VERTIV.

Liebert®

iCOM™

Installer/User Guide

Intelligent Communication and Monitoring

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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.VertivCo.com/en-us/support/ for additional assistance.

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1 GETTING STARTED WITH ICOM

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

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

Figure 1.1 iCOM main display

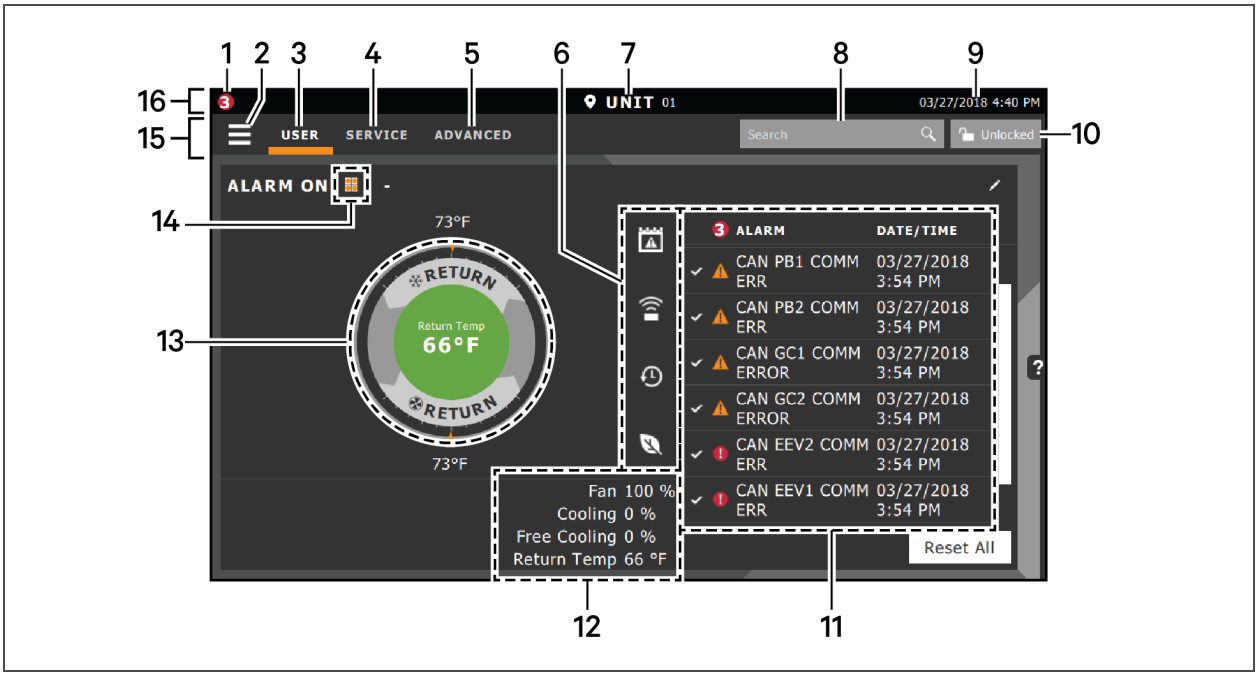


Table 1.1 Main Display controls and options

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 iCOM and Logging-in/Unlocking Controls on page 6.**
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 iCOM and Logging-in/Unlocking Controls on page 6.**
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 iCOM and Logging-in/Unlocking Controls on page 6.**
6	Cooling-unit parameters. Status display of selected system parameter settings. See Adding and Adjusting Content on page 137
7	Unit Identification. You may customize the unit name up to 6 characters/numbers.
8	Search icon. Open the keyboard to search for controls and setting locations. See Searching on page 9.
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 iCOM and Logging-in/Unlocking Controls on page 6.

Table 1.1 Main Display controls and options (continued)

Item	Description
11	Secondary-content panel. When accessing settings/configuration via the menus, the settings display in the right, "secondary" panel.
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 93.
15	Control header. Controls to access the user and service menus. See Control Header on page 6.
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 5.

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 137.

Figure 1.2 Dial sections

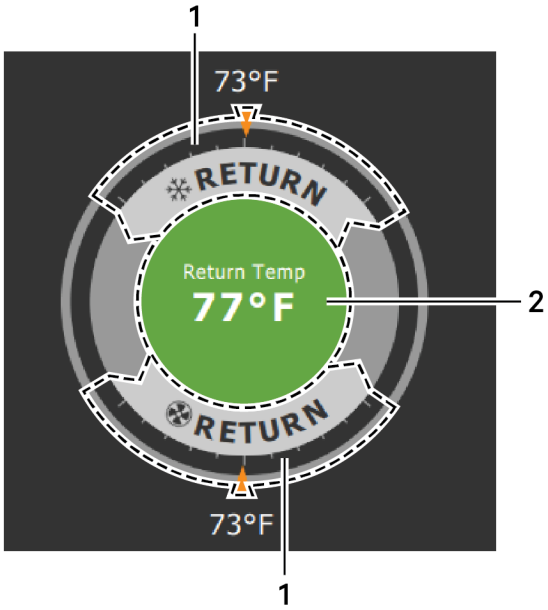


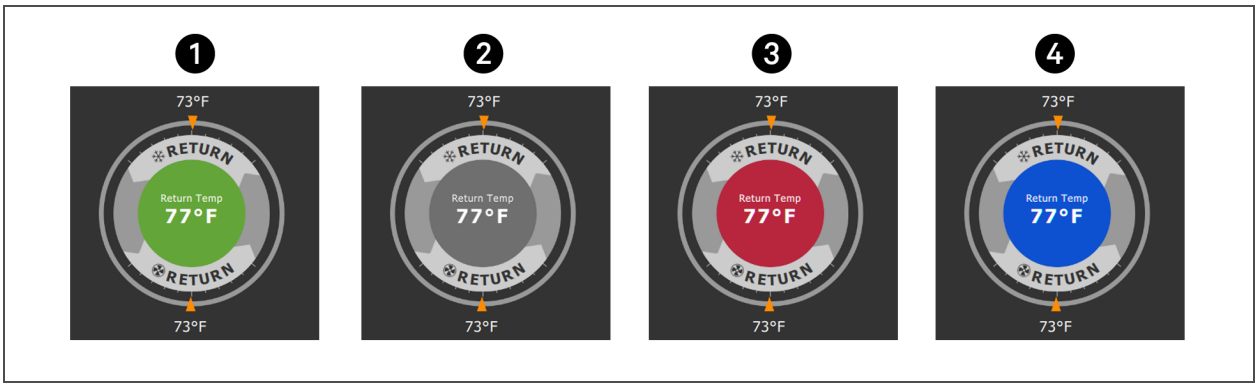
Table 1.2 Dial Sections

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 iCOM and Logging-in/Unlocking Controls

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

iCOM is locked when started and also locks after a period of inactivity to prevent unauthorized changes. A 4-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 1 minute. To change the inactivity period, see Setting general display properties on page 135.

NOTE: The factory-default passord for user and service login are provided. We recommend you change passwords as necessary to prevent unauthorized changes. See Managing access permission and Passwords on page 123.

- 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 view-only access to the Advanced menu are accessible. See Accessing the User, Service and Advanced Menus on page 10.

1.3.2 Powering-on the Thermal Management Unit

NOTE: Depending on the operating state, there are start/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 iCOM.

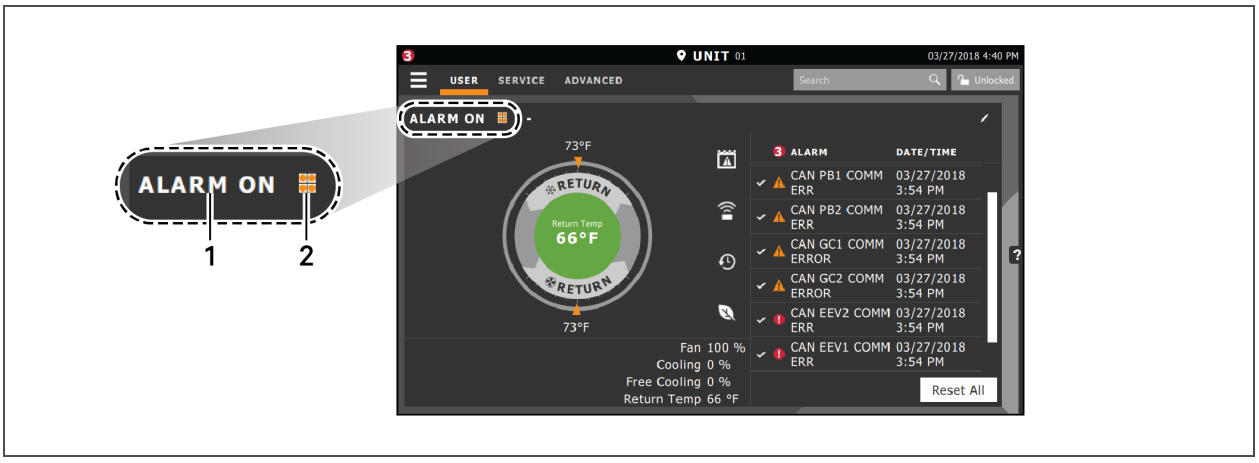
The cooling unit operates only when all switches are closed. For example, even though you have turned-on the unit through iCOM, if the BMS remote-monitoring system is sending a command to turn-off the unit, the cooling unit remains off.

NOTE: You must be logged-in to access the menu options. See Powering-on 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 iCOM display



Item	Description
1	Current status of the unit. See Cooling-unit statuses displayed on the next page.
2	Teamwork icon. See Viewing Teamwork, Stand-by, and Cascade Status on page 22.

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 17.
MANUAL	Controlled by a service technician. See Enabling manual mode for diagnostics on page 125.
DISPLAY OFF	Unit is turned Off at the iCOM display. See Powering-on the Thermal Management Unit on the previous page.
ALARM STANDBY	In stand-by because of an active alarm on the unit. See Viewing Unit Alarms on page 17.
STANDBY	In standby because of service-menu setting. See Assigning Cooling Units to Stand-by (Lead/Lag) on page 97.
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 17.
ALARM ON	Active alarm, but still operating. See Viewing Unit Alarms on page 17.
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 24-V 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 iCOM and Logging-in/Unlocking Controls on page 6.

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 1 minute. To change the inactivity period, see Setting general display properties on page 135

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

1.3.5 Calibrating the Touchscreen

Use a firm touch or a stylus for the best response. To improve interaction with quicker and more-accurate touch response, calibrate the touchscreen.

1. On the User menu, touch *Display Options* > *Display Properties*.
2. On the UNIT DISPLAY panel, touch *Calibrate Screen* and follow the prompts to calibrate.
   - If you cannot access the calibration because of screen response, continue with step 3.
3. At the cooling-unit disconnect switch, power-off the unit and then back on.
4. Touch your finger to the screen and hold it there while the display boots.
5. When the LED begins flashing, remove your finger.
   Cross-hairs appear in each corner and in the center of the display.
6. Touch the center of each cross-hair ONCE ONLY. (Touching more than once interrupts the calibration and you must start over at step 3.)
   Cross-hairs disappear and the display reboots when calibration is complete.

1.3.6 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.

1.3.7 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 iCOM before the touchscreen model. For a listing of the line IDs, see Setpoints and Alarm Settings by Line ID on page 167.

NOTE: You must be logged-in to access the display search. See Powering-on iCOM and Logging-in/Unlocking Controls on page 6.

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 iCOM Version

The version, build, and other firmware information for the iCOM display board may be helpful when servicing or troubleshooting. To locate the firmware version of the iCOM control board, see Updating iCOM Control-board Firmware on page 119.

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

1.6 Accessing the User, Service and Advanced Menus

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 iCOM and Logging-in/Unlocking Controls on page 6.

1. To access a menu, touch the icon for the menu you want,  ,  or  , in the control header, see Control Header on page 6.
   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 15.

Active Alarms

Opens the ALARMS panel. See Viewing Unit Alarms on page 17.

Event Log

Opens the EVENT LOG panel. See Viewing the Event Log on page 20.

Sensor Data

Opens the SENSOR DATA panel. See Viewing Sensor Data on page 20.

Display Options

Opens the Display Options menu:

- Customize Layout—see Customizing main-display views on page 136.
- Custom Labels—see Customizing parameter and field labels on page 138.
- Date & Time—see Setting the Date and Time on page 9.

Total Run Hours

Opens the RUN HOURS panel. See Managing Run Hours for a Component on page 20.

EconoPhase

Opens the ECONOPHASE - PUMP MODE panel.

About

Opens the ABOUT panel. See About iCOM Version on the previous page.

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 7, or Powering-off the Thermal Management Unit on page 8.

1.8 Service Menu

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

Service Menu Options

Setpoints

Opens the SETPOINTS panel. See Editing setpoints for the cooling unit on page 23, .

Diagnostic/Service

Opens the Diagnostic / Service menu:

- Diagnostics—see Performing Diagnostics on page 125.
- EconoPhase View—Opens the ECONOPHASE - PUMP MODE panel.
- Technical Support—contact information for the cooling unit and iCOM display.

Alarm/Event Setup

Opens the ALARMS & EVENTS panel. See Managing Events: Alarms, Warnings and Messages on page 69, .

BMS & Teamwork

Opens the BMS & Teamwork menu:

- U2U Setup—See Configuring U2U Network Settings on page 89.
- Teamwork/Standby—See Teamwork, Stand-by and Rotation for Cooling Units on page 93.
- BMS Setup—See BMS and IntelliSlot Settings on page 109.

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.
- Analog Input—See Configuring Analog-input Devices on page 114.
- Modbus Devices
- CapCom

Backup & Security

Opens the Backup & Security menu:

- Display Backup and Restore. See Backing-up, Importing/Exporting and Restoring Display Settings on page 121.
- Control Backup and Restore. See Backing-up and Restoring Control-board Settings on page 122.
- Display Upgrade. See Updating iCOM display firmware on page 119.
- Control Upgrade. See Updating iCOM Control-board Firmware on page 119.
- Manage Permissions. See Managing access permission and Passwords on page 123.

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 7, or Powering-off the Thermal Management Unit on page 8.

1.9 Advanced Menu

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

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.

Tandem Info

Details about tandem compressor states and operating modes.

MBV Settings

Motorized ball valve settings (water-cooled heat rejection).

Runtime Monitoring

Details about component run times.

Modbus Devices

Information about connected Modbus devices such as power and flow meters.

Control Override

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

EEV Settings

Electronic expansion valve settings.

EconoPhase

Details about EconoPhase pumping unit.

MC Condenser

Details about MC condenser (air-cooled heat rejection),

Parameter Directory

A searchable list of all parameters in the user interface. See Setpoints and Alarm Settings by Line ID on page 167.

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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 23.

NOTE: Depending on the type of thermal-managment unit, included components, and control settings of your system, the options on your iCOM display may differ.

2.1.1 Editing Humidity Setpoints

1. Touch 

, then  >*Setpoints.* > *Humidity Control.*
The HUMIDITY CONTROL secondary panel opens.
2. Refer to the User humidity-setpoint options below and Humidity Control on page 41 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

User humidity-setpoint options

Dewpoint Setpoint

Desired dewpoint (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.
- Dewpoint = Percent of humidification/dehumidification is determined by the difference between the dewpoint calculated from the humidity-sensor reading and the dewpoint 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/RAD). When customer input connection = 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 26, and Compressor Control by Cooling Requirement on page 28 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

User temperature setpoint options

2nd Temperature Setpoint

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

BMS Backup Temp Setpoint

Selects a temperature setpoint that activates in the event of a BMS timeout. The BMS timer must be configured for this setpoint to activate. See Setting BMS Back-up Setpoints on page 111.

Optimized Aisle Enabled

Read-only. Indicates that iCOM is configured for optimized-aisle operation. See Teamwork Mode 3—Optimized-aisle Operation on page 96.

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.

Temperature Setpoint Act

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

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

Temperature Setpoint

Temperature that the unit maintains via cooling/reheat.

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/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.

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

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.

2.2.1 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 81.

2.2.2 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 iCOM I/O board assigned as U2U address number XX (two up to thirty-two) has lost communication with the group. Make sure all units are powered-on at the disconnect. Check cable connections and network settings where applicable.
NO CONNECTION W/UNIT 1	The iCOM I/O board assigned as U2U address number 1 has lost communication with the group. Make sure all units are power on at the disconnect. Check cable connections and network settings where applicable.
BMS DISCONNECT	The BMS/BAS has not completed a handshake within the time defined by the BMS/BAS. Verify monitoring connections and communication to the BMS/BAS panel.
UNIT CODE MISSING	The factory unit code must be confirmed, saved and executed.
UNIT CODE MISMATCH	The factory unit code must be confirmed, saved and executed.
AMBIENT SENSOR FAILURE	The outdoor temperature / humidity sensor used on the air economizer unit has become disconnected or is no longer working properly.
CAN GC 1 or 2 COMM ERR	See Events specific to Liebert MC Condenser (continued) on page 77.
CAN PB COMM ERR	See Events specific to Liebert EconoPhase (continued) on page 79.
CAN EEV 1or 2 COMM ERR	See Events specific to EEV alarm board on page 81
COMP 1 or 2 OVERLOAD	See Events specific to Liebert DSE compressor on page 80.
LOW PRESS CIRCUIT 1 or 2	See Events specific to Liebert DSE compressor on page 80.

2.3 Viewing the Event Log

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

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

NOTE: Depending on the type of thermal-managment unit, included components, and control settings of your system, the options on your iCOM display may differ.

Table 2.3 Event status/type indicators

Indicator	Description
Green dot	Message.
Yellow dot	Unacknowledged warning event. See Acknowledging Alarms on page 18.
Red dot	Unacknowledged alarm event. See Acknowledging Alarms on page 18.
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 iCOM and the current reading of each sensor.

- Touch USER, 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-managment unit, included components, and control settings of your system, the options on your 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 USER, then ☰ > *Total Run Hours*.
   The RUN HOURS panel opens and the current hours for each component are listed in the Total Run Hours column.
   To reset the total run hours to zero, see Setting run hours to zero on the facing page.
2. Use the slider to set the total-run-time limit for each component, then touch *Save*.
   The limits are set.

NOTE: Depending on the type of thermal-managment unit, included components, and control settings of your system, the options on your iCOM display may differ.

2.5.1 Setting run hours to zero

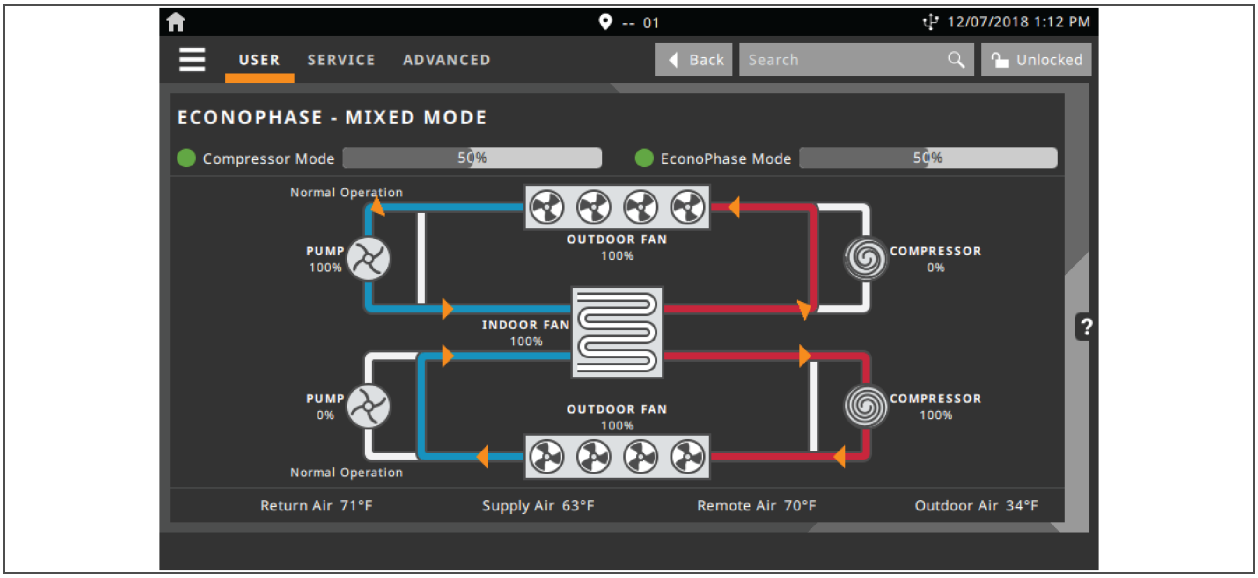
1. On the RUN HOURS panel, touch to check each box in the *Total Run Hours* column next to the component(s) to reset.
   The Set to Zero button becomes available.
2. Touch *Set to Zero*.
   The total run hours for selected component(s) is set to zero.

2.6 Viewing EconoPhase Operation

When your Thermal Management System is a Liebert® DSE system with a Liebert® EconoPhase pumped-refrigerant economizer (PRE) and a Liebert® MC or MCV condenser, the EconoPhase screen, Figure 2.1 below, shows the operating mode of the system. The DSE System Optimization feature is automatically employed and reduces power consumption significantly because a PRE package consumes about one-tenth the power of the compressors.

EconoPhase operation saves energy by eliminating compressor operation when outdoor ambient temperatures are cool enough, or when the difference between the indoor and outdoor ambient temperature is satisfied. DSE System Optimization further improves efficiency by optimizing liquid-refrigerant-temperature and pressure setpoints in mid- and high-ambient temperature conditions, thus reducing the operation of condenser fans while maintaining the appropriate heat-rejection capacity.

Figure 2.1 EconoPhase - Pump Mode screen



2.7 Viewing Teamwork, Stand-by, and Cascade Status

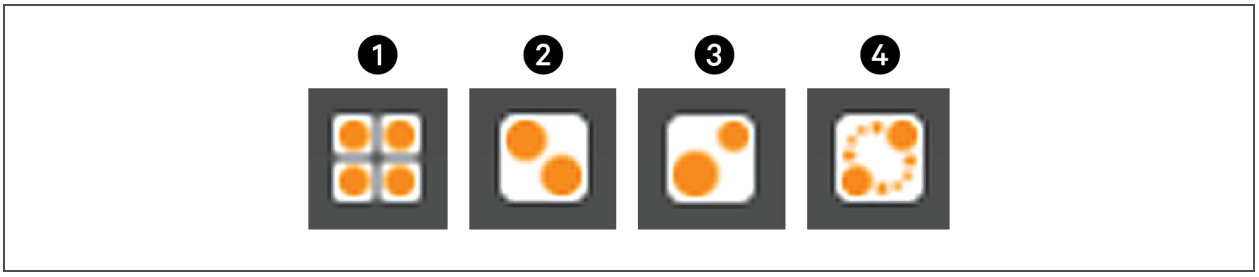
In the main User panel, the Teamwork Mode icon indicates the mode selected, Figure 2.2 below.

To view the teamwork details:

Touch the Teamwork-mode icon.
The teamwork dialog opens displaying the teamwork mode, number of units in stand-by, and number of operating units.

NOTE: You must be logged-in with the Service PIN to edit teamwork mode. See Powering-on iCOM and Logging-in/Unlocking Controls on page 6.

Figure 2.2 Teamwork icons



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

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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Setpoints options

Fan Control

See Configuring Fan Setpoints on page 43.

High/Low Limit Control

See Configuring high/low-limit setpoints on page 38.

Humidity Control

See Configuring humidity setpoints on page 39.

Static Pressure Settings

See Configuring Static-pressure Setpoints on page 47.

Temperature Control

See Configuring Temperature Setpoints below.

Temperature Compensation

See Setting temperature compensation on page 37.

3.1.1 Configuring Temperature Setpoints

1. Touch SERVICE, then ☰ > *Setpoints* > *Temperature Control*.
   The TEMPERATURE CONTROL secondary panel opens.
2. Refer to Temperature Control options on the next page, Temperature Control – Temperature Setpoints and Cooling Operation on page 26," and Compressor Control by Cooling Requirement on page 28" to adjust the setpoint options, then touch *Save*.
   The setpoint is updated.

NOTE: Proportional-band setting is dependent on the heat load and the components specific to your cooling unit. Additional tuning may be required after start-up when using PI temperature control. See Considerations when Using PI Temperature Control on page 28.

NOTE: Depending on the type of thermal-managment unit, included components, and control settings of your system, all of the options listed may not be available on your 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 back-up 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)

Temperature Control Type

Control when staging cooling and heating operations. Valid values:

- Proportional = percent of cooling/heating determined by the difference between the air-temperature sensor reading and the temperature setpoint.
- PI = percent of cooling/heating calculated using the temperature proportional band and temperature-integration time settings. See Considerations when Using PI Temperature Control on page 28.
- Adaptive PID = Auto-tuning PID control loop, can be set for Cooling. Only available on Liebert® CW (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 3 minutes is selected, cooling capacity will increase to 100% in 3 minutes.

NOTE: 3 to 5 minutes of integration time is adequate for most applications. See Considerations when Using PI Temperature Control on page 28.

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 back-up temperature setpoint

3.1.2 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-mangement units employ several types of primary cooling sources:

Compressor operation

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

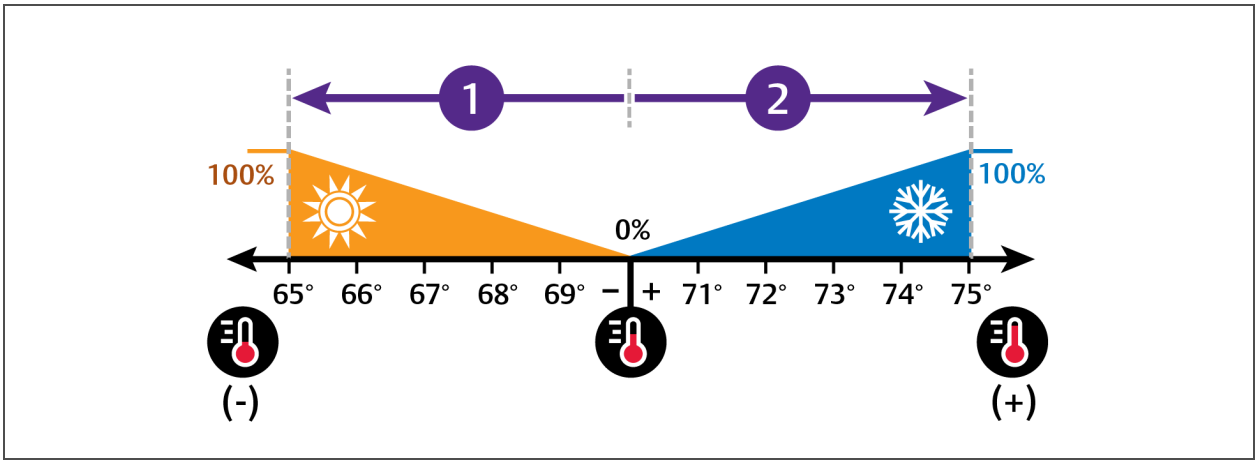
Use the proportional and dead-band parameters to control how your cooling unit(s) respond based on the calculated need for cooling (or heating). Figure 3.1 below, illustrates temperature control using:

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

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 57.

Figure 3.1 Temperature control without a dead band



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

Temperature deadband

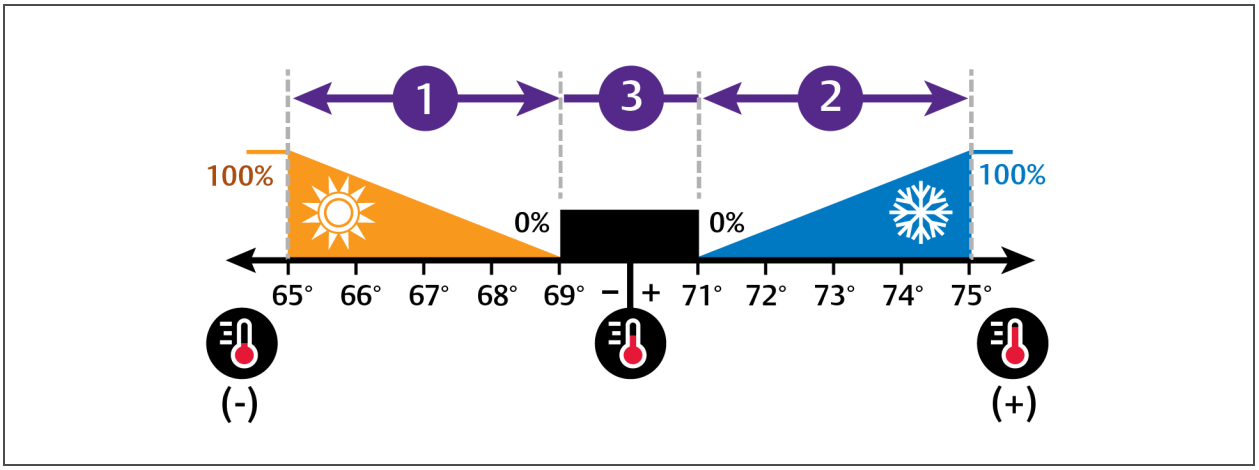
A dead band widens the setpoint to prevent small temperature changes from activating compressors and valves and cause excessive component cycling. Figure 3.2 below, illustrates temperature control using:

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

Like the proportional band, the dead band 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 dead band



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 below.

Table 3.1 PI temperature-control troubleshooting

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

3.1.3 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 and type of compressors varies. The following describes compressor operation along the proportional band for the varying compressor options.

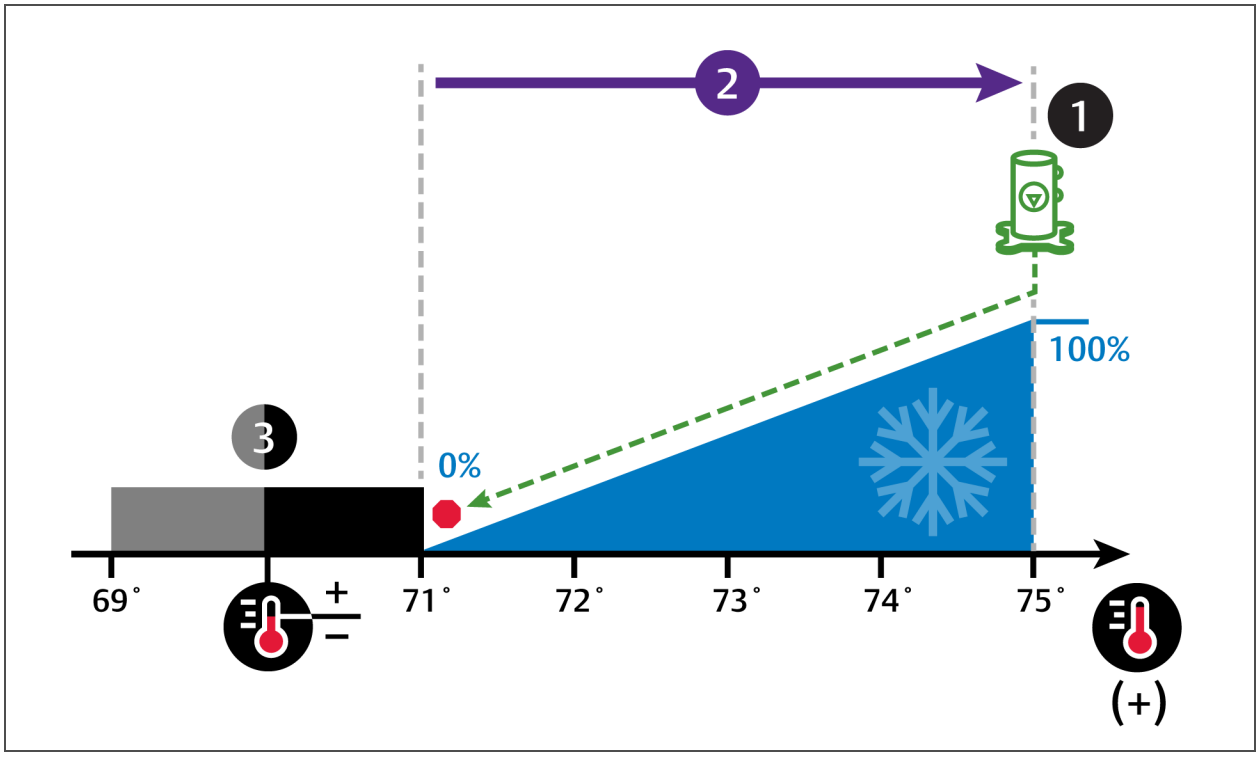
One scroll compressor without unloaders

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

In Figure 3.3 below:

The compressor starts at 75° when the cooling requirement is 100% and continues to operate until 71° is reached when cooling requirement is 0%.

Figure 3.3 Compressor control—1-step capacity



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

Two scroll compressors without unloaders

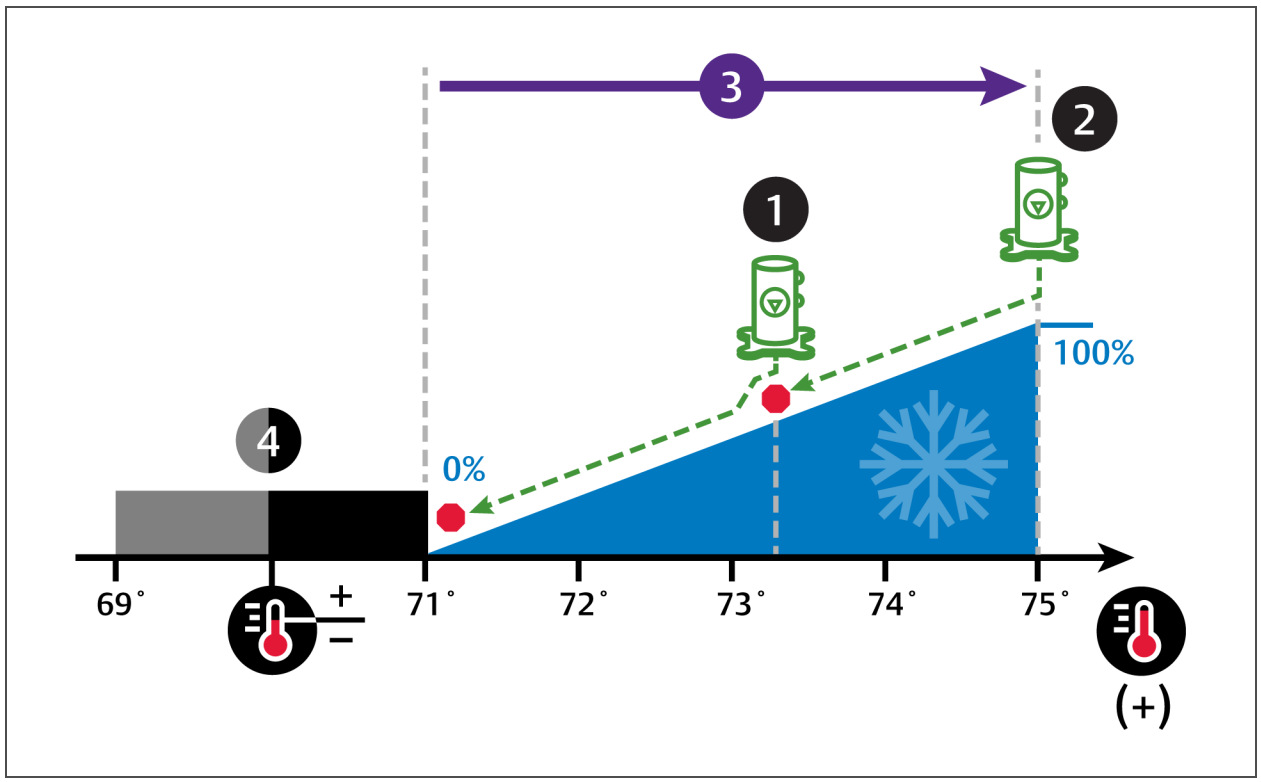
- 70° setpoint
- 8° proportional band
- 2° dead band

In Figure 3.4 below:

Compressor 1 starts at 73° when the cooling requirement is 50% and continues to operate until 71° is reached when cooling requirement is 0%.

Compressor 2 starts at 75° when the cooling requirement is 100% and continues to operate until 73° is reached when cooling requirement is 50%.

Figure 3.4 Compressor control—2-step capacity using 2 scroll compressors without unloaders



Number	Description
1	Scroll compressor 1.
2	Scroll compressor 2.
3	½ of proportional band.
4	Deadband.

One scroll compressor with unloader

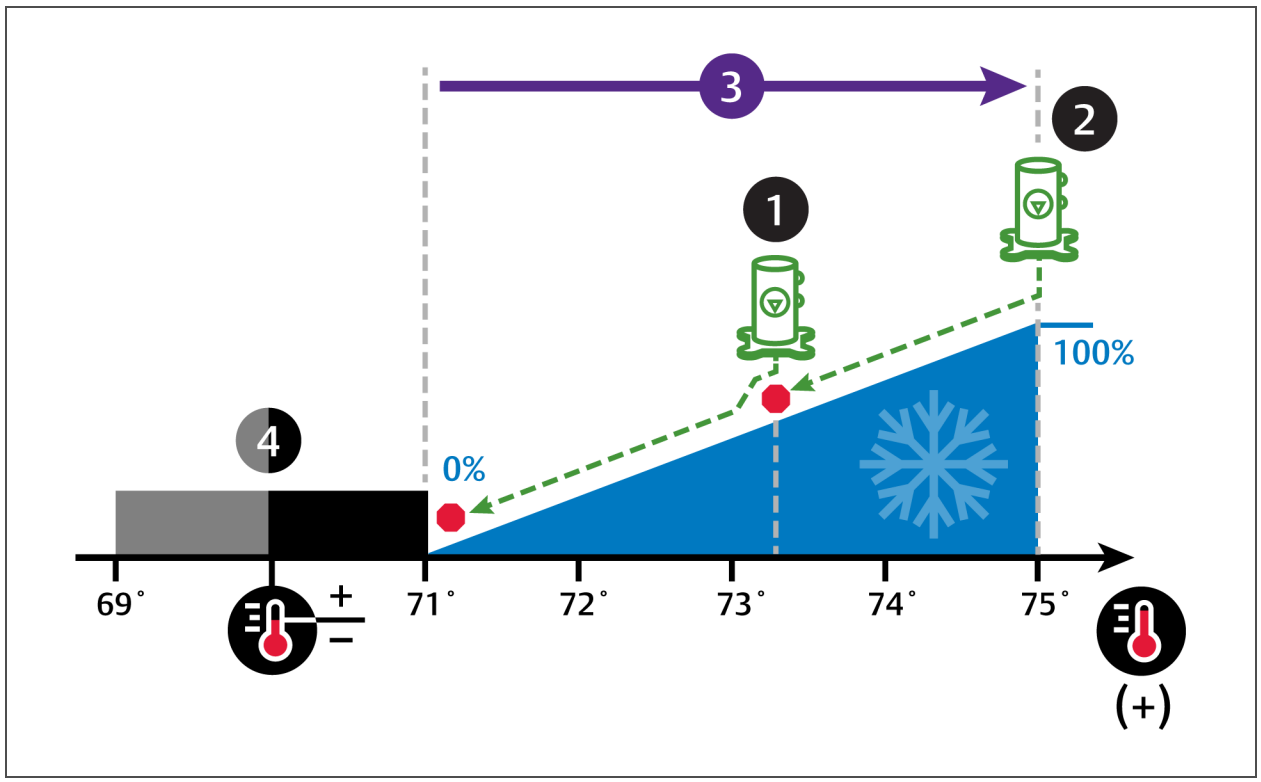
- 70° setpoint
- 8° proportional band
- 2° dead band

In Figure 3.5 below:

The compressor starts un-loaded at 73° when the cooling requirement is 50%.

At 75° when the cooling requirement is 100%, the compressor operates loaded until 73° is reached when cooling requirement is 50% and it returns to un-loaded operation.

Figure 3.5 Compressor control—2-step capacity using 1 scroll compressor with unloaders



Number	Description
1	Scroll compressor unloaded.
2	Scroll compressor loaded.
3	½ of proportional band.
4	Deadband.

Two scroll compressors with unloaders

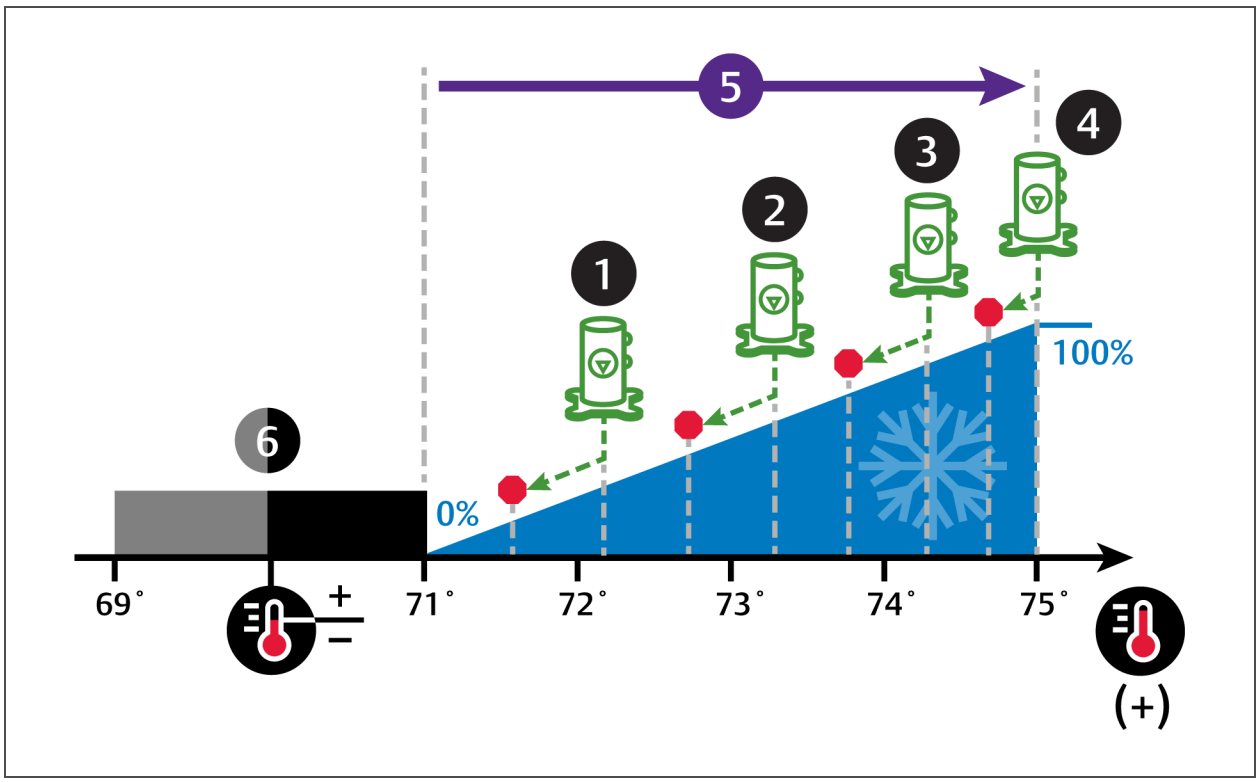
- 70° setpoint
- 8° proportional band
- 2° dead band

In Figure 3.6 below:

Compressor 1 starts unloaded when the cooling requirement is 33% and continues to operate until the cooling requirement is 17% or, if the cooling requirement reaches 80%, Compressor 1 operates loaded until the requirement is 70%.

Compressor 2 starts unloaded when the cooling requirement is 63% and continues to operate until the cooling requirement is 47% or, if the cooling requirement reaches 100%, Compressor 2 operates loaded until the requirement is 90%.

Figure 3.6 Compressor control—4-step capacity



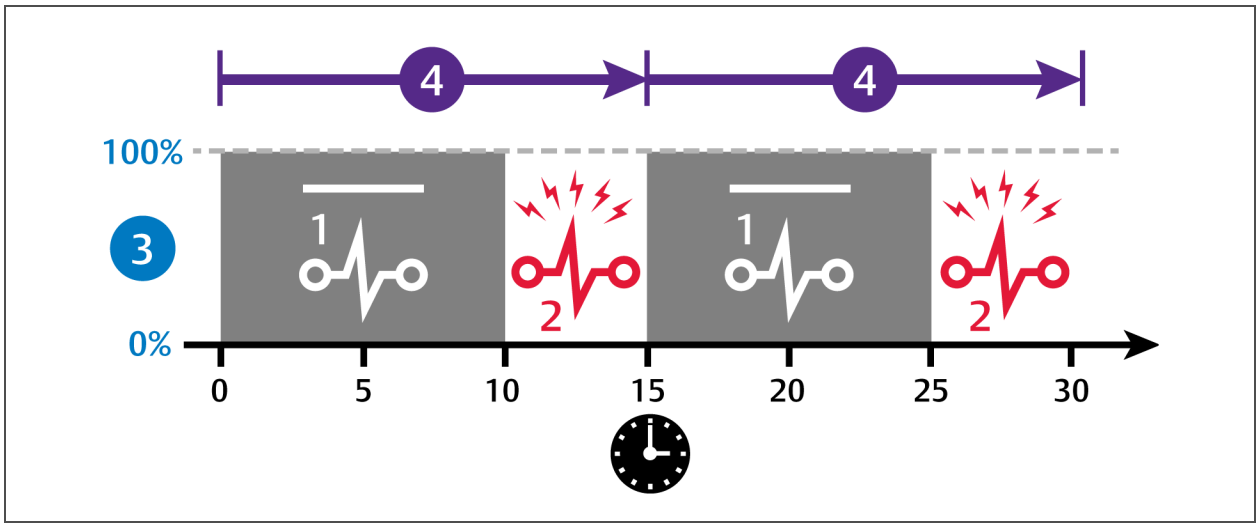
No.	Description	No.	Description
1	Step 1: Compressor 1 starts unloaded.	4	Step 4: Compressors 1 and 2 operate loaded.
2	Step 2: Compressor 2 starts unloaded.	5	½ of proportional band.
3	Step 3: Compressor 1 operates loaded and compressor 2 operates unloaded.	6	Deadband.

Digital-scroll Compressors

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

- When the valve is opened (energized, the compressor is un-loaded and capacity is 0% (because the scroll plates are separated so that there is no refrigerant flowing through the compressor).
- When the valve is closed (de-energized), the compressor is loaded and capacity is 100%.
- Capacity is determined by the amount of time that the valve is closed in the 15-second interval. Figure 3.7 below illustrates solenoid-valve operation when cooling requirement is 66%.
  - The valve is closed for 10 seconds (100% cooling),
  - then open for 5 seconds (0% cooling),
  - which results in 66% cooling. Essentially, the compressor is "partially-loaded."

Figure 3.7 Digital-scroll compressor operation to provide 66% cooling capacity



No.	Description
1	Solenoid de-energized.
2	Solenoid energized.
3	Percent loaded.
4	15-second capacity modulation cycle.

One digital-scroll compressor

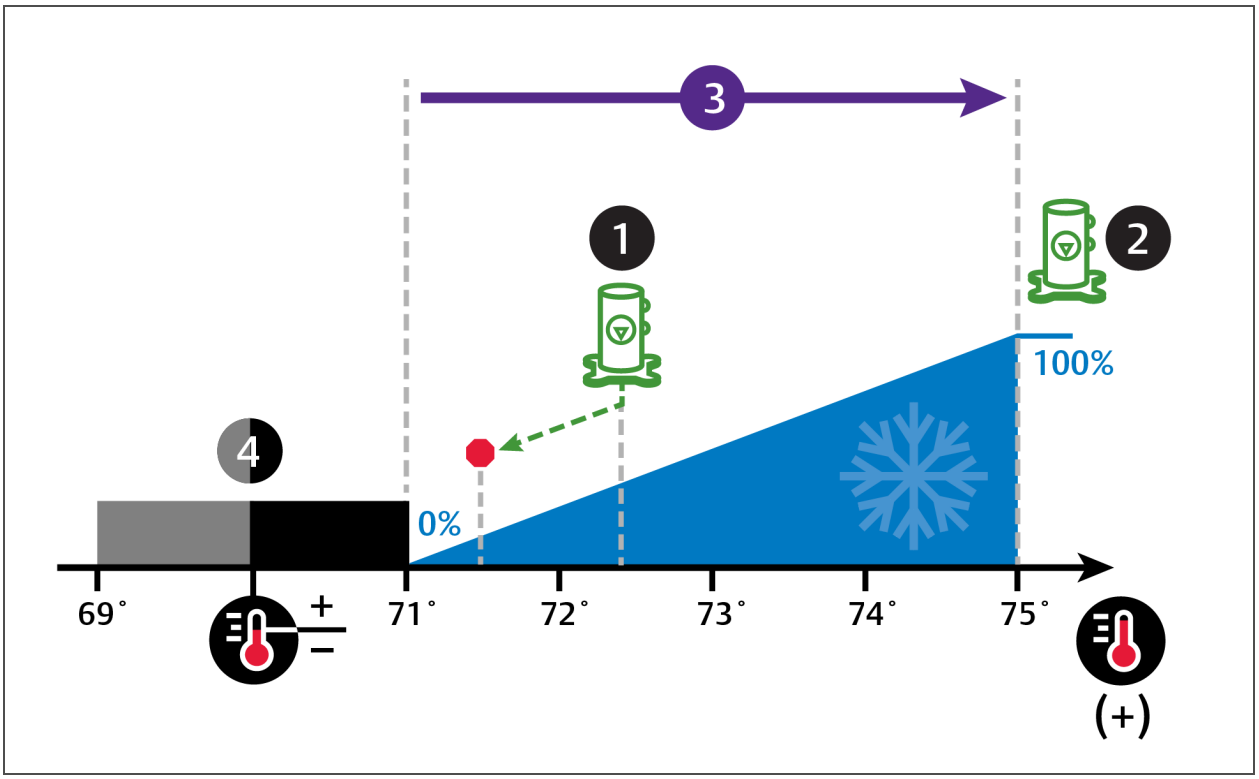
In a single digital-scroll system:

- The compressor starts when the cooling demand is at least 25% (calculated from temperature proportional band) and operates at 50% capacity (valve open 7.5 sec/closed 7.5 sec) for an initial period set in Winter Start Delay, see Setting Low-pressure Time Delay on page 55, after which it operates per cooling demand.
- As cooling demand increases, the length of time the valve is closed increases/capacity increases.
- At 100% cooling requirement, the valve remains closed for the entire 15-second interval and the compressor is operating loaded at 100% capacity.
- The compressor stops when cooling demand decreases to 10%.

Figure 3.8 on the facing page illustrates digital-scroll compressor operation with the following setpoint parameters:

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

Figure 3.8 Compressor control—Single digital-scroll compressor



No.	Description
1	Digital-scroll begins operation.
2	Digital-scroll operation at 100%
3	½ of proportional band.
4	Deadband

Dual digital-scroll compressors

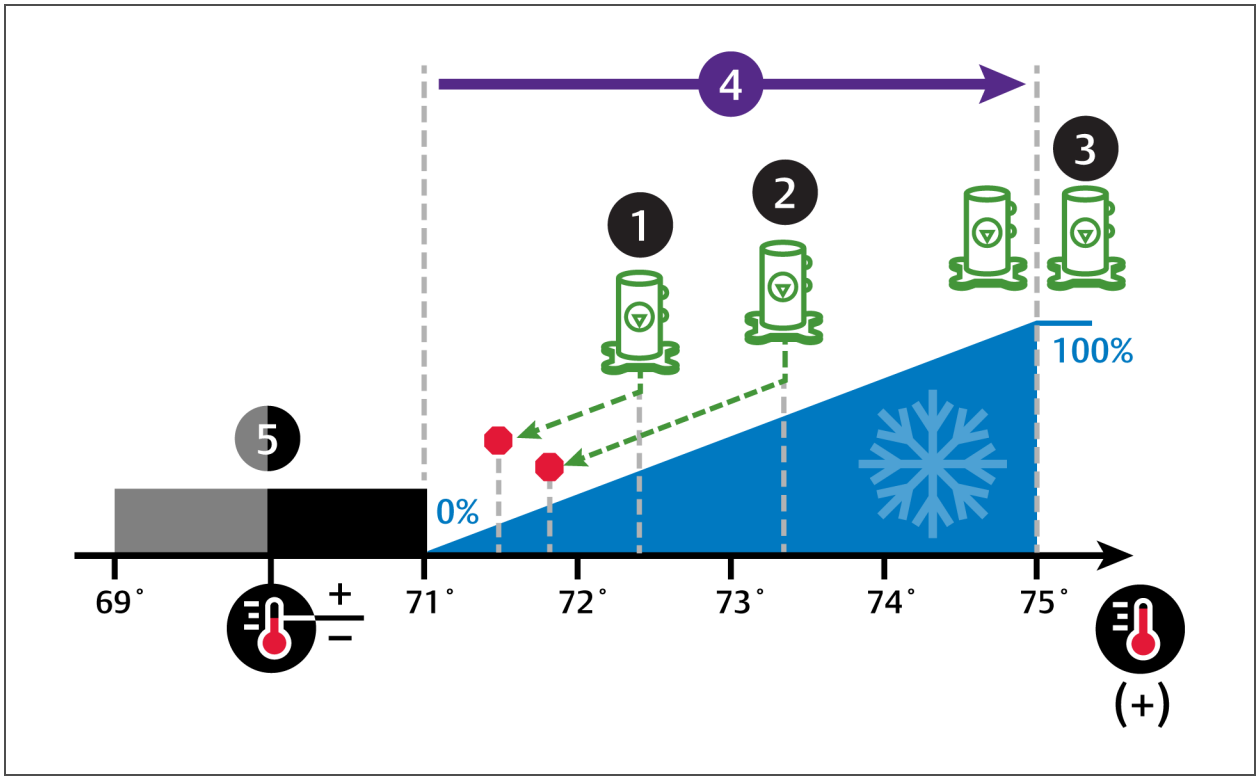
In a two digital-scroll system, the compressors operate in a lead-lag configuration:

- The lead compressor starts when the cooling demand is at least 25% (calculated from temperature proportional band) and operates at 50% capacity (valve open 7.5 sec/closed 7.5 sec) for an initial period set in Winter Start Delay, see Setting Low-pressure Time Delay on page 55, after which it operates per cooling demand..
- The lag compressor starts when cooling demand is 35% and operates at 70% capacity, increasing capacity as cooling demand increases.
- On both compressors at 100% cooling requirement, the valve remains closed for the entire 15-second interval and the compressors operate loaded at 100% capacity.
- The lag compressor stops when the cooling demand decreases to 20%.
- The lead compressor stops when cooling demand decreases to 10%.

Figure 3.9 on the facing page illustrates digital-scroll compressor operation with the following setpoint parameters:

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

Figure 3.9 Compressor control—Dual digital-scroll compressor



No.	Description
1	Lead compressor.
2	Lag compressor.
3	Lead and lag compressors.
4	½ of proportional band.
5	Deadband

3.1.4 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 un-expected heat-load fluctuations at rack equipment.

Temperature compensation is also tied-in to cascade/stand-by operation in Teamwork Mode 3. See Teamwork Mode 3—Optimized-aisle Operation on page 96.

1. Touch SERVICE, 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your 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.

3.1.5 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 lock-out, 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your 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.

3.1.6 Configuring humidity setpoints

1. Touch SERVICE, then ☰ > *Setpoints* > *Humidity Control*.
   The HUMIDITY CONTROL secondary panel opens.
2. Refer to Humidity Control options below and Humidity Control on page 41 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Humidity Control options

Control Dewpoint

Dewpoint setpoint.

Dewpoint 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.

Dewpoint 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 dewpoint setpoint. A smaller number causes faster reaction to humidity changes.

Dewpoint 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:

- 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 un-necessary 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/RAD). When customer input connection = 2nd Setpoint, this value becomes the active humidity setpoint.

3.1.7 Humidity Control

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

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, iCOM responds with a humidification or dehumidification capacity of 0% to 100% in 1% increments.

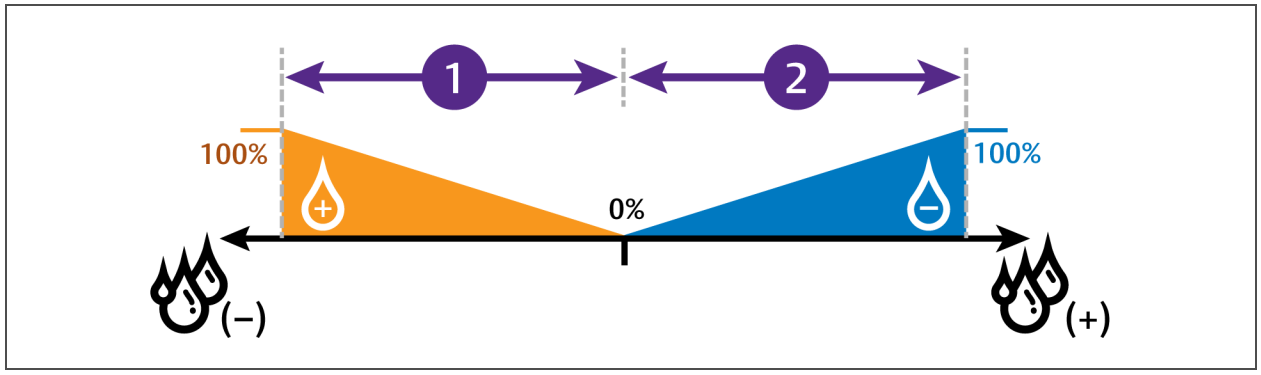
Figure 3.10 below, illustrates humidity control using:

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

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: A557) and 100% depending upon required dehumidifying capacity. The display always shows 100% dehumidification.

Figure 3.10 Humidity control without a dead band



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

Humidity deadband

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

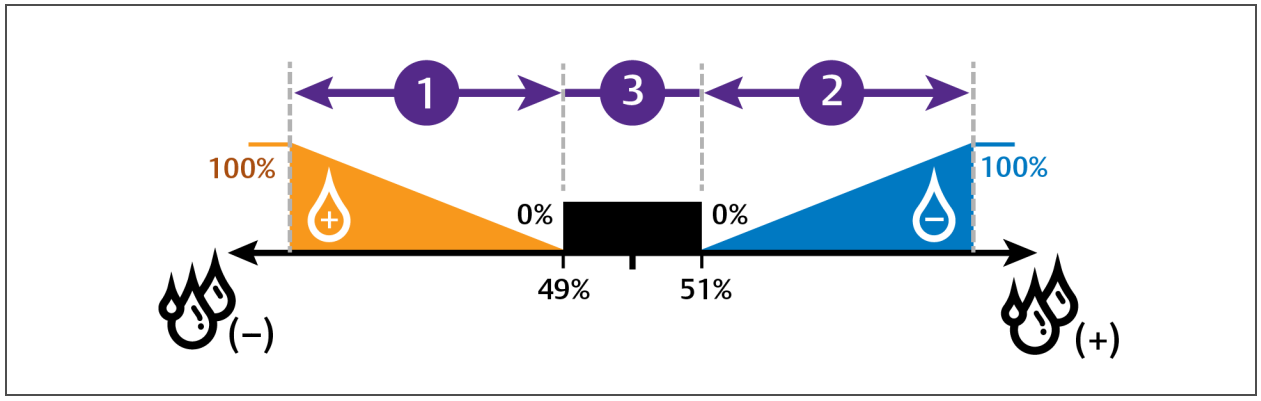
Figure 3.11 below, illustrates humidity control using:

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

Like the proportional band, the dead band 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 3.11 Humidity control with a dead band



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

3.1.8 Configuring Fan Setpoints

Configures fan-speed control to operate independent of compressor loading (de-coupled 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your 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 page 46,
– or –
Selects manual control, see Manual Fan-speed Control on the facing 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 Fanspeed.

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 Fanspeed

Maximum percentage at which the fans will operate.

Minimum Fanspeed

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 Fanspeed 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 unit-of-measurement selected.

Static Pressure Upper Range

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

3.1.9 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 iCOM.
- Hard-wired analog input (input-signal types including 4 to 20 mA, 0 to 10 VDC, and 0 to 5 VDC) and a factory-suppled isolator to ensure reliable communication.
- Remotely using a Liebert® IntelliSlot® card.

Setting Manual Fan-speed Control via Analog Input

1. Touch SERVICE, then ☰ > *Setpoints* > *Fan Control*, set *Fan Control Sensor* to Manual, then touch *Save*.
2. Touch SERVICE, then ☰ > *Auxiliary Device Setup* > *Analog Input*.
3. On ANALOG INPUTS, touch *Customer Analog Inputs* to expand it, then touch the analog-input device corresponding to fan-speed control.
4. On the ANALOG INPUT PROPERTIES panel, adjust the properties, then touch *Save*.
    - Touch *Cancel* to discard the changes without saving.

Setting Manual Fan-speed Control via BMS System

1. Touch 

, then 
 > *Setpoints* > *Fan Control*, set *Fan Control Type* to Manual, then touch *Save*.
2. Touch 

, then 
 > *BMS & Teamwork Setup* > *BMS Setup*.
3. On BMS SETUP, touch *Control Settings*.
   The CONTROL SETTINGS sencondary panel displays:
   - In *Fan Control Sensor*, select Manual.
   - In *BMS Fan Speed Local Override*, select No.
   - Touch *Save*.
     BMS control of fan speed is set, and the BMS-set fan speed is displayed on the Fan Speed slider.

NOTE: Set the fan speed via BMS by writing to the Fan Speed Maximum Set Point monitoring point. For details, see SL-28170 IntelliSlot Reference Guide found at *https://www.vertivco.com/en-us/support/*.

NOTE: Local adjustments to fan speed are overridden when remote/BMS fan-speed control is set.

3.1.10 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 is determined by the temperature setpoints.
- Decoupled—the fan-control and temperature-control sensor selection is different. When decoupled, fan speed is determined by the fan setpoints.

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	N/A	N/A
	Remote Sensor	Decoupled (Recommended)	Coupled	N/A
	Return Sensor	Decoupled	Decoupled	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*.

3.1.11 Configuring Static-pressure Setpoints

1. Touch 

, then  > *Setpoints* > *Static Pressure Settings*.
   The STATIC PRESSURE SETTINGS secondary panel opens.
2. Adjust the setpoint options described in the Static Pressure Settings options below, then touch *Save*.
   The setpoint is updated.
   - Touch *Cancel* to discard the changes.

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

Static Pressure Settings options

Current Override Temperature

Current temperature reading of the sensor selected for static-pressure control override.

Current Override Value

Percentage of override from 0% (no override/static-pressure control only) to 100% (temperature-sensor reading overrides completely).

Full Speed at

Temperature at which override reaches 100% and fan operates at full speed.

Operation at Static Pressure Sensor Failure

Selects operation in the event that the static-pressure sensor fails. Values are:

- Freeze Speed = Current fan speed is kept.
- SP Off = Static-pressure control is disabled and fan speed is dictated by selected fan-speed sensor.

Override Integration Time

Adjusts amount of override based on the length of time the temperature has deviated from the setpoint.

Override Slew Rate Filter

Rate-of-change filter to slow-down fan-speed changes.

Static Pressure Control Override

Selects sensor that may override static-pressure control if the temperature gets too far from the temperature setpoint to provide additional air flow because static pressure is not able to maintain the temperature. Values are:

- None = Override is disabled.
- Remote Sensor = the remote sensor overrides static-pressure control.
- Return Sensor = the return sensor overrides static-pressure control.

Static Pressure Min Pause

Minimum initial length of time that fan-speed stops increasing after the pressure reading crosses into the deadband. After the pause, the fan speed pulses (increases if below the setpoint and decreases if above the setpoint) for the period selected in the Static Pressure Pulse inside deadband field. After each pulse, a pause takes place, the length of which is calculated as a ratio between the deadband border (minumum) and the setpoint (maximum).

Static Pressure Max Pause

Maximum initial length of time that fan-speed stops increasing after the pressure reading crosses into the deadband. After the pause, the fan speed pulses (increases if below the setpoint and decreases if above the setpoint) for the period selected in the Static Pressure Pulse inside deadband field. After each pulse, a pause takes place, the length of which is calculated as a ratio between the deadband border (minumum) and the setpoint (maximum).

Static Pressure Pulse inside deadband

Period of time the fan speed increases or decreases (pulses) when pressure is inside the deadband.

Static Pressure Requested Speed Up to

Temperature at which static-pressure-control override begins.

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 the facing page.
- Condenser fan-reversal—see Scheduling Condenser-fan Reversal on page 50.
- Unit sleep Schedule—Turns-off units during times of low demand and controlled only by temperature. Sleep is interrupted if the return temperature rises above the alarm threshold.

3.2.1 Scheduling Condenser Low-noise Operation

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

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

1. Touch 

, then  > *Scheduler* > *Condenser Setback Schedule*.
   The TASK PROPERTIES panel opens.
2. Adjust the schedule settings, and touch *Save*.
   The schedule is set up.
   - Touch *Cancel* to discard the changes.

Condenser Setback Task-properties options

Disabled Day

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

Interval 1

Start and finish time of day that noise-reduction operates.

Interval Day

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

Max Speed in Low Noise Mode

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

Max Speed in Normal Mode

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

Noise Reduction

Enable/Disable noise reduction. When checked, the schedule is run. When un-checked, the scheduling parameters are ignored.

Status

Indicates if low-noise operation is active or inactive.

Whole Day

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

3.2.2 Scheduling Condenser-fan Reversal

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

1. Touch 

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

Condenser Fan-reversal Task-properties options

Reverse Fans At Duration

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

Reverse Fans Every

Selects number of days between fan reversal.

Reverse Fans Now

Enables/Disables immediate fan reversal.

3.2.3 Scheduling "Sleep" Times for Thermal-management Units

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

1. Touch 

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

Unit Sleep Schedule Task-properties options

Interval 1/2

Start and finish time of day that sleep mode operates.

Interval Day

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

Sleep Mode

Enable/Disable sleep schedule. When checked, the schedule is run. When un-checked, the scheduling parameters are ignored.

Timer Mode Type

Selects unit operation when in sleep mode. Values are:

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

Timer Reset

Selects whether or not the sleep-mode timer resets.

Whole Day

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

3.3 Setting General Thermal-management Unit Options

NOTE: Depending on the type of thermal-managment unit, included components, and control settings of your system, all of the options listed may not be available on your 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your 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 next 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 93, see the Teamwork Control options on page 94.

Freecool Capacity Transition Filter

Selects how quickly capacity changes between modes of operation to avoid overshooting during the transition.

- Only a factory-trained service technician should adjust this setting.

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 "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.

Temp Control Sensor Failure Cooling Mode

Unit operation when "Cooling" is selected at control temperature sensor failure.

- Hold = holds the last call for cooling. That is, continue operating at same capacity.
- Full = activates full cooling, 100% capacity.

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 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* > *Fan Settings*.
   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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Fan Settings options

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 Backdraft Mode

Enables/Disables fan operation in back-draft mode.

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 Fanspeed at unit start.

Fanspeed Filter at 0%

Decreases the rate at which the fan speed changes when close-to or at the temperature setpoint to avoid undershooting the setpoint.

Fanspeed Filter at 100%

Increases the rate at which the fan speed changes for a quicker reaction of fan speed at high temperatures.

Fanspeed Reposition Delay

Length of time before fan speed can decrease, allowing temperature to stabilize before the change occurs.

Fanspeed Reposition Mode

Sets a one-time delay that allows the fan to maintain current speed when a call to increase or decrease is made to allow the temperature to stabilize.

Fanspeed Transition Filter

Sets how quickly the fan speed changes between operating modes. Prevents an instant reaction when fans turn on or off and prevents unstable operation.

Max Deceleration Rate

Selects the rate and which the fan speed changes during deceleration.

Maximum Fanspeed

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.

No Power Fanspeed

Speed at which the fans operate when using emergency power.

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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Compressor Settings options

Ball Valve Setpoint Offset

Adjusts sensitivity to compressor discharge pressure or liquid pressure by increasing sensitivity. The higher the added pressure, the more the valve opens.

Capacity Change at 0%

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

Capacity Change at 100%

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

Compressor Sequence

Selects the lead compressor when cooling activates. Values are:

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

Winter Start Delay

Length of time, in minutes, that a low-pressure condition is ignored during compressor start-up. See Setting Low-pressure Time Delay below.

Setting Low-pressure Time Delay

At compressor start-up, a low-pressure condition is ignored for a set period to avoid false trips due to bubbles in the refrigerant or other misreading of the low-pressure device.

NOTE: The factory-default setting is a 3-minute delay for air-cooled units and a 0- to 1-minute delay for water-cooled units.

1. Touch 

, then  > *Options Setup* > *Compressor Settings*.
2. Use the *Winter Start Delay* slider to select the number of minutes for the delay, and touch *Save*.

Adjusting Ball-valve Pressure Offset

NOTE: Only a properly-trained and qualified technician should modify the motorized ball valve setting.

The number of times the valve opens and closes is adjusted based on added pressure offset.

1. Touch 

, then  > *Options Setup* > *Compressor Settings*.
2. Use the *Ball Valve Setpoint Offset* slider to select amount of pressure added to open the valve wider, and touch *Save*.

Compressor Sequencing for Balancing Run Times

Compressor sequencing, available in two-compressor cooling units, allows assigning a lead compressor or allowing automatically leading with the compressor with the lower run-hours logged.

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

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

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

To set-up compressor sequencing:

1. Touch 

, then  > *Options Setup* > *Compressor Settings*.
2. Select the *Compressor Sequence* option to use, and touch *Save*.

3.3.5 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 1 to 3 stages of reheat, which is 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 on the facing page to adjust the setpoint options, then touch*Save*.
The option settings are updated.
   - Touch *Cancel* to discard the changes without saving.

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

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 below. Values are:

- No = hot-gas reheat disabled.
- Comp.1 = use compressor 1.
- Comp.2 = use compressor 2

Enable Hot Water Flush

(steam canister) 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.

Hot Water Flush Duration

(steam canister)

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 below. 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.

3.3.6 Reheat Control

If your cooling unit(s) 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 26.

Electric, hot-gas and hot-water reheat

Depending on the type of cooling unit, there may be 1 to 3 stages of electric and hot-gas/hot-water reheat. Table 3.3 below, shows the 9 electric reheat options.

Table 3.3 Electric, hot-gas and hot-water reheat configurations

Type	Stage 1	Stage 2	Stage 3
A	Electric 1	—	—
B	Electric 1	Electric 2	—
C	Electric 1	Electric 2	Electric 3
D	Hot gas	—	—
E	Hot gas	Electric 1	—
F	Hot gas	Electric 1	Electric 2
G	Hot water	—	—
H	Hot water	Electric 1	—
I	Hot water	Electric 1	Electric 2

NOTE: During dehumidification, hot gas/hot water are not influenced by the electric reheat setting. Hot gas is set only when the selected compressor is operating (See Enable Hot Gas Heat on the previous page.)

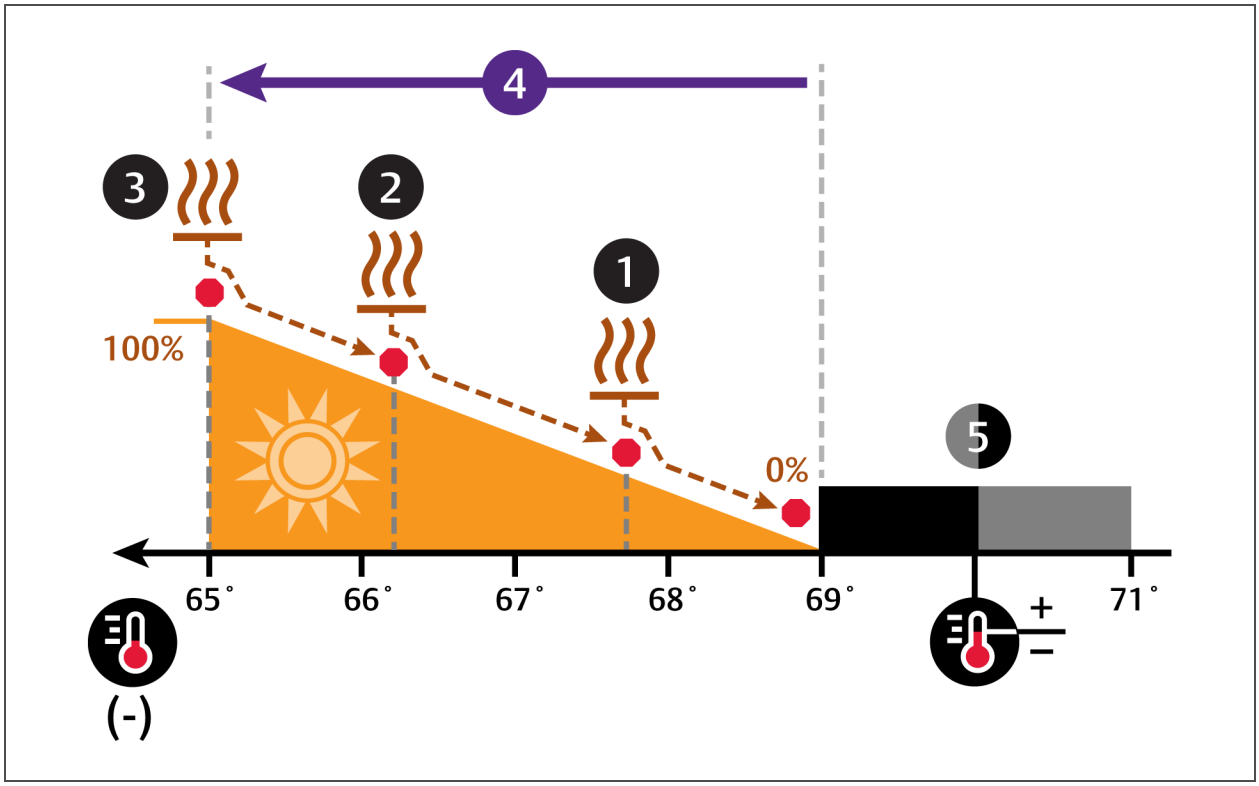
Reheat is controlled by dividing the "heating" half of the temperature proportional band (below the setpoint) by the number of stages. Figure 3.12 on the facing page, illustrates electric reheat operation with 3 stages as follows:

- 70° setpoint
- 8° proportional band
- 2° dead band
- 3-stage reheat

The proportional band is divided evenly on each side of the setpoint. The dead band is divided evenly on each side of the setpoint. The temperature proportional band below the setpoint is divided into thirds, one for each stage.

- From 70° to 69°, 0% heating is required.
- At 68.7° air temperature (heating demand 33%), stage 1 activates and continues operating until temperature reaches 69°.
- When temperature decreases to 67.4°(heating demand 66%), stage 2 activates, and continues until temperature reaches 68.7° (heating demand 33%).
- When temperature decreases to 67.4°(heating demand 100%), stage 2 activates, and continues until temperature reaches 68.7° (heating demand 66%).
- When temperature decreases to 63°(heating demand 100%), stage 3 activates, and continues until temperature reaches 67.4° (heating demand 33%).

Figure 3.12 Temperature control for reheat—3-stage electric reheat



No.	Description	No.	Description
1	Stage 1 reheat.	4	½ of proportional band.
2	Stage 2 reheat.	5	Deadband.
3	Stage 3 reheat.		

SCR Reheat

SCR reheat uses pulsed on/off operation to modulate heating capacity to control temperature more precisely than staged, electric reheat. 100% heating capacity is constant operation of SCR reheat. As the temperature proportional band requires more heat, the SCR output adjusts proportionally.

SCR reheat—Standard mode

NOTE: Standard SCR Reheat when used in conjunction with variable cooling capacity (such as chilled water, variable-speed fans or digital-scroll compressors) provides ultimate capacity control and energy-efficiency gains.

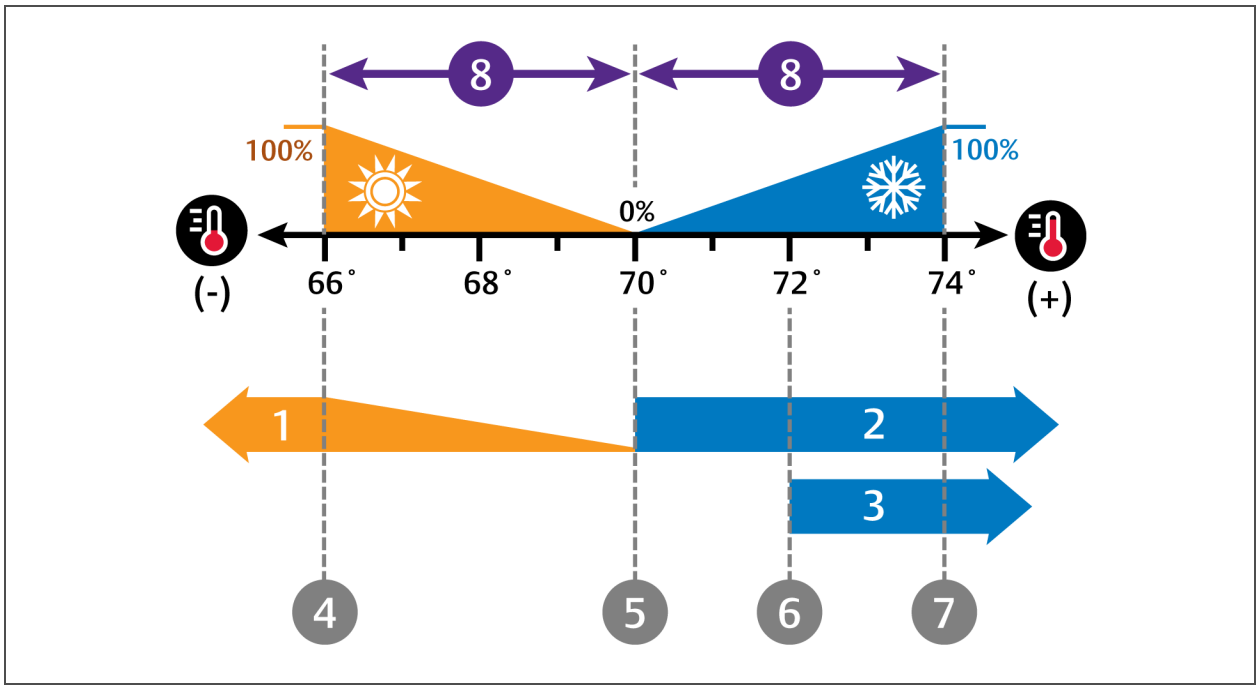
In standard mode, SCR reheat responds to a 0% to 100% heating requirement based on the temperature proportional band. Figure 3.13 on the facing page, illustrates SCR reheat in standard mode as follows:

- 70° setpoint
- 8° proportional band
- No dead band

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

- At 70° air temperature (heating demand 0%), no heating occurs.
- When temperature decreases below the setpoint, SCR reheat activates, and increases output as the heating demand increases from 0% to 100%.
- As air temperature rises and heating demand decreases, the SCR reduces output and stops operating when 70° (0% heading demand) is reached.

Figure 3.13 Temperature control for reheat—SCR in standard mode



No.	Description	No.	Description
1	SCR reheat operation.	5	SCR reheat stops/begins operating at the setpoint. Compressor 1 begins/stops operation at the setpoint.
2	Compressor 1 operation.	6	Compressor 2 stops operating.
3	Compressor 2 operation.	7	Compressor 2 begins operating.
4	SCR reheat output is 100%.	8	½ of proportional band.

SCR Reheat—Tight mode

In tight mode, cooling (compressors) and heating (SCR reheat) components operate simultaneously to provide maximum temperature control.

NOTE: Tight mode is the factory-default setting when available. Tight mode is not available on chilled-water units, units with variable-speed fans or units with digital-scroll compressors.

The compressor(s) respond to a 0% to 100% cooling requirement and the SCR responds to a 0% to 200% heating requirement based on the temperature proportional band. Figure 3.14 on the facing page, illustrates SCR reheat on a system with 2 single-step compressors operating in tight mode as follows:

- 70° setpoint
- 8° proportional band
- No dead band

The proportional band is divided evenly on each side of the setpoint, and an additional half of the proportional band is added to the heating side for 200% heating.

- At 70° air temperature (heating demand 0%), SCR reheat operates at full capacity and compressor 1 operates continuously from 100% cooling demand to 200% heating demand.
- At 200% heating demand, compressor 1 deactivates until the temperature increases to 70° setpoint (0% heading/cooling demand).
- As cooling demand increases from 0% to 100%, SCR reduces heating capacity proportionally and stops operating at 100% cooling demand.
- At 100% cooling demand, compressor 2 starts and operates until the air temperature returns to 70° (0% cooling demand) when it stops operation.

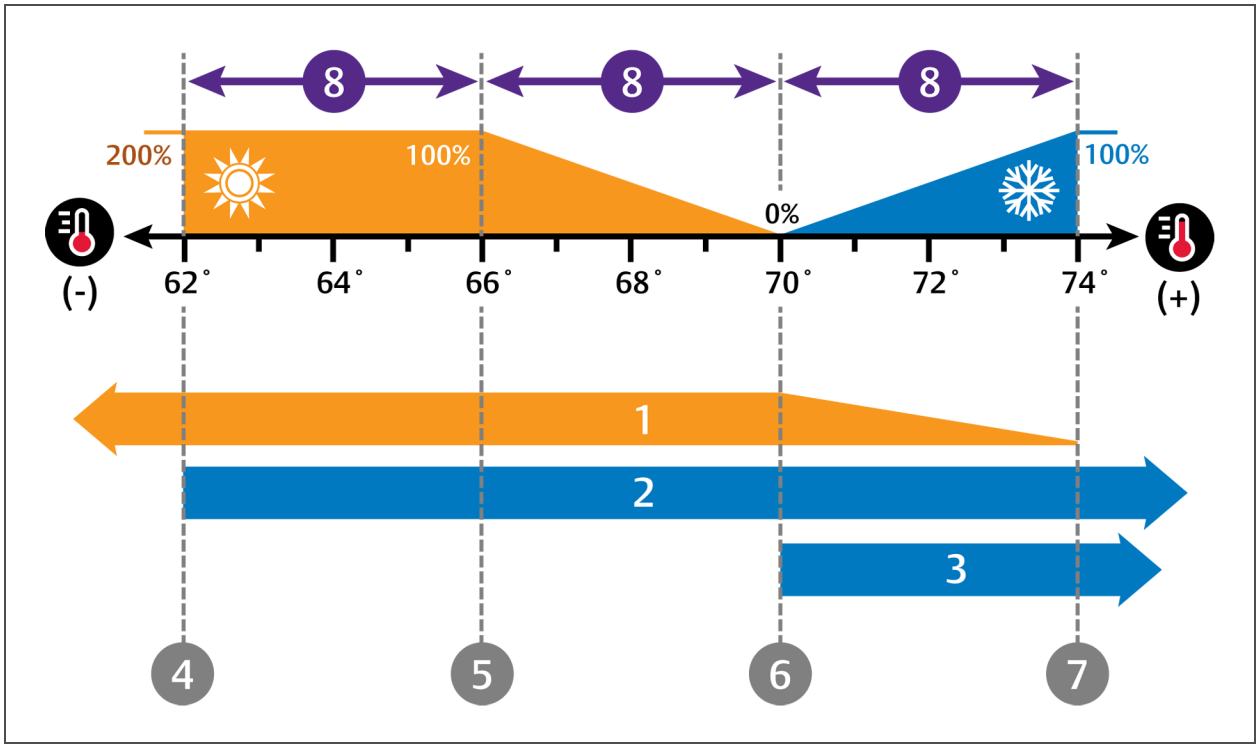
  – at the same time –

  SCR increases heating capacity as the cooling demand decreases from 100% to 0%.

- When temperature decreases below the setpoint, SCR operates at full capacity as the air temperature drops and heating demand increases from 0% to 200%.

NOTE: Some cooling units are not suited for a strict, NO-LOAD application and require a minimal load in the space. Consult a Vertiv™ representative for verification.

Figure 3.14 Temperature control for reheat—SCR in tight mode



No.	Description	No.	Description
1	SCR reheat operation.	5	100% heating.
2	Compressor 1 operation.	6	SCR reheat capacity is decreased as temperature nears 100% cooling, and compressor 2 stops operating.
3	Compressor 2 operation.	7	SCR reheat stops operating, and Cooling begins operating.
4	SCR reheat is operates at full capacity from 0% to 200% heating, and compressor 1 stops operating at 200% heating and remains inactive until temperature returns to the setpoint.	8	½ of proportional band.

3.3.7 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your 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 paramater.

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%

3.3.8 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your 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.

3.3.9 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Water Leak Detector settings options

Water Detector

Type of water-leak detector installed.

3.3.10 Setting Q15 options

1. Touch 

, then  > *Options Setup* > *Q15 Settings*.
   The Q15 SETTINGS panel displays.
2. Make adjustments as needed and click *Save*.
   The option settings are updated.
   - Touch *Cancel* to discard the changes without saving.

Q15 Settings options

Damper Switch Feedback Timer

If output function is Damper and End Switch, the length of time iCOM waits for the feedback signal from the damper motor, that is, if it is open or closed.

Fan Delay for Damper

Length of time that must elapse during damper opening/closing. During this span, all functions associated with the on/off state are eligible.

Medium Board: Q15 map to K11

Maps the Q15 function to the K11 (warning) relay because a medium-sized board does not have Q15 output.

Q15 Output Direction

Selects whether the output is normally-on or normally-off.

Q15 Output Function

Selects the reason for which the digital output is activated. Options are:

1 = Dehum On	9 = FreeCool ON
3 = Reheat On	10 = Damper
4 = Comp On	11 = High Temp
5 = Comp 1 On	12 = Low Temp
6 = Comp 2 On (in dual-compressor systems)	13 = Loss Power
7 = Humi On	14 = Power Source

Q15 Output Sensor

Selects a sensor reading to compare to the set threshold that activates Q15 output. Options are:

- 0 = Return
- 1 = Supply
- 2 = Rem Max
- 3 = Rem Low
- 4 = Rem Avg

Q15 Output State

Status of Q15 output, "On" or "Off."

Q15 temp actual

Current value of the sensor selected as the Q15 Output Sensor.

Q15 Temp output threshold

Temperature threshold above or below which Q15 output activates.

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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 20, and Viewing Unit Alarms on page 17.)

In some cases, depending on configuration, an alarm event may power-off the cooling unit, but not always. However, if a stand-by unit is configured, all alarm events stop the faulty unit and start the stand-by 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-managment unit, included components, and control settings of your system, the options on your iCOM display may differ.

Alarms & 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 page 71.

Ack.

Indicates type of acknowledgment required. See Acknowledging Alarms on page 18. 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 18.

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 on the facing page).

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 on the facing page.

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 75, lists the default and adjustable notification settings for events. Table 4.3 on page 77, describes evens for the Liebert® MC Condenser. Table 4.4 on page 79, describes events for the Liebert® EconoPhase unit. Table 4.5 on page 80, describes events for the Liebert® DSE compressors. Events specific to EEV alarm board on page 81, 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.

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 75, 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 75, 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 11.1** on page 125, and Viewing Unit Alarms on page 17.
Alarm	Listed with a red status dot on the ALARMS panel, the LED flashes, and the audible alarm sounds. See **Table 11.1** on page 125, Viewing Unit Alarms on page 17, and Enabling the Audible Alarm Notification on page 81.

Table 4.2 on page 75, 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 2 OVERLOAD	Internal Calc.	no	ALM
COMP 1 HIGH PRESSURE	Internal Calc.	no	ALM
COMP 2 HIGH PRESSURE	Internal Calc.	no	ALM
COMP 1 LOW PRESSURE	Internal Calc.	no	ALM
COMP 2 LOW PRESSURE	Internal Calc.	no	ALM
COMP 1 PUMPDOWN FAIL	Internal Calc.	no	ALM
COMP 2 PUMPDOWN FAIL	Internal Calc.	no	ALM
DIG SCROLL1 HIGH TEMP	Internal Calc.	no	ALM
DIG SCROLL2 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
STBY GLYCOL PUMP ON	2 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

Table 4.2 Event Notification Defaults (continued)

Event	Internal delay	Default delay/Range for adjustment	Type
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
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
FC 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
COMP 2 SHORT CYCLE	0 sec	0 – 9999	MSG
No Power	0 sec	0 sec/0 – 9999WRN	
Condensate 1 Failure	0 sec	5 sec/0 – 9999	WRN
Condensate 2 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
LOW SUP TEMP	0 sec	30 sec/0 – 9999	ALM
REDUCED ECO AIRFLOW	0 sec	3 sec/0 – 9999	WRN
ECO HI TEMP OVERRIDE	0 sec	10 sec/0 – 9999	WRN
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

Table 4.2 Event Notification Defaults (continued)

Event	Internal delay	Default delay/Range for adjustment	Type
HUM CTRL SENSOR FAIL	0 sec	30 sec/0 – 9999	WRN
LOSS OF FLOW	0 sec	5 sec/0 – 9999	ALM
STAT PRES SENSOR FAIL	0 sec	120 sec/0 – 9999	ALM
LOW STATIC PRESSURE	0 sec	120 sec/0 – 9999	WRN
HIGH STATIC PRESSURE	0 sec	120 sec/0 – 9999	WRN
STATPRES OUT OF RANGE	0 sec	150 sec/0 – 9999	WRN
DAMPER FAILURE	0 sec	10 sec/0 – 9999	ALM
BMS DISCONNECTED	0 sec	ENABLED/DIS - ENAB	WRN

Table 4.3 on the facing page, describes events available with a Liebert® MC Condenser.

NOTE: A CANbus connection between the Liebert® MC condenser and iCOM is required to trigger these events.

Table 4.3 Events specific to Liebert MC Condenser

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

Table 4.3 Events specific to Liebert MC Condenser (continued)

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

Table 4.4 on the facing page, describes events available with a Liebert® EconoPhase™.

Table 4.4 Events specific to Liebert EconoPhase

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

Table 4.4 Events specific to Liebert EconoPhase (continued)

Event	Description
PB2 LO DIFF PRESSURE	Pump differential pressure fell below a lower threshold and pump shut down. • Event is reset when iCOM requests a new startup.
PB2 LO OUTLET TEMP	Pump outlet-refrigerant-temperature fell below a lower threshold and pump shut down. • Event is reset when iCOM requests a new startup.
PB2 OUT PRES SEN FAIL	Outlet refrigerant-pressure-sensor failure. Pump shut down. • Event is reset when condition clears.
PB2 OUT TEMP SEN FAIL	Outlet refrigerant-temperature-sensor failure. Pump shut down. • Event is reset when condition clears.
PB2 CAN DISCONNECTED	iCOM lost CAN communication with pump board. Pump shut down. • Event is reset when condition clears.
PB2 REMOTE SHUTDWN	Remote shut-down requested. Pump shut down. • Event is reset when condition clears.
PB2 STARTUP FAIL	Three pump start-up attempts in a row have failed. • Event must be reset manually.
PB1 COMMUNICATE FAIL	Ethernet communications failure. Pump not shut down. • Event is reset when condition clears. USB communications failure. Pump not shut down. • Event is reset when condition clears.
PB2 COMMUNICATE FAIL	Ethernet communications failure. Pump not shut down. • Event is reset when condition clears. USB communications failure. Pump not shut down. • Event is reset when condition clears.
PB1 COND TO PUMP TEMP	Temperature variance from condenser 1 output to pump 1 input exceeds allowed parameters. Pump shut down. • Event is reset when iCOM requests a new startup.
PB2 COND TO PUMP TEMP	Temperature variance from condenser 2 output to pump 2 input exceeds allowed parameters. Pump shut down. • Event is reset when iCOM requests a new startup.
MM Cycle Lock Out	Liebert® EconoPhase operating in Mixed Mode has failed to control cooling 10 times in 6 hours. • Mixed Mode operation is disabled until the event is manually reset.
PB Cycle Lock Out	Liebert® EconoPhase in Pump Mode has failed to control cooling 5 times consecutively at full-pump-capacity temperature conditions. • EconoPhase operation is disabled until the event is manually reset.

Table 4.5 below, describes events available with the Liebert® DSE compressor.

Table 4.5 Events specific to Liebert DSE compressor

Event	Description
COMP 1A OVERLOAD	Compressor overloaded. • The corresponding compressor is disabled until the condition resets. Some external overloads may require the device to be reset manually.
COMP 1B OVERLOAD	
COMP 2A OVERLOAD	
COMP 2B OVERLOAD	
COMP 1A HRS EXCEEDED	Compressor run-hour limit exceeded by actual run hours.
COMP 1B HRS EXCEEDED	
COMP 2A HRS EXCEEDED	
COMP 2B HRS EXCEEDED	
COMP 1A HIGH TEMP	High discharge temperature. Compressor is powered-off.
COMP 1B HIGH TEMP	
COMP 2A HIGH TEMP	
COMP 2B HIGH TEMP	
COMP 1A DISCH SENSOR FAIL	Compressor discharge pressure sensor failed.
COMP 1B DISCH SENSOR FAIL	
COMP 2A DISCH SENSOR FAIL	
COMP 2B DISCH SENSOR FAIL	
COMP 1A SHORT CYCLE	Compressor exceeded the maximum number of stop/starts allowed in the time period.
COMP 1B SHORT CYCLE	
COMP 2A SHORT CYCLE	
COMP 2B SHORT CYCLE	
CIRCUIT 1 HIGH PRESS	Circuit 1 or 2 high discharge pressure
CIRCUIT 2 HIGH PRESS	
CIRCUIT 1 LOW PRESS	Circuit 1 or 2 low suction pressure
CIRCUIT 2 LOW PRESS	

Table 4.6 below, describes events available with the EEV alarm board.

Table 4.6 Events specific to EEV alarm board

Event	Description
EEV 1 or 2 Communication Error	iCOM lost communication with the EEV board. • The compressor(s) shut-off and the unit exits EconoPhase while the error is active.
EEV 1 or 2 Sensor Error	iCOM lost communication with a connected EEV sensor. • If a sensor value is not reported for 10 seconds, a sensor error occurs. The compressor(s) shut-off and the unit exits EconoPhase while the error is active. • If 4 sensor errors occur in a 30-minute window, the Sensor Error event remains active until reset manually.
EEV 1 or 2 Motor Error	Problem with the stepper motor. • The corresponding compressor(s) are disabled until the condition is cleared.
EEV 1 or 2 Low Superheat	Superheat dropped below 1°F (–17°C) for 1 minute. • The corresponding compressor(s) are powered-off for the minimum "off time" while the event is active.
EEV 1 or 2 High discharge temp	Discharge temperature exceeded the high-temperature threshold. • The corresponding compressor(s) are powered-off until the alarm is manually reset.
EEV 1 or 2 Feedback Failure	The EEV control monitors feedback from the compressor contactor. Feedback Failure is reported if the contactor is de-energized while the EEV is operating for superheat control. • The corresponding compressor is disabled until the alarm is manually reset.
EEV 1 or 2 Battery Warning	The EEV control tests the EEV battery back-up (if included), and indicates low battery life. • If this warning remains active for 24 hours, a Battery-failure event occurs and the circuit is locked-out.
EEV 1 or 2 Battery Failure	The EEV control tests the EEV battery back-up (if included), and indicates battery failure. • The corresponding EEV circuit is locked-out until the failure code is reset. See Resetting EEV Battery-failure Counter on page 130.
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.
Comp 1 or 2 High Superheat	Superheat is above the high threshold for 30 minutes. • The compressor is powered-off for the minimum "off time."

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. RAD include smoke detectors, filter-condition, valve status.

Included in the remote-alarm devices (RAD) option are up to 4 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 below.

RAD and customer-input notifications are set in the same way as other events. See Selecting Event Type and Setting Alarm/Warning Notification on page 71.

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 4.7 below, maps the customer input to the remote-alarm devices (RAD).

Table 4.7 Customer-input terminals to RAD 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 4.8 on page 85.
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 4.8 on page 85, for a description of available values.

Customer Input *X* Active When

Selects when the input triggers an event. Options are:

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

NOTE: Depending on customization, some events listed in Table 4.8 on the facing page, may not be available with your system.

Table 4.8 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.

Table 4.8 Customer-input Options (continued)

Input	Action/Description
COND 2 FAIL	Event only.
D-SCROLL RED	Event + Reduces requested compressor capacity by 20%.
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.

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5 U2U NETWORKING

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
- Stand-by (lead/lag)
- Rotation
- Cascading

NOTE: The U2U network must be separate from other networks. Use a communication card, such as a 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, stand-by, 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.

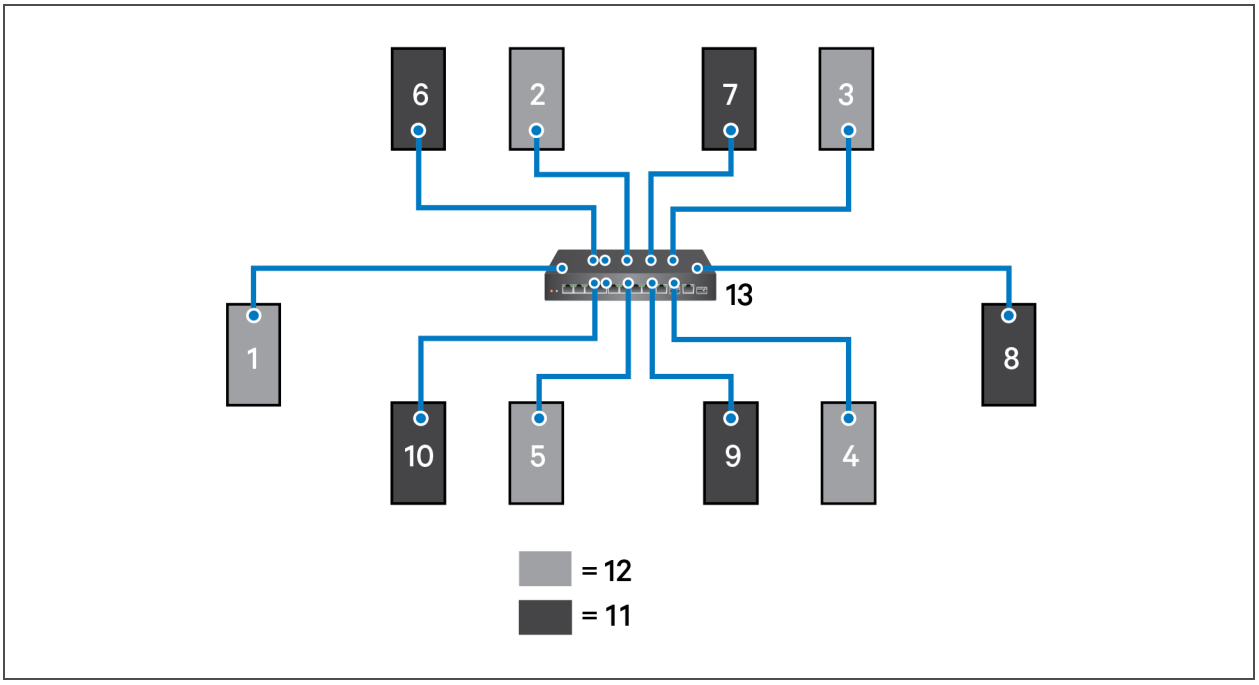
NOTE: For ease of set-up and use, we recommend using only 1 group unless you have multiple rooms, differing software versions, or different types of cooling units.

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 stand-by units.
5. Determine if using teamwork and if so, which mode.
6. Plan U2U address assignments.
   - Refer to the U2U Display and Control-board settings on page 89, for guidelines assigning cooling-unit control-board addresses and iCOM display-board addresses.
   - Balance/Alternate unit address assignments based on room layout and because stand-by 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 stand-by 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, Importing/Exporting and Restoring Display Settings on page 121).
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 facing page, then refer to U2U Wiring connection on page 161, to connect the network cabling and hardware.

Figure 5.1 Example layout stand-by/operating unit-address assignment



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

5.2 Configuring U2U Network Settings

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

The U2U NETWORK SETTINGS configure 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 91.

To configure unit-to-unit networking:

1. Touch  , 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.

U2U Display and Control-board settings

Broadcast

Logical address at which connected units receive datagrams.

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

CB Firmware Version

Display configuration based on the firmware version of the control board. Depends on your cooling unit as follows:

- CR-2.03 = CRV
- PA-2.01 = CW/DS
- PA-2.04 = DSE
- PA-2.05 = DSE, PDX/PCW, Mini-Mate
- PA-2.06 = CW/DS, DSE, PDX/PCW, Mini-Mate

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

Gateway

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

Generate U2U Compatible Broadcast

Facilitates U2U communication between the display and control board.

NOTE: Do not un-check. Failure to generate the compatible broadcast address results in loss of communication between the display and control board.

IP Address

Network address of the display and control board.

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

Netmask

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

MAC Address

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

U2U Address

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

For the control board, a unique identifier for each control board on the U2U network. Address range is 1 to 32 and must be consecutive from the previous control-board address in the U2U group. This is the address used for stand-by/lead-lag and cascade operation, see Figure 5.1 on page 88.

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

U2U Group

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

For the control board, selects the zone/group with which the unit will be configured in teamwork/stand-by/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 iCOM firmware and otherwise do not operate together efficiently or at all.

U2U Target Address

The address of the control board targeted by the display.

- The unit's U2U target address must match the control-board U2U address.

5.2.1 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.

5.2.2 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, STAND-BY AND ROTATION FOR COOLING UNITS

iCOM Unit-to-unit (U2U) communication via private network and additional hardware (see U2U Networking on page 87) allows the following operating features for the cooling units:

- Teamwork
- Stand-by (Rotation)
- Cascade

6.1 Continuous Control with Virtual Master

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

6.2 Teamwork Modes

When 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.

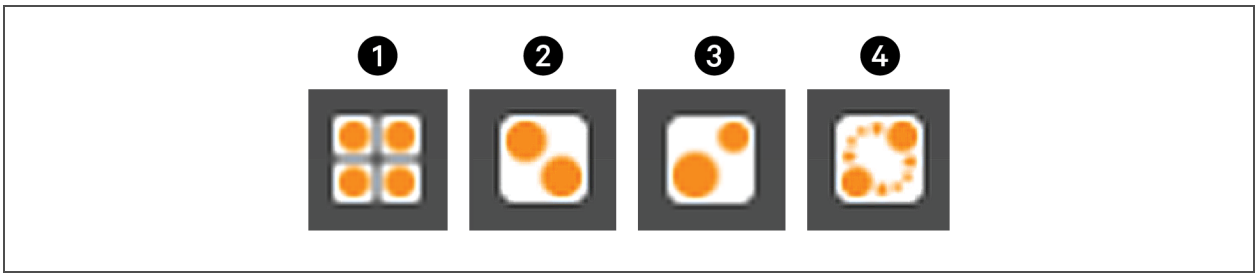
In a panel with "Status" content, the Teamwork Mode icon indicates the mode selected, Figure 6.1 on the next page. Touching the icon displays the Teamwork dialog from which you can access the teamwork-control settings.

To set up team work:

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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Teamwork Control options

Cascade Units

Stages-on stand-by 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 = stand-by units cascade-on based on a call for heating, cooling, humidification, or dehumidification.
  - Cool/Heat = stand-by units cascade-on with a call for heating or cooling only.
  - Cooling = stand-by units cascade-on with a call for cooling only.
- Teamwork mode 3 - Optimized Aisle options are:
  - Fan PI = stand-by 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.
  - Fanspeed = stand-by 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 @ SYS Fanspeed* setting.

Cascaded Units Quick Start

After a power cycle of the master 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 @ SYS Fanspeed

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

Stop Next Unit @ SYS Fanspeed

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.

6.2.1 No Teamwork—Multiple Zones in One Room

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

6.2.2 Teamwork Mode 1—Parallel Operation

In Teamwork Mode1, 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 master 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.

6.2.3 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 master 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 un-even distribution of work hours.

6.2.4 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 un-balanced 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: Stand-by 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:

- 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 master 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 Stand-by (Lead/Lag)

Stand-by assigns some units to operate while others are "on stand-by" which is idle but ready 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 stand-by mode, fan(s) are off and no cooling occurs. In multiple cooling-unit systems, assigning units to stand-by lets you:

- Configure redundancy in case of failure scenarios (stand-by).
- Manage cooling-unit run time (lead/lag). See Setting a Rotation Schedule on page 99.
- Modulate for very low loads to full-design load (to be temperature reactive) by cascading activation of stand-by units (configured when setting-up teamwork mode).

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

- During single cooling-unit or component failure, a stand-by unit is activated to replace the failed unit.
- Alarm event causes unit shut-down, a stand-by unit is activated. If the activated unit also has an alarm event, the next available stand-by 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 stand-by regardless of the teamwork mode selected, including "no teamwork."

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.

Stand-by options

High Temperature Threshold

Temperature at which all stand-by units are activated.

Number of Standby Units

Number of units in stand-by mode.

Standby Fan Timer at Reheat/Humidification

Length of time in minutes that the fan continues to operate after the cooling unit enters stand-by or sleep 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 stand-by 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.

Unit-rotation options

Lead Lag Overlap Timer

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

Rotate At

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

6.4.1 Manually Rotating the Operating and Stand-by Units

You can rotate the operating and stand-by 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 the previous page.

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 stand-by units are rotated.

7 CONFIGURING ECONOMIZER OPERATION

Use iCOM to configure the economizer installed on your cooling unit.

NOTE: Depending on customization to your cooling system, one of two types of economizer may be installed, Liebert® Fluid Economizer or Liebert® Air Economizer. Menu options differ depending on the type of economizer installed and significant differences are noted when they occur.

7.1 Fluid Economizers

Fluid economizers provide a secondary chilled-water or glycol coil (Liebert® Econ-O-Coil™) for cooling. Economizer operation is commonly referred-to as “free cooling” because it reduces or eliminates the use of the compressor(s) in the right environmental conditions.

Your system may have one of two kinds of fluid economizers:

- GLYCOOL™ economizer—a 2-pipe system that feeds a second glycol coil in the cooling unit and also the compressor(s) and heat exchanger (Liebert Paradenser™, tube-in-tube condenser, or brazed-plate heat exchanger).
- Dual-Cool economizer—a 2-pipe or 4-pipe system.
  - A 2-pipe system provides chilled water to a second coil, bypassing the air-cooled/condenser compressorized loop.
  - In a 4-pipe system, 2 fluid lines are dedicated to a second chilled-water coil and 2 fluid lines are dedicated to a glycol-cooled or chilled-water-cooled compressorized loop.

The Fluid Economizer option appears on the iCOM Service menu and opens the FLUID ECONOMIZER panel to configure operation.

Fluid-economizer control options

Override

Configures cooling-unit override of economizer operation. See Overriding Fluid Economizer Operation on the next page.

Setup

Configures the activation setpoints of the economizer. See Setting-up Fluid Economizer Operation on the next page.

Status

Status of economizer properties. See Viewing Fluid Economizer Statuses on page 107.

7.1.1 Overriding Fluid Economizer Operation

Overrides the economizer's settings with those of the cooling unit.

1. Touch 

, then  > *Economizer* > *Override*.
The OVERRIDE panel opens.
2. Select the override settings and touch *Save*.

Fluid-economizer override options

Enable Fluid Economizer

Enables/Disables economizer operation.

Lockout FC at FC Fluid below

When enabled, prevents frost on free-cooling pipes by disabling the free-cooling unit when the FC Fluid Temperature falls below the specified limit. The default setting is 32°F

Stop FC at Setpoint + Value

Temperature at which free-cooling is locked-out.

7.1.2 Setting-up Fluid Economizer Operation

Configures activation points of the economizer. The sensors used to control/activate secondary cooling are room/local air-temperature sensor or return-air sensor and an Aquastat Sensor (AQ) that measures the glycol/chilled-water temperature.

1. Touch 

, then  > *Economizer* > *Setup*.
The SETUP panel opens.

   Indicator dots next to the parameters show the status of the property. Table 7.1 below, describes the color "dots" that indicate whether or not DT Between Room and Fluid Value (depending on the selection for DT Between Room and Fluid Value) is within range for economizer operation. Indicators must be green to condition the space using the economizer. If an indicator is yellow, the economizer will not condition the space.

2. Refer to the Fluid-economizer set-up options on the facing page, and Temperature Control with a Fluid Economizer on page 104, to adjust the setpoint options, then touch *Save*.

Table 7.1 Economizer property-status indicators

Indicator color	Definition
Green	The air or fluid meets the requirements for use.
Yellow	The air or fluid does not meet requirements and is ineligible for use.

NOTE: Depending on the type of economizer with your system, all of the options listed may not be available on your iCOM display.

Fluid-economizer set-up options

DT Between Room and Fluid Type

Selects the glycol/chilled-water temperature input used by the comparator circuit to determine if the differential temperature (DT) warrants use of secondary cooling.

- Disabled = Disables the second cooling source in dual-cool configurations and is the default setting for standard, compressorized units and for chilled-water units without a second cooling source.
- Contact = An external input is used to determine secondary cooling activation based on the open/closed status of the contact:

  Open = activate second cooling source.

  Closed = deactivate second cooling source.
- Temp = The difference between the fluid temperature and the room air temperature (Temperature Setpoint) determines use of secondary cooling. (The difference parameter is set with the DT Between Room and Fluid Value slider. When the difference is equal-to or greater than the selected value, secondary cooling is used.)
- Set = Enables free-cooling when the sensed fluid temperature is colder than the Temperature Setpoint. (The difference parameter is set using the DT Between Room and Fluid Value slider. When the difference is equal-to or greater than the selected value, secondary cooling is used.)

DT Between Room and Fluid Value

Temperature difference between fluid and room air at which secondary cooling activates. For example, when set at the factoy-default 12°F (–11.1°C), secondary cooling activates when the the fluid temperature is 12 or more degrees colder than the room air temperature/setpoint.

Minimum CW Temp

Enables/Disables setting a minimum chilled-water temperature that controls simultaneous operation of chilled-water secondary cooling and compressor(s).

Minimum CW Temp Value

Temperature of the fluid that determines whether or not secondary cooling and compressor(s) operate simultaneously:

- If the fluid temperature is below the minimum temperature and if the temperature differential is satisfied (DT Between Room and Fluid Value), then the compressor(s) are locked-out and the seondary chilled-water coil provides cooling.

NOTE: If secondary cooling fails (for example, loss of water flow), this setting is overridden and the compressor(s) activated. If this occurs, free-cooling is locked-out for 1 hour.

- If the fluid temperature is above the minimum temperature, chilled-water and the compressorized cooling will operate simultaneously if needed.

Enable Freecooling Flush

Number of hours between flushes of the free-cooling coil.

Freecooling Flush Duration

Length of time the for flush of the free-cooling coil.

Freecooling Flush Starts K11

When enabled, the Q15 relay is activated during the free-cooling flush.

Ramp up fan at 100% FC

Enables/Disables and increase in fan speed when free-cooling reaches 100% capacity.

7.1.3 Temperature Control with a Fluid Economizer

When an economizer is installed, the cooling requirement (determined by the temperature proportional band) is addressed first by the economizer's secondary cooling, if the economizer cooling capacity is insufficient, the compressor(s) begin cooling to bring the room air temperature down to the temperature setpoint.

The fluid economizer employs a motorized ball valve that controls the flow of chilled-water/glycol to provide a cooling capacity from 0% to 100%.

Simultaneous operation/Partial economizer operation/Staging cooling sources

When simultaneous operation of the compressor(s) and secondary cooling is enabled, the portion of the proportional band assigned to the fluid-capacity valve may be reduced by the comparator circuit based on the differential-temperature (DT) settings. When this occurs, the compressor-control proportional band moves closer to the setpoint, and compressorized cooling begins before secondary cooling reaches 100% (as shown in the example Secondary-cooling temperature control with 2-step compressor on the facing page) or shuts-off.

CAUTION: On units with a GLYCOOL fluid economizer and standard-scroll or semi-hermetic compressors without unloaders, there is a risk of over-cooling and low refrigerant pressure when freecooling/secondary cooling operates simultaneously with compressor/DX cooling. Make sure adequate flow is provided when 100% freecooling and compressorized cooling occur at the same time. If the fluid temperature is too cold while the compressors are running, the refrigerant pressure will drop. Contact technical support at 1-800-543-2778 for more information on setting-up simultaneous operation.

NOTE: The compressor control method is not affected by economizer operation and operates across the assigned proportional band based on the compressor configuration of your system (1-step, 2-step, 4-step, or digital-scroll). See Compressor Control by Cooling Requirement on page 28, for a description compressor-control methods.

Secondary-cooling temperature control with 2-step compressor

When the fluid temperature meets the set-up requirements, secondary cooling provides temperature control as follows. If the fluid is not cold enough, primary, compressorized cooling operates as normal.

NOTE: The compressor control method is not affected by economizer operation and operates across the assigned proportional band based on the compressor configuration of your system (1-step, 2-step, 4-step, or digital-scroll). See Compressor Control by Cooling Requirement on page 28, for a description compressor-control methods.

- 70° temperature setpoint
- 8° temperature proportional band
- 2° temperature dead band

In Figure 7.1 on the next page:

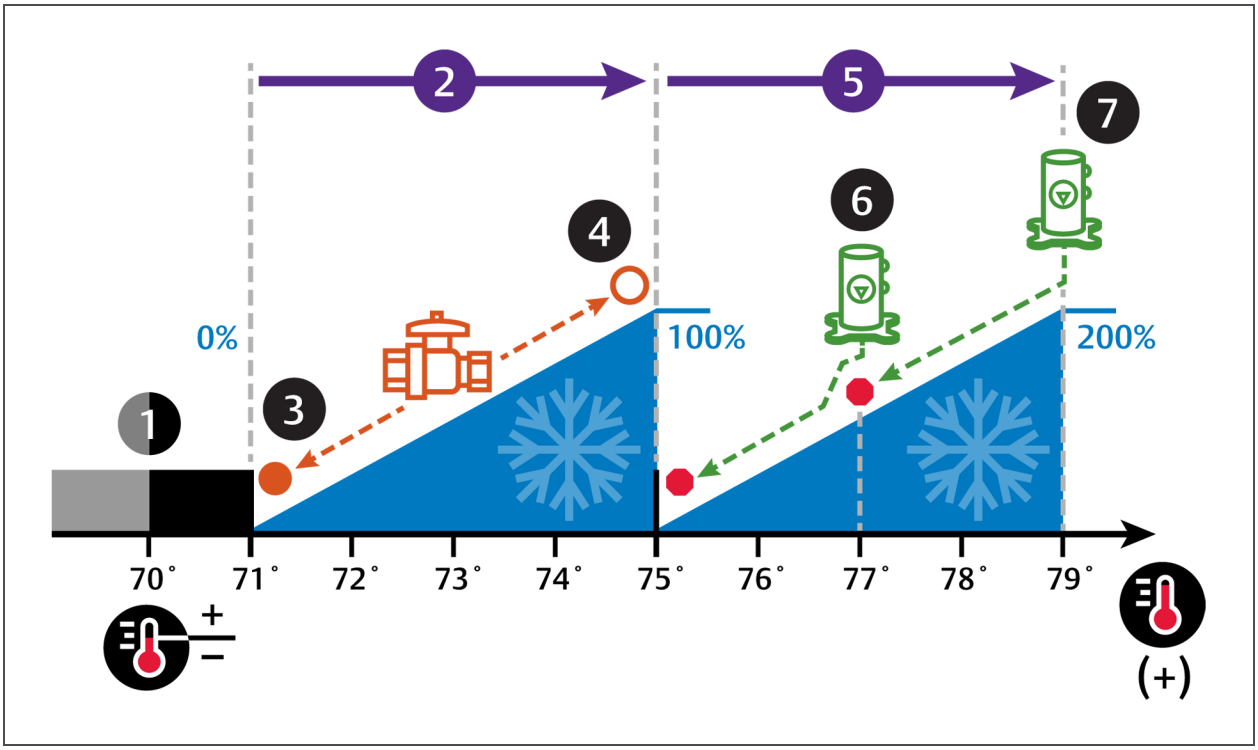
The proportional band is divided evenly on each side of the setpoint, and an additional half of the proportional band is added to the cooling side for 200% cooling.

- At 71° air temperature (cooling demand 0%), the fluid-control valve is closed.
- As cooling demand increases from 0% to 100%, the fluid-control valve opens incrementally to increase cooling capacity proportionally until fully-open at 75° (cooling demand 100%).

NOTE: If simultaneous operation of economizer cooling and compressor (DX) cooling is enabled, the compressor(s) may begin operation before the valve is open 100% because the fluid temperature differential is calculated to provide insufficient cooling.

- At 100% cooling demand, the compressor control method is employed across the additional half of the proportional band, a single scroll compressor with unloaders in this example:
  - The compressor starts un-loaded at 77° when the cooling requirement is 150%.
  - At 79° when the cooling requirement is 200%, the compressor operates loaded until 77° is reached when cooling requirement is 150% when it returns to un-loaded operation.

Figure 7.1 Temperature control—Fluid economizer and example 2-step compressor capacity



No.	Description	No.	Description
1	Deadband.	5	½ of proportional band assigned to compressor(s) operation.
2	½ of proportional band assigned to valve operation.	6	Scroll compressor step 1. (Compressor 1 in dual-compressor configuration, Unloaded in single-compressor configuration.)
3	Fluid control valve closed.	7	Scroll compressor step 2. (Compressor 2 in dual-compressor configuration, Loaded in single-compressor configuration.)
7	Fluid control valve fully-open.		

7.1.4 Viewing Fluid Economizer Statuses

Display the status of the economizer features installed in the cooling unit.

- Touch 

, then  > *Economizer* > *Status*.
  The STATUS panel opens.
  - If the status indicators are not all green, the economizer is not used to condition the unit. To adjust the settings, see Setting-up Fluid Economizer Operation on page 102.

Fluid-economizer status options

FC Capacity

Cooling capacity of the fluid economizer.

Freecooling Fluid Temperature

Current temperature of the free-cooling fluid.

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8 EXTERNAL MONITORING AND BUILDING-MANAGEMENT SYSTEMS

iCOM-controlled cooling units are equipped with Liebert® IntelliSlot™ plug-in slots for optional communication cards to communicate with external monitoring systems including Building Management Systems (BMS), Network Monitoring Systems (NMS) and Liebert® SiteScan™ Web.

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

Two cards are available to provide remote communication to iCOM.

- Liebert® IntelliSlot IS-UNITY-DP communication card—communicates with up-to two third-party protocols to monitor and manage a range of parameters and events and requires Velocity V4 monitoring protocol (standard on firmware versions PA1.04.033 and later). Unity cards deliver:

The Unity card also communicates with up-to two third-party protocols to monitor and manage a range of parameters and events and requires Velocity V4 monitoring protocol (standard on firmware versions PA1.04.033 and later) including:

  - Velocity Protocol for Trellis™, Liebert® SiteScan™ and Liebert® Nform™.
  - Embedded 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 Master-Slave/Token-Passing communication protocol for BMS over an RS-485 serial network (Modbus MSTP RS-485)
- Liebert® IntelliSlot SiteLink-E™ CARD (IS-485EXI)—monitoring and management via ground-fault isolated connection to a Liebert® SiteLink-E.

8.1 BMS and IntelliSlot Settings

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

- Disconnect fail-safe
- Manual fan-speed control
- Allowing the BMS to change fan speed.
- Back-up fan control

8.1.1 Configuring BMS Communication with IntelliSlot Card

Modbus, BACnet, SNMP, SMS and HTTP communication cannot be configured via iCOM. To set up third-party protocols, refer to the appropriate Liebert® IntelliSlot Card user manual avalable at https://www.vertivco.com/en-us/support/.

NOTICE

Risk of loss-of-communication with Liebert® IntelliSlot cards. Can cause operational problems.

Do not change the monitoring address of the IntelliSlot card (set at 3) unless directed by a technical support representative.

To set-up communication with a card

1. Touch 

, then  > *BMS & Teamwork* > *BMS Setup*.
The BMS SETUP panel opens.
2. Select *IntelliSlot Card Settings* and refer to IntelliSlot options below, to make selections.
3. Touch *Save*.

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

IntelliSlot options

Monitoring Address

Address used by an optional, installed IntelliSlot card. Factory default = 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 = Liebert IS-UNITY card.
- Embedded = Embedded IS-UNITY function
- Embedded & IS V4 Both Embedded Unity function and Velocity V4 for an optional-installed IS-UNITY card

8.1.2 Setting BMS Control Settings

1. Touch 

, then  > *BMS & Teamwork* > *BMS Setup* > *Control Settings*.
The CONTROLL 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 Back-up Setpoints on the facing page.

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

BMS Control Settings options

BMS is connected to

- Velocity
- Analog Input 1-4

BMS Fanspeed 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 43.

Handshake

Sets time-period, in minutes, in which communication between the BMS and iCOM must occur.

Maximum Fanspeed

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

8.1.3 Setting BMS Back-up Setpoints

1. Touch SERVICE, 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

BMS Timeout Settings options

BMS Backup Fan Operation

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

- Disabled
- BMS Backup Spd
- Coupled
- BMS Backup Set

BMS Backup Temp Setpoint

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

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9 CONFIGURING AUXILIARY DEVICES

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

9.1 Power Monitoring

Up to 6 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 set-up 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

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:

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

Type

Read-only. The type of power meter.

9.2 Fluid-temperature Monitoring

Up to 2 supply and 2 return sensors may be connected to each cooling unit to monitor local and remote fluid-temperature differential. A 2T sensor monitors fluid temperature (two 2T sensors on dual-circuit units).

1. Touch 

, then  > *Auxiliary Device Setup* > *Sensors* > *Fluid Sensors* > *Fluid 2T Sensor*.
The SENSOR PROPERTIES panel opens.
2. Adjust the temperature offset, and touch *Save*.
The fluid-temperature sensor settings are saved.

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

Fluid-sensor options

Current Fluid Temperature

Actual temperature reading.

Fluid Sensor Type

Type of sensor connected. Options are:

- 2T
- Dual 2T

Fluid Temperature Offset

Correction (calibration) value added to the fluid temperature reading. Used in the event that the fluid temperature-sensor readings are incorrect.

- May be a positive or negative value.

9.3 Configuring Analog-input Devices

1. Touch 

, then  > *Auxiliary Device Setup* > *Analog Input*.
The ANALOG INPUTS and ANALOG INPUT PROPERTIES panels open.

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

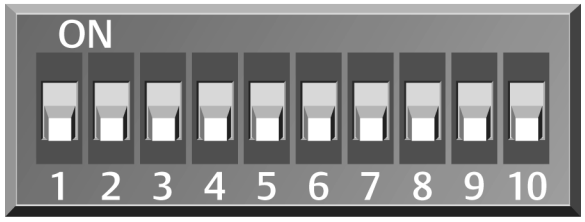
2. Before you touch a specific analog input, the properties panel lists the inputs along with their configuration status:
   - *Factory Std* indicates that the input is configured for a factory-installed component such as a pressure transducer.
   - *Not Config* indicates that the input is configurable.
3. Locate the DIP switches on the control board and program the input type according to Table 9.1 below.
   Figure 9.1 below shows the switch and on/off setting.

Table 9.1 DIP-switch Settings for Analog-input Connection

Analog Input Number		Input #1		Input #2		Input #3		Input #4		Not used	
Control-board Switch Number		1	2	3	4	5	6	7	8	9	10
Analog-input device value	0 – 10 VDC	Off	Off	Off	Off	Off	Off	Off	Off	—	—
	0 – 5 VDC	On	Off	On	Off	On	Off	On	Off	—	—
	4 – 20 mA	On	On	On	On	On	On	On	On	—	—

NOTE: Up is on, down is off on the DIP switch. Switches 9 and 10 are not used.

Figure 9.1 Analog-connection DIP switches on the control board



4. On iCOM, touch SERVICE, then ☰ > *Auxiliary Device Setup* > *Analog Input* > Customer Analog Inputs, the touch an Analog Input.
   The ANALOG INPUT PROPERTIES for that device displays.
5. Select the configuration and touch *Save*.
   The analog input is configured.

NOTE: The Airflow, Static Pressure and Fluid Flow analog-input settings configure factory options and require special instruction. Contact Vertiv™ Technical Support at 1-800-543-2778.

9.4 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.

Each wired-remote rack sensor has two thermistors/probes. In “Individual Sensor” mode, the higher temperature reading or the average temperature reading of the two probes can be used. In “Unit Sensors” mode, some or all of the rack sensor’s temperature readings are considered for higher (maximum) or average calculation. For example, setting 3 sensors as “control” and “average” for unit mode, averages the 3 highest temperature readings.

At the system level, using a unit-to-unit (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 stand-by) using teamwork. See Teamwork Modes on page 93.

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—set-up 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.

Wired-remote sensor—set-up 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Wired-remote sensor—Sensor-property options

Function

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

- Disable = sensor readings are ignored.
- Reference = sensor readings are considered for Max Rack Temp, but are not used in maximum/average calculations.
- Control = sensor readings are used in maximum/average calculations.

Left Lead Current Value

Current reading of the left sensor probe. The left probe is always a temperature reading.

Left Lead Offset

Correction (calibration) value added to the reading. Used in the event that the sensor reading is incorrect.

- May be a positive or negative value.

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/or lower-case characters
- the following 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.

9.5 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.

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.

10 ADMINISTERING FIRMWARE, SETTINGS AND SECURITY

10.1 iCOM firmware upgrades

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

10.1.1 Compatibility with earlier versions of iCOM

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

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

Contact your Vertiv™ representative to upgrade firmware.

10.1.2 Updating iCOM display firmware

The display firmware is updated by loading the file via USB port, and the update process may take from 30 seconds to 20 minutes typically. Cooling-unit functions continue during a display-firmware update.

1. Download and extract the display-firmware file to a USB drive.
2. Insert the USB drive into an open port on the back of the iCOM display.
   On the touchscreen, an update screen displays.
3. Compare the existing version with the version to which you are updating to confirm that you are installing the correct firmware, then check the box next to *Update Firmware To*.
4. Depending on whether you want to restore the display to factory defaults or keep the current display settings:
   - Check the box next to Reboot with Factory Defaults to return the display to factory-default settings.
   - Leave un-checked to retain the current display settings.
5. Press start.
   The display firmware is updated within 30 seconds to 5 minutes.
6. Wait for the unit information to appear at the top of the screen, which confirms the process is complete and the display has re-established communication with the board, before removing the USB drive.

10.1.3 Updating iCOM Control-board Firmware

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

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

1. Save the iCOM software to a USB flash drive.
   - Make sure that the file-name extension is all lower case, ".xbp" not ".XBP."
   - Remove all other files are removed from the flash drive.

2. At the iCOM control:
   - Touch 

, then  > *Backup & Security* > Control Upgrade.
     The FIRMWARE UPGRADE panel opens.
   - Make sure the *Lock for Upgrade*, is selected.
   - Refer to Control-board firmware upgrade options below, for the reset and retain options.
3. Plug the USB drive into Port 1 or Port 2 on the display, and touch *Upgrade*.
   The control-board firmware is upgraded.
4. Remove the USB flash drive after the board reboots

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.

10.2 Backing-up, Importing/Exporting and Restoring Display Settings

iCOM display settings may be saved to a local disk or USB drive (Setpoint parameters cannot be exported, only iCOM display settings.), and the saved files may be imported to restore iCOM if it is replaced or if a problem occurs and to transfer settings to another iCOM. iCOM can also be returned to factory-default settings.

- Back-up—Saves a copy of the settings in a file named with the IP address of the display board. The saved settings include network settings, unit name, panel configuration and other details of the iCOM display. Use a back-up file to restore the unit settings in the event of a failure.
- Restore—Copies settings from a back-up file to return iCOM function to exactly what it was before the problem or failure. The settings may be restored from a file on the local disk or a USB drive. When restoring from a file on USB, make sure that you use the correct back-up file to restore settings, otherwise settings for the display may be incorrect.
- Export—Saves a copy of the iCOM display settings for later import to another iCOM for identical display settings on both systems.
- Import—Loads iCOM display settings from a previously-exported file to an additional iCOM system for identical settings, including panel customization and custom labels, on both.

To back-up or restore:

1. Touch 

, then  > *Backup & Security* > *Display Backup/Restore*.
The BACKUP & RESTORE panel opens.
2. Touch the *Action Type* drop-down, and select the action to perform, then touch the *Location* where the back-up/import file is located or will be saved.

NOTE: USB drives connected to Ports 1 or 2 on the iCOM display are automatically detected and displayed as options for Location selection.

3. Touch the action button in the lower-right corner.
A notification indicates that the back-up/restore/import/export is complete.
    - Remove the USB drive from the port if used.

10.2.1 Resetting display settings to defaults

Return the iCOM display to factory-default settings including panel customization, display network settings, and custom labels. Reset does not affect control-board network settings, setpoints, or alarm thresholds.

1. Touch 

, then  > *Backup & Security* > *Backup and Restore*.
The BACKUP & RESTORE panel opens.
2. Touch the *Reset to Defaults* button in the lower-right corner, then *Continue* on the confirmation dialog.
(or *Cancel* to disregard the reset).
The display restarts, and the start-up wizard opens to assist in configuring the reset display.

10.3 Backing-up and Restoring Control-board Settings

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

1. Touch 

, 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 connected to Ports 1 or 2 on the iCOM display 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.

Control-board Back-up and Restore options

Action Type

Selects the back-up or restore function. Options are:

- Back-up—Saves a copy of the settings in a file named with the IP address of the iCOM control board. Use a back-up 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 back-up configuration from a previously-saved back-up file. For example, when a control board fails and must be replaced, you can load the configuration from a back-up 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.

10.4 Managing access permission and Passwords

NOTICE

Risk of loss-of-access to iCOM. Can cause operational problems.

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

Two, 4-digit passwords provide two levels of permission to access iCOM menus and are set with factory-default values. You can change the value of each password so that only those provided with the current password may access the menus that it unlocks.

The factory-default password for user and service login are:

- Default User password = 1490
- Default Service password = 5010

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

1. Touch  , then 

> *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 4-digit/character password, then touch  , and touch *Save*.
   The password is saved.
   - Touch *Cancel* to discard the change.

10.5 Configuring with the Start-up Wizard

Upon initial use of the iCOM display or after resetting to defaults, the iCOM start-up wizard offers to guide you through first-time set up.

To update system information using the wizard:

1. Touch 

, then  > *Backup & Security* > *Display Backup/Restore*, then touch *Reset to Defaults*.
   The display reboots.
2. On the WELCOME panel, touch *Next*.
   The DATE & TIME panel opens.
3. Touch each field to make your selections., then touch *Next*.
   The UNIT DISPLAY panel opens.
4. Touch each field to make your selections, then touch *Next*.
   The NETWORK panel opens.
5. Determine the use of network communications and configure as needed, then touch *Next*.
   The SUMMARY panel opens.
6. Review the selections and settings and, if correct, touch *Finish*.
   - If corrections are needed, touch *Previous* to return to the appropriate panels.

Start-up wizard options

Calibrate Screen

Optimizes touch response. See Calibrating the Touchscreen on page 9.

Language

Selects the display language.

Import

Imports previously-saved display settings. See .

Next

Continues configuration using the set-up wizard.

Skip

Closes the start-up wizard and uses the factory-default settings.

11 PERFORMING DIAGNOSTICS

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

11.1 Cooling-unit status LED

Just below the iCOM touchscreen display is an LED that changes color and flashes on-off indicating cooling-unit status. See Table 11.1 below, for the LED colors and meanings.

Table 11.1 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 un-acknowledged alarm.
Flashing	Red	Active warning or alarm present but un-acknowledged.
Flashing	Blue	iCOM display is starting-up or updating iCOM firmware.

11.2 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 times-out 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.

11.2.1 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.

11.3 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Diagnostics—Evaporator-fan options

Analog Output 1 – 4

0-V to 10-V 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

Status of Air Safety Switch: Open or Closed..

Status Filter

Status of the air filter.

Status Remote Shutdown

Indicates whether remote shutdown is On or Off.

11.4 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Diagnostics—Compressor-circuit options

Compressor Capacity

Enables/Disables compressor capacity during manual/diagnostics mode.

Compressor Freeze Protection

Indicates whether freeze-protection influences compressor capacity (On) or not (Off), based on low-pressure values.

Compressor Mode

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

- 0 = Run (normal operation)
- 1 = Evacuate
- 2 = Charge

Compressor Overload

Compress overload status.

Compressor State

Compressor status, On or Off.

Fan Freeze Protection

Indicates whether freeze-protection influences fan speed (On) or not (Off), based on low-pressure values.

High Pressure Alarm Code

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

- 0 (zero) = Okay
- Non-zero = High head-pressure situation.

High Pressure Status

Status of compressor's high-pressure switch.

Liquid Line Solenoid Valve

Enables/Disables the valve during manual/diagnostics mode.

Low Pressure Alarm Code

Code of low-pressure alarm. To address the alarm condition, see Resetting Low-pressure Alarm Code below.

- 0 (zero) = Okay.
- Non-zero = Low suction pressure condition.

Low Pressure Status

Status of compressor's low-pressure switch.

Pump Down Failure Counter

Number of pump-down failure events.

Status HT1

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

11.4.1 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 (0) unlocks the compressor for operation.

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

1. Touch 

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

11.4.2 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 (0) unlocks the compressor for operation.

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

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

11.4.3 Resetting High-temperature Alarm Counter

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* > *Compressor Circuit N*in the Category list *(where "N" is the circuit number)*.
2. On the COMPRESSOR CIRCUIT panel, touch *Set to Zero* next to High Temperature Alarm Counter, then touch *Save*.
   The code is reset and the compressor can now operate.

11.5 Diagnosing electronic-expansion-valve issues

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* > *Electronic Expansion Valve N* in the Category list.
   The ELECTRONIC EXPANSION VALVE panel displays.
2. Refer to Diagnostics—Electronic-expansion-valve options below for descriptions of diagnostic options.

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

Diagnostics—Electronic-expansion-valve options

Current SH Setpoint

Setpoint for superheat.

EEV Batt Fail Counter C1

Number of battery-test failures for the valve control board. To address the alarm condition, see Resetting EEV Battery-failure Counter on the next page.

Firmware Version

Current firmware data.

Manual Valve Control

Sets the valve-open percentage during manual/diagnostics mode.

Manual Valve Control Enabled

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

Saturation Suction Temp

Saturated suction temperature of the refrigeration circuit.

Status Battery

Status of the battery on the valve control board.

Status EEV

Current status of the valve control board.

Suction Pressure

Current pressure at valve.

Suction Temp

Suction temperature of the refrigeration circuit.

Superheat

Current superheat reading of the refrigeration circuit.

Valve Opening

Current percentage that valve is open.

11.5.1 Resetting EEV Battery-failure Counter

1. Touch 

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

11.6 Diagnosing EconoPhase issues

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* > *EconoPhase* in the Category list.
   The ECONOPHASE panel displays,.
2. Refer to Diagnostics—EconoPhase options below, for descriptions of diagnostic options.

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

Diagnostics—EconoPhase options

Pump Board N Firmware

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

Pump Board Test

Runs a diagnostic test on the board.

Pump N Diff Pressure

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

Pump N Inlet pressure

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

Pump N Outlet Pressure

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

Pump N Speed

Current pump speed, where N is the pump number.

Pump N Test Results

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

11.7 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Diagnostics—Reheat options

Analog Output 1 – 4

0-V to 10-V analog outputs that operate reheat.

Electric Heat N

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

11.8 Diagnosing humidifier issues

1. Touch 

, then  > *Diagnostic/Service* > *Diagnostics* > *Humidifier* in the Category list. The HUMIDIFIER panel displays.
2. Refer to Diagnostics—Humidifier options below, for descriptions of diagnostic options.

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

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.

Humidifier Drain

Enables/Disables humidifier drain.

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.

11.9 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 below for descriptions of diagnostic options.

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

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.

11.10 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Diagnostics—Analog-output options

Analog Output N

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

11.11 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Diagnostics—Customer-input options

Input N

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

11.12 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-managment unit, included components, and control settings of your system, all of the options listed may not be available on your iCOM display.

Diagnostics—Water-leak detection options

LWD Value

Current percentage of resistance measured from the leakage water detector (LWD, leak-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

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12 CUSTOMIZING YOUR ICOM DISPLAY

12.1 Setting general display properties

NOTE: You must be logged-in to adjust the settings. See Powering-on iCOM and Logging-in/Unlocking Controls on page 6.

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.

Unit-display options

Alarm Buzzer Pattern

Selects or disables the audible alarm notification. See Enabling the Audible Alarm Notification on page 81.

Allow System On/Off

Enables/Disables powering on/off the entire system of networked units from the 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 iCOM main display so personnel can turn the unit on or off with out logging-in and accessing the User/Service menus.

12.2 Customizing main-display views

The default 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 iCOM and Logging-in/Unlocking Controls on page 6.

12.2.1 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.

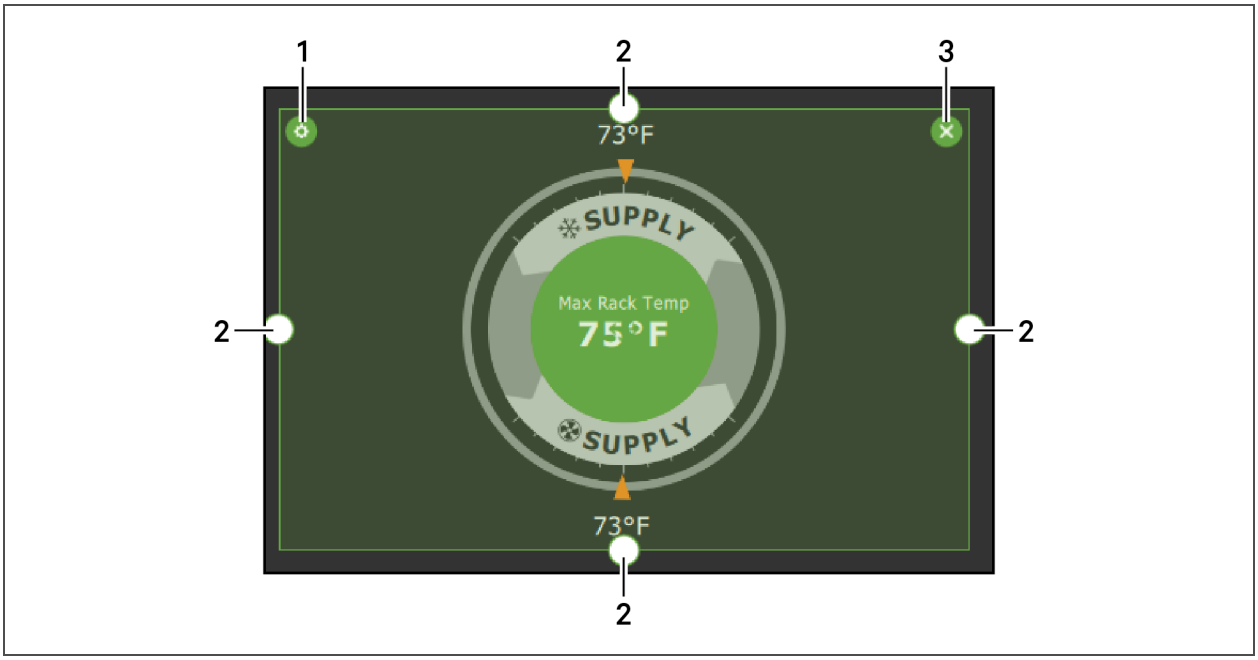
12.2.2 Re-sizing Content

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 12.1 on the facing page.

Figure 12.1 Add/Remove-content icons and Re-sizing handles



Item	Description
1	Content-adjustment icon
2	Resizing handles
3	Remove-content icon

12.2.3 Adding and Adjusting Content

You can add a variety of content to the main display.

1. Touch  , 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 12.1 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 12.1 above.

Table 12.1 Main/User-display Content Options

Content	Description
Separator	Separating line to place between content sections. You can adjust the thickness and orientation of the separator.
Dial	Status dial. You can select the sensor readings displayed in the center of the status dial when you touch to scroll through the readings.
Setpoint Readout	Displays the current reading of a connected sensor, for example: Return-temperature at 72°F.
Setpoint Bar	Displays a bar graph for a selected setpoint with customizable "empty" and "full" limits. For example, if a temperature setpoint bar is empty at 60°F and full at 80°F, and the reading is 70°, the graph will be filled half way.
Sensor Bar	For remote sensors only, functions the same as the setpoint bar, but only offers connected remote sensors, and displays the customer-assigned name of the sensor next to the graph.
Shortcut	Shortcut opens panels directly instead of browsing through menus. You can select the destination of the shortcut, whether or not an icon displays, and the size, label, and frame of the shortcut.
Alarms	Alarms panel. You can select whether or not the information may be exported.
Event Log	Event-log panel. You can select whether or not the information may be exported.
Run Hours	Run-hours panel. Summary of the component run hours and limits.
EconoPhase Diagram	EconoPhase operating diagram.
EconoPhase Status	Compressor/Econophase status bar. Indicates the operating mode and the percentage at which the component is operating.

12.2.4 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 12.1** on the previous page.

12.3 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 140.

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 12.2** 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 12.3** on the next page, shows the Analog Input Properties panel with the custom labels that replaced “Property” and “Value.”

Figure 12.2 Custom text for the analog-input properties labels

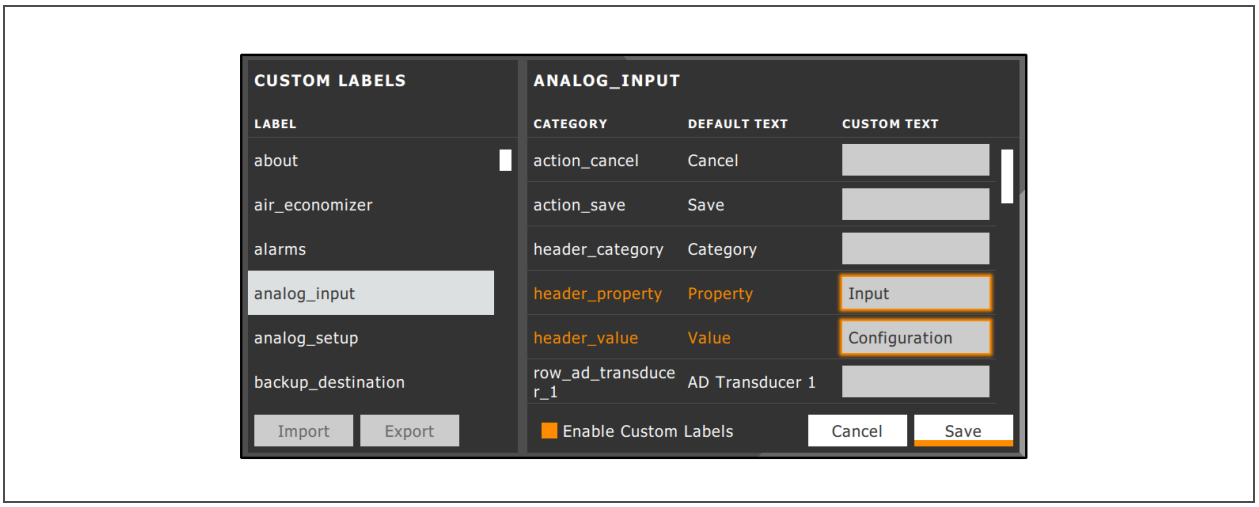
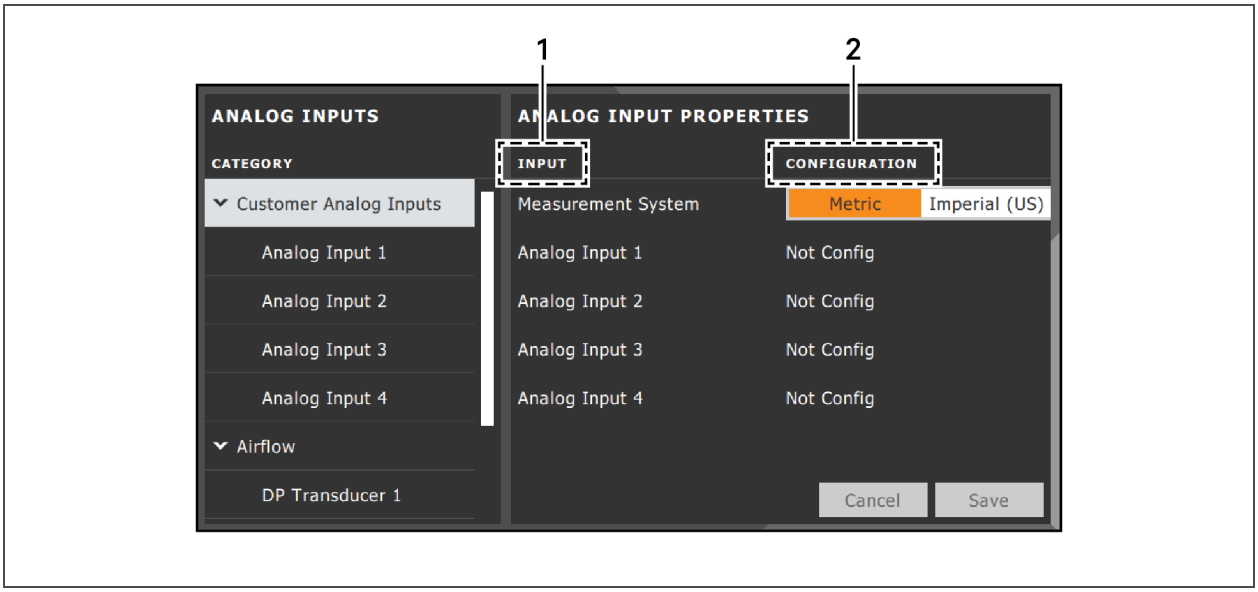


Figure 12.3 Customized label text on Analog Input Properties panel



Item	Description
1	Former "Parameter" heading is now "Input."
2	Former "Value" heading is now "Configuration."

12.3.1 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 “No USB devices are available” displays, check the connection or try reinserting 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 equals 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 12.3 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.

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13 HARDWARE INSTALLATION

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

13.1 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 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 consists of 2T sensors that each have two temperature probes on a 6-ft (1.8-m) probe-connection cable, Figure 13.1 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 iCOM.

NOTE: The 2T sensor shown in Figure 13.1 below, may differ slightly for your system, depending on equipment installed.

Figure 13.1 2T sensor for rack monitoring

13.1.1 Setting DIP switches and labeling 2T 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.

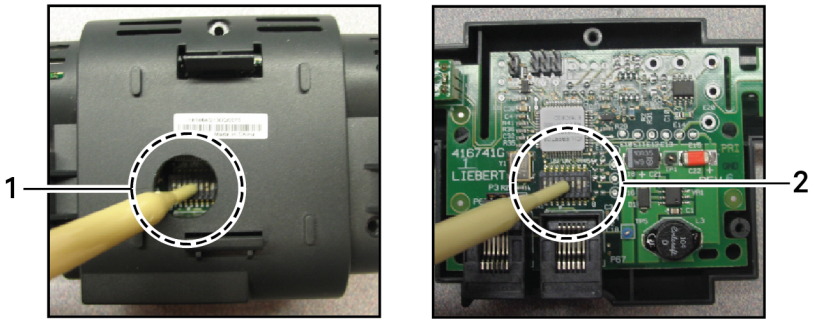
1. Apply numbered stickers to the sensor housing that corresponds to the sensor's position in the chain.
2. Locate the DIP-switch hole on the rear of the sensor housing, Figure 13.2 below.

   – 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 13.2 below.

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 13.2 DIP-switch opening/DIP switches inside of 2T sensor



Item	Description
1	Hole in sensor housing
2	Cover removed

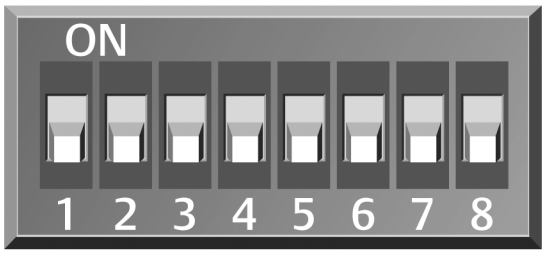
3. Referring to Table 13.1 below, and using the non-conductive tool, set the DIP switches for each sensor to its number in the chain (from sticker applied in step 1).
   Figure 13.3 below, shows a representation of the DIP switches.
4. Confirm that the DIP switches are set correctly for each sensor, and replace the housing cover if necessary.

Table 13.1 DIP-switch settings for wired-remote sensors

2T sensor number/address	DIP-switch position							
	1	2	3	4	5	6	7	8
1	Off	Off	On	Off	On	Off	Off	Off
2	On	Off	On	Off	On	Off	Off	Off
3	Off	On	On	Off	On	Off	Off	Off
4	On	On	On	Off	On	Off	Off	Off
5	Off	Off	Off	On	On	Off	Off	Off
6	On	Off	Off	On	On	Off	Off	Off
7	Off	On	Off	On	On	Off	Off	Off
8	On	On	Off	On	On	Off	Off	Off
9	Off	Off	On	On	On	Off	Off	Off
10	On	Off	On	On	On	Off	Off	Off

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

Figure 13.3 DIP switches in 2T sensor

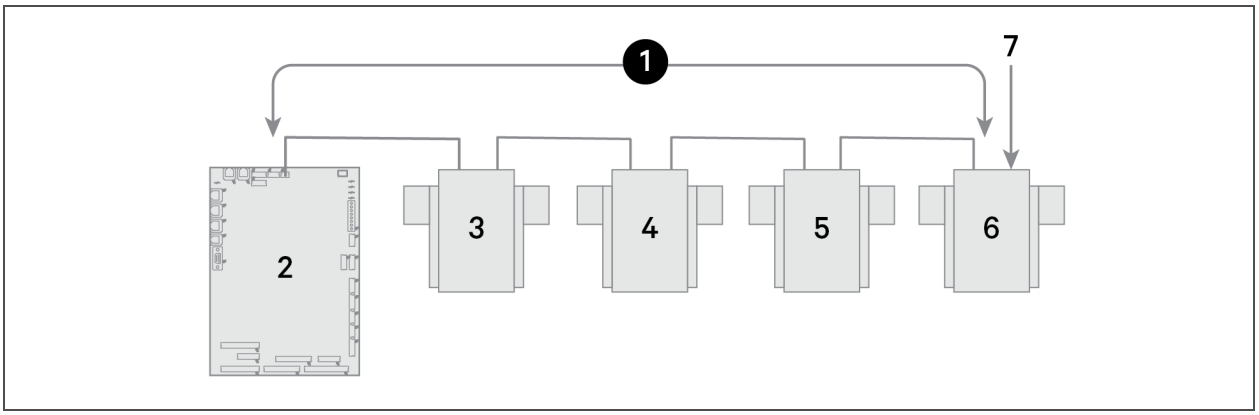


13.1.2 Terminating the last sensor on the CANbus link

The 2T 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 13.4 below, shows an example CANbus arrangement.

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

Figure 13.4 Example Sensor CANbus arrangement



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

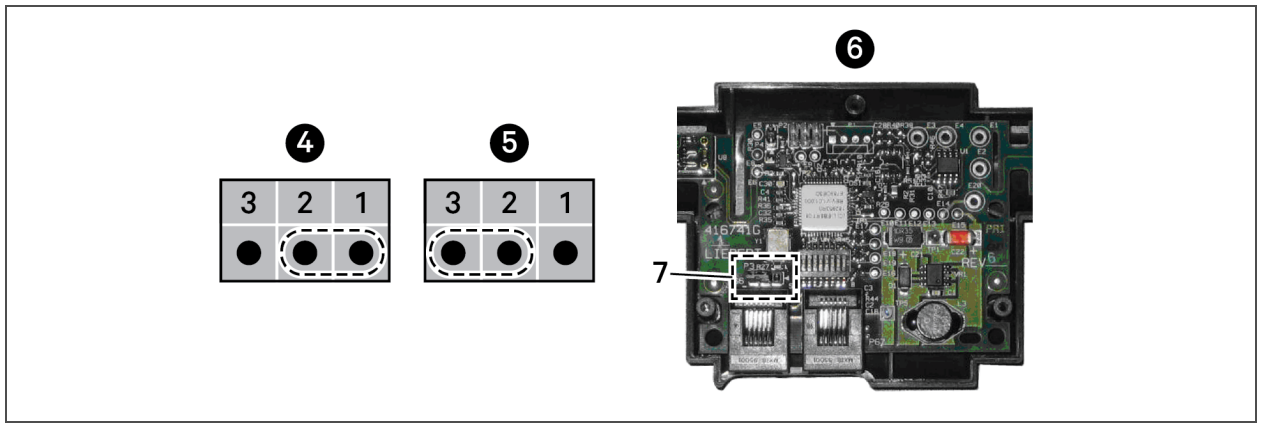
To terminate the last sensor:

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

NOTE: The last sensor on the network will be the sensor with only 1 CAN cable after all sensors are connected to the CANbus network. See Connect the CANbus cable and ground on page 150.

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 13.5 on the facing page.
4. Replace the sensor cover.
   The 2T sensor is terminated in the CANbus link.

Figure 13.5 Termination-jumper on 2T 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

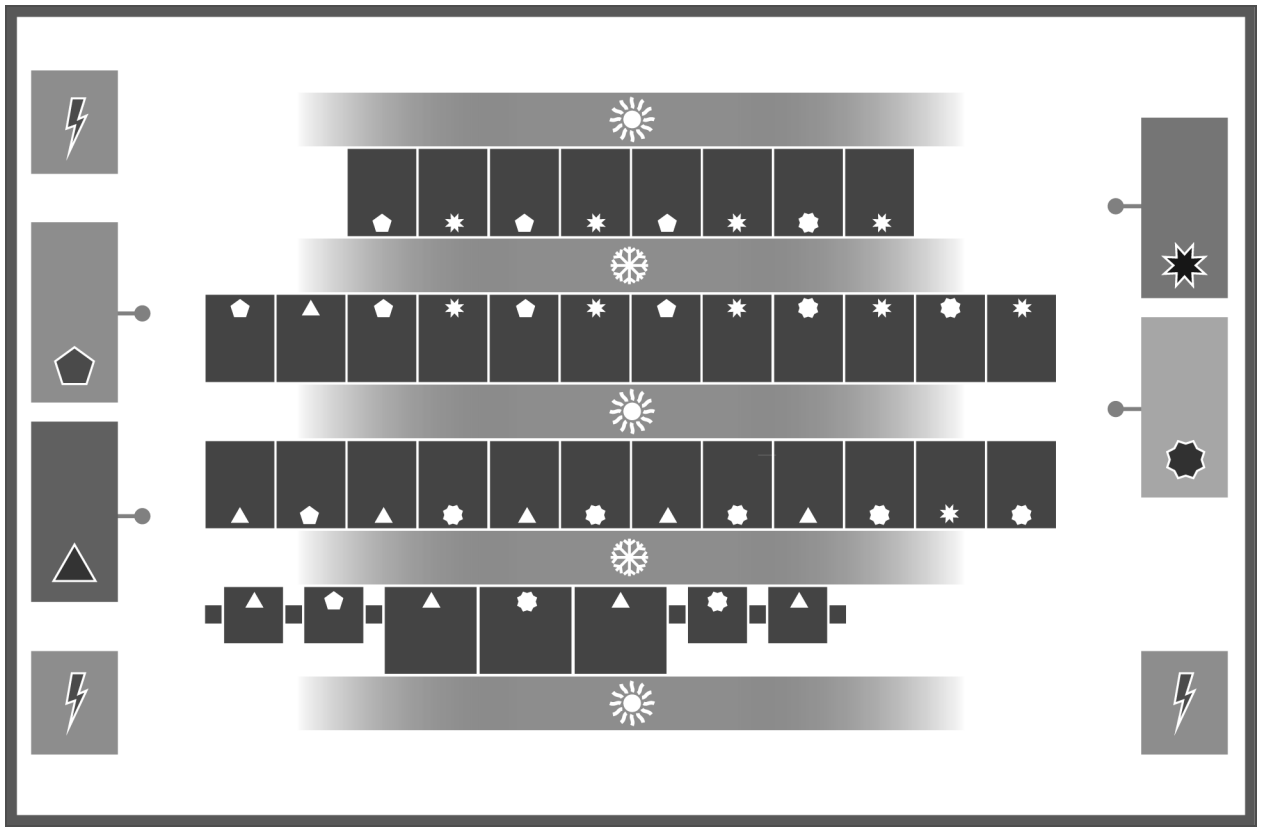
13.1.3 Installing 2T sensors in the racks to monitor

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 13.6** 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 13.6 Interlacing sensor placement



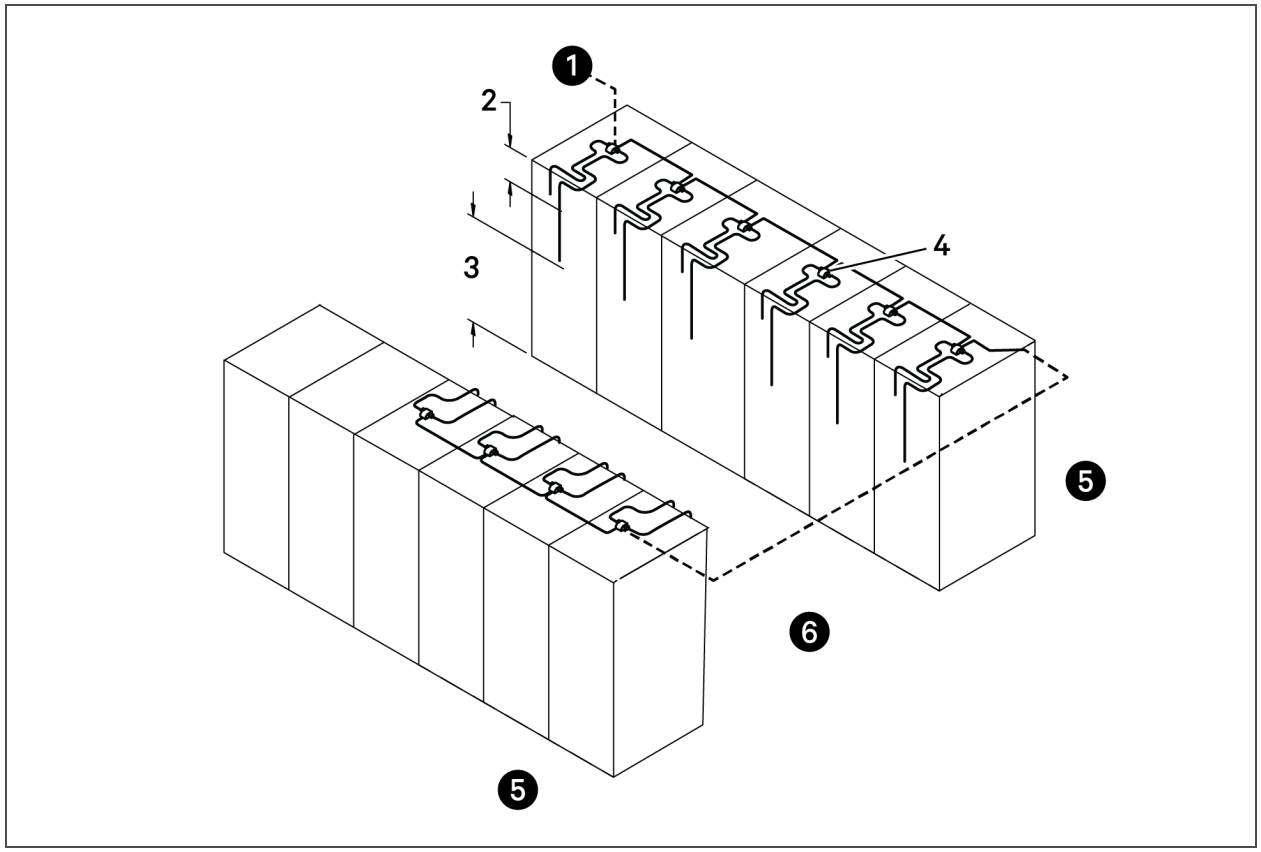
Item	Description	Item	Description
⬟	Unit 1	❄	Cold aisle (front of racks)
▲	Unit 2	☀	Hot Aisle (rear of racks)
✸	Unit 3	⊸	Supply (discharge) temperature sensor
✹	Unit 4	ϟ	Power-distributrion unit

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 13.7 below.

Figure 13.7 Rack 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.

13.1.4 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 13.8 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 146.

- Use only approved hangers, and do not secure cables in a way that could damage them.
- Limit bends to less-than 4-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.

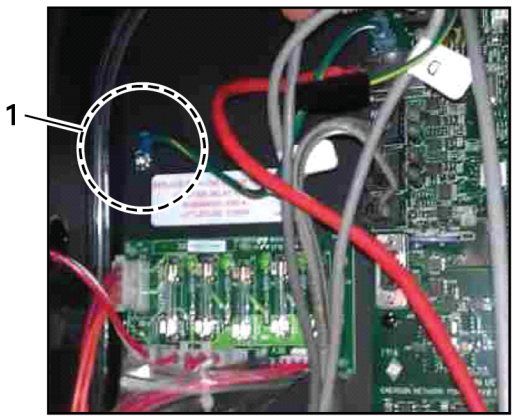
NOTE: High-voltage sources much be at-least 12 in. (305 mm) from CAN wires.

- Avoid stretching cables.
- Avoid using excess cable between sensors.
- Make sure that cables have the correct pin-out. Mismatched pins at the RJ2 connection will damage the CAN device.

Figure 13.8 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 13.9 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 13.9 Ground-wire ring connection



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

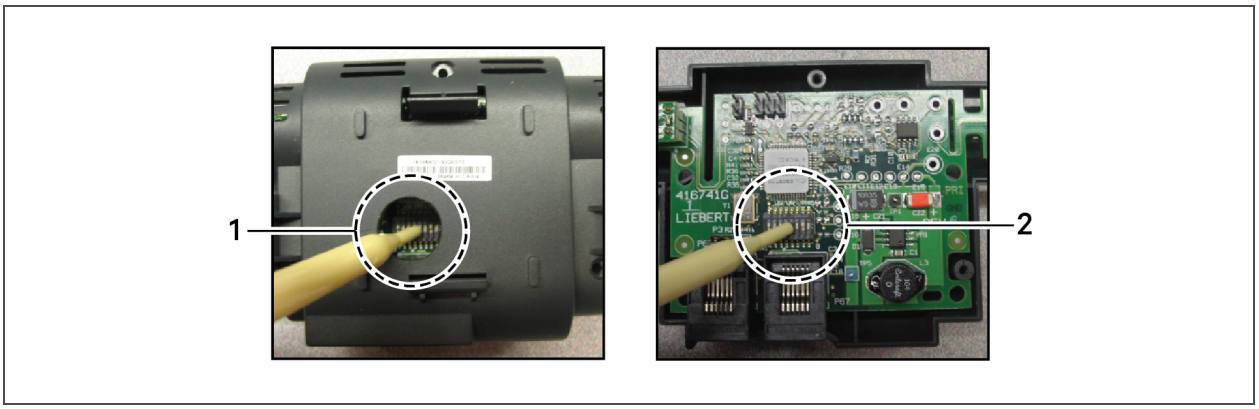
13.2 Installing a Fluid-temperature Sensor

1. Locate the DIP switches in the 2T sensor(s) by removing rear housing or via pre-cut hole in housing, Figure 13.10 on the facing page, and program according to Table 13.2 below. Figure 13.11 on the facing page, shows the switch and on/off setting.

Table 13.2 DIP-switch Settings in 2T Sensors

	CANbus node ID	DIP-switch position							
		1	2	3	4	5	6	7	8
Fluid-circuit 1	30	Off	On	On	On	On	Off	Off	Off
Fluid-circuit 2	31	On	On	On	On	On	Off	Off	Off
Circuit 1 and 2 fluid sensors are dual-purpose CANbus IDs in firmware. These sensors might also be used for monitoring supply temperature. Before installing fluid temperature sensors, determine whether or not the supply-temperature 2T sensors are in use. Adding duplicate sensors will cause sensor communication loss.									

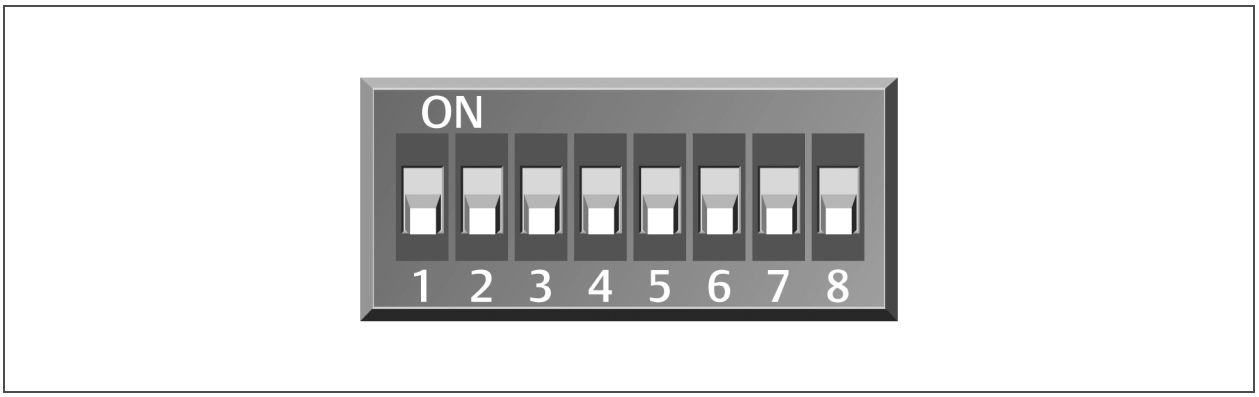
Figure 13.10 Locating DIP switches in 2T sensor



Item	Description
1	Hole in sensor housing
2	Cover removed

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

Figure 13.11 DIP switches in 2T sensor



2. Once DIP switches are set, refer to Terminating the last sensor on the CANbus link on page 146, then continue with step 3.
3. On iCOM:
   - In the Service menu, touch *Auxiliary Device Setup* > *Sensors* > *Fluid Sensors* > *Fluid 2T SensorCW T*.
     The SENSOR PROPERTIES panel opens.
   - In *Fluid Sensor Type*, select the type of 2T sensor.
4. At the fluid inlet and outlet, use a field-supplied temperature sensor to verify the temperature readings, compare the iCOM readings to the actual measured temperatures, and calibrate as needed.
   - If inlet and outlet temperature readings in iCOM are reversed based on the field measurements, use Fluid Sensor 1/2 Placement to swap the readings.
5. Touch *Save*.
   The fluid-temperature sensor settings are saved.

13.3 Installing Supply-control Sensors

13.3.1 Installing the supply-air temperature sensor

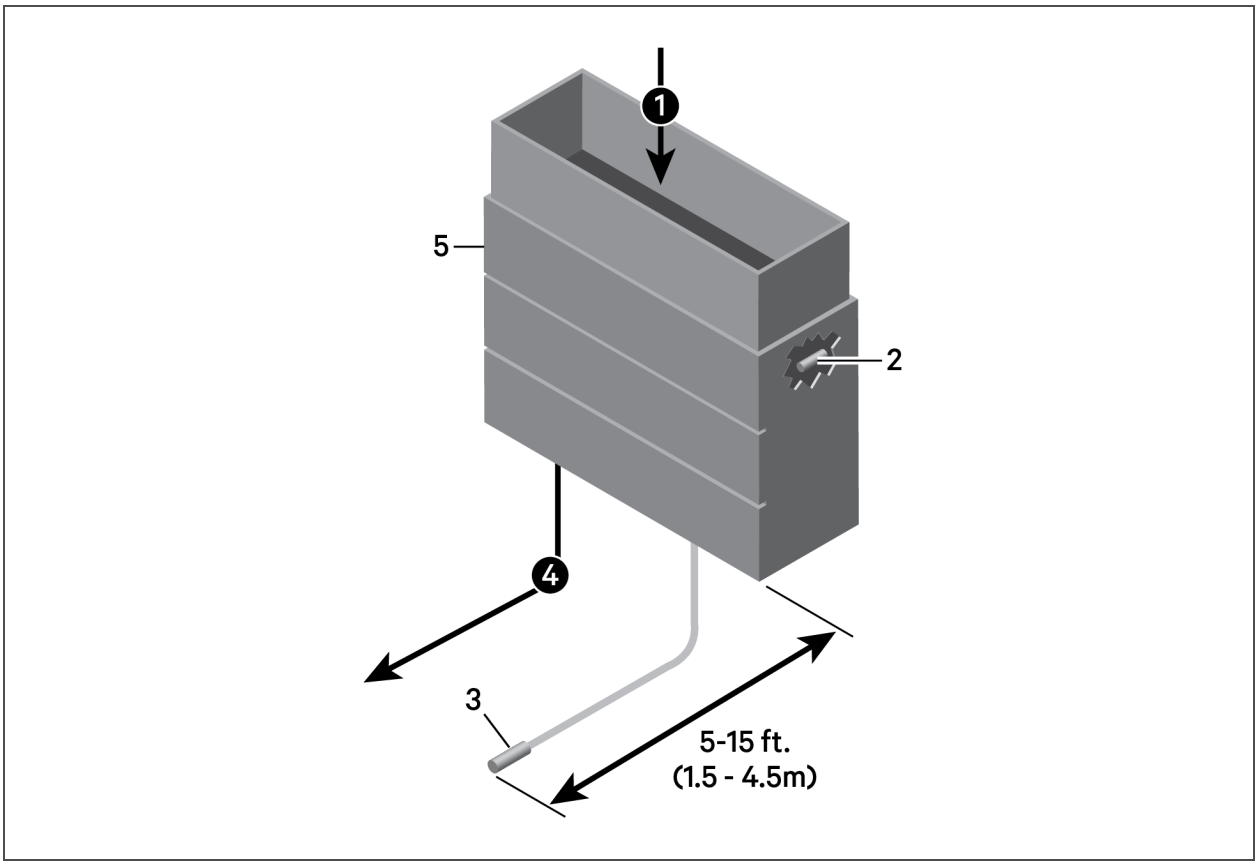
The supply temperature sensor is connected to P8, Pins 1 and 2 at the factory require no configuration.

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 13.12** on the facing 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 iCOM unit.

2. Confirm connectivity via SENSOR DATA. See Viewing Sensor Data on page 20.

Figure 13.12 Placement of the supply-air temperature sensor



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

13.3.2 Installing aggregated supply-air temperature sensors

On systems with large supply-air plenums, up to 5 additional 2T sensors may be connected (via CANbus) in addition to the standard supply-air sensor. iCOM then aggregates the readings and converts to "average" or "maximum" values for supply control.

NOTE: The 2T sensors used for supply-air sensor aggregation are identical to the wired-remote sensors and are added in addition to the up-to 10 remote sensors. You may install the supply-air sensors at the end of the wired-remote CANbus link or as a separate CANbus loop tied-back to the control board and properly terminated.

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 iCOM.

Setting DIP switches and labeling supply-air sensors

Supply sensors A through E have dual-purpose CANbus node IDs in iCOM software and may be alternately used for air temperature/humidity monitoring or fluid temperature monitoring. Table 13.3 on the facing page, indicates the Node IDs and the alternate use.

Once installed, iCOM recognizes the as "supply-air" sensors, distinguished from the wired-remote sensors that may be in use. Before installing the supply-air sensors, make sure that the CANbus node IDs are not already in use. Duplicate sensors will cause loss of sensor communication.

Tools required:

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

Each sensor requires a unique address on the CANbus cable 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 to the cooling-unit control board. Do not run individual wires from the sensors to the cooling unit.

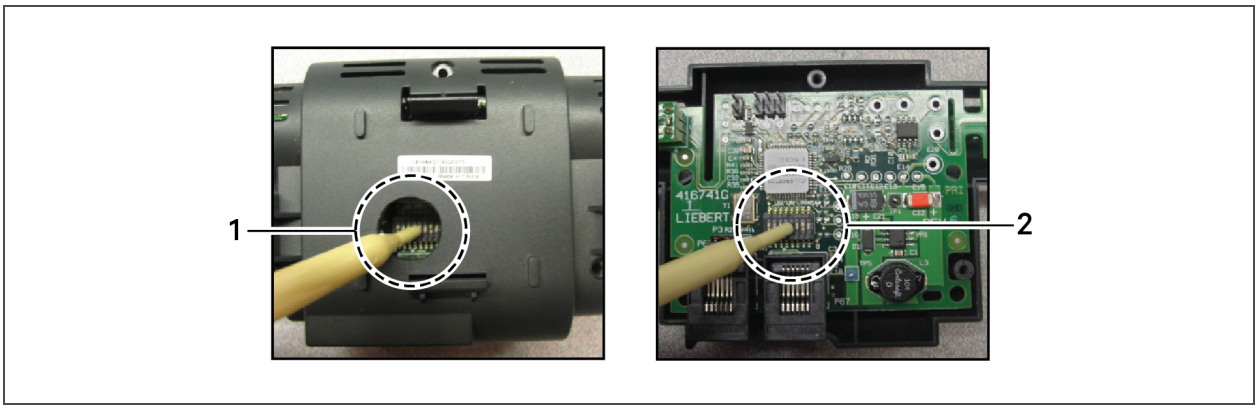
1. Apply numbered stickers to the sensor housing that corresponds to the sensor's position in the chain.
2. Locate the DIP-switch hole on the rear of the sensor housing, Figure 13.13 on the facing page.

   – 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).

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 13.13 DIP-switch opening/DIP switches inside of 2T sensor



Item	Description
1	Hole in sensor housing
2	Cover removed

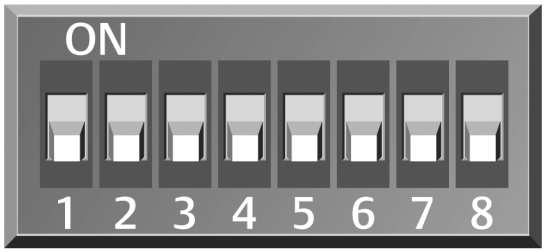
3. Referring to Table 13.3 below, and using the non-conductive tool, set the DIP switches for each sensor to its number in the chain (from sticker applied in step 1). Figure 13.14 on the next page, shows a representation of the DIP switches.
4. Confirm that the DIP switches are set correctly for each sensor, and replace the housing cover if necessary.

Table 13.3 DIP-switch settings for supply-air aggregation sensors

Sensor number/address	DIP-switch position								CANbus node ID	Alternate use
	1	2	3	4	5	6	7	8		
A	On	Off	Off	Off	On	Off	Off	Off	17	Temperature/Humidity
B	Off	On	Off	Off	On	Off	Off	Off	18	Temperature/Humidity
C	On	On	Off	Off	On	Off	Off	Off	19	Temperature/Humidity
D	Off	On	On	On	On	Off	Off	Off	30	Fluid inlet/outlet temperature
E	On	On	On	On	On	Off	Off	Off	31	Fluid inlet/outlet temperature

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

Figure 13.14 DIP switches in 2T sensor



Terminating the last supply-air sensor on the CANbus link

The 2T sensor need not be installed in the alphabetic-order of their address/sensor letter (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/location of the equipment on which they are installed.

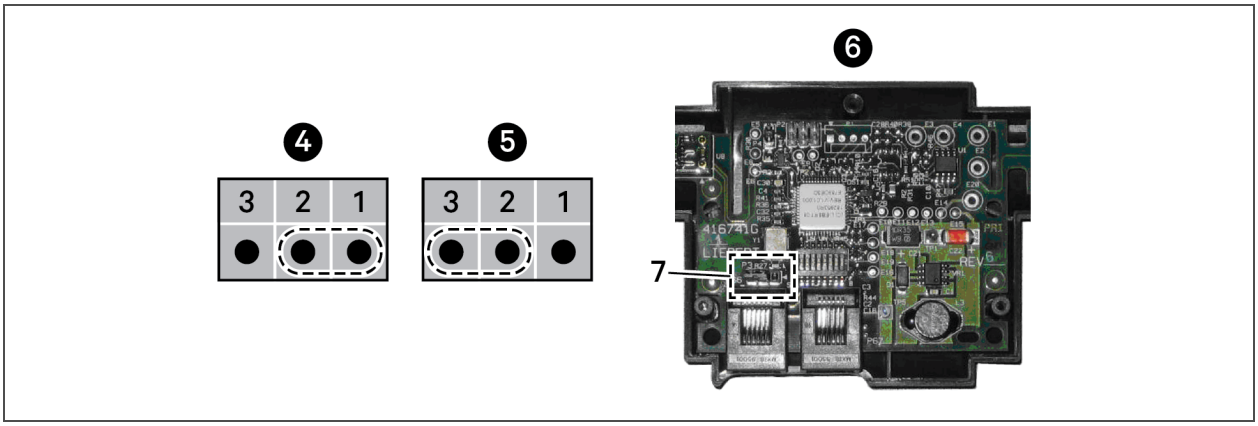
To terminate the last sensor:

1. Locate the sensor that will be last on the CANbus link.

NOTE: The last sensor on the network will be the sensor with only 1 CAN cable after all sensors are connected to the CANbus network.

2. Open the sensor's case by removing the Phillips-head screws (typically 3) one the rear of the housing to access the jumper used for terminating.
3. Remove the black jumper from pins 1 and 2, and install it on pins 2 and 3 as shown in Figure 13.15 on the facing page.
4. Replace the sensor cover.
   The 2T sensor is terminated in the CANbus link.
5. If installing in an existing CANbus link, remember to un-terminate the sensor that was previously last.

Figure 13.15 Termination-jumper on 2T 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

13.4 Installing Analog-input Devices

External sensors and analog devices may be connected to 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 13.4 on the next page, lists available analog inputs depending on the type of cooling unit.

See Configuring Analog-input Devices on page 114, to configure the iCOM settings for the device.

Table 13.4 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.

Table 13.4 Number of analog inputs available by cooling-unit type (continued)

Cooling unit	Inputs available
Liebert® DS Water/Glycol Cooling	0 Models without high-pressure transducers may have 2.
Liebert® PDX™ Air-Cooled	3 1 is used for low-pressure transducers.
Liebert® PDX Water/Glycol Cooled	2 1 is used for a low-pressure transducer. Optionally, a second for a high-pressure transducer.

13.5 Installing the U2U Network

13.5.1 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.

13.5.2 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 devuses such as machines, flourescent lights and electronics.
- Do not bend cables to less than 4 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 approve hangers, such as telephone wire/RG-6 coaxial-wire hangers.

13.5.3 U2U Wiring connection

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 un-reliable display readings will result.

Before you begin, refer to Preparing for U2U Group Set-up on page 87, and Configuring U2U Network Settings on page 89.

– or –

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

U2U Network Requirements

The network must be private:

- Isolated from other network traffic.
- Switches connecting the units must be dedicated to 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.

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

- Input/output board (1 in each cooling unit)
- Large wall-mount display

Small touchschreen displays on the cooling unit are not considered nodes because they are directly-connected to the input/output board in the unit, not the network.

Of the 64 nodes, up to 32 may be cooling-unit input/output boards connected as a "group." Table 13.5 below, provides U2U network-configuration examples.

Table 13.5 Example 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

13.5.4 Wiring Cooling Units without Wall-mount Displays

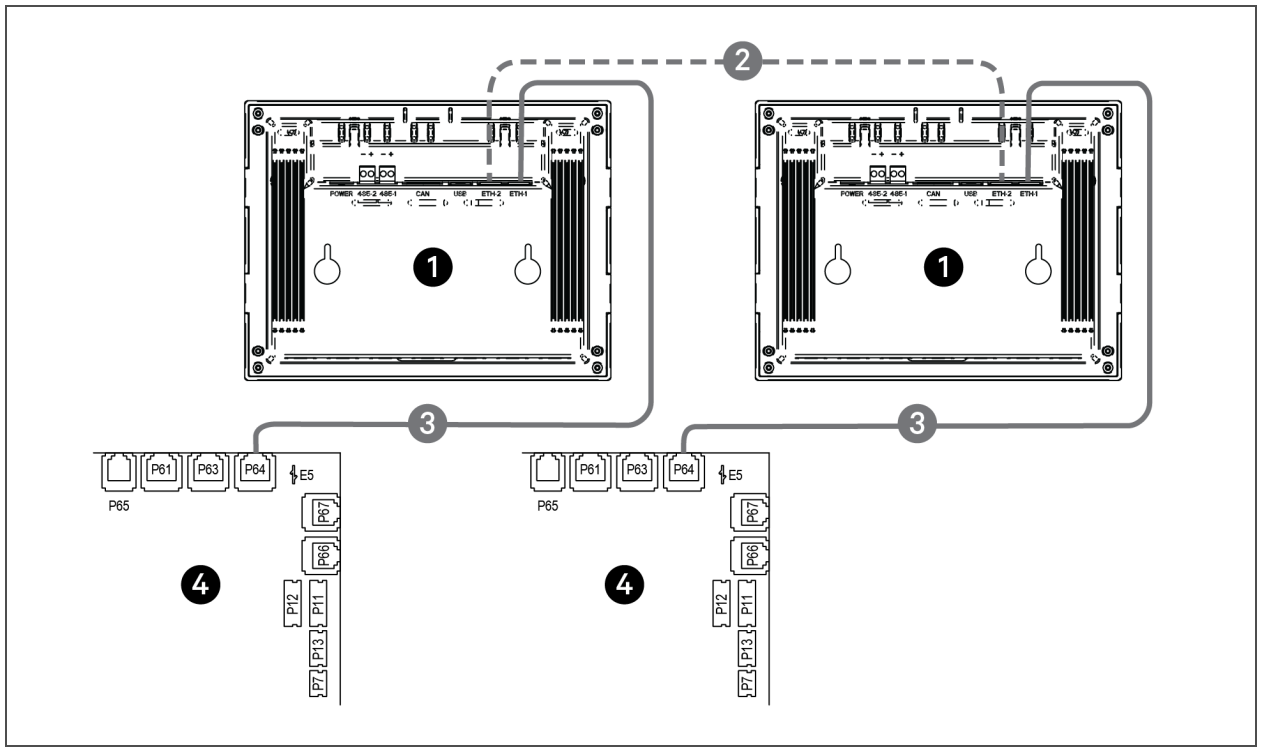
NOTE: Cooling units are factory-wired for stand-alone operation. Do not connect the U2U network cabling before setting the U2U network configuration/groups. Network communication conflicts and un-reliable display readings will result.

NOTE: Before you begin, refer to Preparing for U2U Group Set-up on page 87, and Configuring U2U Network Settings on page 89.

To connect 2 cooling units with a touchscreen, a network switch is not needed:

- Connect a crossover CAT5 cable to the ETH-2 connector on the rear of each display as shown in Figure 13.16 below.

Figure 13.16 Connection between only 2 cooling units—no network switch needed

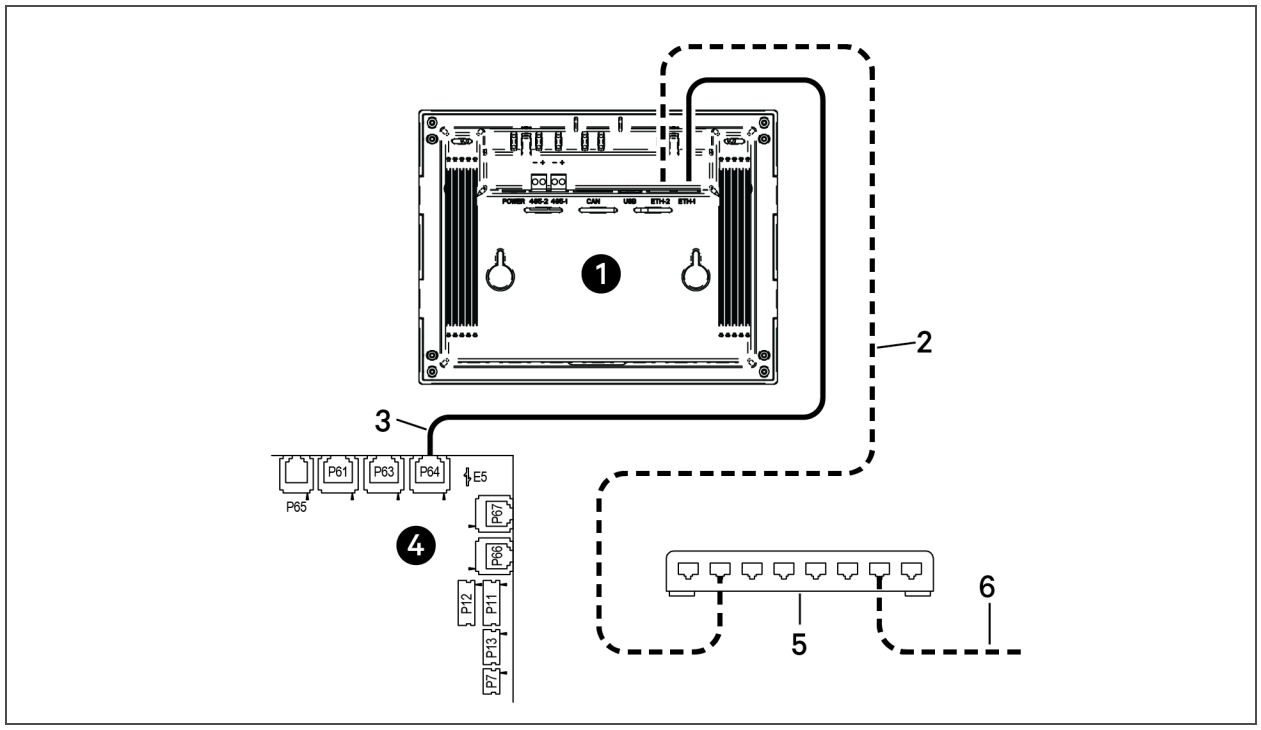


Item	Description
1	Touchscreen (rear view)
2	Ethernet cable (field-supplied)
3	Ethernet cable (factory-supplied)
4	iCOM I/O board

To connect 2 or more cooling units into 1 group (maximum 32 units per group, up to 99 groups), a network switch is required:

- On each unit, connect one plug on the CAT5 cable to ETH-2 on the rear of the display, and the other to the network switch, see Figure 13.17 below.

Figure 13.17 Connecting two or more units with a network switch



Item	Description
1	Touchscreen (rear view)
2	Ethernet cable (field-supplied)
3	Ethernet cable (factory-supplied)
4	iCOM I/O board
5	Network switch (field-supplied)
6	to ETH-2 on rear of other cooling-unit touchscreeens

13.5.5 Wiring Cooling Units with 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 un-reliable display readings will result.

NOTE: Before you begin, refer to Preparing for U2U Group Set-up on page 87, and Configuring U2U Network Settings on page 89.

Large, wall-mount displays may be used to remotely configure, control and monitor all cooling units connected on the U2U network.

- Each display requires 120 VAC or 230 VAC input power.
- An AC-adapter wall plug is factory-supplied.

To connect wiring:

1. On each wall-mount display (32 max.), 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.

APPENDICES

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert Thermal Management Products

1-800-543-2778

Liebert Channel Products

1-800-222-5877

Liebert AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

1050 Dearborn Drive

Columbus, OH, 43085, USA

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road

Wanchai, Hong Kong

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Appendix B: Setpoints and Alarm Settings by Line ID

These tables list the parameters by the line identification assignments employed before the iCOM touchscreen. The tables include range/options of the parameter, the factory-default setting, and a description of the parameter function.

The line IDs are not listed in the User or Settings menus, only in the parameter directory. You can search the parameter list to find the line ID and it's associated label and value in the iCOM user interface.

To search the parameters list:

1. Log-in at the Service level, then touch 

>  > 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 User-menu Setpoints by Line ID

Line ID	Parameter Name	Range	Default Setting	Description
U102	Temperature Setpoint Act	32 - 113 °F 0.0 - 45.0 °C	73 °F 23.0 °C	Selects the temperature that the cooling unit will maintain by applying cooling and/or reheats. "Temp Set" value is the temperature that has been set by the User to control the temperature. "Temp Act" 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 be activated, the ACT and SET values will always match.
	Temperature Setpoint	41 - 104 °F 5.0 - 40.0 °C	73 °F 23.0 °C	
	TempSetUsr	41 - 104 °F 5.0 - 40.0 °C	73 °F 23.0 °C	
U103	Temperature Control Sensor	Supply Sensor Remote Sensor Return Sensor	Return Sensor	Selects the sensor that will control the cooling capacity; either chilled water valve, compressors, free cooling valve, or air economizer. Unloading-type compressors can be set to any type of sensor, however, fixed-style compressors can only be set to Return or Remote sensors.
U104	Humidity Dew Point 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 be represented in %RH or Dew Point value depending on what the humidity control type is set for.
	Humidity Setpoint	20 - 80 %RH	50 %RH	
U105	Humidity Control Sensor	Remote Sensor Return Sensor	Return Sensor	Defines which humidity value the setpoint will be compared with. The return sensor is equipped with Temp/Humidity sensor and can calculate the dew point based on icom's internal lookup table. If a sensor other than the return sensor is selected, the iCOM will calculate the correct %RH based on the sensor selected and its actual temperature reading.
U106	Humidity Control Type	Relative Compensated Predictive Dew Point	Predictive	Selects the humidity control calculation. If set to "Relative', the unit will control the humidity without considering any temperature deviations. If set to "Predictive" and "Absolute", the control will 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. "Dew Point" allows the iCOM controller to calculate the actual dew point of the space and to control the humidity based on a user-entered dew point temperature.

Table B.1 User-menu Setpoints by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
U107	Fan Setpoint	41 - 104 °F 5.0 - 40.0 °C	73 °F 22.8 °C	Required anytime the fan operates from a different sensor than that used for the temperature setpoint. EX: temperature setpoint is set to Supply Air and the fan control is set to Remote Air.This is considered "Optimized Aisle" control, which decouples the fan and cooling capacity modulation. The remote sensor setpoint would modulate the fan speed and the supply sensor setpoint would modulate the cooling.
U108	Fan Control Sensor	Supply Sensor Remote Sensor Return Sensor Manual	Disabled	Determines which sensor will control the speed of the fan. If set to "Manual", then the fan control can be set through the local iCOM display or through the BMS system via one of the various Intellislot monitoring cards.
U110	Optimized Aisle Enabled	Disabled Enabled	Disabled	This read-only value indicates if the Liebert iCOM controller is setup in a Optimized Aisle configuration. To enable optimized aisle via the iCOM display, the Supply Air sensor must be set to control the cooling capacity and the remote sensor must be set to control the fan speed. This allows the cooling unit to maintain rack temperatures whill still maintaining an even under-floor air temperature when controlling unbalanced rooms.
U113	2nd Temperature Setpoint	41 - 104 °F 5.0 - 40.0 °C	73 °F 23.0 °C	Allows for a dry contact through the customer input connections. When a customer input connection is set for 2nd temperature setpoint and that input is triggered, then the value set in this parameter sets the active temperature setpoint the unit will maintain. If the unit is configured for De-coupled Mode, then this setpoint will only affect the temperature control setpoint; it will not affect the fan control setpoint.
U114	Supply Temp Limit Setpoint	41 - 81 °F 5.0 - 27.0 °C	41 °F 5.0 °C	Selects the minimum discharge air temperature. When the actual sensor reading approaches this parameter, the cooling capacity will be limited to avoid going below the Supply Limit Temperature value. This parameter must be enabled in the Service Menu / Setpoints menu prior to setting a supply limit setpoint.
U116	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 time-out or a customer input signal. The BMS timer and/or the customer input must be configured for this parameter to activate. If the unit is operating in De-coupled mode, then this setpoint will only affect the temperature control setpoint; it will not affect the fan control setpoint.
U117	BMS Backup Fan Setpoint	41 - 104 °F 5.0 - 40.0 °C	73 °F 23.0 °C	Selects a temperature setpoint when the backup fans will be activated in the event of a BMS time-out or a customer input signal. The BMS timer and/or customer input must be configured in order for this parameter to activate. If the unit is operating in De-coupled mode, then this setpoint will only affect the temperature control setpoint; it will not affect the fan control setpoint.
	BMS Backup Fan Speed	0 - 100 %	100%	
U119	Return Compensation Setpoint	41 - 104 °F 5.0 - 40.0 °C	73 °F 23.0 °C	Allows the return air sensor to be used even when in Supply or Remote temperature control mode. Return Compensation modifies the temperature setpoint to ensure that the return air temperature is kept above a specific temperature. If the return compensation value is set to 80 °F and the actual return temperature falls to 75 °F, then the controlling temperature setpoint will be increased and will reflect in the "Control Temp Act" parameter.

Table B.2 Service-menu Setpoints by Line ID

S102	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, FreeCooling 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	Temperature Setpoint	41 - 104 ◦F 5.0 - 40.0 ◦C	73 ◦F 23.0 ◦C	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.
	Temperature Setpoint Actual	32 - 113 °F 0.0 - 45.0 °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.
S104	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	Temperature User Low Limit	41 - 104 ◦F 5.0 - 40.0 ◦C	41 ◦F 5.0 ◦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.
	Temperature User High Limit	41 - 104 ◦F 5.0 - 40.0 ◦C	104 ◦F 40.0 ◦C	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	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 saller this number, the faster the compressors/chilled water values will increase capacity. Too small of a number may cause the unit to short cycle compressors or excessively reposition the valve.
	Temperature 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.
S107	Temperature Derivative Time	0 - 900 sec	0 sec	
S108	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	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 septoint.

Table B.2 Service-menu Setpoints by Line ID (continued)

S110	Supply Limit Enabled	No Yes	No	Chilled water units may be set up with the supply air sensor to maintain a minimum air temperature under the raised floor to help prevent condensation. In order to avoid supply temperatures that are too low, the Supply Limit can influence the opening of three-point or analog actuators or the output of analog values. The control compares the deviation from the return air setpoint & the supply limit setpoint, and calculates the output to the actuator from the smaller deviation.
	Supply Limit Setpoint	41 - 81 °F 5.0 - 27.0 °C	41 °F 5.0 °C	
S111	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	Enable Temperature Compensation	No Return Supply Ret+Sup	No	Temperature compensation allows for a second or even a third sensor to be used that 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	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	Return Compensation Band	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.
	Return Compensation Value	0 - 18 °F 0.0 - 10.0 K	0 °F 0.0 K	
S116	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.
S118	Compressor Capacity Filter at 0 %	0.01 - 99.99 %/s	0.60 %/s	Controls the rate of change during compressor load changes to avoid overshoots. The filter value depends on the current control deviation from setpoint. On the setpoints (@ 0% call for cooling), it's typically set lower (slow).
	Compressor Capacity Filter at 100%	0.01 - 99.99 %/s	4.00 %/s	At the end of the proportional band (@ 100% call for cooling) it's typically set higher (faster).
S119	Capacity Transition Filter	0.01 - 99.99 %/s	4.00 %/s	This parameter should only be adjusted by a factory-service trained technician. The transition capacity filter controls how quickly the capacity changes between different modes of operation. This filter helps with the transition to avoid overshoot.
S120	CW Capacity Filter @ 0%	0.01 - 99.99 %/s	0.10 %/s	The CW capacity filter controls the rate of change during a valve position adjustment to avoid overshoots. The filter value depends on the current control deviation from setpoint. On the setpoint (@ 0% call for cooling), its typically set lower (slower)

Table B.2 Service-menu Setpoints by Line ID (continued)

	CW Capacity Filter @ 100%	0.01 - 99.99 %/s	0.60 %/s	At the end of the p-band (@ 100% call for cooling) its typically set higher (faster)
S121	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.
S122	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	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 iCOM's internal lookup 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	Dew Point 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.
	Humidity Setpoint	20 - 80 %	0.5	
S126	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 degree Celcius is equal to 3 %RH, indirect proportional. If temperature increases, the humidity setpoint is decreased and vice versa.
	Humidity Control Mode	Supply Return	Return	
S127	Dew Point Proportional Band	2 - 18 ◦F 1.1 - 10.0 K	8 ◦F 4.4 K	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.
	Humidity Proportional Band	1 - 20%	0.2	
S128	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	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.
S130	Dehum Supply Temperature Setpoint	41 - 104 ◦F 5.0 - 40.0 ◦C	54 °F 12.2 °C	

Table B.2 Service-menu Setpoints by Line ID (continued)

				Allows for a target temperature setpoint to be activated when a call for dehumidification is enabled instead of the traditional method of overcooling the space by increaseing cooling to 100% and lowering fan speed if equipped. Must be in supply air control mode. When a call for dehumidification is active, the supply or remote sensor setpoint will be lowered to this parameter. This parameter should be set below the accepted dew point threshold of your space. Used only when supply dehumidification is enabled.
	Actual Dehum Temperature Setpoint	41 - 104 ◦F 5.0 - 40.0 ◦C	50 ◦F 10.0 ◦C	
S131	Dehum Setpoint Adjustment	0 - 18 °F 0.0 - 10.0 K	9 °F 5.0 K	Sets the amount of that the Dehum Temp Setpoint is adjusted once the reheats activate. EX: If the unit is equipped with a reheat device, this parameter will increase the dehumidification temperature as the call for reheats are increased until the reheat call is at 100%. When the reheats are at 100%, the full Dehum Setpoint Adjustment will be applied.
	Dehum Setpoint Filter	0.01 - 0.10 K/s	0.02 K/s	
S132	Dehum Reheat/LL Sensor	Supply Sensor Remote Sensor Return Sensor	Return Sensor	Sets the sensor and temperature start point that the reheat will be deactivated and dehumidification will be stopped due to overcooling the space in a call for dehumidification.
	Dehum Reheat/LL Setpoint	41 - 104 °F 5.0 - 40.0 °C	71 °F 21.7 °C	
S133	Dehum/Reheat Low Limit 1 Temp Hysteresis	-30.0 °F - -2.0 °F -16.7K - -1.1K	-5 °F -2.5 K	Dehum/Reheat Low Limit 1
	Dehum/Reheat Low Limit 2 Temp Hysteresis	-30.0 °F - -2.0 °F -16.7K - -1.1K	-7 °F -3.9 K	Dehum/Reheat Low Limit 2
S13A	Dehum Reheat Proportional Band	2 - 54 °F 2.0 - 30.0 K	14 °F 7.8 K	Sets the reheat proportional band for reheat operation independently of the temperature proportional band. This parameter can be used to activate the reheats at different points below the temperature setpoint.
S13B	Estimated Aisle Temp	41 - 104 °F 5.0 - 40.0 °C	75 °F 23.9 °C	Sets an estimated cold aisle temperature when humidity control sensor is set to remote and no remote temperature sensors are installed at the unit. This estimated temperature will be used to determine the humidity versus using an actual temperature in the cold aisle that may fluctuate during modes of dehumidification or load changes of the IT equipment. This provides a stable control point to reference the actual measured dew point from the return sensor.
S135	DT1 (Room/Outdoor) Type	0 = Disabled 1 = Contact 2 = EFC 3 = Temp 4 = Set	Temp	Sets the activation point of the ambient dry bulb outdoor temperature as it relates to either an indoor actual temperature or temperature setpoint.
S136	DT1 (Room/Outdoor) Value	2 - 72 °F 1.0 - 40.0 K	5 °F 3.0 K	field-adjustable setpoint or temperature

Table B.2 Service-menu Setpoints by Line ID (continued)

S137	DT2 (Room/FC Fluid) Type	Disabled Contact Temp Set	Disabled	Determines the method to activate the water circuit on Dual-Cool and Free-Cool units. It may be set to CONTACT, TEMP or SET. CONTACT uses a dry contact to activate the free-cooling circuit. TEMP uses a sensor reading that can be compared to the return temp to see whether free-cooling is possible. SET compares the temperature set to the free-cooling sensor to determine free-cooling availability.
S138	DT2 (Room/FC Fluid) Value	0 - 36 °F 0.0 - 20.0 K	12 °F 6.7K	sets the delta T between the actual temperature and fluid temperature that must be met before free-cooling will occur.
S139	Minimum Chilled Water Temp Enable	No Yes	Disabled	Enables the temperature at which free-cooling can operate independently without assistance of the compressor circuit(s).
S140	Minimum Chilled Water Temp Value	32 - 68 °F 0.0 - 20.0 °C	45 °F 7.0 °C	Sets the water temperature at which 100% free-cooling can be provided to handle the full room load. When the fluid temperature is below this setting, then the compressors will no longer turn ON until the water temperature is above the minimum CW temperature.
S141	Lockout FC at Fluid Below	6 - 50 °F -15.0 - +10.0°C	32 °F 0.0 °C	Prevents frost from building up on the free-cooling pipes when the outdoor ambient temperature is extremely low by turning OFF the free-cooling circuit when the water temperature is too low.
S146	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	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	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	Fan Temperature Control Prop Band	4 - 200 °F 2.0 - 111.0 K	36 °F 20.0 K	Adjusts the fanspeed 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
	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 intergral work together to maintain setpoint. Large p-band with small integral time is a typical way to achieve stable control.

Table B.2 Service-menu Setpoints by Line ID (continued)

S150	Fan CFF Hysteresis	0 - 20 %	0.02	Modifies the reaction of the fanspeed when fanspeed is being dictated by the Call for Cooling. Adding the Hysteresis may result in a lagged response to changes in fanspeed.
	Fan Deadband	0 - 36 °F 0 - 20.0 K	1 °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	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 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	Fanspeed VSD Setpoint Minimum	0 - 100 %	0.7	Sets the range for the variable fans. Min sets the minimum speed that the fan will operate at. 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 parametter is also adjustable through the BMS.
	Fanspeed VSD Setpoint Standard	0 - 100 %	1	
S153	Fanspeed VSD Setpoint Dehum	0 - 100 %	70%	Sets the fan speed when a call for dehumidification is active. This allows the units fan speed to be ramped lower to help with any overcooling due to the dehumidification process. This also allows the coil to remove additional moisture even faster
	Fanspeed VSD Setpoint No Power	0 - 100 %	100%	
S154	Allow Fan Modulation on Compressors	No Yes	Yes	Provides the option to set the fan to fixed speed if unit is equipped with compressors. Once this parameter is set at the local display, it must be removed at the local display to re-engage fan speed control.
S155	High Return Limit Enable	Disabled Local Team	No	Sets a control point that will increase the fanspeed if the return temperature exceeds the limit set in the High Return Temperature Limit parameter. If set to DISABLED, no limit will be applied to the return air temperature. If set to LOCAL, then only the local units return temperature will be monitored for applying the limit. If set to TEAM, then the highest networked unit return temperature will activate the limit on all connected units.
S15A	High Return Temperature Limit	41 - 104 °F 5.0 - 40.0 °C	85 °F 29.4 °C	Sets the temperature limit that will increase the fan speed to decrease the return temperature. Some compressors may require this limit to prevent extremely high temperatures that could potentially cause degradation of the compressor oil, that could decrease the overall compressor life expectancy.
S15B	Return Limit Proportional Band	0 - 36 °F 0.2 - 20.0 K	20 °F 11.1 K	Sets the rate of fanspeed increase as the atual return temperature approaches the limit set in the High Return Temperature limit parameter.
S157	Fan Startup Time	0 - 600 sec	3 sec	Determines the speed of the fan at system startup. 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%	
S158	Fanspeed Filter @ 0%	0.01 - 99.99 %/s	0.20 %/s	This parameter should only be adjusted by factory service trained technician. Fan Cap Filter @ 0/100% controls the rate of change during fan speed changes to avoid overshoots. The filter value depends on the current control deviation from setpoint. On the setpoint (at 0%), its typically set lower (slower). At the end of the p-band (at 100%) its typically set higher (faster). The value is given as a % control output per second change. This parameter sets the rate of changed based on where actual temperature is when compared to septoint.

Table B.2 Service-menu Setpoints by Line ID (continued)

S159	Fanspeed Filter @ 100%	0.01 - 99.99 %/s	1.00 %/s	This parameter should only be adjusted by factory service trained technician. The transition fan speed filter controls how quickly the fan speed changes between different modes of operation. This filter helps with the transition to avoid overshoots.
	Fanspeed Transition Filter	0.50 - 99.99 %/s	1.00 %/s	
S160	Fanspeed Reposition Mode	Decel Both	Decel	This parameter should only be adjusted by factory service trained technician. The fan speed reposition mode/delay is a one time delay as the fan speed is requested to change direction. This delay will be applied only when the fan speed is commanded from an increasing to decreasing state or decreasing to increasing state. This allows the fan to hold its current position while the temperature stabilizes.
	Fanspeed Reposition Delay	0 - 300 sec	0 sec	
S161	Max Deceleration Rate	0.01 - 99.99 %/s	0.10 %/s	This parameter should only be adjusted by the factory service trained technician. Only slows the decreasing of the variable fan speed. The control will use the slower of this parameter and the fan speed filter.
S162	BMS Backup Fan Setpoint	41 - 104 °F 5.0 - 40.0 °C	73 °F 23.0 °C	Selects a fan speed setpoint that will be activated in the event of a BMS Timeout. The BMS timer must be configured for this parameter to activate.
	BMS Backup Fanspeed	0 - 100 %	1	
S163	BMS Backup Fan Operation	Disabled BMS Backup Spd Coupled BMS Backup Set	Disabled	Sets the default operation of the fan speed control when a BMS Timeout occurs. Default is disabled which will keep the fan speed at the last value before the disconnect occurred. STD speed will ramp the fan to the STD speed setting. This will drive the fan speed to its maximum speed. The control will use the slower value. COUPLED will set the fan speed to follow the cooling capacity. BACKUP SET will use the BMS Backup Setpoint to drive fan speed.
S164	Allow BMS to change Fanspeed	No Yes	Yes	Enables or disables BMS fan speed control. When this parameter is disabled, the BMS will not have write capability to this point.
S165	BMS is connected to	Velocity Ana In 1 Ana In 2 Ana In 3 Ana In 4	Velocity	If the BMS is connected to Analog Input (1-4), it is used for manually writing to & controlling the unit fanspeed using a low-voltage control signal. If the BMS is set to 'Velocity' (V3 or V4), it is used for manually writing to & controlling the unit fanspeed via the Velocity protocol.
	BMS Analog Input Signal Type	0-5V 0-10V 4-20mA None	None	
	BMS Analog Input current value	0 - 100%	100%	
S166	High Temp Limit Approach	Disabled Supply Return	Return	Sets the sensor to be used to increase the fanspeed value above the fanspeed setpoint STD to the value set in the Analog Output high limit.
S16A	High Temp Limit Approach at	0 °F / +10 °F 0 K / +5.5 K	2 °F 1.1 K	Sets the temperature differential below the high supply and high return temperature limit where the fan speed would increase from fanspeed setpoint STD to fanspeed MAX.

Table B.2 Service-menu Setpoints by Line ID (continued)

S16B	FC / AirEco Ramp Up w/ CFC	0 = No 1 = Yes	0 (No)	Sets the selection to decouple the fan output from the call for cooling.
S168	Fan Back Draft Control	Disabled Enabled	Disabled	Enables/disables Fan Back Draft Control. This feature allows EC Fans (only) to operate at very low speeads to prevent airflow from cycling through the unit due to a high under-floor static pressure than above the floor static pressure. VFD's cannot be used with this feature due to motor and/or bearing degradation that may occur at the low fan speeds required to support this feature.
S169	VSD Setpoint Back Draft	0.1 - 5.1 V	1.5 V	The variable speed device setpoint is set as a voltage reference. The lower the voltage, the slower the fans will spin. This parameter is set based on the application. Higher under-floor static pressure may require a higher setting to prevent airflow through the unit.
S171	Not Selectable Zone 1 Low	0.0 - 5.0 V	3.5 V	The not selectable zone 1 and 2 are zones that the EC fans cannot operate within due to vibration harmonics that the fans may introduce to the unit. These parameters will be set from the factory based on model type and should not need adjusted in the field.
S172	Not Selectable Zone 2 Low	0.0 - 5.0 V	0 V	The not selectable zone 1 and 2 are zones that the EC fans cannot operate within due to vibration harmonics that the fans may introduce to the unit. These parameters will be set from the factory based on model type and should not need adjusted in the field.
	Not Selectable Zone 2 High	0.0 - 5.0 V	0 V	
S173	Stop BDR when System is OFF	No Yes	No	The above is true when S173 Stop BDR when System is OFF is set to "YES". If set to "NO", the BDR mode will not be interrupted, unless BDR is disabled or the unit is restarted.
S175	Display Off and BDR	Off BackDraft	Off	When the back draft damper is enabled, different modes can activate this feature. Remote Off, Display Off, BMS Off, and Local Off can all be set to activate te back draft damper operation. This is done by pressing te ON/OFF key at the unit to put the unit in a Display Off condition
S176	BMS Off and BDR	Off BackDraft	Off	When the back draft damper is enabled, different modes can activate this feature. Remote Off, Display Off, BMS Off, and Local Off can all be set to activate te back draft damper operation. This is done by sending a remote OFF signal from BMS to the unit to be remotely OFF.
S177	LOC Off and BDR	Off BackDraft	Off	When the back draft damper is enabled, different modes can activate this feature. Remote Off, Display Off, BMS Off, and Local Off can all be set to activate te back draft damper operation. This is done by sending local OFF signal to the unit by pressing the ON/OFF key.
S179	SCR Control Type	None Tight Standard	None	Sets the control type for the SCR reheats. If set to "Standard", then the reheats will modulate when the temperature is below setpoint based on the control settings. If set to "Tight", then one compressor will be locked on and the reheats will modulate to offset the cooling capacity.
S180	Start 1st Compressor at	-100 / +100 %	0%	Sets activation point of the first compressor. This parameter can be used when set to "Tight" control with SCR.
S181	Stop 1st Compressor at	-200 / +50 %	-200 %	Sets the deactivation point of the first compressor. This parameter can be used when set to "Tight" control with SCR.

Table B.2 Service-menu Setpoints by Line ID (continued)

S182	1st Compressor stop delay	0 - 30 min	20 min	Sets the delay when the stop compressor setpoint for the first compressor is met.
S183	Start 2nd Compressor at	-100 / +100 %	100%	Sets activation point of the second compressor. This parameter can be used when set to "Tight" control with SCR.
S184	Stop 2nd Compressor ats	-200 / +50 %	0%	Sets the deactivation point of the second compressor. This parameter can be used when set to "Tight" control with SCR.
S185	2nd Compressor stop delay	0 - 30 min	0 min	Sets the delay when the stop compressor setpoint for the second compressor is met.
S186	Cycle Time	1.0 - 200.0 sec	1.0 sec	Set at the factory and should be changed only by an authorized Vertiv/Liebert technician.
S187	SCR Factor	1.0 - 10.0	1	Set at the factory and should be changed only by an authorized Vertiv/Liebert technician.
S188	Actual SCR request	0 - 100 %	0%	Displays the actual SCR reheat being requested.
S190	Static Pressure Fan Control	Disabled Limit Control	Disabled	Enables/disables the use of static pressure control for fan modulation.
S191	Static Pressure Setpoint inWC	0.010 - 1.003 inWC	0.020 inWC	Sets the static pressure setpoint to be used by the control to modulate the fan control.
	Static Pressure Setpoint Pa	2 - 250 Pa	5 Pa	
S192	Static Pressure Deadband in WC	0.010 - 1.003 inWC	0.020 inWC	Sets the static pressure deadband.
	Static Pressure Deadband Pa	2 - 250 Pa	5 Pa	
S193	SP Pause Time @ Deadband minimum	0 (Disabled) - 180 sec	30 sec	Sets the minimum and maximum pause times when the static pressure crosses into the deadband border. The fanspeed will stop increasing or decreasing based on the time set in these parameters.
	SP Pause time @ Deadband maximum	2 - 180 sec	60 sec%	
S194	SP Pulse Time inside Deadband	2 - 15 sec	3 sec	Sets the pulse time that the speed filter will be performed to the fan analog output.
S195	Static Pressure Prop Band inWC	0.010 - 1.003 inWC	0.020 inWC	Sets the proportional band for which the fan speed modulation output calculation is based upon in relation to the difference between the pressure reading the the "SP Setpoint".
	Static Pressure Prop Band Pa	2 - 250 Pa	5 Pa	
S196	SP During Dehum	Disabled Enabled	Disabled	Sets the use of static pressure control if dehumidification becomes active. It set to "Disabled" then the static pressure routines will become inactive and the fan will be allowed to ramp to the dehumidification speed set in "Fanspeed Dehum/No Power". If set to "Enabled", then the static pressure routines shall remain active during the call for dehumidification.

Table B.2 Service-menu Setpoints by Line ID (continued)

S197	Static Pressure Teamwork Mode	Average Minimum	Average	There are modes available for static pressure teamwork functionality: Average & Minimum. When selecting "Average Mode", the average of the lowest static pressure sensor readings in the system will be average to generate a shared static pressure value for all units in the team. The number of static pressure sensors to be averaged is set in line S198 SP Sensors in Avg for TW. When this line is set to a value lower than the number of units in the team, the lowest static pressure readings will be averaged.
S198	SP Sensors in Avg for TW	1 - 32	2	Sets the number of sensors used when averaging sensors in the teamwork.
S199	Operation on Sensor Failure	SP Off Freeze Speed	SP Off	This parameter determines what action to take if the static pressure sensor fails (non-teamwork). If "SP OFF" is selected, then the control will use S146 "Fan Control Sensor" to control the fan when the sensor is lost. If "Freeze Speed" is selected, then the control will keep the fanspeed in its last known position. Situations that need to override the fanspeed such as Freeze Protection can still change the fanspeed.
S1A1	Static Pressure Upper Range inWC	0.010 - 1.003 inWC	0.030 inWC	The control calculates the Upper Range by using S191 "SP Setpoint" and S192 "SP Deadband", the results on lines show both values, inWC and Pa.
	Static Pressure Upper Range Pa	2.5 - 250.0 Pa	7.5 Pa	
S1A2	Static Pressure Lower Range inWC	0.000 - 0.993 inWC	0.010 inWC	The control calculates the Lower Range by using S191 "SP Setpoint" and S192 "SP Deadband", the results on lines show both values, inWC and Pa.
	Static Pressure Lower Range Pa	0.0 - 247.5 Pa	2.5 Pa	
S1A4	Enable Static Pressure Control Override	None Remote Sensor Return Sensor	None	
S1A5	SP Requested Speed up to	41 - 104 °F 5.0 - 40.0 °C	86 °F 30.0 °C	
S1A6	STD Speed at	41 - 104 °F 5.0 - 40.0 °C	95 °F 35.0 °C	
S1A7	Override Integration Time	0.0 - 15.0 min	0.0 min	
S1A8	Control Slew Rate Filter	0.50 - 99.99 %/s	1.00 %/s	
S1A9	Current Override Temperature	°F °C	invalid	
S1B1	Current Override Value	0 - 100 %	0%	

Table B.2 Service-menu Setpoints by Line ID (continued)

S1B9	Create SuperSaver Signal	0 = No 1 = Local 2 = U2U Group AVG 3 = U2U Group MAX 4 = U2U Group MIN	0 (No)	
S1C1	Deadband Low Value	5 - 95 %	20%	
S1C2	Deadband High Value	10 - 100 %	90%	
S1C3	Update SuperSaver Signal every	30 - 300 sec	120 sec	
S1C4	Update SuperSaver Signal by	1 - 10 %	1%	
S1C5	SuperSaver Max Limit	0 - 100 %	100%	
S1C6	Current SuperSaver Request	0 - 100 %	0%	
	Current SuperSaver Signal	0 - 100 %	0%	
S1C7	U2U Aggregated Signal	0 - 100 %	0%	

B.2 Line IDs for Alarm-setting Parameters

Table B.3 User-menu Alarm Settings by Line ID

Line ID	Parameter Name	Range	Default Setting	Description
U202	Return Sensor Alarms	Disabled Enabled	Enabled	Enables or disables the return sensor alarms. When enabled, the return temperature and humidity values will be compared to a high & low setting.
U203	High Return Temperature	34 - 210 °F 1.0 - 99.0 °C	100 °F	Allows a user to adjust the point at which the acual return temperature activates a High Temperature Alarm.
U204	Low Return Temperature	34 - 210 °F 1.0 - 99.0 °C	65 °F	Allows a user to adjust the point at which the actual return temperature activates the Low Temperature Alarm.

Table B.3 User-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
U205	High Return Humidity	1.0 - 99.0 %	65.0%	Allows a user to adjust the point at which the actual return humidity activates the High Humidity Alarm.
U206	Low Return Humidity	1.0 - 99.0 %	35.0%	Allows a user to adjust the point at which the actual return humidity activates the Low Humidity Alarm.
U207	Sensor A Alarms	Disabled Enabled	Disabled	Enables or disables the alarms for reference Sensor A. When enabled, the Sensor A temperature and humidity values will be compared to a high and low setting.
U208	High Temperature Sensor A	34 - 210 °F 1.0 - 99.0 °C	90 °F	Allows a user to adjust the point at which the actual Sensor A temperature activates a High Temperature Alarm.
U209	Low Temperature Sensor A	34 - 210 °F 1.0 - 99.0 °C	55 °F	Allows a user to adjust the point at which the actual Sensor A temperature activates a Low Temperature Alarm.
U210	High Humidity Sensor A	1.0 - 99.0 %	70.0%	Allows a user to adjust the point at which the actual Sensor A humidity activates a High Humidity Alarm.
U211	Low Humidity Sensor	1.0 - 99.0 %	30.0%	Allows a user to adjust the point at which the actual Sensor A humidity activates a Low Humidity Alarm.
U213	Supply Sensor Alarms	Disabled Enabled	Disabled	Enables or disables the supply sensor alarms. When enabled, the supply temperature value will be compared to a high and low setting.
U214	High Supply Temperature	34 - 210 °F 1.0 - 99.0 °C	75 °F	Sets the temperature at which the High Supply Temperature Alarm is activated.
U215	Low Supply Temperature	34 - 210 °F 1.0 - 99.0 °C	50 °F	Sets the temperature at which the Low Supply Temperature Alarm is activated.
U219	Remote Sensor Alarms	0 = Disabled 1 = Com Set 2 = Sep Set	Disabled	Enables or disables the remote sensor alarms. When enabled, the remote temperature values will be compared to a high and low setting.
U220	High Remote Temperature	34 - 210 °F 1.0 - 99.0 °C	90 °F	Enables or disables remote sensor temperature alarms. When enabled, the high and low remote temperature alarm will allow a user to adjust the point at which the actual remote temperature activates a High/Low temperature alarm. This parameter is used when common alarm points will be shared by all sensors. Otherwise, the remote sensors can be set individually.
	Low Remote Temperature	34 - 210 °F 1.0 - 99.0 °C	55 °F	

Table B.3 User-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
U224-U233	High Remote 01-10	34 - 210 °F 1.0 - 99.0 °C	90 °F	Sets the high and low remote temperature sensor alarm points individually for each sensor when the parameter separate thresholds is set to disabled
	Low Remote 01-10	34 - 210 °F 1.0 - 99.0 °C	55 °F	
U235	Static Pressure Messages	Disabled Enabled	Disabled	Enables or disables static pressure messages.
U236	High Static Pressure (inWC)	0.010 - 1.405 inWC	1.284 inWC	Sets the pressure at which the High Static Pressure Alarm is activated (inWC, Pa)
	High Static Pressure (Pa)	2 - 350 Pa	320 Pa	
U237	Low Static Pressure (inWC)	0.000 - 1.395 inWC	0.000 inWC	Sets the pressure at which the Low Static Pressure Alarm is activated (inWC, Pa)
	Low Static Pressure (Pa)	0 - 348 Pa	0 Pa	
U238	SP Messages During Unit Off	No Yes	No	Enables or disables Static Pressure messages when the unit is OFF
U239	SP Messages on Fan Adjust	No Yes	No	Enables or disables the static pressure messages when the fan as been adjusted due to special events. These events include an adjustment for heating, humidification, dehumidification, motor overload / EC fan fault or loss of airflow.
U240	SP Transducer High Range (inWC)	0.000 - 1.405 inWC	1.284 inWC	Sets the pressure range at which the High Static Pressure Out of Range alarm is activated.
	SP Transducer High Range (Pa)	0 - 350 Pa	320 Pa	
U241	SP Transducer Low Range (inWC)	0.000 - 1.395 inWC	0.000 inWC	Sets the pressure range at which the Low Static Pressure Out of Range alarm is activated.
	SP Transducer Low Range (Pa)	0 - 348 Pa	0 Pa	

Table B.4 Service-menu Alarm Settings by Line ID

Line ID	Parameter Name	Range	Default Setting	Description
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	
S204	High Return Humidity Alarm	1.0 - 99.0 %	0.65	Sets the humidity threshold for the High/Low Return Temperature alarms.
	Low Returm 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 1.0 - 99.0 °C	90 °F	
S207	Sensor A Low Humidity Alarm	1.0 - 99.0%	30.0%	Sets the temperature threshold when Sensor A High/Low Humidity alarm will occur
	Sensor A High Humidity Alarm	1.0 - 99.0%	70.0%	
S208	Warning Activates Alarm Relay	No Yes	Yes	When set for 'Yes', a "Warning" event-type will activate the Alarm Relay in addition to an "Alarm" event-type.
S209	K11 (WA Relay) Active On	0 = Dehum 1 = Warning 2 = Emergency Pwr 3 = Freecooling 4 = FC Start	Warning	The Warning Relay (WA Relay) can be activated for different purposes; during a Call of Dehumidification, during a 'Warning' event-type, when unit is on Emergency Power and a Customer Input Alarm is configured for 'Emergency Pwr', during Freecooling, or during Freecooling (FC) Start.
S210	K11(WA Relay) and AL Relay	Direct Reverse	Direct	Determines whether the K11 (WA Relay) is Direct or Reverse acting.

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S211	Water Alarm Shuts Down Unit	No Yes	No	The controller can be configured to shut the following down during an active 'Water Alarm': • Shutdown the entire unit • Shutdown Humidification operation
	Water Alarm Hum Fill Down	No Yes	No	
S21A	Loss of Flow Compressor Timer	0 - 180 sec	0 sec	Allows setting a maximum pumpdown time during a loss of flow condition to prevent causing a high-pressure alarm due to pumpdown with no water/glycol flow to the condenser; hidden unless pumpdown is enabled; applies only to water/glycol-cooled systems
S21B	Loss of Flow Threshold	0 - 100 %	0.1	Sets the threshold for call for cooling (CFC) loss of flow.
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	34 - 210 °F 1.0 - 99.0 °C	75 °F	Sets the high & low supply temperature threshold that the alarms will be triggered at.
	Low Supply Temperature	34 - 210 °F 1.0 - 99.0 °C	50 °F	
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	34 - 210 °F 1.0 - 99.0 °C	59 °F	Sets the high/low depoint threshold.
	Low Dew Point	34 - 210 °F 1.0 - 99.0 °C	39 °F	
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	34 - 210 °F 1.0 - 99.0 °C	62 °F	Sets the high/low Sensor A dewpoint thresholds.
	Low Dew Point Sensor A	34 - 210 °F 1.0 - 99.0 °C	36 °F	
S219	Remote Sensor Alarms Enable	0 = Disabled 1 = Com Set 2 = Sep Set	Disabled	Disable prevents remote temperature sensor alarms from occuring. 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	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
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	
S222	EEV Alarmboard	0 = NO 1 = NC	1 (NC)	
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)	
S224 - S233, S23A,	Customer Input 1 - 11	0 = Smoke 1 = Water Alarm 2 = C PMP Alarm 3 = Flow Alarm 4 = Stdby G Pump 5 = Stdby Unit 6 = C-Input 1 7 = C-Input 2 8 = C-Input 3 9 = C-Input 4 10 = Rht Lockout 11 = Hum Lockout 12 = Rht+Hum Lock 13 = Comp Lockout 14 = Call Service 15 = High Temp 16 = Air Loss 17 = FC Lockout 18 = Heater Alarm 19 = Flow AL SD 20 = Flow AL LC	1 (Water Alarm) for inputs 1-4 38 (Not Used) for inputs 5-11	Selects the device and operation of the Customer Inputs. Each event reflects a different alarm scenario and possible action to the unit. A user may select whether the customer input is normally-open or normally-closed. If the parameter is configured for 'Factory STD.', then it indicates that this input is factory-configured and is not configurable in the field.

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S224 - S233, S23A, (Cont'd)	Customer Input 1 - 11 (Cont'd)	21 = Comp Lock PD 22 = Enable FC 23 = HTRJ VFD 24 = HTRJ SPD 25 = Fire Alarm 26 = 2nd Setpoint 27 = Emergency Pwr 28 = LSI 29 = Cond 1 Fail 30 = Cond 2 Fail 31 = D-Scroll Red 32 = Swap Valve 33 = EC Fan Fault 34 = Eco Airflow 35 = DamperSwitch 36 = Power A 37 = Power B 38 = Not Used 39 = Flow AL LFC 40 = Hand Mode 41 = Fan Overrd. 42 = Cool Overrd	1 (Water Alarm) for inputs 1-4 38 (Not Used) for inputs 5-11	Selects the device and operation of the Customer Inputs. Each event reflects a different alarm scenario and possible action to the unit. A user may select whether the customer input is normally-open or normally-closed. If the parameter is configured for 'Factory STD.', then it indicates that this input is factory-configured and is not configurable in the field.
S224 - S233, S23A, (Cont'd)	Customer Input Active open/closed	Closed Open	Closed	A user may select if the customer input is active when contacts are open or closed
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	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
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	
	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	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S242	Event Delay Time (sec)	10 - 9999 sec	30 sec	Low Room Humidity
	Event Enabled	Disabled Enabled	Enabled	
	Event: LOW ROOM HUM	MESSAGE WARNING ALARM	WARNING	
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)	10 - 9999 sec	30 sec	Low Temperature Sensor A
	Event Enabled	Disabled Enabled	Disabled	
	Event: LOW TEMP SENSOR A	MESSAGE WARNING ALARM	WARNING	
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)	10 - 9999 sec	30 sec	Low Humidity Sensor A
	Event Enabled	Disabled Enabled	Disabled	
	Event: LOW HUM SENSOR A	MESSAGE WARNING ALARM	WARNING	
S249	Event Delay Time (sec)	–	–	Compressor 1 Overload
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 1 OVERLOAD	MESSAGE WARNING ALARM	ALARM	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S250	Event Delay Time (sec)	–	–	Compressor 2 Overload
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 2 OVERLOAD	MESSAGE WARNING ALARM	ALARM	
S251	Event Delay Time (sec)	–	–	Circuit 1 High Pressure
	Event Enabled	Disabled Enabled	Enabled	
	Event: CIRCUIT 1 HIGH PRESS	MESSAGE WARNING ALARM	ALARM	
S252	Event Delay Time (sec)	–	–	Circuit 2 High Pressure
	Event Enabled	Disabled Enabled	Enabled	
	Event: CIRCUIT 2 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	
S254	Event Delay Time (sec)	–	–	Circuit 2 Low Pressure
	Event Enabled	Disabled Enabled	Enabled	
	Event: CIRCUIT 2 LOW PRESS	MESSAGE WARNING ALARM	ALARM	
S255	Event Delay Time (sec)	–	–	Circuit 1 Pumpdown Failure
	Event Enabled	Disabled Enabled	Enabled	
	Event: CIRCUIT 1 PUMPD. FAIL	MESSAGE WARNING ALARM	ALARM	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S256	Event Delay Time (sec)	–	–	Circuit 2 Pumpdown Failure
	Event Enabled	Disabled Enabled	Enabled	
	Event: CIRCUIT 2 PUMPD. FAIL	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	
S258	Event Delay Time (sec)	–	–	Digital Scroll 2 High Temperature
	Event Enabled	Disabled Enabled	Enabled	
	Event: DIG SCROLL2 HIGH TEMP	MESSAGE WARNING ALARM	ALARM	
S259	Event Reset Type	0 = AR 1 = MR	0 (AR)	Electric Heat High Temp 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)	10 - 9999 sec	10 sec	Working HRS Exceeded
	Event Enabled	Disabled Enabled	Enabled	
	Event: UNIT HRS EXCEEDED	MESSAGE WARNING ALARM	WARNING	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
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 (sec)	10 - 9999 sec	10 sec	Water Under Floor
	Event Enabled	Disabled Enabled	Enabled	
	Event: WATER UNDER FLOOR	MESSAGE WARNING ALARM	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	
S266	Event Delay Time (sec)	0 = AR 1 = MR	0 (AR)	Loss of Flow AR = Auto Reset MR = Manual Reset
	Event Enabled	10 - 9999 sec	10 sec	
	Event Number 107 Enabled	Disabled Enabled	Enabled	
	Event: LOSS OF FLOW	MESSAGE WARNING ALARM	ALARM	
S267	Event Delay Time (sec)	10 - 9999 sec	10 sec	Standby Glycol Pump ON
	Event Enabled	Disabled Enabled	Enabled	
	Event: STANDBY GLYCOL PUMP ON	MESSAGE WARNING ALARM	ALARM	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S268	Event Delay Time (sec)	10 - 9999 sec	10 sec	Standby Unit ON
	Event Enabled	Disabled Enabled	Enabled	
	Event: STANDBY UNIT ON	MESSAGE WARNING ALARM	ALARM	
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)	10 - 9999 sec	300 sec	No Connection w/ Unit 1
	Event Enabled	Disabled Enabled	Enabled	
	Event: NO CONNECTION W/ UNIT1	MESSAGE WARNING ALARM	WARNING	
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	60 - 3600 sec	300 sec	Loss of Power
	Event Enabled	Disabled Enabled	Enabled	
	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	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S276	Event Delay Time (sec)	10 - 9999 sec	10 sec	Customer Input 2
	Event Enabled	Disabled Enabled	Enabled	
	Event: CUSTOMER INPUT 2	MESSAGE WARNING ALARM	ALARM	
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)	10 - 9999 sec	10 sec	Customer Input 4
	Event Enabled	Disabled Enabled	Enabled	
	Event: CUSTOMER INPUT 4	MESSAGE WARNING ALARM	ALARM	
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)	10 - 9999 sec	10 sec	High Temperature
	Event Enabled	Disabled Enabled	Enabled	
	Event: HIGH TEMPERATURE	MESSAGE WARNING ALARM	ALARM	
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	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S282	Event Delay Time (sec)	10 - 9999 sec	10 sec	Reheat Lockout
	Event Enabled	Disabled Enabled	Enabled	
	Event: REHEAT LOCKOUT	MESSAGE WARNING ALARM	WARNING	
S283	Event Delay Time (sec)	10 - 9999 sec	10 sec	Humidifier Lockout
	Event Enabled	Disabled Enabled	Enabled	
	Event: HUMIDIFIER LOCKOUT	MESSAGE WARNING ALARM	WARNING	
S284	Event Delay Time (sec)	10 - 9999 sec	10 sec	FC Lockout
	Event Enabled	Disabled Enabled	Enabled	
	Event: FC LOCKOUT	MESSAGE WARNING ALARM	WARNING	
S285	Compressor Lockout Option	0 = ALL 1 = 1 (A) 2 = 2 (A) 3 = 1B 4 = 2B 5 = 1A + 2A 6 = 1B + 2B 7 = 1A + 1B 8 = 2A + 2B	0(ALL)	Compressor(s) Lockout
	Event Delay Time (sec)	10 - 9999 sec	10 sec	
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMPRESSOR (S) LOCKOUT	MESSAGE WARNING ALARM	WARNING	
S27B	Edit Cust Input 1	(20 digits) 0-9 A-Z a-z &* / . + - _ : @ \	CUSTOMER INPUT 1	Edit Customer Input 1 Text

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S27C	Edit Cust Input 2	(20 digits) 0-9 A-Z a-z &* / . + - _ : @ \	CUSTOMER INPUT 2	Edit Customer Input 2 Text
S27D	Edit Cust Input 3	(20 digits) 0-9 A-Z a-z &* / . + - _ : @ \	CUSTOMER INPUT 3	Edit Customer Input 3 Text
S27E	Edit Cust Input 4	(20 digits) 0-9 A-Z a-z &* / . + - _ : @ \	CUSTOMER INPUT 4	Edit Customer Input 4 Text
S288	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 1 Short Cycle
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 1 SHORT CYCLE	MESSAGE WARNING ALARM	WARNING	
S289	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 2 Short Cycle
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 2 SHORT CYCLE	MESSAGE WARNING ALARM	WARNING	
S290	Event Delay Time (sec)	10 - 9999 sec	10 sec	Emergency Power
	Event Enabled	Disabled Enabled	Enabled	
	Event: EMERGENCY POWER	MESSAGE WARNING ALARM	WARNING	
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	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S292	Event Delay Time (sec)	10 - 9999 sec	10 sec	Condenser 2 Failure
	Event Enabled	Disabled Enabled	Enabled	
	Event: CONDENSER 2 FAILURE	MESSAGE WARNING ALARM	WARNING	
S293	Event Delay Time (sec)	10 - 9999 sec	15 sec	EC Fan Fault
	Event Enabled	Disabled Enabled	Enabled	
	Event: EC FAN FAULT	MESSAGE WARNING ALARM	ALARM	
S294	Event Delay Time (sec)	10 - 9999 sec	30 sec	High Supply Temperature
	Event Enabled	Disabled Enabled	Enabled	
	Event: HI SUPPLY TEMPERATURE	MESSAGE WARNING ALARM	WARNING	
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	
S296	Event Delay Time (sec)	10 - 9999 sec	10 sec	Reduced Eco Airflow
	Event Enabled	Disabled Enabled	Enabled	
	Event: REDUCED ECO AIRFLOW	MESSAGE WARNING ALARM	WARNING	
S297	Event Delay Time (sec)	10 - 9999 sec	10 sec	Eco High Temperature Override
	Event Enabled	Disabled Enabled	Enabled	
	Event: ECO HI TEMP OVERRIDE	MESSAGE WARNING ALARM	WARNING	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S298	Event Delay Time (sec)	10 - 9999 sec	10 sec	Temperature Control Sensor Fail
	Event Enabled	Disabled Enabled	Enabled	
	Event: TEMP CTRL SENSOR FAIL	MESSAGE WARNING ALARM	ALARM	
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)	10 - 9999 sec	30 sec	Low Dew Point
	Event Enabled	Disabled Enabled	Enabled	
	Event: LOW DEW POINT	MESSAGE WARNING ALARM	WARNING	
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 ALARM	WARNING	
S2A5	Event Delay Time (sec)	10 - 9999 sec	30 sec	Low Dew Point Sensor A
	Event Enabled	Disabled Enabled	Enabled	
	Event: LOW DEW POINT SENSOR A	MESSAGE WARNING ALARM	WARNING	
S2A6	Event Delay Time (sec)	10 - 9999 sec	30 sec	High Remote Sensor
	Event Enabled	Disabled Enabled	Enabled	
	–	MESSAGE WARNING ALARM	WARNING	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S2A7	Event Delay Time (sec)	10 - 9999 sec	30 sec	Low Remote Sensor
	Event Enabled	Disabled Enabled	Enabled	
	–	MESSAGE WARNING ALARM	WARNING	
S2A8	Event Delay Time (sec)	10 - 9999 sec	10 sec	Power 'A' Failure
	Event Enabled	Disabled Enabled	Enabled	
	Event: POWER 'A' FAILURE	MESSAGE WARNING ALARM	ALARM	
S2A9	Event Delay Time (sec)	10 - 9999 sec	10 sec	Power 'B' Failure
	Event Enabled	Disabled Enabled	Enabled	
	Event: POWER 'B' FAILURE	MESSAGE WARNING ALARM	ALARM	
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)	10 - 9999 sec	30 sec	Humidity Control Sensor Failure
	Event Enabled	Disabled Enabled	Enabled	
	Event: HUM CTRL SENSOR FAILURE	MESSAGE WARNING ALARM	WARNING	
S2B6	Event Delay Time (sec)	10 - 9999 sec	120 sec	Low Static Pressure
	Event Enabled	Disabled Enabled	Disabled	
	Event: LOW STATIC PRESSURE	MESSAGE WARNING ALARM	WARNING	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S2B7	Event Delay Time (sec)	10 - 9999 sec	120 sec	High Static Pressure
	Event Enabled	Disabled Enabled	Disabled	
	Event: HIGH STATIC PRESSURE	MESSAGE WARNING ALARM	WARNING	
S2B8	Event Delay Time (sec)	10 - 9999 sec	150 sec	Static Pressure 1 Out of Range
	Event Enabled	Disabled Enabled	Disabled	
	Event: STATPR 1 OUT OF RANGE	MESSAGE WARNING ALARM	WARNING	
S2B9	Event Delay Time (sec)	10 - 9999 sec	150 sec	Static Pressure 2 Out of Range
	Event Enabled	Disabled Enabled	Disabled	
	Event: STATPR 2 OUT OF RANGE	MESSAGE WARNING ALARM	WARNING	
S2C1	Event Delay Time (sec)	10 - 9999 sec	150 sec	Static Pressure 3 Out of Range
	Event Enabled	Disabled Enabled	Disabled	
	Event: STATPR 3 OUT OF RANGE	MESSAGE WARNING ALARM	WARNING	
S2C2	Event Delay Time (sec)	10 - 9999 sec	150 sec	Static Pressure 4 Out of Range
	Event Enabled	Disabled Enabled	Disabled	
	Event: STATPR 4 OUT OF RANGE	MESSAGE WARNING ALARM	WARNING	
S2C3	Event Delay Time (sec)	10 - 9999 sec	120 sec	Static Pressure 1 Sensor Failure
	Event Enabled	Disabled Enabled	Disabled	
	Event: STAT PR 1 SENS FAIL	MESSAGE WARNING ALARM	ALARM	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S2C4	Event Delay Time (sec)	10 - 9999 sec	120 sec	Static Pressure 2 Sensor Failure
	Event Enabled	Disabled Enabled	Disabled	
	Event: STAT PR 2 SENS FAIL	MESSAGE WARNING ALARM	ALARM	
S2C5	Event Delay Time (sec)	10 - 9999 sec	120 sec	Static Pressure 3 Sensor Failure
	Event Enabled	Disabled Enabled	Disabled	
	Event: STAT PRES 3 SENS FAIL	MESSAGE WARNING ALARM	ALARM	
S2C6	Event Delay Time (sec)	10 - 9999 sec	120 sec	Static Pressure 4 Sensor Failure
	Event Enabled	Disabled Enabled	Disabled	
	Event: STAT PRES 4 SENS FAIL	MESSAGE WARNING ALARM	ALARM	
S2D1	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 1A Overload
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 1A OVERLOAD	MESSAGE WARNING ALARM	ALARM	
S2D2	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 1B Overload
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 1B OVERLOAD	MESSAGE WARNING ALARM	ALARM	
S2D3	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 2A Overload
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 2A OVERLOAD	MESSAGE WARNING ALARM	ALARM	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S2D4	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 2B Overload
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 2B OVERLOAD	MESSAGE WARNING ALARM	ALARM	
S2D5	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 1A High Temperature
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 1A HIGH TEMP	MESSAGE WARNING ALARM	ALARM	
S2D6	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 1B High Temperature
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 1B HIGH TEMP	MESSAGE WARNING ALARM	ALARM	
S2D7	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 2A High Temperature
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 2A HIGH TEMP	MESSAGE WARNING ALARM	ALARM	
S2D8	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 2B High Temperature
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 2B HIGH TEMP	MESSAGE WARNING ALARM	ALARM	
S2D9	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 1A Short Cycle
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 1A SHORT CYCLE	MESSAGE WARNING ALARM	WARNING	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S2E1	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 1B Short Cycle
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 1B SHORT CYCLE	MESSAGE WARNING ALARM	WARNING	
S2E2	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 2A Short Cycle
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 2A SHORT CYCLE	MESSAGE WARNING ALARM	WARNING	
S2E5	Event Delay Time (sec)	10 - 9999 sec	10 sec	Compressor 2B Short Cycle
	Event Enabled	Disabled Enabled	Enabled	
	Event: COMP 2B SHORT CYCLE	MESSAGE WARNING ALARM	WARNING	
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	
S2E7	–	–	–	C1 Freeze Protection
	Event Enabled	Disabled Enabled	Enabled	
	Event: C1 FREEZE PROTECTION	MESSAGE WARNING ALARM	ALARM	
S2E8	–	–	–	C2 Freeze Protection
	Event Enabled	Disabled Enabled	Enabled	
	Event: C2 FREEZE PROTECTION	MESSAGE WARNING ALARM	ALARM	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S2E9	Event Delay Time (sec)	10 - 9999 sec	10 sec	Damper Failure
	Event Enabled	Disabled Enabled	Enabled	
	Event: DAMPER FAILURE	MESSAGE WARNING ALARM	ALARM	
SF2F	–	–	–	BMS Disconnected
	Event Enabled	Disabled Enabled	Enabled	
	Event: BMS DISCONNECTED	MESSAGE WARNING ALARM	WARNING	
S2F9	Phase Loss MB01 shuts unit down	0 = No 1 = Yes	1 (Yes)	Power 1 Phase Loss
	Event Delay Time (sec)	10 - 9999 sec	10 sec	
	Event Enabled	Disabled Enabled	Enabled	
	Event: POWER 1 PHASE LOSS	MESSAGE WARNING ALARM	ALARM	
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	0 = No 1 = Yes	1 (Yes)	Power 3 Phase Loss
	Event Delay Time (sec)	10 - 9999 sec	10 sec	
	Event Enabled	Disabled Enabled	Enabled	
	Event: POWER 3 PHASE LOSS	MESSAGE WARNING ALARM	ALARM	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
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
	Event Delay Time (sec)	10 - 9999 sec	10 sec	
	Event Enabled	Disabled Enabled	Enabled	
	Event: POWER 5 PHASE LOSS	MESSAGE WARNING ALARM	ALARM	
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	
S2G6	Event Delay Time (sec)	10 - 9999 sec	60 sec	Flow Sensor Fail C1
	Event Enabled	Disabled Enabled	Enabled	
	Event: FLOW SENSOR FAIL C1	MESSAGE WARNING ALARM	WARNING	

Table B.4 Service-menu Alarm Settings by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S2G7	Event Delay Time (sec)	10 - 9999 sec	60 sec	Flow Sensor Fail C2
	Event Enabled	Disabled Enabled	Enabled	
	Event: FLOW SENSOR FAIL C2	MESSAGE WARNING ALARM	WARNING	
S2G8	Event Delay Time (sec)	10 - 9999 sec	60 sec	TSA Sensor Fail
	Event Enabled	Disabled Enabled	Enabled	
	Event: TSA SENSOR FAIL	MESSAGE WARNING ALARM	ALARM	

B.3 Line IDs for Cascade-operation Parameters

Table B.5 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 Fanspeed	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 Fanspeed = enabled via TW Mode 3
S516	Cascaded Units Delay	0 - 30 min	10 min	Once a Standby unit receives an ON command from the Master (U2U 1); the amount of time that must surpass prior to the standby unit staging ON
S517	Cascaded Units Quick Start	0 - 30 min	2 min	After the Master (U2U 1) has restarted after a power-cycle; this control delay time is used (Shorter time than S516). 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 disable.**
	Cascaded Units QS Delay	15 - 1800 sec	120 sec	
S518	Cascaded Units Control Delay	0 - 30 min	5 min	Once a standby unit has been cascaded ON; the amount of time that must surpass before the normal unit control is used.
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 master; the cascaded unit will stop after this timer and S520 have elapsed.
S520	Cascaded Units Min Run	2 - 360 min	30 min	The minimum ON time the cascaded system will run before staging OFF, once energized.

Table B.5 Service-menu Cascade Parameters by Line ID (continued)

Line ID	Parameter Name	Range	Default Setting	Description
S521	Start Next Unit @ SYS Fanspeed	50 - 100%	100%	When the 'System' (network) fanspeed operates at or above S521, S516 timer is started. Once S516 has elapsed, the next single unit will energized. **NOTE: Fanspeed must be at/continuously above value set in S521; the timer restarts any time the Fanspeed falls below**
S522	Max. Intermediate System Speed	50 - 100 %	100%	Defines the value to which the System (network) Fanspeed may increase to when not all units in the network are in operation
S523	Stop Next Unit @ SYS Fanspeed	20 - 70 %	70%	when the current System (network) Fanspeed operates at or below S523, two timers must elapse before the cascasded ON unit turns OFF; S519 & S520.
S524	Cascaded Units OFF Master Delay	0 - 360 min	1 min	In the event of the Virtual Master taking control; the new Master unit shall control the staging OFF of currently operating units for the amount of time set in S524. After S524 time has elapsed, S519 value is used.

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