DAIKIN OIL COOLING UNIT
INSTRUCTION MANUAL

HP	MODEL NAME
1／2	AKJ56(A)Y AKJ56(A)Y-C

THANK YOU FOR PURCHASED DAIKIN OIL COOLING UNIT.

Before you use the unit, please be sure to read this instruction manual for knowing how to use it correctly.

- ●It will also help when, with the machine in use, you have any questions or have experienced trouble of any kind about it.
- ●After persuading, please keep this with the spares.

This instruction manual has contained in everything you should know when you use the OIL COOLING UNIT.

CONTENTS

HM1494C

【OIL COOLING UNIT】

《NOTES ON SAFETY》

■Before use

●Carefully read our materials such as 《NOTES ON SAFETY》, an operation manual and specification for proper use.
●Keep the above materials for easy reference.

(Note 1) This material contains extraction of items which should be particularly noted for "safety".
For other details, refer to your operation manual and specification.
(Note 2) You are requested to incorporate the contents shown in this paper into the operation manual of your machine.

■About marks employed in this material

Danger ➡ indicates an imminent hazardous situation which may result in fatality or serious injury if not avoided.
Warning ➡ indicates a potential hazardous situation which could result in fatality or serious injury if not avoided.
Caution ➡ indicates a potential hazardous situation which could result in slight or medium injury or property damage.

■Notes on safety

(1)General

Danger ①Transportation, installation, piping, wiring, oparation, maintenance and inspection should be done by experts.
Danger ②Be sure to observe the following strictly when starting work.
・Be sure to turn the power off. Never keep wires alive.
Danger ③Do not operate the unit in explosive atomospheres, which may cause a fire or an accident resulting in injury or death.
Caution ④Operate the unit exactly according to the specifications described in the catalog and the delivery specification. Failure to do this may cause serious accidents such as breakage of the main unit, injury, fire, and electric shock.
Caution ⑤Remodeling of products by a customer is beyond our warranty, for which the company shall have no liability.
Caution ⑥Be sure to carry out daily inspection (shown in the operation manual or attached material).
Caution ⑦Do not operate the unit in special atomospheres such as high temperature or high humidity.
Caution ⑧Do not mount the oil cooling unit, hit it, or give external force on it, which may cause injury or damage.

(2)Transportation/transfer

Observe the following strictly since the oil cooling unit is heavy in weight and very dangerous if dropped or turned over. (which may cause injury or damage.)

Danger ①Check the weight of the oil cooling unit (shown in the assembly diagram). Hang only a unit within the rated load of a hoisting attachment.
Danger ②Use a hanging hook securely at the exact designated position (shown in the assembly diagram).
Warning ③Keep away from the unit while carrying it by a hoisting attachment. There is a fear of injury or damage due to dropping or turning over.
Caution ④Fix the unit firmly to prevent movement by trembling or external force during transportation.

(3) Installation/adjustment/test operation

Caution ①Confirm the installing position of the oil cooling unit with the assembly diagram, and fix it securely with bolts or foundation bolts.

Danger ②Earth a ground terminal securely. Failure to do this may cause electric shock.

Caution ③Do not interfere with ventilation around the air inlet or outlet of the oil cooling unit with obstacles.
Cooling will be hindered, and abnormal heating may cause "damage or a burn"

Danger ④A cover or casing is provided on the rotating part for safety.
Do not insert your finger through an opening, which may cause injury.

Caution ⑤Fill the proper amount of usable oil into the oil tank (when with oil tank). (As for proper amount, refer to the specification/operation manual.)

Caution ⑥When performing test run of the oil cooling unit, observe the following strictly. Failure to do this may cause injury or damage.
·Make sure that the main unit is in safety (not running, or running in safety from accident).

(4) Wiring/piping

Caution ①Perform wiring work in accordance with 『Electric installation standard』 and 『Interior wiring regulation』.
Failure to do this may cause burning or fire.

Caution ②Since a power breaker is not included in the oil cooling unit. you are requested to prepare it.
It is recommended to install other protective devices (such as earth leakage circuit breaker).

Danger ③Connect with the power cable in accordance with the wiring diagram in the specification or the operation manual.
Improper connection may cause electric shock or fire.

Danger ④Do not bend or pull the power cable or the motor's lead wire by force, or put them between some objects, which may cause electric shock.

(5) Operation

Caution ①The motor casing, the outer board and the refrigerant pipe may get considerably hot during operation. Take care not to contact them with your hand or body. which may cause a burn.

Caution ②In case of abnormal conditions, stop operation immediately.
Otherwise, damage, electric shock, fire or injury may be caused.

Danger ③Do not operate with the casing of the oil cooling unit or the terminal box cover of the motor and other electric parts removed, which may cause electric shock.

Caution ④Do not perform continuous operation exceeding the capacity of the motor.
Overcurrent may cause burning of the coil or fire.

Danger ⑤Be sure to turn the power switch off when stopping operation.

(6) Maintenance/inspection

Caution ①The compressor, the frame of the motor and the refrigerant pipe will get considerably hot. Do not touch them with bare hands, which may cause a burn.

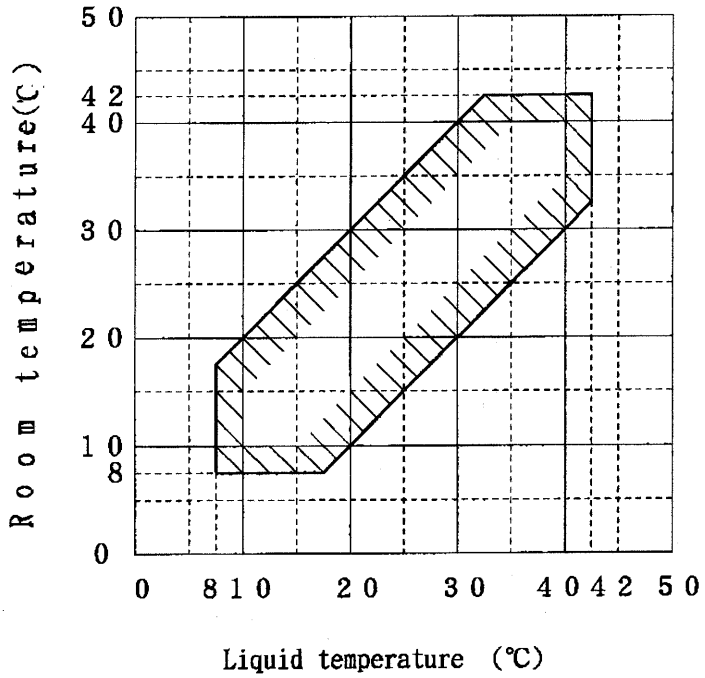
Danger ②Repair, disassembly or remodelling should be performed by an expert.

Caution ③Periodically check the electric parts (switches for the motor, pressure, temperature, oil level).
Follow the procedure shown in the operation manual or the attached sheet.

1. CAUTIONS IN GENERAL

1-1 Scope of operation

Operational limits to the range of room temperature and liquid temperature are placed on the oil cooling unit applied with a refrigerator.
Be sure to use the oil cooling unit within the following temperature range.



1-2 Applicable liquid

Since this equipment is intended for cooling the following liquid, it is unusable for the other liquid.

- LONG LIFE COOLANT GREEN (50% water solution)
  (MOBIL LLC T/N
  MOBIL LLC D/M)
- Lubricating oil of low viscosity (ISO VG 2 equivalent)
  (Please prevent discoloring number from being over 1 in method of copper corrsion test 「JIS K 2513」)
  (It is unusable for the chlorinated hydrocarbon group, water + glycol group, W/O・O/W emulsion group, phosphate ester group)

1-3 Safety work in repair service

The oil cooling unit has been manufactured under careful quality control. In case where it has need of repair service (replacement of parts), however, careful attention should be given especially to the following points.

1)Turn operation mode to operation lock to bring this equipment to a stop and be sure to throw OFF the main power supply.
(Please refer to P.11.)

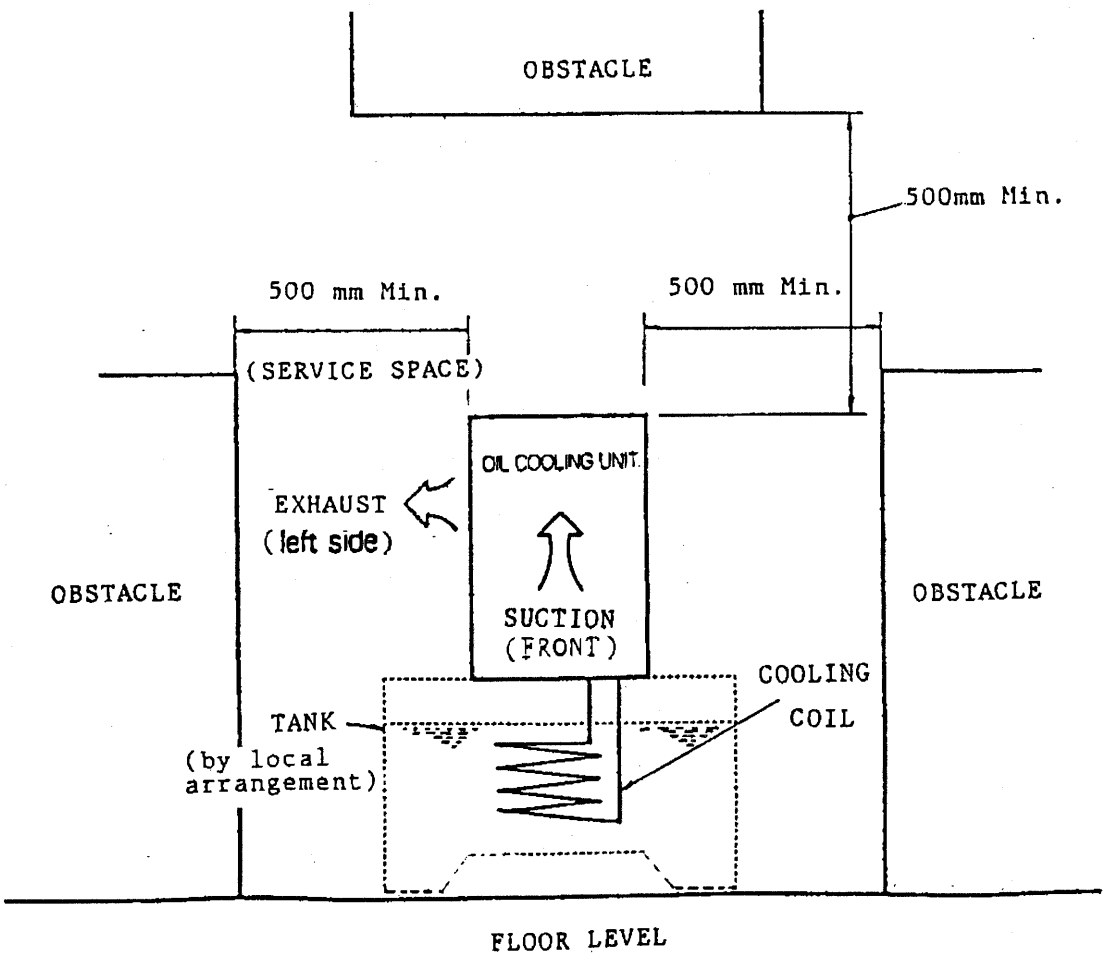
2)When using fire in making repairs, dismount the oil cooling unit from the machine and wipe off throughly the liquid on evaporator (cooling coil unit) of oil cooling unit. At the same time, select such working area as is well-ventilated and free from ignition and suffocation caused by refrigerant gas discharged.

2 CAUTIONS FOR INSTALLATION

2-1 Place of installation

* Select such place of installation as is given below.
  1) Flat and solid place subjected to less vibration.
  2) Place free from direct sublight and heat.
  3) Well-ventilated and less-humid place.
  4) Place free from the possibility of exhaust air being re-circulated and re-sucked in;
  5) Place exposed to less dust, dirt, fine particles, oil mist, etc.

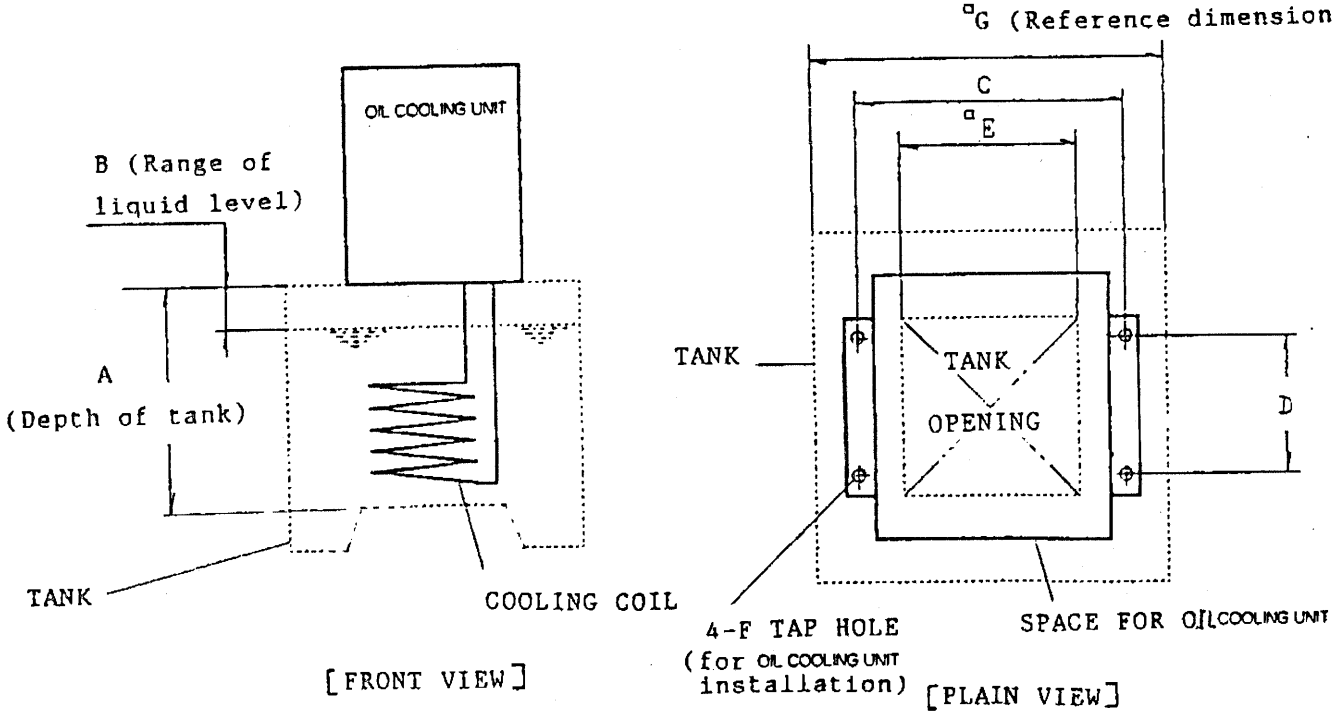
※ Service spaces (each side 500 mm min.) as shown in figure below should be secured so that suction and exhaust can be effected smoothly and that maintenance and inspection can be performed with ease.



2-2 Floor-mounted tank (by local arrangement)

Capacity and finished dimensions of floor-mounted tank should be selected from the following.

Finished Dimension / Model	A	B	C	D	E	H	F	G Ref. (Tank capacity)
AKJ56AY, AKJ56AY-C	400 min.	100 max.	390	270	320	350	M8	500 (75L) min.



Note: 1. When liquid level comes down below the specified level, the cooling coil is exposed to allow the moisture contained in the atmosphere to condense and intermix into the liquid. Further lowering of liquid level not only lowers the cooling capacity but also leads to a cause of failure. Therefore, extreme care should be taken to prevent such troubles.

Note: 2. Careful consideration should be given to the partition and piping arrangements, etc. for the floor-mounted tank so that the high-temperature return liquid from the machine and the low-temperature liquid cooled down by the OIL COOLING UNIT will be mixed uniformly.

2-3 Return filter (by local arrangement)

Accumulation of swarf and cuttings on the surface of cooling coil in the OIL COOLING UNIT not only lowers the cooling capacity but also leads to a cause of failure. Therefore, a high-efficiency return filter should be applied to the return (liquid inlet) side to prevent such troubles.

3 ELECTRICAL WIRING

- For electric wiring work, refer to the electric wiring plate attached to the back side of switch box cover.
- Do not change the wirings nor operate the electromagnetic switches manually inside the OIL COOLING UNIT.

3-1 Power source capacity

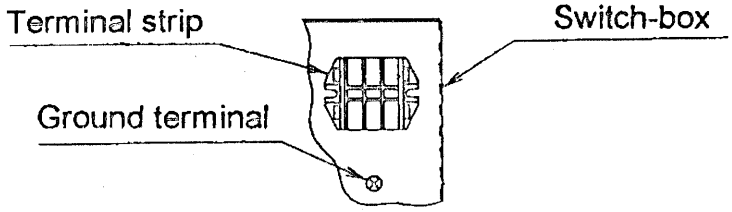
Rated Voltage	AKJ5G(A)Y, AKJ5G(A)Y-C
3-phase, 200V	1.4kVA
3-phase, 220V	1.5kVA

3-2 Circuit breakers

This equipment is not equipped with an earth leakage circuit breaker for main power supply. Be sure to install the earth leakage circuit breaker of rated current 5A.

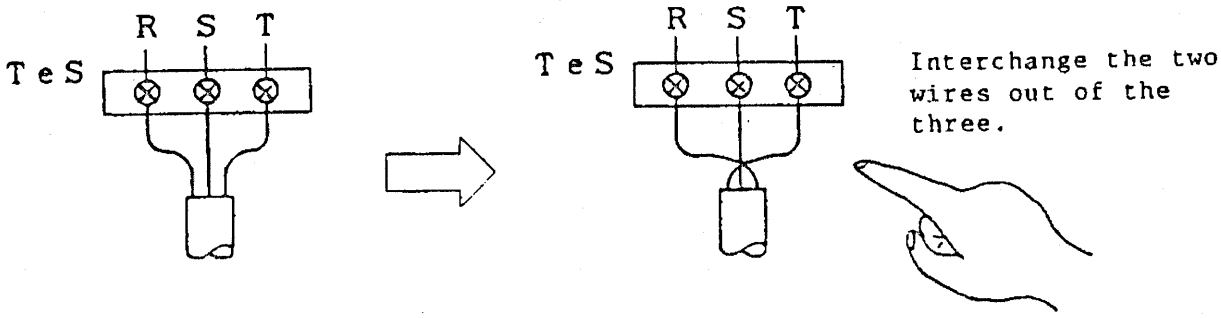
3-3 Grounding and power source connection

1) Remove the switch box cover.
2) Pass the main power wires and ground wire (600V PVC insulated power wire, 2mm² or more) through the power wiring supply hole (φ27mm) in the top panel and into the switch box.
3) Connect the ground wire to the ground terminal.



4) Connect main power source wires R, S and T to the corresponding L1, L2 and L3 on the terminal strip (TeS).

· WIRING PROCEDURE



Note) When the power source is connected to the reverse phase,change the two wires;R and S,as shown in the Fig. below.
(If in reverse phase,an alarm display is indicated "U1" on the control panel by the individual abnormaly function.)

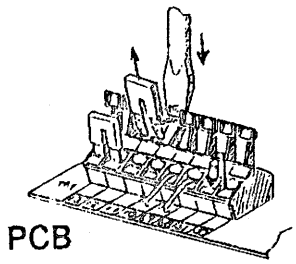
3-4. Remote control and connecting the alarm contact

1) Wire as indicated below for remote control.

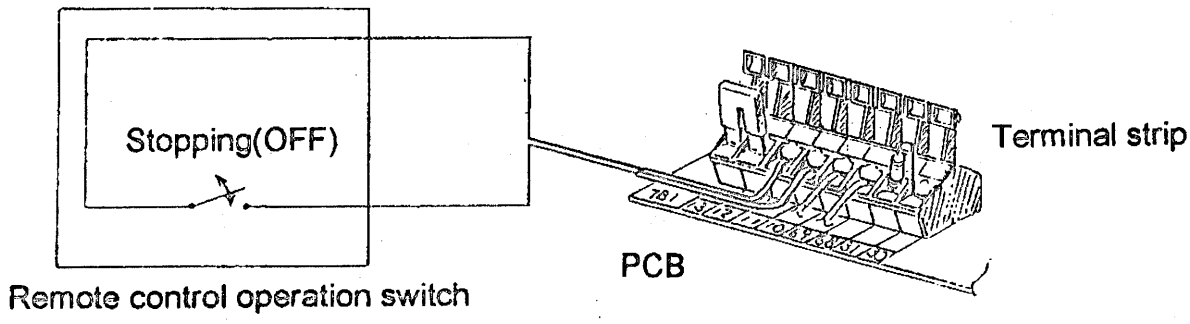
Part to be prepared.

Part		Wiring material
Single-pole,single-throw remote control switch or "a" contact capable of transmitting control signal.		HVSF 0.75㎟wire
Minimum contact capacity.	10mA(DC24V)	

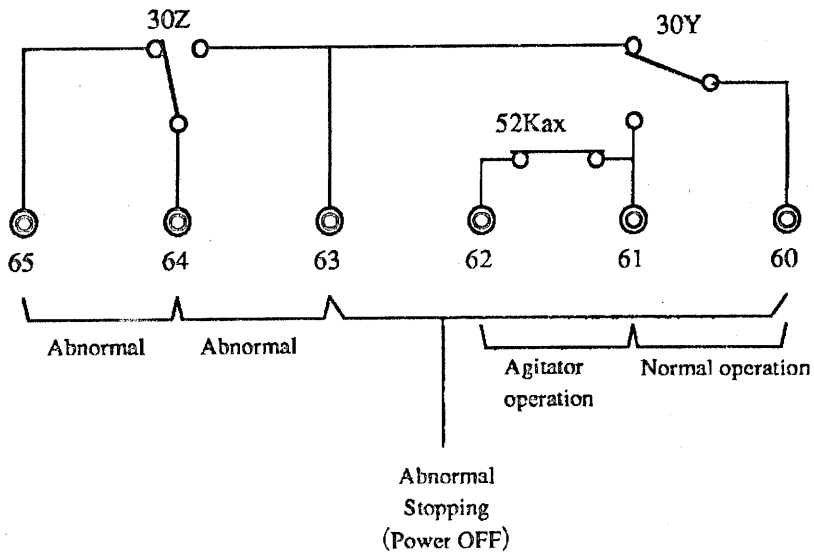
2) Remove the short-circuit wire (terminal Nos.(10)-(11)) from the terminal strip inside the switch box.



3) Connect Nos.(10)-(11) on the terminal strip with the remote control operation .



4) Outside output connection of alarm (No.60,61,62,63,64,65) are as shown in the figure below.Please use connecting terminals on necessary.



Time chart of external output contacts of AKJ56(A)Y, AKJ56(A)Y-C

Operation condition			Power OFF (Including power outage)	Power ON						
				Normal	Abnormal (51C,CT)	Normal	Abnormal (51K)	Normal	Abnormal (excluding 51C,CT,51K)	Normal
Condition of setting	Power source		OFF	ON	Reset		Reset		Reset	
	Remote control contact	Between 10-11	OFF	ON	OFF	ON				
	Control panel	[LOCK] key		ON	OFF (release)	ON	ON			
External output contact and terminal marks	Normal ('a' contact)	Between 60-61	OFF	ON						
	Abnormal • stop (power down) ('b' contact)	Between 60-63	ON	OFF						
	Agitator operation ('a' contact)	Between 61-62	OFF	ON	OFF	ON	ON			
	Abnormal ('a' contact)	Between 63-64	OFF		ON					
	Abnormal ('b' contact)	Between 64-65	ON		OFF					

4 CAUTIONS FOR OPERATION

4-1 After connecting the power cable, earth conductor and alarm contact, make sure that the liquid level in the tank falls within the specified limits.

Thereafter, cancel operation lock of oil cooling unit to put the agitator into operation.

Never conduct the dry run of the equipment when it is short of liquid. (it may lead to a cause of trouble.)

4-2 By the effect of the self-contained delay timer, the refrigerator may not operate when put into operation again after stopping its operation. However, it is not the symptom of trouble.

4-3 The OIL COOLING UNIT is a liquid cooler applied with refrigerator. It is unable to apply such a method of operation as for water cooling type cooler where cooling is started after liquid temperature has increased.

Operation of OIL COOLING UNIT should be started simultaneously with the machine operation

If operation is started after liquid temperature has increased, then the protective device of compressor may function to prevent the operation of OIL COOLING UNIT.

4-4 If you use the synchronous liquid of tank out and atomospheric temperature control, set the operational mode No. 3 on the control panel and connect the thermistor for liquid temperature of accessory with CN44 in wiring diagram.

4-5 Control the volume of tank liquid used for this equipment in such a way that the distance from the floor level of this equipment to the lowest liquid level will not become larger than the specified level (refer to para. 2, (2-2)). Also give consideration to prevent overflow caused by variations in liquid level during operation.

4-6 At the high viscosity of liquid used, the overcurrent relay of agitator motor will operate to light up the trouble indicator lamp and actuate the alarm contact.

4-7 This cooling unit has shipping parts (foamed polystyrene) under compressor and on the side of it. Take them away before operation.

[Or may generate noise and may cause deformation of shipping parts by compressor heat.]

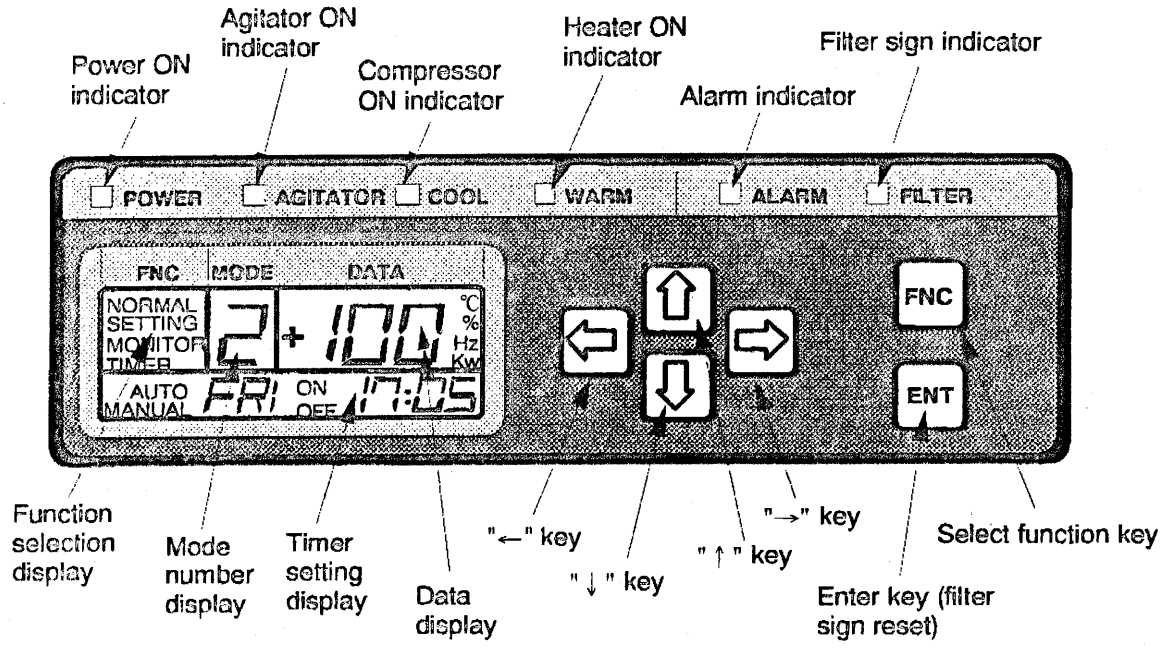
5 NAMES, FUNCTIONS AND OPERATIONS ON CONTROL PANEL

5-1. Outline of the control panel

1) Outline

The following describes the functions and operating method of the display panel. Details are further explained in the section of each panel item.

2) External diagram



3) LED indicator section

Item	Description
Power ON indicator (green)	Turns ON when the +5V power is supplied to the controller. Even when this indicator is OFF, the main power may be supplied to the equipment.
Agitator ON indicator (green)	Turns ON when the agitator is in operation (when protection input 52Ka is ON).
Compressor ON indicator (green)	Turns ON when the compressor is in operation.
Heater ON indicator (green)	Turns ON when the heater is in operation (when CPU issues ON instruction to 52H).
Alarm indicator (yellow)	Turns ON when the controller detects an abnormality. When a level-1 alarm is generated, the indicator flashes in 0.5-second intervals.
Filter sign indicator (yellow)	Turns ON when the duration of the power supply to the oil cooling unit exceeds the predetermined time (parameter setting). (300Hr.)

4) LCD display section

Item	Description
Function selection display	Indicates the current operation mode.
Mode number display	Indicates the current temperature-controlled operation mode.
Data display	Indicates the target value of the temperature control. (The displayed information varies depending on the temperature-controlled operation mode.)
Timer setting display	Indicates ON/OFF of the timer operation and the setting of the ON/OFF time.

5) Keys

Item	Description
"FUNC" key (function setting key)	Used to change operation modes. Pressing this key during data entry cancels the input, and changes to the next operation mode.
"ENT" key (input entry key)	Used to enter input data. (Also functions as filter reset key)
" ↑ " " ↓ " key	Used to change displayed value. (Generally " ↓ " indicates reduction, while " ↑ " indicates increase.)
"→" "←" key	Used to select the item and digit of data input.

Every key has a repeat input function.
The repeat timing is shown below.

Item	Defined value	Remarks
Time interval between the key pressing and repeat start	1 sec	10% increment/decrement (1.0℃)
Repeat intervals	0.5 sec	1% increment/decrement (0.1℃)

5-2. Operation mode

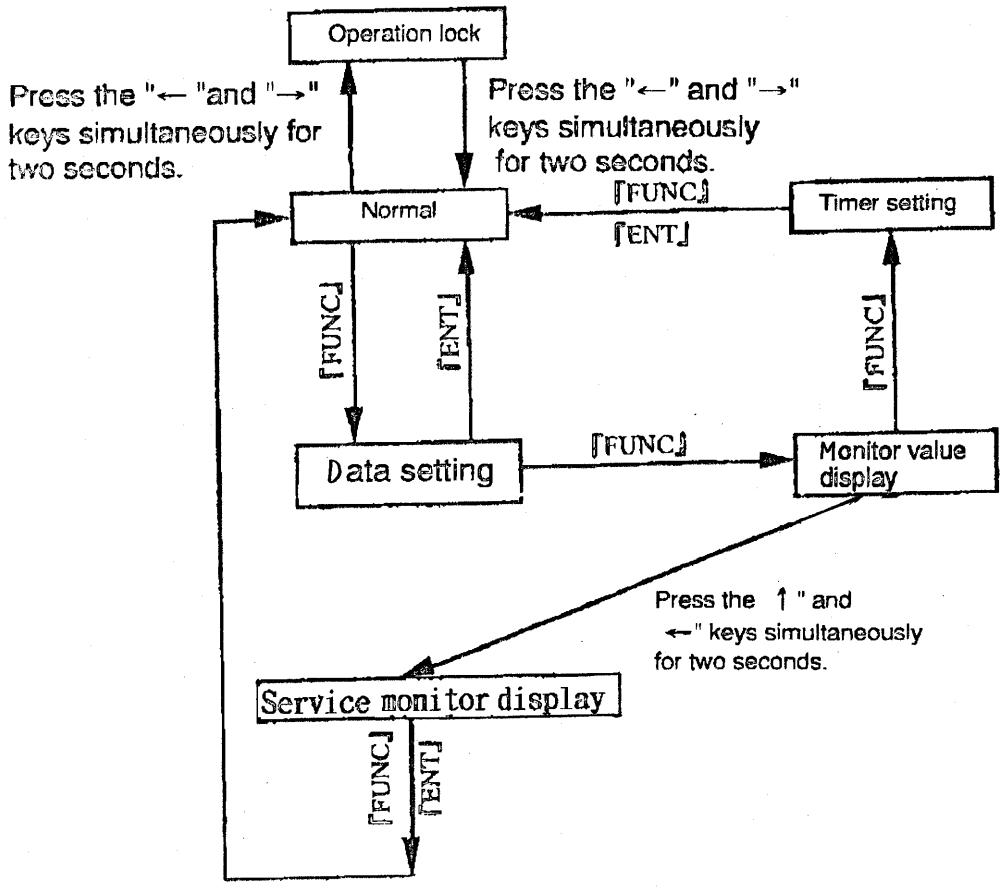
There are six operation modes, as shown below.

Operation mode	Function selection display section	Description
Operation lock	LOCK flashes	Prohibits all key operations except lock cancellation, and operation of the agitator motor and fan motor (factory setting). The data display section shows flashing "Lock" indication.
Normal	NORMAL illuminates	Displays the target operation value. (Main operation mode)
Data setting	SETTING illuminates	For operation data setting.
Monitor value display	MONITOR illuminates	Displays data such as sensor temperatures.
Timer setting	TIMER illuminates	For the ON/OFF time setting of timer operation.
Service monitor display	SETTING flashes	Displays special monitor value for service.

The "normal," "data setting," "monitor value display and timer setting" modes are commonly used, and the mode changes in a set order every time the FUNC key is pressed.

A special procedure must be followed to change to other modes.

The key operation and operation mode changing order are shown in the diagram below.



5-3. Normal operation mode

1) Outline

This mode displays the operation mode and target control value of the oil cooling unit.

2) Indication

1. When alarm is not generated

The operation mode is indicated on the mode display section, and the target control value is shown on the data display section.
When the target control temperature value obtained from the synchronous liquid temperature control exceeds the allowed temperature setting range, a limiter is automatically set on the target control value, and the result is displayed.

Mode display section		Data display section		
Mode No.	Mode	Displayed information	Displayed value	Unit
0	Fixed liquid temperature control	Liquid temperature	5.0 ~ 50.0	℃
1	Not used	———	———	—
2	Fixed equipment temperature control	Equipment temperature	5.0 ∫ 50.0	℃
3	Synchronous liquid and atmospheric temperature control	Liquid temperature		
4	Synchronous liquid and equipment temperature control	Liquid temperature		
5	Not used	———	———	—
6	Not used			
7	Not used			
8	Not used			
9	Not used			

2. When alarm is generated

The operation mode is indicated on the mode display section, and the alarm code is shown on the data display section.

Mode display section		Data display section		
Mode No.	Mode	Displayed information	Displayed value	Unit
0 ∫ 9	Current operation mode	Alarm code (See the alarm code table.)	Rightmost digit: OFF Second and third digits from the right: alarm code (flashing)	OFF

3) Operating method

1. Filter sign reset

The filter sign indicator turns ON when the duration of the power supply to the oil cooling unit exceeds the predetermined time (parameter setting).
This indication can be turned OFF by pressing the ENT key.

2. Operation lock

The operation lock can be activated by simultaneously pressing the "←" and "→" keys in normal operation mode for two seconds.
When the operation lock is engaged, the data display section shows a flashing " Lock" indication, and the MANUAL and AUTO indications on the timer setting display section turn OFF.
The operation lock mode cannot be canceled by turning off the power and turning it back on.
The operation lock can be canceled by simultaneously pressing the "←" and "→" keys for two seconds. When the operation lock is canceled, the equipment returns to normal operation mode. After this operation, be sure to set the timer setting to MANUAL.
Transporting the equipment in operation lock mode prevents accidents resulting from turning on the main power and before pipe connection check is completed after installation.

3. Adjusting the day and time

Conducting the following table process in normal operation mode advances the display of the day of the week, hours and minutes.
There is no carry to hours from minutes or to week from hours.

Day of the week	Press the " ↓ " and "←" keys simultaneously.
Hours	Press the " ↓ " and " ↑ " keys simultaneously.
Minutes	Press the " ↓ " and "→" keys simultaneously.

4) Note

1. Operation mode

Depending on the oil cooling unit device, not all operation models can be used.

(Please refer to next page.)

5-4. Operation data setting mode

1) Outline

This mode is used to change the operation mode and setting of the oil cooling unit.

2) Operation mode setting range

The following table shows the operation modes and data setting ranges.

Mode No.	Mode	Setting range	Unit
0	Fixed liquid temperature control	5.0 ~ 50.0	℃
1	Not used	———	—
2	Fixed equipment temperature control	5.0 ~ 50.0	℃
3	Synchronous liquid and atmospheric temperature control	−9.9 ~ 9.9	K
4	Synchronous liquid and equipment temperature control		
5	Not used	———	—
6	Not used		
7	Not used		
8	Not used		
9	Not used		

1. Fixed liquid temperature control (modes 0 and 2)
   Controls the temperature of the control item to the set level.

2. Synchronous liquid temperature control (modes 3 and 4)
   Controls the temperature of the control item to the temperature value calculated with the following equation.
   Target control temperature = Synchronizing source temperature + set value (offset value)
   If the result of the calculation is lower than 5.0℃, the target control temperature is set to 5.0℃, while if the result is over 50.0℃, it is set to 50.0℃.

3) Operating method

1. Changing the operation mode
   When this mode is selected, the current operation mode indication on the mode number display section flashes.
   Use the " ↑ " and " ↓ " keys to select the desired operation mode number.
   (The data display section indicates the setting data for the selected operation mode.)

2. Changing the setting data
   When the "→" key is pressed while the operation mode display is flashing, the data display flashes.
   Use the " ↑ " and " ↓ " keys to change the indication to the desired value.
   (One key operation increases or decreases the displayed value by 0.1℃ (1%). If the repeat key function is activated, however, the value increases or decreases by 1.0℃ (10 %).)
   If the set data exceeds the range allowed for the selected operation mode, the lower-limit value (or upper-limit value) is set.

3. Entering and canceling the data
   Pressing the ENT key enters the input value. The buzzer turns on for one second, and the input value lights at the same time. Then the equipment returns to normal operation mode.
   Pressing the FUNC key during data input cancels the operation mode and setting data being input.
   Pressing the "←" key during data input cancels the input data, and returns to the operation mode selection mode.

4) Note

1. Operation mode
   The data display section shows "---" when an unused operation mode is selected, and data setting is not possible.

5-5. Monitor value display mode

1) Outline

This mode is used to display data such as sensor temperatures.

2) Display data and ranges

The following table shows the monitor value corresponding to the item number.

Mode No.	Mode	Display range	Unit	Remarks
0	Equipment temperature	−99.9 ~ 99.9 Note 1)	℃	
1	Not used	———	—	
2	Air temperature	−99.9 ~ 99.9 Note 1)	℃	
3	Liquid temperature			
4	Not used	———	—	
5	Powor supply frequency	50 , 60	Hz	
6	Not used	———	—	
7		Displays "---"	OFF	
8				
9				

Note 1) The detectable temperature range of the oil cooling unit is between −40℃ and +180℃.
If the sensor is short-circuited, the display indicates " −99.9℃".

3) Operating method

1. Confirming the monitor value
When this mode is selected, "0" flashes on the mode number display section.
Use the " ↑ " and " ↓ " keys to select the desired item number.
(The data display section indicates the monitor data corresponding to the selected operation mode.)

5-6. Time setting mode

1) Outline

This mode is used to change the timer settings.
There are MANUAL and AUTO timer modes, and they are defined as follows.

Timer mode	Description
MANUAL	Timer not used
AUTO	Timer used

The timer allows one ON and one OFF settings for each day of the week from Sunday to Saturday.
The time scale of 00:00 to 23:59 is commonly used. However, since work may continue past 23:59 of the setting day into the following day, timer setting is possible between 00:00 to 29:59 (5:59 of the following morning).

2) Operating method

1. Selecting the timer mode
   When this mode is selected, the current timer mode flashes.
   Use the " ↑ " and " ↓ " keys to select the desired timer mode.

2. Selecting the timer setting
   When the "→" key is pressed in the timer mode selection mode, the timer setting day of the week flashes. "MON" is displayed when the timer mode is selected.
   Use the " ↑ " and " ↓ " keys to select the desired day of the week and either ON or OFF.
   Use the "←" key to return to the timer mode selection mode.

3. Setting the hour
   Use the " ↑ " and " ↓ " keys to set the hour for the selected timer setting item (day of the week, ON/OFF).
   The setting range is between 00 and 29.
   Use the "←" key to return to the timer setting selection mode.

4. Setting the minute
   Use the " ↑ " and " ↓ " keys to set the minute for the selected timer setting item (day of the week, ON/OFF).
   The setting range is between 00 and 59.
   Use the "←" key to return to the timer hour selection mode.

5. Entering and canceling the data
   Pressing the ENT key enters all the timer settings. The buzzer turns on for one second, and the set value lights at the same. Then the equipment returns to normal operation mode.
   Pressing the FUNC key during setting operation cancels all the settings, and returns to normal operation mode.

1)Outline

This mode is used to display special monitor value for service.

2)Display data and ranges

The following table shows the monitor value correesponding to the mode number.

Mode No.	Mode	Display range	Unit	Remarks
0	(Abnormal time) Alarm code	Alarm code	OFF	
1	(Abnormal time) Power supply frequency	50, 60	Hz	
2	(Abnormal time) Output of fan	0, 1	OFF	
3	(Abnormal time) Equipment temperature	-99.9~99.9	℃	
4	Not used	—	OFF	
5	(Abnormal time) Atmospheric temperature	-99.9~99.9	℃	
6	(Abnormal time) Liquid temperature	-99.9~99.9	℃	
7	Not used	—	OFF	
8	(Abnormal time) Cumulative comp. operating hours	0~999	OFF	(min.)
9	Cumulative overall this equipment operating hours	0~999	OFF	(x100Hr.)
A	Cumulative overall comp. operating hours	0~999	OFF	(x100Hr.)
b	Cumulative hours of filter sign	0~999	OFF	(x1Hr.)
C	Not used	—	OFF	
d	Not used	—	OFF	
E	Printed circuit board ID	0~255	OFF	
F	EEPROM data version	0~255	OFF	

3)Operating method

1. Confirming the monitor value

When this mode is selected, "0" flashes on the mode number display section.

Use the "↑" and "↓" keys to select the desired item number.

[The data display section indicates the monitor data corresponding to the selected operation mode.]

2. Clearing the motor overcurrent error 「E6」

The motor overcurrent error is special alarm and this cannot be cleared by turning off the power and turning it back on.

This alarm is cleared by turning off the power and turning it back on after flashing alarm code by pushing [→] key with mode No. "0" and clearing the alarm memory by pushing [ENT] key.

6 Alarms

6-1. Outline of alarm processing

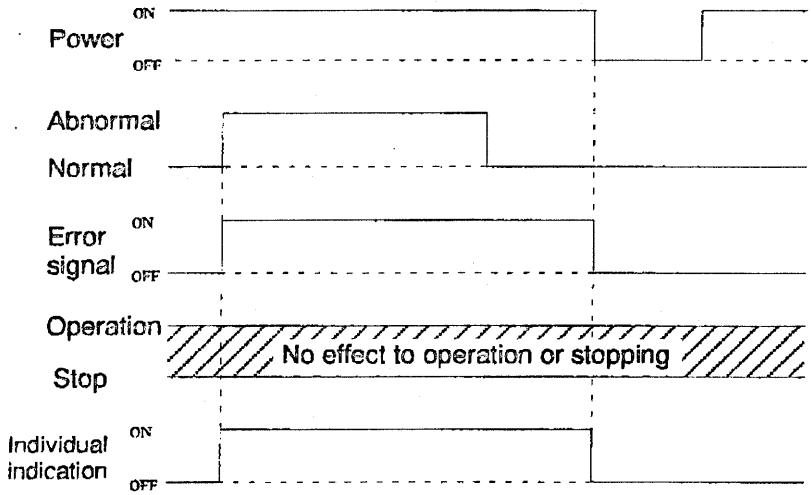
1) Outline

The oil cooling unit classifies alarm level into two levels, level 1 and 2. Level 1 stops agitator operation, while level 2 allows agitator operation.

6-2. Alarm level and priority

A Level-1 alarm is considered a high-level alarm, while a Level-2 alarm is a low-level alarm.
The following describes the levels of alarms and processing methods.
(Note) Abnormality A refers to the first abnormality detected, and abnormality B refers to the second abnormality.

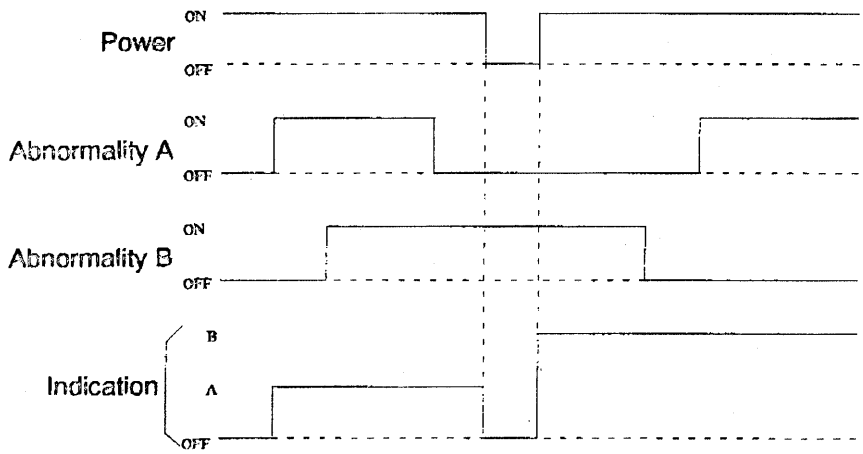
1) When a single abnormality is detected



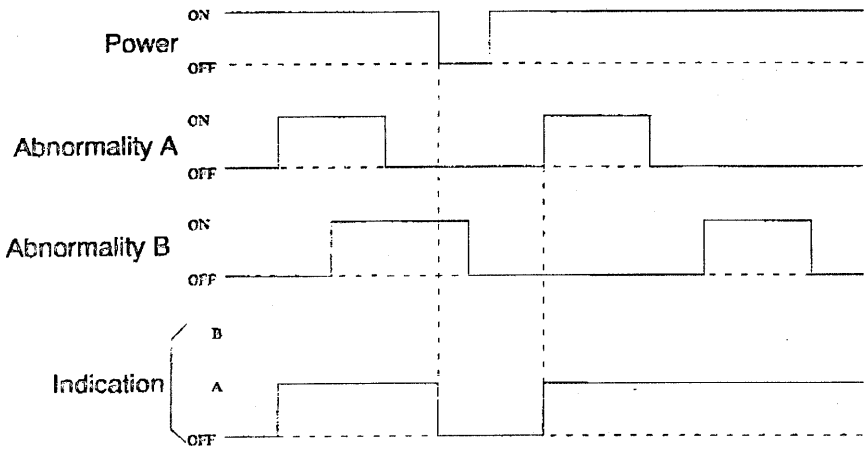
2) When multiple abnormalities are detected

1. When abnormalities A and B are of the same alarm level

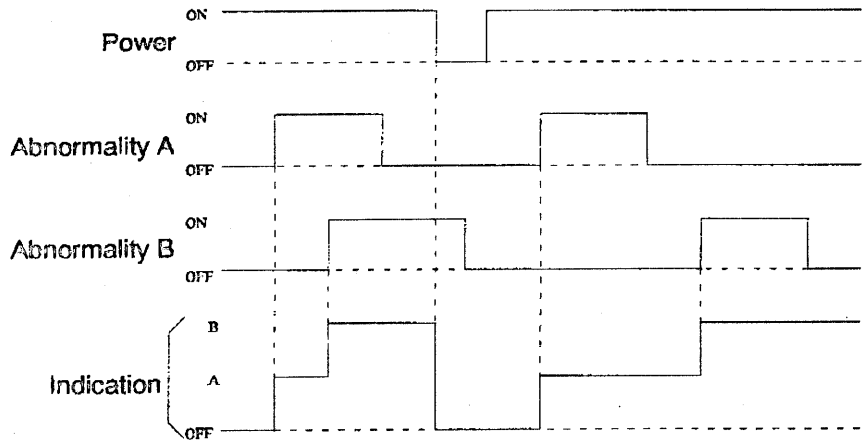
The detection of abnormality B is ignored, and the alarm of abnormality A continues to be used.



2. When the alarm level of abnormality A is higher than the alarm level of abnormality B The detection of abnormality B is ignored, and the alarm of abnormality A continues to be used.



3. When the alarm level of abnormality B is higher than the alarm level of abnormality A The alarm of abnormality A is used at the time of the detection of abnormality A. However, as soon as abnormality B is detected, and the alarm switches to that of abnormality B.



6-3. Processing alarm generation

1) Alarm indication on the control panel

The data display section of the control panel shows the alarm code of the result of the alarm processing based on the alarm level priority.
(only when the operation mode of the display panel is set to NORMAL or TIMER)
The alarm indicator on the control panel lights or flickers as shown below.

Item	Alarm indicator
Level-1 abnormality	Flickers at 0.5-second intervals
Level-2 abnormality	ON

The buzzer also turns on.

2) Abnormality record in memory

When an alarm is generated, the current values of the data in the following table are written in the error parameter memory area in the EEPROM.

Mode No	Mode
0	Alarm code
1	Power supply frequency
2	Not used
3	Equipment temperature
4	Not used
5	Atmospheric temperature
6	Liquid temperature
7	Not used
8	Cumulative compressor operating hours

The data of the first abnormality that occurs after the power is turned on is written into the memory. When multiple errors are generated and alarm switching occurs according to the priority-based processing (described in 6-2)), the newer error data is written.

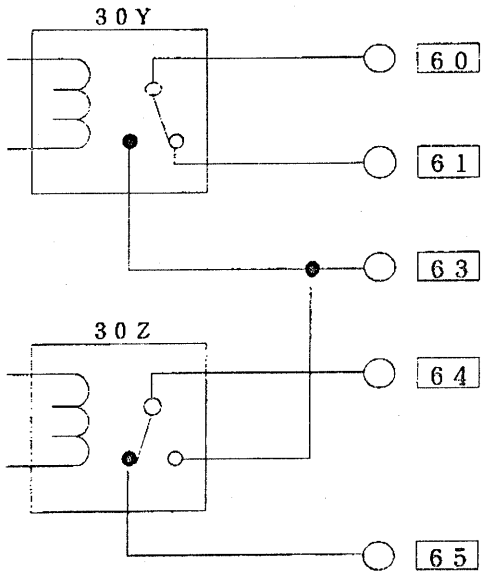
3) Clearing the alarm

The alarm can be cleared by turning off the power and turning it back on.
But the motor overcurrent error [E6] is only cleared in service monitor display mode. (Please refer to P.18.)

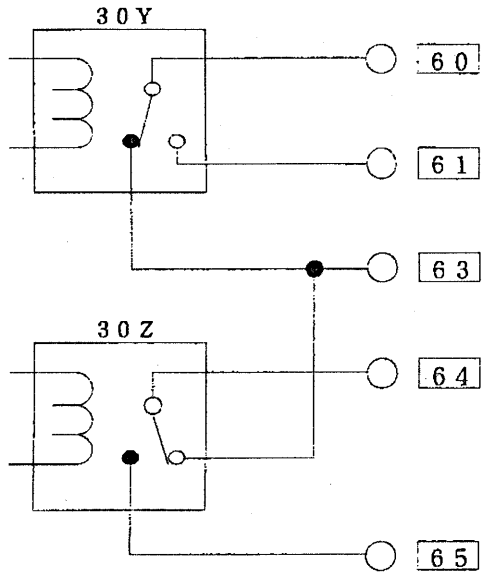
4) External alarm output

1. External alarm communication output port
   The alarm output of the external parallel communication output port turns ON

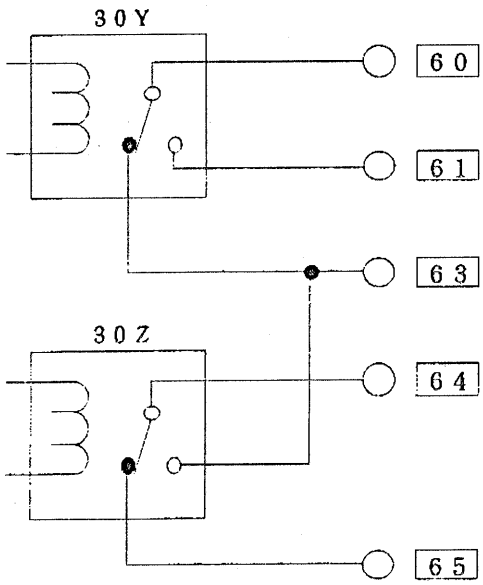
2. Relay contact output
   When an alarm is generated, output 30Y turns OFF, and output 30Z turns ON.
   The following diagrams show the relay contact output conditions.



No alarm generated (normal)



When alarm is generated



In power outage, or in case of faulty CPU startup

6-4. Alarm codes and levels

The following table shows the definition of alarm codes of errors detected by the temperature control PCB.

Alarm code	Level	Description of error
E 1	1	Faulty PCB Illegal overload
E 3	2	63H (high pressure switch) activation
E 5	2	49C (compressor head thermal bimetal) activation
E 6	2	51C (compressor overcurrent relay) activation, or overcurrent detected by CT
E H	1	51K (agitator overcurrent relay) activation
E J	1/2	O.P. (option protection device) activation
H 1	2	Faulty Th1 or Th3 (short-circuit, broken wire)
H 6	2	Faulty current detection by CT (only AKJ56Y)
H H	1	Faulty 52K (agitator magnet) operation
F H	1	Abnormally high liquid temperature
F E	1	Connector (CN23) disconnection
J H	2	Faulty Th4 (short-circuit, broken wire)
P 1	1	Open phase
U 1	1	Power reverse phase, power frequency abnormality, overvoltage
U 6	1	Faulty communication between temperature controller and display CPU
U H	1	System error (EEPROM error)

6-5. Supplementary information regarding alarm codes

1) [E1] Faulty PCB, illegal overload

This code is generated when either of the following is detected.

a) When a circuit problem such as faulty solder bridge occurs in the secondary side (CPU side) of the photocoupler of the protection input.

2) b) When the CPU of the display PCB detects an error in the hardware of the control panel.

Whether the cause is a) or b) can be identified by the condition of the clock display section of the LCD on the control panel. If the clock display section shows the time, the cause of the problem is a), while if it indicates "E-**," the cause is b) (error in the control panel).

In case of b), the error codes for the control panel are as follows.

Alarm code	Name of alarm	Description
E-01	Power shut-off detection port error	The power shut-off detection port is remaining Lo.
E-02	Key input port error	The key input port is remaining Lo.
E-03	LED output port error	The LED output port is remaining Lo.
E-04	Buzzer/LEDA output port error	The buzzer/LEDA output port is remaining Lo.
E-05	RTC access error	RTC cannot be accessed.
E-06	RTC memory data error	RTC can be accessed, but the data in memory causes a check-sum error.

Note 1) Since errors E-01 to E-05 are due to faulty hardware, resetting the equipment does not cancel these errors.

Note 2) As soon as error E-06 is generated, the data is initialized. Therefore, resetting the equipment cancels the error.

Note 3) When the CPU of the control panel is not functioning, the LCD may not display any information.

Note 4) If the CPU of the control panel operates with a communication error between the display device and temperature controller, alarm code [U6] is displayed on the control panel.

2) [E3] 63H (high pressure switch) activation

This code is generated when 63H is tripped, or broken wire or connector (CN27) disconnection is detected.

3) [E5] 49C (compressor head thermal bimetal) activation

This code is generated when 49H is tripped, or broken wire or connector (CN26) disconnection is detected.

4) [E6] 51C (compressor overcurrent relay) activation, overcurrent detected by CT

This code is generated when 51H is tripped, or broken wire or connector (CN24) disconnection is detected, or when the current detected by CT exceeds the set value.

5) [EH] 51K (agitator overcurrent relay) activation
This code is generated when 51K is tripped, or broken wire or connector (CN20) disconnection is detected.

6) [EJ] OP (option protection device) activation
This code is generated when OP is tripped, or broken wire or faulty connection of the terminal board (12,13) is detected.ted.

7) [H1] Faulty Th1 (equipment temperature synchronizing thermistor) or Th3 (room temperature thermistor)
This code is generated when broken wire or short-circuit in Th1 (terminal board: 30, 31 or Th3 (CN43) is detected.
The faulty thermistor can be identified by the monitor code displayed on the control panel.
The thermistor with a monitor value of "−99.9℃" is the faulty one.

8) [H6] Faulty current detection by CT
This code is generated when the compressor wires are not properly connected.

9) [HH] Faulty 52Ka (auxiliary magnet contact for agitator motor) operation
This code is generated when 52Ka (auxiliary magnet contact for agitator motor) does not turn ON or OFF in sync with the ON/OFF signal of 52K (magnet for agitator motor) from the temperature control CPU.
The cause can be broken wire in 52K, disconnected 52K connector (CN4), disconnected 52Ka connector (CN22), faulty 52K magnet (broken wire, melting) or open L2 phase.

10) [FH] Abnormally high liquid temperature
This code is generated when the liquid temperature at the inlet exceeds the set value (60℃).

11) [F E] Connector (CN23) disconnection
The cause can be disconnected connector (CN23).

12) [JH] Faulty Th4 (liquid temperature thermistor)
This code is generated when broken wire or short-circuit is detected in CN42 or Th4 (CN44).
The faulty thermistor can be identified by the monitor code displayed on the control panel.
The thermistor with a monitor value of "−99.9℃" is the faulty one.

13) [P1] Open phase
This code is generated when open L1 or L3 phase is detected.
In case of open L2 phase, error 52Ka [HH] is generated when 52K (agitator magnet) turns ON.

14) [U1] Power reverse phase, power frequency abnormality, overvoltage
This code is generated when power reverse phase, power frequency abnormality (< 45 Hz, >65 Hz) or overvoltage (>242 V) is detected.
The power reverse phase and power frequency abnormality check is conducted only once, immediately after power ON operation, and overvoltage check is continuously performed. Therefore, if error [U1] is generated during ordinary operation, the cause is always overvoltage.

15) [U6] Faulty communication between temperature controller and display CPU

This code is generated when an error in the communication between the temperature controller and display CPU is detected.
If the display device communication is normal, the error code sent from the temperature control CPU to the control panel is displayed. If the error is generated in the communication operation with the control panel, the control panel cannot receive the error code; therefore, there is a possibility that the control panel may not indicate the error code. To solve this problem, the control panel conducts its own communication error detection, and displays "U6" in case of a communication error. When the communication error (U6) detected by the control panel is canceled, the control panel's detection function automatically resets, changing the error indication to the error code received from the temperature control CPU. Therefore, in some cases, the error code obtained through the communication may not agree with the displayed error code.

16) [UH] System error (EEPROM error)

This code is generated when there is an abnormality in the data in the EEPROM or when an error occurs during EEPROM data access.

7 MAINTENANCE AND INSPECTION

In conducting the maintenance and inspection work, be sure to turn operation mode to operation lock to bring this equipment to a stop and throw OFF the main power supply.

(It is extremely dangerous to conduct the work since there is a possibility of electrification or coming in contact with rotating objects if the equipment remains operated.)

7-1 Casing

1) Polish the casing surface with dry cloth. If the surface is heavily fouled, remove the dirt with high quality soap or neutral detergent. Never pour water direct to the equipment.
(Operation of as-wetted equipment may lead to electrical leakage or fire.)

2) To prevent coatings from peeling off, do not use brushes, polishing powder, acids, solvents such as benzine etc., hot water, and so on.

7-2 Tank and return filter (by local arrangement)

1) Maintain the liquid level in the tank in normal position to prevent the liquid leakage caused by overflow or the dry run caused by shortage of by liquid. Note that the liquid should be controlled so as to be kept clean at all times.

2) Clean up periodically the return filter for use on the return (liquid inlet) side of tank to prevent such reduction of liquid volume in the tank as is caused by clogging of dirt.

7-3 Air filter

1) Be sure to wash the air filter once every 2 weeks with neutral detergent. If dirt or dust is accumulated on the air filter, the filtering capacity is lowered by reduction in air flow and, at the same time, the protective device of compressor will operate to prevent a smooth operation.

2) If the equipment is put into operation without the air filter, the resultant loss of dust removal effect will result in fouling of the equipment (especially, condenser), thus leading to a cause of trouble.

3) When the condenser is heavily fouled, clean it up with brush, air gun, etc.

7-4 Cooling coil

1) Since accumulation and deposition of foreign matter such as swarf, cuttings or the like on the surface of cooling coil will reduce the cooling capacity and lead to a cause of trouble, check and clean up the cooling coil periodically.

2) For cleaning, dismount the OIL COOLING UNIT from the liquid tank and clean it up with non-metallic brush or the like.

3) When cleaning, take precautions so that no powerful impact or force will be placed on the cooling coil.

7-5 Replacement of fuse

Be sure to replace two fuses together.
(Two pieces of spare fuse are contained in the accessory bag.)

7-6 Case of long-time shutdown

1) Use care to prevent dirt, dust, water, etc. from coming into the oil cooling unit

2) Turn operation mode to operation lock to bring this equipment to a stop and be sure to throw OFF the main power supply.

3) Take precautions so that no oily dirt and dust will deposit on the condenser surface of refrigerator.

8 TROUBLESHOOTING GUIDE

When your OIL COOLING UNIT is out of condition,fist check for the following items and then eliminated the cause of trouble.
If the troube still persists,please inform our sales office of (1) Model,(2) Mfg.No. (both (1) and (2) are given on the machine name plate.) and (3) Machine condition (as particuraly as possible).

8-1. OIL COOLING UNIT and appliances do not operate.

No.	Trouble	Cause	Remedy
1	POWER indication doesn't light up though main power supply is turned ON.	Fuse for operation circuit is blown.	Check and repair the short-circuit point in operation circuit.
		POWER lamp is burnt out.	Replace the display CPU(EC2).
2	Agitator and fanmotor does not run though POWER indication light up.	Overcurrent relay for agitator motor (51K) has operated as result of agitator being put in overload run.	Eliminate the case of overload. ・Liquid viscosity is abnormally high.→Replace it with low-viscosity liquid. ・Swarf entangled on agitating plate prevents rotation. →Remove theswarf. ・Bearing for agitator motor are damaged. →Replacement (service) is necessary.
		Agitator motor burnt out.	Replacement (service) is necessary.
3	Though refrigerator was running,both agitator,fanmotor and refrigerator have come to a stop with out lighting-up of POWER and ALARM indication.	Due to short-circuit and leakage caused in electorical line,earth leakage circuit breaker for main POWER supply was thrown OFF.	Check and repair the leak point.
		Due to compressor being burnt out by overload run,earth leakage circuit breaker for main POWER supply was thrown OFF.	Replacement (service) of the compressor is necessary.
4	Though refrigerator was running,alarm indication was transmitted,ALARM code was indicated. (Refer to (6-4);Alarm codes and levels)	The air filter and the condenser are clogged.	Clean up the air filter and condenser.
		Obstacles exist near to suction inlet and exaust outlet.	Remove the obstacle.
		Atmospheric temperature is abnormally high.	Use the equipment within the operating range. (If the equipment is exposed to heat,take measures for the prevention of the heat.)
		Liquid temperature is abnormally high.	Use the equipment under low-liquid temperature conditions.
		High-viscosity loquid is applied.	Replace it with low-viscosity liquid.

8-2. Liquid is not cooled down.

No.	Trouble	Cause	Remedy
1	Liquid is not cooled down, though agitator, fanmotor and compressor are in operation.	Thermal load is high.	Eliminate the cause of increase in thermal load.
		Lowered liquid level has resulted in dry run.	Eliminate the cause of lowered liquid level and replenish the tank with liquid.
		Defferential temperature type controller is set at a high preset value.	Reset it at a proper preset value.
		Shortage of refrigerant gas.	Recharge(service) is necessary.
		Fouling of cooling coil. (Swarf is accumlated.)	Cooling up the cooling coil and tank.
2	Agitator and fanmotor run but compressor does not.	Thermostat functions properly and stops the compressor.	Set the thermostat to the low temperature side and check if the compressor starts. The compressor won't start if liquid temperature is too low. Wait until liquid temperature rises.
		Delay timer activated. (60 sec. set)	After resetting the timer, make sure that compressor will operate.
		Defferential temperature type controller is in fault.	Replacement (service) is necessary.
		Thermiser(liquid temperature) is in failure of continuity, (disconnected by corrosion etc.) or in fault.	Replacement (service) is necessary.

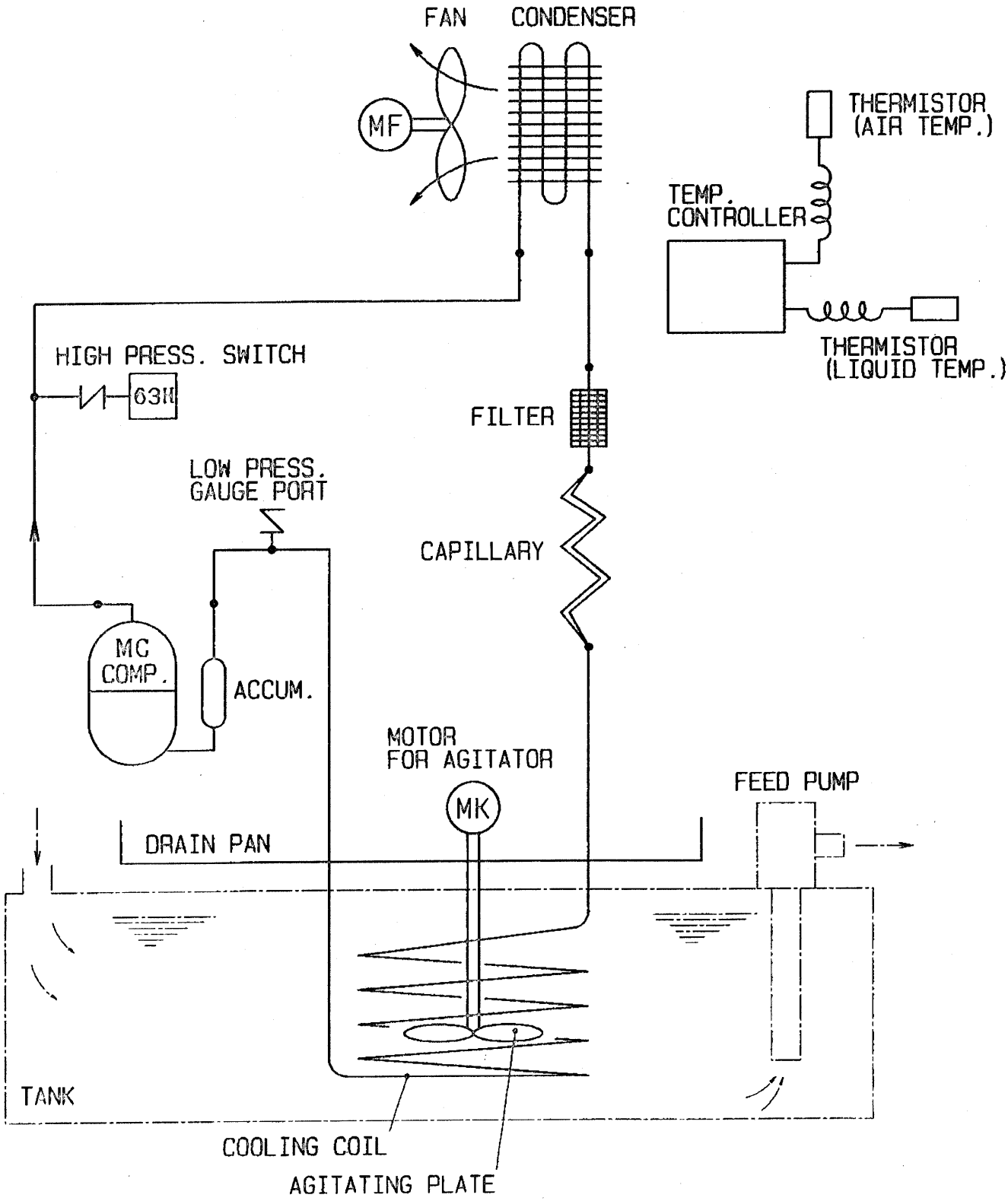
9.SPECIFICATIONS

MODEL		AKJ56(A)Y, AKJ56(A)Y-C
COOLING CAPACITY(50/60Hz)		1600/1700W(1400/1500kcal/h)
MAIN POWER SOURCE		3φ 200/200, 220V 50/60Hz
POWER SOURCE	MAIN CIRCUIT	3φ 200/200, 220V 50/60Hz
	OPERATION CIRCUIT	1φ 24V 50/60Hz
EXTERNAL PAINTING		IVORY WHITE (5Y7.5/1)
EXTERNAL DIMENSIONS (WxDxH)		360x395x610(960)
COMPRESSOR		HERMETIC TYPE ROTARY COMP. (RC17TN-A, 0.4kW 2P)
COOLER		OPEN COIL TYPE (C1220T-O)
CONDENSER		CROSS-FIN-COIL TYPE
MOTOR FOR FAN		PROPELLER FAN(φ250). MOTOR(3φ 40/40W 4P)
MOTOR FOR AGITATOR		3φ 50W 4P
OIL TEMPERATURE CONTROL		SELECT ONE FROM THE FOLLOWING TWO SYSTEMS ・TEMPERATURE DIFFERENCE TYPE CONTROLLER (AGAINST ROOM TEMPERATURE,CONTROL RANGE: -10~+10deg.℃) ・FIXED TYPE CONTROLLER (TEMPERATURE SETTING RANGE AT THE INLET: 8~42℃)
REFRIGERANT CONTROL		CAPILLARY TUBE
PROTECTORS		OVERCURRENT RELAY (FOR AGITATOR) OVERCURRENT PROTECTOR (FOR COMP.) HIGH PRESS.SW., COMP.THERMO PROTECTOR PHASE-REVERSAL RELAY, DELAY TIMER, FUSE
REFRIGERANT		R22 (0.5kg)
REFRIGERATOR OIL		SUNISO 4GS-Di, 0.4L
ACCEPTABLE FLUIDS		LONG LIFE COOLANT GREEN(50% WATER SOLUTION) (MOBIL LLC T/N / MOBIL LLC D/M) LUBRICATING OIL OF LOW VISCOSITY (ISO VG2 EQUIVALENT) (PLEASE PREVENT DISCOLORING NUMBER FROM BEING OVER 1 IN METHOD OF COPPER CORRSION TEST 「JIS K 2513」)
OPERATIVE RANGE	ROOM TEMP.	8 ~ 42 ℃
	LIQUID TEMP.	8 ~ 42 ℃
	LIQUID VISCOSITY	0.5 ~ 4 mm^2/s
WEIGHT		35 kg
ACCESSORIES AND SPARE PARTS		OPERATION MANUAL, FUSES, MACHINE SCREW THRMISTOR FOR LIQUID TEMP, SHIPPING PARTS
ORDERED ON SITE		FEED PUMP, TANK(DEEP MIN.400mm) CIRCUIT BREAKER

• APPENDIX

【PIPING DIAGRAM】

AKJ56(A)Y, AKJ56(A)Y-C



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