



SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

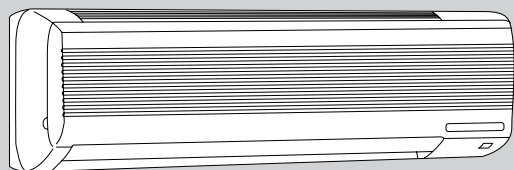
No. OB279



SERVICE MANUAL

Wireless type
Model

MSH-C18TV - E1 (WH) ▪ **MUH-C18TV** - E1
MSH-C24TV - E1 (WH) ▪ **MUH-C24TV** - E1



MSH-C18TV - E1
MSH-C24TV - E1



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MSH-C18SV -[E1]→MSH-C18TV -[E1]

1. Rated voltage has changed to 230V.
2. Remote controller has changed.
 - SLEEP MODE function has been removed.
 - ECONO COOL operation has added.
 - SWING button has been removed, but SWING MODE function has available by VANE CONTROL button.
3. Indoor electronic control P.C. board has changed.

MSH-C24TV -[E1]

New model

MUH-C18SV -[E1]→MUH-C18TV -[E1]

1. Path of heat exchanger has changed.
2. Temperature of defrosting control has changed. (-3°C → -2.7°C)
3. Capillary tube has changed.
[$\phi 3.0 \times \phi 1.6 \times 750$ (2pcs) → $\phi 3.0 \times \phi 1.4 \times 600$ (2pcs), $\phi 3.0 \times \phi 2.0 \times 500$ → $\phi 3.0 \times \phi 2.0 \times 850$, $\phi 3.0 \times \phi 2.0 \times 350$ has removed.]
4. Refrigerant filling capacity has changed. (1.70kg → 1.60kg)

MUH-C24TV -[E1]

New model

INFORMATION FOR THE AIR CONDITIONER WITH R-407C REFRIGERANT

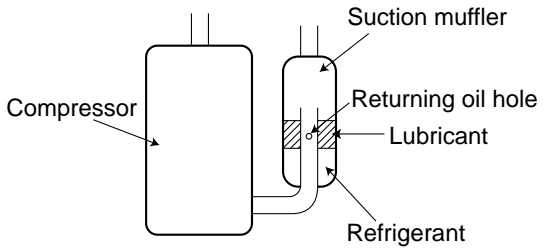
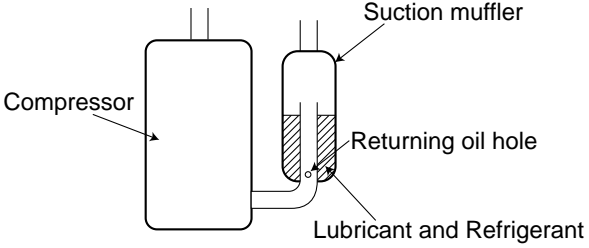
This room air conditioner adopts HFC refrigerant (R407C) which will never destroy the ozone layer.
Pay attention to following points.

- ① Take sufficient care not to allow water and other contaminations to enter the R407C refrigerant during storage and installation, since it is more susceptible to contaminations than HCFC (R22) refrigerant.
- ② Clean refrigerant pipings should be used.
- ③ Composition change may occur in R407C since it is a mixed refrigerant. When charging, charge liquid refrigerant to prevent composition change.
- ④ Be especially careful when managing the tools.
If dust, dirt, or water mixes in the refrigerant cycle, it may cause decrease of performance.

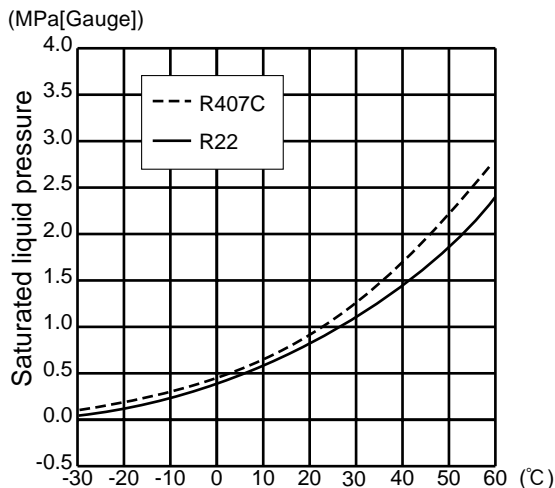
		New refrigerant	Previous refrigerant
Refrigerant	Refrigerant	R407C	R22
	Composition (Ratio)	R32: R125: R134a (23%:25%:52%)	HCFC22 (100%)
	Refrigerant handling	Non-azeotropic refrigerant	Single refrigerant
	Chlorine	Not included	Included
	Safety group (ASHRAE)	A1/A1	A1
	Molecular weight	86.2	86.5
	Boiling point (°C)	-43.6	-40.8
	Steam pressure [25°C](Mpa [Gauge])	0.9177	0.94
	Saturated steam density [25°C](Kg/m³)	42.5	44.4
	Combustibility	Non combustible	Non combustible
	ODP ※1	0	0.055
	GWP ※2	1530	1700
	Refrigerant charge method	From liquid phase in cylinder	Gas phase
Additional charge on leakage	Impossible	Possible	
Lubricant	Kind	Incompatible oil	Compatible oil
	Color	Non	Light yellow
	Smell	Non	Non

※1 :Ozone Destruction Parameter : based on CFC11

※2 :Global Warmth Parameter : based on CO₂

		New Specification	Previous Specification
Compressor	<p>The incompatible lubricant easily separates from refrigerant and makes the layer in the upper inside the suction muffler. The higher position of the returning oil hole enables to return the lubricant of the upper layer to the compressor.</p> 	<p>Since refrigerant and lubricant are compatible each other, lubricant returns to the compressor through the lower position returning oil hole.</p> 	

Conversion chart of refrigerant temperature and pressure



NOTE : The unit of pressure has been changed to MPa on the international system of units(SI unit system).

The conversion factor is: **1(MPa[Gauge]) =10.2(kgf/cm²[Gauge])**

1. Tools dedicated for the air conditioner with R407C refrigerant

The following tools are required for R407C refrigerant. Some R22 tools can be substituted for R407C tools. Do not use tools that are used with R22 refrigerant in order to avoid mixing oils.

R407C tools	Can R22 tools be used?	Description
Gauge manifold	No	A gauge manifold with a sight glass is recommended for charging the liquid refrigerant.
Charge hose	No	Hose material have been changed to improve the pressure resistance.
Gas leak detector	No	Dedicated for HFC refrigerant.
Torque wrench	Yes	_____
Flare tool	Yes	_____
Vacuum pump adapter	New	Provided to prevent the back flow of oil. This adapter enables you to use existing vacuum pumps.
Electronic scale for refrigerant charging	New	Use the electronic control scale for measuring the R407C.

2. Refrigerant piping

Do not use copper pipes which are broken, deformed or discoloured.

In addition, be sure that the inner surfaces of the pipes are clean, free of hazardous sulfur and oxides, or have no dust/ dirt, shaving particles, oil, moisture or any other contamination.

•If there is a large amount of residual oil inside the piping and joints, deterioration of the refrigerant oil will result.

3. Refrigerant oil

Apply the specific refrigeration oil (accessories) to the flare and the union seat surfaces.

4. Air purge

Use the vacuum pump for air purge to protect environments, and to avoid changing the composition of refrigerant.

5. Additional charge

For additional charging, charge the refrigerant with liquid phase slowly using a gas cylinder. If the refrigerant is charged with gas phase, the composition of refrigerant will change. In this case, ability of the refrigerating cycle decreases or normal operation can be impossible.

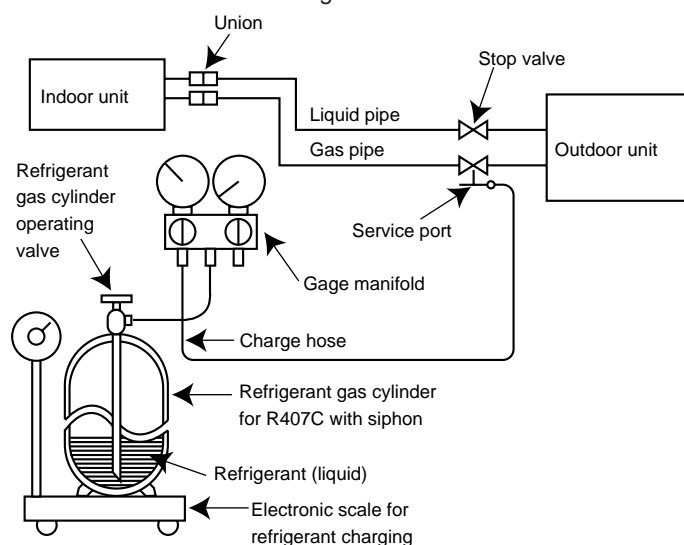
If liquid refrigerant is rapidly charged at once, the compressor may be locked.

NOTE: 1. The R407C is mixed refrigerant which consist of three different kinds of evaporative temperature. As a result, the R407C occurs the change of composition.

2. Additional refrigerant charge has been changed by change of refrigerant. (R22 → R407C)

R22 : <MUH-18 type> 50g/m → R407C : <MUH-C18TV> 35g/m

: <MUH-24 type> 65g/m → R407C : <MUH-C24TV> 45g/m



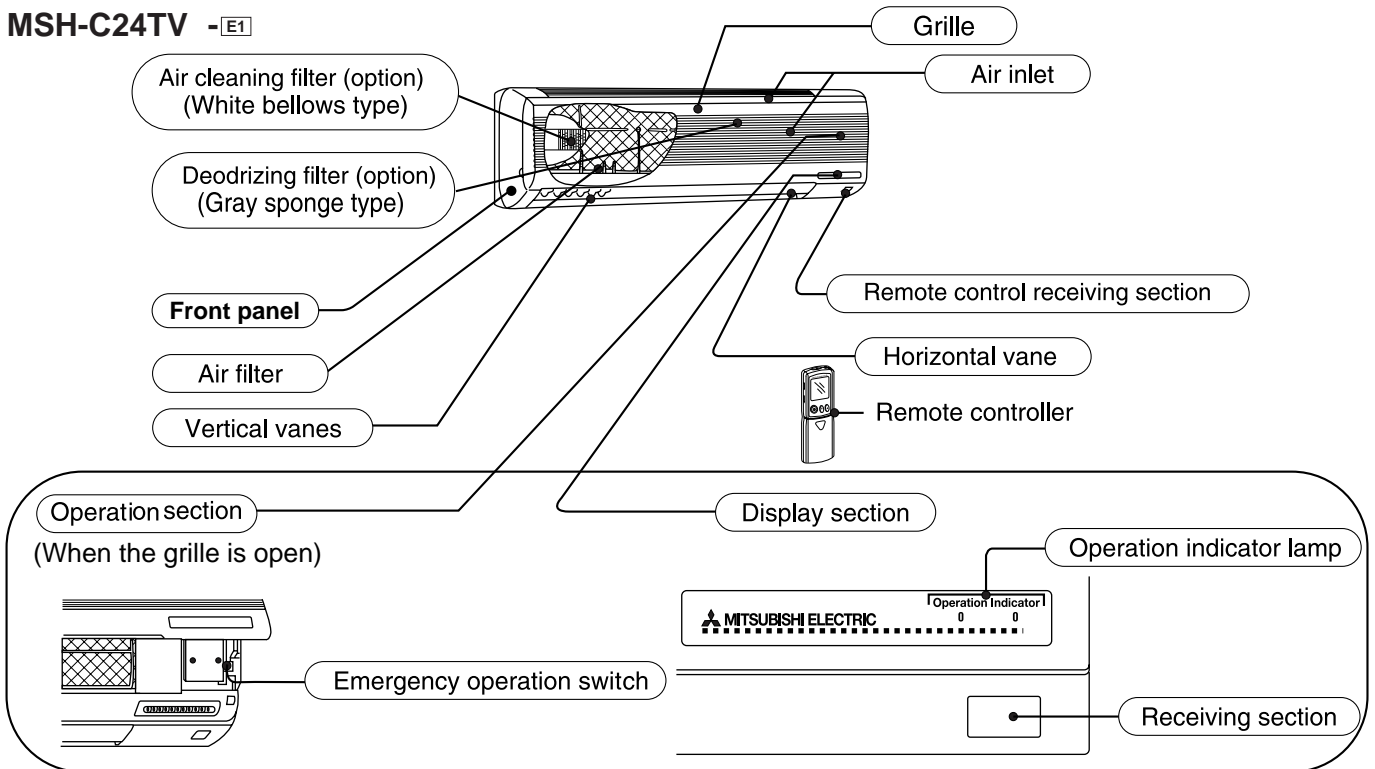
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PART NAMES AND FUNCTIONS

INDOOR UNIT

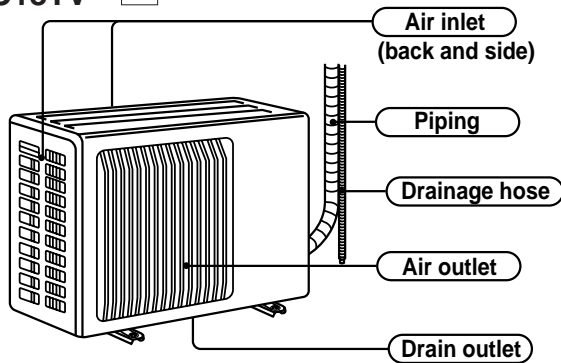
MSH-C18TV -E1

MSH-C24TV -E1

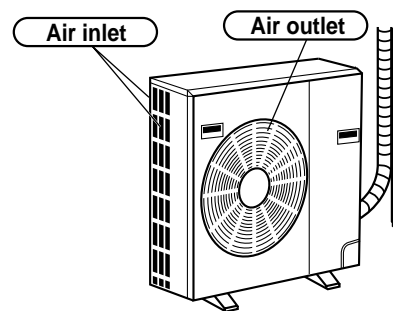


OUTDOOR UNIT

MUH-C18TV -E1



MUH-C24TV -E1



ACCESSORIES

Indoor unit

		MSH-C18TV-E1 MSH-C24TV-E1
①	Installation plate	1
②	Installation plate fixing screw 4 × 25 mm	6
③	Remote controller mouting hardware	1
④	Fixing screw for ③ × 3.5 × 1.6 mm (Black)	2
⑤	Battery (AAA) for remote controller	2
⑥	Wireless remote controller	1
⑦	Felt tape (Used for left or left-rear piping)	1

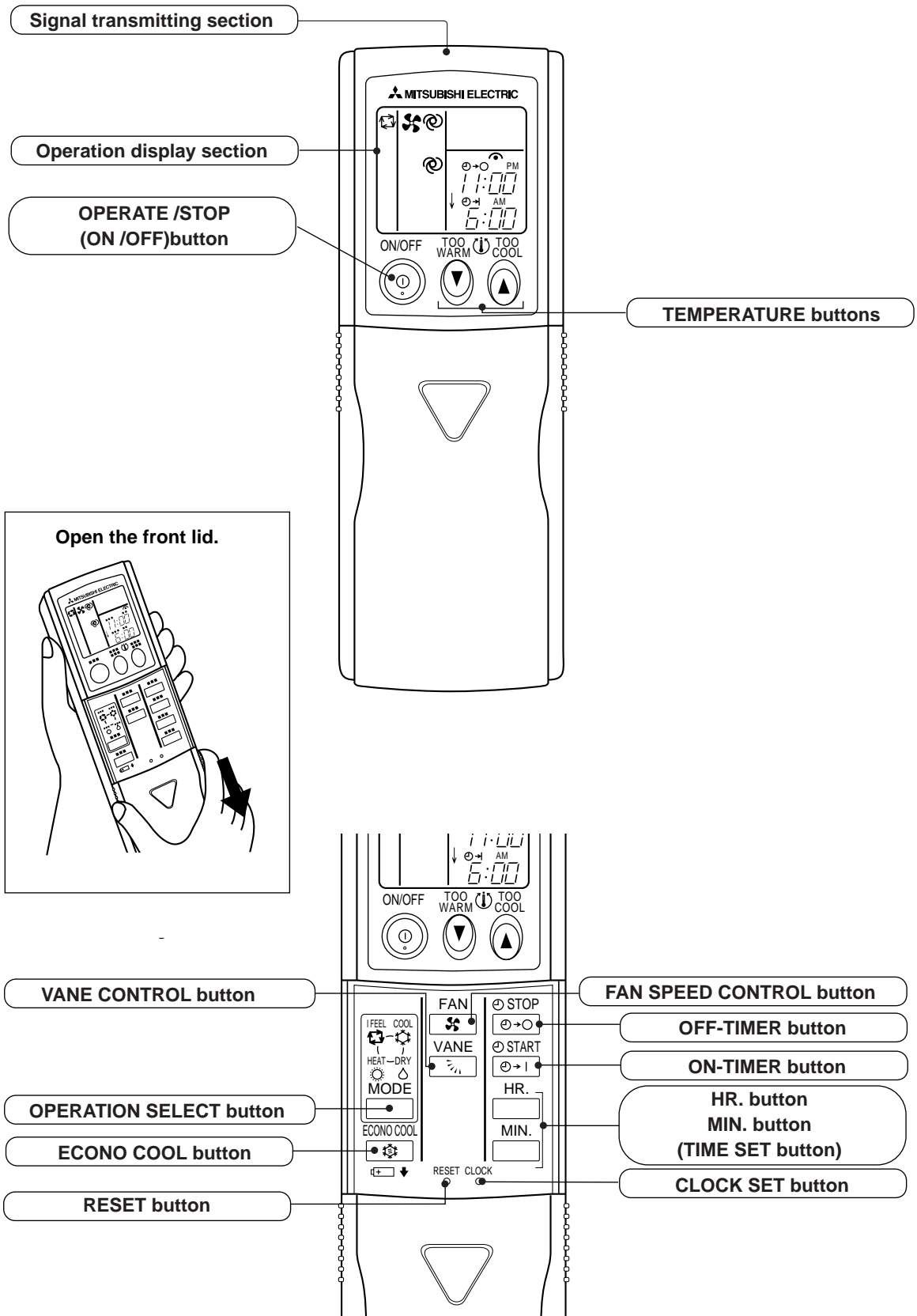
Outdoor unit

		MUH-C18TV-E1	MUH-C24TV-E1
⑧	Drain socket	1	1
⑨	Drain cap ϕ 33	2	6
	Drain cap ϕ 16	1	—

REMOTE CONTROLLER

MSH-C18TV -[E1]

MSH-C24TV -[E1]



3

SPECIFICATION

Indoor model			MSH-C18TV - E1		MSH-C24TV - E1	
Function			Cooling	Heating	Cooling	Heating
Power supply			Single phase 230V, 50Hz		Single phase 230V, 50Hz	
Capacity	Capacity	kW	5.2	6.0	6.3	7.5
	Dehumidification	ℓ /h	2.4	—	3.0	—
	Air flow(High)	m ³ /h	756		816	
Electrical data	Power outlet	A	15		25	
	Running current	A	9.4	9.7	12.8	13.7
	Power input	W	2,110	2,180	2,850	3,020
	Auxiliary heater	A(kW)	—		—	
	Power factor	%	98		97	96
	Starting current	A	55		83	
	Fan motor current	A	0.25		0.29	
Coefficient of performance(C.O.P)			2.46	2.75	2.21	2.48
Fan motor	Model		RA4V27-EF		RA4V27-EE	
	Winding resistance(at20°C)	Ω	WHT-BLK 183.8 BLK-RED 250.5		WHT-BLK 183.3 BLK-RED 250.5	
	Dimensions W×H×D	mm	1,015×320×190		1,015×320×190	
	Weight	kg	14		14	
Special remarks	Air direction		5		5	
	Sound level (High)	dB	42		45	
	Fan speed (High)	rpm	1,180		1,260	
	Fan speed regulator		3		3	
	Thermistor RT11(at25°C)	kΩ	10		10	
	Thermistor RT12(at25°C)	kΩ	10		10	
Outdoor model			MUH-C18TV - E1		MUH-C24TV - E1	
Capacity	Air flow	m ³ /h	2,196		2,700	
Electrical data	Compressor motor current	A	8.76	9.06	11.93	12.87
	Fan motor current	A	0.39		0.58	
Compressor	Model		PE-36VPEHT		NE-47VMHHT	
	Output	W	1,600		2,200	
	Winding resistance(at20°C)	Ω	C-R 1.06 C-S 2.03		C-R 0.67 C-S 2.02	
Fan motor	Model		RA6V50-OG		RA6V85-AA	
	Winding resistance(at20°C)	Ω	WHT-BLK 116.4 BLK-RED 111.0		WHT-BLK 62.7 BLK-YLW 30.2 YLW-RED 62.9	
	Dimensions W×H×D	mm	850×605×290		870×850×295	
	Weight	kg	54		71	
Special remarks	Sound level	dB	52		53	
	Fan speed (High)	rpm	828		735	
	Fan speed regulator		1		2	
	Refrigerant filling capacity(R407C)	kg	1.60		2.00	
	Refrigerating oil (Model)	cc	1,100 (NEO22)		1,400 (NEO22)	
	Thermistor RT61(at0°C)	kΩ	33.18		33.18	
	Thermistor RT63(at0°C)	kΩ	—		33.18	

NOTE: Test conditions are based on JIS C 9612.

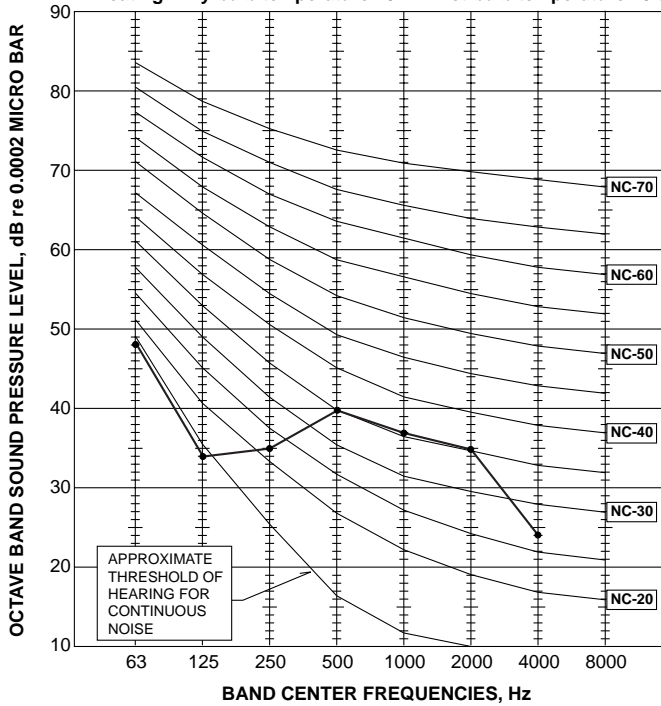
Cooling : Indoor Dry-bulb temperature 27°C / Wet-bulb temperature 19°C
 Outdoor Dry-bulb temperature 35°C / Wet-bulb temperature (24°C)
 Heating : Indoor Dry-bulb temperature 20°C / Wet-bulb temperature —
 Outdoor Dry-bulb temperature 7°C / Wet-bulb temperature 6°C

MSH-C18TV-E1

NOTCH	SPL(dB(A))	LINE
High	42	

Test conditions,

Cooling : Dry-bulb temperature 27°C Wet-bulb temperature 19°C
 Heating : Dry-bulb temperature 20°C Wet-bulb temperature 15.5°C

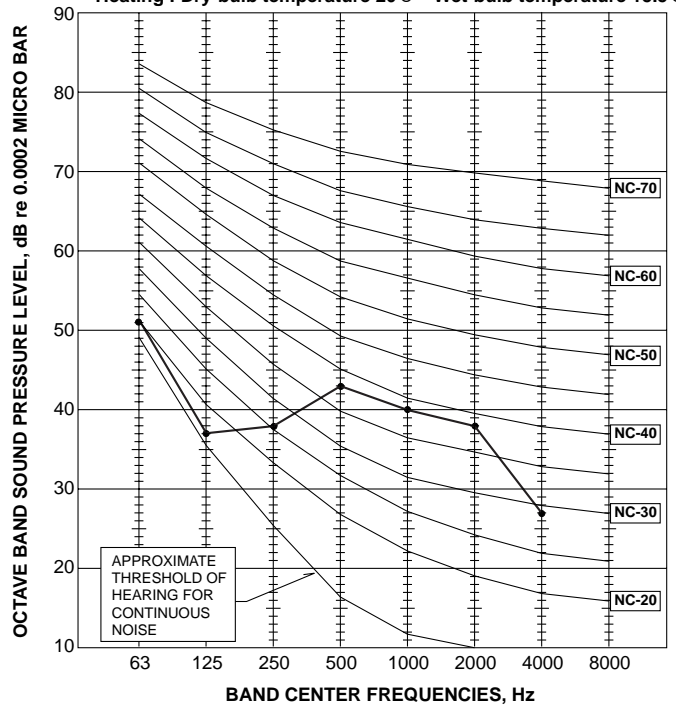


MSH-C24TV-E1

NOTCH	SPL(dB(A))	LINE
High	45	

Test conditions,

Cooling : Dry-bulb temperature 27°C Wet-bulb temperature 19°C
 Heating : Dry-bulb temperature 20°C Wet-bulb temperature 15.5°C

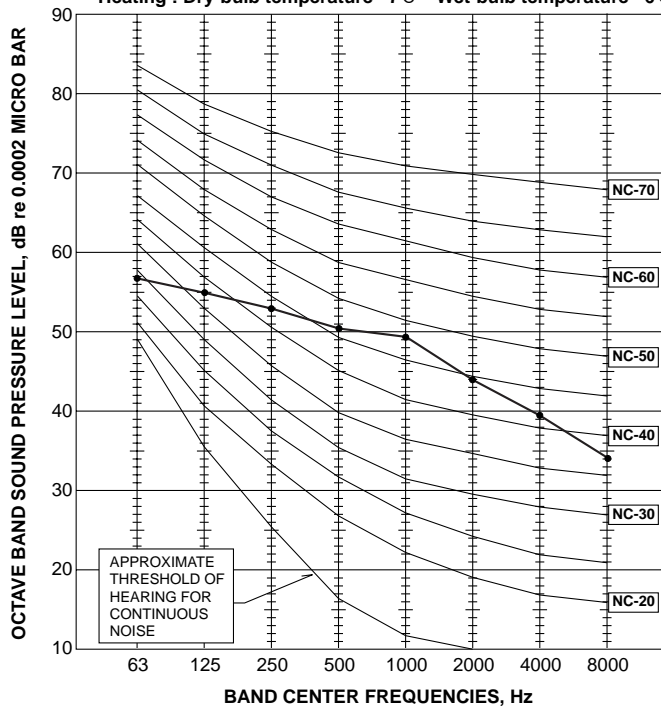


MUH-C18TV-E1

NOTCH	SPL(dB(A))	LINE
High	52	

Test conditions,

Cooling : Dry-bulb temperature 35°C Wet-bulb temperature 24°C
 Heating : Dry-bulb temperature 7°C Wet-bulb temperature 6°C

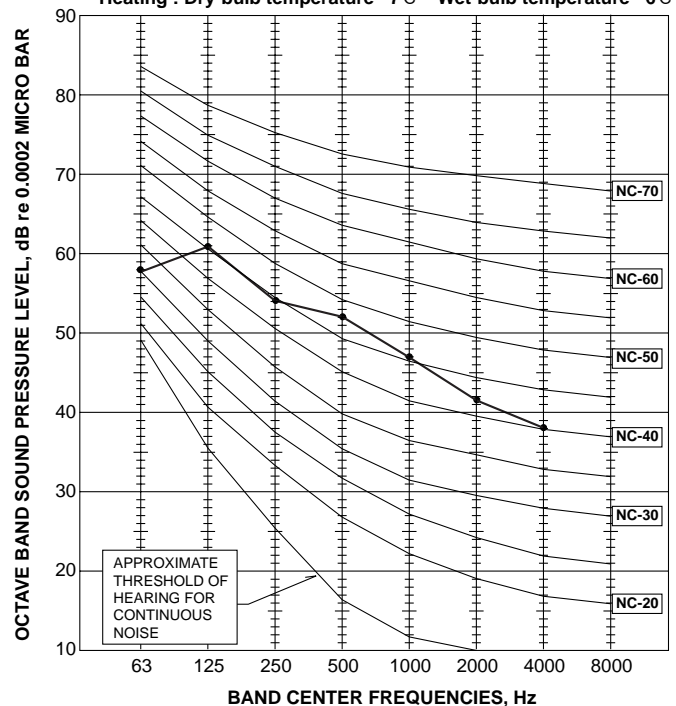


MUH-C24TV-E1

NOTCH	SPL(dB(A))	LINE
High	53	

Test conditions,

Cooling : Dry-bulb temperature 35°C Wet-bulb temperature 24°C
 Heating : Dry-bulb temperature 7°C Wet-bulb temperature 6°C



5

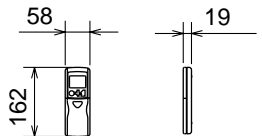
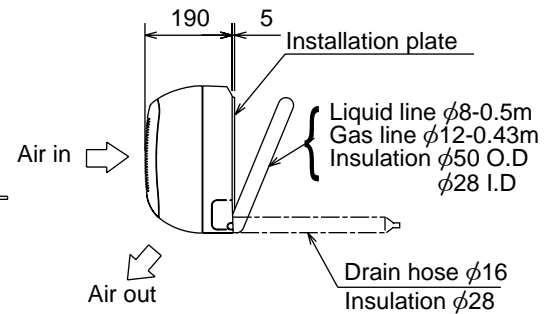
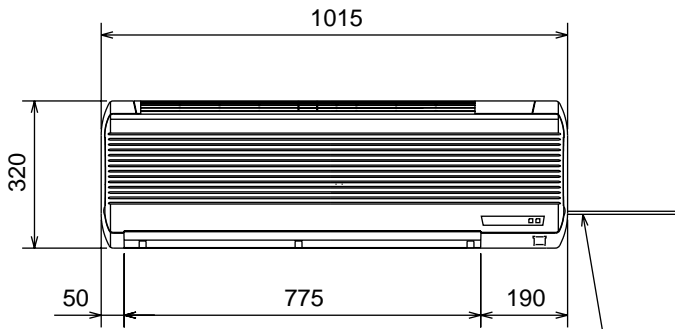
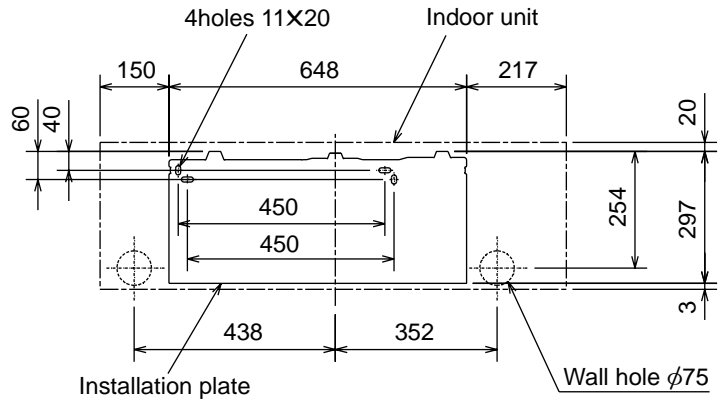
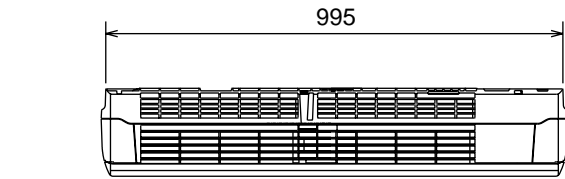
OUTLINES AND DIMENSIONS

Unit: mm

MSH-C18TV -E1

MSH-C24TV -E1

INDOOR UNIT

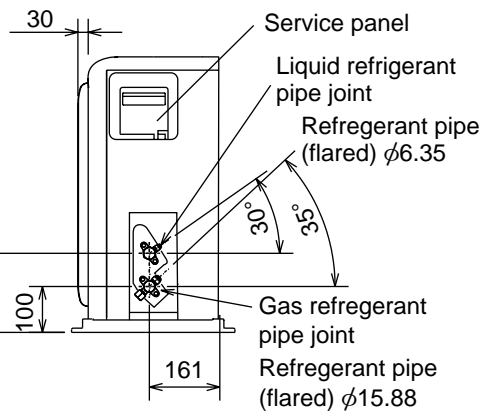
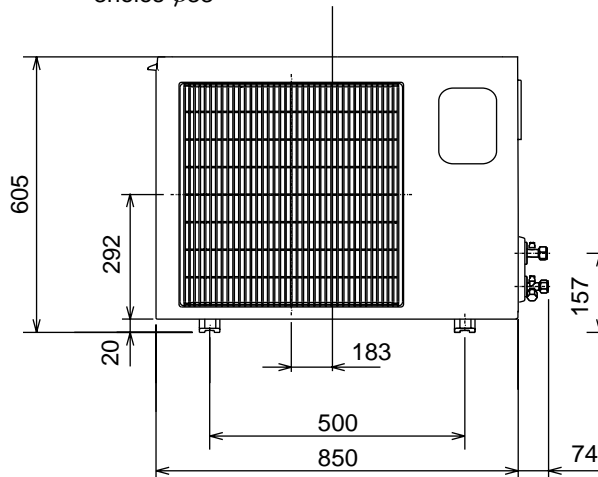
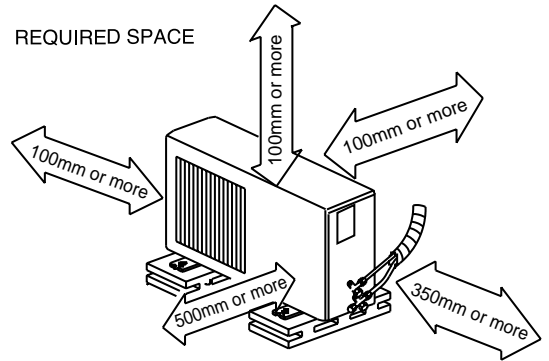
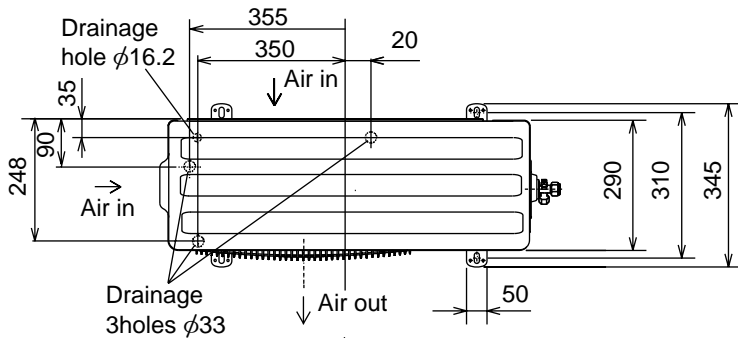


Wireless remote controller

Power supply cord
Lead to right 2m
Lead to left 1m

MUH-C18TV -E1

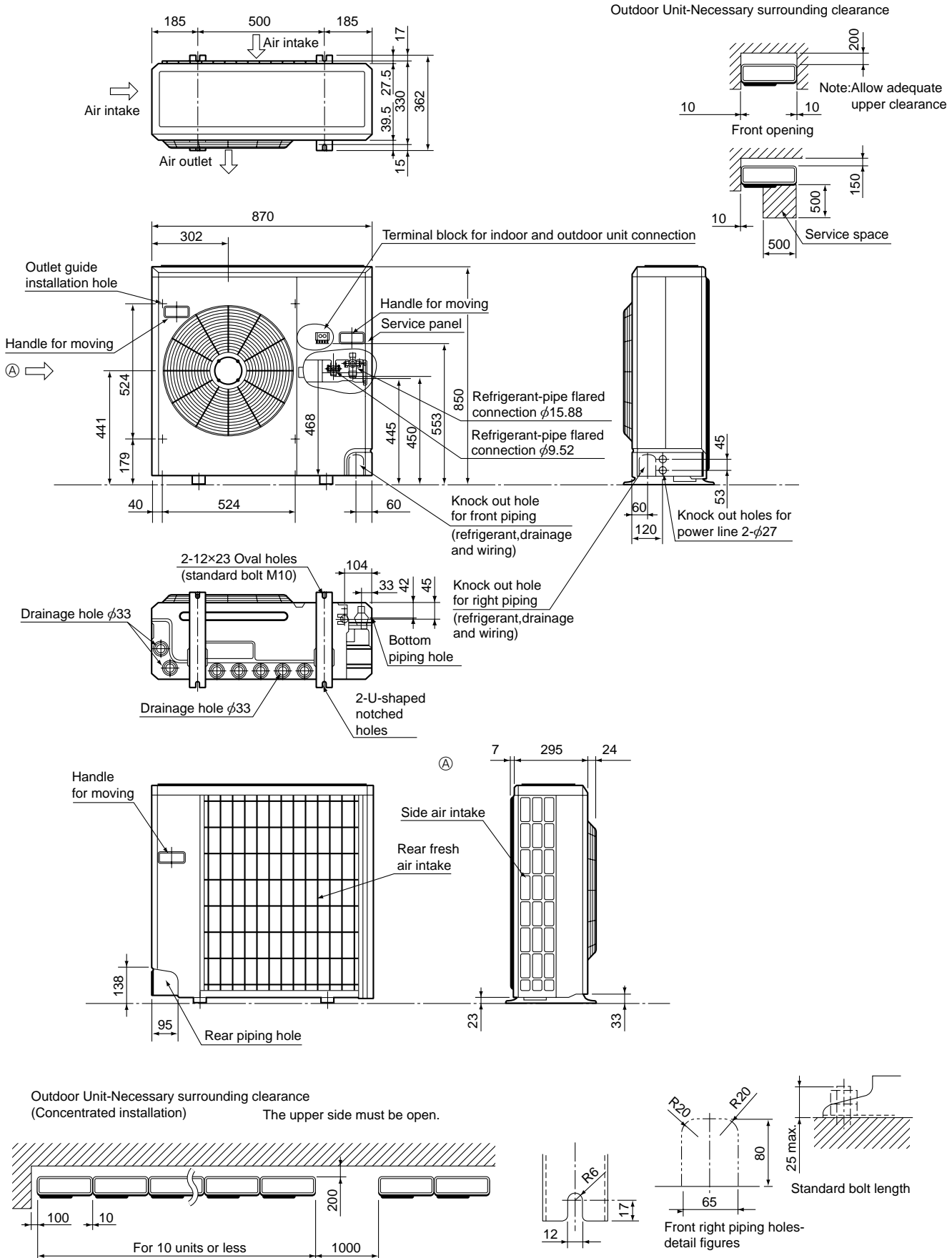
OUTDOOR UNIT



MUH-C24TV-E1

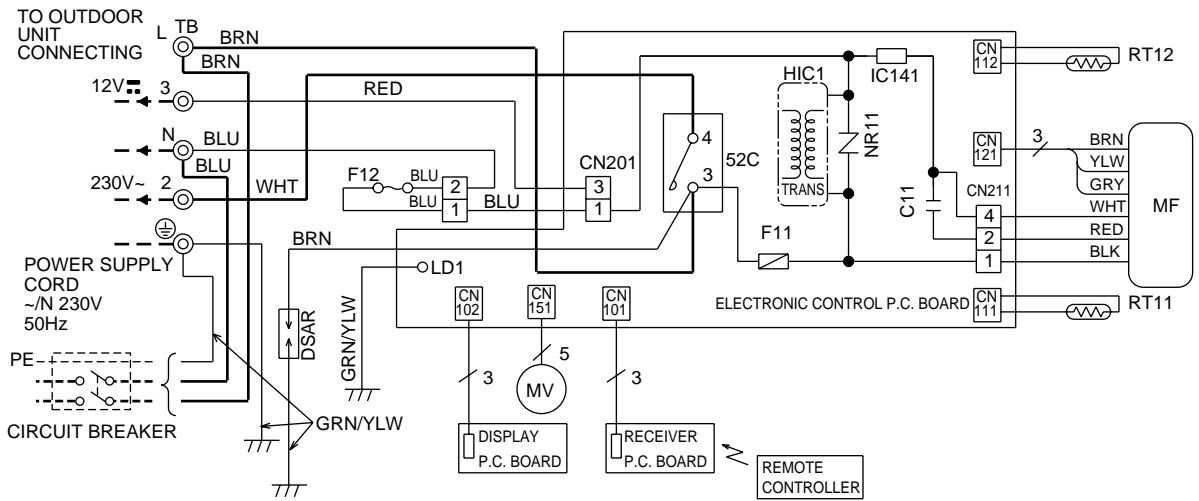
Unit: mm

OUTDOOR UNIT



MSH-C18TV -E1 MODEL WIRING DIAGRAM

INDOOR UNIT



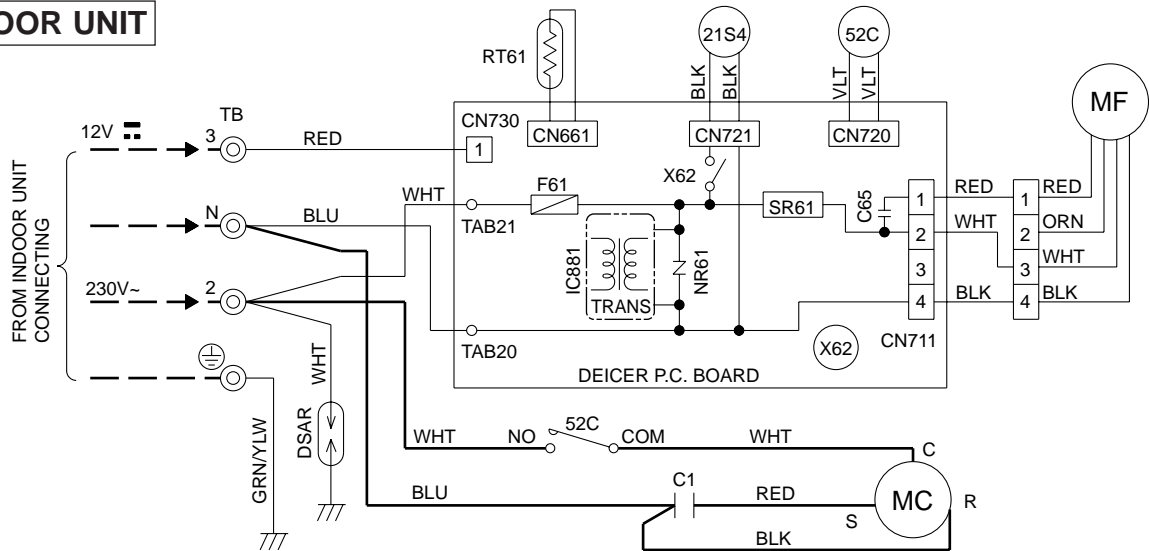
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C11	INDOOR FAN CAPACITOR	IC141	HYBRID IC	RT12	INDOOR COIL THERMISTOR
DSAR	SURGE ABSORBER	MF	INDOOR FAN MOTOR (INNER FUSE)	TB	TERMINAL BLOCK
F11	FUSE (3.15A)	MV	VANE MOTOR	52C	CONTACTOR
F12	THERMAL FUSE (93°C)	NR11	VARISTOR		
HIC1	DC/DC CONVERTER	RT11	ROOM TEMPERATURE THERMISTOR		

NOTES: 1.About the outdoor side electric wiring refer to the outdoor unit electric wiring diagram for servicing.
 2.Use copper conductors only. (For field wiring)
 3.Symbols below indicate.
 ⊙ : Terminal block □ : Connector

VG79B068H01

MUH-C18TV -E1 MODEL WIRING DIAGRAM

OUTDOOR UNIT



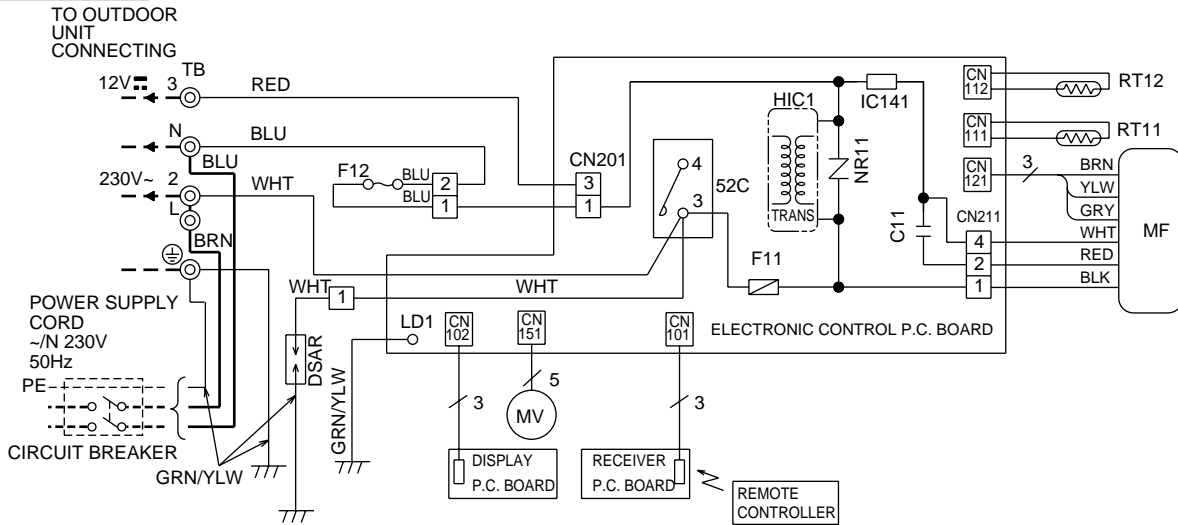
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MC	COMPRESOR (INNER PROTECTOR)	TB	TERMINAL BLOCK
C65	OUTDOOR FAN CAPACITOR	MF	OUTDOOR FAN MOTOR (INNER PROTECTOR)	X62	R.V. COIL RELAY
DSAR	SURGE ABSORBER	NR61	VARISTOR	21S4	R.V. COIL
F61	FUSE (2A)	RT61	DEFROST THERMISTOR	52C	COMPRESSOR CONTACTOR
IC881	DC/DC CONVERTER	SR61	SOLID STATE RELAY		

NOTES: 1.About the indoor side electric wiring refer to the indoor unit electric wiring diagram for servicing.
 2.Use copper conductors only. (For field wiring)
 3.Symbols below indicate.
 ⊙ : Terminal block □ : Connector

SG79B966H01

MSH-C24TV -[E1] MODEL WIRING DIAGRAM

INDOOR UNIT



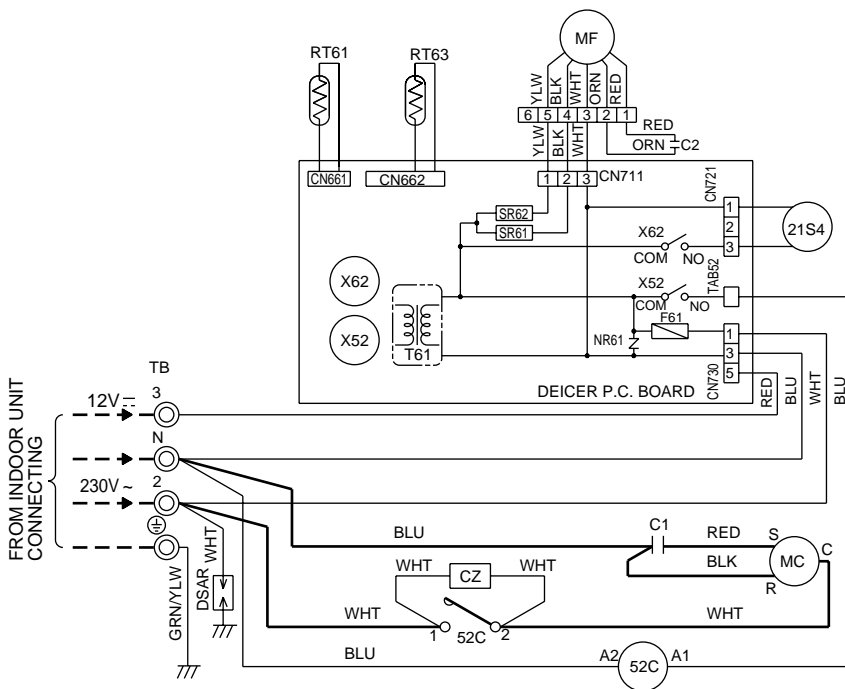
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C11	INDOOR FAN CAPACITOR	IC141	HYBRID IC	RT12	INDOOR COIL THERMISTOR
DSAR	SURGE ABSORBER	MF	INDOOR FAN MOTOR (INNER FUSE)	TB	TERMINAL BLOCK
F11	FUSE (3.15A)	MV	VANE MOTOR	52C	CONTACTOR
F12	THERMAL FUSE (93°C)	NR11	VARISTOR		
HIC1	DC/DC CONVERTER	RT11	ROOM TEMPERATURE THERMISTOR		

- NOTES: 1.About the outdoor side electric wiring refer to the outdoor unit electric wiring diagram for servicing.
 2.Use copper conductors only. (For field wiring)
 3.Symbols below indicate.
 ⊙ : Terminal block □ : Connector

VG79B069H01

MUH-C24TV -[E1] MODEL WIRING DIAGRAM

OUTDOOR UNIT



SYMBOL	NAME
CZ	CZ SURGE ABSORBER
C1	COMPRESSOR CAPACITOR
C2	OUTDOOR FAN CAPACITOR
DSAR	SURGE ABSORBER
F61	FUSE (3.15A)
MC	COMPRESSOR (INNER PROTECTOR)
MF	OUTDOOR FAN MOTOR (INNER PROTECTOR)
NR61	VARISTOR
RT61	DEFROST THERMISTOR
RT63	AMBIENT TEMPERATURE THERMISTOR
SR61	SOLID STATE RELAY
SR62	SOLID STATE RELAY
TB	TERMINAL BLOCK
T61	TRANSFORMER
X52	CONTACTOR
X62	R. V. COIL RELAY
21S4	R. V. COIL
52C	COMPRESSOR CONTACTOR

- NOTES: 1.Use copper conductors only (For field wiring).
 2.Since the indoor and outdoor unit connecting wires have polarity, connect them according to the numbers (3,N,2).
 3.Symbols below indicate.
 ⊙:Terminal block, □:Connector

SG79J155H01

REFRIGERANT SYSTEM DIAGRAM

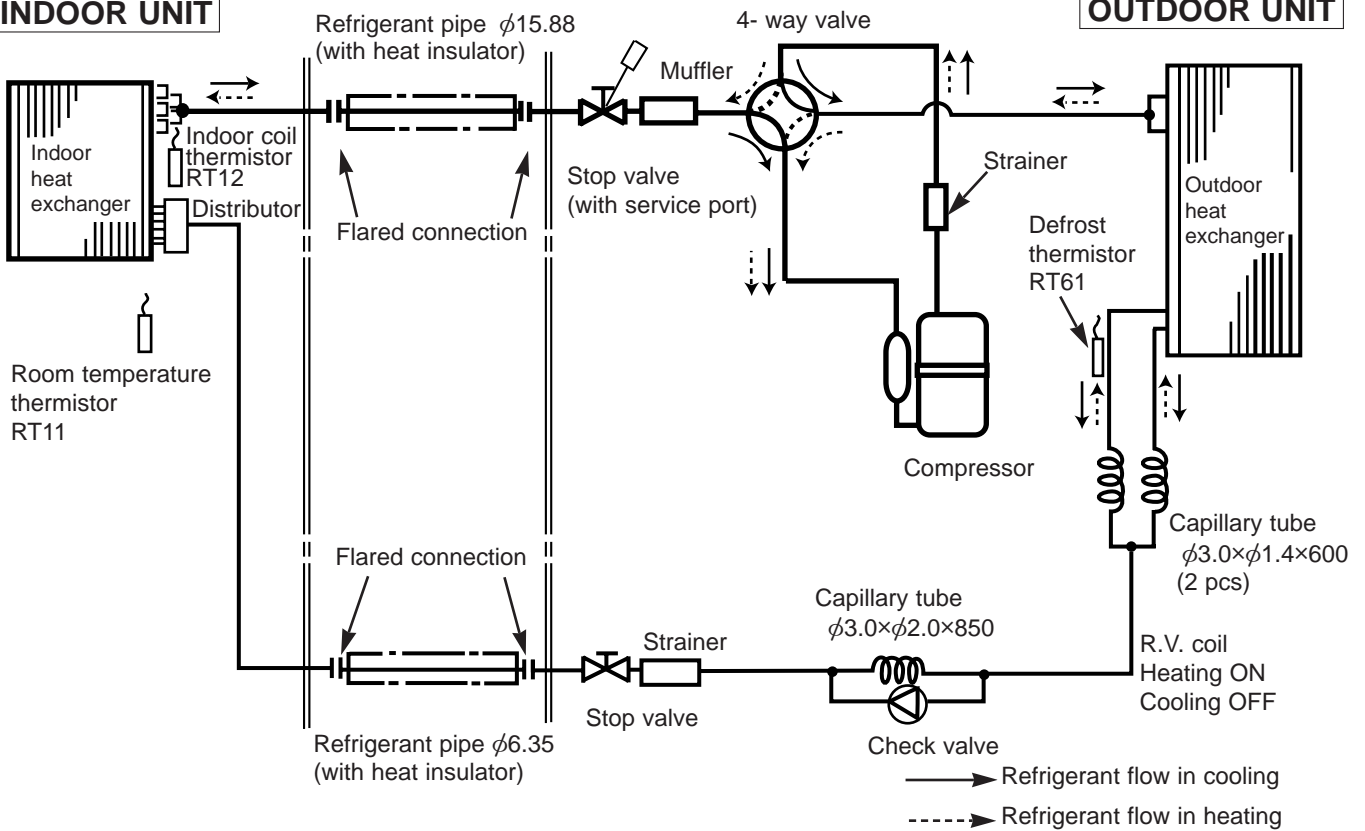
Unit:mm

MSH-C18TV -[E1]

MUH-C18TV -[E1]

INDOOR UNIT

OUTDOOR UNIT



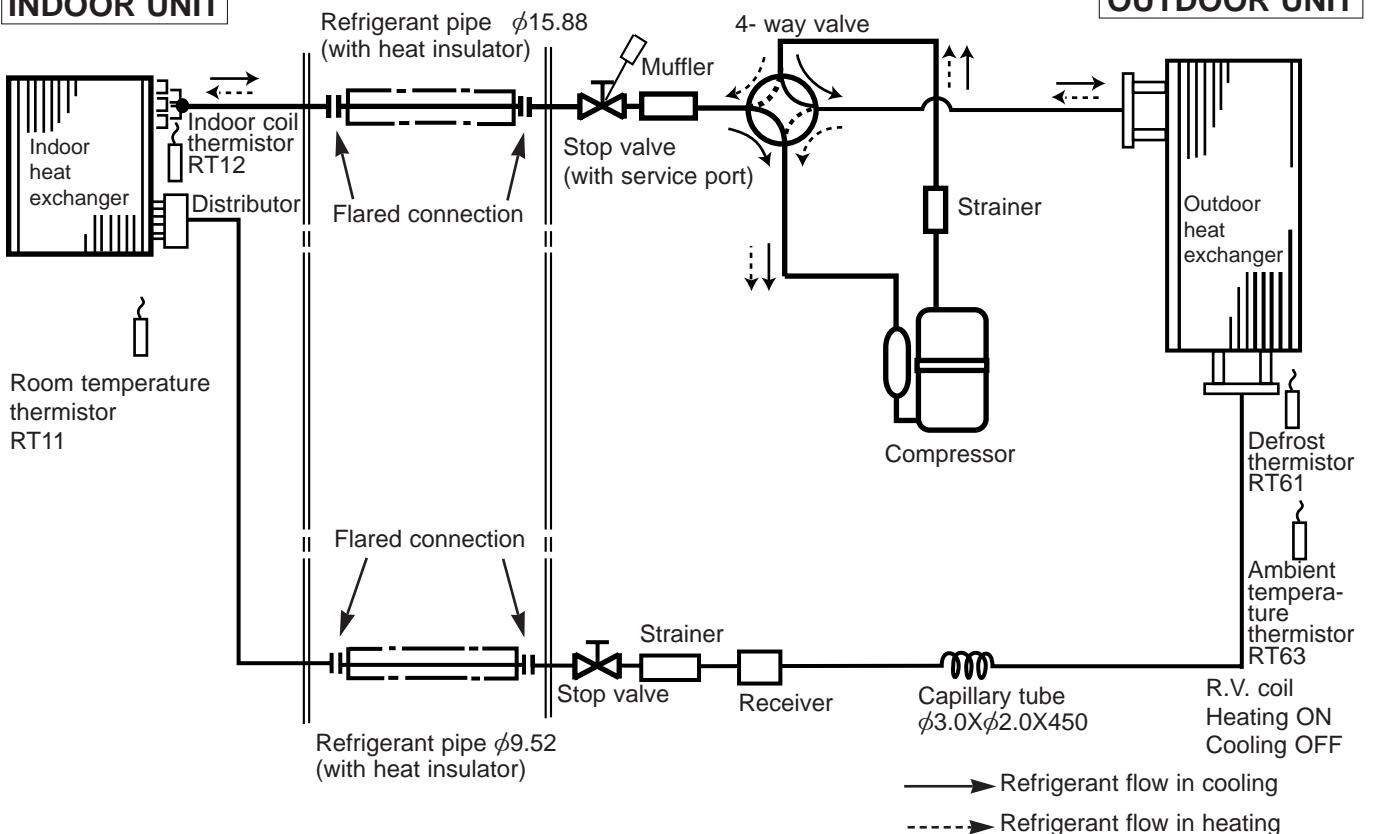
Unit:mm

MSH-C24TV -[E1]

MUH-C24TV -[E1]

INDOOR UNIT

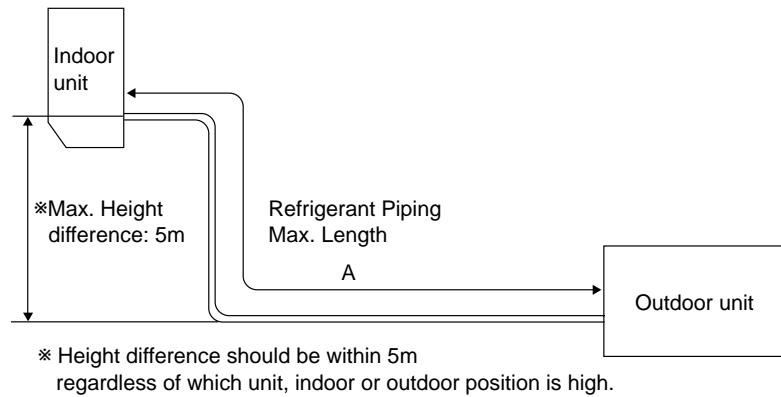
OUTDOOR UNIT



MAX. REFRIGERANT PIPING LENGTH

Model	Refrigerant piping Max. length : m A	Piping size O.D : mm		Length of connecting pipe : m	
		Gas	Liquid	Indoor unit	Outdoor unit
MSH-C18TV - E1 MUH-C18TV - E1	15	15.88	6.35	Gas 0.43	Gas 0
MSH-C24TV - E1 MUH-C24TV - E1			9.52	Liquid 0.5	Liquid 0

MAX. HEIGHT DIFFERENCE



ADDITIONAL REFRIGERANT CHARGE(R407C : g)

Model	Outdoor unit precharged	Refrigerant piping length (one way)		
		7m	10m	15m
MSH-C18TV - E1 MUH-C18TV - E1	1600	0	105	280

Calculation : $Xg=35g/m \times (\text{Refrigerant piping length (m)}-7)$

Model	Outdoor unit precharged	Refrigerant piping length (one way)		
		7m	10m	15m
MSH-C24TV - E1 MUH-C24TV - E1	2000	0	135	360

Calculation : $Xg=45g/m \times (\text{Refrigerant piping length (m)}-7)$

MSH-C18TV -E1 **MUH-C18TV** -E1

MSH-C24TV -E1 **MUH-C24TV** -E1

The standard data contained in these specifications apply only to the operation of the air conditioner under normal conditions, since operating conditions vary according to the areas where these units are installed. The following information has been provided to clarify the operating characteristics of the air conditioner under the conditions indicated by the performance curve.

(1) GUARANTEED VOLTAGE

198 ~ 264V, 50Hz

(2) AIR FLOW

Air flow should be set at MAX.

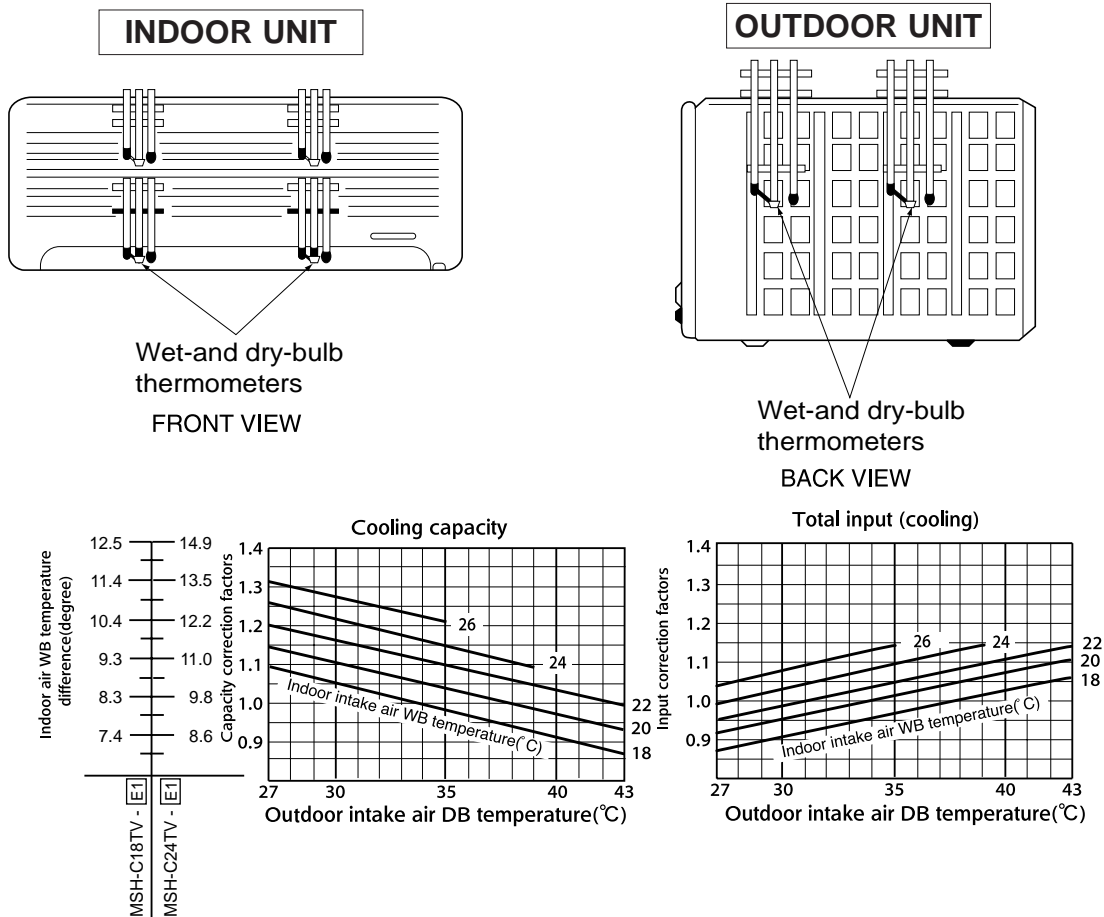
(3) MAIN READINGS

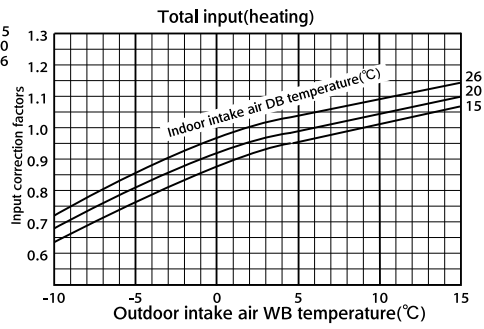
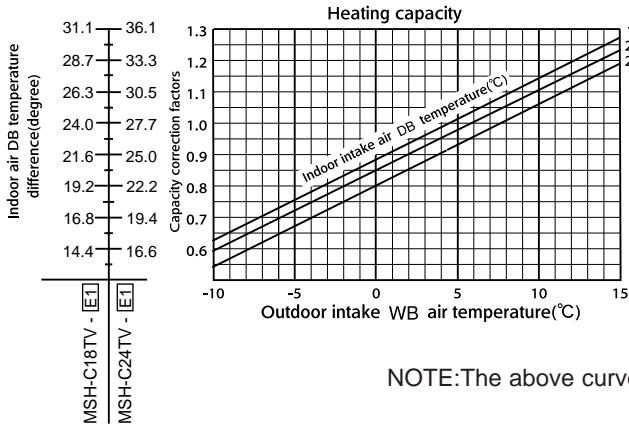
(1) Indoor intake air wet-bulb temperature :	°CWB	} Cooling
(2) Indoor outlet air wet-bulb temperature :	°CWB	
(3) Outdoor intake air dry-bulb temperature :	°CDB	
(4) Total input:	W	} Heating
(5) Indoor intake air dry-bulb temperature :	°CDB	
(6) Outdoor intake air wet-bulb temperature :	°CWB	
(7) Total input :	W	

Indoor air wet/dry-bulb temperature difference on the left side of the chart on this page and next page shows the difference between the indoor intake air wet/dry-bulb temperature and the indoor outlet air wet/dry-bulb temperature for your reference at service.

How to measure the indoor air wet-bulb/dry-bulb temperature difference

1. Attach at least 2 sets of wet-and dry-bulb thermometers to the indoor air intake as shown in the figure, and at least 2 sets of wet-and dry-bulb thermometers to the indoor air outlet. The thermometers must be attached to the position where air speed is high.
2. Attach at least 2 sets of wet-and dry-bulb thermometers to the outdoor air intake. Cover the thermometers to prevent direct rays of the sun.
3. Check that the air filter is cleaned.
4. Open windows and doors of room.
5. Press the EMERGENCY OPERATION switch once(twice) to start the EMERGENCY COOL(HEAT) MODE.
6. When system stabilizes after more than 15 minutes, measure temperature and take an average temperature.
7. 10 minutes later, measure temperature again and check that the temperature does not change.





NOTE: The above curves are for the heating operation without any frost and defrosting.

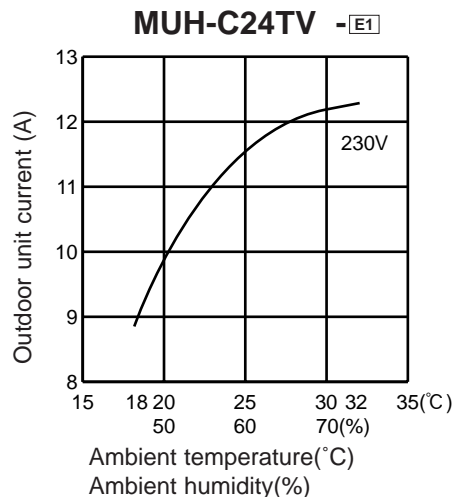
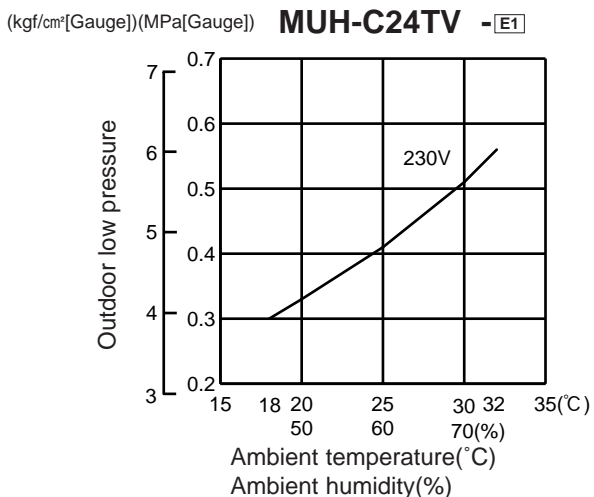
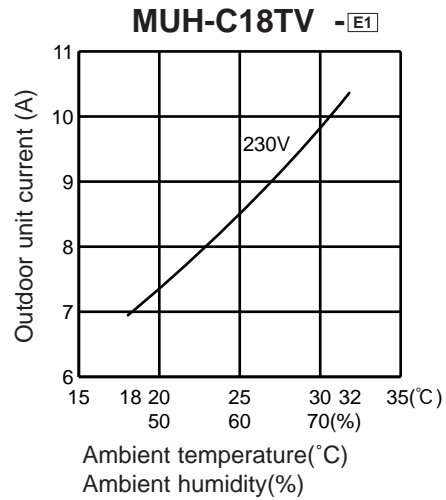
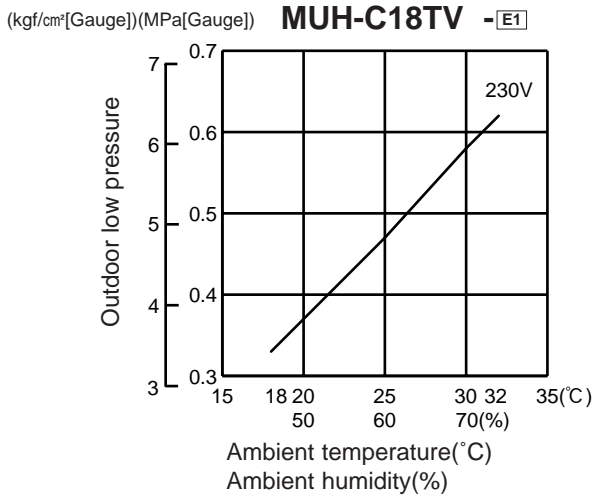
OUTDOOR LOW PRESSURE AND OUTDOOR UNIT CURRENT COOL operation

① Both indoor and outdoor unit are under the same temperature/humidity condition.

Dry-bulb temperature	Relative humidity(%)
20	50
25	60
30	70

② Air flow should be set at MAX.

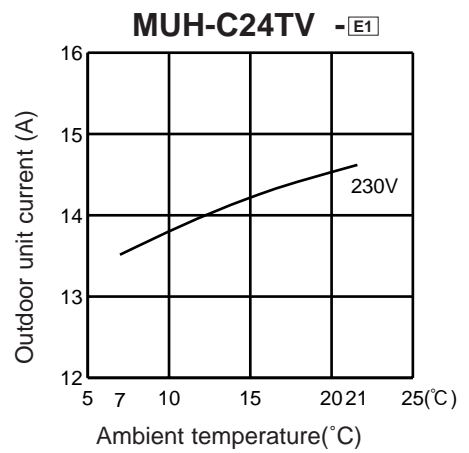
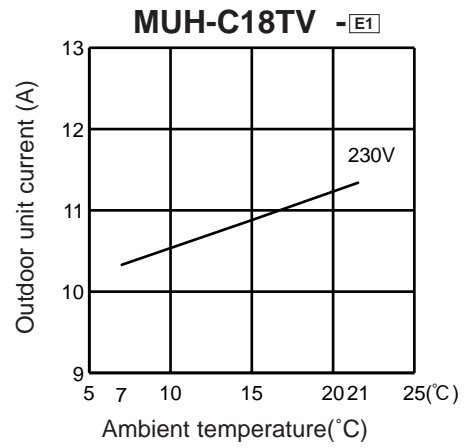
③ The unit of pressure has been changed to MPa on the international system of units(SI unit system).
The conversion factor is : **1(MPa [Gauge]) = 10.2(kgf/cm² [Gauge])**



HEAT operation

Condition indoor: Dry bulb temperature 20.0°C
Wet bulb temperature 14.5°C

Outdoor: Dry bulb temperature 7, 15, 20°C
Wet bulb temperature 6, 12, 14.5°C



PERFORMANCE DATA HEAT operation

MSH-C18TV -[E1] : MUH-C18TV -[E1] (230V)

CAPACITY : 6.0(KW) INPUT : 2180(W)

INDOOR DB(°C)	OUTDOOR WB(°C)													
	-10		-5		0		5		10		15		20	
	Q	INPUT	Q	INPUT	Q	INPUT	Q	INPUT	Q	INPUT	Q	INPUT	Q	INPUT
15	3.78	1417	4.56	1700	5.34	1918	6.12	2071	6.90	2202	7.62	2267	8.40	2311
21	3.60	1526	4.32	1809	5.10	2006	5.82	2158	6.60	2267	7.32	2333	8.07	2420
26	3.24	1635	4.02	1918	4.74	2115	5.52	2267	6.30	2376	7.02	2442	7.80	2507

NOTE Q :Total capacity (kW) INPUT:Total power input (W) DB : Dry-bulb temperature

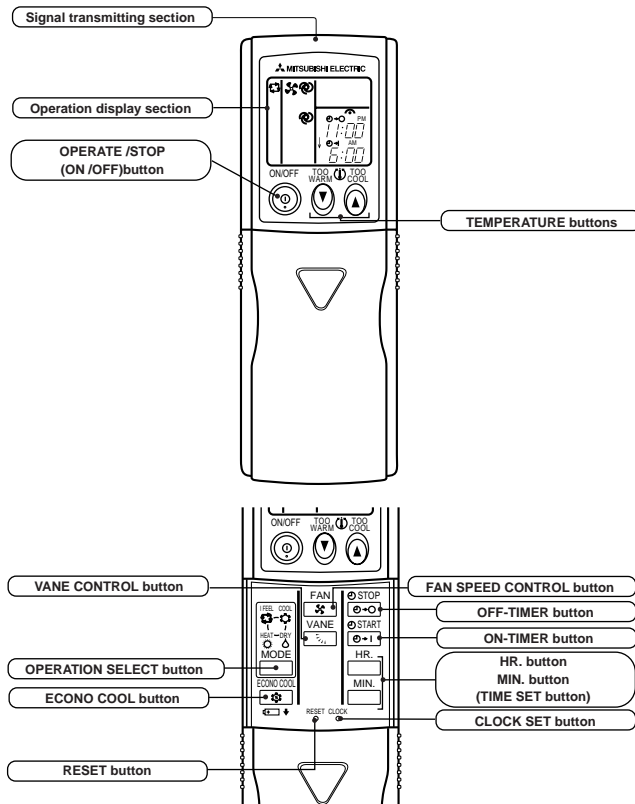
MSH-C24TV -[E1] : MUH-C24TV -[E1] (230V)

CAPACITY : 7.5(KW) INPUT : 3020(W)

INDOOR DB(°C)	OUTDOOR WB(°C)													
	-10		-5		0		5		10		15		20	
	Q	INPUT	Q	INPUT	Q	INPUT	Q	INPUT	Q	INPUT	Q	INPUT	Q	INPUT
15	4.73	1963	5.70	2356	6.68	2658	7.65	2869	8.63	3050	9.53	3141	10.50	3201
21	4.50	2114	5.40	2507	6.38	2778	7.28	2990	8.25	3141	9.15	3231	10.09	3352
26	4.05	2265	5.03	2658	5.93	2929	6.90	3141	7.88	3292	8.78	3382	9.75	3473

NOTE Q :Total capacity (kW) INPUT:Total power input (W) DB : Dry-bulb temperature

WIRELESS REMOTE CONTROLLER



MSH-C18TV -E1 MUH-C18TV -E1
MSH-C24TV -E1 MUH-C24TV -E1

Once the operation mode are set, the same operation mode can be repeated by simply turning the OPERATE/STOP (ON/OFF) button ON.
Indoor unit receives the signal with a beep tone.
When the system turns off, 3-minute time delay will operate to protect system from overload and compressor will not restart for 3 minutes.

9-1. "I FEEL CONTROL" (□) OPERATION

- (1) Press OPERATE/STOP (ON/OFF) button on the remote controller. OPERATION INDICATOR lamp of the indoor unit turns on with a beep tone.
- (2) Select mode with the OPERATION SELECT button "I FEEL CONTROL".
- (3) The operation mode is determined by the room temperature at start-up of the operation.

Initial room temperature	Mode
25°C or more	COOL mode of "I FEEL CONTROL"
23°C to 25°C	DRY mode of "I FEEL CONTROL"
less than 23°C	HEAT mode of "I FEEL CONTROL"

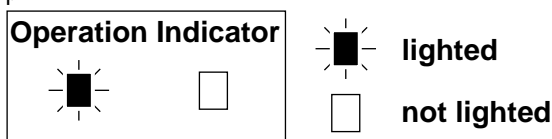
- Once the mode is fixed, the mode does not change by room temperature afterwards.
- Under the ON-TIMER (⊖→|) operation, mode is determined according to the room temperature at the set time the operation starts.
- When the system is stopped on the remote controller, and restarted within 2 hours in "I FEEL CONTROL" (□) mode, the system operates in previous mode automatically regardless of the room temperature.

INDOOR UNIT DISPLAY SECTION

Operation Indicator lamp

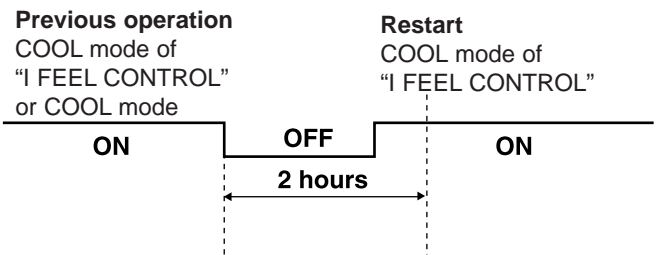
The operation indicator at the right side of the indoor unit indicates the operation state.

- The following indication does not depend on the shape of lamp.



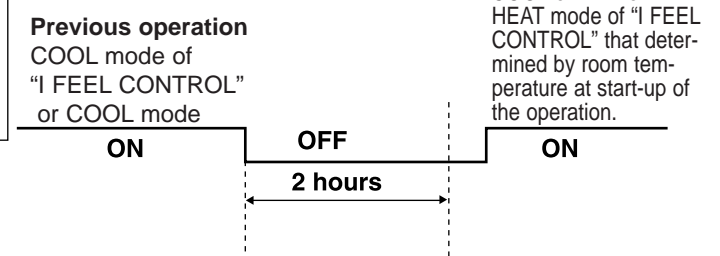
Indication	Operation state	Difference between target temperature and room temperature
	This shows that the air conditioner is operating to reach the target temperature. Please wait until the target temperature is obtained.	Approx. 2 °C or more
	This shows that the room temperature is approaching the target temperature.	Approx. 2 °C or less

Example



When the system is restarted after 2 hours and more, the operation mode is determined by the room temperature at start-up of the operation.

Example





(4) The initial set temperature is decided by the initial room temperature.

Model	Initial room temperature	Initial set temperature	
COOL mode of "I FEEL CONTROL"	26°C or more	24°C	*1
	25°C to 26°C	Initial room temperature minus 2°C	
DRY mode of "I FEEL CONTROL"	23°C to 25°C	Initial room temperature minus 2°C	
HEAT mode of "I FEEL CONTROL"	less than 23°C	26°C	

*1 When the system is restarted with the remote controller, the system operates with the previous set temperature regardless of room temperature at restart. The set temperature is calculated by the previous set temperature.

(5) TEMPERATURE buttons

In "I FEEL CONTROL" (□) mode, set temperature is decided by the microprocessor based on the room temperature. In addition, set temperature can be controlled by TOO WARM or TOO COOL buttons when you feel too cool or too warm. Each time the TOO WARM or TOO COOL button is pressed, the indoor unit receives the signal and emits a beep tone.

• Fuzzy control

When the TOO COOL or TOO WARM button is pressed, the microprocessor changes the set temperature, considering the room temperature, the frequency of pressing TOO COOL or TOO WARM button and the user's preference to heat or cool. So this is called "Fuzzy control", and works only in "I FEEL CONTROL" mode. In DRY mode of "I FEEL CONTROL", the set temperature doesn't change.



... To raise the set temperature 1~2 degrees(°C)

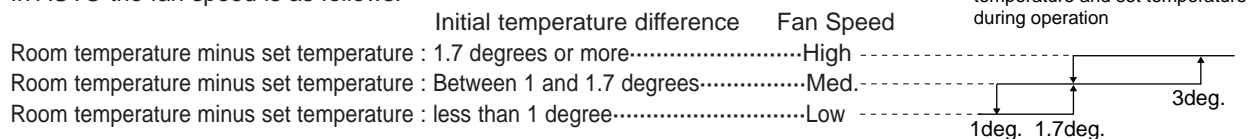


... To lower the set temperature 1~2 degrees(°C)

9-1-1. COOL mode of "I FEEL CONTROL"

1. Indoor fan speed control

Indoor fan operates at the set speed by FAN SPEED CONTROL button. In AUTO the fan speed is as follows.



2. Coil frost prevention

① Temperature control

When the indoor coil thermistor RT12 reads 3°C or below, the coil frost prevention mode starts immediately. However, the coil frost prevention doesn't work for 5 minutes since the compressor has started. The indoor fan operates at the set speed and the compressor stops for 5 minutes. After that, if RT12 still reads below 3°C this mode prolonged until the RT12 reads over 3°C.

② Time control

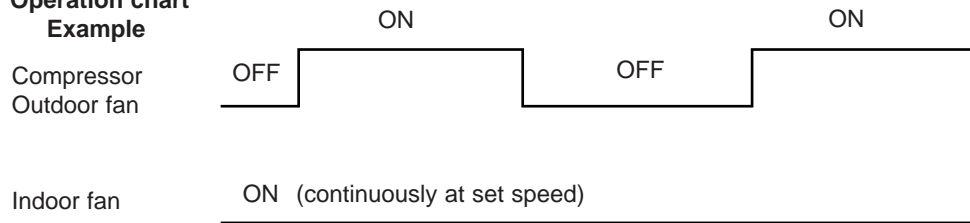
When the three conditions as follows have been satisfied for 1 hour and 45 minutes, compressor stops for 3 minutes.

- a. Compressor has been continuously operating.
- b. Indoor fan speed is Low or Med..
- c. Room temperature is below 26°C.

When compressor stops, the accumulated time is cancelled and when compressor restarts, time counting starts from the beginning.

Time counting also stops temporarily when the indoor fan speed becomes High or the room temperature exceeds 26°C. However, when two of the above conditions (b.and c.) are satisfied again. Time accumulation is resumed.

Operation chart Example



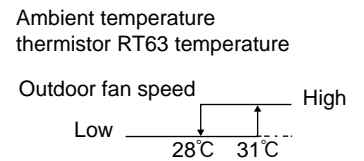
3. Outdoor fan control <MSH-C24TV only>

Outdoor fan speed is controlled according to the temperature of ambient temperature thermistor RT63.

Outdoor fan Low operation : When the outside temperature decreases to 28°C or less. Until the outside temperature goes to 31°C or more.

Outdoor fan High operation : Until the outside temperature decreases to 28°C or less. When the outside temperature goes to 31°C or more.

NOTE : If the temperature of RT63 reads from 28°C to 31°C at the air conditioner starting, outdoor fan speed is High.



9-1-2. DRY mode of "I FEEL CONTROL"

The system for dry operation uses the same refrigerant circuit as the cooling circuit.

The compressor and the indoor fan are controlled by the room temperature.

By such controls, indoor flow amounts will be reduced in order to lower humidity without much room temperature decrease.

1. Indoor fan speed control

Indoor fan operates at the set speed by FAN SPEED CONTROL button.

However, in AUTO fan operation, fan speed becomes Low.

2. The operation of the compressor and indoor/ outdoor fan

Compressor operates by room temperature control and time control.

Set temperature is controlled to fall 2°C from initial room temperature.

Indoor fan and outdoor fan operate in the same cycle as the compressor.

•When the room temperature is 23°C or over:

When the thermostat is ON, the compressor repeats 8 minutes ON and 3 minutes OFF.

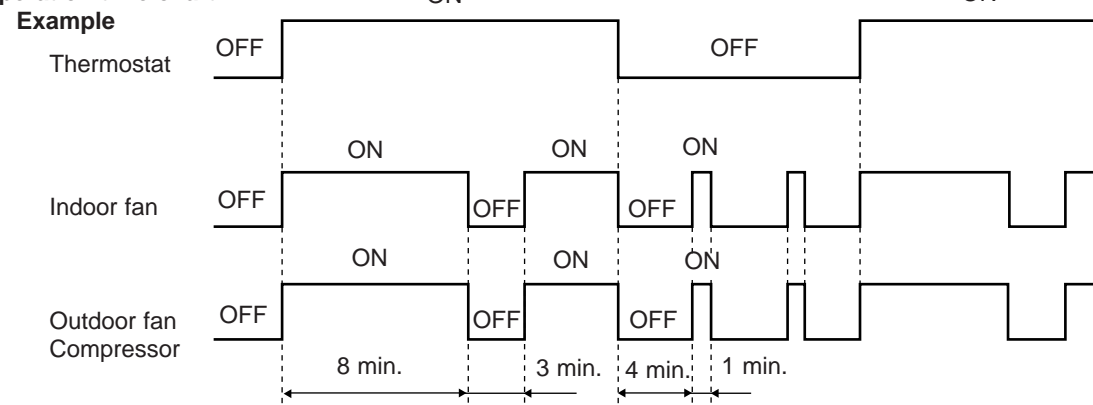
When the thermostat is OFF, the compressor repeats 4 minutes OFF and 1 minute ON.

•When the room temperature is under 23°C.

When the thermostat is ON, the compressor repeats 2 minutes ON and 3 minutes OFF.

When the thermostat is OFF, the compressor repeats 4 minutes OFF and 1 minute ON.

Operation time chart Example



3. Coil frost prevention

• The operation is as same as coil frost prevention during COOL mode of "I FEEL CONTROL".

• Indoor fan operates at the set speed and the compressor stops for 5 minutes, because protection(Coil frost prevention) has the priority.

However, when coil frost prevention works while the compressor is not operating, it's speed becomes Low.

4. Outdoor fan control <MSH-C24TV only>

Outdoor fan control is as same as one of COOL mode of "I FEEL CONTROL".

9-1-3. HEAT mode of "I FEEL CONTROL"

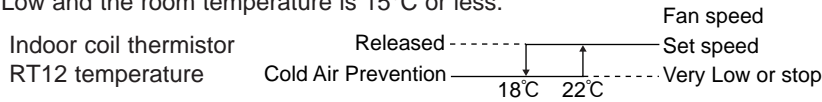
1. Indoor fan speed control

(1) In AUTO the fan speed is as follows.

Initial temperature difference	Fan speed	Difference between room temperature and set temperature during operation
Set temperature minus room temperature: 2 degrees or more	High	2deg. 4deg.
Set temperature minus room temperature: Between 1 and 2 degrees	Med.	1deg. 1.7deg.
Set temperature minus room temperature: less than 1 degree	Low	

(2) Cold air prevention control

The fan runs at set speed when the indoor coil thermistor RT12 temperature exceeds 22°C. The fan operates at Very Low when the temperature of indoor coil thermistor RT12 is below 18°C. But the fan stops when the indoor fan operates at Very Low and the room temperature is 15°C or less.



NOTE : If the temperature of RT12 reads from 18°C to 22°C at the air conditioner starting and also after defrosting, this control works.

(3) Warm air control.

When compressor starts in heating operation or after defrosting, the fan changes the speed due to the indoor coil thermistor RT12 temperature to blow out warm air.

After releasing of cold air prevention, when the indoor coil thermistor RT12 temperature is 37°C or above, the fan speed shifts to the set speed, and when the fan speed is changed by the remote controller, the fan speed is the set speed. When the indoor coil thermistor RT12 temperature is less than 37°C, the fan speed is controlled by time as below.

<Time condition>	<Indoor fan speed>
less than 2 minutes	Low
2 minutes to 4 minutes	Med.
4 minutes or more	High

The upper limit of the fan speed is the set speed.

If the thermostat turns off, this operation changes to flow soft control.

(4) Flow soft control

After the thermostat turns off, the indoor fan operates at Very Low.

NOTE : When the thermostat turns on, the fan operates at the set speed. Due to the cold air prevention control, the fan does not start at set speed until the indoor coil thermistor RT12 reads 22°C or more.

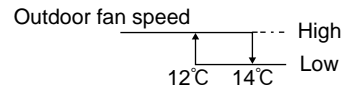
2. Outdoor fan control <MSH-C24TV only>

Outdoor fan speed is controlled according to the temperature of ambient temperature thermistor RT63.

Outdoor fan Low operation : Until the outside temperature decreases to 12°C. Ambient temperature thermistor RT63 temperature

When the outside temperature goes to 14°C or more.

Outdoor fan High operation : When the outside temperature decreases to 12°C or less. Until the outside temperature goes to 14°C.

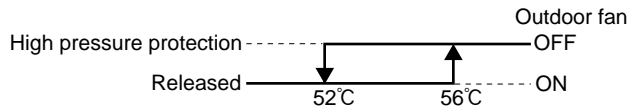


3. High pressure protection

During heating operation, the outdoor fan motor is controlled by the temperature of indoor coil thermistor RT12 for excess rise protection of compressor discharge pressure.

Outdoor fan OFF : 56°C

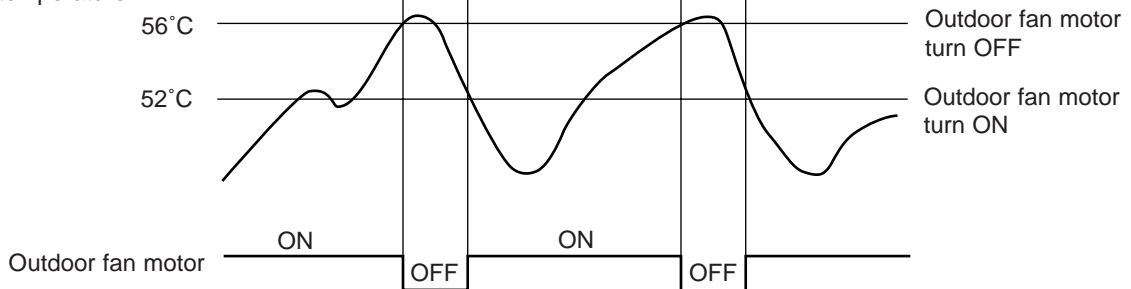
Outdoor fan ON : 52°C



High pressure protection chart

Example

Indoor coil thermistor RT12 temperature



NOTE 1 During high pressure protection and for 4 minutes and 15 seconds (MUH-C18TV)/ 10 seconds (MUH-C24TV) after high pressure protection, defrosting of outdoor heat exchanger is not detected by the defrost thermistor RT61.

4. Defrosting

Defrosting of outdoor heat exchanger is controlled by deicer P.C. board, with detection by the defrost thermistor RT61.

(1) Starting conditions of defrost

When all conditions of a) ~ c) are satisfied, the defrosting operation starts.

- a) Under the heat operation, the compressor cumulative operation time exceeds 40 minutes without the defrosting operation working.
- b) The defrost thermistor RT61 reads -2.7°C or less (MSH-C18TV) / -2.0°C or less (MSH-C24TV).
- c) After releasing the high pressure protection 4 minutes and 15 seconds (MSH-C18TV) / 10 seconds (MSH-C24TV) have elapsed.

(2) Releasing conditions of defrost

When the condition d) or e) is satisfied, the defrosting operation stops.

- d) The defrost thermistor RT61 reads 16.3°C or more (MSH-C18TV) / 20.0°C or more (MSH-C24TV).
- e) The defrosting time exceeds 10 minutes.

(3) Defrosting time chart

Defrost thermistor RT61

20.0°C or more (MSH-C24TV)

16.3°C or more (MSH-C18TV)

-2.0°C or less (MSH-C24TV)

-2.7°C or less (MSH-C18TV)

Outdoor 52C
contactor(Compressor)

ON

OFF

X62
(R.V. coil)

ON

OFF

15 sec.

30 sec.

30 sec.

5 sec.

SR61
Outdoor fan

ON

OFF

(MSH-C24TV)

(MSH-C18TV)

Defrost
counter

ON

OFF

Max 10 min.

Indoor fan

ON

Very Low

OFF

NOTE

Indoor vane

Horizontal

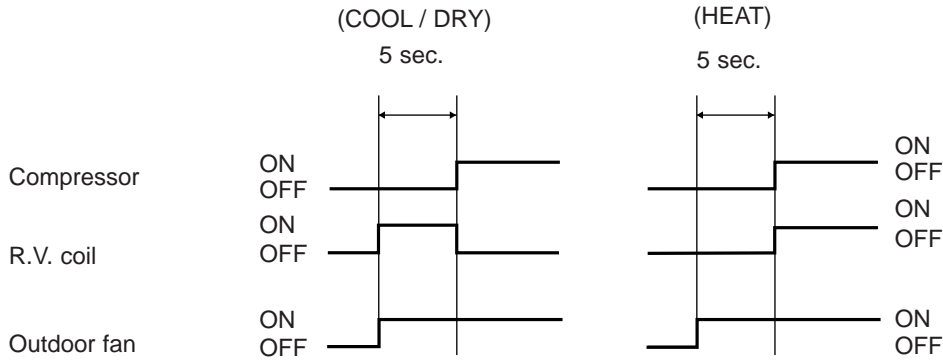
Set position

- NOTE**
- When the indoor coil thermistor RT12 reads above 18°C , indoor fan operates at Very Low for 30 seconds.
 - When the indoor coil thermistor RT12 reads 18°C or less, the indoor fan stops.

5. R.V. coil control

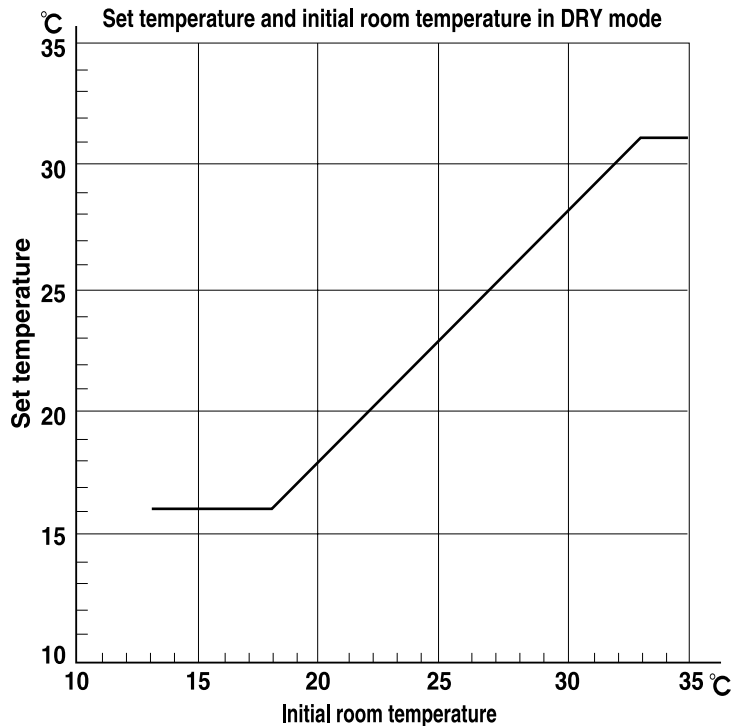
- Heating ON
- Cooling OFF
- Dry OFF

NOTE: The 4-way valve reverses for 5 seconds right before start-up of the compressor.



9-2. COOL (❄) OPERATION

- (1) Press OPERATE/STOP (ON/OFF) button.
OPERATION INDICATOR lamp of the indoor unit turns on with a beep tone.
- (2) Select COOL mode with the OPERATION SELECT button.
- (3) Press the TEMPERATURE buttons (TOO WARM or TOO COOL button) to select the desired temperature.
The setting range is 16 ~ 31°C.
* Indoor fan continues to operate regardless of thermostat's OFF-ON at set speed.
* Coil frost prevention is as same as COOL mode of "I FEEL CONTROL".



9-3. DRY (△) OPERATION

- (1) Press OPERATE/STOP (ON/OFF) button.
OPERATION INDICATOR lamp of the indoor unit turns on with a beep tone.
- (2) Select DRY mode with the OPERATION SELECT button.
- (3) The microprocessor reads the room temperature and determines the set temperature. Set temperature is as shown on the right chart. Thermostat (SET TEMP.) does not work. The other operations are same as DRY mode of "I FEEL CONTROL".
- (4) DRY operation will not function when the room temperature is 13°C or below.

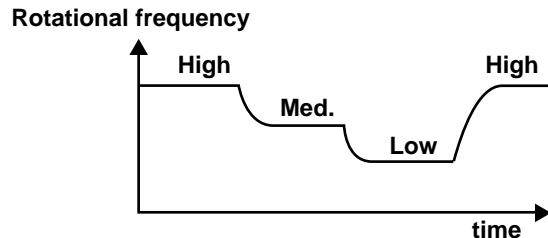
9-4. HEAT (☀) OPERATION

- (1) Press OPERATE/STOP (ON/OFF) button.
OPERATION INDICATOR lamp of the indoor unit turns on with a beep tone.
- (2) Select HEAT mode with the OPERATION SELECT button.
- (3) Press TEMPERATURE buttons (TOO WARM or TOO COOL button) to select the desired temperature.
The setting range is 16 ~ 31°C.
- (4) Indoor fan speed control, high pressure protection, defrosting, R.V. coil control are the same as HEAT mode of "I FEEL CONTROL".

9-5. FAN MOTOR CONTROL

(1) Rotational frequency feedback control

The indoor fan motor is equipped with a rotational frequency sensor, and outputs signal to the microprocessor to feed back the rotational frequency. Comparing the current rotational frequency with the target rotational frequency (High,Med.,Low), the microprocessor controls IC141 and adjusts fan motor electric current to make the current rotational frequency close to the target rotational frequency. With this control, when the fan speed is switched, the rotational frequency changes smoothly.



(2) Fan motor lock-up protection

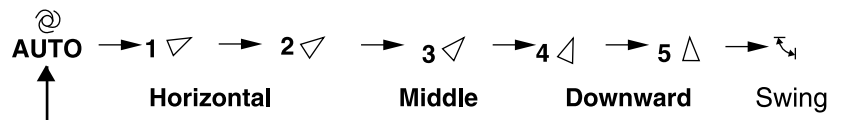
When the rotational frequency feedback signal has not output for 12 seconds, (or when the microprocessor cannot detect the signal for 12 seconds) the fan motor is regarded locked-up. Then the electric current to the fan motor is shut off. 3 minutes later, the electric current is applied to the fan motor again. During the fan motor lock-up, the OPERATION INDICATOR Indicator lamp flashes on and off to show the fan motor abnormality. (Refer to page 37.)

9-6. AUTO VANE OPERATION

(1) Vane motor drive

These models are equipped with a stepping motor for the horizontal vane. The rotating direction, speed, and angle of the motor are controlled by pulse signals (approx. 12V) transmitted from indoor microprocessor.

(2) The horizontal vane angle and mode changes as follows by pressing the VANE CONTROL button.



(3) Positioning

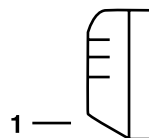
The vane is once pressed to the vane stopper below to confirm the standard position and then set to the desired angle. Confirming of standard position is performed in case of follows.

- When the OPERATE/STOP (ON/OFF) button is pressed.
- When the vane control is changed from AUTO to MANUAL.
- When the SWING is finished.
- When the test run starts.
- When the power supply turns ON.

(4) VANE AUTO (Ⓐ) mode

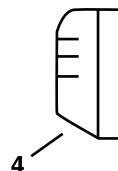
In VANE AUTO mode, the microprocessor automatically determines the vane angle and operation to make the optimum room-temperature distribution.

① In COOL and DRY operation



Vane angle is fixed to Angle 1.

② In HEAT operation



Vane angle is fixed to Angle 4.

(5) STOP (operation OFF) and ON-TIMER standby.


When the following cases occur, the horizontal vane returns to the closed position.

- (a) When the OPERATE/STOP (ON/OFF) button is pressed (POWER OFF).
- (b) When the operation is stopped by the emergency operation.
- (c) When the ON-TIMER is on standby.

(6) Dew prevention

During COOL or DRY operation at Vane Angle 4 or 5 when the cumulative operation time of compressor exceeds 1 hour, the vane angle automatically changes to Angle 1 for dew prevention.

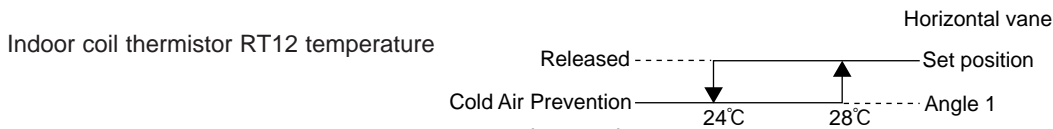
(7) SWING MODE ()

By selecting SWING mode with the VANE CONTROL button, the horizontal vane swings vertically. The remote controller displays “  ”.


(8) Cold air prevention in HEAT operation

When any of the following conditions occurs in HEAT operation, the vane angle changes to Angle 1 automatically to prevent cold air blowing on users.

- ① Compressor is not operating.
- ② Defrosting is performed.
- ③ Indoor coil thermistor RT12 reads 24°C or below.
- ④ Indoor coil thermistor RT12 temperature is raising from 24°C or below, but it does not exceed 28°C.



NOTE: If the temperature of RT12 reads from 27°C to 28°C at the air conditioner starting, this control works.

(9) ECONO COOL () operation (ECONOmical operation)

When the ECONO COOL button is pressed in COOL mode, set temperature is automatically set 2°C higher than that in COOL mode.

Also the horizontal vane swings in various cycle according to the temperature of indoor heat exchanger(RT12).

SWING operation makes you feel cooler than set temperature. So, even though the set temperature is higher than that in COOL mode, the air conditioner can keep comfort. As a result, energy can be saved.

ECONO COOL operation is cancelled when the ECONO COOL button is pressed once again or VANE CONTROL button is pressed or change to other operation mode.

NOTE : ECONO COOL operation not work in COOL mode of “I FEEL CONTROL”.

SWING operation

In swing operation of ECONO COOL operation air flow is initially blew out upward(levelly).

According to the temperature of indoor coil thermistor RT12 at starting of this operation, next downward blow time is decided. Then when the downward blow has been finished, next upward blow time is decided.

For initial 10 minutes the swing operation is performed in table G~H for quick cooling(but G : RT 12 is 24°C or less).

Also, after 10 minutes when the difference of set temperature and room temperature is more than 2°C, the swing operation is performed in table D~H for more cooling(but D: RT12 is 20°C or less).

The air conditioner repeats the swing operation in various cycle as follows.

	Temperature of indoor coil thermistor RT12	Downward blow time (sec.)	Upward(level) blow time (sec.)
A	15°C or less	2	23
B	15°C to 17°C	5	20
C	17°C to 18°C	8	17
D	18°C to 20°C	11	14
E	20°C to 21°C	14	11
F	21°C to 22°C	17	8
G	22°C to 24°C	20	5
H	more than 24°C	23	2

9-7. TIMER OPERATION

1. How to set the timer

- (1) Press OPERATE/STOP (ON/OFF) button to start the air conditioner.
- (2) Check that the current time is set correctly.

NOTE : Timer operation will not work without setting the current time. Initially “AM0:00” blinks at the current time display of TIME MONITOR, so set the current time correctly with CLOCK SET button.

- (3) Press TIMER CONTROL button to select the operation.

“ON-TIMER” button... AUTO START operation (ON timer)

“OFF-TIMER” button... AUTO STOP operation (OFF timer)

- (4) Press HR. and MIN. button to set the timer. Time setting is 10-minute units.

HR. and MIN. button will work when “⊕→|” or “⊕→○” mark is flashing.

These marks disappear in 1 minute.

After setting the ON timer, check that OPERATION INDICATOR lamp of the indoor unit lights.

NOTE1 : Be sure to place the remote controller at the position where its signal can reach the air conditioner even during TIMER operation, or the set time may deviate within the range of about 10 minutes.

NOTE2 : Reset the timer in the following cases, or the set time may deviate and other malfunctions may occur.

- A power failure occurs.
- The circuit breaker functions.

2. Cancel

TIMER setting can be cancelled with the ON/OFF TIMER buttons.

To cancel the ON timer, press the “ON-TIMER” button.

To cancel the OFF timer, press the “OFF-TIMER” button.

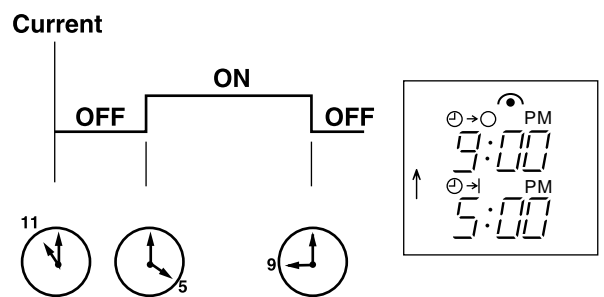
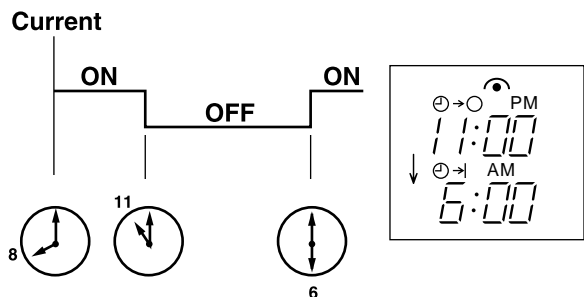
TIMER is cancelled and the display of set time disappears.

PROGRAM TIMER

- The OFF timer and ON timer can be used in combination.
- “↑” and “↓” display shows the order of the OFF timer and ON timer operation.

(Example 1) The current time is 8:00 PM.
The unit turns off at 11:00 PM, and on at 6:00 AM.

(Example 2) The current time is 11:00 AM.
The unit turns on at 5:00 PM, and off at 9:00 PM.



NOTE : TIMER setting will be cancelled by power failure or breaker functioning.

9-8. EMERGENCY-TEST OPERATION

In case of test run operation or emergency operation, use the EMERGENCY OPERATION switch on the front of the indoor unit. Emergency operation is available when the remote controller is missing, has failed or the batteries of remote controller run down. The unit will start and the OPERATION INDICATOR lamp will light.

The first 30 minutes of operation is the test run operation. This operation is for servicing. The indoor fan speed runs at High speed and the system is in continuous operation. (The thermostat is ON.)

After 30 minutes of test run operation the system shifts to EMERGENCY COOL / HEAT MODE with a set temperature of 24°C.

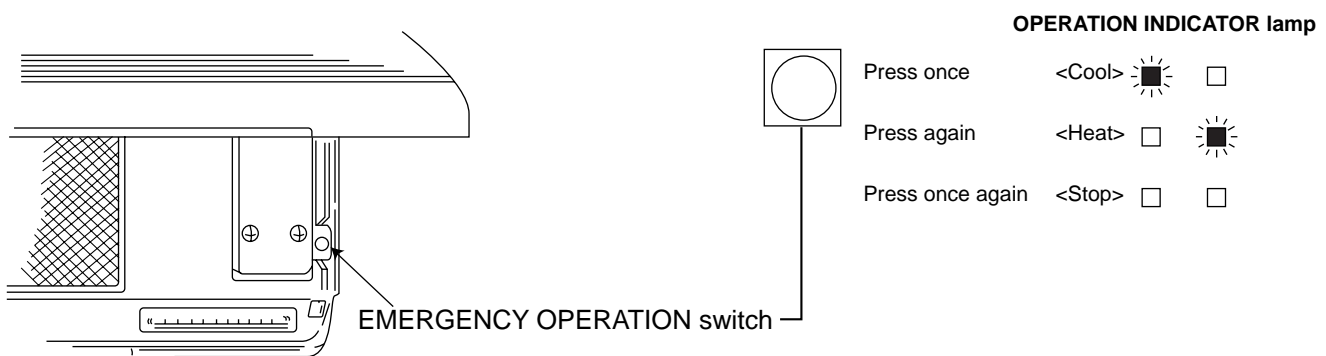
The fan speed shifts to Med. speed.

The coil frost prevention works even in emergency operation, and defrosting too.

In the test run or emergency operation, the horizontal vane operates in VANE AUTO (@) mode.

Emergency operation continues until the EMERGENCY OPERATION switch is pressed once or twice or the unit receives any signal from the remote controller. In case of latter normal operation will start.

NOTE : Do not press the EMERGENCY OPERATION switch during normal operation.



MSH-C18TV -[E1] **MUH-C18TV** -[E1]

MSH-C24TV -[E1] **MUH-C24TV** -[E1]

10-1. COMPULSORY DEFROST MODE FOR SERVICE

By short circuit of the JP607 and R853(MSH-C18TV)/JPG1 and R871(MSH-C24TV) on the outdoor deicer P.C. board, defrosting mode can be accomplished regardless of the defrost interval restriction. (Refer to page 45 or 46.)

Defrost thermistor RT61 must read below -2.7°C (MSH-C18TV)/ -2.0°C (MSH-C24TV).

10-2. CHANGE IN DEFROST SETTING

MSH-C18TV

<JPC> When the JPC wire of the deicer P.C. board is cut, the defrost interval time will be changed. (Refer to page 45.)

MSH-C24TV

<JRF> When the JRF wire of the deicer P.C. board is cut, the defrost interval time will be changed. (Refer to page 46.)

Model	Jumper wire	Change point
MUH-C18TV - [E1]	JPC	Defrost interval time changes from 40 minutes to 15 minutes.

Model	Jumper wire	Change point
MUH-C24TV - [E1]	JRF	Defrost interval time changes from 40 minutes to 15 minutes.

10-3. TIMER SHORT MODE

For service, set time can be shortened by short circuit of JPG and JPS the electronic control P.C. board.

The time will be shortened as follows.

Set time : 1 minute → 1-second

Set time : 3 minute → 3-second (It takes 3 minutes for the compressor to start operation. However, the starting time is shortened by short circuit of JPG and JPS.)

10-4. P.C. BOARD MODIFICATION FOR INDIVIDUAL OPERATION

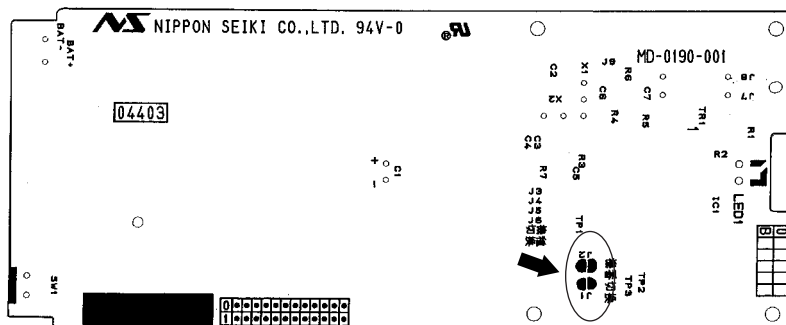
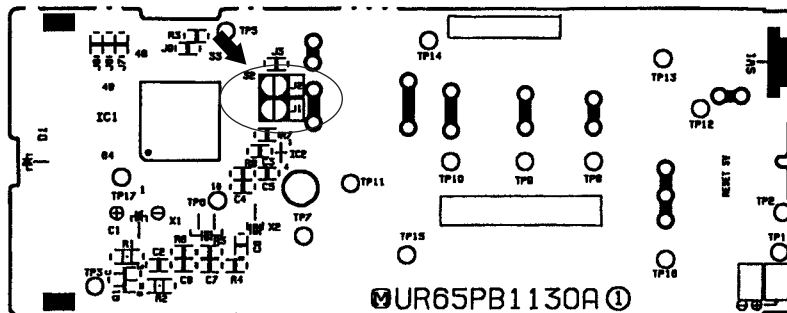
A maximum of 4 indoor units with wireless remote controllers can be used in a room.

In this case, to operate each indoor unit individually by each remote controller, P.C. boards of remote controller must be modified according to the number of the indoor unit.

How to modify the remote controller P.C. board

Remove batteries before modification.

The board has a print as shown below :



NOTE : For remodelling, take out the batteries and push the OPERATE/STOP(ON/OFF)button twice or 3 times at first. After finish remodelling, put back the batteries then push the RESET button.

The P.C. board has the print "J1" and "J2". Solder "J1" and "J2" according to the number of indoor unit as shown in Table 2. After modification, push the RESET button.

Table 1

	1 unit operation	2 units operation	3 units operation	4 units operation
No. 1 unit	No modification	Same as at left	Same as at left	Same as at left
No. 2 unit	–	Solder J1	Same as at left	Same as at left
No. 3 unit	–	–	Solder J2	Same as at left
No. 4 unit	–	–	–	Solder both J1 and J2

NOTE : At power supply failure or installation, indoor unit deletes the memory about remote controller. When the power supply is turned on and indoor unit receives the first signals from the remote controller, the remote controller number is designated as the indoor unit number. Therefore at and after the second time indoor unit accepts the remote controller of the initial setting number.

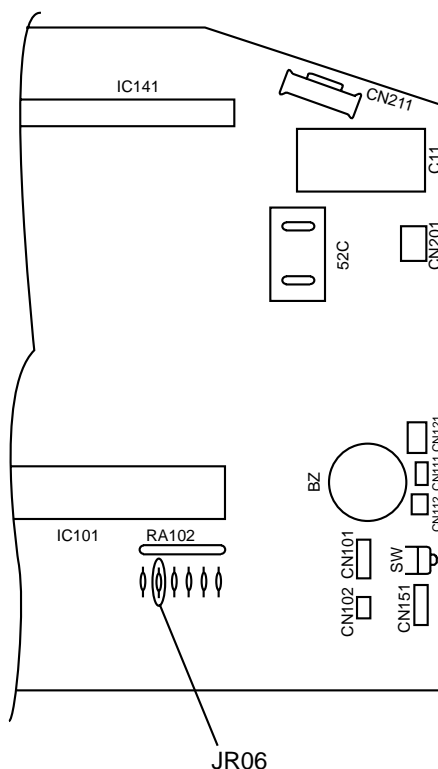
At setting - error, turn the power supply off to cancel the individual operation and then turn the power supply on to restart the setting.

10-5. AUTO RESTART FUNCTION

When the indoor unit is controlled with the remote controller, the operation mode, set temperature, and the fan speed are memorized by the indoor electronic control P.C.board. The “AUTO RESTART FUNCTION” sets to work the moment power has restored after power failure. Then, the unit will restart automatically. However if the unit is operated in “I FEEL CONTROL” mode before power failure, the operation is not memorized. In “I FEEL CONTROL” mode, the operation is decided by the initial room temperature.

How to set “AUTO RESTART FUNCTION”

- ① Turn off the main power for the unit.
- ② Pull out the electronic control P.C. board and the display P.C.board. (Refer to page 47.)
- ③ Cut the RESISTOR JR06 on the indoor electronic control P.C.board. (Refer to page 44 .)



Operation

- ① If the main power (230V AC) has been cut, the operation settings remain.
- ② After the power is restored, the unit restarts automatically according to the memory.(However, it takes at least 3 minutes for the compressor to start running.)

NOTE

- The operation settings are memorized when 10 seconds have passed after the remote controller was operated with the remote controller.
- If main power is turned off or a power failure occurs while AUTO START/STOP timer is active ,the timer setting is cancelled.
- If the unit has been off with the remote controller before power failure, the auto restart function does not work as the power button of the remote controller is off.
- To prevent breaker off due to the rush of starting current, systematize other home appliances not to turn on at the same time.
- When some air conditioners are connected to the same supply system, if they are operated before power failure, the starting current of all the compressors may flow simultaneously at restart. Therefore, the special counter-measures are required to prevent the main voltage-drop or the rush of the starting current by adding to the system that allows the units to start one by one.

MSH-C18TV -E1 MUH-C18TV -E1
MSH-C24TV -E1 MUH-C24TV -E1

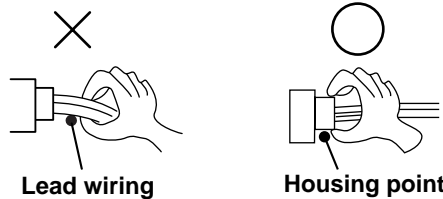
11-1. Cautions on troubleshooting

1. Before troubleshooting, check the following:

- (1) Check the power supply voltage.
- (2) Check the indoor/outdoor connecting wire for mis-wiring.

2. Take care the following during servicing.

- (1) Before servicing the air conditioner, be sure to first turn off the remote controller to stop the main unit, and then after confirming the horizontal vane is closed, turn off the breaker and / or disconnect the power plug.
- (2) Be sure to turn OFF the power supply before removing the front panel, the cabinet, the top panel, and the electronic control P.C. board.
- (3) When removing the electronic control P.C. board, hold the edge of the board with care NOT to apply stress on the components.
- (4) When connecting or disconnecting the connectors, hold the housing of the connector. DO NOT pull the lead wires.



3. Troubleshooting procedure

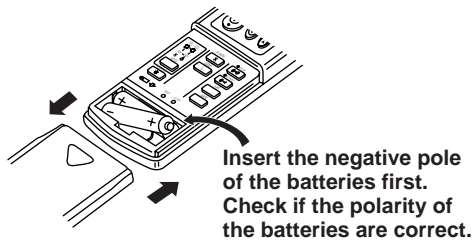
- (1) First, check if the OPERATION INDICATOR lamp on the indoor unit is flashing on and off to indicate an abnormality. To make sure, check how many times the abnormality indication is flashing on and off before starting service work.
- (2) Before servicing check that the connector and terminal are connected properly.
- (3) If the electronic control P.C. board is supposed to be defective, check the copper foil pattern for disconnection and the components for bursting and discolouration.
- (4) When troubleshooting, refer to the flow chart on page 36 and the check table on page 37.

4. How to replace batteries

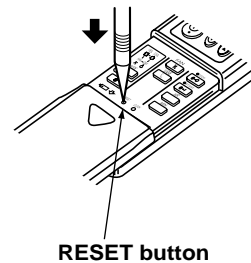
Weak batteries may cause the remote controller malfunction.

In this case, replace the batteries to operate the remote controller normally.

- ① Remove the front lid and insert batteries. Then re-attach the front lid.



- ② Press the RESET button with tip end of ball point pen or the like, and then use the remote controller.

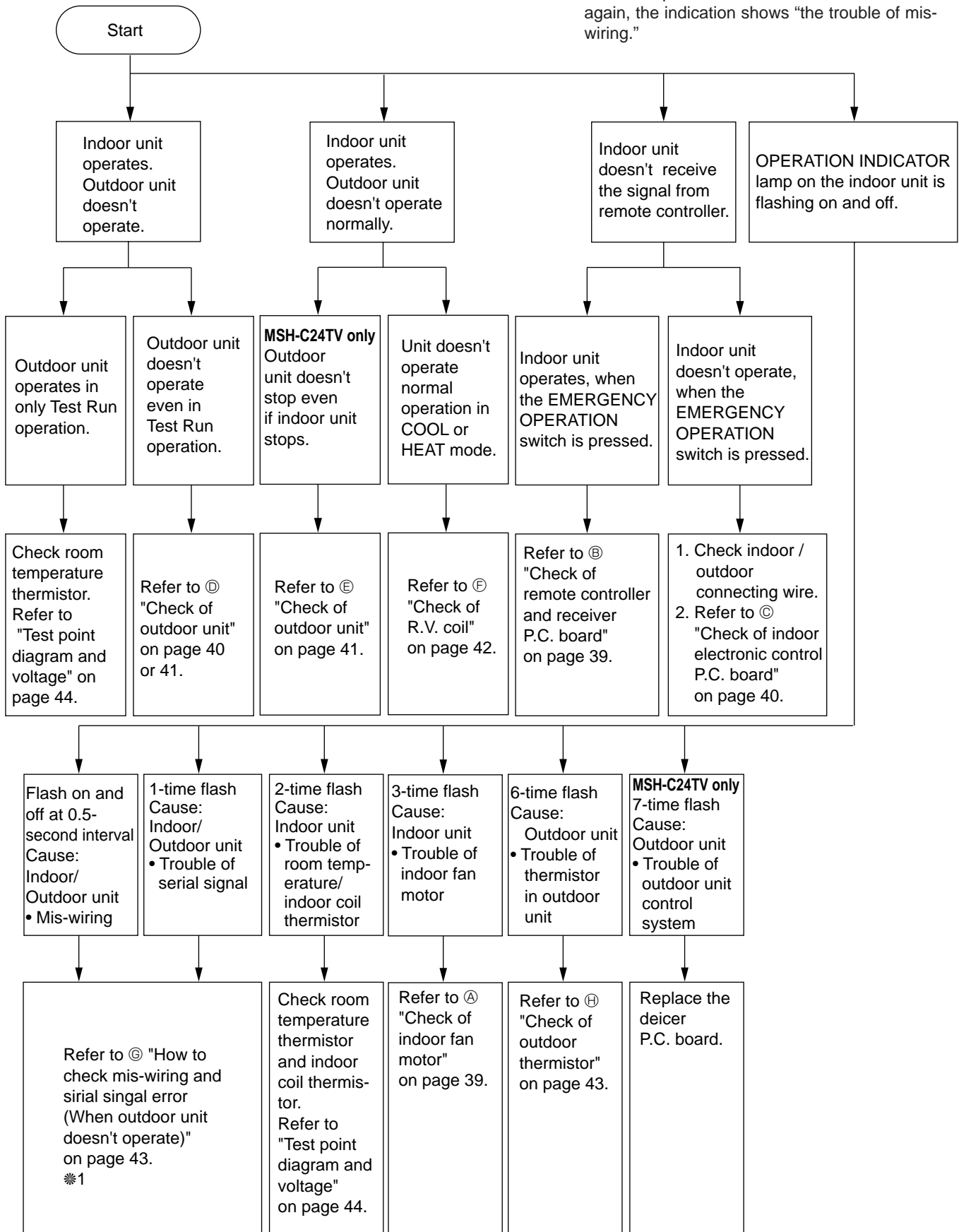


NOTE : If the RESET button is not pressed, the remote controller may not operate correctly.

11-2. Instruction of troubleshooting

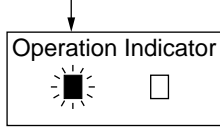
※1<The case of the trouble of the serial signal>

When the power is turned off and then turned on again, the indication shows "the trouble of mis-wiring."



1. Troubleshooting check table

- The following indication does not depend on the shape of lamp flashing



- Flashing of the OPERATION INDICATOR lamp (on the left-hand side) indicates possible abnormalities.
- The OPERATION INDICATOR lamp (on the left-hand side) is lighting during normal operation.

Before taking measures, make sure that the symptom reappears, for accurate troubleshooting.

Self check table

NO.	Abnormal point	Indication	Symptom	Detect method	Check point
1	Mis-wiring	0.5-second ON ●○○○○○ 0.5-second OFF	Outdoor unit does not run.	When serial signal stops for 4 to 5 seconds after 1st on of 52C contactor by POWER turning on.	<ul style="list-style-type: none"> ● Check wiring (visual check and conductivity check). ● Check indoor electronic control P.C.board. ● Check deicer P.C. board. ● Check electrical parts.
	Serial signal	1-time flash ●○○○○○●○○○○○●○○ 2.5-second OFF		When serial signal from outdoor unit stops for 4 to 5 seconds.	
2	Indoor coil thermistor	2-time flash ●●○○○○○●●○○○○○ 2.5-second OFF	Outdoor unit does not run.	Detect Indoor coil/room temperature thermistor short or open circuit every 8 seconds during operation.	<ul style="list-style-type: none"> ● Check resistance of thermistor. ● Re-connect connector. ● Check indoor electronic control P.C.board.
	Room temperature thermistor				
3	Indoor fan motor	3-time flash ●●●○○○○○●●●○○○○○●○○○○○ 2.5-second OFF	Indoor fan motor repeats 12 seconds ON and 3 minutes OFF. When the indoor fan motor breaks, the fan keeps stopping.	When rotational frequency feedback pulse signal is not emit during 12-second indoor fan operation.	<ul style="list-style-type: none"> ● Disconnect connector CN211 and then check connector CN121②-③ to make sure rotational frequency feedback signal of 1.5V or over exists. ● Check indoor electronic control P.C. board. ● Check indoor fan motor. ● Re-connect connector.
4	Outdoor thermistor	6-time flash ●●●●●●○○○○○○●○○○○○ 2.5-second OFF	Outdoor unit does not run	When the defrost thermistor shorts or opens after the compressor start-up.	<ul style="list-style-type: none"> ● Check deicer P.C. board. ● Check resistance of thermistor. ● Re-connect connector.
5	MSH-C24TV only Outdoor control system	7-time flash ●●●●●●●○○○○○○●○○○○○ 2.5-second OFF	Outdoor unit does not run	When nonvolatile memory data cannot be read properly on deicer P.C. board, outdoor unit stops and restarts 3 minutes later.	<ul style="list-style-type: none"> ● Replace deicer P.C. board.

2. Trouble criterion of main parts

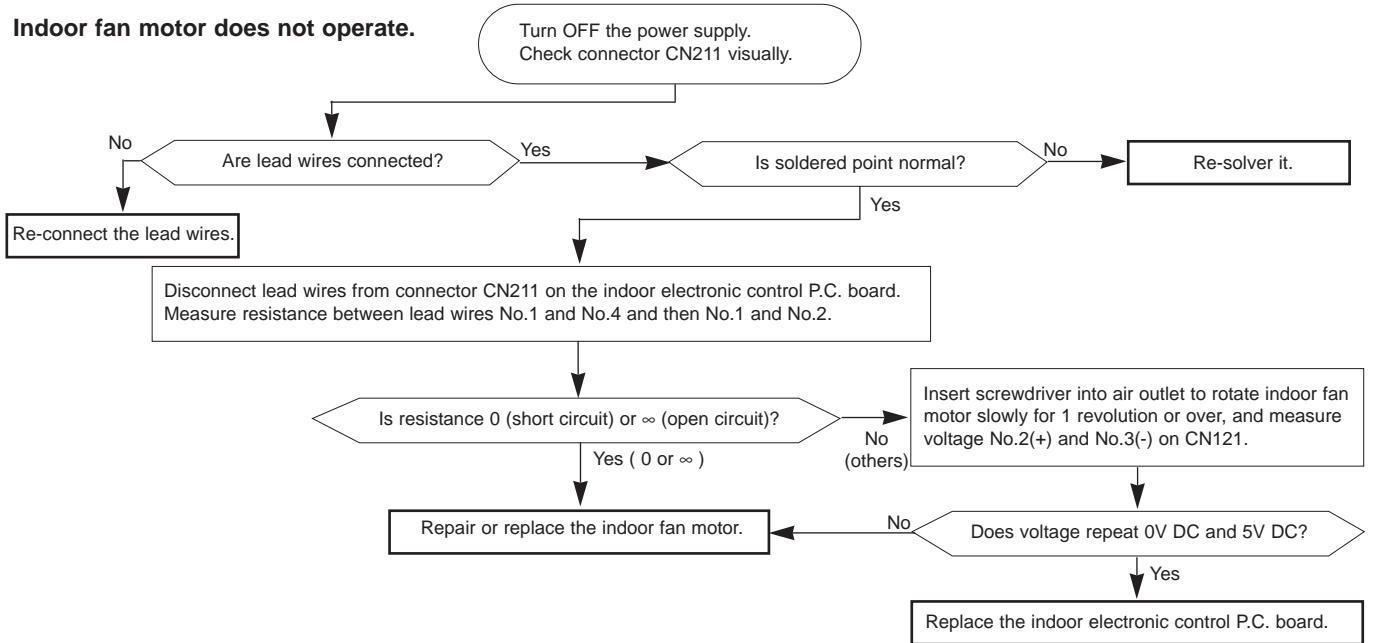
MSH-C18TV -[E1] **MUH-C18TV** -[E1]

MSH-C24TV -[E1] **MUH-C24TV** -[E1]

Part name	Check method and criterion	Figure
Room temperature thermistor(RT11)	Measure the resistance with a tester. (Part temperature 10°C ~ 30°C)	
Indoor coil thermistor(RT12)		
Defrost thermistor(RT61)	Measure the resistance with a tester. (Part temperature -10°C ~ 40°C)	
Ambient temperature thermistor(RT63)		
Compressor (MC)	Measure the resistance between the terminals with a tester. (Coil wiring temperature -10°C ~ 40°C)	
Indoor fan motor (MF)	Measure the resistance between the terminals with a tester. (Coil wiring temperature 10°C ~ 30°C)	
	Measure the voltage Power ON.	
Outdoor fan motor (MF)	Measure the resistance between the terminals with a tester. (Coil wiring temperature -10°C ~ 40°C)	MSH-C18TV MSH-C24TV
Vane motor (MV)	Measure the resistance between the terminals with a tester. (Part temperature 10°C ~ 30°C)	

Ⓐ Check of indoor fan motor

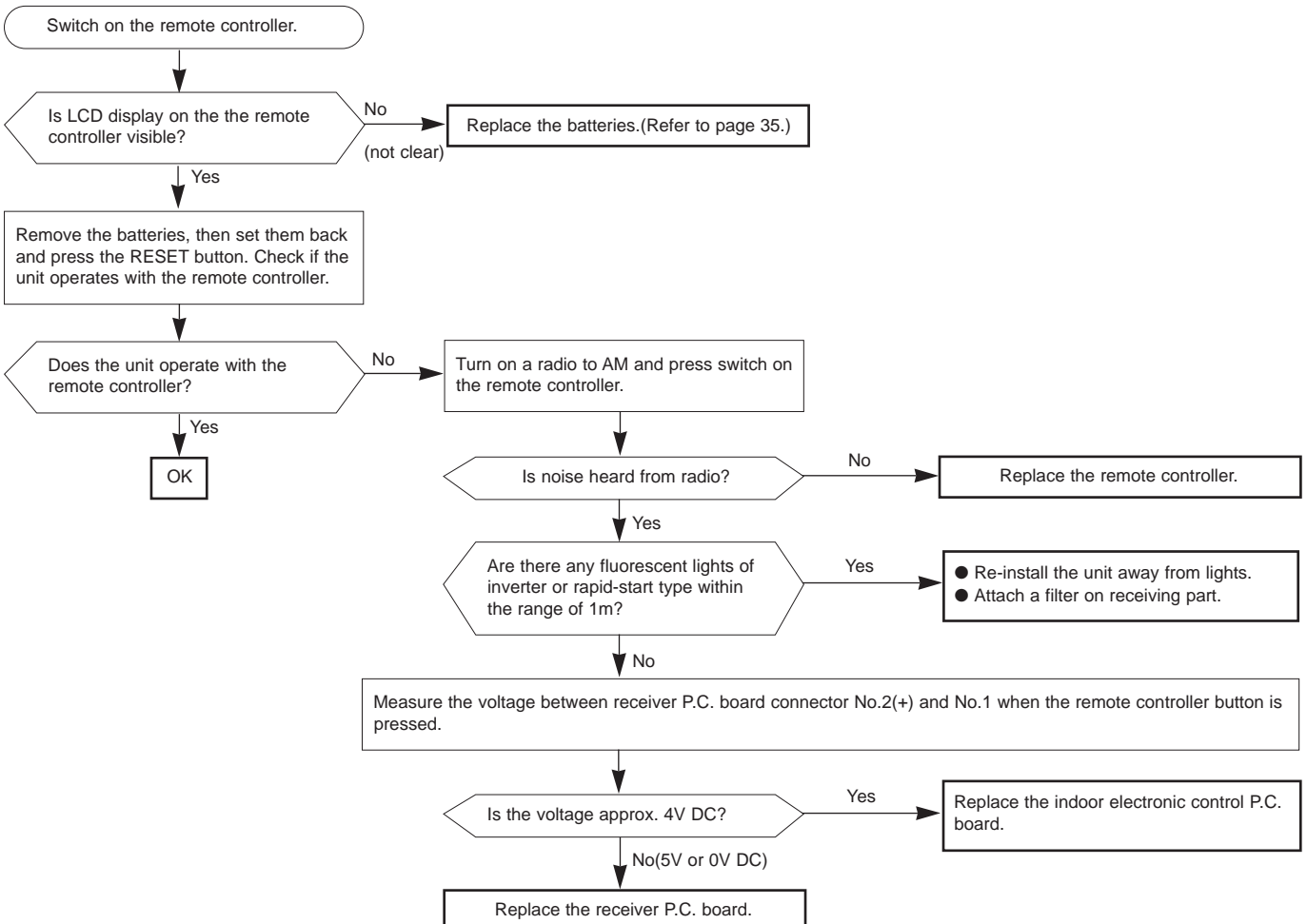
Indoor fan motor does not operate.



Ⓑ Check of remote controller and receiver P.C. board

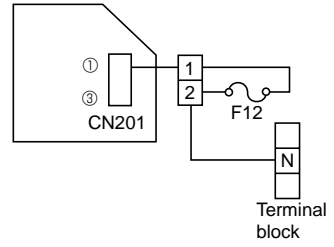
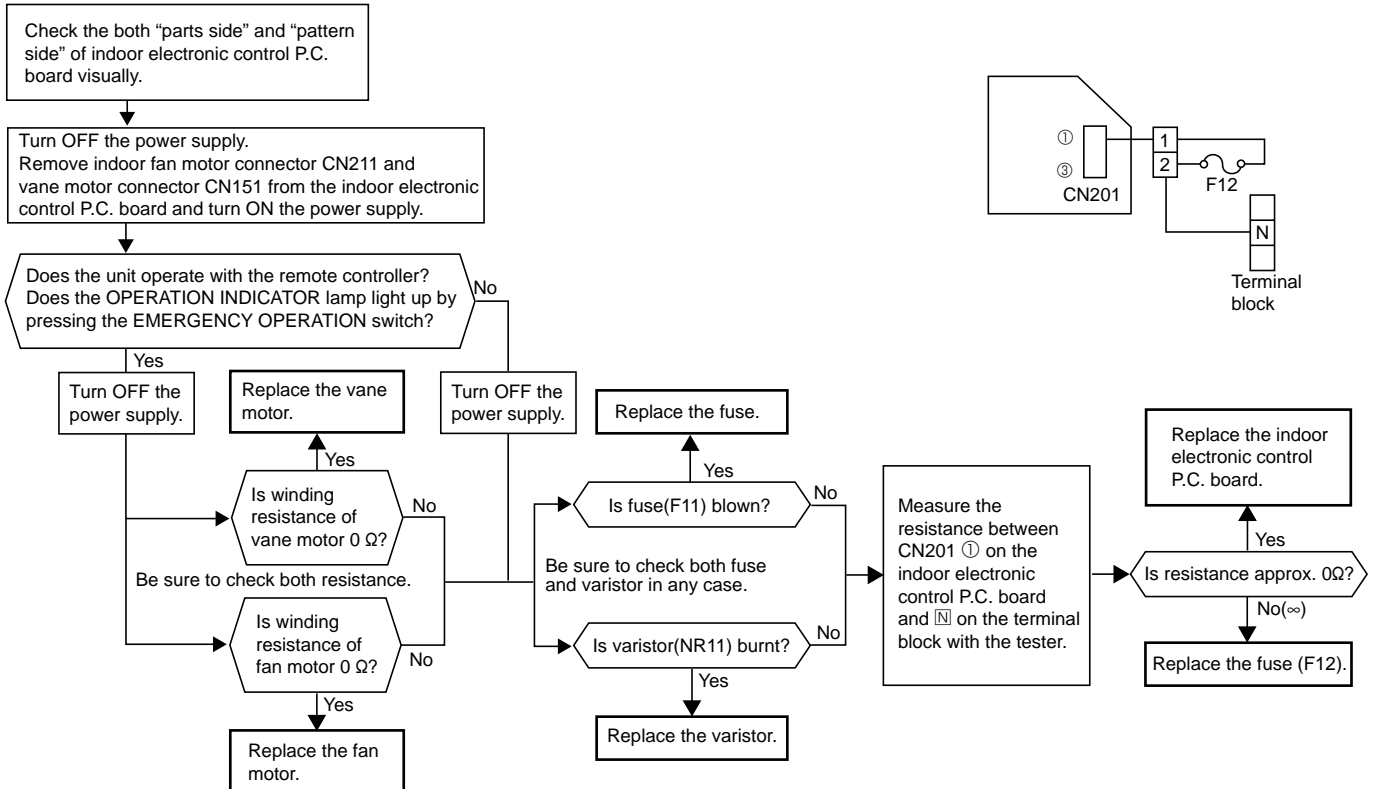
Indoor unit operates by pressing the EMERGENCY OPERATION switch, but does not operate with the remote controller.

* Check if the remote controller is exclusive for this air conditioner.



© Check of indoor electronic control P.C. board

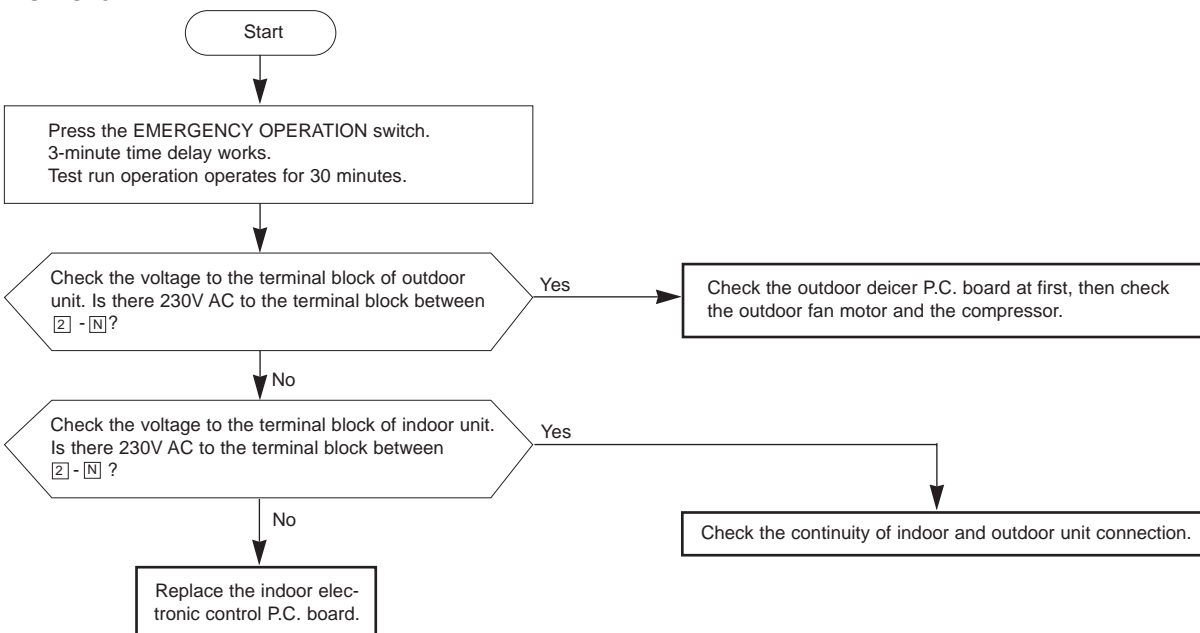
The unit doesn't operate with the remote controller. Also, the OPERATION INDICATOR lamp doesn't light up by pressing the EMERGENCY OPERATION switch.



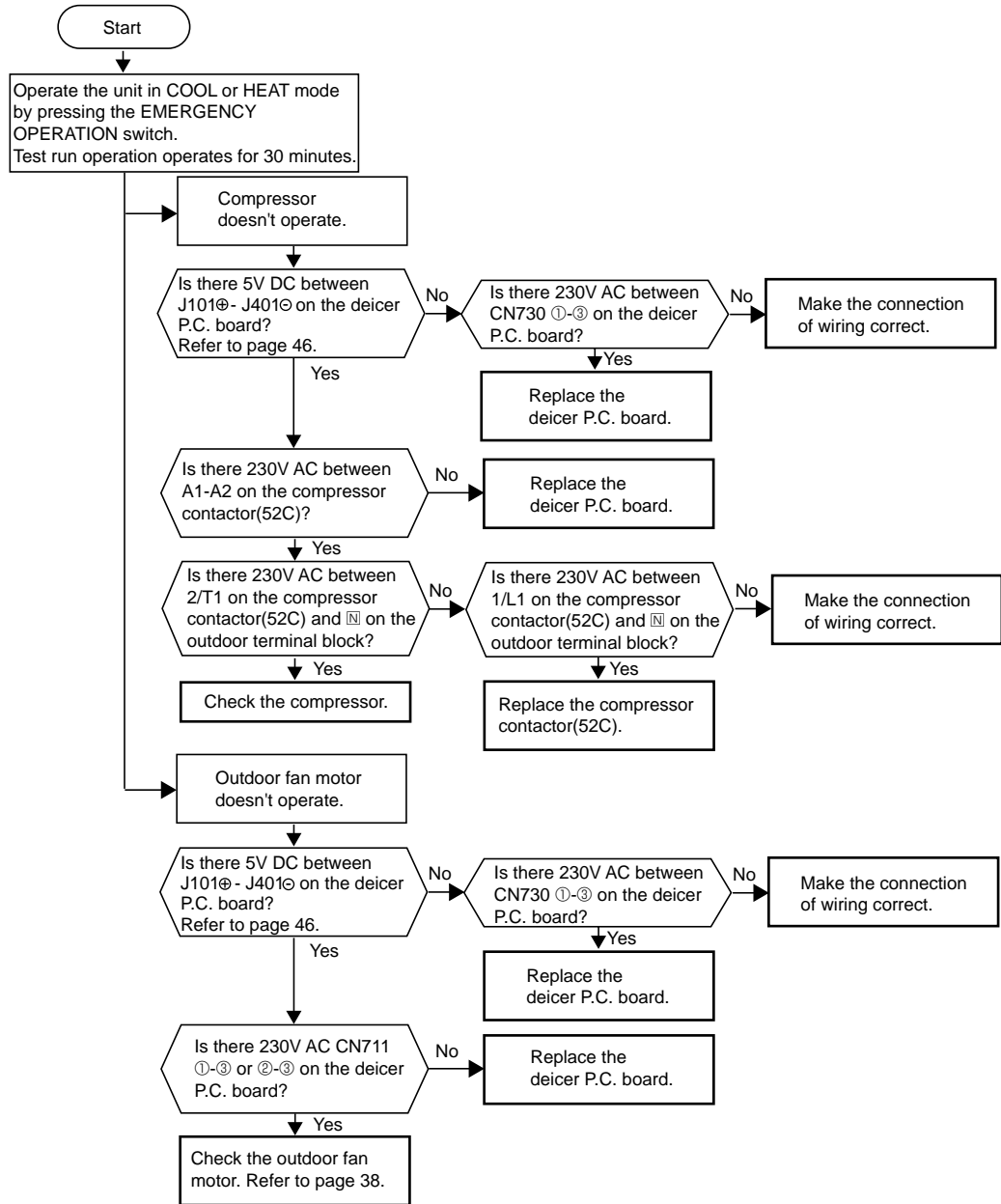
④ Check of outdoor unit

Compressor and / or outdoor fan motor doesn't operate.(Only indoor fan operates.)

MSH-C18TV



MSH-C24TV

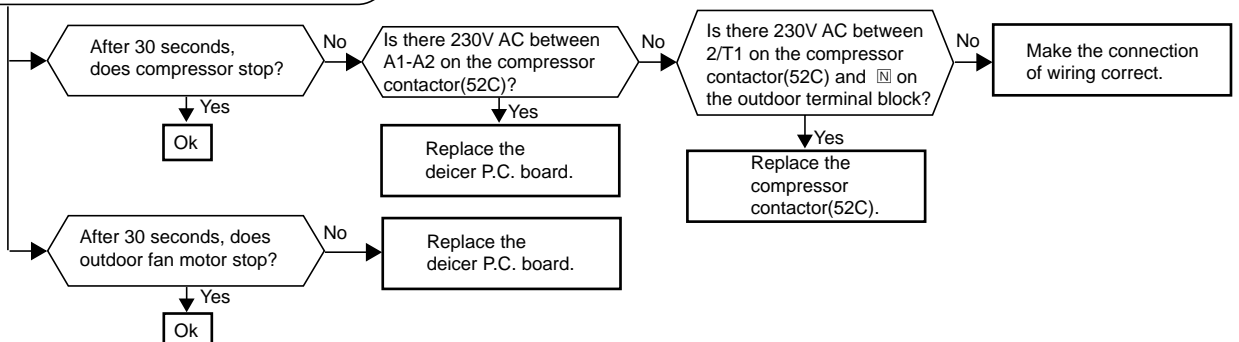


Ⓔ Check of outdoor unit

<MSH-C24TV only>

Compressor and/or outdoor fan motor doesn't stop.

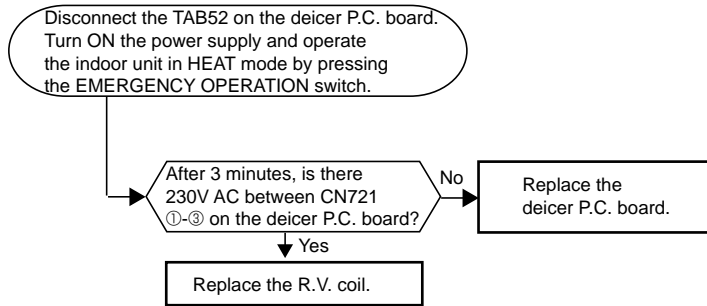
- ① Turn OFF the power supply.
- ② After 30 seconds, turn ON the power supply again.
- ③ Operate the unit in COOL or HEAT mode by pressing the EMERGENCY OPERATION switch for 1 minute or more.
- ④ Stop it by pressing the EMERGENCY OPERATION switch twice or once.



F Check of R.V. coil

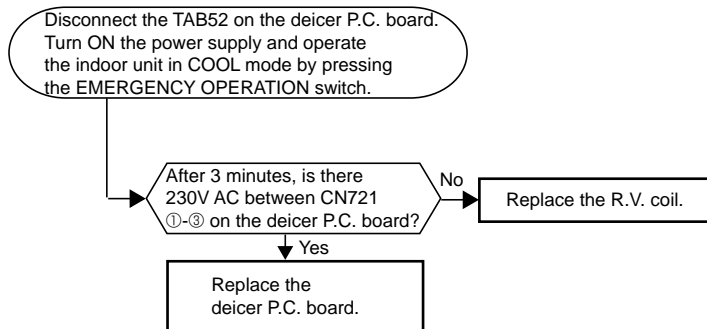
Unit operates COOL mode even if it is set HEAT mode.

* First, measure the resistance of R.V. coil to confirm it is disconnected or is not short-circuit.



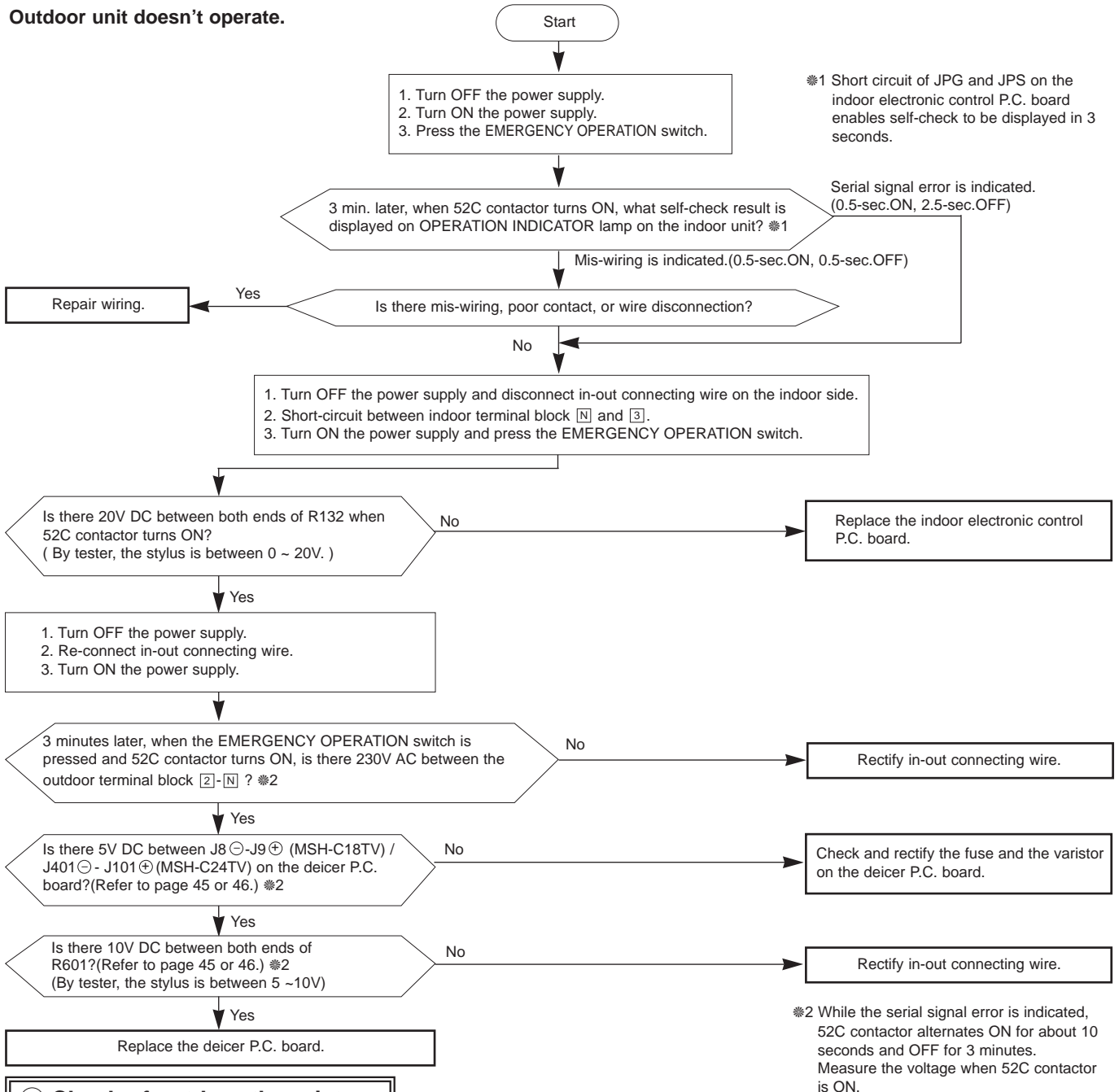
Unit operates HEAT mode even if it is set to COOL mode.

* First, measure the resistance of R.V. coil to confirm it is disconnected or is not short-circuit.



Ⓔ How to check mis-wiring and serial signal error

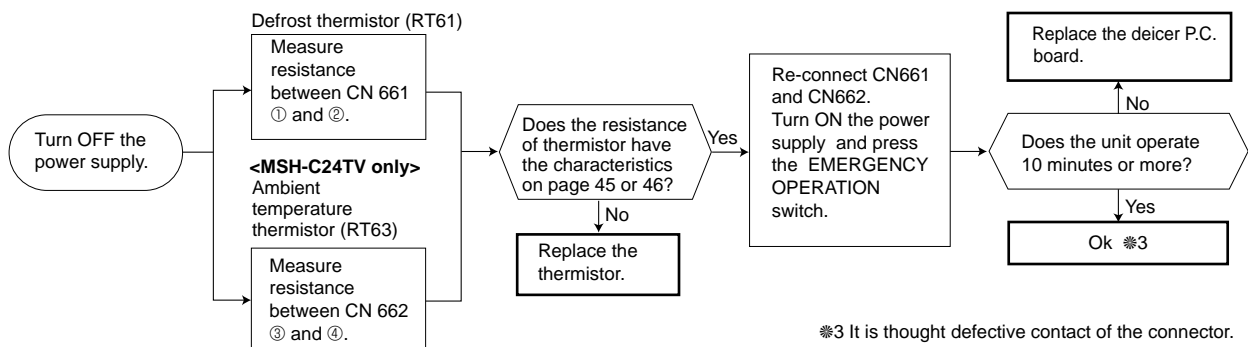
Outdoor unit doesn't operate.



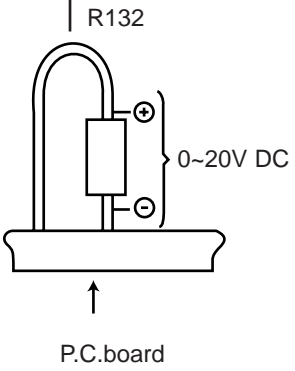
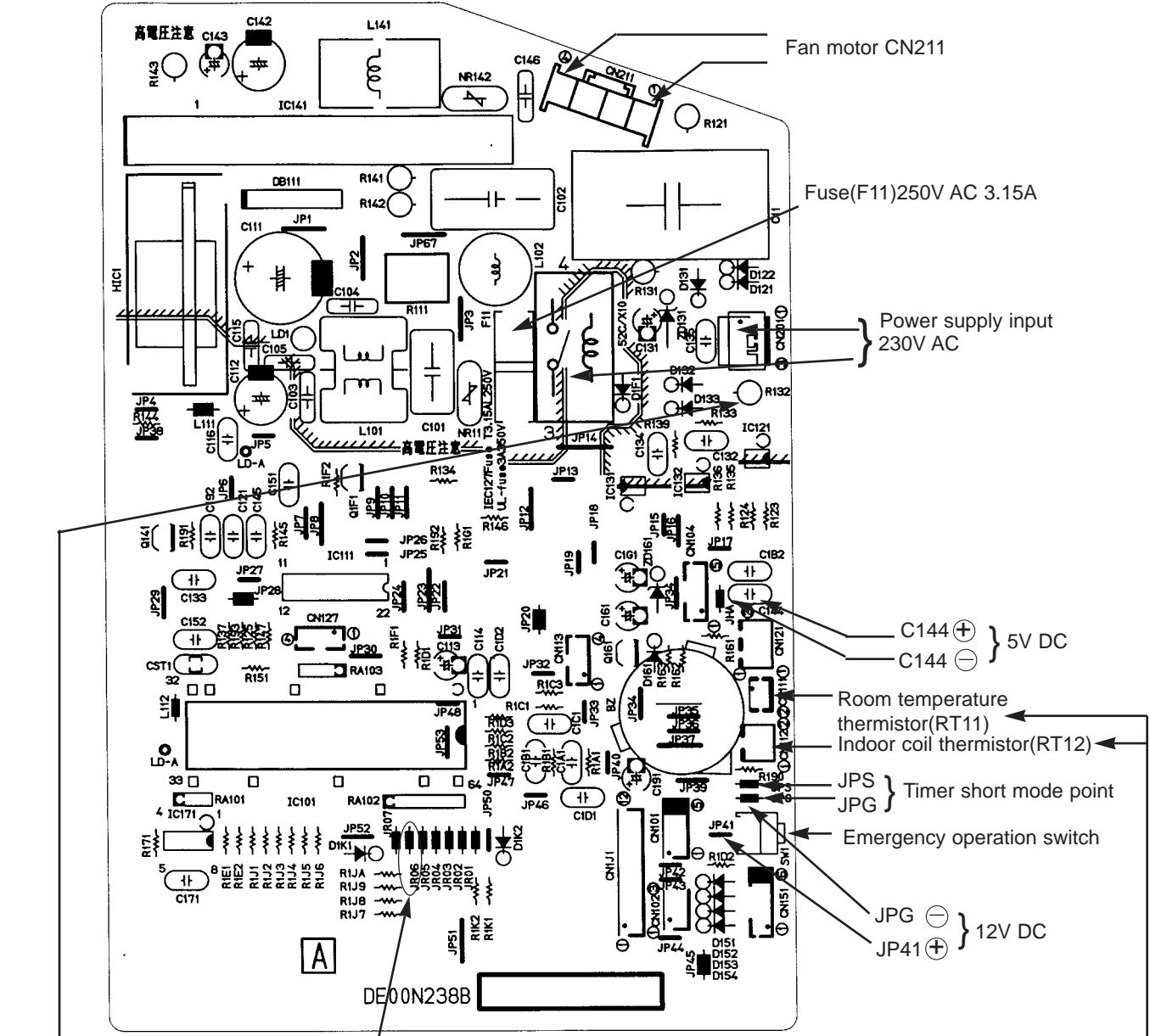
Ⓕ Check of outdoor thermistor

Thermistors in the outdoor unit are abnormal.

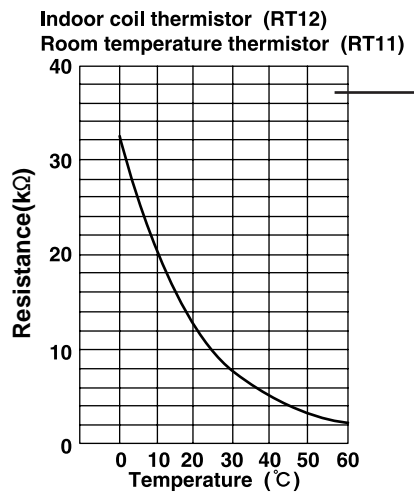
* Disconnect the connector CN661 and CN662 from the deicer P.C. board.
(Check the characteristics of each thermistor.)



TEST POINT DIAGRAM AND VOLTAGE
MSH-C18TV -E1
MSH-C24TV -E1

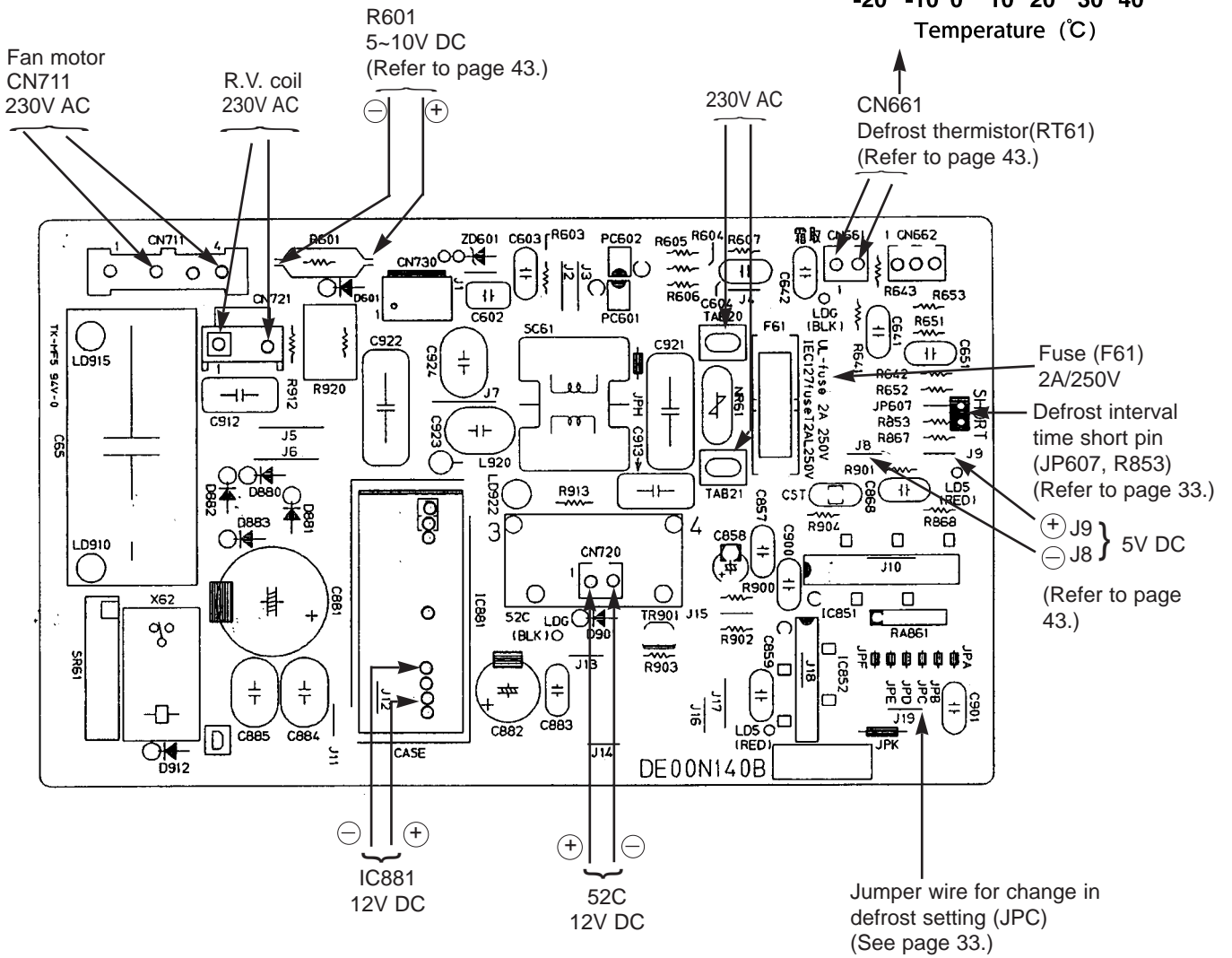
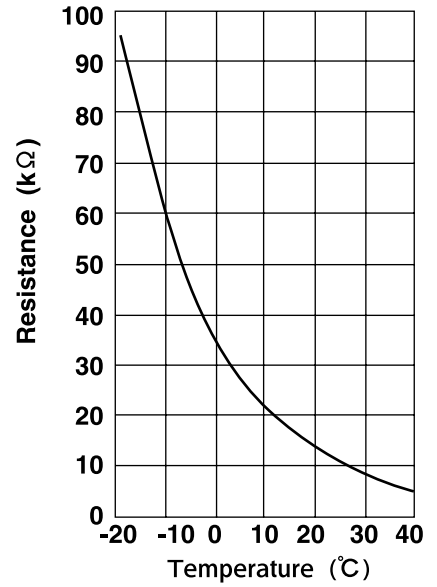


Auto restart function
 Cut the Resistor JR06.
 (Refer to page 34.)



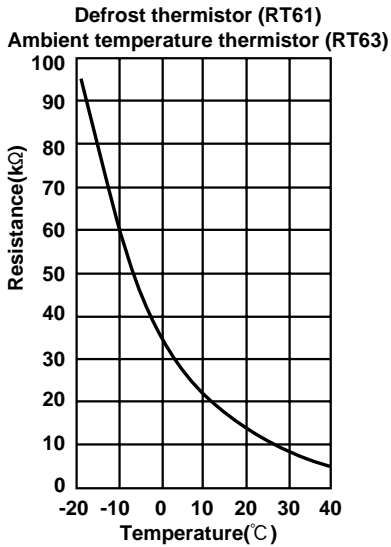
MUH-C18TV -E1
Outdoor deicer P.C. board

Defrost thermistor (RT61)



MUH-C24TV -E1

Outdoor deicer P.C. board



CN661 ①-②
Defrost thermistor (RT61)
(Refer to page 43.)

CN662 ③-④
Ambient temperature thermistor (RT63)
(Refer to page 43.)

Fan motor
CN711
Varistor
NR62

R.V. coil
230V AC

12V DC

Fuse(F61)
3.15A / 250V

Varistor
NR61

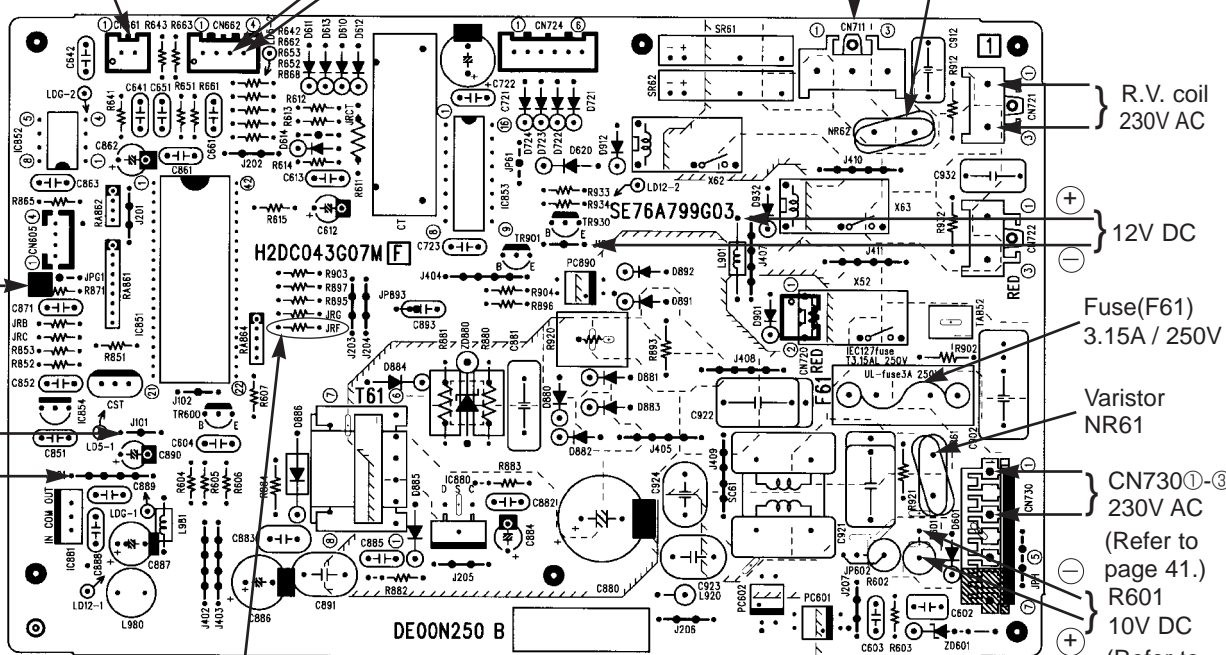
CN730 ①-③
230V AC
(Refer to page 41.)
R601
10V DC
(Refer to page 43.)

Defrost interval time short pin(JPG1, R871)
(Refer to page 33.)

J101 +
5V DC

J401 -
(Refer to page 41 and 43.)

Jumper wire for change in defrost setting (JRF)
(Refer to page 33.)

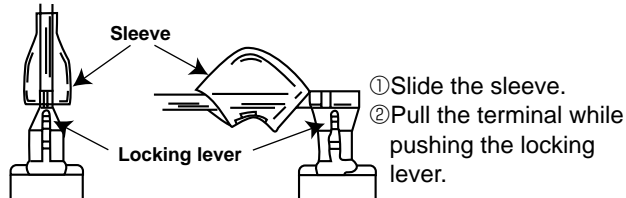


NOTE:

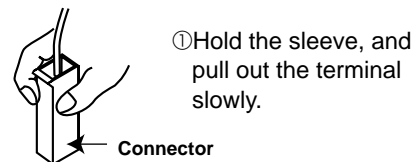
<"Terminal with lock mechanism" Detaching points>

In case of terminal with lock mechanism, detach the terminal as shown below.
There are two types (Refer to (1) and (2)) of the terminal with lock mechanism.
The terminal with no lock mechanism can be removed by pulling it out.
Check the shape of the terminal and work.

(1) Slide the sleeve and check if there is a locking lever or not.



(2) The terminal with this connector is a terminal with lock mechanism



12-1. MSH-C18TV -E1 MSH-C24TV -E1 INDOOR UNIT

OPERATING PROCEDURE	PHOTOS
<p>1. Removing the front panel</p> <ol style="list-style-type: none"> (1) Remove the screw caps at the down of the front panel. Remove the screws. (2) Pull the panel down to your side slightly and unhook the catches at the top. 	<p>Photo 1</p>
<p>2. Removing the electronic control P.C. board, the receiver P.C. board and the display P.C. board</p> <ol style="list-style-type: none"> (1) Remove the front panel. (Refer to 1) (2) Remove the electrical cover. (3) Remove the screw of the terminal cover. (4) Remove the screw of the terminal block. (5) Unhook the catch of the lamp holder. (6) Remove the receiver holder and the receiver P.C. board. (7) Remove the screw of the ground wire. (8) Disconnect all the connectors and all the lead wires on the electronic control P.C. board. (9) Remove the electronic control P.C. board and display P.C. board. 	<p>Photo 2</p>

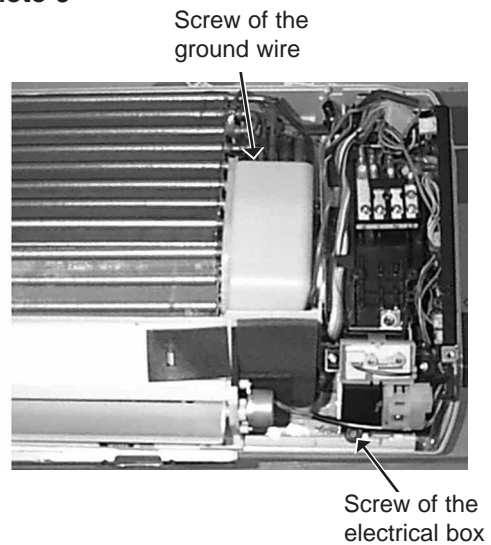
OPERATING PROCEDURE

3. Removing the electrical box

- (1) Remove the front panel. (Refer to 1)
- (2) Remove the electrical cover.
- (3) Disconnect the connector of the indoor coil thermistor.
- (4) Disconnect the motor connector (CN211 and CN121) and the vane motor connector (CN151) on the electronic control P.C. board.
- (5) Remove the screw of the electrical box, remove the electrical box.

PHOTOS

Photo 3



4. Removing the indoor fan motor and the line flow fan

- (1) Remove the front panel.
- (2) Remove the electrical box.
- (3) Unhook the catches on the both sides of the nozzle assembly.
- (4) Remove the nozzle assembly.
- (5) Remove the screws of the bearing support.
- (6) Remove the screw of the heat exchanger unhook the catch.
- (7) Lifting the heat exchanger, remove the bearing support.
- (8) Loose the screw fixing the line flow fan, remove the line flow fan.
- (9) Remove the screws of the motor band, remove the fan motor.

Photo 4

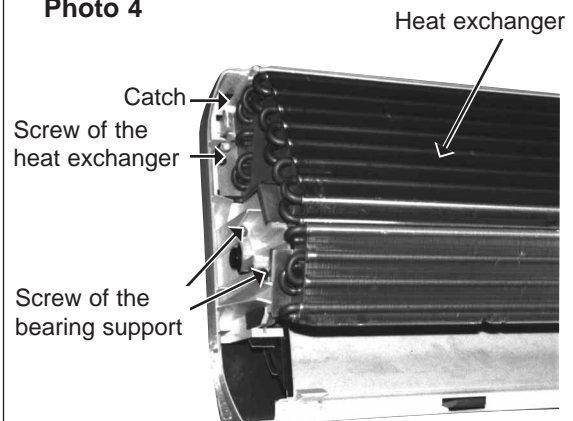
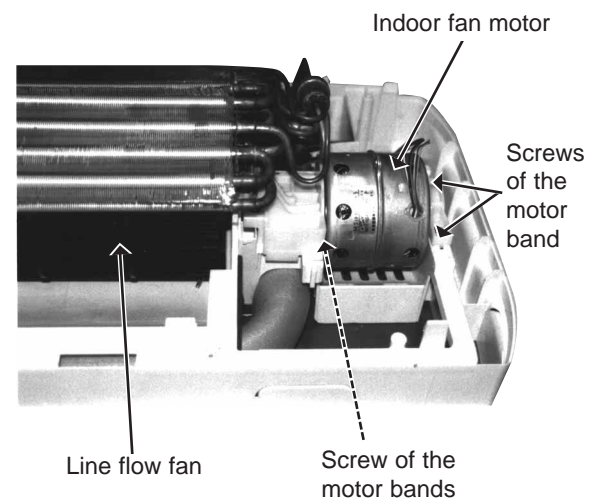
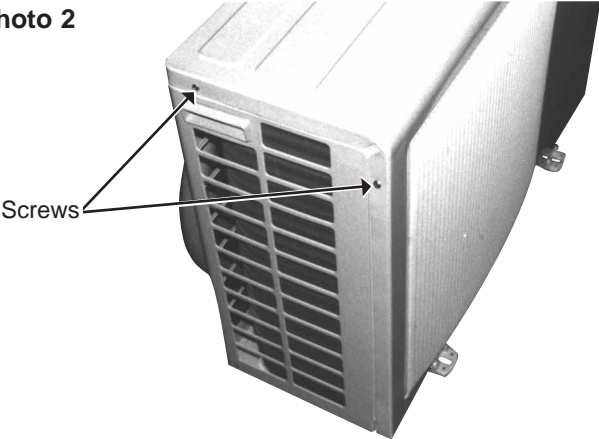
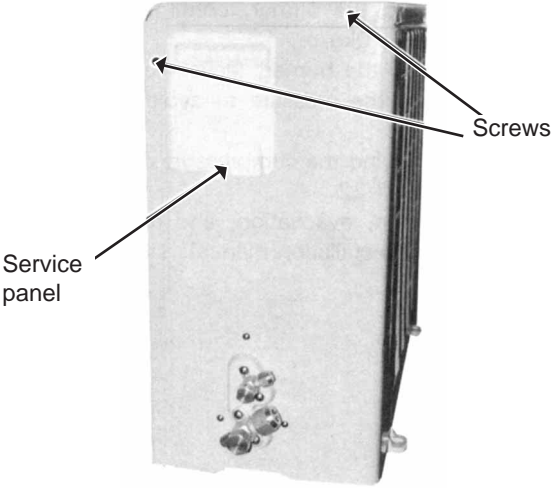
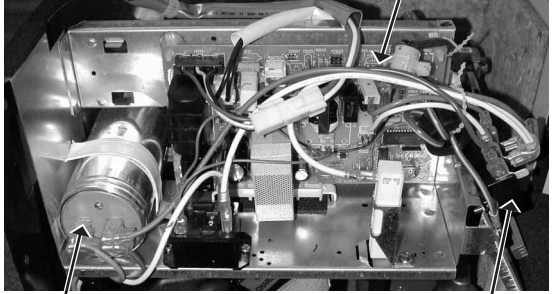


Photo 5

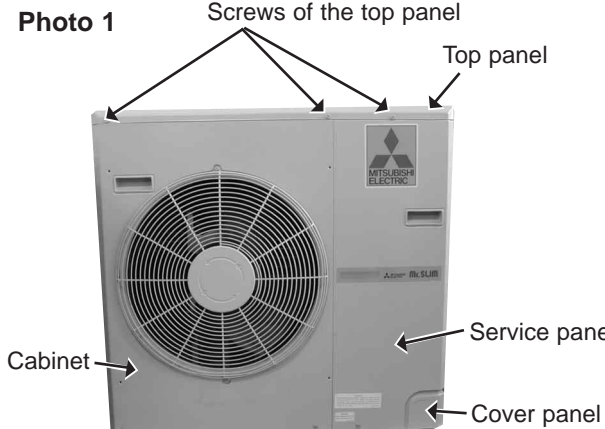
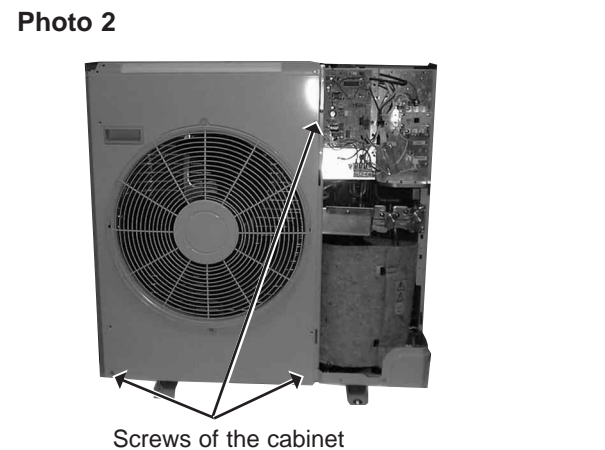
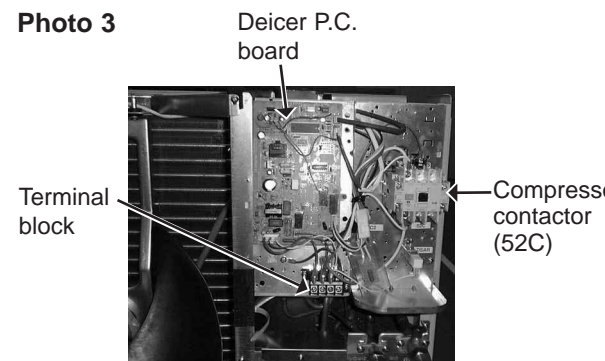
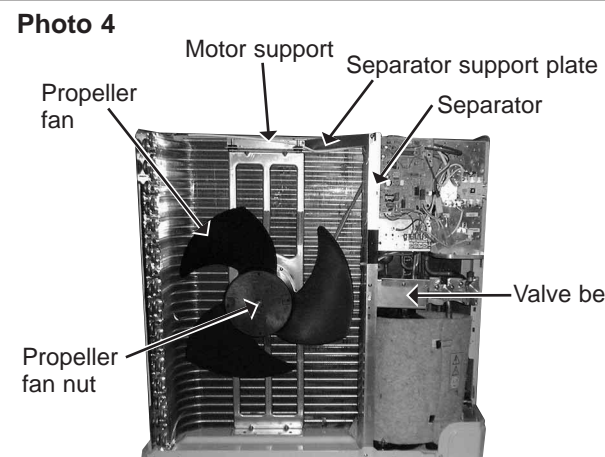


12-2. MUH-C18TV -E1
OUTDOOR UNIT

OPERATING PROCEDURE	PHOTOS
<p>1. Removing the cabinet</p> <p>(1) Remove the screws of the cabinet. (2) Hold the down of the cabinet on the both side to remove the cabinet.</p> <p>Photo 2</p> 	<p>Photo 1</p> 
<p>2. Removing the deicer P.C. board</p> <p>(1) Remove the service panel and the cabinet. (2) Disconnect all the connectors and the terminals on the deicer P.C. board. (3) Remove the deicer P.C. board.</p>	<p>Photo 3</p> 



12-3. MUH-C24TV -E1 OUTDOOR UNIT

OPERATING PROCEDURE	PHOTOS
<p>1. Removing the cabinet</p> <ol style="list-style-type: none"> (1) Remove the screws of the top panel and the top panel. (2) Remove the screw of the service panel. To remove the service panel, pull it down toward you and unhook the catches on the both sides. (3) Remove the screw of the cover panel. To remove the cover panel. (4) Remove the screws of the cabinet. Open the cabinet to a 45-degree angle. Then lift it and unhook the catches to remove. 	<p>Photo 1</p>  <p>Photo 2</p> 
<p>2. Removing the deicer P.C. board</p> <ol style="list-style-type: none"> (1) Remove the top panel, the service panel and the cover panel. (2) Disconnect all the connectors and the terminals on the deicer P.C. board. (3) Remove the deicer P.C. board. 	<p>Photo 3</p> 
<p>3. Removing the propeller fan and the outdoor fan motor</p> <ol style="list-style-type: none"> (1) Remove the cabinet. (Refer to 1) (2) Remove the propeller fan nut and the propeller fan. NOTE:Loose the propeller fan in the rotating direction for removal. When attaching the propeller fan, align the mark on the propeller fan and the motor shaft cut section. Set the propeller fan in position by using the cut on the shaft and the mark on the propeller fan. (3) Remove the screws and the outdoor fan motor and the connectors. Remove the outdoor fan motor. 	<p>Photo 4</p> 

OPERATING PROCEDURE

4. Removing the heat exchanger and compressor

- (1) Remove the screws of the rear panel. Remove the screws of the valve bed and the valve bed. (The valve bed is fixed by the catches on the right and left sides. Lift it to remove.)

Open the rear panel to the rear to remove.

NOTE :

All panels are fixed by catches, and must be removed by up and down.

- (2) Remove the screws of the side panel and the side panel.
- (3) Remove the screws of the rear guard and the rear guard.
- (4) Remove the screws of the separator support plate and the separator support plate.
- (5) Remove the screws of the motor support and the motor support.
- (6) Remove the relay panel.
Disconnect the fan motor lead wires.
- (7) Remove the soundproof felt.
- (8) Remove the screws of the separator and the separator.
- (9) Recover gas from the refrigerant circuit.
- (10) Remove the screws of the heat exchanger and the heat exchanger.
Detach the welded part of pipe.
- (11) Remove the nuts of the compressor and the compressor.
Detach the welded part of the suction pipe and the discharge pipe.

PHOTOS

Photo 5

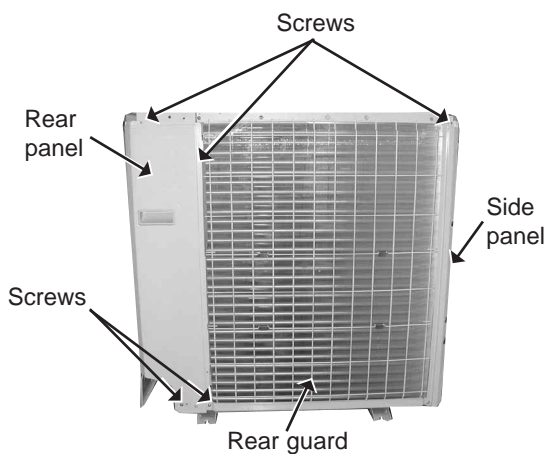


Photo 6

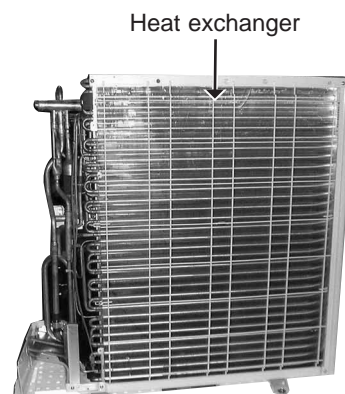
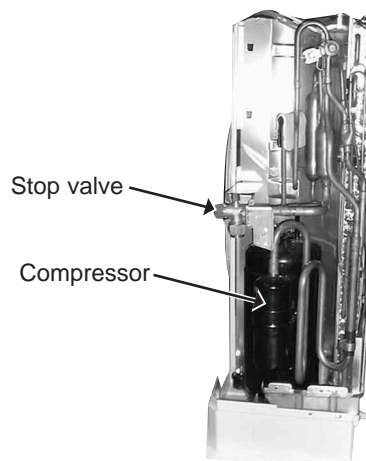


Photo 7

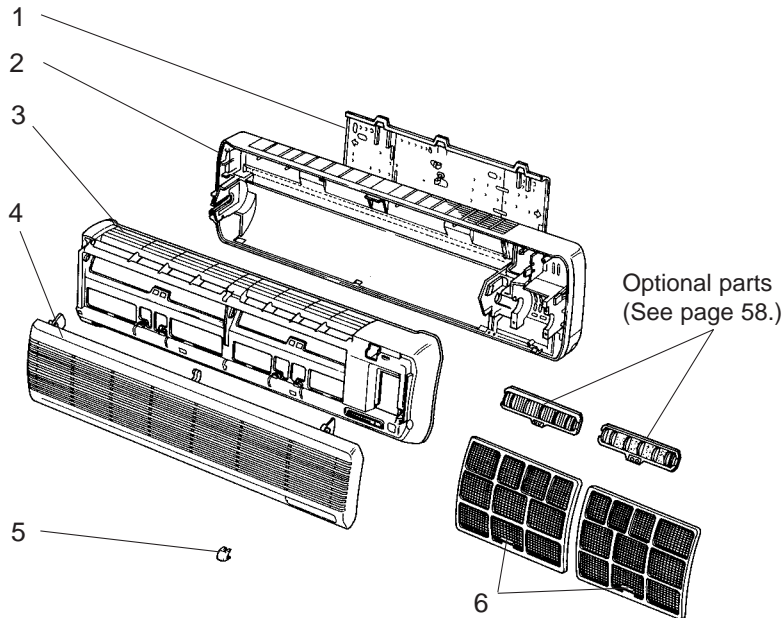
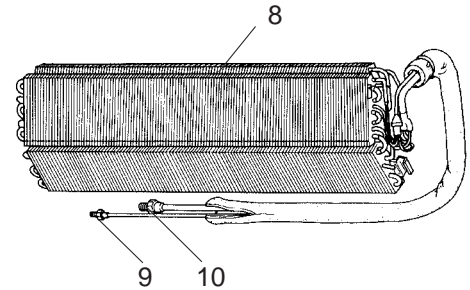


MSH-C18TV -E1 (WH)

MSH-C24TV -E1 (WH)

13-1. INDOOR UNIT

STRUCTURAL PARTS

13-2. INDOOR UNIT
HEAT EXCHANGER

13-1. INDOOR UNIT STRUCTURAL PARTS

Part number that is circled is not shown in the illustration.

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
				MSH-C18TV-E1 (WH)	MSH-C24TV-E1 (WH)	
1	E02 141 970	INSTALLATION PLATE		1	1	
2	E02 143 234	BOX(WH)		1	1	
3	E02 138 000	FRONT PANEL ASSEMBLY(WH)		1	1	Including 4,5
4	E02 138 010	GRILLE(WH)		1	1	
5	E02 143 067	SCREW CAP(WH)		3	3	3PCS/SET
6	E02 141 100	AIR FILTER		2	2	
⑦	E02 516 007	LAMP PANEL(WH)		1	1	

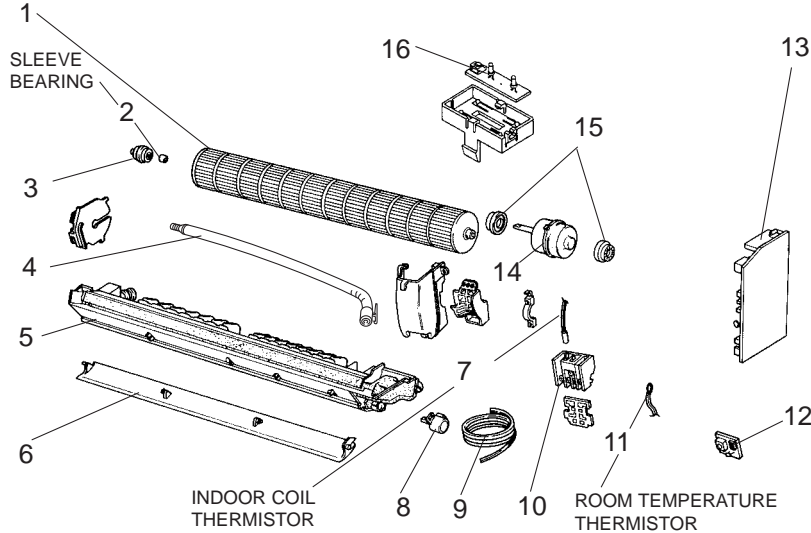
13-2. INDOOR UNIT HEAT EXCHANGER

8	E02 141 620	INDOOR HEAT EXCHANGER		1	1	
9	E02 138 667	UNION(LIQUID)		1		φ6.35
	E02 176 667	UNION(LIQUID)			1	φ9.52
10	E02 138 666	UNION(GAS)		1	1	φ15.88

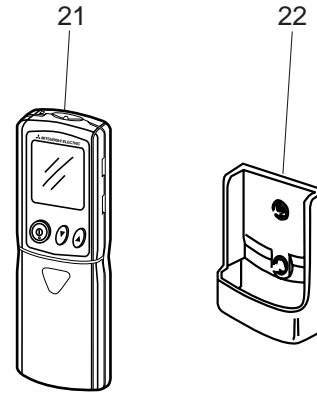
MSH-C18TV -E1 (WH)

MSH-C24TV -E1 (WH)

**13-3. INDOOR UNIT
FUNCTIONAL PARTS
AND ELECTRICAL PARTS**



**13-4. ACCESSORY PARTS
AND REMOTE CONTROLLER**



13-3. INDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

Part numbers that are circled are not shown in the illustration.

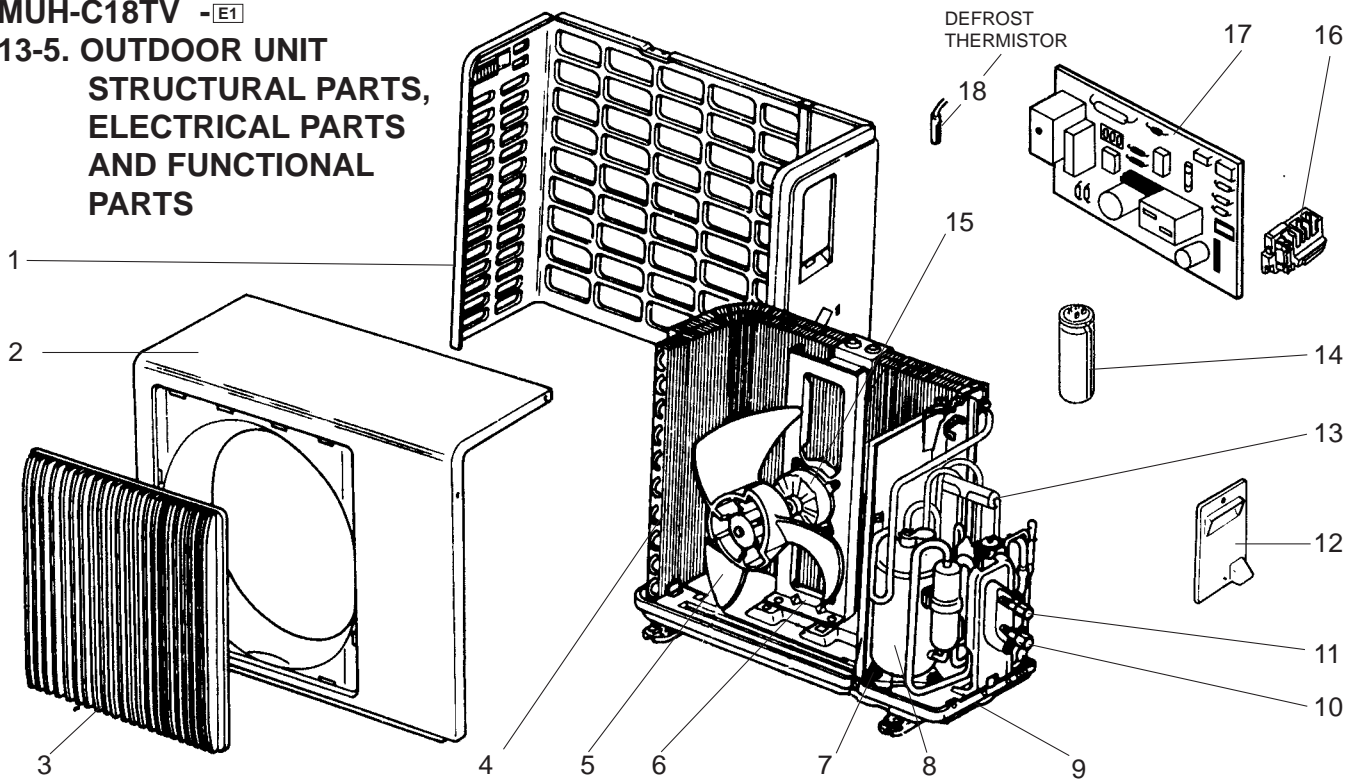
NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
				MSH-C18TV- <u>E1</u> (WH)	MSH-C24TV- <u>E1</u> (WH)	
1	E02 141 302	LINE FLOW FAN		1	1	
2	E02 001 504	SLEEVE BEARING		1	1	
3	E02 141 509	BEARING MOUNT		1	1	
4	E02 408 702	DRAIN HOSE		1	1	
5	E02 143 235	NOZZLE(WH)		1	1	
6	E02 143 040	VANE(WH)		1	1	
7	E02 138 307	INDOOR COIL THERMISTOR	RT12	1	1	
8	E02 141 303	VANE MOTOR	MV	1	1	
9	E02 138 395	POWER SUPPLY CORD		1		
	E02 320 395	POWER SUPPLY CORD			1	
10	E02 581 375	TERMINAL BLOCK	TB	1		
	E02 540 375	TERMINAL BLOCK	TB		1	
11	E02 138 308	ROOM TEMPERATURE THERMISTOR	RT11	1	1	
12	E02 141 468	RECEIVER P. C. BOARD		1	1	
13	E02 581 452	ELECTRONIC CONTROL P.C. BOARD		1		AUTO RESTART
	E02 582 452	ELECTRONIC CONTROL P.C. BOARD			1	AUTO RESTART
14	E02 141 300	INDOOR FAN MOTOR	MF	1		RA4V27 -□□
	E02 213 300	INDOOR FAN MOTOR	MF		1	RA4V27 -□□
15	E02 001 505	FAN MOTOR RUBBER MOUNT		2	2	2PCS/SET
16	E02 138 329	DISPLAY P.C. BOARD		1	1	
17	E02 336 385	VARIATOR	NR11	1	1	
18	E02 127 382	FUSE	F11	1	1	3.15A
19	E02 205 381	THERMAL FUSE	F12	1		93°C
	E02 209 381	THERMAL FUSE	F12		1	93°C
20	E02 138 383	SURGE ABSORBER	DSAR	1		
	E02 147 383	SURGE ABSORBER	DSAR		1	

13-4. ACCESSORY PARTS AND REMOTE CONTROLLER

21	E02 581 426	REMOTE CONTROLLER		1	1	
22	E02 527 083	REMOTE CONTROLLER HOLDER		1	1	

MUH-C18TV -E1

**13-5. OUTDOOR UNIT
STRUCTURAL PARTS,
ELECTRICAL PARTS
AND FUNCTIONAL
PARTS**

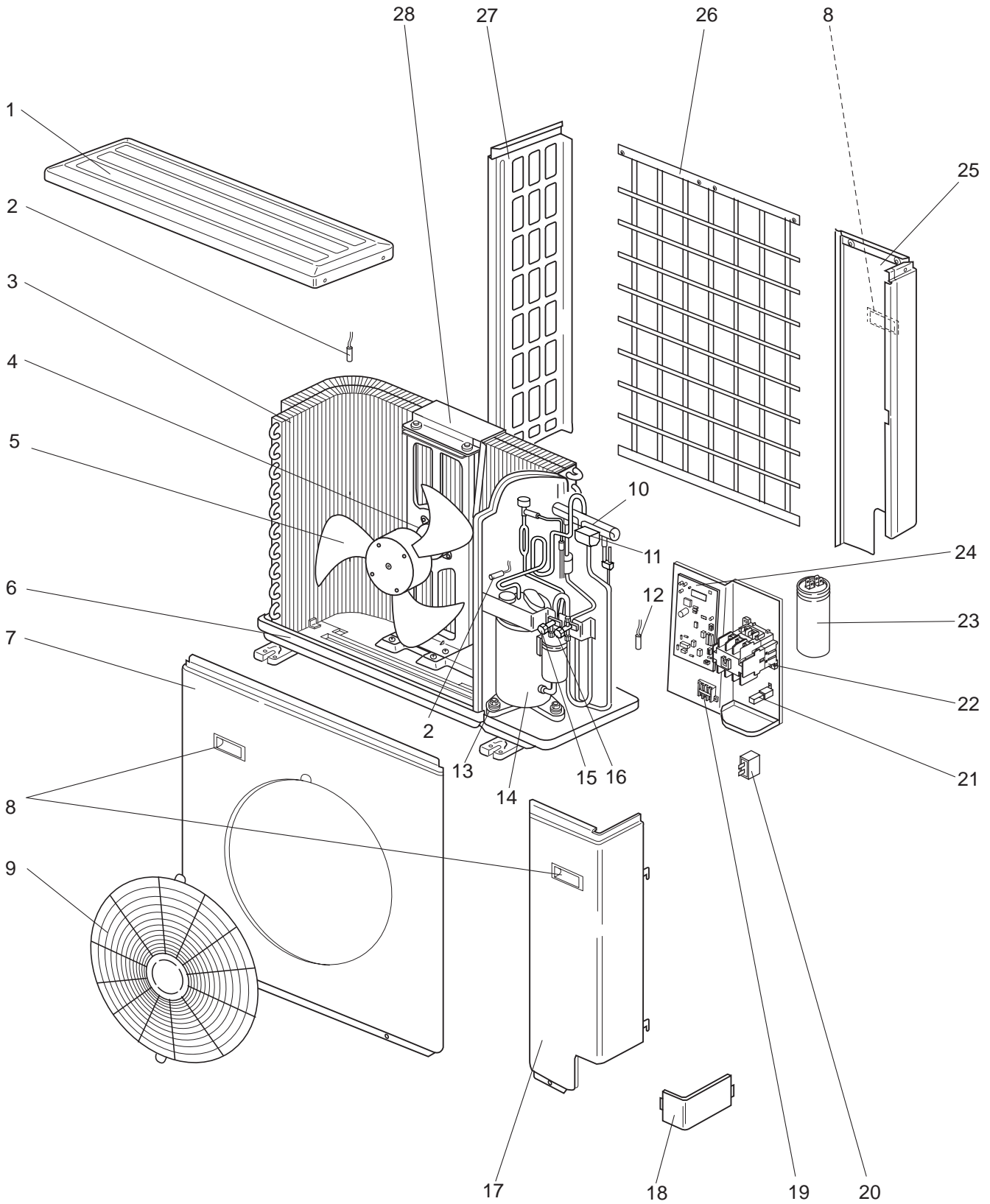


Part numbers that are circled are not shown in the illustration.

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
					MUH-C18TV- <u>E1</u>	
1	E02 140 233	BACK PANEL		1		
2	E02 141 232	CABINET		1		
3	E02 141 521	GRILLE		1		
4	E02 643 630	OUTDOOR HEAT EXCHANGER		1		
5	E02 141 501	PROPELLER FAN		1		
6	E02 139 515	MOTOR SUPPORT		1		
7	E02 138 506	COMPRESSOR RUBBER SET		4		4RUBBERS/SET
8	E02 516 900	COMPRESSOR	MC	1		PE-36VPEHT
9	E02 277 290	BASE		1		
10	E02 624 661	STOP VALVE(GAS)		1		φ15.88
11	E02 621 662	STOP VALVE(LIQUID)		1		φ 6.35
12	E02 141 245	SERVICE PANEL		1		
13	E02 444 961	4-WAY VALVE		1		
14	E02 277 353	COMPRESSOR CAPACITOR	C1	1		55μF/420V AC
15	E02 144 301	OUTDOOR FAN MOTOR	MF	1		RA6V50 - □□
16	E02 540 374	TERMINAL BLOCK	TB	1		4P
17	E02 643 451	DEICER P.C. BOARD		1		
18	E02 440 310	DEFROST THERMISTOR	RT61	1		
19	E02 004 340	COMPRESSOR CONTACTOR	52C	1		
20	E02 339 936	CAPILLARY TUBE		2		φ3.0×φ1.4×600
	E02 624 936	CAPILLARY TUBE		1		φ3.0×φ2.0×850
21	E02 095 382	FUSE	F61	1		250V / 2A
22	E02 139 490	R. V. COIL	21S4	1		
23	E02 128 383	SURGE ABSORBER	DSAR	1		
24	E02 214 642	CHECK VALVE		1		

MUH-C24TV -E1

13-6. OUTDOOR UNIT STRUCTURAL PARTS, ELECTRICAL PARTS
AND FUNCTIONAL PARTS



MUH-C24TV - [E1]

**13-6. OUTDOOR UNIT STRUCTURAL PARTS, ELECTRICAL PARTS
AND FUNCTIONAL PARTS**

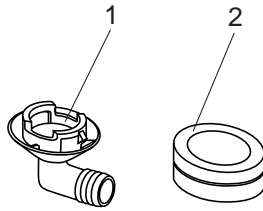
Part numbers that are circled are not shown in the illustration.

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit	Remarks
				MUH-C24TV - [E1]	
1	E02 214 297	TOP PANEL		1	
2	E02 578 309	AMBIENT TEMPERATURE THERMISTOR	RT63	1	
3	E02 644 630	OUTDOOR HEAT EXCHANGER		1	
4	E02 214 301	OUTDOOR FAN MOTOR	MF	1	RA6V85- □□
5	E07 214 501	PROPELLER FAN		1	
6	E02 214 290	BASE		1	
7	E02 214 232	CABINET		1	
8	E07 001 009	HANDLE		3	
9	E02 527 521	FAN GUARD		1	
10	E02 444 961	4-WAY VALVE		1	
11	E02 529 490	R.V. COIL	21S4	1	
12	E02 529 310	DEFROST THERMISTOR	RT61	1	
13	E02 138 506	COMPRESSOR RUBBER SET		4	4RUBBERS/SET
14	E02 517 900	COMPRESSOR	MC	1	NE-47VMHHT
15	E02 644 662	STOP VALVE(LIQUID)		1	φ9.52
16	E02 644 661	STOP VALVE(GAS)		1	φ15.88
17	E02 214 245	SERVICE PANEL		1	
18	E07 001 006	COVER PANEL		1	
19	E02 540 374	TERMINAL BLOCK	TB	1	4P
20	E02 138 351	OUTDOOR FAN CAPACITOR	C2	1	3.0μF/440V AC
21	E02 128 383	SURGE ABSORBER	DSAR	1	
22	E02 010 342	COMPRESSOR CONTACTOR	52C	1	
23	E02 082 353	COMPRESSOR CAPACITOR	C1	1	50μF/440V AC
24	E02 644 451	DEICER P.C. BOARD		1	
25	E02 214 522	REAR PANEL		1	
26	E02 605 523	REAR GUARD		1	
27	E02 214 249	SIDE PANEL		1	
28	E02 527 515	MOTOR SUPPORT		1	
29	E02 127 382	FUSE	F61	1	250V/3.15A
30	E02 214 384	CZ SURGE ABSORBER	CZ	1	
31	E02 644 936	CAPILLARY TUBE		1	φ3.0×φ2.0×450

MUH-C18TV -[E1]

MUH-C24TV -[E1]

13-7. ACCESSORY PARTS



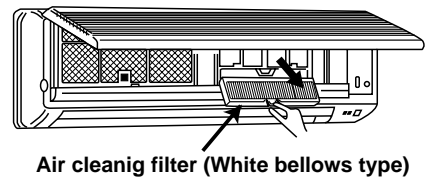
NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
				MUH-C18TV-[E1]	MUH-C24TV-[E1]	
1	E02 444 704	DRAIN SOCKET		1		
	E02 329 704	DRAIN SOCKET			1	
2	E02 444 705	DRAIN CAP		2	6	φ33
	E02 444 706	DRAIN CAP		1		φ16

14 OPTIONAL PARTS

14-1. AIR CLEANING FILTER

- AIR CLEANING FILTER removes fine dust of 0.01 micron from air by means of static electricity.
- Normal life of AIR CLEANING FILTER is 4 months. However, when it becomes dirty, replace it as soon as possible.
- Clogged AIR CLEANING FILTER may reduce the air conditioner capacity or cause frost on the air outlet.
- DO NOT reuse AIR CLEANING FILTER even if it is washed.
- DO NOT remove or attach AIR CLEANING FILTER during unit operation.

Model	Part No.
MSH-C18TV-[E1] MSH-C24TV-[E1]	MAC-1100FT

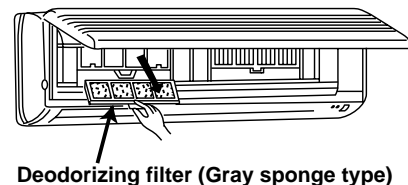


Air cleanig filter (White bellows type)

14-2. DEODORIZING FILTER

- DEODORIZING FILTER removes ammonia and hydrogen sulphide emitted from tobacco, and odor of pets.
 - Clean DEODORIZING FILTER every two weeks. If the filter is particularly dirty, clean the filter more often.
 - For cleaning, soak the filter in warm water for a while, and then wash and rinse it. Dry the filter in the shade thoroughly.
 - When the filter color is still dark even after cleaning, replace the filter with a new one.
- Replace the filter at least once a year.

Model	Part No.
MSH-C18TV-[E1] MSH-C24TV-[E1]	MAC-1600DF



Deodorizing filter (Gray sponge type)

- DEODORIZING FILTER and AIR CLEANING FILTER can be attached on either side.



HEAD OFFICE: MITSUBISHI DENKI BLDG., 2-2-3, MARUNOUCHI CHIYODA-KU, TOKYO100-8310, JAPAN