

# TEST PAGE B

This document contains testing instructions which are specific to the controller shown below. If the seven tests throughout this document do not resolve a problem with your fridge, the **remove and send instructions** at the end of this document will help you send your Danfoss controller to Cold Technology to be repaired.

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## Very Important Note!

This type of controller may not be repairable. An exchange unit may not be available. If the fault in your controller is due to the failure of an electronic component that we cannot source then we cannot repair your controller and therefore, cannot provide you with an exchange unit, however, most controllers of this type can be exchanged.



# SECTION A

## *Check the battery*

*This procedure should only be used for the type of controller shown on the contents page of this document.*

The most common cause of the poor operation of a 12 volt or 24 volt fridge is insufficient state of charge of the car, boat or house batteries supplying power to the fridge. In simpler terms, your batteries are flat. When the state of charge of the batteries supplying power to the fridge drops to approximately 20%, the Danfoss controller will turn the compressor off automatically. This means that the fridge will not operate, even though most lights, radios and other electrical equipment in the boat, vehicle or house will still operate. In these conditions the fridge is the only device that is not operating and it is often falsely assumed that the fridge is faulty when in fact the problem lies in the batteries or charging system. The following procedure will help you check the state of charge of the batteries.

**If you do not understand this procedure seek help from a qualified electrician or technician!**

- 1** Turn on some lights or electrical equipment that share the power supply to the fridge. This will place some load on the battery.
- 2** Most installations have a meter somewhere in the boat, vehicle or house to indicate the state of charge of the batteries. This may be labelled as a voltmeter or a battery condition meter. With the load suggested in step 1, the meter in a 12 volt system should show 11.5 volts or higher. With the load suggested in step 1, the batteries in a 24 volt system should show 23 volts or higher.
- 3** If the battery state is lower than recommended in step 2, the batteries should be charged until they meet the recommendation. If the fridge operates after the batteries have been charged, you have probably diagnosed a low battery problem. You do not need to continue with the instructions in this document and your Danfoss controller probably does not need to be repaired. The batteries, charging system or charging method should be investigated.  
**If the battery state meets the recommendations in step 2 but the fridge still does not operate, go to the next procedure.**

**Note:** There are many combinations and capacities of batteries as well as charging methods used in D.C. Electrical systems. There are also many opinions regarding suitable state of charge of batteries. The recommendations in step 2 refer only to the minimum battery state of charge necessary to test a refrigerator and do not indicate the state of charge necessary for good battery system maintenance.

# SECTION B

## Check the fuse




*This procedure should only be used for the type of controller shown on the contents page of this document.*

If you do not understand this procedure seek help from a qualified electrician or technician!

BEWARE a short circuit between two terminals of a battery can result in a fatal explosion of the battery

- 1 Turn off or isolate any charging sources such as wind generators, mains battery chargers or solar panels.  
Solar panels can simply be covered to block the sun.
- 2 Disconnect the fridge from the battery/power supply by turning off the battery isolator switch which is usually near the batteries in the boat, vehicle or house. If there is no battery isolator switch in the installation, continue with the procedure. Adjust the fridge thermostat to the off position.

If you are unsure of the battery or electrical configuration seek help from a qualified electrician or technician!

	3 Locate the plastic fuse cover on the Danfoss controller - lever off with a screw driver.
	4 Loosen the fuse by moving from side to side and pulling outward.
	5 Grip the sides & pull outwards to remove the fuse completely from the holder.

- 6 The fuse can be inspected visually or tested with an ohm/multi meter or simply replaced with another fuse of the same rating. Remove and re-insert the fuse several times to create a good connection between the fuse and the holder. With the fuse firmly inserted for the final time, push it firmly into place.
- 7 While listening for any sound from the compressor, reconnect the fridge to the battery/power supply by turning on the battery isolator switch and turn on the fridge and adjust the fridge thermostat to the coldest setting. Wait at least 1 minute to see if the compressor will run.
- 8 If the compressor runs you have probably diagnosed a faulty or dirty fuse. You do not need to continue with the instructions in this document and your Danfoss controller probably does not need to be repaired. Replace the plastic cover on the fuse holder.
- 9 **If the compressor does not run, go to the next procedure.**

## SECTION C

### *Check the thermostat*

*This procedure should only be used for the type of controller shown on the contents page of this document.*

A thermostat is commonly used with Danfoss compressors to stop and start the compressor thereby controlling the temperature in the fridge/freezer compartment. The thermostat should be connected between terminal (C) and terminal (T) on the Danfoss controller. When the temperature in the fridge/freezer rises the switch contacts of the thermostat close and create a circuit between terminal (C) and terminal (T). In this condition the controller will run the compressor to cool the fridge/freezer

When the temperature in the fridge/freezer drops, the switch contacts in the thermostat open, removing the circuit between terminal (C) and terminal (T). In this condition the controller will stop the compressor.

The following procedure will temporarily eliminate the thermostat.

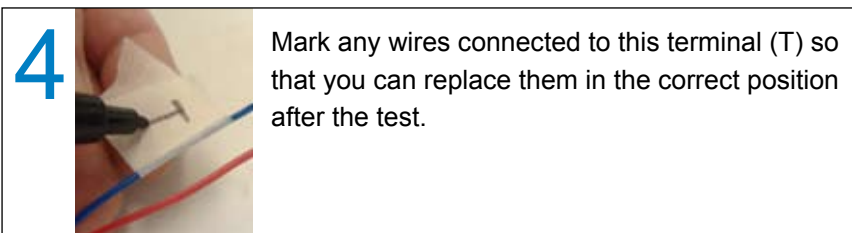
The fridge should not be run for more than a few minutes in this configuration.

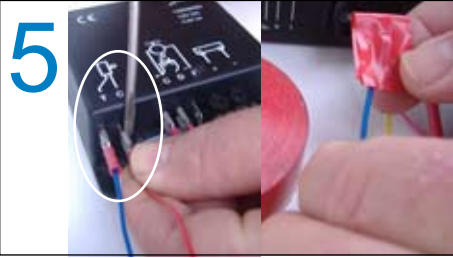
If you do not understand this procedure seek help from a qualified electrician or technician!

BEWARE a short circuit between two terminals of a battery can result in a fatal explosion of the battery.

- 1 Turn off or isolate any charging sources such as wind generators, mains battery chargers or solar panels.  
Solar panels can simply be covered to block the sun.
- 2 Disconnect the fridge from the battery/power supply by turning off the battery isolator switch and remove the fuse as shown in Section B steps 3,4 & 5. If there is no battery isolator switch, remove the fuse as shown in Section B steps 3,4 & 5.

If you are unsure of the battery or electrical configuration seek help from a qualified electrician or technician!





5 Disconnect any wires connected to the terminals marked (T) and (C) on the Danfoss controller. Use insulation tape to protect the wires once they are disconnected from the terminals marked (T) and (C) on the Danfoss controller so it cannot contact other wires, electrical components or metal. ***Fire could result if this wire is not insulated correctly. Always grip the crimped terminal, not the wire.***



6 You may need to have a technician or auto electrician assemble a wire with a female spade terminal each end for this step. Connect one end of the wire to the terminal marked (C) on the Danfoss controller. Connect the other end of the wire to the terminal marked (T) on the Danfoss controller.

7 While listening for any sound from the compressor, reconnect the fridge to the battery/power supply by turning on the isolator switch and/or re-inserting the fuse removed in step 2 and try to detect noise or vibration from the compressor. Wait at least 1 minute to see if the compressor will run.

8 If the compressor runs you have probably diagnosed a faulty thermostat and the thermostat will need to be replaced. You do not need to continue with the instructions in this document and your Danfoss controller probably does not need to be repaired.

9 If the compressor does not run, disconnect the fridge from the battery/power supply by turning off the battery isolator switch and remove the fuse as shown in Section B steps 3,4 & 5. If there is no battery isolator switch, remove the fuse as in Section B steps 3,4 & 5. Remove the temporary wire link that you connected in step 6, reconnect any wires you removed in step 5 to the terminal marked (T) so that the wiring is back as it was before the test and **go to the next procedure.**

# SECTION D

## Check the fan

*This procedure should only be used for the type of controller shown on the contents page of this document.*

In some installations an electric fan may be used to cool the condenser of the refrigeration system. The fan may be connected between the terminal marked (F) on the Danfoss controller and the terminal marked (C) on the Danfoss controller. The Danfoss controller will turn the fan on when the compressor is running. If a fan connected to the Danfoss controller is defective it may cause the controller to shut down.

The following procedure will temporarily eliminate the fan.

The fridge should not be run for more than a few minutes in this configuration.

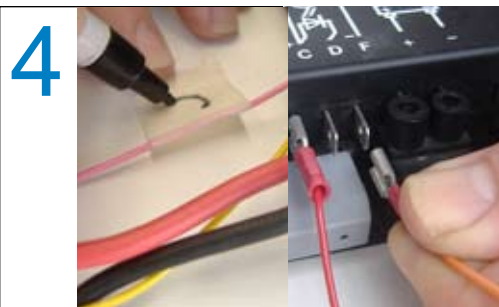
If you do not understand this procedure seek help from a qualified electrician or technician!

BEWARE a short circuit between two terminals of a battery can result in a fatal explosion of the battery.

- 1 Turn off or isolate any charging sources such as wind generators, mains battery chargers or solar panels.  
Solar panels can simply be covered to block the sun.
- 2 Disconnect the fridge from the battery/power supply by turning off the battery isolator switch. Remove the fuse as shown in Section B steps 3,4 & 5. If there is no battery isolator switch, remove the fuse as shown in Section B, steps 3,4 & 5.

If you are unsure of the battery or electrical configuration seek help from a qualified electrician or technician.

- 3 Locate the terminal marked (F) on the Danfoss controller.



4 Mark any wires connected to this terminal (F) so that you can replace them in the correct position. Remove the wire from the terminal marked (F) on the Danfoss controller. Use insulation tape to protect the wire once it is disconnected from the terminal so it cannot contact other wires, electrical components or metal as shown in Section C, Step 5.

**Fire could result if this wire is not insulated correctly.**

- 5 While listening for any sound from the compressor, reconnect the fridge to the battery/power supply by turning on the isolator switch and/or re-inserting the fuse you removed in step 2. Adjust the fridge thermostat to the coldest setting and try to detect noise or vibration from the compressor. After you turn on the fridge wait at least 1 minute to see if the compressor will run.
- 6 If the compressor runs you have probably diagnosed a faulty fan and the fan may need to be replaced. You do not need to continue with the instructions in this document and your Danfoss controller probably does not need to be repaired.
- 7 If the compressor still does not run, disconnect the fridge from the battery/power supply by turning off the battery isolator switch and remove the fuse as shown in Section B steps 3,4 & 5. If there is no battery isolator switch, remove the fuse as shown in Section B steps 3,4 & 5. Reconnect any wires you removed in step 4 to the terminal marked (F) on the Danfoss controller so that the wiring is back as it was before the test and **go to the next procedure.**

## SECTION E

### Check the compressor plug



*This procedure should only be used for the type of controller shown on the contents page of this document.*

If you do not understand this procedure seek help from a qualified electrician or technician!

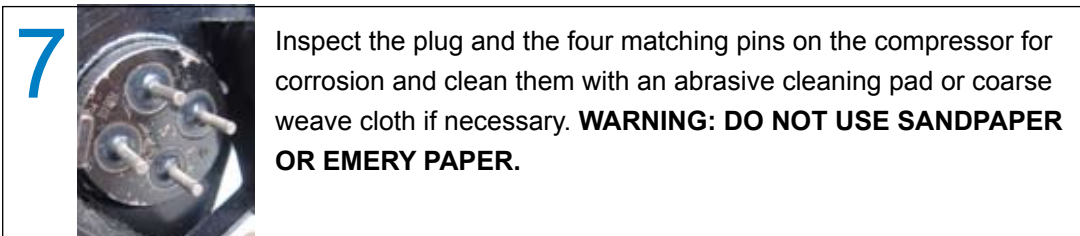
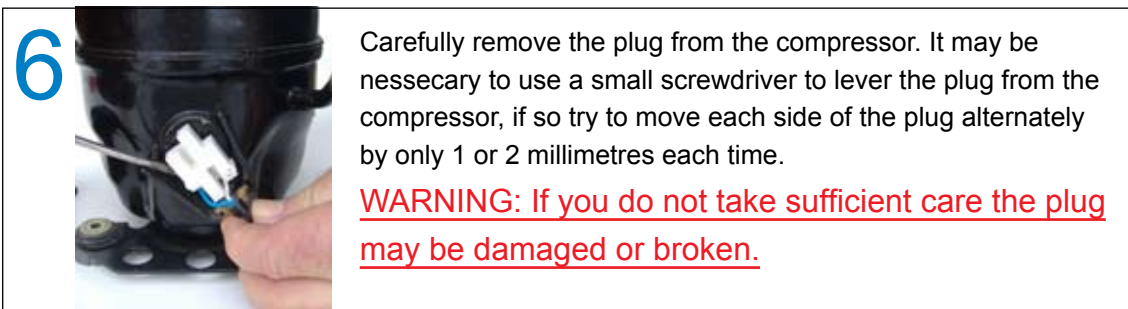
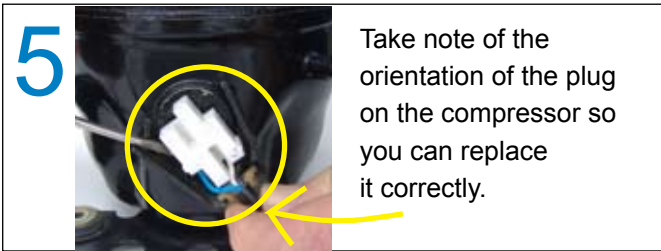
BEWARE a short circuit between two terminals of a battery can result in a fatal explosion of the battery.

- 1 Turn off or isolate any charging sources such as wind generators, mains battery chargers or solar panels. Solar panels can simply be covered to block the sun.
- 2 Disconnect the fridge from the battery/power supply by turning off the battery isolator switch and remove the fuse as shown in Section B steps 3,4 & 5. If there is no battery isolator switch, remove the fuse as shown in Section B, steps 3,4 & 5.

If you are unsure of the battery or electrical configuration seek help from a qualified electrician or technician.

<p>3</p> 	<p>Locate the power lead that connects the Danfoss controller to the compressor.</p>	<p>4</p> 	<p>Remove the metal clip and plastic cover from the compressor plug. You may need to lever it off with a screwdriver.</p>
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**8** Replace the plug in the same orientation as you noted in step 5. Do not replace the cover and clip at this time.

**9** While listening for any sound from the compressor, reconnect the fridge to the battery/power supply by turning on the battery isolator switch and/or re-insert the fuse removed in step 2. Adjust the fridge thermostat to the coldest setting and try to detect noise or vibration from the compressor. Wait at least 1 minute to see if the compressor will run.

**10** If the compressor runs, you have probably diagnosed a dirty plug connection and resolved the problem. Turn off the fridge and replace the cover and clip. You do not need to continue with the instructions in this document and your Danfoss controller probably does not need to be repaired.

**11** If the compressor still does not run go to the next procedure.



# SECTION F

## Compressor resistance test

*This procedure should only be used for the type of controller shown on the contents page of this document.*




Inside the Danfoss compressor are three coils that are switched by the Danfoss controller to make the compressor run. These coils and the points where they connect to the outside plug some times become loose or disconnected. The procedure described below allows you to test the condition of the connections and the coils inside the compressor. Experience with electrical meters is preferred as it is quite impossible to include instructions for all the meters that could be used for this test.

If you do not understand this procedure seek help from a qualified electrician or technician!

BEWARE a short circuit between two terminals of a battery can result in a fatal explosion of the battery.

- 1 Turn off or isolate any charging sources such as wind generators, mains battery chargers or solar panels.  
Solar panels can simply be covered to block the sun.
- 2 Disconnect the Danfoss controller from the battery/power supply by turning off the battery isolator switch and remove the fuse as shown in Section B steps 3,4 & 5. If there is no battery isolator switch, remove the fuse as shown in Section B steps 3,4 & 5.

If you are unsure of the battery or electrical configuration seek help from a qualified electrician or technician!

	<p>3 Locate the power lead that connects the Danfoss controller to the compressor (as in the compressor plug test).</p>		<p>4 Remove the metal clip and plastic cover from the compressor plug (as in the compressor plug test).</p>
	<p>5 Take note of the orientation of the plug on the compressor so you can replace it correctly.</p>		

6



Carefully remove the plug from the compressor. It may be necessary to use a small screwdriver to lever the plug from the compressor, if so try to move each side of the plug alternately by only 1 or 2 millimetres each time.

**WARNING: If you do not take sufficient care the plug may be damaged or broken.**

7



Identify the positions of the four pins.

8



On your meter select the lowest range capable of measuring 5 ohms. Place one meter probe on pin 3. Place the second meter probe on pin 1, then pin 4, then pin 2, recording the values for each.

9

For **12 volt** Danfoss compressors the measured resistances between the pins should be as follows

Between pins **3** and **1** should be **0.2 ohms**

Between pins **3** and **4** should be **0.2 ohms**

Between pins **3** and **2** should be **2.7 ohms**

For **24 volt** Danfoss compressors the measured resistances between the pins should be as follows

Between pins **3** and **1** should be **0.7 ohms**

Between pins **3** and **4** should be **0.7 ohms**

Between pins **3** and **2** should be **2.7ohms**

These are the coil resistances recommended by Danfoss but I have seen compressors that varied from these recommended values by 10% that still operated.

10

The results of this test will be the basis of a major and perhaps costly decision in resolving your refrigeration problem, so take some time, check your results and perhaps get some one with more electrical experience to repeat the procedure and verify your results.

11

If the values you measured vary from the values recommended in step 9 by more than 10%, the windings or connections inside the compressor are probably damaged and will need the services of a refrigeration technician to test and probably replace the compressor.

12

If the values you measured meet the specifications, replace the plug on the compressor making sure the plug is oriented the same way as it was before you removed it. Reconnect the fridge to the battery/power supply by turning on the isolator switch and/or re-insert the fuse removed in step 2 and **go to the next procedure.**

# SECTION G

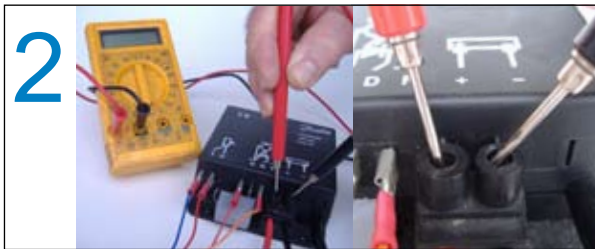
## Supply voltage test

*This procedure should only be used for the type of controller shown on the contents page of this document.*

If you do not understand this procedure seek help from a qualified electrician or technician

BEWARE a short circuit between two terminals of a battery can result in a fatal explosion of the battery.

**1** Locate the terminal marked + and the terminal marked - on the controller.



Turn the fridge off. Then using a d.c. voltmeter or a multi meter place one of the meter probes in the terminal marked + on the Danfoss controller and place the second meter probe in the terminal marked - on the Danfoss controller and read the voltage.

**3** Power and thermostat wiring can vary in individual installations so there is no "best" way to carry out this test. However, if possible, it is advantageous to initiate a compressor start attempt. This may be accomplished by turning the thermostat that controls the fridge/freezer temperature fully to the warm or off position, wait approximately 3 minutes, then while watching the volt/multimeter, turn the thermostat fully to cold. Alternately in some installations turning the power supply off and then back on will initiate a start attempt. If the compressor rattles or squeals this is an indication that the compressor is trying to start. It is important to note the voltage at the + and - terminals on the Danfoss controller during these start attempts.

**4** If the voltage measured at the + and - terminals on the Danfoss controller drops below 11 volts for a 12 volt system or below 22 volts for a 24 volt system, the batteries and/or electrical system supplying power to the fridge should be investigated and the Danfoss compressor/controller may not be at fault. You do not need to continue with the instructions in this document and your Danfoss controller probably does not need to be repaired.

If the voltage measured at the + and - terminals is consistent and stays above the recommended values and you have performed all the tests on this site but the compressor still does not run, the Danfoss controller is probably defective.

If you do not understand this procedure seek help from a qualified electrician or technician

**Note:** When the Danfoss compressor attempts to start, it uses a large amount of electrical power for a short time (less than a second) During this time a loose or dirty connection in the power supply or a poor battery can cause the voltage at the Danfoss controller terminals to drop so that the compressor won't start. Some voltage/multi meters don't update their readings quickly enough to indicate this short drop in supply voltage even though it causes the compressor controller to turn off.

# SECTION H

## ***Conclusion - REMOVE, PACK AND SEND***

If you have carried out all the procedures in this document and the values recorded during the compressor resistance test and the supply voltage test were within the recommended values then the Danfoss controller is probably defective.

Cold technology can provide an exchange controller which has been cleaned, repaired, recoated and tested under various temperature, supply voltage and load conditions. The following information is a guide to help you remove the Danfoss controller from your installation and send it to us. **It is important that you follow the instructions below very carefully.**

- 1 Turn off or isolate any charging sources such as wind generators, mains battery chargers or solar panels. Solar panels can simply be covered to block the sun.

**BEWARE a short circuit between two terminals of a battery can result in a fatal explosion of the battery.**

- 2 Disconnect the fridge from the battery/power supply by turning off the battery isolator switch and remove the fuse as shown in Section B steps 3, 4 & 5. If there is no battery isolator switch, remove the fuse as shown in Section B, steps 3,4 & 5.

**If you are unsure of the battery or electrical configuration or do not understand this procedure seek help from a qualified electrician or technician.**

- 3 Attach a piece of tape to each wire connected to the Danfoss controller and write on the tape which terminal the wire is connected to as in Section C step 4. This will allow you to reconnect the wires to the correct terminals when you reinstall the repaired Danfoss controller.

- 4 When you have marked the wires, remove one wire and **use insulation tape to protect the wire once it is disconnected from the Danfoss controller so it cannot contact other wires, electrical components or metal as in Section C step 5. Fire could result if this wire is not insulated correctly.**

- 5 Repeat step 3, removing and insulating one wire at a time until all the wires are disconnected from the Danfoss controller. **Fire could result if these wires are not insulated correctly.**

- 6 Locate the power lead that connects the Danfoss controller to the compressor. See Section F step 3.

- 7 Remove the clip and plastic cover from the compressor plug. See Section F step 4.

**8** Take note of the orientation of the plug on the compressor so you can replace it correctly. See Section F step 5.

**9** Carefully remove the plug from the compressor. It may be necessary to use a small screwdriver to lever the plug from the compressor, if so try to move each side of the plug alternately by only 1 or 2 millimetres each time. See Section F step 6.

WARNING: If you do not take sufficient care the plug may be damaged or broken.

If you are not confident in carrying out this procedure seek assistance from a qualified electrician or technician!

**10** Remove any screws or bolts that hold the Danfoss controller in place. **TIGHTEN THE SCREWS IN ALL THE TERMINALS ON THE DANFOSS CONTROLLER SO THAT THEY ARE NOT LOST IN TRANSPORT.**

## IMPORTANT - READ BEFORE SENDING

*Please include YOUR NAME and EMAIL address which we will use to:*

1. Advise you when your controller arrives.
2. Provide your invoice.
3. AFTER RECEIPT OF PAYMENT, notify you that your controller has been shipped.

For pricing see the pricing page in the services menu on the *Cold Technology* website.

## SENDING INSTRUCTIONS

Now that you have uninstalled the Danfoss controller, Pack it and send it to:

**COLD TECHNOLOGY  
UNIT 15/398 THE BOULEVARDE  
KIRRAWEE 2232  
SYDNEY, AUSTRALIA**



## Very Important Note!

This type of controller may not be repairable. An exchange unit may not be available. If the fault in your controller is due to the failure of an electronic component that we cannot source then we cannot repair your controller and therefore, cannot provide you with an exchange unit, however, most controllers of this type can be exchanged.