MITSUBISHI ELECTRIC

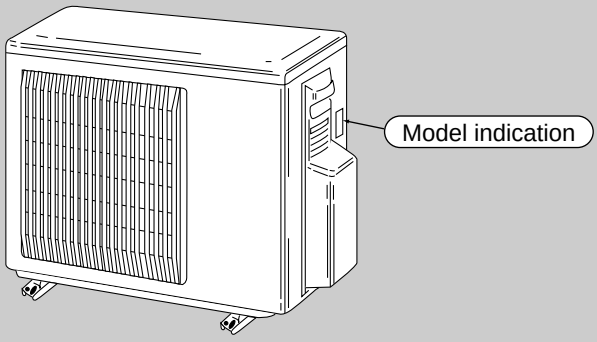
SPLIT-TYPE,HEAT PUMP AIR CONDITIONER

No. OB280

SERVICE MANUAL

Inverter-controlled multi system
Model

MXZ-18TV -E1



CONTENTS

CE

This manual describes technical data of outdoor unit.
For the indoor unit refer to the service manuals No. OB229, OB227 REVISED EDITION-B, OB252 REVISED EDITION-A, and OC165 of corresponding models.

1 TECHNICAL CHANGES

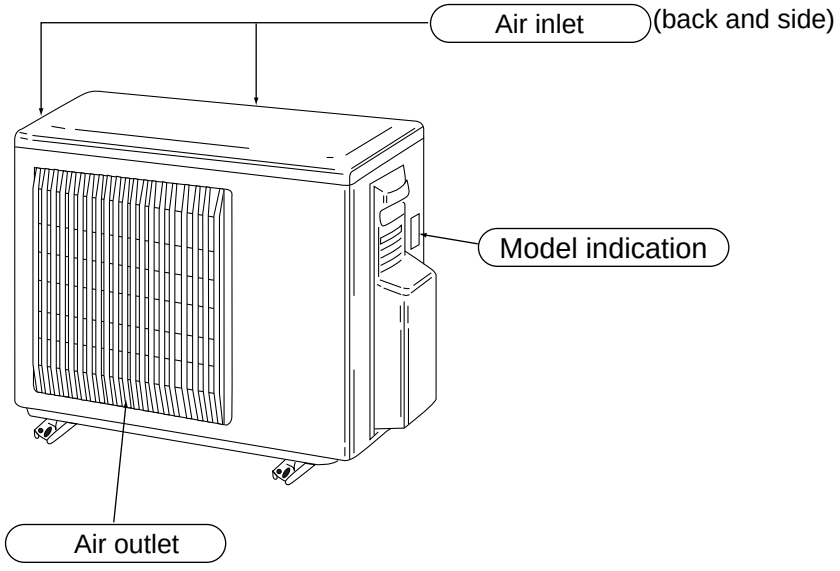
MXZ-18RV -E1 → MXZ-18TV -E1

1. The combination pattern of indoor unit has increased.
2. Outside dimension of the outdoor equipment changed.
3. Ball valve has changed to stop valve.
4. Accumulator has been removed.
5. Hight pressure switch has been removed.
6. Compressor has changed.
7. Refrigerant filling capacity has changed. (1.3kg → 1.55kg)

2 PART NAMES AND FUNCTIONS

OUTDOOR UNIT

MXZ-18TV-E1



3 INDOOR / OUTDOOR CORRESPONDENCE TABLE

	OUTDOOR UNIT
	MXZ-18TV-E1
Combination of the connectable indoor units	07+09
	07+12
	07+SEH-1.6
	09+09
	09+12
	09+SEH-1.6
	12+12

❋There is no combination other than this table.

4 INDOOR UNITS COMBINATION

MXZ-18TV - E1

NOTE: Electrical data is for outdoor unit only.

Indoor units combination	Cooling capacity (kw)			Outdoor unit power consumption (kw)	Current (A)	Power factor (%)
	Unit A	Unit B	Total		230V	
07	2.3	–	2.3 (0.9-2.8)	0.850 (0.225-1.055)	3.88	90
09	2.5	–	2.5 (0.9-3.0)	0.865 (0.225-1.125)	4.17	90
12	3.4	–	3.4 (0.9-3.8)	1.29 (0.220-1.550)	6.22	90
07+09	2.3	2.5	4.8 (1.49-5.25)	1.82 (0.370-2.11)	8.79	90
07+12	2.02	2.98	5.0 (1.51-5.45)	1.835 (0.365-2.125)	8.85	90
09+09	2.5	2.5	5.0 (1.51-5.45)	1.840 (0.370-2.130)	8.88	90
09+12	2.2	3.0	5.2 (1.53-5.60)	1.865 (0.365-2.145)	9.00	90
12+12	2.65	2.65	5.3 (1.55-5.70)	1.88 (0.370-2.190)	9.07	90

NOTE: Electrical data is for outdoor unit only.

Indoor units combination	Heating capacity (kw)			Outdoor unit power consumption (kw)	Current (A)	Power factor (%)
	Unit A	Unit B	Total		230V	
07	3.3	–	3.3 (0.9-4.0)	1.005 (0.225-1.115)	4.85	90
09	3.6	–	3.6 (0.9-4.5)	1.085 (0.225-1.195)	5.23	90
12	4.0	–	4.0 (0.9-4.7)	1.440 (0.220-1.490)	6.95	90
07+09	2.97	3.23	6.2 (1.53-6.70)	1.92 (0.300-2.030)	9.27	90
07+12	2.62	3.88	6.5 (1.55-7.00)	1.895 (0.295-2.005)	9.14	90
09+09	3.25	3.25	6.5 (1.55-7.0)	1.900 (0.300-2.010)	9.17	90
09+12	2.78	3.77	6.55 (1.56-7.1)	1.825 (0.295-1.925)	8.81	90
12+12	3.30	3.30	6.6 (1.58-7.2)	1.790 (0.290-1.840)	8.64	90

NOTE: SEH-1.6AR is equivalent to class 12 (12000BTU).
However, the combination of “12+12” has only the MSC type.

5 SPECIFICATION

	Outdoor model		**MXZ-18TV -** E1	
	Outdoor unit power supply		Single phase 230V,50Hz	
System	Indoor units number		2	
	Indoor units total capacity (Connectable)		Total model name 24	
	indoor units total capacity (Simultaneous operation)		Total model name 24	
	Piping total length	m	Max. 30 (chargeless 20)	
	Connecting pipe length	m	Max. 20	
	Height difference (Indoor ~ Outdoor)	m	10	
	Height difference (Indoor ~ Indoor)	m	10	
	Function		Cooling	Heating
Capacity	Capacity	kW	5.3 (1.55~5.7)	6.6 (1.58~7.2)
	Dehumidification	ℓ /h	—	—
	Outdoor air flow	m³ /h	1,860	
Electrical data	Power outlet	A	20	
	Running current	A	9.08	8.64
	Power input	W	1,880 (370~2,190)	1,790 (290~1,840)
	Auxiliary heater	A(kW)	—	
	Crankcase heater	W	—	
	Power factor	%	90.0	
	Starting current	A	9.08	
	Compressor motor current	A	8.70	8.26
	Fan motor current	A	0.38	
	Coefficient of performance(C.O.P)		2.82	3.69
Compressor	Model		SHV-130FEA (ROTARY)	
	Output	W	1,400	
	Winding resistance(at20℃)	Ω	U-V 0.45 V-W 0.45 W-U 0.45	
Fan motor	Model		RA6V35-AA	
	Winding resistance(at20℃)	Ω	WHT-BLK 236.2 BLK-YLW 48.1 BLK-RED 224.1	
	Dimensions W×H×D	mm	800(+69)×600×300	
	Weight	kg	46	
Special remarks	Sound level (Hi)	dB	48	49
	Fan speed (Hi)	rpm	630	
	Fan speed regulator		2	
	Refrigerant filling capacity(R-22)	kg	1.55	
	Refrigerating oil (Model)	cc	350 (MS-56)	
	Thermistor RT61	kΩ	13.4 (at 100℃)	
	Thermistor RT62	kΩ	10.0 (at 25℃)	
	Thermistor RT63	kΩ	10.0 (at 25℃)	
	Thermistor RT65,66	kΩ	10.0 (at 25℃)	
	Thermistor RT67	kΩ	17.0 (at 50℃)	

NOTE: Test conditions are based on ISO 5151 (Refrigerant piping length (one way) :5m

✻1 Electrical data is for only outdoor unit.

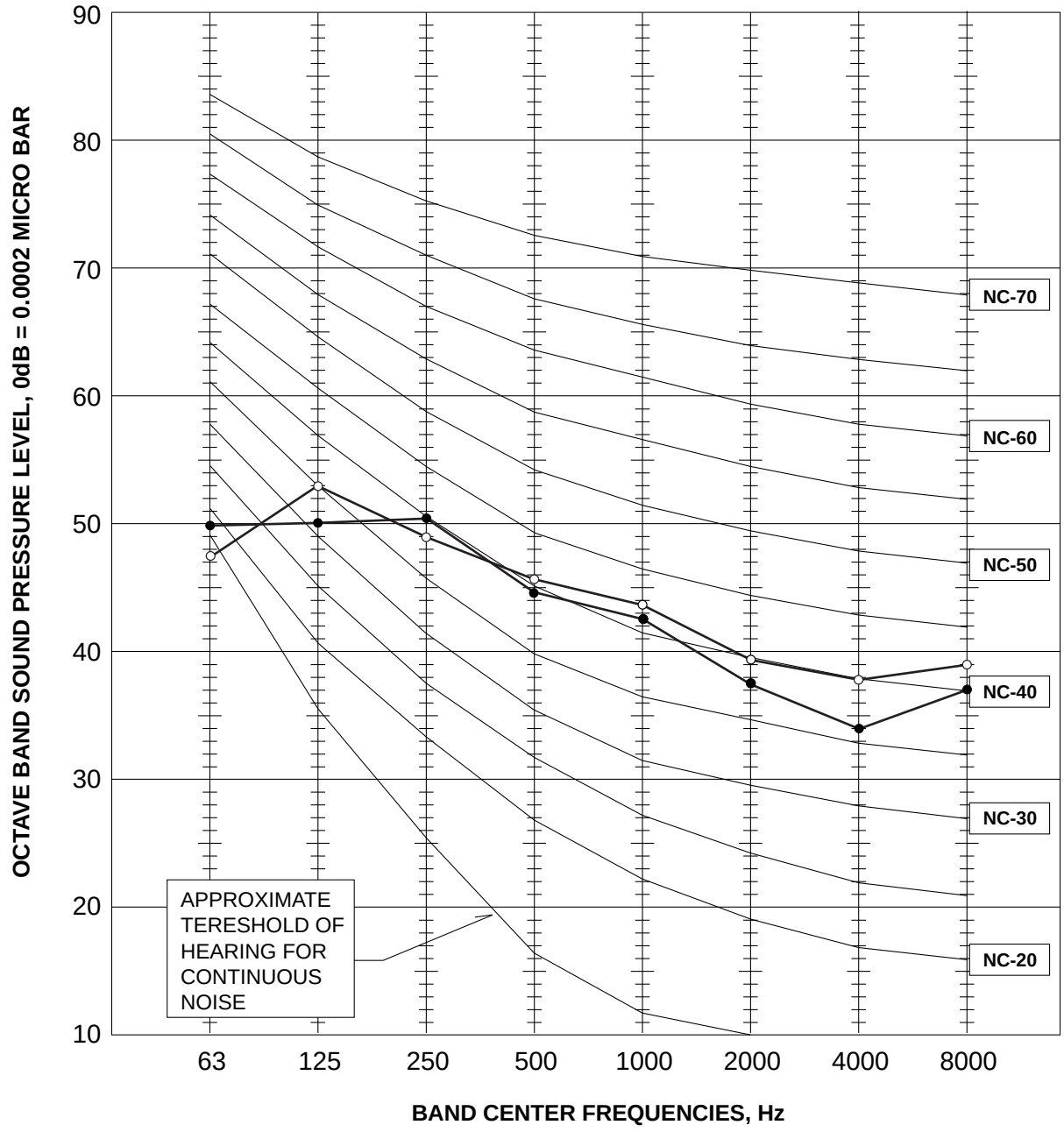
TEST CONDITIONS COOLING INDOOR DB27.0°C WB19.0°C
OUTDOOR DB35.0°C WB24.0°C
HEATING INDOOR DB20.0°C
OUTDOOR DB 7.0°C WB 6.0°C

6 NOISE CRITERIA CURVES

NOTCH	SPL($dB_{(A)}$)	LINE
Cooling	48	●——●
Heating	49	○——○

MXZ-18TV - E1

Test conditions.
Cooling :DB35℃ WB24℃
Heating :DB 7℃ WB 6℃

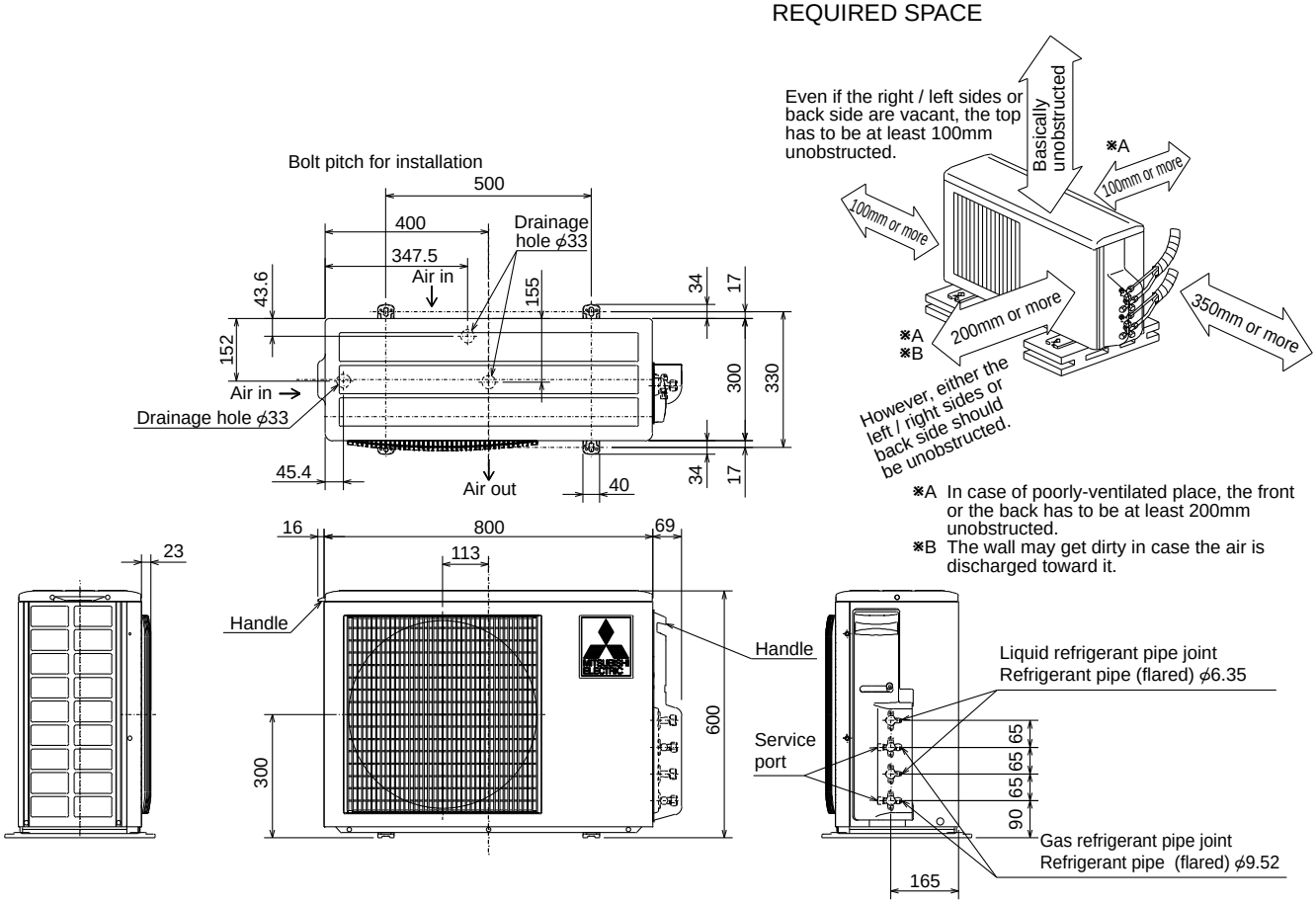


7 OUTLINES AND DIMENSIONS

OUTDOOR UNIT

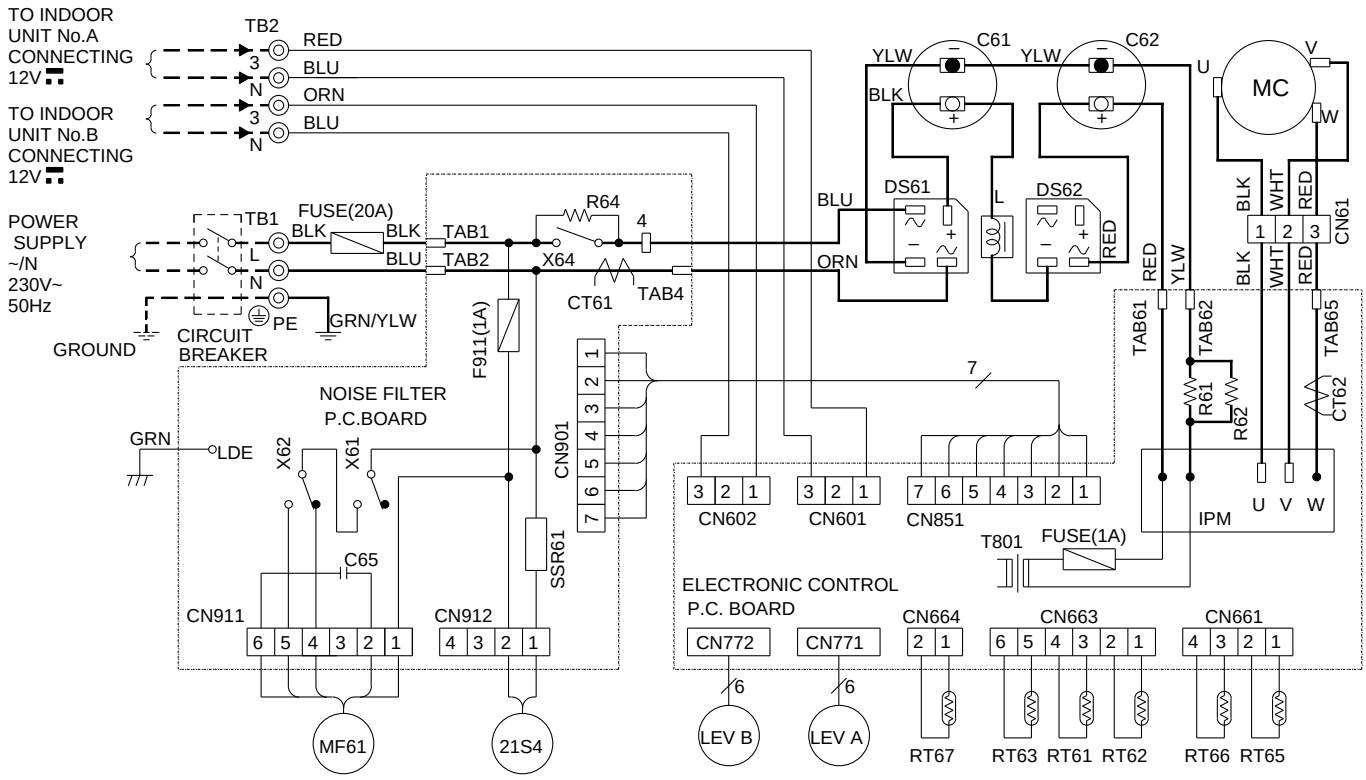
MXZ-18TV - E1

Unit: mm



8 WIRING DIAGRAM

OUTDOOR UNIT MODELS MXZ-18TV- E1



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C61	POWER-FACTOR CAPACITOR	R64	RESISTOR	RT66	GAS PIPE TEMP. B THERMISTOR
C62	SMOOTHING CAPACITOR	R61,R62	RESISTOR	RT67	FIN TEMP. THERMISTOR
C65	FAN MOTOR CAPACITOR	LEV A	EXPANSION VALVE A,COIL	SSR61	SOLENOID COIL RELAY
CT61	CURRENT TRANSFORMER	LEV B	EXPANSION VALVE B,COIL	T801	TRANSFORMER
CT62	CURRENT TRANSFORMER	21S4	REVERSING VALVE SOLENOID COIL	TB1	TERMINAL BLOCK
DS61,DS62	DIODE MODULE	MC	COMPRESSOR	TB2	TERMINAL BLOCK
FUSE	FUSE(20A)	MF61	FAN MOTOR	X61	FAN MOTOR RELAY
FUSE	FUSE(1A)	RT61	DISCHARGE TEMP. THERMISTOR	X62	FAN MOTOR RELAY
F911	FUSE(1A)	RT62	DEFROST TEMP. THERMISTOR	X64	RELAY
IPM	POWER TRANSISTOR MODULE	RT63	EVAPORATOR TEMP. THERMISTOR	CN61	CONNECTOR
L	REACTOR	RT65	GAS PIPE TEMP. A THERMISTOR		

SG79J191H01

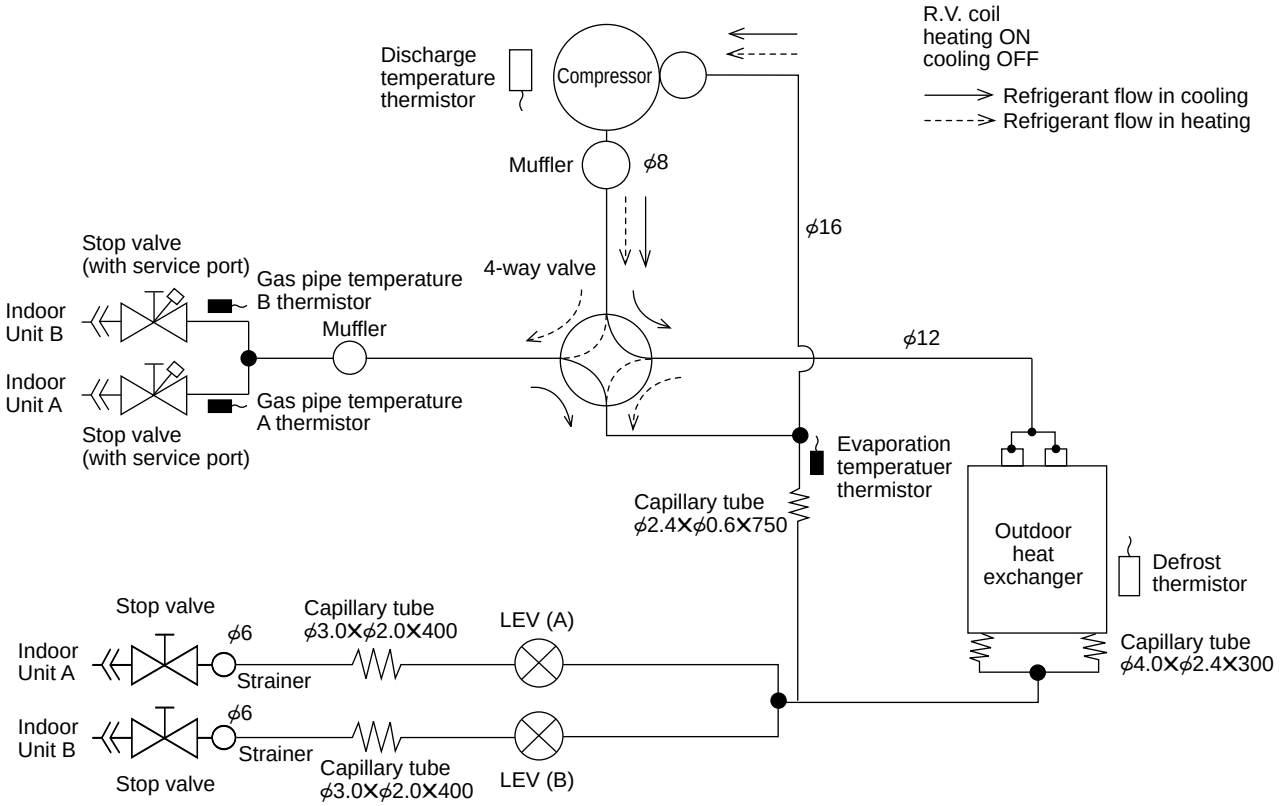
NOTES:

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

9 REFRIGERANT SYSTEM DIAGRAM

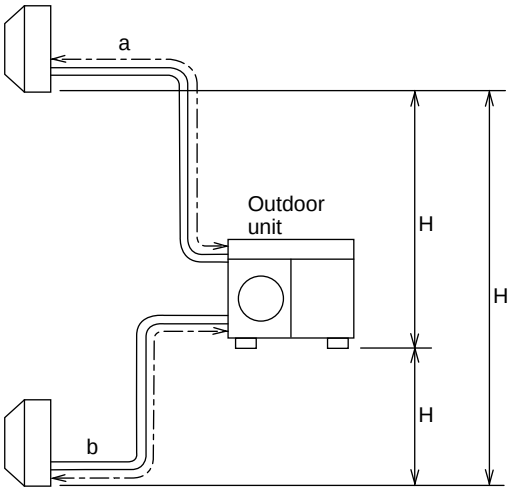
MXZ-18TV - E1

Unit:mm



MAX REFRIGERANT PIPING LENGTH

MXY-18TV - E1



Piping length each indoor unit (a, b)	20m
Total piping length (a+b)	30m
Height difference between units (H)	10m
Bending point for each unit	15
Total bending point	30

✻It does not matter which unit is higher.

- Refrigerant pipe diameter is different according to indoor unit to be connected. When using extension pipes,refer to the tables below.
- When diameter of refrigerant pipe is different from that of outdoor unit union, use optional Different-diameter pipe. For further information on Different-diameter pipe, see page BACK COVER.

Unit : mm (inch)

Indoor unit			Extension pipe diameter	
class	Pipe diameter			
07/09	Liquid	6.35(1/4)	Liquid	6.35(1/4)
	Gas	9.52(3/8)	Gas	9.52(3/8)
12	Liquid	6.35(1/4)	Liquid	6.35(1/4)
	Gas	12.7(1/2)	Gas	12.7(1/2)

NOTE: SEH-1.6AR is equivalent to class 12.

Outdoor unit union diameter		
For		
Indoor unit A	Liquid	6.35(1/4)
	Gas	9.52(3/8)
Indoor unit B	Liquid	6.35(1/4)
	Gas	9.52(3/8)

10 PERFORMANCE CURVES

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.

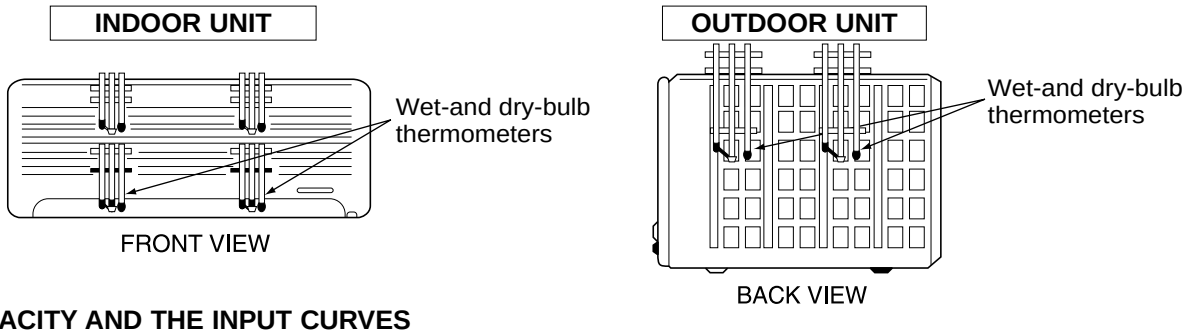
(3) MAIN READINGS

(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	
(5) Indoor intake air dry-bulb temperature :	°CDB	Heating
(6) Outdoor intake air wet-bulb temperature :	°CWB	
(7) Total input :	W	

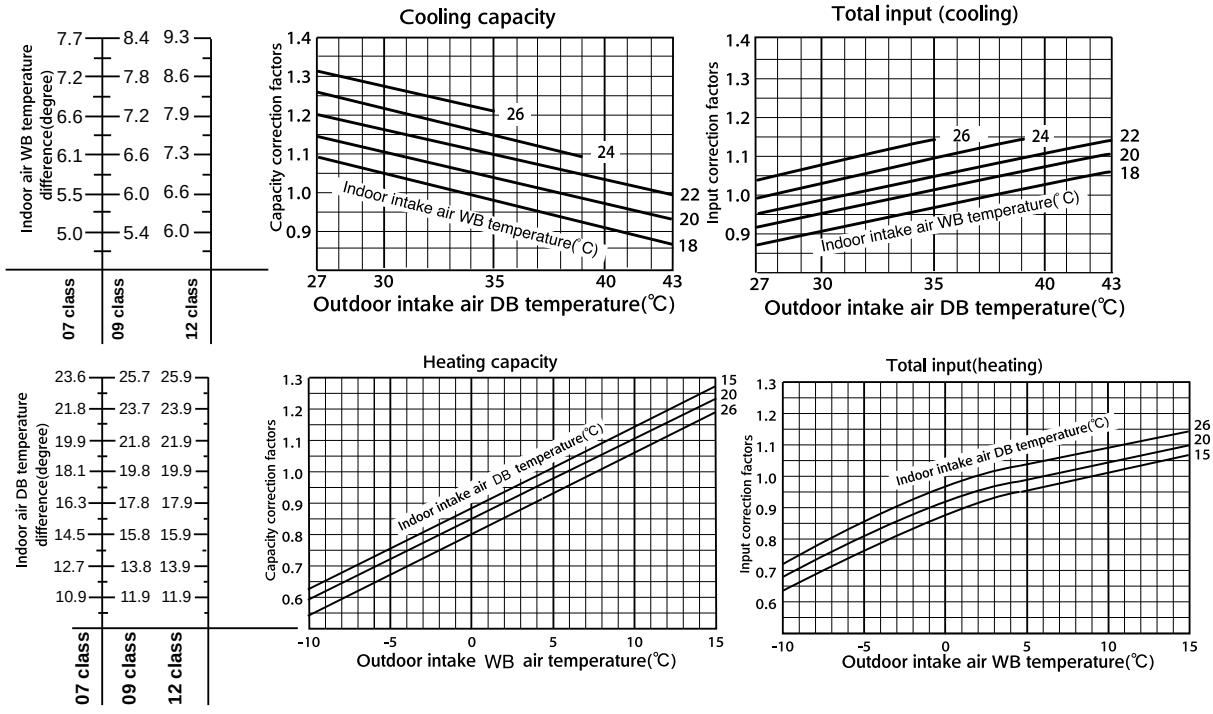
Indoor air wet/dry-bulb temperature difference on the left side of the chart on page 10 and 11 shows the difference between the indoor intake air wet/dry-bulb temperature and the indoor outlet air wet/dry-bulb temperature for your reference at service.

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.



10-1. CAPACITY AND THE INPUT CURVES



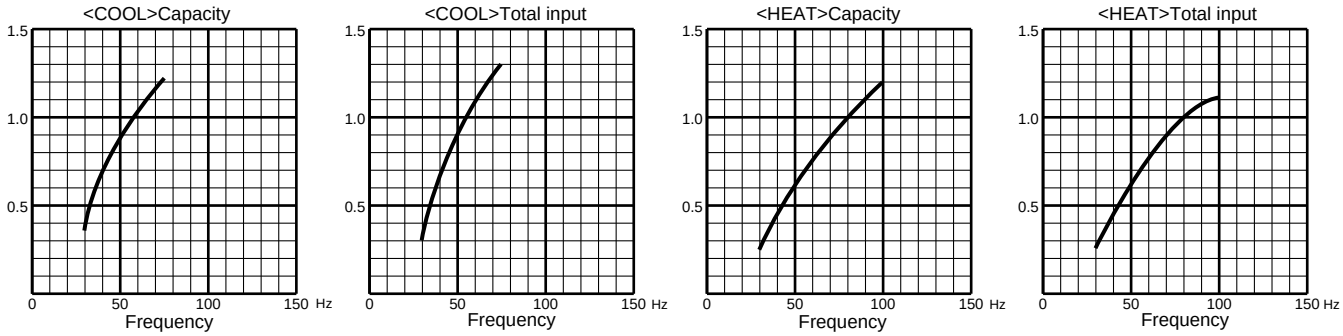
10-2. Capacity and input correction by inverter output frequency

(OUTDOOR UNIT:MXZ-18TV)

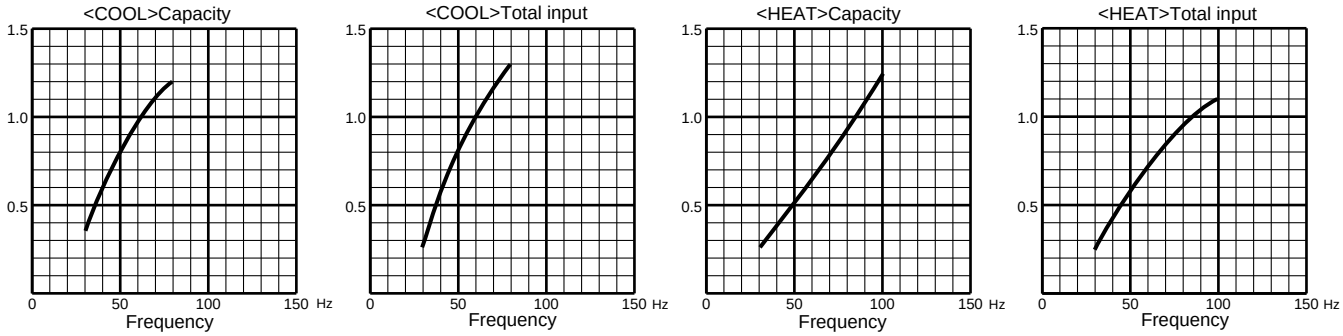
NOTE 1 : Inverter output frequency : COOL 55Hz,HEAT 80Hz

NOTE 2 : The dotted line on graphs connects the frequency range in normal operation shown by the full line and the frequency in test run shown by the point.

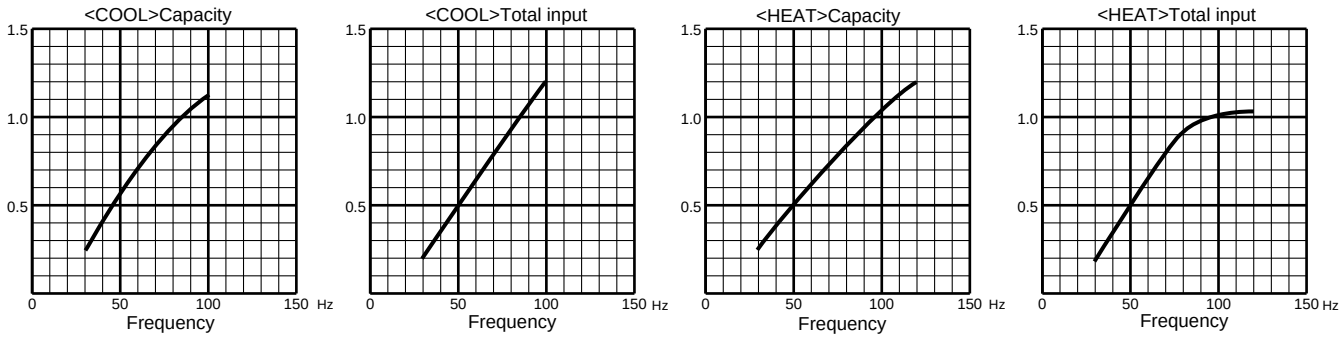
1. 07-class unit in single operation



2. 09-class unit in single operation



3. 12-class unit in single operation



10-3. Outdoor low pressure and outdoor unit current

1. 07-class unit in single operation (OUTDOOR UNIT : MXZ-18TV)

NOTE: The unit of pressure has been changed to MPa on the international system of units(SI unit system).
The converted score against the traditional unit system can be gotten according to the formula below.

1(MPa • G) =10.2(kgf/㎠ • G)

(1) COOL operation

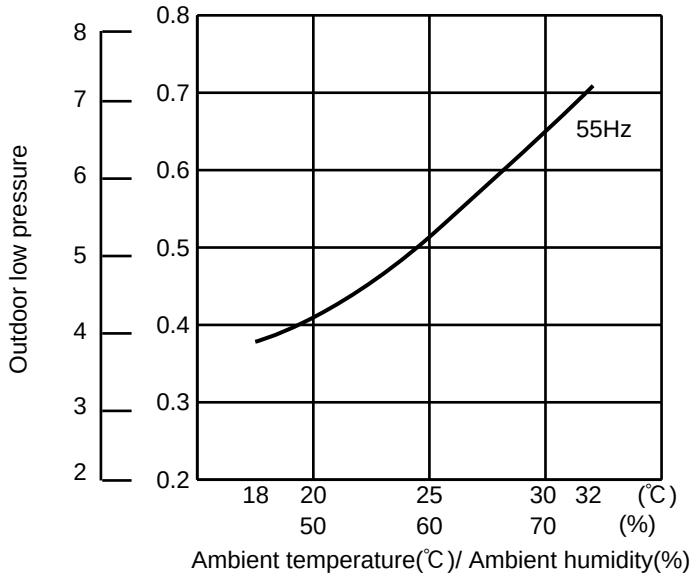
①Both indoor and outdoor units are under the same temperature/humidity condition.

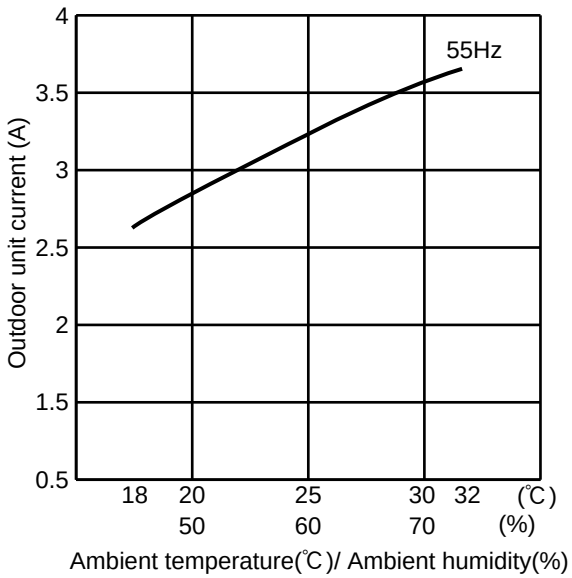
Dry-bulb temperature(°C)	Relative humidity(%)
20	50
25	60
30	70

②Air flow speed : HI

③Inverter output frequency : 55Hz

<How to work fixed-frequency operation>
1.Set emergency switch to COOL or HEAT.The switch is located on indoor unit.
2.Press emergency run ON/OFF button.
3.Compressor starts running at 55Hz (COOL) or 80Hz (HEAT).
4.Indoor fan runs at HI speed and continues for 30 minutes.
5.To cancel this operation,press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Indoor

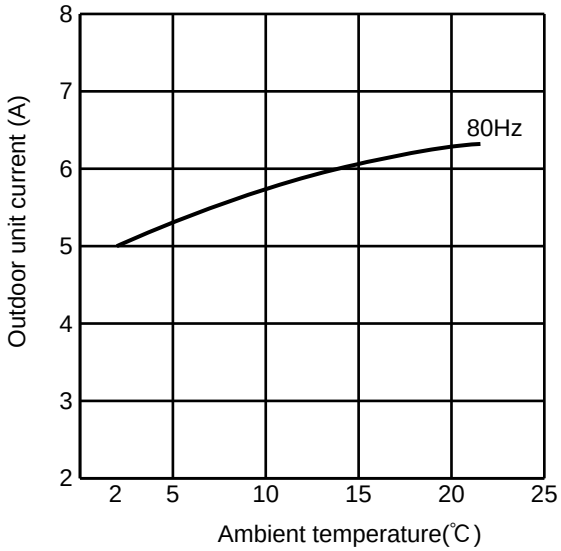
DB(°C)	20.0
WB(°C)	14.5

Outdoor

DB(°C)	2	7	15	20.0
WB(°C)	1	6	12	14.5

② Set air flow to Hi speed.

③ Inverter output frequency is 80Hz.



2. 09-class unit in single operation (OUTDOOR UNIT : MXZ-18TV)

NOTE: The unit of pressure has been changed to MPa on the international system of units(SI unit system).
The converted score against the traditional unit system can be gotten according to the formula below.

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<How to work fixed-frequency operation>

1.Set emergency switch to COOL or HEAT.The switch is located on indoor unit.
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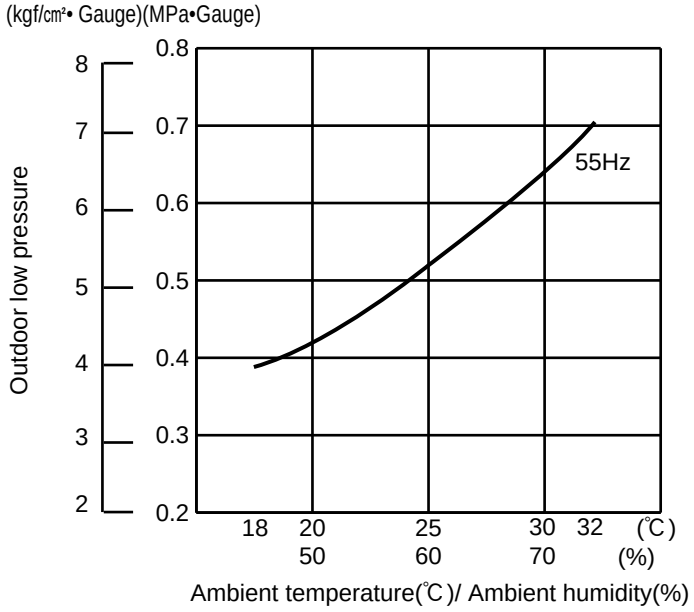
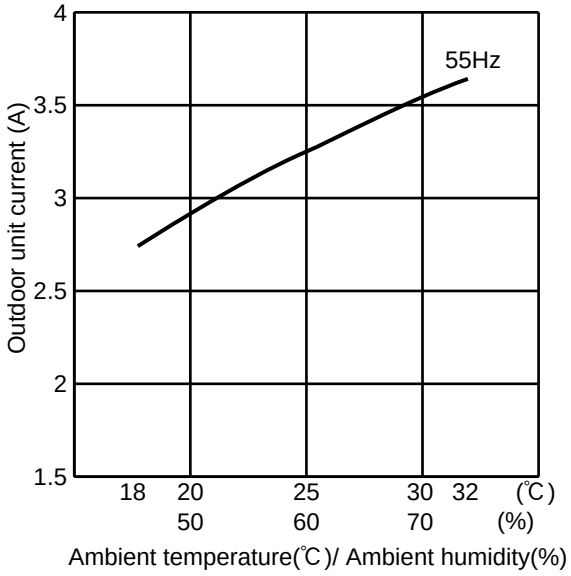
5.To cancel this operation,press emergency run ON/OFF button or any button on remote controller.





(2) HEAT operation

① Indoor

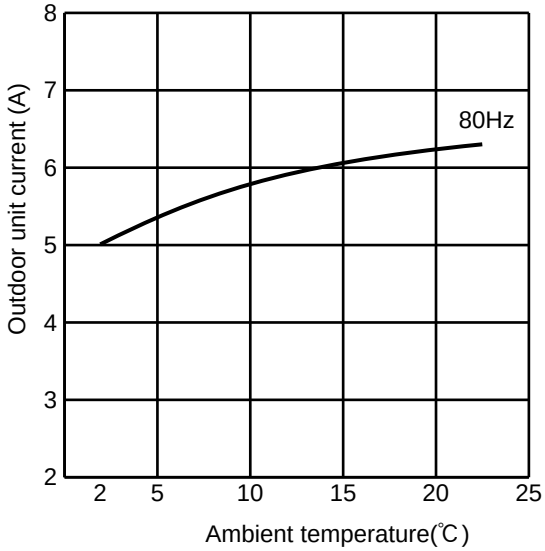
DB(°C)	20.0
WB(°C)	14.5

Outdoor

DB(°C)	2	7	15	20.0
WB(°C)	1	6	12	14.5

② Set air flow to Hi speed.

③ Inverter output frequency is 80Hz.



3. 12-class unit in single operation (OUTDOOR UNIT : MXZ-18TV)

NOTE: The unit of pressure has been changed to MPa on the international system of units(SI unit system).
The converted score against the traditional unit system can be gotten according to the formula below.

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(1) COOL operation

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

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

②Air flow speed : HI

③Inverter output frequency : 55Hz

<How to work fixed-frequency operation>

1.Set emergency switch to COOL or HEAT.The switch is located on indoor unit.
2.Press emergency run ON/OFF button.
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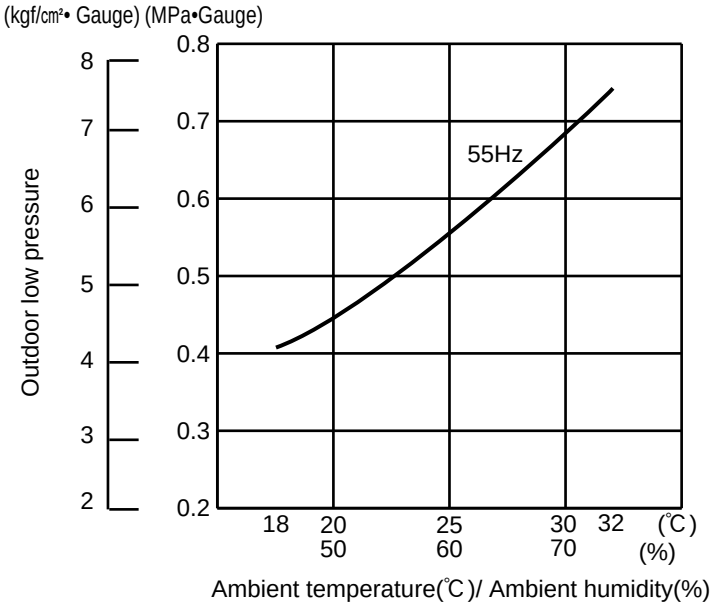
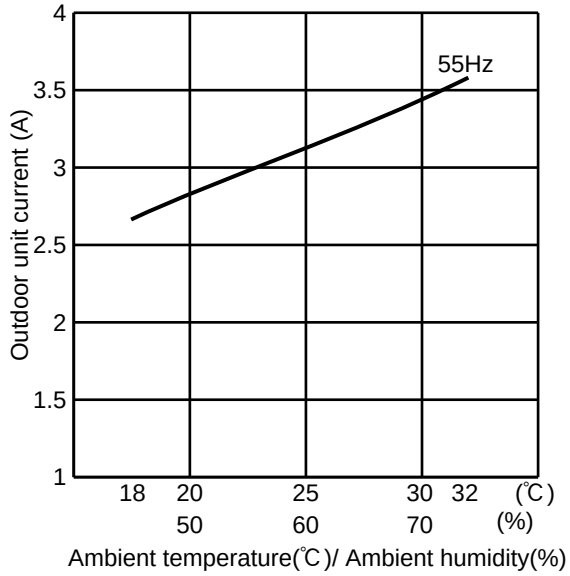




(2) HEAT operation

① Indoor

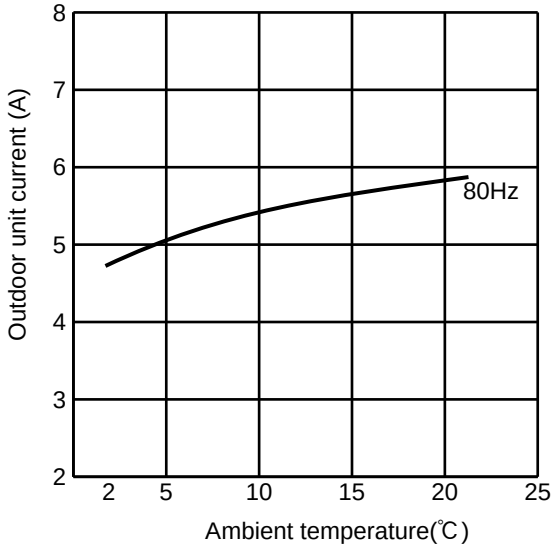
DB(°C)	20.0
WB(°C)	14.5

Outdoor

DB(°C)	2	7	15	20.0
WB(°C)	1	6	12	14.5

② Set air flow to Hi speed.

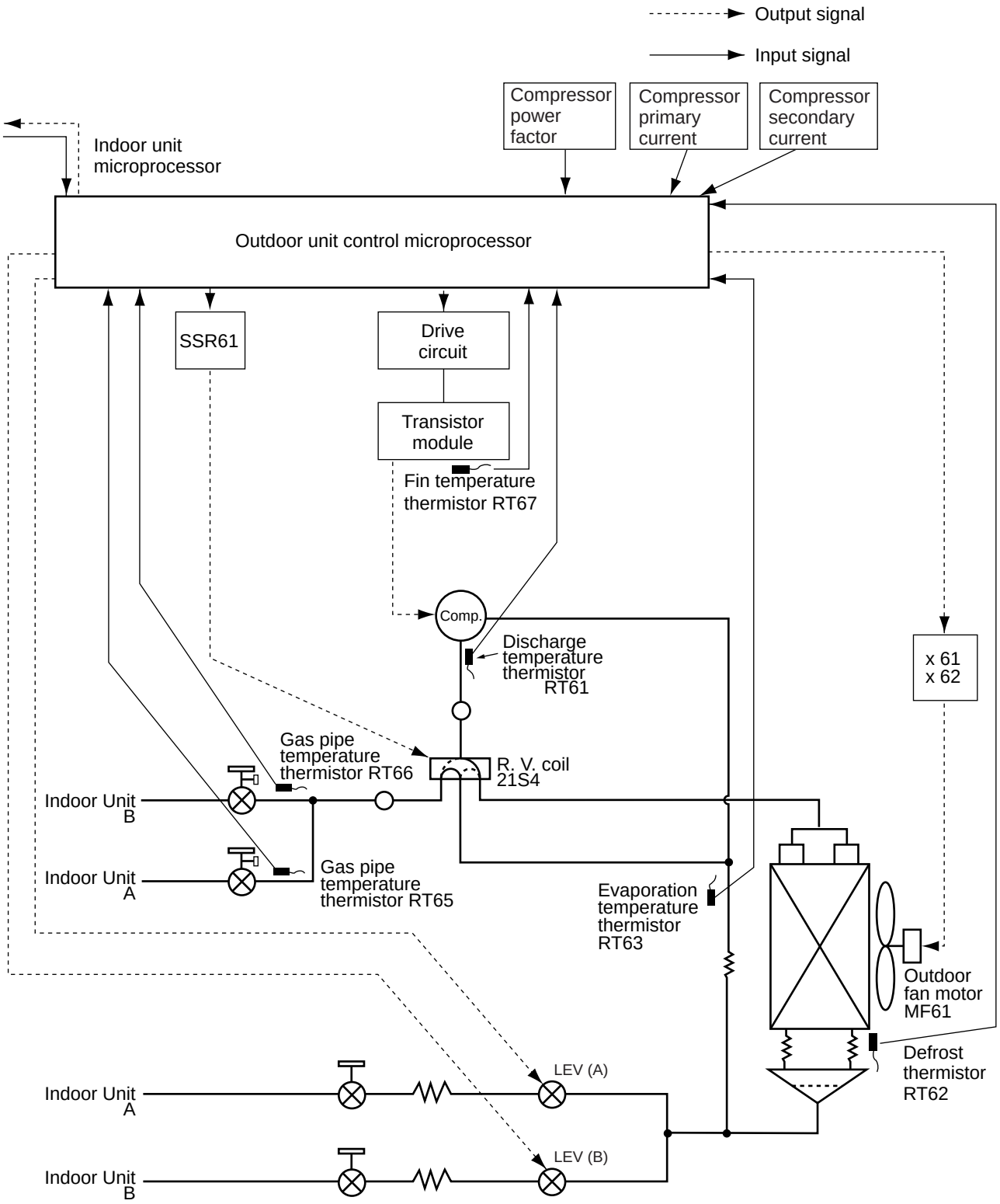
③ Inverter output frequency is 80Hz.



11 MICROPROCESSOR CONTROL

INVERTER MULTI SYSTEM CONTROL

MXZ-18TV - E1



11-1.LEV control

Linear expansion valve (LEV) is controlled by "Thermostat ON" commands given from each unit.

Indoor unit status	LEV opening
Stop of all indoor unit	Opening before stop → 500 pulse in 15 minutes
When outdoor unit is operating, some indoor unit stops and some operates.	COOL : 5 pulse (full closed) HEAT : 59 pulse (slightly opened)
Thermostat OFF in COOL or DRY mode	When the outdoor unit operation (When the other indoor unit operate): 5 pulse. When outdoor unit stops. (When the other indoor unit stops or thermo off): Maintain LEV opening before stop → 500 pulse in 15 minutes
Thermostat ON in COOL or DRY mode	• LEV opening for each indoor unit is determined by adding adjustment in accordance with the number of operating unit and the capacity class to standard opening, based on the operation frequency: Ex.) Opening 130 pulse in standard opening 1 → Minimum 80 pulse, Maximum 205 pulse. (Capacity code 4 at 1 unit operation) (Capacity code 1 at 4 unit operation) • After starting operation, adjustment in accordance with intake super heat, discharge temperature is included in standard opening. ※1 Note: LEV opening in each frequency at DRY operation and COOL operation is the same. However, velocity and compressor operation frequency controls are different. See 11-2 Operational frequency range (As far as the indoor unit velocity control goes, refer to DRY operation in MICROPROCESSOR CONTROL in the indoor unit service manual.)
Thermostat OFF in HEAT mode	• When the outdoor unit operates. (When the other indoor unit operates): 59 pulse • When the outdoor unit stops. (When the other indoor unit stops or thermo off): Maintain LEV opening before stop → 500 pulse in 15 minutes.
Thermostat ON in HEAT mode	• LEV opening for each indoor unit is determined by adding adjustment in accordance with the number of operating unit and the capacity class to standard opening, based on the operation frequency: Ex.) Opening 120 pulse in standard opening 1 → Minimum 70 pulse, Maximum 165 pulse. (Capacity code 4 at 1 unit operation) (Capacity code 1 at 4 unit operation) • After starting operation, opening becomes the one that adjustment in accordance with discharge temperature was added to basic opening. ※1

※1 LEV opening when the outdoor unit operating: Upper limit 500 pulse, Lower limit 59 pulse.

Determination of LEV standard opening in each indoor unit

- The standard opening is on the straight line, which connects an each standard point in the section where divided into seven according to the operation frequency of compressor as shown in the figure below.
  (LEV opening is controlled in proportion to the operation frequency.)

Note: Opening is adjusted at the standard opening according to the indoor unit conditions.
However, inclination of standard opening in each point of opening does not change with the original curve.

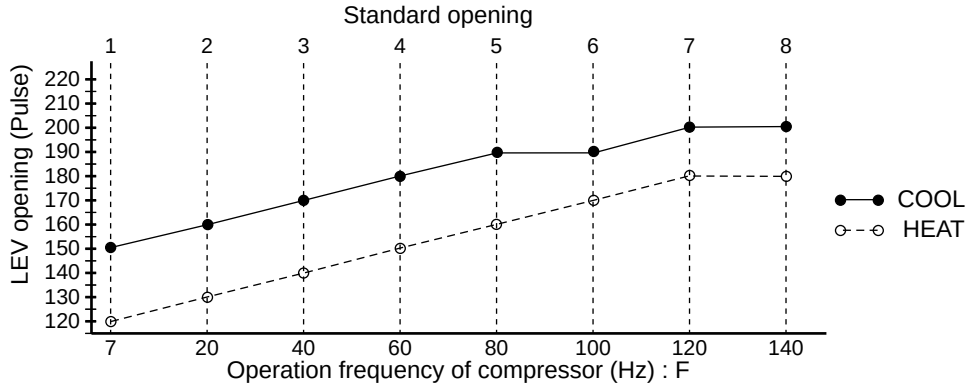
- Add opening provided in Difference in Capacity in the table below to the standard opening from 1 to 8, when capacity of the indoor unit is excluding code 1.
- Add opening provided in Difference in Operation number in the table below to determined LEV opening for each indoor unit, when 2, 3 or 4 indoor units are operated at the same time.

Note: Even when the adjusted standard opening exceeds the driving range from 59 to 500 pulse, actual driving output opening is in a range from 59 to 500 pulse.

< Calculation example of LEV opening >

Cool operation: Compressor frequency 70Hz: 2 unit ON: 18class

(170-150)÷(80-60)×(70-60)+150+75-30=205 pulse



	Standard opening								Difference in capacity		Difference in operation number
	1	2	3	4	5	6	7	8	Code2	Code3	2
COOL	150	160	170	180	190	190	200	200	25	50	-60
HEAT	120	130	140	150	160	170	180	180	20	40	-60

Capacity code	1	2	3	4
Indoor unit	07	09	12	18

<Correction>

	COOL	DRY	HEAT
① Suction super heat (MIN gas pipe temperature thermistor - Evaporation temperature thermistor)	●	●	–
② Each correction ※ 1 • (Each gas pipe temperature thermistor - Evaporation temperature thermistor) • (Main pipe temperature thermistor - sub pipe temperature thermistor)			
③ Discharge temperature	● ※ 2	● ※ 2	●

※ 1 Perform this, when number of operation units is 2units or more
※ 2 When the correction opening of suction super heat is 0, correct the LEV opening by dischaege temperature.

(1) LEV opening correction by suction super heat (COOL, DRY)
(Suction super heat) = (Minimum gas pipe temperature) - (Evaporation temperature)
When COOL and DRY , correct the LEV openings corrected from the table below

Suction superheat (S.H.)	LEV opening correction (pulse)
more than 12	6
10 to12	4
8 to 10	3
6 to 8	2
6 or less	0

(2) Separate correction (COOL,DRY)
(When number of operation unit is 2 units)
(a) Correction by the separate super heat
Correct the LEV separately by temperature difference between each gas pipe temperature thermistor and evaporator temperature thermistor.
① Calculate each super heat of the unit from the expression below;
(Super heat) = (Gas pipe temperature thermistor) - (Evaporation temperature thermistor)
② Select a minimum super heat from among them.
③ Correct an each LEV is corrected opening is corrected by difference between each super heat and minimum super heat.

Difference of superheat	LEV opening correction (pulse)
more than 9	8
6 to9	6
3to 6	2
6 or less	0

(3) LEV opening correction by discharge temperature

When LEV correction output is 0 pulse by the suction super heat at cool or dry operation, or dry operating, correct LEV is corrected according to the following table.

The target discharge temperature is determined according to frequency zone and number of operation unit of the compressor.

Operation frequency of compressor	COOL, DRY		HEAT	
	Number of operating unit.		Number of operating unit.	
	Single	Double	Single	Double
Minimum ~ 20	40	40	40	40
21 ~ 33	40	40	45	45
34 ~ 46	45	45	50	50
47 ~ 59	45	45	55	55
60 ~ 72	50	50	60	60
73 ~ 85	55	55	65	65
86 ~ 98	65	65	70	70
97 ~ 111	70	70	75	73
111 ~ Maximum	75	75	75	73

Correct the LEV opening according to difference between the target discharge temperature and discharge temperature.

Discharge temperature (℃)	LEV opening correction (pulse)	
	COOL	HEAT
more than Target discharge temperature+11	10	8
Target discharge temperature+11 to Target discharge temperature+8	4	2
Target discharge temperature+8 to Target discharge temperature+5	2	1
Target discharge temperature+5 to Target discharge temperature+2	1	1
Target discharge temperature+2 to Target discharge temperature-2	0	0
Target discharge temperature-2 to Target discharge temperature-5	-1	-1
Target discharge temperature-5 to Target discharge temperature-8	-2	-1
Target discharge temperature-8 to Target discharge temperature-11	-5	-2
Target discharge temperature-11 or less	-8	-6

11-2.Operational frequency range

Number of operating unit	capacity cord	COOL			DRY	HEAT			
		Min.	Max.	Rated		Min.	Max.	Defrost	Rated
1	1	30	70	55	30	30	100	100	80
	2		80	61	41		100	100	85
	3		100	85	53		120	100	94
2	2 3 4 5 6 7	30	120	108	72	30	120	100	120

Note: When the fan speed of indoor unit is total Lo notch, restrict the maximum frequency is rated frequency.

11-3.Heat defrosting control

(1) Conditions to enter defrosting mode

①. When temperature of defrosting thermistor is -3℃ or less.

②.When specified non-defrosting time, is counted in the control p.c.board is satisfied.
(Total time of compressor operating)

Going to defrosting mode at both condition of ① and ②.

(2) Defrosting operation

①. Compressor stops for 50 seconds, Indoor fan is off, Defrosting lamp lights

②.4-way valve reverses flow, Compressor operates by the frequency in heat defrosting control.

③. After compressor stops for 35 seconds, 4-way valve reverses flow, then defrosting finishes.

(3) Conditions to finish defrosting mode

①. When the defrosting thermistor temperature is 8℃ or more.

②. When it has spent 10 minutes for defrosting.

Defrosting finishes at condition of ① or ②.

11-5.Discharge temperature protection control

This protection controls the compressor ON/OFF and operation frequency according to temperature of the discharge temp. thermistor.

(1) Compressor ON/OFF

When temperature of the discharge temp. thermistor exceeds 116℃, the control stops the compressor.
When temperature of the discharge temp. thermistor is 80℃ or less, the controls starts the compressor.

(2) Compressor operation frequency

When temperature of the discharge temp. thermistor is expected to be higher than 116℃, the control decreases 12Hz from the current frequency.
When temperature of the discharge temp. thermistor is expected to be higher than 111℃ and less than 116℃, the control decreases 6Hz from the current frequency.
When temperature of the discharge temp. thermistor is expected to be higher than 104℃ and less than 111℃, the control is set at the current frequency.

11-6.Refrigerant recovery control on heating

<Control status>

The control performs when the following status are satisfied everything;

- When there is 1 unit or more not operating indoor unit on heat operation. (Excluding thermo OFF)
- When discharge temperature becomes 107℃ or more.
- When it passed 60 minutes or more since the operation has started or the last refrigerant recovery has controlled.

<Control details>

LEV opening, which adjusts to not operating indoor unit, is considered to be 80 pulse.

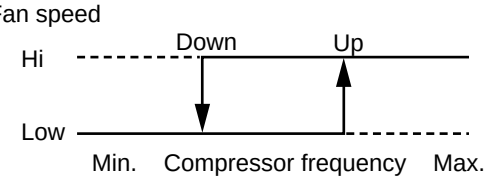
<Control finish status>

The control finishes either as follows. However, the LEV opening is considered to be 59 pulse.

- When it passed 60 seconds since the control has started.
- When the discharge temperature is 90℃ or less.

11-7.Outdoor fan control

Fan speed is switched according to a number of operating indoor unit and the compressor frequency.



<Relation between compressor frequency and fan speed.>

Mode	Fan speed	Indoor unit operation	
		Single	Double
COOL	Up	60Hz	60Hz
	Down	50Hz	50Hz
HEAT	Up	60Hz	60Hz
	Down	50Hz	50Hz

Note

- When operation, fan speed of Hi/ Low mode changes to VHi/ Hi mode by promoting those fan speeds respectively by 1 step after defrosting is operated. This control is cleared, when the compressor off.
- When overheat protection of P.C. board temperature or fin temperature operates, the outdoor fan speed is fixed to VHi mode regardless of compressor frequency. Also, when the overheat protection is cleared, the fan speed is back to normal
- When the indoor coil thermistor is 57℃ or more on HEAT operation, fan speed is fixed to Low notch . Or, the indoor coil thermistor is 45℃ or less on HEAT operation, fan speed is back to normal.

11-8.Relation between main sensor and actuator

Relation between main sensor and actuator.

Sensor	Purpose	Actuator			
		Compressor	LEV	Outdoor fan motor	Reversing valve
Discharge temperature thermistor	Protection	◯	◯		
Indoor pipe temperature thermistor	Defrosting Protection	◯	◯	◯	
Defrost thermistor	Defrosting	◯	◯		◯
Evaporation temperature thermistor	Control		◯		
Gas pipe temperature thermistor	Control		◯		
Fin temperature thermistor	Protection	◯		◯	
Capacity code	Control	◯	◯	◯	

12 TROUBLESHOOTING

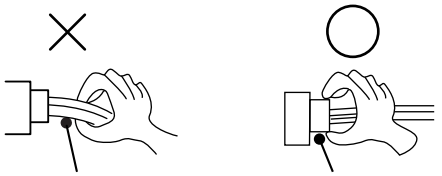
12-1. Cautions on troubleshooting

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 unit, and then after confirming the horizontal vane is closed, turn off the breaker and / or disconnect the power plug.
2) Be sure to unplug the power cord 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.

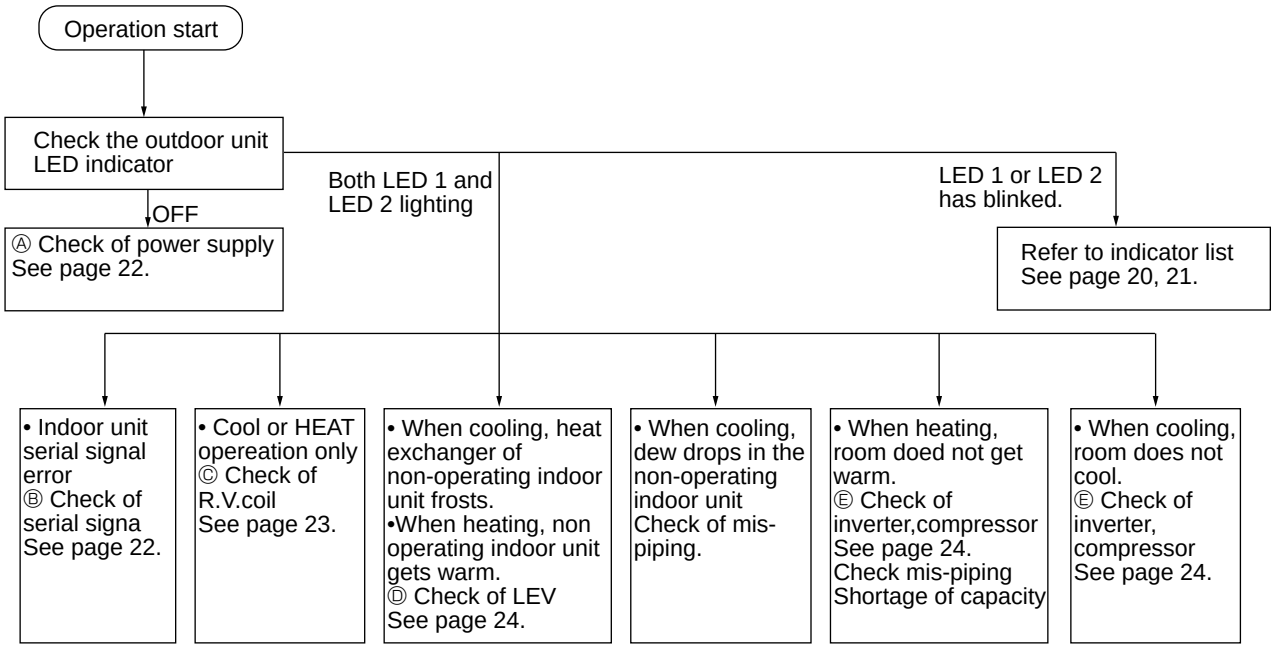


3. Troubleshooting procedure

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) 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 discoloration.
3) When troubleshooting, refer to the flow chart on page 19 and the check table on page 20, 21.

12-2. Instruction of troubleshooting

• Check the indoor unit with referring to the indoor unit service manual, and confirm that there is any problem in the indoor unit. Then, check the outdoor unit with referring to this page.



Troubleshooting check table <OUTDOOR UNIT>

LED 1 (red)	LED 2 (yellow)	Error mode
Lighting	Lighting	Normal

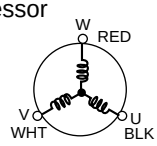
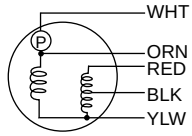
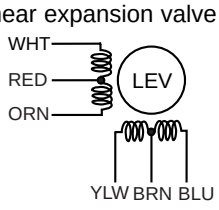
Symptom: Outdoor unit does not operate.				
Indication		Abnormal point	Detecting method	Check points
LED 1 (red)	LED 2 (Yellow)			
Lighting	Twice	Outdoor power system	When the compressor operation has been interrupted by overcurrent protection continuously three times within 1 minute after start-up.	• Check the inverter / compressor. Refer to "Ⓔ" on page 24.
Lighting	7 times	Outdoor control system	When the nonvolatile memory data cannot be read properly on the outdoor electronic control P.C. board.	• Replace the outdoor electronic control P.C. board.
6 times	Goes out	Indoor unit and LEV	When the drain abnormality is detected in the indoor unit and the indoor unit coil temperature is too low, or when any abnormality is detected in the components of indoor unit.	• Check the abnormality indication on the indoor unit. • Check the LEV. Refer to "Ⓓ" on page 24.
Lighting	9 times	DC voltage sensing circuit	When DC voltage sensing circuit detects 57V or below or 395V or above	• Replace the outdoor electronic control P.C. board.

Symptom: Outdoor unit repeats to stop and restart in 3 minutes				
Indication		Abnormal point	Detecting method	Check points
LED 1 (red)	LED 2 (Yellow)			
Lighting	3 times	Discharge temperature thermistor	When a short or open circuit occurs in the discharge temperature thermistor during compressor running.	• Check the characteristic of the discharge temperature thermistor. Refer to "Ⓕ" on page 25. • Check the connector. (CN663)
Lighting	4 times	Fin temperature thermistor	When a short or opern circuit occurs in the fin temperature thermistor during compressor running.	• Check the characteristic of the fin temperature thermistor. Refer to "Ⓕ" on page 25. • Check the connector. (CN664)
Lighting	5 times	P.C. board temperature thermistor	When a short or open circuit occurs in the P.C. board temperature thermistor during compressor running.	• Replace the outdoor electronic control P.C. board.
Lighting	10 times	Evaporation temperature thermistor	When a short or open circuit occurs in the evaporation temperature thermistor during compressor running.	• Check the characteristic of the evaopration temperature thermistor. Refer to "Ⓕ" on page 25. • Check the connector. (CN663)
Lighting	11 times	Gas pipe temperature A thermistor	When a short or open circuit occurs in the gas pipe temperature A thermistor during compressor running.	• Check the characteristic of the gas pipe temperature A thermistor. Refer to "Ⓕ" on page 25. • Check the connector. (CN661)
Lighting	12 times	Gas pipe temperature B thermistor	When a short or open circuit occurs in the gas pipe temperature B thermistor during compressor running.	• Check the characteristic of the gas pipe temperature B thermistor. Refer to "Ⓕ" on page 25. • Check the connector. (CN661)
Twice	Goes out	Over current protection	When over current is applied to the power module.	• Check the inverter / compressor. Refer to "Ⓔ" on page 24. • Check the amount of gas. • Check the indoor / outdoor air flow for short cycle. • Check the indoor unit air filter for clogging.
3 times	Goes out	Discharge temperature overheat protection	When the discharge temperature thermistor detects 116℃ or above. (Protection will be released at 100℃ or below.)	• Check the amount of gas and the refrigerant cycle. • Check the outdoor unit air passage.
4 times	Goes out	Fin temperature overheat protection	When the fin temperature thermistor detects 91℃ or above.	• Check the outdoor unit air passage. • Check the outdoor fan motor. Refer to "Ⓖ" on page 25. • Check the power module.
4 times	Goes out	P.C. board temperature overheat protection	When the P.C. board temperature thermistor detects 79℃ or above.	• Check the outdoor unit air passage. • Check the outdoor fan motor. Refer to "Ⓖ" on page 25. • Replace the outdoor electronic control P.C. board.

Symptom: Oudtoor unit operates (The compressor operates at reduced frequency)				
Indication		Abnormal point	Detecting method	Check points
LED 1 (red)	LED 2 (Yellow)			
Once	Lighting	Current protection	When the outdoor unit input current exceeds 15.5A.	These symptoms do not mean any abnormality of the product, but check the following points. • Air filter clogging. • Amount of gas. • Short cycle of indoor / outdoor air flow.
Twice	Lighting	Overload protection	When the compressor load exceed the specified value.	
3 times	Lighting	High pressure protection	When indoor pipe temperature exceeds 55℃ during heating.	
3 times	Lighting	Defrosting in cooling	When indoor pipe temperature falls to 6℃ or below during cooling.	
4 times	Lighting	Discharge temperature protection	When the discharge temperature exceeds 111℃.	
7 times	Lighting	Low discharge temperature protection	When the state with low discharge temperature of which 50.4℃ or below in cool and 48.8℃ or below in heat for 20 minutes.	

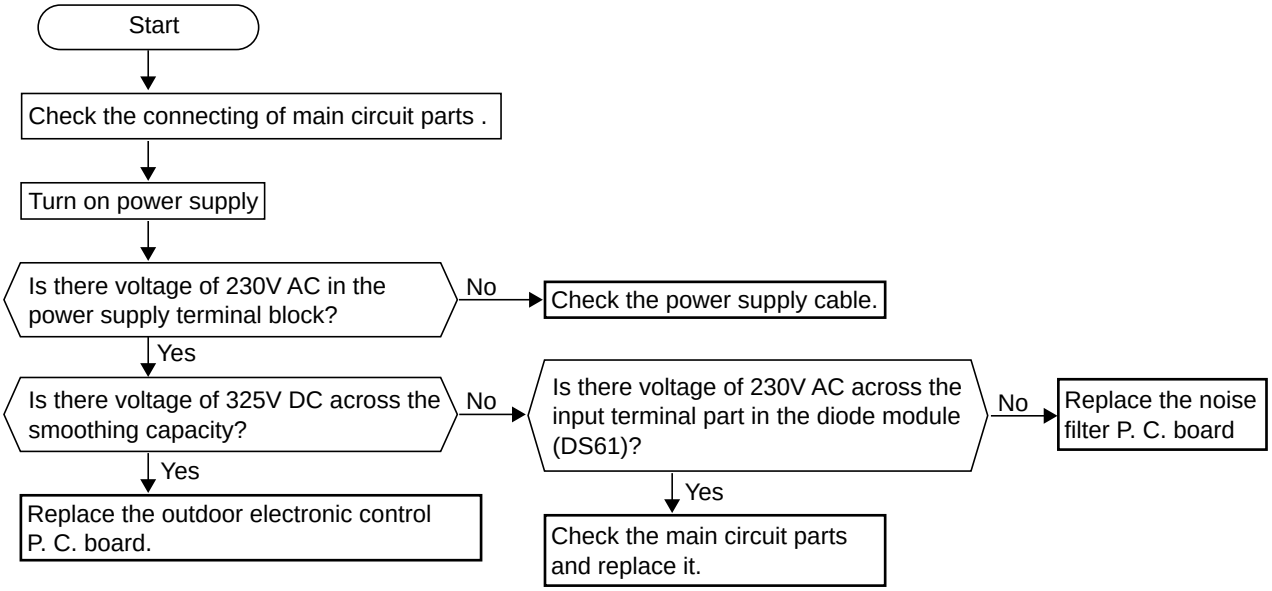
Symptom: Outdoor unit operates				
Indication		Abnormal point	Detecting method	Check points
LED 1 (red)	LED 2 (Yellow)			
5 times	Lighting	Defrost thermistor	When a short or open circuit occurs in the defrost thermistor during heating.	• Check the characteristic of the defrost temperature thermistor. Refer to "Ⓔ" on page 25. • Check the connector. (CN663)
6 times	Lighting	Power factor detection	When the compressor power factor cannot be detected.	• Check the compressor wiring.

12-4. Trouble criterion of main parts

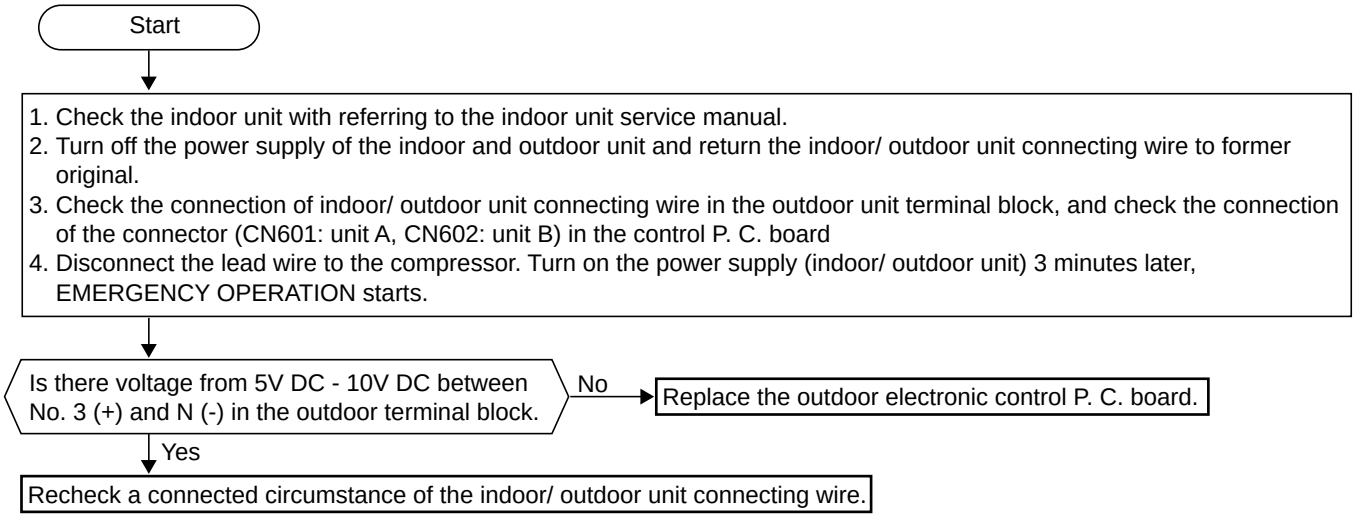
<table>
<tr><th>Part name</th><th>Check method and criterion</th></tr>
<tr><td>Defrost thermistor
Evaporation / Gas pipe temperature thermistor</td><td>Measure the resistance using a tester.
(Part temperature -10°C ~ 40°C)
<table>
<tr><th>Normal</th><th>abnormal</th></tr>
<tr><td>5kΩ ~ 55kΩ</td><td>Opened or short-circuited</td></tr>
</table></td></tr>
<tr><td>Discharge temperature thermistor</td><td>Measure the resistance using a tester, after warming up the thermistor by holding by hand.
(Part temperature : 20°C ~40°C)
<table>
<tr><th>Normal</th><th>abnormal</th></tr>
<tr><td>100kΩ ~ 250kΩ</td><td>Opened or short-circuited</td></tr>
</table></td></tr>
<tr><td>Compressor
 
</td><td>Measure the resistance between terminals using a tester.
(Winding temperature : -10°C ~ 40°C)
<table>
<tr><th>Normal</th><th>abnormal</th></tr>
<tr><td>1Each phase 0.39Ω ~ 0.50Ω</td><td>Opened or short-circuited</td></tr>
</table></td></tr>
<tr><td>Outdoor fan motor
 
</td><td>Measure the resistance between lead wires using a tester.
(Part temperature : -10°C ~ 40°C)
<table>
<tr><th></th><th>Normal</th><th>abnormal</th></tr>
<tr><td>WHT - BLK</td><td>208.4Ω ~ 254.8Ω</td><td rowspan="3">Opened or short-circuited</td></tr>
<tr><td>BLK - YLW</td><td>42.4Ω ~ 51.9Ω</td></tr>
<tr><td>BLK - RED</td><td>197.7Ω ~ 241.7Ω</td></tr>
</table></td></tr>
<tr><td>R. V. coil</td><td>Measure the resistance using a tester. (Part temperature -10°C ~ 40°C)
<table>
<tr><th>Normal</th><th>abnormal</th></tr>
<tr><td>2.6kΩ ~ 3.3kΩ</td><td>Opened or short-circuited</td></tr>
</table></td></tr>
<tr><td>Linear expansion valve
 
</td><td>Measure the resistance using a tester.(Part temperature -10°C ~ 40°C)
<table>
<tr><th>Lead wire color</th><th>Normal</th><th>Abnormal</th></tr>
<tr><td>WHT - RED</td><td rowspan="4">37.4Ω ~ 53.9Ω</td><td rowspan="4">Opened or short-circuited</td></tr>
<tr><td>RED - ORN</td></tr>
<tr><td>YLW - BRN</td></tr>
<tr><td>BRN - BLU</td></tr>
</table></td></tr>
</table>

Ⓟ Inner protector

Ⓐ Check of power supply

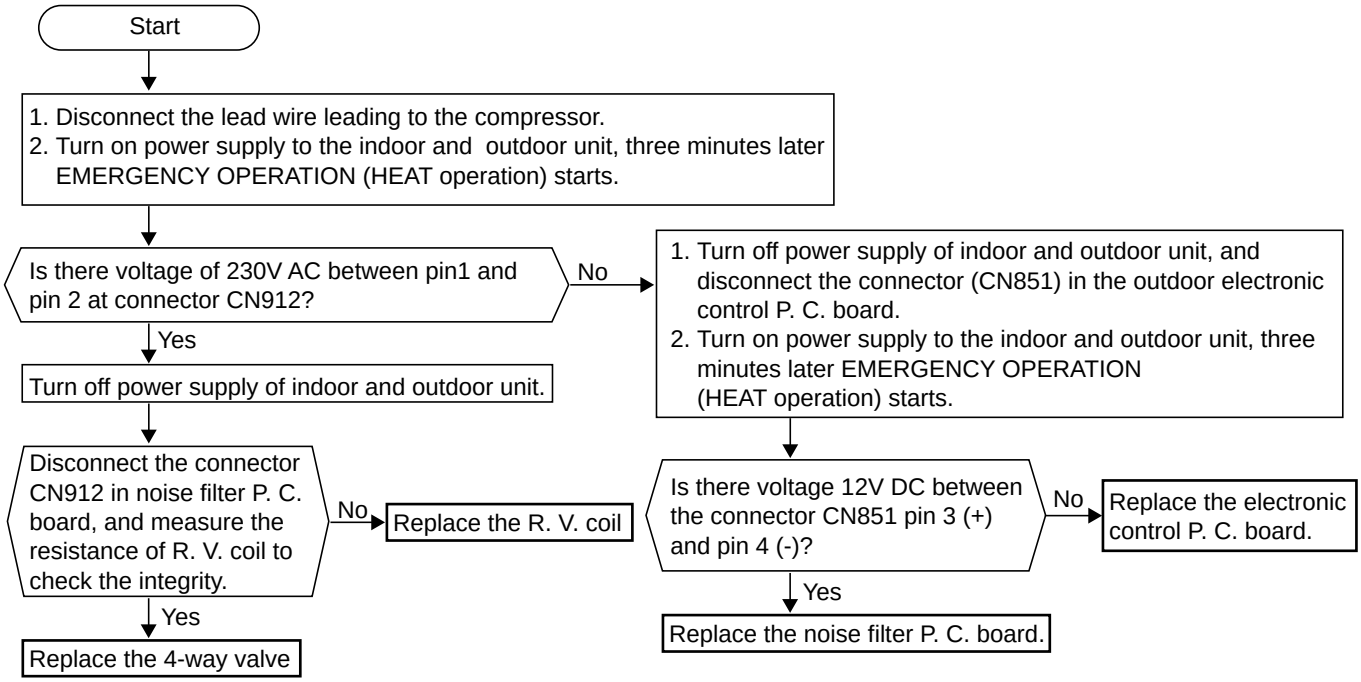


Ⓑ Check of outdoor unit serial signal

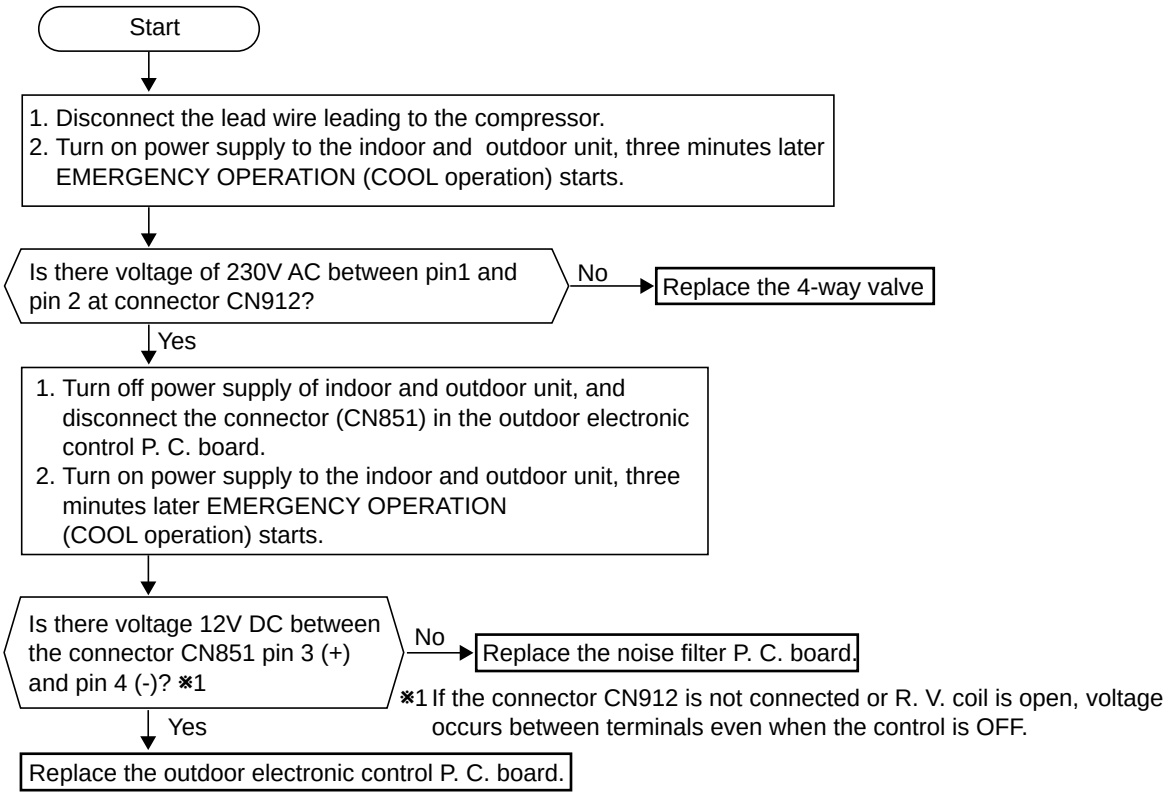


© Check of R. V. coil

• When heating operation does not work.

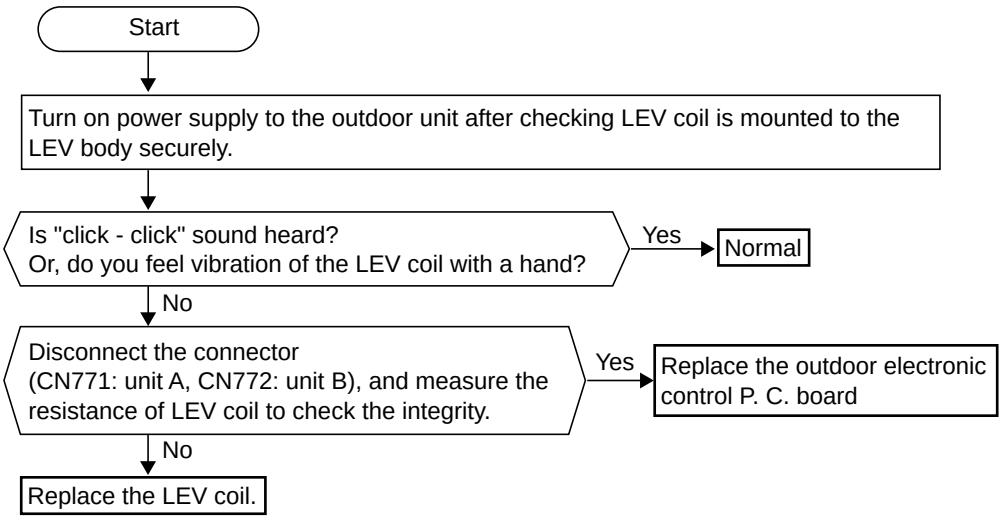


• When cooling operation does not work.

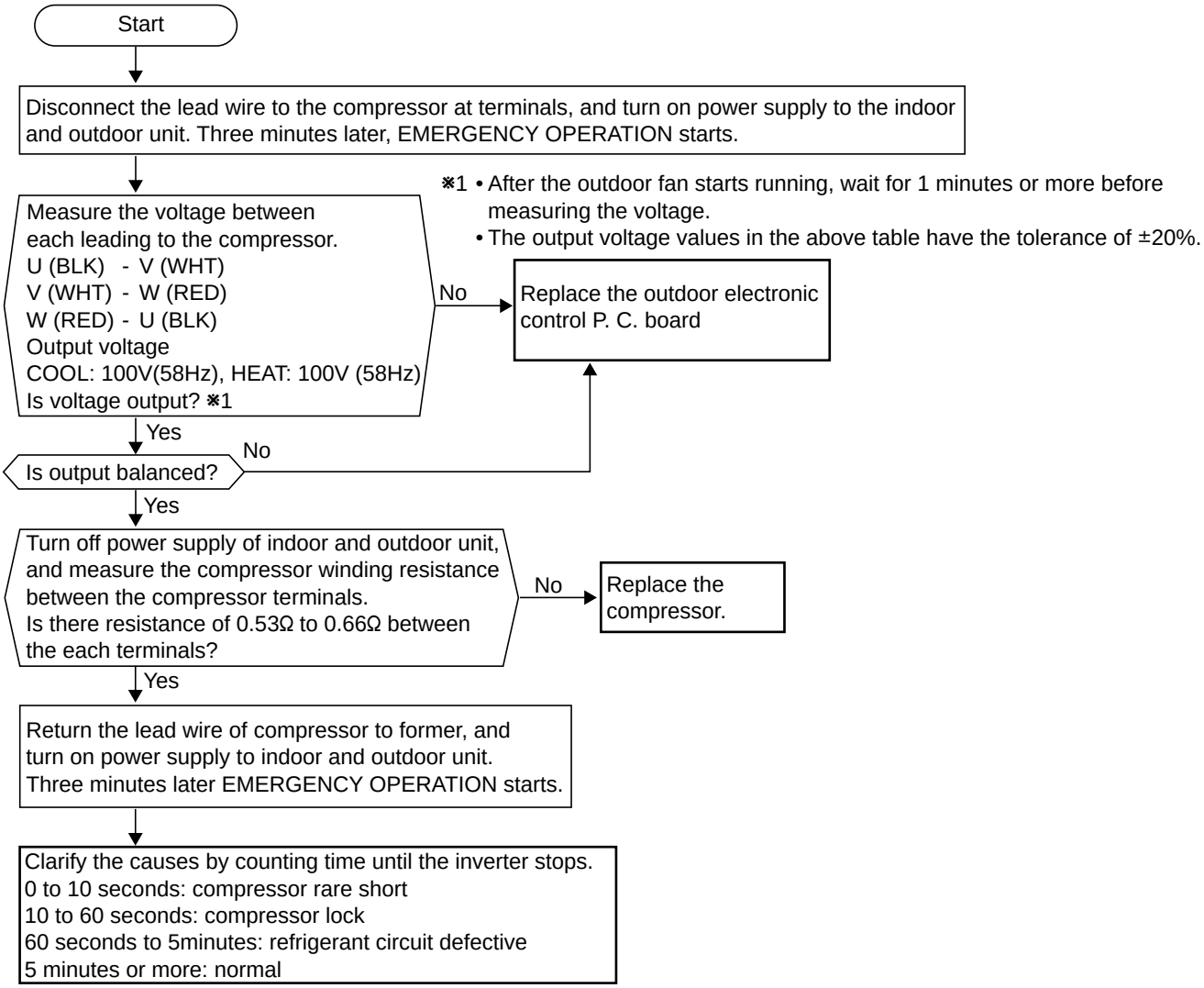


※1 If the connector CN912 is not connected or R. V. coil is open, voltage occurs between terminals even when the control is OFF.

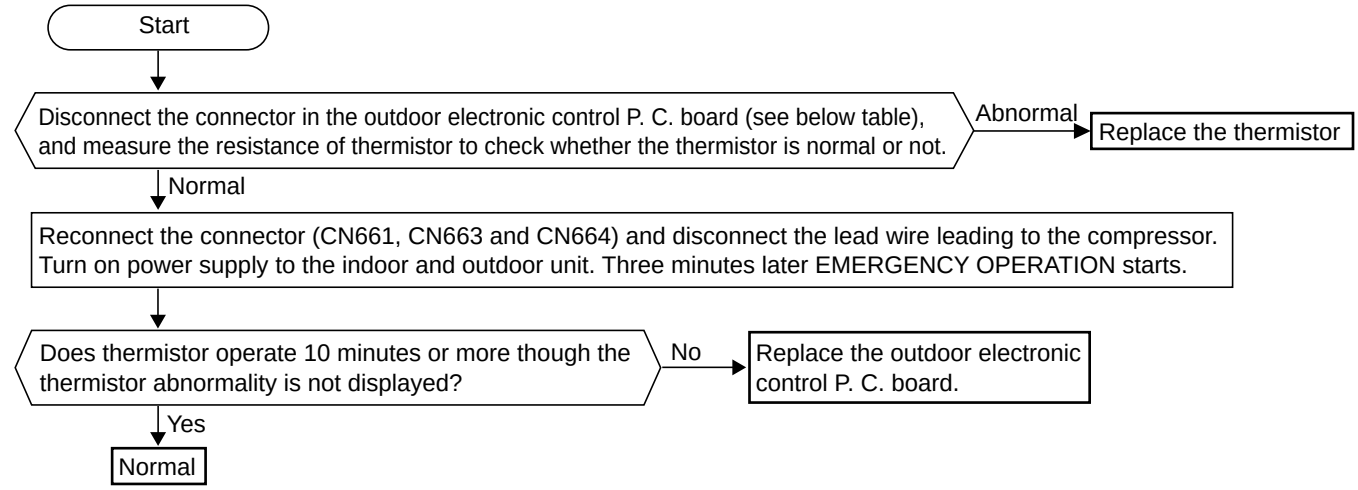
Ⓓ Check of LEV



Ⓔ Check of inverter/ compressor

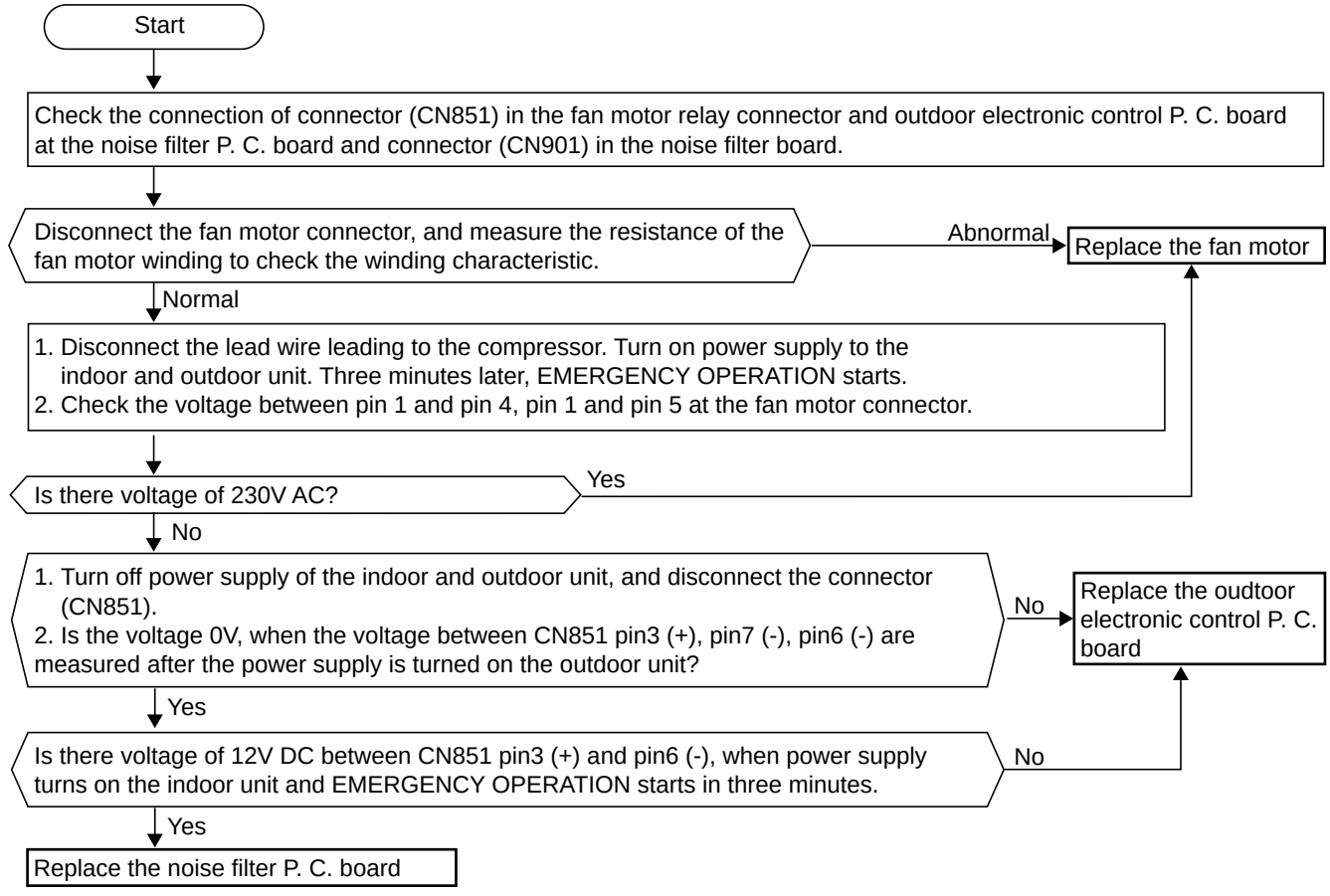


Ⓕ Check of outdoor unit thermistor



Thermistor	Symbol	Connector, Pin No.
Discharge temperature thermistor	RT61	Between CN663 pin3 and pin4
Defrost thermistor	RT62	Between CN663 pin1 and pin2
Evaporation temperature thermistor	RT63	Between CN663 pin5 and pin6
Gas pipe temperature A thermistor	RT65	Between CN661 pin1 and pin2
Gas pipe temperature B thermistor	RT66	Between CN661 pin3 and pin4
Fin temperature thermistor	RT67	Between CN664 pin1 and pin2

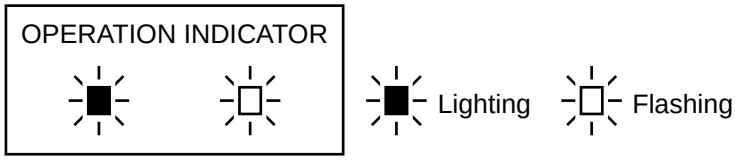
Ⓖ Check of outdoor fan motor



Ⓗ The other cases

① Indoor unit dose not operate. (difference modes)

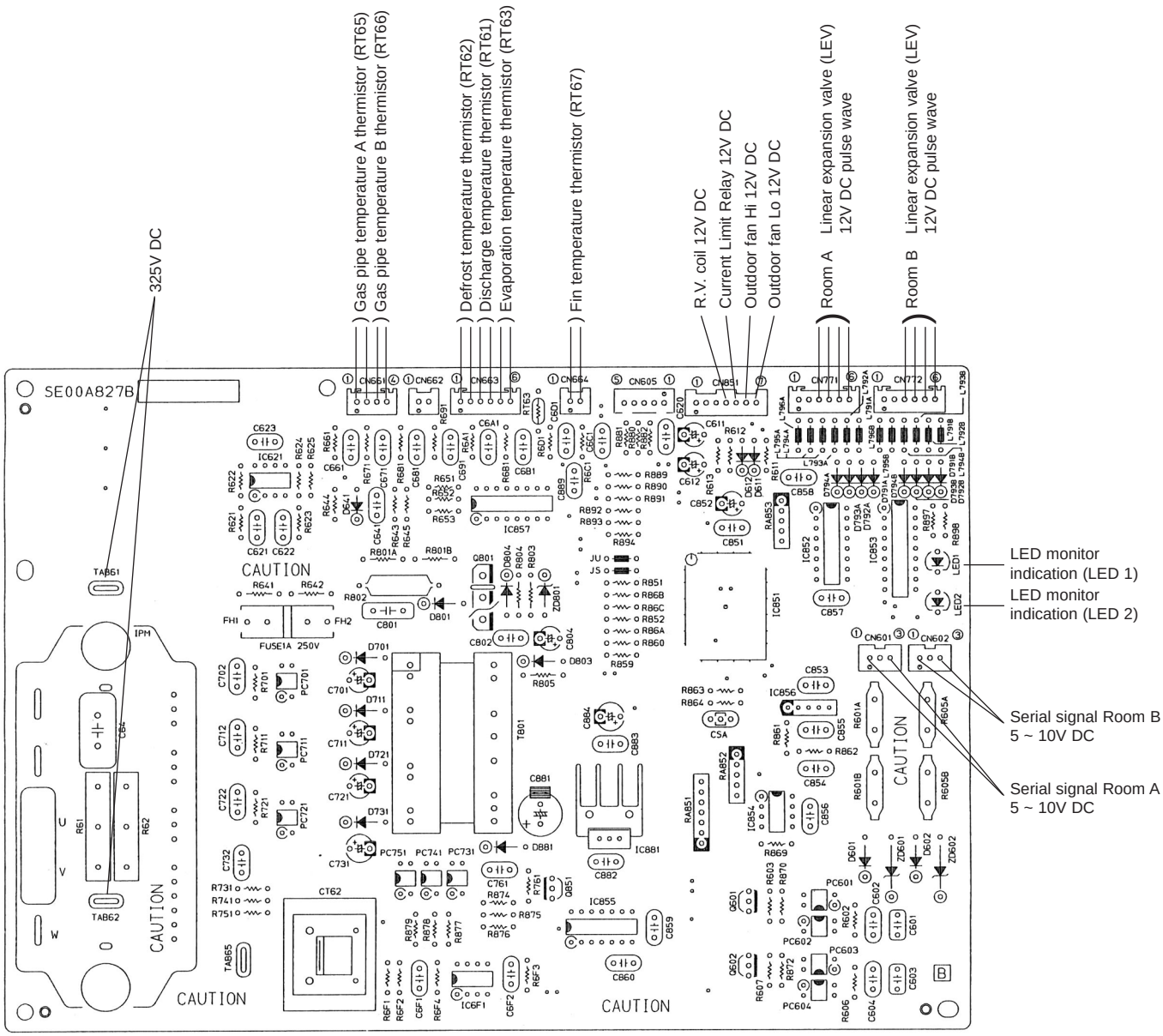
- When you try to run two indoor unit simultaneously, one for cooling and the other for heating, the unit which transmits signal to the outdoor units earlier decides the operation mode. The other unit indicates as shown in the figure below.
- When the above situation occurs, set all the indoor units to the same mode, turn OFF the indoor units, and then turn them back ON.
- Though the top of the indoor unit sometimes gets warm, this does not mean malfunction. The reason is that the refrigerant gas continuously flows into the indoor unit even while it is not operating.



TEST POINT DIAGRAM AND VOLTAGE

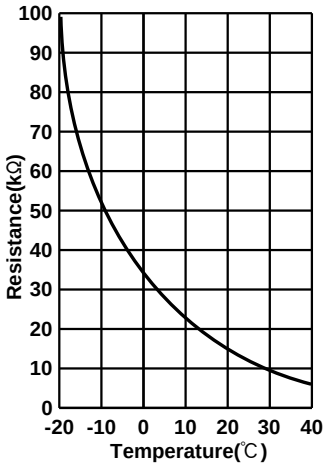
MXZ-18TV - E1

Outdoor Electronic control P.C.board

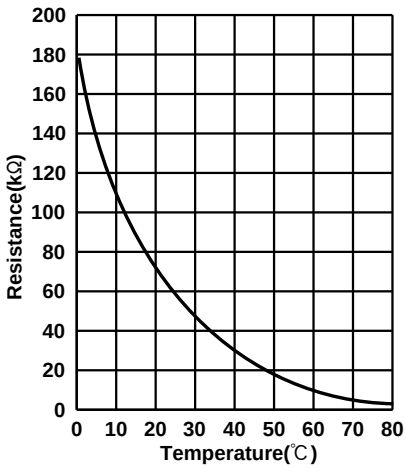


Evaporation temperature thermistor (RT63)

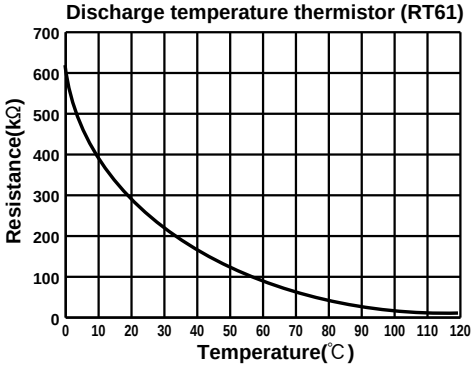
Gas pipe temperature thermistor (RT65,66)



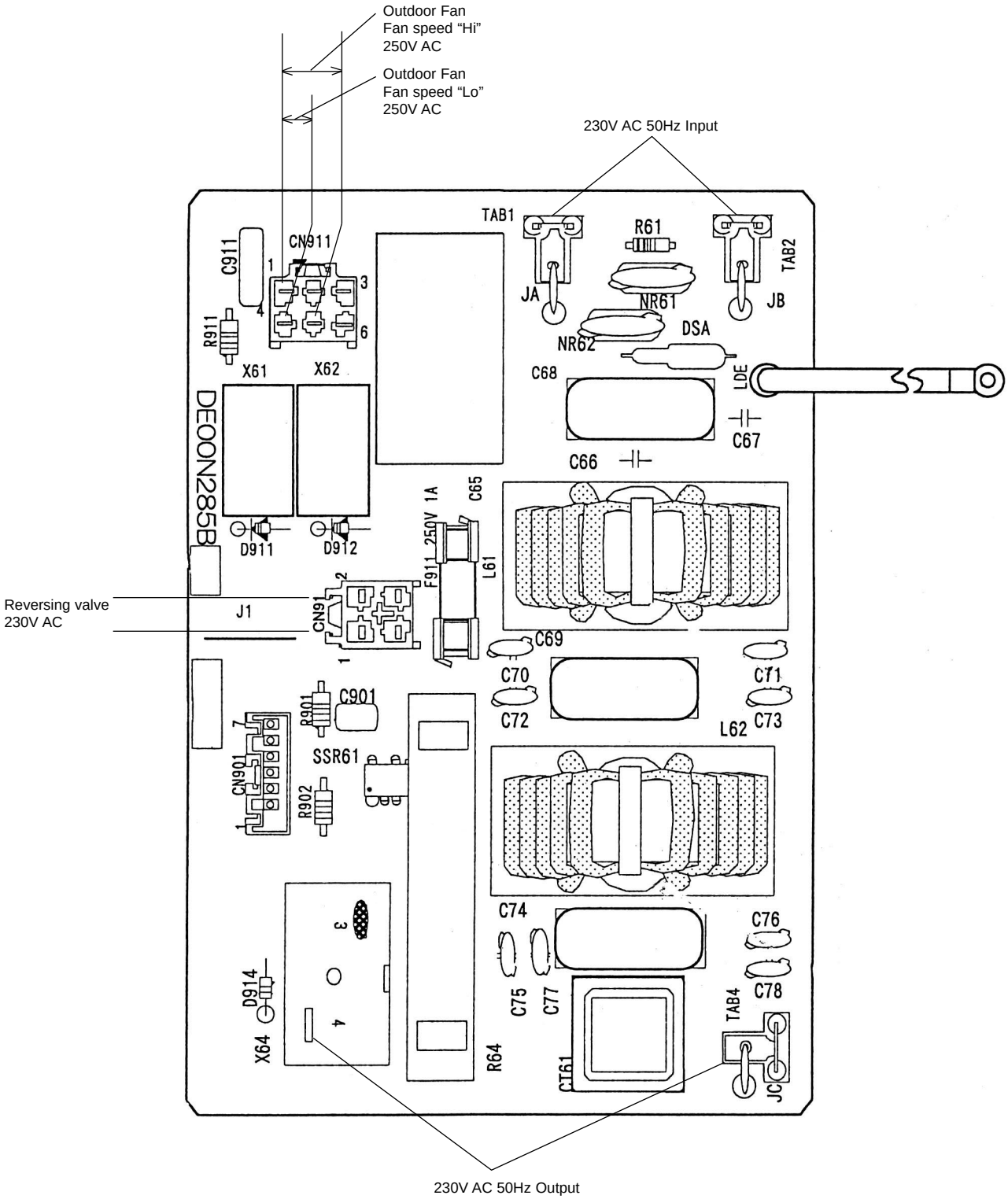
Fin temperature thermistor (RT67)



Discharge temperature thermistor (RT61)

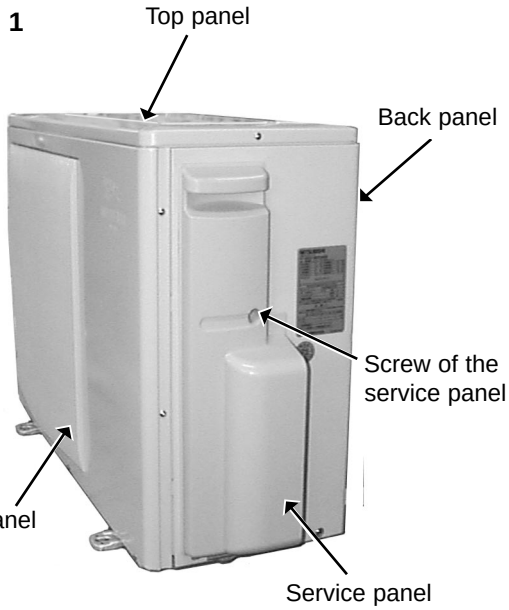
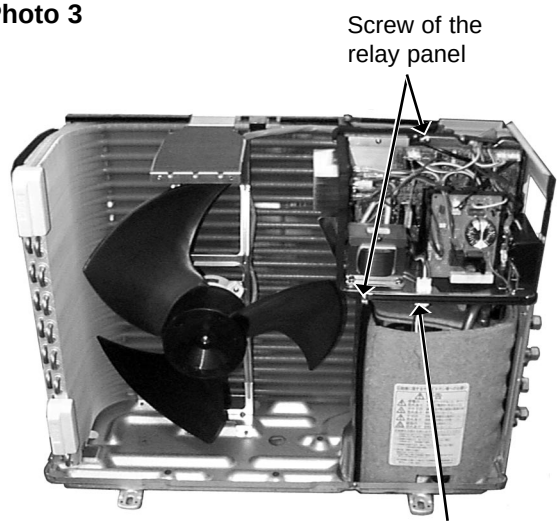
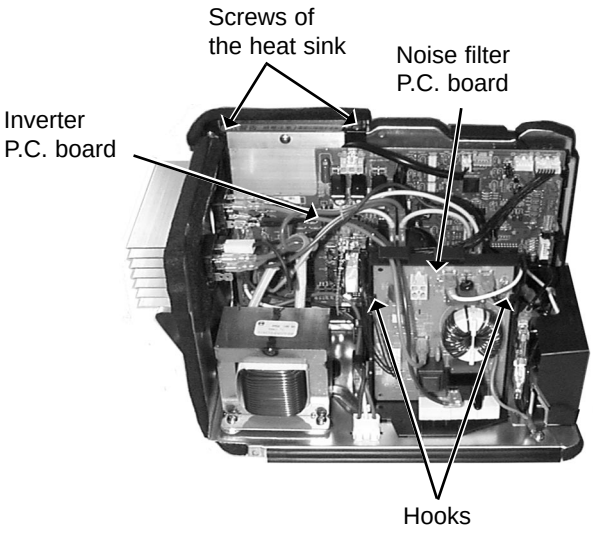


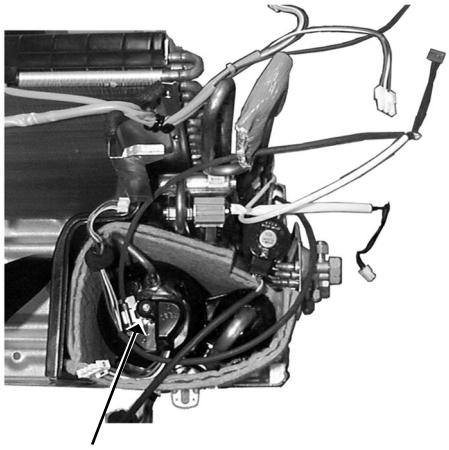
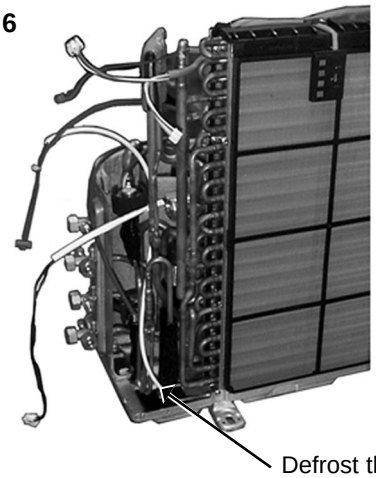
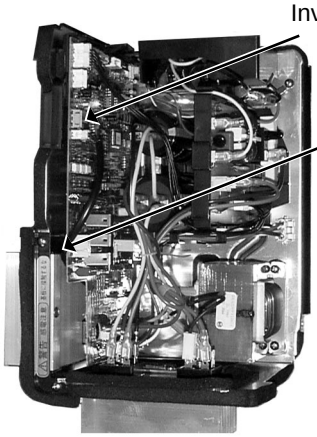
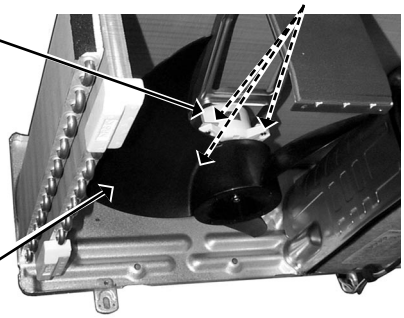
Noise filter P.C.board

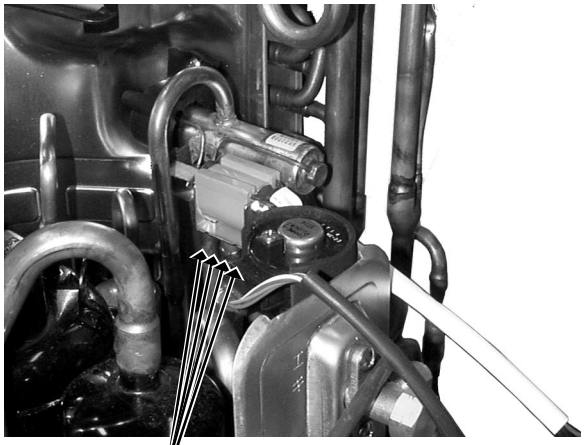


13 DISASSEMBLY INSTRUCTIONS

MXZ-18TV -E1
OUTDOOR UNIT

OPERATING PROCEDURE	PHOTOS
1. Removing the top panel ~ back panel (1) Remove the screws fixing the top panel and remove it. (Photo 1) (2) Remove the screw fixing the service panel, next pull down the service panel and remove it from the cabinet. (Photo 2) (3) Remove the screws fixing the front cover and remove it. (4) Remove the inside and outside connection electric wire. (5) Remove the screws fixing the back panel and remove it. **Photo 2**  	**Photo 1** 
2. Removing the inverter assembly (1) Remove the top panel, front cover, and service panel. (2) Remove the inside and outside connection electric wire, next remove the back panel. (3) Disconnect the noise filter P.C. board 4-way connector (CN722), fan motor (CN903, CN904) Defrost, discharge temperature thermistor (CN641) air temperature thermistor (CN643) LEV A (CN724), LEV B (CN726). (4) Remove the compressor relay connector. (Photo 3) (5) Remove the two screws fixing the relay panel, and remove the inverter assembly. (Photo 3)	**Photo 3** 
3. Removing the inverter P.C. board (1) Remove the top panel, front panel, and service panel. (2) Remove all the connectors the lead wire and the earth wire on the electronic control P.C board. (3) Remove the compressor relay connector. (4) Remove the two screws fixing the heat sink, and pull up the inverter P.C. board. (5) Remove the screws fixing the transistor module. (6) Remove the inverter P.C. board.	**Photo 4** 
4. Removing the noise filter (1) Remove the top panel, front cover, and service panel. (2) Remove all the connectors the lead wire and earth wire on the electronic control P.C. board. (3) Remove the two hooks, then remove the noise filter P.C. board.	

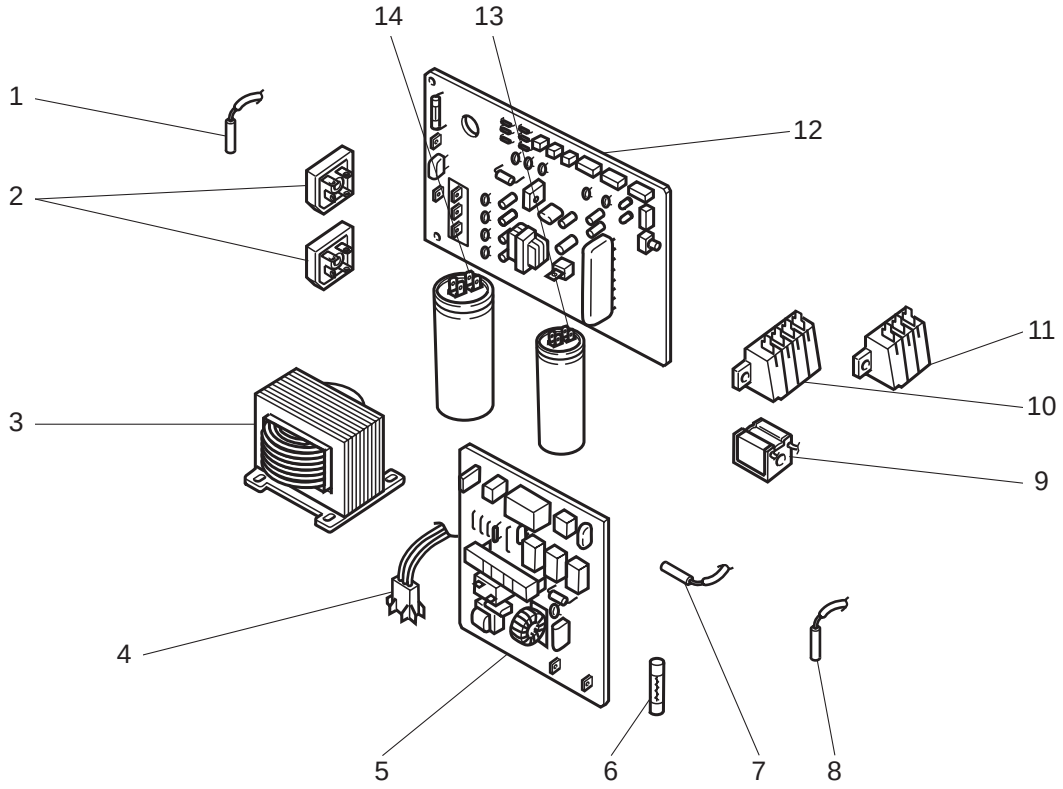
OPERATING PROCEDURE	PHOTOS
5. Removing the 4-way coil (1) Remove the top panel, front cover and service panel. (2) Remove the inside and outside connection electric wire, next remove the back panel. (3) Remove 4-way coil and disconnect the noise filter P.C. board connectors CN722 **6. Defrost, Discharge temperature thermistor** (1) Remove the top panel, front cover, service panel. (2) Remove the inside and outside connection electric wire, next remove the back panel. (3) Remove the connector CN641 on inverter P.C. board. (4) Remove the defrost thermistor and remove the discharge temperature thermistor on the compressor. (Photo 5, 6) **7. Fin temperature thermistor** (1) Remove the top panel, front cover, service panel. (2) Remove the inside and outside connection electric wire, next remove the back panel. (3) Remove all the connectors the lead wire and the earth wire on the electronic control P.C. board. (4) Remove the compressor relay connector. (Photo 3) (5) Remove the two screws fixing the heat sink, and pull up the inverter P.C. board. (Photo 4) (6) Remove the screws fixing the transistor module. (Photo 4) (7) Remove the screws the fin temperature thermistor, and remove it. (Photo 7)	**Photo 5**  Discharge temperature thermistor **Photo 6**  Defrost thermistor **Photo 7** Inverter board  Fin temperature thermistor
8. Removing the fan motor (1) Remove the top panel, front cover. (2) Remove the fan motor connectors (CN903, CN904) on the noise filter P.C. board. (3) Remove the propeller fan. (4) Remove the screws fixing the fan motor and remove it.	**Photo 8** Screws of fan motor Fan motor  Propeller fan

OPERATING PROCEDURE	PHOTOS
9. Remove the compressor (1) Remove the top panel, front cover, service panel. (2) Remove the inside and outside connection electric wire, next remove the back panel. (3) Remove the inverter assembly. (4) Can have the service of compression, 4-way and other refrigerant circuit.. (5) Remove then the part (four places) which welds it when you leave 4-way. (Photo 9)	**Photo 9**  Welded part

14 PARTS LIST

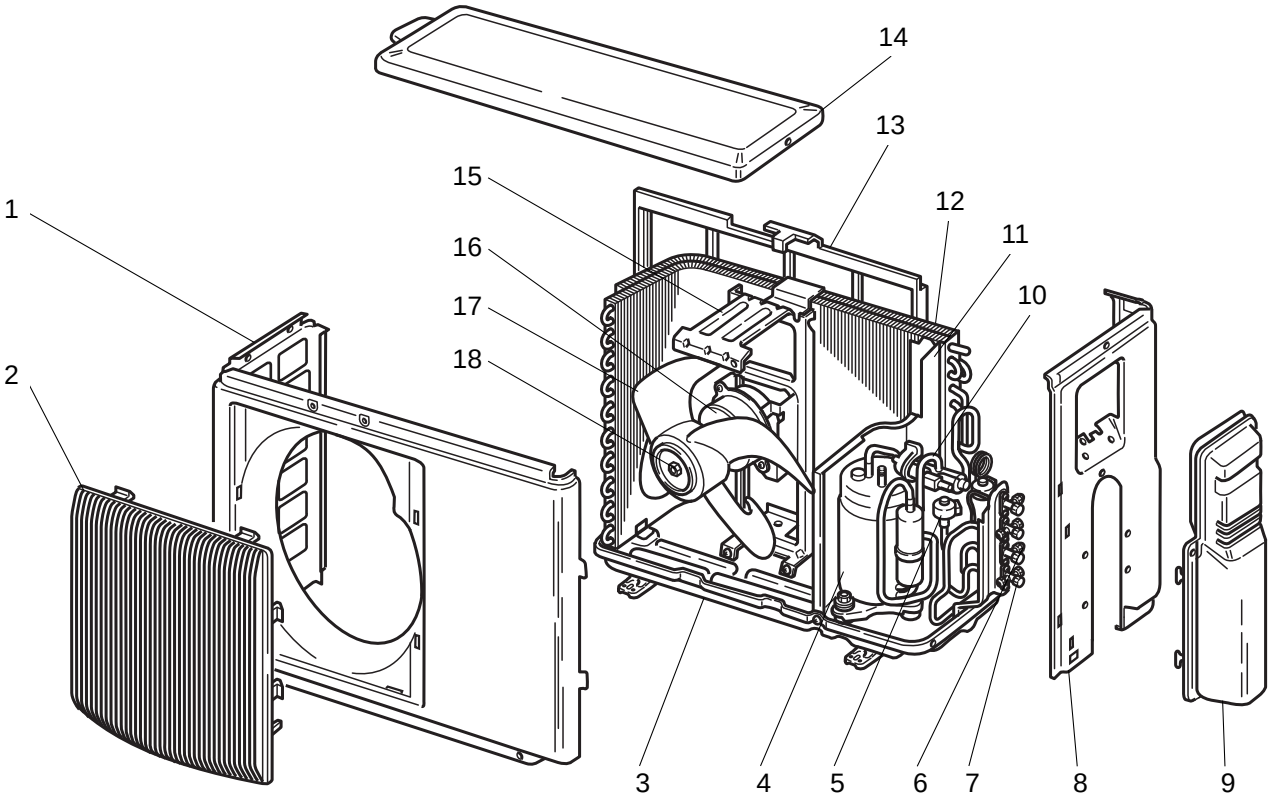
14-1. OUTDOOR UNIT FUNCTIONAL PARTS

MXZ-18TV - E1



No.	Parts No.	Parts Name	Symbol in Wiring Diagram	Q'ty / unit	Remarks
				MXZ-18TV- E1	
1	T2W E87 308	FIN TEMPERATURE THERMISTOR	RT67	1	
2	T2W E45 447	DIODE STACK	DS61, DS62	2	
3	M21 68K 337	REACTOR	L	1	
4	T2W E87 471	CONNECTOR POST ASSY		1	
5	T2W E87 424	NOISE FILTER P.C. BOARD		1	
6	T2W E66 382	FUSE		1	
7	T2W E87 309	THERMISTOR SET	RT61,RT62,RT63	1	EVAOPRATION DISCHARGE, DEFROST
8	T2W E87 306	GAS PIPE TEMPERATURE THERMISTOR SET	RT66, RT65	1	GAS PIPE TEMPERATURE THREMISTOR
9	T2W E87 389	R.V. COIL	21S4	1	
10	T2W E64 376	TERMINAL BED	TB2	1	
11	T2W E75 375	TERMINAL BED	TB1	1	
12	T2W E87 451	ELECTRONIC CONTROL P.C. BOARD		1	
13	T2W E45 357	POWER FACTOR CAPACITOR	C61	1	
14	T2W E75 356	SMOOTHING CAPACITOR	C62	1	

14-2. OUTDOOR UNIT STRUCTURAL PARTS
MXZ-18TV - E1



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

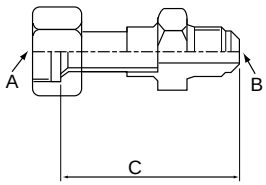
No.	Parts No.	Parts Name	Symbol in Wiring Diagram	Q'ty / unit	Remarks
				MXZ-18TV- E1	
1	T2W E87 232	FRONT PANEL ASSEMBLY		1	
2	T2W E87 521	GRILLE		1	
3	M21 68N 290	BASE ASSEMBLY		1	
4	T92 501 280	COMPRESSOR		1	SHV-130FEA
5	T2W E87 646	EXPANSION VALVE	LEV	1	
6	M21 21J 662	STOP VALVE (LIQUID)		2	
7	M21 00A 661	STOP VALVE (GAS)		2	
8	T2W E87 531	BACK PANEL		1	
9	T2W E87 245	SERVICE PANEL ASSEMBLY		1	
10	M21 20A 961	4-WAY VALVE		1	
11	T2W E87 293	SEPARATOR		1	
12	T2W E87 630	OUTDOOR HEAT EXCHANGER		1	
13	M21 68K 523	CONDENSER NET		1	
14	M21 68N 297	TOP PANEL		1	
15	T2W E87 515	MOTOR SUPPORT		1	
16	T2W E87 301	OUTDOOR FAN MOTOR		1	
17	M21 68N 501	PROPELLER FAN		1	
18	M21 61G 972	PROPELLER FAN NUT		1	
(19)	T2W E87 645	LEV ASSEMBLY		1	
(20)	M21 PA2 642	STRAINER		2	

15 OPTIONAL PARTS

15-1. Different-diameter pipe

Unit : mm (inch)

MXZ-18TV	Model name	Model code	Connected pipes diameter (mm)	Length A	Length B	Length C
For different-diameter pipes	MAC-454JP	51H-454	ϕ9.52 — ϕ12.7 (3/8) (1/2)	ϕ9.52 (3/8)	ϕ12.7 (1/2)	69



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