ENVIRO-CONTROL™

This reference should remain on site with the installed OEM controller.

Contents

Accessories

Remote Displays

Part Number	Description
154099	Standard Remote Display w/ cable

Temperature Sensors

Part Number	Description
154101	Temperature Sensor Pack, 3 Color 15 ft
151553	Temperature Sensor – NTC Thermistor Assembly, 10 ft. (black)
154105*	Temperature Sensor - Yellow 45 inches
154104*	Temperature Sensor - Green 45 inches
154103*	Temperature Sensor - Blue 45 inches
154096*	Temperature Sensor - Black 45 inches

Wireless Router

Part Number	Description
158712	KE2 SmartGate

Pressure Transducer

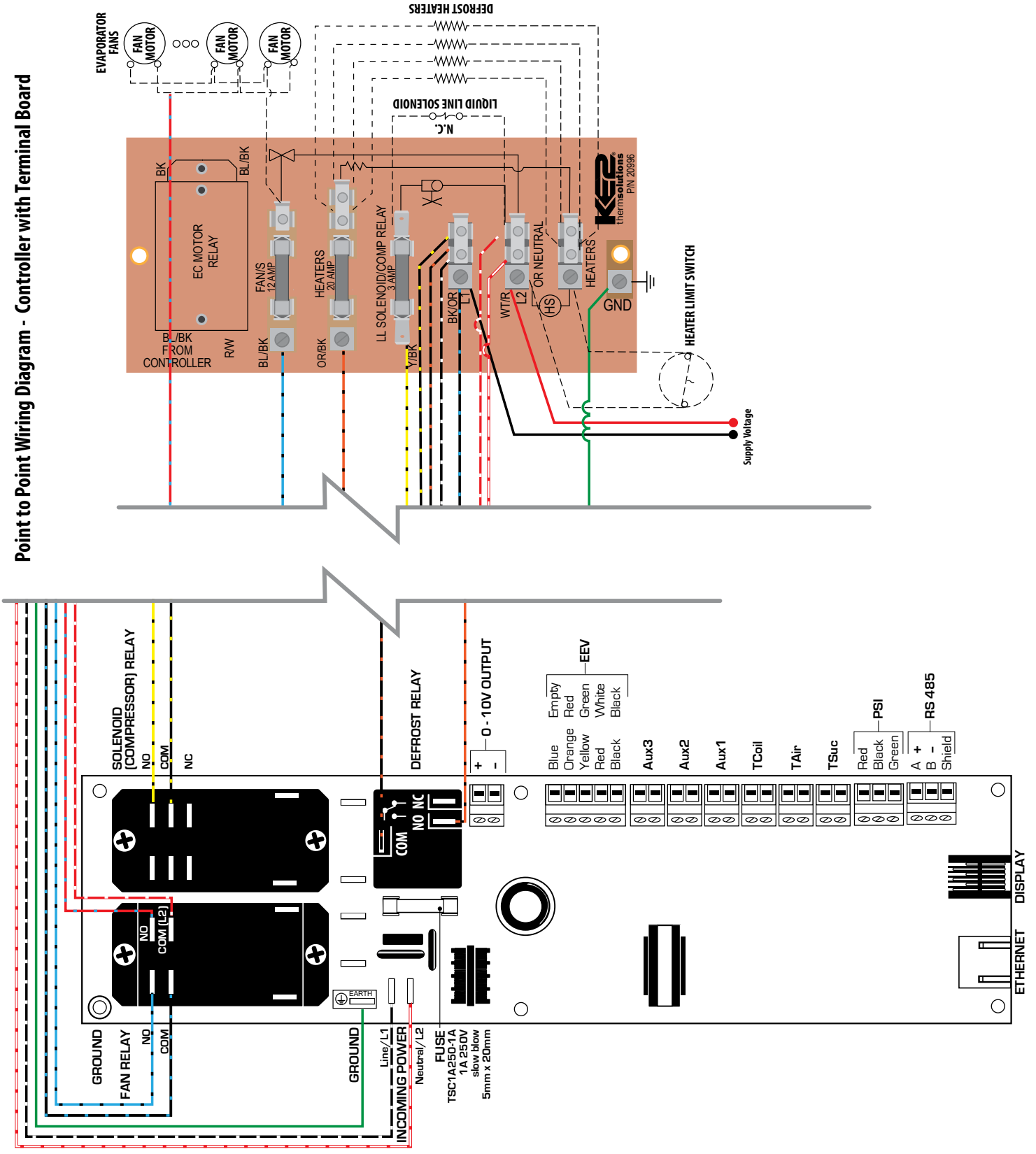
Part Number	Description
151552	Pressure Transducer – 0 to 150 psia, 10 ft. leads

RSV - Refrigeration Stepper Valves

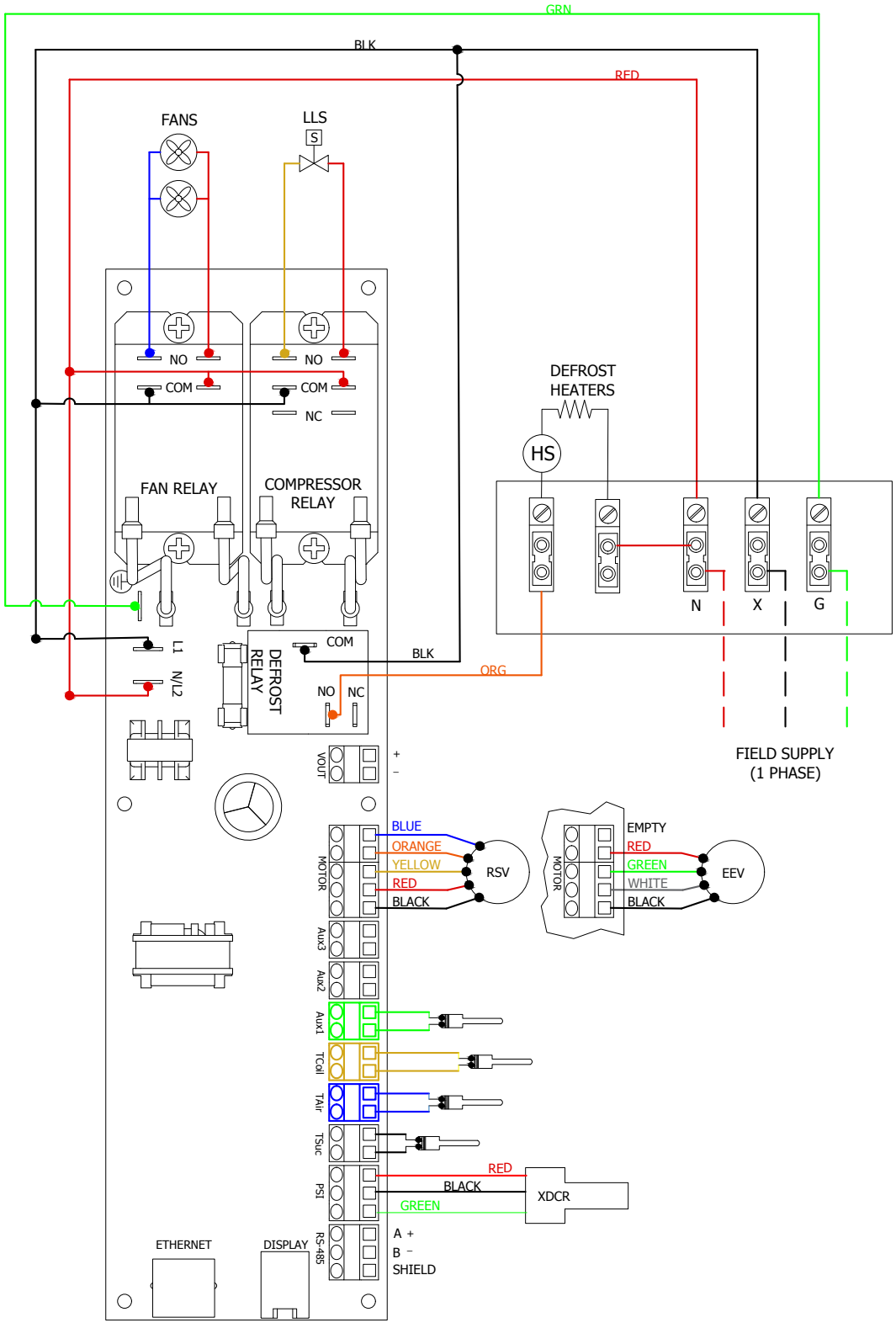
Part Number	Description
154097	RSV-130 3/8 x 1/2 ODF - 5ft
166190	RSV-130 3/8 x 1/2 ODF - 10ft
166186	RSV-220 3/8 x 1/2 ODF - 40ft
166187	RSV-320 1/2 x 1/2 ODF - 40ft

** Special Order. Minimum purchase required.*

Point to Point Wiring Diagram - Controller with Terminal Board



Wiring Diagram - Controller without Terminal Board



Wiring Diagram - Controller without Terminal Board

NORLAKE

Menus and Parameters

BASIC Setpoints Menu

Abbreviation	Scrolling Text*	Full Name	Min	Max	R-404A	R-449A	Description
tS	**ROOM TEMP**	Room Temp Setpoint	-50.0 ºF	90.0 ºF	0.0 ºF	0.0 ºF	Walk-in freezer or cooler room temp to be maintained
rFG	**REFRIGERANT**	Refrigerant	N/A	N/A	R-404A	R-449A	Type of refrigerant used: see table below
dtY	**DEFROST TYPE**	Defrost Type	N/A	N/A	ELE/Ai	ELE/Ai	Type of Defrost for Evap: ELE for Electric/ Ai for off time/ HGn for hot gas w/comp on/ HGF for hot gas w/comp off. Freezer/cooler.

ADVANCED Setpoints Menu

Abbreviation	Scrolling Text*	Full Name	Min	Max	R-404A	R-449A	Description
tS	**ROOM TEMP**	Room Temp Setpoint	-50.0 ºF	90.0 ºF	-10/35ºF	-10/35ºF	Walk-in freezer or cooler room temp to be maintained
dtY	**DEFROST TYPE**	Defrost Type	N/A	N/A	Electric/ Air	Electric/ Air	Type of Defrost for Evap: ELE for Electric/ Ai for off time/ HGn for hot gas w/comp on/ HGF for hot gas w/comp off
Edt	**VALVE TYPE**	Expansion Valve Device Type	N/A	N/A	Mechanical	Mechanical	Type of valve used on system: mechanical, pre-configured electric, custom EEV configuration
rFG	**REFRIGERANT**	Refrigerant	N/A	N/A	R-404A	R-449A	Type of refrigerant used: see table below
ind	**DEFROST MODE**	Defrost Initiation Mode	N/A	N/A	Demand	Demand	Mode to initiate a defrost: dnd=demand / SCH=Schedule / rnt=comp run time
dPd	**DEFROSTS / DAY**	Defrosts per day	0	8	5	5	If DEFROST MODE = SCH: Number of evenly spaced defrosts per day the controller will initiate.
dtP	**DEFROST TERM TEMP**	Defrost Term Temp	35.0 ºF	90.0 ºF	50.0 ºF/40	50.0 ºF/40	The temperature the coil sensor(s) must exceed in order to terminate defrost. The controller's defrost mode is complete at this point. Freezer/cooler.
dEF	**DEFROST PARAMETER**	Defrost Parameter	0	90	30/40	30/40	if DEFROST MODE = DEMAND: Coefficient to Defrost algorithm. Freezer/cooler.
dtL	**MAX DEFROST TIME**	Max Defrost Time	0 min	90 min	45/40 min	45/40 min	If DEFROST MODE = SCH: The maximum amount of time the defrost relay will be energized. (Not available if DEFROST MODE = DEMAND). Freezer/cooler.
drn	**DRAIN TIME**	Drain Time	0 min	15 min	2 min	2 min	Time to be in drain mode (drip time)
Stt	**SUPERHEAT**	Superheat	5.0 Fº	30.0 Fº	8.0 Fº	8.0 Fº	*Target superheat value. Not available on Basic Display*
LPt	**LOW PRESSURE CUT OUT TIME**	Low Pressure Cut Out Time	0 min	15 min	0 min	0 min	Only applies when non-mechanical valve selected; 0=Disabled
LPC	**LOW PRESSURE CUT OUT**	Low Pressure Cut Out	-5.0 psig	138.0 psig	8.0 psig	4.0 psig	Displays when LOW PRESSURE CUTOUT TIME (LPt) is greater than zero. And,only applies if non-mechanical valve is selected
LPd	**PRESS DIFF FOR LPCO**	Pressure Differential for LPCO	1.0 psig	20.0 psig	15.0 psig	12.0 psig	Displays when LOW PRESSURE CUTOUT TIME (LPt) is greater than zero. And,only applies if non-mechanical valve is selected
rnt	**COMP RUN TIME**	Compressor Run Time	0 hrs	24 hrs	6 hrs	6 hrs	When rnt selected, number of hours of cooling before starting defrost
Htn	**ELECTRIC DEFROST MODE**	Electric Defrost Mode	N/A	N/A	PUL/Prn	PUL/Prn	If DEFROST TYPE = ELE: Whether to leave the defrost relay energized during the defrost cycle or to utilize advanced defrost algorithm. PUL = Pulse, Prn = Permanent. Freezer/cooler.
HAo	**HIGH TEMP ALARM OFFSET**	High Temp Alarm Offset	0 Fº	99.9 Fº	10.0 Fº	10.0 Fº	The number of degrees above ROOM TEMP for a HIGH TEMP ALARM condition.
HAd	**HIGH TEMP ALARM DELAY**	High Temp Alarm Delay	0 min	120 min	60 min	60 min	Minutes the room temperature must remain above ROOM TEMP + HIGH TEMP ALARM OFFSET before issuing a HIGH TEMP ALARM
LAo	**LOW TEMP ALARM OFFSET**	Low Temp Alarm Offset	0 Fº	20.0 Fº	4.0 Fº	4.0 Fº	The number of degrees below ROOM TEMP for a LOW TEMP ALARM condition.
LAd	**LOW TEMP ALARM DELAY**	Low Temp Alarm Delay	0 min	30 min	10 min	10 min	Minutes the room temp must remain below ROOM TEMP-LOW-TEMP ALARM OFFSET before issuing a LOW TEMP ALARM
dAd	**DOOR ALARM DELAY**	Door Alarm Delay	0 min	180 min	30 min	30 min	If AU IN (1, 2 and/or 3) MODE = dor The amount of time, in minutes, before an alarm condition is initiated, if door is open & room temperature is 5 degrees above ROOM TEMP + AIR TEMP DIFF
AU1	**AUX IN 1 MODE**	Aux Input 1 mode	N/A	N/A	Disabled	Disabled	See Auxiliary Input Modes table
A1A	**AUX IN 1 STATE**	Aux Input 1 state	N/A	N/A	Closed	Closed	oPn= active if input is an open / CLo=active if input is shorted
AU2	**AUX IN 2 MODE**	Aux Input 2 mode	N/A	N/A	Disabled	Disabled	See Auxiliary Input Modes table
A2A	**AUX IN 2 STATE**	Aux Input 2 state	N/A	N/A	Closed	Closed	oPn= active if input is an open / CLo=active if input is shorted
AU3	**AUX IN 3 MODE**	Aux Input 3 mode	N/A	N/A	Sys Off	Sys Off	See Auxiliary Input Modes table
A3A	**AUX IN 3 STATE**	Aux Input 3 state	N/A	N/A	Closed	Closed	oPn= active if input is an open / CLo=active if input is shorted
tS2	**ROOM TEMP**	2nd room temp SP	-50.0 ºF	90.0 ºF	-50.0 ºF	-50.0 ºF	If AU IN (1, 2 and/or 3) MODE = (t2n) 2ND ROOM TEMP: This value becomes the ROOM TEMP setpoint when the digital input is active
Unt	**TEMP UNITS**	temperature units	N/A	N/A	Fahrenheit	Fahrenheit	Units for temperature's display in ºF or ºC; FAH = Fahrenheit, CEL = Celsius
EdF	**EXTREME TEMP DIFF**	Extreme Temp Diff.	0 ºF	99.9 ºF	20.0 ºF	20.0 ºF	ADVANCED TOPIC: Call for assistance
CLA	**CLEAR ALARMS**	Clear Alarms	N/A	N/A			Press and hold to clear all active alarms
diA	**DIAGNOSTICS MODE**	Diagnostics Mode	N/A	N/A			Energizes each relay individually for 60 seconds: fan relay, defrost relay, compressor relay

ADVANCED Setpoints Menu (continued)

Abbreviation	Scrolling Text*	Full Name	Min	Max	R-404A	R-449A	Description
FAC	**FACTORY RESET**	Factory reset	N/A	N/A			Press and hold to reset the controller to the factory default setpoints
PAS	**WEB PASSWORD RESET**	Web password reset	N/A	N/A			Press and hold to reset the web password to the factory default
SA	**SMART ACCESS**	Smart Access	N/A	N/A	Disabled	Disabled	Turn Smart Access on or off: EnA to enable smart access / diS to disable Smart Access
dHC	**DHCP**	DHCP Mode	N/A	N/A	Enabled	Enabled	Turn DHCP mode on or off: EnA to enable DHCP mode / diS to disable DHCP mode
Not Available on Basic Display	**MOTOR TYPE**	Motor Type	Unipolar or Bipolar		Unipolar	Unipolar	Unipolar if unipolar stepper used, Bipolar if bipolar stepper used
	MOTOR STEP RATE	Motor Step Rate	30	400	40	40	*Motor Step rate for custom valve. Not available on Basic Display*
	MAX VALVE STEPS	Max Valve Steps	200	6400	500	500	*Full stroke steps for custom valve. Not available on Basic Display*
	MAX OPERATING PRES	Max Operating Pres	10.0 psi	150.0 psi**	35/150 psi	35/150 psi	Freezer/cooler
	FAN SPEED	Fan Speed	-100.0%	100.0%	0.0%	0.0%	*Fan speed %. Not available on Basic Display*
	MIN COMP RUN TIME	Min Comp Run Time	0 min	15 min	2 min	2 min	*Minimum Compressor Run Time. Not available on Basic Display*
	MIN COMP OFF TIME	Min Comp Off Time	0 min	15 min	5 min	5 min	*Minimum Compressor Off Time. Not available on Basic Display*
	REFRIG FAN MODE	Refrigeration Fan Mode	Manage, Permanent, ON with Compressor, Title 24		ON with compressor	ON with compressor	Managed = manage fans during refrig cycle; Permanent = fans ON permanent during refrig cycle; On with Compressor = manage fans in OFF then ON in refrig; Title 24 = cycle fans based on Title 24 regulations
	1ST DEFROST DELAY	1st Defrost Delay	0 min	240 min	120 min	120 min	*First Defrost Delay. Not available on Basic Display*
	DEFROST FAN STATE	Defrost Fan State	ON or OFF		OFF(E)/ ON(A)	OFF(E)/ ON(A)	OFF = fans off during defrost; ON = fans ON during defrost
	FAN DELAY TEMP		-40.0 ºF	35.0 ºF	20.0 ºF	20.0 ºF	*Fan delay temp. Not available on Basic Display*
	MAX FAN DELAY TIME	Max Fan Delay Time	0 min	20 min	2 min	2 min	*Max fan delay time. Not available on Basic Display*
	PUMP DOWN TIME	Pump Down Time	0 min	90 min	0 min	0 min	Minimum amount of time between de-energizing the liquid line solenoid/compressor relay and energizing the defrost relay.
	MULTI AIR TEMP CTRL	Multi Air Temp Control	Warmest or Average		Warmest Air	Warmest Air	Warmest air = use the warmest air temp from bonded controls; Average air = use the average air temp from bonded controls
	MULTI EVAP COOL	Multi Evap Cooling	Synchronized or Independent		Synchro-nized	Synchro-nized	Synchronized = synchronize bonded controller in refrigeration mode; Independent = bonded controllers control temperature independently in refrigeration mode.
	MULTI EVAP DEFROST	Multi Evap Defrost	Synchronized or Independent		Synchro-nized	Synchro-nized	Synchronized = synchronize bonded controller in defrost mode; Independent = bonded controllers defrost independently
	MULTI EVAP SENSOR	Multi Evap Sensor	Shared or Un-shared		Shared	Shared	Shared = share sensor readings from bonded controllers; Un-shared = use local sensor readings only
	SUCT PRES OFFSET	Suct Pres Offset	-5.0 Fº	5.0 Fº	0.0 Fº	0.0 Fº	An offset added or subtracted from the suction line pressure transducer reading, if needed
	SUCT TEMP OFFSET	Suct Temp Offset	-5.0 Fº	5.0 Fº	0.0 Fº	0.0 Fº	An offset added or subtracted from the suction temperature sensor reading, if needed
	COIL TEMP OFFSET	Coil Temp Offset	-5.0 Fº	5.0 Fº	0.0 Fº	0.0 Fº	An offset added or subtracted from the coil temperature sensor reading, if needed
	AIR TEMP OFFSET	Air Temp Offset	-5.0 Fº	5.0 Fº	0.0 Fº	0.0 Fº	An offset added or subtracted from the room temperature sensor reading, if needed
	AUX 1 OFFSET	AUX1 Temp Offset	-5.0 Fº	5.0 Fº	0.0 Fº	0.0 Fº	When Aux1, Aux2, or Aux 3 are used as a temperature sensor, an offset is added or subtracted from the reading.
	AUX 2 OFFSET	AUX2 Temp Offset	-5.0 Fº	5.0 Fº	0.0 Fº	0.0 Fº	
	AUX 3 OFFSET	AUX3 Temp Offset	-5.0 Fº	5.0 Fº	0.0 Fº	0.0 Fº	
	PROPORTIONAL	Proportional	0	255	3	3	A coefficient to the valve control algorithm that increases valve responsiveness as the value increases
	INTEGRAL	Integral	0	255	5	5	A coefficient to the valve control algorithm that increases valve responsiveness as the value increases
	DERIVATIVE	Derivative	0	255	3	3	Should not be adjusted unless instructed by Nor-Lake
	AIR TEMP DIFF	Air Temp Differential	0.1	5.0	1.0 Fº	1.0 Fº	The number of degrees above ROOM TEMP before the controller will go into REFRIGERATION mode
	DEFROST FAN STATE	Defrost Fan State	Off	Off	On	On	Fan state during the defrost cycle
	MULTI AIR TEMP CTRL	Multi Evaporator Air Temp Control	Average	Warmest	Warmest	Warmest	Select control method to use with multiple room temperature sensors
	MULTI EVAP COOL	Multi Evaporator Cool Control	Sync	Indepen-dent	Sync	Sync	Select type of multi evaporator control - options are synchronous or independent
	MULTI EVAP DEFROST	Multi Evaporator Defrost Control	Sync	Indepen-dent	Sync	Sync	Select whether to have all bonded controllers initiate defrost mode at the same time or independently.
	MULTI EVAP SENSOR	Multi Evaporator Sensor Sharing	Shared	Not Shared	Not Shared	Not Shared	Select whether or not to share room temperature, coil temperature and suction pressure sensor data with bonded controllers.

* Scrolling Text is available when using the Combo Display

First Time Setup - Types of Control & Smart Access

Abbreviation	Scrolling Text*	Full Name / Description
Ed	**ELECTRIC DEFROST /TEV**	Electric Defrost w/Mechanical valve
EdE	**ELECTRIC DEFROST /EEV**	Electric Defrost w/Electric Valve
Ad	**AIR DEFROST /TEV**	Air Defrost w/Mechanical Valve
AdE	**AIR DEFROST /EEV**	Air Defrost w/Electric Valve
SA	**SMART ACCESS MODE**	SmartAccess (Enabled/Disabled)

*Scrolling Text is available when using the Combo Display coming 2019.

System Modes

Abbreviation	Scrolling Text*	Full Name
rEF	**REFRIGERATE**	Refrigeration
ddF	**DEFROST DELAY FAN**	Defrost Delay Fans
dEF	**DEFROST**	Defrost
drn	**DRAIN TIME**	Drain Time
FdL	**FAN DELAY**	Fan Delay
SoF	**SYSTEM OFF**	System Off (External System Off)
oFF	**OFF**	Off (Satisfied on Temperature)

*Scrolling Text is available when using the Combo Display coming 2019.

Auxiliary Input Modes

Abbreviation	Scrolling Text*	Full Name	Description
diS	**DISABLED**	Disabled	Not used
rtP	**ROOM TEMP**	Room Temp	Room temp as measured by TAIR Input
CLt	**COIL TEMP**	Coil Temp	Coil Temp as measured by TCOIL Input
oni	**MONITOR**	Monitor Temp	Monitoring Temp as measured by Aux Input
t2n	**2ND (ROOM) TEMP**	2nd Temp	Inactive=2nd room temp SP off (t2F)/Active=2nd room temp SP on (t2n)
dor	**DOOR SWITCH**	Door Switch	Inactive=Door Closed (dCL)/Active=Door Open (don)
EA1/EA2/ EA3	**EXTERNAL ALARM 1 EXTERNAL ALARM 2 EXTERNAL ALARM 3**	External Alarm	Active=EAo / Inactive=EAF
SoF	**SYSTEM OFF**	System Off	Inactive=System On (Son)/Active=System Off (SoF)
dFi	**DEFROST INTERLOCK**	Defrost Interlock	Inactive=Defrost Heaters normal (AUt)/Active=Defrost Heaters Off (oFF)
dFL	**DEFROST LOCKOUT**	Defrost Lockout	Inactive=Defrost Normal (AUt)/Active=Defrost Not Allowed (dLo)

*Scrolling Text is available when using the Combo Display coming 2019.

Variables Menu

Abbreviation	Scrolling Text*	Full Name	Description
rtP	**ROOM TEMP**	Room Temp	Room Temperature as measured by controller
CLt	**COIL TEMP**	Coil Temp	Coil Temperature as measured by controller
SYS	**SYSTEM MODE**	System Mode	Current operating status
SHt	**SUPERHEAT**	Superheat	Superheat as calculated by the controller
PrS	**SUCTION PRESSURE**	Suction Pressure	Suction Pressure as measured by controller
SUt	**T1 SUCTION TEMP**	Suction Temp	Suction Temperature as measured by controller
SAt	**SATURATION TEMP**	Saturation Temp	Saturation Temperature as calculated by controller
oPn	**VALVE % OPEN**	Valve% Open	Percentage EEV is open
Cor	**COMPRESSOR RELAY**	Compressor Relay	Current status of LLS/compressor relay
dEr	**DEFROST RELAY**	Defrost Relay	Current Status of Defrost relay
FAr	**FAN RELAY**	Fan Relay	Current Status of Fan relay
AU1	**DIG 1 STATUS**	Aux Input 1	Current Status/Temperature as measured by controller at Aux input 1
AU2	**DIG 2 STATUS**	Aux Input 2	Current Status/Temperature as measured by controller at Aux input 2
AU3	**DIG 3 STATUS**	Aux Input 3	Current Status/Temperature as measured by controller at Aux input 3
iP1	**IP OCTET 1**	IP Address Part 1	First 3 digits of IP address
iP2	**IP OCTET 2**	IP Address Part 2	Second 3 digits of IP address
iP3	**IP OCTET 3**	IP Address Part 3	Third 3 digits of IP address
iP4	**IP OCTET 4**	IP Address Part 4	Fourth 3 digits of IP address
Fir	**FIRMWARE VERSION**	Firmware Version	Current Version of firmware on controller

*Scrolling Text is available when using the Combo Display coming 2019.

Refrigerants

Abbreviation	Full Name
R22	R-22
134	R-134a
42d	R-422D
42A	R-422A
40C	R-407C
40A	R-407A
507	R-507
404	R-404A
513	R-513A
450	R-450A
449	R-449A
448	R-448A
744	R-744
410	R-410A
407	R-407F
409	R-409A
408	R-408A
438	R-438A
717	R-717
452	R-452A

Valve Types

Abbreviation	Scrolling Text* & Full Name	Description
tHr	**MECHANICAL**	Traditional Thermostatic Expansion Valve
HS	**HSV**	Hybrid Stepper Valve
rS	**RSV**	Refrigeration Stepper Valve
SEi	**SEI**	Sporlan Valve with 1,600 steps
SEr	**SER**	Sporlan Valve with 2,500 steps
CrL	**CAREL**	Carel Valve with 500 steps

*Scrolling Text is available when using the Combo Display coming 2019.

Alarm Status Menu

Abbreviation	Scrolling Text*	Full Name	Description
PSA	**PRESSURE SENSOR**	Pressure Sensor Alarm	Suction pressure sensor is shorted, open or pressure out of range
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
HSH	**HIGH SUPERHEAT**	High Superheat Alarm	Superheat above upper limit
LSH	**LOW SUPERHEAT**	Low Superheat Alarm	Superheat below lower limit
HtA	**HIGH AIR TEMP**	High Temperature Alarm	Room temperature is above ROOM TEMP + AIR TEMP DIFF + HIGH TEMP ALARM OFFSET for longer than HIGH TEMP ALARM DELAY
LtA	**LOW AIR TEMP**	Low Temperature Alarm	Room temperature is below ROOM TEMP - LOW TEMP ALARM OFFSET for longer than LOW TEMP ALARM DELAY
EdF	**EXCESS DEFROST**	Excess Defrost Alarm	32 defrosts or more within 48 hours
dtt	**DEFR TERM ON TIME**	Defr Term on Time Alarm	Defrost terminated on time instead of temperature for two consecutive cycles
dor	**DOOR SWITCH**	Door Open Alarm	If door is open and room temperature is 5 degrees above ROOM TEMP + AIR TEMP DIFF for DOOR ALARM DELAY time
CoA	**COMMUNICATION ERROR**	Communication Error	ONLY FOR BONDED CONTROLLERS: No communication between controllers for one minute or more
EA1	**EXTERNAL ALARM 1**	External Alarm 1	If AU1 IN MODE = EXT ALARM: The digital input is in an active state
EA2	**EXTERNAL ALARM 2**	External Alarm 2	If AU2 IN MODE = EXT ALARM: The digital input is in an active state
EA3	**EXTERNAL ALARM 3**	External Alarm 3	If AU3 IN MODE = EXT ALARM: The digital input is in an active state
EFL	**EMAIL FAILURE**	Email Failure Alarm	Email alert was not confirmed by email server provided after seven consecutive attempts
A1A	**AUX1 SENSOR**	AU1 Temp sensors Alarm	AU1 temperature sensor is shorted or open
A2A	**AUX2 SENSOR**	AU2 Temp sensors Alarm	AU2 temperature sensor is shorted or open
A3A	**AUX3 SENSOR**	AU3 Temp sensors Alarm	AU3 temperature sensor is shorted or open
Pdt	**PUMPDOWN TIMEOUT**	Pump Down Timeout	Max time for LPCO pumpdown exceeded
SCC	**SHORT COMP CYCLE**	Short Compressor Cycle	Compressor is started an excessive number of times to maintain suction pressure
LPA	**LOW PRESSURE**	Low Pressure Alarm	Suction pressure dropped below expected point excessive number of times
PrF	N/A	Process Failure	Basic Display is not communicating to the controller

*Scrolling Text is available when using the Combo Display

Specifications

Controller	
Input Voltage:	100VAC - 240VAC
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 (12V)
Relays:	1-20A resistive (defrost) (2) 10A inductive
Auxiliary Input 1: **Auxiliary Input 2:** **Auxiliary Input 3:**	room temp, coil temp, monitor, 2nd temp setpoint, door switch, external alarm, system off, defrost interlock, defrost lockout
Communication:	Standard TCP/IP

Pressure Transducer - pn 20201 (10 ft lead) or pn 20204 (40 ft lead)	
Pressure Range:	0 to 150 psia
Proof Pressure:	450 psi
Burst Pressure:	1500 psi
Operating Temp:	-40°F to 275°F (-40°C to 135°C)
Temperature Sensor - 3 pack pn 21151 (15 ft leads) or pn 21066 (40 ft leads)	
Sensor Specs:	-60°F to 150°F (-51°C to 65°C) moisture resistant package

Navigation Using the Basic Display

Indicator lights
- **Red light** - critical Alarm (system not running)
- **Yellow light** - non-critical alarm (system running)
- **Green light** - compressor on
- **Green flashing** - compressor waiting on timer to start/stop

- **Access Setpoint mode by pressing and holding the ENTER button until tS (temperature setpoint) displays on the screen**
- **Use the ▲ up and ▼ down arrows to scroll through the available setpoints.**
- **Press ENTER to view the current setting.**
- **Use the ▲ up and ▼ down arrows to change the setpoint. Press ENTER to move between the digits to accelerate the changes.**
- **Press ENTER and hold to confirm each setpoint change.**
- **Press BACK to escape.**

User Interface

The KE2 Evap OEM board has multiple methods of user input. Most controllers ship with the Basic Display. This display uses a familiar menu structure to allow service technicians to change the major setpoints. The setpoints may also be accessed using the controller's webpages.

The ▲ and ▼ arrows move the user through the available options for the Variables Menu. If alarms are present, they will be displayed and can be viewed using the up and down arrows.

Basic Menu:

Pressing and holding the ENTER button enters the **Basic Setpoints** menu.

Advanced Menu:

Pressing and holding the BACK button enters the **Advanced Setpoints** menu.

The ENTER button is used to save an input option when it has been changed. **The ENTER button must be held for 3 seconds, to prevent accidental changes.** Changes may be discarded by waiting, to allow the controller to time-out and return to default screen, or by pressing the BACK button. The BACK button is used to return to the previous screen. Pressing the BACK button several times will return the controller to the default view.

Controller Setup

Upon initially applying power to the controller, the controller will initialize, then automatically enter **Introduction Mode**. The Introduction Mode consists of four **Types of Control** options:

- **Ed -** Electric Defrost with Mechanical TEV
- **EdE -** Electric Defrost with Electric Expansion Valve
- **Ad -** Air Defrost with Mechanical TEV
- **AdE -** Air Defrost with Electric Expansion Valve

Step 1 - Using the ▲ and ▼ arrows, moves the user through the available **Types of Control** options. Once the preferred option is displayed press and hold the ENTER button for 3 seconds.

Note: For mechanical valve control, Ed and Ad options, continue to Step 4. For Ede and AdE control options continue to Steps 2, 3, &4.

Step 2 - Next, the controller prompts for the **Expansion Valve Type**, and displays **rS (RSV)**. If you this is the correct selection, press and hold the ENTER button for 3 seconds. If not, use the ▲ or ▼ arrow to move to the correct valve.

With correct electric valve displayed, press and hold ENTER for three seconds.

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

Step 3 - The controller now prompts for the **Refrigerant Type** and displays **404 (R-404a)** as the default. Change this value by pressing the ▲ or ▼ arrow. Once you have the correct value, press and hold ENTER for three seconds.

Step 4 - The fourth prompt is whether **SMART ACCESS** is **ENABLED** or **DISABLED**. **SMART ACCESS** allows you to easily view your controller online. (See pages 16 & 17 for more information.) Make your selection by using the ▲ or ▼ arrow, and then press and hold ENTER for **three seconds.**

THESE ARE THE ONLY SETPOINTS REQUIRED TO BEGIN CONTROLLING THE SYSTEM.

Additional Setpoints

For the majority of users, the Basic Display will provide the necessary parameters to setup the controller.

From the default display, pressing the ▲ and ▼ arrows will cycle through the **Variables** menu. The ENTER button will toggle between the variable name and value.

Changing Setpoints

Pressing and holding the ENTER button will enter the **Basic Setpoints** menu. Press ENTER button to toggle between setpoint and value.

Pressing and holding the BACK button will enter the **Advanced Setpoints** menu. Press ENTER button to toggle between setpoint and value.

When the parameter value is displayed it may be changed by using ▲ and ▼ arrows, and ENTER buttons. The ▲ and ▼ arrows will increase or decrease numerical values, and will scroll through the available options, on the non-numerical setpoints.

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

To abort changes, press the BACK button to return the parameter abbreviation.

Manual Valve Control

Press and hold the BACK button & ▼ arrow to put the EEV in **Manual Control** mode. ▲ and ▼ arrows will control the valve opening. ENTER will advance to the next digit, and BACK will exit this mode.

Manual Defrost

Pressing and holding the BACK and ENTER buttons will put the controller into **Defrost (next mode)**.

Diagnostics Mode

The KE2 Evap OEM has been programmed with a diagnostics mode. When activated, the controller energizes each relay for 60 seconds. When the compressor relay is on the EEV will regulate to the Superheat setpoint.

Display Firmware

Pressing and holding all 4 buttons (▲ ▼ BACK and ENTER)will show the display's firmware revision **(dir – Display Revision)**

Display Options

Simultaneously pressing and holding the ▲ and ▼ arrows will show the address of the display (reserved for future versions).

Web Login

The User Name and Password are required when accessing the controller using the webpage.

The defaults are: **User Name:** ke2admin **Password:** ke2admin

Introduction to Smart Access

Smart Access 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 Evap OEM's free connectivity is still available, we recognize that some customers prefer the simplicity and convenience of Smart Access to enjoy the benefits of the controller's communication capability.

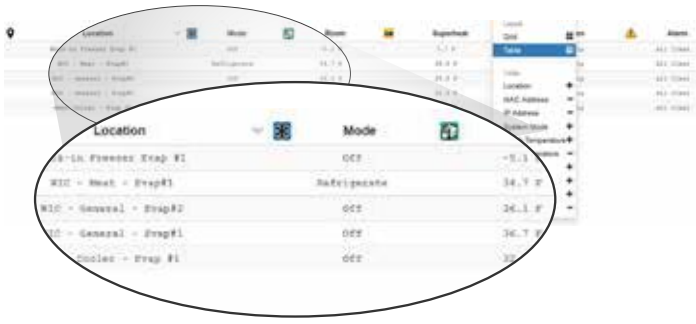
For a nominal monthly fee, Smart Access provides easy, real time access to your refrigeration system 24/7. No port forwarding. No VPN.

All the KE2 Evap OEM needs is a physical connection to the network router with a cat 5 cable. Once enabled, Smart Access quickly connects to your personal web portal, hosted by KE2 Therm, and provides a "customized" dashboard of all the controllers you setup with Smart Access.

Benefits of Smart Access

- **Smart Access auto launches, and often eliminates costly IT support**
- **Doesn't require port forwarding or a vpn**
- **Customized dashboard lets you view all your controllers on one page**
- **It's easier than ever to set up every controller you service to provide alarm notifications via text or email**
- **Easy setup of remote monitoring & system control**

Screen shot of a single Evap connected through Smart Access.

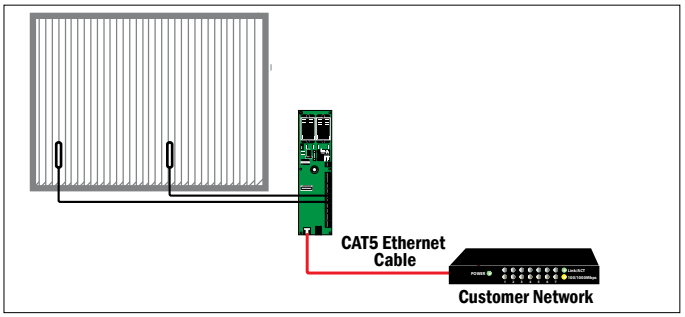


Screen shots of Smart Access dashboard. Controller and system information is displayed for all of the controllers on the portal.

Smart Access - Online Access In 3 Easy Steps

Preliminary

Connect the KE2 Evap OEM to the customer's network.



Step 1 Enable Smart Access in the Setpoints menu

■ After the initial Introduction Mode setup, press and hold the ENTER button.

■ Press the ▲ arrow two times to view **SA** (abbreviation for Smart Access). Press ENTER, then use the ▲ arrow to change **diS** (disabled) to **EnA** (enabled)

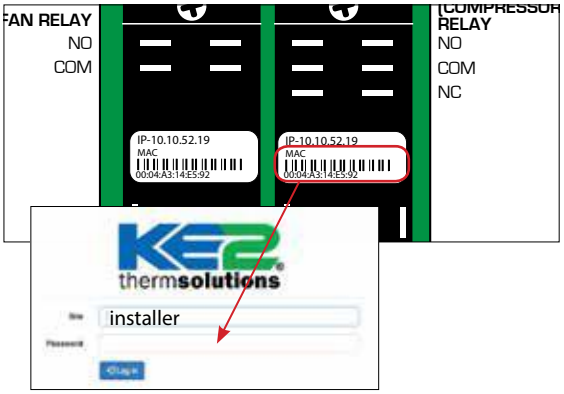
Press and hold the ENTER button for 3 seconds to save the change.

Step 2 Go to smartaccess.ke2therm.net

■ Using your PC, tablet or smartphone, enter **http://smartaccess.ke2therm.net** in the web browser's address bar.

Step 3

Enter default information and click **Log In** button
Site: installer
Password: controller's Mac Address (from sticker on back of controller)



Alphabetical List of Abbreviations

Abbreviation	Full Name	Type	Description
A1A	Aux Input 1 state	Setpoint	oPn= active if input is an open / CLo=active if input is shorted
A1A	AU1 Temp sensor Alarm	Alarms	AU3 temperature sensor is shorted or open
A2A	Aux Input 2 state	Setpoint	oPn= active if input is an open / CLo=active if input is shorted
A2A	AU2 Temp sensor Alarm	Alarms	AU2 temperature sensor is shorted or open
A3A	Aux Input 3 state	Setpoint	oPn= active if input is an open / CLo=active if input is shorted
A3A	AU3 Temp sensor Alarm	Alarms	AU3 temperature 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/EEV	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) - Air Off time Defrost is used; other options Electric (ELE), Hot Gas w Compressor On (HGN),or Hot Gas with Compressor Off
ASA	Air Sensor Alarm	Alarms	Return air temperature 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	Inactive = defrost heaters normal
AUt	Defrost Lockout - Defrost Normal	Auxiliary Input	Inactive = defrost will occur by normal controller logic
CEL	Celsius	Setpoint	Option for the units for the temperature display in degrees - Celsius or Fahrenheit (FAH)
CLA	Clear Alarms	Setpoint	Press and hold to clear all active alarms
CLo	Closed	Setpoint	Option under Auxiliary Input State
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	ONLY FOR BONDED CONTROLLERS: No communication between controllers for one minute or more
Cor	Compressor Relay	Variables	Current state of liquid line solenoid/compressor relay
CrL	Carel	Valve Type	Carel valve with 500 steps
CSA	Coil Sensor Alarm	Alarms	Coil temperature sensor is shorted or open
dAd	Door Open Alarm Delay	Setpoint	If AU IN (1, 2 and/or 3) MODE = dor The amount of time, in minutes, before an alarm condition is initiated if door is open and room temperature is 5 degrees above ROOM TEMP + AIR TEMP DIFF
dCL	Door Switch - Door Closed	Auxiliary Input	Door switch indicates door is closed
ddF	Defrost Delay Fan	System Mode	At defrost, but prior to the defrost heaters turning on, the fans will continue running for several minutes, using stored cooling in the coil. Once the coil reaches room temp, the fans will stop, and the heaters will turn on and begin the electric defrost.
dEF	Defr Parameter	Setpoint	if DEFROST MODE = DEMAND: Coefficient to Defrost algorithm
dEF	Defrost	System Mode	Controller is performing a defrost cycle
dEr	Defrost Relay	Variables	Current state of the defrost relay
dFi	Defrost Interlock Switch	Auxiliary Input	Inactive=Defrost Heaters normal (AUT)/Active=Defrost Heaters Off (OFF)
dFL	Defrost Lockout Switch	Auxiliary Input	Inactive=Defrost Normal (AUT)/Active=Defrost Not Allowed (dLO)
dHC	DHCP	Setpoint	Turn DHCP mode on or off: EnA to enable DHCP mode / DiS to disable DHCP mode
diA	Diagnostics Mode	Setpoint	Energizes each relay individually for 60 seconds: fan relay, defrost relay, compressor relay
diS	Disabled	Auxiliary Input	Input is not used by the controller
dLo	Defrost Lockout - Defrost not allowed	Auxiliary Input	Active = Defrost not allowed while signal is active
dnd	Demand Defrost	Setpoint	Option for Defrost Initiation Mode (ind) - when Demand Defrost (dnd) selected, system defrosts only when dictated by decrease in evaporator efficiency; other options for (Ind) are Scheduled (SCH) or Compressor Run Time (rnt)
don	Door Switch - Door Open	Auxiliary Input	Door switch indicates door is open
dor	Door Switch	Auxiliary Input	Inactive=Door Closed (dCL)/Active=Door Open (don)
dor	Door Open Alarm	Alarms	If door is open and room temperature is 5 degrees above ROOM TEMP + AIR TEMP DIFF for DOOR ALARM DELAY time
dPd	Defrosts per day	Setpoint	If DEFROST MODE = SCH: The number of evenly spaced defrosts per day the controller will initiate.
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
dtL	Max Defrost Time	Setpoint	If DEFROST MODE = SCH: The maximum amount of time the defrost relay will be energized. (Not available if DEFROST MODE = DEMAND)
dtP	Defr Term Temp	Setpoint	The temperature the coil sensor(s) must exceed in order to terminate defrost. The controller's defrost mode is complete at this point.
dtt	Defr Term on Time Alarm	Alarms	Defrost terminated on time instead of temperature for two consecutive cycles
dtY	Defrost Type	Setpoint	Type of Defrost for Evap: ELE for Electric/ Ai for off time/ HGn for hot gas w/comp on/ HGF for hot gas w/comp off
EA1	External Alarm Switch	Auxiliary Input	Active=EAo / Inactive=EAF
EA1	External Alarm 1	Alarms	If AU1 IN MODE = EXT ALARM: The digital input is in an active state
EA2	External Alarm 2	Alarms	If AU2 IN MODE = EXT ALARM: The digital input is in an active state
EA3	External Alarm 3	Alarms	If AU3 IN MODE = EXT ALARM: The digital input is in an active state
EAo	External Alarm Switch Active	Auxiliary Input	External Alarm switch is receiving Active signal
EAF	External Alarm Switch Inactive	Auxiliary Input	External Alarm switch is not receiving external signal

Alphabetical List of Abbreviations (continued)

Abbreviation	Full Name	Type	Description
Ed	Electric Defrost w/Mech. valve	Type of Control	System operates with default values for Electric Defrost with Mechanical Valve
EdE	Electric Defrost w/EEV	Type of Control	System operates with default values for Electric Defrost with Electric Valve
EdF	Extreme Temp Diff	Setpoint	ADVANCED TOPIC: Call us for assistance
EdF	Excess Defrost Alarm	Alarms	32 defrosts or more within 48 hours
Edt	Valve Type	Setpoint	Type of valve used on the system: mechanical, pre-configured electric, custom EEV configuration
EFL	Email Failure Alarm	Alarms	Email alert was not confirmed by email server provided after seven consecutive attempts
ELE	Electric Defrost	Setpoint	Option for evaporator Defrost Type (dtY) - Electric defrost heaters used; other options, Hot Gas w Compressor Off (HGF), Hot Gas with Compressor On (HGn) or Air Off time Defrost (Ai)
EnA	Enabled	Setpoint	Enabled - Option to allow connection with Smart Access
FAC	Factory reset	Setpoint	Press and hold to reset the controller to the factory default setpoints
FAH	Fahrenheit	Setpoint	Option for units for the temperature display, in degrees - Fahrenheit or Celsius (CEL)
FAr	Fan Relay	Variables	Current state of the fan relay
FdL	Fan Delay	System Mode	Coming out of defrost, the LLS relay will be energized, and the coil will pulldown until it reaches 20ºF, or 2 minutes, before the fans turn on. This allows any moisture on the coil to re-freeze, keeping it from spraying and forming ice drops on the walk-in's surfaces.
Fir	Firmware Version	Variables	Current version of the firmware on the controller
HAd	High Temp Alarm Delay	Setpoint	Minutes the room temperature must remain above ROOM TEMP + HIGH TEMP ALARM OFFSET before issuing a HIGH TEMP ALARM
HAo	High Temp Alarm Offset	Setpoint	The number of degrees above ROOM TEMP for a HIGH TEMP ALARM condition.
HGF	Hot Gas Defrost w. Compressor Off	Setpoint	Option for evaporator Defrost Type (dtY) - Hot Gas defrost used with the Compressor Off; other options Electric (ELE), Hot Gas w Compressor On (HGN), or Air Off time Defrost (Ai)
HGn	Hot Gas Defrost w. Compressor On	Setpoint	Option for evaporator Defrost Type (dtY) - Hot Gas defrost used with the Compressor On; other options Electric (ELE), Hot Gas w Compressor Off (HGF), or Air Off time Defrost (Ai)
HS	HSV	Valve Type	HSV, Hybrid Stepper Valve
HSH	High Superheat Alarm	Alarms	Superheat above upper limit
HtA	High Temperature Alarm	Alarms	Room temperature is above ROOM TEMP + AIR TEMP DIFF + HIGH TEMP ALARM OFFSET for longer than HIGH TEMP ALARM DELAY
Htn	Electric Defrost Mode	Setpoint	If DEFROST TYPE = ELE: Whether to leave the defrost relay energized during the defrost cycle or to utilize advanced defrost algorithm.
ind	Defrost Ini Mode	Setpoint	Mode to initiate a defrost: dnd=demand / SCH=Schedule / rnt=comp run time
iP1	IP Address Part 1	Variables	The first three digits of the IP address
iP2	IP Address Part 2	Variables	The second three digits of the IP address
iP3	IP Address Part 3	Variables	The third three digits of the IP address
iP4	IP Address Part 4	Variables	The fourth three digits of the IP address
LAd	Low Temp Alarm Delay	Setpoint	Minutes the room temperature must remain below ROOM TEMP + LOW TEMP ALARM OFFSET before issuing a LOW TEMP ALARM
LAo	Low Temp Alarm Offset	Setpoint	The number of degrees below ROOM TEMP for a LOW TEMP ALARM condition.
LPA	Low Pressure Alarm	Alarms	Suction pressure dropped below expected point excessive number of times
LPC	Low Pressure Cut Out	Setpoint	Only applies when non-mechanical valve selected
Lpd	Press Diff for LPCO	Setpoint	Only applies when non-mechanical valve selected
LPt	Max Time for LPCO	Setpoint	Only applies when non-mechanical valve selected
LSH	Low Superheat Alarm	Alarms	Superheat below lower limit
LtA	Low Temperature Alarm	Alarms	Room temperature is below ROOM TEMP - LOW TEMP ALARM OFFSET for longer than LOW TEMP ALARM DELAY
oFF	Off	System Mode	System has satisfied on temperature
oFF	Defrost Heaters Off	Auxiliary Input	Defrost heaters are being interrupted by external input
oni	Monitor Temp	Auxiliary Input	Monitoring Temp as measured by Aux Input
oPn	Valve% Open	Variables	Percentage the EEV is open (only available if EEV is selected)
oPn	Open	Setpoint	Option under Auxiliary Input State
PAS	Web password reset	Setpoint	Press and hold to reset the web password to the factory default
Pdt	Pump Down Timeout	Alarms	Max time for LPCO pumpdown exceeded
PrF	Process Failure	Alarms	Display is not communicating to the controller
Prn	Permanent	Setpoint	Option when Defrost Type (dtY) is set for Electric (ELE) - Permanent (Prn) means defrost relay is energized during the entire defrost cycle; other option Pulse (PUL) uses the advanced defrost algorithm to cycle the relay
PrS	Suction Pressure	Variables	Suction pressure as measured by the controller (only available if suction pressure transducer installed)
PSA	Pressure Sensor Alarm	Alarms	Suction pressure sensor is shorted, open or pressure out of range
PUL	Pulse	Setpoint	Option when Defrost Type (dtY) is set for Electric (ELE) - Pulse (PUL) uses the advanced defrost algorithm to energize the defrost relay during the defrost cycle; other option Permanent (Prn)
rEF	Refrigeration	System Mode	Indicates the system is currently in Refrigeration mode
rFG	Refrigerant	Setpoint	Type of refrigerant used: see table below
rnt	Compressor Run Time	Setpoint	Option for Defrost Initiation Mode (ind) - when Compressor Run Time (rnt) selected, number of hours of cooling before starting defrost; other options for (Ind) are Demand Defrost (dnd) or Scheduled (SCH)
rS	RSV	Valve Type	(RSV) Refrigeration Stepper Valve
rtP	Room Temp	Variables	Walk-in freezer or cooler room temperature (TAir Sensor) as measured by the controller
rtP	Room Temp	Auxiliary Input	Room temp as measured by Aux Input
SA	Smart Access	Setpoint	Turn Smart Access on or off: EnA to enable Smart Access / DiS to disable

Alphabetical List of Abbreviations (continued)

Abbreviation	Full Name	Type	Description
SAt	Saturation Temp	Variables	Saturation temperature as calculated by the controller (requires pressure transducer and T1 sensor)
SCC	Short Compressor Cycle	Alarms	Compressor is started an excessive number of times to maintain suction pressure
SCH	Scheduled Defrost	Setpoint	Option for Defrost Initiation Mode (ind) - when Scheduled (SCH) selected, system defrosts on a programmed schedule; other options for (Ind) are Demand Defrost (dnd) or Compressor Run Time (rnt)
SEi	SEI	Valve Type	Sporlan Valve with 1,600 Steps
SEr	SER	Valve Type	Sporlan Valve with 2,500 Steps
SHt	Superheat	Variables	Superheat as calculated by the controller (requires suction pressure transducer and TSUC sensors)
SoF	System Off Switch	Auxiliary Input	Inactive=System On (Son)/Active=System Off (SoF)
SoF	System Off	System Mode	System has been turned off by external signal
Son	System Off Switch - System On	Auxiliary Input	Inactive=System On (Son)/Active=System is running normally
SSA	Suction Sensor Alarm	Alarms	Suction temperature sensor is shorted or open
Stt	Superheat	Setpoint	Superheat setpoint
SUt	Suction Temp	Variables	Suction Temperature as measured by controller
SYS	System Mode	Variables	Current operating status
t2F	2nd Room Temp Setpoint Off	Auxiliary Input	System is controlling to Room Temp setpoint
t2n	2nd Temp Switch	Auxiliary Input	Inactive=2nd room temp SP off (t2F)/Active=2nd room temp SP on (t2n)
tHr	Mechanical	Valve Type	Thermostatic Expansion Valve
tS	Room Temp SP	Setpoint	Walk-in freezer or cooler room temperature to be maintained
tS2	2nd room temp SP	Setpoint	If AU IN (1, 2 and/or 3) MODE = (t2n) 2ND ROOM TEMP: This value becomes the ROOM TEMP setpoint when the digital input is active
Unt	Temperature Units	Setpoint	Units for temperature's display in °F or °C