



SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

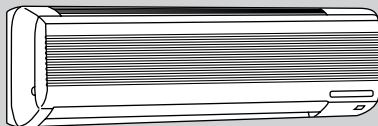
No. OB198

SERVICE MANUAL

Wireless type
Models

MSH09NW (WH)
MSH12NN (WH)
MSH15NN (WH)
MSH17NN (WH)

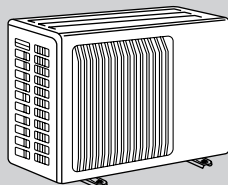
▪ **MUH09NW**
 ▪ **MUH12NN**
 ▪ **MUH15NN**
 ▪ **MUH17NN**



MSH12NN
MSH15NN
MSH17NN
INDOOR UNIT



Remote
controller



MUH12NN
MUH15NN
OUTDOOR UNIT

CONTENTS

1. FEATURES	3
2. TECHNICAL CHANGE	4
3. PART NAMES AND FUNCTIONS	4
4. SPECIFICATIONS	6
5. DATA	10
6. OUTLINES AND DIMENSIONS	23
7. WIRING DIAGRAM	26
8. REFRIGERANT SYSTEM DIAGRAM	28
9. MICROPROCESSOR CONTROL	30
10. SERVICE FUNCTIONS	41
11. TROUBLESHOOTING	43
12. DISASSEMBLY INSTRUCTIONS	55
13. PARTS LIST	65
14. OPTIONAL PARTS	74



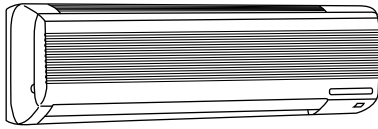
The Slim Line.
From Mitsubishi Electric.



Mr. SLIM

1

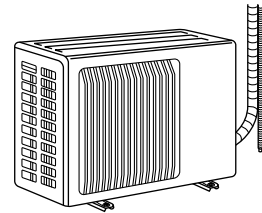
FEATURES



MSH12NN, MSH15NN



LCD wireless
remote controller



MUH12NN, MUH15NN

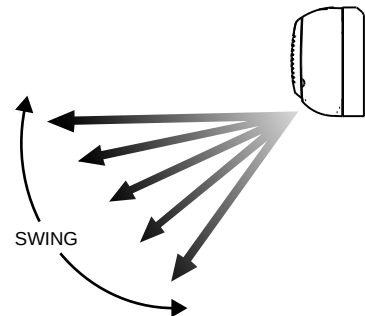
Models	Cooling capacity	Heating Capacity	SEER	HSPF
MSH09NW	8,800Btu/h	10,500Btu/h	10.0	6.8
MSH12NN	12,900Btu/h	13,500Btu/h	10.2	6.8
MSH15NN	14,600Btu/h	14,800Btu/h	10.7	6.8
MSH17NN	16,200tu/h	17,200tu/h	10.3	6.8

NEW "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 time. 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. And what's more, the new controller has been made more better design and easier to handle than even before.

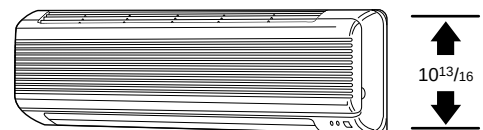
Select desired air flow direction. REMOTE-CONTROL OPERATION MODE

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.



Small in size, big on cooling. COMPACT INDOOR UNIT

The sleek design of the NW/NN Series matches virtually any room layout. For instance, MSH09NW is $10^{13/16} \times 32^{1/16} \times 7^{3/16}$ (HXWXD), which used to be $14^{3/16} \times 31^{1/8} \times 5^{3/8}$.



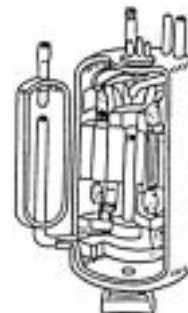
MSH09NW

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.



MSH09EW → MSH09NW

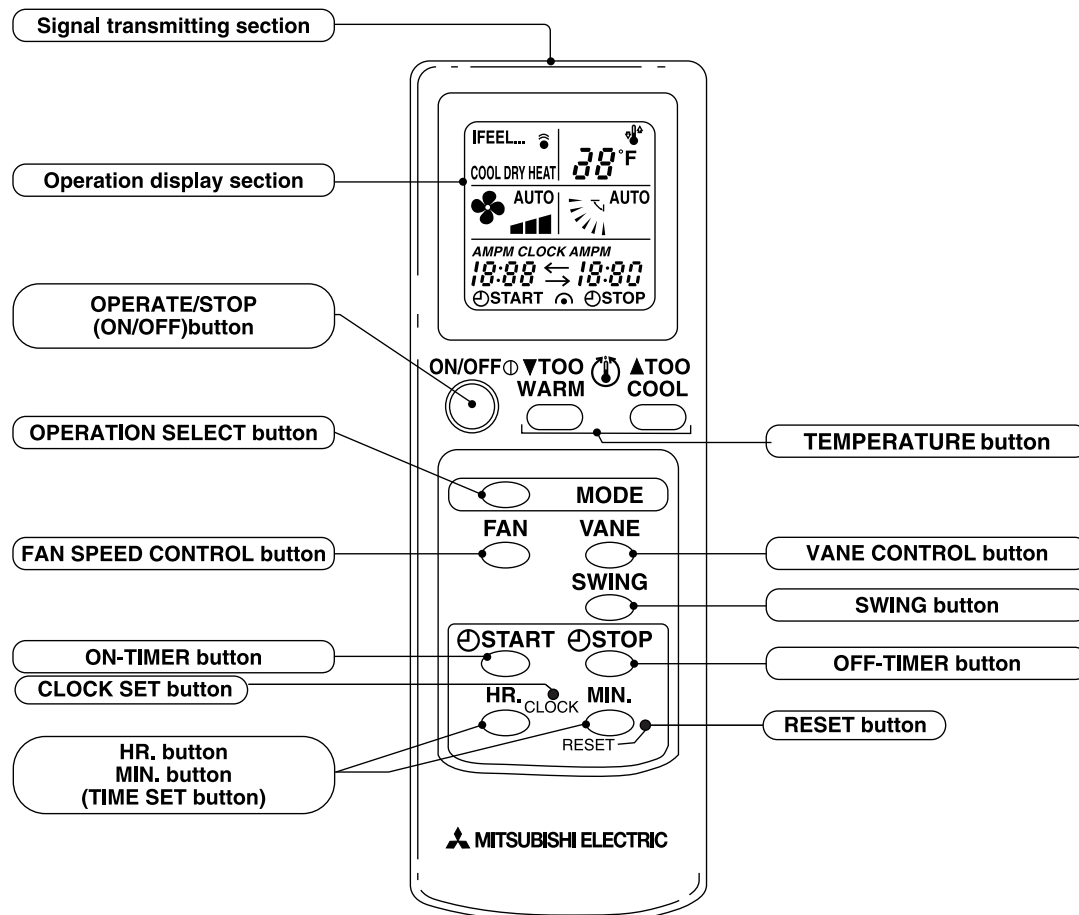
1. Indoor unit has changed.
(Outline dimension changes. 31-1/8"×5-3/8"×14-3/16"(W×D×H)→32-1/16"×7-3/16"×10-13/16"(W×D×H))
2. Outdoor unit has changed. (Capillary tube and refrigerant had changed.)
3. Remote controller has changed. (The timer function was changed to the clock timer function.)
4. Indoor auto vane has been adopted.

MSH12EN, MSH15EN → MSH12NN, MSH15NN

1. Indoor unit has changed.
(Outline dimension changes. 39-3/8"×7"×14-3/16"(W×D×H)→39-15/16"×7-1/2"×12-5/8"(W×D×H))
2. Outdoor unit has changed.
(Outline dimension changes. 33-1/2"×11-7/16"×23-7/8"(W×D×H)→33-7/16"×11-7/16"×23-13/16"(W×D×H))
(Capillary tube, refrigerant and pipe had changed.)
3. Remote controller has changed. (The timer function was changed to the clock timer function.)
4. The swing mode was added to indoor auto vane.

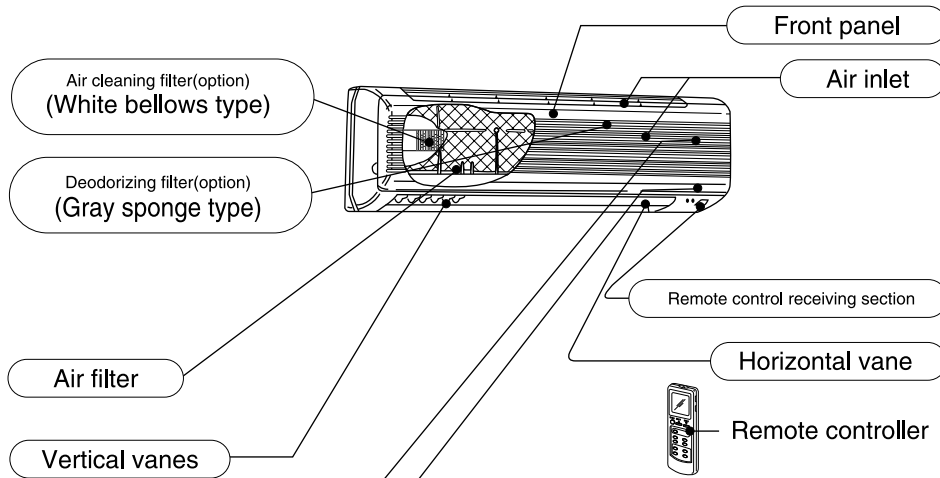
MSH17NN

1. New Model

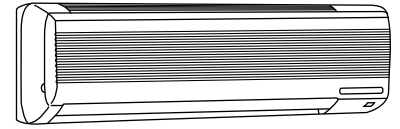
MSH09NW, MSH12NN, MSH15NN, MSH17NN**REMOTE CONTROLLER**

INDOOR UNIT

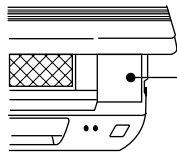
MSH09NW



MSH12NN MSH15NN MSH17NN

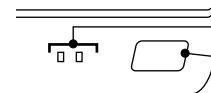


(When the front panel is opened) MSH09NW



Emergency operation switch

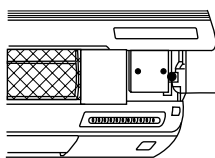
MSH09NW



Operation Indicator lamp

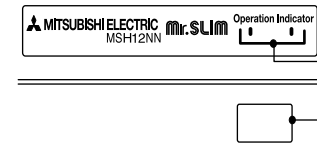
Receiving section

MSH12NN, MSH15NN, MSH17NN



Emergency operation switch

MSH12NN, MSH15NN, MSH17NN

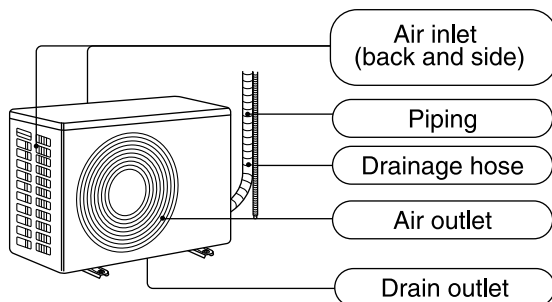


Operation Indicator lamp

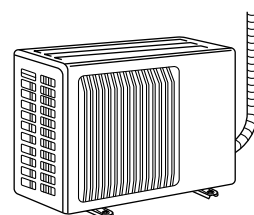
Receiving section

OUTDOOR UNIT

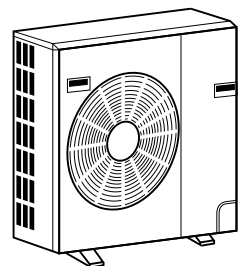
MUH09NW



MUH12NN MUH15NN



MUH17NN



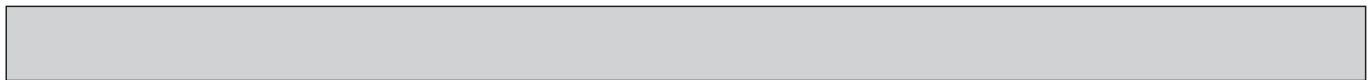
ITEM		MODELS	MSH09NW
Capacity	Cooling ^{※1}	Btu/h	8,800
	Heating 47 ^{※1}	Btu/h	10,500
	Heating 17 ^{※2}	Btu/h	5,300
Power consumption	Cooling ^{※1}	W	890
	Heating 47 ^{※1}	W	890
	Heating 17 ^{※2}		820
EER ^{※1} [SEER]			9.9 [10.0]
HSPF	47 ^{※1} [17°] ^{※2}		6.8
COP			3.5
INDOOR UNIT MODEL			MSH09NW
External finish			White
Power supply	V, phase, Hz		115, 1, 60
Max. fuse size (time delay)	A		15
Min. ampacity	A		0.5
Fan motor	F.L.A		0.37
Auxiliary heater	A(kW)		—
Airflow Lo—Me—Hi	Dry	CFM	208-265-328
	Wet	CFM	177-226-279
Moisture removal	Pints/h		2.3
Sound level Lo-Me-Hi	dB(A)		31-37-42
Cond. drain connection O.D.	in.		5/8
Dimensions	W	in.	32-1/16
	D	in.	7-3/16
	H	in.	10-13/16
Weight	lbs.		18
OUTDOOR UNIT MODEL			MUH09NW
External finish			Munsell 5Y 7/1
Power supply	V, phase, Hz		115, 1, 60
Max. fuse size (time delay)	A		20
Min. ampacity	A		16
Fan motor	F.L.A		0.7
Compressor	Model		RH-140WGJT
	Winding resistance (at 68°F) Ω		C-R 0.83 C-S 1.48
	R.L.A		12
	L.R.A		42
Refrigerant control			Capillary tube
Defrost method			Reverse cycle
Dimensions	W	in.	30-11/16
	D	in.	10-1/16
	H	in.	21-1/4
Weight	lbs.		80
REMOTE CONTROLLER			Wireless type
Control voltage (by built-in transformer)			12V DC (peak voltage)
REFRIGERANT PIPING			Not supplied (optional parts)
Pipe size	Liquid	in.	1/4
	Gas	in.	3/8
Connection method	Indoor		Flared
	Outdoor		Flared
Between the indoor & outdoor units	Height difference	ft	Max. 25
	Piping length	ft	Max. 49

Notes ^{※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} : Rating conditions (heating) — Indoor : 70°FDB, 60°FWB, Outdoor : 17°FDB, 15°FWB

Operating Range

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	90°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

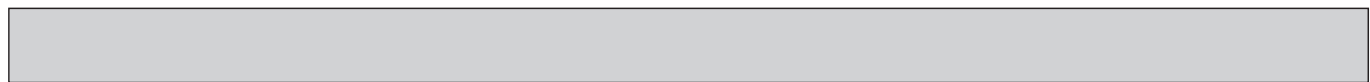


ITEM		MODELS	MSH12NN	MSH15NN
Capacity	Cooling * ¹	Btu/h	12,600/12,900	14,300/14,600
	Heating 47 * ¹	Btu/h	13,000/13,500	14,500/14,800
	Heating 17 * ²	Btu/h	6,800/7,000	8,700/8,900
Power consumption	Cooling * ¹	W	1,280/1,310	1,350/1,380
	Heating 47 * ¹	W	1,180/1,250	1,250/1,300
	Heating 17 * ²		1,110/1,140	1,210/1,240
EER * ¹ [SEER]			9.8/9.8[10.2/10.2]	10.6/10.6 [10.7/10.7]
HSPF	47 * ¹ [17°] * ²		6.8/6.8	
COP			3.2/3.2	3.4/3.3
INDOOR UNIT MODEL			MSH12NN	MSH15NN
External finish			White	
Power supply		V, phase, Hz	115, 1, 60	
Max. fuse size (time delay)		A	15	
Min. ampacity		A	0.6	
Fan motor		F.L.A	0.43	
Auxiliary heater		A(kW)	—	
Airflow Lo—Me—Hi	Dry	CFM	360-395-452	
	Wet	CFM	311-339-388	293-321-367
Moisture removal		Pints/h	3.3	4.7
Sound level Lo-Me-Hi		dB(A)	36-39-42	
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		lbs.	31	
OUTDOOR UNIT MODEL			MUH12NN	MUH15NN
External finish			Munsell 5Y7/1	
Power supply		V, phase, Hz	208/230, 1, 60	
Max. fuse size (time delay)		A	15	20
Min. ampacity		A	14	
Fan motor		F.L.A	0.52	
Compressor	Model		RH-185NHDT	RH-207NHDT
	Winding resistance (at 68°F) Ω		C-R 1.68 C-S 2.78	
	R.L.A		10	
	L.R.A		35	
Refrigerant control			Capillary tube	
Defrost method			Reverse cycle	
Dimensions	W	in.	33-7/16	
	D	in.	11-7/16	
	H	in.	23-13/16	
Weight		lbs.	99	
REMOTE CONTROLLER			Wireless type	
Control voltage (by built-in transformer)			12V DC (peak voltage)	
REFRIGERANT PIPING			Not supplied (optional parts)	
Pipe size	Liquid	in.	1/4	
	Gas	in.	5/8	
Connection method	Indoor		Flared	
	Outdoor		Flared	
Between the indoor & outdoor units	Height difference	ft	Max. 25	
	Piping length	ft	Max. 49	

Notes *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 : Rating conditions (heating) — Indoor : 70°FDB, 60°FWB, Outdoor : 17°FDB, 15°FWB
 *³ : include auxiliary electric heater operation at 115V

Operating Range

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	90°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



ITEM		MODELS	MSH17NN
Capacity	Cooling ^{※1}	Btu/h	16,000/16,200
	Heating 47 ^{※1}	Btu/h	16,800/17,200
	Heating 17 ^{※2}	Btu/h	10,100/10,300
Power consumption	Cooling ^{※1}	W	1,560/1,580
	Heating 47 ^{※1}	W	1,500/1,570
	Heating 17 ^{※2}		1,410/1,510
EER ^{※1} [SEER]			10.3/10.3 (10.4/10.4)
HSPF	47 ^{※1} [17°] ^{※2}		6.8/6.8
COP			3.3/3.2
INDOOR UNIT MODEL			MSH17NN
External finish			White
Power supply	V, phase, Hz		115, 1, 60
Max. fuse size (time delay)	A		15
Min. ampacity	A		0.7
Fan motor	F.L.A		0.51
Auxiliary heater	A(kW)		—
Airflow Lo—Me—Hi	Dry	CFM	406-441-491
	Wet	CFM	342-371-413
Moisture removal	Pints/h		5.1
Sound level Lo-Me-Hi	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	lbs.		31
OUTDOOR UNIT MODEL			MUH17NN
External finish			Munsell 5Y 7/1
Power supply	V, phase, Hz		208/230, 1, 60
Max. fuse size (time delay)	A		20
Min. ampacity	A		15
Fan motor	F.L.A		0.75
Compressor	Model		RH-231NHDT
	Winding resistance (at 68°F) Ω		C-R 1.65 C-S2.67
	R.L.A		11
	L.R.A		38
Refrigerant control			Capillary tube
Defrost method			Reverse cycle
Dimensions	W	in.	34-1/4
	D	in.	11-5/8
	H	in.	33-1/2
Weight	lbs.		128
REMOTE CONTROLLER			Wireless type
Control voltage (by built-in transformer)			12V DC (peak voltage)
REFRIGERANT PIPING			Not supplied (optional parts)
Pipe size	Liquid	in.	1/4
	Gas	in.	5/8
Connection method	Indoor		Flared
	Outdoor		Flared
Between the indoor & outdoor units	Height difference	ft	Max. 25
	Piping length	ft	Max. 49

Notes ^{※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} : Rating conditions (heating) — Indoor : 70°FDB, 60°FWB, Outdoor : 17°FDB, 15°FWB

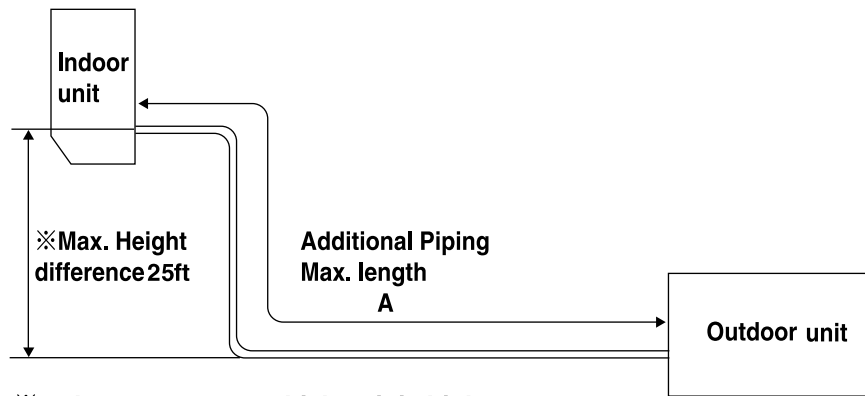
Operating Range

		Indoor intake air temperature	Outdoor intake air temperature
Cooling	Maximum	90°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 O.D. : in.		Length of connecting pipe : in.	
		Gas	Liquid	Indoor unit	Outdoor unit
MSH09NW	49	ϕ 3/8	ϕ 1/4	16-15/16	0
MSH12NN MSH15NN MSH17NN		ϕ 5/8			

MAX. HEIGHT DIFFERENCE



※ It does not matter which unit is higher.

MSH09NW, MSH12NN, MSH15NN, MSH17NN

1. PERFORMANCE DATA

1) COOLING CAPACITY

Models	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
MSH09NW	71	10.8	6.1	0.79	10.1	5.7	0.87	9.5	5.4	0.94	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
MSH12NN	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
MSH15NN	71	17.9	9.2	1.23	16.7	8.6	1.35	15.7	8.1	1.45	14.6	7.5	1.53	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	1.31	12.5	9.8	1.41	11.4	8.9	1.46
MSH17NN	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	1.68	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	1.68

2) COOLING CAPACITY CORRECTIONS

Notes 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.

MODEL	Refrigerant piping length (one way)		
	25ft (std)	40ft	49ft
MSH09NW	1.0	0.954	0.927
MSH12NN	1.0	0.954	0.927
MSH15NN	1.0	0.954	0.927
MSH17NN	1.0	0.954	0.927

3) HEATING CAPACITY

Models	Models	Outdoor intake air WB temperature(°F)											
	IWB (°F)	15		25		35		43		45		55	
		TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC
MSH09NW	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
MSH12NN	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
MSH15NN	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
MSH17NN	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

Notes 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)

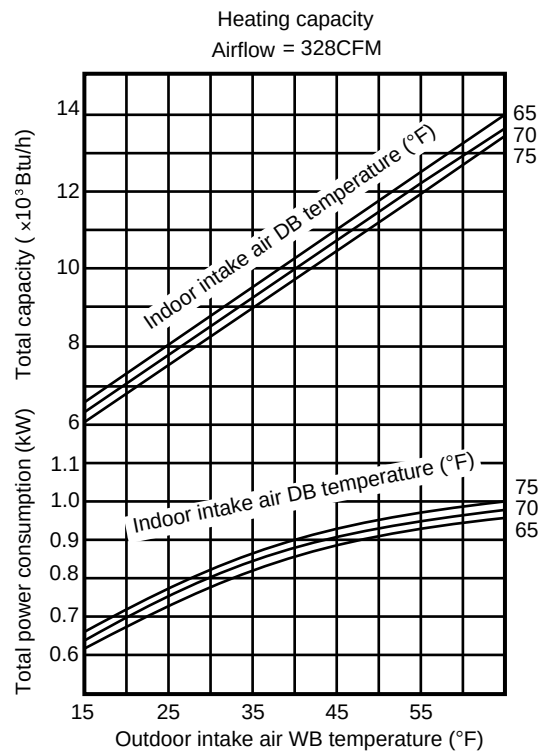
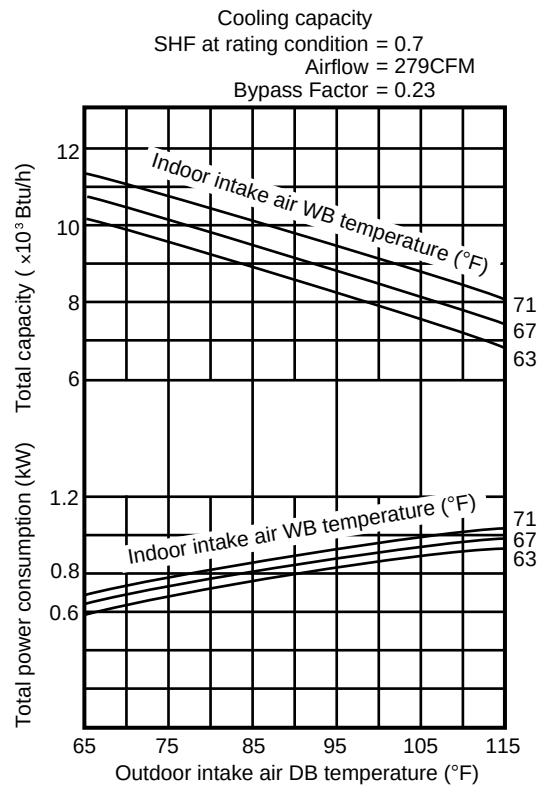
2. Heating capacity correction factors.

2. PERFORMANCE CURVE

NOTE : A point on the curve shows the reference point.

MSH09NW

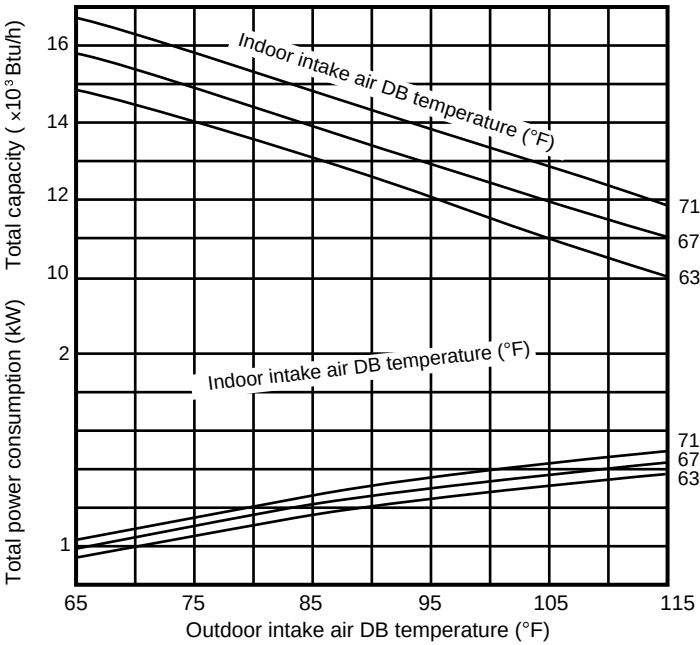
MUH09NW



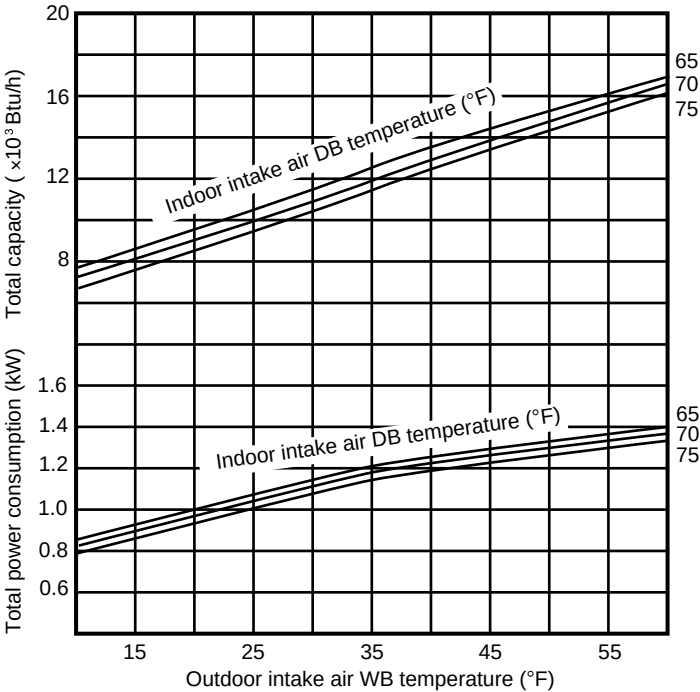
NOTE : A point on the curve shows the reference point.

MSH12NN
MUH12NN

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



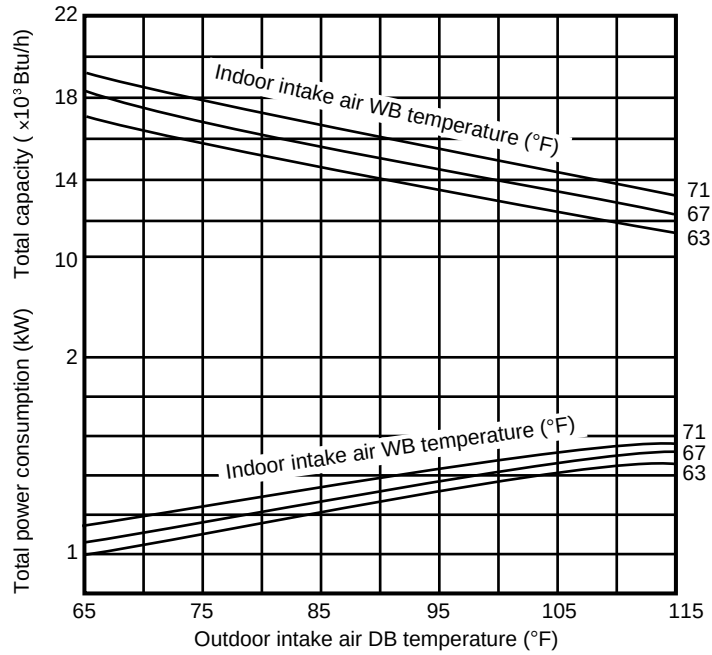
Heating capacity
Airflow = 452CFM



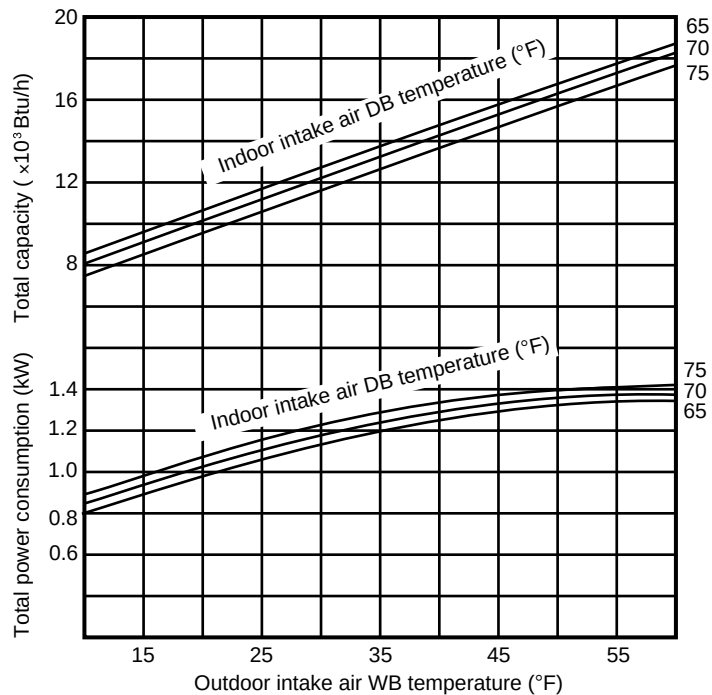
NOTE : A point on the curve shows the reference point.

MSH15NN
MUH15NN

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



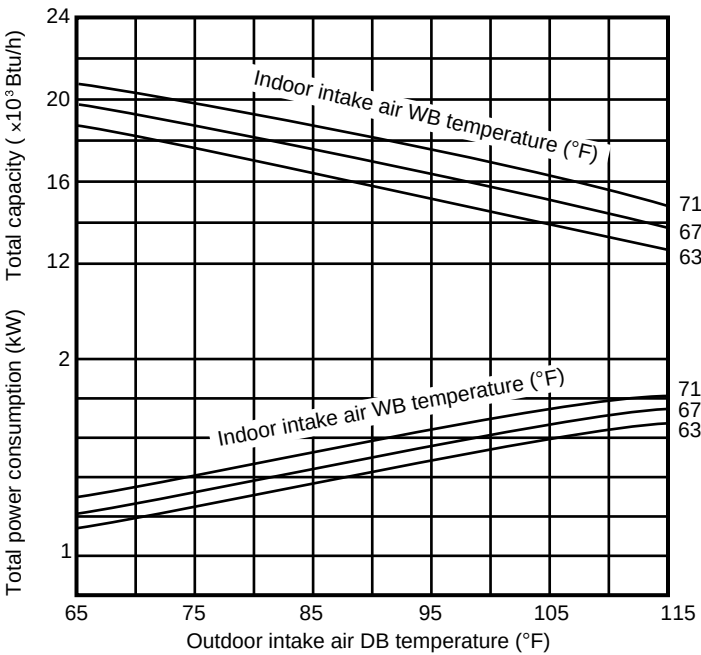
Heating capacity
Airflow = 452CFM



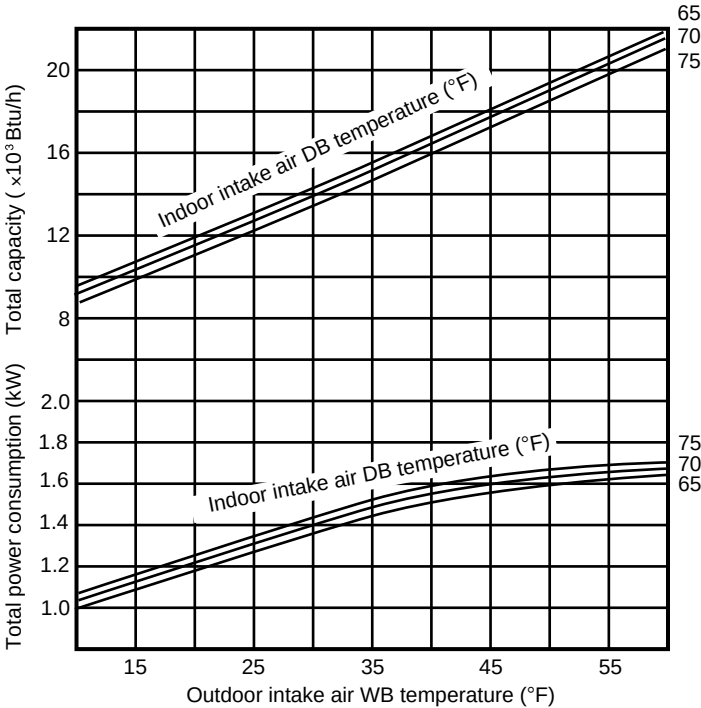
NOTE : A point on the curve shows the reference point.

MSH17NN
MUH17NN

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

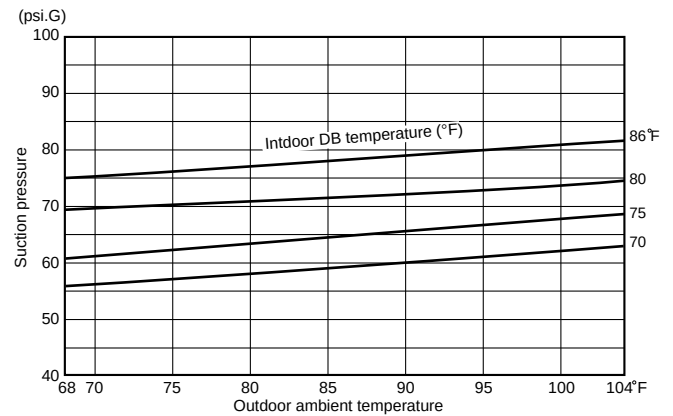
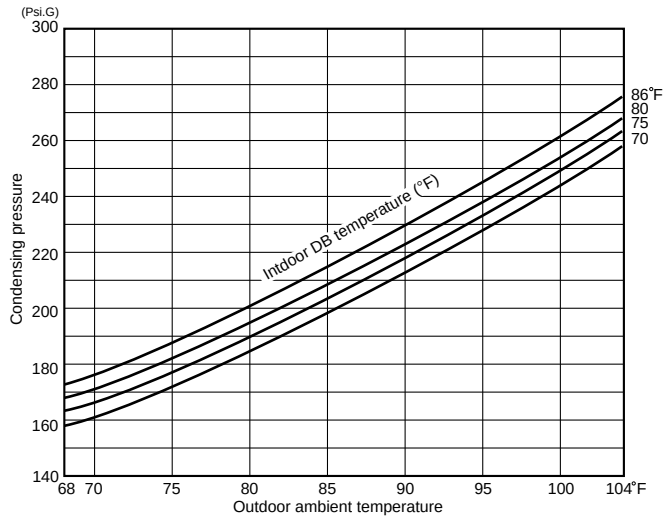


Heating capacity
Airflow = 491CFM



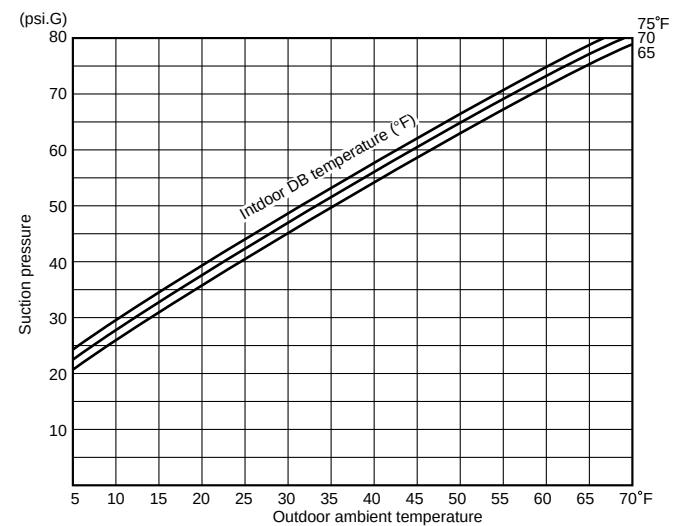
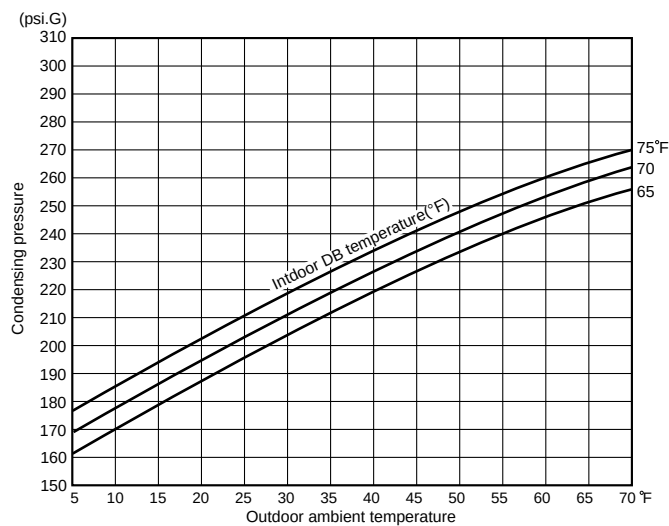
3. Condensing pressure MSH09NW(Cooling)

Data is based on the condition of indoor humidity 50%.
Air flow should be set at Hi.
A point on the curve shows the reference point.



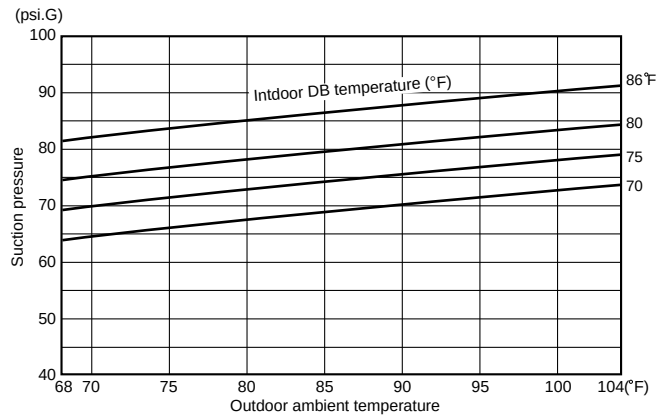
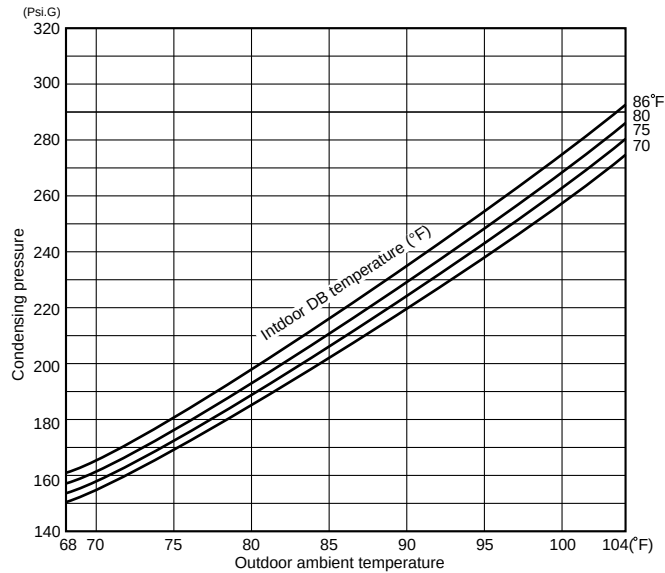
MSH09NW(Heating)

Data is based on the condition of outdoor humidity 75%.
Air flow should be set at Hi.
A point on the curve shows the reference point.



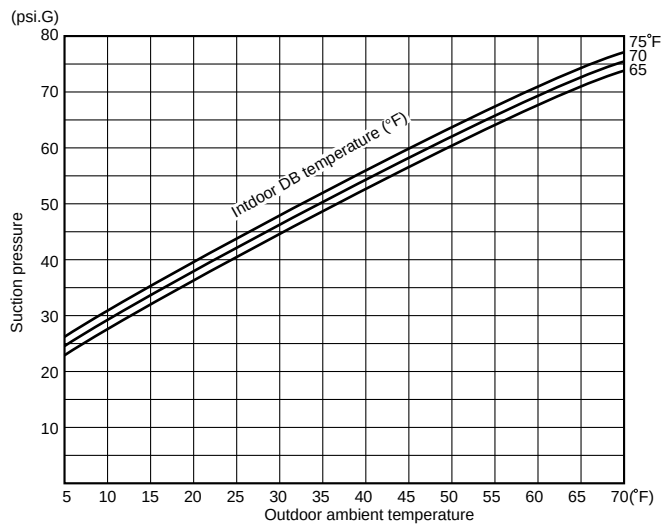
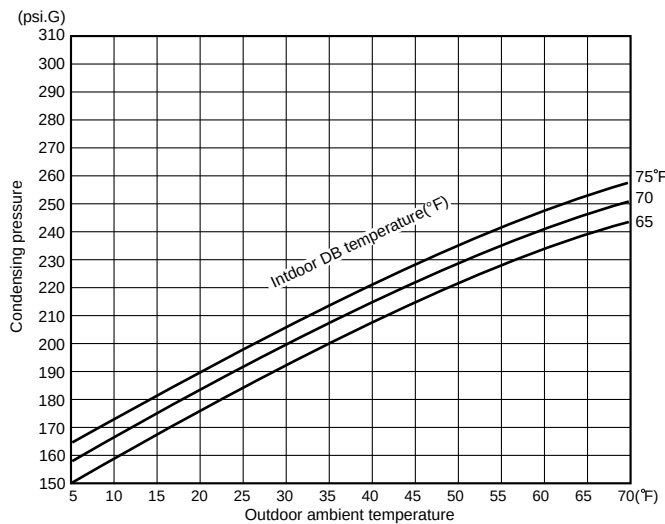
MSH12NN(Cooling)

Data is based on the condition of indoor humidity 50%.
Air flow should be set at Hi.
A point on the curve shows the reference point.



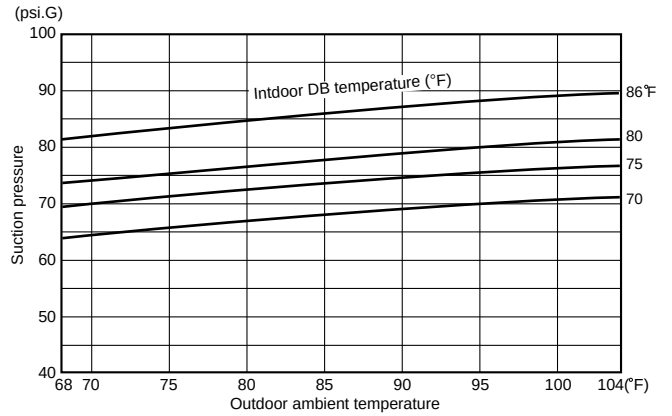
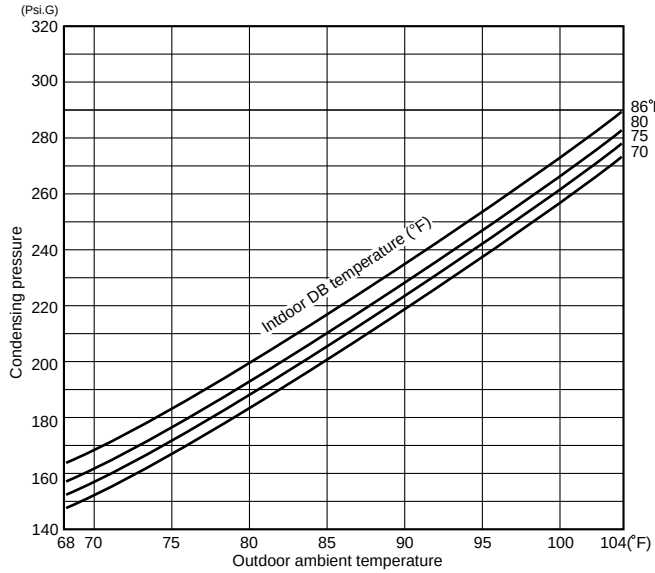
MSH12NN(Heating)

Data is based on the condition of outdoor humidity 75%.
Air flow should be set at Hi.
A point on the curve shows the reference point.



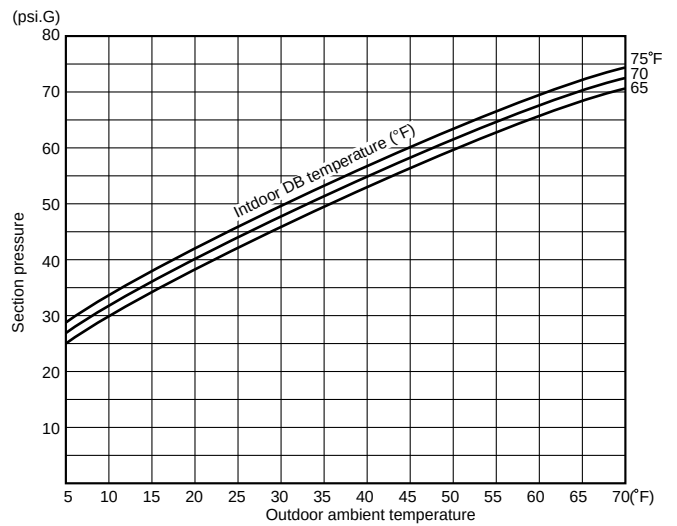
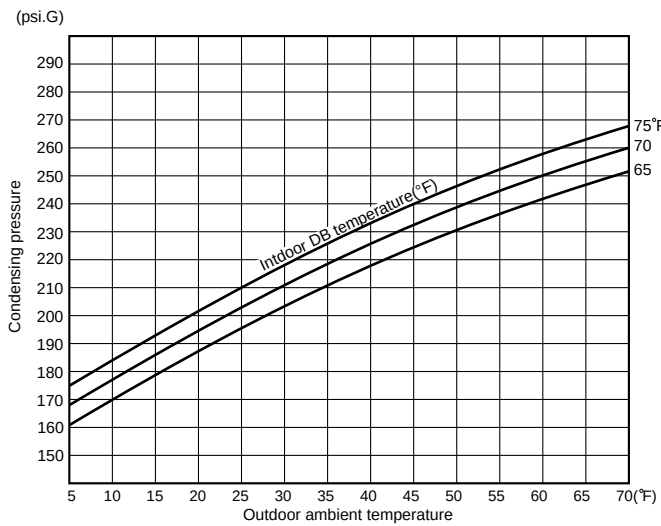
MSH15NN(Cooling)

Data is based on the condition of indoor humidity 50%.
Air flow should be set at Hi.
A point on the curve shows the reference point.



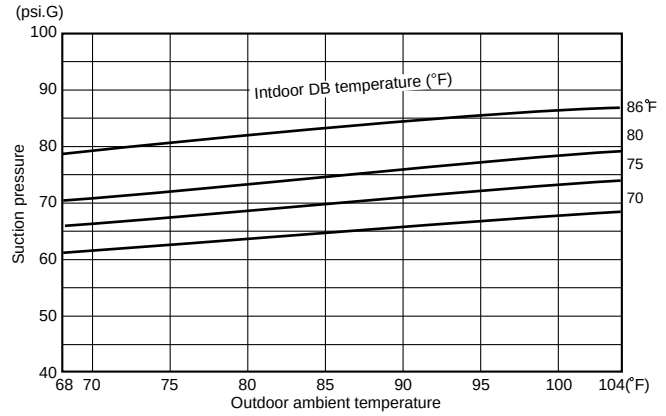
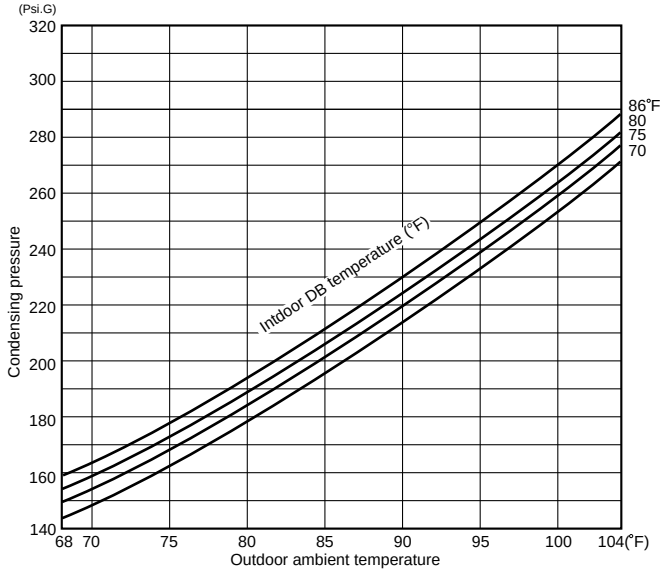
MSH15NN(Heating)

Data is based on the condition of outdoor humidity 75%.
Air flow should be set at Hi.
A point on the curve shows the reference point.



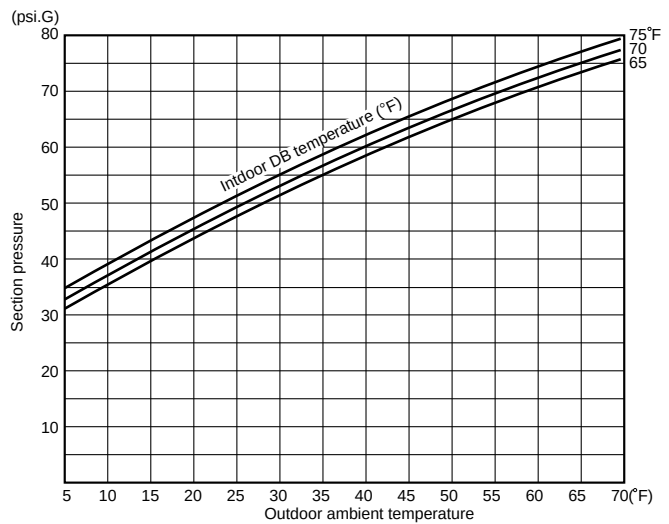
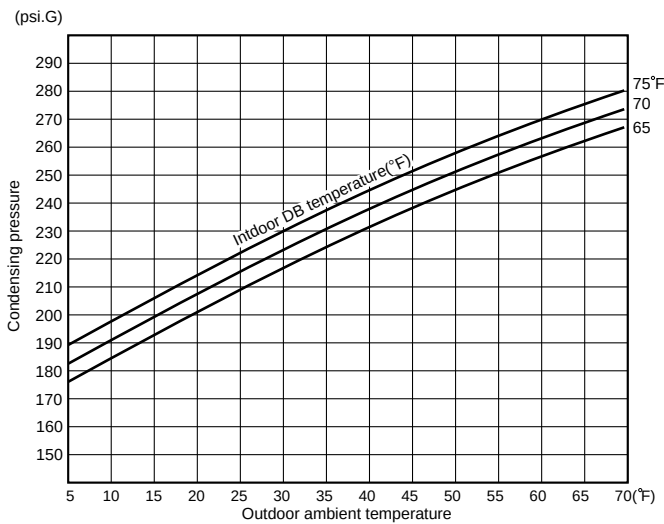
MSH17NN(Cooling)

Data is based on the condition of indoor humidity 50%.
Air flow should be set at Hi.
A point on the curve shows the reference point.



MSH17NN(Heating)

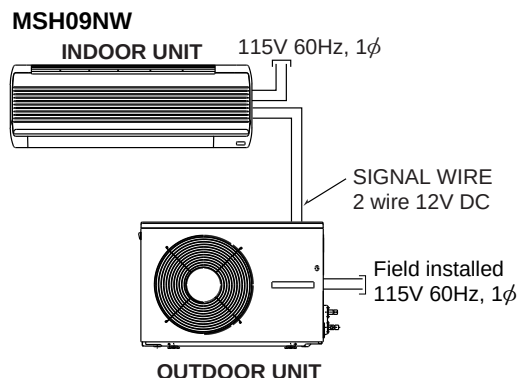
Data is based on the condition of outdoor humidity 75%.
Air flow should be set at Hi.
A point on the curve shows the reference point.



4. STANDARD OPERATION

Model				MSH09NW	
Item			Unit	Cooling	Heating
Total	Capacity		Btu / h	8,800	10,500
	SHF		—	0.70	—
	Input		kW	0.89	
Electrical circuit	Indoor unit		MSH09NW		
	Power supply (V, phase, Hz)		115,1,60		
	Input	kW	0.035		
	Fan current	A	0.34		
	Aux. heater current	A	—		
	Outdoor unit		MUH09NW		
	Power supply (V, phase, Hz)		115, 1, 60		
	Input	kW	0.855		
	Comp. current	A	6.8		
	Fan current	A	0.7		
Refrigerant circuit	Condensing pressure		psi.G	237	233
	Suction pressure		psi.G	73	60
	Discharge temperature		°F	162	160
	Condensing temperature		°F	110	108
	Suction temperature		°F	47	37
	Comp. shell bottom temp		°F	147	142
	Ref. pipe length		ft	25	
	Refrigerant charge		—	2 lbs 5 oz	
Indoor unit	Intake air temperature	DB	°F	80	70
		WB	°F	67	60
	Discharge air temperature	DB	°F	59	104
		WB	°F	57	—
	Fan speed		rpm	1,230	1,430
	Airflow (Hi)		CFM	279	328
Outdoor unit	Intake air temperature	DB	°F	95	47
		WB	°F	—	43
	Fan speed		rpm	850	
	Airflow		CFM	1,059	

POWER SUPPLY

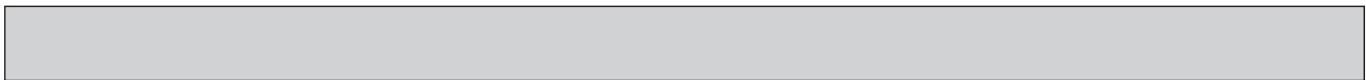


* Control voltage

MSH09NW / MUH09NW

Power supply voltage to serial signal circuit is 12V DC.

Between ① and ③ on in-out terminal block will be 12V DC peak voltage.

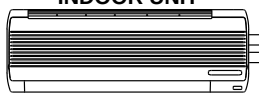


Model			MSH12NN		MSH15NN	
Item		Unit	Cooling	Heating	Cooling	Heating
Total	Capacity	Btu / h	12,600/12,900	13,000/13,500	14,300/14,600	14,500/14,800
	SHF	—	0.71	—	0.65	—
	Input	kW	1.28/1.31	1.18/1.25	1.35/1.38	1.25/1.30
Electrical circuit	Indoor unit		MSH12NN		MSH15NN	
	Power supply (V, phase, Hz)		115, 1, 60		115, 1, 60	
	Input	kW	0.047		0.047	
	Fan current	A	0.41		0.41	
	Aux. heater current	A	—		—	
	Outdoor unit		MUH12NN		MUH15NN	
	Power supply (V, phase, Hz)		208/230, 1, 60		208/230, 1, 60	
	Input	kW	1.233/1.263	1.133/1.203	1.303/1.333	1.203/1.253
	Comp. current	A	5.61/5.11	5.11/4.91	5.91/5.41	5.41/5.11
	Fan current	A	0.49		0.49	
Refrigerant circuit	Condensing pressure	psi.G	246	220	246	230
	Suction pressure	psi.G	82	58	80	57
	Discharge temperature	°F	167	159	146	158
	Condensing temperature	°F	114	106	112	108
	Suction temperature	°F	51	31	58	33
	Comp. shell bottom temp	°F	156	146	161	143
	Ref. pipe length	ft	25		25	
	Refrigerant charge	—	3bs 1oz		3bs 1oz	
Indoor unit	Intake air temperature	DB	°F	80	70	80
		WB	°F	67	60	60
	Discharge air temperature	DB	°F	57	104	55
		WB	°F	56	—	54
	Fan speed	rpm	1,200		1,200	
	Airflow (Hi)	CFM	388	452	367	452
Outdoor unit	Intake air temperature	DB	°F	95	47	95
		WB	°F	—	43	—
	Fan speed	rpm	830/900		830/900	
	Airflow	CFM	1,288/1,394		1,288/1,394	

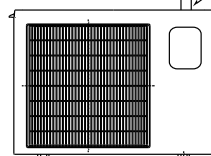
POWER SUPPLY

MSH12NN / MSH15NN

INDOOR UNIT 115V 60Hz, 1ϕ



SIGNAL WIRE
2 wire 12V DC



OUTDOOR UNIT

Field installed
208/230V 60Hz, 1ϕ

* Control voltage

MSH12NN / MUH12NN

MSH15NN / MUH15NN

Power supply voltage to serial signal circuit is 12V DC.

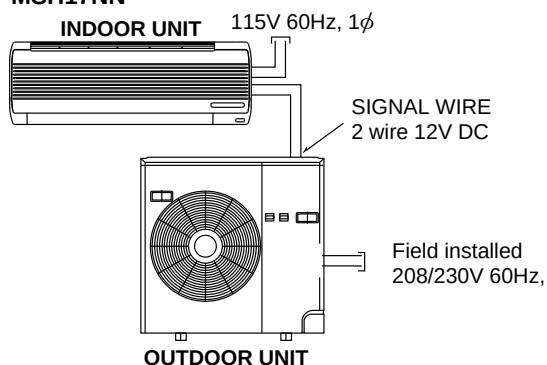
Between ① and ② on in-out terminal block will be 12V DC peak voltage.



Model				MSH17NN	
Item			Unit	Cooling	Heating
Total	Capacity		Btu / h	16,000/16,200	16,800/17,200
	SHF		—	0.64	—
	Input		kW	1.56/1.58	1.50/1.57
Electrical circuit	Indoor unit			MSH17NN	
	Power supply (V, phase, Hz)			115,1,60	
	Input		kW	0.054	
	Fan current		A	0.47	
	Aux. heater current		A	—	
	Outdoor unit			MUH17NN	
	Power supply (V, phase, Hz)			208/230, 1, 60	
	Input		kW	1,506/1,526	1,446/1,516
	Comp. current		A	6.69/6.19	6.39/6.09
	Fan current		A	0.61	
Refrigerant circuit	Condensing pressure		psi.G	243	242
	Suction pressure		psi.G	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		—	4 lbs 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		rpm	1,290	
	Airflow (Hi)		CFM	413	491
Outdoor unit	Intake air temperature	DB	°F	95	47
		WB	°F	—	43
	Fan speed		rpm	740/800	
	Airflow		CFM	1,606/1,730	

POWER SUPPLY

MSH17NN



* Control voltage

MSH17NN / MUH17NN

Power supply voltage to serial signal circuit is 12V DC.

Between ① and ③ on in-out terminal block will be 12V DC peak voltage.

5. OPERATING RANGE

(1) POWER SUPPLY

	Models	Rating	Guaranteed Voltage
Indoor unit	MSH09NW MSH12NN MSH15NN MSH17NN	115V 60Hz 1 ϕ	Min. 103V — Max. 127V
Outdoor unit	MUH09NW MUH12NN MUH15NN MUH17NN		
		208/230V 60Hz 1 ϕ	Min. 198V — Max. 253V

(2) OPERATION

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

6. OUTLET AIR SPEED AND COVERAGE RANGE

Model	Function	Air flow (CFM)	Air speed (ft/sec.)	Coverage range (ft)
MSH09NW	Dry	328	19.0	25.6
	Wet	279	16.1	21.8
MSH12NN	Dry	452	18.2	29.2
	Wet	388	15.6	25.2
MSH15NN	Dry	452	18.2	29.2
	Wet	367	14.8	23.9
MSH17NN	Dry	491	19.7	31.7
	Wet	413	16.6	26.8

- The air coverage range is the value 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 installed inside the room.

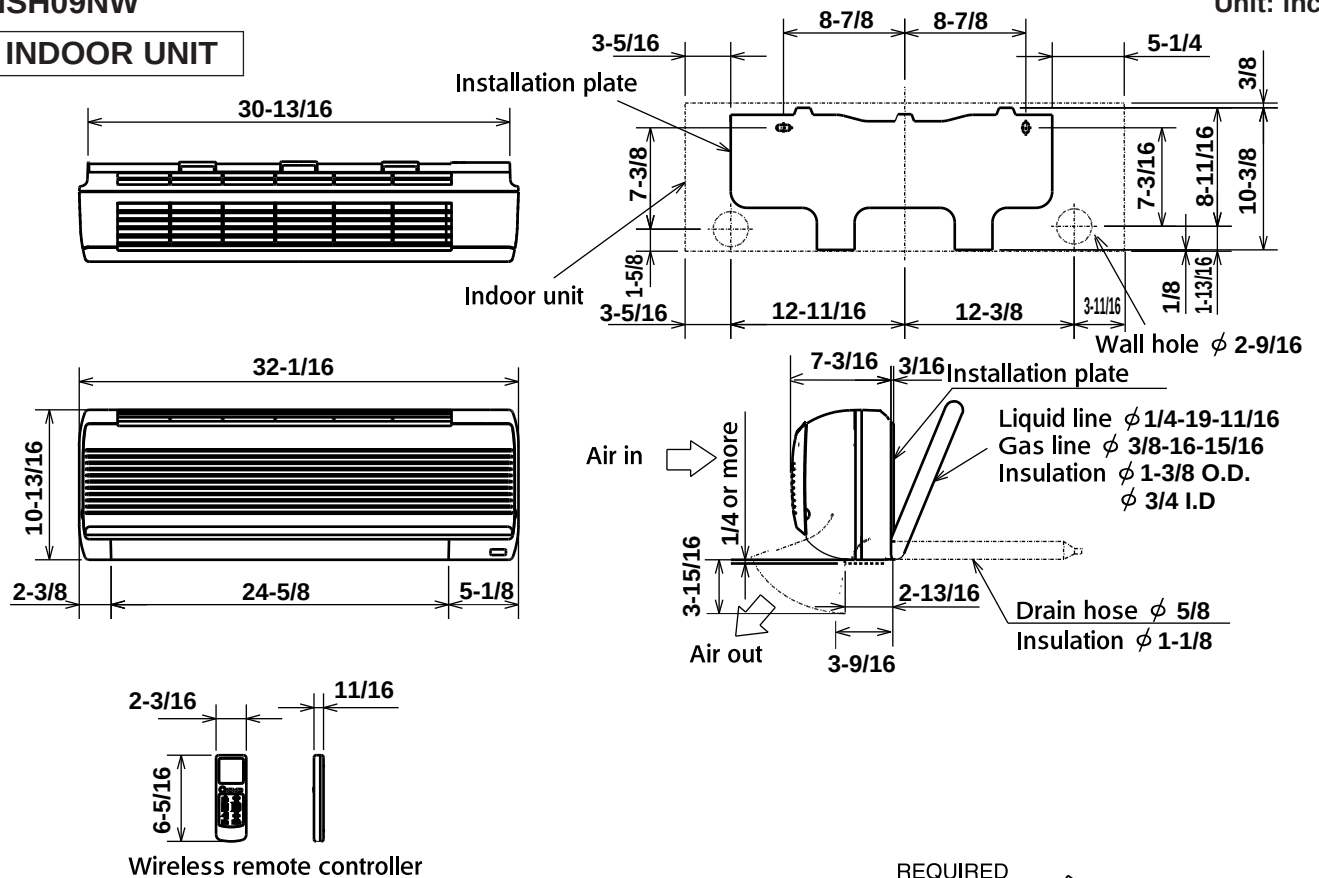
7. ADDITIONAL REFRIGERANT CHARGE (R-22(oz))

Model	Outdoor unit precharged (up to 25ft)	Refrigerant piping length (one way)					
		25ft	30ft	35ft	40ft	45ft	49ft
MSH09NW MUH09NW	2 lbs 5 oz	0	3	5	8	11	13
MSH12NN MUH12NN	3 lbs 1 oz						
MSH15NN MUH15NN	3 lbs 3 oz						
MSH17NN MUH17NN	4 lbs 14 oz						

MSH09NW

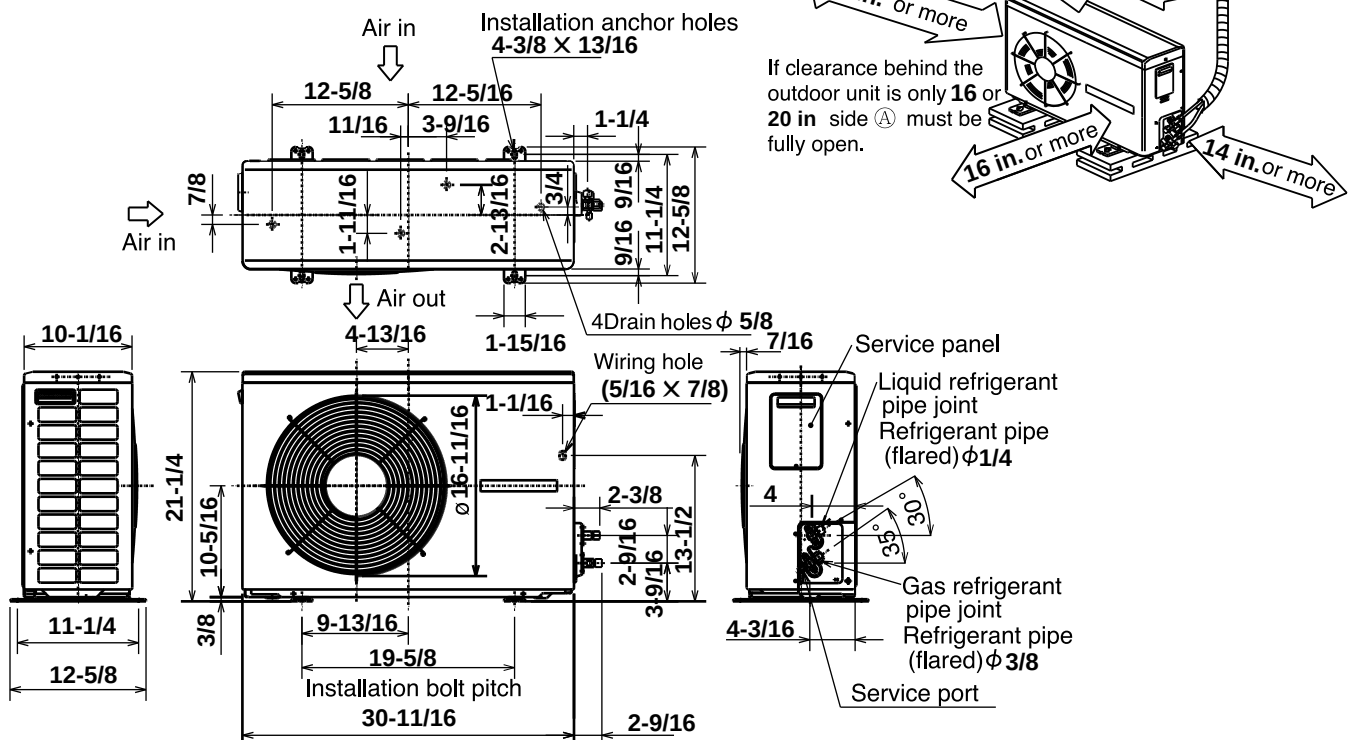
INDOOR UNIT

Unit: inch



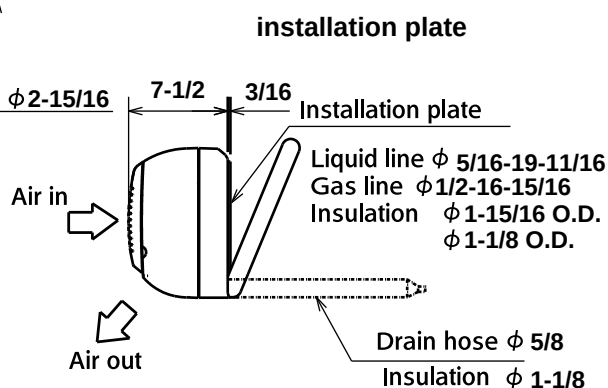
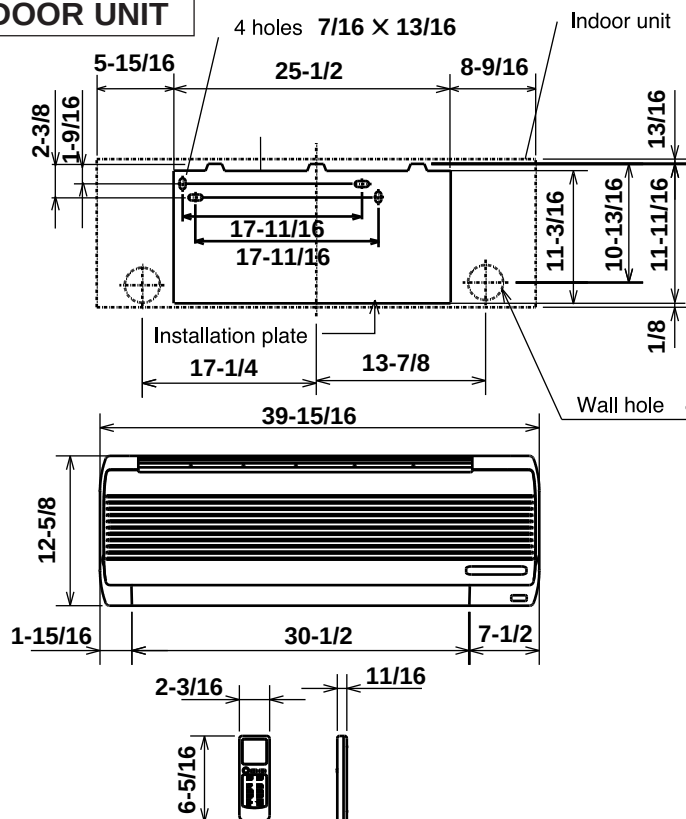
MUH09NW

OUTDOOR UNIT

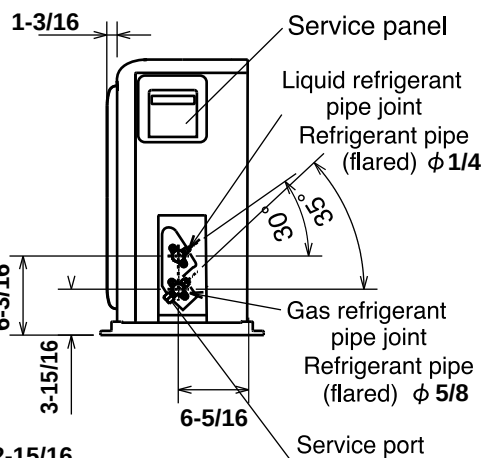
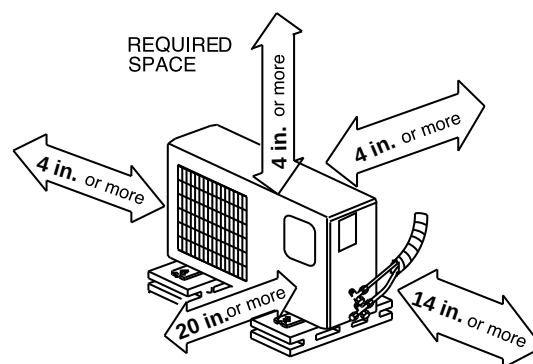
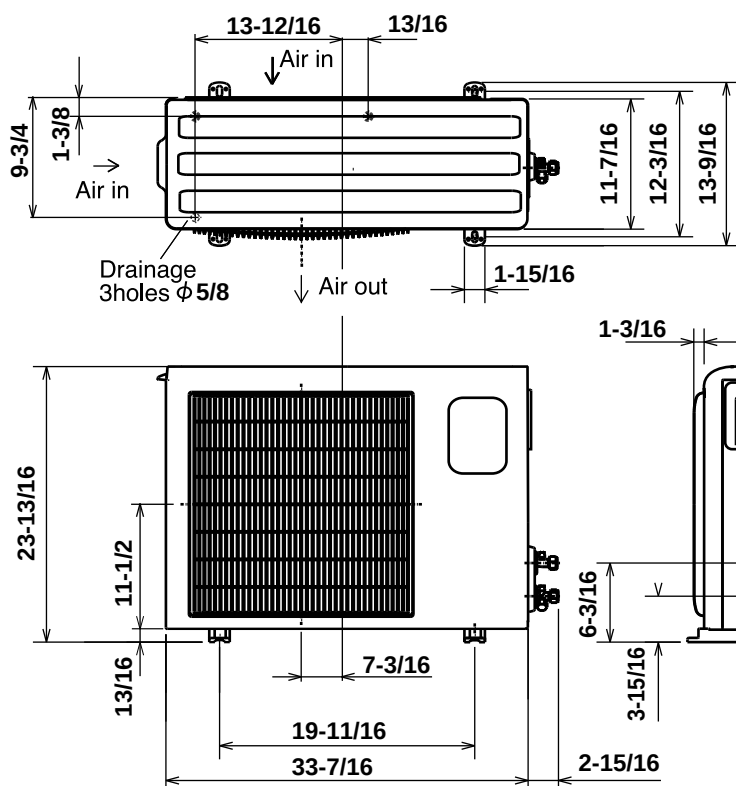


INDOOR UNIT

INDOOR UNIT



OUTDOOR UNIT

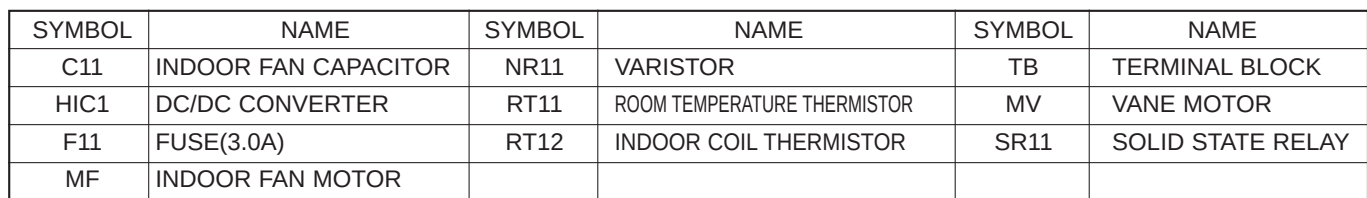


OUTDOOR UNIT

[illegible]

MODEL WIRING DIAGRAM

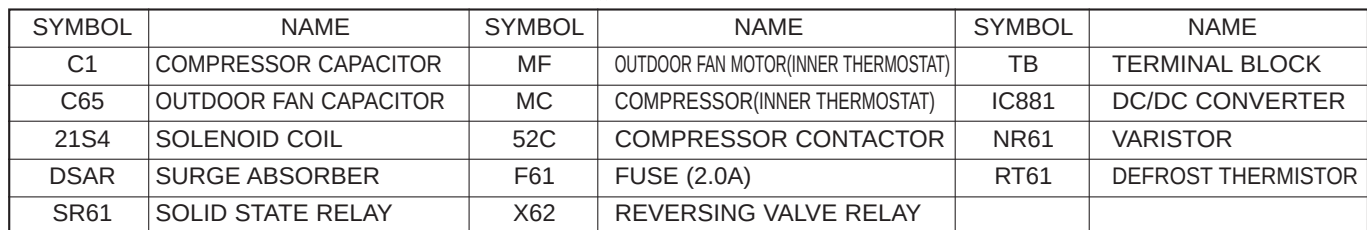
MODEL WIRING DIAGRAM



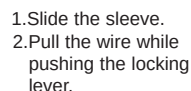
©: Terminal block, □□□□: Connector

MODEL WIRING DIAGRAM

MODEL WIRING DIAGRAM



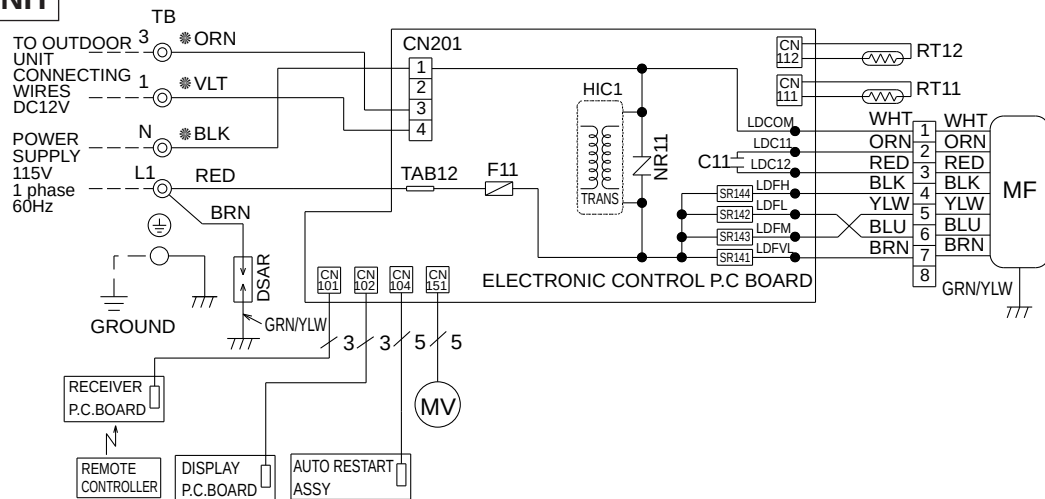
©: Terminal block, : Connector



MSH12NN, MSH15NN, MSH17NN

MODEL WIRING DIAGRAM

INDOOR UNIT



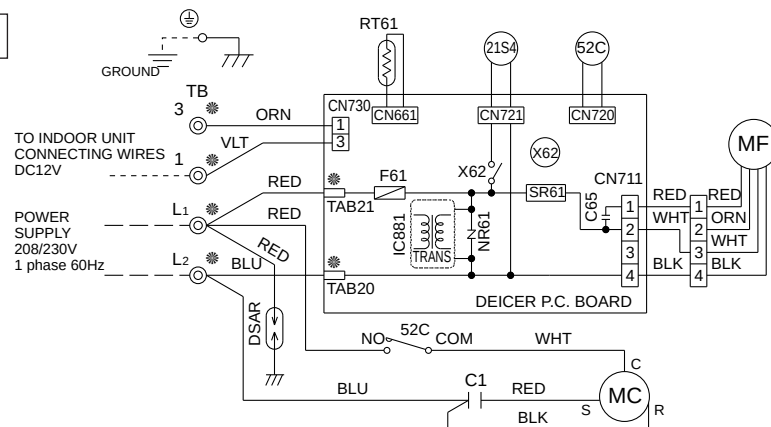
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C11	INDOOR FAN CAPACITOR	NR11	VARISTOR	TB	TERMINAL BLOCK
HIC1	DC/DC CONVERTER	RT11	ROOM TEMPERATURE THERMISTOR	MV	VANE MOTOR
F11	FUSE(3.0A)	RT12	INDOOR COIL THERMISTOR	DSAR	SURGE ABSORBER
MF	INDOOR FAN MOTOR	SR142~SR144	SOLID STATE RELAY		

NOTE:1. For the outdoor 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

MUH12NN, MUH15NN, MUH17NN

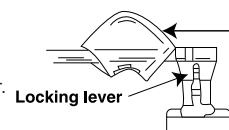
MODEL WIRING DIAGRAM

OUTDOOR UNIT



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C1	COMPRESSOR CAPACITOR	MF	OUTDOOR FAN MOTOR(INNER THERMOSTAT)	TB	TERMINAL BLOCK
C65	OUTDOOR FAN CAPACITOR	MC	COMPRESSOR(INNER THERMOSTAT)	52C	COMPRESSOR CONTACTOR
DSAR	SURGE ABSORBER	NR61	VARISTOR	X62	REVERSING VALVE RELAY
F61	FUSE (2.0A)	RT61	DEFROST THERMISTOR	21S4	SOLENOID COIL
IC881	DC/DC CONVERTER	SR61	SOLID STATE RELAY		

NOTE:1. Use copper conductors only.(For field wiring)
 2. "※"show the terminals with a lock mechanism, so they cannot be removed when you pull the lead wire.
 Be sure to pull the wire by pushing the locking lever(projected part) of the terminal with a finger.
 3. Symbols below indicate.
 ○: Terminal block, □□□□: Connector



1. Slide the sleeve.
2. Pull the wire while pushing the locking lever.

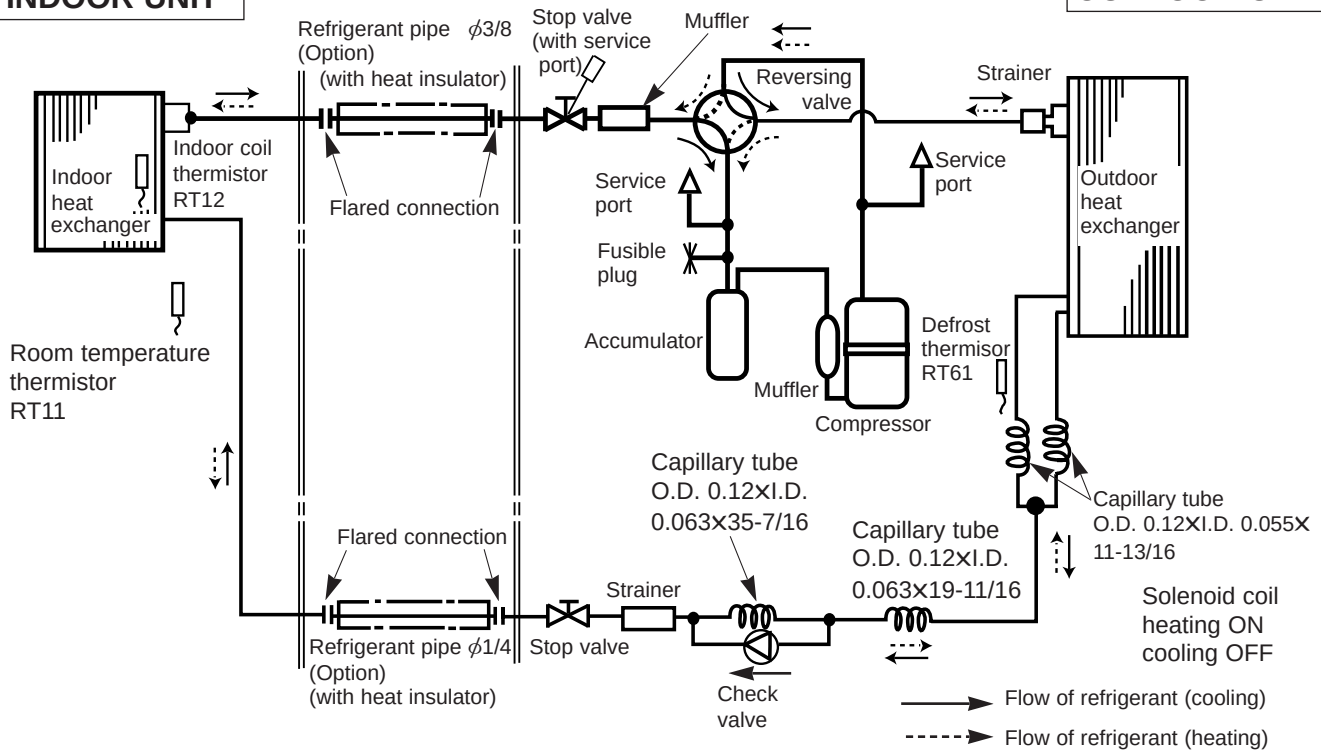
Unit:inch

MSH09NW

MUH09NW

INDOOR UNIT

OUTDOOR UNIT

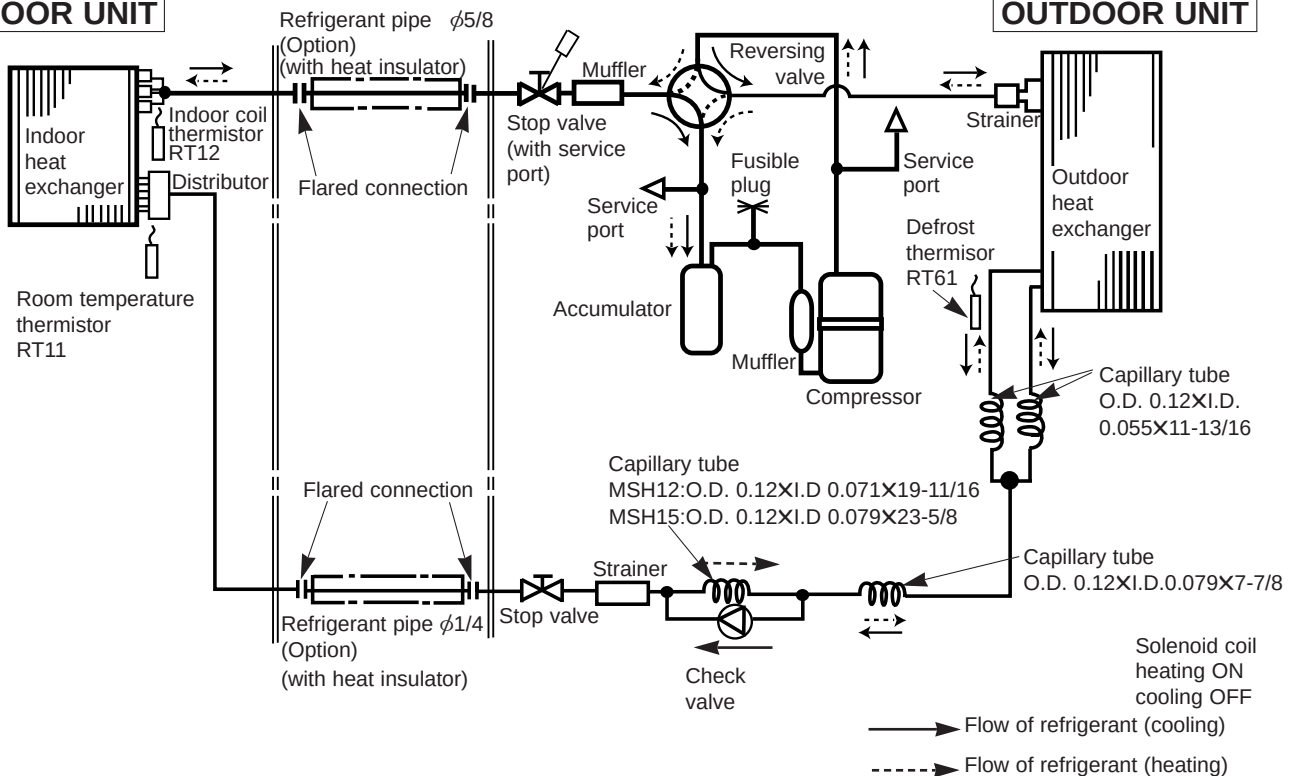


Unit:inch

MSH12NN
MSH15NNMUH12NN
MUH15NN

INDOOR UNIT

OUTDOOR UNIT

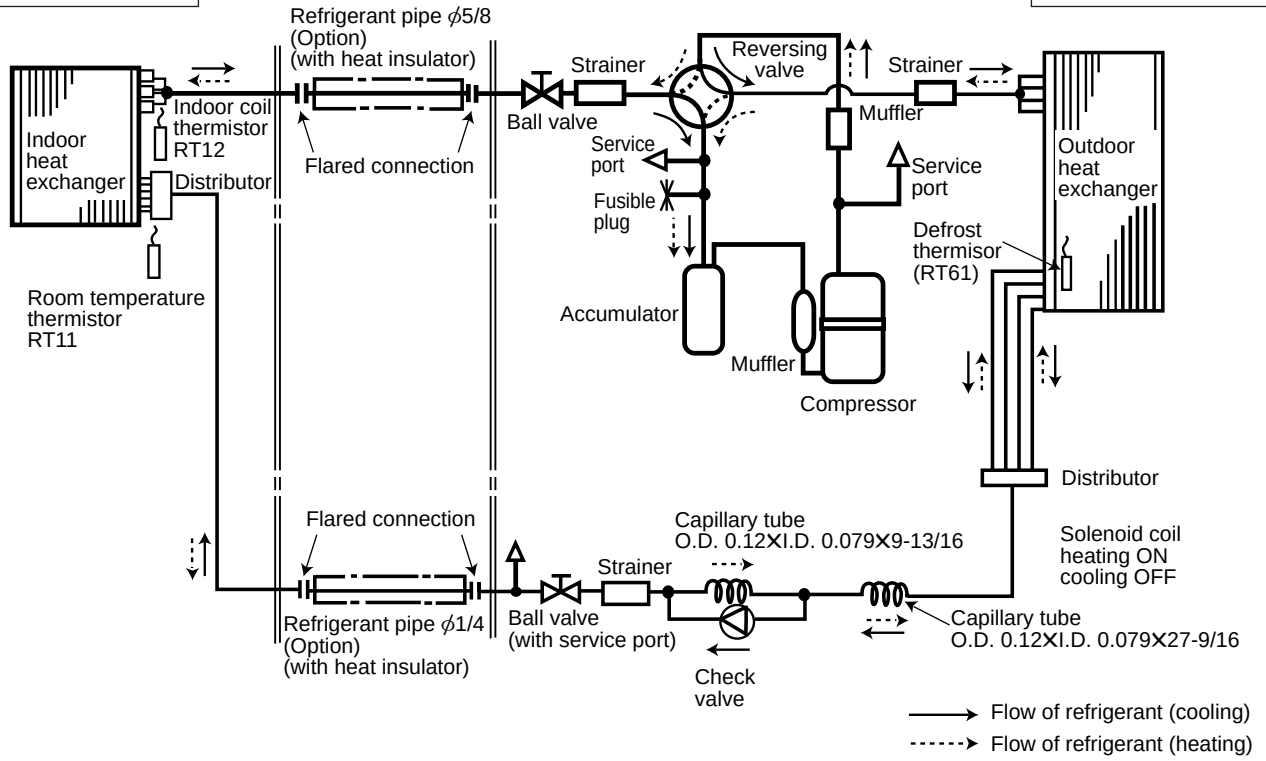


MSH17NN

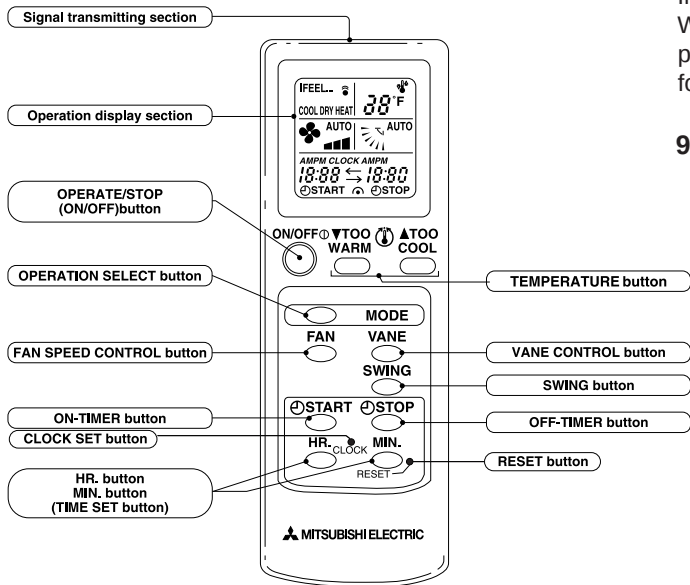
MUH17NN

INDOOR UNIT

OUTDOOR UNIT



Wireless remote controller



INDOOR UNIT DISPLAY SECTION

MSH09NW, MSH12NN
MSH15NN, MSH17NN

Once the controls are set, the same operation mode can be repeated by simply turning the OPERATE/STOP button ON. Indoor unit receives the signal with a beep tone.

When the system turned off, 3-minute time delay will operate to protect system from overload and compressor will not restart for 3 minutes.

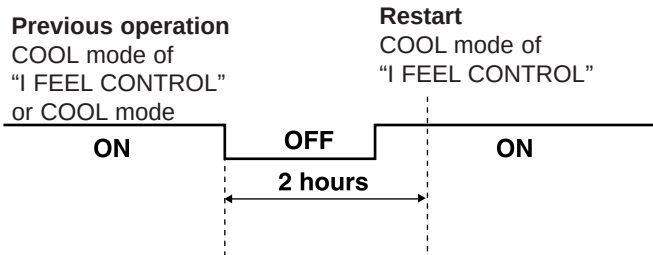
9-1. "I FEEL CONTROL" OPERATION

- (1) Press OPERATE/STOP button on the remote controller. OPERATION INDICATOR LAMP of the indoor unit will turn 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 initial room temperature at start-up of the operation.

Initial room temperature	mode
more than 77°F	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"

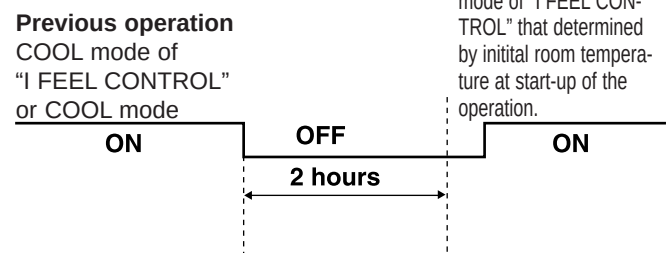
- Once the mode is fixed, the mode will not change by room temperature afterwards.
- Under the ON-TIMER (⌚ START) operation, mode is determined according to the room temperature when the operation starts.
- When the system is stopped with the OPERATE/STOP button on the remote controller, and restarted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

Example



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

Example



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

Model	Initial room temperature	Initial set temperature	
COOL mode of “I FEEL CONTROL”	79°F or more	75°F	※ 1
	79°F or less	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”	73°F or less	79°F	

※1 After the system restarts by the remote controller, the system operates with the previous set temperature regardless of the initial set temperature.

The set temperature is calculated by the previous set temperature.

(5) TEMPERATURES buttons

In **"I FEEL CONTROL"** mode, set temperature is decided by the microprocessor based on the room temperature.

In addition, set temperature is 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.

▲ TOO

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

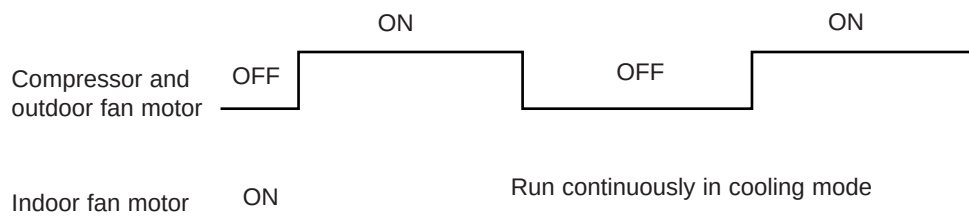


▼ TOO

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



— COOL mode of “I FEEL CONTROL” —



NOTE : Coil frost prevention during COOL mode of “I FEEL CONTROL”

There are two types of controls in 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 only works after 5 minutes from the compressor starts.

The compressor stops and the indoor fan operates at the set speed for 5 minutes.

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

② Time control

When the three conditions below 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 Lo or Me.

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 Hi or the room temperature exceeds 79°F. However, when two of the above conditions (b. and c.) are satisfied again, time accumulation is resumed.

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

Followings are the fan speed in AUTO.

Initial temperature difference	Fan speed
Room temperature minus set temperature : 4 degrees or more.....	Hi
Room temperature minus set temperature : 2 degree or more and less than 4 degrees.....	Me
Room temperature minus set temperature : less than 2 degree.....	Lo

2 deg. 3 deg. 4 deg. 7 deg.

— 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 and the microprocessor.

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

The operation of the compressor and indoor fan is as follows.

1. When the room temperature is 73°F or over:

Compressor operates by temperature control and time control.

① Set temperature is controlled to fall 4°F as initial set temperature.

② 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.

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

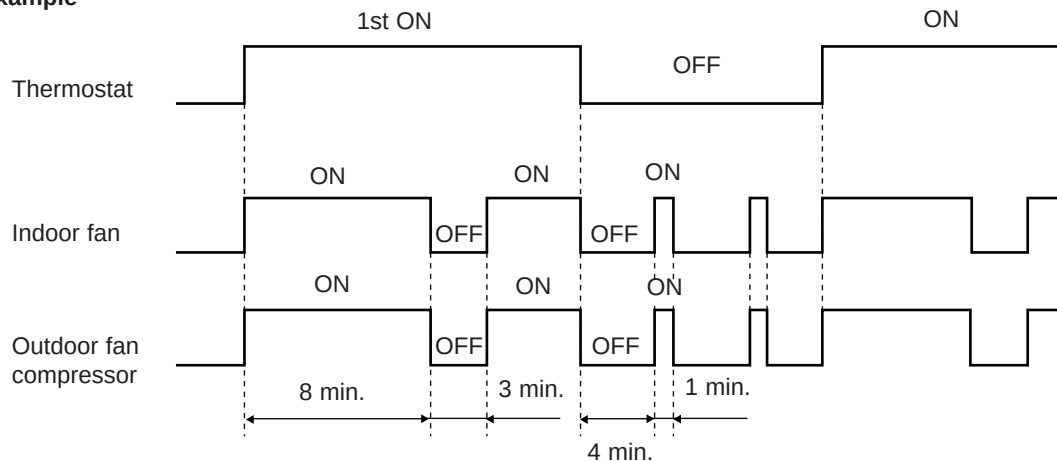
2. When the room temperature is under 73°F.

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



NOTE ● Coil frost prevention during DRY mode of "I FEEL CONTROL"
The operation is as same as that of coil frost prevention during COOL mode of "I FEEL CONTROL".
However the indoor fan speed becomes the set speed or Lo.

— HEAT mode of "I FEEL CONTROL" —

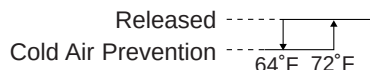
1. Indoor fan speed control

(1) Followings are the fan speed in AUTO.

temperature difference	Fan speed
Set temperature minus room temperature: 4 degrees or more	Hi
Set temperature minus room temperature: 2 degrees or more and less than 4 degrees	Me
Set temperature minus room temperature: less than 2 degree	Lo
	2 deg. 3 deg. 4 deg. 7 deg.

(2) Cold air prevention control

The fan runs at set speed when the indoor coil thermistor RT12 temperature exceeds 72°F. The fan operates at VLo when the temperature is below 64°F. But the fan stops when the indoor fan operates at VLo and the temperature is below 59°F or less.



NOTE : At initial in hysteresis this control works.

(3) New warm air control.

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

After releasing of cold air prevention, when the indoor coil temperature is 99°F or above, the fan speed shifts to the set speed, and when the fan speed is changed by the remote controller, the fan speed is the set speed.

When the indoor coil temperature is less than 99°F, the fan speed is controlled by time as below.

<Time condition> <Indoor fan speed>

less than 2 minutes.....Lo

2 minutes to 4 minutes.....Me

4 minutes or more.....Hi

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

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

(4) Flow soft control

After the thermostat turns off, the indoor fan operates at VLo.

NOTE : When the thermostat turns on, the fan operates at the set speed. Due to the cold air prevention control, the fan does not start until the indoor coil thermistor RT12 reads above 72°F or more.

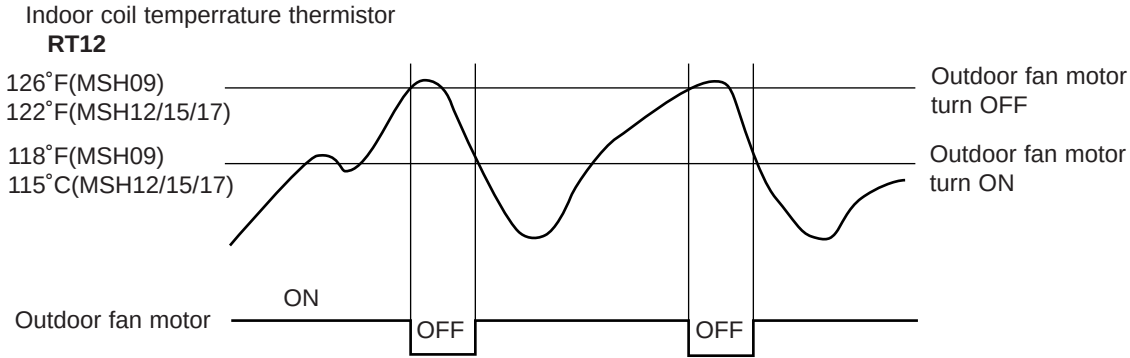
2. High pressure protection

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 : 118.4°F (MSH09), 115°F (MSH12/15/17)

High pressure protection time chart



NOTE: When the outdoor fan is OFF in heating, the defrosting of outdoor heat exchanger is not detected by the defrost thermistor RT61.

3. Defrosting

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

(1) Defrost starting conditions

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

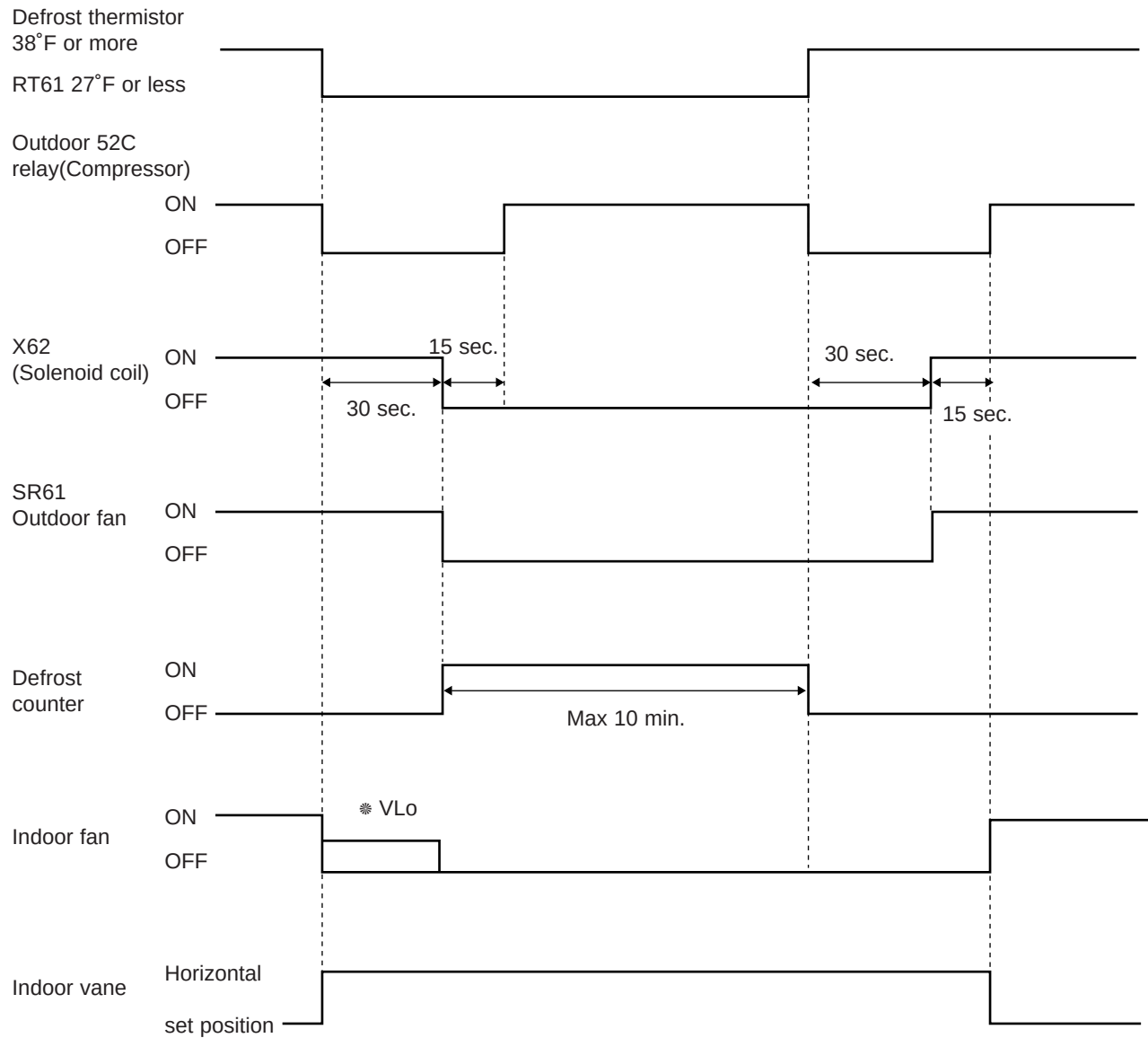
- a) Under the heat operation, the compressor cumulative operation time exceeds for 40 minutes without the defrosting operation working.
- b) The defrost thermistor RT61 reads 27°F.
- c) After releasing the high pressure protection, 4 minutes and 15 seconds have elapsed.

(2) Defrost terminating conditions

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

- d) The defrost thermistor RT61 reads 38°F or more.
- e) The defrosting time exceeds 10 minutes.

(3) Defrost time chart

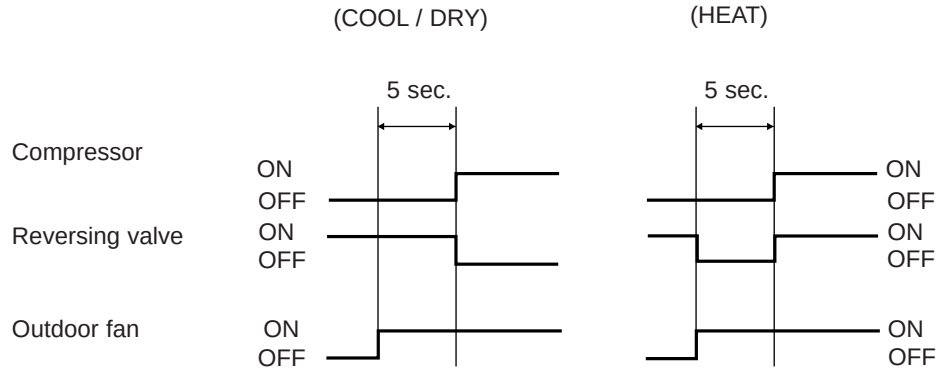


NOTE ● When the indoor coil thermistor reads above 64°F, indoor fan operates at VLo for 30 seconds.
 ● When the indoor coil thermistor reads 64°F or less, the indoor fan stops.

4. Reversing valve control

Heating ON
Cooling OFF
Dry OFF

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

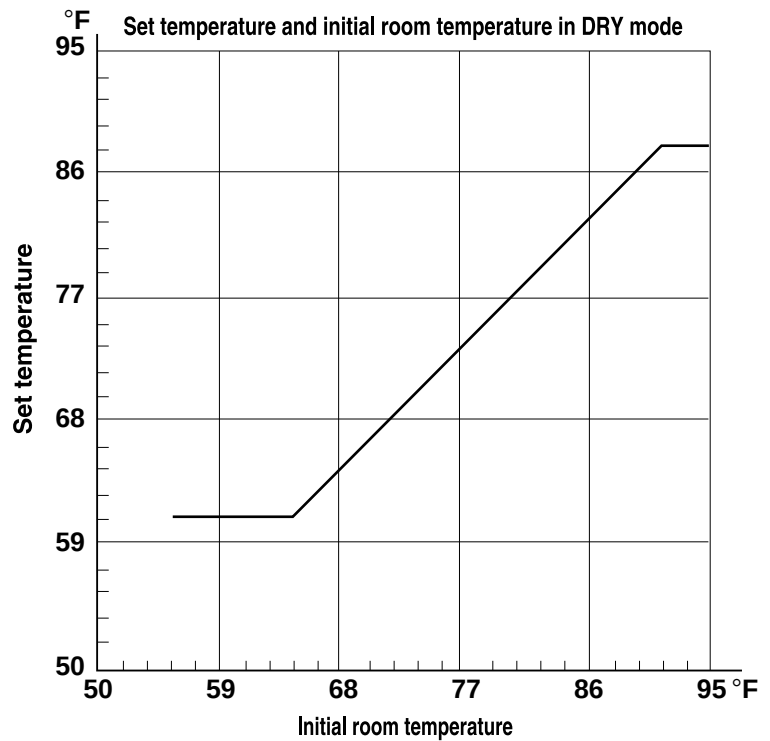


9-2. COOL OPERATION

- Press OPERATE/STOP button.
OPERATION INDICATOR of the indoor unit turns on with a beep tone.
- Select COOL mode.
- Set the TEMPERATURE button.
(TOO WARM or TOO COOL button)
The setting range is 59 ~ 89°F
* Indoor fan continues to operate regardless of thermostat's OFF-ON
* Coil frost prevention is as same as COOL mode of "I FEEL CONTROL"

9-3. DRY OPERATION

- Press OPERATE/STOP button.
OPERATION INDICATOR of the indoor unit turns on with a beep tone.
- Select DRY mode.
- The microprocessor reads the room temperature and determines the set temperature. Set temperature is as shown in the right chart. Thermostat (SET TEMP.) is not work. The other operations are same as DRY mode of "I FEEL CONTROL".
- DRY operation will not functions when the room temperature is 55°F or below.
- When DRY operation functions, the fan speed is lower than cool operation.



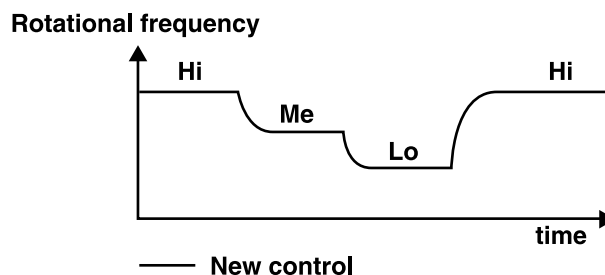
9-4. HEAT OPERATION

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

9-5. FAN MOTOR CONTROL (MSH09 only)

(1) Rotational frequency feedback control

The indoor fan motor is equipped with a rotational frequency sensor, and outputs signal to the microprocessor to feedback the rotational frequency. Comparing the current rotational frequency with the target rotational frequency (Hi, Me, Lo) the microprocessor controls SR11 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

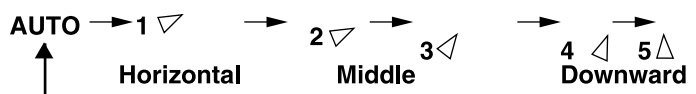
When the rotational frequency feedback signal has not output for 12 seconds, (or when the microprocessor cannot detect the signal for 12 seconds) the fan motor is regarded locked-up. Then the electric current to the fan motor is shut off. 3 minutes later, the electric current is applied to the fan motor again. During the fan motor lock-up, the operation indicator flashes to show the fan motor abnormality. (See page 45.)

9-6. AUTO VANE OPERATION

(1) Vane motor drive

MSH-N series is equipped with a stepping motor for the vane. The rotating direction, speed, and angle of the motor are controlled by plus signals (approx. 12V) transmitted from indoor microprocessor.)

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



(3) Positioning

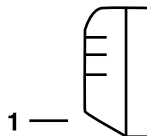
The vane is once pressed to the vane stopper below to confirm the standard position and then set to the desired angle. The positioning is decided as follows.

- (a) When the OPERATE/STOP button is pressed. (POWER ON/OFF)
- (b) When the vane control change 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

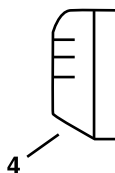
In VANE AUTO mode, the microprocessor automatically determines the vane angle and operation to make the optimum room-temperature distribution.

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) 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.

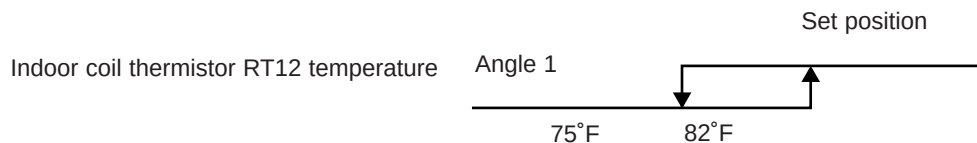
(6) SWING MODE

By pressing the SWING button vane swings vertically. The remote controller displays “” SWING mode is cancelled when the SWING button is pressed or the operation stops or changes to other mode.

(7) Cold air prevention in HEAT mode.

When either of the following conditions occurs in HEAT mode, 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.



NOTE : At initial in hysteresis this control works.

9-7. TIMER OPERATION

1. How to set the timer.

(1) Press OPERATE/STOP 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 TIMER CONTROL button to select the operation.

"⌚ START" button... AUTO START operation (ON timer)

"⌚ STOP" button... AUTO STOP operation (OFF timer)

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

HR. and MIN. button will work when "⌚ START" or "⌚ STOP" mark is flashing.

These marks disappear in 1 minute.

When setting the ON timer, check that OPERATION INDICATOR 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 TIMER CONTROL buttons. ("⌚ START" or "⌚ STOP")

To cancel the ON timer, press the "⌚ START" button.

To cancel the OFF timer, press the "⌚ STOP" button.

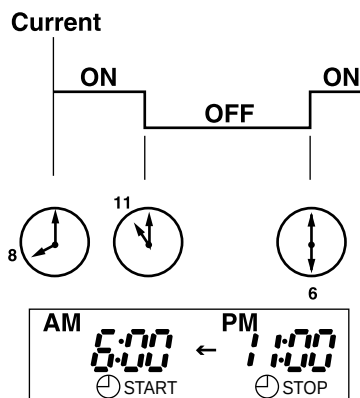
Timer is cancelled and the display of set time disappears.

PROGRAM TIMER

- The OFF timer and ON timer can be used in combination.
- "—" and "—" display shows the order of the OFF timer and ON timer operation.

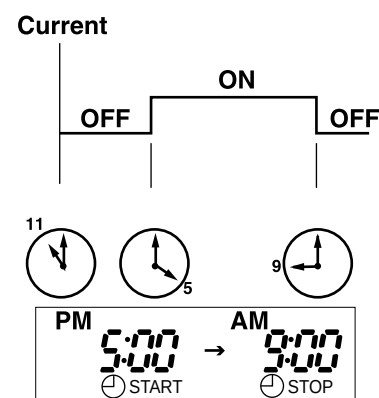
(Example 1) The current time is 8:00 PM.

The unit turns off at 11:00 PM, and on at 6:00 AM.



(Example 2) The current time is 11:00 AM.

The unit turns on at 5:00 PM, and off at 9:00 PM.



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

9-8. EMERGENCY-TEST OPERATION

When the remote controller is missing, has failed or the batteries run down, press the EMERGENCY OPERATION switch on the front of the indoor unit. The unit will start and the POWER MONITOR lamp will light.

The first 30 minutes of operation will be the test run operation. This operation is for servicing. The indoor fan runs at high speed and the system is in continuous operation. The thermostat is ON and the timer is reset to normal.

After 30 minutes of test run operation the system shifts to EMERGENCY COOL/HEAT MODE with a set temperature of 75°F.

The fan shifts to Me speed.

This operation continues until the EMERGENCY OPERATION switch is pressed or a button on the remote controller is pressed, then normal operation will start.

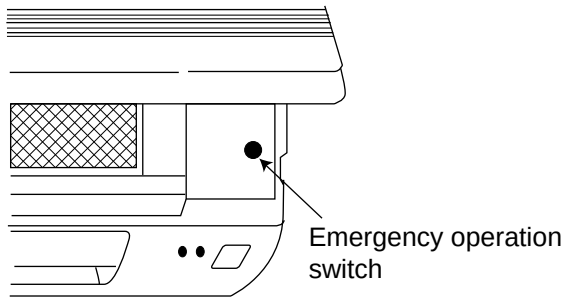
The coil frost prevention circuit operates in this operation, and defrosting operates too.

In the test run or emergency operation, the horizontal vane operates in AUTO mode at the set temperature of 75°F.

Defrosting of outdoor heat exchanger works in EMERGENCY HEAT MODE.

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

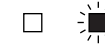
MSH09NW



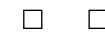
Press once
<Cool>



Press again
<Heat>



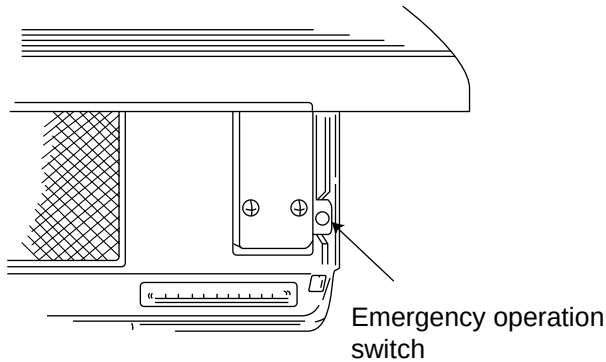
Press once again
<Stop>



MSH12NN

MSH15NN

MSH17NN



MSH09NW, MSH12NN, MSH15NN, MSH17NN**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. See Page 53.

Defrost thermistor RT61 must read below 27°F

2. DEFROST TERMINATION CHANGE

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

<JPE> when the JPE wire of the deicer P.C. board is cut, the defrost temperature will be changed.

Model	Junper wire	Change point
MSH09NW MSH12NN	JPC	Defrost interval time changes from 40 minutes to 15minutes.
MSH15NN MSH17NN	JPE	Defrost start temperature changes from 27°F to 32°F. Defrost finish temperature changes from 38°F to 50°F.

3. 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 assy.

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

NOTE:

- a) When the unit operation is stopped with the Emergency Operation Switch, the unit does not restart after the power is restored, since the signal of "Operation Stop" is memorized in the auto restart assy.
- b) Operation details may not be memorized in case the signal is transmitted by the remote controller to turn the main power OFF within 10 seconds after the power ON. .
- c) When the unit operation is stopped with the remote controller before power failure, the unit does not restart until the OPERATE/STOP (ON/OFF) button on the remote controller is pressed.

4. TIMER SHORT MODE

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

The time will be shortened as follows.

3-minute delay : 3-minute → 3-second.

AUTO START : 1 hour → 1-minutes

AUTO STOP : 1 hour → 1-minutes

} Short the connector during the timer mode.

5. P.C. BOARD MODIFICATION FOR INDIVIDUAL OPERATION

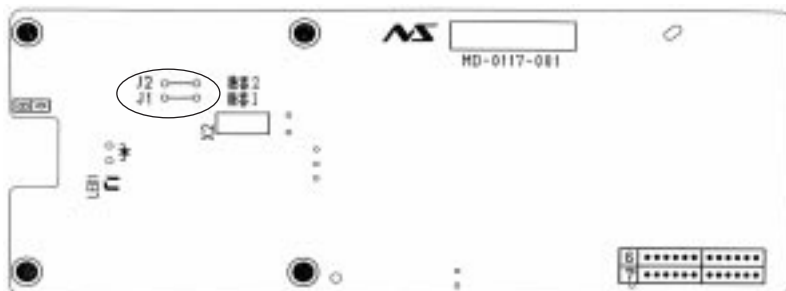
A maximum of 4 indoor units with wireless remote controllers can be used in a room.

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 remodeling, take out the batteries at first.
After finish remodeling, put back the batteries then push the RESET-button.

The P.C.board has the print "J1" and "J2". Jumper wires are mounted to each "J1" and "J2". Cut "J1" and "J2" according to the number of indoor unit as shown in Table 1.

After modification, push the RESET button near the MIN-button on the remote controller.

Table.1

	1 unit operation	2 unit operation	3 unit operation	4 unit operation
No,1 unit	No modification	Same as at left	Same as at left	Same as at left
No,2 unit	—	Cut J1	Same as at left	Same as at left
No,3 unit	—	—	Cut J2	Same as at left
No,4 unit	—	—	—	Cut both J1 and J2

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

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

MSH09NW, MSH12NN, MSH15NN, MSH17NN

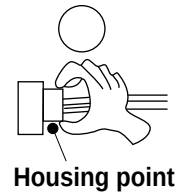
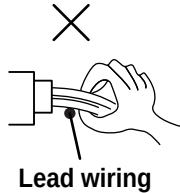
11-1 Cautions on troubleshooting

11-1-1 Before troubleshooting, check the followings:

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

11-1-2 Take care the followings during servicing.

- 1) Be sure to unplug the power cord before removing the front panel, the cabinet, the top panel, and the P.C. boards.
- 2) When removing the P.C. board, hold the edge of the board with care NOT to apply stress on the components.
- 3) When connecting or disconnecting the connectors, hold the housing of the connector. DO NOT pull the lead wires.



11-1-3 Troubleshooting procedure

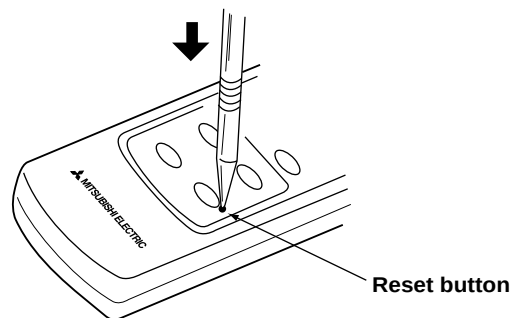
- 1) First, check if the OPERATION INDICATOR lamp on the indoor unit is flashing to indicate an abnormality. To make sure, check the how many times abnormality indication is flashing on and off before starting service work.
- 2) If the P.C. board is supposed to be defective, check the copper foil pattern for disconnection and the components for bursting and discoloration.
- 3) When troubleshooting, refer to the flow chart on page 44 and the check table on page 45.

11-1-4 How to replace batteries

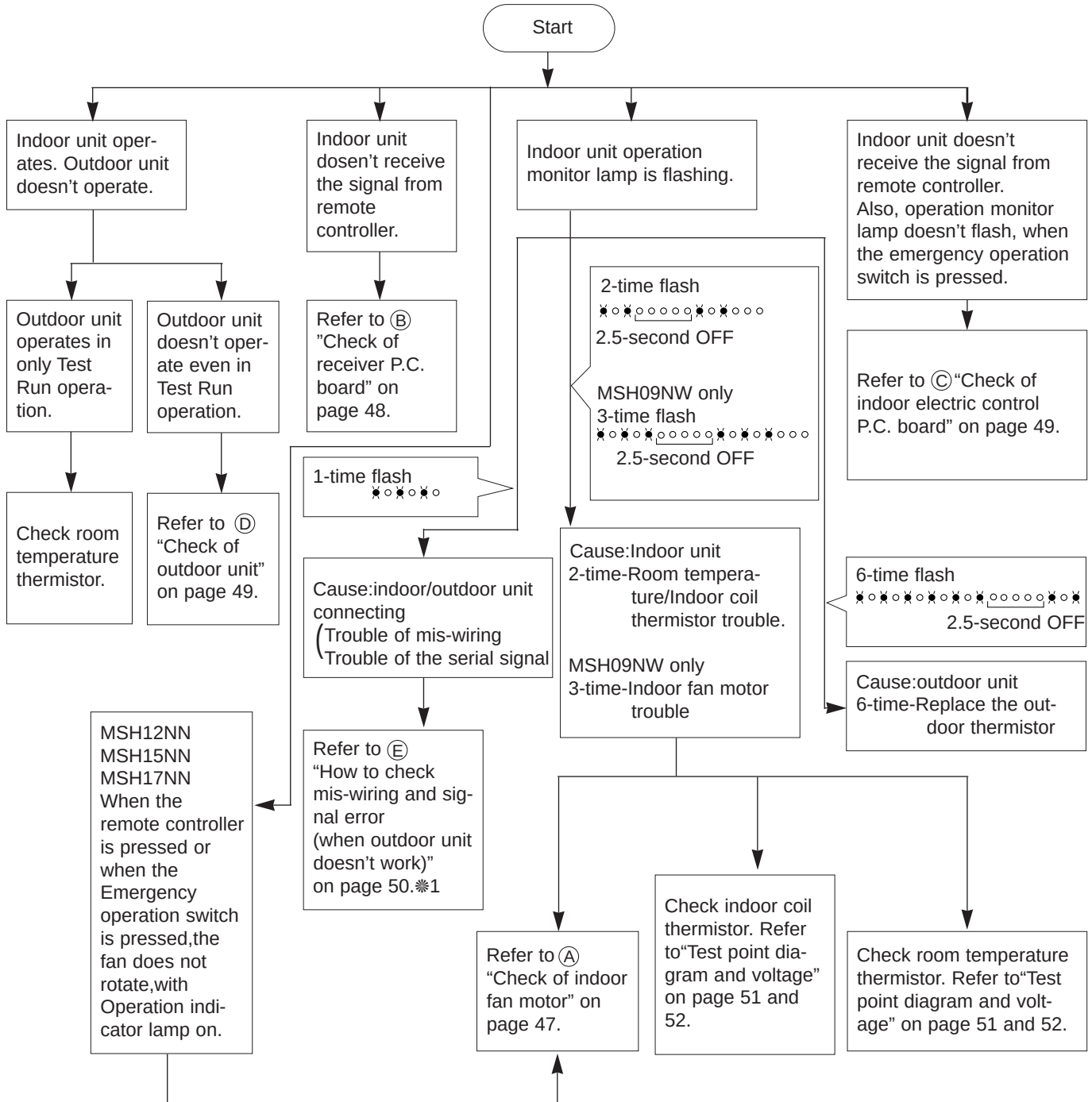
Weak batteries may cause the remote controller malfunction.

In this case, the remote controller can not be repaired only by the battery replacement. To operate the remote controller normally, discharge the remote controller in the following order.

The remote controller has a reset button. After installing new batteries, press the reset button with tip end of ball point pen or the like, and then use the remote controller.

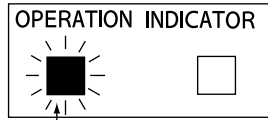


11-2 Instruction of troubleshooting



※1<The case of the trouble of the serial signal>
when turn off the power and then turn on the power again, the indication shows "the trouble of mis-wiring."

11-2-1 troubleshooting check table



Look at the left lamp flash for the self check table.

✳ 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	1-second ON ●○●○●○●○ 1-second OFF	Outdoor unit does not run.	When serial signal stops for 4 to 5 seconds after 1st on of 52C relay by POWER turning on.	● Check wiring (visual sheck and conductivity check). ● Check indoor electronic control P.C. board. ● Check outdoor DEICER P.C. board. ● Check electrical parts.
	Serial signal	1-second ON ●○●○●○●○●○●○●○ 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 2 seconds during operation.	● Check thermistor calibretrion. ● Reconnect connector. ● Check indoor borad.
3	Indoor fan motor	MSH09NW only 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 stoping.	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. ● Reconnect conector.
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 outdoor DEICER P.C. board. ● Check thermistor calibretrion.

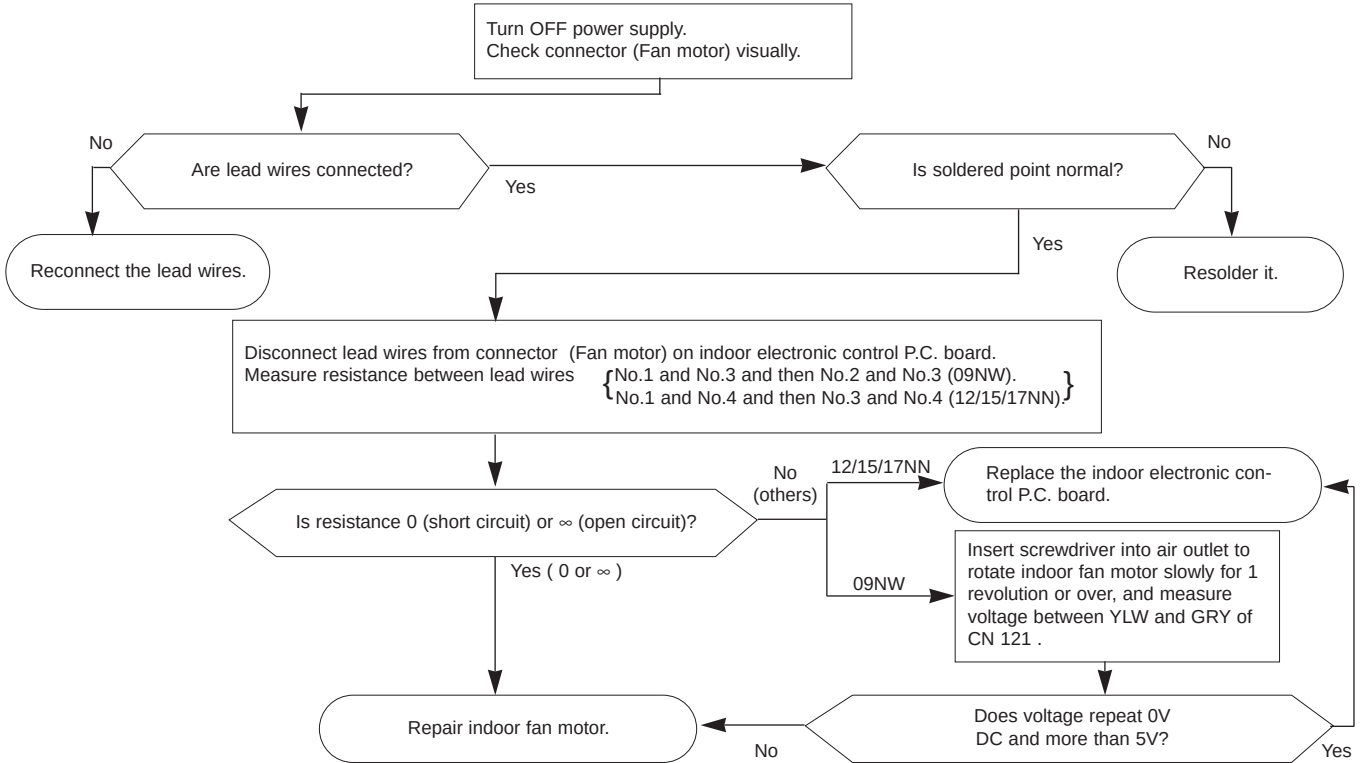
MSH09NW, MSH12NN, MSH15NN, MSH17NN

11-2-2 Trouble criterion of main parts

Part name		Check method and criterion					Figure		
Room temperature thermistor		Measure the resistance with a tester. (Part temperature 50°F ~ 86°F)							
Indoor coil thermistor									
		Normal		Abnormal					
		8kΩ ~ 20kΩ		Opened or short-circuited					
Defrost thermistor		Measure the resistance with a tester. (Part temperature 14°F ~ 104°F)							
		Normal		Abnormal					
		5kΩ ~ 55kΩ		Opened or short-circuited					
Compressor		Measure the resistance between the terminals with a tester. (Coil wiring temperature 14°F ~ 104°F)							
			Normal			Abnormal			
			09NW	12NN	15NN	17NN			
		C-R	0.86~1.06Ω	1.9~2.4Ω	1.4~1.9Ω	1.4~1.8Ω	Opened or short-circuited		
		C-S	1.9~2.4Ω	2.7~3.4Ω	2.4~3.0Ω	2.3~2.9Ω			
Indoor fan motor		Motor part	Measure the resistance between the terminals with a tester. (Coil wiring temperature 50°F ~ 86°F)						
									Normal
			09NW						
			WHT-BLK	76~83 Ω			Opened or short-circuited		
		BLK-RED	70~76 Ω						
		Sensor part	Measure the voltage Power ON.						
				Normal		Abnormal			
				09NW					
		BRN-YLW	4.5 ~ 5.5V		Remain 0V or 5V				
		YLW-GRY	(When fan revolved one time) 0V→5V→0V (Approx.)						
Outdoor fan motor		Motor part	Measure the resistance between the terminals with a tester. (Coil wiring temperature 14°F ~ 104°F)						
									Normal
			12/15NN		17NN				
			WHT-BLK	67~73Ω		53~59Ω			Opened or short-circuited
			BLK-YLW	9~9.8Ω		10~12Ω			
			YLW-BLU	4.9~5.5Ω		4.6~5.0Ω			
			BLU-BRN	5.8~6.4Ω		5.4~6.0Ω			
			BRN-RED	28~32Ω		36~40Ω			
		Measure the resistance between the terminals with a tester. (Coil wiring temperature 14°F ~ 104°F)							
			Normal			Abnormal			
			09NW	12/15NN	17NN				
		WHT-BLK	42~53Ω	102~126Ω	55~68Ω	Opened or short-circuited			
		BLK-RED	74~92Ω	97~120Ω	82~101Ω				
Vane motor		Measure the resistance between the terminals with a tester. (Part temperature 50°F ~ 86°F)							
		Normal		Abnormal					
		09NW	12/15/17NN	Opened or short-circuited					
		282 ~ 305Ω	358 ~ 387Ω						

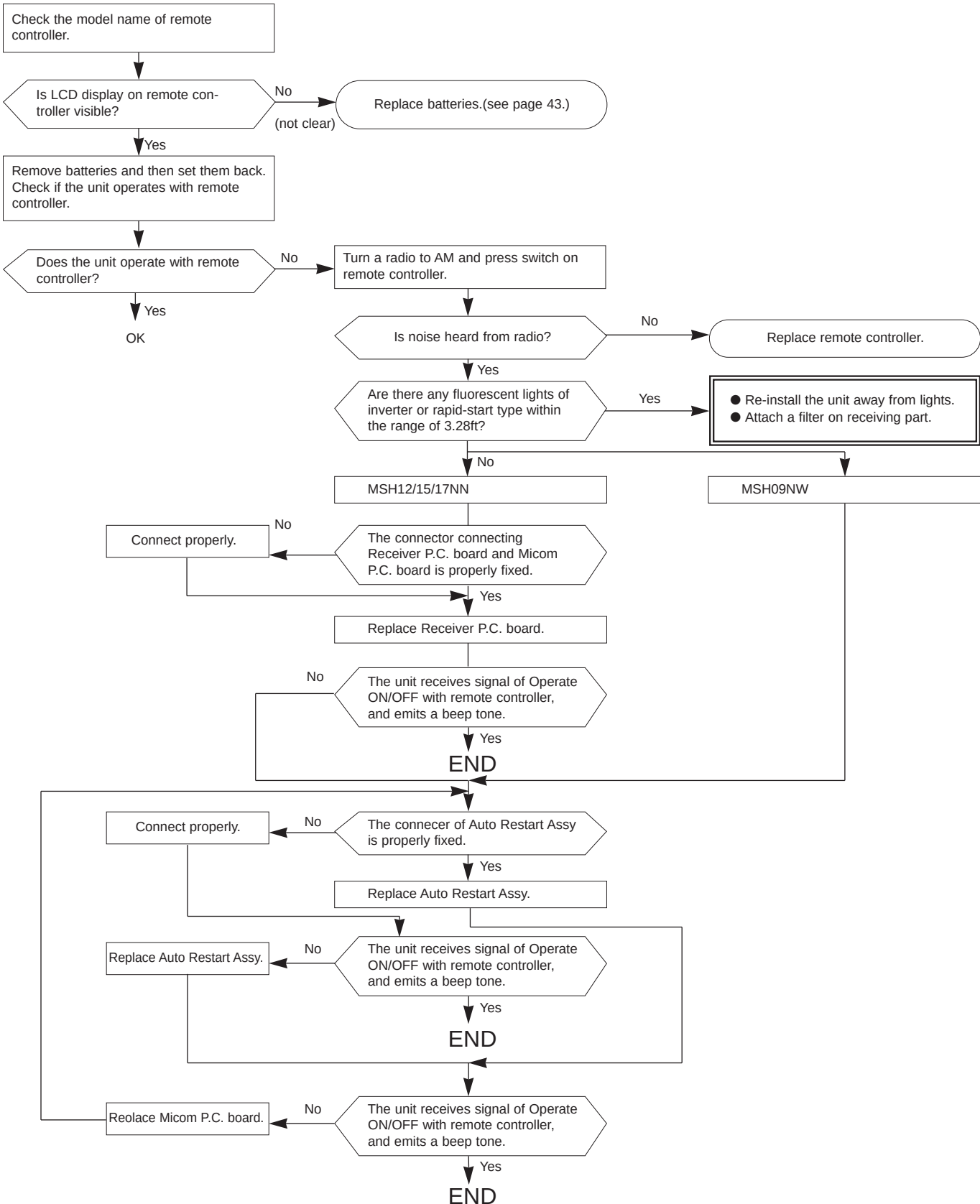
Ⓐ Check of indoor fan motor

Indoor fan does not operate.



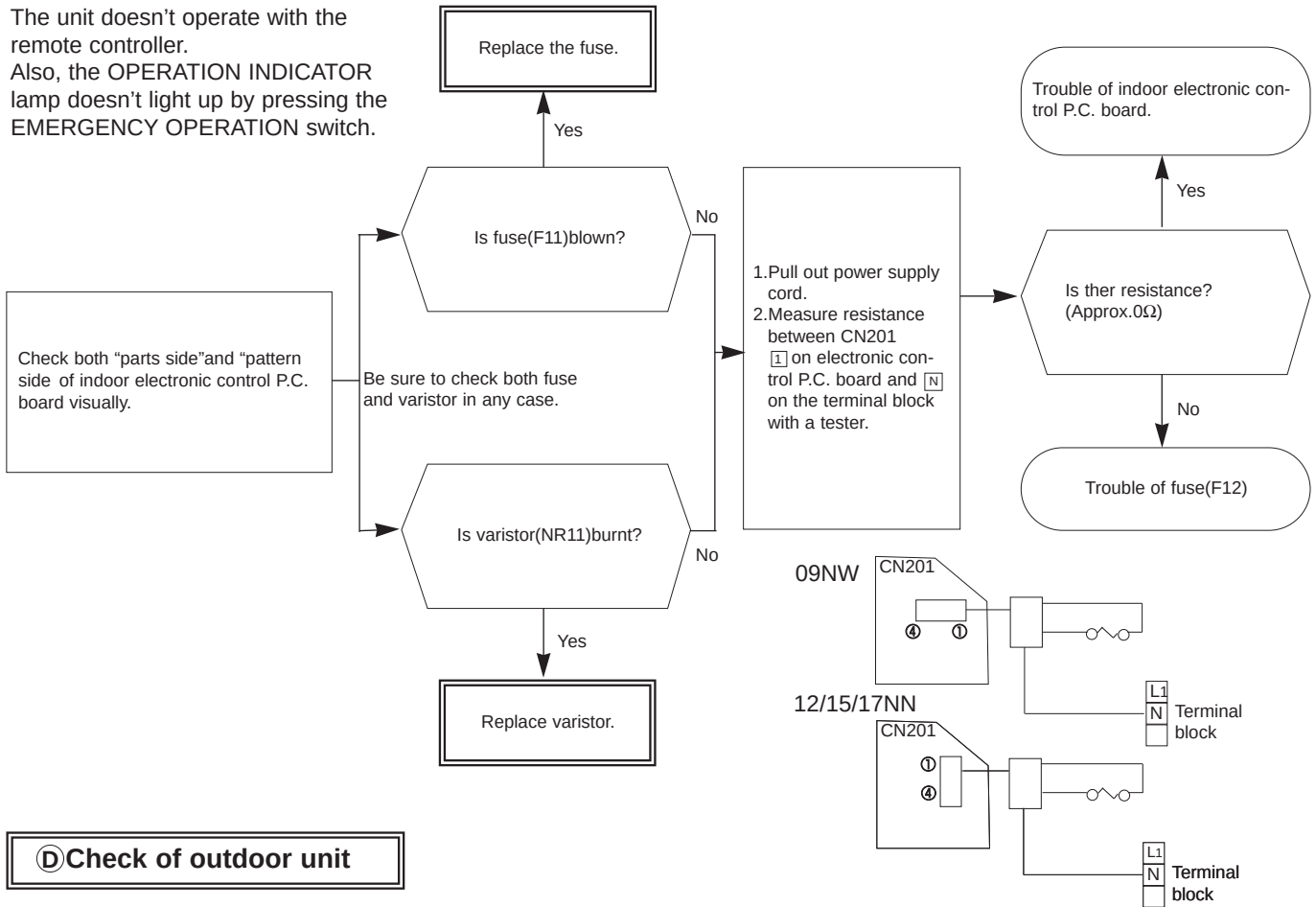
Ⓑ Check of receiver P.C. board

Indoor unit operates by pressing the emergency ON/OFF switch, but does not operate with the remote controller.



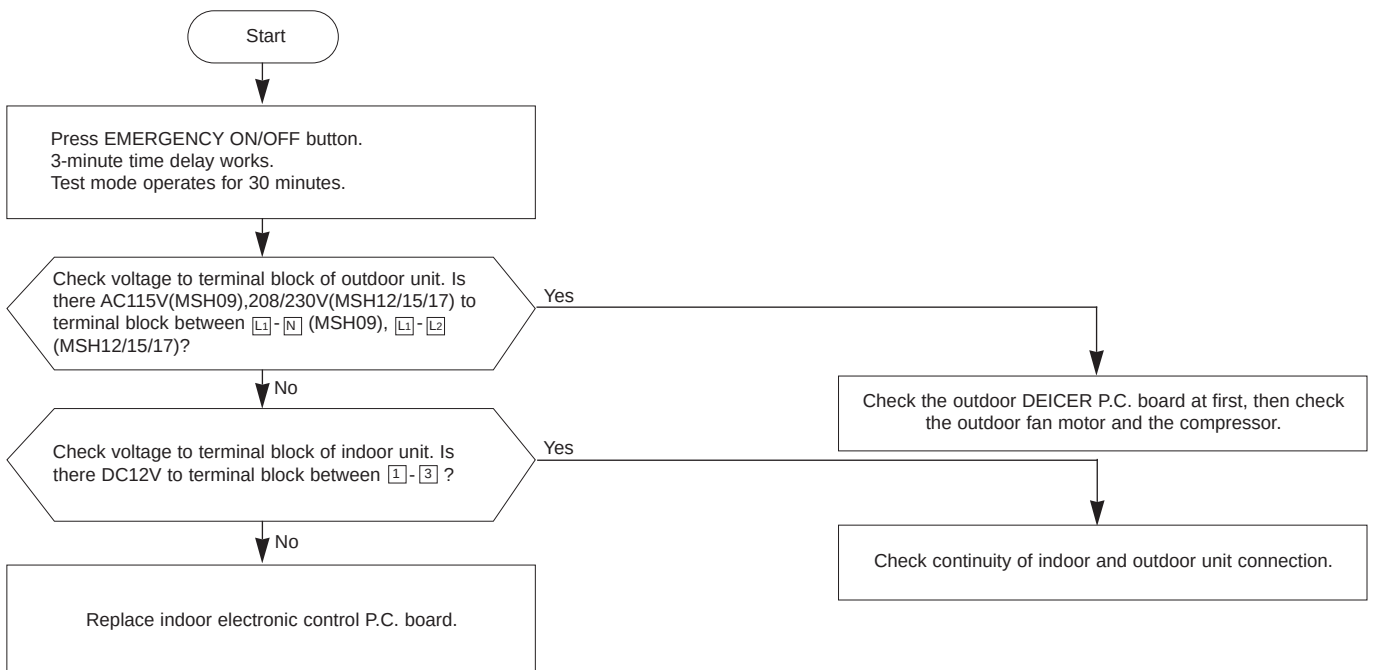
© Check of indoor electronic control P.C. board

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

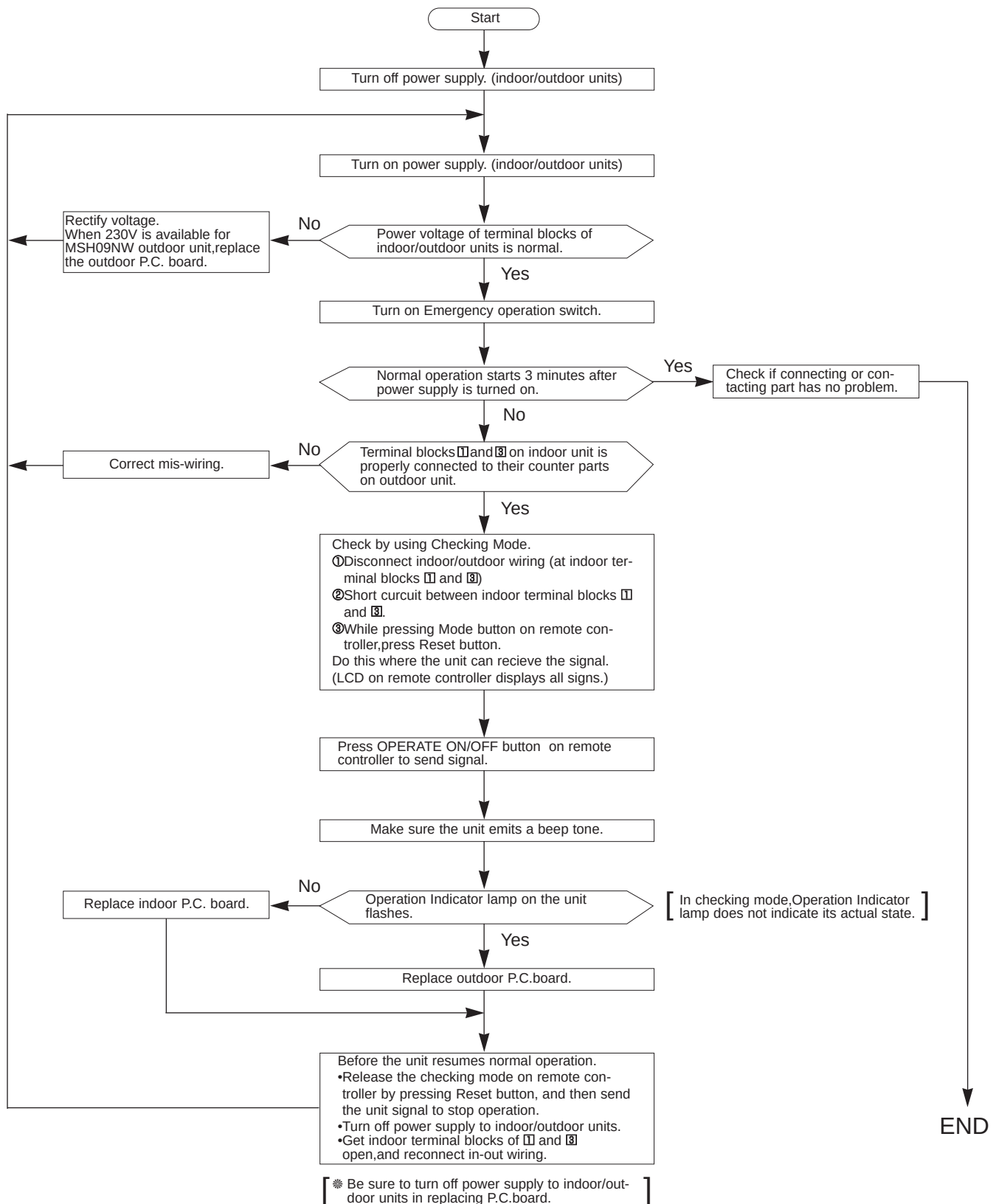


Ⓓ Check of outdoor unit

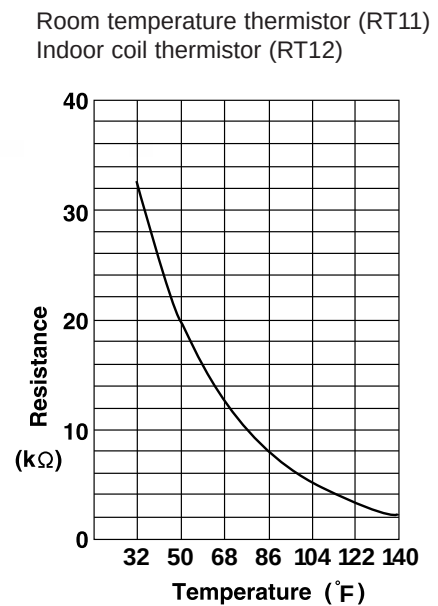
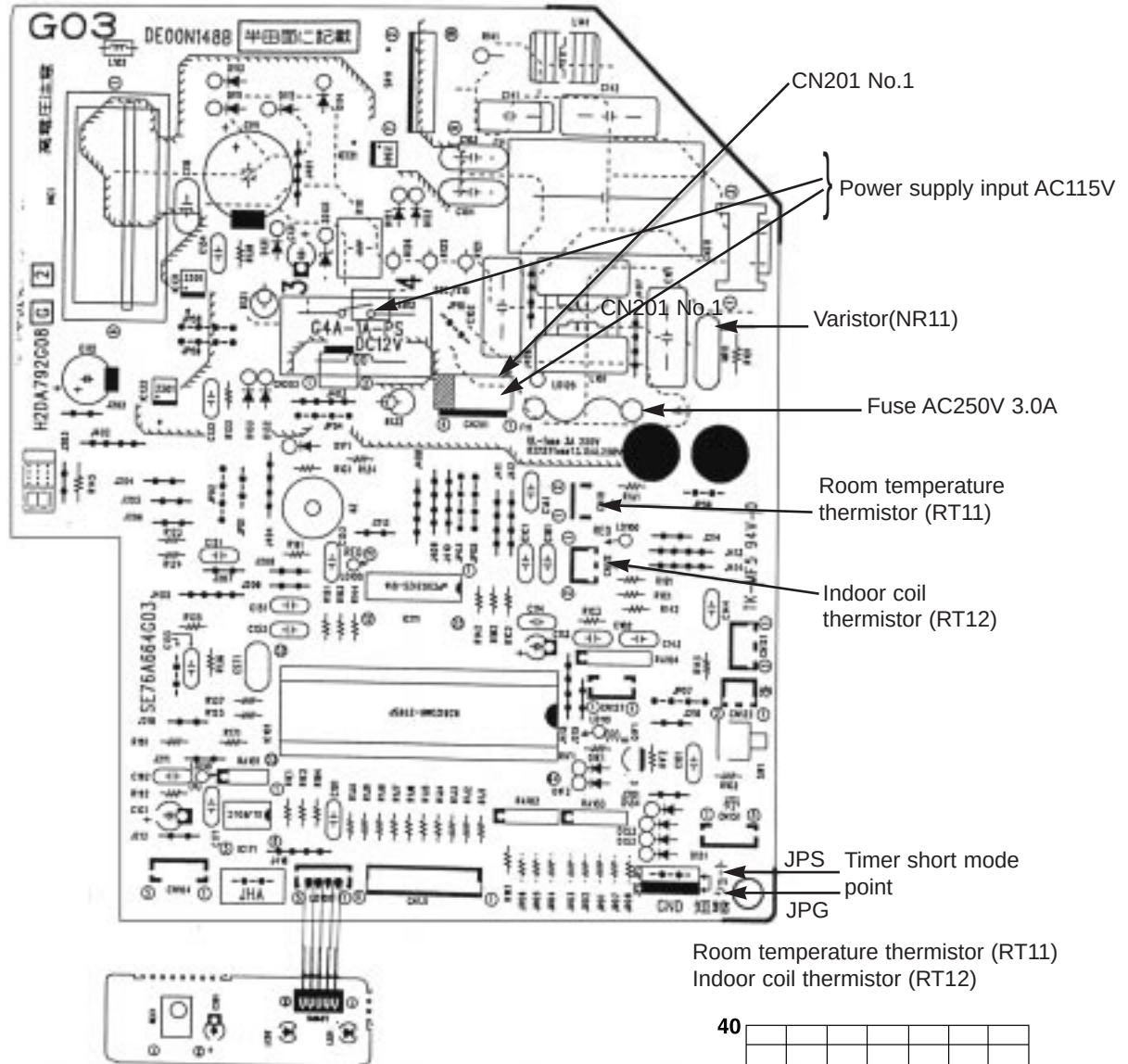
Compressor and outdoor fan do not operate. (Only indoor fan operates.)



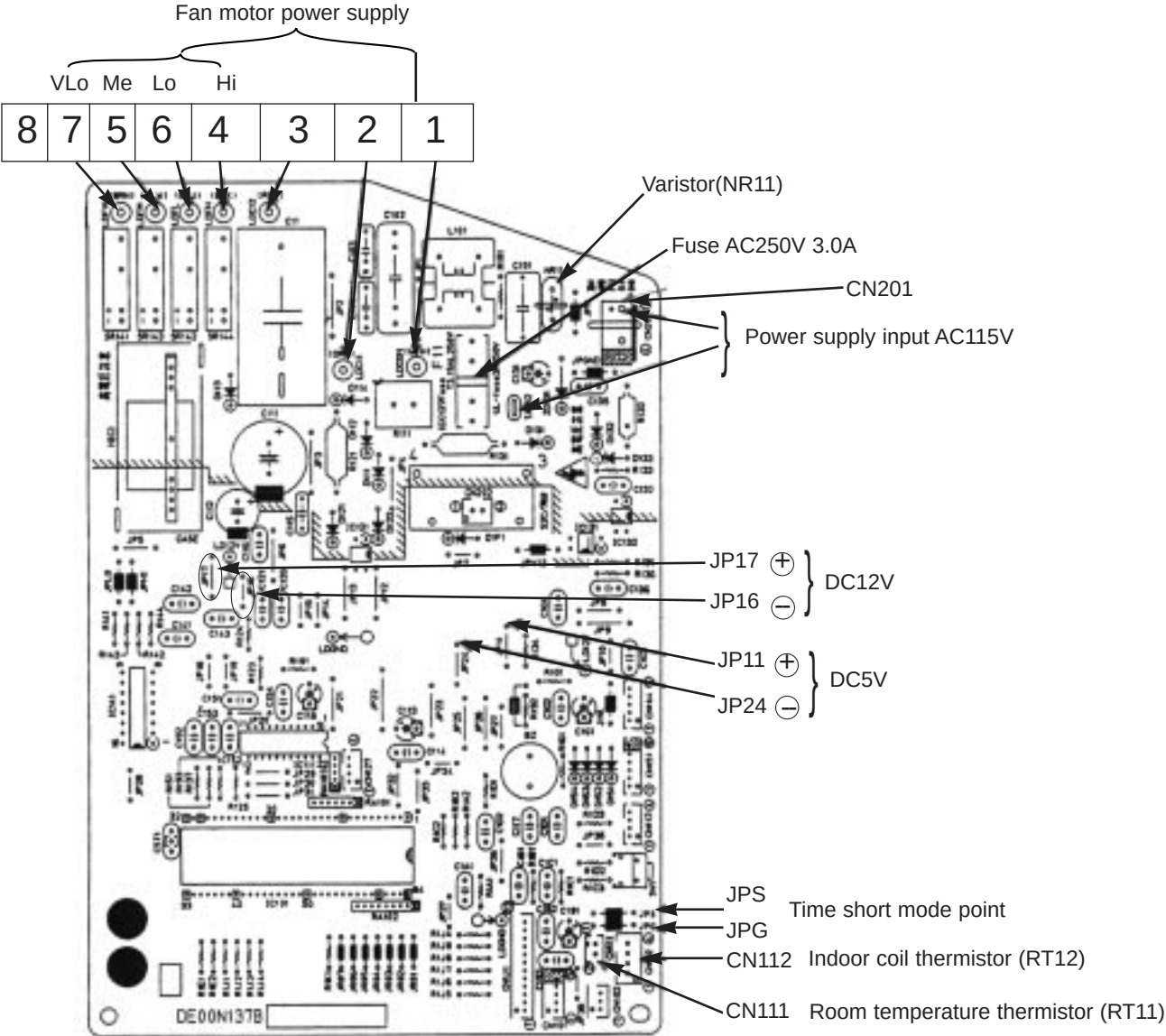
⑤How to check mis-wiring and serial signal error (when outdoor unit does not work)



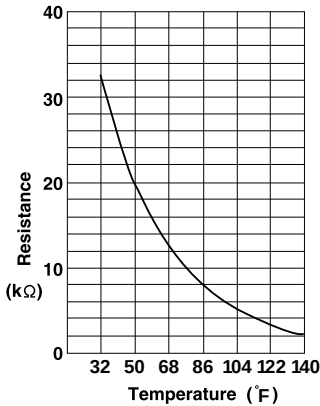
TEST POINT DIAGRAM AND VOLTAGE MSH09NW Indoor electronic control P.C. board



TEST POINT DIAGRAM AND VOLTAGE MSH12NN, MSH15NN, MSH17NN Indoor electronic control P.C. board

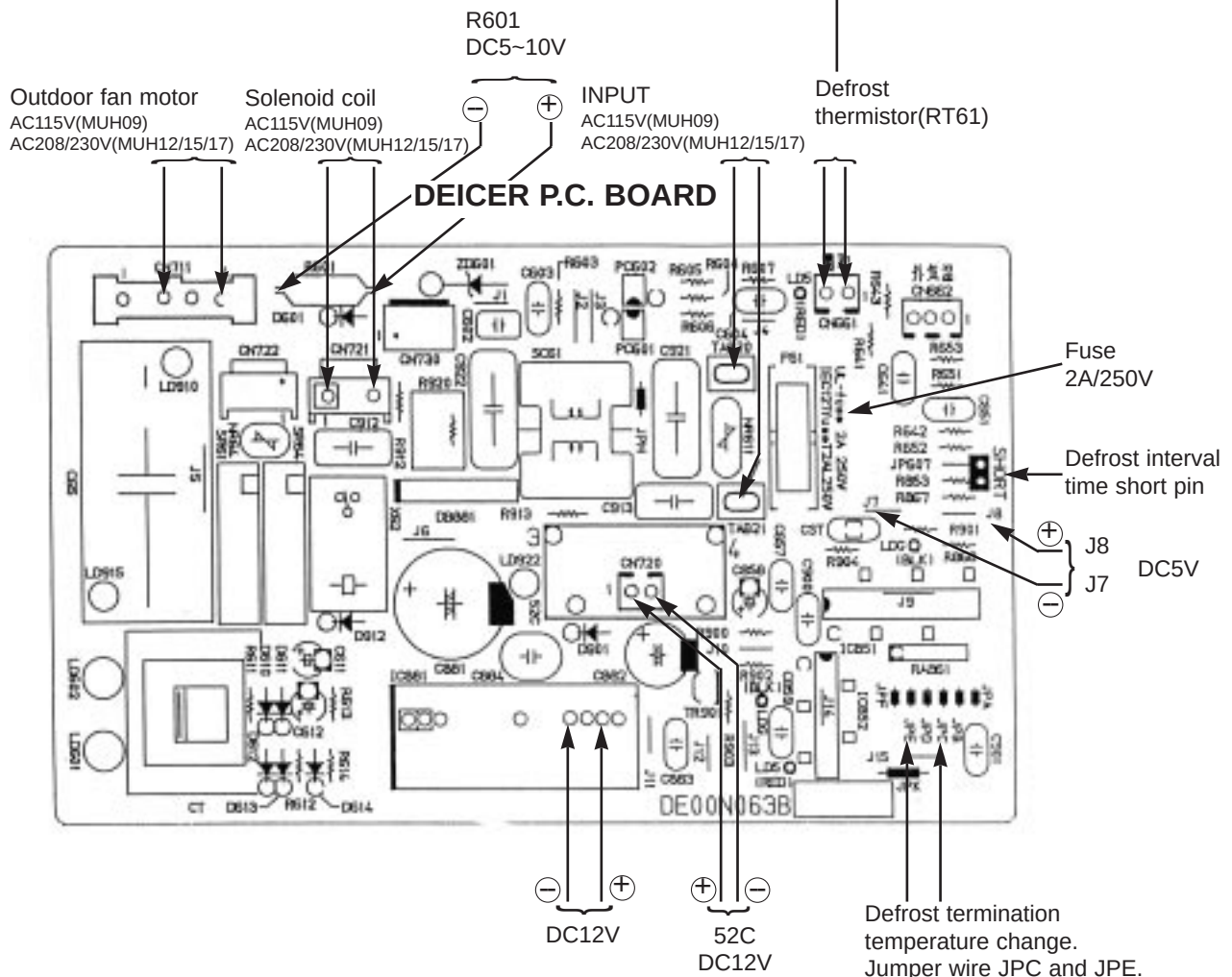
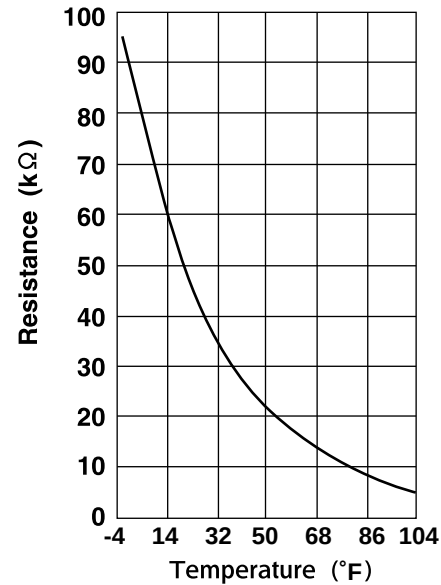


Room temperature thermistor (RT11)
Indoor coil thermistor (RT12)



MUH09NW
MUH12NN
MUH15NN
MUH17NN

Defrost thermistor (RT61)



RELAY OPERATION

MSH09NW

MSH12NN

MSH15NN

MSH17NN

MODE	THERMOSTAT	52C CONTACTOR	INDOOR FAN RELAY
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 system Repeats 8 min. ON/3min. OFF operation or 2 min. ON/3 min. OFF operation	AUTO or set
	OFF	Repeats 4 min. OFF/1 min. ON operation	AUTO or set speed links with 52C con- tactor.
HEAT & HEAT mode of I FEEL CONTROL	ON	ON	AUTO or set speed
	OFF	OFF	VLo speed

NOTE : When the compressor is OFF, "3-minute time delay circuit" operates.

COIL FROST PREVENTION mode are as follows

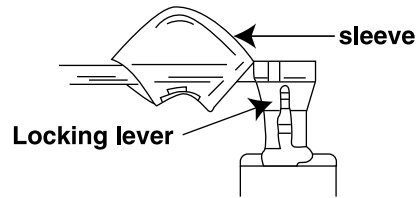
MODE	THERMOSTAT	52C CONTACTOR	INDOOR FAN RELAY
COOL & COOL mode of I FEEL CONTROL	ON	Off for 5 min. After that, OFF is pro- longed until indoor coil thermistor reads termination temper- ature.	AUTO or set speed
DRY & DRY mode of I FEEL CONTROL			VLo speed

Indoor fan relay mode (MSH12NN,MSH15NN)

Indoor fan speed	Relay turning ON
Hi	SR144
Me	SR143
Lo	SR142
VLo	SR141
OFF	All fan relays are off

NOTE:

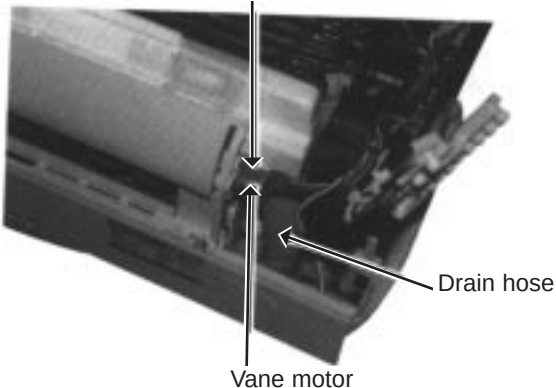
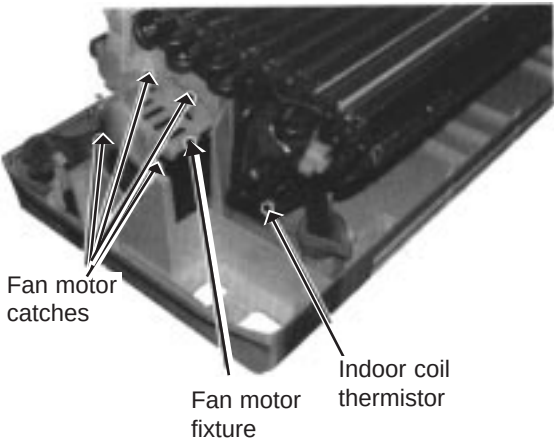
✳ On the wiring diagram shows the terminals with a lock mechanism, so it cannot be removed when you pull the lead wire. Be sure to pull the wire by pushing the locking lever (projected part) of the terminal with a finger.



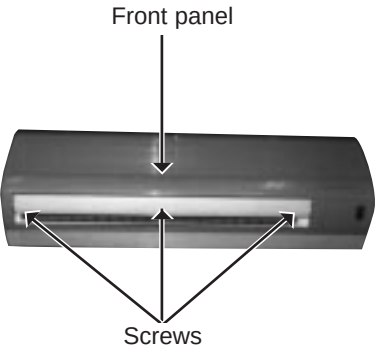
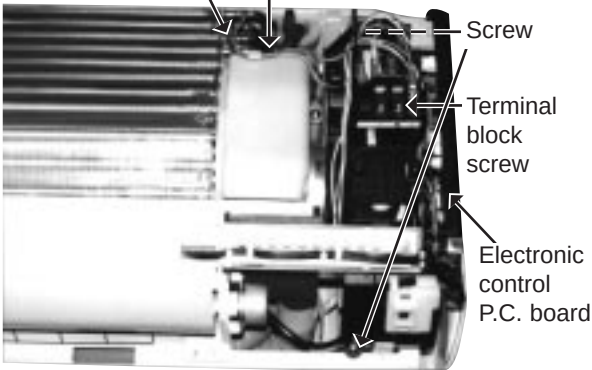
- ① Slide the sleeve.
- ② Pull the wire while pushing the locking lever.

12-1 MSH09NW INDOOR UNIT

OPERATING PROCEDURE	PHOTOS
1. Removing the front panel (1) Remove the screws caps 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 Labels: Front panel, Screw
2. Removing the electronic control P.C. board and the display 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 terminal cover. Remove the screw of the terminal block. (4) Remove the cord clamp. (5) Disconnect the room temperature thermistor and the connector from the indoor coil thermistor. (6) Remove the screw of the ground wire. (7) Remove the electronic control P.C. board and the display P.C. board.	Photo 2 Labels: Room temperature thermistor connector, Ground wire screw, Cord clamp, Terminal block cover, Indoor electronic control P.C. board, Terminal block cover screw

OPERATING PROCEDURE	PHOTOS
3. Removing the electrical box (1) Remove the front panel. (Refer to 1) (2) Remove the electrical cover. (3) Remove the electronic control P.C. board and the display P.C. board.(Refer to 2) (4) Remove the ground wire of the indoor heat exchanger. (5) Unhook the catches (both upper and lower), remove the electrical box.	
4. Removing the vane motor (1) Remove the front panel. (2) Remove the screw of the vane motor, disconnect the connector. (3) Remove the vane motor.	Photo 3 
5. Removing the line flow fan and the indoor fan motor (1) Remove the front panel. (Refer to 1) (2) Disconnect the connector from the vane motor. (3) Pull out the drain hose from the nozzle assembly, remove the nozzle assembly. (4) Lifting the left side of the heat exchanger, remove the electrical box. (5) Remove the fixture of the fan motor. (6) Remove the hexagon socket set screws. (7) Remove the line flow fan and the fan motor.	Photo 4 

12-2 MSH12NN , MSH15NN, MSH17NN INDOOR UNIT

OPERATING PROCEDURE	PHOTOS
1. Removing the front panel (1) Remove the screws caps 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 (1) Remove the front panel. (Refer to 1) (2) Remove the screw of the electrical cover. Remove the electrical cover. (3) Remove the terminal cover. Remove the screw of the terminal block. (4) Unhook the catch of the lamp holder. (5) Remove the receiver holder. (6) Disconnect the connectors on the electronic control P.C. board and remove the ground and the indoor coil thermistor. (7) Remove the electronic P.C. board.	Photo 2  Ground Indoor coil thermistor Screw Terminal block screw Electronic control P.C. board

OPERATING PROCEDURE

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

- (1) Remove the front panel.(Refer to 1)
- (2) Remove the electrical cover.
- (3) Disconnect the connector of the indoor coil thermistor.
- (4) Disconnect the motor connector (CN211 and CN121) and the vane motor connector (CN151) on the electronic control P.C. board.
Remove the ground wire of the indoor heat exchanger.
- (5) Unhook the catches (both upper and lower), remove the electrical box.
- (6) Unhook the catch on the both sides of the nozzle assembly.
- (7) Remove the nozzle assembly.
- (8) Remove the screws of the bearing support.
- (9) Remove the screw of the heat exchanger and unhook the catch.
- (10) Lifting the heat exchanger, remove the bearing support.
- (11) Remove the motor support.
- (12) Loose the screw securing the line flow fan, remove the line flow fan.
- (13) Remove the screws of the side cover, remove the fan motor.

PHOTOS

Photo 3

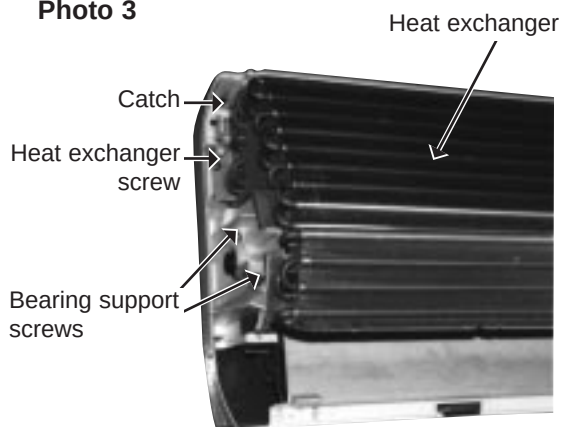
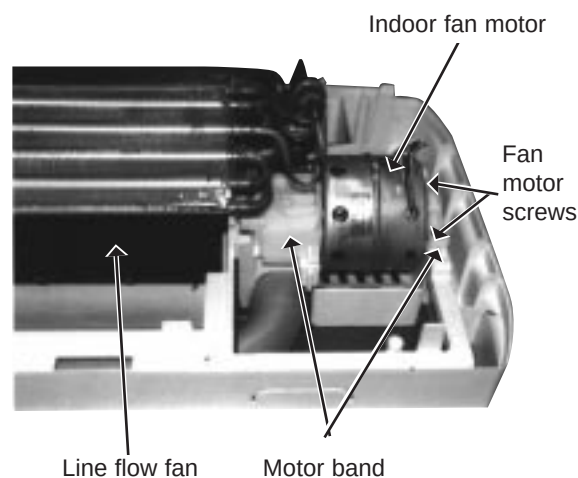
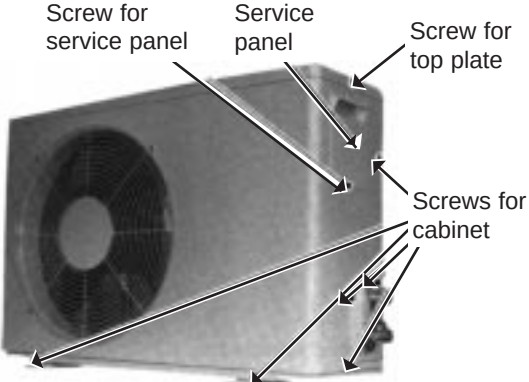
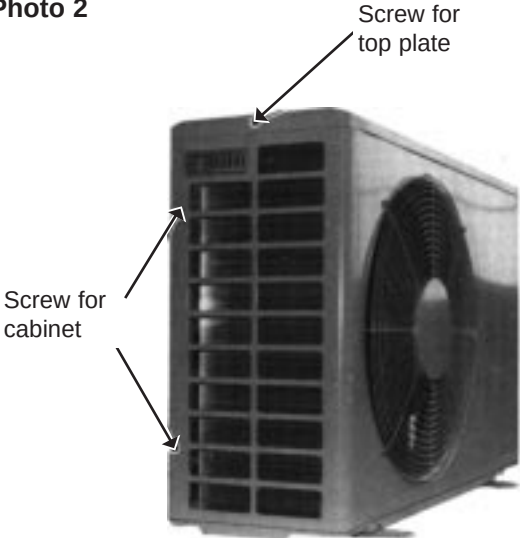
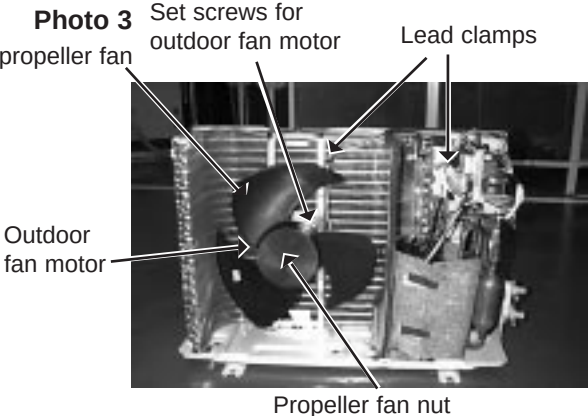


Photo 4



12-3 MUH09NW OUTDOOR UNIT

OPERATING PROCEDURE	PHOTOS
1. Removing the cabinet (1) Remove screws securing the top panel. (2) Remove the screw securing the service panel. (3) Remove screws securing the cabinet. (4) Remove the service panel, and remove the screw from the insides. (5) Remove the top panel. (6) Remove the cabinet.	Photo 1  Photo 2 
2. Removing the propeller fan and the outdoor fan motor (1) Remove the cabinet. (Refer to 1) (2) Remove the propeller fan nuts. (3) Remove 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 fan in position by using the cut on the shaft and the mark on the fan. (4) Remove lead clamps and disconnect the outdoor fan motor lead wires. (5) Remove screws securing the fan motor. (6) Remove the outdoor fan motor.	Photo 3 

OPERATING PROCEDURE

3. Removing the compressor

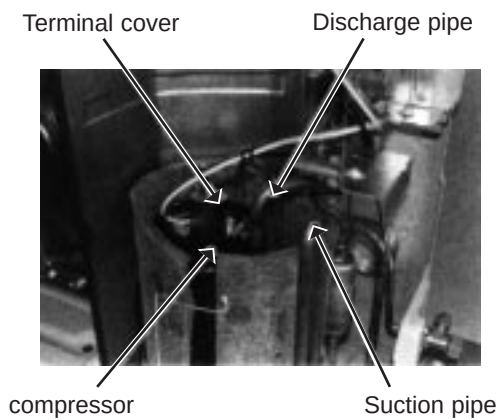
- (1) Remove the lead clamps.
- (2) Remove the screws securing the relay panel.
- (3) Remove the screw securing the service port.
- (4) Remove the terminal cover.
- (5) Pull out the lead from the compressor terminal.
- (6) Remove the overcurrent relay.
- (7) Remove the compressor nuts.
- (8) Detach the suction pipe welded section and discharge pipe welded section with a burner.

NOTE

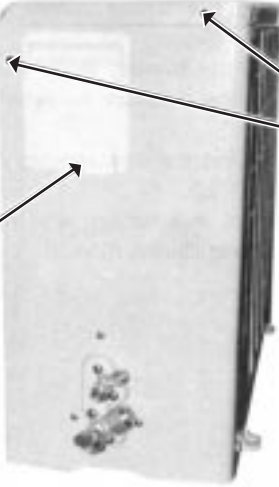
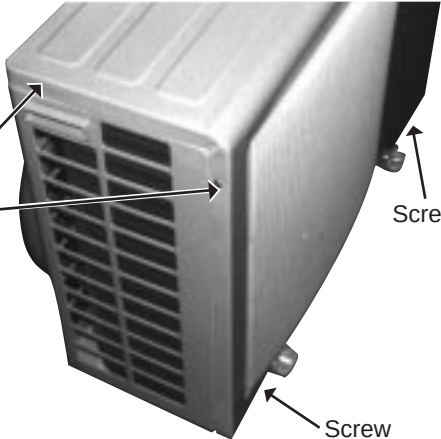
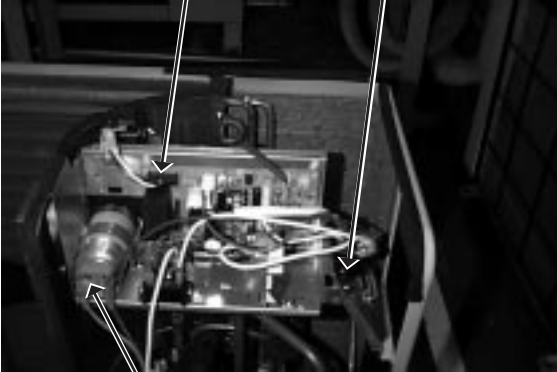
- Before using a torch, rechin gas from the pipes until the pressure gauge shows 0 PSIG.
- Use the burner under the condition that gas can be released even when the inner pressure rises by heat.
- Reclaim all refrigerant in an environmentally acceptable manner.

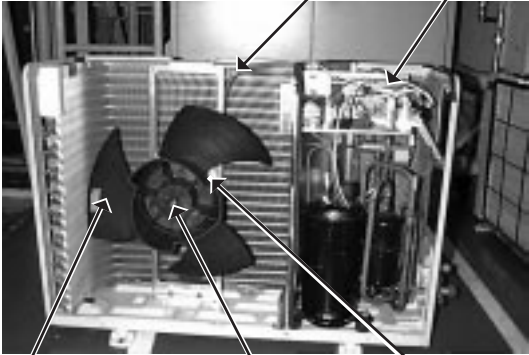
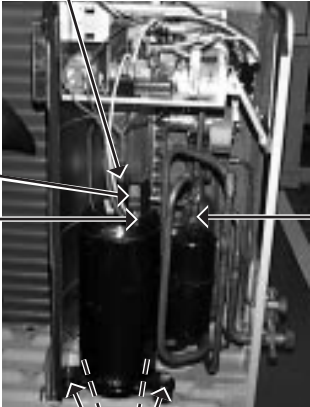
PHOTOS

Photo 4

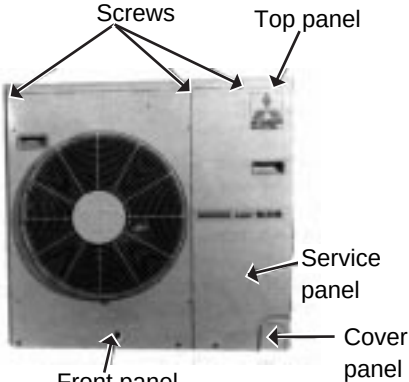
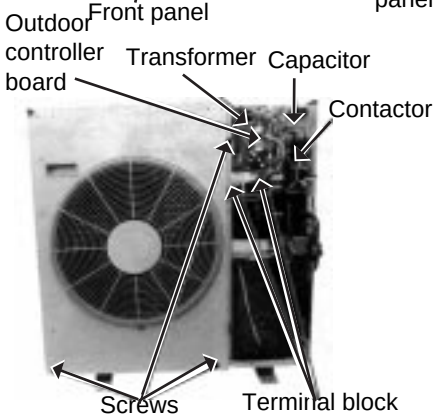
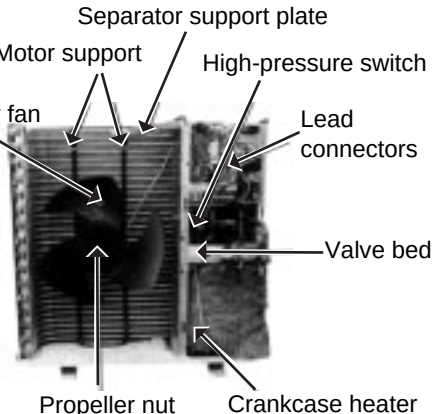


12-4 MUH12NN , MUH15NN OUTDOOR UNIT

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 electrical parts (1) Remove the service panel and the cabinet. (2) Remove the following parts. •Compressor capacitor (C1) •Outdoor fan connector •Terminal block	Photo 3 

OPERATING PROCEDURE	PHOTOS
3. Removing the outdoor fan motor (1) Remove the cabinet. (Refer to 1) (2) Disconnect the connector and remove the clamp of fan motor lead wire. (3) Remove the propeller fan nut and remove the propeller fan. (4) Remove screws securing the fan motor.	Photo 4  Clamp Connector Propeller fan Propeller fan nut Set screw for outdoor fan motor
4. Removing the compressor (1) Remove the cabinet. (Refer to 1) (2) Remove the terminal cover on the compressor (3) Disconnect lead wires from the glass terminal of the compressor.(Refer to 2) (4) Release gas from the refrigerant circuit. (5) Disconnect the welded part of the discharge pipe. (6) Disconnect the welded part of the suction pipe. (7) Remove nuts securing the compressor. (8) Remove the compressor. NOTE ● Reclaim all refrigerant in an environmentally acceptable manner.	Photo 5  Discharge pipe Terminal cover Compressor fan Suction pipe Compressor nuts

12-5 MUH17NN OUTDOOR UNIT

OPERATING PROCEDURE	PHOTOS
1. Removing the cabinet and electrical parts (1) Remove the top panel (3 screws in front, 2 screws in rear) (2) Remove the cover panel (1 screw). The panel is anchored by clicks to the side panel. Remove by pulling towards you. (3) Remove the cover panel (1 screw). The panel is anchored by clicks on the right and left sides. After removing the screw, pull the panel down and remove it by pulling towards you.	Photo 1  Photo 2 
2. Removing the outdoor fan motor (1) Remove the front panel (3 screws). Open the panel to a 45 degree angle and lift to remove. The panel is clasped at three points on the left side. (2) Remove the propeller fan (1 set nut). (3) Remove the fan motor (3 screws). Remove the lead connectors.	Photo 3 

OPERATING PROCEDURE

3. Removing the heat exchanger and compressor

- (1) Remove the rear panel (2 screws in front, 1 screw on the side, 3 screws in the rear). Remove the valve bed, and open the rear panel to the rear to remove.

NOTE :

All panels are clasped, and must be removed by shifting up and down.

- (2) Remove the right side panel (4 screws).
- (3) Remove the rear guard (3 screws).
- (4) Remove the separator support plate (4 screws).
- (5) Remove the motor support (2 screws).
- (6) Remove the valve bed (5 screws). The valve bed is clasped on the right and left sides. Lift to remove.
- (7) Remove the electrical parts box.
Remove the respective connectors from highpressure switch, crank case heater, shell thermo, and fan motor lead.
- (8) Remove the separator (2 screws).
- (9) Remove the heat exchanger (2 screws).
Disconnect the welded section of pipe.
- (10) Remove the compressor (3 set nuts).
Remove the weldment of the compressor suction pipe and discharge pipe.

PHOTOS

Photo 4

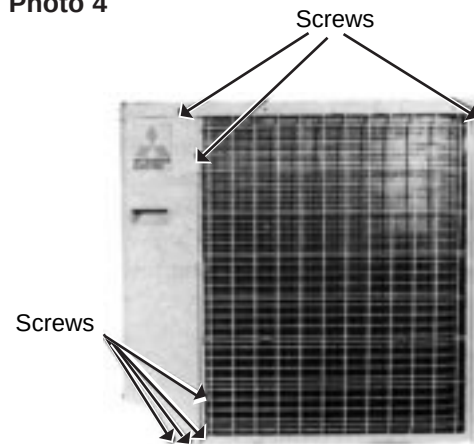


Photo 5

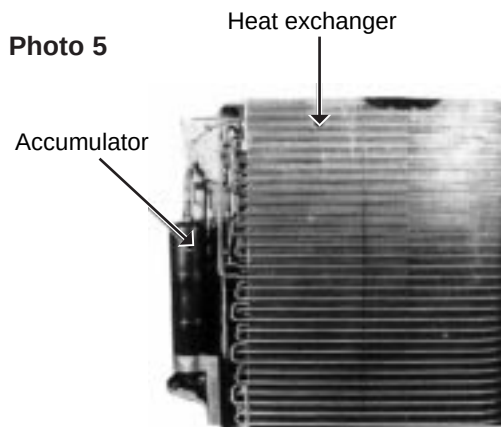
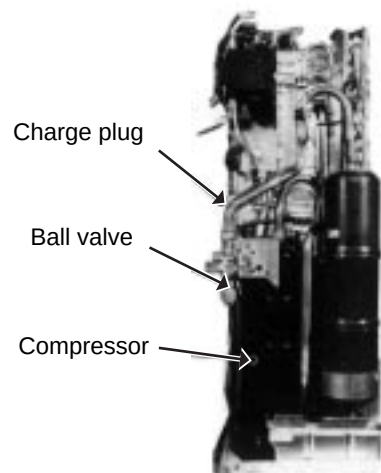
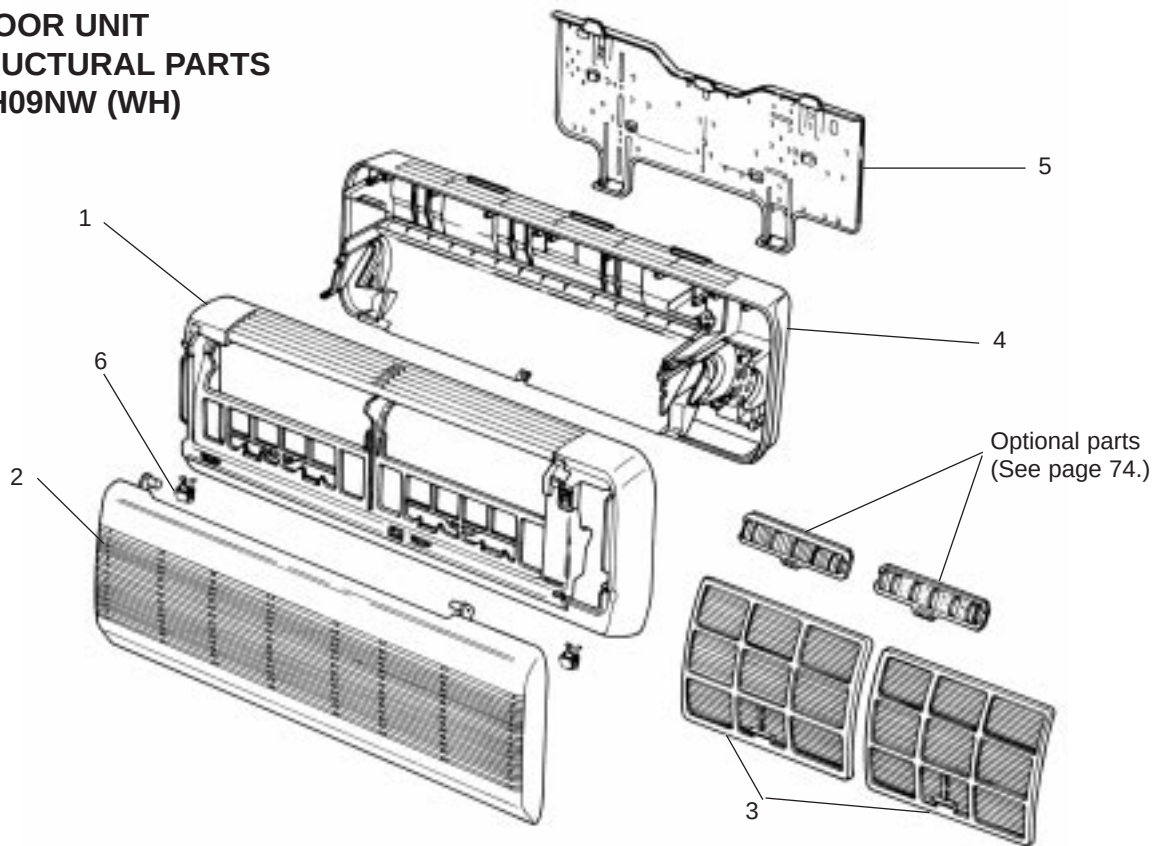


Photo 6

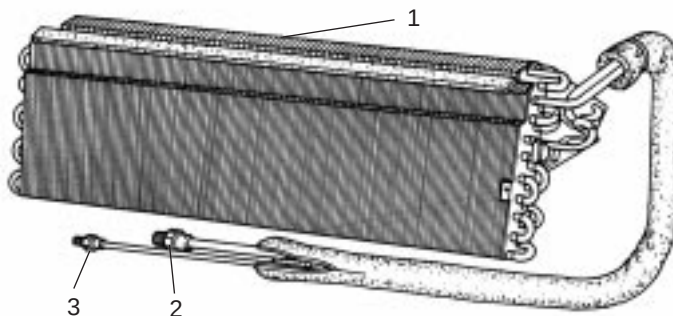


**INDOOR UNIT
STRUCTURAL PARTS
MSH09NW (WH)**



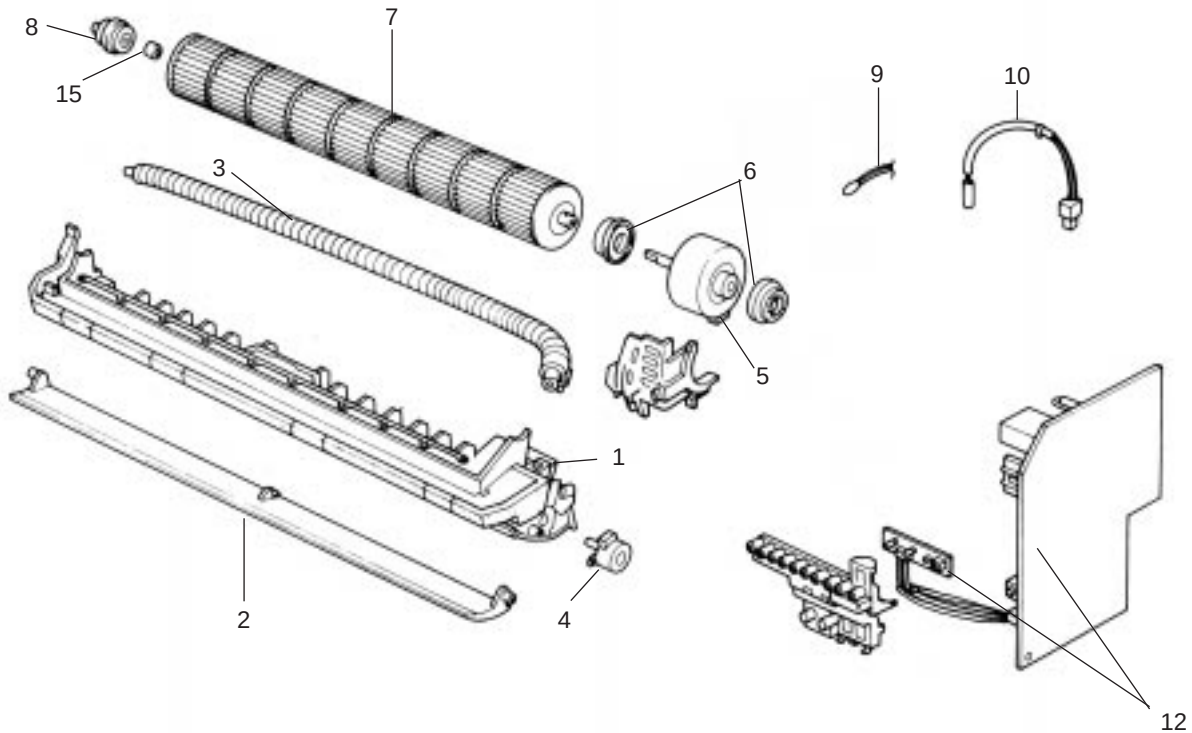
NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit	Remarks
				MSH09NW (WH)	
1	E02 289 000	FRONT PANEL(WH)		1	
2	E02 151 010	GRILL(WH)		1	
3	E02 164 100	AIR FILTER		2	1PC/SET
4	E02 166 234	BOX(WH)		1	
5	E02 151 970	INSTALLATION PLATE		1	
6	E02 166 067	SCREW CAP(WH)		2	2PCS/SET

**INDOOR UNIT
HEAT EXCHANGER
MSH09NW (WH)**



NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit	Remarks
				MSH09NW (WH)	
1	E02 155 620	INDOOR HEAT EXCHANGER		1	
2	E02 155 666	UNION(GAS)		1	φ 3/8
3	E02 151 667	UNION(LIQUID)		1	φ 1/4

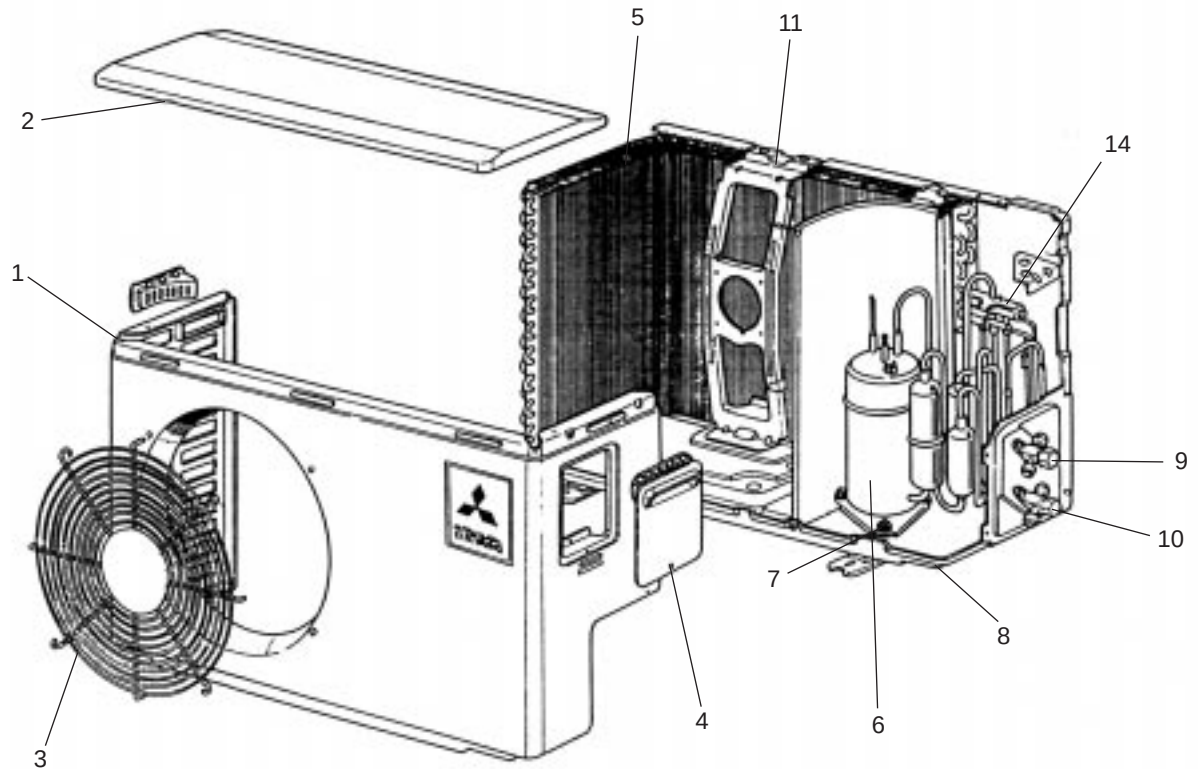
INDOOR UNIT ELECTRICAL PARTS MSH09NW(WH)



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

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit	Remarks
				MSH09NW (WH)	
1	E02 199 520	NOZZLE(WH)		1	FAN GUARD
2	E02 166 040	VANE(WH)		1	
3	E02 141 702	DRAIN HOSE		1	
4	E02 151 303	VANE MOTOR	MV	1	
5	E02 268 300	INDOOR FAN MOTOR	MF	1	
6	E02 151 505	RUBBER MOUNT		2	2PCS/SET
7	E02 151 302	LINE FLOW FAN		1	
8	E02 151 509	BEARING MOUNT		1	
9	E02 151 308	ROOM TEMPERATURE THERMISTOR	RT11	1	
10	E02 151 307	INDOOR COIL THERMISTOR	RT12	1	
⑪	E02 289 375	TERMINAL BLOCK	TB	1	
12	E02 289 450	ELECTRONIC CONTROL P.C.BOARD		1	
⑬	E02 268 452	AUTO RESTART		1	
⑭	E02 268 382	FUSE	F11	1	250V3A
15	E02 001 504	SLEEVE BEARING		1	
⑯	E02 151 468	RECEIVER		1	
⑰	E02 268 385	VARISTOR	NR11	1	

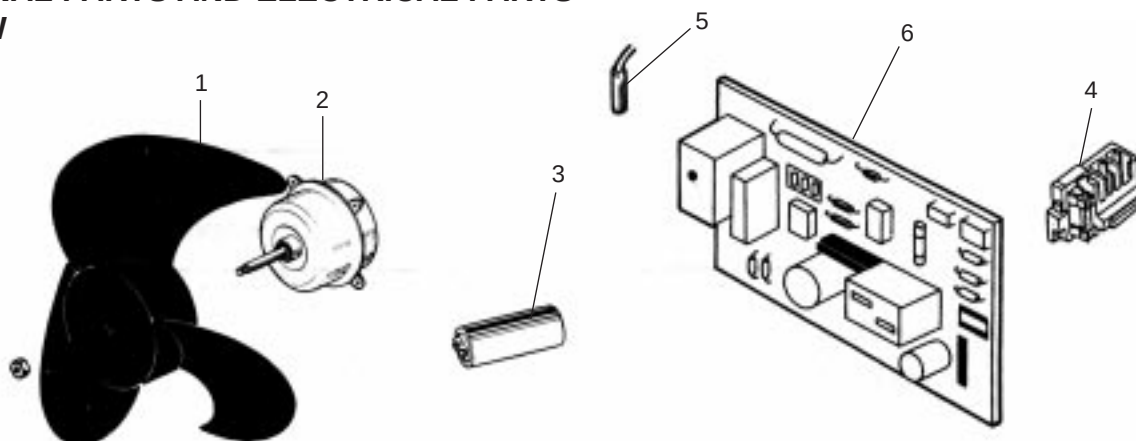
OUTDOOR UNIT STRUCTURAL PARTS MUH09NW



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

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit	Remarks
				MUH09NW	
1	E02 096 232	CABINET		1	
2	E02 085 297	TOP PANEL		1	
3	E02 199 521	FAN GUARD		1	
4	E02 085 245	SERVICE PANEL		1	
5	E02 289 630	OUTDOOR HEAT EXCHANGER		1	
6	E02 289 900	COMPRESSOR	MC	1	RH-140WGJT
7	E02 047 506	COMPRESSOR RUBBER SET		1	2RUBBER 3SPRING
8	E02 289 290	BASE		1	
9	E02 096 662	STOP VALVE(LIQUID)		1	φ 1/4
10	E02 096 661	STOP VALVE(GAS)		1	φ 3/8
11	E02 289 515	MOTOR SUPPORT		1	
	E02 289 936	CAPILLARY TUBE		1	φ 0.12Xφ 0.063X35-7/16
⑫	E02 290 936	CAPILLARY TUBE		2	φ 0.12Xφ 0.55X11-13/16
	E02 289 937	CAPILLARY TUBE		1	φ 0.12Xφ 0.063X19-11/16
⑬	E02 268 351	OUTDOOR FAN CAPACITOR		1	5.0μF/250VAC
14	E02 289 967	REVERSING VALVE		1	

OUTDOOR UNIT **FUNCTIONAL PARTS AND ELECTRICAL PARTS** **MUH09NW**



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

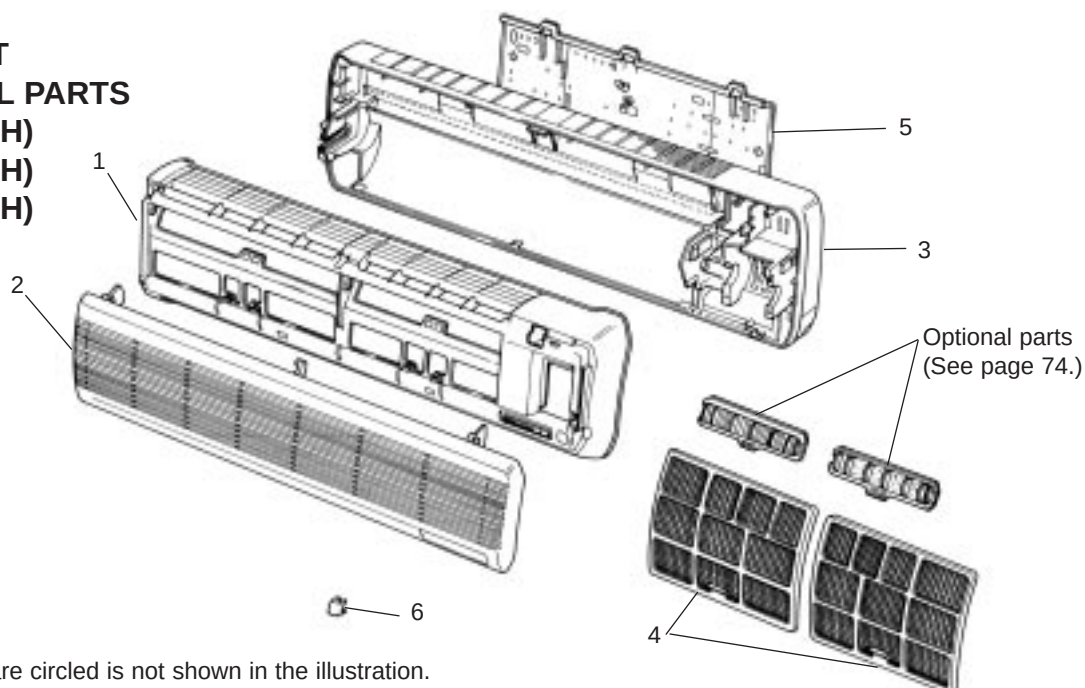
NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit	Remarks
				MUH09NW	
1	E02 085 501	PROPELLER FAN		1	
2	E02 289 301	OUTDOOR FAN MOTOR	MF	1	
3	E02 289 353	COMPRESSOR CAPACITOR	C1	1	70 μ F/220VAC
4	E02 289 374	TERMINAL BLOCK	TB	1	
5	E02 289 310	DEFROST THERMISTOR	RT61	1	
6	E02 289 451	DEICER P.C. BOARD		1	
⑦	E02 289 490	SOLENOID COIL	21S4	1	

INDOOR UNIT STRUCTURAL PARTS

MSH12NN (WH)

MSH15NN (WH)

MSH17NN (WH)



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

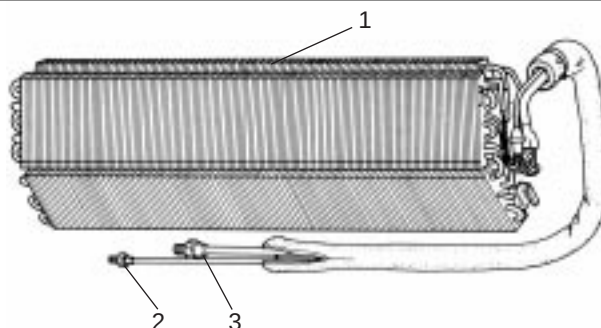
NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit			Remarks
				MSH12NN (WH)	MSH15NN (WH)	MSH17NN (WH)	
1	E02 282 000	FRONT PANEL(WH)		1			
	E02 283 000	FRONT PANEL(WH)			1		
	E02 284 000	FRONT PANEL(WH)				1	
2	E02 138 010	GRILLE(WH)		1	1	1	
3	E02 143 234	BOX(WH)		1	1	1	1PC/SET
4	E02 141 100	AIR FILTER		2	2	2	
5	E02 141 970	INSTALLATION PLATE		1	1	1	3PCS/SET
6	E02 143 067	SCREW CAP(WH)		3	3	3	
⑦	E02 282 007	LAMP PANEL(WH)		1			
	E02 283 007	LAMP PANEL(WH)			1		
	E02 284 007	LAMP PANEL(WH)				1	

INDOOR UNIT HEAT EXCHANGER PARTS

MSH12NN (WH)

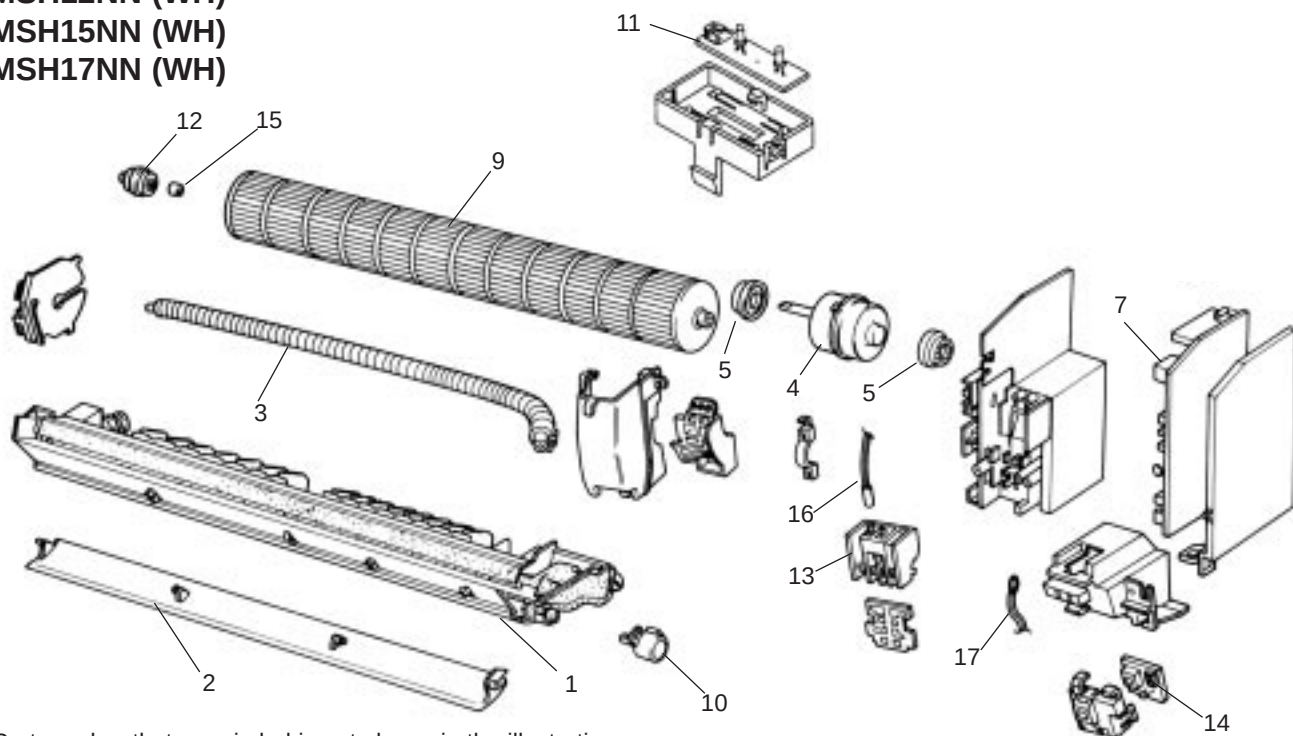
MSH15NN (WH)

MSH17NN (WH)



NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit	Remarks
				MSH12NN,MSH15NN,MSH17NN (WH)	
1	E02 141 620	INDOOR HEAT EXCHANGER		1	
2	E02 138 667	UNION(LIQUID)		1	ϕ1/4
3	E02 138 666	UNION(GAS)		1	ϕ5/8

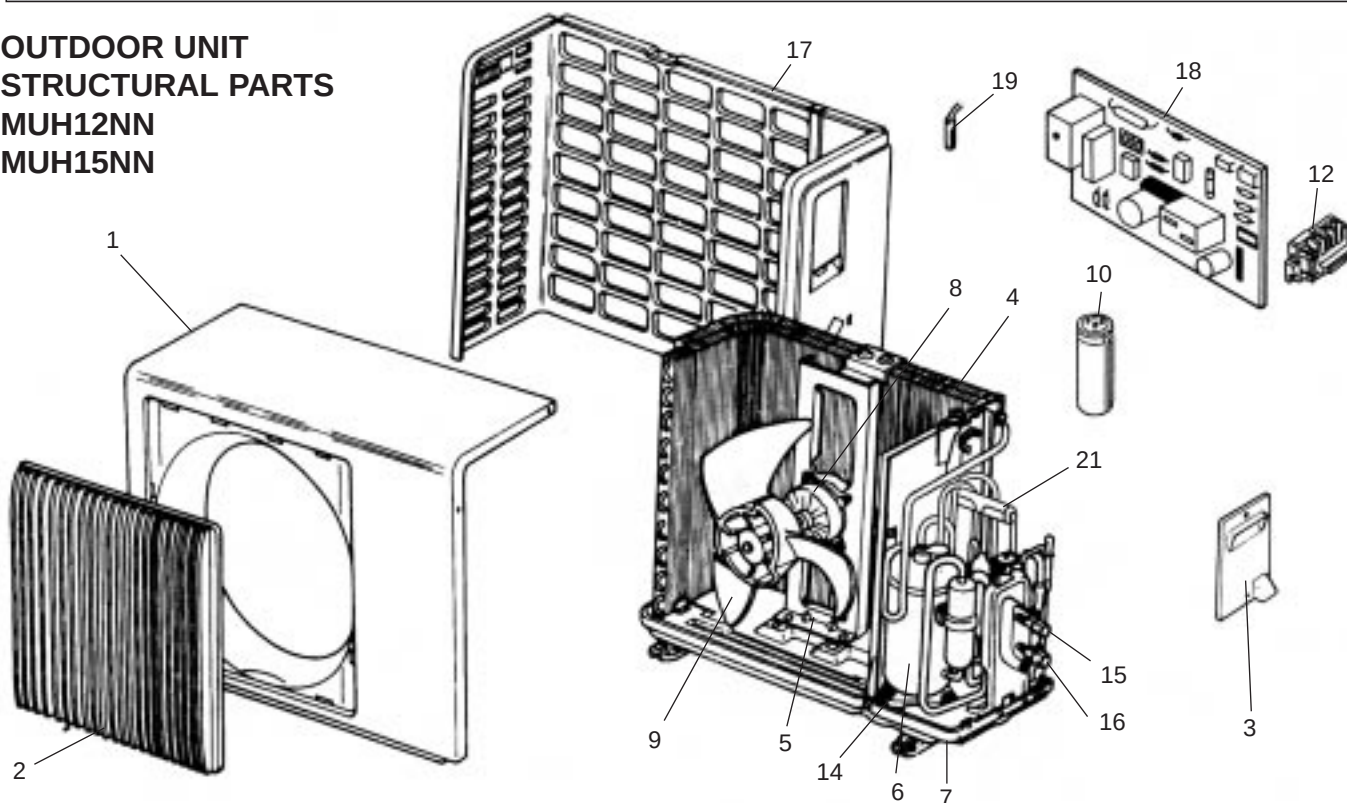
INDOOR UNIT
ELECTRICAL PARTS
MSH12NN (WH)
MSH15NN (WH)
MSH17NN (WH)



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

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit			Remarks
				MSH12NN (WH)	MSH15NN (WH)	MSH17NN (WH)	
1	E02 138 520	NOZZLE(WH)		1	1	1	FAN GUARD
2	E02 143 040	VANE(WH)		1	1	1	
3	E02 141 702	DRAIN HOSE		1	1	1	
4	E02 270 300	INDOOR FAN MOTOR	MF	1	1		
	E02 272 300	INDOOR FAN MOTOR	MF			1	
5	E02 001 505	RUBBER MOUNT		2	2	2	2PCS/SET
⑥	E02 268 452	AUTO RESTART		1	1	1	
7	E02 282 450	ELECTRONIC CONTROL P.C. BOARD		1			
	E02 283 450	ELECTRONIC CONTROL P.C. BOARD			1		
	E02 284 450	ELECTRONIC CONTROL P.C. BOARD				1	
⑧	E02 268 382	FUSE	F11	1	1	1	250V/3A
9	E02 141 302	LINE FLOW FAN		1	1	1	
10	E02 141 303	VANE MOTOR	MV	1	1	1	
11	E02 138 329	DISPLAY P.C. BOARD		1	1	1	
12	E02 141 509	BEARING MOUNT		1	1	1	
13	E02 282 375	TERMINAL BLOCK	TB	1	1	1	
14	E02 141 468	RECEIVER P. C. BOARD		1	1	1	
15	E02 001 504	SLEEVE BEARING		1	1	1	
16	E02 138 307	INDOOR COIL THERMISTOR	RT12	1	1	1	
17	E02 138 308	ROOM TEMPERATURE THERMISTOR	RT11	1	1	1	
⑱	E02 268 385	VARISTOR	NR11	1	1	1	

**OUTDOOR UNIT
STRUCTURAL PARTS
MUH12NN
MUH15NN**

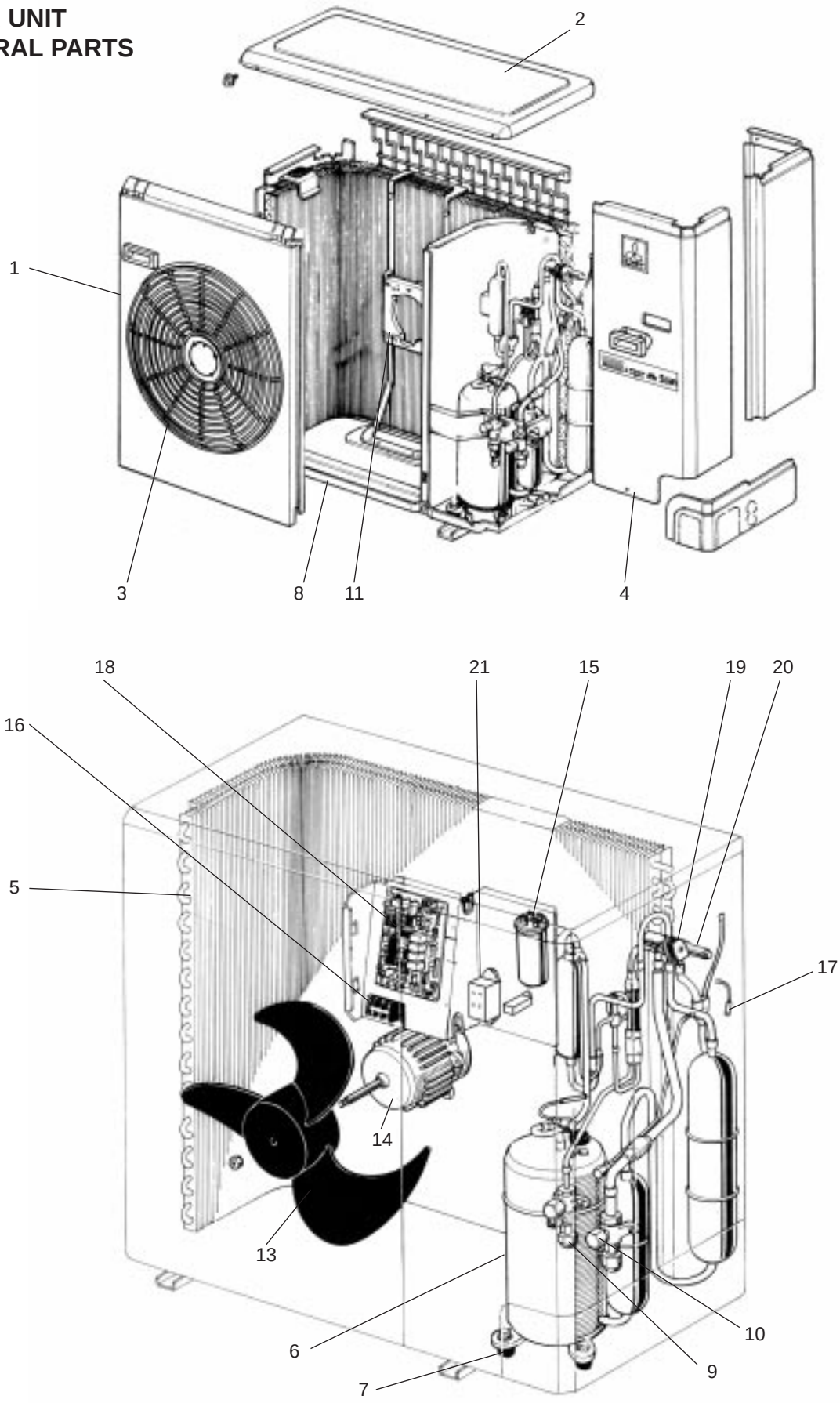


Part number that are circled is not shown in the illustration.

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
				MUH12NN	MUH15NN	
1	E02 141 232	CABINET		1	1	
2	E02 141 521	GRILLE		1	1	
3	E02 270 245	SERVICE PANEL		1	1	
4	E02 139 630	OUTDOOR HEAT EXCHANGER		1		
	E02 283 630	OUTDOOR HEAT EXCHANGER			1	
5	E02 139 515	MOTOR SUPPORT		1	1	
6	E02 271 900	COMPRESSOR	MC		1	RH-207NHDT
	E02 282 900	COMPRESSOR	MC	1		RH-185NHDT
7	E02 156 290	BASE		1	1	
8	E02 270 301	OUTDOOR FAN MOTOR	MF	1	1	
9	E02 141 501	PROPELLER FAN		1	1	
10	E02 271 353	COMPRESSOR CAPACITOR	C1	1	1	30 μ F/370VAC
11	E02 282 340	COMPRESSOR CONTACTOR	52C	1	1	
12	E02 282 374	TERMINAL BLOCK	TB	1	1	
	E02 285 936	CAPILLARY TUBE		1		ϕ 0.12X ϕ 0.071X19-11/16
13	E02 283 936	CAPILLARY TUBE			1	ϕ 0.12X ϕ 0.079X23-5/8
	E02 282 936	CAPILLARY TUBE		2	2	ϕ 0.12X ϕ 0.055X11-13/16
	E02 282 937	CAPILLARY TUBE		1	1	ϕ 0.12X ϕ 0.079X7-7/8
14	E02 075 506	COMPRESSOR RUBBER SET		3	3	3RUBBER
15	E02 139 662	STOP VALVE(LIQUID)		1	1	ϕ 1/4
16	E02 150 661	STOP VALVE(GAS)		1	1	ϕ 5/8
17	E02 270 233	BACK PANEL		1	1	
18	E02 282 451	DEICER P.C. BOARD		1	1	
19	E02 139 310	DEFROST THERMISTOR	RT61	1	1	
20	E02 172 490	SOLENOID COIL	21S4	1	1	
21	E02 282 961	REVERSING VALVE		1	1	



**OUTDOOR UNIT
STRUCTURAL PARTS
MUH17NN**



**OUTDOOR UNIT
STRUCTURAL PARTS
MUH17NN**

NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit	Remarks
				MUH17NN	
1	E02 214 232	CABINET		1	
2	E02 214 297	TOP PANEL		1	
3	E02 214 521	FAN GUARD		1	
4	E02 214 245	SERVICE PANEL		1	
5	E02 284 630	OUTDOOR HEAT EXCHANGER		1	
6	E02 272 900	COMPRESSOR	MC	1	RH-231NHDT
7	E02 075 506	COMPRESSOR RUBBER SET		3	3RUBBER
8	E02 284 290	BASE		1	
9	E02 284 662	STOP VALVE(LIQUID)		1	φ1/4
10	E02 010 661	STOP VALVE(GAS)		1	φ3/8
11	E02 214 515	MOTOR SUPPORT		1	
⑫	E02 138 936	CAPILLARY TUBE		1	φ0.12×φ0.079×27-9/16
	E02 257 936	CAPILLARY TUBE (φ0.12×φ0.079×9-13/16)		1	φ0.12×φ0.079×19-11/16
13	E02 214 501	PROPELLER FAN		1	
14	E02 284 301	OUTDOOR FAN MOTOR	MF	1	
15	E02 272 353	COMPRESSOR CAPACITOR	C1	1	35μF/370VAC
16	E02 282 374	TERMINAL BLOCK	TB	1	
17	E02 214 310	DEFROST THERMISTOR	RT61	1	
18	E02 282 451	DEICER P.C. BOARD		1	
19	E02 172 490	SOLENOID COIL	21S4	1	
20	E02 282 961	REVERSING VALVE		1	
21	E02 282 340	COMPRESSOR CONTACTOR		1	

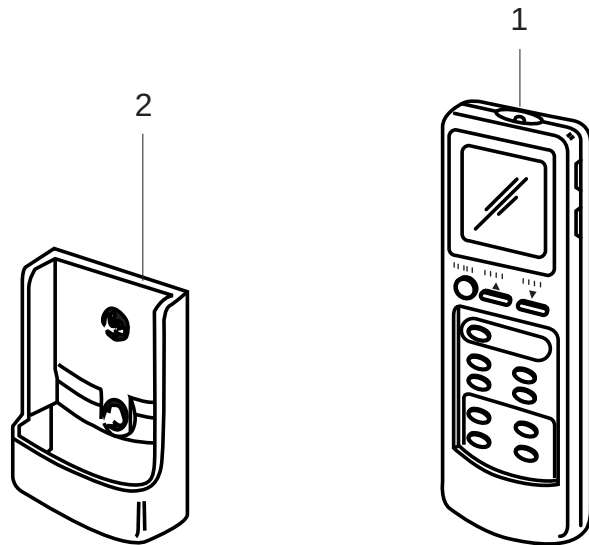
ACCESSORY AND REMOTE CONTROLLER PARTS

MSH09NW (WH)

MSH12NN (WH)

MSH15NN (WH)

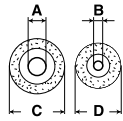
MSH17NN (WH)



NO.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
				MSH09NW (WH)	MSH12/15/17NN (WH)	
1	E02 141 426	REMOTE CONTROLLER		1	1	
2	E02 141 083	REMOTE CONTROLLER HOLDER		1	1	

1. REFRIGERANT PIPES

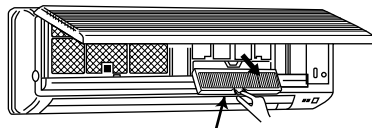
The air conditioner has flared connections its on indoor and outdoor sides.
Please use the optional extension pipe as follows.

Applicable Model	Part No.	Pipe length	Pipe size O.D				Additional refrigerant charge R-22(Oz)		
			Cross-section	A-Gas(in.)	B-Liquid(in.)	Insulation(in.)			
MSH09NW	MAC - 440PI	10ft		3/8	1/4	C 13/16 D1-1/16	0		
	MAC - 441PI	16ft							
	MAC - 442PI	23ft							
	MAC - 443PI	33ft					5		
MSH12NN MSH15NN MSH17NN	MAC - 670PI	10ft		5/8				C 1-7/32 D 1-1/16	0
	MAC - 671PI	16ft							
	MAC - 672PI	23ft							
	MAC - 673PI	33ft							5
	MAC - 674PI	49ft							13

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 3 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.

Part No.	Model
MAC-1000FT	MSH09NW
MAC-1100FT	MSH12NN,MSH15NN,MSH17NN

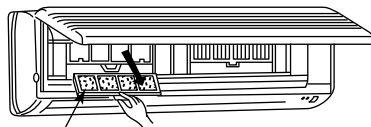


Air cleaning filter(White bellow type)

3. DEODORIZING FILTER

- DEODORIZING FILTER removes ammonia and hydrogen sulphide emitted from tobacco, and odors 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.

Part No.	Model
MAC-1500DF	MSH09NW
MAC-1600DF	MSH12NN,MSH15NN,MSH17NN



Deodorizing filter (Gray sponge type)

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

Mr.SLIM

 **mitsubishi electric corporation**

© Copyright 1997 MITSUBISHI ELECTRIC ENGINEERING CO.,LTD

Issued in Jul. 1997. No.OB198 5042

New publication, effective Jul. 1997
Specifications subject to change without notice.



3400 Lawrenceville Suwanee Road • Suwanee, Georgia 30024
Toll Free: 800-433-4822 • Toll Free Fax: 800-889-9904
www.mrslim.com

Specifications are subject to change without notice.