SERVICE INSTRUCTIONS

DUCT TYPE ROOM
AIR CONDITIONER

18000 & 24000 BTU/h
36000 & 45000 BTU/h

LIQUID CRYSTAL WIRED
REMOTE CONTROLLER TYPE

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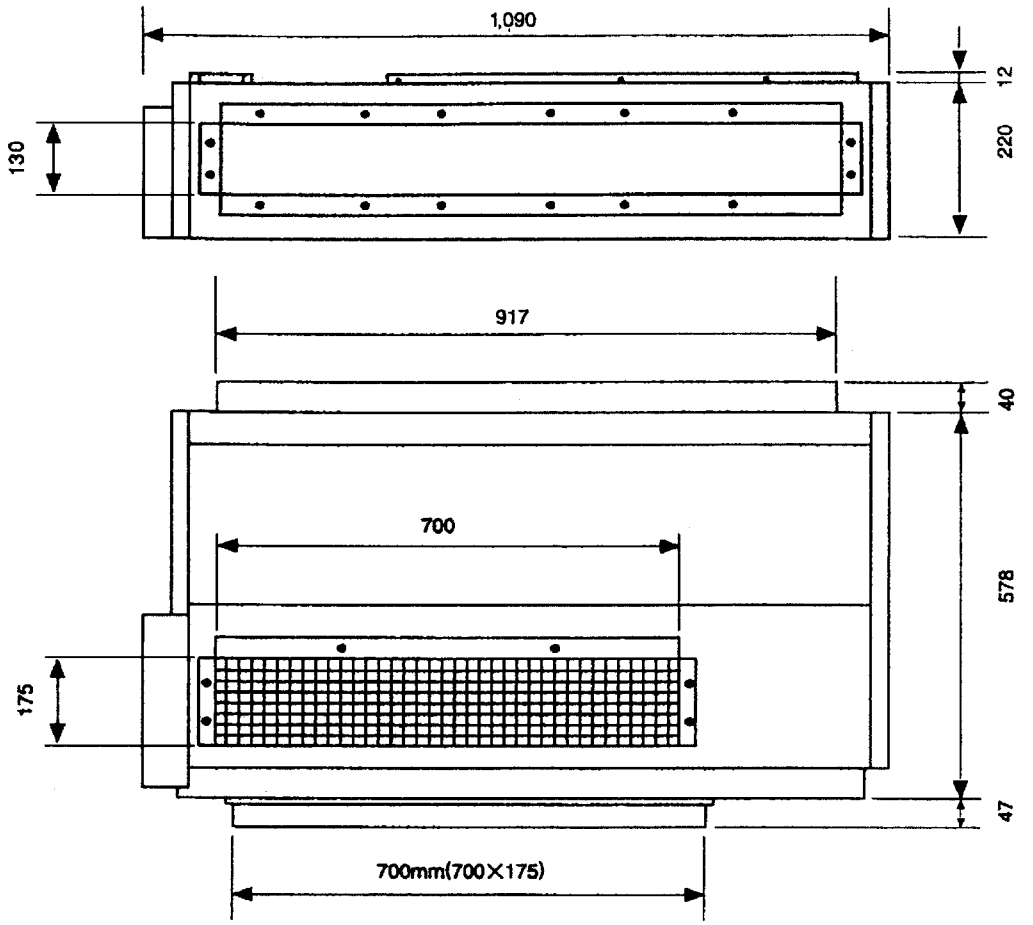
No. SI-23AR-2

DIMENSIONS

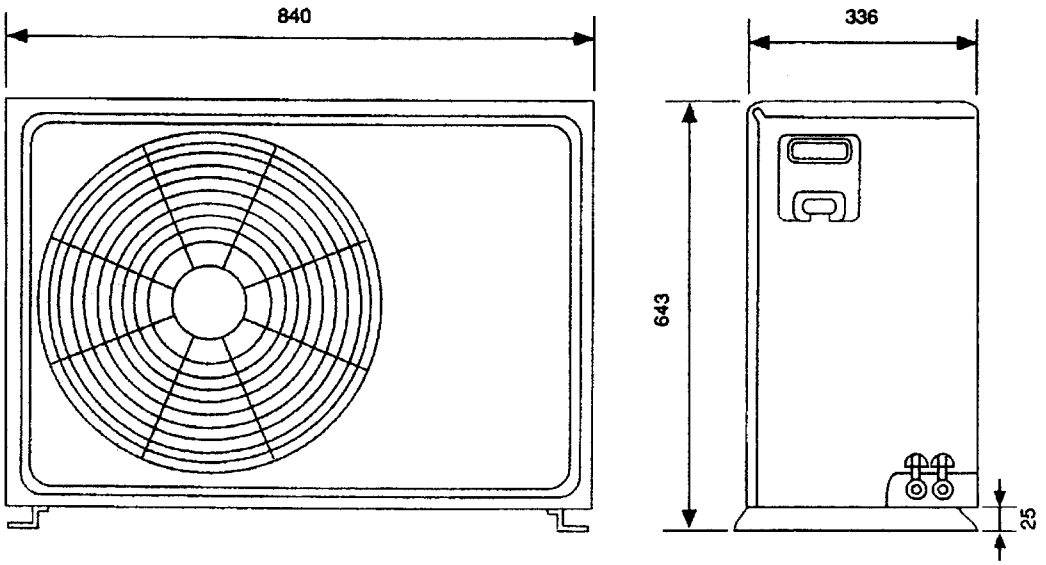
1) 18000 & 24000 BTU/h

Unit : (mm)

INDOOR UNIT



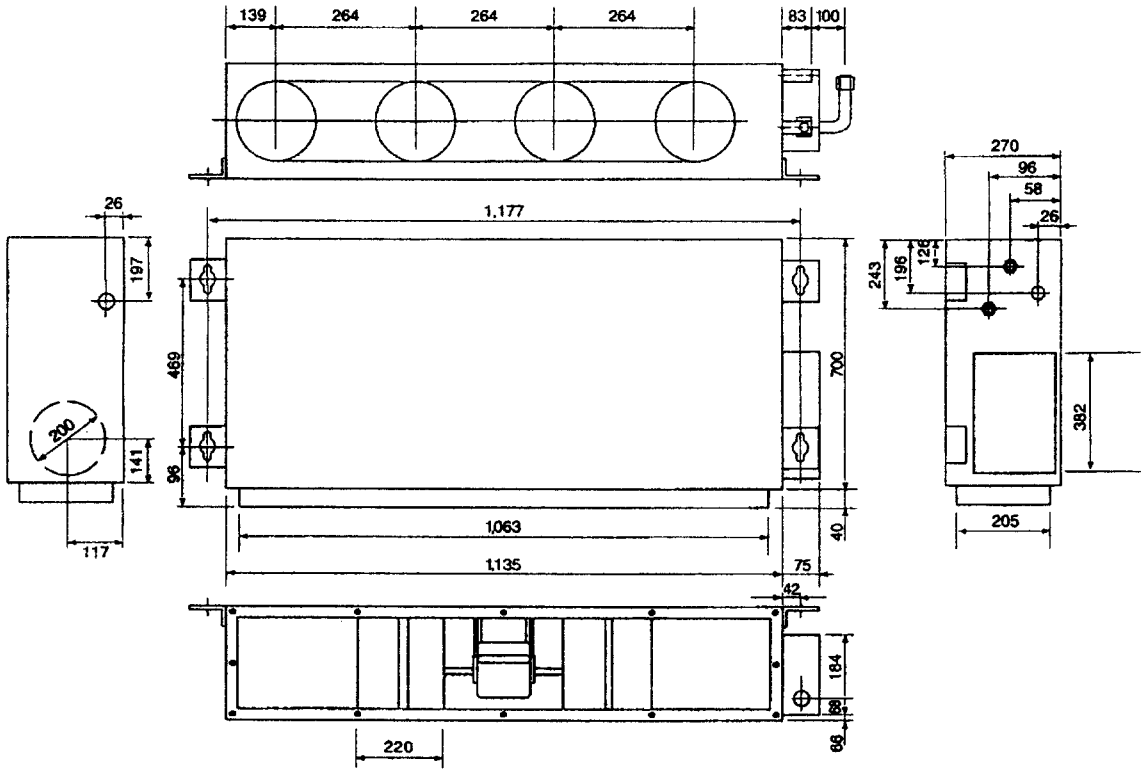
OUTDOOR UNIT



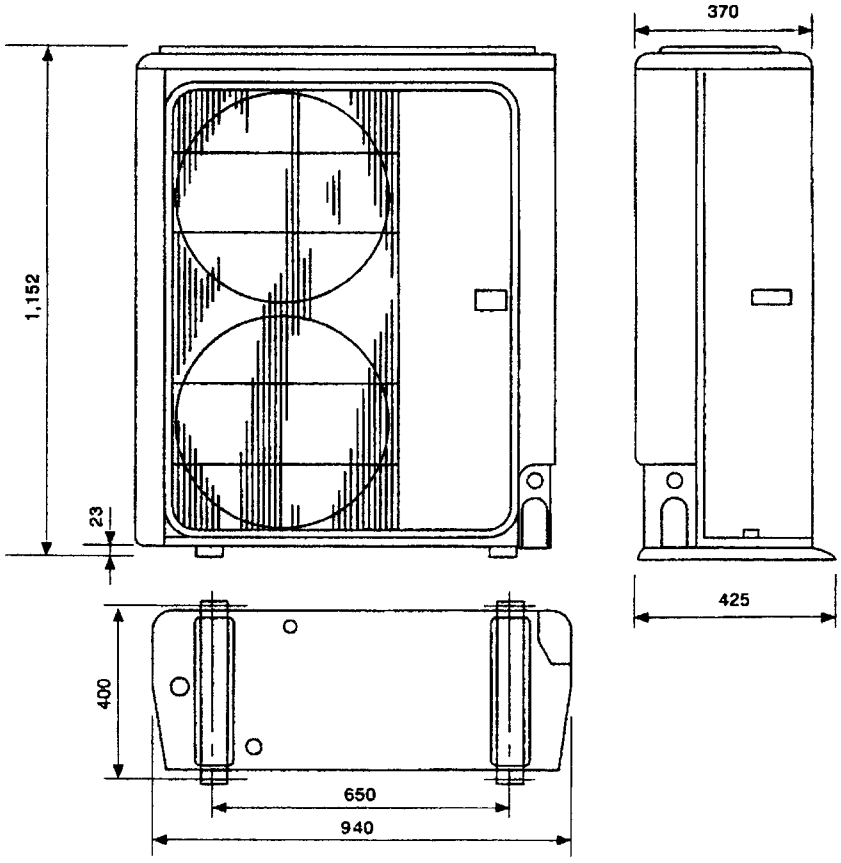
1) 36000 & 45000 BTU/h

Unit : (mm)

INDOOR UNIT



OUTDOOR UNIT



DESCRIPTION OF FUNCTIONS

1. THREE MINUTES DELAY FUNCTION

1) The outdoor unit is not operated for three minutes after the power plug is inserted into the socket. (Compressor protection, breaker off prevention, etc.)

2) When test operation was performed at heating, it takes some time until an air necessary to operate "Three minutes delay" and "Cold air prevention" continuously starts to blow out.

2. TEST RUN

1) Operates continuously without the thermostat operating.

2) If the air conditioner is used in the "TEST" state, the compressor, heat exchanger, etc. will be damaged because temperature control cannot be performed.

3) If the microcomputer or other electronic circuit is faulty, the air conditioner can not be operated even by the test run.

3. TIMER

1) NON STOP
When "cooling", "heating" and "fan" are performed continuously, set the timer mode to "NON STOP".

2) OFF TIMER
When the timer mode is set to "OFF TIMER", operation automatically stops when the set time has elapsed.

3) ON TIMER
When the timer mode is set to "ON TIMER", operation automatically starts when the set time has elapsed.

4) PROGRAM TIMER

Use for OFF→ON operation etc., to stop the air conditioner when going to bed and adjust the room temperature to the optimum temperature upon arising.

* The program timer allows the OFF timer and ON timer to be used in combination one time (OFF→ON or OFF←ON).

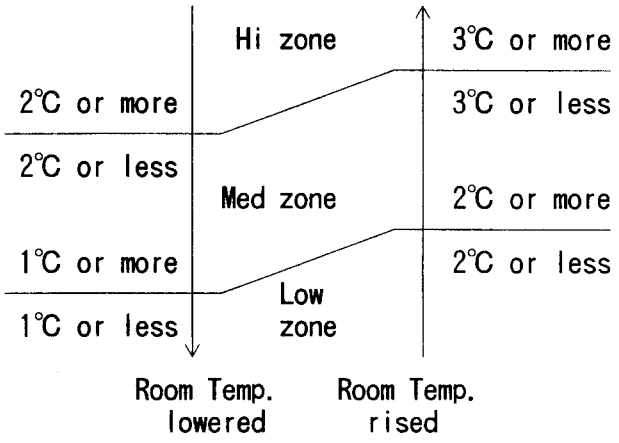
* Operation will start from the timer setting (either OFF timer or ON timer) whichever is closest to the clock's current time setting.

5) REPEAT TIMER
Repeat timer allows operation of OFF timer and ON timer repeatedly.

4. FAN CONTROL "AUTO" position

With the unit on "COOL" or "HEAT" and the fan control set to "AUTO", a microcomputer judges conditions such as the temperature of the room and variably adjusts the fan level to suit those conditions.

4-A. COOLING OPERATION



Air flow mode is set automatically in accordance with the condition " (Room temp. −Set temp.) " as shown above.

4-B. FAN OPERATION

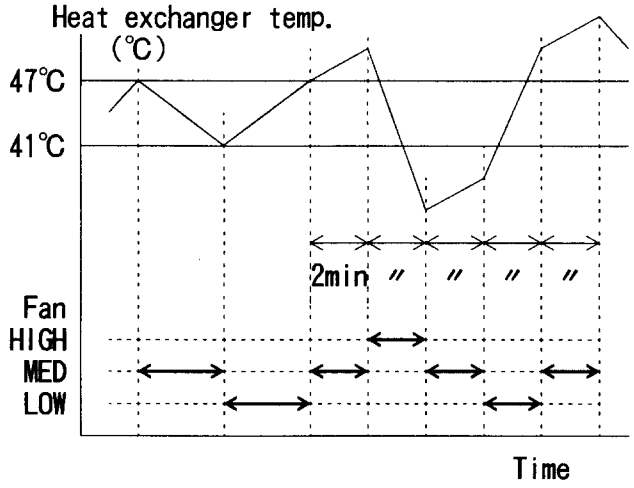
When only the "FAN" mode is being used, setting to "AUTO" is equivalent to set it at "MED".

4-C. HEATING OPERATION

1) When the indoor heat exchanger temperature becomes 47℃ or more, fan mode switches to higher position for one step ("LOW" → "MED", "MED" → "HIGH")

2) When the indoor heat exchanger temperature lowers less than 41℃ while the compressor operates, fan mode switches to lower position for one step.
("HIGH" → "MED", "MED" → "LOW")

3) After switching the fan mode, it does not switch within 2 minutes.



4) When "FAN CONTROL" is switched to "AUTO" while the unit is operated at the "FAN CONTROL" position of "HIGH", "MED" or "LOW", the unit operation is performed in "MED" fan mode.

5. 3-MIN. CONTINUOUS OPERATION TIMER

For 3-min. after the compressor is started, operation continues without halting.

6. COLD AIR DISCHARGE PREVENTION

When heating operation is started, the indoor fan rotates at the lowest speed until the temperature of the indoor heat exchanger rises up to 27℃ (approximately 3 to 10 min.) even if the compressor is turned on.

7. HEATING OVERLOAD PROTECTION

During the heating operation, the compressor is operated, but the outdoor fan may be stopped.

A function which suppresses the absorption of heat and protects the machine by stopping the outdoor fan when the indoor heat exchanger temperature has risen abnormally when the outdoor temperature is high, is provided.

1) When the indoor heat exchanger temperature reaches 56℃, the "outdoor fan motor" stops. When the heat exchanger temperature has recovered to 48℃, the outdoor fan motor re-starts.

2) When the indoor heat exchanger temperature rises to 60℃ even when the outdoor fan motor stops, the compressor stops.
(This function has a priority to the function of 3-MIN. CONTINUOUS OPERATION TIMER)

8. DEFROSTING OPERATION

(See operation flow chart on page 6)

1) The defrosting operation is performed when frost is produced on the outdoor heat exchanger and also may occur when it is not warm indoors.

2) The defrosting operation time differs from ambient conditions (temperature, humidity, etc., about 4 to 15 minutes).

3) During the defrosting operation, the indoor fan is operated at the lowest speed, the outdoor fan is stopped and the defrost indication on the remote controller is appeared.

4) "Bushhhh", "goh, goh, goh", and other sounds will be heard during the defrosting operation. These sounds are normal.

(Four-way valve switching sound, refrigerant sound)

9. 4-WAY VALVE DELAY SWITCHING FUNCTION

When heat operation is stopped, 4-way valve stops 3 minutes later.

10. AUTO RESTART

When the air conditioner power supply is temporarily turned off by a power failure, etc., it restarts automatically after the power recovers.

11. INDOOR HEAT EXCHANGER DE-ICING FUNCTION

1) When the temperature of the heat exchanger at the indoor side becomes less than 2℃ during cooling operation, FAN CONTROL is switched to HIGH flow automatically.

2) After that, when the temperature of the indoor heat exchanger becomes 6℃ or more, the fan control returns to the air flow specified.

3) When the temperature of the indoor heat exchanger is kept less than 2℃ for 3 minutes at HIGH flow, operation of the compressor stops.

4) The above items 1) and 3) do not operate while 10 minutes after the compressor starts.

12. ABNORMAL OPERATION STOP

When the discharge temperature is over 130℃ abnormal operation stop device activates and operation stops.

Thermistor for discharge pipe temperature
OFF : 130℃ ／ ON : 100℃

* ARS36A (60Hz) MODEL only
When the refrigerant pressure at the high pressure side reaches more than 30Kg/cm²G abnormal operation stop device activates and operation stops.

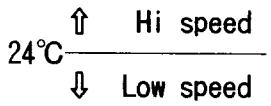
High pressure swith (outdoor unit side)
OFF : 30Kg/cm²G ON : 24Kg/cm²G

13. OUTDOOR FAN CONTROL

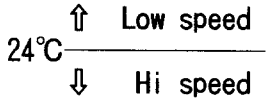
Outdoor fan operation is controlled with an outdoor thermostat.

* 18000BTU & 25000BTU COOLING & REVERSE MODEL

1) Cooling operation : outdoor fan speed

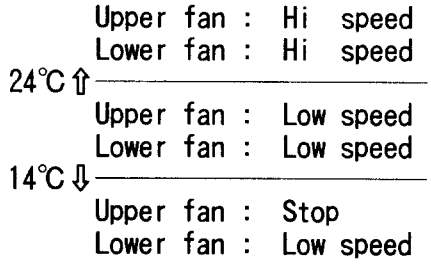


2) Heating operation : outdoor fan speed

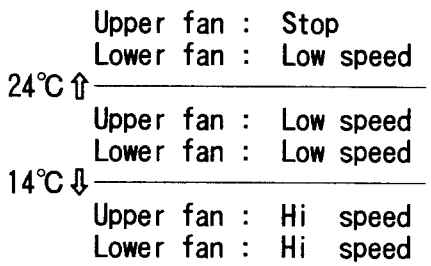


* 36000BTU, 45000BTU COOLING & REVERCE MODEL

1) Cooling operation : outdoor fan speed



2) Heating operation : outdoor fan speed



14. CENTRALIZED CONTROL

1) One remote controller can control up to 16 air conditioners.

2) All the air conditioners can be operated with the same setting.

3) When the plural air conditioners are turned on simultaneously, the compressor for each air conditioner are turned on at a interval of one second in order.

15. ZONE CONTROL

When the ZONE CONTROL button on the remote controller is pressed while multiple air conditioners are being centralized controlled only the present air conditioner stops.

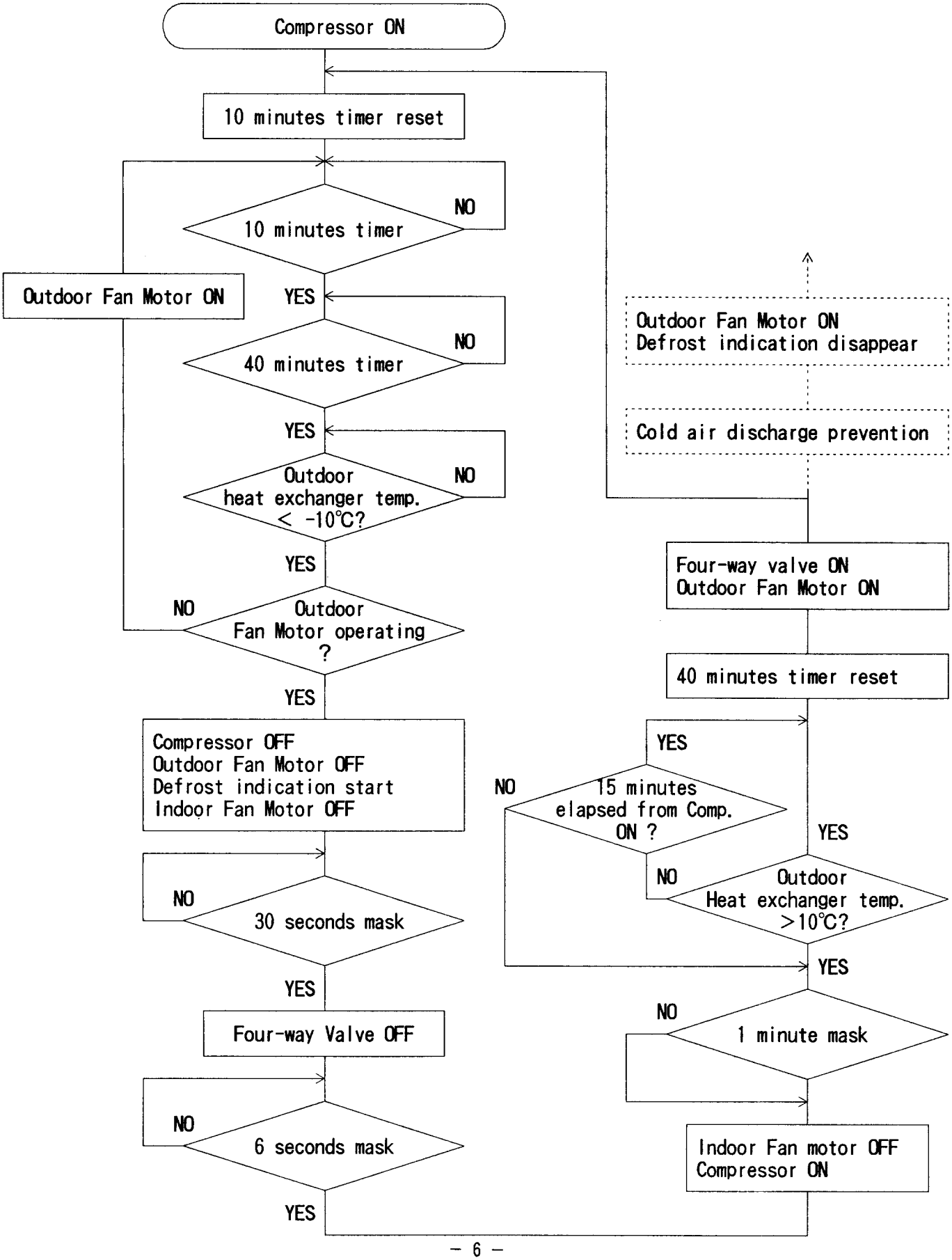
16. SPARE REMOTE CONTROLLER

Two remote controllers can be connected to one air conditioner.

The air conditioner operation contents are the remote controller setting contents set later. (Both remote controllers show the same display.)

DEFROSTING OPERATION FLOW CHART

DEFROSTING (Only at "HEATING" flow chart)



TROUBLESHOOTING

〔 LIQUID CRYSTAL REMOTE CONTROLLER 〕
INDOOR UNIT SIDE

Symptom	Possible causes	Check points
An error message is displayed on the remote controller indicator.	Communication error Thermistor faulty	(1)Self diagnosis check
The system does not work at all.	Power supply circuit failure Reset circuit failure Power interrupt circuit failure Ceramic resonator failure Remote controller input/output circuit failure	(2)Primary circuit of the power supply (3)Secondary circuit of the power supply (4)Reset circuit (5)Power interrupt circuit (6)Ceramic resonator (7)Remote controller input/output circuit
The indoor fan motor does not work.	Fan motor capacitor failure Output circuit for fan motor faulty	(8)Fan motor capacitor and harness
The air flow of the indoor fan motor does not vary.		(9)Output circuit for the indoor fan motor

OUTDOOR UNIT SIDE

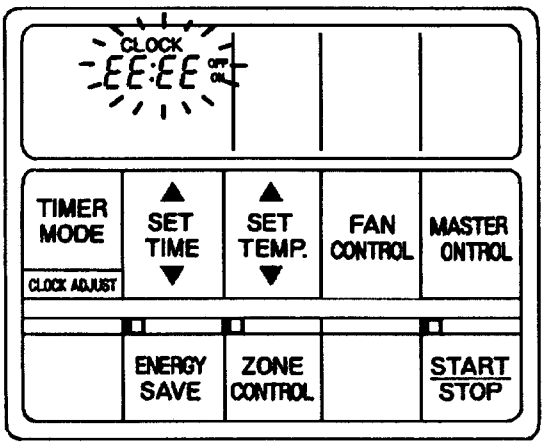
Symptom	Possible causes	Check points
An error message is displayed on the remote controller indicator.	Communication error Thermistor faulty	(10)Self diagnosis check
The system does not work at all.	Power supply circuit failure Reset circuit failure Power interrupt circuit failure Ceramic resonator failure	(11)Primary circuit of the power supply (12)Secondary circuit of the power supply (13)Reset circuit (14)Power interrupt circuit (15)Ceramic resonator
The compressor does not work.	Power relay output circuit failure	(16)Power relay output circuit
The outdoor fan motor does not work.	Fan motor output circuit failure	(17)Fan motor output circuit
The heating does not work.	Four-way valve circuit failure	(18)Four-way valve circuit
The defrost does not work.	Outdoor unit heat exchanger thermistor circuit failure	(19)Outdoor unit heat exchanger thermistor circuit
An error message is displayed on the outside PCB.	Communication error Thermistor faulty	(20)Self diagnosis check

(1) Remote control self diagnosis

If E E : E E blinks on the time indicating LED of the remote controller, perform the self diagnosis. The LED indicates which air conditioner is faulty.

If the operation indication lamp is lit, first press the START/STOP button to turn it to OFF. Then, excute the following procedure to display the error description.

Self diagnosis starts when the ZONE CONTROL and ENERGY SAVE switches are pressed at the same time for three seconds or more while EE:EE is blinking on the remote controller. Then, a description of the error is displayed.



Example : E 2 : 0 3

Faulty unit number
Error code

The room temperature sensor of Unit 3 is faulty (in a situation where 2 to 16 units are under simultaneous control).
("E2:00" is displayed in a 1-to-1 situation.)

For details about errors, see below table.

① E0:XX	Transmission and reception errors (indoor unit ⇔ remote controller)
② E1:XX	Transmission and reception errors (indoor unit ⇔ outdoor unit)
③ E2:XX	Room temperature sensor opened or disconnected
④ E3:XX	Room temperature sensor short-circuit
⑤ E4:XX	Disconnection of the indoor heat exchanger temperature sensor
⑥ E5:XX	Short-circuit of the indoor heat exchanger temperature sensor
⑦ E6:XX	Disconnection of the outdoor heat exchanger temperature sensor
⑧ E7:XX	Short-circuit of the outdoor heat exchanger temperature sensor
⑨ EA:XX	Disconnection of the outdoor temperature sensor (open mode)
⑩ EB:XX	Short-circuit of the outdoor temperature sensor
⑪ EC:XX	Disconnection of the outdoor discharge pipe temperature sensor
⑫ ED:XX	Short-circuit of the outdoor discharge pipe temperature sensor
⑬ EE:XX	* ARS30A (60Hz) MODEL only High pressure abnormal of the outdoor
⑭ EF:XX	Discharge pipe temperature abnormal of the outdoor

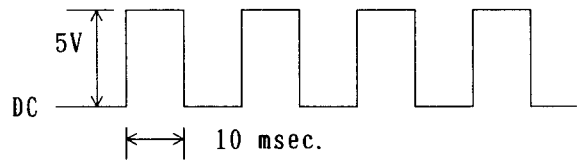
XX : Faulty unit number

(INDOOR UNIT SIDE)

① Error code E0

Transmission and reception errors between the indoor unit and remote controller
Use the oscilloscope to check the output waveform of pin 44 of the microcomputer.

If the waveform does not match that shown in the following figure, it may be due to failure of the following parts :
R7, R8, R9, R10, R11, R12, Q4, Q5, IC7, D6, D7 or L4.



Use the oscilloscope to check the output waveform of pin 20 of the CN8.

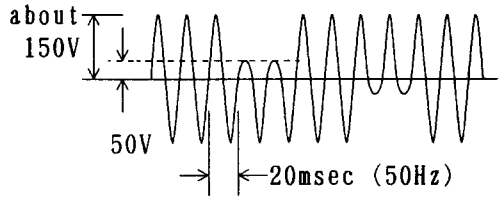
If the waveform does not match that shown in the above figure, it may be due to failure of the following parts :
IC6, R12, R13, D6, D7 or L4.

② Error code E1
Transmission and receiving errors between indoor unit and outdoor unit

* Forward transmission error

Use the oscilloscope to check the output waveform between terminals 1 and 3 of the terminal board.

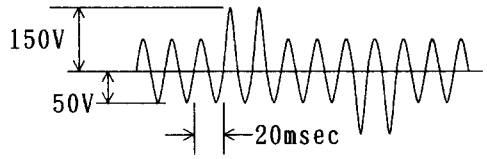
If a serial signal is not output as shown in the following figure, IC4, Q2 or the indoor unit microcomputer may be faulty.



* Reverse transmission error

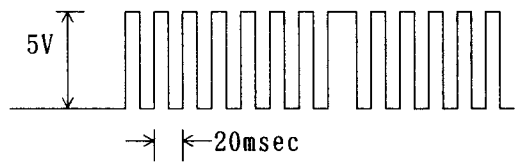
Use the oscilloscope to check the output waveform between terminals 1 and 3 of the terminal board.

If a serial signal is not output as shown in the following figure, the outdoor unit may be faulty.



Use the oscilloscope to check the output waveform of pin 47 of IC4.

If the waveform matches as shown in the following figure, IC4, Q3 is faulty or C15 may be short-circuited.



③ Error code E2
Room temperature sensor disconnection

(a) Check whether the room temperature sensor is disconnected.
→ Attach the connector CN9 securely.
(b) Check whether the room temperature sensor lead wire is disconnected.
→ Replace the room temp. thermistor.
(c) Check whether there is 5V between pin 1 of CN9 and ground.
→ Check the power supply circuit.
(d) Check whether R15 is disconnected or the microcomputer is faulty.

④ Error code E3
Room temperature sensor short-circuit

(a) Check whether the room temperature sensor is short-circuited by measuring the resistance value.
→ Replace the room temp. thermistor.

⑤ Error code E4
Disconnection of the indoor heat exchanger temperature sensor

(a) Check whether the indoor heat exchanger temperature sensor is removed.
→ Attach the connector CN10 securely.
(b) Check whether the indoor heat exchanger temperature sensor is disconnected.
→ Replace the indoor pipe temp. thermistor, if necessary.
(c) Check whether there is 5V between pin 1 of CN10 and ground.
→ Check the power supply circuit.
(d) Check whether R17 is disconnected or the microcomputer is faulty.

⑥ Error code E5
Short-circuit of the indoor heat exchanger temperature sensor

(a) Check whether the indoor heat exchanger temperature sensor is short-circuited.
→ Replace the indoor pipe temp. thermistor, if necessary.

(OUTDOOR UNIT SIDE)
⑦ Error code E6
Disconnection of the outdoor heat exchanger temperature sensor

(a) Check the outdoor pipe temp. thermistor.

⑧ Error code E7
Short-circuit of the outdoor heat exchanger temperature sensor

(a) Check the outdoor pipe temp. thermistor.

⑨ Error code EA
Disconnection of the outdoor temperature sensor

(a) Check the outdoor temperature thermistor.

⑩ Error code EB
Short-circuit of the outdoor temperature sensor

(a) Check the outdoor temperature thermistor.

⑪ Error code EC
Disconnection of the outdoor discharge pipe temperature sensor

(a) Check the outdoor discharge pipe temperature thermistor.

⑫ Error code ED
Short-circuit of the outdoor discharge pipe temperature sensor

(a) Check the outdoor discharge pipe temperature thermistor.

⑬ Error code EE * ARS30A (60Hz) MODEL only
High pressure abnormal

(a) Check the high pressure thermostat switch.

⑭ Error code EF
Outdoor discharge pipe temperature abnormal

(a) Check the discharge pipe temperature.

(2) Primary circuit of the power supply

Is there 220/240V between terminals 2 and 3 on the terminal board ?
- No → The power is not supplied to the unit.
- Yes ↓

Is there 220/240V between terminals 2 and 3 of CN1 ?
- Yes ↓
- No → The CN1 harness is faulty.

Is 220/240V applied to both ends of the varistor (VA1) ?
- Yes ↓
- No → The fuse has blown.

*Remove the connector from the power transformer to measure the resistance across the primary side of the transformer.

Is the resistance value infinite(∞) ?
- Yes ↓
- No → The power primary circuit is working normally.

The voltage selector socket has been removed or the thermal fuse has blown.

(3) Secondary circuit of the power supply
(a) Logical power supply circuit

(Relay driver power circuit)

Is there about 20V between terminals 1 and 2 of CN7 ?
- Yes ↓
- No → The power transformer is faulty.

Is there about 20V across C5 ?
- Yes ↓
- No → D1 is faulty or C5 is short-circuited.

Is the output voltage of Q1 13V ?
- Yes ↓
- No → Q1 may be faulty or D7, C6 or C7 may be short-circuited.

Is the output voltage of IC2 (7805) 5V ?
- No ↓
- Yes → The logical power supply circuit is working normally.

Is the input voltage of IC2 (7805) 11V ?
- No ↓
- Yes → IC2 may be faulty or C9 may be short-circuited.

D3 is disconnected.

(b) Remote controller power circuit

Is there about 20V between terminal 3 and 4 of CN7 ?
- Yes ↓
- No → The power transformer is faulty.

Is there about 20V across C10 ?
- Yes ↓
- No → D4 is faulty or C10 is shorted.

Is the output voltage of IC3 12V ?
- Yes ↓
- No → IC3 may be faulty or D5, C11 may be shorted.

The logical power supply circuit is working normally.

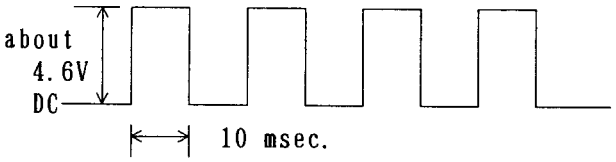
(4) Reset circuit

Check the output voltage of pin 43 ($\overline{\text{Reset}}$) of the microcomputer. If it is 5V, the reset circuit is working normally. If it is not 5V, it may be due to one of the following failures :

C18 or C17 short-circuit, R14 disconnected, IC8 failure, or Microcomputer faulty.

(5) Power interrupt circuit

Use an oscilloscope to check the output waveform of pin 45 (INT1) of the microcomputer.
If the waveform has the shape shown in the following figure, the power interrupt circuit is working normally.

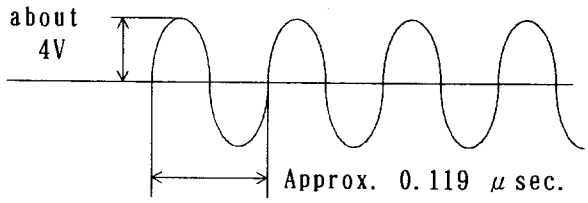


If not, check the output waveform of pin 4 of IC4. If the waveform does not match that shown in the above figure, IC4 is faulty.
If the waveform matches the above figure, the power interrupt circuit problem is due to one of the following :

C14 or C15 short-circuit,
R4, R5 disconnection, or Q3 failure.

(6) Ceramic resonator

Use an oscilloscope to check the output waveform between pins 49 and 50 of the microcomputer.
If the waveform matches that shown in the following figure, the ceramic resonator (X2) is working normally.



(7) Remote controller input-output circuit

The remote controller signal circuit is working normally if there is about 12V between pins 1 and 3 of CN8 and about 11V between pins 2 and 3 of CN8.

(8) Fan motor capacitor and harness

(a) Fan motor capacitor
Check whether CN4 is disconnected.
Check whether the fan motor capacitor lead wire is disconnected.

(b) Fan output circuit

Is the output voltage of pin 31 of the microcomputer 5V when the fan output is ON ?
Yes → ↓
No → Microcomputer failure

Is there about 14V between pins 10 and 8 of the IC5 ?
Yes → ↓
No → IC5 failure

Is SSR1 alternating current ON ?
Yes → ↓
No → SSR1 failure

K1, K2 failure, or fan motor failure

(9) Output circuit for indoor fan motor

The failure may be due to one of the following : K1, K2 or IC9, microcomputer faulty

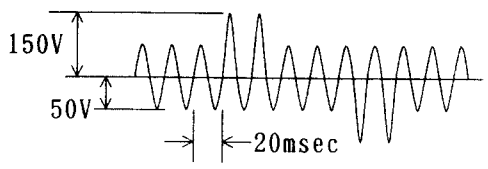
OUTDOOR UNIT SIDE

(10) An error message is displayed on the remote controller indicator. (Self diagnosis)

There are three error codes about the outdoor unit to be displayed on the remote controller indicator as follows.

②-1 Error code E1
Transmission and receiving error between indoor unit and outdoor unit

* Reverse transmission error
(a) Use an oscilloscope to check the output waveform between terminals 1 and 3 on the terminal board.
If the waveform matches that shown in the following figure, the system is working normally.



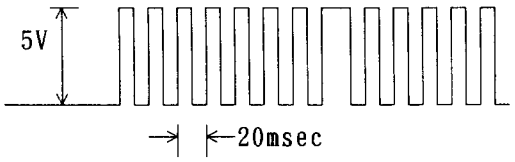
If it does not match, check the waveform as follows.

(b) Use the oscilloscope to check the output waveform between pins 14 and 18 of IC2.

If the waveform does not match that shown in the above figure, IC2 is faulty.

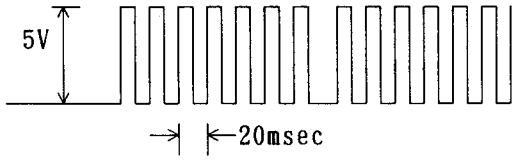
(c) Use an oscilloscope to check the output waveform of pin3 of the microcomputer.

If the waveform does not match that shown in the following figure, the microcomputer may be faulty or Q3 may be faulty.



(d) Use an oscilloscope to check the output waveform of pin 4 of IC2 (HU2001).

If the waveform does not match that shown in the following figure, Q3 is faulty.

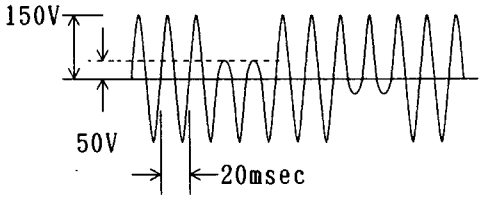


②-2 Error code E1

* Forward transmission error

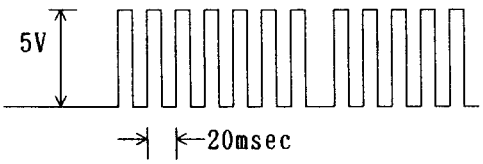
Use an oscilloscope to check the output waveform between pins 2 and 3 of the terminal board.

If the waveform matches that shown in the following figure, the indoor unit is working normally.



Use an oscilloscope to check the output waveform between pins 1 and 3 of the IC2.

If the waveform does not match that shown in the following figure, IC2 is faulty or R5 is disconnected.



If the output waveform of pin 4 of the microcomputer does not match that shown in the above figuire, it may be due to R6 disconnection, C11, C35 short-circuited or micrcomputer failure.

⑦ Error code E6

The outdoor heat exchanger sensor is disconnected.

(a) Check whether the outdoor unit pipe temperature thermistor is removed.
→ Attach the connector CN11 securely.

(b) Check whether the lead wire for the outdoor unit pipe temperature thermistor is disconnected.
→ If it is disconnected, replace the thermistor.

(c) Microcomputer IC1 may be faulty.

⑧ Error code E7

The outdoor heat exchanger sensor is short-circuited.

(a) Check whether the outdoor unit pipe temperature thermistor is short-circuited.
→ Replace the thermistor if necessary.

(b) Microcomputer IC1 may be faulty.

⑨ Error code EA
Disconnection of the outdoor temperature sensor

(a) Check whether the outdoor temperature thermistor is removed.
→ Attach the connector CN12 securely.

(b) Check whether the lead wire for the outdoor temperature thermistor is disconnected.
→ If it is disconnected, replace the thermistor.

(c) Microcomputer IC1 may be faulty.

⑩ Error code EB
Short-circuit of the outdoor temperature sensor

(a) Check whether the outdoor temperature thermistor is short-circuited.
→ Replace the thermistor if necessary.

(b) Microcomputer IC1 may be faulty.

⑪ Error code EC
Disconnection of the outdoor discharge pipe temperature sensor

(a) Check whether the outdoor discharge pipe temperature thermistor is removed.
→ Attach the connector CN13 securely.

(b) Check whether the lead wire for the outdoor discharge pipe temperature thermistor is disconnected.
→ If it is disconnected, replace the thermistor.

⑫ Error code ED
Short-circuit of the outdoor discharge pipe temperature sensor

(a) Check whether the outdoor discharge pipe temperature thermistor is short-circuited.
→ Replace the thermistor if necessary.

(b) Microcomputer IC1 may be faulty.

⑬ Error code EE * ARS30A (60Hz) MODEL only
High pressure abnormal

(a) Check the LED2 lamp operate as follows.
See check points (20).

(4) Error code EF
Outdoor discharge pipe temperature abnormal

(a) Check the LED1 lamp operate as follows.
See check points (20).

⑪ Primary circuit of the power supply

Is there 220/240V between terminals 2 and 3 on the terminal board ?
No → The power is not supplied to the unit or wiring is wrong.
Yes ↓
Is 220/240V applied to both ends of the varistor (VA1) ?
Yes ↓ No → The fuse has blown.
* Remove the connector from the power transformer to measure the resistance across the primary side of the transformer.
↓
Is the resistance value infinite(∞) ?
Yes ↓ No → The power primary circuit is working normally.
↓
The voltage selector socket has been removed or the thermal fuse has blown.

⑫ Secondary circuit of the power supply

Is there about 20V between the pins 1 and 2 of CN3 ?
Yes ↓ No → The power transformer is faulty.
Is there 12 to 14V at the both ends of C5 ?
Yes ↓ No → D1 (D2SB20) faulty.
Is there about 12V at the both ends of C7 ?
Yes ↓ No → D2 is disconnected.
Is the 5V output from IC4 ?
Yes ↓ No → IC4 may be faulty
The voltage at the secondary circuit of the power supply is normal.

⑬ Reset circuit

Measure the output voltage of pin 16 of the microcomputer.

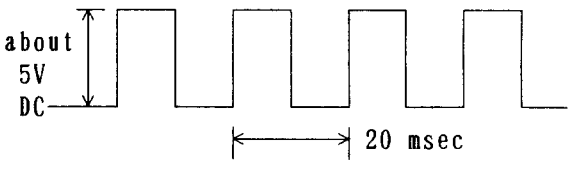
If it is 5V, the reset circuit is working normally.
If it is not 5V, reinsert the power plug to measure the output voltage again.

If the voltmeter does not read 5V, C36 or C19 may be short-circuited, or R13 may be disconnected.

⑭ Power interrupt circuit failure

Use an oscilloscope to check the output waveform of pin 2 of IC2

If the waveform does not match that shown in the following figure, IC2 may be faulty, R26 disconnected, or C9 short-circuited.

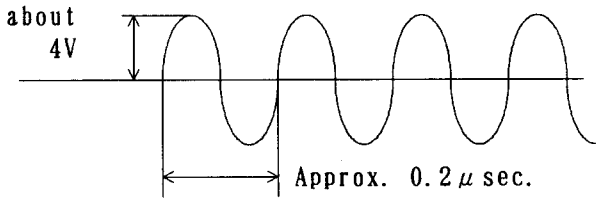


If the output waveform of pin 13 of the microcomputer does not match that shown in the above figure, Q2 may be faulty, R4 may be disconnected, or C10 may be short-circuited.

⑮ Ceramic resonator

Use an oscilloscope to check the output waveform between pins 26 and 27 of the microcomputer.

If the waveform does not match that shown in the following figure, the ceramic resonator (X1) is faulty.



⑯ Power relay output circuit
(The compressor does not operate)

Is 5V output from pin 37 of the microcomputer when the compressor on condition ?
Yes → ↓
No → The microcomputer IC1 is faulty.

Is there about 12V between pin10 and 8 of IC6?
Yes → ↓
No → IC6 is faulty.

Check the power relay, electromagnetic switch and the compressor OCR.

⑰ Fan motor output circuit.
(The outdoor unit fan does not rotate)

Is 5V output from pin 39 of the microcomputer when the fan motor on condition ?
Yes → ↓
No → The microcomputer is faulty.

Is there about 12V between pin12 and 8 of IC6?
Yes → ↓
No → IC6 is faulty.

Check K2, outdoor temperature thermistor, fan motor capacitor, and relay.

⑱ Four-way valve circuit
(The heating does not work)

Is 5V output from pin 38 of the microcomputer when the four-way valve on condition?
Yes → ↓
No → The microcomputer is faulty.

Is there about 12V between pin11 and 8 of IC6?
Yes → ↓
No → IC6 is faulty.

Check K1, and solenoid coil for the four-way valve.

⑲ The defrost does not work

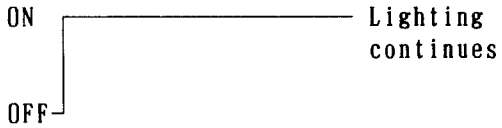
If the outdoor heat exchanger temperature thermistor is working normally, microcomputer may be faulty, or C21 may be short-circuited.

⑳ Outdoor unit self diagnosis

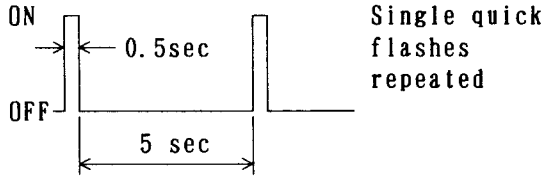
The LED lamps operate as follows according to the error contents.
The LED lamps are on the outdoor unit board.

(a) LED1 lamp error display

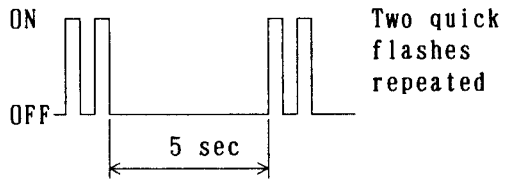
① Discharge pipe temperature abnormal



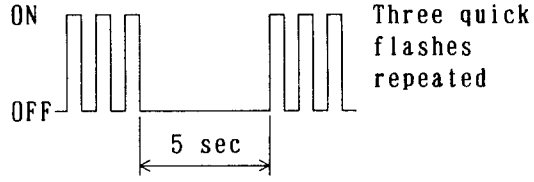
② Outdoor heat exchanger temperature sensor abnormal



③ Outdoor temperature sensor abnormal

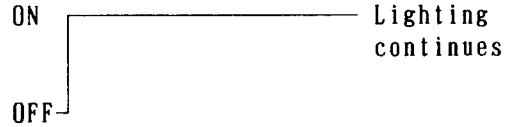


④ Discharge pipe temperature sensor abnormal



(b) LED2 lamp error display

⑤ High pressure abnormal



When the fault is cleared, the LED lamp goes off.
However, for discharge pipe temperature abnormal and high pressure abnormal, the LED lamp lights continuously for 24 hours, as long as the power is not turned off.

Note: Thermistor resistance values

<Indoor unit side>

1) Room temperature thermistor

Room temperature(℃)	3	5	8	10	15	20	25	29	31	33	36	40	44
Resistance value(KΩ)	28.7	25.9	22.3	20,1	15.8	12.5	10.0	8.4	7.7	7.0	6.2	5.3	4.5

2) Pipe temperature thermistor (Indoor unit side)

Pipe temperature(℃)	0	2	6	10	14	18	22	25	30
Resistance value(KΩ)	176.0	157.8	127.3	103.3	84.4	69.3	57.2	50.0	39.6

34	38	44	50	55	60
33.2	27.9	21.7	17.0	14.05	11.6

<Outdoor unit side>

3) Outdoor heat exchanger temperature thermistor

Pipe temperature(℃)	-8	-4	0	5	8	10	15	20	25	29	33	36	40
Resistance value(KΩ)	24.4	19.7	16.0	12.5	10.8	9.8	7.8	6.2	5.0	4.2	3.6	3.2	2.7

4) Discharge pipe temperature thermistor

Pipe temperature(℃)	10	15	20	25	30	35	40	50	60	70	80	90	100
Resistance value(KΩ)	646	503	395	313	250	201	163	109	74.4	52.1	37.2	27.1	20.0

5) Outdoor temperature thermistor

This thermistor is the same as the room temperature thermistor mentioned above.

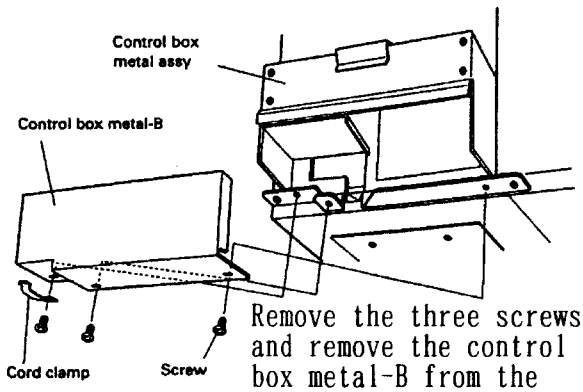
PRECAUTIONS ON INSTALLATION

1. ELECTRICAL WIRING

18,000 & 24,000 BTU/h Models

(1) INDOOR UNIT SIDE

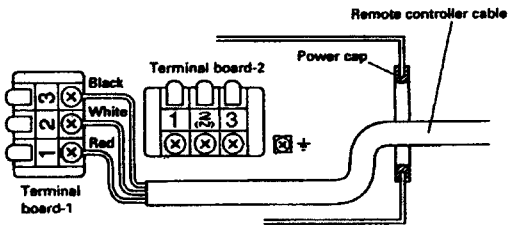
Remove the control box metal-B from the control box metal Assy.



Remove the three screws and remove the control box metal-B from the control box metal assy.

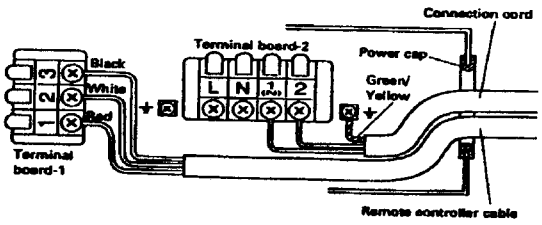
1-1) Remote controller cable installation

【Reverse model】
Pass the remote controller cable through the power cap and connect it to terminal board-1 away from the power cap.



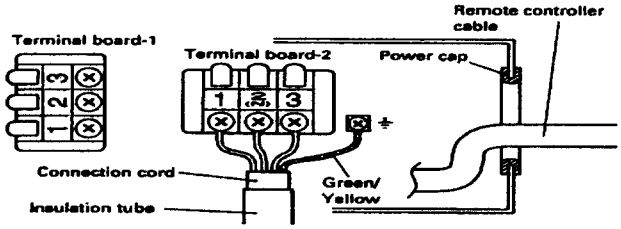
1-2) Remote controller cable and connection cord installation

【Cooling model】
Pass the remote controller cable and connection cord through the power cap. Connect the remote controller cable to terminal board-1 and the connection cord to terminal board-2 and the ground terminal



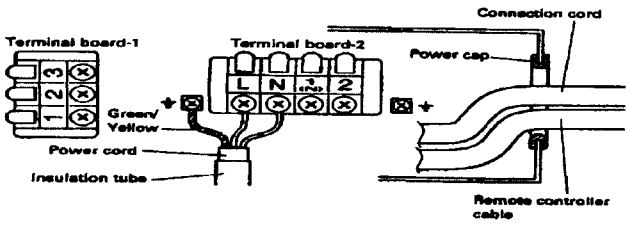
2-1) Connection cord installation

【Reverse model】
Do not pass the connection cord through the power cap. Connect it to terminal board-2 and the ground terminal.
Always install the insulation tube.



2-2) Power cord installation

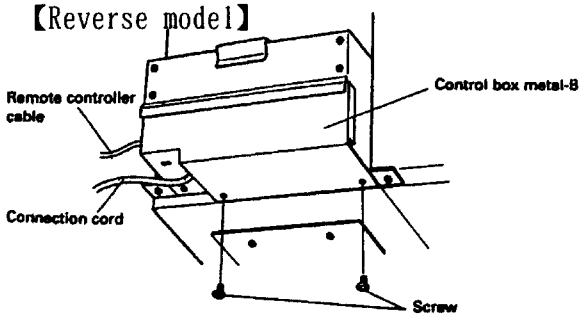
【Cooling model】
Do not pass the power cord through the power cap. Connect it to terminal board-2 and the ground terminal.
Always install the insulation tube.



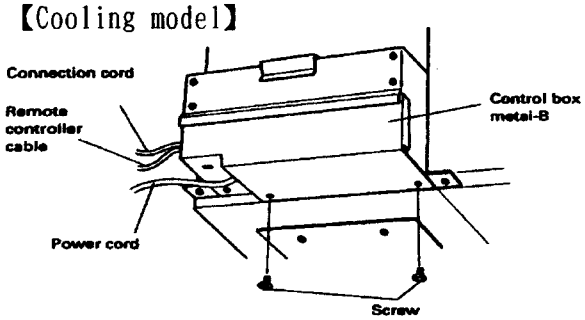
3) Control box metal-B installation

Fasten control box metal-B with the two screws.

【Reverse model】

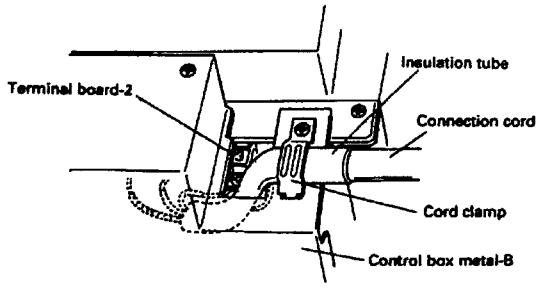


【Cooling model】



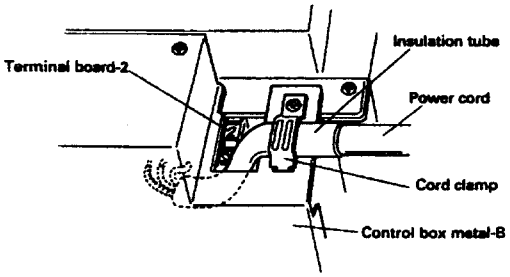
4-1) Connection cord fastening

【Reverse model】
Arrange the connection cord so that unreasonable force is not applied to the terminal board-2 connection section and fasten the cord with the cord clamp.



4-2) Power cord fastening

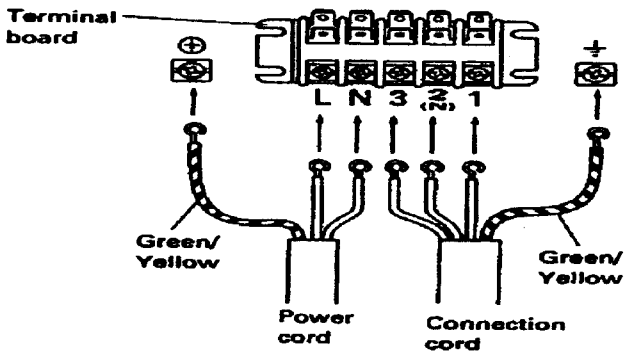
【Cooling model】
Arrange the power cord so that unreasonable force is not applied to the terminal board-2 connection section and fasten the cord with the cord clamp.

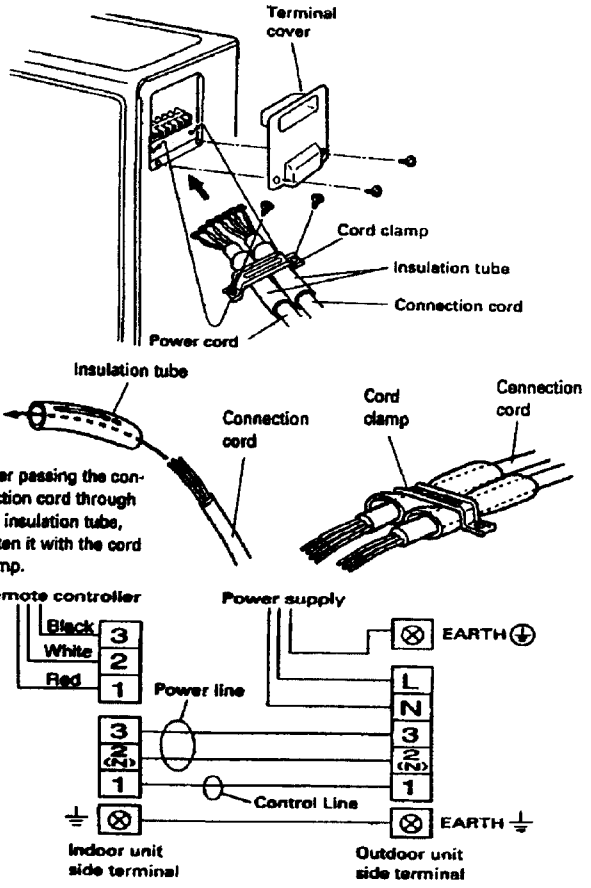


(2) OUTDOOR UNIT SIDE

【Reverse model】
1) Remove the terminal cover of the outdoor unit, and insert the end of the connection cord and the power cord into the terminal board.

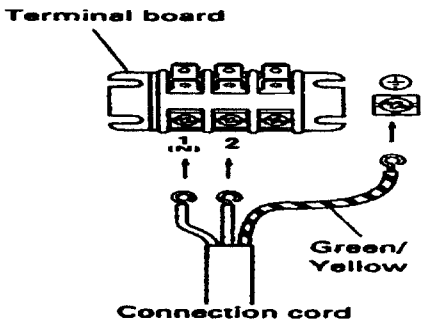
2) Fasten the connection cord and power cord with the cord clamp, and install the terminal cover.

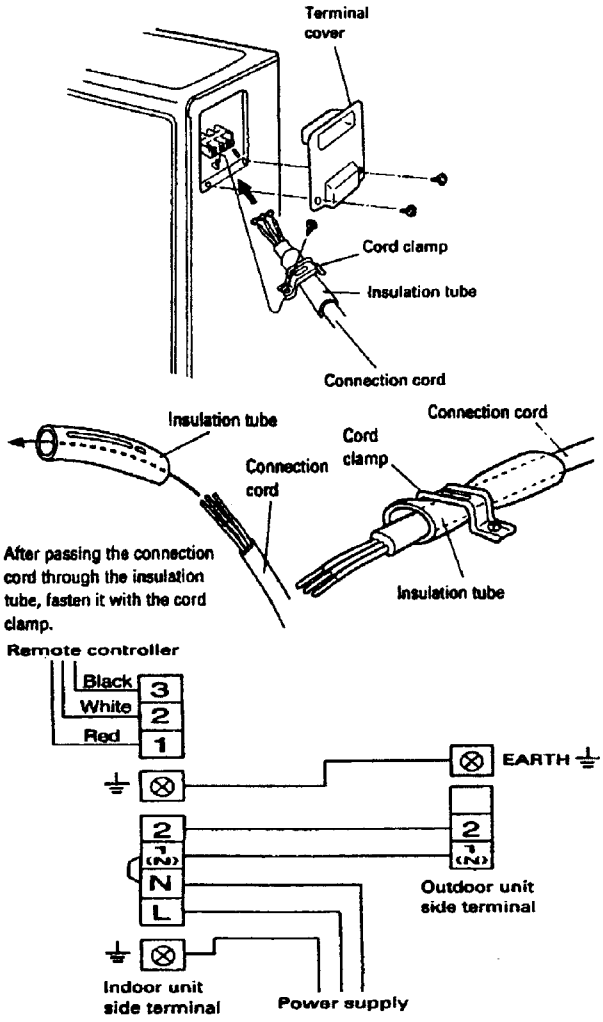




【Cooling model】
1) Remove the terminal cover of the outdoor unit, and insert the end of the connection cord into the terminal board.

2) Fasten the connection cord with the cord clamp, and install the terminal cover.

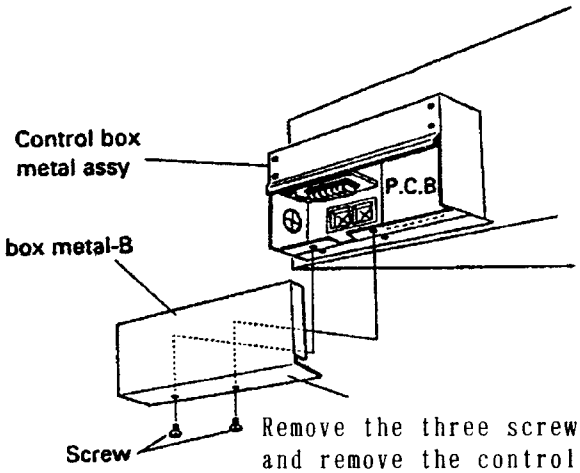




36,000 & 45,000 BTU/h Models

(1) INDOOR UNIT SIDE

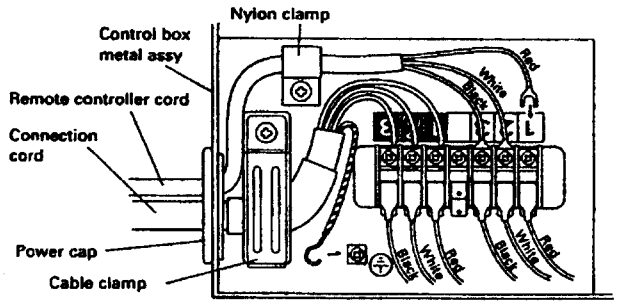
1) Remove the control box metal-B from the control box metal Assy.



Remove the three screws and remove the control box metal-B from the control box metal assy.

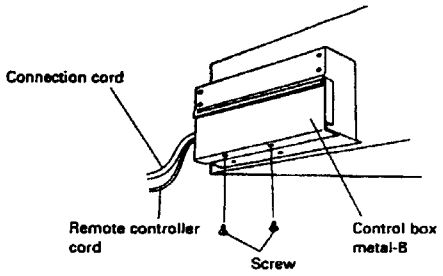
2) Connection cord and remote controller cord connections

- Clamp the connection cord with the cable clamp and the remote controller cord with the nylon clamp.
- Connect the connection cord to the terminals with the white characters on the terminal nameplate.
- Connect the remote controlller cord to the terminals with the black characters on the terminal nameplate.



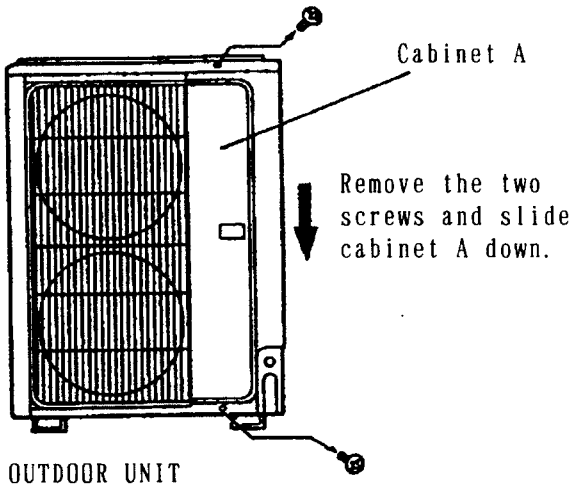
3) Control box metal-B installation

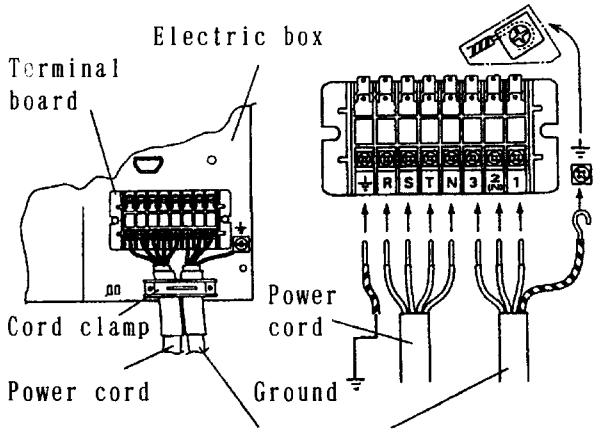
Fasten control box metal-B with the two screws.

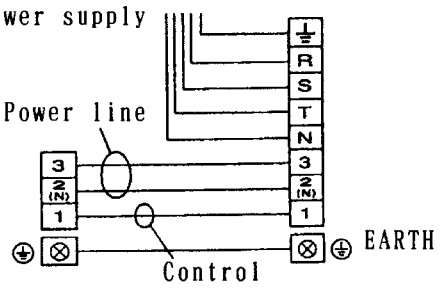


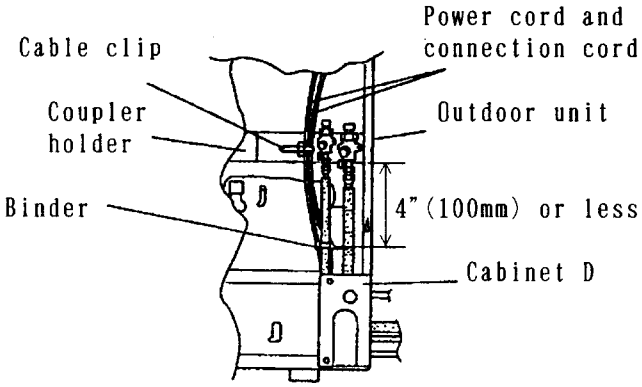
(2) OUTDOOR UNIT SIDE

1) Remove outdoor unit cabinet A and connect the power cable and the outdoor unit connection cord wired at the indoor unit.









【 CAUTION 】

1) Tighten the indoor unit connection cord (to the outdoor unit) and power supply indoor and outdoor unit terminal board connections firmly with the terminal board screws. Faulty connection may cause a fire.

2) If the indoor unit connection cord (to the outdoor unit) and power supply are wired incorrectly, the air conditioner may be damaged.

3) Wire the indoor unit connection cord (to the outdoor unit) by matching the numbers of the outdoor and indoor units terminal board numbers.

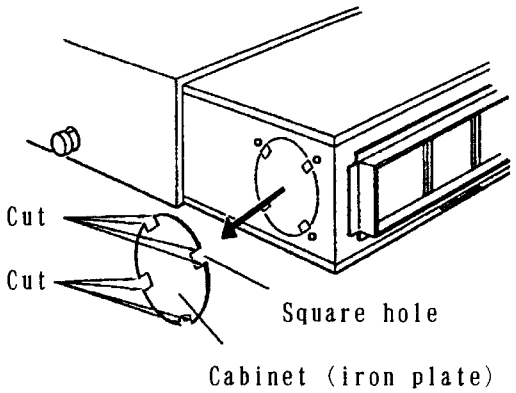
4) Ground both the indoor and outdoor units by attaching a ground wire.

5) Unit shall be grounded in compliance with the applicable and national cordes.

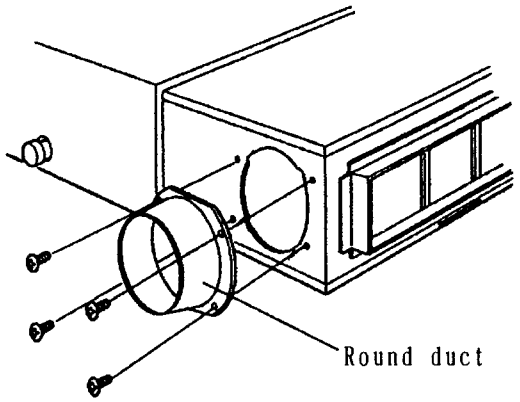
2. Fresh air intake installation

(36,000 & 45,000 BTU/h Models only)

1) When taking in fresh air, cut a slit shaped cabinet in the felt side of the outer case.

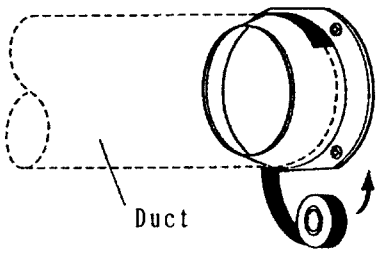


2) Install the round flange (option parts) to the fresh air intake.



3) Connect the duct to the round flange.

4) seal with a band and vinyl tape, etc. so that the air does not leak from the connection.



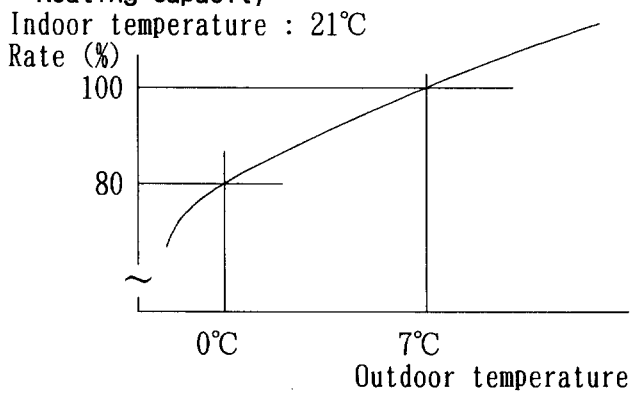
3. AREA LIMIT ON USE BY HEATING OPERATION

These models are not designed for use in the area where the temperature in winter is less than 0℃.

Do not perform "Heating" operation when the outdoor temperature is below 0℃. Otherwise the compressor may be damaged due to the defrosting performance drop.

Heating capacity also lowers extremely when the outdoor temperature is below 0℃. Relation between outdoor temperature and heating capacity is shown below. (Mean value)

Heating Capacity

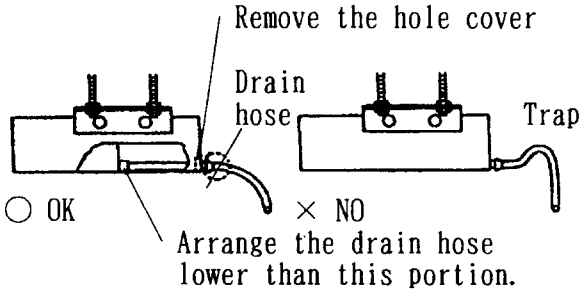


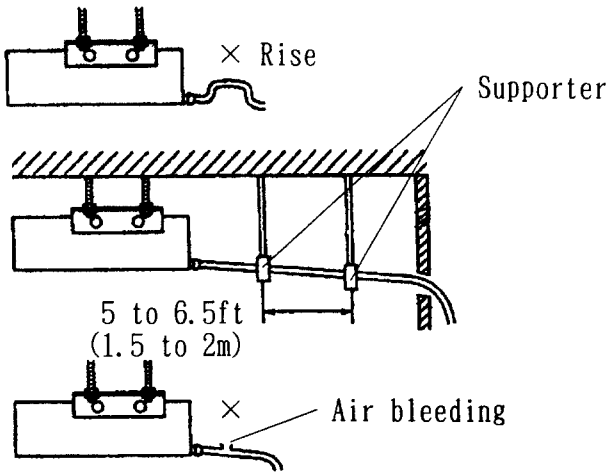
4. DRAIN PIPE INSTALLATION

1) Indoor unit drain processing

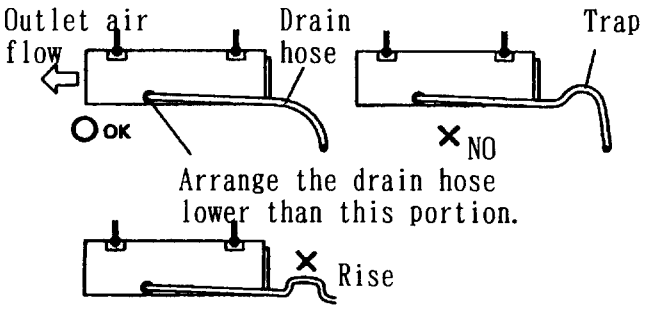
【18000 BTU/h & 24000 BTU/h Models】

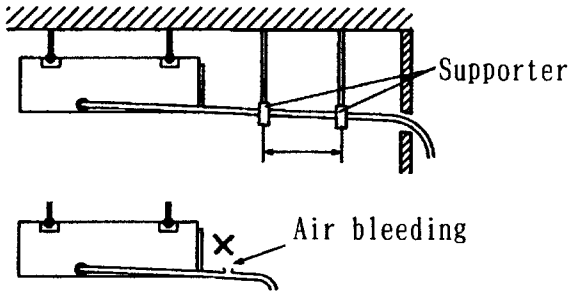
* Install the drain hose with **downward gradient** (1/50~1/100) so that there are no rises or traps in the hose.
* Use general hard polyvinyl chloride pipe (VP25) [outside diameter: **1-1/4"** (29 mm)] and connect it with adhesive (polyvinyl chloride) so that there is no water leakage.
* When the hose is long, install supporters.
* Do not perform air bleeding.
* Always heat insulate the indoor side of the drain hose.



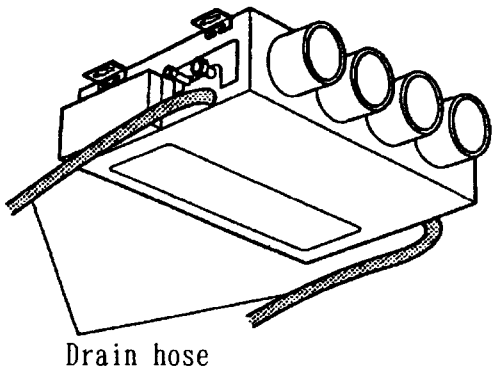


【36000 BTU/h & 45000 BTU/h Models】



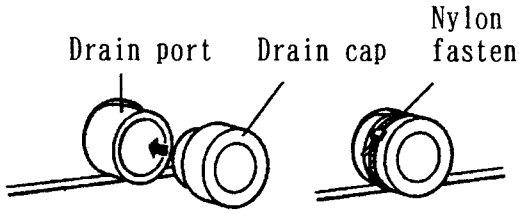


* The outside diameter of the drain port is 36 mm. Use a suitable drain hose.
* There is a drain port on both the left and right sides. Select the drain port to match the local conditions.



* When the unit is shipped from the factory, the drain port is on the left side (control box side).

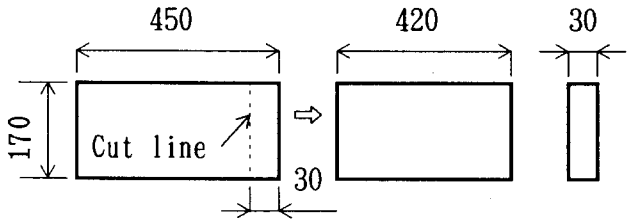
* When using the drain port on the right side of the unit, reinstall the drain cap to the left side drain port.



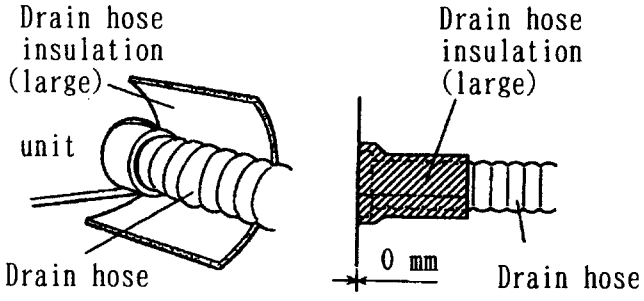
CAUTION :

Always check that the drain cap in installed to the unused drain port and is fastened with the nylon fastener. If the drain cap is not installed, or is not sufficiently fastened by the nylon fastener, water may drip during the cooling operation.

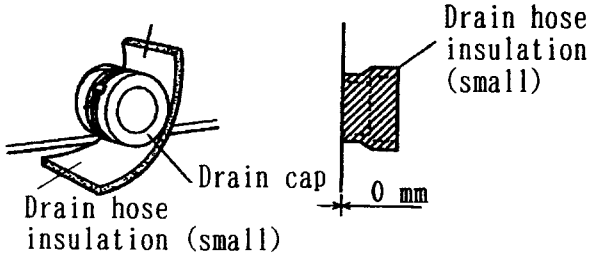
* Cut the drain hose insulation at a position approximately 30 mm from the end with cutters, etc.



* Stick the large drain hose insulation at the drain hose installation side.



* Stick the small drain hose insulation at the drain cap side.

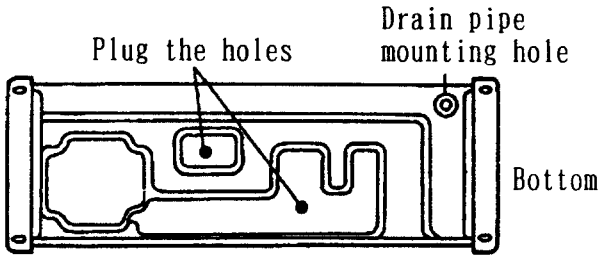


2) Outdoor unit drain processing

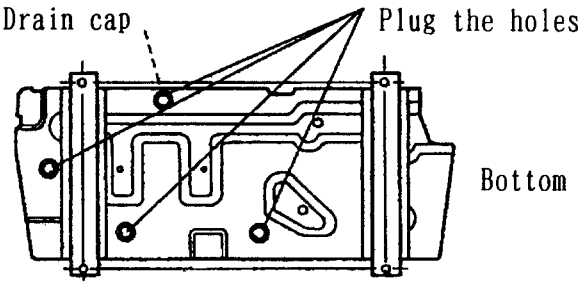
Since the drain water flows out of the outdoor unit during heating operation, when installing at a high place, install the drain pipe sold separately and connect it to an 16mm commercially available hose.

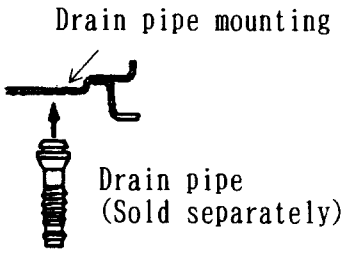
When installing the drain pipe, plug all the holes other than the drain pipe mounting hole in the bottom of the outdoor unit with putty so there is no water leakage.

* 18,000 & 24,000 BTU/h Type



* 36,000 & 45,000 BTU/h Type





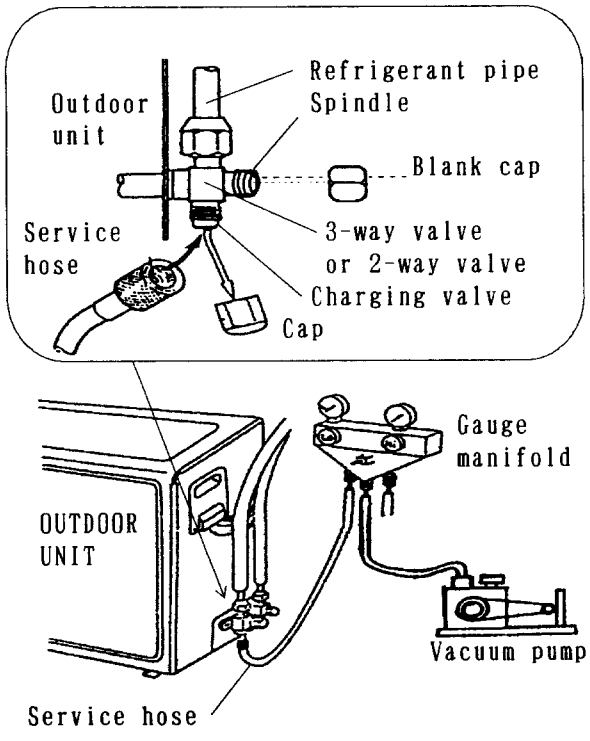
5. LENGTH OF REMOTE CONTROL CABLE

The length of remote control cable is 10 m. Do not extend it, otherwise there is possibility that the electrical noise gets into the cable and malfunction of the unit may be occurred.

6. AIR PURGING

* 18,000 & 24,000 BTU/h Type

1) Connect the indoor unit to the outdoor unit with the connection pipes, and tighten them with a torque wrench to the specified torque (Small pipe : 310 - 350 Kgf-cm, Large pipe : 750 - 800 Kgf-cm).
2) Remove the cap, and connect the gauge manifold and the vacuum pump to the charging valve with the service hoses.
3) Vacuum the indoor unit and the connecting pipes until the pressure in them lowers to below 1.5 mmHg.
4) Disconnect the service hoses and fit the cap to the charging valve (Tightening torque :70 - 90 Kgf-cm).
5) Remove the blank caps, and fully open the spindles of the 2-way and 3-way valves with a hexagon wrench (Torque :2-way valve :70 - 90 Kgf-cm, 3-way valve :100 - 120 Kgf-cm).
6) Tighten the blank caps of the 2-way valve and 3-way valve to the specified torque (2-way valve : 280 - 320 Kgf-cm, 3-way valve : 200 -250 Kgf-cm).



* 36,000 & 45,000 BTU/h Type

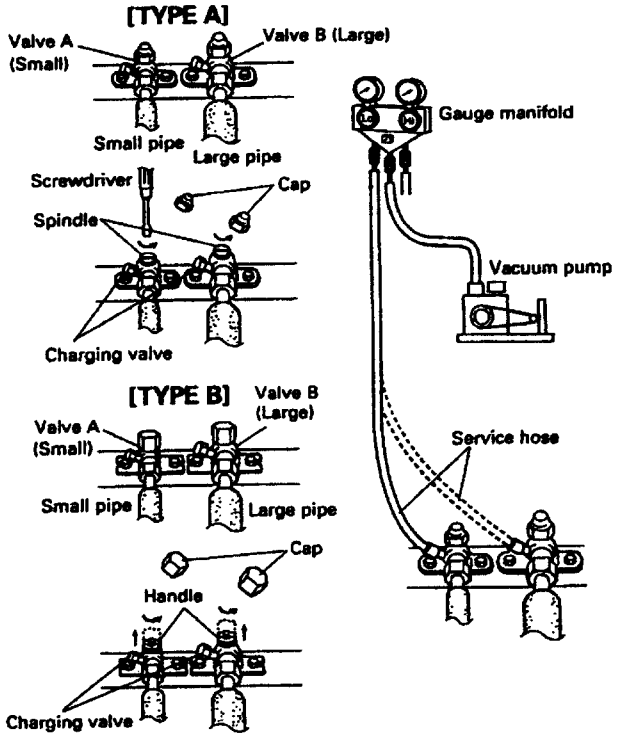
1) Purge the air inside the indoor unit and the piping to a pressure of 1.5 mmHg abs or less from the charging valve with a vacuum pump.
2) After purging the air inside the indoor unit and the piping, remove the cap of the two valves.
3) Open the spindle (handle) of the two valves from the closed state.
4) Tighten the cap of the two valves to the specified torque.

Tightening toque (Large & Small valves)

Spindle (Type A)	25 kgf.cm or less
Handle (Type B)	15 kgf.cm or less
Cap	150 to 200 kgf.cm

Valve	Open valve	Closed valve
TYPE A		
TYPE B		

If the spindle (handle) is not fully open, performance will drop and an abnormal sound will be generated.



7. PUMP DOWN

(Draining outdoor unit refrigerant)

When the connection pipe must be disconnected or the unit is moved to an another place, the refrigerant in the indoor unit and pipes should be drained into the outdoor unit.
This procedure is called "Pump down".

1) Fully close the valve spindle of the two-way valve. (9.53mm dia. connection pipe. Turn clockwise.)

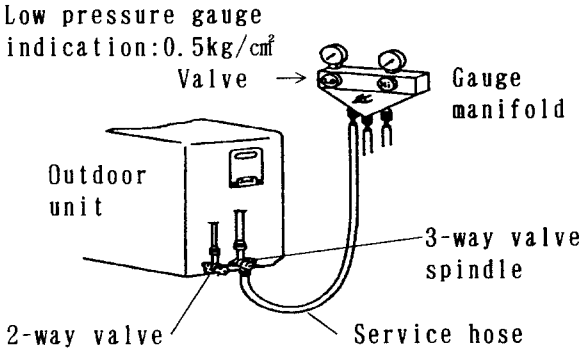
2) Connect the charging valve of the three-way valve to the low pressure gauge manifold with a charge hose.

3) Set the three-way valve to its middle position, slightly open the low pressure valve of the gauge manifold to discharge the air from the charge hose and close the valve.

4) While running the air conditioner, close the three-way valve (turn the valve spindle clockwise) when the low pressure gauge reads 0.5kg/ cm², and stop the air conditioner.

5) After disconnecting the pipes, attach the screw caps and tighten securely the flare nut.

【Connection Example : 18,000 BTU/h Type】



8. COLLECTING AND CHARGING REFRIGERANT

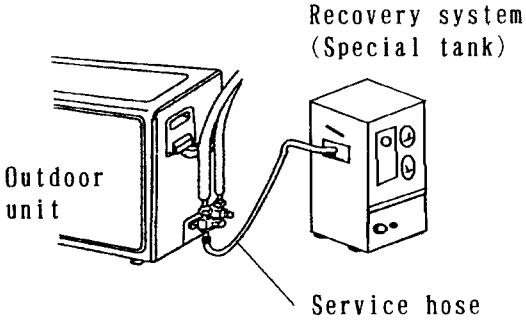
1) Collection
When the pipe must be unbrazed to repair the refrigeration cycle, carefully collect the refrigerant as follows.

Note: Since there is in danger of frostbite if you touch the refrigerant directly, perform this work carefully.

(1) Remove the cap, and connect the refrigerant collecting device to the charging valve.
(2) Collect the refrigerant in the unit into the collecting device or a special tank. (The collected refrigerant cannot be used unless it is refined.)

CAUTION :
When collecting the refrigerant, observe the environment protection regulations and laws in each district.

【Connection Example : 18,000 BTU/h Type】



2) Charging.
To charge the refrigerant, proceed as described below.

(1) Check that the refrigeration cycle is connected perfectly.

(2) Evacuate the cycle to a vacuum from the charging valves connection to the outdoor unit.

(3) After evacuation, charge the refrigerant from the large piping charging valve.

Large piping size :
18,000 & 24,000 BTU/h type - 5/8"(15.88mm)
36,000 & 45,000 BTU/h type - 3/4"(19.05mm)

The charging amount is shown in the table below.
(Including the amount of additional charge)

Pipe length / Full charge amount	16ft / 5 m [oz.]	33ft /10 m [oz.]	66ft /20 m [oz.]	82ft /25 mm [oz.]
18,000BTU/h Type (Heating model)	1,690g [59.6]	1,930g [68.1]	2,410g [85.0]	2,650g [93.5]
24,000BTU/h Type (Cooling model)	1,950g [68.8]	2,930g [68.1]	2,410g [85.0]	2,650g [93.5]
24,000BTU/h Type (Heating model)	2,070g [73.0]	2,240g [79.0]	2,580g [91.0]	2,750g [97.0]
24,000BTU/h Type (Cooling model) 3 phase type	2,070g [73.0]	2,240g [79.0]	2,580g [91.0]	2,750g [97.0]
	98ft/30m [oz.]		115ft/35m[oz.]	
	2,330g[82.2]		2,390g[84.3]	

Pipe length / Full charge amount	16ft / 5 m [oz.]	33ft /10 mm [oz.]	66ft /20 mm [oz.]
36,000BTU/h Type (Cooling model)	2,150g [75.8]	2,285g [80.6]	2,555g [90.1]
36,000BTU/h Type (Heating model)	2,800g [98.8]		
45,000BTU/h Type (Cooling model)	3,150g [111.1]		
45,000BTU/h Type (Heating model)	3,400g [119.9]		

Pipe length / Full charge amount	99ft /30 mm [oz.]	132ft /40 m [oz.]	164ft /50 mm [oz.]
36,000BTU/h Type (Cooling model)	2,825g [99.6]	3,095g [109.2	3,365g [118.7
36,000BTU/h Type (Heating model)	3,200g [112.9	3,600g [127.0	4,000g [141.1
45,000BTU/h Type (Cooling model)	3,550g [125.2	3,950g [139.3	3,350g [153.4
45,000BTU/h Type (Heating model)	3,800g [134.0	4,200g [148.2	4,600g [162.3

3) Refrigerant additional charge

Refrigerant suitable for a piping length of 5 m [18,000 & 24,000 & 36,000(cooling model) BTU/h type] and 20 m(other models) is charged in the outdoor unit at the factory.

When the piping is longer than 5 m [18,000 & 24,000 & 36,000(cooling model) BTU/h type] and 20 m(other models), additional charging is necessary.

When using a connection pipe other than that in the table, charge additional refeigerant with :

	Between pipe length (m)	Additional refrigerant /1 m(3.3ft)
24,000BTU/h Type (Cooling model) 3 phase type	5 and 35	12g (0.42oz.)

	Between pipe length (m)	Additional refrigerant /1 m(3.3ft)
18,000BTU/h Type (Heating model)	5 and 25	48g (1.69oz.)
24,000BTU/h Type (Cooling model)		12g (0.42oz.)
24,000BTU/h Type (Heating model)		34g (1.20oz.)
36,000BTU/h Type (Cooling model)	5 and 50	27g (0.95oz.)
36,000BTU/h Type (Heating model)	20 and 50	40g (1.41oz.)
45,000BTU/h Type (Cooling model)		
45,000BTU/h Type (Heating model)		

Caution:
- * Always pump down the piping before use.
- * Add refrigerant from the charging valve after the completion of the work.
- * Do not operate the compressor at the start of the charging.
- * However, the compressor can be operated if no more refrigerant will enter the cycle.

9. ALLOWABLE LENGTH OF CONNECTING PIPE

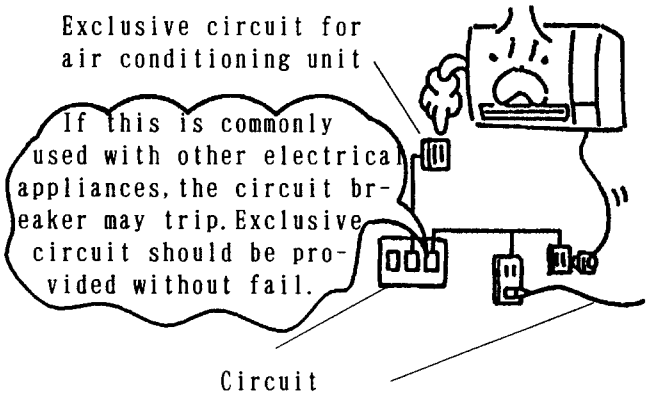
As shown in the item 8, the maximum length of the piping is 25 m (82 ft) for 18,000 & 24,000 BTU/h type, 35 m (115 ft) for 24,000 (3 phase) BTU/h type, 50 m (164 ft) for 36,000 & 45,000 BTU/h type.
If the units are further apart than this, correct operation cannot be guaranteed.

10. HEIGHT DIFFERENCE

Limit the height difference between the indoor unit and outdoor unit within 15 m (49 ft) for 18,000 & 24,000 BTU/h type, 30 m (99 ft) for 24,000(3) & 36,000 and 45,000 BTU/h type.

11. ELECTRICAL WORK (POWER SUPPLY)

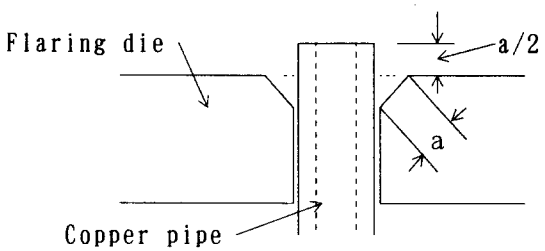
As shown in the right figure, an exclusive power supply circuit should be provided without fail.



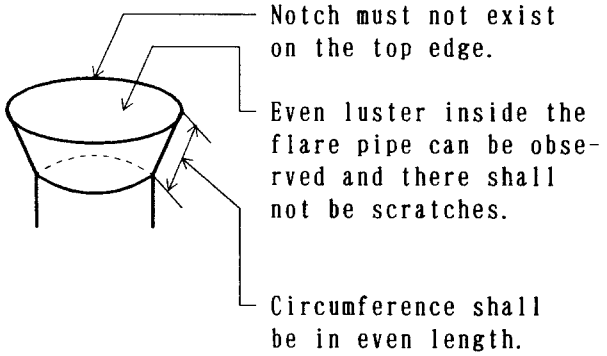
12. PIPING.

1) Flaring of Pipe

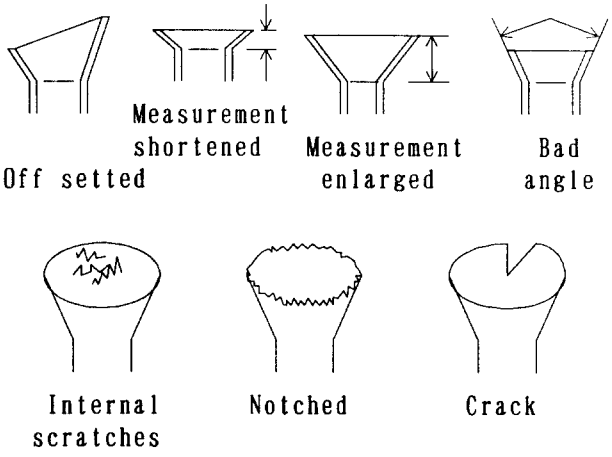
The following figure shows the optimum pipe position to make flare.



Flare part shall be as shown below.



* Poor Flaring
The figures shown below bring gas leakage.



2) Flare Nut Tightening.

①As shown in Fig. 1, adjust the pipe so that the center line of the pipe sets to that of the valve and then tighten the flare nut by hands. (Tightening the nut with a spanner initially causes the thread to damage and gas leakage.)

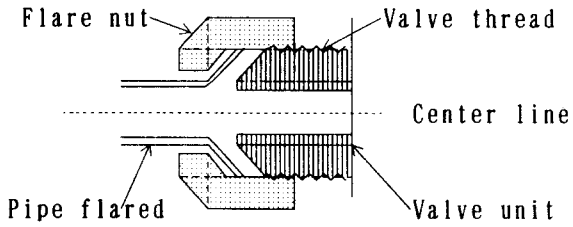


Fig. 1

②To tighten the flare nut, use a torque wrench.

③The flare part is extended and gas leakage may occur, if excessive force is applied to tighten the flare nut as shown in Fig. 2.

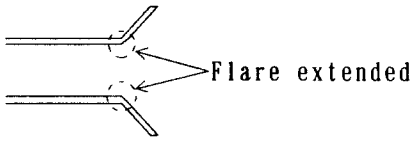


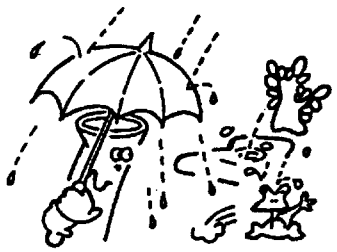
Fig. 2

④Tightening the flare nut on the indoor unit side should be done with 2 spanners as shown in Fig. 3.

Fig. 3

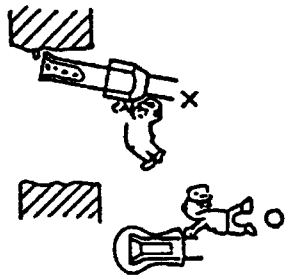
3) When installing, take care of the following points.

A. Drying:



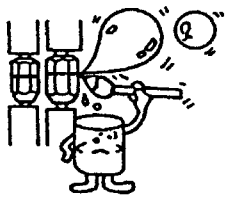
Never allow water and air to enter the unit.
(1) Do not install piping on a rainy day.
(2) To store copper pipe, cap the pipe.
(3) Always perform air purge.

B. Cleaning:



Never allow dust or dirt to enter the unit.
(1) When removing burrs from the flare nuts, point the pipe opening downward.
(2) When passing the copper pipe through a through-hole, cover the opening with cap or vinyl tape.

C. Air tighteness:

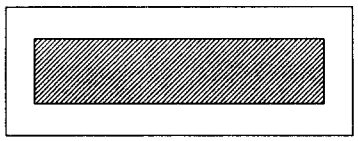
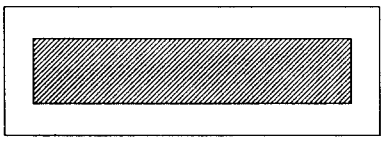
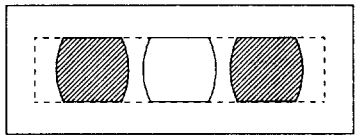
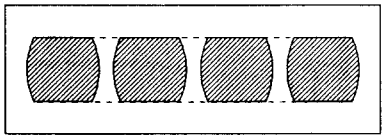
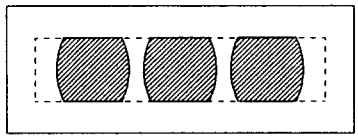


The coolant should not leak.
(1) Connect the flare pipe so that it is tight.
(2) Use 2 spanners to tighten the flare nuts.
(3) Securely cover with caps.
(4) Carefully check for air-tightness with soapy water.

DUCT CONNECTION INSTRUCTIONS

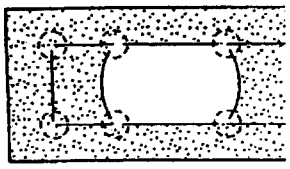
1. DUCT INSTALLATION PATTERN

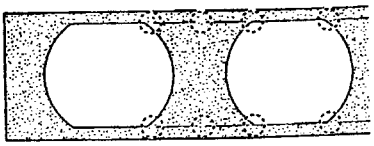
▨ CUT PART :

18,000 & 24,000 BTU/h Type	36,000 & 45,000 BTU/h Type
(1) Square Duct	(1) Square Duct
	
(2) Round Duct outlet x 2	(2) Round Duct outlet x 4
	
(This is the factory setting)	(This is the factory setting)
(3) Round Duct outlet x 3	
	

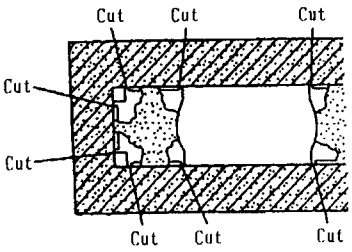
2. CUTTING EXAMPLE

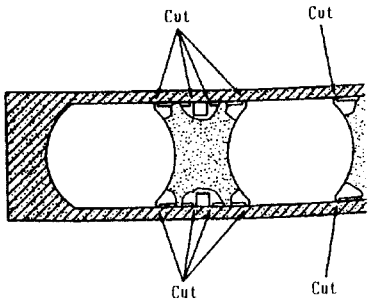
1) Cut the slit seam (⋯) with a cutter.





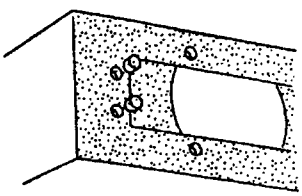
2) Turn up the insulation around the points to be cut according to the outlet port shape working points so that the insulation does not stick out at the ▨ part.

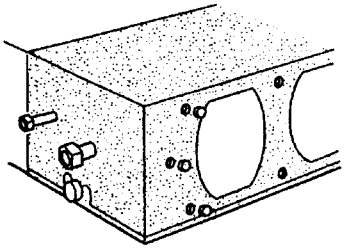




3) Cut with Nippers and remove the sheet metal.

4) Since there is a slit in the insulation, use radio pliers, tweezers, etc. to stretch tight the screw hole part used when installing the round flange and square flange when connecting the duct.



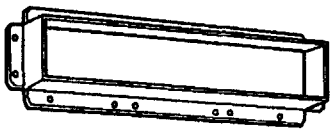


3. OPTION PARTS FOR OUTLET DUCT

when connecting the square duct and round duct, use the optional square flange or round flange and flexible duct.

【 SQUARE FLANGE 】

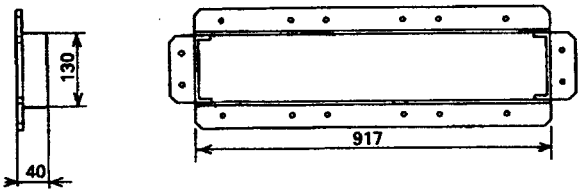
18,000 & 24,000 BTU/h Type



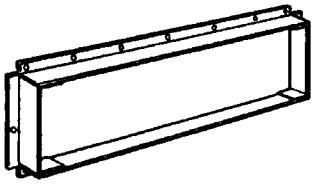
Model name:UTD-SF024

P/N 9074175003

Dimensions Unit:(mm)



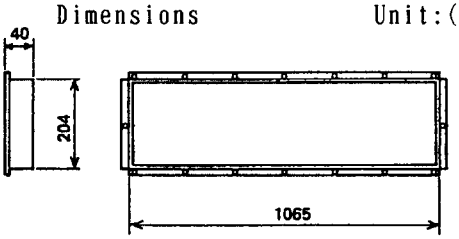
36,000 & 45,000 BTU/h Type



Model name:UTD-SF045

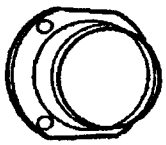
P/N 9054229009
P/N 9098180007

Dimensions Unit:(mm)



【 ROUND FLANGE 】

18,000 & 24,000 BTU/h type



Model name:UTD-RF200

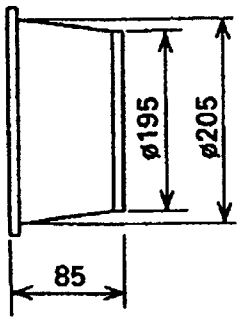
P/N 9074184005

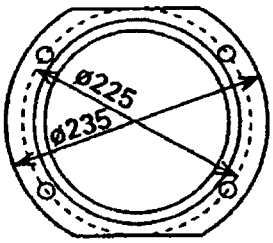
36,000 & 45,000 BTU/h type

Model name:UTD-RF204

P/N 9093160004

Dimensions Unit:(mm)





【 FLEXIBLE DUCT 】

Model name:UTD-RD202

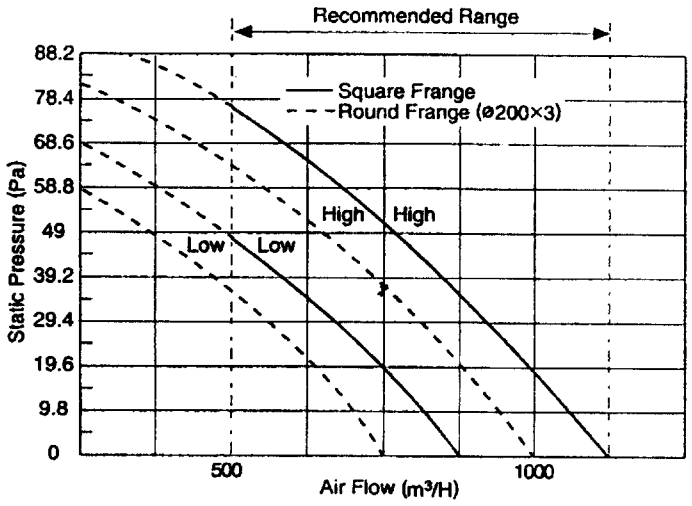
P/N 9094165004

φ200 m L 2 m

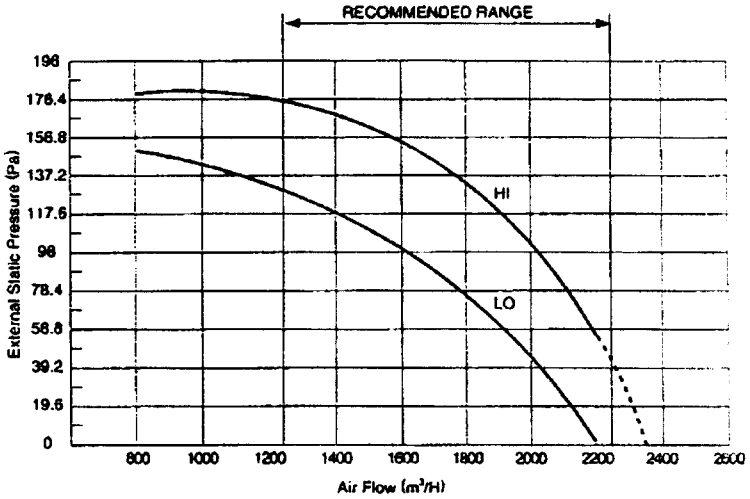
4. STATIC PRESSURE CHARACTERISTIC

FAN PERFORMANCE AND AIR FLOW

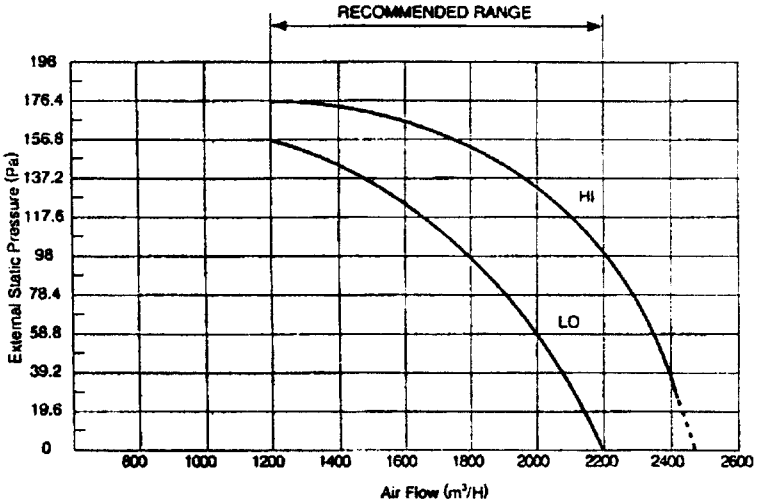
■ 18,000 & 24,000 BTU/h Type : EXTERNAL STATIC PRESSURE (at 240V)



■ 36,000 BTU/h Type : EXTERNAL STATIC PRESSURE (at 415V)



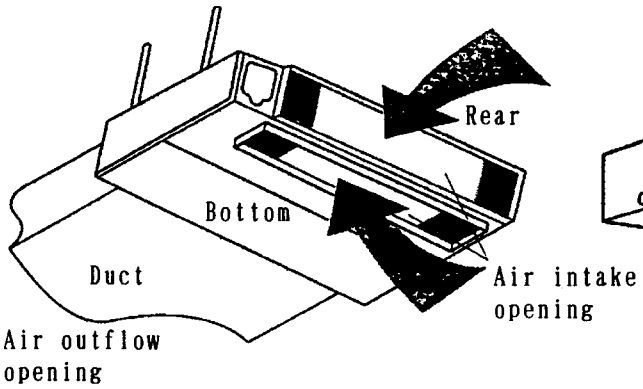
■ 45,000 BTU/h Type : EXTERNAL STATIC PRESSURE (at 415V)



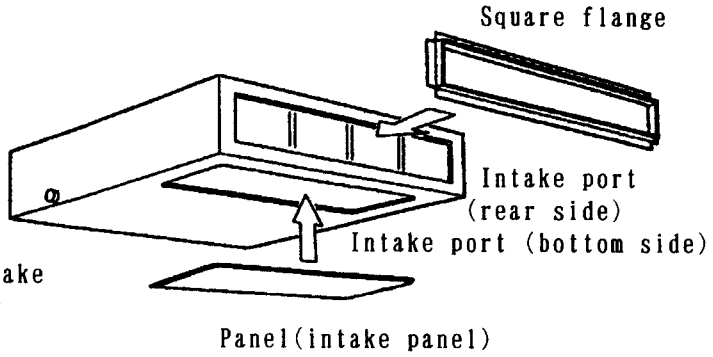
5. INTAKE PORT REAR COVER

You can choose to have the unit intake air from the rear or from the bottom, whichever is more convenient.

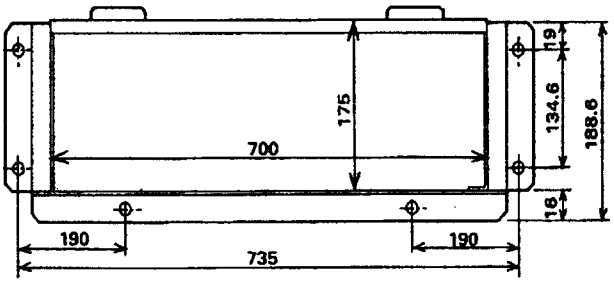
■ 18,000 & 24,000 BTU/h Type



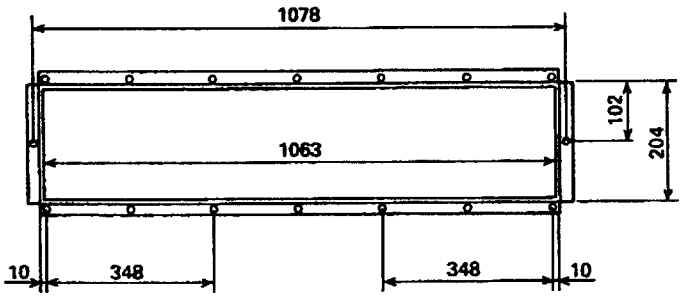
■ 36,000 & 45,000 BTU/h Type



Rear cover dimensions Unit: (mm)



Rear cover dimensions Unit: (mm)



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