Models:
DC440, DC451, DC490
DE441, DE451, DE461, DE490
MRFT415, MRFT440, MRFT460
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure A</td>
<td>Thermostat “ON” Compressor does not run</td>
<td>3</td>
</tr>
<tr>
<td>Procedure B</td>
<td>Compressor Resistance</td>
<td>4</td>
</tr>
<tr>
<td>Procedure C</td>
<td>Power Supply Output Voltage</td>
<td>5</td>
</tr>
<tr>
<td>Procedure D</td>
<td>Compressor Amp Draw</td>
<td>6</td>
</tr>
<tr>
<td>Procedure E</td>
<td>Evaporator Thermister Resistance</td>
<td>7</td>
</tr>
<tr>
<td>Procedure F</td>
<td>Insufficient Cooling</td>
<td>8</td>
</tr>
<tr>
<td>Procedure G</td>
<td>Refrigerator to Cold</td>
<td>9</td>
</tr>
<tr>
<td>Procedure H</td>
<td>Auto Shut-OFF Device</td>
<td>10</td>
</tr>
<tr>
<td>Wiring Schematic</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Procedure I</td>
<td>Ventilation</td>
<td>12-14</td>
</tr>
<tr>
<td>Quick Reference Repair Sheet</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

**WARNING**

Perform all tests using a fully charged 12 VDC battery. Using other equipment that supplies DC voltage may cause permanent refrigerator compressor failure.
Trouble Shooting - Procedure A

Thermostat "ON" Compressor does not run

Is Temperature Control LED on?

YES

NO

Measure terminal voltage of Temperature Control between TP1 & TP2

DC 0 V

DC 5 V

DC 2 V

Short Circuit

Power Supply Failure

Normal

Change Temperature Control

Check Battery Voltage (10.5 - 32 VDC)

Wrong

Correct DC Voltage

Compressor runs

YES

OK

Check DC Fuse

Bad

Wrong

Compressor runs

YES

OK

Check DC Polarity

Good

Wrong

Replace fuse if defective 10A (DE/DC)
8A (MRFT)
See Figure 2

Compressor runs

YES

OK

Measure terminal voltage of Temperature Control between TP2 & TP3
See Figure 1

DC 0 V

DC 12 to 32 V

Power Supply Failure

Normal

Change Power Supply
See Procedure B

Correct DC Voltage

Wrong

Compressor runs

YES

OK

Check Battery Voltage (10.5 - 32 VDC)

Wrong

Correct DC Voltage

Compressor runs

YES

OK

Check DC Fuse

Bad

Correct DC Voltage

Compressor runs

YES

OK

Check DC Polarity

Good

Wrong

Replace fuse if defective 10A (DE/DC)
8A (MRFT)
See Figure 2

Compressor runs

YES

OK

Measure terminal voltage of Temperature Control between TP1 & TP2
See Figure 1

DC 0 V

DC 5 V

DC 2 V

Short Circuit

Power Supply Failure

Normal

Change Temperature Control

Note:
If 10 Amp fuse is blown, check wiring of vehicle

Figure 1 - Temperature Control

Figure 2 - Power Supply
Turn the refrigerator to OFF.

Remove the black wire to the compressor. Measure the resistance of the compressor between Point A and Point B.

Figure 2 - Measuring Compressor Resistance
Trouble Shooting - Procedure C

Power Supply Output Voltage

Measure voltage between A & B at the compressor

Below 15 V AC
Power Supply Failure

0 V AC
Power Supply Failure

Remove Power Supply

Check F3 fuse on circuit board

∞ Ohms: Replace Power Supply & Cooling Unit

0 Ohms: Replace Power Supply

15 - 25 V AC
Normal
See Procedure D

ART01196

Figure 3 - Measuring Power Supply Output Voltage

Figure 4 - DE Models only - F3 Fuse Location

Figure 4A - DC Models only - F3 Fuse Location
Trouble Shooting - Procedure D

Figure 5 - Measuring Amp draw of Compressor
Thermister Check-Out

Turn the refrigerator to OFF to measure resistance of the Evaporator Thermistor.

Disconnect the three pole connector (Figure 6)

Measure resistance (Figure 7).

The Evaporator Thermistor is checked by measuring the temperature and resistance of the Thermistor (Table 1).

1.6K - 29K Ω = good Thermistor.

∞ Ω = open Thermistor windings. An open Thermistor will stop compressor operation. Replace Thermistor.

---

Table 1

<table>
<thead>
<tr>
<th>Thermistor Temperature °F</th>
<th>Resistance</th>
<th>Allowable Resistance Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>9.7K</td>
<td>8.7K - 10.7K</td>
</tr>
<tr>
<td>10</td>
<td>7.8K</td>
<td>7.0K - 8.6K</td>
</tr>
<tr>
<td>20</td>
<td>6.4K</td>
<td>5.7K - 7.0K</td>
</tr>
<tr>
<td>30</td>
<td>5.3K</td>
<td>4.8K - 5.7K</td>
</tr>
<tr>
<td>40</td>
<td>4.5K</td>
<td>4.0K - 4.9K</td>
</tr>
<tr>
<td>50</td>
<td>3.6K</td>
<td>3.2K - 4.0K</td>
</tr>
<tr>
<td>60</td>
<td>2.8K</td>
<td>2.5K - 3.1K</td>
</tr>
<tr>
<td>70</td>
<td>2.1K</td>
<td>1.9K - 2.3K</td>
</tr>
<tr>
<td>80</td>
<td>1.9K</td>
<td>1.7K - 2.0K</td>
</tr>
<tr>
<td>90</td>
<td>1.8K</td>
<td>1.6K - 1.9K</td>
</tr>
</tbody>
</table>

---

Figure 6 - Evaporator Thermister

Three Pole Connector

Figure 7 - Evaporator Thermister

Measure Resistance
Trouble Shooting - Procedure G

Refrigerator too cold

Adjust temperature control to lower setting (#1= Warm #5= Coldest)

Yes → OK

No

Is the Evaporator Thermistor securely mounted to plate?

Yes → Refer to Procedure E

No → Reposition Thermistor or Tighten mounting screw

ART01200
Auto-Shut Off Device

Trouble Shooting Shut-Off Device

WARNING
Do not operate refrigerator with Shut-OFF Device disconnected. Operating the refrigerator without device may cause compressor failure.

To determine if Shut-OFF Device is functional, disconnect the Shut-OFF Device from the Temperature Control. Connect the Temperature Control direct to power supply. IF refrigerator operates, replace the Shut-OFF Device. If no operation, replace the Temperature Control.

Overheating Shut-off Device Installation


2. Attach the SHUT-OFF DEVICE to the refrigerator:
   
   - Position the SHUT-OFF DEVICE [5] above the POWER SUPPLY and align the mounting holes of the SHUT-OFF DEVICE with the upper holes of the POWER SUPPLY (See Art01325).
   
   - Put a screw through each mounting hole of the SHUT-OFF DEVICE, through the POWER SUPPLY and into the back of the refrigerator.
   
   - Tighten each screw.

3. Connect the SHUT-OFF DEVICE wires to the refrigerator (See Art01325):
   
   - Push the longer wire [6] of the SHUT-OFF DEVICE onto the upper connection of the POWER SUPPLY.
   

Overheating Shut-off Device Operation

The refrigerator will not restart until the refrigerator is manually turned off and the air temperature is lower than 110°F.

Operating the refrigerator in high ambient temperatures can overheat the cooling unit and cause premature failure of the compressor. (Refer to the label inside the refrigerator.)

To protect the cooling unit from overheating, the refrigerator will automatically shut-off when the vehicle air temperature is higher than 110°F. If shut off occurs, an audible alarm tone (an intermittent beeping) from the refrigerator will sound.

To stop the audible alarm tone and restart the refrigerator, you must turn the thermostat knob counterclockwise to "OFF" and then clockwise to the desired setting.
Ventilation is necessary for the correct operation of the refrigerator and to increase the life of the refrigerator cooling system. Ventilation allows the natural air flow that is necessary for good refrigeration. Cooler air comes in from the living area of the vehicle through a lower intake vent, goes around the refrigerator coils where it removes the excess heat from the refrigerator components, and goes out into the living area of the vehicle through an upper exhaust vent. If this air flow is blocked or decreased, the refrigerator will not cool correctly. **Do not install the vents into areas such as closets or cabinets.** Each refrigerator has specified **minimum** vent size requirements (See page 12). However, more air flow over the refrigerator coils increases the cooling performance of the refrigerator. If the construction of the vehicle does not allow you to install the vents into the living area of the vehicle, use any of the following approved vent combinations that are at the rear of the refrigerator (See Art01129).

**CAUTION:**

Each refrigerator has specified **minimum** vent size requirements. Vent sizes that are less than the minimum requirements can cause:

- shortened life of the refrigerator cooling unit.
- poor cooling performance of the refrigerator.
- continuous operation of the refrigerator.
- fast battery discharge.
- void of the refrigerator warranty.

![Diagram of refrigerator vents](Art01129)

A / I, B / F, C / J; D / G, A / J, B / G, D / H, B / H
In addition to the required vents sizes, a fan can be added to increase the refrigerator performance and to decrease the refrigerator current consumption. A fan kit is available through Norcold part distribution network. Refer to Fan Kit Assembly chart on page 12.

1. Side view of refrigerator
2. Ventilation Fan
3. Air Intake
4. Exhaust
## Ventilation - Procedure I

<table>
<thead>
<tr>
<th>Refrigerator Model</th>
<th>Min. Vent Sizes Without Fan</th>
<th>Min. Vent Sizes With Fan</th>
<th>Recommended Fan CFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC440,K,V</td>
<td>50 Square Inches Inlet 50 Square Inches Outlet</td>
<td>25 Square Inches Inlet 25 Square Inches Outlet</td>
<td>28</td>
</tr>
<tr>
<td>DC/DE/EV451</td>
<td>50 Square Inches Inlet 50 Square Inches Outlet</td>
<td>25 Square Inches Inlet 25 Square Inches Outlet</td>
<td>28</td>
</tr>
<tr>
<td>DE490,V</td>
<td>100 Square Inches Inlet 100 Square Inches Outlet</td>
<td>35 Square Inches Inlet 35 Square Inches Outlet</td>
<td>28</td>
</tr>
<tr>
<td>DE/EV441</td>
<td>100 Square Inches Inlet 100 Square Inches Outlet</td>
<td>50 Square Inches Inlet 50 Square Inches Outlet</td>
<td>28</td>
</tr>
<tr>
<td>DE/EV461</td>
<td>100 Square Inches Inlet 100 Square Inches Outlet</td>
<td>50 Square Inches Inlet 50 Square Inches Outlet</td>
<td>60</td>
</tr>
</tbody>
</table>

### Part Number Table

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Model</th>
<th>AMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>160928900</td>
<td>Fan Only</td>
<td>DE/DC451</td>
<td>.15</td>
</tr>
<tr>
<td>160928900</td>
<td>Fan Only</td>
<td>DC440,K,V</td>
<td>.15</td>
</tr>
<tr>
<td>160928900</td>
<td>Fan Only</td>
<td>DE490, V</td>
<td>.1</td>
</tr>
<tr>
<td>160928900</td>
<td>Fan Only</td>
<td>DE441</td>
<td>.15</td>
</tr>
<tr>
<td>160929310</td>
<td>Fan Only</td>
<td>DE461</td>
<td>.15</td>
</tr>
</tbody>
</table>
1. Check for 12 VDC (supply voltage) at rear of the refrigerator. Turn refrigerator ON, operating voltage is between 10.5 VDC to 32 VDC.

2. Check for voltage (15 VAC-25 VAC) at compressor between points A and B. If voltage is not within range, refer to Procedure C on page 5.

3. Take an Ohm (2.5-3.5 Ohms) reading at compressor between points A and B. If Ohms is not within range, refer to Procedure B on page 4.

4. Take an Amp (1.5-2.5 Amps) reading at the black wire (with rubber boot) connected to the compressor. If Ohms is not within range, refer to Procedure D on page 6.
All manuals are believed to be released for distribution, and/or in the public domain.

Service manuals provided with the understanding that persons using them are well versed in proper safety practices, and are familiar with basic safety procedures, including, but not limited to safety procedures dealing with 120 volt electricity, high amperage 12 volt circuits an LPG (propane) systems.

If in doubt, consult a professional (better safe than sorry).