KE2
therm**solutions**

Q.1.20
June 2015

KE2 Temp + Defrost (pn 20611)
For **Medium Temperature** Applications with **Air Defrost**
Installation Manual

c US

This reference should remain on site with the installed KE2 Temp + Defrost controller.

Ⓐ

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KE2 Temp

⯅
BACK   ENTER
⯆

Hold for manual defrost

Ⓕ

Programming
■ Press & hold ENTER button to access setpoint menu
■ Use arrow buttons to select function:
 tS = Temperature Setpoint
 diF = Differential
 CSH = Max Compressor Starts/ Hour
 dPd = Defrost Per Day
 dFt = Defrost Time
 HAO = High Alarm Offset
 LAO = Low Alarm Offset
 tAd = Temp Alarm Delay
 Adr = Mod Bus Address
 Unt = Units for temp display
■ Press ENTER & use arrows to change value
■ Press & hold ENTER button to confirm changes
Alarms
■ When amber LED is lit:
 SSA = Shorted Sensor Alarm
 OSA = Open Sensor Alarm
 HtA = High Temp Alarm
 LtA = Low Temp Alarm
pn 20679   06/14

Ⓒ   **Ⓓ**

Ⓔ   **Ⓕ**

What's in the Kit - Parts List
The following parts are included in the KE2 Temp + Defrost kit:

Ⓐ **(1) KE2 Temp + Defrost controller**

Ⓑ **(1) temperature sensor - 10'**

Ⓒ **(4) self-tapping mounting screws**

Ⓓ **(1) liquid tight cord grip**

Ⓔ **(1) sensor ziptie**

Ⓕ **(1) programming sticker**

Ⓖ **(2) screws for high voltage shield**

Supplies List
All of the accessories required for the controller to work are supplied, however, standard truck stock items are required to install the controller. A list is provided below:

■ **conduit to go between the controller & evaporator**
■ **(2) conduit connectors** (straight or elbow as required)
■ **(4) high voltage wires matched to the load of the liquid line solenoid/compressor and the controller.**
■ **wire labeling** (numbers, colors, etc.)
■ **additional wire ties**
■ **18 gauge twisted shielded pair** (if extending sensor wires/adding communication)
■ **foam insulation (**if running wires outside the space)
■ **silicone** (for sealing any box penetrations)

Select Mounting Location
The KE2 Temp is designed for a wide range of applications; therefore there are many potential installation locations. Breaking down the installation location by application provides the most helpful reference.

Application	Locations
Undercounter	Evaporator cabinet
	Outside controlled space
Walk-in	Evaporator cabinet
	Adjacent to entrance
Side-by-side	Above door

Walk-in   **Under Counter**

Wine Cabinet   **Commercial**

KE2 Temp + Defrost (pn 20611)
For **Medium Temperature** Applications with **Air Defrost**
Installation Manual

Wiring the Controller

The KE2 Temp was designed with simplicity in mind. The controller accepts 120V / 208-240V to power the controller and 12V - 240V solenoid voltage via the liquid line solenoid relay through the lower conduit connection. The temperature sensor and communication wires are attached via the upper conduit connector.

1 When wiring the controller first remove the display by loosening the four corner screws. The display is connected to the lower board by a short ribbon cable.

⚠ **Caution:** The board may be damaged if excessive force is used when removing the cover.

2 After the four screws have been detached from the lower section, the cover may be gently moved to the side.

**3** Next remove the high voltage protective cover. There are two screws holding it in place.

4 With the high voltage cover removed, the two screw terminal connectors can be seen. The 2-position connector is the controller's power supply. The voltage selector switch should be positioned to match the voltage supplied.
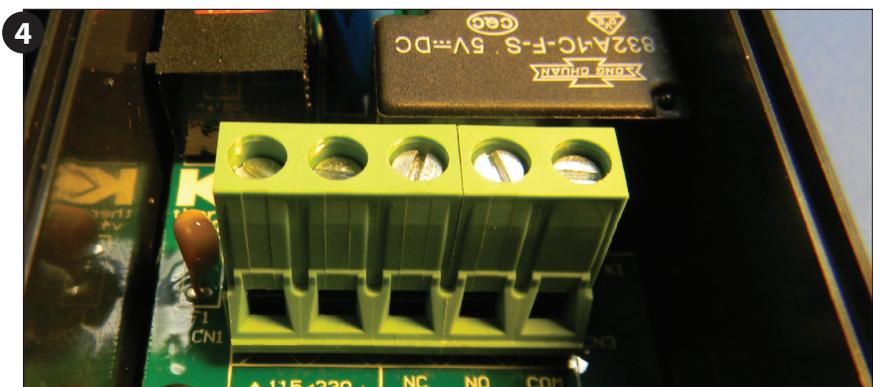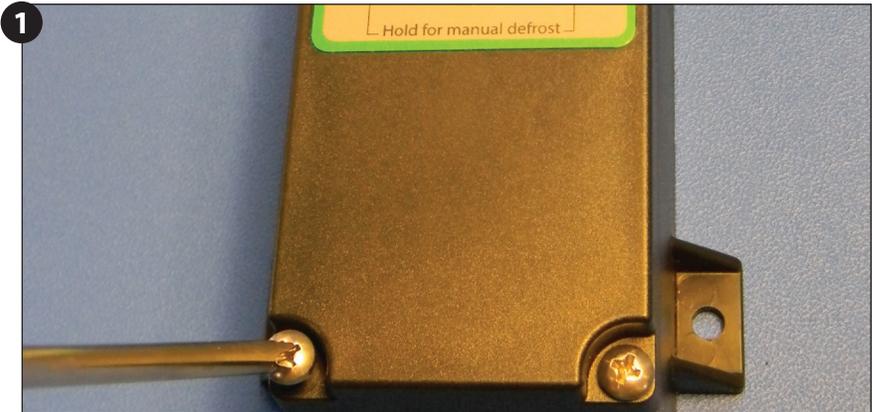
![KE2 thermsolutions logo] **KE2 Temp** + Defrost (pn 20611)
For **Medium Temperature** Applications with **Air Defrost**
Installation Manual

5 Connect line (L1) to the right terminal position and neutral (L2) to the left terminal position.

5
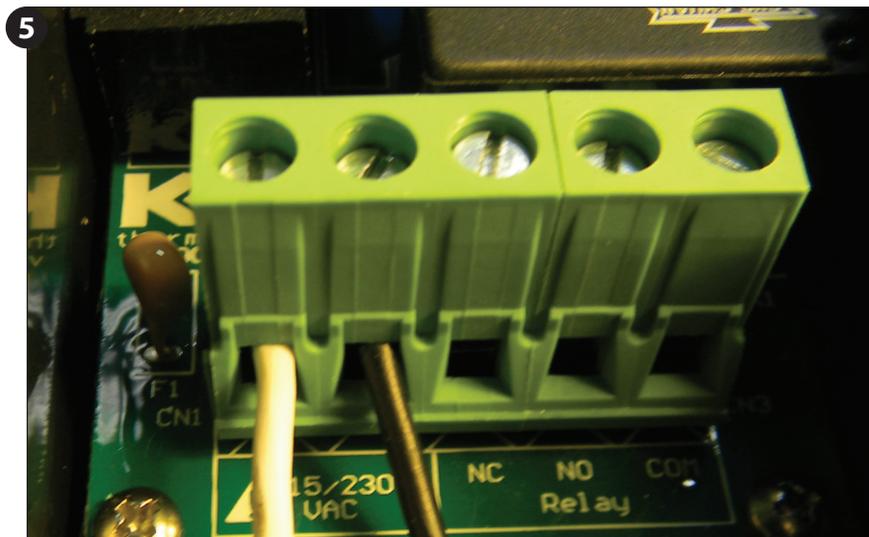
6 The liquid line solenoid/compressor relay accepts a variety of input voltages and is not required to match the controller's input. See table for relay ratings. The relay uses the 3-position screw terminal to make the connection on the board. This relay is designed to control smaller compressors directly. It may also control either the liquid line solenoid or as a pilot to the compressor contactor.When connecting the wires to the relay, the controller will be breaking one leg of the power.

One leg of incoming power (L1) supply for the liquid line solenoid should be connected to the common terminal of the liquid line solenoid relay, the right most terminal connection. The other leg of the incoming power (L2) should be connected directly to the solenoid lead. The remaining lead from the solenoid should be connected to the NO (normally open) terminal, the leftmost terminal location.
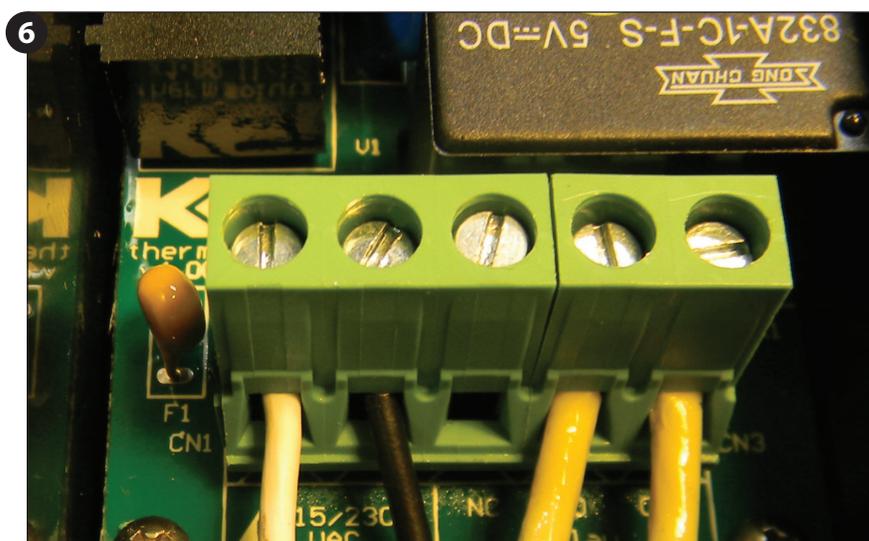
⚠ Proper wiring practices must be followed. Local wiring codes take precedence over any information in this bulletin.

6

Voltage Table

		Normally Open		Normally Closed	
		120V	**240V**	**120V**	**240V**
Outputs: **(1) Relay** Single Pole Double Throw	**FLA**	30A	30A	N/A	10A
	LRA	98A	80A	20A	20A
	Resistive	N/A	30A	N/A	30A
	Horsepower	1 hp	2 hp	1/4 hp	1/2 hp
	Pilot Duty	800VA	720VA	290VA	360VA

**7** Replace high voltage shield after wiring is completed.

KE2 Temp + Defrost (pn 20611)
For **Medium Temperature** Applications with **Air Defrost**
Installation Manual
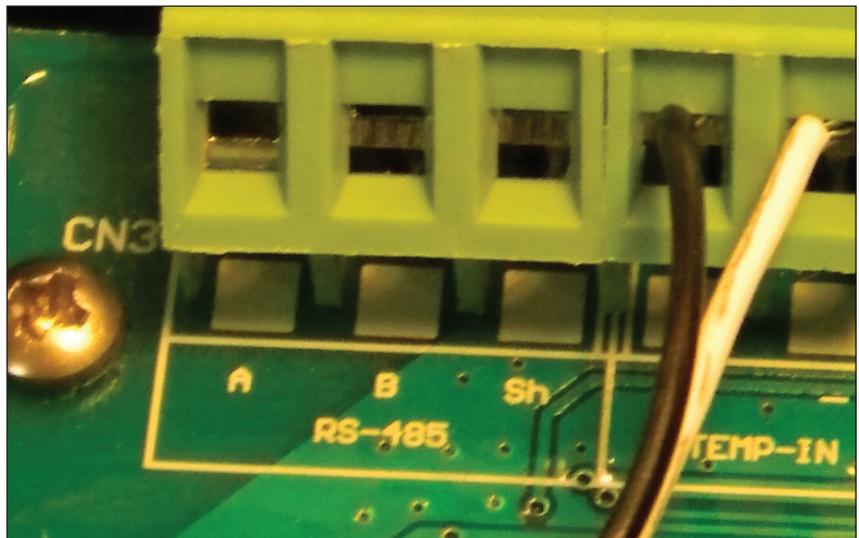
Low Voltage Connections

Temperature sensor - The temperature sensor terminal is located on the cover's circuit board and is permanently attached. The temperature sensor input consists of the right two terminals. Although the terminals are labeled '+' and '-' the sensor is not polarized and may be connected in either orientation.

The sensor should be fed through the top conduit connection using **D** liquid tight cord and before being attached to the board. If Modbus communication is being used, a water tight type conduit maybe used instead.

Temperature sensor

D
Liquid tight cord grip - snaps into conduit opening at the top of the controller.
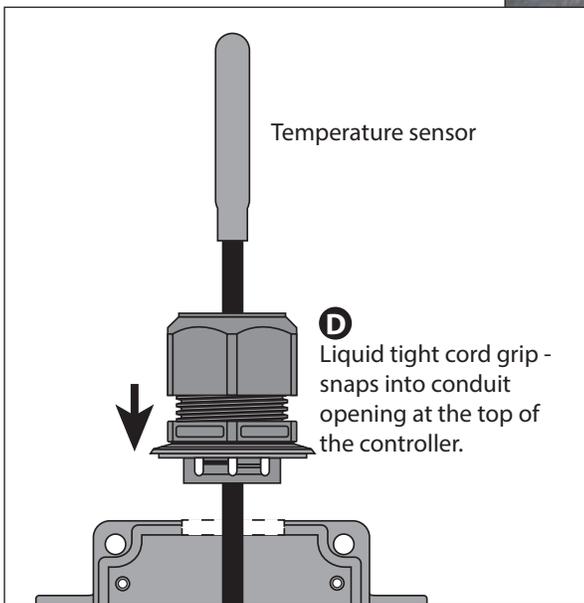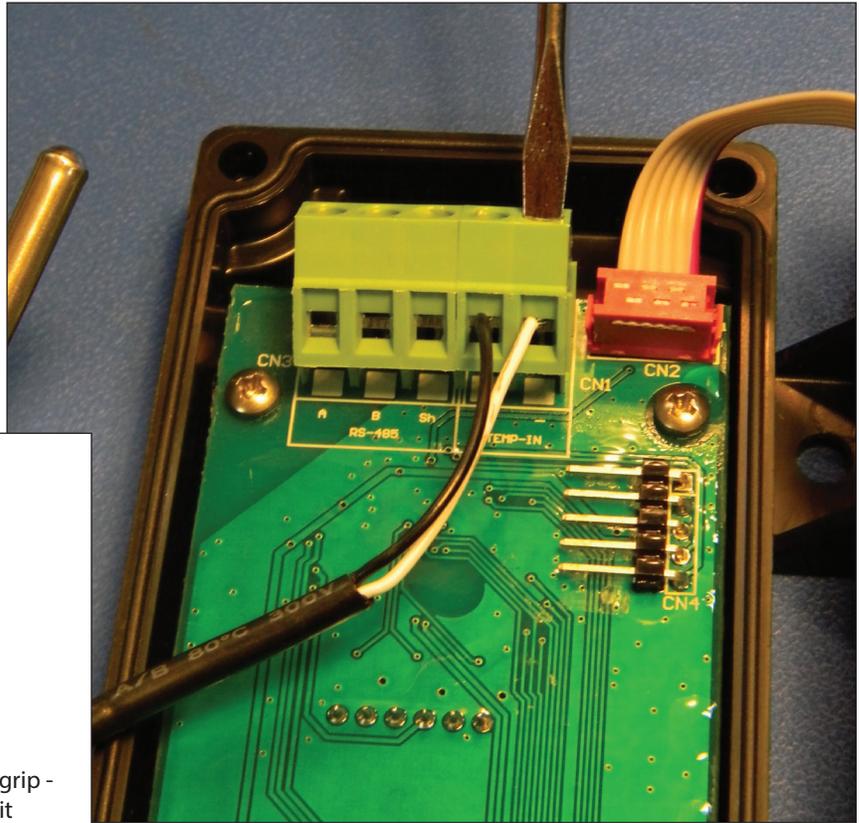
Communication

The KE2 Temp includes RS-485 Modbus communication. RS-485 communication should be connected to the A, B, and Sh (shield) connections.

KE2 Temp + Defrost (pn 20611)
For **Medium Temperature** Applications with **Air Defrost**
Installation Manual

Programming the Controller

Many applications of the KE2 Temp + Air Defrost can use the controller's preset defrosts per day. This automatically spaces the defrosts throughout the day, based on the number of defrost cycles selected. The user has the ability to change the number of defrost cycles performed by changing the Defrost per Day setpoint from 0 to 12.
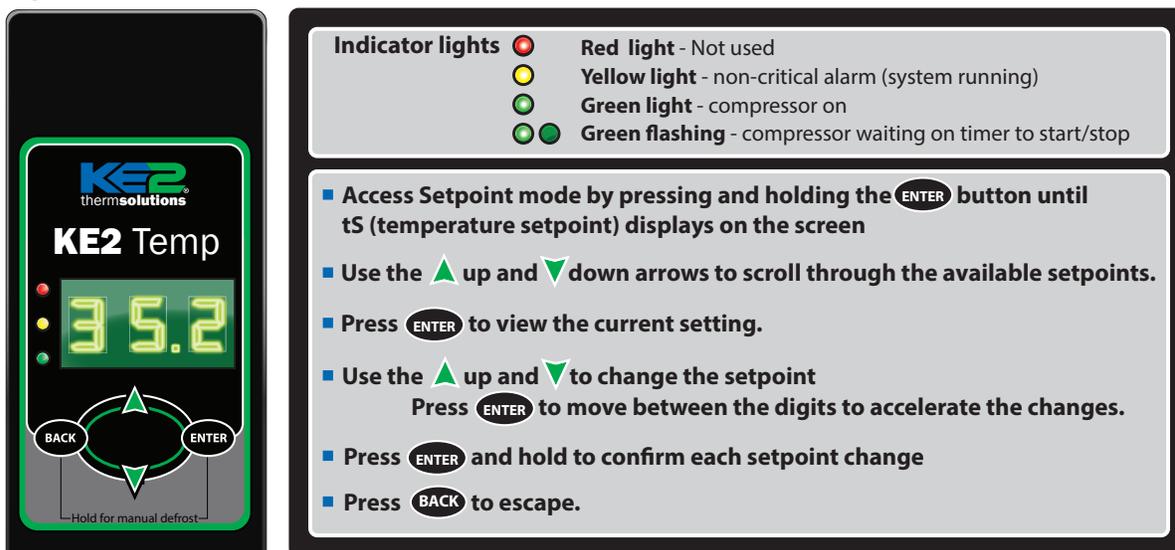
For more specific applications, the KE2 Temp has the option to schedule each individual defrost at a specific time of day.

KE2 Temp + Air Defrost Basic Navigation

Understanding the KE2 Temp + Air Defrost's menu structure will simplify configuration.

In **Figure 1** shows the basic button functions, as well as a list of basic setpoints.

Figure 1

Indicator lights
- **Red light** - Not used
- **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 ▼ 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.**

KE2 Temp

3 5.2

BACK   ENTER

Hold for manual defrost

Setpoints

tS	=	Temperature Setpoint
diF	=	Differential
CSH	=	Maximum Compressor Starts/Hour
dPd	=	Defrost Per Day

tOd
d1
d2
d3
d4
d5
d6
d7
d8
d9
d10
d11
d12

Only visible if CUS (custom) is selected for dPd (Defrost per day) See page 7 for detailed setup instructions.

dFt	=	Defrost Time
HAO	=	High Alarm Offset
LAO	=	Low Alarm Offset
tAd	=	Temp Alarm Delay
Adr	=	Mod Bus Address
Unt	=	Units for temp display (FAH or CEL)

KE2 Temp + Defrost (pn 20611)
For **Medium Temperature** Applications with **Air Defrost**
Installation Manual

Basic Setpoints

Setpoint	Description	Minimum	Default	Maximum
tS	Temperature Setpoint	-50°F (-45°C)	35°F	100°F (38°C)
diF	Differential	1°F (1K)	2°F	30°F (17K)
CSH	Maximum Compressor Starts/Hour	5 (Off)*	6	10
dPd	Defrost Per Day	0	6	12, CUS**
dFt	Defrost Time	0 min	15 min	720 min
HAO	High Alarm Offset	1°F (1K)	5°F	10°F (6K)
LAO	Low Alarm Offset	1°F (1K)	3°F	10°F (6K)
tAd	Temp Alarm Delay	1 min	90 min	180 min
Adr	Mod Bus Address	1	1	247
Unt	Units for temp display	FAH	FAH	CEL

*Selecting fewer than 5 compressor starts per hour results in the starts per hour feature being turned off. The compressor will then function on temperature only.
** Selecting CUS (custom) unlocks additional Setpoints. See Advanced Setpoints table.

Advanced Setpoints - includes setpoints only visible when CUS (custom) is selected under dPd (defrosts per day)

Setpoint		Description	Minimum	Default	Maximum
tS		Temperature Setpoint	-50°F (-45°C)	35°F	100°F (38°C)
diF		Differential	1°F (1K)	2°F	30°F (17K)
CSH		Maximum Compressor Starts/Hour	5 (Off)*	6	10
dPd		Defrost Per Day	0	6	12, CUS
	d12	Start time of Defrost #12	00	dis (disabled)	23,dis (disabled)
	d11	Start time of Defrost #11	00	dis	23,dis
	d10	Start time of Defrost #10	00	dis	23,dis
	d9	Start time of Defrost #9	00	dis	23,dis
	d8	Start time of Defrost #8	00	dis	23,dis
	d7	Start time of Defrost #7	00	dis	23,dis
	d6	Start time of Defrost #6	00	dis	23,dis
	d5	Start time of Defrost #5	00	dis	23,dis
	d4	Start time of Defrost #4	00	dis	23,dis
	d3	Start time of Defrost #3	00	dis	23,dis
	d2	Start time of Defrost #2	00	dis	23,dis
	d1	Start time of Defrost #1	00	dis	23,dis
	tod	Time of Day	0.0	12.0	23.5
dFt		Defrost Time	0 min	15 min	720 min
HAO		High Alarm Offset	1°F (1K)	5°F	10°F (6K)
LAO		Low Alarm Offset	1°F (1K)	3°F	10°F (6K)
tAd		Temp Alarm Delay	1 min	90 min	180 min
Adr		Mod Bus Address	1	1	247
Unt		Units for temp display	FAH	FAH	CEL

**CUS – Setpoints display when CUS selected
See page 7 for detailed Custom Defrost setup instructions

*Selecting fewer than 5 compressor starts per hour results in the starts per hour feature being turned off. The compressor will then function on temperature only.

KE2 Temp + Defrost (pn 20611)
For **Medium Temperature** Applications with **Air Defrost**
Installation Manual

Custom Defrost Setup

The following steps will guide you through the setup of the KE2 Temp's custom defrost feature.

Abbreviations:

CUS = custom
d1 = custom defrost 1
diS = disabled
dpd = defrosts per day
ts = temperature setpoint
tod = time of day

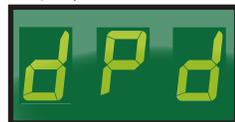### STEP 1

Press and hold the ENTER button, **tS** is displayed on the LEDs

STEP 2

Press the ▲ up arrow until **dPd** is displayed,

then press ENTER , 6 (default) will be displayed.

STEP 3

Press the ▲ up arrow until **CUS** is displayed.

Press and hold the ENTER button for 3 seconds until the **dPd** is displayed.

STEP 4

Press the ▲ up arrow until **tod** (time of day) is displayed,

then press ENTER

Use the ▲ up arrow and ▼ down arrow to set the time.

Note: The time is displayed in military time (24-hr clock) The 1st 2 digits are the hour. The minutes are after the decimal. Since there are only 3 digits, the time will be set to the nearest 10 minutes. See examples below.

Examples:

8:10 am would be 8.1 on the controller's display

4:32 pm would be 16.3 on the controller's display.

After the time is set, press and hold the ENTER button for 3 seconds, until **tod** is displayed

STEP 5

Press the ▲ up arrow to display Defrost 1 **(d1)**.

To set the first defrost, press ENTER button.

diS (disabled) will be displayed.

Use the ▼ down arrow to set the defrost time.

Note: Defrost times may only be set on the hour.

Example:

2:00 am would be 2

Once the correct time is displayed, press and hold the ENTER button until **d1** is displayed.

STEP 6

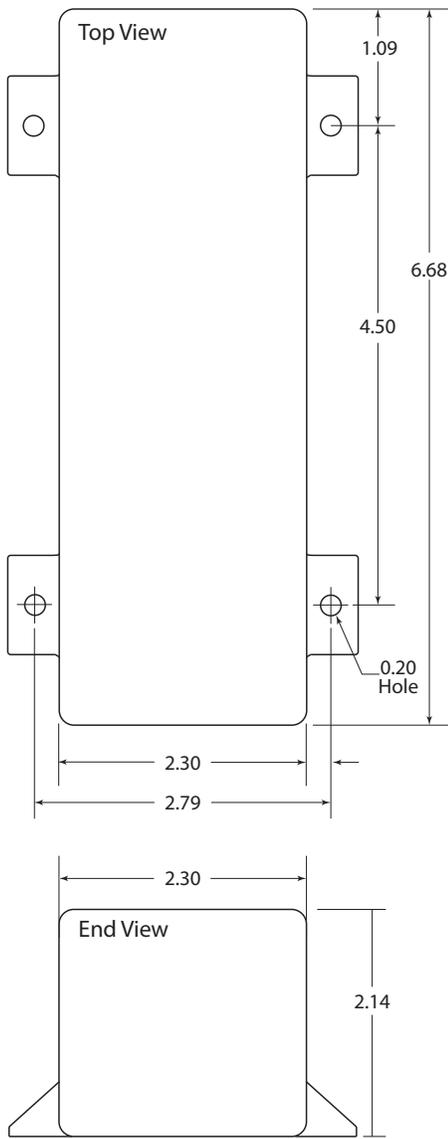Repeat steps as necessary for **d2** to **d12.**

STEP 7

Press the BACK button to save settings, and return to the main screen (room temp will be displayed).

KE2 Temp + Defrost (pn 20611)
For **Medium Temperature** Applications with **Air Defrost**
Installation Manual

Dimensions - Inches

Top View

1.09

6.68

4.50

0.20
Hole

2.30

2.79

2.30

End View

2.14

Wiring Diagram

Observe proper orientation of Ribbon Cable connection

COIL TEMP SENSOR

RIBBON CABLE

A   B   Sh   +   −
RS−485   TEMP IN

115V

115/230   NC   NO   COM
VAC   Relay

Neutral (L2)

120 (208−240)/1/60
CONTROLLER POWER SUPPLY

LLS
COMP

L1

ALTERNATE WIRING METHOD

115/230   NC   NO   COM
VAC   Relay

LLS / COMPRESSOR POWER SUPPLY
REFERENCE RELAY SPECIFICATION FOR
VOLTAGE AND CURRENT LIMITATIONS

120 (208−240)/1/60
CONTROLLER POWER SUPPLY

LLS
COMP