LogiTemp® Electronic Controller System Operations Manual For Split-Pak™ Refrigeration Systems Containing A1 Refrigerants

Contents

Overview

The KE2 Evap OEM provides the energy savings, precise temperature control, frost reduction, and communications capability of the KE2 Evaporator Efficiency in a compact and economic package. It replaces and performs the function of multiple mechanical components such as the thermostat, defrost time clock, defrost termination, and fan delay. The KE2 Evap OEM controls the liquid line solenoid (LLS), evaporator fans, and defrost heaters (if present). It is able to control an electronic expansion valve (EEV) to regulate superheat but will also function with a mechanical thermostatic expansion valve.

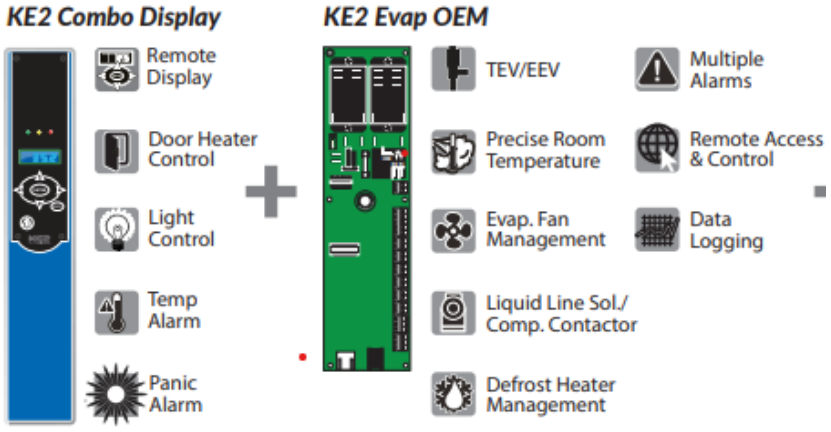
Defrosts are initiated by a proprietary calculation of actual evaporator efficiency. When evaporator efficiency has dropped to 90%, the controller will initiate a defrost. Defrost is terminated based on one or more coil temperature sensors. To maximize efficiency, fans may run for several minutes at the start of a defrost before turning off and energizing heaters.

Fans are also managed in a unique way. If wired to control fans with fan management enabled, during the off cycle the controller will intelligently cycle fans based on room and coil temperature for precise room temperature control. Fans should always be running when the controller is calling for refrigeration.

Communications capability on the KE2 Evap OEM was designed with the service technician in mind. The controller has built-in webpages that show system performance in real time, allow setpoint changes, provide a 30-day room/coil temperature graph, and a 30-day data log of all variables. The webpages can be accessed by smartphone or tablet through KE2 Therm Wi-Fi accessory, a local network, or by plugging directly into the controller with a Cat53 cable and laptop. If the controller is provided wired internet access, it can be accessed remotely via KR3 *SmartAccess*.

KE2 Combo Display KE2

Evap OEM controllers may be installed with the KE2 Combo Display. The KE2 Combo Display provides a remote display for the KE2 Evap OEM and a number.



Steps to Ensure Proper Coil Sensor Location

The coil sensor acts as defrost termination sensor and must be installed where frost is last to disappear during defrost to ensure a clear coil.

Installing the Sensor – The most active portion of the sensor is the first 1/2" of the probe.

The photo in **Figure 2** shows that the sensor is positioned so that it is touching two circuit tubes. When inserting the sensor into the coil, the tip should touch one of the circuit tubes, and the probe should be inserted into the fins so approximately 1/16" of the stainless shielding is still outside of the fins. Pinch the fins gently together, securing the sensor in place. This provides thermal ballast to ensure a complete defrost.

NOTE: The sensor should not be located adjacent to the electric heating elements.

Alternate Method- As the defrost termination sensor, it is important to ensure the sensor does not terminate defrost before all frost is removed from the coil. In some installations, inserting the sensor into the coil may position it too close to the defrost heat source. An alternate method of positioning, **Figure 3a**, places the sensor vertically between the coil fins. **Figure 3b** shows the coil sensor properly secured.

NOTE: On a small fraction of installations, the sensor placement may require adjusting. This is typically caused by product loading, door openings, air flow, high/low superheat etc. The sensor(s) should be placed where frost disappears last on the coil.

Extending sensor wires

After the sensors are mounted, they are routed back to the controller. If the wires must be extended, use **18 gauge twisted shielded pair cable.** Maximum recommended combined length for extension is 100 ft.

If additional resistance affects the temperature or pressure reading of the controller, the temperature and pressure may be "offset" to read correctly. Use the OFFSET* function, in the SETPOINTS menu.

*Requires KE2 Combo Display or access to the KE2 Evap OEM's webpage.

When running the sensor wires to the controller, avoid introducing electrical noise. Electrical noise can occur when sensor wires are located near high voltage lines. Underwriter's Laboratories defines high voltage as above 30V. The higher the voltage, the more likely electrical noise will occur.

If crossing a high voltage line is necessary, run sensor wiring at right angles to prevent noise.

Figure 1

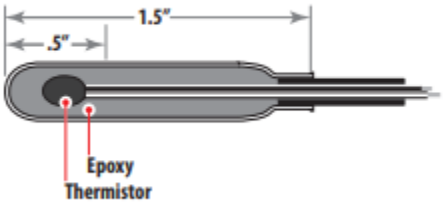


Figure 2

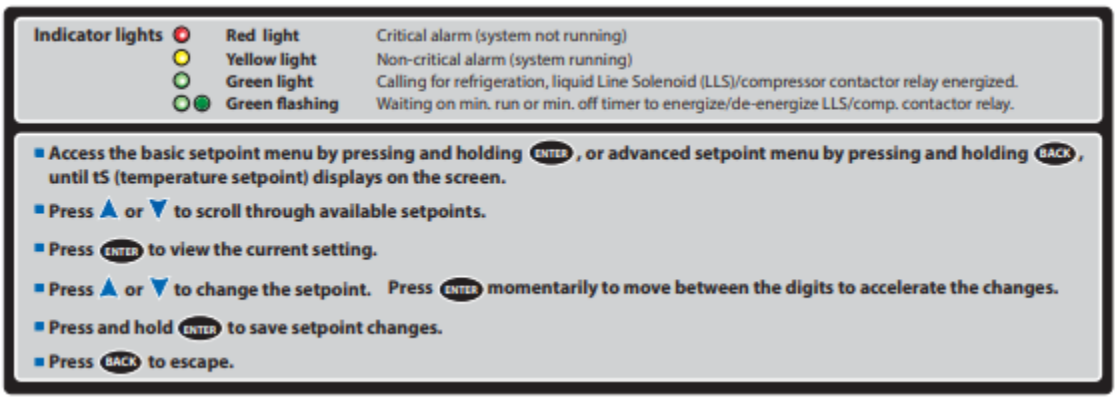
Figure 3a

Figure 3b

KE2 Basic Display

Most KE2 Evap OEM controllers ship with the KE2 Basic Display. The display allows service technicians to change major setpoints. Setpoints can also be accessed using the JE2 Combo Display or the controller's webpages.

Navigation Using the Basic Display



Controller Setup

When powering up the controller for the first time, the controller will enter **Introduction Mode**. Introduction Mode consists of four **Types of Control**. A maximum of four steps are required to begin refrigeration.

Step 1

Press ↑ or ↓ to move through the available Types of Control. Once the correct option is displayed, press and hold ENTER for 3 seconds.

Ed	Ed	**Electric Defrost with Mechanical TEV**
AdE	AdE	**Air Defrost with Electric Expansion Valve (EEV)**
Ad	Ad	**Air Defrost with Mechanical TEV**
EdE	EdE	**Electric Defrost with Electric Expansion Valve (EEV)**

Note: For mechanical valve control options (Ed and Ad), go to Step 4. For EEV control options (Ede and AdE), go to Step 2.

Step 2

Next, the controller asks for the Expansion Valve Type and displays ES (RSV). If this is the correct valve, press and hold ENTER for 3 seconds. If not, press ↑ or ↓ to select the correct valve. See page 12 for a list of valve types. With correct EEV displayed, press and hold ENTER for three seconds.

Note: Custom valve setup is not available from the Basic Display.

Step 3

The controller next prompts for Refrigerant Type and displays 404 (R-404a). Press ↑ or ↓ to change the selection. See page 12 for a list of refrigerants. Once you have the correct refrigerant, press and hold ENTER for three seconds.

Step 4

The final prompt is to set KE2 SMART ACCESS to ENABLED or DISABLED. KE2 SMART ACCESS allows you to easily view and modify your controllers online. Press ↑ or ↓ to make your selection, then press and hold ENTER for three seconds.

THESE ARE THE ONLY SETPOINTS REQUIRED TO BEGIN REFRIGERATION.

Variables Menu

When not in a menu, press ↑ or ↓ to cycle through the Variables. The variables show important system information in real time. Press ENTER to toggle between the variable name and value.

Changing Setpoints

To enter the **Basic Setpoints** menu, press and hold ENTER until ES is displayed. Press ↑ or ↓ to cycle through available Setpoints. Press ENTER to view the current setpoint value.

To enter the Advanced Setpoints menu press and hold BACK until ES is displayed. Press ↑ or ↓ to cycle through the available Setpoints. Press ENTER to view the current setpoint value.

↑ or ↓ will increase or decrease the numerical value or scroll through the available options. Press ENTER momentarily to change the digit being modified.

Press and hold ENTER for 3 seconds to save the displayed value.

To cancel changes, press BACK to return to the setpoint abbreviation.

Manual Valve Control

Press and hold BACK and ↓ to switch to EEV Manual Control mode. The current valve open percentage will be displayed. To open the valve press ↑. To close the valve press ↓. The controller will immediately attempt to move the valve in the direction indicated. ENTER will advance to the next digit. BACK will exit this mode and return to automatic control.

Manual Defrost

Press and hold ENTER and ↓ to put the controller into **Defrost**. The defrost will terminate automatically based on coil temperature, however, pressing and holding ENTER and ↓ again during defrost will skip to drain (drip) mode.

Note: Fans may run for the first few minutes of electric defrost before fans turn off and heaters are energized

System Off (Pumpdown)

Press and hold BACK and ↑ at the same time until SoF is displayed. The controller is in system off and will not refrigerate or defrost until system off is cleared or one hour has passed. Press and hold BACK and ↑ again to exit system off. Power cycling the controller resets the one-hour timer. If controller maintains SoF even after the proper button presses, check auxiliary inputs (AU1, AU2, AU3) for proper operation.

Display Lock

Press and hold BACK and ENTER at the same time until LoC is displayed. The display will be locked and show LoC whenever a button is pressed. To unlock, press and hold BACK and ENTER until LoC disappears.

Diagnostics Mode

The KE2 Evap OEM has been programmed with a diagnostics mode. When activated in the advanced setpoints menu, the controller energizes each relay for 30 seconds. While the LLS relay is energized, the EEV will regulate to the superheat setpoint.

To activate diagnostics mode, go to diA in the Advanced Setpoints Menu. Press and hold ENTER until fan relay FAr is displayed. The defrost relay dEr, then LLS/Comp. Contactor relay Cpr will be energized in turn.

Web Login

The Username and Password are required when making changes to the controller using the built-in webpages. **Upon logging in for the first time the user will be required to change the password**. Please record the new password in a secure location for future reference.

The defaults are **Username:** RSGadmin **Password**: RSGadmin1

IMPORTANT: For security purposes, the Password MUST be changed from the default.

Resetting the controller Web Password

If the username or password for the controller is forgotten or lost, the web page login must be reset to regain login access.

From the KE2 Basic Display default screen, press and hold BACK until ES is displayed. Press ↑ several times to display PAS. Press and hold ENTER until the red LED blinks, then release.

From the KE2 Combo Display default screen, press ← several times to navigate to MANUAL MENU. Press ENTER. LOGIN will be displayed, if not logged in already. Press ENTER again, 0000 will be displayed. Use ↑↓←→ to enter the password 2222. Press and hold ENTER until the screen changes. Press↓ to navigate to WEB PASSWORD RESET. Press ENTER to display RESET. Press and hold ENTER until the display goes back to WEB PASSWORD RESET. Press BACK to exit.

The username and password will be reverted to the default "RSGadmin" and “RSGadmin1”, however, the user will still be required to change from the default password when logging in for security purposes.

Bonding (Multi-Evap Applications)

Bonding allows multiple controllers to synchronize refrigeration and/or defrost. It is required on systems with multiple evaporators on one condensing unit with no unloading capability. Bonding can easily be done through the controller webpages, or from the KE2 Basic Display if only bonding two controllers.

Run a Cat5e cable between the two controllers. Plug the cable into the Ethernet port at each controller. The cable will remain permanently plugged into both controllers to allow synchronization. Cables can also be run from each controller to a network switch, however, only the two controllers to be bonded can be connected to the switch during the bonding process when bonding from the display.

Go to bnd in the Advanced Menu. Press and hold ENTER until the red LED is blinking. Wait several seconds. PAS means the bond was successful and both controllers will restart. FAi means the bond failed, check cables and ensure only two KE2 Evap OEM controllers are on the network before trying again. Press ENTER again to return to the Advanced Menu.

To unbond controllers from the display, go to Unb. Press and hold ENTER until the red LED is blinking. Wait several seconds. The controllers will unbond and restart. If bonded to more than one controller, the controllers must be unbonded using the webpages.

Note: Only controllers with the same firmware and version can be bonded.

Pairing (Lead/Lag, KE2 Combo Display)

Pairing is used to set up two KE2 Evap OEM controllers for lead/lag control, or to allow them to both be displayed on a single KE2 Combo Display.

Run a Cat5e cable between the two controllers. Plug the cable into the Ethernet port at each controller. The cable will remain permanently plugged into both controllers in order to communicate. Cables can also be run from each controller to a network switch, however, only the two controllers to be paired can be connected to the switch during the pairing process when pairing from the display.

Go to PAr in the Advanced Menu. Press and hold ENTER until the red LED is blinking. Wait several seconds. PAS means the pair was successful. FAi means the pair failed, check cables and ensure only two KE2 Evap OEM controllers are on the network before trying again. Press ENTER again to return to the Advanced Menu.

To enable lead/lag control, go to tEt in the Advanced Menu. Select LGC for redundant cool, LGF for redundant off, or ALt for Alternate. If using a redundant mode, the default switch time is 12 hours. This can be adjusted using the Lead/Lag Time setpoint LLt. Confirm the 2nd Room Temp setpoint t52, as this will be the backup temperature setpoint for the lag controller.

To unpair controllers from the display, go to UnP. Press and hold ENTER until the red LED is blinking. Wait several seconds. PAS means the unpairing was successful. FAi means the unpair failed. Press ENTER again to return to the Advanced Menu.

Note: Only controllers with the same firmware and version can be paired

Menus and Parameters

Basic Display	KE2 Combo Display		Min	Max	Default	Description
Abbreviation	Scrolling text					
ts		Room temp	-50.0 F	90.0F	0.0F(E) 37.8F(A)	Room Temperature to be maintained (cut-out temperature)
rFG		REFRIGERANT	N/A	N/A	R-404A	Refrigerant used. See table on page 12

dtY		**DEFROST TYPE**	**N/A**	**N/A**	**Electric**	**(ELE) for Electric. (Air) for off time. (HGF) for hot gas with LLS relay off.**

BASIC Setpoints Menu- Press and hold **ENTER**

ADVANCED Setpoints Menu – Press and hold **BACK**. Setpoints marked with * depend on auxiliary board or other setpoints to appear. (E) denotes default if **DEFROST TYPE=ELECTRIC,** (A) denotes default if **DEFROST TYPE=AIR**

Basic Display	KE2 Combo Display		Min	Max	Default	Description
Abbreviation	Scrolling Text					
Ts		**ROOM TEMP**	-50F	90.0 F	0.0 F(E) 37.8F(A)	Room temperature to be maintained (cut-out temperature).
rFG		**REFRIGERANT**	N/A	N/A	R-404A	Refrigerant used. See table on page 12.
dtY		**DEFROST TYPE**	N/A	N/A	Electric	(ELE) for electric. (Air) for off time. (HGn) for hot gas with LLS relay on. (HGF) for hot gas with LLS relay off.
Edt		**VALVE TYPE**	N/A	N/A	Mechanical	Expansion valve used on system. See table on page 12.
ind		**DEFROST MODE**	N/A	N/A	Demand	Mode to initiate defrost. (dnd) demand. (SCH) schedule. (rnt) comp run time
dPd		**DEFROSTS / DAY**	0	8	5	**If DEFROST MODE = SCH**: Defrosts per day. Number of evenly spaced defrosts per day
dtP		**DEFROST TERM TEMP**	35.0f	90.0 F	50.0 F (E) 39.8F (A)	Temperature the coil sensor(s) must exceed to terminate defrost. *If DEFROST TYPE = AIR, term temp will automatically adjust 2.0°F above ROOM TEMP if ROOM TEMP if changed.
dEF		**DEFROST PARAMETER**	0	90	30(E) 40(A)	If DEFROST MODE = DEMAND: Do not adjust unless directed to by KE2 Therm tech support.
dtl		**MAX DEFROST TIME**	0 MIN.	90 MIN.	45min.	If DEFROST MODE = SCH: Maximum amount of time the defrost relay will be energized.
drn		**DRAIN TIME**	0 MIN.	15 MIN.	2 min. (E) 0 min. (A)	Time to be in drain mode (drip time).
rFt		**REFRIG FAN TYPE**	Manage/Cycle, Permanent, On with Com-pressor, Title 24	On w/ compressor		Select evaporator fan management. (CYC) cycle, i.e. manage fans during refrigeration and off cycle. (FoC) fans on w/ compressor will primarily manage fans only during the off cycle. (PEr) permanent forces fans to run during refrigeration and off cycle. (t24) Title 24 cycles fans based on California's Title 24 regulations.

Fts	**MIN FAN SWITCH TIME**	10 SEC.	240 sec.	10 sec.	Minimum time before fans can be turned on again after turning off.
Stt	**SUPERHEAT**	5.0F	30.0 F	EEV-8.0F TEV=20.0F	When EEV selected, target superheat value. When mechanical valve selected, high superheat alarm threshold. If humidity control enabled, becomes minimum superheat value.
HAo	**HIGH TEMP ALARM OFFSET**	0 F	99.9 F	10.0F(E) 3.0F(A)	Degrees above ROOM TEMP + AIR TEMP DIFF to trigger HIGH TEMP ALARM.
HAd	**HIGH TEMP ALARM OFFSET**	0 min.	120 min.	60 min.	Delay before triggering HIGH TEMP ALARM.
LAo	**LOW TEMP ALARM OFFSET**	0 F	20.0 F	4.0F	Degrees below ROOM TEMP to trigger LOW TEMP ALARM.
LAd	**LOW TEMP ALARM DELAY**	0 MIN.	30 min.	10 min.	Delay before triggering LOW TEMP ALARM.
dAd	**DOOR ALARM DELAY**	0 MIN.	180 min.	30 min.	Time door must be open before triggering DOOR OPEN ALARM. Requires door switch. See Auxiliary Input Modes table on page 12.
AU1	**AUX IN 1 MODE**	N/A	N/A	Disabled	See Auxiliary Input Modes table on page 12.

ADVANCED Setpoints Menu (Continued)

Basic display Abbreviation		**KE2 Combo Display Scrolling Text**	**min**	**max**	**default**	**description**
A1A		AUX IN 1 STATE	N/A	N/A	Closed	(oPn) active if input is an open circuit. (CLo) active if input is shorted.
AU2		AUX IN 2 MODE	N/A	N/A	Disabled	See Auxiliary Input Modes table on page 12.
A2A		AUX IN 2 STATE	N/A	N/A	Closed	(oPn) active if input is an open circuit. (CLo) active if input is shorted.
AU3		AUX IN 3 MODE	N/A	N/A	Sys off	See Auxiliary Input Modes table on page 12.
A3A		AUX IN 3 STATE	N/A	N/A	Closed	(oPn) active if input is an open circuit. (CLo) active if input is shorted.
tS2		2ND ROOM TEMP	50.0 °F	90.0°F	-50.0°F	for AU1, AU2, or AU3 = (t2n) 2ND ROOM TEMP: This value becomes the ROOM TEMP setpoint when the Auxiliary Input is active, or, if (tEt) = (LGC) Redundant Cool or (ALt) Alternate, this value becomes the ROOM TEMP setpoint when the controller is in Lag mode.
10t		0 TO 10 VDC MODE	-	-	Alarm relay	(ALr) Alarm relay. (FSd) Evap fan speed control. (dAL) Door alarm relay.

tEt		MULTI EVAP MODE	-	-	Off	Lead/lag mode. (oFF) Off, lead/lag disabled. (LGC) Redundant Cool, time-based lead/lag with backup system controlling to 2nd Room Temp. (LGF) Redundant Off, time-based lead/ lag with backup system always off. (ALt) Alternate, lead/lag system will switch after every refrigeration run cycle.
PAd		PAIRED DEFROST MODE	-	-	Off	Select operation when lead/lag pair controller goes into defrost. (oFF) Off, paired controller will stay off. (AUt) Auto, paired controller will refrigerate based on room temp.
LLt		LEAD/LAG TIME	1 hour	168 HOURS	12 hours	Toggle time between lead/lag when (tEt) = (LGC) Redundant Cool or (LGF) Redundant Off.
Unt		TEMP UNITS	N/A	N/A	Fahrenheit	Display temperature in (FAH) Fahrenheit or (CEL) Celsius.
CLA		CLEAR ALARMS	N/A	N/A	-	Press and hold ENTER until red LED starts blinking, alarms will be reset. Sensor and transducer alarms will immediately return until fixed.
Dia		DIAGNOSTICS MODE	N/A	N/A	-	Press and hold ENTER until FAr is displayed. Energizes each relay individually for 30 seconds: (FAr) fan relay, (dEr) defrost relay, (CPr) compressor relay.
FAC		FACTORY RESET	N/A	N/A	-	Press and hold ENTER to reset the controller's refrigeration setpoints to KE2 Therm defaults. Does NOT reset network settings. Do not press unless requested to by tech support.
PAS		WEB PASSWORD RESET	N/A	N/A	-	Press and hold ENTER to reset the web username and password to the factory default.
PAr*		PAIR L/L	-	-	-	Press and hold ENTER until red LED blinks. (PAS) successful pairing. (FAi) pairing failed. Only two controllers can be present on network.
Bnd*		BOND	-	-	-	Press and hold ENTER until red LED blinks. (PAS) successful bond. (FAi) bond failed. Check cabling and only two controllers can be present on network to bond from display.
SA		SMART ACCESS	N/A	N/A	Disabled	Turn KE2 SmartAccess on or off. (EnA) enabled. (diS) disabled
dHC		DHCP	N/A	N/A	Disabled	Turn DHCP client mode on or off. (EnA) enable DHCP mode. (diS) disable tdP mode. IP address can change automatically from default when DHCP mode is enabled.

Basic display	**KE2 Combo Display**	**Min**	**Max**	**Default**	**Description**
Abbreviation	**Scrolling text**				
Only available on KE2 Combo	MOTOR TYPE	Unipolar or bipolar		Unipolar	Motor type for custom valve, bipolar or unipolar.
	MOTOR STEP RATE	30	400	40	Motor Step rate for custom valve.
	MAX VALVE STEPS	200	6400	500	Full stroke steps for custom valve.

Display or controller built-in webpages.	MAX OPERATING PRES	10.0 psig	150.0 psig**	150.0 psig**	**Max operating pressure. Max is 300 when R-410A selected, 750 when R-744.
	FAN SPEED	-100.0%	100.0%	0.0%	Fan speed %. Do not adjust unless using the 0-10 VDC output for variable speed fans.
	MIN COMP RUN TIME	0 min.	15 min.	2 min.	Minimum Compressor Run Time.
	MIN COMP OFF TIME	0 min.	15 min.	5 min.	Minimum Compressor Off Time.
	1ST DEFROST DELAY	0 min.	240 min.	120 min.	DEFROST MODE = SCHEDULED delay after power cycle before initiating 1st scheduled defrost.
	DEFROST FAN STATE	ON or OFF		OFF(E)/ ON(A)	OFF = fans off during defrost; ON = fans ON during defrost.
	FAN DELAY TEMP	-40.0°F	35.0°F	5.0°F	After electric or hot gas defrost, temperature that coil must fall below to resume normal fan operation, or Max Fan Delay Time elapses, whichever is sooner.
	MAX FAN DELAY TIME	0 min.	20 min.	3 min. (E) 0 min. (A	Maximum amount of time after defrost to resume normal fan operation.
	PUMP DOWN TIME	0 min.	90 min.	0 min.	Minimum time between de-energizing the liquid line solenoid/compressor contactor relay and energizing the defrost relay.
	MULTI AIR TEMP CTRL	Warmest or Average		Warmest Air	Bonded controls w/synchronized refrigeration only. Warmest Air = use warmest air temp from bonded controls; Average Air = use average of air temp from bonded controls.
	MULTI EVAP COOL	Synchronized or Independent		Synchronized	Synchronized = synchronize bonded controller in refrigeration mode; Independent = bonded controllers control temperature independently bonded controllers refrigerate independently based on their local room temp sensor.
	MULTI EVAP DEFROST	Synchronized or Independent		Synchronized	Synchronized = synchronize bonded controller in defrost mode;

					Independent = bonded controllers defrost independently.
	MULTI EVAP SENSOR	Shared or Unshared		Shared	Shared = share sensor readings from bonded controllers; Unshared = use local sensor readings only.
	ROOM TMP IND DE	-50.0°F	90.0°F	0.0°F	Room temp while bonded controller is in defrost. Only applies to bonded controllers with Multi-Evap Defrost set to Independent. Allows better defrost performance in certain multi-evap applications.
	SUCT PRES OFFSET	-5.0°F	5.0°F	0.0°F	Offset added or subtracted from the suction line pressure transducer reading, if needed. Offset added or subtracted from the suction temp sensor reading, if needed.
	SUCT TEMP OFFSET	-5.0°F	5.0°F	0.0°F	Offset added or subtracted from the suction temp sensor reading, if needed.
	COIL TEMP OFFSET	-5.0°F	5.0°F	0.0°F	Offset added or subtracted from the coil temperature sensor reading, if needed.
	AIR TEMP OFFSET	-5.0°F	5.0°F	0.0°F	Offset added or subtracted from the room temperature sensor reading, if needed.
	AUX 1 OFFSET	-5.0°F	5.0°F	0.0°F	
	AUX 2 OFFSET	-5.0°F	5.0°F	0.0°F	
	AUX 3 OFFSET	-5.0°F	5.0°F	0.0°F	
	PROPORTIONAL	0	255	3	Coefficient to valve control algorithm. Increases responsiveness as value increases.
	INTEGRAL	0	255	5	Coefficient to valve control algorithm. Increases responsiveness as value increases.
	DERIVATIVE	0	255	3	Should not be adjusted unless instructed to by KE2 Therm.
	AIR TEMP DIFF	0.1°F	5.0°F	1.0°F	Degrees above ROOM TEMP before the controller will begin REFRIGERATION.
	HUMIDITY OFFSET*	-5.0%	5.0%	0.0%	Offset added or subtracted from the humidity sensor reading, if needed. **Min operating pressure when

					humidity control is enabled & EEV present. Max is 300 when R-410A selected, 750 when R-744 selected.
	MIN OPERATING PRESSURE	0.0 psig	150.0 psig**	0.0 psig	**Min operating pressure when humidity control is enabled & EEV present. Max is 300 when R-410A selected, 750 when R-744 selected.
Only available on controller built-in webpages.	Webpage Text	Min	Max	Default	Description
	START TIMER 1*	12:00 AM	11:59 PM	12:00 AM	Energizes the Timer Relay on the KE2 Humidity Control board at the specified time.
	STOP TIMER 1*	12:00 AM	11:59 PM	12:00 AM	De-energizes the Timer Relay on the KE2 Humidity Control board at the specified time.
	START TIMER 2*	12:00 AM	11:59 PM	12:00 AM	Energizes the Timer Relay on the KE2 Humidity Control board at the specified time.
	STOP TIMER 2*	12:00 AM	11:59 PM	12:00 AM	De-energizes the Timer Relay on the KE2 Humidity Control board at the specified time

Variables Menu

Basic Display Abbreviation		KE2 Combo Display Scrolling Text	Description
rtP		ROOM TEMP	Room Temperature as measured by controller.
CLt		COIL TEMP	Coil Temperature as measured by controller
SYS		SYSTEM MODE	Current operating status
LLS		LLS RELAY	Current status of LLS/Compressor Contactor Relay.
dEr		DEFROST RELAY	Current status of Defrost Relay
FAr		FAN RELAY	Current status of Fan Relay.
AU1		AUX 1 STATUS	Current status/temperature as measured by controller at Aux Input 1.
AU2		AUX 2 STATUS	Current status/temperature as measured by controller at Aux Input 2
AU3		AUX 3 STATUS	Current status/temperature as measured by controller at Aux Input 3
iP1		IP OCTET 1	First 3 digits of the controller's IP address.
iP2		IP OCTET 2	Second 3 digits of the controller's IP address.
iP3		IP OCTET 3	Third 3 digits of the controller's IP address
iP4		IP OCTET 4	Fourth 3 digits of the controller's IP address.
PnH		FIRMWARE PARTNUM	First three digits of firmware PN
PnL		FIRMWARE PARTNUM	Last three digits of firmware PN.
Fir		FIRMWARE VERSION	Current version of firmware on controller

Auxiliary Input Modes

Basic Display Abbreviation		KE2 Combo Display Scrolling Text	Description
diS		DISABLED	Not used.
rtP		ROOM TEMP	Sets the Aux Input as an additional room (air) temperature sensor input
CLt		COIL TEMP	Sets the Aux Input as an additional coil temperature sensor input.
oni		MONITOR	Sets the Aux Input as a monitor temperature input. Monitor temp does not affect controller operation.
t2n		2ND (ROOM) TEMP	Switches between main and 2nd Room Temperature setpoints. Inactive = 2nd room temp SP off (t2F). Active = 2nd room temp SP on (t2n).
dor		DOOR SWITCH	Inactive = Door Closed (dCL). Active = Door Open (don).
EAL		EXT ALARM	Receive a dry contact from a 3rd party device to show an alarm for that device on the controller. Active = (EAo). Inactive = (EAF).
SoF		SYS OFF	Active input will cause the controller to enter the system off (pumpdown). Inactive = System On (Son). Active = System Off (SoF).
dFi		DFR INTERLOCK	Prevents the defrost relay from energizing when active. Inactive = Defrost Heaters normal (AUt). Active = Defrost Heaters Off (oFF).

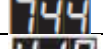
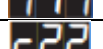
Valve Types

Basic Display Abbreviation		KE2 Combo Display Scrolling Text	Description
tHr		MECHANICAL	Traditional Thermostatic Expansion Valve.
PLS		PULSE VALVE	Pulse Width Modulation (PWM) Valve.
rS		KE2 RSV	KE2 Therms Refrigeration Stepper Valve.
SEi		SER/SEI 1 TO 20	12 VDC Bipolar Sporlan EEV with 1,600 max steps, 200 steps/second.
SEr		SER AA TO L	12 VDC Bipolar Sporlan EEV with 2,500 max steps, 200 steps/second.
CrL		CAREL	12 VDC Bipolar Carel EEV with 480 max steps, 50 steps/second.

System Modes

Basic Display Abbreviation		KE2 Combo Display Scrolling Text	Description
rEF		REFRIGERATE	Controller is calling for refrigeration (LLS/Compressor Contactor relay should be energized).
dEF		DEFROST	Controller in defrost mode.
drn		DRAIN TIME	Controller in drain or "drip" time.
FdL		FAN DELAY	Controller in fan delay, will turn on fans once coil reaches fan delay temp.
SoF		SYSTEM OFF	Controller in system off
oFF		OFF	Satisfied on temperature or off for other reason (ex. door switch)

Refrigerants

Abbreviation		Full Name
404		R-404A
449		R-449A
448		R-448A
744		R-744
410		R-410A
717		R-717
r22		R-22
134		R-134a
40C		R-407C
40A		R-407A
507		R-507

Alphabetical List of Abbreviations

Abbreviation		Full Name	Type	Description
10t		0 to 10 VDC Mode	Setpoint	(ALr) Alarm relay. (FSd) Evap fan speed control. (dAL) Door alarm relay
A1A		Aux Input 1 state	Setpoint	(oPn) active if input is an open circuit. (CLo) active if input is shorted.
A1A		AU1 Temp Sensor Alarm	Alarms	AU1 is set to rtP, CLt, or oni and temp sensor is shorted or open.
A2A		Aux Input 2 state	Setpoint	(oPn) active if input is an open circuit. (CLo) active if input is shorted.
A2A		AU2 Temp Sensor Alarm	Alarms	AU2 is set to rtP, CLt, or oni and temp sensor is shorted or open.
A3A		Aux Input 3 state	Setpoint	(oPn) active if input is an open circuit. (CLo) active if input is shorted.
A3A		U3 Temp Sensor Alarm	Alarms	AU3 is set to rtP, CLt, or oni and temp sensor is shorted or open.
Ad		Air Defrost w/Mechanical valve	Type of Control	System operates with default values for Air Defrost and Mechanical Valve.
AdE		Air Defrost w/EE	Type of Control	System operates with default values for Air Defrost and Electric Valve.
Ai		Air Defrost (Off time)	Setpoint	Option for evaporator Defrost Type (dtY) setpoint. (Ai) Air Off time Defrost. Other options are (ELE) Electric, (HGn) Hot Gas w/ Compressor On, and (HGF) Hot Gas w/ Compressor Off.
ALt		Alternate	Setpoint	Sets lead/lag control to alternate. Lead/lag will switch after every refrigeration run cycle
ALr		Alarm Relay	Setpoint	Sets 0 to 10 VDC output to alarm relay.
ASA		Air Sensor Alarm	Alarms	Return air temp sensor is shorted or open.
AU1		Aux Input 1	Variables	Current status/temperature as measured by controller at Aux1 input
AU1		Aux Input 1 mode	Setpoint	Options for configuring the Auxiliary Input, see Auxiliary Input Modes table
AU2		Aux Input 2	Variables	Current Status/Temperature as measured by controller at Aux2 input
AU2		Aux Input 2 mode	Setpoint	Options for configuring the Auxiliary Input, see Auxiliary Input Modes table.
AU3		Aux Input 3	Variables	Current Status/Temperature as measured by controller at Aux3 input.
AU3		Aux Input 3 mode	Setpoint	Options for configuring the Auxiliary Input, see Auxiliary Input Modes table.
AUt		Defrost Interlock -Heaters Normal	Auxiliary Input	Defrost interlock inactive. Defrost heaters will energize as needed.
AUt		Defrost Lockout - Defrost Normal	Auxiliary Input	Defrost lockout inactive. Defrost will be initiated as normal by controller logic.
bnd		Bond	Setpoint	Press and hold ENTER until red LED blinks. (PAS) successful bond. (FAi) bond failed. Only two controllers can be present on network to bond from display

CCA		Compressor Communications Alarm	Alarms	[Siteview Only] Communication lost to KE2 Compressor Sequencer OEM
CEL		Celsius	Setpoint	Option for Temp Units (Unt) setpoint. (FAH) Fahrenheit. (CEL) Celsius.
CHA		Humidity Comms Alarm	Alarms	KE2 Evap OEM lost communication with KE2 Humidity Control board for 10 seconds.
CLA		Clear Alarms	Setpoint	Press and hold ENTER until red LED starts blinking, alarms will be reset. Sensor and transducer alarms will immediately return until fixed.
CLL		Lead/Lag Comm Error	Alarms	Communication lost between lead/lag controllers.
CLo		Closed	Setpoint	Option for Aux Input State (A1A, A2A, A3A) setpoints. Input will be Active when it reads a closed circuit.
CLt		Coil Temp	Variables	Coil temperature (TCoil Sensor) as measured by the controller.
CLt		Coil Temp	Auxiliary Input	Coil Temp as measured by Aux input.
CoA		Communication Alarm	Alarms	[Bonded controllers only] No communication between bonded controllers for one minute or more.
CrL		Carel	Valve Type	Pre-configured EEV selection. 12 VDC Bipolar Carel EEV with 480 max steps, 50 steps/second.
CSA		Coil Sensor Alarm	Alarms	Coil temperature sensor is shorted or open
CYC		Cycle	Setpoint	Option under Refrig Fan Type (rFt) setpoint. (CYC) to cycle, i.e. managed fan control. Other options are (FoC) on w/ compressor, (PEr) permanent, and (t24) title 24.
dAd		Door Open Alarm Delay	Setpoint	Time door must be open before triggering DOOR OPEN ALARM. Requires door switch.
dAL		Door Alarm	Setpoint	Sets 0 to 10 VDC output to door alarm. Will only activate for door alarm.
dCL		Door Switch - Door Closed	Auxiliary Input	Auxiliary input set to Door Switch indicates that the door is closed
ddF		Defrost Delay Fan	System Mode	At the start of defrost, fans will continue running for several minutes, using stored cooling in the coil. Once the coil reaches room temp, fans will stop, and heaters will turn on to begin electric defrost.
dEF		Defrost Parameter	Setpoint	If DEFROST MODE = DEMAND: Do not adjust unless directed to by KE2 Therm tech support.
dEF		Defrost	System Mode	Controller is performing a defrost cycle.
dHC		DHCP	Setpoint	Turn DHCP client mode on or off. (EnA) enable DHCP mode. (diS) disable DHCP mode
diA		Diagnostics Mode	Setpoint	Press and hold ENTER until FAr is displayed. Energizes each relay individually for 30 seconds: (FAr) fan relay, (dEr) defrost relay, (CPr) compressor relay.
drn		Drain Time	Setpoint	Time to be in drain mode (drip time)
drn		Drain	System Mode	Time after defrost to allow moisture to drain from coil (drip time).
dtP		Defrost Term Temp	Setpoint	Temperature the coil sensor(s) must exceed to terminate defrost. If DEFROST TYPE = AIR, term temp will automatically adjust 2.0°F above ROOM TEMP if ROOM TEMP is chan

dtY		Defrost Type	Setpoint	(ELE) for Electric. (Air) for off time. (HGn) for hot gas with LLS relay on. (HGF) for hot gas with LLS relay off
Edt		Valve Type	Setpoint	Expansion valve on the system: (tHr) mechanical, pre-configured electronic, or custom EEV configuration.
FAC		Factory reset	Setpoint	Press and hold ENTER to reset the controller's refrigeration setpoints to KE2 Therm defaults. Does NOT reset network settings. Do not press unless requested to by tech support.
FtS		Min Fan Switch Time	Setpoints	Minimum time before fans can be turned on again after turning off.
HAd		High Temp Alarm Delay	Setpoint	Delay before triggering HIGH TEMP ALARM.
HAo		High Temp Alarm Offset	Setpoint	Degrees above ROOM TEMP + AIR TEMP DIFF to trigger HIGH TEMP ALARM.
ind		Defrost Initiation Mode	Setpoint	Mode to initiate defrost. (dnd) demand. (SCH) schedule. (rnt) comp run time.
iP1		IP Address Part 1	Variables	First 3 digits of the controller's IP address.
iP2		IP Address Part 2	Variables	Second 3 digits of the controller's IP address.
iP3		IP Address Part 3	Variables	Third 3 digits of the controller's IP address.
iP4		IP Address Part 4	Variables	Fourth 3 digits of the controller's IP address.
LAd		Low Temp Alarm Delay	Setpoint	Delay before triggering LOW TEMP ALARM.
LAo		Low Temp Alarm Offset	Setpoint	Degrees below ROOM TEMP to trigger LOW TEMP ALARM
LLt		Lead/Lag Time	Setpoint	Toggle time between lead/lag when (tEt) = (LGC) Redundant Cool or (LGF) Redundant Off
PAR		Pair L/L	Setpoint	Press and hold ENTER until red LED blinks. (PAS) successful pairing. (FAi) pairing failed. Only two controllers can be present on network.
PAS		Web password reset	Setpoint	Press and hold ENTER to reset the web username and password to the factory default "ke2admin"
rFG		Refrigerant	Setpoint	Refrigerant used. See table on page 12
SA		KE2 SmartAccess	Setpoint	Turn KE2 SmartAccess on or off. (EnA) Enable KE2 SmartAccess. (diS) disable KE2 SmartAccess
Stt		Superheat	Setpoint	When EEV selected, target superheat value. When mechanical valve selected, high superheat alarm threshold
SYS		System Mode	Variables	Current operating status
tEt		Multi Evap Mode	Setpoint	Lead/lag mode. (oFF) Off, lead/lag disabled. (LGC) Redundant Cool, time-based lead/lag with backup system controlling to 2nd Room Temp. (LGF) Redundant Off, time-based lead/lag with backup system always off. (ALt) Alternate, lead/lag system will switch after every refrigeration run cycle.
tS		Room Temp SP	Setpoint	Room temperature to be maintained (cut-out temperature)
tS2		2nd room temp SP	Setpoint	If AU1, AU2, or AU3 = (t2n) 2ND ROOM TEMP: This value becomes the ROOM TEMP setpoint when the Auxiliary Input is active.
Unt		Temperature Units	Setpoint	Option for Temp Units (Unt) setpoint. (FAH) Fahrenheit. (CEL) Celsius.

Introduction to KE2 SmartAccess

KE2 SmartAccess provides quick and easy real-time access to your refrigeration systems, 24/7. Now it's easier than ever to monitor and adjust your KE2 Evap OEM remotely. While the KE2 Evap OEM's webpages can be accessed via traditional IT techniques, many customers prefer the simplicity and convenience of KE2 SmartAccess. Once the controller is provided Internet access and KE2 SmartAccess is enabled, the controller quickly connects to your personal web portal. Hosted by KE2 Therm, the portal provides a customized dashboard of all the controllers you set up with KE2 SmartAccess, for a nominal monthly fee. No port forwarding or VPN required. Preliminary Setup Connect your KE2 Evap OEM to the existing network directly, or, add a KE2- Edge Manager Plus (KE2-EM Plus) & KE2 Switch to manage the refrigeration network if you need any of the following:

KE2-EM Plus

- Bridge to existing Wi-Fi for Internet instead of running cable
- One year+ of detailed data logs and graphs (@ 15-minute interval)
- Local dashboard of up to 35 KE2 Therm devices on location
- Add KE2 Therm Wireless Sensors to monitor additional spaces
- Incorporate existing KE2 Therm devices at site
- Local Wi-Fi access for service
- BACnet/IP integration

KE2 SmartAccess with direct connection to network - Online Access in 3 Easy Steps

Step ❶Enable KE2 SmartAccess in the Setpoints menu.

After the initial Introduction Mode setup, press and hold BACK until  appears.

Press↑ two times to view  (abbreviation for KE2 SmartAccess). Press ENTER, then press↓ to change  (disabled) to EnA (enabled).

Press and hold ENTER for 3 seconds to save the change.

NOTE: Enabling  also enables  (DHCP client mode)

Step ❷Go to **smartaccess.ke2therm.net**

Using your PC, tablet, or smartphone, enter

http://smartaccess.ke2therm.net in the web browser's

address bar.

Step ❸ **Enter default information and click Log In button.**

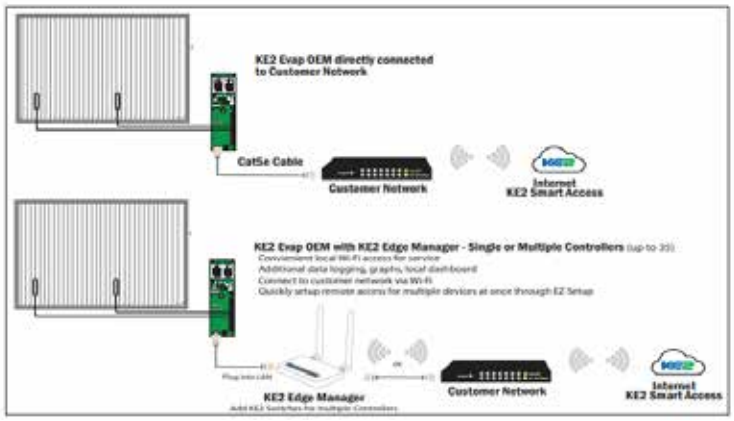
Site: installer

Password: controller's MAC address (from sticker on controller,

all capital including colons).

Once logged in, clicking on the controller allows access to the controller's built-in webpages. Navigate to Setpoints -> Communications -> KE2 SmartAccess and change the Site and Password to something unique (Site Example: MyStore-04CD). Follow best practices for password creation. Setting multiple controllers to the same Site and Password will cause them all to appear on a single KE2 SmartAccess dashboard for easy access and monitoring. See Q.1.46 Web Screens for more details on everything available on the KE2 Evap OEM's built-in webpages:

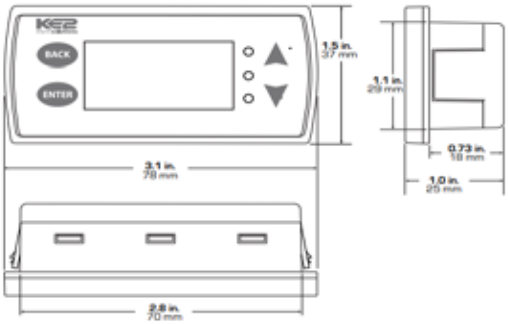
https://ke2therm.com/literature/literature-ke2-evap-oem/



KE2 SmartAccess setup with KE2-EM

Please follow the KE2-EM Plus Quick Start Guide that comes with the KE2-EM to complete the EZ SETUP, or visit the link below for a digital copy:

https://ke2therm.com/literature/literature-ke2-edge-managers/



Displays	
Part #	Description
19-14717 – 3 Digit Display w/ Cable	3-digit display w/LogiTemp Logo & cable KE2# 21732 or KE2# 21232

Sensors		
Part #	Description	Lead Length
19-14224	– Suction Pressure Transducer	10ft Lead

RSV - Refrigeration Stepper Valves			
Valve Body	Part #	Connections - Inches ODF Inlet x Outlet	Lead Length
RSV-320	19-14682	1/2 X 1/2 ODF	10ft Lead

External Relays	
Part #	Description
19-14812	KE2 Remote Relay Control Board

Specifications

Controller	
Input Voltage:	100 to 240 VAC
Ambient Temp:	-40°F to 140°F (-40°C to 60°C)
Operating Temp:	-40°F to 140°F (-40°C to 60°C)
Inputs:	(3) temperature sensor
	(3) multi-use (temp sensor or digital input)
	(1) pressure sensor input
Valve Types:	unipolar and bipolar stepper motors (L/R 12 VDC)

Relays:	(1) 20A resistive (defrost)
	(2) 10A inductive
Auxiliary Input 1:	room temp, coil temp, monitor, 2nd temp setpoint, door switch, external alarm, system off, defrost interlock, defrost lockout
Auxiliary Input 2	
Auxiliary Input 3:	
Communication:	Standard TCP/IP, RESTful API, BACnet/IP (w/ KE2-EM)

Pressure Transducer	
Pressure Range:	0 to 150 psia
Proof Pressure:	450 psi
Burst Pressure:	750 psi
Operating Temp:	-40°F to 248°F (-40°C to 120°C)

Temperature Sensor	
Sensor Specs:19-13968 – NTC Temperature Sensor, 10ft Black	-60°F to 150°F (-51°C to 65°C) moisture resistant package
19-14827 – NTC Temperature Sensor, 10ft Blue	
19-14828 - NTC Temperature Sensor, 10ft Yellow	

WEBPAGE PORTION

Webpage Screens

Accessing the built-in web page of the KE2 Evap OEM controller reveals a great deal of information about the system performance and allows for quick adjustments. With KE2 Therm accessories the webpage can be conveniently accessed via Wi-Fi at site. With an internet connection and KE2 SmartAccess, the controller can be viewed remotely from home, work, or anywhere else internet is available.

Access your equipment anywhere, anytime:

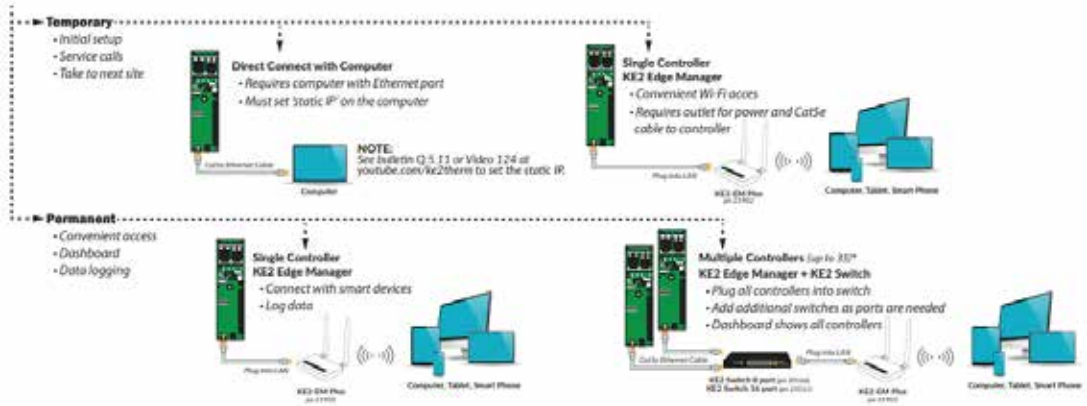
Location	Mode	Room	Superheat	Alarm
Restaurant - Walk-in Freezer	Off	-8.2	8.7 F	All Clear
Restaurant - Walk-in Cooler	Refrigerate	36.1	10.6 F	All Clear
Corner Mkt - Beer Cave	Refrigerate	33.5	9.2 F	All Clear
Corner Mkt - Walk-in Freezer	Off	-10.3	6.8 F	All Clear
Corner Mkt - Display Case	Off	42.8	11.0 F	All Clear
C-store - Walk-in Cooler	Off	36.7	7.7 F	All Clear
C-store - Walk-in Freezer	Refrigerate	-3.2	8.7 F	All Clear

All equipment shows on one dashboard

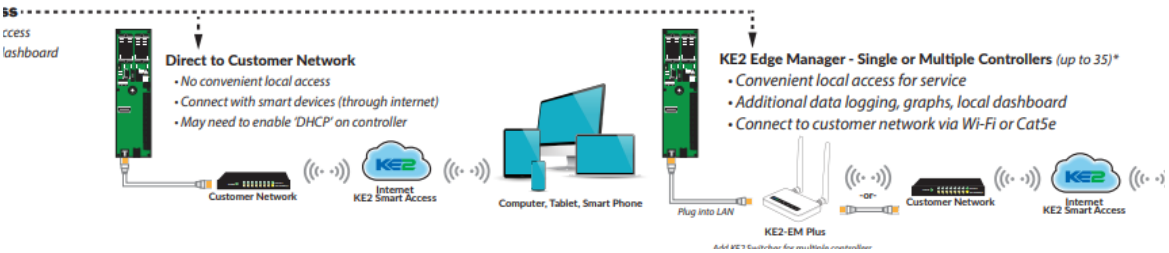
Get notified by e-mail or text alerts.

The graphic below shows the most common options for communicating with the controller and will help determine which method is best for your specific needs.

On Site – Local Access Only

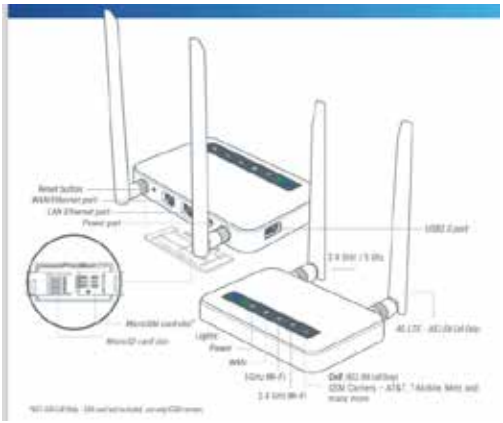


Remote Access - Access via Internet



The ⌂ Home Page provides room temperature and system status of one KE2 Evap OEM controller, or two controllers if they are paired. If a KE2 Combo Display is connected to either controller, it will be shown under Local or Remote Components. Clicking on the menu or icons allows you to quickly navigate to a specific web page. Relative humidity will be shown if a KE2 Humidity Control board is communicating to the KE2 Evap OEM.

GETTING STARTED, EZ-INSTALL WIZARD GUIDE, WIRELESS SETUP & MODBUS SETUP/WIRING



GETTING STARTED

1 Power On

Plug the power cable into the power port of the KE2-EM. Use the 12V/1.5A power adapter supplied with the KE2-EM to ensure proper operation.

Note: If necessary to perform a Factory Reset, hold down the Reset button for 10 seconds, then release. **Caution - all User Data will be cleared!**

2 Connecting to the KE2-EM

You can connect to the KE2-EM via Wi-Fi or Ethernet Cat5e cable. Choose the most convenient method.

Note: This step only connects your mobile/ tablet/laptop/desktop to the local area network (LAN) of the KE2-EM. Internet access is not yet configured. To connect to the Internet, please finish the setup procedures below and then follow EZ-Install Wizard to setup an Internet connection.

Method 1 - Connect via Wi-Fi

Search for the KE2-EM's Wi-Fi network (SSID) in your device's list of Wi-Fi networks and input the default password – All characters are upper case: KE2EMPLS#1 for KE2-EM or KE2EMCELL#1 for KE2-EM Cell.

The SSID is printed on the label on the bottom of the KE2-EM in the following formats:

KE2EMPLUS-XXXXX (Ex: KE2EMPLUS-04CDC7)

KE2EMPLUS-XXXXX-5G (Ex: KE2EMPLUS-04CDC7-5G)

KE2EMCELL-XXXXXX (Ex: KE2EMCELL-04CDC7)

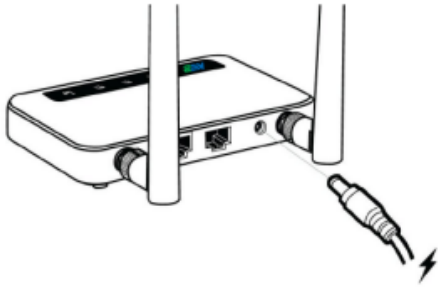
KE2EMCELL-XXXXXX-5G (Ex: KE2EMCELL-04CDC7)

Method 2 - Connect via LAN

Connect your device to the LAN port of the KE2-EM via Ethernet cable.

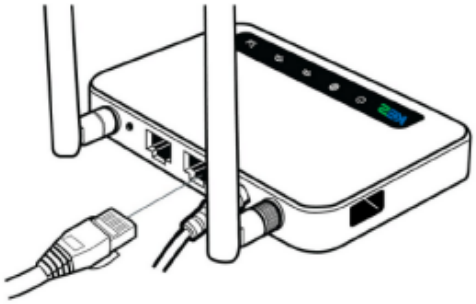
3 Access the KE2-EM Dashboard

Open a web browser (Firefox, Chrome, Edge, Safari) and visit https://em.ke2.io or http://192.168.50.1. If this is a new install, you will be guided using the **EZ-Install Wizard**.



Note: A MicroSD card is pre-installed in the KE2-EM. **DO NOT** remove or replace the MicroSD card.

KE2-EM Cell only - install a GSM SIM card for internet/ backup internet if desired.



Note: Your device will not display both Wi-Fi networks unless it supports both 2.4GHz and 5GHz Wi-Fi

1 Password Setup

Email – Optional field.

Username – Management Console Username. The KE2-EM secures access to the Management Console with these credentials. You are required to create this account on first install.

Password – Management Console Password. The KE2-EM secures access to the Management Console with these credentials. You are required to create this password on first install. Please record both Username and Password for future reference. You will need both to login to the Management Console. This password requires 8-15 characters, at least one upper and lower case, a number, and a special character (!@#$()%&*).

Confirm Password – Confirm Password as entered in the prior field. You are required to confirm this password on first install.

The **Next Step** button will be available once all fields are entered properly.

You will be prompted to **CONFIRM** the management account credentials to continue.

2 Publish

Auto Publish ALL devices – This option allows you to automatically publish any KE2 Therm devices communicating with the KE2- EM to the Portal specified below.

Do not Auto Publish devices – If you do not wish your KE2 Therm devices to be automatically published to the Portal, select this option.

Portal – This is the remote portal that your devices will be published to. In most cases, this does not need to be changed.

Site – This is the unique Site name on the Portal where all devices on the KE2-EM will be published. A Site name should be descriptive. Ex: MyStore-04CD

Pass – This field contains the Portal password used to publish devices. This password should be 8-15 characters, with upper and lower case, including numerals and special characters (!@#$()%&*).

The **Next** button will be available once all requirements have been satisfied.

3 Wi-Fi Password

Wi-Fi Password – For security purposes, you will be prompted to change the default Wi-Fi Password during installation. A minimum of 8 characters is required, but 14 is recommended. Please record this Wi-Fi password. You will need it to reconnect later.

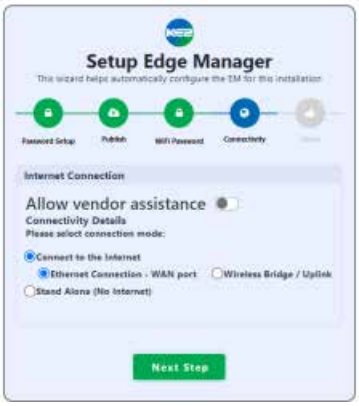
Confirm Password – Confirm Password as entered in the prior field. You are required to confirm the password before the Next Step button becomes available.

Enable Guest AP – Allows Wi-Fi access to the dashboard without a password. Internet access is not available when connected to the Guest AP.

4 Connectivity

This page helps you connect this KE2-EM to the Internet. If you want to publish devices to the Portal for remote access, or receive alarm notifications, the KE2-EM must be connected to the Internet.

Connect to the Internet



Allow vendor assistance – Allows KE2 Therm to remotely connect to the KE2-EM for technical support.

Ethernet Connection – WAN Port – Select this option if you are using a Cat5e Ethernet cable to connect the KE2-EM to the Internet. The KE2-EM will automatically request an IP address from the network.

Stand Alone (No Internet) – Select this option if you do not want to connect the KE2- EM to the Internet.

Wireless Bridge / Uplink – Select this option if you want to wirelessly connect to an available Wi-Fi network within range of the KE2-EM and use it to access the Internet. This mode is a convenient way to connect to another Wi-Fi Access Point, Hotspot, or Guest Network for quick Internet access. Be sure to consider any security implications this may cause. If in doubt, contact your local IT or help desk for direction and support.

Wireless Bridge / Uplink – has additional configuration options:

The KE2-EM has two wireless radios (2.4GHz and 5GHz) to connect to a pre-existing Wi-Fi network for Internet access. This provides the KE2-EM access to the Internet without running Ethernet cables. Choose only **ONE**, 2.4GHz OR 5GHz, for the Wireless Bridge.

NOTE: If using cellular only for internet, select **Stand Alone (No Internet)**

Name – Select this dropdown to display Wi-Fi networks within range. If a network does not appear, it may be on another frequency (2.4GHz or 5GHz).

Use hidden SSID – Use this option to specify the SSID of a hidden Wi-Fi network.

Pass – This is the password field for the Wi-Fi network found previously. Input the password for the Wi-Fi network.

Set as Priority – This is an advanced option and usually not required. This option allows network traffic to be delivered to the Wi-Fi interface first. Enable this only at the instruction of an IT representative.

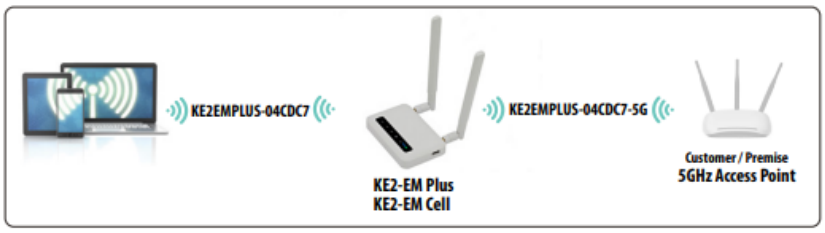
Save Changes – to complete the Wireless Bridge / Uplink connection, you must select save changes.

The **Next Step** button can be selected if Stand Alone (No Internet) was selected previously.

Note: The wireless radio (2.4GHz or 5GHz) selected for the Wireless Bridge will no longer be able to be used as an Access Point for the KE2-EM. If you lose access to the KE2-EM and cannot reconnect, perform a Factory Reset and select the other wireless radio for the Wireless Bridge.

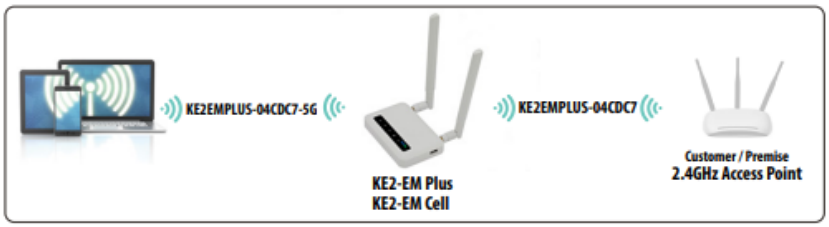
4 Wi-Fi Example 1:

Users connect their smart device to the KE2EMPLUS-04CDC7 2.4GHz Wi-Fi network to access the KE2- EM Plus. The 5GHz radio is used to create the Wireless Bridge to the existing Wi-Fi network.



4 Wi-Fi Example 2:

Users connect their smart device to the KE2EMPLUS-04CDC7-5G 5GHz Wi-Fi network to access the KE2- EM Plus. The 2.4GHz radio is used to create the Wireless Bridge to the existing Wi-Fi network.



Wi-Fi Tips:

Use 2.4GHz Wi-Fi Bridge for sites using traditional, slower Internet Access Points. Use 5GHz Wi-Fi Bridge for sites using newer, faster Internet Access Points.

Note: 2.4GHz wireless transmissions can travel farther than 5GHz transmissions.

DO NOT ATTEMPT to Wi-Fi Bridge both 2.4GHz and 5GHz!!!

5 Finish

Congratulations! You have successfully completed the **EZ-Install Wizard**. The KE2- EM will need to reboot with the configuration options you have selected. This process will take less than two minutes to complete. To reconnect, simply use the same method you used in **Step ❷ Connecting to the KE2- EM** as described earlier. Don't forget, the Wi-Fi password and management credentials were changed during the **EZ-Install Wizard** setup.

WIRELESS SENSOR SETUP

To ensure the sensors have the strongest wireless connection possible, please follow the steps in:

Video 125 – Best Practices for Deploying a Wireless Monitoring Solution or https://bit.ly/2Prb1Oc

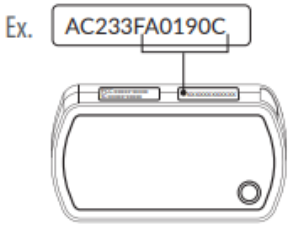
1 Power On

Press the button until blue blinking light comes on.

2 Sensors should automatically display on the Dashboard.

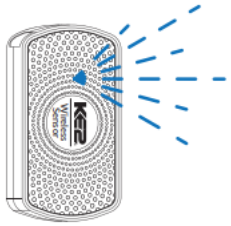
Use the MAC address to find the sensor on the list. Click the link to open the sensor's page.

3 The last 6 digits of the MAC address are unique for each sensor.



4 The timer in the top left shows how often the wireless sensor is checking in with the KE2-EM. This helps determine optimal sensor location.

5 Place the sensor where you think you want it.



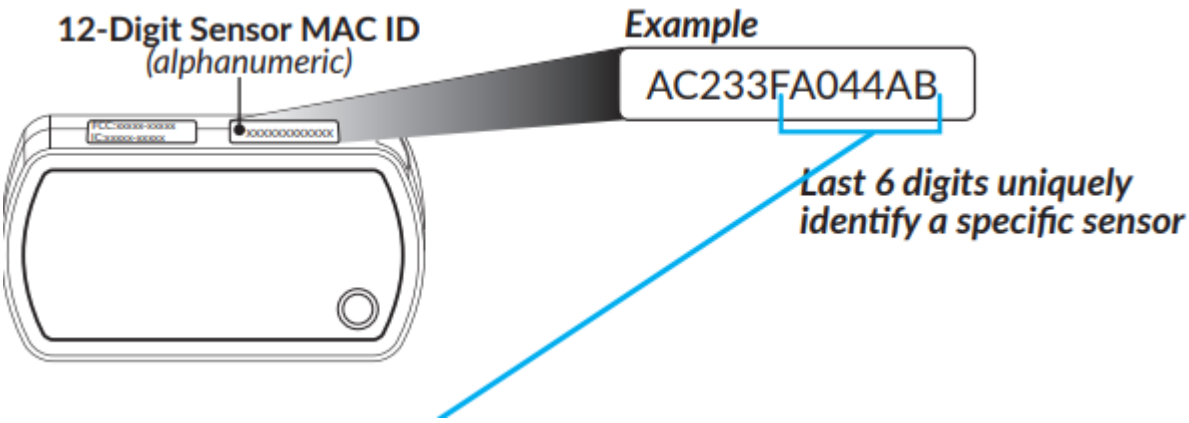
6 If the timer reads 1 second or less, the location is ideal. Below 10 seconds is good. If 20 seconds or more, consider moving or changing the orientation of the sensor.

7 Once the location is validated, apply Velcro or adhesive strip, and place sensor.

8 Record on the tracking chart.

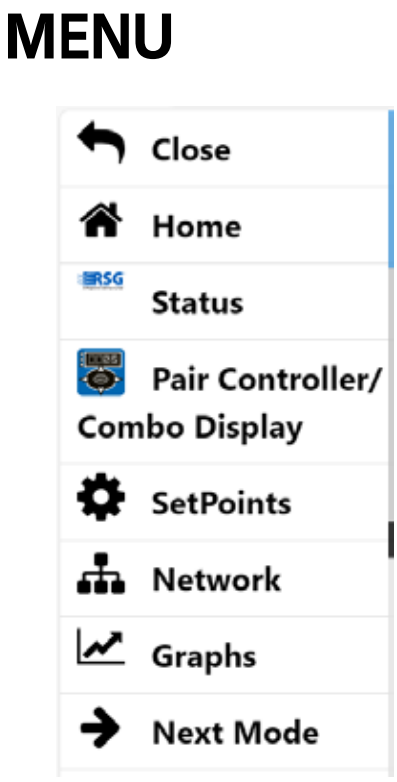
9 Repeat steps ❶ through ❽ for each additional sensor. Store tracking chart in a secure location and take a picture of it for future reference.

Wireless Sensor Tracking Chart



Ex. AO 44 AB	To help you locate the sensor later, write a description of the sensor's physical location. (Example: North wall walk-in cooler)

Once your Tracking Chart is filled in, we suggest taking a picture of the list, to serve as a backup copy.



The modes in order are:

Refrigeration

Defrost Delay Fan

Defrost

Drain

Fan Delay

Refrigeration

(NEXT MODE) Forces controller to next system mode (Must be logged in)

How to: Direct Connect to your KE2 Therm Controller for managing KE2 Therm Ethernet Controllers

Overview

KE2 Therm controllers with an Ethernet connection (including KE2 Evap, KE2 Evap OEM, KE2 Evap-RE2, KE2 Compressor Sequencer OEM, and KE2 Condenser Fan Control) can be managed from a computer via direct Ethernet connection.

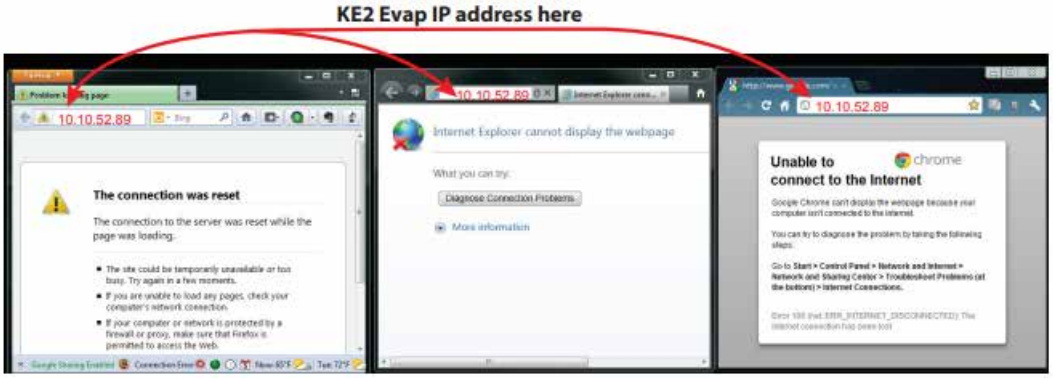
Note: Most KE2 Therm controllers without an Ethernet connection, including KE2 Temp, KE2 Low Temp, KE2 Temp + Valve, and KE2 Adaptive can be accessed from a laptop or smart device via a KE2-Edge Manager.

Step 1 Plug one end of an Ethernet cable into your computer and the other end into the controller. Turning off Wi-Fi on your computer is recommended when trying to directly connect via Ethernet. (Note: Ethernet cables are either “straight-through” or “cross-over” and either will work for this connection.)

Step 2 Change the IP address of your computer to a Static IP by following these procedures:

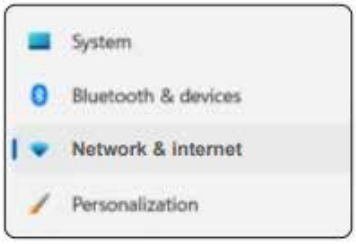
Step 3

Open a web browser (e.g. Edge, Firefox, Google Chrome), ignoring any notices the browser gives indicating it cannot find an internet connection, and type the controller IP address into the browser’s address bar).



Setting a Static IP address on Windows 11 ❶ Click on the Start button, then click Settings.

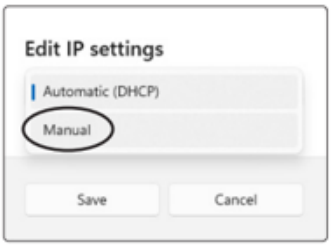
❷ Select Network and Internet.



❸ Click Ethernet.

❹ Click Edit next to IP assignment.

❺ Select Manual from the drop-down menu.



❻ Click the slider under IPv4.

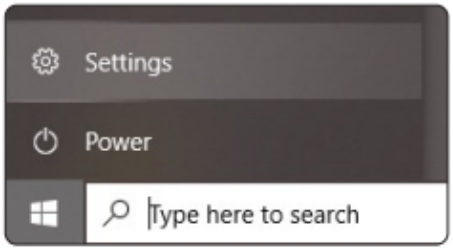
❼ Enter the following information as shown in the screenshot, then click Save.
IP address: 10.10.255.252
Subnet mask: 255.255.0.0
Gateway: 10.10.255.254
Preferred DNS: 10.10.255.254

Important Note: The values listed above will allow your computer to connect to any controller that is still on its factory assigned 10.10.X.X IP address. If the IP address of the controller has been changed, you will need to look it up via the controller's variables menu and adjust your computer's static IP address settings appropriately. Usually, changing the last number of the IP address is sufficient (Ex. If the controller IP address is 192.168.1.15, you could set your computer to 192.168.1.252).

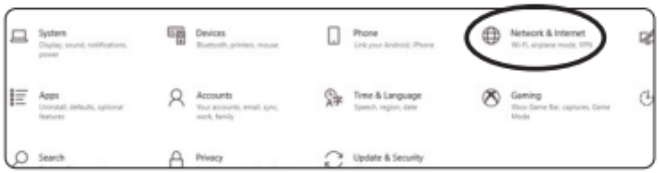
Note: If the computer will be hardwired to another network later, the process should be reversed to restore the original settings.
You can now directly connect to the controller!

Setting a Static IP address on Windows 10

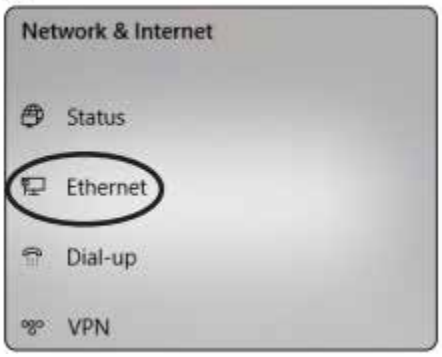
❶ Click on the Start button, then click Settings.



❷ Click Network & Internet.

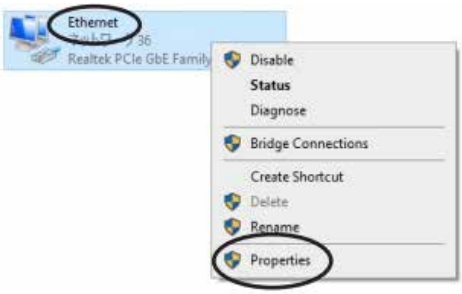


❸ Select Ethernet.



❹ Click Change adapter options.

❺ Right-click on your **Ethernet** adapter, then select **Properties**. If you have multiple Ethernet adapters, you should right-click on the one that does not show a red X when the Ethernet cable is plugged into the controller.



❻ In the Local Area Connection Properties window, highlight Internet Protocol Version 4 (TCP/IPv4) then click the Properties button.

❼ Now select the button **Use the following IP address** and enter in the correct **IP address**, **Subnet mask**, and **Default gateway** that corresponds with the picture. When completed, click the **OK** button.

IP Address: 10.10.255.252
Subnet Mask: 255.255.0.0
Default Gateway: 10.10.255.254

Important Note: The values listed below will allow your computer to connect to any controller that is still on its factory assigned 10.10.X.X IP address. If the IP address of the controller has been changed, you will need to look it up via the controller's variables menu and adjust your computer's static IP address settings appropriately. Usually, changing the last number of the IP address is sufficient (Ex. If the controller IP address is 192.168.1.15, you could set your computer to 192.168.1.252).

Note: If the computer will be hardwired to another network later, the process should be reversed to restore original settings.
You can now directly connect to the controller!

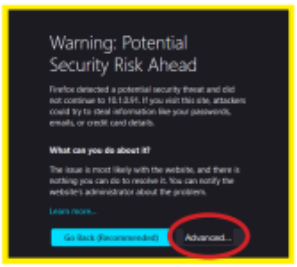
❽ Now close out of the Local Area Connection Properties window.
For any older versions of Windows, go to the Ke2Therm website at https://www.ke2therm.com/resources

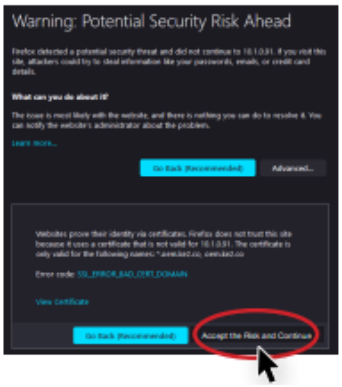
Browser Privacy Warnings

When connecting to the controller via its IP address, a privacy or security warning will likely appear in the browser. If the IP address of the controller is correct, depending on the browser, click "Advanced" or "Show Details" then "Proceed to..." / "Accept the Risk..." / "Continue to..." / "...visit this website" to continue to the controller webpage. It is generally not advisable to click past this warning, however, proceeding past this warning when connecting to the controller is safe.

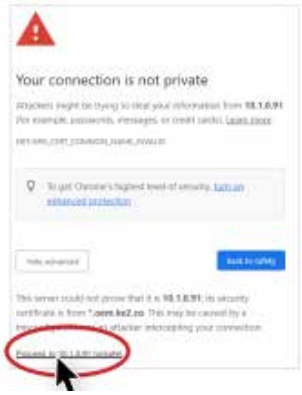
Edge

Firefox

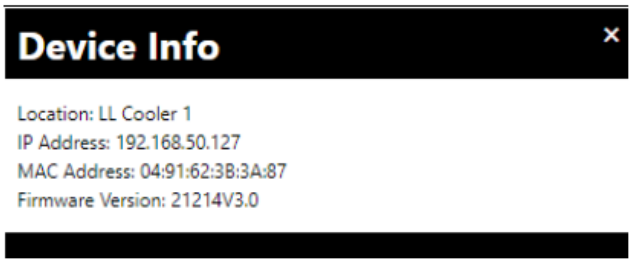




Chrome



Device Info: Shows controller location, IP address, MAC address, and firmware version.



STATUS PAGE

Status Page is the most useful page for diagnosing system issues. It shows the status, in real time, of all sensors, relays, inputs, valve percent open (with EEV), and superheat/saturation temp (with suction transducer & temp sensor). Many values are shown in familiar gauge format for easy diagnosis.

System Mode-Current system mode

Applicable doors closed

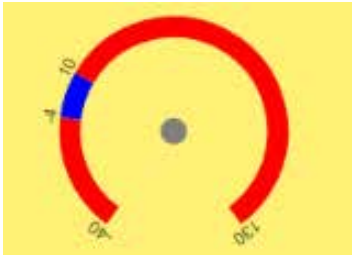
Shows status of door switches connected to KE2 Evap OEM and KE2 Combo Display. System messages are also displayed here.

Shows alarms (if any). Opens alarm window.

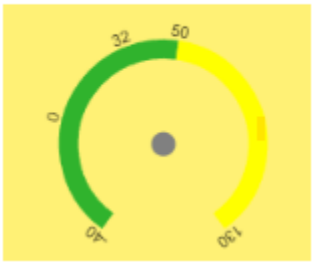
Clears all alarms. Sensor and transducer alarms will immediately return until fixed.

Auxiliary Inputs and their current status.

Sensor Fault Room Temp



Sensor Fault Coil Temp



Gauges show current temp, pressure, superheat, saturation temp, and humidity values. Gauges only appear if the relevant sensor is connected. Generally, green represents ideal control range, blue is acceptable control range, yellow is caution, and red is within alarm condition. Gauges related to any active alarms are highlighted.

Output Status

Liq. Line Sol. **Evaporator Fan** **Defrost** **Alarm**

Pair Controller / Combo Display Page

to pair two KE2 Evap OEM controllers for Lead/Lag control or to display both controllers on KE2 Combo Displays. This page also allows access to the KE2 Combo Display specific setpoints. KE2 Combo Display is not required to pair controllers. Status on the left-hand side Shows status of relays, temps, and other inputs of the KE2 Combo Display (if present) in real time.

SETTINGS

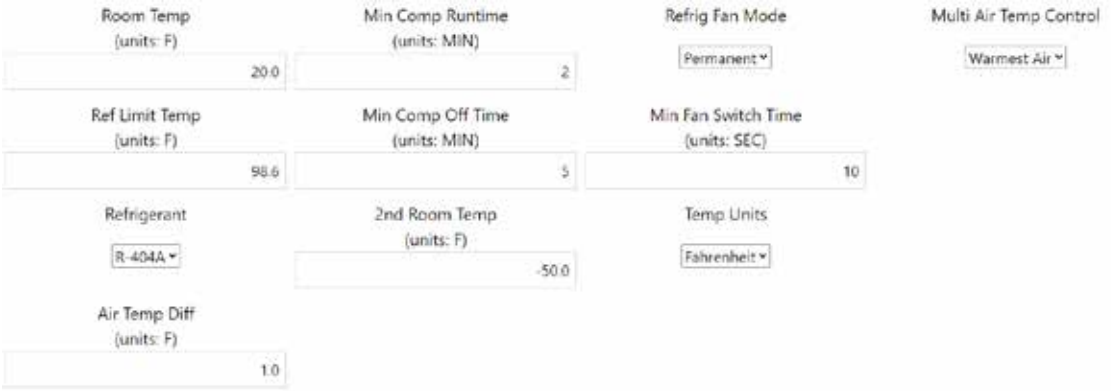
When you click one this menu will pop up

SETPOINTS

The setpoints menu allows customization of setpoints specific to the KE2 Combo Display connected to the KE2 Evap OEM.

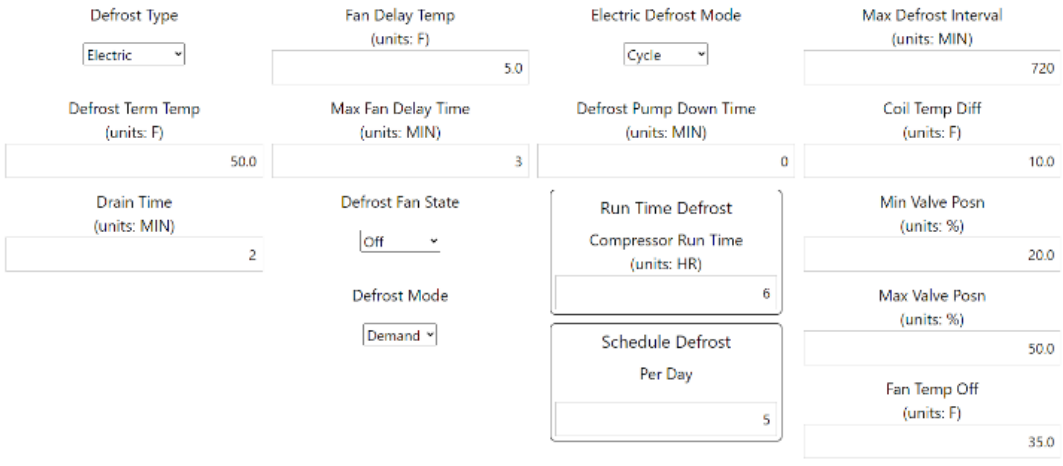
Important settings

Refrigeration



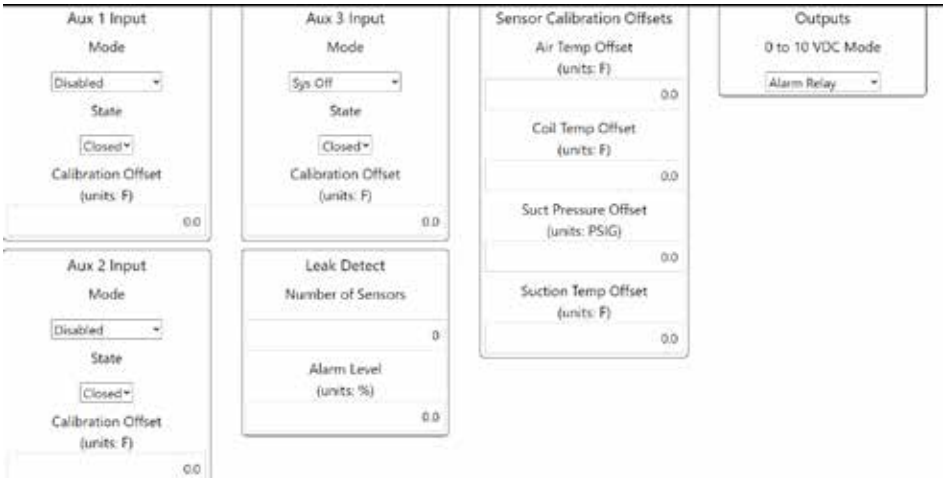
Expansion Valve

Defrost



Multi Evap Control

Inputs & Outputs

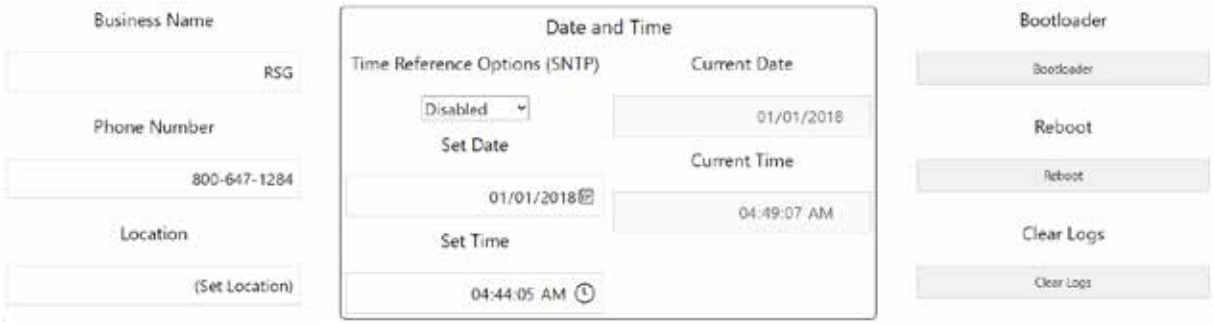


Alarms

Lead/Lag

Communications

General Information

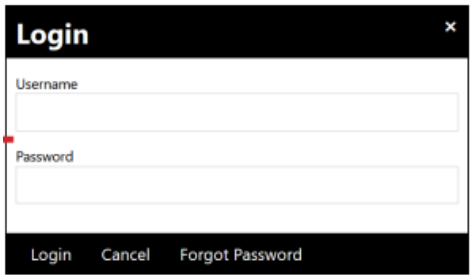


Select "**Disabled**" to manually update the date and time.

Select "**Internet**" to automatically update date and time via the internet.

Select "**Local Device**" to update time and date automatically from a connected device (smartphone, tablet, PC).

Select "**Custom**" to manually input a SNTP server to update the date and time automatically. Requires internet connection.



Login to make changes, default credentials are as follows.

Username: RSGadmin

Password: RSGadmin1

For security, the Password MUST be changed from default upon first login.

NOTE: Only one user may be logged in at a time. Changing browsers or devices without logging out first may also prevent login. Try again after up to 15 minutes.

NETWORK PAGE

From the Network Page the controller's network settings can be changed and multiple controllers can be bonded.

Bonded Controllers

Bonding creates a link between controllers that coordinates their refrigeration and defrost cycles. After bonding, the user should review Multi Evap Control Setpoints.

Steps to bond:

1. Login.

2. Click discover.

3. Select 'Included' in the

'Bond State' of controllers

to be bonded.

4. Click Save/Group.

5. Click Bond.

Controllers will restart.

Clear Directory-Clears all fields when not bonded.

Bond-Will bond controllers. Must save/group first to select controllers. Will switch to Unbond after bonding.

Discover-Finds up to eight un-bonded KE2 Evap OEM and KE2 Evap v5.0 controllers on the network and automatically fills in controller information.

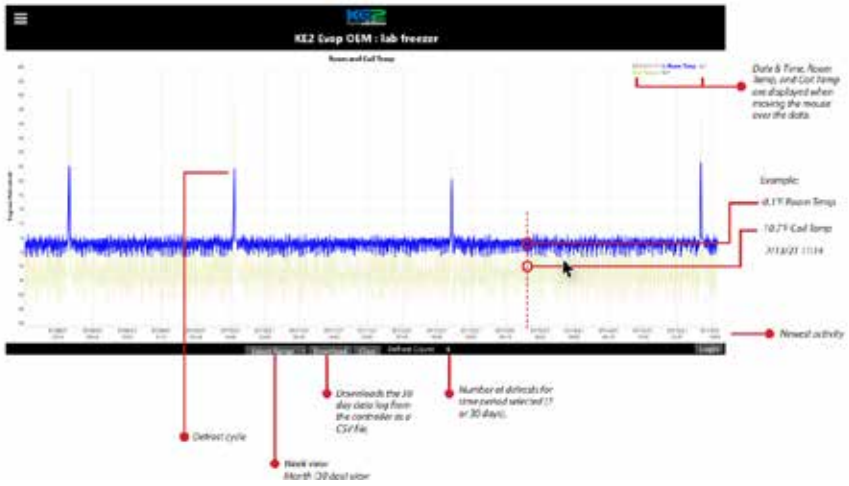
Network Info

Controller network information can be changed if necessary.

Note: Network Info can only be changed when unbonded

GRAPHS

The Graphs Page shows the past seven or thirty days of Room Temp, Coil Temp, and Humidity* readings, as well as the number of defrost cycles. It is an essential tool for system analysis and troubleshooting.



PASSWORD RESET

For security, the webpage password for the controller MUST be changed from the default "RSGadmin1".

The webpage credentials are used to login to the controller to make changes via the controller's built-in webpage; they are separate from any remote access portal credentials for KE2 SmartAccess. If the webpage credentials are lost, they must be reset to regain login access. The login credentials can be reset from the **KE2 Basic Display, KE2 Combo Display**, or using the **webpage.** Both username and password will be reset to **"RSGadmin"** and **"RSGadmin1"**, but changing the password from the default upon logging in will still be required for security. NOTE: Resetting from the webpage requires visual access to one of the displays to retrieve a reset code number, access to the pre-determined Password Reset Email saved in the controller (if internet is available), or access to a KE2-Edge Manager (KE2-EM) in the network.

STEP 1

Reset Login Credentials (use any of the following methods)

1a. Password Reset from the KE2 Basic Display

From the **KE2 Basic Display**, press and hold BACK until  is displayed.

Press ↑ several times to display  .

Press and hold ENTER until the red LED blinks, then release.

1b. Password Reset from the KE2 Combo Display

From the **KE2 Combo Display**, press ← to navigate MANUAL MENU. Press ENTER. LOGIN will be displayed, if not logged in already. Press ENTER again, 0000 will be displayed. Use ↑↓←→to enter the password 2222. Press and hold ENTER until the screen changes.

Press ↓to navigate to WEB PASSWORD RESET. Press ENTER to display RESET. Press and hold ENTER until the display goes back to WEB PASSWORD RESET. Press BACK to exit.

STEP 1(CONTINUED)

1c. Password Reset from the Webpage

Resetting login credentials from the webpage requires a 3-digit code to be entered that will be displayed on the KE2 Basic Display, KE2 Combo Display, and sent to the user's pre-determined **Password Reset Email** saved in the controller (if internet is available).

From the controller **webpage**, click **login**. Next, click **Forgot Password**. A 3-digit code will be displayed on the KE2 Basic Display, the KE2 Combo Display, and sent to the user's pre-determined email address. Type the 3-digit code under **Password Reset Code** and click **Reset Password**.

NOTE: If the controller is under a KE2-Edge Manager (KE2-EM), once **Forgot Password** is clicked on the controller, the reset code can also be retrieved by clicking the **Get Access Code** button on the KE2-EM management console. The button is found under **System -> Credentials -> Manage Controllers** on the KE2-EM management console page.

STEP 2

Login and setup new credentials

Once credentials have been reset using any of the above methods, login using the default "**RSGadmin**" for the username and **"RSGadmin1"** for the password. You will immediately be prompted to change the password. Type in a new password into the fields and click "**Change Password**".

You will be returned to the Login prompt. Login with username “RSGadmin” and the new password you just set. You will now be logged in and able to make changes to the controller.

NOTE: If the controller has access to the internet, setting **the Password Reset Email** is highly recommended. This is found on the **Setpoints** page under the **Communications** tab.

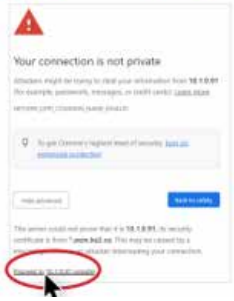
Browser Warning

When connecting to the controller via its IP address, a privacy or security warning will likely appear in the browser. If the IP address of the controller is correct, depending on the browser, click “**Advanced**” or “**Show Details**” then “**Proceed to**...” / “**Accept the Risk**...” / “**Continue to**...” / “...**visit this website**” to continue to the controller webpage. It is generally not advisable to click past this warning, however, proceeding past this warning when connecting to the controller is safe.

Edge

Firefox

Chrome



Safari

MODBUS SETUP

1 KE2 Temp + Air Defrost, KE2 Adaptive Control, & KE 2 Low Temp

Change Modbus address on each controller.

Each controller's Modbus address must be unique. Available addresses are 2-247.

KE2 Temp: Press and hold **ENTER** to access the setpoints menu.

KE2 Adaptive / Low Temp: Press and hold **BACK** to access the Advanced menu.

tS is displayed 

Use the ↑arrow until you see **Adr**

(Address) 

Press **ENTER** to display the current address (default =1) 

Change the address by pressing ↑ or ↓ Press **ENTER** momentarily to move to the next digit if necessary. Available addresses are 2 to 247.

Example: 

The controller will return to the **Adr** screen when the setting is saved. 

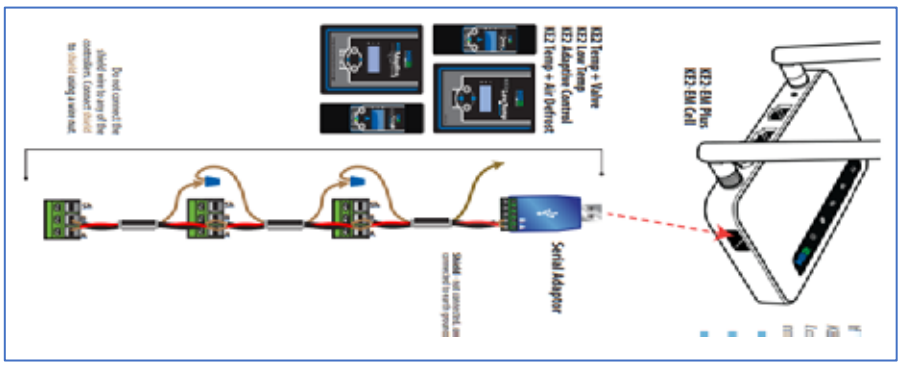
The setting change can be verified by pressing **ENTER** again.

To exit, press **BACK** several times.

MODUS WIRING

If using the KE2-EM to communicate with the KE2 Temp + Air Defrost, KE2 Temp + Valve, KE2 Low Temp, or KE2 Adaptive, the controllers must be wired to the EM.

- Connection must be daisy chained.
- Maximum 1,000ft total cable length.
- Use only cables that meet RS-485 specifications. Cat5e cable is acceptable in most situations (use one of the twisted pairs). Use 24 AWG or larger.



TECHNICAL SUPPORT

Factory/Login Credentials Reset

If you are unable to access the KE2 Dashboard or cannot connect to the KE2-Edge Manager (KE2-EM), you can press the RESET button:

- Press the reset button for 1 second or less to reboot the KE2-EM.
- Press and hold the reset button for 3 to 5 seconds, then release to reset KE2-EM credentials to the default of RSGadmin/RSGadmin1. You will be prompted to change the username and password from default upon logging in.
  NOTE: Any Modbus controller and wireless sensor login credentials will also be reset to RSGadmin/RSGadmin1.
- Press and hold the reset button for at least 10 seconds, then release to reset the KE2-EM to factory settings. WARNING - all settings and user data will be cleared.

Technical Support

If you are unable to access the KE2 Dashboard or cannot connect to the KE2-Edge Manager (KE2-EM), you can press the RESET button:

- For more detailed / updated instructions, please visit our website https://ke2therm.com
- For additional questions, use one of the following:

• Send an E-mail to techsupport@ke2therm.com

• Visit our YouTube channel https://youtube.com/user/KE2Therm/videos

• Call us at 636-266-0140 (M-F, 8am - 5pm CST)

If calling, please make sure you are running the latest version and have access to the KE2-EM.

Visit https://ketherm.com/literature/literature-ke2-edge-managers/ or use the QR code to view all KE2-EM literature:

Record Credentials (optional)

Record your credentials in the space below and secure in a safe location for future reference:

Management Console

Username:	Password:

KE2 SmartAccess

Site:	Password:

Wi-Fi

Password:

KE2-EM Plus/KE2-EM Cell

Serial No:	MAC Address:

Alarm Troubleshooting Guide

Introduction:

The KE2 Evap OEM has advanced communications and alarming features, never before seen in the refrigeration industry. These alarms provide early indications of a poorly performing refrigeration system. Text messages and/or email alerts provide notification of system issues immediately, whether on-site or remote, as long as there is an internet connection. Advanced alarming, diagnostic, and troubleshooting are key features of the KE2 Evap OEM controller and help prevent catastrophic failures. This protects contractor, owner, product, and refrigeration equipment. When using KE2 SmartAccess, the controllers can be viewed, setpoints changed, and defrosts initiated remotely, saving time and frustration. In addition, your home office or KE2 Therm technical support can even login with you to diagnose the system in real time.

From the face of the Basic Display:

The alarm is shown as a three-digit code on the Basic Display, and the yellow or red LED light on the right side of the display will illuminate. If there is more than one alarm present at the same time, press ↓ to cycle through the alarms.

Alarm Severity:

Red **LED: Critical Alarm -** The controller will close the electric expansion valve (EEV) to prevent compressor damage. This will likely prevent refrigeration from continuing, but the controller is attempting to prevent a catastrophic system failure, such as damage to the compressor. **Critical alarms must be addressed immediately.**

Yellow LED: Cautionary Alarm - The controller will continue to function to the best extent possible given the system conditions, but the **alarm should be addressed as soon as possible.**

On the controller's webpage: Alarms can also be viewed in the top right-hand side of the controller's webpage as a pulsing yellow or red bell when connected to the controller via a smart device (smartphone, tablet, PC etc.), or remotely via KE2 SmartAccess. When not in alarm, no bell is displayed.

If the controller is connected to the internet, the KE2 Evap OEM can also send text messages and/or emails to immediately notify all necessary personnel of the alarm condition. Alarm thresholds such as high temp and door alarm can be adjusted and should be set so as not to trigger during normal loading and use.

Almost all alarms will automatically clear once the alarm condition no longer exists. To clear an alarm manually, press and hold **BACK** until **tS** (temperature Setpoint) appears, press ↑ several times to CLA (Clear Alarm), press and hold **BACK** until the red LED blinks, then release. Power cycling the controller to clear alarms is not recommended but will also reset the alarm conditions.

Clearing alarms before calling technical support will make diagnosis more difficult or impossible; please call technical support before clearing alarms if assistance is required.

Note: If the alarm is a sensor alarm and the sensor is still disconnected or shorted, the alarm will immediately reappear.

Alarms & Notifications List

Alarm Type	Abbreviation		Scrolling Text*	Full Name	Description	Page
Display	Blank Display				No LEDs are illuminated on the display.	Page 4
	Ed			Intro Mode	"Ed" on display, yellow and red LEDs flashing.	Page 4
	Prf		N/A	Process Failure	KE2 Basic Display not able to communicate with controller.	Page 4
Sensor Alarms	PSA		PRESSURE SENSOR	Pressure Sensor Alarm	Suction pressure sensor is shorted, open, or pressure out of range.	Page 6
	SSA		SUCTION TEMP SENSOR	Suction Sensor Alarm	Suction temperature sensor is shorted or open.	
	ASA		AIR TEMP SENSOR	Air Sensor Alarm	Return air temperature sensor is shorted or open.	
	CSA		COIL TEMP SENSOR	Coil Sensor Alarm	Coil temperature sensor is shorted or open.	

	A1A		AUX1 SENSOR	AU1 Temp Sensor Alarm	AU1 temperature sensor is shorted or open.	
	A2A		AUX2 SENSOR	AU2 Temp Sensor Alarm	AU2 temperature sensor is shorted or open.	
	A3A		AUX3 SENSOR	AU3 Temp Sensor Alarm		
Defrost	EdF		EXCESS DEFROST	Excess Defrost Alarm	Time between defrosts too short in demand defrost.	Page 7
	dtt		DEFR TERM ON TIME	Defr Term on Time Alarm	Defrost terminated on time instead of temperature for two consecutive defrosts.	Page 7
Superheat	HSH		HIGH SUPERHEAT	High Superheat Alarm	[EEV] Superheat 2°F above superheat setpoint for 90 minutes of cumulative runtime, and valve > 90% open. [TEV] Superheat above SUPERHEAT setpoint for 90 minutes of cumulative runtime.	Page 8-9
	LSH		LOW SUPERHEAT	Low Superheat Alarm	Superheat below 3°F for 5 minutes and EEV < 10% open if EEV is selected.	Page 8-9
Temperature	HtA		HIGH AIR TEMP	High Temperature Alarm	Air temp above Room Temp + Air Temp Diff + High Temp Alarm Offset for longer than High Temp Alarm Delay.	Page 10
	LtA		LOW AIR TEMP	Low Temperature Alarm	Air temp below Room Temp - Low Temp Offset for longer than Low Temp Alarm Delay.	Page 10
Door Switch	dor		DOOR SWITCH	Door Open Alarm	Door open and air temp above Room Temp + 0.5°F longer than Door Alarm Delay.	Page 11
Communication	CoA		COMMUNICATION ERROR	Communication Error	No communication between bonded controllers for one minute or more.	Page 12
	CLL		LEAD/LAG COMM ERROR	Lead Lag Comms	Communication lost between lead/lag controllers.	Page 12
	CCA		CompSeq. Comms error	CompSeq. Comms Alarm	Communication lost to KE2 Compressor Sequencer OEM.	Page 12

	EFL		Email Failure	Email Failure Alarm	Email alert was not confirmed by email server provided after seven consecutive attempts.	Page 12
	NTP		Time Server Comm	Time Server Comm	Controller cannot communicate with external time of day server (SNTP server).	Page 12
Digital Inputs	EA1		EXTERNAL ALARM 1	External Alarm 1	Aux Input 1 is set to External Alarm and the input is active.	Page 13
	EA2		EXTERNAL ALARM 2	External Alarm 2	Aux Input 2 is set to External Alarm and the input is active.	Page 13
	EA3		EXTERNAL ALARM 3	External Alarm 3	Aux Input 3 is set to External Alarm and the input is active.	Page 13

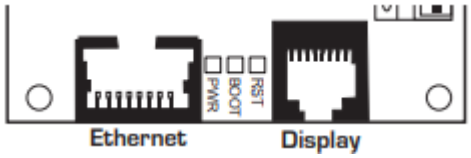
Alarm Type	Abbreviation		Scrolling Text	Full Name	Description	Page
KE2 Combo Display	dtS		DOOR TEMP SENSOR	Door Temp Sensor Alarm	Combo Display Aux 1 Door Temp Sensor is shorted or open.	Page 13
	dt2		DISPLAY AUX2 SENSOR	Disp Aux2 Sensor Alarm	Combo Display Aux 2 Temp Sensor is shorted or open.	Page 13
	dt3		DISPLAY AUX3 SENSOR	Disp Aux3 Sensor Alarm	Combo Display Aux 3 Temp Sensor is shorted of open.	Page 13
	dtH		DOOR TEMP HIGH	High Door Temp Alarm	Combo Door Temp above Door Temperature + High Door Alarm Offset longer than High/Low Door Temperature Alarm Delay.	Page 14
	dtL		DOOR TEMP LOW	Low Door Temp Alarm	Combo Door Temp below Door Temperature - Low Door Alarm Offset longer than High/Low Door Temperature Alarm Delay.	Page 14
	Hd2		HIGH MONITOR TEMP2	High Mon2 Temp Alarm	Combo Aux2 Monitor Temp reading above Monitor Temp2 High Alarm setpoint longer than Monitor Temp2 Alarm Delay.	Page 15
	Ld2		LOW MONITOR TEMP2	Low Mon2 Temp Alarm	Combo Aux2 Monitor Temp reading below Monitor Temp2 Low Alarm setpoint longer than Monitor Temp2 Alarm Delay.	Page 15
	Hd3		HIGH MONITOR TEMP3	High Mon3 Temp Alarm	Combo Aux3 Monitor Temp reading above Monitor Temp3 High Alarm setpoint longer than Monitor Temp3 Alarm Delay.	Page 15

	Ld3		LOW MONITOR TEMP3	Low Mon3 Temp Alarm	Combo Aux3 Monitor Temp reading below Monitor Temp3 Low Alarm setpoint longer than Monitor Temp3 Alarm Delay.	Page 15
	EA1		DISPLAY EXTERNAL ALARM 1	Disp Ext1 Alarm	Combo External Alarm 1 input is active.	Page 15
	EA2		DISPLAY EXTERNAL ALARM 2	Disp Ext2 Alarm	Combo External Alarm 2 input is active.	Page 15
	EA3		DISPLAY EXTERNAL ALARM 3	Disp Ext3 Alarm	Combo External Alarm 3 input is active.	Page 15
	Pbt		HELP	Panic Button Alarm	KE2 Combo Display panic button is active.	Page 15
LPCO (Low Pressure Cut-Out control) Only	Pdt		PUMPDOWN TIMEOUT	Pump Down Timeout	Low Pressure Cut-out Time exceeded before suction pressure reached Low Pressure Cut-out.	Page 15
	SCC		SHORT COMP CYCLE	Short Compressor Cycle	Compressor started excessive number of times due to high suction pressure in off mode, or comp. stopped excessive number of times due to low suction pressure while in refrigeration mode.	Page 15
	LPA		Low Pressure	Low Pressure Alarm	Suction pressure below Low-Pressure Cut-out despite attempts to run.	Page 16
KE2 Humidity Control	HSA		HUMIDITY SENSOR	Humidity Sensor Alarm	Humidity sensor is shorted or open.	Page 16
	HHA		HIGH HUMIDITY	High Humidity Alarm	Humidity reading above Humidity Setpoint + Humidity Differential + Humidity Alarm Offset for longer than Humidity Alarm Delay.	Page 16
	LHA		LOW HUMIDITY	Low Humidity Alarm	Humidity reading below Humidity Setpoint - Humidity Differential - Humidity Alarm Offset for longer than Humidity Alarm Delay.	Page 17
	CHA		HUMIDITY COMM	Humidity Comms Alarm	KE2 Evap OEM lost communication with KE2 Humidity Control board for 10 seconds.	Page 17
KE2 Evap OEM w/ High	HDA		HIGH DISCH TEMP	High Disch Temp	Discharge temp reading above High Discharge Temp Setpoint for longer than High Discharge Temp Delay.	Page 17

Side Control Only	LCT		SYSTEM LOCKOUT	Comp Locked Out	In one hour, system cycled off on high discharge temp more times than Max Number of Starts setpoint.	Page 17
	HCA		HIGHCOND TEMP	High Cond Temp	Condenser temp reading is above Cond Temp Setpoint + High Cond Temp Alarm Offset for longer than High Cond Temp Delay.	Page 18
	LCA		LOW COND TEMP	Low Cond Temp	Condenser temp reading is less than Cond Temp Setpoint - Low Cond Temp Alarm Offset for longer than Low Cond Temp Alarm Delay.	Page 18
	A1A		AUX1 SENSOR	Dis Aux1 Sensor	Discharge temp sensor input is shorted or open.	Page 18
	A2A		AUX2 SENSOR	Dis Aux2 Sensor	Discharge temp sensor input is shorted or open.	Page 18
	A3A		AUX3 SENSOR	Dis Aux3 Sensor	Discharge temp sensor input is shorted or open.	Page 18

TROUBLESHOOTING TABLES

Alarm & Alarm Name			Description	Variables & Setpoints	Corrective Action
Basic Display	Combo Display	Webpages			
Blank Display			No LEDs are illuminated on the display	N/A	Note: While not an alarm condition, the controller may or may not be operational if nothing is shown on the Basic Display. The KE2 Evap OEM can continue to operate the system even while the Basic Display is disconnected. If the controller is still powered and system is running troubleshoot the Basic Display: • Make sure the plugs are fully inserted into the jacks at both the KE2 Evap OEM and the Basic Display. • Check the connection between the KE2 Evap OEM board and the Basic Display for any burned, chaffed, cut or otherwise damaged sections. If damaged, replace the cable. • There are two jacks on the Basic Display. Switch the jack used on the Basic Display and check for functionality. • Check to see if Basic Display cable is longer than 5ft. The maximum cable length between Basic Display and KE2 Evap OEM board is 5ft. If the system is not running and there are no LEDs lit on the KE2 Evap OEM board, check: • Incoming voltage to the board. Voltage should be between 100VAC – 240VAC, if not address supply voltage issue. • Remove power to controller and check fuse located on board. The fuse cannot be checked visually; remove fuse from board and check resistance across the fuse. An open reading

					indicates the fuse has blown and points to a supply voltage issue or short on the board or connected devices. The fuse will blow in order to protect the controller from permanent damage. Check for proper incoming power, examine all cables for burned, cut, chaffed or otherwise damaged insulation/wire and repair. Replace fuse (PN 21375). • Remove all connections to controller except for power and the Basic Display; see if the Basic Display illuminates. Note: Power injected into the controller's Ethernet port may result in the display going blank and other unexpected problems. Power over Ethernet (POE) switches connected to the KE2 Evap OEM should have the power output feature disabled.
Ed 	ELECTRIC DEFROST / TEV	Intro	"Ed" is blinking on the Basic Display, yellow and red LEDs are flashing.	N/A	Not an alarm condition, controller is in introduction mode. Please refer to Q.1.45 for controller setup.
PrF 	N/A	N/A	Process Failure. Basic Display is not communicating to the controller.	N/A	The Basic Display is not properly communicating with the KE2 Evap OEM board. The KE2 Evap OEM can continue to refrigerate without the Basic Display, but setpoints can only be changed via the browser interface. • Check that cable is inserted into the correct location on the board. • Check that cable between board and display is firmly inserted at both ends. • Check that the cable is not cut, burned, chaffed, disconnected or otherwise damaged. • Cable should not be extended over 5ft. • Confirm LEDs on KE2 Evap OEM board. The LEDs are located between the Ethernet and display ports.  If PWR & BOOT are solid green, the board is operating normally. There may be an issue with the display, cable, or display port on the controller. If RST is solid red, there is a hardware malfunction. Remove all connections to the controller except for incoming power. If RST is still solid red, replace the controller. If BOOT & RST is blinking alternately, controller has been put in bootloader mode to receive an update. If the update process has already started beyond putting the controller in bootloader mode, complete the update to return to normal operation. Otherwise, the controller will exit bootloader mode after 10 minutes.

PSA 	PRESSURE SENSOR	Suc Pres Sensor Alarm	ONLY ACTIVE WHEN AN ELECTRIC EXPANSION VALVE IS SELECTED. Red LED is illuminated. Suction pressure sensor is shorted, open, or pressure is out of range. EEV cannot operate while this alarm is present.	**Variables** PrS - Suction Pressure **Setpoints** rFG – Refrigerant •Suction pressure will read -14.6 if the green input (signal) is open or disconnected. •Suction pressure will read 150* or over if the green input (signal) is shorted, or if actual pressure is higher than the transducer is rated for. *150, 300, or 750 psig depending on refrigerant selected.	The majority of sensor alarms and inaccurate readings are caused by cut, burned, chaffed or otherwise damaged sensor cables. Inspect the length of the cable for any burned, chaffed or otherwise damaged sections. Repair any damaged sections; take care not to swap colors when repairing. • Confirm that a KE2 Therm pressure transducer and cable are being used. KE2 Therm's pressure transducer cable will have red, black, and green leads. • Check that the pressure transducer cable wires are inserted into the proper position on the board (gray connector) and that the colors are inserted into the proper screw down terminals. The bare stranded wire of the transducer cable should be inserted so that the wire is directly touching the gate of the connector. If the gate is contacting the insulation of the wire, it will not allow the controller to read the sensor. • If wires have been extended, check that colors have not been swapped when extended. Check for any bad splices, crimps or solder joints where extended. • Check that the pressure transducer cable is fully inserted into the pressure transducer. The cable should click when fully inserted into the transducer. • Confirm that the proper transducer is being used for the system. 0-150psia for most common refrigerants, 0-300psig for R-410A and 0-750psig for R-744 (CO2). Confirm that the proper refrigerant (rFG) is selected in the setpoints menu. • To verify the accuracy of the transducer, remove the transducer from the system. The controller should read suction pressure as approximately 0 psig when measuring atmosphere. The transducer can also be checked against your manifold set. Note: If PrS shows -15 when transducer is measuring atmosphere, the wrong pressure transducer/refrigerant combination has been selected. • Verify the voltage between the black and red pressure transducer inputs on the controller is +5 VDC. • Measure the voltage between the black and green inputs on the controller. Enter that number into the following formula: (voltage read - 0.5V) x 150*psia = actual pressure read (verify with gauges) 4v * 300 psig or 750 psig depending on pressure transducer range.
SSA 	SUCTION TEMP SENSOR	T1 Suct Sensor Alarm	ONLY ACTIVE WHEN AN ELECTRONIC EXPANSION VALVE IS SELECTED. Red LED is illuminated. System	**Variables** SUt - T1 Suction Temp rtP - Room (Air) Temp CLt - Coil Temp	• The majority of sensor alarms and inaccurate readings are caused by cut, burned, chaffed or otherwise damaged sensor cable. Inspect the length of the cable for any cut, burned, chaffed or otherwise damaged sections. Repair any damaged sections • Check that the sensor is inserted into the proper position on the board. The sensor is not polarized; black and white wires can be inserted in either position on the connector: Suction Temp: black connector labeled TSUC. Air Temp: blue connector labeled TAIR. Coil Temp: yellow connector labeled TCOIL. 2nd Coil Temp/Aux 1 Temp: green

<table>
<tr><td></td><td></td><td></td><td>cannot operate while this alarm is present. Temperature sensor is shorted or open (not connected).</td><td>AU1 - Aux Temp 1

AU2 - Aux Temp 2

AU3 - Aux Temp 3

• If temp sensor reads -88 the cable or sensor is open, or not connected.

• If temp sensor reads 180+ the input, cable, or sensor is shorted.</td><td>connector labeled AUX1. Aux 2 Temp: black connector labeled AUX2. Aux 3 Temp: black connector labeled AUX3. • The bare stranded wire of the temperature sensor should be inserted so that the wire is directly touching the gate of the connector. If the gate is contacting the insulation of the wire, it will not allow the controller to read the sensor. • If wires have been extended, check for any bad splices, crimps or solder joints where extended. • Check the sensor probe. If the sensor cable has been pulled, the sensor probe may have been damaged, and needs to be replaced. • To verify accuracy of the sensor, the preferred method is to place the sensor in a proper ice bath while connected to the controller. View the relevant sensor in the variable's menu, temperature should read around 32.0°F. If adjustment is necessary, an offset can be applied via the browser interface. • Sensor accuracy can also be verified using a third-party thermometer, however, it must be calibrated and rated to measure low temperatures. • Unplug the connector and check that the resistance reading of the sensor matches the temperature vs. resistance table.
<table><tr><th>Temperature °F</th><th>Ohms</th></tr><tr><td>-22</td><td>19480</td></tr><tr><td>-4</td><td>12110</td></tr><tr><td>14</td><td>7763</td></tr><tr><td>32</td><td>5114</td></tr><tr><td>50</td><td>3454</td></tr><tr><td>68</td><td>2387</td></tr><tr><td>77</td><td>2000</td></tr><tr><td>86</td><td>1684</td></tr><tr><td>104</td><td>1231</td></tr><tr><td>122</td><td>885</td></tr></table>• If temperature appears to be within the proper operating range, swap a non-alarming sensor with the sensor being diagnosed. • If the new sensor is read properly by the controller, the sensor being diagnosed will need to be replaced. • If the sensor was disconnected for diagnostic purposes, return the sensor to the appropriate location on the controller once diagnostics are complete.</td></tr>
<tr><td>ASA
  </td><td>AIR TEMP SENSOR</td><td>Air Sensor Alarm</td><td rowspan="5">Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Temperature sensor is shorted or open (not connected).</td><td rowspan="5"></td><td rowspan="5"></td></tr>
<tr><td>CSA
  </td><td>COIL TEMP SENSOR</td><td>T3 Coil Sensor Alarm</td></tr>
<tr><td>A1A
  </td><td>AUX1 SENSOR</td><td>AUX1 Sensor Alarm</td></tr>
<tr><td>A2A
  </td><td>AUX2 SENSOR</td><td>AUX2 Sensor Alarm</td></tr>
<tr><td>A3A
  </td><td>AUX3 SENSOR</td><td>AUX3 Sensor Alarm</td></tr>
<tr><td>EdF
  </td><td>EXCESS DEFROST</td><td>Excess Defrost Alarm</td><td>Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Time</td><td><u>Variables</u>
CLt - Coil Temp

DEr - Defrost Relay

<u>Setpoints</u>
dtY - Defrost Type</td><td>Excess Defrost Alarm and Defrost Termination on Time Alarm are closely linked; both indicate issues with the defrost process/defrost heat. Excess defrost alarm only occurs when using defrost based on evaporator efficiency (demand). Air/ Electric / Hot Gas Defrost - Check solenoid valve. While the controller is in refrigeration or satisfied on temperature, initiate a defrost from the Basic Display by pressing and holding the and until ddF (defrost delay fan) or dEF appears. The solenoid valve should close and the flow of liquid refrigerant to the evaporator should be stopped for the entire defrost. Note: For electric and hot gas defrost, the controller should run fans only for several minutes while the system pumps down in ddF (defrost delay</td></tr>
</table>

			between defrosts too short in demand defrost.	ind - Initiate Defrost Mode	Fan) mode. In ddF, solenoid valve and heaters should be off. The display will change to dEF (defrost) after the fan operation is complete. Fans should turn off, solenoid valve should remain off, and all heaters should turn on. Electric Defrost - Verify that the heaters are working properly. Measure the amperage of the heaters while heaters are energized and check that it matches the nameplate of the evaporator. If less than the nameplate, check for damaged heaters and any cut, burned, chaffed or disconnected wires in the heater circuit. Repair damage and check for proper defrost operation. Note: Toward the end of the defrost cycle, the controller periodically turns heaters off to reduce steaming and overall heat of defrost. Air/ Electric / Hot Gas Defrost - Verify coil sensor location. An excessive number of defrosts is often due to coil sensor location. The coil sensor, or sensors, serve as defrost termination sensors. If in an improper location (such as close to a heater), or if a coil sensor has been pulled out, defrost will terminate too soon or will take too long to terminate. The controller will respond by initiating another defrost shortly after the irregular defrost, and the cycle will continue until the Excess Defrost Alarm is triggered. Relocate the coil sensor to where frost has built up the heaviest on the coil and initiate a defrost. Check to make sure the defrost terminates in a reasonable amount of time (less than 30-35 minutes for air defrost, less than 18-22 minutes for electric defrost) and the coil is completely clear of frost. If there is any frost remaining on the coil after the defrost, relocate a coil sensor to that location. The proper location for the coil sensor is always the last place frost disappears. Air/ Electric / Hot Gas Defrost - Verify door has not been left open for an extended period. Add door switch (PN 20543) to reduce excess frost caused by door openings. Air/ Electric – Cold air from an evaporator in refrigeration in the same space may prevent a defrosting coil from reaching termination temperature within a reasonable amount of time. Bonding and synchronizing defrost on the evaporators allow the evaporators to defrost more quickly. See Q.1.45-A Multi Evap Applications for more information on bonding. Air Defrost - The KE2 Evap OEM keeps the room temperature much tighter than is typically seen in the industry. The KE2 Evap OEM's default air temperature differential is 1.0°F, while the system is still protected from short cycling by minimum off and minimum run times if temperature fluctuation is larger than normal. If the room temperature setpoint on the KE2 Evap OEM is set to the same temperature cut-out as traditional mechanical controls where differentials of 4.0°F or 5.0°F are common, it will result in a much colder room
dtt 	DEFR TERM ON TIME	Defr Term on Time Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Defrost terminated on time instead of temperatur e for two consecutive defrosts	dtP - Defrost Term Temp	

<table>
<tr><td></td><td></td><td></td><td></td><td></td><td>temperature on average. Consider this when setting the room temperature setpoint. If receiving Defrost Termination on Time or Excess Defrost Alarm with air defrost, the room air heat alone may not be sufficient to complete the air defrost. The room temperature setpoint should be raised, or electric heat added to the evaporator. Alternatively, dtP (defrost term temp) can be lowered to one degree above rTP (room temp), however, the coil sensor MUST be in the spot on the coil where frost disappears last during defrost to ensure a completely clean coil after every defrost. Otherwise, set ind (initiate defrost mode) to SCH (schedule), and set dPd (defrost per day) and dtL (defrost time length) to the number of times per day and length of defrost needed to completely clear the coil of frost. If the maximum defrost time is still not sufficient to clear the coil of frost, the Defrost Termination on Time Alarm will continue to trigger. Return Defrost Mode to Demand after resolving the issue.</td></tr>
<tr><td>HSH
  </td><td>HIGH SUPERHEAT</td><td>High Superheat Alarm</td><td>Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. [EEV] Superheat reading 2°F above superheat setpoint for 90 minutes of cumulative runtime, and valve > 90% open. [TEV] Superheat reading above superheat setpoint for 90 minutes of</td><td><u>Variables</u>
SHt – Superheat

PrS - Suction Pressure

SUt - Suction Temp

oPn – Valve % Open

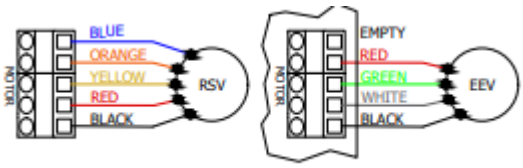
<u>Setpoints</u>
rFG - Refrigerant

Edt - Expansion Device Type</td><td>• Check the system suction pressure using either the Basic Display (PrS), or the controller's browser interface. Validate the suction pressure is within the range of the system design. If a new install, confirm valve is properly sized for the system under all operating conditions.
• Check refrigerant type. Press and hold BACK until tS appears. Press ↓ to rFG (refrigerant). Press ENTER to see the currently selected refrigerant. To change refrigerant press ↓ until the correct refrigerant is shown. Press and ENTER hold to save correct refrigerant type. To exit the menu, press BACK.
Refrigerants
<table><tr><th>Abbreviation</th><th>Full Name</th></tr><tr><td>R22</td><td>R-22</td></tr><tr><td>134</td><td>R-134a</td></tr><tr><td>42d</td><td>R-422D</td></tr><tr><td>42A</td><td>R-422A</td></tr><tr><td>40C</td><td>R-407C</td></tr><tr><td>40A</td><td>R-407A</td></tr><tr><td>507</td><td>R-507</td></tr><tr><td>404</td><td>R-404A</td></tr><tr><td>458</td><td>R-458A</td></tr><tr><td>513</td><td>R-513A</td></tr><tr><td>450</td><td>R-450A</td></tr></table><table><tr><th>Abbreviation</th><th>Full Name</th></tr><tr><td>449</td><td>R-449A</td></tr><tr><td>448</td><td>R-448A</td></tr><tr><td>744</td><td>R-744</td></tr><tr><td>410</td><td>R-410A</td></tr><tr><td>407</td><td>R-407F</td></tr><tr><td>409</td><td>R-409A</td></tr><tr><td>408</td><td>R-408A</td></tr><tr><td>438</td><td>R-438A</td></tr><tr><td>717</td><td>R-717</td></tr><tr><td>452</td><td>R-452A</td></tr></table>
• Check valve type. Press and hold BACK until tS appears. Press to ↓ Edt (expansion device type). Press ENTER to see currently selected valve. To change the valve type press ↓ until the correct valve is shown. Press and hold ENTER to save. Controller will reboot. Confirm proper system operation with the variables menu.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>cumulative runtime.</td><td></td><td rowspan="2">Valve Types
<table>
<tr><th colspan="2">Basic Display
Abbreviation</th><th>KE2 Combo Display
Scrolling Text</th><th rowspan="2">Description</th></tr>
<tr><td>tHr</td><td>tHr</td><td>MECHANICAL</td><td>Thermostatic Expansion Valve (TEV)</td></tr>
<tr><td>PLS</td><td>PLS</td><td>PULSE VALVE</td><td>Pulse Width Modulation (PWM) Valv</td></tr>
<tr><td>rS</td><td>rS</td><td>KE2 RSV</td><td>KE2 Therm's Refrigeration Stepper V</td></tr>
<tr><td>SEi</td><td>SEI</td><td>SER/SEI 1 TO 20</td><td>12VDC Bipolar Sporlan EEV with 1,6 max steps, 200 steps/second.</td></tr>
<tr><td>SEr</td><td>SEr</td><td>SER AA TO L</td><td>12VDC Bipolar Sporlan EEV with 2,5 max steps, 200 steps/second.</td></tr>
<tr><td>CrL</td><td>CrL</td><td>CAREL</td><td>12VDC Bipolar Carel EEV with 480 m steps, 50 steps/second.</td></tr>
</table>
• If system operation has not improved, re-initialize the valve. This can be done by clicking the “Reboot” button on the Setpoints page under General Information in the browser interface, or power may be cycled to the controller.
• Check the valve position in the variables menu (oPn). If the valve is fully open, verify the valve is operating properly by manually operating the valve from the Basic Display. Press BACK and ↓ at the same time on the Basic Display until a number with the right most number blinking displays. This is the valve percent open, and the EEV is now under manual control. Press ↑ to open and ↓ to close the valve. Press ENTER momentarily to change how much the valve opens with each button press (0.1%, 1.0% or 10.0%). The valve should start to move immediately to the position indicated on the display. While verifying suction pressure either from the controller’s browser interface or with gauges, begin closing the valve 10.0% at a time. The suction pressure should decrease with each 10% closure. Completely close the valve to 0.0%; system should pump down. If suction pressure responds to closing the valve, valve should be operating correctly and a system issue is likely present: low charge, restriction in the liquid line, dirty condenser etc. If suction pressure does not respond to manually operating the valve, proceed to next step.</td></tr>
<tr><td>LSH
  </td><td>LOW SUPERHEAT</td><td>Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Superheat reading below 3°F for 5 minutes and EEV < 10% open if EEV is selected.</td><td>Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Superheat reading below 3°F for 5 minutes and EEV < 10% open if EEV is selected.</td><td></td></tr>
</table>

HSH / LSH Corrective Action

Check wiring to the EEV terminal on the KE2 Evap OEM board. Refer below for proper wiring of the KE2-RSV EEV and other common EEV wiring.



• The bare stranded wire of the EEV cable should be inserted so that the wire is directly touching the gate of the connector. If the gate is contacting the insulation of the wire, it will not allow the controller to correctly operate the valve. • If wires have been extended, check that colors have not been swapped. • Measure resistance across the EEV leads. This will measure the resistance for the entire length of the lead wire, through the windings of the EEV and back to the other lead.

Check resistance across RSV leads:

Wire Colors	RSV-100 to 320	RSV-400 to 550
Blue – Orange	36 or 46 ohms	32 ohms
Blue – Yellow	36 or 46 ohms	32 ohms
Blue – Red	36 or 46 ohms	32 ohms
Blue – Black	36 or 46 ohms	32 ohms

For Sporlan SER-AA to L, measure:

Wire Colors	
Black – White	100 ohms
Red – Green	100 ohms
Black – Green	Open
Red – White	Open

All values should be within 10% of stated values, otherwise indicating a wiring issue. If sure of no wiring issue, the external coil may need to be replaced. For valves with internal windings, the valve may need to be replaced. • If electrical diagnosis reveals no issues, and no system issues are present, there may be debris in the valve port. The valve can be driven open/closed several times through the manual control, while also lightly tapping the valve to dislodge any debris. If the valve has a strainer, the strainer may need to be cleaned.

Low Superheat Alarm Only

The Low Superheat Alarm is most commonly caused by the compressor failing to start/ compressor not running. There is a common misconception in the industry that the low-pressure switch cut-in and cut-out pressure control on the condensing unit is set correctly for the application from the factory.

The equipment manufacturers' installation instructions recommend that the installing contractor adjust the low pressure cut-in and cut-out to recommended settings for the application. The low pressure cut-in and cut-out set point should be set to either the ambient or space temperature, whichever is lower.

When the controller calls for refrigeration, if suction pressure is not able to rise to the cut-in pressure before the EEV closes due to low superheat, the system will not start, and a Low Superheat Alarm triggered.

Our technical support team typically sees an increase of these alarms in the fall when the ambient temperatures begin to decrease. If the low superheat alarm is intermittent, this is the most likely source of the alarm. Check the following:

• Low Pressure Control Pressure Switch. Reduce the cut-out pressure to meet the equipment manufacture.

• Measure continuity across the low-pressure control, if it indicates a closed circuit, next check the compressor start components and continue diagnosis at the condensing unit.

Verify all fans are moving. Check if there is a mechanical service switch for the fans in the space being used inappropriately. If only one fan is not moving, verify whether the fan is operational. Replace the motor if necessary.

Check fan motor rotational direction and fan blade pitch to ensure air is flowing in the proper direction.

Check for diminished load due to low air movement across the coil. This can be caused by excessive frost build-up on the coil on the air entering and/or air exiting sides of the coil. The fans should be turned off while checking for frost buildup to allow a clear view of the coil. Product that is stacked too close to the coil and impedes airflow through the coil can also be a source of diminished load.

• Check EEV and EEV wiring/cables – Please see previous steps.

Alarm & Alarm Name			Description	Variables & Setpoints	Corrective Action
Basic Display	Combo Display	Webpages			
HtA 	HIGH AIR TEMP	High Air Temp Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Return air temp is above Room Temp setpoint + Air Temp Diff + High Temp Alarm Offset for longer than High Temp Alarm Delay. Example Room Temp setpoint 20°F Air Temp Diff 1°F High Temp Alarm Offset 10°F Alarm threshold temp 31°F These setpoints can be adjusted by the user. The High Temp Alarm Offset factory default is 10.0°F for electric	**Variables** rtP - Room (Air) Temp **Setpoints** tS - Room Temp Setpoint HAo - High Temp Alarm Offset HAd - High Temp Alarm Delay	Investigate condition. The majority of high temperature alarms are not related to the controller. To resolve the High Air Temp Alarm will require basic refrigeration troubleshooting. Ask staff if the door has been propped open for an extended period of time due to loading, unloading, inventory, etc. If this is not the case, begin to troubleshoot the system. Check air sensor. Check the evaporator coil to verify the coil is free from excessive frost. • Check the fans to ensure all fans are rotating properly. • Check compressor operation. • Check for proper refrigerant charge. • Make sure the system has sufficient capacity. • If pressure transducer and suction temperature sensor are installed, check superheat and investigate if

			defrost and 3.0°F for air defrost.		superheat is abnormally high. • Troubleshoot TEV or EEV (if installed, see high superheat corrective actions on the previous pages). Note: High Temp Alarm is not triggered during defrost.
LtA 	LOW AIR TEMP	Low Air Temp Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Return air temp is below Room Temp setpoint - Low Temp Alarm Offset for longer than Low Temp Alarm Delay. The default alarm condition is 4°F below the Room Temp setpoint for 10 minutes but can be adjusted as necessary.	**Variables** rtP - Room (Air) Temp **Setpoints** tS - Room Temp Setpoint LAo - Low Temp Alarm Offset LAd - Low Temp Alarm Delay	• Verify the system will pumpdown. This can be done in multiple ways; the easiest is to initiate a defrost from the Basic Display. Press and hold the and until ddF (defrost delay fan) or dEF (defrost) is displayed. The liquid line solenoid should close immediately, if not, troubleshoot the solenoid and the wiring controlling the solenoid. Solenoid should shut tightly and not allow liquid refrigerant through. If the system only has an EEV, the EEV should also shut tightly during the defrost. • Check that the low-pressure control is set and operating properly. • Check the tS (room temperature setpoint), LAo (low alarm offset), and LAd (low temp alarm delay) settings. • If there are multiple systems in the room, check the room temperature setpoint of the other systems. • Check for outside air infiltration. Example: Infiltration from freezer into cooler.
Dor 	DOOR SWITCH	Door Open Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Door is open and air temp reading	**Variables** rtP - Room (Air) Temp AU1 - Aux Input 1 Status AU2 - Aux Input 2 Status AU3 - Aux Input 3 Status **Setpoints**	• Verify that the door is closed. • Verify which auxiliary input is being used for the door switch (AU1, AU2 or AU3). Press and hold BACK until tS appears. Press ↓ until AU1, AU2 or AU3 appears. Press ENTER to view what the auxiliary input is currently set to. If the auxiliary input is set

			above Room Temp setpoint + 0.5°F longer than Door Alarm Delay.	tS - Room Temp setpoint dAd - Door Alarm Delay AU1 - Aux Input 1 Mode A1A - Aux Input 1 State AU2 - Aux Input 2 Mode A2A - Aux Input 2 State AU3 - Aux Input 3 Mode A3A - Aux Input 3 State KE2 Combo Display Setpoints AUX1 FUNCTION AUX1 SWITCH STATE AUX2 FUNCTION AUX2 SWITCH STATE AUX3 FUNCTION AUX3 SWITCH STATE DOOR SWITCH STATE	to door switch, **dor** will be shown on the Basic Display. Press BACK to return to the advanced setpoints menu and check the other inputs. Verify the leads of the door switch are connected to the correct auxiliary input, and that the bare stranded wire of door switch lead is inserted so that the wire is directly touching the gate of the connector. If the gate is contacting the insulation of the wire, it will not allow the controller to read the door switch. Inspect the length of the cable for any cut, burned, chaffed, or otherwise damaged wire. Repair if there is damage and verify operation. • Verify that the door switch is in proper working order. Door switches provided by KE2 Therm are normally closed switches. To test them, move the two pieces of the switch close together, remove the leads from the connector on the board and check that the circuit is continuous using a multimeter. Move the two pieces of the switch apart more than 6 inches. Check continuity again; it should be open. If the door switch is operating in an opposite manner, the switch is a normally open switch and the controller should be reconfigured appropriately: select the correct input, A1A, A2A or A3A (indicating Aux In 1, 2 or 3 state) and set it to CLo for activate on closed circuit. If the switch is verified to be inoperable, replace the switch. • Confirm proper door switch operation by opening the

					door, fans should turn off and refrigeration should stop shortly after. Close door, the controller should resume refrigeration and fans. If there is a blinking green light on the controller, it has not cleared the time for short cycle protection and should resume refrigeration in a few minutes. • Check KE2 Combo Display inputs. If a KE2 Combo Display is present, additional inputs are available for door switches. To confirm settings, press and hold ENTER and BACK at the same time for at least 3 seconds to access the KE2 Combo Display setpoints. Check AUX 1 FUNCTION, AUX 2 FUNCTION, AUX 3 FUNCTION, and DOOR SWTCH STATE to see which input or inputs are set to DOOR SWITCH. Proceed with the troubleshooting steps outlined above.
CoA 	COMMUNICATION ERROR	Network Comms Alarm	ONLY ACTIVE FOR BONDED CONTROLLERS. Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. No communication between controllers for one minute or more.	**Variables** iP1 - IP Address Part 1 iP2 - IP Address Part 2 iP3 - IP Address Part 3 iP4 - IP Address Part 4	• Communication, Lead/Lag, and Compressor Sequencer Communications Alarms are most commonly caused by local network issues. • Verify all network switches are connected and functioning properly. Check that all controllers in a bonded group, lead/lag pair, or compressor sequencer group are powered up. • Verify communication to each individual controller using whatever method is usually used to communicate to the controllers in question (via IP address, KE2 SmartAccess etc.). If one or more are unreachable, investigate those controllers and their network cabling further.
CLL 	LEAD/LAG COMM ERROR	Lead/Lag Comms Alarm	ONLY ACTIVE FOR LEAD/LAG CONTROLLERS. Yellow LED is illuminated. The controller will attempt to continue to		

			operate the system while this alarm is present. Communication lost between lead/lag controllers.		• Ensure all cables are inserted fully into their respective jacks. Check for any damaged cable. • On new installations, where the cables are built in the field, check network cables for proper wire color code (Ethernet standard A or B, see Q.5.5 Making Ethernet Cable for more information). Also make sure copper for each wire goes fully into the clip. If one or more wires is out of order or doesn't fully insert into the clip, it needs to be fixed before it can be used to communicate. • Attempt to unbond and re-bond the controllers or unpair/re-pair for lead/lag (remember to re-enable Lead/Lag mode after re-pairing). If any of the controllers are not discoverable from the Network page, investigate those controllers further.
CCA 	COMP SEQ COMM ERROR	CompSeq. Comms Alarm	ONLY ACTIVE WHEN SITEVIEW IS ACTIVE. Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Communication lost to KE2 Compressor Sequencer OEM.		
EFL 	EMAIL FAILURE	Email Failure Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Email alert was not confirmed by email server provided after seven consecutive attempts.	**Variables** iP1 - IP Address Part 1 iP2 - IP Address Part 2 iP3 - IP Address Part 3 iP4 - IP Address Part 4 **Setpoints** dHC - DHCP mode	• Ensure the controller has Internet access. If possible, plug a laptop into the Ethernet cable at the controller to test Internet connection. • Check the Network Info settings (gateway, DNS etc.) on the controller's Network webpage. If DHCP is enabled on the controller these settings should be provided automatically to the controller by the local network. • Email Failure Alarm is a function of the controller attempting to send out an email alert using the information entered in the Alert Notifications section of the Settings Page and failing to communicate successfully with the email server
ntP 	TIMER SERVER COMM	Time Server Comm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Controller cannot communicate with external time of		

			day server (SNTP server).		provided. If using a custom email server, consider using the KE2 Therm Default Server instead. • Servers requiring basic authentication should provide Username and Password, and ensure it is correctly entered. • Servers without authentication requirements should not enter information in the Username or Password field. If unsure of server requirements and an alarm occurs, ensure both Username and Password are blank and retry. • Check the Time Reference Options on the setpoints page of the controller webpage. This is found under general information. If set to "Custom" ensure the web address provided is a valid SNTP server. Alternatively, change the setting to "Internet" to use a predefined SNTP server or "Local" to rely on the local web browser to update the time.
EA1 	EXTERNAL ALARM 1	EXT ALARM 1	If AU1 (AUX IN 1 MODE) = EA1 (EXT ALARM 1): The digital input is in an active state.	**Variables** AU1 - Aux Input 1 Status AU2 - Aux Input 2 Status AU3 - Aux Input 3 Status **Setpoints** AU1 - Aux 1 Input Mode A1A - Aux 1 Input State AU2 - Aux 2 Input Mode A2A - Aux 2 Input State AU3 - Aux 3 Input Mode	• Troubleshoot the device connected to the auxiliary input to discover why it is in alarm condition and resolve the issue. • If the device is not in alarm, check to make sure the device is connected to the appropriate position (AUX 1, AUX 2 or AUX 3). • Review the KE2 Evap OEM settings to make sure they match the type of device connected to the controller. AU1, AU2 or AU3 should be set to EA1, EA2 or EA3 respectively to set the aux input to be an external alarm. • Verify the aux input state (A1A, A2A or A3A) is
EA2 	EXTERNAL ALARM 2	EXT ALARM 2	If AU2 (AUX IN 2 MODE) = EA2 (EXT ALARM 2): The digital input is in an active state.		
EA3 	EXTERNAL ALARM 3	EXT ALARM 3	If AU3 (AUX IN 3 MODE) = EA3 (EXT ALARM 3): The digital input is in an active state.		

				A3A - Aux 3 Input State	appropriately set to oPn (open) or CLo (closed, reads continuity) to match the input's functionality. If the controller is displaying the opposite of what is expected, changing the state will reverse the logic.
dtS 	DOOR TEMP SENSOR	Door Temp Sensor Alarm	Combo Display Aux 1 Door Temp Sensor is shorted or open.	**Variables** DISP AUX1 STATUS **Setpoints** AUX1 FUNCTION	• The majority of sensor alarms and inaccurate readings are caused by cut, burned, chaffed or otherwise damaged sensor cable. Inspect the length of the cable for any cut, burned, chaffed or otherwise damaged sections. Repair any damaged sections. • Check that the sensor is inserted into the proper position on the KE2 Combo Display board. The sensor is not polarized; black and white wires can be inserted in either position on the connector: **DOOR TEMP SENSOR**: blue connector labeled TEMP1. **DISPLAY AUX2 SENSOR**: blue connector labeled TEMP2. **DISPLAY AUX3 SENSOR**: blue connector labeled TEMP3. • If there is no sensor wired to the input, and none are expected to be wired in, the input can be disabled. Press and hold BACK and ENTER to display AUX1 FUNCTION (press ↓ to navigate to AUX2 FUNCTION or AUX3 FUNCTION). Press ENTER to display the current setpoint. Press ↑ or ↓to select DISABLED. Press and hold ENTER to save. • The bare stranded wire of the temperature sensor should be inserted so that the wire is directly touching the gate of the connector. If the gate is contacting the insulation of the wire, it will
dt2 	DISPLAY AUX2 SENSOR	Disp Aux2 Sensor Alarm	Combo Display Aux 2 Temp Sensor is shorted or open.	**Variables** DISP AUX2 STATUS **Setpoints** AUX2 FUNCTION	
dt3 	DISPLAY AUX3 SENSOR	Disp Aux3 Sensor Alarm	Combo Display Aux 3 Temp Sensor is shorted of open.	**Variables** DISP AUX3 STATUS **Setpoints** AUX3 FUNCTION	

					not allow the controller to read the sensor. • If wires have been extended, check for any bad splices, crimps, or solder joints where extended.
dtH 	DOOR TEMP HIGH	High Door Temp Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Combo door temp reading above DOOR TEMP setpoint + HI DOOR ALR OFST for longer than DOOR TEMP ALR DLY.	**Variables** DISP AUX1 STATUS **Setpoints** DOOR TEMP HI DOOR ALR OFST DOOR TEMP ALR DLY	• Check to see what the Door Temp variable is reading. If the reading seems abnormally high or low, proceed to Door Temp Sensor alarm corrective actions. • Confirm DOOR TEMP, HI/LO DOOR ALR OFST, and DOOR TEMP ALR DLY setpoints. Press and hold BACK and ENTER to access the KE2 Combo Display setpoints. Press ↓ to navigate to DOOR TEMP. Press ENTER to see the current setpoint. If incorrect, use the arrows to change the setpoint, then press and hold ENTER to save. Press ↓ to navigate to HI DOOR ALR OFST and DOOR TEMP ALR DLY setpoint; repeat steps if adjustment is required. • Confirm where door temp sensor is landed on the controller. DOOR TEMP SENSOR is the blue connector labeled TEMP1. If incorrect sensor is wired in, re-wire to correct position. • See if DISP HEATER RELAY in the VARIABLES menu is showing heater ON or OFF. If controller is in High Door Temp Alarm and relay shows ON, or if controller is in Low Door Temp Alarm and relay shows OFF, re-check setpoints and sensor reading. Otherwise, continue with voltage checks below. • Check to see if door mullion heater circuit has power. The door heater relay is on the KE2 Combo Display board and labeled SSR-A and
dtL 	DOOR TEMP LOW	Low Door Temp Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Combo door temp reading below DOOR TEMP - LO DOOR ALR OFST for longer than DOOR TEMP ALR DLY.	**Variables** DISP AUX1 STATUS **Setpoints** DOOR TEMP LO DOOR ALR OFST DOOR TEMP ALR DLY	

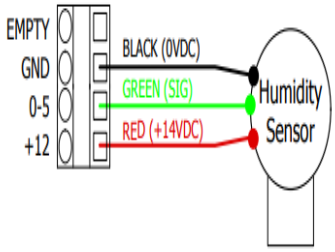
					SSR-B. Measure each terminal to ground, it should read correct voltage from each terminal to ground for the application. • After confirming voltage to ground, measure voltage across the SSR-A and SSR-B terminals. A closed (energized) relay will indicate close to 0V. An open (de-energized) relay will show the voltage potential between the two terminals. If the opposite of what is expected, the controller must be replaced. • Check walk-in manufacturer literature/support for additional troubleshooting.
Hd2 	HIGH MONITOR TEMP2	High Mon2 Temp Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Combo aux monitor temp reading above MON TMP HI ALRM or below MON TMP LO ALRM for longer than MON TMP AL DLY.	**Variables** DISP AUX2 STATUS DISP AUX3 STATUS **Setpoints** MON TMP2 HI ALRM MON TMP2 LO ALRM MON TMP2 AL DLY MON TMP3 HI ALRM MON TMP3 LO ALRM MON TMP3 AL DLY	• See if the refrigeration system is running, or in the case of a low alarm, whether the refrigeration system is over-cooling due to a stuck thermostat, solenoid, EEV etc. • Infiltration from an adjoining freezer or outdoor wall may cause a low alarm. Address the infiltration and/or move the sensor to a more appropriate location. • Ensure that the relevant Monitor Temp Alarm setpoint is high enough, and the delay is long enough, so that the alarm does not trigger during normal loading or defrost.
Ld2 	LOW MONITOR TEMP2	Low Mon2 Temp Alarm			
Hd3 	HIGH MONITOR TEMP3	High Monitor Temp3 Alarm			
Ld3 	LOW MONITOR TEMP3	Low Monitor Temp3 Alarm			
EA1 	DISPLAY EXTERNAL ALARM 1	Disp Ex1 Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system	**Variables** DISP AUX1 STATUS DISP AUX2 STATUS DISP AUX3 STATUS	• Troubleshoot the device connected to the Combo Display auxiliary input to discover why it is in alarm condition and resolve the issue.
EA2 	DISPLAY EXTERNAL ALARM 2	Disp Ext2 Alarm			
EA3 	DISPLAY EXTERNAL ALARM 3	Disp Ext3 Alarm			

			while this alarm is present. Combo External Alarm input is active.	**Setpoints** AUX1 FUNCTION AUX1 SWITCH STATE AUX2 FUNCTION AUX2 SWITCH STATE AUX3 FUNCTION AUX3 SWITCH STATE	• If the device is not in alarm, check to make sure the device is connected to the appropriate position on the Combo Display board (TEMP1, TEMP2 or TEMP3). • Review the Combo Display settings to make sure they match the type of device connected to the controller. AUX1, AUX2, or AUX3 FUNCTION should be set to EXTERNAL ALARM as appropriate to set the aux input to function as an external alarm input. • Verify the aux input state (AUX1, AUX2, or AUX3 SWITCH STATE) is appropriately set to OPEN or CLOSED to match the input's functionality. If the controller is alarming when the external device is not active, changing the state will reverse the logic.
Pbt 	HELP	Panic Button Alarm	Red LED is illuminated on KE2 Basic Display. All LEDs are blinking on KE2 Combo Display and buzzer beeping. Refrigeration will stop while this alarm is present.	N/A	• Check walk-in immediately for any trapped personnel. • Press and hold Panic Button for 3 seconds to clear.

LPCO (Low Pressure Cut-Out control)

Pdt 	PUMP DOWN TIMEOUT	Pump Down Timeout	Low Pressure Cut-Out Time exceeded before suction pressure reached Low Pressure Cut-out.	**Variables** PrS – Suction Pressure **Setpoints** LPC – Low Pressure Cut-out LPt – Max Time for LPCO	• Check LPt to see if the Low-Pressure Cut-out Time is too short. • Check LPC to see if the Low-Pressure Cut-out is set too low. LPC should be set to refrigeration unit manufacturer's recommendation. • Confirm EEV is operating properly. See High/Low Superheat corrective actions for troubleshooting the EEV. • Follow compressor manufacturer's troubleshooting guide to ensure compressor is operating properly.

					• If controller is operating a liquid line solenoid instead of compressor contactor, LPCO control should not be enabled. Set LPt to 0 to disable LPCO control.
SCC 	SHORT COMP CYCLE	Short Compressor Cycle	Compressor started excessive number of times due to suction pressure in off mode, or compressor cutout excessive number of times due to suction pressure while in refrigeration mode.	**Variables** PrS – Suction Pressure **Setpoints** LPC – Low Pressure Cut-out LPd – Pressure Differential for LPCO	• Check LPC to see if the Low-Pressure Cut-out is set too low. LPC should be set to refrigeration unit manufacturer's recommendation. • Check LPd to see if the Pressure Differential for LPCO is too small. LPd should be set to refrigeration unit manufacturer's recommendation. • Confirm EEV is operating properly. See High/Low Superheat corrective actions for troubleshooting the EEV. • High superheat conditions can cause short cycling of the compressor while calling for refrigeration. Troubleshoot the refrigeration system for common causes of high superheat (restriction in the liquid line, flash gas, insufficient subcooling, dirty condenser etc.). • Confirm suction temperature is reading correctly. Follow Suction Temp Alarm corrective actions. • Confirm pressure transducer is reading correctly. Follow Pressure Sensor Alarm corrective actions.
LPA 	LOW PRESSURE	Low Pressure Alarm	Suction pressure below Low-Pressure Cut-out despite attempts to run.	**Variables** PrS – Suction Pressure **Setpoints** LPC – Low Pressure Cut-out	• Check LPC to see if the Low-Pressure Cut-out is set too high. LPC should be set to refrigeration unit manufacturer's recommendation. • Check for restrictions in the liquid line. • Confirm EEV is operating properly. See High/Low Superheat corrective actions for troubleshooting the EEV.

HAS HSH	HUMIDITY SENSOR	Humidity Sensor Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Humidity sensor is shorted or open.	**Variables** HU - Humidity	• The majority of sensor alarms and inaccurate readings are caused by cut, burned, chaffed, or otherwise damaged sensor cables. Inspect the length of the cable for any burned, chaffed, or otherwise damaged sections. Repair or replace any damaged sections; take care not to swap colors when repairing. • Check that the humidity sensor cable wires are inserted into the proper terminals on the KE2 Humidity Control, and that the screw down terminals are screwed down. The bare stranded wire of the cable should be inserted so that the wire is directly touching the gate of the connector. If the gate is contacting the insulation of the wire, it will not allow the controller to read the sensor.  • If wires have been extended, check that colors were not swapped when extended. Check for any bad splices, crimps, or solder joints where extended. • Verify the voltage between the red and black humidity sensor inputs on the controller is approximately +14 VDC. • Measure the voltage between the black and green inputs on the controller. Enter that number into the following formula: (voltage read / 5VDC) x 100 = humidity reading

HHA 	HIGH HUMIDITY	High Humidity Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Humidity reading is above Humidity Setpoint + Humidity Differential + Humidity Alarm Offset for longer than the Humidity Alarm Delay.	**Variables** HU – Humidity **Setpoints** HSP – Humidity Setpoint HdP – Humidity Differential UAo – Humidity Alarm Offset UAd – Humidity Alarm Delay HEt – Heater setpoint HEd – Heater Differential setpoint dto – Dehumidity Temp Offset USt – Max Superheat	• The humidity sensor should be located in an area representative of the controlled space. Avoid large openings to the space as they have the potential to read higher than the rest of the space. The senor must be placed with the metal cylinder in the downward direction to read accurately. • Confirm that any dehumidification, humidification, and/or reheat devices are operating as expected. • Address any sources of infiltration to reduce the amount of humidity being introduced to the space. • Check drain pan and drain line for any clogs. • Confirm Electric Expansion Valve (EEV) and refrigeration system is operating as expected. See High/Low Superheat Alarm corrective actions for troubleshooting the EEV. • Increase the Max Superheat setpoint to increase runtime. Do not allow superheat at the compressor to exceed the manufacturer's recommended maximum. • If the system is satisfying on temperature before humidity target is reached, the Dehumidify Offset can be decreased. Do not allow room to over-cool to the point it damages product. • If the system is satisfying on temperature before humidity target is reached, additional reheat or dehumidifiers may be required. Defrost heaters should not be used for reheat, as it does not allow the coil to reach dew point and extract moisture, leading to higher humidity. • For systems with electric defrost, increase the number of defrosts per day. • If you believe the humidity reading may be in error, proceed to troubleshooting steps for Humidity Sensor Alarm.

LHA 	LOW HUMIDITY	Low Humidity Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Humidity reading is below the Humidity Setpoint - Humidity Differential - Humidity Alarm Offset for longer than the Humidity Alarm Delay.	**Variables** HU – Humidity **Setpoints** HSP – Humidity Setpoint HdP – Humidity Differential UAo – Humidity Alarm Offset UAd – Humidity Alarm Delay Stt – (Min) Superheat tS – Room Temp Setpoint	• The humidity sensor should be located in an area representative of the controlled space. An area with poor air movement may provide an unusually low humidity reading. The senor must be placed with the metal cylinder in the downward direction to read accurately. • Confirm that any dehumidification, humidification, and/or reheat devices are operating as expected. • Confirm Electric Expansion Valve (EEV) and refrigeration system is operating as expected. See High/Low Superheat Alarm corrective actions for troubleshooting the EEV. • Decrease the Superheat setpoint to decrease runtime. Do not allow superheat at the compressor to go below the manufacturer's recommended minimum. • For systems with electric defrost, decrease the number of defrosts per day or switch to demand defrost. If the number of defrosts is still high, see Excess Defrost corrective actions. • Review room temperature to see if room temp setpoint can be raised slightly. The controller keeps a tighter temperature band than typical mechanical thermostats. • If the system is otherwise operating as expected, consider adding humidification to the space. • If you believe the humidity reading may be in error, proceed to troubleshooting steps for Humidity Sensor Alarm.
CHA 	HUMIDITY COMM	Humidity Comms Alarm	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. KE2 Evap OEM lost communication with KE2 Humidity	HU - Humidity Mode	• Check to make sure the KE2 Humidity Control is powered up and both the KE2 Humidity Control and KE2 Evap OEM have proper incoming voltage. • Confirm the RS-485 connection between the KE2 Evap OEM and KE2 Humidity Control. The "A" terminal on the KE2 Evap OEM board should be wired to the "A" terminal on the KE2 Humidity Control. The "B" terminal on the KE2 Evap OEM board should be wired to the "B" terminal on the KE2 Humidity Control.

			Control board for 10 seconds.		GND/SH should not be connected at either end. • The bare stranded wire of the communication cable should be inserted so that the wire is directly touching the gate of the connector. If the gate is contacting the insulation of the wire, it will not allow communication. • Check for any burned, cut, chaffed sections of the communications cable, repair or replace the cable or damaged sections. • Switch the existing cable with Cat5e cable. Strip back the cable ends and use the blue & blue with white stripe twisted pair for the A & B connections.
had 	HIGH DISCH TEMP	High Disch Temp	Red LED is illuminated. System cannot operate while this alarm is present. Discharge temp reading above High Discharge Temp setpoint for longer than High Discharge Temp Delay.	**Variables** AU1, AU2, AU3 – Discharge Temp (any Aux Input can be set to Discharge Temp). **Setpoints** Hdd – High Discharge Temp HdL – High Discharge Delay	• Confirm condenser fans are operating correctly. • Clean condenser/remove any obstructions to proper airflow. • Confirm discharge sensor is reading properly. • Confirm that Hdd and HdL setpoints are not set too low or short for the application. Check manufacturer's recommendations for maximum discharge temperature. • Follow compressor/refrigeration unit manufacturer's troubleshooting steps for high discharge temperature.
LCT 	SYSTEM LOCKOUT	Comp Locked Out	Red LED is illuminated. System cannot operate while this alarm is present. In one hour, system cycled off on high discharge temp more times than Max Number of Starts setpoint.	**Variables** AU1, AU2, AU3 – Discharge Temp (any Aux Input can be set to Discharge Temp). **Setpoints** Hdd – High Discharge Temp HdL – High Discharge Delay NSt – Max Number of Starts	• Proceed to corrective actions for High Disch Temp alarm. • Must be manually cleared by clearing alarms or cycling power.

HCA 	HIGH COND TEMP	High Cond Temp	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Condenser temp reading is above Cond Temp setpoint + High Cond Temp Alarm Offset for longer than High Cond Temp Delay.	**Variables** AU1, AU2, AU3 – Condenser Temp (any Aux Input can be set to Cond Temp). **Setpoints** Cdt – Cond Temp Setpoint HCO – High Cond Temp Offset HCd – High Cond Alarm Delay	• Confirm condenser fans are operating correctly. • Clean condenser/remove any obstructions to proper airflow. • Confirm condenser temp sensor is reading properly. • Confirm that Cdt, HCO, and HCd setpoints are not set too low or short for the application.
LCA 	LOW COND TEMP	Low Cond Temp	Yellow LED is illuminated. The controller will attempt to continue to operate the system while this alarm is present. Condenser temp reading is below Cond Temp setpoint - Low Cond Temp Alarm Offset for longer than Low Cond Temp Alarm Delay.	**Variables** AU1, AU2, AU3 – Condenser Temp (any Aux Input can be set to Cond Temp). **Setpoints** Cdt – Cond Temp Setpoint LCO – Low Cond Temp Offset LCd – Low Cond Alarm Delay	• Confirm condenser fans are operating correctly. • Confirm condenser temp sensor is reading properly. • Confirm that Cdt, LCO, and LCd setpoints are not set too high or short for the application.
A1A 	AUX1 SENSOR	Dis Aux1 Sensor	Discharge temp sensor input is shorted or open.	**Variables** AU1, AU2, AU3 – Discharge Temp (any Aux Input can be set to Discharge Temp).	• The majority of sensor alarms and inaccurate readings are caused by cut, burned, chaffed or otherwise damaged sensor cable. Inspect the length of the cable for any cut, burned, chaffed or otherwise damaged sections. Repair any damaged sections. • Check that the sensor is inserted into the proper position on the KE2 Evap OEM board. The sensor is not
A2A 	AUX2 SENSOR	Dis Aux 2 Sensor			

A3A	AUX3 SENSOR	Dis Aux3 Sensor			polarized; black and white wires can be inserted in either position. • The bare stranded wire of the temperature sensor should be inserted so that the wire is directly touching the gate of the connector. If the gate is contacting the insulation of the wire, it will not allow the controller to read the sensor. • If wires have been extended, check for any bad splices, crimps, or solder joints where extended.

KE2 Condensing Unit Control

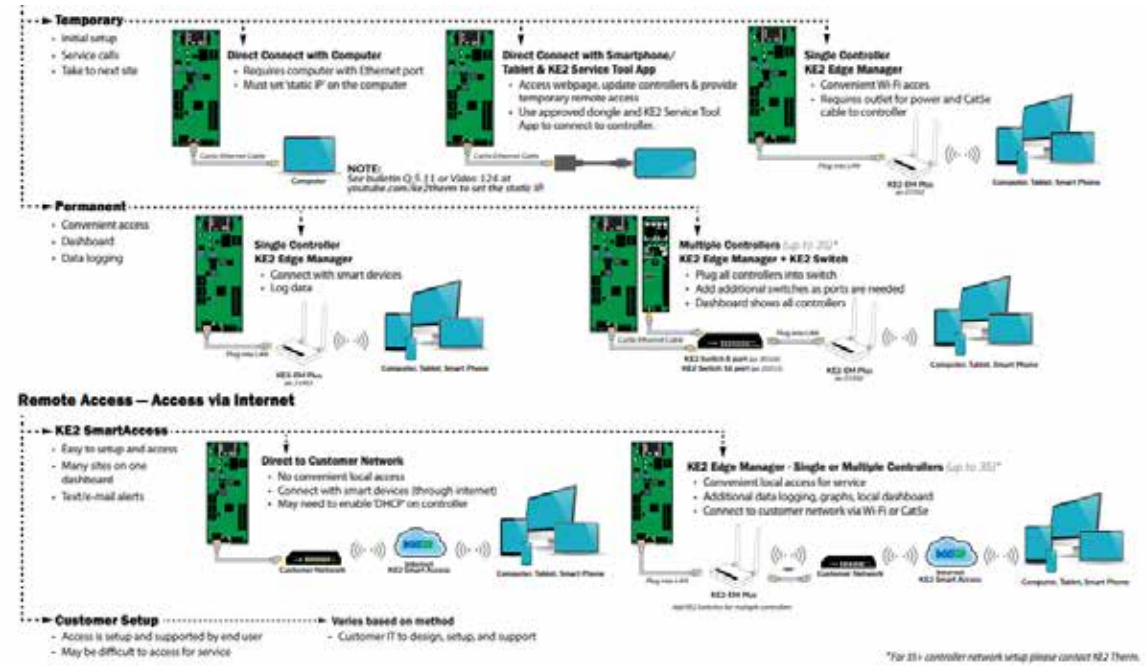
Accessing the built-in web page of the KE2 Condensing Unit Control reveals a great deal of information about the system performance and allows for quick adjustments. With KE2 Therm accessories the webpage can be conveniently accessed via Wi-Fi at site. With an internet connection and KE2 SmartAccess, the controller can be viewed remotely from home, work, or anywhere else internet is available.

Access your equipment anywhere, anytime:

All equipment is shown on one dashboard.

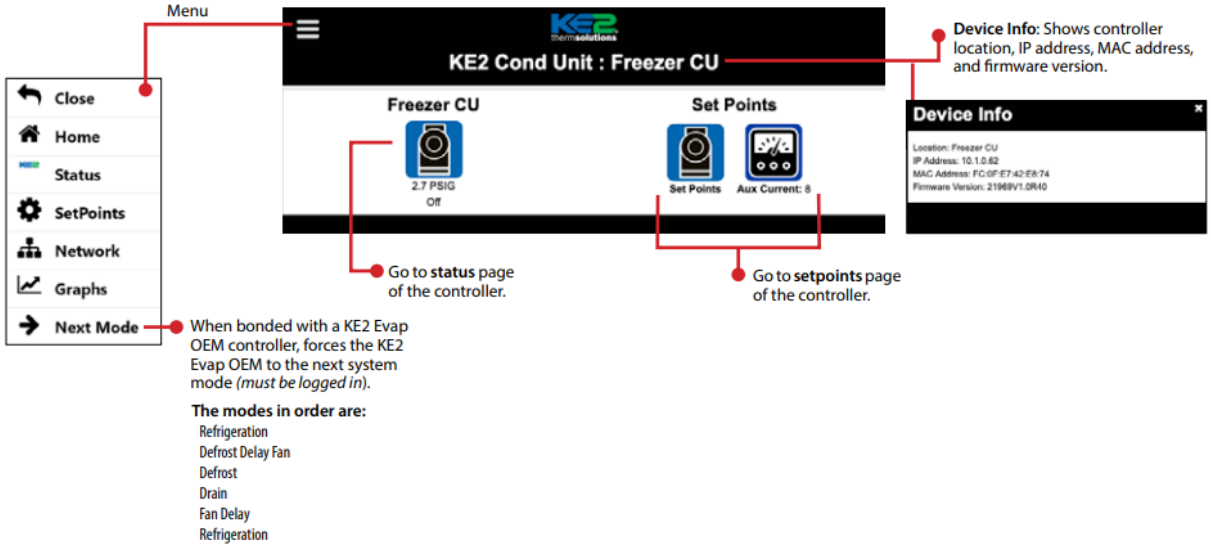
Get notified by e-mail or text alerts.

The graphic below shows the most common options for communicating with the controller and will help determine which method is best for your specific needs.

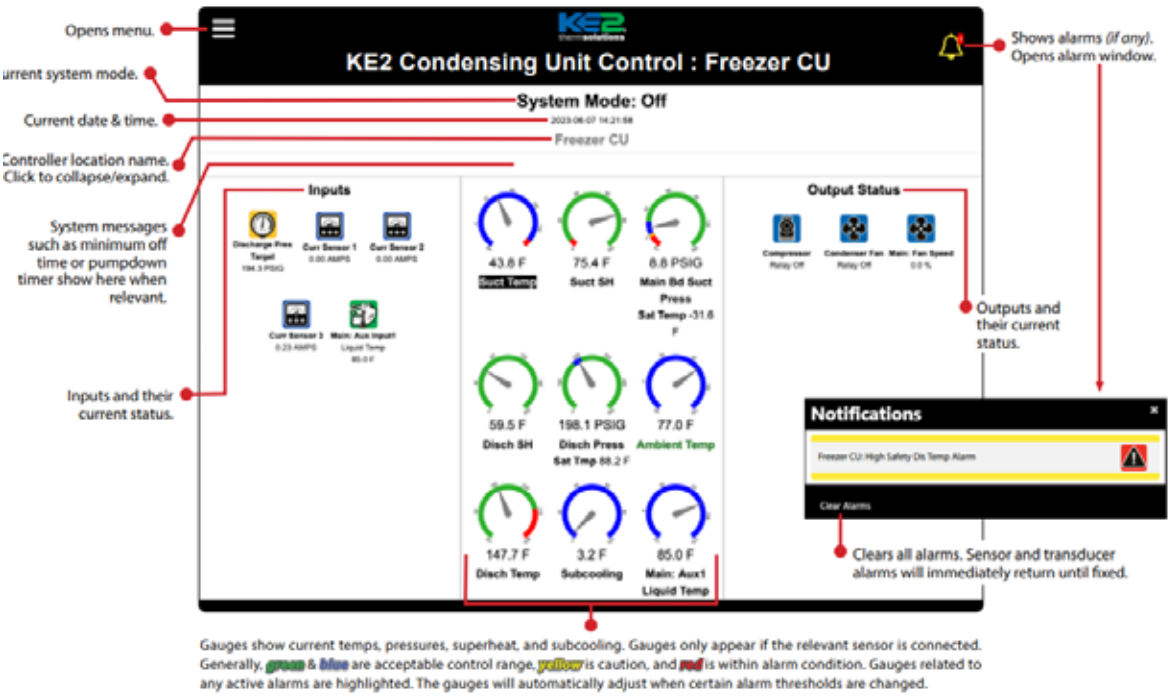


The ⌂ **Home Page** provides the suction pressure and system status of the KE2 Condensing Unit Control. If a Digital Compressor Aux Board or Current Sensor Aux Board is connected to either controller, it will be shown under Local or Remote Components. Clicking on the menu or icons allows you to quickly navigate to a specific web page.

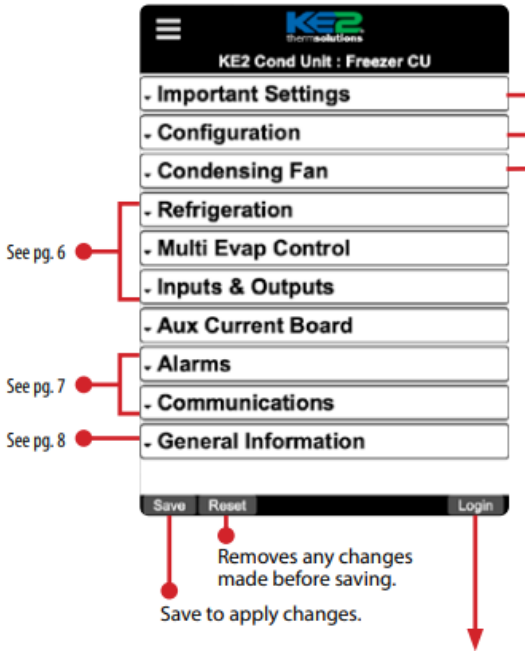
Note: The webpages will automatically rearrange for easy viewing based on screen size.



The KE2 **Status Page** is the most useful page for diagnosing system issues. It shows the status, in real time, of all sensors, relays, inputs, fan speed (with variable speed fans), superheat, subcooling, and more. Many values are shown in familiar gauge format for easy diagnosis.



The  Setpoints Page allows customization of the KE2 Evap OEM setpoints.



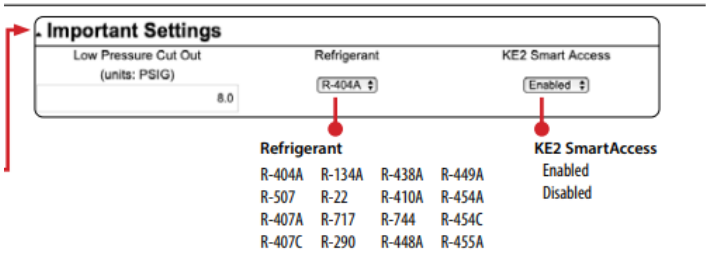
Login to make changes, default credentials are as follows.

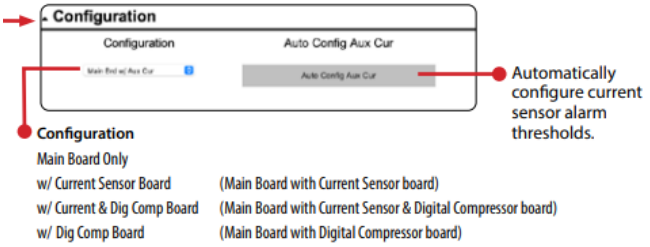
Username: ke2admin
Password: ke2admin

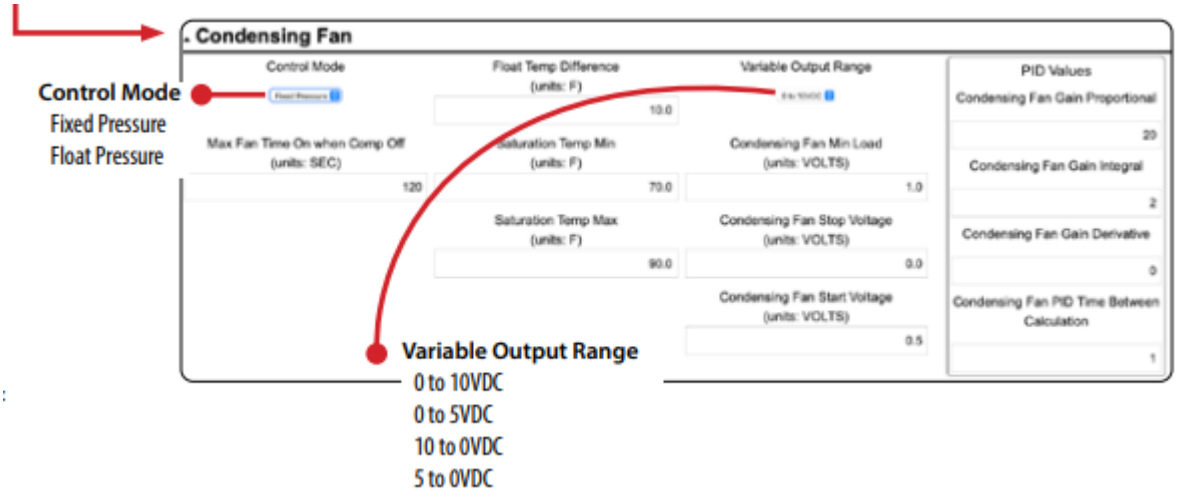
For security, the Password ***MUST*** be changed from default upon first login.

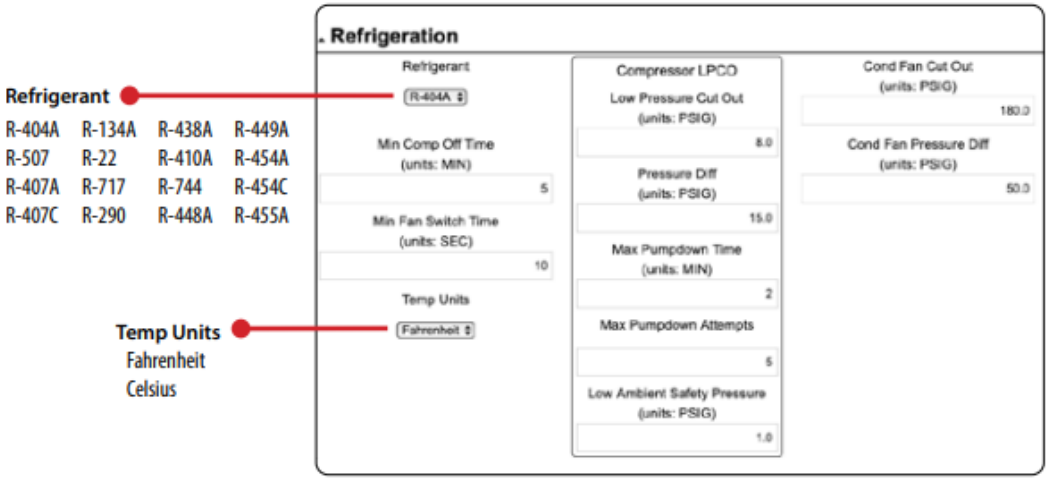
The new Password must be a minimum of 8 characters. Allowed characters for passwords are spaces, A-Z, a-z, 0-9 and the following special characters: -_.@!#():,[]+/? Invalid special characters are: (<>*`~). If invalid characters are entered for the password then an error will be displayed, and the password will not be saved.

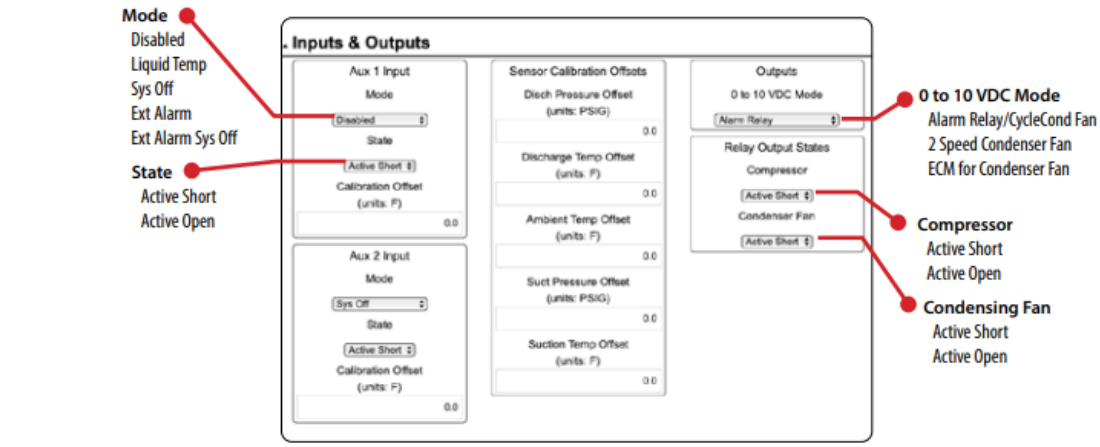
See pg. 11 for information on resetting the login credentials.

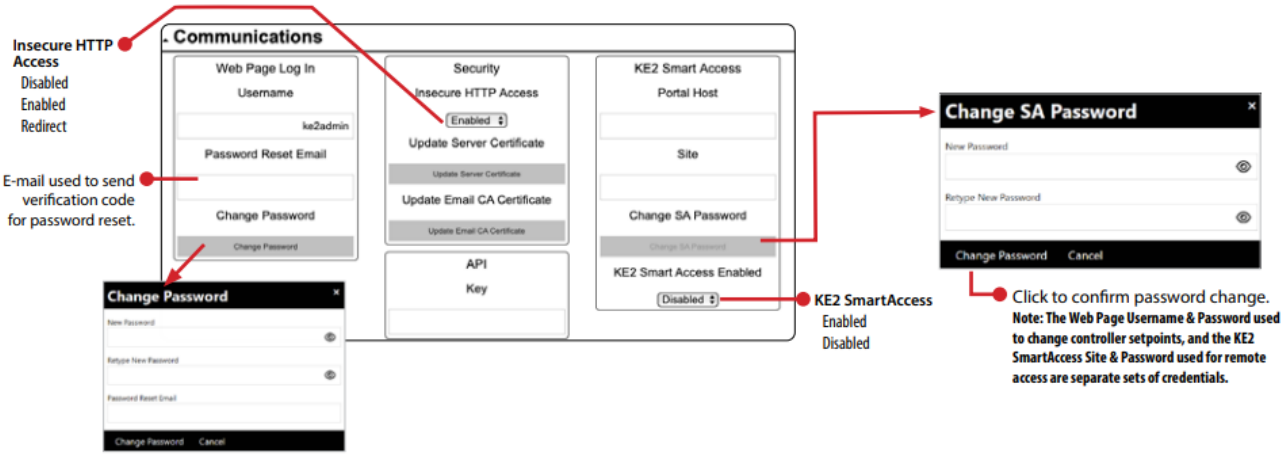


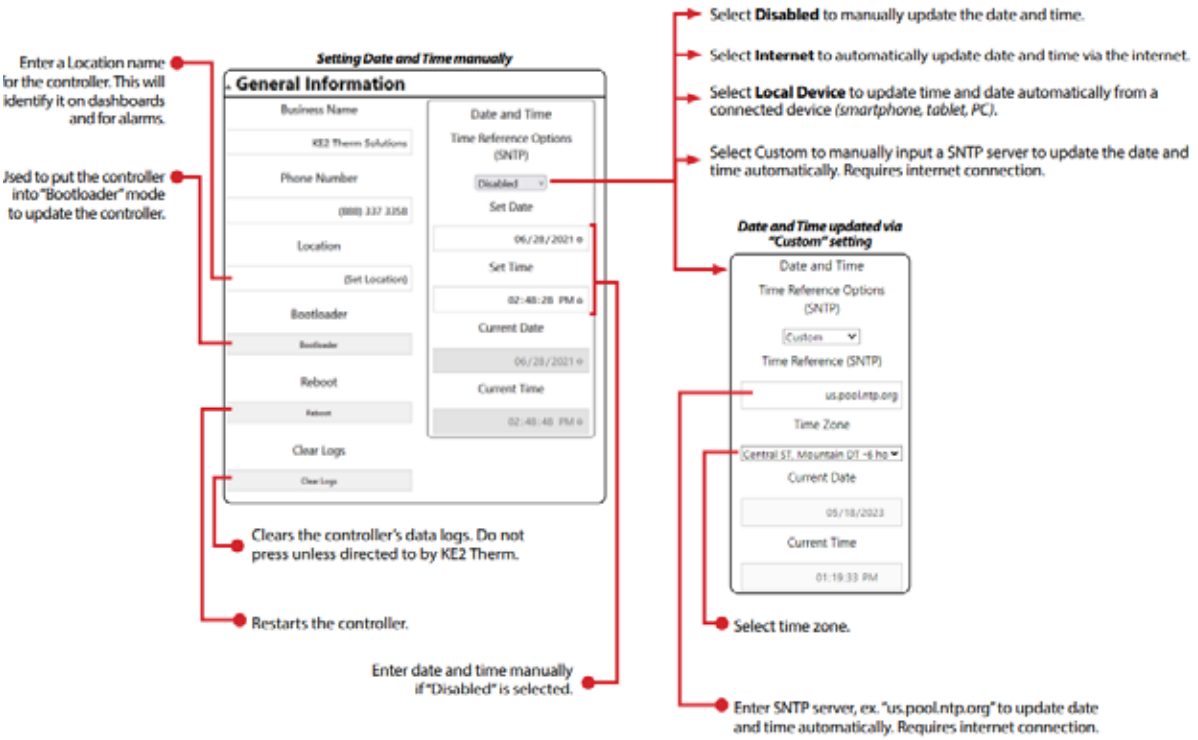




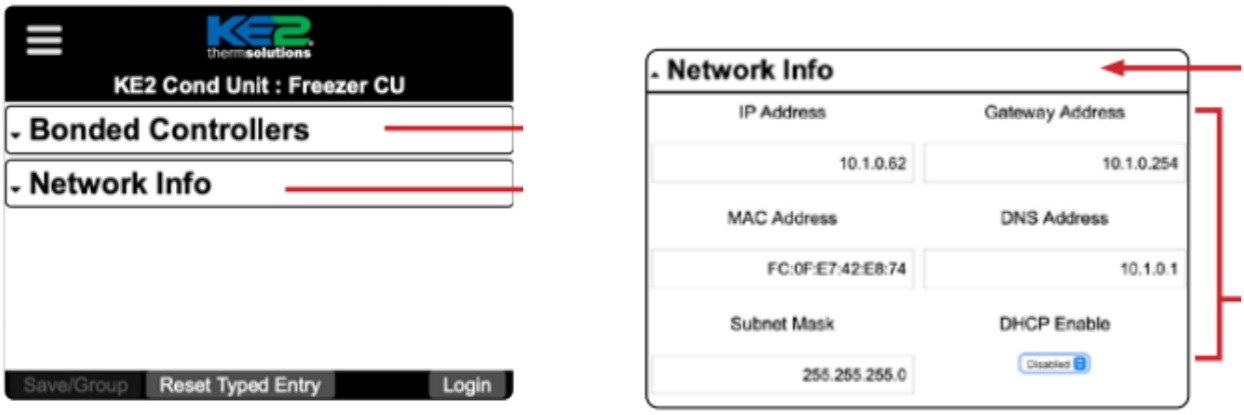






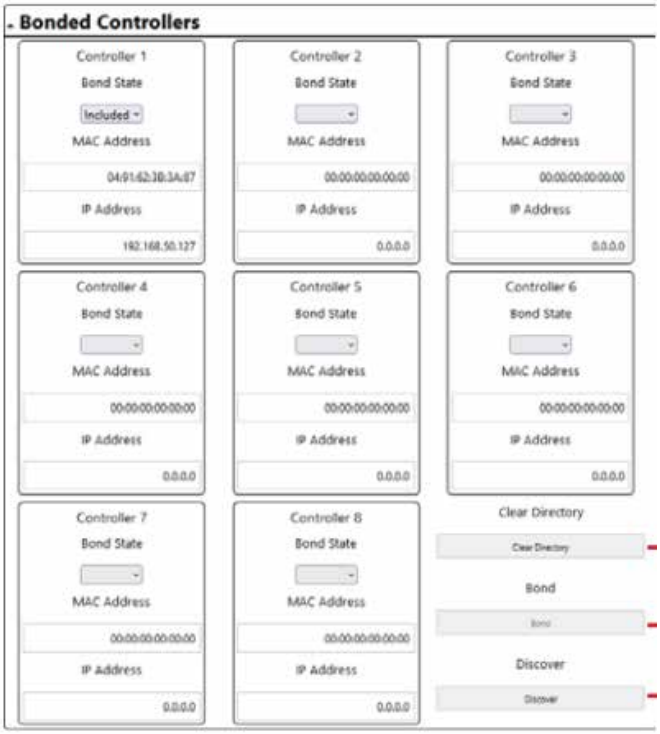


From the Network Page the controller's network settings can be changed and multiple controllers can be bonded. Only KE2 Evap OEM controllers running the latest firmware version can be bonded with the KE2 Condensing Unit Control. **Additional KE2 Condensing Unit Controllers should not be included in the same bond group.**



Controller network information can be changed if necessary.

Note: Network Info can only be changed when unbonded.



Bonding creates a link between controllers that coordinates their refrigeration and defrost cycles. After bonding, the user should review Multi-Evap Control Setpoints.

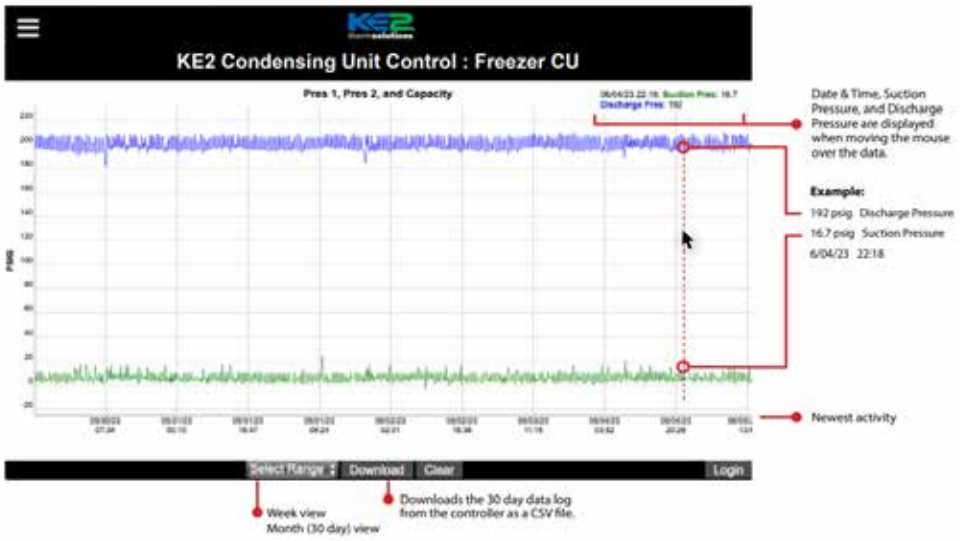
Steps to bond:

1. Login.
2. Click discover.
3. Select 'Included' in the 'Bond State' of controllers to be bonded.
4. Click Save/Group.
5. Click Bond. Controllers will restart.

Clear directory-Clears all fields when not bonded.

Bond-Will bond controllers. Must save/group first to select controllers. Will switch to Unbond after bonding.

Discover-Finds up to seven un-bonded KE2 Evap OEM controllers on the network and automatically fills in controller information.



The Graphs Page shows the past seven or thirty days of Suction Pressure and Discharge Pressure. It is an essential tool for system analysis and troubleshooting.

For security, the webpage password for the controller MUST be changed from the default "RSGadmin".

The webpage credentials are used to login to the controller in order to make changes via the controller's built-in webpage; they are separate from any remote access portal credentials for KE2 SmartAccess. If the webpage credentials are lost, they must be reset to regain login access. The login credentials can be reset from the KE2 **Basic Display** or using the **webpage**. The username will be reset to "**RSGadmin**", but changing the password from the default upon logging in will still be required for security.

NOTE: Resetting from the **webpage** requires visual access to the display to retrieve a reset code number, access to the pre-determined Password Reset Email saved in the controller (if internet is available), or access to a KE2-Edge Manager (KE2-EM) in the network.

STEP 1

Reset Login Credentials

1a. Password Reset from the KE2 Basic Display

From the **KE2 Basic Display**, press and hold **ENTER** until  is displayed. Press ↑ several times to display  . Press and hold **ENTER** until the red LED blinks, then release.

STEP 1 (CONTINUED)

1c. Password Reset from the Webpage

Resetting login credentials from the webpage requires a 3-digit code to be entered that will be displayed on the KE2 Basic Display and sent to the user's pre-determined **Password Reset Email** saved in the controller (if internet is available).

From the controller **webpage**, click **login**. Next, click **Forgot Password**. A 3-digit code will be displayed on the KE2 Basic Display and sent to the user's pre-determined email address. Type the 3-digit code under **Password Reset Code** and click **Reset Password**.

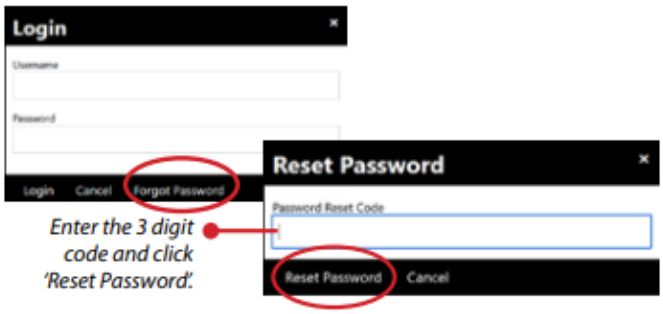
KE2 Evap Efficiency Controller Alert

– Location: Union Freezer 1a

– Address: http://192.168.50.127

– Password Reset Code: 751

Example of password reset e-mail.



NOTE: If the controller is under a KE2-Edge Manager (KE2-EM), once **Forgot Password** is clicked on the controller, the reset code can also be retrieved by clicking the **Get AccessCode** button on the KE2-EM management console. The button is found under **System -> Credentials -> Manage Controllers** on the KE2-EM management console page.

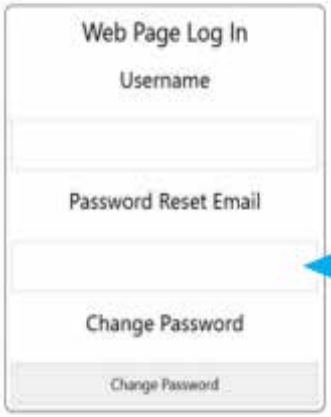
STEP 2

Login and setup new credentials

Once credentials have been reset using any of the above methods, login using the default "**RSGadmin**" for the username and "**RSGadmin1"** for the password. You will immediately be prompted to change the password. Type in a new password into the fields and click "**Change Password**".

Password must be a minimum of 8 characters. Allowed characters for passwords are spaces, A-Z, a-z, 0-9 and the following special characters: -_.@!#():,[]+/? Invalid special characters are: (<>"`~) If invalid characters are entered for the password then an error will be displayed, and the password will not be saved.

You will be returned to the Login prompt. Login with username "**RSGadmin**" the new password you just set. You will now be logged in and able to make changes to the controller.



NOTE: If the controller has access to the internet, setting the **Password Reset Email** is highly recommended. This is found on the **Setpoints** page under the **Communications** tab.

When connecting to the controller via its IP address, a privacy or security warning will likely appear in the browser. If the IP address of the controller is correct, depending on the browser, click "**Advanced**" or "**Show Details**" then "**Proceed to**..." / "**Accept the Risk**..." / "**Continue to**..." / "...**visit this website**" to continue to the controller webpage. It is generally not advisable to click past this warning, however, proceeding past this warning when connecting to the controller is safe.

KE2 Condensing Unit Control Startup Parts List:

The following parts are recommended for each install.

21994 KE2 Condensing Unit Control

21232 Basic Display with 18" Cable

21324 Snaptrack 11"

20201 Pressure Transducer – 0 to 150 psia, 10 ft. (Suction Pressure)

20202 Pressure Transducer – 0 to 500 psig, 10 ft. (Discharge Pressure)

20199 Temp Sensor 10 ft. – Black (Suction Temp)

21794 Temp Sensor 10 ft. – Blue (Ambient Temp)

21230 Temp Sensor 15 ft. – White (Discharge Temp)

20199

Temp Sensor 10 ft. – Black (Suction Temp)

21794

Temp Sensor 10 ft. – Blue (Ambient Temp)

21230

Temp Sensor 15 ft. – White (Discharge Temp)

21994

KE2 Condensing Unit Control

21232

Basic Display with 18” Cable

21324

Snaptrack 11”

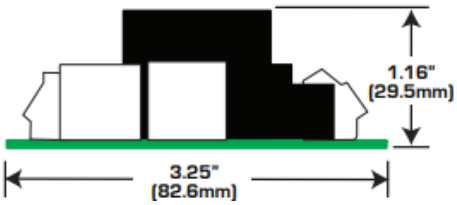
20201

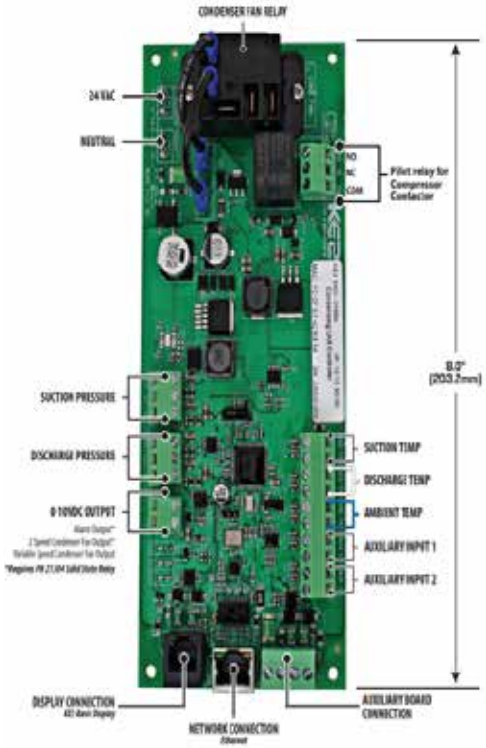
Pressure Transducer – 0 to 150 psia, 10 ft. (Suction Pressure)

20202

Pressure Transducer – 0 to 500 psig, 10 ft. (Discharge Pressure)

General Layout

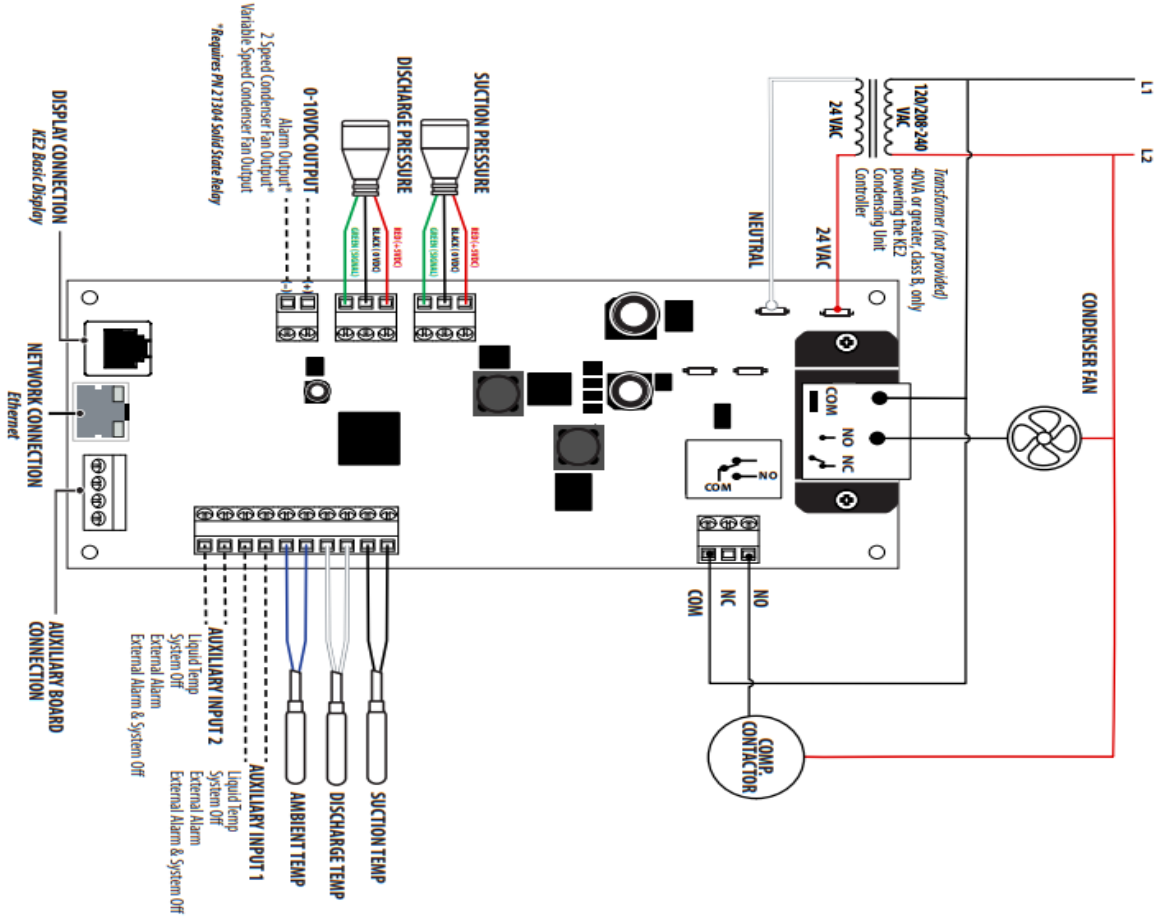


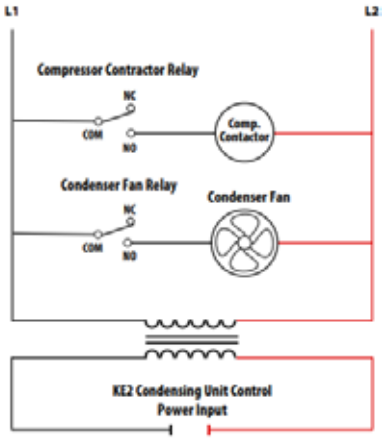


Wiring Schematic

NOTE: If factory installed refer to equipment manufacturer's wiring diagram.

CONTROLLER INCOMING POWER MUST BE 24 VAC.





Ladder Diagram

The Compressor Contactor Relay must be used to pilot an external contactor for the compressor. If the amp draw of the condenser fan motor exceeds the rating of the onboard relay, an external contactor must also be used. The onboard relay should be wired to switch power to the contactor coil.

24 VAC must be provided to power the controller; a 24 VAC transformer is not included. The transformer must be 40 VA or greater, class B, and only provide power to a single KE2 Condensing Unit Control, and no other devices. Each controller must have its own isolated transformer.

Install in accordance with local wiring codes. KE2 Therm does not accept responsibility for incorrect or unsafe wiring.

Sensor Installation

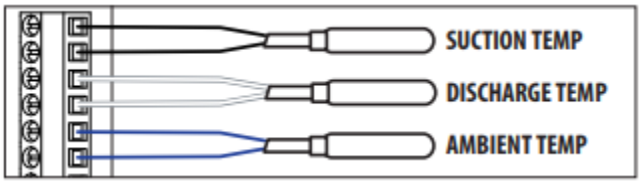
Sensors should be labeled with their function. **DO NOT** run sensor cables and other low voltage wiring next to high voltage wiring, as it will create electrical noise and interfere with sensor readings. If necessary to extend sensor wire, use 18 AWG shielded twisted pair cables. The maximum recommended total length is 100 ft.

We recommend standardizing for all installations.

Black (SUC TMP) - Suction Temperature

White (DIS TMP) – Discharge Temperature

Blue (AMB TMP) – Ambient Temperature



NOTE: The suction and ambient temperature sensors can be used interchangeably. The discharge sensor must use PN 21230 – High Temperature Sensor.

Controller Setup: Intro Mode

When powered up for the first time or after a factory reset the controller enters **Intro Mode**. **Intro Mode** consists of three initial startup setpoints that must be configured before refrigeration can begin.

1 Con for KE2 Condensing Unit Control, then rFG for refrigerant will be displayed. Press ↓ several times until the correct refrigerant for the system is displayed, then press and hold **ENTER**.

404	R-404A
55A	R-455A
45C	R-454C
54A	R-454A
449	R-449A
448	R-448A
744	R-744
410	R-410A

438	R-438A
290	R-290
717	R-717
r22	R-22
134	R-134A
40C	R-407C
40A	R-407A
507	R-507

SEt for default setpoint will be displayed next. This sets the initial cut-out pressure. Press ↓ to the appropriate default then press and hold **ENTER**.

Lot	Lot	Low temp default	Sets the cut-out pressure to the equivalent saturated temp of -35°F for the selected refrigerant.
Hit	Hit	High temp default	Sets the cut-out pressure to the equivalent saturated temp of 5°F for the selected refrigerant.

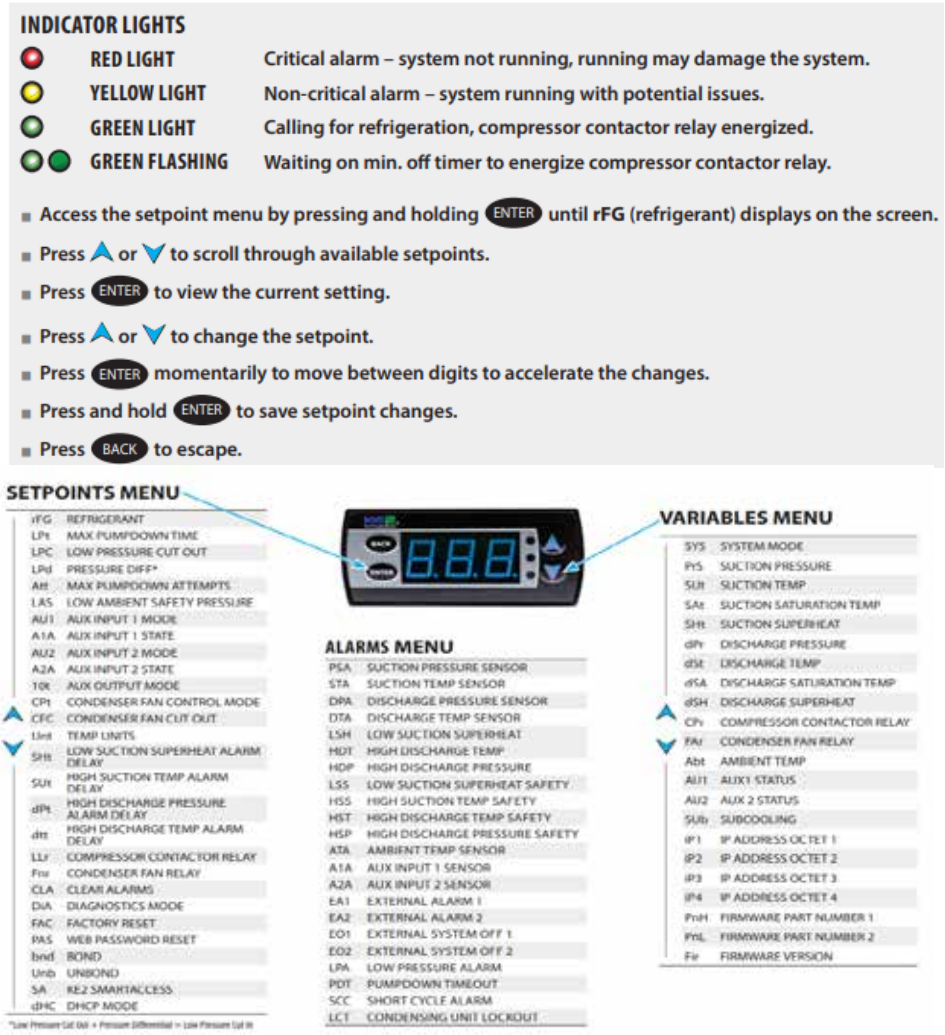
The above default cut-out pressure is a starting point only. **ALWAYS** refer to the condensing unit manufacturer's recommended low-pressure cut-out setting for the lowest space and ambient temperature the unit will experience. Adjust controller low pressure cut-out setpoint as necessary.

SA for KE2 SmartAccess will be displayed next. KE2 SmartAccess allows you to easily view and modify your controllers online. Press ↓ to EnA for enabled or dis for disabled, then press and hold **ENTER**.

NOTE: Enabling KE2 SmartAccess in Intro Mode will also enable DHCP client mode and allow the IP address of the controller to change from the factory default. Enable only if connecting directly into the local network without going through a KE2-Edge Manager.

Once **Intro Mode** is complete, the controller will begin to control the condensing unit. Review any necessary or desired additional setpoints and confirm proper operation of the system.

Controller Navigation



Specification

Input Voltage:	24 VAC
Ambient Temp:	-40°F to 140°F (-40°C to 60°C)
Operating Temp:	-40°F to 140°F (-40°C to 60°C)
Inputs	(3) Temperature: Suction, Discharge, Ambient
	(2) Temp/Digital Input : Aux 1, Aux2
	(2) Pressure: Suction, Discharge
Outputs	1) Relay 2.5A, 240VAC Pilot Duty: Compressor Contactor
	1) Relay 12A, 240VAC Inductive: Condenser Fan
	1) 0-10 VDC: Variable Speed Condenser Fan, 2 Speed Condenser Fan*, Alarm*
Communication	RS-485 (to auxiliary boards only)
	TCP/IP, RESTful API
	BACnet/IP**

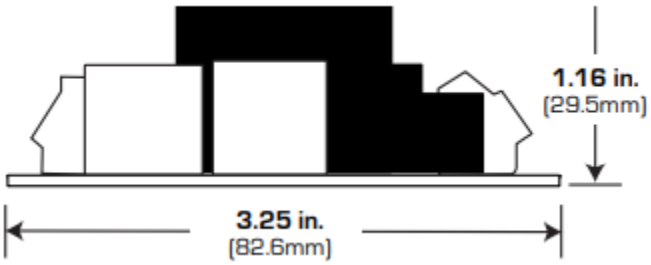
*Requires PN 21304 Solid State Relay

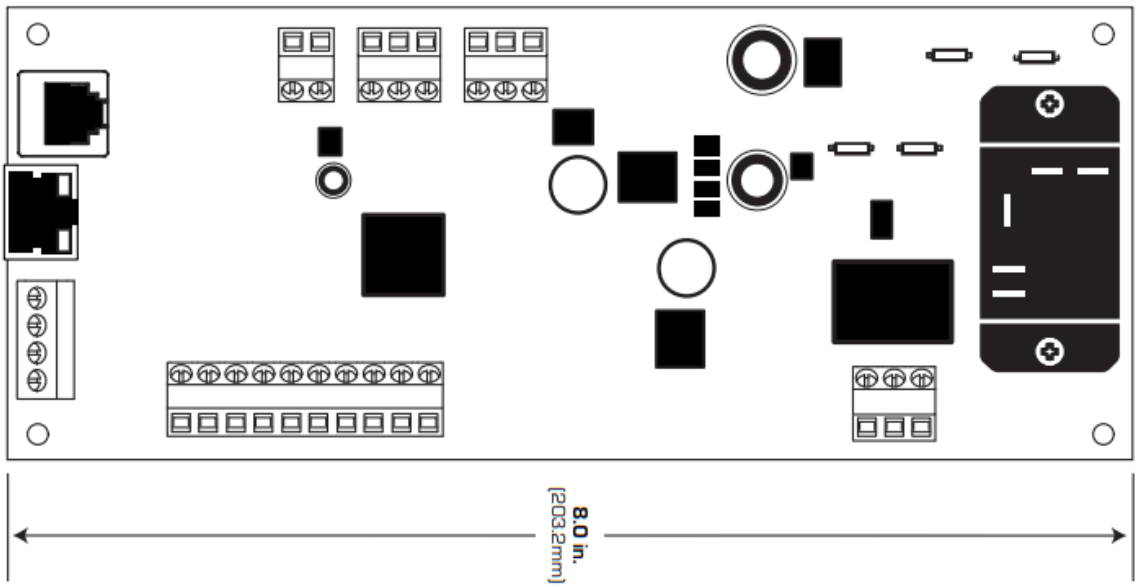
**Requires a KE2-EM w/ BACnet license (does not support BBMD)

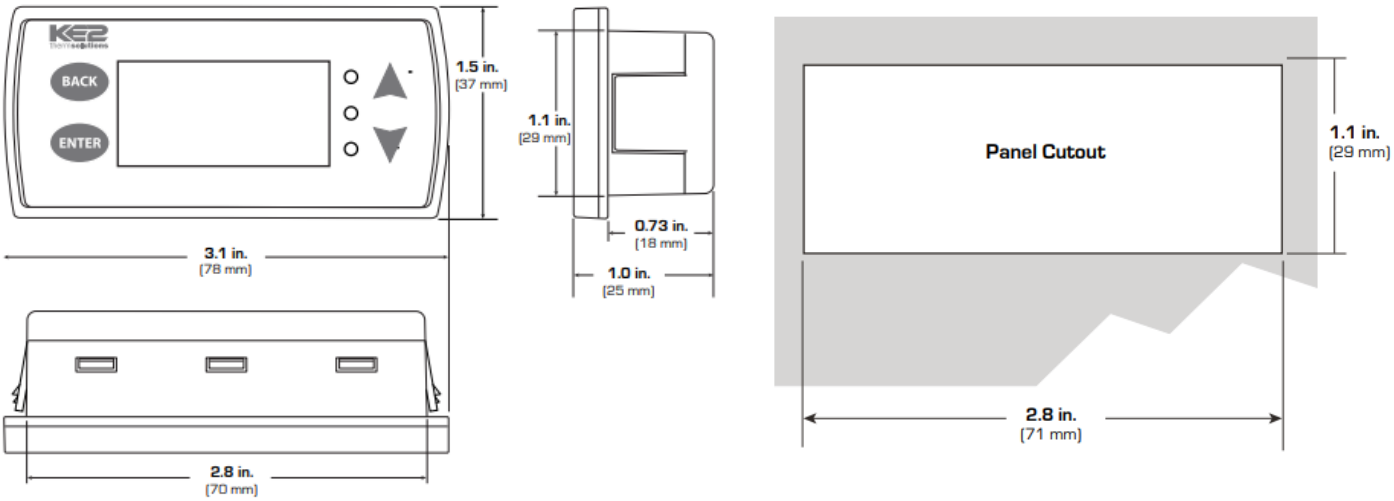
Additional Part Numbers

PART#	Description
22060	Replacement Condenser Fan Relay
21902	KE2-Edge Manager Plus (Wi-Fi, Datalogging & more)
20200	Temp Sensor, 40 ft. – Black
21066	Temp Sensors – Set of 3– Blue, Yellow, Green, 40 ft.
20204	Pressure Transducer – 0 to 150 psia, 40 ft. (suction pressure)
20712	Pressure Transducer – 0 to 500 psig, 40 ft. (discharge pressure)
21872	Pressure Transducer – 0 to 750 psig, 10 ft. (R-744 suction pressure, R-410A discharge pressure)
21873	Pressure Transducer – 0 to 750 psig, 40 ft. (R-744 suction pressure, R-410A discharge pressure)
21671	Pressure Transducer - 0 to 1,000 psig, 10 ft. (R-744 discharge pressure)
21672	Pressure Transducer - 0 to 1,000 psig, 40 ft. (R-744 discharge pressure)
20208	Pressure Transducer - 0 to 300 psig, 10 ft. (R-410A suction pressure)
20711	Pressure Transducer - 0 to 300 psig, 40 ft. (R-410A suction pressure)

Dimensions- Inches (Millimeters)







Verifying the EEV operation

(assumption here is that there is a liquid line solenoid)

If the system is running and superheat is being controlled: EEV is good.
If the system is running and the superheat is high or low:

- Take note of the suction pressure through the controller. Preferrable to use the controllers web pages.
    1. This can be done using a smart phone and the KE2 Therm EM Plus or KE2 Service tool app kit.
- Put the controller into 'System Off Mode' by pressing and holding the controllers "BACK" and 'up' buttons for 3 seconds.
- Watch the suction pressure.
    1. Suction pressure should fall and the condensing unit pump down and shut off.
    2. Suction pressure should stay near cut out pressure.
        1. If pressure rises too high and multiple secondary pump downs are occurring, verify the cut in pressure setting is not too low.
        2. If pressure rises too high and multiple secondary pump downs are occurring, verify the compressor discharge check valve is good.
        3. If 1 and 2 above are checked and are fine, then both the LLS and EEV are leaking by and need to be addressed.
- Once it is established the system will pump down and EEV/LLS will close tightly.
    1. Put the system back into 'Refrigeration mode' by pressing and holding the "BACK" and 'up' buttons for 3 seconds.
    2. Once the system is operating again, compressor running, then manually move the EEV closed.
        - § Press the "BACK" and 'down' buttons for 3 seconds.
        - § Press the "ENTER" button twice.
        - § Press the 'down' button until the controller reads 000.
    3. The system should again pump down and the compressor shut off.
        - § If the system will not pump down or the suction pressure is not lowering, then the EEV is not moving/closing.
            - If EEV is not closing completely, power cycle the controller to re-establish 'home' and the EEV is completely closed.
                - o If this resolves the problem, then verify the correct EEV is selected in the controller.
        - § If suction pressure is rising, then the valve is wired incorrectly.
        - § If the suction pressure is not moving much at all
            - Check for wiring connection to the controller
            - Check the ohms across the leads of the EEV windings. Use the EEV OEM's spec for readings/tolerance.
            - If all components have been cleared, then the valve could be damaged or restricted.
    4. If the system pumps down ok, then the EEV will close and the EEV is ok.

- If the issue is that the superheat is too high, then move the EEV manually to a more open position.
    - § Press the "BACK" and 'down' buttons for 3 seconds.
    - § Press the "ENTER" button twice.
    - § Press the 'down' button until the controller reads 000.
- Verify that the superheat goes down and the suction pressure rises. If you cannot lower the superheat to the desired value then:
    1. Validate you have no restrictions in the liquid line and its components.
    2. Validate you have enough head pressure and charge in the system.
    3. Validate the EEV is large enough for the application.
    4. If 1,2, and 3 all check out then you may have a damaged or restricted EEV.

Refrigerated Solutions Group
891 County Road U
Hudson, WI 54016

800-955-5253 Norlake Foodservice Sales
800-477-5253 Norlake Scientific Sales
800-388-5253 Norlake Parts/Service
877-503-5253 Norlake Walk-In Installation

800-647-1284 Master-Bilt Sales
800-684-8988 Master-Bilt Parts/Service