Fast Track Troubleshooting

Model:
RF221 RF220**
RL225**
RL220**

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GSPN: http://gspn3.samsungcsportal.com/main.jsp
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Force Mode

[RF221, RF220]

TEST MODE KEY
-. RF221, RF220, RL225 Model : Ice Off + Fridge Key
-. RL220 Model : Power Freeze + Fridge Key

Compressor Run

1. After pressing any key all LED's will indicate that Force mode is activated and the Compressor and Fan will run

Force Defrost

2. The Forced Defrost will begin after pressing any key twice in Force mode

Diagnostic Mode

[RF221, RF220]

※ Self-diagnostic function KEY
-. RF221, RF220 Model : Ice Off + Energy Saver Key
-. RL225 Model : Ice Off + Alram on/off
-. RL220 Model : Power Freeze + Alram on/off

① If **"Self-diagnostic function KEY"** are pressed simultaneously for 6 seconds, ALL ON/OFF will blink with 0.5interval for 2 seconds.
② If take the finger off from above keys and press Fridge, load condition mode will be started.

1) If **"Self-diagnostic function KEY"** are pressed simultaneously for 6 seconds during normal operation, the temperature setting display of fresh food and freezer compartments will blink ALL ON/OFF with 0.5 for 2 seconds.
2) At this moment, If Fridge Key after **"Self-diagnostic function KEY"** is pressed, load condition display mode will be returned with alarm. At LED all on state, only load condition display will blink ON/OFF with 0.5seconds interval.
3) Load condition display mode shows the load that micom signal is outputting. However, It means that micom signal is outputting, it does not mean whether load is operating or not. That is to say that though load operation is displayed, load could not be operated by actual load error or PCB relay error etc. (This function would be applied at A/S.)
4) Load condition display function will maintain for 30 seconds and then normal condition will be returned automatically.
5) Load condition display is as below.

Component Value Chart

Component	Resistance	Wattage	Voltage
Freezer Defrost Heater	62.6Ω	230	120vac
Fridge Defrost Heater	120Ω	120	120vac
French Mullion Heater	2057Ω	7	120vac
Ice Duct Heater	2057Ω	7	120vac
Dispenser Heater	9000Ω	1.6	120vac
Damper	144Ω	1	12vdc
Sensors	2.5kΩ-89kΩ	N/A	1~4.5vdc
Fans	N/A	N/A	7~12vdc

Refrigerant Charge R134a 5.64 oz

Demo Mode

[RF221, RF220]

In Demo Mode no heating or cooling elements will work

DC FAN MOTORS

Brushless DC Fan motors are used to save energy. The fans operate at two speeds. Fan speed information is read by the Main PCB. If the fan speed exceeds 600 RPM or the speed is too slow, or stopped the fan drive circuit is disabled, After 10 seconds the circuit tries again with 3 seconds of DC voltage If the fan continues this activity for 5 cycles, 10 seconds off 3 seconds on, the fan drive circuit is disabled for 10 minutes.

TO TEST THE FAN CIRCUIT VOLTAGE.

Power off and back on to check the DC voltage to the motor, wait from 10 to 60 seconds for the fan voltage to kick in, and then check fan voltage, the average reading is 9 VDC. If you get 3 seconds of voltage every 10 seconds for the 5 fan power up cycles, then the Main PCB is good.

NOTE: You may need to put unit in FORCED FREEZE mode to activate the fans/compressor.

If the fan blade is blocked by ice, then defrost and check the motor again, after removing power from the unit.

If the evaporator is ice blocked and thus blocking the air flow, the fan will over RPM and is stopped. Remove ice and check the motor again. If everything is clear around the fan blade then the motor would be at fault. Continuous fan errors will be displayed on the front panel display. **PLEASE NOTE:** The door switches control the evaporator fan motors. Have them closed to test the motors. Delay time 10 – 60 seconds.

Heat Release Ice Makers

Heat Release Ice production Explanation

38 minutes after the water fill is complete, the control board will check the temperature of the eject Thermistor on the Ice Maker Head. If the Thermistor reads a temperature lower than 18.5°F for more than 5 seconds, the ice production process is complete. The Ice Maker will harvest if the ice bucket is not sensed as full. If a Fault Mode is detected with the Ice Maker operation, the Ice Maker stops working for 3 hours, which means that the Ice Maker checks the operation every 3 hours until it works properly.

Heat Release I/M Test Mode

Press and hold the ICE TEST Switch for at least 1.5 sec. and the harvest function will start. If the Ice Maker thermistor is below 0°F, the Ice Maker heater turns on for about two minutes. If the temperature exceeds 0°F, the Ice Maker heater turns on for 30 seconds. After the Ice Maker heater turns on for 30 seconds, the heater turns off and the Ice Maker harvest motor turns on. The motor will rotate in right direction for about 3 minutes, then the water supply valve is energized and then de-energized and the test mode is complete. If the above operation is not carried out within 6 minutes, the Ice Maker will go into a fault mode.

FREEZER TEMPERATURE CONTROL BY THE ICE MAKER

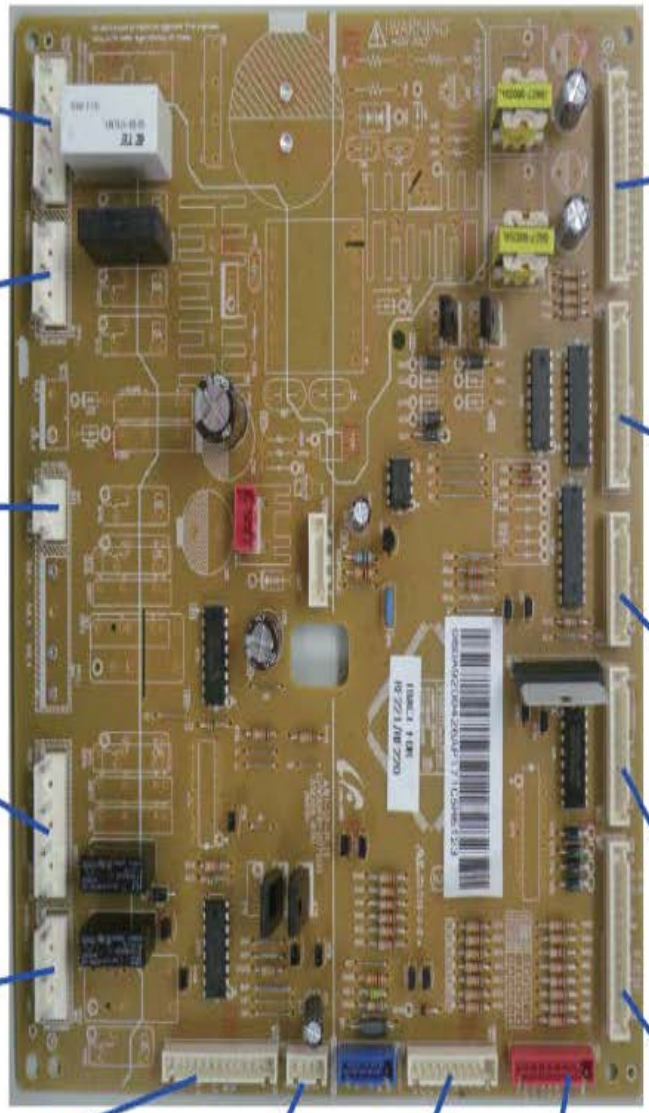
Interior Temperature of the freezer will be set to -14°F until the ice bucket is full. When the ice bucket is full, the freezer will maintain original set temperature. Also, whenever some ice is used, the freezer will again set to -14°F. Selecting "Ice Off" will allow the freezer to be controlled by the set temperature. ***NOTE* If water is not hooked up, the freezer will always be at –14°F unless "Ice Off" is selected.**

Temperature/Resistance/Voltage Chart for Samsung Refrigerators Sensors

Temp.	(Ω)	Volts	Temp.	(Ω)	Volts	Temp.	(Ω)	Volts	Temp.	(Ω)	Volts
-29.2°F	64227	4.326	1.4°F	28021	3.685	32.0°F	13290	2.853	62.6°F	6771	2.019
-27.4°F	61012	4.296	3.2°F	26760	3.64	33.8°F	12749	2.802	64.4°F	6521	1.974
-25.6°F	57977	4.264	5.0°F	25562	3.594	35.6 °F	12233	2.751	66.2°F	6281	1.929
-23.8°F	55112	4.232	6.8°F	24425	3.548	37.4 °F	11741	2.7	68.0°F	6052	1.885
-22.0°F	52406	4.199	8.6°F	23345	3.501	39.2 °F	11271	2.649	69.8°F	5832	1.842
-20.2°F	49848	4.165	10.4°F	22320	3.453	41.0°F	10823	2.599	71.6°F	5621	1.799
-18.4°F	47431	4.129	12.2°F	21345	3.405	42.8°F	10395	2.548	75.2°F	5225	1.716
-16.6°F	45146	4.093	14.0°F	20418	3.356	44.6°F	9986	2.498	77.0°F	5000	1.675
-14.8°F	42984	4.056	15.8°F	19537	3.307	46.4°F	9596	2.449	78.8°F	4861	1.636
-13.0°F	40938	4.018	17.6°F	18698	3.258	48.2°F	9223	2.399	80.6°F	4690	1.596
-11.2°F	39002	3.98	19.4°F	17901	3.208	50.0°F	8867	2.35	86.0°F	4218	1.483
-9.4°F	37169	3.94	21.2°F	17142	3.158	51.8°F	8526	2.301	87.8°F	4072	1.447
-7.6°F	35433	3.899	23.0°F	16419	3.107	53.6°F	8200	2.253	89.6°F	3933	1.412
-5.8°F	33788	3.858	24.8°F	15731	3.057	55.4°F	7888	2.205	91.4°F	3799	1.377
-4.0°F	32230	3.816	26.6°F	15076	3.006	57.2°F	7590	2.158	95.0°F	3547	1.309
-2.2°F	30752	3.773	28.4°F	14452	2.955	59.0°F	7305	2.111	96.8°F	3428	1.277
-0.4°F	29350	3.729	30.2°F	13857	2.904	60.8°F	7032	2.064	100.4°F	3204	1.213

※ Self-diagnostics check list

LED		Item		Trouble contents	Diagnostic method
R1		Ice Maker(F) Sensor Error		Display error : separation of sensor housing part, contact error, disconnection, short circuit Display error of detecting temperature of sensor: more than 149°F (+65° C) or less than −58°F(−50°C)	The Voltage of MAIN PCB CN90 #8 (−)#9: Shall be between 4.5v ~ 1.0v
R3		Compressor Error	Comp starting Failure Error	When the Compressor fails starting	Check if there is a short between compressor terminals. Check if there is a short between IPM Pins. Check the Compressor and the Cycle Turn Off the Ref. , after 5minutes, Turn on the Ref.
			IPM Fanlt Error	When there is a IPM Fault error	
			Comp Abnormal current Detection Error	When there is abnormal current detected at the Compressor	Check the Compressor connections Check the Compressor and the Cycle Turn Off the Ref. , after 5minutes, Turn on the Ref.
			Motor Locked Over RPM Error	When there is a Compressor restriction error	Check the condition of R1[Shunt Resistance] Check the Compressor and the Cycle Turn Off the Ref. , after 5minutes, Turn on the Ref.
			Comp under voltage Error	When there is a low voltage error	Check the input Voltage Turn Off the Ref. , after 5minutes, Turn on the Ref.
			Comp over voltage Eroor	When there is a over voltage	Check the input Voltage Turn Off the Ref. , after 5minutes, Turn on the Ref.
R4		FF−Sensor Error		Display error : separation of sensor housing part, contact error, disconnection, short circuit. Display error of detecting temperature of sensor : more than 149°F(+65°C) or less than −58°F(−50°C)	When measuring the voltage between the Main PCB CN30−"6" ↔ CN76−"1", it should read between 4.5V~1.0V.
R6		FZ−Ice Pipe Heater Error		The error occurs when there is a wire connector slip−out of the Water Supply Pipe Heater, a contact error or a breakage in the wiring.	When measuring the resistance of the Main PCB CN79 Yellow−Pink wires, it should be within 102Ω ±7%. 0Ω : heater short, ∞Ω : Check for Wire Open or Connector Slip−out
R7		Ice Maker(FZ)Function Error		When the Freezer Ice Maker error occurs more than 3 times, the error will be displayed.	After replacing the Ice Maker, check if it operates normal.
F1		Ambient−Sensor Error		Display error : separation of sensor housing part, contact error, disconnection, short circuit. Display error of detecting temperature of sensor : more than 149°F(+65°C) or less than −58°F(−50°C)	The voltage of MAIN PCB CN78−"8"↔ CN78−"12": shall be between 4.5V~1.0V
F2		FZ−Sensor Error			When measuring the voltage between the Main PCB CN30−"4" ↔ CN76−"1", it should read between 4.5V~1.0V.
F3		FZ−DEF−Sensor Error		Display error : separation of sensor housing part, contact error, disconnection, short circuit. Display error of detecting temperature of sensor : more than 149°F(+65°C) or less than −58°F(−50°C)	The voltage of MAIN PCB CN30− "5"↔ N76−"1":shall be between 4.5V~
F4		FZ−FAN Error		Display error during operation of applicable fan motor : Feed back signal line contact error, motor wire separation, motor error	The voltage of MAIN PCB CN76− "3" (Yellow) ↔CN76−"1"(Gray): shall be between 7V~12V
F5		C−FAN Error		Display error during operation of applicable fan motor : Feed back signal line contact error, motor wire separation, motor error	The voltage of MAIN PCB CN76− "5" (Sky−blue) ↔ CN76−"1"(Gray): shall be between 7V~12V
F6		Humidity−Sensor Error		Separation of sensor housing part, contact error, disconnection, short circuit	When measuring the voltage between the Main PCB CN30−"3" ↔ CN76−"1", it should read between 4.5V~1.0V.
F7		FZ−DEF Error		Separation of freezer compartment defrost heater housing part, contact error, disconnection, short circuit or temperature fuse error. Display error : the defrosting does not finish though freezer compartment defrost is heating continuously for more than 80 minutes.	After separating MAIN PCB CN70 wire from PCB, resistance value between CN70 Brown ↔ CN70 Gray shall be 63(230) ohm ± 7%.(Resistance value is varied by input power) 0 ohm : heater short, ∞ ohm : wire/ bimetal open (Must power off)



CN70 – AC LOAD
① : FF-DEF-HEATER
③ : FZ-DEF-HEATER
ICE DUCT HEATER
⑤ : COMMON2 LINE(L)
⑦ : COMMON1 LINE(N)

CN70_1 – AC LOAD
① : Open
③ : Open
⑤ : FRENCH-HEATER
DISPENSER HEATER

CN72 – AC LOAD
① : ICE WATER
SOLENOIDE VALVE (FZ)
③ : COMMON1 LINE(N)

CN73_1 – AC LOAD
① : OPEN
③ : OPEN
⑤ : OPEN
⑦ : OPEN

CN73 – AC LOAD
① : OPEN
③ : OPEN
⑤ : WATER SOLENOIDE VALVE

CN78 – LAMP(LED)/SENSOR
① : FZ LAMP (LED)
② : GND
③ : FF LAMP (LED)
④ : OPEN
⑤ : GND
⑥ : OPEN
⑦ : OPEN
⑧ : AMBIENT SENSOR
⑨ : OPEN
⑩ : OPEN
⑪ : +5V
⑫ : GND
⑬ : +12V (Option : 13.2V)

CN75 – Inverter
① : COMP. SIGNAL INPUT
② : +5V
③ : GND
⑤ : COMP. SIGNAL OUTPUT

CN50
① : LED PANEL TX
② : LED PANEL RX
③ : +12V (Option : 13.2V)
④ : +5V
⑤, ⑥ : GND
⑦ : WATER SWITCH
⑧ : OPEN
⑨ : OPEN
⑩ : OPEN

CN30 – SENSOR
① : GND
② : +5V
③ : HUMDITY
④ : FZ-SENSOR
⑤ : FZ-DEF-SEOSOR
⑥ : FF-SENSOR
⑦ : IR-SENSOR
⑧ : FF-DEF-SENSOR
⑨ : PANTRY ROOM SENSOR

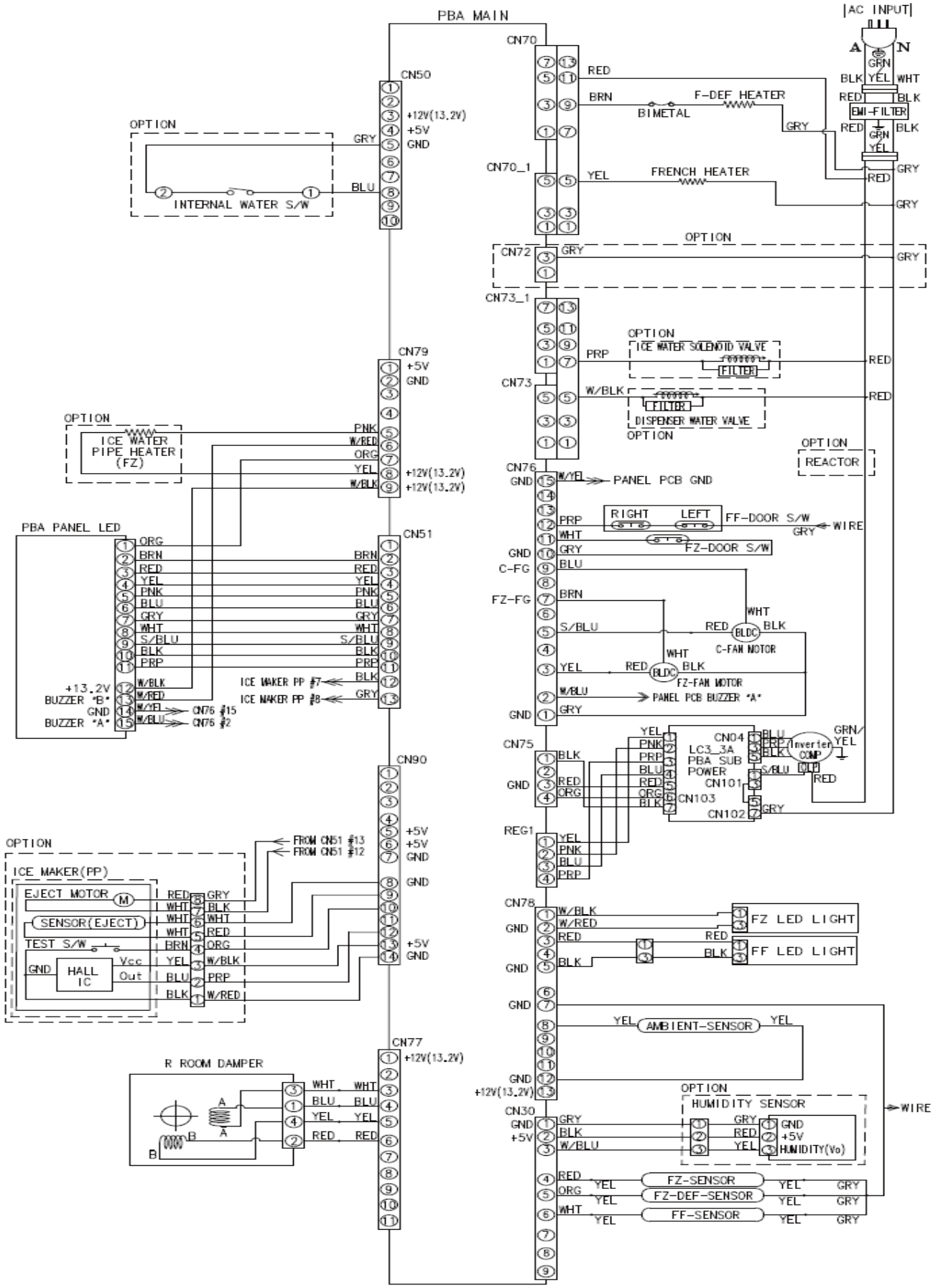
CN90 – ICE MAKER
① : OPEN
② : OPEN
③ : OPEN
④ : OPEN
⑤ : +5V
⑥ : OPEN
⑦ : GND
⑧ : GND
⑨ : SENSOR (FZ)
⑩ : TEST SWITCH (FZ)
⑪ : OPEN
⑫ : HALL IC OUTPUT
⑬ : +5V
⑭ : GND

CN77 – DAMPER & VALVE
①~② : DAMPER HEATER
③~⑥ : DAMPER MOTOR
⑦ : +12V (Option : 13.2V)
⑧~⑪ : STEP VALVE

CN79
1. +5V
2. GND
3. Open
4. Open
5. Ice Water pipe heater
6. PBA Panel LED
7. PBA Panel LED
8. +12V out
9. +12V out

CN51 – PANTRY ROOM DISPLAY
① : OPEN
② : OPEN
③~⑦ : PANTRY ROOM LED DRIVER
⑧~⑩ : OPEN
⑪ : PANTRY ROOM SWITCH
⑫ : ICE MAKER(FZ) MOTOR CCW
⑬ : ICE MAKER(FZ) MOTOR CW

CN76 – BLDC MOTOR & DOOR SWITCH
① : GND
② : OPEN
③ : FZ-FAN OPERATION SIGANL
④ : FF-FAN OPERATION SIGNAL
⑤ : C-FAN OPERATION SIGANL
⑥ : OPEN
⑦ : FZ-FAN SIGNAL INPUT VOLT
⑧ : FF-FAN SIGNAL INPUT VOLT
⑨ : C-FAN SIGNAL INPUT VOLT
⑩ : GND
⑪ : FZ-DOOR SWITCH
⑫ : FF-DOOR SWITCH
⑬ : OPEN
⑭ : OPEN
⑮ : OPEN


PBA MAIN
CN70
CN50
CN70_1
CN72
CN73_1
CN73
CN79
CN51
CN76
CN90
CN75
CN77
CN78
CN30
REG1
AC INPUT
A
N
GRN
BLK
YEL
WHT
RED
BRN
GRY
BLU
PRP
PNK
ORG
W/BLK
W/RED
W/YEL
S/BLU
F-DEF HEATER
BIMETAL
EMI-FILTER
FRENCH HEATER
OPTION
INTERNAL WATER S/W
+12V(13.2V)
+5V
GND
ICE WATER SOLENOID VALVE
FILTER
DISPENSER WATER VALVE
ICE WATER PIPE HEATER (FZ)
REACTOR
PANEL PCB GND
RIGHT
LEFT
FF-DOOR S/W
WIRE
FZ-DOOR S/W
C-FG
FZ-FG
C-FAN MOTOR
FZ-FAN MOTOR
PANEL PCB BUZZER "A"
PBA PANEL LED
+13.2V
BUZZER "B"
BUZZER "A"
ICE MAKER PP #7
ICE MAKER PP #8
CN76 #15
CN76 #2
LC3_3A
PBA SUB
POWER
CN101
CN103
CN102
CN04
Inverter COMP
OLP
ICE MAKER(PP)
EJECT MOTOR
SENSOR(EJECT)
TEST S/W
HALL IC
Vcc
Out
FROM CN51 #13
FROM CN51 #12
FZ LED LIGHT
FF LED LIGHT
AMBIENT-SENSOR
HUMIDITY SENSOR
HUMIDITY(Vo)
FZ-SENSOR
FZ-DEF-SENSOR
FF-SENSOR
R ROOM DAMPER

AC 115V

①② 13.2V ③ 5V
④⑤ GND ⑥ RPM ⑦FB

POWER(115V) OLP ⑤W ③V ①U

If Failure Condition is detected during compressor is operating, immediately stop Compressor operating and stand by 5 minutes. During this 5 minutes, RPM command signal is not available. It means, even if available RPM command signal is applied to the compressor, it does not work and keep standing by.

Blinking time is 1 second and dwell time is 2 seconds.

LED Blinking Frequency	Protecting Functions	Remarks
	Normal Operation	N/A
	Starting Failure	1. Short between COMP U,V, and W phase(CN04) 2. Short among IPM Pins(No, #1~26) 3. Drop the IPM operating Voltage under DC 13.5V 4. Other cases, check the COMP, cycle, etc.
	SPM Fault	
	Abnormal Current Detection	1. Open the COMP wire(CN04) 2. Bad condition of R 1(ex. Bad soldering) 3. Other cases, check the COMP, cycle, etc.
	Motor Locked / Over RPM	1. Operating the locked rotor COMP with in 5 seconds. 2. Operating the COMP under 1000RPM more than 5 seconds. 3. Occur the huge change of input voltage in a moment 4. Other cases, check the COMP, cycle, etc.
	Under Voltage	1. Drop the input voltage under AC 53V 2. Short resistor R312(DC link resistor)
	Over Voltage	1. Increase the input voltage over AC 155V 2. Short resistor among R309, R310 and R311 (DC link resistor)

LED blinking frequency depending on protecting functions
If the same blinking, After 5 minutes, Follow the Remarks