R410A 50Hz Top-discharge Outdoor Series

Service Manual

2018 Version

LCAC/201806

Content

R410A 50Hz Top-discharge Outdoor series

Part 1 General Information

1. Indoor unit

2. outdoor unit

2. Model Names of Indoor/Outdoor Units

2.2 Outdoor Units

Model name	Dimension (W×D×H) (mm)	Net/Gross weight (kg)	Power supply
CTVCN036E	554×554×633	57/59.7	380~415v/3Ph/50Hz
CTVCN048E	740×740×835	89/94	380~415v/3Ph/50Hz
CTVCN060E	740×740×835	92.5/98	380~415v/3Ph/50Hz

3. External Appearance

3.1 Indoor Units

4-way Cassette	Round flow Cassette
	
ceiling& Floor	**ceiling& Floor**
Duct Type	
	

3.2 Outdoor units

 36kBtu/h	 48~60kBtu/h

4. Features

4.1 High quality coils

The coil is constructed of advanced inner grooved copper tube and aluminum fins.

4.2 Low operation sound level: Well-known stable and quiet running fan motor.

3. Well-known compressor, Sanyo & Hitachi.
4. Compact design: Smaller dimension and larger stuffing capacity.
5. Universal outdoor unit design.

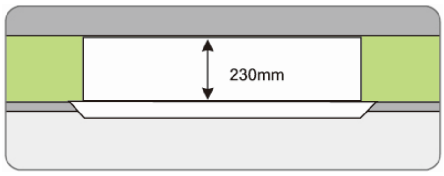
Part 2 Indoor Units

1. Cassette Type (Standard)

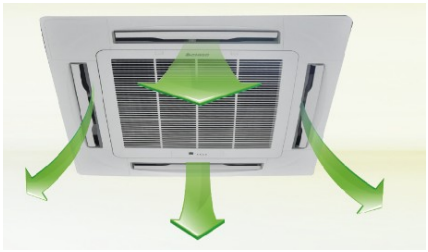
1.Features

1. Brand-new panel design
   Simple, featly and voguish appearance suit for different requirements, it's mostly used for office, shopping center, restaurant, meeting room and etc.
   Round-flow cassette, cold air can reaching each coner of the room.
   18kBtu, compact type, 650mm*650mm
   18kBtu~60kBtu, standard type, 950mm*950mm

2. Ultra-thin body design, the min. height is only 230mm, save installation space.

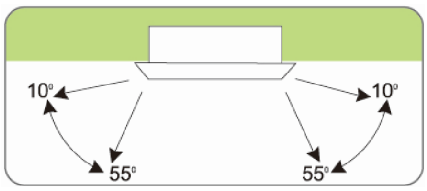


3.4-way air flow, cold air can reach each corner of the room, providing a stable and comfortable environment.

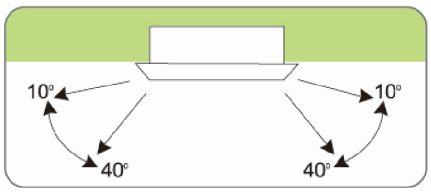


4.Intelligentauto-swing function, three modes for choice.

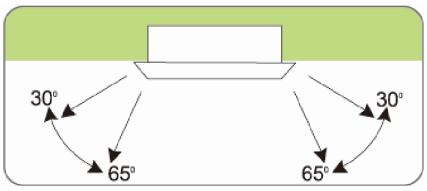
Standard mode



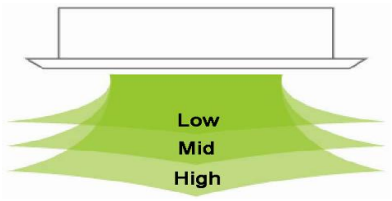
Anti-point blow mode



Ceiling against mode

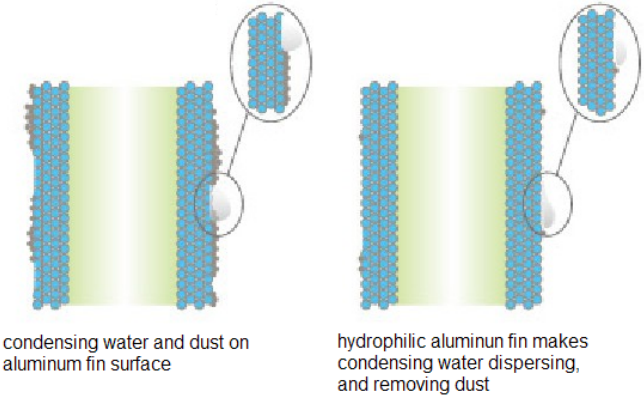


5. 3 fan speed， meet for different requirement.

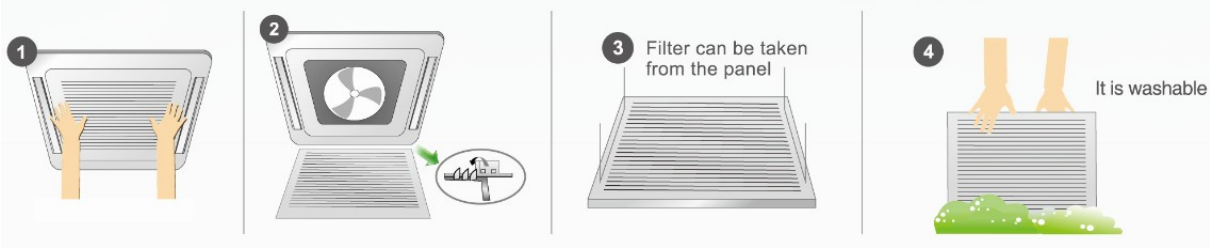


⑹New streamlined fan design.

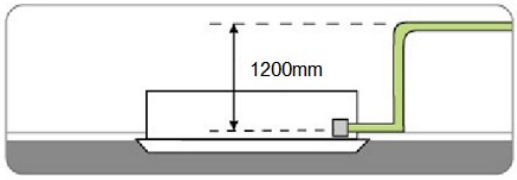
⑺ Energy saving and healthy, adopting hydrophilic aluminum fins increasing heat-exchange efficiency.



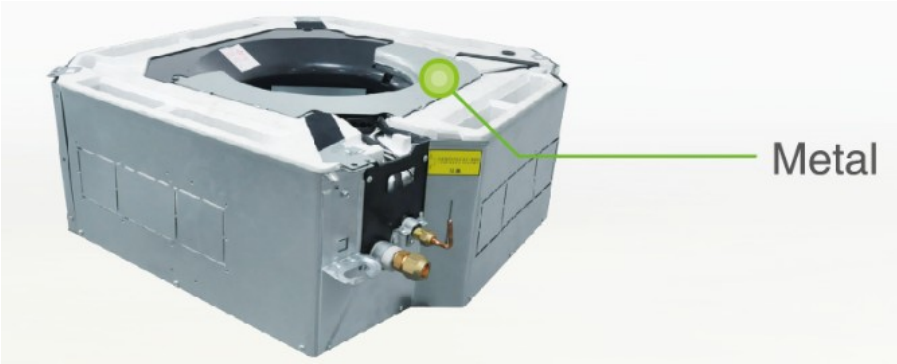
⑻ Easy and convenient installation and maintenance, washable filter design.



⑼ Built-in water pump, water head up to 1200mm (Compact type, 700mm).



⑽ Fire resistance design, the E-box with galvanized steel built-in body easy for maintenance.

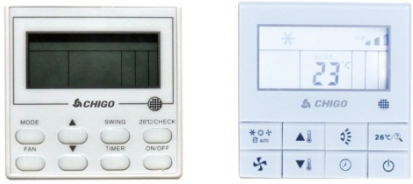


⑾Add 4 interfaces in body, can be connected with duct to another room.Fresh air makes air quality more healthy and comfortable.

⑿ Multi protection and auto-restart function.

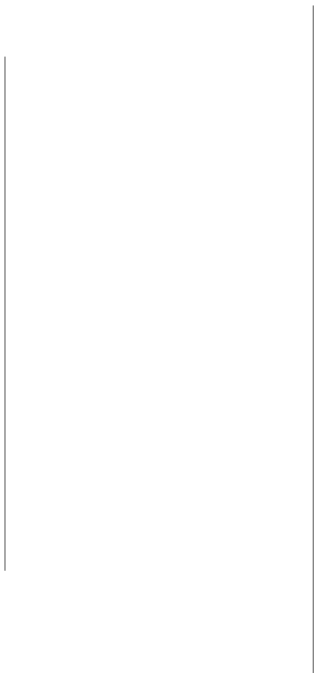
⒀ Standard for wireless controller; option for wired controller.

Standard



optional

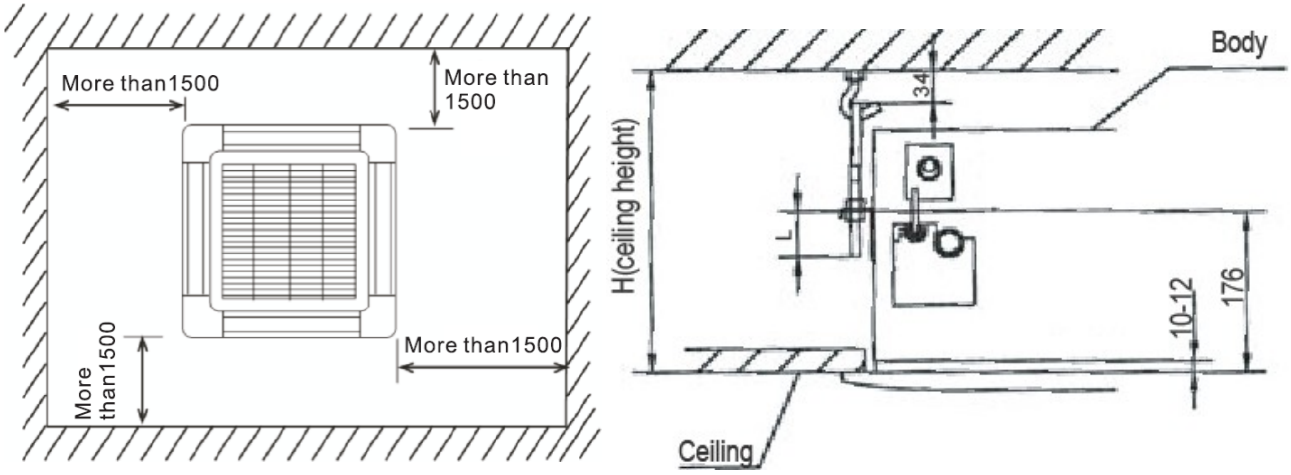
2. Specifications



4. Service Space

The indoor unit should be installed in a location that meets the following requirements:

- There is enough room for installation and maintenance.
- The ceiling is horizontal, and its structure can endure the weight of the indoor unit.
- 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.



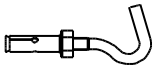
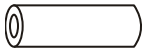
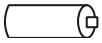
5. Wiring Diagrams

6. Capacity Tables

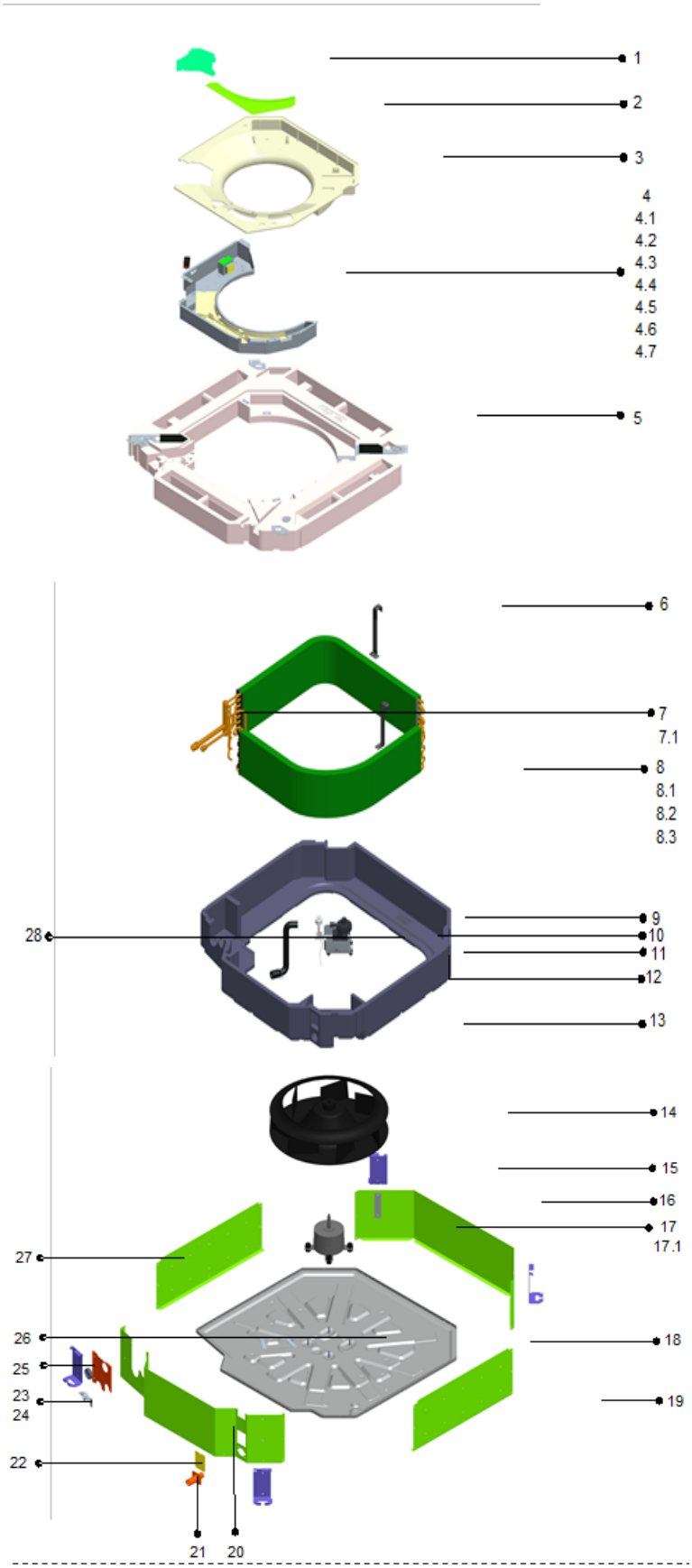
6.1 Cooling Capacity

7. Electric Characteristics

9. Accessories

	Name	Shape	Quantity
Installation Fittings	1. Expansible hook		4
	2. Installation hook		4
	3. Installation paper board		1
	4. Bolt M5		4
Tubing & Fittings	5. Connecting pipe group		1
	6. Binding tape		1
	7.Soundproof/insulation sheath		2
Drainpipe Fittings	8. Out-let pipe sheath		1
	10. Tightening band		5
Protect Pipe Fittings	13. Wall conduit		1
	14. Wall conduit cover		1
Remote controller	15. Remote controller		1
	16. Mounting screw(ST2.9×10-C-H)		2
	17. Alkaline dry batteries (AM4)		2

10. Exploded View

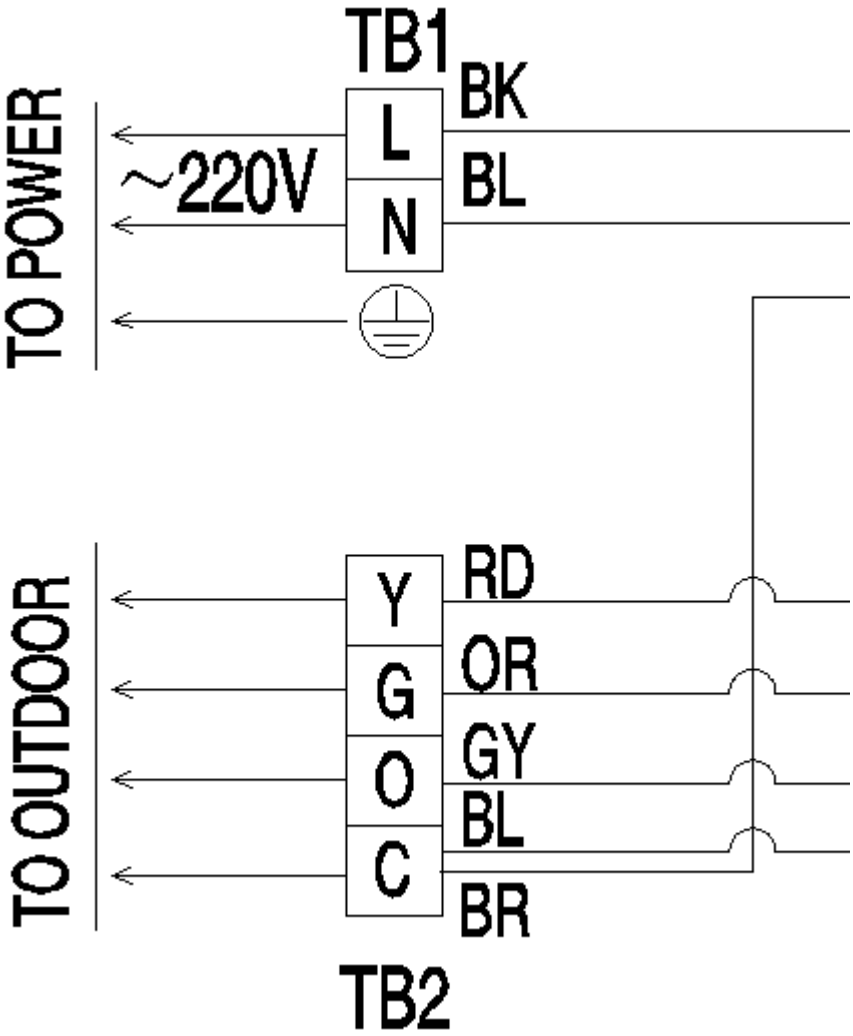


No.	Part Name	Quantity	No.	Part Name	Quantity

1	Warning panel	1	8.3.4	Instalation tube for probe	1
2	Circuit diagram panel	1	9	Water pump	1
3	Small wind inlet guide	1	10	Liquid-level sensor	1
4	E-parts components	1	11	Water pump fan motor holder	1
4.1	E-parts box welding assy	1	12	Underlay for water pump support	3
4.2	No.3 groove clamp	1	13	Upper foam	1
4.3	(ROHS)Transformer	1	14	Centrifugal fan	1
4.4	Fan motor capacitor	1	15	Hanger	4
4.5	Terminal (DJ-75W-3PA)	1	16	Rear brattice	1
4.6	Terminal (DJ-75W-5PA)	1	17	Fan motor for indoor unit (YDK-55T-6)	1
4.7	Electric control board for indoor unit	1	17.1	Fan motor foot underlay	1
4.8	E-parts box	1	18	Chassis assy	1
5	Water pan assy	1	19	Right clapboard	1
6	Auxiliary fixing board for evaporator	2	20	Front brattice	1
7	Main fixing board assy	1	21	Discharge pipe joint	1
7.1	Main fixing board for evaporator	1	22	Side maintenance board for water pump	1
8	Evaporator components	1	23	Lower clamp	1
8.1	Rubber insulating pipe	1	24	Upper clamp	1
8.2	Insulating pipe	1	25	Valve panel	1
8.3	Welding parts for evaporator	1	26	Wire board	2
8.3.1	Collecting pipe assy for evaporator	1	27	Left clapboard	1
8.3.2	Distributing pipe assy for evaporator	1	28	Water outlet pipe	1
8.3.3	Evaporator	1			

11. The Specification of Power

Heating & cooling


TB1
TO POWER
~220V
L
N
BK
BL
TO OUTDOOR
Y
G
O
C
RD
OR
GY
BL
BR
TB2

13. Troubleshooting

Fault Code Table

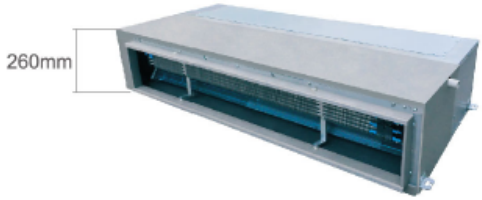
No.	Type	Content	LED Flashing	Remark
1	Fault	Room temperature sensor fault	Timing lamp flashing/5Hz	Automatic recovery after the problem resolved
2	Fault	Indoor coil temperature sensor fault	Running lamp flashing/5Hz	
3	Fault	Outdoor coil temperature sensor fault	Defrosting lamp flashing/5Hz	
4	Fault	Water full protection	Alarm lamp flashing/5Hz	
5	Fault	Outdoor protection	Defrosting lamp and Alarm lamp both flashing/5Hz	
6	Fault	Communication fault	Running lamp and Defrosting lamp both flashing/5Hz	Manual eliminate
7	Fault	EEPROM communication fault	Running lamp and Timing lamp both flashing/5Hz	Recovery after interruption of power supply
8	Indication	Enforced cooling	Running lamp and Alarm lamp both flashing/5Hz	
9	Indication	Anti- cool air in heating mode	Defrosting preheat lamp ON	
10	Indication	Defrosting	Defrosting preheat lamp ON	

3.Duct Type

Middle Static Pressure-Duct Type

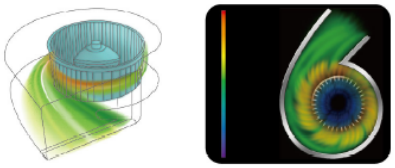
1. Features:

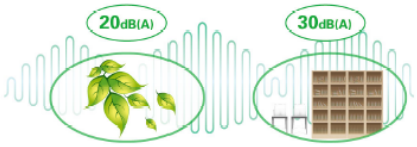
1.Ultra-thin body design.



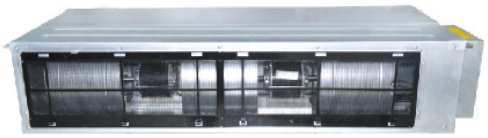
Medium ESP Type

2.Adopting aviation centrifugal fans,and CFD technology design,increasing air-volume and decreasing noise level.





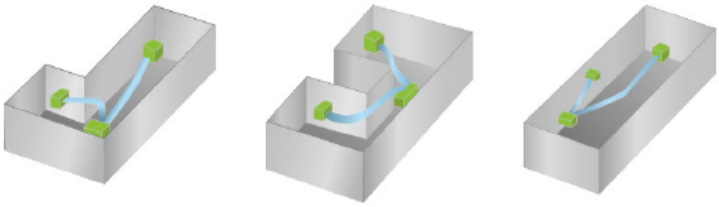
3. Filter can be taken out easily for clean maintenance.



4. Body-side is E-box,convenient for installation and maintenance.

5.Three fan speed,meeting different requirements.

6.30Pa ESP design,duct connected installation meeting different room structure.



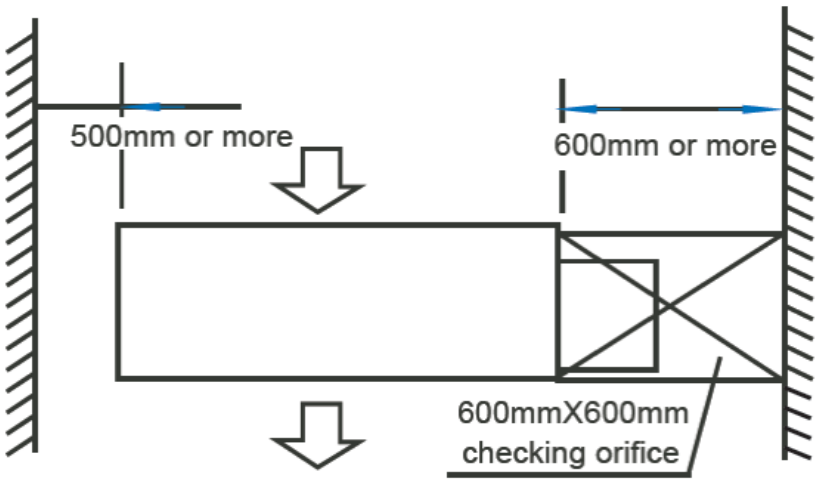
4. Multi protection and auto-restart function.

2. Specifications

3.Dimensions

4.Service Space

Ensure enough space required for installation and maintenance.



There is enough space for installation and maintenance. The ceiling is horizontal, and its structure can endure the weight of the indoor unit. 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 heater.

5. Wiring Diagrams

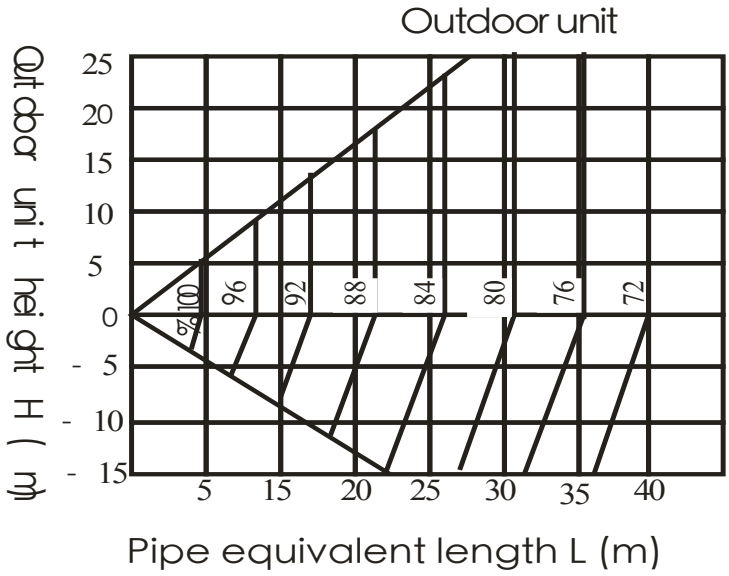
6. Capacity Tables

6.1 Cooling Capacity

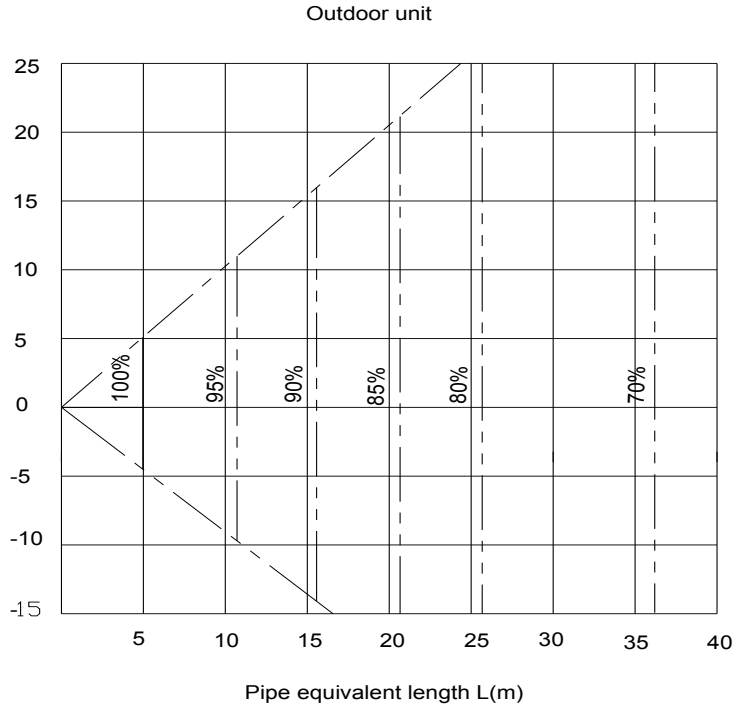
7. Capacity Correction Factors

7.1 Correction factor of the length and elevation difference of refrigerant pipe

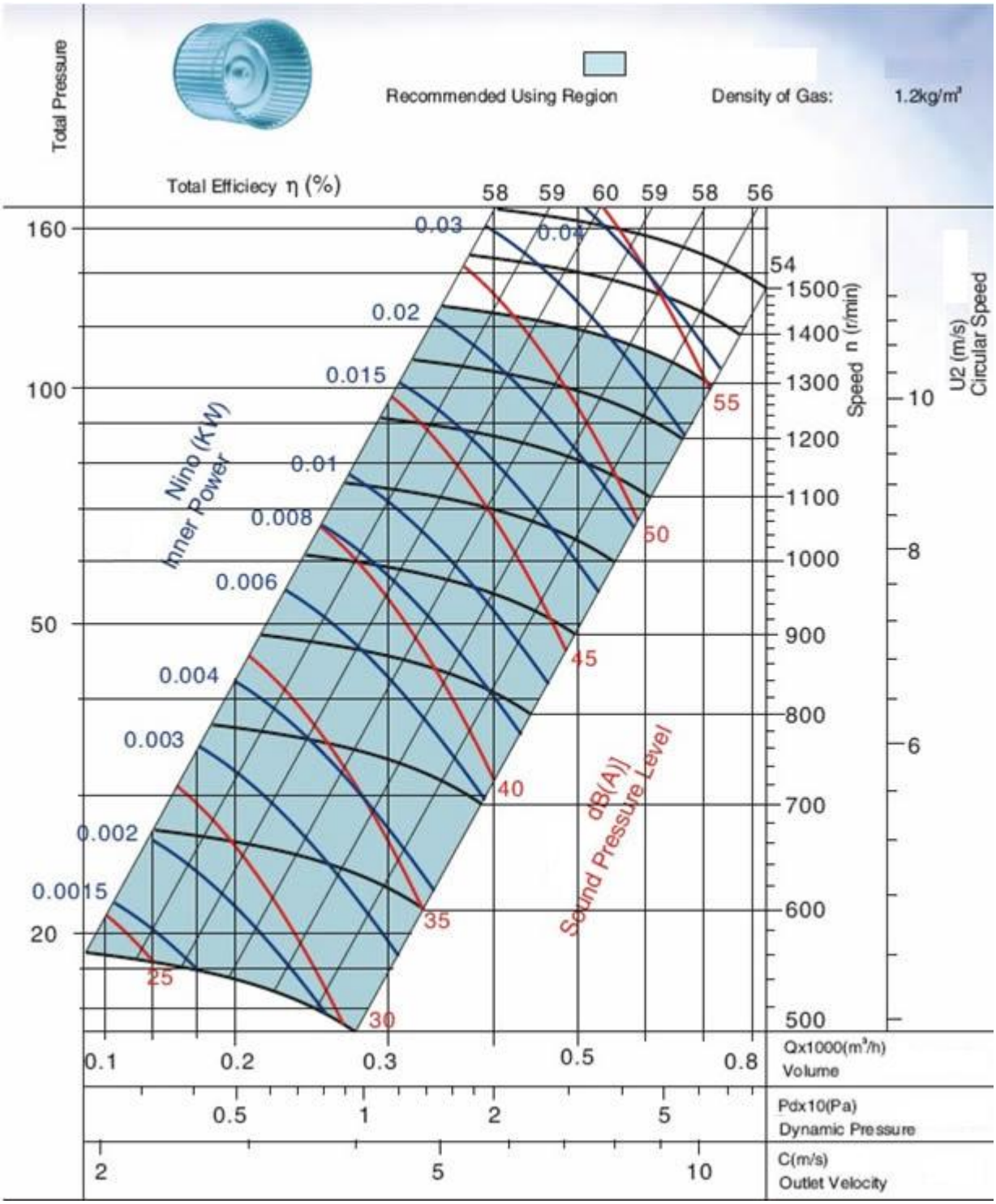
1. Rate of change in cooling capacity



2. Rate of change in heating capacity

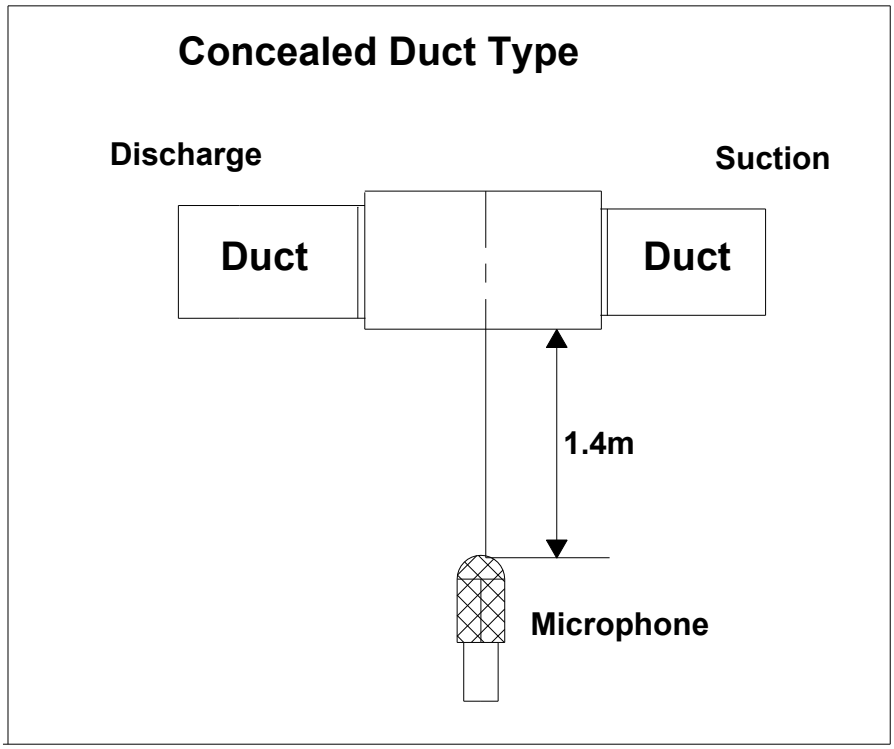


8. Static Pressure



9. Electric Characteristics

10. Sound Levels



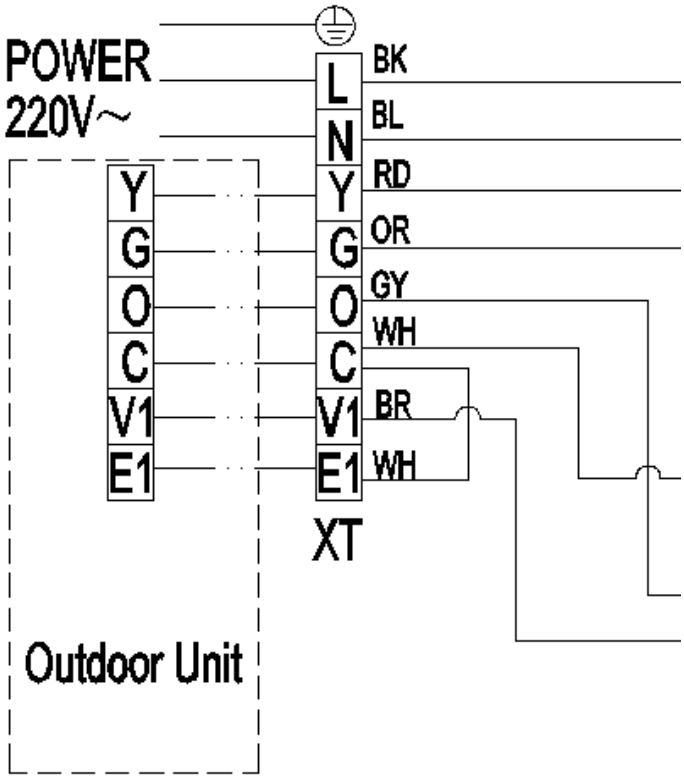
11. Accessories

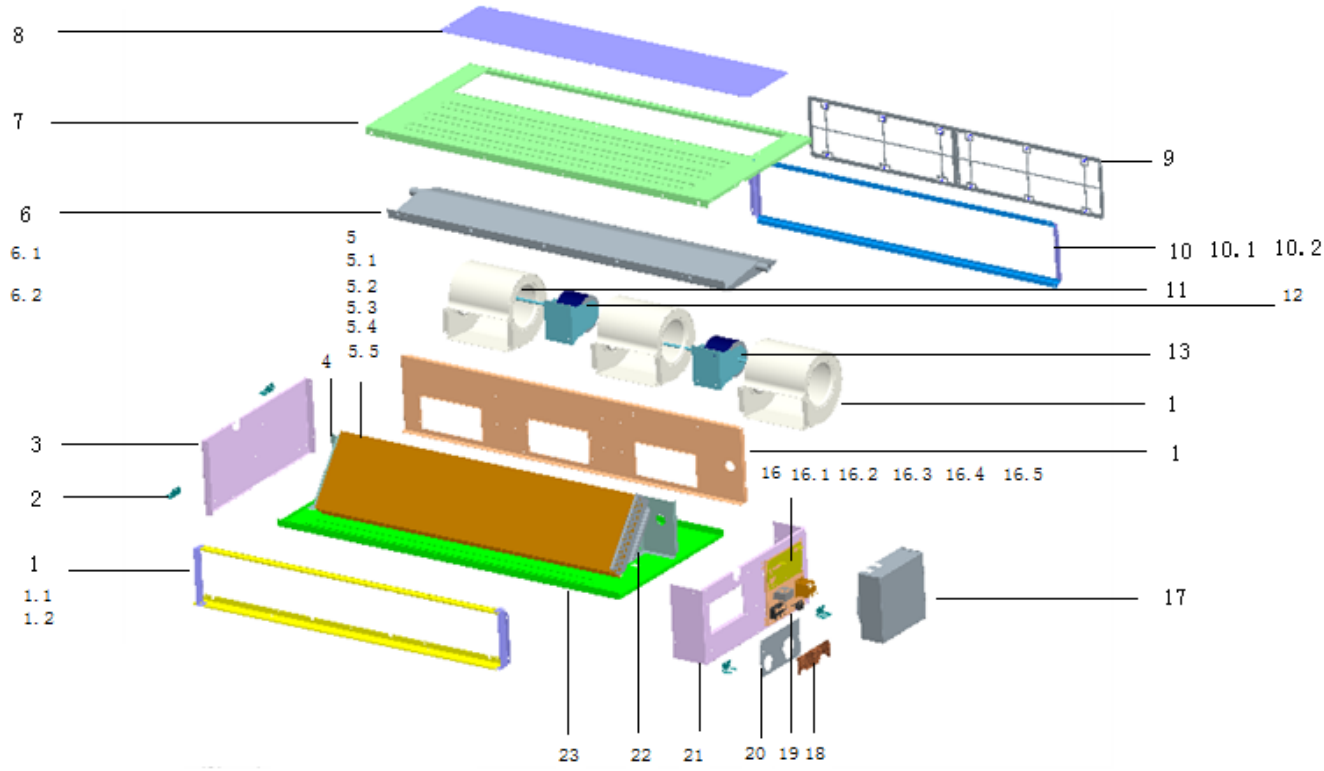
	Name	Shape	Quantity
Tubing & Fittings	Soundproof/insulation sheath		2
	Binding tape		1
	Seal sponge		1
Drainpipe Fittings	Seal ring		1
Controller	Wire controller		1
	Remote controller		1
others	Operation & installation instruction manual		1

12. The Specification of Power

MODEL (For R22,Cooling only)		CTB-36HR1	CTB-48HR1	CTB-60HR1
Power	Phase	1-phase	1-phase	1-phase
	Frequency and Voltage	208-230V, 50Hz	208-230V, 50Hz	208-230V, 50Hz
Circuit Breaker/ Fuse (A)		35/30	40/30	40/30
Indoor Unit Power Wiring (mm^2)		3x1.0	3x1.0	3x1.0
Indoor/Outdoor Connecting Wiring (mm^2)	Ground Wiring	0.75	0.75	0.75
	Outdoor Unit Power Wiring	5×1.5	5x2.5	5x2.5
	Strong Electric Signal	———	———	———
	Weak Electric Signal	6×0.75	6×0.75	60.75

13. Field Wiring





No.	Part Name	Quantity	No.	Part Name	Quantity
1	outlet assy	1	10.2	return air left-right rail	2
1.1	outlet left-right rail	2	11	scroll case(left)	1
1.2	outlet upper-lower rail	2	12	Fan motor	1
2	hanger	4	13	Fan motor	1
3	left clapboard	1	14	scroll case(right)	2
4	Left end plate of Evaporator	1	15	Fan fixing board assy	1
5	Evaporator assy	1	16	E-parts	1
5.1	Transition tube	5	16.1	Main control board	1
5.2	Shunt assy	1	16.2	Temperature sensor	1
5.3	air header assy	1	16.3	PTC transformer	1
5.4	Evaporator	1	16.4	Terminal	1
5.5	Probe copper tube	1	16.5	NO.7Line pressing buckle	2
6	Welding assy for water collector	1	17	E-parts box cover assy	1
6.1	leading	2	18	Small cover plate	1
6.2	effluent joint rubber cap	2	19	E-parts box base	1
7	Lower plate	1	20	big cover plate	1
8	Return air damper	1	21	Right clapboard	1
9	filter screen	2	22	Right end plate of Evaporator	1
10	Return air assy	1	23	Upper plate	1
10.1	return air upper-lower rail	2			

14. Troubleshooting

Fault code table

No.	Type	Content	Code	Remark
1	Fault	Room temperature sensor fault	E2	Automatic recovery after the problem resolved
2	Fault	Indoor coil temperature sensor fault	E3	
3	Fault	Outdoor coil temperature sensor fault	E5	
4	Fault	Water full protection	F5	
5	Fault	Outdoor protection	F2	
6	Fault	Communication fault	E1	Manual eliminate
7	Fault	EEPROM communication fault	P6	Recovery after interruption of power supply
8	Indication	Enforced cooling	/	
9	Indication	Anti- cool air in heating mode	P1	
10	Indication	Defrosting	P3	

4.Ceiling & Floor Type

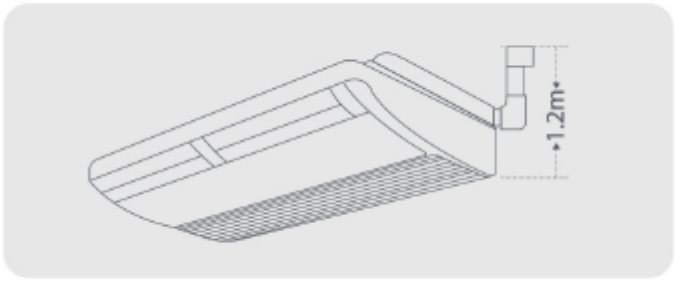
1. Features

1. Flexible installation,ceiling suspended and floor standing.

2. Washable air filter.

3. Auto-swing function,built-in two louver motor,vertical and horizontal air-flow adjustment.

4. Built-in with water pump,pimping head is up to 1200mm(Option).



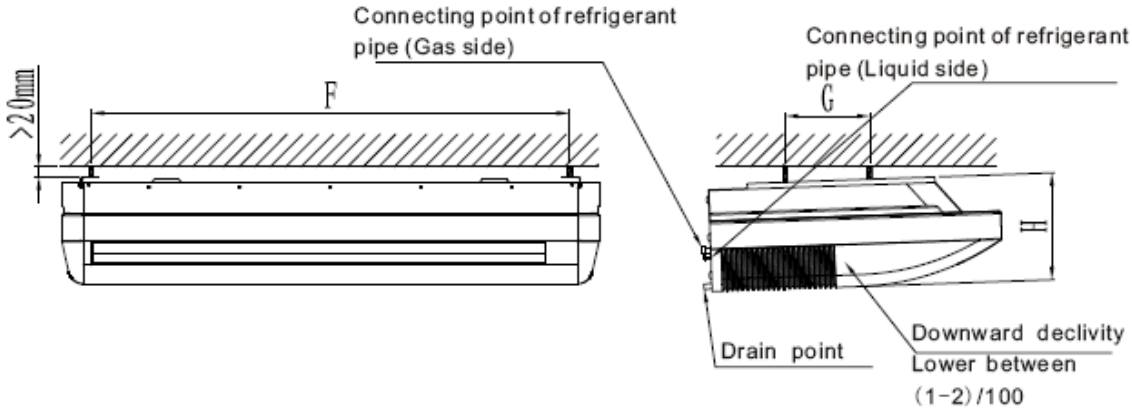
5.Adopting waterproof plastic film on water collector, avoiding water leakage

6. Self-diagnostic function and multi protection.

7.Auto-restart function.

2. Specifications

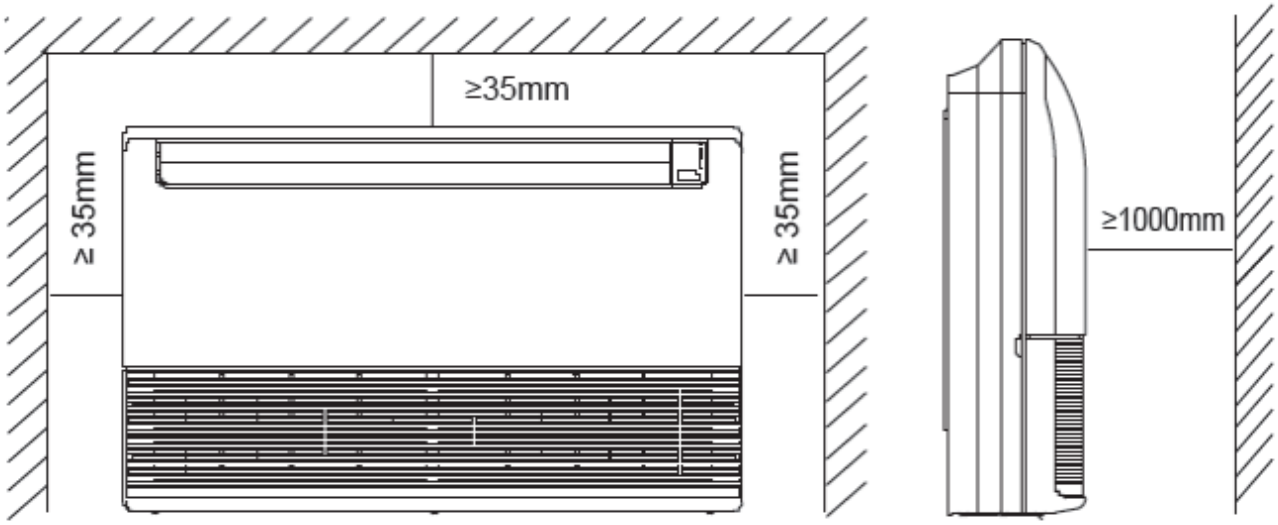
3. Dimensions



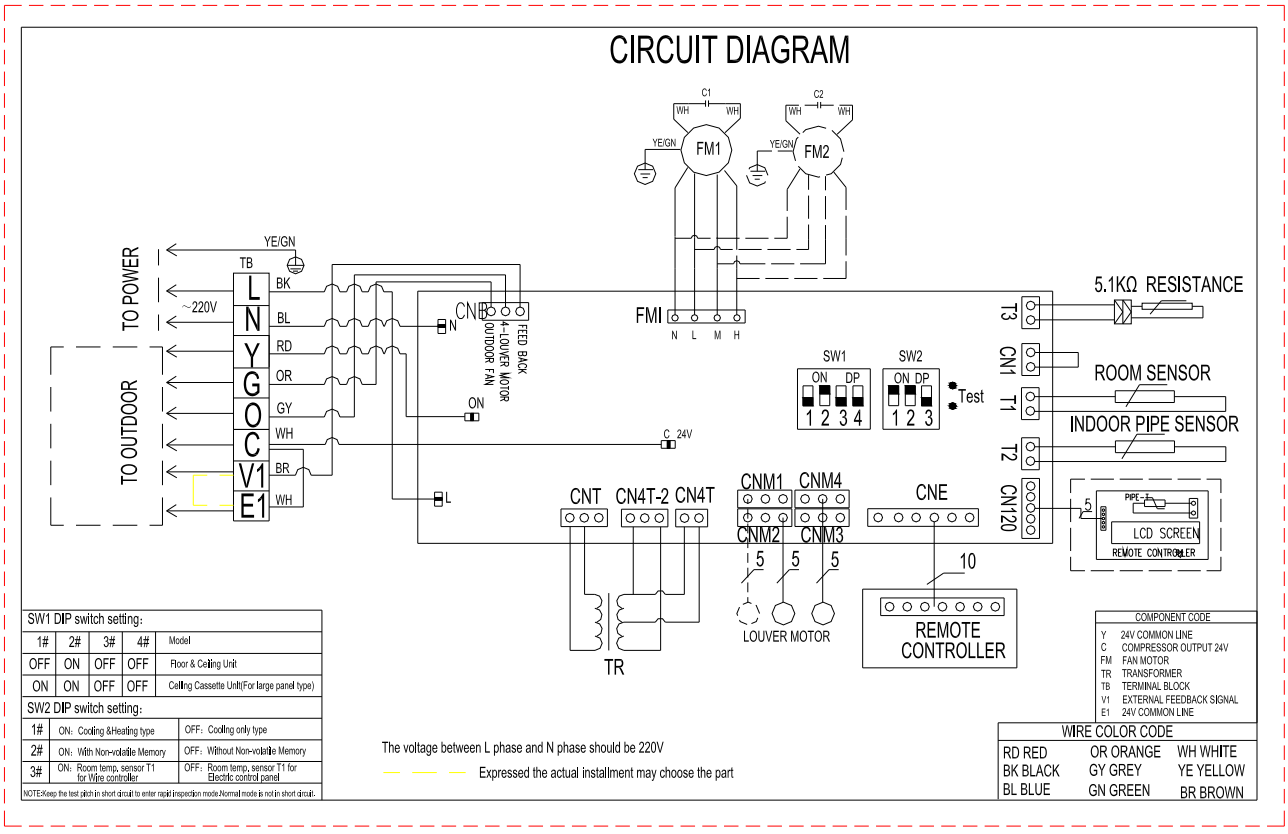
Model (kBtu/h)	A	B	C	D	E	F	G	H
24~36	1245	680	244	760	450	1119	200	240
48~60	1670	680	244	1070	450	1542	200	240

NOTE: The dimension of 24 kBtu/h and 36 kBtu/h are the same
The dimension of 48 kBtu/h and 60 kBtu/h are the same

4. Service Space



5. Wiring Diagrams



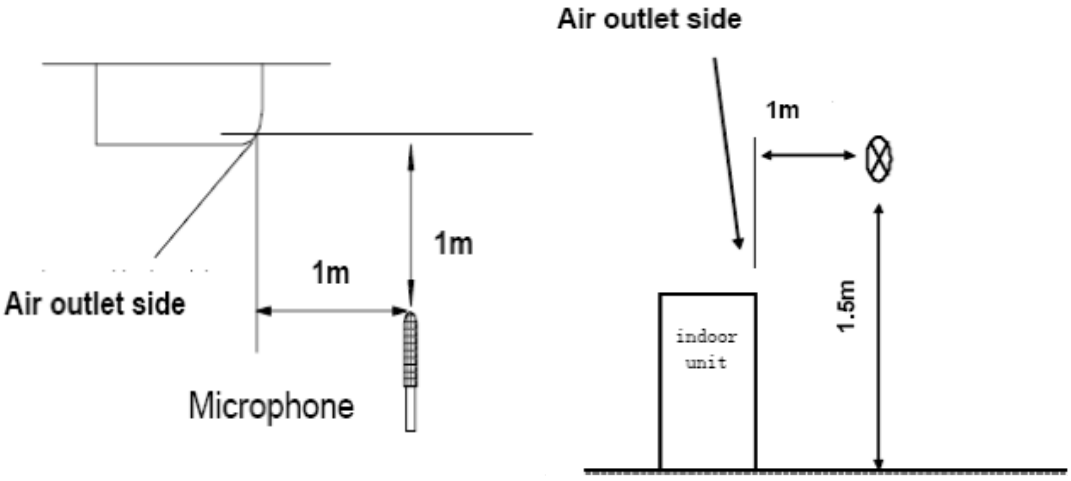
6. Capacity Tables

6.1 Cooling Capacity

6.2 Heating Capacity

7. Electric Characteristics

8. Sound Levels



Ceiling floor

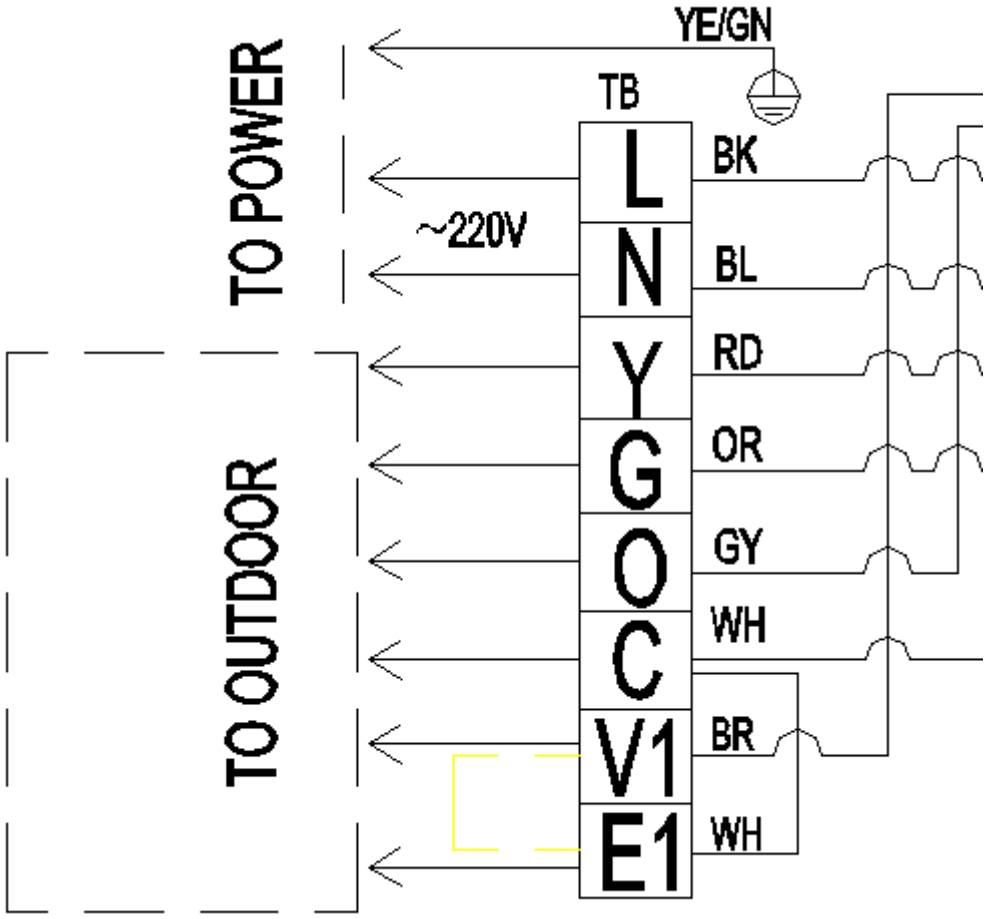
9. Accessories

	Name	Shape	Quantity
Installation fittings	1.Hanging arm		2
Controller	2. Remote controller		1
	3. Remote controller holder (optional)		1
	4. Wire controller		1
	5. Mounting screw (ST2.9×10-C-H)		2
	6. Alkaline dry batteries (AM4)		2
Others	7. Installation & operation instruction manual		1

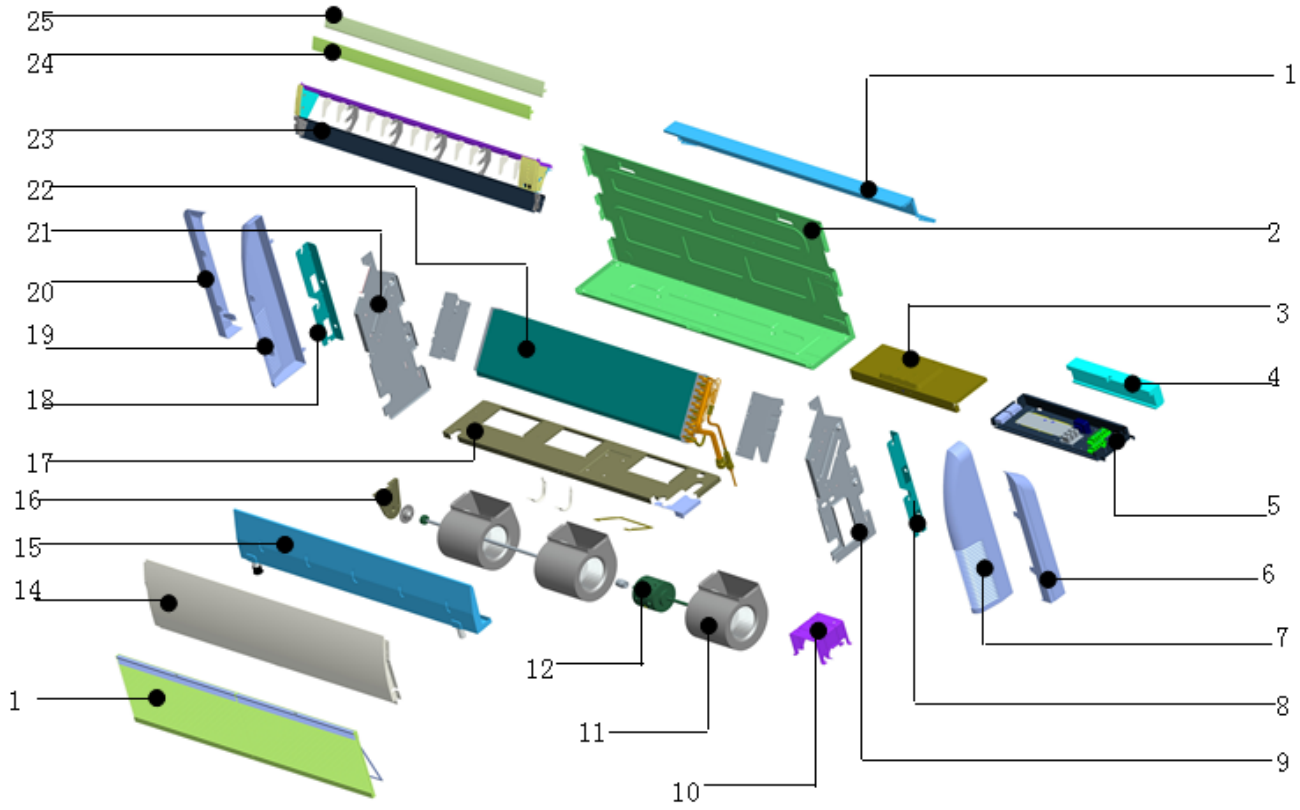
10.The Specification of Power

Type（cooling & heating）		36	48	60
Power	Phase	1-phase	1-phase	1-phase
	Frequency and Voltage	208-230V, 50Hz	208-230V, 50Hz	208-230V, 50Hz
Circuit Breaker/ Fuse (A)		20/16	40/25	40/20
Indoor Unit Power Wiring (mm^2)		3x1.0	3×1.0	3x1.0
Indoor/Outdoor Connecting Wiring (mm^2)	Ground Wiring	0.75	0.75	0.75
	Outdoor Unit Power Wiring	5×1.5	5×2.5	5x2.5
	Strong Electric Signal	———	———	———
	Weak Electric Signal	6×0.75	6×0.75	6×0.75

11.Field Wiring



12. Exploded View



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Rear cover	1	20	Right sealplate	1
2	Chassis assembly	1	21	Right separating board	1
3	E-part box cover	1	22	Evaporator component	1
4	E-part box mat	1	22.1	Left mounting plate of evaporator	1
5	Indoor PCB assembly	1	22.2	Shunt capillary assembly	1
5.1	E-part box	1	22.3	Distributor	1
5.2	Indoor PCB	1	22.4	Air inlet header pipe assembly of evaporator	1
5.3	Fan capacitor	1	22.5	Single Connector	1
5.4	Transformer	1	22.6	Evaporator assembly	1
5.5	Temperature sensors （indoor)	1	22.7	Right mounting plate of evaporator	1
5.6	Terminal	1	22.8	Temperature sensors (evaporator)	1
6	Left sealplate	1	23	Air-out frame component	1
7	Left cover	1	23.1	Fixing board assembly for air-out frame	1
8	Left hoisting pate	1	23.2	Display film	1
9	Lelf separating board I	1	23.3	Display lamp panel	1
10	Motor separating board	1	23.4	Vertical step motor	1
11	Wheel volute for slim type	3	23.5	Horizontal step motor	1

12	**Indoor fan motor**	**1**	**23.6**	**Endbearing of louver**	**2**
13	**Air inlet grille**	**2**	**23.7**	**Intermediate bearing of louver**	**8**
14	**Top Cover assembly**	**1**	**23.8**	**Driving lever for louver**	**1**
15	**Weld assembly of Water drain pan**	**1**	**23.9**	**Follower lever for louver**	**1**
15.1	**Water outlet rubber cover**	**1**	**23.10**	**Louver holder**	**1**
16	**Supporting board for motor**	**1**	**23.11**	**Guard vane**	**10**
17	**Weld assembly for intermediate transverse girder**	**1**	**24**	**Upper horizontal louver**	**1**
18	**Right mounting plate of evaporator**	**1**	**25**	**Down horizontal louver**	**1**
19	**Right cover**	**1**			

13. Troubleshooting

Table 2 Fault code

No.	Type	Content	LED Flashing	Code	Remark
1	Fault	Room temperature sensor fault	Timing lamp flashing/5Hz	E2	Automatic recovery after the problem resolved
2	Fault	Indoor coil temperature sensor fault	Running lamp flashing/5Hz	E3	
3	Fault	Outdoor coil temperature sensor fault	Defrosting lamp flashing/5Hz	E5	
4	Fault	Water full protection	Alarm lamp flashing/5Hz	F5	
5	Fault	Outdoor protection	Defrosting lamp and Alarm lamp both flashing/5Hz	F2	
6	Fault	Communication fault	Running lamp and Defrosting lamp both flashing/5Hz	E1	Manual eliminate
7	Fault	EEPROM communication fault	Running lamp and Timing lamp both flashing/5Hz	P6	Recovery after interruption of power supply
8	Indication	Enforced cooling	Running lamp and Alarm lamp both flashing/5Hz	/	
9	Indication	Anti- cool air in heating mode	Defrosting preheat lamp ON	P1	
10	Indication	Defrosting	Defrosting preheat lamp ON	P3	

Part 3 Outdoor Units

1.Specificatio

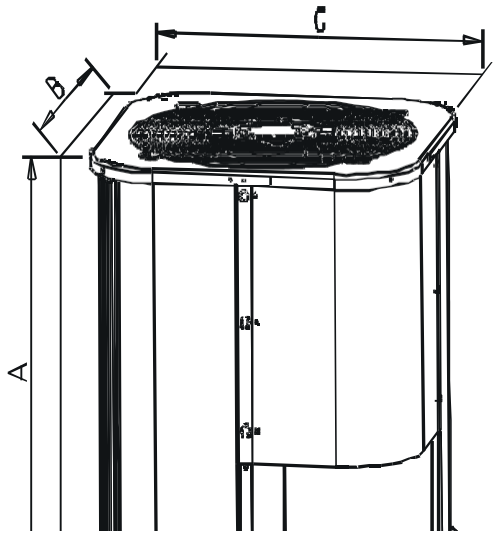
Model			COT-36HR1	COT-48HR1	COT-60HR1
Outdoor power supply		V/Ph/Hz	380~415/3/50	380~415/3/50	380~415/3/50
Cooling	Capacity	Btu/h	36000	48000	60000
		W	10500	14068	17585
	Input	W	3000	5000	5100
	Rated current	A	5.6	8.5	9.9
Heating	Capacity	Btu/h	39000	52000	60000
		KW	11.5	15.2	16
	Input	W	2600	5300	5600
	Rated current	A	4.5	8.9	9.5
Max. input consumption		W	2960	6873	6900
Max. current		A	19.8	31.24	13
Starting current		A	48	66	70
Compressor	Model		YA331X3CS-9MU	C-SBN373H8D	E604DH-59D2G
	Type		SCROLL	SCROLL	SCROLL
	Brand		GMCC	SANYO	HITACHI
	Capacity	Btu/h	36000	48100	56000
	Input	W	3650	4750	5750
	Rated current(RLA)	A	6.58	8.22	9.77
	Locked rotor Amp(LRA)	A	48	66	70
	Thermal protector		Internal	Internal	Internal
	Capacitor	μF	/	/	/
	Refrigerant oil	ml	1700	1700	1700
Outdoor motor fan	Brand		weiling	weiling	weiling
	Model		YDK-160-4P3	YDK-230-6P3	YDK-230-6P3
	Input	W	400	325	325
	Capacitor	μF	6	12	12
	Speed	r/min	1220	920	920
Outdoor coil	Number of rows		1	1	2
	Tube pitch(a)xrow pitch(b)	mm	25×21.5	25×21.3	25×21.3
	Fin spacing	mm	1.4	1.5	1.5
	Fin type		Hydrophilic	Hydrophilic	Hydrophilic
	Tube outside dia. and type	mm	9.52	9.52	9.52
			inner grooved	inner grooved	inner grooved
	Number of circuits		3	5	5
Outdoor air flow(High speed)		CFM	6000	3200	6100
Outdoor noise level		dB(A)	65	65	65
	Dimension(W*D*H)	mm	554×554×633	740×740×835	740×740×835

Outdoor unit	Packing(W*D*H)	mm	575×575×690	760×760×875	760×760×875
	Net/Gross weight	kg	57/59.7	89/94	92.5/98
Refrigerant type/quantity		g	R410A/2650	R410A/3600	R410A/3600
Throttle part			capillary	capillary	capillary
Design pressure		MPa	4.5/1.2	4.5/0.7	4.5/0.7
Max pressure		MPa	4.5	4.5	4.5
Connection wiring	Power Supply		From outdoor unit	From outdoor unit	From outdoor unit
	Power wiring	mm^2	5×1.5/3×1.0	5×2.5/3×1.0	5×2.5/3×1.0
	Signal wiring	mm^2	5×1.0	5×1.0	5×1.0
Refrigerant piping	Liquid side/Gas side	mm	Φ12.7/Φ19.05	Φ12.7/Φ19.05	Φ12.7/Φ19.05
	Max. pipe length	m	20	20	20
	Max. high drop	m	10	10	10
Ambient temp		°C	-7 ~ 43	-7 ~ 43	-7 ~ 43
Stuffing Quantity		20'/40'/40'HQ	40/80/80	32/64/64	32/64/64

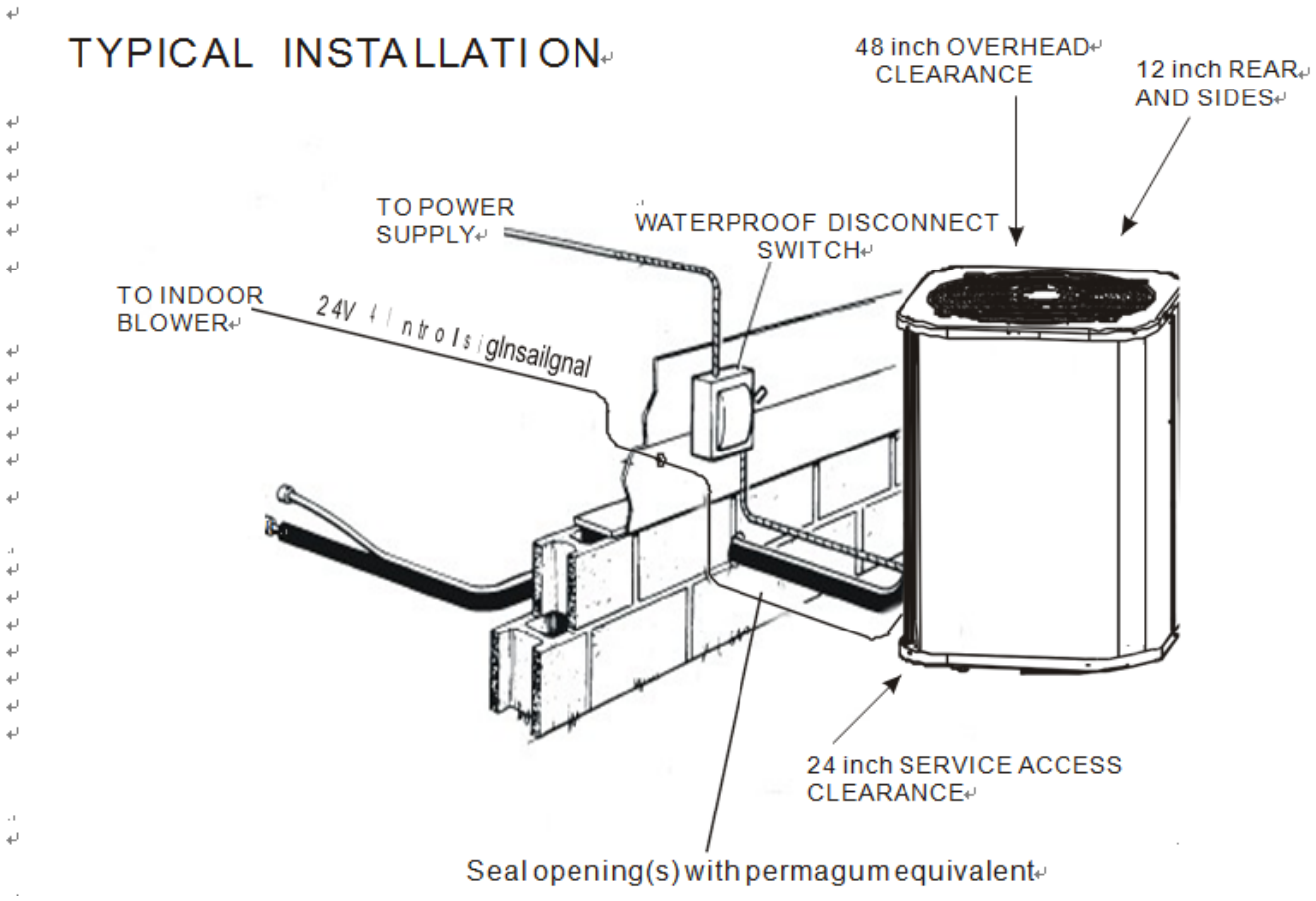
2.Dimensions

Applicable for 18-60 series

Unit Model	Dimensions(mm)			Refrigerant Connection Line		
	A	B	C	Liquid(φ)		Vapor(φ)
				LF	RF	
18	633	554	554	6.3		12.7
24	633	554	554	9.5		15.88
36	633	554	554	9.52	12.7	19.05
	633	740	740			
	835	554	554			
48	835	740	740	9.52	12.7	19.05
60	835	740	740	9.52	12.7	19.05

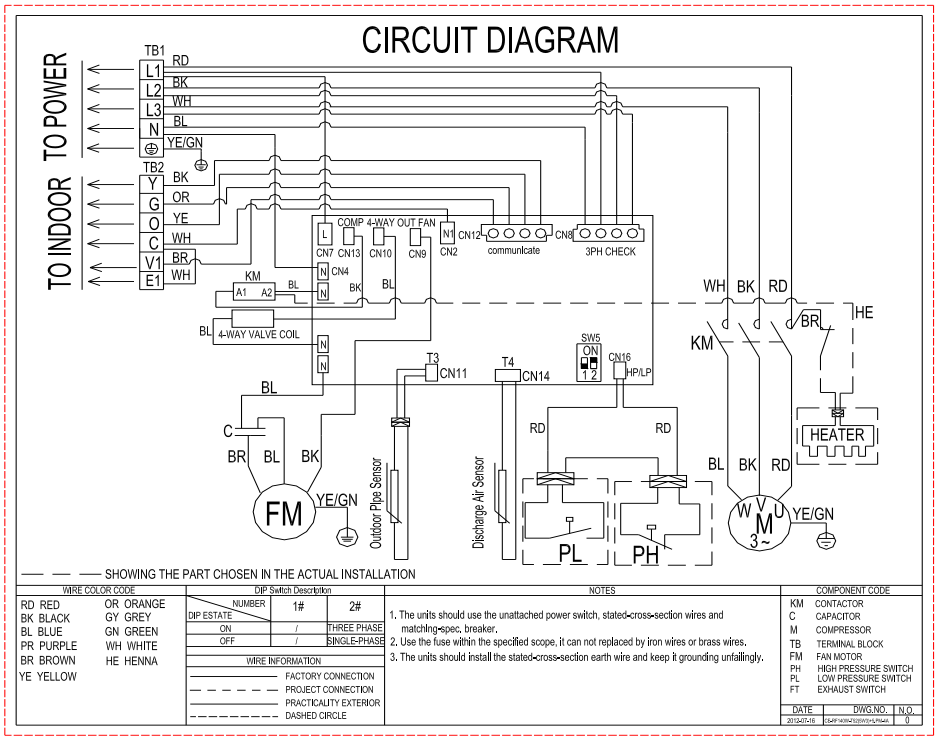


3.Typical Installation

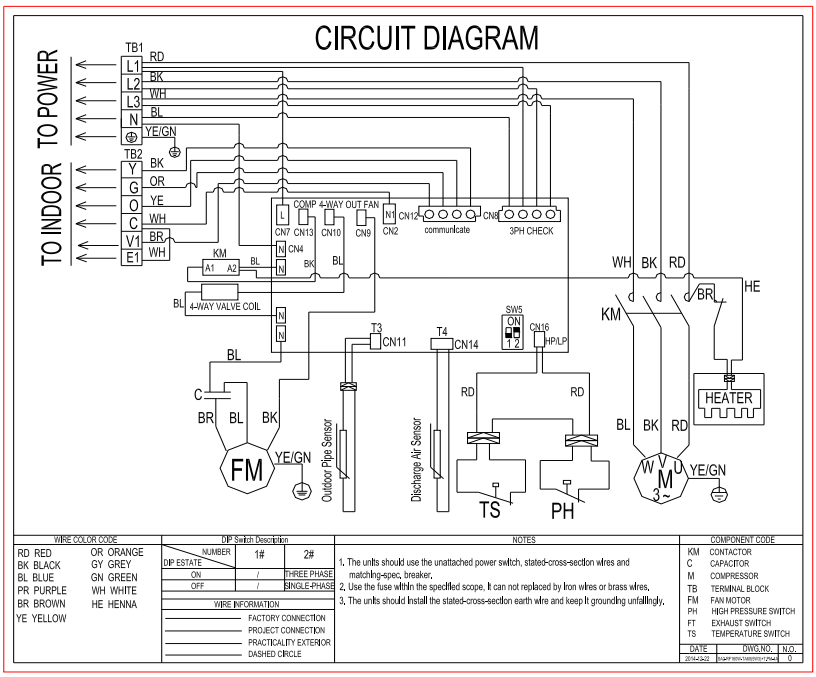


5.Wiring Diagrams

COT-36HR1 COT-48HR1



COT-60HR1

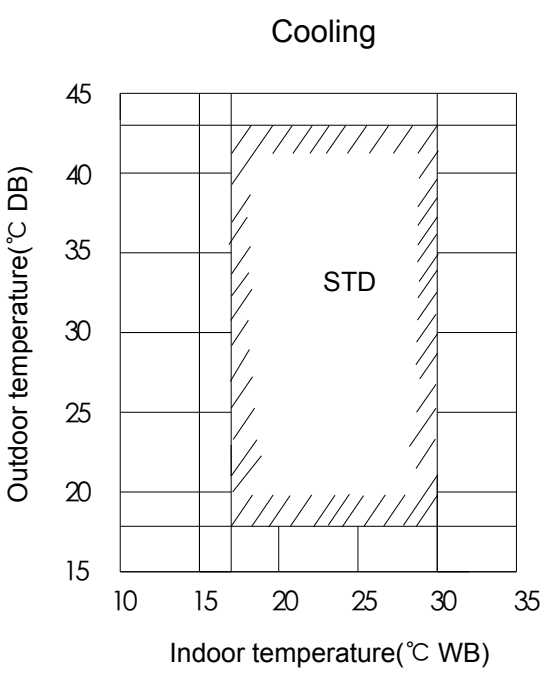


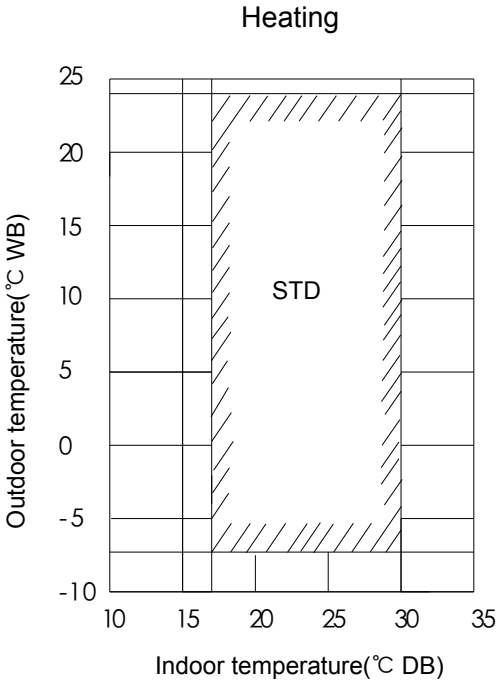
6.Electric Characteristics

Model	Outdoor Unit			
	Hz	Voltage	Min.	Max.
CTVCN036E	50	380~415V	342V	418V
CTVCN048E	50	380~415V	342V	418V
CTVCN060E	50	380~415V	342V	418V

7.Operation Limits

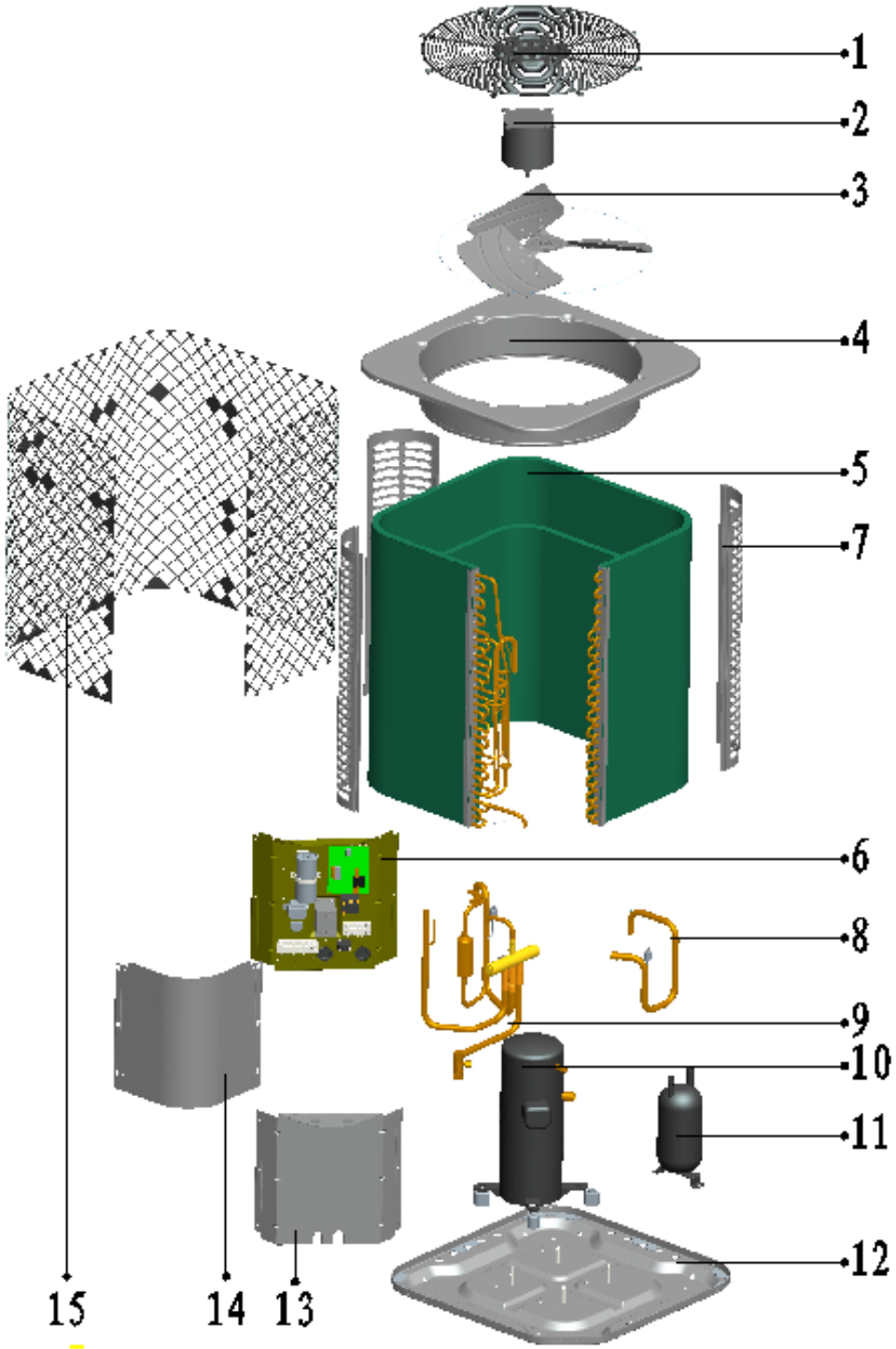
Operation mode	Outdoor temperature(℃)	Room temperature(℃)
Cooling operation	18~43	17~30
Heating operation	-7~24	17~30



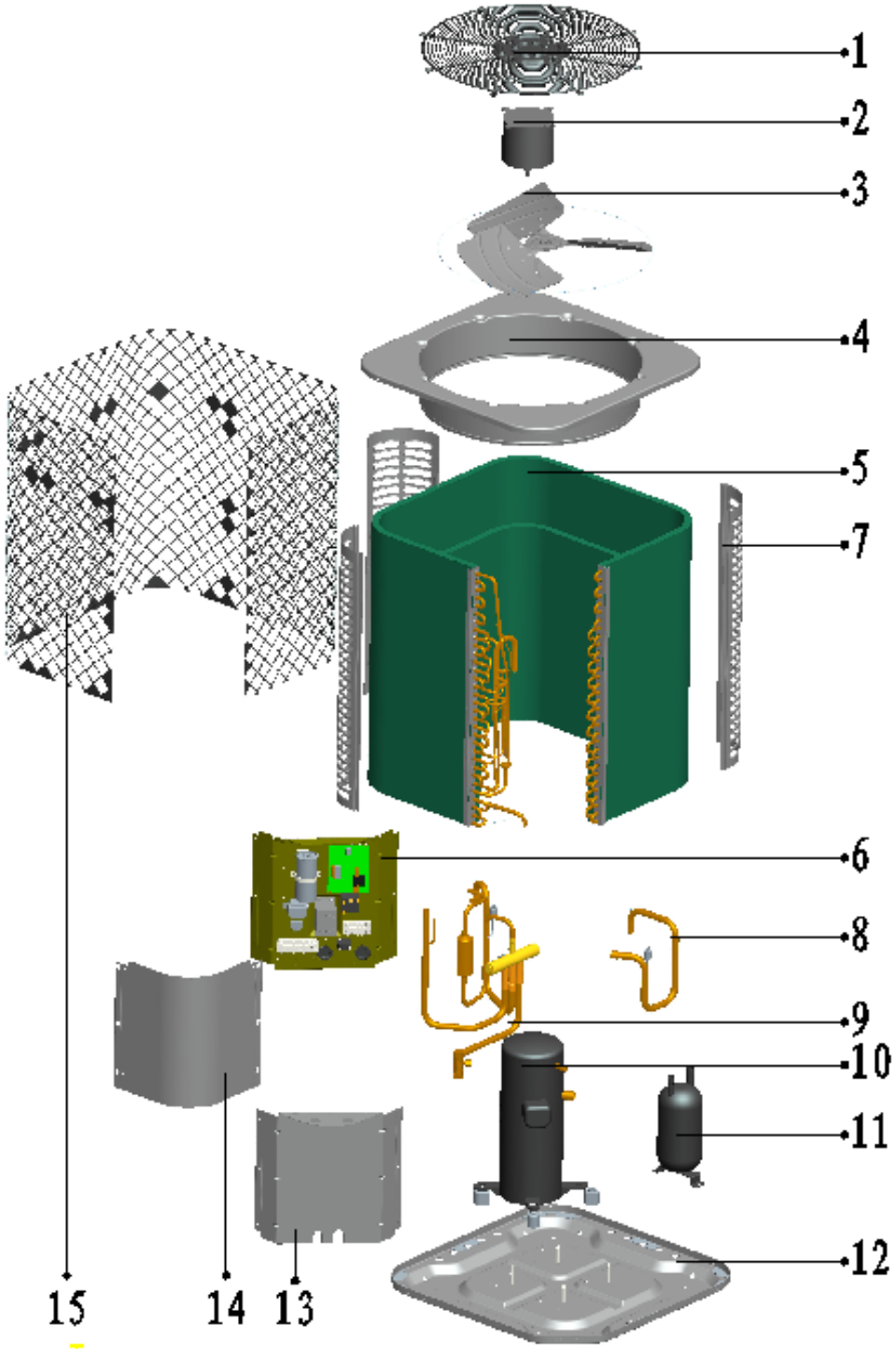


8. Exploded View

COT-36HR1



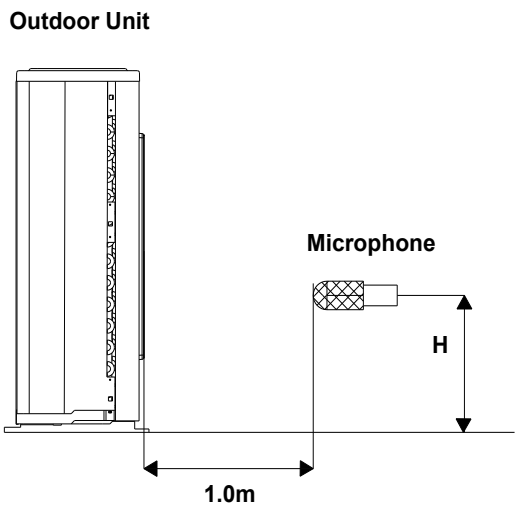
CTVCN048E CTVCN060E

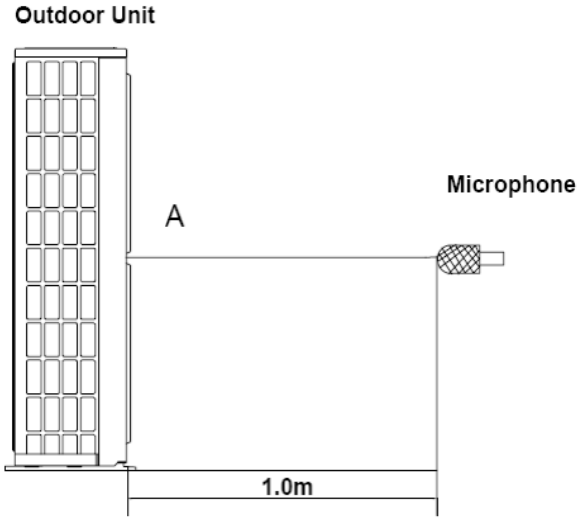

1
2
3
4
5
7
6
8
9
10
11
12
15
14
13

9.Sound Levels

12000Btu/h~24000Btu/h

48000Btu/h~60000Btu/h





Note: H= 0.5 × height of outdoor unit

Note: The point A is in the middle of the whole outdoor panel.

Model	Noise level dB(A)
CTVCN036E	65
CTVCN048E	65
CTVCN060E	65

Part 4 Installation

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1.Precaution on Installation

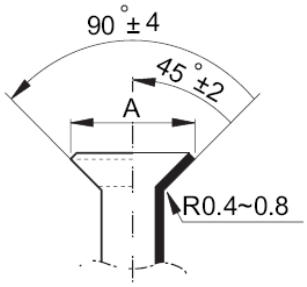
1.1. Measure the necessary length of the connecting pipe, and make it by the following way.

a. Connect the indoor unit at first, then the outdoor unit.
Bend the tubing in proper way. Do not harm them.

CAUTIONS:

- Daub the surfaces of the flare pipe and the joint nuts with frozen oil, and wrench it for 3~4 rounds
- With hands before fasten the flare nuts.

Be sure to use two wrenches simultaneously when you connect or disconnect the pipes.

Pipe gauge	Tightening torque	Flare dimension A Min (mm) Max		Flare shape
Φ6.4	15～16N.m (153～163 kgf.cm)	8.3	8.7	
Φ9.5	25～26N.m (255～265kgf.cm)	12.0	12.4	
Φ12.7	35～36N.m (357～367kgf.cm)	15.4	15.8	
Φ15.9	45～47N.m (459～480 kgf.cm)	18.6	19.1	
Φ19.1	65～67N.m (663～684kgf.cm)	22.9	23.3	

b. The stop value of the outdoor unit should be closed absolutely (as original state). Every time you connect it, first loosen the nuts at the part of stop value, then connect the flare pipe immediately (in 5 minutes). If the nuts have been loosened for a long time, dusts and other impurities may enter the pipe system and may cause malfunction later. So please expel the air out of the pipe with refrigerant before connection.
c. Expel the air after connecting the refrigerant pipe with the indoor unit and the outdoor unit. Then fasten the nuts at the repair-points.

1.2. Locate The Pipe
a. 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.
b. Bind the connecting pipe and the cables together tightly with binding tapes. Do not let air in, which will cause water leakage by condensation.
c. Pass the bound connecting pipe through the wall conduit from outside. Be careful of the pipe allocation to do no damage to the tubing.

1.3. Connect the pipes.

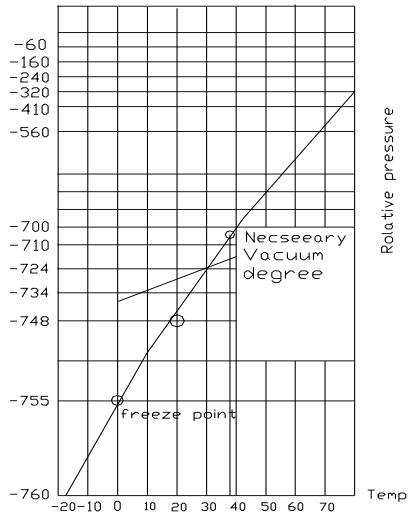
1.4. Then, open the stem of stop values of the outdoor unit to make the refrigerant pipe connecting the indoor unit with the outdoor unit in fluent flow.

1.5. Be sure of no leakage by checking it with leak detector or soap water.

1.6. Cover the joint of the connecting pipe to the indoor unit with the soundproof / insulating sheath (fittings), and bind it well with the tapes to prevent leakage.

2.Vacuum Dry and Leakage Checking

2.1 Vacuum Dry: use vacuum pump to change the moisture (liquid) into steam (gas) in the pipe and discharge it out of the pipe to make the pipe dry. Under one atmospheric pressure, the boiling point of water(steam temperature) is 100℃. Use vacuum pump to make the pressure in the pipe near vacuum state, the boiling point of water falls relatively. When it falls under outdoor temperature, the moisture in the pipe will be vaporized.

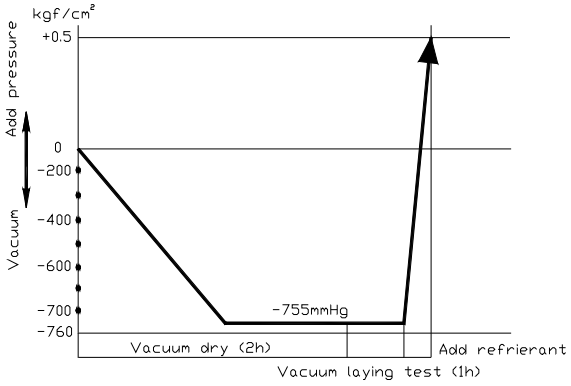


2.2 Vacuum dry procedure

There are two methods of vacuum dry due to different construction environment: common vacuum dry, special vacuum dry.

①. Common vacuum dry procedure

- Vacuum dry (for the first time)---connect the all-purpose detector to the inlet of liquid pipe and gas pipe, and run the vacuum pump more than two hours (the vacuum pump should be below -755mmHg)
- If the pump can't achieve below -755mmHg after pumping 2 hours, moisture or leakage point will still exist in the pipe. At this time, it should be pumped 1 hour more.
- If the pump can't achieve -755mmHg after pumping 3 hours, please check if there are some leakage points.
- Vacuum placement test: place 1 hour when it achieves -755mmHg, pass if the vacuum watch shows no rising. If it rises, it shows there's moisture or leakage point.
- Vacuuming from liquid pipe and gas pipe at the same time.
- Sketch map of common vacuum dry procedure.



②. Special vacuum dry procedure

- This vacuum dry method is used in the following conditions:
- There's moisture when flushing the refrigerant pipe.
- Rainwater may enter into the pipe.
- Vacuum dry for the first time …… 2h pumping

③. Vacuum destroy for the second time …… Fill nitrogen to 0.5Kgf/cm²

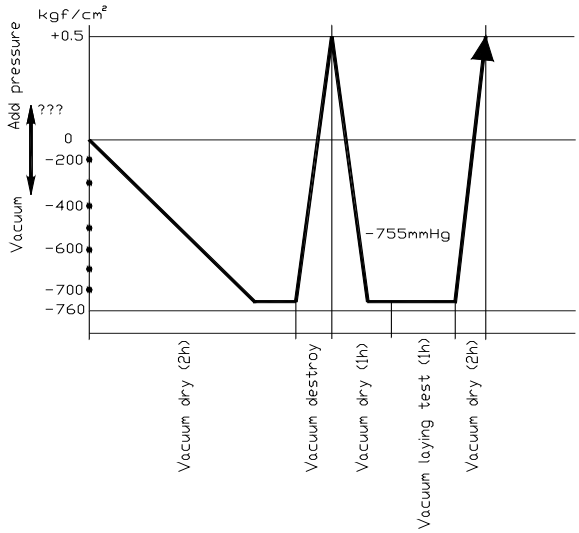
Because nitrogen is for drying gas, it has vacuum drying effect during vacuum destroy. But if the moisture is too much, this method can't dry thoroughly. So, please pay more attention to prevent water entering and forming condensation water.

④. Vacuum dry for the second time……1h pumping

Determinant: Pass if achieving below -755mmHg. If -755mmHg can't be achieved in 2h, repeat procedure ③ and ④.

⑤. Vacuum placing test …… 1h

⑥. Sketch map of special vacuum dry procedure



3.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

R(g) D(mm) L(m)	ϕ6.4	Φ9.5	Φ12.7
Less than 5m (One-way)	—	—	—
Added Refrigerant When Over 5m(One-way)	30g/m×(L-5)	65g/m×(L-5)	120g/m×(L-5)

Remark:
R (g): Additional refrigerant to be charged
L (m): The length of the refrigerant pipe (one-way)
D (mm): Liquid side piping diameter

4.Water Drainage

4.1 Gradient and Supporting

4.1.1 Keep the drainpipe sloping downwards at a gradient of at least 1/100. Keep the drainpipe as short as possible and eliminate the air bubble.

4.1.2 The horizontal drainpipe should be short. When the pipe is too long, a prop stand must be installed to keep the gradient of 1/100 and prevent bending. Refer to the following table for the specification of the prop stand.

	Diameter	Distance between the prop stands
Hard PVC pipe	25~40mm	1~1.5m

4.1.3. Precautions

① The diameter of drainpipe should meet the drainage requirement at least.

② The drainpipe should be heat-insulated to prevent atomization.

③ Drainpipe should be installed before installing indoor unit. After powering on, there is some water in water-receiver plate. Please check if the drain pump can operate correctly.

④ All connection should be firm.

⑤ Wipe color on PVC pipe to note connection.

⑥ Climbing, horizontal and bending conditions are prohibited.

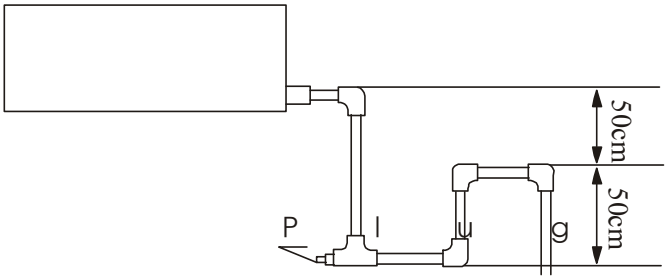
⑦ The dimension of drainpipe can't less than the connecting dimension of indoor drainpipe.

⑧ Heat-insulation should be done well to prevent condensation.

⑨ Indoor units with different drainage type can't share one convergent drainpipe.

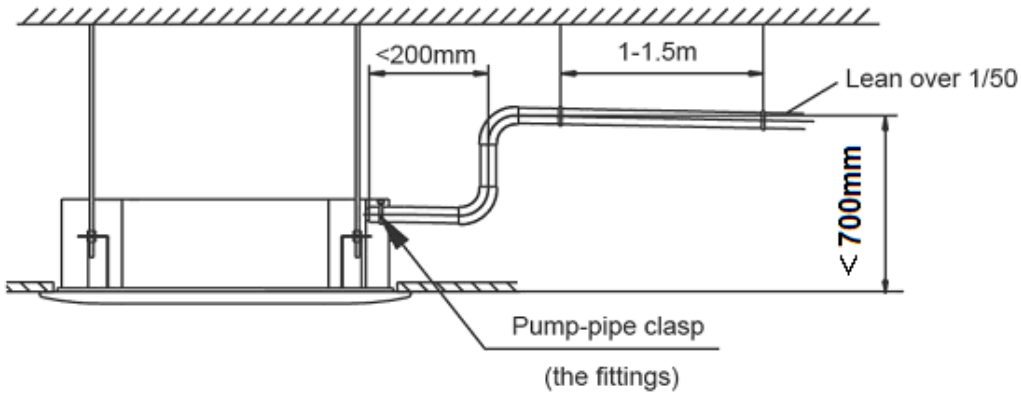
4.2 Drainpipe Trap

4.2.1. If the pressure at the connection of the drainpipe is negative, it needs to design drainpipe trap.
4.2.2. Every indoor unit needs one drainpipe trap.
4.2.3. A plug should be designed to do cleaning.

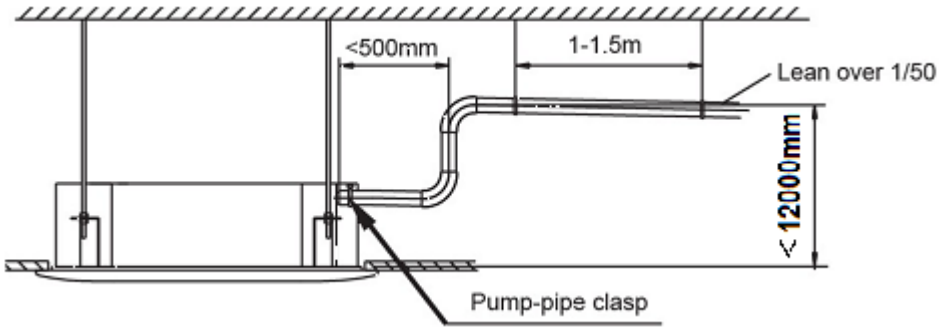


4.3 Upwards drainage (drain pump)

Ceiling cassette (compact)

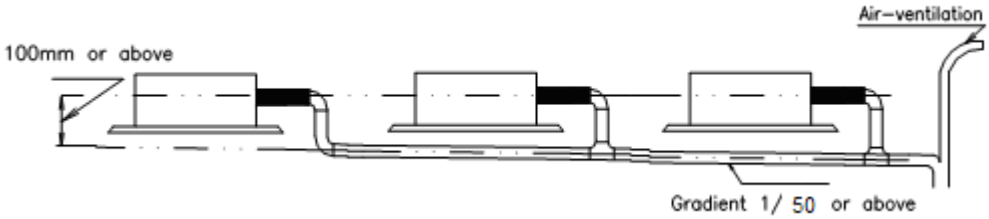


Ceiling cassette



4.4 Convergent drainage

4.4.1. The number of indoor units should be as small as possible to prevent the traverse main pipe overlong.
4.4.2. Indoor unit with drain pump and indoor unit without drain pump should be in different drainage system.



4.4.3. Selecting the diameter

Number of connecting indoor units→Calculate drainage volume→Select the diameter
Calculate allowed volume =Total cooling capacity of indoor units(HP)×2 (l/ hr)

	Allowed volume(lean 1/50) (l/ hr)	I.D. (mm)	Thick
Hard PVC	-≤14	Ø25	3.0
Hard PVC	14< -<88	Ø30	3.5
Hard PVC	88< -<334	Ø40	4.0
Hard PVC	175< -<334	Ø50	4.5
Hard PVC	334< -	Ø80	6.0

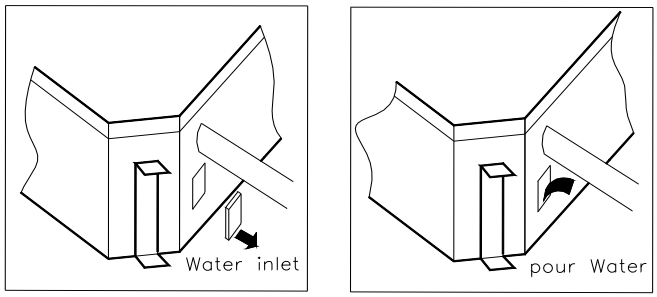
4.5 Drainage test

4.5.1Drainage without drain pump

After finishing drainpipe installation, pour some water into the water receiver plate to check if the water flows smoothly.

4.5.2 Drainage with drain pump

① Poke the Water Level Switch, remove the cover, use water pipe to pour 2000ml water into the water receipt plate through the water inlet.



② Turn on the power to Cooling operation. Check the pump's operation and switch on the Water Level Switch. Check the pump's sound and look into the transparent hard pipe in the outlet at the same time to check if the water can discharge normally.

③ Stop the air conditioner running, turn off the power, and put back the cover.

- Stop the air conditioner. After 3 minutes, check if it has abnormity. If the collocation of drainpipes is illogical, the water will flow back overfull, which will cause the alarm lamp flashes, even overflow from the water receipt plate.
- Keep on pouring water until it gives an alarm signal for high water level, check if the pump drains water at once. If the water level can't fall below the alarmed water level after 3 minutes, the air conditioner will stop. Turn off the power and drain the remained water, and then turn on the air conditioner.

Note: the drain stuff in the main water receipt plate is for maintenance. Stuff up the drain stuff to prevent water leakage.

5.Insulation Work

5.1 Insulation material and thickness

5.1.1. Insulation material

Insulation material should adopt the material which is able to endure the pipe's temperature: no less than 70℃ in the high-pressure side, no less than 120℃ in the low-pressure side(For the cooling type machine, no requirements at the low-pressure side.)

- Example: Heat pump type----Heat-resistant Polyethylene foam (withstand above 120℃)
  Cooling only type----Polyethylene foam (withstand above 100℃)

5.1.2. Thickness choice for insulation material

Insulation material thickness is as follows:

	Pipe diameter (mm)	Adiabatic material thickness
Refrigerant pipe	Φ6.4—Φ25.4	10mm
	Φ28.6—Φ38.1	15mm
Drainage pipe	Inner diameterΦ20—Φ32	6mm

5.2 Refrigerant pipe insulation

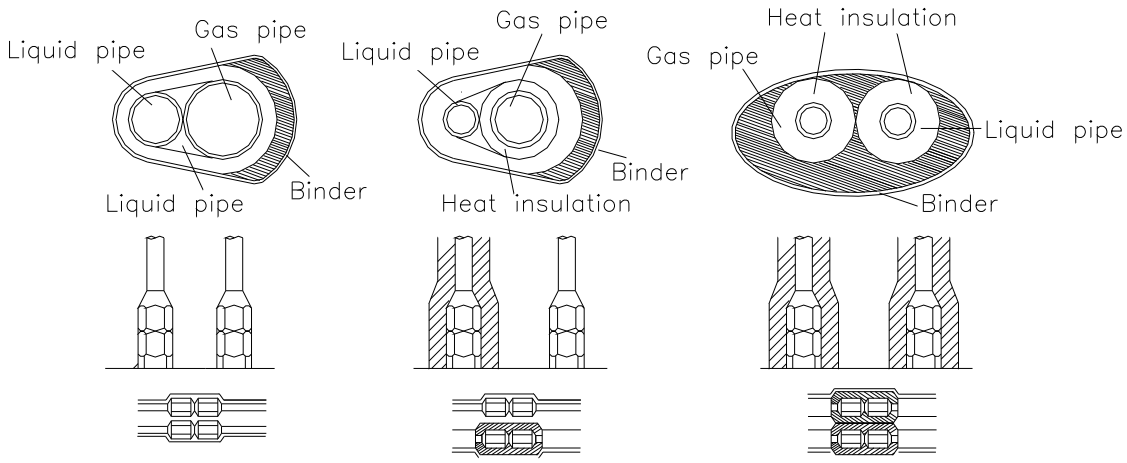
5.2.1. Work Procedure

① Before laying the pipes, the non-jointing parts and non-connection parts should be heat insulated.

② When the gas proof test is eligible, the jointing area, expanding area and the flange area should be heat insulated

5.2.2. Insulation for non-jointing parts and non-connection parts

wrong	right	
Gas pipe and liquid pipe should not be put together to insulate	Insulate the gas pipe (cooling only)	Insulate the gas pipe and liquid pipe

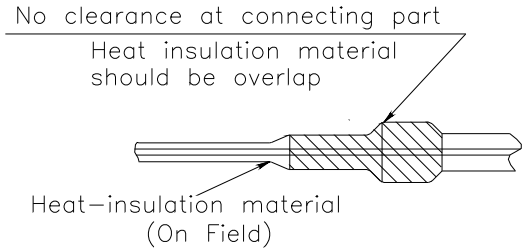


For construction convenience, before laying pipes, use insulation material to insulate the pipes to be deal with, at the same time, at two ends of the pipe, remain some length not to be insulated, in order to be welded and check the leakage after laying the pipes.

5.2.3. Insulate for the jointing area, expanding area and the flange area

① Insulate for the jointing area, expanding area and the flange area should be done after checking leakage of the pipes

② Make sure there's no clearance in the joining part of the accessorial insulation material and local preparative insulation material.



5.3 Drainage pipe insulation

The connection part should be insulated, or else water will be condensing at the non-insulation part.

5.4 Note

5.4.1 The jointing area, expanding area and the flange area should be heat insulated after passing the pressure test

5.4.2 The gas and liquid pipe should be heat insulated individually, the connecting part should be heat insulated individually.

5.4.3 Use the attached heat-insulation material to insulate the pipe connections (pipes' tie-in ,expand nut) of the indoor unit

6.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 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 values 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 when 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.

Indoor unit

- Whether the switch on the remote controller works well.
- Whether the buttons on the remote controller works well.
- Whether the air flow louver moves normally.
- Whether the room temperature is adjusted well.
- Whether the indicator lights normally.
- Whether the temporary buttons works well.
- Whether the drainage is normal.
- Whether there is vibration or abnormal noise during operation.

Outdoor unit

- Whether there is vibration or abnormal noise during operation.
- Whether the generated wind, noise, or condensed of by the air conditioner have influenced your neighborhood.
- Whether any of the refrigerant is leaked.

Part 5 Control

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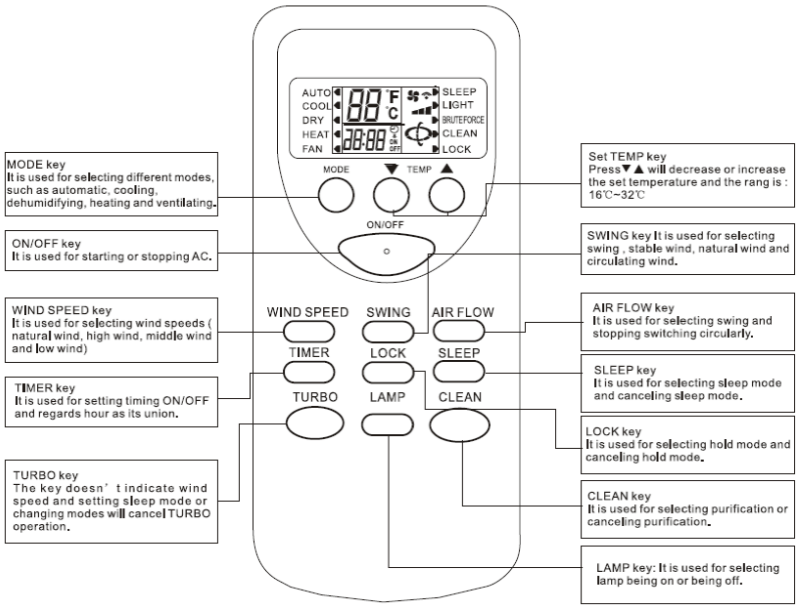
1. Wireless Remote Controller

1.1Jingling Common



USE OF REMOTE CONT

The controller below is :LEAN key is applicable for special latest developed new n

FUNCTION KEY

A. ON/OFF key:

Press the key and the remote control will switch circularly in the order : ON→OFF→ON. When it is powered on at first from off state to on state, the default setting of work condition is (The set temperature is 25℃ and the mode , wind speed, swing and air door are all automatic and there is no lamp, no turbo, no purification, no sleep, no timing and no hold function). When it is not powered on firstly from off state to on state, the work condition is as the same as the state before stopping. It will cancel damp, purification, sleep, turbo and timing running mode.

B. MODE key:

Press the key to switch modes in the order : automatic →cooling→dehumidify→heating→ventilating→automatic.

C. " ▼ " key:

In dehumidifying mode and automatic mode, pressing the key cannot change the temperature. In other mode, press the key once and the temperature will decrease 1℃ in the order : 32℃→31℃→…→17℃→16℃ .

D. " ▲ " key:

In dehumidifying mode and automatic mode, pressing the key cannot change the temperature. In other mode, press the key once and the temperature will increase 1℃ in the order: 16℃→17℃→…→31℃→32℃ .

E. SWING key :

In dehumidifying mode, the swing mode is in the stable wind mode without change. In other mode, press the key to switch modes in the order:

Swing →stable wind→natural wind →swing

F. AIR FLOW key:

The default air flow is in the swing mode when starting firstly and press the key to switch modes in the order: swing →stop →swing.

G. WIND SPEED key:

The default wind speed is in the automatic wind mode when starting firstly. The remote control won ' t react by pressing the key because the wind speed can't be adjusted and in low speed in dehumidifying mode. In other mode, press the key to switch modes in the order :

Automatic wind→ high speed →middle speed→ low speed →automatic wind

H. TIMER key :

The default mode is in no timing state, press the key to set timing time with hour as its union. The switch order is: 1H→2H→…→24H→cancel→1H…. Press the key to set timing starting in the off state and set timing stopping in the on state. After setting timing function, the time keeps decreasing per hour until the time decreasing to the timing on or timing off and the timing display will be cancelled

at the same time. Pressing MODE key can't cancel timing in timing mode which will send out the order of timing time by pressing other key.

I. TURBO key:

The default state for the control is no turbo and the key don't work in the automatic mode, dehumidifying mode and ventilating mode (It will not display any contents and not send out any codes). The control, however, will switch between on and off by pressing the key in other mode. The wind speed isn't indicated in turbo mode and it will be cancelled for changing modes and setting sleep mode.

J. SLEEP key :

Press the key to switch modes in the order: sleep→ cancel sleep→ sleep. The sleep function won't be cancelled for changing modes. Press the key to set sleep mode and the wind speed will automatically be switched to low speed and it can adjust the wind speed by pressing the WIND SPEED key (except dehumidifying mode).

K. LOCK key:

The default state is in no LOCK key state, press the key to select modes in order: LOCK key →cancel LOCK key→ LOCK key ; In LOCK key mode, all keys except LOCK key of the remote control can't work . (NOTE: In LOCK key mode, the remote and operation panel of the unit both will be locked automatically by pressing the key and press the key again , they will be unlocked. As for the split unit , it only hold the control rather than urgent keys and the panel will make a reaction.)

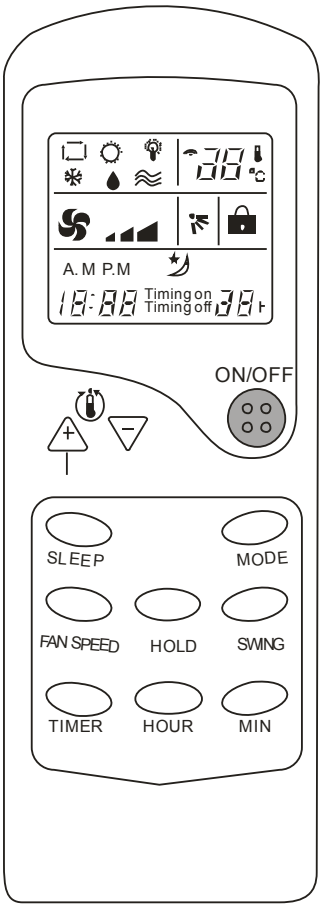
L. LAMP key:

The default state is in no LAMP key state, press the key to select modes in order : LAMP key →cancel LAMP key→ LAMP key; In LAMP key mode, pressing MODE key can't cancel the show of LAMP key.

M. CLEAN key :

The default state is in no purification state, press the key to select modes in order : CLEAN →cancel CLEAN→ CLEAN; In purification mode, pressing CLEAN key can't cancel purification function. Press the key when the remote control is closed, the control will switch modes in the order : CLEAN →cancel CLEAN→ CLEAN; When you stop the unit and turn on the purification switch, except the wind, the stable swing and air door swing speed aren't adjusted.

1.2 Lingtong 7 common (old controller)



USE OF REMOTE CONTROLLER

The controller below is the Lingtong 7 common Remote Controller, and some keys is just for some special models.

FUNCTION KEY

A. ON/OFF key:

Press the key and the remote control will switch circularly in the order : ON→OFF→ON. When it is powered on at first from off state to on state, the default setting of work condition is (The set temperature is 25℃ and the mode , wind speed, swing and air door are all automatic and there is, no sleep, no timing and no hold function). When it is not powered on firstly from off state to on state, the work condition is as the same as the state before stopping. It will cancel sleep and timing running mode.

B. " - " key:

In dehumidifying mode and automatic mode, pressing the key cannot change the temperature. In other mode, press the key once and the temperature will decrease 1℃ in the order : 32℃→31℃→…→17℃→16℃.

C. " + " key:

In dehumidifying mode and automatic mode, pressing the key cannot change the temperature. In other mode, press the key once and the temperature will increase 1℃ in the order: 16℃→17℃→…→31℃→32℃ .

D. MODE key:

Press the key to switch modes in the order : automatic →cooling→dehumidification→heating→ventilating→automatic.

E. SLEEP key :

Press the key to switch modes in the order: sleep→ cancel sleep→ sleep. The sleep function won't be cancelled for changing modes. Press the key to set sleep mode and the wind speed will automatically be switched to low speed and it can adjust the wind speed by pressing the WIND SPEED key (except dehumidifying mode).

F. FAN SPEED key:

The default wind speed is in the automatic wind mode when starting firstly. The remote control won ' t react by pressing the key because the wind speed can't be adjusted and in low speed in dehumidifying mode. In other mode, press the key to switch modes in the order :

Automatic wind→ high speed →middle speed→ low speed →automatic wind

G. HOLD key:

The default state is in no HOLD key state, press the key to select modes in order: HOLD key →cancel HOLD key→HOLD key ; In HOLD key mode, all keys except HOLD key of the remote control can't work . (NOTE: In HOLD key mode, the remote and operation panel of the unit both will be locked automatically by pressing the key and press the key again , they will be unlocked. As for the split unit , it only hold the control rather than urgent keys and the panel will make a reaction.)

H. SWING key :

In dehumidifying mode, the swing mode is in the stable wind mode without change. In other mode, press the key to switch modes in the order:

swing →stable wind→natural wind →swing

I. TIMER key :

The default mode is in no timing state,press the key to set timing time with hour as its union. The switch order is: 1H→2H→…→24H→cancel→1H…. Press the key to set timing starting in the off state and set timing stopping in the on state. After setting timing function, the time keeps decreasing per hour until the time decreasing to the timing on or timing off and the timing display will be cancelled at the same time. Pressing MODE key can't cancel timing in timing mode which will send out the order of timing time by pressing other key.

J. HOUR key:

This key is for setting time or hour in timing function. The switch order is: 1H→2H→…→24H→cancel→1H….

K. MIN key:

This key is for setting current time.

2. Wire Controller

Instructions for function:

1. Key function: In the panel, there are 9 keys and their function and defining are:

a. “ON/OFF” key On running, press the key to stop AC; On standby, press it to start AC;

b. “MODE” key The key works as the “MODE” key in the remote controller;

c. SPEED” key The key works as the “SPEED” key in the remote controller;

d. “TIMING” key The key works as the “TIMING” key in the remote controller;

e. Press “TIME ＋” and “TIME －” key to adjust the time. At the timing state, press “TIME ＋” key once and the timing time indicated on the LCD will increase one hour; When it increases to 12 hours and the time will stay at the value. Press “TIME－” key once and the timing time indicated on the LCD will decrease one hour; When it decreases to 1hour and the time will stay at the value.

f. “TEST” key: No matter the unit is running or at the standby state, press the key and LCD will indicate the model and the temperature of the indoor coil instead of timing state or set temperature. Besides, “TEST” key has another function. Press the key and power on, the main panel of the wire controller will begin to check itself and the display is distributed the whole screen of LCD and the buzzer will utter three times. The display and self-inspection will be complete 2 minutes later.

2. Indicator light (red): There is a power indicator light in the main panel of the wire controller. When the system has been supplied power, the red light will be on. When the system goes wrong, the indicator light will flash and give an alarm and it will turn off after the system power-off.

3. Incepting terminal: It is used for accepting the signal of infrared remote controller.

4. Buzzer: The buzzer will utter three times when power-on and starting and it will utter twice when pressing “TIME ＋” and “TIME －” key at the same time. When the controller accepts other signal, it only utters once.