KE2 Evaporator**Efficiency**
Alarm Troubleshooting Guide

Introduction:

Notification of alarms and system problems is a key feature of the KE2 Evaporator Efficiency (KE2 Evap) controller. Users are notified of alarms several ways.

On the face of the controller an alarm will be shown in descriptive scrolling text, while the yellow or red LED light to the left of the read-out is illuminated.

While all alarms need a response, the yellow LED light indicates an advisory alarm, and the controller will continue to function. A red light indicates a critical alarm, and will turn the system off to prevent compressor damage.

At the same time, the auxiliary relay, if configured as an alarm relay, will transition, and can be used with an external light or buzzer. If connected to the Internet, the KE2 Evap will also e-mail, or text, the alarm to designated personnel.

Additional information about the alarm is available in the VARIABLES menu on the controller.

Please note: many alarms are the result of incorrect wiring of the controller, sensors, or valve. An aspect of the corrective action on all alarms should be a wiring and installation check.

Alarm Severity:

Yellow LED: Advisory Alarm - controller will continue to function

Red LED: Critical Alarm - will turn the system off to prevent compressor damage

The following videos may also be relevant when troubleshooting your controller or for basic setup of the KE2 Evap.

Troubleshooting:
Video 034 - Iced Evaporator Coil on a Walk-in Freezer
Video 044 - Iced Evaporator Coil on a Walk-in Cooler
Video 045 - Arriving at the Jobsite and the KE2 Evap Display is Blank

Basic setup:
Video 012 - How to Navigate the KE2 Evap Controller
Video 030 - Setup the KE2 Evap Controller for Walk-in Freezers
Video 031 - Setup the KE2 Evap Controller for Walk-in Coolers
Video 032 - Initial Defrost Sequence KE2 Evap & KE2 Adaptive Control
Video 033 - How to Confirm the KE2 Evap is Wired Correctly
Video 046 - How to Wire the KE2 Evap Controller
Video 035 - Why Use the KE2 Wire Harness

Alarm Name on Masterview Screen & Controller Display	Alarm Description	Parameter in VARIABLES menu to check for more information	Corrective Action
No display	No lights or display are showing	N/A	While not a true Alarm condition, the controller is not operational if no display is shown. Check for incoming power properly connected to the controller, voltage jumpers are correct for the incoming voltage and fuse on the board. Power injected into the controllers' RJ45 connector can result in the controller's display going blank. Power over Ethernet (POE) switches used with the KE2 Therm's Ethernet equipped controllers should disable the power output feature.
INTRO	INTRO displayed and all LEDs flashing	N/A	Controller is not operational until configured. See Bulletin N.1.1 or Q.1.3
All Clear / NO ALARM	Controller is not in an alarm condition	Neither yellow nor red LED is illuminated	No action necessary. An alarm condition has been corrected. "No Alarm" will be shown on the display for approximately 10 minutes, or until the **BACK** button has been pressed.
PRESSURE SENSOR Only active when an Electric Expansion Valve (EEV) is selected.	**Suction pressure sensor is shorted, open, out of range or miswired.** Only active when an Electric Expansion Valve (EEV) is selected.	**Red LED is illuminated System shut down** **SUCTION PRESSURE** • If wiring connects Signal to -5 or open, parameter will show -14.6 • If wiring connects Signal to +5, parameter will show >150* • If actual pressure is > range of transducer, parameter will show >150*	• **Verify the connector is inserted in the proper position in the board.** • **Verify the pressure transducer is properly attached to the pressure transducer cable.** • **Verify the voltage between the Black and Red input to the board is +5 VDC. Measure the voltage between the Black and Green positions. Enter that number into the following formula.** $\frac{(voltage\ read\ -\ 0.5V)\ x\ 150*psia}{4v}$ = actual pressure read *(verify with gauges)* * *300 psig or 500 psig depending on range of pressure transducer* • **Remove the transducer from the system. The reading should be approximately 0 psig.** • **Unplug the transducer cable from the controller and confirm.**

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T1 SUCTION SENSOR **T2 AIR SENSOR** **T3 COIL SENSOR** **T4 AUX SENSOR**	**Temperature sensor open or shorted, or not connected**.	**Yellow LED is illuminated System is running** ROOM TEMP COIL TEMP T1 SUCTION TEMP T4 AUX TEMP • If parameter for the sensor reads -87 the sensor is open, or not connected • If the parameter for the sensor reads 180+ the sensor is shorted	• **Verify the connector is inserted in the proper position in the board.** • **Verify the senor wire is correctly inserted into the pluggable connector.** The bare stranded wire should be inserted so 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. • **Unplug the connector and verify the resistance reading of the sensor matches the temperature vs. resistance table.** (see table below) If the sensor does not match the table, check to see if the sensor has been extended. If extended, check the connection between the sensor and extension to verify continuity. If the sensor has not been extended, or continuity is present, replace the sensor. • **If everything appears to be within the proper operating range, verify the sensor is operating properly by replacing a non-alarming sensor with the sensor in question**. If the test sensor is not read by the controller, replace the controller. If the new sensor is read by the controller, insert the sensor in question into the newly vacated sensor location. If the sensor still doesn't read properly, replace the sensor. Once issue is resolved, if the sensor was disconnected for diagnostic purposes, return the sensor to appropriate location on the controller.
HIGH SUPERHEAT	**High superheat is only active when an Electric Expansion Valve (EEV) is applied to the system.** **Superheat has been 2 Fahrenheit degrees above setpoint for 90 minutes, and EEV has been at least 95% open.**	**Yellow LED is illuminated System is running** SUCTION PRESSURE REFRIGERANT T1 SUCTION TEMP VALVE % OPEN	• **Check the system suction pressure using either the front panel or the Master View.** • **Validate the suction pressure is within the range of the system design.** • **Verify refrigerant type.** • **Verify the valve position.** If the valve is fully open, verify the valve is operating properly. Using the front panel, close the valve completely via Manual Menu - Manual Valve. If the alarm is caused by a system condition. Correct the system condition causing the alarm and return to normal operation. • **System may have insufficient refrigerant charge**

Temperature °F	Ohms
-22	19480
-4	12110
14	7763
32	5114
50	3454
68	2387
77	2000
86	1684
104	1231
122	885

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LOW SUPERHEAT	Superheat has been below 3 Fahrenheit degrees for 5 minutes and valve is < 10% open.	Yellow LED is illuminated System is running SUCTION PRESSURE REFRIGERANT T1 SUCTION TEMP VALVE % OPEN	**Low Superheat is most commonly caused by the compressor failing to start/ compressor not running. Check the following:** • **Low Pressure Control Pressure Switch not set correctly.** (Often this control is overlooked, and does not get set properly in the field.) - Typically the KE2 Therm controller is going to energize the Liquid Line Solenoid, and the compressor will be controlled by the low pressure control switch. - If the suction pressure is not able to rise to the cut-in pressure, the system will not start. - There is a common misconception in the industry the cut-in and cut-out pressure control is set from the factory, this is not true. The equipment manufacturers clearly state in their installation instructions that this is the responsibility of the installing contractor. The reason for this is due to the varying application of the equipment. Specifically the low pressure cut-in and cut-out set point is going to be dependent on either the ambient or space temperature, whichever is lower. - If the low superheat alarm is intermittent, or comes and goes, then this is probably the problem. - Our technical support team typically sees an increase of these alarms in the fall when the ambient temperatures begins to decrease. - To resolve the issue reduce the cut-out temperature to meet the equipment manufacturer's specification. - If measuring continuity across the low pressure control indicates a closed circuit, next check the condenser's compressor Start components. • **Validate Expansion Valve** – Valve Type is correctly selected in Setpoints • **Check fan motor rotational direction, and fan blade pitch** to ensure air if flowing in the proper direction. • **Check system conditions.** When the system is using a mechanical expansion valve, the coil must be thoroughly inspected. One cause of low superheat is diminished load due to low air movement across the coil. Check to see that there is no excessive frost build-up on the coil on both the air entering and air exiting sides of the coil. The fans should be turned off to allow the best viewing. • **Verify all fans are moving.** It is not uncommon to see all of the fans off due to a mechanical service switch, in the space, being inappropriately used. If only one fan is not moving, verify whether the fan is operational. Replace the motor if necessary. • **Check EEV.** If an Electronic Expansion Valve (EEV) is being used, in addition to the steps above, check the valve to ensure it is moving properly. From the front panel, MANUAL MENU will allow the valve to be exercised open and closed. Use Manual VALVE to move the valve to 0 percent open and verify the flow of refrigerant has been stopped. This can be seen by the suction pressure dropping and the system turning off. If it is apparent the valve is not stopping the flow, re-initialize the valve. This can be done by clicking the reset button on the **Master View's Settings** page or power may also be cycled to the controller. If resetting the valve is not successful, check valve wiring for proper connection to the controller. Valve cable color code must be followed and particular care must be taken when extending valve wiring.

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HIGH AIR TEMP	High Air Temp is caused by the air temperature being above **Air Temp Setpoint + Air Temp Diff + Hi Temp Alarm Offset** for **Hi Temp Alarm Delay time.** **Example** Air Temp Setpoint 20°F Air Temp Diff 1°F Hi Temp Offset 10°F Alarm trigger temp 31°F Both of these variables can be set by the user. The default from the factory is 10 Fahrenheit degrees above the setpoint for 60 minutes.	**Yellow LED is illuminated System continues to run** ROOM TEMP T2 AIR SENSOR T3 COIL SENSOR If the parameter for the sensor reads -87 the sensor is open, or not connected. If the parameter for the sensor reads 180+ the sensor is shorted. SUPERHEAT (if available) VALVE % OPEN (if available)	• Check air sensor. • **Investigate condition.** To resolve the **Hi Air Temp** will require investigation. First, ask the 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 the evaporator coil to verify the coil is free from excessive frost.** • **Check the fans to ensure all fans are rotating properly.** • **Check for compressor operation** • **Check for proper refrigerant charge** • **Make sure the system has sufficient system capacity** • **High Temp Alarm is not triggered during defrost**
LOW AIR TEMP	Low Air Temp is caused by the air temperature being below **Air Temp Setpoint** by the **Low Temp Alarm Offset** for the **Low Temp Alarm Delay** time. The default from the factory is 4 Fahrenheit degrees below the setpoint for 10 minutes. Both of these variables can be set by the user.	**Yellow LED is illuminated System continues to run** ROOM TEMP T2 AIR SENSOR T3 COIL SENSOR LOW TEMP ALARM OFFSET LOW TEMP ALARM DELAY If the parameter for the sensor reads -87 the sensor is open, or not connected. If the parameter for the sensor reads 180+ the sensor is shorted. SUPERHEAT (if available) VALVE % OPEN (if available)	• **Check variables defined by the user.** • **Verify system will pumpdown using Manual Compressor Control in the Manual Menu, if a liquid line solenoid and low pressure control are being used.** • **Check that the Liquid Line Solenoid is shutting tightly** • **Check that the low pressure control is set, and operating properly**
EXCESS DEFROST	There have been 32 defrosts in a 48 hour period. An **Excess Defrost** alarm will force the **Defrost Mode** to **Forced Schedule,** and the controller will defrost per the schedule, **Defrost-Defrost Per Day**. The default is 5	**Yellow LED is illuminated System continues to run** ROOM TEMP DEFROST TYPE DEFROST TERM TEMP View Graphs to confirm that Coil Temp (T4 Coil Temp) reaches termination temperature. DEFROST MODE may have to be returned to DEMAND.	• **Verify room setpoint is not lower than 36ºF for air defrost.** • **Verify coil sensor location.** Most often an excessive number of defrosts is due to coil sensor location. The sensor, or sensors, serve as defrost termination sensors. If near a heater, the defrost will terminate too soon. But, the controller will respond by initiating another defrost shortly. This cycle will continue until the excess defrost alarm is shown. • **Check solenoid valve.** • **Verify heaters are working properly.** • **Return Defrost Mode to Demand after resolving the basis of the issue**

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DEFR TERM ON TIME	**Defrost Termination on Time** alarm is triggered when the system has not reached termination temperature during 2 consecutive defrost cycles. Termination time is set by **Defrost Parameter** when in **Demand** mode or **Max Defrost Time** when in **Schedule** Mode	**Yellow LED is illuminated System continues to run** **Defrost Term Temp** **Electric Defrost Mode** **Multi Evap Defrost** View Graphs to see if Coil Temp rises to termination temperature. Time of temperature rise may be estimated from the graph or data from a **File Download**	• **Verify heaters are working properly.** • **Check coil for ice** • **Verify coil sensor location.** • **Verify door has not been left open for an extended period by viewing graphs page.** • **Check solenoid valve.** In freezers, **Pulse** in **Electric Defrost Mode** may not allow evaporators to retain enough heat to reach termination temperature. A change to **Permanent** may help. Cold air from a refrigerating evaporator may prevent a defrosting coil from reaching termination temperature within the time specified. Bonding and synchronizing the defrosts on the evaporators may help. On coolers, there may not be enough heat admitted to the space to meet termination temperature. In that instance, set **Defrost Mode** to **Schedule,** and modify **Defrost Per Day** and **Max Defrost Time** to desired values. • **Verify room setpoint is not lower than 36ºF for air defrost.**
DOOR SWITCH	The Door Switch alarm is activated when the room temperature is 5 Fahrenheit degrees above setpoint, and the door has been open past the time set in the **Door Alarm Delay** parameter.	DIG 1 STATUS DIG 2 STATUS DIG 3 STATUS This will identify the Digital Input (DI) being used for the door switch	• **Verify the door is closed.** • **Verify the switch is in proper working order.** Switches provided by KE2 Therm Solutions are normally closed switches. To test them, move the two pieces of the switch close together. • **Verify the circuit is continuous using a multimeter.** Move the two pieces of the switch apart more than 6 inches. Measure the continuity. It should be open at this time. If the switch is operating in the opposite manner, the switch is an open switch and the controller should be reconfigured appropriately, **DI Mode** as **Door Switch, DI State** as **Closed.** If the switch is verified to be inoperable, replace the switch. If the switch is operating properly, proceed to the next step. • **Verify which digital input is being used for the switch.** Verify the connection of the switch wires to the connector and the connector is properly inserted into the desired position in the board. • **Review the controller's digital input settings.** Either through the front panel or using the **Masterview**, verify the digital input being used for the door switch is set to door switch. • **Verify the Digital Input State matches the switch being used** (open when door open & closed when door closed).
COMMUNICATION ERROR	ONLY FOR BONDED CONTROLLERS: The Communication Error is generated when the KE2 Evap fails to communicate with its other bonded controllers.	**Yellow LED is illuminated System is running** IP OCTET 1 IP OCTET 2 IP OCTET 3 IP OCTET 4 The system router or network may have changed the IP address of the controller. The actual IP address will be needed for checking the bond or re-bonding.	**Communication Error is most commonly caused by local network issues.** • **Check network cables.** On new installations, where the cables are built in the field, verify cable ends to ensure Ethernet standard A or B is utilized. • **Verify all network switches are connected and functioning properly** • **Verify communication to each individual controller in alarm by entering the IP address into a web browser,** i.e. Chrome, Firefox, Safari, etc. • **Access the network page and click current values.** • **All the controllers in the bonded group should be present.** • **Check Network cables or proper wire color code and correct insertion in the Ethernet connecter on each controller** • **Break bond and rebond each controller.** • **If unable to resolve, call KE2 Therm.**

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EXT ALARM	The external alarm input is triggered by a 3rd party device. The controller can be used to pass through an alarm from a third party device, e.g. pan overflow float switch. The alarm will be shown on the controller and Masterview web page, the alarm relay will transition and an e-mail/text sent. The control will not be affected and will continue to run normally.	**Yellow LED is illuminated System is running** DIG 1 STATUS DIG 2 STATUS DIG 3 STATUS This will identify the Digital Input (DI) being used for the external alarm.	• **Verify the device is working properly.** If the device is working properly, check to make sure the device is connected to the appropriate position. • **Review the KE2 Evap settings to make sure they match the type of device connected to the controller.** Ensure **DI** is set to **EXT Alarm**. • **Verify DI State is appropriately set to open or closed, to match the input's functionality.** Changing the state from open to closed will allow the user to verify the controller is reading **DI** correctly.

Notifications when Connected to KE2 SmartAccess

Alarm Name on Masterview Screen	Alarm Description	Parameter in VARIABLES menu to check for more information	Corrective Action
E-MAIL FAILURE	KE2 SmartAccess is configured to send an e-mail to a designated address during an alarm condition.	On KE2 SmartAccess only.	• E-mail Failure Alarm is a function of the controller attempting to send out an e-mail alert using the information entered in the Alert Notifications section of the Settings Page, and failing to communicate successfully with the e-mail server provided. • Servers requiring basic authentication should provide User name and Password, and ensure it is correctly entered. • Servers without authentication requirements should not enter information in the User name or Password field. If unsure of server requirements and alarm occurs, ensure both User name and Password are blank and retry. • G-mail is no longer supported due to changes in their service. • Contact KE2Therm for additional information.
ACCESS DENIED	KE2 SmartAccess is reached at **SmartAccess.KE2Therm.net** and requires a Site name and Password.	On KE2 SmartAccess only.	**Site name and Password are case sensitive and must be entered exactly as originally set by the user.** • If Site and Password are correct, the controller(s) have stopped communicating to KE2 Therm's server. The local network's functionality should be validated to ensure the controller is communicating properly. The Internet connection should also be checked to ensure it is working properly. The KE2 Evaporator Efficiency must be configured to register on KE2 SmartAccess from the Settings page on the Masterview screen. The default Site is installer and the Password is the MAC address exactly as shown on the controller label, e.g. 12:34:56:AB:CD:EF The user may change the Site and Password on the Settings page to something more convenient.
Controller Communication Failure. Retry in XX seconds.	Clicking on any controller from the KE2 SmartAccess Services screen should redirect to that controller. This error will prevent viewing that screen.	On KE2 SmartAccess only.	After connection to KE2 SmartAccess, the dashboard will shown all registered controllers, clicking on any controller will redirect to that controller's **Masterview** webpage. • Browsers commonly maintain a cache to improve the user experience. After changes to the user view, like a firmware update, the webpage view stored in the browser's cache may falsely be displayed. To resolve, the browser's cache must be cleared completely. Some browsers refer to this as 'from the beginning of time'. Refer to your browser's help for more information.