COMMERCIAL FREEZER

HF-78MC-S-X
HF-128MC-S-X
HF-148MC-S-X
HF-188MC-S-X

SERVICE MANUAL

S179-001(081125)

CONTENTS

I. GENERAL INFORMATION

1.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.

⚠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 leak in servicing, immediately put out any fire used in the vicinity.
4)When brazing and removing the part of the refrigeration circuit, check that the refrigerant in the circuit is completely evacuated. At the same time, be sure that no flammable refrigerant exists in the welding area.
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 leak s. Leaking refrigerant may catch fire or explode when exposed to an open flame.
7)Before servicing, check the surface temperature of the refrigeration circuit to prevent a burn.
8)When maintaining the product, anti-static measures should be taken to prevent electrostatic sparks.
9)If there is a door-to-door service with refrigerant containers, the refrigerant filled in the refrigerant container should not exceed the specified value. Containers are stored in the car or on the maintenance site, to be fixed and placed vertically, while away from heat sources, fire sources, radiation sources, electrical equipment
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 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.

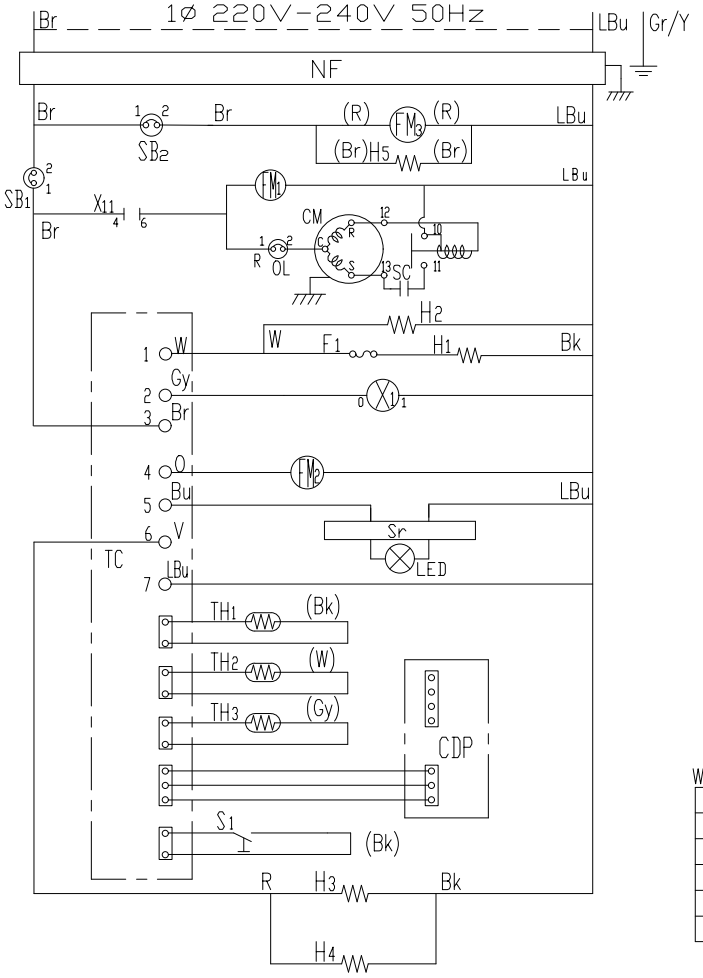
⚠CAUTION
1.After servicing, follow the instructions below:
1）Always check the unit for proper operation before finishing services.
2)Be sure to reassemble the parts completely. Loose assembly of such parts as control box cover may cause entrance of vermin resulting in a short circuit between terminals and possible ignition.

II.TECHNICAL INFORMATION

1.WIRING DIAGRAM

*Standard models: model names and model codes for representative models only.

[a] HF-78MC-S-X(Model Code:S178-W101)



CODE	NAME
SB1,2	SAFTY BREAKER
TC	TEMP CONTROLLER
CDP	CONTROLLER DISPLAY
X1	RELAY
CM	COMPRESSOR
OL	OVERLOAD PROTECTOR
SC	START CAPACTOR
FM1	FAN MOTOR(CONDENSER)
FM2	FAN MOTOR(INTERIOR)
TH1	THERMISTOR(INTERIOR/ROOM)
TH2	THERMISTOR(DEFROST/EVA)
TH3	THERMISTOR(CONDENSER)
H1	DEFROST HEATER
H2	CORD HEATER(DUCT)
H3	CORD HEATER(OUTER FRAME)
H4	CORD HEATER(PIPE)
F1	FUSE 94℃
Sr	SWITCHING REGULATOR
LED	LED LAMP
NF	NOISE FILTER
S1	DOOR SWITCH
FM3	FAN MOTOR(EVAPORATING PAN)
H5	HEATING ROD(EVAPORATING)

WIRE COLOR CODE

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

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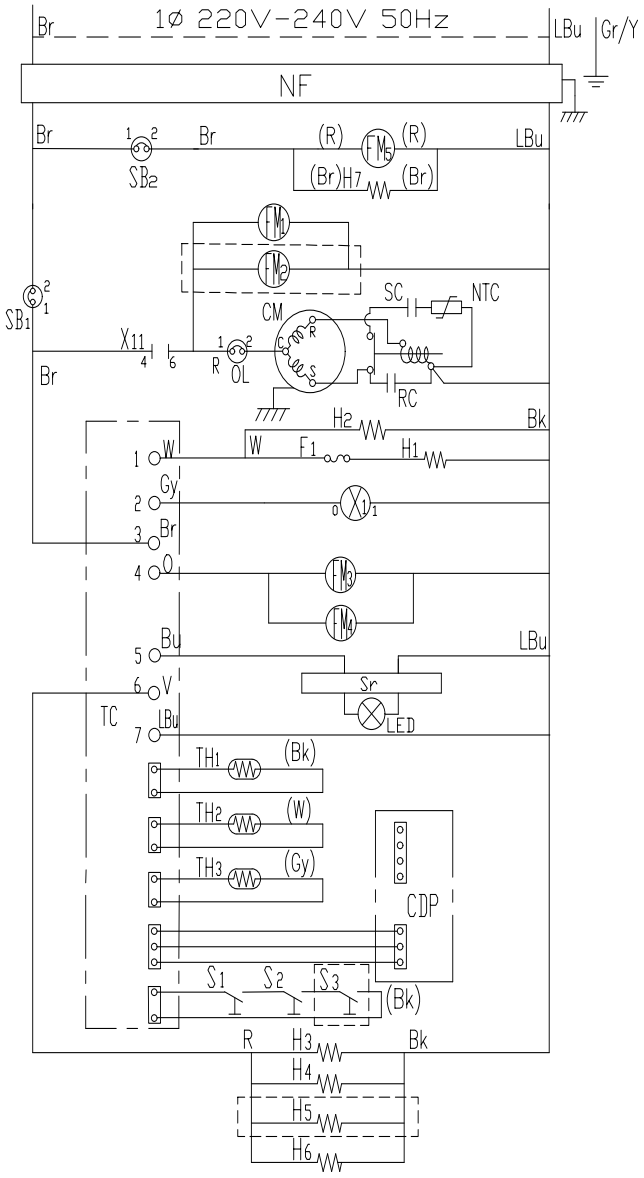
[b] HF-128MC-S-X(Model Code:S179-W101)
HF-148MC-S-X(Model Code:S180-W101)
HF-188MC-S-X(Model Code:S181-W101)



CODE	NAME
SB1,2	SAFTY BREAKER
TC	TEMP CONTROLLER
CDP	CONTROLLER DISPLAY
X1	RELAY
CM	COMPRESSOR
OL	OVERLOAD PROTECTOR
SC	START CAPACITOR
RC	RUN CAPACITOR
FM1,2	FAN MOTOR(CONDENSER)
FM3,4	FAN MOTOR(INTERIOR)
TH1	THERMISTOR(INTERIOR/ROOM)
TH2	THERMISTOR(DEFROST/EVA)
TH3	THERMISTOR(CONDENSER)
H1	DEFROST HEATER
H2	CORD HEATER(DUCT)
H3,4,5	CORD HEATER(OUTER FRAME)
H6	CORD HEATER(PIPE)
F1	FUSE 94℃
Sr	SWITCHING REGULATOR
LED	LED LAMP
NF	NOISE FILTER
S1,2,3	DOOR SWITCH
FM5	FAN MOTOR(EVAPORATING PAN)
H7	HEATING ROD(EVAPORATING)

: FOR 6 DOOR MODELS

WIRE COLOR CODE

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

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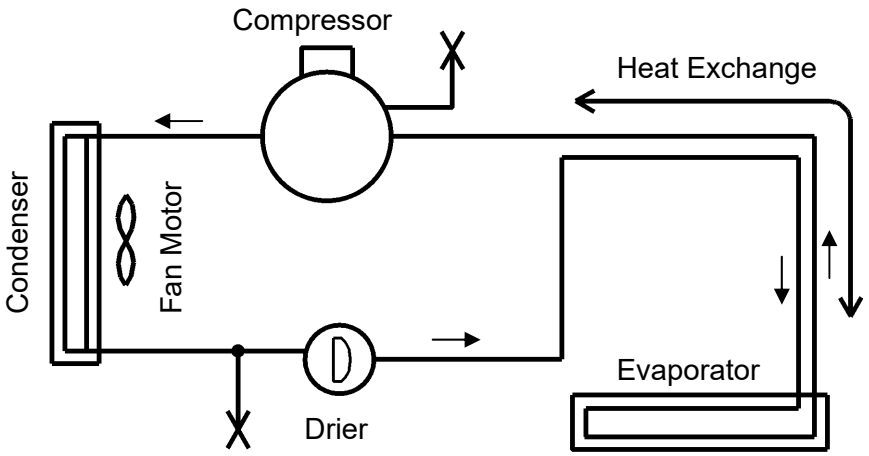
2.REFRIGERATION CIRCUIT

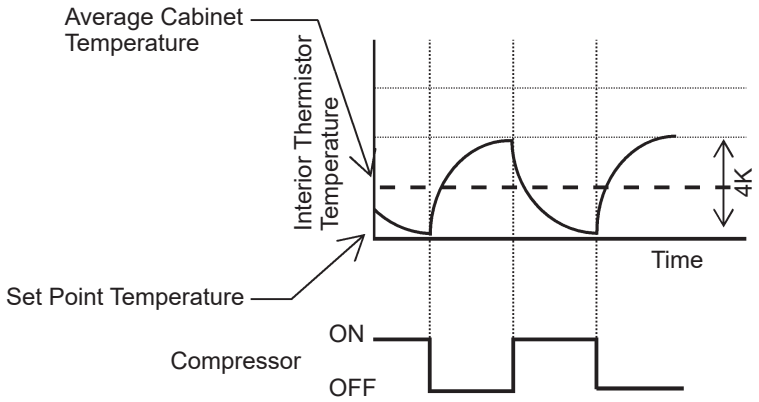


Refrigerant: R290 (HF series)

3.ELECTRONIC CONTROLS

[a] SET POINT TEMPERATURE (Compressor OFF temperature)

HF Series : -25 to -7°C



[b] CABINET TEMPERATURE DIFFERENTIAL

4 K (from “set point temp” to “set point temp + 4 K”)

The compressor stops when the cabinet temperature reaches down to the set point temperature, and starts when the cabinet temperature rises to the set point temperature + 4°C. Accordingly, the average cabinet temperature will be around the set point temperature + 2°C.

[c] DEFROST CYCLE

The unit automatically defrosts the evaporator 6 hours after the refrigeration starts. The defrost indicator light on the operation panel comes on when the defrost cycle starts.

[d] DEFROST TERMINATION TEMPERATURE

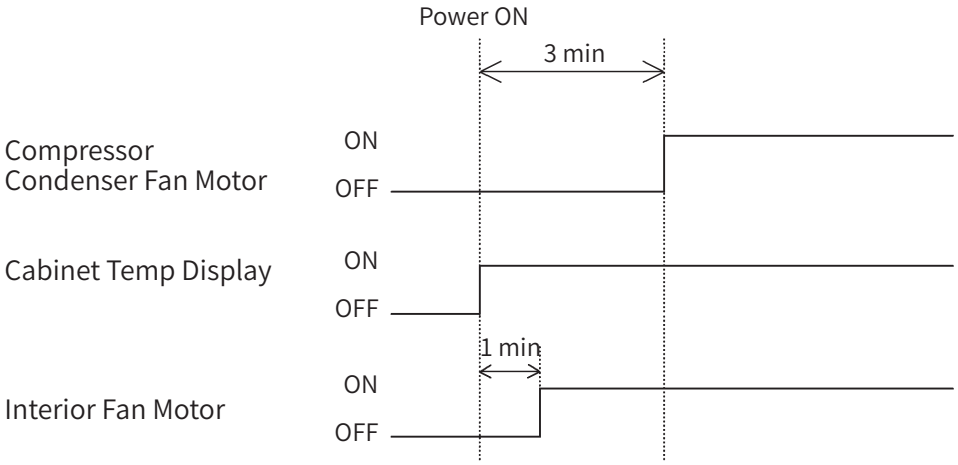
Heater defrost : +10°C

[e] TEMPERATURE DISPLAY

During a defrost cycle, the screen indicates “dEF”.

[f] COMPRESSOR SOFT START

1) Startup

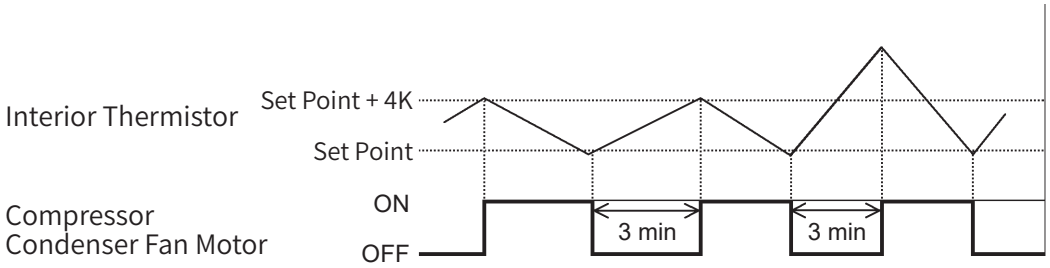


When the power supply is turned on, the screen shows the cabinet temperature and the interior fan motor starts up with a 1 minute delay. The compressor and condenser fan motor start up with a 3 minute delay.

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 3 minute delay before startup. For example, if the compressor turns off by cabinet 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 3 minutes have passed since its shutdown.



[g] CHECKING SET POINT TEMPERATURE

Note
See “5. CONTROLLER” for the operation panel key locations.

Press and hold the set key on the operation panel for 3 seconds to display “St” on the screen. Press the set key again to display the set point temperature on the screen. After 30 seconds, the screen displays the cabinet temperature again.

[h] MANUAL DEFROST

To start the manual defrost cycle, press the defrost/rest key for 3 seconds. The defrost indicator light on the operation panel comes on when the defrost cycle starts.

[i] ANTI-CONDENSATION MODE SETTING

To modify the anti-condensation mode, hold down the setting key for 3 seconds, and the password value will be displayed. After entering the password “55”, press the setting key to display Fg1, and then press the setting key once again, and the value will be displayed as 3. At this time, adjust the value to 2 by pressing the up or down keys. After the setting is completed, press the enter key then exit from parameter mode.

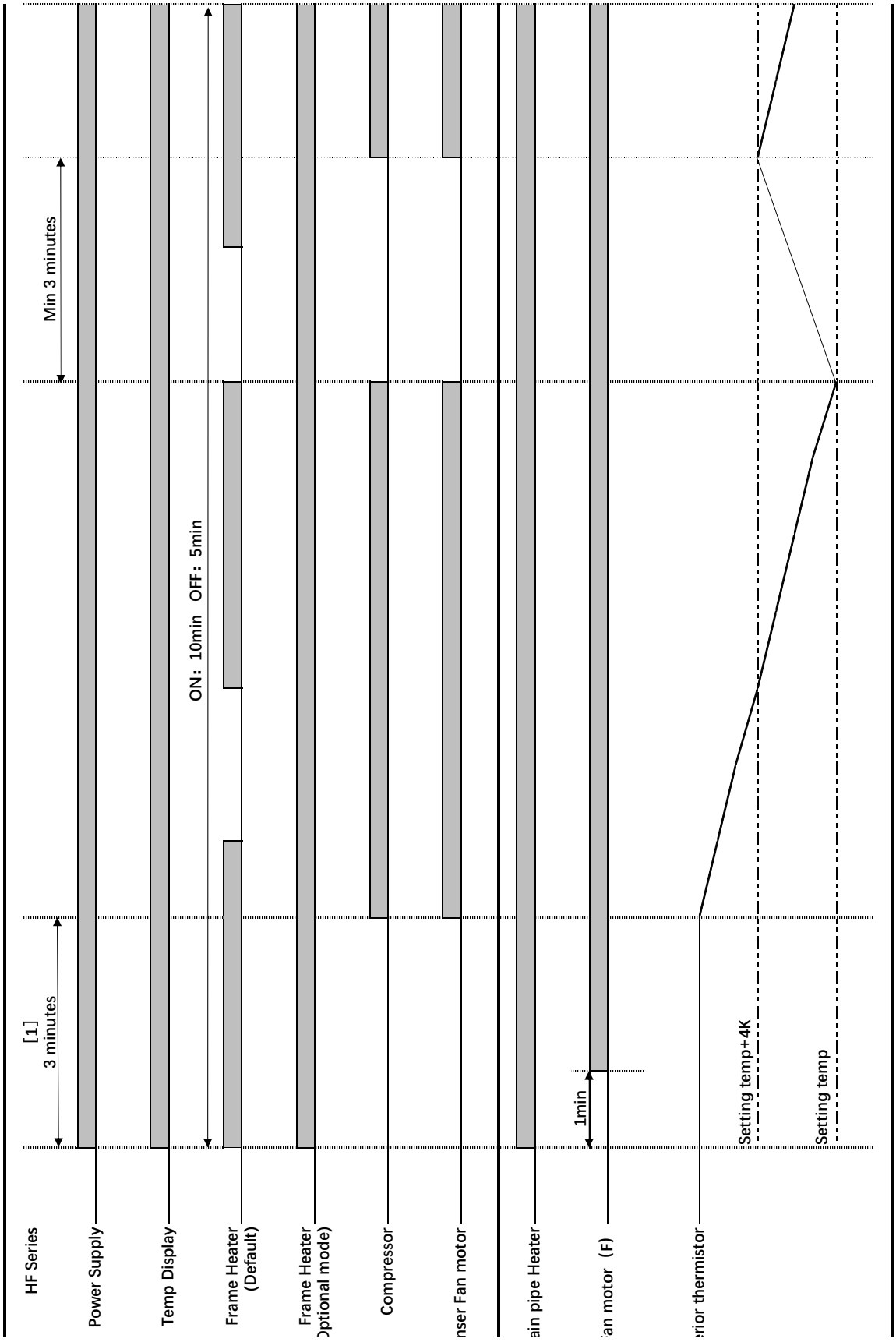
[j] ERROR CODES

Code	Possible Cause	Operation and Remedy
E1	Cabinet sensor (interior thermistor) error	Compressor cycles on for 45 minutes and off for 15 minutes. Check cabinet temperature. See “III. 1. ERROR CODES” for further details.
E2	Evaporator sensor (defrost thermistor) error	Defrost termination temperature is invalid. Press any key to stop beep. See “III. 1. ERROR CODES” for further details.
E3	Condenser sensor (defrost thermistor) error	See “III. 1. ERROR CODES” for further details.
cH	Condenser high temperature alarm	When the condenser temperature is too high, the temperature will fall down and the alarm will be released. See “III. 1. ERROR CODES” for further details.

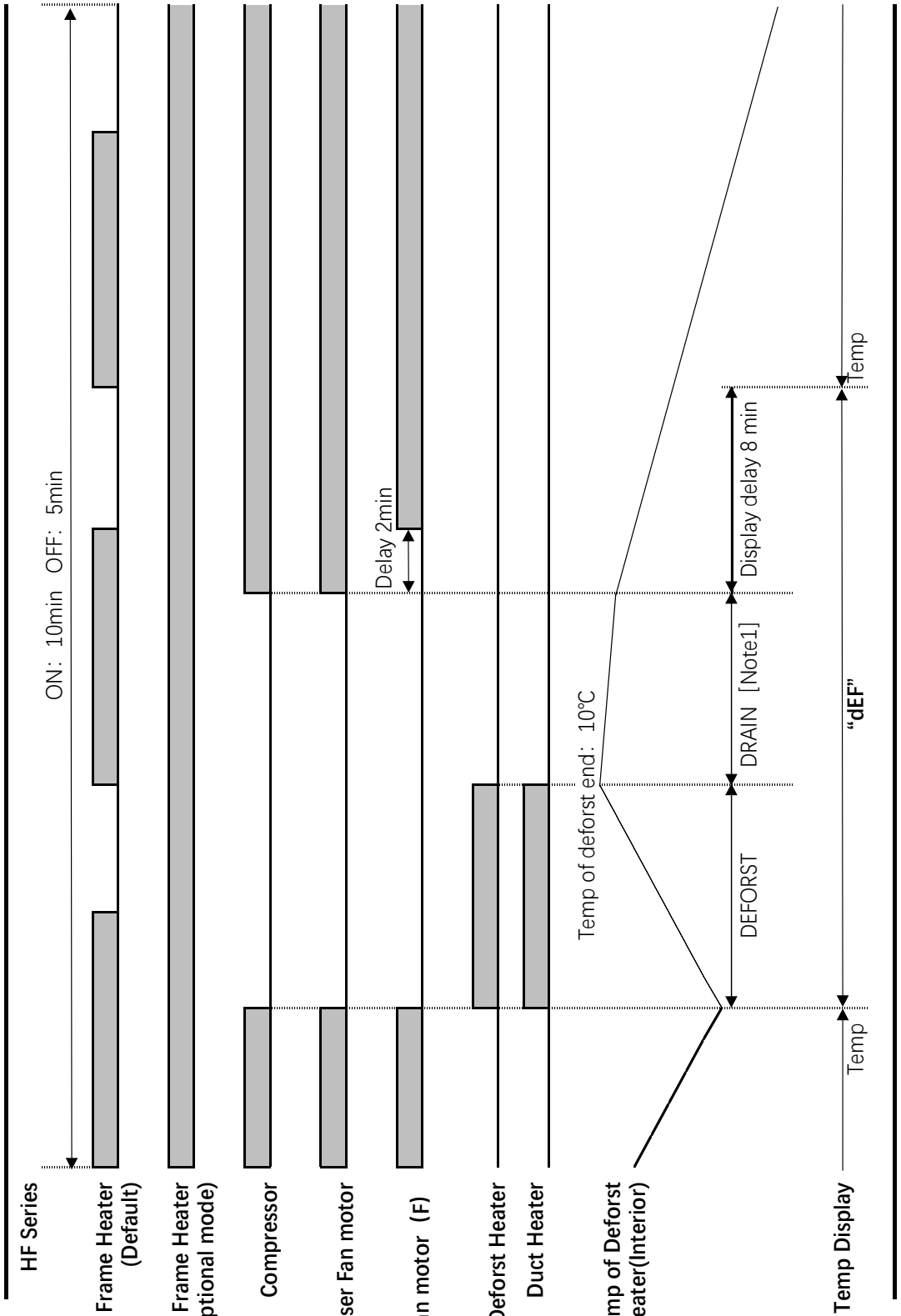
*The code “dEF” is not an error code but indicates the unit is in defrost cycle.

4.TIMING CHART

[a] STARTUP - CONTROL



[b] DEFROST



Note1: HF Series drain time is 10 min.

5.CONTROLLER

Operation Panel

[1] Power switch key

[2] Led switch key

[3] Defrost switch key

[4] Setting key

[5] Enter key

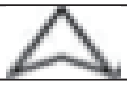
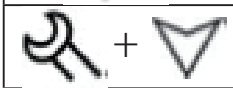
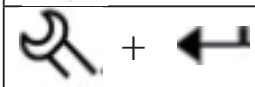
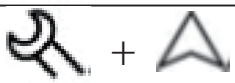
[6] Down Key

[7] Up Key

Indicator light status description

Indicator light	Symbol	Status	Meaning
Setting		ON	Parameter setting
		OFF	Measurement and control status
Refrigeration		ON	Refrigeration work
		OFF	Refrigeration stops
		FLASH	Refrigeration delay
Defrost		ON	Defrost work
		OFF	Defrost stop
Fan		ON	Fan work
		OFF	Fan stop
Defrost dripping		ON	Defrost drip work
		OFF	Defrost drip stops
Anti-condensation		ON	Anti-condensation work
		OFF	Anti-condensation stops
Door signal		ON	Door switch open
		OFF	Door switch is closed

Keys Function and setting mode

Keys	Keys	Key action
	Enter measurement and control mode, digital display shows normal measurement and control values	Press down and hold for 3 seconds
	Exit measurement and control mode, digital display shows “oFF”	Press down and hold for 3 seconds
	Enter the status of parameter setting	Press down and hold for 3 seconds
	Switch between menu and parameter	Press down and response
	View evaporator sensor temperature	Press down and response
	Press 3s to forced switch between refrigeration, defrost/defrost delay, defrost dripping	Press down and hold for 3 seconds
	Save the data and exit the parameter setting state	Press down and response
	Adjust menu and parameters	Press down and response
	Adjust menu and parameters	Press down and response
	Turn on/off Anti-condensation	Press down and response
	Open/close light	Press down and response
	Enter maintenance mode	Press the combination key and hold it down for 3 seconds
	Force start refrigeration	Press the combination key and hold it down for 3 seconds
	Enter network setup (built-in WIFI module)	Press the combination key and hold it down for 3 seconds

Parameters

Menu	Functions	Setting range	Setting	Unit
/	Parameter Group	H1~H12	H7 (HF setting code)	/
Common user menu				
St	Temperature set value	Upper limit~Lower limit	-20	°C/°F
Fg1	Anti-condensation (door frame heating) method	0: Manual 1: Start and stop with refrigeration. 2: Anti-condensation runs continuously. 3: Anti-condensation cycle control, stop Fg2time, run Fg3 time	3	/
Po	Menu password	Common user menu password	55	/
		Manager menu password	125	/
Manager Menu				
C1	Hysteresis value	0.5°C~9.0°C 1°F~20°F	4°C	°C/°F
C2	Compressor start Min. interval	0~60	3	min
C3	Compressor initial start Min. interval	0~90	3	min
C4	Cabinet sensor calibration	-10.0°C~10.0°C -20°F~20°F	0.5°C	°C/°F
C5	Temperature set lower limit	-50°C~ temperature set value -58°C~ temperature set value	-25°C	°C/°F
C6	Temperature set upper limit	temperature set value~99°C temperature set value~210°F	-7°C	°C/°F
C7	Max. standby time after finishing compressor start Min. interval	0~90 0: Max. standby time calculation is forbidden	0	min
C8	Refrigeration Min. running time	0~90 0:Refrigeration Min. running time calculation is forbidden	0	min
C9	compressor start-up time	0~90 0:Disable the force start feature	0	min
d1	Evaporator sensor selection	0:Disabled 1:Enabled	1	/
d2	Evaporator sensor-calibration	-10.0°C~10.0°C -20°C~120°C	0.0°C	°C
d3	Defrost cycle calculation	0:Accumulated refrigeration time 1:Natural time	1	/
d4	Defrost cycle	0~90 0:Defrost forbidden	6	hour
d5	Defrosting process display	1:Display dEF during defrost and defrost time delay, display cabinet temperature after finishing defrost time delay 2:When defrosting, the cabinet temperatureis displayed when the defrost is started, and the cabinet temperature is displayed with a delay D9 after the defrost drip is turned on. 3: Display the temperature setting value during defrosting, and delay D9 to display the cabinet temperature after the defrost drip is turned on. 4:dEF is displayed when defrosting, and the cabinet temperature is displayed after the cabinet temperature ≤ the temperature setting value after the defrost drip is turned on. 5:When defrosting, the cabinet temperature is displayed when the defrost is started, and the cabinet temperature is displayed after the defrost drip is turned on when the cabinet temperature ≤ the temperature setting value. 6: The temperature setting value is displayed when defrosting, and the cabinet temperature is displayed when the cabinet temperature is ≤ the temperature setting after the defrost drip is turned on.	1	/
d6	The maximum time of defrost	1~90	60	min

Menu	Functions	Setting range	Setting	Unit
d7	Defrost termination temperature	0°C~50°C 32°F~122°F	10°C	°C/°F
d8	Dripping time after defrost	0~60 0:Defrost dripping time forbidden	10	min
d9	Cabinet temperature display time delay after defrost	0~90	18	min
d10	Time delay after defrost start	0~60 0:Defrost start time delay is canceled	0	min
d11	Defrost type	0:Electric heating defrost 1:Hot gas defrost	0	/
d12	Heating wire opening time in advance during defrosting	0~30 0:Turn off the heating wire when defrosting and turn on time earlier	0	min
F1	Fan running mode	0:Fan and compressor run or stop synchronically 1:Fan runs continuously, stops during defrost 2:Fan runs continuously, stops during defrost and defrost dripping 3:Fan runs continuously, stops during defrost, fan time delay after defrost 4:Controlled by defrost sensor, fan stops during defrost 5:Continuous fan operation. 6:Fan operation by timer during compressor stop. 7:Start and stop with refrigeration, and the fan runs when defrosting. 8:In the refrigeration cycle stage, the fan also works when the compressor is working, and the fan runs according to the working F6 time when the compressor is stopped, and the F7 time stops the cycle. 9: In the refrigeration cycle stage, the fan also works when the compressor is working, the fan runs according to the working F6 time when the compressor is stopped, the F7 time stops the cycle, the defrost stops, and the defrost is delayed.	3	/
F2	Fan initial start time delay after electrified	0~60	1	min
F3	Fan start time delay after defrost	0~60 0:Fan time delay canceled	12	min
F4	Fan working lowest temp	-50°C~Fan working highest temp -58°F~Fan working highest temp	-50	°C/°F
F5	Fan working highest temp	Fan working highest temp~99°C Fan working highest temp~210°F	85	°C/°F
F6	The operating time of the fan during the refrigeration cycle	1-300	135	sec
F7	The length of time the fan is shut down during the refrigeration cycle	1-300	75	sec
A1	Compressor run and stop in a proportional time after cabinet sensor failure	0: Cancel the mode of “Run/stop in a proportional time” 1: Start the mode of “Run/stop in a proportional time”	1	/
A2	Compressor stop time in the mode of “Run/stop in a proportional time”	1~60	15	min
A3	Compressor running time in the mode of “Run/stop in a proportional time”	1~60	45	min
A4	Buzzer alarm output switch	0:Buzzer output disabled 1:Buzzer output enabled	0	/

Menu	Functions	Setting range	Setting	Unit
A5	Alarm beep code delay output.	0-30	0	min
A6	Cabinet temperature lower limit alarm value	-50°C~Cabinet temperature upper limit alarm value -58°C~ Cabinet temperature upper limit alarm value	-50°C	°C/°F
A7	Cabinet temperature upper limit alarm value	Cabinet temperature lower limit alarm value~99°C Cabinet temperature lower limit alarm value~210°C	85°C	°C/°F
A8	Cabinet over temperature alarm time delay	0~60	5	min
A9	The initial cabinet over temperature alarm time delay after electrified	0~60	20	min
A10	Over temperature alarm upper deviation	1°C~30°C 1°F~60°F	10°C	°C/°F
A11	Over temperature alarm lower deviation	1°C~30°C 1°F~60°F	5°C	°C/°F
A12	Over temperature alarm mode	0:Absolute temperature point 1:set value+ over temperature alarm deviation	0	/
A13	Light/Alarm relay selection	0: Light output 1: Alarm output	0	/
do1	Control output of door switch	0:Door switch is canceled 1: Close fan during door open 2:Turn on the light when door open, turn off the light when door closed 3:Close fan and turn on the light when door open, Turn off the light when door closed 4:When door is open, it is the synchronous signal input of defrost, defrost will start	1	/
do2	Buzzer response when door open	0:NO 1:YES	0	/
do3	Door switch signal polarity	0:Closed is closed 1:Close as a door opens	1	/
Fg2	Automatic defogging off time	1~240	5	min
Fg3	Automatic defogging on time	1~240	10	min
cd1	Condenser sensor selection	0:Disabled 1:Enabled	1	/
cd2	Condenser high temperature alarm start value	30°C~99°C 86~210°F	55	°C/°F
cd3	Lower hysteresis of condenser high temperature alarm	1°C~15°C 2°F~30°F	5	°C/°F
cd4	The condenser protects the start-up value at high temperatures	30°C~ 99°C	60	°C/°F
cd5	Condenser cleaning reminder time	0~365 0: Disable condenser cleaning reminder function	0	Day
cd6	Condenser high temperature alarm delay	0~60	0	min
cd7	Condenser high temperature protection delay	0~60	0	min

Menu	Functions	Setting range	Setting	Unit
adr	Controller address	01~99	01	/
HC	Cooling/heating mode conversion	0: Cooling	0	/
		1: heating		
u0	Display type in Celsius state	0: Decimal display of temperature values	0	/
		1:Integer display of temperature values		
u1	Fahrenheit/Celsius selection	0: Fahrenheit	1	/
		1: Celsius		
u2	Temperature smoothing display mode	0: Turn off smooth display	0	/
		1:0-20[x represents 0.x units per data update]		
		2:0-20[Display x minute temperature sampling average]		
u3	Temperature smoothed display	u2=1:0-20[x represents 0.x units per data update]	1	/
		u2=2:0-20[Display x minute temperature sampling average]		
u4	Output function selection	0:Compressor, defrost, fan, light, demist, second compressor	0	/
		1: Compressors, defrosters, fans, lights, defogging,heating elements		
Fid	Model code	00~65535	0	/

Keys operation

1)View and modify the cabinet temperature setting

[a]While in the measuring and controlling state, press the key and release it. The setting indicator light will light up and display the temperature set value of the cabinet, entering the cabinet temperature viewing/modification state.

[b]If you press the key, or there is no button operation for 30s, the current cabinet temperature setting value will be automatically saved and exit the cabinet temperature viewing/modification state.

2)Parameter settings

[a]While in the measuring and controlling state, press and hold the key for 3s to display the password “00”.(After pressing the key continuously for 2s, the code “Po” will be displayed for 1 second. After the display disappears, you can release the key.) The setting indicator light will light up, displaying the password “00”(Which is the administrator menu password. To access the administrator menu, you must enter the correct password).

[b]After displaying “00”, you can enter the administrator menu password “55” through the or keys. After entering the password, press the key (to confirm that the password input is completed). The controller will automatically verify the correctness of the password. If the password is correct, it will directly enter the administrator menu and display the “Fg1” parameter. If the password is entered incorrectly, the controller displays “Er” and returns to the measuring and controlling state.

[c]After displaying “00”, you can enter password 125 by pressing the or key. Pressing the key will display the c1 parameter. At this time, you can select the “c1, c2,... Po” parameter items by pressing the or key (menu items are displayed in a loop), and view and modify all parameters.

[d]After selecting a menu item, press the key to enter the current menu item parameter value setting. Use the or keys to adjust the parameter value, and then press the key to return to the menu selection.

[e]Under the status of parameter setting, press key or no key operation within 30s, it will exit from parameter setting and automatically save the current parameter value.

Note
1. The administrator menu password can be set through the “Po” parameter in the menu.
2.The administrator menu password input is valid for a single use. If there is no button operation within 30s or the key is pressed to exit the parameter setting, you will need to enter the correct password again the next time you adjust the settings.

3)Parameter restoration (Model Selection)

In the measurement and control state, after pressing the key 10S, the digital tube displays H0 and enters the one-key restore operation. You can continue to press the key to select the recovered parameter catalog item, select the range H0~Hl2, press to execute the parameter restore judgment and exit, if the restore confirmation is not performed within 30S, the controller will automatically exit the mode and do not perform parameter recovery.

Note
During this operation, it is necessary to ensure that the power supply of the controller is stable, and if the power supply abnormality occurs during operation, the operation needs to be performed again after the controller is stably powered on.

4) Defrosting sensor temperature check

While in measuring and controlling mode, pressing the key can display the current measurement value of the defrosting sensor temperature.

5) Manual forced operation

a) In measuring and controlling mode, press and hold the key for 3 seconds to force switch between refrigeration, defrost/defrost delay, and defrost water dripping status.

b) In the measuring and controlling mode, pressing the key can turn the lighting on or off.

c) In the measuring and controlling mode, pressing the key can turn the anti-condensation on or off.

6) Power switch

a) When the temperature controller is in measuring mode, press and hold the key for 3s, the controller will shut down, stop all output, and the digital display will show “oFF”.

b) When the temperature controller is turned off, press and hold the key for 3s, the controller will restart.

c) The device can remember the power on/off state.

7)Maintenance mode

In the measuring mode, press and hold the + key for 3s to enter the maintenance mode, and the screen will display 200(indicating the LTW-200pro model).

a) In maintenance mode, press the or key to view the product model, currently using parameter groups (Hl~H12), cabinet temperature sensor temperature, evaporator temperature sensor temperature, and condenser temperature sensor temperature. When viewing the cabinet temperature sensor temperature, the cooling symbol will light up and display the temperature on the screen; when viewing the evaporator temperature sensor temperature, the defrosting symbol “ “ will light up and display the temperature on the screen; when viewing the condenser temperature sensor temperature, only the condenser temperature will be displayed on the screen and no symbol will light up. If the evaporator

temperature sensor or the condenser temperature sensor is not enabled, “--” will be displayed on the screen. If there is a sensor malfunction, the corresponding fault code will be displayed (the cabinet temperature sensor corresponds to El, the evaporator temperature sensor corresponds to E2, and the condenser temperature sensor corresponds to E3).

b) In maintenance mode, press and hold the key for 3s to enter the display self-check mode, and the digits on the display will light up one by one. After the self-check is completed, it will return to maintenance mode automatically

c) In the display self-check mode, the buzzer will also be checked, and it will sound continuously. When the display self-check is finished, the buzzer will stop.

d) In maintenance mode, if you press the key or there is no operation within 30s, the system will exit maintenance mode and return to control status.

8) Internal Wi-Fi configuration operation (using optional internal Wi-Fi module)

By holding down the + key for more than Is, the controller enters the networking state and displays “con”. At this time, Wi-Fi can be reconfigured (used to reconnect to a Wi-Fi hotspot). The specific steps of configuring Wi-Fi are as follows:

Open the “Jing chuang Cold Cloud” app. Click on the “+” icon in the upper right corner to scan the QR code (note 2). Enter your Wi-Fi password and click “Start” to initiate the configuration for the device. The app will display a message “WiFi configuration successful”, click “OK” to begin adding the device. Enter a name for the device and click “OK” to confirm the addition. Once the device is added, you can view its working status and set parameters through the app.

Note
1.This device does not support the 5G frequency band.
2.LTW-200pro QR code for network configuration scanning as shown below:

9) Control output

9.1 Compressor (HC=0)

1) Forced start

In the measuring and controlling state, when the unit is not in the refrigeration or defrosting mode, press and hold the + button for 3S to force start the refrigeration mode. Repeat the operation to exit the forced mode.

During the forced start period, the defrosting mode will not be activated, and forced defrosting is invalid.

9.2 Internal Alarm

1) Temperature sensor failure alarm

When the cabinet sensor fails, the digital tube displays E1; When evaporator sensor fails,

the digital tube displays E2; When the condenser sensor fails, the digital tube displays E3.

2) Condenser high temperature alarm

High temperature alarm: when the condenser temperature > the condenser high temperature alarm start value (HF:55°C;), the condenser high temperature alarm is issued after a fixed delay of 60S, and the digital tube shows “cH” without affecting the control output.

Release alarm: When the condenser temperature < condenser high temperature alarm start value (HF:55°C) - condenser high temperature alarm lower differential (5°C), release the alarm.

High temperature protection: when the condenser temperature > the condenser high temperature alarm protection value (HF:60°C), the condenser high temperature alarm is issued after a fixed delay of 60S, and the digital tube displays “cH”, and all outputs are turned off at the same time.

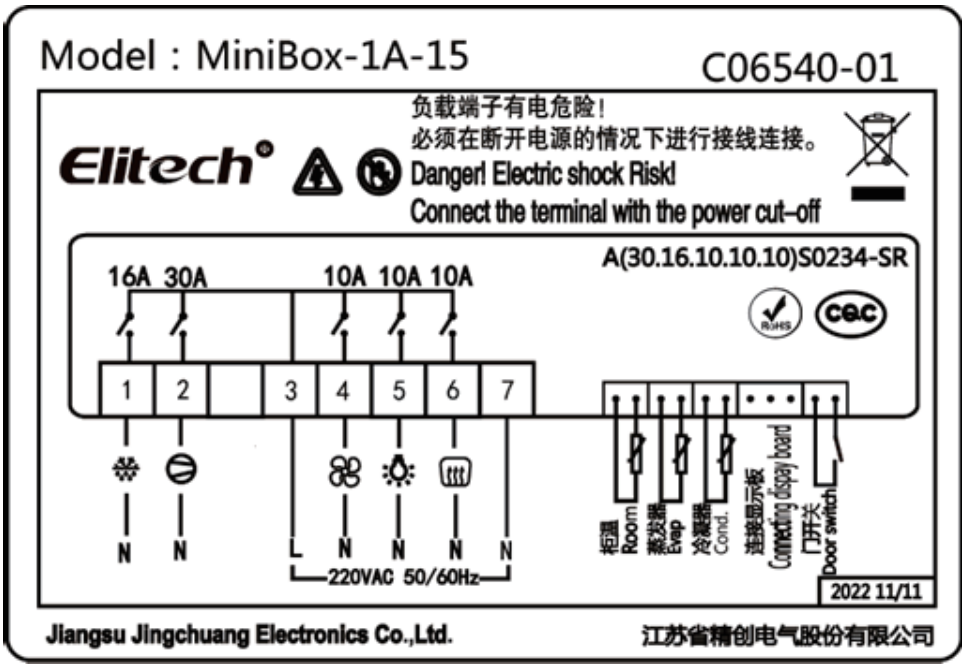
Release protection: When the condenser temperature < condenser high temperature alarm start value (cd2) - condenser high temperature alarm lower differential (cd3), the protection is released after a fixed delay of 60S.

Note
When the beep output switch is selected as Off, the buzzer is always off.

Alarm codes and their explanations

Alarm code	The alarm reason
E1	Cabinet sensor failure
E2	Evaporator sensor failure
E3	Condenser sensor failure
cH	Condenser high temperature alarm
dEF	Defrost running
---	Main board communication failure
oFF	After the controller is shut down by pressing the power button, the code is displayed
Err	Copy card programming error

10) Wiring diagram

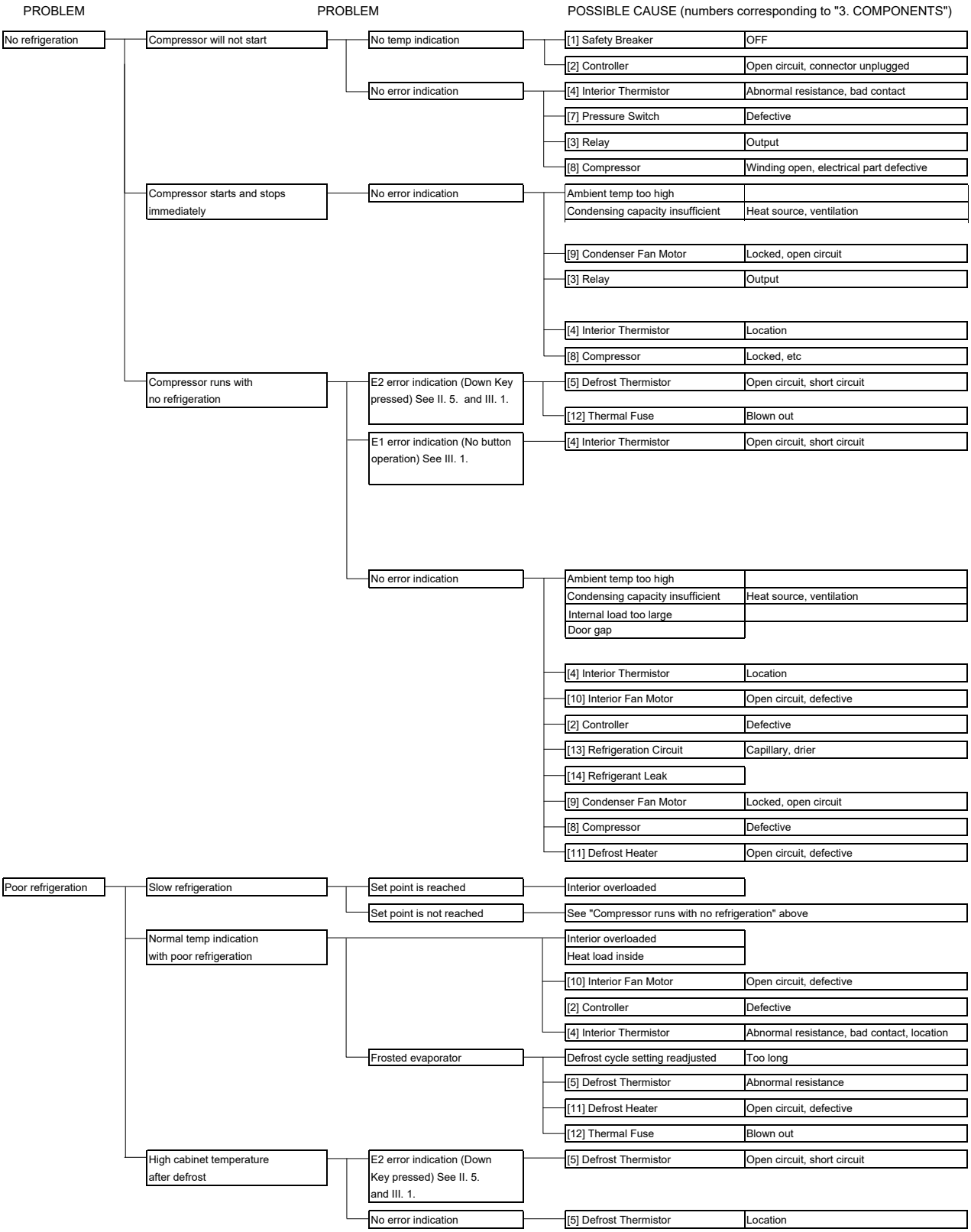


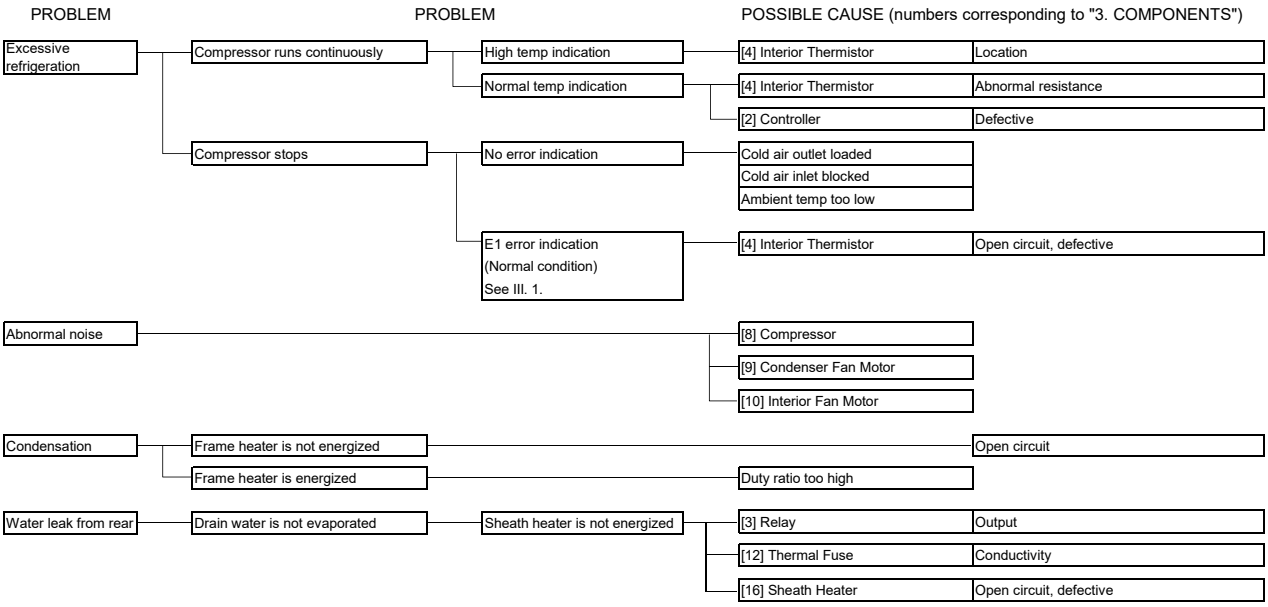
III. SERVICE DIAGNOSIS

1.ERROR CODES

Display	Error	Possible Cause	Reset
E1	Interior thermistor defective	Interior thermistor circuit shorted, dusty connector	Automatically resets after cause is removed
E2	Defrost thermistor defective	Defrost thermistor circuit shorted, dusty connector	Automatically resets after cause is removed
E3	Condenser thermistor defective	Condenser thermistor circuit shorted, dusty connector	Automatically resets after cause is removed
cH	Condenser high temperature alarm defective	Dusty Condenser filter	Automatically resets after cause is removed

2.FLOW CHART


PROBLEM
PROBLEM
POSSIBLE CAUSE (numbers corresponding to "3. COMPONENTS")
No refrigeration
Compressor will not start
No temp indication
[1] Safety Breaker
OFF
[2] Controller
Open circuit, connector unplugged
No error indication
[4] Interior Thermistor
Abnormal resistance, bad contact
[7] Pressure Switch
Defective
[3] Relay
Output
[8] Compressor
Winding open, electrical part defective
Compressor starts and stops immediately
No error indication
Ambient temp too high
Condensing capacity insufficient
Heat source, ventilation
[9] Condenser Fan Motor
Locked, open circuit
[3] Relay
Output
[4] Interior Thermistor
Location
[8] Compressor
Locked, etc
Compressor runs with no refrigeration
E2 error indication (Down Key pressed) See II. 5. and III. 1.
[5] Defrost Thermistor
Open circuit, short circuit
[12] Thermal Fuse
Blown out
E1 error indication (No button operation) See III. 1.
[4] Interior Thermistor
Open circuit, short circuit
No error indication
Ambient temp too high
Condensing capacity insufficient
Heat source, ventilation
Internal load too large
Door gap
[4] Interior Thermistor
Location
[10] Interior Fan Motor
Open circuit, defective
[2] Controller
Defective
[13] Refrigeration Circuit
Capillary, drier
[14] Refrigerant Leak
[9] Condenser Fan Motor
Locked, open circuit
[8] Compressor
Defective
[11] Defrost Heater
Open circuit, defective
Poor refrigeration
Slow refrigeration
Set point is reached
Interior overloaded
Set point is not reached
See "Compressor runs with no refrigeration" above
Normal temp indication with poor refrigeration
Interior overloaded
Heat load inside
[10] Interior Fan Motor
Open circuit, defective
[2] Controller
Defective
[4] Interior Thermistor
Abnormal resistance, bad contact, location
Frosted evaporator
Defrost cycle setting readjusted
Too long
[5] Defrost Thermistor
Abnormal resistance
[11] Defrost Heater
Open circuit, defective
[12] Thermal Fuse
Blown out
High cabinet temperature after defrost
E2 error indication (Down Key pressed) See II. 5. and III. 1.
[5] Defrost Thermistor
Open circuit, short circuit
No error indication
[5] Defrost Thermistor
Location



3.COMPONENTS

CHART NO.	COMPONENT	CHECK	REMEDY
[1]	Safety Breaker	Safety breaker trips	Locate earth leakage/short circuit
		Safety breaker splashed with water	Dry and replace if necessary
[2]	Controller	Open circuit	Correct or replace
		Input/output (interior fan motor)	Replace
		See wiring label	
		Connector disconnected	Correct
		Connector dusty/dirty	Remove
		7 segment display partially/totally off	Replace
		Electronic parts defective/burnt out	
[3]	Relay	Fast-on terminal/pin disconnected	Correct
		Connector dusty/dirty	Remove
		Open circuit	Correct
		Output to each load	Replace
		Check with wiring diagram/timing chart	
		Abnormal noise	
[4]	Interior Thermistor	Location (holder in front of evaporator)	Correct
		Disconnected, replaced with defrost thermistor, etc	
		Incorrect temp indication	Immerse in ice water to check resistance
			(25 - 30k) Replace if necessary
		Short circuit (temp displayed as "E1")	Clean/dry connector
			Replace
		Open circuit (temp displayed as "E1")	Replace
[5]	Defrost Thermistor	Location (plug in from evaporator back)	Correct
		Disconnected, replaced with interior thermistor, etc	
		Abnormal resistance	Immerse in ice water to check resistance
			(25 - 30k) Replace if necessary
		Short circuit (temp displayed as "E2")	Clean/dry connector
			Replace
		Open circuit (temp displayed as "E2")	Replace

[6]	Condenser Thermistor	Location (plug in from evaporator back)	Correct
		Disconnected, replaced with interior thermistor, etc	
		Abnormal resistance	Immerse in ice water to check resistance
			(25 - 30k) Replace if necessary
		Short circuit (temp displayed as "E3")	Clean/dry connector
			Replace
		Open circuit (temp displayed as "E3")	Replace
[8]	Compressor	Abnormal noise	Replace
		Insufficient compression (discharge temp too low)	Replace if no gas leaks
		Compressor electrical part defective	Replace
		- Run/start capacitor ruptured/deformed	
		- Capacitor defective	
		Check resistance between terminals	
		Gradually reduces: No problem	
		0 from start: Defective	
		- Starter defective	
		Loose terminal, no conductivity, damaged	
		- Overload relay defective	
		Loose terminal, no conductivity, damaged	
[9]	Condenser Fan Motor	Open circuit	Correct
		Locked (not rotating with voltage)	Replace
		Abnormal noise	
		Burning smel ｌ	
[10]	Interior Fan Motor	Open circuit	Correct
		Locked (not rotating with voltage)	Replace
		Abnormal noise	
		Burning smel ｌ	
[11]	Defrost Heater	Open circuit	Correct
		Conductivity	
		Insulation resistance 1MΩ or more at 500V	Replace
[12]	Thermal Fuse	Conductivity	Replace
		Contact welding of relay	Replace relay
[13]	Refrigeration Circuit	Discharge pressure: High	Replace capillary/expansion valve
	Clogged	Suction pressure: Low (vacuum)	(Replace drier at same time)
[14]	Refrigerant Leak	Discharge pressure: Low	Locate leakage and replace
		Suction pressure: Low	(Replace drier at same time)
		Compressor discharge pipe will not heat up	
		Compressor suction pipe will not cool down	
[16]	Sheath Heater	Open circuit	Correct
		Conductivity	Replace
		Insulation resistance 1MΩ or more at 500V	Replace

4.CONTROLLER

[a] SERVICING CONTROLLER

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:

* Check that the unit has been earthed properly. If not, the controller will not work properly.

* To get static free, always touch the cabinet (earth) before servicing. Electrostatic discharge will cause severe damage to the controller.

* The controller and thermistor can be replaced separately.

* Do not drop the controller on the floor.

* The thermistor and pressure switch wires have a thin coating and are potentially breakable. Do not tense the wires.

* The connectors must not be subjected to tension to prevent disconnecting or breakage. After servicing the controller, check the controller is connected.

* The thermistor is provided with Single core cable. Do not bend or stretch.

* Do not pinch or weigh down the thermistor and thermistor wires. If done, the coatings may be broken, resulting in a short circuit.

[b] CHECKING THERMISTOR

1)Remove the thermistor from the controller.

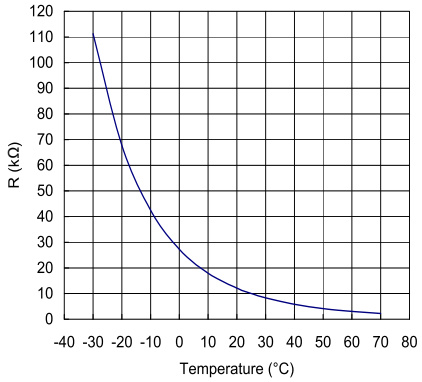
2)Put ice and water in a glass or other container to make 0° C water. Immerse the thermistor bulb in the water for 5 minutes (at the center of the container).

3)Use the Ω range of the tester to measure the resistance between the thermistors.

4)If the measured resistance is not within 25 - 30 kΩ (standard 27 kΩ), replace the thermistor (see the T-R curve below).

T-R Curve (Interior/Defrost Thermistor)

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



IV. REMOVAL AND REPLACEMENT OF COMPONENTS

1. CONTROLLER AND THERMISTOR

[a] CONTROLLER

1) Unplug the unit.

2) Remove the two screws at both sides to take off the control box cover.

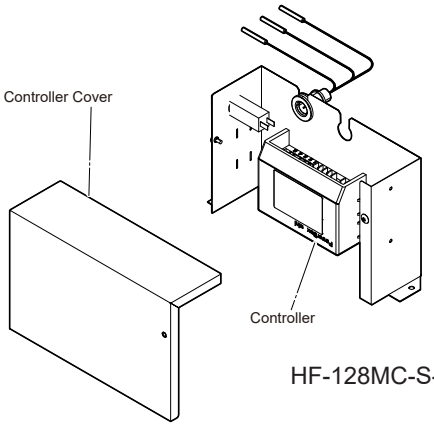
3) Use a precision screwdriver to remove the wiring cover and wiring.

4) Push the stoppers at both sides of the controller and slide off the stoppers to the rear.

5) Remove the controller to the front.

6) To replace the removed parts, reverse the above procedure.

7) Check that the operation panel is securely mounted.



HF-128MC-S-X

[b] DISPLAY BOARD

1) Unplug the power plug of the machine.

2) Remove the screws between the front frame and the fixed bracket, and then open the front frame.

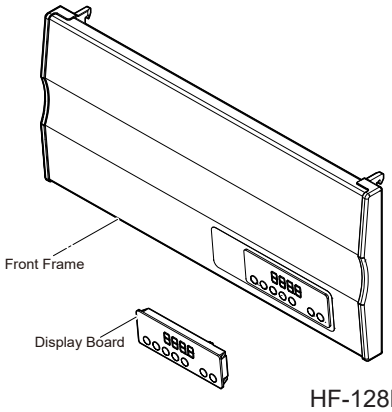
3) Unplug the connection cable between the monitor and the control board.

4) Remove the front frame

5) Press out the four stands of the monitor from the back of the front frame.

6) When reassembling the removed parts, the sequence should be the opposite of the above steps.

7) Check whether the operation panel is installed firmly.



HF-128MC-S-X

[c] THERMISTOR

1)Remove the air duct inside the cabinet. See “3. [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.

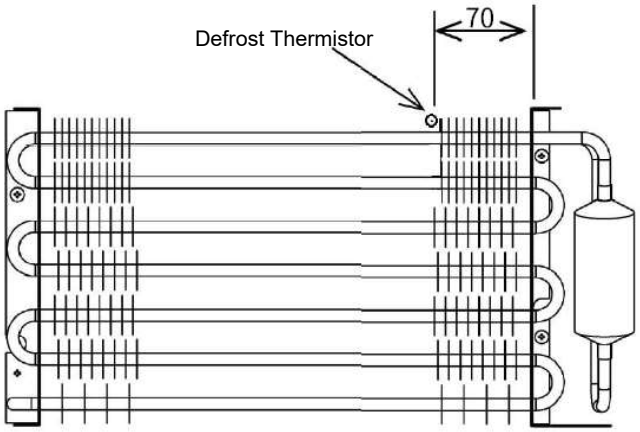
3)Remove the defrost thermistor bulb inside the evaporator fins by pinching off the thermistor holder.

4)Pull out the thermistors through the hole in the refrigeration unit base. Be careful not to press hard on the bulbs and leads.

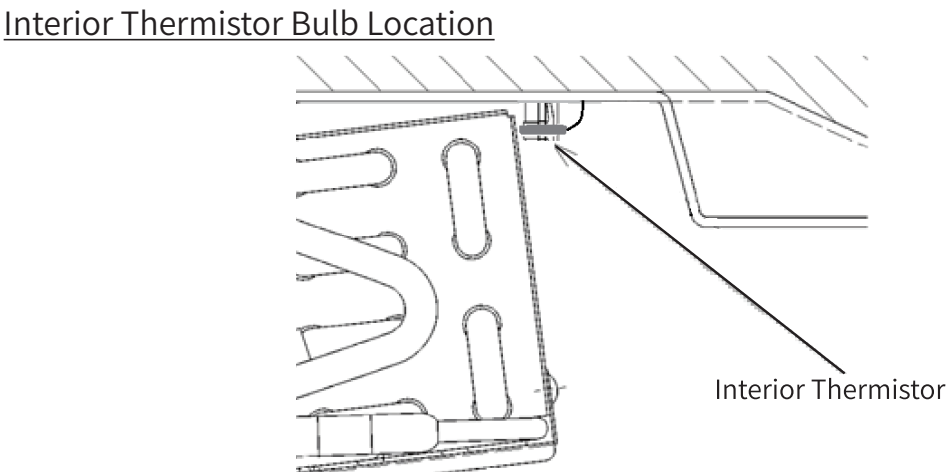
5)Remove the control box cover, use a precision screwdriver to loosen the terminal block screws, and remove the thermistors.

Note
1. To replace the removed parts, reverse the above procedure.
2. To prevent the evaporator from freezing, putty the wire hole in the refrigeration unit base.

Defrost Thermistor Bulb Location



Interior Thermistor Bulb Location



2.REFRIGERATION CIRCUIT

The refrigerant R290 used in this machine is colorless and odorless gas. It is non-toxic, flammable and explosive, and belongs to hydrocarbon refrigerant.

[a] COMPRESSOR

1) Unplug the unit.

2) Remove the front panel.

3) Remove the top panel.

4) Remove the protector cover enclosing the electrical parts. Remove the overload relay, starting relay, and other parts.

5) Recycle the refrigerant from the low side access valve.

6) Disconnect the discharge and suction pipes by using cutting-off tool.

7) Remove the hexagon bolts securing the compressor.

8) To replace the removed parts, reverse the above procedure.

NOTE
1. Use the Lockring tool to connect the pipe. When welding is required for the refrigeration circuit, should use nitrogen to clean the refrigeration cycle. Before welding, use a dedicated leak detector for specific flammable refrigerants to inspect the refrigeration cycle, check that there is no refrigerant present in the refrigeration system and the surrounding environment.
2. The vacuuming time shall not be less than one hour.
3. Use a dedicated leak detector to check for any gas leakage.
4. As the refrigerant of R290, when maintaining, make sure to open windows and avoid operating in a confined and small space.

[b] CONDENSER AND DRIER

1) Unplug the unit.

2) Remove the front panel.

3) Remove the top panel.

4) Recycle the refrigerant from the low side access valve.

5) Unscrew the condenser.

5) Disconnect the condenser from the upper inlet pipe by using cutting-off tool.

6) Remove the condenser and drier from the refrigeration unit, and disconnect them using brazing equipment.

7) To replace the removed parts, reverse the above procedure.

Note
1.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.
2. When the copper pipes are reinstalled by using lockable rings. When welding is required for the refrigeration circuit, should use nitrogen to clean the refrigeration cycle. Before welding, use a dedicated leak detector for specific flammable refrigerants to inspect the refrigeration cycle, check that there is no refrigerant present in the refrigeration system and the surrounding environment. This part can refer to the compressor replacement process in [a].

[c] EVAPORATOR

1) Unplug the unit.

2) Remove the front panel.

3) Remove the top panel.

4) Recycle the refrigerant from the low side access valve.

5) Remove the insulation hoses on the refrigeration unit base. Disconnect the evaporator using brazing equipment.

6) Remove the air duct.

7) Disconnect the defrost heater wires. See “[e] DEFROST HEATER AND THERMAL FUSE”.

8) Unscrew and remove the evaporator.

9 To replace the removed parts, reverse the above procedure.

Note
When the copper pipes are reinstalled by using lockable rings. When welding is required for the refrigeration circuit, should use nitrogen to clean the refrigeration cycle. Before welding, use a dedicated leak detector for specific flammable refrigerants to inspect the refrigeration cycle, check that there is no refrigerant present in the refrigeration system and the surrounding environment. This part can refer to the compressor replacement process in [a].

[d] CONDENSER FAN MOTOR

1) Unplug the unit.

2) Remove the front panel.

3) Remove the top panel.

3) Disconnect the condenser fan motor.

4) Remove the two screws securing the bracket on the refrigeration unit base.

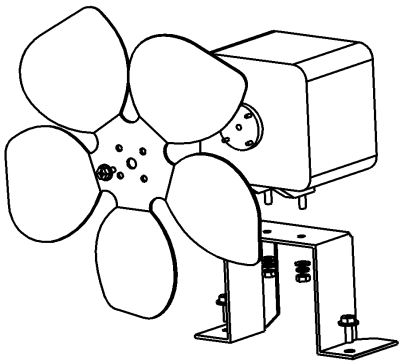
5) Pull up the fan motor together with the bracket.

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 inseries connected and interchangeable without any operational problems.

3) Remove the putty from the wire hole in the refrigeration unit base, and take connector through the hole.

4) Remove the air duct. See “3. [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.

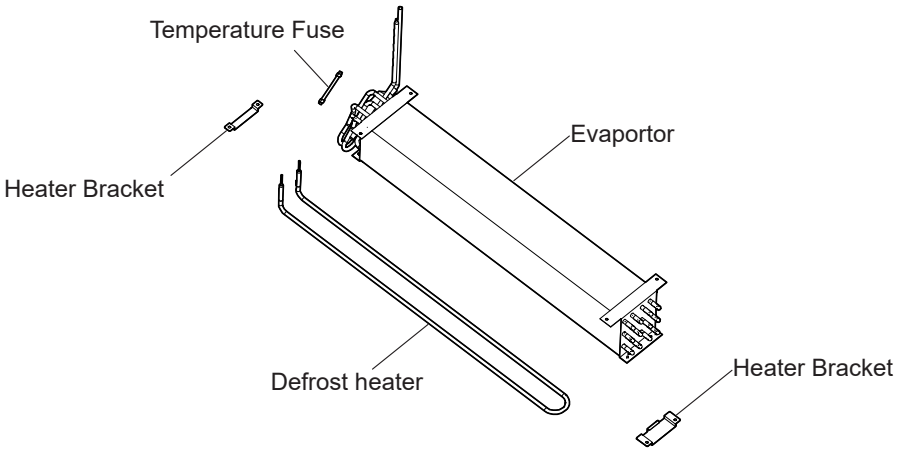
7) Cut the tie, put the thermal fuse from the evaporator.

8) Remove the thermistor from the evaporator’s fin.

9) Pull out the wire through the hole in the refrigeration unit base.

10) To replace the removed parts, reverse the above procedure.

Note
Locate the defrost heater, thermal fuse and thermistor in the same position as before.



3. AIR DUCT

[a] AIR DUCT

1)Remove the screws securing the air duct.

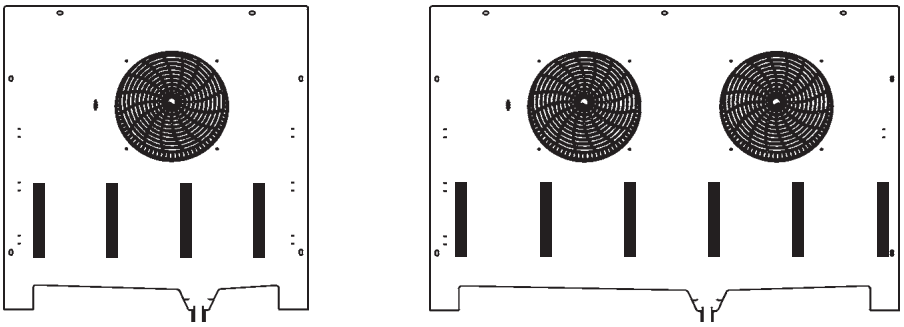
2)Hold both sides of the air duct, and pull it out towards you. The air duct for the HF series is provided with a gasket in the drain pipe and must be pulled hard to remove.

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.

5)Fit the air duct in the back.

6)Tighten all the screws.



[b] INTERIOR FAN MOTOR

1) Unplug the unit.

2) Disconnect the interior fan motor connector beside the refrigeration unit.

3) Take the wire of interior fan motor into the cabinet.

4) Remove the air duct.

5) Remove the internal fan motor from the mounting plate of the body

6) To replace the removed parts, reverse the above procedure. After putting the wire of the interior fan motor through the hole in the refrigeration unit, to make sure the hole is sealed by putty.

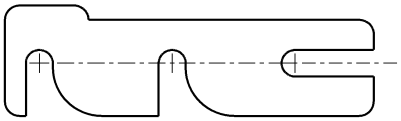
Note
To prevent the wire from being caught between the fan blades, fix the wire with the wire retainer inside the air duct before fitting the air duct.

4. DOOR PARTS

[a] HINGE SPACER

For door closing adjustment, the hinge spacers may be provided between the hinges and cabinet. When removed, the hinge spacers must be reinstalled 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



[b] 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 or equivalent food grade grease. 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.

[c] DOOR GASKET

To replace the door gasket:

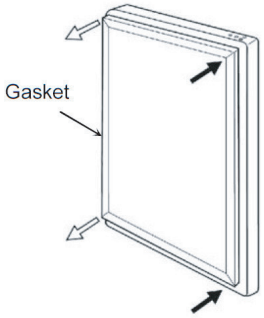
1)Pinch and pull out the door gasket from the corners.

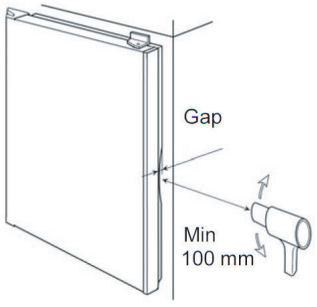
2)Push the convex of the new door gasket into the concave of the door interior. Insert the corners first to facilitate replacement.

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.





5. OPTIONAL PARTS

[a] HINGE KIT

The door hinges for HF-78MC-S-X 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 pcs
Door Hinge (R) - Up	375317G01	1 pcs
Door Hinge (R) - CT	375315G01	1 pcs
Hinge Collar - Hinge	339948-01	2 pcs

Hinge Kit (L)

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

[b] LEG

Width		700/1200/1400mm	1800mm
Leg H=90	P04879-01	4 pcs	6 pcs
Leg H=150	P05012-01	4 pcs	6 pcs
Leg SUS H=90	4Y2043-01	4 pcs	6 pcs

[c] CASTER

Width		700/1200/1400mm	1800mm
Caster	C07571-01	4 pcs	6 pcs
Plain Washer	FWPL20F0	4 pcs	6 pcs
Spacer - Caster	471512M01	4 pcs	6 pcs
Spanner	471513M01	1 pcs	1 pcs

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 washer (M20) provided before fixing the caster to the cabinet. The fixing part of caster may deform without the plain washer (M20).