SPLIT TYPE
ROOM AIR CONDITIONER

DUCT type
INVERTER

SERVICE INSTRUCTION

Models	Indoor unit	Outdoor unit
	AR* C72LHTA	AO* A72LALT
	AR* C90LHTA	AO* A90LALT

Refrigerant
R410A

FUJITSU GENERAL LIMITED

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1. DESCRIPTION OF EACH CONTROL OPERATION

2. TROUBLE SHOOTING

3. APPENDING DATA

Refrigerant
R410A

DUCT type
INVERTER

1 . DESCRIPTION OF EACH CONTROL OPERATION

1-1. COOLING OPERATION

1-1-1 COOLING CAPACITY CONTROL

A sensor (room temperature thermistor) built in the indoor unit will usually perceive difference or variation between a set temperature and present room temperature, and controls the operation frequency of the compressor.

* If the room temperature is 2°C higher than a set temperature, the compressor operation frequency will attain to maximum performance.

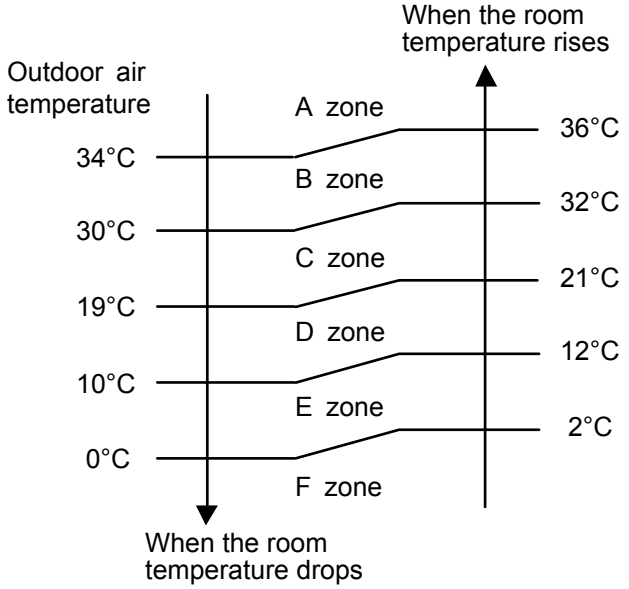
* If the room temperature is 2.5°C lower than a set temperature, the compressor will be stopped.

* When the room temperature is between +2°C to -2.5°C of the setting temperature, the compressor frequency is controlled within the range shown in Table1.

(Table 1 : Compressor Frequency Range)

	minimum frequency	maximum frequency
AO* A72LALT	28rps	77rps
AO* A90LALT	28rps	86rps

(Fig. 1 : Limit of Maximum Frequency based on Outdoor Temperature)



Fan speed mode		Hi	Me	Lo
AO* A72LALT	A zone	77rps	56rps	51rps
	B zone	77rps	56rps	51rps
	C zone	60rps	51rps	48rps
	D-F zone	51rps	48rps	48rps
AO* A90LALT	A zone	86rps	71rps	66rps
	B zone	86rps	71rps	66rps
	C zone	77rps	66rps	56rps
	D-F zone	66rps	56rps	53rps

1-2. HEATING OPERATION

1-2-1 HEATING CAPACITY CONTROL

A sensor (room temperature thermistor) built in the indoor unit will usually perceive difference or variation between a set temperature and present room temperature, and controls the operation frequency of the compressor.

* If the room temperature is lower 3°C than a set temperature, the compressor operation frequency will attain to maximum performance.

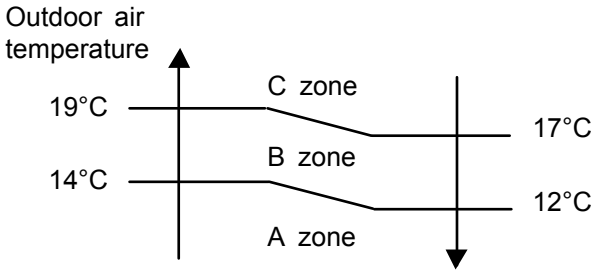
* If the room temperature is higher 2.5°C than a set temperature, the compressor will be stopped.

* When the room temperature is between +2.5°C to -3°C of the setting temperature, the compressor frequency is controlled within the range shown in Table2. However, the maximum frequency is limited in the range shown in Fig. 2 based on the outdoor temperature.

(Table 2 : Compressor Frequency Range)

	minimum frequency	maximum frequency
AO* A72LALT	30rps	85rps
AO* A90LALT	30rps	100rps

(Fig.2 : Limit of Maximum Frequency based on Outdoor Temperature)



Fan speed mode		Hi	Me	Lo
AO* A72LALT	A zone	90rps	79rps	70rps
	B zone			
	C zone			
AO* A90LALT	A zone	100rps	90rps	79rps
	B zone			
	C zone			

1-3. DRY OPERATION

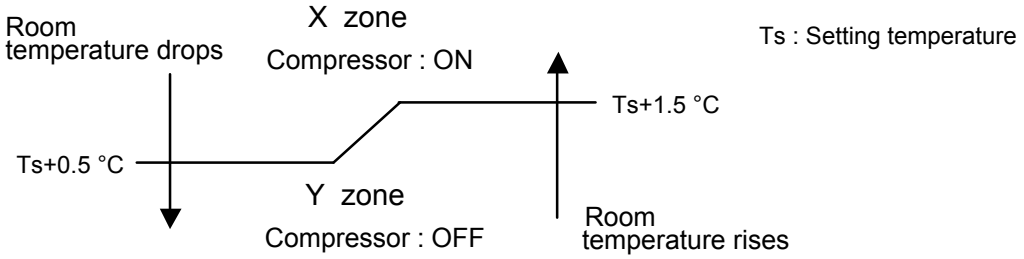
1-3-1 INDOOR UNIT CONTROL

The compressor rotation speed shall change according to set temperature and room temperature variation which the room temperature sensor of the indoor unit has detected as shown in the Fig 3.

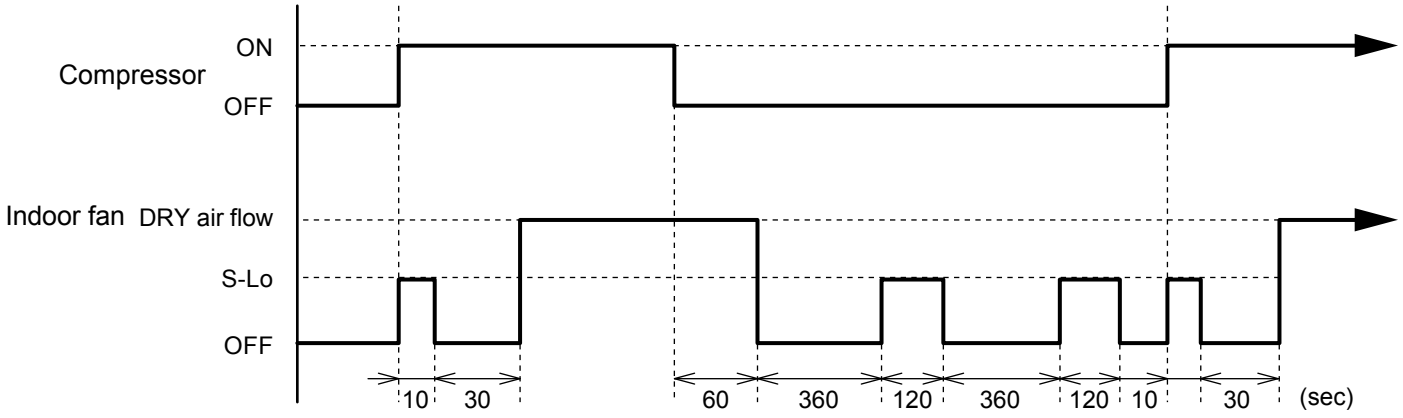
(Table 3 : Compressor Rotational Speed Range)

AO* A72LALT	X zone	42rps
	Y zone	0
AO* A90LALT	X zone	47rps
	Y zone	0

(Fig.3 : Compressor Control based on Room Temperature)



(Fig 4 : Indoor Fan Control)

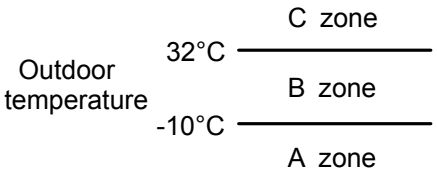


1-4. AUTO CHANGEOVER OPERATION

When the air conditioner is set to the AUTO mode by remote control, operation starts in the optimum mode from among the HEATING, COOLING and MONITORING modes. During operation, the optimum mode is automatically switched in accordance with temperature changes. The temperature can be set between 18°C and 30°C in 1 °C steps.

(1) When operation starts, only the indoor fan is operated for 2 minute. (Air flow mode: S-Lo)
After 2 minute, depends on the room temperature and outdoor unit's operation mode,
the operation mode is selected in accordance with the below. (During 3 minutes ST, Air flow mode : S-Lo)

(Fig 5 : Operation mode selection based on Outdoor Temperature)



(Table 4 : Operation mode selection table)

Outdoor temperature zone / Room temperature :Tr	A zone	B zone	C zone
Tr > Ts +2 °C	MONITORING	COOLING	COOLING
Ts +2 °C ≧ Tr ≧ Ts -2 °C	MONITORING	MONITORING	MONITORING
Ts -2 °C > Tr	HEATING	HEATING	MONITORING

Ts : Setting temperatureTr : Room temperature

(2) When COOLING or HEATING was selected at (1), the air conditioner operates
in the room temperature correct coefficient value is 0°C.

(3) When the compressor was stopped for 6 consecutive minutes by the temperature control function
after the COOLING or HEATING operation mode was selected at (1) above,
operation is switched to MONITORING and the operation mode is selected again.

1-5. INDOOR FAN CONTROL

1. Fan speed

(Table 5 : Indoor Fan Speed)

AR* C72LHTA

Operation mode	Fan motor	Standard (72Pa)			Static Pressure 1 (0Pa)			Static Pressure 2 (50Pa)			Static Pressure 3 (150Pa)		
		HEATING	COOLING	DRY	HEATING	COOLING	DRY	HEATING	COOLING	DRY	HEATING	COOLING	DRY
Hi	1	900	900	—	790	790	—	860	860	—	1040	1040	—
	2	940	940	—	830	830	—	900	900	—	1080	1080	—
Me	1	790	790	—	620	620	—	760	760	—	900	900	—
	2	830	830	—	760	760	—	800	800	—	940	940	—
Lo	1	620	620	620	580	580	580	560	560	560	760	760	760
	2	760	760	760	620	620	620	760	760	760	800	800	800
Intermittent	1	400			400			400			420		
	2	440			440			440			460		
S-Lo	1	350			350			350			300		
	2	250			250			250			400		

Operation mode	Fan motor	Static Pressure 4 (200Pa)			Static Pressure 5 (250Pa)		
		HEATING	COOLING	DRY	HEATING	COOLING	DRY
Hi	1	1110	1110	—	1190	1190	—
	2	1150	1150	—	1230	1230	—
Me	1	950	950	—	1040	1040	—
	2	990	990	—	1080	1080	—
Lo	1	830	830	830	870	870	870
	2	870	870	870	910	910	910
Intermittent	1	440			460		
	2	480			500		
S-Lo	1	300			300		
	2	400			400		

AR* C90LHTA

Operation mode	Fan motor	Standard (72Pa)			Static Pressure 1 (0Pa)			Static Pressure 2 (50Pa)			Static Pressure 3 (150Pa)		
		HEATING	COOLING	DRY	HEATING	COOLING	DRY	HEATING	COOLING	DRY	HEATING	COOLING	DRY
Hi	1	910	910	—	820	820	—	890	890	—	1040	1040	—
	2	950	950	—	860	860	—	930	930	—	1080	1080	—
Me	1	820	820	—	630	630	—	780	780	—	920	920	—
	2	860	860	—	850	850	—	820	820	—	960	960	—
Lo	1	630	630	630	520	520	520	600	600	600	780	780	780
	2	810	810	810	760	760	760	760	760	760	820	820	820
Intermittent	1	400			400			400			420		
	2	440			440			440			460		
S-Lo	1	350			350			350			300		
	2	250			250			250			400		

Operation mode	Fan motor	Static Pressure 4 (200Pa)			Static Pressure 5 (250Pa)		
		HEATING	COOLING	DRY	HEATING	COOLING	DRY
Hi	1	1120	1120	—	1190	1190	—
	2	1160	1160	—	1230	1230	—
Me	1	980	980	—	1040	1040	—
	2	1020	1020	—	1080	1080	—
Lo	1	840	840	840	890	890	890
	2	880	880	880	930	930	930
Intermittent	1	440			460		
	2	480			500		
S-Lo	1	300			300		
	2	400			400		

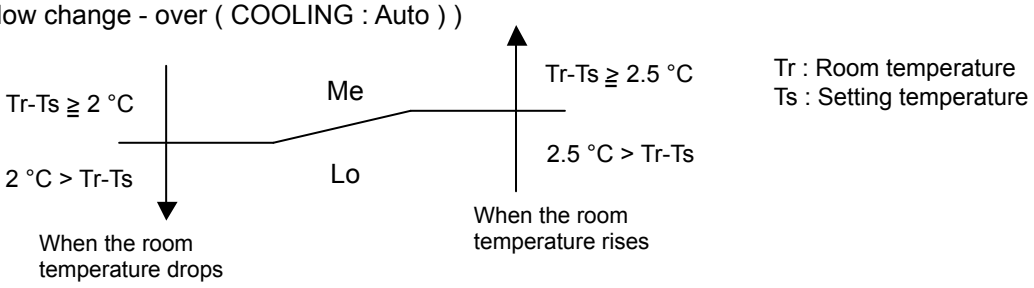
2. FAN OPERATION

The airflow can be switched in 4 steps such as Auto, Lo, Me, Hi, while the indoor fan only runs.

3. COOLING OPERATION

Switch the airflow [Auto], and the indoor fan motor will run according to a room temperature, as shown in Fig.6.
On the other hand, if switched in [Hi] ~ [Lo], the indoor motor will run at a constant airflow of [COOL] operation modes Lo, Med, Hi, as shown in Table 5.

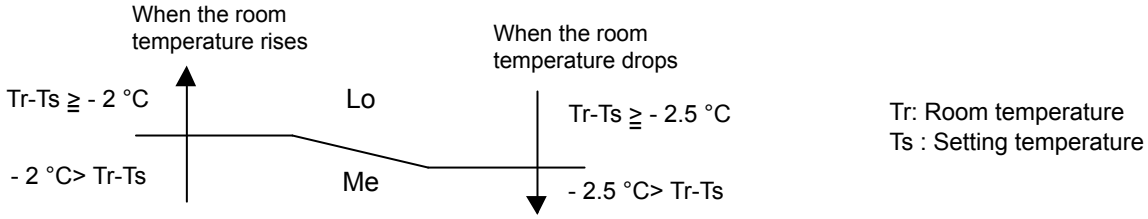
(Fig.6 : Airflow change - over (COOLING : Auto))



4. HEATING OPERATION

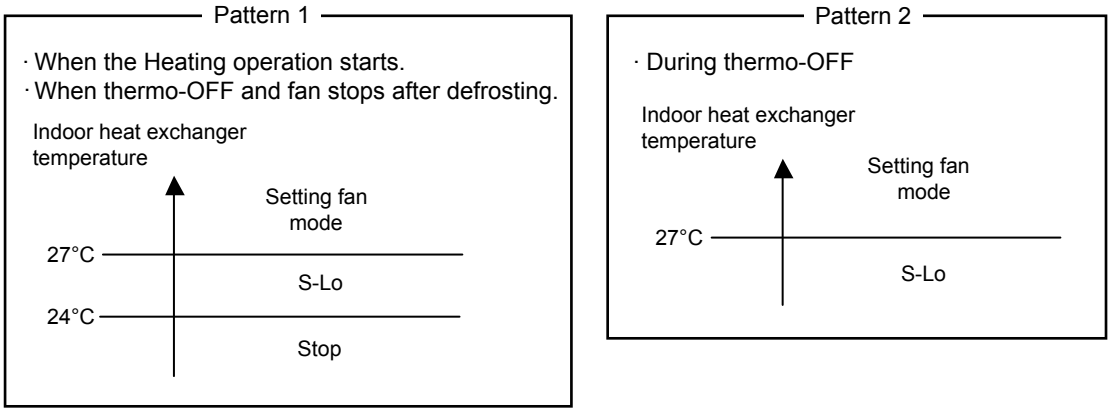
Switch the airflow [Auto], and the indoor fan motor will run according to a room temperature, as shown in Fig.7.
On the other hand, if switched in [Hi] ~ [Lo], the indoor motor will run at a constant airflow of [HEAT] operation modes Lo, Me, Hi, as shown in Table 5.

(Fig.7 : Airflow change - over (HEATING : Auto))



5. COOL AIR PREVENTION CONTROL (HEATING mode)

Indoor fan motor operates in set fan mode when the indoor unit heat-exchanger temperature becomes more than 27°C, and it operates until the compressor stops with a set mode maintained. (The fan stops until the indoor unit heat-exchanger temperature reaches 27°C)



6. DRY OPERATION

Refer to the Fig.4 and Table 5.
During the DRY mode operation, the fan speed setting can not be changed.

1-6. OUTDOOR FAN CONTROL

1. Outdoor Fan Motor

- The outdoor fan speed is decided depending on the operation mode and the outdoor temperature.
- The compressor and the fan start-up at the same time,
  and the fan stops after the compressor stops and 60 seconds has passed.
- The fan doesn't operates for 5 seconds after the fan stops.
- The fan operates at 500 rpm for 20 seconds after the start-up.
  However, the fan operates at 300rpm for 20 seconds when the initial rotational speed is 300rpm or less.

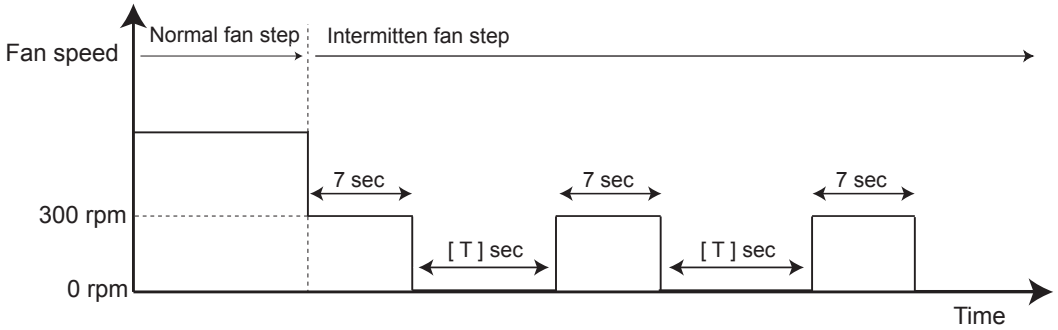
Following table shows the fan speed of the outdoor unit.

(Table 6 : Fan speed of the outdoor unit)

Fan step	Fan speed [rpm]			
	COOLING / DRY mode		HEATING mode	
	AO* A72LALT	AO* A90LALT	AO* A72LALT	AO* A90LALT
16	850	860	880	880
15	850	860	840	840
14	820	830	810	810
13	730	730	730	730
12	620	620	600	600
11	500	500	500	500
10	420	420	420	420
9	360	360	360	360
8	320	320	320	320
7	300	300	300	300
6	intermittent 1	intermittent 1	intermittent 1	intermittent 1
5	intermittent 2	intermittent 2	intermittent 2	intermittent 2
4	intermittent 3	intermittent 3	intermittent 3	intermittent 3
3	intermittent 4	intermittent 4	intermittent 4	intermittent 4
2	intermittent 5	intermittent 5	intermittent 5	intermittent 5
1	intermittent 6	intermittent 6	intermittent 6	intermittent 6

Fan step	Fan mode	Fan speed 0 rpm duration time T (sec)	Fan speed 300 rpm duration time (sec)
6	intermittent 1	6	7
5	intermittent 2	12	
4	intermittent 3	19	
3	intermittent 4	26	
2	intermittent 5	33	
1	intermittent 6	40	

(Fig.8 : Intermittent fan mode)



When switched from normal fan step to intermittent fan step, always start from 300rpm /7sec.
When there was a change during intermittent step 1-6, switching is performed
at the time the current speed duration time reaches time-up.

1-7. COMPRESSOR CONTROL

1. OPERATION SPEED RANGE

The operation speed of the compressor is different based on the operation mode as shown in Table 7.

(Table 7 : Compressor Operation Speed Range)

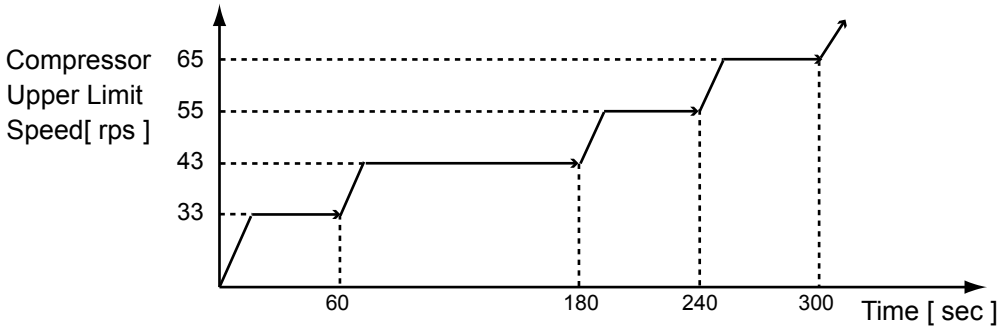
	COOLING		HEATING		DRY
	Min	Max	Min	Max	
AO* A72LALT	28rps	77rps	30rps	85rps	42rps
AO* A90LALT	28rps	86rps	30rps	100rps	47rps

2. OPERATION SPEED CONTROL AT START UP (Common in all models)

The compressor speed soon after the start-up is controlled as shown in Fig.9.

(Fig.9 : Compressor Control at Start-up)

< Normal start-up >



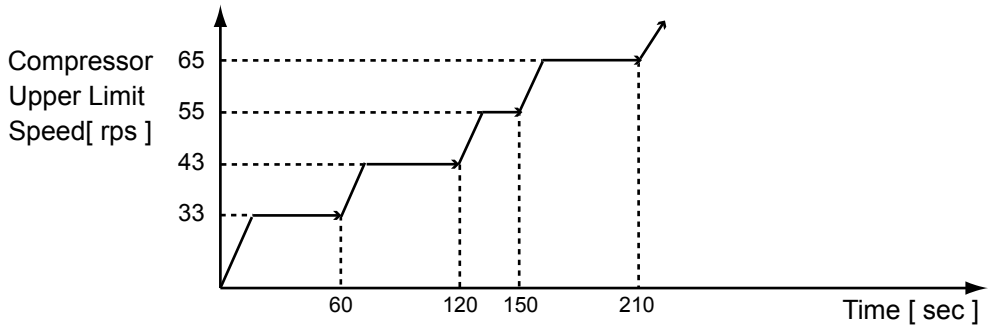
< Cold start : Heating mode >

The compressor start-up by Cold start when corresponding to any of the following condition.

(1) First start-up after power-on

(2) Compressor temperature < 31°C

(3) 8 hours has passed after the compressor stop



1-8. TIMER OPERATION CONTROL

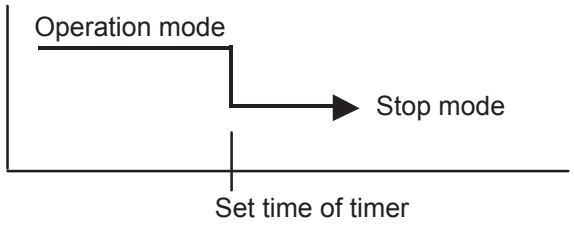
1-8-1 Wired Remote Controller

AR-WAE1E

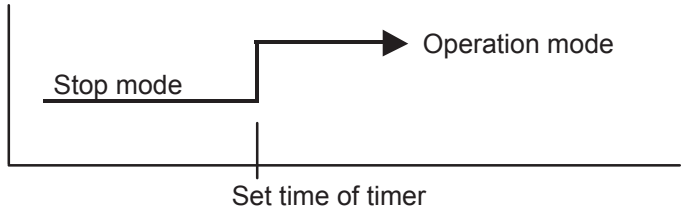
- ON / TIMER
- OFF / TIMER
- WEEKLY TIMER
- TEMPERATURE SET BACK TIMER

1. ON / OFF TIMER

・OFF timer : When the clock reaches the set time, the air conditioner will be turned off.



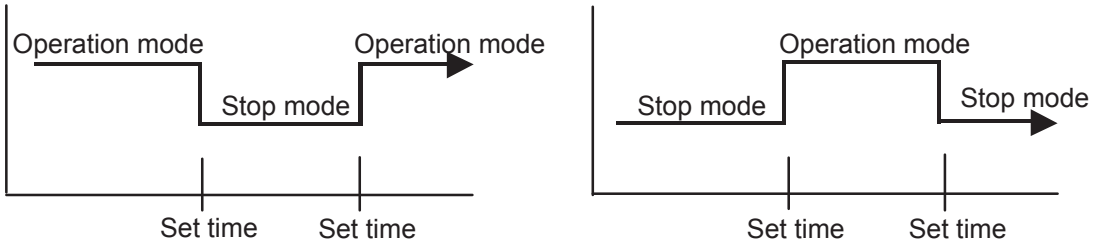
・ON timer : When the clock reaches the set time, the air conditioner will be turned on.



2. WEEKLY TIMER

2-1. WEEKLY TIMER

・Use this timer function to set operating time for each day of the week.
・The weekly timer allows up to two ON and OFF time to set up per day.

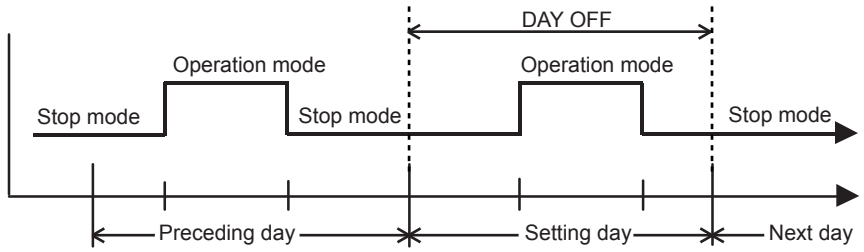


・The operating time can be set in 30 min increments only.
・The OFF time can be carried over to next day.
・The ON timer and the OFF timer functions cannot be set with using the weekly timer.
Both ON and OFF time must be set.

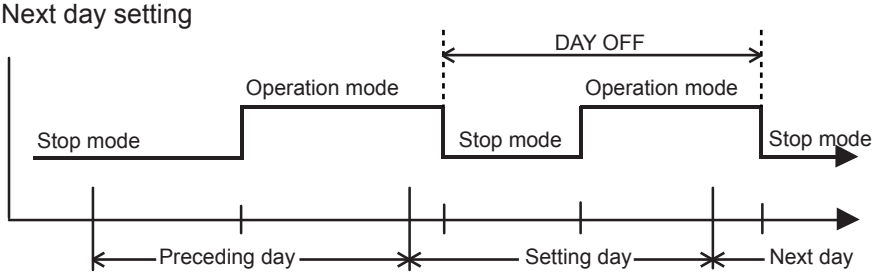
2-2. DAY OFF setting

- The DAY OFF setting is only available for days for which weekly settings already exist.
- If the operating time carries over to the next day (during a next day setting), the effective DAY OFF range will be set as shown below.

- Normal



- Next day setting



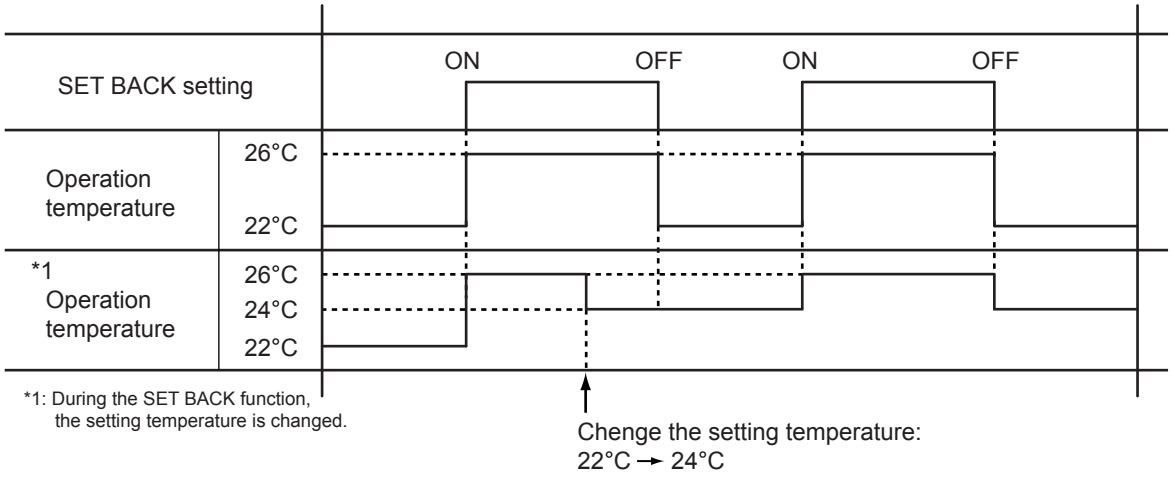
- The DAY OFF setting can only be set one time. The DAY OFF setting is cancelled automatically after the set day has passed.

3. TEMPERATURE SET BACK TIMER

- The SET BACK timer only changes the set temperature for 7 days, it cannot be used to start or stop air conditioner operation.
- The SET BACK timer can be set to operate up to two times per day but only one temperature setting can be used.
- During COOLING/DRY mode, the air conditioner will operate at a minimum of 18°C even if the SET BACK temperature is set to 17°C or lower.

Case of SET BACK timer on the Cooling operation.
(Setting temperature :22°C, SET BACK temperature :26°C)

(Fig.10 : Detail of set back timer)



1-9. ELECTRONIC EXPANSION VALVE CONTROL

The most proper opening of the electronic expansion valve is calculated and controlled under the present operating condition based on the following values.
The compressor speed, the temperatures detected by the discharge temperature sensor, the indoor heat exchanger sensor, the outdoor heat exchanger sensor, and the outdoor temperature sensor.

(1) Pulse range of EEV

	Operation	Pulse range
All Models	COOLING / DRY	70 ~ 500 pulse
	HEATING	60 ~ 500 pulse

(2) The EEV is set up at 500 pulses when the compressor is stopped.

(3) Initialization (Input of 528 pulses toward closing direction) is operated under the following condition.

* When the power is turned on.
* 4 hours has passed since the last initialization, and 3 minutes has passed after the compressor stop.
  (If 12 hours has passed since the last initialization, the compressor is compulsorily stopped.)

1-10 PREVENT TO RESTART FOR 3 MINUTES (3 MINUTES ST)

The compressor won't enter operation status for 3 minutes after the compressor is stopped, even if any operation is given.

1-11. AUTO RESTART

When the power was interrupted by a power failure, etc. during operation, the operation contents at that time are memorized and when power is recovered, operation is automatically resumed with the memorized operation contents.

(Table 8 : Operation contents memorized when the power is interrupted)

	Wired remote controller (When Memory Backup : Disable)	Wired remote controller (When Memory Backup : Enable)	
Operation mode	○	○	
Set temperature	○	○	
Set air flow	○	○	
Thermistor detected position	×	○	
Timer mode	×	OFF Timer	×
		ON Timer	×
		WEEKLY Timer	○
		Temperature SET BACK Timer	○

○ : Memorize
× : Not memorize

*It is necessary to set on the DIP-SW1-No,6 of the wired remote controller, to enable the memory backup.
Refer to the installation manual of wired remote controller for details.

1-12. 4-WAY VALVE EXTENSION SELECT

At the time when the air conditioner is switched from the Cooling mode to Heating mode, the compressor is stopped, and the 4-way valve is switched in 3 minutes later after the compressor stopped.

1-13. TEST OPERATION CONTROL

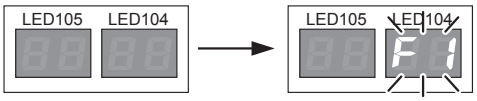
▪ With Wired Remote Controller

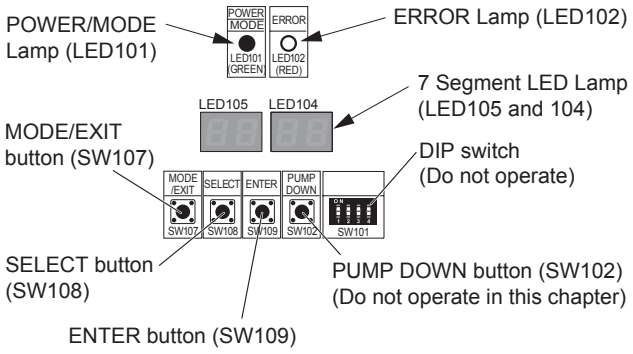
Under the condition where the air conditioner stops, press the MASTER CONTROL button and the FAN CONTROL button simultaneously for 2 seconds or more, and the test operation control mode will appear.
During test running, "01" will display on the remote controller display.
Set the test operation mode, and the compressor will continue to run regardless of whatever the room temperature sensor detects.
The test operation mode is released if 60 minutes have passed after setting up the test operation.

▪ With Outdoor Unit

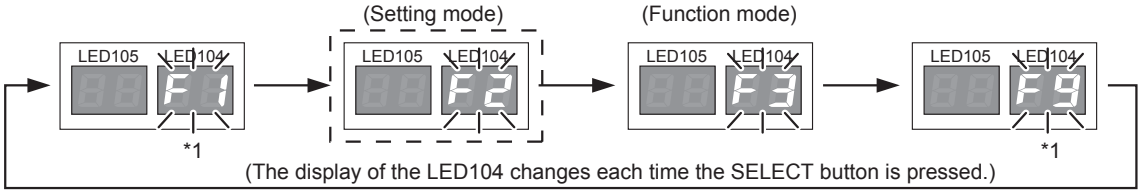
(1) Turn on the power of the outdoor unit and enter standby mode. POWER/MODE Lamp lights up. (ERROR lamp is off.)

(2) Press the MODE/EXIT button (SW107) once.



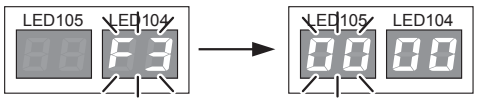


(3) Press the SELECT button (SW108), and display "F3" on the LED104.



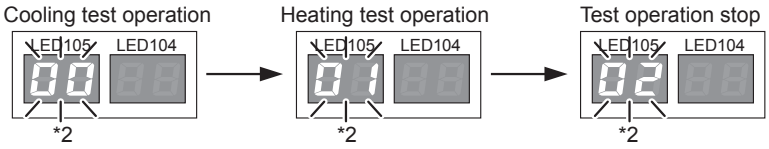
*1: The "F1" and "F9" modes are used for maintenance, so do not set them in regular operation.

(4) When "F3" appears on the LED104, press the ENTER button (SW109).



A flashing display appears on the LED105, and the flashing display of • gF3• h on the LED104 go out.

(5) Press the SELECT button (SW108), and display the code number of the mode you want to get on the LED105.



*2: Numbers other than 00-02 are used during maintenance. Please do not use during normal operation.

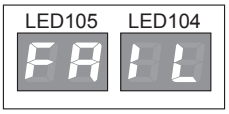
(6) After confirming the operation mode you want to set, press ENTER button (SW109) for more than 3 seconds.
Ex.) To select the cooling test operation setting.

Once "done" has displayed, operation will start after a few minutes. With this, setting is complete.
After operation has started, verify according to "9.3. Checklist" provided below.
If you want to stop during test operation, set to test operation stop described in (5) above and execute.

(7) After the completion of test operation, turn off the power, attach electrical components cover and install front panel of outdoor unit.

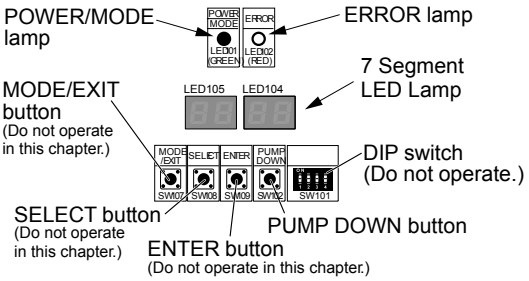
Note

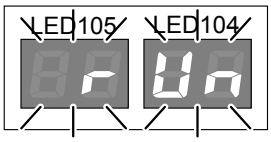
- Test run will finish after about 60 minutes automatically.
- Test run may be stopped before operating for 60 minutes if an error occurs after a starting test run.
- Switching between heating and cooling is not possible during test operation.
  If you want to change the operation mode, stop the test operation,
  and change the operation mode once again with mode selection of step (5).
  If switching between heating and cooling is done during test operation,
  display as per the right figure will appear and settings will not change.
  * After 5 seconds since the display of right figure, you can return to screen of step (5) by holding the "Enter" switch.



1-14. PUMP DOWN

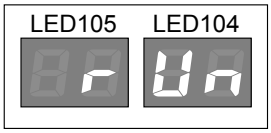
(1) Confirm that the power is off, and the than open the service panel.
(2) Turn the power on.
(3) Check that stop valves of liquid side and gas side are fully and properly open.
(4) Hold PUMP DOWN button (SW102) for over 3 seconds. 7 Segment LED of board on outdoor unit will flash, and compressor will start the operation.

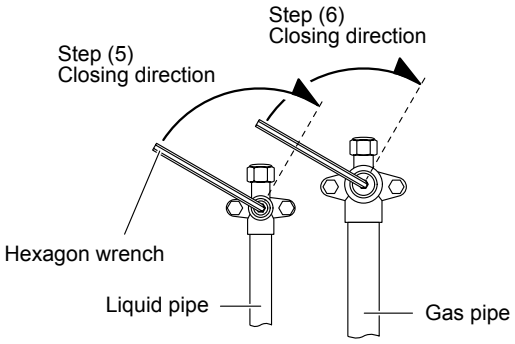




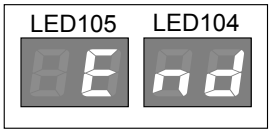
- Fan of indoor unit will start the operation automatically.
- Compressor and outdoor fan will start the operation automatically.
- It you want to stop pump down operation once it has started, hold PUMP DOWN button (SW102) again for over 3 seconds.

(5) LED display of outdoor unit board will light-up with the display of "rUn" after around 5 minutes of the start of compressor operation. At this time, firmly close the three-way valve of liquid side immediately.
- If the valve on liquid side is not closed at this stage, pump down will not be possible.



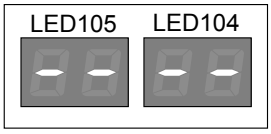


(6) LED display of outdoor unit board will change as shown in the right figure after around 2-7 minutes of the start of compress or operation. At this time, firmly close the three-way valve of gas side immediately.



- If the valve on gas side is not closed at this stage, refrigerant may runoff through pipes after the compressor is stopped.

(7) After "End" displays, compressor and outdoor fan will automatically stop after around 1 minute.

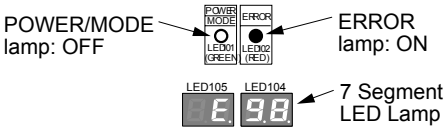


- If pump down operation has ended normally (LED display figure on the left), outdoor unit will remain stopped until the power supply is disconnected.

(8) Turn the power off. PUMP DOWN is comoleted.

Note

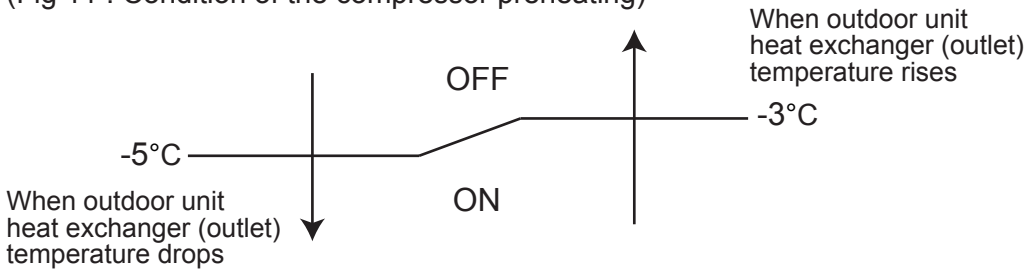
- For performing pump down once again after pump down task has failed and compressor has automatically stopped; open the close three-way valve (both liquid and gas side), disconnect the power supply at once and restore it after 2-3 minutes, and then perform pump down operation.
- For restarting the operation after the completion of pump down operation; open the close three-way valve (both liquid and gas side), disconnect the power supply at once and restore it after 2-3 minutes, and make sure to perform test operation in "Cooling".
- If an error occurs during pump down operation; as shown in the right figure, "E.98." (pump down error) will appear In such case, recover the refrigerant from service port.



1-15. COMPRESSOR PREHEATING

When 30 minutes has passed after power-on or operation stop, the preheating is started according to the outdoor unit heat exchanger (outlet) temperature as shown in Fig.11.
It applies the current to compressor and the compressor is heated.
(By heating the compressor, warm air is quickly discharged when operation is started.)
When operation was started, the preheating ends.

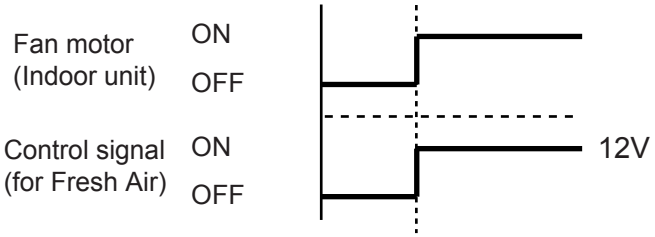
(Fig 11 : Condition of the compressor preheating)



1-16. FRESH AIR CONTROL

The fan motor for Fresh Air is operated in synchronization with the indoor fan operation as shown in Fig.12.

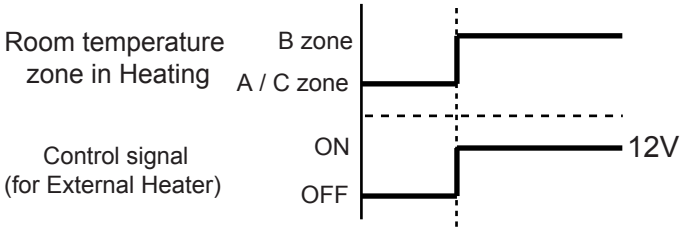
(Fig 12 : Fresh Air control)



1-17. EXTERNAL ELECTRICAL HEATER CONTROL

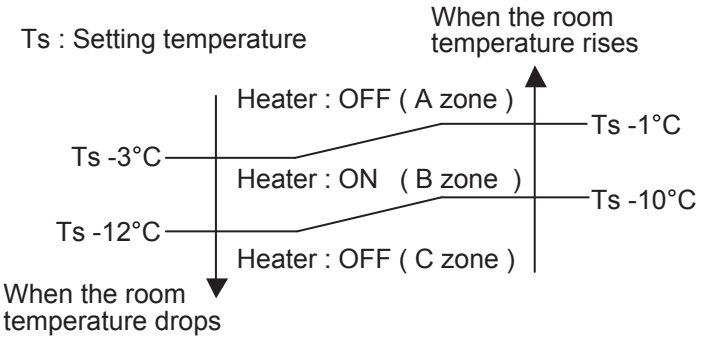
The External Electrical Heater operates when it meets all the following conditions.

- Model type : Heat pump
- Operation mode : Heating mode
- Compressor : ON
- Indoor fan : ON
- Room temperature zone : B zone



It operates only in Heating mode and when the indoor fan operates. (However, S-Lo is excluded)

(Fig 13 : External Electrical Heater control)



1-18. DEFROST OPERATION CONTROL

1. CONDITION OF STARTING THE DEFROST OPERATION

The defrost operation starts when the outdoor heat exchanger temperature sensor detects the temperature lower than the values shown in Table 9.

(Table 9 : Condition of starting Defrost Operation)

- Condition of 1st defrost operation

Compressor contiguous operation time	Below 10min.	Above 10min.		
Compressor integrating operation time	Less than 22min.	22 to 62min.	62 to 105min.	After 105min.
Operation temperature	Does not operate	Below - 9°C	Below - 3°C	Below - 1°C

- Condition of 2nd defrost operation

Compressor contiguous operation time	Below 10min.	Above 10min.	
Compressor integrating operation time	Less than 35min.	36 to 105min.	After 105min.
Operation temperature	Does not operate	Below - 5°C	Below - 1°C

- Condition of Integrating defrost operation)

Compressor contiguous operation time	Below 10min.	Above 10min.	
Compressor integrating operation time	Less than 105min.	After 105min. (For long continuous operation)	Less than 10min.※ (For intermittent operation)
Operation temperature	Does not operate	Below - 1°C	OFF count of the comp. 40 times

※ If the compressor continuous operation time is less than 10 minutes, the OFF number of the compressor is counted.
If any defrost operated, the compressor OFF count is cleared.

2. CONDITION OF THE DEFROST OPERATION COMPLETION

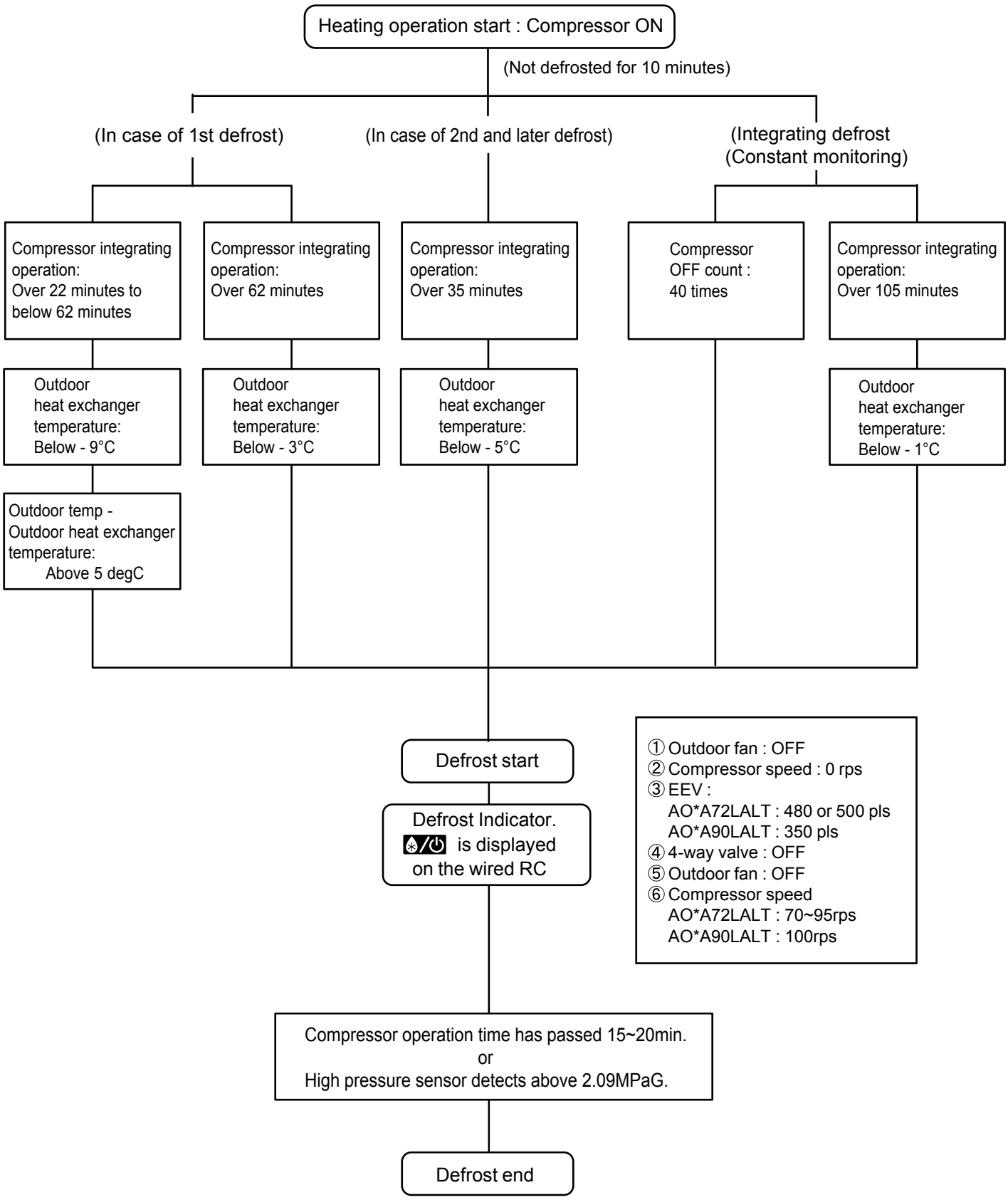
Defrost operation is released when the conditions becomes as shown in Table 10.

(Table 10 : Condition of defrost release)

Release Condition
Compressor operation time has passed 15~20min. or High pressure sensor detects above 2.09MPaG.

3. Defrost Flow Chart

The defrosting shall proceed by the integrating operation time and outdoor heat exchanger emperature as follows.



1-19. OFF DEFROST OPERATION CONTROL

When operation stops in the HEATING mode, if frost is adhered to the outdoor unit heat-exchanger, the defrost operation will proceed automatically.
In this time, if ❄/⏻ is displayed on the wired RC,
the outdoor unit will allow the heat-exchanger to defrost, and then stop.

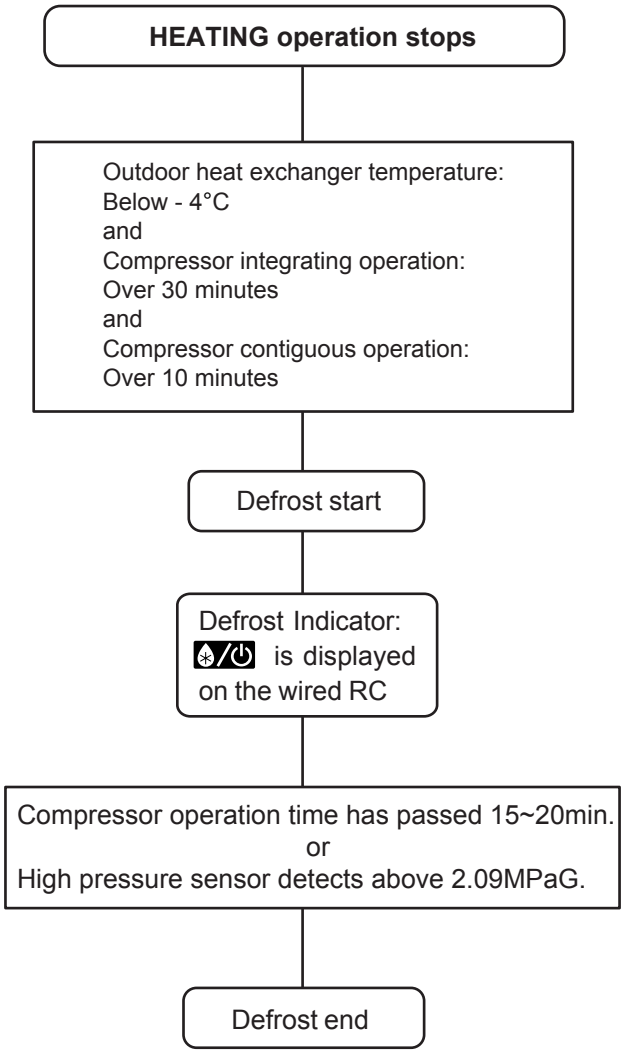
1. OFF DEFROST OPERATION CONDITION

In heating operation, the outdoor heat exchanger temperature is less than - 4°C,
and compressor operation integrating time lasts for more than 30 minutes.
and compressor operation contiguous time lasts for more than 10 minutes.

2. OFF DEFROST END CONDITION

Release Condition
Compressor operation time has passed 15~20min. or High pressure sensor detects above 2.09MPaG.

OFF Defrost Flow Chart



1 -20. VARIOUS PROTECTIONS

1. DISCHARGE GAS TEMPERATURE OVER RISE PREVENTION CONTROL

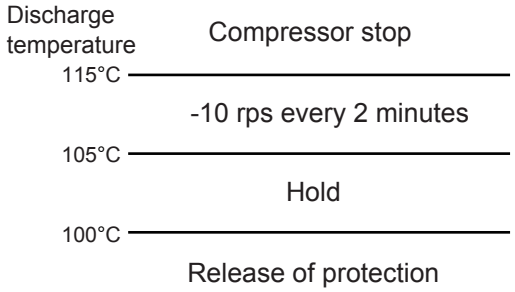
1-1. Discharge Temperature Protection 1

(a). When the discharge temperature becomes more than 115°C, the compressor is stopped under all conditions.
(b). The compressor restarts after 7 minutes has passed from the protection stop by (a).
(c). The error is displayed and the compressor stops when the discharge temperature becomes more than 115°C again within 24 hours after the restart by (b). **[Permanent stop]**

1-2. Discharge Temperature Protection 2

(a). When the discharge temperature becomes more than 105°C, the compressor speed -10 rps, and it continues the speed -10 rps every 2 minutes until the temperature becomes less than 105°C.
(b). When the discharge temperature becomes less than 100°C, the protection control of the compressor speed is released.

(Fig 14 : Discharge temperature control)



2. COMPRESSOR TEMPERATURE PROTECTION CONTROL

(a). When the compressor thermistor value becomes more than 112°C, the compressor is stopped under all conditions.
(b). When 3 minutes has passed after the protection stop by (a), the compressor is restarted.
(c). When the compressor thermistor value becomes more than 112°C again within 24 hours after the restart by (b), the error is displayed and the compressor is stopped. **[Permanent stop]**

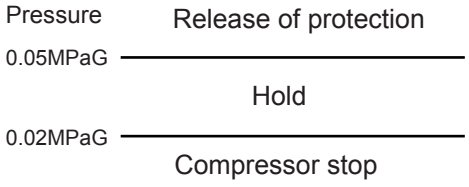
3. LOW PRESSURE PROTECTION CONTROL

3-1. Low Pressure Protection 1 (For Cooling and Heating)

<After the compressor start-up and 1 minute has passed>

(a).The detected value of pressure sensor is 0.02MPaG or less, continues for 5 minutes, the compressor is stopped.
(b). When 7 minutes has passed and low pressure sensor detects value is more than 0.05MPaG after the protection stop by (a), the compressor restarts.
(c).When the protection (a) operates 5 times within 2 hours after the restart by (b), the error is displayed and the compressor stops. **[Permanent stop]**

(Fig 15 : Low pressure protection 1)



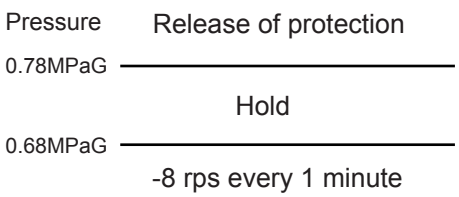
3-2. Low Pressure Protection 2

Anti Freezing Protection (For Cooling mode)

<After the compressor start-up and 10 minutes has passed>

(a).When the low pressure value becomes 0.68MPaG or less continues for 1 minute, the compressor speed -8 rps.
(b). When the low pressure value becomes 0.68MPaG or less after the protection (a), the compressor continues speed -8 rps every 1 minute until the detected value becomes more than 0.68MPaG.
(c). When the low pressure value becomes more than 0.78MPaG, this protection is released.

(Fig 16 : Anti freezing protection)



4 . HIGH PRESSURE PROTECTION CONTROL

4-1. Abnormal Stop

<After the start-up and 1 minute has passed>

(a). When the high pressure value becomes more than 4.10 MPaG, the compressor is stopped under all conditions.

(b). When 3 minutes has passed after the protection stop by (a), and high pressure value becomes *[A] MPaG or less, the protection is released and the compressor is restarted.

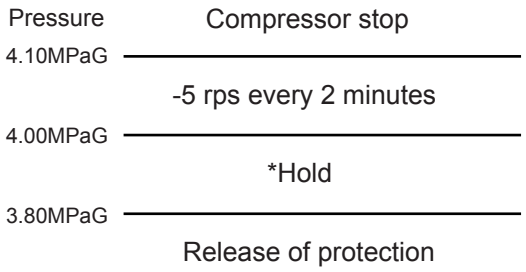
	Cooling	Heating
A	3.8	3.0

4-2. Cooling Pressure Over Rise Protection

(a). When the high pressure value becomes more than 4.00MPaG, the compressor speed -5 rps every 2 minutes until it becomes 4.00MPaG or less.

(b). When the high pressure value becomes 3.80MPaG or less, the protection is released.

(Fig 17 : Cooling pressure over rise protection)



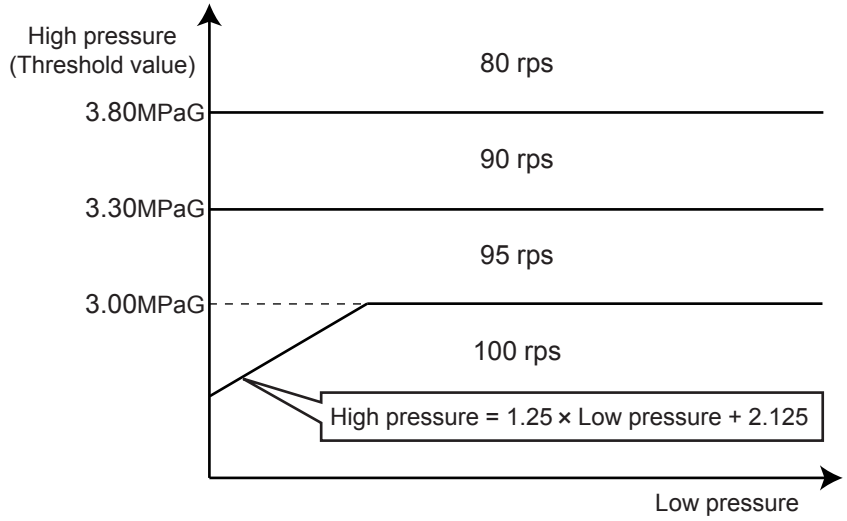
*During protection : Compressor speed is holded, or when a lower speed is directed, it accedes it.
During release of protection : Compressor operates according to the direction speed.

4-3. Limitation of the Compressor Upper Limit Speed

(a). The compressor upper limit speed is controlled by high pressure value as shown in Fig 18.

(b). The lowest upper limit speed is given to priority compared with other controls.

(Fig 18 : Limitation of the compressor upper limit speed)

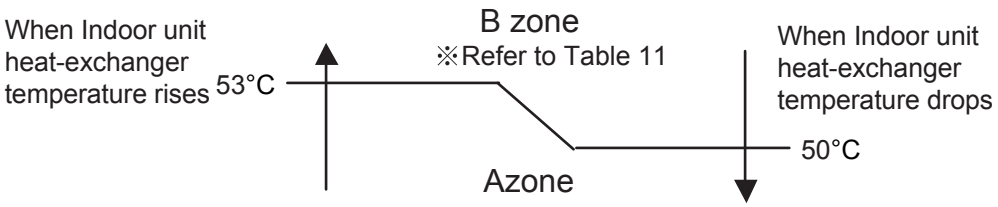


6. HEATING OVERLOAD PROTECTION

In Heating mode, the compressor speed is controlled as following based on the detection value of the indoor heat-exchanger temperature sensor and pressure sensor.

6-1. High Temperature Release Control <Indoor unit control>

(Fig 19 : High temperature release control by indoor unit)



(Table 11: Compressor Operation)

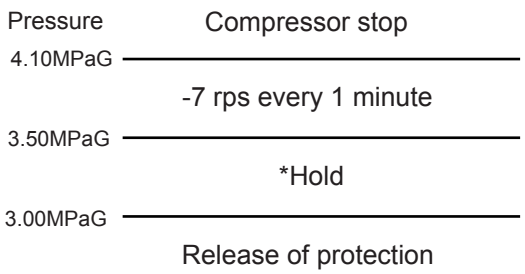
B zone AO*A72LALT	73 rps~ ➡ 70 rps
	43~70 rps ➡ Speed down every 2 minutes
	34~40 rps ➡ 32 rps for 2 minutes
	28~32 rps ➡ Stop
B zone AO*A90LALT	82 rps~ ➡ 79 rps
	45~79 rps ➡ Speed down every 2 minutes
	34~42 rps ➡ 32 rps for 2 minutes
	28~32 rps ➡ Stop
A zone	Normal Heating Control

6-2. High Pressure Release Control <Outdoor unit control>

(a). When the high pressure value becomes more than 3.50MPaG, the compressor speed -7 rps every 1 minute until it becomes 3.50MPaG or less.

(b). When the high pressure value becomes 3.00MPaG or less, the protection is released.

(Fig 20 : High pressure release control)



*During protection : Compressor speed is holded, or when a lower speed is directed, it accedes it.
During release of protection : Compressor operates according to the direction speed.

7 . CURRENT RELEASE CONTROL

The compressor speed is controlled so that the outdoor unit input current does not exceeds the current limit value that was set up with the outdoor temperature and outdoor fan speed. The compressor speed returns to the designated speed of the indoor unit at the time when the speed becomes lower than the release value.

4 . LOW VOLTAGE PROTECTION

When the temporary blackout, the load current is reduced to delay the switching power-off, and reset of microcomputer is delayed.
A low voltage signal is detected every 1msec.

(Table 12 : Low voltage protection)

	Condition	Operation
Protection operate	When level [L] is detected 3msec more continuously	Compressor : stop Fan : stop
Protection release	When level [H] is detected 2msec more continuously	Restart

1-21. ECONOMY OPERATION

At the maximum output, ECONOMY OPERATION is approximately 70% of normal air conditioner operation for Cooling and Heating.
When ECONOMY OPERATION is performed during the Cooling mode, dehumidification is improved. This function is especially convenient when you want to remove the humidity in the room without significantly lowering the room temperature.

- If the room is not cooled (or heated) well during economy operation, select normal operation.
- During the monitor period in the AUTO mode, the air conditioner operation will not change to ECONOMY OPERATION even if ECONOMY OPERATION is selected by pressing the ECONOMY button.

1-22. COMPRESSOR STOP CONTROL

When the detection value of outdoor temperature sensor is lower than temperature I in the table below, the compressor is stopped.

(Table 13 : Operation temperature of compressor stop control)

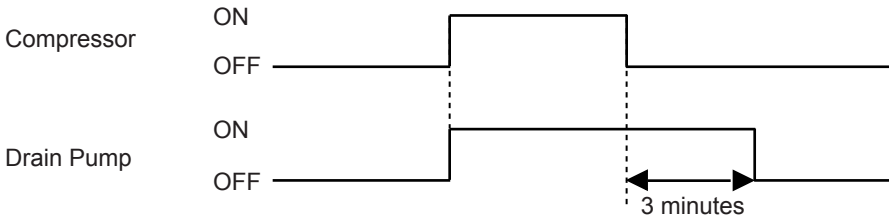
	Temperature I	
	COOLING	HEATING
Operation temperature	- 20°C	———
Release temperature	- 15°C	———

1-23. DRAIN PUMP OPERATION

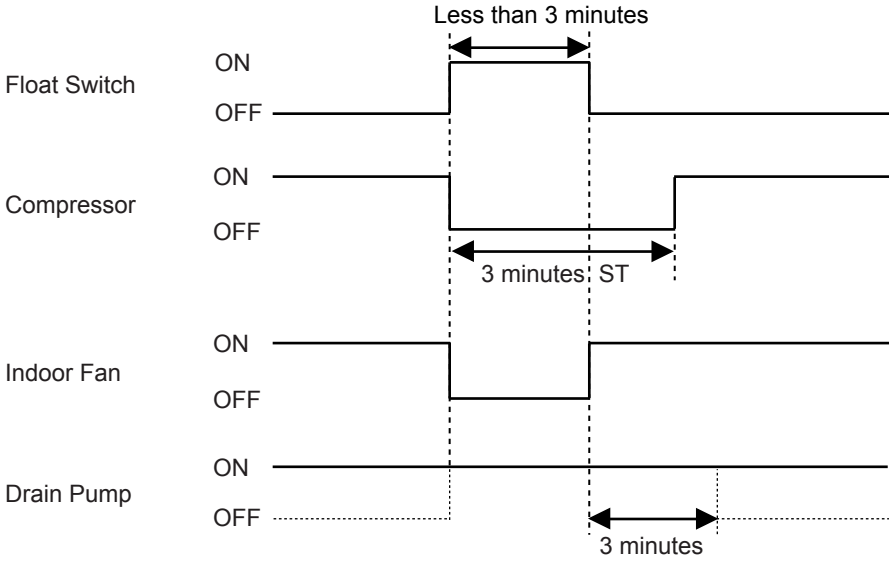
· During COOLING / DRY mode

1. When the compressor starts, the drain pump starts simultaneously.
2. The drain pump operates continuously for 3 minutes after the compressor is turned off.
3. When the compressor stops by the "Anti- freezing protection", the drain pump is turned off in 1 hour after the compressor stops.
4. When the water level in the drain pan rises up and then the float switch functions:
   ① The compressor, indoor and outdoor fan motor operation are stopped.
   ② Drain pump operates continuously for 3 minutes after the float switch is turned off. (Almost condensing water may be drained)
   ③ The indoor unit fan motor operates after the float switch is turned off.
5. When the float switch turns ON continuously for 3 minutes, "FAILURE INDICATION" operates. (It is necessary to turn off power for release it.)
6. When the float switch turns OFF less than 3 minutes, the unit starts Cooling operation.

(Fig 21 : Detail of Drain Pump Operation)



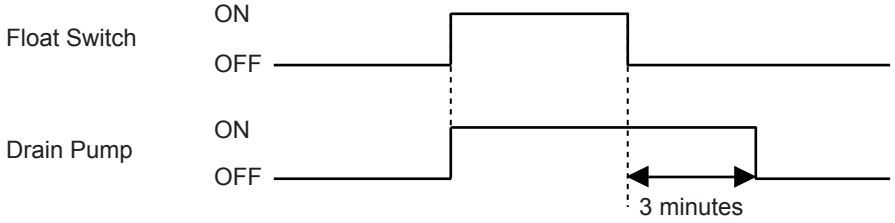
<Float Switch turns OFF less than 3 minutes>



· During HEATING / FAN mode / Stop operation

1.When the water level in the drain pan rises up and then the float switch functions:
   ① Drain pump operates continuously for 3 minutes after the float switch is turned off. (Almost condensing water may be drained)
2. When the float switch turns ON continuously for 3 minutes, "FAILURE INDICATION" operates. Thereafter, even if the float switch turns OFF, the "FAILURE INDICATION" is not released. (It is necessary to turn off power for release it.)

(Fig 22 : Stop operation on Heating and Fan mode)



1-24. LOW NOISE OPERATION

The compressor speed and the outdoor unit fan speed are limited to reduce the operation noise by External Input.

During the LOW NOISE OPERATION,
"CURRENT OVERLOAD OPERATION", "ECONOMY OPERATION" and "PEAK CUT OPERATION" are effective, and the outdoor unit operates by lowest current of them.

However, during the DEFROST OPERATION, the compressor operates by the speed for DEFROST OPERATION.

(Table 14 : Detail of Low Noise Operation)

Low Noise Mode		Outdoor Fan Upper Limit Speed (rpm)	Compressor Speed (rps)	
			AO* A72LALT	AO* A90LALT
LEVEL 1	Cooling	620	54	60
	Heating	600	69	70
LEVEL 2	Cooling	500	46	54
	Heating	500	45	48
LEVEL 3	Cooling	420	43	45
	Heating	500	43	45

*The performance drops when operating in the LOW NOISE OPERATION.

1-25. PEAK CUT OPERATION

The Current Value is limited to reduce the power consumption by External Input.

During the PEAK CUT OPERATION,
"CURRENT OVERLOAD OPERATION", "ECONOMY OPERATION" and "LOW NOISE OPERATION" are effective, and the outdoor unit operates by lowest current of them.

However, this function becomes invalid during DEFROST OPERATION.

(Table 15 : Outline of Peak Cut Operation)

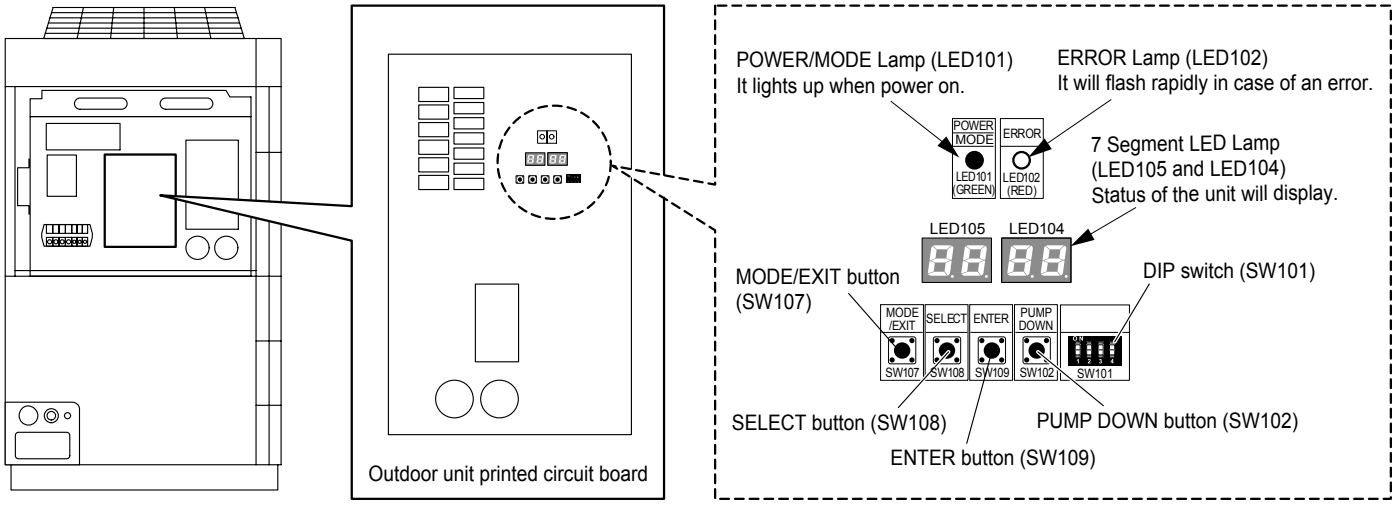
PEAK CUT LEVEL	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Peak Cut For Rated Capacity	Forced thermostat-OFF	50%	75%	100%

*Percentage is rated electrical power ratio.

1-26. DESCRIPTION OF DISPLAY UNIT

1-26-1 Field setting switches

Remove the front panel of the outdoor unit and the cover of the electrical component box to access the print circuit board of the outdoor unit.
Print circuit board switches for various settings and LED displays are shown in the figure.



1-26-2 Normal operation mode

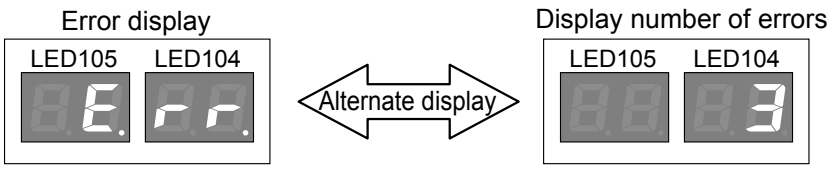
Operation status is displayed in 7 Segment LED Lamp (LED105 and LED104).

Mode	CODE				DESCRIPTION
Operation	C	L			Cooling
	H	t			Heating
			d	F	During defrosting operation
			P	C	During power saving operation
			L	n	During low noise operation
					Stopped

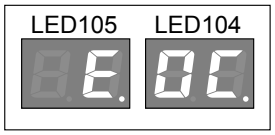
1-26-3 Error display mode

10.2.1. Method for ascertaining the errors

(1) When an error has occurred, ERROR LED (LED102) will flash rapidly, and as shown in the figure below, 7 Segment LED will alternately display "Err" and number of errors.

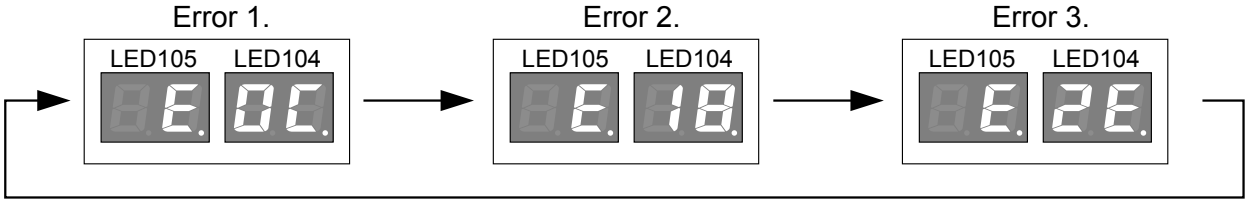


(2) Error contents will display if ENTER button (SW109) is pressed in the state of (1).
For error contents, refer to the list of error code described later.



Ex.) "E.0C" is displayed.
Discharge temperature
thermistor error.

(3) If SELECT button (SW108) is pressed in the state of (2), contents of all the errors will display.



(4) If ENTER button (SW109) is pressed, it will return to state of (1).
If no action is taken, it will return to the state of (1) after 60 seconds.

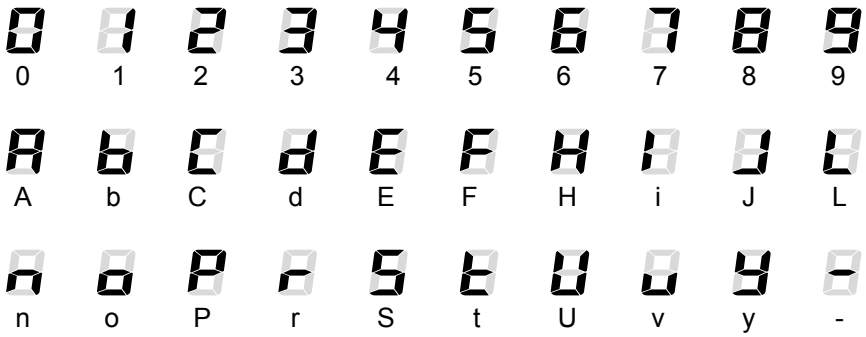
Note

- In case the errors are resolved, it will return to "Normal operation mode" described in 10.1. earlier.

Error code check table

CODE	DESCRIPTION
E. 06.	Outdoor heat exchanger temperature sensor (outlet) error
E. 0A.	Outdoor temperature sensor error
E. 0C.	Outdoor discharge pipe temperature sensor error
E. 0E.	Heat sink thermistor (inverter) error
E. 0F.	Discharge temperature error
E. 13.	Indoor signal error
E. 15.	Compressor temperature sensor error
E. 16.	Pressure switch error, Pressure sensor error
E. 17.	IPM protection
E. 1A.	Compressor location error
E. 1b.	Outdoor fan error
E. 24.	Excessive high pressure protection
E. 2b.	Compressor temperature error
E. 2E.	Inverter error
E. 2F.	Low pressure error
E. 98.	Pump down error
E. 99.	Indoor unit error condition

LED lamp :



1-26-6 Field Setting and Monitor Mode List

	Classification	ITEM CODE No.	Setting Mode	Information contents
Monitor mode [F1]	Operation of each part	10	Rotational speed of outdoor unit fan motor	The rotational speed of the outdoor unit fan motor is displayed [0 ~ 999] rpm
		11	Rotational speed of INV compressor	The rotational speed of the compressor is displayed [0 ~ 999] rps
		12	Current value of INV compressor	Current value of INV compressor is displayed [0.00 ~ 99.99] A
		14	Pulse of EEV1	Pulse of EEV1 is displayed [0 ~ 9999] pls
	Time guard	21	INV compressor accumulated time [Cooling]	Accumulated time is displayed in the cooling operation of the INV compressor [0 ~ 9999] ×10hour
		22	INV compressor accumulated time [Heating]	Accumulated time is displayed in the heating operation of the INV compressor [0 ~ 9999] × 10hour
	Refrigerant cycle data 1	30	Information on Thermistor 1 (Discharge Pipe Temperature Thermistor)	The value of the Thermistor 1 is displayed [-99.9 ~ 999.9] °C or °F
		32	Information on Thermistor 3 (Outdoor Temperature Thermistor)	The value of the Thermistor 3 is displayed [-99.9 ~ 999.9] °C or °F
		34	Information on Thermistor 5 (Heat Exchanger Temperature Thermistor)	The value of the Thermistor 5 is displayed [-99.9 ~ 999.9] °C or °F
		39	Information on Thermistor 10 (Compressor Temperature Thermistor)	The value of the Thermistor 10 is displayed [-99.9 ~ 999.9] °C or °F
	Refrigerant cycle data 3	50	Information on pressure sensor 1	The value of the pressure sensor 1 is displayed If unit is [MPa], it is displayed as [0.00 ~ 9.99] [psi], it is displayed as [0.0 ~ 999.9]
		51	Information on pressure sensor 2	The value of the pressure sensor 2 is displayed If unit is [MPa], it is displayed as [0.00 ~ 9.99] [psi], it is displayed as [0.0 ~ 999.9]

	Classification	ITEM CODE No.	Setting Mode	ITEM CODE No.	Setting Function	Default
Setting mode [F2]	Install	00	Pipe length setting	00	40-65m	○
				02	65-90m	
	Correction	13	Defrost setting shift 1 (Defrosting time)	00	End temperature:Normal End time:Normal	○
				01	End temperature:Higher End time:Longer	
				02	End temperature:Lower End time:Shorter	
			Defrost setting shift 2 (Defrosting start time)	00	Start temperature:Normal Start time:Normal	○
				01	Start temperature:Higher Start time:Longer	
				02	Start temperature:Lower Start time:Shorter	
	Change of function 2	30	Energy saving level setting	00	Level 1 (stop)	
				01	Level 2 (operated at 50% capacity)	
				02	Level 3 (operated at 75% capacity)	○
				03	Level 4 (operated at 100% capacity)	
	Low noise setting	41	Low noise mode setting	00	Off (Normal operation)	○
				01	On (Low noise mode operation is always done)	
		42	Low noise mode operation level setting	00	Level 1 (dB)	○
				01	Level 2 (dB)	
				02	Level 3 (dB)	

		ITEM CODE No.	Setting Mode	Setting Function
Function mode [F3]	Forced operation	00	Cooling test run	Forced thermostat-ON in Cooling
		01	Heating test run	Forced thermostat-ON in Heating
		02	Test run stop	Test run is stopped
	Clear	30	Error history clear	All the abnormal code histories are cleared
		33	INV compressor accumulated time clear	Accumulated time of the INV compressor becomes [0]
		35	Field setting all clear	Return to default the all set items

		ITEM CODE No.	Meaning of Error History Number	Information contents
Error History Display Mode [F9]	Error history	00	1 time ago (Newest)	Refer to TROUBLE SHOOTING
		01	2 times ago	
		02	3 times ago	
		03	4 times ago	

Refrigerant
R410A

DUCT type
INVERTER

2 . TROUBLE SHOOTING

2. TROUBLE SHOOTING

2-1 ERROR DISPLAY

2-1-1 WIRED REMOTE CONTROLLER DISPLAY

The Error code operate as follows according to the error contents.
Indoor Unit : AR* C72 / 90LHTA

Error Code	Error Contents	Trouble Shooting
E00	Wired remote controller error	4
E01	Serial error (Serial reverse transfer error)	1
E02	Room temperature thermistor error	5
E04	Indoor heat exchanger temperature thermistor (middle) error	3
E06	Outdoor heat exchanger temperature thermistor (outlet) error	7
E0A	Outdoor temperature thermistor error	8
E0C	Outdoor discharge pipe temperature thermistor error	6
E0E	Heat sink thermistor (inverter) error	9
E0F	Discharge temperature error	17
E11	Model distinction error (Indoor)	23
E12	Indoor fan motor 1 lock error Indoor fan motor 1 rev. error	16
E13	Indoor signal error	2
E15	Compressor temperature thermistor error	10
E16	Pressure switch error, Pressure sensor error	20
E17	IPM Protection	12
E1A	Compressor location error	13
E1b	Outdoor fan error	14
E24	Excessive high pressure protection	18
E2A	Power supply frequency detection error	11
E2b	Compressor temperature error	21
E2c	4-way Valve Error, Solenoid Valve Error	19
E2E	Inverter error	15
E2F	Low pressure error	22
E34	Indoor fan motor 2 lock error Indoor fan motor 2 rev. error	16
E37	Indoor fan motor 1 drivers circuit error	24
E38	Indoor fan motor 2 drivers circuit error	

2-1-2 OUTDOOR UNIT DISPLAY

Please refer the blinking pattern as follows.
Outdoor Unit : AO* A72 / 90LALT

The Error LED operate as follows according to the error contents.

Error Code	Error Contents	Trouble Shooting
E. 06.	Outdoor heat exchanger temperature thermistor (outlet) error	7
E. 0A.	Outdoor temperature thermistor error	8
E. 0C.	Outdoor discharge pipe temperature thermistor error	6
E. 0E.	Heat sink thermistor (inverter) error	9
E. 0F.	Discharge temperature error	17
E. 13.	Indoor signal error	2
E. 15.	Compressor temperature thermistor error	10
E. 16.	Pressure switch error, Pressure sensor error	20
E. 17.	IPM protection	12
E. 1A.	Compressor location error	13
E. 1b.	Outdoor fan error	14
E. 24.	Excessive high pressure protection	18
E. 2b.	Compressor temperature error	21
E. 2E.	Inverter error	15
E. 2F.	Low pressure error	22
E. 99.	Indoor unit error condition	---

2-2 TROUBLE SHOOTING WITH ERROR CODE

Trouble shooting 1 **OUTDOOR UNIT Error Method:** **Serial error** **(Serial reverse transfer error)**	**Indicate or Display:** **Refer to error code table.**
Detective Actuators: Outdoor unit Main PCB	**Detective details:** When the indoor unit cannot properly receive the serial signal from outdoor unit for 10 seconds or more.

Forecast of Cause:

1. Connection failure 2. External cause 3. Main PCB failure

Check Point 1-1 : Reset the power and operate

- Does error indication reappear?

NO → **Check Point 1-2 : Check external cause such as noise**

- Check if the ground connection is proper.
- Check if there is any equipment that causes harmonic wave near the power cable (Neon light bulb or any electronic equipment which causes harmonic wave).

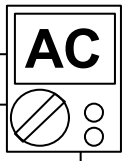
YES

Check Point 2 : Check connection

- Check any loose or removed connection line of between indoor unit and outdoor unit.
  >> If there is an abnormal condition, correct it by referring to Installation Manual or Data & Technical Manual.
- Check connection condition in control unit. (If there is loose connector, open cable or mis-wiring)

OK

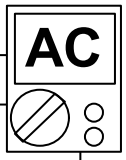
Check Point 3 : Check the voltage of power supply



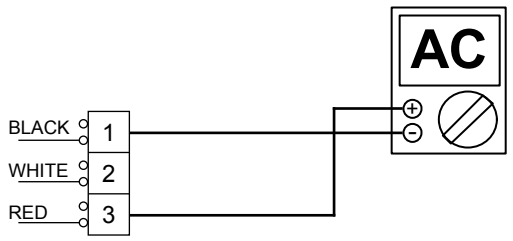
- Check the voltage of power supply
  >> Check if AC198(AC220V-10%) - 264V(AC240V+10%) appears at outdoor unit terminal L1 - N, L2 - N, L3 - N.

OK

Check Point 4 : Check serial signal (Reverse transfer signal)



- Check serial signal (Reverse transfer signal)
  >> Check if indicated value swings between AC70V and AC130V at outdoor unit terminal 1 - 3.
  >> If it is abnormal, replace Main PCB.



Trouble shooting 2 **INDOOR UNIT Error Method:** **Indoor signal error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Indoor unit controller PCB Indoor unit filter PCB	When the indoor unit cannot properly receive the serial signal from outdoor unit for 10 seconds or more.

Forecast of Cause:

1. Connection failure 2. External cause 3. Controller PCB failure 4. Filter PCB failure

Check Point 1-1 : Reset the power and operate

- Does error indication reappear?

NO → **Check Point 1-2 : Check external cause such as noise**

- Check if the ground connection is proper.
- Check if there is any equipment that causes harmonic wave near the power cable (Neon light bulb or any electronic equipment which causes harmonic wave).

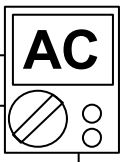
YES

Check Point 2 : Check connection

- Check any loose or removed connection line of between indoor unit and outdoor unit.
  >> If there is an abnormal condition, correct it by referring to Installation Manual or Data & Technical Manual.
- Check connection condition in control unit.
  (If there is loose connector, open cable or mis-wiring)

OK

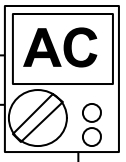
Check Point 3 : Check the voltage of power supply



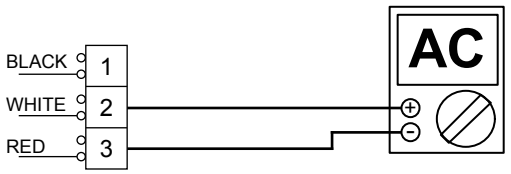
- Check the voltage of power supply
  >> Check if AC198(AC220V-10%) - 264V(AC240V+10%) appears at outdoor unit terminal L1 - N, L2 - N, L3 - N.

OK

Check Point 4 : Check serial signal (Forward transfer signal)



- Check serial signal (Forward transfer signal)
  >> Check if indicated value swings between AC70V and AC130V at outdoor unit terminal 2 - 3.
  >> If it is abnormal, replace Controller PCB and Filter PCB.



Trouble shooting 3 **INDOOR UNIT Error Method:** **Indoor heat exchanger temperature thermistor (middle) Error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators: Indoor unit controller PCB Heat exchanger temperature thermistor (middle)	**Detective details:** When Heat exchanger temperature thermistor (middle) open or short-circuit is detected at power ON.

Forecast of Cause :

1. Connector connection failure 2.Thermistor failure 3. Controller PCB failure

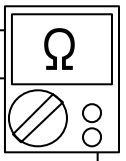
Check Point 1 : Check connection of connector

- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if thermistor cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Remove connector and check thermistor resistance value



Thermistor characteristics (Approx. value)

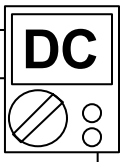
Temperature (°C)	-10	-5	0	5	10	15	20	30	40
Resistance value (kΩ)	312.3	233.2	176.0	134.2	103.3	80.3	62.9	39.6	25.6

Temperature (°C)	50	60	70	80	90	100	110	120
Resistance value (kΩ)	17.1	11.6	8.1	5.8	4.2	3.1	2.3	1.8

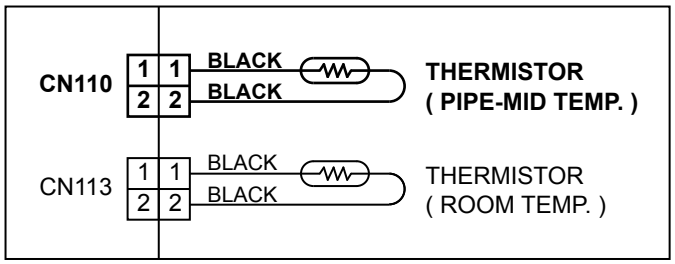
▶ **If Thermistor is either open or shorted, replace it and reset the power.**

OK

Check Point 3 : Check voltage of Controller PCB (DC5.0V)



Make sure circuit diagram of indoor unit and check terminal voltage at thermistor (DC5.0V)



▶ **If the voltage does not appear, replace Controller PCB.**

Trouble shooting 4 **INDOOR UNIT Error Method:** **Wired remote controller error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Indoor unit controller PCB Wired remote controller	When the indoor unit cannot properly receive the signal from Wired remote controller for 1 minute or more.

Forecast of Cause:

1. Connection failure 2. Wired remote controller failure 3. Controller PCB failure

Check Point 1 : Check the connection of terminal

Check & correct the followings.

- Check the connection of terminal between Wired Remote Controller and indoor unit, and check if there is a disconnection of the cable.

OK

Check Point 2 : Check Wired remote controller and Controller PCB

- Check voltage at connector of Wired remote controller of Controller PCB. (Power supply to Wired remote controller)
  >> CN140 : 1 - 3 pin

If it is DC12V, Wired remote controller is failure. (Controller PCB is normal)
>> Replace Wired remote controller.
If it is DC 0V, Controller PCB is failure.
>> Replace Controller PCB.

Trouble shooting 5 **INDOOR UNIT Error Method:** **Room temperature thermistor error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Indoor unit controller PCB Room temperature thermistor	When Room temperature thermistor open or short-circuit is detected at power ON.

Forecast of Cause :

1. Connector connection failure 2.Thermistor failure 3. Controller PCB failure

Check Point 1 : Check connection of connector

- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if thermistor cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Remove connector and check thermistor resistance value

Thermistor characteristics (Approx. value)

Temperature (°C)	-10	-5	0	5	10	15	20	30
Resistance value (kΩ)	58.2	44.0	33.6	25.9	20.2	15.8	12.5	8.0

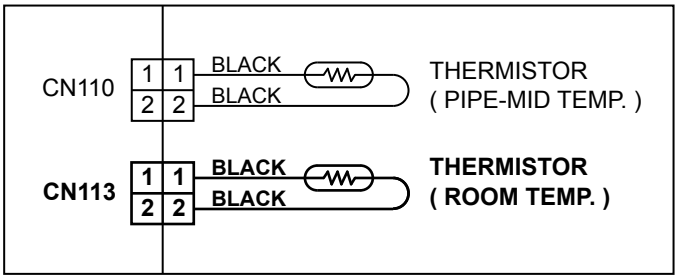
Temperature (°C)	40	50	60	70	80
Resistance value (kΩ)	5.3	3.6	2.5	1.8	1.3

▶ **If Thermistor is either open or shorted, replace it and reset the power.**

OK

Check Point 3 : Check voltage of Controller PCB (DC5.0V)

Make sure circuit diagram of indoor unit and check terminal voltage at thermistor (DC5.0V)



▶ **If the voltage does not appear, replace Controller PCB.**

Trouble shooting 6 **OUTDOOR UNIT Error Method:** **Outdoor discharge pipe temperature thermistor error**	**Indicate or Display:** **Refer to error code table.**
Detective Actuators: Outdoor unit Main PCB Discharge pipe temperature thermistor	**Detective details:** When Discharge pipe temperature thermistor open or short-circuit is detected at power ON or while running the compressor.

Forecast of Cause :

1. Connector connection failure 2. Thermistor failure 3. Main PCB failure

Check Point 1 : Check connection of connector

- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if thermistor cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Remove connector and check thermistor resistance value

Thermistor characteristics (Approx. value)

Temperature (°C)	-30	-20	-10	0	10	20	30	40	50
Resistance value (kΩ)	1013.1	531.6	292.9	168.6	100.9	62.5	40.0	26.3	17.8

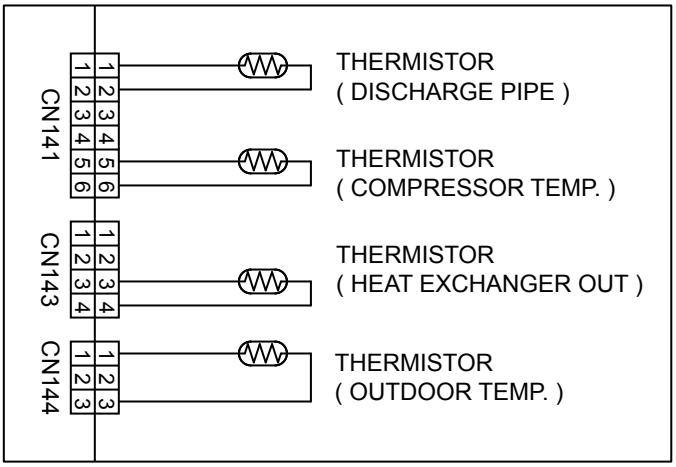
Temperature (°C)	60	70	80	90	100	110	120
Resistance value (kΩ)	12.3	8.7	6.3	4.6	3.4	2.6	2.0

▶ **If Thermistor is either open or shorted, replace it and reset the power.**

OK

Check Point 3 : Check voltage of Main PCB (DC5.0V)

Make sure circuit diagram of outdoor unit and check terminal voltage at thermistor (DC5.0V)



▶ **If the voltage does not appear, replace Main PCB.**

Trouble shooting 7 **OUTDOOR UNIT Error Method:** **Outdoor heat exchanger temperature thermistor (outlet) error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Main PCB Heat exchanger temperature thermistor (Out)	When Heat exchanger temperature thermistor (out) open or short-circuit is detected at power ON or while running the compressor.

Forecast of Cause :

1. Connector connection failure 2. Thermistor failure 3. Main PCB failure

Check Point 1 : Check connection of connector

- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if thermistor cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Remove connector and check thermistor resistance value

Thermistor characteristics (Approx. value)

Temperature (°C)	-30	-20	-10	0	10	20	30	40	50
Resistance value (kΩ)	95.6	50.3	27.8	16.1	9.6	6.0	3.8	2.5	1.7

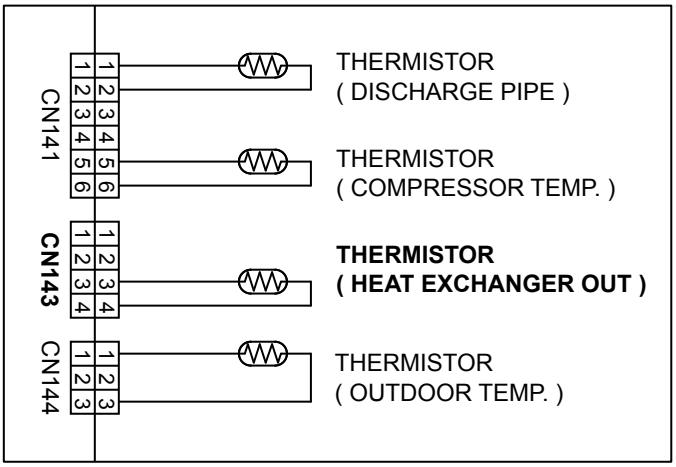
Temperature (°C)	60	70	80
Resistance value (kΩ)	1.2	0.8	0.6

▶ **If Thermistor is either open or shorted, replace it and reset the power.**

OK

Check Point 3 : Check voltage of Main PCB (DC5.0V)

Make sure circuit diagram of outdoor unit and check terminal voltage at thermistor (DC5.0V)



▶ **If the voltage does not appear, replace Main PCB.**

Trouble shooting 8 **OUTDOOR UNIT Error Method:** **Outdoor temperature thermistor error**	**Indicate or Display:** **Refer to error code table.**
Detective Actuators: Outdoor unit Main PCB Outdoor temperature thermistor	**Detective details:** When Outdoor temperature thermistor open or short-circuit is detected at power ON or while running the compressor.

Forecast of Cause :

1. Connector connection failure 2. Thermistor failure 3. Main PCB failure

Check Point 1 : Check connection of connector

- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if thermistor cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Remove connector and check thermistor resistance value

Thermistor characteristics (Approx. value)

Temperature (°C)	-30	-20	-10	0	10	20	30	40
Resistance value (kΩ)	200.2	105.4	58.2	33.6	20.2	12.5	8.0	5.3

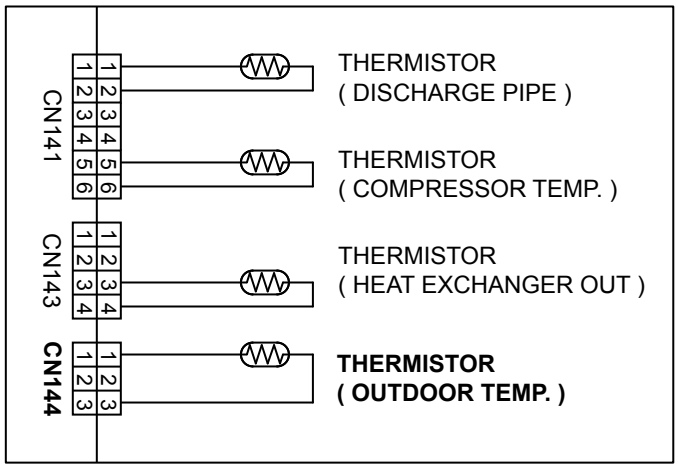
Temperature (°C)	50	60	70	80
Resistance value (kΩ)	3.6	2.5	1.8	1.3

▶ **If Thermistor is either open or shorted, replace it and reset the power.**

OK

Check Point 3 : Check voltage of Main PCB (DC5.0V)

Make sure circuit diagram of outdoor unit and check terminal voltage at thermistor (DC5.0V)



▶ **If the voltage does not appear, replace Main PCB.**

Trouble shooting 9 **OUTDOOR UNIT Error Method:** **Heat sink thermistor (inverter) error**	**Indicate or Display:** **Refer to error code table.**
Detective Actuators: Outdoor unit Inverter PCB Heat sink temperature thermistor (INV)	**Detective details:** When Heat sink temperature thermistor (INV) open or short-circuit is detected at power ON or while running the compressor.

Forecast of Cause :

1. Connector connection failure 2. Thermistor failure 3. Inverter PCB failure

Check Point 1 : Check connection of connector

- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if thermistor cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Remove connector and check thermistor resistance value

Thermistor characteristics (Approx. value)

Temperature (°C)	-30	-20	-10	0	10	20	30	40
Resistance value (kΩ)	94.3	49.6	27.4	15.8	9.5	5.9	3.8	2.5

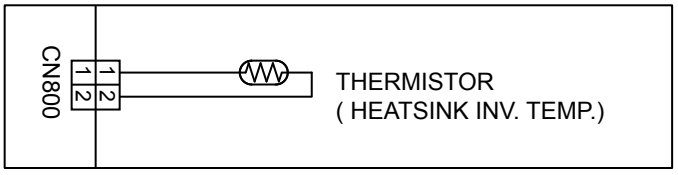
Temperature (°C)	50	60	70	80	90
Resistance value (kΩ)	1.7	1.2	0.8	0.6	0.4

▶ **If Thermistor is either open or shorted, replace it and reset the power.**

OK

Check Point 3 : Check voltage of Inverter PCB (DC5.0V)

Make sure circuit diagram of outdoor unit and check terminal voltage at thermistor (DC5.0V)



▶ **If the voltage does not appear, replace Inverter PCB.**

Trouble shooting 10 **OUTDOOR UNIT Error Method:** **Compressor temperature thermistor error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Main PCB Compressor temperature thermistor	When Compressor temperature thermistor open or short-circuit is detected at power ON or while running the compressor.

Forecast of Cause :

1. Connector connection failure 2. Thermistor failure 3. Main PCB failure

Check Point 1 : Check connection of connector

- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if thermistor cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Remove connector and check thermistor resistance value

Thermistor characteristics (Approx. value)

Temperature (°C)	-30	-20	-10	0	10	20	30	40
Resistance value (kΩ)	1013.1	531.6	292.9	168.6	100.9	62.5	40.0	26.3

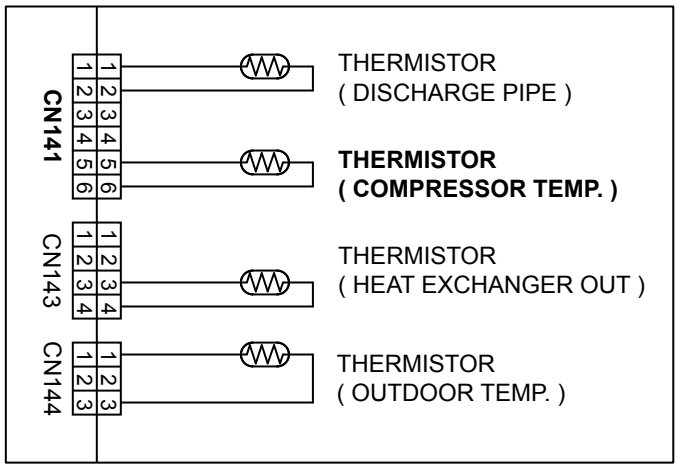
Temperature (°C)	50	60	70	80	90	100	110	120
Resistance value (kΩ)	17.8	12.3	8.7	6.3	4.6	3.4	2.6	2.0

▶ **If Thermistor is either open or shorted, replace it and reset the power.**

OK

Check Point 3 : Check voltage of Main PCB (DC5.0V)

Make sure circuit diagram of outdoor unit and check terminal voltage at thermistor (DC5.0V)



▶ **If the voltage does not appear, replace Main PCB.**

Trouble shooting 11 **INDOOR UNIT Error Method:** **Power supply frequency detection error**	**Indicate or Display:** **Refer to error code table.**
Detective Actuators: Indoor unit Controller PCB Indoor unit Filter PCB	**Detective details:** When power frequency is not detected by 4 seconds after power-on.

Forecast of Cause:

1. Connection failure 2. External cause 3. Controller PCB failure 4. Power PCB failure

Check Point 1-1 : Reset the power supply and operate

- Does error indication reappear?

NO

YES

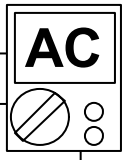
Check Point 2 : Check connection

- Check any loose or removed connection line of between indoor unit and outdoor unit.
  >> If there is an abnormal condition, correct it by referring to Installation Manual or Data & Technical Manual.
- Check connection condition in control unit.
  (If there is loose connector, open cable or mis-wiring.)

Check Point 1-2 : Check external cause such as noise

- Check if the ground connection is proper.
- Check if there is any equipment that causes harmonic wave near the power cable (Neon light bulb or any electronic equipment which causes harmonic wave).

OK



Check Point 3 : Check the voltage of power supply

- Check the voltage of power supply
  >> Check if AC198(AC220V-10%) - 264V(AC240V+10%) appears at outdoor unit terminal, L1 - N, L2 - N, L3 - N.

OK

Check Point 4 : Replace Controller PCB and Power PCB

▶ **If Check Point 1 ~ 3 do not improve the symptom, replace Controller PCB and Filter PCB.**

Trouble shooting 12 **OUTDOOR UNIT Error Method:** **IPM Protection**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Inverter PCB Compressor	① When over current flows in Inverter PCB, the compressor stops. ② After the compressor restarts, if the same error is repeated within 40sec, the compressor stops reappear. ③ If ① and ② repeats 5 times, the compressor stops permanently.

Forecast of Cause :

1. Connection failure
2. Outdoor fan operation failure
3. Outdoor heat exchanger clogged
4. Inverter PCB failure
5. Compressor failure

Check Point 1 : Check connections condition in control unit

- Check if the terminal connection is loose.
- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Check Outdoor heat exchanger

- Is there any obstructing the air flow route?
- Is there any clogging of outdoor unit heat exchanger?

>> If clogged, clear the clog.

OK

Check Point 3 : Check Outdoor fan

- Check Outdoor fan motor. (Refer to Trouble shooting 14)

>> If the fan motor is failure, replace it.

OK

Check Point 4 : Check Inverter PCB

- Inverter PCB check is refer to SERVICE PARTS INFORMATION 4.

>> If it is abnormal, replace Inverter PCB.

OK

Check Point 5 : Check Compressor

- Compressor check is refer to SERVICE PARTS INFORMATION 2.

>> If it is abnormal, replace compressor.

Trouble shooting 13 **OUTDOOR UNIT Error Method:** **Compressor location error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Inverter PCB	When "compressor location detection error" is detected consecutively 5 times, within 40 seconds after start-up.

Forecast of Cause :

1. Connector connection failure 2. Inverter PCB failure 3. Compressor

Check Point 1 : Check connections condition in control unit

- Check if the terminal connection is loose.
- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Check Inverter PCB

- Inverter PCB check is refer to SERVICE PARTS INFORMATION 4.

>> If it is abnormal, replace Inverter PCB.

OK

Check Point 3 : Check connection of around the Compressor components

For Compressor Terminal, Main PCB

- Check if connector is removed.
- Check erroneous connection.
- Check if cable is open.

(Refer to PARTS INFORMATION 2)

>>Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 3-1: Replace Compressor

▶ **If Check Point 3 do not improve the symptom, change Compressor.**

Trouble shooting 14 **OUTDOOR UNIT Error Method:** **Outdoor Unit Fan Error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Main PCB Outdoor fan motor Main Filter PCB	① When outdoor fan rotation speed is less than 100rpm in 20 seconds after fan motor starts, fan motor stops. ② After fan motor restarts, if the same operation within 60sec is repeated consecutively 3 times, compressor and fan motor stops. ③ If ② repeats 5 times in a row, compressor and fan motor stops permanently.

Forecast of Cause:

1. Fan Motor failure
2. Motor protection by surrounding temperature rise
3. Main PCB failure
4. Main Filter PCB failure

Check Point 1 : Check rotation of Fan

- Check if the fan motor is lock.
  (Can the fan be rotated by hand when operation is off.)
- Check the fan loosening.
  (Lock-nut loosening, defective propeller fan)

>> If fan motor or bearing is abnormal, replace it.

OK

Check Point 2 : Check ambient temp. around motor

- Check excessively high temperature around the motor.
  (If there is any surrounding equipment that causes heat)

>> Upon the temperature coming down, restart operation.

OK

Check Point 3 : Check Fuse of Main Filter PCB.

- Check if F602 is open.

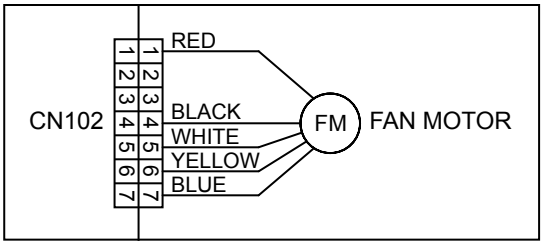
>> If F602 is open, replace Main Filter PCB.

OK

Check Point 4 : Check output voltage of Main PCB

- Check outdoor unit circuit diagram and the voltage.
  (Measure at Main PCB side connector)

>>1 pin (Red) - 4 pin (Black) : DC280V (AC220V-10%)~ 373V (AC240+10%)
>>4 pin (Black) - 5 pin (White) : DC15V ± 1.5V



▶ **If the voltage is not correct, replace Main PCB.**

Trouble shooting 15 **OUTDOOR UNIT Error Method:** **Inverter error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Main PCB Outdoor unit Inverter PCB	・When there is communication error between Main PCB and Inverter PCB. ・When "Inverter PCB cement resistor difference voltage between both ends" detects 18V and above twice continuously.

Forecast of Cause :

1. Connection failure 2. Main PCB failure 3. Inverter PCB failure

Check Point 1 : Check connections in control unit

・Check if the terminal connection is loose.
・Check if connector is removed.
・Check if connector is erroneous connection.
・Check if cable is open.
>> Upon correcting the removed connector or mis-wiring, reset the power.

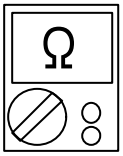
OK

Check Point 2 : Check resistance of Cement Resister

・Remove connector, check each Cement Resister

Resistance value

5.6 Ω ± **5** Ω



▶ **If Resistance value is abnormal, replace Cement Resister.**

OK

Check Point 3 : Replace Main PCB and Inverter PCB

▶ **If Check Point 1 and 2 do not improve the symptom, replace Main PCB and Inverter PCB.**

Trouble shooting 16 **INDOOR UNIT Error Method:** **Indoor fan motor 1 lock error** **Indoor fan motor 1 rev. error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Indoor unit Controller PCB Indoor unit Power PCB Indoor fan motor	When the condition that actual rev. of Indoor Fan is 1/3 or less. Or the condition of fan speed is 0rpm is continued more than 56 seconds.

Forecast of Cause:

1. Fan motor failure
2. Motor protection by surrounding temperature rise
3. Power PCB failure
4. Controller PCB failure

Check Point 1 : Check rotation of fan

- Check if the fan motor is lock.
  (Can the fan be rotated by hand when operation is off.)
- Check the fan loosening.
  (Lock-nut loosening, defective propeller fan)

>> If fan motor or bearing is abnormal, replace it.

OK

Check Point 2 : Check ambient temp. around motor

- Check excessively high temperature around the motor.
  (If there is any surrounding equipment that causes heat)

>> Upon the temperature coming down, restart operation.

OK

Check Point 3 : Replace Power PCB and Controller PCB

▶ **If Check Point 1, 2 do not improve the symptom, replace Power PCB and Controller PCB.**

Trouble shooting 17 **OUTDOOR UNIT Error Method:** **Discharge temperature error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Main PCB Discharge pipe temperature thermistor	When the discharge temperature becomes higher than 115°C. When detecting it 2 times within 24 hours, the compressor stops.

Forecast of Cause :

1. Valve is close
2. EEV failure
3. Gas leak, less
4. Discharge thermistor failure
5. Outdoor fan operation failure
6. Outdoor heat exchanger clogged

< Cooling mode >

Check Point 1 : Check if gas valve is open

- If it is not open, open it and check the operation.

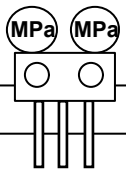
OK

Check Point 2 : Check EEV and Strainer

- Are EEV and Strainer open?
  (Refer to PARTS INFORMATION 3)
  >> If EEV or Strainer is defective, replace it.

OK

Check Point 3 : Check if gas leak or less gas



- Measure gas pressure, if there is a leak, correct it.
  >> If recharging refrigerant, make sure to perform vacuuming and recharge the specified amount.

OK

Check Point 4 : Check Discharge pipe thermistor

- Is it on the holder?
- Is there a cable pinched?
  >> Check characteristics of thermistor (Refer to Trouble shooting 6). If defective, replace the thermistor

OK

Check Point 5 : Check Outdoor heat exchanger

- Is there any obstructing the air flow route?
- Is there any clogging of outdoor unit heat exchanger?
  >> If clogged, clear the clog.

OK

Check Point 6 : Check Outdoor fan

- Check outdoor fan motor. (Refer to Trouble shooting 14)
  >> If the fan motor is failure, replace it.

< Heating mode >

Check Point 1 : Check if liquid valve is open

- If it is not open, open it and check the operation.

OK

Check Point 2 : Check EEV and Strainer

- Are EEV and Strainer open?
  (Refer to PARTS INFORMATION 3)
  >> If EEV or Strainer is defective, replace it.

OK

Trouble shooting 18 **OUTDOOR UNIT Error Method:** **Excessive high pressure protection**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Main PCB Outdoor fan motor Heat exchanger temp. thermistor (Out) Outdoor unit EEV	In cooling operation, after 1 minute or more compressor starts, when outdoor heat exchanger temperature is 68 °C and above.

Forecast of Cause :

1. Connection failure
2. Outdoor fan operation failure
3. Outdoor heat exchanger clogged
4. Thermistor failure
5. EEV failure
6. Main PCB failure

Check Point 1 : Check connections condition in control unit

- Check if the terminal connection is loose.
- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Check Outdoor heat exchanger

- Is there any obstructing the air flow route?
- Is there any clogging of outdoor unit heat exchanger?

>> If clogged, clear the cloge it.

OK

Check Point 3 : Check Outdoor fan

- Check Outdoor fan motor. (Refer to Trouble shooting 14)

>> If the fan motor is failure, replace it.

OK

Check Point 4 : Check Thermistor

- Check Thermistor. (Refer to Trouble shooting 7)

>> If the thermistor is failure, replace it.

OK

Check Point 5 : Check EEV

- Check EEV. (PARTS INFORMATION 3)

>> If the EEV is failure, replace it.

OK

Check Point 6 : Replace Main PCB

▶ If Check Point 1 ~ 5 do not improve the symptom, replace Main PCB.

Trouble shooting 19 **OUTDOOR UNIT Error Method:** **4-way Valve Error,** **Solenoid Valve Error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Indoor unit Controller PCB Heat exchanger temperature thermistor Room temperature thermistor 4-way valve	When the indoor heat exchanger temperature is compared with the room temperature, and either following condition is detected continuously two times, the compressor stops. ・Cooling or Dry operation [Indoor heat exchanger (middle) temp.] - [Room temp.] > 20degC ・Heating operation [indoor heat exchanger (middle) temp.] - [Room temp.] < -14degC If the same operation is repeated 5 times, the compressor stops permanently.

Forecast of Cause :

1. Connector connection failure
2. Thermistor failure
3. Solenoid Coil failure
4. 4-way valve failure
5. Main PCB failure

Check Point 1 : Check connection of Connector

・Check if connector is removed.
・Check erroneous connection.
・Check if thermistor cable is open.
>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

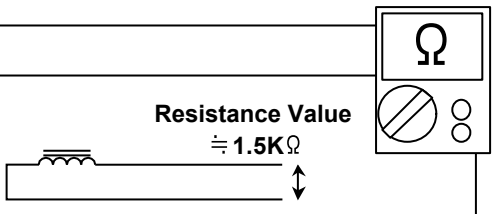
Check Point 2 : Check thermistor

・Isn't it fallen off the holder?
・Is there a cable pinched?
>> Check characteristics of thermistor, If defective, replace the thermistor.

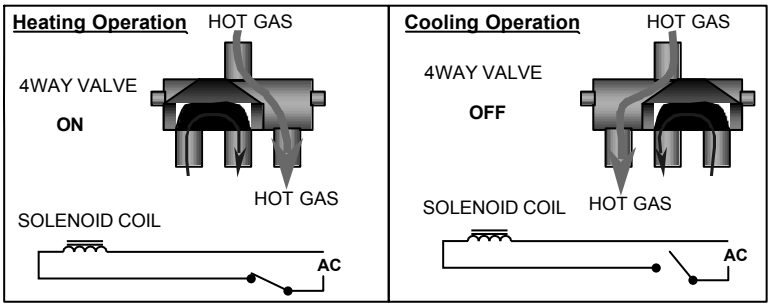
OK

Check Point 3 : Check the solenoid coil and 4-way valve

[Solenoid coil]
・Remove CN105 from PCB and check the resistance value of coil.
Resistance value is about 1.5kΩ
>> If it is Open or abnormal resistance value, replace Solenoid Coil.



[4-way valve]
・Check each piping temperature, and confirm the location of the valve by the temperature difference.
>> If the value location is not proper, replace 4-way valve.



OK

Check Point 4: Check Voltage of Solenoid Coil

▶ **If CN105 of Control PCB dose not Show 220V ± 20 V during Heating operation (Compressor is in operation), replace Control PCB.**

Trouble shooting 20 **OUTDOOR UNIT Error Method:** **Pressure switch error,** **Pressure sensor error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Main PCB Pressure sensor Pressure switch	30 seconds or more after power-on, when pressure sensor detection value detects the condition below continuously for 30 seconds or more. ・High pressure : Ps < 0.3 or Ps ≧ 5.0 MPa ・Low pressire : Ps < 0.06 or Ps ≧ 5.0 MPa When pressure switch detectes more than 4.2 MPa

Forecast of Cause :

1. Connector connection failure 2. Pressure sensor failure 3. Main PCB failure 4. Pressure switch failure

Check Point 1 : Check connection of the Pressure Sensor

- Check if the terminal connection is loose.
- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if cable is open.

>> Upon correcting the removed connector or mis-wiring, reset the power.

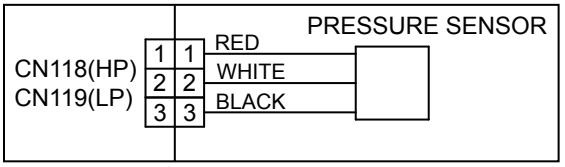
OK

Check Point 2 : Check output voltage of Main PCB

- Check voltage of Main PCB.
  (Measure at Main PCB side connector)

  >>1 pin(Red) - 3 pin(Black) DC5V ±5%

▶ **If the voltage is not correct, replace Main PCB.**



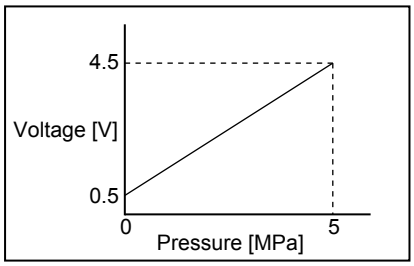
OK

Check Point 3 : Check output voltage of Pressure Sensor

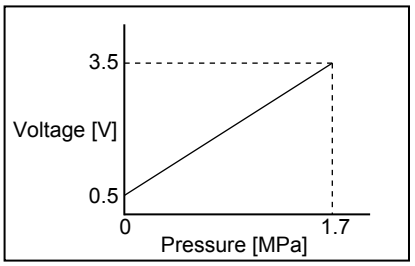
- Check voltage of Main PCB.
  (Measure at Main PCB side connector)

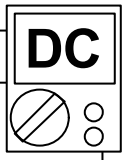
  >>2 pin(White) - 3 pIn(Black) Voltage is refer to the following graph.

[High pressure]



[Low pressure]





▶ **If the voltage is not correct, replace Presure Sensor.**

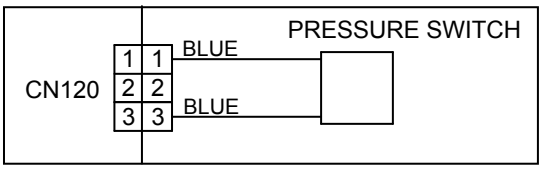
OK

Check Point 3 : Continuity check of Pressure Switch

- Continuity check of Pressure Switch

  Pressure Switch characteristics
  OFF : 4.2±0.1 MPa
  ON : 3.2±0.15 MPa

▶ **If it is not correct, replace pressure switch.**



Trouble shooting 21 **OUTDOOR UNIT Error Method:** **Compressor temperature error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Outdoor unit Main PCB Compressor temperature thermistor	When the compressor temperature becomes 112°C or more.

Forecast of Cause :

1. Valve is close
2. EEV failure
3. Gas leak, less
4. Compressor thermistor failure
5. Outdoor fan failure
6. Outdoor heat exchanger clogged

< Cooling mode >

Check Point 1 : Check if gas valve is open

- If it is not open, open it and check the operation.

OK

Check Point 2 : Check EEV and Strainer

- Are EEV and Strainer open?
  (Refer to PARTS INFORMATION 3)
  >> If EEV or Strainer is defective, replace it.

OK

< Heating mode >

Check Point 1 : Check if liquid valve is open

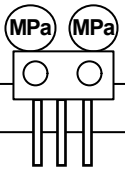
- If it is not open, open it and check the operation.

OK

Check Point 2 : Check EEV and Strainer

- Are EEV and Strainer open?
  (Refer to PARTS INFORMATION 3)
  >> If EEV or Strainer is defective, replace it.

OK



Check Point 3 : Check if gas leak or less gas

- Measure Gas pressure, if there is a leak, correct it.
  >> If recharging refrigerant, make sure to perform vacuuming and recharge the specified amount.

OK

Check Point 4 : Check Compressor temperature thermistor

- Is it on the holder?
- Is there a cable pinched?
  >> Check characteristics of thermistor (Refer to Trouble shooting 10), If defective, replace the Compressor temperature thermistor.

OK

Check Point 5 : Check Outdoor heat exchanger

- Is there any obstructing the air flow route?
- Is there any clogging of outdoor unit heat exchanger?
  >> If clogged, clear the clog.

OK

Check Point 6 : Check Outdoor fan

- Check Outdoor fan motor. (Refer to Trouble shooting 14)
  >> If the Fan Motor is failure, replace it.

OK

Check Point 7 : Replace Main PCB

▶ **If Check Point 1 ~ 6 do not improve the symptom, replace Main PCB.**

Trouble shooting 22 **OUTDOOR UNIT Error Method:** **Low pressure error**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators: Outdoor unit Main PCB Pressure sensor	**Detective details:** In cooling operation, 1 minute or more after compressor's start-up, when pressure sensor detects 0.12 MPa or less for consecutive 5 minutes.

Forecast of Cause :

1. Connector connection failure 2. Pressure sensor failure 3. Main PCB failure 4. Gas leak, less

Check Point 1 : Check connections of the Pressure sensor

- Check if the terminal connection is loose.
- Check if connector is removed.
- Check if connector is erroneous connection.
- Check if cable is open.

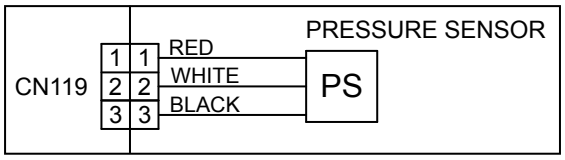
>> Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 2 : Check output voltage of Main PCB

- Check voltage of Main PCB.
  (Measure at Main PCB side connector)

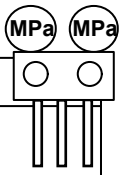
>>1 pin(Red) - 3 pin(Black) DC5V ±5%



▶ **If the voltage is not correct, replace Main PCB.**

OK

Check Point 3 : Check if gas leak or less gas



- Measure Gas pressure, if there is a leak, correct it.

>> If recharging refrigerant, make sure to perform vacuuming and recharge the specified amount.

OK

Check Point 4 : Replace Pressure sensor

▶ **If Check Point 1 ~ 3 do not improve the symptom, replace Pressure sensor.**

Trouble shooting 23 **INDOOR UNIT Error Method:** **Model distinction error (Indoor)**	**Indicate or Display:** **Refer to error code table.**

Detective Actuators:	**Detective details:**
Indoor unit Controller PCB	When power is on and there is some below case. 1. When model information of EEPROM is incorrect 2. When the access to EEPROM failed

Forecast of Cause:

1. External cause 2. Defective for connection in controller unit 3. Controller PCB failure

Check Point 1-1 : Reset power supply and operate

- Does error indication show reappear?

NO → Check Point 1-2 : Check external cause such as noise

- Check if the ground connection is proper.
- Check if there is any equipment that causes harmonic wave near the power cable (Neon light bulb or any electronic equipment which causes harmonic wave).

YES ↓

Check Point 2 :
Check connections condition in control unit

- Check all connectors.
  (loose connector or incorrect wiring)
- Check any shortage or corrosion on PCB.

OK ↓

Check Point 3 : Replace Controller PCB

▶ **If Check Point 1, 2 do not improve the symptom, replace Controller PCB.**

Trouble shooting 24 **INDOOR UNIT Error Method:** **Indoor fan motor 1 drivers circuit error** **Indoor fan motor 2 drivers circuit error**	**Indicate or Display:** **Refer to error code table.**
Detective Actuators: Indoor unit Power PCB	**Detective details:** When a momentary power cut off. When do not start fan motor.

Forecast of Cause :

1. External cause 2. Connection of connector failure 3. Power PCB failure

Check Point 1 : Check external cause at Indoor and Outdoor (Voltage drop or Noise)

- Instant drop : Check if there is a large load electric apparatus in the same circuit.
- Momentary power failure : Check if there is a defective contact or leak current in the power supply circuit.
- Noise : Check if there is any equipment causing harmonic wave near electric line. (Neon bulb or electric equipment that may cause harmonic wave) Check the complete insulation of grounding.

OK

Check Point 2 : Check connection of Connector

- Check if connector is removed.
- Check erroneous connection.
- Check if cable is open.

>>Upon correcting the removed connector or mis-wiring, reset the power.

OK

Check Point 3 : Replace Power supply PCB

▶ **If Check Point 1, 2 do not improve the symptom, replace Power PCB.**

2-3 TROUBLE SHOOTING WITH NO ERROR CODE

Trouble shooting 25

Indoor unit - No Power

Forecast of Cause:

1. Power supply failure
2. External cause
3. Electrical components defective

Check Point 1 : Check installation condition

- Isn't the breaker down?
- Check loose or removed connection cable.
  >> If abnormal condition is found, correct it by referring to manual.

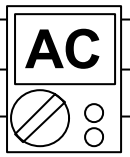
OK

Check Point 2 : Check external cause at indoor unit and outdoor unit (Voltage drop or noise)

- Instant voltage drop of ----- Check if there is abnormally large load in the same power supply power supply system.
- Momentary power failure ----- Check if there is a defective contact or leak current in the power supply system.
- Noise ----- Check if there is any equipment causing harmonic wave near electric line. (Neon bulb or electric equipment that may cause harmonic wave) Check whether the ground connection is proper.

OK

Check Point 3 : Check electrical components



Check the voltage of power supply.
>> Check if AC198(AC220V-10%) - 264V(AC240V+10%) appears at indoor unit Terminal 1 - 2 (Power supply).

NO

OK

- Check Fuse(F600) on Power PCB and 20A Fuse .
  >> If Fuse is open, check loose terminal, and replace Fuse.
- Check Varistor on Filter PCB (VA301, VA302).
  >> If Varistor is defective, there is a possibility of an abnormal power supply. Check the correct power voltage and replace Filter PCB.

OK

▶ **If Check Point 1 ~ 3 do not improve the symptom, replace Filter PCB, Power PCB and controller PCB.**

Trouble shooting 26

Outdoor unit - No Power

Forecast of Cause:

1. Power supply failure
2. External cause
3. Electrical components defective

Check Point 1 : Check installation condition

- Isn't the breaker down?
- Check loose or removed connection cable.

>> If abnormal condition is found, correct it by referring to manual.

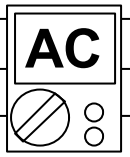
OK

Check Point 2 : Check external cause at indoor unit and outdoor unit (Voltage drop or noise)

- Instant voltage drop of power supply ----- Check if there is a abnomally large load in the same power supply system.
- Momentary power failure ----- Check if there is a defective contact or leak current in the power supply system.
- Noise ----- Check if there is any equipment causing harmonic wave near electric line. (Neon bulb or electric equipment that may cause harmonic wave) Check whether the ground connection is proper.

OK

Check Point 3 : Check electrical components



Check the voltage of power supply.

>> Check if AC198(AC220V-10%) - 264V(AC240V+10%) appears at outdoor unit terminal , L1 - N, L2 - N, L3 - N.

NO

OK

- Check Fuse F50 and F100 on Main PCB.
  >> If Fuse is open, check loose terminal, and replace Fuse.
- Check Fuse F602 on Main Filter PCB.
  >> If Fuse is open, check loose terminal, and replace Fuse.
- Check Varistor VA50 and VA51 on Main PCB.
  >> If Varistor is defective, there is a possibility of an abnormal power supply. Check the correct power voltage and replace Main PCB.
- Check Varistor VA601, and VA604 on Main Filter PCB.
  >> If Varistor is defective, there is a possibility of an abnormal power supply. Check the correct power voltage and replace Main Filter PCB.

OK

▶ If Check Point 1 ~ 3 do not improve the symptom, replace Main Filter PCB, Inverter Filter PCB Main PCB, and Inverter PCB .

Trouble shooting 27

No Operation (Power is ON)

Forecast of Cause:

1. Setting / Connection failure
2. External cause
3. Electrical component defective

Check Point 1 : Check indoor and outdoor installation condition

- Indoor unit - Check incorrect wiring between indoor unit - remote controller, or terminals between indoor units. Or, check if there is an open cable connection.
- Are these indoor unit, outdoor unit, and remote controller suitable model to connect?

>> If there is some abnormal condition, correct it by referring to manual.

OK

- Is there loose or removed serial communication line of between indoor unit and outdoor unit?

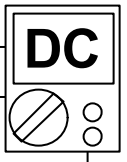
OK

Check Point 2 : Check external cause at indoor unit and outdoor unit (Voltage drop or noise)

- Instant voltage drop of power supply ----- Check if there is abnormally large load in the same power supply system.
- Momentary power failure ----- Check if there is a defective contact or leak current in the power supply system.
- Noise ---------- Check if there is any equipment causing harmonic wave near electric line.
  (Neon bulb or electric equipment that may cause harmonic wave)
  Check whether the ground connection is proper.

OK

Check Point 3 : Check electrical components at indoor unit and outdoor unit



- Check voltage at CN140

>> If it is DC12V, Wired Remote Controller is failure. >> Replace Wired Remote Controller.
>> If it is DC 0V, Controller PCB is fallure. >> Replace Controller PCB.

>> If Check Point 1, 2 do not improve the symptom, replace control parts of outdoor unit.

Trouble shooting 28

No cooling / No heating

Forecast of Cause:

1. Indoor unit error
2. Outdoor unit error
3. Effect by surrounding environment
4. Connection pipe / Connection wire failure
5. Refrigeration cycle failure

Check Point 1 : Check indoor unit

- Does indoor unit fan run on high fan?
- Is Air filter dirty?
- Is Heat exchanger clogged?
- Check if energy save function is operated.

OK

Check Point 2 : Check outdoor unit operation

- Is outdoor unit is operating?
  (If not, refer to Trouble shooting 25)
- Is there any obstructing the air flow route?
- Is there any clogging on outdoor unit heat exchanger?
- Is the valve open?

OK

Check Point 3 : Check site condition

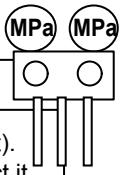
- Is capacity of indoor unit fitted to room size?
- Any windows open? or direct sunlight?

OK

Check Point 4 :
Check indoor unit / outdoor unit installation condition

- Check connection pipe.
  (Specified pipe length and pipe diameter?)
- Check any loose or removed communication line.
  >> <u>If there is an abnormal condition, correct it by referring to Installation Manual or Data & Technical Manual.</u>

OK

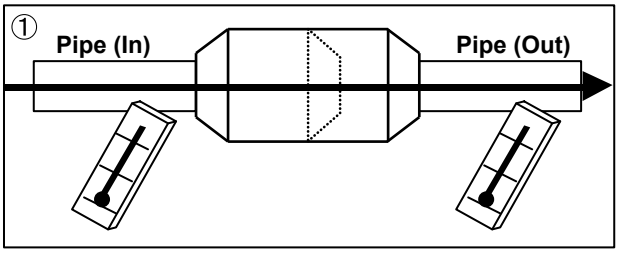


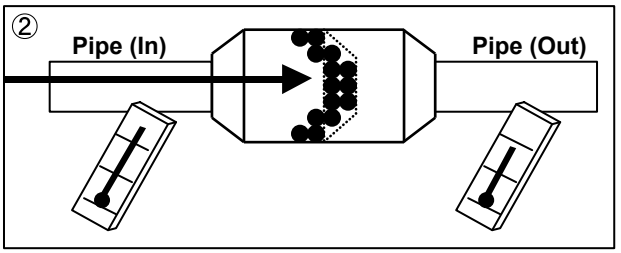
Check Point 5 : Check refrigeration cycle

- Check if Strainer is clogged (Refer to the figure at right).
- Measure gas pressure and if there is a leakage, correct it.
  >> <u>When recharging the refrigerant, make sure to perform vacuuming, and recharge the specified amount.</u>
- Check EEV
- Check Compressor

<u>Attention</u>

Strainer normally does not have temperature difference between inlet and outlet as shown in ①, but if there is a difference like shown in ②, there is a possibility of inside clogged. In this case, replace Strainer.





Trouble shooting 29

Abnormal Noise

Forecast of Cause :

1. Abnormal installation (Indoor unit / outdoor unit)
2. Fan failure (Indoor unit / outdoor unit)
3. Compressor failure (Outdoor unit)

Diagnosis method when abnormal noise is occurred

- Abnormal noise is coming from indoor unit. (Check and correct followings)
  - Is main unit installed in stable condition?
  - Is the installation of air suction grille and front panel normal?

OK

  - Is Fan broken or deformed?
  - Is the screw of Fan loose?
  - Is there any object which obstruct the Fan rotation?

- Abnormal noise is coming from outdoor unit. (Check and correct followings)
  - Is main unit installed in stable condition?
  - Is Fan guard installed normally?

OK

  - Is Fan broken or deformed?
  - Is the screw of Fan loose?
  - Is there any object which obstruct the Fan rotation?

OK

  - Check if vibration noise by loose bolt or contact noise of piping is happening.

OK

  - Is Compressor locked? >> Check Compressor

Trouble shooting 30

Water leaking

Forecast of Cause:

1. Erroneous installation 2. Drain hose failure

Diagnosis method when water leak occurs

- Is main unit installed in stable condition?
- Is main unit broken or deformed at the time of transportation or maintenance?

OK

- Is Drain hose connection loose?
- Is there a trap in Drain hose?
- Is Drain hose clogged?

OK

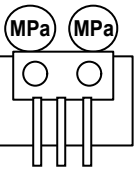
- Is Fan rotating? >> Check Fan motor

Diagnosis method when water is spitting out.

- Is the filter clogged?

OK

- Check gas pressure and correct it if there was a gas leak.



2-4 SERVICE PARTS INFORMATION

SERVICE PARTS INFORMATION 1

Compressor

Diagnosis method of Compressor (If outdoor unit LED displays error, refer to Trouble shooting)

Does not start up

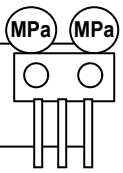
- Is there open or loose connection cable?
- Check connection of Compressor,and winding resistance. (Refer to the next page).

>> If there is no failure, the defect of Compressor is considered. (Locked compressor due to clogged dirt or less oil)

Replace Compressor

Stops soon after starting up

- Is there open or loose connection cable?
- Is Gas pipe valve open? (Low pressure is too low)
- Check if Refrigerant is leaking. (Recharge refrigerant)



- Check if Strainer is clogged. (PARTS INFORMATION 3)
- Check Inverter PCB connection of Compressor,and winding resistance. (Refer to the next page).

>> If there is no failure, the defect of Compressor can be considered. (Compression part broken or valve defective.)

Replace Compressor

Abnormal noise

- Check if vibration noise by loose bolt or contact noise of piping is happening.

▶Defective Compressor can be considered. (due to inside dirt clogging or broken component)

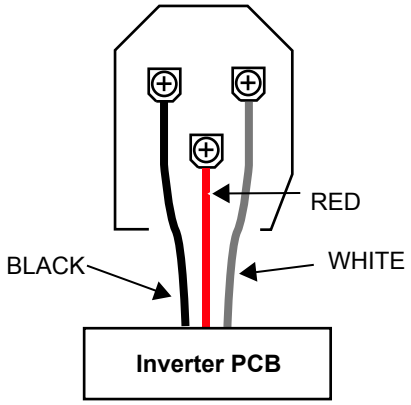
Replace Compressor

SERVICE PARTS INFORMATION 2

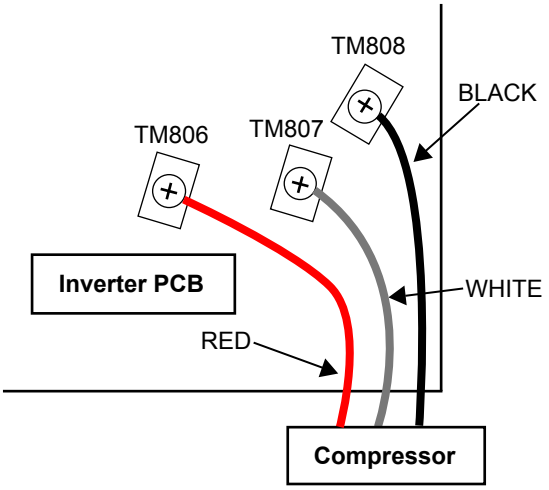
Inverter Compressor

Check Point 1 : Check connection

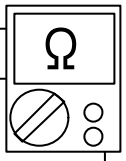
・Check terminal connection of Compressor
(Loose or incorrect wiring)



Check connection of Inverter PCB
(Loose or incorrect wiring)

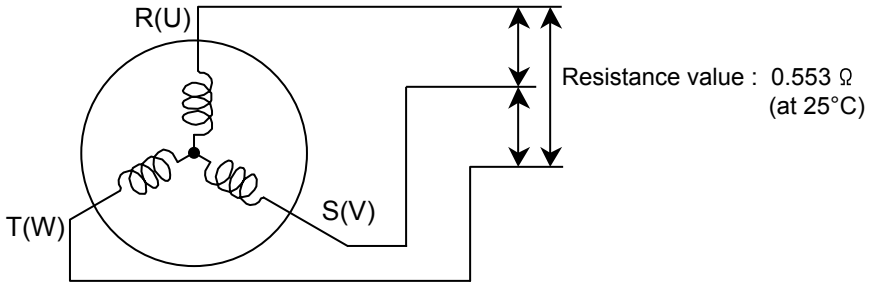


Check Point 2 : Check winding resistance



・Check winding resistance of each terminal

▶ **If the resistance value is 0 Ω or infinite, replace Compressor.**



Check Point 3 : Check Inverter PCB

▶ If Check Point 1, 2 do not improve the symptom, refer to SERVICE PARTS INFORMATION 4.

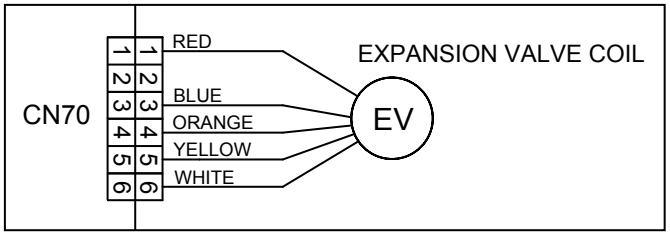
>> If it is abnormal, replace Inverter PCB.

SERVICE PARTS INFORMATION 3

Outdoor Unit Electronic Expansion Valve (EEV)

Check Point 1 : Check Connections

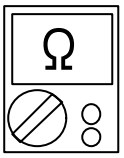
・Check connection of connector (Loose connector or open cable)



Check Point 2 : Check coil of EEV

・Remove connector, check each winding resistance of Coil.

Read wire	Resistance value
Red - Blue	**46**Ω ± **4**Ω at 20°C
Red - Orange	
Red - Yellow	
Red - White	



▶ **If Resistance value is abnormal, replace EEV.**

Check Point 4 : Check Noise at start up

・Turn on Power and check operation noise.

▶ **If an abnormal noise does not show, replace Main PCB.**

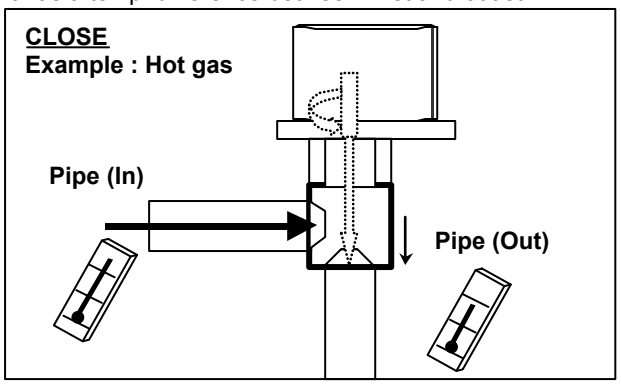
Check Point 3 : Check voltage from Main PCB.

・Remove Connector and check Voltage (DC12V)

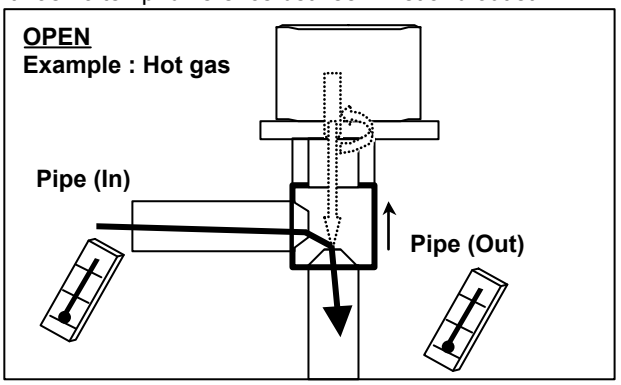
▶ **If it does not appear, replace Main PCB.**

Check Point 5 : Check opening and closing operation of valve

When valve is closed,
it has a temp. difference between Inlet and outlet.

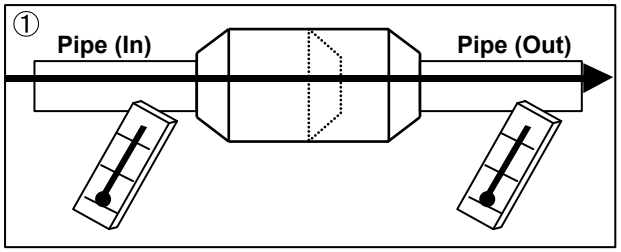


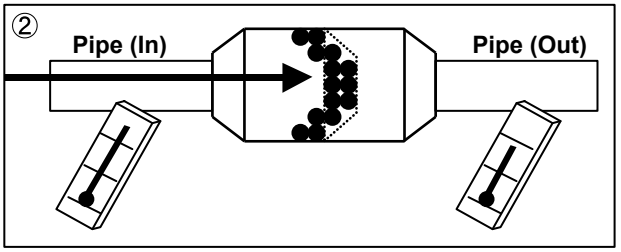
If it is open,
it has no temp. difference between inlet and outlet.



Check Point 6 : Check Strainer

Strainer normally does not have temperature difference between inlet and outlet as shown in ① ,
but if there is a difference as shown in ② , there is a possibility of inside clogged. In this case, replace Strainer.





SERVICE PARTS INFORMATION 4

IPM
(Mounted on Inverter PCB)

Check Point 1

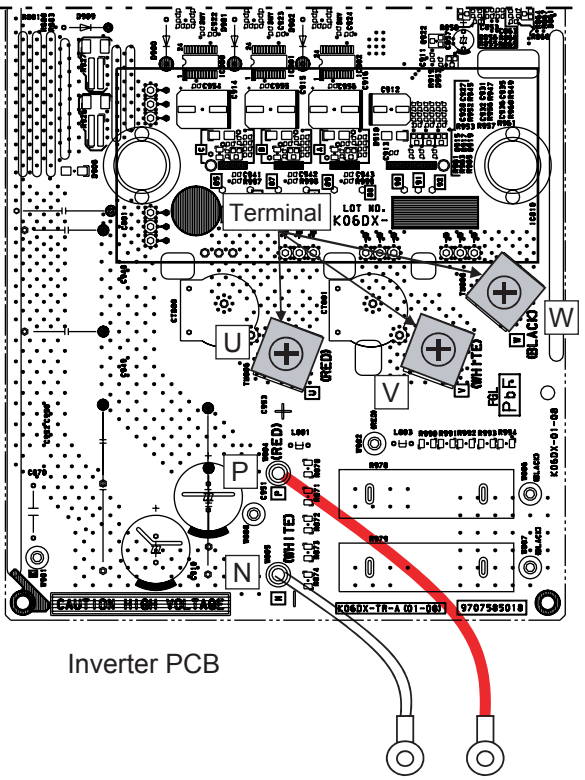
- Disconnect the connection wires between the Inverter PCB - electrolytic capacitor and Inverter PCB - Inverter Compressor.

- Set the tester to the "Resistance" mode, and measure the resistance between the following terminals.

  Red wire (P) - screw terminals U/V/W
  White wire (N) - screw terminals U/V/W

③ Judge the result of ② as follows:

All 6 points several M or greater	: Normal
1 or more points several k to short	: Defective



Inverter PCB

Check Point 2

Set the tester to the "Diode" mode, and measure the voltage value between the following terminals.

Tester +side (red)	Tester - side (black)	Tester display [V]
Terminal U		
Terminal V		
Terminal W		
	Terminal U	
	Terminal V	
	Terminal W	

Judge the result of as follows:

All 6 points several 0.3V to 0.7V	: Normal
1 or more points under 0.1V or over load	: Defective

Refrigerant
R410A

DUCT type
INVERTER

3 . APPENDING DATA

3-1. FUNCTION SETTING

3-1-1 INDOOR UNIT

- Follow the instructions in the Local Setup Procedure, which is supplied with the remote control, in accordance with the installed condition.
  After the power is turned on, perform the Function Setting on the remote control.
- The settings may be selected between the following two: Function Number or Setting Value.
- Settings will not be changed if invalid numbers or setting values are selected.

1-1. Setting the Filter sign

The indoor unit has a sign to inform the user that it is time to clean the filter.
Select the time setting for the filter sign display interval in the table below according to the amount of dust or debris in the room.
If you do not wish the filter sign to be displayed, select the setting value for "No indication".

(◆. . .Factory setting)

	Setting Description	Function Number	Setting Value
	Standard (2,500 hours)	11	00
	Long interval (5,000 hours)		01
	Short interval (1,250 hours)		02
◆	No indication		03

1-2. Setting the Static Pressure

Select appropriate static pressure according to the installation conditions.
Refer to the technical manual for details or follow the instructions of the duct designer.

(◆ ⋯Factory setting)

	Setting Description	Function Number	Setting Value
◆	Normal (72Pa)	21	00
	Low static pressure (50Pa)		02
	High static pressure 1 (150Pa)		03
	High static pressure 2 (200Pa)		04
	High static pressure 3 (250Pa)		05

1-3. Setting the Cooler Room Temperature Correction

Depending on the installed environment, the room temperature sensor may require a correction. The settings may be selected as shown in the table below.

(◆ ⋯Factory setting)

	Setting Description	Function Number	Setting Value
◆	Standard (No correction)	30	00
	Warmer control (+1.0°C)		01
	Slightly warmer control (+0.5°C)		02
	Slightly lower control (-0.5°C)		03
	Low control (-1.0°C)		04

1-4. Setting the Heater Room Temperature Correction

Depending on the installed environment, the room temperature sensor may require a correction. The settings may be selected as shown in the table below.

(◆ ⋯ Factory setting)

	Setting Description	Function Number	Setting Value
◆	Standard (No correction)	31	00
	Warmer control (+1.0°C)		01
	Slightly warmer control (+0.5°C)		02
	Slightly lower control (-0.5°C)		03
	Low control (-1.0°C)		04

1-5. Setting the Auto restart

Enable or disable automatic system restart after a power outage.

(◆ . . . Factory setting)

	Setting Description	Function Number	Setting Value
◆	Yes	40	00
	No		01

Auto restart is an emergency function such as for power failure etc.
Do not start and stop the indoor unit by this function in normal operation.
Be sure to operate by the control unit, or external input device.

1-6. Setting the Indoor room temperature sensor switching function

(Only for Wired remote controller)

The following settings are needed when use the control by Wired remote controller temperature sensor.

(◆ . . . Factory setting)

	Setting Description	Function Number	Setting Value
◆	No	42	00
	Yes		01

- If setting value is “00”,
  room temperature is controlled by the indoor unit temperature sensor.
- If setting value is “01”,
  room temperature is controlled by either indoor unit temperature sensor or remote control unit sensor.

1-7. Cool Air Prevention

This setting is used to set the fan speed when the compressor stops once the room temperature has reached the set temperature during heating operation.

(◆ ••• Factory setting)

	Setting Description	Function Number	Setting Value
◆	Super low	43	00
	Follow the setting on the remote controller (corresponding to ventilation)		01

1-8. Room Temperature Control Switching

This setting is used to set the room temperature control method when the wired remote controller is selected by the Indoor Room Temperature Sensor Switching Function.

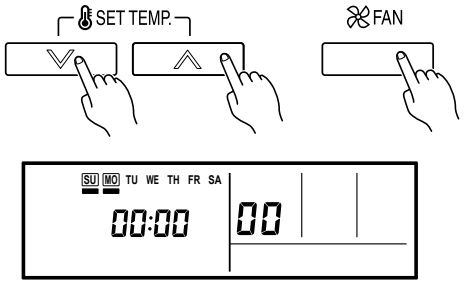
(◆ ••• Factory setting)

	Setting Description	Function Number	Setting Value
◆	Control by the sensors of both the indoor unit and the wired remote controller.	48	00
	Control only by the sensor of the wired remote controller		01

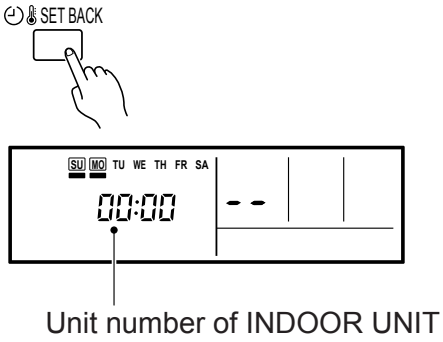
3-1-3 Procedures to change the Function Setting

- This procedure changes the function settings used to control the indoor unit according to the installation conditions.
  Incorrect settings can cause the indoor unit to malfunction.
  This procedure should be performed by authorized installation or service personnel only.
- Perform the "FUNCTION SETTING" according to the installation conditions using the remote controller.

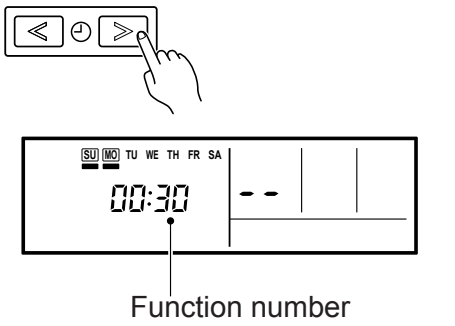
(1) Press the set temperature buttons (∨) (∧) and fan control button simultaneously for more than 5 seconds to enter the function setting mode.



(2) Press the SET BACK button to select the indoor unit number.

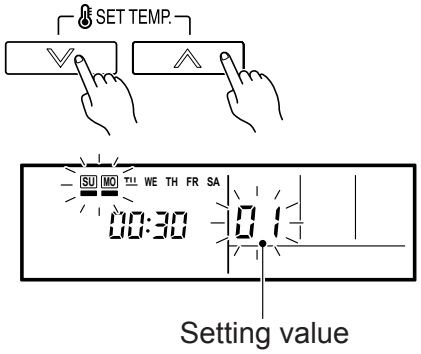


(3) Press the set time buttons to select the function number.



(4) Press set temperature buttons (∨) (∧) to select the setting value.
The display flashes as shown to the right during setting value selection.

(5) Press the SET button to confirm the setting.
Press the SET button for a few seconds until the setting value stops flashing.
If the setting value display changes or if "- -" is displayed when the flashing stops, the setting value has not been set correctly.
(An invalid setting value may have been selected for the indoor unit.)



(6) Repeat steps 2 to 5 to perform additional settings.
Press the set temperature buttons (∨) (∧) and fan control button simultaneously again for more than 5 secondsto cancel the function setting mode.
In addition, the function setting mode will be automatically canceled after 1 minute if no operation is performed.

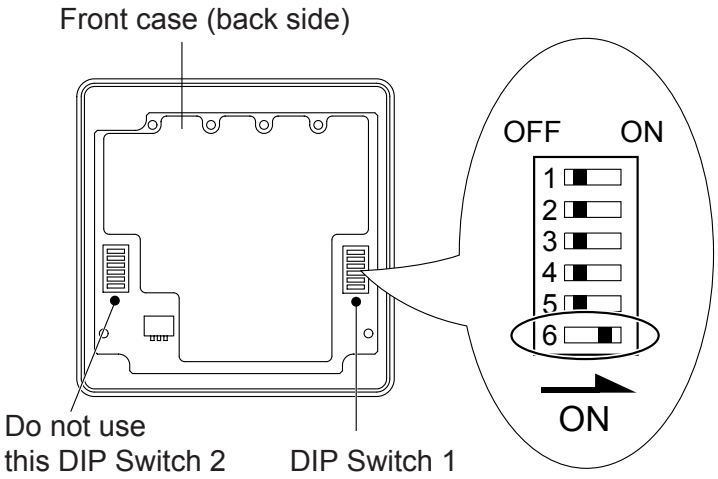
(7) After completing the FUNCTION SETTING, be sure to turn off the power and turn it on again.

3-1-4 WIRED REMOTE CONTROLLER

Wired remote controller		
DIP SW	1	Can be used. (Do not change.)
	2	Dual remote controller setting
	3	Filter reset operation and filter display (Duct model is nonfunctional.)
	4	Can be used. (Do not change.)
	5	Can be used. (Do not change.)
	6	Memory backup setting

■ SWITCH POSITION

● Wired remote controller



■ DIP SWITCH SETTING

1. SW setting

1-1 Dual remote controller setting

Set the remote controller DIP switch 1 No.2 according to the following table.

(◆ ▪ ▪ ▪Factory setting)

	Number of remote controller	Master unit	Slave unit
		DIP-SW 1 No.2	DIP-SW 1 No.2
◆	1 (Normal)	OFF	—
	2 (Dual)	OFF	ON

1-2 Memory backup setting

Set to ON to use batteries for the memory backup.if batteries are not used, all of the settings stored in memory will be deleted if there is a power failure.

※ This function is wired remotecontroll only.

(◆ ▪ ▪ ▪Factory setting)

	DIP-SW No.6	Memory backup
◆	OFF	Invalidity
	ON	Validity

3-2. THERMISTOR RESISTANCE VALUES

3-2-1 Indoor unit

Room temperature thermistor		
Tempe˚C	Resistance(KΩ)	Voltage(V)
-10.0	58.25	1.15
-5.0	44.03	1.39
0.0	33.62	1.66
5.0	25.92	1.94
10.0	20.17	2.22
15.0	15.84	2.50
20.0	12.54	2.77
25.0	10.00	3.03
30.0	8.04	3.27
35.0	6.51	3.48
40.0	5.30	3.68
45.0	4.35	3.85

Indoor heat exchanger thermistor		
Tempe˚C	Resistance(KΩ)	Voltage(V)
-10.0	312.27	0.69
-5.0	233.21	0.88
0.0	176.03	1.10
5.0	134.23	1.36
10.0	103.34	1.63
15.0	80.28	1.92
20.0	62.91	2.21
25.0	49.70	2.51
30.0	39.57	2.79
35.0	31.74	3.06
40.0	25.64	3.30
45.0	20.85	3.53
50.0	17.06	3.73
55.0	14.05	3.90
60.0	11.64	4.05
65.0	9.69	4.19
70.0	8.12	4.30
75.0	6.83	4.40
80.0	5.78	4.48
85.0	4.91	4.55
90.0	4.19	4.61
95.0	3.59	4.66
100.0	3.09	4.71
105.0	2.67	4.75
110.0	2.32	4.78
115.0	2.02	4.81
120.0	1.76	4.83

3-2-2 Outdoor unit

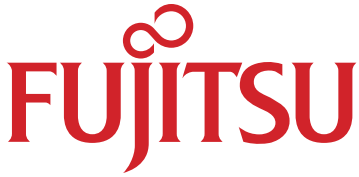
Discharge thermistor		
Tempe˚C	Resistance(KΩ)	Voltage(V)
-30.0	1013.11	0.06
-25.0	729.09	0.09
-20.0	531.56	0.12
-15.0	392.31	0.16
-10.0	292.91	0.21
-5.0	221.09	0.28
0.0	168.60	0.36
5.0	129.84	0.46
10.0	100.91	0.57
15.0	79.12	0.71
20.0	62.55	0.86
25.0	49.84	1.03
30.0	40.01	1.23
35.0	32.35	1.43
40.0	26.34	1.65
45.0	21.58	1.88
50.0	17.79	2.11
55.0	14.75	2.34
60.0	12.30	2.57
65.0	10.32	2.79
70.0	8.69	3.00
75.0	7.36	3.19
80.0	6.27	3.37
85.0	5.36	3.54
90.0	4.60	3.69
95.0	3.96	3.83
100.0	3.43	3.96
105.0	2.98	4.07
110.0	2.60	4.17
115.0	2.27	4.26
120.0	2.00	4.33

Compressor temperature thermistor		
Tempe˚C	Resistance(KΩ)	Voltage(V)
-30.0	1013.11	0.06
-25.0	729.09	0.09
-20.0	531.56	0.12
-15.0	392.31	0.16
-10.0	292.91	0.21
-5.0	221.09	0.28
0.0	168.60	0.36
5.0	129.84	0.46
10.0	100.91	0.57
15.0	79.12	0.71
20.0	62.55	0.86
25.0	49.84	1.03
30.0	40.01	1.23
35.0	32.35	1.43
40.0	26.34	1.65
45.0	21.58	1.88
50.0	17.79	2.11
55.0	14.75	2.34
60.0	12.30	2.57
65.0	10.32	2.79
70.0	8.69	3.00
75.0	7.36	3.19
80.0	6.27	3.37
85.0	5.36	3.54
90.0	4.60	3.69
95.0	3.96	3.83
100.0	3.43	3.96
105.0	2.98	4.07
110.0	2.60	4.17
115.0	2.27	4.26
120.0	2.00	4.33

Outdoor heat exchanger thermistor		
Tempe℃	Resistance(KΩ)	Voltage(V)
-30.0	95.57	0.24
-25.0	68.89	0.32
-20.0	50.31	0.43
-15.0	37.19	0.57
-10.0	27.81	0.73
-5.0	21.02	0.92
0.0	16.05	1.14
5.0	12.38	1.39
10.0	9.63	1.65
15.0	7.56	1.93
20.0	5.98	2.21
25.0	4.77	2.49
30.0	3.84	2.77
35.0	3.11	3.02
40.0	2.53	3.26
45.0	2.08	3.48
50.0	1.71	3.67
55.0	1.42	3.85
60.0	1.19	4.00
65.0	1.00	4.13
70.0	0.84	4.25
75.0	0.71	4.35
80.0	0.61	4.43

Outdoor Temprature thermistor		
Tempe℃	Resistance(KΩ)	Voltage(V)
-30.0	200.20	0.80
-25.0	144.32	1.05
-20.0	105.38	1.33
-15.0	77.90	1.65
-10.0	58.25	1.98
-5.0	44.03	2.33
0.0	33.62	2.66
5.0	25.92	2.98
10.0	20.17	3.27
15.0	15.84	3.54
20.0	12.54	3.77
25.0	10.00	3.96
30.0	8.04	4.13
35.0	6.51	4.27
40.0	5.30	4.39
45.0	4.35	4.49
50.0	3.59	4.57
55.0	2.98	4.64
60.0	2.49	4.70
65.0	2.09	4.74
70.0	1.76	4.78
75.0	1.49	4.81
80.0	1.27	4.84

Heat sink thermistor		
Tempe℃	Resistance(KΩ)	Voltage(V)
-30.0	94.26	0.08
-25.0	67.95	0.11
-20.0	49.62	0.15
-15.0	36.68	0.20
-10.0	27.42	0.26
-5.0	20.73	0.34
0.0	15.83	0.43
5.0	12.21	0.55
10.0	9.50	0.68
15.0	7.46	0.84
20.0	5.90	1.01
25.0	4.71	1.21
30.0	3.78	1.42
35.0	3.06	1.64
40.0	2.50	1.88
45.0	2.05	2.11
50.0	1.69	2.35
55.0	1.40	2.58
60.0	1.17	2.81
65.0	0.98	3.02
70.0	0.83	3.22
75.0	0.70	3.41
80.0	0.60	3.57
85.0	0.51	3.73
90.0	0.44	3.87



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