
NO. R273-865

ISSUED: APR. 27, 2012

REVISED: DEC. 23, 2015



**HOSHIZAKI
COMMERCIAL
REFRIGERATOR/FREEZER**

**MODEL HRE-B series
HFE-B series
HRFE-B series**
(China, Hong Kong, Singapore, Taiwan)

SERVICE MANUAL

Use this service manual for product with auxiliary code B-1 or later.

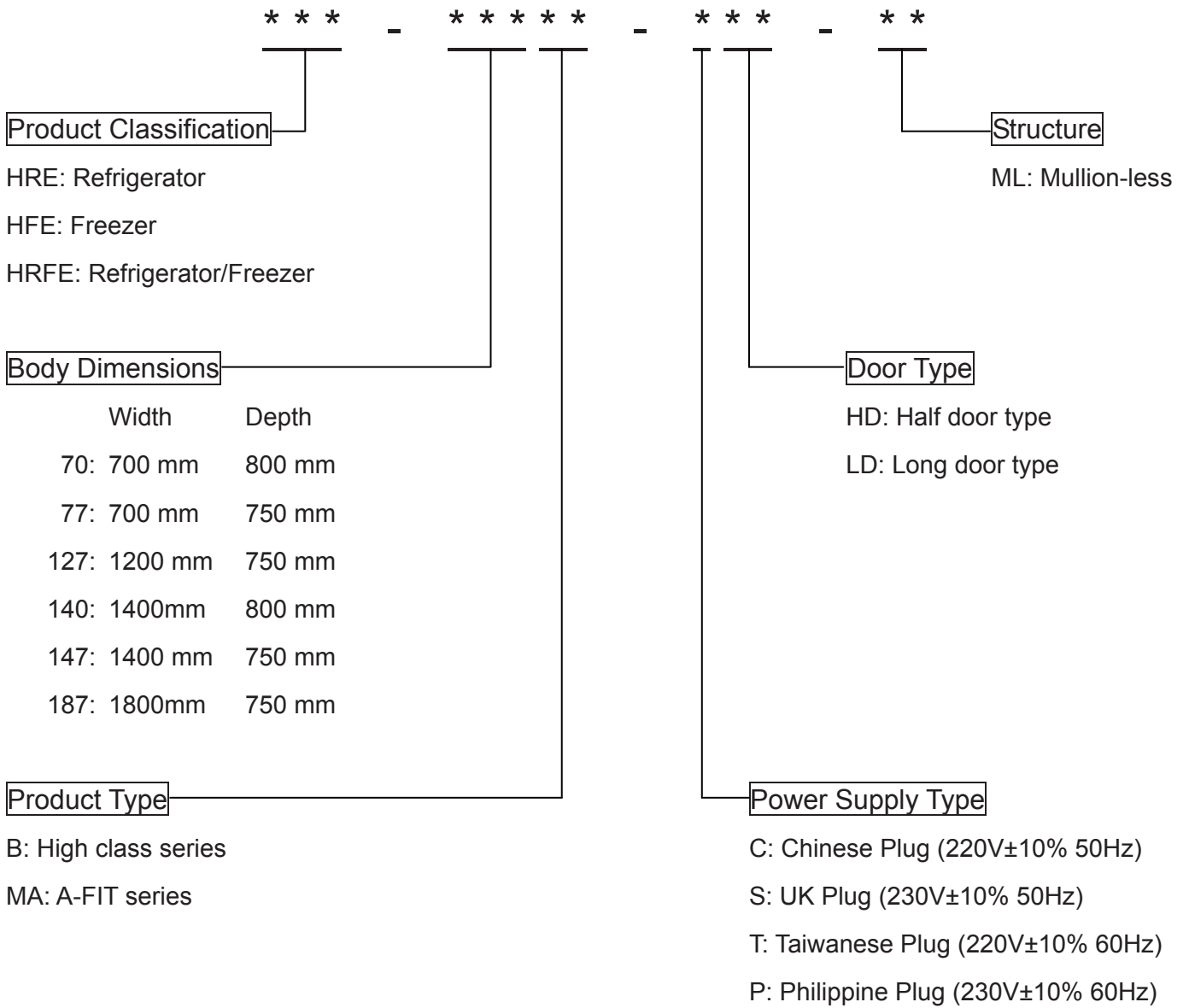
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Explanation for Model Name



I. GENERAL INFORMATION

1. SPECIFICATION CHANGES

	Model	New code	Old code
	Auxiliary code	B1 and later	B0 and earlier
Refrigerator	HRE-77B-CHD	R273	R046
	HRE-127B-CHD	R274	R110
	HRE-147B-CHD	R275	R047
	HRE-187B-CHD	R276	R112
Freezer	HFE-77B-CHD	R277	R048
	HFE-127B-CHD	R278	R111
	HFE-147B-CHD	R279	R049
	HFE-187B-CHD	R280	R113

Item	After change	Before change	Reason for change
Door dimension change (77, 147 type)	Door width 668 mm	Door width 663 mm	Body construction standardization with A-FIT series enlarged front width. * For 127, 187 type, same in size but not interchangeable.
Voltage change for anti-condensation frame heater	230V AC	115V AC	Parts standardization with A-FIT series
Voltage change for body foaming drain pipe anti-freeze heater	230V AC	115V AC	Parts standardization with A-FIT series
Voltage change for cooling duct anti-freeze heater (HFE only)	230V AC	115V AC	Parts standardization with A-FIT series
Transformer change by cord heater voltage change	Input: 230V Output: 115V Supply capacity: 180VA	Input: 230V Output: 115V Supply capacity: 320VA	Space saving by minimization of transformer size
Shelf post fixation change	Rivet fixation	Screw fixation	Body construction standardization with A-FIT series
Bottom shelf change	Grille type	Shelf holder fixation at bottom	Efficient use of effective volume
Interior bottom plate material change	SUS 430 2B	SUS 304 2B	Standardization of interior material
Door hinge thickness change	t 3.0	t 4.0	Parts standardization with A-FIT series

2. SAFETY INSTRUCTIONS

The following instructions contain important safety precautions and should be strictly observed. The terms used here are defined as follows:

WARNING: There is a possibility of death or serious injury to the service person and a third party or the user due to improper service operations or defects in serviced products.

CAUTION: There is a possibility of injury to the service person and a third party or the user or damage to their property* due to improper service operations or defects in serviced products.

* The term "damage to their property" here refers to extensive damage to household effects, houses and pets.

WARNING

1. Always ask the user to keep children away from the work area. They may be injured by tools or disassembled products.
2. When there is no need to energize the unit during disassembly or cleaning, be sure to unplug the unit or disconnect the main power supply before servicing the unit to prevent electric shocks.
3. If the unit must be energized for inspection of the electric circuit, use rubber gloves to avoid contact with any live parts resulting in electric shocks.
4. Keep the following in mind when servicing the refrigeration circuit:
 - (1) Be sure to recover the refrigerant. Do not discharge it into the atmosphere. It will affect the environment.
 - (2) Check for any flames in the vicinity, and ensure good ventilation.
 - (3) If the refrigerant should leak in servicing, immediately put out any fire used in the vicinity.
 - (4) When unbrazing the refrigeration circuit connections, check that the circuit is completely evacuated. The refrigerant may produce a poisonous gas when coming in contact with an open flame.
 - (5) Do not braze in an enclosed room to prevent carbon monoxide poisoning.
 - (6) In case of a refrigerant leak, locate and repair the leaking part completely before recharging the refrigerant and checking for further leaks. If the leaking part cannot be located, be sure to check again for further leaks after recharging the refrigerant. Leaked refrigerant may produce a poisonous gas when coming in contact with an open flame of a gas cooking stove or a fan heater.

(7) Before servicing, check the surface temperature of the refrigeration circuit to prevent a burn.

5. Keep the following in mind when making electrical connections:

(1) Check for proper earth connections, and repair if necessary to prevent electric shocks.

(2) Always use service parts intended for the applicable model for replacement of defective parts. Use proper tools to secure the wiring. Otherwise abnormal operation or trouble may occur and cause electric leaks or fire.

(3) Check for proper part installations, wiring conditions and soldered or solderless terminal connections to avoid fire, heat or electric shocks.

(4) Be sure to replace damaged or deteriorated power cords and lead wires to prevent fire, heat or electric shocks.

(5) Cut-off lead wires must be bound using closed end connectors or the like, with their closed ends up to avoid entrance of moisture that could lead to electric leaks or fire.

(6) After servicing, always use a megohmmeter (500V DC) to check for the insulation resistance of at least 1 megohm between the live part (attachment plug) and the dead metal part (earth terminal).

(7) Do not service the electrical parts with wet hands to prevent electric shocks.

(8) The capacitors used for the compressor and other components may be under high voltage and should be discharged properly before servicing.

CAUTION

1. After servicing, follow the instructions below:

(1) Always check the unit for proper operation before finishing services.

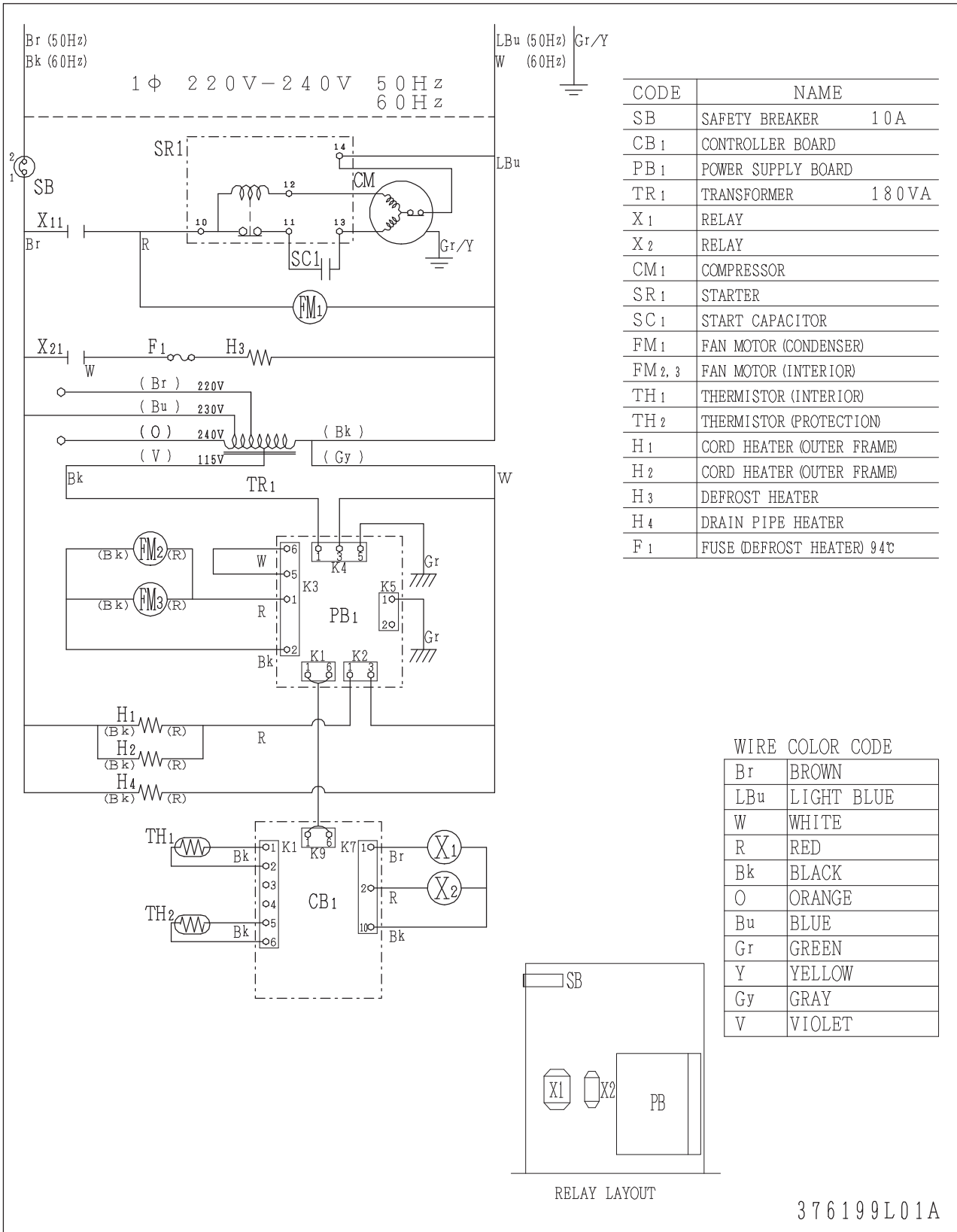
(2) Be sure to reassemble the parts completely. Loose assembly of such parts as control box cover may cause entrance of vermins resulting in a short circuit between terminals and possible ignition.

3. DIMENSIONS/SPECIFICATIONS

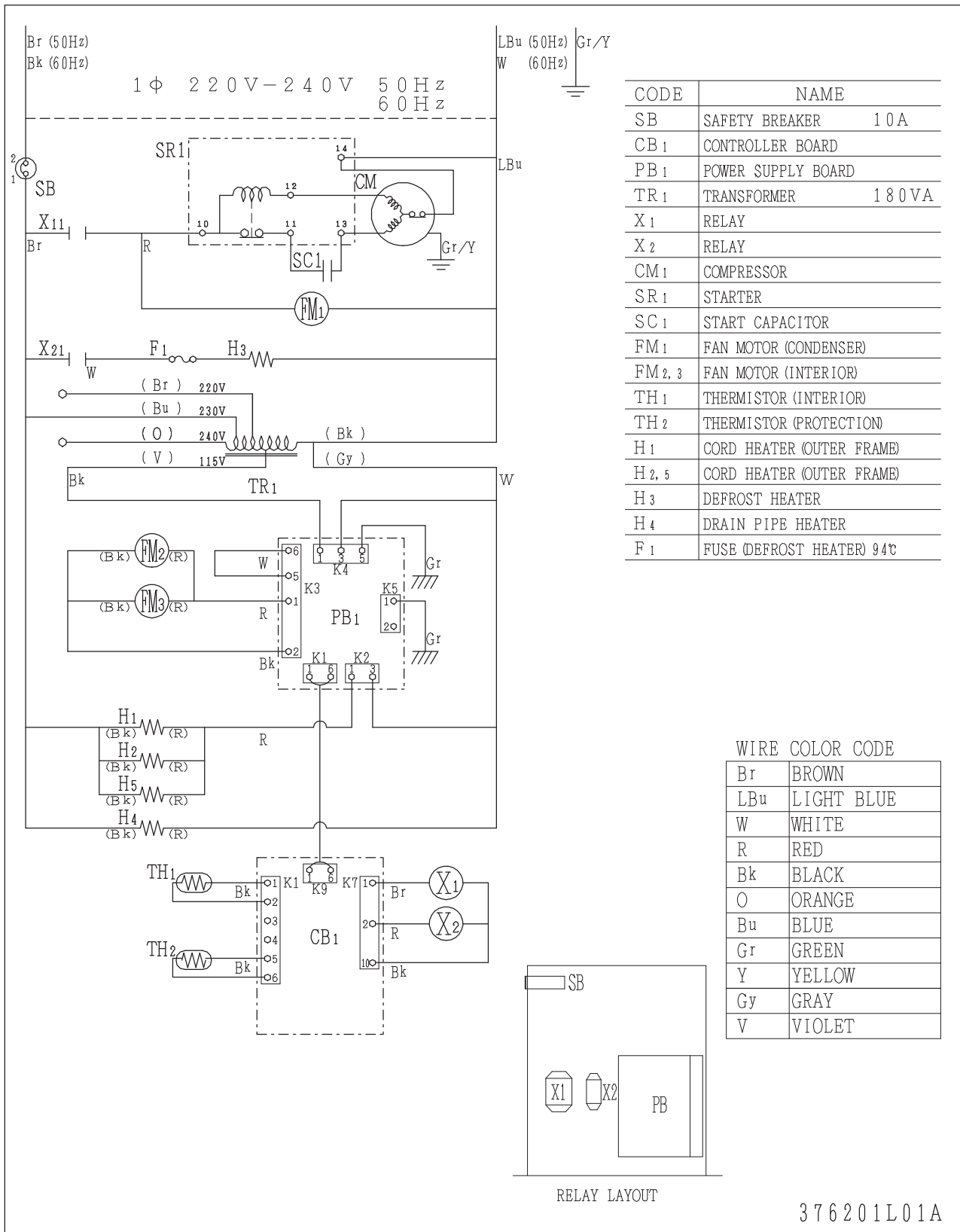
Note: Refer to “Dimensional Drawings” on HOSHIZAKI NET.

HRE-77B-CHD (Model Code: R273)
HRE-127B-CHD (Model Code: R274)
HRE-147B-CHD (Model Code: R275)
HRE-187B-CHD (Model Code: R276)
HFE-77B-CHD (Model Code: R277)
HFE-127B-CHD (Model Code: R278)
HFE-147B-CHD (Model Code: R279)
HFE-187B-CHD (Model Code: R280)
HRFE-77B-CHD (Model Code: R271)
HRE-127B-CHD-ML (Model Code: R320)
HRE-147B-CHD-ML (Model Code: R321)
HRE-187B-CHD-ML (Model Code: R322)
HFE-127B-CHD-ML (Model Code: R323)
HFE-147B-CHD-ML (Model Code: R324)
HFE-187B-CHD-ML (Model Code: R325)

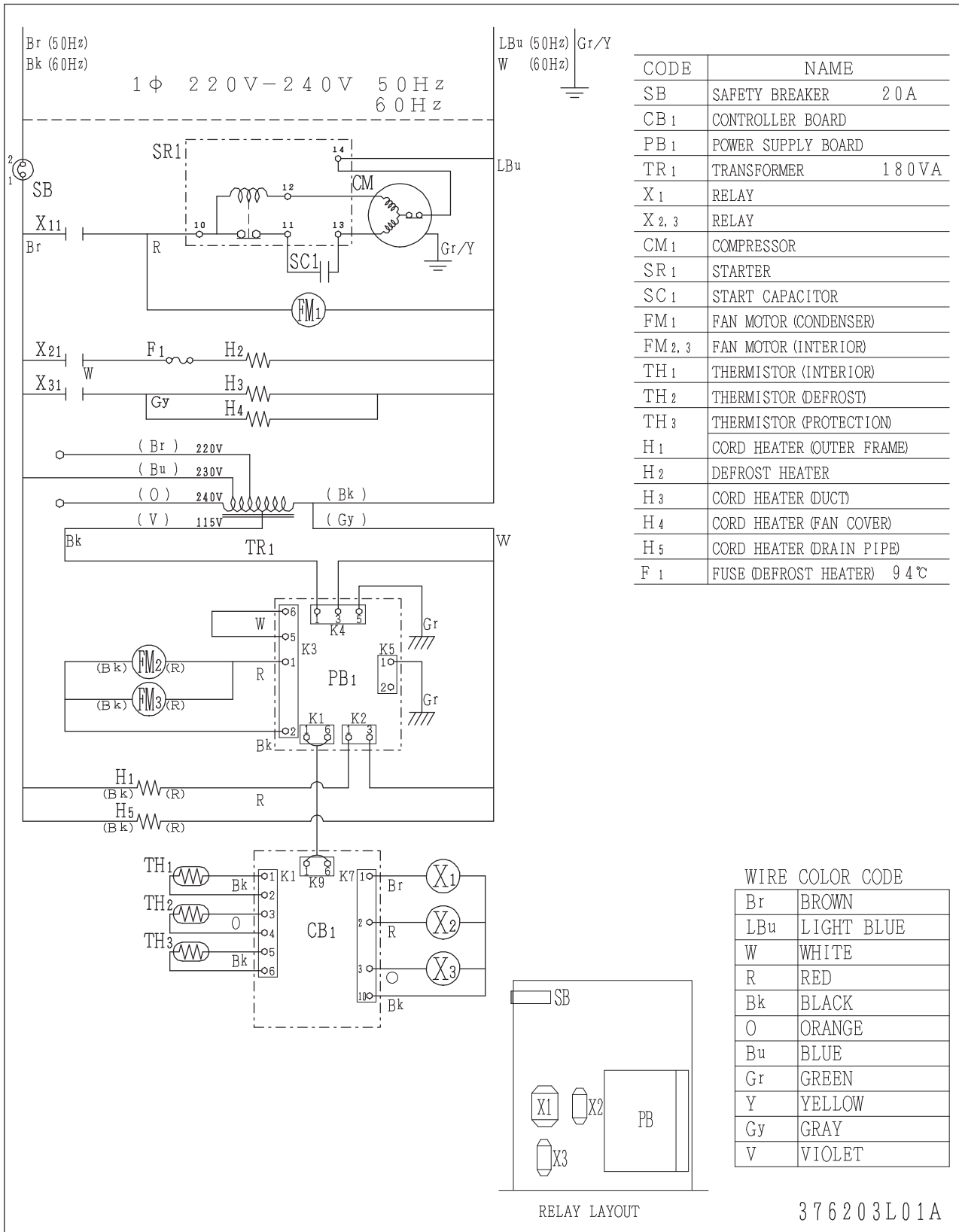
[b] HRE-127/147B-CHD (Model Code: R274/275)



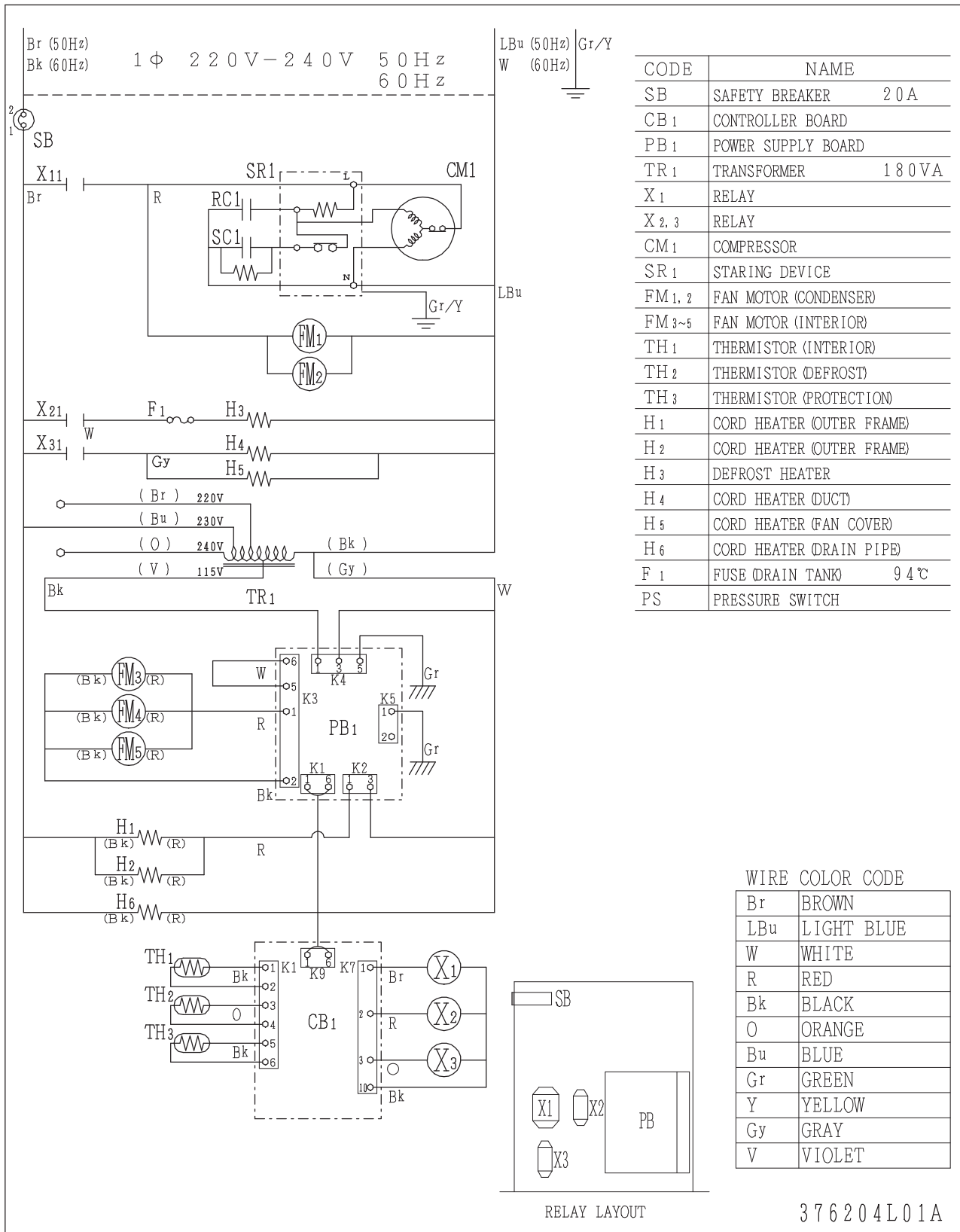
[c] HRE-187B-CHD (Model Code: R276)



[d] HFE-77B-CHD (Model Code: R277)



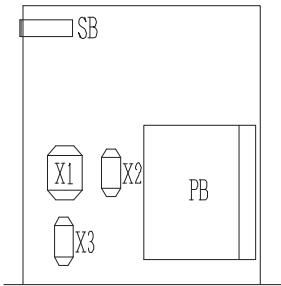
[e] HFE-127/147B-CHD (Model Code: R278/279)



CODE	NAME
SB	SAFETY BREAKER 20A
CB1	CONTROLLER BOARD
PB1	POWER SUPPLY BOARD
TR1	TRANSFORMER 180VA
X1	RELAY
X2,3	RELAY
CM1	COMPRESSOR
SR1	STARTING DEVICE
FM1,2	FAN MOTOR (CONDENSER)
FM3~5	FAN MOTOR (INTERIOR)
TH1	THERMISTOR (INTERIOR)
TH2	THERMISTOR (DEFROST)
TH3	THERMISTOR (PROTECTION)
H1	CORD HEATER (OUTER FRAME)
H2	CORD HEATER (OUTER FRAME)
H3	DEFROST HEATER
H4	CORD HEATER (DUCT)
H5	CORD HEATER (FAN COVER)
H6	CORD HEATER (DRAIN PIPE)
F1	FUSE (DRAIN TANK) 9.4℃
PS	PRESSURE SWITCH

WIRE COLOR CODE

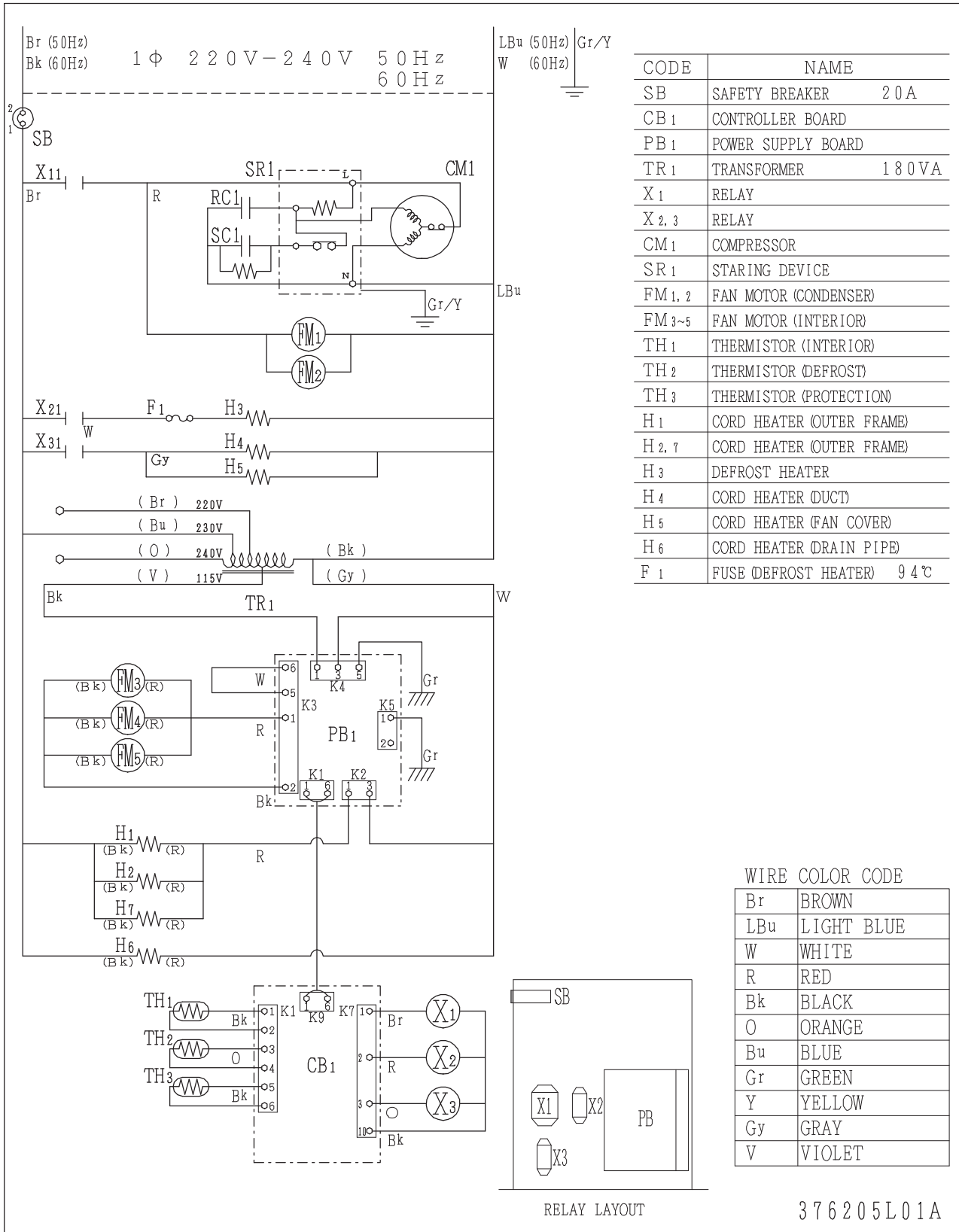
Br	BROWN
Lbu	LIGHT BLUE
W	WHITE
R	RED
Bk	BLACK
O	ORANGE
Bu	BLUE
Gr	GREEN
Y	YELLOW
Gy	GRAY
V	VIOLET



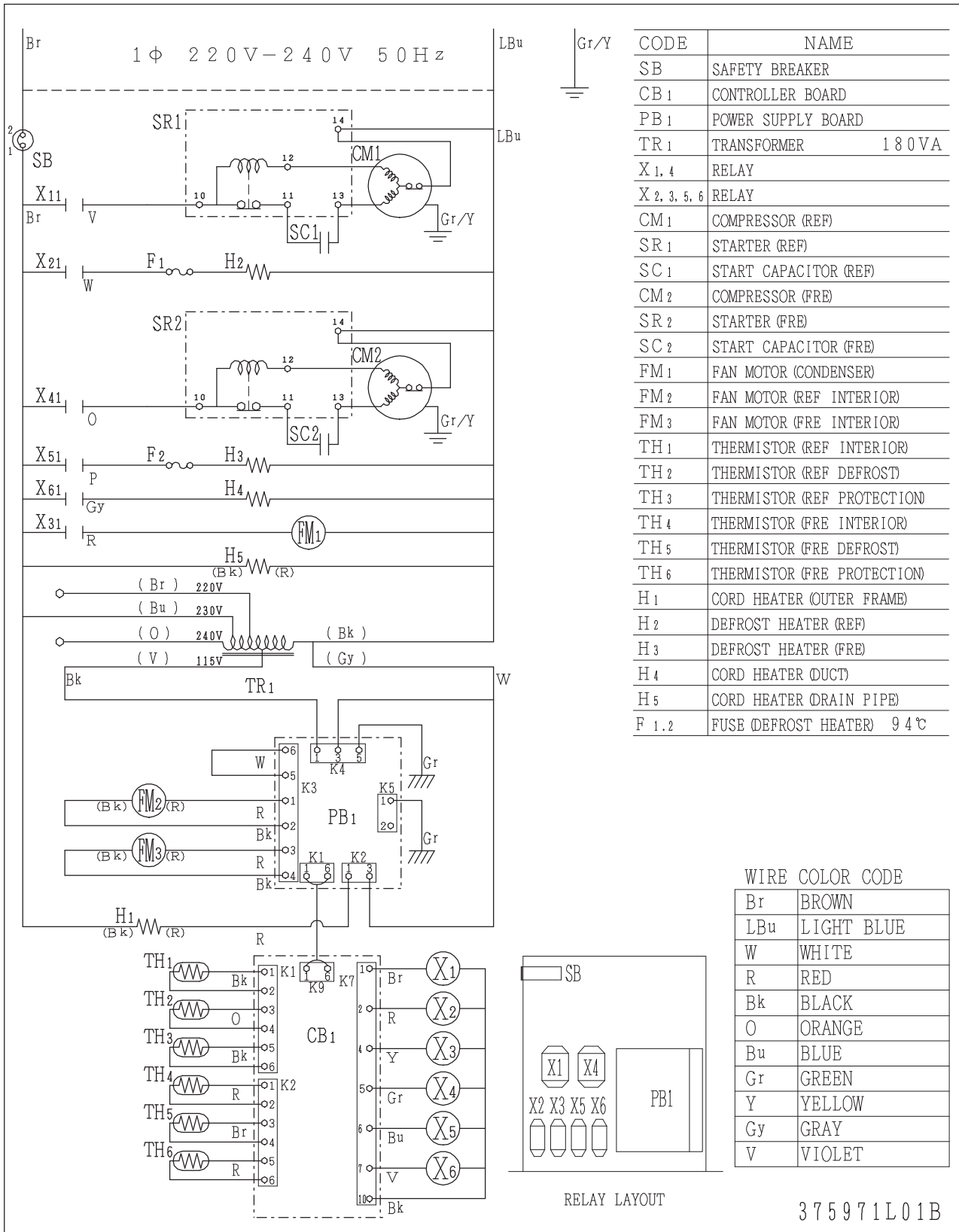
RELAY LAYOUT

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[f] HFE-187B-CHD (Model Code: R280)



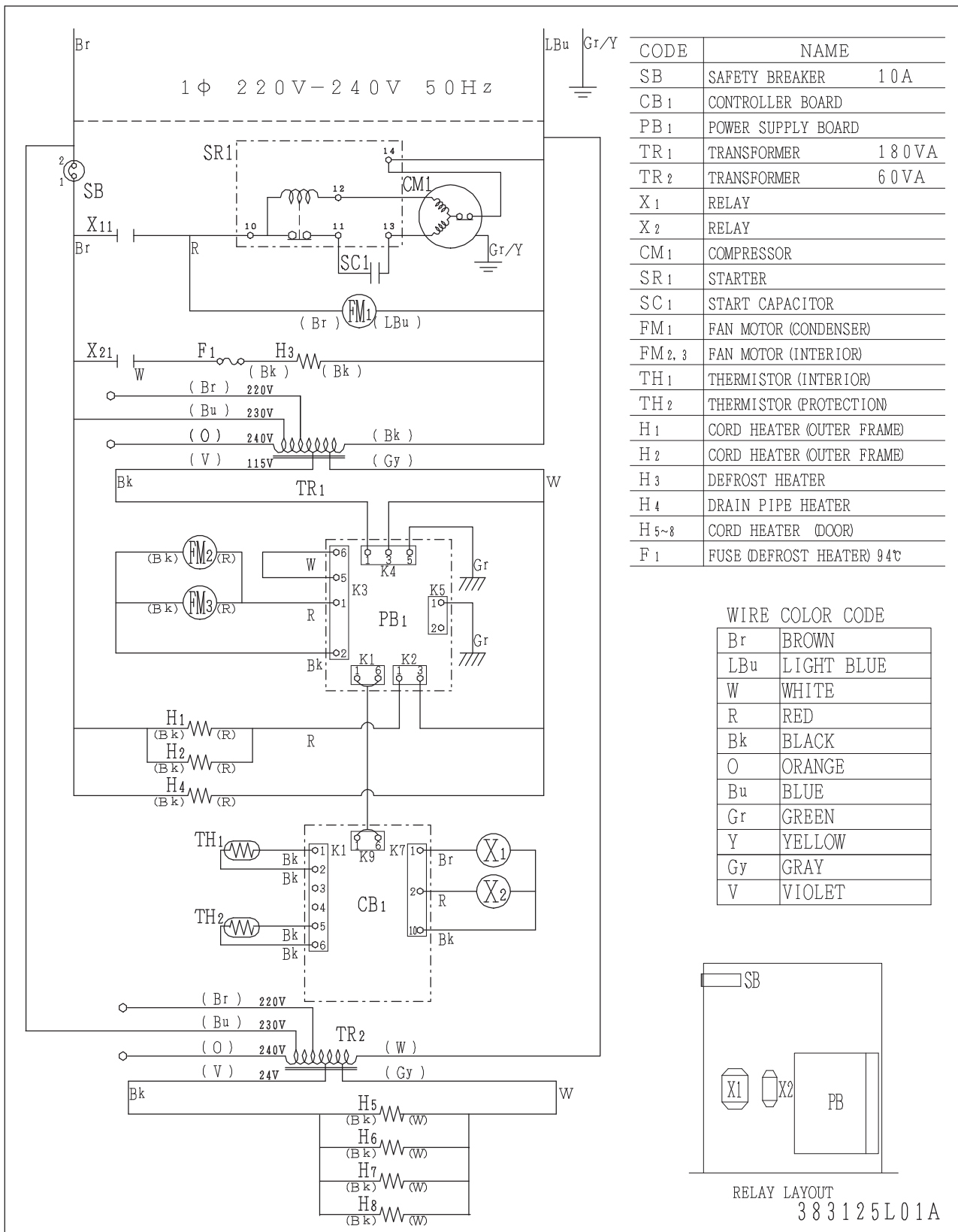
[g] HRFE-77B-CHD (Model Code: R271)



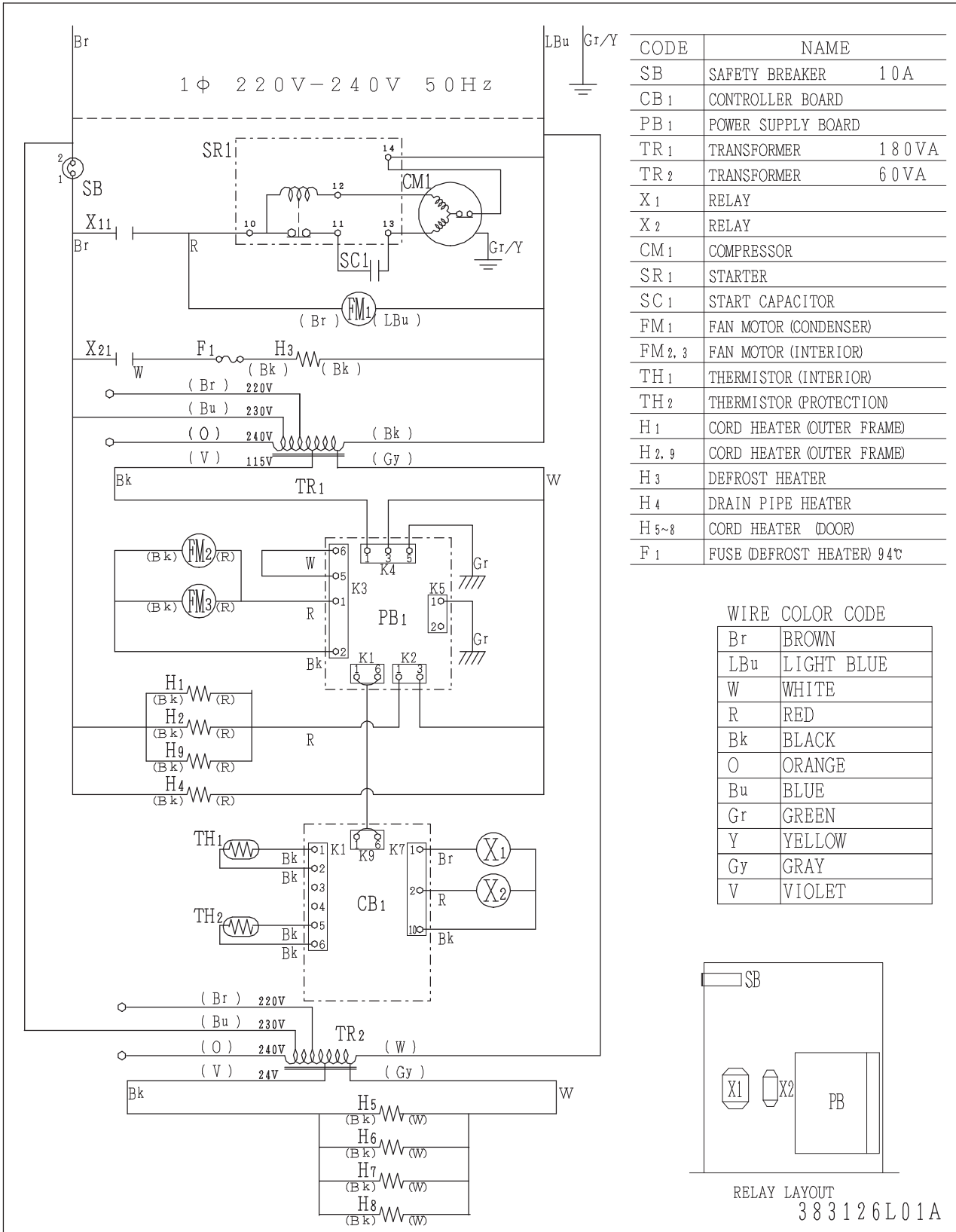
CODE	NAME
SB	SAFETY BREAKER
CB 1	CONTROLLER BOARD
PB 1	POWER SUPPLY BOARD
TR 1	TRANSFORMER 180VA
X 1, 4	RELAY
X 2, 3, 5, 6	RELAY
CM 1	COMPRESSOR (REF)
SR 1	STARTER (REF)
SC 1	START CAPACITOR (REF)
CM 2	COMPRESSOR (FRE)
SR 2	STARTER (FRE)
SC 2	START CAPACITOR (FRE)
FM 1	FAN MOTOR (CONDENSER)
FM 2	FAN MOTOR (REF INTERIOR)
FM 3	FAN MOTOR (FRE INTERIOR)
TH 1	THERMISTOR (REF INTERIOR)
TH 2	THERMISTOR (REF DEFROST)
TH 3	THERMISTOR (REF PROTECTION)
TH 4	THERMISTOR (FRE INTERIOR)
TH 5	THERMISTOR (FRE DEFROST)
TH 6	THERMISTOR (FRE PROTECTION)
H 1	CORD HEATER (OUTER FRAME)
H 2	DEFROST HEATER (REF)
H 3	DEFROST HEATER (FRE)
H 4	CORD HEATER (DUCT)
H 5	CORD HEATER (DRAIN PIPE)
F 1.2	FUSE (DEFROST HEATER) 9.4℃

WIRE COLOR CODE	
Br	BROWN
LBu	LIGHT BLUE
W	WHITE
R	RED
Bk	BLACK
O	ORANGE
Bu	BLUE
Gr	GREEN
Y	YELLOW
Gy	GRAY
V	VIOLET

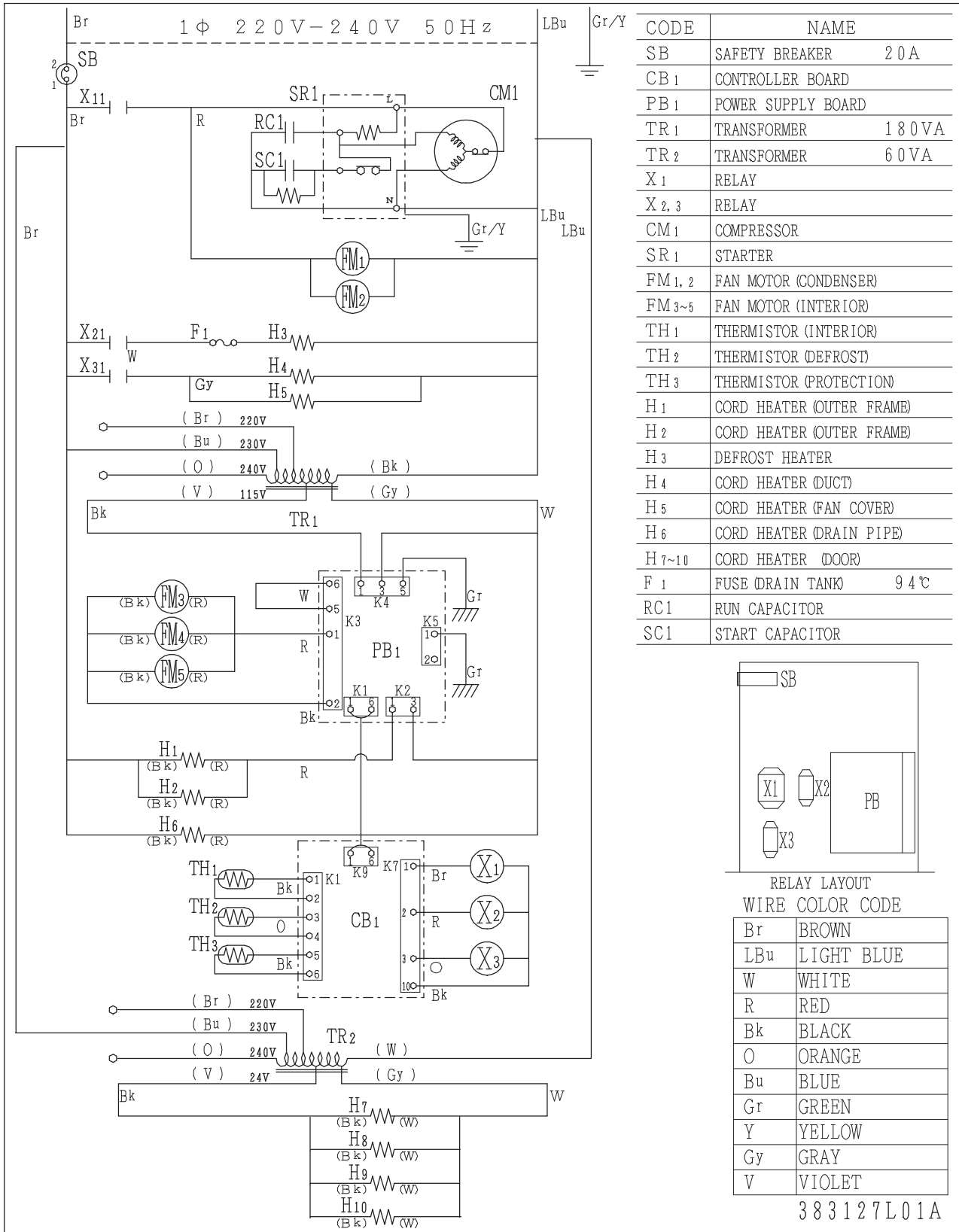
[h] HRE-127/147B-CHD-ML (Model Code: R320/321)



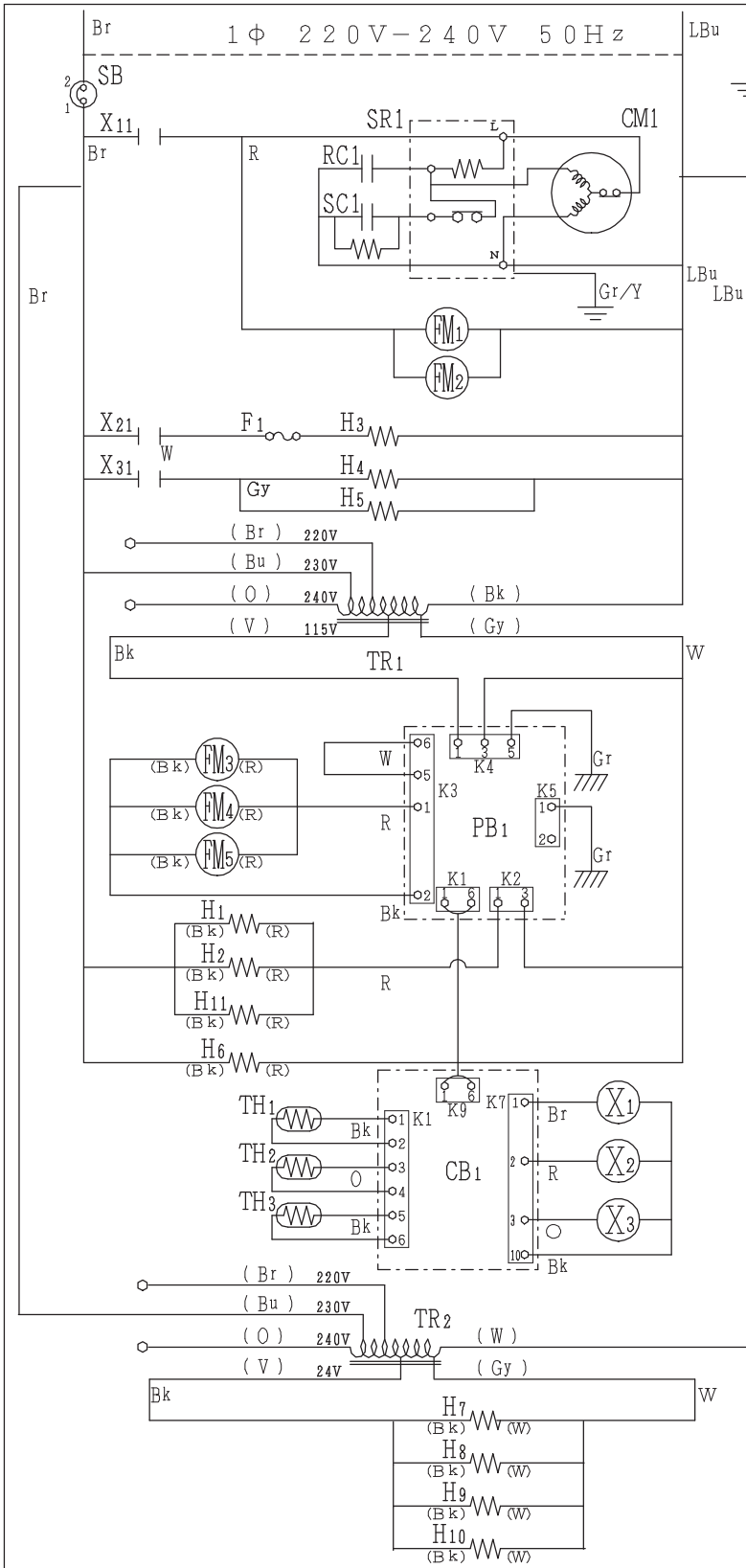
[i] HRE-187B-CHD-ML (Model Code: R322)



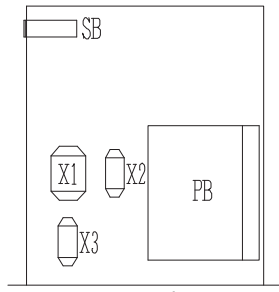
[J] HFE-127/147B-CHD-ML (Model Code: R323/324)



[k] HFE-187B-CHD-ML (Model Code: R325)



CODE	NAME	
SB	SAFETY BREAKER	20A
CB 1	CONTROLLER BOARD	
PB 1	POWER SUPPLY BOARD	
TR 1	TRANSFORMER	180VA
TR 2	TRANSFORMER	60VA
X 1	RELAY	
X 2, 3	RELAY	
CM 1	COMPRESSOR	
SR 1	STARTER	
FM 1, 2	FAN MOTOR (CONDENSER)	
FM 3~5	FAN MOTOR (INTERIOR)	
TH 1	THERMISTOR (INTERIOR)	
TH 2	THERMISTOR (DEFROST)	
TH 3	THERMISTOR (PROTECTION)	
H 1	CORD HEATER (OUTER FRAME)	
H 2, 11	CORD HEATER (OUTER FRAME)	
H 3	DEFROST HEATER	
H 4	CORD HEATER (DUCT)	
H 5	CORD HEATER (FAN COVER)	
H 6	CORD HEATER (DRAIN PIPE)	
H 7~10	CORD HEATER (DOOR)	
F 1	FUSE (DRAIN TANK)	94℃
RC 1	RUN CAPACITOR	
SC 1	START CAPACITOR	



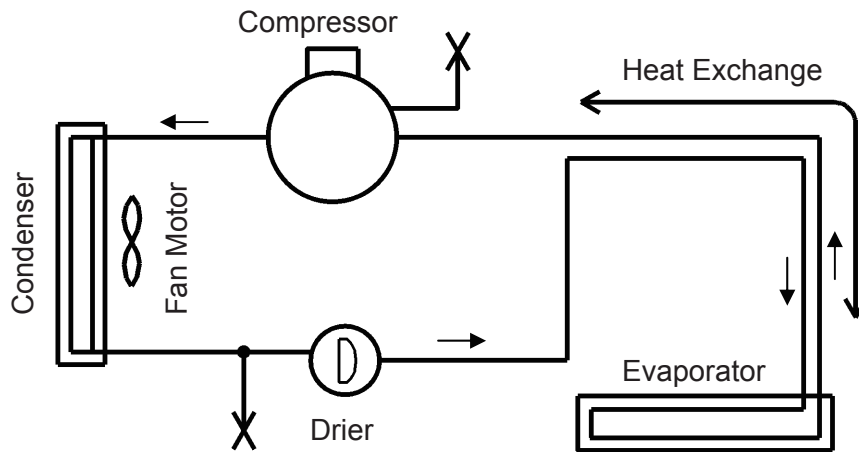
RELAY LAYOUT
WIRE COLOR CODE

Br	BROWN
LBu	LIGHT BLUE
W	WHITE
R	RED
Bk	BLACK
O	ORANGE
Bu	BLUE
Gr	GREEN
Y	YELLOW
Gy	GRAY
V	VIOLET

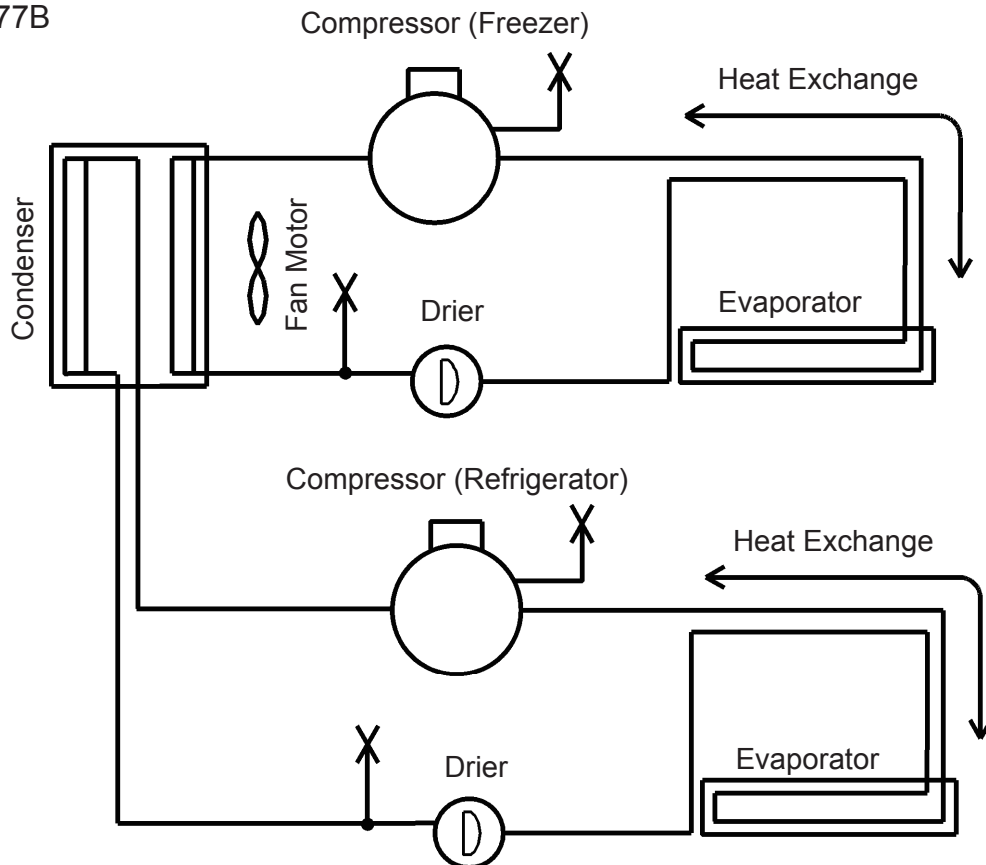
3 8 3 1 2 8 L 0 1 A

2. REFRIGERATION CIRCUIT

HRE/HFE



HRFE-77B



Refrigerant:	HFC-134a	(HRE series) (HRFE refrigerator)
	HFC-404A	(HFE series) (HRFE freezer) (HRE-187B glass door model)

There may be exceptions for some customized models.

3. ENERGY SAVING FEATURES

[a] FRAME HEATER ENERGIZING CONTROL

The frame heater is energized intermittently to keep the front frame surfaces at the optimum temperature for preventing condensation. As the optimum surface temperature depends on the ambient temperature, the ratio between ON time and OFF time is determined by the difference between the ambient temperature (measured by the temperature sensor built in the controller board) and the cabinet temperature (measured by the interior thermistor). This duty ratio has eight patterns and is updated every two minutes.

The duty ratios are sorted into seven levels (HRE series) or six levels (HFE series) depending on the difference between the ambient and cabinet temperatures. The higher levels at the same ambient and cabinet temperatures mean the higher duty ratios. The unit is factory adjusted to level 2.

The user is allowed to choose between levels 2 and 3 only, and service persons between levels 0 - 6 (HRE series) or 1 - 6 (HFE series).

[Reference]

Level 2: No condensation at ambient temperature 35°C, relative humidity 70%

Level 3: No condensation at ambient temperature 35°C, relative humidity 80%

Duty Ratio (%)	ON time (sec)	OFF time (sec)	Ambient temp - cabinet temp			
			HRE series		HFE series	
			Level 3	Level 2	Level 3	Level 2
12.5	15	105	5 or less	14 or less	9 or less	23 or less
25	30	90	5 - 10	14 - 19	9 - 16	23 - 30
37.5	45	75	10 - 14	19 - 24	16 - 23	30 - 37
50	60	60	14 - 19	24 - 28	23 - 30	37 - 44
62.5	75	45	19 - 24	28 - 33	30 - 37	44 - 52
75	90	30	24 - 28	33 - 37	37 - 44	52 - 59
87.5	105	15	28 - 33	37 - 41	44 - 52	59 - 66
100	120	0	33 or more	41 or more	52 or more	66 or more

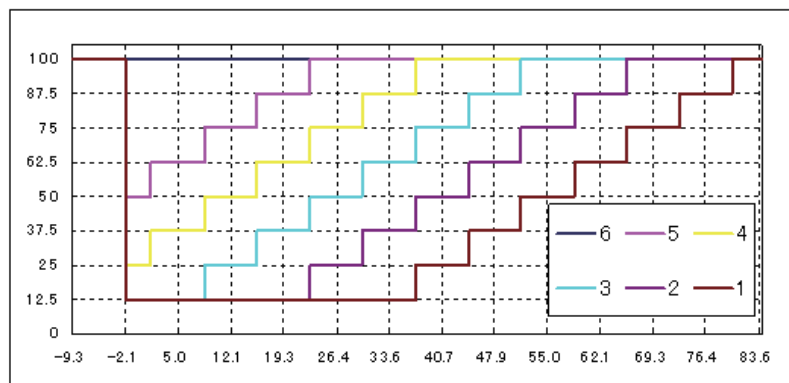
[Relations between duty ratio and ambient and cabinet temperature differences]

HRE series duty ratio

Level 0: Constantly OFF

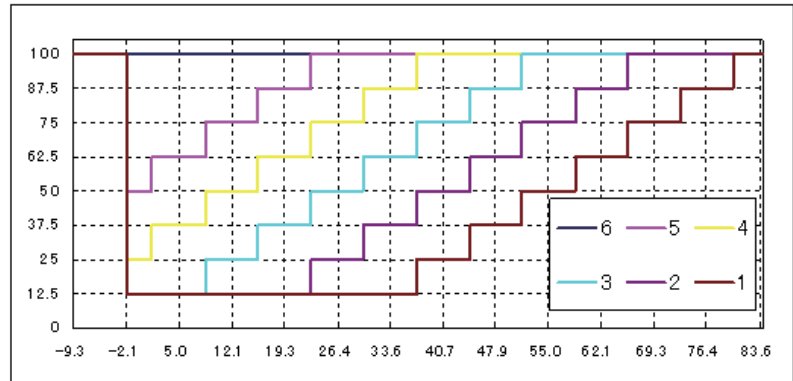
Level 2: Factory adjustment

Level 6: Constantly ON



HFE/HRFE series duty ratio

Level 2: Factory adjustment
Level 6: Constantly ON



The heater control reduces the power consumption, and the less heat invasion into the cabinet improves the refrigeration unit operating efficiency, resulting in significant energy saving effects.

[b] INTERIOR DC FAN MOTOR

The highly efficient DC brushless motor reduces the power consumption of the motor body from 21 W to 4 W with the same output. Also, the lower heating value prevents cabinet temperature rise and improves the refrigeration unit operating efficiency, resulting in energy saving effects.

[c] CONTROLLER BOARD

To save energy, HRE series stops energizing the frame heater for a maximum of 15 minutes during a defrost cycle (HFE/HRFE series has an energizing control).

[d] REFRIGERATION UNIT

Provided with the best matched capillary tubes for refrigerant control.
Plastic unit base and unit frame in shape to minimize heat input/output.
Corrosion resistant aluminum evaporator with boehmite treated and clear coated surfaces.

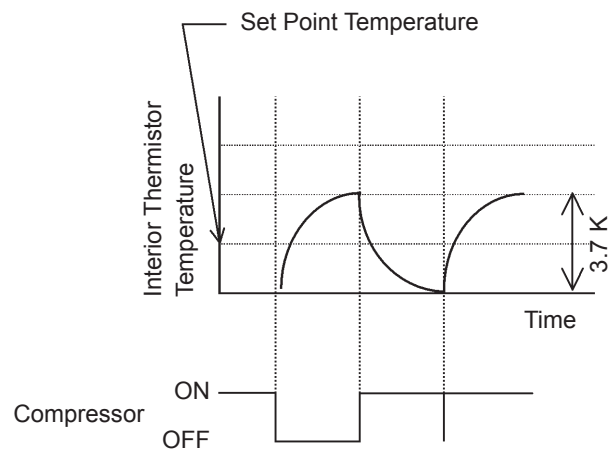
4. ELECTRONIC CONTROLS

[a] SET POINT TEMPERATURE

(mean temperature between compressor ON and OFF temperatures)

Heater defrost (Refrigerator): -6 to +12°C

Heater defrost (Freezer): -25 to -7°C



[b] CABINET TEMPERATURE DIFFERENTIAL

3.7 K (from “set point temp - 2.0 K” to “set point temp + 1.7 K”)

Note: On the controller board only. Actual differential may be 4 - 6 K.

[c] DEFROST CYCLE

Every 6 hours (from the beginning of a cycle to the beginning of the next cycle)

[d] DEFROST COMPLETION TEMPERATURE

Heater defrost (HRE series): +30°C

Heater defrost (HFE series): +20°C

Heater defrost (HRFE-77): +13°C (Refrigerator)

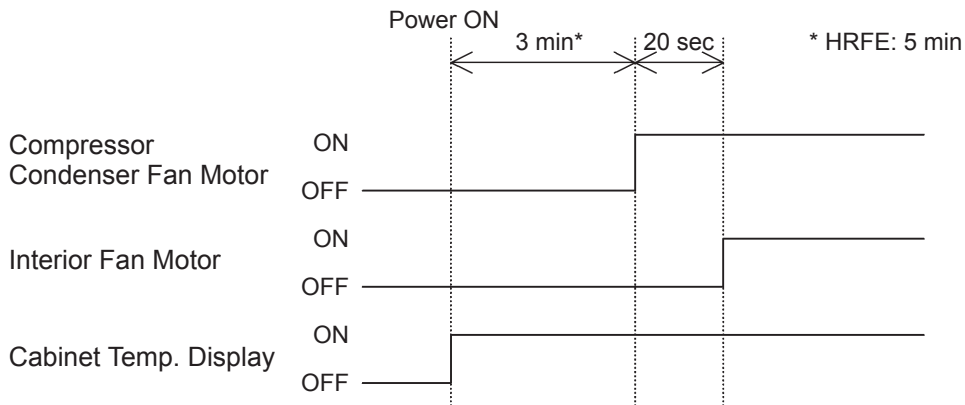
+20°C (Freezer)

[e] TEMPERATURE DISPLAY CYCLE

The temperature display window renews its cabinet temperature display every 30 seconds. The display remains the same for 30 seconds even if the actual temperature changes in the meantime. During a defrost cycle, the temperature display window indicates “dF”.

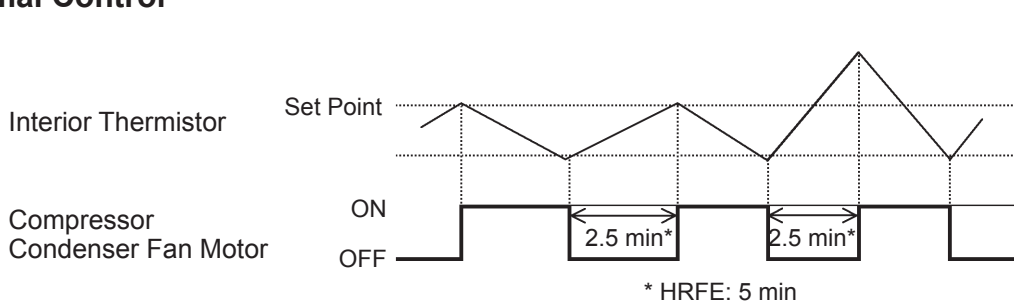
[f] COMPRESSOR SOFT START

1) Startup



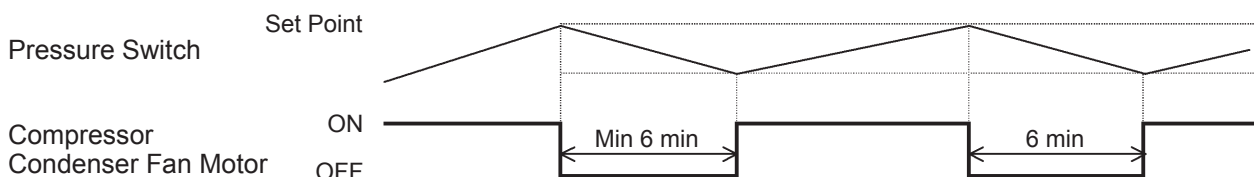
When the power supply is turned on, the temperature display window shows the cabinet temperature, but the compressor and condenser fan motor start up with a 3 minute (5 minute for HRFE) delay. Then, the interior fan motor starts up 20 seconds later. This delay is intended to minimize the difference between the high-side and low-side pressures and to reduce the load on the compressor so that it can start easily in case of a short (especially instantaneous) power failure.

2) Normal Control



When the compressor turns off during normal control, it has a mandatory 2.5 minute (5 minute for HRFE) delay before startup. For example, if the compressor turns off by its thermistor and the door is opened immediately after (causing the cabinet temperature to immediately exceed the restart temperature), the compressor will still not start until 2.5 minutes (5 minutes HRFE) have passed since its shutdown.

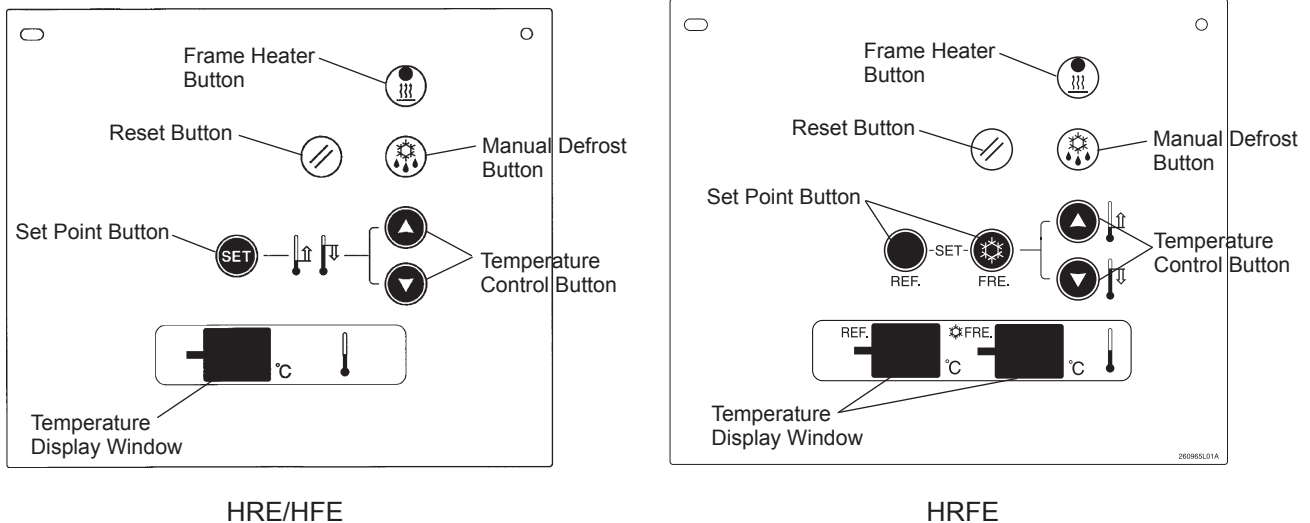
[g] HIGH PRESSURE SWITCH



All models are provided with a high pressure sensor to monitor the condensing temperature. If the high-side pressure rises to operate the high pressure sensor, the compressor will not restart for at least 6 minutes to protect itself.

[h] CHECKING AND ADJUSTING SET POINT TEMPERATURE

Press the set point button to display the set point temperature on the temperature display window. To change the set point temperature, hold down the set point button and press the temperature control button.



[i] MANUAL DEFROST

When the manual defrost button is pressed for more than 5 seconds, the unit will start a manual defrost cycle. The unit will start repeating automatic defrost cycles 6 hours after the manual defrost button is pressed.

To cancel the manual defrost cycle, turn off the power supply. Wait for at least 30 seconds before turning the power back on.

[j] FRAME HEATER SETTING

The duty ratio of the frame heater is controlled. The unit is factory adjusted to the duty ratio level 2 with the lamp on the frame heater button off. If condensation occurs at the installation site, press the frame heater button for more than 3 seconds to change the duty ratio level from 2 to 3. Then, the lamp on the frame heater button will illuminate.

To de-energize the frame heater (HRE series only), see “6. BUTTON OPERATION”.

[k] CANCELING SOFT START

To cancel the “soft start” (3 minute delay for HRE/HFE, 5 minute delay for HRFE), turn on the power supply while pressing the set point button. The compressor and condenser fan motor will start at the same time after 10 seconds.

When the soft start is cancelled, the illuminated seven segment LED on the temperature display window changes to the model setting number. To resume the cabinet temperature display, press the set point button (REF set point button for HRFE) again or wait for 30 seconds.

Note: If the power supply is turned off while the compressor is running and immediately turned back on to cancel the soft start, the high-side and low-side pressures cannot be equalized, often resulting in compressor starting failure. Do not cancel the soft start for at least 2.5 minutes after the power supply is turned off.

[l] ERROR CODES

In case of trouble, the temperature display window will alternately flash every second between one of the following error codes and the cabinet temperature. See “III. 1. ERROR CODES” for further details.

Code	Error	Code	Error
E1	Cabinet Temperature Too High	E7	Condenser Clogged
E2	Cabinet Temperature Too Low	E8	Defrost Thermistor Defective
E3	Defrost Cycle Too Long	E9	Clog Thermistor Defective
E4	Abnormal High-Side Pressure	EA	EEPROM Write Error
E5	Interior Thermistor Defective	Ed	EEPROM Verify Error

In case of error, an external output (12V DC) function is available for connection with a buzzer.

[m] CONTROLLER BOARD MODEL SETTING

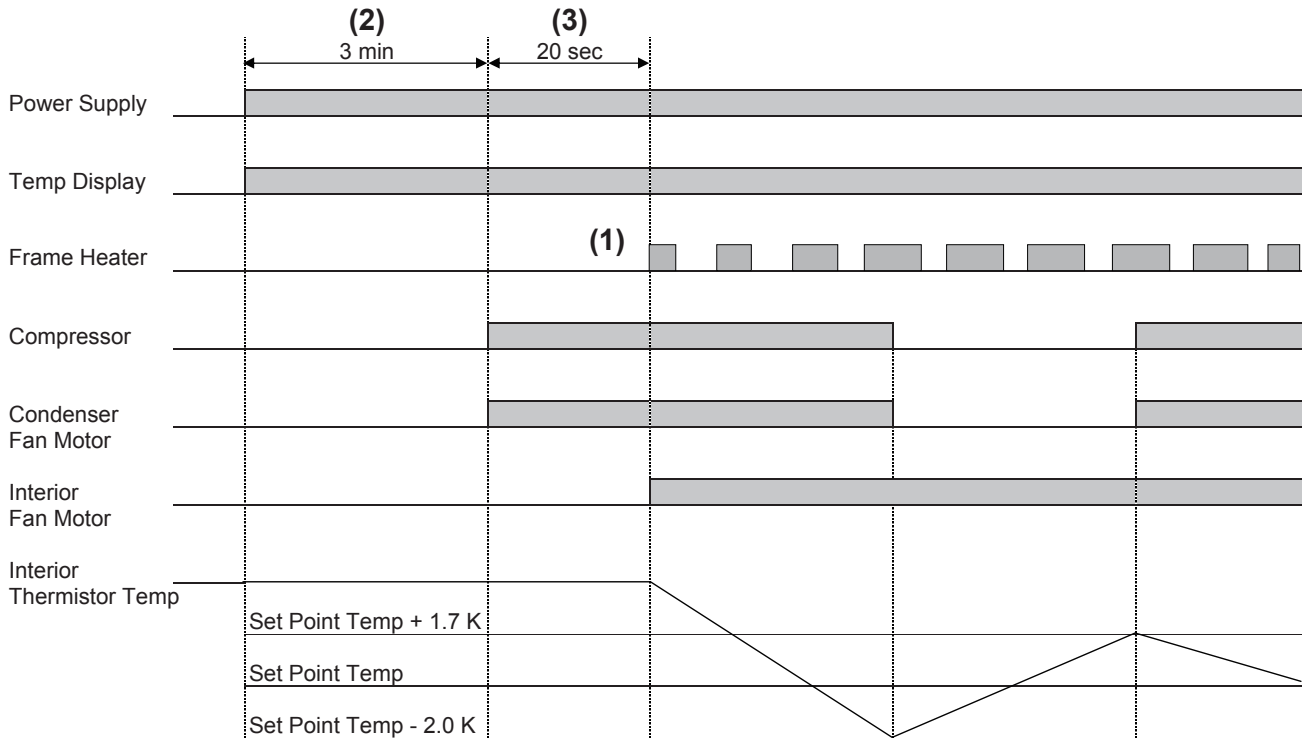
To indicate the controller board model setting number on the temperature display window, turn on the power supply while pressing the set point button (REF set point button for HRFE).

Note: Proper model setting is required when the controller board is replaced. See “6. BUTTON OPERATION” for further details.

5. TIMING CHART

[a] STARTUP - CONTROL

HRE, HFE series



(1) Frame Heater Control

Intermittent energization by difference between ambient and cabinet temperatures.

Energization time has 8 patterns (duty ratio 12.5% - 100%).

Duty ratio is updated every 2 min, except previous ratio is maintained during defrost cycle.

(2) Standby at Startup

Only temperature indication is available for 3 min (HRE/HFE) or 5 min (HRFE) [not a sign of failure].

(3) Interior Fan Motor Delay at Startup

Interior fan motor and frame heater will not operate for 20 sec after compressor starts.

(4) Interior Fan Motor OFF after End of Control

Interior fan motor will not operate for 2 min.

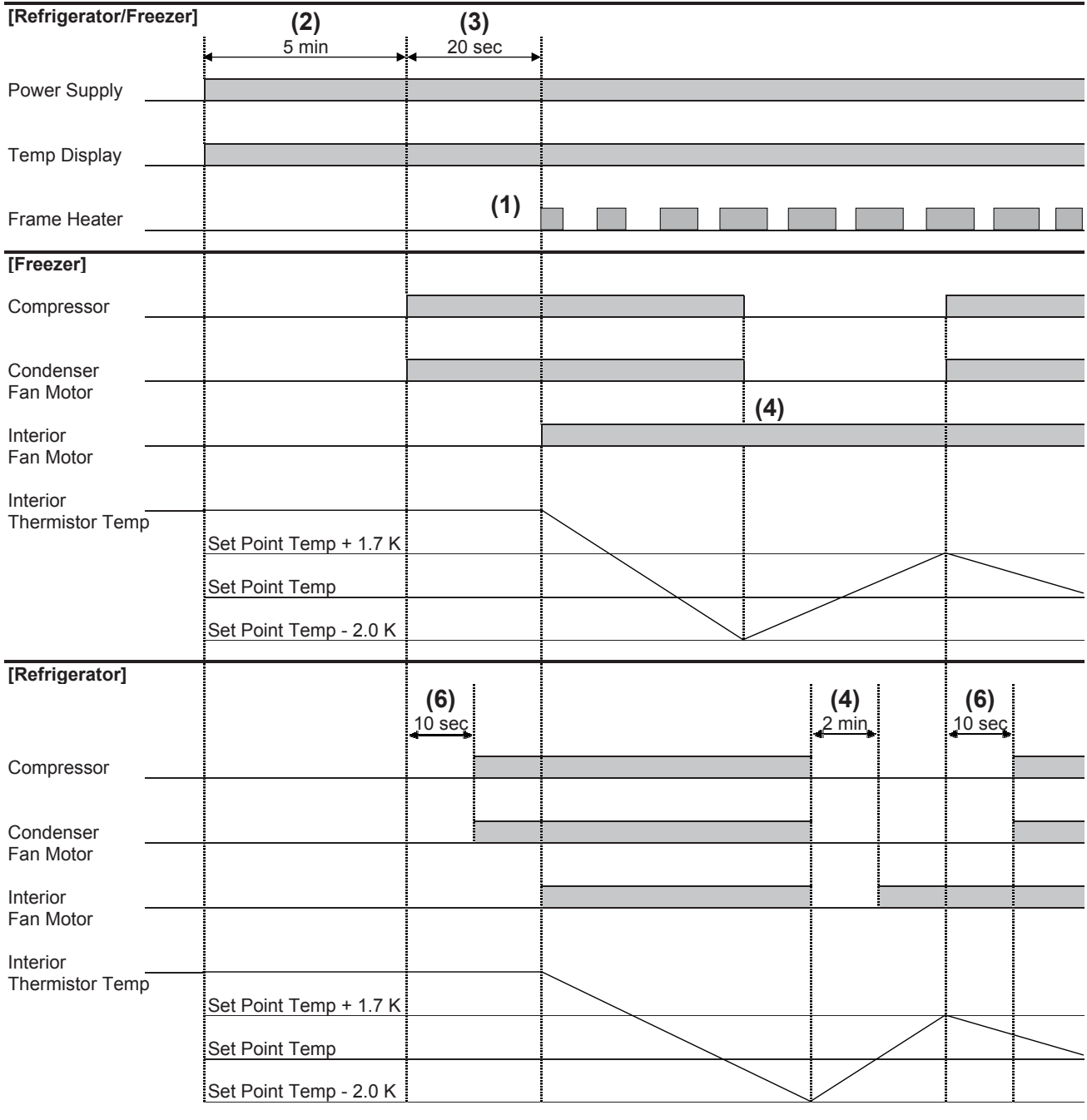
(5) Evaporation Signal (forced drain water evaporation model only)

HRE/HFE series: Defrost start signal, every 6 hrs

(6) Non-Synchronous Compressor Startup Time

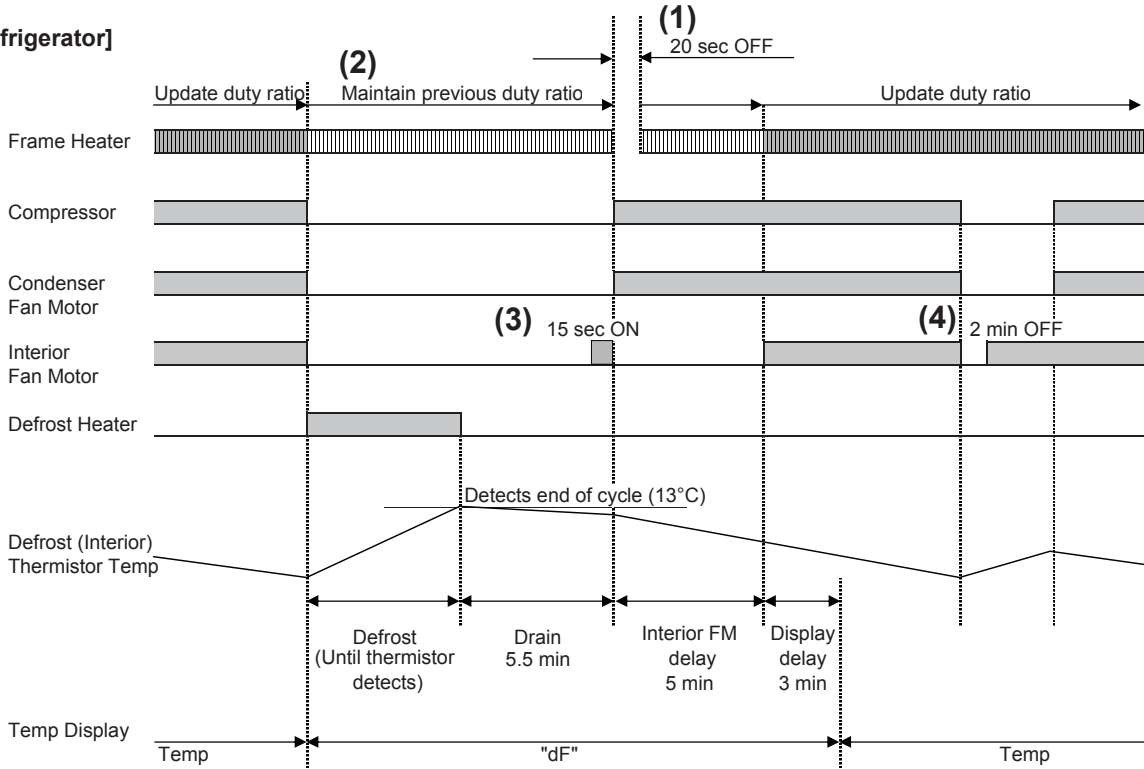
10 seconds. During this time, two compressors do not start at the same time.

HRFE series

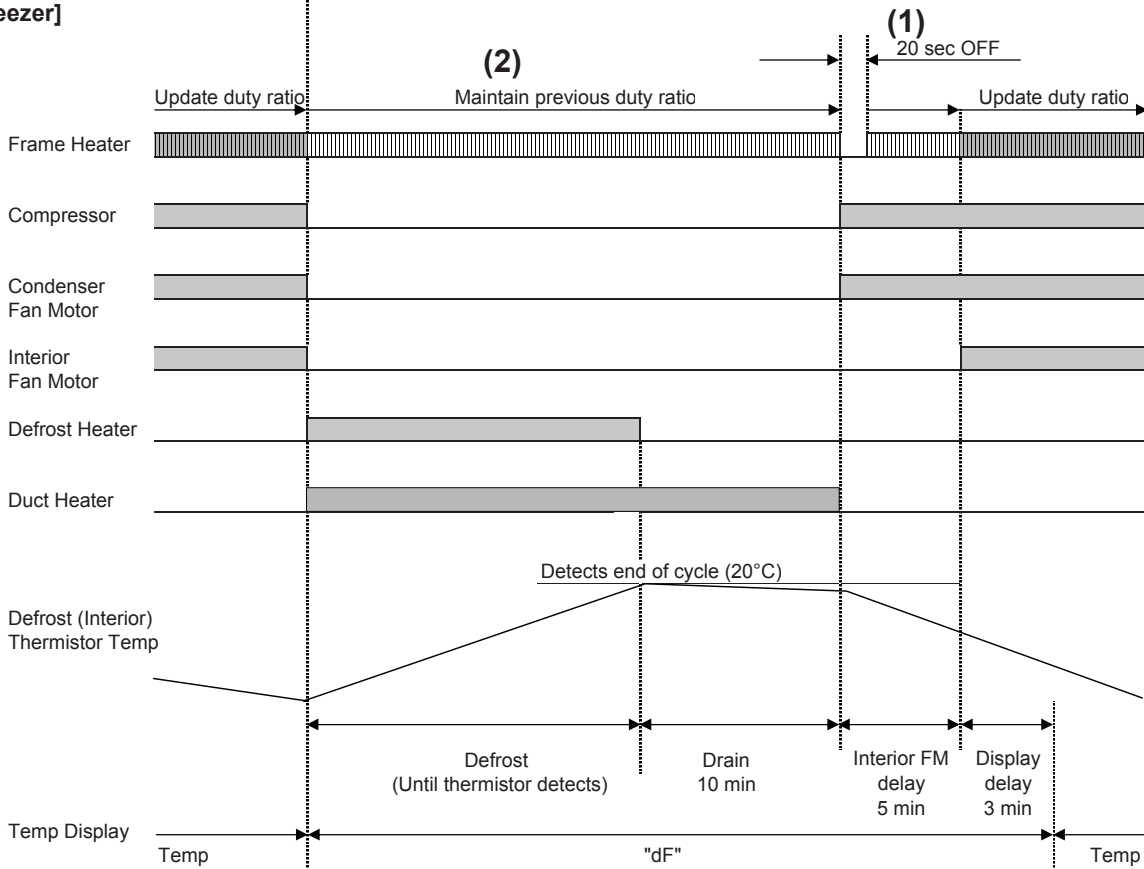


HRFE series

[Refrigerator]



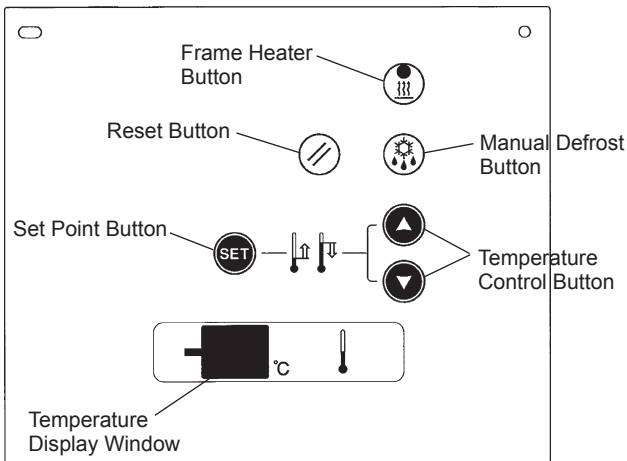
[Freezer]



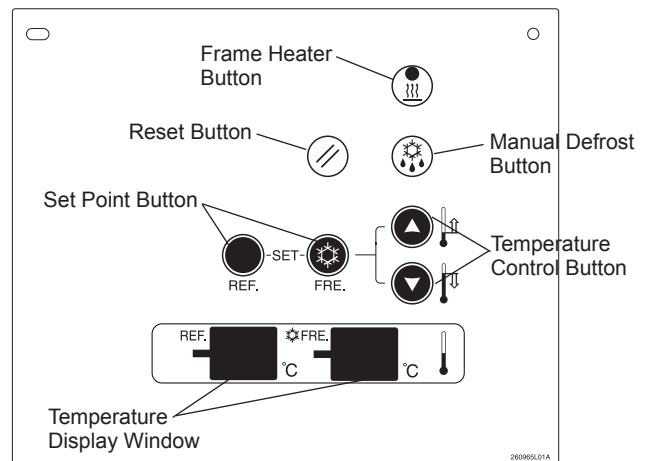
Subject of Control	Description	Model	Purpose
Frame Heater	(1) Remains OFF for 20 sec after compressor starts following drain cycle	HFE HRFE	Improve compressor startability
	(2) Duty ratio is not updated and maintains previous ratio after defrost cycle starts and until interior fan motor delay ends	HFE HRFE	Prevent condensation
Interior Fan Motor	(3) Remains ON for 15 sec after compressor starts following drain cycle	HRE HRFE (Refrigerator)	Improve compressor startability
	(4) Remains OFF for 2 min after control stops	HRE HRFE (Refrigerator)	

6. BUTTON OPERATION

[a] OPERATION PANEL LAYOUT



HRE/HFE



HRFE

[b] BASIC OPERATION

Condition	Button	Pressing Duration	Function
Constant	Set Point	—	Indicate set point temp while depressed
Constant	Set Point Temp Control	—	Change set point temp
Constant	Manual Defrost	Long (5 sec)	Start manual defrost
Error	Reset	Short	Cancel error code indication (not available on some errors) With more than one error, press to cancel one by one
Constant	Frame Heater	Long (3 sec)	Change frame heater level High: Lamp ON (raise default duty ratio by 1 level) Low: Lamp OFF (default)

[c] CHECKING AND DELETING ERROR RECORDS

To check error records:

- 1) Press the reset button and set point button (REF set point button for HRFE) at the same time for 5 seconds (reset button first). The temperature display window will show "F0".
- 2) Press the temperature control button until "F6" appears.
- 3) Press the reset button to flash the error records in the order of occurrence. "--" will appear if no error is recorded.
- 4) Press the manual defrost button to return to "F6".
- 5) Repeat step 1) to indicate the cabinet temperature.

To delete error records:

- 1) Follow steps 1) to 3) above.
- 2) Press the reset button for 5 seconds to flash "--".
- 3) Follow steps 4) to 5) above.

Note: 1. Do not perform any other button operation until the temperature display window shows from "F0" to "FF" before showing "F6". Otherwise, the basic settings will change and may cause malfunction. In case of misoperation, see the list in "[d] ADJUSTING OPERATION SETTINGS" to restore the default settings.

2. Repeated errors are stored as one record. For example, errors in the order of E7, E7, E7, E4, E7 are recorded as E7, E4, E7.

[d] ADJUSTING OPERATION SETTINGS

The following settings are adjustable:

- (1) Set Point Temperature
- (2) Frame Heater Duty Ratio Level
- (3) Soft Start Cancelation
- (4) Automatic Defrost Cycle Interval
- (5) E1 (Cabinet Temperature Too High) Occurrence Timing
- (6) E2 (Cabinet Temperature Too Low) Occurrence Timing
- (7) Buzzer Output (External Output)
- (8) Defrost Backup Timer
- (9) Refrigerator Interior Condensation Control Setting (HRFE only)

Except (1) and (2), the default settings are optimal to meet the specifications. To prevent unexpected malfunction, do not adjust them unless necessary.

(1) Set Point Temperature

Hold down the set point button, use the temperature control button to adjust to the desired set point temperature, and release the set point button.

(2) Frame Heater Duty Ratio Level

If condensation occurs on the front frame:

Press the frame heater button for 3 seconds to illuminate the lamp on the button (the duty ratio is raised by 1 level).

To freely select the frame heater duty ratio level from 1 to 6:

- 1) Hold down the frame heater button and press the set point button (REF set point button for HRFE). The temperature display window will show "2".
- 2) Hold down the set point button (REF set point button for HRFE) and use the temperature control button to indicate "1" - "6". The higher levels at the same ambient and cabinet temperatures mean the higher duty ratios (level 6 is constantly ON).

To keep the frame heater OFF (HRE series only):

- 1) Hold down the frame heater button and press the set point button. The temperature display window will show "2".
- 2) Hold down the set point button, use the temperature control button to indicate "0", and release the set point button.

(3) Soft Start Cancelation (for Immediate Startup of Compressor)

Hold down the set point button (REF set point button for HRFE) and turn on the power supply. The compressor will start after 10 seconds. This operation is available only once when the power supply is turned on.

Note: If the power supply is turned off while the compressor is running and immediately turned back on to cancel the soft start, the high-side and low-side pressures cannot be equalized, often resulting in compressor starting failure. Do not cancel the soft start for at least 2.5 minutes after the power supply is turned off.

(4) - (9)

These adjustments are available by the following button operation including the error records checking and deleting procedures:

- 1) Press the reset button and set point button (REF set point button for HRFE) at the same time for 5 seconds (reset button first). The temperature display window will show "F0".
- 2) Press the temperature control button until the desired function code (F0 - FF) appears.
- 3) Press the set point button to indicate the current setting (except "F6").
- 4) Hold down the set point button and use the temperature control button to indicate the desired value. Adjust to the default setting when the correct value is not known.
- 5) Release the set point button.
- 6) Repeat step 1) or wait for more than 1 minute. The temperature display window will show the cabinet temperature.

Note: In the above steps 3) to 5), use the REF set point button for HRFE refrigerator and the FRE set point button for HRFE freezer.

Code	Function	Indication with Set Point Button
F0	Automatic Defrost Cycle Interval	--: No automatic defrost cycle 3: Every 3 hrs 6: Every 6 hrs (default setting) 8: Every 8 hrs 12: Every 12 hrs 24: Every 24 hrs Long defrost cycle intervals may increase frosting and cause inadequate cooling.
F3	E1 (Cabinet Temp Too High) Occurrence Timing * Individual settings are available for HRFE refrigerator and freezer.	0: Immediate occurrence (no error record) For remote alarm checking. Return to original setting after checking. 1: After 1 hr 2: After 2 hrs (default setting) 3: After 3 hrs
F4	E2 (Cabinet Temp Too Low) Occurrence Timing * Individual settings are available for HRFE refrigerator and freezer.	0: Immediate occurrence (no error record) For remote alarm checking. Return to original setting after checking. 1: After 1 hr (default setting)
F6	Checking/Deleting Error Records	1) Press reset button to indicate error records (E1 - EE) every 0.5 sec for 1 sec each (max 8 records per compartment). 2) Press reset button for more than 5 sec to delete error records. 3) Press manual defrost button to indicate "F6".
Fb	Buzzer Output (External Output)	AL: Buzzer output for all errors (default setting) 1.2: Buzzer output for E1 and E2 only
FC	Defrost Backup Timer (duration until forced de-energization of defrost heater) * Individual settings are available for HRFE refrigerator and freezer.	--: No backup (no E3 occurrence) 0.4: 24 min 0.7: 40 min 1: 60 min (default setting) 1.3: 80 min 1.7: 100 min 2: 120 min Long duration until backup (or no backup) may cause fuse to blow when defrost heater is energized for a long time.

Code	Function	Indication with REF Set Point Button	
F9	Interior Condensation Control (prevention of interior condensation in refrigerator due to refrigerator and freezer temperature difference)	--: No control (default setting)	
*For HRFE refrigerator only		Ambient temperature	OFF time
		1: Low	15°C or less
		2: Mid	15°C or less
		3: High	15°C or less
		4: High	20°C or less
		5: High	25°C or less
		6: High	30°C or less
		Higher set point makes defrost heater easier to energize during compressor OFF time and shortens defrost heater OFF time, causing decrease of condensation on partition wall of refrigerator compartment. Check condensation condition and make adjustment.	

[e] MODEL SETTING AT CONTROLLER BOARD REPLACEMENT

The replacement controller boards are shipped without model setting. To prevent malfunction and inadequate cooling, be sure to finish model setting before use.

Some buttons on the replacement controller boards may be unnecessary for some models. Proper model setting will disable those buttons.

To set the mode setting number:

- 1) Turn off the power supply.
- 2) Hold down the two temperature control buttons and turn on the power supply. The temperature display window will show "01".
Note: This is not the preset model number.
- 3) Use the temperature control button to indicate the desired model number. (See the table below.)

HRE, HFE

- 4) Press the reset button for more than 3 seconds. The temperature display window will flash "rc".
- 5) Go to step 10) below.

HRFE-77

- 4) Press the reset button for more than 3 seconds. The temperature display window will show "a1".
- 5) Use the temperature control button to indicate "d4", and press the reset button for more than 3 seconds. The temperature display window will show "0.0".
- 6) Use the temperature control button to indicate "0.1.", and press the reset button for more than 3 seconds. The temperature display window will flash "rc".

Change the freezer defrost detection temperature from 13°C to 20°C as below.

- 7) Hold down the reset button and two temperature control buttons and turn on the power supply. The REF and FRE temperature display windows will show “2.2.” and “2.4.” respectively.
- 8) Use the temperature control button to indicate “3.3.” on the REF and FRE temperature display windows.
- 9) While holding down the FRE set point button, press the temperature control button until the FRE temperature display window shows “3.2.” (with “3.3.” still on the REF temperature display window).
- 10) Press the reset button again for more than 3 seconds. The temperature display window will flash “oF”.
- 11) Turn off the power supply.
- 12) Go to [f] below.

Note: If the setting is not successful, turn off the power supply, and retry from the start.

To check the model setting number:

- 1) Hold down the set point button (REF set point button for HRFE) and turn on the power supply.
- 2) The temperature display window will illuminate and show the model setting number (HRE, HFE) or show “d4” and “0.1.” alternately (HRFE).
(The compressor will start 10 seconds after this button operation.)

Model Setting Number

Series	Type	Model			
		77	127	147	187
HRE	Standard	0D	0D	0D	0D
	Glass Door	0D	0D	0D	0E
	Wheat Noodle Aging Refrigerator	B0	–	–	–
HFE	–	29	29	29	29
HRFE	–	00 *	–	–	–

* Follow the above instructions for HRFE-77.

[f] CORRECTING DISPLAYED CABINET TEMPERATURE

When the controller board is replaced, lower the displayed temperature by 2°C (HRE, HFE) or by 1°C (HRFE).
(This setting is not required for wheat noodle aging refrigerator.)

HRE, HFE

- 1) Carry out model setting (see [e] above) after controller board replacement, and then turn off the power supply.
- 2) Turn on the power supply, and check the displayed temperature.
- 3) Turn off the power supply.

- 4) Turn on the power supply while holding down the reset button and two temperature control buttons together.
- 5) "2.2." (HRE) or "2.4." (HFE) appears on the temperature display window.
- 6) Press the temperature control button until "5.2." appears on the display.
- 7) While holding down the set point button, press the temperature control button until "5.0." appears on the display.
- 8) Press the reset button for more than 2 seconds until "rc" appears on the display.
- 9) Press the reset button again for more than 2 seconds until "oF" appears on the display.
- 10) Turn off the power supply.
- 11) Turn on the power supply to confirm the temperature on the display is 2°C lower than the displayed temperature in step 2) above.

HRFE

- 1) Use the temperature control button to indicate "5.2." on the REF and FRE temperature display windows.
- 2) While holding down the REF set point button, press the temperature control button until the REF temperature display window shows "5.1." (with "5.2." still on the FRE temperature display window).
- 3) Press and hold the reset button for more than 3 seconds. The temperature display window flashes "rc".
- 4) Press and hold the reset button for more than 3 seconds. The temperature display window flashes "oF".
- 5) Turn off the power supply.

Note: If the setting is not successful, turn off the power supply, and retry from the start.

III. SERVICE DIAGNOSIS

1. ERROR CODES

In case of trouble, the temperature display window indicates the cabinet temperature and the applicable error code alternately every 1 second (even in a defrost cycle).
 Except EA and Ed, there is no need to restart the unit to reset errors.

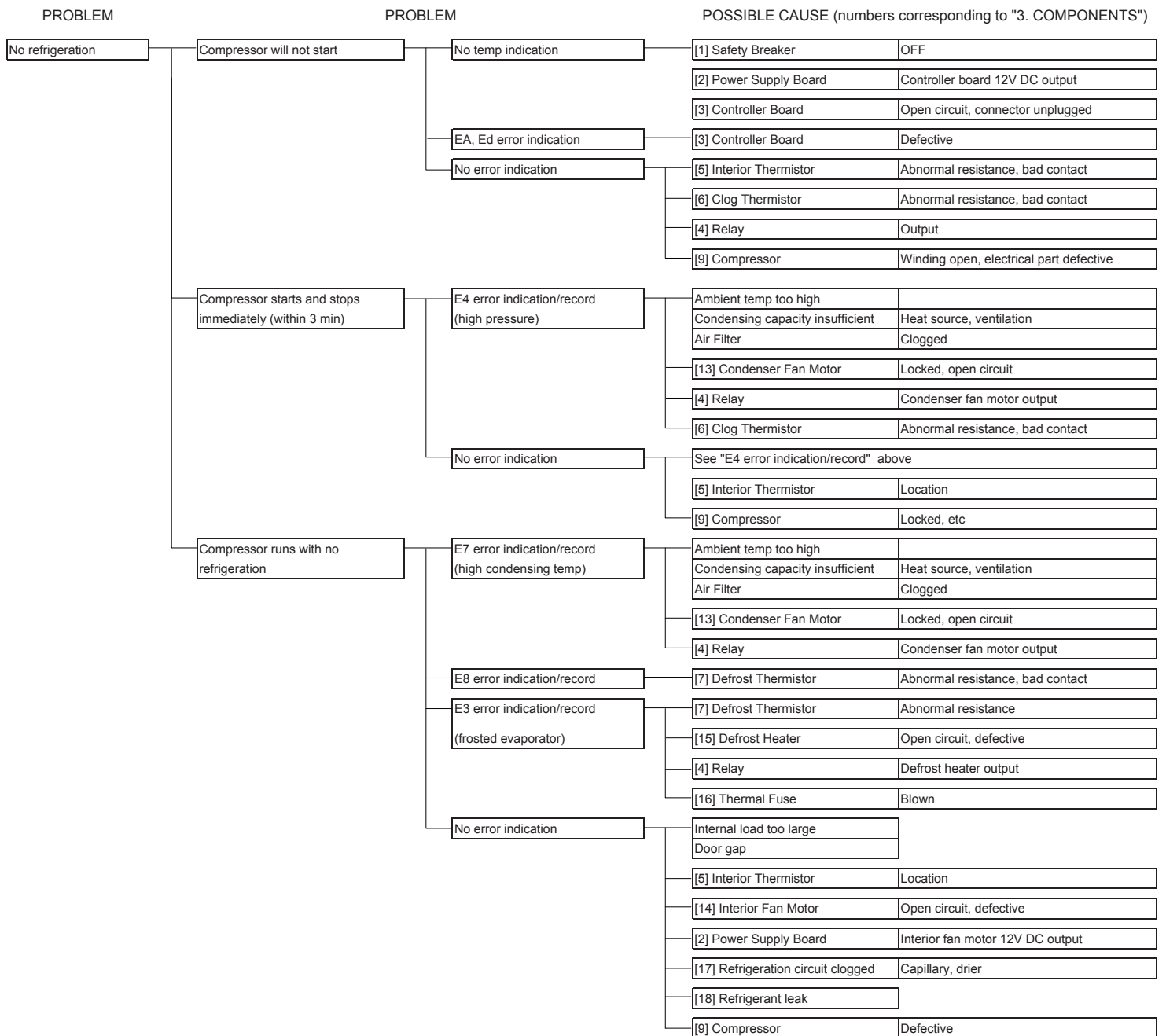
Code	Error	Description	Possible Cause		Reset
			Component	Condition	
E1	Cabinet Temp Too High	Cabinet temp stays 10K above set point for 2 hrs (available after power is turned on and cabinet temp drops to lower limit).	<ul style="list-style-type: none"> - Compressor control error - Compressor defective - Refrigeration circuit defective (ex. gas leak) - Interior thermistor defective 	<ul style="list-style-type: none"> - Ambient temp too high - Gap between door and cabinet - Door opened too frequently - Too many warm items inside 	Press reset button. Automatically resets when cabinet temp drops to lower limit.
E2	Cabinet Temp Too Low	Cabinet temp stays 5K below set point for 1 hr.	<ul style="list-style-type: none"> - Compressor control error - Interior thermistor defective 	<ul style="list-style-type: none"> - Ambient temp too low - Too many frozen items inside 	Press reset button. Automatically resets when cabinet temp rises to upper limit.
E3	Defrost Cycle Too Long	Defrost heater remains energized for 1 hr and is forcibly de-energized.	<ul style="list-style-type: none"> - Heater control error - Heater defective - Thermal fuse circuit open - Defrost thermistor defective 	<ul style="list-style-type: none"> - Door opened too frequently, causing excessive evaporator frosting 	Press reset button (no automatic reset).
E4	Abnormal High-Side Pressure	High pressure is detected 5 or more times in 1 hr (4 times within 1 hr after 1st detection). Clog thermistor * See table below for set point.	<ul style="list-style-type: none"> - Condenser fan motor defective - Dirty air filter - Clog thermistor defective 	<ul style="list-style-type: none"> - Ambient temp too high 	Press reset button (no automatic reset).

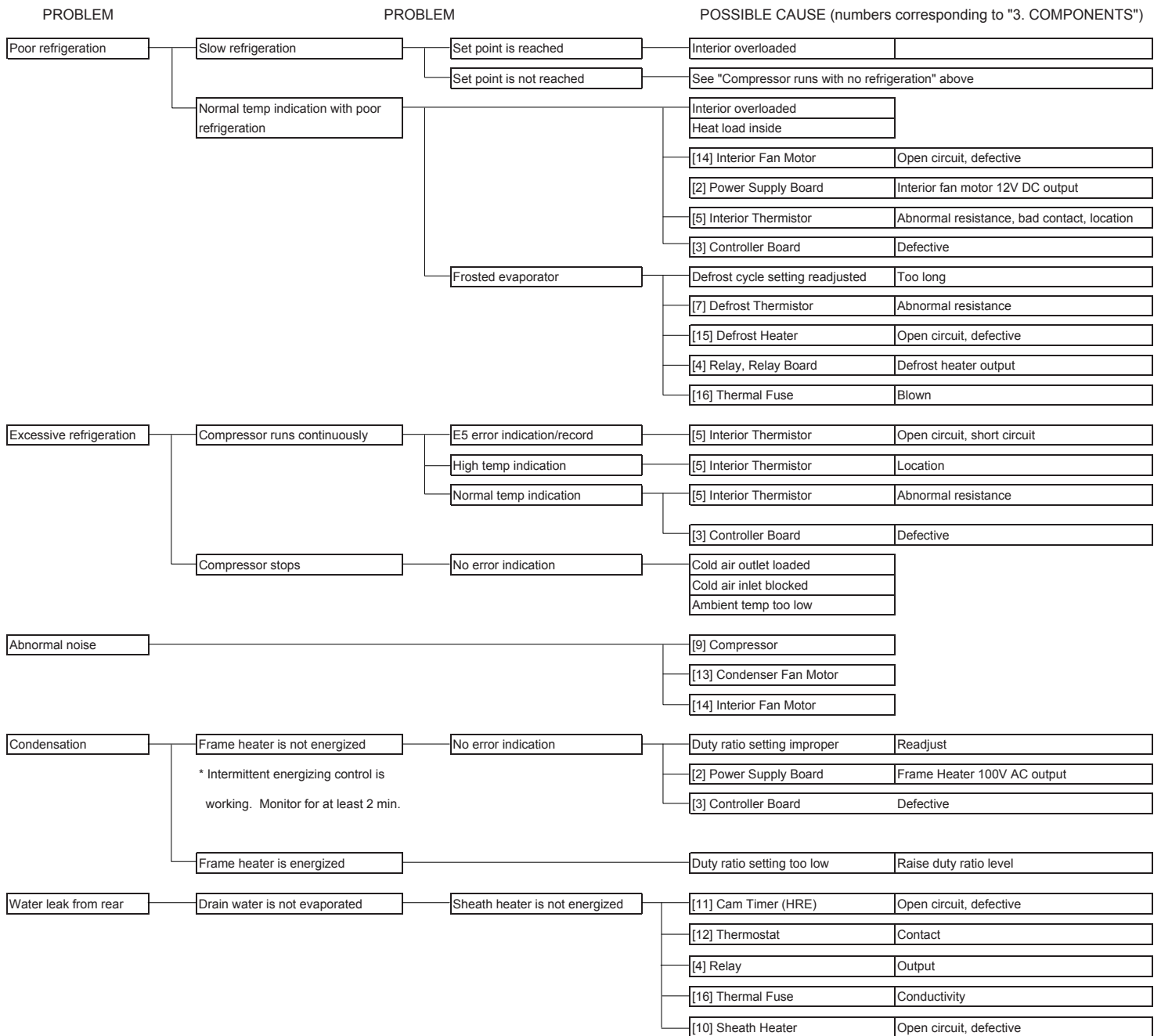
Code	Error	Description	Possible Cause		Reset
			Component	Condition	
E5	Interior Thermistor Defective	Interior thermistor circuit is open or shorted for 10 min or more. <u>Note: For either reason, compressor will operate continuously. Be careful with frozen refrigerator compartment.</u>	- Interior thermistor circuit open, connector unplugged - Interior thermistor circuit shorted, dusty connector		Press reset button after removing cause (no automatic reset).
E7	Condenser Clogged	Surface temp of condenser piping (U-bend at center or outlet) stays above set point for 5 min. * See table below for set point.	- Condenser fan motor defective - Dirty air filter	- Ambient temp too high	Automatically resets when clog thermistor senses temp lower than set point (reset button will not work).
E8	Defrost Thermistor Defective	Defrost thermistor circuit is open or shorted for 10 min or more.	- Defrost thermistor circuit open, connector unplugged - Defrost thermistor circuit shorted, dusty connector		Automatically resets after cause is removed (reset button will not work).
E9	Clog Thermistor Defective	Clog thermistor circuit is open or shorted for 10 min or more.	- Clog thermistor circuit open, connector unplugged - Clog thermistor circuit shorted, dusty connector		Automatically resets after cause is removed (reset button will not work).
EA	EEPROM Write Error	Abnormal value is detected in EEPROM reading/writing (controller board hardware problem).	- Controller board defective - Controller board malfunction		Turn power off and back on after 30 sec (no automatic reset).
Ed	EEPROM Verify Error	Inconsistency is detected in setting information used (controller board software problem).	- Controller board defective - Controller board malfunction		Turn power off and back on after 30 sec (no automatic reset).

The error cords are indicated in the following order of priority:
 EA > Ed > E5 > E8 > E9 > E4 > E7 > E3 > E1 > E2

Error	Detection	Set Point	
		R-134a	R-404A
E4	High pressure	Clog thermistor immediately at 78°C	Clog thermistor immediately at 73°C 5 min above 70°C
E7	Clog	Clog thermistor 5 min above 56°C	Clog thermistor 5 min above 56°C

2. FLOWCHART





3. COMPONENTS

CHART NO.	COMPONENT	CHECK	REMEDY
[1]	Safety Breaker	Safety breaker trips Safety breaker splashed with water	Locate earth leakage/short circuit Dry and replace if necessary
[2]	Power Supply Board (in Relay Box)	Open circuit Input/output (controller board, interior fan motor) Input: 115V AC Output: 12V DC Controller board output - K1 connector No. 1, 2 Interior fan motor - See wiring label Frame heater voltage (K2 connector No. 1, 3) Heater ON: 0V Heater OFF: 230V Switches every 2 min	Correct or replace Replace Replace
[3]	Controller Board	Connector/pin disconnected Connector dusty/dirty 7 segment display partially/totally off Electronic parts defective/burnt out Ambient temp sensor damaged (Frame heater will be continuously energized) Relay, relay board output (12V DC)	Correct Remove Replace Replace Replace Replace
[4]	Relay	Fast-on terminal/pin disconnected Connector dusty/dirty Open circuit Output to each load Check with wiring diagram/timing chart Abnormal noise	Correct Remove Correct Replace Replace
[5]	Interior Thermistor	Location (holder in front of evaporator) Disconnected, replaced with defrost thermistor, etc Incorrect temp indication Short circuit (temp displayed as "HH") Open circuit (temp displayed as "-60")	Correct Immerse in ice water to check resistance (5 - 6.5k Ω) Replace if necessary Clean/dry connector Replace Replace
[6]	Clog Thermistor	Abnormal resistance Short circuit Open circuit	Immerse in ice water to check resistance (150 - 180k Ω) Replace if necessary Clean/dry connector Replace Replace
[7]	Defrost Thermistor	Location (plug in from evaporator front) Disconnected, replaced with interior thermistor, etc Abnormal resistance Short circuit Open circuit	Correct Immerse in ice water to check resistance (5 - 6.5k Ω) Replace if necessary Clean/dry connector Replace Replace
[8]	Pressure Switch	Terminal splashed with water Terminal dusty/dirty Conductivity between contacts	Dry and replace if necessary Remove Replace if conductive
[9]	Compressor	Resistance between terminals Compressor Winding Resistance (Ω) Primary Secondary FR8.5G 8.9 12.0 SC12G 6.7 11.8 SC12CL 5.0 13.7 SC18CL 3.7 14.1 TL4G 18.2 15.1 FR8.5CL 7.3 12.0 SC12CLX 3.7 14.1 SC15CLX 3.5 12.1 Insulation resistance 1M Ω or more at 500V Abnormal noise Insufficient compression (discharge temp too low)	Replace Replace Replace Replace

CHART NO.	COMPONENT	CHECK	REMEDY
[9]	Compressor	Electrical part defective (constant speed compressor only) - Run/start capacitor ruptured/deformed - Capacitor defective Check resistance between terminals Gradually reduces: No problem 0Ω from start: Defective - Starter defective Loose terminal, no conductivity, damaged - Overload relay defective Loose terminal, no conductivity, damaged	
[10]	Sheath Heater *	Open circuit	Correct
		Conductivity	Replace
		Insulation resistance 1MΩ or more at 500V	Replace
[12]	Thermostat *	Open circuit	Correct
		Conductivity	Replace if not conductive
[13]	Condenser Fan Motor	Open circuit	Correct
		Locked (not rotating with voltage)	Replace
		Internal fuse blown (coil not conductive)	Replace
		Abnormal noise	Replace
[14]	Interior Fan Motor	Open circuit	Correct
		Locked (not rotating with voltage)	Replace
		Abnormal noise	Replace
[15]	Defrost Heater	Open circuit	Correct
		Conductivity	Replace
		Insulation resistance 1MΩ or more at 500V	Replace
[16]	Thermal Fuse	Conductivity	Replace
		Relay contact fused	Replace relay/relay board
[17]	Refrigeration Circuit Clogged	Discharge pressure: High Suction pressure: Low (vacuum)	Replace capillary (Replace drier at same time)
[18]	Refrigerant Leak	Discharge pressure: Low Suction pressure: High	Locate leakage and replace (Replace drier at same time)

* Forced drain water evaporation model only

4. CONTROLLER BOARD

[a] SERVICING CONTROLLER BOARD

- 1) When receiving a service call, ask the user to turn off the power supply and turn it back on after 30 seconds, while watching the unit. This will reset the controller, and in some cases normal operation will resume.
- 2) Keep the following in mind when servicing the controller board:
 - * Check that the unit has been earthed properly. If not, the controller board will not work properly.
 - * To get static free, always touch the cabinet (earth) before servicing. Electrostatic discharge will cause severe damage to the controller board. Also, keep it away from vinyl, plastic or other electrostatically charged products.
 - * Do not touch the reverse side of the controller board and tiny electronic devices on it.
 - * The controller board and thermistor can be replaced separately.
 - * Handle the controller board by the edges only. Do not push the electric parts and wires.
 - * Do not drop the controller board on the floor.
 - * To protect the pattern from damage, place the controller board on a flat surface.
 - * The thermistor leads have a thin coating and are potentially breakable. Do not tension the leads.
 - * The connectors must not be subjected to tension to prevent disconnection or breakage. After servicing the controller board, check for disconnected connectors.
 - * The thermistor is provided with single-wire leads. Do not bend or stretch them (about 400 mm from the end and at lead connections).
 - * Do not pinch or weigh down the thermistor and thermistor leads. The coatings may be broken, resulting in a short circuit.
 - * Keep the thermistor and relay box wires at least 30 mm away from the high voltage (100V AC or more) wires.
- 3) After replacing the controller board, make the following settings:
 - * The replacement controller boards are shipped without model setting. To prevent malfunction and failure, be sure to finish model setting and temperature correction before use according to “II. 6. [e] MODEL SETTING AT CONTROLLER BOARD REPLACEMENT” and “II. 6. [f] CORRECTING DISPLAYED CABINET TEMPERATURE”.
 - * Some buttons on the replacement controller boards may be unnecessary for some models. Proper model setting will disable those buttons.

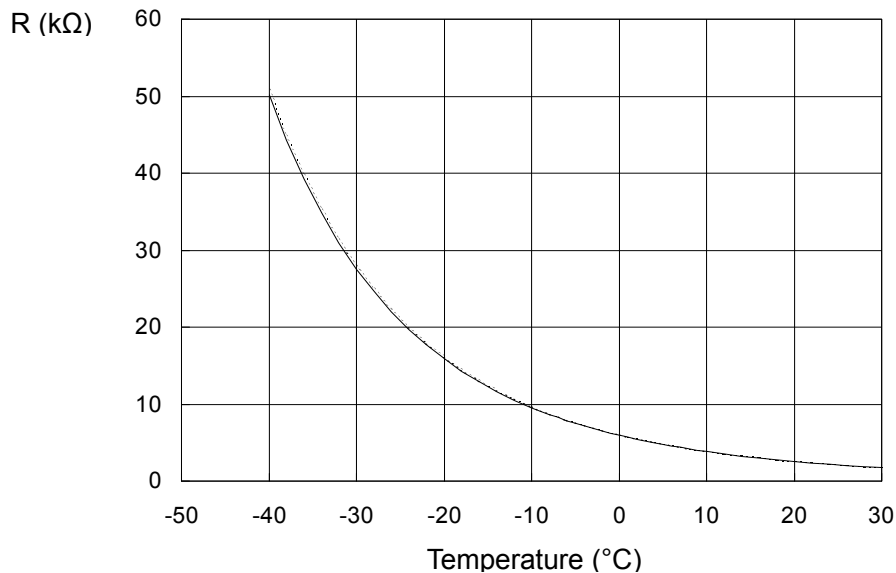
[b] CHECKING THERMISTOR

- 1) Remove the thermistor's intermediate connector from the controller board.
- 2) Put ice and water in a glass or other container to make 0°C water. Immerse the thermistor bulb in the water for 5 minutes (at the center of the container).
- 3) Use the Ω range of the tester to measure the resistance between the thermistors.
- 4) If the measured resistance is not within:
Interior/defrost thermistor 5 - 6.5 k Ω (standard 6 k Ω)
Clog thermistor 150 - 180 k Ω (standard 162 k Ω)
replace the thermistor (see the T-R curve below).

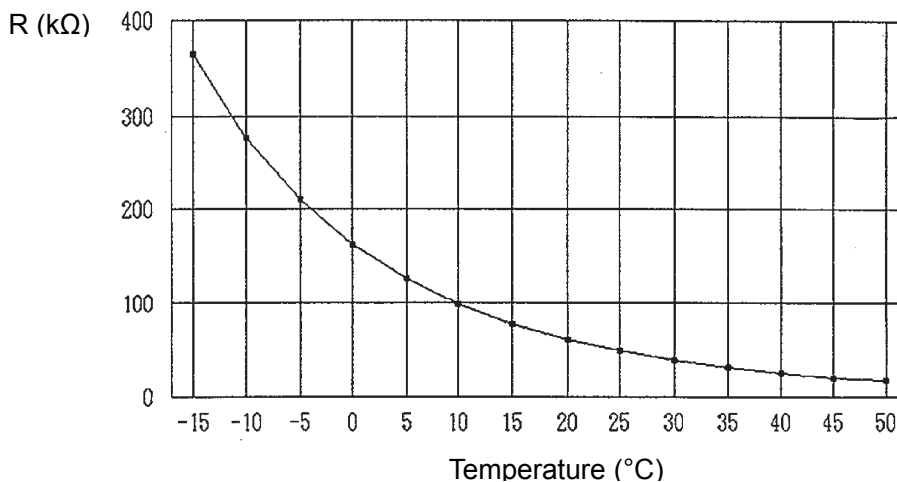
T-R Curve (Interior/Defrost Thermistor)

$$R = 6 \times \text{Exp} \left\{ 3390 \times \left(\frac{1}{273.15 + T} - \frac{1}{273.15} \right) \right\}$$

The graph shows reference values only and may differ from actual values.



T-R Curve (Clog Thermistor)

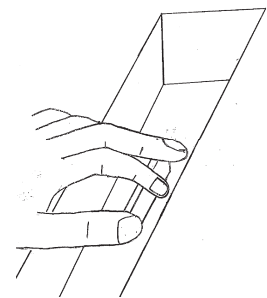
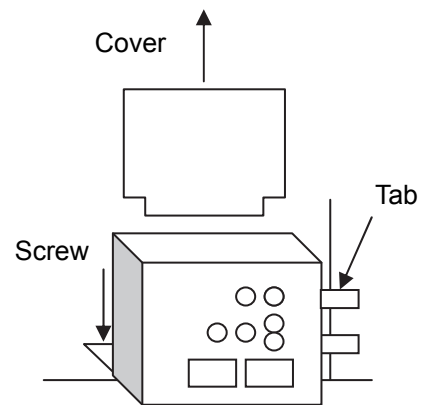


IV. REMOVAL AND REPLACEMENT OF COMPONENTS

1. CONTROLLER BOARD AND THERMISTOR

[a] REMOVAL OF CONTROL BOX

- 1) Lift the cover off the back of the control box.
- 2) Remove the screw (rear left) securing the control box, and remove the control box.
- 3) Disconnect the connectors from the control box by pinching both ends of the connectors with thumb and middle finger and unlocking the connectors with forefinger.
- 4) Remove the four screws of the control box, and separate it into the operation panel side and box side.
- 5) Remove the two screws from the operation panel side, and remove the controller board.



[b] REPLACEMENT OF CONTROL BOX

- 1) Handle the controller board with care according to “III. 4. [a] SERVICING CONTROLLER BOARD”.
- 2) Replace the controller board in the reverse order of the removal procedure with the following points in mind:
 - * To replace the control box, be sure to hook the two tabs on the grips.
 - * Plug in the connectors until they lock in place.
 - * Keep the wires inside the rear cover.
- 3) Check that the operation panel is securely mounted.
- 4) After replacing the controller board, be sure to make model setting. Otherwise, the unit will not operate properly, and the compressor may be damaged.

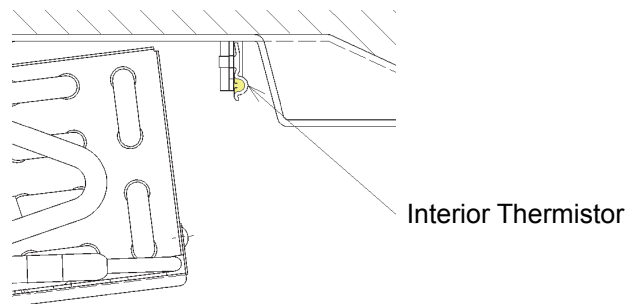
[c] THERMISTOR

- 1) Remove the air duct inside the cabinet. See “5. [a] AIR DUCT”.
- 2) Remove the interior thermistor bulb on the ceiling in front of the evaporator by unhooking the two tabs securing the thermistor holder.
- 3) Remove the defrost thermistor bulb inside the evaporator fins by pinching off the thermistor holder. (The defrost thermistor is not provided for HRE and HRFE refrigerator.)

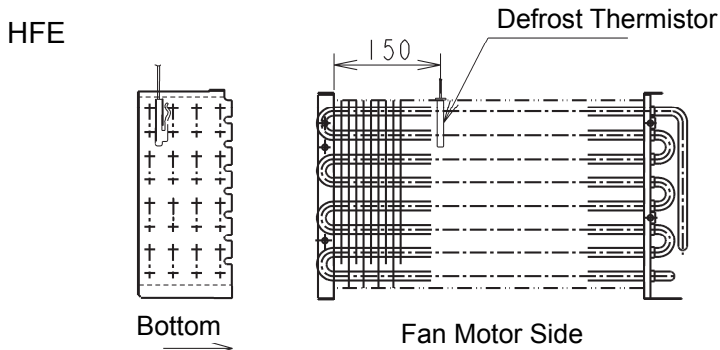
- 4) Pull out the thermistors through the hole in the refrigeration unit base. Be careful not to press hard on the bulbs and leads.
- 5) Remove the clog thermistor bulb by removing the thermistor holder located at the center or outlet of the condenser.
- 6) Remove the control box, and disconnect the thermistor connectors.

- Note:
1. To replace the removed parts, reverse the above procedure.
 2. To prevent the evaporator from freezing, use the bush - thermistor to securely plug the wiring hole in the refrigeration unit base.
 3. To remove the thermistor from HRFE-77B refrigerator, take off the duct first and then the thermistor bulb.

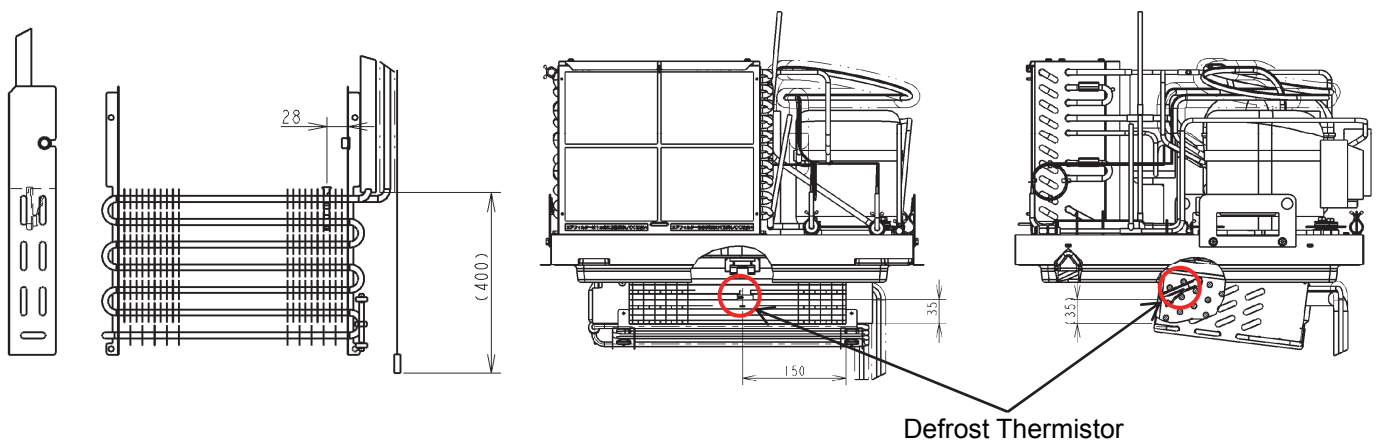
Interior Thermistor Bulb Location



Defrost Thermistor Bulb Location



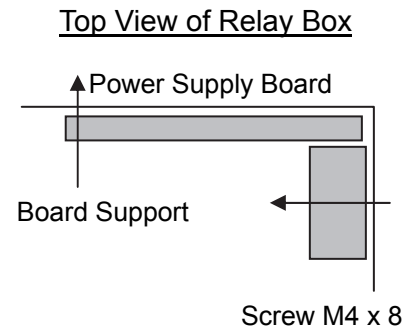
HRFE



2. RELAY BOX

[a] POWER SUPPLY BOARD

- 1) Unplug the unit.
- 2) Disconnect the connectors.
- 3) Loosen and remove the two board supports at the back.
- 4) Loosen the three screws from outside the relay box, and remove the power supply board. Do not remove the screws from inside the relay box, or the parts may fall off the power supply board.
- 5) To replace the removed parts, reverse the above procedure.



- Note: 1. The power supply board is connected to a commercial power supply. Be sure to disconnect the power supply before servicing.
2. Some parts may have become hot just after operation. Handle with care.

3. REFRIGERATION CIRCUIT

For HRFE-77B, it is structurally difficult to replace the whole refrigeration circuit. Replace the individual parts.

[a] COMPRESSOR

- 1) Unplug the unit.
- 2) Remove the front panel.
- 3) Remove the protector cover enclosing the electrical parts. Remove the overload relay, starting relay and other parts.
- 4) Recover the refrigerant from the low side access valve.
- 5) Disconnect the discharge and suction pipes by using brazing equipment.
- 6) Remove the hexagon bolts securing the compressor.
- 7) To replace the removed parts, reverse the above procedure.

[b] CONDENSER AND DRIER

- 1) Unplug the unit.
- 2) Remove the front panel.
- 3) Recover the refrigerant from the low side access valve.
- 4) Unscrew the condenser.
- 5) Disconnect the drier from the wire retainer.
- 6) Disconnect the condenser from the upper inlet pipe connection using brazing equipment.
- 7) Remove the condenser and drier from the refrigeration unit base, and disconnect them using brazing equipment.
- 8) To replace the removed parts, reverse the above procedure.

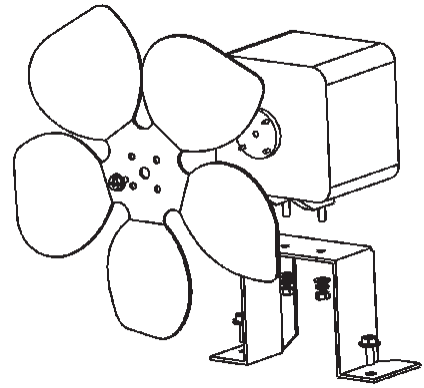
Note: The capillary tube is directly brazed to the drier. To prevent brazing material from clogging, be sure to insert the capillary tube securely into the point of stopper before brazing.

[c] EVAPORATOR

- 1) Unplug the unit.
- 2) Remove the front panel.
- 3) Recover the refrigerant from the low side access valve.
- 4) Remove the insulation hoses on the refrigeration unit base. Disconnect the evaporator using brazing equipment.
- 5) Remove the air duct.
- 6) Disconnect the defrost heater wires. See “[e] DEFROST HEATER AND THERMAL FUSE”.
- 7) Unscrew and remove the evaporator.
- 8) To replace the removed parts, reverse the above procedure.

[d] CONDENSER FAN MOTOR

- 1) Unplug the unit.
- 2) Remove the front panel.
- 3) Disconnect the condenser fan motor.
- 4) Remove the two screws securing the bracket on the refrigeration unit base.
- 5) Pull up the fan motor together with the bracket.
- 6) Loosen the nut securing the fan motor shaft, and remove the fan motor.
- 7) Remove the fan motor from the bracket.
- 8) To replace the removed parts, reverse the above procedure.

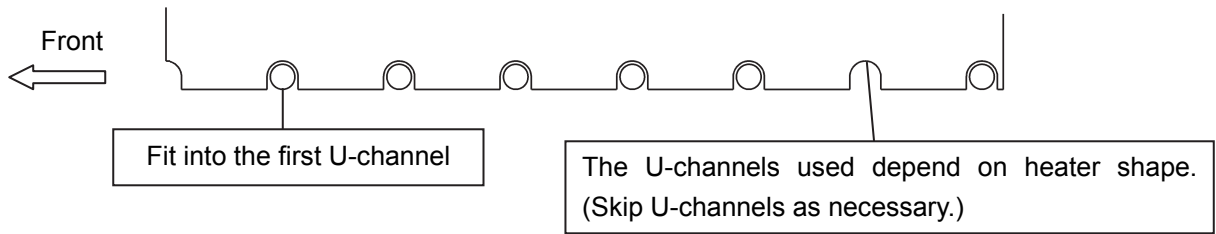
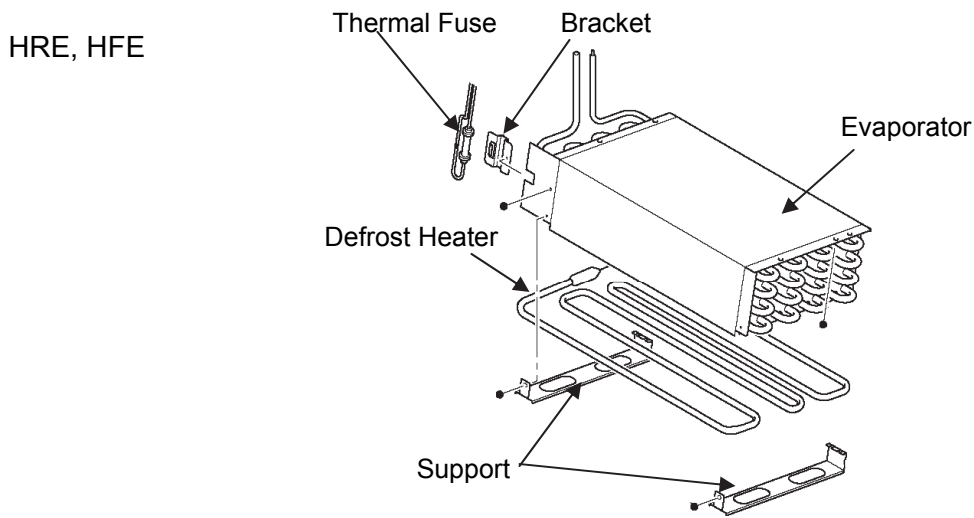


Note: After replacement, check for abnormal noise or vibration noise by trial run.

[e] DEFROST HEATER AND THERMAL FUSE

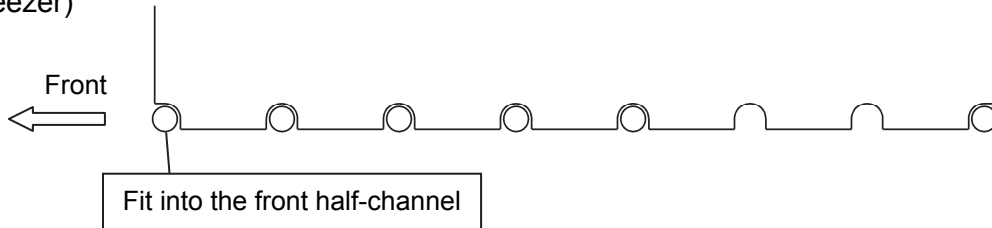
- 1) Unplug the unit.
- 2) Disconnect the defrost heater at the back of the refrigeration unit. The defrost heater and thermal fuse are connected in series and interchangeable without any operational problems.
- 3) Remove the putty from the wire hole in the refrigeration unit base, and put the connector through the hole.
- 4) Remove the air duct. See "5. [a] AIR DUCT".
- 5) Remove the supports at both ends of the evaporator bottom by loosening the screws at the front and unhooking the backside.
- 6) Remove the defrost heater from the evaporator by pulling each U-bend from the front to the back.
- 7) Unscrew and remove the thermal fuse from the evaporator and bracket.
- 8) Pull out the wire through the hole in the refrigeration unit base.
- 9) To replace the removed parts, reverse the above procedure.

Note: Locate the defrost heater in the same position as before. Fit the first front line into the first U-channel, and position the rest according to the U-bend dimensions.

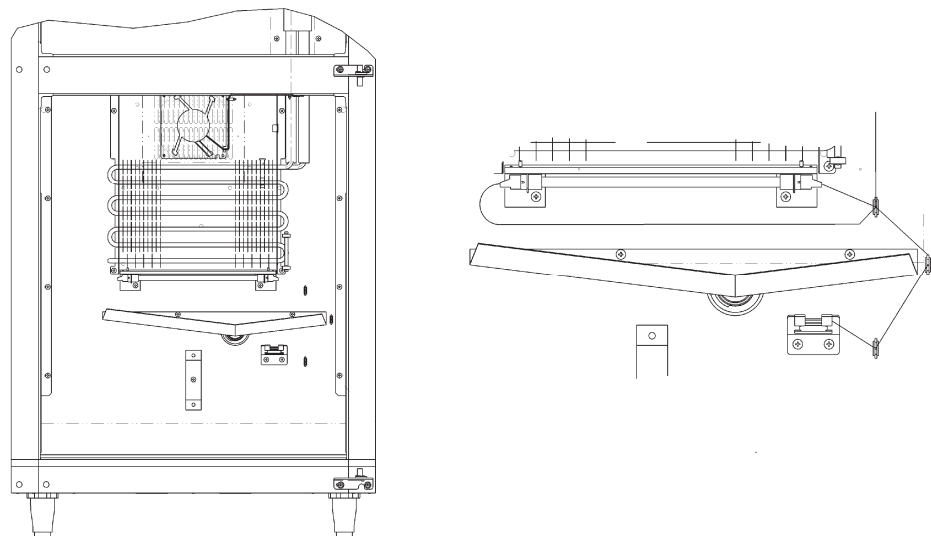


HRFE-77B

(Freezer)

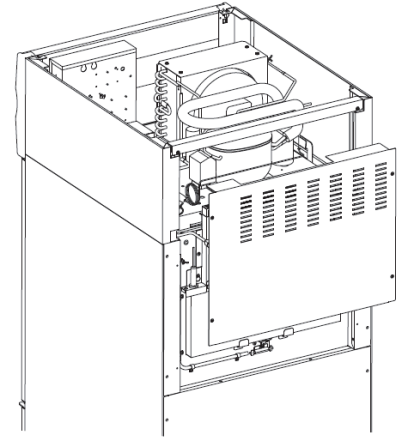


(Refrigerator)



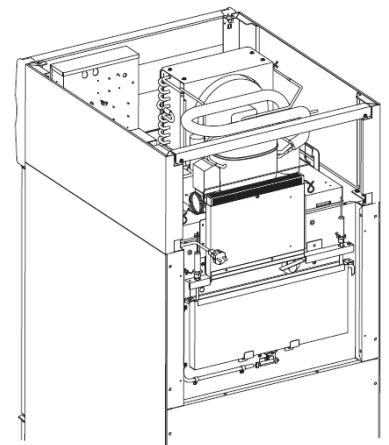
4. EVAPORATION TANK (Forced drain water evaporation model only)

- 1) Unplug the unit.
- 2) Unscrew and remove the rear panel.
- 3) Unscrew the upper part of the evaporation tank cover, and lift off the cover.



[a] DRAIN TANK HEATER

- 1) Unscrew and remove the drain tank duct.
- 2) Unscrew the drain tank flange securing the drain tank heater.
- 3) Cut the drain tank heater leads at their connection.
- 4) Lift the drain tank heater off the drain tank.
- 5) Lift off the drain tank heater together with the heater bush from the drain tank flange.
- 6) Remove the heater bush from the drain tank heater.
- 7) To replace the removed parts, reverse the above procedure.



[b] THERMOSTAT

- 1) Unscrew the thermostat attached to the drain tank bottom.
- 2) Cut the thermostat leads at their connection.
- 3) To replace the removed parts, reverse the above procedure.

[c] THERMAL FUSE

- 1) Unscrew the fuse holder at the drain tank bottom, and remove the thermal fuse.
- 2) Cut the thermal fuse leads at their connection.
- 3) To replace the removed parts, reverse the above procedure.

5. AIR DUCT

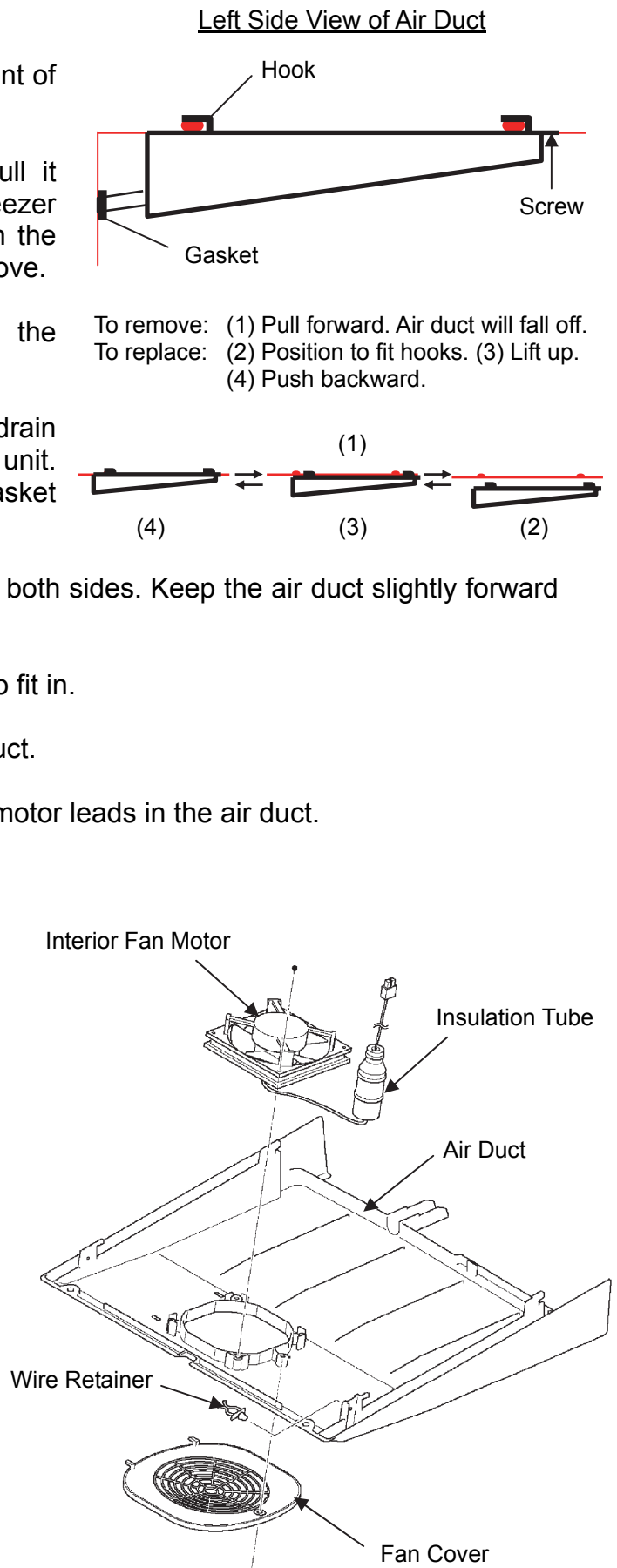
[a] AIR DUCT

- 1) Remove the two or three screws at the front of the air duct.
- 2) Hold both sides of the air duct, and pull it forward. The air duct in the freezer compartment is provided with a gasket in the drain pipe and must be pulled hard to remove.
- 3) To prevent tension on the wires, place the removed air duct on a shelf.
- 4) To replace the air duct, first insert the drain pipe into the drain outlet at the rear of the unit. For the freezer compartment, move the gasket backward before inserting the drain pipe.
- 5) Position the air duct to fit the six hooks on both sides. Keep the air duct slightly forward for smooth positioning.
- 6) Lift up the air duct, and push it backward to fit in.
- 7) Tighten the screws at the front of the air duct.

Note: Be careful not to catch the interior fan motor leads in the air duct.

[b] INTERIOR FAN MOTOR (HRE/HFE)

- 1) Unplug the unit.
- 2) Disconnect the interior fan motor connector (blue) beside the refrigeration unit.
- 3) Unscrew the refrigeration unit.
- 4) Slightly lift up the refrigeration unit, and put the interior fan motor leads inside the cabinet.
- 5) Remove the air duct.
- 6) Remove the interior fan motor from the air duct.



- 7) To replace the removed parts, reverse the above procedure. Cover the interior fan motor leads with the insulation tube as a cushion through the hole in the refrigeration unit.

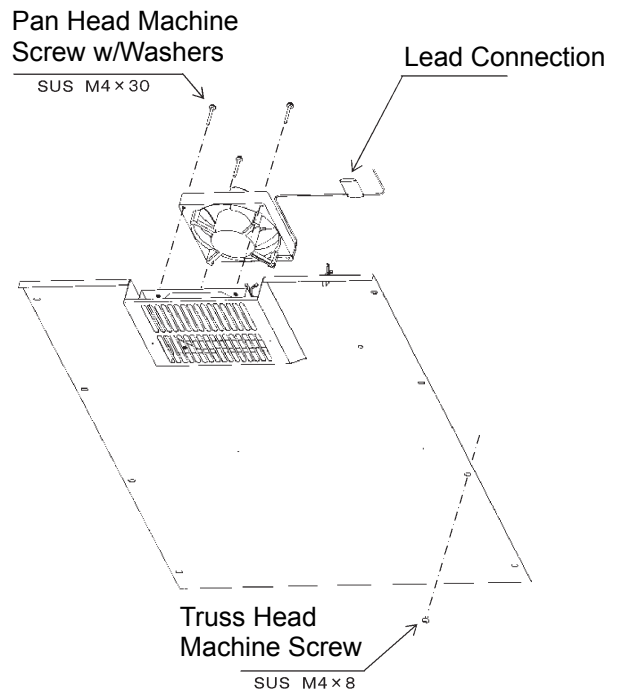
Note: To prevent the leads from being caught between the fan blades, fix the leads with the wire retainer inside the air duct before fitting the air duct.

[c] INTERIOR FAN MOTOR (HRFE-77B)

- 1) Unplug the unit.
- 2) Open the door to the refrigerator. Unscrew and remove the cooling duct.
- 3) Unscrew and remove the fan motor.
- 4) Cut the fan motor leads at their connection. (Keep the lead re-connectable.)
- 5) To replace the removed parts, reverse the above procedure.

Note: 1. To prevent water from coming in, the lead terminals must be caulked and covered with plastic bag. Be sure to connect the leads outside the unit.

2. Seal the lead hole with putty later.

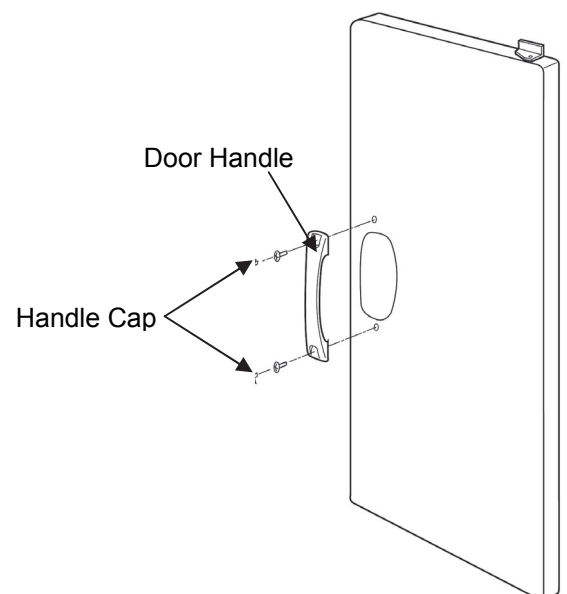


6. DOOR PARTS

[a] DOOR HANDLE

The door handle is replaceable. Order the new door handle and two handle caps. The handle caps are damaged when removed and need to be replaced together with the door handle.

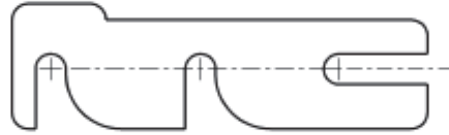
- 1) Put a precision screwdriver into the notches to remove the handle caps.
- 2) Unscrew and remove the door handle.
- 3) To replace the removed parts, reverse the above procedure. Tighten the mounting screws to a torque of 98 - 127 Nm·cm (10 - 13 kgf·cm). Manual tightening with a screwdriver needs additional tightening.



[b] HINGE SPACER

For door closing adjustment, the hinge spacers may be provided between the hinges and cabinet. When removed, the hinge spacers must be reinstated in the correct position. When the door is replaced or the gasket is often caught in the door, order the following parts and replace the hinge spacers:

Hinge Spacer 473352M01



[c] LIFT HINGE

To ensure smooth door closing, the hinge shaft employs a lift hinge. If the hinge makes an abnormal noise or the worn out lift hinge hinders smooth door closing, apply White Alcom Grease (white grease used for industrial icemakers). If the lift hinge is severely worn out, replace the hinge collar (lift hinge) on both the door and hinge sides.

* Apply White Alcom Grease also when the door is replaced in the field.

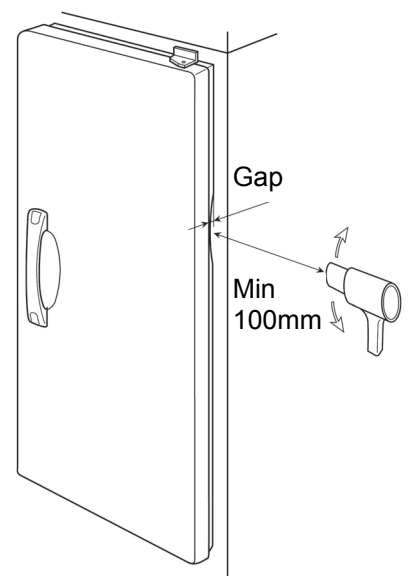
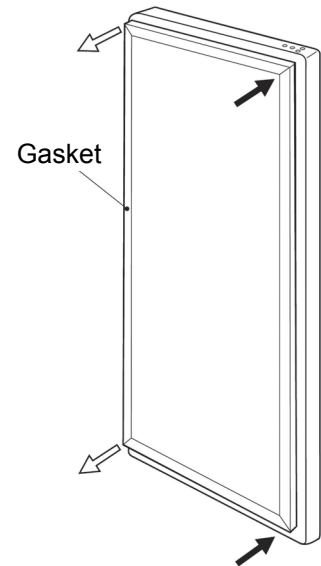
[d] DOOR GASKET

To replace the door gasket:

- 1) Pinch and pull out the door gasket from the corners.
- 2) Push the convex of the new door gasket into the concave of the door interior. Insert the corners first to facilitate replacement.

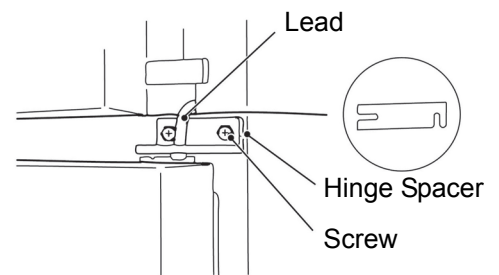
Replacement of the door or door gasket may cause a gap between the cabinet and the gasket. To correct this gap, slightly heat the gasket with a drier. To avoid melting the gasket:

- 1) Keep the drier at least 100 mm away from the gasket.
- 2) Move the drier up and down to heat the entire gap.

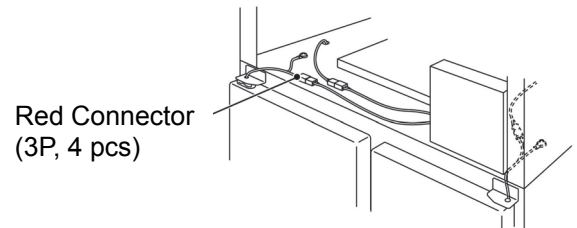


7. DOOR (ML series only)

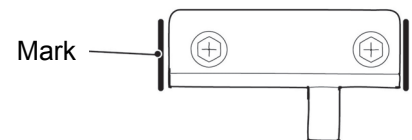
- 1) Remove the front panel.
- 2) Check that a red 3P connector is on the refrigeration unit side.
The door is provided with a heater lead coming from the upper hinge of the upper door or the lower hinge of the lower door, through the side of the cabinet, into the refrigeration unit. The lead end is connected with the red 3P connector.



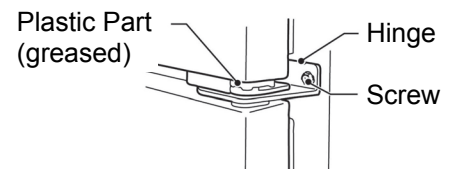
- 3) Disconnect all the red 3P connectors.



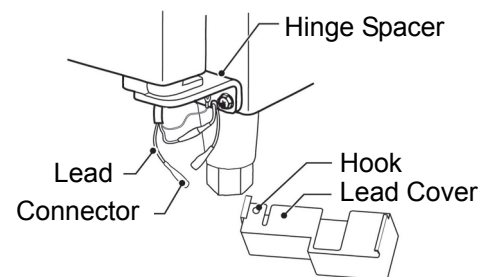
- 4) Mark the left and right of all the hinge locations to refit the hinges in proper position.



- 5) Remove the two screws securing the hinge, and take off the upper door.



- 6) Unhook and remove the heater lead cover from the lower hinge, and disconnect the lead connectors.



- 7) Remove the lower door.

- 8) To reinstall the doors, reverse the above procedure.

Note: Although the doors have been factory-adjusted and the contact between the center seals has been checked, recheck the following points after reinstallation.

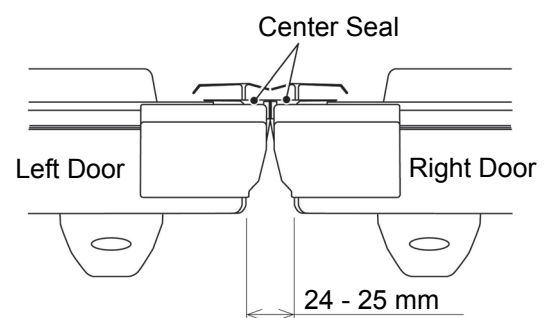
- 9) Open the doors by 5 cm and let them go.

- 10) Check that the doors close automatically and there is no gap between the center seals. If the center seals do not contact properly, make the following adjustments.

If the doors fail to close:

Loosen the mounting bolts securing the upper, lower, left and right door hinges, and increase the dimension between the doors until the doors close tightly. After adjustment, tighten the mounting bolts.

Keep the following dimensions between the left and right doors



If there is a gap between the center seals:

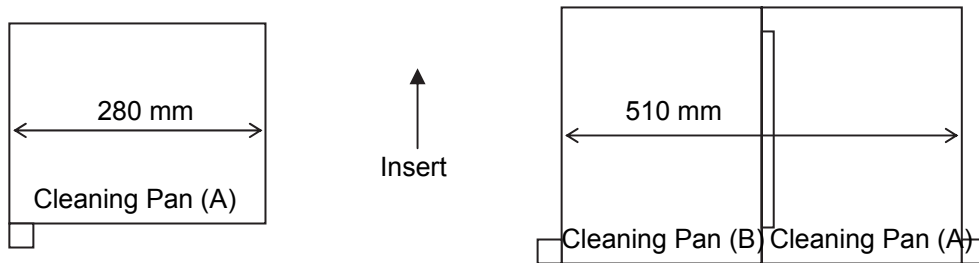
Loosen the mounting bolts securing the upper, lower, left and right door hinges, and decrease the dimension between the doors until there is no gap between the center seals. After adjustment, tighten the mounting bolts.

- 11) When reinstalling the lead cover, reconnect the connectors directly, and put all the connectors in the lead cover.

8. CONDENSER CLEANING PAN

The condenser is designed to allow the cleaning pan at the bottom.

- * Insert the cleaning pan (wastewater pan), and connect the drain hose to the drain outlet. Use the cleaning pan (A) for the 280 mm wide condenser [HRE-77/127/147/187B, HFE-77B, HRFE-77B], and connect the cleaning pan (A) and cleaning pan (B) for the 500 mm wide condenser [HFE-127/147/187B].

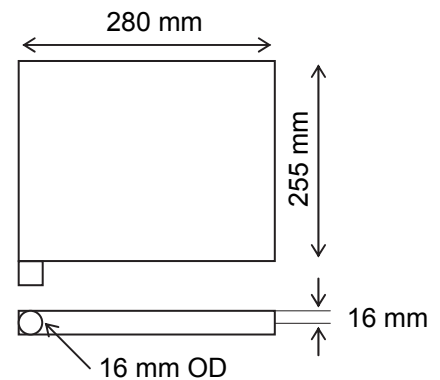


- * Cover the cleaning pan with a waste cloth to prevent wastewater from splashing around (especially the compressor and condenser fan motor).
- * The cleaning pan has a capacity of about 1 L and takes 1 minute to drain. Do not allow a large amount of water into the cleaning pan.

The cleaning pan is not provided in the unit and must be ordered by the following part numbers:

Cleaning Pan (A) 354309G01
Cleaning Pan (B) 354310G01 for connection only

Dimensions: W280 x D255 x H16 (t 0.8) mm
Drain Outlet: 16 mm OD x 14 mm ID
Drain Hose: 16 mm DIA
Capacity: 1.0 L



9. OPTIONAL PARTS

[a] HINGE KIT

The door hinges for HRE-70B and HFE-70B can be moved to the other side of the door by using the following hinge kit.

Hinge Kit (R)

Door Hinge (R) - Lo	375316G01	1 pc
Door Hinge (R) - Up	375315G01	1 pc
Door Hinge (R) - CT	375317G01	1 pc
Hinge Collar - Hinge	339948-01	2 pcs

Hinge Kit (L)

Door Hinge (L) - Lo	375319G01	1 pc
Door Hinge (L) - Up	375318G01	1 pc
Door Hinge (L) - CT	375320G01	1 pc
Hinge Collar - Hinge	339948-01	2 pcs

[b] STAINLESS STEEL INTERIOR DOOR

70 type

Door (R) - Up Assy	261805A01	1 pc
Door (R) - Lo Assy	261806A01	1 pc

120 type

Door (R) - Up Assy	261798A01	1 pc
Door (R) - Lo Assy	261799A01	1 pc
Door (L) - Up Assy	261800A01	1 pc
Door (L) - Lo Assy	261801A01	1 pc

140 type

Door (R) - Up Assy	261805A01	1 pc
Door (R) - Lo Assy	261806A01	1 pc
Door (L) - Up Assy	261807A01	1 pc
Door (L) - Lo Assy	261808A01	1 pc

180 type

Door (R) - Up Assy	261798A01	2 pcs
Door (R) - Lo Assy	261799A01	2 pcs
Door (L) - Up Assy	261800A01	1 pc
Door (L) - Lo Assy	261801A01	1 pc

[c] LEG

<u>Width</u>			<u>700/1200/1400mm</u>	<u>1800mm</u>
Leg	H=90	P00316-01	4 pcs	6 pcs
Leg	H=150	446733-01	4 pcs	6 pcs
Leg	SUS H=90	4Y2043-01	4 pcs	6 pcs
Leg	SUS H=150	4Y2041-01	4 pcs	6 pcs

[d] CASTER

<u>Width</u>			<u>700/1200/1400mm</u>	<u>1800mm</u>
Caster		P00635-01	4 pcs	6 pcs
Plain Washer		FWPL20F0	4 pcs	6 pcs
Spacer - Caster		471512M01	4 pcs	6 pcs
Spanner		471513M01	1 pc	1 pc

To adjust the height of the unit, use the spanner (accessory) to loosen the casters and insert the spacers (accessory). The unit should always be level from side to side and back to front.

All the four casters are provided with stoppers. Always lock the stoppers of the front casters when in use.

Unlock the casters to move the unit for cleaning or other purposes.

Be sure to attach the plain washers (M20) provided before fixing the casters to the cabinet. The fixing part of caster may deform without the plain washer (M20). The plain washers must be located under the spacers.

