Fridge/Freezer Installation and Repair

Introduction

Nova Kool's refrigeration systems are designed to run efficiently from AC Shore Power, Battery Power, or Solar Electric Power.

The refrigerator door is right hinged unless otherwise specified. The decorative panel can be easily changed to match the interior of the boat.

The unit is charged with a CFC free R134A. This refrigerant is a Zero Ozone Depleter.

Our unit features a reciprocating compressor which is very efficient; while running it uses less than 60 watt hrs. / hr.

All our refrigerators and freezers have built in battery protection. This feature is designed to help protect the battery from damage due to accidental Deep discharge.

Operation

Our units are easy to operate. We use one thermostat, whether you have a single door or two-door model.

This thermostat is a full range thermostat that will maintain your unit at the temperature you desire. Turning the control all the way to the right (clockwise) will give you the coldest position, and turning to the left will give you a warmer temperature in the fridge. The control is also an on/off switch when you turn it to the "O" position (hard left). A good setting to start with is #2.

Defrosting

The frequency of defrost depends on the usage, (door openings) and ambient (outside) temperatures. It is time to defrost when the refrigerator builds up 1/4 inch of ice on each side of the cold plates.

The best way to defrost the refrigerator is to remove all the food, and place a towel inside the fridge, on the bottom of the cabinet(s). Turn the thermostat to the "O" position.

Never use a knife to scrape ice from the cold plate. This will rupture the cold plate and let the refrigerant escape.

Cleaning

The best time to clean the fridge is after a defrost. Wipe the inside clean using a non abrasive cleaner (watered down) for the hard to clean stains

We recommend baking soda as the first choice for a cleaner.

If you notice your refrigerator running longer than normal, clean the condenser (usually required every few years).

The condenser is located behind the refrigerator and can be cleaned by using a bottle brush and brushing vertically from top to bottom on the face of the condenser. An alternative method is to vacuum the condenser.

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Ventilation

Condenser at back of fridge

All refrigerators, regardless of the make, are heat-transfer machines. They transfer the heat from the inside of the fridge to the outside of the fridge. If adequate ventilation is provided, the compressor will operate more efficiently, and use less power.

The *minimum* total area required for ventilation openings depends on the size of the fridge. All *single* door Nova Kools require 60 square inches of total ventilation area. It is recommended that the vents are located at the bottom (30 square inches) and the top of the fridge (30 square inches); this supports the natural convection of heat from cold (bottom) to warm (top).

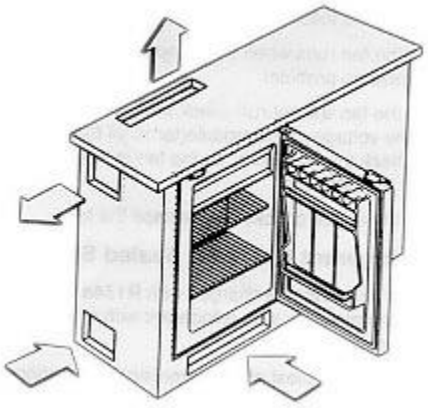
On our *double* door models, 120 square inches is required (60 at the top and 60 at the bottom).

The cold air intake at the bottom of the fridge can be from the left or the right side, and if possible should be at a level below the fridge.

The warm air opening at the top of the refrigerator should be above the fridge if possible.

All openings can be of any configuration (long and narrow , square or round) as long as the 60 or 120 square inches is cut out.

If you are using grills, take into account the restriction they will give, and adjust the opening accordingly.



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Electrical Hook Up

To determine the size of the wire to be used, measure the maximum length of wire to connect one of the leads from the electronic unit (on the back of the refrigerator) to the battery. Using the chart below, size your wire accordingly. The table is based on a 3% voltage drop.

wire size	max. lead length in feet**	
AWG	**12VDC units**	**24VDC units**
14	8	16
12	12	25
10	25	50
8	40	80

** Length is the distance between the electronic unit and the battery

The circuit breaker must be a 20 amp capacity on the DC side and a 5 amp capacity on the (optional) AC side.

Failure to size the wire or breaker correctly (too small) may cause a premature shut down of the refrigerator by the Battery Protection Device.

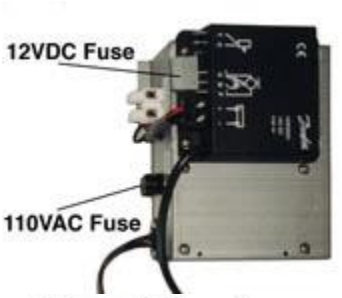
We recommend that the refrigerator have its own circuit, without any other appliances connected to the same wires.

Using the *Common Buss* for the refrigerator wiring can sometimes cause radio frequency noise and interference.

Fuses

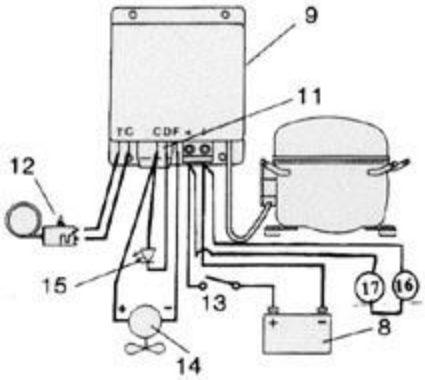
Nova Kool refrigerators use a 15 amp (12 volt) and a 7.5 amp (24 volt) in the electronic unit. This fuse can be found under the gray plastic cap on the electronic unit.

On the optional AC power supply a 4 amp (110 volt) or a 2 amp (220 volt) glass fuse, can be found under the black fuse holder cap.



Electronic unit and power supply for AC/DC Refrigerators

1. Battery
2. Module (electronic unit)
3. Fuse 12VDC 15 amp, 24 VDC 7.5 amp
4. Thermostat
5. 20 amp breaker
6. Air cooled fan (Optional)
7. Low voltage diode (N/A)
8. Light (optional)
9. Light fuse 15amp (if unit has a light)



Wiring diagram for DC only Refrigerators showing new style Electronic Unit

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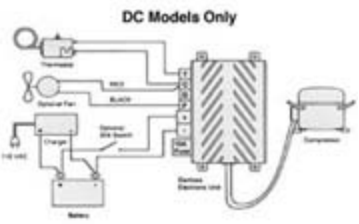
Trouble-Shooting Guide

If your Nova Kool fails to run, check all the electrical items exposed to the marine environment. In the case of a new refrigerator, these are also the items most likely to be damaged by transport and rough handling.

1. *Check the fuse located under the gray cap,* below the DC connections on the module. Reverse polarity will cause this to blow.
2. *Check the voltage at the electronic module.* On 12 volt systems the voltage should read 12.0 volts minimum, with the battery charger turned off.
3. If you don't read over 12.0 volts check the following:
    - condition of batteries and state of charge
    - Wire size and connections
    - If the circuit has a breaker it must be size 30 for 20 amps capacity.

4. *Check the thermostat* by removing the wire from the terminal marked "T." Take a short piece of wire and jumper between "T" and "C". If this starts the compressor we then know that the thermostat circuit is faulty. Replace the thermostat or the faulty wiring that connects the thermostat to the module.



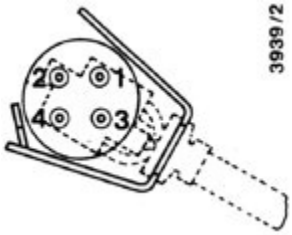
Note the compressor runs very quietly. Hold your hand on top of the compressor to tell if it is running.

If you hear a small squeak when the compressor starts "this is normal".

5. *Check the electronic module.* This device is responsible for all electronic functions. These include motor commutating, battery monitoring, fan power(optional), and all safety functions.

   The module is not field repairable and can be checked out by sending it to Nova Kool.

6. *To check the compressor's internal windings,* ohm the following terminals.



7.

Plug Colors:
1 - Black,
2 - White,
3 - Brown,
4 - Blue

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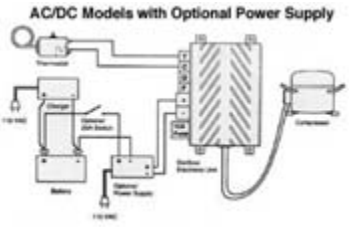
9. **Terminal on compressor**

	12VDC	24VDC
Terminals 1 to 3	0.3	0.7
Terminals 4 to 3	0.3	0.7
Terminals 2 to 3	3.5	3.5

10. Never Connect Power Directly to Compressor!

11. *If your fridge has our optional AC/DC converter,* check the following:



- the glass fuse under the fuse cap (110 volt 4 amp - 220 volt 2 amp)
- check the AC power supply to the converter
- Check the DC out put (12.5-14.5) volts DC

This unit can be replaced as an assembly.

Diagram shows older style Electronic Unit.

12. *If your fridge has an air fan*, check the following:

- if the fan runs when the compressor runs, you have no problem
- if the fan will not run, check the connections and the voltage at the module (terminal C-F) and check the connector on the fan motor to ensure that it is plugged in. (red to + and always on C)
- if the above checks out, replace the fan.

Refrigerant Charge & Sealed System

Your Nova Kool is charged with R134a. This is a environmentally safe refrigerant with a "O" Ozone Depletion Potential.

It is used by most of the domestic refrigeration and appliance repair companies and manufacturers.

If you need to repair the closed sealed system, use a qualified appliance refrigeration person. This is seldom necessary so be sure first, and before any arrangement is made contact Nova Kool.

Operational Sequence

When the thermostat is turned on (you should hear a click) the compressor should try to start. It is not uncommon to hear a small squeak when it tries to start. If it does not start on the first attempt it will continue to try every 40 seconds. If, for some reason, the compressor becomes overloaded it will go through this cycle and the fan will continue to run during the 40 seconds.

When the thermostat is satisfied, the compressor and fan (optional) shut down.

Before doing warranty work contact your dealer or Nova Kool at (604) 523-6515.