

Revision:

- MUH12TN-U2 has been added.
- MUH15TN-U2 has been added.
- REFRIGERANT SYSTEM DIAGRAM of MXZ30TN and MXZ30TN2 has partly been changed.
- PARTS LIST of MXZ30TN and MXZ30TN2 has partly been changed
- Please void OB275 Revised edition-C.

No. OB275
REVISED EDITION-D

SERVICE MANUAL

Wireless type Models

MSH09TW
MSH12TN
MSH15TN
MSH17TN
MSH09TW

- U1
MSH12TN

- U1
MSH15TN

- U1
MSH17TN

- U1
· MUH09TW
· MUH12TN
· MUH15TN
· MUH17TN
· MUH09TW

- U1
· MUH12TN

- U1
· MUH12TN

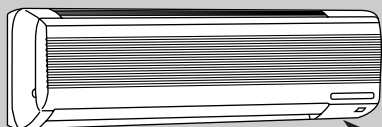
- U2
· MUH15TN

- U1
· MUH15TN

- U2
· MUH17TN

- U1

Inverter-controlled multi system Model

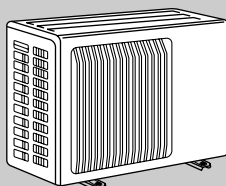
· MXZ30TN
· MXZ30TN2

Indication of
model name

MSH12TN MSH12TN - U1

MSH15TN MSH15TN - U1

MSH17TN MSH17TN - U1

INDOOR UNIT


Remote
controller

Indication of
model name

MUH15TN MUH15TN - U1 MUH15TN - U2

OUTDOOR UNIT

CONTENTS

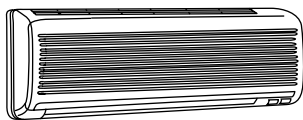
1. FEATURES	2
2. TECHNICAL CHANGES	5
3. PART NAMES AND FUNCTIONS	7
4. INDOOR UNIT COMBINATION	10
5. SPECIFICATION	11
6. DATA	17
7. OUTLINES AND DIMENSIONS	39
8. WIRING DIAGRAM	43
9. REFRIGERANT SYSTEM DIAGRAM	51
10. MICROPROCESSOR CONTROL	54
11. SERVICE FUNCTIONS	72
12. TROUBLESHOOTING	75
13. DISASSEMBLY INSTRUCTIONS	101
14. PARTS LIST	114
15. OPTIONAL PARTS	126


The Slim Line.
From Mitsubishi Electric.

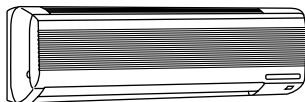
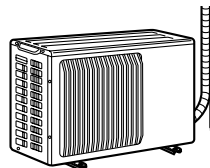
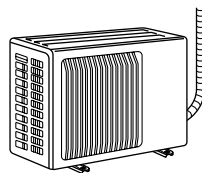
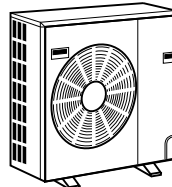
Mr. SLIM™

DIFFERENT POINTS between models for USA and CANADA

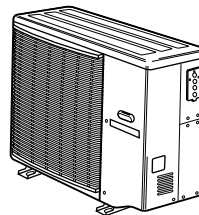
	USA	CANADA	Remark	Refer to
Model	MSH09TW MSH12TN MSH15TN MSH17TN	MSH09TW -[U1] MSH12TN -[U1] MSH15TN -[U1] MSH17TN -[U1]		
AMBIENT TEMPERATURE THERMISTOR	No	Have	RT63(Outdoor): for protection in low ambient temperature	8. WIRING DIAGRAM 10. MICRO PROCESSOR CONTROL 10-1. -HEAT mode of "I FEEL CONTROL"- 5. Outdoor temperature control(P. 60)
DEFROSTING	INTERVAL TIME	40min.	15min.	10. MICRO PROCESSOR CONTROL 10-1. -HEAT mode of "I FEEL CONTROL"- 3. Defrosting (P.59) 11. SERVICE FUNCTIONS 11-2. CHANGE IN DEFROST SETTING(P.72)
	START TEMPERATURE	27°F	32°F	
	FINISH TEMPERATURE	38°F	50°F	



MSH09TW MSH09TW -[U1]

MSH12TN MSH12TN -[U1]
MSH15TN MSH15TN -[U1]
MSH17TN MSH17TN -[U1]LCD wireless
remote controllerMUH09TW MUH09TW -[U1]
MUH12TN MUH12TN-[U1]
MUH12TN-[U2]MUH15TN MUH15TN -[U1]
MUH15TN -[U2]

MUH17TN MUH17TN -[U1]



MXZ30TN MXZ30TN2

Model	Cooling capacity	Heating capacity	SEER	HSPF(Ⅳ/Ⅴ)
MSH09TW MSH09TW -[U1]	8,800Btu/h	10,500Btu/h	10.0	6.8/5.9
MSH12TN MSH12TN -[U1]	12,600/12,900Btu/h	13,000/13,500Btu/h	10.2	6.8/5.9
MSH15TN MSH15TN -[U1]	14,300/14,600Btu/h	14,500/14,800Btu/h	10.7	6.8/5.9
MSH17TN MSH17TN -[U1]	16,000/16,200Btu/h	16,800/17,200Btu/h	10.4	6.8/5.9

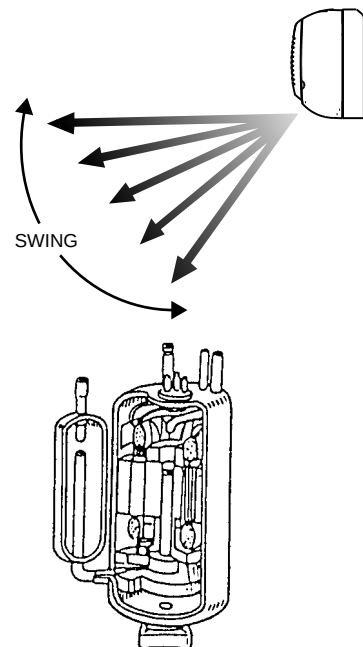
“I FEEL CONTROL” IN OUR LCD WIRELESS REMOTE CONTROLLER WITH ON/OFF PROGRAM TIMER

Mitsubishi Electric's new wireless remote controller incorporates a number of advanced features that provide even greater control and ease-to-use. It has a liquid crystal display which indicates such information as mode, fan speed and temperature selected as well as the programmed ON/OFF timer. It is also equipped with “I Feel Control”, a unique Mitsubishi Electric feature that allows the user to adjust the temperature to exactly the level he or she wants simply by tapping the button that describes present conditions : “Too Cool” or “Too Warm”. The optimum temperature set this way is then memorized for immediate recall whenever the air conditioner is used again.

Select desired air flow direction.

REMOTE-CONTROL OPERATION MODE

Using the remote controller, you can select from five airflow settings to match room layout and the location of people. Also, you can set the vane to swing automatically.



AUTO-RESTART FUNCTION

The auto-restart function restarts the equipment when power is restored following an outage automatically. Operation resumes in the mode in which the equipment was running immediately before the outage.

HIGH PERFORMANCE ROTARY COMPRESSOR

The advanced design of Mitsubishi Electric's powerful and energy efficient rotary compressor results in lower operating costs and longer service life.

MXZ30TN MXZ30TN2

Model	Cooling capacity	Heating capacity	SEER	HSPF(IV)
MXZ30TN MXZ30TN2	28,400Btu/h (4,160 - 30,500)	28,600Btu/h (5,790 - 38,000)	11.0	7.5

Inverter Technology

Outdoor unit uses inverter compressor technology (Variable Frequency Drive) to provide exceptional indoor high-speed cooling and heating.

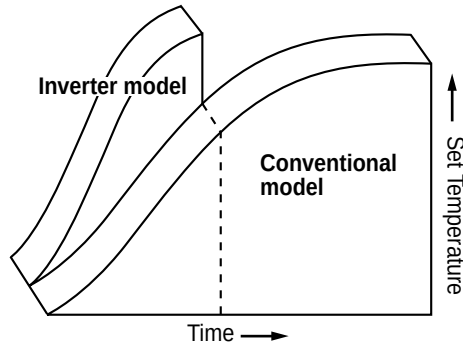
By responding to indoor temperature changes, the system reduces power consumption by varying the compressor speed for extra energy savings and performs only to the levels needed to maintain a constant and comfortable indoor environment.

Extra Energy Savings

For optimum performance inverter technology controls the electrical current to the compressor, delivering only the energy needed to match the cooling and heat load of a room. This feature reduces energy consumption.

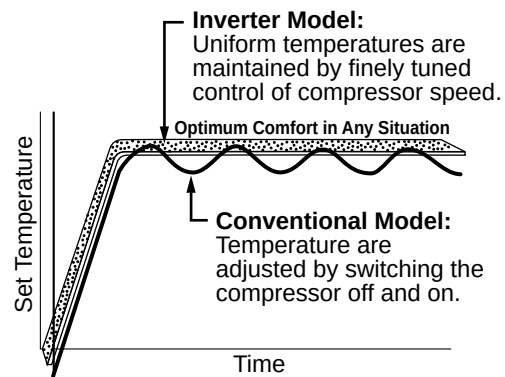
High-Speed Heating and Cooling

Compressor rotation is controlled to maximize efficiency, changing speeds according to the cooling and heating load of a room. This application means the desired temperature is reached much faster.



Optimum Comfort Year-Round

Unlike conventional units that start and stop repetitively, inverter units are able to detect subtle changes in room temperature and adjust airflow automatically. This adaptation means less temperature variation and more comfortable rooms.



MSH09NW2 → MSH09TW

1. Indoor unit has changed.
2. Remote controller has changed.

MSH12NN2 → MSH12TN

1. Remote controller has changed.
2. Union size of connect pipe for gas has changed.

MSH15NN2 → MSH15TN**MSH17NN2 → MSH17TN**

1. Remote controller has changed.

MUH09NW2 → MUH09TW

1. Outdoor unit has changed.

MUH12NN2 → MUH12TN

1. Outdoor unit has changed.

MUH15NN2 → MUH15TN

1. Only model name has changed.

MUH17NN2 → MUH17TN

1. Valve type has changed (Size for connecting pipe is the same).

MSH09NW2 - U1 → MSH09TW - U1

1. Indoor unit has changed.
2. Remote controller has changed.

MSH12NN2 - U1 → MSH12TN - U1

1. Remote controller has changed.
2. Union size of connect pipe for gas has changed.

MSH15NN2 - U1 → MSH15TN - U1**MSH17NN2 - U1 → MSH17TN - U1**

1. Remote controller has changed.

MUH09NW2 - U1 → MUH09TW - U1

1. Outdoor unit has changed.

MUH12NN2 - U1 → MUH12TN - U1

1. Outdoor unit has changed.

MUH15NN2 - U1 → MUH15TN - U1

1. Only model name has changed.

MUH17NN2 - U1 → MUH17TN - U1

1. Valve type has changed (Size for connecting pipe is the same).

MXZ30TN

1. New model.

MXZ30TN → MXZ30TN2

1. Noise filter P.C. board has changed to improve the capacity for protecting the inverter-controlled circuit when the voltage higher than the rated one is supplied with the inverter-controlled circuit.
2. Noise filter P.C. board for “MXZ30TN” and “MXZ30TN2” are not interchangeable.
3. Service parts have been changed as follows according to above change;
 - The value of R(resistor)has changed. $10\Omega \rightarrow 20\Omega$
 - TB5(terminal block) has been removed.

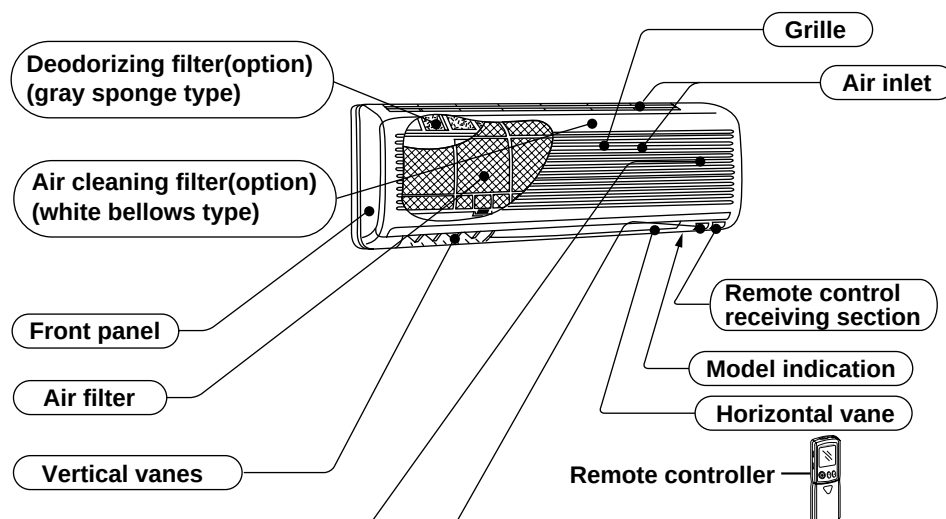
MUH12TN - U1 → MUH12TN - U2

MUH15TN - U1 → MUH15TN - U2

1. Outdoor haet exchanger has changed.
Outdoor haet exchanger for “TN - U1” and “TN - U2” are not interchangeable.

INDOOR UNIT

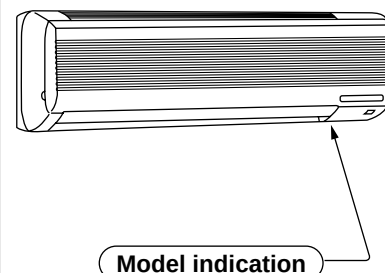
MSH09TW MSH09TW - U1



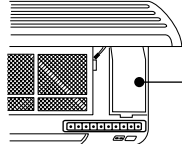
MSH12TN MSH12TN - U1

MSH15TN MSH15TN - U1

MSH17TN MSH17TN - U1

Operation section
(When the grille is opened)

MSH09TW MSH09TW - U1

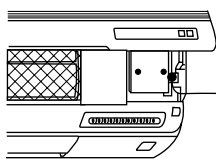


Emergency operation switch

MSH12TN MSH12TN - U1

MSH15TN MSH15TN - U1

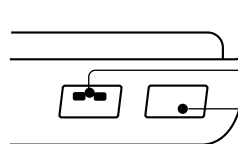
MSH17TN MSH17TN - U1



Emergency operation switch

Display section

MSH09TW MSH09TW - U1



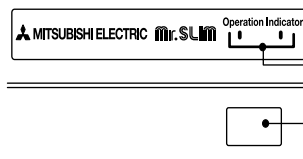
Operation indicator lamp

Receiving section

MSH12TN MSH12TN - U1

MSH15TN MSH15TN - U1

MSH17TN MSH17TN - U1



Operation Indicator lamp

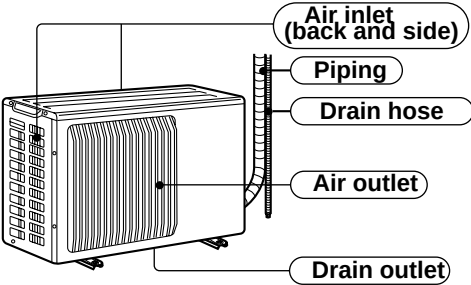
Receiving section

ACCESSORIES

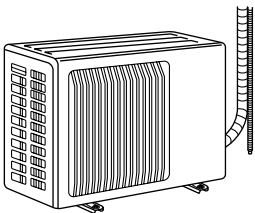
		MSH09TW MSH09TW - U1	MSH12TN MSH12TN - U1 MSH15TN MSH15TN - U1 MSH17TN MSH17TN - U1
①	Installation plate	1	1
②	Installation plate fixing screw 4 x 25 mm(0.16 x 0.98 in.)	5	6
③	Remote controller mounting hardware	1	1
④	Fixing screw for ③ 3.5 x 16 mm(0.14 x 0.63 in.) (Black)	2	2
⑤	Battery (AAA) for remote controller	2	2
⑥	Wireless remote controller	1	1
⑦	Felt tape (Used for left or left-rear piping)	1	1

OUTDOOR UNIT

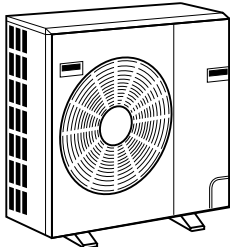
MUH09TW MUH09TW - U1
 MUH12TN MUH12TN - U1
 MUH12TN MUH12TN - U2



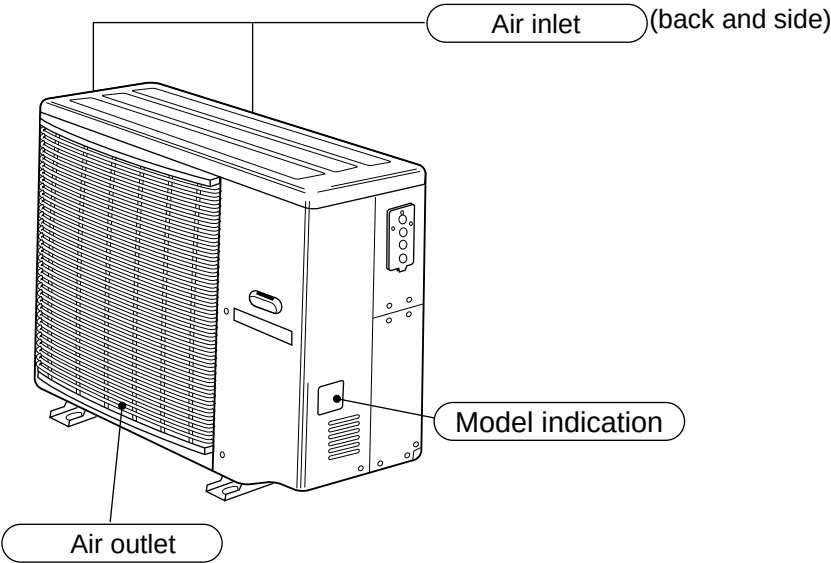
MUH15TN MUH15TN - U1
 MUH15TN MUH15TN - U2



MUH17TN MUH17TN - U1



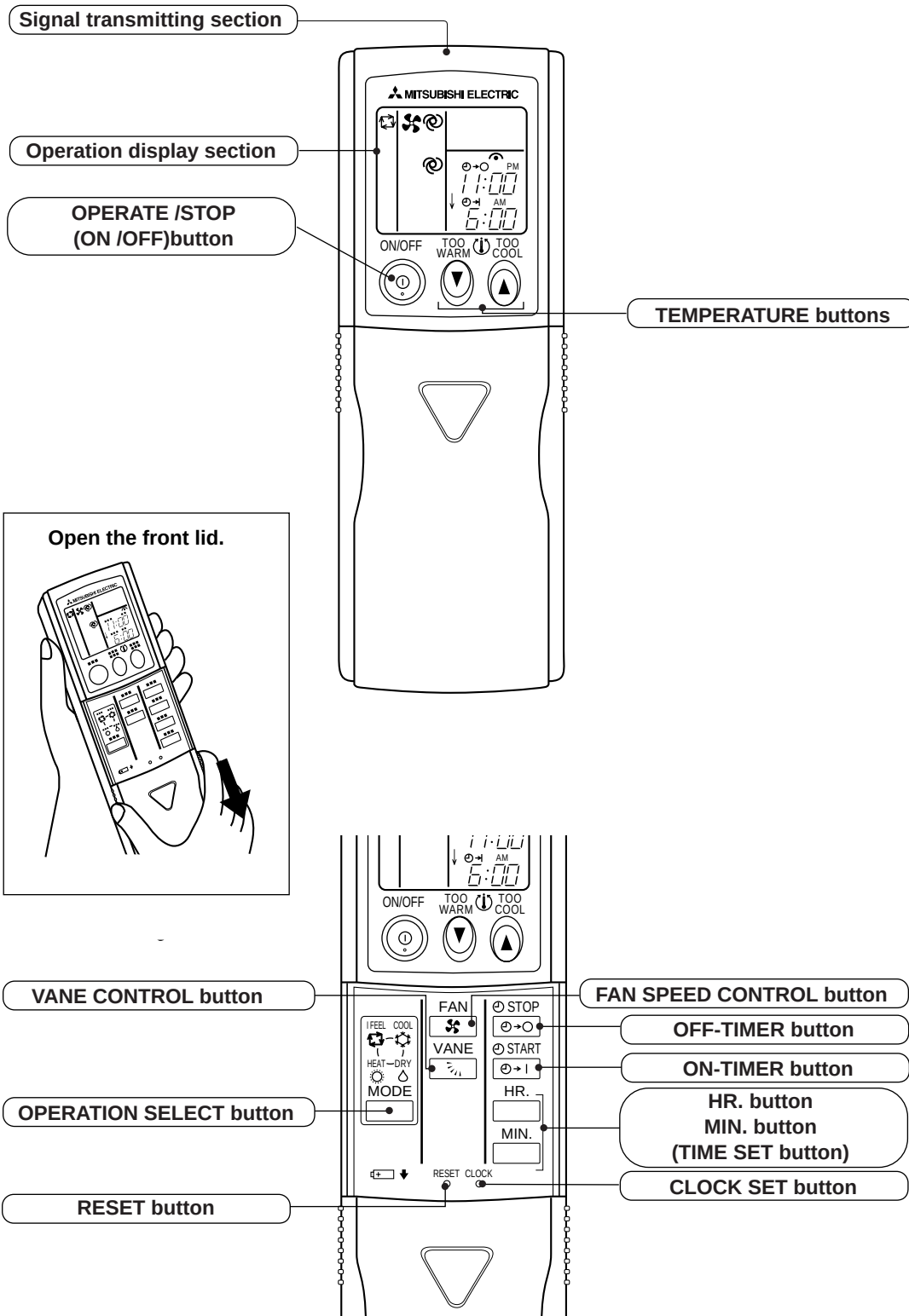
MXZ30TN MXZ30TN2



REMOTE CONTROLLER

MSH09TW
MSH12TN
MSH15TN
MSH17TN

MSH09TW - U1
MSH12TN - U1
MSH15TN - U1
MSH17TN - U1



MXZ30TN MXZ30TN2

NOTE: Electrical data is for outdoor unit only.

Indoor units combination	Cooling capacity (BTU/h)				Outdoor unit power consumption (W)	Current (A)		Power factor (%)
	Unit A	Unit B	Unit C	Total		208V	230V	
09	8,800	—	—	8,800 (4,160~9,210)	1,030 (510~1,280)	4.5	4.0	90
12	12,900	—	—	12,900 (5,600~15,350)	1,250 (510~1,680)	5.4	4.9	90
15	14,600	—	—	14,600 (5,600~17,010)	1,250 (510~1,780)	5.4	4.9	90
17	16,200	—	—	16,200 (6,470~18,720)	2,200 (500~2,620)	9.5	8.6	90
09+09	8,800	8,800	—	17,600 (5,470~18,680)	2,200 (550~3,230)	9.5	8.6	90
09+12	8,800	12,900	—	21,700 (6,240~22,760)	2,280 (540~3,270)	9.9	8.9	90
09+15	8,800	14,600	—	23,400 (6,240~24,030)	2,280 (540~3,430)	9.9	8.9	90
09+17	8,800	16,200	—	25,000 (6,220~27,170)	2,680 (550~4,000)	11.6	10.5	90
12+12	12,900	12,900	—	25,800 (6,300~27,900)	2,700 (540~4,100)	11.7	10.6	90
09+09+09	8,800	8,800	8,800	26,400 (9,740~29,150)	3,500 (700~4,500)	15.1	13.6	90
09+09+12	7,370	7,370	13,660	28,400 (9,940~30,500)	3,800 (810~4,610)	16.4	14.9	90

Indoor units combination	Heating capacity (BTU/h)				Outdoor unit power consumption (W)	Current (A)		Power factor (%)
	Unit A	Unit B	Unit C	Total		208V	230V	
09	10,500	—	—	10,500 (5,790~16,950)	1,100 (560~1,990)	4.8	4.3	90
12	13,500	—	—	13,500 (6,420~22,400)	1,200 (560~2,340)	5.2	4.7	90
15	14,800	—	—	14,800 (6,470~23,180)	1,400 (570~2,480)	6.1	5.5	90
17	17,200	—	—	17,200 (6,520~23,550)	1,600 (600~2,710)	6.9	6.3	90
09+09	10,500	10,500	—	21,000 (6,520~26,900)	1,950 (620~2,900)	8.4	7.6	90
09+12	10,500	13,500	—	24,000 (6,730~30,000)	2,210 (640~3,130)	9.6	8.6	90
09+15	10,500	14,800	—	25,300 (7,490~32,240)	2,400 (640~3,360)	10.4	9.4	90
09+17	10,500	17,200	—	27,700 (8,140~37,100)	2,700 (690~3,900)	11.7	10.6	90
12+12	13,500	13,500	—	27,000 (7,660~36,890)	2,520 (650~3,850)	10.9	9.9	90
09+09+09	9,530	9,530	9,530	28,590 (8,900~37,500)	2,720 (710~3,920)	11.8	10.6	90
09+09+12	7,820	7,820	12,960	28,600 (9,040~38,000)	2,800 (710~3,970)	12.1	11.0	90

5

SPECIFICATIONS

Item		Model	MSH09TW	MSH09TW - [U1]
Capacity	Cooling *1	Btu/h	8,800	
	Heating 47 *1	Btu/h	10,500	
	Heating 17 *2	Btu/h	5,300	
Power consumption	Cooling *1	W	890	
	Heating 47 *1	W	890	
	Heating 17 *2		820	
EER *1 [SEER] *3	Cooling		9.9 [10.0]	
HSPF IV(V)	Heating		6.8 (5.9)	
COP	Heating *1		3.46	
INDOOR UNIT MODEL			MSH09TW	MSH09TW - [U1]
External finish			White	
Power supply V, phase, Hz			115, 1, 60	
Max. fuse size (time delay)/ Disconnect switch A			15	
Min. circuit ampacity A			0.5	
Fan motor F.L.A			0.37	
Auxiliary heater A(kW)			—	
Airflow Low—Med.—High	HEAT Dry	CFM	198-244-297	
	COOL Dry(Wet)	CFM	173(145)-226(187)-279(233)	
Moisture removal pt./h			2.3	
Sound level Low-Med.-High dB(A)			26-31-36	
Cond. drain connection O.D. in.			5/8	
Dimensions	W	in.	33-1/2	
	D	in.	7-1/2	
	H	in.	10-15/16	
Weight lb.			20	
OUTDOOR UNIT MODEL			MUH09TW	MUH09TW - [U1]
External finish			Munsell 5Y 7/1	
Power supply V, phase, Hz			115, 1, 60	
Max. fuse size (time delay) A			20	
Min. circuit ampacity A			16	
Fan motor F.L.A			0.60	
Compressor	Model		RH140WGJT	
	Winding resistance (at 68°F) Ω		C-R 0.83 C-S 1.48	
	R.L.A		12.0	
	L.R.A		42.0	
Refrigerant control			Capillary tube	
Sound level dB(A)			47	
Defrost method			Reverse cycle	
Dimensions	W	in.	30-23/32	
	D	in.	10-1/32	
	H	in.	21-1/4	
Weight lb.			82	
REMOTE CONTROLLER			Wireless type	
Control voltage (by built-in transformer)			12V DC	
REFRIGERANT PIPING			Not supplied (optional parts)	
Pipe size (Min. wall thickness)	Liquid	in.	1/4 (0.0265)	
	Gas	in.	3/8 (0.0285)	
Connection method	Indoor		Flared	
	Outdoor		Flared	
Between the indoor & outdoor units	Height difference	ft.	Max. 25	
	Piping length	ft.	Max. 49	
Refrigerant charge (R22)			2 lb. 3 oz.	
Refrigerating oil (Model)			9.3 (MS56)	

NOTE : Test conditions are based on ARI 210/240.

*1 : Rating conditions (cooling) — Indoor : 80°FDB, 67°F WB, Outdoor : 95°FDB, (75°F WB)
 (heating) — Indoor : 70°FDB, 60°F WB, Outdoor : 47°FDB, 43°F WB
 *2 : (heating) — Indoor : 70°FDB, 60°F WB, Outdoor : 17°FDB, 15°F WB
 *3 : (cooling) — Indoor : 80°FDB, 67°F WB, Outdoor : 82°FDB, 65°F WB

Operating Range

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	95°FDB, 71°F WB	115°FDB
	Minimum	67°FDB, 57°F WB	67°FDB
Heating	Maximum	80°FDB, 67°F WB	75°FDB, 65°F WB
	Minimum	70°FDB, 60°F WB	17°FDB, 15°F WB



Item			Model	MSH12TN	MSH12TN - <u>[U1]</u>	MSH15TN	MSH15TN - <u>[U1]</u>
Capacity	Cooling ^{*1}	(208/230V)	Btu/h	12,600/12,900		14,300/14,600	
	Heating 47 ^{*1}	(208/230V)	Btu/h	13,000/13,500		14,500/14,800	
	Heating 17 ^{*2}	(208/230V)	Btu/h	6,800/7,000		8,700/8,900	
Power consumption	Cooling ^{*1}	(208/230V)	W	1,280/1,310		1,350/1,380	
	Heating 47 ^{*1}	(208/230V)	W	1,180/1,250		1,250/1,300	
	Heating 17 ^{*2}	(208/230V)		1,110/1,140		1,210/1,240	
EER ^{*1} [SEER] ^{*3}	Cooling	(208/230V)		9.8/9.8[10.2/10.2]		10.6/10.6 [10.7/10.7]	
HSPF IV (V)	Heating	(208/230V)		6.8/6.8 (5.9/5.9)			
COP	Heating	(208/230V)		3.23/3.17		3.40/3.34	
INDOOR UNIT MODEL				MSH12TN	MSH12TN - <u>[U1]</u>	MSH15TN	MSH15TN - <u>[U1]</u>
External finish				White			
Power supply				V, phase, Hz			
Max. fuse size (time delay)/ Disconnect switch				A			
Min. circuit ampacity				A			
Fan motor				F.L.A			
Auxiliary heater				A(kW)			
Airflow Low—Med.—High	Dry		CFM	360-395-452			
	Wet		CFM	311-339-388		293-321-367	
Moisture removal				pt./h		4.7	
Sound level Low-Med.-High				dB(A)			
Cond. drain connection O.D.				in.			
Dimensions	W		in.	39-15/16			
	D		in.	7-1/2			
	H		in.	12-5/8			
Weight				lb.			
OUTDOOR UNIT MODEL				MUH12TN	MUH12TN - <u>[U1]</u> <u>[U2]</u>	MUH15TN	MUH15TN - <u>[U1]</u> <u>[U2]</u>
External finish				Munsell 5Y7/1			
Power supply				V, phase, Hz			
Max. fuse size (time delay)				A		20	
Min. circuit ampacity				A		14	
Fan motor				F.L.A		0.52	
Compressor	Model			RH189NHDT		RH207NHDT	
	Winding resistance (at 68°F) Ω			C-R 1.68 C-S 2.78			
			R.L.A	10.0			
			L.R.A	35.0			
Refrigerant control				Capillary tube			
Sound level				dB(A)		49	
Defrost method				Reverse cycle			
Dimensions	W		in.	30-23/32		33-7/16	
	D		in.	10-1/32		11-7/16	
	H		in.	21-1/4		23-13/16	
Weight				lb.		86	
REMOTE CONTROLLER				Wireless type			
Control voltage (by built-in transformer)				12V DC			
REFRIGERANT PIPING				Not supplied (optional parts)			
Pipe size (Min. wall thickness)	Liquid		in.	1/4 (0.0265)			
	Gas		in.	1/2 (0.0285)		5/8 (0.0315)	
Connection method	Indoor			Flared			
	Outdoor			Flared			
Between the indoor & outdoor units	Height difference		ft.	Max. 25			
	Piping length		ft.	Max. 50			
Refrigerant charge (R22)				lb.		2 lb. 12 oz.	
Refrigerating oil (Model)				oz.		16.1 (MS56)	

NOTE : Test conditions are based on ARI 210/240.

- *1 : Rating conditions (cooling) — Indoor : 80°FDB, 67°F WB, Outdoor : 95°FDB, (75°F WB)
 (heating) — Indoor : 70°FDB, 60°F WB, Outdoor : 47°FDB, 43°F WB
 *2 : (heating) — Indoor : 70°FDB, 60°F WB, Outdoor : 17°FDB, 15°F WB
 *3 : (cooling) — Indoor : 80°FDB, 67°F WB, Outdoor : 82°FDB, 65°F WB

Operating Range

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	95°FDB, 71°F WB	115°FDB
	Minimum	67°FDB, 57°F WB	67°FDB
Heating	Maximum	80°FDB, 67°F WB	75°FDB, 65°F WB
	Minimum	70°FDB, 60°F WB	17°FDB, 15°F WB

Item			Model	MSH17TN	MSH17TN - <u>U1</u>
Capacity	Cooling ^{*1}	(208/230V)	Btu/h	16,000/16,200	
	Heating 47 ^{*1}	(208/230V)	Btu/h	16,800/17,200	
	Heating 17 ^{*2}	(208/230V)	Btu/h	10,100/10,300	
Power consumption	Cooling ^{*1}	(208/230V)	W	1,560/1,580	
	Heating 47 ^{*1}	(208/230V)	W	1,500/1,570	
	Heating 17 ^{*2}	(208/230V)		1,410/1,510	
EER ^{*1} [SEER] ^{*3}	Cooling	(208/230V)		10.3/10.3 (10.4/10.4)	
HSPF IV (V)	Heating	(208/230V)		6.8/6.8 (5.9/5.9)	
COP	Heating	(208/230V)		3.28/3.21	
INDOOR UNIT MODEL				MSH17TN	MSH17TN - <u>U1</u>
External finish				White	
Power supply V, phase, Hz				115, 1, 60	
Max. fuse size (time delay)/ Disconnect switch A				15	
Min. circuit ampacity A				0.7	
Fan motor F.L.A				0.51	
Auxiliary heater A(kW)				—	
Airflow Low—Med.—High	Dry		CFM	406-441-491	
	Wet		CFM	342-371-413	
Moisture removal pt./h				5.1	
Sound level Low-Med.-High dB(A)				40-43-45	
Cond. drain connection O.D. in.				5/8	
Dimensions	W		in.	39-15/16	
	D		in.	7-1/2	
	H		in.	12-5/8	
Weight lb.				31	
OUTDOOR UNIT MODEL				MUH17TN	MUH17TN - <u>U1</u>
External finish				Munsell 5Y 7/1	
Power supply V, phase, Hz				208/230, 1, 60	
Max. fuse size (time delay) A				20	
Min. circuit ampacity A				15	
Fan motor F.L.A				0.75	
Compressor	Model			RH231NHDT	
	Winding resistance (at 68°F) Ω			C-R 1.65 C-S2.67	
	R.L.A			11.0	
	L.R.A			38.0	
Refrigerant control				Capillary tube	
Sound level dB(A)				53	
Defrost method				Reverse cycle	
Dimensions	W		in.	34-1/4	
	D		in.	11-5/8	
	H		in.	33-1/2	
Weight lb.				128	
REMOTE CONTROLLER				Wireless type	
Control voltage (by built-in transformer)				12V DC	
REFRIGERANT PIPING				Not supplied (optional parts)	
Pipe size (Min. wall thickness)	Liquid		in.	1/4 (0.0265)	
	Gas		in.	5/8 (0.0315)	
Connection method	Indoor			Flared	
	Outdoor			Flared	
Between the indoor & outdoor units	Height difference		ft.	Max. 25	
	Piping length		ft.	Max. 50	
Refrigerant charge (R22) lb.				4lb. 14oz.	
Refrigerating oil (Model) oz.				16.1 (MS56)	

NOTE : Test conditions are based on ARI 210/240.

- *1 : Rating conditions (cooling) — Indoor : 80°FDB, 67°FWB, Outdoor : 95°FDB, (75°FWB)
(heating) — Indoor : 70°FDB, 60°FWB, Outdoor : 47°FDB, 43°FWB
*2 : (heating) — Indoor : 70°FDB, 60°FWB, Outdoor : 17°FDB, 15°FWB
*3 : (cooling) — Indoor : 80°FDB, 67°FWB, Outdoor : 82°FDB, 65°FWB

Operating Range

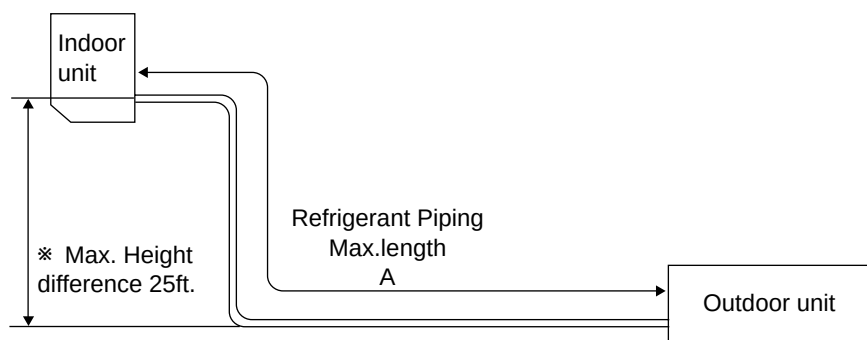
		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	95°FDB, 71°FWB	115°FDB
	Minimum	67°FDB, 57°FWB	67°FDB
Heating	Maximum	80°FDB, 67°FWB	75°FDB, 65°FWB
	Minimum	70°FDB, 60°FWB	17°FDB, 15°FWB

MAX. REFRIGERANT PIPING LENGTH

Model	Additional piping Max. length : ft. A	Piping size : in.				Length of connecting pipe : in.	
		Gas		Liquid		Indoor unit	Outdoor unit
		Outside diameter	Minimum Wall thickness	Outside diameter	Minimum Wall thickness		
MSH09TW MSH09TW- U1 MUH09TW MUH09TW- U1	50	ϕ 3/8	0.0285	ϕ 1/4	0.0265	Gas : 16-15/16 Liquid : 19-11/16	Gas : 0 Liquid : 0
MSH12TN MSH12TN- U1 MUH12TN MUH12TN- U1 MUH12TN- U2		ϕ 1/2					
MSH15TN MSH15TN- U1 MUH15TN MUH15TN- U1 MUH15TN- U2 MSH17TN MSH17TN- U1 MUH17TN MUH17TN- U1		ϕ 5/8	0.0315				

MAX. HEIGHT DIFFERENCE

※ Height difference should be within 25ft. regardless of which unit, indoor or outdoor position is high.



Item		Model	Triple-Unit	Double-Unit	Single-Unit
Capacity	Cooling ※ ¹	Btu/h	28,400/(9,940~30,500)		
	Heating 47 ※ ¹	Btu/h	28,600/(9,040~38,000)		
	Heating 17 ※ ²	Btu/h	(18,100)		
Power consumption	Cooling ※ ¹	W	3,800/(810~4,610)		
	Heating 47 ※ ¹	W	2,800/(710~3,970)		
	Heating 17 ※ ²		(2,310)		
EER ※ ¹ [SEER] ※ ³	Cooling		11.0		
HSPF IV (V)	Heating		7.5		
COP	Heating		3.08		
OUTDOOR UNIT MODEL			MXZ30TN MXZ30TN2		
External finish			Munsell 5Y 8/1		
Power supply V, phase, Hz			208/230, 1, 60		
Max. fuse size (time delay) A			30		
Min. circuit ampacity A			25		
Fan motor F.L.A			1.0		
Compressor	Model		THV-247FBA		
	Winding resistance (at 68°F) Ω		U-V 0.61 V-W 0.61 W-U 0.61		
	R.L.A		15		
	L.R.A		72		
Refrigerant control			LEV		
Sound level dB(A)			47		
Defrost method			Reverse cycle		
Dimensions	W	in.	35-7/16		
	D	in.	12-19/32 (+1+3/8)		
	H	in.	35-7/16		
Weight lb.			176		
REMOTE CONTROLLER			Wireless type		
Control voltage (by built-in transformer)			12V DC		
REFRIGERANT PIPING			Not supplied (optional parts)		
Pipe size (Min. wall thickness)	Liquid	in.	1/4 (0.0265)		
	Gas	in.	A:1/2(0.0285), B,C:3/8(0.0285)		
Connection method	Indoor		Flared		
	Outdoor		Flared		
Between the indoor & outdoor units	Height difference	ft.	Max. 33		
	Piping length (a+b+c)	ft.	Max. 200		
Refrigerant charge (R22)			8lb. 10oz.		
Refrigerating oil (Model)			26.7 (MS56)		

NOTE : Test conditions are based on ARI 210/240.

Unit: °F

Mode	Test	Indoor air condition		Outdoor air condition	
		Dry bulb	Wet bulb	Dry bulb	Wet bulb
Cooling	※1: "A" Cooling Steady State at rated compressor Speed	80	67	95	(75)
	※3: "B-2" Cooling Steady State at rated compressor Speed	80	67	82	(65)
	"B-1" Cooling Steady State at minimum compressor Speed	80	67	82	(65)
	Low ambient Cooling Steady State at minimum compressor Speed	80	67	67	(53.5)
	Intermediate Cooling Steady State At Intermediate compressor Speed*	80	67	87	(69)
Heating	※1: Standard Rating-Heating at rated compressor Speed	70	60	47	43
	※2: Low temperature Heating at rated compressor Speed	70	60	17	15
	Max temperature Heating at minimum compressor Speed	70	60	62	56.5
	High temperature Heating at minimum compressor Speed	70	60	47	43
	Frost Accumulation at rated compressor Speed	70	60	35	33
	Frost Accumulation at Intermediate compressor Speed*	70	60	35	33

*At Intermediate compressor Speed
 =("Cooling rated compressor speed" - "minimum compressor speed") / 3 + "minimum compressor speed".

Operating Range MXZ30TN MXZ30TN2

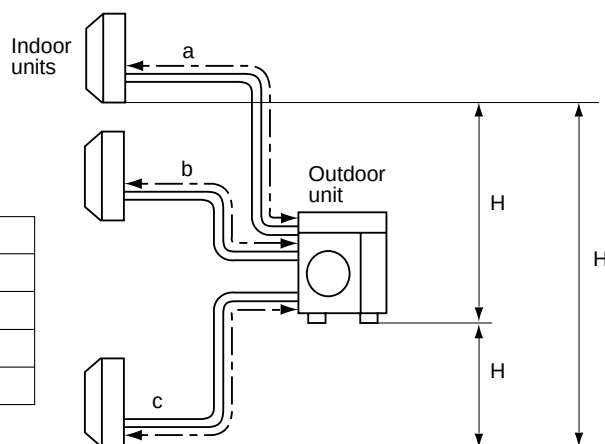
		Indoor intake air temperature	Outdoor intake air temperature
		95°FDB, 71°FWB	115°FDB
Cooling	Maximum	67°FDB, 57°FWB	67°FDB
	Minimum	80°FDB, 67°FWB	75°FDB, 65°FWB
Heating	Maximum	70°FDB, 60°FWB	17°FDB, 15°FWB
	Minimum		

MAX. REFRIGERANT PIPING LENGTH & PIPE SIZE SELECTION

MXZ30TN MXZ30TN2

Piping length each indoor unit (a, b, c)	82ft. MAX.
Total piping length (a+b+c)	200ft. MAX.
Height difference between units (H)	33ft. MAX.
Bending point for each unit	25 MAX.
Total bending point	60 MAX.

*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 128.

Unit : inch

Indoor unit			Extension pipe diameter	
class	Pipe diameter			
09	Liquid	1/4	Liquid	1/4
	Gas	3/8	Gas	3/8
12	Liquid	1/4	Liquid	1/4
	Gas	1/2	Gas	1/2
15/17	Liquid	1/4	Liquid	1/4
	Gas	5/8	Gas	5/8

Outdoor unit union diameter		
For		
Indoor unit A	Liquid	1/4
	Gas	1/2
Indoor unit B	Liquid	1/4
	Gas	3/8
Indoor unit C	Liquid	1/4
	Gas	3/8

- Please connect the indoor unit and the outdoor unit as shown in the table below.

Outdoor unit	Indoor unit		Connection method
A Liquid $\phi 1/4$ Gas $\phi 1/2$	09	Liquid $\phi 1/4$	Use a different-diameter pipe of the option MAC-455JP ($\phi 1/2 \rightarrow \phi 3/8$)
		Gas $\phi 3/8$	
	12	Liquid $\phi 1/4$	Indoor unit can be connected directly
		Gas $\phi 1/2$	
	15/17	Liquid $\phi 1/4$	Use a different-diameter pipe of the option MAC-456JP ($\phi 1/2 \rightarrow \phi 5/8$)
		Gas $\phi 5/8$	
B, C Liquid $\phi 1/4$ Gas $\phi 3/8$	09	Liquid $\phi 1/4$	Indoor unit can be connected directly
		Gas $\phi 3/8$	
	12	Liquid $\phi 1/4$	Use a different-diameter pipe of the option MAC-454JP ($\phi 3/8 \rightarrow \phi 1/2$)
		Gas $\phi 1/2$	
	15/17	Liquid $\phi 1/4$	It is not possible to connect
		Gas $\phi 5/8$	

MSH09TW MSH09TW - [U1] MUH09TW MUH09TW - [U1]
MSH12TN MSH12TN - [U1] MUH12TN MUH12TN - [U1] MUH12TN - [U2]
MSH15TN MSH15TN - [U1] MUH15TN MUH15TN - [U1] MUH15TN - [U2]
MSH17TN MSH17TN - [U1] MUH17TN MUH17TN - [U1]

6-1. PERFORMANCE DATA

1) COOLING CAPACITY

(115V)

Model	Indoor air	Outdoor intake air DB temperature(°F)														
	IWB (°F)	75			85			95			105			115		
		TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC
MSH09TW MSH09TW - [U1]	71	10.8	6.1	0.79	10.1	5.7	0.87	9.5	5.4	0.93	8.8	5.0	0.98	8.1	4.6	1.02
	67	10.2	7.1	0.75	9.5	6.7	0.82	8.8	6.2	0.89	8.2	5.7	0.94	7.5	5.3	0.99
	63	9.6	8.0	0.71	8.9	7.4	0.79	8.3	6.9	0.85	7.5	6.3	0.91	6.9	5.7	0.94

(208V)

Model	Indoor air	Outdoor intake air DB temperature(°F)														
	IWB (°F)	75			85			95			105			115		
		TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC
MSH12TN MSH12TN - [U1]	71	15.4	8.9	1.14	14.4	8.3	1.25	13.5	7.8	1.34	12.6	7.3	1.41	11.6	6.7	1.47
	67	14.6	10.4	1.08	13.6	9.7	1.18	12.6	8.9	1.28	11.7	8.3	1.36	10.8	7.6	1.42
	63	13.7	11.6	1.02	12.7	10.7	1.13	11.8	10.0	1.22	10.8	9.1	1.31	9.8	8.3	1.36
MSH15TN MSH15TN - [U1]	71	17.5	9.1	1.20	16.4	8.5	1.32	15.4	7.9	1.42	14.3	7.4	1.49	13.2	6.8	1.55
	67	16.6	10.8	1.13	15.4	10.0	1.25	14.3	9.3	1.35	13.3	8.6	1.43	12.2	7.9	1.50
	63	15.6	12.2	1.08	14.4	11.3	1.19	13.4	10.5	1.29	12.2	9.6	1.38	11.2	8.7	1.43
MSH17TN MSH17TN - [U1]	71	19.6	9.9	1.39	18.3	9.3	1.52	17.2	8.7	1.64	16.0	8.1	1.72	14.7	7.5	1.79
	67	18.6	11.9	1.31	17.3	11.1	1.44	16.0	10.2	1.56	14.9	9.5	1.65	13.7	8.8	1.73
	63	17.4	13.5	1.25	16.2	12.5	1.38	15.0	11.6	1.49	13.7	10.6	1.59	12.5	9.7	1.65

(230V)

Model	Indoor air	Outdoor intake air DB temperature(°F)														
	IWB (°F)	75			85			95			105			115		
		TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC
MSH12TN MSH12TN - [U1]	71	15.8	9.1	1.17	14.8	8.5	1.28	13.9	8.0	1.38	12.9	7.4	1.45	11.9	6.8	1.51
	67	15.0	10.6	1.10	13.9	9.9	1.21	12.9	9.2	1.31	12.0	8.5	1.39	11.0	7.8	1.45
	63	14.1	11.9	1.05	13.0	11.0	1.16	12.1	10.2	1.25	11.0	9.3	1.34	10.1	8.5	1.39
MSH15TN MSH15TN - [U1]	71	17.9	9.2	1.23	16.7	8.6	1.35	15.7	8.1	1.45	14.6	7.5	1.52	13.4	6.9	1.59
	67	16.9	11.0	1.16	15.8	10.2	1.28	14.6	9.5	1.38	13.6	8.8	1.46	12.5	8.1	1.53
	63	15.9	12.5	1.10	14.7	11.6	1.22	13.7	10.8	1.32	12.5	9.8	1.41	11.4	8.9	1.46
MSH17TN MSH17TN - [U1]	71	19.8	10.1	1.41	18.5	9.4	1.54	17.4	8.8	1.66	16.2	8.2	1.75	14.9	7.6	1.82
	67	18.8	12.0	1.33	17.5	11.2	1.46	16.2	10.4	1.58	15.1	9.6	1.67	13.9	8.9	1.75
	63	17.7	13.7	1.26	16.4	12.7	1.40	15.2	11.8	1.51	13.9	10.7	1.61	12.6	9.8	1.67

NOTE 1. IWB : Intake air wet-bulb temperature
 TC : Total Capacity (x10³ Btu/h), SHC : Sensible Heat Capacity (x10³ Btu/h)
 TPC : Total Power Consumption (kW)
 2. SHC is based on 80°F of indoor intake air DB temperature.

2) COOLING CAPACITY CORRECTIONS

Model	Refrigerant piping length (one way : ft.)		
	25 (std.)	40	49
MSH09TW MSH09TW- <u>U1</u> MSH12TN MSH12TN- <u>U1</u> MSH15TN MSH15TN- <u>U1</u> MSH17TN MSH17TN- <u>U1</u>	1.0	0.954	0.927

3) HEATING CAPACITY

(115V)

Model	Indoor air	Outdoor intake air WB temperature(°F)											
	IDB (°F)	15		25		35		43		45		55	
		TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC
MSH09TW MSH09TW- <u>U1</u>	75	6.1	0.66	7.6	0.78	9.1	0.87	10.2	0.91	10.6	0.93	12.0	0.96
	70	6.5	0.64	7.9	0.76	9.3	0.85	10.5	0.89	10.8	0.91	12.2	0.94
	65	6.6	0.61	8.2	0.73	9.6	0.82	10.8	0.87	11.1	0.88	12.5	0.93

(208V)

Model	Indoor air	Outdoor intake air WB temperature(°F)											
	IDB (°F)	15		25		35		43		45		55	
		TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC
MSH12TN MSH12TN- <u>U1</u> MSH12TN- <u>U2</u>	75	7.5	0.88	9.4	1.03	11.2	1.15	12.7	1.21	13.1	1.23	14.8	1.27
	70	8.0	0.85	9.8	1.01	11.5	1.12	13.0	1.18	13.4	1.20	15.1	1.25
	65	8.2	0.81	10.2	0.97	11.9	1.09	13.4	1.15	13.8	1.17	15.5	1.23
MSH15TN MSH15TN- <u>U1</u> MSH15TN- <u>U2</u>	75	8.4	0.93	10.5	1.09	12.5	1.22	14.1	1.28	14.6	1.30	16.5	1.35
	70	8.9	0.90	10.9	1.07	12.8	1.19	14.5	1.25	14.9	1.28	16.9	1.33
	65	9.1	0.86	11.4	1.03	13.3	1.16	14.9	1.22	15.4	1.24	17.3	1.30
MSH17TN MSH17TN- <u>U1</u>	75	9.7	1.12	12.2	1.31	14.5	1.46	16.4	1.54	16.9	1.56	19.2	1.62
	70	10.3	1.08	12.6	1.28	14.9	1.43	16.8	1.50	17.3	1.53	19.6	1.59
	65	10.6	1.04	13.2	1.24	15.4	1.39	17.3	1.46	17.8	1.49	20.0	1.56

(230V)

Model	Indoor air	Outdoor intake air WB temperature(°F)											
	IDB (°F)	15		25		35		43		45		55	
		TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC
MSH12TN MSH12TN- <u>U1</u>	75	7.8	0.93	9.8	1.09	11.7	1.22	13.2	1.28	13.6	1.30	15.4	1.35
	70	8.3	0.90	10.1	1.07	11.9	1.19	13.5	1.25	13.9	1.28	15.7	1.33
	65	8.5	0.86	10.6	1.03	12.4	1.16	13.9	1.22	14.3	1.24	16.1	1.30
MSH15TN MSH15TN- <u>U1</u>	75	8.6	0.97	10.7	1.14	12.8	1.27	14.4	1.33	14.9	1.35	16.9	1.40
	70	9.1	0.94	11.1	1.11	13.1	1.24	14.8	1.30	15.2	1.33	17.2	1.38
	65	9.3	0.90	11.6	1.07	13.5	1.20	15.2	1.27	15.7	1.29	17.6	1.35
MSH17TN MSH17TN- <u>U1</u>	75	10.0	1.17	12.5	1.37	14.9	1.53	16.8	1.61	17.3	1.63	19.6	1.70
	70	10.6	1.13	12.9	1.34	15.2	1.49	17.2	1.57	17.7	1.60	20.0	1.66
	65	10.8	1.08	13.5	1.30	15.7	1.45	17.7	1.53	18.2	1.55	20.5	1.63

NOTE: 1. IDB : Intake air dry-bulb temperature
 TC : Total Capacity (x10³ Btu/h)
 TPC : Total Power Consumption (kW)
 2. Above data is for heating operation without any frost.

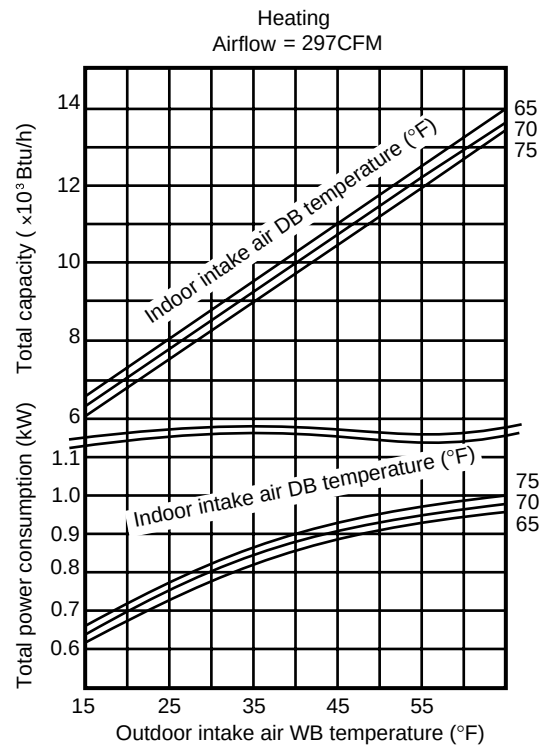
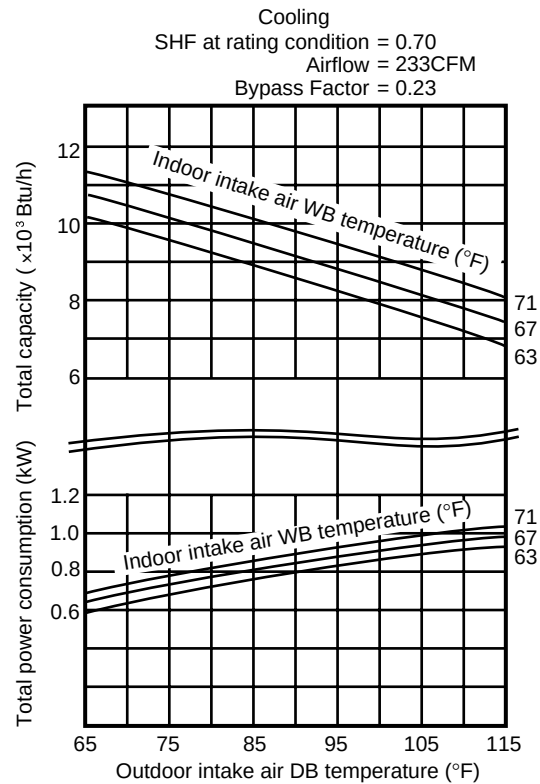
6-2. PERFORMANCE CURVE

NOTE : The curves shows performance under 230V AC.

As for under 208V AC, refer to PERFORMANCE DATA on page 17 and 18.

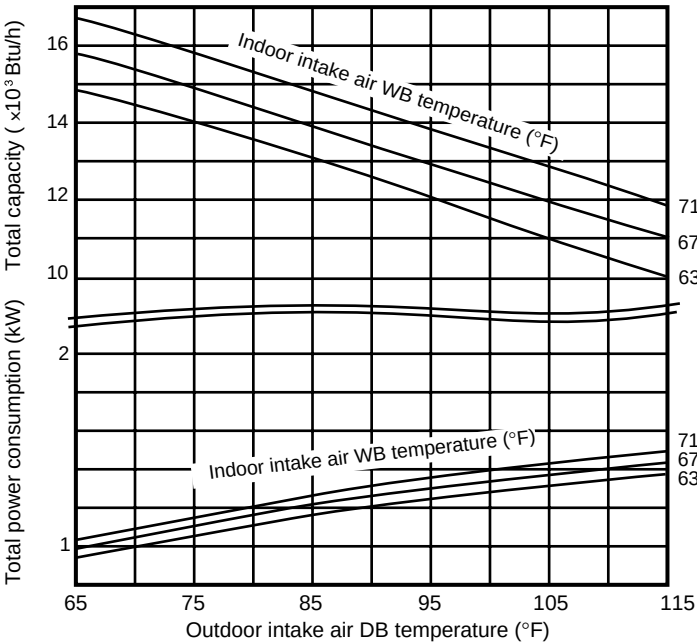
MSH09TW MSH09TW - U1

MUH09TW MUH09TW - U1

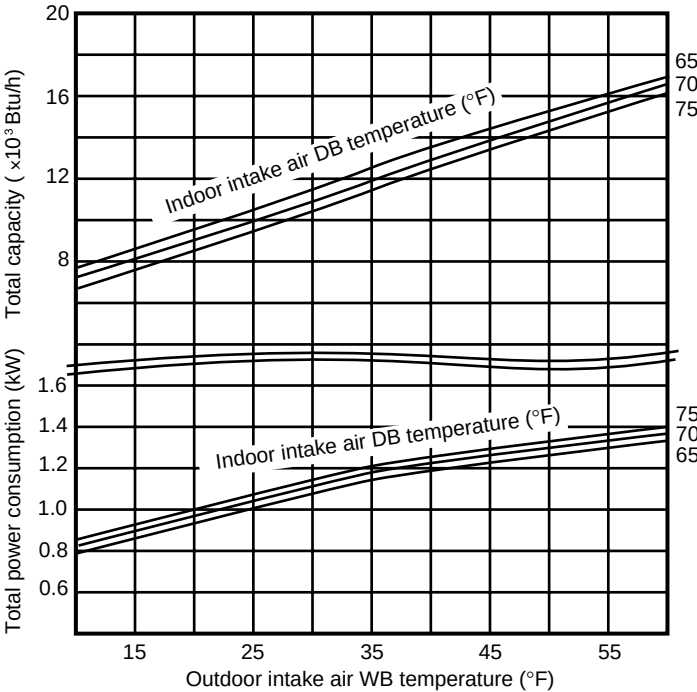


MSH12TN MSH12TN -U1
MUH12TN MUH12TN -U1
MUH12TN MUH12TN -U2

Cooling
SHF at rating condition = 0.71
Airflow = 388CFM
Bypass Factor = 0.15

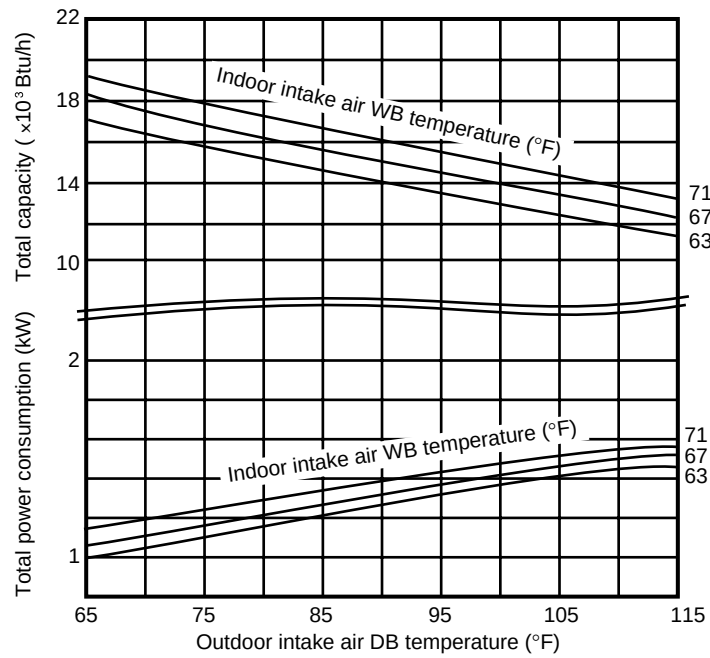


Heating
Airflow = 452CFM

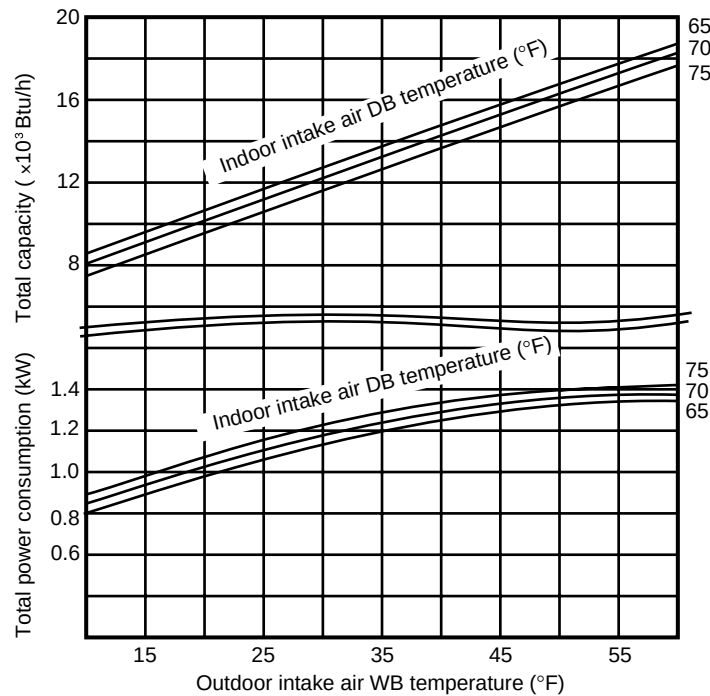


MSH15TN MSH15TN - **U1**
 MUH15TN MUH15TN - **U1**
 MUH15TN MUH15TN - **U2**

Cooling
 SHF at rating condition = 0.65
 Airflow = 367CFM
 Bypass Factor = 0.22

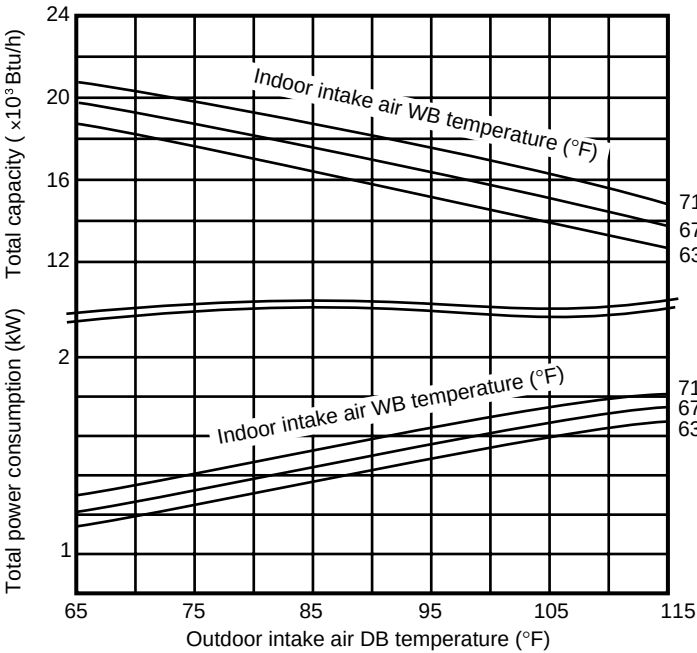


Heating
 Airflow = 452CFM

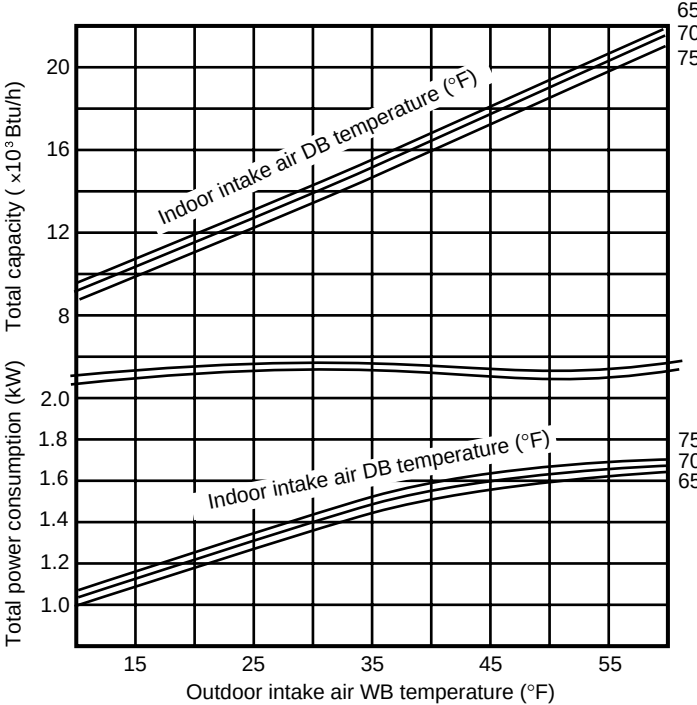


MSH17TN MSH17TN -U1
MUH17TN MUH17TN -U1

Cooling
SHF at rating condition = 0.64
Airflow = 413CFM
Bypass Factor = 0.24

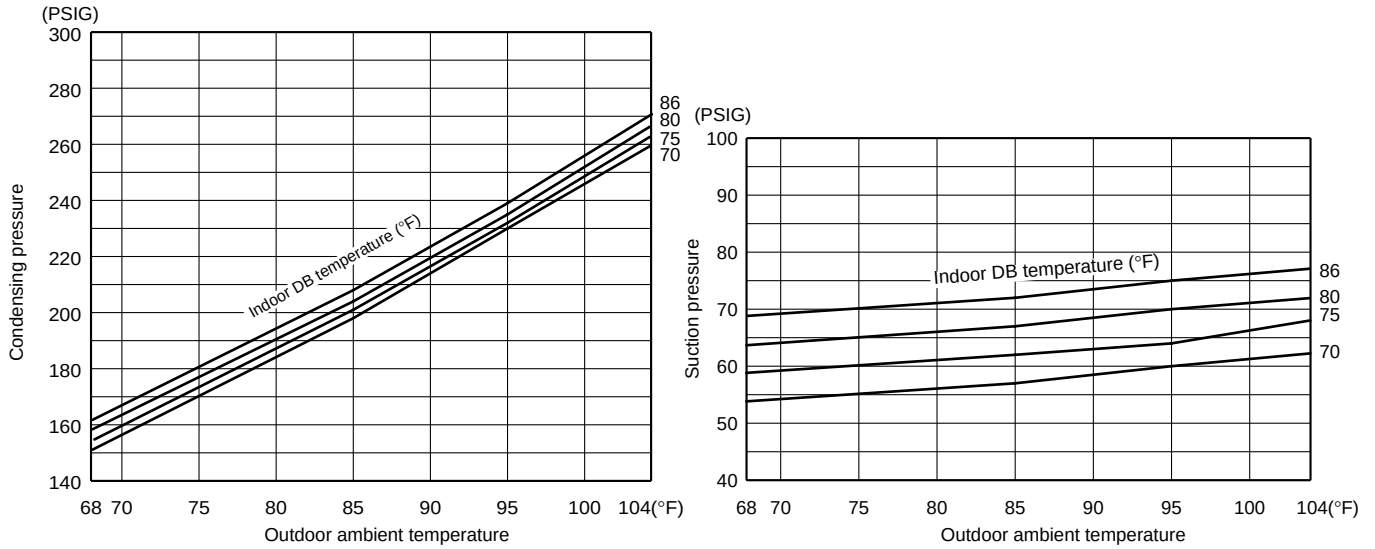


Heating
Airflow = 491CFM



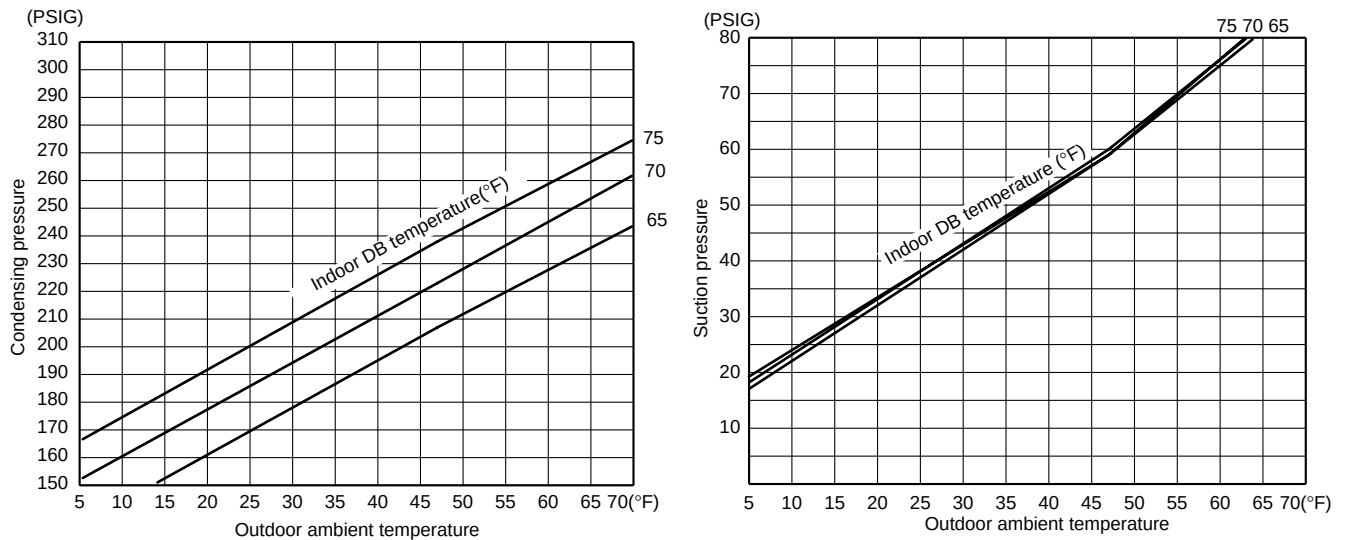
6-3. Condensing pressure
MSH09TW MSH09TW -U1
(Cooling)

Data is based on the condition of indoor humidity 50%.
 Air flow should be set to High speed.



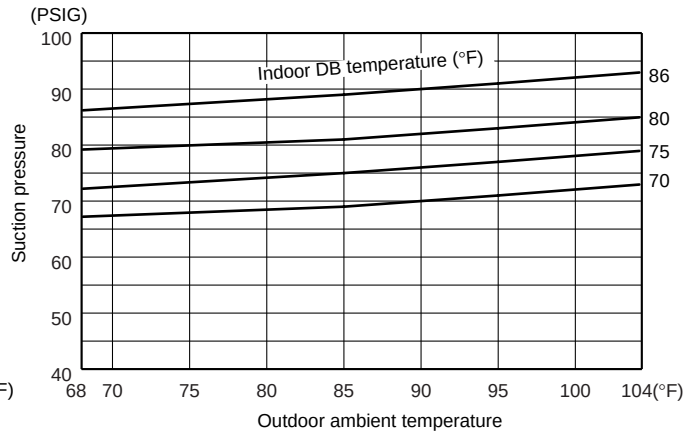
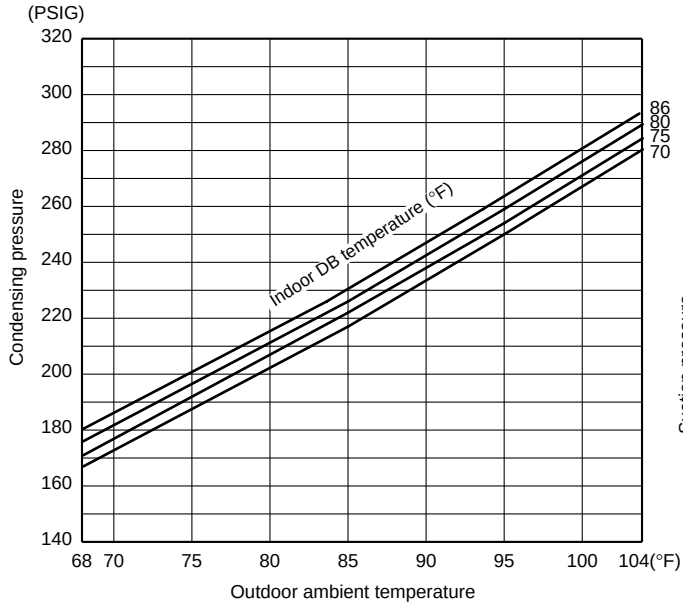
MSH09TW MSH09TW-U1
(Heating)

Data is based on the condition of outdoor humidity 75%.
 Air flow should be set to High speed.
 Data is for heating operation without any frost.



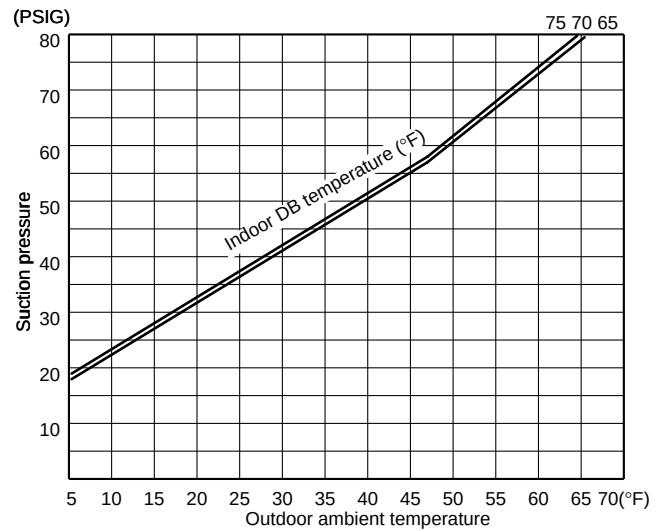
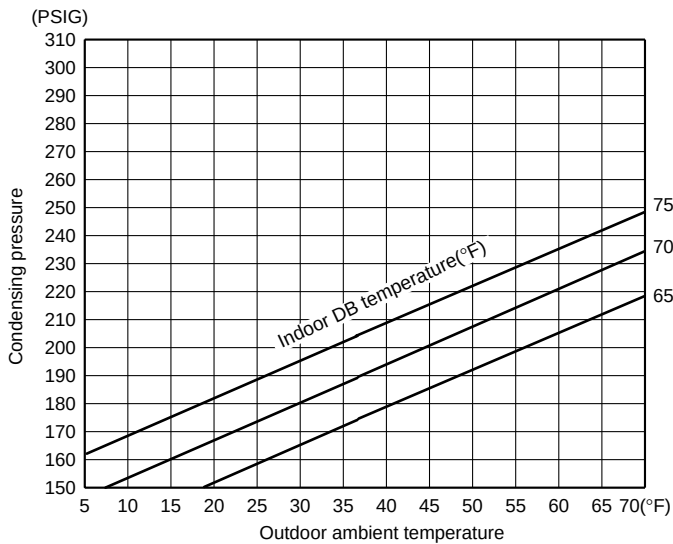
MSH12TN MSH12TN-U1
(Cooling)

Data is based on the condition of indoor humidity 50%.
 Air flow should be set to High speed.



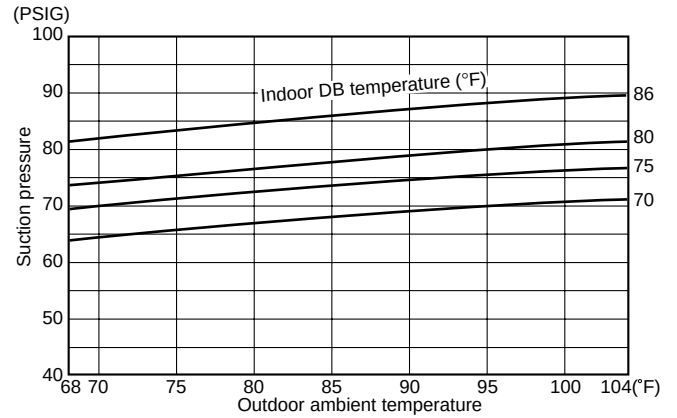
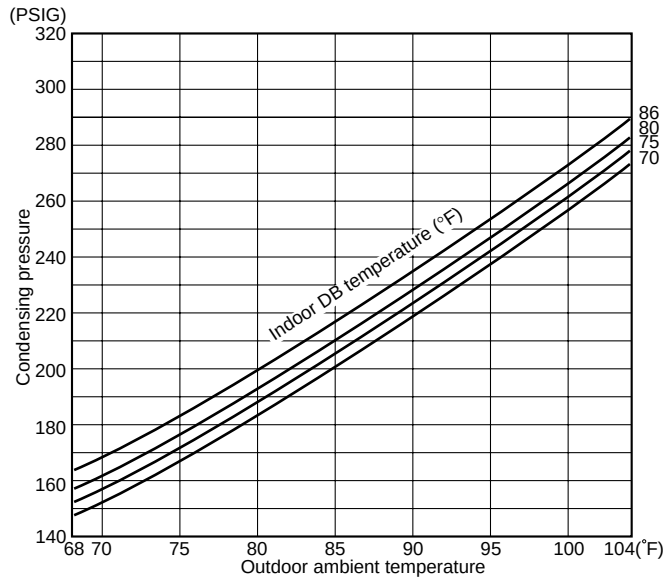
MSH12TN MSH12TN-U1
(Heating)

Data is based on the condition of outdoor humidity 75%.
 Air flow should be set to High speed.
 Data is for heating operation without any frost.



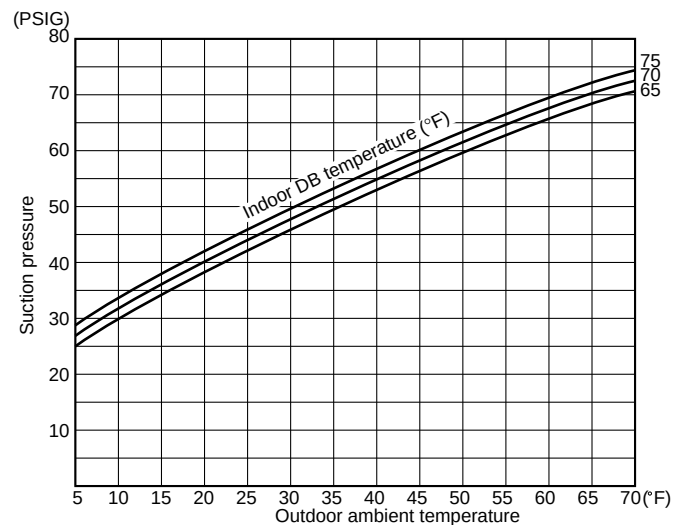
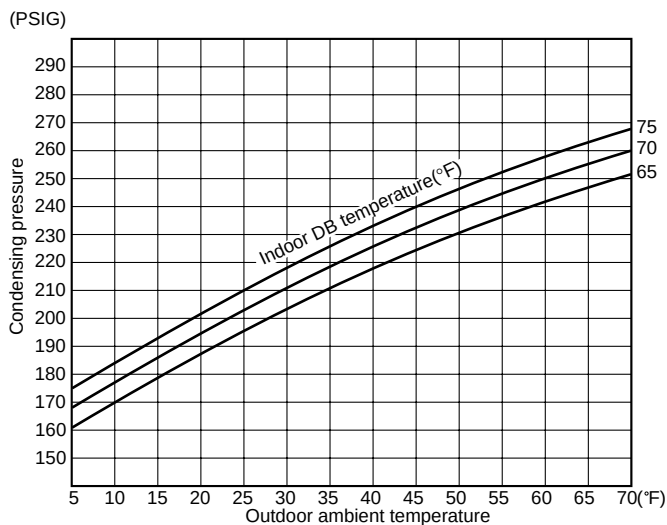
MSH15TN MSH15TN-U1
(Cooling)

Data is based on the condition of indoor humidity 50%.
Air flow should be set to High speed.



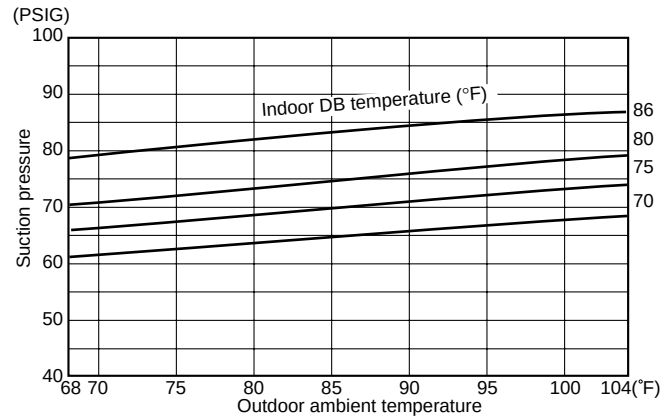
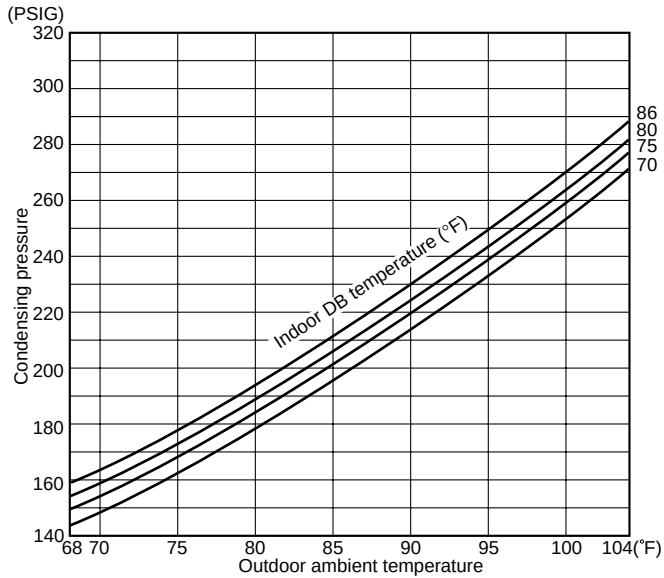
MSH15TN MSH15TN-U1
(Heating)

Data is based on the condition of outdoor humidity 75%.
Air flow should be set to High speed.
Data is for heating operation without any frost.



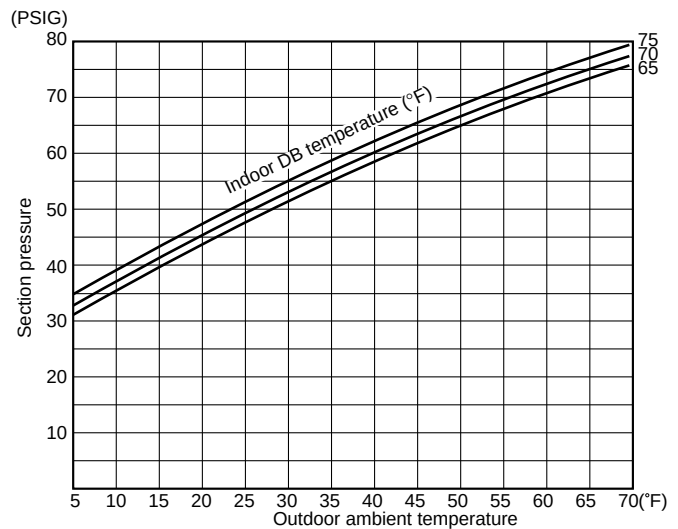
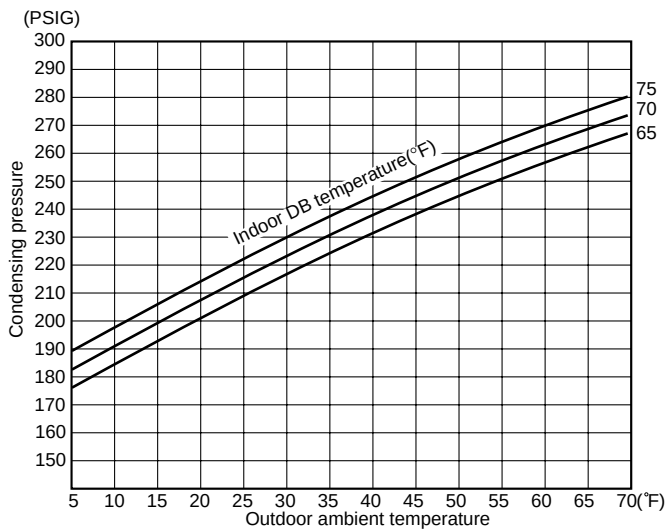
MSH17TN MSH17TN-U1
(Cooling)

Data is based on the condition of indoor humidity 50%.
 Air flow should be set to High speed.



MSH17TN MSH17TN-U1
(Heating)

Data is based on the condition of outdoor humidity 75%.
 Air flow should be set to High speed.
 Data is for heating operation without any frost.



6-4. STANDARD OPERATION DATA

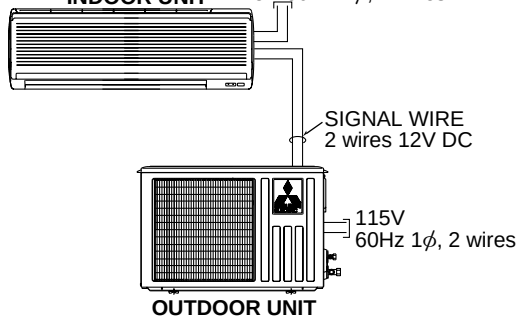
Model				MSH09TW MSH09TW -[U]	
Item			Unit	Cooling	Heating
Total	Capacity		Btu / h	8,800	10,500
	SHF		—	0.70	—
	Input		kW	0.89	
Electrical circuit	Indoor unit			MSH09TW MSH09TW -[U]	
	Power supply (V, phase, Hz)			115,1,60	
	Input		kW	0.035	
	Fan motor current		A	0.34	
	Aux. heater current		A	—	
	Outdoor unit			MUH09TW MUH09TW -[U]	
	Power supply (V, phase, Hz)			115, 1, 60	
	Input		kW	0.855	
	Comp. current		A	6.91	
	Fan motor current		A	0.59	
Refrigerant circuit	Condensing pressure		PSIG	235	223
	Suction pressure		PSIG	70	60
	Discharge temperature		°F	179	171
	Condensing temperature		°F	113	110
	Suction temperature		°F	52	35
	Comp. shell bottom temp		°F	157	146
	Ref. pipe length		ft.	25	
	Refrigerant charge (R22)		—	2 lb. 3 oz.	
Indoor unit	Intake air temperature	DB	°F	80	70
		WB	°F	67	60
	Discharge air temperature	DB	°F	59	100
		WB	°F	57	—
	Fan speed (High)		rpm	950	1,000
	Airflow (High)		CFM	233(Wet)	297(Dry)
Outdoor unit	Intake air temperature	DB	°F	95	47
		WB	°F	—	43
	Fan speed		rpm	640	
	Airflow		CFM	985	

POWER SUPPLY

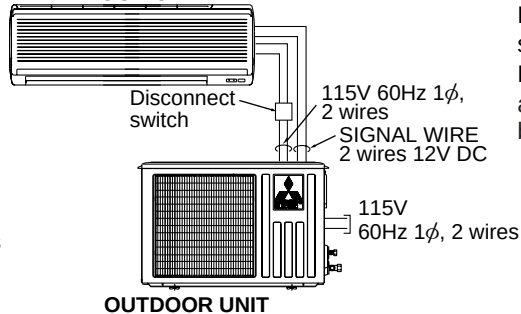
MSH09TW MSH09TW -[U]

•Both wirings can be applied to all MODELS.

INDOOR UNIT 115V 60Hz 1 ϕ , 2 wires



INDOOR UNIT



* Control voltage

Power supply voltage to serial signal circuit is 12V DC. Peak voltage between [U] - and [U] + on in-out terminal block is 12V DC .



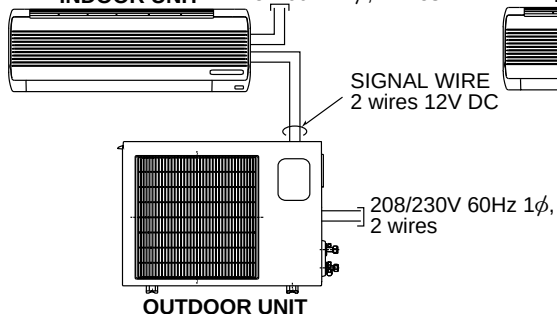
Model				MSH12TN MSH12TN - <u>U1</u>		MSH15TN MSH15TN - <u>U1</u>	
Item			Unit	Cooling	Heating	Cooling	Heating
Total	Capacity (208/230V)		Btu / h	12,600/12,900	13,000/13,500	14,300/14,600	14,500/14,800
	SHF		—	0.71	—	0.65	—
	Input (208/230V)		kW	1.28/1.31	1.18/1.25	1.35/1.38	1.25/1.30
Electrical circuit	Indoor unit			MSH12TN MSH12TN - <u>U1</u>		MSH15TN MSH15TN - <u>U1</u>	
	Power supply (V, phase, Hz)			115, 1, 60		115, 1, 60	
	Input	kW		0.047		0.047	
	Fan motor current		A	0.41		0.41	
	Aux. heater current		A	—		—	
	Outdoor unit			MUH12TN MUH12TN - <u>U1</u> <u>U2</u>		MUH15TN MUH15TN - <u>U1</u> <u>U2</u>	
	Power supply (V, phase, Hz)			208/230, 1, 60		208/230, 1, 60	
	Input (208/230V)	kW		1.233/1.263	1.133/1.203	1.303/1.333	1.203/1.253
	Comp. current (208/230V)		A	5.74/5.21	5.24/5.01	5.91/5.41	5.41/5.11
	Fan motor current		A	0.36/0.39		0.49	
Refrigerant circuit	Condensing pressure		PSIG	259	203	246	230
	Suction pressure		PSIG	84	58	80	57
	Discharge temperature		°F	194	158	146	158
	Condensing temperature		°F	120	103	112	108
	Suction temperature		°F	67	36	58	33
	Comp. shell bottom temp		°F	177	144	161	143
	Ref. pipe length		ft.	25		25	
	Refrigerant charge (R22)		—	2 lb. 12 oz.		3 lb. 3 oz.	
Indoor unit	Intake air temperature	DB	°F	80	70	80	70
		WB	°F	67	60	67	60
	Discharge air temperature	DB	°F	57	100	57	107
		WB	°F	56	—	54	—
	Fan speed (High)		rpm	1,200		1,200	
	Airflow (High)		CFM	388[Wet]	452[Dry]	367[Wet]	452[Dry]
Outdoor unit	Intake air temperature	DB	°F	95	47	95	47
		WB	°F	—	43	—	43
	Fan speed (208/230V)		rpm	700/740		830/900	
	Airflow (208/230V)		CFM	974/1,034		1,288/1,394	

POWER SUPPLY

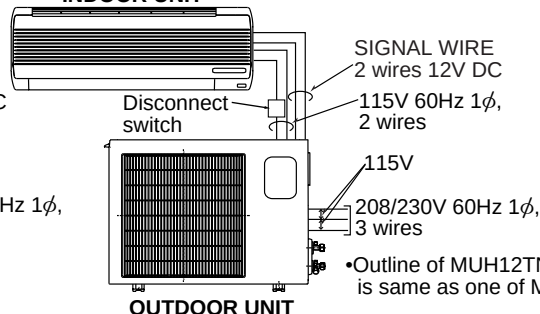
MSH12/15TN MSH12/15TN -[U1]

•Both wirings can be applied to all MODELS.

INDOOR UNIT 115V 60Hz 1 ϕ , 2wires



INDOOR UNIT



* Control voltage

Power supply voltage to serial signal circuit is 12V DC. Peak voltage between ① - and ③ + on in-out terminal block is 12V DC .

•Outline of MUH12TN(-[U1], -[U2]) is same as one of MUH09TW.



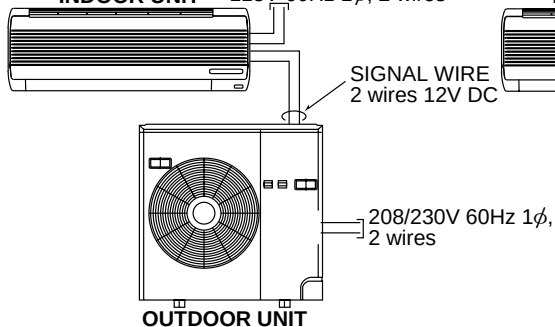
Model				MSH17TN MSH17TN -[U1]	
Item			Unit	Cooling	Heating
Total	Capacity (208/230V)		Btu / h	16,000/16,200	16,800/17,200
	SHF		—	0.64	—
	Input (208/230V)		kW	1.56/1.58	1.50/1.57
Electrical circuit	Indoor unit		MSH17TN MSH17TN -[U1]		
	Power supply (V, phase, Hz)		115,1,60		
	Input	kW	0.054		
	Fan motor current		A	0.47	
	Aux. heater current		A	—	
	Outdoor unit		MUH17TN MUH17TN -[U1]		
	Power supply (V, phase, Hz)		208/230, 1, 60		
	Input (208/230V)	kW	1.506/1.526	1.446/1.516	
	Comp. current (208/230V)		A	6.69/6.19	6.39/6.09
	Fan motor current		A	0.61	
Refrigerant circuit	Condensing pressure		PSIG	243	242
	Suction pressure		PSIG	77	63
	Discharge temperature		°F	165	162
	Condensing temperature		°F	113	112
	Suction temperature		°F	48	35
	Comp. shell bottom temp		°F	150	144
	Ref. pipe length		ft.	25	
	Refrigerant charge (R22)		—	4 lb. 14 oz.	
Indoor unit	Intake air temperature	DB	°F	80	70
		WB	°F	67	60
	Discharge air temperature	DB	°F	56	109
		WB	°F	54	—
	Fan speed (High)		rpm	1,290	
	Airflow (High)		CFM	413[Wet]	491[Dry]
Outdoor unit	Intake air temperature	DB	°F	95	47
		WB	°F	—	43
	Fan speed (208/230V)		rpm	740/800	
	Airflow (208/230V)		CFM	1,606/1,730	

POWER SUPPLY

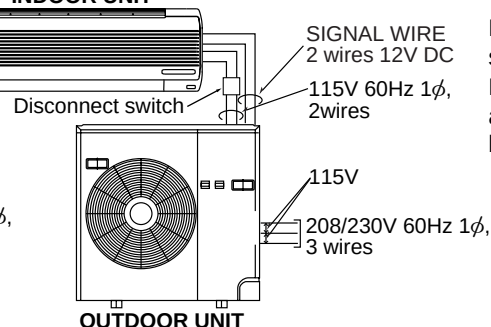
MSH17TN MSH17TN -[U1]

•Both wirings can be applied to all MODELS.

INDOOR UNIT 115V 60Hz 1 ϕ , 2 wires



INDOOR UNIT



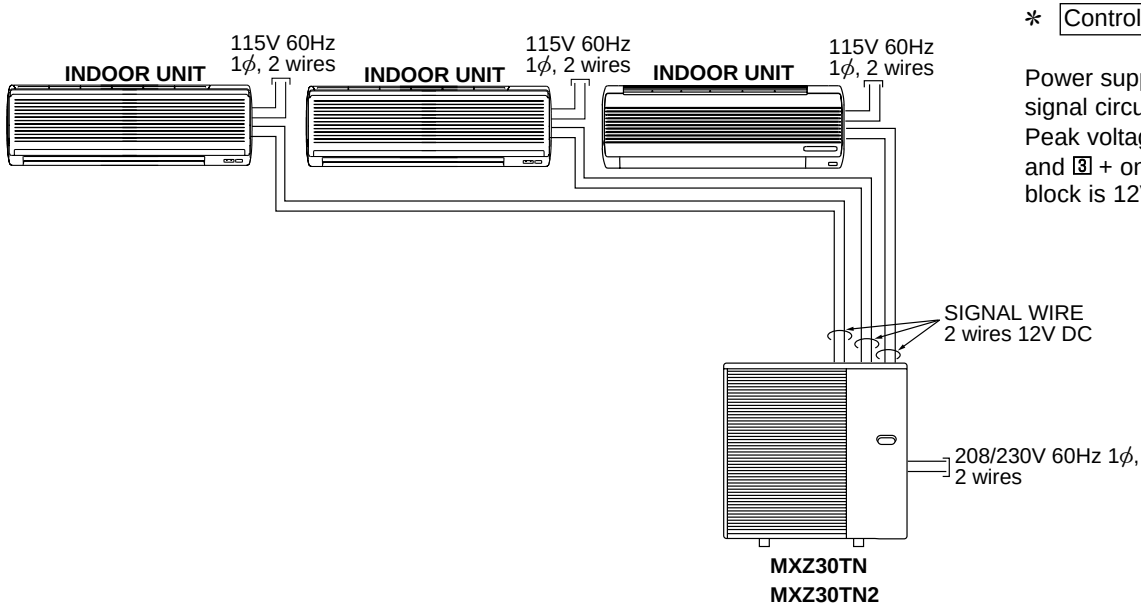
* Control voltage

Power supply voltage to serial signal circuit is 12V DC. Peak voltage between ① - and ② + on in-out terminal block is 12V DC .



Model			MXZ30TN MXZ30TN2	
Item		Unit	Cooling	Heating
Total	Capacity	Btu / h	28,400	28,600
	SHF	—	—	—
	Input	kW	3.8	2.8
Electrical circuit	Outdoor unit		MXZ30TN MXZ30TN2	
	Power supply (V, phase, Hz)		208/230, 1, 60	
	Input	kW	3.8	2.8
	Comp. current	A	17.1	12.3
	Fan motor current	A	0.60	
Refrigerant circuit	Condensing pressure	PSIG	300	219
	Suction pressure	PSIG	65	47
	Discharge temperature	°F	194	169
	Condensing temperature	°F	127	
	Suction temperature	°F	41	26
	Comp. shell bottom temp	°F	150	144
	Ref. pipe length [Total pipe length for multi-system]	ft.	82 [197]	
	Refrigerant charge (R22)	—	8 lb. 10 oz.	
Outdoor unit	Intake air temperature	DB	°F	95
		WB	°F	—
	Fan speed (208/230V)	rpm	630/675	
	Airflow (208/230V)	CFM	1,764/1,906	

POWER SUPPLY



6-5. OPERATING RANGE

(1) POWER SUPPLY

	Model	Rating	Guaranteed Voltage
Indoor unit	MSH09TW MSH09TW-[U1] MSH12TN MSH12TN-[U1] MSH15TN MSH15TN-[U1] MSH17TN MSH17TN-[U1]	115V 60Hz 1 ϕ	Min. 103V 115V Max. 127V ----- ----- ----- -----
Outdoor unit	MUH09TW MUH09TW-[U1] MUH12TN MUH12TN-[U1] MUH15TN MUH12TN-[U2] MUH17TN MUH15TN-[U1] MXZ30TN MUH15TN-[U2] MXZ30TN2 MUH17TN-[U1]	208/230V 60Hz 1 ϕ	Min. 198V 208V 230V Max. 253V ----- ----- ----- -----

(2) OPERATION

MSH09TW MSH09TW-[U1]
MSH12TN MSH12TN-[U1]
MSH15TN MSH15TN-[U1]
MSH17TN MSH17TN-[U1]

Function	Intake air temperature Condition	Indoor		Outdoor	
		DB (°F)	WB (°F)	DB (°F)	WB (°F)
Cooling	Standard temperature	80	67	95	—
	Maximum temperature	95	71	115	—
	Minimum temperature	67	57	67	—
	Maximum humidity	78%		—	
Heating	Standard temperature	70	60	47	43
	Maximum temperature	80	67	75	65
	Minimum temperature	70	60	17	15

MXZ30TN MXZ30TN2

Function	Intake air temperature Condition	Indoor		Outdoor	
		DB (°F)	WB (°F)	DB (°F)	WB (°F)
Cooling	"A" Cooling Steady State at rated compressor Speed	80	67	95	(75)
	"B-2" Cooling Steady State at rated compressor Speed	80	67	82	(65)
	"B-1" Cooling Steady State at minimum compressor Speed	80	67	82	(65)
	Low ambient Cooling Steady State at minimum compressor Speed	80	67	67	(53.5)
	Intermediate Cooling Steady State At Intermediate compressor Speed*	80	67	87	(69)
Heating	Standard Rating-Heating at rated compressor Speed	70	60	47	43
	Low temperature Heating at rated compressor Speed	70	60	17	15
	Max temperature Heating at minimum compressor Speed	70	60	62	56.5
	High temperature Heating at minimum compressor Speed	70	60	47	43
	Frost Accumulation at rated compressor Speed	70	60	35	33
	Frost Accumulation at Intermediate compressor Speed*	70	60	35	33

*At Intermediate compressor Speed

=("Cooling rated compressor speed" - "minimum compressor speed") / 3 + "minimum compressor speed".

6-6. OUTLET AIR SPEED AND COVERAGE RANGE

Model	Mode	Function	Air flow (CFM)	Air speed (ft./sec.)	Coverage range (ft.)
MSH09TW MSH09TW- <u>U1</u>	HEAT	Dry	297	15.8	22.3
		Wet	279	14.9	21.0
	COOL	Wet	233	12.4	17.6
MSH12TN MSH12TN- <u>U1</u>	HEAT	Dry	452	18.2	29.2
		Wet	452	18.2	29.2
	COOL	Wet	388	15.6	25.2
MSH15TN MSH15TN- <u>U1</u>	HEAT	Dry	452	18.2	29.2
		Wet	452	18.2	29.2
	COOL	Wet	367	14.8	23.9
MSH17TN MSH17TN- <u>U1</u>	HEAT	Dry	491	19.7	31.7
		Wet	491	19.7	31.7
	COOL	Wet	413	16.6	26.8

● The air coverage range is the figure up to the position where the air speed is 1 ft./sec., when air is blown out horizontally from the unit properly at the High speed position. The coverage range should be used only as a general guideline since it varies according to the size of the room and furniture arranged inside the room.

6-7. ADDITIONAL REFRIGERANT CHARGE (R22(oz.))

Model	Outdoor unit precharged (up to 25ft.)	Refrigerant piping length (one way)					
		25ft.	30ft.	35ft.	40ft.	45ft.	49ft.
MSH09TW MSH09TW- <u>U1</u> MUH09TW MUH09TW- <u>U1</u>	2 lb. 3 oz.	0	2.68	5.36	8.04	10.72	12.86
MSH12TN MSH12TN- <u>U1</u> MUH12TN MUH12TN- <u>U1</u> MUH12TN- <u>U2</u>	2 lb. 12 oz.						
MSH15TN MSH15TN- <u>U1</u> MUH15TN MUH15TN- <u>U1</u> MUH15TN- <u>U2</u>	3 lb. 3 oz.						
MSH17TN MSH17TN- <u>U1</u> MUH17TN MUH17TN- <u>U1</u>	4 lb. 14 oz.						

※ MXZ30TN and MXZ30TN2 do not have the necessity of additional refrigerant.

MXZ30TN MXZ30TN2

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

(2) AIR FLOW

Air flow should be set at MAX.

(3) MAIN READINGS

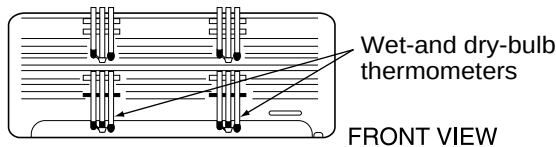
- | | | |
|---|------|-----------|
| (1) Indoor intake air wet-bulb temperature : | °FWB | } Cooling |
| (2) Indoor outlet air wet-bulb temperature : | °FWB | |
| (3) Outdoor intake air dry-bulb temperature : | °FDB | |
| (4) Total input: | W | } Heating |
| (5) Indoor intake air dry-bulb temperature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

Indoor air wet/dry-bulb temperature difference on the left side of the chart on this 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.

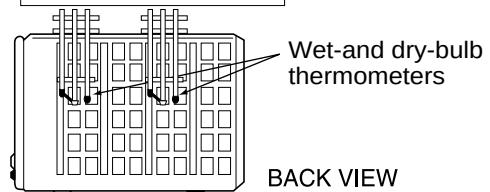
How to measure the indoor air wet-bulb/dry-bulb temperature difference

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. Compressor starts running at 33Hz (COOL) or 45Hz (HEAT). The frequency at each operation mode is fixed.
7. When system stabilizes after more than 15 minutes, measure temperature and take an average temperature.
8. 10 minutes later, measure temperature again and check that the temperature does not change.

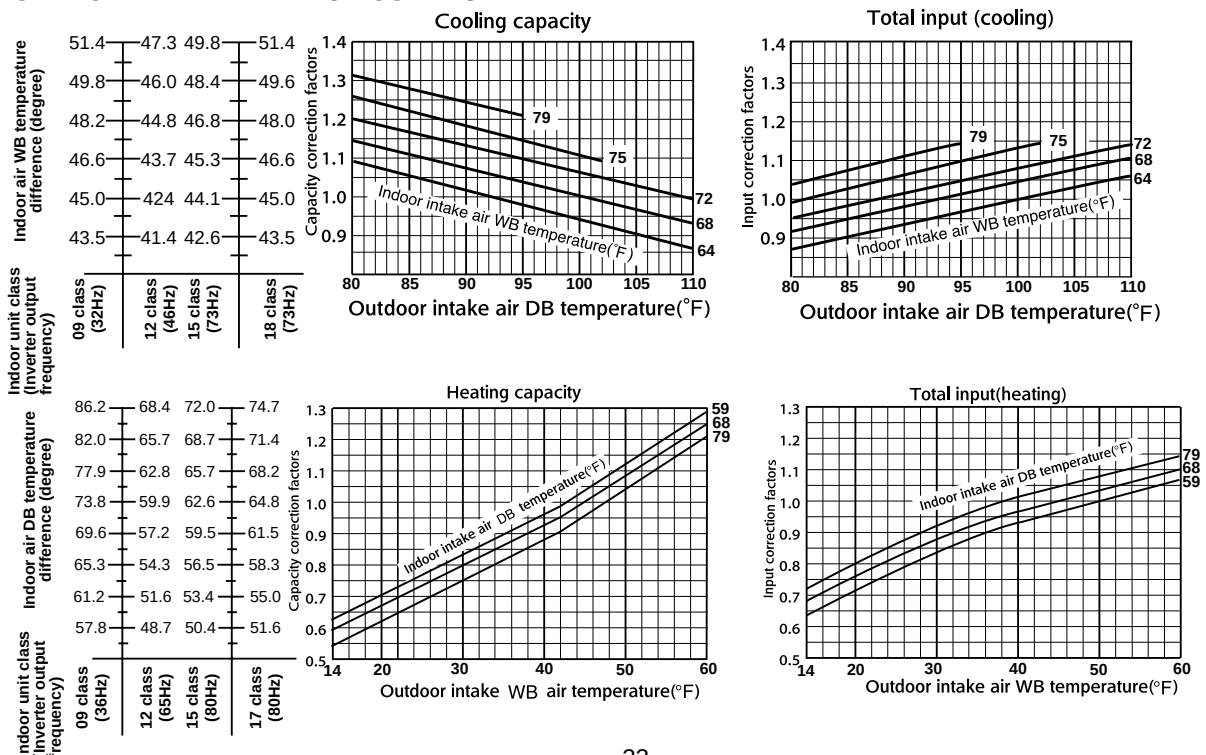
INDOOR UNIT



OUTDOOR UNIT



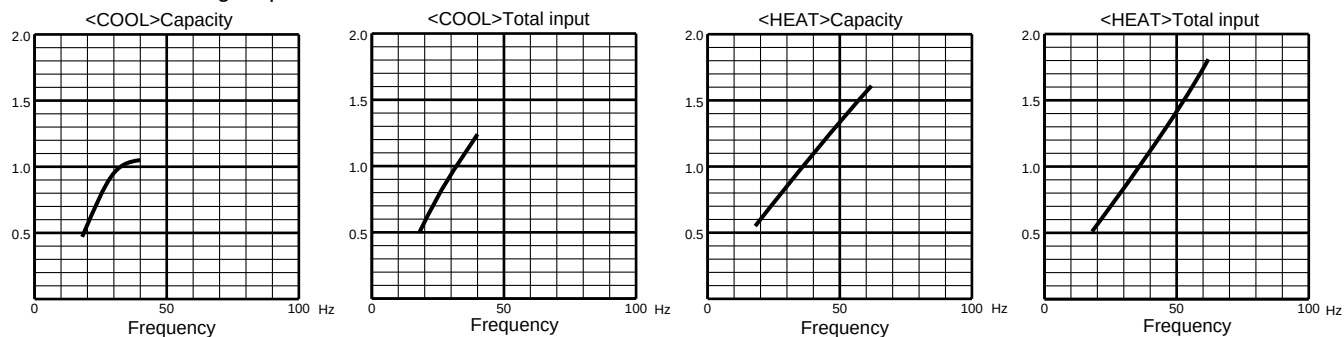
6-8. CAPACITY AND THE INPUT CURVES



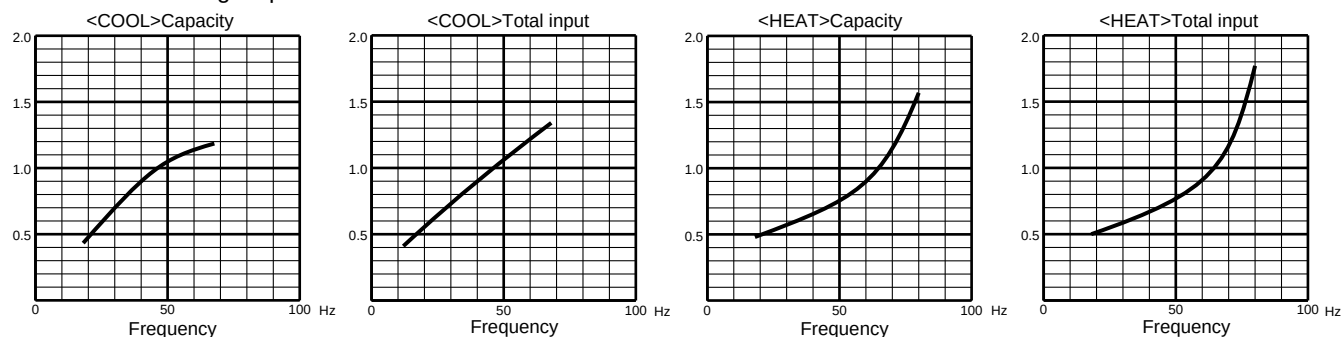
6-9. Capacity and input correction by means of inverter output frequency

(OUTDOOR UNIT:MXZ30TN MXZ30TN2)

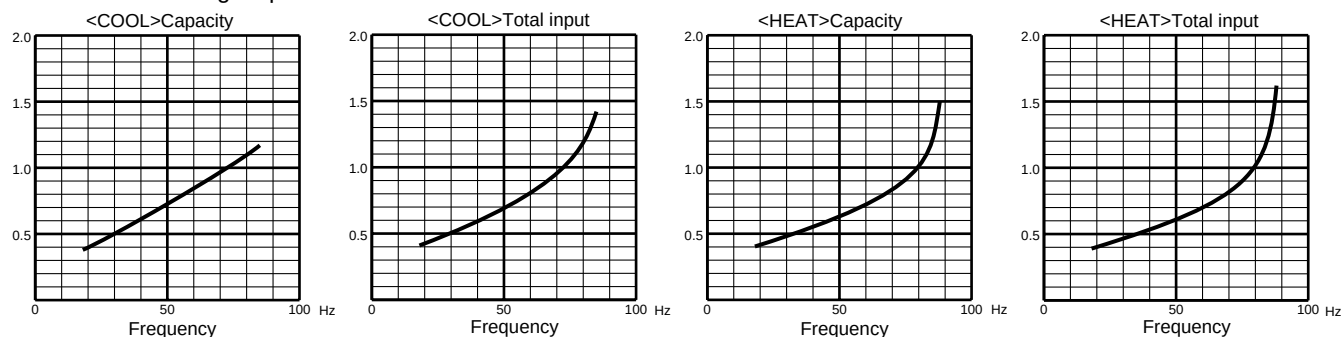
1. 09-class unit in single operation



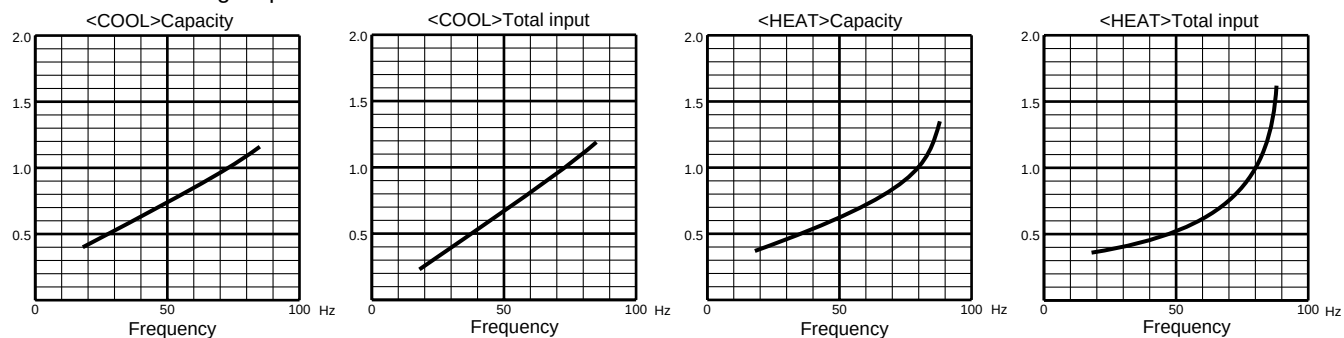
2. 12-class unit in single operation



3. 15-class unit in single operation



4. 17-class unit in single operation



6-10. Outdoor low pressure and outdoor unit current

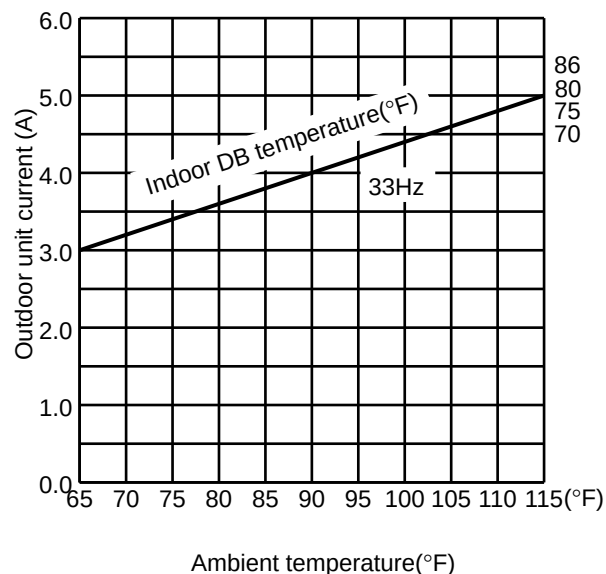
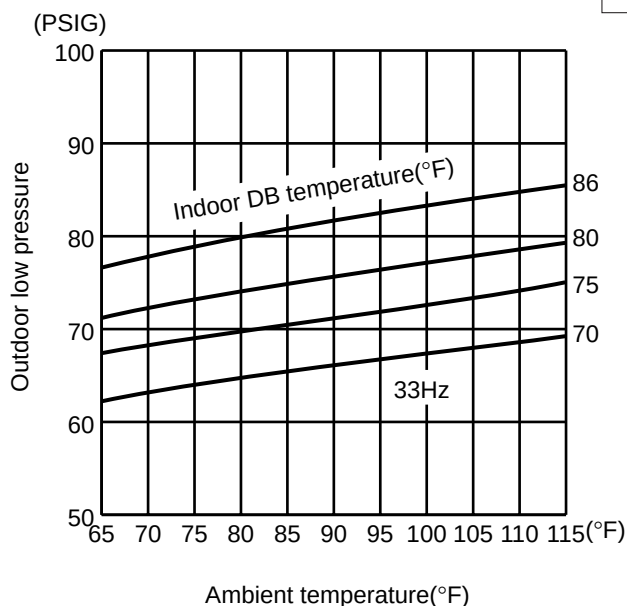
1. 09-class unit in single operation (OUTDOOR UNIT : MXZ30TN MXZ30TN2)

(1) COOL operation

- ① Data is based on the condition of indoor humidity 50%
- ② Air flow speed : High
- ③ Inverter output frequency : 33Hz

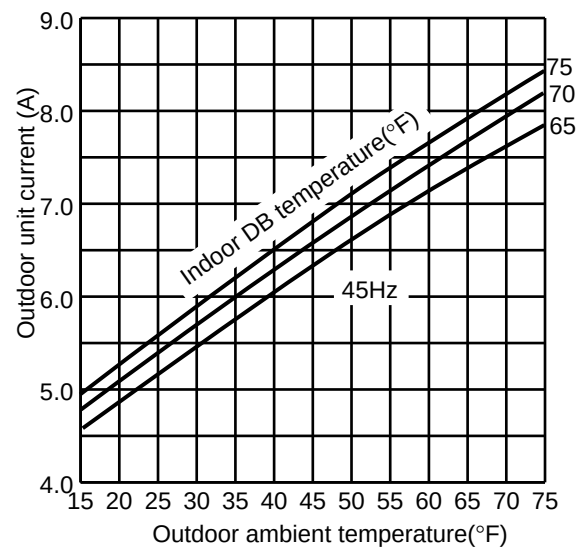
<How to work fixed-frequency operation>

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 33Hz (COOL) or 45Hz (HEAT).
4. Indoor fan runs at High 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 Data is based on the condition of outdoor humidity 75%.
- ② Set air flow to High speed.
- ③ Inverter output frequency is 45Hz.



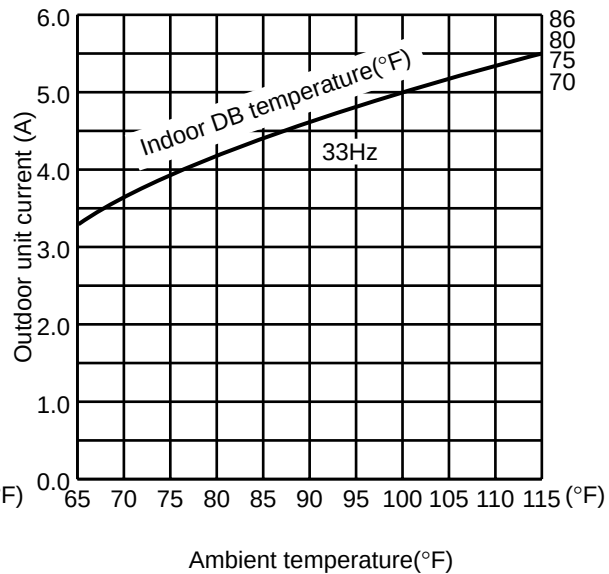
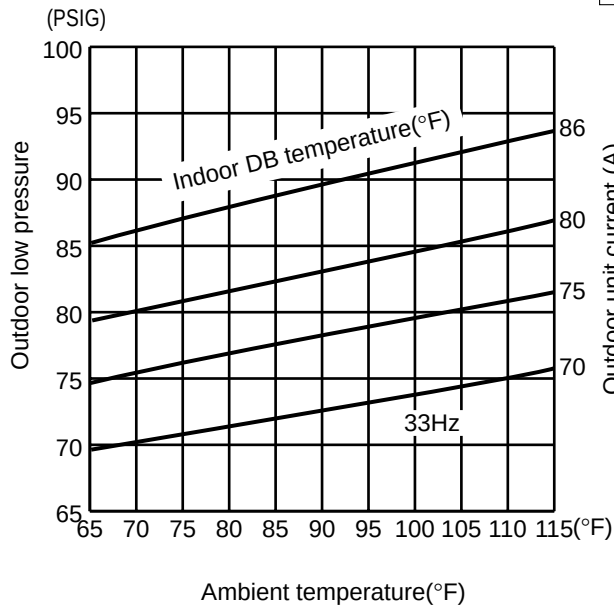
2. 12-class unit in single operation (OUTDOOR UNIT : MXZ30TN MXZ30TN2)

(1) COOL operation

- ① Data is based on the condition of indoor humidity 50%
- ② Air flow speed : High
- ③ Inverter output frequency : 33Hz

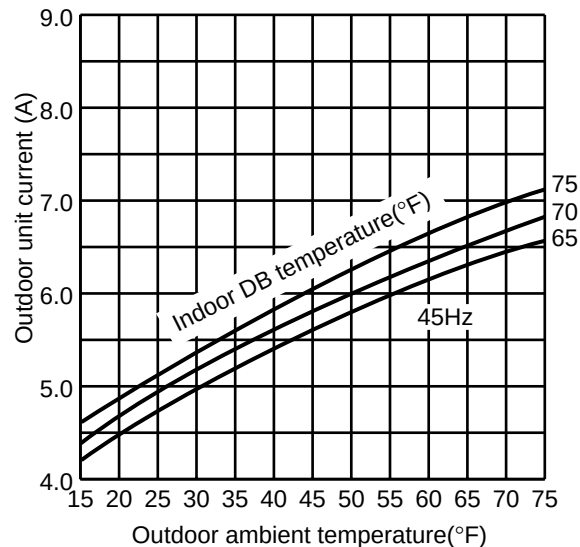
<How to work fixed-frequency operation>

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 33Hz (COOL) or 45Hz (HEAT).
4. Indoor fan runs at High 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 Data is based on the condition of outdoor humidity 75%.
- ② Set air flow to High speed.
- ③ Inverter output frequency is 45Hz.



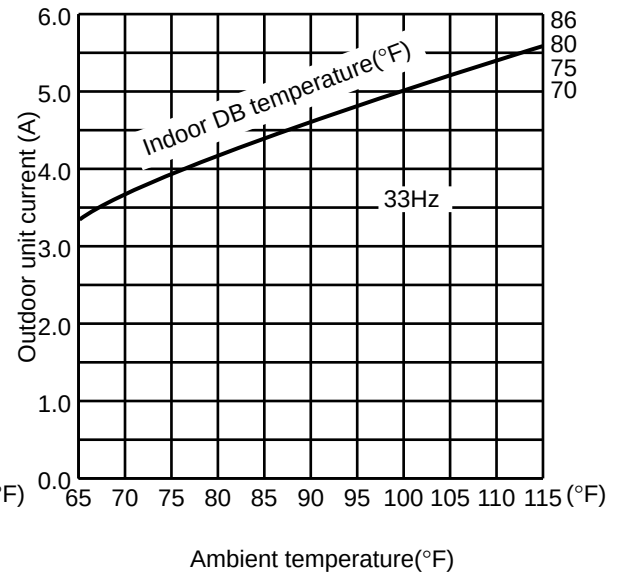
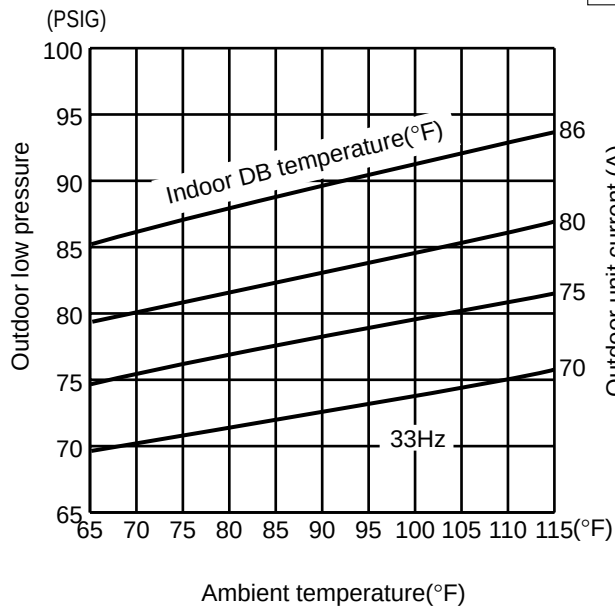
4. 15-class unit in single operation (OUTDOOR UNIT : MXZ30TN MXZ30TN2)

(1) COOL operation

- ① Data is based on the condition of indoor humidity 50%
- ② Air flow speed : High
- ③ Inverter output frequency : 33Hz

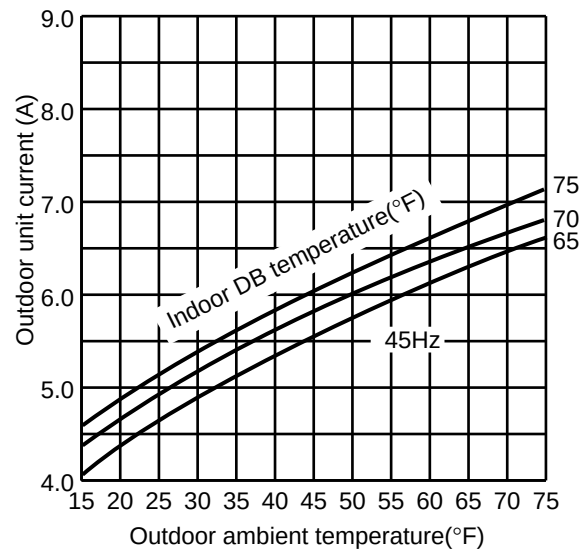
<How to work fixed-frequency operation>

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 33Hz (COOL) or 45Hz (HEAT).
4. Indoor fan runs at High speed.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.



(2) HEAT operation

- ① Data is based on the condition of outdoor humidity 75%
- ② Set air flow to High speed.
- ③ Inverter output frequency is 45Hz.



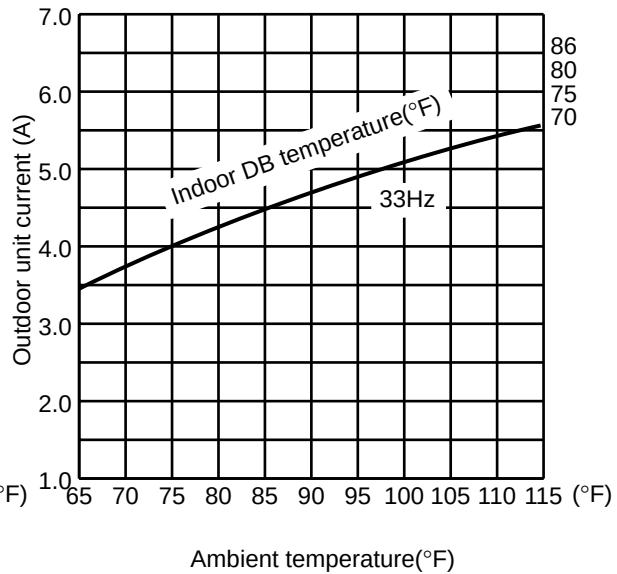
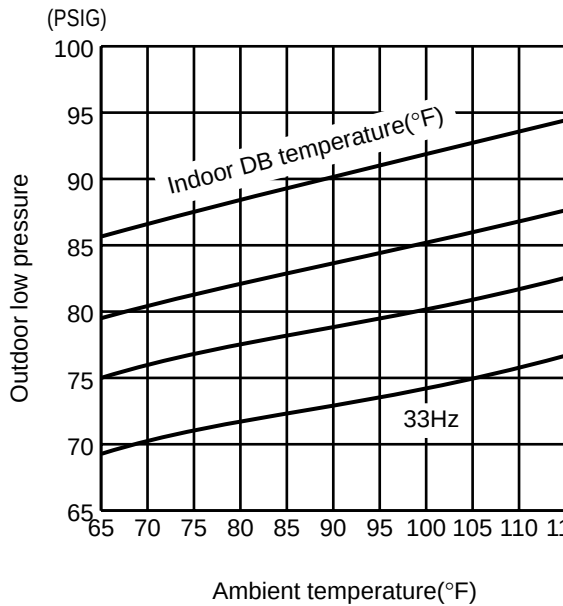
5. 17-class unit in single operation (OUTDOOR UNIT : MXZ30TN MXZ30TN2)

(1) COOL operation

- ① Data is based on the condition of indoor humidity 50%
- ② Air flow speed : High
- ③ Inverter output frequency : 33Hz

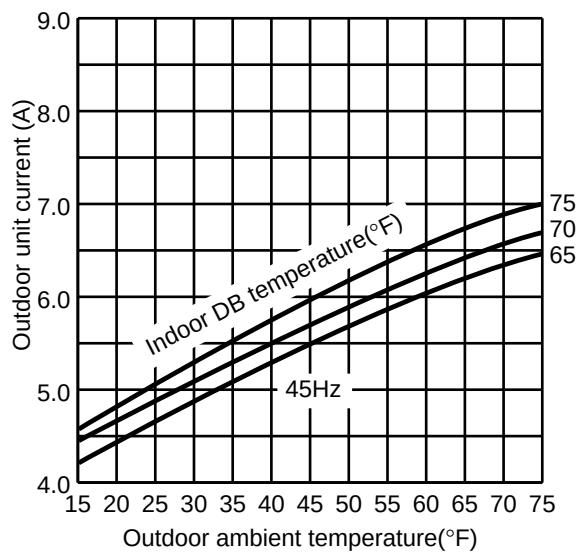
<How to work fixed-frequency operation>

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 33Hz (COOL) or 45Hz (HEAT).
4. Indoor fan runs at High speed.
5. To cancel this operation, press emergency run ON/OFF button or any button on remote controller.



(2) HEAT operation

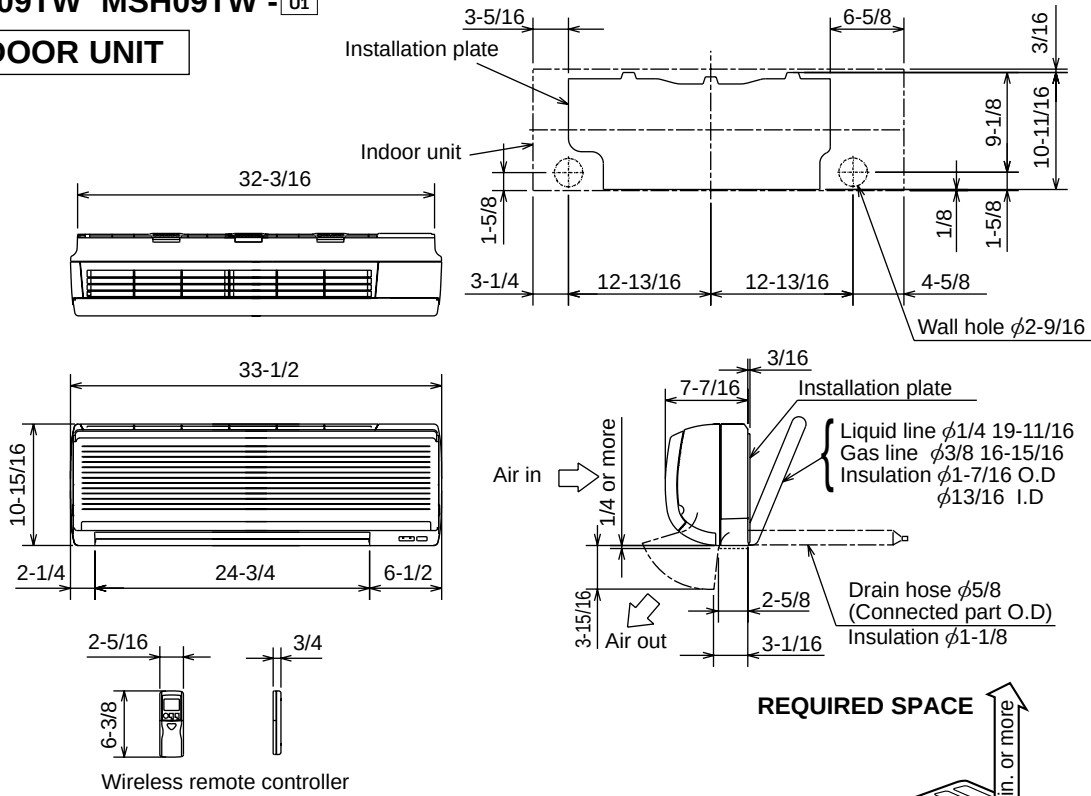
- ① Data is based on the condition of outdoor humidity 75%
- ② Set air flow to High speed.
- ③ Inverter output frequency is 45Hz.



MSH09TW MSH09TW - U1

INDOOR UNIT

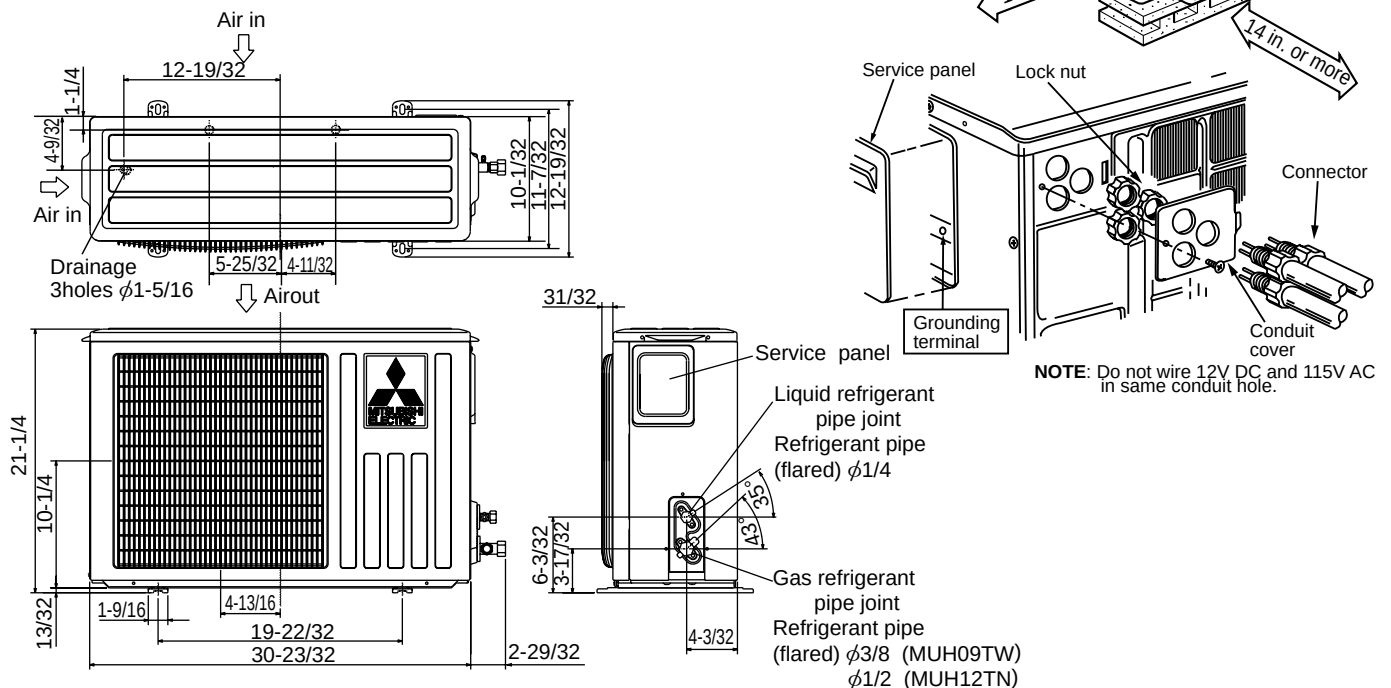
Unit: inch



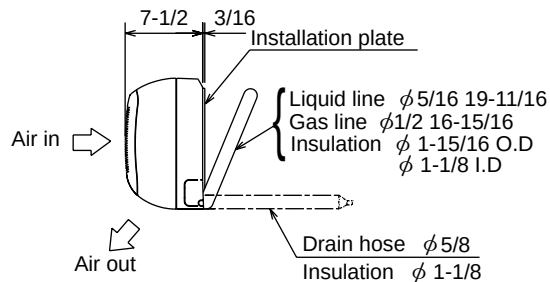
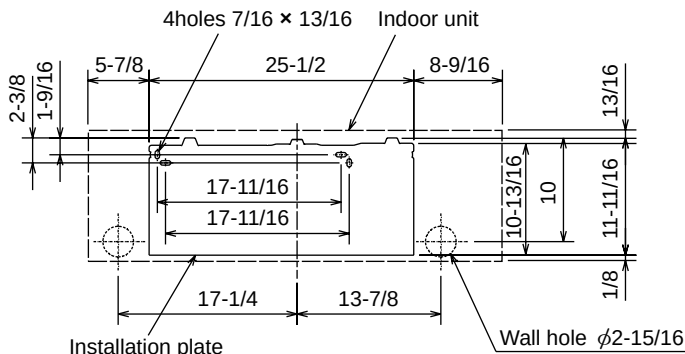
MUH09TW MUH12TN MUH09TW - U1

MUH12TN - U1 MUH12TN - U2

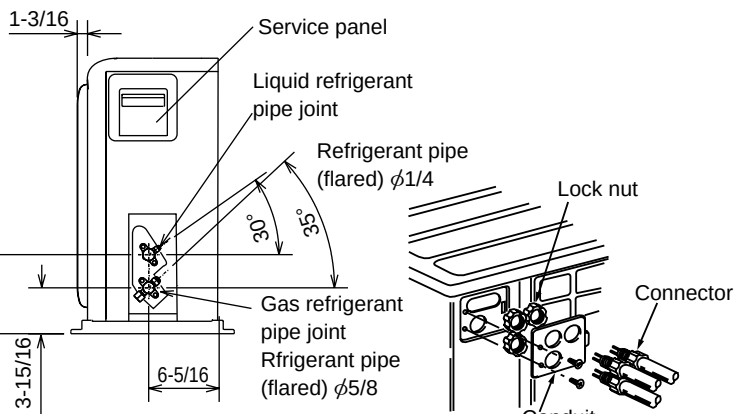
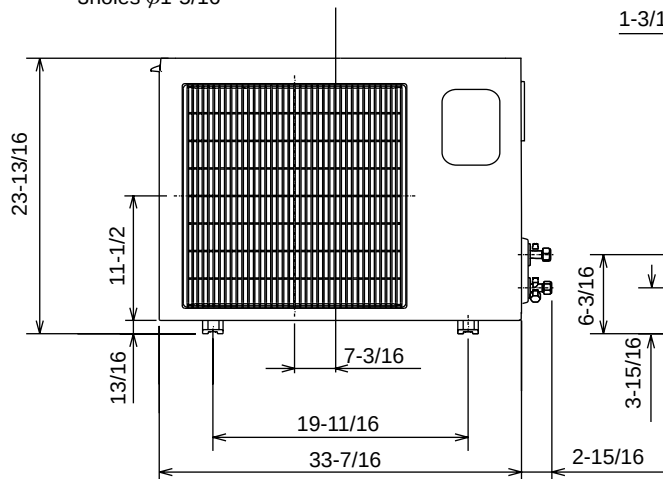
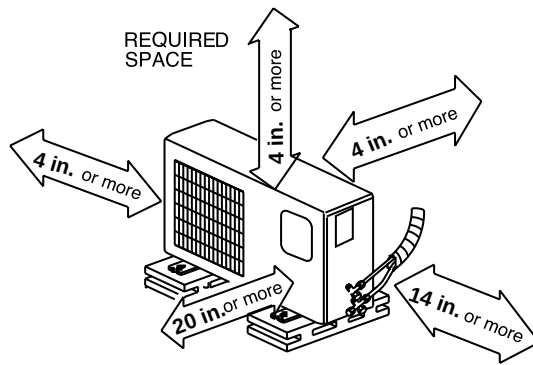
OUTDOOR UNIT



INDOOR UNIT



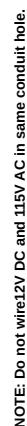
OUTDOOR UNIT



NOTE: Do not wire 12V DC and 115V AC in same conduit hole.

OUTDOOR UNIT

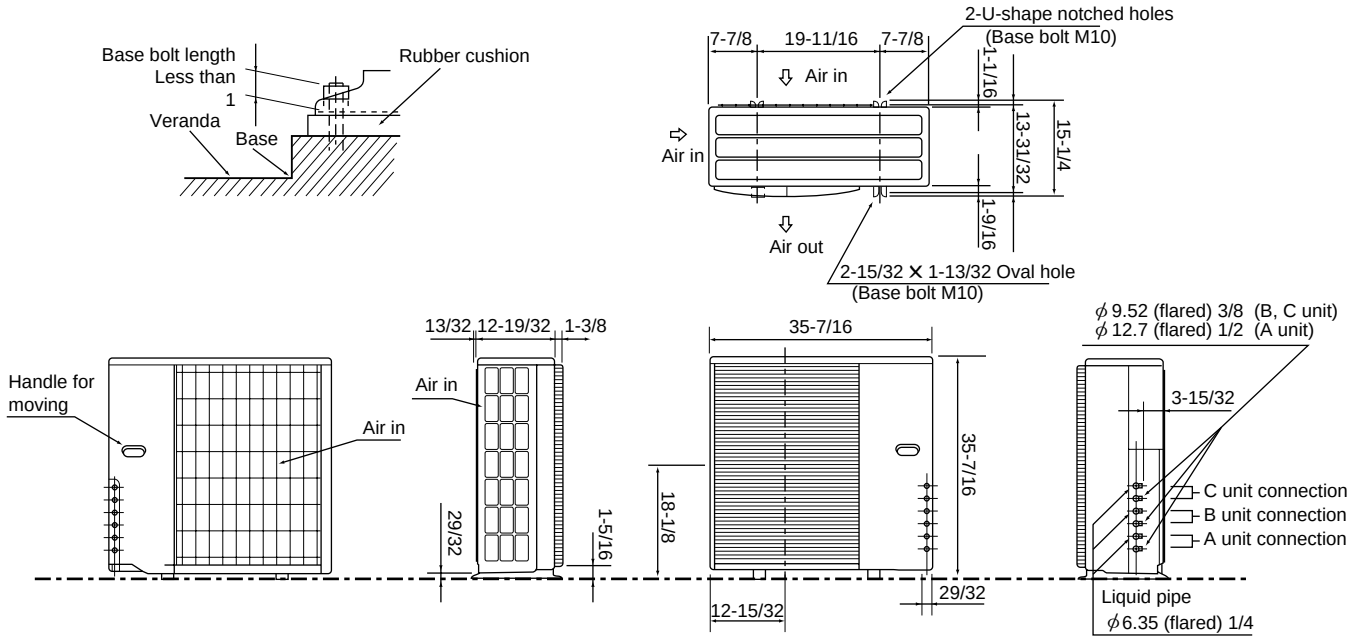
OUTDOOR UNIT



MXZ30TN MXZ30TN2

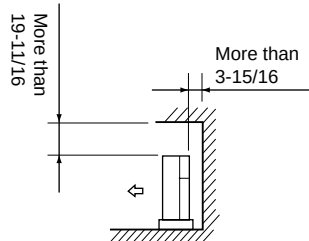
Unit: inch

OUTDOOR UNIT

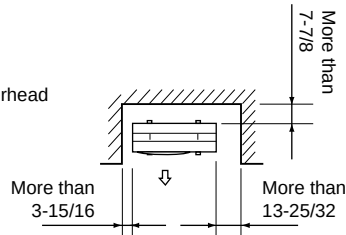


1.Installation space

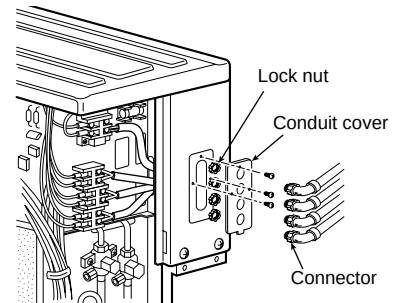
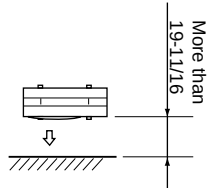
Note : Leave front and both sides clearance fully.



Note : Leave front and overhead clearance fully.



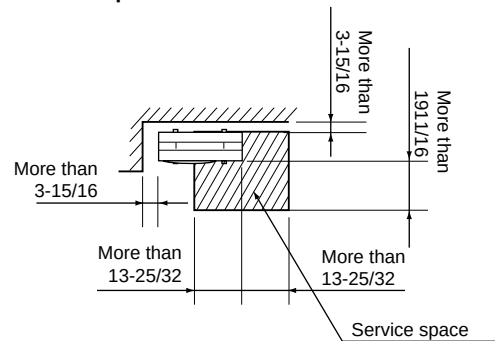
Note : Leave front, overhead and both clearance fully.



Note : Obstacle on front and rear side only.

The unit can be used by attaching an optional outdoor outlet guide (MAC-855SG) (but both sides and the top are open.)

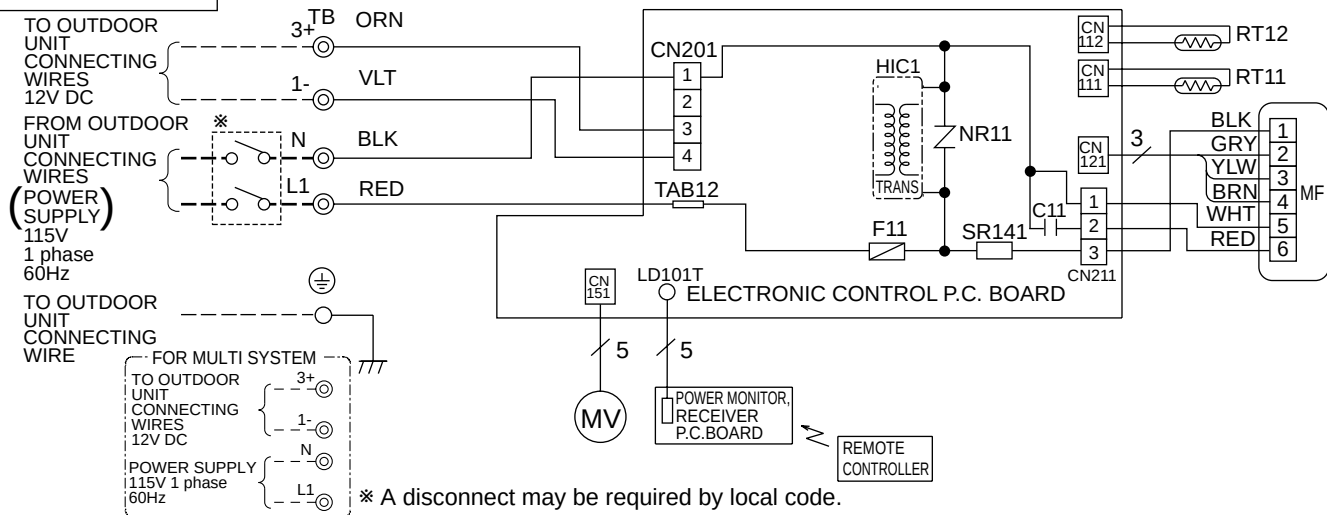
2.Service space



MSH09TW

MODEL WIRING DIAGRAM

INDOOR UNIT



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C11	INDOOR FAN CAPACITOR	MV	VANE MOTOR	SR141	SOLID STATE RELAY
F11	FUSE(3A)	NR11	VARISTOR	TB	TERMINAL BLOCK
HIC1	DC/DC CONVERTER	RT11	ROOM TEMPERATURE THERMISTOR		
MF	INDOOR FAN MOTOR(INNER FUSE)	RT12	INDOOR COIL THERMISTOR		

NOTE: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;

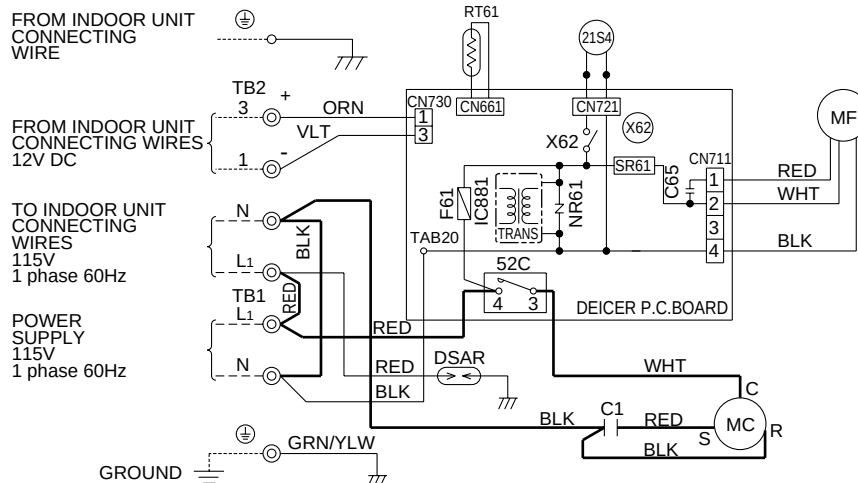
⊙: Terminal block, □□□□: Connector

SG79J022H01

MUH09TW

MODEL WIRING DIAGRAM

OUTDOOR UNIT



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MC	COMPRESSOR(INNER PROTECTOR)	TB1	TERMINAL BLOCK
C65	OUTDOOR FAN CAPACITOR	MF	OUTDOOR FAN MOTOR(INNER PROTECTOR)	TB2	TERMINAL BLOCK
DSAR	SURGE ABSORBER	NR61	VARISTOR	X62	R.V. COIL RELAY
F61	FUSE(2A)	RT61	DEFROST THERMISTOR	21S4	R.V. COIL
IC881	DC/DC CONVERTER	SR61	SOLID STATE RELAY	52C	COMPRESSOR CONTACTOR

NOTE: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;

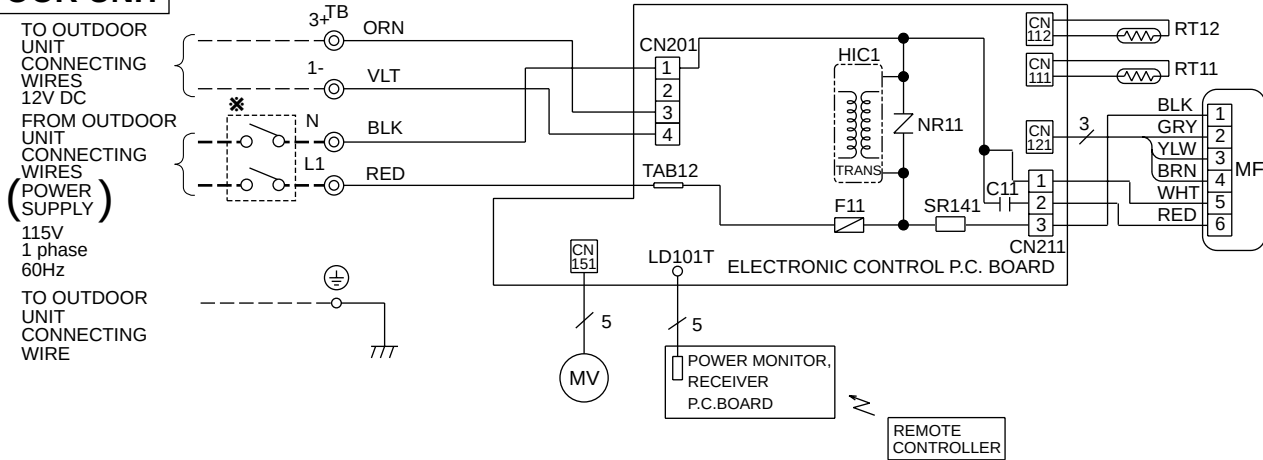
⊙: Terminal block, □□□□: Connector

VG79B007H01

MSH09TW - U1

MODEL WIRING DIAGRAM

INDOOR UNIT



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C11	INDOOR FAN CAPACITOR	MV	VANE MOTOR	SR141	SOLID STATE RELAY
F11	FUSE(3A)	NR11	VARISTOR	TB	TERMINAL BLOCK
HIC1	DC/DC CONVERTER	RT11	ROOM TEMPERATURE THERMISTOR		
MF	INDOOR FAN MOTOR(INNER FUSE)	RT12	INDOOR COIL THERMISTOR		

NOTE:1. About the outdoor side electric wiring, refer to the outdoor unit electric wiring diagram for servicing.

SG79J023H01

2. Use copper conductors only. (For field wiring)

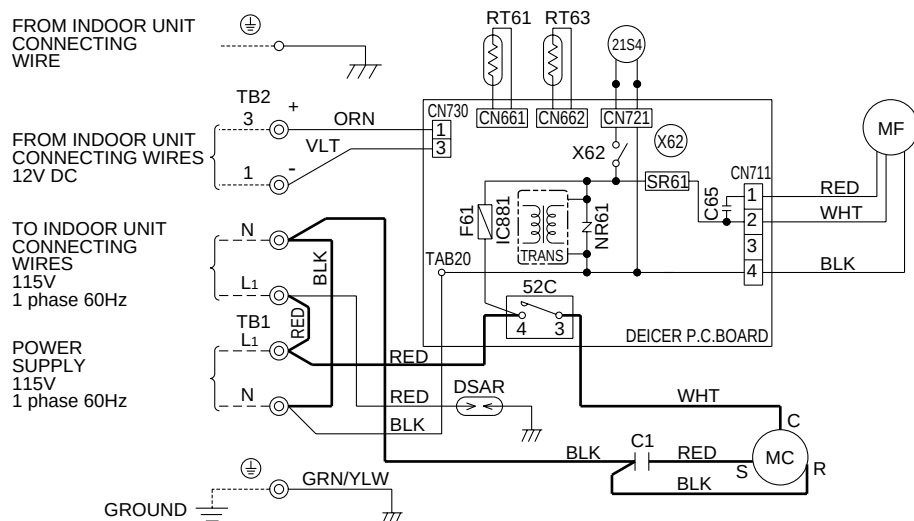
3. Symbols below indicate;

⊙: Terminal block, □□□□: Connector

MUH09TW - U1

MODEL WIRING DIAGRAM

OUTDOOR UNIT



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MF	OUTDOOR FAN MOTOR(INNER PROTECTOR)	X62	R.V. COIL RELAY
C65	OUTDOOR FAN CAPACITOR	NR61	VARISTOR	21S4	R.V. COIL
DSAR	SURGE ABSORBER	RT61	DEFROST THERMISTOR	52C	COMPRESSOR CONTACTOR
F61	FUSE(2A)	RT63	AMBIENT TEMPERATURE THERMISTOR		
IC881	DC/DC CONVERTER	SR61	SOLID STATE RELAY		
MC	COMPRESSOR(INNER PROTECTOR)	TB1,TB2	TERMINAL BLOCK		

NOTE:1. About the indoor side electric wiring, refer to the indoor unit electric wiring diagram for servicing.

VG79B041H01

2. Use copper conductors only. (For field wiring)

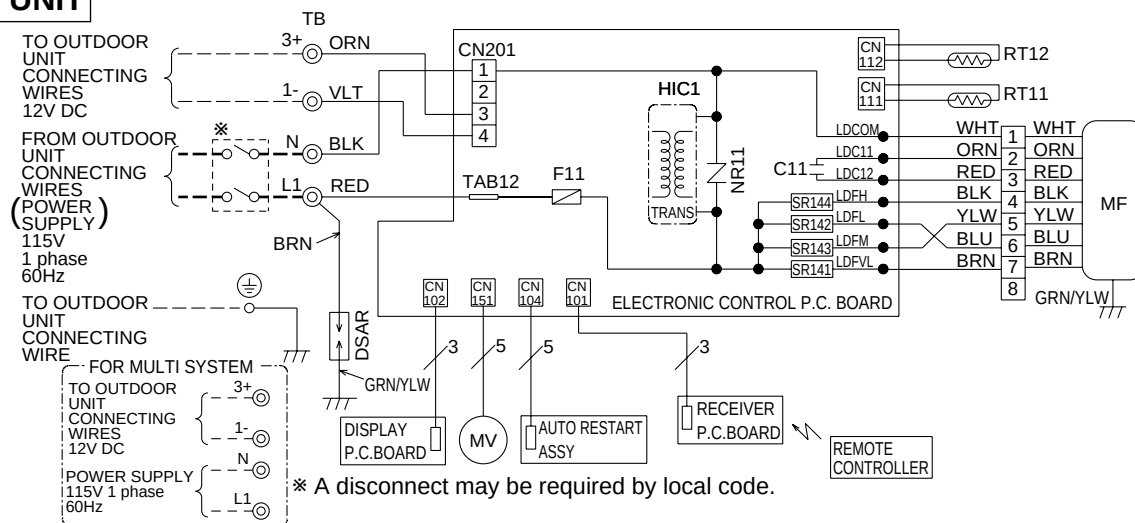
3. Symbols below indicate;

⊙: Terminal block, □□□□: Connector

MSH12TN MSH15TN MSH17TN

MODELS WIRING DIAGRAM

INDOOR UNIT



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C11	INDOOR FAN CAPACITOR	MF	INDOOR FAN MOTOR(INNER FUSE)	RT12	INDOOR COIL THERMISTOR
DSAR	SURGE ABSORBER	MV	VANE MOTOR	SR141-SR144	SOLID STATE RELAY
F11	FUSE(3A)	NR11	VARISTOR	TB	TERMINAL BLOCK
HIC1	DC/DC CONVERTER	RT11	ROOM TEMPERATURE THERMISTOR		

NOTE:1. About the outdoor side electric wiring, refer to the outdoor unit electric wiring diagram for servicing.

VG79B016H01

2. Use copper conductors only. (For field wiring)

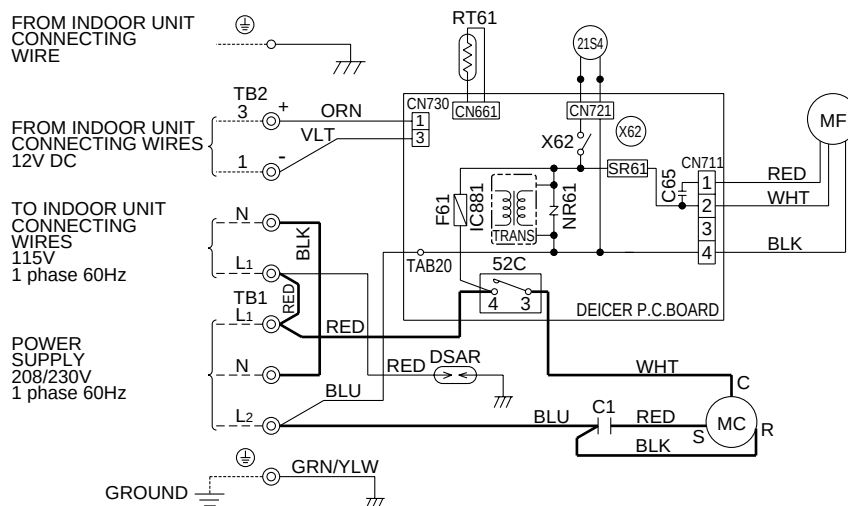
3. Symbols below indicate;

⊙: Terminal block, □□□□: Connector

MUH12TN

MODEL WIRING DIAGRAM

OUTDOOR UNIT



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MC	COMPRESSOR(INNER PROTECTOR)	TB1	TERMINAL BLOCK
C65	OUTDOOR FAN CAPACITOR	MF	OUTDOOR FAN MOTOR(INNER PROTECTOR)	TB2	TERMINAL BLOCK
DSAR	SURGE ABSORBER	NR61	VARISTOR	X62	R.V. COIL RELAY
F61	FUSE(2A)	RT61	DEFROST THERMISTOR	21S4	R.V. COIL
IC881	DC/DC CONVERTER	SR61	SOLID STATE RELAY	52C	COMPRESSOR CONTACTOR

NOTE:1. About the indoor side electric wiring, refer to the indoor unit electric wiring diagram for servicing.

VG79B008H01

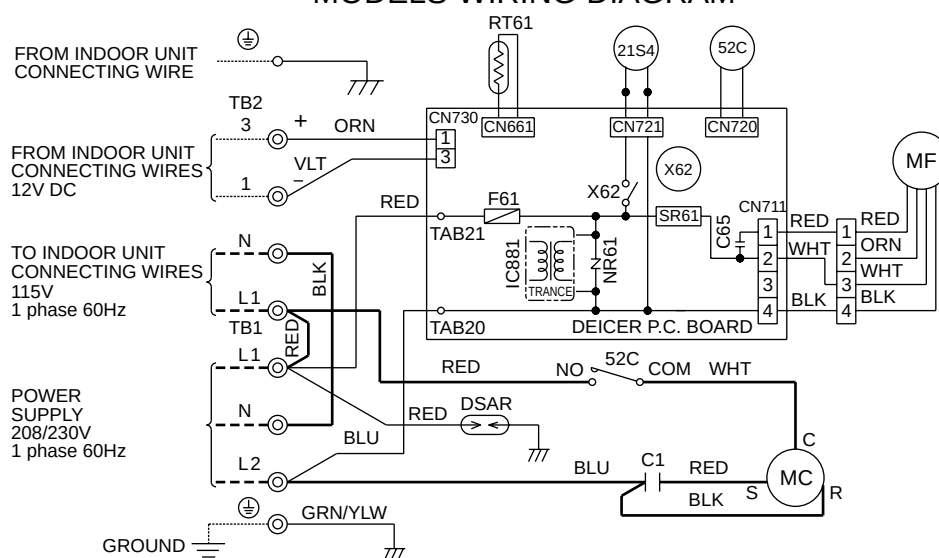
2. Use copper conductors only. (For field wiring)

3. Symbols below indicate;

⊙: Terminal block, □□□□: Connector

MODELS WIRING DIAGRAM

OUTDOOR UNIT



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MC	COMPRESSOR(INNER PROTECTOR)	TB1	TERMINAL BLOCK
C65	OUTDOOR FAN CAPACITOR	MF	OUTDOOR FAN MOTOR(INNER PROTECTOR)	TB2	TERMINAL BLOCK
DSAR	SURGE ABSORBER	NR61	VARISTOR	X62	R.V. COIL RELAY
F61	FUSE(2A)	RT61	DEFROST THERMISTOR	21S4	R.V. COIL
IC881	DC/DC CONVERTER	SR61	SOLID STATE RELAY	52C	COMPRESSOR CONTACTOR

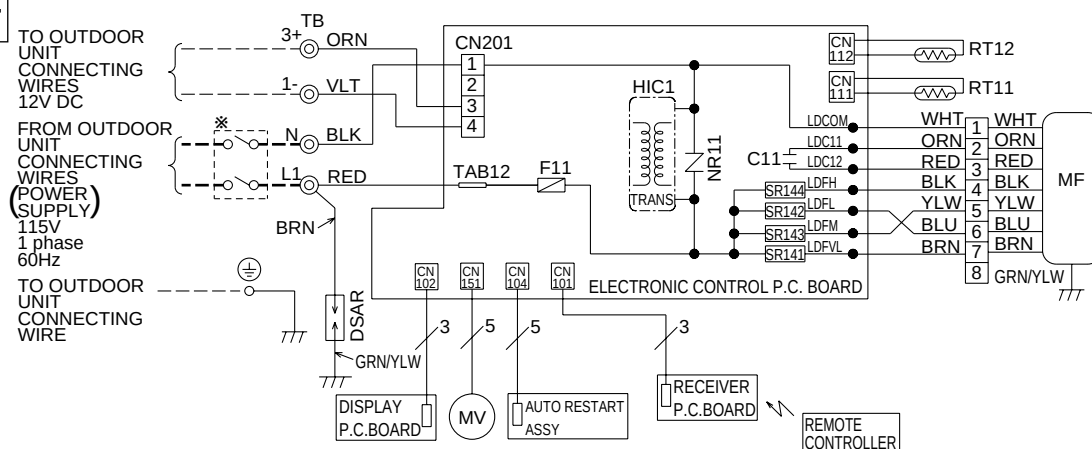
NOTE:1. About the indoor side electric wiring, refer to the indoor unit electric wiring diagram for servicing.

SG79J000H01

2. Use copper conductors only. (For field wiring)
3. Symbols below indicate;
⊙: Terminal block, □□□□: Connector

MSH12TN - MSH15TN - MSH17TN - MODELS WIRING DIAGRAM

INDOOR UNIT



* A disconnect may be required by local code.

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C11	INDOOR FAN CAPACITOR	MF	INDOOR FAN MOTOR(INNER FUSE)	RT12	INDOOR COIL THERMISTOR
DSAR	SURGE ABSORVER	MV	VANE MOTOR	SR141~SR144	SOLID STATE RELAY
F11	FUSE(3A)	NR11	VARISTOR	TB	TERMINAL BLOCK
HIC1	DC/DC CONVERTER	RT11	ROOM TEMPERATURE THERMISTOR		

NOTE:1. About the outdoor side electric wiring, refer to the outdoor unit electric wiring diagram for servicing.

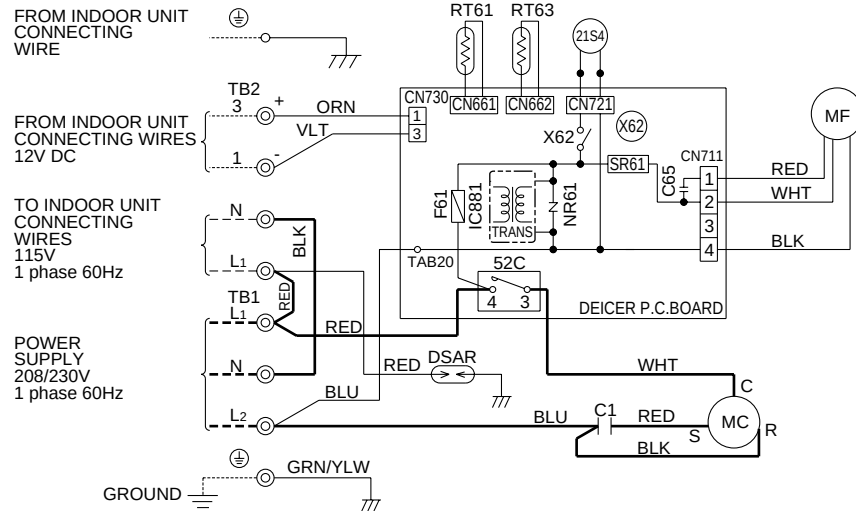
VG79B017H01

2. Use copper conductors only. (For field wiring)
3. Symbols below indicate;
⊙: Terminal block. □□□□: Connector

MUH12TN - U1

OUTDOOR UNIT

MODEL WIRING DIAGRAM



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MC	COMPRESSOR(INNER PROTECTOR)	SR61	SOLID STATE RELAY
C65	OUTDOOR FAN CAPACITOR	MF	OUTDOOR FAN MOTOR(INNER PROTECTOR)	TB1,TB2	TERMINAL BLOCK
DSAR	SURGE ABSORBER	NR61	VARISTOR	X62	R.V. COIL RELAY
F61	FUSE(2A)	RT61	DEFROST THERMISTOR	21S4	R.V. COIL
IC881	DC/DC CONVERTER	RT63	AMBIENT TEMPERATURE THERMISTOR	52C	COMPRESSOR CONTACTOR

NOTE:1. About the indoor side electric wiring, refer to the indoor unit electric wiring diagram for servicing.

VG79B042H01

2.Use copper conductors only. (For field wiring)

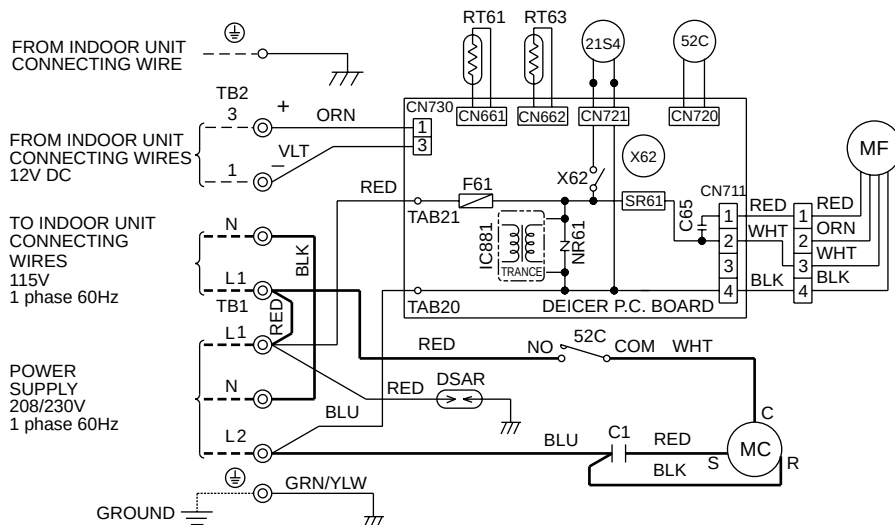
3. Symbols below indicate;

⊙: Terminal block, □□□□: Connector

MUH15TN - U1 MUH17TN - U1

OUTDOOR UNIT

MODELS WIRING DIAGRAM



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MF	OUTDOOR FAN MOTOR(INNER PROTECTOR)	TB2	TERMINAL BLOCK
C65	OUTDOOR FAN CAPACITOR	NR61	VARISTOR	X62	R.V. COIL RELAY
DSAR	SURGE ABSORBER	RT61	DEFROST THERMISTOR	21S4	R.V. COIL
F61	FUSE(2A)	RT63	AMBIENT TEMPERATURE THERMISTOR	52C	COMPRESSOR CONTACTOR
IC881	DC/DC CONVERTER	SR61	SOLID STATE RELAY		
MC	COMPRESSOR(INNER PROTECTOR)	TB1	TERMINAL BLOCK		

NOTE:1. About the indoor side electric wiring, refer to the indoor unit electric wiring diagram for servicing.

SG79J001H01

2.Use copper conductors only. (For field wiring)

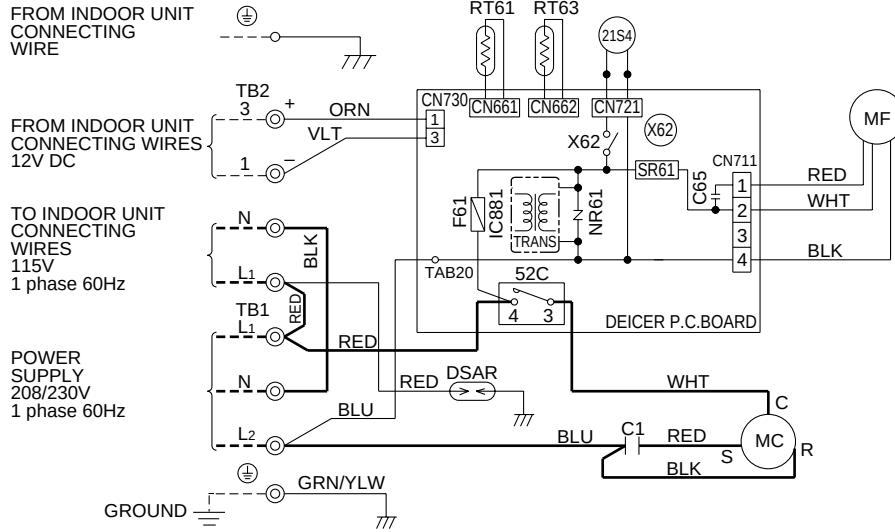
3. Symbols below indicate;

⊙: Terminal block, □□□□: Connector

MUH12TN - U2

OUTDOOR UNIT

MODEL WIRING DIAGRAM



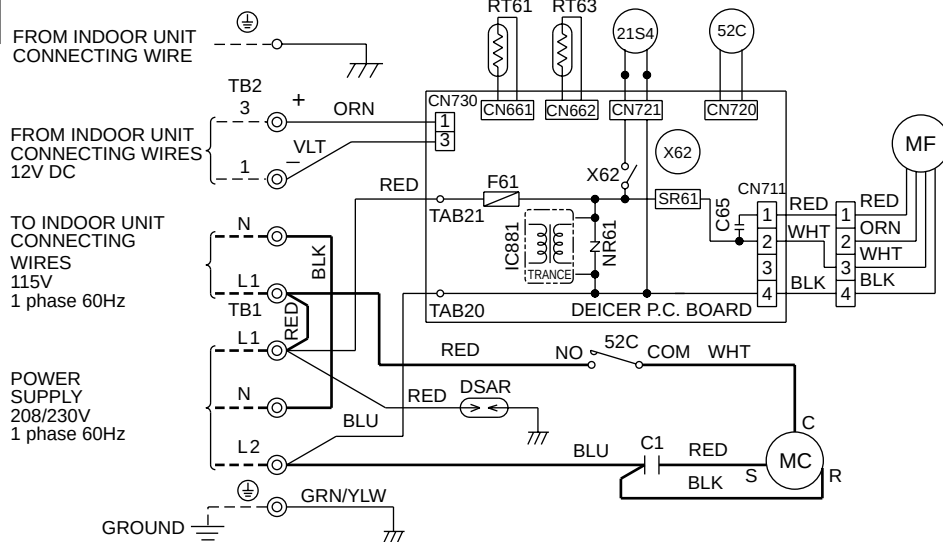
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MC	COMPRESSOR(INNER PROTECTOR)	SR61	SOLID STATE RELAY
C65	OUTDOOR FAN CAPACITOR	MF	OUTDOOR FAN MOTOR(INNER PROTECTOR)	TB1,TB2	TERMINAL BLOCK
DSAR	SURGE ABSORBER	NR61	VARISTOR	X62	R.V. COIL RELAY
F61	FUSE(2A)	RT61	DEFROST THERMISTOR	21S4	R.V. COIL
IC881	DC/DC CONVERTER	RT63	AMBIENT TEMPERATURE THERMISTOR	52C	COMPRESSOR CONTACTOR

VG79B543H01

MUH15TN - U2

OUTDOOR UNIT

MODEL WIRING DIAGRAM



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MF	OUTDOOR FAN MOTOR(INNER PROTECTOR)	TB2	TERMINAL BLOCK
C65	OUTDOOR FAN CAPACITOR	NR61	VARISTOR	X62	R.V. COIL RELAY
DSAR	SURGE ABSORBER	RT61	DEFROST THERMISTOR	21S4	R.V. COIL
F61	FUSE(2A)	RT63	AMBIENT TEMPERATURE THERMISTOR	52C	COMPRESSOR CONTACTOR
IC881	DC/DC CONVERTER	SR61	SOLID STATE RELAY		
MC	COMPRESSOR(INNER PROTECTOR)	TB1	TERMINAL BLOCK		

NOTE: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;

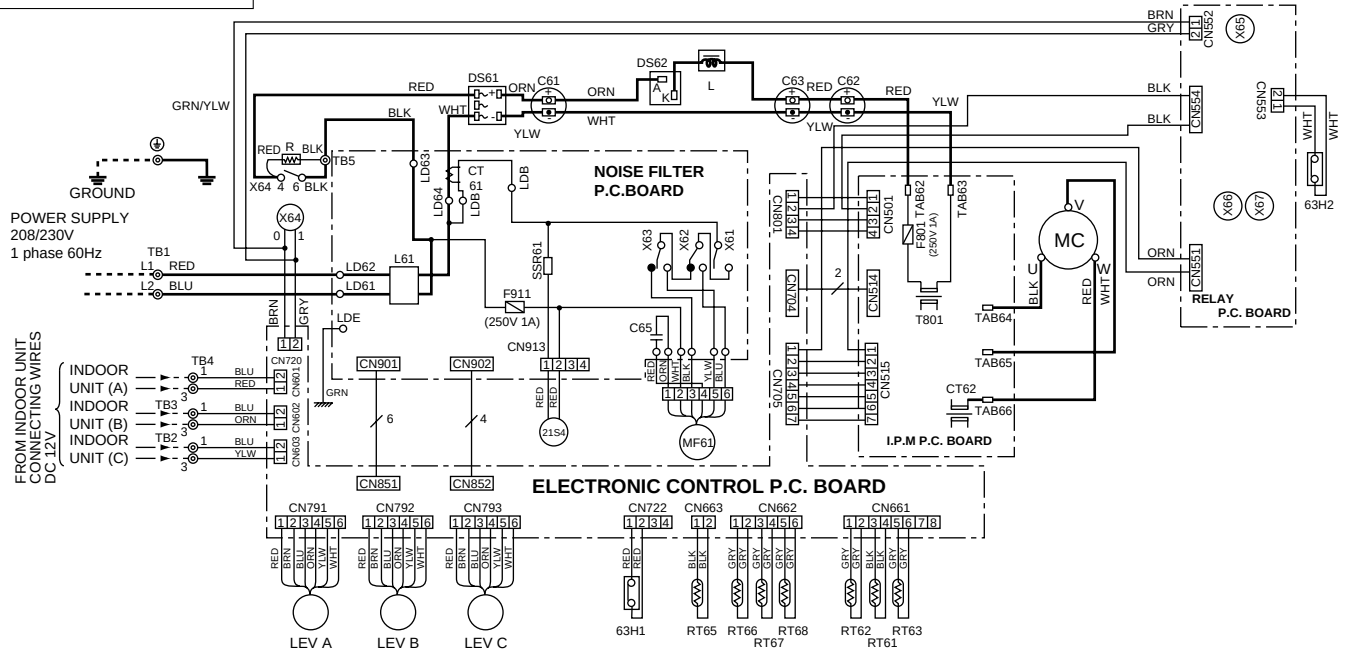
⊙: Terminal block, □□□: Connector

SG79B542H01

MXZ30TN

MODELS WIRING DIAGRAM

OUTDOOR UNIT



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C61	POWER FACTOR CAPACITOR	LEV A-C	EXPANSION VALVE	SSR61	SOLENOID COIL RELAY
C62,63	SMOOTHING CAPACITOR	MC	COMPRESSOR	T801	TRANSFORMER
C65	OUTDOOR FAN CAPACITOR	MF61	OUTDOOR FAN MOTOR (INNER FUSE)	TB1-5	TERMINAL BLOCK
CT61,62	CURRENT TRANSFORMER	R	RESISTOR	X61,62,63	FAN MOTOR RELAY
DS61	DIODE MODULE	RT61	DISCHARGE TEMPERATURE THERMISTOR	X66,67	RELAY
DS62	DIODE STACK	RT62	DEFROST TEMPERATURE THERMISTOR	21S4	R.V. COIL
F801	FUSE (250V 1A)	RT63	EVAPORATION TEMPERATURE THERMISTOR	63H1	HIGH PRESSURE SWITCH
F911	FUSE (250V 1A)	RT65	FIN TEMPERATURE THERMISTOR	63H2	HIGH PRESSURE SWITCH
L	REACTOR	RT66,67	GUS PIPE TEMPERATURE THERMISTOR		
L61	COMMON MODE CHOKE COIL	RT68	GUS PIPE TEMPERATURE THERMISTOR		

NOTE: 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.

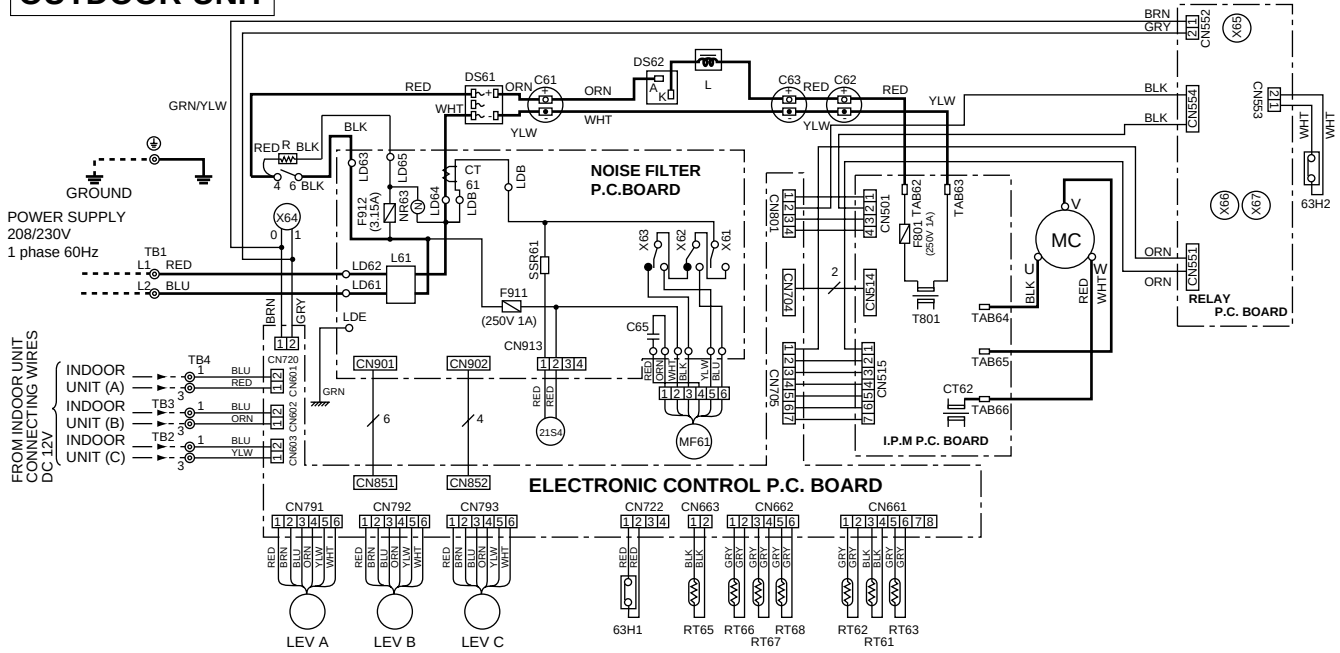
⊙: Terminal block □: Connector

SG79A481H02

MXZ30TN2

MODELS WIRING DIAGRAM

OUTDOOR UNIT



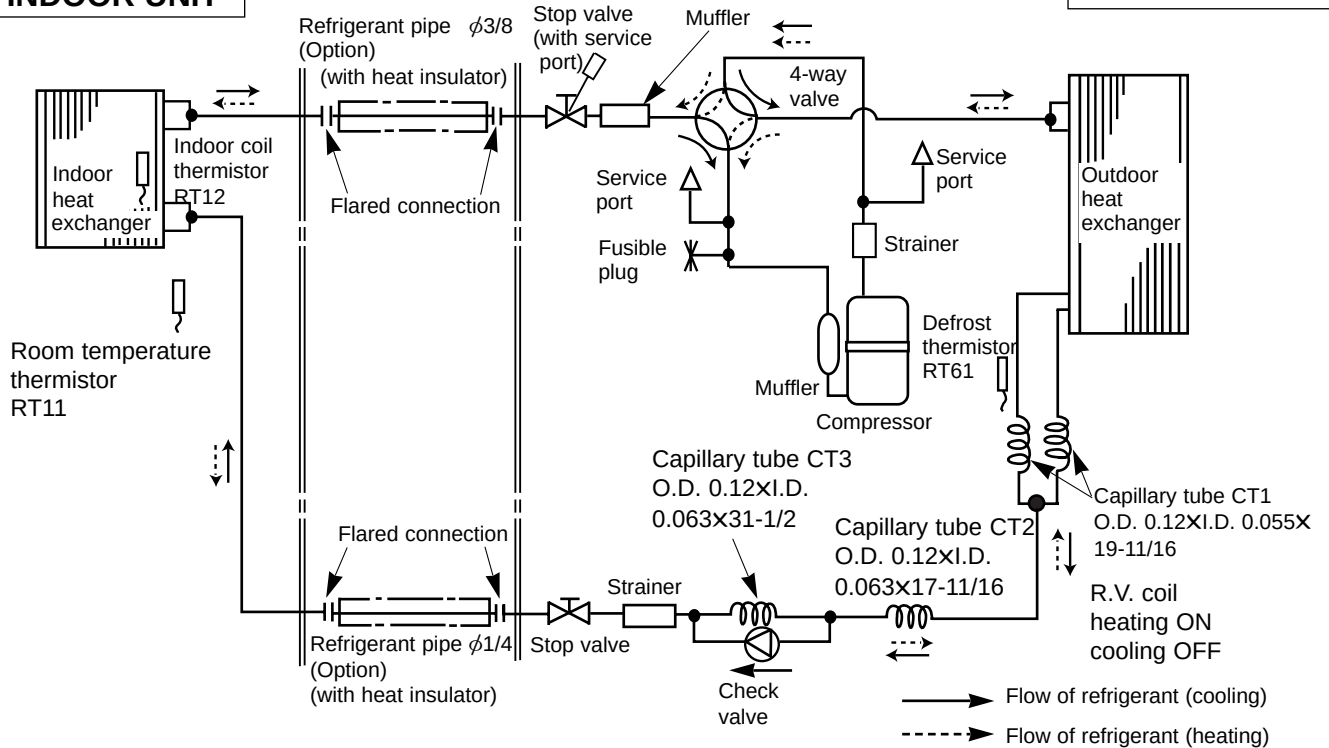
Unit:inch

MSH09TW MSH09TW - U1

MUH09TW MUH09TW - U1

INDOOR UNIT

OUTDOOR UNIT



Unit:inch

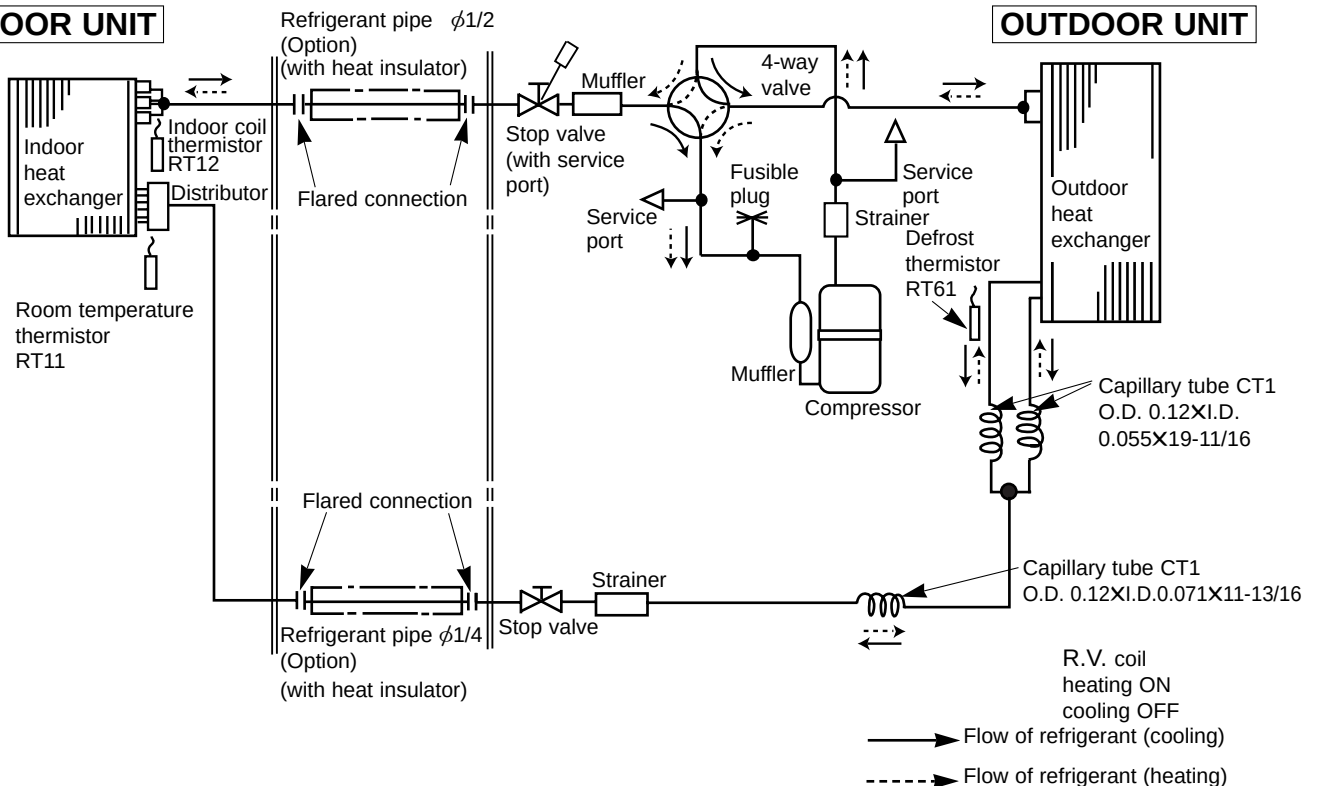
MSH12TN MSH12TN - U1

MUH12TN MUH12TN - U1

MUH12TN - U2

INDOOR UNIT

OUTDOOR UNIT



Unit:inch

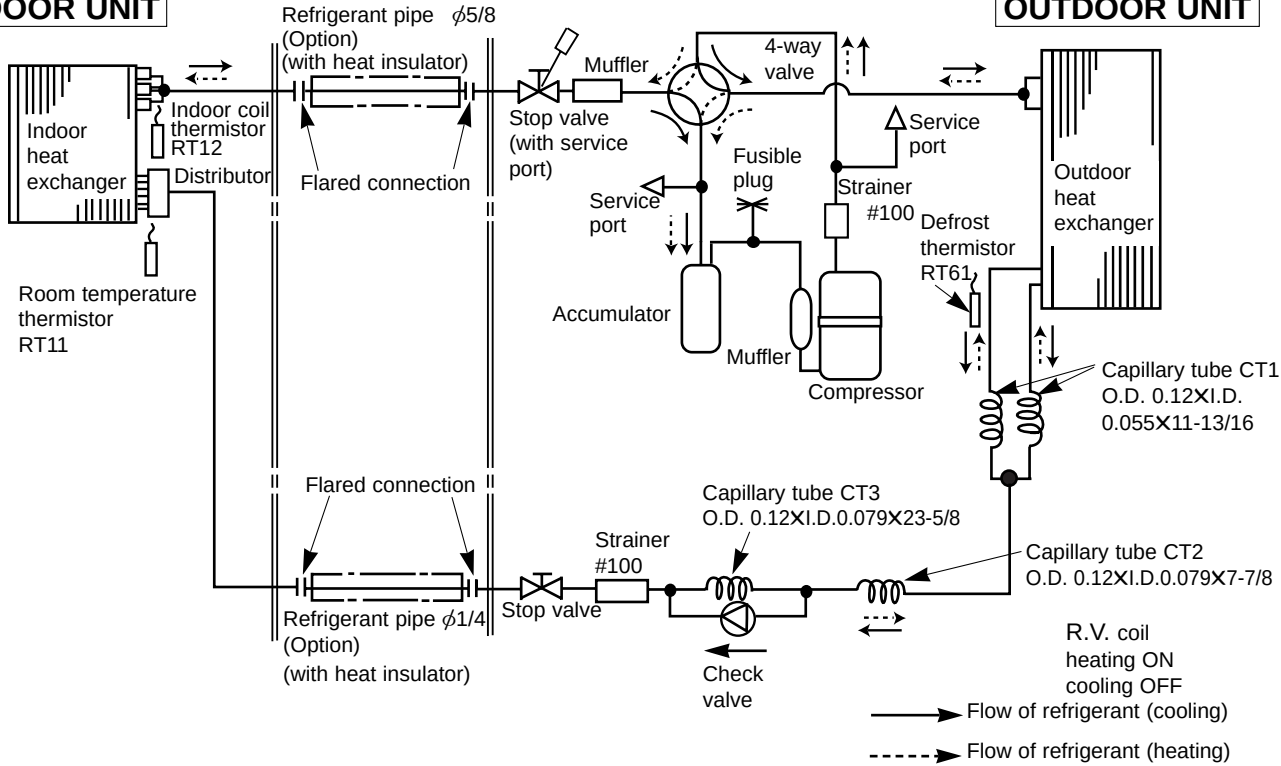
MSH15TN MSH15TN - U1

MUH15TN MUH15TN - U1

MUH15TN - U2

INDOOR UNIT

OUTDOOR UNIT



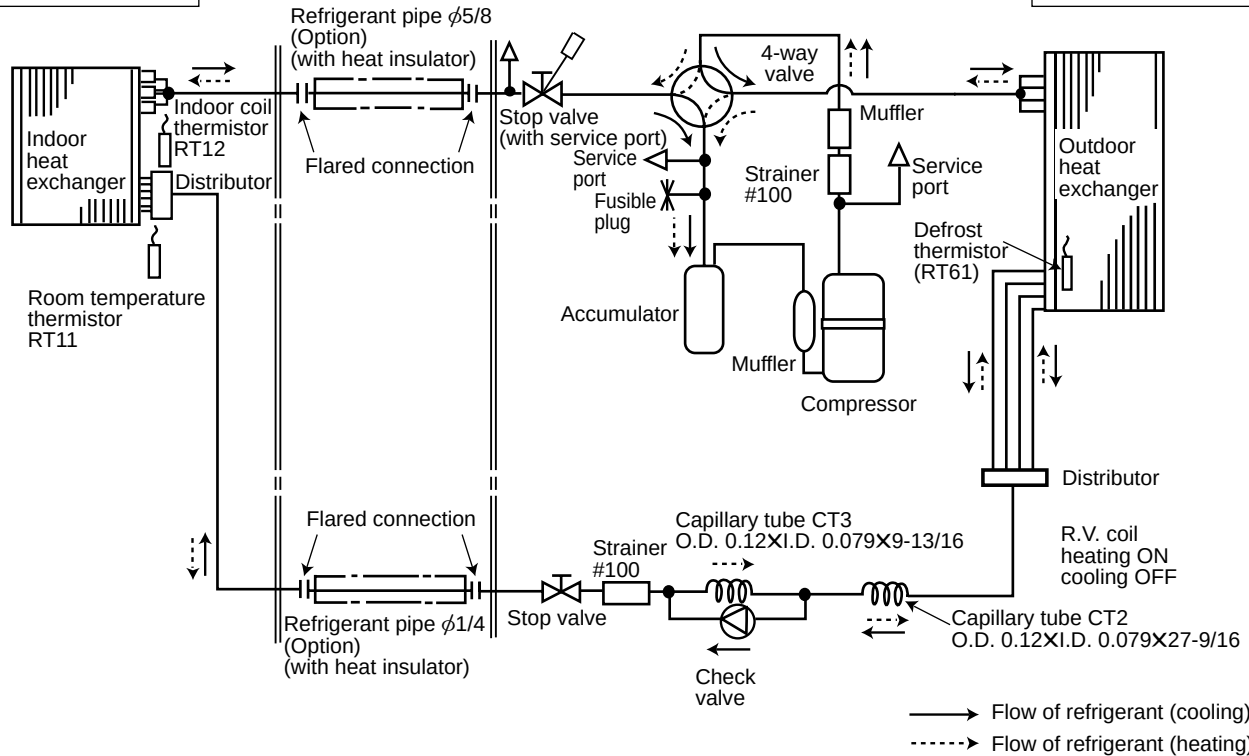
Unit:inch

MSH17TN MSH17TN - U1

MUH17TN MUH17TN - U1

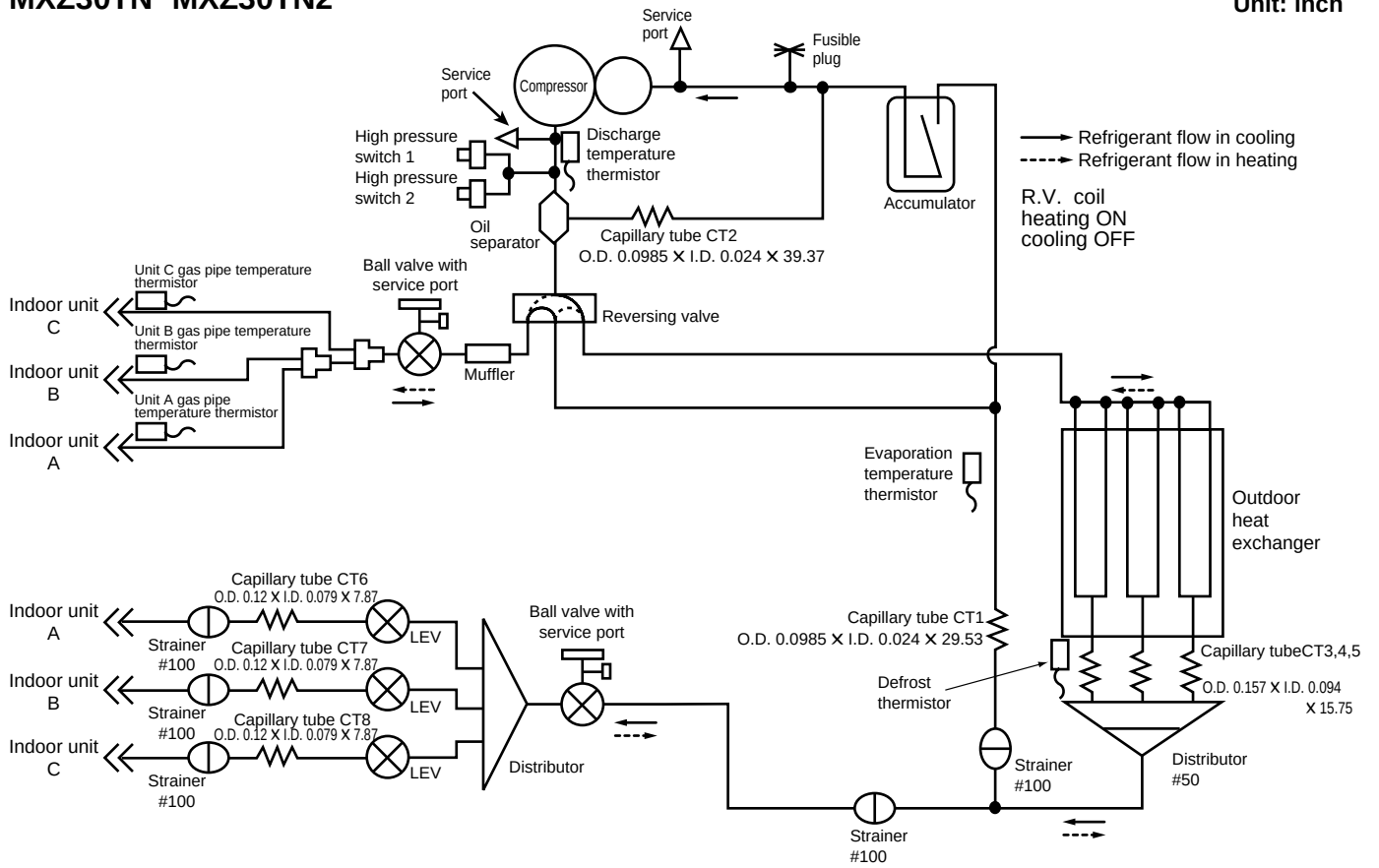
INDOOR UNIT

OUTDOOR UNIT



MXZ30TN MXZ30TN2

Unit: inch



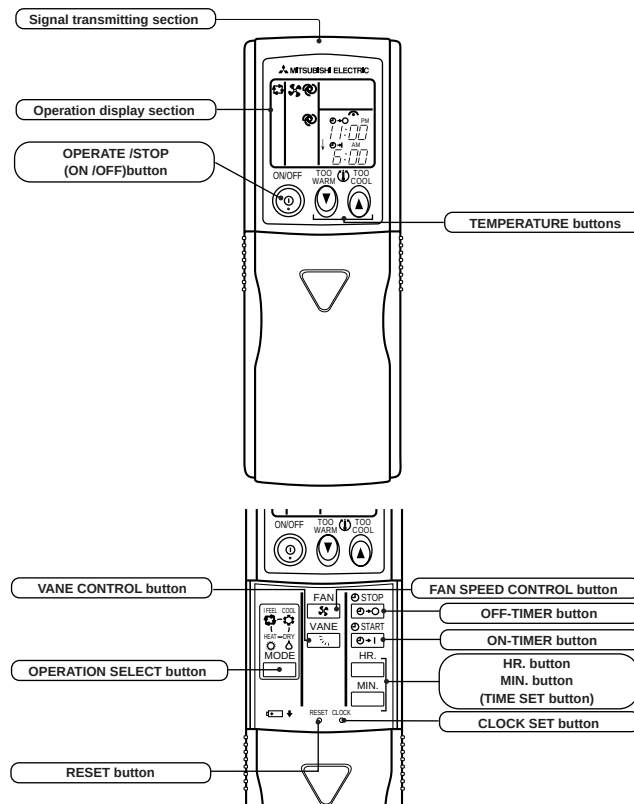
MSH09TW MSH09TW - U1 MUH09TW MUH09TW - U1 MXZ30TN
 MSH12TN MSH12TN - U1 MUH12TN MUH12TN - U1 MUH12TN - U2 MZX30TN2
 MSH15TN MSH15TN - U1 MUH15TN MUH15TN - U1 MUH15TN - U2
 MSH17TN MSH17TN - U1 MUH17TN MUH17TN - U1

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.

WIRELESS REMOTE CONTROLLER

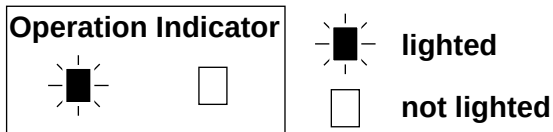


INDOOR UNIT DISPLAY SECTION

Operation Indicator lamp

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

- The following indication applies regardless of shape of the indicator.



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. 4 °F or more
	This shows that the room temperature is approaching the target temperature.	Approx. 4 °F or less

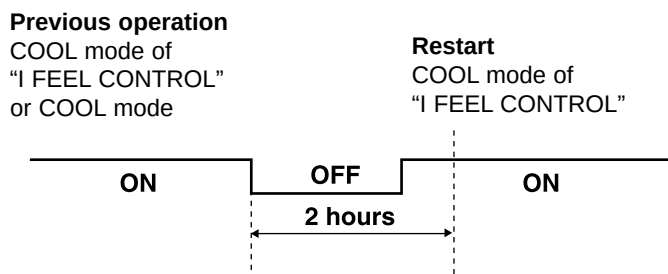
10-1. "I FEEL CONTROL" OPERATION

- (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) Press OPERATION SELECT button to set "I FEEL CONTROL". Then a beep tone is heard.
- (3) The operation mode is determined by the room temperature at start-up of the operation.

Initial room temperature	mode
77°F or more	COOL mode of "I FEEL CONTROL"
73°F to 77°F	DRY mode of "I FEEL CONTROL"
less than 73°F	HEAT mode of "I FEEL CONTROL"

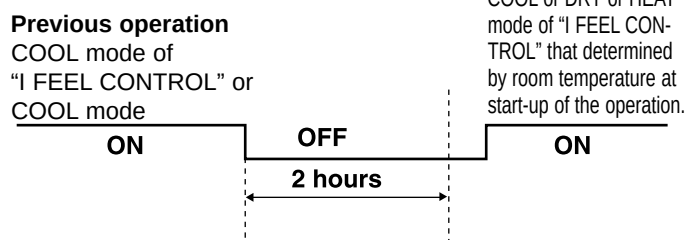
- Once the mode is fixed, the mode does not change by room temperature afterwards.
- Under the ON-TIMER (⊖ START) operation, mode is determined according to the room temperature as the operation starts.
- When the system is stopped with the OPERATE/STOP(ON/OFF) button on the remote controller, and restarted within 2 hours in "I FEEL CONTROL" mode, the system operates in previous mode automatically regardless of the room temperature.

Operation time chart 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.

Operation time chart Example



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

Mode	Initial room temperature	Initial set temperature	
COOL mode of “I FEEL CONTROL”	79°F or more	75°F	※ 1
	77°F to 79°F	Initial room temperature minus 4°F	
DRY mode of “I FEEL CONTROL”	73°F to 77°F	Initial room temperature minus 4°F	
HEAT mode of “I FEEL CONTROL”	less than 73°F	79°F	

- ※1 When the system is restarted with the remote controller, the system operates with the previous set temperature regardless of the 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 2~4 degrees(°F)



... To lower the set temperature 2~4 degrees(°F)

— 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.

	Initial temperature difference	Fan speed
Room temperature minus set temperature : 2 degrees or more		High
Room temperature minus set temperature : Between 1 and 2 degrees		Med.
Room temperature minus set temperature : less than 1 degrees		Low

Difference between room temperature and set temperature during operation

High: 4 deg. 7 deg.
Med.: 2 deg. 3 deg.
Low: 2 deg. 3 deg.

2. Coil frost prevention

① Temperature control

<MSH09> When the indoor coil thermistor RT12 reads 39°F or below for 5 minutes, the coil frost prevention mode starts.

<MSH12/15/17> When the indoor coil thermistor RT12 reads 37°F 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 the compressor stops for 5 minutes.

After that, if RT12 still reads below 39°F (MSH09) or below 37°F (MSH12/15/17) this mode is prolonged until the RT12 reads over 39°F (MSH09) or 37°F (MSH12/15/17).

② Time control

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

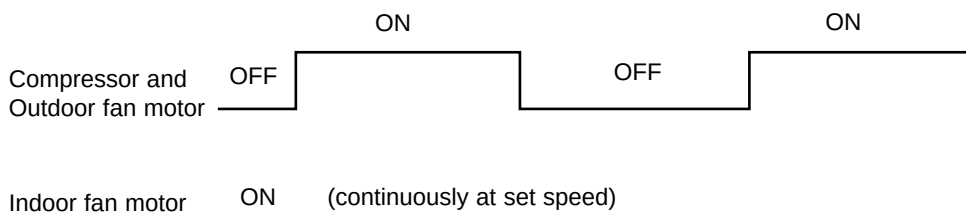
a. Compressor has been continuously operating.

b. Indoor fan speed is Low or Med..

c. Room temperature is below 79°F.

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 79°F. However, when two of the above conditions (b.and c.) are satisfied again. Time accumulation is resumed.



—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 temperature.

By such controls, amount of air flow of indoor unit will be reduced in order to lower humidity without much room temperature drop.

1. Indoor fan speed control

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

In AUTO fan operation, fan speed becomes Low.

2. The operation of the compressor and indoor/ outdoor fan (Refer to page 65 for MXZ30TN)

Compressor operates by room temperature control and time control.

Set temperature is controlled to fall 4°F as initial set temperature.

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

- When the room temperature is 73°F 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.

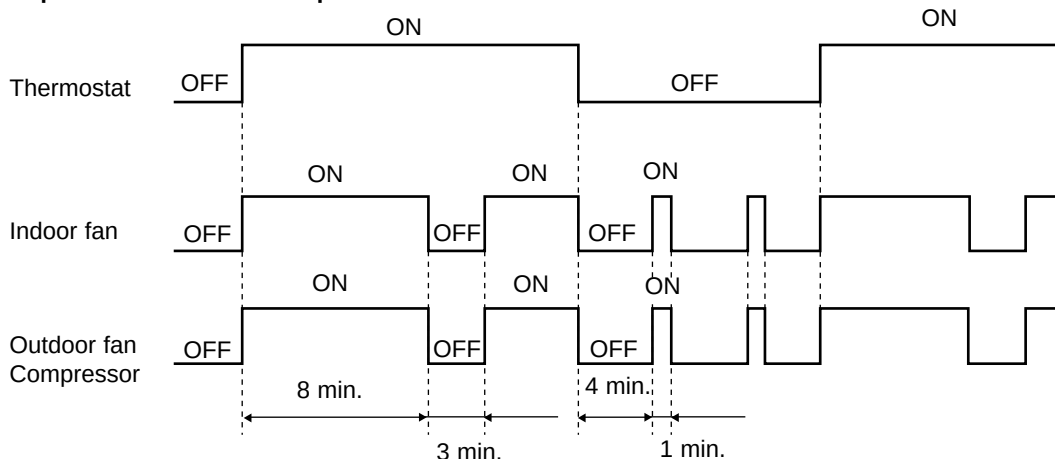
- When the room temperature is under 73°F.

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: When the room temperature is 73°F or over



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, the speed becomes Low.

— 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	4 deg. 7 deg.
Set temperature minus room temperature: Between 1 and 2 degrees	Med.	2 deg. 3 deg.
Set temperature minus room temperature: less than 1 degree	Low	

(2) Cold air prevention control

<MSH09>

① When the compressor is not operating,

(I) if the temperature of indoor coil thermistor RT12 is 64°F or less, the indoor fan stops.

(II) if the temperature of indoor coil thermistor RT12 is more than 64°F, the indoor fan operates at Very Low.

② When the compressor is operating,

(I) if the temperature of RT12 is 72°F or more, the indoor fan operates at set speed.

(II) if the temperature of RT12 is less than 72°F and

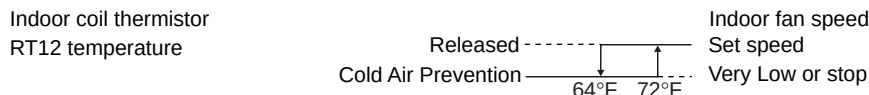
(i) if the temperature of room temperature thermistor RT11 is 59°F or less, the indoor fan stops.

(ii) if the temperature of room temperature thermistor RT11 is more than 59°F, the indoor fan operates at Very Low.

<MSH12/15/17>

When the compressor is operating,

- (I) if the temperature of indoor coil thermistor RT12 is less than 64°F or, the indoor fan operates at Very Low.
But if the temperature of room temperature thermistor RT11 is 59°F or less, the fan stops.
- (II) if the temperature of indoor coil thermistor RT12 is more than 72°F, the indoor fan operates at set speed.



NOTE : If the temperature of RT12 reads from 64°F to 72°F at the air conditioner starting and also after defrosting, this control works.

(3) Warm air control.

When any condition of ①(a. ~ d.) and the condition of ② as follows are satisfied at the same time, warm air control works.

- ① a.) when the operation mode has been changed to HEAT mode
b.) when cold air prevention has been released
c.) when defrosting has been finished
d.) when the compressor starts in HEAT mode
- ② When the temperature of indoor coil thermistor RT12 is less than 99°F.

When warm air control works, the indoor fan speed changes as follows to blow out warm air gradually.

Gradation of indoor fan speed in initial

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

The upper limit of the indoor fan speed in MANUAL is the set speed.

The upper limit of the indoor fan speed in AUTO is the speed decided by indoor fan speed control.

When the temperature of RT12 has been 99°F or more, or when the set speed has been changed, this control is released and the indoor fan speed is the set speed.

(4) Flow soft control

When the thermostat (compressor) is off, the indoor fan operates as follows.

	< RT12 >	< Indoor fan speed >	NOTE : When the thermostat(compressor) turns on, the indoor fan operates at set speed. But until cold air prevention and warm air control is released, the indoor fan follows them.
<MSH09>	less than 64°F	off	
	64°F or more	Very Low	
<MSH12/15/17>	—	Very Low	

2. High pressure protection (Refer to page 70 for MXZ30TN MXZ30TN2)

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

Outdoor fan OFF : 126°F (MSH09), 122°F (MSH12/15/17)

Outdoor fan ON : 118°F (MSH09), 115°F (MSH12/15/17)

High pressure protection time chart

Example

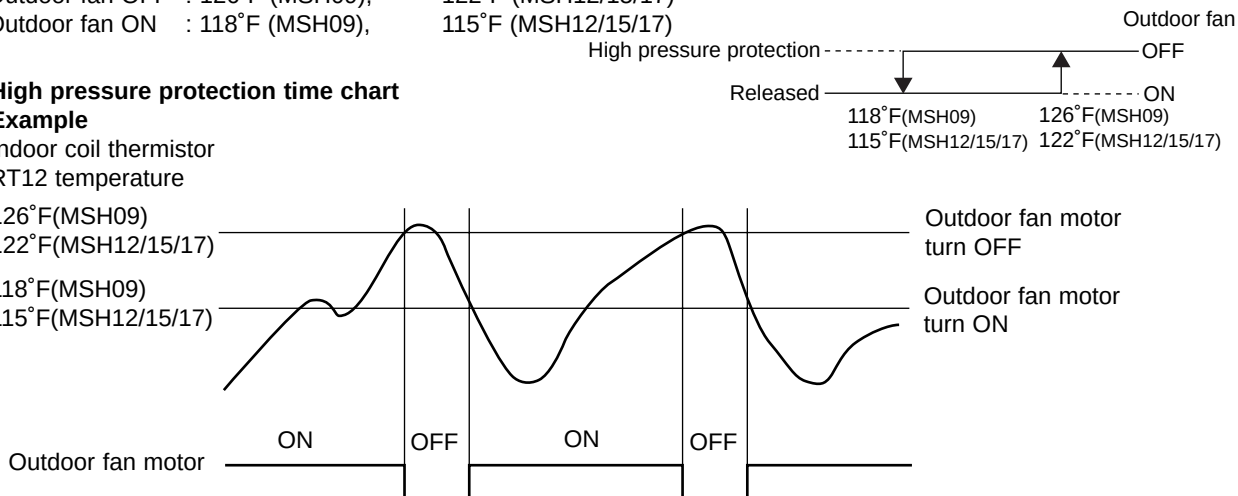
Indoor coil thermistor
RT12 temperature

126°F(MSH09)

122°F(MSH12/15/17)

118°F(MSH09)

115°F(MSH12/15/17)



NOTE: During high pressure protection and for 4 minutes and 15 seconds after high pressure protection, defrosting of outdoor heat exchanger is not detected by the defrost thermistor RT61.

3. Defrosting (Refer to page 70 for MXZ30TN MXZ30TN2)

Defrosting of outdoor heat exchanger is controlled by deicer P.C. board, which 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 (MSH09TW, MSH12/15/17TN) / 15 minutes (MSH09TW -[U1], MSH12/15/17TN-[U1], MSH12/15TN-[U2]) without the defrosting operation working.

b) The defrost thermistor RT61 reads 27°F or less (MSH09TW, MSH12/15/17TN) / 32°F or less (MSH09TW -[U1], MSH12/15/17TN-[U1], MSH12/15TN-[U2]).

c) After releasing the high pressure protection 4 minutes and 15 seconds 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 38°F or more (MSH09TW, MSH12/15/17TN) / 50°F or more (MSH09TW -[U1], MSH12/15/17TN-[U1], MSH12/15TN-[U2]).

e) The defrosting time exceeds 10 minutes.

(3) Defrosting time chart

Defrost thermistor RT61

50°F or more

(MSH09TW -[U1], MSH12/15/17TN-[U1],
MSH12/15TN-[U2])

38°F or more

(MSH09TW, MSH12/15/17TN)

32°F or less

(MSH09TW -[U1], MSH12/15/17TN-[U1],
MSH12/15TN-[U2])

27°F or less

(MSH09TW, MSH12/15/17TN)

Outdoor 52C
contactor(Compressor)

ON
OFF

X62
(R.V. coil)

ON
OFF

SR61
Outdoor fan

ON
OFF

Defrost
counter

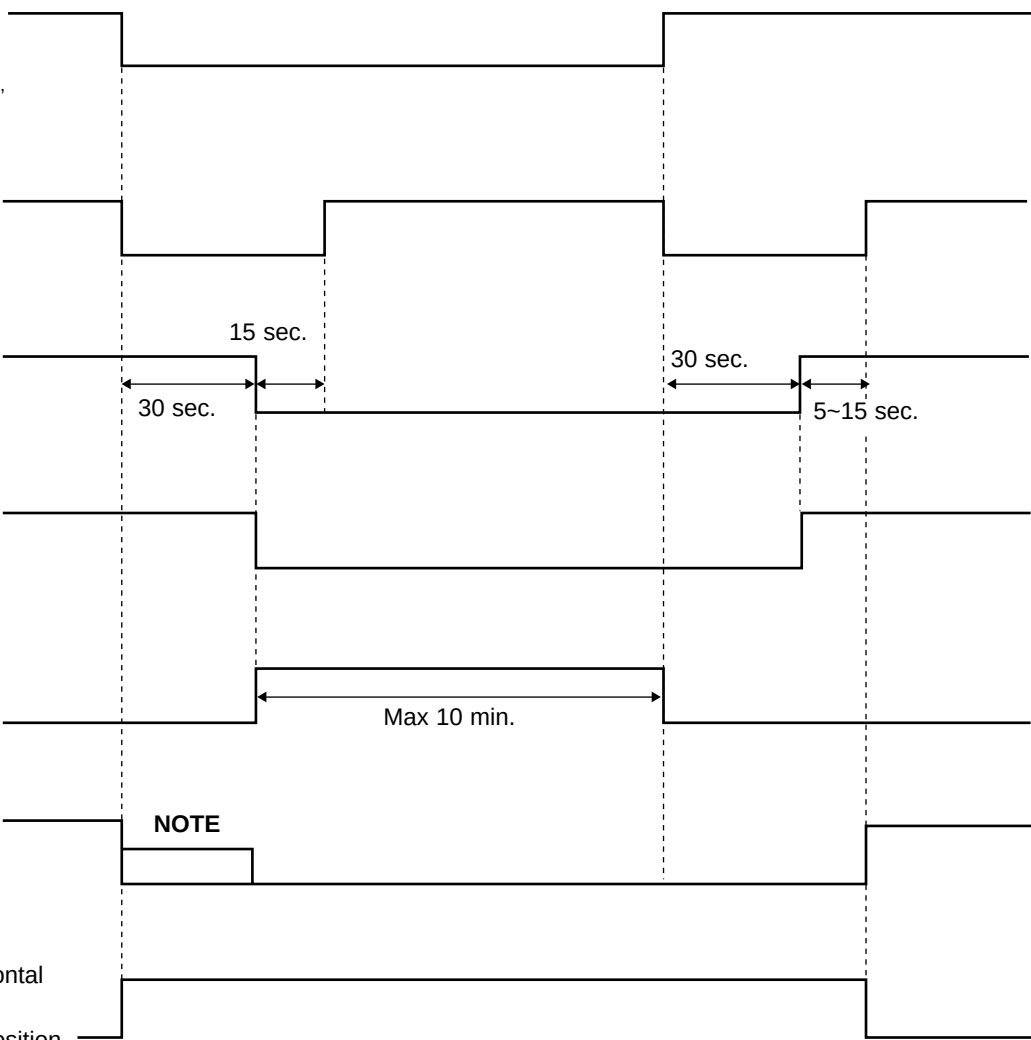
ON
OFF

Indoor fan

ON
OFF

Indoor vane

Horizontal
Set position



NOTE: ● When the indoor coil thermistor RT12 reads above 64°F, indoor fan operates at Very Low for 30 seconds since RT61 has read the working temperature of defrosting.

● When the indoor coil thermistor RT12 reads 64°F or less, the indoor fan stops.

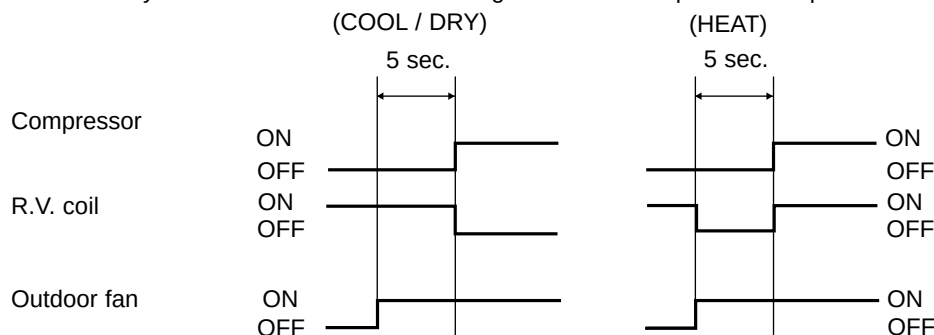
4. R.V. coil control

Heating ON

Cooling OFF

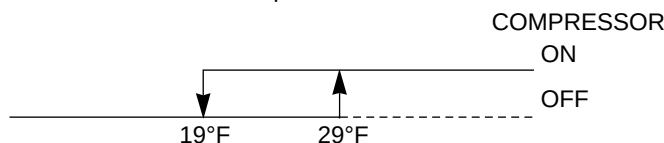
Dry OFF

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



5. Outdoor temperature control <MSH09TW -[U1], MSH12/15/17TN-[U1], MSH12/15TN-[U2]>

When the temperature of the ambient temperature thermistor RT63 falls below 19°F, the compressor stops for protecting the unit.



NOTE: If the temperature of RT63 reads from 19°F to 29°F at the air conditioner starting, compressor operates.

10-2. COOL OPERATION

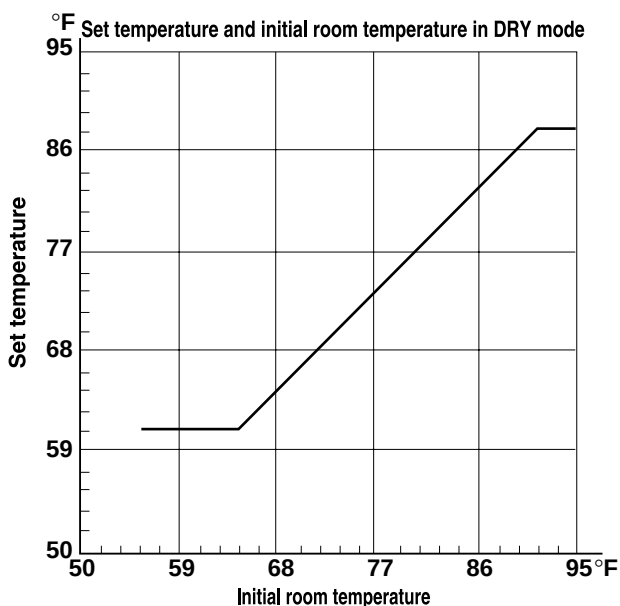
- (1) Press OPERATE/STOP(ON/OFF) button.
OPERATION INDICATOR lamp of the indoor unit turns on with a beep tone.
- (2) Select COOL mode with the OPERATION SELECT button.
- (3) Press the TEMPERATURE buttons.
(TOO WARM or TOO COOL button) to select the desired temperature.
The setting range is 59 ~ 89°F
* 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".

10-3. 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 55°F or below.

10-4. HEAT OPERATION

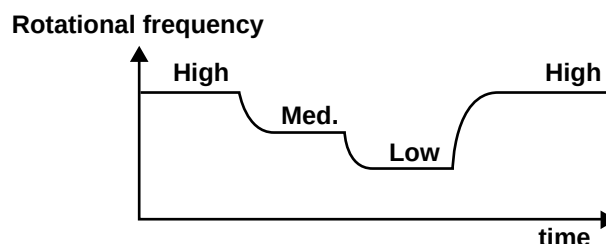
- (1) Press OPERATE/STOP(ON/OFF) button.
OPERATION INDICATOR lamp of the indoor unit turns on with a beep tone.
- (2) Select HEAT mode with the OPERATION SELECT button.
- (3) Press TEMPERATURE buttons (TOO WARM or TOO COOL button) to select the desired temperature.
The setting range is 59 ~ 89°F.
- (4) Indoor fan speed control, high pressure protection, defrosting, 4-way valve control are the same as HEAT mode of "I FEEL CONTROL".



10-5. FAN MOTOR CONTROL<MSH09>

(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 SR141 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

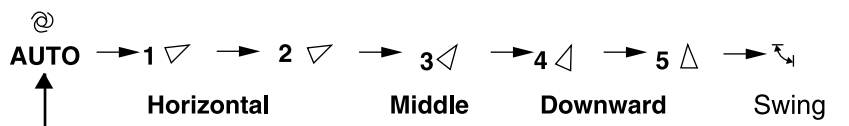
When the rotational frequency feedback signal has not output for 12 seconds, (or when the microprocessor cannot detect the signal for 12 seconds) the fan motor is regarded locked-up. Then the electric current to the fan motor is shut off. 3 minutes later, the electric current is applied to the fan motor again. During the fan motor lock-up, the OPERATION INDICATOR lamp flashes on and off to show the fan motor abnormality. (Refer to page 72.)

10-6. 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.

(a) When the OPERATE/STOP(ON/OFF) button is pressed. (POWER ON/OFF)

(b) When the vane control is changed AUTO to MANUAL.

(c) When the SWING is finished.

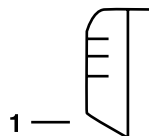
(d) When the test run starts.

(e) When the power supply turns ON.

(4) VANE AUTO mode

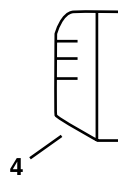
In VANE AUTO mode, the microprocessor automatically determines the vane angle and operation to make the optimum room-temperature distribution.

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 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 in standby.

(6) Dew prevention

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

(7) SWING MODE

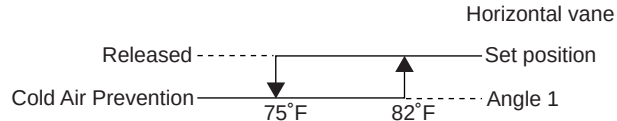
By selecting SWING mode with the VANE CONTROL button, the horizontal vane swings vertically. The remote controller displays “↕”.

(8) Cold air prevention in HEAT operation.

When any of the following conditions occurs in HEAT operation, the horizontal 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 75°F or below.
- ④ Indoor coil thermistor RT12 temperature is raising from 75°F or below, but it does not exceed 82°F.

Indoor coil thermistor RT12 temperature



NOTE : If the temperature of RT12 reads from 75°F to 82 °F at the air conditioner starting, this control works.

10-7. 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 TIMER MONITOR, so set the current time correctly with CLOCK SET button.

(3) Press ON/OFF TIMER buttons 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 (TIME SET 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.

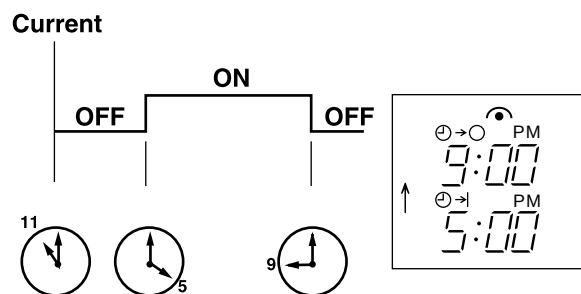
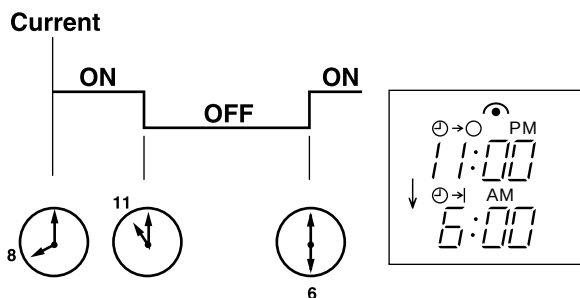
- “↑” and “↓” display shows the order of the OFF timer and ON timer operation.

(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.

10-8. 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 75°F.

The fan speed shifts to Med. speed.

The coil frost prevention works even in emergency operation, and defrosting cycle as well.

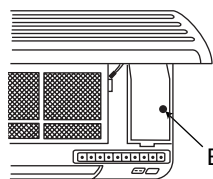
In the test run or emergency operation, the horizontal vane operates in VANE AUTO (@) mode.

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.

- The following indication applies regardless of shape of the indicator.

MSH09TW MSH09TW - U1

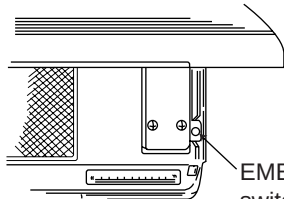


EMERGENCY OPERATION
switch

MSH12TN MSH12TN - U1

MSH15TN MSH15TN - U1

MSH17TN MSH17TN - U1



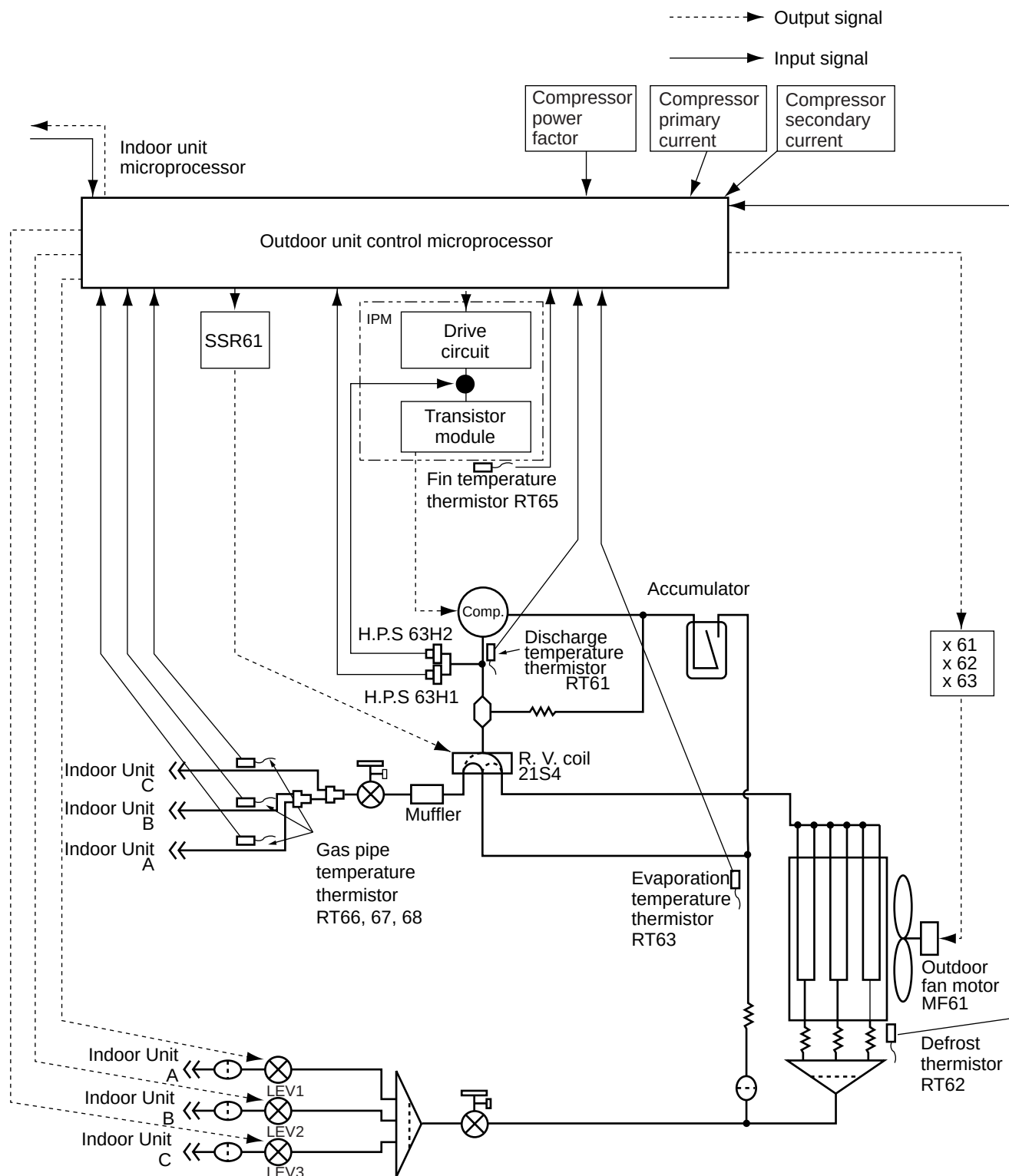
EMERGENCY OPERATION
switch

OPERATION INDICATOR lamp

Press once <Cool>		☐
Press again <Heat>	☐	
Press once again <Stop>	☐	☐

10-9. INVERTER MULTI SYSTEM CONTROL

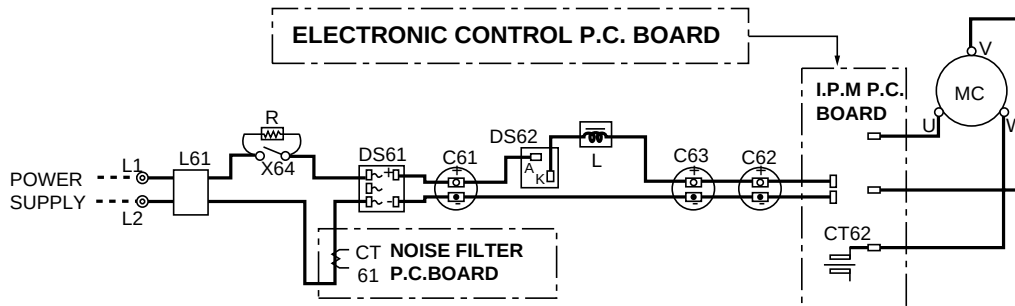
MXZ30TN MXZ30TN2



10-10. INVERTER MAIN POWER SUPPLY CIRCUIT

MXZ30TN MXZ30TN2

10-10-1. Outline drawing of main power supply circuit



10-10-2. Outline of main power supply circuit

1. At the start of operation

Rush current is generated the instant the electricity is turned on to the main power supply circuit to operate the compressor.

To prevent the rush current from running into the main power supply circuit, R(Current-limiting resistor) absorbs the rush current.

After the rush current is absorbed, X64(Relay) is ON and the circuit to R is short-circuited, then the electricity to R is bypassed.

When X64 is ON, the system starts the operation of compressor.

2. At normal operation

The noise of alternating current of power supply is eliminated by L61(Common mode choke coil).

Then DS61(Diode stack) performs full-wave rectification of alternating current and the alternating current is converted to direct current.

C62, C63(Smoothing capacitor) stabilizes the power supply converted to direct current from alternating current and supplies it to IPM(Intelligent power module).

Direct current rectified by DS61 is converted to three-phase alternating current by IPM.

Microcomputer installed in the electronic control P.C. board controls frequency and voltage of three-phase alternating current converted by IPM.

Three-phase alternating current is supplied from IPM to the compressor with frequency and voltage decided by microcomputer based on various kinds of information.

CT61,CT62(Current transformer) measures the current of main power supply circuit.

3. Power factor improvement of power supply

Unlike inverter-less alternating current circuit, the power factor of this inverter circuit is improved by extending the period of the current running in the circuit.

C63 is used in this circuit to supply stable direct current voltage. However, in case only SMOOTHING CAPACITOR is used for stable supply of direct current, the power factor of power supply is lowered because the period of direct current running in the circuit is short.

Therefore, for improvement of power factor, the circuit also uses C61(Power factor capacitor), L61(Reactor) and DS62(Diode stack) to prepare the direct current circuit to extend the period of the current running in the circuit.

4. Elimination of electrical noise

Noise filter circuit is formed by L61, and the condenser installed on the noise filter P.C. board. It eliminates the electrical noise (both common mode and normal mode noise) of alternating current power supply supplied to main power supply circuit.

Noise filter circuit also absorbs electrical noise that is generated in the inverter circuit and prevents it from reaching outside of the unit.

5. IPM

Six power transistors that outputs the direct current waveform as three-phase alternating current waveform, the driving circuit which operates the power transistors, and the overcurrent detecting circuit which protects the power transistors are built into the IPM. It can simplify and miniaturize the control circuit.

10-10-3. Function of main parts

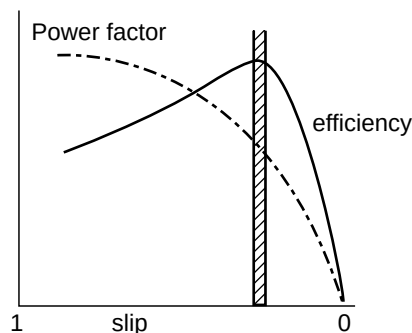
SYMBOL	NAME	FUNCTION
C61	POWER FACTOR CAPACITOR	It improves the power factor of power supply.
C62, C63	SMOOTHING CAPACITOR	It stabilizes the direct current voltage.
CT61, CT62	CURRENT TRANSFORMER	It measures the current of main power supply circuit.
DS61	DIODE STACK	It converts the alternating current voltage to direct current voltage.
DS62	DIODE STACK	It is combined with L61 to improve the power factor of power supply.
IPM	INTELLIGENT POWER MODULE	It generates three-phase alternating current and operates compressor.
L	REACTOR	It is combined with DS62 to improve the power factor of power supply.
L61	COMMON MODE CHOKE COIL	It eliminates and absorbs the electrical noise.
R	CURRENT-LIMITING RESISTOR	It absorbs the rush current so not to run into the main power supply circuit when the electricity is turned on.
X64	RELAY	It short-circuits the circuit to current-limiting resistor when the compressor operates.

10-11. Optimal voltage control

The purpose of optimal voltage control is to operate the compressor at optimal voltage that meets the load detected by the power factor of the compressor.

1. Optimal

As shown on the right the efficiency (ratio of output against input) of the motor in the compressor becomes optimal when the sliding (ratio of difference between the actual number of rotation and the number of synchronous rotation of motor) is one fixed value. The value of sliding can be calculated from the power factor since the sliding and the power factor are mutually related as shown in the table on the right. To make the value of sliding so that the efficiency of motor is optimal, the power factor of the compressor is detected. Then the detected power factor is controlled so that its efficiency can be high. As a result, it is possible to operate the compressor at optimal voltage.



2. How to determine the optimal voltage

Compare the detected power factor with the target power factor so that the efficiency of motor is optimal, the voltage correction value is changed and the optimal output voltage is determined.

Optimal output voltage[V]= Standard voltage at certain frequency [V]x voltage correction value(%)

Target power factor minus detected power factor (Calculated value is supposed to be "A".)	Calculation of voltage correction value (%)
$A \leq -2\%$	Previous voltage correction value minus 1
$-2\% < A < +2\%$	Same as previous voltage correction value
$A \geq +2\%$	Previous voltage correction value plus 1

10-12. 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 units stop and some operate.	COOL : 5 pulse (full closed) HEAT : 59 pulse (slightly opened)
Thermostat OFF in COOL or DRY mode	When the outdoor unit operates (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 units 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 10-10 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 units 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 is operating: Upper limit 500, Lower limit 59

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.

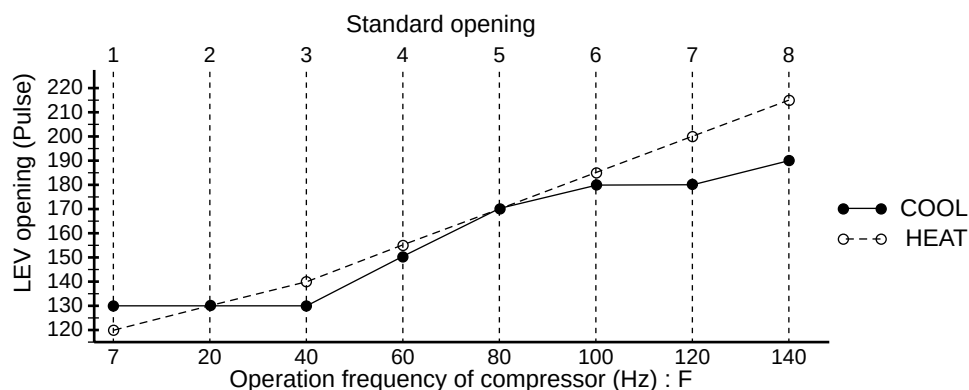
- Add opening provided in Difference in Capacity in the table below to the standard opening from 1 to 8, when capacity of the indoor unit is excluding code 1.
- Add opening provided in Difference in Operation number in the table below to determined LEV opening for each indoor unit, when 2 or 3 indoor 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 units ON: 18 class

$(170-150) \div (80-60) \times (70-60) + 150 + 75 - 30 = 205$ pulse



	Standard opening (pulse)								Difference in capacity			Difference in operation number		
	1	2	3	4	5	6	7	8	Code2	Code3	Code4	2	3	4
COOL	130	130	130	150	170	180	180	190	25	50	75	-30	-40	-50
HEAT	120	130	140	155	170	185	200	215	15	30	45	-10	-40	-50

Capacity code	2	3	4
Indoor unit	09	12	15/17

<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)			
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 Discharge temperature.

(1) Simultaneous correction of LEV openings by suction super heat (COOL, DRY)

(Correction is performed only for operating unit.)

(Suction super heat) = (Minimum gas pipe temperature) - (Evaporation temperature)

Correct the LEV openings simultaneously as the table below

Suction superheat (S.H.)	LEV opening correction (pulse)
more than 53.6	6
50 to 53.6	4
46.4 to 50	3
42.8 to 46.4	2
42.8 or less	0

(2) Separate correction (COOL, DRY)

(Correction is performed only for operating unit.)

(When 2 or more units are operating.)

Correction by the separate super heat.

Correct the LEV separately by the difference between gas pipe temperature and minimum gas pipe temperature.

① Calculate super heat using the expression below.

(Super heat) = (Each gas pipe temperature) - (Minimum gas pipe temperature)

② Separate correction is performed according to each super heat in the table below.

Difference of superheat	LEV opening correction (pulse)
more than 48.2	8
42.8 to 48.2	6
37.4 to 42.8	2
37.4 or less	0

(3) LEV opening correction by discharge temperature

When LEV correction output is 0 pulse by the suction super heat at COOL, DRY or HEAT operation, 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	Triple	Single	Double	Triple
Minimum ~ 20	123.8	140.0	143.6	131.0	120.2	118.4
21 ~ 30	134.6	147.2	150.8	136.4	125.6	123.8
31 ~ 40	149.0	154.4	163.4	145.4	131.0	129.2
41 ~ 55	152.6	161.6	174.2	158.0	136.4	134.6
56 ~ 70	158.0	170.6	186.8	176.0	145.4	143.6
71 ~ 90	161.6	181.4	194.0	185.0	156.2	154.4
91 ~ maximum	165.2	183.2	194.0	185.0	165.2	163.4

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

Discharge temperature (°F)	LEV correction opening (pulse)	
	COOL	HEAT
more than Target discharge temperature+19.8	10	7
Target discharge temperature+19.8 to Target discharge temperature+14.4	4	6
Target discharge temperature+14.4 to Target discharge temperature+9	2	3
Target discharge temperature+9 to Target discharge temperature+3.6	1	2
Target discharge temperature+3.6 to Target discharge temperature-3.6	0	0
Target discharge temperature-3.6 to Target discharge temperature-9	-1	-1
Target discharge temperature-9 to Target discharge temperature-14.4	-2	-1
Target discharge temperature-14.4 to Target discharge temperature-19.8	-5	-3
Target discharge temperature-19.8 or less	-8	-7

10-13. Operational frequency range

Number of operating unit	capacity code	COOL (Hz)			DRY (Hz)	HEAT (Hz)			
		Min.	Max.	Rated		Min.	Max.	Defrost	Rated
1	2	18	52	33	25	18	70	70	49
	3		68	46			80	80	65
	4		85	73			86	86	80
2	4	20	105	80	40	22	90	100	88
	5		110	90			110	100	100
	6								
3	7	30	120	104	58	26	120	100	98
	8								
	9								

Note

• Limit the maximum frequency by means of fan speed

When all the indoor units in their operation are running in the same operation mode and when their fan speed is set to "Low," the maximum frequency is limited to 6/7 the rated frequency in the mode.

• Limit the maximum frequency by means of operation mode

When some indoor units are operating in cool mode while others are in dry mode, the maximum frequency, which has the highest frequency of all the operation mode, is limited as the table below:

DRY	COOL	Maximum frequency
1	1	8/10 of maximum frequency
1	2	9/10 of maximum frequency
2	1	7/10 of maximum frequency

10-14. Heat defrosting control

(1) Conditions to enter defrosting mode

- ①. When temperature of defrosting thermistor is 26.6°F 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 46.4°F or more.
 - ②. When it has spent 10 minutes for defrosting.
- Defrosting finishes at condition of ① or ②.

10-15. High pressure protection

(1) High pressure protection control on heat mode

Temperature of the main pipe temp. thermistor in the indoor unit controls the operation frequency.

When temperature of the main pipe temp. thermistor is approx. 120.0°F, the operation frequency is set at the current level.

When temperature of the main pipe temp. thermistor is approx. 125.6°F the protection control decreases the frequency at the speed of 3Hz a minutes.

When temperature of the main pipe temp. thermistor is approx. 134.6°F the protection decreases the frequency at the speed of 4Hz a minute and changes the outdoor fan to Low.

Note: Temperature of the pipe temp. thermistor is different depending on the indoor unit.

Temperature of the pipe temp. thermistor is 113°F or less, the protection control is Released.

(2) High pressure protection control by high pressure switch (H.P.S 63H1)

High-pressure switch controls the operation frequency and outdoor fan motor.

<Control status>

When high-pressure switch is ON.

(When discharge pipe pressure is 398.8 PSIG or more.)

<Control details>

(a) When cooling or drying

The protection control decreases the compressor frequency at the speed of 10Hz a minute.

(The compressor operates continuously in min. frequency according to a command to decrease more than the min. level.)

(b) When heating

The protection control decreases the compressor frequency at the speed of 10Hz a minute.

The protection control changes the outdoor fan to Low.

<Release status>

When high-pressure switch is OFF. (When discharge pipe pressure is 340.8 PSIG or more.)
Or, the compressor stops.

10-16. 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 240.8°F, the control stops the compressor.

When temperature of the discharge temp. thermistor is 212°F or less, the controls starts the compressor.

(2) Compressor operation frequency

When temperature of the discharge temp. thermistor is expected to be higher than 240.8°F, the control decreases 12Hz from the current frequency.

When temperature of the discharge temp. thermistor is expected to be higher than 231.8°F and less than 240.8°F, the control decreases 6Hz from the current frequency.

When temperature of the discharge temp. thermistor is expected to be higher than 219.2°F and less than 231.8°F, the control is set at the current frequency.

10-17. Refrigerant recovery control on heating

<Control status>

The control performs when the all following status are satisfied;

- When there is 1 unit or more not operating indoor unit on heat operation. (Excluding thermo OFF)
- When discharge temperature becomes 224.6°F 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>

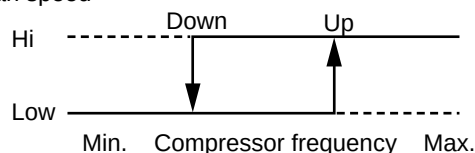
The control finishes either as follows. However, the LEV opening is considered to be 59 pulse.

- When it passed 60 seconds since the control has started.
- When the discharge temperature is 194°F or less.

10-18. Outdoor fan control

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

Fan speed



<Relation between compressor frequency and fan speed.>

Mode	Fan speed	Indoor unit operation		
		Single	Double	Triple
COOL	Up	55 Hz	50Hz	50 Hz
	Down	45 Hz	45 Hz	45 Hz
HEAT	Up	60 Hz	45 Hz	40 Hz
	Down	50 Hz	40 Hz	35 Hz

Note

- When operation, fan speed of High/ Low mode changes to Very High/ High 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 Very High 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 134.6°F or more on HEAT operation, fan speed is fixed to Low notch .
Or, the indoor coil thermistor is 113°F or less on HEAT operation, fan speed is back to normal.

10-19. Relation between main sensor and actuator

Relation between main sensor and actuator.

Sensor	Purpose	Actuator			
		Compressor	LEV	Outdoor fan motor	4-way valve
Discharge temperature thermistor	Protection	☐	☐		
Indoor pipe temperature thermistor	Defrosting Protection	☐	☐	☐	
Defrost thermistor	Defrosting	☐	☐		☐
Evaporation temperature thermistor	Control		☐		
Gas pipe temperature thermistor	Control		☐		
High pressure switch	Protection	☐		☐	
Fin temperature thermistor	Protection	☐		☐	
Capacity code	Control	☐	☐	☐	

11 SERVICE FUNCTIONS

MSH09TW MSH09TW - U1 MUH09TW MUH09TW - U1 MUH12TN - U2 MXZ30TN
MSH12TN MSH12TN - U1 MUH12TN MUH12TN - U1 MUH15TN - U2 MXZ30TN2
MSH15TN MSH15TN - U1 MUH15TN MUH15TN - U1
MSH17TN MSH17TN - U1 MUH17TN MUH17TN - U1

11-1. COMPULSORY DEFROSTING MODE FOR SERVICE

By short circuit of the connector JP607 and R853 on the outdoor deicer P.C. board, defrosting mode can be accomplished regardless of the defrost interval restriction. (Refer to page 96.)

Defrost thermistor RT61 must read below 27°F(MSH09TW,MSH12/15/17TN)/ 32°F(MSH09TW-U1 ,MSH12/15/17TN-U1). (Refer to page 73.)

11-2. CHANGE IN DEFROST SETTING *MXZ30TN and MXZ30TN2 is not equipped with this function.

<MSH09TW, MSH12/15/17TN>

<JPC> When the JPC wire of the deicer P.C. board is cut, the defrost interval time is changed.

<JPE> When the JPE wire of the deicer P.C. board is cut, the defrost temperature is changed. (Refer to page 96.)

Model	Jumper wire	Change point
MUH09TW MUH12TN	JPC	Defrost interval time changes from 40 minutes to 15minutes.
MUH15TN MUH17TN	JPE	Defrost start temperature changes from 27°F to 32°F. Defrost finish temperature changes from 38°F to 50°F.

<MUH09TW-[U1], MUH12/15/17TN-[U1], MUH12/15TN-[U2]>

<JPC> When the JPC wire of the deicer P.C. board is soldered, the defrost interval time is changed.

<JPE> When the JPE wire of the deicer P.C. board is soldered, the defrost temperature is changed. (Refer to page 96.)

Model	Jumper wire	Change point
MUH09TW -[U1] MUH12TN -[U2] MUH12TN -[U1] MUH15TN -[U2]	JPC	Defrost interval time changes from 15 minutes to 40 minutes.
MUH15TN -[U1] MUH17TN -[U1]	JPE	Defrost start temperature changes from 32°F to 27°F. Defrost finish temperature changes from 50°F to 38°F.

11-3. 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. (Refer to page 94 or 95.)

Set time : 1 minute → 1-second

Set time : 3 minutes → 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.)

11-4. P.C. BOARD MODIFICATION FOR INDIVIDUAL OPERATION

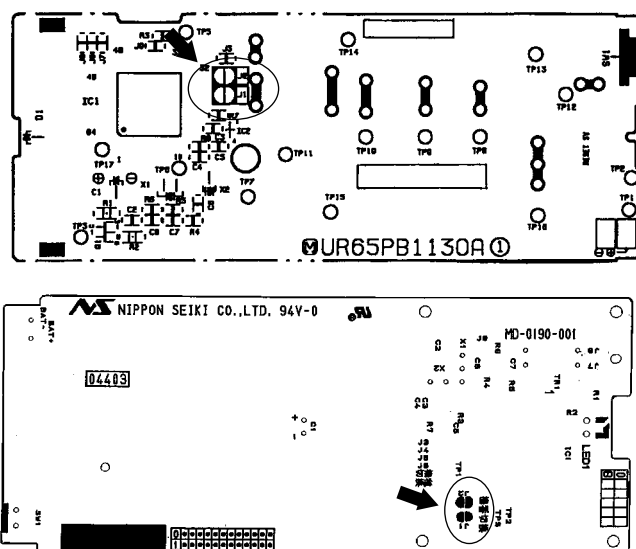
A maximum of 4 indoor units with wireless remote controllers can be used in a room.

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 indoor unit number.

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 press the OPERATE/STOP(ON/OFF)button twice or 3 times at first. After finish remodelling, put back the batteries then press 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 1. After modification, press 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

How to set the remote controller exclusively for particular indoor unit

After you turn the breaker ON, the first remote controller that sends the signal to the indoor unit will be regarded as the remote controller for the indoor unit.

The indoor unit will only accept the signal from the remote controller that has been assigned to the indoor unit once they are set. The setting will be cancelled if the breaker has turned off, or the power supply has shut down.

Please conduct the above setting once again after the power has restored.

11-5. AUTO RESTART FUNCTION

When the indoor unit is operated with the remote controller, the signals of the operation mode, the set temperature, and the fan speed are sent from the indoor electronic control P.C. board and memorized in the auto restart assembly.

When the main power is turned off and then turned back on, the unit restarts automatically in the memorized set conditions approximately after 3 minutes.

How to release “AUTO RESTART FUNCTION”

- ① Turn off the main power for the unit.
- ② Pull out the indoor electronic control P.C. board and the display P.C.board. (Refer to page 102 or 104.)
- ③ <MSH09>

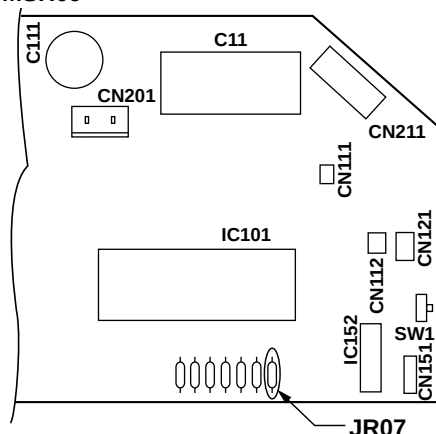
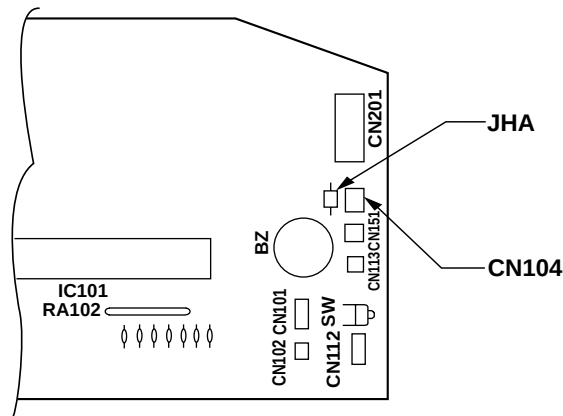
Solder the Jumper wire or the Resistor 220Ω to the JR07 on the indoor electronic control P.C.board. (Refer to page 94.)

<MSH12/15/17>

Disconnect the AUTO RESTART ASSY from CN104, and solder the Jumper wire to JHA on the indoor electronic control P.C. board.(Refer to page 95.)

Operation

- ① If the main power (115V 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.)

MSH09**MSH12/15/17****NOTE:**

- The operation settings are memorized when 10 seconds have passed after the indoor unit was operated with the remote controller.
- If the 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 system that allows the units to start one by one.

MSH09TW MSH09TW - U1 MUH09TW MUH09TW - U1 MUH12TN - U2 MXZ30TN
 MSH12TN MSH12TN - U1 MUH12TN MUH12TN - U1 MUH15TN - U2 MXZ30TN2
 MSH15TN MSH15TN - U1 MUH15TN MUH15TN - U1
 MSH17TN MSH17TN - U1 MUH17TN MUH17TN - U1

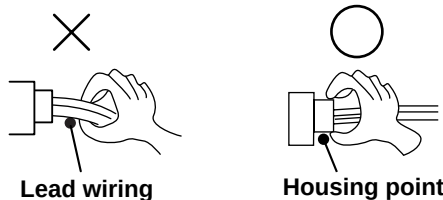
12-1. Cautions on troubleshooting

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, first be sure to 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 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 discoloration.
- 4) When troubleshooting, refer to the flow chart on page 76, 77 and the check table on page 78, 79, 80.

4. How to replace batteries

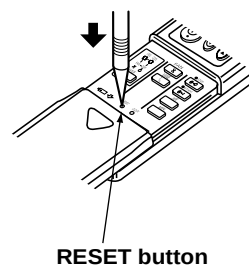
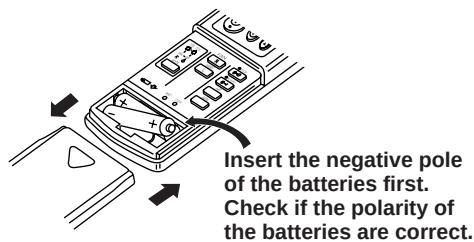
Weak batteries may cause the remote controller malfunction.

In this case, the remote controller can be repaired only by the battery replacement. To operate the remote controller normally, replace the batteries in the following order.

This remote controller has the RESET button. After refilling new batteries, press the RESET button with tip end of ball point pen or the like, and then use the remote controller.

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

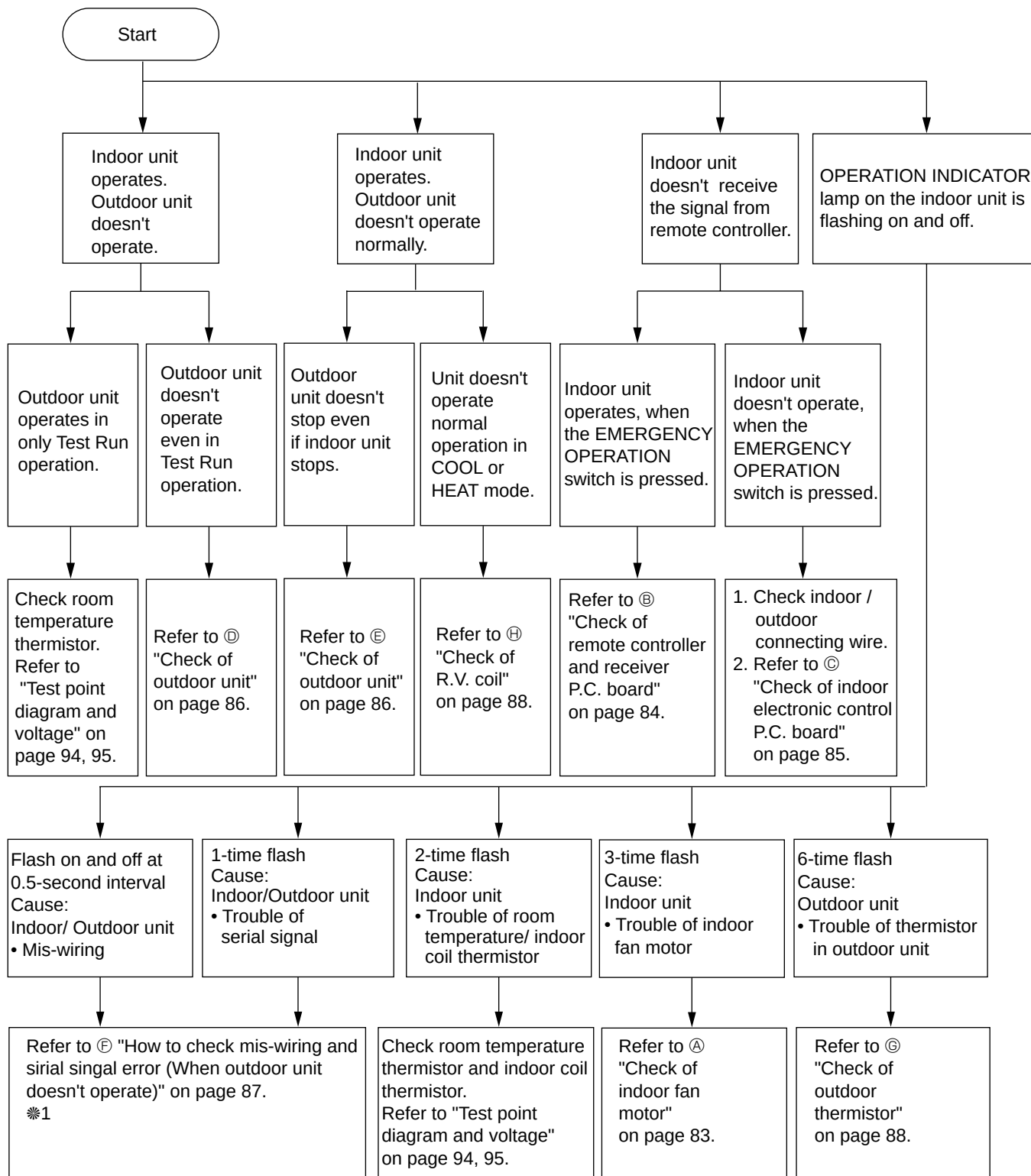
- ② Press the RESET button.



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

12-2. Instruction of troubleshooting

MSH09TW MSH09TW - [U1] MUH09TW MUH09TW - [U1] MUH12TN - [U2]
 MSH12TN MSH12TN - [U1] MUH12TN MUH12TN - [U1] MUH15TN - [U2]
 MSH15TN MSH15TN - [U1] MUH15TN MUH15TN - [U1]
 MSH17TN MSH17TN - [U1] MUH17TN MUH17TN - [U1]

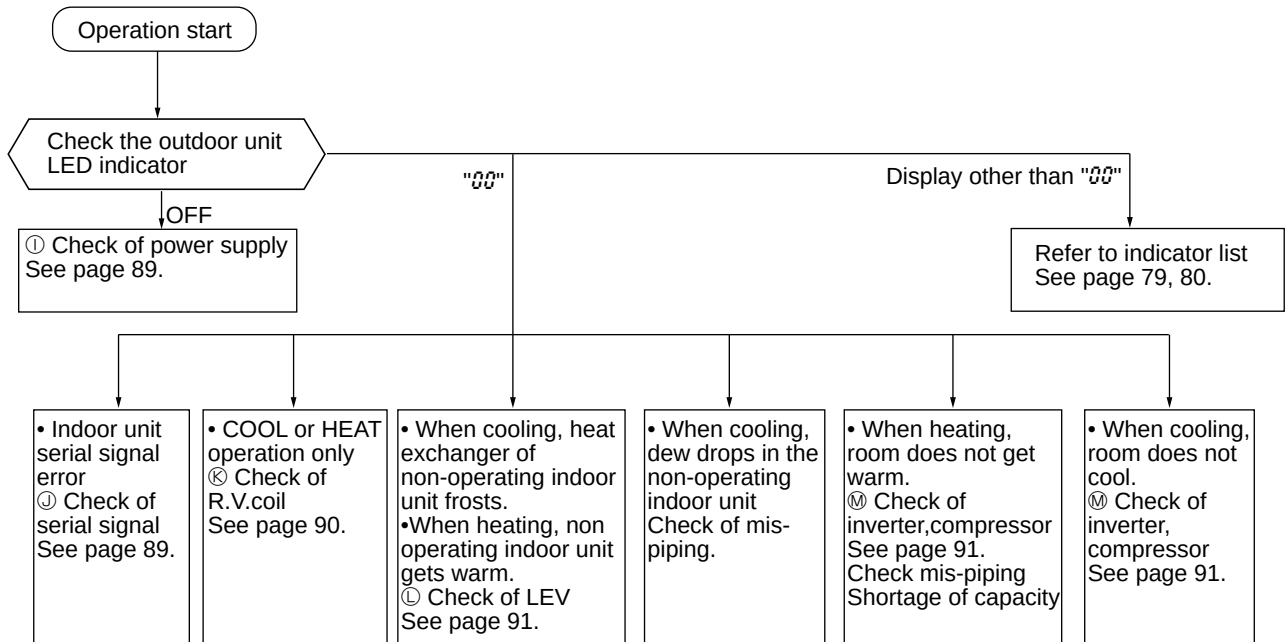


※1<The case of the trouble of the serial signal>

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

MXZ30TN MXZ30TN2 only

- 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.

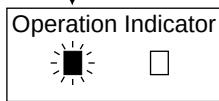


1. Troubleshooting check table

MSH09TW MSH09TW - [U1] MUH09TW MUH09TW - [U1] MUH12TN - [U2]
 MSH12TN MSH12TN - [U1] MUH12TN MUH12TN - [U1] MUH15TN - [U2]
 MSH15TN MSH15TN - [U1] MUH15TN MUH15TN - [U1]
 MSH17TN MSH17TN - [U1] MUH17TN MUH17TN - [U1]

• The following indication applies regardless of shape of the indicator.

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 lighted 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 the unit operates by the remote controller or emergency operation switch at 3 minutes after the main power supply is turned on.	● Check wiring (visual check and conductivity check). ● Check indoor electronic control P.C. board. ● Check outdoor 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 Room temperature thermistor	2-time flash ● ○ ● ○ ○ ○ ○ ● ○ ● ○ ○ ○ 2.5-second OFF	Outdoor unit does not run.	Detects Indoor coil/ room temperature thermistor short or open circuit every 8 seconds during operation.	● Check resistance of thermistor. ● Re-connect connector. ● Check indoor electronic control P.C. board.
3	Indoor fan motor	<MSH09> 3-time flash ● ○ ● ○ ● ○ ○ ○ ○ ● ○ ● ○ ● ○ ○ ○ 2.5-second OFF	Indoor fan repeats 12 seconds ON and 3 minutes OFF. When the indoor fan breaks, the fan keeps stopping.	When rotational frequency feedback signal is not emit during 12-second indoor fan operation.	● 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 outdoor thermistor shorts or opens after the compressor start-up.	● Check deicer P.C. board. ● Check resistance of thermistor.

MXZ30TN MXZ30TN2

Note . LED indicates "00" in the normal status.

7-segment LED display	Error mode
00	Normal

* If there is defect in the following parts(electronic control P.C. board, relay P.C. board, high pressure switches(63H1,63H2),indoor /outdoor fan motor , or indoor coil thermistor), the compressor may stop even with the display remained at " 00 ".In any case, reset the breaker and check the above-stated parts.

Symptom	Outdoor unit does not operate.		
Display	Abnormal	Detecting method	Check points
A4 (A4)	Outdoor power system abnormality	When the compressor operation has been interrupted by overcurrent protection continuously three times within 1 minute after start-up, the compressor stops operation.	- Inverter output - Compressor
A3 (A3)	Outdoor electronic control P.C. board abnormality	When the nonvolatile memory data cannot be read properly on the outdoor controller board	Outdoor electronic control P.C. board

Symptom	Outdoor unit stops and restarts every 3 minutes.		
Display	Abnormal	Detecting method	Check points
E9 (E9)	Evaporation temperature thermistor abnormality	The compressor stops when a short or open circuit occurs in the evaporation temperature thermistor during compressor running.	- Check the characteristic of the evaporation temperature thermistor. Refer to ⑩ on page 90. - Check the contact of P. C. board connectors.
E6 (E6)	Discharge temperature thermistor abnormality	The compressor stops 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 ⑩ on page 90. - Check the contact of P. C. board connectors.
F8 (F8)	Fin temperature thermistor abnormality	The compressor stops when a short or open circuit occurs in the fin temperature thermistor during compressor running.	- Check the characteristic of the fin temperature thermistor. Refer to ⑩ on page 90. - Check the contact of P.C. board connectors.
A8 (A8)	Overcurrent protection	When over current is applied to the power module, the compressor stops and restarts in 3 minutes.	- Check the inverter and compressor. Refer to ⑩ on page 89. - Check the amount of gas. - Check the indoor/outdoor air flow for short cycle. - Check the indoor unit air filter for clogging.
d6 (d6)	Discharge temperature overheat protection	When the discharge temperature thermistor detects 240.8°F or above, the compressor stops and restarts operation in 3 minutes. (Protection will be released at 212°F or below.)	- Check the amount of gas and the refrigerant cycle. - Check the outdoor unit air passage.
d4 (d4)	Fin temperature overheat protection	When the fin temperature thermistor detects 192.2°F or above, the compressor stops and restarts operation in 3 minutes.	- Check the outdoor unit air passage. - Check the power module. - Check the outdoor fan motor. Refer to ⑩ on page 91.
d7 (d7)	High pressure protection	When the compressor starts, primary current or output voltage stops the compressor and restarts in 3 minutes.	- Amount of gas - Outdoor unit air passage. - Check the ball valve.
F5 (F5)	Room-A gas pipe temperature thermistor abnormality	When a short or open circuit occurs in the Room-A gas pipe temperature thermistor.	- Room A gas pipe temperature thermistor characteristic. - Contact of P.C. board connectors.
F6 (F6)	Room-B gas pipe temperature thermistor abnormality	When a short or open circuit occurs in the Room-B gas pipe temperature thermistor.	- Room B gas pipe temperature thermistor characteristic. - Contact of P.C. board connectors.
F7 (F7)	Room-C gas pipe temperature thermistor abnormality	When a short or open circuit occurs in the Room-C gas pipe temperature thermistor.	- Room C gas pipe temperature thermistor characteristic. - Contact of P.C. board connectors.

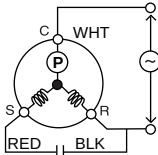


Symptom	Outdoor unit operates. (The compressor operates at reduced frequency.)		
Display	Abnormal	Detecting method	Check points
d8 (d8)	Frequency drop by current protection	When the outdoor unit input current exceeds 22.5 A, the compressor operates at reduced frequency.	These symptoms do not mean any abnormality of the product, but check the following points. • Air filter clogging. • Amount of gas. • Short cycle of indoor/outdoor air flow.
d9 (d9)	Frequency drop by overload protection	When the compressor load exceeds the specified value, the compressor operates at reduced frequency.	
d7 (d7)	Frequency drop by high pressure protection	When indoor pipe temperature exceeds 131°F during heating, the compressor operates at reduced frequency.	
	Frequency drop by defrosting in cooling	When the indoor pipe temperature falls to 42.8°F or below during cooling, the compressor operates at reduced frequency.	
d6 (d6)	Frequency drop by discharge temperature protection	When the discharge temperature exceeds 230°F, the compressor operates at reduced frequency.	• Amount of gas. • Outdoor unit air passage.
d3 (d3)	Frequency drop by high pressure switch (63H1) protection	When the high pressure exceeds 398 PSIG, the compressor operates at reduced frequency. In addition, the fan speed changes.	
d1 (d1)	Low discharge temperature protection	When the state with low discharge temperature of which 122°F in COOL and 119.3°F or less in HEAT for 20 minutes, the compressor operates continuously.	Check the amount of gas. • Replace the outdoor controller board. • Check the contact of LEV board connectors.

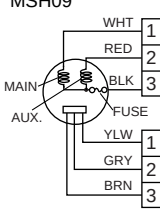
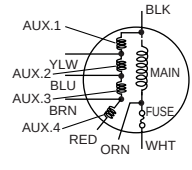
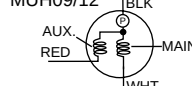
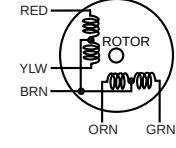
Symptom	Outdoor unit operates.		
Display	Abnormal	Detecting method	Check points
E7 (E7)	Defrost thermistor abnormality	When a short or open circuit occurs in the defrost thermistor during heating * In this case, the compressor continues to operate.	• Defrost thermistor characteristic. • Contact of P. C. board connectors.
h4 (h4)	Power factor detection abnormality	When the compressor power factor cannot be detected * In this case, the compressor keeps running.	• Compressor wiring.

2. Trouble criterion of main parts

MSH09TW MSH09TW - U1 MUH09TW MUH09TW - U1 MUH12TN - U2
 MSH12TN MSH12TN - U1 MUH12TN MUH12TN - U1 MUH15TN - U2
 MSH15TN MSH15TN - U1 MUH15TN MUH15TN - U1
 MSH17TN MSH17TN - U1 MUH17TN MUH17TN - U1

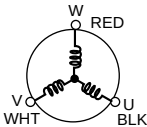
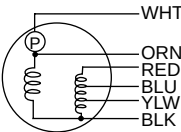
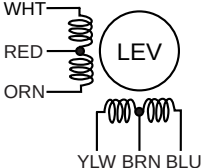
Part name	Check method and criterion	Figure
Room temperature thermistor(RT11)	Measure the resistance with a tester. (Part temperature 50°F ~ 86°F)	
Indoor coil thermistor(RT12)		
Defrost thermistor(RT61)	Measure the resistance with a tester. (Part temperature 14°F ~ 104°F)	
Ambient temperature thermistor (RT63) MSH09TW - <u>U1</u> MSH12/15/17TN - <u>U1</u> only		
Compressor(MC) MUH09TW MUH12/15/17TN OPEN 302°F ± 9°F CLOSE 203°F ± 18°F	Measure the resistance between the terminals with a tester. (Part temperature 14°F ~ 104°F)	

MSH09TW **MSH09TW** - U1 **MUH09TW** **MUH09TW** - U1 **MUH12TN** - U2
MSH12TN **MSH12TN** - U1 **MUH12TN** **MUH12TN** - U1 **MUH15TN** - U2
MSH15TN **MSH15TN** - U1 **MUH15TN** **MUH15TN** - U1
MSH17TN **MSH17TN** - U1 **MUH17TN** **MUH17TN** - U1

Part name	Check method and criterion				Figure
Indoor fan motor(MF) MSH09TW MSH09TW - <u>U1</u> CUT OFF 262°F MSH12/15/17TN MSH12/15/17 TN - <u>U1</u> CUT OFF 293°F	Motor part	Measure the resistance between the terminals with a tester. (Part temperature 50°F ~ 86°F)			MSH09 
			Normal	Abnormal	
	Sensor part	Measure the voltage Power ON.			
			Normal	Abnormal	
	Motor part	Measure the resistance between the terminals with a tester. (Part temperature 14°F ~ 104°F)			MSH12/15/17 
			Normal	Abnormal	
			Normal	Abnormal	
			Normal	Abnormal	
Outdoor fan motor(MF) OPEN 302°F ± 9°F CLOSE 203°F ± 18°F	Motor part	Measure the resistance between the terminals with a tester. (Part temperature 50°F ~ 86°F)			MUH09/12 
			Normal	Abnormal	
			Normal	Abnormal	
			Normal	Abnormal	
Vane motor(MV)	Motor part	Measure the resistance between the terminals with a tester. (Part temperature 50°F ~ 86°F)			MSH09 
			Normal	Abnormal	
			Normal	Abnormal	
			Normal	Abnormal	

©:INNER PROTECTOR

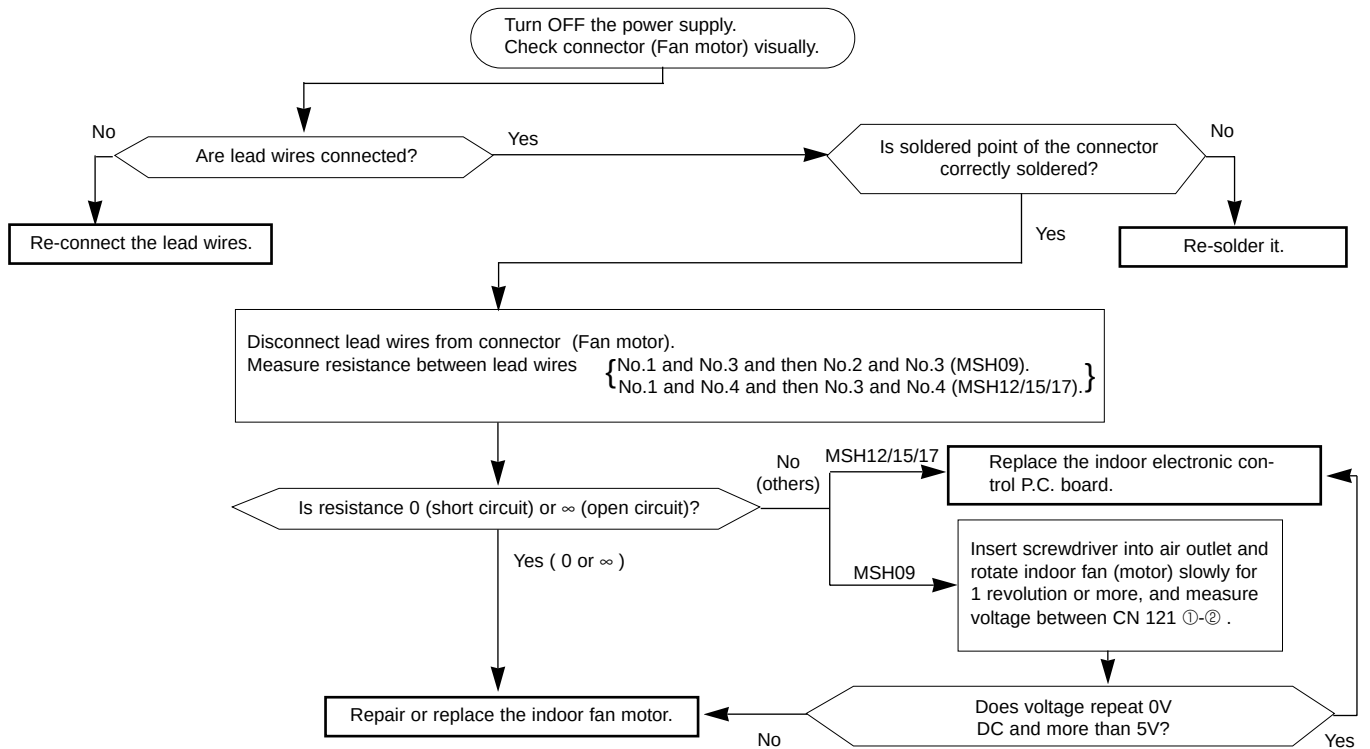
MXZ30TN MXZ30TN2

Part name	Check method and criterion			Figure	
Defrost thermistor Evaporation/ Gas pipe temperature thermistor	Measure the resistance using a tester. (Part temperature 14°F ~ 104°F)				
	Normal		abnormal		
	5kΩ ~ 55kΩ		Open or short-circuit		
Discharge temperature thermistor	Measure the resistance using a tester, after warming up the thermistor by holding by hand. (Part temperature : 68°F ~ 104°F)				
	Normal		abnormal		
	100kΩ ~ 250kΩ		Open or short-circuit		
Compressor	Measure the resistance between terminals using a tester. (Winding temperature : 14°F ~ 104°F)				
	Normal		abnormal		
	1Each phase 0.53Ω ~ 0.66Ω		Open or short-circuit		
Outdoor fan motor OPEN 275°F ± 9°F CLOSE 187°F ± 27°F	Measure the resistance between lead wires using a tester. (Part temperature : 14°F ~ 104°F)				
	Normal		abnormal		
	WHT - BLK	69.0Ω ~ 86.0Ω	Open or short-circuit (Not including WHT - ORN)		
	BLK - YLW	23.0Ω ~ 30.0Ω			
	YLW - BLU	10.0Ω ~ 13.0Ω			
	RED - BLK	73.0Ω ~ 91.0Ω			
R. V. coil	Measure the resistance using a tester. (Part temperature 14°F ~ 104°F)				
	Normal		abnormal		
	1640Ω ~ 2310Ω		Open or short-circuit		
Linear expansion valve	Measure the resistance using a tester.(Part temperature 14°F ~ 104°F)				
	Lead wire color	Normal	Abnormal		
	WHT - RED	37.4 ~ 53.9Ω	Open or short-circuit		
	RED - ORN				
	YLW - BRN				
	BRN - BLU				
High pressure switch (HPS)	Measure the resistance using a tester. (Part temperature 14°F ~ 104°F)				
	Pressure		Normal		abnormal
	Operation OFF		Short		Other than those listed at left
	HPS1	340.8 ± 21.8PSIG			
	HPS2	369.8 ± 29 PSIG			
	HPS1	398.8 ± 14.5 PSIG	Open		
	HPS2	497.5 ± 21.8PSIG			

© Inner protector

Indoor fan does not operate.

Ⓐ Check of indoor fan motor

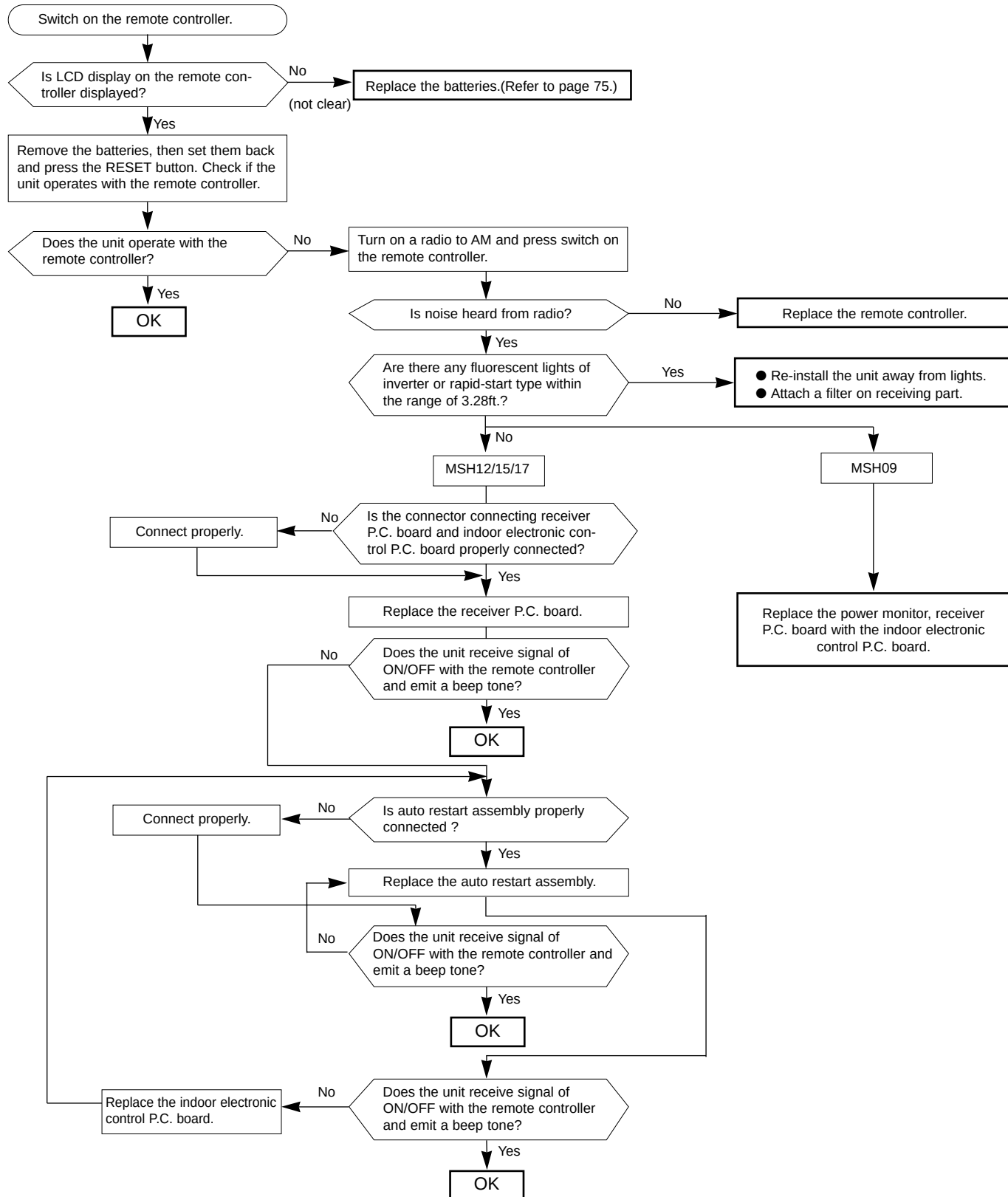


Indoor unit operates by pressing the **EMERGENCY OPERATION** switch, but does not operate with the remote controller.

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

※ In case of replacing the receiver P.C. board of MSH09, replace the indoor electronic control P.C. board with it because they are unified.

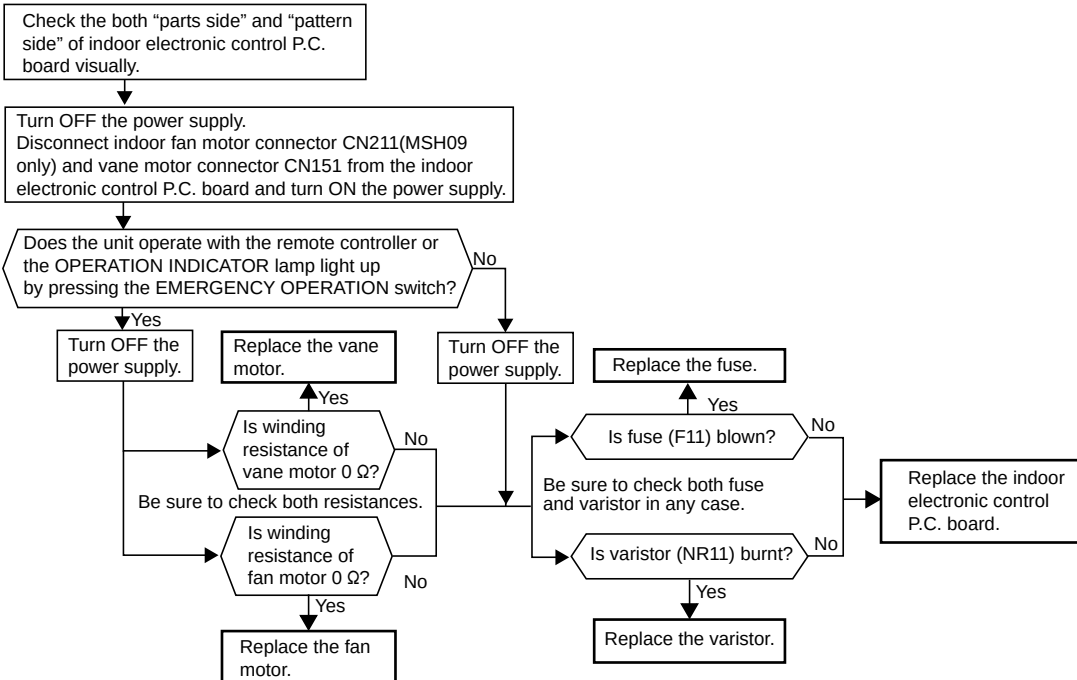
⑧ Check of remote controller and receiver P.C. board



The unit doesn't operate with the remote controller.

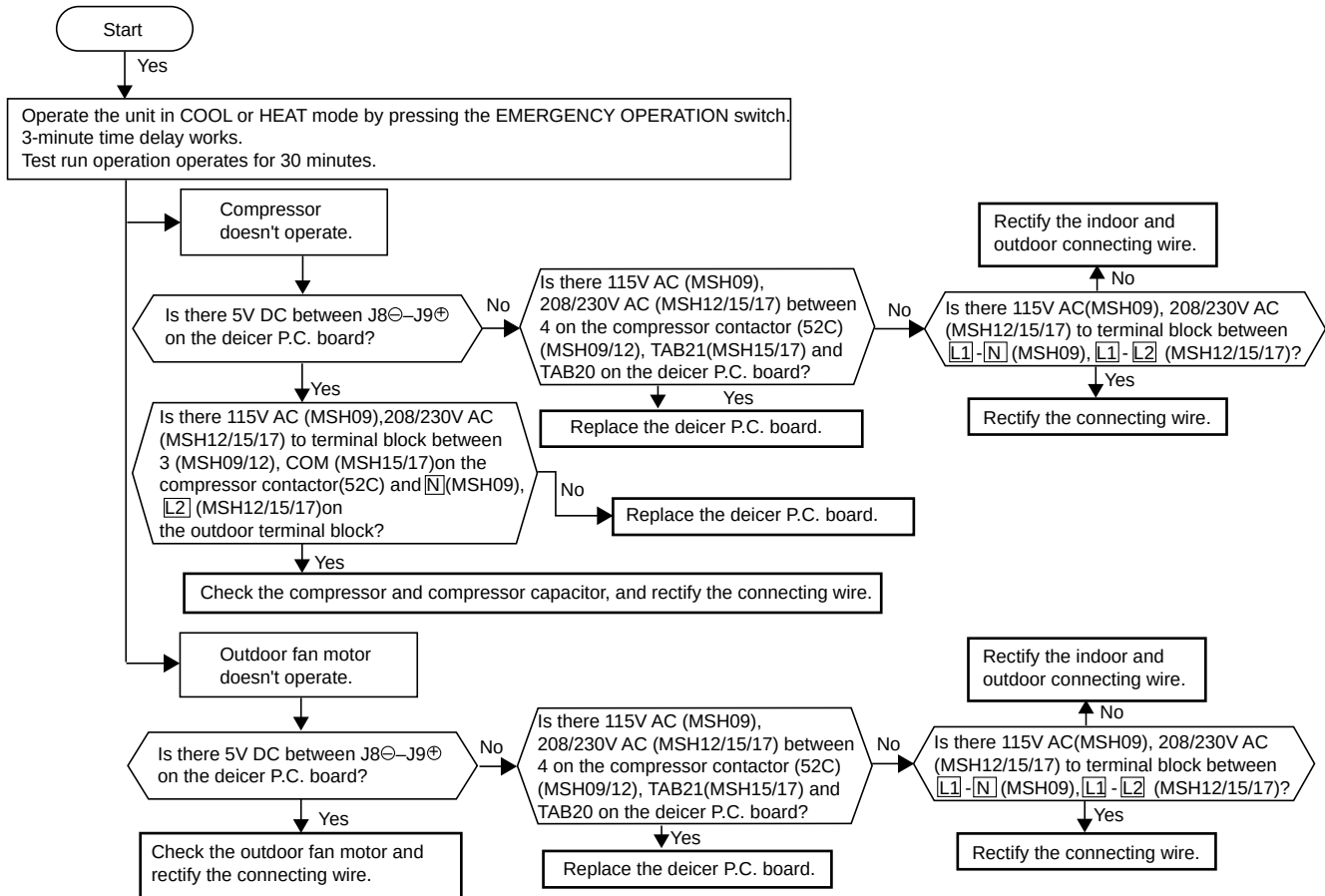
Also, the OPERATION INDICATOR lamp doesn't light up by pressing the EMERGENCY OPERATION switch.

© Check of indoor electronic control P.C. board



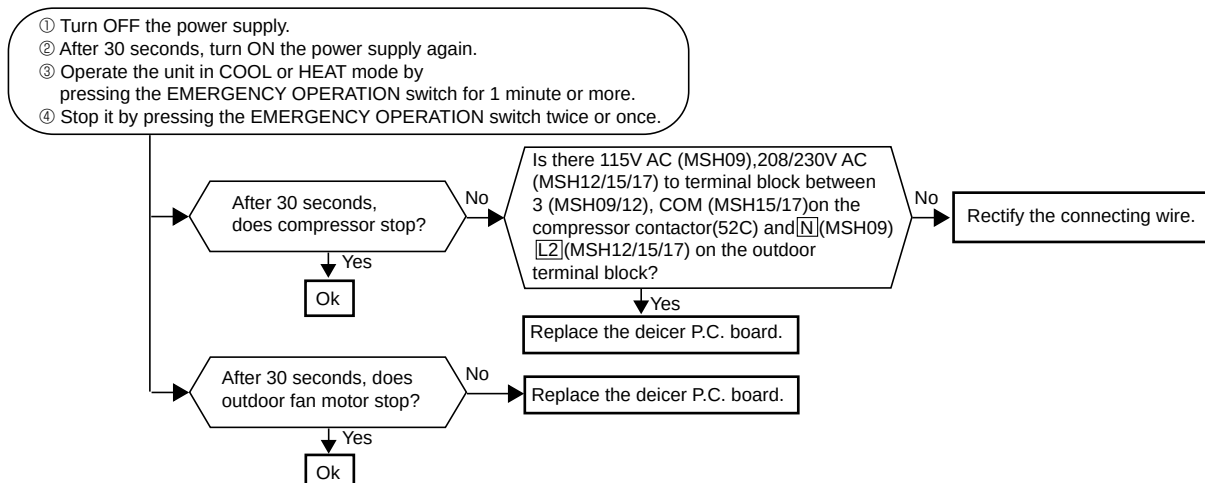
Compressor and/or outdoor fan does not operate. (Only indoor fan operates.)

④ Check of outdoor unit



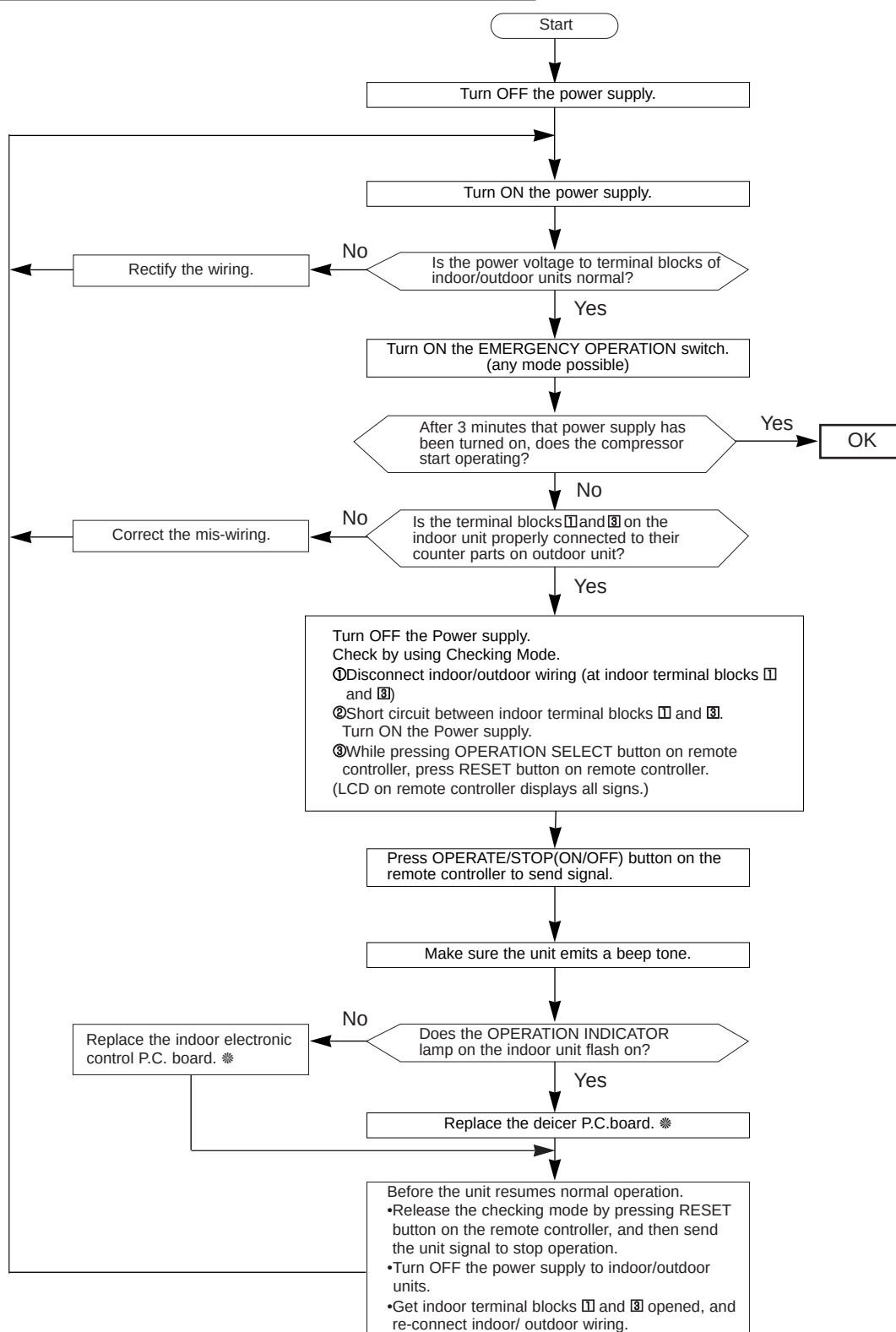
Compressor and/or outdoor fan motor doesn't stop.

⑤ Check of outdoor unit



When OPERATION INDICATOR lamp flashes ON and OFF in every 0.5-second or flashes once.
Outdoor unit doesn't operate.

⑥ How to check mis-wiring and serial signal error

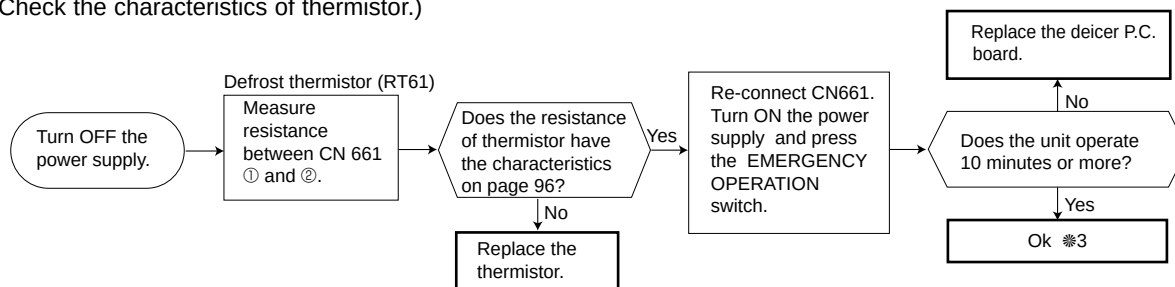


【※ Be sure to turn OFF the power supply to indoor/outdoor units in replacing P.C. board.】

**When OPERATION INDICATOR lamp flashes 6-time.
Thermistors in the outdoor unit are abnormal.**

Ⓒ Check of outdoor thermistor (MUH09/12/15/17)

※ Disconnect the connector CN661 from the deicer P.C. board.
(Check the characteristics of thermistor.)

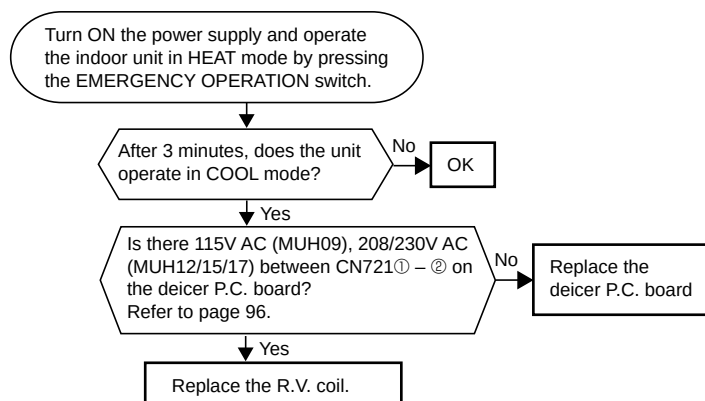


※3 Defective contact of the connector is considered.

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

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

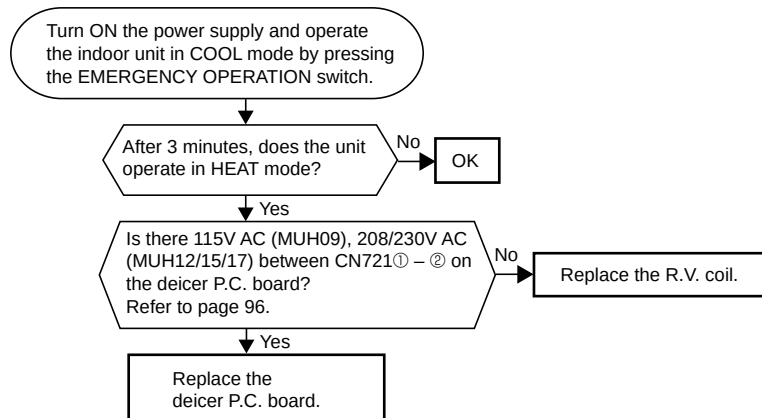
Ⓓ Check of R.V. coil (MUH09/12/15/17)



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.

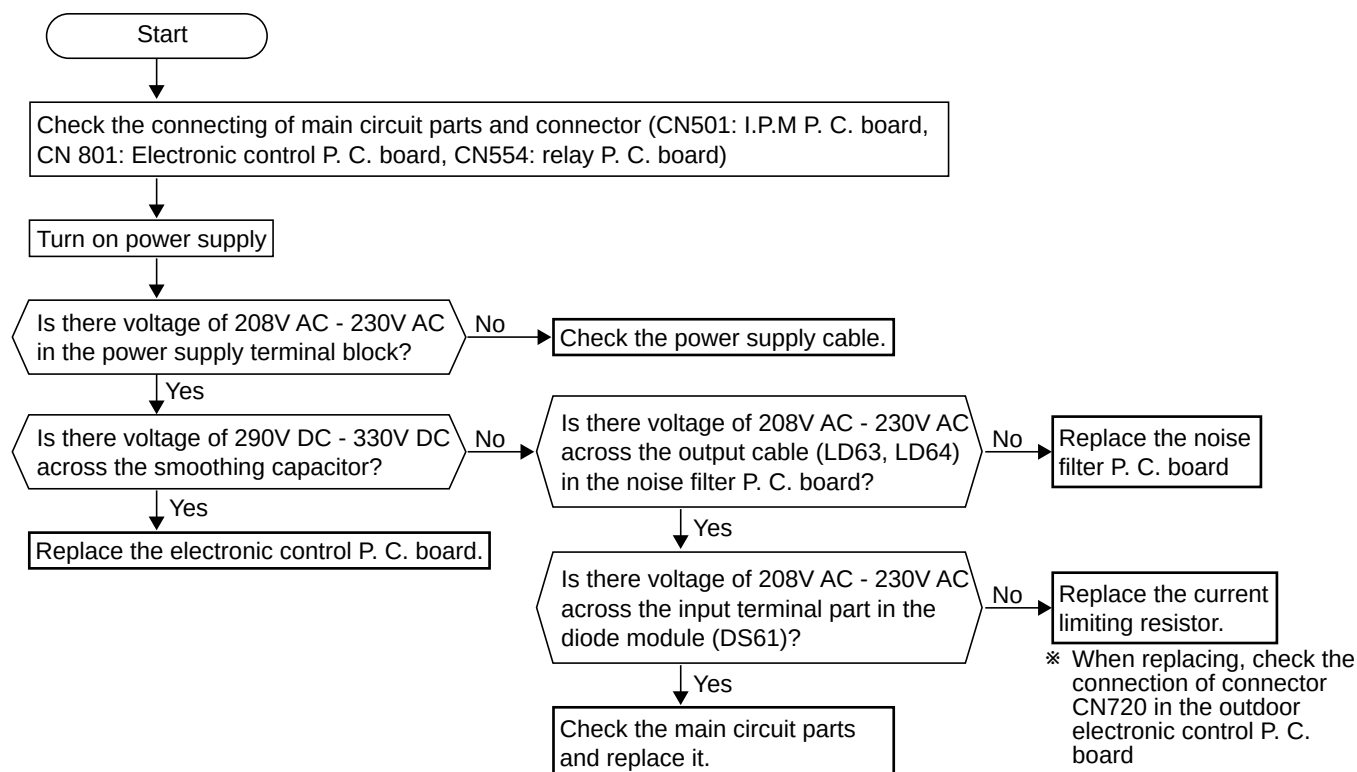
Ⓓ Check of R.V. coil (MUH09/12/15/17)



Outdoor unit does not operate. (LED display: display OFF)

① Check of power supply

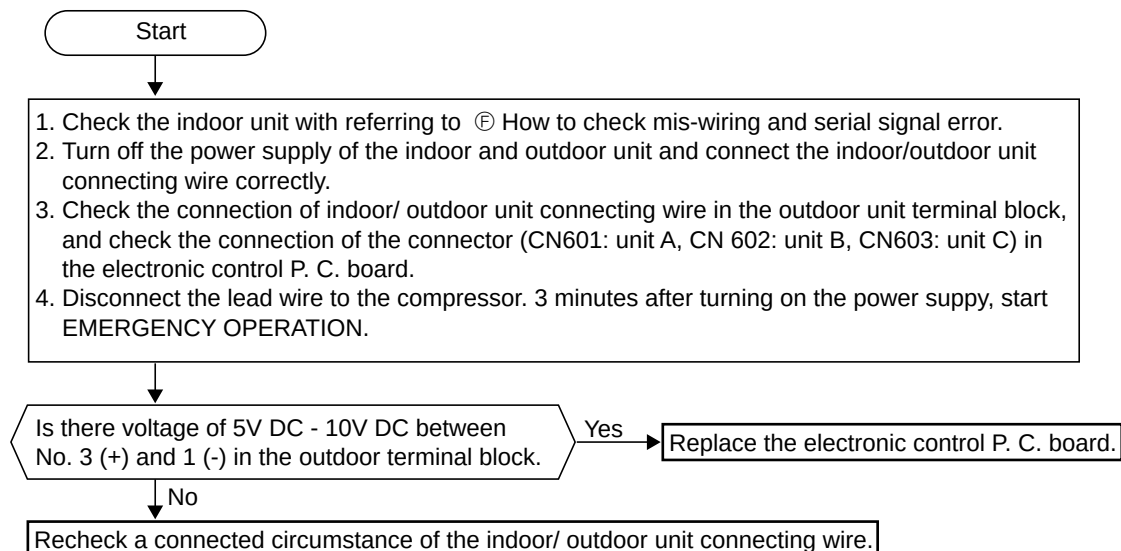
(MXZ30TN MXZ30TN2)



Outdoor unit does not operate. (LED display: 00)

① Check of serial signal

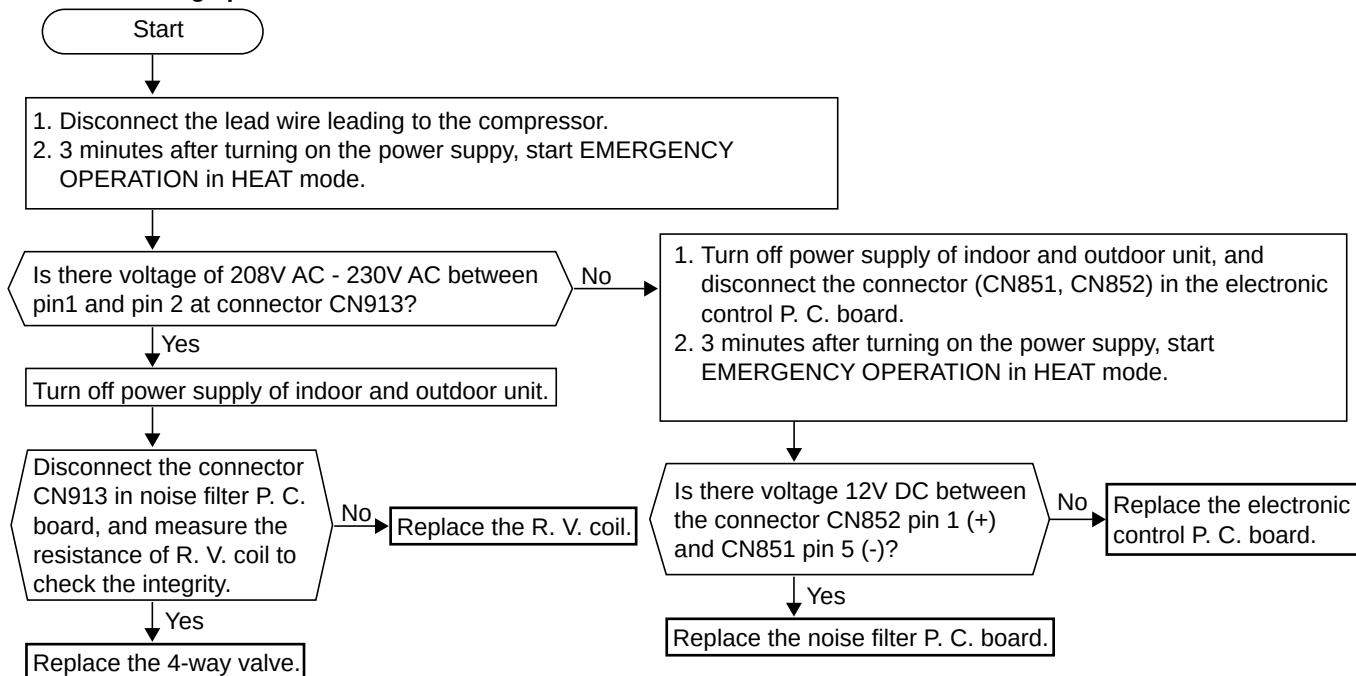
(MXZ30TN MXZ30TN2)



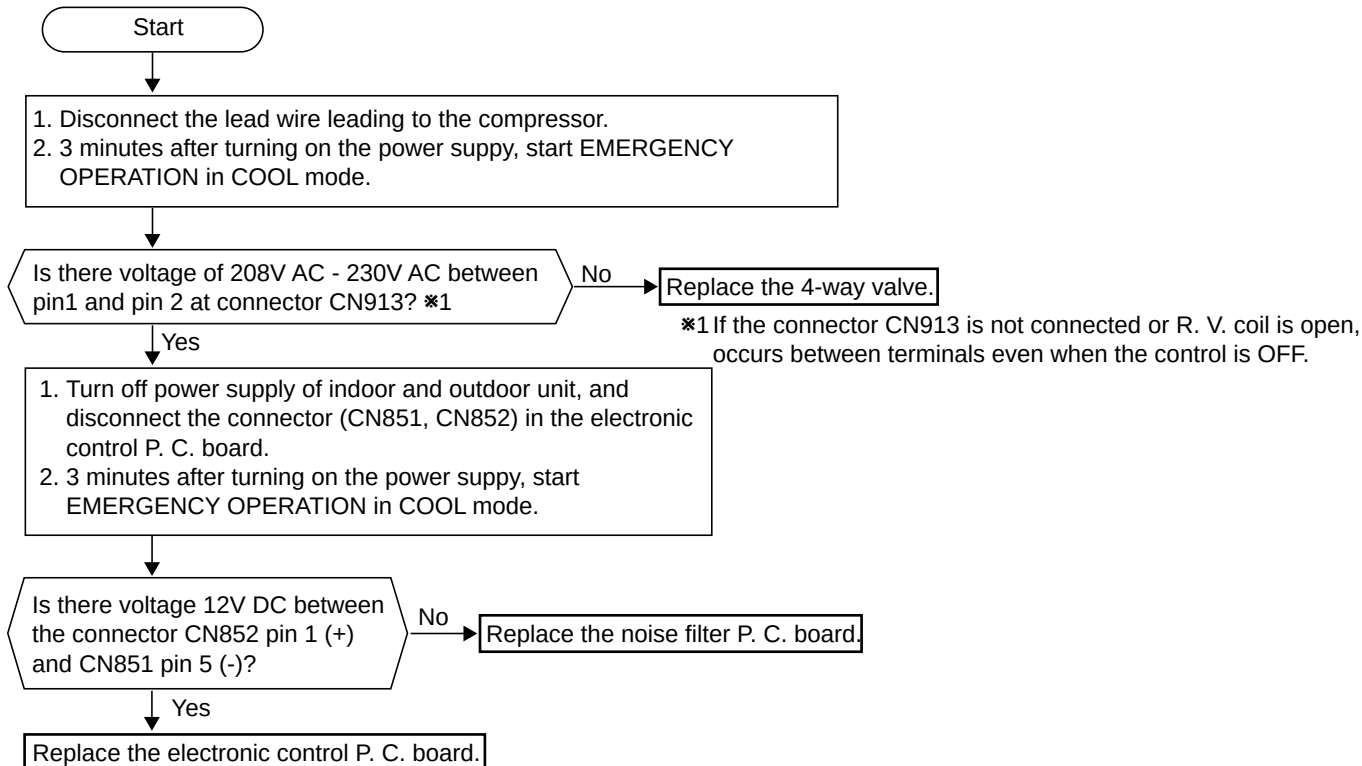
The cooling operation or heating operation does not operate. (LED display: 00)

⊗ Check of R. V. coil (MXZ30TN MXZ30TN2)

• When heating operation does not work.

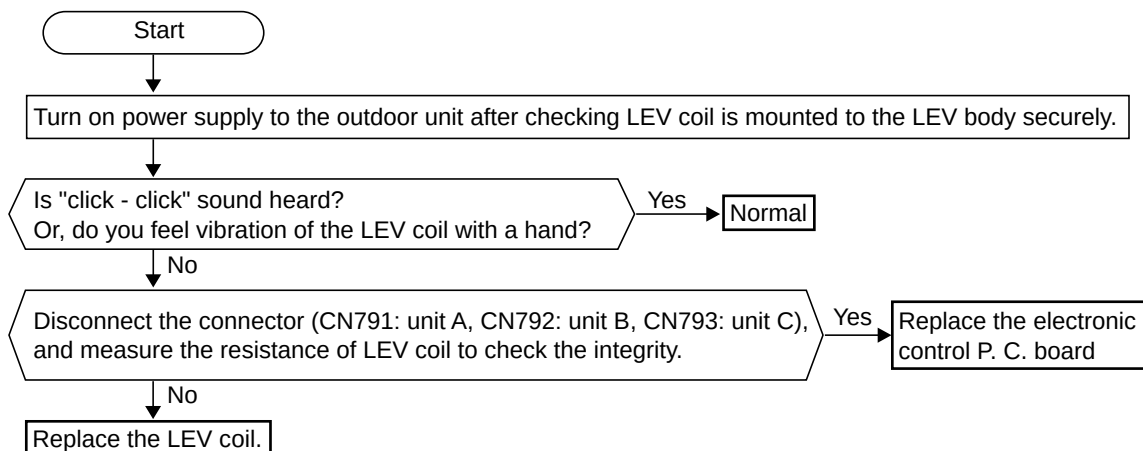


• When cooling operation does not work.



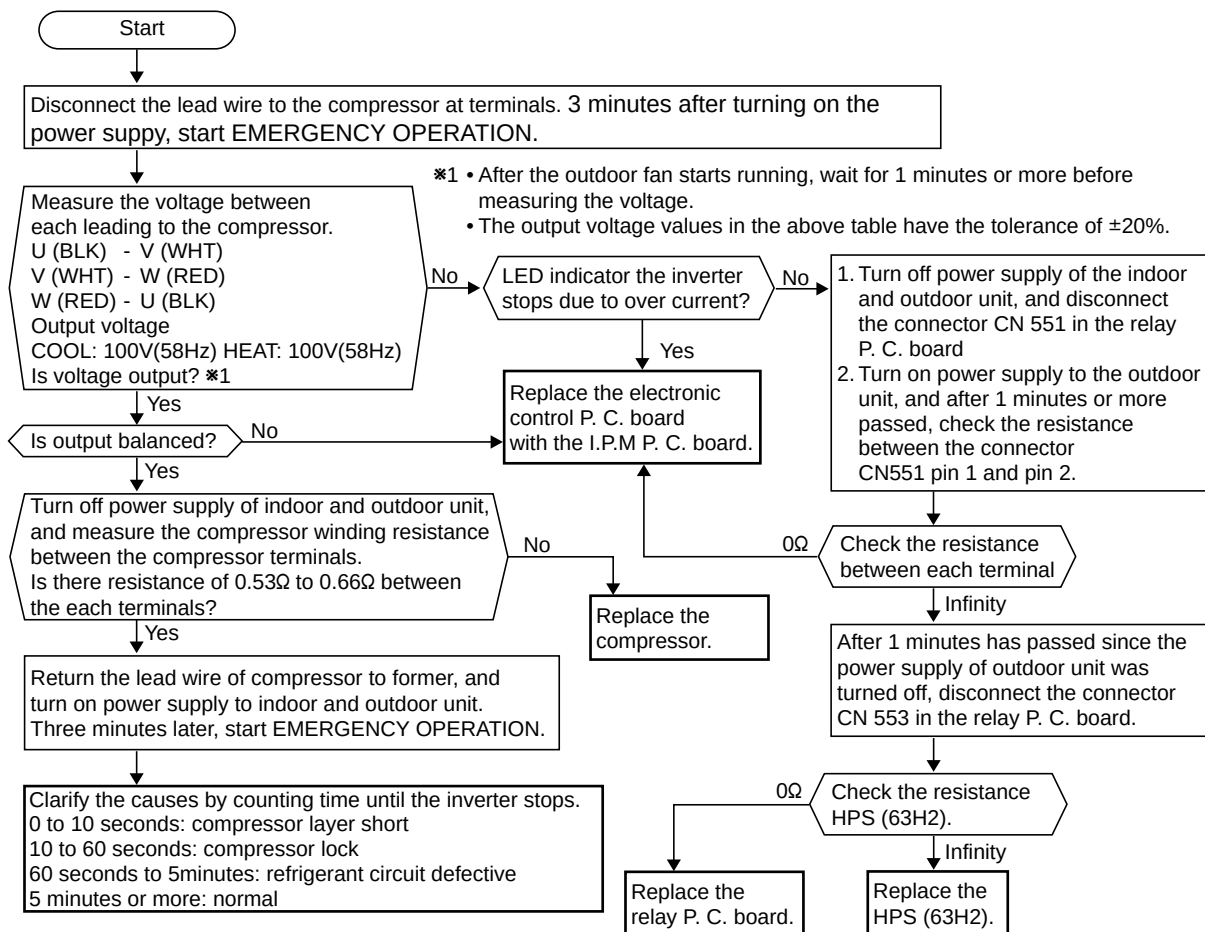
- When cooling, heat exchanger of non-operating unit frosts.
- When heating, non-operating indoor unit get warm. (LED display: 00, P1)

① Check of LEV (MXZ30TN MXZ30TN2)



- When cooling, room does not get cool.
- When heating, room does not get warm. (LED display: 00, A8)

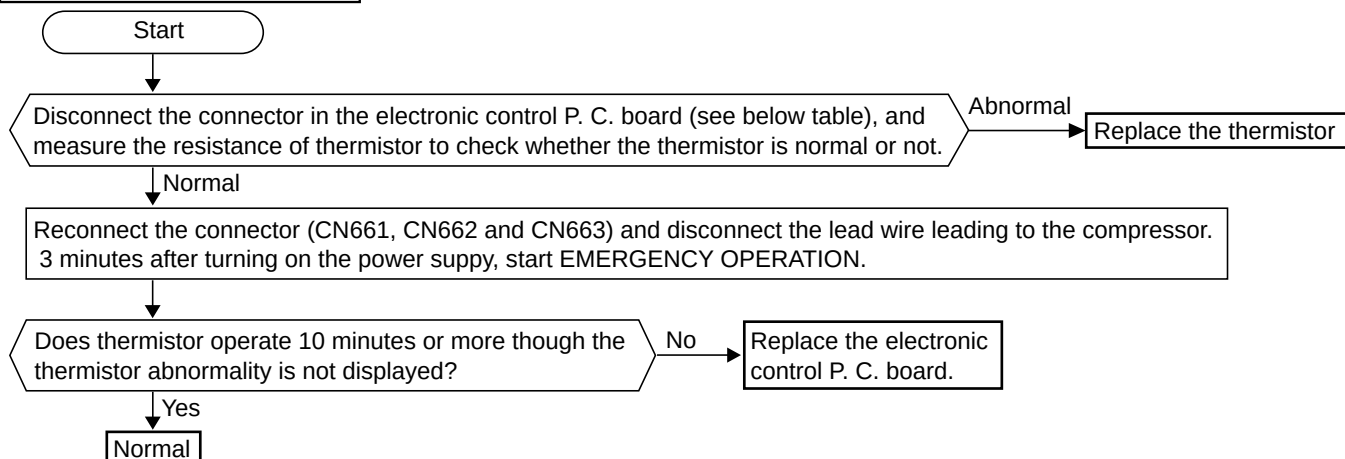
② Check of inverter/compressor (MXZ30TN MXZ30TN2)



•When thermistor is abnormal. (When the LED displays a table below)

㊦ Check of thermistor

(MXZ30TN MXZ30TN2)

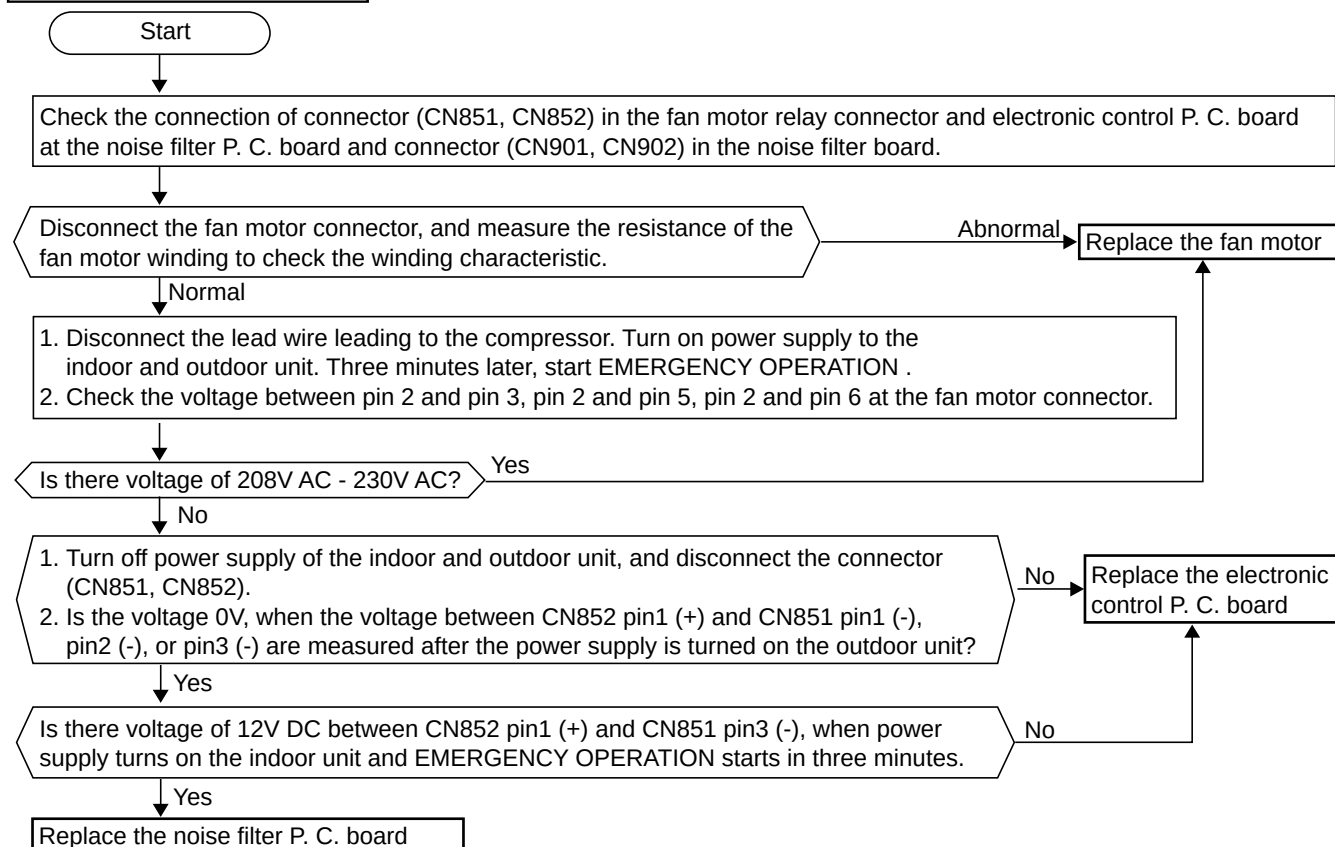


Thermistor	Symbol	Connector, Pin No.
Discharge temperature thermistor	RT61	Between CN661 pin3 and pin4
Defrost thermistor	RT62	Between CN661 pin1 and pin2
Evaporation temperature thermistor	RT63	Between CN661 pin5 and pin6
Fin temperature thermistor	RT65	Between CN663 pin1 and pin2
Gas pipe temperature thermistor (Unit A)	RT66	Between CN662 pin1 and pin2
Gas pipe temperature thermistor (Unit B)	RT67	Between CN662 pin3 and pin4
Gas pipe temperature thermistor (Unit C)	RT68	Between CN662 pin5 and pin6

•Fan motor does not operate or stops operating shortly after starting the operation.

㊦ Check of fan motor

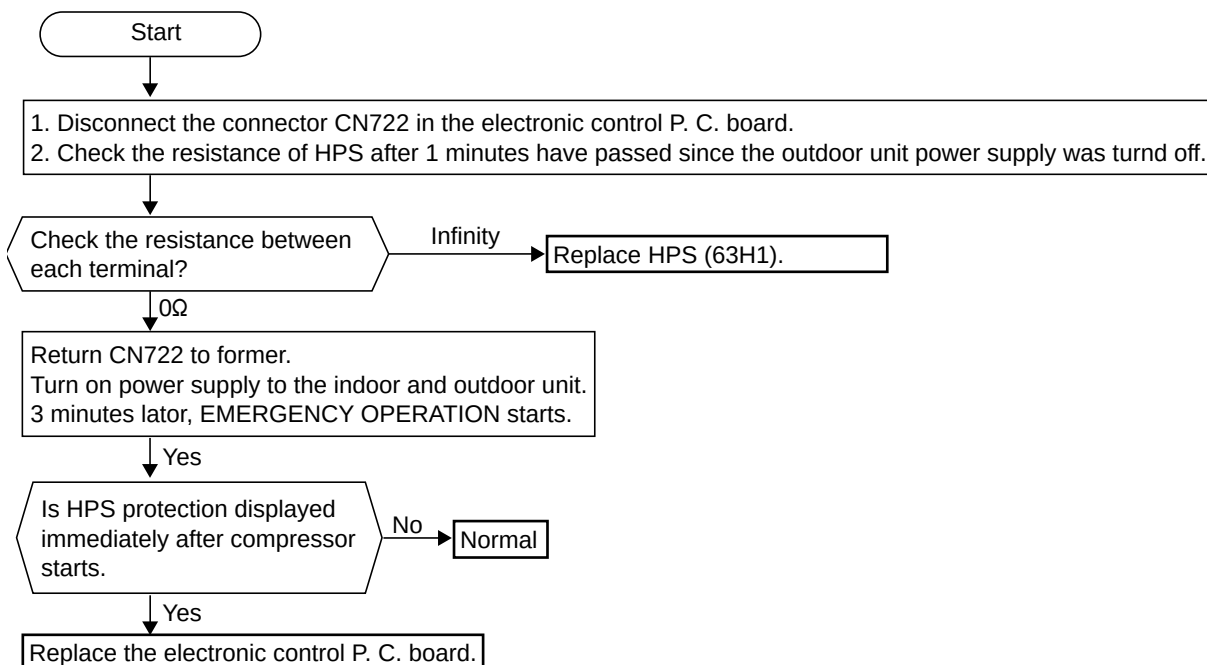
(MXZ30TN MXZ30TN2)



•When the operation frequency does not go up from lowest frequency.

Ⓔ Check of HPS

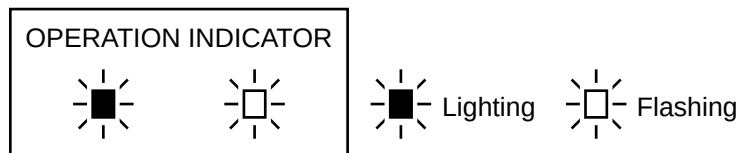
(MXZ30TN MXZ30TN2)



Ⓕ The other cases

(MXZ30TN MXZ30TN2)

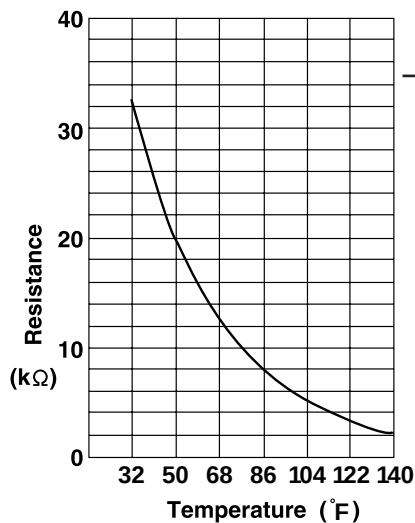
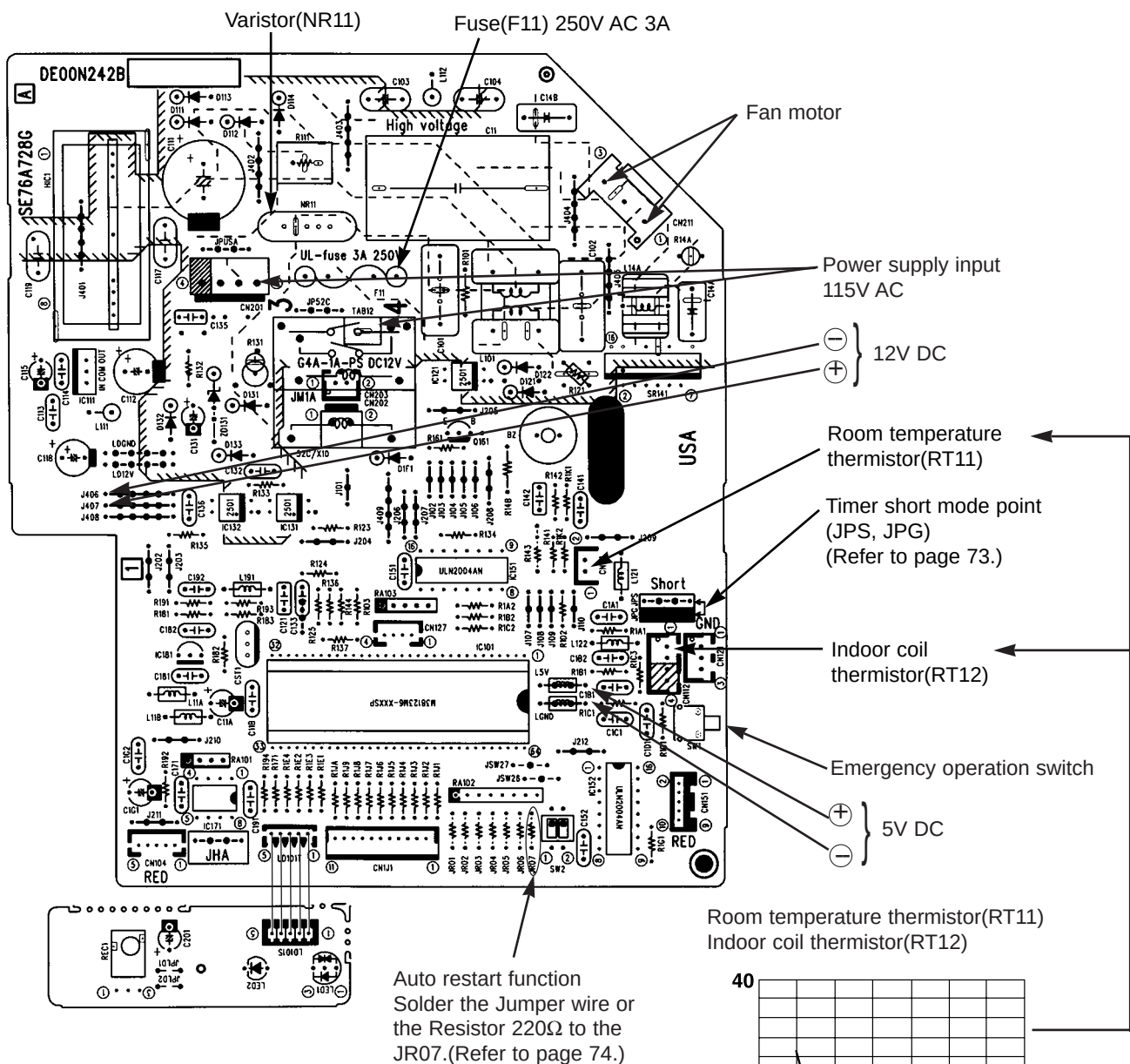
- ① In the case that the indoor fan and outdoor fan operate but the compressor does not operate, it causes that the high pressure switch can be operated once.
First of all, check the high pressure switch can be shorted, turn OFF the power and turn ON again 1 minute later.
- ② Indoor unit does not operate. (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

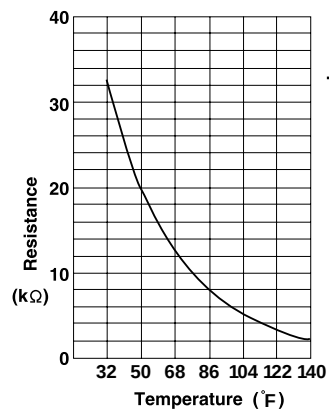
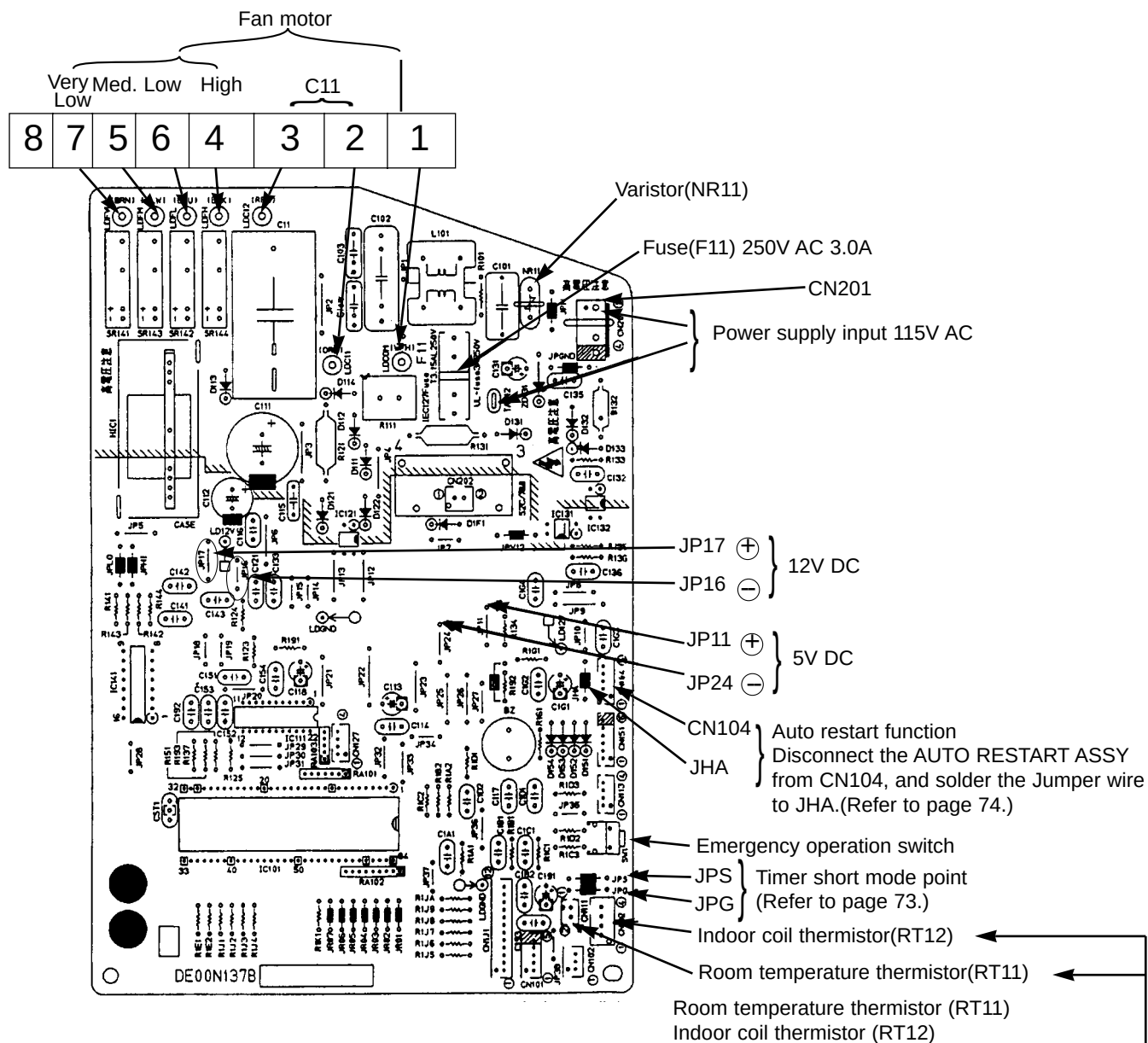
MSH09TW MSH09TW - [U1]

Indoor electronic control P.C. board



TEST POINT DIAGRAM AND VOLTAGE

MSH12TN MSH15TN MSH17TN MSH12TN - U1 MSH15TN - U1 MSH17TN - U1
Indoor electronic control P.C. board



MUH09TW MUH09TW - U1

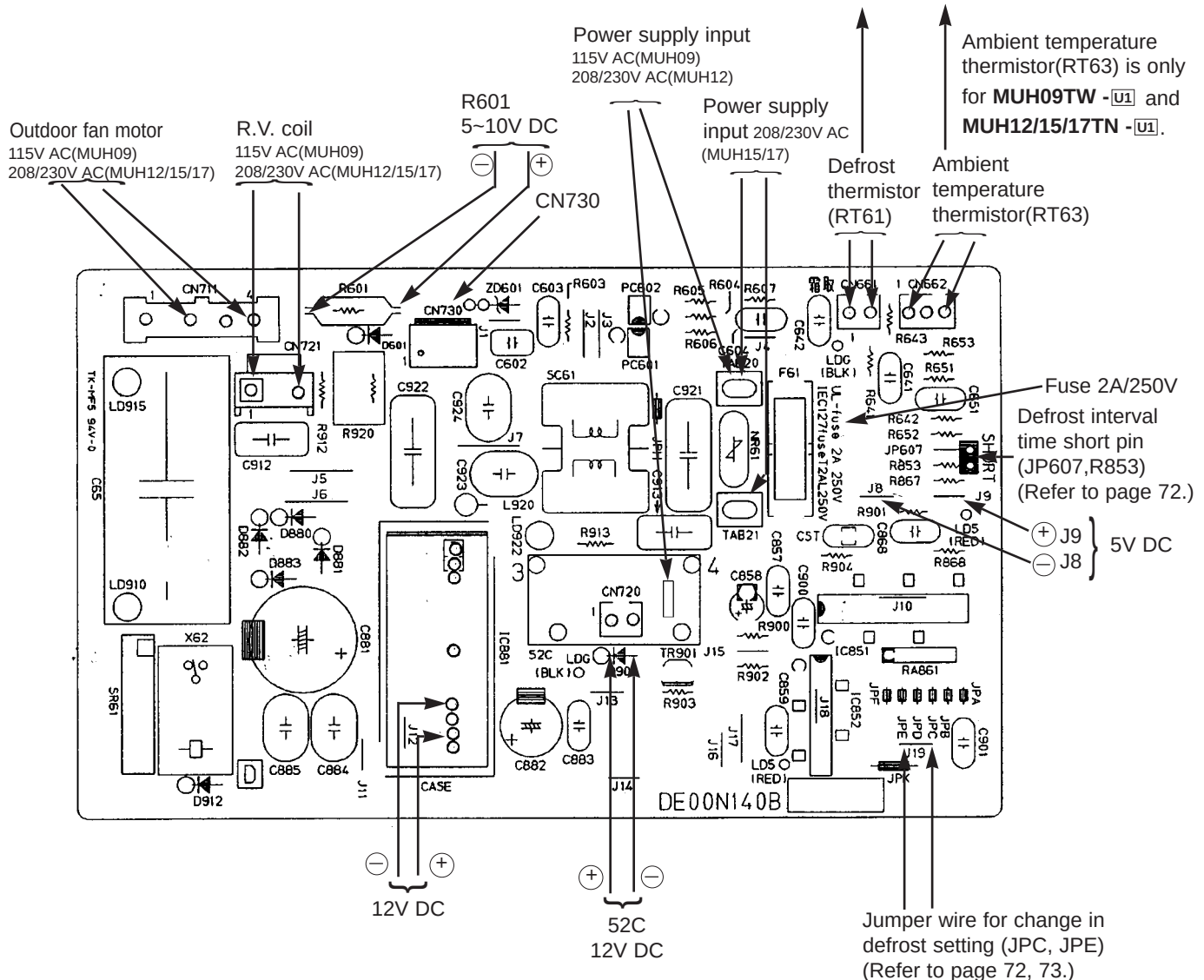
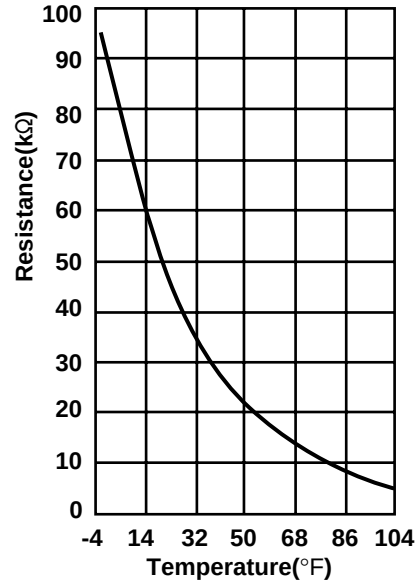
MUH12TN MUH12TN - U1 MUH12TN - U2

MUH15TN MUH15TN - U1 MUH15TN - U2

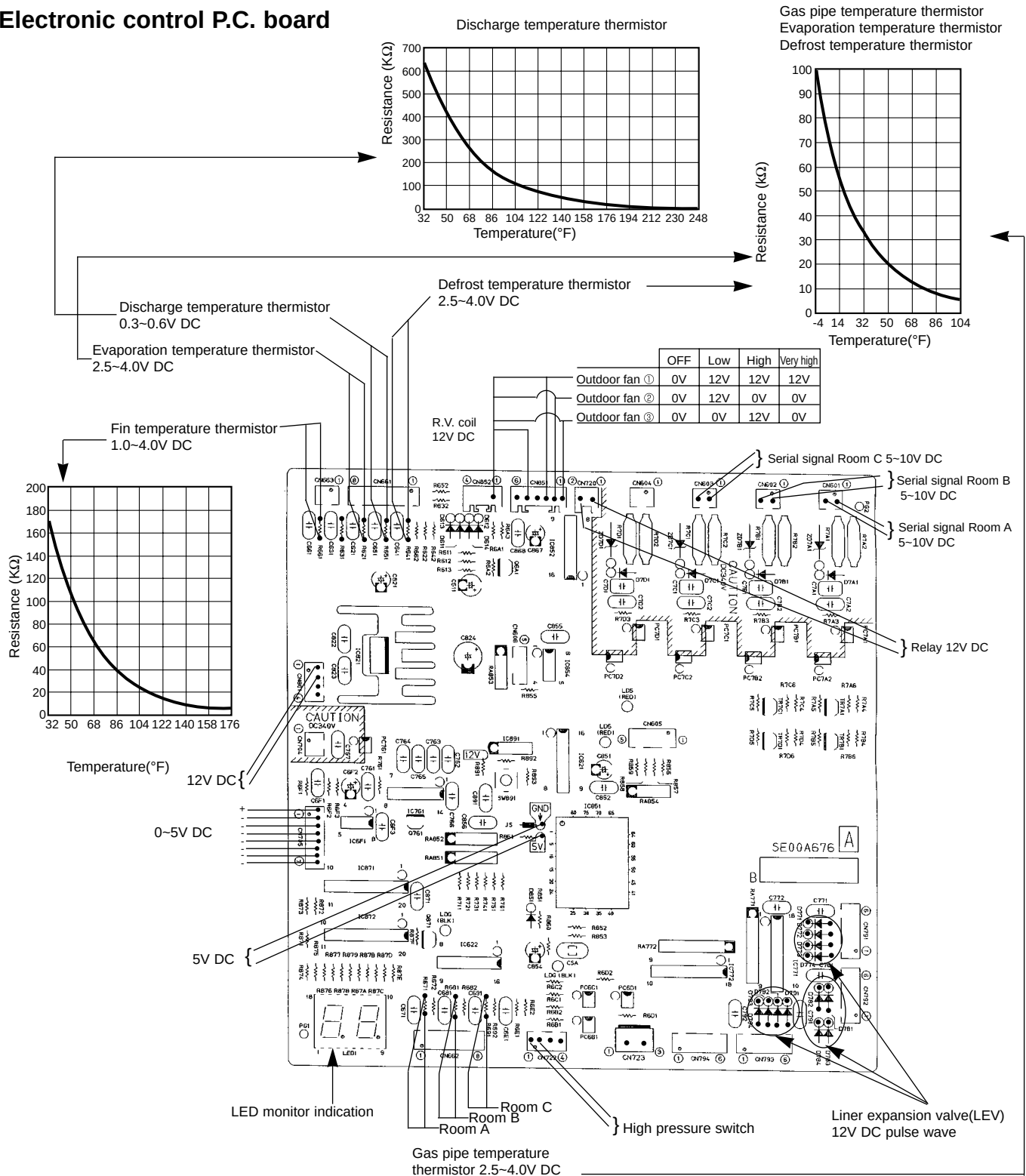
MUH17TN MUH17TN - U1

Outdoor deicer P.C. board

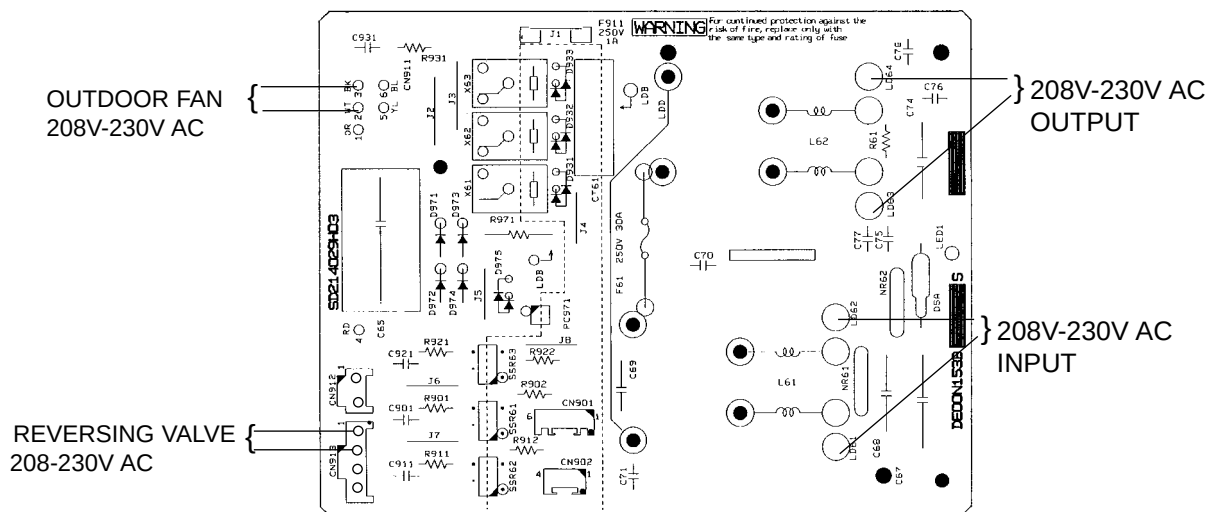
Defrost thermistor (RT61)
Ambient temperature thermistor (RT63)



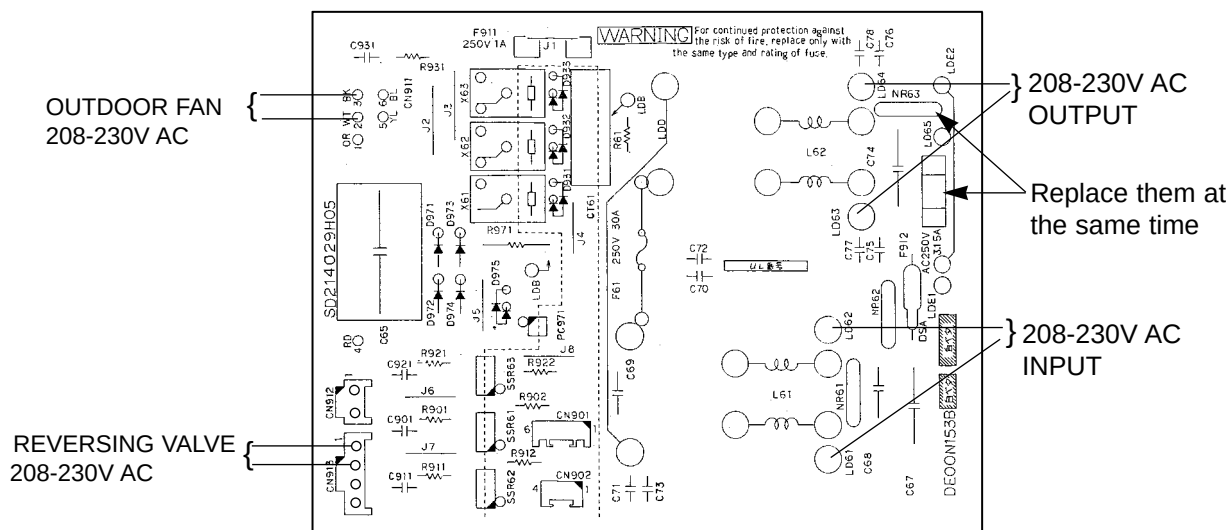
TEST POINT DIAGRAM AND VOLTAGE **MXZ30TN MXZ30TN2** **Electronic control P.C. board**



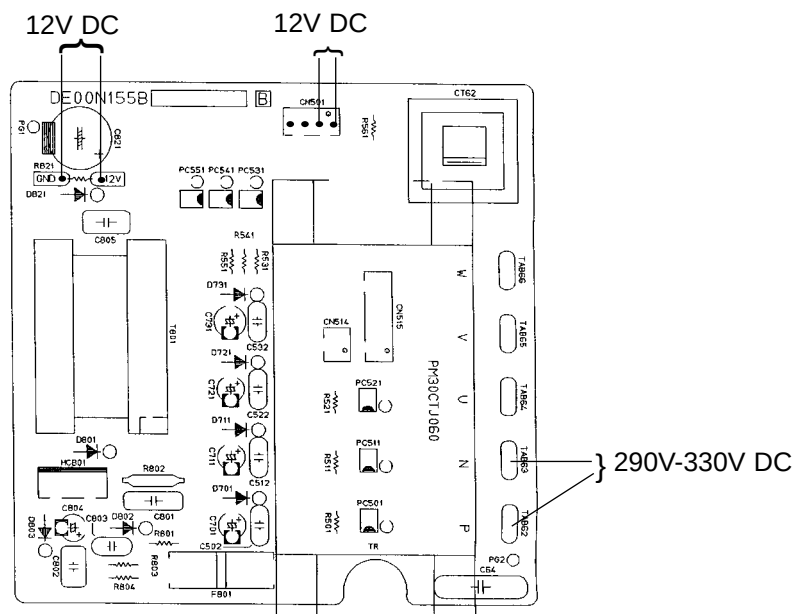
MXZ30TN Noise filter P.C. board



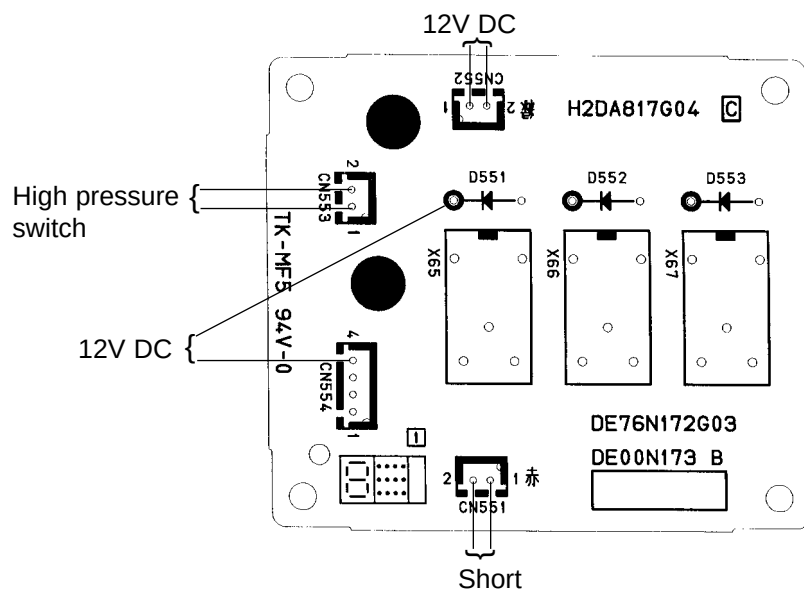
MXZ30TN2 Noise filter P.C. board



I.P.M P.C. board



Relay P.C. board



RELAY OPERATION

MSH09TW MSH09TW - U1

MSH12TN MSH12TN - U1

MSH15TN MSH15TN - U1

MSH17TN MSH17TN - U1

1. COMPRESSOR CONTACTOR

• EACH MODE

MODE	THERMOSTAT	52C CONTACTOR	INDOOR FAN SPEED
COOL & COOL mode of I FEEL CONTROL	ON	ON	AUTO or set speed
	OFF	OFF	
DRY & DRY mode of I FEEL CONTROL	ON	OFF for 2 min. after unit starts operation. Repeat of 8 min. ON/3min. OFF operation or 2 min. ON/3 min. OFF operation	AUTO or set speed
	OFF	Repeat of 4 min. OFF/ 1 min. ON operation	AUTO or set speed links with 52C contactor.
HEAT & HEAT mode of I FEEL CONTROL	ON	ON	AUTO or set speed
	OFF	OFF	OFF or Very Low speed

NOTE : Once the compressor is OFF, "3-minute time delay circuit" works at next start-up.

• COIL FROST PREVENTION

MODE	THERMOSTAT	52C CONTACTOR	INDOOR FAN SPEED
COOL & COOL mode of I FEEL CONTROL	ON	OFF for 5 min. After that, OFF is pro- longed until indoor coil thermistor reads termination temper- ature.	AUTO or set speed
DRY & DRY mode of I FEEL CONTROL			AUTO or set speed <MSH12/15/17> Low speed when coil frost prevention starts while COMPRESSOR OFF

2. SOLID STATE RELAY (INDOOR FAN MOTOR RELAY)

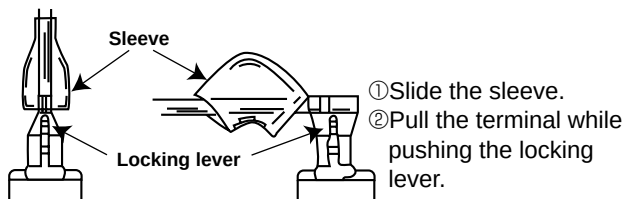
MSH12TN MSH15TN MSH17TN MSH12TN - U1 MSH15TN - U1 MSH17TN - U1

Indoor fan speed	Relay turning ON
High	SR144
Med.	SR143
Low	SR142
Very Low	SR141
OFF	All fan relays are OFF.

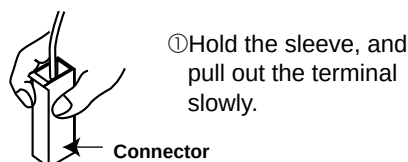
<"Terminal with lock mechanism" Detaching points>

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



13-1. MSH09TW MSH09TW - [U1] INDOOR UNIT

OPERATING PROCEDURE	PHOTOS
1. Removing the front panel (1) Remove the screw caps at the bottom of the front panel. Remove the screws. (2) Pull the panel down to your side slightly and unhook the catches at the top.	Photo 1 Front panel Screws
2. Removing the electronic control P.C. board and the power monitor, receiver P.C. board (1) Remove the front panel. (Refer to 1) (2) Remove the screw of the electrical cover. Remove the electrical cover. (3) Remove the screw of the terminal block. (4) Disconnect all the connectors and all the lead wires on the electronic control P.C. board. (5) Remove the electronic control P.C. board. (6) Remove the R.L holder. (7) Open the R.L holder and remove the power monitor, receiver P.C. board.	Photo 2 Indoor electronic control P.C. board Screw of the terminal block Screw of the electrical cover R.L holder Power monitor, receiver P.C. board

OPERATING PROCEDURE

3. Removing the electrical box

- (1) Remove the front panel. (Refer to 1)
- (2) Remove the electrical cover. (Refer to 2)
- (3) Disconnect the connector of the indoor coil thermistor (CN112).
- (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 ground wire.
- (6) Remove the fan motor lead wire and indoor coil thermistor lead wire from the electrical box.
- (7) Remove the lead wire of vane motor from the bottom of electrical box.
- (8) Remove the R.L holder.
- (9) Remove the screw of the conduit cover.
- (10) Pull down the conduit cover and remove it.
- (11) Remove the screw of the conduit plate and remove the conduit plate.
- (12) Remove the screw fixing the electrical box, remove the electrical box.

4. Removing the vane motor

- (1) Remove the front panel. (Refer to 1)
- (2) Remove the electrical box. (Refer to 3)
- (3) Pull out the drain hose from the nozzle assembly, remove the nozzle assembly.
- (4) Remove the screws (both upper and lower) of the vane motor, disconnect the connector.
- (5) Remove the vane motor.

PHOTOS

Photo 3

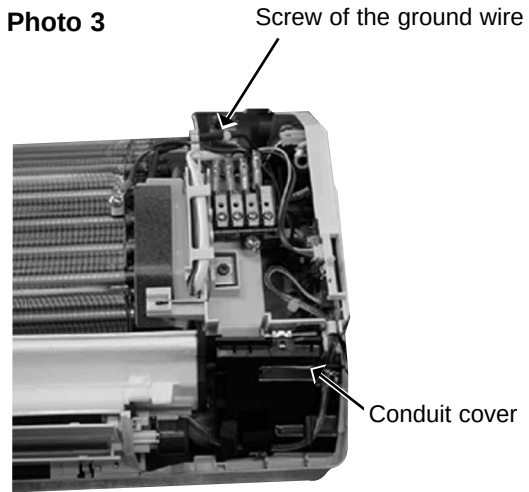


Photo 4

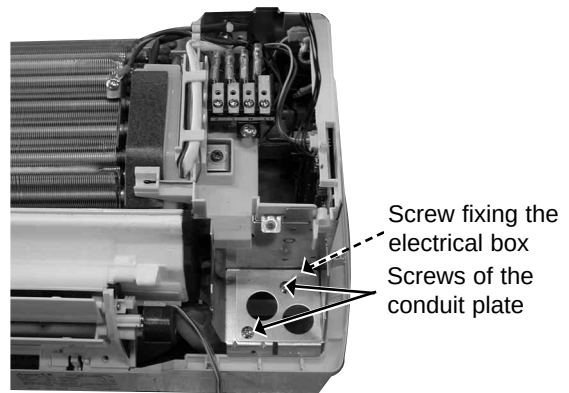
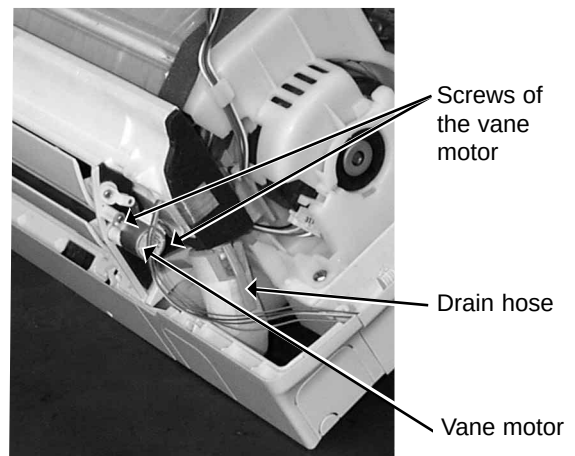
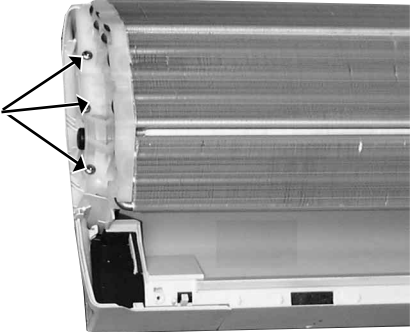
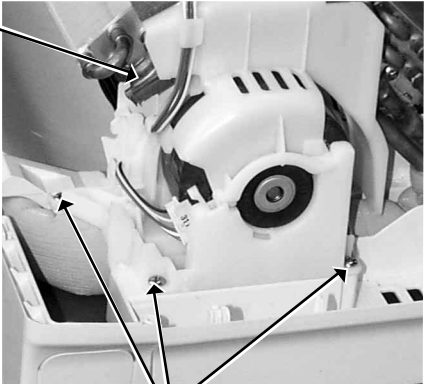
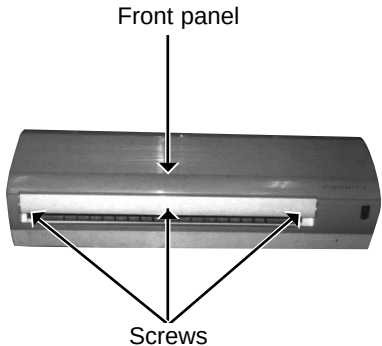
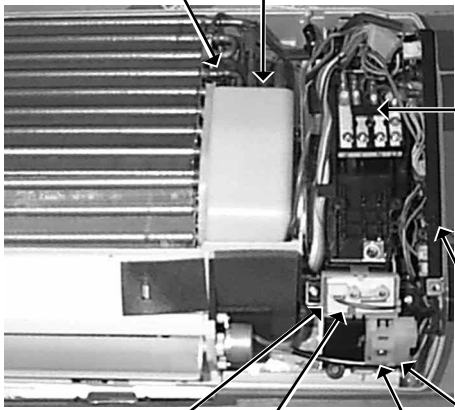


Photo 5

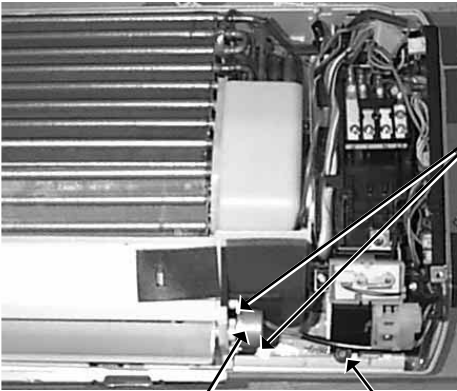
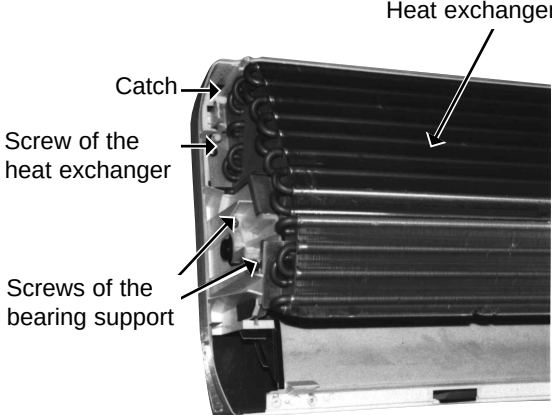
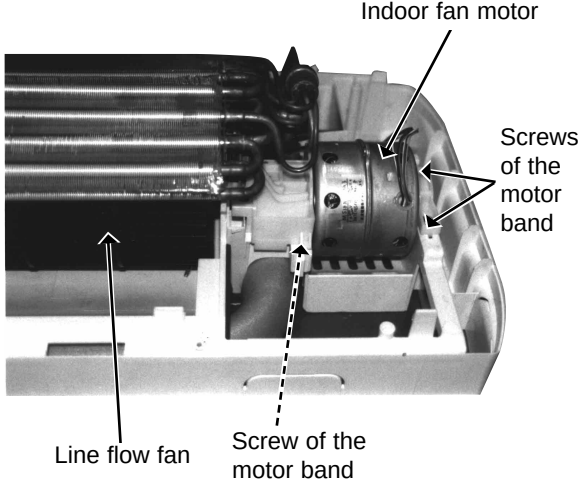


OPERATING PROCEDURE	PHOTOS
5. Removing the line flow fan and the indoor fan motor (1) Remove the front panel. (Refer to 1) (2) Remove the electrical box. (Refer to 3) (3) Pull out the drain hose from the nozzle assembly, remove the nozzle assembly. (4) Remove the hexagon socket set screw from the line flow fan. (5) Remove the screws fixing the fan motor, remove the fan motor. (6) Remove the screws fixing the left side of the heat exchanger. (7) Lifting the left side of the heat exchanger. (8) Remove the line flow fan.	Photo 6  Screws fixing the left side of the heat exchanger Photo 7  Indoor coil thermistor Screws of the fan motor

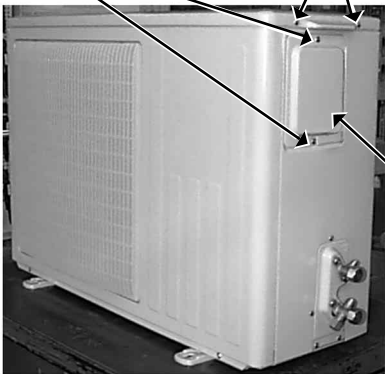
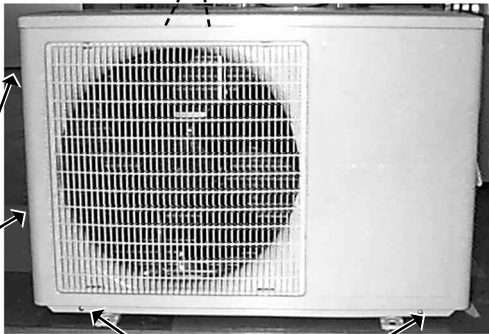
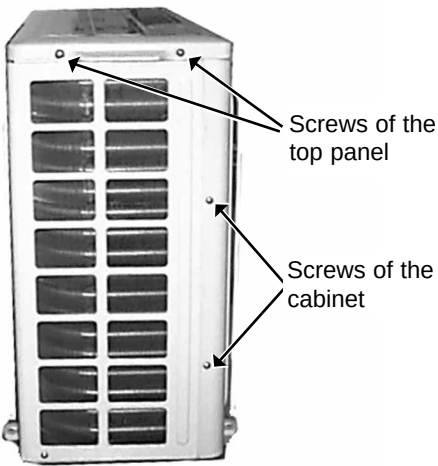
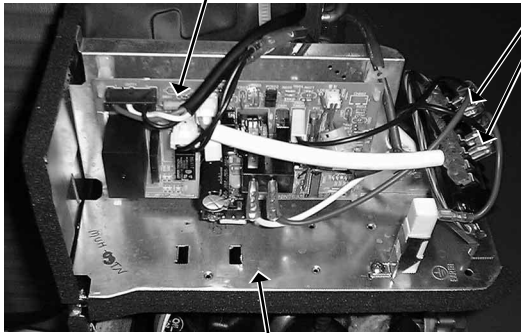
13-2. MSH12TN MSH15TN MSH17TN MSH12TN - [U1] MSH15TN - [U1] MSH17TN - [U1] INDOOR UNIT

OPERATING PROCEDURE	PHOTOS
1. Removing the front panel (1) Remove the screw caps at the bottom of the front panel. Remove the screws. (2) Pull the panel down to your side slightly and unhook the catches at the top.	Photo 1  Front panel Screws
2. Removing the electronic control P.C. board, the receiver P.C. board and the display P.C. board (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.	Photo 2  Screw of the ground wire Indoor coil thermistor Screw of the terminal block Indoor electronic control P.C. board Lamp holder Display P.C. board Receiver P.C. board Receiver holder

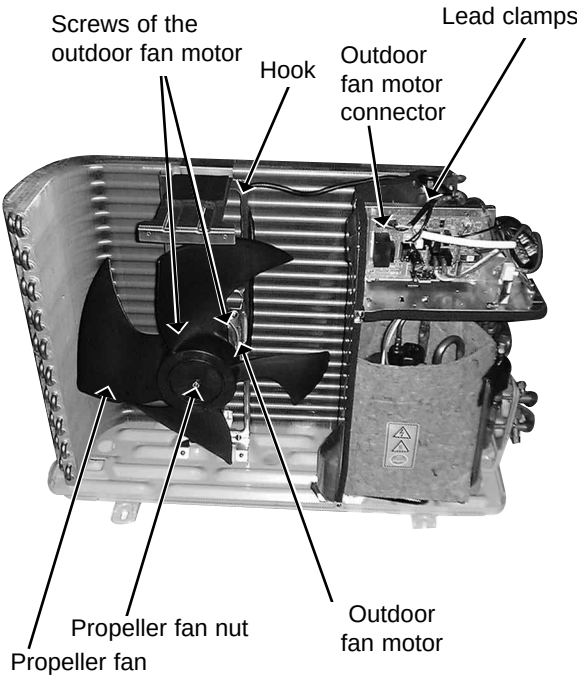
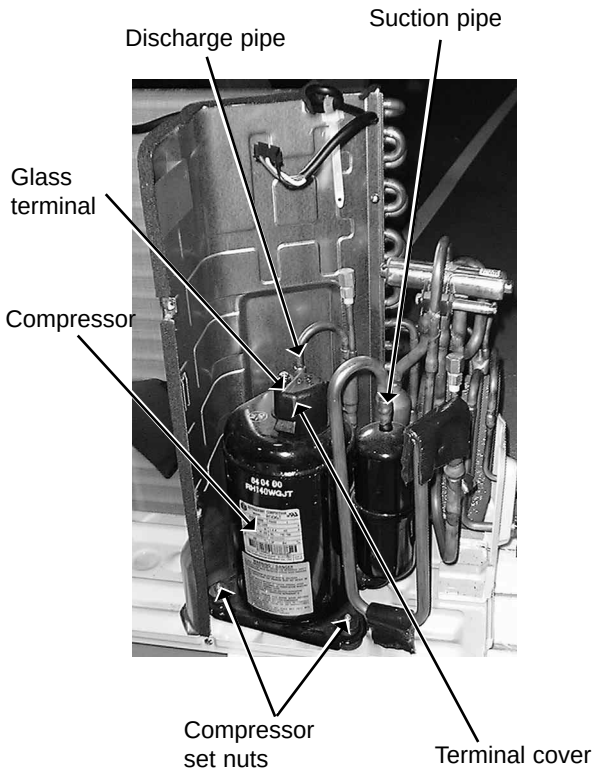


OPERATING PROCEDURE	PHOTOS
3. Removing the electrical box (1) Remove the front panel. (Refer to 1) (2) Remove the electrical cover. (3) Remove the connector of the indoor coil thermistor (CN112). (4) Remove the motor connector and the vane motor connector (CN151) on the electronic control P.C. board. (5) Remove the screw of the electrical box, remove the electrical box.	Photo 3  Screws of the vane motor Vane motor Screw of the electrical cover
4. Removing the vane motor (1) Remove the front panel. (Refer to 1) (2) Remove the electrical box. (Refer to 3) (3) Pull out the drain hose from the nozzle assembly, remove the nozzle assembly. (4) Remove the screws (both upper and lower) of the vane motor, disconnect the connector. (5) Remove the vane motor.	Photo 4  Heat exchanger Catch Screw of the heat exchanger Screws of the bearing support
5. Removing the indoor fan motor and the line flow fan (1) Remove the front panel. (Refer to 1) (2) Remove the electrical box. (3) Unhook the catch 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 and 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 5  Indoor fan motor Screws of the motor band Line flow fan Screw of the motor band

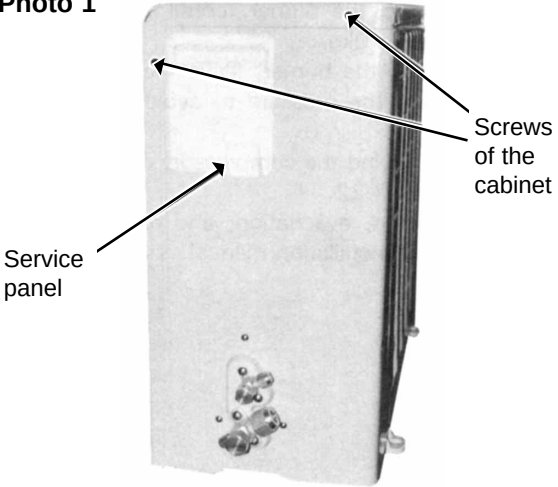
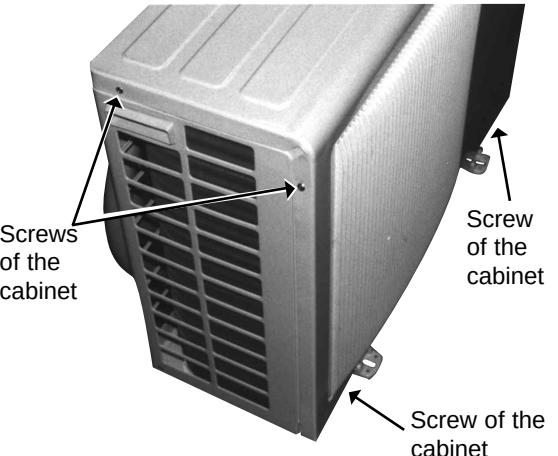
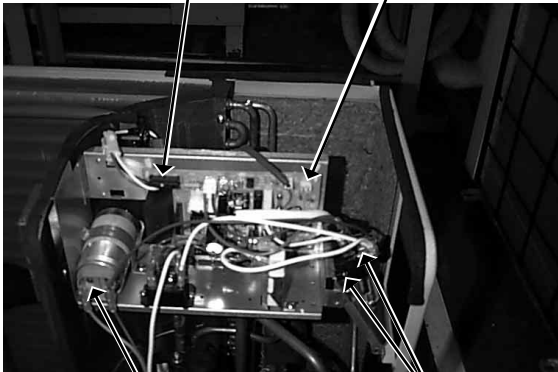
13-3. MUH09TW MUH12TN MUH09TW - U1 MUH12TN - U1 MUH12TN - U2 OUTDOOR UNIT

OPERATING PROCEDURE	PHOTOS
1. Removing the cabinet (1) Remove the screws of the top panel. (2) Remove the screw of the service panel. (3) Remove the screws of the cabinet. (4) Remove the screws of the front panel and motor support. (5) Remove the service panel, and remove the screw from the insides. (6) Remove the top panel. (7) Remove the cabinet. Photo 3 Screws of the service panel Screws of the top panel Service panel 	Photo 1 Screws of the front panel and motor support Screws of the cabinet  Photo 2 Screws of the top panel Screws of the cabinet 
2. Removing the deicer P.C. board (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.	Photo 4 Deicer P.C. board Terminal block Relay panel 

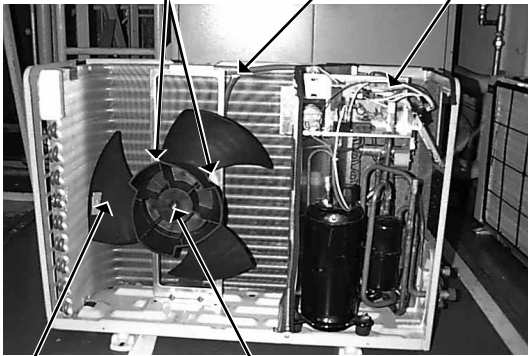
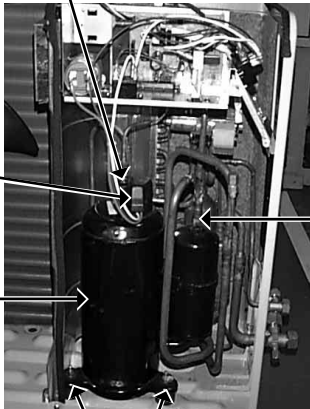


OPERATING PROCEDURE	PHOTOS
3. Removing the propeller fan and the outdoor fan motor (1) Remove the cabinet. (Refer to 1.) (2) Remove the propeller fan nut. (3) Remove the propeller fan. NOTE : Loose the propeller fan in the rotating direction for removal. When attaching the propeller fan, align the mark 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. (4) Remove lead clamps and disconnect the outdoor fan motor connector. (5) Remove screws fixing the fan motor. (6) Remove the outdoor fan motor.	Photo 5 
4. Removing the compressor (1) Remove the cabinet. (Refer to 1) (2) Remove the relay panel. (3) Remove the soundproof felt. (4) Remove the terminal cover on the compressor. (5) Disconnect lead wires from the glass terminal of the compressor. (6) Recover gas from the refrigerant circuit. (7) Disconnect the welded part of the discharge pipe. (8) Disconnect the welded part of the suction pipe. (9) Remove nuts fixing the compressor. (10) Remove the compressor. NOTE ● Before using the torch, reclaim gas from the pipes until the pressure gauge shows 0 PSIG. ● Use the torch under the condition that gas can be recovered even when the inner pressure rises by heat. ● Reclaim all refrigerant in an environmentally acceptable manner.	Photo 6 

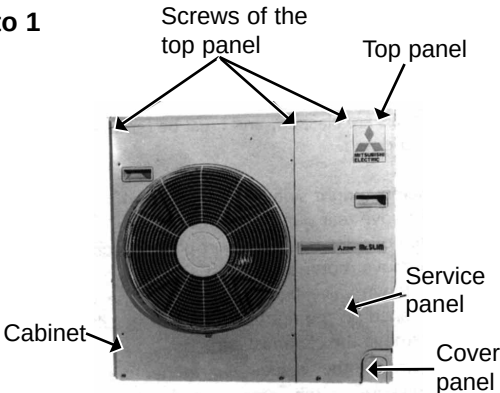
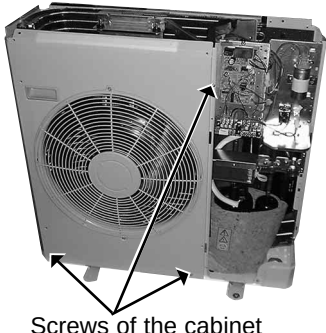
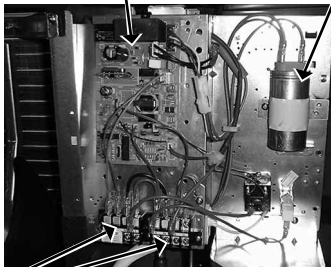
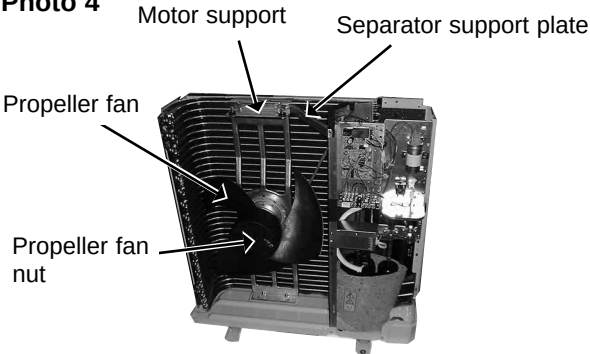
13-4. MUH15TN MUH15TN - U1 MUH15TN - U2 OUTDOOR UNIT

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



OPERATING PROCEDURE	PHOTOS
3. Removing the propeller fan and the outdoor fan motor (1) Remove the cabinet. (Refer to 1) (2) Disconnect the connector and remove the lead clamps of the fan motor lead wires. (3) Remove the propeller fan nut and the propeller fan. NOTE: Loosen 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. (4) Remove the screws fixing the outdoor fan motor and the outdoor fan motor.	Photo 4 Screws of the outdoor fan motor Lead clamp Connector  Propeller fan Propeller fan nut
4. Removing the compressor (1) Remove the cabinet. (Refer to 1) (2) Remove the sound proof felt. (3) Remove the terminal cover on the compressor. (4) Disconnect lead wires from the glass terminal of the compressor. (5) Recover gas from the refrigerant circuit. (6) Detach the welded part of the discharge pipe. (7) Detach the welded part of the suction pipe. (8) Remove the nuts fixing the compressor. (9) Remove the compressor. NOTE ● Before using the torch, reclaim gas from the pipes until the pressure gauge shows 0 PSIG. ● Use the torch under the condition that gas can be recovered even when the inner pressure rises by heat. ● Reclaim all refrigerant in an environmentally acceptable manner.	Photo 5 Discharge pipe  Terminal cover Suction pipe Compressor Compressor nuts

13-5. MUH17TN MUH17TN - U1 OUTDOOR UNIT

OPERATING PROCEDURE	PHOTOS
1. Removing the cabinet (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.	Photo 1  Photo 2 
2. Removing the deicer P.C. board (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.	Photo 3 
3. Removing the propeller fan and the outdoor fan motor (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.	Photo 4 

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.

NOTE

- Before using the torch, reclaim gas from the pipes until the pressure gauge shows 0 PSIG.
- Use the torch under the condition that gas can be recovered even when the inner pressure rises by heat.
- Reclaim all refrigerant in an environmentally acceptable manner.

PHOTOS

Photo 5

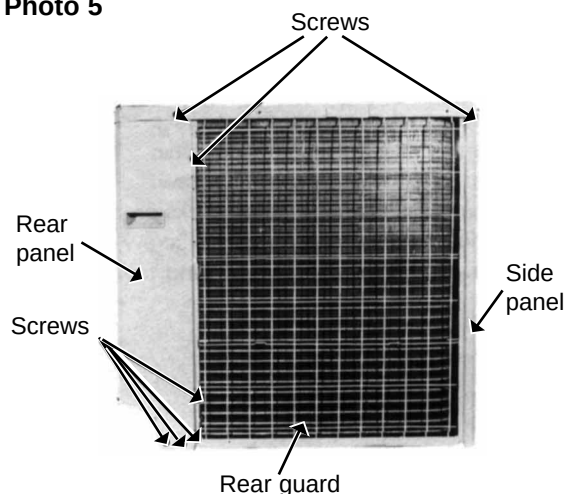


Photo 6

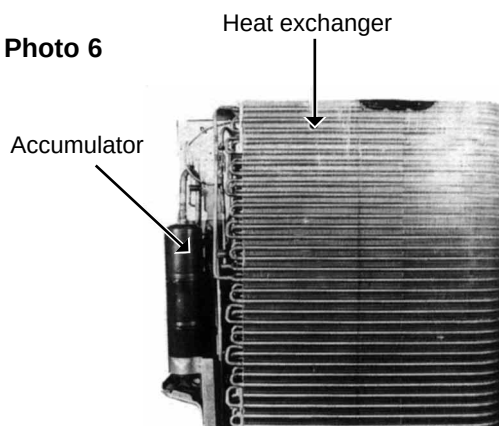
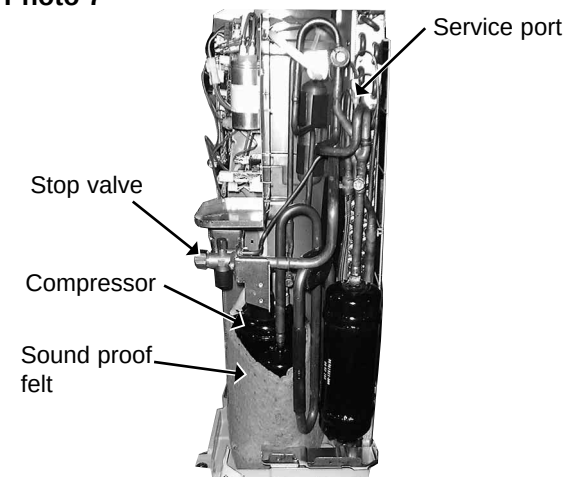
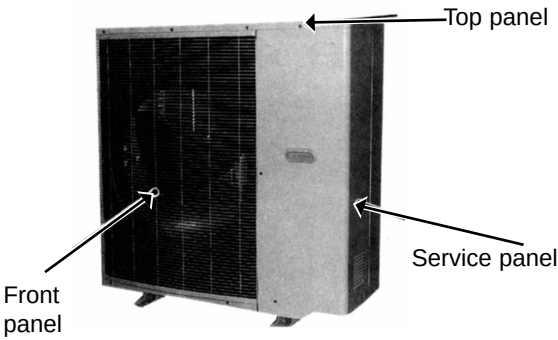
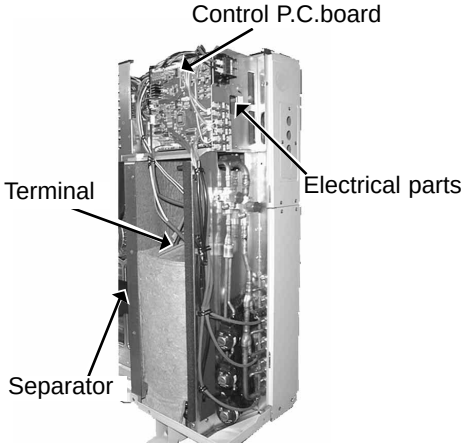
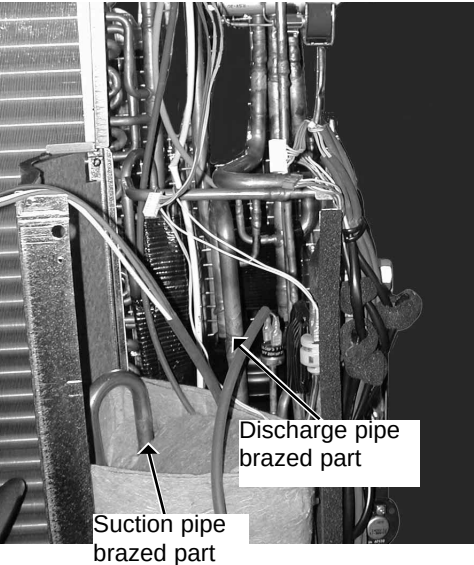


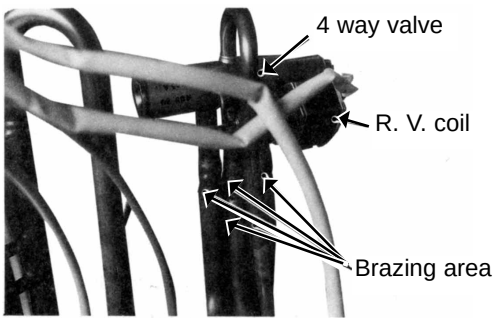
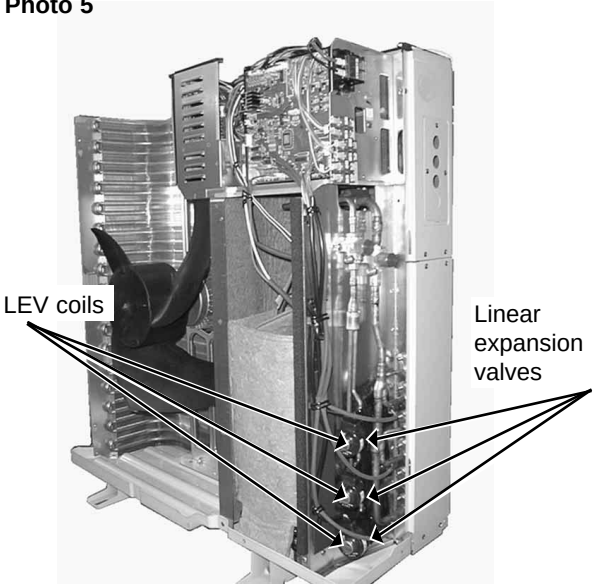
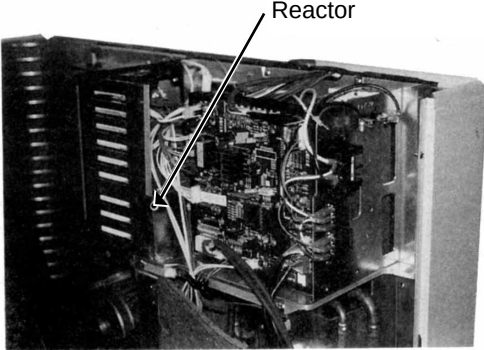
Photo 7



13-6. MXZ30TN MXZ30TN2
OUTDOOR UNIT

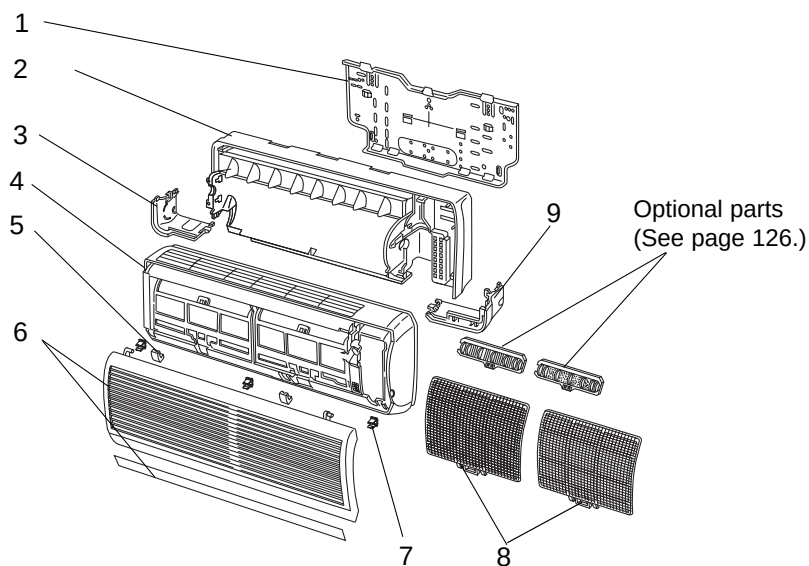
OPERATING PROCEDURE	PHOTOS
1.Removing the compressor (1)Remove the screws of the service panel, and remove it. Recover refrigerant gas. (2)Remove the screws of the top panel , and remove it. (3)Remove the screws of the front panel , and remove it. (4)Disconnect the compressor lead wire.(TAB64,TAB65,TAB66) (5)Disconnect the outdoor electronic control P.C. board connectors CN791, CN792, CN793, CN794, CN662, CN722, and CN661.Disconnect the noise filter P.C. board connectors CN913. (6)Remove the four screws of the electrical parts , and remove them. (7)Remove the propeller. (8)Remove the screws of the separator, and remove it. (9)Detach the brazed joints of the compressor suction and discharge pipes.(See Photo 3.) (10)Remove the three compressor nuts and remove the compressor.	Photo 1  Top panel Service panel Front panel Photo 2  Control P.C.board Electrical parts Terminal Separator
Photo 3  Discharge pipe brazed part Suction pipe brazed part	
2.Removing the fan motor (1)Remove the top panel(five screws),the service panel(four screws),and the front panel (two screws).(See Photo 1.) (2)Disconnect the connector CN911 on the outdoor controller board. (3)Remove the propeller. (4)Remove the fan motor.	



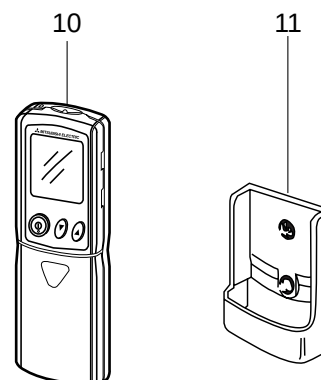
OPERATING PROCEDURE	PHOTOS
3.Removing the 4-way valve (1)Remove the screws of the top panel , and remove it. (See Photo 1.) (2)Remove the service panel,rear panel,and connect cover panel.Recover refrigerant gas. (3)Remove the electrical parts.(See Photo 2.) (4)Detach the brazed joint of 4-way valve and pipe. (See Photo 4.)	Photo 4 
4.Removing the linear expansion valve (1)Remove the service panel.(See Photo 1.) (Gas recover is not required if the unit is pumped down.) (2)Remove the coil of linear expansion valve.(See Photo 5.) (3)Detach the brazed joint of linear expansion valve and pipe.	Photo 5 
5.Removing the reactor (1)Remove the five screws of the top panel , and remove it. (See Photo 1.) (2)Disconnect the reactor lead wire. (3)Remove the two screws of the reactor , and take it out.	Photo 6 

MSH09TW (W) MSH09TW - **U1** (W)

14-1. INDOOR UNIT STRUCTURAL PARTS



14-2. ACCESSORY AND REMOTE CONTROLLER



14-1. INDOOR UNIT STRUCTURAL PARTS

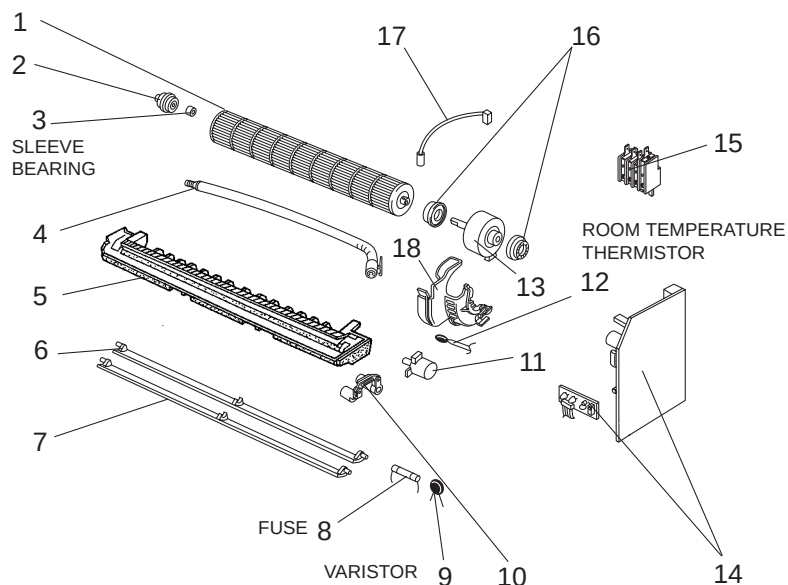
NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
				MSH09TW (W)	MSH09TW- U1 (W)	
1	E02 408 970	INSTALLATION PLATE		1	1	
2	E02 409 234	BOX(W)		1	1	
3	E02 409 976	CORNER BOX LEFT (W)		1	1	
4	E02 424 000	FRONT PANEL ASSEMBLY(W)		1	1	Including 5,6,7
5	E02 409 067	SCREW CAP(W)		2	2	2PCS/SET
6	E02 424 010	GRILLE(W)		1	1	
7	E02 408 142	CATCH (W)		3	3	3PCS/SET
8	E02 408 100	AIR FILTER		2	2	
9	E02 409 975	CORNER BOX RIGHT (W)		1	1	

14-2. ACCESSORY AND REMOTE CONTROLLER

10	E02 545 426	REMOTE CONTROLLER		1	1	
11	E02 527 083	REMOTE CONTROLLER HOLDER		1	1	

MSH09TW (W) MSH09TW -U1 (W)

14-3. INDOOR UNIT ELECTRICAL PARTS AND FUNCTIONAL PARTS



14-4. INDOOR UNIT HEAT EXCHANGER

14-3. INDOOR UNIT ELECTRICAL PARTS AND FUNCTIONAL PARTS

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

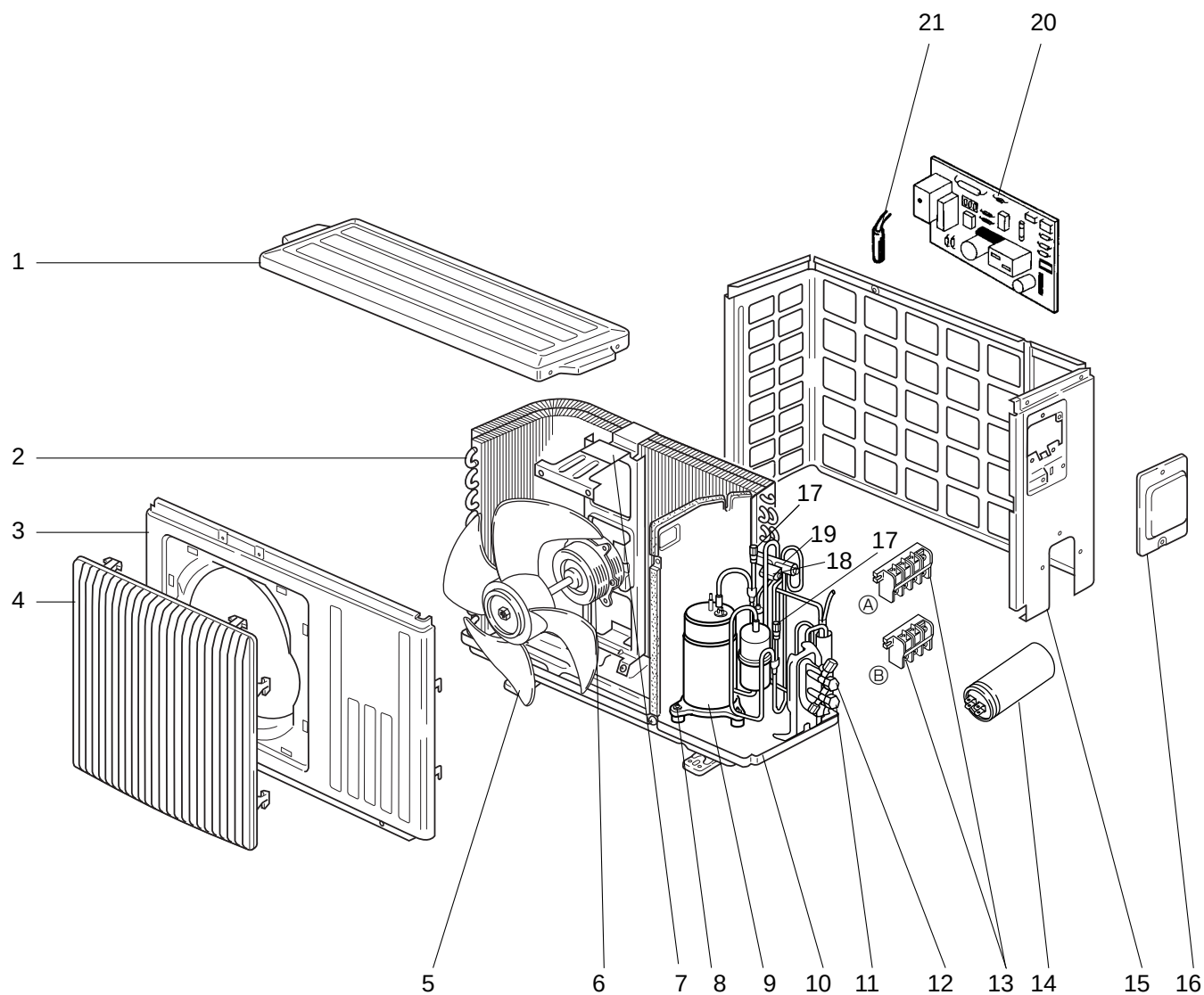
NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
				MSH09TW (W)	MSH09TW- <u>U1</u> (W)	
1	E02 408 302	LINE FLOW FAN		1	1	
2	E02 408 509	BEARING MOUNT		1	1	
3	E02 001 504	SLEEVE BEARING		1	1	
4	E02 408 702	DRAIN HOSE		1	1	
5	E02 409 235	NOZZLE(W)		1	1	
6	E02 409 040	VANE UPPER (W)		1	1	
7	E02 409 041	VANE LOWER (W)		1	1	
8	E02 268 382	FUSE	F11	1	1	250V/3A
9	E02 268 385	VARISTOR	NR11	1	1	
10	E02 408 034	VANE CRANK SET		1	1	
11	E02 408 303	VANE MOTOR	MV	1	1	
12	E02 541 308	ROOM TEMPERATURE THERMISTOR	RT11	1	1	
13	E02 268 300	INDOOR FAN MOTOR	MF	1	1	RC4W19- □□
14	E02 545 452	ELECTRONIC CONTROL P.C. BOARD		1	1	AUTO RESTART
15	E02 545 375	TERMINAL BLOCK	TB	1	1	
16	E02 151 505	FAN MOTOR RUBBER MOUNT		2	2	2PCS/SET
17	E02 408 307	INDOOR COIL THERMISTOR	RT12	1	1	
18	E02 408 333	MOTOR BAND		1	1	

14-4. INDOOR UNIT HEAT EXCHANGER

19	E02 408 620	INDOOR HEAT EXCHANGER		1	1	
20	E02 151 667	UNION(LIQUID)		1	1	φ 1/4
21	E02 151 666	UNION(GAS)		1	1	φ 3/8

MUH09TW MUH12TN MUH09TW - U1 MUH12TN - U1 MUH12TN - U2

14-5. OUTDOOR UNIT STRUCTURAL PARTS, ELECTRICAL PARTS AND FUNCTIONAL PARTS



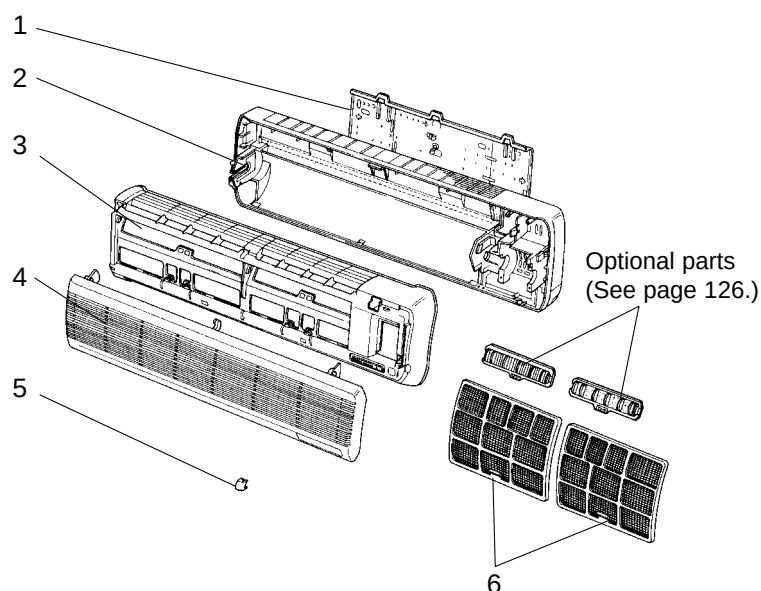
MUH09TW MUH12TN MUH09TW -^[U1] MUH12TN -^[U1] MUH12TN -^[U2]

14-5. OUTDOOR UNIT STRUCTURAL PARTS, ELECTRICAL PARTS AND FUNCTIONAL PARTS

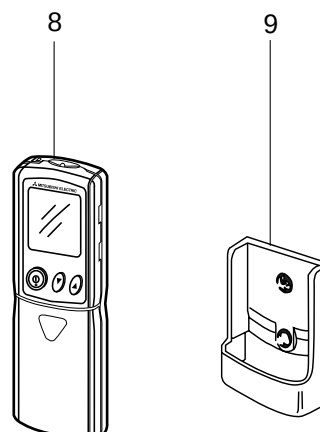
Part numbers that are circled are not shown in the illustration.

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit					Remarks
				MUH09 TW	MUH09 TW - ^[U1]	MUH12 TN	MUH12 TN - ^[U1]	MUH12 TN - ^[U2]	
1	E02 336 297	TOP PANEL		1	1	1	1	1	
2	E02 442 630	OUTDOOR HEAT EXCHANGER		1	1	1	1		
	E02 812 630	OUTDOOR HEAT EXCHANGER						1	
3	E02 336 232	CABINET		1	1	1	1	1	
4	E02 336 521	GRILLE		1	1	1	1	1	
5	E02 336 501	PROPELLER FAN		1	1				
6	E02 545 301	OUTDOOR FAN MOTOR	MF			1	1	1	RA6W21-□□
	E02 547 301	OUTDOOR FAN MOTOR	MF	1	1	1	1	1	RA6N32-□□
7	E02 442 515	MOTOR SUPPORT		1	1	1	1	1	
8	E02 336 506	COMPRESSOR RUBBER SET		3	3				3RUBBERS/SET
	E02 075 506	COMPRESSOR RUBBER SET				3	3	3	3RUBBERS/SET
9	E02 289 900	COMPRESSOR	MC	1	1				RH140WGJT
	E02 282 900	COMPRESSOR	MC			1	1	1	RH189NHDT
10	E02 339 290	BASE		1	1				
	E02 340 290	BASE				1	1	1	
11	E02 339 661	STOP VALVE(GAS)		1	1				φ 3/8
	E02 340 661	STOP VALVE(GAS)				1	1	1	φ 1/2
12	E02 139 662	STOP VALVE(LIQUID)		1	1	1	1	1	φ 1/4
13	E02 545 374	TERMINAL BLOCK	TB2	1	1				4P FIGURE [Ⓐ]
	E02 546 374	TERMINAL BLOCK	TB1	1	1				3P FIGURE [Ⓑ]
	E02 480 374	TERMINAL BLOCK	TB2			1	1	1	4P FIGURE [Ⓐ]
	E02 481 374	TERMINAL BLOCK	TB1			1	1	1	4P FIGURE [Ⓐ]
14	E02 545 353	COMPRESSOR CAPACITOR	C1	1	1				70μF/220VAC
	E02 543 353	COMPRESSOR CAPACITOR	C1			1	1	1	30μF/370VAC
15	E02 545 233	BACK PANEL		1	1	1	1	1	
16	E02 541 245	SERVICE PANEL		1	1	1	1	1	
17	E07 001 641	SERVICE PORT		2	2	2	2	2	
18	E02 545 490	R.V. COIL	21S4	1	1				
	E02 547 490	R.V. COIL	21S4			1	1	1	
19	E02 282 961	4-WAY VALVE		1	1	1	1	1	
20	E02 545 451	DEICER P.C. BOARD		1					
	E02 546 451	DEICER P.C. BOARD			1				
	E02 547 451	DEICER P.C. BOARD				1			
	E02 550 451	DEICER P.C. BOARD					1	1	
21	E02 289 310	DEFROST THERMISTOR	RT61	1	1	1	1	1	
22	E02 156 936	CAPILLARY TUBE CT1 (MSH09/12)		2	2	2	2	2	φ 0.12Xφ 0.055X19-11/16
	E02 340 936	CAPILLARY TUBE CT2 (MSH09)		1	1				φ 0.12Xφ 0.063X17-11/16
	E02 515 937	CAPILLARY TUBE CT3 (MSH09)		1	1				φ 0.12Xφ 0.063X31-1/2
	E02 442 936	CAPILLARY TUBE CT2 (MSH12)				1	1	1	φ 0.12Xφ 0.071X11-13/16
23	E02 282 383	SURGE ABSORBER	DSAR	1	1				
	E02 128 383	SURGE ABSORBER	DSAR			1	1	1	
24	E02 474 642	FUSIBLE PLUG		1	1	1	1	1	
25	E02 013 382	FUSE	F61	1	1	1	1	1	2A
26	E02 282 385	VARISTOR	NR61	1	1	1	1	1	
27	E02 154 642	CHECK VALVE		1	1				
28	E02 290 309	AMBIENT TEMPERATURE THERMISTOR	RT63		1		1	1	

MSH12TN (W) MSH12TN - U1 (W)
 MSH15TN (W) MSH15TN - U1 (W)
 MSH17TN (W) MSH17TN - U1 (W)
14-6. INDOOR UNIT STRUCTURAL PARTS



14-7. ACCESSORY AND REMOTE CONTROLLER



14-6. 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 12TN (W)	MSH 12TN - U1 (W)	MSH 15TN (W)	MSH 15TN - U1 (W)	MSH 17TN (W)	MSH 17TN - U1 (W)	
1	E02 141 970	INSTALLATION PLATE		1	1	1	1	1	1	
2	E02 143 234	BOX(W)		1	1	1	1	1	1	
3	E02 138 000	FRONT PANEL ASSEMBLY(W)		1	1	1	1	1	1	Including 4,5
4	E02 138 010	GRILLE(W)		1	1	1	1	1	1	
5	E02 143 067	SCREW CAP(W)		3	3	3	3	3	3	3PCS/SET
6	E02 141 100	AIR FILTER		2	2	2	2	2	2	
⑦	E02 470 007	LAMP PANEL(W)		1	1	1	1	1	1	

14-7. ACCESSORY AND REMOTE CONTROLLER

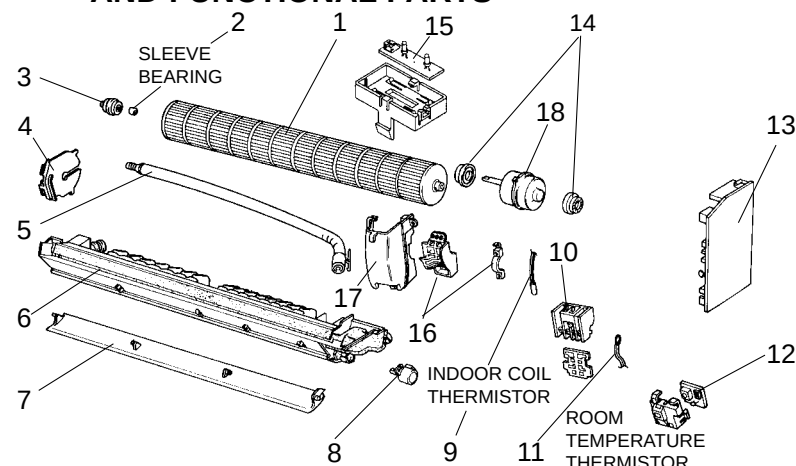
8	E02 545 426	REMOTE CONTROLLER		1	1	1	1	1	1	
9	E02 527 083	REMOTE CONTROLLER HOLDER		1	1	1	1	1	1	

MSH12TN (W) MSH12TN - ☐U1 (W)

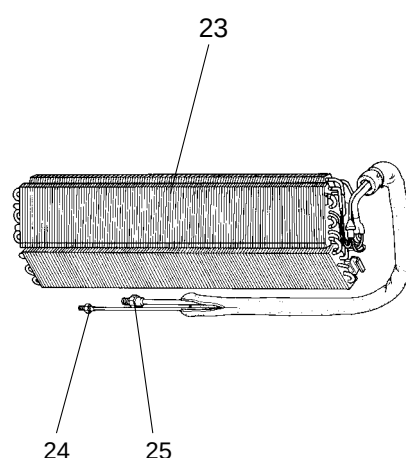
MSH15TN (W) MSH15TN - ☐U1 (W)

MSH17TN (W) MSH17TN - ☐U1 (W)

14-8. INDOOR UNIT ELECTRICAL PARTS AND FUNCTIONAL PARTS



14-9. INDOOR UNIT HEAT EXCHANGER



14-8. INDOOR UNIT 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
				MSH 12TN (W)	MSH 12TN - ☐ U1 (W)	MSH 15TN (W)	MSH 15TN - ☐ U1 (W)	MSH 17TN (W)	MSH 17TN - ☐ U1 (W)	
1	E02 141 302	LINE FLOW FAN		1	1	1	1	1	1	
2	E02 001 504	SLEEVE BEARING		1	1	1	1	1	1	
3	E02 141 509	BEARING MOUNT		1	1	1	1	1	1	
4	E02 494 512	BEARING SUPPORT		1	1	1	1	1	1	
5	E02 408 702	DRAIN HOSE		1	1	1	1	1	1	
6	E02 143 235	NOZZLE(W)		1	1	1	1	1	1	
7	E02 143 040	VANE(W)		1	1	1	1	1	1	
8	E02 141 303	VANE MOTOR	MV	1	1	1	1	1	1	
9	E02 138 307	INDOOR COIL THERMISTOR	RT12	1	1	1	1	1	1	
10	E02 289 375	TERMINAL BLOCK	TB	1	1	1	1	1	1	
11	E02 138 308	ROOM TEMPERATURE THERMISTOR	RT11	1	1	1	1	1	1	
12	E02 141 468	RECEIVER P.C. BOARD		1	1	1	1	1	1	
	E02 282 450	ELECTRONIC CONTROL P.C. BOARD		1	1					
13	E02 283 450	ELECTRONIC CONTROL P.C. BOARD				1	1			
	E02 284 450	ELECTRONIC CONTROL P.C. BOARD						1	1	
14	E02 001 505	FAN MOTOR RUBBER MOUNT		2	2	2	2	2	2	2PCS/SET
15	E02 138 329	DISPLAY P.C. BOARD		1	1	1	1	1	1	
16	E02 138 333	MOTOR BAND ASSEMBLY		1	1	1	1	1	1	
17	E02 542 541	WATER CUT		1	1	1	1	1	1	
18	E02 270 300	INDOOR FAN MOTOR	MF	1	1	1	1			RA4W18-□□
	E02 272 300	INDOOR FAN MOTOR	MF					1	1	RA4W23-□□
19	E02 270 452	AUTO RESTART ASSEMBLY		1	1	1	1	1	1	
20	E02 268 382	FUSE	F11	1	1	1	1	1	1	250V/3A
21	E02 268 385	VARISTOR	NR11	1	1	1	1	1	1	
22	E02 475 383	SURGE ABSORBER	DSAR	1	1	1	1	1	1	

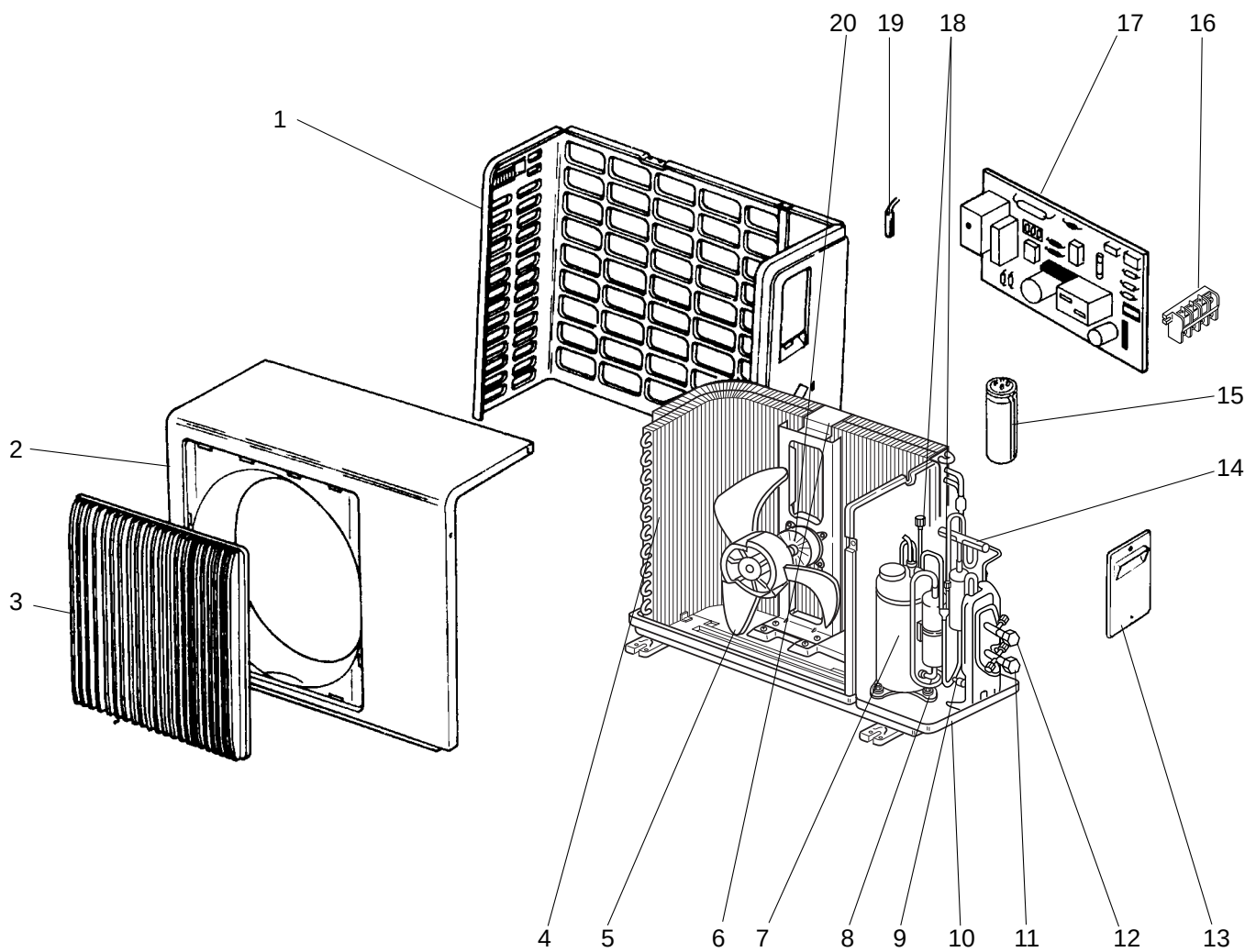
14-9. INDOOR UNIT HEAT EXCHANGER

23	E02 141 620	INDOOR HEAT EXCHANGER		1	1	1	1	1	1	
24	E02 138 667	UNION(LIQUID)		1	1	1	1	1	1	φ1/4
	E02 179 667	UNION(GAS)		1	1					φ1/2
25	E02 138 666	UNION(GAS)				1	1	1	1	φ5/8

MUH15TN MUH15TN -U1 MUH15TN -U2

14-10. OUTDOOR UNIT

STRUCTURAL PARTS, ELECTRICAL PARTS AND FUNCTIONAL PARTS



MUH15TN MUH15TN - ☐ U1 MUH15TN - ☐ U2

14-10. OUTDOOR UNIT

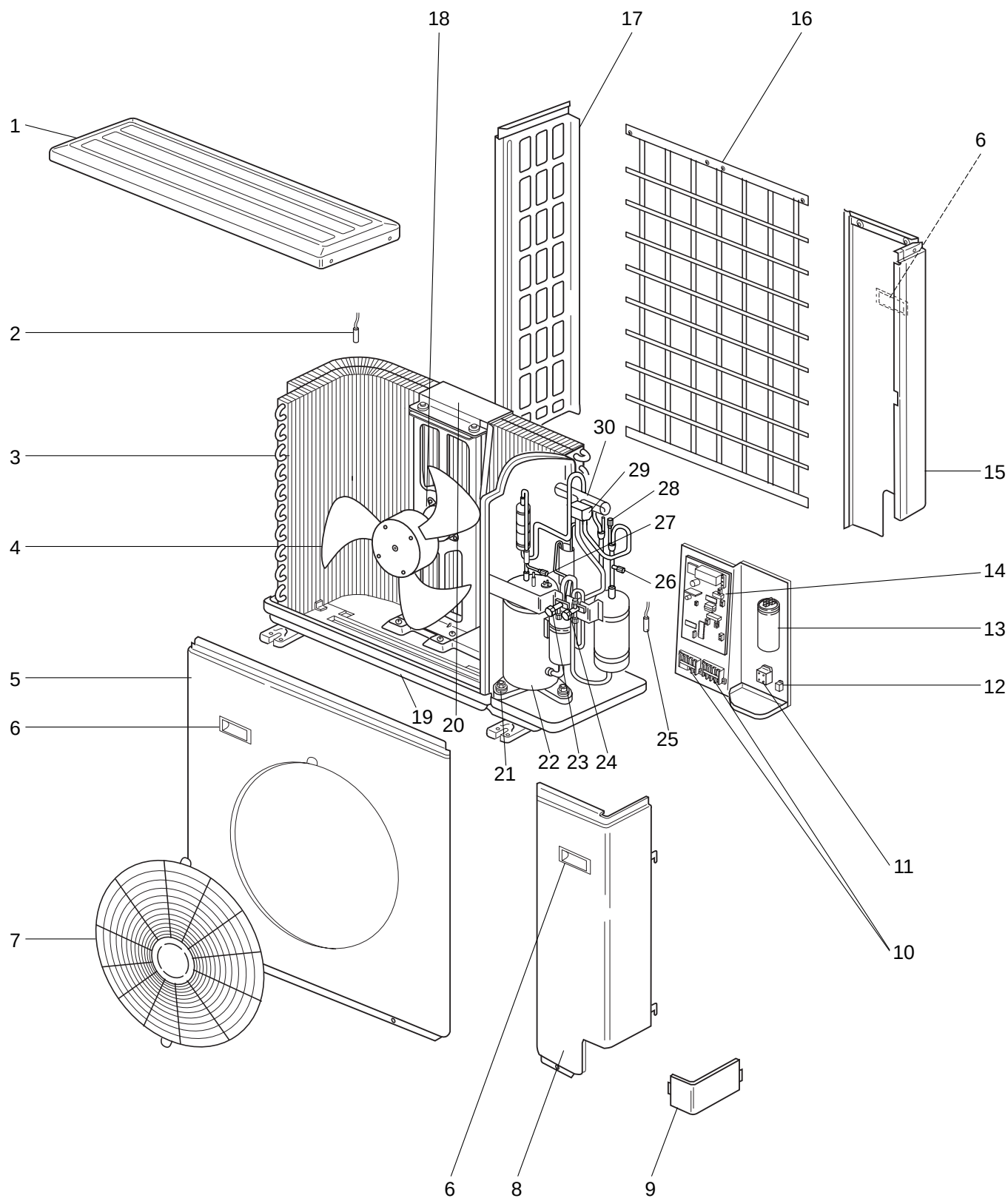
STRUCTURAL PARTS, ELECTRICAL PARTS AND FUNCTIONAL PARTS

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

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit			Remarks
				MUH15TN	MUH15TN - ☐ U1	MUH15TN - ☐ U2	
1	E02 475 233	BACK PANEL		1	1	1	
2	E02 141 232	CABINET		1	1	1	
3	E02 141 521	GRILLE		1	1	1	
4	E02 283 630	OUTDOOR HEAT EXCHANGER		1	1		
	E02 812 630	OUTDOOR HEAT EXCHANGER				1	
5	E02 141 501	PROPELLER FAN		1	1	1	
6	E02 496 515	MOTOR SUPPORT		1	1	1	
7	E02 271 900	COMPRESSOR	MC	1	1	1	RH207NHDT
8	E02 075 506	COMPRESSOR RUBBER SET		3	3	3	3RUBBERS/SET
9	E02 474 642	FUSIBLE PLUG		1	1	1	
10	E02 156 290	BASE		1	1	1	
11	E02 150 661	STOP VALVE(GAS)		1	1	1	φ5/8
12	E02 139 662	STOP VALVE(LIQUID)		1	1	1	φ1/4
13	E02 270 245	SERVICE PANEL		1	1	1	
14	E02 282 961	4-WAY VALVE		1	1	1	
15	E02 543 353	COMPRESSOR CAPACITOR	C1	1	1	1	30μF/370VAC
16	E02 480 374	TERMINAL BLOCK	TB2	1	1	1	4P
	E02 481 374	TERMINAL BLOCK	TB1	1	1	1	4P
17	E02 480 451	DEICER P.C. BOARD		1			
	E02 481 451	DEICER P.C. BOARD			1	1	
18	E07 001 641	SERVICE PORT		2	2	2	
19	E02 440 310	DEFROST THERMISTOR	RT61	1	1	1	
20	E02 270 301	OUTDOOR FAN MOTOR	MF	1	1	1	RA6N50-□□
21	E02 282 340	COMPRESSOR CONTACTOR	52C	1	1	1	
	E02 282 937	CAPILLARY TUBE CT2		1	1	1	φ0.12Xφ0.079X7-7/8
22	E02 282 936	CAPILLARY TUBE CT1		2	2	2	φ0.12Xφ0.055X11-13/16
	E02 238 936	CAPILLARY TUBE CT3		1	1	1	φ0.12Xφ0.079X23-5/8
23	E02 172 490	R.V. COIL	21S4	1	1	1	
24	E02 466 383	SURGE ABSORBER	DSAR	1	1	1	
25	E02 013 382	FUSE	F61	1	1	1	2A
26	E02 282 385	VARISTOR	NR61	1	1	1	
27	E02 154 642	CHECK VALVE		1	1	1	
28	E02 285 309	AMBIENT TEMPERATURE THERMISTOR	RT63		1	1	

MUH17TN MUH17TN - U1

14-11. OUTDOOR UNIT STRUCTURAL PARTS, ELECTRICAL PARTS AND FUNCTIONAL PARTS



MUH17TN MUH17TN - U1

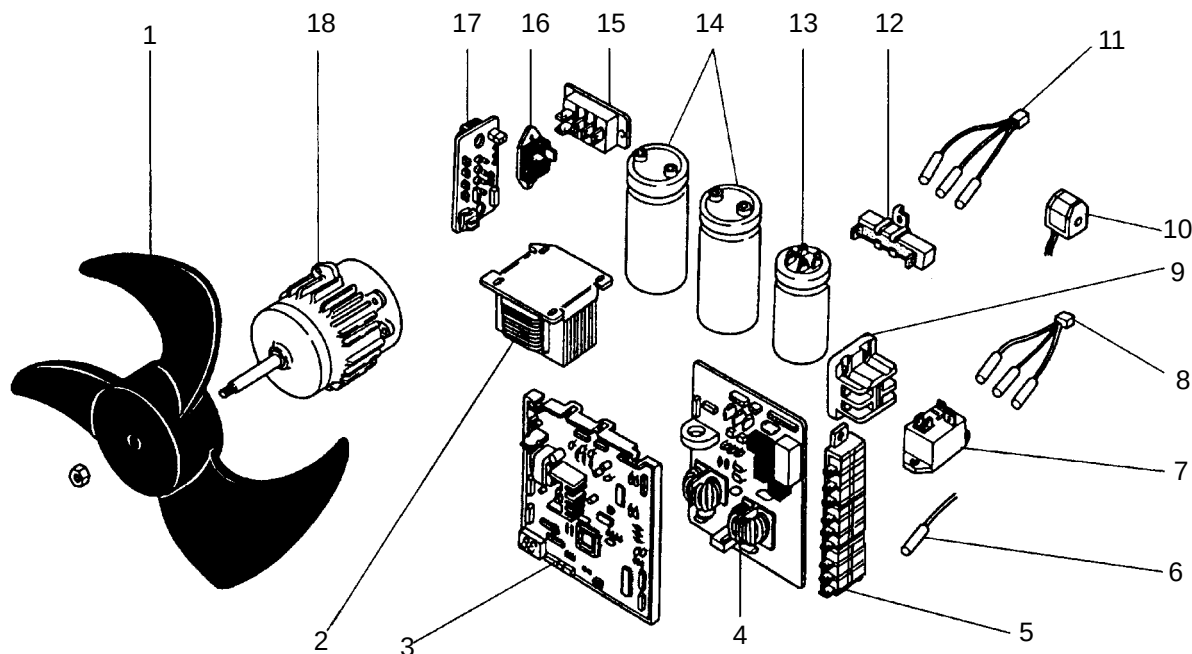
14-11. OUTDOOR UNIT STRUCTURAL PARTS, ELECTRICAL PARTS AND FUNCTIONAL PARTS

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

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
				MUH17TN	MUH17TN- U1	
1	E02 214 297	TOP PANEL		1	1	
2	E02 287 309	AMBIENT TEMPERATURE THERMISTOR	RT63		1	
3	E02 284 630	OUTDOOR HEAT EXCHANGER		1	1	
4	E02 214 501	PROPELLER FAN		1	1	
5	E02 214 232	CABINET		1	1	
6	E07 001 009	HANDLE		3	3	
7	E02 549 521	FAN GUARD		1	1	
8	E02 214 245	SERVICE PANEL		1	1	
9	E07 001 006	COVER PANEL		1	1	
10	E02 480 374	TERMINAL BLOCK	TB2	1	1	4P
	E02 481 374	TERMINAL BLOCK	TB1	1	1	4P
11	E02 282 340	COMPRESSOR CONTACTOR	52C	1	1	
12	E02 128 383	SURGE ABSORBER	DSAR	1	1	
13	E02 544 353	COMPRESSOR CAPACITOR	C1	1	1	35 μ F/370VAC
14	E02 480 451	DEICER P.C. BOARD		1		
	E02 481 451	DEICER P.C. BOARD			1	
15	E02 214 522	REAR PANEL		1	1	
16	E02 605 523	REAR GUARD		1	1	
17	E02 214 249	SIDE PANEL		1	1	
18	E02 284 301	OUTDOOR FAN MOTOR	MF	1	1	RA6N85- □□
19	E02 284 290	BASE		1	1	
20	E02 527 515	MOTOR SUPPORT		1	1	
21	E02 075 506	COMPRESSOR RUBBER SET		3	3	3RUBBERS/SET
22	E02 272 900	COMPRESSOR	MC	1	1	RH231NHDT
23	E02 549 662	STOP VALVE(LIQUID)		1	1	ϕ 1/4
24	E02 527 661	STOP VALVE(GAS)		1	1	ϕ 5/8
25	E02 214 310	DEFROST THERMISTOR	RT61	1	1	
26	E02 474 642	FUSIBLE PLUG		1	1	
27	E07 012 641	SERVICE PORT		1	1	
28	E07 001 641	SERVICE PORT		1	1	
29	E02 172 490	R.V. COIL	21S4	1	1	
30	E02 282 961	4-WAY VALVE		1	1	
31	E02 138 936	CAPILLARY TUBE CT2		1	1	ϕ 0.12X ϕ 0.079X27-9/16
	E02 257 936	CAPILLARY TUBE CT3		1	1	ϕ 0.12X ϕ 0.079X9-13/16
32	E02 013 382	FUSE	F61	1	1	2A
33	E02 282 385	VARISTOR	NR61	1	1	
34	E02 214 642	CHECK VALVE		1	1	

MXZ30TN MXZ30TN2

14-12. OUTDOOR UNIT FUNCTIONAL PARTS

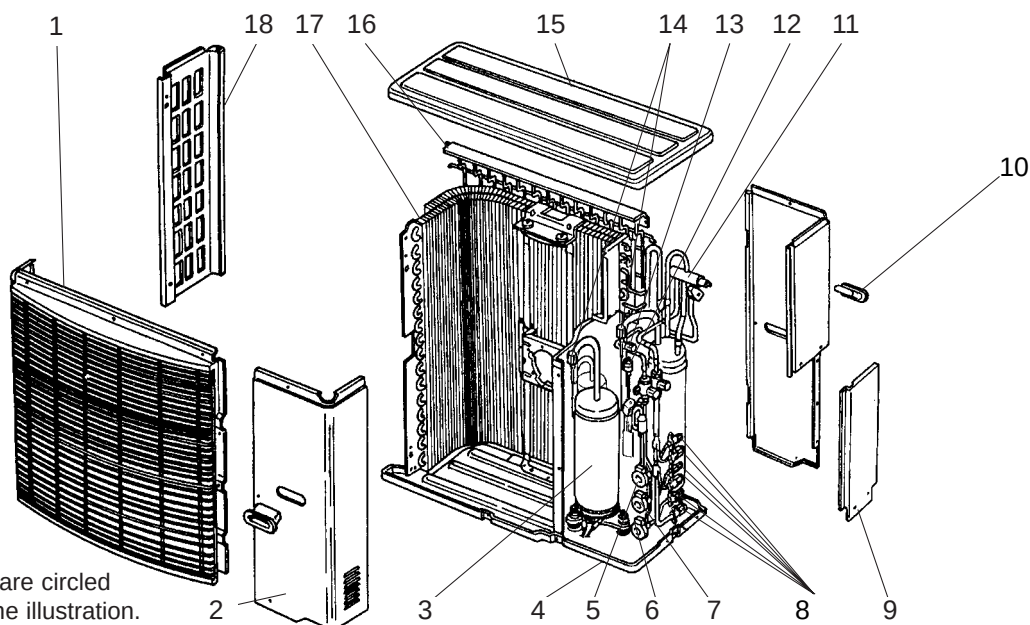


Part numbers that are circled are not shown in the illustration.

No.	Parts No.	Parts Name	Symbol in Wiring Diagram	Q'ty / unit		Remarks
				MXZ30TN	MXZ30TN2	
1	M21 17A 501	PROPELLER FAN		1	1	
2	M21 17E 337	REACTOR	L	1	1	
3	T2W E88 451	ELECTRONIC CONTROL P.C. BOARD		1	1	
4	T2W E88 424	NOISE FILTER P.C. BOARD		1		
	T2W G07 424	NOISE FILTER P.C. BOARD			1	
5	T2W E88 376	TERMINAL BLOCK	TB3	3	3	
6	T2W E88 308	FIN TEMPERATURE THERMISTOR	RT65	1	1	
7	M21 42A 340	RELAY	X64	1	1	
8	T2W E70 308	THERMISTOR SET	RT61, 62, 63	1	1	EVAPORATION DISCHARGE, DEFROST
9	T2W E88 375	TERMINAL BLOCK	TB2	1	1	
10	T2W 827 389	R. V. COIL	21S4	1	1	
11	T2W E88 307	GAS PIPE TEMPERATURE THERMISTOR	RT66,67,68	1	1	A,B,C
12	M21 17A 362	RESISTOR	R	1		
	T2W G01 362	RESISTOR	R		1	
13	T2W E40 357	POWER FACTOR CAPACITOR	C61	1	1	220 μ F 400V
14	T2W E40 356	SMOOTHING CAPACITOR	C62,C63	2	2	2500 μ F 400V
15	M21 17A 443	DIODE MODULE	DS61	1	1	
16	M21 17A 447	DIODE STACK	DS62	1	1	
17	T2W E88 452	I.P.M P.C. BOARD		1	1	
18	T2W E79 301	OUTDOOR FAN MOTOR	MF61	1	1	
19	T2W E40 441	RELAY P.C. BOARD		1	1	
20	T2W E88 382	FUSE	F801,F911	1	1	
21	T2W E88 313	FUSE&VARISTOR	F912,NR63		1	250V 3.15A

MXZ30TN MXZ30TN2

14-13. OUTDOOR UNIT STRUCTURAL PARTS



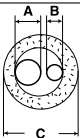
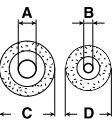
Part numbers that are circled are not shown in the illustration.

No.	Parts No.	Parts Name	Symbol in Wiring Diagram	Q'ty / unit		Remarks
				MXZ30TN	MXZ30TN2	
1	M21 AS2 232	FRONT PANEL		1		
2	M21 17A 245	SERVICE PANEL		1		
3	T92 500 800	COMPRESSOR	MC	1		THV-247FBA
4	T2W E79 290	BASE ASSEMBLY		1		
5	T2W E95 653	LEV COIL	LEV C	1		C room
6	T2W E95 651	LEV COIL	LEV A	1		A room
7	T2W E95 652	LEV COIL	LEV B	1		B room
8	M21 42E 644	UNION		1		1/2,3/8,1/4 SET
9	T2W E40 247	PIPE COVER		1		
10	T2W E88 248	REAR PANEL		1		
11	M21 48A 961	4-WAY VALVE		1		
12	T2W E88 646	HIGH PRESSURE SWITCH	63H1	1		2.75MPa(28kg/cm ³)
13	T7W 973 507	FUSIBLE PLUG		1		
14	M21 B90 641	SERVICE PORT		2		
15	M21 17A 297	TOP PANEL		1		
16	T2W E40 523	REAR GUARD		1		
17	M21 42E 630	HEAT EXCHANGER		1		
18	M21 17A 249	SIDE PANEL		1		
19	T2W E88 647	HIGH PRESSURE SWITCH	63H2	1		3.43MPa(35kg/cm ³)
20	M21 986 936	CAPILLARY TUBE CT3,4,5(O.D. 0.157×I.D. 0.094×78.74)		3		O.D. 0.157×I.D. 0.094×15.75
21	M21 LV0 936	CAPILLARY TUBE SET CT6,7,8(O.D. 0.12×I.D. 0.079×7.87)		4		O.D. 0.12×I.D. 0.079×7.87 4PCS/SET
22	T2W E70 936	CAPILLARY TUBE CT1,2 (O.D. 0.078×I.D. 0.024×29.53)		2		
23	T2W E95 655	EXPANSION VALVE		3		

When servicing , cut the tube to the proper length as shown in the REFRIGERANT SYSTEM DIAGRAM.
See page 53.

15-1. REFRIGERANT PIPES

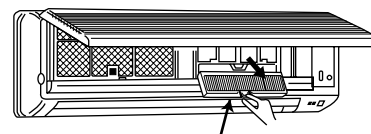
The air conditioner has flared connections its on indoor and outdoor sides.
Please use the optional extension pipe as follows.

Model	Part No.	Pipe length	Pipe size						Additional refrigerant charge R22(oz.)
			Cross-section	A-Gas(in.)		B-Liquid(in.)		Insulation (in.)	
				Outside diameter	Wall thickness	Outside diameter	Wall thickness		
MSH09TW MSH09TW - <u>U1</u> MUH09TW MUH09TW - <u>U1</u>	MAC-645PI	10ft.		3/8	0.03			C 1-3/8	0
	MAC-646PI	16ft.							4.29
	MAC-647PI	23ft.							12.86
	MAC-648PI	33ft.							
	MAC-649PI	49ft.							
MSH12TN MSH12TN - <u>U1</u> MUH12TN MUH12TN - <u>U1</u> MUH12TN - <u>U2</u>	MAC-660PI-US	10ft.		1/2	0.04	1/4	0.03	C 1-7/32 D 1-1/16	0
	MAC-661PI-US	16ft.							4.29
	MAC-662PI-US	23ft.							12.86
	MAC-663PI-US	33ft.							
	MAC-664PI-US	49ft.							
MSH15TN MSH15TN - <u>U1</u> MUH15TN MUH15TN - <u>U1</u> MUH15TN - <u>U2</u> MSH17TN MSH17TN - <u>U1</u> MUH17TN MUH17TN - <u>U1</u>	MAC-725PI	10ft.		5/8				C 1-11/32 D 1-1/16	0
	MAC-726PI	16ft.							4.29
	MAC-727PI	23ft.							12.86
	MAC-728PI	33ft.							
	MAC-729PI	49ft.							

15-2. 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.
MSH09TW MSH09TW -[U1]	MAC-1300FT
MSH12TN MSH15TN MSH17TN MSH12TN -[U1] MSH15TN -[U1] MSH17TN -[U1]	MAC-1100FT

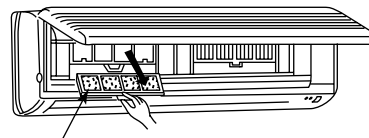


Air cleanig filter (White bellows type)

15-3. 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.
MSH09TW MSH09TW -[U1]	MAC-1800DF
MSH12TN MSH15TN MSH17TN MSH12TN -[U1] MSH15TN -[U1] MSH17TN -[U1]	MAC-1600DF

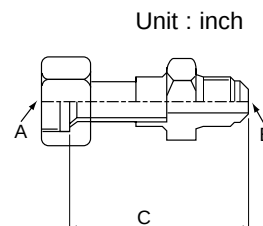


Deodorizing filter (Gray sponge type)

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

15-4. Different-diameter pipe

MXZ30TN MXZ30TN2	Model name	Model code	Connected pipes diameter	Size A	Size B	Size C
For different-diameter pipes	MAC-454JP	51H-454	3/8 - 1/2	3/8	1/2	2 3/4
	MAC-455JP	51H-455	1/2 - 3/8	1/2	3/8	2 9/16
	MAC-456JP	516456	1/2 - 5/8	1/2	5/8	2 5/8



Mr.SLIM™



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