Setting	Description
S108.1	AutoSet Enable	No Yes	Yes	Sets the temperature and humidity proportional bands automatically based on the type of unit when this parameter is set to YES and if teamwork modes are selected. To change the proportional bands, this parameter must be set to NO. If supply or remote sensors are used, then this value is always set to NO.
S109.1	Temperature Deadband	0 - 36°F 0 - 20.0 K	2°F 1.1 K	Avoids overshooting of the setpoint and cycling between cooling and reheats. The value entered in this field will be split in half by the temperature setpoint.
S111.1	Heater Deadband	0 - 36°F 0 - 20.0 K	0°F 0.0 K	Changes the amount of deviation below the temperature setpoint that the heaters will cycle ON and OFF. This value is added to the heating side of the normal temperature deadband.
S113.1	Enable Temperature Compensation	No Return Supply Ret+Sup	No	Temperature compensation allows for a second or even a third sensor to be used that will influence the units cooling or heating. Return compensation can be used when the supply or remote sensors are being used for control. Then the return sensor is then monitored to maintain a minimum return temperature. Supply compensation can be used only when Optimized Aisle (TW3) is enabled. The supply sensor will not only be used for controlling cooling capacity but will also monitor the cold aisle temperature to ensure that the cold aisle temperature setpoint is met.
S114.1	Return Compensation Setpoint	41 - 104°F 5.0 - 40.0°C	73°F 23.0°C	The temperature setpoint where compensation begins to operate by increasing the supply air setpoint.
S115.1	Return Compensation Value	0 - 18°F 0.0 - 10.0 K	0°F 0.0 K	The return compensation band/value will determine how quickly the cooling capacity is adjusted as the return temperature drops below the return compensation setpoint.
S115.2	Return Compensation Band	0 - 18°F 0.0 - 10.0 K	0°F 0.0 K	
S116.1	Supply Compensation Value	0 - 18°F 0.0 - 10.0 K	0°F 0.0 K	The Supply Compensation value determines how much the supply temperature setpoint will be reduced when the units fan speed is at 100% and the cold aisle is not able to maintain temperature setpoint. Any modifications to the supply temperature setpoint will be shown at the temperature setpoint on parameter S103 as the actual active control point.
S15C.1	Fan Temp Comp - Operation	Disabled, Enabled	Disabled-Enables	Disables the Fan Temperature Compensation Routine
S121.1	BMS Backup Temp Setpoint	41 - 104°F 5.0 - 40.0°C	73°F 23.0°C	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.
U113.1	2nd Temperature Setpoint	41 - 104°F 5.0 - 40.0°C	73°F 23.0°C	Selects a temperature setpoint that will be activated in the event of a customer input signal configured as the second setpoint. The customer input must be configured for the parameter to activate.
S124.1	Humidity Control Sensor	Remote Sensor Return Sensor	Return Sensor	Defines which humidity sensor the humidity setpoint is compared with. The return sensor is equipped with a Temp/Hum sensor and can calculate the dew point based on Liebert® iCOM™'s internal look up table. If a sensor other than the return sensor is selected, the Liebert® iCOM™ will calculate the corresponding RH % based on that sensors actual temperature.
S125.1	Dew Point Setpoint & Humidity Setpoint	41 - 65°F 5.0 - 18.3°C	48°F 8.9°C	Selects a humidity level that the cooling unit will maintain by removing or adding moisture to the air. The humidity setpoint will either be set in percent RH or as a dew point value, depending on what the humidity control type is set for.

Line ID	Parameter Name	Range	Default Setting	Description
S126.1	Humidity Control Type	Relative Compensated Predictive Dew Point	Predictive	Selects the humidity control calculation. Setting this parameter to relative (%RH) will control the humidity without considering any temperature deviations. Predictive and Absolute control consider the temperature deviation from temperature setpoint so that a constant level of moisture is kept in the area based on the humidity sensor reading and the temperature deviation from setpoint. Compensated is recalculated with the actual deviation from temperature setpoint. 1° Celsius is equal to 3 % RH, indirect proportional. If temperature increases, the humidity setpoint is decreased and vice versa.
S127.1	Humidity Proportional Band	1 - 20%	0.2	Adjusts the activation points of the humidifier and compressors based on the actual sensor values deviation from setpoint. The smaller this number, the faster the compressors and humidifier will increase capacity. Too small of a number may cause the unit to short cycle or overshoot setpoint.
S127.2	Dew Point Proportional Band	2 - 18°F 1.1 - 10.0 K	8°F 4.4 K	
S128.2	Humidity Integration Time	0.0 - 25.0 min	0.0 min	Adjusts the capacity of the unit based on a time away from setpoint so that accurate humidity control can be maintained. If the integration time is set to 0, the humidity control operates as a proportional only control. When integration time is set, the control mode changes to PI control
S129.1	Humidity Deadband	0 - 18°F 0.0 - 10.0 K	4°F 2.2 K	Prevents overshooting of the setpoint and cycling between humidification and dehumidification. The value entered in this field will be split in half by the temperature setpoint.
S146.1	Fan Control Sensor	Supply Sensor Remote Sensor Return Sensor Manual	Return Sensor	Controls the fan speed for modulation. If MANUAL is selected, then the fan speed can be controlled from the local display or through a building management system.
S147.1	Fan Setpoint	41 - 104°F 5.0 - 40.0 °C	73°F 22.8°C	Activated when a temperature sensor is being used to control the fan speed. If the same sensor is used for temperature control and fan speed control, then this value will reflect the same setpoint as the temperature control setpoint. Manual mode uses fan speed STD for control.
S148.1	Fan Temperature Control Type	Proportional PI Adaptive PID	PI	Sets the type of control the unit will use to control fan speed. PI control gain is set in the Temp Prop/Integral parameter. PI control will operate the fan speed so that the actual temperature of the fan control sensor is equal to the fan temp setpoint. If PROPORTIONAL only is selected, the fan will change ONLY based on the deviation from setpoint which will allow the actual temp to settle higher than setpoint.
149.1	Fan Temperature Control Prop Band	4 - 200°F 2.0 - 111.0 K	36°F 20.0 K	Adjusts the fan speed rate of change based on the actual sensor values deviation from setpoint. The small this number, the faster the fans will increase speed. Too small of a number may cause the fans increase/decrease to overshoot setpoint
149.2	Fan Temperature Control Integration Time	0.0 - 15.0 min	1.0 min	Adjusts the fans of the unit based on time away from setpoint so that accurate temperature control can be maintained. The proportional and integral work together to maintain setpoint. Large p-band with small integral time is a typical way to achieve stable control.
S150.1	Fan Hysteresis	0 - 20%	0.02	Modifies the reaction of the fan speed when fan speed is being dictated by the Call for Cooling. Adding the Hysteresis may result in a lagged response to changes in fan speed.
S150.2	Fan Deadband	0 - 36°F 0 - 20.0 K	°F 0.6 K	Avoids overshooting of the setpoint. The value entered in this field will be split in half by the fan speed setpoint.
S151.1	Airflow Calibration	3.0 - 10.0 V	10.0 V	Allows the front display to be scaled to show the actual percentage of airflow independent of the voltage operating the fan speed. This value cannot be set

Line ID	Parameter Name	Range	Default Setting	Description
				above/below the Analog Output High/Low Limit for the fan set in the Advanced Menu. This also includes the service menu fan speed parameters.
S152.1	Fanspeed VSD Setpoint Minimum	0 - 100%	0.7	Sets the range for the variable fans. Min sets the minimum speed at which the fan will operate. Fan speed is modulated between MIN and STD based on which sensor is set as the controlling sensor, setpoint and the PI settings. If the controlling sensor is set to manual, then the STD setting will control the current fan speed. This parameter is also adjustable through the BMS.
S152.2	Fanspeed VSD Setpoint Standard	0 - 100%	1	
S157	Fan Startup Time	0 - 600 sec	3 sec	Determines the speed of the fan at system start up. The fan will operate at the set speed (%) until the set time has elapsed; at this point the fan will assume normal operation.
	Fan Startup Speed	0 - 100%	100%	

B.2 Line IDs for Alarm Setting Parameters

Table B.2 Service Menu Alarm Settings by Line ID

	Parameter Name	Range	Default Setting	
S202	Return Sensor Alarms Enable	Disabled Enabled	Enabled	Enables or disables the return temperature and humidity sensor alarms.
	Return Sensor Alarms Init Delay	10 - 9999 sec	90 sec	
S203	High Return Temperature Alarm	34 - 210 °F 1.0 - 99.0 °C	100 °F	Sets the temperature threshold for the high/low return temperature alarms.
	Low Return Temperature Alarm	34 - 210 °F 1.0 - 99.0 °C	65 °F	
S202.3	High Ret Temp by Delta to Sup Set	Disabled Enabled	Enabled	
S202.4	High Ret Temp Delta to Sup Set	11 - 54°F	35°F	
S204	High Return Humidity Alarm	1.0 - 99.0 %	0.65	Sets the humidity threshold for the high/low return temperature alarms.
	Low Return Humidity Alarm	1.0 - 99.0 %	0.35	
S205	Sensor A Alarms Enable	Disabled Enabled	Disabled	Enables or disables the alarms associated with Sensor A and sets the time delay before the alarm is annunciated.
	Sensor A Alarms Init Delay	10 - 9999 sec	90 sec	
S206	Sensor A Low Temperature Alarm	34 - 210 °F 1.0 - 99.0 °C	55 °F	Sets the temperature threshold when Sensor A high/low temperature alarm will occur.
	Sensor A High Temperature Alarm	34 - 210 °F	90 °F	

	Parameter Name	Range	Default Setting	
		1.0 - 99.0 °C		
S207	Sensor A Low Humidity Alarm Sensor A High Humidity Alarm	1.0 - 99.0% 1.0 - 99.0%	30.0% 70.0%	Sets the temperature threshold when Sensor A high/low humidity alarm will occur.
S208	Warning Activates Alarm Relay	No Yes	Yes	When set for Yes, a Warning event type will activate the Alarm Relay as well as an Alarm event type.
S211	Water Alarm Shuts Down Unit Water Alarm Hum Fill Down	No Yes No Yes	No No	The controller can be configured to shut the following down during an active Water Alarm: • Shutdown the entire unit • Shutdown humidification operation
S213	Supply Sensor Alarms Enable	Disabled Enabled	Disabled	Enables or disables the supply sensor alarms. If the unit is not equipped with a supply temperature sensor, then this parameter will show Disabled. A user may also select the time delay before the alarm will become active.
	Supply Sensor Alarms Init Delay	10 - 9999 sec	90 sec	
S214	High Supply Temperature Low Supply Temperature	34 - 210 °F 1.0 - 99.0 °C 34 - 210 °F 1.0 - 99.0 °C	75 °F 50 °F	Sets the high and low supply temperature threshold at which the alarms will be triggered.
S215	Dew Point Alarms Enable	Disabled Enabled	Disabled	Enables or disables the Return Air Dew Point alarm. Dew point alarms can be enabled with any humidity control type. Dew point alarms may be used with or without humidification or dehumidification options selected. A user may adjust the time delay before the alarm is activated.
	Dew Point Alarms Init Delay	10 - 9999 sec	90 sec	
S216	High Dew Point Low Dew Point	34 - 210 °F 1.0 - 99.0 °C 34 - 210 °F 1.0 - 99.0 °C	59 °F 39 °F	Sets the high/low dew point threshold.
S217	Sensor A Dew Point Alarms Enable	Disabled Enabled	Disabled	Enables or disables the optional Sensor A Dew Point alarm. Dew Point alarms can be enabled with any humidity control type. Dew point alarms may be used with or without humidification or dehumidification options selected. A user may adjust the time delay before the alarm is activated.
	Sensor A Dew Point Alarms Init Delay	10 - 9999 sec	90 sec	
S218	High Dew Point Sensor A Low Dew Point Sensor A	34 - 210 °F 1.0 - 99.0 °C 34 - 210 °F 1.0 - 99.0 °C	62 °F 36 °F	Sets the high/low Sensor A dew point thresholds.
S219	Remote Sensor Alarms Enable	0 = Disabled 1 = Com Set 2 = Sep Set	Disabled	Disable prevents remote temperature sensor alarms from occurring. Com Set or common setting allows remote alarm activation based on a common alarm setting. Sep Set, or separate setting allows the user to program unique temperature alarm settings. A user may adjust the time delay before the alarm is activated.
	Remote Sensor Alarms Init Delay	10 - 9999 sec	180 sec	

	Parameter Name	Range	Default Setting	
S220	High Remote Temperature	34 - 210 °F 1.0 - 99.0 °C	90 °F	Sets the high/low remote sensor alarm thresholds.
	Low Remote Temperature	34 - 210 °F 1.0 - 99.0 °C	55 °F	
S22A	Operation on Sensor Failure	0 = Cooling 1 = Shutdown	0 (Cooling)	Selects function to occur if the temperature control sensor fails. Full = Full, CFC Hold = hold last CFC
	Operation on Sensor Failure Cooling Mode	0 = Full 1 = Hold	0 (Full)	
S236	Event Delay Time (sec)	10 - 9999 sec	10 sec	Main fan overload.
	Event Enabled	Disabled Enabled	Enabled	
	Event: MAIN FAN OVERLOAD	MESSAGE WARNING ALARM	ALARM	
S237	Initial Loss of Airflow Delay	10 - 600 sec	30 sec	Loss of airflow.
	Event Delay Time (sec)	10 - 9999 sec	30 sec	
	Event Enabled	Disabled Enabled	Enabled	
	Event: LOSS OF AIRFLOW	MESSAGE WARNING ALARM	ALARM	
S238	Event Delay Time (sec)	10 - 9999 sec	10 sec	Clogged filters.
	Event Enabled	Disabled Enabled	Enabled	
	Event: CLOGGED FILTERS	MESSAGE WARNING ALARM	WARNING	
S239	Event Delay Time (sec)	10 - 9999 sec	30 sec	High room temperature.
	Event Enabled	Disabled Enabled	Enabled	
	Event: HIGH ROOM TEMP	MESSAGE WARNING ALARM	WARNING	
S240	Event Delay Time (sec)	10 - 9999 sec	30 sec	Low room temperature.
	Event Enabled	Disabled Enabled	Enabled	

	Parameter Name	Range	Default Setting	
	Event: LOW ROOM TEMP	MESSAGE WARNING ALARM	WARNING	
S241	Event Delay Time (sec)	10 - 9999 sec	30 sec	High room humidity.
	Event Enabled	Disabled Enabled	Enabled	
	Event: HIGH ROOM HUM	MESSAGE WARNING ALARM	WARNING	
S242	Event Delay Time (sec) Event Enabled Event: LOW ROOM HUM	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	30 sec Enabled WARNING	Low room humidity.
S243	Event Delay Time (sec)	10 - 9999 sec	30 sec	High temperature Sensor A.
	Event Enabled	Disabled Enabled	Disabled	
	Event: HIGH TEMP SENSOR A	MESSAGE WARNING ALARM	WARNING	
S244	Event Delay Time (sec) Event Enabled Event: LOW TEMP SENSOR A	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	30 sec Disabled WARNING	Low temperature Sensor A.
S245	Event Delay Time (sec)	10 - 9999 sec	30 sec	High humidity sensor A.
	Event Enabled	Disabled Enabled	Disabled	
	Event: HIGH HUM SENSOR A	MESSAGE WARNING ALARM	WARNING	
S246	Event Delay Time (sec) Event Enabled Event: LOW HUM SENSOR A	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	30 sec Disabled WARNING	Low humidity sensor A.

	Parameter Name	Range	Default Setting	
S251	Event Delay Time (sec)	–	–	Circuit 1 high pressure.
	Event Enabled	Disabled Enabled	Enabled	
	Event: CIRCUIT 1 HIGH PRESS	MESSAGE WARNING ALARM	ALARM	
S253	Event Delay Time (sec)	–	–	Circuit 1 low pressure.
	Event Enabled	Disabled Enabled	Enabled	
	Event: CIRCUIT 1 LOW PRESS	MESSAGE WARNING ALARM	ALARM	
S257	Event Delay Time (sec)	–	–	Digital scroll 1 high temperature.
	Event Enabled	Disabled Enabled	Enabled	
	Event: DIG SCROLL1 HIGH TEMP	MESSAGE WARNING ALARM	ALARM	
S259	Event Reset Type	0 = AR 1 = MR	0 (AR)	Electric heat high temperature. AR = Auto Reset, MR = Manual Reset.
	Event Delay Time (sec)	10 - 9999 sec	10 sec	
	Event Enabled	Disabled Enabled	Enabled	
	Event: EL HEAT HIGH TEMP	MESSAGE WARNING ALARM	ALARM	
S262	Event Delay Time (sec) Event Enabled Event: UNIT HRS EXCEEDED	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled WARNING	Working hours exceeded.
S263	Event Delay Time (sec)	10 - 9999 sec	10 sec	Smoke detected.
	Event Enabled	Disabled Enabled	Enabled	
	Event: SMOKE DETECTED	MESSAGE WARNING ALARM	ALARM	
S264	Event Delay Time	10 - 9999 sec	10 sec	Water under floor.

	Parameter Name	Range	Default Setting	
	(sec) Event Enabled Event: WATER UNDER FLOOR	 Disabled Enabled MESSAGE WARNING ALARM	Enabled ALARM	
S265	Event Delay Time (sec)	10 - 9999 sec	10 sec	Cond. pump high water.
	Event Enabled	Disabled Enabled	Enabled	
	Event: COND PUMP-HIGH WATER	MESSAGE WARNING ALARM	ALARM	
S268	Event Delay Time (sec) Event Enabled Event: STANDBY UNIT ON	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled ALARM	Standby unit ON.
S269	Event Delay Time (sec)	10 - 9999 sec	10 sec	Humidifier problem.
	Event Enabled	Disabled Enabled	Enabled	
	Event: HUMIDIFIER PROBLEM	MESSAGE WARNING ALARM	ALARM	
S270	Event Delay Time (sec) Event Enabled Event: NO CONNECTION W/ UNIT1	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	300 sec Enabled WARNING	No connection with Unit 1.
S271	Event Delay Time (sec)	–	–	Unit X disconnected.
	Event Enabled	Disabled Enabled	Enabled	
	Event: UNIT 01 DISCONNECTED	MESSAGE WARNING ALARM	WARNING	
S272	Event: Loss of power Autoreset Delay Event Enabled	60 - 3600 sec Disabled Enabled	300 sec Enabled	Loss of power.

	Parameter Name	Range	Default Setting	
	Event: LOSS OF POWER	MESSAGE WARNING ALARM	WARNING	
S275	Event Delay Time (sec)	10 - 9999 sec	10 sec	Customer input 1.
	Event Enabled	Disabled Enabled	Enabled	
	Event: CUSTOMER INPUT 1	MESSAGE WARNING ALARM	ALARM	
S276	Event Delay Time (sec) Event Enabled Event: CUSTOMER INPUT 2	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled ALARM	Customer input 2.
S277	Event Delay Time (sec)	10 - 9999 sec	10 sec	Customer input 3.
	Event Enabled	Disabled Enabled	Enabled	
	Event: CUSTOMER INPUT 3	MESSAGE WARNING ALARM	ALARM	
S278	Event Delay Time (sec) Event Enabled Event: CUSTOMER INPUT 4	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled ALARM	Customer input 4.
S279	Event Delay Time (sec)	10 - 9999 sec	10 sec	Call service.
	Event Enabled	Disabled Enabled	Enabled	
	Event: CALL SERVICE	MESSAGE WARNING ALARM	ALARM	
S280	Event Delay Time (sec) Event Enabled Event: HIGH TEMPERATURE	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled ALARM	High temperature.

	Parameter Name	Range	Default Setting	
S281	Event Delay Time (sec)	10 - 9999 sec	10 sec	Loss of Air Blower 1.
	Event Enabled	Disabled Enabled	Disabled	
	Event: LOSS OF AIR BLOWER 1	MESSAGE WARNING ALARM	ALARM	
S282	Event Delay Time (sec) Event Enabled Event: REHEAT LOCKOUT	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled WARNING	Reheat Lockout
S283	Event Delay Time (sec)	10 - 9999 sec	10 sec	Humidifier lockout.
	Event Enabled	Disabled Enabled	Enabled	
	Event: HUMIDIFIER LOCKOUT	MESSAGE WARNING ALARM	WARNING	
S288	Event Delay Time (sec) Event Enabled Event: COMP 1 SHORT CYCLE	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled WARNING	Compressor 1 short cycle.
S290	Event Delay Time (sec) Event Enabled Event: EMERGENCY POWER	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled WARNING	Emergency power.
S291	Event Delay Time (sec)	10 - 9999 sec	10 sec	Condenser 1 failure.
	Event Enabled	Disabled Enabled	Enabled	
	Event: CONDENSER 1 FAILURE	MESSAGE WARNING ALARM	WARNING	
S293	Event Delay Time (sec)	10 - 9999 sec	15 sec	EC fan {n}fault, where {n} is the number of the fan.
	Event Enabled	Disabled	Enabled	

	Parameter Name	Range	Default Setting	
		Enabled		
	Event: EC FAN FAULT	MESSAGE WARNING ALARM	ALARM	
S294	Event Delay Time (sec) Event Enabled Event: HI SUPPLY TEMPERATURE	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	30 sec Enabled WARNING	High supply temperature.
S295	Event Delay Time (sec)	10 - 9999 sec	30 sec	Low supply temperature.
	Event Enabled	Disabled Enabled	Enabled	
	Event: LO SUPPLY TEMPERATURE	MESSAGE WARNING ALARM	WARNING	
S298	Event Delay Time (sec) Event Enabled Event: TEMP CTRL SENSOR FAIL	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled ALARM	Temperature control sensor fail.
S2A2	Event Delay Time (sec)	10 - 9999 sec	30 sec	High dew point.
	Event Enabled	Disabled Enabled	Enabled	
	Event: HIGH DEW POINT	MESSAGE WARNING ALARM	WARNING	
S2A3	Event Delay Time (sec) Event Enabled Event: LOW DEW POINT	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	30 sec Enabled WARNING	Low dew point.
S2A4	Event Delay Time (sec)	10 - 9999 sec	30 sec	High dew point sensor A.
	Event Enabled	Disabled Enabled	Enabled	
	Event: HI DEW POINT SENSOR A	MESSAGE WARNING	WARNING	

	Parameter Name	Range	Default Setting	
		ALARM		
S2A5	Event Delay Time (sec) Event Enabled Event: LOW DEW POINT SENSOR A	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	30 sec Enabled WARNING	Low dew point sensor A.
S2A6	Event Delay Time (sec)	10 - 9999 sec	30 sec	High remote sensor.
	Event Enabled	Disabled Enabled	Enabled	
	—	MESSAGE WARNING ALARM	WARNING	
S2A7	Event Delay Time (sec) Event Enabled —	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	30 sec Enabled WARNING	Low remote sensor.
S2B1	Event Delay Time (sec)	10 - 9999 sec	10 sec	Airflow sensor failure.
	Event Enabled	Disabled Enabled	Enabled	
	Event: AIRFLOW SENSOR FAIL	MESSAGE WARNING ALARM	WARNING	
S2B2	Event Delay Time (sec) Event Enabled Event: HUM CTRL SENSOR FAILURE	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	30 sec Enabled WARNING	Humidity control sensor failure.
S2E6	Event Delay Time (sec)	10 - 9999 sec	60 sec	GCB ambient temperature differential.
	Event Enabled	Disabled Enabled	Enabled	
	Event: GCD AMBIENT TEMP DIFF	MESSAGE WARNING ALARM	WARNING	

	Parameter Name	Range	Default Setting	
SF2F	–	–	–	BMS disconnected.
	Event Enabled	Disabled Enabled	Enabled	
	Event: BMS DISCONNECTED	MESSAGE WARNING ALARM	WARNING	
S2F9	Phase Loss MB01 shuts unit down Event Delay Time (sec) Event Enabled Event: POWER 1 PHASE LOSS	0 = No 1 = Yes 10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	1 (Yes) 10 sec Enabled ALARM	Power 1 phase loss.
S2G1	Phase Loss MB02 shuts unit down	0 = No 1 = Yes	1 (Yes)	Power 2 phase loss.
	Event Delay Time (sec)	10 - 9999 sec	10 sec	
	Event Enabled	Disabled Enabled	Enabled	
	Event: POWER 2 PHASE LOSS	MESSAGE WARNING ALARM	ALARM	
S2G2	Phase Loss MB03 shuts unit down Event Delay Time (sec) Event Enabled Event: POWER 3 PHASE LOSS	0 = No 1 = Yes 10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	1 (Yes) 10 sec Enabled ALARM	Power 3 phase loss.
S2G3	Phase Loss MB04 shuts unit down	0 = No 1 = Yes	1 (Yes)	Power 4 phase loss.
	Event Delay Time (sec)	10 - 9999 sec	10 sec	
	Event Enabled	Disabled Enabled	Enabled	
	Event: POWER 4 PHASE LOSS	MESSAGE WARNING ALARM	ALARM	
S2G4	Phase Loss MB05 shuts unit down	0 = No 1 = Yes	1 (Yes)	Power 5 phase loss.

	Parameter Name	Range	Default Setting	
	Event Delay Time (sec) Event Enabled Event: POWER 5 PHASE LOSS	10 - 9999 sec Disabled Enabled MESSAGE WARNING ALARM	10 sec Enabled ALRM	
S2G5	Phase Loss MB06 shuts unit down	0 = No 1 = Yes	1 (Yes)	Power 6 phase loss.
	Event Delay Time (sec)	10 - 9999 sec	10 sec	
	Event Enabled	Disabled Enabled	Enabled	
	Event: POWER 6 PHASE LOSS	MESSAGE WARNING ALARM	ALARM	

Line ID	Parameter Name	Range	Default Setting	Description
EVT.737	REMOTE POWERING OFF	MSG - WRN - ALM	Alarm	Remote power on/off switch is different from the set value.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.738	SUCTION TMP SNSR FAIL	MSG - WRN - ALM	Alarm	Suction temperature exceeds the normal range.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.739	COMPR DRV COMM FAIL	MSG - WRN - ALM	Alarm	The main control board cannot communicate with the compressor driver board for 30s.
	[Delay Time]	0 - 9999	30 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.740	FAN DET BOARD COM FAIL	MSG - WRN - ALM	Alarm	The main control board cannot communicate with the 10DI board for 20s.
	[Delay Time]	0 - 9999	20 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.741	POWER UNDERVOLTAGE	MSG - WRN - ALM	Alarm	The power input voltage is lower than the under-voltage alarm value.
	[Delay Time]	0 - 9999	10 sec	

Line ID	Parameter Name	Range	Default Setting	Description
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.742	POWER FREQUENCY OFFSET	MSG - WRN - ALM	Alarm	The power frequency offset exceeds ±3Hz.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.743	VFD 1 OVERCURRENT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor driver overcurrent" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.744	VFD 1 OVERVOLTAGE	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor driver overvoltage" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.745	VFD 1 PRECHARGE_ FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor driver precharge_fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.746	VFD 1 UNDERVOLTAGE	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor driver undervoltage" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.747	VFD 1 AC_DRIVE_ OVERLOAD	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor ac_drive_overload" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.748	VFD 1 MOTOR OVERLOAD	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor motor overload" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.749	VFD 1 INPUT_PH_	MSG - WRN	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the

Line ID	Parameter Name	Range	Default Setting	Description
	LOSS	- ALM		"compressor input phase loss" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.750	VFD 1 OUTPUT_PH_LOSS	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor output phase loss" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.751	VFD 1 OVERHEAT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor output phase loss" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.752	VFD 1 EXT_FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor external fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.753	VFD 1 PRECHRG_CIRC_EXC	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor PRECHRG_CIRC_EXC" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.754	VFD 1 CURR_SAMPLING_EXC	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor current sampling abnormal" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.755	VFD 1 AUTOTUNE_EXC	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor autotune abnormal" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.756	VFD 1 ENCODER_EXC	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor encoder abnormal" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off	1 (On)	

Line ID	Parameter Name	Range	Default Setting	Description
		1 = On		
EVT.757	VFD 1 EEPROM_ FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor EEPROM fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.758	VFD 1 ENCODER_ NOT_ACT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor encoder not active" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.759	VFD1 OUTPUT_ SHORT_GROUND	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor output short ground" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.760	VFD 1 ACCUM_RUN_ REACH	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor accum run reach" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.761	VFD 1 USER_DEF_ FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor user define fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.762	VFD 1 USER_DEF_ ALARM	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor user define" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.763	VFD 1 ACCUM_ POW_ON_REACH	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor accum power on reach" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.764	VFD 1 OUTPUT_LD_ LOSS	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor output all three phases loss" alarm is triggered.

Line ID	Parameter Name	Range	Default Setting	Description
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.765	VFD 1 PID_FDBK_ LOSS	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor PID feedback loss" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.766	VFD 1 PARAM_EXC	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor parameter abnormal" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.767	VFD1 PULSE_CURR_ LIM_FAUL	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor pulse current limit fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.768	VFD 1 SPEED_ DEVIATON	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor speed overdeviation" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.769	VFD 1 MOTOR_ OVERSPEED	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor motor overspeed" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.770	VFD 1 MOTOR_ OVERTEMP	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor motor over temperature" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.771	VFD 1 STO_FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor STO fault alarm" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	

Line ID	Parameter Name	Range	Default Setting	Description
EVT.772	VFD 1 POLE_POS_ ERROR	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor pole position error" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.773	VFD1 MSTR_SLV_ CTRL_FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor master slave control fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.774	VFD 1 SELF_CHECK_ FAULT1	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor self check fault1" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.775	VFD 1 SELF_CHECK_ FAULT2	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor self check fault2" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.776	VFD 1 SELF_CHECK_ FAULT3	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor self check fault3" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.777	VFD 1 SELF_CHECK_ FAULT4	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor self check fault4" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.778	VFD 1 BRAKING_ OVERLOAD	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor breaking overload" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.779	VFD1 BRAKING_ TRANS_FAUL	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor breaking trans fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off	1 (On)	

Line ID	Parameter Name	Range	Default Setting	Description
		1 = On		
EVT.780	VFD 1 EXTERNAL_ ALARMS	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor external alarms" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.780	VFD 1 EXTERNAL_ ALARMS	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor external alarms" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.781	VFD 1 PRECHRG_ CONT_FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor prechrg contactor" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.782	VFD 1 TIMING_ FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor timing fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.783	VFD 1 MOTOR_ CTRL_EXC1	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor motor control abnormal" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.784	VFD 1 MOTOR_ CTRL_EXC2	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor motor control abnormal" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.785	VFD 1 AUTO_RST_ FAIL	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor auto reset fail" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.786	VFD 1 MODBUS_TO	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor modbus timeout" alarm is triggered.

Line ID	Parameter Name	Range	Default Setting	Description
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.787	VFD 1 CANOPEN_ FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor canopen fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.788	VFD 1 CANLINK_ FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor canlink fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.789	VFD 1 EXP_CARD_ FAULT	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor expansion card fault" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.790	VFD1 INPUT_EXC_ PRTN	MSG - WRN - ALM	Alarm	The compressor shuts down, and the indoor fan runs at standard speed, because the "compressor input abnormal protection" alarm is triggered.
	[Delay Time]	0 - 9999	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.791	MB EEV 1 COMM ERR	MSG - WRN - ALM	Alarm	Modbus EEV 1 Communication Error
EVT.792	MB VFD 1 COMM ERR	MSG - WRN - ALM	Alarm	Modbus VFD 1 Communication Error
EVT.793	MB 10DI COMM ERR	MSG - WRN - ALM	Alarm	Modbus 10DI Communication Error
EVT.794	MB EEV 1 TEMP SENSOR ERR	MSG - WRN - ALM	Alarm	MB EEV Controller Temperature Sensor Error
EVT.795	MB EEV 1 PRESS SENSOR	MSG - WRN - ALM	Alarm	MB EEV Controller Pressure Sensor Error
EVT.796	MB EEV 1 NO REF SELECTED	MSG - WRN - ALM	Alarm	MB EEV Controller Refrigerant No Selected Error
EVT.797	MB EEV 1 LOSS OF CHARGE	MSG - WRN - ALM	Alarm	Modbus EEV 1 Controller Lost Of Charge Alarm
EVT.798	COMP DRIVER LOCK	MSG - WRN - ALM	Alarm	Compressor Driver Lock Alarm
EVT.799	LOW PRESS LOCK	MSG - WRN - ALM	Alarm	Low Pressure Lock Alarm

Line ID	Parameter Name	Range	Default Setting	Description
EVT.800	HIGH PRESS LOCK	MSG - WRN - ALM	Alarm	Hish Pressure Lock Alarm
EVT.801	DISCH HIGH TEMP LOCK	MSG - WRN - ALM	Alarm	Discharge High Temperature Lock Alarm
EVT.802	DISCH LOW SH LOCK	MSG - WRN - ALM	Alarm	Discharge Low SH Lock Alarm
EVT.803	FAN FAILURE 2	MSG - WRN - ALM	Alarm	Happens when the 10DI module stops receiving feedback from the Evaporator fan #n
	[Delay Time]	0 -60	30 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.804	FAN FAILURE 3	MSG - WRN - ALM	Alarm	Happens when the 10DI module stops receiving feedback from the Evaporator fan #n
	[Delay Time]	0 -60	30 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.805	FAN FAILURE 4	MSG - WRN - ALM	Alarm	Happens when the 10DI module stops receiving feedback from the Evaporator fan #n
	[Delay Time]	0 -60	30 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.806	FAN FAILURE 5	MSG - WRN - ALM	Alarm	Happens when the 10DI module stops receiving feedback from the Evaporator fan #n
	[Delay Time]	0 -60	30 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.807	FAN FAILURE 6	MSG - WRN - ALM	Alarm	Happens when the 10DI module stops receiving feedback from the Evaporator fan #n
	[Delay Time]	0 -60	30 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.808	FAN FAILURE 7	MSG - WRN - ALM	Alarm	Happens when the 10DI module stops receiving feedback from the Evaporator fan #n
	[Delay Time]	0 -60	30 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.809	FAN FAILURE 8	MSG - WRN - ALM	Alarm	Happens when the 10DI module stops receiving feedback from the Evaporator fan #n
	[Delay Time]	0 -60	30 sec	

Line ID	Parameter Name	Range	Default Setting	Description
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.810	DSCH LOW SUPERHEAT	MSG - WRN - ALM	Alarm	Discharge low superheat
	[Delay Time]	(0 - 9999)	30 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.813	CFAN HRS EXCEEDED	MSG - WRN - ALM	Warning	Cfan operation hours excedeed
	[Delay Time]	(0 - 9999)	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.814	VFD FILTER HRS EXCEEDED	MSG - WRN - ALM	Warning	VFD operation hours excedeed
	[Delay Time]	(0 - 9999)	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.815	EFAN FILTER HRS EXCEEDED	MSG - WRN - ALM	Warning	Efan operation hours excedeed
	[Delay Time]	(0 - 9999)	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.816	CONDS PUMP HRS EXCEEDED	MSG - WRN - ALM	Warning	Consensate pump operation hours excedeed
	[Delay Time]	(0 - 9999)	10 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	
EVT.817	EEV DRIVER ABNORMAL	MSG - WRN - ALM	Alarm	EEV driver adnormal operation
	[Delay Time]	(0 - 9999)	1 sec	
	[Event Enable]	0 = Off 1 = On	1 (On)	

B.3 Line IDs for Cascade Operation Parameters

Table B.3 Service Menu Cascade Parameters by Line ID

Line ID	Parameter Name	Range	Default Setting	Description
S515	Cascade Units	No Yes Cool/Heat Cooling Fan PI Fan Speed	No	User may select the method to which the next standby unit will stage ON. • No: Disabled • Yes: Enabled via TW Mode 1 • Cool/Heat: Enabled via TW Mode 1 • Cooling: Enabled via TW Mode 1 • Fan PI: Enabled via TW Mode 3 • Fan Speed : Enabled via TW Mode 3
S516	Cascaded Units Delay	0 - 30 min	10 min	This is the amount of time that must surpass prior to the standby unit staging ON, once a standby unit receives an ON command from the Primary (U2U 1).
S517	Cascaded Units Quick Start	0 - 30 min	2 min	This control delay time is used (shorter time than S516) after the Primary (U2U 1) has restarted after a power cycle. The timer changes back to using S516 when the time of power cycle is equal to S517 min/sec. **NOTE: This setting is not required. If set to a value of 0, then S517 Cascade Units Quick Start is disabled.**
	Cascaded Units QS Delay	15 - 1800 sec	120 sec	
S518	Cascaded Units Control Delay	0 - 30 min	5 min	This is the amount of time that must surpass before the normal unit control is used once a standby unit has been cascaded ON.
S519	Cascaded Units OFF Delay	0 - 360 min	0 min	This timer starts to count down once a cascaded ON system has received an OFF request from the primary. The cascaded unit will stop after this timer and S520 have elapsed.
S520	Cascaded Units Min Run	2 - 360 min	30 min	Once the cascaded system is energized, this is the minimum ON time that it will run before staging OFF.
S521	Start Next Unit at SYS Fanspeed	50 - 100%	100%	When the system (network) fan speed operates at or above S521, the S516 timer is started. Once S516 has elapsed, the next single unit will energized. **NOTE: Fan speed must be continuously at or above the value set in S521, The timer restarts any time the fan speed falls below.**
S522	Max. Intermediate System Speed	50 - 100 %	100%	Defines the value to which the system (network) fan speed may increase when not all units in the network are in operation.
S523	Stop Next Unit SYS Fanspeed	20 - 70 %	70%	When the current System (network) fan speed operates at or below S523, two timers must elapse before the cascaded ON unit turns OFF; S519 and S520.
S524	Cascaded Units OFF Master Delay	0 - 360 min	1 min	In the event that the Virtual Primary takes control, the new Primary unit shall control staging OFF of the currently operating units for the amount of time set in S524. After S524 time has elapsed, S519 value is used.

Appendix C: Technical Support and Contacts

C.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert Thermal Management Products

1-800-543-2378

Liebert Channel Products

1-800-222-5877

Liebert AC and DC Power Products

1-800-543-2378

C.2 Locations

United States

Vertiv Headquarters

505 N. Cleveland Ave.

Westerville, OH 43082, USA

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road

Wanchai, Hong Kong

Connect with Vertiv on Social Media


https://www.facebook.com/vertiv/


https://www.instagram.com/vertiv/


https://www.linkedin.com/company/vertiv/


https://www.x.com/Vertiv/

Vertiv.com | Vertiv Headquarters, 505 N. Cleveland Ave., Westerville, OH 43082, USA

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