

REFRIGERATOR MANUFACTURER
Turbo air

Commercial
Refrigerator
Service Manual

Solid Door MODEL

Model No. : TSR-23SD-N6
 TSR-49SD-N6
 TSR-72SD-N
 TSF-23SD-N
 TSF-49SD-N
 TSF-72SD-N

MAXIMUM MODEL

Model No. : TSR-23GSD-N6
 TSR-49GSD-N
 TSR-72GSD-N

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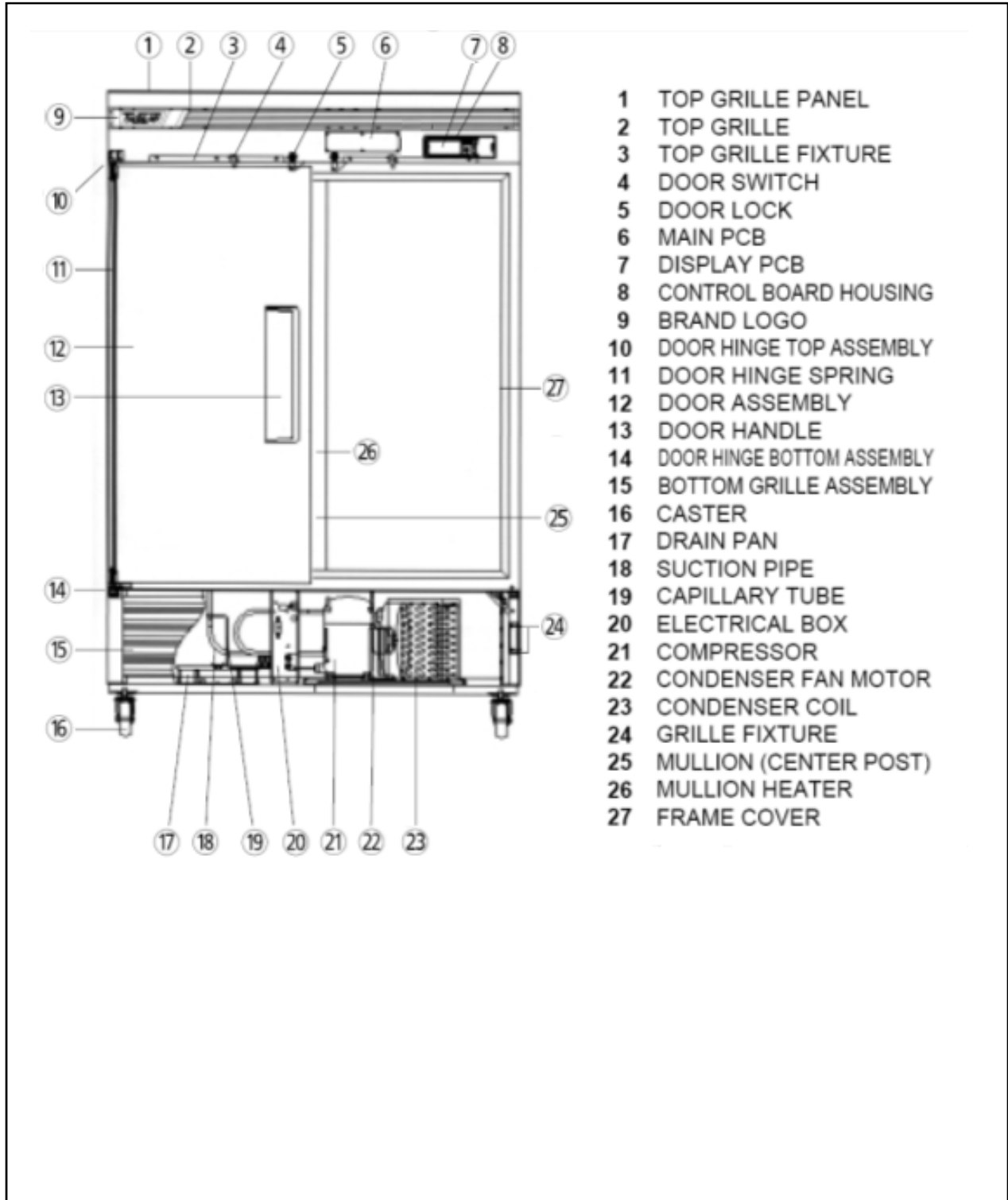
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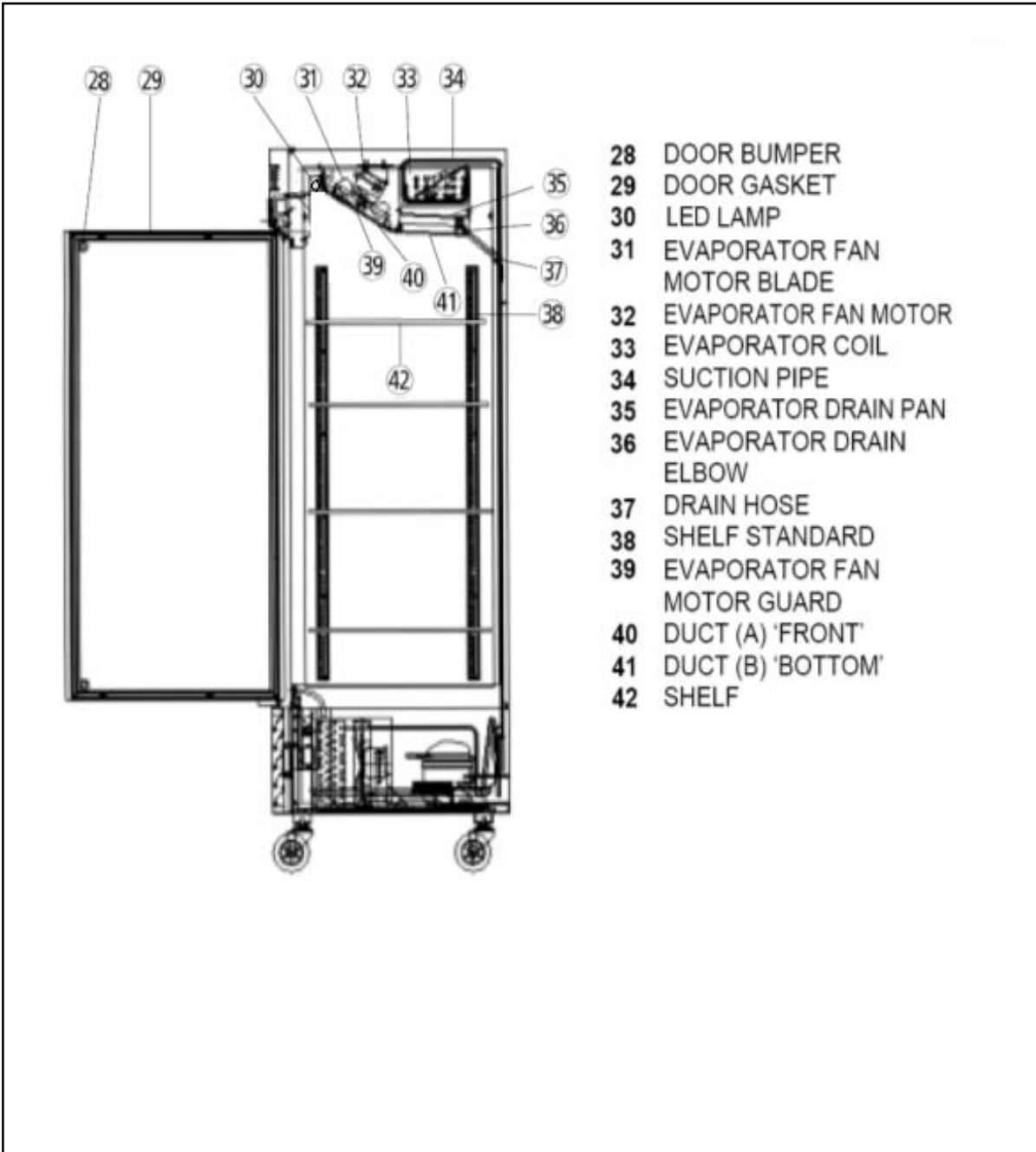
1. FEATURE CHART

1-1. FRONT VIEW (TSR-49SD-N6, TSF-49SD-N)



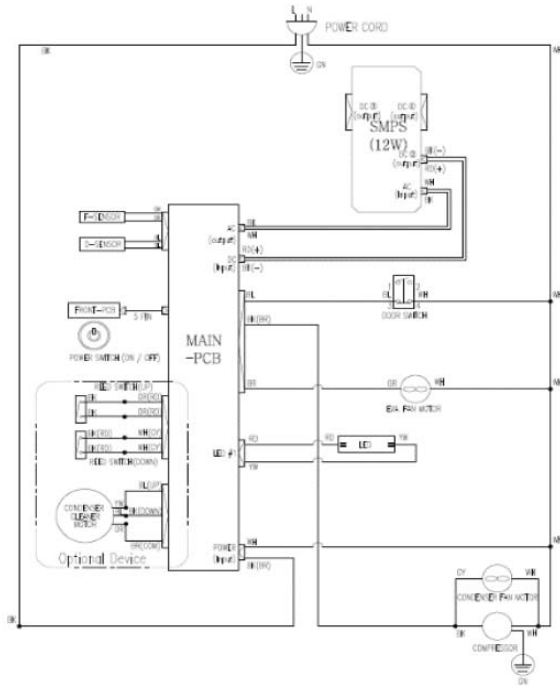
FEATURE CHART

1-2. SIDE VIEW (TSR-23SD-N6, TSF-23SD-N, TSR-49SD-N6, TSF-49SD-N)

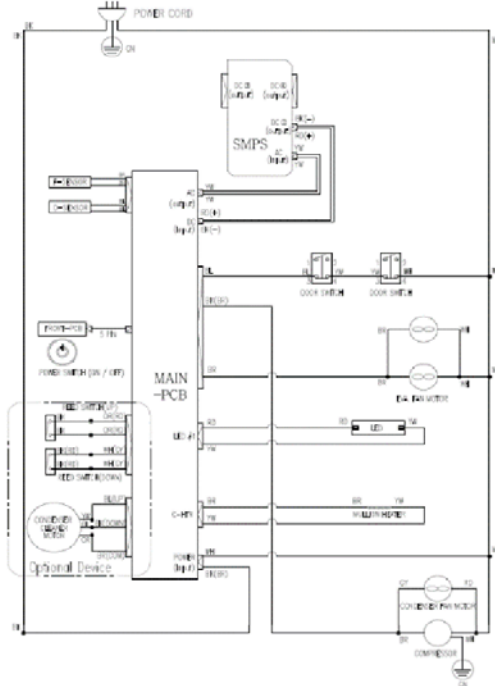


2. WIRING DIAGRAM

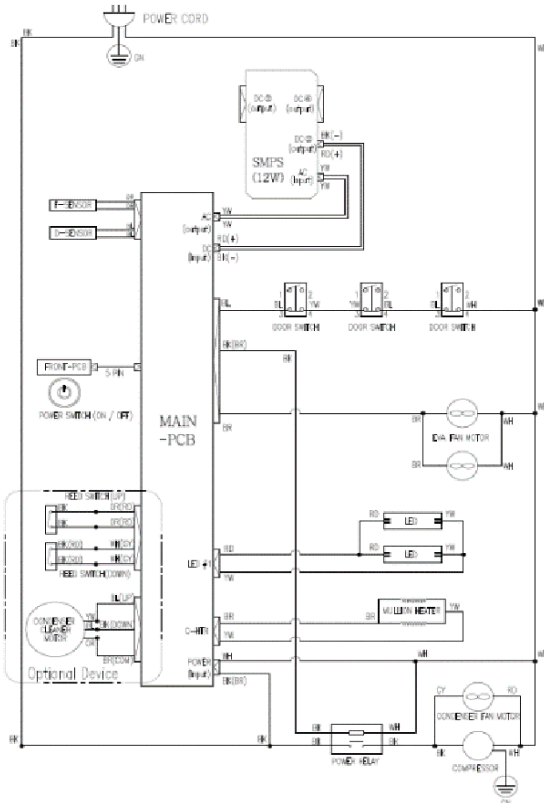
2-1. TSR-23SD-N6



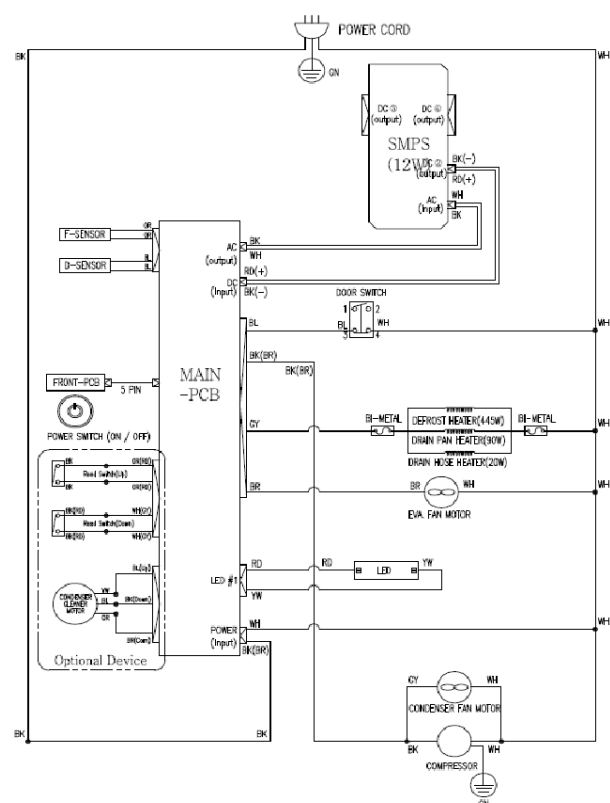
2-2. TSR-49SD-N6



2-3. TSR-72SD-N

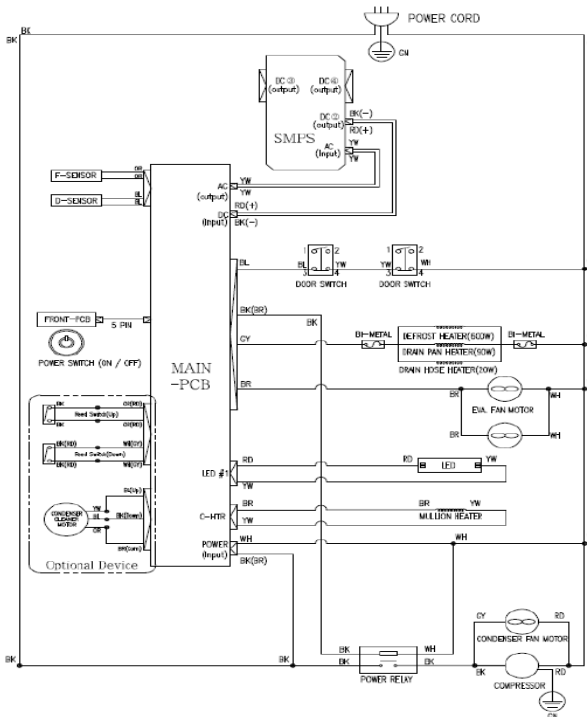


2-4. TSF-23SD-N

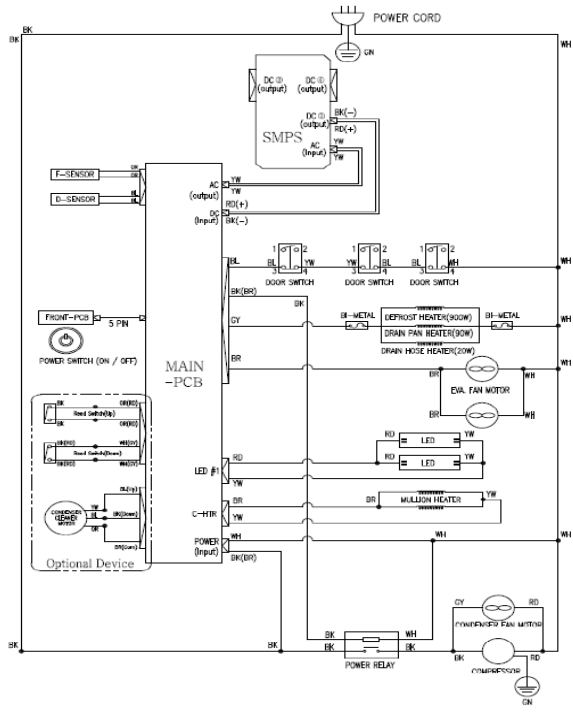


WIRING DIAGRAM

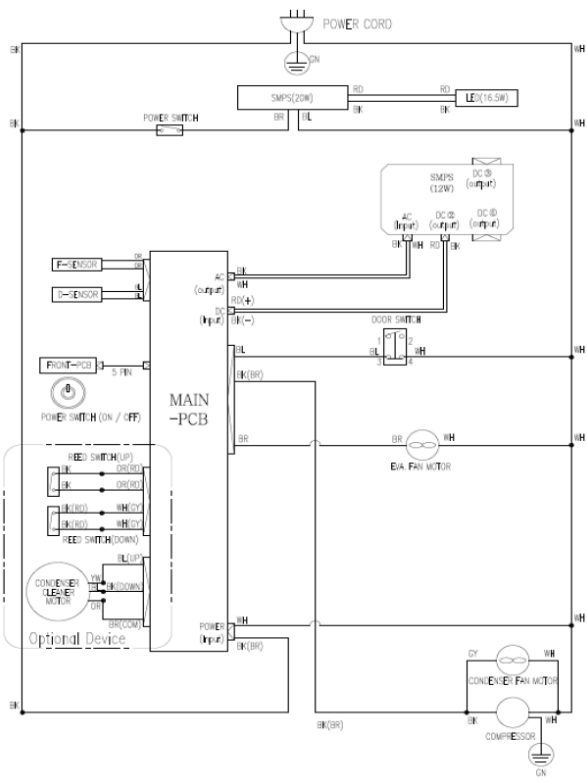
2-5. TSF-49SD-N



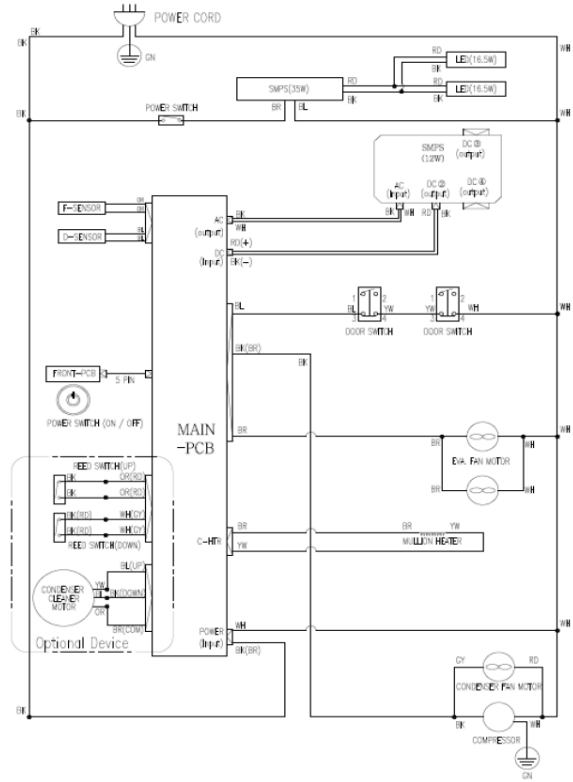
2-6. TSF-72SD-N



2-7. TSR-23GSD-N6

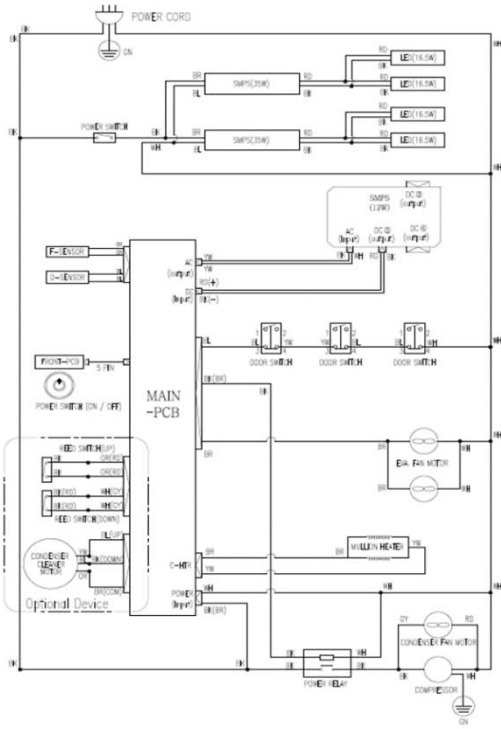


2-8. TSR-49GSD-N



WIRING DIAGRAM

2-9. TSR-72GSD-N



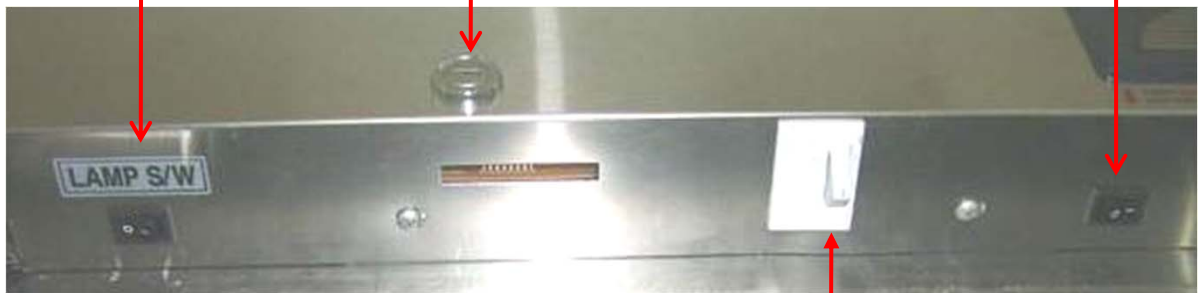
3. PART DETAILS

3-1. TOP GRILLE

Lamp Switch
(For Glass Door Model)

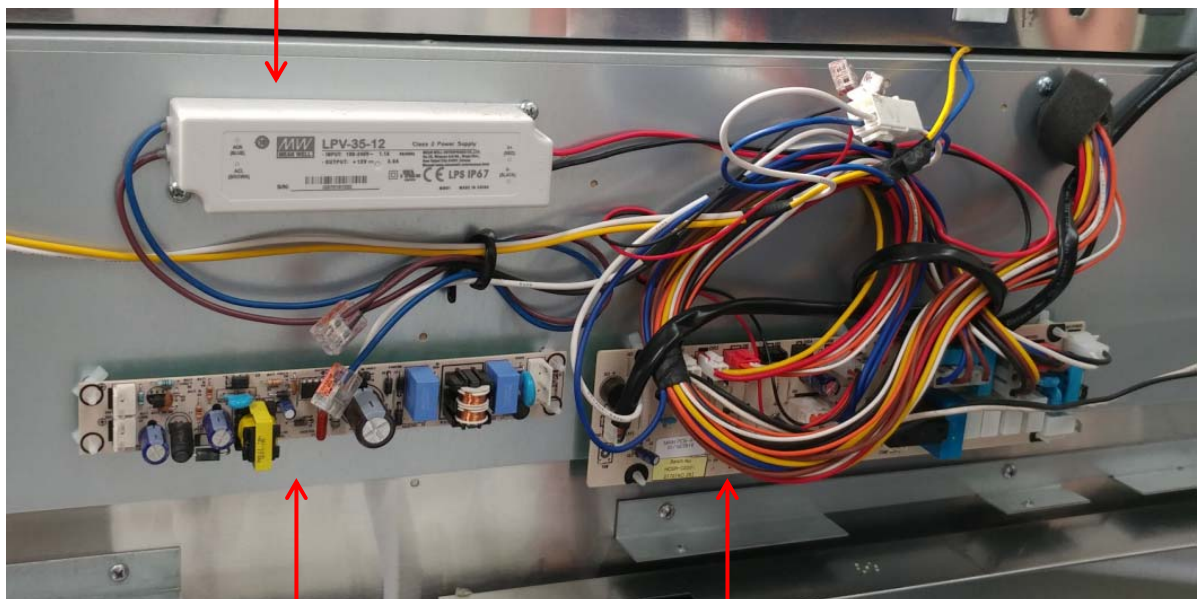
Door Lock

Power Switch



Door Switch

LED SMPS

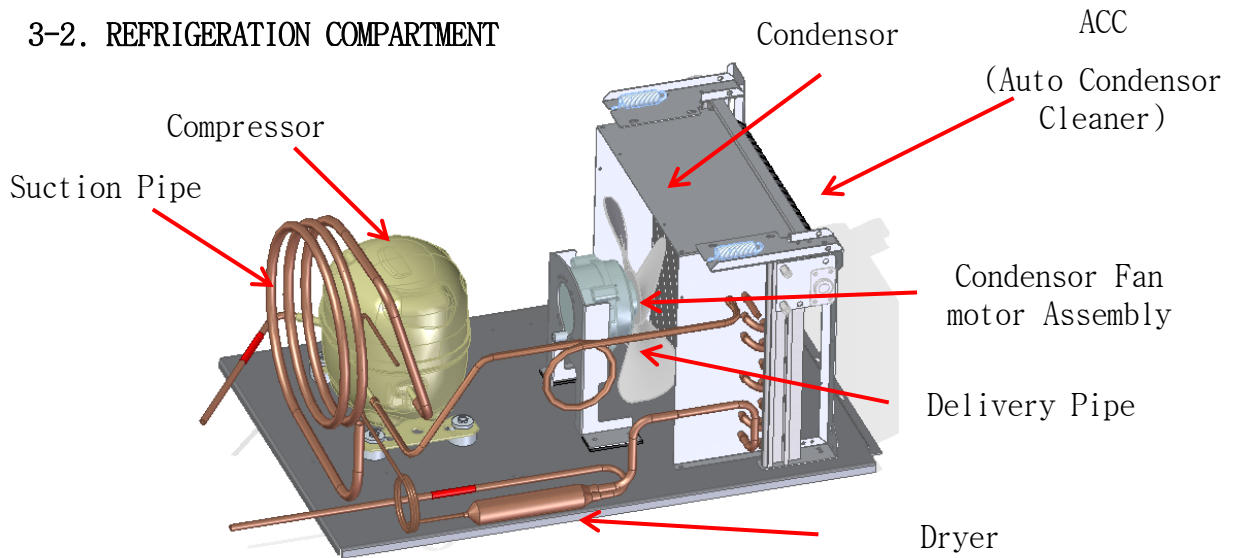


SMPS

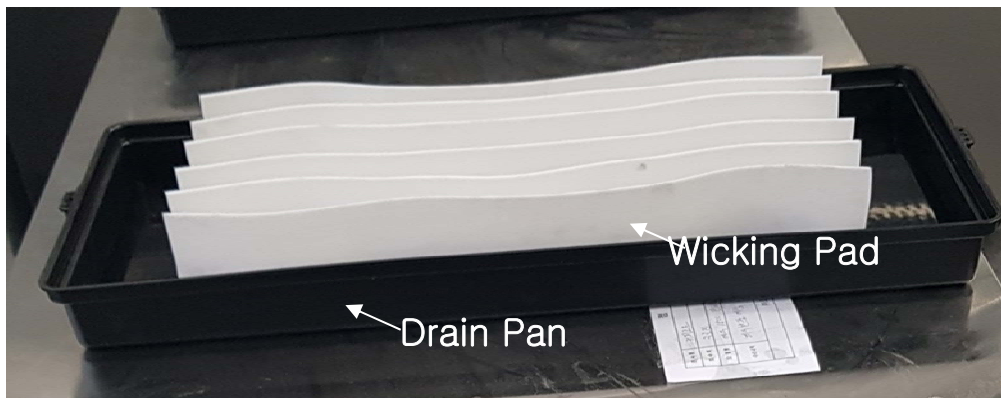
Main PCB

PART DETAILS

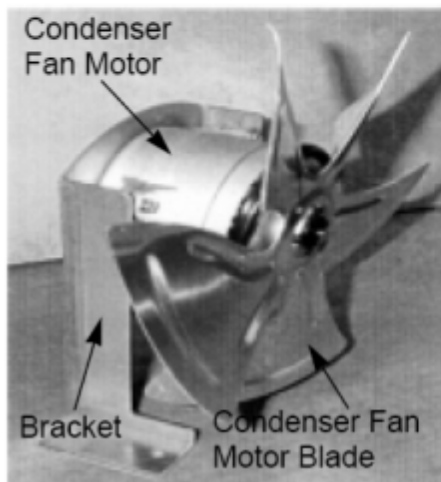
3-2. REFRIGERATION COMPARTMENT



Drain Pan Assembly

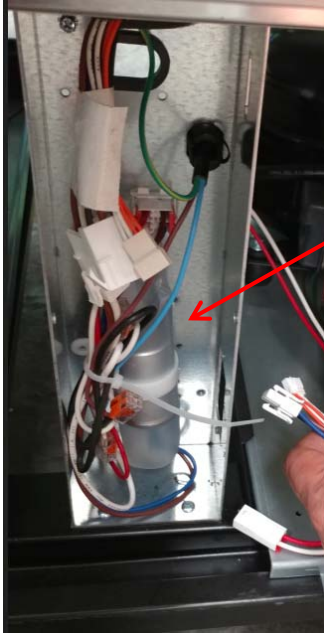


Condenser Fan Motor Assembly



PART DETAILS

3-3. ELECTRICAL BOX



Capacitor
(Compressor Capacitor)



Switch Relay
(Compressor Relay)

TSR-23SD-N6
TSR-23GSD-N6
TSR-49SD-N6

TSR-72SD-N
TSR-49/72GSD-N
TSF-23/49/72SD-N

3-4. DOOR

Gasket

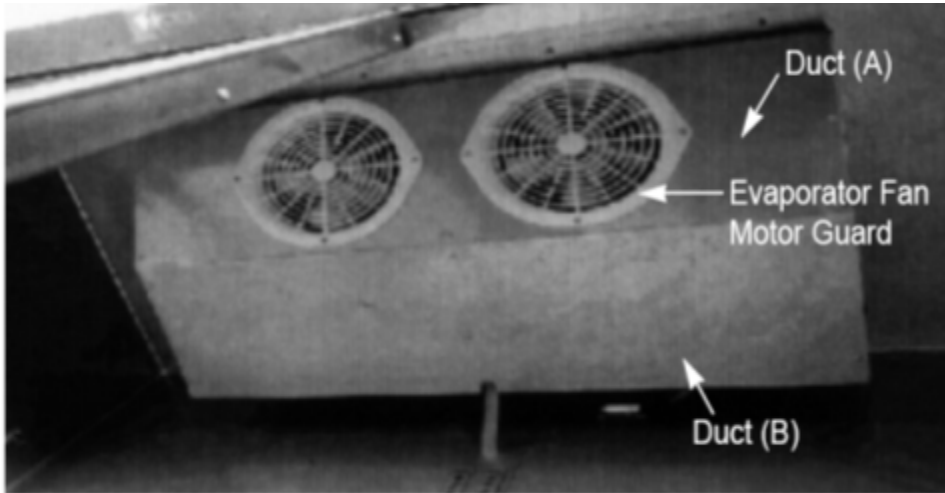


Gasket

PART DETAILS

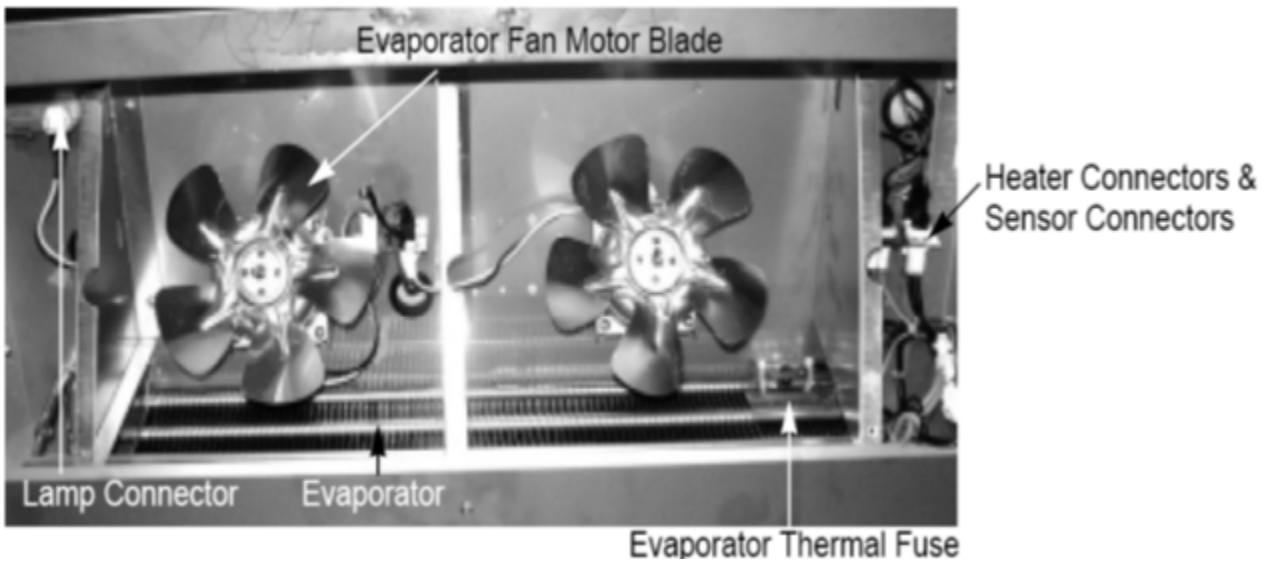
3-5. COOLING COMPARTMENT

Fan Duct (TSR-49SD-N6, TSF-49SD-N, TSR-49GSD-N, TSR-72GSD-N TYPE)



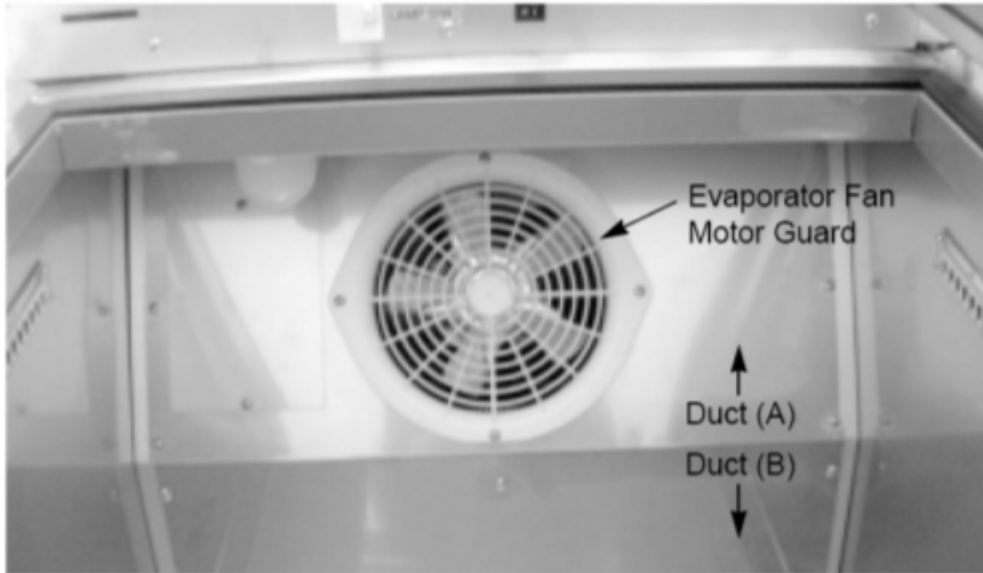
Fan Duct (TSR-49SD-N6, TSF-49SD-N, TSR-49GSD-N, TSR-72GSD-N TYPE)

▶ Heater and Thermal Fuse is used only for TSF-49SD-N



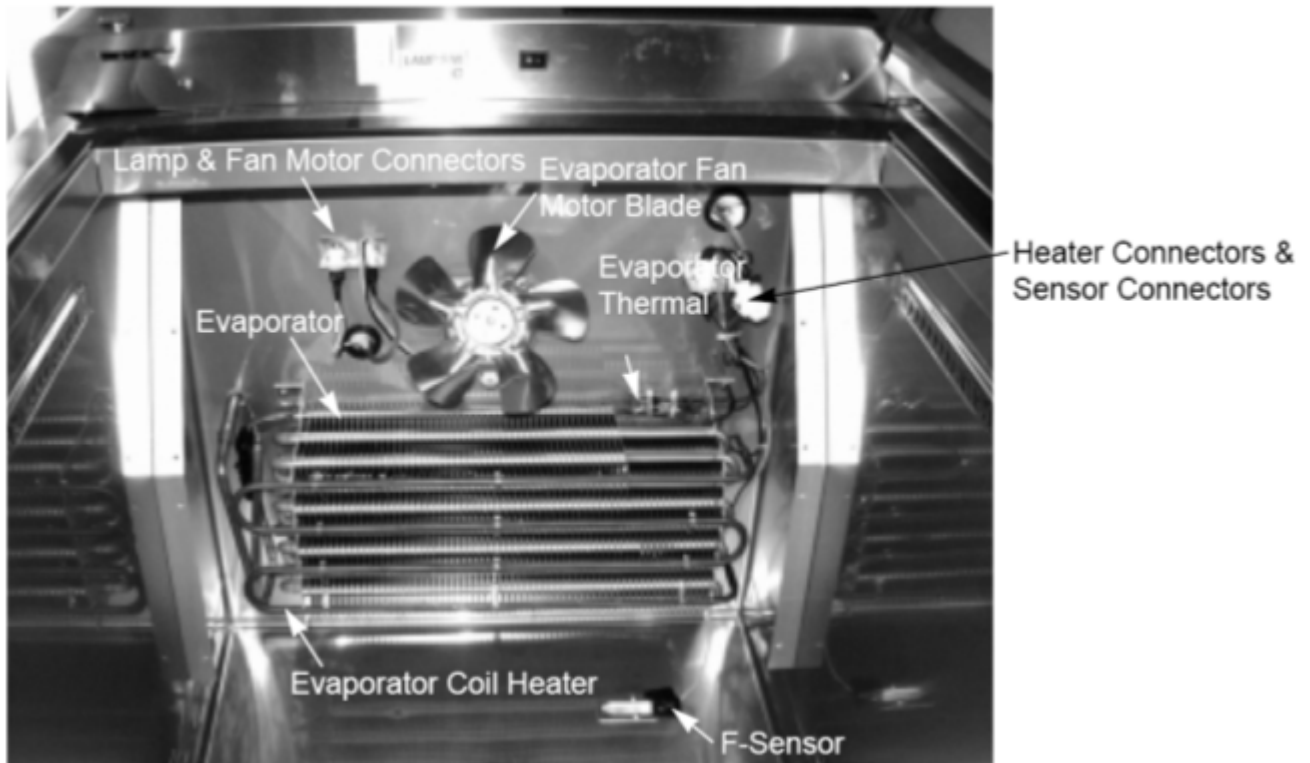
PART DETAILS

Fan Duct (TSR-23SD-N6, TSF-23SD-N, TSR-23GSD-N6 TYPE)



Fan Duct (TSR-23SD-N6, TSF-23SD-N, TSR-23GSD-N6 TYPE)

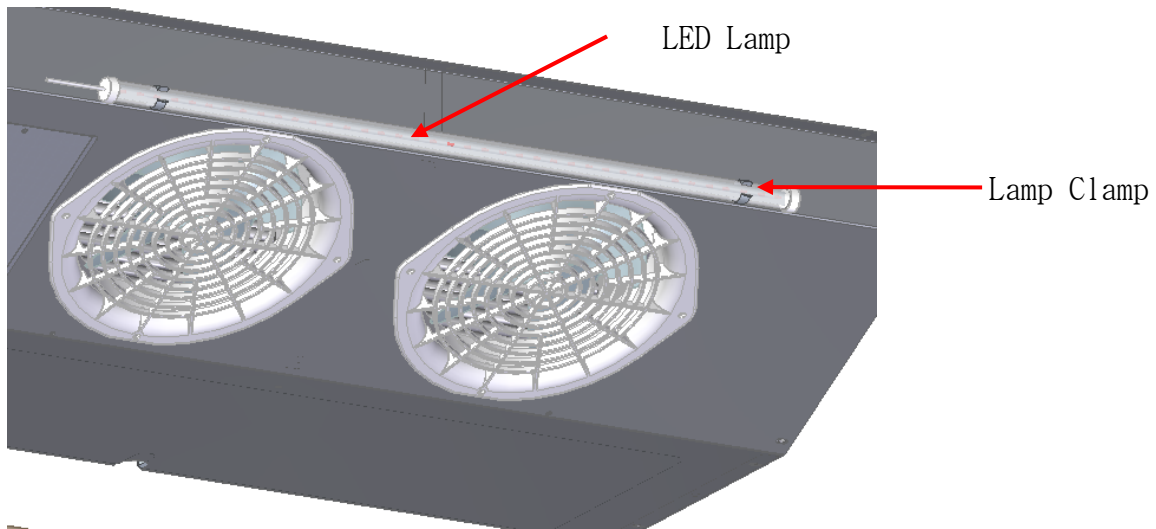
► Heater and Thermal Fuse is used only for TSF-23SD-N



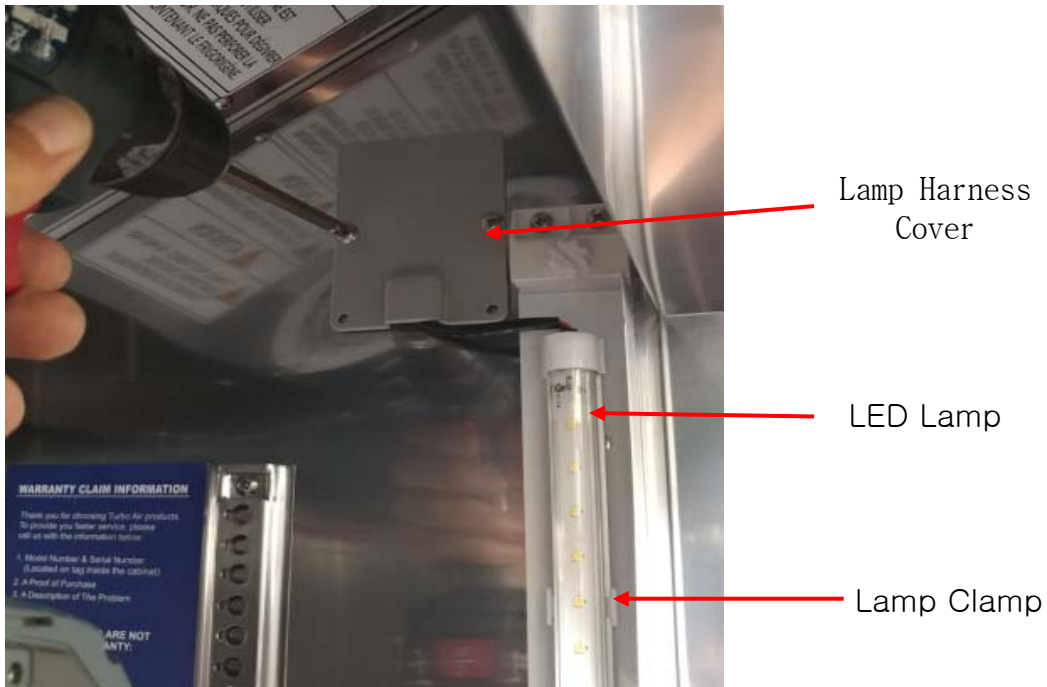
PART DETAILS

3-6. Lamp

** Solid Door Model(TSR-23SD-N6, TSR-49SD-N6, TSF-23SD-N, TSF-49SD-N)



** Glass Door Model(TSR-23GSD-N6, TSR-49GSD-N, TSR-72GSD-N)



4. MAIN COMPONENTS

1. COMPRESSOR

MODEL	PART NAME	PART NO.	HORSE POWER	CAPACITY	TYPE OF MOTOR	CURRENT (LRA)	MAKER
TSR-23SD-N6	MSE482C-S1H	P0189E0100	1/8	596 BTU/H 150 kcal/H	LBP RSCR	8.0 A (LRA)	Samsung Electronics Co., Ltd
TSR-49SD-N6 TSR-23GSD-N6	MSE4A0C-S1H	P0189E0200	1/5	738 BTU/H 186 kcal/H	LBP RSCR	12.0 A (LRA)	Samsung Electronics Co., Ltd
TSR-72SD-N TSF-23SD-N TSR-72GSD-N	NEU2140U	P0189E0400	1/2	1,534 BTU/h 387 kcal/h (ARILLBP)	LBP CSIR	30.0 (LRA)	Embraco Slovakia S R O
TSF-49SD-N	NEU2155U	P0189E0700	1/2	2,075 BYU/h 523 kcal/h (ARILLBP)	LBP CSCR	40.0 (LRA)	Embraco Slovakia S R O
TSF-72SD-N	NEU2168U	P0189E0500	4/3	2,553 BTU/h 643 kcal/h (ARILLBP)	LBP CSCR	49.0 (LRA)	Embraco Slovakia S R O
TSR-49GSD-N	EM2X3125U	P0189E0300	1/3	1,217 BTU/h 307 kcal/h	LBP RSCR	16.8 (LRA)	Embraco Slovakia S R O

2. COMPRESSOR RELAY, OVERLOAD

MODEL	RELAY	OLP
TSR-23SD-N6	100MD2	4TM232PHEBYY-53
TSR-49SD-N6 TSR-23GSD-N6	100MD2	4TM308RHBYY-53
TSR-72SD-N TSF-23SD-N TSR-72GSD-N	MTRPH-60-59	T0808/G9
TSF-49SD-N	RVAH7AA3C-571	MST20JZ-3261
TSF-72SD-N	RVAH7AA3C-571	T0736/G9
TSR-49GSD-N	8EA14C3	CP4TMC460N61A2

MAIN COMPONENTS

3. COMPRESSOR CAPACITOR

MODEL	STARTING	MAKER	RUNING	MAKER
TSR-23SD-N6			250 V~, 12 μ F RNV series	Nuintek
TSR-49SD-N6 TSR-23GSD-N6			250 V~, 12 μ F RNV series	Nuintek
TSR-72SD-N TSF-23SD-N TSR-72GSD-N	250 V~, (189-227) μ F NGM series	Nueva Generacion Manufacturas S A DE C V		
	250 V~, (189-227) μ F 4.12.80 series	Ducati Energia S.p.A		
TSF-49SD-N	250 V~, (189-227) μ F NGM series	Nueva Generacion Manufacturas S A DE C V	400 V~, 30 μ F NGM series	Nueva Generacion Manufacturas S A DE C V
	250 V~, (189-227) μ F 4.12.80 series	Ducati Energia S.p.A	400 V~, 30 μ F 4.16.23(33) series	Ducati Energia S.p.A
TSF-72SD-N	165 V~, (340-408) μ F NGM series	Nueva Generacion Manufacturas S A DE C V	400 V~, 30 μ F NGM series	Nueva Generacion Manufacturas S A DE C V
	165 V~, (340-408) μ F 4.12.80 series	Ducati Energia S.p.A	400 V~, 30 μ F 4.16.23(33) series	Ducati Energia S.p.A
TSR-49GSD-N			250 V~, 20 μ F MKP	SHANGHAI HAOYE Electric Co., Ltd

4. CAPILLARY PIPE B

MODEL	PART NO.	Inner Dia Inch(mm)	LENGTH Inch/mm
TSR-23SD-N6	P0144L9740	0.064(1.6)	39.37(1000)
TSR-49SD-N6	P0144L9820	0.064(1.6)	39.37(1000)
TSR-72SD-N	P0144L9860	0.064(1.6)	47.24(1200)
TSR-23GSD-N6	P0144L9740	0.064(1.6)	39.37(1000)
TSR-49GSD-N	P0144L9940	0.047(1.2)	39.37(1000)
TSR-72GSD-N	P0114L9860	0.064(1.6)	47.24(1200)
TSF-23SD-N	P0144L9760	0.047(1.2)	90.55(2300)
TSF-49SD-N	P0144Q2930	0.047(1.2)	90.55(2300)
TSF-72SD-N	P0144Q2950	0.047(1.2)	39.37(1000)

5. EVAPORATOR FAN MOTOR

MODEL	PART NAME	PART NO.	POLE	INPUT	BLADE	SIZE	MAKER
ALL	KD083010	P0191A0800	4P	5 W	AL	175	Koh-a Jung Gong

6. CONDENSER FAN MOTOR

MODEL	PART NAME	PART NO.	POLE	INPUT	BLADE	SIZE	MAKER
ALL	KD08301A	P0191A0810	4P	5 W	AL	225	Koh-a Jung Gong

MAIN COMPONENTS

7. MAIN PCB

PART NAME	MICOM	PART NO.	MODEL	MAKER
MAIN PCB	HCSR_F1151	P0143N0100	TSR-23SD-N6 TSR-23GSD-N6 TSR-49SD-N6 TSR-49GSD-N TSR-72SD-N TSR-72GSD-N	NEUROSYS.CO.,LTD.
MAIN PCB	HCSR_F1151	P0143N0110	TSF-23SD-N TSF-49SD-N TSF-72SD-N	

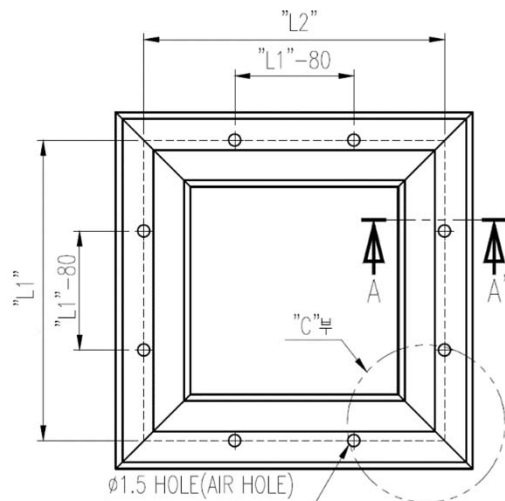
8. LAMP

PART NAME	SPEC	PART NO.	MODEL	NOTE
LED BAR	12 Vdc, 1.375A, 16.5 W	P0136L0400	TSR-23GSD-N6 TSR-49GSD-N TSR-72GSD-N	Length 47.3 Inch (1200 mm)
LED BAR	12 Vdc, 0.19 A, 2.28 W	P0136E0200	TSR-23SD-N6 TSR-72SD-N TSF-23SD-N TSF-72SD-N	Length 11.9 Inch (303 mm)
LED BAR	12 Vdc, 0.36 A, 4.32 W	P0136E0100	TSR-49SD-N6 TSF-49SD-N	Length 23.6Inch (600 mm)

9. DEFROST HEATER

MODEL	PART NAME	SPEC	PART NO.	NOTE
TSF-23SD-N	DEFROST HEATER	445 W	30228L0803	
TSF-49SD-N	DEFROST HEATER	600 W	30228L0701	
TSF-72SD-N	DEFROST HEATER	900 W	30228Q0601	

10. GASKET



MODEL	PART NAME	PART NO.	L1 Inch (mm)	L2 Inch (mm)
All Models	Gasket	P0123L0800	25 (636)	53.15 (1350)

5. ELECTRONIC CONTROLLER INSTRUCTION

5-1. FREEZER CONTROLLER(TSF-23SD-N, TSF-49SD-N, TSF-72SD-N)

5-1-1. HOW TO USE THE PANEL

- Bar LED
- It indicates temperature level customer set

- Temperature can be controlled by the user
- Set the temperature setting from level 1 to 9 by pressing the up or down button
- Factory setting is level 5



- 88 LED
- It indicates inside temperature, except defrost function

- Once you press the button, the compressor will run for 120m to quickly bring down the temperature.
- If you push the T.F. button again during Turbo Freeze mode, the compressor will return to the normal operation

ELECTRONIC CONTROLLER INTRUCTION

5-1-2. FUNCTION TABLE

No	Function	Controlled Parts	Description																														
1	Initial Operation	Buzzer Fan or Door Lamp Bar LED 88 LED	<ol style="list-style-type: none"> 1. Buzzer will be ring 2 sec. after Plug-In. 2. 88 LED display real inside temperature 3. Compressor will be run if evaporator's temperature is higher than 38.3°F(3.5°C) compressor will be run 3 minutes after plug-in, If eva. Temp is lower than 38.3°F(3.5°C) in 5 minutes, compressor will not be run 																														
2	Temperature Control	Compressor F-fan C-fan LED	<ol style="list-style-type: none"> 1. The temperature can be changed by pushing up/down buttons. 2. 88 LED indicate real inside temperature. 3. Buzzer buzzes 1 time whenever each button is pressed. 4. Compressor automatically on and off by F-sensor (Except error mode) 5. After Comp. Is Off, comp. Will not be on for 3 min. even though the F-sensor is at On point. 6. F-fan run continuously except when door is opened. 7. F-fan will start 4 sec. after door closed. 8. Comp. On/off temperature(°F) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>LEVEL</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>Comp On</td> <td>26.6</td> <td>21.2</td> <td>12.2</td> <td>6.8</td> <td>1.4</td> <td>0.5</td> <td>-0.4</td> <td>-1.3</td> <td>-2.2</td> </tr> <tr> <td>Comp Off</td> <td>12.2</td> <td>6.8</td> <td>-2.2</td> <td>-7.6</td> <td>-13.0</td> <td>-13.9</td> <td>-14.8</td> <td>-15.7</td> <td>-16.6</td> </tr> </tbody> </table>	LEVEL	1	2	3	4	5	6	7	8	9	Comp On	26.6	21.2	12.2	6.8	1.4	0.5	-0.4	-1.3	-2.2	Comp Off	12.2	6.8	-2.2	-7.6	-13.0	-13.9	-14.8	-15.7	-16.6
LEVEL	1	2	3	4	5	6	7	8	9																								
Comp On	26.6	21.2	12.2	6.8	1.4	0.5	-0.4	-1.3	-2.2																								
Comp Off	12.2	6.8	-2.2	-7.6	-13.0	-13.9	-14.8	-15.7	-16.6																								
3	Defrost Interval time	Heater Compressor F-fan C-fan	<ol style="list-style-type: none"> 1. Defrost function is controlled by the time interval setting. 2. Time interval can be set in "Time interval setting mode 'dF'" 3. Press 'Up' and 'Down' for 5 s, you can enter 'additional function control' mode. Next, Press 'down' button 2 times and check 'nS' and 'OF' at display panel. Then press 'Down' button 2 times again and check 'dF' mode at panel. 4. Time interval setting value can be changed by pushing down buttons. 5. Each time when down button is pressed, the number from '4' to '12' are displayed in order. 6. The number is defrost interval time(hours) 7. Choose the number and do not press any keys during 10 seconds. and then defrost time interval is changed. 8. Factory setting is 6 hours 9. The first defrost function start half value of setting time interval after plug-in the unit. 																														

ELECTRONIC CONTROLLER INTRUCTION

No	Function	Controlled Parts	Description																														
4	Defrost Function	Heater Compressor F-fan C-fan	<p>1. Defrost step</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Pre-cool</th> <th>DefrostHeater</th> <th>Pause</th> <th>Fan Delay</th> </tr> </thead> <tbody> <tr> <td>Comp.</td> <td style="text-align: center;">on</td> <td style="text-align: center;">off</td> <td style="text-align: center;">off</td> <td style="text-align: center;">on</td> </tr> <tr> <td>F-fan</td> <td style="text-align: center;">on</td> <td style="text-align: center;">off</td> <td style="text-align: center;">off</td> <td style="text-align: center;">off</td> </tr> <tr> <td>C-fan</td> <td style="text-align: center;">on</td> <td style="text-align: center;">off</td> <td style="text-align: center;">off</td> <td style="text-align: center;">on</td> </tr> <tr> <td>Heater</td> <td style="text-align: center;">off</td> <td style="text-align: center;">on</td> <td style="text-align: center;">off</td> <td style="text-align: center;">off</td> </tr> <tr> <td>Max time</td> <td style="text-align: center;">30min</td> <td style="text-align: center;">40min</td> <td style="text-align: center;">3min</td> <td style="text-align: center;">5min</td> </tr> </tbody> </table> <p>If D-sensor temperature is over 50°F, heater goes off. If D-sensor is in error heater goes off automatically 40 min after from activated. If D-sensor temp. lower than 14°F then F-fan turn on immediately</p> <p>A. Pre-Cool Step</p> <ol style="list-style-type: none"> a. It prevent exceed temperature rising during defrost function. b. Comp. C-fan and F-fan run continuously during pre-cool step. c. 88 LED indicate inside temp. and bar LED indicate setting temp. level. d. Maximum pre-cool time is 15 min. e. During 'TF' mode, If defrost interval get 30 minutes after cool time, pre-cool step goes off. f. If F-sensor detects -16.6 °F in 15m(or Comp.'s setting temp. point -1.8 °F, Defrost mode will be engaged <p>B. Heater defrost step</p> <ol style="list-style-type: none"> a. The defrost heater is energized. b. 88 LED displays "dF" and bar LED indicate setting temp. level. c. The defrost heater warms the evaporator coil thereby melting all frost accumulated during the previous refrigeration cycle. d. When D-sensor is higher than 48.2°F(9°C), heater goes off. e. If for any reason D-heater's On time excess 40 min., a back-up defrost termination is also provided. f. If D-sensor's temp. didn't reach 48.2°F(9°C) in 40 min., error code will be recorded on a MICOM. <p>C. Pause step</p> <ol style="list-style-type: none"> a. Time = 5 min. b. 88 LED displays 'dF' and bar LED indicate setting temp. level. <p>D. Fan delay step</p> <ol style="list-style-type: none"> a. Max. Time = 5 min b. Only Comp. and C-fan are On. c. If D-sensor temp. go down under 14°F in 5 min., then F-fan turn on immediately. 		Pre-cool	DefrostHeater	Pause	Fan Delay	Comp.	on	off	off	on	F-fan	on	off	off	off	C-fan	on	off	off	on	Heater	off	on	off	off	Max time	30min	40min	3min	5min
	Pre-cool	DefrostHeater	Pause	Fan Delay																													
Comp.	on	off	off	on																													
F-fan	on	off	off	off																													
C-fan	on	off	off	on																													
Heater	off	on	off	off																													
Max time	30min	40min	3min	5min																													

ELECTRONIC CONTROLLER INTRUCTION

No	Function	Controlled Parts	Description
5	Comp Restart	Comp C-fan	1. After comp. is Off, comp. will not be On for 3 min. even though the F-sensor is at on point.
6	Power Failure	Comp. F-fan C-fan	1. Compressor will not be run for 3 min. after power failure. 2. F-fan is on.
7	Door opening Alarm function	Buzzer LED	1. If door is opened, fan goes off and lamp on. 2. If door is opened for more than 30 seconds, chirpy sound alarm buzzes 3 times. 3. If door is opened for more than 60 seconds, chirpy sound alarm buzzes 5 times. 4. If door is opened for more than 5 minutes, chirpy sound alarm buzzes continuously.
8	Buzzer Function	Buzzer	1. Alarm buzzes 1 time after initial power on. 2. Alarm buzzes whenever each button is pressed. 3. Alarm buzzes if door open certain time period. (See door opening alarm function)
9	Error Display	LED	1. If inside temp. is lower than -58°F or higher than 65, 88 LED indicate 'Lo' or 'Hi' respectively. 2. Press up button 5 times with pressing and holding both down button and manual defrost button. Above procedure switches normal display to error display mode 3. If there was no error occurred before, there will be no change on the 88 LED. If there was any error occurred before, 88 LED will display error code. 4. Next error code will be displayed by pressing down button. 5. 10 seconds after the last button pressed, error display mode will be switched to normal display mode.

5-1-3. ERROR CODE TABLE

Code	Content	Perception Method	Refrigerator operation state
F0	F-sensor Failure	- Short circuit - Wire disconnection	- The comp. runs for 30 minutes and rest for 5 minutes. - Above action will repeat until fixed.
F1			
d0	D-sensor Failure	- Short circuit - Wire disconnection	- Heater turns on for at least 20 minutes, irrespective of D-sensor - If F-sensor temp. is higher than 28.4 °F than heater goes off. - Heater turns on for 20 minutes, if F-sensor error mode, too.
d1			
C1	Cycle, Comp Failure	- When the temp. of the D-sensor is over 32 °F although the comp. has been running for 30m	- Normal operation
F3	Defrost Failure	- When the D-sensor temp. doesn't reach 50 °F in a 40 minutes	- Reattempt normal defrost function repeatedly

ELECTRONIC CONTROLLER INTRUCTION

5-2. REFRIGERATOR CONTROLLER(TSR-..-SD-N#, TSR-..-GSD-N#)

5-2-1. HOW TO USE THE PANEL

- Bar LED
- It indicates temperature level customer set

- Temperature can be controlled by the user
- Set the temperature setting from level 1 to 9 by pressing the up or down button
- Factory setting is level 5



- 88 LED
- It indicates inside temperature, except defrost function

- Once you press the button, the compressor will run for 120m to quickly bring down the temperature.
- If you push the T.C. button again during Turbo Freeze mode, the compressor will return to the normal operation

ELECTRONIC CONTROLLER INTRUCTION

5-2-2. FUNCTION TABLE

No	Function	Controlled Parts	Description																														
1	Initial Operation	Buzzer Fan or Door Lamp	<ol style="list-style-type: none"> 1. Buzzer will be ring 2 sec. after Plug-In. 2. 88 LED displays MICOM version initially and does inside temperature in 2 sec. 3. Compressor runs, if evaporator temperatures is higher than 41.0 °F(5.0 °C). Compressor will run 3 minutes after plug-in, if eva. temperature lower than 41.0 °F(5.0 °C) 																														
2	Temperature Control	Compressor F-fan C-fan LED	<ol style="list-style-type: none"> 1. The temperature can be changed by pushing up/down buttons. 2. 88 LED indicate real inside temperature. 3. Buzzer buzzes 1 time whenever each button is pressed. 4. Compressor automatically on and off by D-sensor (Except error mode) 5. After Comp. Is Off, comp. Will not be on for 3 min. even though the D-sensor is at On point. 6. F-fan run continuously except when door is opened. 7. F-fan will start 4 sec. after door closed. 8. Comp. On/off temperature(°F) <table style="width: 100%; border-collapse: collapse; border-top: 1px dotted black; border-bottom: 1px dotted black;"> <thead> <tr> <th style="text-align: left;">LEVEL</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>Comp On</td> <td>51.8</td> <td>50</td> <td>48.2</td> <td>46.4</td> <td>44.6</td> <td>42.8</td> <td>41</td> <td>39.2</td> <td>37.4</td> </tr> <tr> <td>Comp Off</td> <td>41</td> <td>39.2</td> <td>37.4</td> <td>35.6</td> <td>33.8</td> <td>32</td> <td>30.2</td> <td>28.4</td> <td>26.6</td> </tr> </tbody> </table>	LEVEL	1	2	3	4	5	6	7	8	9	Comp On	51.8	50	48.2	46.4	44.6	42.8	41	39.2	37.4	Comp Off	41	39.2	37.4	35.6	33.8	32	30.2	28.4	26.6
LEVEL	1	2	3	4	5	6	7	8	9																								
Comp On	51.8	50	48.2	46.4	44.6	42.8	41	39.2	37.4																								
Comp Off	41	39.2	37.4	35.6	33.8	32	30.2	28.4	26.6																								
3	Turbo cooling	Compressor F-fan C-fan LED	<ol style="list-style-type: none"> 1. If Turbo Cooling button is pressed, Turbo Cooling mode will start. 2. If the Turbo Cooling button is pressed during Turbo Cooling mode, Turbo Cooling mode can be canceled. 3. During Turbo Cooling mode, the temperature control button will not affect the temperature control. 4. All bar LEDs are fully light during Turbo Cooling mode. 5. The Comp., F-fan and C-fan operate continuously for 120m. If D-sensor temperature comes to 14°F(-10°C), they stop regardless of 120min. 6. Turbo Cooling mode will start after defrost is completed. If you press the Turbo Cooling button during defrost function. 7. Defrost function starts after Turbo cooling mode if defrost function occurs during Turbo Cooling mode. 																														

ELECTRONIC CONTROLLER INTRUCTION

No	Function	Controlled Parts	Description
4	Defrost Interval time	Compressor F-fan C-fan	<ol style="list-style-type: none"> 1. Defrost function is controlled by the time interval setting. 2. Time interval can be set in "Time interval setting mode" 3. Push the up button during 5 seconds the mode will be changed. 4. Time interval setting value can be changed by pushing down buttons. 5. Each time when down button is pressed, the number from '4' to '12' are displayed in order. 6. The number is defrost interval time(hours) 7. Choose the number and do not press any keys during 10 seconds. and then defrost time interval is changed. 8. Factory setting is 8 hours 9. The first defrost function start half value of setting time interval after plug-in the unit.
5	Defrost Function	Compressor F-fan C-fan	<ol style="list-style-type: none"> 1. It becomes defrost cycle time, the refrigerator or executes defrost function. 2. Defrost method is to operate only F-fan with comp. off. 3. Defrost function terminates when D-sensor temperature comes to above 50°F(10°C). 4. During defrost period, 88 LED display "dF" letter 5. After defrost completed, 88 LED display the temp. of 'first compressor off temp.'
6	Forced Defrost	Comp F-fan C-fan	<ol style="list-style-type: none"> 1. Press the Turbo Cooling button 5 times while pressing both up/down button and defrost mode starts, immediately. 2. Next procedure is same as that of the defrost function.
7	Comp Restart Prevent	Comp C-fan	<ol style="list-style-type: none"> 1. After comp. is off, comp. will not start for 3 min, even though the D-sensor is at on point.
8	Power Failure Back-up Failure	Comp F-fan C-fan	<ol style="list-style-type: none"> 1. Compressor will not start for 3min. after power failure. 2. F-fan is on.
9	Door opening alarm function	Buzzer LED	<ol style="list-style-type: none"> 1. If door is opened, fan goes off and lamp on. 2. If door is opened for more than 30 seconds, chirpy sound alarm buzzes 3 times. 3. If door is opened for more than 60 seconds, chirpy sound alarm buzzes 5 times. 4. If door is opened for more than 5 minutes, chirpy sound alarm buzzes continuously
10	Buzzer Function	Buzzer	<ol style="list-style-type: none"> 1. Alarm buzzes 1 time after initial power on. 2. Alarm buzzes whenever each button is pressed. 3. Alarm buzzes if door remains open for certain period
11	Error Display	LED	<ol style="list-style-type: none"> 1. If inside temp. is lower than -58°F or higher than 65°F, 88 LED indicates 'Lo' or 'Hi' respectively. 2. Press 'up' button 5 times with pressing and holding both 'down' and 'Turbo Cooling' button. Above procedure switches normal display to error display mode. 3. If there was no error occurred before, there will be no change on the 88 LED. If there was any error occurred before, 88 LED will display error code. 4. Next error code will be displayed by pressing down button. 5. 10 seconds after the last button pressed, error display mode will be switched to normal display mode.

ELECTRONIC CONTROLLER INTRUCTION

5-2-3. ERROR CODE TABLE

Code	Content	Perception Method	Refrigerator operation state
r0	F-sensor Failure	- Short circuit	- The comp. runs for 15 minutes and rest for 15 minutes. - Above action will repeat until fixed.
r1		- Wire disconnection	
d0	D-sensor Failure	- Short circuit	- Normal operation
d1		- Wire disconnection	
C1	Cycle, Comp Failure	- When the temp. of the D-sensor is over 32 °F although the comp. has been running for 30m	- Normal operation
F3	Defrost Failure	- When the D-sensor temp. doesn't reach 50 °F in a 40 minutes	- Reattempt normal defrost function repeatedly

6. PARTS LIST

PART NAME	CODE	DESCRIPTION	MODEL					
			TSR- 23SD- N6	TSR- 23GSD- N6	TSR- 49SD- N6	TSR- 49GSD- N	TSF- 23SD-N	TSF- 49SD-N
CASTER								
CASTER	30265L0400	TP5040-22-HDP	2	2	2	2	2	2
CASTER BRAKE	30265L0300	TP5040-22-HDP-TLE	2	2	2	2	2	2
COMPRESSOR								
COMPRESSOR RELAY HARNESS	30227L1600		1	1	1			
COMPRESSOR RELAY HARNESS	30227L2803					1	1	
COMPRESSOR RELAY HARNESS	30227L0511							1
POWER RELAY	P0181E0010						1	1
ELECTRICAL BOX HARNESS	P0127E0152		1	1	1	1	1	1
MAIN POWER CORD	30213A1014	125V / 15A	1	1	1	1	1	1
CONDENSER								
CONDENSER COIL	P0156E1100		1	1				
CONDENSER COIL	P0156E0700				1	1	1	1
CONDENSER FAN								
CONDENSER FAN MOTOR BLADE	30218B0200	AL, Φ 225	1	1	1	1	1	1
CONDENSER FAN MOTOR	P0191A0810	KD08301A	1	1	1	1	1	1
DOOR								
DOOR ASSEMBLY	30200L3100	EXCLUDING GASKET	1				1	
DOOR ASSEMBLY	30200Q9300	INCLUDING GASKET		1				
DOOR ASSEMBLY (LEFT)	30200L2600	EXCLUDING GASKET			1			1
DOOR ASSEMBLY (RIGHT)	30200L2700	EXCLUDING GASKET			1			1
DOOR ASSEMBLY (LEFT)	30200Q8700	INCLUDING GASKET				1		
DOOR ASSEMBLY (RIGHT)	30200Q8800	INCLUDING GASKET				1		
DOOR GASKET	P0123L0800	PVC-S	1	1	2	2	1	2
DOOR HINGE TOP ASSEMBLY LEFT	30229L0800				1			1
DOOR HINGE TOP ASSEMBLY RIGHT	30229L0900		1		1		1	1
DOOR HINGE BOTTOM ASSEMBLY LEFT	30229L0100				1			1
DOOR HINGE BOTTOM ASSEMBLY RIGHT	30229L0200		1		1		1	1
DOOR HINGE TOP ASSEMBLY LEFT	30229L1300					1		
DOOR HINGE TOP ASSEMBLY RIGHT	30229L1200			1		1		
DOOR HINGE BOTTOM ASSEMBLY LEFT	30229L1500					1		
DOOR HINGE BOTTOM ASSEMBLY RIGHT	30229L1400			1		1		

PARTS LIST

PART NAME	CODE	DESCRIPTION	MODEL					
			TSR-23SD-N6	TSR-23GSD-N6	TSR-49SD-N6	TSR-49GSD-N	TSF-23SD-N	TSF-49SD-N
DRAIN								
DRAIN PAN	30211L0700	HIPS	1	1			1	
DRAIN PAN	30211J0103	HIPS			1	1		1
EVAPORATOR								
EVAPORATOR COIL	30270L0120		1	1				
EVAPORATOR COIL	30270L0220				1			
EVAPORATOR COIL	P0170E0901					1		
EVAPORATOR COIL	P0170E2301						1	
EVAPORATOR COIL	P0170E2401							1
EVAPORATOR SENSOR	30227Q1200	F-D SENSOR					1	1
EVAPORATOR SENSOR	30227Q1300	R-D SENSOR	1	1	1	1		
EVAPORATOR THERMAL FUSE	30272L0401	125V/10A					2	2
EVAPORATOR DEFROST HEATER	30228L0803	445W					1	
EVAPORATOR DEFROST HEATER	30228L0701	600W						1
EVAPORATOR DRAIN PAN HEATER	30228L1400	90W					1	
EVAPORATOR DRAIN PAN HEATER	30228L1500	90W						1
DRAIN HOSE HEATER	30228L1380	10W					1	1
EVAPORATOR FAN MOTOR BLADE	30218F0200	AL, Φ175	1	1	2	2	1	2
EVAPORATOR FAN MOTOR	P0191A0800	KD083010	1	1	2	2	1	2
TOP GRILLE								
TOP GRILLE PANEL ASSEMBLY	P0100E0230	INCLUDE ACCESSORIES	1					
TOP GRILLE PANEL ASSEMBLY	P0100E0160	INCLUDE ACCESSORIES					1	
TOP GRILLE PANEL ASSEMBLY	P0100E0170	INCLUDE ACCESSORIES						1
TOP GRILLE PANEL ASSEMBLY	P0100E0220	INCLUDE ACCESSORIES		1				
TOP GRILLE PANEL ASSEMBLY	P0100E0240	INCLUDE ACCESSORIES			1	1		
SMPS	P0184N0040	12w	1	1	1	1	1	1
MAIN PCB	P0143N0100		1	1	1	1		
MAIN PCB	P0143N0110						1	1
BOTTOM GRILLE								
BOTTOM GRILLE ASSEMBLY	30224L1413	SUS 430	1	1			1	
BOTTOM GRILLE ASSEMBLY	30224L1403	SUS 430			1	1		1
BOTTOM GRILLE ASSEMBLY	30200Q4102	SUS 430						
LAMP								
LAMP	P0136E0200		1				1	
LAMP	P0136E0100	LED 4W			1			1
LAMP	P0136L0400	LED 16.5W		1		2		
SHELF								
SHELF CLIP	30220L0900	PA-6	12	12	24	24	12	24
SHELF	30278Q0103	PE COATING	3				3	
SHELF	30278Q0203	PE COATING			6			6
SHELF	30278L0300	PE COATING		3				
SHELF LEFT	30278L0400	PE COATING				3		
SHELF RIGHT	30278L0500	PE COATING				3		

PARTS LIST

PART NAME	CODE	DESCRIPTION	MODEL		
			TSR-72SD-N	TSR-72GSD-N	TSF-72SD-N
CASTER					
CASTER	30265L0400	TP5040-22-HDP	3	3	3
CASTER BRAKE	30265L0300	TP5040-22-HDP-TLE	3	3	3
COMPRESSOR					
COMPRESSOR RELAY HARNESS	30227L3100				
COMPRESSOR RELAY HARNESS	30227L9001				1
COMPRESSOR RELAY HARNESS	30227L2802		1	1	
POWER RELAY	P0181E0010				1
ELECTRICAL BOX HARNESS	P0127E0152		1	1	1
MAIN POWER CORD	30213A1014	125V / 15A	1	1	1
CONDENSER					
CONDENSER COIL	P0156E0700		1		
CONDENSER COIL	P0156E0410			1	
CONDENSER COIL	P0156E2100				1
CONDENSER FAN					
CONDENSER FAN MOTOR BLADE	30218A0300	AL, Φ250	1	1	1
CONDENSER FAN MOTOR	P0191A0810	KD08301A	1	1	1
DOOR					
DOOR ASSEMBLY (LEFT)	30200L2600			1	
DOOR ASSEMBLY (RIGHT)	30200L2700			2	
DOOR ASSEMBLY (LEFT)	30200Q8700		1		1
DOOR ASSEMBLY (RIGHT)	30200Q8800		2		2
DOOR GASKET	30223R0203	PVC-S	3	3	3
DOOR HINGE TOP ASSEMBLY LEFT	30229L1300		1	1	1
DOOR HINGE TOP ASSEMBLY RIGHT	30229L1200		2	2	2
DOOR HINGE BOTTOM ASSEMBLY LEFT	30229L1500		1	1	1
DOOR HINGE BOTTOM ASSEMBLY RIGHT	30229L1400		2	2	2
DRAIN PAN	30211J0104	HIPS	1	1	1
EVAPORATOR					
EVAPORATOR COIL	P0170E2200		1	1	
EVAPORATOR COIL	P0170E2500				1
EVAPORATOR SENSOR	30227Q1210	F-D SENSOR			1
EVAPORATOR SENSOR	30227Q1310	R-D SENSOR	1	1	
EVAPORATOR THERMAL FUSE	30272L0401	PST-3(80/10)			2
EVAPORATOR DEFROST HEATER	30228Q0601	900W			1
EVAPORATOR DRAIN PAN HEATER	30228Q0500	90W			1
DRAIN HOSE HEATER	30228L1380	10W			1
EVAPORATOR FAN MOTOR BLADE	30218F0200	AL, Φ175	2	2	2
EVAPORATOR FAN MOTOR	P0191A0800	KD083010	2	2	2
TOP GRILLE PANEL ASSEMBLY	P0100E0250		1	1	
TOP GRILLE PANEL ASSEMBLY	P0100E0180				1
SMPS	P0184N0040	12W	1	1	1
MAIN PCB	P0143N0100		1	1	
MAIN PCB	P0143N0110				1
BOTTOM GRILLE ASSEMBLY	30200Q4103	SUS 430	1	1	1
LAMP	P0136E0200	LED 4W	2		2
LAMP	P0136L0400	LED 16.5W		4	
SHELF					
SHELF CLIP	30220L0900	PA-6			
SHELF		PE COATING	38	38	38
SHELF	30278Q0204	PE COATING	9		9
SHELF MID	30278L0600	PE COATING		3	
SHELF LEFT	30278L0700	PE COATING		3	
SHELF RIGHT	30278L0800	PE COATING		3	

7. REPLACEMENT OF MAIN COMPONENTS

7-1. TOP GRILLE PARTS

- MAIN PCB or TRANSFORMER
- DISPLAY PCB
- DORR LOCK or POWER SWITCH(ROCKER SWITCH)

A. Unscrew the screw located both sides of top grille panel.



REPLACEMENT OF MAIN COMPONENTS

B. Unscrew the screws located on top of top grille panel



C. Unscrew the screws located on bottom of top grille panel

* Caution : When unscrewing, hold top grille panel

Falling down top grille may cause bruise.

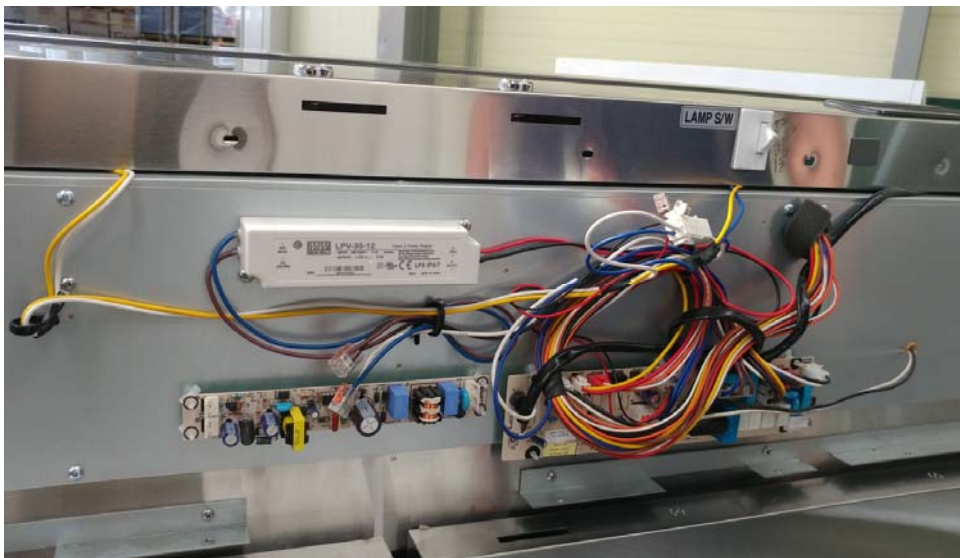


REPLACEMENT OF MAIN COMPONENTS

D. Place the top grille panel on the top of the cabinet.



E. You can replace PCB & Transformer & Ballast

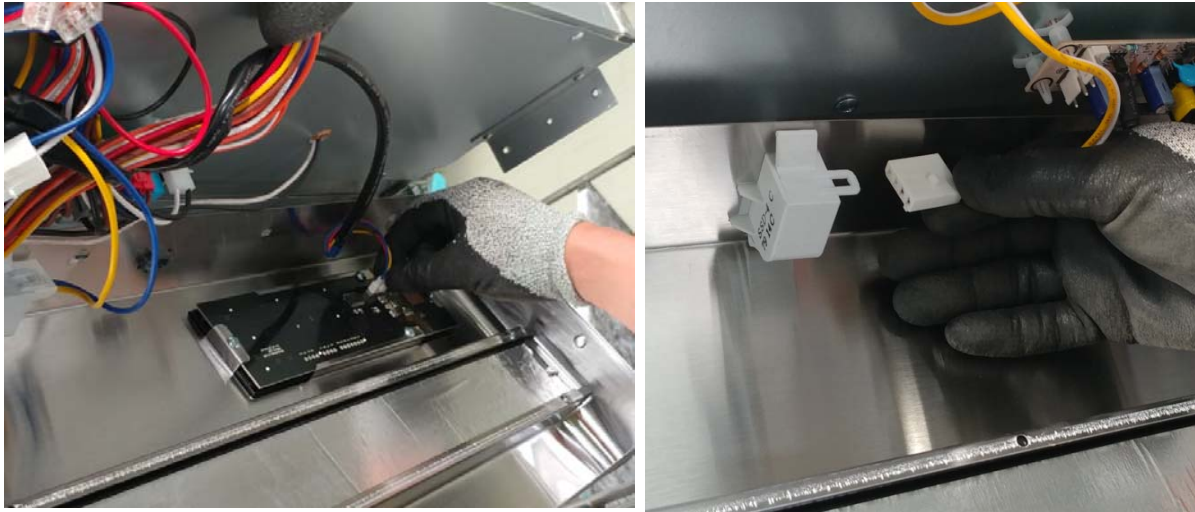


REPLACEMENT OF MAIN COMPONENTS

F. Pull-out the harness located back of top grille panel.

You can separate top grille panel.

You can replace power switch, door switches and control board housing.



G. To re-assemble, do reversed in order.



REPLACEMENT OF MAIN COMPONENTS

7-2. REPLACING DOOR

A. Disassemble top grille panel as described section 7-1 A,B,C,D.

B. Remove Bottom grille By unscrewing the four screws located on each side of the bottom grille.



C. The figure of the disassembled top grille panel.

D. Unscrew the hinge.



E. Unscrew the last screw with pushing the hinge.

F. After unscrewing the hinge will rotate about 90°(CCW), of it self.



REPLACEMENT OF MAIN COMPONENTS

G. Lift the door hinge and pull out the door heater's lead wire.



H. Replace the door with the new one.



I. Ready the hinge as below. It is important to set initial position(angle).



REPLACEMENT OF MAIN COMPONENTS

J. Initial position of the hinge must be as below.



K. Turn the hinge 90° CW. This turning causes torsion strength of the bar spring that shuts the door(s) automatically.



L. Screw the hinge with pushing it. After installation of the door(s), assemble the top grille panel.



REPLACEMENT OF MAIN COMPONENTS

7-3. REFRIGERATION COMPARTMENTS PARTS

- A. Disassemble LED lamp Harness
- LAMP BULB or LAMP SHIELD
 - EVAPORATOR FAN MOTOR
 - F/D SENSOR or R/D SENSOR
 - EVAPORATOR DEFROST HEATER
 - EVAPORATOR COIL

(A) (C-1) Is only for solid door model

*(TSR-23SD-N6, TSR-49SD-N6,
TSF-23SD-N, TSF-49SD-N)*

- B. Disassemble Duct(A).



- C-1. Pull out the lamp harness

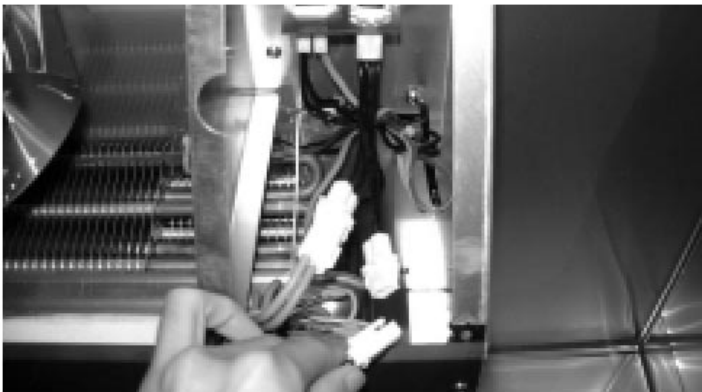


REPLACEMENT OF MAIN COMPONENTS

D. Disassemble duct (B).



E. Pull-out the evaporator drain pan heater's leadwire.



F. Figure of disassembled refrigeration compartments.



In this situation, you can replace fan motor, F/D sensor, Evaporator ETC.

REPLACEMENT OF MAIN COMPONENTS

G. Replace the evaporator fan motor

F-1. Pull out the fan motor's connector.

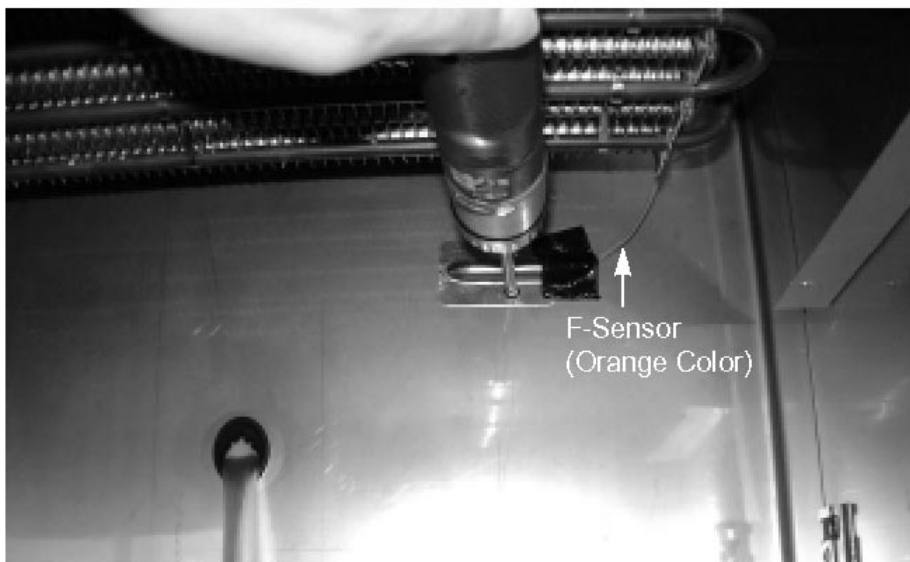
F-2. Unscrew the four screws which located on bottom of fan motor.



G. Replacing F/D Sensor of R/D Sensor

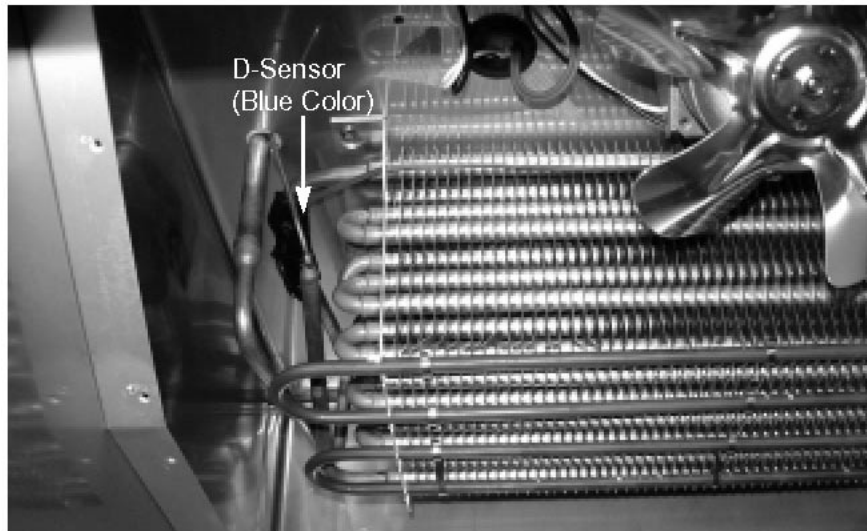
H-1. F-Sensor of Freezer

Unscrew as illustrated below and pull out the F-Sensor from the cover.

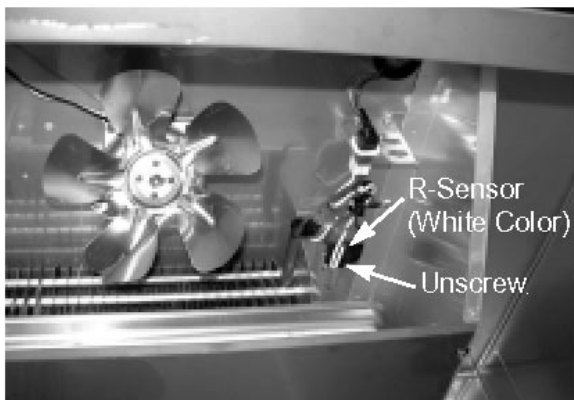


REPLACEMENT OF MAIN COMPONENTS

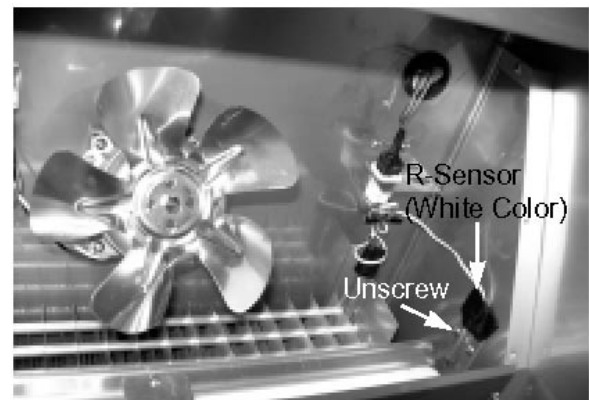
- H-2. D-Sensor of Freezer(Evaporator Defrost Sensor)
Disassemble the D-Sensor from evaporator's end plate.



- H-3. R-Sensor of Refrigerator
Unscrew as illustrated below and pull out the R-Sensor from the cover.



TSR-49SD-N6, TSR-
49GSD-N
TSR-72GSD-N

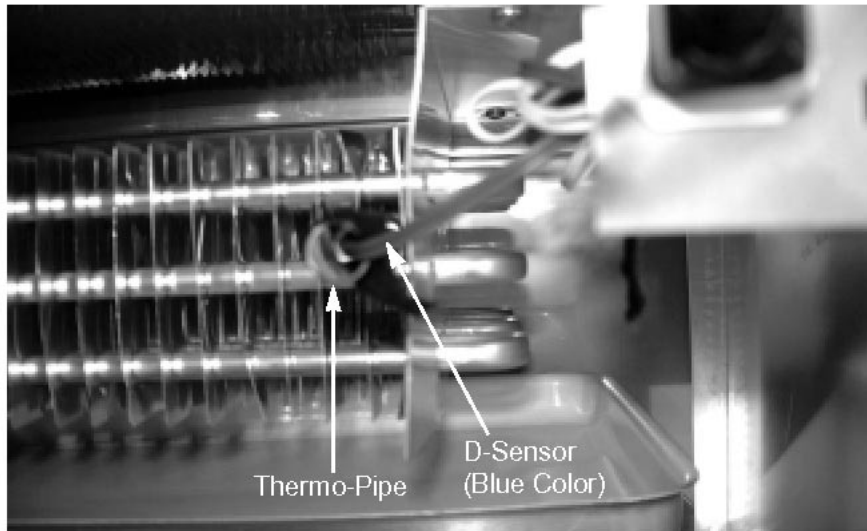


TSR-23SD-N6, TSR-
23GSD-N6

REPLACEMENT OF MAIN COMPONENTS

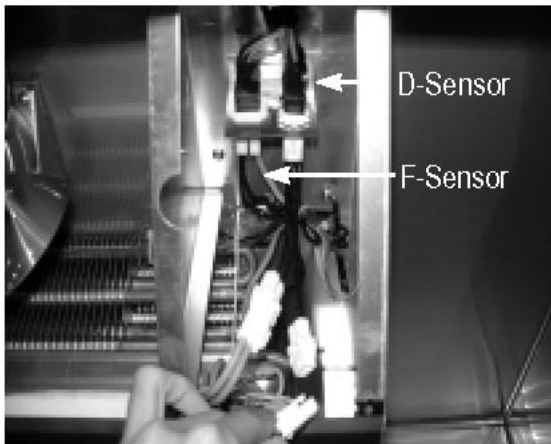
H-4. D-Sensor of Refrigerator

Remove the absorber pad at the end of the thermo-pipe and pull out D-sensor

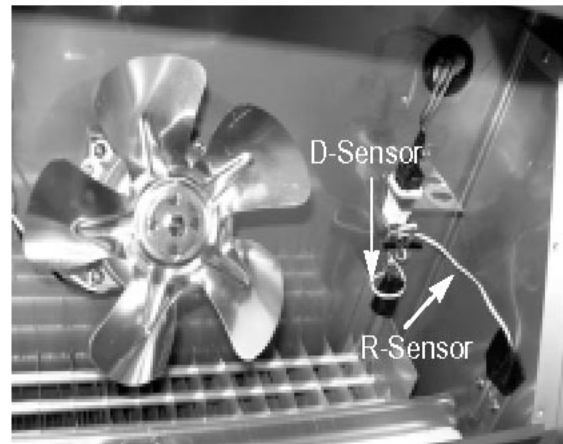


H-5. F/D-Sensor or R/D Sensor

After unplug each sensor. Pull out the sensor's lead wire.



F/D Sensor
(F-Sensor : Orange Color.
D-Sensor : Blue Color)



R/D Sensor
(R-Sensor : White Color.
D-Sensor : Blue Color)

REPLACEMENT OF MAIN COMPONENTS

REPLACING EVAORATOR DEFROST HEATER (FREEZER ONLY)

A. After disassembling the duct(A) and duct(B), get ready as below for replacing the evaporator defrost heater.



B. Pull out the pins from the bottom of the evaporator using the nipper, etc.



C. Split the hooks of the evaporator.



REPLACEMENT OF MAIN COMPONENTS

- D. After removing all pins, disconnect the connectors from the thermal fuse and the main harness.

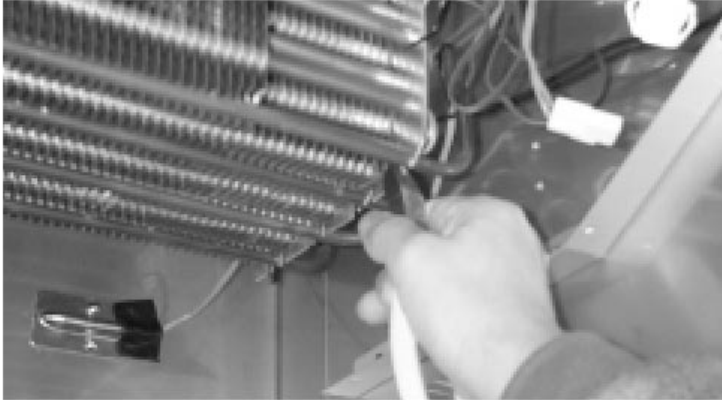


- E. Take apart the evaporator defrost heater from the evaporator.

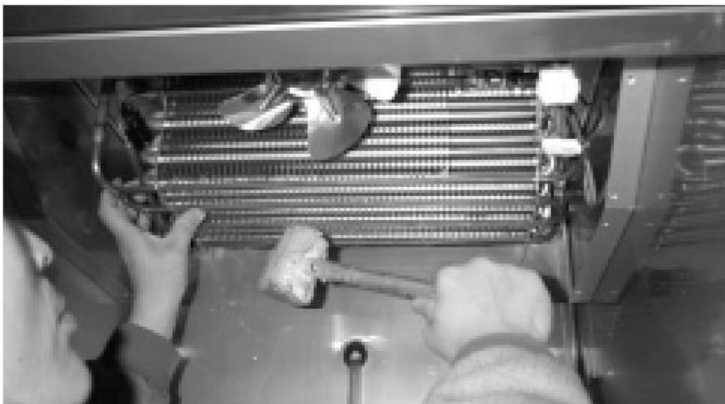


REPLACEMENT OF MAIN COMPONENTS

F. Install the new evaporator defrost heater in original position.



G. Pat the evaporator defrost heater with the soft hammer.

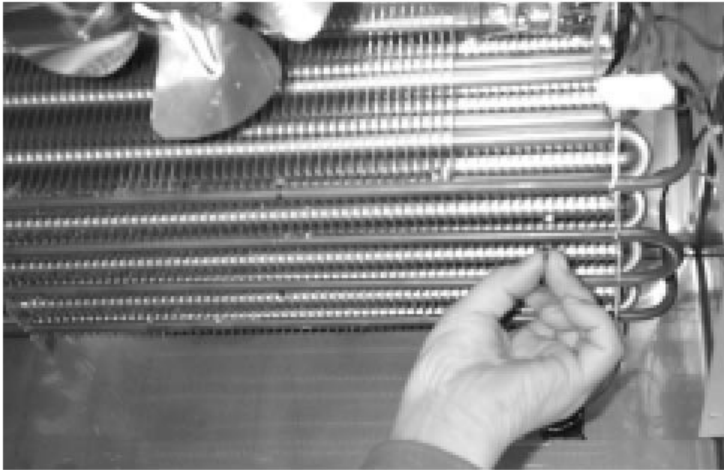


H. Pinch the hooks of the evaporator.



REPLACEMENT OF MAIN COMPONENTS

I. Assemble the pins in original positions.



J. Connect the connectors of the evaporator defrost heater to them of the thermal fuse and the main harness.



- **NOTE.**

Why is always 115 voltage detected between connectors of the evaporator defrost heater in the main harness?

The SNUBBER (located min PCB) holds two AC power lines simultaneously.

The SNUBBER prevents Main PCB malfunction from sparks occurred by other electrical component's ON/OFF. (SNUBBER = Spark Killer)

Because of the SNUBBER, 115 voltage is always detected. But electrical current in this case is very little (small Amps.) So, this electrical current is not enough to operate the evaporator defrost heater.

How to measure the Amps. Of the evaporator defrost heater.

Disconnect the connectors of the evaporator defrost heater.

Then prepare the additional Power Source (115V/60Hz) and the Amp. Meter.

Connect the evaporator defrost heater to the additional power source and read amp value from the Amp. Meter

REPLACEMENT OF MAIN COMPONENTS

7-4. CONDENSING UNIT

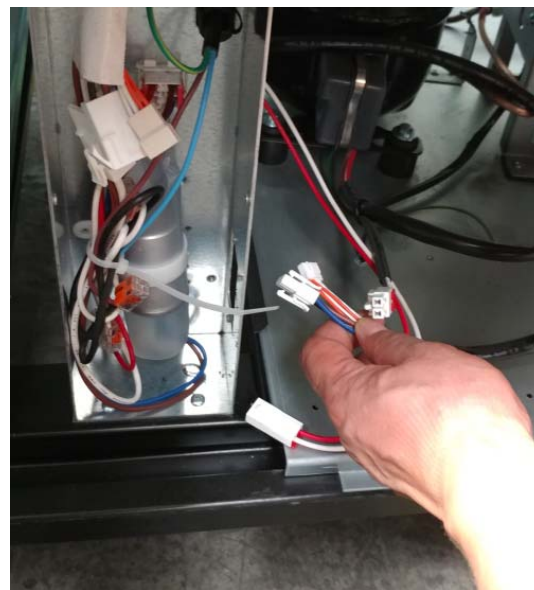
- Condensing units : Compressor, Condenser Fan Motor, Condenser coil, Dryer....,
- Others : Relay Harness, Power Cord, Electrical Box, ETC.,

A. Disassemble Bottom Grille as described section 7-2, B

B. Unscrew two screws as below.



C. Unplug the compressor's & ACC power plug.



REPLACEMENT OF MAIN COMPONENTS

D. Pull out the condensing unit.



REPLACEMENT OF MAIN COMPONENTS

7-5. REPLACING POWER RELAY

- A. Remove Bottom grille By unscrewing the four screws located on each side of the bottom grille.



- B. Open the electrical Box, Unscrew the power relay.

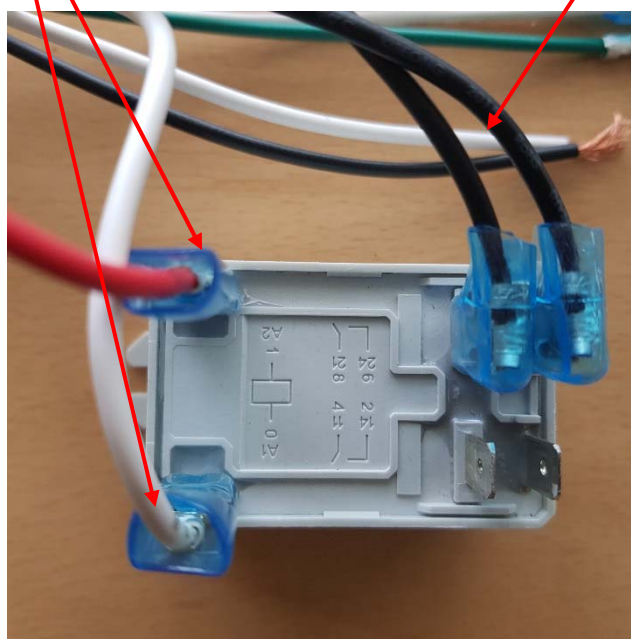


REPLACEMENT OF MAIN COMPONENTS

C. Replace the Power Relay

Connect to Main PCB

Connect to Compressor



REPLACEMENT OF MAIN COMPONENTS

7-6. REPLACING LAMP

7-6-1 . SOLID DOOR(TSR-23SD-N6, TSR-49SD-N6, TSF-23SD-N, TSF-49SD-N)

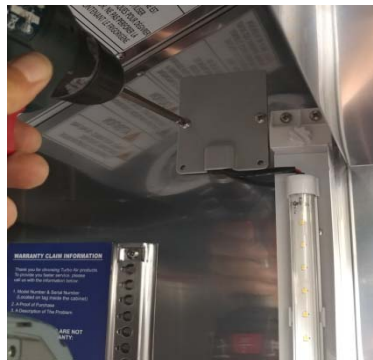
- A. Turn off the power switch.
- B. Disassemble Duct A
- C. Replace the lamp

7-6-2 . GLASS DOOR(TSR-23GSD-N6, TSR-49GSD-N, TSR-72GSD-N)

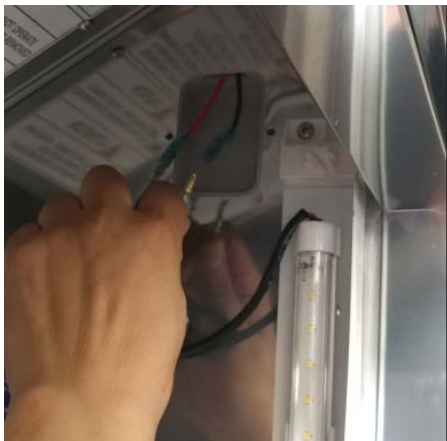
- A. Turn off the Lamp Switch.



- B. Disassemble the Lamp harness cover.



- C. Unplug lamp harness.



- D. Change the lamp.



REPLACEMENT OF MAIN COMPONENTS

7-7. REPLACING MULLION HEATER

*This article is only for solid door model
(TSR-23SD-N6, TSR-49SD-N6, TSF-23SD-N, TSF-49SD-N)*

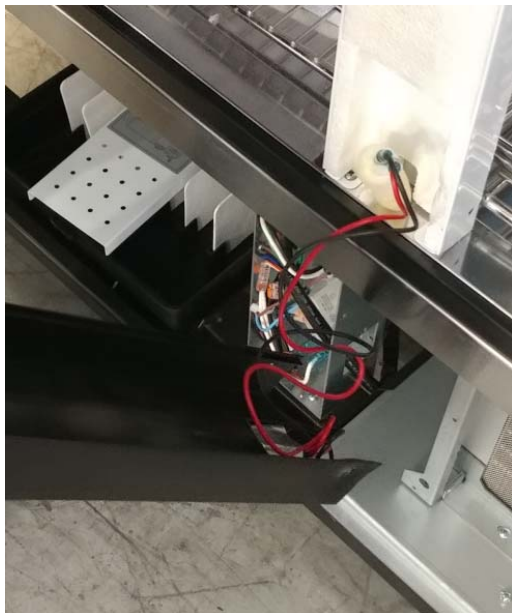
A. Unscrew the screws from the mullion.



B. Take apart the mullion cover from the mullion. And Pull out the insulator from inside.



C. Take care for the mullion heater not to be hurt.(It does not matter, if this heater is out of order).

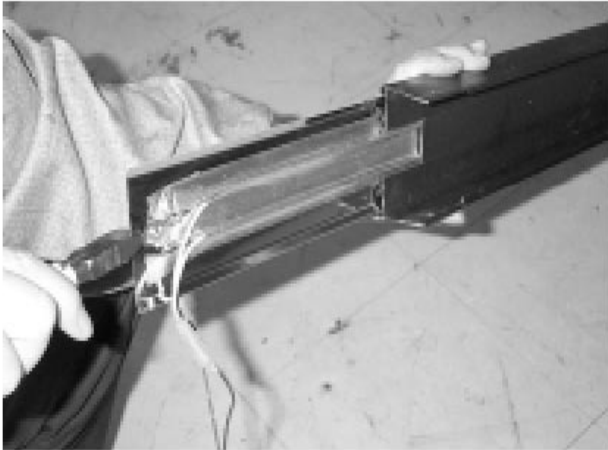


D. Unplug the connectors of the mullion heater.

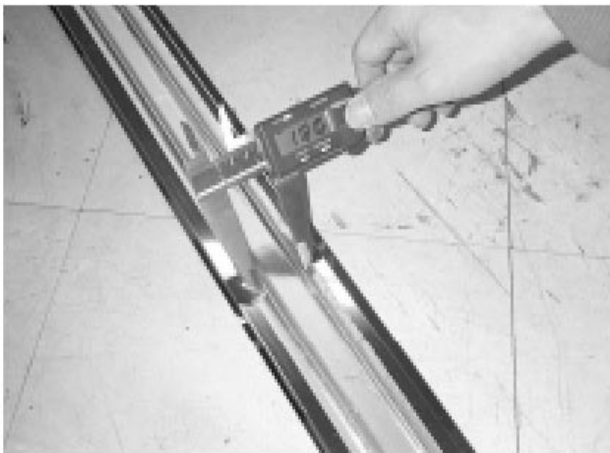


REPLACEMENT OF MAIN COMPONENTS

E. Pull out the mullion cover(SUS) from the mullion cover(ABS).



F. Change the old mullion heater and install the new one with the gap between wires 1.2 inch.



G. Insert the mullion cover(SUS) into the original position.

