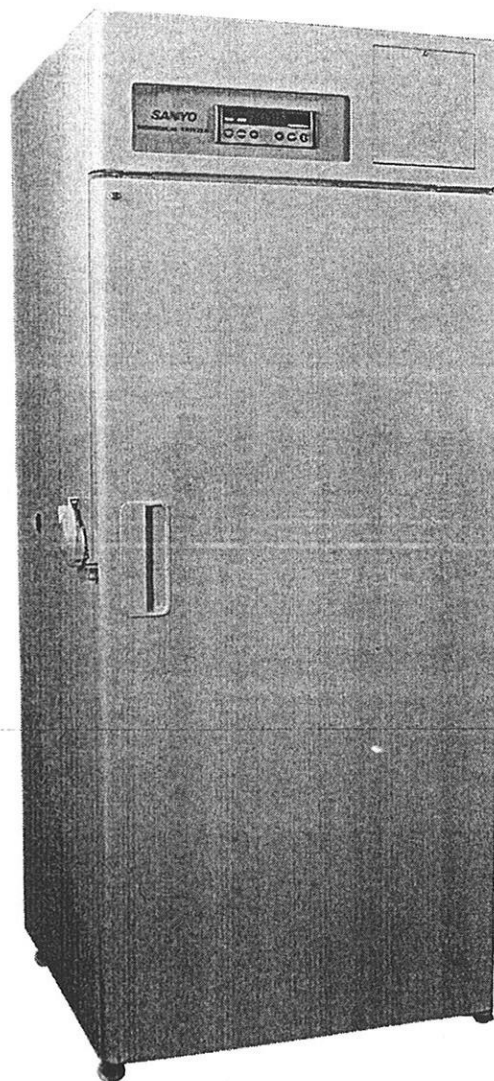


Service
Manual

Biomedical freezer
MDF-U730

SANYO Electric Biomedical CO., Ltd

FILE NO.



SM9910044

EFFECTIVE MODELS

This service manual is effective following models.

Model	Model code	Voltage/Hz
MDF-U730	823-178-51	115V 60Hz

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Features

- HFC refrigerant
Refrigerant circuit contains HFC refrigerant that effect to environment little.
Latest cooling system reduces negative factor to global environment. With ambient temperature shown at 35°C, while temperature inside chamber maintains -35°C.
- PCM structure
PCM structure reduces amount of organic solvent.
- Internal cooled air forced circulation
Internal cooled air forced circulation by internal fan motor is adopted to ensure the uniform internal temperature.
- Digital display and digital setting
Digital display indicates the internal temperature. Thermister sensor is adopted as a temperature sensor because it has high stability of accuracy.
Microcomputer controls internal temperature by receiving signal from thermister sensors.
- The unit has various kinds of safety functions, such as high temperature alarm.
Alarm is shown by blinking LED lamp and buzzer sounds.
The unit also has remote alarm contact.
- Auto defrosting function
Defrost is performed by special heater installed in cooling unit for a short time.
The unit also has manual defrosting function to be able to defrost at regular timing.

Specification

MDF-U730

Items		Specification
Model description		Biomedical freezer
Model Number		MDF-U730
Outer dimension (Max)		W 770 × D 830 × H 1955 mm
Inner dimension		W 650 × D 710 × H 1370 mm
Effective chamber capacity		632 liters. 22.4cu.ft
Cooling performance		-30°C at 1/2 height of the chamber (AT : 35°C、 No load)
Exterior cabinet		Zinc galvanized steel w/powder polyester coating (new bio-gray)
Interior cabinet		Pre-coated steel (white)
Insulation		Rigid polyurethane foam Foam: R-141b
Door		Zinc galvanized steel w/powder polyester coating (new bio-gray)
Door lock		1 pcs
Compressor		Hermetic rotary type (300W)
Refrigerant		R-404A (HFC refrigerant)
Refrigerator oil		E-68NT1 DO NOT RENTANG
Condenser		Skin type
Accessories	Shelf	Hard steel wire PE coating. Max load : 50kg/shelf 4 pcs (W626mm×D620mm)
	Others	Key 1 set ,2 large & 2 small nylon clips
Caster		4pcs. (Front & rear movement wheels)
Leveling legs		2 pcs in front side.
Access hole		Inner diameter 30mm. 1 places in left side of frame and 1 places on top of the unit.
Option		Automatic recorder: MTR-G85G, fixture MPR-S7 Automatic recorder: MTR-4014LH, fixture MPR-S30
Power supply		Single phase, local voltage
Weights		150 kg

Items		Specification
Internal temp.control range		-20°C ~ -30°C(AT : 5°C ~ 35°C,RH80%less)
Settable Range		Temp. set range : -15°C ~ -35°C
Temperature sensor		Thermistor
Temperature display		LED digital display (red colored) by 1°C. Range : -40°C ~ 0°C
Alarm	High/Low Temperature	In case Internal Temp higher/lower than set temp. 10degrees, ALARM lamp brinks and buzzer sounds intermittently (about 15 min. delay) Remote alarm contact: turns ON with buzzer sounds
	Power failure	ALARM lamp brinks, buzzer sounds intermittently, remote alarm contact turns ON and display is extinguished.
	Remote	Remote alarm terminal 3P: contact capacity DC30v, 2A, N.O. -COM. (During temperature alarm, power failure alarm, alarm test: ON)
Control panel		ALARM lamp BUZZER: Buzzer key ALARM TEST: Alarm test key SET: To switch the SV and PV ▶▶ : To shift the set digit ▲ : To change the SV DEF: Defrost key
Key lock function		Press ▶▶ key for five seconds Lo0: Unlock Lo1: Lock
Self diagnosis function		*When temperature sensor is in fault, In case sensor shorted, error code E01/HI are displayed. In case sensor opened, error code E01/LO are displayed. *When defrost sensor is in fault, In case sensor shorted, error code E02/ internal temp. are displayed. In case sensor opened, error code E02/ internal temp. are displayed
Power switch		Side on rear box
Battery switch		Behind on front cover
Power supply		Local voltage

Performance specification

	115V/60hz 110V/60hz				
Cooling capacity	-30°C				
Temperature control range	-20°C ~ 30°C				
Motor rated power consumption	300W				
Motor rated current	2.9 A				

Specification of sensor

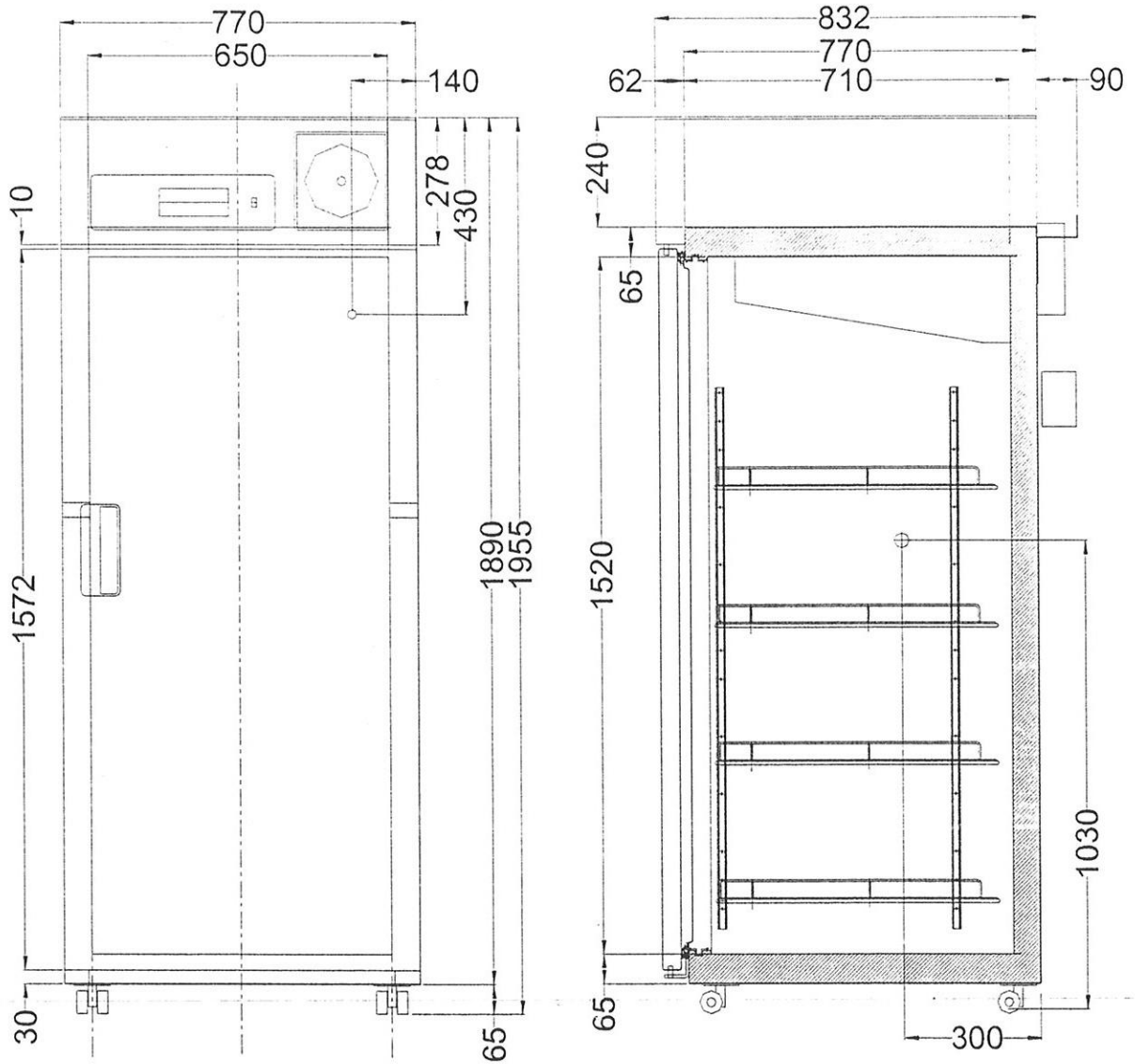
The following show temperature and resistance characteristics on thermistor sensor for internal temperature control (type : TIS-202PH-037) and defrosting (type : TIS-202PH-045)

Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
- 40	59.387	- 25	23.439	- 10	10.216
- 39	55.627	- 24	22.112	- 5	7.898
- 38	52.131	- 23	20.869	0	6.160
- 37	48.881	- 22	19.705	5	4.846
- 36	45.856	- 21	18.614	10	3.842
- 35	43.039	- 20	17.590	15	3.070
- 34	40.415	- 19	16.630	20	2.471
- 33	37.970	- 18	15.728	25	2.003
- 32	35.690	- 17	14.882	30	1.634
- 31	33.563	- 16	14.087	35	1.342
- 30	31.577	- 15	13.339	40	1.109
- 29	29.723	- 14	12.636	45	0.921
- 28	27.990	- 13	11.975	50	
- 27	26.371	- 12	11.353		
- 26	24.856	- 11	10.767		

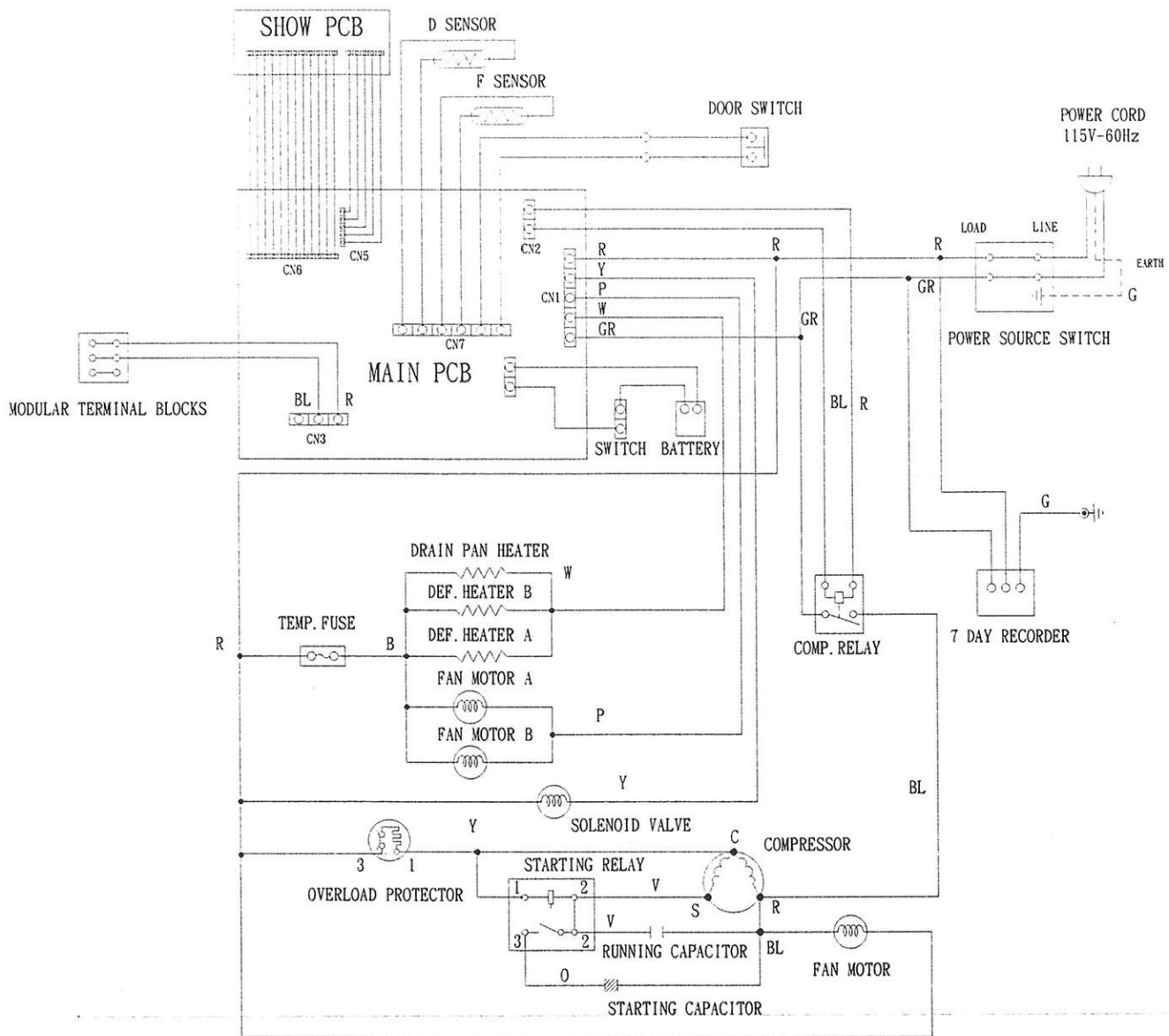
Parts specification

	115V/60hz				
Compressor : Hermetic rotary type Main winding : Between C-R Aux . winding : Between C-S (at 25°C)					
					
Type	80778022				
Output	400W				
Resistance (main winding)	1.82Ω				
Resistance (Aux. winding)	5.43Ω				
Over load relay					
Type	P22MUF				
Operating temperature	130±10°C				
Closing temperature	69±10°C				
Short time trip	5 ~ 15sec				
Starting capacitor : To make compressor start easily					
Rating	100μF 160VAC				
Running capacitor					
Rating	20μF 220VAC				
Starting relay : To supply both winding with the power to start up compressor					
Type	AMVL-180A				
Operating voltage	108 ~ 111V				
Recovering voltage	30 ~ 75V				
Cooling fan motor : To circulate internal air					
Type	FL2- C01.1BMPK				
Rating	110V, 1.5W				
Defrost heater : To defrost on cooling unit during defrosting					
Resistance	12.4Ω×2				
Output	165W×2				
Drain pan heater : To heat the drain pan during defrosting					
Resistance	177Ω				
Output	75W				

Dimensions



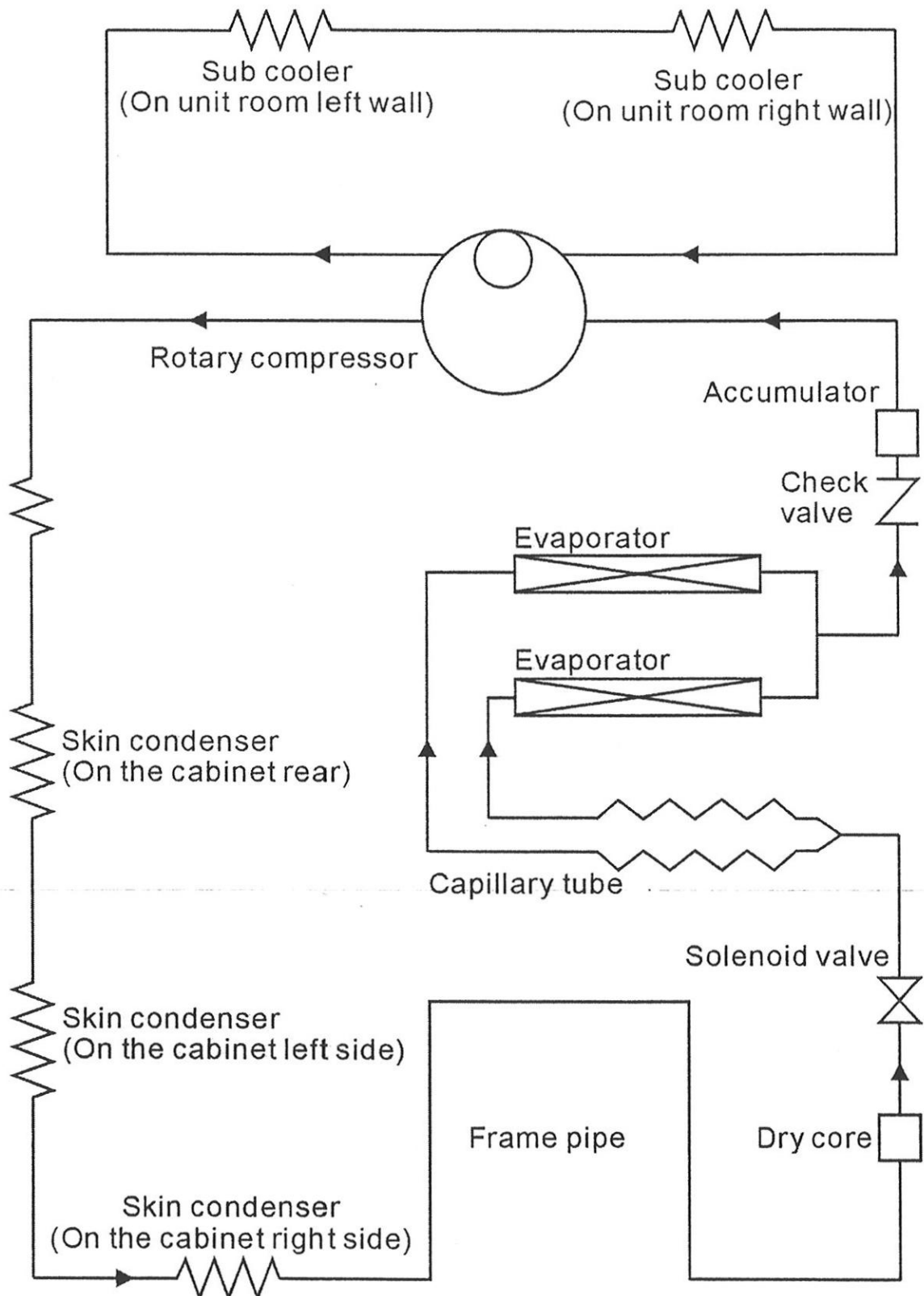
Wiring diagram



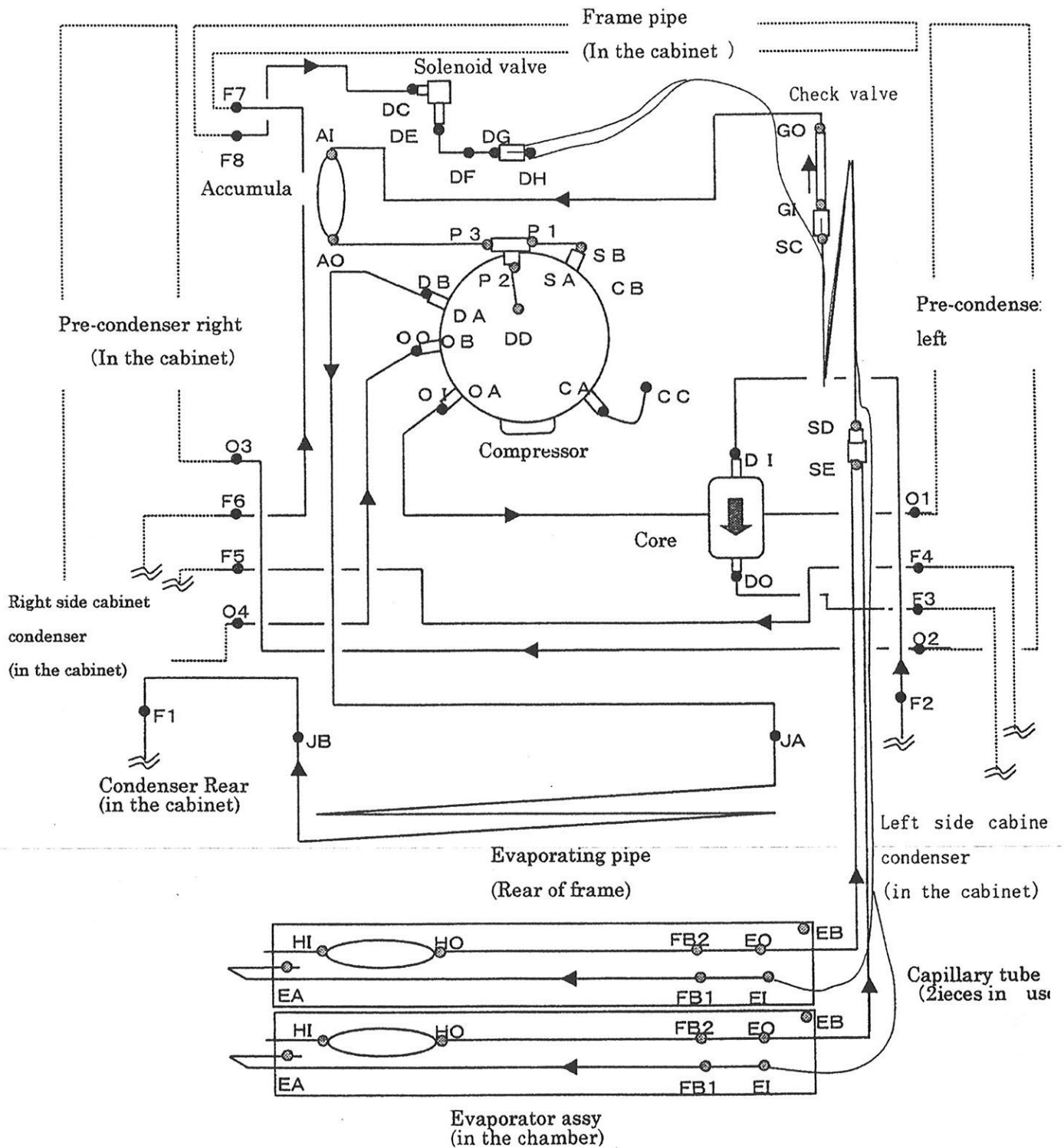
MDF-U730 CIRCUIT DIAGRAM

B: BLACK	R: RED
BL: BLUE	V: VIOLET
GR: GRAY	W: WHITE
O: ORANGE	Y: YELLOW
P: PINK	G: GREEN

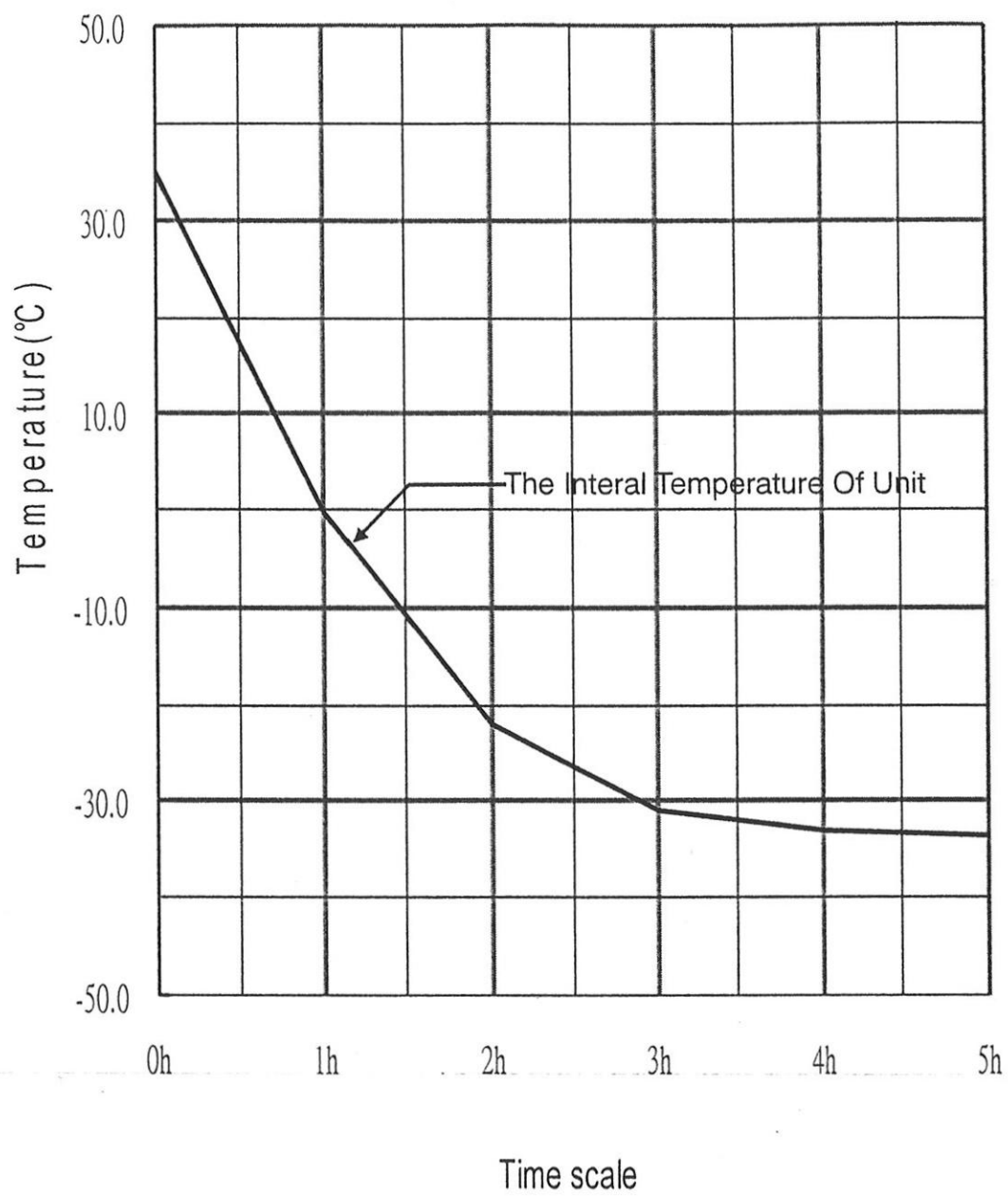
Refrigeration circuit principle diagram



Refrigeration circuit Welding points



Data on cooling capacity



Instruction Manual

- This section is extracted and printed Instruction Manual.
- If you find out " Refer to page ●● " in them, that page means not page in service manual but page in the lower corner of each page in the extract from user's manual.
That page number is not corresponded with serial number in Service manual.

PRECAUTIONS FOR SAFTY OPERATION

You must conform to this manual after reading throughout well, because this manual contains many important items for safty

Items are described so that you can use this unit safety and properly, and so that you can take precautions to prevent possible injury and damage to you and other people. They are distinguished [WARNING] from [CAUTION] by its contents. Be sure to observe those contents because they contain many important items for safety operation.

Indication and meaning are as follows.



WARNING

This contents means that it is possible to result in final injury or serious injury to human beings.



CAUTION

This contents means that it is possible to result in injury to human beings and damage to thing.

Mark shows ;



mark means caution.



mark means prohibition.



mark means an instruction.

< 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.

Be sure to keep this manual in the place accessible by users at any any time.

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.
-  **Be sure to 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.
-  **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.
-  **Make sure a dedicated power source is used** as indicated on the rating label attached to the unit.
-  **Make sure to remove dust from the power supply plug** before inserting in a power source. A dusty plug or improper insertion may pose a hazard.
-  **Use a power supply outlet with ground (earth)** 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.
-  **Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet** for inner air circulation. This may cause electric shock or injury by accidental contact with moving parts.
-  **Never store volatile or flammable substances** in this unit. This may cause explosion or fire.
-  **Never store corrosive substances** in this unit. This may lead to damage to the inner components or electric parts.
-  **If this unit is to be used for storing poisons, radioactive material or other harmful products, ensure that it is in a safe area.** Failure to do so may lead to an adverse effect on the health of personnel in the area and the local environment. In this case, a request for repair or maintenance will necessitate a safety check sheet for maintenance personnel.

PRECAUTIONS FOR SAFE OPERATION



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.



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



Never disassemble, repair, or modify the unit yourself. Any such work carried out by an unauthorized person may result in fire 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.



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. Always remove **doors** to prevent accidents such as suffocation.



Make sure to prepare a safety check sheet when you request any repair or maintenance for the safety of service personnel.

PRECAUTIONS FOR SAFE OPERATION

CAUTION

-  **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.
-  **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.
-  **Fix the shelves securely.** Incomplete installation may cause injury or damage.
-  **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.
-  **Never damage or break the power supply plug or cord. Do not use the supply plug if its cord is loose.** This may cause fire or electric shock.
-  **Do not touch any electrical parts** such as the power supply plug or any switches with a wet hand. This may cause electric shock.
-  **Do not climb onto the unit or do not put articles on the unit.** This may cause injury by tipping or damage to the unit.
-  **Do not store bottle or cans in the freezer.** This may cause injury by broken of containers due to the frozen.
-  **Do not touch any stock (especially metal objects) in the freezer with a wet hand.** This may cause frostbite.
-  **Always hold the handle when closing the door.** This will reduce the likelihood of a trapped finger.
-  **Do not lean on the door.** This may cause injury if the unit tips over.
-  **Always 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.
- Dispose of water in the evaporation tray completely prior to the movement.** Spilled water or splashed water may cause current leakage or electric shock.
-  **Be careful not to tip over the unit** during movement to prevent damage or injury.
-  **Always disconnect the power plug** when the unit is not used for long periods.
-  **Make sure to check the setting value when starting up the operation after the power failure or power off.** A change of setting value may cause damage to contents.
-  **Do not put the packing plastic bag within reach of children** as suffocation may result.

CAUTIONS FOR USAGE

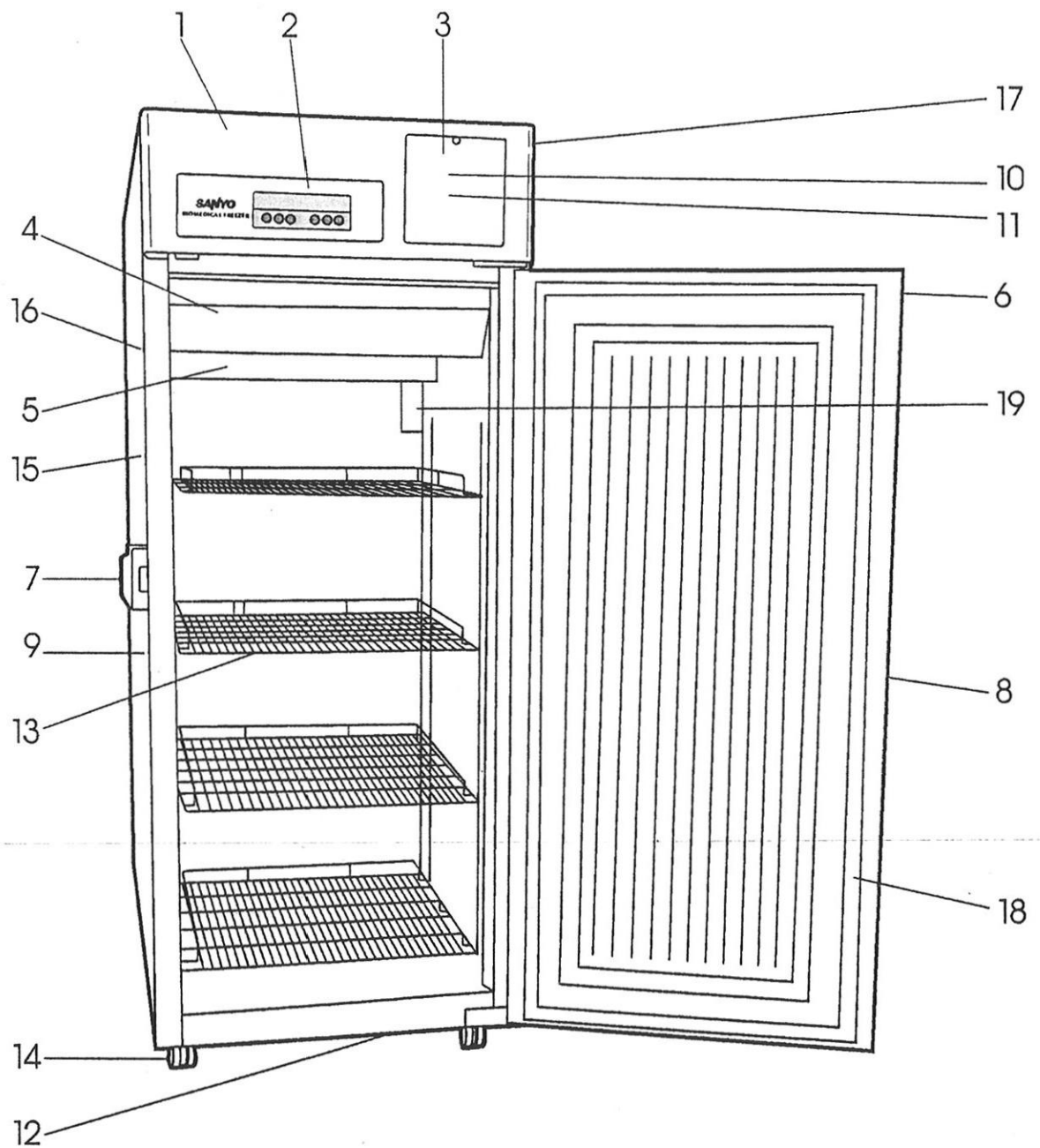
1. If the unit is unplugged or the power to the unit is interrupted, do not restart the unit for at least 5 minutes. This protects the compressor.
2. This inner cabinet is refrigerated by the forced circulation of cooled air inside the chamber. Ensure that the intake and exhaust vents are not blocked. Adequate space should be provided between the items inside the unit to allow air circulation.
3. Never store corrosive materials such as acid or alkali unless the container is completely sealed up. Corrosion may lead to failure of the unit in time.
4. Once the chamber temperature has stabilized, put the items into the chamber in small batches to minimize the temperature increase.
5. Fix the shelves securely. Place items on the shelves and leave a space between the walls of the cabinet and the contents to allow air circulation. Do not place items on the floor of the chamber.
6. Always close the door firmly. The door check lamp is lit when the door is open. The alarm buzzer sounds two minutes after door opening. The buzzer can be canceled automatically when the door is closed.
7. Always open and close the door gently. Rough operation may lead fall down of stocked items, incomplete closing, or damage of door gasket.
8. Do not stock articles beyond the load line. Containers outside the load line disturb the air circulation in the chamber and cause poor cooling.
9. In the refrigerator compartment, put the items on the shelves and do not contact the items with wall.
10. If an instrument requiring a power source is to be placed inside the cabinet, the cable can be lead through the access port on the right side and top of the cabinet. After using of the port, a rubber cap and insulation should be replaced to seal the access port. Failure to do this can affect the temperature uniformity inside the cabinet and lead to condensation on the outside of the access port.
11. Do not clean the unit with scrubbing brushes, acid, thinner, solvents powdered soap, cleanser or hot water. These agents can scratch the paint or cause it to peel. Plastic and rubber parts can be easily damaged by these materials. Especially never use any volatile solvent to clean the plastic or rubber parts. When a neutral dishwashing detergent is used to clean the unit, wipe it up thoroughly with a cloth soaked in clean water.
12. If condensation forms on the door or frame surface, wipe it off with a dry soft cloth.
13. The heat discharge pipe is attached inside of the both side & rear frame. The frame sometimes hot at the start-up of the operation. But this does not mean malfunction.

ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe at least under the following conditions (based on the IEC 1010-1):

1. Indoor use;
2. Altitude up to 2000 m;
3. Ambient temperature 5°C to 35°C
4. Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 35°C;
5. Mains supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage;
6. Other supply voltage fluctuations as stated by the manufacturer;
7. Transient over voltages according to Installation Categories (Over voltage Categories) II; For mains supply the minimum and normal category is II;
8. Pollution degree 2 in accordance with IEC 664.

REFRIGERATOR COMPONENTS

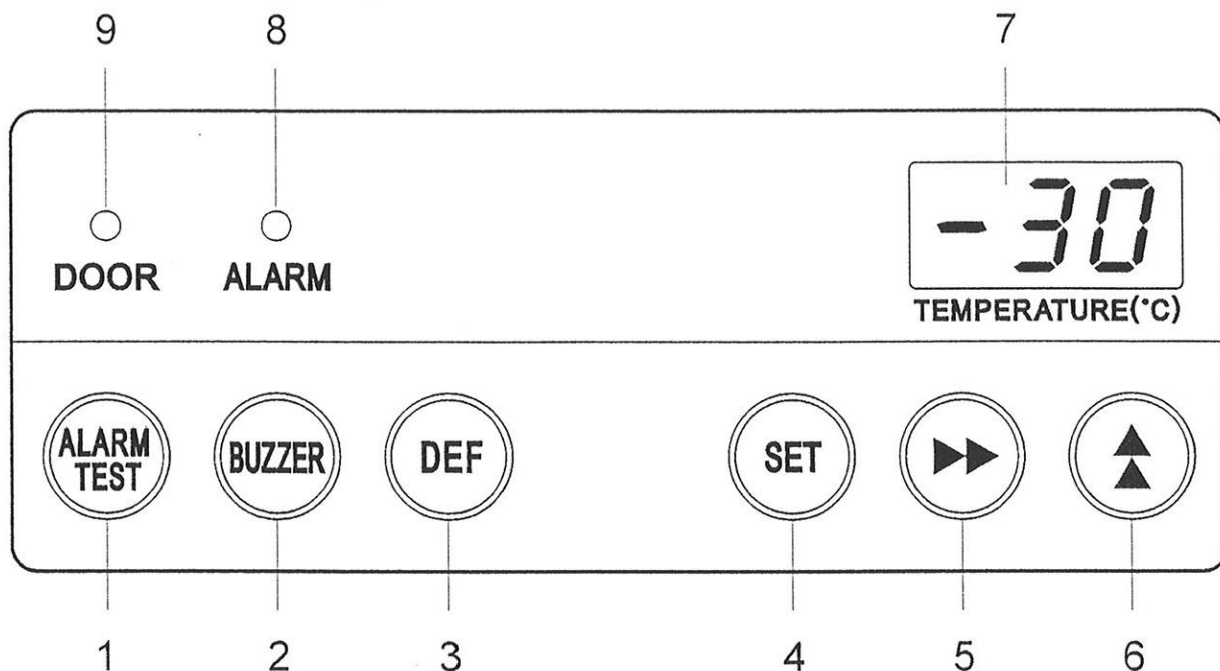


REFRIGERATOR COMPONENTS

1. **Front cover:** Open the cover when connecting the remote alarm or using the power supply outlet.
2. **Control panel:** The operation status is displayed on this panel. And the temperature setting is available through this panel. Refer to page 10 for the details.
3. **Mounting space for temperature recorder:** Space for an automatic temperature recorder is available separately. See page 17 for the mounting of the recorder.
4. **Air intake vent:** Ensure this vent is never blocked. Failure to do so will result in unstable temperature distribution in the freezer.
5. **Cool air rear exhaust vent:** Ensure this vent is never blocked. If this vent is blocked, temperature regulation unstable. Do not place stored item in the path of cold air.
6. **Lock:** Turn key clockwise through 180 degree to lock the door.
7. **Lock acceptance:** Turn clockwise to lock the door and also add the lock too.
8. **Handle:** Always hold the handle when opening /closing the door.
9. **Access port :** These port allow cables to be passed into the cabinet. A total of two (2) are provided ; left side and top of the freezer.
10. **Remote alarm terminal:** This is used to alarm the abnormality to the remote location. See page 14 for the details.
11. **Battery switch:** Turn on/off the battery power for power failure alarm. Normally be used to ON, does not operating more than 1 month be used to OFF.
12. **Leveling feet:** Use these bolts to adjust the height and level the unit for installation.
13. **Shelf:** Items to be stored in the chamber must be placed on the shelves. The maximum storage weight for each shelf is 50kg. Do not put stored items directly onto the interior floor of the chamber.
14. **Castors:** When installing the unit, the castors can be raised from the ground by using the leveling feet above.
15. **Evaporating tray (back side):** The defrost water from the evaporator accumulated in this tray. Wipe off the water occasionally.
16. **Fixture(back side):** These keep the adequate space between the unit and wall, and also can be used for fixing the unit.
17. **Power switch(back side):** Located on the rear of the freezer cabinet.
18. **Magnetic door gasket:** This prevent the cold air from escaping. Always keep clean.
19. **Temperature sensor:** Located on the rear of the chamber.

REFRIGERATOR COMPONENTS

Control panel



1. **Alarm test key (ALARM TEST):** Buzzer will sound and remote alarm will be activated by pressing this key.
2. **Alarm buzzer stop key (BUZZER):** Press this key to silence the buzzer in the event that the alarm operates and buzzer sounds. See page 15 for the details.
3. **Defrost key (DEF):** Defrost will be started by pressing this key for more than 5seconds.
4. **Set key (SET):** Pressing this key activates temperature set mode and the digit which can be set is flashed. By pressing the key again after setting, the set value is accepted.
5. **Digit shift key (▶▶):** Pressing this key in set mode causes the changeable digits to move. Key lock is activated by pressing this key for more than 5 seconds in the temperature display mode. See "Key lock operation" on page 14.
6. **Numerical value shift key (▲):** Pressing this key in the setting mode causes the numerical value to change. "ON-OFF" of key lock can be selected by pressing this key in the key lock mode.
7. **Temperature display:** This indicator shows the chamber temperature, set temperature, or error code.
8. **Alarm lamp (ALARM):** This lamp is flashed during alarm condition.
9. **Door check lamp (DOOR):** This lamp is lit when the door is open.

INSTALLATION

Installation site

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

1. A location not subjected to direct sunlight

Installation in a location subjected to direct sunlight may lead to inadequate cooling.

2. A location with adequate ventilation

Leave at least 10cm around the unit for ventilation. Poor ventilation will result in a reduction of the refrigeration capacity.

3. A location away from heat generating sources

Avoid installing the unit near heat-emitting appliances such as gas ranges or stoves. Heat can cause inefficient refrigeration.

4. A location with a sturdy and level floor

Install the unit on a sturdy floor to avoid vibration and noise. Placing the unit on an unsteady floor may cause vibration and noise.



WARNING

Be sure to 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.



CAUTION

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.

5. A location not prone to high humidity



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.

Do not install the unit under water pipes or steam pipes. Deterioration of the insulation may result which could cause current leakage or electric shock.

6. A location without a flammable or corrosive gas

Avoid placing the unit where chemicals are stored or gases are produced. Also avoid areas where there is a great deal of dust.



WARNING

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.

INSTALLATION

Installation

1. Remove 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 foot

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

3. Fix the unit

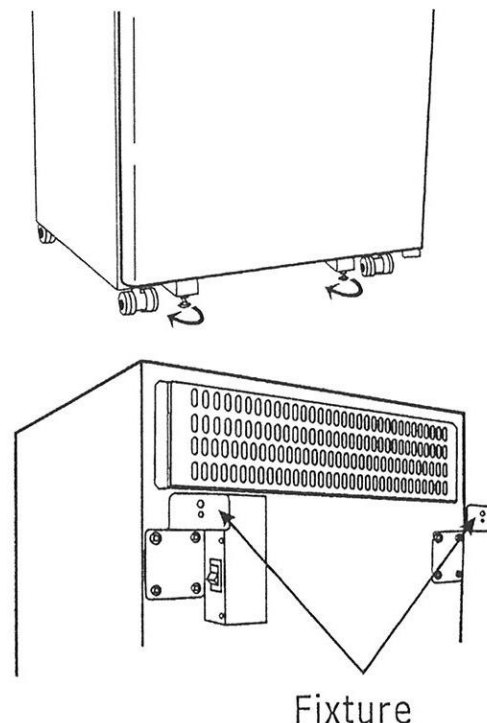
Two fixtures are attached to the rear of the frame. Fix the frame to the wall with these fixtures and rope or chain.

4. Ground (earth)

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

The following procedures should be adhered to for initial start-up and continuous operation.

1. Connect the unit to dedicated power supply and turn on the power switch. Do not put any product in the unit at this time.
2. Set the desired temperature.
3. Confirm that the chamber temperature is at the desired temperature.
4. When you are satisfied that the unit is working correctly, begin slowly placing product into the chamber to minimize the temperature rise.

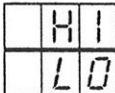
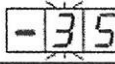
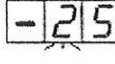
OPERATING INSTRUCTIONS

Temperature setting

Table 1 shows the basic operation method. Perform key operation in the sequence indicated in the table. The example in the table is based on the assumption that the freezer temperature is -30°C.

Note: The unit is set at the factory so that the freezer temperature is -30°C.

Table 1 Basic operation procedure (Example of setting: freezer; -25°C)

Operation	Key operated	Key operated
Connect to the power source and turn on the power switch.	-----	The current freezer temperature is displayed. Freezer temperature higher than 1°C to be displayed HI, lower than -41°C to be displayed LO. 
Press SET key.	SET	The first digit of the temperature display flashes.
Set to -25 by using the digit shift key and numerical value shift key.	▶▶	Pressing the digit shift key leads the flashes of the second digit. 
	▲▲	Pressing the numerical value shifts key down the figure of the current digit to 2. 
Press SET key.	SET	The value is stored in memory and the current refrigerator temperature is displayed.

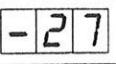
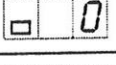
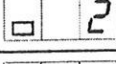
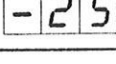
Note:

If no key has been pressed for about 90 seconds in the temperature set mode, the display mode returns automatically to the temperature display mode. In this case, the chamber temperature setting is not changed. The freezer temperature can be set in the range between -20 and -30°C. Remember that the guaranteed temperature with no load at an ambient temperature of 35°C is -30°C.

Offset

The difference between chamber and indicated temperature can be arranged by key operation. As an example, Table 2 shows the procedure in case actual freezer temperature is -25°C and displayed temperature is -27°C, change the displayed temperature to -25°C.

Table 2 Offset setup procedure

Operation	Key operated	Key operated
		The current freezer temperature is displayed. 
Pressing the digit shift key more than 5 seconds.	▲▲	The first digit of the temperature display flashes. 
Set to 2 by using numerical value shift key.	▲▲	Pressing the key shifts up the figure of the current digit to 2. 
Press the set key.	SET	The current adjusted temperature is displayed. 

OPERATING INSTRUCTIONS

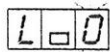
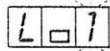
Key lock operation

This unit incorporates a key lock feature which can inhibit the tampering using the keys on the control panel.

The key lock is set to OFF at the factory.

Display	Mode	Function
L o 0	Key lock OFF	Temperature change enabled
L o 1	Key lock ON	Temperature change disabled

Table 3 Key lock setup procedure (Example: Key lock OFF ⇒ Key lock ON)

Operation	Key operated	Indication after operation
		The current refrigerator or freezer temperature is displayed.
Press and hold the digit shift key for about 5 seconds.	▶▶	The first digit of the temperature display blinks. 
Set the first digit to 1 with the numerical value shift key.	▲	Pressing the key shifts up the figure of the digit. 
Press the set key.	SET	Key lock is set to ON and the current refrigerator or freezer temperature is displayed.

Note:

Key lock can be set any time when the current refrigerator or freezer temperature is displayed.

Remote alarm terminal

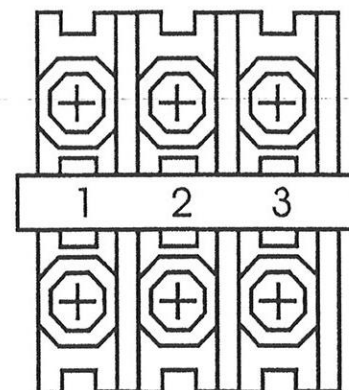
The terminal of the remote alarm is installed at the top of the unit. The alarm is outputted from this terminal between terminal 1 and terminal 2.

Contact capacity is DC 30V, 2 A.

Contact output: At normal condition "Open"
At abnormal condition "Close"

Note:

The alarm is actuated when the power cord is disconnected from the outlet or the power switch is OFF.



DEFROSTING

The defrosting is performed automatically, when a sum of the operation time up to 6 hours.

The defrost water accumulates in the tray evaporates into atmosphere.

Pressing the DEF key for more than 5 seconds, defrost will be started.

And after finishing defrost, freezer will start operating again automatically.

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

- 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 electrical insulation and may cause electric shock or short circuit.
- The compressor and other mechanical part are completely sealed. This unit requires absolutely no lubrication.

OPTIONAL COMPONENT

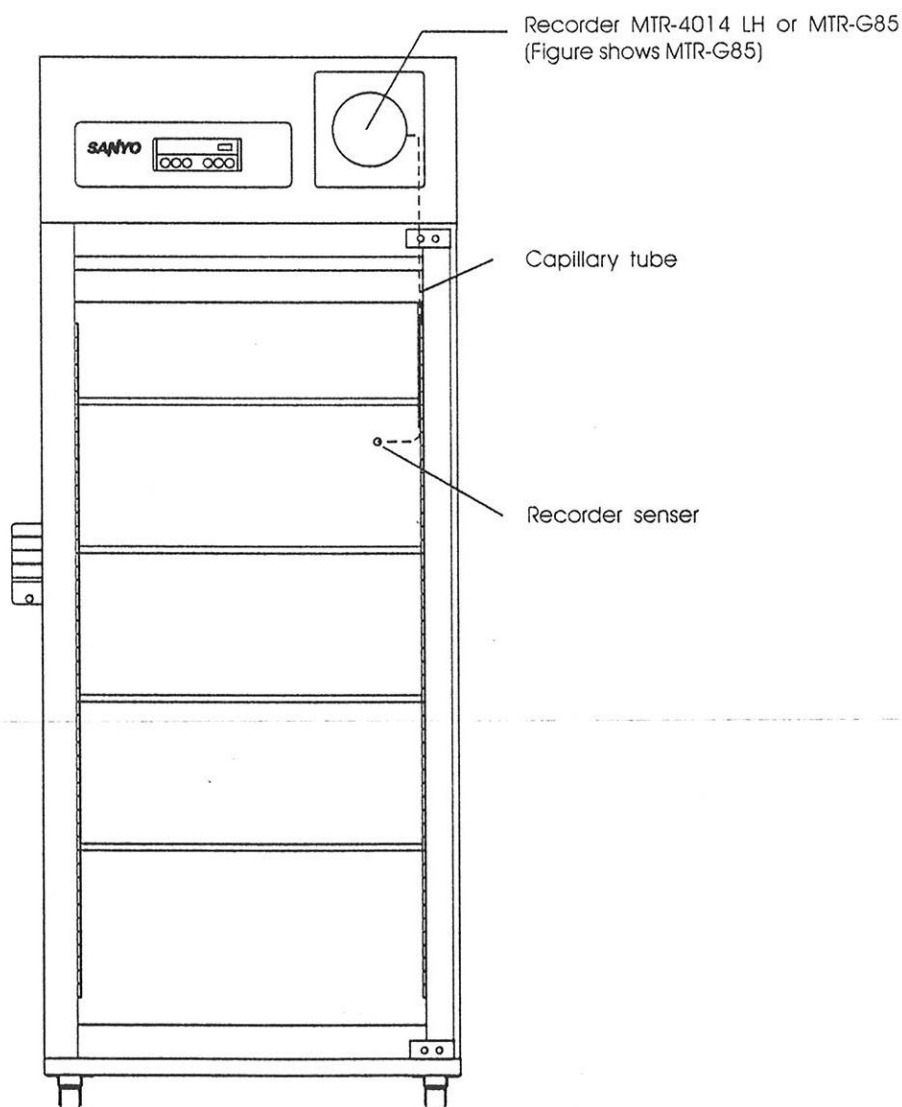
Automatic temperature recorder

To record the chamber temperature, an optional automatic temperature recorder is available. Please consult with our sales department or agency for recorder installation.

For the proper usage of temperature recorder, refer to an instruction manual included with the recorder.

The available recorder and its attachment location are as follows:

Recorder type	Attachment location (See figure below)
MTR-4014LH	Top right of the frame
MTR-G85	Top right of the frame,



WARNING

Always disconnect the power supply to the unit before starting the installation of recorder to prevent electric shock or injury.

OPTIONAL COMPONENT

Installation of recorder

MTR-4014LH

1. Remove a cap for the fixing screw on the panel cover for mounting space of temperature recorder.
2. Remove the fixing screw and open the panel cover. (Fig. 1)
3. Remove the panel cover by pushing the shaft on both side outward.
4. Attach the temperature recorder (MTR-4014LH) to the recorder fixture (MPR-S30: optional component) by using the enclosed screws. (Fig. 2)
5. Mount the recorder fixture with recorder to the mounting space in the unit. (Fig. 3)
6. Take out the cap of access port and cut half of the diameter. Lead the sensor code or capillary into chamber and put into cap. (Fig.4)
7. Route the sensor code and capillary tube into chamber and combine the sensor code or capillary by aluminum tape, after that fix on the freezer wall by cover metal and screw.(Fig. 5).

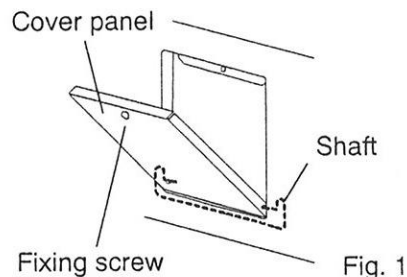


Fig. 1

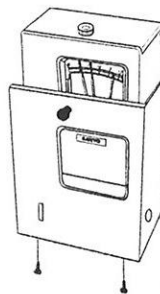


Fig. 2

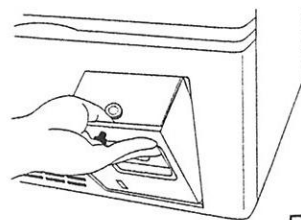


Fig.3

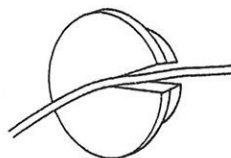


Fig.4

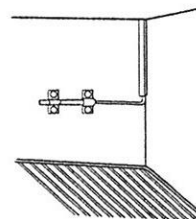


Fig.5

MTR-G85

1. Remove a cap for the fixing screw on the panel cover for mounting space of temperature recorder.
2. Remove the fixing screw and open the panel cover. (Fig. 1)
3. Remove the panel cover by pushing the shaft on both side outward.
4. Attach the temperature recorder (MTR-G85) to the recorder fixture (MPR-S7: optional component) by following the instruction shown in the procedure enclosed with the fixture. (Fig.6)
5. Remove the connector cover. Then connect the power connector on the recorder to the connector on the unit side. (Fig. 7)
6. Mount the recorder fixture with recorder to the right side of front cover. (Fig. 8)
7. Fix the recorder sensor to chamber by using clips, as mentioned in the procedure for MTR-4014LH above.

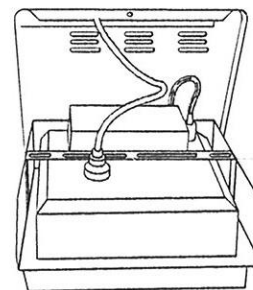


Fig.6

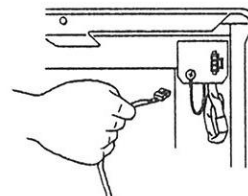


Fig.7

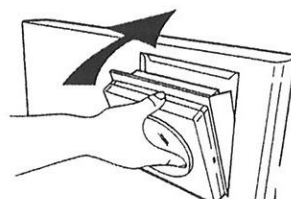


Fig.8

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 RECHARGEABLE BATTERY



The unit contains a rechargeable battery. The battery is recyclable. At the end of its useful life, check with your local solid waste officials for proper disposal.

1. 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 on the right side of electrical box behind the front cover. (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.

2. Removal of nickel-metal-hydride battery

- 1) Turn off the power switch and disconnect the power supply plug.
- 2) Open the front cover and disconnect the battery connector.
- 3) As shown in the Fig.2, remove 2 screws fixing the battery mounting plate.
- 4) Take out the battery.
- 5) Follow the procedure for recycling or proper disposal.

Fig. 1

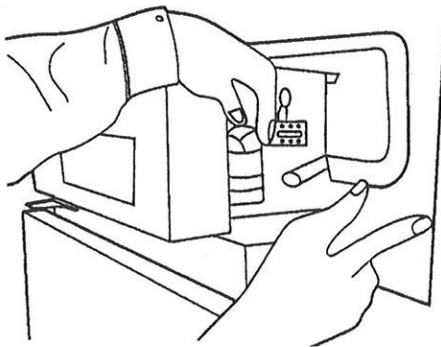
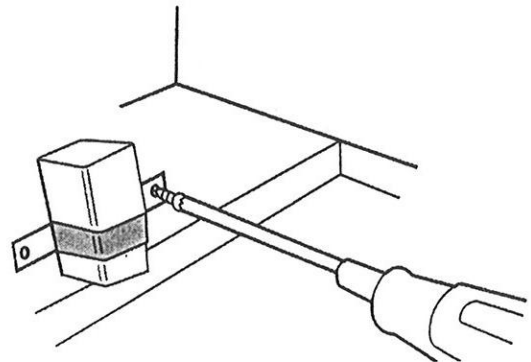


Fig. 2



PERFORMANCE

Control range	Freezer: -20°C to -30°C (Ambient temp.; 5°C to +35°C, No load)					
Noise level	40 dB [A] (background noise 20dB)					
Maximum pressure	2.18 MPa					
Rated voltage	AC 110 V	AC 115 V	AC 220 V	AC 220 V	AC 230 V	AC 240 V
Rated frequency	60 Hz	60 Hz	50 Hz	60 Hz	50 Hz	50 Hz
Power consumption		300W				

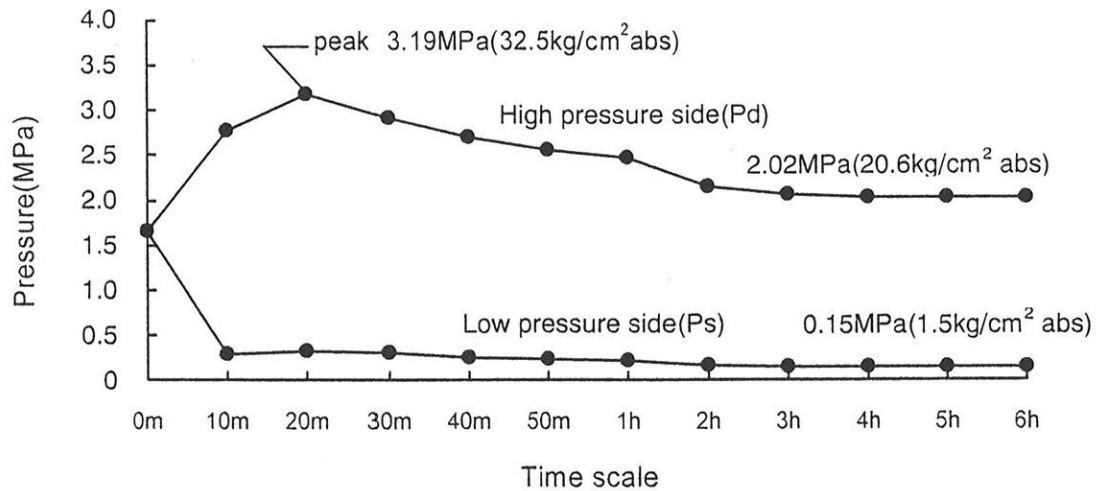
Note : The unit with CE mark complies with EC directives 89/336/EEC, 93/68/EEC and 73/23/EEC.

Test data

■ Pressure characteristics<Reference only>

Condition : Power supply : 50Hz Local voltage

AT : 35°C

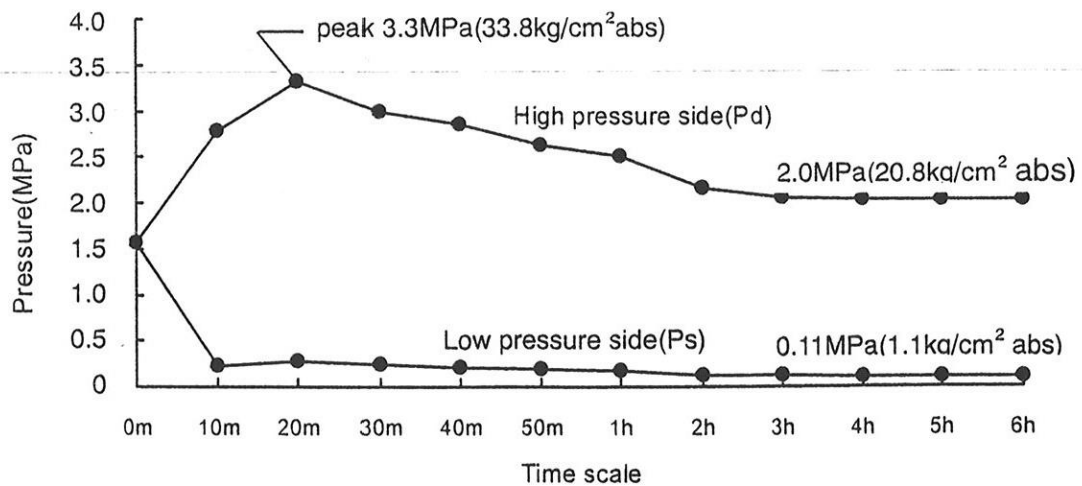


Note: In measuring gas pressure.

- Make sure that in high pressure side. Residual refrigerant in measuring hose were collected to the refrigeration circuit.
- Make sure to evacuate the measuring hose and then open the refrigeration circuit prior to the measurement in low pressure side.

Condition : Power supply : 60Hz Local voltage

AT : 35°C

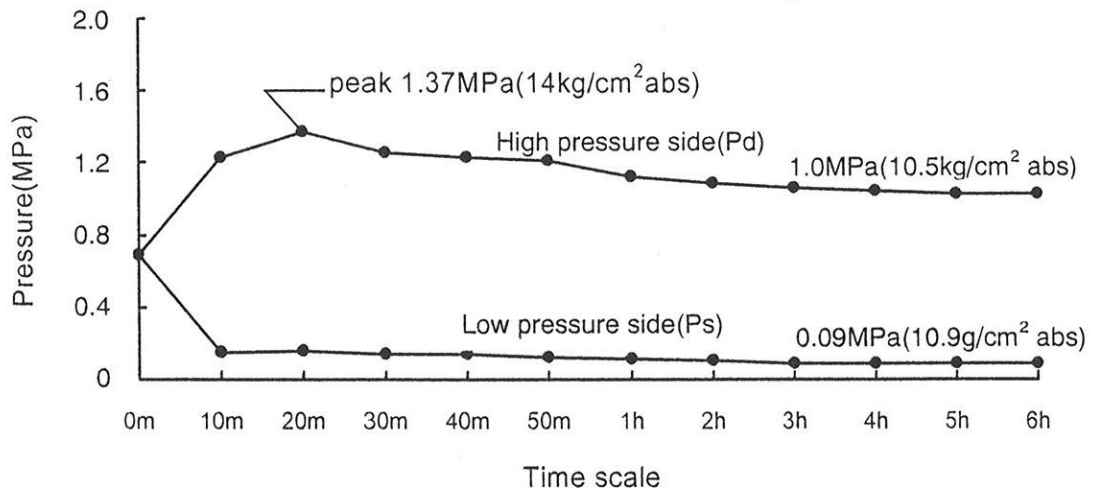


Test data

■ Pressure characteristics<Reference only>

Condition : Power supply : 50Hz Local voltage

AT : 5°C

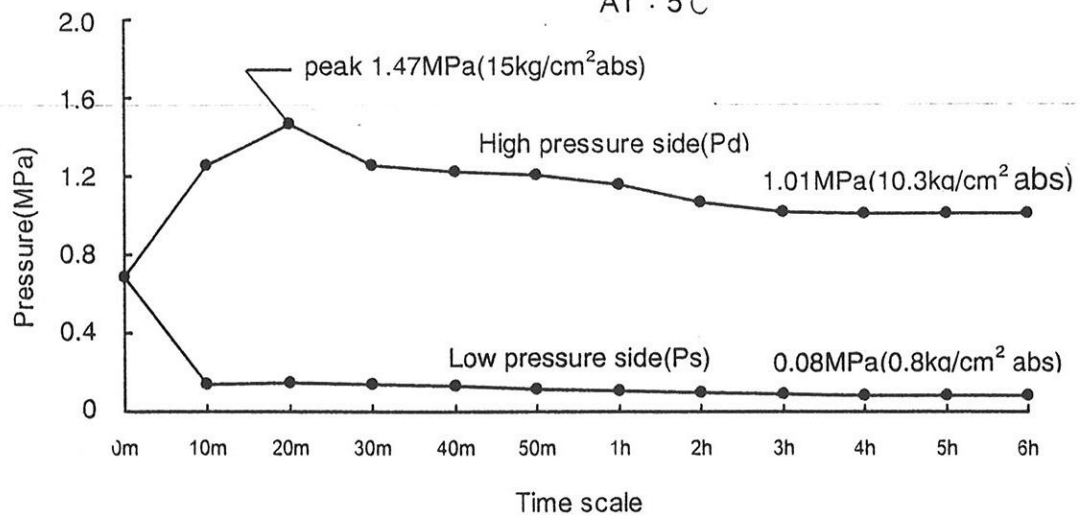


Note: In measuring gas pressure.

- Make sure that in high pressure side, Residual refrigerant in measuring hose were collected to the refrigeration circuit.
- Make sure to evacuate the measuring hose and then open the refrigeration circuit prior to the measurement in low pressure side.

Condition : Power supply : 60Hz Local voltage

AT : 5°C



Trouble shooting

ALARMS AND SAFETY FUNCTIONS

This unit has the alarm and safety functions shown in Table 4, and also a self diagnostic function.

Table 4 Alarms and safety functions

Kind of alarm	Situation	Indication	Buzzer	Safety operation
High temperature alarm	If the chamber temperature exceeds the set temperature more than 10°C.	Alarm lamp flashes.	Intermittent tone after a delay of 15 minutes.	Remote alarm is activated after a delay of 15 minutes.
Low temperature alarm	If the chamber temperature is lower 10°C than the set temperature .	Alarm lamp flashes.	Intermittent tone after a delay of 15 minutes.	Remote alarm is activated after a delay of 15 minutes.
Power failure alarm	In the event of a power failure or disconnection of power supply plug from the outlet	Alarm lamp flashes.	Intermittent tone	Remote alarm is activated.
Door alarm	When the door is open.	Door check lamp is lit.	Intermittent tone after a delay of 2 minutes.	-----
Auto return	If a key operation is not performed for about 90 seconds in each setting mode.	Chamber temperature is displayed.	-----	Setting mode is canceled.
Key lock	When the key lock is ON (L1).	-----	-----	Key input is unable.
Thermal sensor abnormality	If the thermal sensor goes open (E01/LO) or short circuit (E01/HI).	E01 and LO(E01 and HI) are displayed alternately on the temperature display.	-----	Operation is keeping continuously.
	If the defrost sensor goes Open (E02) or short circuit (E02).	E02 and chamber temperature are displayed alternately on the temperature display.		Normal running and defrost will be psaaed

Note:

The alarm can be canceled by pressing the alarm buzzer stop key (BUZZER), but the remote alarm cannot be silenced.

After a power failure, the unit will resume operation with the set value that was in place before power failure occurred.

TROUBLE SHOOTING

If the unit malfunctions, check out the following before calling for service. In the case of no refrigeration or poor refrigeration, transfer the stored items to another refrigerator or freezer before checking out.

If nothing operates even when plug in

1. The unit is not connected to the power supply or capacity of power source is not enough.
2. The power switch is not ON.
3. There is a power failure, the fuse is blown, or the circuit breaker is activated.

When the unit does not accept changes of set-point temperature

1. The key lock is not "OFF".

When alarm is activated

On start-up

1. The temperature in the unit does not match set value.

In use

1. The door was kept opened for long time.
2. The set value was changed.
3. The containers of high temperature (load) were put in the unit.

In these cases, alarm is removed automatically by running the unit for several hours.

When the unit does not get cold enough

1. The air exhaust vent is blocked by refrigerator contents.
2. A large amount of warm product was put in the unit.
3. There is any heat sources in the unit.
4. The door is opened frequently.
5. The ambient temperature is too high.
6. The unit is in direct sunlight.
7. The door is not securely closed.
8. The door seal is damaged or foreign substance inserted between the door gaskets.

When the camber temperature is higher or lower than the setting temperature.

Please make the "Offset" properly.

As an example,

In case setting temperature is -25°C and center of camber temperature is -23°C, make +2°C offset.

Hereby show the procedure to make +2°C offset.

1. Pressing the digit shift key more than 5 seconds .
2. Sound buzzer and -9~+9°C is displayed.
3. Set +2 by pressing the digit shift key.
4. Press the set key.
5. Several seconds after, the displayed temperature become +2°C high.

When PC board or temperature sensor is replaced.

After changing the PC board or temperature sensor, operate the unit by setting SV= -30°C.

Several hours later, center of camber temperature and displayed temperature and displayed temperature should be within -30±3°C.