DANFOSS ELECTRONIC TEMPERATURE CONTROLS

Control version will vary with model and age of cabinet.

DANFOSS:
thermostat probe = return air
defrost probe = coil

DANFOSS ELECTRONIC PROBES:

Previous Danfoss display
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

\[
\text{(Set-Point) } 34°F + 6 \text{ (Differential) } = 40°F \\
\text{Or} \\
\text{(Set-Point) } 1.1°C + 3.3 \text{ (Differential) } = 4.4°C
\]

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/-21.4°C and the Differential is 6°F/4°C

   \[
   \text{(Set-Point)} \ -6°F \ + \ 6 \ \text{(Differential)} \ = \ 0°F
   \]

   Or

   \[
   \text{(Set-Point)} \ -21.4°C \ + \ 3.3 \ \text{(Differential)} \ = \ -18.1°C
   \]

   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 evaporator fans 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 electronic 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

Alarm Symbol

Info / Scroll  Defrost / Down  Manual / Up  Power

LAE electronic control board

DISPLAY FOR DANFOSS CONTROL

No Alarm Symbol

Defrost  Down  Up  Power

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.
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.
# DANFOSS ELECTRONIC TEMPERATURE CONTROLS

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

### DANFOSS CONTROLS

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

*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:

DEFOST

THERMOSTAT

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.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>F</td>
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<tr>
<td>-55</td>
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<td>40</td>
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</table>

Danfoss Probe Temperature to Resistance Chart