

A5xx Series Wall Mount Refrigeration and Defrost Controllers

Technical Bulletin

A525

LIT No. 12012405

Issued December 2018

Introduction	3
Application	3
A5xx Series Wall Mount Refrigeration and Defrost Controllers	3
A5xx Controller UI	4
Cleaning the controller	6
Terminal block and terminal descriptions	6
Refrigeration mode	9
Defrost mode	10
Defrost types	11
Defrost termination types	11
Defrost schedule types	12
Compressor and evaporator fan start delays	12
System setup parameters	14
Adaptive defrost setup parameters	18
Universal inputs and alarms	19
Cooling and system shutdown	22
Detailed procedures	23
Setting up the A5xx Controller	23
Navigating the high-level status and setup start screens	24
Viewing the system status screens	25
Viewing the QREV/PSHC status screens	26
Setting up the system setup screens	27
Setting up the system components	29
Setting up the system setup parameters	31
Setting up the refrigeration setup screens	32
Setting up the defrost setup screens	33
Setting up the universal inputs	36
Setting up the alarm setup	37
Using file to import and export data	38
A5xx Controller screens	39
Info field codes	54
Electrical ratings	56
Technical specifications	57
North American emissions compliance	59
United States	59
Canada	59

A5xx Series Wall Mount Refrigeration and Defrost Controllers

Technical Bulletin

A525

LIT No. 12012405
Issued December 2018

Refer to the [QuickLIT website](#) for the most up-to-date version of this document.

Introduction

This document describes the features and functions of the A5xx Series Wall Mount Refrigeration and Defrost Controller, and provides guidelines and instructions to set up, adjust, and troubleshoot the controller.

Application

IMPORTANT: Use the A5xx Series Wall Mount Refrigeration and Defrost Controller only as an operating control. Where failure or malfunction of the A5xx Controller could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the A5xx Controller.

IMPORTANT : Utiliser ce A5xx Series Wall Mount Refrigeration and Defrost Controller uniquement en tant que dispositif de contrôle de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du A5xx Régulateur risque de provoquer des blessures ou d'endommager l'équipement contrôlé ou un autre équipement, la conception du système de contrôle doit intégrer des dispositifs de protection supplémentaires. Veiller dans ce cas à intégrer de façon permanente d'autres dispositifs, tels que des systèmes de supervision ou d'alarme, ou des dispositifs de sécurité ou de limitation, ayant une fonction d'avertissement ou de protection en cas de défaillance ou de dysfonctionnement du A5xx Régulateur.

The A5xx Series Wall Mount Refrigeration and Defrost Controller provides refrigerated space and defrost control for low and medium temperature refrigeration applications. The A5xx Controller includes five line-voltage, dry contact relays to control the compressor, defrost heater or solenoid, evaporator fans, and user-provided alarm devices. The controller can control two-speed evaporator fans and resistive heat, hot-gas bypass, or passive defrost.

For information about relay wiring, see the *Terminal block and terminal descriptions* section in this document and refer to the *A5xx Series Wall Mount Refrigeration and Defrost Controller Installation Instructions (part no. 24-7664-3310)*. The adaptive defrost feature adjusts the defrost schedule to the minimum number of defrost intervals required to maintain peak efficiency, save energy, and maintain consistent space temperature. The A5xx Controller includes an IP65 enclosure with holes in the enclosure base for wall and surface mounting. You can also order an optional DIN rail mounting kit (part no. BKT524-1K).



A5xx Controller UI

The A5xx Controller's system status and setup information displays on an LCD UI with adjustable brightness. The four status indicator icons show the defrost, cooling, evaporator fan, and alarm features and provide a visual indication of the system status and alarms. The **Defrost** and **Alarm** icons also function as keys. You can use these keys to initiate unscheduled defrost cycles and clear system alarms. You can also use the four touchpad keys to navigate the system, see system information, change parameter settings, and respond to system alarms. The following figure shows the controller's UI, icons, and keys.

Figure 1: A5xx Controller UI with display fields, icons, and touchpad keys

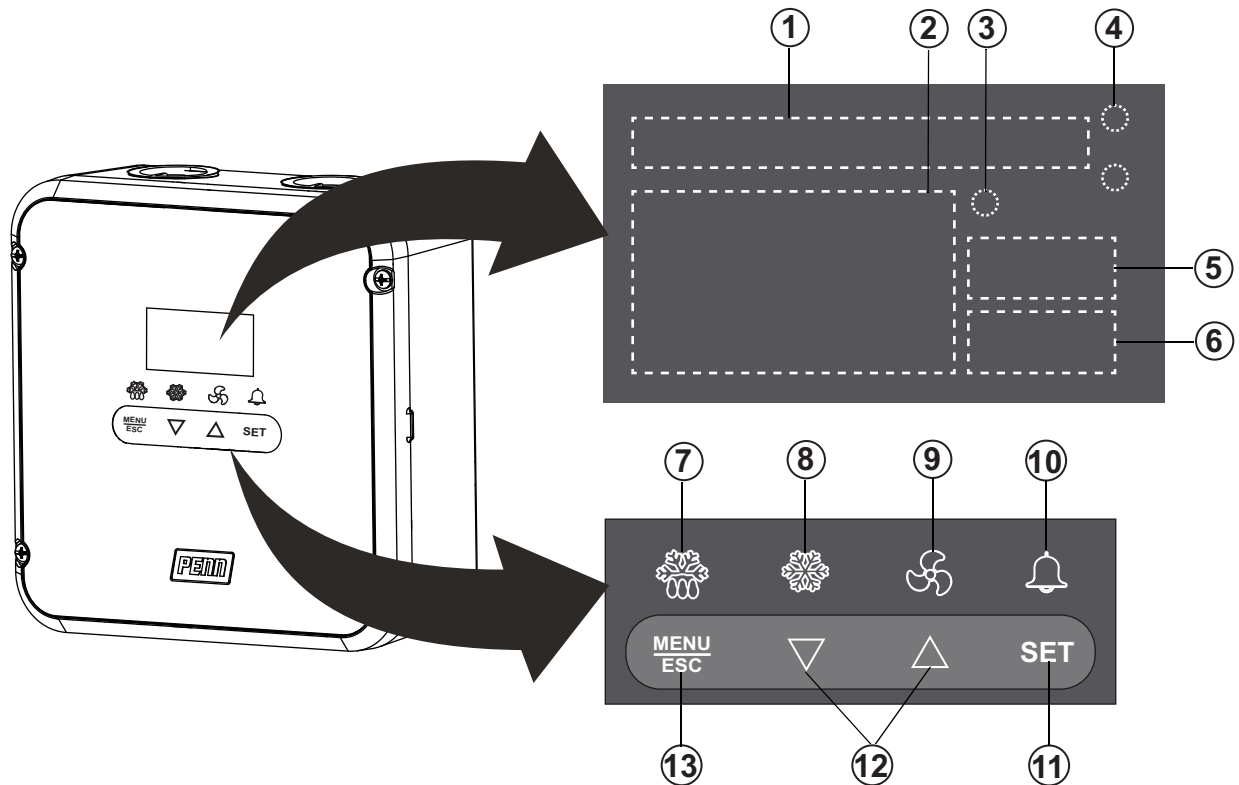







Table 1: A5xx Controller UI with display fields, icons, and touchpad keys callout table (Part 1 of 2)

Callout	Item	Description, behavior, or user-action
1	Message field	<p>The message field shows messages with up to 8 characters that define the purpose of or value displayed in the current screen. Messages with more than 8 characters automatically scroll across the field. Message field messages include the following information:</p> <ul style="list-style-type: none"> Displays the system name, the date, and the time during normal operation. Displays the setup parameter names as you navigate through the setup screens during setup. Displays drip-time, fan delay, and anti-short cycle delay countdowns during defrost duration. The message field identifies the countdown and displays the minutes remaining.
2	Status field	<p>The status field displays the numerical values related to the status or setup parameter information displayed in the message field. Status field values include the following information:</p> <ul style="list-style-type: none"> Displays the temperature sensed at the main sensor (Sn1) during normal operation. Displays the current numerical value in the system status screens. Displays the flashing setup parameter values as you navigate through the setup screens with editable values during setup. Displays four dashes during anti-short cycle delay, defrost duration, drip-time, and fan delay countdowns. When you select or edit a numerical parameter value, the status field displays a blinking value. When the current value blinks in the status field, press the DOWN or UP arrow keys to select a different value. To save the value that displays, press SET.

Table 1: A5xx Controller UI with display fields, icons, and touchpad keys callout table (Part 2 of 2)

Callout	Item	Description, behavior, or user-action
3	Degree symbol	The degree symbol displays when a temperature value displays in the status field.
4	Save icon	When you press SET to save a parameter value or a menu selection, the save icon blinks to indicate that the controller saved the value or selection.
5	Upper info field	The info fields provide additional information depending on the menu screen displayed. When the main or status screen displays, the upper info field displays C for Celsius or F for Fahrenheit. When a parameter value edit screen displays, the upper and lower info fields display the values at each end of the range of selectable values. When a parameter list selection screen displays, the upper and lower info fields display the available selections as blinking parameters. See Info field codes for info field code descriptions.
6	Lower info field	The info fields provide additional information depending on the menu screen that displays. When the main screen or status screen display, the lower info field displays the cooling setpoint value. When a parameter value edit screen displays, the upper and lower info fields display the values at each end of the range of selectable values. When a parameter list selection screen displays, the upper and lower info fields display the available selections as blinking parameters. See Info field codes for info field code descriptions.
7	Defrost 	The Defrost icon indicates the status of the defrost relay. The Defrost icon glows to indicate the closure of the defrost relay and that the controller is in defrost mode. When the Defrost icon is off, the defrost relay is off and the controller is not in defrost mode. The Defrost icon also functions as a key. To go to the manual defrost cycle start screen, press the Defrost key for 3 seconds.
8	Cooling 	The Cooling icon indicates the status of the compressor relay. The Cooling icon glows to indicate the closure of the compressor relay and that the controller is in normal refrigeration mode. When the Cooling icon is off, the compressor relay is off and the controller is not in normal refrigeration mode; it may be in defrost mode or system shutdown.
9	Evaporator fan 	The Evaporator fan icon indicates the status of the evaporator fan. The Evaporator fan icon glows to indicate the closure of the evaporator fan relay or relays. When the Evaporator fan icon is off, the evaporator fan relay or relays are open.
10	Alarm 	The Alarm icon indicates the presence of alarm conditions in the system. The Alarm icon glows to indicate the closure of the alarm relay. When the Alarm icon is off, the alarm relay is open. The Alarm icon also functions as a key. To acknowledge any active alarms, press the Alarm key.
11	SET	To go to the next setup menu level, press the SET key. To save the blinking parameter value or menu selection and to go to the next setup screen, press the SET key in any setup selection screen.
12	Down and Up 	To change the blinking parameter values in the system setup screens, press the DOWN and UP arrow keys. To move through the menu screens available in the current menu level, press the DOWN and UP arrow keys.
13	MENU/ESC	To access the system setup screens, press and hold the MENU/ESC key for 3 seconds on the HOME screen. To cancel any parameter value change in the current screen and return to the previous setup screen or menu level, press the MENU/ESC key in the system setup screens.

Cleaning the controller

Remove any loose debris from the controller. Use a soft cloth with a warm, mild detergent solution to wipe the exterior surface. Rinse the cloth with clean water and wipe the controller until it is clean. Dry the controller with a soft cloth.

Sealing the USB port

Note: After you use the USB port, install the USB plug so that it mounts flush to the outside enclosure surface. This action seals the USB port for IP65 protection.

Terminal block and terminal descriptions

For information about terminal block labels and terminal labels for low-voltage terminations, see Figure 3 and Table 2 in *Low-voltage terminal blocks and terminals*. For information about terminal blocks and terminal labels for high-voltage terminations, see Figure 4 and Table 3 in *High-voltage terminal blocks and terminals*. For information about the electrical ratings for the high-voltage relays, see Table 17 to Table 21.

Note: For detailed wiring guidelines and instructions, refer to the *A5xx Series Wall Mount Refrigeration and Defrost Controller Installation Instructions (part no. 24-7664-3310)*.

Low-voltage terminal blocks and terminals

The following figure and table provide information about the low-voltage wiring terminal blocks and wiring terminal labels.

Note: For detailed wiring guidelines and instructions, refer to the *A5xx Series Wall Mount Refrigeration and Defrost Controller Installation Instructions* (part no. 24-7664-3310).

Figure 3: A5xx Controller low-voltage terminal block connections (internal to control)

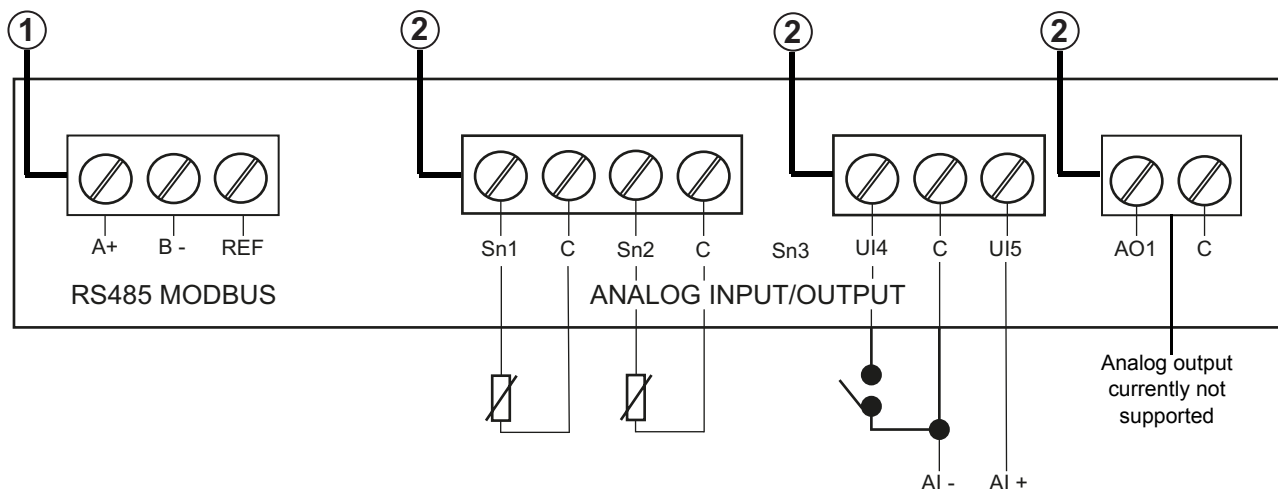


Table 2: A5xx Controller low-voltage terminal block, terminals, and wire sizes

Callout	Terminal block label	Terminal label	Description, functions, and requirements
1	RS485 Modbus	A+	The RS485 Modbus communications terminal block provides a restricted connection to the Modbus connections on an optional Precision Superheat Controller (PSHC). Do not connect any other Modbus devices to these terminals.
		B -	
		REF	The RS485 Modbus signal common or reference
2	Analog inputs and outputs	Sn1	Sensor 1 (Sn1) is the main space temperature sensor. Connect either lead from the sensor to Sn1. Connect the other lead to a common (C) terminal. Note: Sensor wires for the A5xx Controller are not polarity sensitive.
		C	The A5xx Controller includes three low-voltage common terminals. All of the low-voltage C terminals are connected together on the PC board.
		Sn2	The evaporator temperature sensor. Connect either lead from the sensor to Sn2. Connect the other lead to a C terminal. Note: Sensor wires for the A5xx Controller are not polarity sensitive.
		Sn3	Unavailable
		UI 4	You can configure universal input 4 (UI 4) or universal input 5 (UI 5) as a 0 VDC to 10 VDC analog input or dry contact binary input. Connect a 0 VDC to 10 VDC input or binary input to the UI 4 or UI 5 (+) terminal and a C (common/-) on the low-voltage terminal block.
		UI 5	
		AO1	Analog output is currently not supported on A5xx Controllers. Do not connect to this terminal.
		C	

High-voltage terminal blocks and terminals

The following figure and table provide information about the high-voltage wiring terminal blocks and wiring terminal labels.

Note: For detailed wiring guidelines and instructions, refer to the *A5xx Series Wall Mount Refrigeration and Defrost Controller Installation Instructions* (part no. 24-7664-3310).

Figure 4: A5xx Controller high-voltage terminal block connections (internal to control)

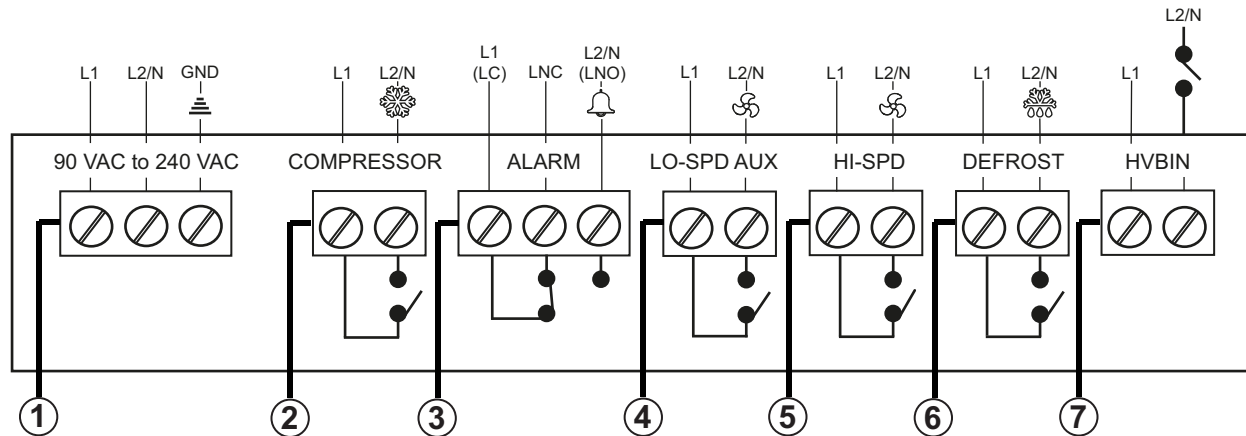







Table 3: A5xx Controller high-voltage terminal blocks, terminals, and wire sizes

Callout	Terminal block label	Terminal functions	Description, function, and requirements
1	90 VAC to 240 VAC	L1	Two terminals for supply power connection to the A5xx Controller. Requires 90 VAC to 240 VAC; 15 VA (0.25 A maximum).
		L2/N	
		GND	Earth ground connection terminal.
2	Compressor 		Two terminals for line-voltage, single-pole, single-throw (SPST), dry-contact relay to control the compressor or solenoid valve.
3	Alarm 	LC	The common (LC), normally-open (LNO), and normally-closed (LNC) terminals for line-voltage, single-pole, double-throw (SPDT), dry-contact relay to control the user-supplied alarm devices.
		LNC	
		LNO	
4	Lo-spd aux 		The A5xx Controller includes two terminals for line-voltage, SPST, dry-contact relay to control an auxiliary device such as a user-provided alarm device or the low-speed on two-speed evaporator fans.
5	Hi-spd 		Two terminals for line-voltage, SPST, dry-contact relay to control single-speed evaporator fans or the high-speed (hi-spd) on two-speed evaporator fans.
6	Defrost 		Two terminals for line-voltage, SPST, dry-contact relay to control resistive defrost heater or bypass defrost solenoid.
7	HVBIN		Two line-voltage binary input terminals for use with the line-voltage defrost temperature termination switch. These terminals require an external power source to provide 120 VAC to 240 VAC, 50/60 Hz activation power when the external, user-supplied defrost termination switch closes.

Refrigeration mode

Refrigeration mode is the normal operating mode of the A5xx Controller. The controller cycles the compressor on and off and operates the evaporator fans according to the setup selections to maintain the setpoint temperature in the refrigerated space. The controller displays the following behaviors in refrigeration mode:

- **Evaporator fan** icon: indicates whether the evaporator fan relay is on or off
- **Cooling** icon: indicates when the compressor is running
- **Defrost** icon: remains off
- Defrost relay: remains off
- UI: displays the **HOME** screen which shows the system name, date, time, space temperature, and setpoint.

The following figure and table provide information about the common application of an A5xx Controller in a refrigeration environment.

Figure 5: Common application of an A5xx Controller

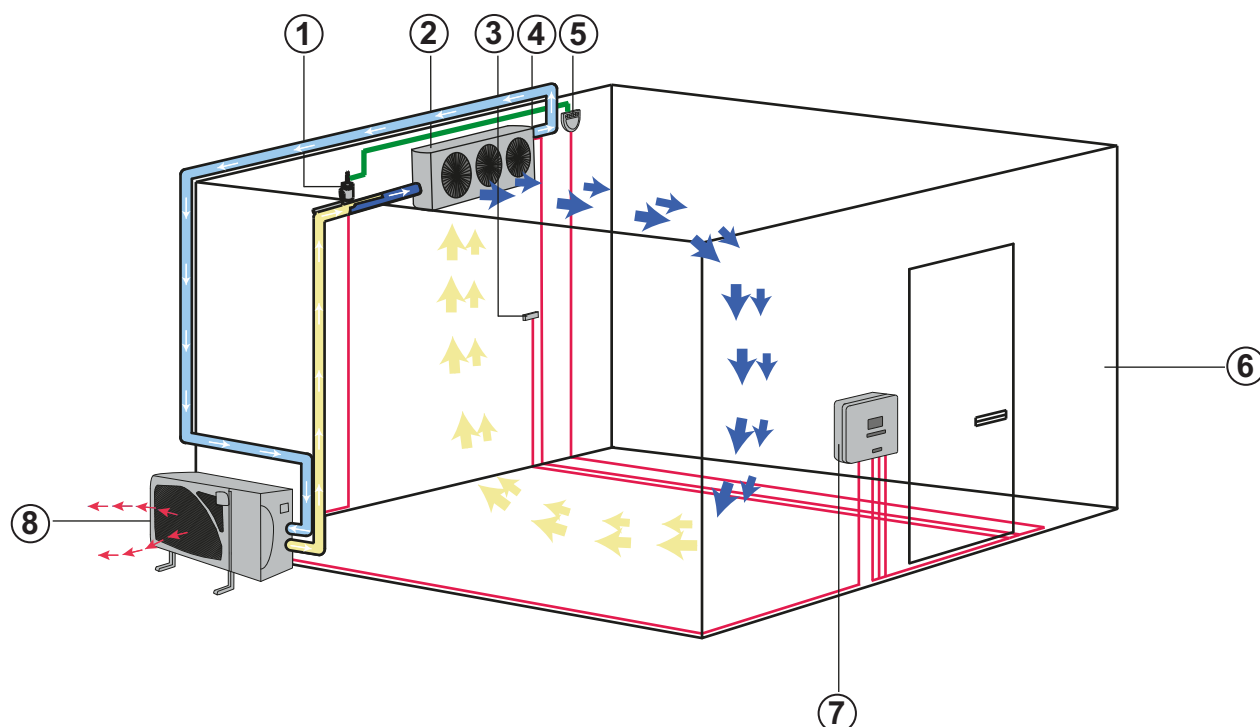


Table 4: Common application of an A5xx Controller callout table

Callout	Item
1	Quick response expansion valve (QREV)
2	Evaporator fan with integrated defrost heater
3	Ambient temperature sensor
4	Defrost temperature sensor
5	PSHC
6	Cold room
7	A5xx Controller
8	Compressor and condensing unit

Defrost mode

Your selections for defrost type, defrost termination type, and evaporator fan behavior determine how the refrigeration system operates in defrost mode. For more information, see [Defrost intervals and durations](#) and [Defrost termination types](#). To manually start or stop a defrost duration, press and hold the **Defrost** icon for 2 seconds.

Notes:

- A defrost duration is the period of time that the refrigeration system spends in defrost mode. During the defrost duration, the ice melts off the evaporator coil. A defrost duration may include drip time at the end of the duration.
- A defrost interval is the time between the start of a defrost duration and the start of the next defrost duration.

The following figure and table provide information about defrost durations and intervals.

Figure 6: Defrost intervals and durations

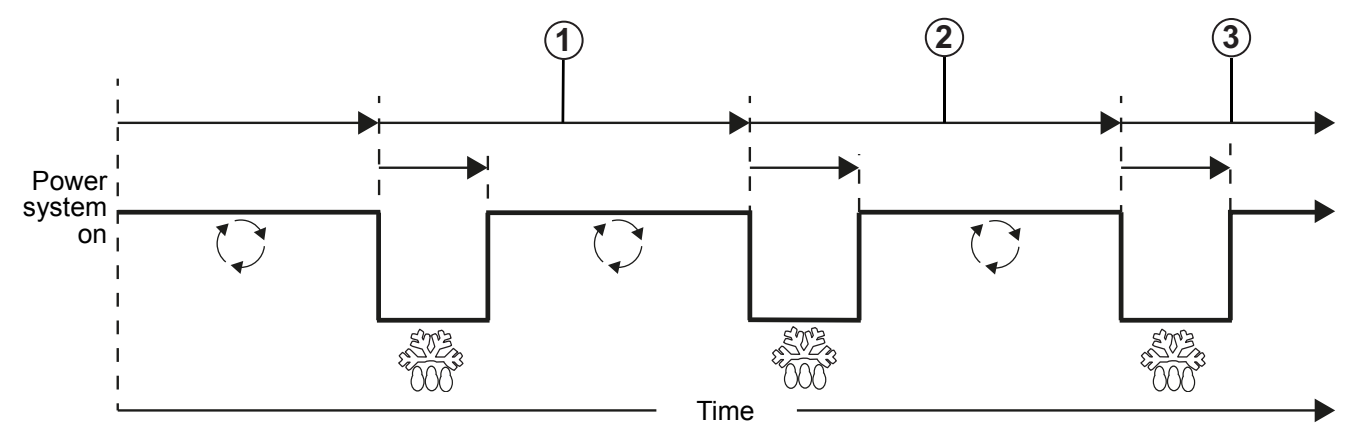




Table 5: Defrost intervals callout table

Item	Description
1	First defrost interval
2	Second defrost interval
3	Third defrost interval
	Defrost duration
	Normal refrigeration cycle

Defrost types

The A5xx Controller provides defrost control for off-cycle defrost systems on medium temperature refrigeration applications of 2°C to 7°C or 35°F to 45°F. The controller also provides defrost control for electric heat or hot gas defrost systems on low-temperature refrigeration applications of less than 2°C or 35°F.

Off-cycle defrost

Off-cycle (passive) defrost does not use the defrost relay. Off-cycle defrost is the defrost type commonly used on medium temperature refrigeration applications. Low-temperature applications do not use off-cycle defrost. During off-cycle defrost, refrigerant flow to the evaporator is interrupted. The evaporator fans remain on to move air over the evaporator coil and melt any accumulated frost or ice. During off-cycle defrost, the compressor relay remains off for the defined defrost duration. Off-cycle defrost uses timed defrost termination only. Off-cycle defrost does not use an evaporator sensor or switch, and you cannot set up temperature defrost termination.

Electric defrost

Electric defrost uses electric resistive heating elements to melt the ice that accumulates on the evaporator coil during normal cooling operation. The defrost relay controls these electric resistive heating elements. Typically, you can find the electric resistive heating elements in or near the evaporator coil and drain pan. Electric defrost is often used on low-temperature refrigeration applications. During electric defrost, the compressor relay is off for the defrost duration, the defrost relay is on, and the evaporator fan relay or relays are typically off. Electric defrost cycles use temperature-based defrost termination or time-based defrost termination.

Hot gas defrost

Hot gas defrost systems use a bypass valve and extra refrigerant piping to temporarily reroute the hot gas discharge from the compressor through to the evaporator coil. The defrost relay controls the bypass valve. The rerouted hot gas melts the accumulated ice on the evaporator coil. Hot gas defrost is used on low and very low-temperature refrigeration applications. During the defrost duration, the compressor relay is on, the defrost relay is on, and the evaporator fan relay or relays are typically off. Typically, hot gas defrost cycles use temperature-based defrost termination. You can also set up time-based defrost termination.

Defrost termination types

The A5xx Controller can terminate defrost durations based on time or temperature. Temperature termination applications use the Sn2 temperature sensor or a temperature switch mounted on the evaporator coil. On applications that use temperature-based termination by sensor or switch, you can define the maximum defrost duration value in minutes. The defrost duration value terminates any defrost durations that do not reach the defined defrost termination temperature.

Time-based defrost termination

Time-based defrost control terminates the defrost duration when the user-defined maximum defrost duration elapses. You must set the defrost duration time at a sufficient length to remove all of the ice that accumulates on the evaporator during the previous defrost interval. Time-based defrost termination does not require a defrost termination sensor or switch.

Temperature sensor defrost termination

Temperature sensor defrost termination uses a defrost termination sensor (Sn2) mounted on the evaporator coil to sense the coil temperature and terminate defrost at the user-selected termination temperature. The defrost termination temperature value is the temperature at which the evaporator coil is clear of ice. Set the termination temperature sufficiently high to ensure that all of the accumulated ice has melted off the evaporator coil at the termination temperature.

Temperature switch defrost termination

You can also use a line-voltage temperature defrost termination switch connected to the high-voltage binary input (HVBIN) terminals to terminate the defrost durations in the refrigeration application. The temperature termination switch is mounted on the evaporator coil and has a fixed temperature termination value. You do not need to set a defrost termination temperature value during defrost setup. When the A5xx Controller detects 120 VAC to 240 VAC across the HVBIN terminals, the controller terminates the defrost duration.

Time-based termination overrides temperature termination

The maximum defrost duration time period overrides both the temperature-sensor and temperature-switch defrost termination types, if the evaporator does not reach the termination temperature. The defrost duration terminates when the evaporator reaches the selected defrost termination temperature or the maximum defrost duration expires, whichever occurs first.

Defrost schedule types

Use the A5xx Controller to schedule routine defrosts or use the adaptive defrost feature. Adaptive defrost automatically determines the optimal time to initiate the defrost cycles for the refrigeration system.

Scheduled defrost

You can set up a manual or automatic scheduled defrost. Schedule one to eight daily defrost cycles. Use the manual setting to set the start times for each daily defrost cycle. Using the automatic setting, set only two parameters; the number of daily defrost cycles and the real-time for the first scheduled defrost. The system automatically calculates the daily schedule for the defrost intervals. The defrost intervals are of equal length. After you create a schedule, use the manual option to change one or more of the scheduled start times.

Adaptive defrost

Adaptive defrost adjusts the defrost schedule to achieve a user-defined defrost duration. You set up the expected defrost duration, the first defrost interval, and a defrost termination temperature. Initially, the system uses the first defrost interval until it learns to adapt to the existing conditions. The adaptive defrost system adjusts the length of the defrost interval so that the expected defrost duration coincides with the time that the evaporator reaches the termination temperature. For adaptive defrost to take place, mount the Sn2 defrost sensor or the HVBIN defrost termination switch on the evaporator. The defrost sensor or switch determines when the defrost duration is complete. For more information, see [*Adaptive defrost setup parameters*](#).

Compressor and evaporator fan start delays

To control the operation of the compressor and evaporator fan, set up the following time delay features on the A5xx Controller:

- Compressor anti-short cycle delay (ASD)
- Evaporator fan drip-time delay
- Evaporator fan time delay

When the controller is in a delay period, the UI message field displays the delay type and the number of minutes that remain in the delay period.

Anti-short cycle delay

The ASD maintains the compressor relay off (contacts open) for a period of time after the relay cycles off. This delay prevents the compressor from cycling back on quickly after it has cycled off. Select from 0 minutes to 12 minutes for the ASD. The following figure provides more information about how the ASD overrides the load demand to maintain the compressor relay off.

Figure 7: ASD overriding load demand to maintain compressor relay off

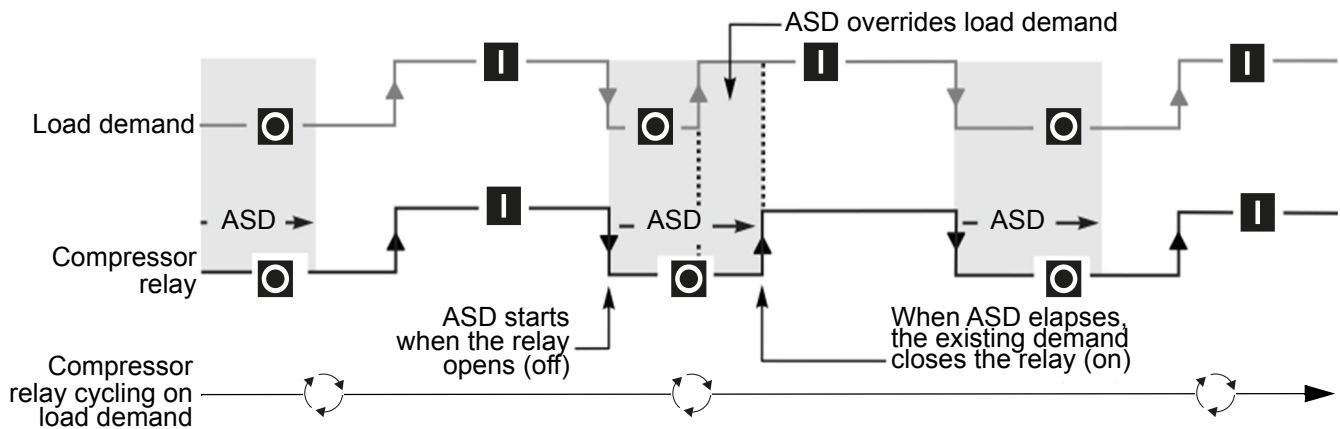





Table 6: ASD overriding load demand callout table

Item	Description
	Relay off
	Relay on
	Normal on/off refrigeration cycle based on load demand

Evaporator fan drip-time delay

The evaporator fan drip-time delay holds the compressor relay, defrost relay, and the evaporator relay off (contacts open) after the defrost duration terminates. This user-defined drip-time delay means that the evaporator coil can shed additional water and reduces the moisture that blows into the refrigerated space when the evaporator fans start. Select from 0 minutes to 10 minutes for the evaporator fan drip-time delay. The evaporator fan drip-time delay is unavailable for off-cycle (passive) defrost. For more information about the evaporator fan drip-time delay, see Figure 8.

Evaporator fan time delay

The evaporator fan time delay holds the evaporator fan relays off (contacts open) after the defrost termination, drip-time delay, and compressor restart in cooling mode. This time-based delay means that the evaporator coil cools down and freezes any moisture before the evaporator fan or fans start. This delay reduces the water and warm air that blows into the refrigerated space. Select a time delay from 0 minutes to 15 minutes for the evaporator to freeze any remaining moisture, before the evaporator fans turn on.

Figure 8: A5xx Controller relay states during defrost duration, drip-time delay, and evaporator fan delay

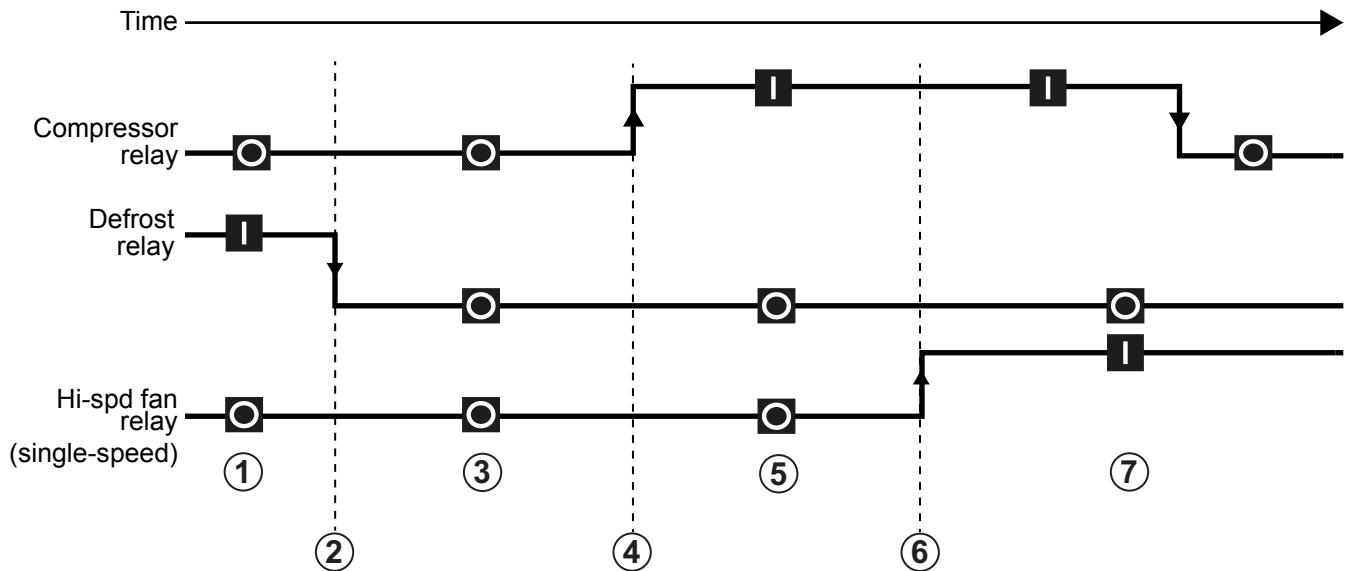


Table 7: A5xx Controller relay states during defrost duration, drip-time delay, and evaporator fan delay callout table

Item	Description
	Relay off
	Relay on
1	Defrost duration
2	Defrost termination
3	Drip-time delay
4	Drip-time ends
5	Evaporator fan delay cool down
6	Evaporator fan delay ends based on time
7	Normal cooling mode

System setup parameters

The system setup parameters define the system attributes, the hardware features, and the hard-wired components of the refrigeration system. To set up the A5xx Controller for the refrigeration system, enter the preferred system setup parameters. After you define the system setup parameters for the refrigeration system, only the setup screens and parameters that are necessary for the system's operation are available for set up.

The system setup parameters include the following features:

- Date and time
- Defrost type
- Defrost termination type
- Evaporator fan type
- Sensor type

- Units of temperature (Celsius or Fahrenheit)
- Display brightness and touchpad sound
- System name

In the system setup screens, you can also create an access password, select the preferred operating language, download controller firmware updates, and set up the QREV/PSHC monitoring and control features.

Date and time setup

The date and time setup screens guide you through the set up of the following features:

Time format: select from 12 hours or 24 hours

Time: set the hours, minutes, and AM or PM time period

Date format: select to display the date as date, month, and year (DMY) or month, date, and year (MDY)

Date: set the date, month, and year

Auto daylight saving: enable the optional automatic changeover for daylight saving time

Sensor setup

The Sn1 cooling temperature sensor monitors and controls the temperature in the refrigerated space. Temperature-termination defrost applications and the adaptive defrost feature require a Sn2 defrost termination sensor or a HVBIN defrost termination switch mounted on the evaporator coil. The controller can use two types of sensors. In North America, some standard A5xx Controller models ship with two A99B-type temperature sensors. In Europe, the TS-6340 negative temperature sensor (NTC) is available for use. The Sn1 and Sn2 sensors are set up independently; Sn1 and Sn2 do not have to be the same sensor type. To set up the sensors on an A5xx Controller, select the sensor type and the sensor offset in the system setup screens. You can use the sensor offset to offset the sensed temperature -5°C to 5°C or -5°F to 5°F. For example, if you apply a -3°F offset, the actual sensed value of 30°F displays and controls as 27°F.

Evaporator fan setup

Select a single-speed evaporator fan or a two-speed evaporator fan. The hi-spd relay controls single-speed evaporator fans. The lo-spd aux relay and the hi-spd relay control two-speed EC evaporator fans. When you control single-speed fans with the hi-spd relay, the lo-spd aux relay is available to control an auxiliary device.

QREV/PSHC setup

The A5xx Controller can communicate with an optional PENN® QREV/PSHC. The QREV is a proportional control expansion valve that uses microelectromechanical system (MEMS) microvalve technology to provide precise flow control for industry standard HVAC and refrigeration applications. The PSHC controls the QREV performance. If the refrigeration system uses a QREV/PSHC, you can monitor the QREV status, adjust the superheat setpoint, and change the refrigerant type on the PSHC to match the refrigeration system's refrigerant type. The QREV/PSHC status screens display the following information:

- Superheat
- Evaporator outlet temperature
- Evaporator outlet pressure
- Current valve state
- PSHC firmware version

Evaporator fan control

The behavior of the evaporator fan depends on the following conditions:

- Whether the evaporator fan is one-speed or two-speed
- Whether the system’s mode of operation is refrigeration or defrost
- The selected evaporator setup options in the refrigeration and defrost setup screens

Evaporator fan operation in refrigeration mode

In normal refrigeration mode, you can set a single-speed evaporator fan to run continuously or to cycle on and off with the compressor. For more information, see the following figure. You can set a two-speed evaporator fan to run continuously at high-speed. For more information, see Figure 10. You can also cycle between low-speed and high-speed. For more information, see Figure 11.

The following figure shows the compressor and hi-spd aux relay states for a single-speed evaporator fan operating in normal refrigeration mode. The hi-spd relay with a single-speed evaporator fan is on continuously or cycles on and off with the compressor relay.

Figure 9: Compressor and hi-spd aux relay states for single-speed evaporator fan in refrigeration mode

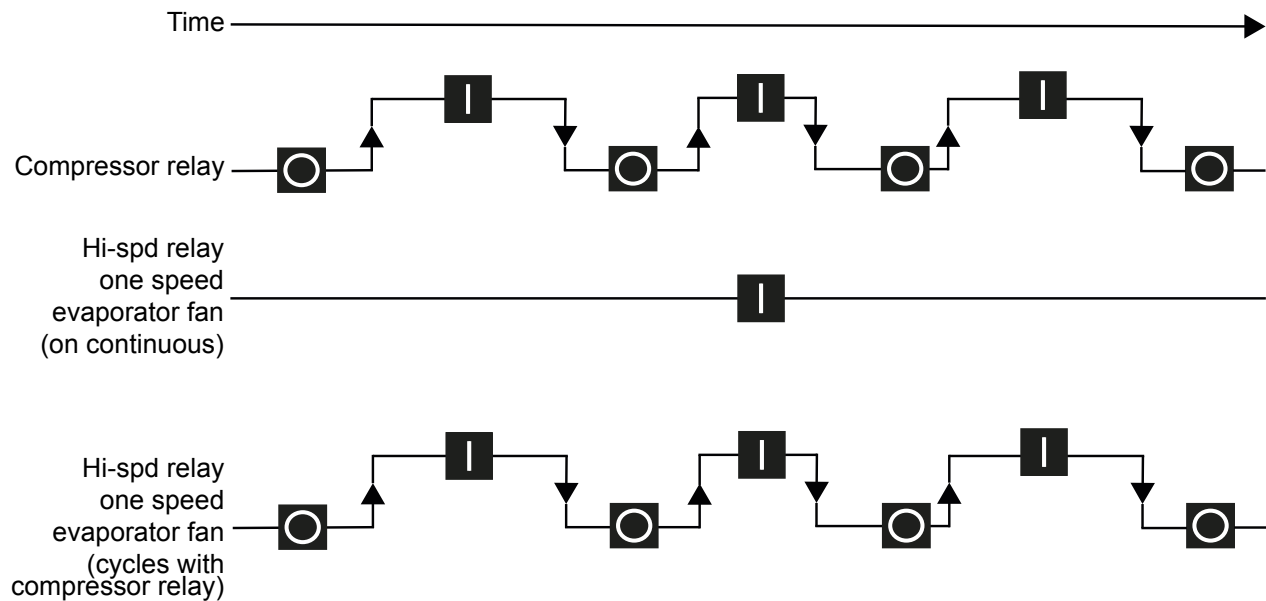


Table 8: Compressor and lo-spd aux relay states for single-speed evaporator fan callout table

Item	Description
	Relay off
	Relay on

The following figure shows the compressor, lo-spd aux relay, and hi-spd relay states for a two-speed evaporator fan operating in normal refrigeration mode. The high-speed fan is on continuously.

Figure 10: Compressor, lo-spd aux, and hi-spd relay states for two-speed evaporator fan in refrigeration mode

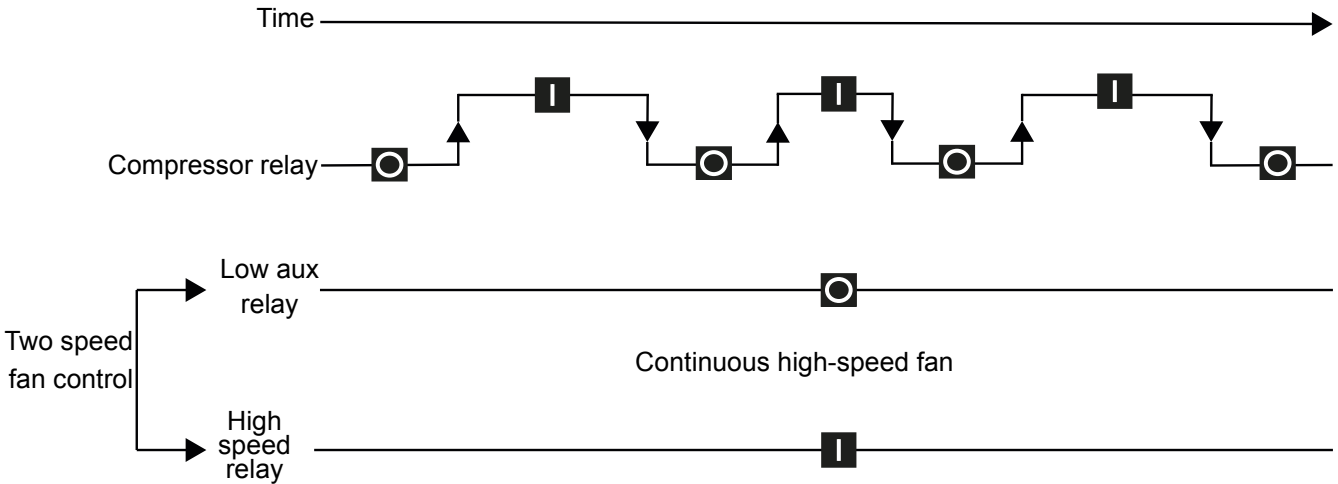




Table 9: Compressor, lo-spd aux, and hi-spd relay states for two-speed evaporator fans callout table

Item	Description
	Relay off
	Relay on

The following figure shows the compressor, lo-spd aux relay, and hi-spd relay states for two-speed evaporator fans operating in refrigeration mode. The evaporator fan is set to low-speed when the compressor is off and high-speed when the compressor is on.

Figure 11: Compressor, lo-spd aux, and hi-spd relay states for two-speed evaporator fan in refrigeration mode with low-speed and high-speed setup

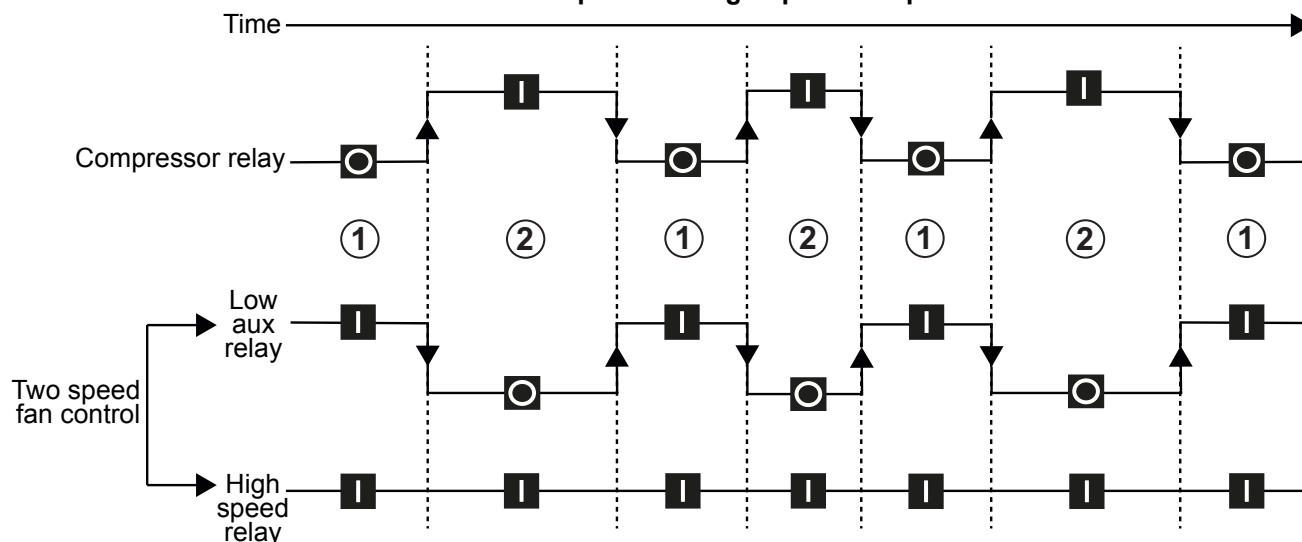




Table 10: Relay states for two-speed evaporator fan in refrigeration mode callout table

Item	Description
	Relay off
	Relay on
1	Evaporator fan on low-speed
2	Evaporator fan on high-speed

Evaporator fan operation in defrost mode

The evaporator fan drip-time delay and evaporator fan time delay settings affect the behavior of the evaporator fan in defrost mode and post-defrost mode. You can set up the post-defrost evaporator fan behavior with the evaporator fan delay-after-defrost feature. The delay time period is 0 minutes to 15 minutes. This feature does not apply if the controller is set to an off-cycle defrost.

Adaptive defrost setup parameters

This section provides information about the A5xx Controller's adaptive defrost setup parameters.

Expected defrost duration

The expected defrost duration is an estimate of the time the system requires to fully defrost the evaporator coil and to reach the defrost termination temperature after a defrost interval. When you set up the adaptive defrost feature, you enter the number of minutes for the expected defrost duration. During operation and changing load conditions, actual defrost durations may vary in length from your defined expected defrost duration. When this occurs, the system adjusts the defrost schedule.

Defrost interval

The defrost interval is an estimate of the number of hours between the start of consecutive defrost cycles. You enter the expected defrost interval time in hours for the first defrost interval. The adaptive defrost feature shortens or lengthens the defrost interval to reach the defrost termination temperature in the expected defrost duration. This value provides a starting point for the adaptive defrost algorithm. If the system reaches the defrost termination temperature before the expected defrost duration elapses, adaptive defrost lengthens the next defrost interval. If the system reaches the defrost termination temperature after the expected defrost duration time elapses, adaptive defrost shortens the next defrost interval.

Maximum time between defrosts

Maximum time between defrosts defines the maximum number of hours for any adaptive defrost interval. If the system calculates a defrost interval that is greater than your defined maximum time, the controller ignores the calculation and starts the next defrost duration at your defined maximum time.

Minimum time between defrosts

Minimum time between defrosts defines the minimum number of hours for any adaptive defrost interval. If the system calculates a defrost interval that is less than your defined minimum time, the controller ignores the calculation and starts the next defrost duration at your defined minimum time.

Blackout period

You can schedule a daily blackout period for adaptive defrost applications. This schedule prevents the occurrence of defrost cycles during the defined blackout period. Blackout periods are typically scheduled for a regular, predictable period of high cooling demand. To establish a blackout period for adaptive defrost, set up the blackout start time and blackout parameters in the defrost setup menu flow.

- **Blackout start time:** This time is when the blackout period begins. The adaptive defrost algorithm does not schedule any defrosts from the start to the end of the blackout period. Edit the real-time value to the time at which the blackout period starts. The real-time value depends on the time format type selected in the time and date screens in the system setup menu flow.
- **Blackout duration:** This duration is the number of hours that you add to the blackout start time to form the blackout period. The blackout period refers to the time interval during which no defrosts occur. Select the number of minutes for your preferred blackout period duration. The duration starts at the blackout start time.

Universal inputs and alarms

This section provides information about the A5xx Controller's universal inputs and alarms.

Universal input modes

Set each of the universal inputs to one of the modes in the following table. When you select an input mode, one or more controller actions associate with that mode.

Notes:

- The A5xx Controller defines alarm actions separately from controller actions.
- The selection of a particular input mode may affect the list of available alarms. For example, Door Open Too Long becomes a potential alarm only after you define the input as Door Open.

Table 11: A5xx Controller universal input modes and controller actions

Mode	Action when condition is true	Description
None	None	The status of the universal input has no effect on the controller.
Refrigerant leak	System shutdown	The system remains shut down as long as the refrigerant leak condition persists. A system shutdown takes priority over the normal control of the compressor, defrost, and fan relays.
Man-in-room Select one of the following options for this input mode.	Normal control	This option indicates that relays R1 to R4 remain unaffected.
	System shutdown	This option takes priority over the normal control of the compressor, defrost, and evaporator fan relays.
	Low-speed fan (if running at high speed)	This option becomes available only if the controller is configured with the two-speed evaporator fan option. This option takes priority over the normal control of the evaporator fan relays.
	Energize auxiliary relay	This option becomes available only if the two-speed fan option is unused.
Door open Note: Select one of the following options for this binary input mode.	Normal control	This option indicates that relays R1 to R4 remain unaffected.
	Low-speed fan	This option becomes available only if the control is configured with the two-speed evaporator fan option. This option takes priority over the normal control of the evaporator fan relays.
	Shut off cooling	This option takes priority over the normal control of the compressor relay. The compressor relay remains off until the state clears.
	Energize auxiliary relay	The system shuts down when it detects an input change from false to true. The system remains shut down until the switch clears. A system shutdown takes priority over the normal control of the compressor, defrost, and evaporator fan relays.
Emergency switch (wall)	System shutdown	The system shuts down when it detects an input change from false to true. The system remains shut down until the switch clears. A system shutdown takes priority over the normal control of the compressor, defrost, and evaporator fan relays.

Setting up universal input modes

Set the two universal inputs to one of the modes in the following table. To configure an input mode, specify if the input is a binary input or an analog input and indicate the level of input that equates to the true condition.

Table 12: A5xx Controller universal inputs and mode selections

Universal input	Mode selection	Binary or analog	Binary true state	Analog true state
UI 4	<ul style="list-style-type: none"> None or unused Refrigerant leak Man-in-room Door open Emergency switch 	BIN/ARY or ANA/LOG	OP/EN or CLO/SED	> nnn (enter the voltage)
UI 5		BIN/ARY or ANA/LOG	OP/EN or CLO/SED	> nnn (enter the voltage)

Alarm setup parameters

The following table provides information about the A5xx Controller's alarms and their corresponding true conditions.

Notes:

- Some of the following alarms are available only when the A5xx Controller uses the corresponding binary input or feature. For example, the QREV/PSHC alarms are available only after you pair the A5xx Controller with a QREV/PSHC.
- To make the door open, man-in-room, refrigerant leak, and emergency shutdown optional alarms available and configurable in the alarm setup screens, select the optional alarm type in the universal input setup screens.

Table 13: Alarms and alarm true conditions

Alarms	Alarm true condition
High temperature	The temperature at Sn1 is greater than the defined high temperature alarm value for a period of time that is equal to or greater than the alarm delay.
Low temperature	The temperature at Sn1 is less than the defined low temperature alarm value for a period of time that is equal to or greater than the alarm delay.
Sensor failure	Sn1 is in a state of failure.
	Sn2 is in a state of failure.
Door open	The cold room door remains open for a period of time that is equal to or greater than the defined value.
Man-in-room	An individual remains in the cold room for a period of time that is equal to or greater than the defined value.
Refrigerant leak	The refrigerant leak detector indicates a leak. This may be a defined voltage level.
QREV/PSHC	A connected PSHC device triggers an alarm if either of the following states occur: <ul style="list-style-type: none">• The PSHC pressure moves out of range• The PSHC internal temperature moves out of range
QREV/PSHC comm loss	A connected PSHC device fails to respond to Modbus messages from the A525.
Emergency shutdown	An individual inside the cold room flips a switch to generate an emergency shutdown.

Alarm actions

- Buzzer: If enabled, the buzzer energizes upon alarm.
- Alarm relay: The alarm relay energizes when any alarm condition is true. The alarm relay de-energizes when you acknowledge the alarm locally or when the condition is no longer true.
- Alarm icon: The **Alarm** icon on the UI glows when any alarm condition is true or requires acknowledgment.

Setting up the alarm setup parameters

The following table provides information about the alarm parameters and their corresponding descriptions.

Table 14: A5xx Controller alarm parameters and descriptions

Alarm parameter	Description
Threshold	Each alarm uses specific levels, units, or ranges for its threshold. For example, temperature alarms use Fahrenheit or Celsius values, the door open alarm uses a time value, and a binary input uses a 1 or 0 or open or closed to indicate an alarm state.
Buzzer	Select ON or OFF to enable or disable the buzzer parameter.
Delay	The delay parameter value is in minutes. The alarm condition remains true for this defined number of minutes before an alarm energizes. If the alarm condition clears before the number of minutes elapses, no alarm action occurs. To trigger an alarm immediately, set the number of minutes to zero.
Auto-clear	Select a latching alarm or a self-clearing alarm. <ul style="list-style-type: none">You must acknowledge a latching alarm at the A5xx Controller. The Alarm icon glows, the alarm relay energizes, and if you enable the buzzer, it sounds until you acknowledge the alarm, even if the alarm condition is no longer true.If the underlying alarm condition clears, the self-clearing alarm no longer identifies itself as true.
Re-alarm interval	The re-alarm interval parameter value is in minutes. If you acknowledge an alarm and the alarm relay deactivates but the alarm condition persists for the defined number of minutes, the alarm relay reactivates.

Alarm vs warnings

The alarm setup includes a delay parameter. When an alarm condition crosses the alarm threshold, the alarm does not occur until after the delay period. The alarm warning condition is active in this situation. The **Alarm** icon glows yellow to indicate an alarm warning. Alarm warnings do not cause the alarm relay to energize and the system does not add an alarm to the event log.

Cooling and system shutdown

The following sections provide information about the A5xx Controller's cooling and system shutdown features.

Cooling shutdown

A cooling shutdown can occur when one of the two universal input modes receives an external signal. The controller turns off the compressor and the evaporator fan when the system receives an external signal.

System shutdown

A system shutdown takes priority over the normal control of the compressor, defrost, and evaporator fan relays. A system shutdown can occur if an alarm condition such as man-in-room, refrigerant leak, or emergency switch activates. During a system shutdown, all outputs are set to off with the exception of the alarm output. The controller can enter a system shutdown state by detection of a refrigerant leak, if enabled, or by the configuration of a universal input to provide this signal.

Detailed procedures

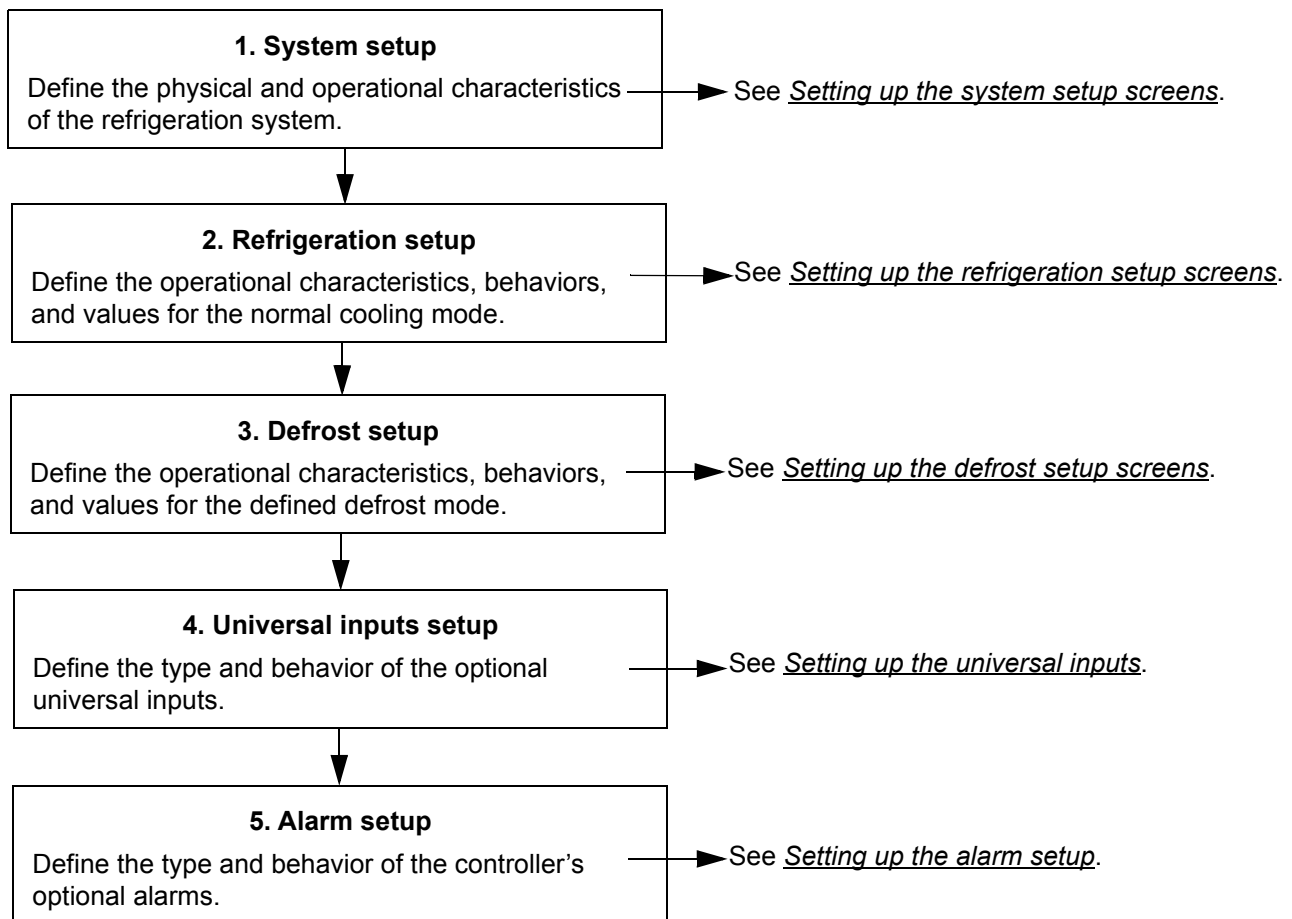
The following sections provides detailed information about the setup procedures for the A5xx Controller.

Setting up the A5xx Controller

To set up the A5xx Controller, set the physical components and features of the controller in the system setup screens. The selections and values that you enter in the system setup screens define the physical characteristics and operation of the refrigeration system on the controller. The following figure shows the order for setting up the controller. It is best practice to configure the system setup screens first to define your refrigeration and defrost system in the controller.

- The gray setup screens on the following pages are conditional screens. The selections you make in the system setup, defrost setup, UI setup, and alarm setup screens determine the presence of these conditional screens. The conditional setup or status screens appear on the LCD only if you require the conditional screen to set up your application or view your application status.
- After you define the system setup parameters in the controller, the setup screens that do not apply to your selections become unavailable. You cannot interact with these setup screens when you set up the cooling and defrost parameters.
- The controller ships with factory default selections and values already entered in the system screens. In most applications, you must change the factory default selections and values to meet the specific refrigeration and defrost requirements of your system.

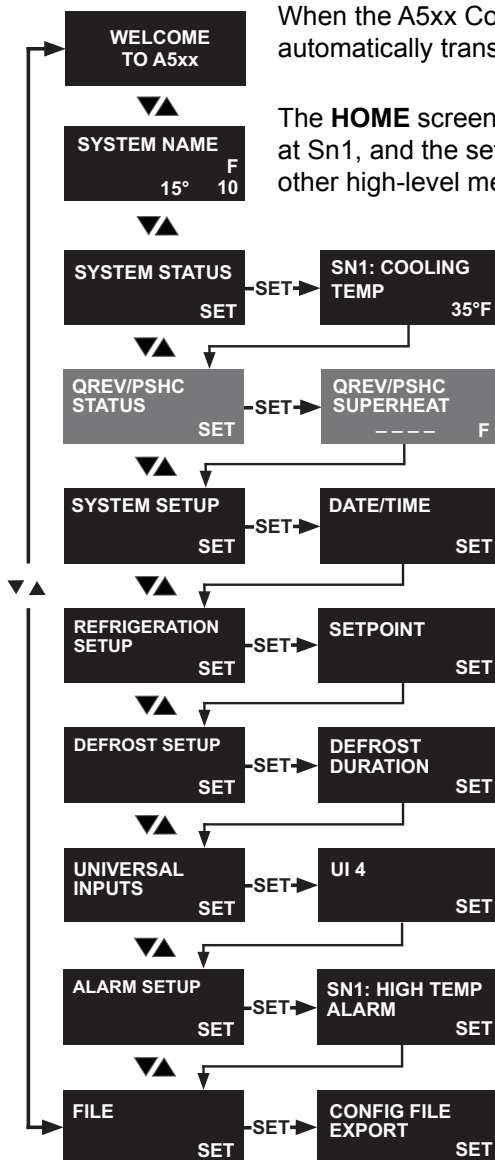
Figure 12: High-level workflow for setting up the A5xx Controller



Navigating the high-level status and setup start screens

To move through the high-level status and setup start screens, press the **DOWN** and **UP** arrow keys.

Note: The **QREV/PSHC STATUS** screens are available only if you install a QREV/PSHC to the controller and set up the interface.



When the A5xx Controller powers on, the **WELCOME** screen displays and then automatically transitions to the **HOME** screen.

The **HOME** screen displays the system name, the date, the time of day, the temperature at Sn1, and the setpoint value. To return to the **SYSTEM STATUS** start screen and the other high-level menu start screens, press and hold **MENU/ESC** for 2 seconds.

To move through and view the **SYSTEM STATUS** screens, press **SET** in the **SYSTEM STATUS** start screen. For more information, see [Viewing the system status screens](#).

To move through and view the **QREV/PSHC STATUS** screens, press **SET** in the **QREV/PSHC STATUS** start screen. For more information, see [Viewing the QREV/PSHC status screens](#).

To move through and set up the **SYSTEM SETUP** screens, press **SET** in the **SYSTEM SETUP** start screen. For more information, see [Setting up the system setup screens](#).

To move through and set up the **REFRIGERATION SETUP** screens, press **SET** in the **REFRIGERATION SETUP** start screen. For more information, see [Setting up the refrigeration setup screens](#).

To move through and set up the **DEFROST SETUP** screens, press **SET** in the **DEFROST SETUP** start screen. For more information, see [Setting up the defrost setup screens](#).

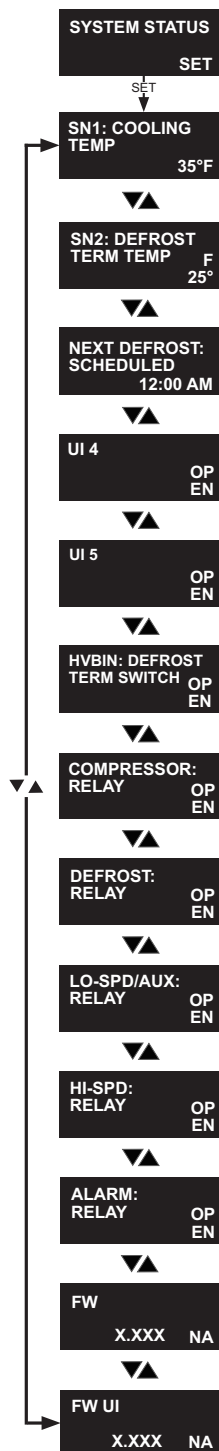
To move through and set up the **UNIVERSAL INPUTS** screens, press **SET** in the **UNIVERSAL INPUTS** start screen. For more information, see [Setting up the universal inputs](#).

To move through and set up the **ALARM SETUP** screens, press **SET** in the **ALARM SETUP** start screen. For more information, see [Setting up the alarm setup](#).

To move through and set up the **FILE** screens, press **SET** in the **FILE** start screen. For more information, see [Using file to import and export data](#).

Viewing the system status screens

The **SYSTEM STATUS** screens display the status of the sensors, the cooling system, the universal inputs, and the system control relays. These screens also identify the firmware versions on the controller. You can use the information on these screens to troubleshoot system and controller problems. To move through the **SYSTEM STATUS** screens, press the **DOWN** and **UP** arrow keys.



To view the **SYSTEM STATUS** screens, navigate to the **SYSTEM STATUS** start screen and press **SET**.

The **SN1: COOLING TEMP** screen displays the temperature at the cooling control sensor Sn1.

The **SN2: DEFROST TERM TEMP** screen displays the temperature at the defrost termination sensor Sn2.

The **NEXT DEFROST: SCHEDULED** screen displays the start time of the next defrost cycle.

The **UI 4** screen displays the status of UI 4.

The **UI 5** screen displays the status of UI 5.

The **HVBIN: DEFROST TERM SWITCH** screen displays the status of the thermal defrost switch that is connected to the HVBIN terminals.

The **COMPRESSOR: RELAY** screen displays the status of the compressor relay as open or closed.

The **DEFROST: RELAY** screen displays the status of the compressor relay as open or closed.

The **LO-SPD/AUX: RELAY** screen displays the status of the lo-spd aux fan relay as open or closed.

The **HI-SPD: RELAY** screen displays the status of the high-speed fan relay as open or closed.

The **ALARM: RELAY** screen displays the status of the alarm relay as open or closed.

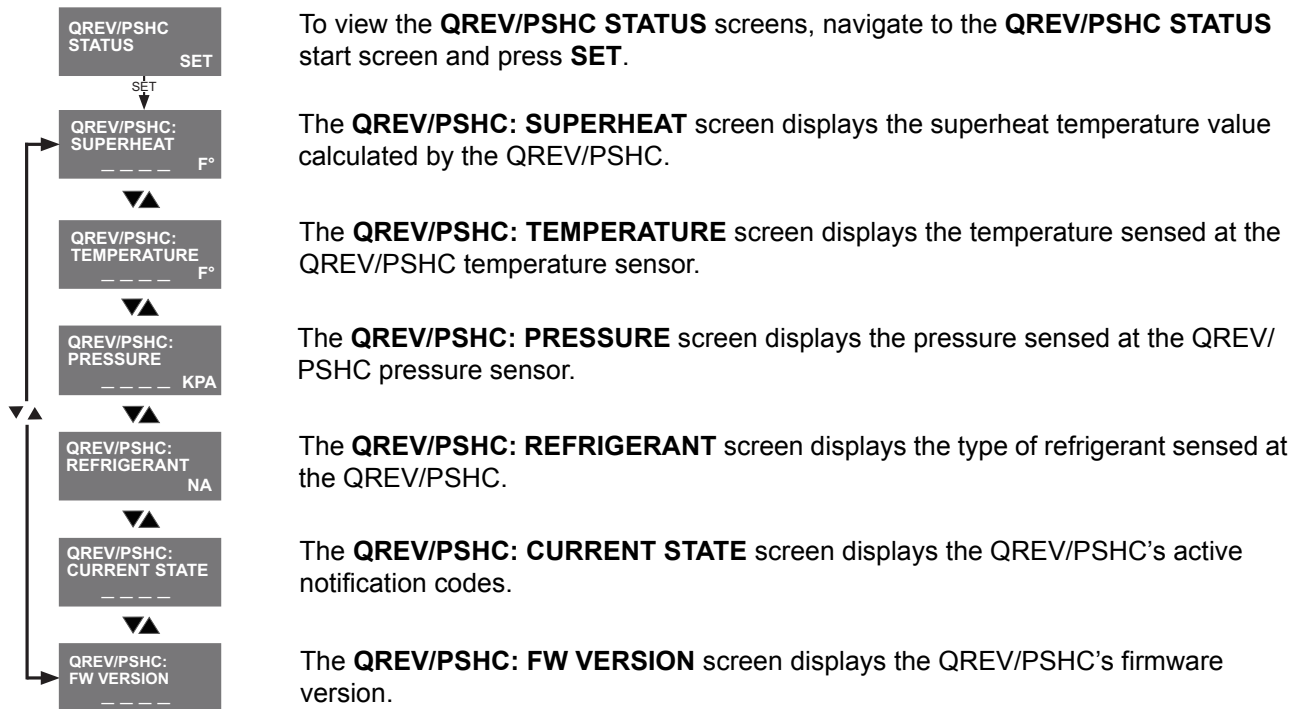
The **FW** screen displays the main firmware version on the controller.

The **FW UI** screen displays the UI firmware version on the controller.

Viewing the QREV/PSHC status screens

The A5xx Controller can monitor and control a QREV/PSHC. To view the **QREV/PSHC STATUS** screens, navigate to the **QREV/PSHC STATUS** start screen and press **SET** to go to the **QREV/PSHC: SUPERHEAT** screen. To move through the **QREV/PSHC STATUS** screens, press the **DOWN** and **UP** arrow keys.

Note: The **QREV/PSHC STATUS** screens are available only if you install a QREV/PSHC to the controller and set up the interface.



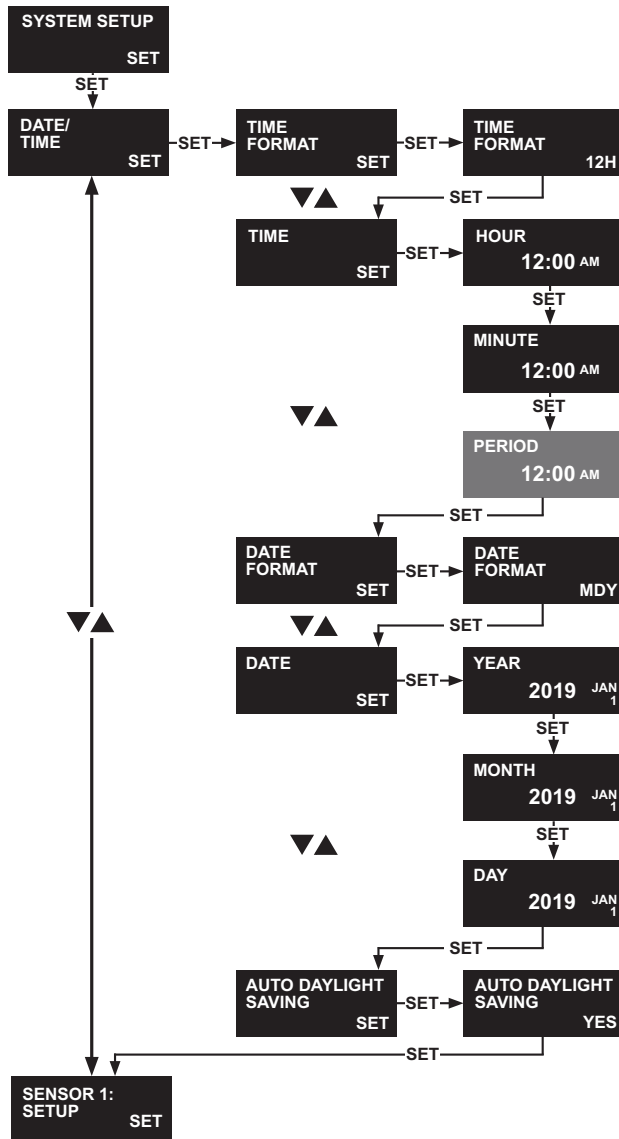
Setting up the system setup screens

To begin the set up procedure for the A5xx Controller, define the following settings for the refrigeration system in the system setup screens.

- System date and time. For more information, see [Setting up the system date and time](#).
- System components. For more information, see [Setting up the system components](#).
 - Sensor types
 - Evaporator fan motor type
 - Defrost system type
 - Optional defrost termination type
 - QREV/PSHC setup when you select the QREV
- System setup parameters. For more information, see [Setting up the system setup parameters](#).
 - System name
 - Temperature units
 - Display brightness
 - Keypad sound
 - Update firmware
 - Optional user security passcode
 - Language

Setting up the system date and time

To set up the date and time on the A5xx Controller, navigate to the **SYSTEM SETUP** start screen and press **SET** to go to the **DATE/TIME** start screen. To move through the **DATE/TIME** screens, press the **DOWN** and **UP** arrow keys.



To set the time format, select **12H** or **24H** and press **SET**.

To set the hour, select a value from the range **1** hour to **12** hours and press **SET**.

To set the minutes, select a value from the range **00** minutes to **59** minutes and press **SET**.

To set the time period, select **AM** or **PM** and press **SET**. **Note:** The **PERIOD** screen displays only if you select the **12H** time format.

To set the date format, select **MDY** (month, date, and year) or **DMY** (date, month, and year) and press **SET**.

To set the year, select the year value and press **SET**.

To set the month, select the month value and press **SET**.

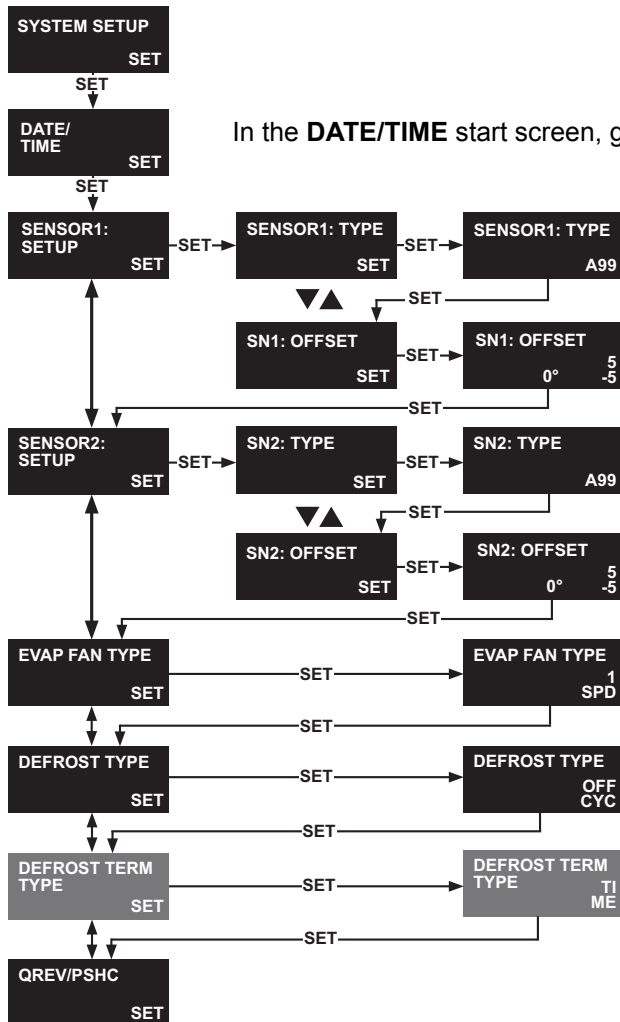
To set the date, select the date value and press **SET**.

To enable or disable the automatic daylight saving adjustment feature, select **YES** or **NO** and press **SET**.

Setting up the system components

To define the sensors, evaporator fan motors, defrost system type, and defrost termination type on the controller, navigate to the **SYSTEM SETUP** start screen and press **SET**. To move through the system component screens, press the **DOWN** and **UP** arrow keys.

Note: The selections that you make in the following setup screens determine many of the setup screens that appear in the **REFRIGERATION SETUP** and **DEFROST SETUP** menus.



In the **DATE/TIME** start screen, go to the **SENSOR1: SETUP** screen and press **SET**.

To set a sensor type for Sn1, select **A99** or **NTC** and press **SET**.

To set the offset value for Sn1, select the offset value from the range **-5°F** to **5°F** and press **SET**.

To set a sensor type for Sn2, select **A99**, **NTC**, or **NON** (none) and press **SET**.

To set the offset value for Sn2, select the offset value from the range **-5°F** to **5°F** and press **SET**.

To set a motor type for the evaporator fan, select **1 SPD** (single-speed) or **2 SPD** (two-speed EC motor fan) and press **SET**.

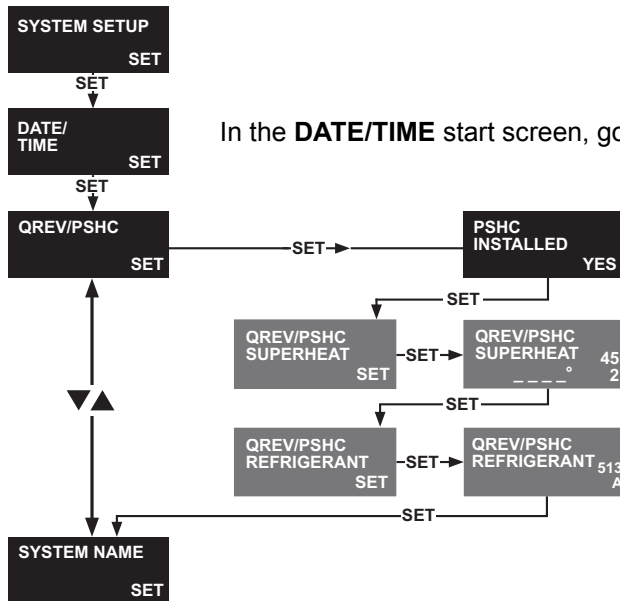
To set the defrost type, select **OFF/CYC** (off-cycle passive), **HOT/GAS** (hot gas) or **ELC/TRC** (electric resistive heat) and press **SET**.

To set a defrost termination type, select **TI/ME** (time-based termination), **HV/BIN** (high-voltage binary temperature switch), or **TE/MP** (temperature-based termination) and press **SET**. **Note:** The **DEFROST TERM TYPE** screens do not display if the defrost type is **OFF/CYC**.

Setting up the QREV/PSHC setup

To set up the QREV/PSHC setup parameters, navigate to the **SYSTEM SETUP** start screen and press **SET**. To move through the QREV/PSHC screens, press the **DOWN** and **UP** arrow keys.

Note: If you select **NO** in the **PSHC INSTALLED** screen, the **QREV/PSHC SUPERHEAT** and **QREV/PSHC REFRIGERANT** screens do not appear.



In the **DATE/TIME** start screen, go to the **QREV/PSHC** screen and press **SET**.

To indicate if a QREV/PSHC is installed and connected to the A5xx Controller, select **YES** or **NO** and press **SET**.

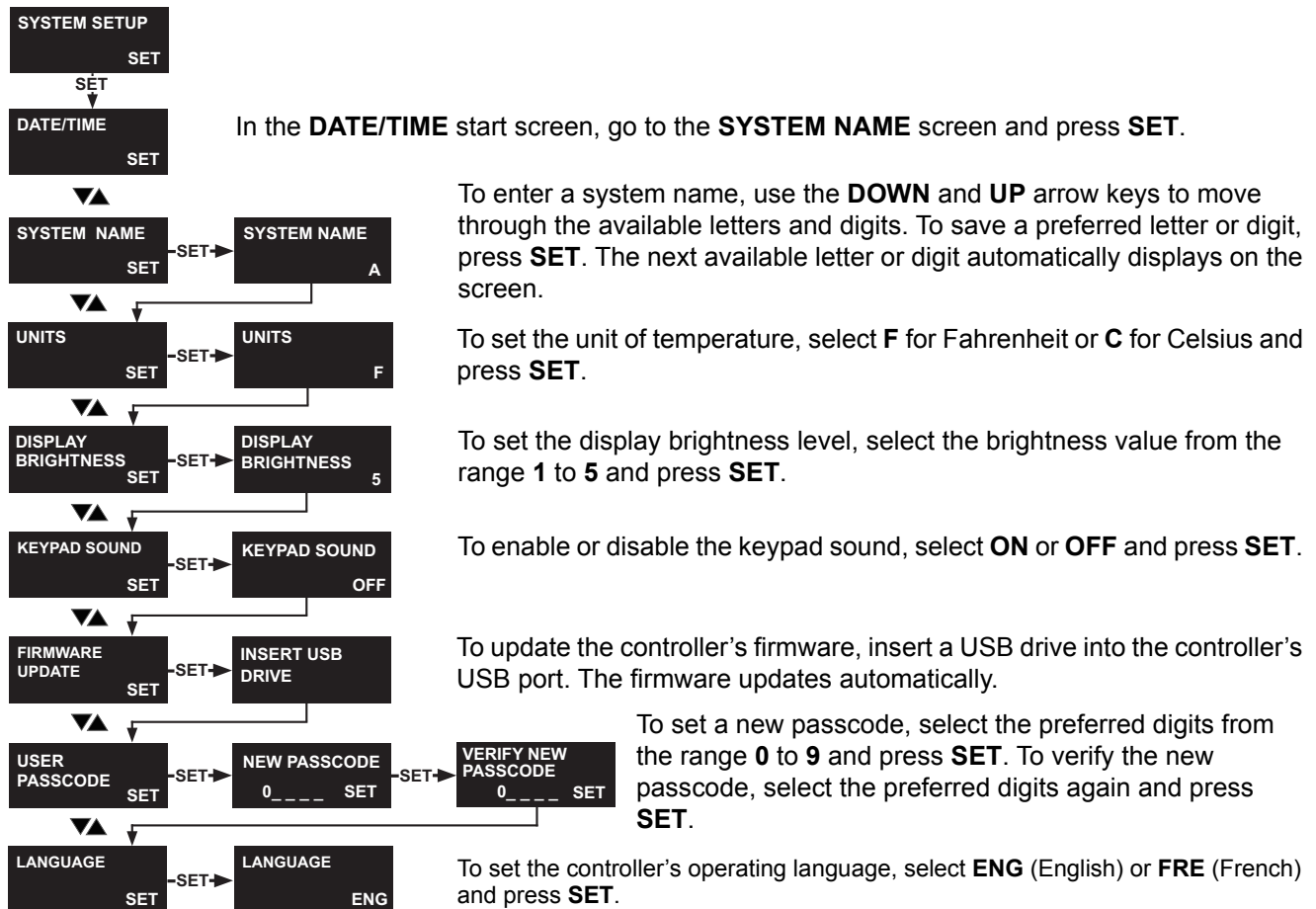
To set the superheat temperature value, select the superheat temperature value from the range **2°F** to **45°F** and press **SET**.

To set the refrigerant type used by the system, select the refrigerant type from the available options and press **SET**.

Note: For more information about available programmed refrigerants, refer to the *Quick Response Expansion Valve (QREV) and Precision Superheat Controller (PSHC) Product Bulletin (LIT-12012398)*.

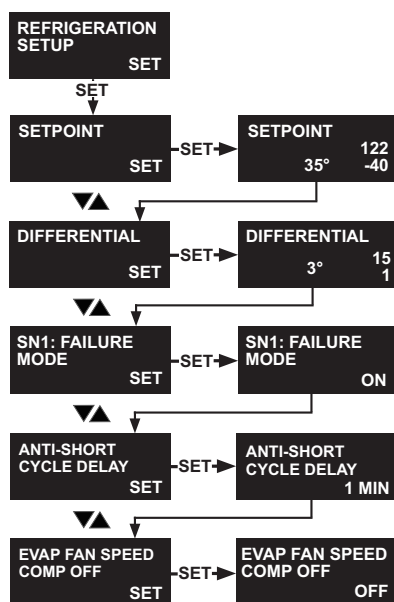
Setting up the system setup parameters

To set up the system setup parameters, navigate to the **SYSTEM SETUP** start screen and press **SET**. To move through the system component screens, press the **DOWN** and **UP** arrow keys.



Setting up the refrigeration setup screens

To set up the refrigeration setup parameters, navigate to the **REFRIGERATION SETUP** start screen, and press **SET**. To move through the **REFRIGERATION SETUP** screens, press the **DOWN** and **UP** arrow keys.



To set the setpoint, select the setpoint value from the range **-40°F** to **122°F** and press **SET**.

To set the system differential, select the differential value from the range **1°F** to **15°F** and press **SET**.

To set the failure mode for Sn1, select **ON**, **OFF**, or **AVG** (average), and press **SET**.

To set the ASD time for the compressor, select the delay time from the range **0 minutes** to **12 minutes** and press **SET**.

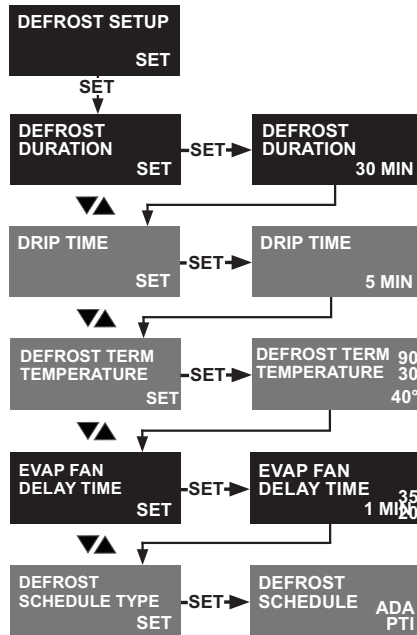
To set the speed of the evaporator fan when the compressor cycles off, select **OFF** or **HIGH** and press **SET**. **Note:** The fan speed selection depends on the selection for **EVAP FAN TYPE** in the **SYSTEM SETUP** screens.

Setting up the defrost setup screens

To set up the defrost setup parameters, see the following section, [Setting up the defrost schedule](#), and [Setting up adaptive defrost](#).

Setting up the defrost cycle

To set up the defrost cycle, navigate to the **DEFROST SETUP** start screen and press **SET**. To move through the **DEFROST SETUP** screens, press the **DOWN** and **UP** arrow keys.



To set the maximum defrost duration time, select the maximum defrost duration value from the range **0** minutes to **99** minutes and press **SET**. **Note:** All defrost cycles, regardless of their termination type, terminate when the system reaches the maximum defrost duration value.

To set the drip time delay, select the drip time delay value from the range **0** minutes to **10** minutes and press **SET**.

To set the defrost termination temperature, select the defrost termination temperature value from the range **30°F** to **90°F** and press **SET**.

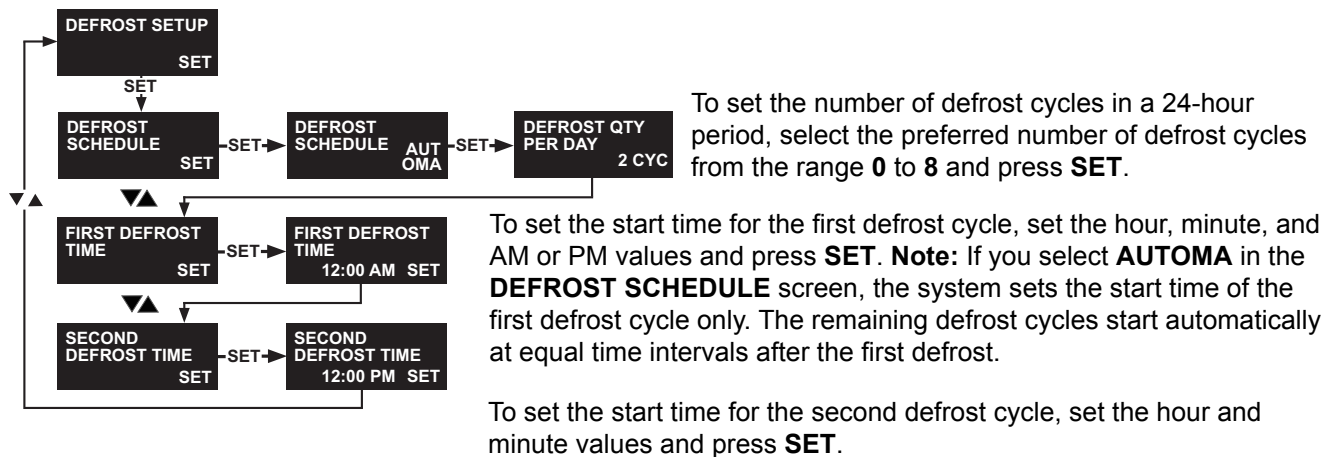
To set the evaporator fan delay time, select the delay time value from the range **0** minutes to **15** minutes and press **SET**.

To set the defrost schedule type, select **SCHEDU** (scheduled) or **ADAPTIVE** (adaptive) and press **SET**.

Setting up the defrost schedule

To set up the defrost schedule, navigate to the **DEFROST SETUP** start screen and press **SET**. To move through the **DEFROST SETUP** screens, press the **DOWN** and **UP** arrow keys.

Note: To schedule the defrost cycles to start automatically at equal intervals after the first defrost time, select **AUTOMA** (automatic) in the **DEFROST SCHEDULE** screen. To manually schedule the defrost cycles to start at preferred times, select **MANUAL** in the **DEFROST SCHEDULE** screen.



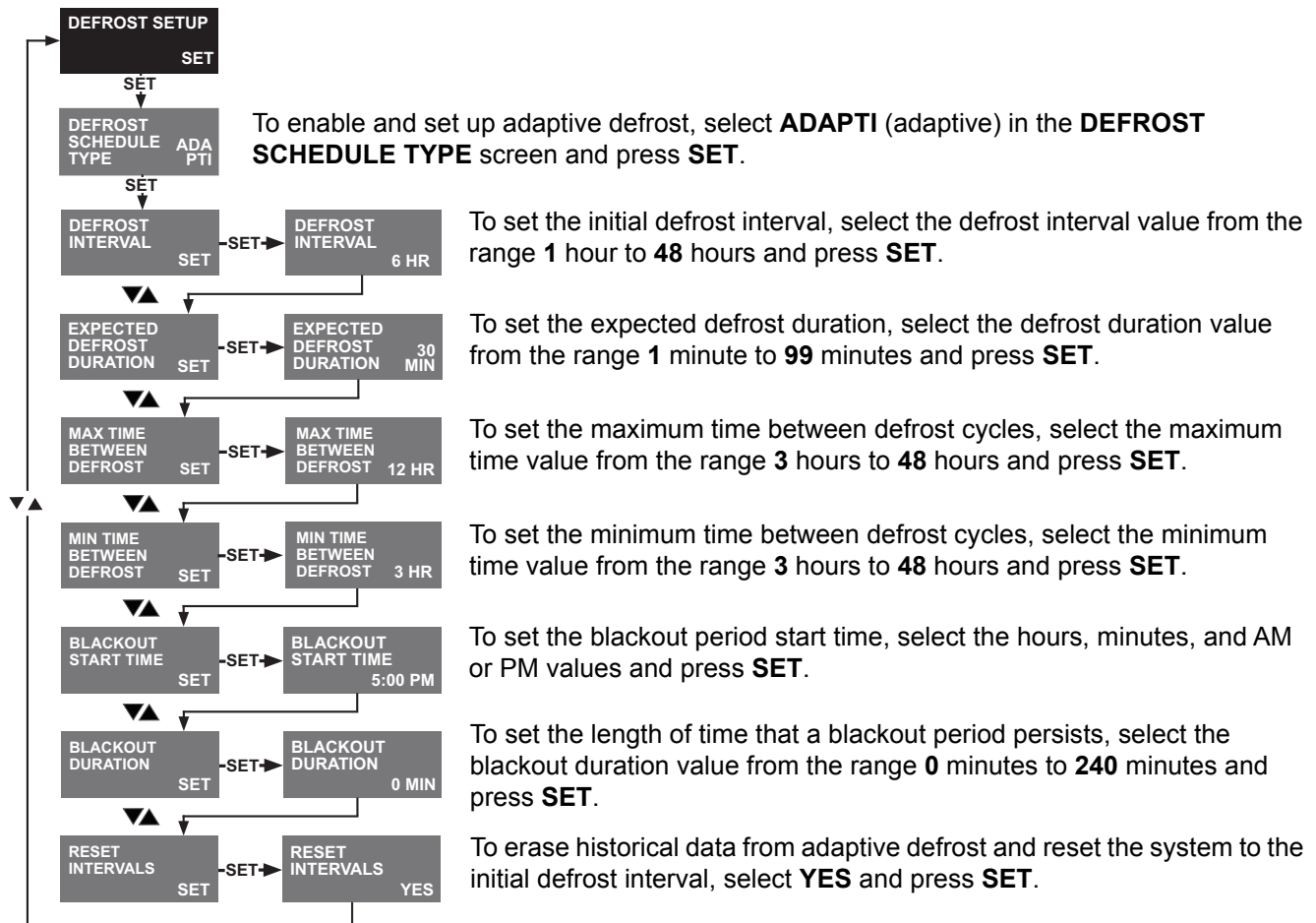
Notes:

- If you select **MANUAL** in the **DEFROST SCHEDULE** screen, you must manually schedule the remaining defrost cycles at real-time values for the 24-hour period.
- The controller displays the remaining defrost time screens for the preferred number of defrost cycles.

Setting up adaptive defrost

To set up adaptive defrost, navigate to the **DEFROST SETUP** start screen and press **SET**. To move through the **DEFROST SETUP** screens, press the **DOWN** and **UP** arrow keys.

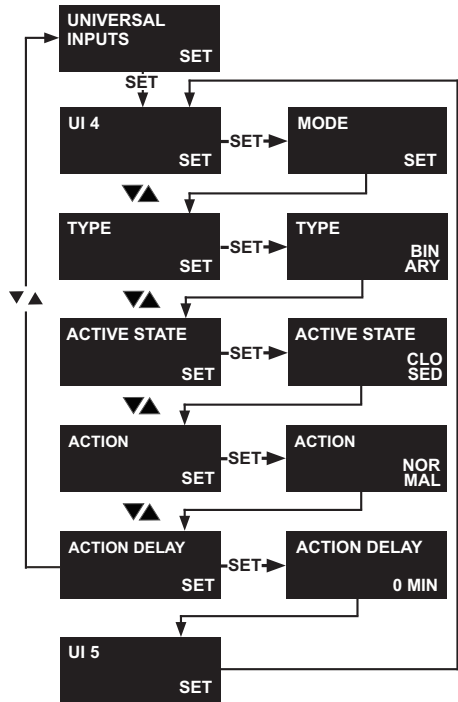
Note: To enable the **ADAPTIVE DEFROST** setup start screen, set the defrost termination type to **TEMP** or **HVBIN** in the **DEFROST TERM TYPE** screen in the system setup menu.



Setting up the universal inputs

To set up the universal inputs, navigate to the **UNIVERSAL INPUTS** start screen and press **SET**. To move through the **UNIVERSAL INPUTS** screens, press the **DOWN** and **UP** arrow keys.

Note: The UI 5 setup screens are identical to the following UI 4 setup screens.



To set a universal input mode for UI 4, select **EMG SW** (emergency switch), **MAN RM** (man in room), **REF LK** (refrigerant leak) or **NON** (none) and press **SET**.

To set an input type for UI 4, select **BINARY** or **ANALOG** and press **SET**.

To set an active state for UI 4, select an active state value from the range **0 V** to **10 V** and press **SET**.

To set an action mode for UI 4, select **NORMAL**, **COO OFF** (cool off), or **AUX ON** and press **SET**.

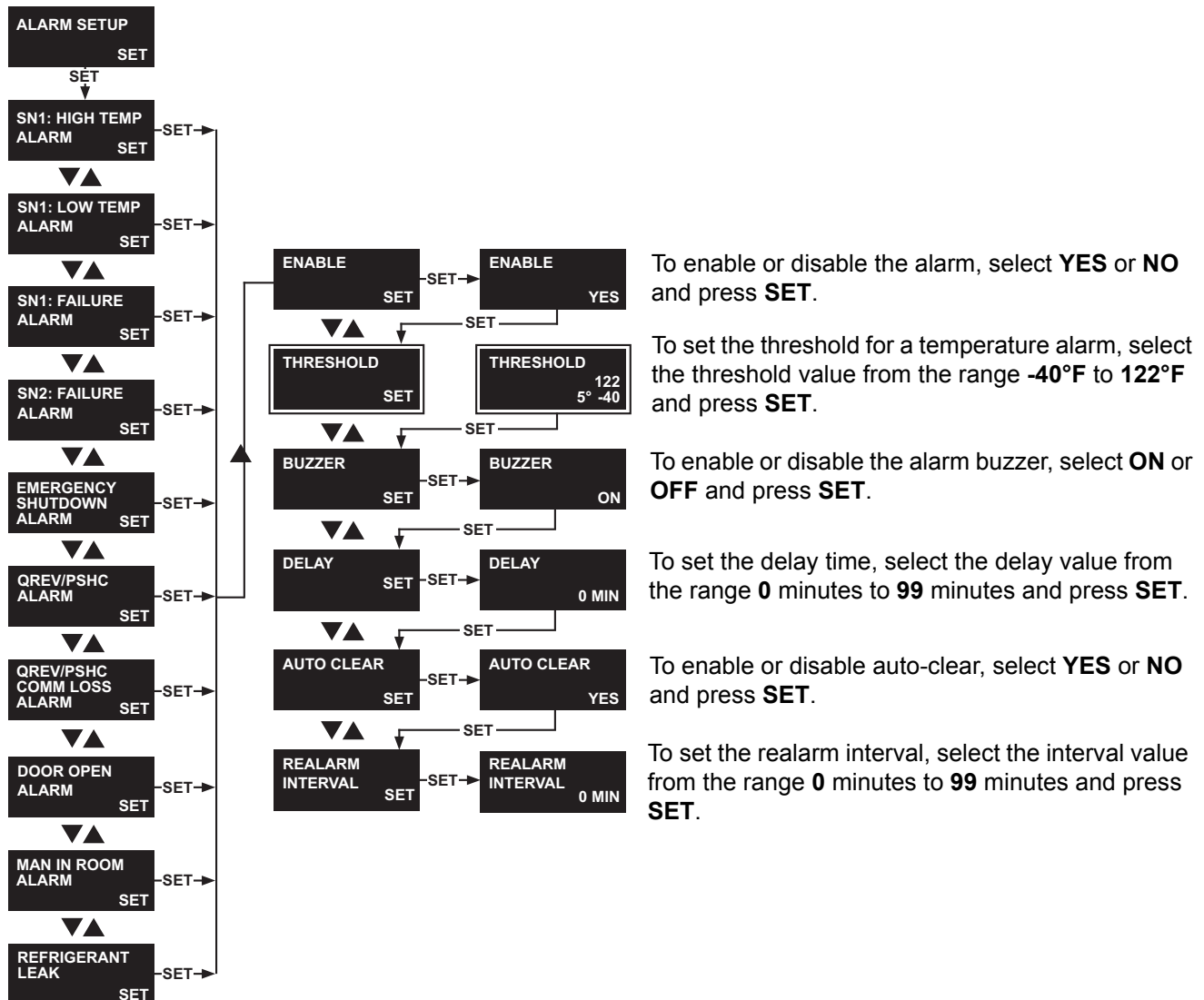
To set an action delay time for UI 4, select an action delay value from the range **0 minutes** to **10 minutes** and press **SET**.

Setting up the alarm setup

To set up the alarm parameters, navigate to the **ALARM SETUP** start screen and press **SET**. To move through the **ALARM SETUP** screens, press the **DOWN** and **UP** arrow keys.

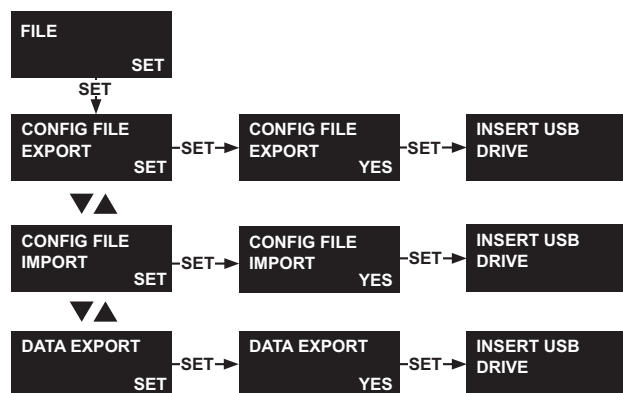
Notes:

- All of the alarm setup screens are identical to the following **SN1: HIGH TEMPERATURE ALARM** screens, with the exception of the **THRESHOLD** screens.
- The **THRESHOLD** screens display only in the **SN1: HIGH TEMPERATURE ALARM** and **SN1: LOW TEMPERATURE ALARM** setup screens.
- If you select **NONE** (none) for the UI 4 and UI 5 input alarms, the alarm setup screens do not display.



Using file to import and export data

To use the file import and export functions, navigate to the **FILE** start screen and press **SET**. To move through the **FILE** screens, press the **DOWN** and **UP** arrow keys.



To initiate a file export, press **SET**, select **YES**, and insert a USB drive. The file export begins automatically.

To initiate a file import, press **SET**, select **YES**, and insert a USB drive. The file import begins automatically.

To initiate a data export, press **SET**, select **YES**, and insert a USB drive. The data export begins automatically.

A5xx Controller screens

The following table provides information about the screens that you may encounter when you set up the A5xx Controller for your refrigeration system. You can view the black screens in the controller's UI. The gray screens display only when relevant to the application requirements you select in the setup screens.

Table 15: A5xx Controller screens (Part 1 of 15)


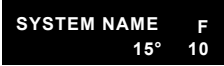




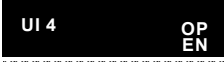



Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
	When the A5xx Controller powers on, the WELCOME screen displays and then automatically transitions to the HOME screen.	n/a	n/a
	The HOME screen displays the system name, the date, and the time in the scrolling message field. The temperature at Sn1 displays in the status field. Your selections for temperature units and the setpoint value display in the information fields. To go to the SYSTEM STATUS start screen and the other high-level menu start screens, press MENU/ESC .	n/a	n/a
System status screens			
	The SYSTEM STATUS screen is the top-level screen for viewing the status of the refrigeration system. To move through the SYSTEM STATUS screens, press the DOWN and UP arrow keys. To go to the Sn1: COOLING TEMP screen press SET .	n/a	n/a
	This screen displays the temperature at the cooling control sensor Sn1.	Current temperature value	n/a
	This screen displays the temperature at the defrost termination sensor Sn2.	Current temperature value	n/a
	This screen displays the start time of the next defrost cycle.	Real-time value	n/a
	This screen displays the following information about UI 4: <ul style="list-style-type: none"> The binary input displays as OP/EN (open) or CLO/SED (closed) in the upper information field. The analog input displays as a 0 VDC to 10 VDC value in the status field. 	<ul style="list-style-type: none"> OP/EN CLO/SED 0 VDC to 10 VDC 	n/a
	This screen displays the following information about UI 5: <ul style="list-style-type: none"> The binary input displays as OP/EN or CLO/SED in the upper info field. The analog input displays as a 0 VDC to 10 VDC value in the status field. 	<ul style="list-style-type: none"> OP/EN CLO/SED 0 VDC to 10 VDC 	n/a
	This screen displays the status of the user-supplied high-voltage, binary input switch connected to the HV/BIN terminals.	<ul style="list-style-type: none"> OP/EN CLO/SED 	n/a
	This screen displays the status of the compressor relay as open or closed.	<ul style="list-style-type: none"> OP/EN CLO/SED 	n/a

Table 15: A5xx Controller screens (Part 2 of 15)

Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
DEFROST: RELAY OP EN	This screen displays the status of the defrost relay as open or closed.	<ul style="list-style-type: none"> • OP/EN • CLO/SED 	n/a
LO-SPD/AUX: RELAY OP EN	This screen displays the status of the low-spd aux fan relay as open or closed.	<ul style="list-style-type: none"> • OP/EN • CLO/SED 	n/a
HI-SPD: RELAY OP EN	This screen displays the status of the hi-spd fan relay as open or closed.	<ul style="list-style-type: none"> • OP/EN • CLO/SED 	n/a
ALARM: RELAY OP EN	This screen displays the status of the alarm relay.	<ul style="list-style-type: none"> • OP/EN • CLO/SED 	n/a
FW X.XXX NA	This screen displays the version of firmware on the controller.	X.XXX	n/a
FW UI X.XXX NA	This screen displays the version of UI firmware on the controller.	X.XXX	n/a
QREV status screens			
QREV/PSHC STATUS SET	<p>The QREV/PSHC STATUS screen is the top-level screen for the QREV/PSHC screens. To move through the QREV/PSHC STATUS screens, press the DOWN and UP arrow keys. To go to the QREV/PSHC: SUPERHEAT screen, press SET.</p> <p>Note: The QREV/PSHC STATUS screens are available only if you install a QREV/PSHC to the controller and set up the interface.</p>	n/a	n/a
QREV/PSHC: SUPERHEAT F°	This screen displays the superheat temperature value calculated by the QREV/PSHC.	n/a	n/a
QREV/PSHC: TEMPERATURE F°	This screen displays the temperature sensed at the QREV/PSHC temperature sensor on the evaporator coil outlet.	n/a	n/a
QREV/PSHC: PRESSURE KPA	This screen displays the pressure sensed at the QREV/PSHC pressure sensor connected at the evaporator outlet or the suction line compressor.	n/a	n/a
QREV/PSHC: REFRIGERANT NA	This screen displays the type of refrigerant sensed at the QREV/PSHC.	n/a	n/a

Table 15: A5xx Controller screens (Part 3 of 15)









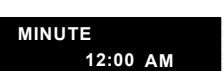


Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
	This screen displays the QREV/PSHC's active notification codes.	n/a	n/a
	This screen displays the QREV/PSHC's firmware version.	n/a	n/a
System setup screens: date and time			
	The SYSTEM SETUP screen is the top-level screen for setting up the refrigeration system's date and time, components, and parameters. To move through the SYSTEM SETUP screens, press the DOWN and UP arrow keys. To go to the DATE/TIME setup start screen, press SET .	n/a	n/a
	This screen is the date and time setup start screen. To go to the TIME FORMAT screen and set the time and date, press SET .	n/a	n/a
	This screen is the time format setup start screen.	n/a	n/a
	To set the time format, select 12H or 24H and press SET .	<ul style="list-style-type: none"> • 12H • 24H 	12H
	This screen is the time setup start screen.	n/a	n/a
	To set the hour, select a value from the range 1 hour to 12 hours and press SET .	Hour value	12 hours
	To the set the minutes, select a value from the range 00 minutes to 59 minutes and press SET .	Minute value	00 minutes
	To set the time period, select AM or PM and press SET . Note: The PERIOD screen displays only if you select the 12H time format in the TIME FORMAT screen.	<ul style="list-style-type: none"> • AM • PM 	AM
	This screen is the date format start screen.	n/a	n/a

Table 15: A5xx Controller screens (Part 4 of 15)


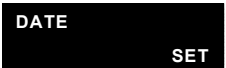


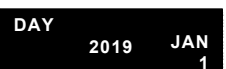







Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
	To set the date format, select MDY (month, date, and year) or DMY (date, month, and year) and press SET .	<ul style="list-style-type: none"> MDY DMY 	MDY
	This screen is the date setup start screen. To go to the YEAR screen, press SET .	n/a	n/a
	To set the year, select the year value and press SET .	Year value	2018
	To set the month, select the month value and press SET .	Month code	Jan
	To set the day, select the day value and press SET .	Day value	1
	To set the automatic daylight saving adjustment feature, press SET .	n/a	n/a
	To enable or disable the automatic daylight saving adjustment feature, select YES or NO and press SET .	<ul style="list-style-type: none"> YES NO 	No
System setup screens: system components			
	This screen is the SENSOR1: SETUP setup start screen. To go to the SENSOR1: TYPE start setup screen, press SET .	n/a	n/a
	This screen is the SENSOR1: TYPE setup start screen. To go to the SENSOR1: TYPE setup screen, press SET .	n/a	n/a
	To set a sensor type for Sn1, select A99 or NTC and press SET .	<ul style="list-style-type: none"> A99 NTC 	A99
	This screen is the SN1: OFFSET setup start screen. To go to the SN1: OFFSET screen, press SET .	n/a	n/a
	To set the offset value for Sn1, select the offset value from the range -2.5°C and 2.5°C (-5°F to 5°F) and press SET .	-2.5°C to 2.5°C (-5°F to 5°F)	0° (C) 0° (F)

Table 15: A5xx Controller screens (Part 5 of 15)

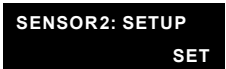
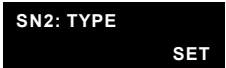
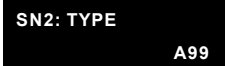








Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
	This screen is the SENSOR2: SETUP setup start screen. To go to the SN2: TYPE setup screen, press SET .	n/a	n/a
	To go to the SN2: TYPE setup screen, press SET .	n/a	n/a
	To set a sensor type for Sn2, select A99 , NTC , or NON (none) and press SET .	<ul style="list-style-type: none"> • A99 • NTC • NON 	A99
	To go to the SN2: OFFSET setup screen, press SET .	n/a	n/a
	To set the offset value for Sn2, select the offset value from the range -2.5°C to 2.5°C (-5°F to 5°F) and press SET .	-2.5°C to 2.5°C (-5°F to 5°F)	0° (C) 0° (F)
	This screen is the EVAP FAN TYPE setup start screen. To go to the EVAP FAN TYPE setup screen, press SET .	n/a	n/a
	To set a motor for the evaporator fan, select 1-SPD (single-speed) or 2-SPD (two-speed) EC motor fan and press SET .	<ul style="list-style-type: none"> • 1-SPD • 2-SPD 	1-SPD
	This screen is the DEFROST TYPE setup start screen. To go to the DEFROST TYPE setup screen, press SET .	n/a	n/a
	To set the defrost type, select OFF/CYC (off-cycle), HOT/GAS (hot gas) or ELC/TRC (electric resistive heat) and press SET .	<ul style="list-style-type: none"> • OFF/CYC • HOT/GAS • ELC/TRC 	OFF/CYC
	This screen is the DEFROST TERM TYPE setup start screen. To go to the DEFROST TERM TYPE setup screen, press SET . Note: The DEFROST TERM TYPE screens do not display if the defrost type is OFF/CYC , because off-cycle defrost termination is time-based.	n/a	n/a
	To set a defrost termination type, select TI/ME (time-based termination), HV/BIN (high-voltage binary temperature switch), or TE/MP (temperature-based termination) and press SET .	<ul style="list-style-type: none"> • TI/ME • HV/BIN • TE/MP 	TI/ME

Table 15: A5xx Controller screens (Part 6 of 15)












Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
System setup screens: QREV/PSHC screens			
	This screen is the QREV/PSHC setup start screen. To go to the PSHC INSTALLED setup screen, press SET .	n/a	n/a
	To indicate whether a QREV/PSHC is installed and connected to the A5xx Controller or not, select YES or NO and press SET . Note: If you select NO , the REFRIGERANT TYPE screen and the SUPERHEAT SETPOINT screen do not display.	<ul style="list-style-type: none"> • YES • NO 	No
	To go to the QREV/PSHC: SUPERHEAT screen, press SET .	n/a	n/a
	To set the superheat temperature value, select the superheat temperature value from the range 2°F to 45°F and press SET .	2°F to 45°F	n/a
	To go to the QREV/PSHC: REFRIGERANT TYPE screen, press SET .	n/a	n/a
	To set the refrigerant type used by the system, select the refrigerant type from the available options and press SET . Note: For more information about available programmed refrigerants, refer to the <i>Quick Response Expansion Valve (QREV) and Precision Superheat Controller (PSHC) Product Bulletin (LIT-12012398)</i> .	n/a	n/a
System setup screens: system parameters			
	This screen is the SYSTEM NAME setup start screen. To go to the SYSTEM NAME setup screen, press SET .	n/a	n/a
	To set the system name, select the preferred characters and numbers from the available options, and press SET . To save the system name, press SAVE .	<ul style="list-style-type: none"> • A-Z • 0-9 • DEL (delete) • SPA (space) • SAVE (save) 	n/a
	This screen is the UNITS setup start screen. To go to the UNITS setup screen, press SET .	n/a	n/a
	To set the unit of temperature, select F (Fahrenheit) or C (Celsius), and press SET .	<ul style="list-style-type: none"> • F • C 	F
	This screen is the DISPLAY BRIGHTNESS setup start screen. To go to the DISPLAY BRIGHTNESS setup screen, press SET .	n/a	n/a

Table 15: A5xx Controller screens (Part 7 of 15)








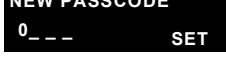



Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
	To set the display brightness level, select the brightness value from the range 1 to 5 and press SET .	1 to 5	5
	This screen is the KEYPAD SOUND setup start screen. To go to the KEYPAD SOUND setup screen, press SET .	n/a	n/a
	To enable or disable the keypad sound, select ON or OFF and press SET .	<ul style="list-style-type: none"> • ON • OFF 	Off
	This screen is the FIRMWARE UPDATE setup start screen. To go to the FIRMWARE UPDATE setup screen, press SET .	SET	n/a
	To go to the INSERT USB DRIVE screen for a firmware update, select YES . To go to the USER PASSCODE screen without updating the firmware, press NO .	<ul style="list-style-type: none"> • YES • NO 	n/a
	To update the controller's firmware, insert a USB drive into the controller's USB port within 15 seconds. The firmware updates automatically.	n/a	n/a
	This screen is the USER PASSCODE setup start screen. To go to the USER PASSCODE setup screen, press SET .	n/a	n/a
	To set a new passcode, select the preferred digits from the range 0 to 9 and press SET .	0000 to 9999	n/a
	To verify the new passcode, select the preferred digits again and press SET .	0000 to 9999	n/a
	This screen is the LANGUAGE setup start screen. To go to the LANGUAGE setup screen, press SET .	n/a	n/a
	To set the controller's operating language, select ENG (English) or FRE (French) and press SET .	<ul style="list-style-type: none"> • ENG • FRE 	ENG

Table 15: A5xx Controller screens (Part 8 of 15)

Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
Refrigeration setup screens			
REFRIGERATION SETUP SET	The REFRIGERATION SETUP screen is the top-level screen for setting up the controller's behavior during refrigeration mode. To move through the REFRIGERATION SETUP screens, press the DOWN and UP arrow keys. To go to the SETPOINT setup start screen, press SET .	n/a	n/a
SETPOINT SET	This screen is the SETPOINT setup start screen. To go to the SETPOINT setup screen, press SET .	n/a	n/a
SETPOINT 122 35° -40	To set the setpoint, select the setpoint value from the range -40°C to 50°C (-40°F to 122°F) and press SET .	-40°C to 50°C (-40°F to 122°F)	35°F
DIFFERENTIAL SET	This screen is the DIFFERENTIAL setup start screen. To go to the DIFFERENTIAL setup screen, press SET .	n/a	n/a
DIFFERENTIAL 15 3° 1	To set the differential, select the differential value from the range 0.5°C to 9.5°C (1°F to 15°F) and press SET .	0.5°C to 9.5°C 1°F to 15°F	5°F
SN1: FAILURE MODE SET	This screen is the SN1: FAILURE MODE setup start screen. To go to the SN1: FAILURE MODE setup screen, press SET .	n/a	n/a
SN1: FAILURE MODE ON	To set the failure mode for Sn1, select ON , OFF , or AVG (average temperature of the previous four cycles) and press SET .	<ul style="list-style-type: none"> • ON • OFF • AVG 	Off
ANTI-SHORT CYCLE DELAY SET	This screen is the ANTI-SHORT CYCLE DELAY setup start screen. To go to the ANTI-SHORT CYCLE DELAY setup screen, press SET .	n/a	n/a
ANTI-SHORT CYCLE DELAY 1 MIN	To set the ASD time for the compressor, select the delay time value from the range 0 minutes to 12 minutes and press SET .	0 minutes to 12 minutes	1 minute
EVAP FAN SPEED COMP OFF SET	This screen is the EVAP FAN SPEED COMPRESSOR OFF setup start screen. To go to the EVAPORATOR FAN SPEED COMPRESSOR OFF setup screen, press SET .	n/a	n/a
EVAP FAN SPEED COMP OFF OFF	To set the speed of the evaporator fan when the compressor cycles off, select HI/GH (high), LOW , or OFF and press SET . Note: The fan speed selections depend on the selection for EVAP FAN TYPE in the SYSTEM SETUP screens.	1-SPD fan: <ul style="list-style-type: none"> • HI/GH • OFF 	Off
		2-SPD fan: <ul style="list-style-type: none"> • HI/GH • LOW • OFF 	Off

Table 15: A5xx Controller screens (Part 9 of 15)

Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
Defrost setup screens: defrost cycle			
DEFROST SETUP SET	The DEFROST SETUP screen is the top-level screen for setting up the behavior of the refrigeration system during defrost mode. To move through the DEFROST SETUP screens, press the DOWN and UP arrow keys. To go to the DEFROST DURATION setup screen, press SET .	n/a	n/a
DEFROST DURATION SET	This screen is the DEFROST DURATION setup start screen. To go to the DEFROST DURATION setup screen, press SET .	n/a	n/a
DEFROST DURATION 30 MIN	To set the maximum defrost duration time, select the maximum defrost duration value from the range 0 minutes to 99 minutes and press SET . Note: Regardless of the termination type, all defrost cycles terminate when the system reaches the maximum defrost duration value.	0 minutes to 99 minutes	30 minutes
DRIP TIME SET	This screen is the DRIP TIME setup start screen. To go to the DRIP TIME setup screen, press SET .	n/a	n/a
DRIP TIME 5 MIN	To set the drip time delay, select the drip time delay value from the range 0 minutes to 10 minutes and press SET .	0 minutes to 10 minutes	5 minutes
DEFROST TERM TEMPERATURE SET	This screen is the DEFROST TERM TEMPERATURE setup start screen. To go to the DEFROST TERM TEMPERATURE setup screen, press SET .	n/a	n/a
DEFROST TERM TEMPERATURE 90 30 40°	To set the defrost termination temperature, select the defrost termination temperature value from the range -1°C to 30°C (30°F to 90°F) and press SET . Notes: <ul style="list-style-type: none"> The Sn2 defrost sensor senses the defrost termination temperature. The DEFROST TERMINATION TEMPERATURE screen displays only if you select TE/MP (temperature) in the DEFROST TYPE screen in the system setup menu. 	-1°C to 30°C (30°F to 90°F)	4.5°C (40°F)
EVAP FAN DELAY TIME SET	This screen is the EVAP FAN DELAY TIME setup start screen. To go to the EVAP FAN DELAY TIME screen, press SET .	n/a	n/a
EVAP FAN DELAY TIME 1 MIN	To set the evaporator fan delay time, select the delay time value from the range 0 minutes to 15 minutes and press SET . Note: The evaporator fan delay time is the number of minutes that the evaporator fans delay turning on after the compressor relay closes, post defrost duration and drip-time delay.	0 minutes to 15 minutes	5 minutes
DEFROST SCHEDULE TYPE SET	This screen is the DEFROST SCHEDULE TYPE setup start screen. To go to the DEFROST SCHEDULE TYPE screen, press SET .	n/a	n/a

Table 15: A5xx Controller screens (Part 10 of 15)


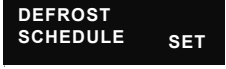
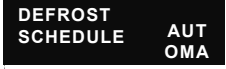


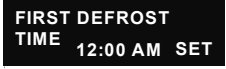
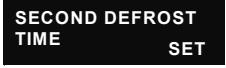
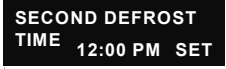

Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
	To set the defrost schedule type, select SCH/EDU (scheduled) or ADA/PTI (adaptive) and press SET .	<ul style="list-style-type: none"> SCH/EDU ADA/PTI 	SCH/EDU
Defrost setup screens: defrost schedule			
	This screen is the DEFROST SCHEDULE setup start screen. To go to the DEFROST SCHEDULE setup screen, press SET .	n/a	n/a
	To set the defrost schedule type, select AUT/OMA (automatic) or MAN/UAL (manual) and press SET . Note: <ul style="list-style-type: none"> To start the selected number of defrost cycles per day at equal time intervals, select AUT/OMA. For example, if the DEFROST QTY PER DAY value is four intervals, a defrost cycles starts automatically every six hours. To start the selected number of defrost cycles per day at user-selected times, select MAN/UAL. For example, if the DEFROST QTY PER DAY value is four intervals, the defrost cycles occur at four user-selected times. 	<ul style="list-style-type: none"> AUT/OMA MAN/UAL 	Auto
	To set the number of defrost cycles in a 24-hour period, select the preferred number of defrost cycles from the range 0 to 8 and press SET .	0 cycles to 8 cycles	2 cycles
	This screen is the FIRST DEFROST TIME setup start screen. To go to the FIRST DEFROST TIME setup screen, press SET .	n/a	n/a
	To set the start time for the first defrost cycle, set the hour, minute, and AM or PM values and press SET . Notes: <ul style="list-style-type: none"> If you select AUT/OMA in the DEFROST SCHEDULE screen, the system sets the start time of the first defrost cycle only. The remaining defrost cycles start automatically at equal time intervals after the first defrost. 	Real-time value	12:00 AM
	This screen is the SECOND DEFROST TIME setup start screen. To go to the SECOND DEFROST TIME setup screen, press SET .	n/a	n/a
	To set the start time for the second defrost cycle, set the hour, minute, and AM or PM values and press SET . Enter the real-time value at which the second, third, fourth and so on defrost cycles begin. Press SET to save those values. Note: If you select MAN/UAL in the DEFROST SCHEDULE screen, you must manually schedule the remaining defrost cycles at real-time values for the 24-hour period.	Real-time value	12:00 PM
Adaptive defrost setup screens			
	This screen is the DEFROST SCHEDULE setup start screen. To go to the DEFROST SCHEDULE TYPE setup screen, press SET .	n/a	n/a

Table 15: A5xx Controller screens (Part 11 of 15)

Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
DEFROST SCHEDULE TYPE ADA PTI	To enable and set up adaptive defrost, select ADA/PTI (adaptive) in the DEFROST SCHEDULE TYPE screen and press SET .	<ul style="list-style-type: none"> • ADA/PTI • SCH/EDU 	SCHEDU
DEFROST INTERVAL SET	This screen is the DEFROST INTERVAL setup start screen. To go to the DEFROST INTERVAL setup screen, press SET .	n/a	n/a
DEFROST INTERVAL 6 HR	To set the initial defrost interval, select the defrost interval value from the range 1 hour to 48 hours and press SET . Note: The defrost interval is the time in hours from the start of a defrost cycle to the start of the next defrost cycle. This time period is an estimate only. The adaptive defrost feature continually adjusts over time to achieve the expected defrost duration value.	1 hour to 48 hours	6 hours
EXPECTED DEFROST DURATION SET	This screen is the EXPECTED DEFROST DURATION setup start screen. To go to the EXPECTED DEFROST DURATION setup screen, press SET .	n/a	n/a
EXPECTED DEFROST DURATION 30 MIN	To set the expected defrost duration, select the defrost duration value and press SET . The expected defrost duration value range is 1 minute to 99 minutes. Note: The expected defrost duration is an estimate of the time required to clear the evaporator of all accumulated ice. The evaporator or refrigeration system manufacturer may provide some guidance about the most appropriate defrost duration for your system.	1 minute to 99 minutes	30 minutes
MAX TIME BETWEEN DEFROST SET	This screen is the MAX TIME BETWEEN DEFROST setup start screen. To go to the MAX TIME BETWEEN DEFROST setup screen, press SET .	n/a	n/a
MAX TIME BETWEEN DEFROST 12 HR	To set the maximum time between defrost cycles, select the maximum time value from the range 3 hours to 48 hours and press SET .	3 hours to 48 hours.	12 hours
MIN TIME BETWEEN DEFROST SET	This screen is the MIN TIME BETWEEN DEFROST setup start screen. To go to the MIN TIME BETWEEN DEFROST setup screen, press SET .	n/a	n/a
MIN TIME BETWEEN DEFROST 3 HR	To set the minimum time between defrost cycles, select the minimum time value from the range 3 to 48 hours and press SET .	3 hours to 48 hours	3 hours
BLACKOUT START TIME SET	This screen is the BLACKOUT START TIME setup start screen. To go to the BLACKOUT START TIME setup screen, press SET .	n/a	n/a
BLACKOUT START TIME 5:00 PM	To set the blackout period start time, select the hours , minutes , and AM or PM values and press SET . Note: During the optional blackout period, an adaptive defrost cycle does not start.	Hours , minutes , and AM or PM	5:00 PM

Table 15: A5xx Controller screens (Part 12 of 15)












Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
	This screen is the BLACKOUT DURATION setup start screen. To go to the BLACKOUT DURATION setup screen, press SET .	n/a	n/a
	To set the length of time that a blackout period persists, select the blackout duration value from the range 0 minutes to 240 minutes and press SET .	0 minutes to 240 minutes	0 minutes
	This screen is the RESET INTERVALS setup start screen. To go to the RESET INTERVALS setup screen, press SET .	n/a	n/a
	To erase historical data from adaptive defrost and reset the system to the initial defrost interval, select YES and press SET .	<ul style="list-style-type: none"> YES NO 	n/a
Universal inputs setup screens			
	The UNIVERSAL INPUTS screen is the top-level screen for setting up the universal inputs. To move through the UNIVERSAL INPUTS screens, press the DOWN and UP arrow keys. To go to the UI 4 setup start screen, press SET . Note: The UI 5 setup screens are identical to the following UI 4 setup screens.	n/a	n/a
	This screen is the UI 4 setup start screen. To go to the UI 4 setup screen, press SET .	n/a	n/a
	To set a universal input mode for UI 4, select EMG SW (emergency switch), DOR OPN (door open), MAN RM (man in room), REF LK (refrigerant leak), or NON (none), and press SET .	<ul style="list-style-type: none"> EMG/SW DOR OPN MAN RM REF LK NON 	None
	This screen is the TYPE setup start screen. To go to the TYPE setup screen, press SET .	n/a	n/a
	To set up an input type for UI 4, select BIN/ARY or ANA/LOG and press SET .	<ul style="list-style-type: none"> BIN/ARY ANA/LOG 	Binary
	This screen is the ACTIVE STATE setup start screen. To go to the ACTIVE STATE setup screen, press SET .	n/a	n/a
	To set up an active state for UI 4, select an active state value from the range 0 V to 10 V for analog or OP/EN or CLO/SED for binary.	<ul style="list-style-type: none"> 0 V to 10 V OP/EN CLO/SED 	Closed

Table 15: A5xx Controller screens (Part 13 of 15)

















Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
	This screen is the ACTION setup start screen. To go to the ACTION setup screen, press SET .	n/a	n/a
	To set an action mode for UI 4, select NORMAL , COO OFF (cool off), or AUX ON (auxiliary on), and press SET .	<ul style="list-style-type: none"> • NORMAL • COO OFF • LOW/SPD 	Normal
	This screen is the ACTION DELAY setup start screen. To go to the ACTION DELAY setup screen, press SET .	n/a	n/a
	To set an action delay time for UI 4, select an action delay value from the range 0 minutes to 10 minutes and press SET .	0 minutes to 10 minutes	0 minutes
Alarm setup screens			
	<p>The ALARM SETUP screen is the top-level screen for setting up the controller's alarm configurations. To move through the ALARM SETUP screens, press the DOWN and UP arrow keys. To go to the SN1: HIGH TEMP ALARM setup start screen, press SET.</p> <p>Notes:</p> <ul style="list-style-type: none"> • All of the alarm setup screens are identical to the following SN1: HIGH TEMPERATURE ALARM screens, with the exception of the THRESHOLD screens. • The THRESHOLD screens display only in the SN1: HIGH TEMPERATURE ALARM and SN1: LOW TEMPERATURE ALARM setup screens. • If you select NONE (none) for the UI 4 and UI 5 input alarms, the alarm setup screens do not display. 	n/a	n/a
	This screen is the alarm type setup start screen. To go to the ENABLE setup start screen, press SET .	n/a	n/a
	This screen is the ENABLE setup start screen. To go to the ENABLE setup screen, press SET .	n/a	n/a
	To enable or disable the alarm, select YES or NO and press SET .	<ul style="list-style-type: none"> • YES • NO 	No
	This screen is the THRESHOLD setup start screen. To go to the THRESHOLD setup screen, press SET .	n/a	n/a
	To set the threshold for a temperature alarm, select the threshold value from the range -40°F to 122°F and press SET .	-40°F to 120°F	120°F

Table 15: A5xx Controller screens (Part 14 of 15)

Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
BUZZER SET	This screen is the BUZZER setup start screen. To go to the BUZZER setup screen, press SET .	n/a	n/a
BUZZER ON	To enable or disable the alarm buzzer, select ON or OFF and press SET .	<ul style="list-style-type: none"> • ON • OFF 	Yes
DELAY SET	This screen is the DELAY setup start screen. To go to the DELAY setup screen, press SET .	n/a	n/a
DELAY 0 MIN	To set the delay time, select the delay value from the range 0 minutes to 99 minutes and press SET .	0 minutes to 99 minutes	0 minutes
AUTO CLEAR SET	This screen is the AUTO CLEAR setup start screen. To go to the AUTO CLEAR setup screen, press SET .	n/a	n/a
AUTO CLEAR YES	To enable or disable AUTO CLEAR , select YES or NO and press SET .	<ul style="list-style-type: none"> • YES • NO 	No
REALARM INTERVAL SET	This screen is the REALARM INTERVAL setup start screen. To go to the REALARM INTERVAL setup screen, press SET .	n/a	n/a
REALARM INTERVAL 0 MIN	To set the realarm interval, select the interval value from the range 0 minutes to 99 minutes and press SET .	0 minutes to 99 minutes	0 minutes
File system setup screens			
FILE SET	The FILE start screen is the top-level screen to configure the controller's file and data import and exports. To move through the FILE screens, press the DOWN and UP arrow keys. To go to the CONFIG FILE EXPORT screen, press SET .	n/a	n/a
CONFIG FILE EXPORT SET	This screen is the CONFIG FILE EXPORT setup start screen. To go to the CONFIG FILE EXPORT setup screen, press SET .	n/a	n/a
CONFIG FILE EXPORT YES	To confirm a file export, select YES , and press SET .	<ul style="list-style-type: none"> • YES • NO 	n/a
INSERT USB DRIVE	To export a file, insert a USB drive into the controller within 15 seconds. The file export begins automatically.	n/a	n/a

Table 15: A5xx Controller screens (Part 15 of 15)

Screen name in message field	Parameter description, behavior, or user action	Value range or selection list	Default value or selection
	This screen is the CONFIG FILE IMPORT setup start screen. To go to the CONFIG FILE IMPORT setup screen, press SET .	n/a	n/a
	To confirm a file import, select YES , and press SET .	<ul style="list-style-type: none"> • YES • NO 	n/a
	To import a file, insert a USB drive into the controller within 15 seconds. The file import begins automatically.	n/a	n/a
	This screen is the DATA EXPORT setup start screen. To go to the DATA EXPORT setup screen, press SET .	n/a	n/a
	To confirm a data export, select YES , and press SET .	<ul style="list-style-type: none"> • YES • NO 	n/a
	To export data, insert a USB drive into the controller within 15 seconds. The data export begins automatically.	n/a	n/a

Info field codes

The 2 three-character information fields in the lower right corner of the LCD display flashing codes in the parameter selection screens. The following table identifies and describes the information field codes. To move through the available selections in the screen, press the **DOWN** and **UP** arrow keys. When the preferred code flashes in the information field, press **SET** to save the selection and to go to the next screen. See the menu flow charts in [*Navigating the high-level status and setup start screens*](#) to view the navigation path to the selection screens. The availability of the selection screens and codes depend on your selections in the system setup screens.

Table 16: Information field selection codes, code identifications, and code descriptions

Information field selection codes	Code identification	Description
1 SPD	Single-speed evaporator fan	Select this option for applications with a single-speed evaporator fan or fans.
2 SPD	Two-speed evaporator fan	Select this option for applications with a two-speed evaporator fan or fans.
12 HR	12-hour time display format	Select this option to display hours as 1 to 12 and in AM or PM time periods.
24 HR	24-hour time display format	Select this option to display hours as 1 to 24 and without AM or PM time periods.
A99	A99 temperature sensor	Select the sensor type.
ANA LOG	Analog input type	Select this option to configure a universal input as a 0 to 10 VDC analog input.
AUT OMA	Automatic	The defrost interval start times occur at equal frequency throughout the day. Select this option to automatically set up the frequency and real-time values for all of the selected number of defrost cycles.
AUX ON	Auxiliary output on	Select this option to enable the lo-spd aux relay as an auxiliary output.
AVG	Average	Select this option to set up the Sn1 failure mode for averaging. When the system detects a Sn1 failure condition, the controller cycles the cooling system at an on/off frequency that is equal to the average of the last four on/off cycles before the sensor failure condition.
BIN ARY	Binary type input	Select this option to configure a universal input as a binary on or off input.
C	Celsius degrees	Select this option for the units of temperature measure.
CLO SED	Closed	Select this option to set the active state of a universal input set up as a binary input.
DMY	Day, month, and year	Select this option to display the date format as DD/MMM/YYYY.
DOR OPN	Door open	Select this option for an optional alarm condition mode in the ALARM setup screens.
ELE TRC	Electric resistive defrost	Select this option to choose a defrost type in the SYSTEM SETUP screens.
EMG SW	Emergency switch	Select this option for an optional alarm condition mode in the ALARM setup screens.
F	Fahrenheit degrees	Select this option for the units of temperature measure.
HIGH	High-speed	Select this option for a two-speed fan speed selection.
HOT GAS	Hot gas	Select this option to choose a defrost type in the SYSTEM SETUP screens.

Table 16: Information field selection codes, code identifications, and code descriptions

Information field selection codes	Code identification	Description
HV BIN	High voltage binary switch	The defrost termination type when a high-voltage binary switch terminates the defrost.
LOW	Low	Select this option to operate a two-speed fan at low-speed.
LOW SPD	Low-speed fan	This code is a universal input action type.
MAN RM	Man in room	This code is an optional alarm condition selection in the ALARM setup screens.
MAN UAL	Manual	Defrost schedule set up. Select this option to choose the real-time value for each of the selected number of defrosts that occur daily.
MDY	Month, day, and year	Select this option to display the date format as MMM/DD/YYYY.
NO	No	None
NON	None	Select this option for no selection
NOR MAL	Normal	None
NTC	Negative Temperature Coefficient	This code is a temperature sensor type.
OFF	Off	Sn1 failure mode: When you select OFF and the system detects a sensor failure condition, the controller ignores sensor/ setpoint control and maintains the cooling equipment as off continuously. The compressor relay maintains as off and the selected evaporator fan behavior controls the evaporator fan relay or relays.
OFF CYC	Off cycle defrost type	Off-cycle defrost is the defrost type commonly used on medium temperature refrigeration applications. This defrost option does not activate the defrost relay.
ON	On	Sn1 failure mode: When you select ON and the system detects a sensor failure condition, the controller ignores the sensor/ setpoint control and maintains the cooling equipment as on continuously. The compressor relay maintains as on and the selected evaporator fan behavior controls the evaporator relay or relays.
OP EN	Open	The active state of a universal input set up as a binary input
REF LK	Refrigeration leak	Select this option for an optional alarm condition mode in the ALARM setup screens.
SYS OFF	System shutdown	This code is a universal input action type.
TI ME	Time-based defrost termination type	Time-based defrost control terminates the defrost duration when the user-defined maximum defrost duration elapses.
YES	Yes	None

Electrical ratings

Table 17 through Table 21 provides the electrical ratings for the control relays in the A5xx Controller. See Table 21 for the relay duty cycle ratings.

Table 17: SPST compressor relay electrical ratings

	cULus			CE
Applied AC voltage at 50/60 Hz	24 VAC	120 VAC	240 VAC	240 VAC
Horsepower	n/a	1 hp	1 hp	1 hp
Full load amperes	n/a	16 A	8 A	8 A
Locked rotor amperes	n/a	96 A	48 A	48 A
Resistive amperes	10 A			
Pilot duty VA	125 VA at 24 VAC to 240 VAC			

Table 18: SPDT alarm relay electrical ratings

	cULus			CE
Applied AC voltage at 50/60 Hz	24 VAC	120 VAC	240 VAC	240 VAC
Horsepower (LC/LNO and LC/LNC)	n/a	1/2 hp	1/2 hp	1/2 hp
Full load amperes (LC/LNO and LC/LNC)	n/a	9.8 A	4.9 A	4.9 A
Locked rotor amperes (LC/LNO and LC/LNC)	n/a	58.8 A	29.4 A	29.4 A
Resistive amperes (LC/LNO and LC/LNC)	10 A			
Pilot duty VA (LC/LNO and LC/LNC)	125 VA at 24 VAC to 240 VAC			

Table 19: SPST lo-spd aux fan relay electrical ratings¹

	cULus			CE
Applied AC voltage at 50/60 Hz	24 VAC	120 VAC	240 VAC	240 VAC
Horsepower	n/a	1/2 hp	1/2 hp	1/2 hp
Full load amperes	n/a	9.8 A	4.9 A	4.9 A
Locked rotor amperes	n/a	58.8 A	29.4 A	29.4 A
Resistive amperes	10 A			
Pilot duty VA	125 VA at 24 VAC to 240 VAC			

Table 20: SPST high-speed fan (HI-SPD) relay electrical ratings

	cULus			CE
Applied AC voltage at 50/60 Hz	24 VAC	120 VAC	240 VAC	240 VAC
Horsepower	n/a	1/2 hp	1/2 hp	1/2 hp
Full load amperes	n/a	9.8 A	4.9 A	4.9 A
Locked rotor amperes	n/a	58.8 A	29.4 A	29.4 A
Resistive amperes	10 A			
Pilot duty VA	125 VA at 24 VAC to 240 VAC			


Table 21: SPST defrost relay electrical ratings

	cULus			CE
Applied AC voltage at 50/60 Hz	24 VAC	120 VAC	240 VAC	240 VAC ¹
Resistive amperes	10 A	24 A ¹	24 A ¹	24 A ¹
Pilot duty VA	125 VA at 24 to 240 VAC			

1. The A5xx Controller is rated for 24 A at temperatures up to 45°C (113°F). When the controller operates from 45°C to 60°C (113°F to 140°F), the ampere rating decreases from 24 A to 15 A at a rate of 0.6 A per 1°C. The A5xx Controller is not rated for use in ambient conditions above 60°C (140°F).

Technical specifications

Table 22: A5xx Series Wall Mount Refrigeration and Defrost Controllers

Product	A525
Power consumption	1.8 VA maximum
Supply power	84 VAC to 260 VAC, 50/60 Hz, 10 VA maximum
Ambient conditions	Operating: -30°C to 60°C (-22°F to 140°F), 0% to 95% RH noncondensing Shipping and storage: -40°C to 85°C (-40°F to 185°F), 0% to 95% RH noncondensing
Temperature sensing range	-40°C to 50°C (-40°F to 122°F)
Input signal (Sn1 and Sn2)	A99B PTC temperature sensors: 1,035 ohms at 25°C (77°F) TS-6340 NTC temperature sensors: 10K ohms at 25°C (77°F)
Input signal (UI 4 and UI 5)	0 VDC–10 VDC input for leak detector status or dry contact binary input with a switch wired between terminals UI 4 and UI 5 and C.
HVBIN signal	120 VAC or 240 VAC
Sensor offset range	±3°C or ±5°F
RS485 Modbus	Maximum distance: 100 ft Default baud rate: 9.6K Note: Also supports a baud rate of 19.2K
External USB	Use a standard USB flash drive to extract hazard analysis critical control point (HACCP) data or update firmware revision for future upgrades.
Enclosure	IP65 watertight, corrosion-resistant, high-impact thermoplastic
Dimensions (H x W x D)	196.8 mm (7.75 in.) x 190.5 mm (7.5 in.) x 82.6 cm (3.25 in.)
Weight	1.1 kg (2.4 lb)
Compliance 	United States: cULus Listed; UL60730-1, UL60730-2-9, File SDFY.SA516 FCC Compliant to CFR47, Part 15, Class B
	Canada: cULus Listed; CAN/CSA-E60730-1:15, CAN/CSA-E60730-2-9:15, File SDFY7.SA516; Industry Canada (IC) compliant to Canadian ICES-003, Class B
	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive; RoHS Directive
	Australia and New Zealand: RCM Mark, Australia/NZ emissions compliant

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.

Table 19: A99B type positive temperature coefficient (PTC) temperature sensor

Ambient sensing and operating conditions¹	Type A99BA: -40°C to 100°C (-40°F to 212°F); 0% to 100% RH, condensing Type A99BB: -40°C to 100°C (-40°F to 212°F); 0% to 100% RH, condensing Type A99BC: -40°C to 120°C (-40°F to 248°F); 0% to 100% RH, condensing
Reference resistance	1,035 ohms at 25°C (77°F) and 855 ohms at 0°C (32°F)
Accuracy	0.5C° (0.9F°) between -15°C and 75°C (5°F and 167°F). Refer to the <i>A99B Series Temperature Sensors Product/Technical Bulletin (LIT-125186)</i> for accuracy rating outside of this temperature range.
Sensor construction	Probe: stainless steel (50 mm x 6.0 mm) Cable length: A99Bx-200 (2 m); A99Bx-300 (3 m); A99Bx-500 (5 m)
Sensor cable sheath	Type A99BA: Shielded polyvinyl chloride (PVC) cable Type A99BB: PVC cable Type A99BC: High temperature silicon cable
Wire gauge	22 AWG (0.33 mm ²)
Ambient storage conditions	Type A99BA: -40°C to 105°C (-40°F to 221°F); 0% to 100% RH, condensing Type A99BB: -40°C to 105°C (-40°F to 221°F); 0% to 100% RH, condensing Type A99BC: -40°C to 130°C (-40°F to 266°F); 0% to 100% RH, condensing
Shipping weight	41 g (1.4 oz) for 2 m (6.5 ft) sensor

1. When you connect any A99B series temperature sensor to an A5xx Controller, the range of displayed temperature values is restricted from -40C° to 50C° (-40F° to 122F°).

Table 20: TS6340K-F00 negative temperature coefficient (NTC) temperature sensor

Ambient sensing and operating conditions	-40°C to 100°C (-40°F to 212°F); 0% to 100% RH, condensing
Reference resistance	10,000 ohms at 25°C (77°F)
Sensor construction	Probe: stainless steel (50 mm x 6.0 mm) Cable length: 1.5 m
Sensor cable sheath	PVC cable

Table 21: UL conformity declaration information

Information	Description
Purpose of control	Sensing control/operating control
Construction of control	Electronic independently mounted control
Number of cycles	Compressor relay: 100,000
	Defrost relay: 30,000
	Evaporator fan relays: 30,000
	Alarm relay: 8,000
Method of mounting control	Four mounting screws or optional DIN rail mounting kit
Type 1C or type 2C action	Micro-interruption
Heat and fire resistance category	D
Rated impulse voltage	4,000 V
Ball pressure temperature	125°C (257°F)
Cover screw torque requirements instruction	All models: To maintain the A5xx type IP65 rating, tighten enclosure screws to 0.9 to 1.1 N·m (8 to 10 in·lb).

North American emissions compliance

United States

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio or TV technician for help.

Canada

This Class (B) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (B) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Software terms:

Use of the software that is in (or constitutes) this product or access to the cloud or hosted services applicable to this product, if any, is subject to applicable terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms. If you do not agree to be bound by such terms, you may return the unused product to your place of purchase.



www.penncontrols.com

® Johnson Controls and PENN are registered trademarks of Johnson Controls in the United States of America and/or other countries. All other trademarks used herein are the property of their respective owners. © Copyright 2018 by Johnson Controls. All rights reserved.