Service Manual

Biomedical Freezer

MDF-U5412

FILE No.

SANYO Electric Co., Ltd.
Biomedical Business Division

SM9910214

Effective models

This service manual is effective following models.

Model	Product code	Voltage and Frequency	
MDF-U5412	823 018 53	220V	60Hz
	823 018 54	230/240V	50Hz
	823 018 56	220V	50Hz

Contents

Features

■ Temperature control

New cooling system realizes to set to -20℃ which is suitable for reagent preservation with ambient temperature at 30℃.

■ HFC refrigerant

Refrigerant circuit contains HFC refrigerant that effects to environment little.

Latest cooling system reduces negative factor to global environment. With ambient temperature at 30℃, while temperature of inside chamber maintains -40℃.

■ Specification unified

Unified specification for same categories, which also realized to unify performance for high/low temperature alarm (the available setting range is between +5℃ and +15℃ for high temperature alarm, -5℃ and -15℃ for low temperature alarm against the set temperature), power failure alarm, remote alarm terminal, setting memorization by non-volatile memory.

■ Self diagnosis function

Abnormal condition for temperature sensor is indicated as E1/E2 by self-diagnosis system.

■ Storage box

Storage box makes easily to access and arrange for stores.

■ Validation

Control panel enable Zero “0” adjust for validation.

■ Door latch mechanism

Door latch prevents the door from being ajar to preserve reagent without damaged.

Individual lock can be arranged. (Consult to your sales representative)

Specifications

Structural specifications

Item	Specification
Name	Biomedical freezer
Model	MDF-U5412
Exterior dimensions	W 804 × D 772 × H 1802 mm
Interior dimensions	W 658 × D 607 × H 1272 mm
Effective capacity	482 liters
Exterior	Painted steel
Interior cabinet	Styrol resin
Outer door	2, Painted steel
Door latch	2
Door lock	1
Insulation	Rigid polyurethane foamed-in place
Access port	ϕ30mm, 2 on back side
Caster	4
Leveling legs	2
Weight	134 Kg
Evaporator	Tube on sheet type (also used as a shelf)
Condenser	Wire and tube type
Compressor	Hermetic rotary type, 400W
Compressor oil	Ze-NIUSL22SA
Refrigerant	R-404A (HFC refrigerant)
Battery	For power failure alarm, Nickel hydrogen battery, DC6V 1100mAh, Automatic charge (5HR-AAC)
Accessories	1 set of key, 1 scraper 6 small baskets for upper chamber (W290 x D536 x H136 mm) 4 large baskets for lower chamber (W290 x D536 x H238 mm)
Power supply	Single phase, local voltage
Optional components	Temperature recorder: MTR-4015LH, MTR-G85 Mounting kit for MTR-4015LH: MPR-S30 Mounting kit for MTR-G85: MPR-S7 Interface board: MTR-480, MTR-L03

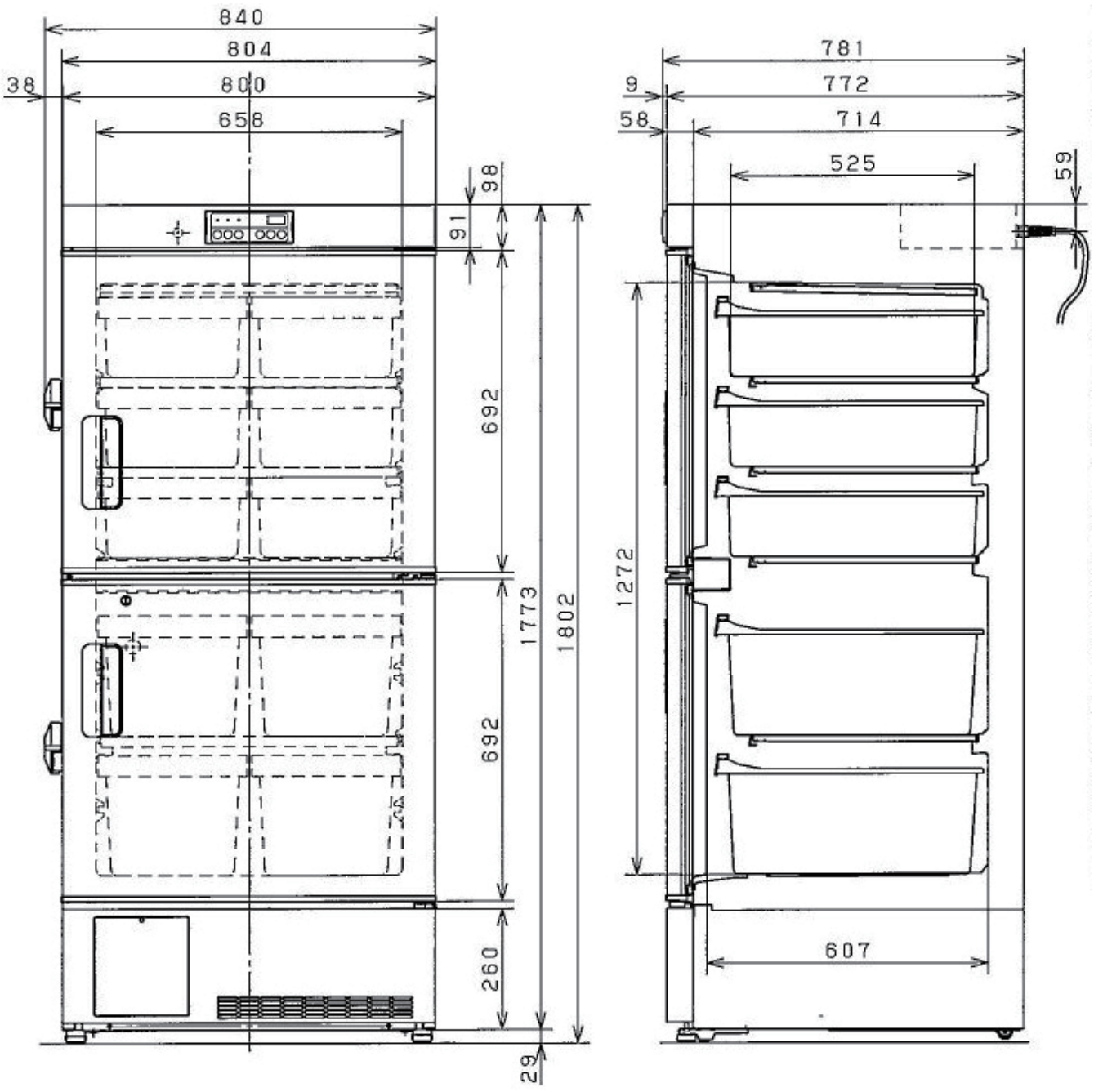
Control specifications

Item		Specification
Temperature controller		Microprocessor controlled system with non-volatilized memory. Settable range : -18℃～-45℃ (unit:1℃) Memorized by Non-volatile memory
Temperature sensor		Thermistor sensor (Type: 502AT)
Temperature display		LED digital display (Unit: 1℃) Range : -50℃～+50℃
Alarms	High temp.	SV+5℃～+15℃, changeable (Initial:+10℃) ALARM lamp and LED display brink, buzzer beeps and remote alarm activates with 15min. of delay
	Low temp.	SV-5℃～-15℃, changeable (Initial:-10℃) ALARM lamp and LED display brink, buzzer beeps and remote alarm activates with 15min. of delay
	Remote alarm	Remote alarm terminal 3P; contact capacity DC30V, 2A (Max) Remote alarm activates when temp. alarm or power failure occur.
	Alarm resume time	Buzzer beeps again after alarm resume time expires Range; 10~60 min, changeable (Initial: 30min.) (Unit: 10min.) 000: Not resumed
	Battery age	When battery accumulation time reaches about 2.8 years, battery will be recommended to replace by displaying chamber temperature and 'F1' alternately.
	Fan motor age	When fan motor accumulation time reaches about 5.6 years, fan motor will be recommended to replace by displaying chamber temperature and 'F1' alternately.
	Power failure	ALARM lamp brinks, buzzer beeps and LED display turns off. Remote alarm activates.
Control panel		ALARM lamp BUZZER: Buzzer stop key ALARM TEST: Alarm test key SET: Setting key ＞: Digit shift key ∧: Numerical value shift key DEF: Defrost key
Key lock function		Press ＞key for 5 seconds to step in Key Lock mode. L0: Unlocked L1: Locked
Self diagnosis function		When a sensor is failed, error code and chamber temperature are displayed alternately. Remote alarm activates and buzzer beeps.
Compressor protection		Overload relay (Internal)

Performance specifications

Item	Specification		
Cooling performance	-40℃ (AT;30℃, no load)		
Temperature control range	-20℃～-40℃		
Power source	220V, 50Hz	220V, 60Hz	230/240V, 50Hz
Rated power consumption	240W	285W	255/290W
Noise level	42dB [A] (background noise; 20 dB)		
Maximum pressure	1.80MPa		

Dimensions

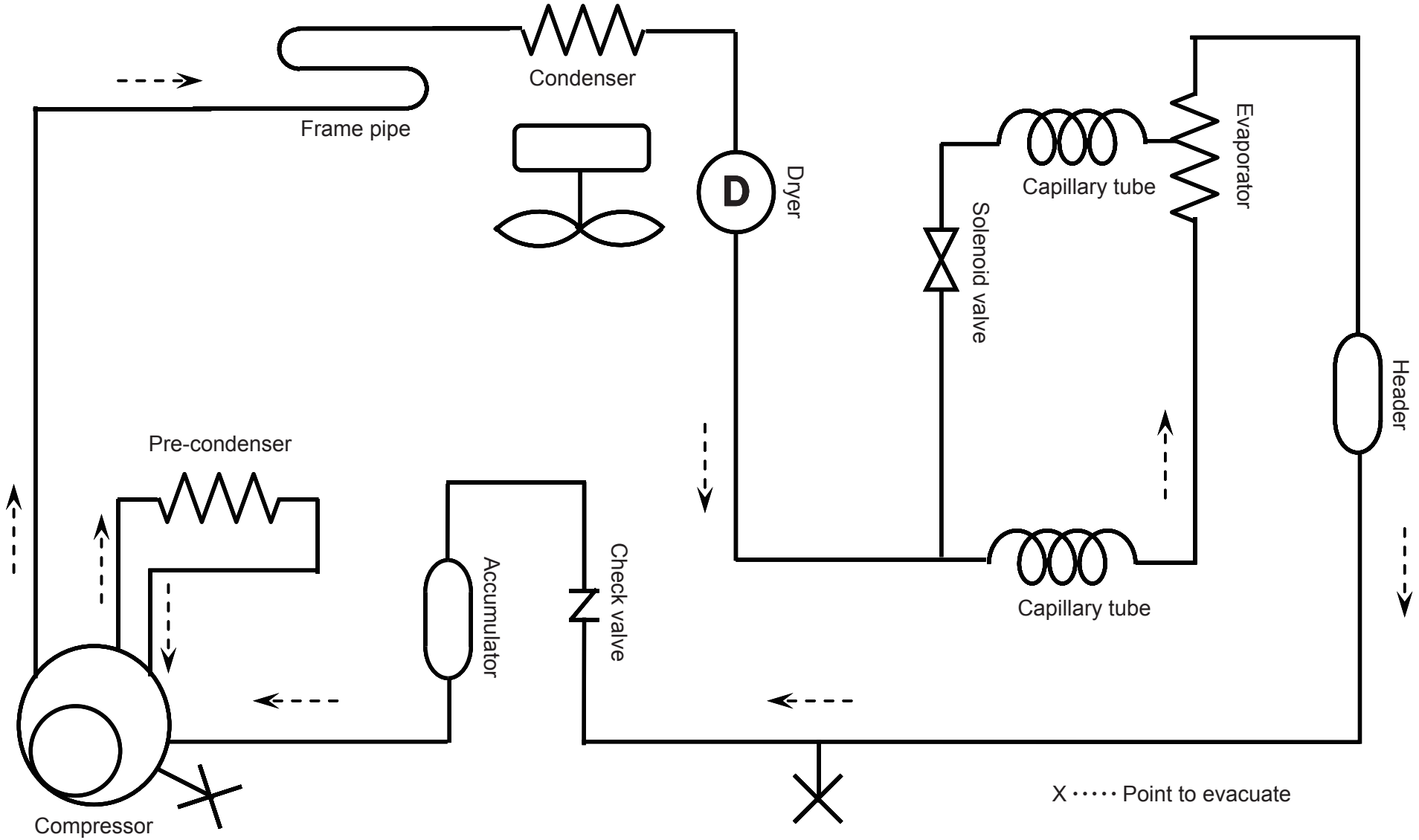

840
804
38
800
658
98
91
692
1773
1802
692
260
29
781
9
772
58
714
525
59
1272
607

Cooling unit parts

MDF-U5412

Parts name	Specifications	
Compressor	<For 220~240V, 50Hz>	
	Type	C-1RN40L5C
	Compressor cord	802 012 152
	Rated power supply	Single phase, 220~240V, 50Hz
	Oil	Ze-NIUSL22SA Charged q'ty: 230cc
	Cooling method	Air circulation by fan
	Starting relay	AMVL-300A
	Overload relay	Internal
	Starting capacitor	40μF-300VAC
	Running capacitor	12μF-370VAC
	<For 220V, 60Hz>	
	Type	C-1RN40L6A
	Compressor cord	802 012 162
	Rated power supply	Single phase, 220V, 60Hz
	Oil	Ze-NIUSL22SA Charged q'ty: 230cc
	Cooling method	Air circulation by fan
	PTC	AMVL-300A
	Overload relay	Internal
	Starting capacitor	40μF-300VAC
	Running capacitor	10μF-400VAC
Evaporator	Type	Direct cooling tube on sheet type
	Accumulator	ϕ30 × L140 × T1.0 mm
Dryer	Type	D-SM032T
Capillary tube	Resistance	0.73MPaG
	Length（L）	4500 mm
	Outer diameter（OD）	ϕ1.8 mm
	Inner diameter（ID）	ϕ0.7 mm
Condenser	Type	Natural convection
	Condenser	Wire and tube type 1 line × 6 columns x P40mm × W480 mm
	Pre-condenser	-----
	Frame pipe	ϕ4.0 x T0.5
Refrigerant	Type	R-404A Charged q'ty: 259g
	Oil additive	n-pentane Charged q'ty: 11g (18cc)

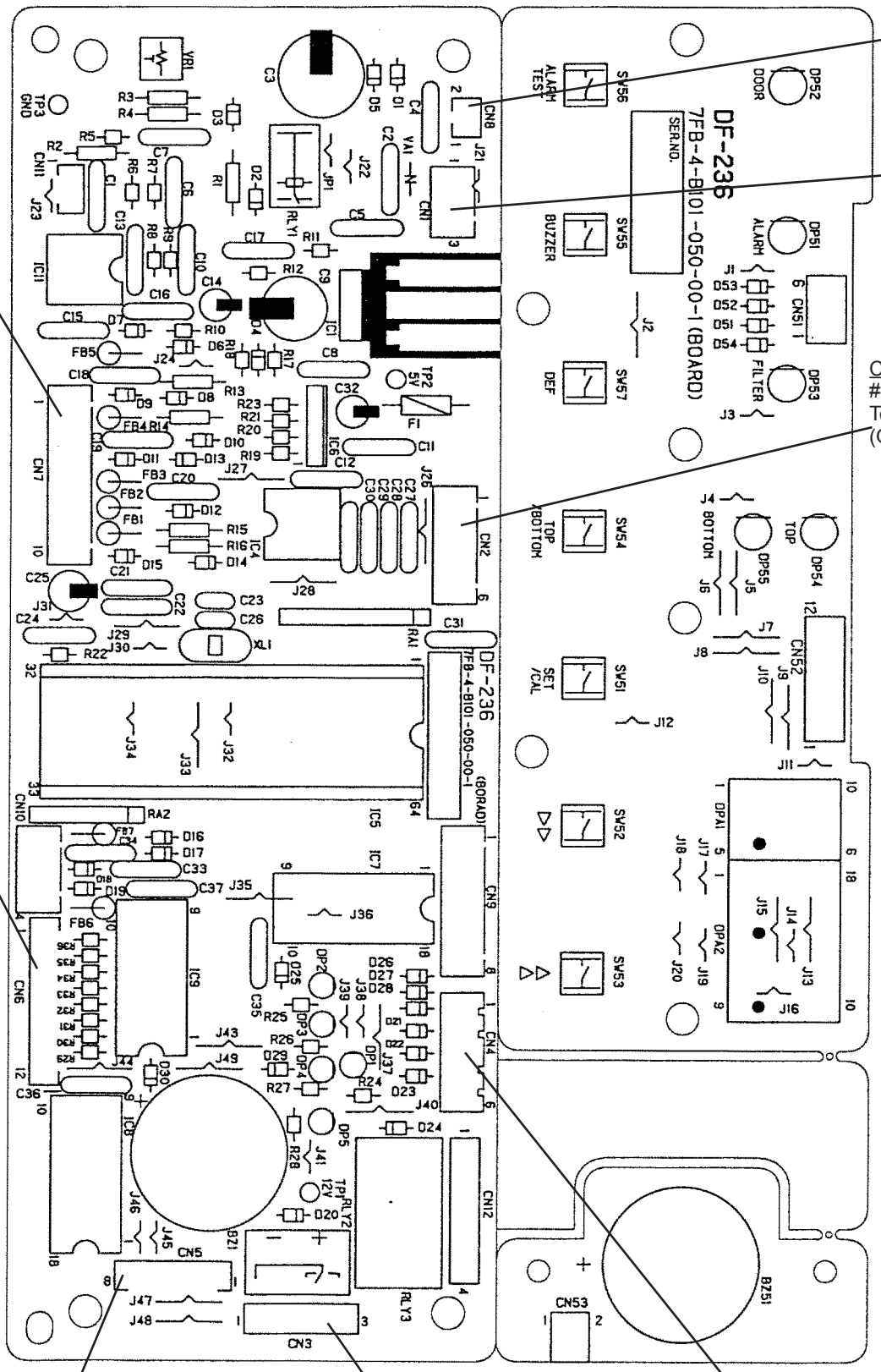
Refrigeration Circuit



Electric components

MDF-U5412		AC220V, 60Hz	AC220V, 50Hz	AC230V/240V, 50Hz
Compressor	Type	C-1RN40L6A	C-1RN4L5C	C-1RN4L5C
	Code	802 012 16	802 012 15	802 012 15
	Rated voltage (50/60Hz)	220V, 60Hz	220~240V, 50Hz	220~240V, 50Hz
	Winding resistance C-R(Main)	5.34Ω(25℃)	7.37Ω(25℃)	7.37Ω(25℃)
	C-S(Aux)	8.88Ω(25℃)	15.76Ω(25℃)	15.76Ω(25℃)
Starting relay	Type	AMVL-300A	AMVL-300A	AMVL-300A
	Pick up voltage	AC185V~217V	AC185V~217V	AC185V~217V
		AC215V~232V	AC215V~232V	AC215V~232V
	Drop out voltage	AC60~120V	AC60~120V	AC60~120V
		AC69~132V	AC69~132V	AC69~132V
Starting capacitor	Rating	40μF, 300VAC	40μF, 300VAC	40μF, 300VAC
Running capacitor	Rating	10μF, 400VAC	12μF, 370VAC	12μF, 370VAC
Temp. control relay	Type	G4F-11123T	G4F-11123T	G4F-11123T
	Contact capacity	AC220V, 20A	AC220V, 20A	AC220V, 20A
	Coil	DC12V	DC12V	DC12V
Solenoid valve relay	Type	G2R-1A-T	G2R-1A-T	G2R-1A-T
	Contact capacity	AC250V, 10A	AC250V, 10A	AC250V, 10A
	Coil	DC12V	DC12V	DC12V
Switching power supply	Type	ZWS10-12/J	ZWS10-12/J	ZWS10-12/J
	Input	AC100-240V 50-60Hz, 0.3A	AC100-240V 50-60Hz, 0.3A	AC100-240V 50-60Hz, 0.3A
	Rated output	DC12V, 0.85A	DC12V, 0.85A	DC12V, 0.85A
Temp. sensor	Type	502AT-1	502AT-1	502AT-1
	Rating	5KΩ, 25℃	5KΩ, 25℃	5KΩ, 25℃
Valve sensor	Type	502AT-1	502AT-1	502AT-1
	Rating	5KΩ, 25℃	5KΩ, 25℃	5KΩ, 25℃
Battery	Type	5HR-AAC	5HR-AAC	5HR-AAC
	Rating	6V 1100MAH	6V 1100MAH	6V 1100MAH
Battery switch	Type	SLE6A2-5	SLE6A2-5	SLE6A2-5
	Rating	AC250V 4A	AC250V 4A	AC250V 4A
Breaker switch	Type	BAM215131	BAM215131	BAM215131
	Rating	AC250V 15A	AC250V 15A	AC250V 15A
Solenoid valve	Type	NEVAC220V	NEVAC220V	NEVAC240V
	Rating	220V 50/60Hz	220V 50/60Hz	240V 50/60Hz
Condensing fan motor	Type	FU2-C051B5MP	FU2-C051B5MP	FU2-O051B5MP
	Rating	AC220-240V 50/60Hz	AC220-240V 50/60Hz	AC220-240V 50/60Hz
	Thermal fuse	130℃	130℃	130℃

Components on PCB



Specifications of sensor

The following shows temperature and resistance characteristics on each thermistor sensor (type 502AT-1).

Temperature (℃)	Resistance (kΩ)	Temperature (℃)	Resistance (kΩ)	Temperature (℃)	Resistance (kΩ)
−50	154.50	−7	17.92	12	8.17
−45	116.50	−6	17.16	13	7.85
−40	88.85	−5	16.43	14	7.55
−35	68.15	−4	15.74	15	7.27
−30	52.84	−3	15.08	16	6.99
−25	41.19	−2	14.45	17	6.73
−20	32.43	−1	13.86	18	6.48
−19	30.92	0	13.29	19	6.24
−18	29.50	1	12.74	20	6.01
−17	28.14	2	12.22	25	5.00
−16	26.87	3	11.72	30	4.18
−15	25.65	4	11.25	35	3.51
−14	24.51	5	10.80	40	2.96
−13	23.42	6	10.37	45	2.51
−12	22.39	7	9.96	50	2.14
−11	21.41	8	9.57	55	1.83
−10	20.48	9	9.20	60	1.57
−9	19.58	10	8.84		
−8	18.73	11	8.49		

Control specifications

1. Keys on control panel

BUZZER : When alarm lamp blinks and buzzer sounds, press this key to stop buzzer and remote alarm operation.
When you set alarm resume time (except for 000) in F25, buzzer will sound again after the time elapses.
: Buzzer does not activate during alarm test performs.
: When alarm lamp blinks and buzzer does not activate, buzzer will not activate if you press BUZZER key.
: When you press this key during power failure, current chamber temperature will be displayed for 5 seconds.

SET : Press this key to step to setting mode.
Press this key again to memorize setting value.
(It functions as ENTER key)

DEF : In chamber temperature displays, press this key for 5 seconds to start defrosting with chamber temperature and 'dF' are displayed alternately.
Press this key during defrost performs to come defrosting to end.
High/low temperature alarm will not activate during defrost performs.
When sensor is failed during defrost performs, an error code and chamber temperature are displayed alternately. ('dF' will be gone off.)
During defrost performs, any keys but BUZZER are inoperative.

ALARM TEST : In chamber temperature displays, press this key to activate alarm test mode.
Press the key again to stop ALARM TEST performing.
When BATTERY switch is ON position, press this key to blank the display, ALARM lamp blinks and buzzer sounds.
When BATTERY switch is OFF position, press this key to display "E09", ALARM lamp blinks and buzzer sounds.
During alarm test performs, any keys but ALARM TEST key are inoperative.

Digit shift key ▶▶ : Press this key is in setting mode that enables changeable digit to shift. Press this key for 5 seconds to step to Key Lock mode. ('L 0' displays)

Numerical value shift key ▲▲ : Press this key in setting mode that enables numerical value to shift. Press this key for 5 seconds to step to Key Lock mode. ('L 0' displays)

2. Temperature control, high & low temperature alarm

<Temperature control>

Setting range : -18℃～-45℃

Display range : -50℃～+50℃

How to set : Press SET key to set required value using with digit shift key and numerical value shift key. Press SET key again to memorize the value.

Unacceptable setting : When you try to set value out of range and press SET key, buzzer sounds for 1 second to inform the value is unacceptable to set.

<Alarms>

High temperature alarm : When a chamber temperature is higher than setting temperature +5℃～+15℃ (initial: +10℃), ALARM lamp and digital display blink. Buzzer sounds and remote alarm output activates with 15 minutes delay.

Low temperature alarm : When a chamber temperature is lower than setting temperature -5℃～-15℃ (initial: -10℃), ALARM lamp and digital display blink. Buzzer sounds and remote alarm activates with 15 minutes delay.

How to set : Press numerical value shift key for 5 seconds to step to Function mode (“F00” displays). Set “ F01” by using numerical value shift key for setting high temperature alarm, set “F02” for setting low temperature alarm.
Press SET key and set a required value by numerical value shift key and digit shift key.
Press SET key again to memorize the value.

Unacceptable setting : When you try to set value out of range and press SET key, buzzer sounds for 1 second to inform the value is unacceptable to set.

3. Defrosting

In chamber temperature display, press DEF key for 5 seconds to start defrosting.
Compressor and solenoid valve are inoperative during defrosting.
Press DEF key again to come defrosting to the end.

4. Error codes

Error code priority

E01 : Temperature sensor is disconnected.
“E01” and “-50℃” are displayed alternately.

E02 : Temperature sensor is short circuited.
“E02” and “+50℃” are displayed alternately.

E09 : BATTERY switch is off position.
“E09” is displayed if BATTERY switch is off poison when the power is supplied.

E11 : Valve sensor is disconnected.
“E11” and “-50℃” are displayed alternately.

E12 : Valve sensor is short circuited.
“E12” and “+50℃” are displayed alternately.

Note) “E09” and “Blank” are displayed during power failure.

5. Key lock function

In chamber temperature display, press digit shift key for 5 seconds to step to Key Lock mode with “L 0” displayed.
When you set to “1” by using numerical value shift key, Key Lock is ON.
Once Key Lock is ON, values are unchangeable, defrosting cannot be performed, while Function mode is operative and ALARM test can be performed.
Press SET key to memorize value and unit returns to chamber temperature display.
When you set to “0” by using numerical value shift key, Key Lock is OFF.

6. Power failure alarm (buzzer and display are not operative without power supplied)

When a power is failed, power failure alarm will be given by battery.
ALARM lamp will blink, digital display will go off, buzzer will sound intermittently and remote alarm output will activate.
Buzzer will stop sounding if BUZZER key is pressed.
Press BUZZER key to show a current chamber temperature for 5 seconds.
Any keys but BUZZER key will be inoperative during power failure alarm.

7. Alarm test

This function is to ensure ALARM lamp, buzzer and remote alarm are workable.
In chamber temperature display, ALARM lamp will blink, buzzer will sound, remote alarm will activate and digital display will go off when you press ALARM TEST key.
Any keys but ALARM TEST key will be inoperative during ALARM TEST is performed.
Note) E09 will be displayed even if other error code displays prior to perform alarm test.

8. Auto return function

If there are no key operations for 90 seconds in setting mode or key lock mode or function mode, a value which will be set is not memorized and unit returns to chamber temperature display.

9. Compressor delay time

In cycle operation, compressor will inactivate for 3 minutes since the compressor turns off.
When the power is supplied (micro computer is reset), compressor delay time is changeable (3~15 minutes). See Function mode, ‘F05’ for details.

10. Function mode

F01: Setting of high temperature alarm
F02: Setting of low temperature alarm
F05: Setting of compressor delay time
F06: Setting of service code
F07: Zero calibration of temp. sensor
F12: Display of temperature of temp. sensor
F15: Display of temperature of valve sensor
F17: Check of model code
F21: Setting of communication ID (000～255)
F22: Setting of communication mode
F25: Setting of alarm resume time
F32: Display of fan motor accumulation time
F45: Display of battery accumulation time
F46: Display of diagnosis value

How to step to Function mode:

In chamber temperature display, press numerical value shift key for 5 seconds to step to Function mode with “F00” displays. Input required function code by numerical value shift key and press SET key.

F01: Setting of high temperature alarm
Setting range is +5℃～+15℃. (Initial: +10℃)

F02: Setting of low temperature alarm
Setting range is -5℃～-15℃. (Initial: -10℃)

F05: Setting of compressor delay time
This function is to reduce compressor start-up failure and breaker tripping which will be caused after power failure.
Setting range is 3～15 minutes. (Initial: 3 minutes)
This function is active when the power is supplied (micro-computer is reset).

F06: Input service code ‘384’ by numerical value shift key and digit shift key, prior to perform F07 or latter number function codes.
Press SET key to memorize the value.
You can change value for F21 and F22 without inputting service code.
Note) Service code will be memorized until you input “000” in F06 or the main power turns off.

<Reset of battery accumulation time>
Input service code, ‘384’ then ‘409’ to reset battery accumulation time. Unit automatically reverts to chamber temperature display.

<Reset of fan motor accumulation time>
Input service code, ‘384’ then ‘419’ to reset fan motor accmulation time. Unit automatically reverts to chamber temperature display.

F07: Zero calibration of temp. sensor
Input service code “384” prior to use the function.
Setting range is -9.9℃~+9.9℃.
In “F07” display, press SET key to display “00.0” (initial value), and set temperature by numerical value shift key and digit shift key.
Press SET key to memorize the value.
Zero calibration of temp. sensor is done by differential input.
Ex.)
When measured center temperature is –28.5℃and display temperature is –30℃, you should add +1.5 to the value in F07. (Calculation: -28.5 – (-30))

F12: Display of temperature of temp. sensor
Input service code “384” prior to use the function.
Display range is -72.0~+83.0.
Decimal point is displayed but minus code, “-“ of a value which is equal or lower than -20℃ is not displayed.
Ex.)
Actual temperature: -35℃ -> Displays as “35.0”

F15: Display of temperature of valve sensor
Input service code “384” prior to use the function.
Display range is -72.0~+163.

F17: Check of model code
004: MDF-U5412
Input service code “384” prior to use the function.
In “F17” display, press SET key to display “001” (initial) and change the value by numerical value shift key. Press SET key to memorize the value.

Initial setting values

Chamber temp	: -40℃
Key lock mode	: 0 (OFF)
High temp. alarm	: Set temperature +10℃
Low temp. alarm	: Set temperature -10℃
Zero calibration	: +0℃ (for temp. sensor)
Compressor delay time	: 0 minutes
Communication ID	: 000
Communication mode	: 000
Alarm resume time	: 030 (30 minutes)

F21: Setting of serial communication ID
Settable range: 000～255 (000: No communication)

F22: Setting of serial communication mode

Control mode (The 3rd digit)	0: Local (Initial)
	1: Remote
Baud rate (The 2nd digit)	0: 2400bps (Initial)
	1: 4800bps
	2: 9600bps

Note 1) The 1st digit is not used.
2) When you set mode in “Remote”, you cannot change chamber temperature and perform defrosting in unit directly.

F25: Setting of alarm resume time
Settable range: 000, 010, 020, 030, 040, 050, 060 (000: Not resume)

F32: Display of condensing fan motor accumulation time
Input service code “384” prior to use the function.
Input F32 and press SET key to display F32 and “XX.X” (“00.0” will be displayed if the accumulation time is less than a month) alternately.
Press SET key to return to chamber temperature display.

F45: Display of battery accumulation time
Input service code “384” prior to use the function.
Input F45 and press SET key to display F45 and “XX.X” (“00.0” will be displayed if the accumulation time is less than a month) alternately.
Press SET key to return to chamber temperature display.

F46: Display of diagnosis temperature for valve control
Input service code “384” prior to use the function.
Input F46 and press SET key to display F46 and diagnosis temperature (-20.0~-40.0) alternately.
Press SET key to return to chamber temperature display.

11. Differential temperature

When chamber temperature is equal or higher than set temperature, it allows compressor to activate.

When chamber temperature is equal or lower than set temperature – 0.6℃, compressor will be inoperative.

12. Remote alarm

In normal operation	: Remote alarm contact is opened
In alarm or power failure	: Remote alarm contact is closed

13. Solenoid valve

Solenoid valve is a magnetic valve which transfers gas to capillary tube that is located in the center of evaporator.

(1) In condition that -18℃≧SV (set temperature) ≦-25℃;
Solenoid valve will forcibly inactivate when PV (chamber temperature) - SV (set temperature) +5℃ ≧ 0

Ex. 1) SV(set temperature): -20℃ PV(chamber temperature): -10℃
(-10) – (-20) + 5 = 15 ……15 is higher than 0 => Solenoid valve inactivates forcibly

2) SV(set temperature): -20℃ PV(chamber temperature): -30℃
(-30) – (-20) + 5 = -5 …… -5 is lower than 0 => Solenoid valve activates

(2) Diagnosis value for valve operation
Solenoid valve is controlled with every 30 minutes by comparing diagnosis value with SV(set temperature).
The comparison is done after 1 minute elapses since the unit was started.

In condition that AT(ambient temperature) ≦18.0℃, diagnosis value is -40.0℃.
In condition that AT(ambient temperature) ＞18.0℃, diagnosis value is 0.6 x AT(ambient temperature) – 51

In condition that AT(ambient temperature) ≧ diagnosis value, solenoid valve is linked with compressor. That is, solenoid valve transfers gas to the capillary tube when compressor activates.

Ex. 1) AT(ambient temperature): 15℃ SV(set temperature): -40℃
Diagnosis value is -40.0℃.
AT(ambient temperature) is higher than -40℃(diagnosis value) so solenoid valve links with compressor.

2) AT(ambient temperature): 20℃ SV(set temperature): -35℃
Diagnosis value is 0.6 x 20(AT) – 51 = -39
Diagnosis value (-39) is lower than -35(diagnosis value) so solenoid valve links with compressor.

3) AT(ambient temperature): 35℃ SV(set temperature): -35℃
Diagnosis value is 0.6 x 35(AT) – 51 = -30
Diagnosis value (-30) is higher than -35(set temperature) so solenoid value does not link with compressor. That is, solenoid valve does not transfer gas to the capillary tube.

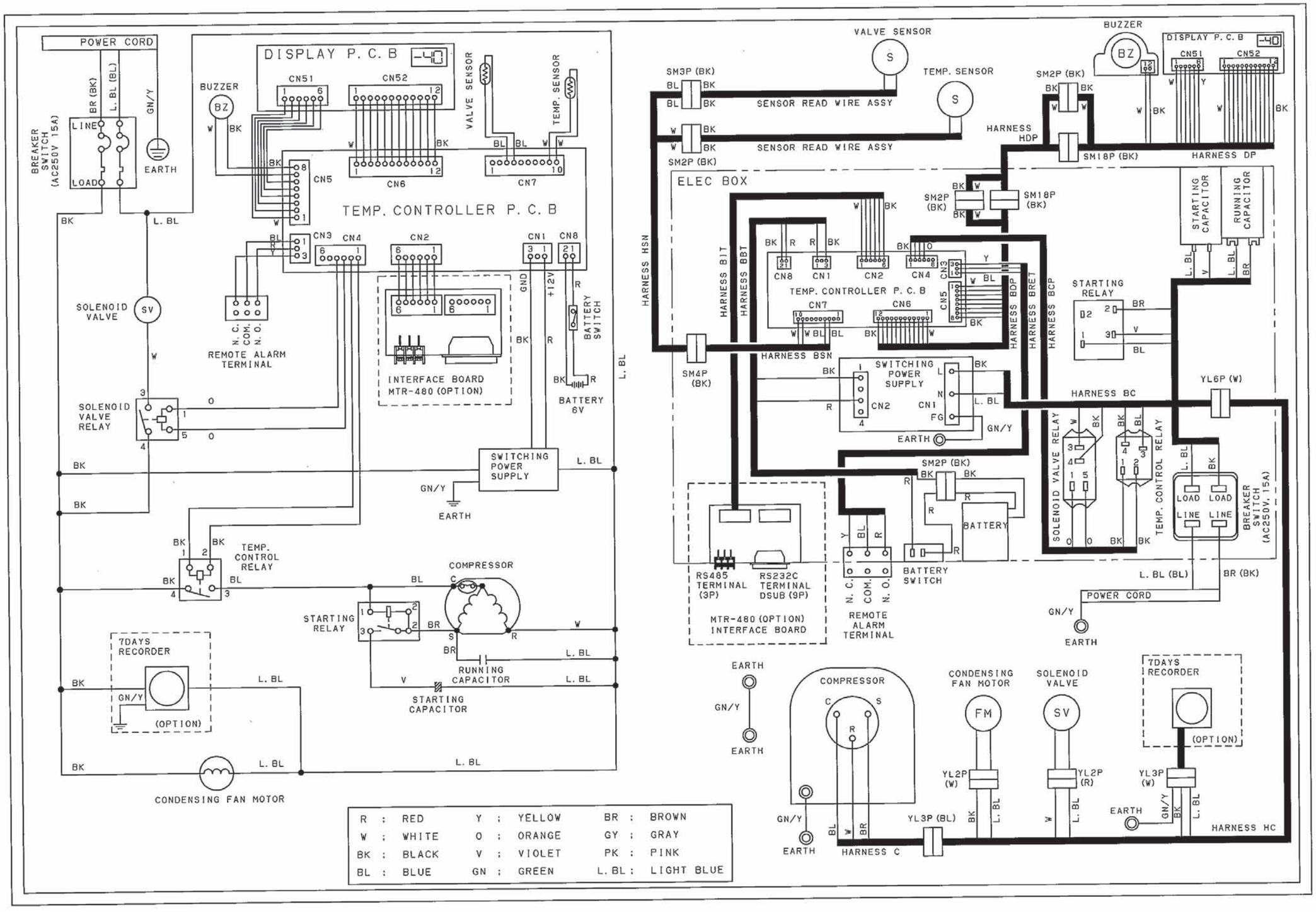
(3) Summary

In condition of (1) (ambient temperature is equal or higher than set temperature + 6℃), solenoid valve forcibly activates.

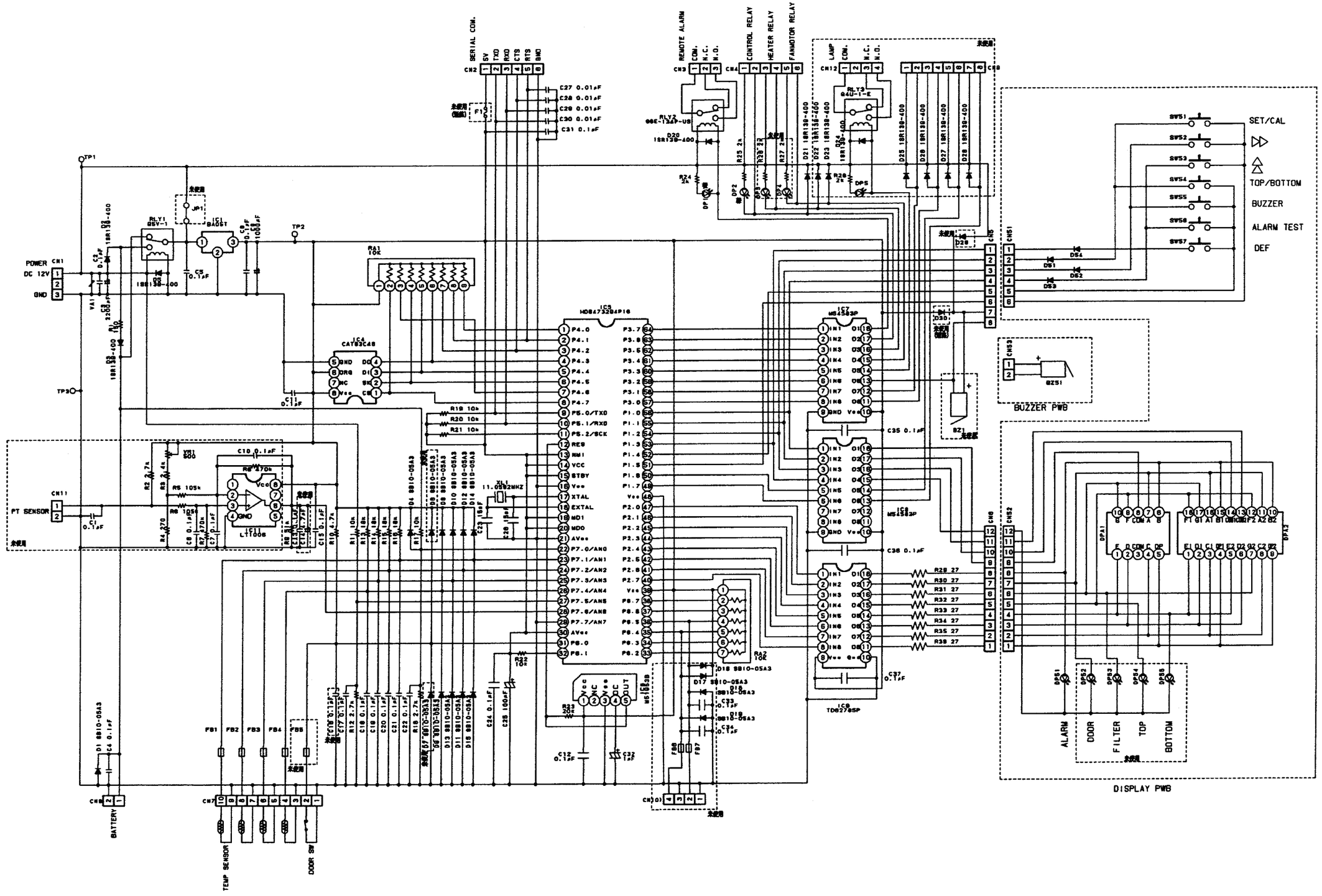
In condition of (2), solenoid valve is controlled by diagnosis value to enable unit to reach set temperature if both of capillary tube are used in high ambient temperature.

Solenoid valve is used to control chamber temperature uniformity in condition of higher set temperature and to enable unit to reach set temperature in condition of higher ambient temperature.

Wiring diagram



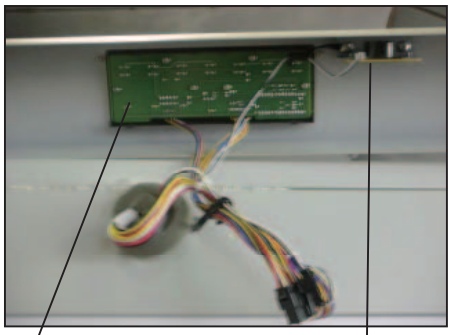
Circuit diagram



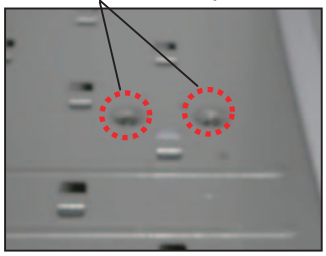
Parts layout

<Front view>

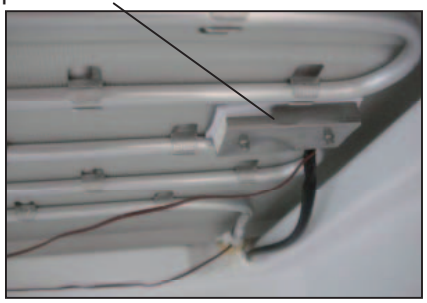
<Opposite side of control panel>



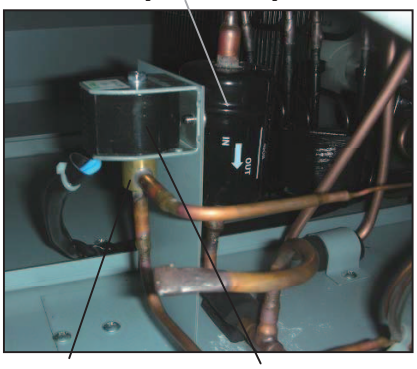
<Screw holes to fix Temp. sensor>

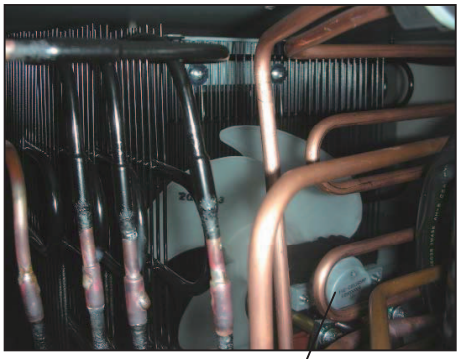


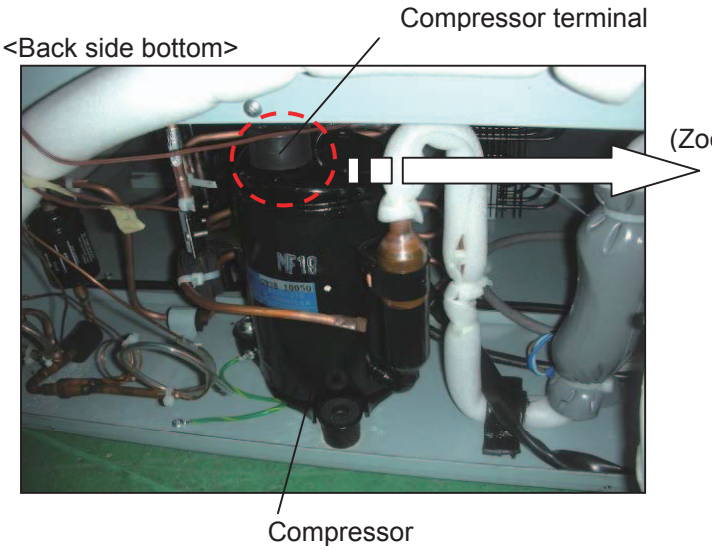
<Temp. sensor mounts on lowest shelf>



<Temp. sensor cover is removed>


Dry core ass'y
Solenoid valve
Solenoid coil


Condensing fan motor


<Back side bottom>
Compressor terminal
Compressor

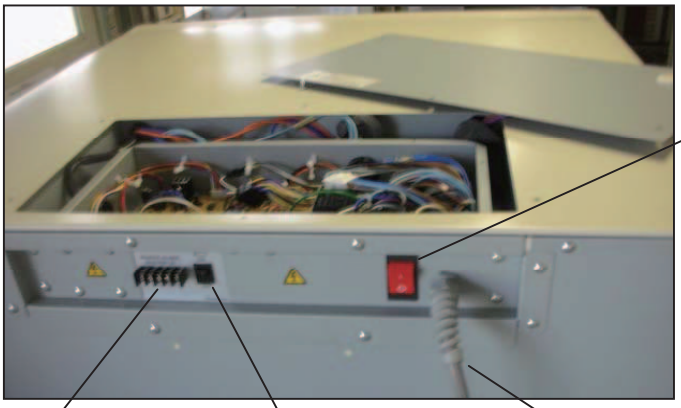
(Zoom-in)


<Terminal cover is removed>

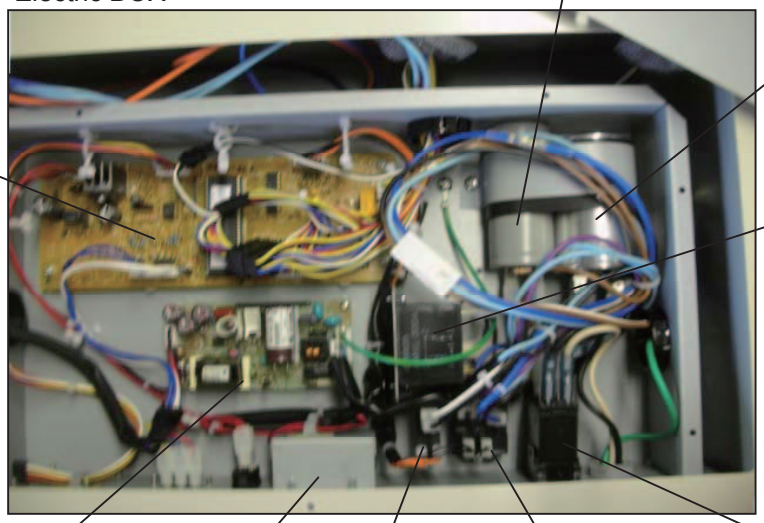

Fan motor connection


Tube connect ass'y (Check valve)

<Electric BOX on top of unit - Back side>



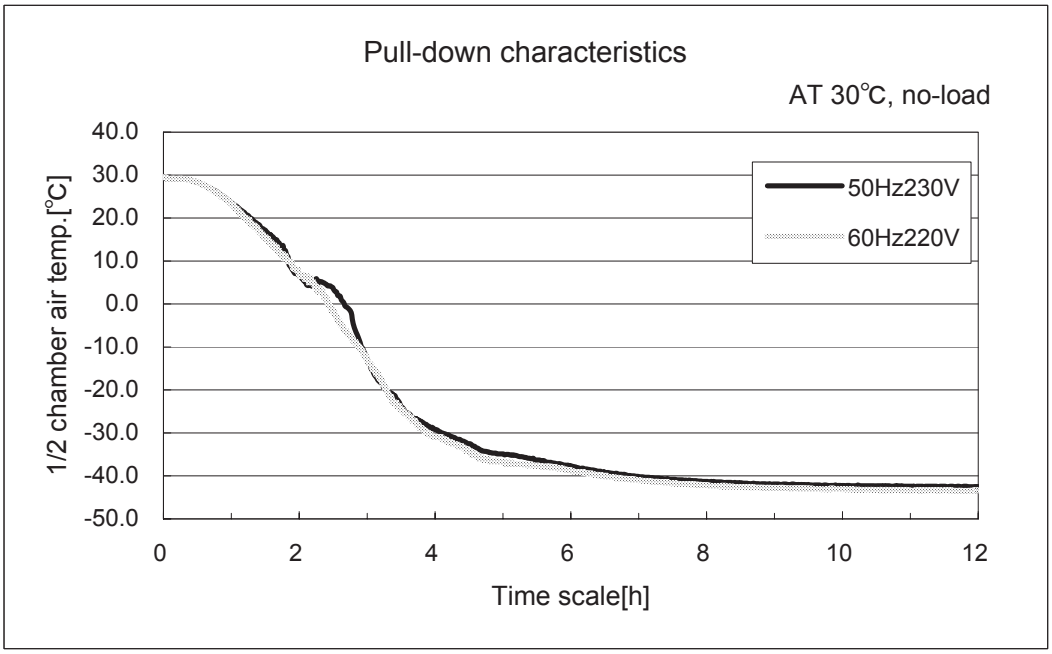
<Electric BOX>

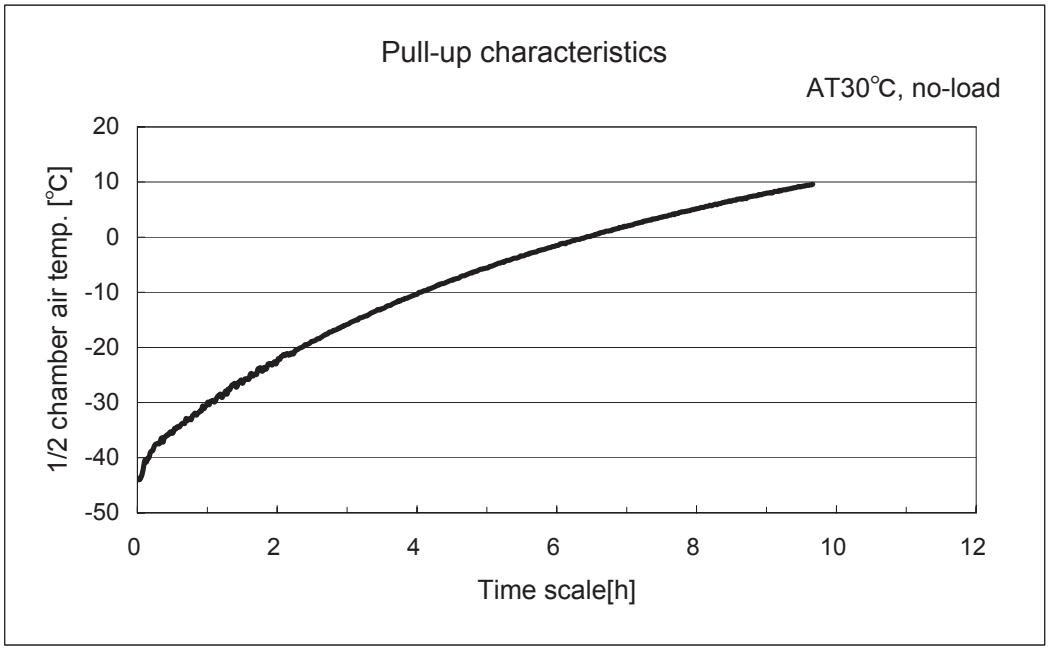


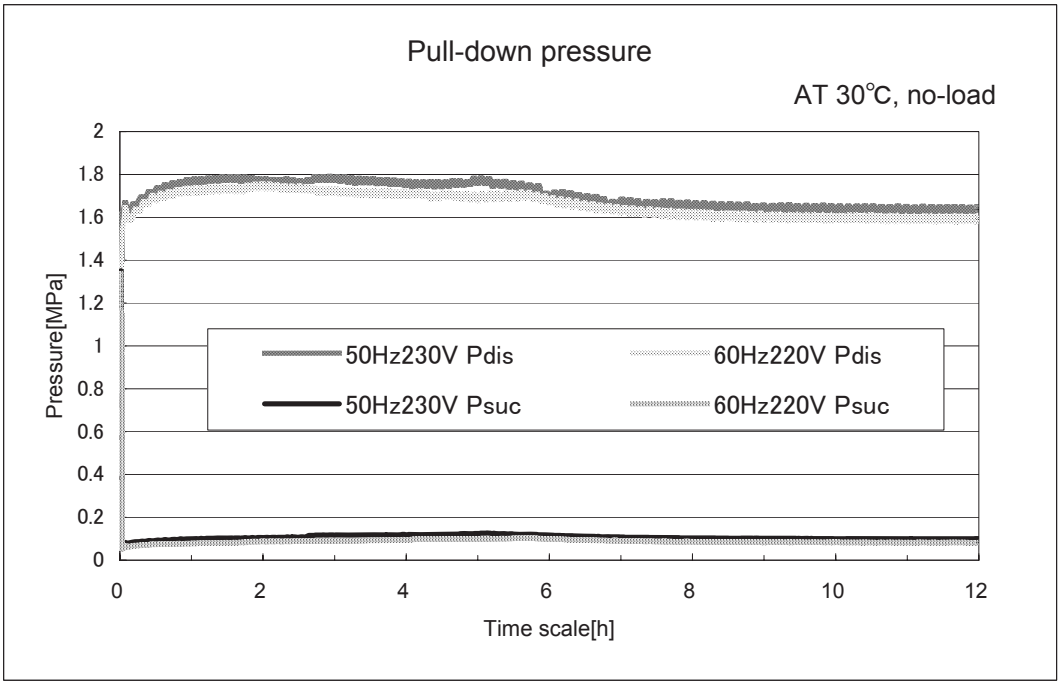
<Temp. sensor wiring harness - Back side>

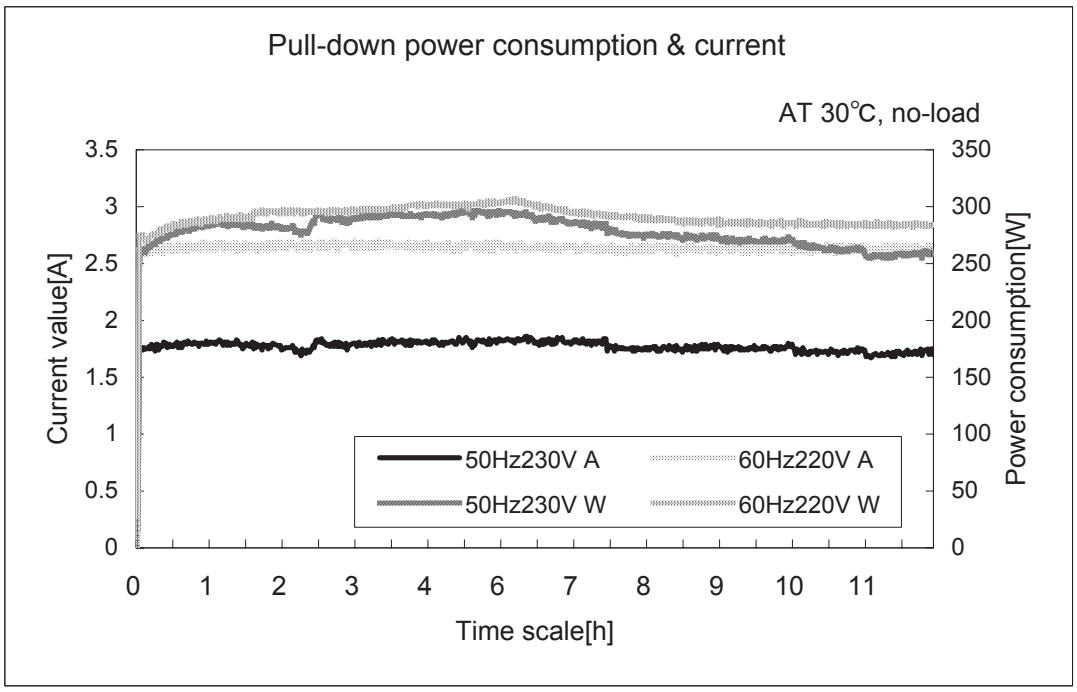
Test data

*All the data are the reference only.






Pull-down pressure
AT 30℃, no-load
Pressure[MPa]
Time scale[h]
50Hz230V Pdis
60Hz220V Pdis
50Hz230V Psuc
60Hz220V Psuc


Pull-down power consumption & current
AT 30℃, no-load
Current value[A]
Power consumption[W]
Time scale[h]
50Hz230V A
60Hz220V A
50Hz230V W
60Hz220V W

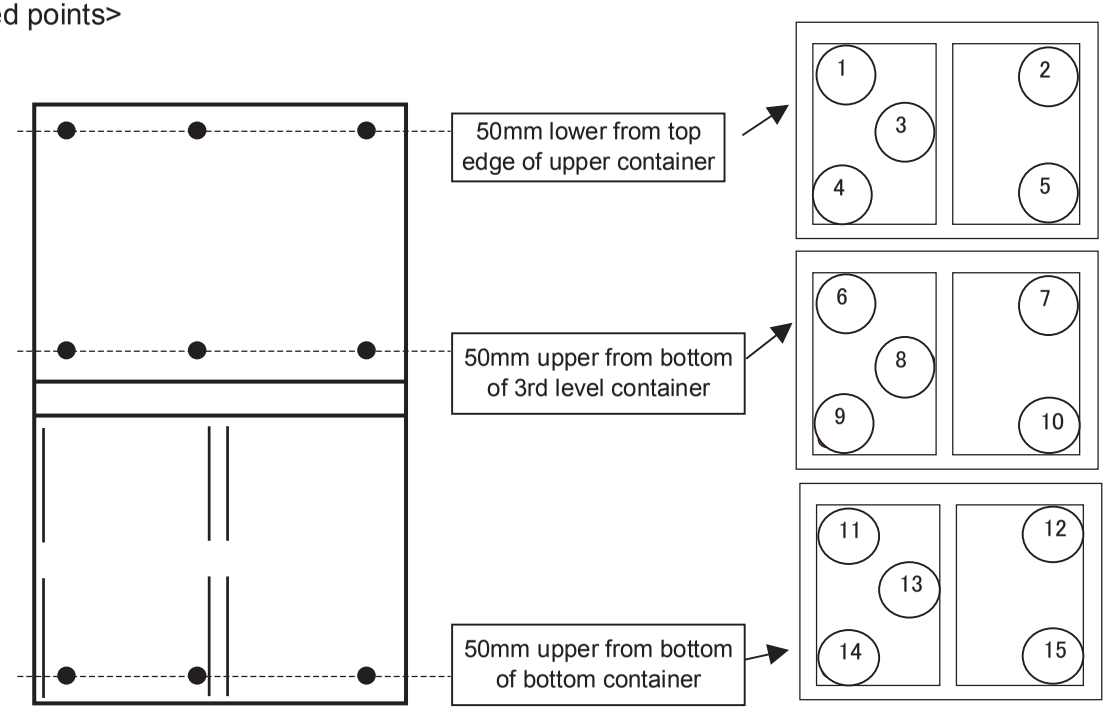
Temperature uniformity (15 points measured)

*Data are the reference only.

〈Test conditions〉

AT20℃, No load

<Measured points>

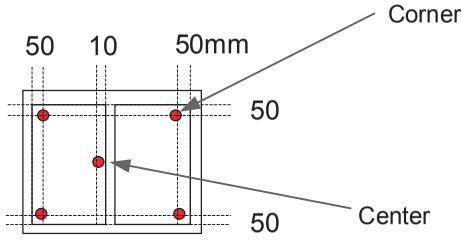


<Measured points>

* Upper : 50mm lower from top of top container
  ·Center (③)
  ·Corner (①,②,④,⑤)

* Middle: 50mm upper from bottom of 3rd stage container
  ·Center, 1/2H (⑧)
  ·Corner (⑥,⑦,⑨,⑩)

*Lower: 50mm upper from bottom of bottom container
  ·Center (⑬)
  ·Corner (⑪,⑫,⑭,⑮)



<Temperature uniformity>

SV-30℃ (Unit:℃)

	Ambient temperature 20℃							
	50Hz				60Hz			
	Maximum	Minimum	Middle of cycle	Differential	Maximum	Minimum	Middle of cycle	Differential
①	−27.7	−30.7	−29.2	±1.5	−27.5	−30.4	−29.0	±1.5
②	−26.5	−30.0	−28.3	±1.8	−26.7	−29.7	−28.2	±1.5
③	−27.4	−29.6	−28.5	±1.1	−27.6	−29.6	−28.6	±1.0
④	−26.7	−29.3	−28.0	±1.3	−26.2	−28.7	−27.5	±1.3
⑤	−25.9	−28.6	−27.3	±1.4	−26.0	−28.7	−27.4	±1.4
⑥	−29.6	−31.6	−30.6	±1.0	−29.8	−31.6	−30.7	±0.9
⑦	−29.3	−31.8	−30.6	±1.3	−29.5	−31.7	−30.6	±1.1
⑧	−30.0	−32.7	−31.4	±1.4	−30.4	−32.2	−31.3	±0.9
⑨	−28.6	−30.2	−29.4	±0.8	−29.0	−29.2	−29.1	±0.1
⑩	−27.8	−29.8	−28.8	±1.0	−29.1	−30.6	−29.9	±0.8
⑪	−27.1	−28.9	−28.0	±0.9	−27.5	−29.1	−28.3	±0.8
⑫	−27.5	−29.2	−28.4	±0.9	−27.2	−29.0	−28.1	±0.9
⑬	−28.3	−30.3	−29.3	±1.0	−28.0	−29.7	−28.9	±0.9
⑭	−27.6	−29.6	−28.6	±1.0	−27.0	−28.5	−27.8	±0.8
⑮	−28.0	−30.3	−29.2	±1.2	−27.8	−29.9	−28.9	±1.1
Average	−	−	−29.0	−	−	−	−28.9	−

SV-40℃ (Unit:℃)

	Ambient temperature 20℃							
	50Hz				60Hz			
	Maximum	Minimum	Middle of cycle	Differential	Maximum	Minimum	Middle of cycle	Differential
①	−37.1	−39.6	−38.4	±1.3	−36.9	−39.7	−38.3	±1.4
②	−35.7	−38.4	−37.1	±1.4	−35.5	−38.2	−36.9	±1.4
③	−36.7	−38.6	−37.7	±0.9	−36.8	−38.9	−37.9	±1.1
④	−36.1	−38.4	−37.3	±1.2	−35.5	−38.0	−36.8	±1.3
⑤	−34.9	−37.2	−36.1	±1.2	−35.0	−37.4	−36.2	±1.2
⑥	−39.3	−41.4	−40.4	±1.1	−39.7	−41.6	−40.7	±0.9
⑦	−39.0	−41.4	−40.2	±1.2	−39.5	−41.8	−40.7	±1.2
⑧	−39.9	−42.4	−41.2	±1.3	−40.4	−42.4	−41.4	±1.0
⑨	−37.9	−38.6	−38.3	±0.4	−38.8	−39.6	−39.2	±0.4
⑩	−37.5	−39.6	−38.6	±1.1	−38.8	−40.5	−39.7	±0.9
⑪	−36.1	−37.6	−36.9	±0.8	−36.5	−38.0	−37.3	±0.8
⑫	−36.8	−38.3	−37.6	±0.8	−36.5	−38.0	−37.3	±0.8
⑬	−37.6	−39.1	−38.4	±0.8	−37.3	−38.8	−38.1	±0.8
⑭	−37.0	−38.8	−37.9	±0.9	−36.0	−37.4	−36.7	±0.7
⑮	−37.4	−39.2	−38.3	±0.9	−37.1	−38.8	−38.0	±0.8
Average	−	−	−38.3	−	−	−	−38.3	−

SV-30℃ (Unit:℃)

	Ambient temperature 30℃							
	50Hz				60Hz			
	Maximum	Minimum	Middle of cycle	Differential	Maximum	Minimum	Middle of cycle	Differential
①	−27.1	−30.0	−28.6	±1.5	−27.0	−29.8	−28.4	±1.4
②	−25.9	−29.1	−27.5	±1.6	−26.1	−29.1	−27.6	±1.5
③	−26.8	−28.9	−27.9	±1.1	−27.2	−29.1	−28.2	±1.0
④	−26.1	−28.4	−27.3	±1.2	−25.7	−28.3	−27.0	±1.3
⑤	−25.2	−27.9	−26.6	±1.4	−25.5	−28.2	−26.9	±1.4
⑥	−29.3	−31.2	−30.3	±0.9	−29.8	−31.5	−30.7	±0.9
⑦	−28.9	−31.2	−30.1	±1.2	−29.4	−31.5	−30.5	±1.1
⑧	−29.8	−32.1	−31.0	±1.2	−30.4	−32.3	−31.4	±0.9
⑨	−28.1	−29.1	−28.6	±0.5	−28.8	−28.9	−28.9	±0.0
⑩	−27.1	−29.1	−28.1	±1.0	−29.0	−30.5	−29.8	±0.8
⑪	−26.4	−28.0	−27.2	±0.8	−26.8	−28.3	−27.6	±0.8
⑫	−26.7	−28.3	−27.5	±0.8	−26.5	−28.2	−27.4	±0.9
⑬	−27.6	−29.5	−28.6	±0.9	−27.5	−29.2	−28.4	±0.9
⑭	−26.8	−28.8	−27.8	±1.0	−26.2	−27.8	−27.0	±0.8
⑮	−27.3	−29.5	−28.4	±1.1	−27.1	−29.2	−28.2	±1.1
Average	−	−	−28.3	−	−	−	−28.5	−

SV-40℃ (Unit:℃)

	Ambient temperature 30℃							
	50Hz				60Hz			
	Maximum	Minimum	Middle of cycle	Differential	Maximum	Minimum	Middle of cycle	Differential
①	−36.5	−38.8	−37.7	±1.2	−36.4	−39.0	−37.7	±1.3
②	−34.8	−37.6	−36.2	±1.4	−35.5	−37.9	−36.7	±1.2
③	−36.0	−37.9	−37.0	±0.9	−36.6	−38.7	−37.7	±1.1
④	−35.3	−37.6	−36.5	±1.2	−35.0	−37.5	−36.3	±1.3
⑤	−34.1	−36.5	−35.3	±1.2	−34.7	−37.2	−36.0	±1.3
⑥	−39.1	−41.3	−40.2	±1.1	−39.6	−41.5	−40.6	±0.9
⑦	−38.9	−41.1	−40.0	±1.1	−39.5	−41.7	−40.6	±1.1
⑧	−39.9	−42.1	−41.0	±1.1	−40.4	−42.3	−41.4	±0.9
⑨	−37.8	−38.1	−38.0	±0.2	−38.8	−40.0	−39.4	±0.6
⑩	−37.3	−39.5	−38.4	±1.1	−38.8	−40.4	−39.6	±0.8
⑪	−35.6	−37.0	−36.3	±0.7	−36.1	−37.6	−36.9	±0.8
⑫	−36.6	−38.1	−37.4	±0.8	−36.1	−37.5	−36.8	±0.7
⑬	−37.4	−38.9	−38.2	±0.8	−37.1	−38.6	−37.9	±0.8
⑭	−36.9	−38.6	−37.8	±0.9	−35.5	−36.9	−36.2	±0.7
⑮	−37.2	−38.8	−38.0	±0.8	−36.8	−38.5	−37.7	±0.9
Average	−	−	−37.8	−	−	−	−38.1	−

Note:This data does not represent a guarantee of product performance.

＜Amount of power consumption＞
Amount of power consumption when driving at cycle

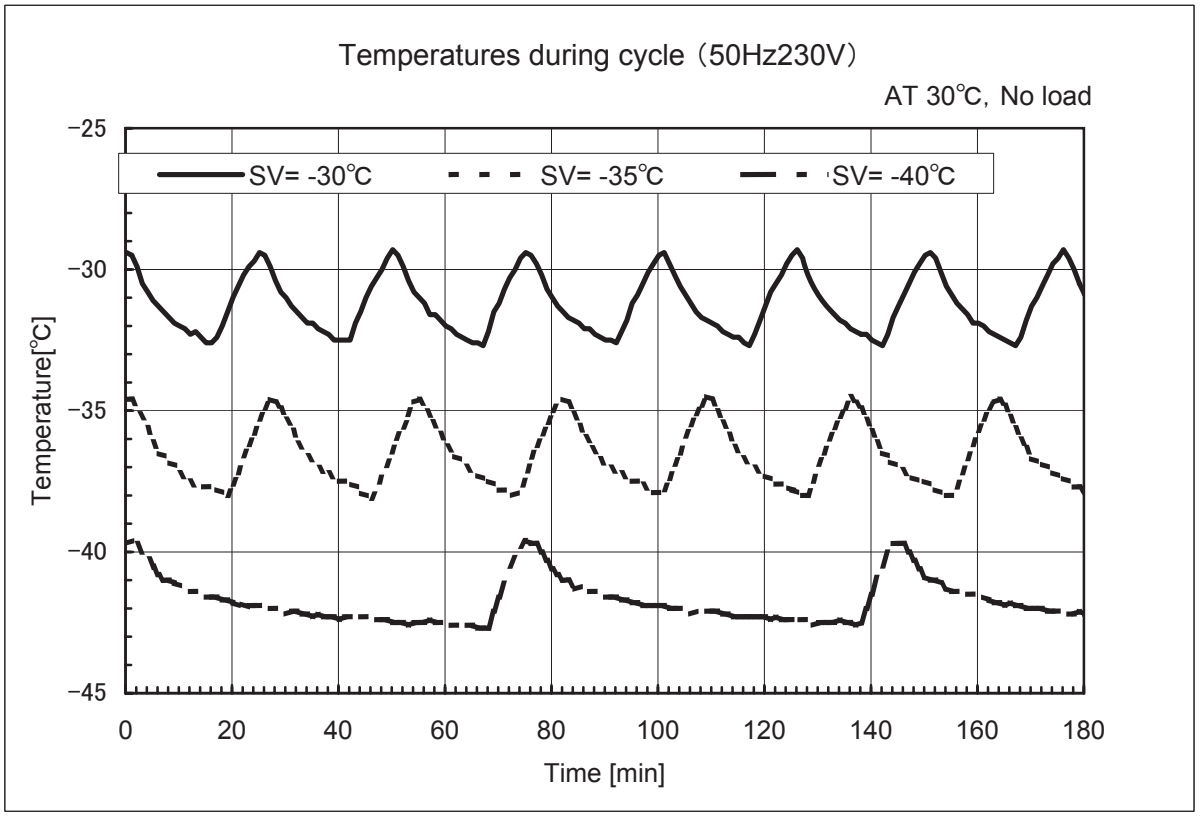
Unit:kWh/day

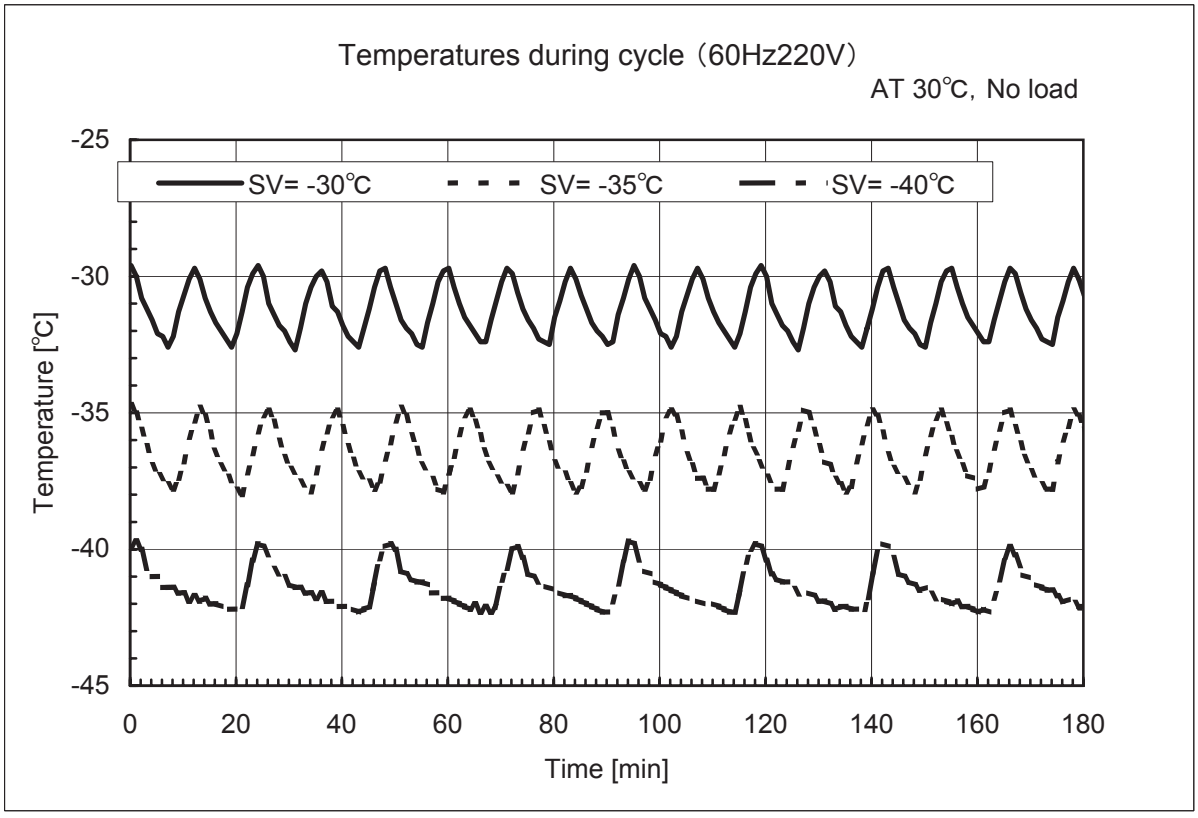
	Ambient temperature 20℃			
	SV-30℃		SV-40℃	
	50Hz	60Hz	50Hz	60Hz
220V	3.66	2.62	4.51	3.39
230V	3.74	-	4.84	-
240V	3.93	-	5.63	-

＜Amount of power consumption＞
Amount of power consumption when driving at cycle

Unit:kWh/day

	Ambient temperature 30℃			
	SV-30℃		SV-40℃	
	50Hz	60Hz	50Hz	60Hz
220V	5.14	3.39	5.89	4.56
230V	5.39	−	6.42	−
240V	5.91	−	6.92	−





Note:This data does not represent a guarantee of product performance.

Instruction manual

・This section is extracted and printed from Instruction Manual.

・If you find out “Refer to page ●●” in them, this page means not page in Service manual but page in the lower corner of each page in the extract from Instruction Manual.
This page number is not corresponded with serial number in Service manual.

・**Please note the extracted Instruction Manual which corresponds to the initial unit production, so the contents may be revised in future.**

SANYO

INSTRUCTION MANUAL

MDF-U5412

BIOMEDICAL FREEZER

CONTENTS

INTRODUCTION

■ Read this manual carefully before using the appliance and follow the instructions for safety operation.

■ Sanyo never guarantee any safety if the appliance is used for any objects other than intended use or used by any procedures other than those mentioned in this manual.

■ Keep this manual in an adequate place to refer to it as necessary.

■ The contents of the manual will be subjected to change without notice due to the improvement of performance or functions.

■ Contact Sanyo sales representative or agent if any page of the manual is lost or page order is incorrect.

■ Contact Sanyo sales representative or agent if any point in this manual is unclear or if there are any inaccuracies.

⚠CAUTION
SANYO guarantees the product under certain warranty conditions. SANYO in no way shall be responsible for any loss of content or damage of content.

PRECAUTIONS FOR SAFE OPERATION

It is imperative that the user complies with this manual as it contains important safety advice.

Items and procedures are described so that you can use this unit correctly and safely. If the precautions advised are followed, this will prevent possible injury to the user and any other person.

Precautions are illustrated in the following way:

⚠WARNING

Failure to observe WARNING signs could result in a hazard to personnel possibly resulting in serious injury or death.

⚠CAUTION

Failure to observe CAUTION signs could result in injury to personnel and damage to the unit and associated property.

Symbol shows;

△ this symbol means caution.

⃠ this symbol means an action is prohibited.

● this symbol means an instruction must be followed.

Be sure to keep this manual in a place accessible to users of this unit.

< Label on the unit >
This mark is labeled on the cover in which the electrical components of high voltage are enclosed to prevent the electric shock.
The cover should be removed by a qualified engineer or a service personnel only.

.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.

Only qualified engineers or service personnel should install the unit. The installation by unqualified personnel may cause electric shock or fire.

Install the unit on a sturdy floor and take an adequate precaution to prevent the unit from turning over. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.

Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

Never install the unit in a flammable or volatile location. This may cause explosion or fire.

Never install the unit where acid or corrosive gases are present as current leakage or electric shock may result due to corrosion.

Always ground (earth) the unit to prevent electric shock. If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod. Such grounding may cause electric shock in the case of an incomplete circuit.

Connect the unit to a power source as indicated on the rating label attached to the unit. Use of any other voltage or frequency other than that on the rating label may cause fire or electric shock.

Never store volatile or flammable substances in this unit if the container cannot be sealed. These may cause explosion or fire.

Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet on the unit. This may cause electric shock or injury by accidental contact with moving parts.

Use this unit in safe area when treating the poison, harmful or radiate articles. Improper use may cause bad effect on your health or environment.

Turn off the power switch (if provided) and disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Do not touch any electrical parts (such as power supply plug) or operate switches with a wet hand. This may cause electric shock.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Never splash water directly onto the unit as this may cause electric shock or short circuit.

Never put containers with liquid on the unit as this may cause electric shock or short circuit when the liquid is spilled.

Never bind, process, or step on the power supply cord, or never damage or break the power supply plug. A broken supply cord or plug may cause fire or electric shock.

Do not use the supply cord if its plug is loose. Such supply cord may cause fire or electric shock.

Never disassemble, repair, or modify the unit yourself. Any such work carried out by an unauthorized person may result in fire, or electric shock or injury due to a malfunction.

Disconnect the power supply plug if there is something wrong with the unit. Continued abnormal operation may cause electric shock or fire.

When removing the plug from the power supply outlet, grip the power supply plug, not the cord. Pulling the cord may result in electric shock or fire by short circuit.

Disconnect the power supply plug before moving the unit. Take care not to damage the power cord. A damaged cord may cause electric shock or fire.

Disconnect the power plug when the unit is not used for long periods. Keeping the connection may cause electric shock, current leakage, or fire due to the deterioration of insulation.

If the unit is to be stored unused in an unsupervised area for an extended period, **ensure that children do not have access and that doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Remove doors to prevent accidents such as suffocation.

Do not put the packing plastic bag within reach of children as suffocation may result.

PRECAUTIONS FOR SAFE OPERATION

⚠CAUTION

Use a dedicated power source (a dedicated circuit with a breaker) as indicated on the rating label attached to the unit. A branched circuit may cause fire resulting from abnormal heating.

Connect the power supply plug to the power source firmly after removing the dust on the plug. A dusty plug or improper insertion may cause a heat or ignition.

Never store corrosive substances such as acid or alkali in this unit if the container cannot be sealed. These may cause corrosion of inner components or electric parts.

Check the setting when starting up of operation after power failure or turning off of power switch. The stored items may be damaged due to the change of setting.

Be careful not to tip over the unit during movement to prevent damage or injury.

Prepare a safety check sheet when you request any repair or maintenance for the safety of service personnel.

ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe at least under the following conditions (based on the IEC 61010-1):

■ Indoor use;

■ Altitude up to 2000 m;

■ Ambient temperature 5^{o}C to 30^{o}C

■ Maximum relative humidity 80% for temperature up to 31^{o}C decreasing linearly to 50% relative humidity at 40^{o}C;

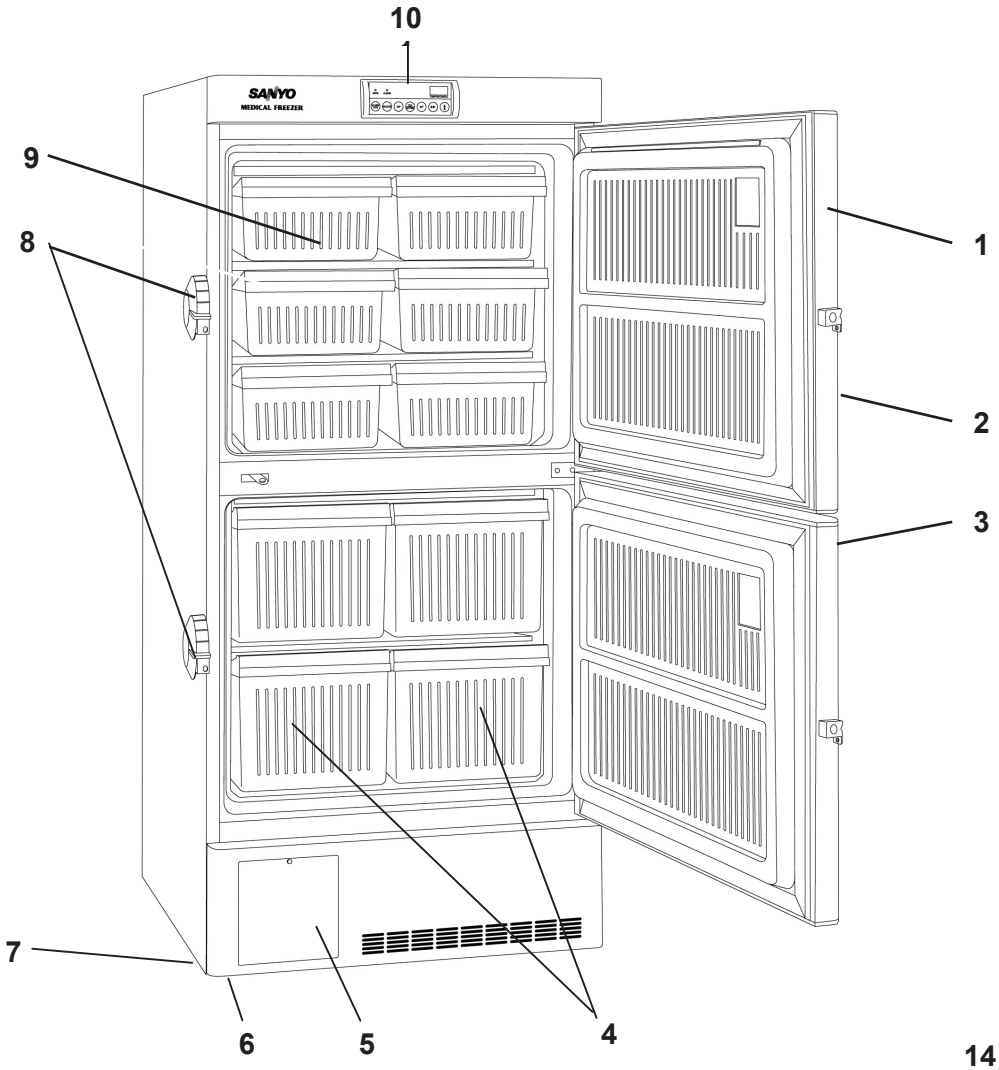
■ Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage;

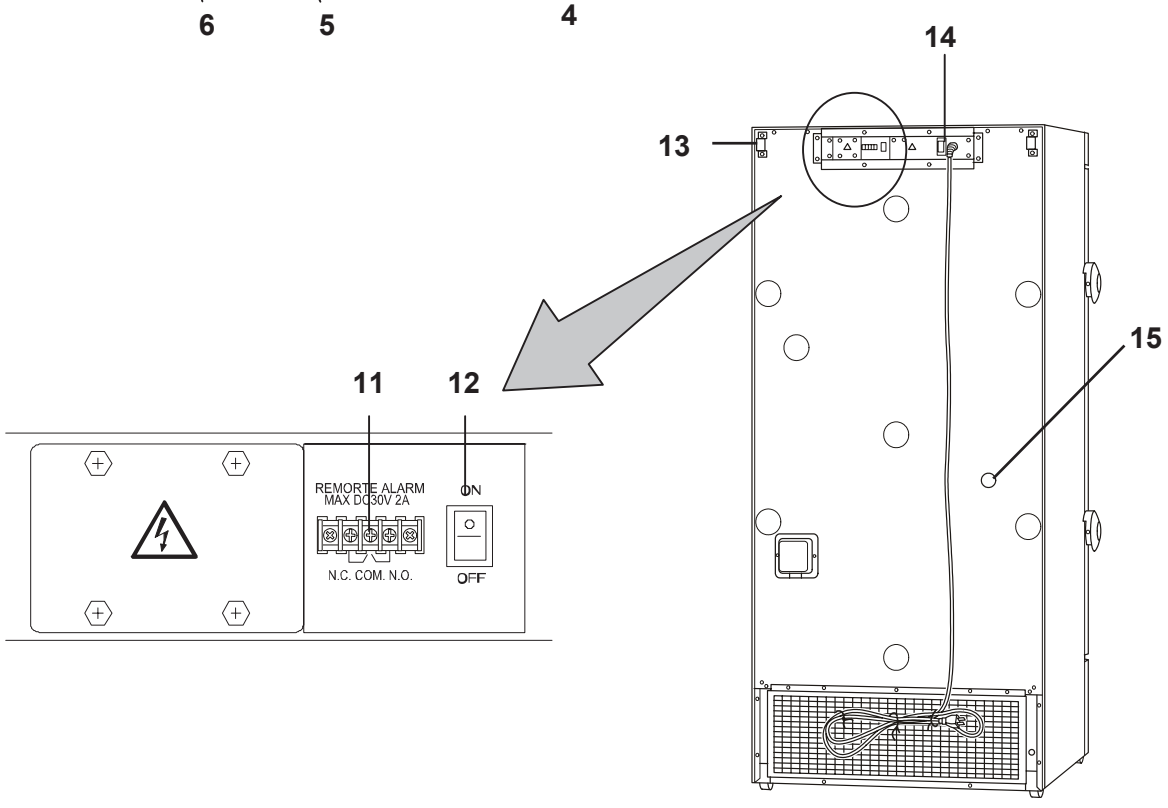
■ Other supply voltage fluctuations as stated by the manufacturer;

■ Transient overvoltages according to Installation Categories (Overvoltage Categories) II; For mains supply the minimum and normal category is II;

■ Pollution degree 2 in accordance with IEC 60664.

FREEZER COMPONENTS





Back side

FREEZER COMPONENTS

1. Door: To open the door, grip the handle. On closing, lock the door latch completely.

2. Handle: Always grip the handle to open the door.

3. Lock: Turn clockwise to 180^{o} with a key and the door is securely locked.

4. Defrost water vessel & storage container: The container can be used to collect the defrosted water when defrosting.

5. Space for temperature recorder: An temperature recorder (optional component) can be attached here. See page 27 “Temperature recorder”.

6. Leveling foot: The height of the freezer can be adjusted by this screw type foot. Keep the unit in level at the installation. See page 12 “INSTALLATION”.

7. Caster: 4 casters are provided to facilitate moving of the cabinet. For the installation, adjust the leveling foot so that the front 2 casters cannot contact with the floor.

8. Door latch: To lock the door, turn this latch downward. A padlock is also available.

9. Storage container: Made of styrol resin. Be careful not to damage the container by a scraper at the time of defrosting.

10. Control panel: To display the temperature setting and running condition. See page 10 for details.

11. Remote alarm terminal: Used to notify an alarm condition of the unit to remote location. See page 17 for details.

12. Battery switch: Switch for battery used for power failure alarm. Always keep “ON”. Turn the switch “OFF” when the unit is in no use for a long period (more than 1 month).

13. Fixture (on back side): 2 fixtures are provided as spacers between the cabinet and wall and also serve as hooks to fix the unit. See page 12 “Installation”.

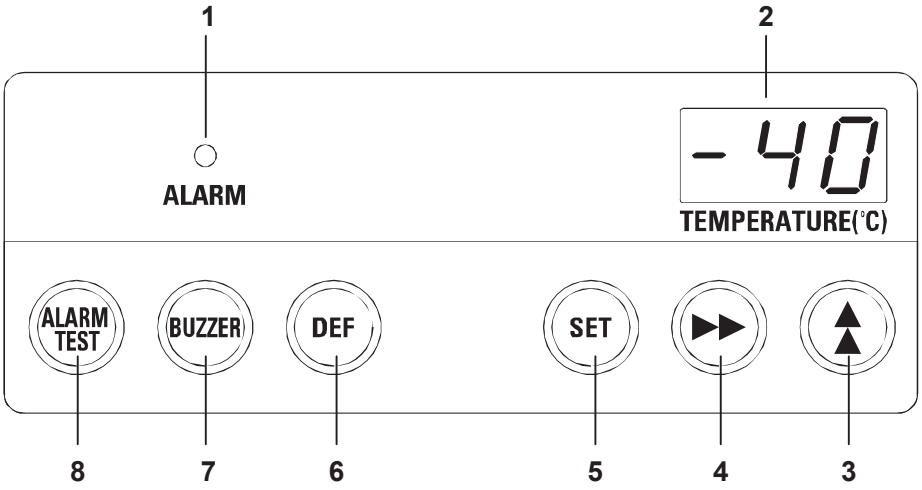
14. Power switch: Switch for the freezer. This switch also activates as an over-current breaker (15 A).

15. Access port: This is used for leading a cable and sensor of a measuring equipment.

Note: The door does not open quickly because the inside of the chamber becomes negative pressure after the door is closed.

FREEZER COMPONENTS

Control panel



1. Alarm lamp (ALARM): This lamp is flashed when the audible alarm is activated.

2. Digital temperature indicator: This indicator shows the present chamber temperature or set temperature.

3. Numerical value shift key (▲▲): Pressing this key in the setting mode causes the numerical value to shift. ON-OFF of key lock can be selected by pressing this key in the key lock mode.

4. Digit shift key (▶▶): Pressing this key in the setting mode causes the changeable digit to shift. Key lock is available by pressing this key for more than 5 seconds in the temperature display mode. Refer to page 14 for the key lock.

5. Set key (SET): Temperature setting mode is led by pressing this key. Once the key is pressed, the changeable digit is flashed. Pressing this key again after setting desired temperature, the setting is stored into computer memory. If there is no key operation for 90 seconds during the setting mode, the setting mode is invalid automatically. See page 14 for the details.

6. Defrost key (DEF): By pressing this key for 5 seconds, the refrigerating operation is stopped. Pressing this key again after defrosting leads resumption of the refrigerating operation.
Note: The refrigerating operation never resumes automatically after defrosting.

7. Buzzer stop key (BUZZER): To silence the audible alarm, press this key. The remote alarm is also stopped by pressing this key. (Buzzer cannot be stopped during remote alarm.)

8. Alarm test key (ALARM TEST): Test key for alarm device. By pressing this key, the alarm lamp is flashed, remote alarm is activated and buzzer sounds. This means all alarm function operate correctly. This key is available only during normal running.

INSTALLATION SITE

To operate this unit properly and to obtain maximum performance, install the unit in a location with the following conditions:

■ A location not subjected to direct sunlight

Do not install the unit under direct sunlight. Installation in a location subjected to direct sunlight cannot obtain the intended performance.

■ A location with adequate ventilation

Leave at least 10 cm around the unit for ventilation. Poor ventilation will result in a reduction of the performance and consequently the failure.

■ A location away from heat generating sources

Avoid installing the unit near heat-emitting appliances such as a heater or a boiler etc. Heat can decrease the intended performance of the unit.

■ A location with little temperature change

Install the unit under stable ambient temperature. The allowable ambient temperature is between +5 and +30°C.

■ A location with a sturdy and level floor

Always install the unit on a sturdy and level floor. The uneven floor or tilted installation may cause failure or injury. Install the unit in stable condition to avoid the vibration or noise. Unstable condition may cause vibration or noise.

⚠ WARNING

Install the unit on a sturdy floor. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.

Select a level and sturdy floor for installation. This precaution will prevent the unit from tipping. Improper installation may result in water spillage or injury from the unit tipping over.

■ A location not prone to high humidity

Install the unit in the ambient of 80% R.H. or less humidity. Installation under high humidity may cause current leakage or electric shock.

⚠ WARNING

Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.

Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

■ A location without flammable or corrosive gas

Never install the unit in a flammable or volatile location. This may cause explosion or fire or may result in the current leakage or electric shock by the corrosion of the electrical components.

■ A location without the possibility of anything fall

Avoid installing the unit in the location where anything can fall down onto the unit. This may cause the breakdown or failure of the unit.

INSTALLATION

1. Removing the packaging materials and tapes

Remove all transportation packaging materials and tapes. Open the doors and ventilate the unit. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.) After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the panels with a dry cloth.

2. Adjust the leveling feet

Extend the leveling feet by rotating them counterclockwise to contact them to the floor. Ensure the unit is level. (Fig.1)

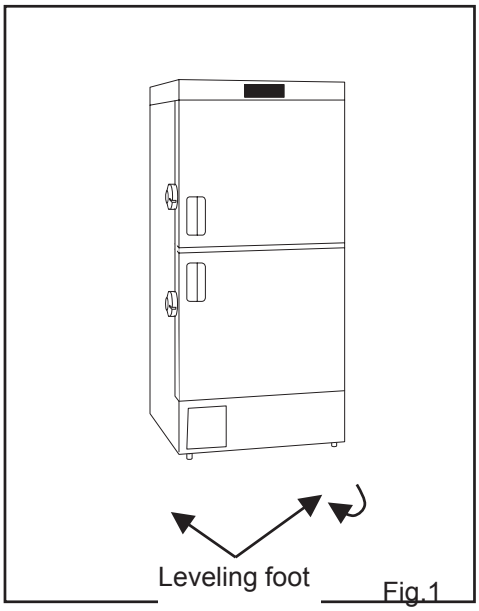


Fig.1

3. Fixing the unit

Two fixtures are attached to the rear of the frame. Fix the frame to the wall with these fixtures and rope or chain. (Fig. 2)

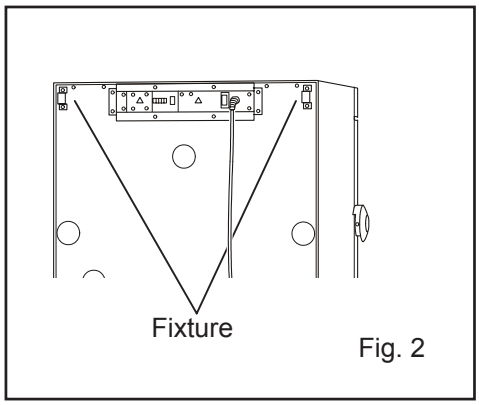


Fig. 2

4. Ground (earth)

The ground (earth) is for preventing the electric shock in the case of the electrical insulation is somehow degraded. Always ground the unit at the time of installation.

⚠WARNING

Use a power supply outlet with ground (earth) to prevent electric shock. If the power supply outlet is not grounded, it is necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod. Such grounding may cause electric shock in the case of an incomplete circuit.

START-UP OF UNIT

Follow the procedures for the initial and consequent operations of the unit.

1. Connect the power cord to the dedicated outlet having appropriate rating with the chamber empty, and turn on the power switch on the freezer.

2. Check that the battery switch is on.

3. Set the desired chamber temperature. See page 14 for the temperature setting.

4. Check that the chamber temperature reaches the desired temperature.

5. Make sure that the alarm lamp blinks and the buzzer sounds by pressing the alarm test key (ALARM TEST). The remote alarm is also operated. E09 is displayed on the control panel and buzzer sounds if the battery switch is off. Make sure to turn on the battery switch.

6. After confirming the above, you can put articles into the freezer chamber in a small batch to prevent the temperature rise.

Note:

■When starting the operation of the freezer for the first time, the alarm lamp (ALARM) lights after the start of operation. When the chamber temperature reaches around the set temperature, then the alarm lamp goes out (The remote alarm is not activated).

■If the buttery switch is turned on before turning on the power of the freezer, the temperature alarm is activated and the buzzer sounds and the remote alarm is also activated after the start of operation. Check that the buttery switch is off before turning on the freezer.

Operation after power failure

The set value is memorized by nonvolatile memory. Accordingly, the freezer resumes the operation with setting before power failure.

When the freezer is recovered from power failure with the chamber temperature higher than the preset temperature during a power failure, then the high temperature alarm is activated and the buzzer sounds and the remote alarm is also activated. Please push the buzzer stop key (BUZZER) to silence buzzer and take appropriate actions if needed.

TEMPERATURE SETTING

Table 1 shows the basic procedure for setting the chamber temperature. Perform key operations in the sequence indicated in the table. The example in the table is based on the assumption that the desired temperature is -25°C.

Note: The unit is set at the factory that the chamber temperature -40°C.

Table 1. Basic operation sequence (Example: Chamber temperature -25°C)

	Description of operation	Key operated	Indication after operation
1	Turn the power switch ON.	----	The current chamber temperature is displayed. 
2	Press set key.	SET	The second digit is flashed. 
3	Set to -25 with the numerical value shift key and digit shift key.	▲	When pressed, the figure of settable digit changes.
		▶▶	When pressed, the settable digit is shifted. 
4	Press set key.	SET	Set temperature is memorized and the current chamber temperature is displayed. 

Note:

• The temperature set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation.

• Although the value of the chamber temperature setting can range from -18°C to -45°C, the guaranteed temperature with no load is -40°C when the ambient temperature is 30°C.

Key lock function

This unit is provided with the key lock function. When the key lock is ON, change of temperature setting through the key pad is not possible. The key lock is set to OFF at the factory.

Display	Mode	Function
L 0	Key lock is OFF	Enable to change temperature setting
L 1	Key lock is ON	Disable to change temperature setting

Table 2. Procedure for key lock setting (change from key lock OFF to key lock ON)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed. 
2	Press digit shift key for 5 seconds.	▶▶	The first digit is flashed. 
3	Press numerical value shift key and scroll the figure to 1.	▲	When pressed, the figure of settable digit changes. 
4	Press set key.	SET	The key lock is set to ON. The current chamber temperature is displayed. 

ALARM TEMPERATURE SETTING

This unit is provided with both high and low temperature alarms. The temperature at which the alarm is activated can be changed.
The available set range for high temperature alarm is between +5°C and +15°C, and -5°C and -15°C for low temperature alarm against the set temperature.
Note: The temperature alarm is set at ±10°C of the set temperature at the factory.

Display	Mode	Function
F01	High temperature alarm set	See Table 6 on page 18
F02	Low temperature alarm set	See Table 6 on page 18

As an example, Table 3 shows the procedure to set the high temperature alarm so that the alarm can activate when the chamber temperature is 5°C higher than the set temperature.
Table 4 shows the procedure to set the low temperature alarm so that the alarm can activate when the chamber temperature is 5°C lower than the set temperature.

Table 3. Procedure for setting high temperature alarm

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed. -40
2	Press numerical value shift key for about 5 seconds.	▲▲	The first digit is flashed. F00
3	Press numerical value shift key and scroll the figure to 1.	▲▲	The first digit is flashed. F01
4	Press set key.	SET	The first digit is flashed. 010
5	Scroll the figure to 005 by using digit shift key and numerical value shift key	▲▲	When pressed, the figure of settable digit changes.
		▶▶	When pressed, the changeable digit moves. 005
6	Press set key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed. -40

Table 4. Procedure for setting low temperature alarm

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed. -40
2	Press numerical value shift key for about 5 seconds.	▲▲	The first digit is flashed. F00
3	Press numerical value shift key and scroll the figure to 2.	▲▲	The first digit is flashed. F02
4	Press set key.	SET	The first digit is flashed. -10
5	Scroll the figure to -05 by using digit shift key and numerical value shift key	▲▲	When pressed, the figure of settable digit changes.
		▶▶	When pressed, the changeable digit moves. -05
6	Press set key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed. -40

• The temperature set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation.

SETTING OF ALARM RESUME TIME

The buzzer and remote alarm are silenced by pressing buzzer stop key (BUZZER) on the control panel during alarm condition. The buzzer and remote alarm will be activated again after certain suspension if the alarm condition is continued. The suspension time can be set by following the procedure shown in the Table 5 below.

The example in the table is based on the assumption that the desired duration is 20 minutes.

Note: The duration is set in 30 minutes at the factory.

Table 5. Setting procedure for alarm resuming time (change from 30 minutes to 20 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed. -40
2	Press digit shift key for 5 seconds.	▲▲	The first digit is flashed. F00
3	Set the figure to F25 with the digit shift key and numerical value shift key.	▶▶	The settable digit is shifted.
		▲▲	When pressed, the figure of settable digit changes. F25
4	Press set key.	SET	The current reset time is displayed. The middle digit is flashed. 030
5	Set the figure to 020 with the numerical value shift key.	▲▲	When pressed, the figure of settable digit changes. 020
6	Press set key.	SET	The setting is memorized and the current chamber temperature is displayed. -40

• The settable alarm resume time are 10, 20, 30, 40, 50, or 60 minutes. The buzzer and remote alarm would not reset if the resume time is set in 000.

• The setting of alarm reset time cannot be changed during the defrosting.

• The buzzer and remote alarm during power failure or alarm testing cannot be silenced.

• The temperature set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation.

REMOTE ALARM TERMINAL

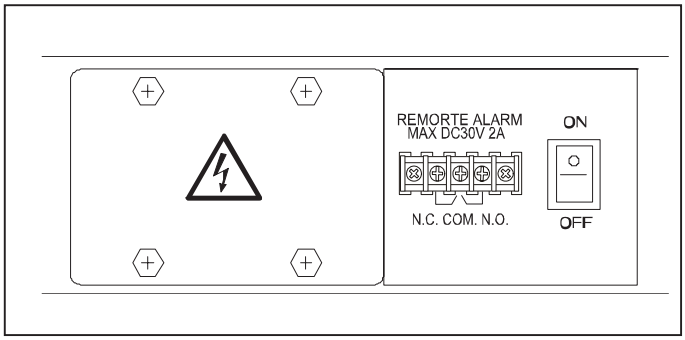
⚠WARNING

Always disconnect the power supply cord before connecting an alarm device to the remote alarm terminal.

The remote alarm terminal is installed at the back of the unit. The alarm is outputted from this terminal. Contact capacity is DC 30 V, 2 A.

Contact output:

	between COM. and N.O.	between COM. and N.C.
At normal	Open	Close
At abnormal	Close	Open



Note: The remote alarm is silenced by pressing the buzzer stop key (BUZZER) as the remote alarm is operated in conjunction with the buzzer except for the power failure alarm and alarm test.

• It is the same condition with being abnormal at the time of the power failure.

ALARMS & SAFETY FUNCTIONS

This unit has the alarms and safety functions shown in Table 6, and also self diagnostic functions.

Table 6 Alarms and safety functions

Alarm & Safety	Situation	Indication	Buzzer	Safety operation
High temperature alarm	If the chamber temperature is higher than the temperature at which the high temperature alarm is activated.	Alarm lamp is flashed. Temperature indicator is flashed.	Intermittent tone with 15 minutes delay.	Remote alarm with 15 minutes delay.
Low temperature alarm	If the chamber temperature is lower than the temperature at which the low temperature alarm is activated.	Alarm lamp is flashed. Temperature indicator is flashed.	Intermittent tone with 15 minutes delay.	Remote alarm with 15 minutes delay.
Power failure alarm	In the case of power failure. When power switch is turned OFF. When the power to the unit is disconnected.	Alarm lamp is flashed.	Intermittent tone	Remote alarm.
Auto-return	When there is no key pressing in each setting mode for 90 seconds.	Chamber temperature is displayed.	-----	Finishing of each Setting mode.
Key lock	When the key lock is ON.	-----	-----	Change of setting is disable.
Thermal sensor Abnormality	If the thermal sensor is disconnected.	Alarm lamp is flashed. E01 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Continuous running.
	If the thermal sensor is short-circuited.	Alarm lamp is flashed. E02 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Continuous running.
Battery switch check	When battery switch is OFF at the time of alarm test.	Alarm lamp is flashed. E09 is flashed.	Intermittent tone	Remote alarm.
Temperature control sensor abnormality	If the sensor is disconnected.	Alarm lamp is flashed. E11 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Normal operation.
	If the thermal sensor is short-circuited.	Alarm lamp is flashed. E12 and chamber temp. are displayed alternately.		
Battery check	When about 3 years has passed with power switch ON.	_F01 and chamber temp. are displayed alternately.	-----	-----
Fan motor check	When about 6 years has passed with power switch ON.	_F02 and chamber temp. are displayed alternately.	-----	-----

Note:

• The above power failure alarm is available when the battery switch is on and the battery is charged. If the battery switch is off or the battery is discharged, only the remote alarm is activated.

• The power failure alarm can be kept about 12 hours with the battery charged fully. A two-day operation of the freezer is needed to charge the battery full.

• The chamber temperature is displayed for 5 seconds if the buzzer stop key (BUZZER) key is depressed during the power failure alarm. At the same time, the alarm stops.

• The remote alarm is silenced by pressing buzzer stop key (BUZZER) as the remote alarm is operated in conjunction with the buzzer, except for the power failure alarm.

• After power failure, the operation is resumed with the condition before power failure since the temperature setting and alarm temperature setting are memorized in a nonvolatile memory.

ROUTINE MAINTENANCE

⚠WARNING

Always disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Cleaning of cabinet

• Clean the unit once a month. Regular cleaning keeps the unit looking new.

• Use a dry cloth to wipe off small amounts of dirt on the outside and inside of the unit and all accessories. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.) After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the cabinet or accessories with a dry cloth.

• Never pour water onto or into the unit. Doing so can damage the electric insulation and cause failure.

• The compressor and other mechanical parts are completely sealed. This unit requires absolutely no lubrication.

• Remove the frost or ice on the chamber wall and clean the condenser filter once a month.

Defrosting

This product is refrigerated by the direct cooling. When it uses for a long time, frost appears on the chamber wall side. It cannot be cooled down when there is much amount of frost. The defroster is mentioned in the following.

Use the scraper provided for removing the frost if the freezer operation must be continued. Pay attention not to impact or damage the inner wall.

1. When defrosting, temporarily move all the contents of containers in the freezer to another low-temperature freezer.

2. Place the empty defrost/storage container inside the freezer.

3. Press defrost key (DEF) for 5 seconds to stop the refrigerating operation. While the refrigerating operation is stopped, the current chamber temperature and dF is displayed on the control panel alternately.

4. After a several hours, check visually that all frost was removed completely.

5. Throw out the water that has accumulated in the defrost/storage containers, then wipe the inside of the freezer.

6. Press defrost key (DEF) so that the refrigerating operation can be started.

7. Once the chamber temperature has dropped to the desired temperature, place the original contents back in the freezer chamber.

Note:

After the defrosting, the refrigerating operation is never resumed automatically. Make sure to press defrost key (DEF) to start the refrigerating operation after defrosting.

REPLACEMENT OF BATTERY

Location of a nickel-metal-hydride battery

This unit is provided a nickel-metal-hydride battery for the power failure warning device. The battery is located in the battery mounting plate inside the cover on the upper side. (Fig. 1)

The high voltage components are enclosed in the electrical box. The cover should be removed by a qualified engineer or a service personnel only to prevent the electric shock.

Removal of nickel-metal-hydride battery

1. Turn off the power switch and disconnect the power supply plug.
2. Remove 6 screws fixing the top cover with a screw driver and remove the top cover. (Fig. 2)
3. Disconnect the battery connector and remove 2 screws fixing the battery mounting plate. (Fig. 3)
4. Take out the battery. (Fig. 4)
5. Follow the procedure for recycling or proper disposal.

Handling of battery

Cover the battery terminal with an insulating tape to avoid the short circuit. Then follow the procedure for recycling or proper disposal.

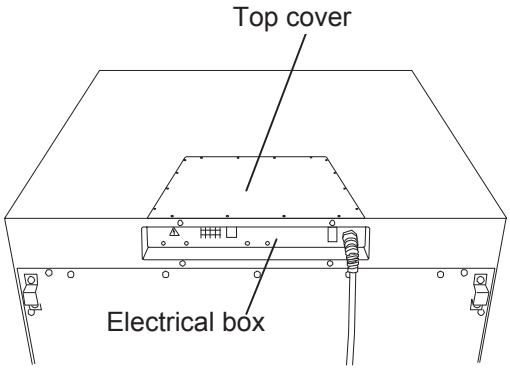


Fig. 1

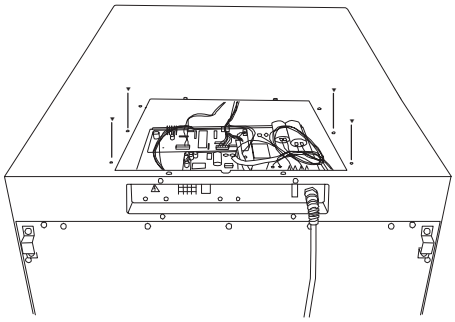


Fig. 2

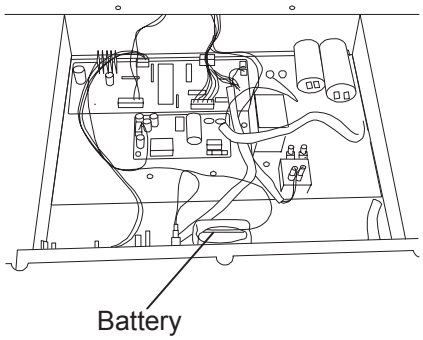


Fig. 3

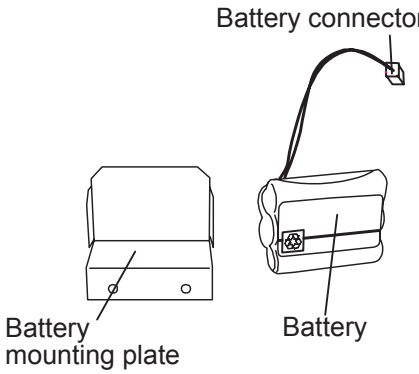


Fig. 4

TROUBLE SHOOTING

If the unit malfunctions, check out the following before calling for service.

Malfunction	Check/Remedy
The chamber is not cooled at all	■ The circuit breaker of power source is active ■ The voltage is too low. (In this case, call an electrician.) ■ The power switch is not ON. ■ The large amount of articles (load) is stored in the chamber at one time. ■ The freezer is in defrost condition.
The cooling is poor	■ The ambient temperature is too high. ■ The door is not closed firmly. ■ The large amount of frost is built on the chamber wall. ■ The air intake vent is blocked. ■ The set temperature is not inputted properly. ■ The freezer is in the direct sunlight. ■ There is any heating source near the freezer. ■ A rubber cap and insulation for the access port are not set correctly. ■ You put too many unfrozen articles into the freezer compartment.
Noise	■ The freezer is not installed on the sturdy floor. ■ The freezer is not leveled with the leveling feet. ■ There is anything touching the frame. ■ The freezer is in the status immediately after start up. The unit sometimes causes a noise when the chamber temperature is high due to the large load. The noise gets less and less accompanying with the cooling of the chamber.

Note:

If the malfunction is not eliminated after checking the above items, or the malfunction is not shown in the above table, contact Sanyo sales representative or agent.

DISPOSAL OF UNIT

⚠WARNING

If the unit is to be stored unused in an unsupervised area for an extended period **ensure that children do not have access and doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Always remove doors to prevent accidents such as suffocation.

Recycle of battery

The unit contains a rechargeable battery. The battery is recyclable. At the end of it's useful life, check with you local solid officials option or proper disposal.

∗ Label indication is obliged to comply with Taiwanese battery regulation.

DISPOSAL OF UNIT

(English)
FOR EU USERS
The symbol mark and recycling systems described below apply to EU countries and do not apply to countries in other areas of the world.

Your SANYO product is designed and manufactured with high quality materials and components which can be recycled and/or reused.

The symbol mark means that electrical and electronic equipment, batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.

Note:
If a chemical symbol is printed beneath the symbol mark, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows: Hg: mercury, Cd: cadmium, Pb: lead

In the European Union there are separate collection systems for used electrical and electronic equipment, batteries and accumulators.
Please, dispose of them correctly at your local community waste collection/recycling centre.

Please, help us to conserve the environment we live in!

(German)
Für EU-Staaten
Das Symbol und das erwähnte Wiederverwertungssystem gelten nur für die Länder der EU und nicht für andere Länder oder Gebiete in der Welt.

Die Produkte von SANYO werden aus hochwertigen Materialien und Komponenten gefertigt, die sich wieder verwenden lassen.

Das Symbol bedeutet, dass elektrische oder elektronische Geräte, Batterien und Akkus am Ende ihrer Lebensdauer nicht im Haushaltmüll entsorgt werden dürfen.

Hinweis:
Ein chemisches Zeichen unter dem Symbol bedeutet, dass die Batterie bzw. der Akku Schwermetalle in gewissen Konzentrationen enthält. Die Metalle werden wie folgt bezeichnet: Hg: Quecksilber, Cd: Kadmium, Pb: Blei

In der Europäischen Union gibt es separate Sammelstellen für elektrische und elektronische Geräte, Batterien und Akkus.
Entsorgen Sie solche Geräte bitte richtig in der kommunalen Sammelstelle bzw. im Recyclingzentrum.

Helfen Sie mit, die Umwelt in der wir leben, zu schützen.

DISPOSAL OF UNIT

(French)
POUR LES UTILISATEURS DE UE
Le symbole et les systèmes de recyclage évoqués ci-dessous s'appliquent uniquement aux pays de UE.

Votre produit SANYO est conçu et fabriqué avec des composants et des matériaux de hautes qualités qui peuvent être recyclés et/ou réutilisés.

Le symbole signifie que les équipements électriques et électroniques, les batteries et les accumulateurs ne doivent pas être mis au rebut avec les déchets domestiques à l'issue de leur durée de vie.

Remarque:
Si un symbole chimique est imprimé sous le symbole, le symbole chimique indique que la batterie ou l'accumulateur contient une certaine concentration de métaux lourds. Les métaux sont indiqués de la manière suivante: Hg: mercure, Cd: cadmium, Pb: plomb.

Il existe différents systèmes de collecte pour les équipements électriques et électroniques, les batteries et les accumulateurs usagés au sein de l'Union européenne.
Veuillez mettre les équipements au rebut de manière correcte, auprès de votre centre de recyclage/de collecte des déchets local.

Aidez-nous à préserver l'environnement dans lequel nous vivons!

Les machines ou appareils électriques et électroniques contiennent fréquemment des matières qui, si elles sont traitées ou éliminées de manière inappropriée, peuvent s’avérer potentiellement dangereuses pour la santé humaine et pour l’environnement.
Cependant, ces matières sont nécessaires au bon fonctionnement de votre appareil ou de votre machine. Pour cette raison, il vous est demandé de ne pas vous débarrasser de votre appareil ou machine usagé avec vos ordures ménagères.

(Spanish)
PARA USUARIOS DE LA UNION EUROPEA
El símbolo y los sistemas de reciclado descriptos a continuación se aplican para países de la Unión Europea y no se aplica para países en otras áreas del mundo.

Su producto SANYO fue diseñado y fabricado con materiales de alta calidad y componentes que pueden ser reciclados y/o vueltos a usar.

El símbolo significa que los equipos eléctricos y electrónicos, baterías y acumuladores, al final de su vida útil, debe ser desechados separadamente de sus residuos domiciliarios.

Nota:
Si hay un símbolo químico impreso debajo del símbolo, este símbolo químico significa que la batería o acumulador contiene una cierta concentración de un metal pesado. Esto es indicado de la siguiente manera: Hg: mercurio, Cd: cadmio, Pb: plomo

En la Unión Europea hay sistemas de recolección separados para equipos eléctricos y electrónicos, baterías y acumuladores usados.
Por favor, disponga de ellos correctamente en el centro de recolección de residuos/reciclado de la comunidad de su localidad.

Por favor, ayúdenos a proteger el medio ambiente en que vivimos!

DISPOSAL OF UNIT

(Portuguese)
PARA UTILIZADORES DA UE
O símbolo e os sistemas de reciclagem descritos abaixo aplicam-se aos países da UE e não se aplicam aos países noutras áreas do mundo.

O seu produto SANYO foi concebido e fabricado com materiais e componentes de elevada qualidade que podem ser reciclados e/ou reutilizados.

O símbolo significa que o equipamento eléctrico e electrónico, baterias e acumuladores, em final de vida, não devem ser deitados fora juntamente com o lixo doméstico.

Atenção:
Se estiver impresso um símbolo químico debaixo do símbolo de , este símbolo químico significa que a bateria ou acumulador contém um metal pesado numa determinada concentração. Estará indicado da seguinte forma: Hg: mercúrio, Cd: cádmio, Pb: chumbo

Na União Europeia existem sistemas de recolha separados para equipamento eléctrico e electrónico, baterias e acumuladores.
Por favor, entregue-os no seu centro de reciclagem/recolha de lixo local.

Por favor, ajude-nos a conservar o ambiente!

(Italian)
PER UTENTI UE
Il simbolo e i sistemi di riciclaggio descritti di seguito si applicano esclusivamente ai paesi dell'UE.

Questo prodotto SANYO è stato progettato e realizzato con materiali e componenti di elevata qualità che possono essere riciclati e/o riutilizzati.

Il simbolo di riciclaggio mostrato di seguito indica che i dispositivi elettrici ed elettronici, le batterie e gli accumulatori, una volta esauriti, devono essere smaltiti separatamente rispetto ai rifiuti domestici.

Nota:
Se sotto il simbolo di riciclaggio appare un simbolo chimico, esso sta ad indicare che la batteria o l'accumulatore contengono metalli pesanti a determinate concentrazioni. Questo viene specificato come segue: Hg: mercurio, Cd: cadmio, Pb: piombo.

Nell'Unione europea esistono diversi sistemi per la raccolta dei rifiuti speciali quali i dispositivi elettrici ed elettronici, le batterie e gli accumulatori.
Si raccomanda di provvedere allo smaltimento di tali rifiuti secondo quanto previsto dalle normative vigenti in materia.

Aiutaci a conservare l'ambiente!

DISPOSAL OF UNIT

(Dutch)
VOOR GEBRUIKERS IN DE EU
Het symbool en de recycleersystemen die hieronder beschreven worden, zijn van toepassing op de landen in de EU en zijn niet van toepassing op landen in andere delen van de wereld.

Uw SANYO product is ontworpen en gemaakt met materialen en onderdelen van hoge kwaliteit, die gerecycleerd en opnieuw gebruikt kunnen worden.

Het symbool betekent dat elektrische en elektronische apparatuur, batterijen en accu's aan het eind van hun leven apart van uw huisafval weggegooid moeten worden.

Let op:
Indien een chemisch symbool afgedrukt staat onder het symbool, betekent dit chemisch symbool dat de batterij of accu een zwaar metaal met een bepaalde concentratie bevat. Dit wordt als volgt aangegeven: Hg: kwik, Cd: cadmium, Pb: lood

In de Europese Unie zijn afzonderlijke inzamelingssystemen voor gebruikte elektrische en elektronische apparatuur, batterijen en accu's.
Wilt u deze op de juiste manier weggooien bij uw plaatselijk afvalinzameling-/recyclingcentrum in uw buurt?

Help ons het milieu waarin wij leven in stand te houden!

(Swedish)
FÖR ANVÄNDARE INOM EU
Den symbolmärkning och de återvinningssystem som beskrivs här nedan gäller länder inom EU och gäller inte länder i någon annan del av världen.

Din SANYO-produkt har konstruerats och tillverkats med delar och material av hög kvalitet, som kan återvinnas och/eller återanvändas.

Symbolmärkningen innebär att elektrisk och elektronisk utrustning, batterier och ackumulatorer, vid slutet av deras livslängd, inte får slängas som hushållsavfall utan skall slängas separat.

Observera:
Om en kemisk symbol finns tryckt under denna symbolmärkning, betyder denna kemiska symbol att batteriet eller ackumulatorn innehåller en tungmetall med en viss koncentration. Detta indikeras på följande sätt: Hg: kvicksilver, Cd: kadmium, Pb: bly

I den Europeiska Unionen finns det separata uppsamlingssystem för använd elektrisk och elektronisk utrustning, batterier och ackumulatorer.
Gör dig av med sådana saker på rätt sätt på den speciella lokala platsen för återsamling/återanvändning.

Hjälp oss att bevara den miljö vi lever i!

TEMPERATURE RECORDER (OPTION)

⚠WARNING

Always disconnect the power supply to the unit prior to attachment of a temperature recorder in order to prevent electric shock or injury.

An automatic temperature recorders is available for the freezer as the optional component. The type of the temperature recorder is MTR-G85 and MTR-4015LH. For the attachment, the mounting kit is necessary. Following shows the combination of recorder with the mounting kit. Contact Sanyo sales representative or agent for the attachment of an automatic temperature recorder. :

Temperature recorder	Mounting kit
MTR-4015LH	MPR-S30
MTR-G85 (circular chart type)	MPR-S7

Setting of MTR-4015LH

Pull the knob on the upper part of the temperature recorder forward to change the recording chart or battery.

Setting of recording chart

1. The information on the temperature recording chart is shown in Fig. 1.

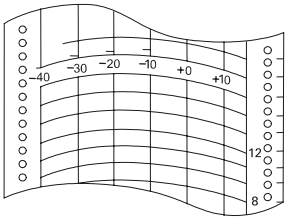


Fig. 1

2. Pull the cartridge up after opening the top lid. The lid can be opened by turning the knob counterclockwise. See Fig. 2.

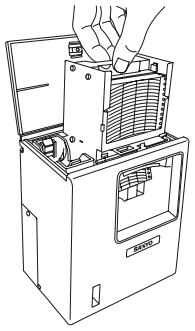


Fig. 2

3. As shown in Fig. 3, insert the recording chart with the “begin” tab placed in the cartridge. Check that the printed side is facing out.

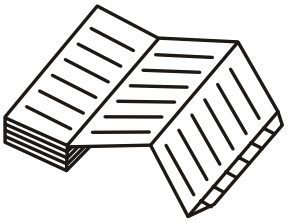


Fig. 3

4. Place the recording chart beneath the arm and between the plate spring and guide plate in the direction of the arrow.

Note:

- ■ Do not scratch or put pressure on the recording chart.
- ■ Do no bend the recording chart.
- ■ Do not reverse the recording chart manually.

The used paper left in the used recording chart compartment can cause a malfunction. Be sure to remove it. See Fig. 4.

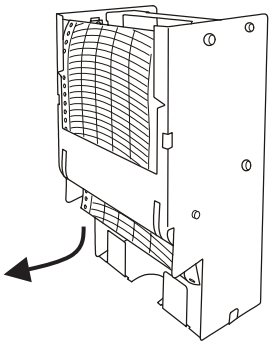


Fig. 4

TEMPERATURE RECORDER (OPTION)

5. Place the recording chart between the guide and the guide plate. Slide the recording chart along the guide plate so that the recording chart will not be forced out of the date/hour slot. See Fig. 5.

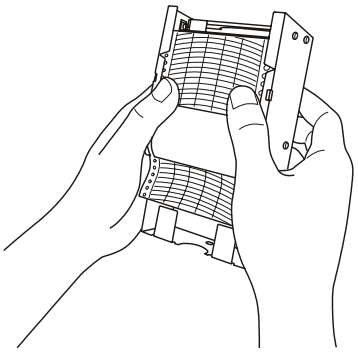


Fig. 5

6. After ascertaining that the holes on the side of the chart are locked into the teeth of the sprocket, turn the gear and send the chart into the used chart compartment.

Setting of time

1. Turn the gear on the date/hour slot to the desired time.

2. After properly folding the recording chart in the used or unused chart compartment, replace the cartridge.

Removing of the used recording chart

After recording, take out the cartridge and remove the recording chart from the recording chart outlet. If not all of the recording chart has been fed into the used recording chart compartment, send all the recording chart in the compartment first turning the gear.

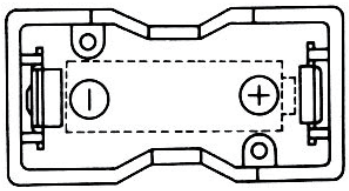


Fig. 6

Battery replacement

To replace the battery, turn the knob counterclockwise to open the lid. Place the battery in the battery case according to the plus-minus indications on the bottom of the battery case. See Fig. 6. At the time of the first use the battery.

Note :

This temperature recorder is designed for the manganese dry cell and the alkaline dry cell.

Do not use a rechargeable battery because the initial voltage of such battery is low. The rechargeable battery may cause the malfunction of temperature recorder or shorten the battery life significantly.

Start-up

1. The quartz motor is started by placing a “R14” or size “C” dry cell battery in the battery case.

2. Check the operation of the recorder using the quartz motor rotation check gear.

3. Replace the battery once a year.

Stopping

The temperature recorder is stopped by taking the battery out of the battery case.

TEMPERATURE RECORDER (OPTION)

Installation of MTR-4015LH

The temperature recorder is installed on the left lower front of the freezer.

1. Remove the screw on the cover for the temperature recorder space on the lower front of the freezer. Open the cover and push the shaft on the both sides outward to remove the cover. Fig. 7

2. Remove the wire grille on the back bottom of the freezer. See Fig.9

3. Set the automatic temperature recorder (MTR-4015LH) to the recorder fixture (MPR-S30:option) referring to a manual enclosed with the recorder fixture. (Fig.8)

4. Install the temperature recorder in the temperature recorder space.

5. Route the capillary tube of the temperature recorder to the back of the freezer through the unit compartment.

6. Remove 2 rubber caps (outside and inside) on the access port on the back of the freezer and also remove the insulation in the port.

7. Pass the temperature recorder sensor into the chamber through the access port. Fig. 10

8. After covering the temperature recorder sensor with the cover provided, fix the recorder sensor under the 3rd shelf by using 2 enclosed binders. See Fig. 11.

9. Make a small cut on the rubber caps for capillary to pass.

10. Replace the insulation into the access port and cover the port completely with the rubber caps.

11. Replace the wire grille on the back bottom of the freezer.

12. Operate the freezer until the chamber temperature gets to the set temperature. Check the recorded temperature and chamber temperature displayed on the control panel. Adjust the zero adjustment volume on the temperature recorder so that the recorded temperature can corresponds with the displayed temperature if they are not compliance each other

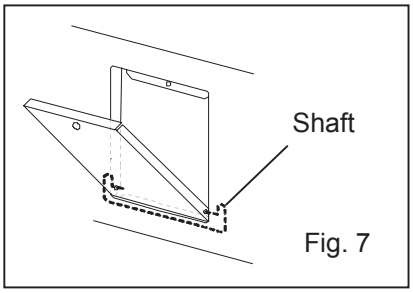


Fig. 7

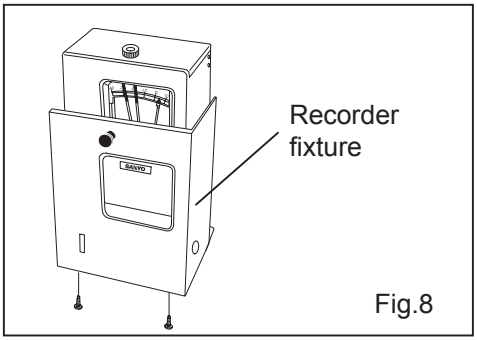


Fig.8

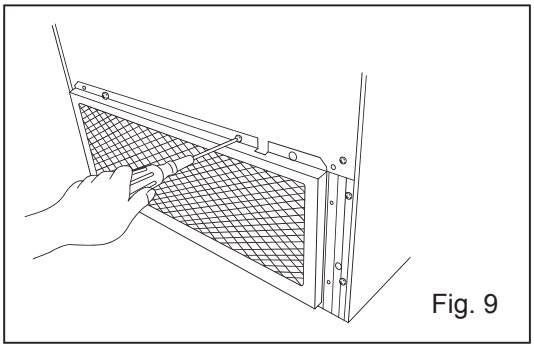


Fig. 9

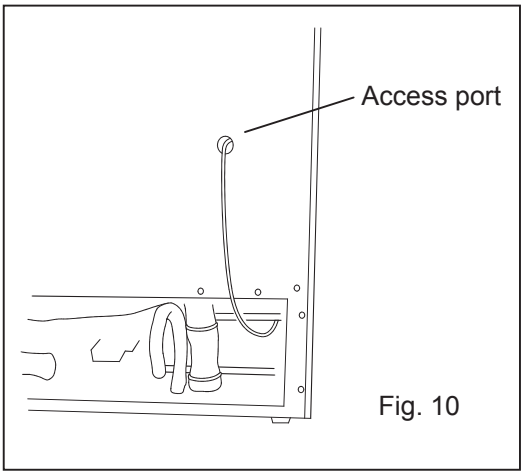


Fig. 10

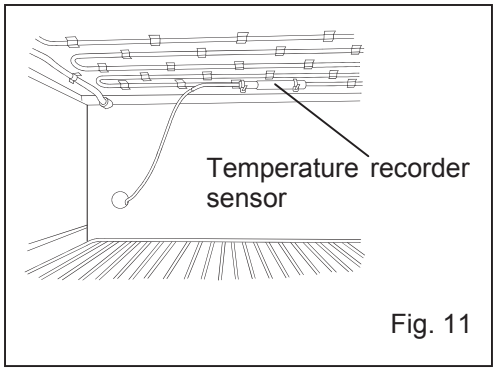


Fig. 11

TEMPERATURE RECORDER (OPTION)

Installation of MTR-G85

The temperature recorder is installed on the left lower front of the freezer.

1. Attach the temperature recorder to the mounting kit (MPR-S7) by following the procedure shown in the manual enclosed with the mounting kit.

2. Remove the screw on the cover for the temperature recorder space on the lower front of the freezer. Open the cover and push the shaft on the both sides outward to remove the cover. Fig. 12

3. Install the temperature recorder in the temperature recorder space.

4. Join the wire in the unit compartment with the temperature recorder wire by each wire connector. See Fig. 13

5. Remove the wire grille on the back bottom of the freezer. See Fig.14

6. Route the capillary tube of the temperature recorder to the back of the freezer through the unit compartment

7. Remove 2 rubber caps (outside and inside) on the access port on the back of the freezer and also remove the insulation in the port.

8. Pass the temperature recorder sensor into the chamber through the access port. Fig. 15

9. After covering the temperature recorder sensor with the cover provided, fix the temperature recorder sensor under the 3rd shelf by using 2 enclosed binders. See Fig. 16.

10. Make a small cut on the rubber caps for capillary to pass.

11. Replace the insulation into the access port and cover the port completely with the rubber caps.

12. Replace the wire grille on the back bottom of the freezer.

13. Operate the freezer until the chamber temperature gets to the set temperature. Check the recorded temperature and chamber temperature displayed on the control panel. Adjust the zero adjustment volume on the temperature recorder so that the recorded temperature can corresponds with the displayed temperature if they are not compliance each other

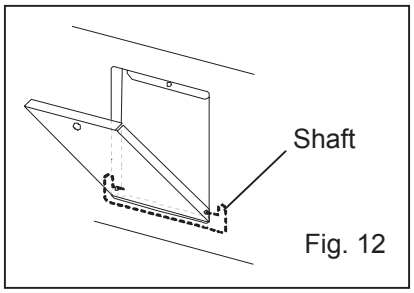


Fig. 12

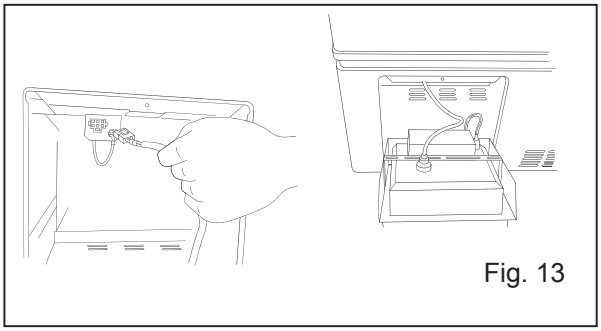


Fig. 13

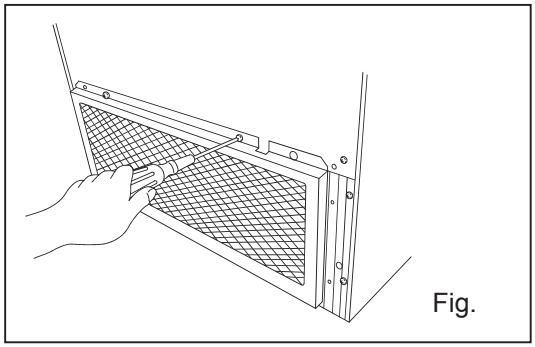


Fig.

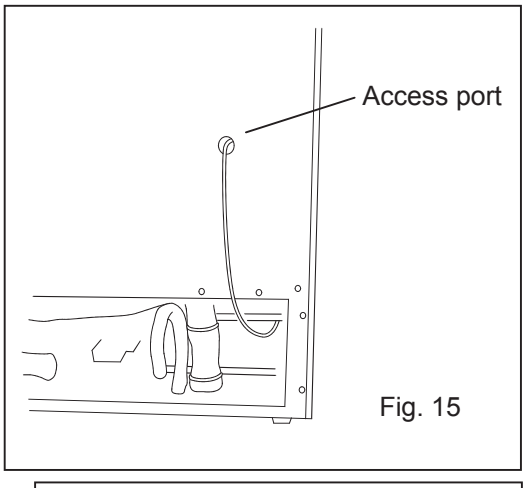


Fig. 15

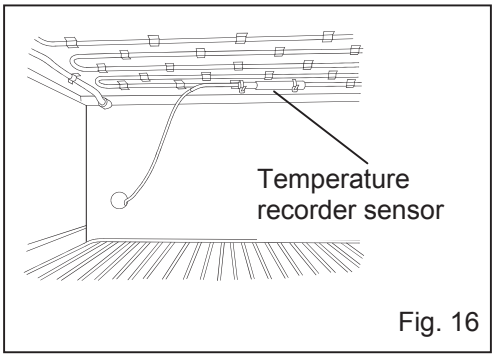


Fig. 16

SPECIFICATIONS

Name	Biomedical Freezer
Model	MDF-U5412
External dimensions	W804 x D772 x H1802 (mm)
Internal dimensions	W658 x D607 x H1272 (mm)
Effective capacity	482 L
Exterior	Painted steel
Interior	Styrol resin
Insulation	Rigid polyurethane foamed-in place
Outer door	Painted steel
Lock	1
Caster	4
Leveling leg	2
Evaporator	Tube on sheet type (also used as a shelf)
Access port	Diameter 30 mm, 2 on back side
Condenser	Wire and tube type
Compressor	Hermetic rotary type, 400 W
Refrigerant	R-404A
Temperature controller	Microcomputer control system
Temperature display	Digital display (between -50 and +50°C)
Temperature sensor	Thermistor sensor
Temperature alarm	Flash of digital indicator and alarm lamp, Buzzer, (Remote alarm)
Accessories	1 set of key, 1 scraper 6 small baskets for upper chamber; W290 x D536 x H136 (mm) 4 large baskets for lower chamber; W290 x D536 x H238 (mm)
Weight	134 kg
Battery	For power failure alarm, Nickel-metal-hydride battery, DC 6 V, 1100 mAh, Automatic charge (5HR-AAC)
Optional component	Temperature recorder (MTR-4015LH, MTR-G85) Mounting kit for temperature recorder (MPR-S30, MPR-S7) Interface board (MTR-480, MTR-L03)

Note: Design or specifications will be subject to change without notice.

- The battery for power failure alarm is an article for consumption. It is recommended that the battery will be replaced about every 3 years. Contact Sanyo sales representative or agent at the time of replacement of the battery for recycling.
- Fan motors are expendable supplies. Exchange it for about every 6 years. Contact Sanyo sales representative or agent at the time of replacement of the fan motor.

PERFORMANCE

Cooling performance	-40°C (ambient temperature; 30°C, no load)			
Temperature control range	-20°C to -40°C			
Power source	220 V 50 Hz	220 V 60 Hz	230 V 50 Hz	240 V 50 Hz
Rated power consumption	240 W	285 W	255 W	290 W
Noise level	42 dB [A] (background noise; 20 dB)			
Maximum pressure	1.80 MPa			

Note: The unit with CE mark complies with EC directives.

⚠ CAUTION

Please fill in this form before servicing.
Hand over this form to the service engineer to keep for his and your safety.

Safety check sheet

1. Freezer contents : ☐Yes ☐No
   Risk of infection: ☐Yes ☐No
   Risk of toxicity: ☐Yes ☐No
   Risk from radioactive sources: ☐Yes ☐No

   (List all potentially hazardous materials that have been stored in this unit.)
   Notes :

2. Contamination of the unit
   Unit interior ☐Yes ☐No
   No contamination ☐Yes ☐No
   Decontaminated ☐Yes ☐No
   Contaminated ☐Yes ☐No
   Others:

3. Instructions for safe repair/maintenance of the unit
   a) The unit is safe to work on ☐Yes ☐No
   b) There is some danger (see below) ☐Yes ☐No
   Procedure to be adhered to in order to reduce safety risk indicated in b) below.

Date :
Signature :
Address, Division :
Telephone :

Product name:	Model:	Serial number:	Date of installation:
Biomedical Freezer	MDF-U5412		

Please decontaminate the unit yourself before calling the service engineer.

SANYO Electric Co., Ltd
Printed in Japan