A52x Series Electronic Refrigeration Controller with Adaptive Defrost

Technical Bulletin

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Introduction

This document describes the features and functions of the A52x Electronic Refrigeration Controller with Adaptive Defrost (A52x Controller), and provides guidelines and instructions to set up, adjust, and troubleshoot the controller.

Overview

IMPORTANT: Use of this product is subject to and constitutes your agreement to the End User License Agreement set forth at www.johnsoncontrols.com/buildings/legal/digital LIT No. 12012405.

IMPORTANT: Use this A52x Refrigeration Controller only as an operating control. Where failure or malfunction of the A52x 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 A52x Controller.

IMPORTANT : Utiliser ce A52x Refrigeration Controller uniquement en tant que dispositif de contrôle de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du A52x 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 A52x Régulateur.

The A52x Controller provides refrigerated space control and defrost control for medium and low-temperature refrigeration applications. The A525 Controller has five line-voltage relays to control the compressor, defrost functions, high and low speed evaporator fans, and user-provided alarms. The controller can also control the following functions:

- Resistive heat
- Hot-gas bypass
- Off-cycle defrost
- Two-speed evaporator fans

Refer to the *A524/A525 Series Refrigeration Controller with Adaptive Defrost Installation Instructions (Part No. 24-7664-3310*) for information about relay wiring. 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 A52x Controller has an IP65 enclosure with holes in the enclosure base for wall-surface mounting. An optional DIN Rail mounting kit (Part No. BKT524-1K) is also available.

Concepts

A52x User Interface

The A52x Controller has an LCD user interface with adjustable brightness that displays the system status and setup information. Four status indicator icons that show the defrost, cooling, evaporator fan, and alarm features provide a visual indication of the system status and alarms. You can use four touchpad keys to navigate the system and to see detailed system information, change parameter settings, and respond to system alarms.The defrost and alarm icons also function as touchpad keys to initiate unscheduled defrost cycles and clear system alarms.

Cleaning the A52x

Remove any loose debris from the controller. Wipe the exterior surface of the controller with a cloth and mild detergent. Rinse the cloth with clean water and wipe the controller until it is clean. Dry the controller with a soft cloth.

Notes:

- Do not use abrasive cleaning powders.
- Do not use abrasive cleaning pads or brushes.
- Do not use solvents or cleaning solutions that damage plastic.

Figure 1 shows the A52x Controller user interface. Figure 2 shows the controller's status icons and touchpad keys. Table 1 on page 3 describes the user interface behavior and user actions.

Figure 1: A52x Controller Interface

Figure 2: A52x Display Fields, Icons, and Touchpad Keys

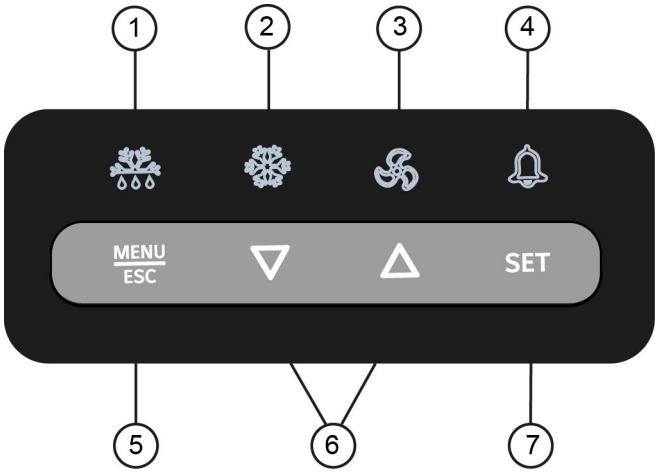


Table 1: A52x Controller Icons, Keys, Description, Behavior, and User Actions

Callout	Item Name	Description / Behavior / User-Actions
1	**Defrost Icon** 	The **Defrost** icon indicates the status of the defrost relay. A lit icon indicates that the defrost relay is closed and the system is in defrost mode. When the **Defrost** icon is off, the defrost relay is off and the system is not in defrost mode. To go to the manual defrost cycle start screen, press and hold the **Defrost** icon for three seconds.
2	**Cooling Icon** 	The **Cooling** icon indicates the status of the compressor relay. A lit icon indicates that the compressor is on. When the **Cooling** icon is off, the system is not in normal refrigeration mode; it may be in defrost mode or system shutdown.
3	**Evaporator Fan Icon** 	The **Evaporator Fan** icon indicates the status of the Evaporator Fan. A lit icon indicates that the evaporator fan relay or relays are closed. When the **Evaporator Fan** icon is off, the evaporator fan relay is open.
4	**Alarm Icon** 	The **Alarm** icon indicates the presence of alarm conditions in the system. A lit icon indicates that the alarm relay is closed. When the **Alarm** icon is off, the alarm relay is open. To acknowledge any active alarms, tap the **Alarm** icon.
5	**MENU/ESC Key**	To access the System Setup screens, press and hold the **MENU/ESC** key for three 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, tap the **MENU/ESC** key in the System Setup screens.
6	**Down and Up Keys**	To change the blinking parameter values in the System Setup screens, tap the **Down** or **Up** keys. To scroll through the menu screens available in the current menu level, tap the **Down** or **Up** keys.
7	**SET Key**	To go to the next setup menu level, tap the **SET** key. To save the blinking parameter value or menu selection and to go to the next setup screen, tap the **SET** key in any setup selection screen.

Figure 3 on page 4 shows the A52x Controller low voltage terminal block connections. Table 2 on page 4 describes the A52x Controller's low voltage terminal blocks, terminals, and wire sizes. Figure 4 on page 5 shows the A52x Controller's high voltage terminal block connections. Table 3 on page 5 describes the A52x Controller's high voltage terminal blocks, terminals, and wire sizes.

Figure 3: A52x Controller Low Voltage Terminal Block Connections

INTERNAL TO CONTROL

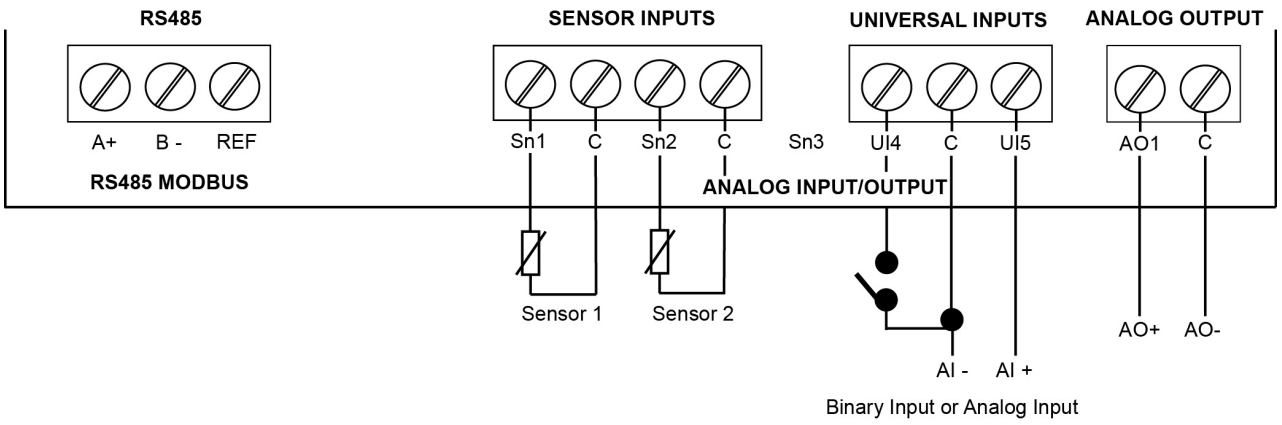


Table 2: A52x Controller Low Voltage Terminal Blocks, Terminals, and Wire Sizes

Terminal Block Label	Terminal Label	Description, Function, and Requirements	Recommended Wire Sizes
RS485 MODBUS	A +	The RS485 Modbus communications terminal block is restricted to the optional PENN Precision Superheat Controller (PSHC). Do not connect any other Modbus device to these terminals.	0.20 to 0.30 mm^2 (26 to 22 AWG) Stranded wires and twisted-leads cable
	B -		
	REF	RS485 Modbus signal common or reference.	
ANALOG INPUT/ OUTPUT	Sn1 	The main space temperature sensor. Connect either lead from the sensor to Sensor 1 (Sn1). Connect the other lead to a common (C) terminal. **Note:** Sensor wires for the A52x Controller are not polarity sensitive.	0.30 to 1.50 mm^2 (22 to 16 AWG) Stranded wires and twisted-leads cable
	C	There are four 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 Sensor 2 (Sn2). Connect the other lead to a C terminal. **Note:** Sensor wires for A52x Controller are not polarity sensitive.	
	Sn3	Not available	
	UI4	Universal Input 4 can be configured as a 0–10 VDC analog input or dry contact binary input. Connect a 0 to 10 VDC input or binary input to the UI4 (+) terminal and a C (common/-) on the low voltage terminal block.	
	UI5	Universal Input 5 can be configured as a 0–10 VDC analog input or dry contact binary input. Connect a 0 to 10 VDC input or binary input to the UI5 (+) terminal and a C (common/-) on the low voltage terminal block.	
	AOI	**Note:** Analog Output 1 (AO1) is not supported in the A525. Make no connection to this terminal. The A524 Controller does not include an analog output and does not have an AO1 terminal block.	

Figure 4: A52x Controller High Voltage Terminal Block Connections

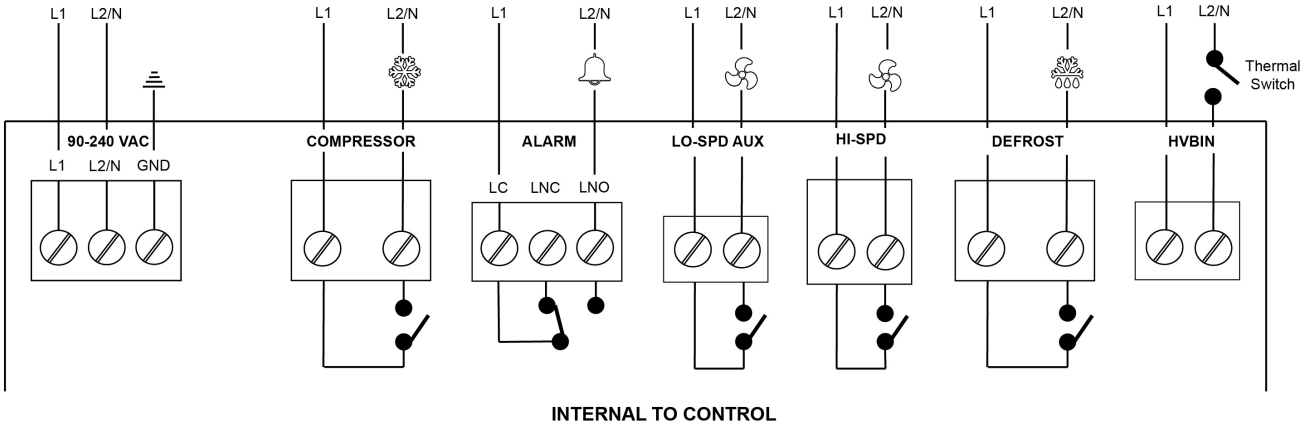


Table 3: A52x Controller High Voltage Terminal Blocks, Terminals, and Wire Sizes

Terminal Block Label	Terminal Voltages	Description, Function, and Requirements	Recommended Wire Sizes
90-240 VAC	L1	Two terminals for supply power connection to the A525 Controller. Requires 90 to 240 VAC; 15 VA, (0.25 A maximum).	0.75 to 2.50 mm^2 (18 to 14 AWG)
	L2/N		
	GND	Earth ground connection terminal.	
Compressor		Two terminals for line-voltage, single-pole, single-throw (SPST), dry-contact relay to the control compressor.	1.50 to 6.0 mm^2 (16 to 10 AWG)
Alarm	L1/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.	0.30 to 2.50 mm^2 (22 to 14 AWG)
	LNC		
	L2/N/LNO		
LO-SPD AUX		The A525 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. The A524 Controller does not include this relay and terminal block.	0.30 to 2.50 mm^2 (22 to 14 AWG)
HI-SPD		Two terminals for line-voltage, SPST, dry-contact relay to control single-speed evaporator fans or the high-speed on two-speed evaporator fans.	0.75 to 2.50 mm^2 (18 to 14 AWG)
Defrost		Two terminals for line-voltage, SPST, dry-contact relay to control resistive defrost heater or bypass defrost solenoid.	1.5 to 6.0 mm^2 (16 to 10 AWG)
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 to 240 VAC, 50/60 Hz activation power when the external, user-supplied defrost termination switch closes.	0.30 to 1.50 mm^2 (22 to 16 AWG)

Refrigeration Mode

Refrigeration mode is the normal operating mode of the A52x Controller. The system cycles the compressor on and off, and operates the evaporator fans according to the setup selections to maintain the set point temperature in the refrigerated space. See Figure 5 on page 6 for a common application of the A52x Controller. The controller exhibits the following behaviors in refrigeration mode:

- The fan icon indicates the evaporator fan relay status, which is either on or off.
- The defrost relay and icon remain off.
- The refrigeration icon indicates when the compressor is running.
- The LCD user interface displays the Home screen, which shows the system name, date, time, space temperature, and set point.

Figure 5: Common Application of an A52x Controller

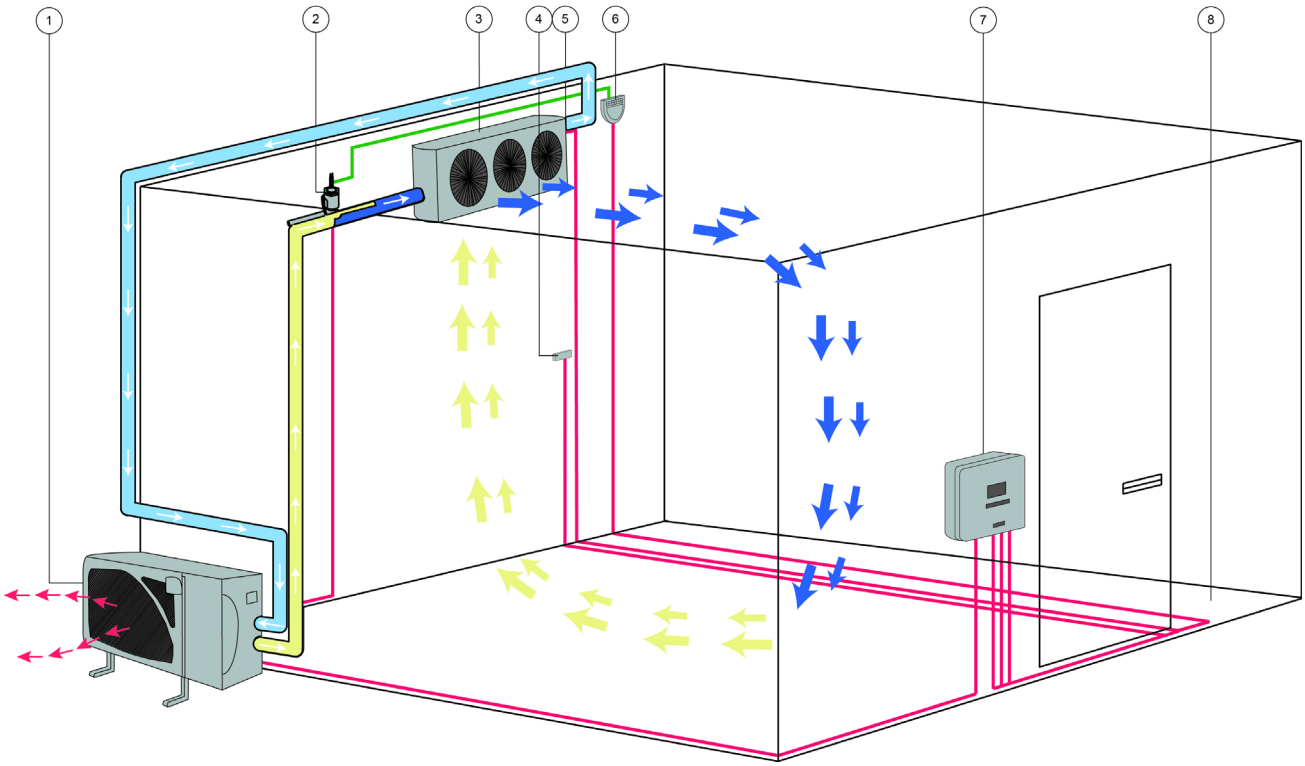


Table 4: Common Application of an A52x Controller

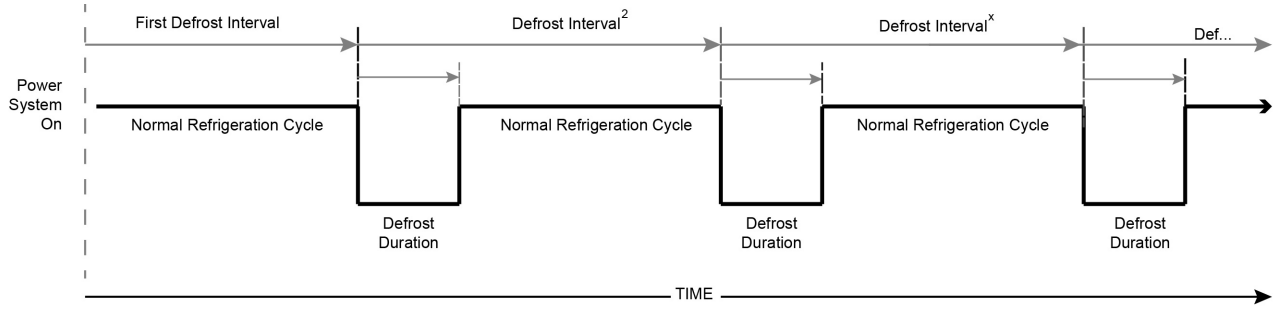
Callout	Item Name
1	Compressor/Condensing Unit
2	QREV Expansion Valve
3	Evaporator Fan with integrated Defrost Heater
4	Ambient Temperature Sensor
5	Defrost Temperature Sensor
6	Precision Super Heat Controller (PSHC)
7	A52x Controller
8	Cold Room

Defrost Mode

The selections you make for defrost type, defrost termination type, and evaporator fan behavior determine how your refrigeration system operates during defrost mode. See *Defrost Types* and *Defrost Termination Types* for more information. To manually start or stop a defrost cycle, press the **Defrost** icon for several seconds.

A *defrost duration* is the time period that the refrigeration system is in defrost mode and the system is melting ice off of the evaporator coil. The *defrost duration* may include Drip Time. A *defrost interval* is defined as the time between the start of a defrost cycle and the start of the next defrost cycle.

Figure 6: Defrost Intervals and Defrost Durations



Defrost Types

The A52x Controller provides defrost control for off-cycle defrost systems on medium temperature refrigeration applications of 2C° to 7C° or 35F° to 45F°. The A52x Controller also provides defrost control for electric heat or hot gas defrost systems on low temperature refrigeration applications of < 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. Off-Cycle Defrost is not used on low temperature applications. 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 temperature defrost termination cannot be set up.

Electric Defrost

Electric Defrost uses electric resistive heating elements controlled by the defrost relay to melt the ice that accumulates on the evaporator coil during normal cooling operation. The electric resistive heating elements are typically embedded in or positioned near to the evaporator coil and drain pan. Electric Defrost is often used on low temperature refrigeration applications. During Electric Defrost, the compressor relay remains off for the defrost duration, the defrost relay is on, and the evaporator fan relay or relays are usually off. Electric Defrost cycles use either temperature-based defrost termination or time-based defrost termination.

Hot Gas Defrost

Hot Gas Defrost systems use a bypass valve controlled by the defrost relay and extra refrigerant piping to temporarily reroute the hot gas discharge from the compressor through the evaporator coil. The re-routed 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 usually off. Hot Gas Defrost cycles typically use temperature-based defrost termination but may be set up for time-based defrost termination.

Defrost Termination Types

The A52x Controller can terminate the defrost durations based on time or temperature. Temperature termination applications use a temperature sensor (Sn2) or a temperature switch mounted on the evaporator coil. On applications that use temperature-based termination by sensor or switch, the maximum defrost duration value is also defined 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. The defrost duration must be of sufficient length to remove all of the ice that accumulated on the evaporator during the previous defrost interval. Timed 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 high enough 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 your refrigeration application. The temperature termination switch is mounted on the evaporator coil and it has a fixed temperature termination value. You do not need to set a defrost termination temperature value during defrost setup. When 120 to 240 VAC is detected across the HVBIN terminals, the A52x Controller terminates the defrost duration.

Time Based Termination Overrides Temperature Termination

The maximum defrost duration time period overrides both 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 A52x Controller to schedule routine defrosts or use the adaptive defrost feature, which automatically determines the optimal time to initiate the defrost cycles for your refrigeration system.

Scheduled Defrost

You can set up Scheduled Defrost as manual or automatic. You can schedule one to eight daily defrost cycles. Using the manual setting, you set the start times for each daily defrost cycle. Using the automatic setting, you 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 (equal-length) defrost intervals. You can use the manual option to change one or more of the scheduled start times after you create a schedule.

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. See *Adaptive Defrost Setup Parameters* for more information. 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.

Compressor and Evaporator Fan Start Delays

You can set up four time delay features on the A52x Controller to control the compressor and evaporator fan operation:

- Compressor Anti-Short Cycle Delay

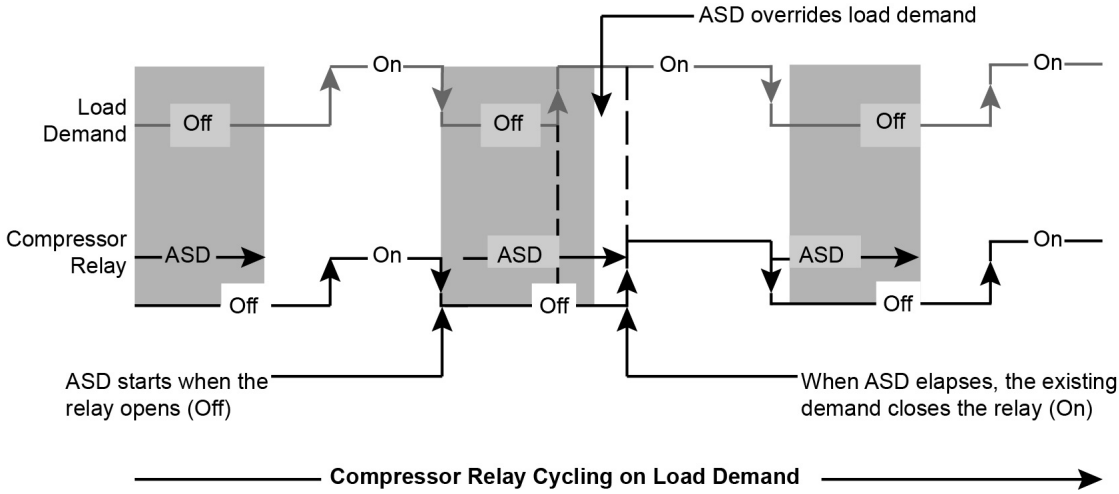
- Evaporator Fan Drip-Time Delay
- Evaporator Fan Temperature Delay
- Evaporator Fan Time Delay

When the A52x Controller is in a delay period, the delay type and the minutes left in the delay scroll across the Message Field at the top of the display.

Anti-Short Cycle Delay

Anti-Short Cycle Delay (ASD) maintains the compressor relay off or 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 to 12 minutes for the Anti-Short Cycle Delay. See Figure 7.

Figure 7: Anti-Short Cycle Delay (ASD) Overriding Load Demand to Maintain Compressor Relay Off



Evaporator Fan Drip-Time Delay

Evaporator Fan Drip-Time Delay holds the compressor relay and the evaporator fan relays off (open) after the defrost duration terminates. The user-selected drip-time delay allows the evaporator coil to shed additional water and reduces the moisture that blows into the refrigerated space when the evaporator fans start. Select from 0 to 10 minutes for the Evaporator Fan Drip-Time Delay after the defrost duration terminates. The Evaporator Fan Drip-Time Delay is not available for Off Cycle (passive) Defrost. See Figure 8 on page 10.

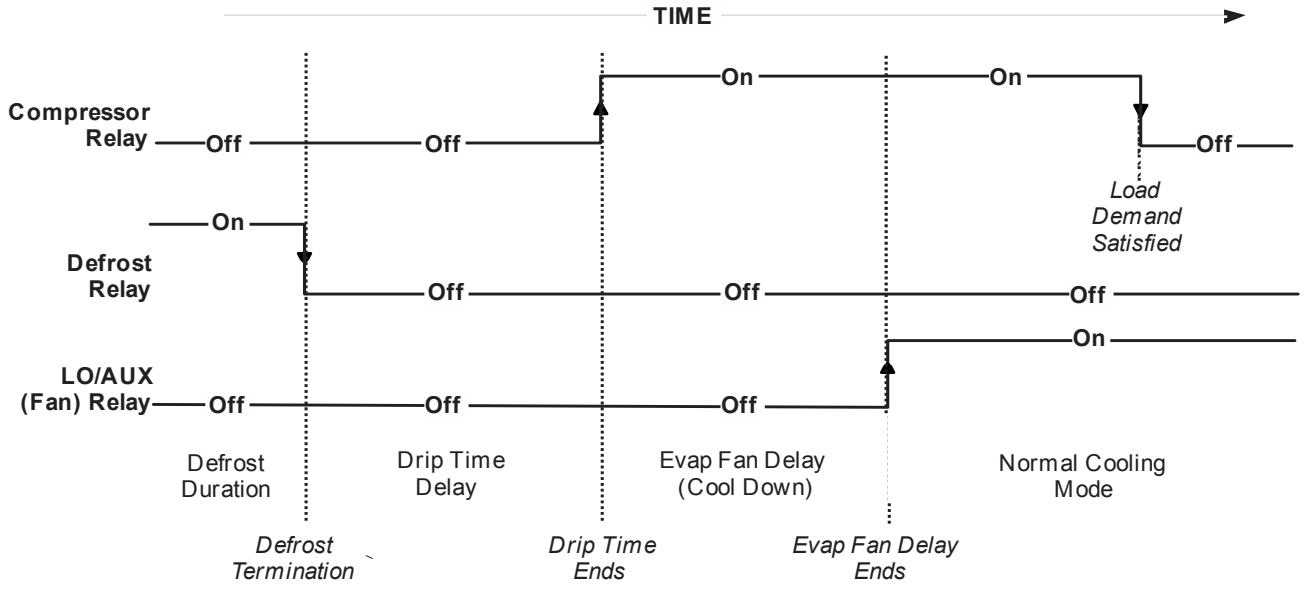
Evaporator Fan Temperature Delay

Evaporator Fan Temperature Delay holds the evaporator fan relay or relays off (open) after the defrost termination, drip-time delay, and compressor start in cooling mode. This temperature-based evaporator fan delay allows the evaporator coil to cool down and freeze any moisture before the evaporator fan or fans start. This delay reduces the moisture and warm air that is blown into the refrigerated space. Select from 20F° to 35F° for the Evaporator Fan Temperature Delay. See Figure 8 on page 10.

Evaporator Fan Time Delay

Evaporator Fan Time Delay holds the evaporator fan relays off (open) after defrost termination, drip-time delay, and compressor restart in cooling mode. This time-based evaporator fan delay allows the evaporator coil to cool down and freeze any moisture before the evaporator fan or fans start. This delay reduces the water and warm air that is blown into the refrigerated space. The Evaporator Fan Time Delay works with the Evaporator Fan Temperature Delay. If the evaporator coil reaches the evaporator fan temperature value before the time delay, the fan turns on. If the time delay expires first and the coils are not at the temperature value, the fan turns on. Select a time delay from 0 to 15 minutes to allow the evaporator to freeze any remaining moisture, before the evaporator fans turn on.

Figure 8: Example of the A52x Controller Relay States During Defrost Duration, Drip Time Delay, and Evaporator Fan Delay



System Setup Parameters

The System Setup parameters define the basic system attributes, the hardware features, and hard-wired components of your refrigeration system.

The first step in setting up an A52x Controller for your refrigeration system requires entering the System Setup parameters. After the System Setup parameters are defined to your system's requirements, only the setup screens and parameters that are required to set up the system's operation are available for set up.

System Setup parameters include the following features:

- Time and date
- 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 create an access password, download controller firmware updates, and also set up the Quick Response Expansion Valve/Precision Superheat Controller (QREV/PSHC) monitoring and control features.

Time and Date Setup

The Date/Time setup screens guide you through the setup of the following features:

- Time Format (12 or 24 hours)
- Time (hours, minutes, and AM or PM)
- Date Format (DMY or MDY)

- Date (day, month, and year)
- Automatic Daylight Saving Time change over.

Sensor Setup

The A52x Controller requires the Sn1 cooling temperature sensor to monitor and control the cooling temperature in the refrigerated space. Temperature-termination defrost applications and the Adaptive Defrost feature requires either a Sn2 defrost termination sensor or a HVBIN defrost termination switch mounted on the evaporator coil.

The A52x Controller can use two types of sensors. In North America, all standard A52x Controller models ship with two A99B-type temperature sensors. In Europe, the TS-6340 Negative Temperature Sensor (NTC) is available for use. The sensors are set up independently; Sn1 and Sn2 do not have to be the same sensor type.

To set up the sensors on an A52x Controller, select the sensor type and the sensor offset in the System Setup screens. The sensor offset allows you to offset the sensed temperature -5C° to 5C° or -5F° to 5F°. 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 either 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 A52x Controller is designed to communicate with the Johnson Control/PENN Quick Response Expansion Valve (QREV) and Precision Super Heat Controller (PSHC). If the refrigeration system uses a QREV/PSHC, you can monitor the QREV status, adjust the superheat set point, and change the refrigerant type on the PSHC to match the refrigeration system's refrigerant type. The QREV/PSHC status screens display the superheat, the evaporator outlet temperature and pressure, the current valve state, and the PSHC firmware version.

Evaporator Fan Control

Evaporator fan behavior 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 set up 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. See Figure 9 on page 12. You can set a two-speed evaporator fan to run continuously at high speed. See Figure 10 on page 13. You can also cycle between low-speed and high-speed. See Figure 11 on page 13.

Figure 9: Compressor and Lo/Aux Relay States for Single Speed Evaporator Fan Operation in Normal Refrigeration Mode: Continuous On Fan or Cycling Fan with Compressor

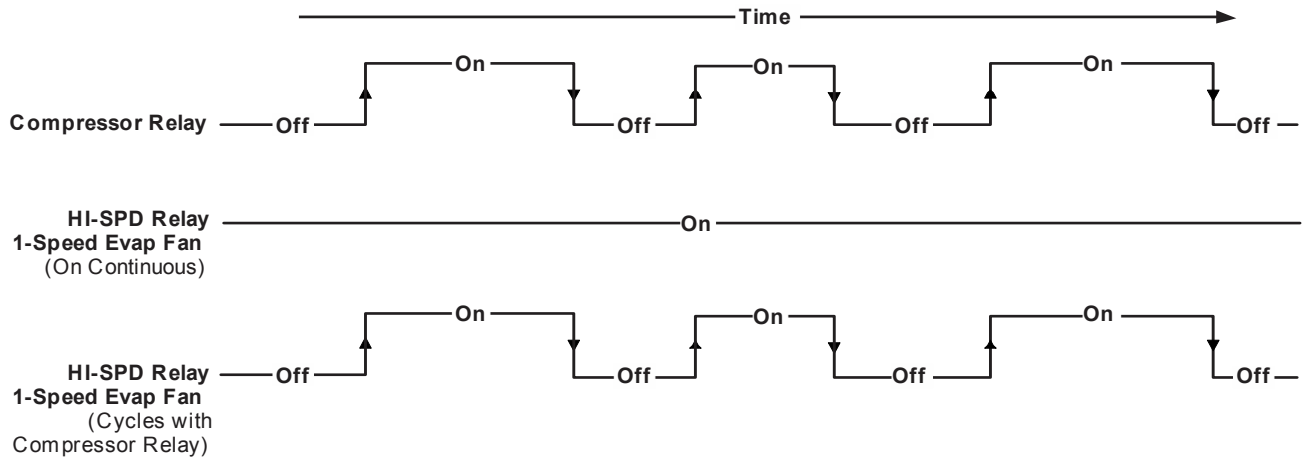


Figure 10: Compressor, Lo/Aux, and Hi-Spd Relay States for Two Speed Evaporator Fan Operation in Normal Cooling Mode: Continuous High Speed Fan

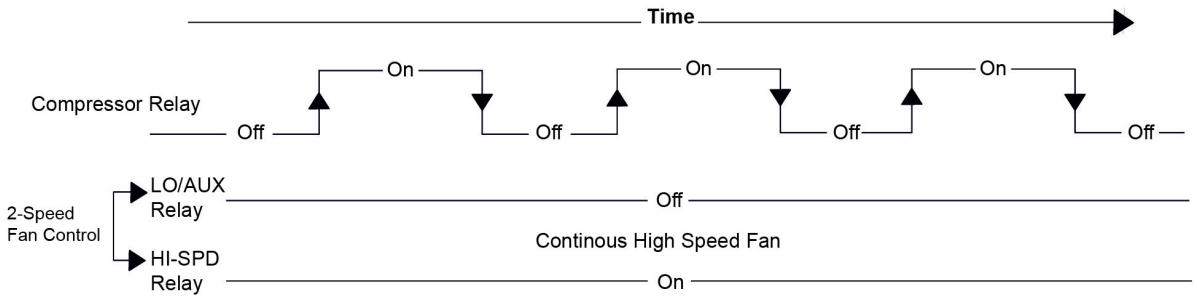
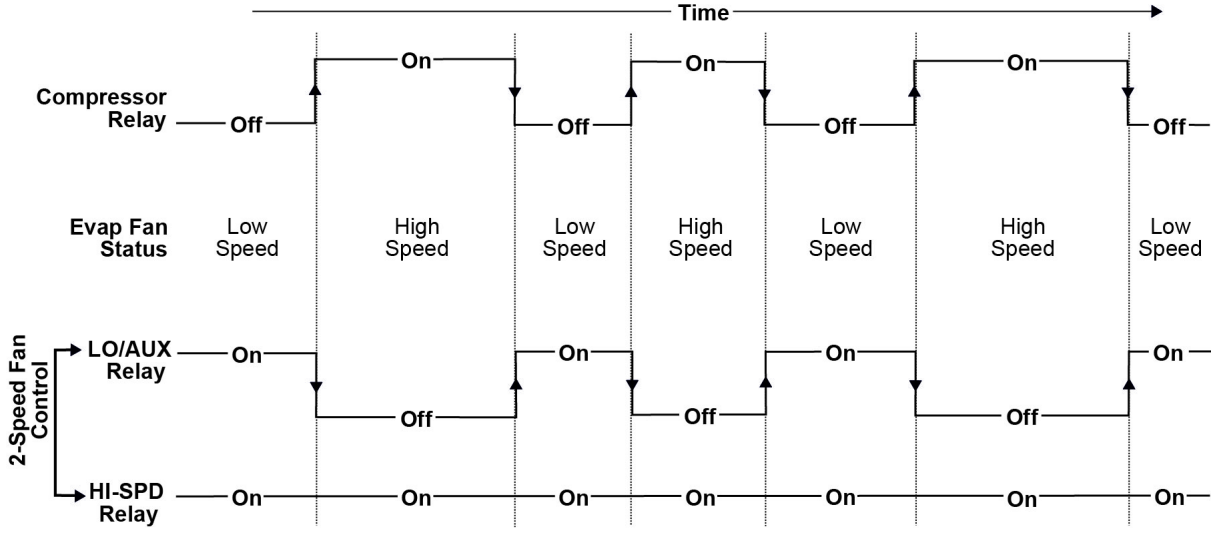


Figure 11: Compressor, Lo/Aux, and Hi-Spd Relay States for Two Speed Evaporator Fan Operation in Cooling Mode Set Up for Low Speed Fan when Compressor is Off, High Speed when Compressor is On



Evaporator Fan Operation in Defrost Mode

The Evaporator Fan Drip-Time Delay, Evaporator Fan Temperature 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 to 15 minutes. This feature does not apply if the controller is set to an off-cycle defrost.

Adaptive Defrost Setup Parameters

Expected Defrost Duration

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

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 Defrost

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, which 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, you must set up the Blackout Start Time and Blackout parameters in the Defrost Setup menu flow.

- **Blackout Start Time:** This is the time at which 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/ Date screens in the System Setup menu flow.
- **Blackout Duration:** This 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

Universal Input Modes

You can set each of the universal inputs to one of the modes in Table 5. When you select an input mode, one or more control actions become associated with that mode.

Note: The system defines alarm actions separately from control 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 5: A52x Universal Input Modes and Control Actions

Mode	Control Action when condition is TRUE
None	The state of the universal input has no effect on the A52x control.
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	You can select one of the following options for this input mode: • Normal Control indicates that relays R1-R4 are unaffected. • System Shutdown. This option takes priority over the normal control of the compressor, defrost, and fan relays. • Low Speed Fan, if running at High Speed. This option becomes available only if the control is configured with the two-speed fan option. This takes priority over the normal control of the fan relays. This option is available on the A525 Controller only. • Energize Auxiliary Relay. This option becomes available only if the two-speed fan option is not used. This option is available on the A525 Controller only.
Door Open	You can select one of these options for this binary input mode: • Normal Control indicates that R1-R4 are unaffected. • Low Speed Fan. This option becomes available only if the control is configured with the two speed fan option. This option takes priority over the normal control of the fan relays. This option is available on the A525 Controller only. • Shut off cooling. • Energize Auxiliary Relay if the two speed fan option is not used. This option is available on the A525 Controller only.
Emergency Switch (Wall switch)	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 fan relays.

Setting Up Universal Input Modes

You can set each of the two universal inputs to one of these modes. When you configure an input mode, you must specify if the input is a binary or an analog input. You then indicate what level of input equates to the TRUE condition.

Table 6: A52x Universal Inputs and Mode Selections

Universal Input	Mode Selection	Binary or Analog	True State (binary)	True State (analog)
1	None, not used Refrigerant Leak Man in Room Door Open Emergency Switch	BIN / ANA	OPEN / CLOSED	> nnn (user enters voltage)
2		BIN / ANA	OPEN / CLOSED	> nnn (user enters voltage)

Alarm Setup Parameters

Table 7: List of Alarms and Alarm True Conditions

Alarms	Alarm TRUE Condition
High Temperature Alarm	The Sensor 1 temperature is greater than the high temperature alarm value that you defined for a period of time equal to or greater than the alarm delay.
Low Temperature Alarm	The Sensor 1 temperature is less than the low temperature alarm value that you defined for a period of time equal to or greater than the alarm delay.
Sensor Failure	Sensor 1 is in a state of failure.
Sensor Failure	Sensor 2 is in a state of failure.
Door Open Alarm	The door is open for a period of time equal to or greater than the value that you defined.
Man in Room Alarm	A person is in the room for a period of time equal to or greater than the value that you defined.
Refrigerant Leak Alarm	The refrigerant leak detector indicates a leak. This may be a voltage level that you defined.
Emergency Shutdown	Emergency shutdown activates when a person trapped inside a cold room flips a switch.

Alarm Actions

- Piezo: If enabled, the piezo energizes.
- 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.
- Local UI: The local UI lights the alarm icon when any alarm condition is TRUE or requires acknowledgment.

Alarm Settings

You must set these parameters for each alarm:

- Threshold: Each alarm may have a specific level, units, and range. For example, temperature alarms expect Fahrenheit or Celsius values to set the alarm threshold. The Door Open alarm expects a time duration. A binary input expects a 1 or 0, or an Open or Closed selection to indicate the alarm state.
- Piezo: Enabled or Disabled.
- Delay: This time is represented in minutes. The alarm condition must remain TRUE for the required number of minutes before an actual alarm sounds. If the condition clears before the number of minutes elapses, no alarm action initiates. If you set the delay to zero, the alarm triggers immediately.
- Auto Clear: Select a latching alarm or a self-clearing alarm. The latching alarm requires you to acknowledge an alarm at the A52x Controller. The alarm icon remains lit, the alarm relay energizes, and the piezo sounds (if enabled) until you acknowledge the alarm, even if the alarm condition is no longer TRUE. A self-clearing alarm is an alarm that no longer identifies itself as TRUE if the underlying alarm condition clears.
- Re-Alarm Interval: This time is represented in minutes. If you acknowledge the alarm and the alarm relay deactivates but the alarm condition persists for this number of minutes, the alarm relay reactivates.

Alarm vs Warnings

The alarm set up 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. A lit yellow alarm icon indicates an alarm warning. Alarm warnings do not cause the alarm relay to energize and the system does not add an alarm to event log.

Cooling Shutdown

Cooling Shutdown is a specific action that can occur when one of the two Universal Input modes receives an external signal. The controller turns off the compressor and the fan when the system receives an external signal.

System Shutdown

A system shutdown takes priority over the normal control of the compressor, defrost, and fan relays. It can happen if an alarmed condition such as man-in room, refrigerant leak or emergency switch is activated. An active system shutdown state means that all outputs are set to off, excluding the alarm output. This state can be entered by detection of a refrigerant leak, if enabled, or a Universal Input that is configured to provide this signal.

Detailed Procedures

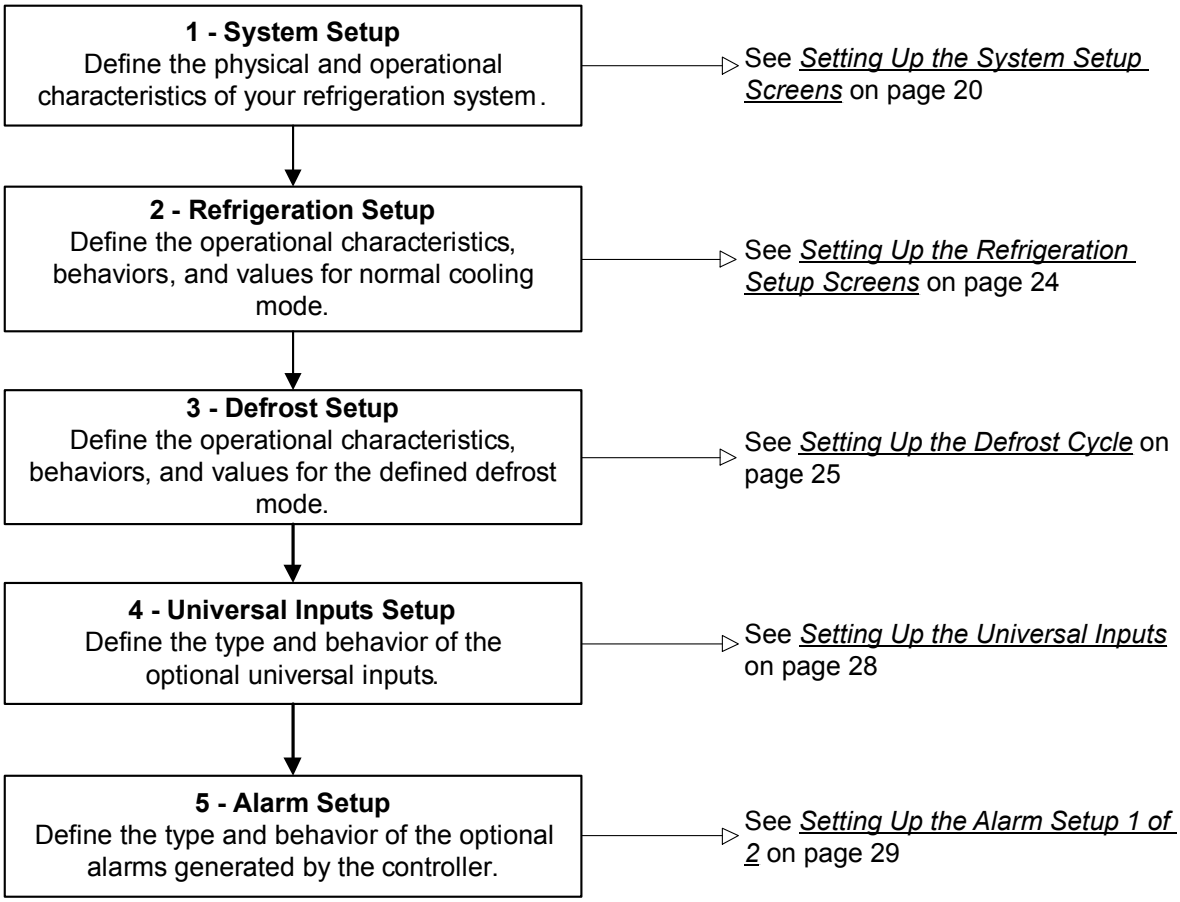
Setting Up the A52x Controller

Set up the physical components and features of the A52x Controller in the System Setup screens. The selections and values you enter in the System Setup screens define the characteristics and operation of your refrigeration system on the A52x Controller.

Note: The gray setup screens indicate setup selections that are available based on previous setup selections.

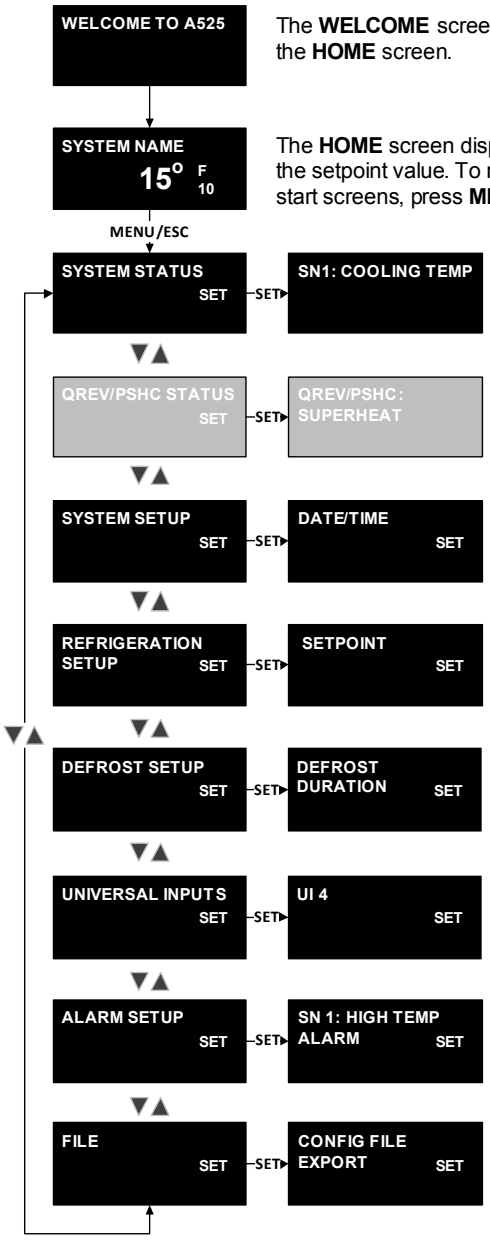
After you define the system setup parameters in the A52x Controller for your system, the setup screens that do not apply to your selections become unavailable when you set up the cooling and defrost parameters. The A52x Controller ships with factory default selections and values in the system screens. In most applications, you must change some of the factory default selections and values to meet your system's specific cooling and defrost requirements. See Figure 12 for the high-level work flow for setting up the A52x Controller for your refrigeration system.

Figure 12: High-Level Setup Work Flow for the A52x Controller



Navigating the High-Level Status and Setup Start Screen

To scroll through the high-level Status and Setup Start screens, tap the **DOWN** and **UP** keys.



The **WELCOME** screen displays when the A52x Controller powers on, and then changes 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 **MENU/ESC.**

To scroll through and view the **SYSTEM STATUS** screens, press **SET** in the **SYSTEM STATUS** screen. See Viewing the System Status Screens for more information.

To scroll through and view the **QREV/PSHC STATUS** screens, press **SET** in the **QREV/PSHC STATUS** start screen. See Viewing the QREV/PSHC Status Screens for more information. **Note:** The **QREV/PSHC STATUS** screens are available only if a QREV is installed on the system.

To scroll through and set up the **SYSTEM SETUP** screens, press **SET** in the **SYSTEM SETUP** start screen. See Setting Up the System Setup Screens for more information.

To scroll through and set up the **REFRIGERATION SETUP** screens, press **SET** in the **REFRIGERATION SETUP** start screen. See Setting Up the Refrigeration Setup Screens for more information.

To scroll through and set up the **DEFROST SETUP** screens, press **SET** in the **DEFROST SETUP** start screens. See Setting Up the Defrost Setup Screens for more information.

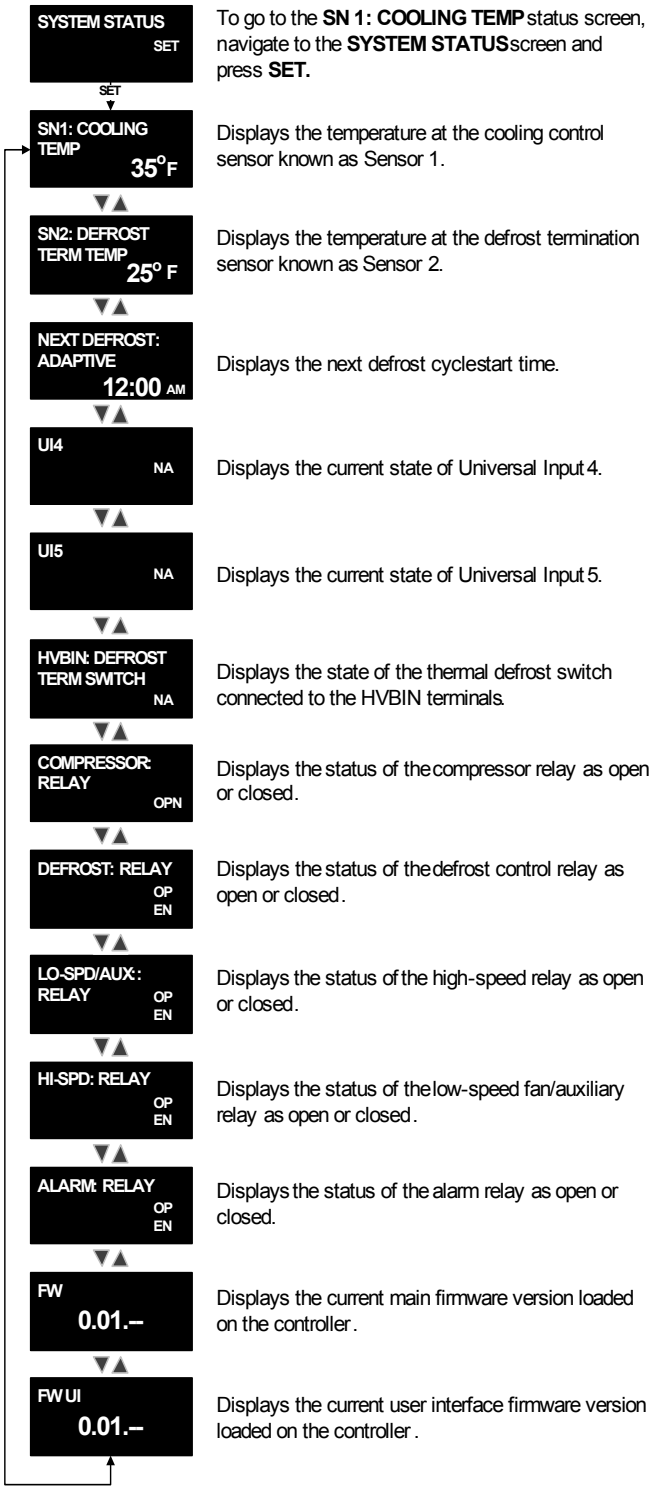
To scroll through and set up the **UNIVERSAL INPUTS** screens, press **SET** in the **UNIVERSAL INPUT** setup start screen. See Setting Up the Universal Input Screens for more information.

To scroll through and set up the **ALARM SETUP** screens, press **SET** in the **ALARM SETUP** start screen. See Setting Up the Alarm Setup Screens for more information.

To scroll through and set up the **FILE** screens, press **SET** in the **FILE** start screen. See Setting Up the File System Setup Screens.

Viewing System Status

The **SYSTEM STATUS** screens provide the current status of the sensors, the cooling system, the universal inputs, and the system control relays. The **SYSTEM STATUS** screens also identify the firmware versions on the controller. The information on these screens can help you to troubleshoot system and controller problems. To scroll through the **SYSTEM STATUS** screens, tap the **DOWN** and **UP** keys.



To go to the **SN 1: COOLING TEMP** status screen, navigate to the **SYSTEM STATUS** screen and press **SET.**

Displays the temperature at the cooling control sensor known as Sensor 1.

Displays the temperature at the defrost termination sensor known as Sensor 2.

Displays the next defrost cyclestart time.

Displays the current state of Universal Input 4.

Displays the current state of Universal Input 5.

Displays the state of the thermal defrost switch connected to the HVBIN terminals.

Displays the status of the compressor relay as open or closed.

Displays the status of the defrost control relay as open or closed.

Displays the status of the high-speed relay as open or closed.

Displays the status of the low-speed fan/auxiliary relay as open or closed.

Displays the status of the alarm relay as open or closed.

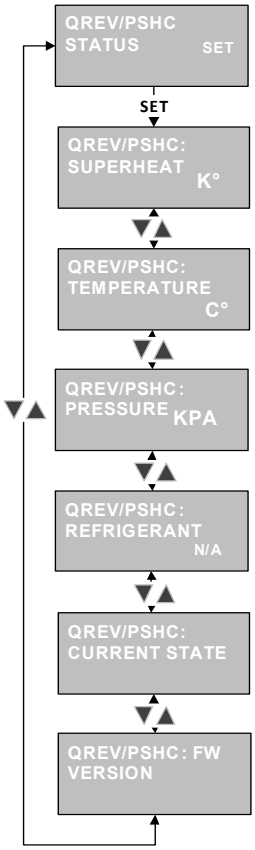
Displays the current main firmware version loaded on the controller.

Displays the current user interface firmware version loaded on the controller.

Viewing QREV/PSHC Status

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

The A52x Controller can monitor and control a QREV/PSHC. To view the **QREV/PSHC STATUS** screens, navigate to the **QREV/PSHC STATUS** start screen in the high-level menu flow and press **SET** to go to the **QREV/PSHC: SUPERHEAT** status screen. To scroll through the QREV/PSHC status screens, tap the **DOWN** and **UP** keys.



To go to the **QREV/PSHC: SUPERHEAT** status screen, press **SET**.

Displays the QREV/PSHC calculated superheat temperature value

Displays the temperature sensed at the QREV/PSHC temperature sensor

Displays the pressure sensed at the QREV/PSHC pressure sensor

Displays the refrigerant type at the QREV/PSHC.

Displays the QREV/PSHC's active notification codes

Displays the version of the QREV/PSHC firmware.

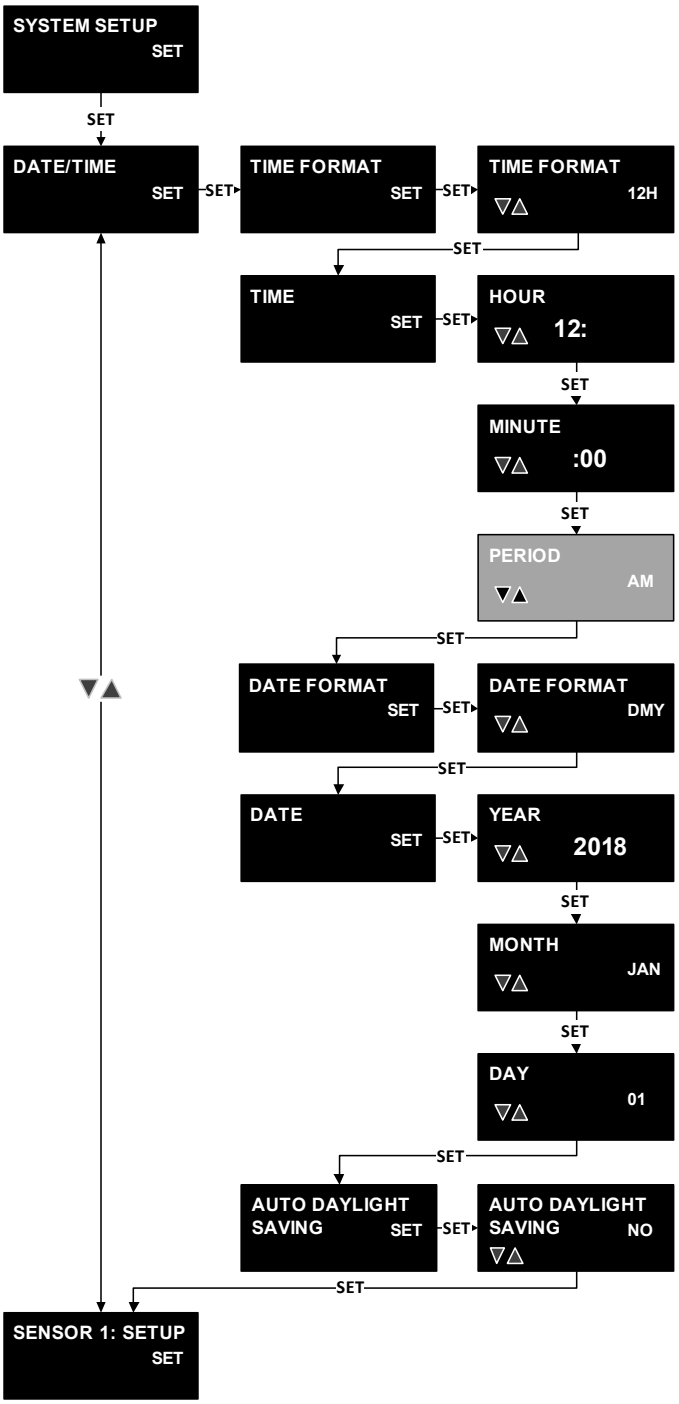
Setting Up the System Setup Screens

The first step to configure the A52x Controller is to define your refrigeration system in the System Setup screens. You can set up the following settings in the System Setup Screens:

- System time and date
- System components
  - Sensor types
  - Evaporator fan motor type
  - Defrost system type
  - Optional defrost termination type
- System setup parameters
  - System name
  - Temperature units
  - Display brightness
  - Keypad sound
  - Update firmware
  - Optional user security passcode.

Setting Up the System Time and Date

To set the date and time on the A52x Controller, navigate to the **SYSTEM SETUP** start screen and press **SET** to go to the **DATE/TIME** screen. To scroll through the **DATE/TIME** screens and options, tap the **DOWN** and **UP** keys.



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

To set the hour, select the hour value and press **SET.** The hours range is **1 to 12** or **1 to 24**.

To set the minutes, select the minute value and press **SET**. The minutes range is **00 to 59.**

To set the time period, select **AM** or **PM** and press **SET**. **Note:** The **PERIOD** screen does not appear if you select the **24H** time format.

The date format options are **MDY** (MMM DD / YYYY) or **DMY** (DD MMM / YYYY). To set the date, select **MDY** or **DMY** and press **SET.**

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

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

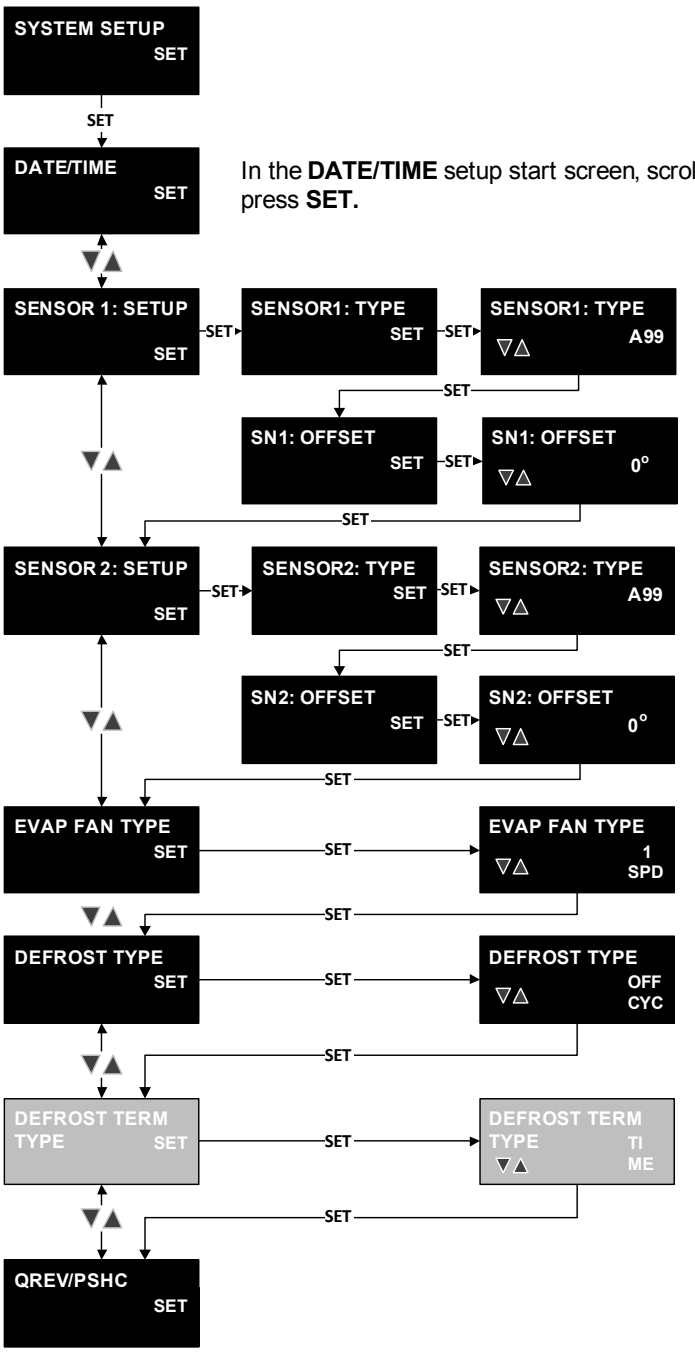
To set the day, select the day code and press **SET.**

To enable or disable the Daylight Savings 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 high-level **SYSTEM SETUP** screen and press **SET.** To scroll through the **SYSTEM COMPONENT** screens and options, tap the **DOWN** and **UP** keys.

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



In the **DATE/TIME** setup start screen, scroll to the **SENSOR 1: SETUP** screen and press **SET.**

To set a Sensor 1 sensor type, select **A99** or **NTC** (Negative Temperature Coefficient) and press **SET**.

To set the Sensor 1 offset value, select the offset value and press **SET.** The offset range is -5F° to 5F°.

To set a Sensor 2 sensor type, select **A99, NON** (None or no sensor), or **NTC** and press **SET.**

To set the Sensor 2 offset value, select the offset value and press **SET.** The offset range is -5F° to 5F°.

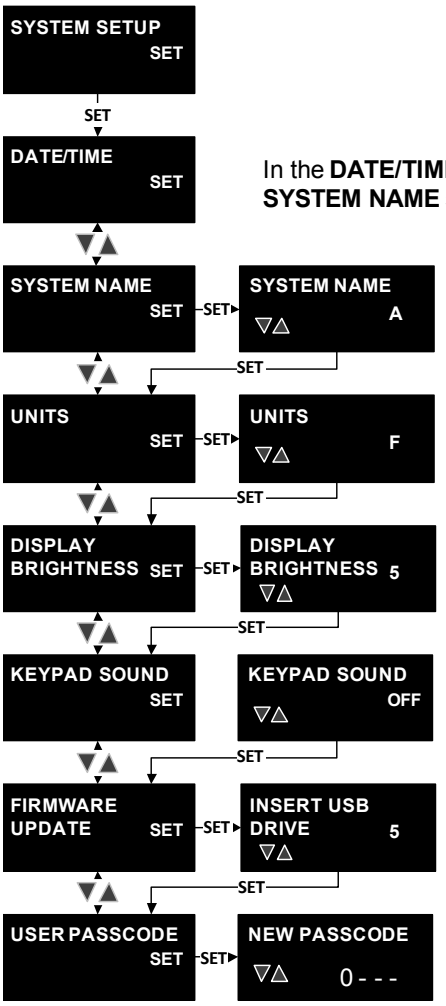
To set an evaporator fan motor type, select **1 SPD** (single-speed fan) or **2 SPD** (two-speed EC motor fan) and press **SET.**

To set the defrost type, select **OFF/CYC** (off-cycle passive defrost)**, HOT/GAS** (hot gas defrost), 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: DEFROST TERM TYPE** screens do not appear when the defrost type is **OFF/CYC**.

Setting Up the System Setup Parameters

To set the system setup parameters, navigate to the high-level **SYSTEM SETUP** screen and press **SET** to go to the **SYSTEM SETUP** menu.To scroll through the **SYSTEM SETUP** screens and options, tap the **DOWN** and **UP** keys.



In the **DATE/TIME** setup start screen, tap the **DOWN** and **UP** keys to scroll to the **SYSTEM NAME** setup start screen.

To enter a system name, scroll through the available characters and numbers with the **DOWN and UP** keys. To save a selection and go to the next character or number, press **SET**.

The units of temperature measurement are **F** (Fahrenheit) and **C** (Celsius). To set the unit of temperature measurement, select **F** or **C** and press **SET**.

To set the display brightness level, select the brightness value and press **SET.** The brightness range is **1** to **5**.

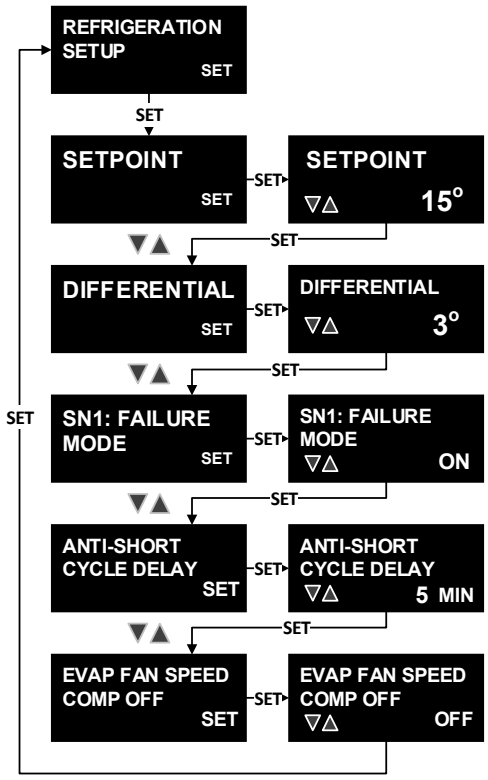
To enable or disable the keypad sound, select **ON** or **OFF** and press **SET.**

To update the controller firmware, insert a USB drive into the controller. The firmware updates automatically.

To set a new passcode, select the preferred digits and press **SET**. The digits range is **0** to **9**.

Setting Up the Refrigeration Setup Screens

To enter the **REFRIGERATION SETUP** menu, navigate to the high-level **REFRIGERATION SETUP** screen, and press **SET**. To scroll through the Refrigeration Setup screens and options, tap the **DOWN** and **UP** keys.



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

To set the system differential, enter the differential value and press **SET**. The differential value range is **1F°** to **15F°**.

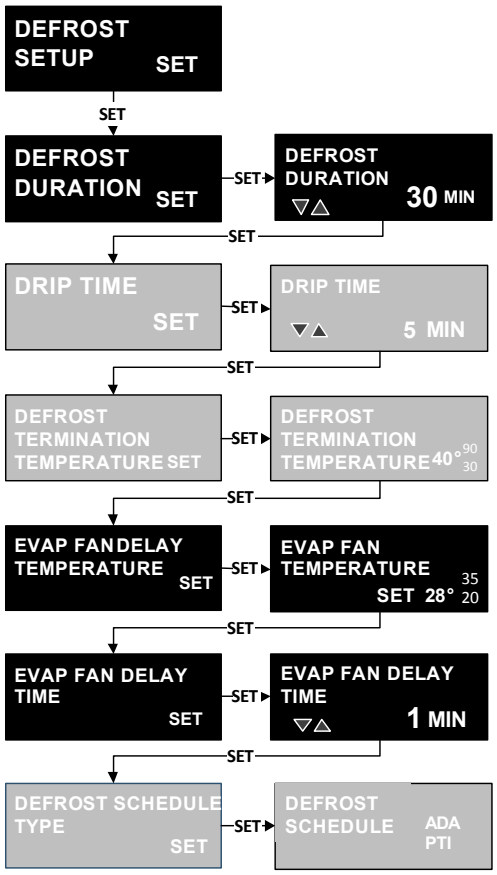
To set the Sensor 1 failure mode, select **ON**, **OFF** or **AVG** (average) and press **SET**.

To set the compressor Anti-Short Cycle Delay time, select the delay value and press **SET**. The delay value range is **0** to **12** minutes.

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 Cycle

To enter the Defrost Setup menu, navigate to the high-level **DEFROST SETUP** screen and press **SET.** To scroll through the **DEFROST SETUP** screens and options, tap the **DOWN** and **UP** keys.



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

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

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

To set the evaporator fan delay temperature sensed at the Sensor 2 defrost sensor, select the delay temperature value and press **SET**. The delay temperature value range is **20F°** to **35F°**.

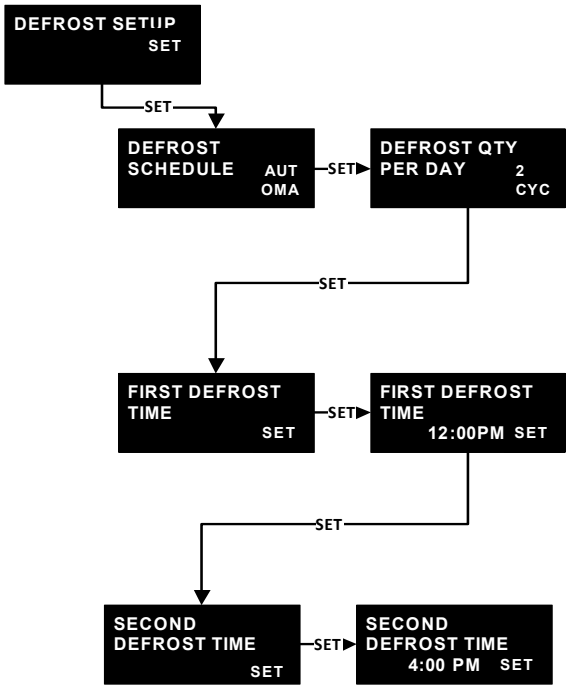
To set the evaporator fan delay time, select the delay time value and press **SET**. The delay time value range is **0** to **15** minutes.

To set the defrost schedule type, select **SCHEDU** (Scheduled) or **ADAPTI** (Adaptive) and press **SET**.

Setting up the Defrost Schedule

To enter the Defrost Schedule menu, navigate to the high-level **DEFROST SETUP** screens and press **SET.** To scroll through the **DEFROST SETUP** screens and options, tap the **DOWN** and **UP** keys.

Note: To automatically schedule the defrost cycles to start 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.



To set the number of defrost cycles in a 24 hour period, select the defrost cycle number value and press **SET**. The defrost cycle number value range is **0** to **8** defrost cycles.

To set the time for the first defrost cycle to begin, select the hour, minutes, and AM or PM values and press **SET**. **Note:** If you select **AUTOMA** in the **DEFROST SCHEDULE** screen, the start time of only the first defrost cycle is set. The remaining defrost cycles automatically start at equal time intervals after the first defrost.

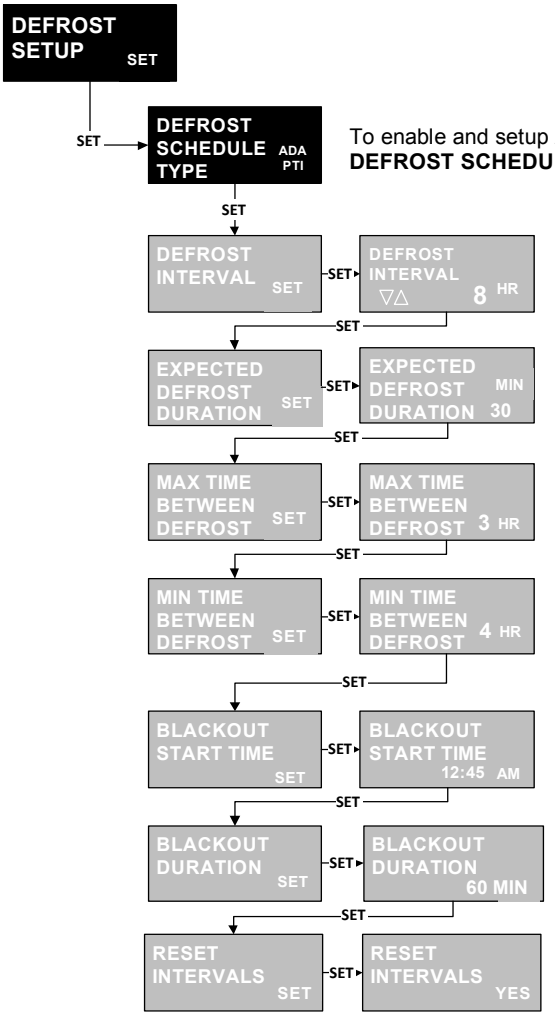
To set the time for the second defrost cycle to begin, select the hours and minutes values and press **SET**.
Notes:

- 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 continues to display the remaining defrost time screens for the desired number of defrost cycles.

Setting Up Adaptive Defrost

To enter the Adaptive Defrost menu, navigate to the high-level **DEFROST SETUP** screens and press **SET.** To scroll through the **DEFROST SETUP** screens and options, tap the **DOWN** and **UP** 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 flow.



To enable and setup Adaptive Defrost, select **ADAPTI** (Adaptive) in the **DEFROST SCHEDULE TYPE** screen and press **SET**.

To set the initial defrost interval, select the defrost interval value and press **SET**. The defrost interval value range is **1** to **48** hours.

To set the expected defrost duration, select the defrost duration value and press **SET**. The expected defrost duration value range is **1** to **99** minutes.

To set the maximum time between defrost cycles, select the maximum time value and press **SET**. The maximum time value range is **3** to **48** hours.

To set the minimum time between defrost cycles, select the minimum time value and press **SET**. The minimum time value range is **3** to **48** hours.

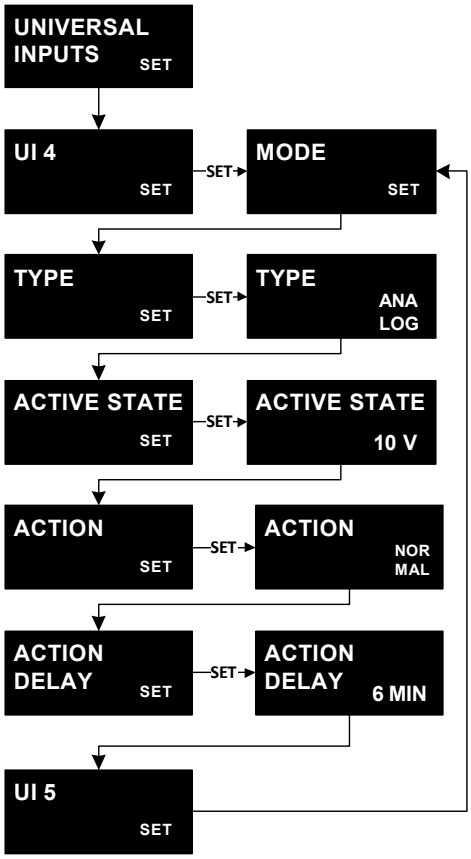
To set the blackout period start time, select the hours, minutes, and AM or PM values and press **SET**.

To set the length of time that a blackout period persists, select the blackout duration value and press **SET**. The blackout duration value is **0** to **240** minutes.

To erase the Adaptive Defrost feature's historical data and reset the system to the initial defrost interval, select **YES** and press **SET**.

Setting Up the Universal Inputs

To view the Universal Inputs screens, navigate to the **UNIVERSAL INPUTS** start screen and press **SET** to go to the **UI4** screen. To scroll through the universal inputs screens and option, tap the **DOWN** and **UP** keys.



To set a universal input mode, select **EMG SW** (Emergency Switch), **DOR OPN** (Door Open), **MAN RM** (Man In Room), **REF LK** (Refrigerant Leak), or **NON** (None), and press **SET**.

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

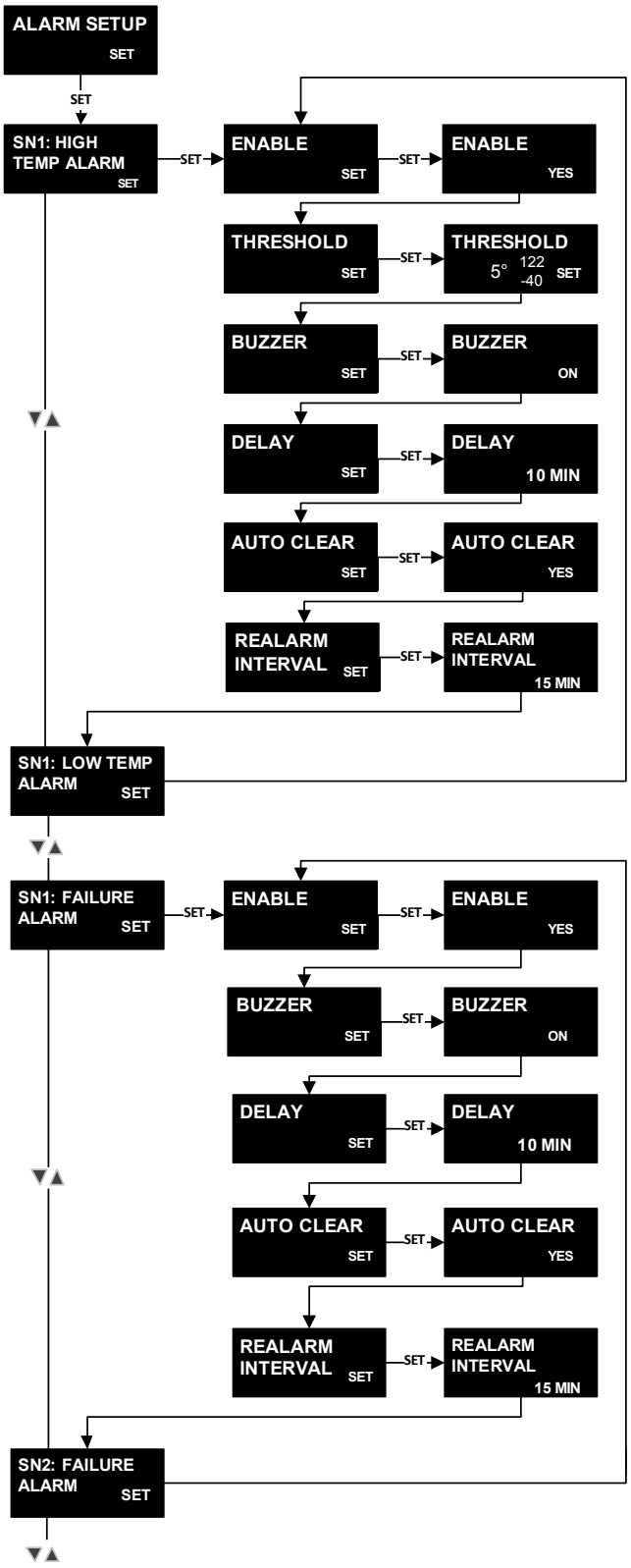
To set an active state, scroll through the active state range and press **SET** at your preferred selection. The active state range is **0** to **10 V**.

To set an action mode, select **NORMAL**, **COO OFF** (Cooling Off), or **AUX ON** (Auxiliary On), and press **SET.**

To set an action delay time, scroll through the action delay range and press **SET** at your preferred selection. The action delay range is **0** to **10** minutes.

Setting Up the Alarm Setup 1 of 2

To view the Alarm Setup screens, navigate to the **ALARM SETUP** start screen and press **SET** to go to the **Sn1: HIGH TEMP ALARM** screen. To scroll through the alarm setup screens, tap the **DOWN** and **UP** keys.



To enable the high temperature alarm at Sensor 1, select **YES** and press **SET**. To continue to the **THRESHOLD** screen without enabling the alarm , select **NO** and press **SET**.

To set the threshold for a high temperature alarm at Sensor 1, select the high temperature threshold value and press **SET.** The threshold range is **-40F°** to **122F°**.

To set the buzzer for a high temperature alarm at Sensor 1, select **ON** and press **SET**. To continue to the **DELAY** screen without setting the buzzer, select **OFF** and **SET**.

The delay time is the period of time that elapses before an alarm annunciates. To set the delay time , select the delay time value and press **SET**. The delay value range is **0** to **99** minutes.

Auto clear mode automatically clears a high temperature alarm if the alarm condition is no longer true . To enable auto clear , select **YES** and press **SET**. To continue to the **REALARM INTERVAL** screen without enabling auto clear , select **NO** and press **SET**.

The realarm interval reactivates the high temperature alarm if the alarm condition persists for a specific period of time . To set the realarm interval , select the time period value and press **SET**. The realarm interval time period is **0** to **99** minutes.

To enable the failure alarm at Sensor 1, select **YES** and press **SET**. To continue to the **BUZZER** screen without enabling the alarm , select **NO** and press **SET**.

To set the buzzer for a failure alarm at Sensor 1, select **ON** and press **SET**. To continue to the **DELAY** screen without setting the buzzer , select **OFF** and **SET**.

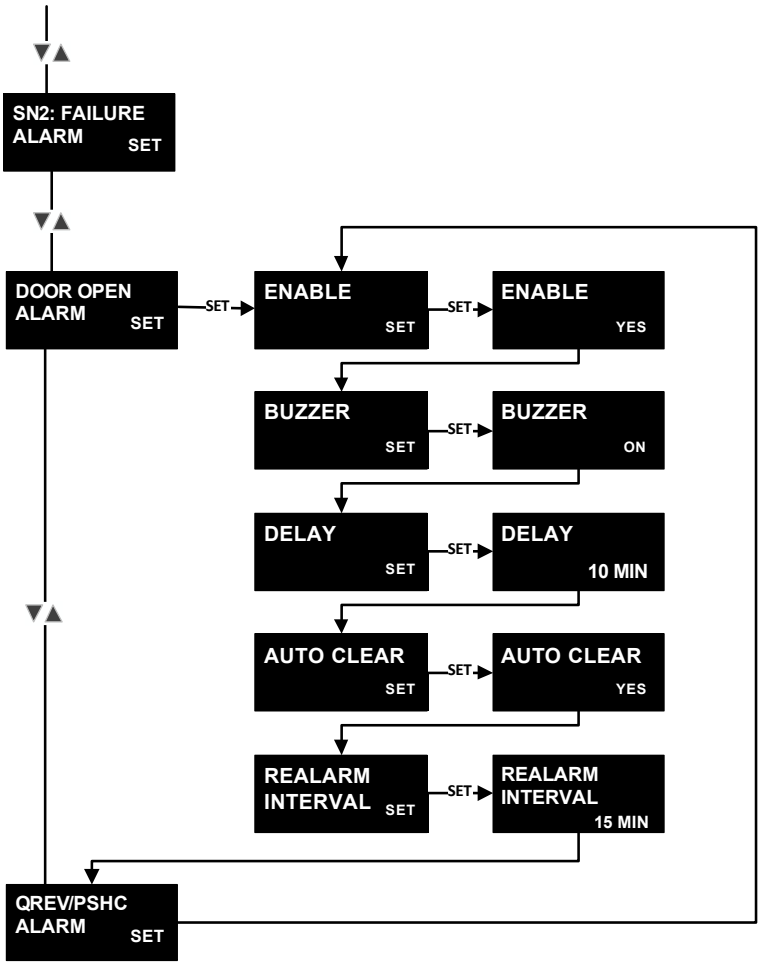
The delay time is the period of time that elapses before a failure alarm annunciates. To set the delay time , select the delay time value and press **SET**. The delay value range is **0** to **99** minutes.

Auto clear mode automatically clears an alarm if the alarm condition is no longer true. To enable auto clear , select **YES** and press **SET**. To continue to the **REALARM INTERVAL** screen without enabling auto clear , select **NO** and press **SET**.

The realarm interval reactivates the failure alarm if the alarm condition persists for a specific period of time . To set the realarm interval , select the time period value and press **SET**. The realarm interval time period is **0** to **99** minutes.

Setting Up the Alarm Setup 2 of 2

Note: If you select Door Open (DOR OPN), Man in Room (MAN RM), Refrigerant Leak (REF LK), or Emergency Switch (EMG SW) for the UI4 and UI5 input alarms, the following menu displays. If you select None (NONE) for the UI4 and UI5 input alarms, the following menu does not display.



To enable the Door Open Alarm , select **YES** and press **SET**.

To set the Door Open Alarm buzzer , select **ON** and press **SET**.

To set the Door Open Alarm delay time period, select the delay time value and press **SET**. The delay value range is **0** to **99** minutes.

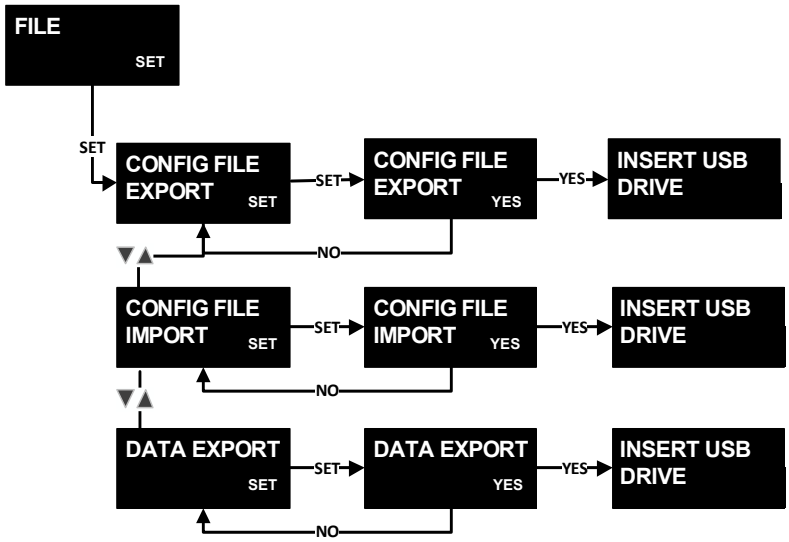
To set the Door Open Alarm auto clear , select **YES** and press **SET**.

To set the Door Open Alarm realarm interval , select the time period value and press **SET**. The realarm interval time period is **0** to **99** minutes.

Note: To set up the QREV/PSHC Alarm settings, repeat the preceding tasks .

File System

To access the File system, navigate to the **FILE** start screen and press **SET** to enter the File menu. To scroll through the **FILE** screens, tap the **DOWN** and **UP** keys.



To begin a config file export , select **YES,** press **SET**, and insert a USB drive.

To begin a config file import , select **YES,** press **SET**, and insert a USB drive.

To begin a data export , select **YES,** press **SET**, and insert a USB drive.

A524/A525 Controller Screens

Table 8 shows the screens that you may see as you set up the A52x Controller for your refrigeration system.

You can view the black screens in Table 8 in the A52x Controller user interface. The gray screens appear when they are relevant to your selections in the System Setup and other setup screens.

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 1 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
WELCOME TO A525	Temporarily displays when the A52x Controller starts.	No selection	N/A
SYSTEM NAME 15° F 10	The **HOME** screen. The System Name, current date, and time displays in the scrolling Message Field. The temperature Sensor 1 displays in the status field. Your selections for temperature units and the setpoint value display in the Info fields.	No selection	N/A
System Status Screens:			
SYSTEM STATUS SET	Top-level start screen for viewing refrigeration system status. To scroll through the top-level setup start screens, tap the **DOWN** or **UP** keys**.** To go to the **Sn1: COOLING TEMP** status screen, press **SET**.	No selection	N/A
SN1: COOLING TEMP 35° F	The temperature at Sensor 1 displays in the status field. To scroll through the **SYSTEM STATUS** screens, tap the **DOWN** or **UP** keys.	Current temperature value	N/A
SN2: DEFROST TERM TEMP F 25°	The temperature at Sensor 2 displays in the status field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	Current temperature value	N/A
NEXT DEFROST: ADAPTIVE 12:00 AM	The time at which the next defrost cycle begins displays in the status field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	Real-time value	N/A
UI4 NA	The Universal Input 4 status displays: • Binary input displays as open or closed on the upper Info field. • Analog input displays as a 0 to 10 VDC value in the status field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**OPN** or **CLS** **0.0** to **10.0** **NA**	--
UI5 NA	The Universal Input 5 status displays: • Binary input displays as open or closed on the upper Info field. • Analog input displays as a 0 to 10 VDC value in the status field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**OPN** or **CLS** **0.0** to **10.0**	N/A

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 2 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
HVBIN: DEFROST TERM SWITCH NA	The status of the user-supplied high-voltage, binary input switch connected to the HV/BIN terminals displays in the upper Info field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**OPN** or **CLS**	N/A
COMPRESSOR: RELAY OPN	The compressor relay state displays in the upper Info field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**OPN** or **CLS**	N/A
DEFROST: RELAY OP EN	The defrost relay state displays in the upper Info field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**OPN** or **CLS**	N/A
LO-SPD/AUX: RELAY OP EN	The low-speed/auxiliary relay state displays in the upper Info field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**OPN** or **CLS**	N/A
HI-SPD: RELAY OP EN	The high-speed relay state displays in the upper Info field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**OPN** or **CLS**	N/A
ALARM: RELAY OP EN	The alarm relay state displays in the upper Info field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**LNO** or **LNC**	N/A
FW 0.01.- -	The current main firmware version displays in the Status field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**X.XXX**	N/A
FW UI 0.01.- -	The current user interface firmware version displays in the Status field. To scroll through the system status screens, tap the **DOWN** or **UP** keys.	**X.XXX**	N/A
QREV Status Screens			
QREV/PSHC: STATUS SET	The top-level **QREV/PSHC Status** start screen. You can navigate through the QREV status screens from this screen. **Note:** This screen and the following QREV Status screens do not appear if a QREV and PSHC are not installed and set up in the System Setup screens.	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 3 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
QREV/PSHC: SUPERHEAT F°	Displays the current calculated Superheat temperature value. To scroll through the QREV/PSHC Status screens, tap the **DOWN** or **UP** keys.	No selection	
QREV/PSHC: TEMPERATURE F°	Displays the temperature sensed at the QREV temperature sensor on the evaporator coil outlet.	No selection	
QREV/PSHC: PRESSURE KPA	Displays the temperature sensed at the PSHC pressure sensor connected at the evaporator outlet or the suction line compressor.	No Selection	
QREV/PSHC: REFRIGERANT N/A		No Selection	
QREV/PSHC: CURRENT STATE	Displays any active QREV and PSHC notification codes.	No Selection	
QREV/PSHC: FW VERSION	Displays the current QREV and PSHC firmware version.	No Selection	
System Setup Screens			
SYSTEM SETUP SET	Top-level **SYSTEM SETUP** start screen for setting up the refrigeration system's physical features and parameters.To scroll through the top-level start screens, tap the **DOWN** or **UP** keys**.** To go to the **TIME/DATE** setup start screen, press **SET.**	No selection	
DATE/TIME SET	Time and date setup start screen. To scroll through the system setup start screens, tap the **DOWN** or **UP** keys. To go to the **TIME FORMAT** screen and set the time and date, press **SET.**	No selection	
TIME FORMAT SET	Time format setup start screen.	No Selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 4 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	The time format options are 12 hour or 24 hour. To save the selection and go to **TIME**, press **SET.**	**12H** or **24H**	**12H**
	Time setup start screen.	No selection	
	To set the hour, select the hour value and press **SET.**	Hour value	
	To the set the minutes, select the minutes value and press **SET.**	Minute value	
	Select the time period. To save the selection, press **SET.** **Note:** The **PERIOD** screen does not display if you select the 24H format in the **TIME FORMAT** selection screen.	**AM** or **PM**	
	Date format start screen.	No selection	
	Select MMM DD/YYYY or DD MMM /YYYY as the date format. To save the format, press **SET**.	**MDY** or **DMY**	**MDY**
	Date setup start screen. Select a month value and press **SET** to save the value. Select a year value and press **SET** to save the value.	Month value Year value	
	To set the year, select the year value and press **SET.**	Year value	
	To set the month, select the month value and press **SET.**	Month code	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 5 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
DAY ▽△ 01	To set the day, select the day value and press **SET.**	Day value	
AUTO DAYLIGHT SAVING SET	Auto Daylight Saving start screen.	No selection	
AUTO DAYLIGHT SAVING ▽△ NO	Select the Auto Daylight Saving Time operation.	**YES** or **NO**	
SENSOR 1: SETUP SET	To scroll through the system setup start screens, tap the **DOWN** or **UP** keys. To go to the **Sn1: TYPE** setup screen, press **SET.**	No selection	
SENSOR 1: TYPE SET	To go to the **SENSOR 1: TYPE** selection screen, press **SET.**	No selection	
SENSOR 1: TYPE ▽△ A99	Select your preferred sensor type. To save the selection, press **SET.**	**A99** or **NTC**	**A99**
SN1: OFFSET SET	To go to the **Sn1 OFFSET** selection screen, press **SET.**	No selection	
SN1: OFFSET ▽△ 0°	Select a temperature offset value for Sensor 1 between -2.5C° and 2.5C° (-5F° and 5F°). To save the selection, press **SET.**	**-2.5C°–2.5C°** (-5F°–5F°)	**0** (C) 0 (F)
SENSOR 2: SETUP SET	To scroll through the system setup start screens, tap the **DOWN** or **UP** keys. To go to the **Sensor 2: TYPE** setup screen, press **SET.**	No selection	
SENSOR 2: TYPE SET	To go to the **SENSOR 2: TYPE** selection screen, press **SET.**	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 6 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	Select the preferred sensor or no sensor. To save the selection, press **SET.**	**A99**, **NTC, or NON**	**A99**
	To go to the **Sn2: OFFSET** selection screen, press **SET**.	No selection	
	Select a temperature offset value for Sensor 2 between -2.5C° and 2.5C° (-5F° and 5F°). To save the selection, press **SET.**	**-2.5C°–2.5C°** (**-5F°–5F**°)	**0** (C) **0** (F)
	To scroll through the system setup start screens, tap the **DOWN** or **UP** keys.To go to the **Evaporator Fan Type** selection screen, press **SET.**	No selection	
	Select the evaporator fan type: single speed fan or two-speed fan. To save the selection, press **SET** to save selection.	**1-SPD** or **2-SPD**	**1-SPD**
	To scroll through the system setup start screens, tap the **DOWN** or **UP** keys**.** To go to the Defrost Type selection screen, press **SET.**		
	Select the defrost type: resistive electric heat, passive off-cycle, or hot gas bypass. To save the selection, press **SET.**	**ELE/TRC, OFF/CYC,** or **HOT/GAS**	**OFF/CYC**
	To scroll through the system setup start screens, tap the **DOWN** or **UP** keys. To go to the **DEFROST TERM TYPE** screen, press **SET.** **Note:** The **DEFROST TERM TYPE** screen does not display when the **DEFROST TYPE** is **OFF/CYC**, because off-cycle defrost termination is time-based.		
	Select the defrost termination type: high-voltage binary input temperature switch, Sn2 temperature sensor, or time-based. To save the selection, press **SET.** **Note:** The **DEFROST TERM TYPE** screen does not display when the **DEFROST TYPE** is **OFF/CYC**, because off-cycle defrost termination is time-based.	**HV/BIN, TE/MP,** or **TI/ME**	**TI/ME**

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 7 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
QREV/PSHC Setup Screens			
	To scroll through the system setup start screens, tap the **DOWN** or **UP** keys. To go to the **INSTALLED** screen, press **SET.**	No selection	
	Select **YES** or **NO** to indicate whether or not a QREV/PSHC is installed. To save the selection, press **SET.** **Note:** If you select **NO,** the **REFRIGERANT TYPE** screen and **SUPERHEAT SETPOINT** screen do not display.	**YES** or **NO**	**NO**
	To go to the **QREV/PSHC SUPERHEAT** screen, press **SET**.	No selection	
	Select the Superheat temperature value, and press **SET**. The Superheat temperature range is 2F° to 45F°.	**2F° to 45F°**	
	To go to the **QREV/PSHC REFRIGERANT TYPE** screen, press **SET**.	No selection	
	Select the refrigerant type used by the system and press **SET**. Refer to the product bulletin *Quick Response Expansion Valve (QREV) and Precision Superheat Controller (PSHC) LIT-12012398* for available programmed refrigerants.		
	To set the system name, select the preferred characters and numbers and press **SET.**	A-Z	
	To go to the **UNITS** screen, press SET.	No selection	
	To set the units of temperature measurement, select **F** (Fahrenheit) or **C** (Celsius), and press **SET**.	**F** (Fahrenheit) or **C** (Celsius)	**F**

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 8 of 19)

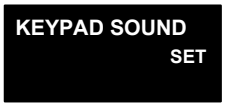
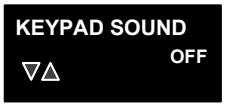
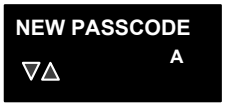
Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	To go to the **DISPLAY BRIGHTNESS** screen, press **SET**.	No selection	
	Select the LCD brightness level. To save the selection, press **SET.**	**1** to **5**	**5**
	To go to the **KEYPAD SOUND** screen, press **SET**.	No selection	
	Set the keypad sound as **ON** or **OFF.** To save the selection, press **SET.**	**ON** or **OFF**	**OFF**
	To go to the **INSERT USB DRIVE** screen, press **SET**.	No selection	
	To update the A52x firmware, insert a flash drive into the USB port.	No selection	
	To go to the **NEW PASSCODE** screen, press **SET**.	No selection	
	Select the optional user passcode value. To save the value, press **SET.**	**0000** to **9999**	**0000**
Refrigeration Setup Screens			
	The top-level **REFRIGERATION SETUP** start screen for setting up the system behavior during normal cooling mode.To scroll through the top-level start screens, tap the **DOWN** or **UP** keys. To go to the **SETPOINT** setup screen, press **SET.**	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 9 of 19)

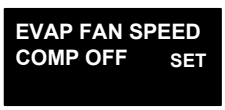
Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	To scroll through the **REFRIGERATION SETUP** start screens, tap the **DOWN** or **UP** keys**.** To go to the **SETPOINT VALUE SELECTION** screen, press **SET.**	No selection	
	Select the target setpoint value for the refrigerated space. To save the value, press **SET.**	**-40C°–50C°** **-40F°–122F°**	
	To scroll through the **REFRIGERATION SETUP** start screens, tap the **DOWN** or **UP** keys.To go to the **DIFFERENTIAL** screen, press **SET.**	No selection	
	Select the differential (setpoint + differential = cut in) value for the refrigerated space. To save the value, press **SET.**	**0.5C°–9.5C°** **1F°–15F°**	**5**°F
	To scroll through the **REFRIGERATION SETUP** start screens, tap the **DOWN** or **UP** keys.To go to the **Sn1: Failure Mode** behavior selection screen, press **SET.**	No selection	
	Select the behavior of the compressor relay if the Sn1 sensor or sensor wiring fails. You can select on, off, or the average temperature of last the four cycles before failure. To save the selection, press **SET.**	**ON, OFF,** or **AVG**	**OFF**
	To scroll through the **RFEFRIGERATION SETUP** start screens, tap the **DOWN** or **UP** keys. To go to the **ANTI-SHORT CYCLE DELAY** selection screen, press **SET.**	No selection	
	Select the number of minutes that the compressor relay remains off after it cycles off. To save the value, press **SET.**	**0** to **12** minutes	3 minutes
	To scroll through the **REFRIGERATION SETUP** start screens, tap the **DOWN** or **UP** keys**.** To go to the **EVAPORATOR FAN SPEED COMPRESSOR OFF** selection screen, press **SET.**	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 10 of 19)

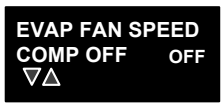
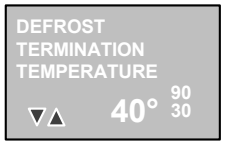
Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	Select the evaporator fan speed when the compressor relay is off. To save the selection, press **SET.** **Note:** Fan speed selections depend on whether you select **FAN TYPE 1-SPD** or **2-SPD** in the System Setup menus.	For 1-SPD Fan: **ON** or **OFF**	OFF
		For 2-SPD Fan: **HI, LOW,** or **OFF**	OFF
Defrost Setup Screens			
	The top-level **Defrost Setup** start screen for setting up the refrigeration system behavior during defrost mode. To scroll through the top-level start screens, tap the **DOWN** or **UP** keys. To go to the **DEFROST TERMINATION TEMPERATURE** screen or the **MAX DEFROST DURATION** screen and setup or adjust the defrost operation and schedule, press **SET.**	No selection	
	To go to the **DEFROST DURATION** screen, press **SET**.	No selection	
	Select the maximum defrost duration in minutes. To save the value, press **SET.** **Note:** Temperature-based defrost durations that do not reach termination temperature terminate when the maximum defrost duration time elapses.	**0** to **99** minutes	
	See *Evaporator Fan Drip-Time Delay*. To go to the **DRIP TIME** screen, press **SET.**	No selection	
	Select the preferred drip time delay in minutes after the defrost duration terminates. To save the value, press **SET.**	**0** to **10** minutes	
	To go to the **DEFROST TERMINATION TEMPERATURE** screen, press **SET**.	No selection	
	Select the defrost termination temperature, sensed at the Sn2 defrost sensor, at which the defrost duration is terminated. To save the value, press **SET**. **Note:** The **DEFROST TERMINATION TEMPERATURE** screen appears only if **TE/MP** is selected in the **DEFROST TYPE** screen in the System Setup menus.	**-1C°–30C°** **30F°–90F°**	10°C 40°F

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 11 of 19)

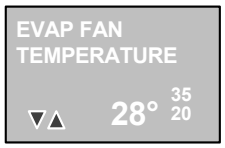
Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	See *Evaporator Fan Temperature Delay* To go to the **EVAPORATOR FAN DELAY TEMPERATURE** screen, press **SET**.	No selection	
	Select the temperature at the defrost sensor Sn2 that the evaporator coil must drop to before the evaporator fan is powered on. To save the value, press **SET.** **Note:** This screen displays only when the defrost sensor Sn2 requires setting up in the System Setup menus.	-7C°–to 2C° 20F°–35F°	-2°C 30°F
	To go to the **EVAPORATOR FAN DELAY TIME** screen, press **SET**.	No selection	
	Select the number of minutes that the evaporator fans delay turning on after the compressor relay closes, post defrost duration and drip-time delay. To save the value, press **SET.**	**0** to **15** minutes	0 minutes
Defrost Schedule Setup Screens			
	Select **AUTO** to start each of the selected number of defrost cycles per day at equal time intervals during the day. For example, if the DEFROST QTY PER DAY value is intervals, then a defrost cycle starts automatically every six hours. Select **MANUAL** to start the selected number of defrost cycles per day at a user-selected time during the day. For example, if the DEFROST QTY PER DAY value is four intervals then four defrost cycles are at four user-selected times during the day. To save the selection, press **SET**.	**AUTO** **MANUAL**	
	Select the preferred number of defrost cycles per day.	1 to 8 cycles	1 cycle
	To go to the **FIRST DEFROST TIME** screen, press **SET**.	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 12 of 19)

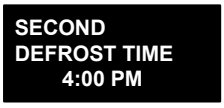
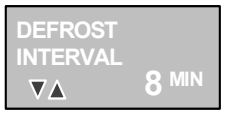
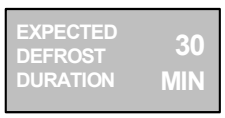
Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	Enter the real-time value at which the first defrost cycle begins. To save the value, press **SET.** **Note:** If **AUTO** is selected in the **DEFROST SCHEDULE** screen, only the start time of the first interval is selected. The remaining defrost cycles per day are automatically scheduled to start at equal time intervals after the first defrost.	Real-time value	
	To set a second defrost time in the **SECOND DEFROST TIME** screen, press **SET**.	No selection	
	Enter the real-time value at which the second, third, fourth and so on defrost cycle begins. Press **SET** to save the value. **Note:** If you select **MAN/UAL** in the **DEFROST SCHEDULE** screen, you must manually schedule each remaining defrost cycle at a real-time value during a 24 hour period. Select up to eight defrost cycles in a 24 hour period.	Real-time value	
Adaptive Defrost Setup Screens			
	To enable and set up Adaptive Defrost, select **ADAPTI** (Adaptive) in the **DEFROST SCHEDULE TYPE** screen and press **SET**.	**ADAPTI** or **SCHEDU**	
	To go to the **DEFROST INTERVAL** screen to set the initial defrost interval, press **SET**.	No selection	
	To set the initial defrost interval, select the defrost interval value and press **SET.** The defrost interval value range is **1** to **48.** **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** to **48**	
	To go to the **EXPECTED DEFROST DURATION** screen to set the expected defrost duration, press **SET**.	No selection	
	To set the expected defrost duration, select the defrost duration value and press **SET**. The expected defrost duration value range is **1** 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** to **99** minutes	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 13 of 19)

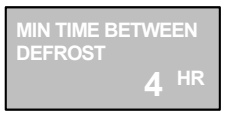
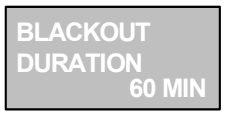
Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	To go to the **MAX TIME BETWEEN DEFROST** screen to set the maximum time between defrosts, press **SET**.	No selection	
	To set the maximum time between defrost cycles, select the maximum time value and press **SET**. The maximum time value range is **3** to **48** hours.	**3** to **48** hours.	
	To go to the **MINIMUM TIME BETWEEN DEFROST** screens to set the minimum time between defrosts, press **SET**.	No selection	
	To set the minimum time between defrost cycles, select the minimum time value and press **SET**. The minimum time value range is **3** to **48** hours.	**3** to **48** hours	
	To go to the **BLACKOUT START TIME** screen to set the blackout start time, press **SET**.	No selection	
	During the optional blackout period, an Adaptive Defrost cycle does not start. To set the blackout period start time, select the hours, minutes, and AM or PM values and press **SET**.	**Hours**, **Minutes**, and **AM** or **PM**	
	To go to the **BLACKOUT DURATION** screen to set the length of time for a blackout period, press **SET**.	No selection	
	To set the length of time that a blackout period persists, select the blackout duration value and press **SET**. The blackout duration value is **0** to **240** minutes.	**0** to **240** minutes	
	To go to the **RESET INTERVALS** screen to reset the defrost intervals, press **SET**.	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 14 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	To erase the Adaptive Defrost feature's historical data and reset the system to the initial defrost interval, select **YES** and press **SET**.	**YES** or **NO**	
Universal Inputs Setup Screens			
	To enter the **UNIVERSAL INPUTS** setup menu, press **SET**.	No selection	
	To set up the universal input mode for UI4 in the **MODE** screen, press **SET**.	No selection	
	To set a a universal input mode for UI4, select **EMG SW** (Emergency Switch), **DOR OPN** (Door Open), **MAN RM** (Man In Room), **REF LK** (Refrigerant Leak), or **NON** (None), and press **SET**.	**EMG/SW, DOR OPN, MAN RM, REF LK,** or **NON**	NON
	To set an input type in the **TYPE** screen, press **SET**.	No selection	
	To set an input type for UI4, select **BINARY** or **ANALOG** and press **SET**.	**BINARY** or **ANALOG**	
	To set an active state in the **ACTIVE STATE** screen, press **SET**.	No selection	
	To set an active state for UI4, scroll through the active state range and press **SET** at your preferred selection.	**0** to **10** V for Analog. **OPEN** or **CLOSED** for Binary	
	To set an action mode in the **ACTION** screen, press **SET**.	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 15 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	To set an action mode for UI4, select **NORMAL**, **COO OFF** (Cool Off), or **AUX ON** (Auxiliary On), and press **SET.**	**NORMAL, COO OFF,** on **AUX ON**	
	To set an action delay time in the **ACTION DELAY** screen, press **SET**.	No selection	
	To set an action delay time for UI4, scroll through the action delay range and press **SET** at your preferred selection. The action delay range is **0** to **10** minutes.	**0** to **10** minutes	
	To set up the universal input mode for UI5 in the **MODE** screen, press **SET**.	No selection	
	To set a a universal input mode for UI5, select **EMG SW** (Emergency Switch), **DOR OPN** (Door Open), **MAN RM** (Man In Room), **REF LK** (Refrigerant Leak), or **NON** (None), and press **SET**.	**EMG/SW, DOR OPN, MAN RM, REF LK,** or **NON**	
	To set an input type in the **TYPE** screen, press **SET**.	No selection	
	To set an input type for UI5, select **BINARY** or **ANALOG** and press **SET**.	**BINARY** or **ANALOG**	
	To set an active state in the **ACTIVE STATE** screen, press **SET**.	No selection	
	To set an active state for UI5, scroll through the active state range and press **SET** at your preferred selection.	**NORMAL, COO OFF,** or **AUX ON**	
	To set an action mode in the **ACTION** screen, press **SET**.	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 16 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
	To set an action mode for UI5, select **NORMAL**, **COO OFF** (Cool Off), or **AUX ON** (Auxiliary On), and press **SET.**	**NORMAL, COO OFF,** or **AUX ON**	
	To set an action delay time in the **ACTION DELAY** screen, press **SET**.	No selection	
	To set an action delay time for UI5, scroll through the action delay range and press **SET** at your preferred selection. The action delay range is **0** to **10** minutes.	**0** to **10** minutes	
Alarm Setup Screens			
	Top-level **ALARM SETUP** start screen for setting up the controller's alarm configurations. To scroll through the **ALARM SETUP** screens, tap the **DOWN** and **UP** keys. To go to the Sn1: **HIGH TEMP ALARM** setup start screen, press **SET**. **Note:** Use the following **ALARM SETUP** screens to set up the Sn1: Low Temperature alarm, Sn1: Failure alarm, Sn2: Failure Alarm, and QREV/PSHC alarm.	No selection	
	To configure the Sensor 1: High Temperature Alarm settings in the **Sn1: HIGH TEMP ALARM** menu, press **SET**.	No selection	
	To enable the Sensor 1: High Temperature Alarm, press **SET**.	No selection	
	To enable the Sensor 1: High Temperature Alarm, select **YES** and press **SET**.	**YES** or **NO**	
	To set the Sensor 1: High Temperature Alarm threshold, press **SET**.	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 17 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
THRESHOLD SET	To set the Sensor 1: High Temperature Alarm threshold, select the threshold value and press **SET.** The threshold range is **-40F°** to **122F°**.	**-40F°** to **122F°**	
BUZZER SET	To set the Sensor 1: High Temperature Alarm buzzer, press **SET**.	No selection	
BUZZER ON	To set the Sensor 1: High Temperature Alarm buzzer, select **ON** and press **SET**.	**ON** or **OFF**	
DELAY SET	To set the Sensor 1: High Temperature Alarm delay time, press **SET**.	No selection	
DELAY 10 MIN	To set the Sensor 1: High Temperature Alarm delay period, select the delay time value and press **SET**. The delay value range is **0** to **99** minutes.	**0** to **99** minutes	
AUTO CLEAR SET	To set the Sensor 1: High Temperature Alarm auto clear, press **SET**.	No selection	
AUTO CLEAR YES	To enable the Sensor 1: High Temperature Alarm auto clear, select **YES** and press **SET**. T	**YES** or **NO**	
REALARM INTERVAL SET	To set the Sensor 1: High Temperature Alarm realarm interval, press **SET**.	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 18 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
REALARM INTERVAL 15 MIN	To set the Sensor 1: High Temperature Alarm realarm interval, select the time period value and press **SET**. The time period range is **0** to **99** minutes.	**0** to **99** minutes	
File System Setup Screens			
FILE SET	Top-level **FILE** start screen to configure the controller's file and data import and exports. To scroll through the **FILE** screens, tap the **DOWN** and **UP** keys. To go to the **CONFIG FILE EXPORT** screen, press **SET**.	No selection	
CONFIG FILE EXPORT SET	To set up a file export in the **CONFIG FILE EXPORT** screen, press **SET**.	No selection	
CONFIG FILE EXPORT YES	To confirm a file export, select **YES**, and press **SET**.	**YES** or **NO**	
INSERT USB DRIVE	To export a file, insert a USB drive into the controller.	No selection	
CONFIG FILE IMPORT SET	To set up a file import in the **CONFIG FILE IMPORT** screen, press **SET**.	No selection	
CONFIG FILE IMPORT YES	To confirm a file import, select **YES**, and press **SET**.	**YES** or **NO**	
INSERT USB DRIVE	To import a file, insert a USB drive into the controller.	No selection	

Table 8: A52x Controller Set Up Screens, Descriptions, Behaviors, Value Ranges a Selection Lists (Part 19 of 19)

Screen Name in Message Field	Parameter Description, Behavior, User Action	Value Range or Selection List	Default Value or Selection
DATA EXPORT SET	To set up a data export in the **DATA EXPORT** screen, press **SET**.	No selection	
DATA EXPORT YES	To confirm a data export, select **YES**, and press **SET**.	**YES** or **NO**	
INSERT USB DRIVE	To export data, insert a USB drive into the controller.	No selection	

Info Field Codes

The two information fields in the lower right corner of the LCD display flashing codes in the parameter selection screens. Table 9 identifies and describes these codes. Use the up and down arrows to scroll through the available selections in the screen.

When the preferred code is flashing in the Info 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 Screen* 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 9: Information Field Selection Codes, Code Identifications, and Code Descriptions

Info Field Selection Codes	Code Identification and Description
1 SPD	**Single-speed evaporator fan** Select for applications with a single-speed evaporator fan or fans.
2 SPD	**Two-speed evaporator fan** Select for applications with a two-speed evaporator fan or fans.
12 HR	**12-hour time display format** Select to display hours as 1 to 12 and with AM or PM time periods.
24 HR	**24-hour time display format** Select to display hours as 1 to 24 and without AM or PM time periods.
A99	**A99 temperature sensor** Select the sensor type.
ANL	**Analog input type** Select to configure a universal input as a 0 to 10 VDC analog input.
AU TO	**Auto-generate** defrost interval start times occur at equal frequency throughout the day. Select 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 to enable the LO/AUX Relay as an auxiliary output.
AVG	**Average** Select to set up the Sn1 Sensor 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	**Binary type input** Select to configure a universal input as a binary on or off input.
C	**Celsius** degrees Select the units of temperature measure.
CLS	**Closed** Select to set the active state of a Universal Input set up as a binary input.
DMY	**Day, Month, and Year** date format: The date displays as DD/MMM/YYYY.
DOR OPN	**Door Open** Select an optional alarm condition mode in the **ALARM** setup screens.
ELE TRC	**Electric resistive defrost** Select to choose a defrost type in the **SYSTEM SETUP** screens.
EMG SW	**Emergency Switch** Select an optional alarm condition mode in the **ALARM** setup screens.
F	**Fahrenheit degrees** Select the units of temperature measure.
HIGH	**High Speed** Two-speed fan speed selection

Table 9: Information Field Selection Codes, Code Identifications, and Code Descriptions

Info Field Selection Codes	Code Identification and Description
HOT GAS	**Hot Gas** defrost Select to choose a defrost type in the **SYSTEM SETUP** screens.
HV BIN	**High Voltage Binary Switch** A defrost termination type when a high-voltage binary switch terminates the defrost
LOW	**Low** Select to operate a two-speed fan at low speed.
LOW SPD	**Low Speed Fan** This is a Universal Input Action Type.
MAN RM	**Man in Room** An optional alarm condition selection in the **ALARM** setup screens.
MAN UAL	**Manual** defrost schedule set up. Use this selection to choose the real-time value for each of the selected number of defrosts that occur daily.
MDY	**Month, Day, and Year** date format Select to display the date format as MMM DD/YYYY.
NO	No
NON	**None** Select for no selection
NOR MAL	Normal
NTC	Negative Temperature Coefficient temperature sensor
OFF	**Off** Sn1 Sensor 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.
OFF CYC	Off Cycle defrost type
ON	On Sn1 Sensor 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.
OPN	Open The active state of a Universal Input set up as a Binary Input
REF LK	Refrigeration leak
SYS OFF	System Shutdown Universal Input Action Type
TI ME	Time-based defrost termination type
YES	Yes

Related Documentation

Technical Specifications

Relay Electrical Ratings

Table 10 through Table 14 provides the electrical ratings for the control relays in the A52x Controller. See Table 16 for the relay's duty cycle ratings.

Table 10: SPST Compressor Relay Electrical Ratings

Agency and File	**UL 60730**			**EN 60730**
Applied AC Voltage at 50/ 60 Hz	24 VAC	120 VAC	240 VAC	240 VAC
Horsepower	--	1 HP	1 HP	1 HP
Full Load Amperes	--	16 A	8 A	8 A
Locked Rotor Amperes	--	96 A	48 A	48 A
Resistive Amperes	10 A	--	--	--
Pilot Duty VA	125 VA at 24 to 240 VAC			

Table 11: SPDT Alarm Relay Electrical Ratings

Agency and File	**UL 60730**			**EN 60730**
Applied AC Voltage at 50/ 60 Hz	24 VAC	120 VAC	240 VAC	240 VAC
Horsepower (LC/LNO and LC/LNC)	--	1/2 HP	1/2 HP	1/2 HP
Full Load Amperes (LC/ LNO and LC/LNC)	--	9.8 A	4.9 A	4.9 A
Locked Rotor Amperes (LC/LNO and LC/LNC)	--	58.8 A	29.4 A	29.4 A
Resistive Amperes (LC/ LNO and LC/LNC)	10 A	10 A	10 A	10 A
Pilot Duty VA (LC/LNO and LC/LNC)	125 VA at 24 to 240 VAC			

Table 12: SPST Low Speed Fan or Auxiliary (LO-SPD AUX) Relay Electrical Ratings (included on the A525 but not on the A524)

Agency and File	**UL 60730**			**EN 60730**
Applied AC Voltage at 50/ 60 Hz	24 VAC	120 VAC	240 VAC	240 VAC
Horsepower	--	1/2 HP	1/2 HP	1/2 HP
Full Load Amperes	--	9.8 A	4.9 A	4.9 A
Locked Rotor Amperes	--	58.8 A	29.4 A	29.4 A
Resistive Amperes	10 A	10 A	10 A	10 A
Pilot Duty VA	125 VA at 24 to 240 VAC			

Table 13: SPST High Speed Fan (HI_SPD) Relay Electrical Ratings

Agency and File	UL 60730			EN 60730
Applied AC Voltage at 50/ 60 Hz	24 VAC	120 VAC	240 VAC	240 VAC
Horsepower	--	1/2 HP	1/2 HP	1/2 HP
Full Load Amperes	--	9.8 A	4.9 A	4.9 A
Locked Rotor Amperes	--	58.8 A	29.4 A	29.4 A
Resistive Amperes	10 A	10 A	10 A	10 A
Pilot Duty VA	125 VA at 24 to 240 VAC			

Table 14: SPST Defrost Relay Electrical Ratings

Agency and File	UL 60730			EN 60730
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. Rated for 24 A at temperatures up to 45°C (113°F). From 45C° to 60C° (113F° to 140F°), the Ampere rating decreases from 24 A to 15 A at a rate of 0.6 A per 1°C. The A52x Controller is not rated for use in ambient conditions above 60°C (140°F).

Table 15: (Part 1 of 2)A52x Refrigeration Controller with Adaptive Defrost

Product	A524/A525
Power Consumption	1.8 VA maximum
Supply Power	84 VAC to 260 VAC, 50/60 HZ, 10 VA maximum
Ambient Conditions	**Operating:** -30C°–60C° (-22F°–140F°), 0 to 95% RH non-condensing **Shipping and Storage:** -40C°–85C° (-40F°–185F°), 0 to 95% RH non-condensing
Temperature Sensing Range	-40C°–50C°(-40F° –122F°)
Input Signal (Sn1 and Sn2)	1,035 ohms at 25°C (77°F) for A99B PTC temperature sensors 10,000 ohms at 25°C (77°F) for TS-6340 NTC temperature sensors
Input Signal (UI4 and UI5)	0–10 VDC input for leak detector status or dry contact binary input with a switch wired between terminals UI4 and UI5 and C.
HVBIN Signal	120 VAC or 240 VAC
Sensor Offset Range	±3ºC or ±5ºF
RS485 MODBUS	Maximum distance is 100 ft; 9.6K baud is the default but 19.2K is also supported.
External USB	Use a standard USB flash drive to extract 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)

Table 15: (Part 2 of 2)A52x Refrigeration Controller with Adaptive Defrost

Product	A524/A525
Compliance	**United States:** cULus Listed; UL60730-1, UL60730-2-9, File SDFY.SA515; 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 (2014/ 30/EU) and Low Voltage Directive (2014/35/EU); RoHS Directive (2011/65/EU)
	Australia and New Zealand: RCM Mark, Australia/NZ emissions compliant

Table 17: A99B Type PTC Temperature Sensors

Ambient Sensing and Operating Conditions[1]	Type A99BA and A99BB: -40C° to 100C° (-40F° to 212F°); 0 to 100% RH, condensing Type A99BC: -40C° to 120C° (-40F°to 248F°); 0 to 100% RH, condensing
Reference Resistance	1,035 ohms at 25°C (77°F) and 855 ohms at 0°C (32°F)
Accuracy	0.5°C (0.9°F) between -15C° and 57C° (5°F and 167°F). Refer to the *A99B Series Temperature Sensors Product/Technical Bulletin (LIT-125186)* 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 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 and A99BB: -40C° to 105C° (-40F° to 221F°); 0 to 100% RH, condensing Type A99BC: -40C° to 130C° (-40F° to 266F°); 0 to 100% RH, condensing
Shipping Weight	41 g (1.4 oz) for 2 m (6 1/2 ft) sensor

1. When any A99B Series Temperature Sensor is connected to an A52x Controller, the range of displayed temperature values is restricted from -40C° to 50Cº (-40F° to 122Fº).

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 18: TS6340K-F00 NTC Temperature Sensor

Ambient Sensing and Operating Conditions	-40C° to 100C° (-40F° to 212F°); 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 16: UL Conformity Declaration Information (Part 1 of 2)

Information	Description
Purpose of Control	Sensing control/operating control
Construction of Control	Electronic independently mounted control

Table 16: UL Conformity Declaration Information (Part 2 of 2)

Number of Cycles	Compressor relay: 100,000 cycles
	Defrost relay: 30,000 cycles
	Evaporator fan relays: 30,000 cycles
	Alarm relay: 8,000 cycles
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	4000 V
Ball Pressure Temperature	125°C (257°F)
Cover Screw Torque Requirements Instruction	All models: To maintain the A52x Type IP65 rating, tighten enclosure screws to 0.9–1.1 N·m (8–10 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/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.

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