

QC- 007
updated 6-23-2011

Bottom Mount 21 cu ft Refrigerator

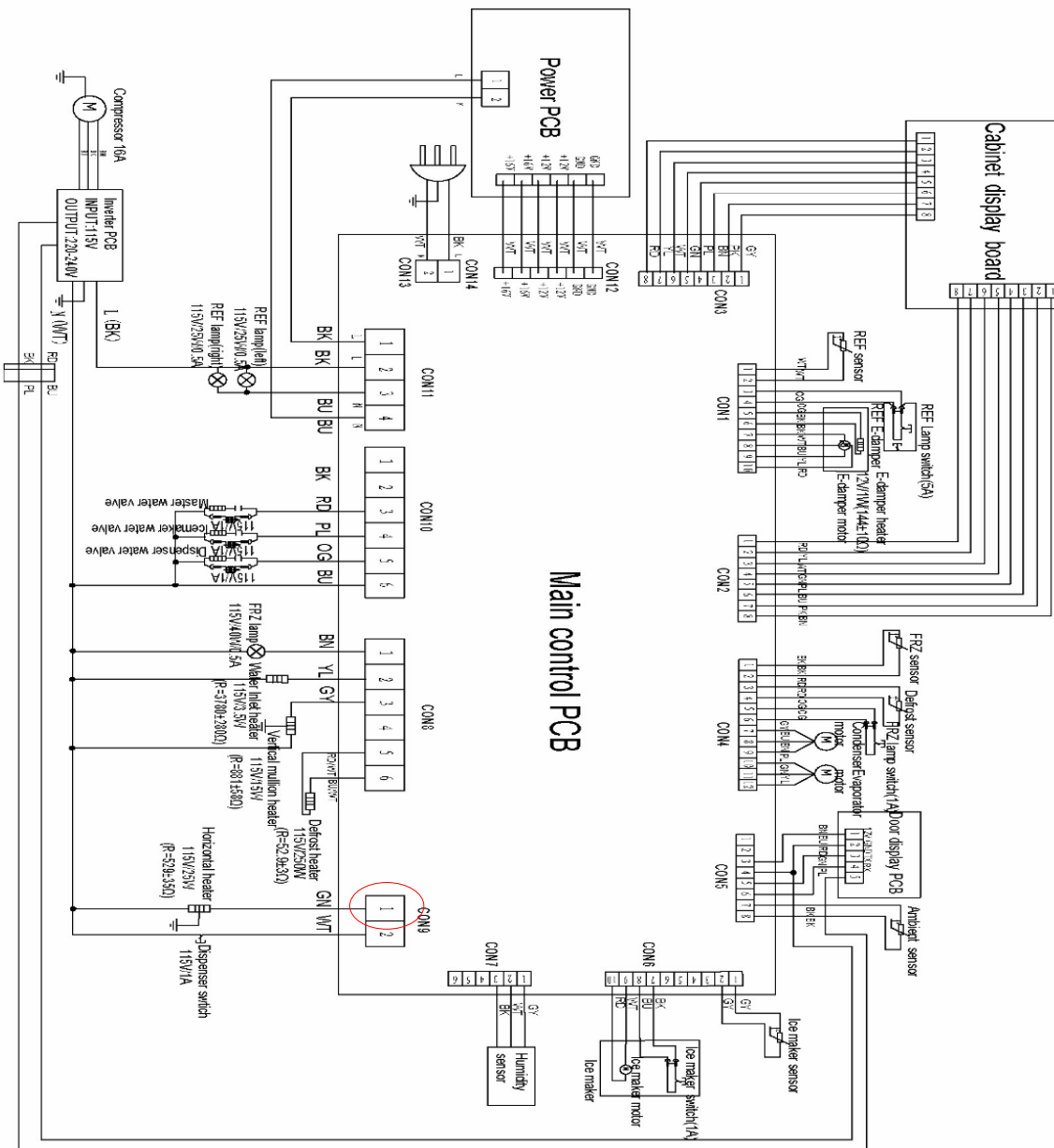
PBFS21E*** / RBFS21**** / HB21FC**** / H21BFC****

WARNING

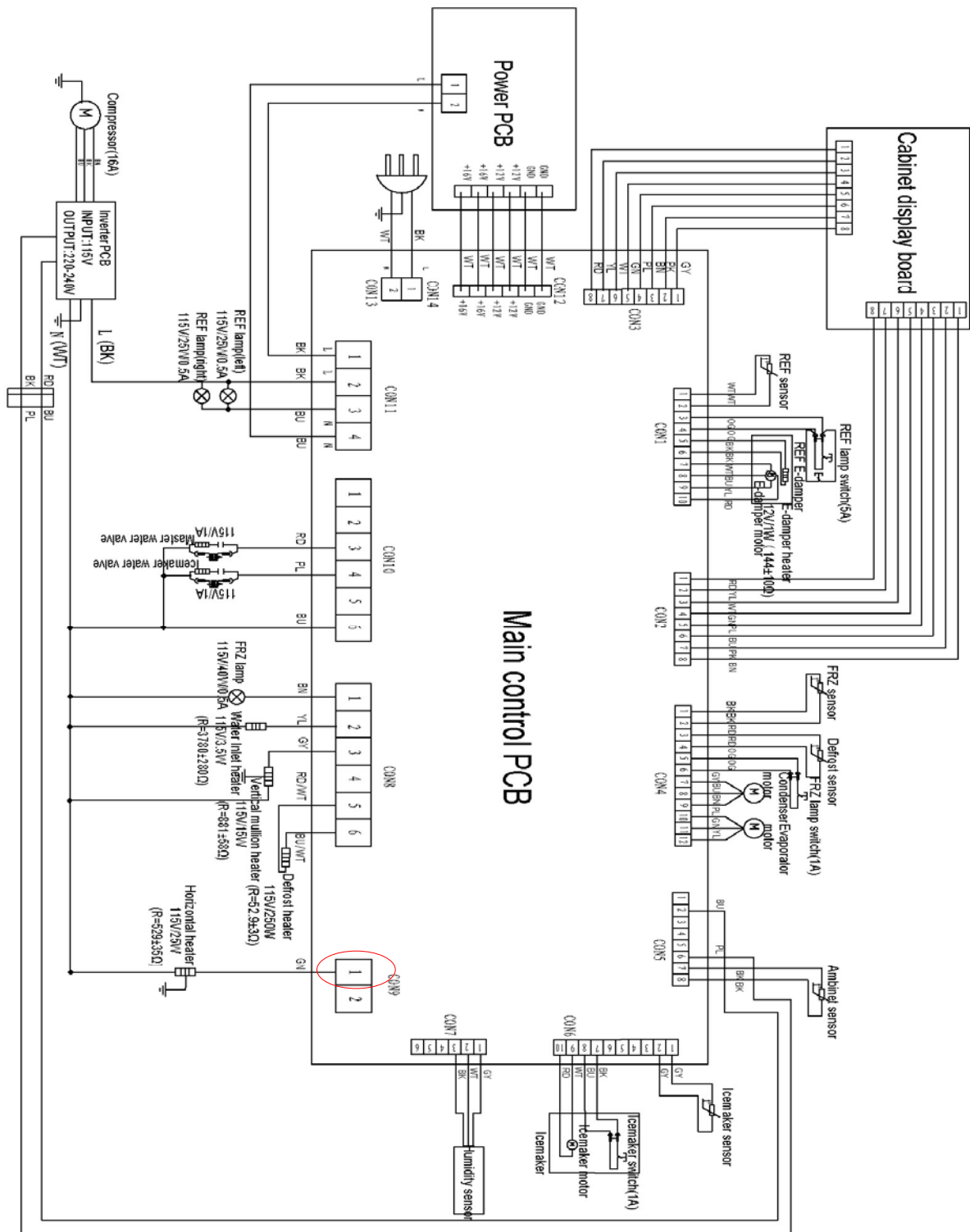
This service information is designed for experience repair technicians only and is not designed for the user or general public. It does not contain warning and cautions to advise non-technical individuals of potential dangers in attempting to service a product. Product power on electricity should be service or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in the service information by anyone else could result in serious injury or death.

Circuit Diagrams

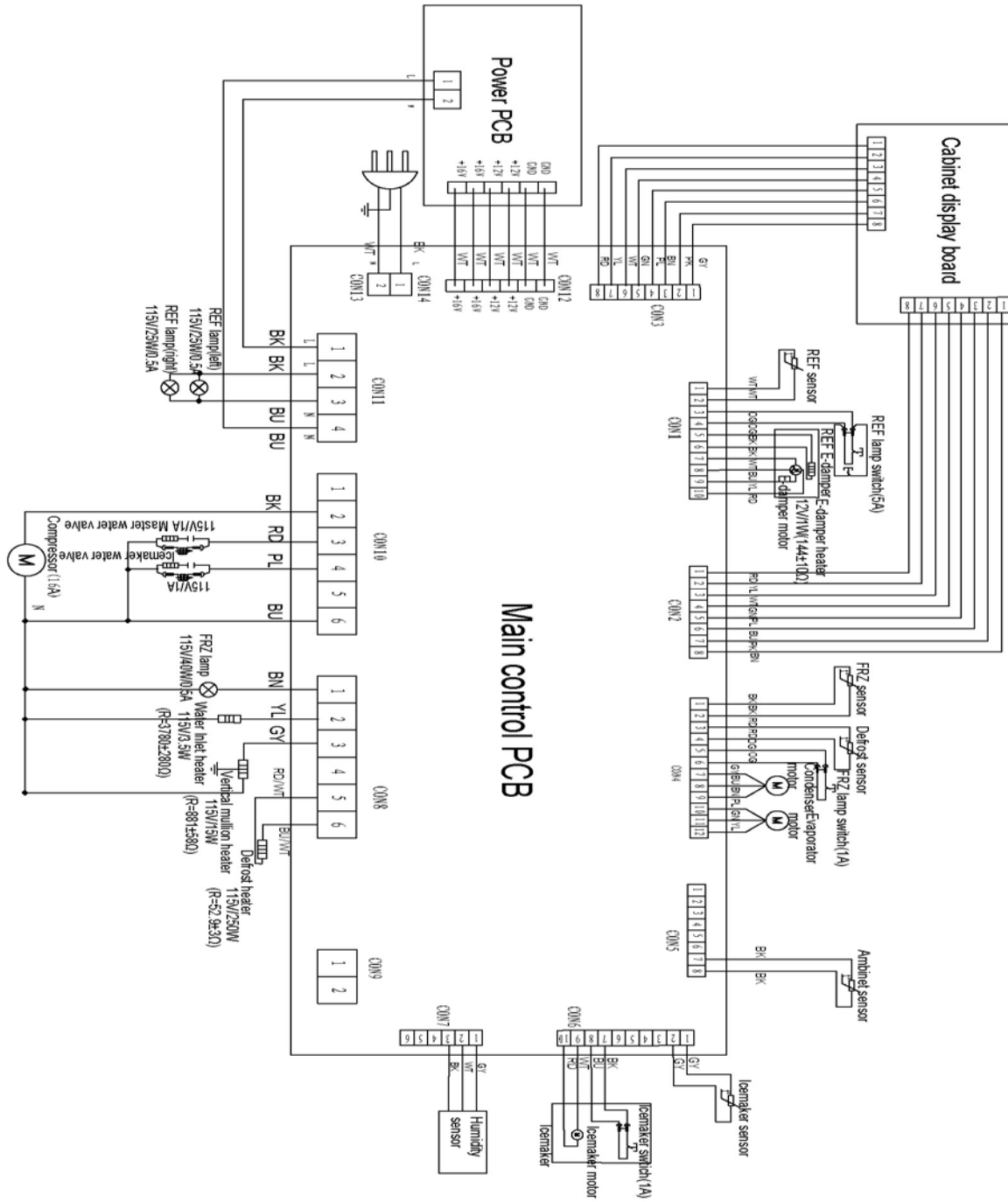
PBFS21E*** series (The diagram of HB21FC75** is the same, except for CON9-1)



RBFS21T*** series (The diagram of HB21FC45** / H21BFC45** is the same, except for CON9-1)



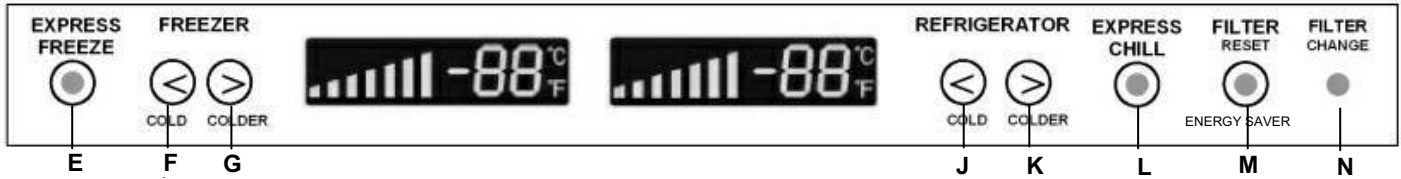
HB21FC10** series



models Parts	Four doors: PBFS21E***/ RBFS21T*** Three doors: HB21FC75**/ HB21FC45**/ H21BFC45**	Three doors: HB21FC10**
Compressor	Model : VEGY7H Running resistance 6.40 Starting resistance 6.40 Voltage 115V Frequency 53-150HZ	Model : EGX90HLC Running resistance 2.95 Starting resistance 6.05 Voltage 115V Frequency 60HZ
Running capacitor	/	12µF
Overload protector	/	4TM437NFBYY-53
Evaporator fan motor	1750-1500 RPM/15V-11V	
Condenser fan motor	1350-1150 RPM/13V-11V	

FREEZER - - REFRIGERATOR CONTROLS

Control Panel for PBFS21E***, RBFS21****, HB21FC****, H21BFC**** models
* Functions not available on all models



<p>FREEZER – 7 temperature settings. –6° ~+6° F. More bars indicate colder temperatures. Press <-> to adjust. EXPRESS FREEZE* – Increases evaporator fan speed by approximately 10%. Will reset to normal operation after 21- 42 hours. Temperature cannot be changed when EXPRESS FREEZE is activated. Temperature will not drop below set temperature.</p>	<p>REFRIGERATOR – 7 Temperature settings. 34°~ 46° F. More bars indicate colder temperatures. Press <- > to adjust. EXPRESS CHILL* - Increases evaporator fan speed by approximately 10%. Will reset to normal operation when temperature drops 2° below set temperature. Temperature cannot be changed when EXPRESS CHILL is activated.</p>
<p>ENERGY SAVER Energy Saver ON. The energy saver button is initially set to ON. ES will be shown in the Refrigerator Display for 5 seconds when the refrigerator door is opened then return to the actual temperature in the compartment. Energy Saver OFF – ES will no longer be displayed when the door is first opened. The fresh food mullion and mullion between the freezer drawers (if equipped with 2 drawers) will cycle ON. If condensation is seen on the mullions, the energy saver should be ON. Press and hold the ENERGY SAVER button for 5 seconds. The chime will ring and the function is activated (Energy Saver OFF). Press and hold again the function will deactivate (Energy Saver ON)</p>	<p>FILTER RESET – FILTER CHANGE – filter change indicator will activate on 6 months intervals as a reminder to change the water filter. After changing the water filter, press and hold FILTER RESET for 3 seconds to reset. The icemaker and water dispenser will not function if no filter is in place. QUICK ICE – Press and hold buttons E and M for 3 seconds. The chime will sound and indicator M will flash then go off. The evaporator fan will operate on high speed for 24 hours then reset to normal operation.</p>

OPTIONAL SETTINGS

<p>Fahrenheit / Celsius - F° / C° setting. Press and hold buttons F, G, and J at the same time for 3 seconds. Chime will sound indicating mode change. SABBATH Mode – Press and hold the E and L buttons for 3 seconds. All lights and displays will be off in this mode. Reset using the same procedure. The cooling system will remain ON.</p>	<p>ICEMAKER OFF / ON – the icemaker function can be turned OFF or ON through this setting. Press and hold buttons G and K at the same time for 3 seconds. Reset using the same procedure. Indicator E will flash then turn off. The icemaker will not function if no water filter is in place. Indicator M will continue to flash.</p>
<p>Energy Saver – When the Energy Saver mode is ON, ES will be shown on the fresh food display for 5 seconds when the door is opened. If sweating occurs on the FF door mullion, press and hold the Filter Reset button (M) for 5 seconds to turn the Energy Saver mode OFF. Repeat to turn Energy Saver Mode ON</p>	<p>Demo Mode –Press and hold the F, G, and K buttons for 3 seconds will turn compressor and fans off for demo mode.</p>

OPERATION NOTES

<p>Indicator chimes: <u>Function Change</u> – a chime will sound when buttons are pressed for 3 seconds indicating a function change. A Chime will sound when a door is open for 60 seconds. <u>Interior Lights</u> – will turn off if door is left open for more than 7 minutes</p>	<p><u>Evaporator Fan</u> – Single evaporator fan in freezer compartment. <u>Turns ON</u> when refrigerator door is opened forming an air curtain through vents at top of fresh food compartment <u>Turns OFF</u> when Freezer door(s) is opened</p>
---	---

TEST MODE FUNCTIONS

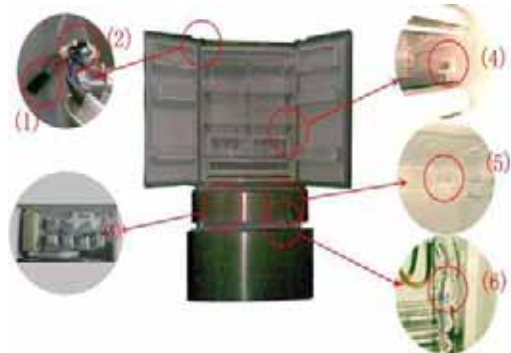
Test Mode Set Up	MODE	OPERATION	NOTE
<p>The unit will enter a forced test mode by pressing the F, G, and M keys and holding for 3 seconds. The chime will sound.</p> <p>T1/T1 will show in the display for Test Mode 1</p> <p>Press and hold the same keys for Test Mode 2</p> <p>Press and hold the same keys again for Test Mode 3</p> <p>Exit the test mode by pressing and holding the keys again. The chime will ring indicating the process is complete. The compressor will restart in 7 minutes.</p>	TEST 1	<ol style="list-style-type: none"> 1 Compressor ON 2 Evaporator fan ON 3 Condenser fan ON 4 Defrost heater CLOSED 5 Air Damper open 90° 6 Shows T1 / T1 on the display 	Test 1 continues until exit manually to mode 2
	TEST 2	<ol style="list-style-type: none"> 1 Compressor OFF 2 Evaporator / Condenser fans OFF 3 Air Damper and its heater Closed / Off <small>fresh food damper heater - 140Ω</small> 4 Defrost Heater ON 5 Shows T2 / T2 on the display 	Mode ends after defrost cycle is complete (see defrost cycle notes)
	TEST 3	<ol style="list-style-type: none"> 1 Compressor OFF 2 Evaporator / Condenser fans OFF 3 Defrost heater OFF 4 Refrigerator vertical mullion heater ON 5 Freezer mullion heater between drawers (4 door models only) ON 6 Shows T3 / T3 on the display 	Mode ends after 30 minutes and refrigerator returns to normal operation

ERROR CODES AND FUNCTIONAL TESTS



When there is a component malfunction, the appliance does not display the error codes automatically. Press and hold the freezer temperature setting button “>” and refrigerator temperature setting button “<+>” for 3 seconds and the chime rings. Error codes will show on the cabinet display panel. Press again above three control-key combinations for 3 seconds, exit to normal display status. The control will exit to normal status after 1 minute. If there are multiple errors, the first error must be repaired before the next will display.

FAILURE CODES			
Shown on cabinet display panel			
Code	Display	Error Description	Location
F1	FF	Refrigerator Sensor	Right side wall of Fresh Food compartment (4)
F2	FZR	Freezer Sensor	Right side wall of Freezer compartment (5)
F3	FF	Ambient Air Sensor	Under upper freezer hinge cover (2)
F5	FF	Defrost Sensor	Top left corner of evaporator (6)
F6	FF	Icemaker Sensor	Icemaker flex tray (3)
Ed	FF	Defrost Heating Issue	Evaporator top right corner (6)
E1	FF	Evaporator Fan Motor	Evaporator fan operating at less than 300 rpm
E2	FF	Condenser Fan Motor	Condenser fan operating at less than 300 rpm
Eh	FZR	Humidity Sensor	Under upper freezer hinge cover (1)
Er	FF	Ice Maker Failure	Ice Maker



SENSORS

Fresh Food - Ambient			Freezer- Ice Maker-, Defrost		
°C	KΩ	°F	°C	KΩ	°F
0	6.35	32	0	6.5	32
10	3.9	50	10	4.0	50
20	2.3	70	20	2.25	70

ICEMAKER - WATER DISPENSER - FILTER (if equipped)

Refer to control panel diagram on page 1

ICEMAKER OFF / ON – the icemaker function can be turned OFF or ON through this setting. Press and hold buttons G and J at the same time for 3 seconds. Reset using the same procedure. Indicator E will flash then turn off. The icemaker will not function if no water filter is in place. Indicator M will continue to flash.

Icemaker Test Mode – DO NOT ATTEMPT TO MANUALLY START THE ICEMAKER. The icemaker will not operate if the freezer door is open. Press and hold the “F” and “K” buttons for 3 seconds. Once the icemaker starts a harvest cycle release the buttons. Icemaker harvest default is 1 tray every 60 minutes. Actual time will vary depending on settings and conditions.

Ice harvest The icemaker must meet the following conditions before harvesting ice. The temperature at the ice-maker sensor must reach -14°C (7°F) and a minimum of 60 minutes from the last harvest. When this is achieved, the icemaker will attempt to harvest the tray of ice. If the sensing arm senses ice in the bin, the harvest cycle will end and the icemaker will attempt to harvest again in approximately 60 minutes.)

Icemaker Water Fill Level – Press and hold “F”, “G”, and “J”, “K” for 3 seconds. This is a time fill. The water inlet fill time will be shown (in seconds) in the freezer temperature display field. The factory default setting is 6.5 seconds and shown as 65 in the freezer display, during this fill time of 6.5 seconds, it will allow 110ml water to fill into the cube tray when the water pressure is 0.5Mpa. This should fill all of the cube molds evenly and the cubes should break apart when dumped into the ice storage bin. The local water pressure can also effect the water fill level.

CAUTION

Always recheck fill level after making an adjustment.

Icemaker Service Note – The icemaker must reach -14°C (7°F) for the icemaker to produce ice.

Dispenser Service Note - After 2 minutes of continuous dispensing, a 30-minute time out is initiated. An alarm on the control panel will also sound as ding ding dong.

F6 Failure Code – indicates the sensor in the icemaker has failed. Replace the entire icemaker head assembly. The icemaker will continue to make ice but only 1 tray every 100 minutes.

Water Inlet Solenoids – All water flows through the water filter before being routed to the icemaker or dispenser (if equipped). There are 3 solenoid valves which have color coded rings. The single primary valve supplies water to the filter (white ring). The water then returns to dual secondary valves (black ring). The valve feeding the dispenser is designated with a green ring. The icemaker with an orange ring. All solenoids have a resistance of approximately 385Ω. The solenoids are replaced as an assembly.

Fill Time Settings	Fill time in seconds	Display Shows
Minimum	4	4
	4.5	45
	5	5
	5.5	55
	6	6
Default	6.5	65
	7	7
	7.5	75
Maximum	8	8

DEFROST SYSTEM

1 The first defrost cycle will start after an accumulated compressor run time of 4 hours. This will be a full defrost cycle programmed to start after initial operation start up or after any power down situation.

2 Automatic Defrost

2.1 A defrost cycle will start after 7 hours of accumulated compressor run time.

2.2 The fresh food air damper will be closed and the evaporator fan motor will be off. The defrost heater will power on.

2.3 The heater will operate until the evaporator temperature reaches 7°C (44.6°F) at the defrost sensor.

2.4 Seven minutes after the heater shuts off, the compressor will start. The damper will remain closed and the evaporator fan will be off.

2.5 The compressor will operate for 5 minutes then the evaporator fan will start but the damper will remain closed

2.6 After 3 minutes of fan operation, the damper will open and normal cooling operation will resume.

3 Defrost Malfunction

3.1 If the temperature at the evaporator defrost sensor does not rise above 7°C (44.6°F) after 60 minutes of the beginning of the defrost cycle, “Ed” will be displayed in the refrigerator display and then disappear from view. It can only be viewed by displaying the error codes as shown in the ERROR CODE section

Compressor Diagnostics

Variable Speed Compressor Models Only

Inverter removal



Do not remove this screw

Remove this screw to remove inverter from compressor

The compressor is a variable-speed motor controlled through a low voltage signal to the inverter.

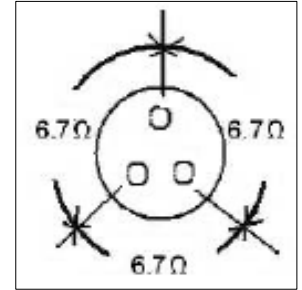
There is no output test to the compressor from the inverter.
Do not attempt to start the compressor with an externally connected power source as immediate damage to the compressor will result.



Power Feed to Inverter

A= 2.5 – 3.5 vdc from the control board ,Frequency 53-155Hz
B= 115v black to white from control board
C=No Test Point – No power is applied until compressor load is sensed.

Compressor Winding Test



Resistance check should show approximately 6.7Ω [at 25 °C (77°F)] between all windings.

Winding test should equal between each leg.

Instructions for testing the variable speed compressor
Never attempt to jump start or bypass the inverter board to start this compressor.
Failure to follow this instruction could cause permanent damage to the compressor motor.

