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※The specifications, designs, and information in this book are subject to change without notice for product improvement.

Part 1

General Information

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1. Model Names of Indoor/Outdoor Units

1.1 Indoor Units

Model name	Dimension (mm)	Net/Gross weight (kg)	Power supply
MFA-12HRN1	Width: 700 Height: 600 Depth: 210	15/20	220~240V-1ph-50Hz
MFA-18HRN1	Width: 700 Height: 600 Depth: 210	15/20	220~240V-1ph-50Hz
MFA-12HRN1-Q	Width: 700 Height: 600 Depth: 210	20/25	220~240V-1ph-50Hz

1.2 Outdoor Units

Model name	Dimension (mm)	Net/Gross weight (kg)	Power supply
MON-12HN1	Width: 780 Height: 547 Depth: 250	34/38	220~240V-1ph-50Hz
MON-18HN1	Width: 842 Height: 695 Depth: 324	52/56	220~240V-1ph-50Hz
MON-12HN1-Q	Width: 780 Height: 547 Depth: 250	35/39	220~240V-1ph-50Hz

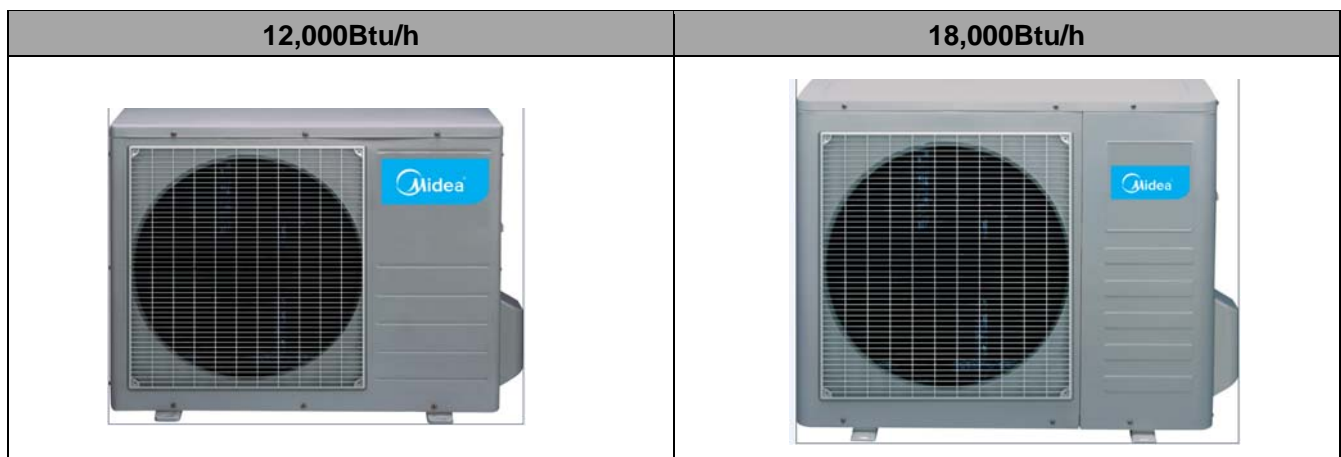
2. External Appearance

2.1 Indoor Units

MFA-12HRN1/MFA-18HRN1/MFA-12HRN1-Q

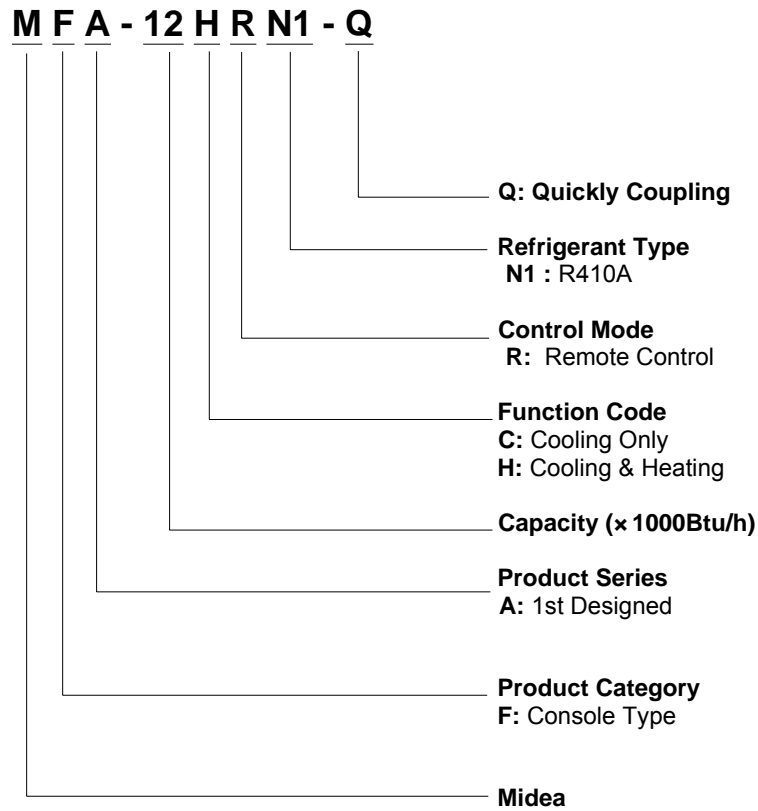


2.2 Outdoor Units

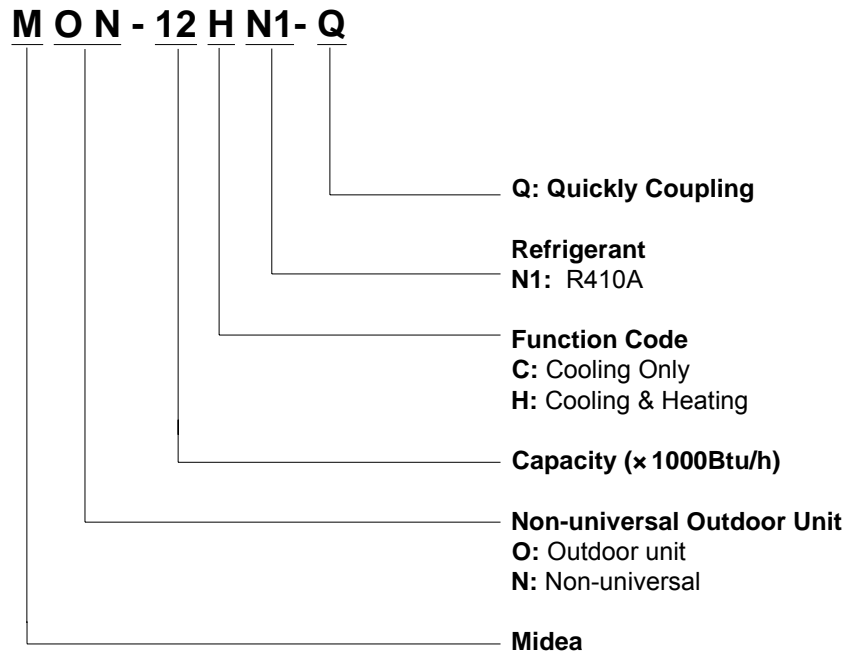


3. Nomenclature

3.1 Indoor Unit



3.2 Outdoor Unit



4. Features

1. Achieves set temperature more quickly

- air supplying from top and bottom or from top only
- air inlet from four directions



2. Compact unit body, space saving

- this unit body is very thin and harmonious with room. It is beautiful, elegant and space saving.
- light weight and compact.

3. Flexible installation

- can be used for floor standing or lower wall applications

4. High efficiency filter

- built in Formaldehyde nemesis filter
- active-carbon and biological anti-virus filter is optional.

5. Comfort

- flexible air blow: vertical auto swing and wide angle louvers ensure that warm air reaches the furthest corners of the room and increase the air flow coverage
- Low noise operation
- Low starting power and precise room temperature adjustment

6. Powerful mode can be selected for rapid cooling or heating.

7. Easy cleaning grille and maintenance

Part 2

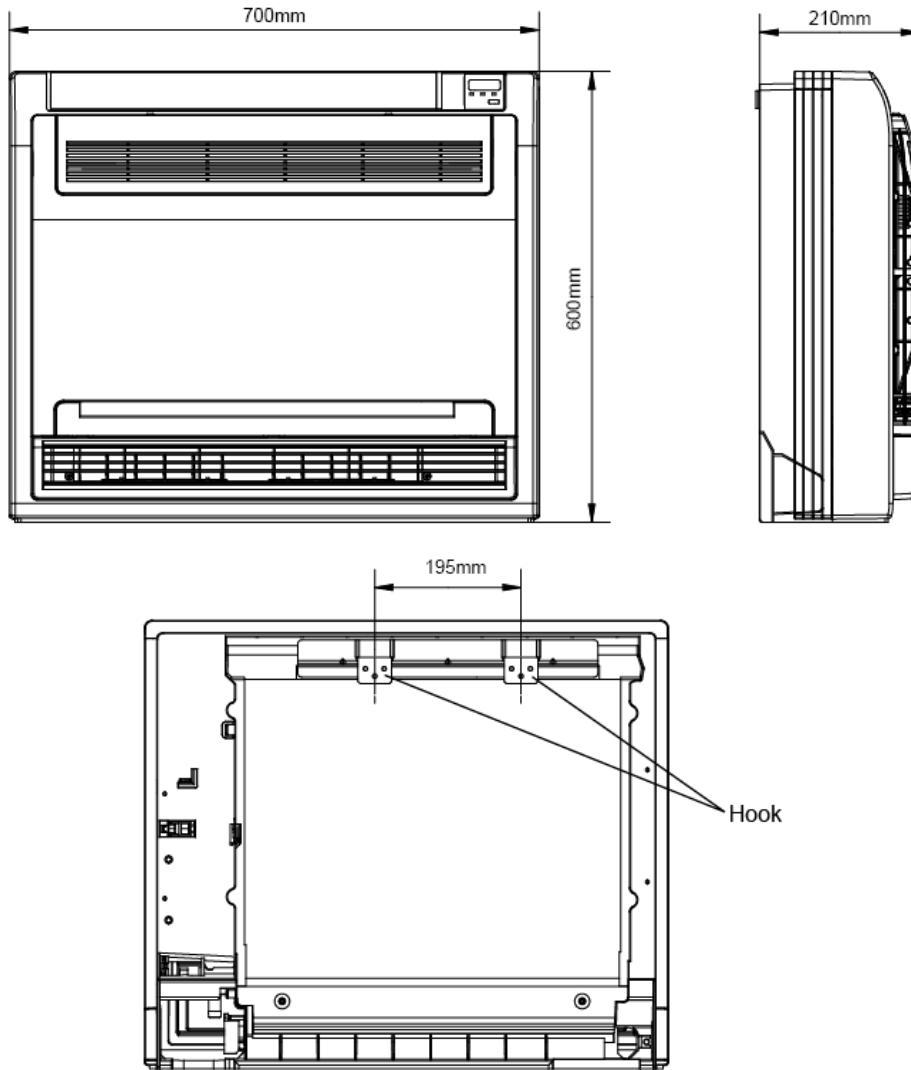
Indoor Units

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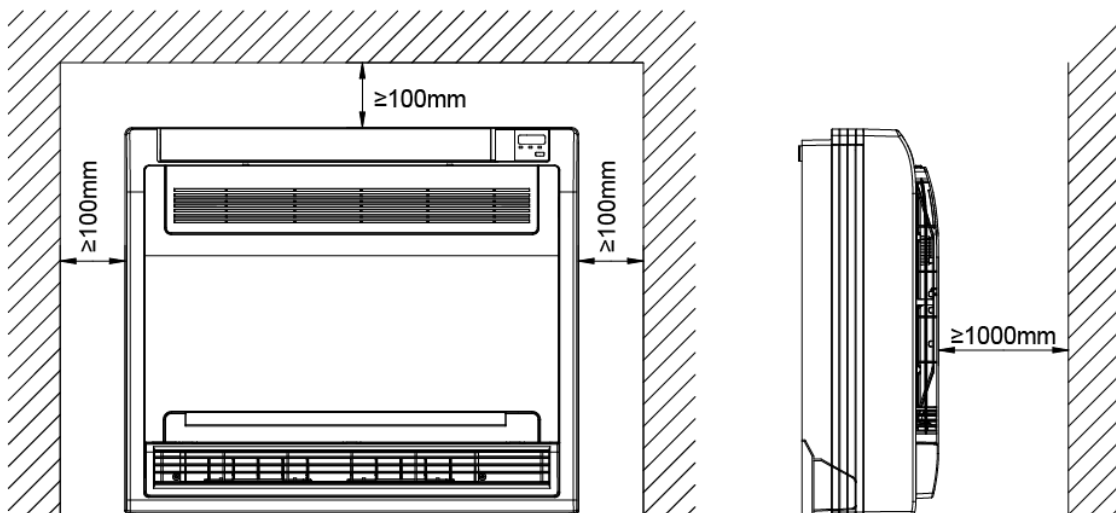
1. Specifications

Model			MFA-12HRN1	MFA-18HRN1	MFA-12HRN1-Q
Code			220044000090	220044100280	220044000100
Power supply		V-ph-Hz	220~240-1-50	220~240-1-50	220~240-1-50
Cooling	Capacity	Btu/h	12000	18000	12000
	Input	W	1096	1650	1101
Heating	Capacity	Btu/h	13380	19600	13300
	Input	W	1122	1715	1117
Indoor fan motor	Model		RD-280-20-8A	RD-280-20-8A	RD-280-20-8A
	Type		DC MOTOR	DC MOTOR	DC MOTOR
	Input	W	24.5/19.5/16.8/13/10.5	38/33.5/24.5/15.2	24.5/19.5/16.8/13/10.5
	Capacitor	uF	/	/	/
	Speed(Hi/Mi/Lo)	r/min	680/610/560/460/420	890/840/780/680/530	680/610/560/460/420
Indoor coil	Number of rows		2	2	2
	Tube pitch(a)×row pitch(b)	mm	21×13.37	21×13.37	21×13.37
	Fin spacing	mm	1.3	1.3	1.3
	Fin type (code)		Hydrophilic aluminum	Hydrophilic aluminum	Hydrophilic aluminum
	Tube outside dia. and type	mm	Φ7 Inner grooved copper tube	Φ7 Inner grooved copper tube	Φ7 Inner grooved copper tube
	Coil length× height × width	mm	512×378×26.74	512×378×26.74	512×378×26.74
	Number of circuits		2	2	2
Indoor air flow(Hi/Mi/Lo)		m ³ /h	550/490/460/380/350	740/700/640/560/440	550/490/460/380/350
Indoor noise level (sound pressure)		dB(A)	35/33/31/27/23	38/35/33/31/29	35/33/31/27/23
Indoor unit	Dimension (W×H×D)	mm	700×600×210	700×600×210	700×600×210
	Packing (W×H×D)	mm	810×710×305	810×710×305	810×710×365
	Net/Gross weight	kg	15/20	15/20	20/25
Refrigerant type			R410A	R410A	R410A
Design pressure		MPa	4.2/2.0	4.2/2.0	4.2/2.0
Refrigerant piping	Liquid side/ Gas side	mm	φ6.4/φ12.7	φ6.4/φ12.7	φ6.4/φ12.7
Drainage water pipe diameter		mm	φ16	φ16	φ16
Connection wiring	Power wiring	mm ²	3×1.5	3×2.5	3×1.5
	Signal wiring	mm ²	4×1.5	4×2.5	4×1.5
Controller			R51D/E(standard)	R51D/E(standard)	R51D/E(standard)
Operation temperature		℃	17~30	17~30	17~30

2. Dimensions

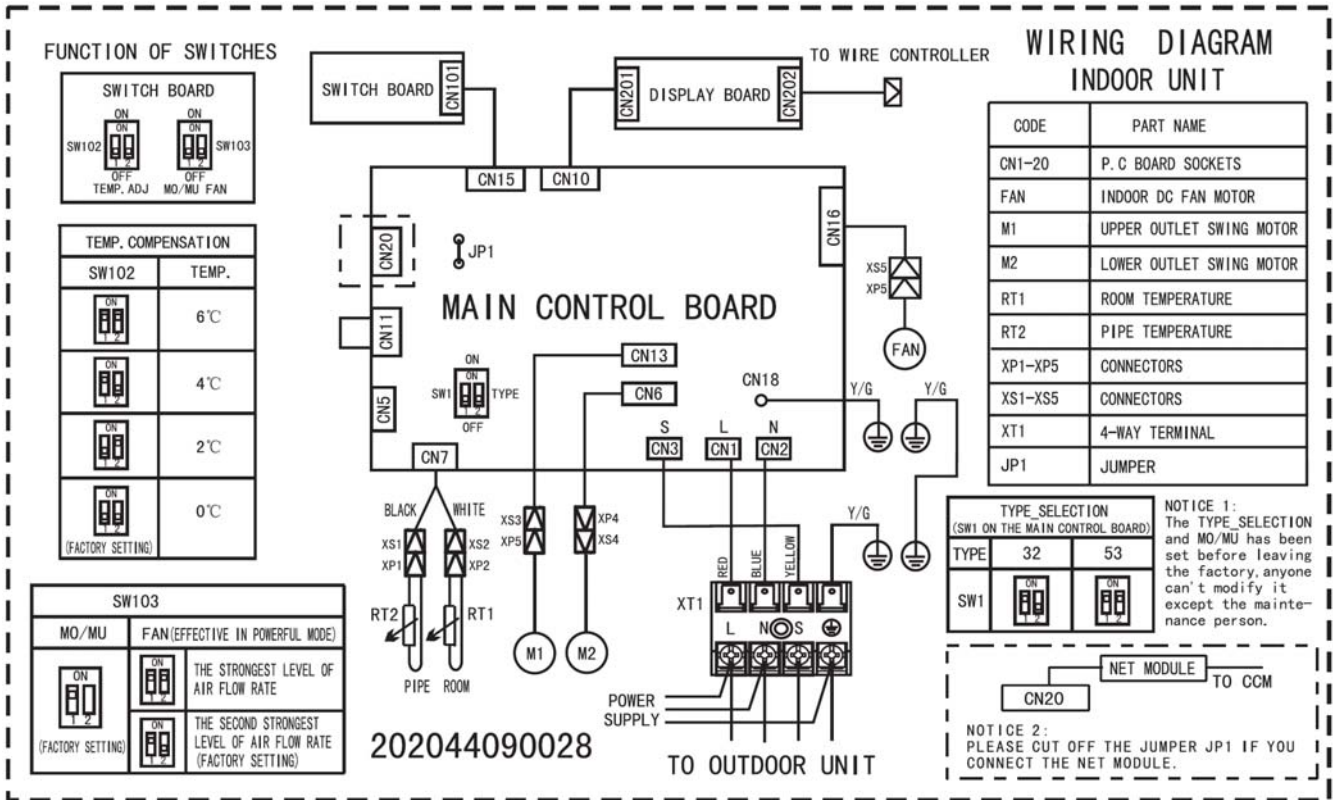


3. Service Space

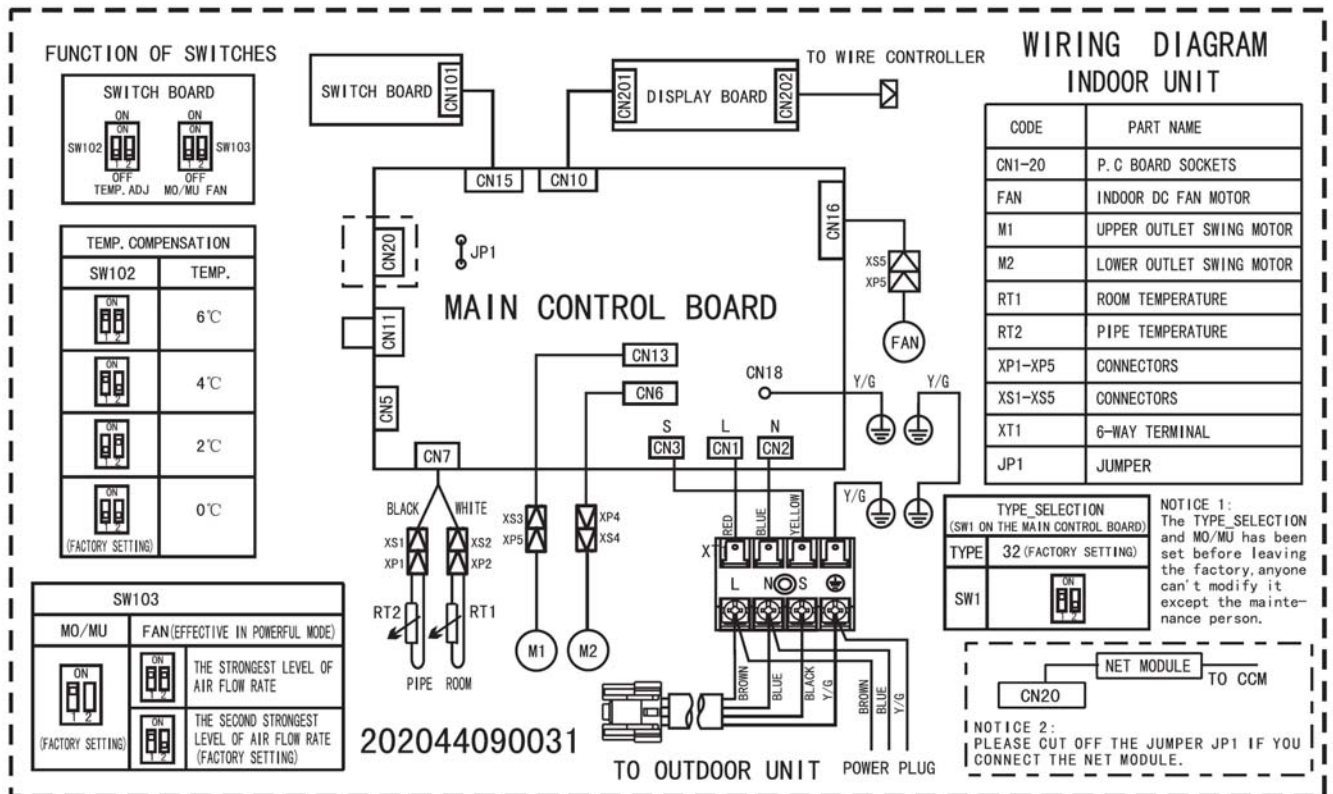


4. Wiring Diagrams

4.1 MFA-12HRN1 MFA-18HRN1



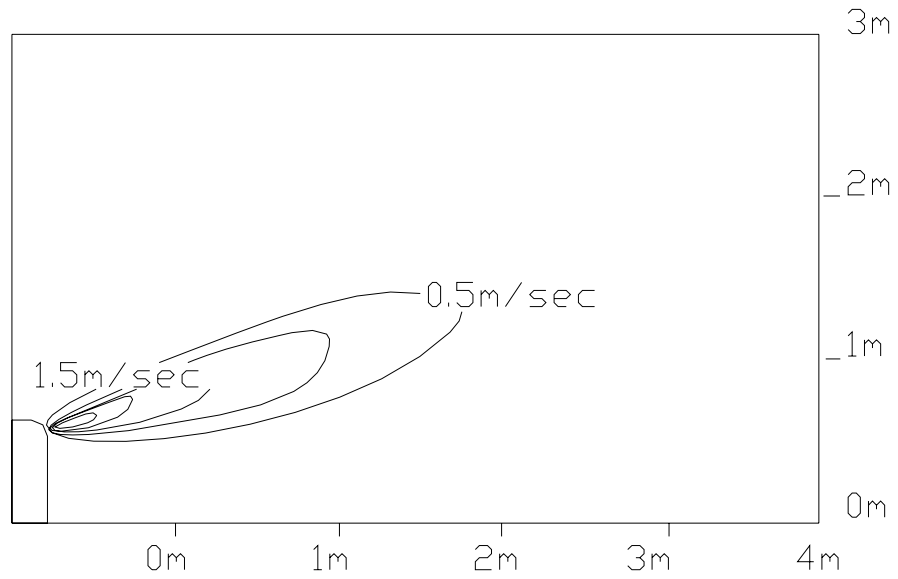
4.2 MFA-12HRN1-Q



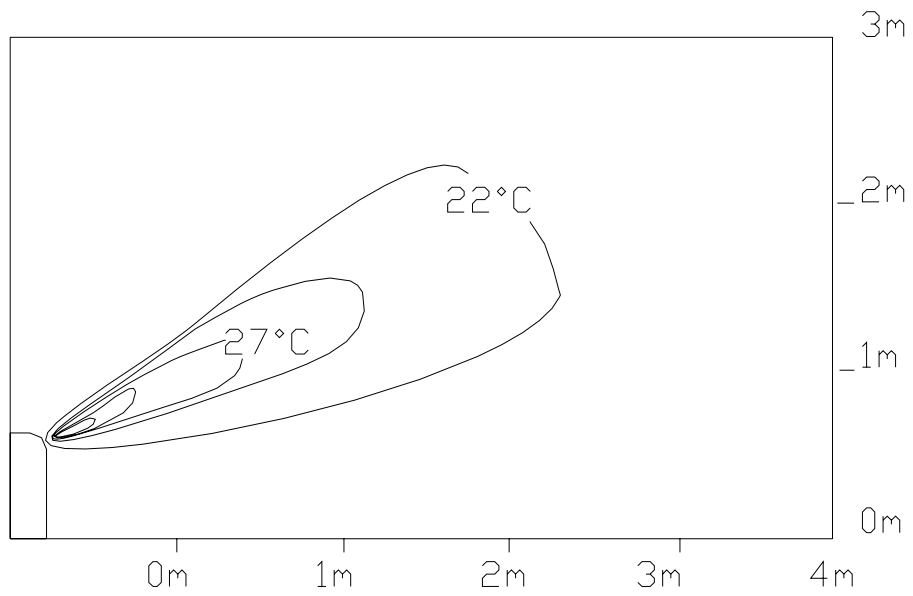
5. Air Velocity and Temperature Distributions

Discharge angle 60

Airflow velocity



Temperature



6. Capacity Tables

6.1 MFA-12HRN1

Cooling capacity

Cooling		Outdoor conditions (DB)			
Indoor Conditions	(kW)	21°C	28°C	35°C	43°C
21/15°C DB/WB	TC	3.30	3.14	2.98	2.85
	SC	2.44	2.41	2.38	2.39
	Input	0.91	0.99	1.03	1.06
24/17°C DB/WB	TC	3.39	3.23	3.07	2.88
	SC	2.54	2.52	2.49	2.42
	Input	0.96	1.03	1.07	1.13
27/19°C DB/WB	TC	3.46	3.30	3.22	2.98
	SC	2.56	2.54	2.50	2.44
	Input	0.99	1.04	1.096	1.15
32/23°C DB/WB	TC	3.52	3.39	3.33	3.07
	SC	2.99	2.95	2.93	2.86
	Input	1.03	1.07	1.15	1.19

Heating capacity

Heating		Outdoor conditions			
Indoor Conditions (DB)	(kW)	24/18°C DB/WB	7/6°C DB/WB	2/1°C DB/WB	-5/-6°C DB/WB
15°C	TC	4.58	3.95	3.03	2.75
	Input	1.21	1.04	0.90	0.84
20°C	TC	4.44	3.92	2.85	2.68
	Input	1.32	1.122	0.99	0.91
27°C	TC	4.15	3.31	2.68	2.60
	Input	1.40	1.21	1.07	0.99

6.2 MFA-18HRN1

Cooling capacity

Cooling		Outdoor conditions (DB)			
Indoor Conditions	(kW)	21°C	28°C	35°C	43°C
21/15°C DB/WB	TC	5.46	5.19	4.93	4.72
	SC	4.04	4.00	3.94	3.96
	Input	1.32	1.43	1.50	1.55
24/17°C DB/WB	TC	5.62	5.35	5.09	4.77
	SC	4.21	4.18	4.12	4.01
	Input	1.40	1.50	1.56	1.64
27/19°C DB/WB	TC	5.72	5.46	5.30	4.93
	SC	4.24	4.20	4.13	4.04
	Input	1.43	1.51	1.65	1.67
32/23°C DB/WB	TC	5.83	5.62	5.51	5.09
	SC	4.96	4.89	4.85	4.73
	Input	1.50	1.56	1.67	1.74

Heating capacity

Heating		Outdoor conditions			
Indoor Conditions (DB)	(kW)	24/18°C DB/WB	7/6°C DB/WB	2/1°C DB/WB	-5/-6°C DB/WB
15°C	TC	7.80	6.30	5.16	4.68
	Input	1.85	1.59	1.37	1.29
20°C	TC	7.56	5.74	4.86	4.56
	Input	2.02	1.715	1.51	1.39
27°C	TC	7.08	5.64	4.56	4.44
	Input	2.14	1.85	1.63	1.51

6.3 MFA-12HRN1-Q

Cooling capacity

Cooling		Outdoor conditions (DB)			
Indoor Conditions	(kW)	21°C	28°C	35°C	43°C
21/15°C DB/WB	TC	3.30	3.14	2.98	2.85
	SC	2.44	2.41	2.38	2.39
	Input	0.91	0.99	1.03	1.07
24/17°C DB/WB	TC	3.39	3.23	3.07	2.88
	SC	2.54	2.52	2.49	2.42
	Input	0.97	1.03	1.08	1.13
27/19°C DB/WB	TC	3.46	3.30	3.21	2.98
	SC	2.56	2.54	2.50	2.44
	Input	0.99	1.05	1.101	1.16
32/23°C DB/WB	TC	3.52	3.39	3.33	3.07
	SC	2.99	2.95	2.93	2.86
	Input	1.03	1.08	1.16	1.20

Heating capacity

Heating		Outdoor conditions			
Indoor Conditions (DB)	(kW)	24/18°C DB/WB	7/6°C DB/WB	2/1°C DB/WB	-5/-6°C DB/WB
15°C	TC	4.58	3.70	3.03	2.75
	Input	1.21	1.04	0.89	0.84
20°C	TC	4.44	3.68	2.85	2.68
	Input	1.32	1.117	0.98	0.90
27°C	TC	4.15	3.31	2.68	2.60
	Input	1.40	1.21	1.06	0.98

Remark:

TC: Total capacity; kW

SC: Sensible heat capacity; kW

Input: Input power; kW

7. Electric Characteristics

Model	Indoor Units				Power Supply		Indoor Fan Motor	
	Hz	Voltage	Min.	Max.	MCA	MFA	kW	FLA
MFA-12HRN1(-Q)	50	220-240V	198V	254V	0.1	15	0.02	0.08
MFA-18HRN1	50	220-240V	198V	254V	0.156	20	0.02	0.125

Remark:

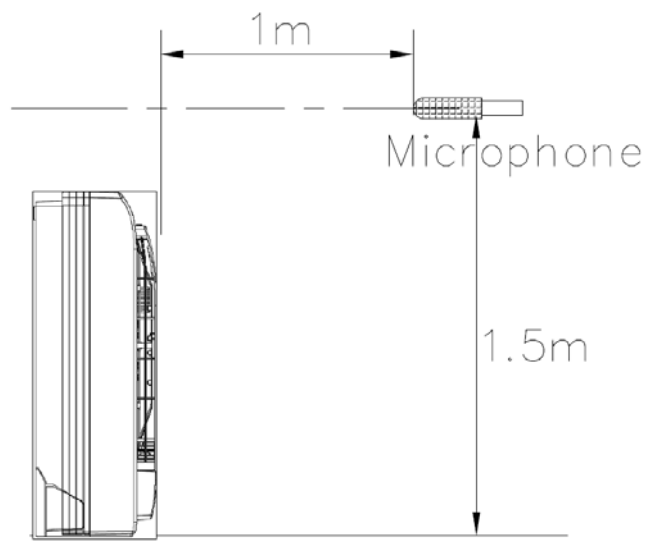
MCA: Min. Current Amps. (A)

MFA: Max. Fuse Amps. (A)

KW: Fan Motor Rated Output (kW)

FLA: Full Load Amps. (A)

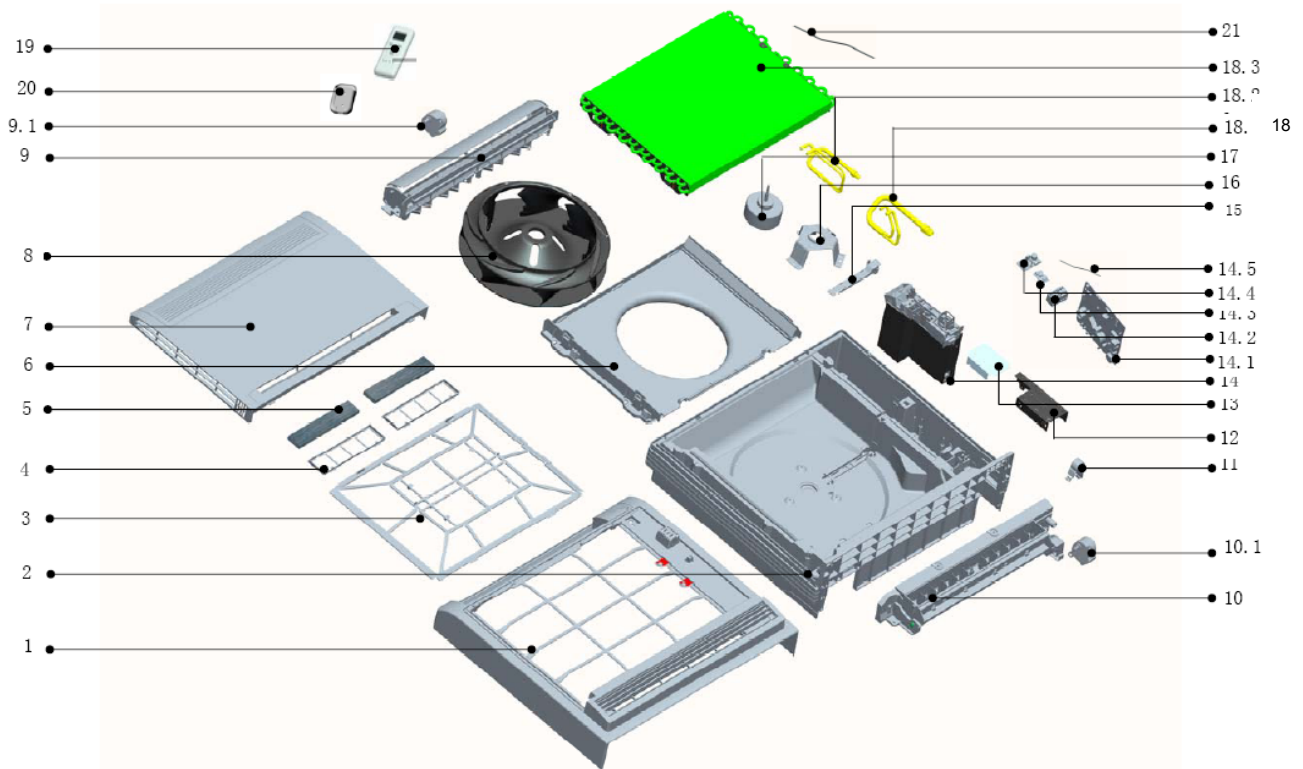
8. Sound Levels



Model	Noise level dB(A)				
	Highest	Higher	H	M	L
MFA-12HRN1/ MFA-12HRN1-Q	35	33	31	27	23
MFA-18HRN1	38	35	33	31	29

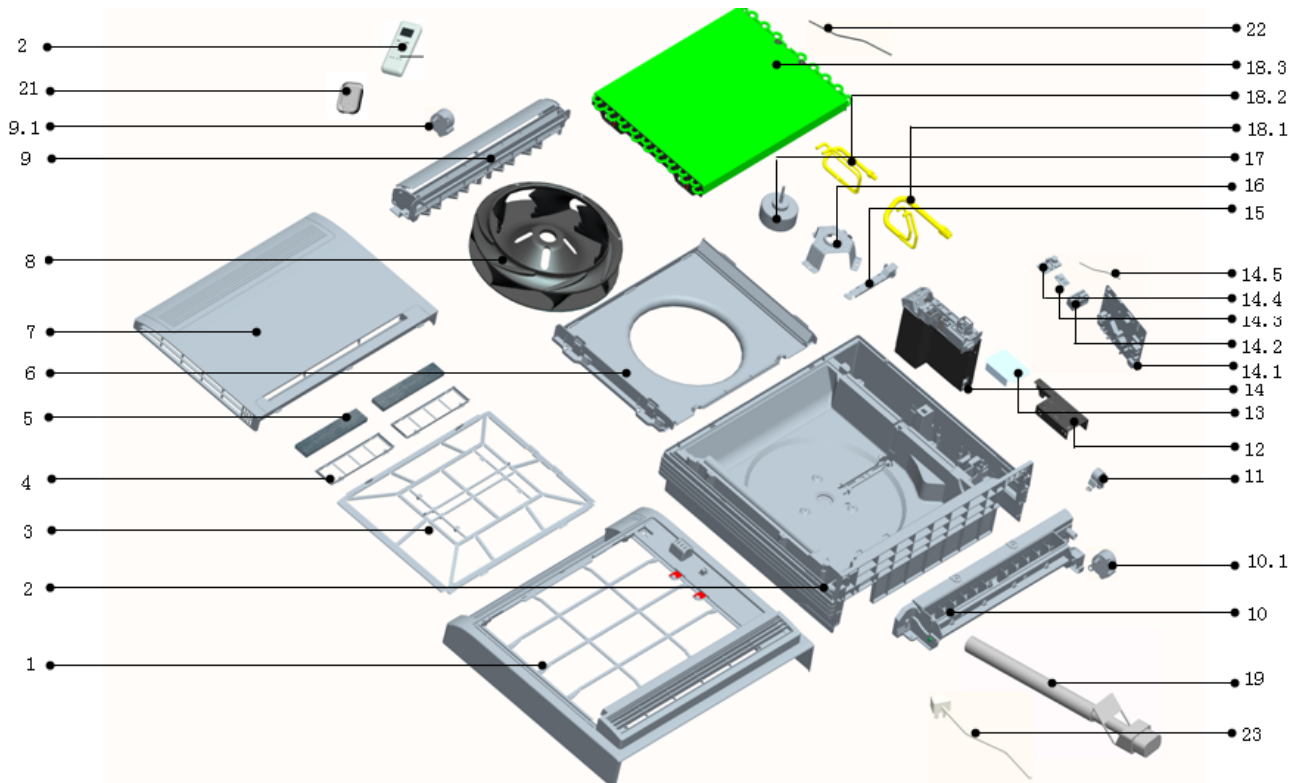
9. Exploded View

9.1 MFA-12HRN1 MFA-18HRN1



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Panel frame ass'y	1	14.1	Main control board ass'y	1
2	Base ass'y	1	14.2	Wire joint	1
3	Filter	1	14.3	Dial-up board ass'y	1
4	Air fresh net	2	14.4	Display board ass'y	1
5	Formaldehyde-killer	2	14.5	Room temp sensor ass'y	1
6	Air guide ring ass'y	1	15	Wire clamp	1
7	Panel ass'y	1	16	Motor bracket	1
8	Centrifugal fan	1	17	Dc motor	1
9	Air outlet frame ass'y	1	18	Evaporator ass'y	1
9.1	Stepper motor	1	18.1	Output pipe ass'y	1
10	Drainage pan ass'y	1	18.2	Input pipe ass'y	1
10.1	Stepper motor	1	18.3	Evaporator	1
11	Pipe clamp	1	19	Remote controller	1
12	E-Part box cover	1	20	Remote controller holder ass'y	1
13	Insulation washer	1	21	Temp.sensor ass'y	1
14	E-part box ass'y	1			








9.2 MFA-12HRN1-Q










No.	Part Name	Quantity	No.	Part Name	Quantity
1	Panel frame ass'y	1	14.2	Wire joint	1
2	Base ass'y	1	14.3	Dial-up board ass'y	1
3	Filter	1	14.4	Display board ass'y	1
4	Air fresh net	2	14.5	Room temp. sensor ass'y	1
5	Formaldehyde-killer	2	15	Wire clamp	1
6	Air guide ring ass'y	1	16	Motor bracket	1
7	Panel ass'y	1	17	Dc motor	1
8	Centrifugal fan	1	18	Evaporator ass'y	1
9	Air outlet frame ass'y	1	18.1	Output pipe ass'y	1
9.1	Stepper motor	1	18.2	Input pipe ass'y	1
10	Drainage pan ass'y	1	18.3	Evaporator	1
10.1	Stepper motor	1	19	Connection tube ass'y	1
11	Pipe clamp	1	20	Remote controller	1
12	E-Part box cover	1	21	Remote controller holder ass'y	1
13	Insulation washer	1	22	Temp. sensor ass'y	1
14	E-part box ass'y	1	23	Power supply wire	1
14.1	Main control board ass'y	1			

10. Accessories

10.1 MFA-12HRN1/ MFA-18HRN1

	Name	Shape	Quantity
Installation fittings	Hook		2
Remote controller & Its Frame	Remote controller		1
	Frame		1
	Mounting screw(ST2.9×10-C-H)		2
	Alkaline dry batteries (AM4)		2
Others	Installation manual		1
	Owner's manual		1

10.2 MFA-12HRN1-Q

	Name	Shape	Quantity
Installation fittings	Hook		2
Remote controller & Its Frame	Remote controller		1
	Frame		1
	Mounting screw(ST2.9×10-C-H)		2
	Alkaline dry batteries (AM4)		2
Others	Installation & Owner's manual	/	1
	Holding sponge		2
	Wrapping tape		1

Part 3

Outdoor Units

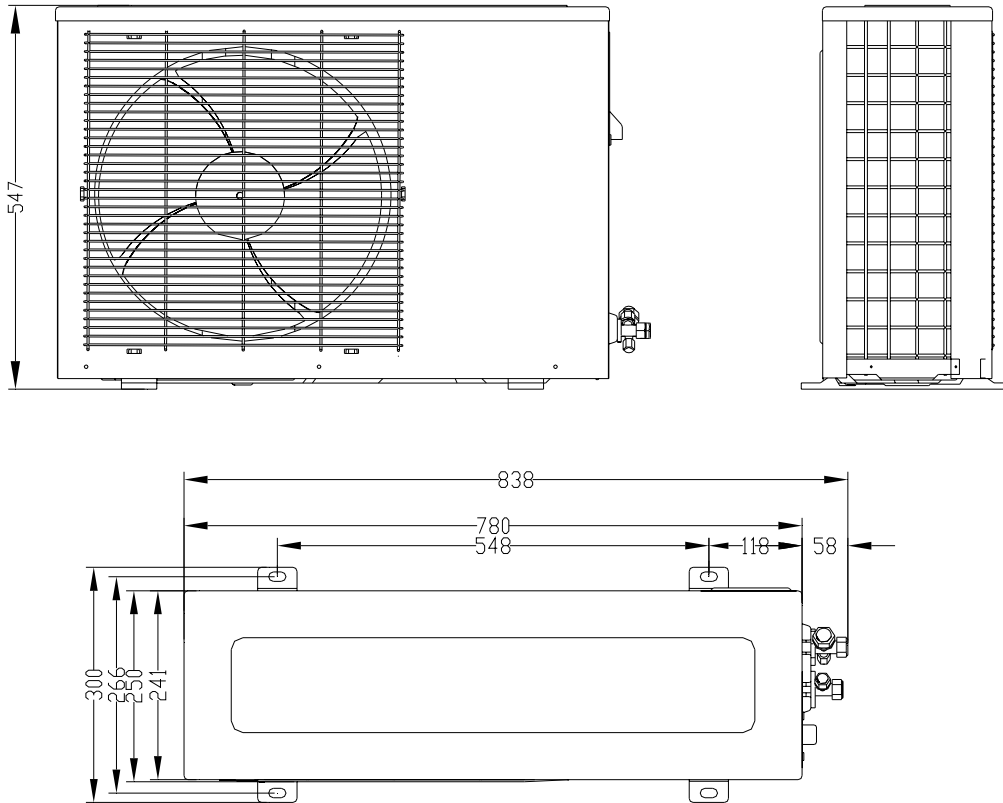
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1. Specifications

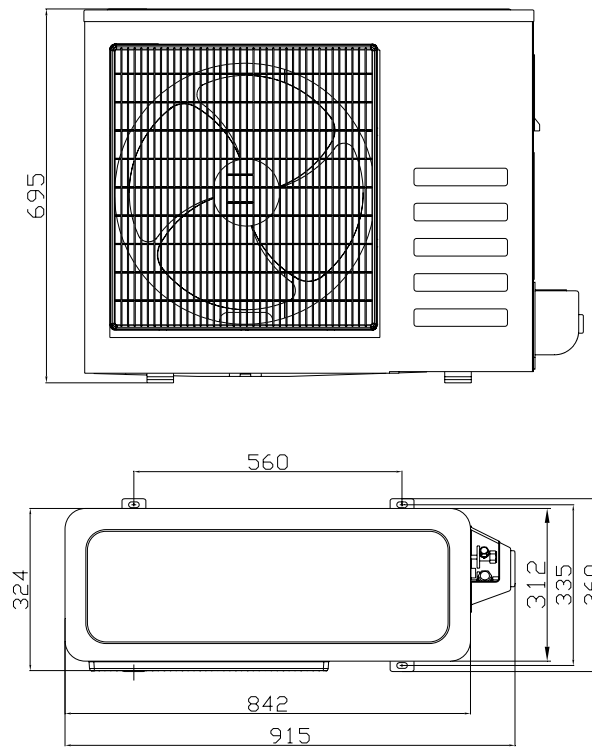
Model		MON-12HN1	MON-18HN1	MON-12HN1-Q	
Code		220075100200	220075200460	220075100210	
Power supply	V-ph-Hz	220~240-1-50	220~240-1-50	220~240-1-50	
Max. input consumption	W	1500	2000	1500	
Max. input current	A	7.5	12	7.5	
Starting current	A	29.9	31.8	29.9	
Compressor	Model	PA140X2C-4FT	PA200X2CS-4KU1	PA140X2C-4FT	
	Type	Rotary	Rotary	Rotary	
	Brand	Midea-TOSHIBA	Midea-TOSHIBA	Midea-TOSHIBA	
	Supplier	Midea-TOSHIBA	Midea-TOSHIBA	Midea-TOSHIBA	
	Capacity	Btu/h	11566.68	16787.04	11566.68
	Input	W	1150	1670	1150
	Rated current (RLA)	A	5.3	7.81	5.3
	Locked rotor Amp (LRA)	A	29.9	31.8	29.9
	Thermal protector		Internal	Internal	Internal
	Capacitor	μF	35μF/440-450V	50μF/440-450V	35μF/440-450V
Refrigerant oil	ml	ESTEL OIL VG74, 480	ESTER OIL VG74, 750	ESTEL OIL VG74, 480	
Outdoor fan motor	Model	YDK24-6F	YDK53-6K	YDK24-6F	
	Type	AC MOTOR	AC MOTOR	AC MOTOR	
	Brand	WELLING	WELLING	WELLING	
	Input	W	58	130	58
	Capacitor	μF	2.5μF/450V	2.5μF/450V	2.5μF/450V
	Speed	r/min	800	750	800
Outdoor coil	Number of rows		2	2	2
	Tube pitch(a) × row pitch(b)	mm	21×13.37	22×19.05	21×13.37
	Fin spacing	mm	1.5	1.6	1.5
	Fin type		Hydrophilic aluminum	Hydrophilic aluminum	Hydrophilic aluminum
	Tube outside dia. and type	mm	Φ7 Inner grooved copper tube	Φ7.94 Inner grooved copper tube	Φ7 Inner grooved copper tube
	Coil length × height × width	mm	628×504×26.74	630×660×38.1	628×504×26.74
	Number of circuits		2	2	2
Outdoor air flow	m ³ /h	1985	2770	1985	
Outdoor noise level (sound pressure)	dB(A)	52.8	55.5	52.6	
Outdoor unit	Dimension(W×H×D)	mm	780×547×250	842×695×324	780×547×250
	Packing (W×H×D)	mm	910×575×335	975×770×405	910×575×335
	Net/Gross weight	kg	34/38	52/56	35/39
Refrigerant	Type		R410A	R410A	R410A
	Charged volume	g	1120	1300	1120
Design pressure	MPa	4.2/2.0	4.2/2.0	4.2/2.0	
Refrigerant piping	Liquid side/ Gas side	mm	φ6.4/φ12.7	φ6.4/φ12.7	φ6.4/φ12.7
	Max. pipe length	m	15	20	—
	Max. difference in level	m	5	10	—
Ambient temp.	℃	cooling: 21~43; heating: -5~24	cooling: 21~43; heating: -5~24	cooling: 21~43; heating: -5~24	

2. Dimensions

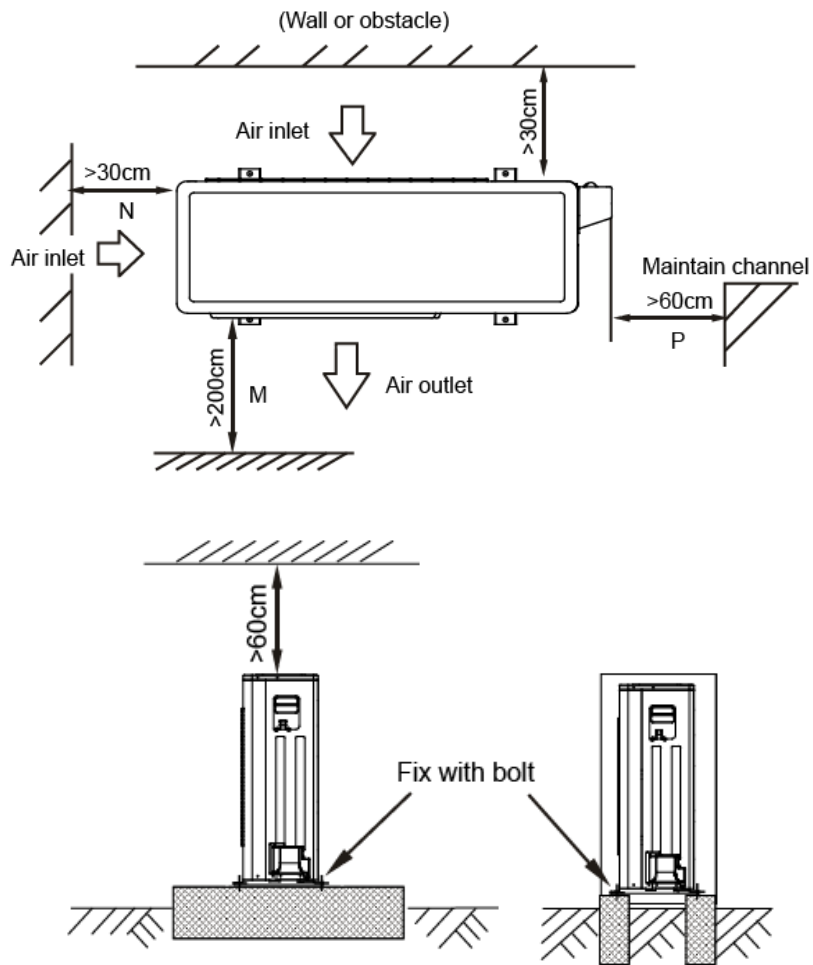
2.1 MON-12HN1 MON-12HN1-Q



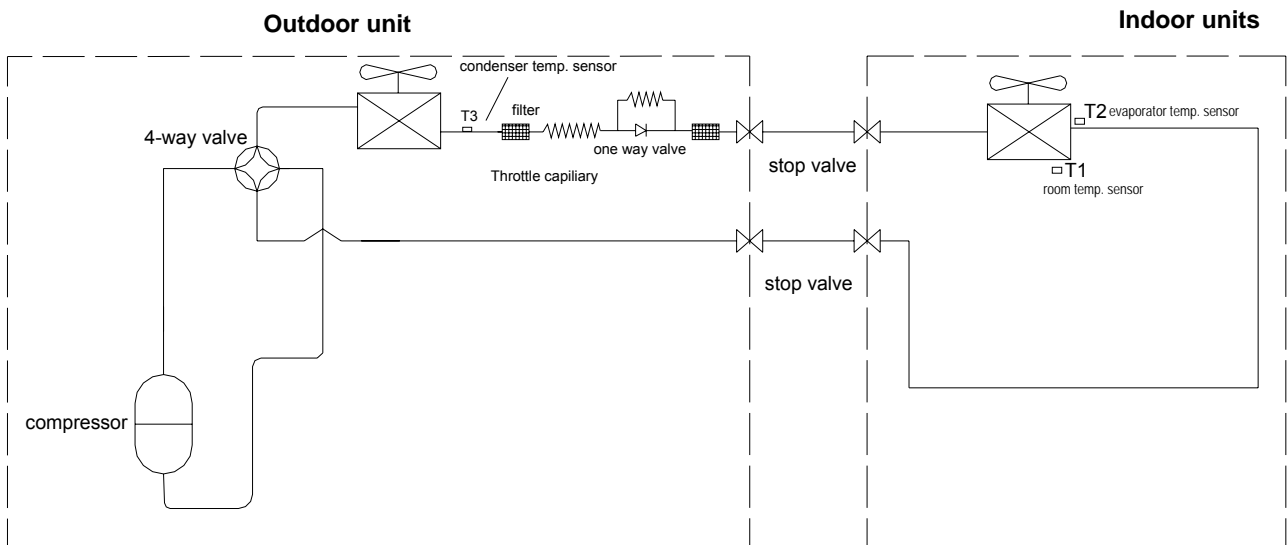
2.2 MON-18HN1



3. Service Space

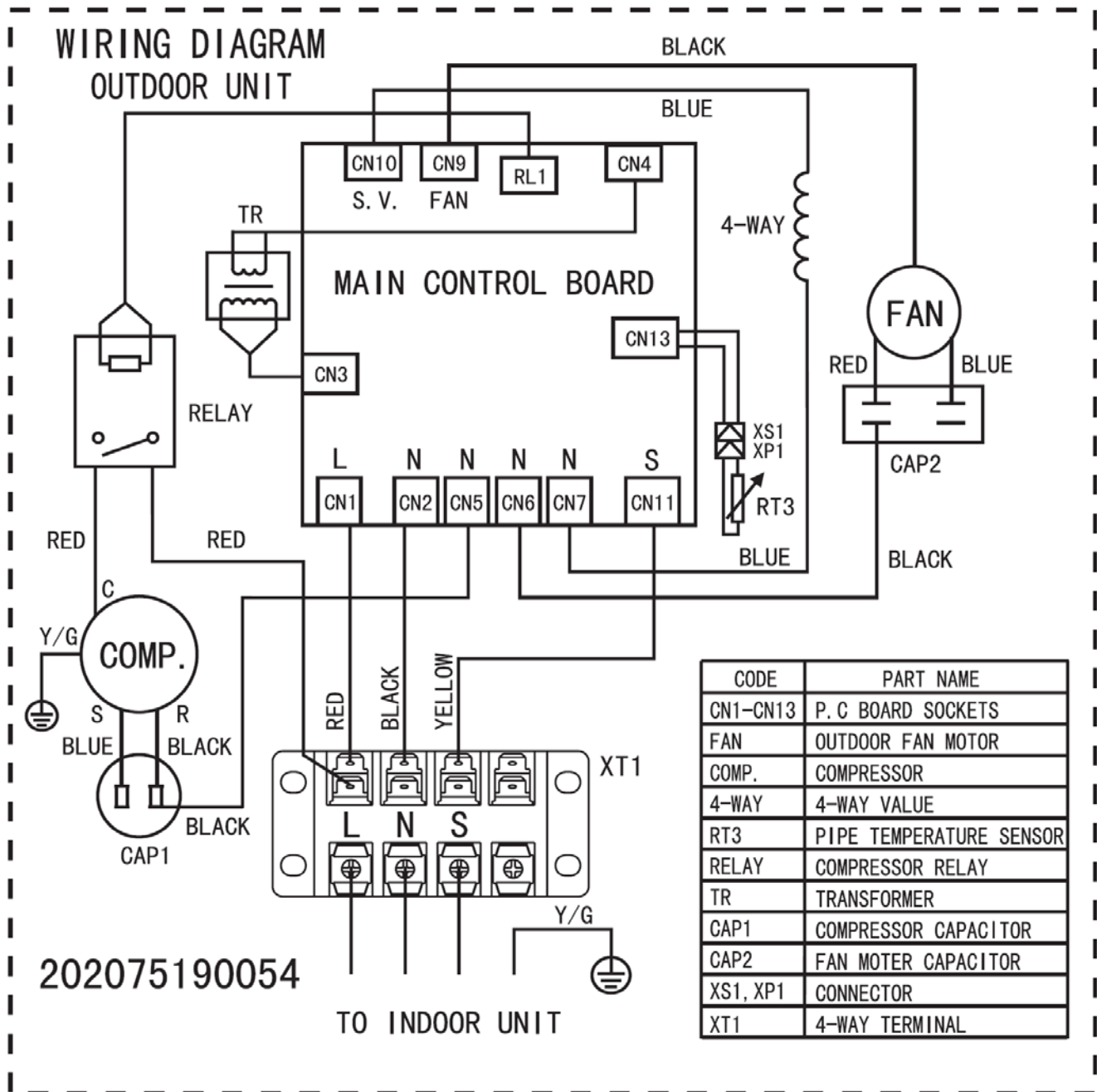


4. Piping Diagrams

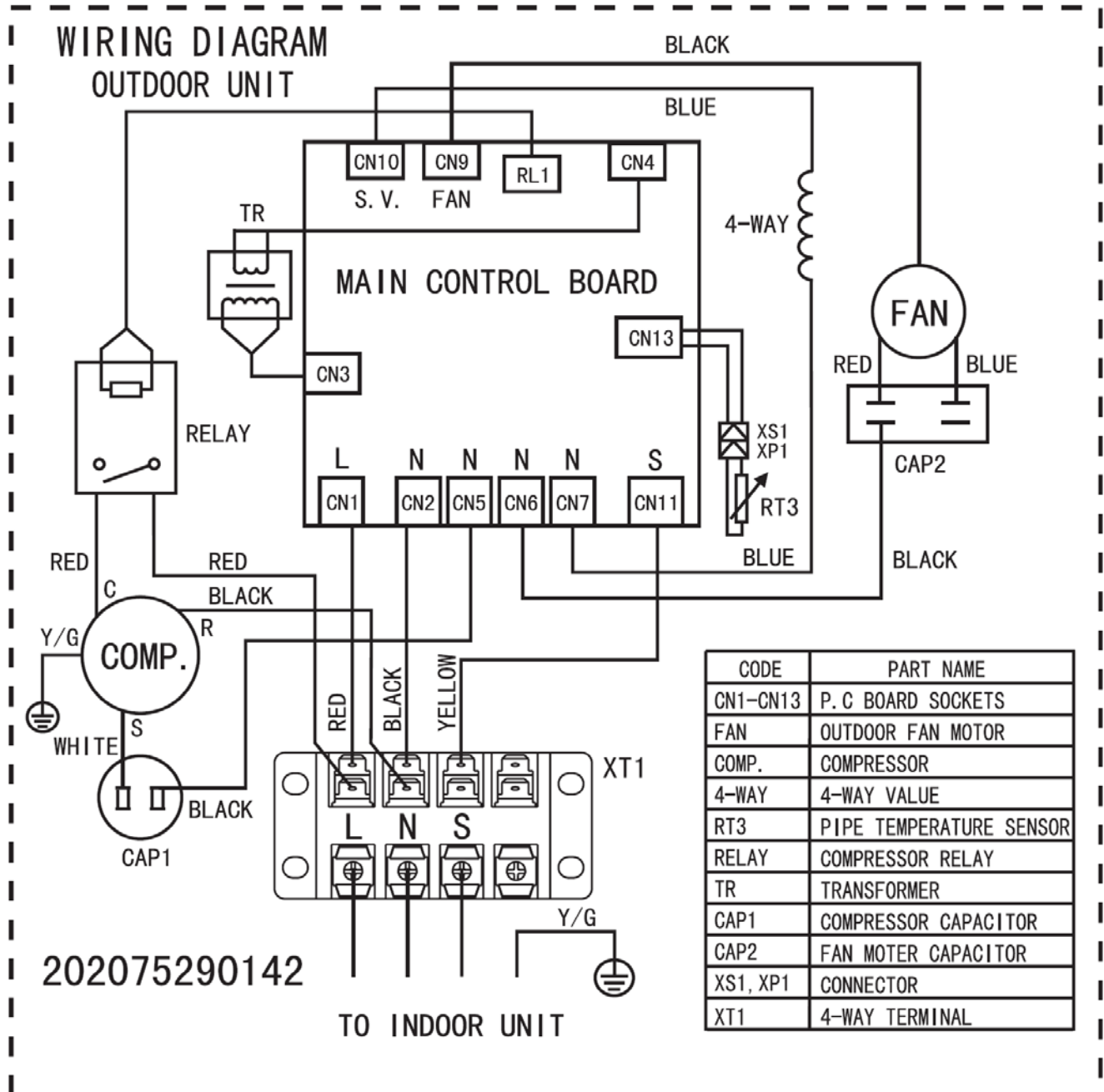


5. Wiring Diagrams

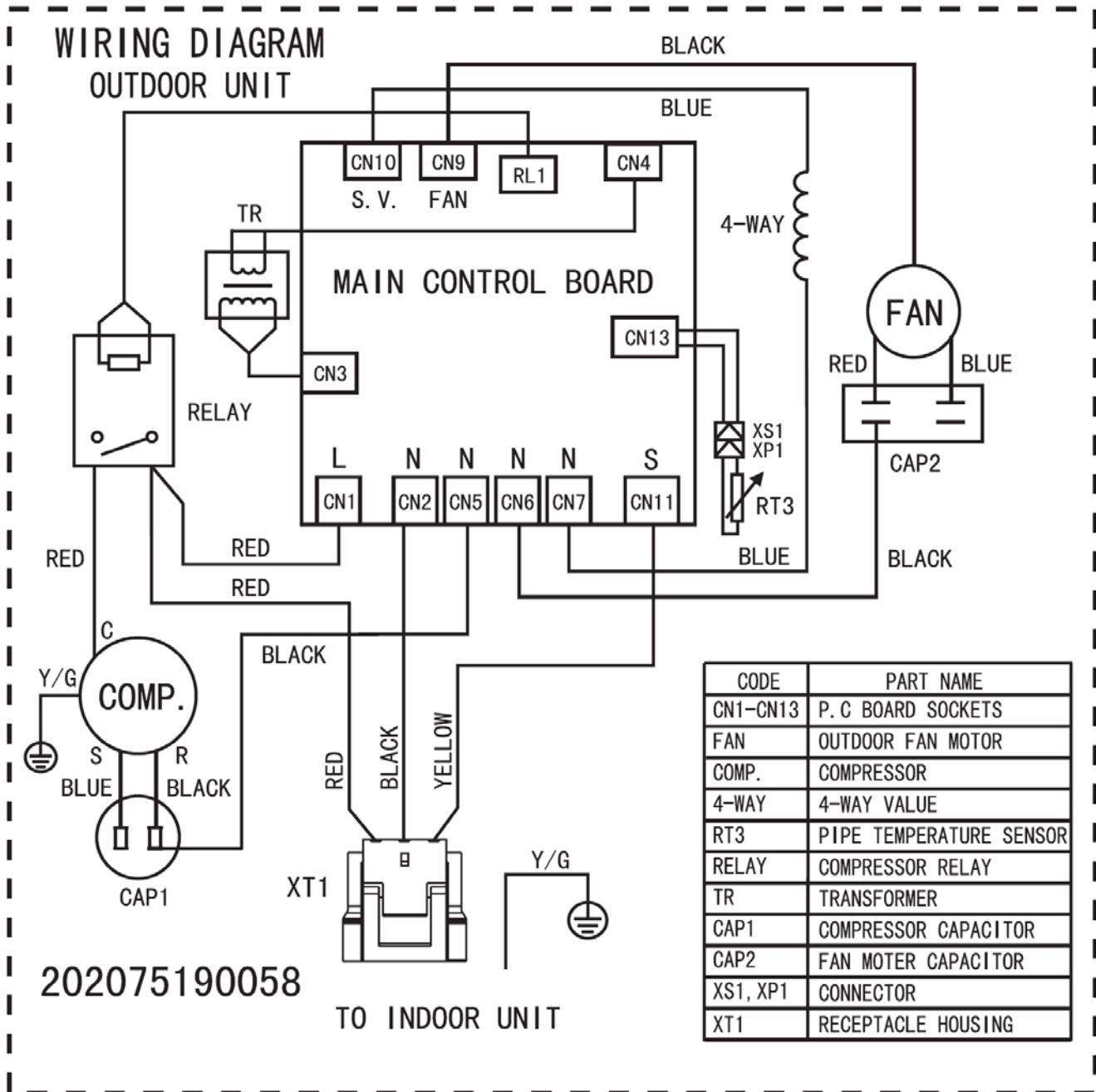
5.1 MON-12HN1



5.2 MON-18HN1



5.3 MON-12HN1-Q



6. Electric Characteristics

Model	Outdoor Unit				Power Supply			Compressor		OFM	
	Hz	Voltage	Min.	Max.	MCA	TOCA	MFA	MSC	RLA	KW	FLA
MON-12HN1	50	220~240V	198V	254V	6.6	13	15	29.9	5.3	0.024	0.275
MON-18HN1	50	220~240V	198V	254V	9.8	18	20	31.8	7.81	0.053	0.592
MON-12HN1-Q	50	220~240V	198V	254V	6.6	13	15	29.9	5.3	0.024	0.275

Remark:

MCA: Min. Current Amps. (A)

TOCA: Total Over-current Amps. (A)

MFA: Max. Fuse Amps. (A)

MSC: Max. Starting Amps. (A)

RLA: Rated Locked Amps. (A)

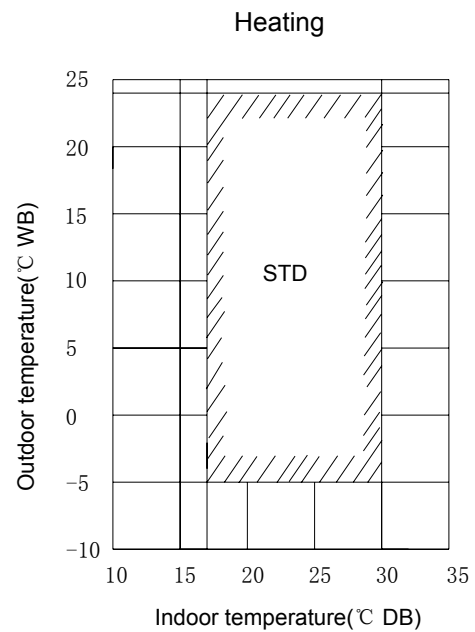
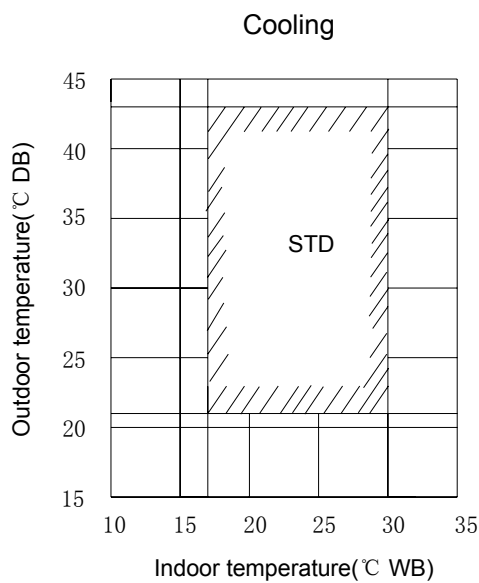
OFM: Outdoor Fan Motor.

FLA: Full Load Amps. (A)

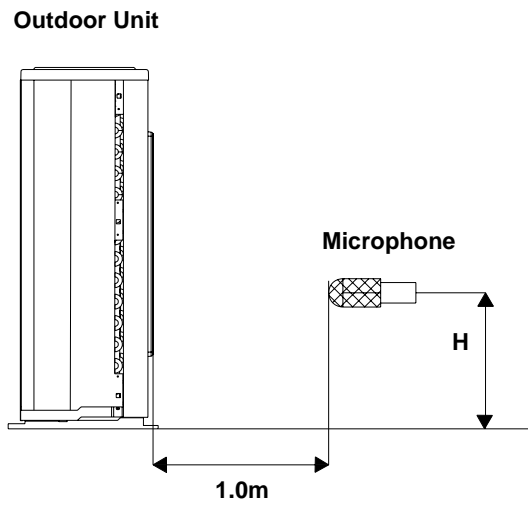
KW: Rated Motor Output (W)

7. Operation Limits

Operation mode	Outdoor temperature (°C)	Room temperature (°C)
Cooling operation	21~43	17~30
Heating operation	-5~24	17~30



8. Sound Levels

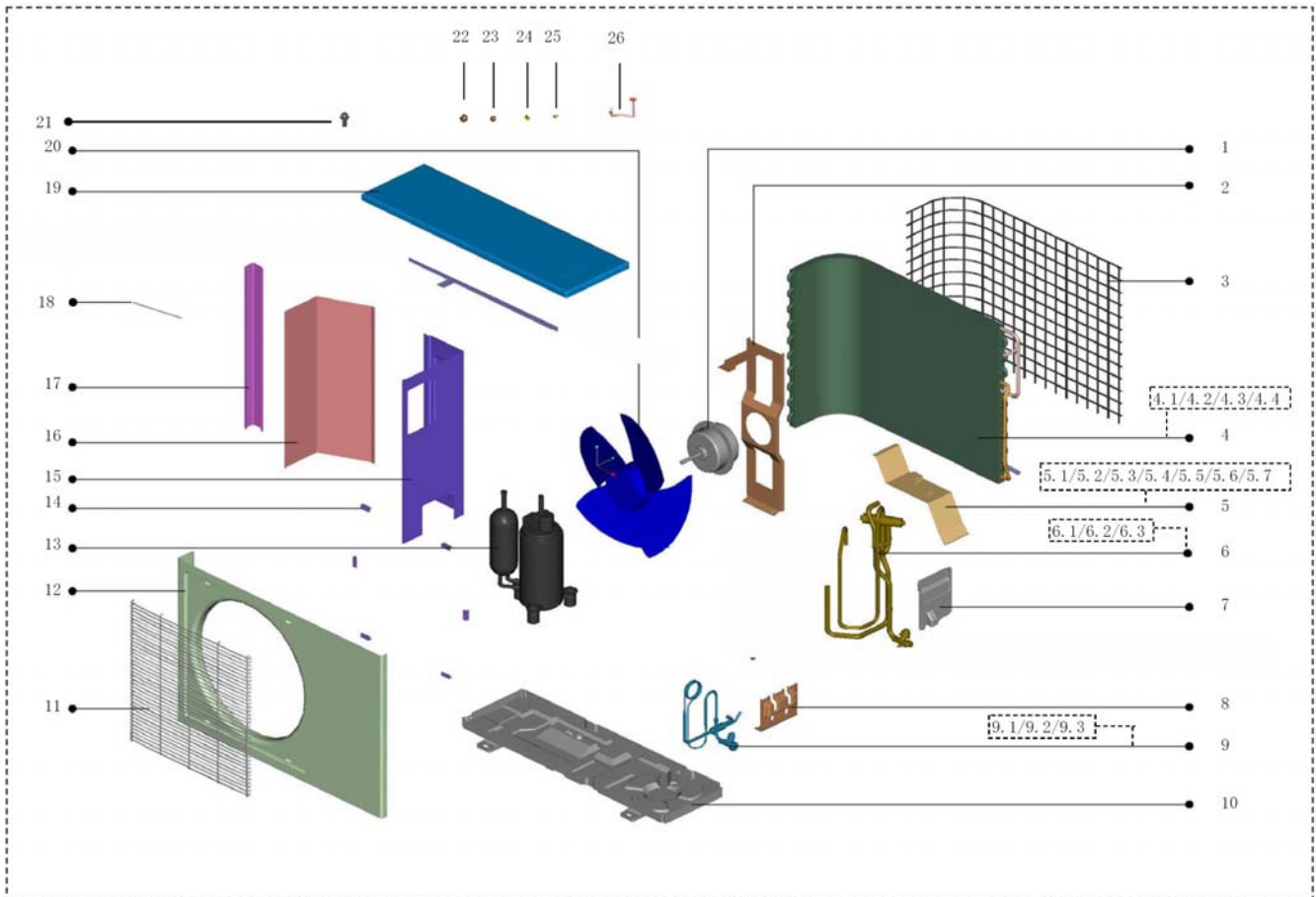


Note: $H = 0.5 \times \text{height of outdoor unit}$

Model	Noise level dB(A)
MON-12HN1	52.8
MON-18HN1	55.5
MON-12HN1-Q	52.6

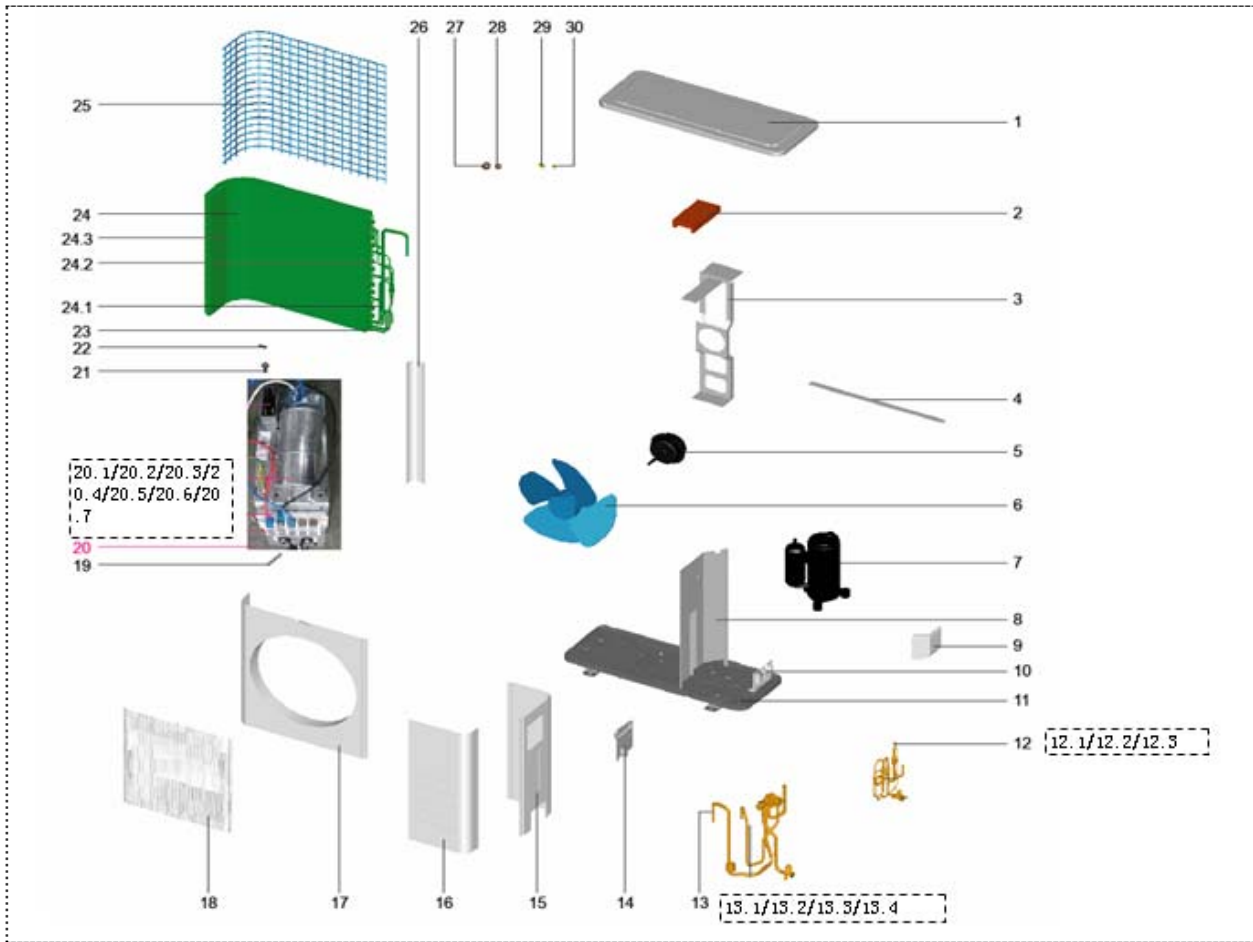
9. Exploded View

9.1 MON-12HN1



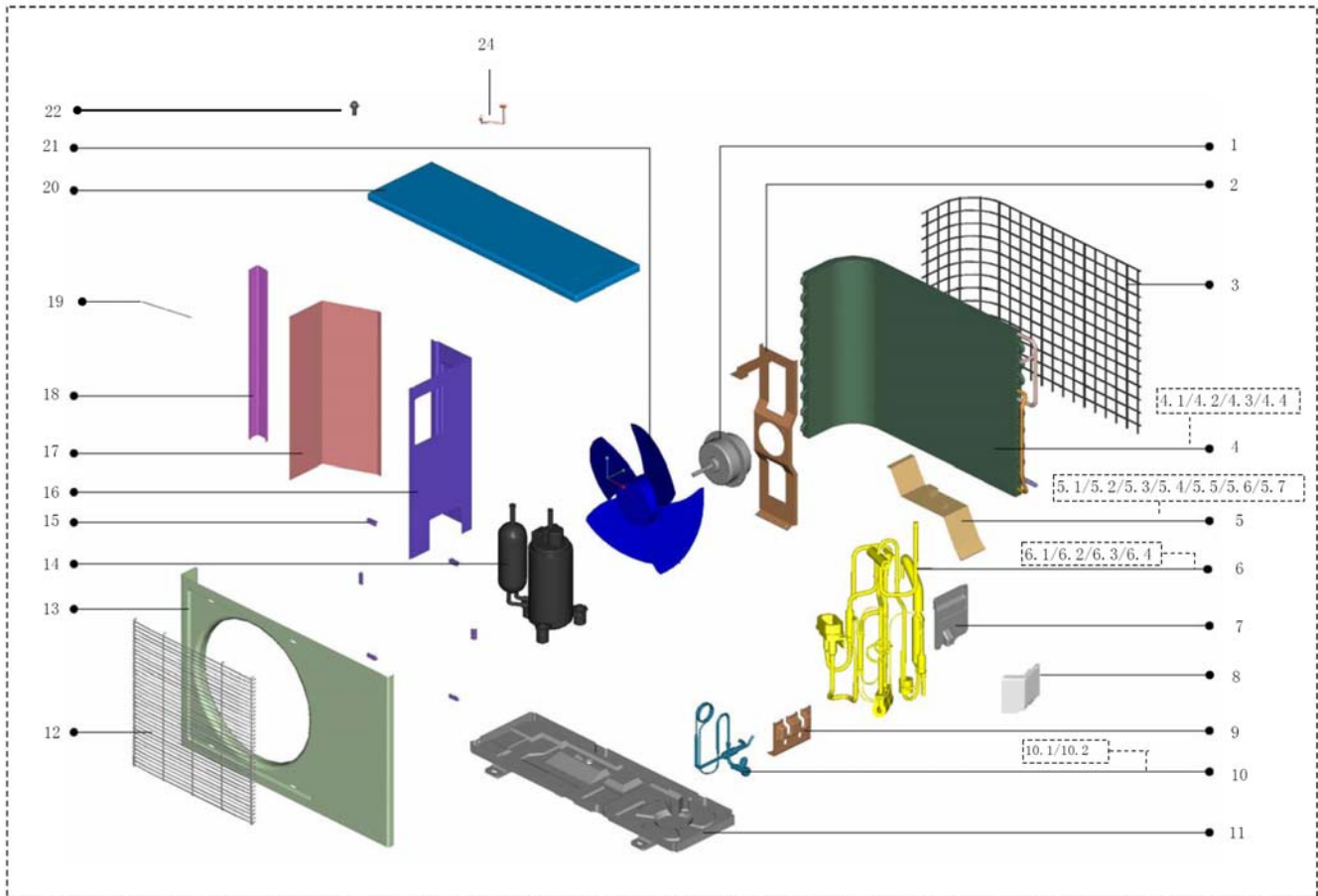
No.	Part Name	Quantity	No.	Part Name	Quantity
1	Fan motor	1	9	High pressure valve ass'y	1
2	Motor bracket ass'y	1	9.1	High pressure valve	1
3	Rear net	1	9.2	Strainer	1
4	Condenser ass'y	1	9.3	One way valve	1
4.1	Condenser	1	10	Base ass'y	1
4.2	Condenser output pipe	1	11	Grille	1
4.3	Condenser connecting pipe ass'y	1	12	Front panel	1
4.4	Condenser inlet pipe ass'y	1	13	Compressor	1
5	E-part box ass'y	1	14	Net clamp	6
5.1	Wire joint,4p	1	15	Right clapboard	1
5.2	Transformer	1	16	Partition board ass'y	1
5.3	Compressor capacitor	1	17	Left supporter	1
5.4	Motor capacitor	1	18	Small handle	1
5.5	Relay	1	19	Top cover	1
5.6	E-Part box	1	20	Axial flow fan	1
5.7	Main control board ass'y	1	21	Drain hose	1
6	4-way valve ass'y	1	22	Copper nut	1
6.1	4-way valve	1	23	Copper nut	1
6.2	Solenoid	1	24	Sphere pad	1
6.3	Low pressure valve	1	25	Sphere pad	1
7	Big handle	1	26	Temp. sensor ass'y	1
8	Valve plate	1			

9.2 MON-18HN1



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Top cover ass'y	1	18	Grille	1
2	Foam	1	19	Small handle	1
3	Motor bracket ass'y	1	20	E-part box ass'y	1
4	Rear net frame	1	20.1	Wire joint, 4p	1
5	Fan motor	1	20.2	Compressor capacitor	1
6	Axial flow fan	1	20.3	Electric installation board	1
7	Compressor	1	20.4	Motor capacitor	1
8	Partition board ass'y	1	20.5	Main control board ass'y	1
9	Drainage cover	1	20.6	Transformer	1
10	Valve plate	1	20.7	Relay	1
11	Base ass'y	1	21	Drain hose	1
12	High pressure valve ass'y	1	22	Net clamp	8
12.1	Strainer	1	23	Temp. sensor ass'y	1
12.2	One way valve	1	24	Condenser ass'y	1
12.3	High pressure valve	1	24.1	Fluted pipe ass'y	1
13	4-way valve ass'y	1	24.2	Input pipe ass'y	1
13.1	Solenoid	1	24.3	Condenser ass'y	1
13.2	Low pressure valve	1	25	Rear net	1
13.3	4-way valve	1	26	Left holder	1
13.4	Muffler	1	27	Copper nut	1
14	Big handle	1	28	Copper nut	1
15	Rear right clapboard ass'y	1	29	Sphere pad	1
16	Front right clapboard ass'y	1	30	Sphere pad	1
17	Front panel	1			

9.3 MON-12HN1-Q

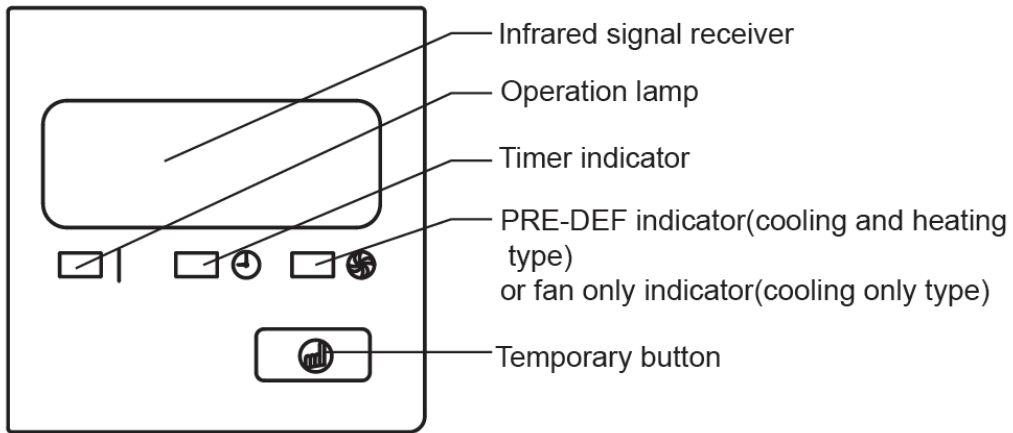


No.	Part Name	Quantity	No.	Part Name	Quantity
1	Fan motor	1	7	Big handle	1
2	Motor bracket ass'y	1	8	Drainage cover	1
3	Rear net	1	9	Valve plate	1
4	Condenser ass'y	1	10	High pressure valve ass'y	1
4.1	Condenser	1	10.1	One way valve	1
4.2	Condenser output pipe	1	10.2	Filter ass'y	1
4.3	Condenser connecting pipe ass'y	1	11	Base ass'y	1
4.4	Condenser inlet pipe ass'y	1	12	Grille	1
5	E-part box ass'y	1	13	Front panel	1
5.1	Connect wiring	1	14	Compressor	1
5.2	Transformer	1	15	Net clamp	6
5.3	Compressor capacitor	1	16	Right clapboard	1
5.4	Motor capacitor	1	17	Partition board ass'y	1
5.5	Relay	1	18	Left supporter	1
5.6	E-Part box	1	19	Small handle	1
5.7	Main control board ass'y	1	20	Top cover	1
6	4-way valve ass'y	1	21	Axial flow fan	1
6.1	4-way valve	1	22	Drain hose	1
6.2	Solenoid	1	23	R410A	
6.3	Pipe joint	1	24	Temp. sensor ass'y	1
6.4	Coupling ass'y	1			

10. Troubleshooting

10.1 Indoor Unit Malfunction

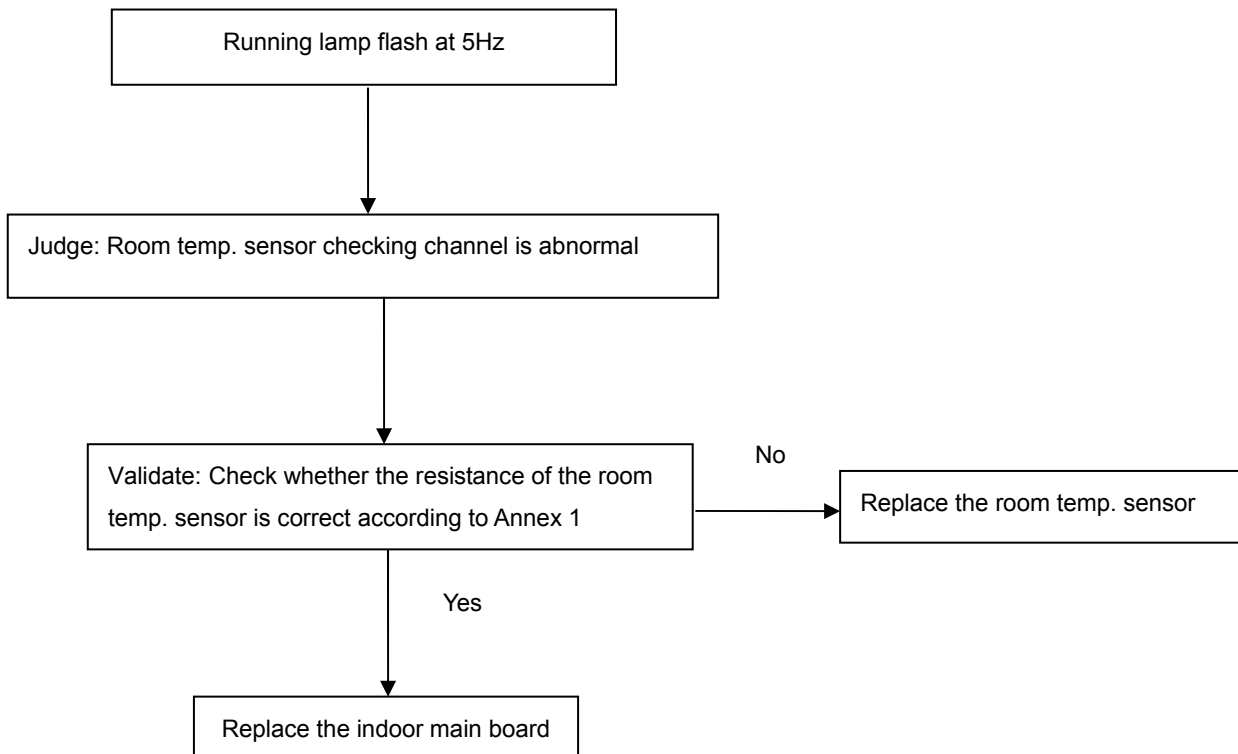
Indoor unit display panel



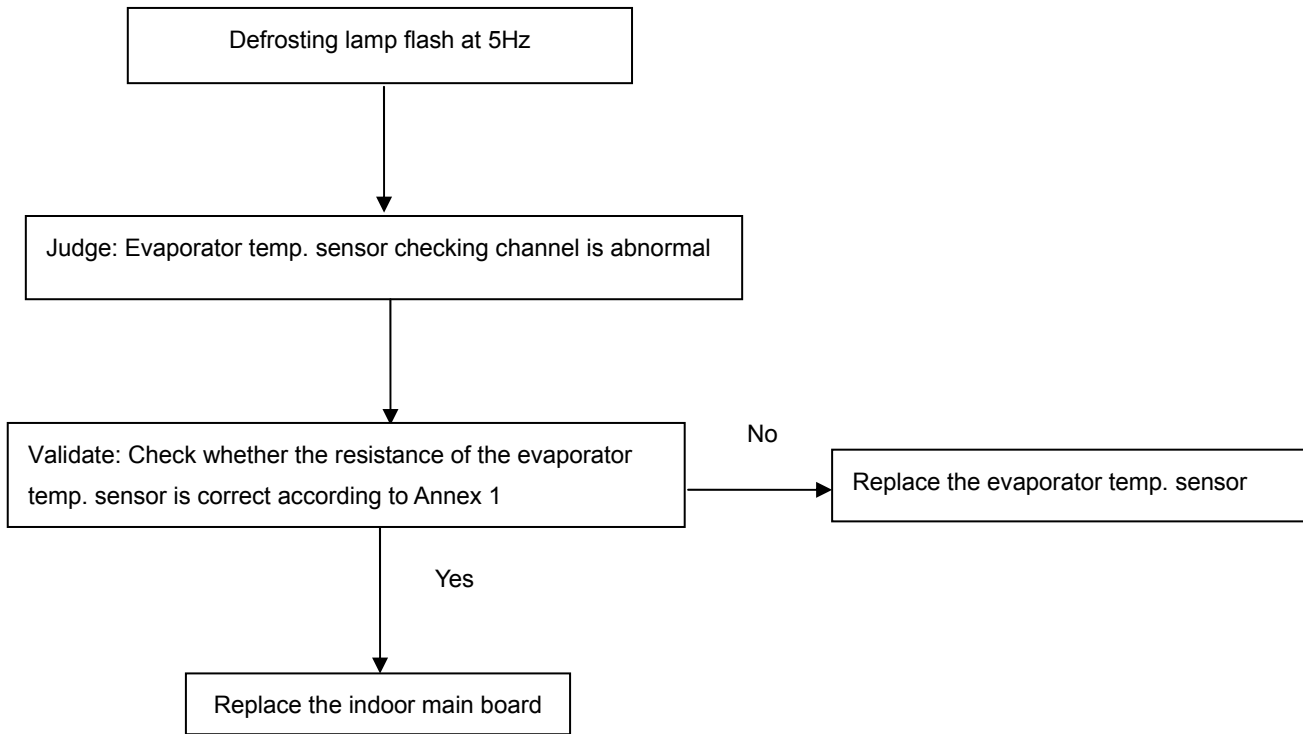
No.	Running lamp	Timer lamp	Defrosting lamp	Malfunction
1	☆	×	×	Room temp. sensor checking channel is abnormal
2	×	×	☆	Evaporator temp. sensor checking channel is abnormal
3	☆	☆	☆	Condenser temp. sensor checking channel is abnormal
4	×	☆	×	In-outdoor unit communication malfunction
5	☆	●	☆	DC Fan malfunction
6	☆	☆	●	EEPROM malfunction

(× Extinguish, ☆ Flash at 5Hz, ● Light)

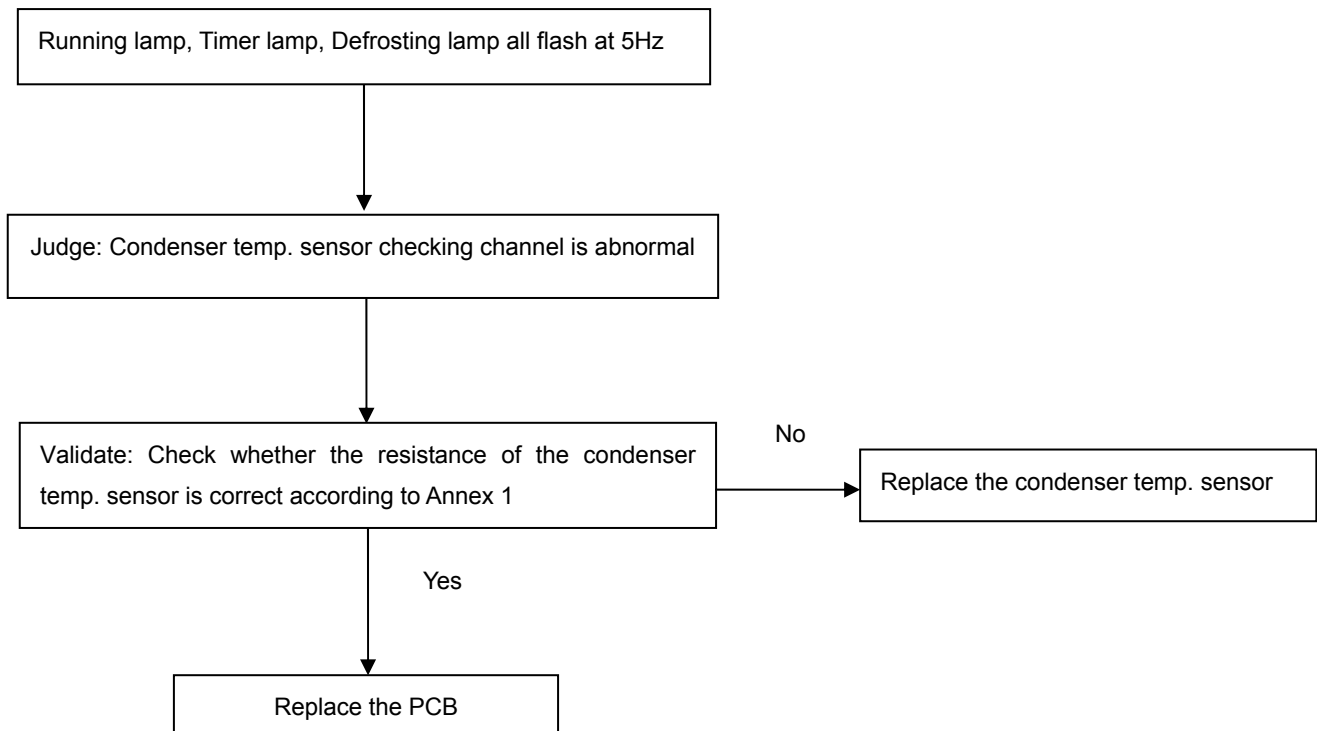
1. Running lamp flash at 5Hz



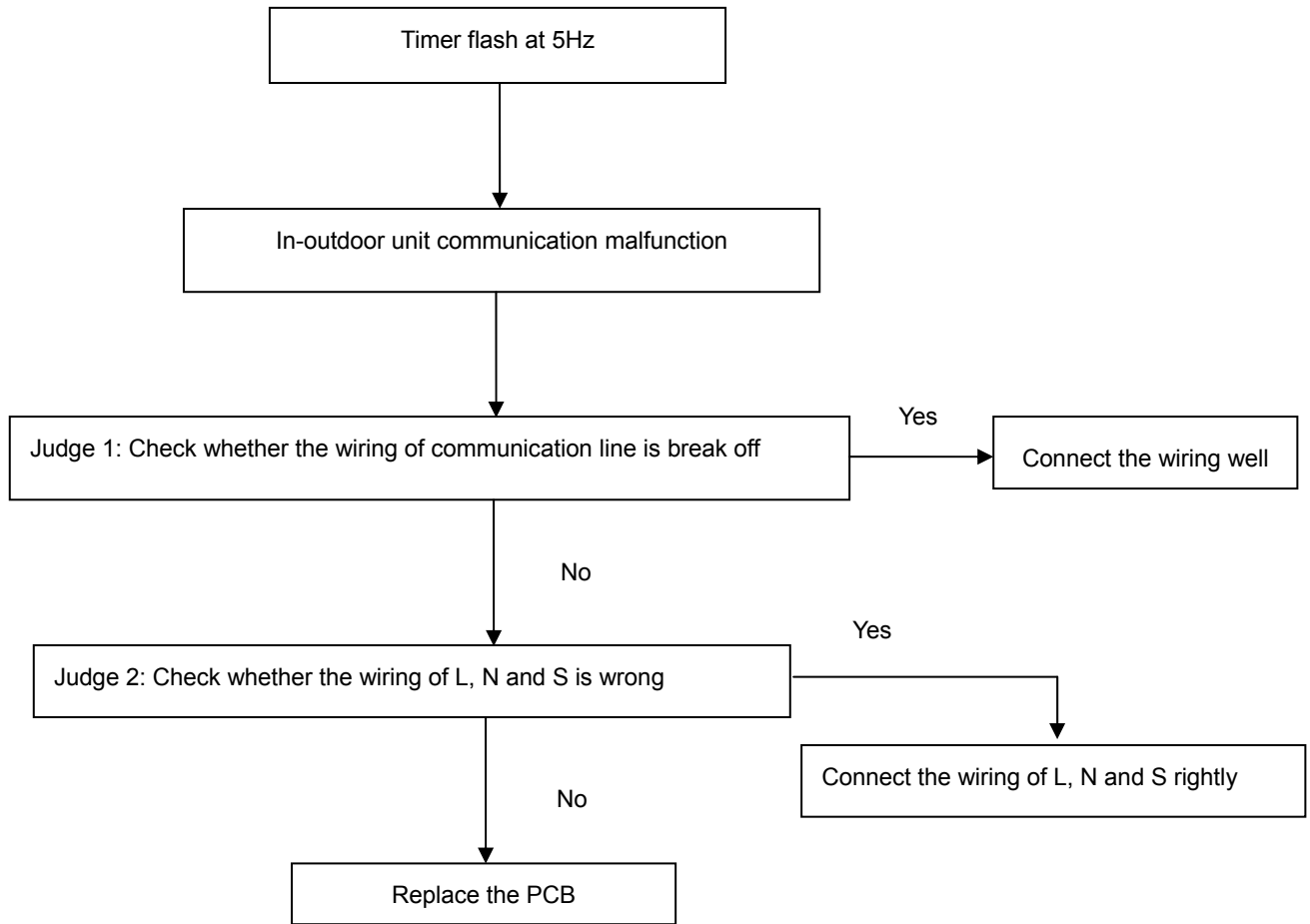
2. Defrosting lamp flash at 5Hz



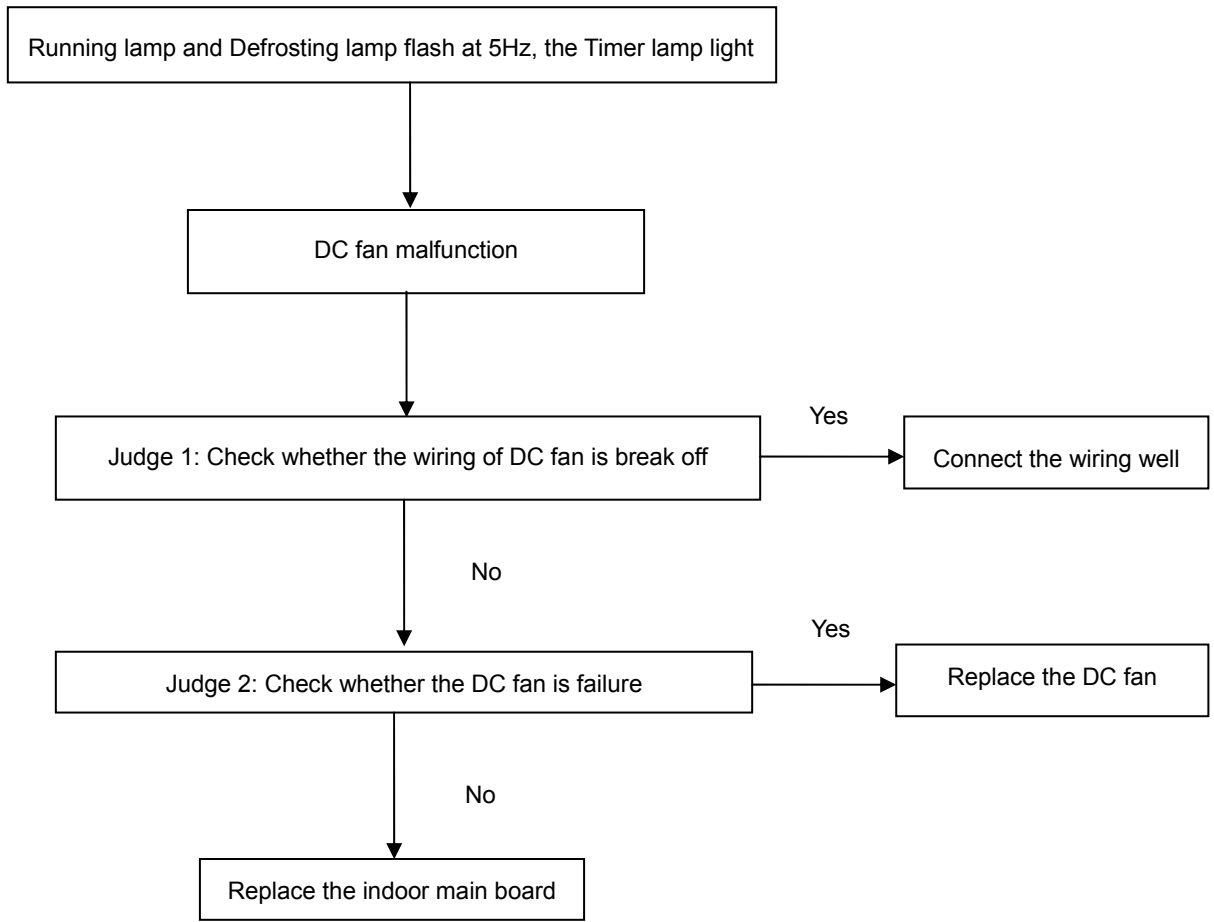
3. Running lamp, Timer lamp, Defrosting lamp all flash at 5Hz



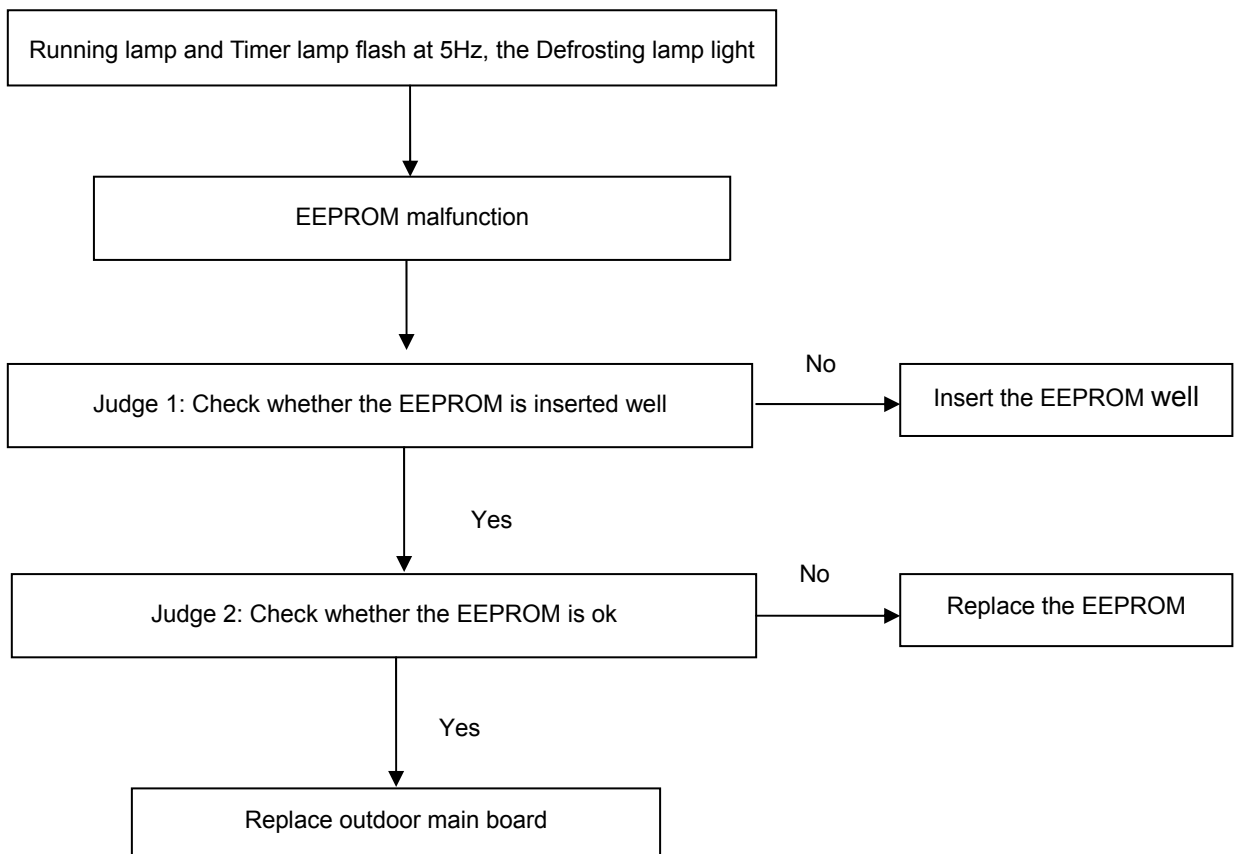
4. Timer lamp flash at 5Hz



5. Running lamp and Defrosting lamp flash at 5Hz, the Timer lamp light



6. Running lamp and Timer lamp flash at 5Hz, the Defrosting lamp light

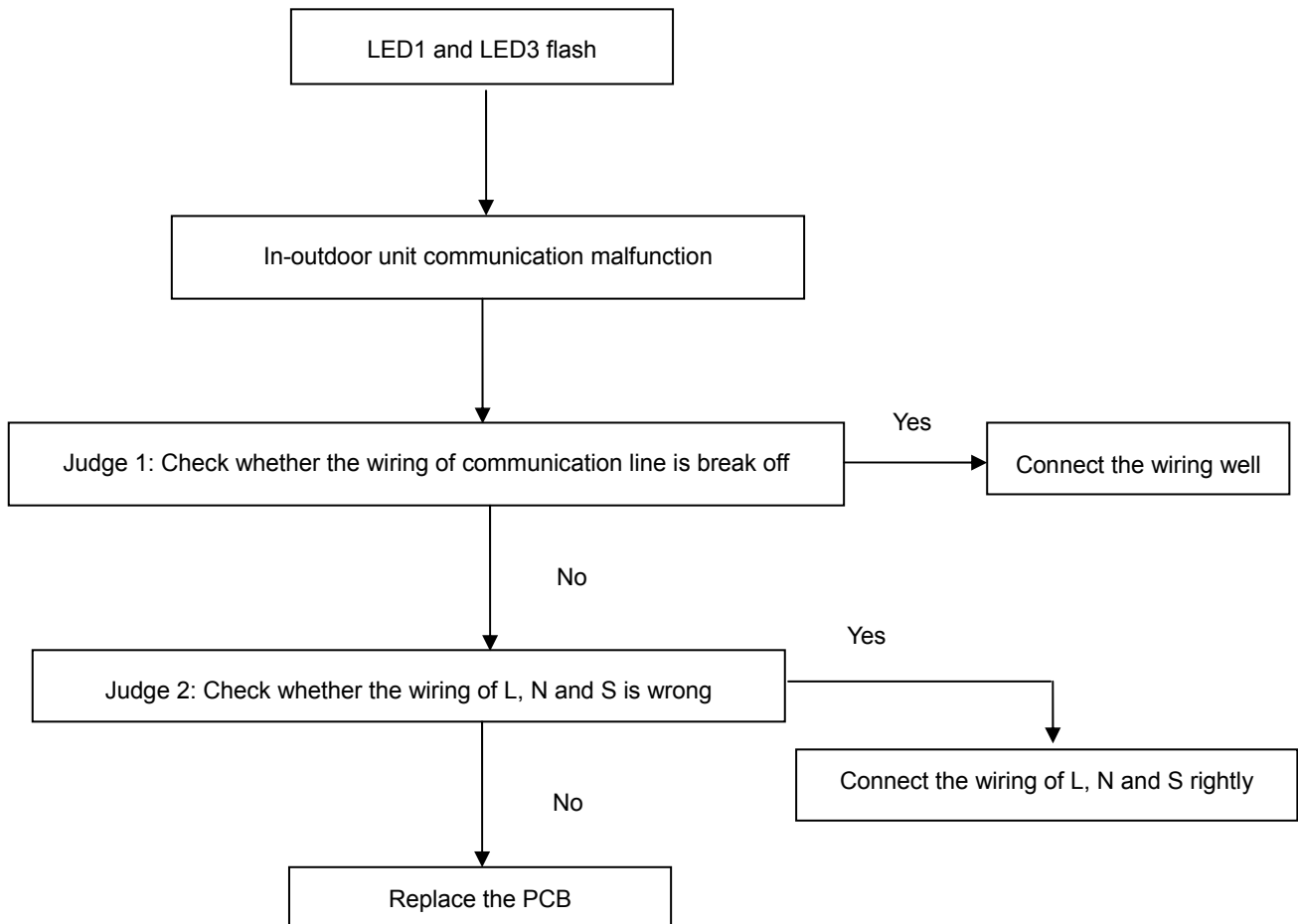


10.2 Outdoor Unit Malfunction

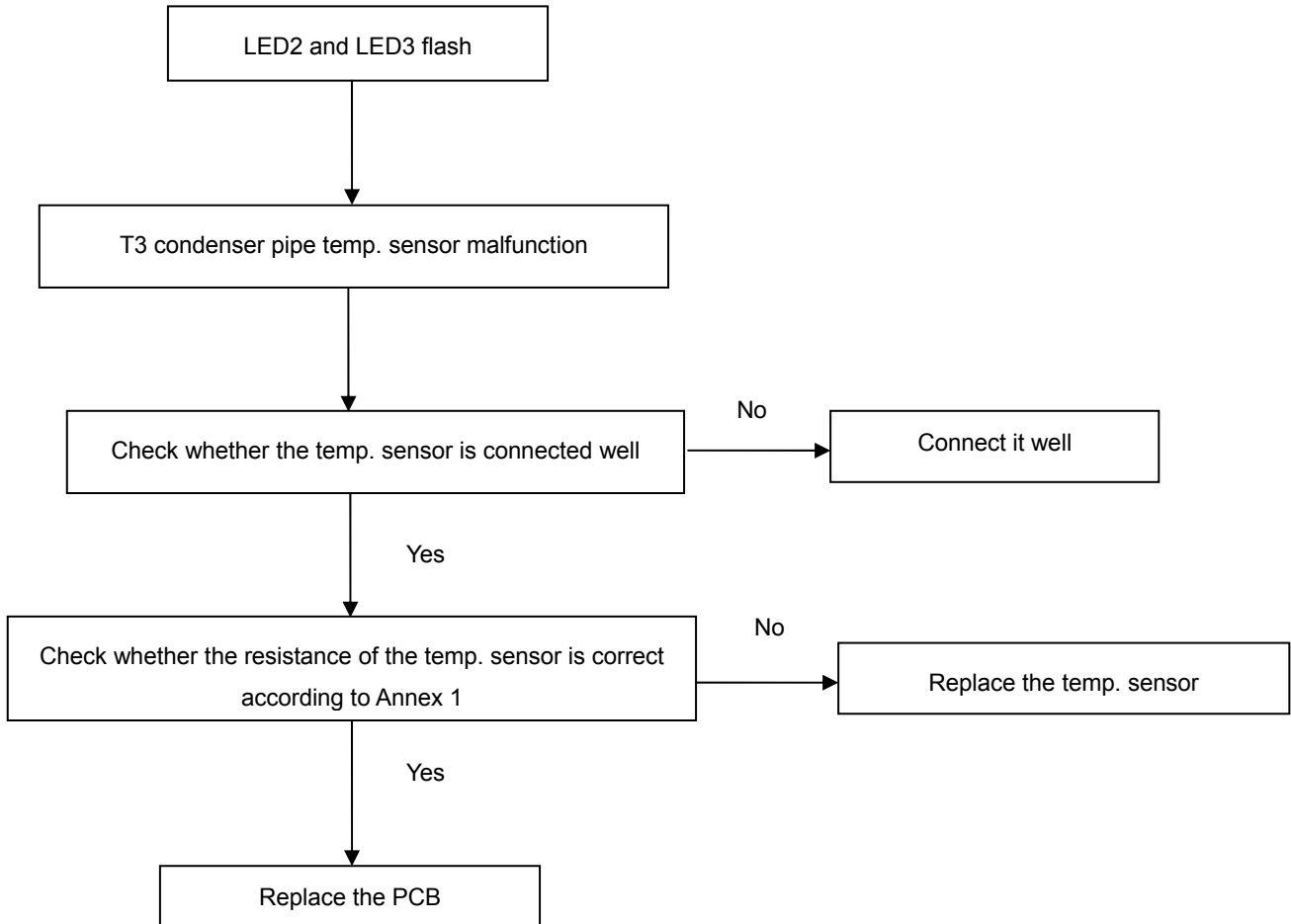
No.	LED1	LED2	LED3	Malfunction
1	☆	×	☆	In-outdoor unit communication malfunction
2	×	☆	☆	T3 condenser pipe temp. sensor malfunction

× Extinguish, ☆ Flash

1. LED1 and LED3 flash



2. LED2 and LED3 flash



Appendix Indoor Temp. and Pipe Temp. Sensor Resistance Value Table (°C--K)

°C	K Ohm	°C	K Ohm	°C	K Ohm	°C	K Ohm
-20	115.266	20	12.6431	60	2.35774	100	0.62973
-19	108.146	21	12.0561	61	2.27249	101	0.61148
-18	101.517	22	11.5000	62	2.19073	102	0.59386
-17	96.3423	23	10.9731	63	2.11241	103	0.57683
-16	89.5865	24	10.4736	64	2.03732	104	0.56038
-15	84.2190	25	10.0000	65	1.96532	105	0.54448
-14	79.3110	26	9.55074	66	1.89627	106	0.52912
-13	74.5360	27	9.12445	67	1.83003	107	0.51426
-12	70.1698	28	8.71983	68	1.76647	108	0.49989
-11	66.0898	29	8.33566	69	1.70547	109	0.48600
-10	62.2756	30	7.97078	70	1.64691	110	0.47256
-9	58.7079	31	7.62411	71	1.59068	111	0.45957
-8	56.3694	32	7.29464	72	1.53668	112	0.44699
-7	52.2438	33	6.98142	73	1.48481	113	0.43482
-6	49.3161	34	6.68355	74	1.43498	114	0.42304
-5	46.5725	35	6.40021	75	1.38703	115	0.41164
-4	44.0000	36	6.13059	76	1.34105	116	0.40060
-3	41.5878	37	5.87359	77	1.29078	117	0.38991
-2	39.8239	38	5.62961	78	1.25423	118	0.37956
-1	37.1988	39	5.39689	79	1.21330	119	0.36954
0	35.2024	40	5.17519	80	1.17393	120	0.35982
1	33.3269	41	4.96392	81	1.13604	121	0.35042
2	31.5635	42	4.76253	82	1.09958	122	0.3413
3	29.9058	43	4.57050	83	1.06448	123	0.33246
4	28.3459	44	4.38736	84	1.03069	124	0.32390
5	26.8778	45	4.21263	85	0.99815	125	0.31559
6	25.4954	46	4.04589	86	0.96681	126	0.30754
7	24.1932	47	3.88673	87	0.93662	127	0.29974
8	22.5662	48	3.73476	88	0.90753	128	0.29216
9	21.8094	49	3.58962	89	0.87950	129	0.28482
10	20.7184	50	3.45097	90	0.85248	130	0.27770
11	19.6891	51	3.31847	91	0.82643	131	0.27078
12	18.7177	52	3.19183	92	0.80132	132	0.26408
13	17.8005	53	3.07075	93	0.77709	133	0.25757
14	16.9341	54	2.95896	94	0.75373	134	0.25125
15	16.1156	55	2.84421	95	0.73119	135	0.24512
16	15.3418	56	2.73823	96	0.70944	136	0.23916
17	14.6181	57	2.63682	97	0.68844	137	0.23338
18	13.9180	58	2.53973	98	0.66818	138	0.22776
19	13.2631	59	2.44677	99	0.64862	139	0.22231

Part 4

Installation

1. Installation Place	37
2. Installation of Indoor Unit.....	38
3. Installation of outdoor unit.....	40
4. Installation of the Connecting Pipe.....	41
5. Connect the Drain Pipe.....	48
6. Wiring	50
7. Test Operation	55

1. Installation Place

1.1 The indoor Unit

5. There is enough room for installation and maintenance.
6. The air outlet and the air inlet are not impeded, and the influence of external air is the least.
7. The air flow can reach throughout the room.
8. The connecting pipe and drainpipe could be extracted out easily.
9. There is no direct radiation from heaters

1.2 The Outdoor Unit

1. There is enough space for installation and maintenance.
2. The air outlet and the air inlet are not impeded, and can not be reached by strong wind.
3. The place is dry and ventilative.
4. The support is flat and horizontal and can stand the weight of the outdoor unit. And no additional noise or vibration.
5. Your neighborhood will not feel uncomfortable with the noise or expelled air.
6. There is no leakage of combustible gas.
7. It is easy to install the connecting pipe or cables.

Caution:

Don't install the air conditioner in the following locations:

- a. There exists petrolatum.
- b. There is salty air surrounding (near the coast).
- c. There is caustic gas (the sulfide, for example) existing in the air (near a hot spring).
- d. The Volt vibrates violently (in the factories).
- e. In buses or cabinets.
- f. In kitchen where it is full of oil gas.
- g. There is strong electromagnetic wave existing.
- h. There are inflammable materials or gas.
- i. There is acid or alkaline liquid evaporating.
- j. Other special conditions

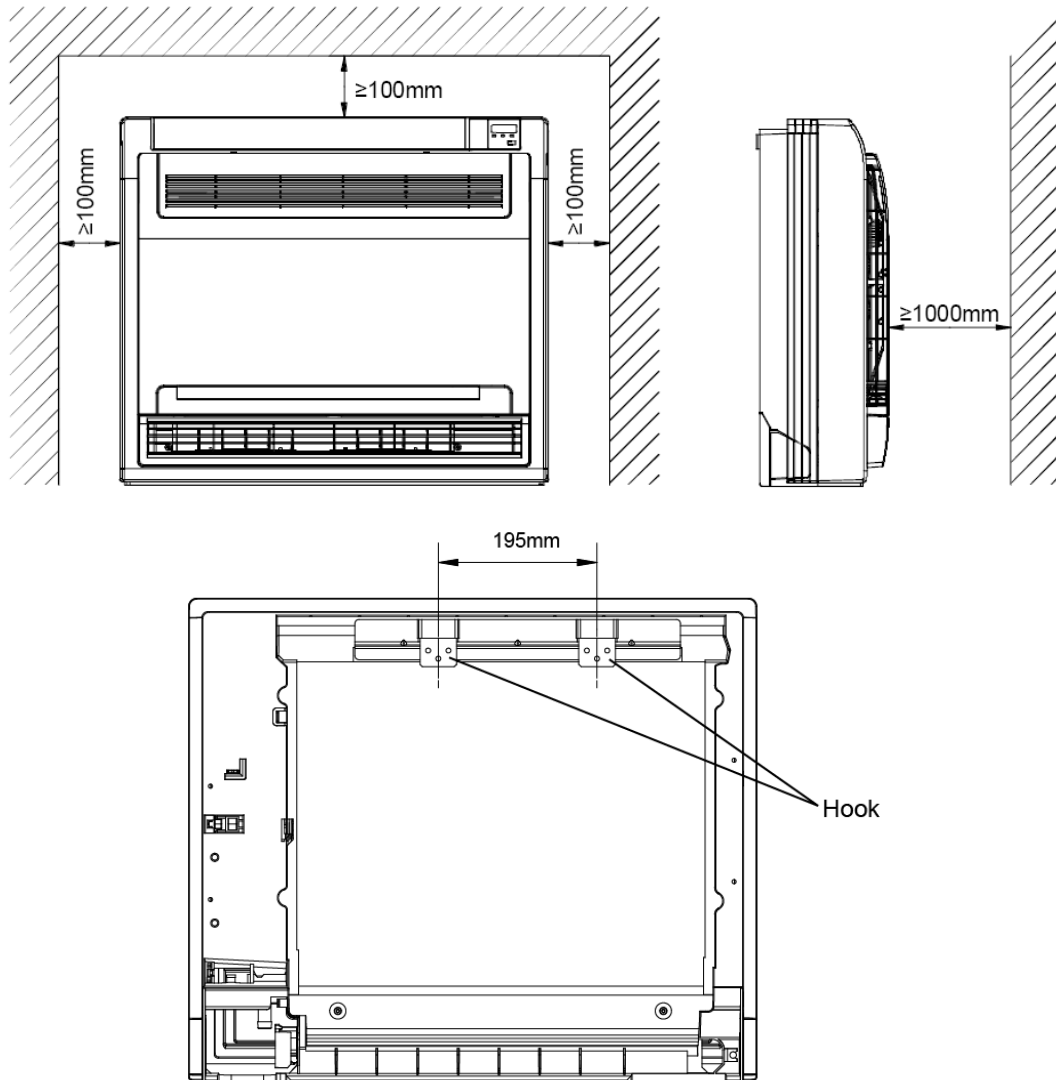
1.3 Notes before Installation

1. Select the correct carry-in path.
2. Move this unit as originally packaged as possible.
3. If the air conditioner is installed on a metal part of the building, it must be electrically insulated according to the relevant standards to electrical appliances.

2. Installation of Indoor Unit

2.1 Service Space

- The indoor unit should be installed in a location that meets the following requirements:
- There is enough room for installation and maintenance. (Refer to the following figure)

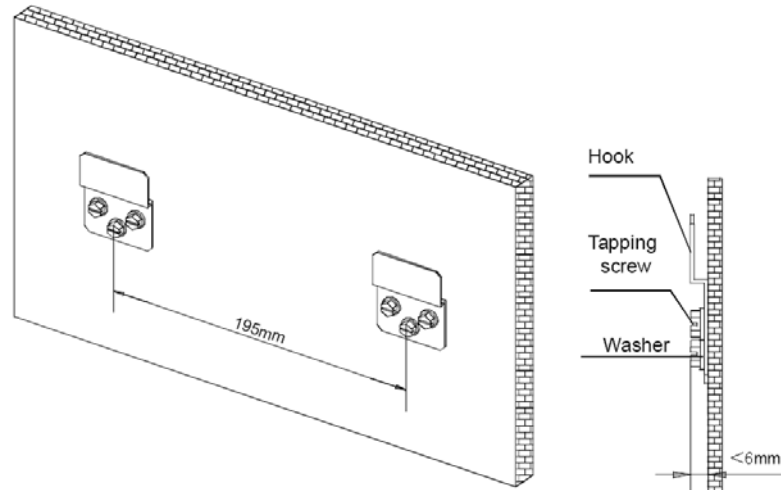


- The outlet and the inlet are not impeded, and the influence of external air is the least.
- The air flow can reach throughout the room.
- The connecting pipe and drainpipe could be extracted out easily.
- There is no direct radiation from heaters.

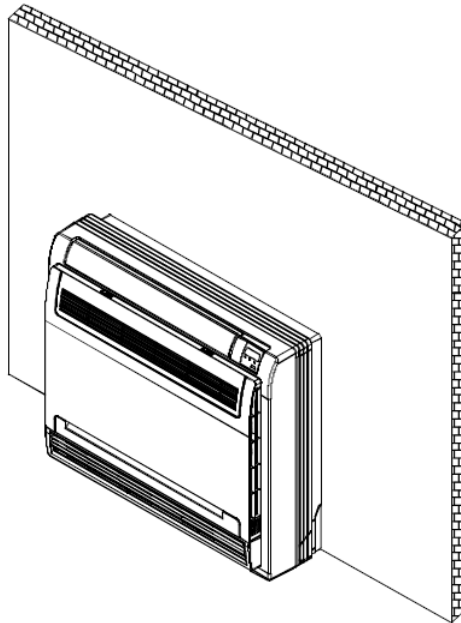
Caution: Keep indoor unit, outdoor unit, power supply wiring and transmission wiring at least 1 meter away from televisions and radios. This is to prevent image interference and noise in those electrical appliances. (Noise may be generated depending on the conditions under which the electric wave is generated, even if 1 meter is kept.)

2.2 Installation the main body

- Fix the hook with tapping screw onto the wall



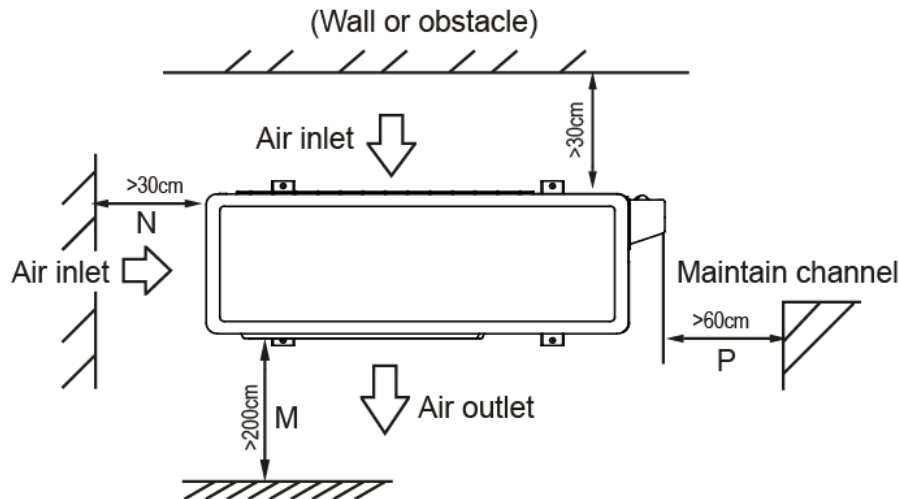
- Hang the indoor unit on the hook.
(The bottom of body can touch with floor or suspended, but the body must install vertically.)



3. Installation of outdoor unit

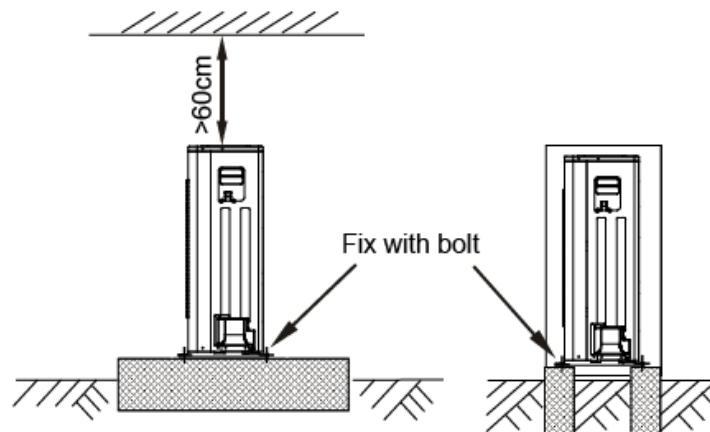
3.1 Necessary space for Installation and Maintenance

If possible, please remove the obstacles nearby to prevent the performance from being impeded by too little of air circulation. The minimum distance between the outdoor unit and obstacles described in the installation chart doesn't mean that the same is applicable to the situation of an airtight room. Leave open two of the three directions (M, N, P).



3.2 Moving and Installing

1. Since the gravity center of the unit is not at its physical center, so please be careful when lifting it with a sling.
2. Never hold the inlet of the outdoor unit to prevent it from deforming.
3. Do not touch the fan with hands or other objects.
4. Do not lean it more than 45°, and do not lay it sidelong.
5. Make concrete foundation according to the specifications of the outdoor units.
6. Fasten the feet of this unit with bolts firmly to prevent it from collapsing in case of earthquake or strong wind.



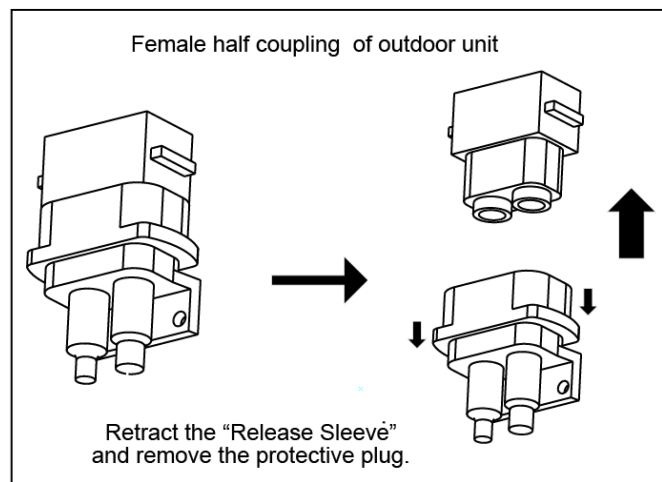
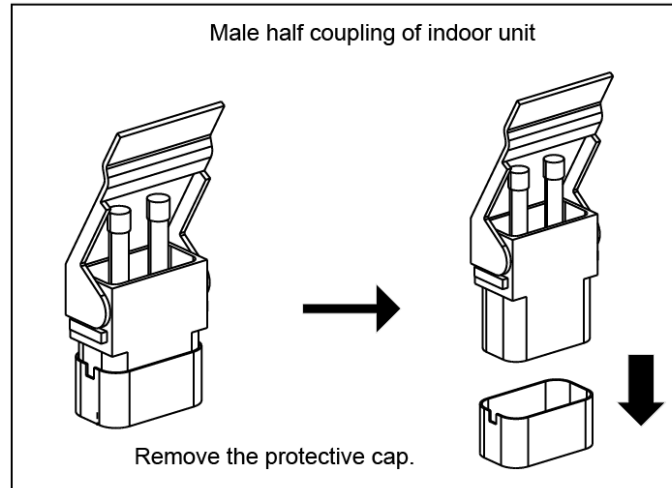
4. Installation of the Connecting Pipe

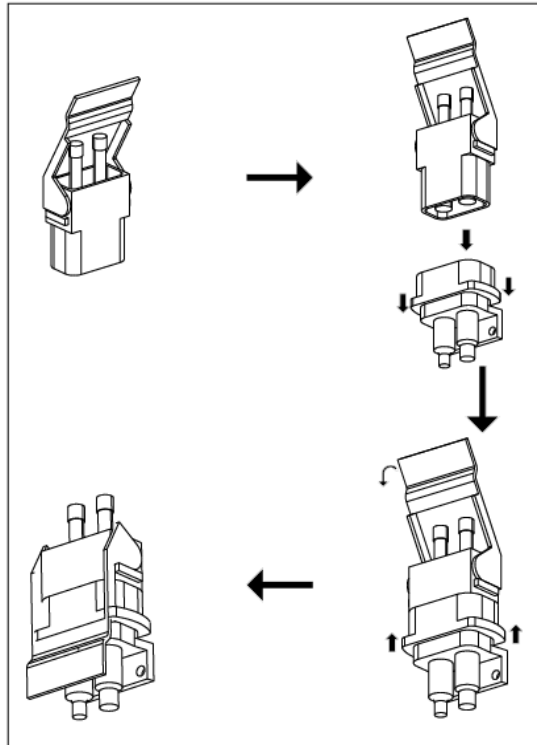
Caution:

For your safety, always wear safety eye wear and work gloves when connecting the pipes.

4.1 MFA-12HRN1-Q (Quick connector)

Remove the water tray before performing the connection.



To connect the couplings:

Step 1: Ensure that the handle on the male coupling is in a reclined position away from the mating male coupling.

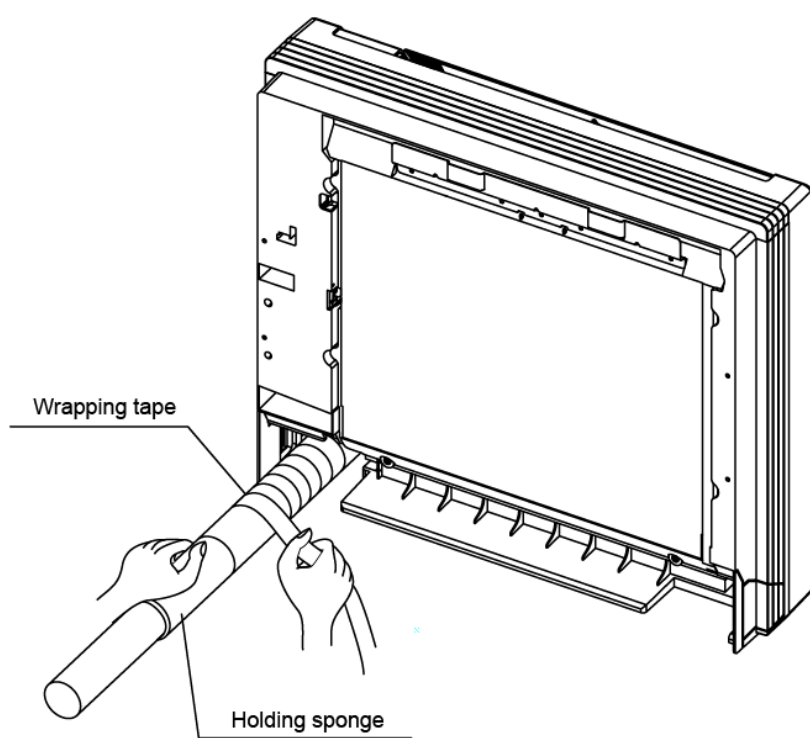
Step 2: Retract the “Release Sleeve” on female coupling, insert the male coupling located on the indoor unit into the female coupling.

Step 3: Release the “Release Sleeve” to lock the male coupling into place.

Step 4: Fold the male coupling handle towards the female coupling half and push until the handle seals behind the “Release Sleeve” and flat against the entire coupling assembly.

Frost proof processing

For prevent that the connect pipe produce frost to drip, you need to inhibit the holding sponge on the connect pipe of inside door, and then bundle it by wrapping tape.



4.2 MFA-12HRN1 and MFA-18HRN1

Check whether the height drop between the indoor unit and outdoor unit, the length of refrigerant pipe, and the number of the bends meet the following requirements:

Capacity(Btu/h)	12000	18000
The max. height drop	5m	10m
The length of refrigerant pipe	Less than 15m	Less than 20m
The number of bends	Less than 5	Less than 8

4.2.1 The Procedure of Connecting Pipes

Caution:

- All field piping must be provided by a licensed refrigeration technician and must comply with the relevant local and national codes.
- Do not let air, dust, or other impurities fall in the pipe system during the time of installation.
- The connecting pipe should not be installed until the indoor and outdoor units have been fixed already.
- Keep the connecting pipe dry, and do not let moisture in during installation.
- Execute heat insulation work completely on both sides of the gas piping and the liquid piping. Otherwise, this can sometimes result in water leakage.
 1. Drill a hole in the wall (suitable just for the size of the wall conduit), then set on the fittings such as the wall conduit and its cover.
 2. Bind the connecting pipe and the cables together tightly with binding tapes.
 3. Pass the bound connecting pipe through the wall conduct from outside. Be careful of the pipe allocation to do on damage to the tubing.
 4. Connect the pipes.
 5. Expel the air with a vacuum pump. Refer to "How to expel the air with a vacuum pump" for details.
 6. Open the stop valves of the outdoor unit to make the refrigerant pipe connecting the indoor unit with the outdoor unit in fluent flow.
 7. Check the leakage. Check all the joints with the leak detector or soap water.
 8. Cover the joints of the connecting pipe with the soundproof / insulating sheath (fittings), and bind it well with the tapes to prevent leakage.

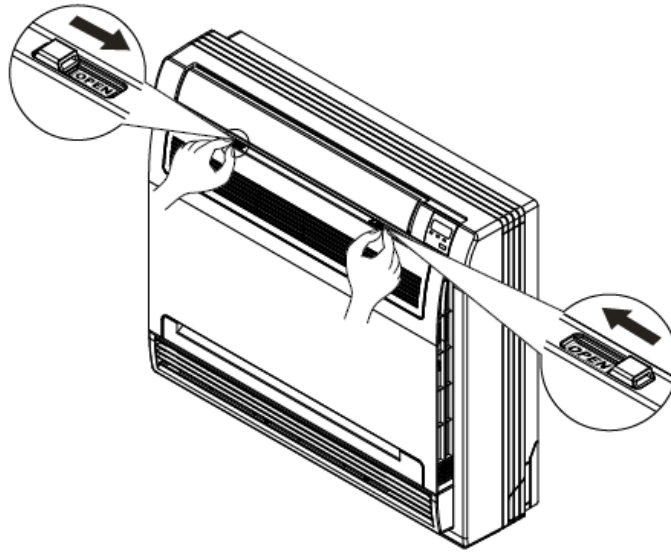
Caution:

- Be sure to with insulating materials cover all the exposed parts of the flare pipe joints and refrigerant pipe on the liquid-side and the gas-side. Ensure that there is no gap between them.
- Incomplete insulation may cause water condensation.

How to take indoor unit apart to connect the pipes

1. Open the front panel

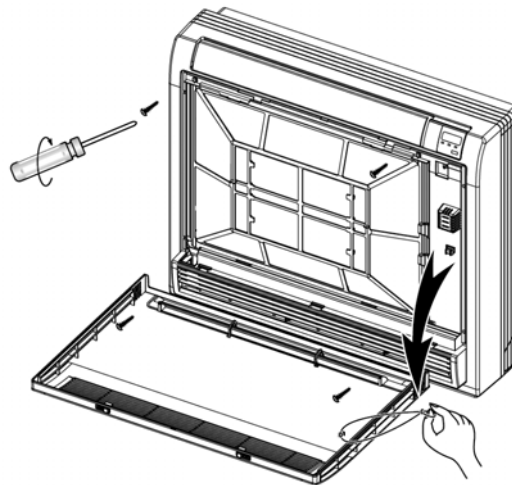
Slide the two stoppers on the left and right sides until they click.



2. Remove the front panel

Remove the string.

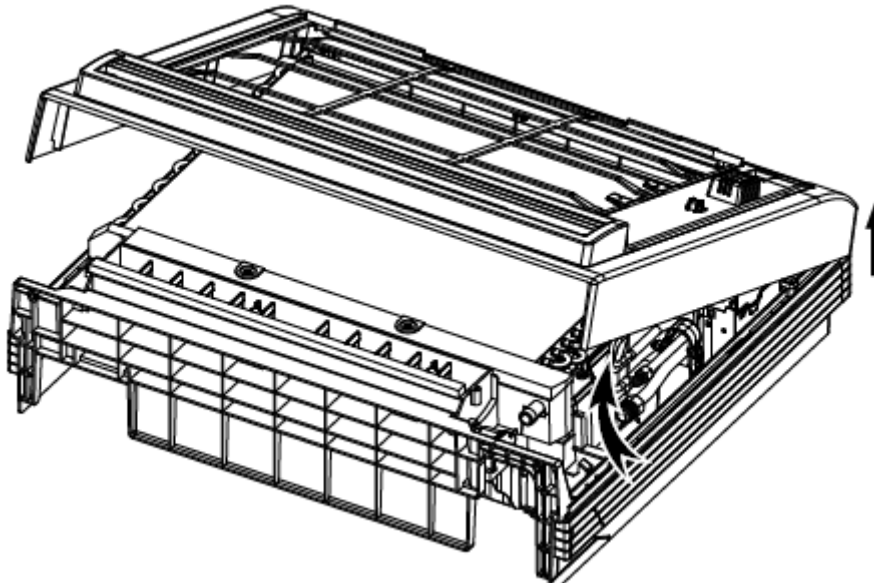
Allowing the front panel to fall forward will enable you to remove it.



3. Remove the face plate

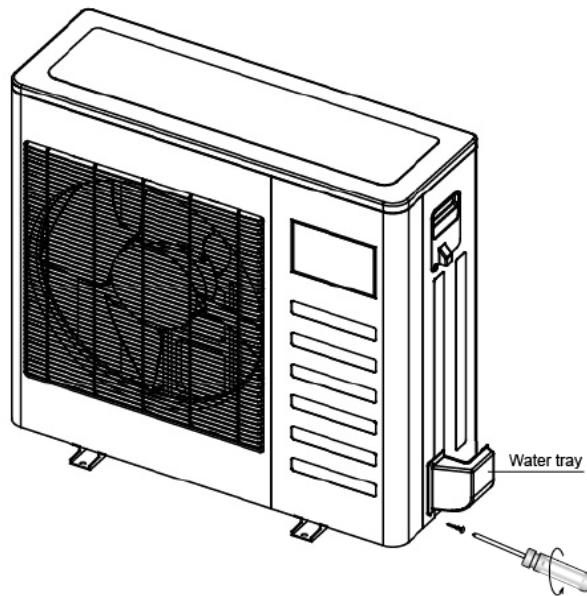
Remove the four screws.

Opening bottom of face plate for a angle that is 30 degree, then the top of face plate will be take up.



How to take outdoor unit apart to connect the pipes

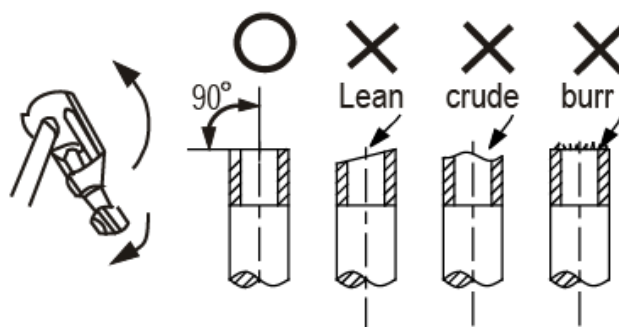
Remove the water tray



How to connect the pipes

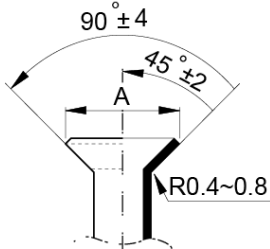
1. Flaring:

Cut a pipe with a pipe cutter.



Insert a flare nut into a pipe and flare the pipe.

Refer to the following table for the dimension of flare nut spaces.

Pipe gauge	Tightening torque	Flare dimension (A)		Flare shape
		Min	Max	
Φ6.4	15~16N.m (153~163kgf.cm)	8.3	8.7	
Φ9.5	25~26N.m (255~265 kgf.cm)	12.0	12.4	
Φ12.7	35~36 N.m (357~367 kgf.cm)	15.4	15.8	
Φ15.9	45~47 N.m (459~480 kgf.cm)	18.6	19.0	
Φ19.1	65~67 N.m (663~684 kgf.cm)	22.9	23.3	

2. Connect the indoor unit at first, then the outdoor unit.

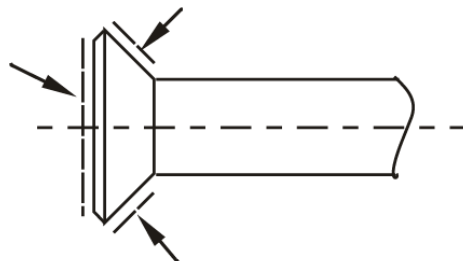
- Bend the tubing in proper way. Do not harm to them.

Bend the pipe with thumb

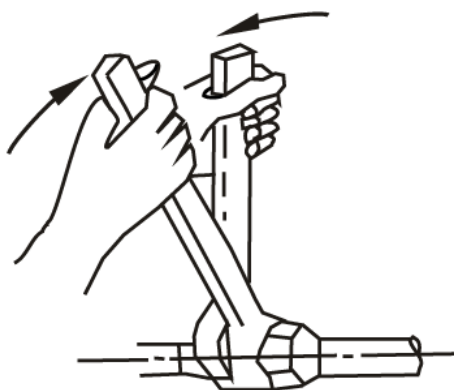


min-radius 100mm

- The bending angle should not exceed 90°.
- Bending position is preferably in the middle of the bendable pipe. The larger the bending radius the better it is.
- Do not bend the pipe more than three times.
- When connecting the flare nut, coat the flare both inside and outside with either oil or ester oil and initially tighten by hand 3 or 4 turns before tightening firmly.



- Be sure to use both spanner and torque wrench together when connecting or disconnecting pipes to the unit.



Caution:

- Too large torque will harm the bell mouting and too small will cause leakage.
- After the connecting work is finished, be sure to check that there is no gas leak.

How to expel the air with a vacuum pump

Stop valve operation introduction

1. Opening stop valve
 - 1) Remove the cap and turn the valve counter clock-wise with the hexagon wrench.
 - 2) Turn it until the shaft stops. Do not apply excessive force to the stop valve. Doing so may break the valve body, as the valve is not a backseat type. Always use the special tool.
 - 3) Make sure to tighten the cap securely.
2. Closing stop valve
 - 1) Remove the cap and turn the valve clockwise with the hexagon wrench.
 - 2) Securely tighten the valve until the shaft contacts the main body seal.

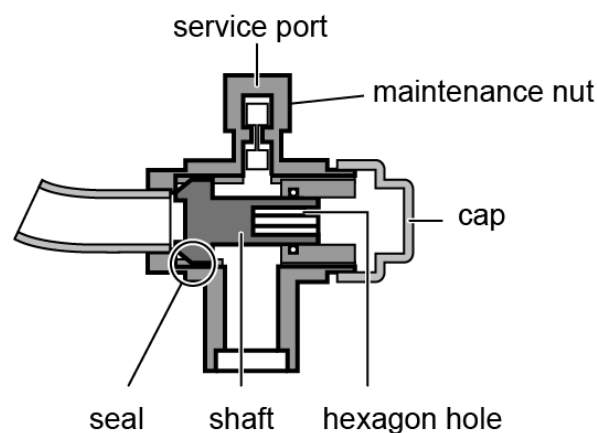
Make sure to tighten the cap securely.

For the tightening torque, refer to the table below.

Tightening torque N.M (Turn clockwise to close)			
Stop Valve size	Shaft (valve body)		Cap (Valve lid)
φ6.4	5.4~6.6	Hexagonal wrench 4 mm	13.5~16.5
φ9.5			18~22
φ12.7	8.1~9.9	Hexagonal wrench 6mm	23~27
φ15.9	13.5~16.5		36~44
φ22.2	27~33	Hexagonal wrench 10 mm	11.5~13.9
φ25.4			11.5~13.9

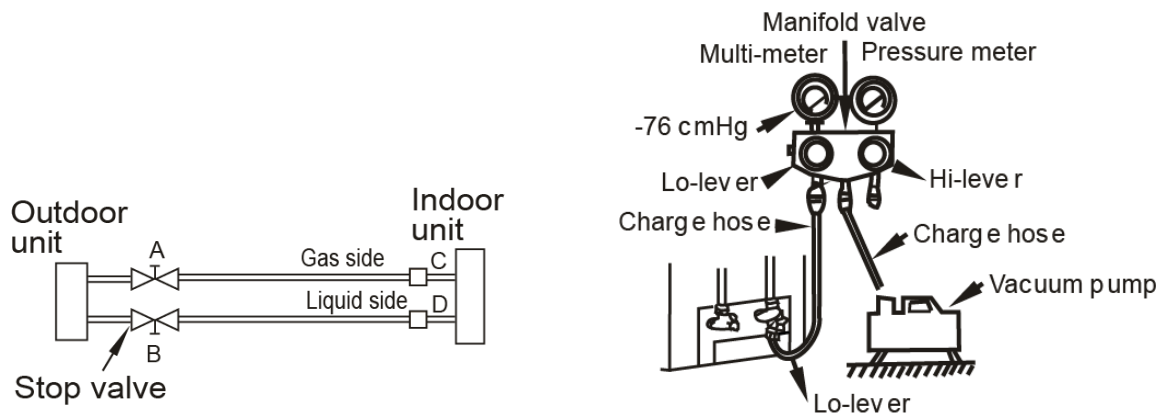
Caution:

- Always use a charge hose for service port connection.
- After tightening the cap, check that no refrigerant leaks are present



Using the vacuum pump

- 1) Loosen and remove the maintenance nuts of stop valves A and B, and connect the charge hose of the manifold valve to the service port of stop valve A. (Be sure that stop valves A and B are both closed)
- 2) Connect the joint of the charge hose with the vacuum pump.
- 3) Open the Lo-lever of the manifold valve completely.
- 4) Turn on the vacuum pump. At the beginning of pumping, loosen the maintenance nut of stop valve B a little to check whether the air comes in (the sound of the pump changes, and the indicator of compound meter turns below zero). Then fasten the maintenance nut.
- 5) When the pumping has finished, close the Lo-lever of the manifold valve completely and turn off the vacuum pump. Make pumping for 15 minutes or more and check that the compound meter indicates -76cmHg (-1×10^5 Pa)
- 6) Loosen and remove the cap of stop valves A and B to open stop valve A and B completely, then fasten the cap.
- 7) Disassemble the charge hose from the service port of stop valve A, and fasten the nut.



4.2.2 Additional Refrigerant Charge

Caution:

- Refrigerant cannot be charged until field wiring has been completed.
- Refrigerant may only be charged after performing the leak test and the vacuum pumping.
- When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.
- Charging with an unsuitable substance may cause explosions and accidents, so always ensure that the appropriate refrigerant is charged.
- Refrigerant containers shall be opened slowly.
- Always use protective gloves and protect your eyes when charging refrigerant.

The outdoor unit is factory charged with refrigerant. Calculate the added refrigerant according to the diameter and the length of the liquid side pipe of the outdoor unit/indoor unit connection.

R(g)	D(mm)	L(m)	
		Φ6.4	Φ9.5
Less than 5m (One-way)		—	—
Added refrigerant when over 5m (One-way)		11g/m×(L-5)	30g/m×(L-5)

R(g): Additional refrigerant to be charged

L(m): The length of the refrigerant pipe(one-way)

D(mm): Liquid side piping diameter

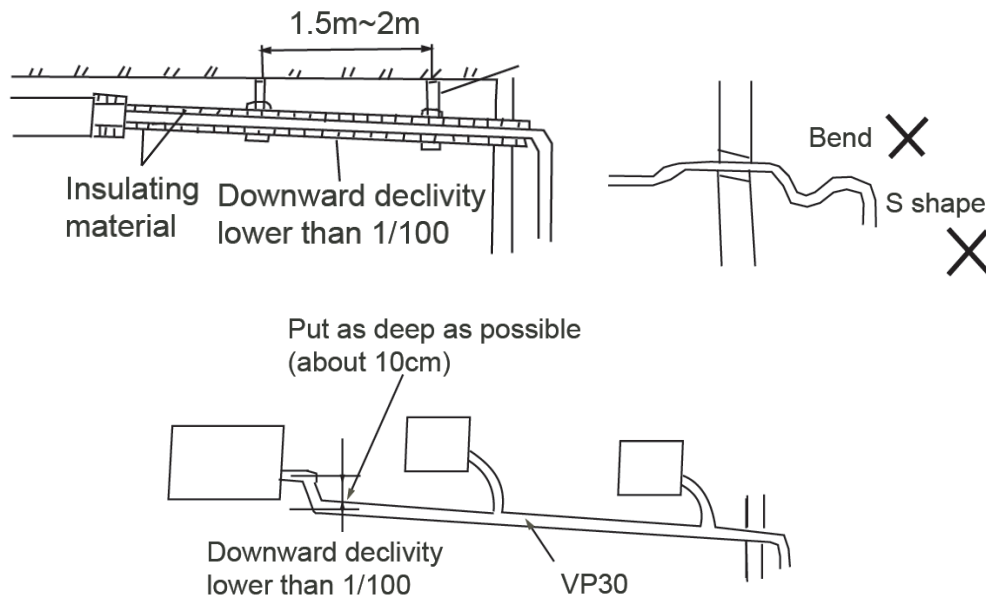
5. Connect the Drain Pipe

5.1 Install the drainpipe of the indoor unit

The outlet has PTI screw bread, Please use sealing materials and pipe sheath(fitting) when connecting PVC pipes.

Caution:

- 1) The drain pipe of indoor unit must be heat insulated, or it will condense dew, as well as the connections of the indoor unit.
- 2) Hard PVC binder must be used for pipe connection, and make sure there is no leakage.
- 3) With the connection part to the indoor unit, please be noted not to impose pressure on the side of indoor unit pipes.
- 4) When the declivity of the drain pipe downwards is over 1/100, there should not be any winding.
- 5) The total length of the drain pipe when pulled out transversely shall not exceed 20m, when the pipe is over long, a prop stand must be installed to prevent winding.
- 6) Refer to the figures on the right for the installation of the pipes.

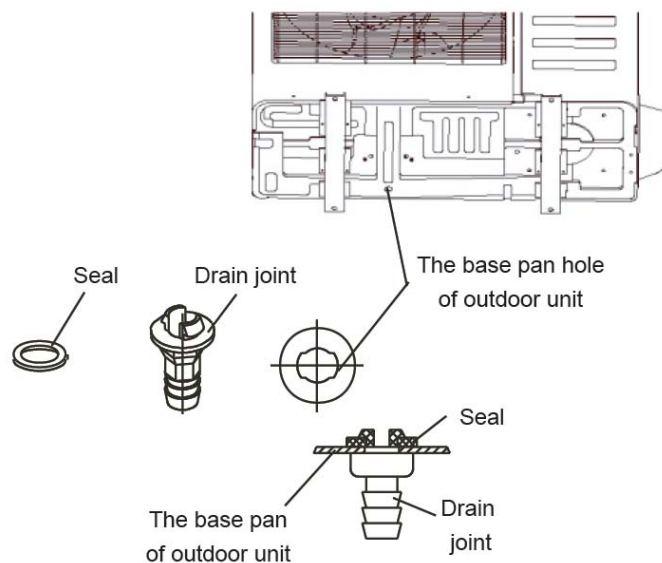


5.2 Drainage test

- 1) Check whether the drainpipe is unhindered.
- 2) New built house should have this test done before paving the ceiling.

5.3 Install the drain joint of the outdoor unit

Fit the seal into the drain elbow, then insert the drain elbow into the base pan hole of outdoor unit, rotate 90° to securely assemble them. Connect the drain elbow with an extension drain hose (Locally purchased), in case of the condensate draining off the outdoor unit during the heating mode. (Refer to below chart)



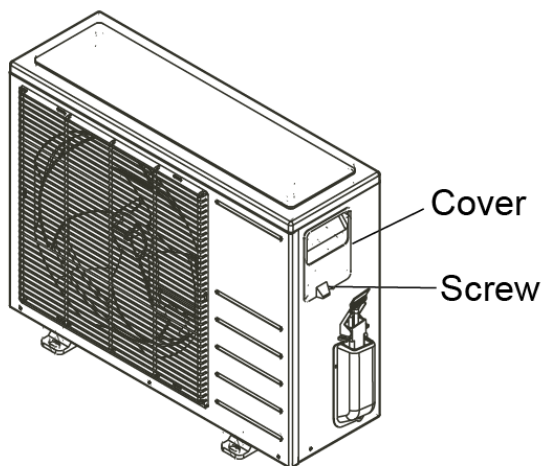
6. Wiring

6.1 MFA-12HRN1-Q (Quick connector)

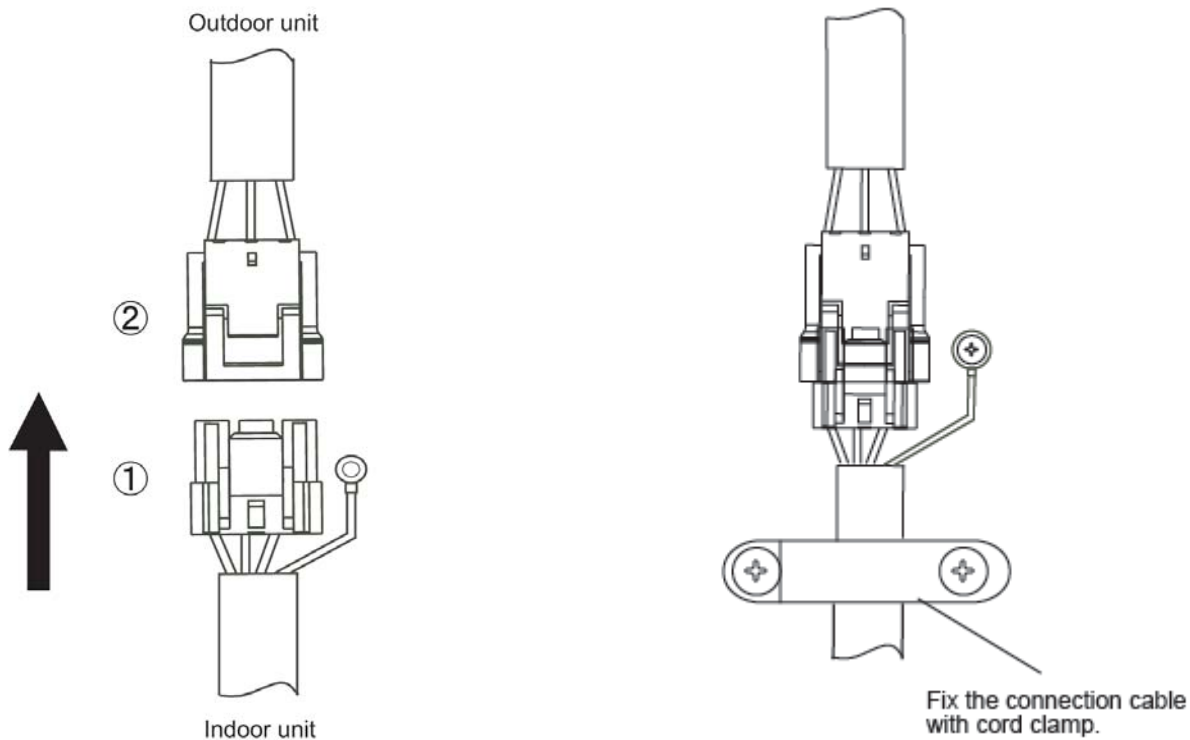
Attention:

Make sure the power supply has been cut off when inserting or pulling out the plug connectors.

- 1) The connection cables of indoor and outdoor units have been connected to the terminals on the control board.
- 2) Remove the control cover from the outdoor unit by loosening the screw.
- 3) Hold the indoor plug connector and insert the mating plug connector located on the outdoor unit until it fixed with a clicking sound. Secure the cable onto the control board with the cord clamp.
- 4) Connect the ground wire (yellow & green) reliably with sheet-metal by screws.
- 5) The electrical connection has finished now.



Connect the wire



Number	①	②
Area of the connecting wiring(mm ²)	4×1.5	3×1.5

6.2 MFA-12HRN1 and MFA-18HRN1

Caution:

- 1) The appliance shall be installed in accordance with national wiring regulations.
- 2) The air conditioner should use separate power supply with rated voltage.
- 3) The external power supply to the air conditioner should have ground wiring, which is linked to the ground wiring of the indoor and outdoor unit.
- 4) The wiring work should be done by qualified persons according to circuit drawing.
- 5) An all-pole disconnection device which has at least 3mm separation distance in all pole and a residual current device (RCD) with the rating of above 10mA shall be incorporated in the fixed wiring according to the national rule.
- 6) Be sure to locate the power wiring and the signal wiring well to avoid cross-disturbance.
- 7) Do not turn on the power until you have checked carefully after wiring.

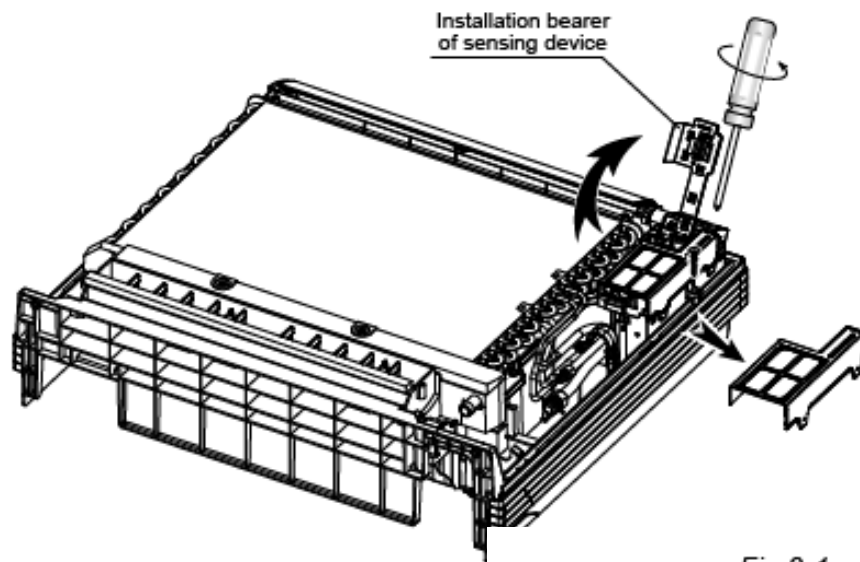
Remark per EMC Directive 89/336/EEC

For to prevent flicker impressions during the start of the compressor (technical process), following installation conditions do apply.

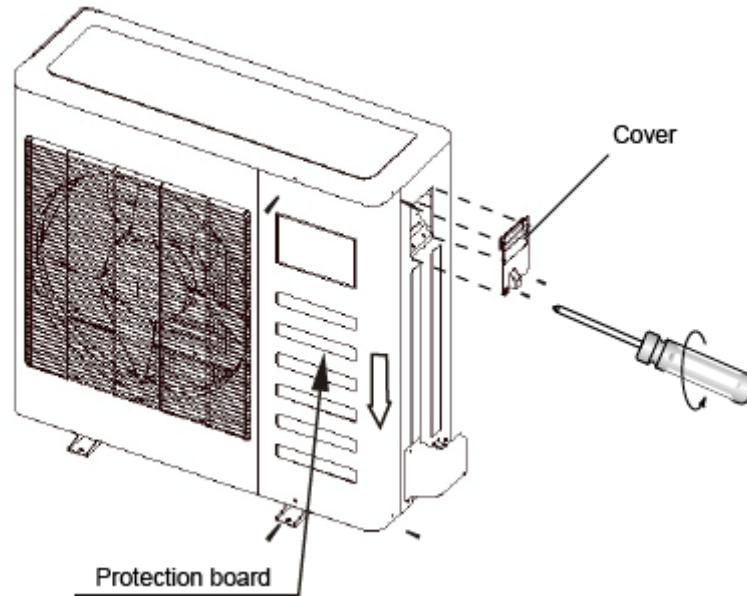
1. The power connection for the air conditioner has to be done at the main power distribution. The distribution has to be of a low impedance, normally the required impedance reaches at a 32 A fusing point.
2. No other equipment has to be connected with this power line.
3. For detailed installation acceptance please refer to your power supplier, if restrictions do apply for products like washing machines, air conditioners or electrical ovens.

6.2.1 Connect the cable

1. The installation bearer of sensing device rotated to another side, and then takes off cover of electrical box.



2. Disassemble the bolts from the cover. (If there isn't a cover on the outdoor unit, disassemble the bolts from the maintenance board, and pull it in the direction of the arrow to remove the protection board.)

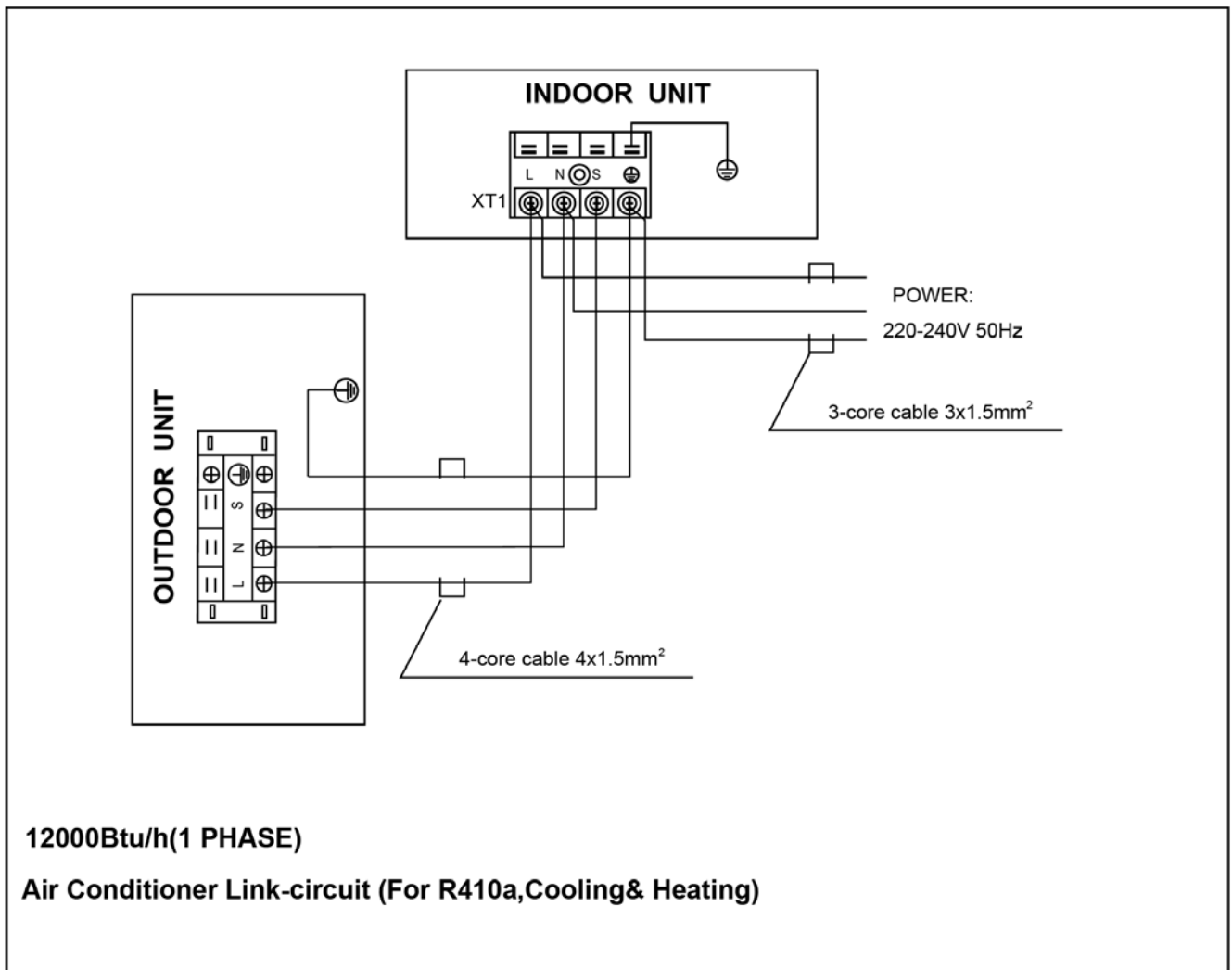
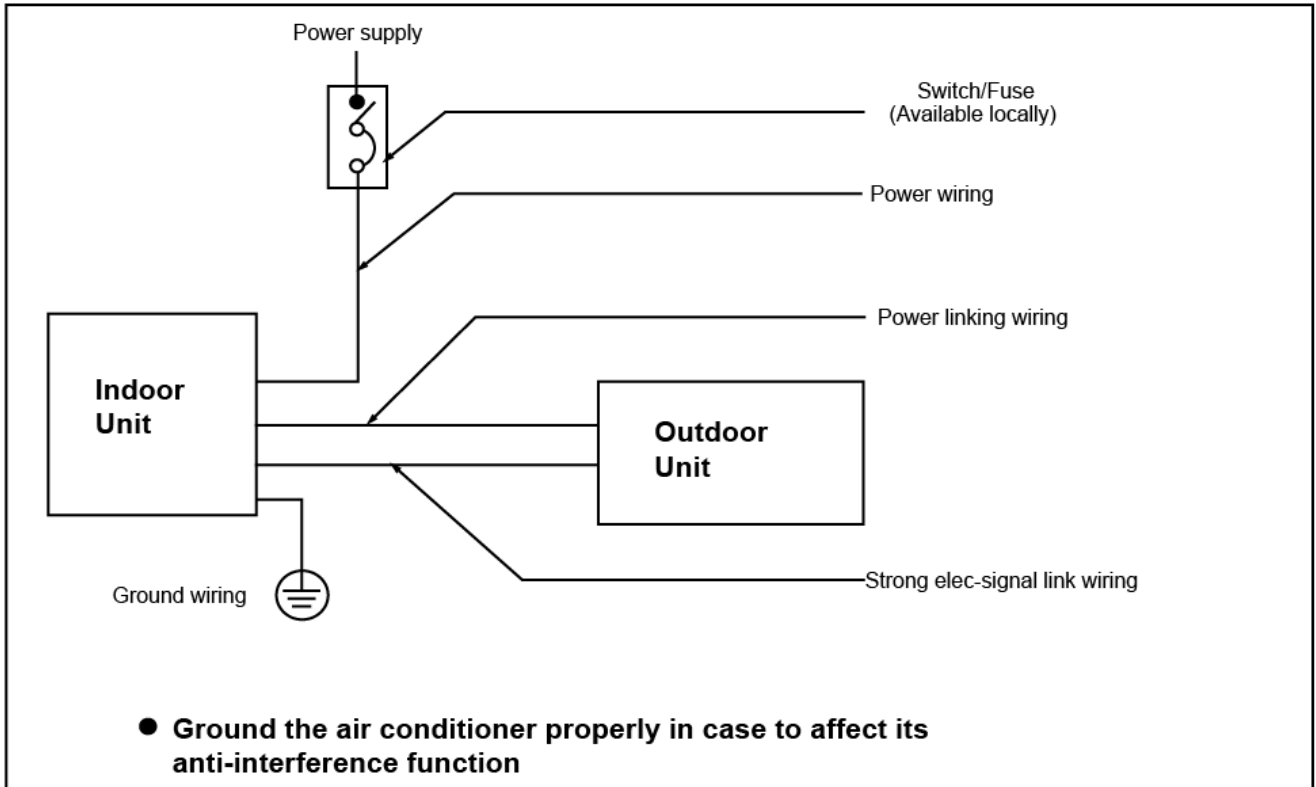


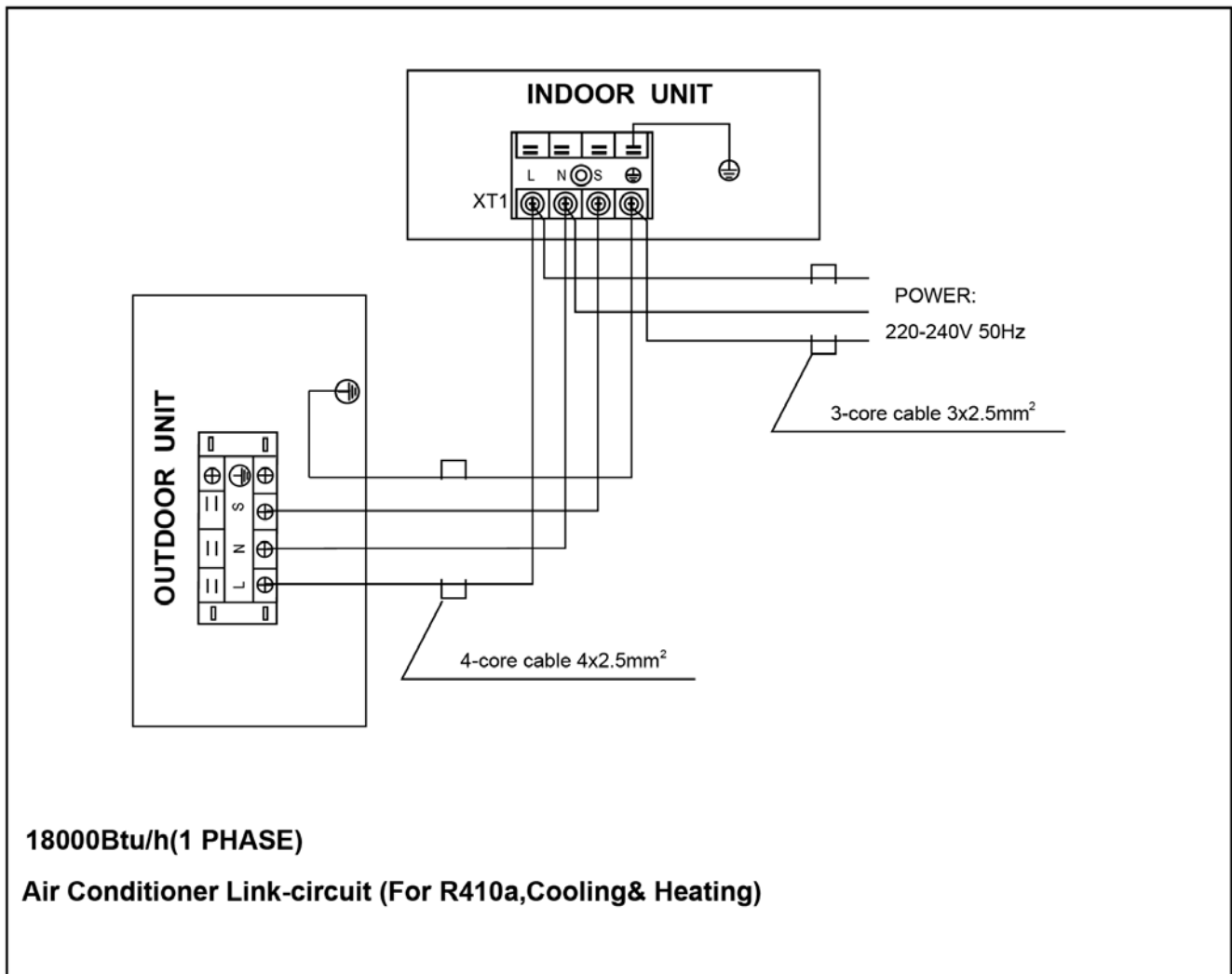
3. Connect the connective cables to the terminals as identified with their respective matched numbers on the terminal block of indoor and outdoor units.
4. Re-install the indoor unit and outdoor unit.

6.2.2 The Specification of Power

Type		12000Btu/h	18000Btu/h
Power	Phase	1-phase	1-phase
	Frequency and Voltage	220-240V, 50Hz	220-240V, 50Hz
Circuit Breaker/ Fuse (A)		20/16	20/16
Indoor Unit Power Wiring (mm ²)		3×1.5	3×2.5
Indoor/Outdoor Connecting Wiring (mm ²)	Ground Wiring	1.5	2.5
	Outdoor Unit Power Wiring	—————	—————
	Strong Electric Signal	4×1.5	4×2.5
	Weak Electric Signal	—————	—————

6.2.3 Wiring figure



**Note:**

All the pictures in this manual are for explanation purpose only. They may be slightly different from the air conditioner you purchased (depend on model).The actual shape shall prevail.

7. Test Operation

1. The test operation must be carried out after the entire installation has been completed.
2. Please confirm the following points before the test operation:
 - The indoor unit and outdoor unit are installed properly.
 - Tubing and wiring are correctly completed.
 - The refrigerant pipe system is leakage-checked.
 - The drainage is unimpeded.
 - The heating insulation works well.
 - The ground wiring is connected correctly.
 - The length of the tubing and the added stow capacity of the refrigerant have been recorded.
 - The power voltage fits the rated voltage of the air conditioner.
 - There is no obstacle at the outlet and inlet of the outdoor and indoor units.
 - The gas-side and liquid-side stop valves are both opened.
 - The air conditioner is pre-heated by turning on the power.
3. According to the user's requirement, install the remote controller frame where the remote controller's signal can reach the indoor unit smoothly.
4. Test operation

Set the air conditioner under the mode of "COOLING" with the remote controller, and check the following points. If there is any malfunction, please resolve it according to the chapter "Troubleshooting" in the "Owner's Manual".

- 1) The indoor unit
 - a. Whether the switch on the remote controller works well.
 - b. Whether the buttons on the remote controller works 10.well.
 - c. Whether the air flow louver moves normally.
 - d. Whether the room temperature is adjusted well.
 - e. Whether the indicator lights normally.
 - f. Whether the temporary buttons works well.
 - g. Whether the drainage is normal.
 - h. Whether there is vibration or abnormal noise during operation.
 - I. Whether the air conditioner heats well in the case of the HEATING/COOLING type.
- 2) The outdoor unit
 - a. Whether there is vibration or abnormal noise during operation.
 - b. Whether the generated wind, noise, or condensed of by the air conditioner have influenced your neighborhood.
 - c. Whether any of the refrigerant is leaked.

Caution:

A protection feature prevents the air conditioner from being activated for approximately 3 minutes when it is restarted immediately after shut off.

Part 5 Control

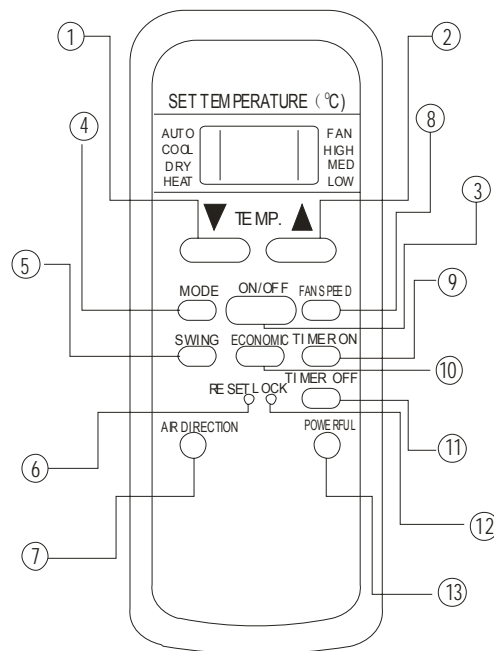
1. Wireless remote controller R51D/E57

1. Wireless remote controller R51D/E

1.1 Remote Controller Specifications

Model	R51D/E, R51D/CE
Rated Voltage	3.0V(Alkaline dry batteries LR03×2)
Lowest Voltage of CPU Emitting Signal	2.0V
Reaching Distance Signal Range	8m (when using 3.0 voltage, it Gets 11m)
Environment	-5°C~60°C

1.2 Introduction of Function Buttons on the Remote Controller



- TEMP Button ▼** : Press the button to decrease the indoor temperature setting.
- TEMP Button ▲** : Press the button to increase the indoor temperature setting.
- ON/OFF Button**: Push this button to start the unit operation. Push the button again to stop the unit operation.
- MODE Select Button**: Each time you push the button, a mode is selected in a sequence that goes from AUTO、COOL、DRY、HEAT and FAN, as the following figure indicates:



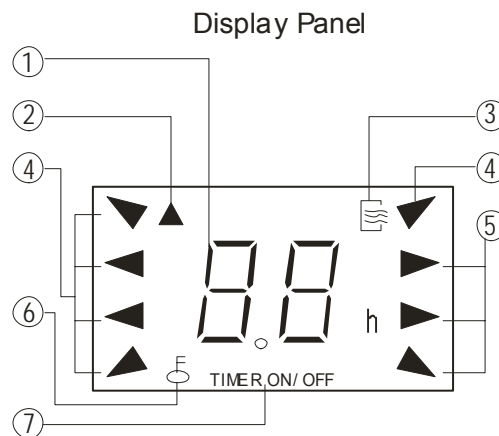
▲ NOTE: *HEAT only for Heat Pump*

- SWING Button**: Push this button, the louver would swing up and down automatically. Push again to stop it.
- RESET Button**: When the RESET button is pushed, all of the current settings are cancelled and the control will return to the initial settings.(Use a φ1mm little round stick to push the button)
- AIR DIRECTION Button**: Push this button, the louver can be fixed at a desired angle. The louver swing (upward or downward) to a certain angle for each press. When the louvers swing at an angle which would affect the cooling and heating efficiency of the air conditioner, it would automatically change the swing direction (upward or downward).
- FAN SPEED Button**: This button is used for setting Fan Speed in the sequence that goes from AUTO, LOW , MED to HIGH, then back to Auto.

9. **TIMER ON Button:** Press this button to preset the time ON (start to operate). Each press will increase the time ON setting in 30minutes increments. When the setting time displays 10:00, each press will increase the time ON setting in 60 minutes increments. To cancel the time ON program, simply adjust the time ON to 0:00.
10. **ECONOMIC RUNNING Button:** Press this button to go into the energy-Saving operation mode. Press the button again to cancel.
11. **TIMER OFF Button:** Press this button to preset the time OFF (turn off the operation). Each press will increase the time OFF setting in 30 minutes increments. When the setting time displays 10:00, each press will increase the time OFF setting in 60 minutes increments. To cancel the time OFF program, simply adjust the time OFF to 0:00
12. **LOCK Button:** Push this button to lock in all the current settings. To release settings, push again. (Use a $\phi 1\text{mm}$ little round stick to push this button)
13. **POWERFUL Button:** Press this button on cooling/heating mode to go into powerful cooling (heating operation). Press again to cancel it.

Note: The unit will automatically revert back to the previous operational mode after continuously operating under the powerful cooling mode.

1.3 Names and Functions of indicators on Remote Controller



1. **DIGITAL DISPLAY area:** This area will show the temperature and, if in the TIMER mode, will show the ON and OFF settings of the TIMER. It will automatically revert back to show the temperature after 5 seconds. Under "FAN" operation mode, nothing is shown in this area.
2. **TRANSMISSION Indicator:** This indicator flashes once when remote controller transmits signals to the indoor unit.
3. **ON/OFF Indicator:** This symbol appears when the unit is turned on by the remote controller, and disappears when the unit is turned off.
4. **OPERATION MODE Indicator:** Shows the current operation modes--"AUTO", "COOL", "DRY", "HEAT" and "FAN".HEAT only available for heat pump model.
5. **FAN SPEED Indicator:** Press the FAN SPEED button to select the desired fan speed setting (Auto-Low-Med-High). Your selection will be displayed in the LCD window except the Auto fan speed.
6. **LOCK Indicator:** This symbol appears when press the LOCK button, and disappears when presses it again.
7. **TIMER ON/OFF Display:** This display area shows the settings of TIMER. That is, if only the starting time of operation is set, it will display the TIMER ON. If only the turning off time of operation is set, it will display the TIMER OFF. If both operations are set, it will show TIMER ON/ OFF which indicates you have chosen to set both the starting time and off time.