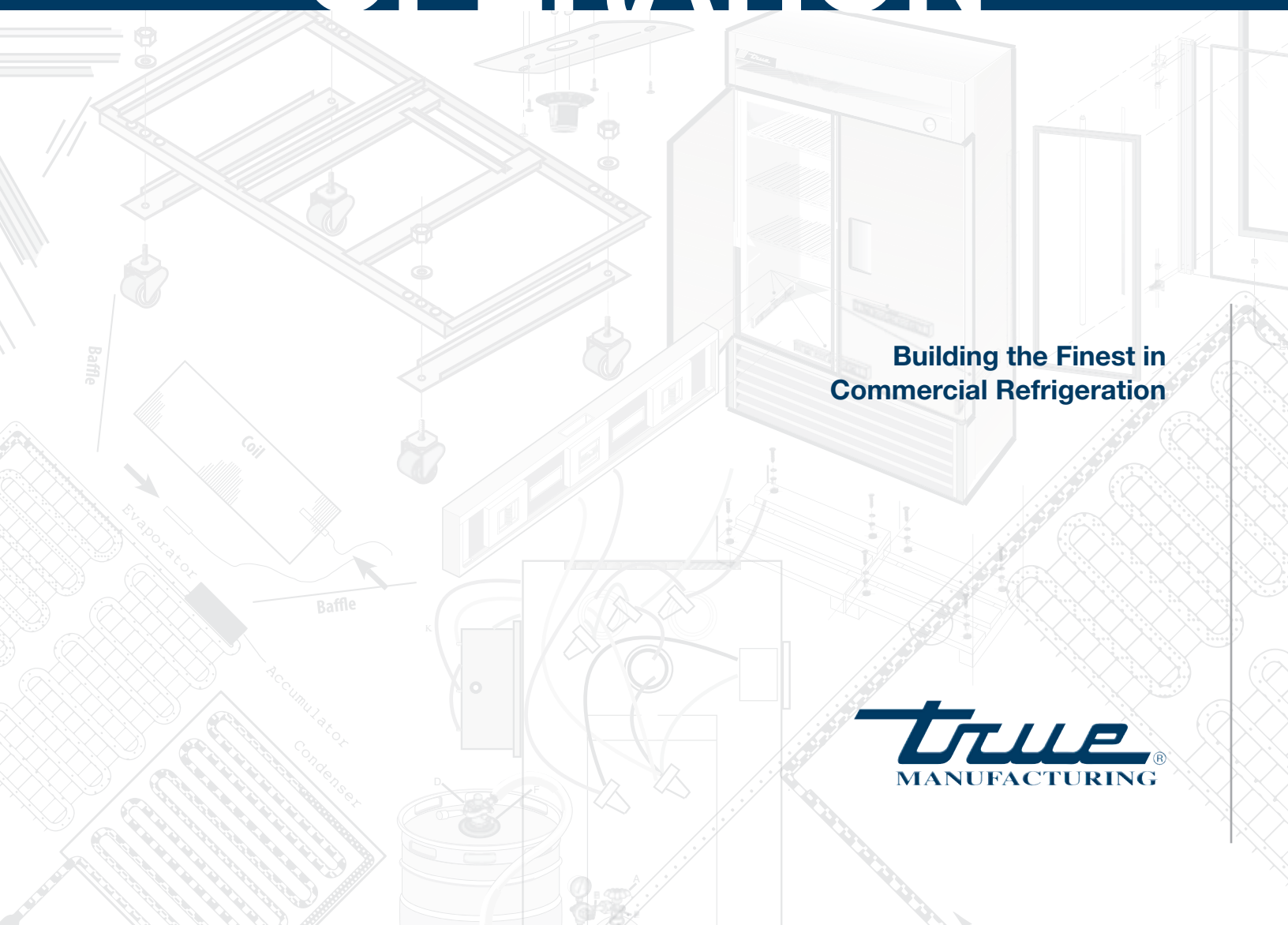
TEMPERATURE CONTROLS

SEQUENCE OF OPERATION



Building the Finest in
Commercial Refrigeration

true® MANUFACTURING

TYPES OF TEMPERATURE CONTROLS

The cabinet's General Sequence of Operation is determined by the temperature control.

What is a temperature control or thermostat?

A temperature control or thermostat is a device that is interposed in a cooling system by which temperature is automatically maintained between certain levels.

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MECHANICAL TEMPERATURE CONTROLS

MECHANICAL CONTROLS CYCLE THE COMPRESSOR BY SENSING *EITHER* AIR TEMPERATURE OR EVAPORATOR COIL TEMPERATURE.

Refrigerator = Evaporator Coil

Freezer = Air

ELECTRONIC TEMPERATURE CONTROLS

ELECTRONIC CONTROLS CYCLE THE COMPRESSOR BY SENSING AIR TEMPERATURE.

OPERATION

STARTUP

A. Temperature controls are factory-set to give refrigerators an approximate temperature of 35°F (1.6°C) and freezers an approximate temperature of -10°F (-23.3°C). Allow unit to function several hours, completely cooling cabinet before changing the control setting.

Temperature Control Location and Settings.

- Temperature control type will vary upon model and age of cabinet.
- Mechanical control or electronic control without display:
  - Inside cabinet
  - Behind cabinet
  - Behind front or rear access grill
- Electronic control with display:
  - In countertop
  - In top louvered panel
  - In or behind bottom louvered grill

B. Excessive tampering with the control could lead to service difficulties. Should it ever become necessary to replace temperature control, be sure it is ordered from your TRUE dealer or recommended service agent.

MECHANICAL TEMPERATURE CONTROLS

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HOW TO DIAGNOSE

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MECHANICAL TEMPERATURE CONTROLS

COIL SENSING

An evaporator coil sensing temperature control ensures that the evaporator coil will remain clear of frost and ice by not allowing the compressor to restart until the coil temperature is above the freezing temperature. This is considered an **off cycle defrost.**

Note: Some Deli Cabinets with a gravity coil system will use a regular defrost cycle without heaters to assist in clearing the coil.

AIR SENSING

An air sensing temperature control used in a freezer application will require a defrost cycle with heaters to ensure that the evaporator coil is kept clear of frost and ice.

Note: Air sensing control used for wine/chocolate do not utilize a defrost cycle as coil temperatures are above freezing.

MECHANICAL TEMPERATURE CONTROL GENERAL SEQUENCE OF OPERATION

MECHANICAL CONTROL REFRIGERATOR GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Interior lights will illuminate on Glass Door Models only. If lights do not come on verify the light switch is in the "ON" position. Solid door cabinets may or may not have lights that may be controlled by the door switch.
2. The compressor and evaporator fans will start if the temperature control is calling for cooling. (If the compressor does not start, verify that the temperature control is not in the "OFF" or "0" position.)
3. The temperature control may cycle the compressor and evaporator fan(s) on and off together.
   a. The temperature control is sensing the evaporator coil temperature.
   b. The temperature control should be set on the #4 or #5.
   c. The warmest setting is #1, the coldest is #9, and #0 is the off position.
   d. The thermometer is designed to read and display a cabinet temperature not a product temperature.
      The thermometer may reflect the refrigeration cycle swings of up and down temperatures.
      The most accurate temperature on a cabinet's operation is to verify the product temperature.
4. There is not a defrost timer as the temperature control will initiate the off-cycle defrost during each refrigeration cycle.
   a. At this time, the compressor will and the evaporator fan(s) may turn off. Defrost heaters are not installed on refrigerators and therefore will not be energized.
   b. After the evaporator coil temperature has been reached, as determined by the temperature control, the compressor will restart.
5. There may be a timer located on the condensing unit base. This timer is not used for a defrost event. The timer will change the rotation of the reversing condenser fan motor.

MECHANICAL TEMPERATURE CONTROLS

MECHANICAL CONTROL FREEZER GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Interior lights will illuminate on glass door models only. If lights do not come on, verify the light switch is in the "ON" position. Solid door cabinets may or may not have lights that may be controlled by the door switch.
2. The compressor only will start if the temperature control is calling for cooling. (If the compressor does not start, verify that the temperature control is not in the "OFF" or "0" position or the cabinet is not in a defrost event.)
   a. The evaporator fan(s) will remain off until a specific temperature of the evaporator coil is reached.
3. The temperature control may cycle the compressor and evaporator fan(s) on and off together.
   a. The temperature control is sensing the air temperature.
   b. The temperature control should be set on the #4 or #5.
   c. The warmest setting is #1, the coldest is #9, and #0 is the off position.
   d. The thermometer is designed to read and display a cabinet temperature not a product temperature. The thermometer may reflect the refrigeration cycle swings of up and down temperatures. The most accurate temperature on a cabinet's operation is to verify the product temperature.
4. The defrost timer will initiate defrost during specific times of day.
   a. At this time, the compressor and evaporator fan(s) will turn off and the evaporator coil heater and drain tube heater will be energized. Some cabinets may also change the rotation of the reversing condenser fan motor.
   b. After the predetermined evaporator coil temperature has been reached or duration for defrost has expired, the compressor will restart and the evaporator fan(s) will remain off until a specific temperature of the evaporator coil is reached.

MECHANICAL CONTROL DELI DISPLAY GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Interior lights will illuminate. If lights do not come on verify the light switch is in the "ON" position.
2. a. The compressor and evaporator fans will start on a model TCGR if the temperature control is calling for cooling. (If the compressor does not start, verify that the temperature control is not in the "OFF" or "0" position.)
   b. The compressor will start on models TSID, TDBD, and TCGG if the temperature control is calling for cooling. (The above 3 models are a gravity style coil design and do not have an evaporator fan motor.)
3. The temperature control may cycle the compressor and evaporator fan(s) on and off together.
   a. The temperature control is sensing the evaporator coil temperature.
   b. The temperature control should be set on the #4 or #5.
   c. The warmest setting is #1, the coldest is #9, and #0 is the off position.
   d. The thermometer is designed to read and display a cabinet temperature not a product temperature. The thermometer may reflect the refrigeration cycle swings of up and down temperatures. The most accurate temperature on a cabinet's operation is to verify the product temperature.
4. There is not a defrost timer on a model TCGR as the temperature control will initiate the off-cycle defrost during each refrigeration cycle.
   a. At this time, the compressor will turn off. Defrost heaters are not installed on refrigerators and therefore will not be energized.
   b. After the evaporator coil temperature has been reached determined by the temperature control, the compressor will restart.

   The defrost timer will initiate defrost on models TSID, TDBD, and TCGG during specific times of day.
   a. At this time, the compressor will turn off. No heaters will be energized.
   b. After the predetermined duration has expired, the compressor will restart.

MECHANICAL TEMPERATURE CONTROLS

MECHANICAL CONTROL TFM/TDC/THDC GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
2. The compressor only will start if the temperature control is calling for cooling. (If the compressor does not start, verify that the temperature control is not in the "OFF" or "0" position.
3 The temperature control will cycle the compressor on and off.
   a. The temperature control is sensing the coil temperature.
   b. The temperature control should be set on the #4 or #5.
   c. The warmest setting is #1, the coldest is #9, and #0 is the off position.
   d. The thermometer is designed to read and display a cabinet temperature **not a product temperature.** The thermometer may reflect the refrigeration cycle swings of up and down temperatures. The most accurate temperature on a cabinet's operation is to verify the product temperature.
4. The control will not initiate defrost.
   a. The cabinet will need to be manually defrosted. The manual defrost frequency will depend on the unit's usage, environment and the amount of frost.

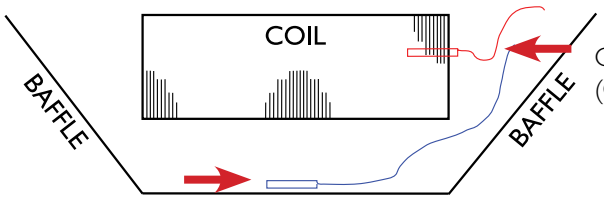
MECHANICAL CONTROL HEATED CABINET GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Interior lights will illuminate if the rocker switch on the outside panel is in the "ON" position.
2. The temperature control will energize the heat elements if the control is calling for heat.
3. The temperature control will cycle the heating elements on and off.
   a. The temperature control is sensing the air temperature.
   b. The temperature control should be set between 140°-180°.
   c. The temperature control has an "OFF" position.
   d. The thermometer is designed to read and display a cabinet temperature not a product temperature. This cabinet temperature may reflect the heating cycle determined by the temperature control. The most accurate temperature on a cabinets operation is to verify the product temperature.

MECHANICAL TEMPERATURE CONTROLS

White Wine: 45-50°F (8.2-10°C)
Red Wine / Chocolate: 50-55°F (10-12.8°C)

GDM / T-Series Coolers

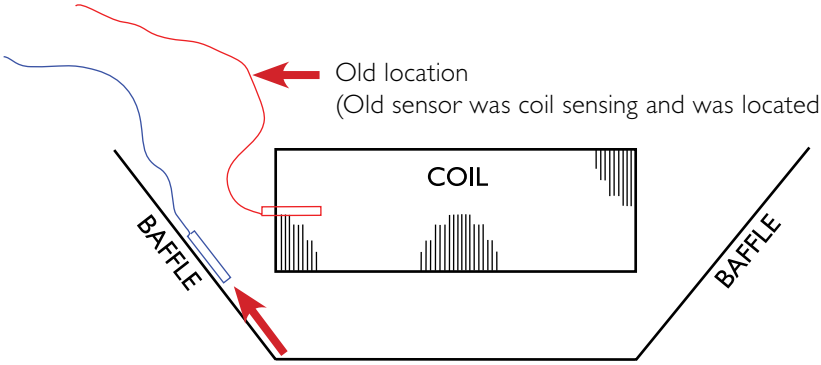


Old location
(Old sensor was coil sensing and was located in the coil).

Front of Cabinet

Temperature Control Pig Tail Install Here
(New sensor is air sensing and mounted in front of the coil).

TBB Units



Old location
(Old sensor was coil sensing and was located in the coil).

Front of Cabinet

Mount as close to the evaporator housing edge as possible.
Temperature Control Pig Tail Install Here
(New sensor is air sensing and mounted in front of the coil).

MECHANICAL TEMPERATURE CONTROLS

HOW TO DIAGNOSE

STEP 1 - Control must operate within its pre-calibrated range of temperatures.

STEP 2 - ***Cut-in*** is the **ON** temperature.

STEP 3 - ***Cut-out*** is the **OFF** temperature.

NOTE: All temps are at mid-point setting #5. All temps advised have a +/- 2 degree variance.

Information is provided to verify cut-in/cut-out range for diagnostic purposes only. True recommends replacing OEM control with the same part number.

OLD TRUE P/N	NEW TRUE P/N (KIT)	MFG P/N	APPLICATION	CUT-IN °F (C)	CUT-OUT °F (C)
800303		9531N376		35.0 (1.7)	14.5 (-9.7)
800304		9530N1490		-8.5 (-22.5)	-14.5 (-25.8)
800306		9531N251		40.0 (4.4)	19.0 (-7.2)
800312		9530N1284		-8.5 (-22.5)	-14.5 (-25.8)
800313		9531N335		36.5 (2.5)	16.0 (-8.9)
800320		9530N1185		32.5 (0.3)	26.5 (-3.1)
800325		9530N1318	RED WINE, CHOCOLATE	62.0 (16.7)	55.0 (12.8)
800335		9530N1376		38.0 (3.3)	20.0 (-6.7)
800340		9530N1155		26.1 (-3.3)	10.9 (-11.7)
800345	988271	077B1264		-2.6 (-19.4)	-15.5 (-26.6)
800357		9530266		-3.0 (-19.4)	-8.0 (-22.2)
800358		077B1214		-8.5 (-22.7)	-14.4 (-26.0)
800363		9530C311		-2.6 (-19.2)	-12.5 (-24.7)
800366	988282	077B6806		37 (2.8)	16.5 (-8.7)
800368	988285	077B6857		39.6 (4.3)	26.2 (-3.2)
800369	988266	077B1212		-2.6 (-19.4)	-12.3 (-24.8)
800370	988267	077B1216		-4.0 (-20-2)	-15.3 (-26.5)
800371	988286	077B6863		41.9 (5.5)	23.7 (-4.6)
800382	988284	077B6856		37.2 (2.9)	18.1 (-7.8)
800383	988268	077B1227		0.3 (-17.8)	-5.6 (-21.1)
800384	988270	077B1229		24.8 (-4.0)	18.7 (-7.4)
800385	988269	077B1228	WHITE WINE	44.2 (6.8)	34.7 (1.5)
800386	988287	077B6871		43.2 (6.3)	20.1 (-6.7)
800387	988288	077B6887	FLOWER COOLER	39.2 (4.0)	21.2 (-6.0)
800390		9530N1329	SUPER NOVA	13.1 (-10.5)	8.1 (-13.3)
800393	988283	077B6827		41.7 (5.4)	20.5 (-6.4)
800395		931N370	HIGH ALTITUDE	40.0 (4.4)	22.8 (-5.1)
800399		9530C304		0.4 (-17.6)	-5.4 (-20.8)
822212	988291	CAP-075-174R	HEATED	165.0 (73.9)	174.0 (78.9)
822213	988289	077B6894		37 (2.8)	21.6 (-5.8)
822214	988273	077B1309		32.0 (0.0)	17.9 (-7.9)
822223	988274	077B1331		25.7 (-3.5)	8.6 (-13.0)
831931	988272	077B1277		-2.0 (-19.0)	-9.0 (-23.0)
831932		3ART56VAA4		40.0 (4.4)	18.0 (-7.8)
831987	988265	077B0995	RED WINE, CHOCOLATE	57.2 (14.1)	49.6 (9.9)
908854	988290	077B6926		36.3 (2.4)	10.4 (-12.1)
908975	988275	077B1352		-12.1 (-24.7)	-25.1 (-32.0)
911427	988276	077B1354		37.6 (3.1)	26.2 (-3.2)
913382	988277	077B1367		-11.0 (-24.1)	-22.5 (-30.5)
917838	988278	077B1369		0.3 (-17.8)	-14.1 (-25.8)
930794	988279	091X9775		41.5 (5.3)	24.9 (-3.9)
933190	988280	077B3264		41.7 (5.4)	19.4 (-7.1)
942659	988281	077B3315		39.6 (4.3)	26.2 (-3.2)
952478		077B3347		43.2 (6.3)	20.1 (-6.7)
954800		077B3531		41.9 (5.5)	23.7 (-4.6)
958745		3ART55VAA4		39.2 (4.0)	17.6 (-8.0)
958747	988264	077B3548		37.2 (2.9)	18.1 (-7.8)
958857		3ART5VAA198		8.0 (-13.3)	-6.0 (-21.1)
959268	988294	3ART55VAA3		39.6 (4.2)	26.2 (-3.2)
960640	988296	3ART55VAA5		43.1 (6.2)	20.2 (-6.6)
962728		3ART55VAA6		41.8 (5.4)	20.4 (-6.4)
963056		3ART55VAA2		39.2 (4.0)	15.8 (-9.0)
All temps are at mid-point setting #5					
All temps advised have a +/- 1.8 to 2 degree variance depending upon control					

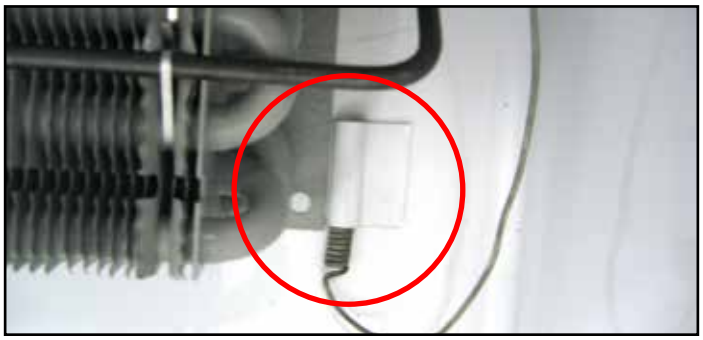
MECHANICAL TEMPERATURE CONTROLS

CHECKING THE CUT IN AND CUT OUT OF THE TEMPERATURE CONTROL

COIL SENSING

Example of checking coil temperature for a coil sensing thermostat. Position thermometer as close as possible to the control sleeve in the evaporator coil.

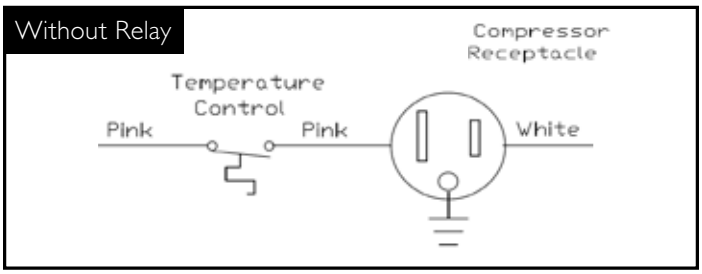
AIR SENSING

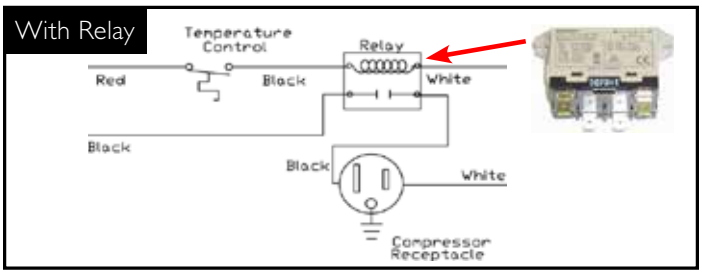


Example of checking air temperature for an air sensing thermostat. Position thermometer as close as possible to the "pig tail" at the end of the thermostat bulb.

CONDITIONS THAT COULD CAUSE A TEMPERATURE CONTROL MISDIAGNOSIS

- Dirty Condensing Coil
- Bad Door Gasket
- Poor Ventilation / High Ambient Conditions
- Refrigeration System Failure
- Temperature Control Relay





MECHANICAL TEMPERATURE CONTROLS

WHEN TO MAKE AN ADJUSTMENT TO A MECHANICAL TEMPERATURE CONTROL

We advise to make a mechanical temperature control adjustment only for a high altitude location.

HOW TO ADJUST A MECHANICAL TEMPERATURE CONTROL

GE TEMPERATURE CONTROL ADJUSTMENT FOR HIGH ALTITUDE APPLICATIONS:

REQUIRED TOOLS:

- Jewelers screwdriver (Small screwdriver)

GE CONTROL INSTRUCTIONS:

The scale to the right may be used as a guide for measuring degrees of rotation required for altitude correction. See Figure 1. The arrows indicate direction of screw rotation. Turn calibration screw clockwise to obtain warmer operating temperatures.

STEP 1 - Unplug cooler.

STEP 2 - Remove the screws that secure the temperature control to the inset box.

STEP 3 - To make these adjustments it may be necessary to remove the temperature control from the housing.

NOTE: You may have to remove the wires attached to the control. Take note as to which wire is on which spade terminal.

STEP 4 - Pull out gently from cabinet.

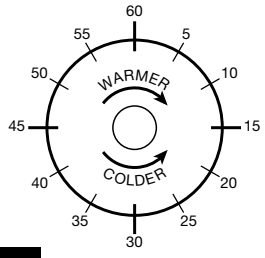
STEP 5 Each 1/4 turn of the calibration screw is equal to approximately 2 degrees F (1.1 degree C). Do not make more than 3/4 turn. After making adjustment, measure temperature during three cycles before adjusting again.

NOTE: Only adjust the screw (small flathead) on the face of the control (next to the cam). See Figure 3.

STEP 6 - Make sure to reconnect the wires to the proper spade terminal when reinstalling.

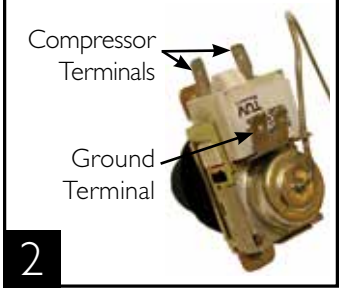
Follow the Altitude Correction Table to the right.

Scale Guide for Measuring



1

Back of Temperature Control



2

Altitude Correction

Front of Temperature Control

To adjust the temperature control take the control knob off to view the cut-in screw. (See Photo Above)

3

ALTITUDE CORRECTION TABLE: CALIBRATION SCREW ADJUSTS BOTH CUT-IN AND CUT-OUT

Altitude (Feet / Meters)	Clockwise Turns
2000 / 610	7/60
3000 / 914	11/60
4000 / 1219	15/60
5000 / 1524	19/60
6000 / 1829	23/60
7000 / 2134	27/60
8000 / 2438	30/60
9000 / 2743	34/60
10,000 / 3048	37/60

MECHANICAL TEMPERATURE CONTROLS

DANFOSS TEMPERATURE CONTROL ADJUSTMENT FOR HIGH ALTITUDE APPLICATIONS:

REQUIRED TOOLS:

- Allen Wrench (5/64")
- Torx Screw (T-7)

TERMS:

Cut-out - Temperature sensed by the controller that shuts the compressor off.

Cut-in - Temperature sensed by the controller that turns the compressor on.

STEP 1 - Unplug cooler.

STEP 2 - Remove the screws that secure the temperature control to the inset box.

STEP 3 - To make these adjustments it may be necessary to remove the temperature control from the housing.

NOTE: You may have to remove the wires attached to the control. Take note as to which wire is on which spade terminal.

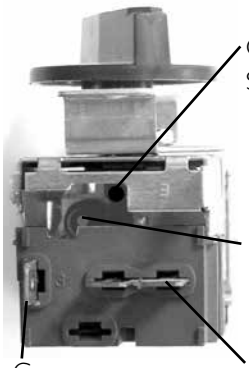
STEP 4 - Pull out gently from cabinet.

NOTE: Mechanical temperature controllers are affected when functioning at high altitude. The cut-in and cut-out temperatures will be colder than when the controller functions closer to sea level.

STEP 5 - For high elevation installations, it may be necessary to "warm-up" the set points. To make the adjustment, insert the appropriate tool in each adjustment screw and turn 1/4 of a revolution clockwise (to the right). This procedure will adjust both the cut-in and cut-out about 2°F warmer. (1.1 °C) Do not turn more than one (1) full turn.

STEP 6 - Make sure to reconnect the wires to the proper spade terminal when reinstalling.

Bottom of Temperature Control



ELECTRONIC TEMPERATURE CONTROLS

DIXELL

DIXELL ELECTRONIC TEMPERATURE CONTROL GENERAL SEQUENCE OF OPERATION
USING THE DIXELL ELECTRONIC CONTROL

LAE

LAE ELECTRONIC TEMPERATURE CONTROL GENERAL SEQUENCE OF OPERATION
USING THE LAE ELECTRONIC CONTROL

DANFOSS

DANFOSS ELECTRONIC TEMPERATURE CONTROL GENERAL SEQUENCE OF OPERATION
USING THE DANFOSS ELECTRONIC CONTROL

SOLLATEK

SOLLATEK ELECTRONIC TEMPERATURE CONTROL GENERAL SEQUENCE OF OPERATION
USING THE SOLLATEK ELECTRONIC CONTROL

DIXELL ELECTRONIC TEMPERATURE CONTROL

Control version will vary with model and age of cabinet.

DIXELL:
p1 = Thermostat
p2 = Defrost
p3 = Display

p3 probe is not installed and / or activated in all applications. If p3 is not installed and / or activated, the display probe is p1.

DIXELL PROBES:

DIXELL ELECTRONIC TEMPERATURE CONTROL

DIXELL ELECTRONIC CONTROL GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Display will illuminate.
   b. Interior lights will illuminate on Glass Door Models only. If lights do not come on verify the light switch is in the "ON" position. Solid door cabinets may or may not have lights that may be controlled by the door switch.
   c. Evaporator motors will come on (refrigerator only).

2. After the Dixell control preprogrammed time delay of 3-5 minutes, the compressor and freezer evaporator fan(s) will start if the control is calling for cooling.

3. The Dixell control will cycle the compressor but may also cycle the evaporator fan(s) on and off determined by the Set-Point and Differential temperatures.
   a. The Set-Point is the **adjustable** preprogrammed temperature which shuts off the compressor and evaporator fan(s). This is not the programmed cabinet temperature.
   b. The Differential is the **non adjustable** preprogrammed temperature that is added to the Set-Point temperature that will start the compressor and evaporator fan(s).
   c. The Dixell control is designed to read and display a cabinet temperature **not a product temperature.** This cabinet temperature may reflect the refrigeration cycle of the Set-Point and it's Differential. The most accurate temperature on a cabinets operation is to verify the product temperature.

Example: If the Set-Point is 33°F/1°C and the Differential is 8°F/4°C

(Set-Point) 33°F + 8 (Differential) = 41°F

Or

(Set-Point) 1°C + 4 (Differential) = 5°C

The compressor will cycle off 33°F/1°C and back on at 41°F/5°C

4. The Dixell control may be preprogrammed to initiate defrost at specific intervals that start when the cabinet is plugged in.
   a. At this time the "dEF" may appear on the display and compressor will turn off until a preprogrammed temperature or duration is reached. During this time, for freezers only, evaporator fan(s) will also turn off and the coil heater and drain tube heaters will also be energized. Some cabinets may also change the rotation of the reversing condenser fan motor.
   b. After the preprogrammed temperature has been reached or duration for defrost has expired, there may be a short delay for both the compressor and evaporator fans to restart. At this time "dEF" may still appear on the display for a short time.

DIXELL ELECTRONIC TEMPERATURE CONTROL

HOW TO LOCK / UNLOCK THE KEYS:

USING THE DIXELL ELECTRONIC CONTROL:

May need to unlock control.

STEP 1 - Press the **(UP)** and **(DOWN)** keys at the same time for more than (3) seconds.

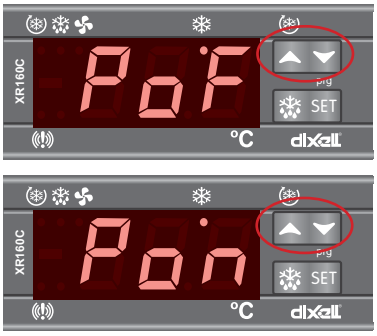
STEP 2 - The "POF" message will be displayed if the keyboard is locked. At this point, it is only possible to view the set point, MAXIMUM / MINIMUM temperature stored.

STEP 3 - To unlock the keyboard, press the **(UP)** and **(DOWN)** keys at the same time for more than (3) seconds. The "Pon" message will be displayed.

Dixell Control XW60VS

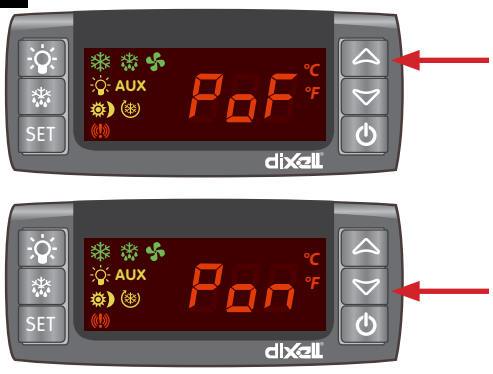
1

Dixell XR160C



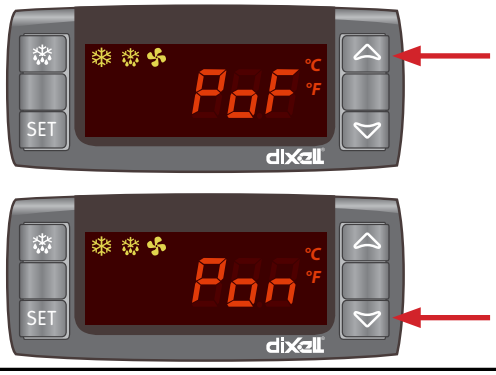
2

Dixell XR70CX



3

Dixell XR02CX / XR06CX



4

DIXELL ELECTRONIC TEMPERATURE CONTROL

HOW TO SEE AND MODIFY THE SET POINT:

THE SET POINT IS WHERE THE COMPRESSOR WILL SHUT OFF.

May need to unlock control.

STEP 1 - Model XW60VS only push and immediately release the (SET) key. All other models push and hold the (SET) key: The display will show the (SET) point value.

STEP 2 - The (SET LED) will start blinking.

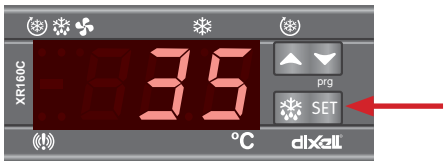
STEP 3 - To change the (SET) value, push the (UP) or (DOWN) arrows within (10) seconds.

STEP 4 - To memorize the new set point value, push the (SET) key again or wait (10) seconds.

Dixell Control XW60VS

1

Dixell XR160C



2

Dixell XR70CX

3

Dixell XR02CX / XR06CX

4

DIXELL ELECTRONIC TEMPERATURE CONTROL

HOW TO SEE "LOD" LOCAL DISPLAY:

THE LOCAL DISPLAY SHOWS WHICH PROBE IS READING.

May need to unlock control.

STEP 1 - Press and hold the (SET) and (DOWN) arrows at the same time for (7-12) seconds.

STEP 2 - You should then see (HY).

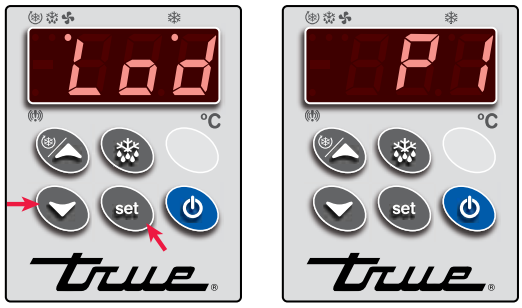
STEP 3 - Release the keys.

STEP 4 - Press the down arrow until you see the letters (LOD), (LD) for models XRO2CX and XRO6CX.

STEP 5 - Press the (SET) button. You should see P1, P2, P3. This is the probe used for the display. (All probes may not be used in some applications). To change, press the (UP / DOWN) arrow to set a new number and then push the (SET) button to save these changes.

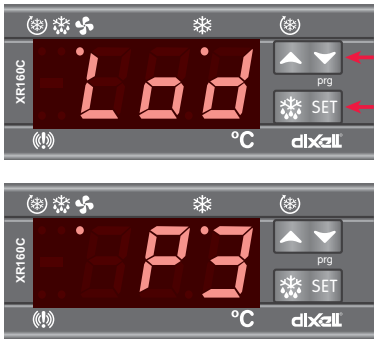
Wait 10 seconds for control to display temperature.

Dixell Control XW60VS



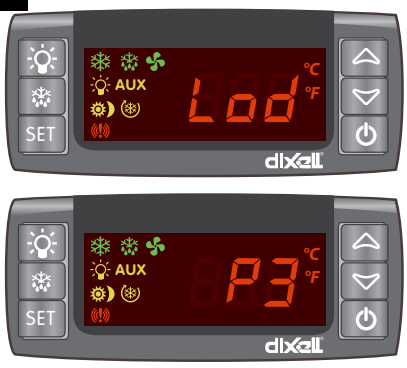
1

Dixell XR160C



2

Dixell XR70CX



3

Dixell XR02CX / XR06CX

4

DIXELL ELECTRONIC TEMPERATURE CONTROL

HOW TO SEE "idF" INTERVAL BETWEEN DEFROST:

THE INTERVAL BETWEEN DEFROST TERMINATION IS THE TIME BETWEEN EACH DEFROST CYCLE.

May need to unlock control.

NOTE: This interval is started when the cabinet is plugged in or after initiate of manual defrost.

STEP 1 - Press and hold the (SET) and (DOWN) arrows at the same time for (7-12) seconds.

STEP 2 - You should then see (HY).

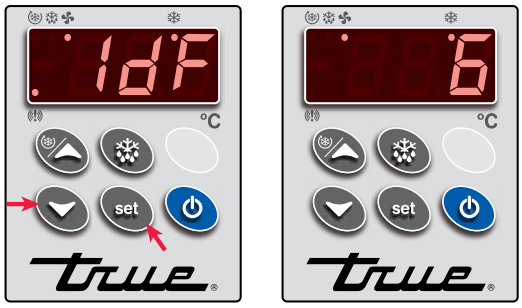
STEP 3 - Release the keys.

STEP 4 - Press the down arrow until you see the letters "idF", "id" for models XRO2CX and XRO6CX.

STEP 5 - Press the (SET) button. You should see the number 6. This is time in hours between each defrost cycle. To change, press the (UP / DOWN) arrow to set a new number and then push the (SET) button to save these changes. Wait 10 seconds for control to display temperature.

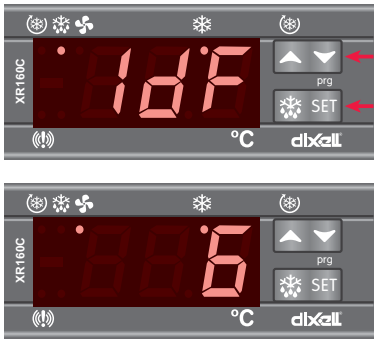
NOTE: The interval between defrost termination is the time between each defrost cycle.

Dixell Control XW60VS



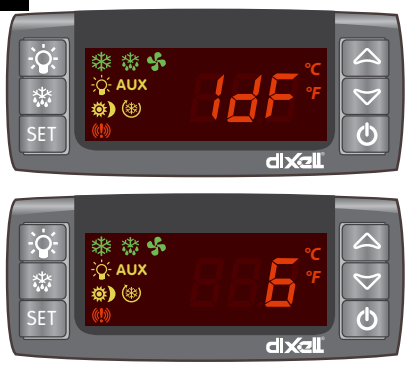
1

Dixell XR160C



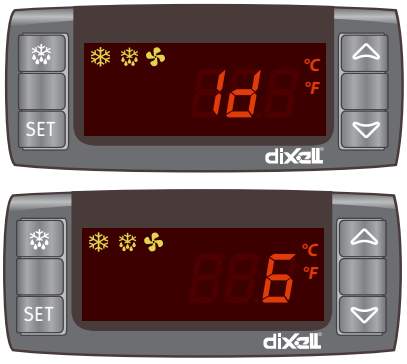
2

Dixell XR70CX



3

Dixell XR02CX / XR06CX



4

DIXELL ELECTRONIC TEMPERATURE CONTROL

HOW TO START A MANUAL DEFROST:

May need to unlock control.

STEP 1 - Push the **(DEFROST)** key for more than (2) seconds and a manual defrost will start.

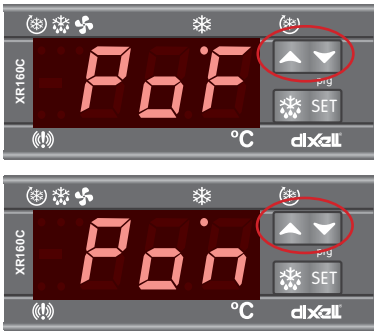
The "dEF" message will be displayed.

NOTE: Defrost will only terminate once a specific preset temperature or a preset time duration is reached.

Dixell Control XW60VS

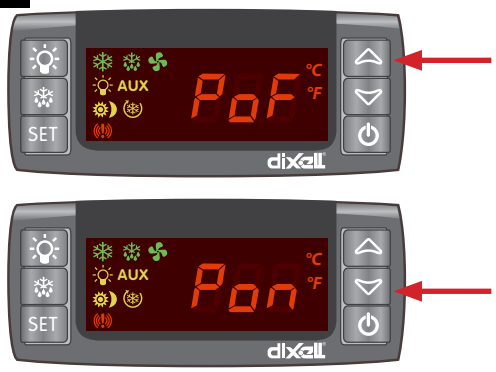
1

Dixell XR160C



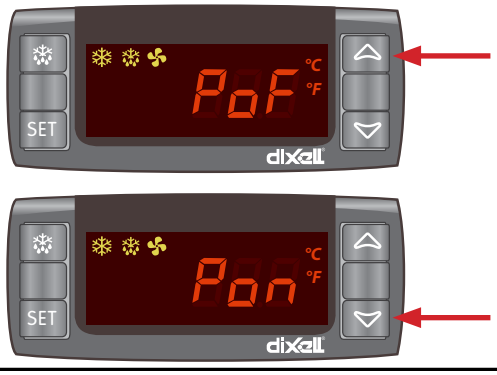
2

Dixell XR70CX



3

Dixell XR02CX / XR06CX



4

DIXELL ELECTRONIC TEMPERATURE CONTROL

HOW TO DOWNLOAD THE CONTROL PARAMETER:BETWEEN DEFROST:

THE PROGRAM PARAMETERS CAN BE DOWNLOADED BY THE USE OF A "HOT KEY."

May need to unlock control.

NOTE: These parameters will vary from model to model.

STEP 1 - Turn controller in the off position or unplug cabinet.

STEP 2 - Insert "Hot Key" into the back of the controller.

STEP 3 - Turn on controller or plug in cabinet.

STEP 4 - "Hot Key" will download automatically once download is complete. Remove "Hot Key".

Dixell Control XW60VS

Example of hot key port location shown on model XW60VS. All models use a similar port location.

DIXELL CONTROL ALARM CODES

ALARM SIGNALS

MESSAGE	CAUSE
"P1"	Thermostat probe failure
"P2"	Evaporator probe failure
"P3"	Auxiliary probe failure
"HA"	Maximum temperature alarm
"LA"	Minimum temperature alarm
"EE"	Data or memory failure
"dA"	Door switch alarm
"EAL"	External alarm
"BAL"	Serious external alarm
"PAL"	Pressure switch alarm

NOTE: To silence alarm, press any button on keypad.

DIXELL ELECTRONIC TEMPERATURE CONTROL

DIXELL CONTROLLER PARAMETER LIST ORDER

XW60VS
Hy
LS
US
odS
Ac
cct
con
coF
cF
rES
Lod
tdF
EdF
SdF
dtE
idF
MdF
dFd
dAd
dSd
Fdt
dPo
dAF
Fnc
Fnd
FSt
ALc
ALU
ALL
ALd
dAo
EdA
doA
ot
oE
o3
P2P
P3P
Odc
i2P
i2F
dId
Adr
Pbc
rEL
Ptb
Prd
Set

XR160C	
Hy	ot
LS	oE
US	o3
odS	P2P
Ac	P3P
cct	Pbr
con	HES
coF	Odc
cF	i1P
rES	i2P
Lod	i2F
tdF	dId
EdF	Adr
SdF	Pbc
dtE	onF
idF	rEL
MdF	Ptb
dFd	Prd
dAd	SEt
Fdt	
dPo	
dAF	
Fnc	
Fnd	
FSt	
ALc	
ALU	
ALL	
AFH	
ALd	
dAo	
EdA	
dot	
doA	
nPS	

XR02CX
SEt
Hy
LS
US
ot
P2
oE
od
AC
Cy
Cn
CF
rE
Ld
dy
dE
id
Md
dF
AU
AL
Ad
dA
tb
d2
Pt
rL

XR06CX
SEt
Hy
LS
US
ot
P2
oE
od
AC
Cy
Cn
CF
rE
Ld
dy
td
dE
id
Md
dd
dF
dt
dP
FC
Fd
FS
AU
AL
Ad
dA
iP
iF
di
dC
rd
Pt
rL

XR70CX	
SEt	ALC
Hy	ALU
LS	ALL
US	AFH
ot	ALd
P2P	dAo
oE	AP2
P3P	AL2
o3	AU2
P4P	AH2
o4	Ad2
odS	dA2
AC	bLL
rtr	AC2
CCt	tbA
CCS	oA3
Con	AOP
CoF	iIP
CF	iIF
rES	did
Lod	nPS
dLy	OdC
dtr	rrd
tdF	HES
dFP	Adr
dtE	PbC
idF	OnF
MdF	dPI
dSd	dP2
dFd	dP3
dAd	dP4
Fdt	rSE
dPo	rEL
dAF	Ptb
FnC	
Fnd	
FCt	
FSt	
Fon	
FoF	
FAP	

Per our design or control version, all Parameters may or may not be displayed.

DIXELL ELECTRONIC TEMPERATURE CONTROL

DIXELL NTC PROBES

p1 - Thermostat
p2 - Defrost
p3 - Display

Checking the probe resistance.

• Verify the probe resistance is accurate at the probe location.

• Use a calibrated thermometer to check the probe location temperature (coil or air temperature).

• Disconnect the probe from the controller. The probe cannot be plugged into the controller when measuring resistance.

• Use a calibrated Ohm meter to measure the resistance of the probe

• The resistance of the probe should match the associated temperature from the above table.

• Fill a cup full of ice water (use a lot of ice). Put the probe into the ice bath, stir for 1 minute, then measure the resistance with a calibrated Ohm meter. Make sure to keep the probe in the center of the cup.

• The resistance of the probe should match the associated temperature at 32°F / 0°C degrees as shown in the above table.

Checking the controller display temperature accuracy.

• After verifying the probe resistance to the box temperature, plug the probe into the controller and check the temperature display.

• The controller should display the associated temperature from the above table

• Fill a cup full of ice water (use a lot of ice). Put the Ohm verified probe in to the ice bath, stir for 1 minute. Make sure to keep the probe in the center of the cup.

• The controller should display 32°F / 0°C.

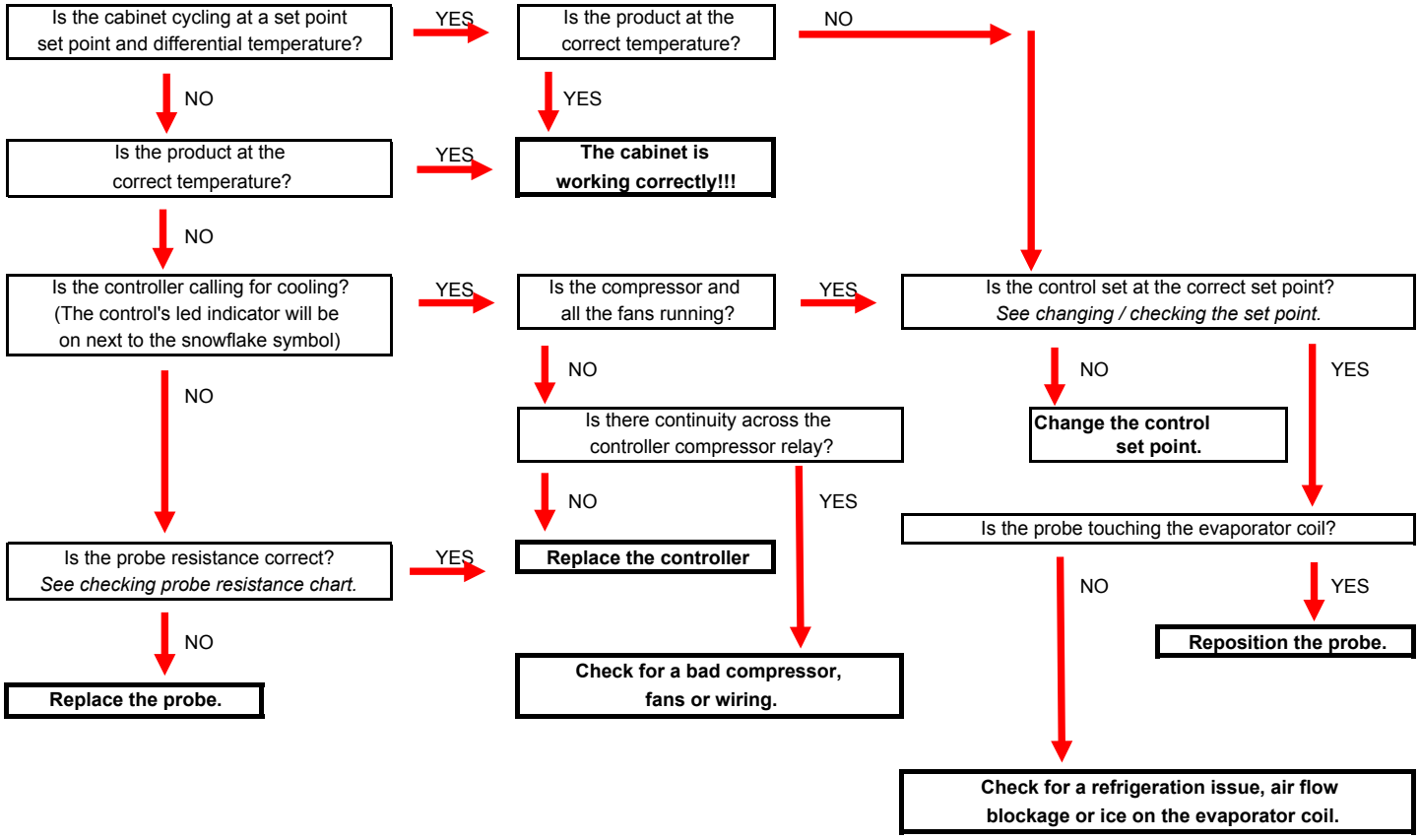
Dixell Probe Temperature to Resistance Chart		
Temperature		Resistance
C	F	K-ohm
-50	-58	329.50
-45	-50	247.70
-40	-40	188.50
-35	-31	144.10
-30	-22	111.30
-25	-12.5	86.43
-20	-4	66.77
-15	5	53.41
-10	14	42.47
-5	23	33.90
0	32	27.28
5	41	22.05
10	50	17.96
15	59	14.69
20	68	12.09
25	77	10.00
30	86	8.31
35	95	6.94
40	104	5.83
45	113	4.91
50	122	4.16
55	131	3.54
60	140	3.02
65	149	2.59
70	158	2.23
75	167	1.92
80	176	1.67
85	185	1.45
90	194	1.27
95	203	1.11
100	212	0.97
105	221	0.86
110	230	0.76
		0.53

DIXELL ELECTRONIC TEMPERATURE CONTROL

DIAGNOSTIC FLOW CHART FOR DIXELL AND LAE ELECTRONIC CONTROLS

Concern: Electronic Control Display Temperature does not match the cabinet temperature

NOTE: The temperatures may reflect the refrigeration cycle determined by a set point and differential or it may show an average temperature.
The temperatures are also effected by a defrost cycle and the open and closing of the door.
The most accurate temperature on a cabinets operation is to verify the product temperature.



LAE ELECTRONIC TEMPERATURE CONTROLS

Control version will vary with model and age of cabinet.

LAE:
t1 = Thermostat
t2 = Defrost
t3 = Display

t3 probe is not installed and / or activated in all applications if t3 is not installed and / or activated, the display probe is t1.

LAE CURRENT PROBES:
GRAY- Thermostat
BLUE - Defrost
YELLOW - Display

LAE PRIOR PROBES:
Probes are identical.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE ELECTRONIC CONTROL GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Display will illuminate.
   b. Interior light will illuminate on Glass Door Models only. Solid door cabinet lights are controlled by the door switch.
2. After the LAE control preprogrammed time delay of up to 6 minutes, the compressor and evaporator fan(s) will start if the control is calling for cooling.
   a. Control or condenser fans may be already pre-programmed from the factory so at the start of every compressor cycle or during a defrost cycle, the condenser fan(s) will reverse for 30 seconds to blow dirt off the condensing coil.
3. The LAE control will cycle the compressor but may also cycle evaporator fan(s) on and off determined by the Set-Point and Differential temperatures.
   a. The Set-Point is the adjustable preprogrammed temperature.
   b. The Differential is the non adjustable preprogrammed temperature.
   c. The LAE control is designed to read and display a cabinet temperature **not a product temperature**.
   This cabinet temperature may reflect the refrigeration cycle of the Set-Point and its Differential, or it may show an average temperature.
   The most accurate temperature on a cabinets operation is to verify the product temperature.

Example: If the Set-Point is -9°F/-23°C and the Differential is 10°F/5°C

(Set-Point) -9°F + 10 (Differential) = 1°F
Or
(Set-Point) -23°C + 5 (Differential) = -18°C

The compressor and evaporator fan(s) will cycle off -9°F/-23°C and back on at 1°F/-18°C

4. The LAE control may be preprogrammed to initiate defrost by interval or at specific times of day.
   a. At this time the "dEF" will appear on the display and compressor will turn off until a preprogrammed temperature or duration is reached. During this time for freezers only, evaporator fan(s) will also turn off and the coil heater and drain tube heaters will also be energized. Some cabinets may also change the rotation of the reversing condenser fan motor.
   b. After the preprogrammed temperature or duration for defrost has been reached there may be a short delay for both the compressor and evaporator fans to restart. At this time "dEF" may still appear on the display for a short time.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE MODEL TMW ELECTRONIC CONTROL GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Display will illuminate.
2. After the LAE control preprogrammed time delay of up to 6 minutes, the compressor will start if the control is calling for cooling.
   a. Control may be already preprogrammed from the factory so at the start of every compressor cycle, the condenser fan(s) will reverse for 30 seconds to blow dirt off the condensing coil.
3. The LAE control will cycle the compressor on and off determined by the Set-Point and Differential temperatures.
   a. The Set-Point is the adjustable preprogrammed temperature.
   b. The Differential is the non adjustable preprogrammed temperature.
   c. The LAE control is designed to read and display a cabinet temperature **not a product temperature**. This cabinet temperature may reflect the refrigeration cycle of the Set-Point and it's Differential, or it may show an average temperature. The most accurate temperature on a cabinets operation is to verify the product temperature.

Example: If the Set-Point is -9°F/-23°C and the Differential is 10°F/5°C

(Set-Point) -9°F + 10 (Differential) = 1°F
Or
(Set-Point) -23°C + 5 (Differential) = -18°C

The compressor will cycle off -9°F/-23°C and back on at 1°F/-18°C

4. The LAE control is not and cannot be preprogrammed to initiate defrost, only refrigeration.
   a. The cabinet will need to be manually defrosted. Unplug the cabinet or turn the LAE control to "OFF" per LAE instruction sheet. The manual defrost frequency will depend on the units usage, environment, and the amount of frost.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE MODEL HEATED CABINET ELECTRONIC CONTROL GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Display will illuminate.
2. The LAE control will energize the heat elements if the control is calling for heat.
3. The LAE control will cycle the heating elements on and off determined by the Set-Point and Differential temperatures.
   a. The Set-Point is the adjustable preprogrammed temperature.
   b. The Differential is the non adjustable preprogrammed temperature.
   c. The LAE control is designed to read and display a cabinet temperature not a product temperature. This cabinet temperature may reflect the heating cycle of the Set-Point and it's Differential. The most accurate temperature on a cabinets operation is to verify the product temperature.

Example: If the Set-Point is 180°F/82.2°C and the Differential is 1°F/.56°C

(Set-Point) 180°F + 1 (Differential) = 181°F
Or
(Set-Point) 82.2°C + .56 (Differential) = 82.76°C

The heating elements will cycle on 180°F/82.2°C and back off at 181°F/82.76°C

LAE ELECTRONIC TEMPERATURE CONTROLS

PRODUCT ADVISEMENT

DETERMINING THE TYPE OF ELECTRONIC CONTROL DISPLAY

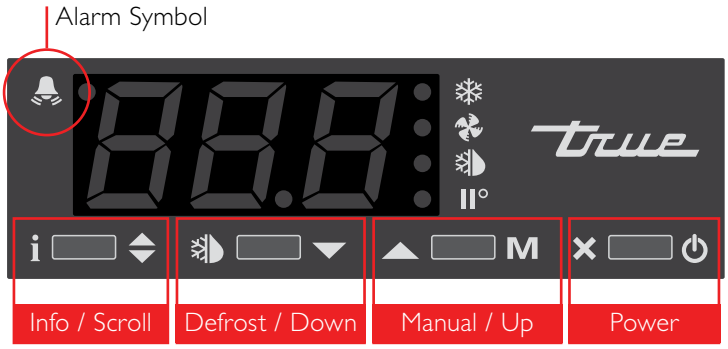
Reason for Advisement

Both Danfoss and LAE electroinc controls utilize similar digital displays.

To provide the visual differences and operations between the displays used for the LAE Electronic Control and the Danfoss Electronic control

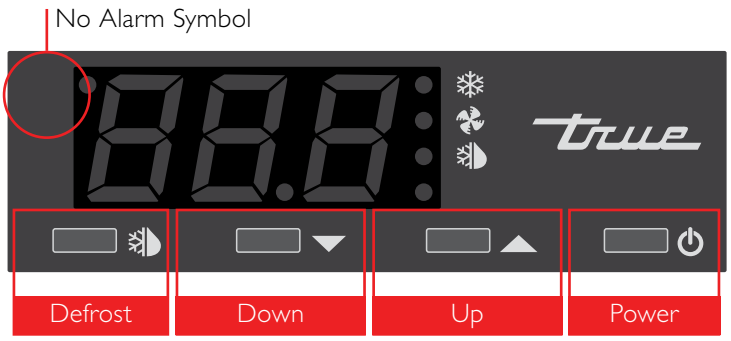
NOTE: Displays do not interchange with each other due to wiring and programming limitations.

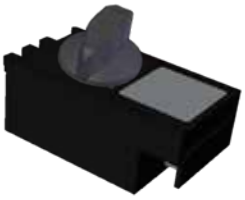
DISPLAY FOR LAE CONTROL



LAE electronic control board

DISPLAY FOR DANFOSS CONTROL





Danfoss electronic control board

Previous Danfoss display

LAE ELECTRONIC TEMPERATURE CONTROLS

HOW TO USE AN LAE ELECTRONIC CONTROL

LAE Control

Info / Set Point Button

Manual Defrost / Down Button

Manual Activation Up Button

Stand-By Button

LAE Control Icons

- Compressor Running
- Evaporator Fan Running
- Cabinet in Defrost
- Activation of 2nd Parameter Set
- Alarm

HOW TO LOCK AND UNLOCK LAE CONTROLLER:

LOCKING AND UNLOCKING THE LAE CONTROLLER:

WHY: Locking of control is necessary to prevent changes to program that may affect cabinet operation.

STEP 1 - To change lock setting press and release the Info button [i]. "t1" will appear. See image 1.

STEP 2 - Press the Down button [▼] until "Loc" appears. See image 2.

STEP 3 - While pressing and holding the Info button [i] press the Up [▲M] or Down [▼] button to change the lock settings. If "no" appears, the controller is unlocked. If "yes" appears, the controller is locked. See images 3 and 4.

STEP 4 - Once the lock setting has been set correctly release the info button [i]. Wait 5 seconds for the display to show temperature. See image 5.

Image 3: If "no" appears on screen, the controller is unlocked.

Image 4: If "yes" appears on screen, the controller is locked.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE Control

Info / Set Point Button

Manual Defrost / Down Button

Manual Activation Up Button

Stand-By Button

HOW TO TURN OFF THE LAE ELECTRONIC CONTROL:

TURN OFF THE LAE ELECTRONIC CONTROL:
May need to unlock control.

WHY: Turning off the control will deactivate all electrical components.

CAUTION: Turning off the control will not shut off power to the cabinet. Cabinet must be unplugged prior to any repair.

STEP 1 - To turn off control, press and hold the Stand-by button (x⏻) until "OFF" appears. Release Stand-by button. See Image 2.

STEP 2 - To turn on control, repeat prior steps and a temperature will appear.

HOW TO TURN THE LIGHTS ON AND OFF:

TURN THE LIGHTS ON AND OFF:
May need to unlock control.

WHY: Light may be controlled by LAE Controller or interior light switch.

STEP 1 - To control interior / sign lights by the LAE Controller, press and release the Manual Activation button (▲M).

STEP 2 - To control interior / sign lights by the interior door switch, depress the rocker switch to the "ON" position. Light switch is located on inside top right of the ceiling.

NOTE: Not all moels have an interior light switch. Location of interior light switch will vary by model. Example shown is an interior switch on an Upright Glass Door cabinet.

ON Position

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE Control

Info / Set Point Button

Manual Defrost / Down Button

Manual Activation Up Button

Stand-By Button

HOW TO CHANGE THE "SET POINT":

CHANGING THE "SET POINT":

May need to unlock control.

WHY: To make an adjustment to the product/cabinet temperature.

NOTE: The electronic control *CANNOT* convert a Freezer to a Refrigerator or a Refrigerator to a Freezer.

STEP 1 - To see the set point, press and hold the Info button. See image 1.

STEP 2 - While still holding the Info button, press the Up or Down button to change the "set point".

STEP 3 - Once the "set point" has been set correctly release the Info button. The display will show temperature. See image 2.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE Control

Info / Set Point Button

Manual Defrost / Down Button

Manual Activation Up Button

Stand-By Button

HOW TO INITIATE A MANUAL DEFROST:

INITIATE A MANUAL DEFROST:

May need to unlock control.

WHY: A one time additional defrost may be necessary to clear accumulated frost / ice from evaporator coil.

The method to initiate a manual defrost is determined by the Defrost Mode Parameter "DFM" preprogrammed in the controller.

REGULAR TIME DEFROST (TIM)

If controller is preprogrammed for "TIM", press and release the Manual Defrost button until "dEF" appears.

REAL TIME CLOCK (RTC)

If controller is preprogrammed for "RTC" press the and hold the Manual Defrost button for 5 seconds until "dh1" appears. Release the Manual Defrost button and then press and hold for an additional 5 seconds until "dEF" appears.

NOTE: Defrost will only terminate once a specific preset temperature or a preset time duration is reached.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE Control

Info / Set Point Button

Manual Defrost / Down Button

Manual Activation Up Button

Stand-By Button

HOW TO CHANGE "DEFROST INTERVALS":

CHANGING "DEFROST INTERVALS":

May need to unlock control.

This can only be changed if defrost mode parameter "DFM" is set for "TIM".

WHY: The defrost interval is the time duration between defrost cycles. The defrost interval time starts when the cabinet is supplied power or after a manual defrost.

STEP 1 - To see the set point, press and hold the Info button [i] and the Stand-by button [⏻] at the same time.

NOTE: Depending on the version of control, one of three parameters will appear: "ScL" image 1a, "SPL" image 1b, "MdL" image 1c.

STEP 2 - Push the Up button [▲M] until "dFt" appears. See image 2.

STEP 3 - Press and hold the Info button [i] to see the defrost interval time. See image 3

STEP 4 - While pressing and holding the Info button [i], press the Up [▲M] or Down [❄▼] button to change the defrost interval times (higher the number the less frequent the cabinet will defrost).

STEP 5 - Once the defrost interval time has been changed, release the Info button [i].

STEP 6 - Wait 30 seconds for the display to show temperature. See image 4.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE Control

Info / Set Point Button

Manual Defrost / Down Button

Manual Activation Up Button

Stand-By Button

HOW TO CHANGE DISPLAY READOUT FROM FAHRENHEIT TO CELSIUS:

CHANGE DISPLAY READOUT FROM FAHRENHEIT TO CELSIUS:

May need to unlock control.

This can NOT be changed with the LAE model AR2-28 version of the control.
See page 32 for more information.

WHY: Changing readout will assist with customer application.

STEP 1 - To change the display, press and hold the Info button [i] and the Stand-by button [⏻] at the same time. "MdL" or "SPL" will appear.
See images 1a and 1b.

STEP 2 - Push the Down button [▼] until "ScL" appears. See image 2.

STEP 3 - Press and hold the Info button [i] to see the "readout scale". See image 3.

STEP 4 - While pressing and holding the Info button [i], press the up [▲M] or down [▼] button to change the "readout scale".
See image 4.

STEP 5 - Once the "readout scale" has been changed, release the info button [i].

STEP 6 - Wait 30 seconds for the display to show temperature.
See image 5.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE Control

Info / Set Point Button

Manual Defrost / Down Button

Manual Activation Up Button

Stand-By Button

HOW TO DISPLAY PROBE TEMPERATURES:

DISPLAYING TEMPERATURE PROBES, T1, T2, T3:

WHY: To display temperature probe readings in different locations of the cabinet.

Also, display may show an average cabinet temperature and not a specific probe temperature.

STEP 1 - To display T1 temperature, press and release the info button. "t1" will appear. See image 1.

STEP 2 - Press and hold the info button. This is the temperature of the T1 Probe. See image 2.

STEP 3 - By releasing the info button, "t2" will appear. Press and hold the info button to display the temperature of the T2 probe.

STEP 4 - By releasing the info button again, "t3" will appear. Press and hold the info button to display the temperature of the T3 probe. (If probe T3 is not activated, "t3" will not appear of the display.)

DISPLAY CODES

	DISPLAY		
dEF	Defrost in progress	hi	Room high temperature alarm
oFF	Controller in stand-by	Lo	Room low temperature alarm
do	Door open alarm	E1	Probe T1 failure
t1	Instant Probe 1 temperature	E2	Probe T2 failure
t2	Instant Probe 2 temperature	E3	Probe T3 failure
t3	Instant Probe 3 temperature	th1	Maximum probe 1 temperature recorded
min	Minutes of the Real Time Clock	tLo	Minimum probe 1 temperature recorded
hrS	Hours of the Real Time Clock	Loc	Keypad state lock

LAE ELECTRONIC TEMPERATURE CONTROLS

INSTRUCTIONS FOR SETTING THE OPTIONAL TEMPERATURE ALARM RANGES ON THE ELECTRONIC CONTROL (CONTINUED)

THE DISPLAY WILL READ AN INTERIOR CABINET TEMPERATURE DURING NORMAL OPERATION.

INFO BUTTON

DOWN BUTTON

UP BUTTON

POWER BUTTON

WHY DO WE LOCK THE CONTROL?

The control is locked to prevent unnecessary changes to the program that may affect cabinet operation.

HOW DO WE UNLOCK THE CONTROL?

STEP 1: With the display showing temperature, press and release the info button [i] until "t1" appears.

STEP 2: With the display showing "t1", press and release the down button until "loc" appears. "loc" is the parameter to lock and unlock.

STEP 3: With the display showing "loc", press and hold the info button [i] until "yes" appears. "yes" shows the control is locked out.

Continue holding the info button.

NOTE: Holding the info button [i] allows the parameter to be displayed and then changed.

STEP 4: With the display showing "yes", and while still holding the info button [i] press and release the down button until "no" appears. "no" shows the control is unlocked.

Release all buttons.

THE CONTROL IS NOW UNLOCKED.

LAE ELECTRONIC TEMPERATURE CONTROLS

INSTRUCTIONS FOR SETTING THE OPTIONAL TEMPERATURE ALARM RANGES ON THE ELECTRONIC CONTROL

THE DISPLAY WILL READ AN INTERIOR CABINET TEMPERATURE DURING NORMAL OPERATION.

INFO BUTTON
DOWN BUTTON
UP BUTTON
POWER BUTTON

Control may need to be unlocked. See instructions on how to unlock the electronic control.

WHY DO WE NEED TO SET THE ALARM ON THE ELECTRONIC CONTROL?

The alarm will advise that a temperature has gone above and/or below the cabinets Cut-in and/or Cut-out temperature after a determined time has expired.

STOP: Prior to proceeding, please contact The True Manufacturing tech service department as they will provide assistance in verifying the cut in and cut out settings of your electronic control.

HOW DO WE PROGRAM THE ALARM SETTING ON THE ELECTRONIC CONTROL?

STEP 1: With the display showing temperature, press and hold the info button and the power button at the same time until either "ScL", "SPL' or "MDL" appears. Release both buttons.

STEP 2: With the display showing "ScL", "SPL' or "MDL", press and release the info button until "AtM" appears.

"AtM" is the parameter to change alarm mode.

STEP 3: With the display showing "AtM", press and hold the info button until "non" appears. "non" shows the alarm is not active. Continue holding the info button.

NOTE: Holding the info button allows the parameter to be displayed and then changed.

STEP 4: With the display showing "non", and while still holding the info button, press and release the down button to change the setting to "AbS". Release both buttons.

"AbS" shows the alarm will be an absolute number.

NOTE: The procedure of holding the info button while then pressing and releasing the up button or the down button will allow the parameter setting to be displayed and then changed. Releasing the buttons will allow the control to scroll to the next parameter.

THIS PROCEDURE WILL BE REPEATED ON THE FOLLOWING PARAMETERS.

LAE ELECTRONIC TEMPERATURE CONTROLS

INSTRUCTIONS FOR SETTING THE OPTIONAL TEMPERATURE ALARM RANGES ON THE ELECTRONIC CONTROL (CONTINUED)

STEP 5: The display will now show "ALA". Press and hold the info button [i] until a temperature appears. "ALA" is the parameter for the low alarm setting.

With the display showing a temperature, and while still holding the info button [i], press and release the down button [▼] to change the temperature below the Cut-Out Temperature.

NOTE: True Manufacturing recommends this temperature to be at least 3 degrees colder than the Cut-Out temperature to prevent a false alarm.

Release both buttons.

STEP 6: The display will now show "AhA". Press and hold the info button [i] until a temperature appears. "AhA" is the parameter for the high alarm setting.

With the display showing a temperature, and while still holding the info button [i] press and release the up button [▲M] to change the temperature above the Cut-In Temperature.

NOTE: True Manufacturing recommends this temperature to be at least 3 degrees warmer than the Cut-In temperature to prevent a false alarm.

Release both buttons.

STEP 7: Press and release the info button [i] until "Atd" appears.

STEP 8: With the display showing "Atd", and while holding the info button [i] press and release the up button [▲M] to change alarm delay in minutes. "Atd" is the parameter for the delay alarm setting.

NOTE: True Manufacturing recommends this time delay to be at least 30 minutes to prevent a false alarm.

Release both buttons.

THE ALARM AND TIME DELAY IS NOW SET.

LAE ELECTRONIC TEMPERATURE CONTROLS

INSTRUCTIONS FOR SETTING THE OPTIONAL TEMPERATURE ALARM RANGES ON THE ELECTRONIC CONTROL

THE DISPLAY WILL READ AN INTERIOR CABINET TEMPERATURE DURING NORMAL OPERATION.

INFO BUTTON

DOWN BUTTON

UP BUTTON

POWER BUTTON

WHY DO WE LOCK THE CONTROL?

The control is locked to prevent unnecessary changes to the program that may affect cabinet operation.

HOW DO WE LOCK THE ELECTRONIC CONTROL?

STEP 1: With the display showing temperature, press and release the info button [i] until "t1" appears.

STEP 2: With the display showing "t1", press and release the down button [▼] until "loc" appears. "loc" is the parameter to lock and unlock..

STEP 3: With the display showing "loc", press and hold the info button [i] until "no" appears. "no" shows the control is unlocked.

Continue holding the info button.

NOTE: Holding the info button [i] allows the parameter to be displayed and then changed.

STEP 4: With the display showing "no", and while still holding the info button [i], press and release the up button [▲M] until "yes" appears.

"yes" shows the control is locked out.

Release all buttons.

THE CONTROL IS NOW LOCKED.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE CONTROL PARAMETER LIST ORDER

AR2-28-1TM and 2TM	
SCL	IISM
SPL	IISL
SPH	IISH
SP	IISP
C-H	IIHY
HYS	IIFC
CRT	HDS
CT1	IIDF
CT2	SB
CSD	DSM
DFM	DI2
DFT	STT
DH1	EDT
DH2	LSM
DH3	OA1
DH4	OA2
DH5	CD
DH6	INP
DLI	OS1
DTO	T2
DTY	OS2
DPD	T3
DRN	OS3
DDM	TLD
DDY	TDS
FID	AVG
FDD	SIM
FTO	ADR
FCM	
FDT	
FDH	
FT1	
FT2	
FT3	
ATM	
ALA	
AHA	
ALR	
AHR	
ATI	
ATD	
ADO	
AHM	
AHT	
ACC	

BR1-28	
MDL	IISM
SPL	IISL
SPH	IISH
SP	IISP
C-H	IIH0
HY0	IIH1
HY1	IIHT
CRT	IIDF
CT1	IIFC
CT2	ECS
HRT	EPT
TIL	SB
HT	DSM
DFM	DAD
DFT	CSD
DFB	D1O
DH1	D1A
DH2	D2O
DH3	
DH4	LSM
DH5	LSA
DH6	STT
DLI	EDT
DTO	OA1
DTY	OA2
DSO	OA3
SOD	2CD
DPD	OS1
DRN	T2
DDM	OS2
DDY	T3
FID	OS3
FDD	T4
FTO	OS4
FCM	TLD
FDT	TDS
FDH	AVG
FT1	SCL
FT2	SIM
FT3	ADR
FMS	BTE
ATM	RFS
ALA	
AHA	
ALR	
AHR	
ATI	
ATD	

Per our design or control version, all Parameters may or may not be displayed.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE CONTROL PARAMETER LIST ORDER

BIT25	
SPL	IISM
SPH	IISL
SP	IISH
HYS	IISP
CRT	IIHY
CT1	IIFC
CT2	IIDF
CSD	SB
DFM	DI1
DFT	DI2
DFB	T3M
DLI	OS3
DTO	PSL
DTY	PSR
DPD	POF
DRN	LSM
DDM	OA1
DDY	OA2
FID	OS1
FDD	T2
FTO	OS2
FCM	TLD
FDT	SCL
FDH	SIM
FT1	ADR
FT2	
FT3	
ATM	
ALA	
AHA	
ALR	
AHR	
ATI	
ATD	
ADO	
AHM	
AHT	
ACC	

BIT25-6TM and 7TM	
SPL	IISM
SPH	IISL
SP	IISH
HY0	IISP
HY1	IIH0
CRT	IIH1
CT1	IIHT
CT2	IIFC
CSD	IIDF
HT	SB
DFM	DI1
DFT	DI2
DFB	T3M
LTD	OS3
DDS	PSL
DLI	PSR
DTO	POF
DTY	LSM
DSO	OA1
SOD	OA2
DPD	OS1
DRN	T2
DDM	OS2
DDY	TLD
FID	SCL
FDD	SIM
FTO	ABE
FCM	ADR
FDT	
FDH	
FT1	
FT2	
FT3	
FMS	
ATM	
ALA	
AHA	
ALR	
AHR	
ATI	
ATD	
ADO	
AHM	
AHT	
ACC	

BIT25 Heating	
SPL	SB
SPH	DI1
SP	DI2
CM	PSL
HYS	PSR
TON	POF
TOF	DSM
PB	LSM
IT	OA1
DT	OA2
AR	OS1
CT	TLD
PF	SCL
HSD	SIM
ATM	ADR
ALA	
AHA	
ALR	
AHR	
ATD	
ADO	

Per our design or control version, all Parameters may or may not be displayed.

LAE ELECTRONIC TEMPERATURE CONTROLS

LAE CONTROLLER PARAMETER SETTINGS FOR CELSIUS

For LAE control model AR2-28 ONLY, ALL parameters with a formula shown need to be converted for Celsius applications.

EXAMPLE:

If current SPL is set for 20 degrees F the formula is (X-32) / 1.8

(20-32) / 1.8 = -6.7 Celsius

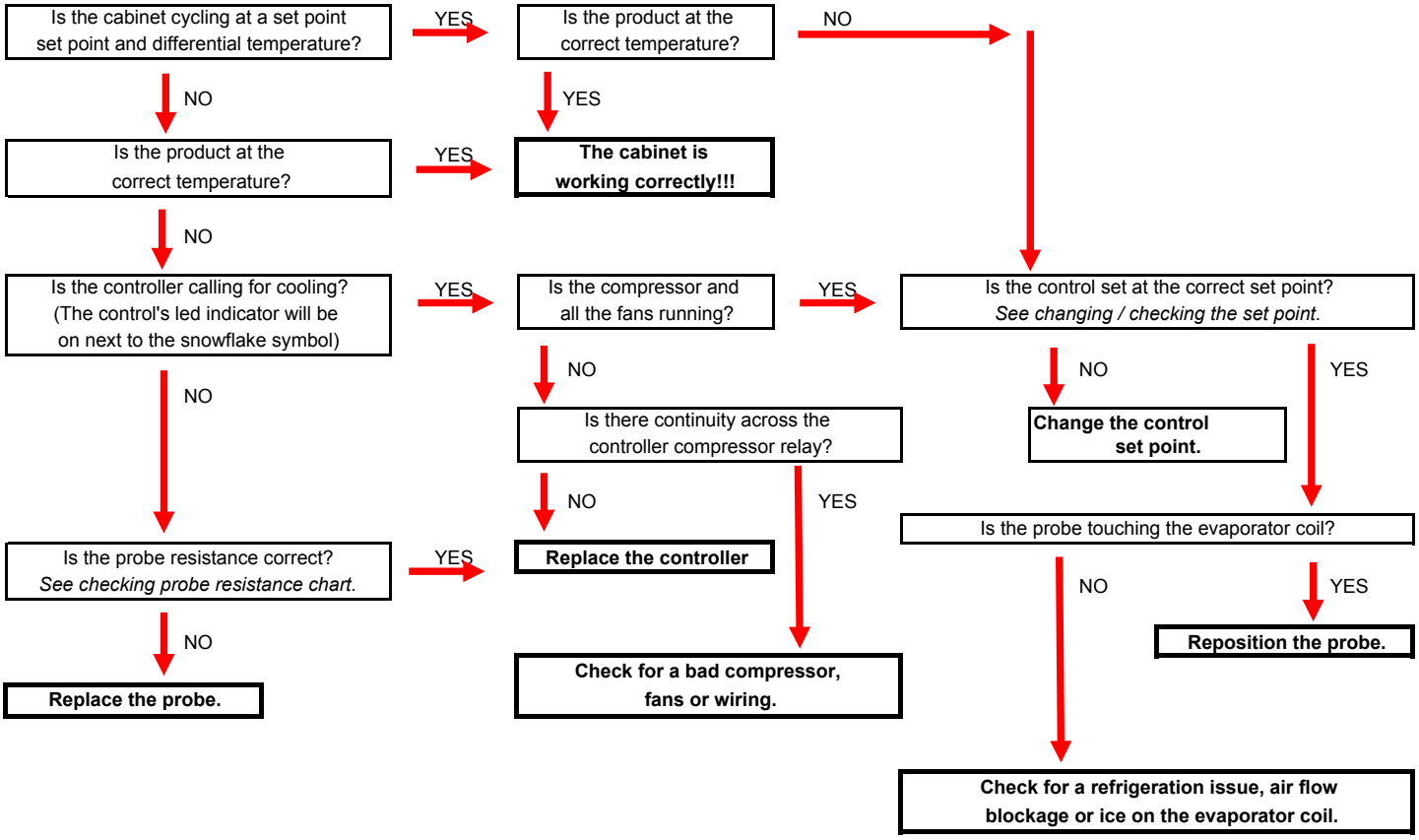
AR2-28			
SCL	1C	ADO	
SPL	(X-32) / 1.8	AHM	
SPH	(X-32) / 1.8	AHT	(X-32) / 1.8
SP	(X-32) / 1.8	ACC	
C-H		IISM	
HYS	(X) / 1.8	IISL	(X-32) / 1.8
CRT		IISH	(X-32) / 1.8
CT1		IISP	(X-32) / 1.8
CT2		IIHY	(X) / 1.8
CSD		IIFC	
DFM		HDS	
DFT		IIDF	
DH1		SB	
DH2		DS	
DH3		DSM	
DH4		DI2	
DH5		STT	
DH6		EDT	
DLI	(X-32) / 1.8	LSM	
DTO		OA1	
DTY		OA2	
DPD		CD	
DRN		INP	
DDM		OS1	(X) / 1.8
DDY		T2	
FID		OS2	(X) / 1.8
FDD	(X-32) / 1.8	T3	
FTO		OS3	(X) / 1.8
FCM		TLD	
FDT	(X) / 1.8	TDS	
FDH	(X) / 1.8	AVG	
FT1		SIM	
FT2		ADR	
FT3			
ATM			
ALA	(X-32) / 1.8		
AHA	(X-32) / 1.8		
ALR	(X) / 1.8		
AHR	(X) / 1.8		
ATI			
ATD			

LAE ELECTRONIC TEMPERATURE CONTROLS

DIAGNOSTIC FLOW CHART FOR DIXELL AND LAE ELECTRONIC CONTROLS

Concern: Electronic Control Display Temperature does not match the cabinet temperature

NOTE: The temperatures may reflect the refrigeration cycle determined by a set point and differential or it may show an average temperature.
The temperatures are also effected by a defrost cycle and the open and closing of the door.
The most accurate temperature on a cabinets operation is to verify the product temperature.



LAE ELECTRONIC TEMPERATURE CONTROLS

Control version will vary with model and age of cabinet.

LAE:
t1 = Thermostat
t2 = Defrost
t3 = Display

Checking the probe resistance.

- Verify the probe resistance is accurate at the probe location.
  - Use a calibrated thermometer to check the probe location temperature (coil or air temperature).
  - Disconnect the probe from the controller. The probe cannot be plugged into the controller when measuring resistance.
  - Use a calibrated Ohm meter to measure the resistance of the probe
  - The resistance of the probe should match the associated temperature from the above table.

- Fill a cup full of ice water (use a lot of ice). Put the probe into the ice bath, stir for 1 minute, then measure the resistance with a calibrated Ohm meter. Make sure to keep the probe in the center of the cup.
  - The resistance of the probe should match the associated temperature at 32°F / 0°C degrees as shown in the above table.

Checking the controller display temperature accuracy.

- After verifying the probe resistance to the box temperature, plug the probe into the controller and check the temperature display.
  - The controller should display the associated temperature from the above table

- Fill a cup full of ice water (use a lot of ice). Put the Ohm verified probe in to the ice bath, stir for 1 minute. Make sure to keep the probe in the center of the cup.
  - The controller should display 32°F / 0°C.

LAE Probe Temperature to Resistance Chart		
Temperature		Resistance
C	F	K-ohm
-40	-40	195.65
-35	-31	148.17
-30	-22	113.35
-25	-13	87.56
-20	-4	68.24
-15	5	53.65
-10	14	42.51
-5	23	33.89
0	32	27.22
5	41	22.02
10	50	17.93
15	59	14.67
20	68	12.08
25	77	10.00
30	86	8.32
35	95	6.95
40	104	5.83
45	113	4.92
50	122	4.16
55	131	3.54
60	140	3.01
65	149	2.59
70	158	2.23
75	167	1.93
80	176	1.67
85	185	1.45
90	194	1.27
95	203	1.15
100	212	0.97
105	221	0.86
110	230	0.76
115	239	0.67
120	248	0.60
125	257	0.53

LAE ELECTRONIC TEMPERATURE CONTROLS

PRODUCT ADVISEMENT

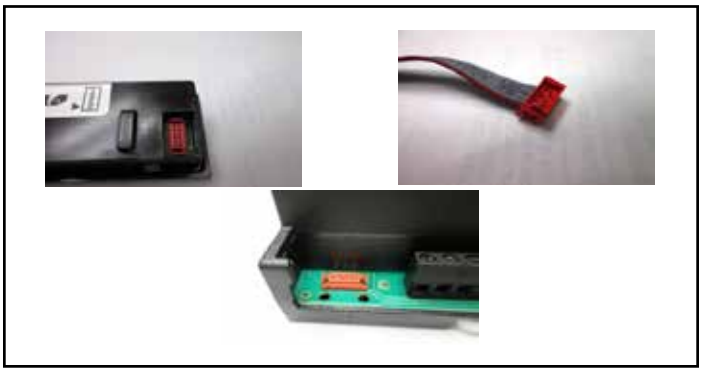
LAE ELECTRONIC CONTROL CHANGE FROM MODEL AR1 AND MODEL AR2 TO MODEL BR1.

REASON FOR ADVISEMENT: LAE Electronic Control model update will change the display, connecting cable, module, wiring and programming*.

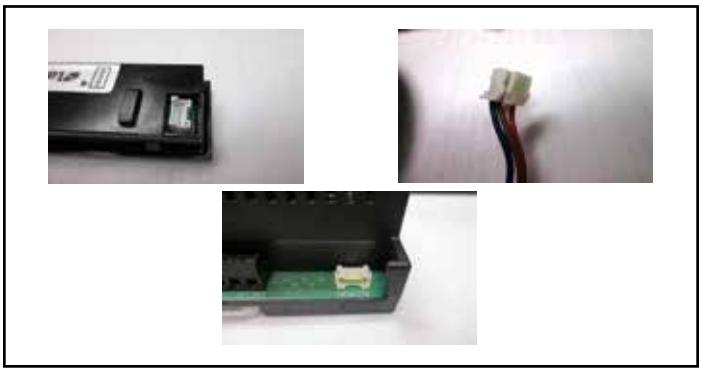
*Control is pre-programmed from the factory. New control is Universal voltage

NOTE: Below instructions do not pertain to cabinet models with display cable foamed in the wall.

AR2 DISPLAY, CABLE AND MODULE CONNECTIONS

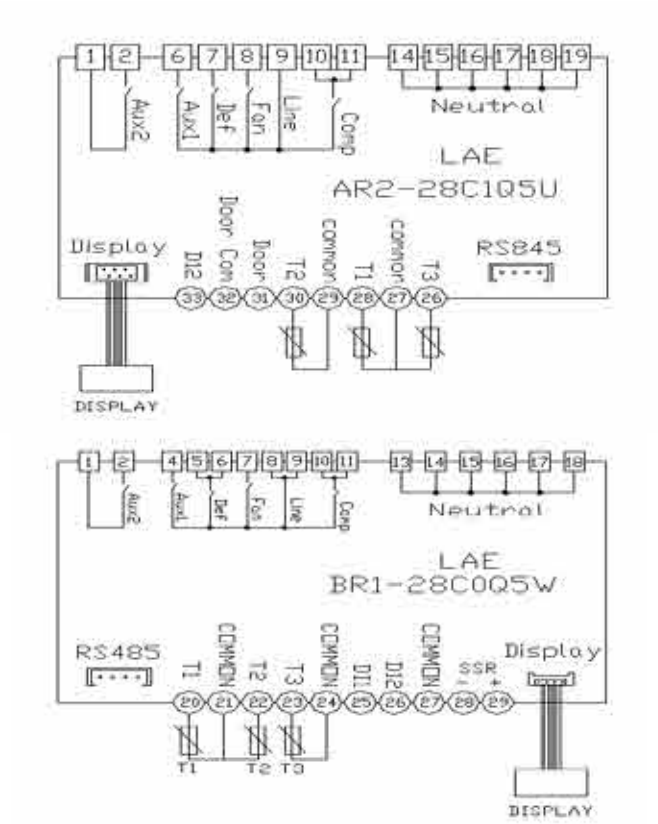


BR1 DISPLAY, CABLE AND MODULE CONNECTIONS



AR2	
1	LINE IN
2	AUX 2
6	AUX 1
7	DEF
8	FAN
9	LINE IN
10 OR 11	COMP
14-19	NEUTRAL
26	T3
27	T1 (COMMON)
27	T3 (COMMON)
28	T1
29	T2 (common)
30	T2
31	DOOR (DI1)
32	DI1 (COMMON)
32	DI2 (COMMON)
33	DI2

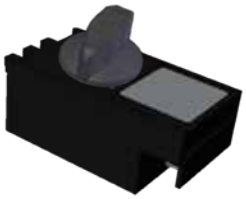
BR1	
1	LINE IN
2	AUX 2
4	AUX 1
5 OR 6	DEF
7	FAN
8 OR 9	LINE IN
10 OR 11	COMP
13-18	NEUTRAL
23	T3
21	T1 (COMMON)
24	T3 (COMMON)
20	T1
21	T2 (COMMON)
22	T2
25	DOOR (DI1)
27	DI1 (COMMON)
27	DI2 (COMMON)
26	DI2



DANFOSS ELECTRONIC TEMPERATURE CONTROLS

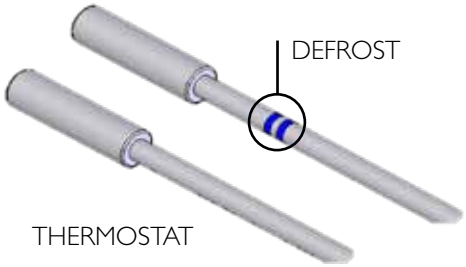
Control version will vary with model and age of cabinet.

DANFOSS:
thermostat probe = return air
defrost probe = coil



Previous Danfoss display

DANFOSS ELECTRONIC PROBES:



DANFOSS ELECTRONIC TEMPERATURE CONTROLS

DANFOSS ELECTRONIC CONTROL REFRIGERATOR WITH DIGITAL DISPLAY GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Interior lights will illuminate on glass door models only. If the lights do not come on verify the light switch is in the "ON" position. Solid door cabinets may or may not have lights that may be controlled by the door switch.
   b. Cabinet will start in a Defrost Cycle. The duration for defrost will be a minimum of 4 minutes and a maximum of 60 minutes.
   c. The Danfoss Control Display will illuminate showing "deF".

2. The Danfoss control is preprogrammed to initiate defrost every 4 hours of compressor run time. If deemed necessary by the Danfoss control additional defrost may occur at unspecified times.
   a. At this time the, evaporator fans will continue to run but the compressor will turn off. Some cabinets may also change the rotation of the reversing condenser fan motor.
   b. Once a preprogrammed temperature of the evaporator coil is reached, the Defrost Cycle will terminate and the 2 minute delay will start.
   c. After the 2 minute delay the compressor will restart.
   d. The Danfoss Control Display will continue to show "deF" for an additional 30 minutes.

3. The Danfoss control will cycle the compressor and the evaporator fan(s) on and off determined by the Set-Point and Differential temperatures.
   a. The Set-Point is the adjustable preprogrammed temperature which shuts off the compressor and evaporator fan(s). This is not the programmed cabinet temperature.
   b. The Differential is the non adjustable preprogrammed temperature that is added to the Set-Point temperature that will start the compressor and evaporator fan(s).
   c. The Danfoss control is designed to read and display a cabinet temperature not a product temperature. This cabinet temperature may reflect the refrigeration cycle of the Set-Point and its Differential. The most accurate temperature on a cabinets operation is to verify the product temperature.

Example: If the Set-Point is 34°F/1.1°C and the Differential is 6°F/3.3°C

(Set-Point) 34°F + 6 (Differential) = 40°F
Or
(Set-Point) 1.1°C + 3.3 (Differential) = 4.4°C

The compressor will cycle off 34°F/1.1°C and back on at 40°F/4.4°C

DANFOSS ELECTRONIC TEMPERATURE CONTROLS

DANFOSS ELECTRONIC CONTROL FREEZER WITH DIGITAL DISPLAY
GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Interior lights will illuminate on glass door models only. If the lights do not come on verify the light switch is in the "ON" position. Solid door cabinets may or may not have lights that may be controlled by the door switch.
   b. Cabinet will start in a Defrost Cycle. The duration for defrost will be a minimum of 4 minutes and a maximum of 30 minutes.
   c. The Danfoss Control Display will illuminate showing "deF".

2. The Danfoss control is preprogrammed to initiate defrost every 4 hours of compressor run time. If deemed necessary by the Danfoss control additional defrost may occur at unspecified times.
   a. At this time, the compressor and evaporator fan(s) will turn off and the evaporator coil heater and drain tube heater will be energized. Some cabinets may also change the rotation of the reversing condenser fan motor.
   b. Once a preprogrammed temperature of the evaporator coil is reached, or 30 minutes, the Defrost Cycle will terminate and the 2 minute delay will occur.
   c. After the 2 minute delay the compressor will restart.
   d. The evaporator fans will remain off for an additional 3 minutes.
   e. The Danfoss Control Display will continue to show "deF" for an additional 30 minutes.

3. The Danfoss control will cycle the compressor and the evaporator fan(s) on and off determined by the Set-Point and Differential Temperatures.
   a. The Set-Point is the adjustable preprogrammed temperature which shuts off the compressor and evaporator fan(s). This is not the programmed cabinet temperature.
   b. The Differential is the non adjustable preprogrammed temperature that is added to the Set-Point temperature that will start the compressor and evaporator fan(s).
   c. The Danfoss control is designed to read and display a cabinet temperature not a product temperature. This cabinet temperature may reflect the refrigeration cycle of the Set-Point and it's Differential. The most accurate temperature on a cabinets operation is to verify the product temperature.

Example: If the Set-Point is -6°F/1°C and the Differential is 6°F/4°C

(Set-Point) -6°F + 6 (Differential) = 0°F

Or

(Set-Point) -21.4°C + 3.3 (Differential) = -18.1°C

The compressor will cycle off -6°F/-21.4°C and back on at 0°F/-18.1°C

DANFOSS ELECTRONIC TEMPERATURE CONTROLS

DANFOSS ELECTRONIC CONTROL REFRIGERATOR WITHOUT DIGITAL DISPLAY GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Interior lights will illuminate on glass door models only. If the lights do not come on verify the light switch is in the "ON" position. Solid door cabinets may or may not have lights that may be controlled by the door switch.
   b. Cabinet will start in a Defrost Cycle. The duration for defrost will be a minimum of 4 minutes and a maximum of 60 minutes.

2. The Danfoss control is preprogrammed to initiate defrost every 4 hours of compressor run time. If deemed necessary by the Danfoss control additional defrost may occur at unspecified times.
   a. At this time, the evaporator fans will continue to run but the compressor will turn off. Some cabinets may also change the rotation of the reversing condenser fan motor.
   b. Once a preprogrammed temperature of the evaporator coil is reached, the Defrost Cycle will terminate and the 2 minute delay will start.
   c. After the 2 minute delay the compressor will restart.

3. The Danfoss control will cycle the compressor and the evaporator fan(s) on and off together.
   a. The temperature control should be set on the #4 or #5.
   b. The warmest setting is #1, the coldest is #9, and #0 is the off position.
   c. The thermometer is designed to read and display a cabinet temperature not a product temperature. This cabinet temperature may reflect the refrigeration cycle determined by the temperature control. The most accurate temperature on a cabinets operation is to verify the product temperature.

DANFOSS ELECTRONIC CONTROL FREEZER / GC WITHOUT DIGITAL DISPLAY GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Interior lights will illuminate on glass door models only. If the lights do not come on verify the light switch is in the "ON" position. Solid door cabinets may or may not have lights that may be controlled by the door switch.
   b. Cabinet will start in a Defrost Cycle. The duration for defrost will be a minimum of 4 minutes and a maximum of 30 minutes.

2. The Danfoss control is preprogrammed to initiate defrost every 4 hours of compressor run time. If deemed necessary by the Danfoss control additional defrost may occur at unspecified times.
   a. At this time, the compressor and evaporator fan(s) will turn off and the evaporator coil heater and drain tube heater will be energized. Some cabinets may also change the rotation of the reversing condenser fan motor.
   b. Once a preprogrammed temperature of the evaporator coil is reached, or 30 minutes,the Defrost Cycle will terminate and the 2 minute delay will occur.
   c. After the 2 minute delay the compressor will restart.
   d. The evaporator fans will remain off for an additional 3 minutes.

3. The Danfoss control will cycle the compressor and the evaporator fan(s) on and off together.
   a. The temperature control should be set on the #4 or #5.
   b. The warmest setting is #1, the coldest is #9, and #0 is the off position.
   c. The thermometer is designed to read and display a cabinet temperature not a product temperature. This cabinet temperature may reflect the refrigeration cycle determined by the temperature control. The most accurate temperature on a cabinets operation is to verify the product temperature.

DANFOSS ELECTRONIC TEMPERATURE CONTROLS

PRODUCT ADVISEMENT

DETERMINING THE TYPE OF ELECTRONIC CONTROL DISPLAY

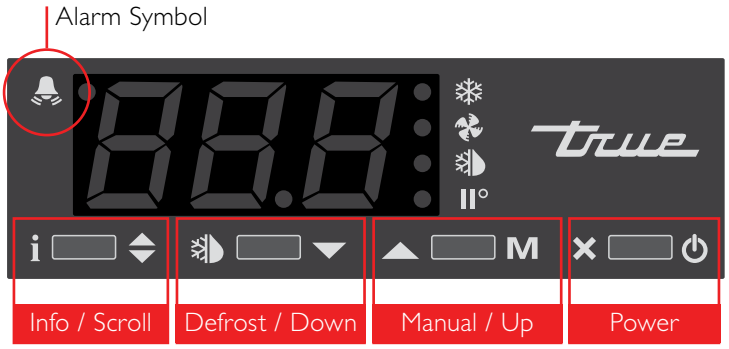
Reason for Advisement

Both Danfoss and LAE electroinc controls utilize similar digital displays.

To provide the visual differences and operations between the displays used for the LAE Electronic Control and the Danfoss Electronic control

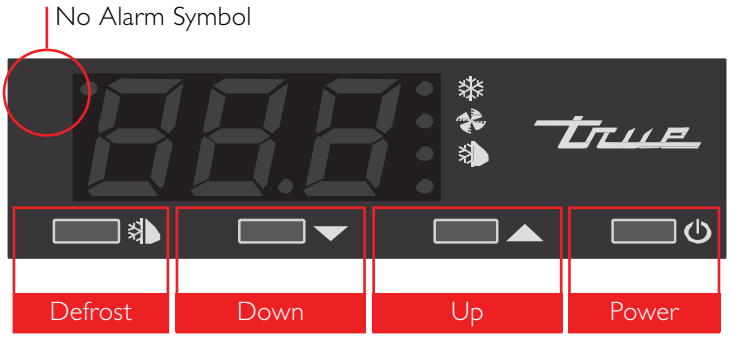
NOTE: Displays do not interchange with each other due to wiring and programming limitations.

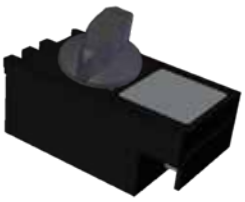
DISPLAY FOR LAE CONTROL



LAE electronic control board

DISPLAY FOR DANFOSS CONTROL





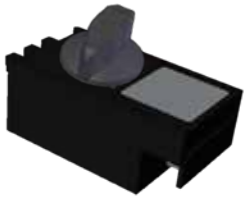
Danfoss electronic control board

Previous Danfoss display

DANFOSS ELECTRONIC TEMPERATURE CONTROLS

HOW TO USE THE DANFOSS ELECTRONIC CONTROL

ELECTRONIC TEMPERATURE CONTROLS - DANFOSS:



USING A DANFOSS ELECTRONIC CONTROL WITH DIGITAL DISPLAY:

STEP 1 - Press both buttons to power on the temperature control. See Figure 1.

STEP 2 - Press both buttons and hold for 6 seconds to power off the temperature control. See Figure 2.

STEP 3 - Press bottom button and hold for 6 seconds to defrost. See Figure 3.

STEP 4 - Press and release top or bottom button for 2 seconds to display cut out temperature.

Raise or lower the set point, use the top or bottom to go up or down. Release the button and temperature will go back. See Figure 4.

NOTE: The set point / cut-out temperature is NOT the cabinet temperature.

STEP 6 - Press upper button and hold for 5 seconds to change temperature settings from °F to °C.
See Figure 5.

Turning On Power

1

Turning Off Power

2

Defrost

3

Cut Out Temperature

4

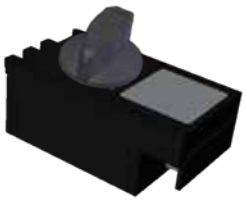
Celsius Temperature

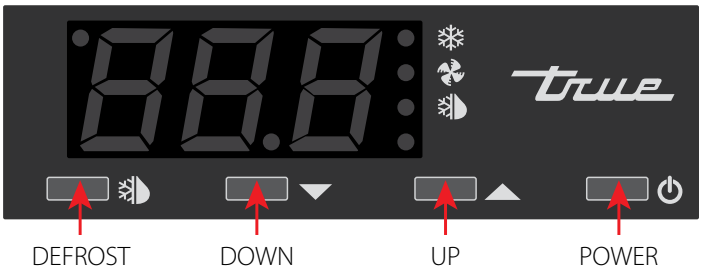
5

DANFOSS ELECTRONIC TEMPERATURE CONTROLS

HOW TO USE THE DANFOSS ELECTRONIC CONTROL

ELECTRONIC TEMPERATURE CONTROLS - DANFOSS:





USING A DANFOSS ELECTRONIC CONTROL WITH DIGITAL DISPLAY:

STEP 1 - Press the POWER button ⏻ for 5 seconds to power on the temperature control. See Figure 1.

STEP 2 - Press the POWER button ⏻ for 5 seconds to power off the temperature control. See Figure 2.

STEP 3 - Press the DEFROST button ❄ for 3 seconds to defrost. See Figure 3.

STEP 4 - Press the UP button ▲ for 3 seconds to display the set point/cut-out temperature. Press the UP ▲ or DOWN ▼ button to raise or lower the temperature. See Figure 4.

NOTE: The set point / cut-out temperature is NOT the cabinet temperature.

STEP 6 - Press the UP button ▲ for 10 seconds, °F or °C will display. Press the UP button ▲ to change from °F to °C. See Figure 5.

Turning On Power

1

Turning Off Power

2

Defrost

3

Cut Out Temperature

4

Celsius Temperature

5

DANFOSS ELECTRONIC TEMPERATURE CONTROLS

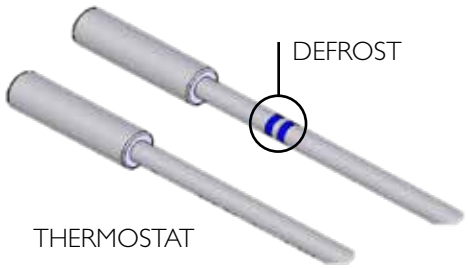
ALARMS	ALARM TYPE	CODE SHOWN	VALUE
	Sensor 1 defect	E1	–
	Sensor 2 defect	E2	–
	Compressor fault	E4	–
	Heater fault	E5	–
	Pot fault	E6	–
	Supply voltage low	ULo	–
	Supply voltage high	UHi	–
	High temperature alarm	Hi	Temperature
	Low temperature alarm	Lo	Temperature
	Communication error	E13	–

DANFOSS CONTROLS*		
PART NUMBER	**MARKING 5 CUT-IN/CUT-OUT TEMPERATURE C (F)**	**DEFROST END TEMPERATURE C (F)**
945058	**4.41/1.1115 (39.94/34)**	**5 (41)**
945059	**-18.1/-21.4 (-0.58/-6.52)**	**5 (41)**
947981	**4.41 /1.1115 (39.94/34)**	**5 (41)**
948072	**3.69 /0.39 (38.64/32.7)**	**5 (41)**
967195	**2.22/0.555 (36/33)**	**5 (41)**
970719 (230V)	**4.41/1.1115 (39.94/34)**	**5 (41)**
970727	**4.41/1.1115 (39.94/34)**	**5 (41)**
970728	**4.41/1.1115 (39.94/34)**	**5 (41)**
981945 (230V)	**4.41/1.1115 (39.94/34)**	**5 (41)**
981946 (230V)	**-18.1/-21.4 (-0.58/-6.52)**	**5 (41)**
981947 (230V)	**4.41/1.1115 (39.94/34)**	**5 (41)**

*Information is provided to verify cut-in/cut-out range for diagnostic purposes only. True recommends replacing OEM control with the same part number.

DANFOSS ELECTRONIC TEMPERATURE CONTROLS

DANFOSS PROBES:



Checking the probe resistance.

- Verify the probe resistance is accurate at the probe location.
  - Use a calibrated thermometer to check the probe location temperature (coil or air temperature).
  - Disconnect the probe from the controller. The probe cannot be plugged into the controller when measuring resistance.
  - Use a calibrated Ohm meter to measure the resistance of the probe
  - The resistance of the probe should match the associated temperature from the above table.

- Fill a cup full of ice water (use a lot of ice). Put the probe into the ice bath, stir for 1 minute, then measure the resistance with a calibrated Ohm meter. Make sure to keep the probe in the center of the cup.
  - The resistance of the probe should match the associated temperature at 32°F / 0°C degrees as shown in the above table.

Checking the controller display temperature accuracy.

- After verifying the probe resistance to the box temperature, plug the probe into the controller and check the temperature display.
  - The controller should display the associated temperature from the above table

- Fill a cup full of ice water (use a lot of ice). Put the Ohm verified probe in to the ice bath, stir for 1 minute. Make sure to keep the probe in the center of the cup.
  - The controller should display 32°F / 0°C.

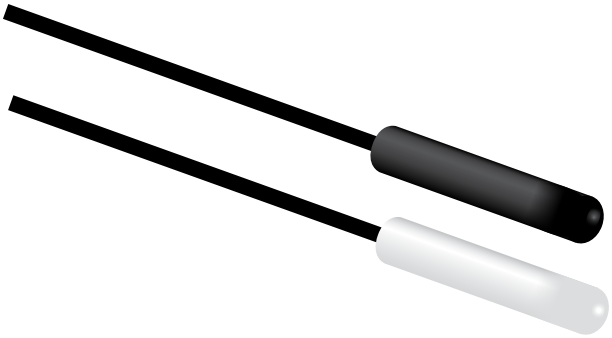
Danfoss Probe Temperature to Resistance Chart		
Temperature		Resistance
C	F	K-ohm
-55	-67	487.89
-50	-58	338.25
-45	-49	237.69
-40	-40	169.16
-35	-31	121.80
-30	-22	88.77
-25	-13	65.34
-20	-4	48.61
-15	5	36.50
-10	14	27.68
-5	23	21.17
0	32	16.33
5	41	12.70
10	50	9.95
15	59	7.86
20	68	6.25
25	77	5.00
30	86	4.03
35	95	3.27
40	104	2.67

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

Control version will vary with model and age of cabinet.

SOLLATEK:
control probe = return air
defrost probe = coil

SOLLATEK ELECTRONIC PROBES:
BLACK- Thermostat
WHITE - Defrost



SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

SOLLATEK ELECTRONIC CONTROL REFRIGERATOR GENERAL SEQUENCE OF OPERATION

1. Cabinet is plugged in.
   a. Interior lights will illuminate on Glass Door Models only. If the lights do not come on verify the light switch is in the "ON" position. Solid door cabinets may or may not have lights that may be controlled by the door switch.
2. The compressor and evaporator fans will start if the temperature control is calling for cooling. (If the compressor does not start verify that the temperature control is not in the "off" or "0" position.)
   a. Control or condenser fan(s) may be already preprogrammed from the factory so at the start of every compressor cycle, the condenser fan(s) will reverse for 30 seconds to blow dirt off the condensing coil.
3. The Sollatek temperature control may cycle the compressor and evaporator fan(s) on and off together.
   a. The temperature control should be set on the #4 or #5.
   b. The warmest setting is #1, the coldest is #9, and #0 is the off position.
   c. The thermometer is designed to read and display a cabinet temperature not a product temperature. This cabinet temperature may reflect the refrigeration cycle determined by the temperature control. The most accurate temperature on a cabinets operation is to verify the product temperature.
4. The Sollatek control is preprogrammed to initiate defrost every 4 hours of compressor run time. If deemed necessary by the Sollatek control, additional defrost may occur at unspecified times.
   a. At this time the evaporator fans will continue to run, but the compressor will turn off. Some cabinets may also change the rotation of the reversing condenser fan motor.
   b. Once a preprogrammed temperature of the evaporator coil is reached, the Defrost Cycle will terminate and the 2 minute delay will start.
   c. After the 2 minute delay the compressor will restart.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

USING THE SOLLATEK ELECTRONIC CONTROL

ELECTRONIC TEMPERATURE CONTROLS - SOLLATEK

USING A SOLLATEK ELECTRONIC CONTROL TO INITIATE DEFROST:

STEP 1 - Set the temperature knob to position 0 when the unit is unplugged.

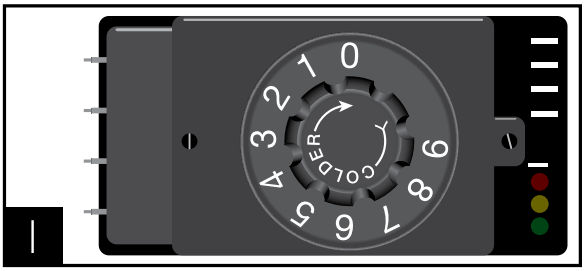
STEP 2 - Power the unit up and the green LED will be ON alone.

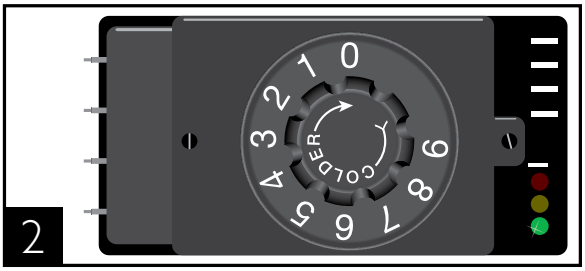
STEP 3 - Wait for one second, and rotate the knob slowly to position 4, the yellow LED will be ON alone.

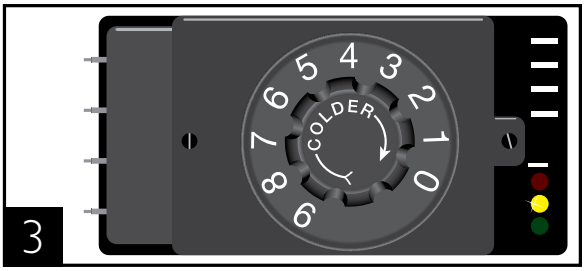
STEP 4 - Wait for one second, and rotate the knob slowly to position 2, the red LED will be ON alone.

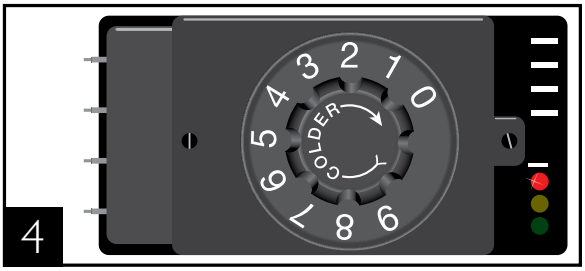
STEP 5 - Wait for one second, and rotate the knob slowly to position 8, all the LED's will be ON.

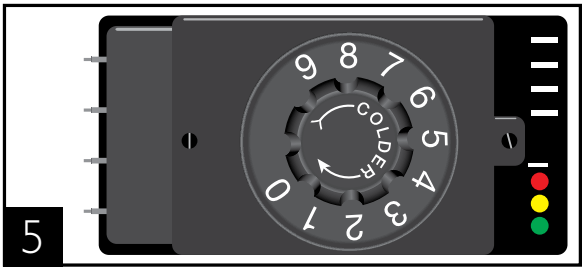
STEP 6 - Wait for one second, and rotate the knob slowly away from marking 8, the defrost will be initiated.

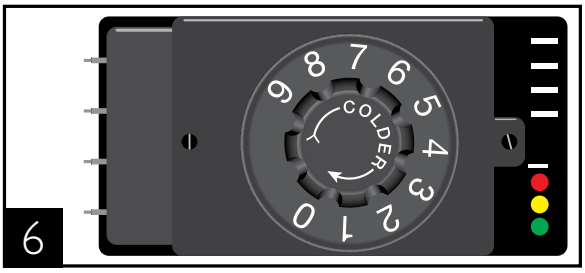






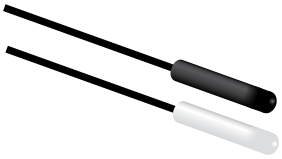






SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

SOLLATEK ELECTRONIC PROBES:
BLACK- Thermostat
WHITE - Defrost



Checking the probe resistance.

• Verify the probe resistance is accurate at the probe location.

  • Use a calibrated thermometer to check the probe location temperature (coil or air temperature).

  • Disconnect the probe from the controller. The probe cannot be plugged into the controller when measuring resistance.

  • Use a calibrated Ohm meter to measure the resistance of the probe

  • The resistance of the probe should match the associated temperature from the above table.

• Fill a cup full of ice water (use a lot of ice). Put the probe into the ice bath., stir for 1 minute, then measure the resistance with a calibrated Ohm meter. Make sure to keep the probe in the center of the cup.

  • The resistance of the probe should match the associated temperature at 32°F / 0°C degrees as shown in the above table.

Checking the controller display temperature accuracy.

• After verifying the probe resistance to the box temperature, plug the probe into the controller and check the temperature display.

  • The controller should display the associated temperature from the above table

• Fill a cup full of ice water (use a lot of ice). Put the Ohm verified probe in to the ice bath, stir for 1 minute. Make sure to keep the probe in the center of the cup.

  • The controller should display 32°F / 0°C.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

Sollatek Probe Temperature to Resistance Chart		
Temperature		Resistance
C	F	K-ohm
-10	14	548.267
-9	15.8	519.821
-8	17.6	492.994
-7	19.4	467.688
-6	21.2	443.81
-5	23	421.271
-4	24.8	399.992
-3	26.6	379.896
-2	28.4	360.911
-1	30.2	342.971
0	32	326.015
1	33.8	309.982
2	35.6	294.819
3	37.4	280.475
4	39.2	266.902
5	41	254.054
6	42.8	241.89
7	44.6	230.369
8	46.4	219.456
9	48.2	209.115
10	50	199.314
11	51.8	190.021
12	53.6	181.209
13	55.4	172.849
14	57.2	164.918
15	59	157.391
16	60.8	150.245
17	62.6	143.459
18	64.4	137.014
19	66.2	130.891
20	68	125.073
21	69.8	119.542
22	71.6	114.283
23	73.4	109.283
24	75.2	104.526
25	77	100

Sollatek Probe Temperature to Resistance Chart*		
Temperature		Resistance
C	F	K-ohm
26	78.8	95.692
27	80.6	91.592
28	82.4	87.687
29	84.2	83.969
30	86	80.427
31	87.8	77.051
32	89.6	73.835
33	91.4	70.768
34	93.2	67.844
35	95	65.055
36	96.8	62.395
37	98.6	59.857
38	100.4	57.434
39	102.2	55.122
40	104	52.914
41	105.8	50.805
42	107.6	48.79
43	109.4	46.866
44	111.2	45.026
45	113	43.268
46	114.8	41.587
47	116.6	39.98
48	118.4	38.443
49	120.2	36.972
50	122	35.564
60	140	24.386
70	158	17.035
80	176	12.11
90	194	8.75
100	212	6.419

*Information is provided to verify cut-in/cut-out range for diagnostic purposes only. True recommends replacing OEM control with the same part number.

Sollatek Controls				
Part Number	968535-obsolete	978701	979009-obsolete	988937
MARKING 5 CUT-IN/CUT-OUT TEMPERATURE C (F)	4.4/1.1 (40/34)	4.4/1.1 (40/34)	16.1/12.8 (61/55)	15.6/12.2 (60/54)
DEFROST END TEMPERATURE C (F)	5 (41)	4.4 (40)	4.4 (40)	5 (41)

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

PRODUCT ADVISEMENT

INSTALLATION INSTRUCTIONS: RETROFIT FROM A MECHANICAL CONTROL TO AN ELECTRONIC TEMPERATURE CONTROL

REASON FOR INSTRUCTION.

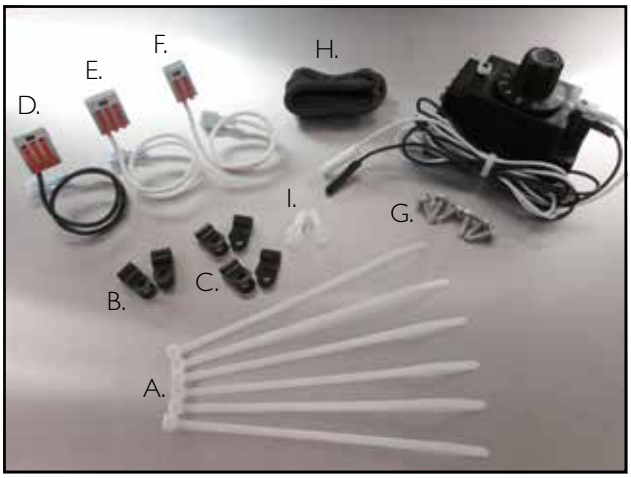
These instructions are for replacing a mechanical control with an Electronic Control. These instructions are not model specific and are meant as a general installation guide.

These instructions are designed to cover a number of different cabinets. We have assembled a parts kit that should contain anything you need. When installing your new control, all parts may not be necessary.

WE REQUIRE THAT ANY PARTS BEING USED FOR THIS REPAIR BE OEM. IF YOU ARE MISSING A PART PLEASE CONTACT US RIGHT AWAY.

THIS KIT NEEDS TO BE INSTALLED BY A QUALIFIED SERVICE TECHNICIAN.

IF YOU HAVE ANY QUESTIONS, PLEASE CALL TRUE SERVICE. SEE LAST PAGE FOR CONTACT INFORMATION.



TOOLS REQUIRED

- 1/4" Nut Driver
- Wire Cutter/Stripper/Crimper
- Volt Meter
- Phillips Screwdriver
- Flat Blade Screw Driver
- Power Drill With 1/4" Bit Driver
- Adjustable Wrench

NOTE: Depending upon model of cabinet and install method, not all tools will be required.

KIT COMPONENTS

1 – ELECTRONIC CONTROL

1 – BLACK PROBE (THERMOSTAT)

1 – WHITE PROBE (DEFROST)

MISCELLANEOUS SPARE COMPONENTS INCLUDES ITEMS LISTED BELOW:

A. 6 – WIRE ZIP TIES

B. 2 – 1/4" BLACK P-CLIP

C. 4 – 3/16" BLACK P-CLIP

D. 1 – BLACK WIRE WITH TERMINAL AND 3-WAY LEVER CONNECTOR

E. 1 – WHITE WIRE WITH TERMINAL AND 3-WAY LEVER CONNECTOR

F. 1 – WHITE WIRE WITH TERMINAL AND 2-WAY LEVER CONNECTOR

G. 6 – 1/4" HEX HEAD SELF TAPPING SCREWS

H. 1 – PERMA-GUM

I. 2 – SMALL STA-KON CRIMP CONNECTORS

NOTE: TRUE IS ADVISING TO ONLY USE THE SUPPLIED OEM COMPONENTS FOR THE INSTALL OF THE NEW ELECTRONIC CONTROL. IF ANY NON-OEM PARTS ARE TO BE USED, PLEASE CONTACT THE SERVICE DEPARTMENT FOR PRIOR APPROVAL.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

RETROFIT FROM A MECHANICAL CONTROL TO AN ELECTRONIC TEMPERATURE CONTROL

MECHANICAL CONTROLS

ELECTRONIC CONTROL

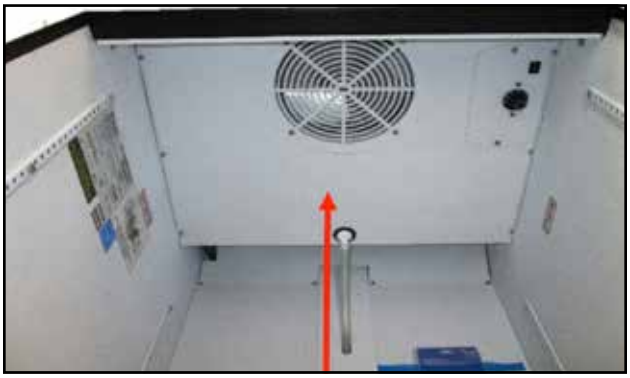
Electronic control with probes connected.

THE NEW ELECTRONIC CONTROL WILL MOUNT IN THE SAME LOCATION AS THE MECHANICAL CONTROL. THE NEW ELECTRONIC CONTROL USES TWO PROBES INSTEAD OF A SINGLE COIL SENSING CAPILLARY FROM THE MECHANICAL CONTROL.

PLEASE FOLLOW THESE STEP-BY-STEP INSTRUCTIONS.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

BOTTOM MOUNT CONDENSING UNIT

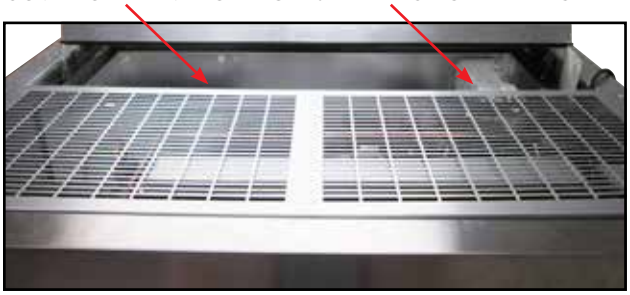


INSIDE EVAPORATOR COVER

TOP-MOUNT CONDENSING UNIT

COVER CLOSED

COVER OPEN. EVAPORATOR IS THE BACK ON THE RIGHT.



INSTRUCTIONS

Unplug cabinet before proceeding.

PLACEMENT OF THE BLACK THERMOSTAT PROBE

Thermostat probe cycles the compressor.

The thermostat probe will be located in the return air area of the evaporator housing. Depending upon the model of cabinet, access may either be from the inside evaporator cover or by the exterior top lid cover (top-mount condensing unit only).

Route the black probe from the temperature control location to the return air area of the evaporator housing. Use any existing access holes with OEM bushing to pass through air baffles.

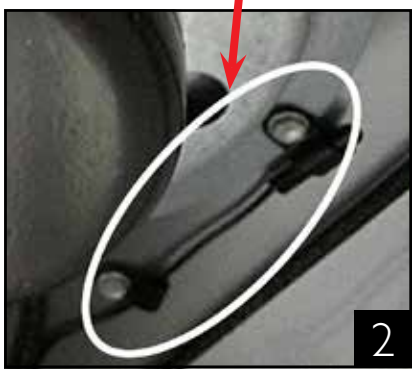
Any existing perma-gum will need to be reapplied to seal the hole(s). If perma-gum is missing, use perma-gum (item "H" from parts kit).

FAN GUARD

CONTROL PLATE

SOME APPLICATIONS MAY REQUIRE THE REMOVAL OF THE TEMPERATURE CONTROL MOUNTING PLATE AND THE EVAPORATOR FAN GUARD, WHILE OTHER APPLICATIONS WILL REQUIRE THE COMPLETE REMOVAL OF THE ENTIRE EVAPORATOR COVER AND/OR LID COVER.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS



Close-up of 1/4" P-clip securing black probe.

PROBE PLACEMENT

Probe may be attached to either an available fan motor bracket mounting screw with the supplied 1/4" P-clip (item "B" from parts kit). See images 1 and 2.

Close-up of black probe next to power wire at bushing.

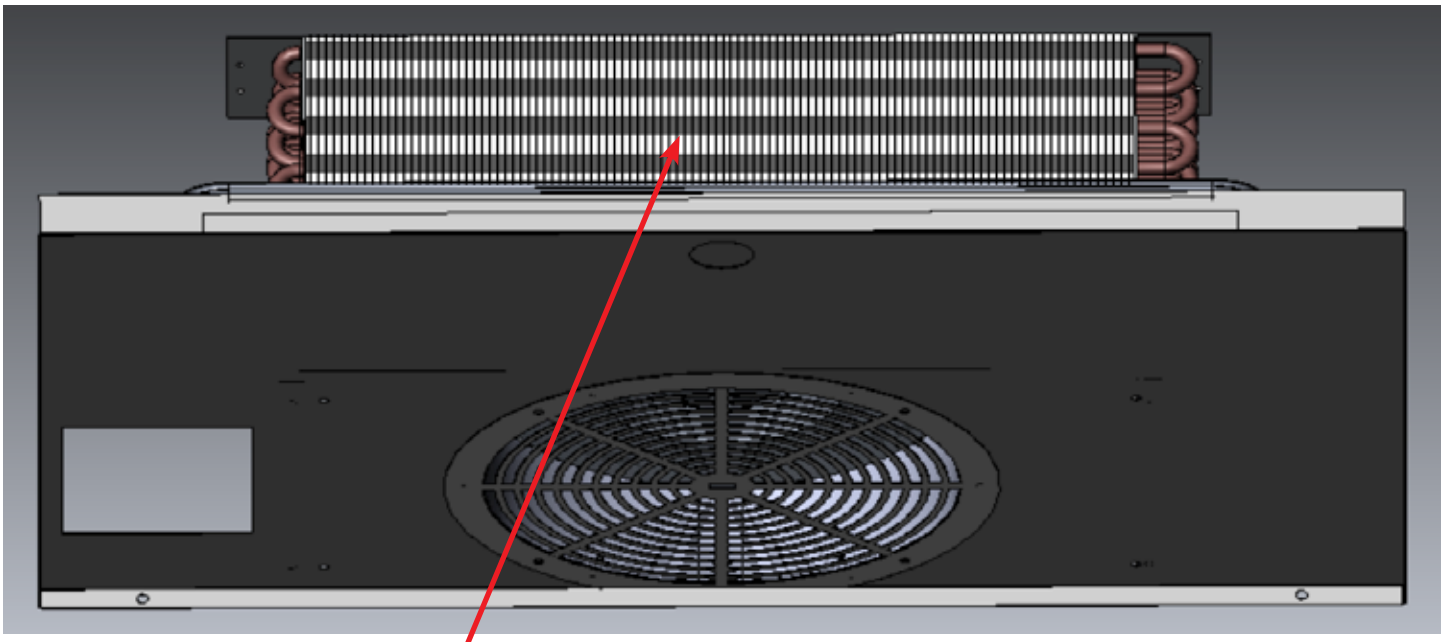
An optional location, or if no fan bracket is available, would be to zip tie the probe to a power wire at the bushing as it enters into the return air area. See images 3 and 4.

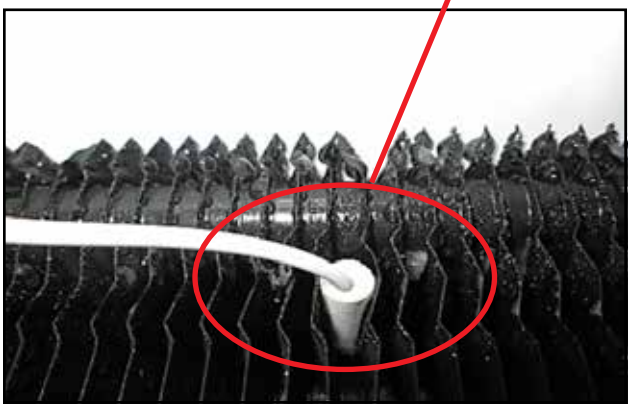
Secure thermostat probe wire to ensure any of the sensor wire does not hang or interfere with cabinet operation or mounting parts (for example, the evaporator fan motor/blade).

Use the supplied 3/16" P-clips (item "C" from parts kit) or wire ties to secure the wire(s).

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

PICTURE OF THE BACKSIDE OF THE EVAPORATOR COIL OR DISCHARGE SIDE OF COIL





PICTURE FROM THE BACKSIDE OF THE EVAPORATOR COIL

NOTE: For a dual fan with dual evaporator coil, locate the white probe in coil that is closest to the black thermostat probe.

PLACEMENT OF THE WHITE DEFROST PROBE

The defrost probe will be located in the discharge air side of the evaporator coil.

Route the white probe from the temperature control location to the discharge side of the evaporator coil through any opening. If necessary use any existing access holes with OEM bushing to pass through air baffles.

Any existing perma-gum will need to be reapplied to seal the hole(s).

PROBE PLACEMENT

From left to right, locate the middle of the evaporator coil.

Insert the probe tip below the top most refrigeration line in the middle of the coil. See pictures above.

NOTE: Insert only the tip of the probe in the evaporator coil, approximately one inch.

Secure fins around probe tip to hold it in place.

Secure defrost probe wire to ensure any of the sensor wire does not hang or interfere with cabinet operation or mounting parts (for example, the evaporator fan motor/blade).

Use the supplied 3/16" P-clips (item "C" from parts kit) or wire ties to secure the wire(s).

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

STOP!

2-WIRE SHADED POLE MOTOR

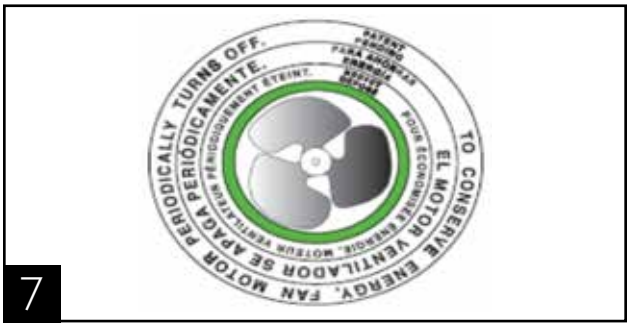
5

PRIOR TO PROCEEDING, VERIFY THE TYPE OF OEM FAN MOTOR THAT IS INSTALLED.

If you have the 2-wire shaded pole motor, proceed with installation. See image 5. **CONTINUE TO "WIRING OF THE ELECTRONIC CONTROL" SECTION.**

4-WIRE EBM FAN MOTOR

6

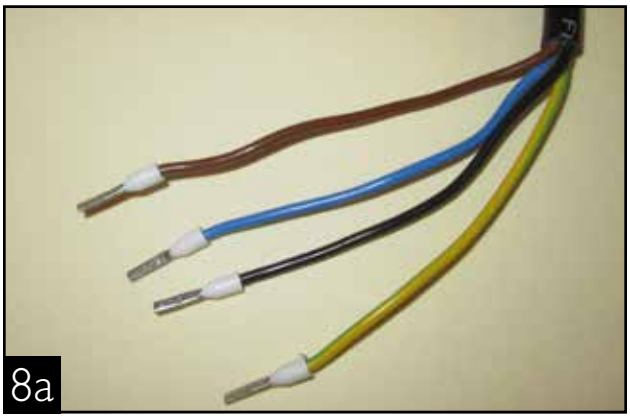


7

If you have the 4-wire EBM fan motor, and/or the sticker in image 7, then the fan motor wiring will need to changed. See images 6 and 7.

SEE "REWIRE 4-WIRE EBM MOTOR" SECTION ON NEXT PAGE.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS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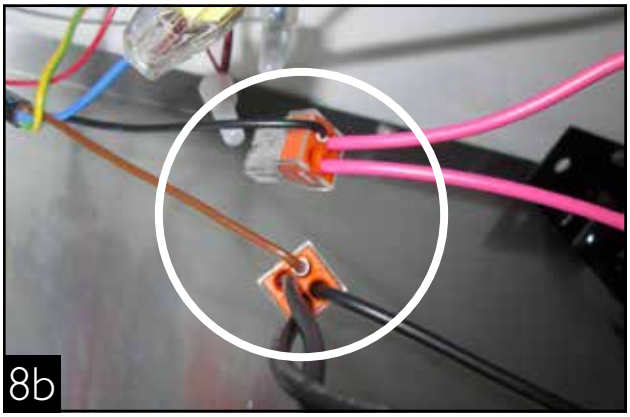
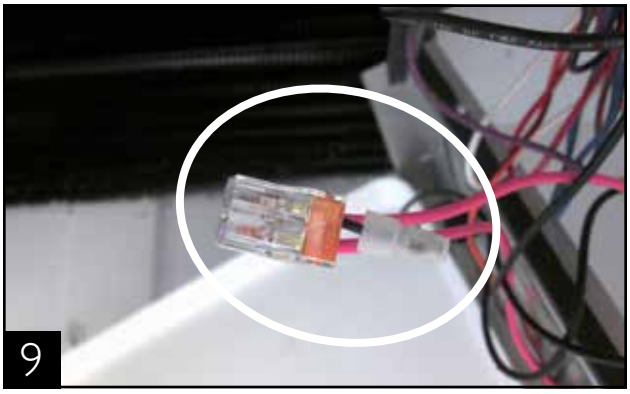

8b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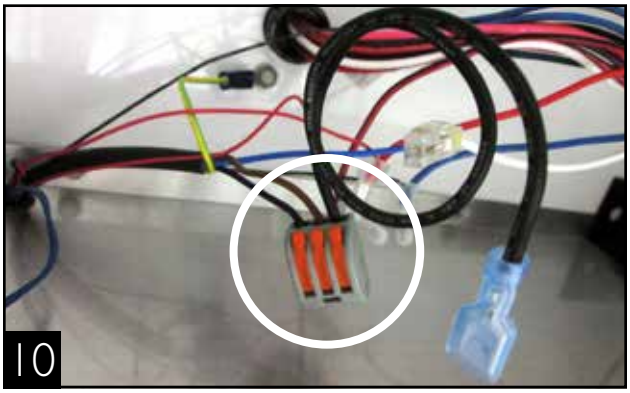

10

REWIRING 4-WIRE EBM MOTOR ONLY

Locate the black EBM wire sleeve containing black, brown, blue, green/yellow wires. See image 8a.

Cut the black and brown fan wires one inch from their respective connectors. See image 8b.

Using the provided crimp connectors (item "I" from parts kit), cap the ends of the remaining black and brown wire from connectors. See image 9.

Strip both black and brown wires to the EBM wire sleeve. Connect with supplied new black wire with 3-way lever connector. (Item "D" from parts kit) See image 10.

Attach the new black wire to the "AUX" of the new electronic control.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

Control wiring.

WIRING OF THE ELECTRONIC CONTROL

Remove electrical wires from the existing temperature control. Remove old temperature control from existing location and discard.

Determine which wire is the line-in (line voltage, constant power to control) and attach it to the "LINE-IN" terminal on the new electronic control. Attach the other wire to the "COMP" terminal on the new electronic control. See image 11.

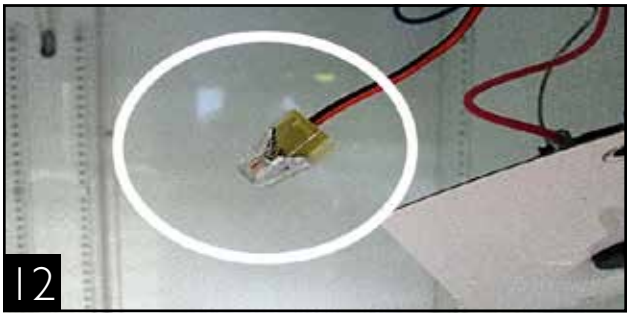
NOTE: The electronic control will require a neutral wire for its operation. Examples of two options for supplying a neutral wire are on the following pages.

HOW TO DETERMINE CABINET NEUTRAL WIRE COLOR

- **ALL 115V CABINETS, NEUTRAL IS WHITE**
- **ALL OTHER VOLTAGES, REFER TO MAIN POWER CORD TO DETERMINE CABINET NEUTRAL WIRE COLOR.**

INSTRUCTION PHOTOS SHOW 115V.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS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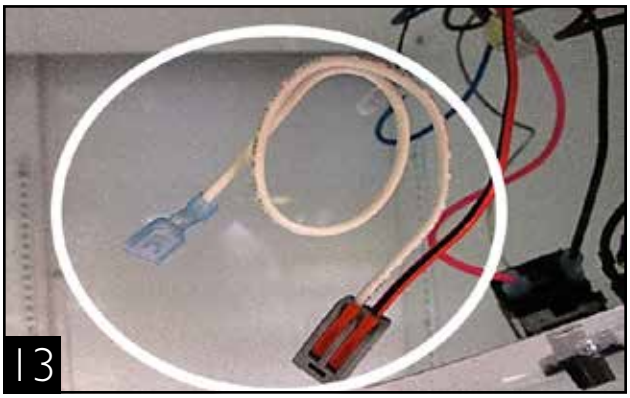
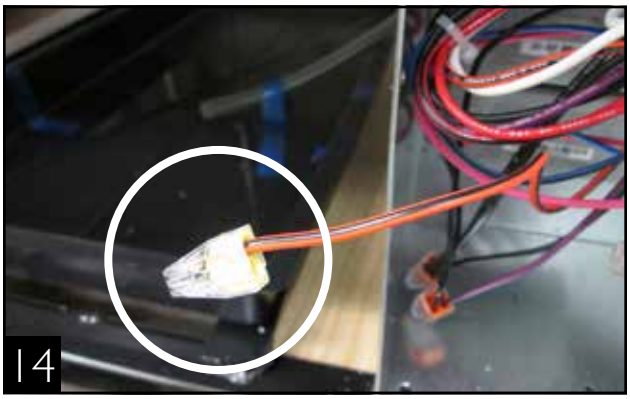

13

NEUTRAL WIRE OPTION 1

SPARE WIRE AVAILABLE

Locate spare wire that is capped off (typically orange/black stripe) in the evaporator housing area.

Attach provided white wire with spade connector (item "F" from parts kit) onto the "neutral" terminal on the new electronic control. Attach the spare wire to the new white wire with the provided 2-way lever connector. See images 12 and 13.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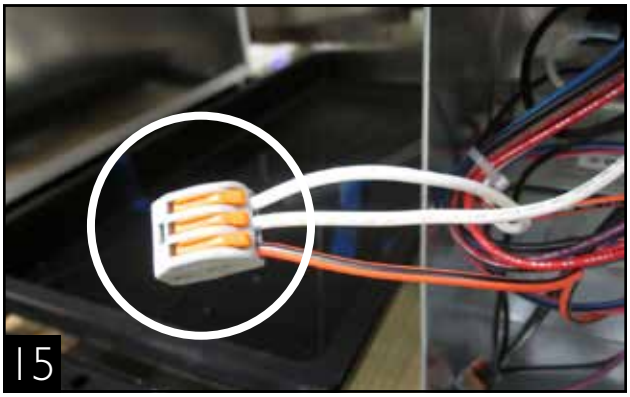
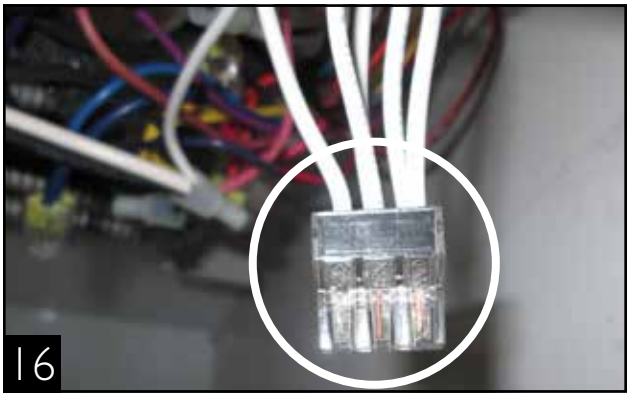

15

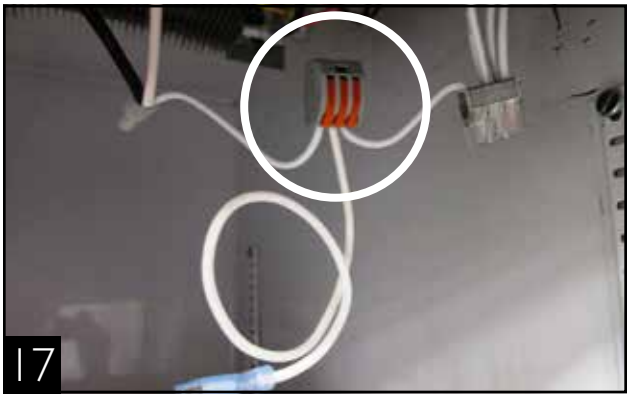
Locate the electrical box behind the louvered panel either on the top or bottom of the cabinet.

Remove the electrical box cover and locate the same spare wire capped off (typically orange/black stripe).

Locate any neutral wire from its bundle and splice in the spare wire using the provided 3-way lever connector (item "E" from parts kit). Discard white wire with spade. See images 14 and 15.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS


16


17

NEUTRAL WIRE OPTION 2

NO SPARE WIRE AVAILABLE

Attach provided white wire with spade connector onto the "neutral" terminal on the new electronic control. Locate any neutral wire in evaporator area and splice in the new white wire using the provided 3-way lever connector (item "E" from parts kit). See images 16 and 17.

18

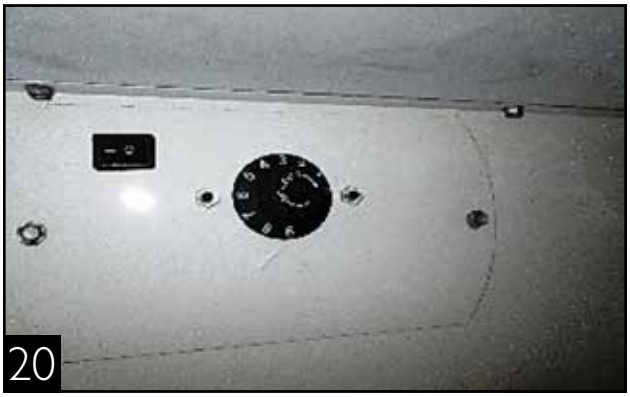
PROBE CONNECTIONS

Attach the white probe wire to "probe 2" on the controller. Attach the black probe wire to "probe 1" on the controller. See image 18.

If "AUX" is not used by EMB motor, use the provided blank spade connector in parts kit and attach to the "AUX" terminal on the electronic control. See image 19.

19

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS


20

21

22

MOUNTING OF THE ELECTRONIC CONTROL

The new electronic control will mount in the same location as the old mechanical control. Place the temperature control mounting plate onto the electronic control. See image 20.

When control knob is rotated all the way counterclockwise, #0 will align with the embossed mark. See image 21.

Secure the electronic control to the mounting plate with supplied hardware.

NOTE: Hand tighten the nut to the post of the electronic control. To prevent damage to the control, do not overtighten.

Align #5 on temperature control with the embossed mark.

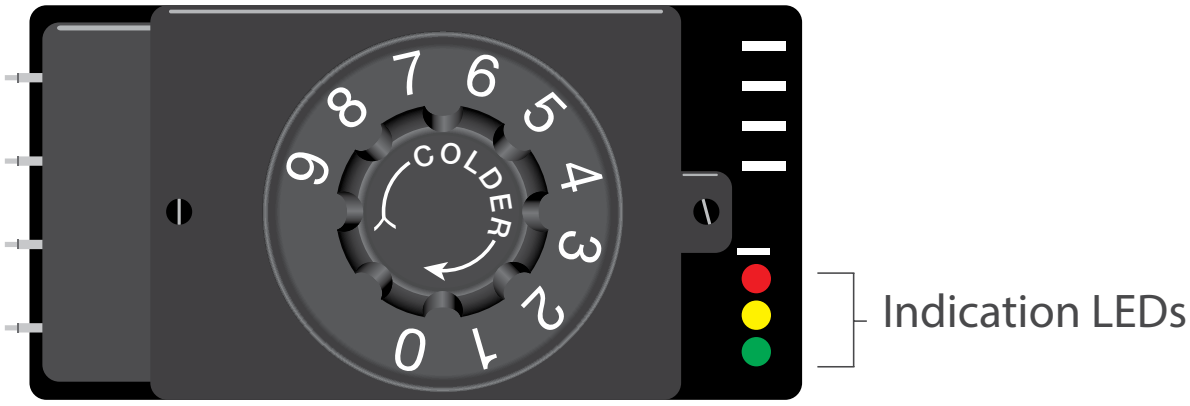
Plug in cabinet.

NOTE: If the power wires (line-in and "COMP") are reversed the control indictor lights will not illuminate upon start up. See image 22. Refer to Trouble Shooting on last page for more information.

FOR ADDITIONAL TEMPERATURE CONTROL INFORMATION AND TROUBLESHOOTING, SEE NEXT PAGES.

SOLLATEK ELECTRONIC TEMPERATURE CONTROLS

HOW TO DIAGNOSE THE SOLLATEK ELECTRONIC CONTROL



RED LED	YELLOW LED	GREEN LED	MEANING
OFF	OFF	ON	Compressor is ON, there is cooling demand.
ON	OFF	OFF	Voltage is bad, all outputs are OFF, there is cooling demand.
Flashing	OFF	OFF	Voltage is bad, all outputs are OFF, no cooling demand.
OFF	ON	OFF	In wait mode, there is cooling demand, waiting for the time delay is over. Compressor is OFF. Relay#2 & 3 are configurable.
OFF	Flashing	OFF	In wait mode, no cooling demand and time delay is not over yet. Compressor is OFF. Relay#2 & 3 are configurable.
OFF	OFF	Flashing	No cooling demand and time delay is over. Compressor is OFF. Relay#2 & 3 are configurable.
Cycling	OFF	Cycling	In pre-defrost mode. All outputs are OFF
ON	OFF	ON	In defrost mode. Compressor is OFF. Relay#2 & 3 are configurable.
Flashing	OFF	Flashing	In drip-down mode (or post-defrost mode). All outputs are OFF
OFF	ON	ON	In post drip-down recovery mode. Compressor is ON. Relay#2 & 3 are configurable.
OFF	Flashing	Flashing	Probe#1 is faulty.
OFF	Cycling	Cycling	Probe#2 is faulty.

NOTES

NOTES

NOTES

USA Service Department Hours

(Central Standard Time Zone)

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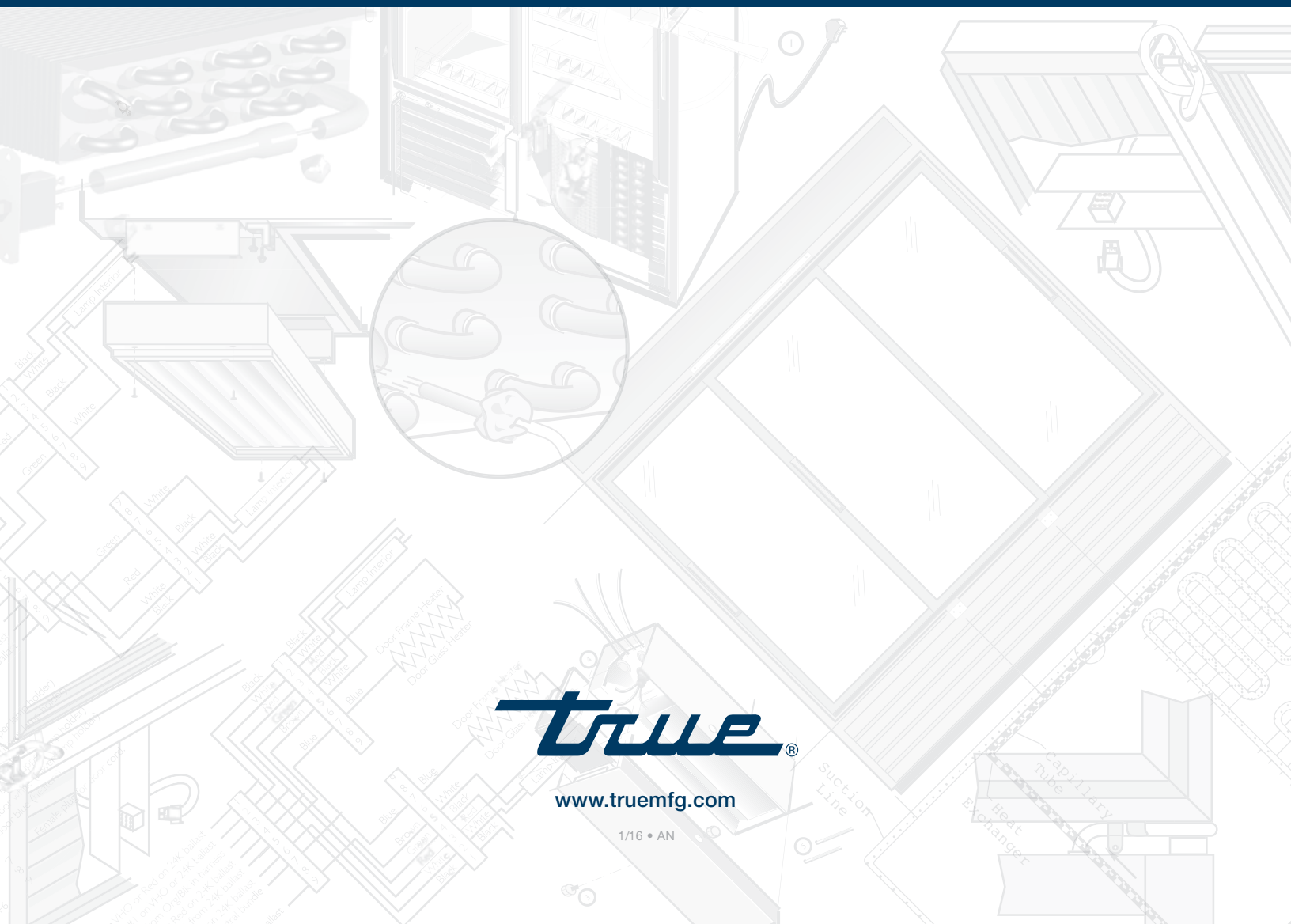

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