



New Generation PAC

Service Manual

New Released

Form: M-R410A 50Hz On-off-160101

R410A 50Hz On-off

All Model Numbers



Issue Date
Jan 1st, 2016

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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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2.1 Indoor Units	错误!未定义书签。
2.2 Outdoor Units	错误!未定义书签。

1. Model Lists

1.1 Indoor Units

R410A		Capacity multiplied by 1000Btu/h						
Type	Function	12	18	24	30	36	48	60
Four-way cassette(compact)	Cooling only	●	●					
	Cooling and heating	●	●					
Super-slim 4-way cassette	Cooling only			●	●	●	●	●
	Cooling and heating		●	●		●	●	●
A5 middle static pressure duct	Cooling only	●	●	●	●	●	●	●
	Cooling and heating	●	●	●		●	●	●
High static pressure duct	Cooling and heating			●		●		
Ceiling & Floor	Cooling only		●	●	●	●	●	●
	Cooling and heating	●	●	●		●	●	●

1.2 Outdoor Units

Universal Outdoor unit Model	Compressor type	Compressor Brand	Matched indoor units
Heat Pump			
YUGE12BYE--MO-X	ROTARY	GMCC	YTGE12BXE--M-RX YFGE12BXE--M-RX YEGE12BXE--M-WX
YUGE18BYE--MO-X	ROTARY	GMCC	YTGE18BXE--M-RX YFGE18BXE--M-RX YEGE18BXE--M-WX YKGE18BXE--M-RX
YUGE24BYE--MO-X	ROTARY	GMCC	YFGE24BXE--M-RX YGGE24BXE--M-WX YKGE24BXE--M-RX YEGE24BXE--M-WX
YUGE36BYO--MS-X	SCROLL	Panasonic	YFGE36BXO--M-RX YEGE36BXO--M-WX YGGE36BXO--M-WX YKGE36BXO--M-RX
YUGE48BYO--MS-X	SCROLL	Panasonic	YFGE48BXO--M-RX YEGE48BXO--M-WX YGGE48BXO--M-WX YKGE48BXO--M-RX
YUGE55BYO--MS-X	SCROLL	Panasonic	YFGE55BXO--M-RX YEGE55BXO--M-WX YGGE55BXO--M-WX YKGE55BXO--M-RX
Cooling only			
YUFE12BYE--MO-X	ROTARY	GMCC	YTFE12BXE--M-RX YEFE12BXE--M-WX
YUFE18BYE--MO-X	ROTARY	GMCC	YEFE18BXE--M-WX YFFE18BXE--M-RX YTFE18BXE--M-RX
YUFE24BYE--MO-X	ROTARY	GMCC	YEFE24BXE--M-WX YFFE24BXE--M-RX YKFE24BXE--M-RX
YUFE30BYE--MO-X	ROTARY	Shanghai-Hitachi	YKFE30BXE--M-RX YFFE30BXE--M-RX YEFE30BXE--M-WX
YUFE36BYE--MO-X	ROTARY	Shanghai-Hitachi	YFFE36BXE--M-RX YKFE36BXE--M-RX YEFE36BXE--M-WX
YUFE36BYO--MO-X	ROTARY	Shanghai-Hitachi	YFFE36BXO--M-RX YEFE36BXO--M-WX YKFE36BXO--M-RX

YUFE48BYO--MS-X	SCROLL	Panasonic	YEFE48BXO--M-WX YKFE48BXO--M-RX YFFE48BXO--M-RX
YUFE60BYO--MS-X	SCROLL	Panasonic	YKFE60BXO--M-RX YFFE60BXO--M-RX YEFE60BXO--M-WX

2. External Appearance

2.1 Indoor Units

Compact Four-way cassette



Super-slim 4-way Cassette



A5 Middle static pressure duct



High static pressure duct



Ceiling & floor type



2.2 Outdoor Units



Single fan outdoor unit



Double fan outdoor unit

Part 2

Indoor Units

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Ceiling & Floor Type	57

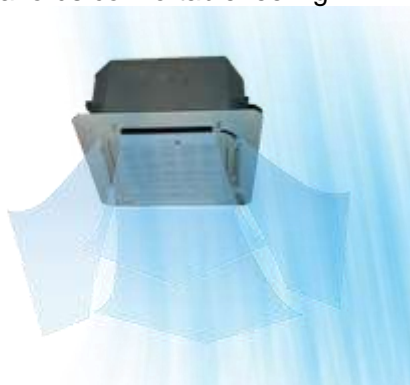
Four-way Cassette Type (Compact)

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1. Features

1.1 New panel

- 360°surrounding air outlet design, affords comfortable feeling



1.2 Compact design

- The body size is 570×260×570mm, it's just smaller than the ceiling board, so it's very easy for installation and will not damage the decoration. The panel size is 647×50×647mm.
- The hooks are designed in the four corners of the body, which can save installation space.



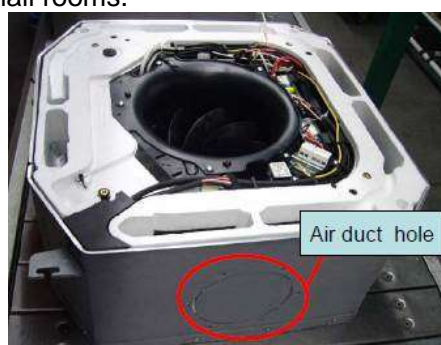
1.3 Electric control box built-in design

- The E-box is simply and safely built inside the indoor unit. It's convenient for installation and maintenance. Can check the control part easily, you only need to open the air return grille.

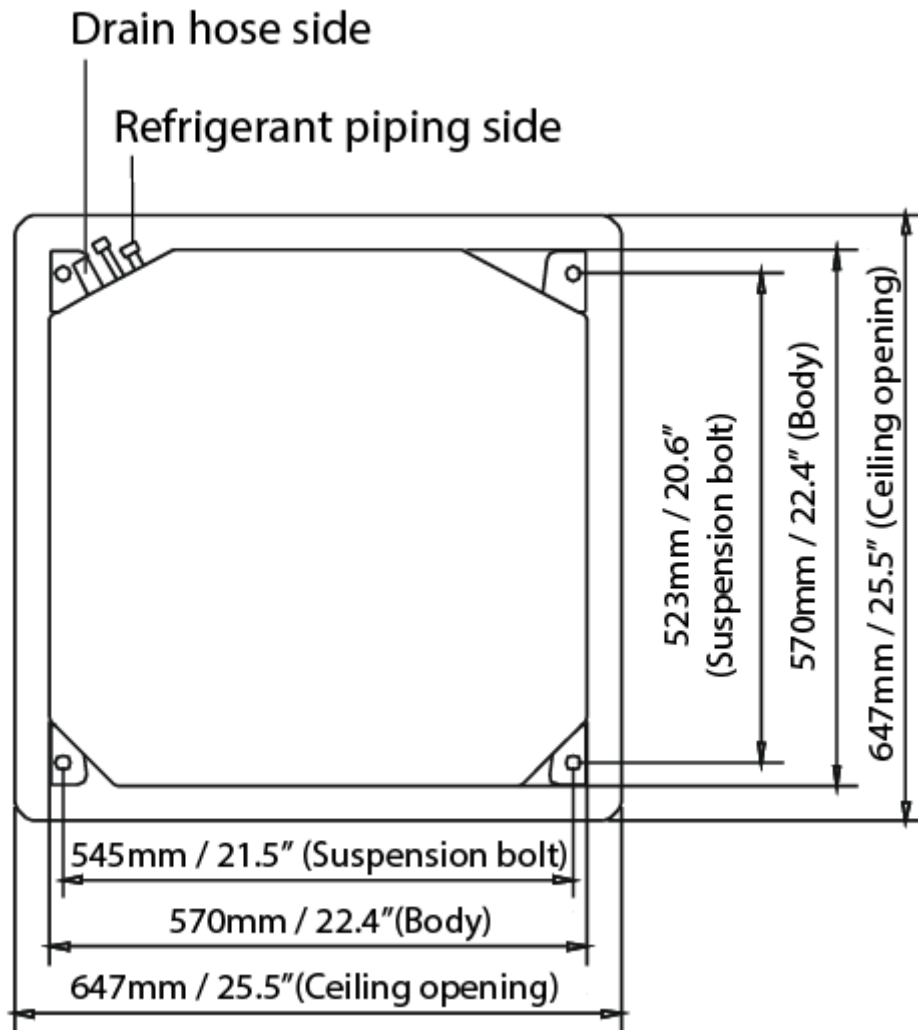


1.4 Air passage function

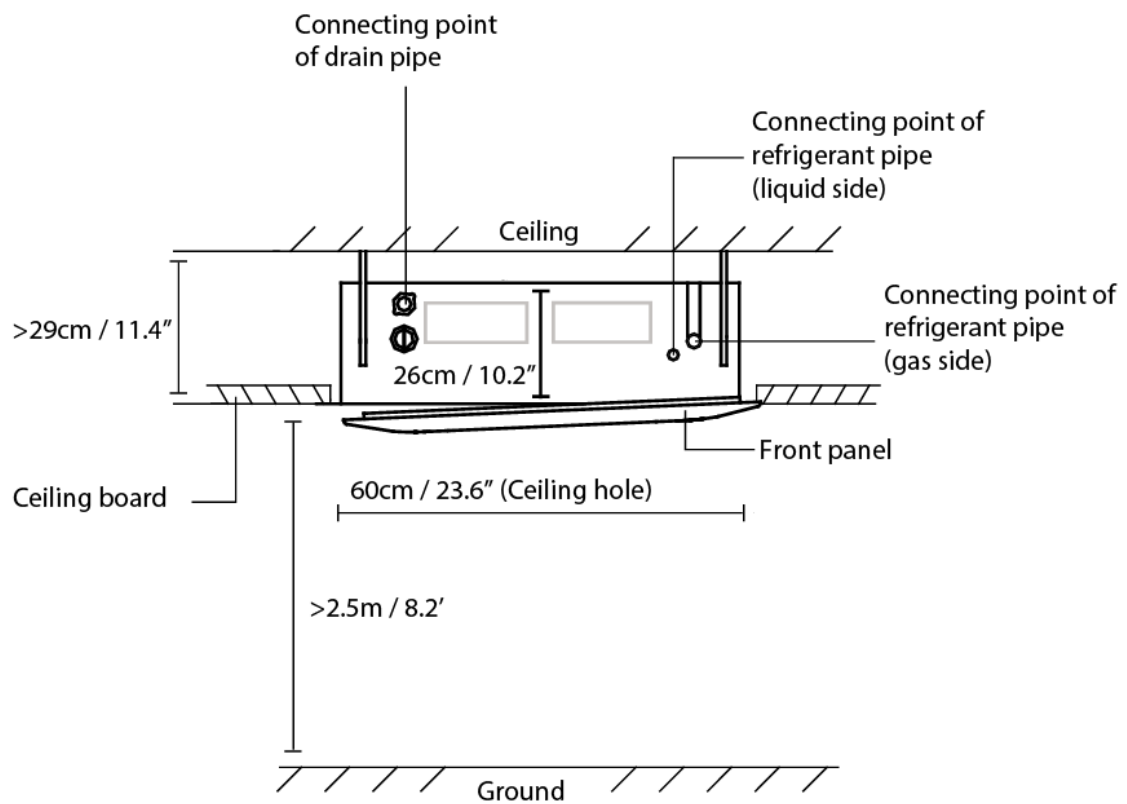
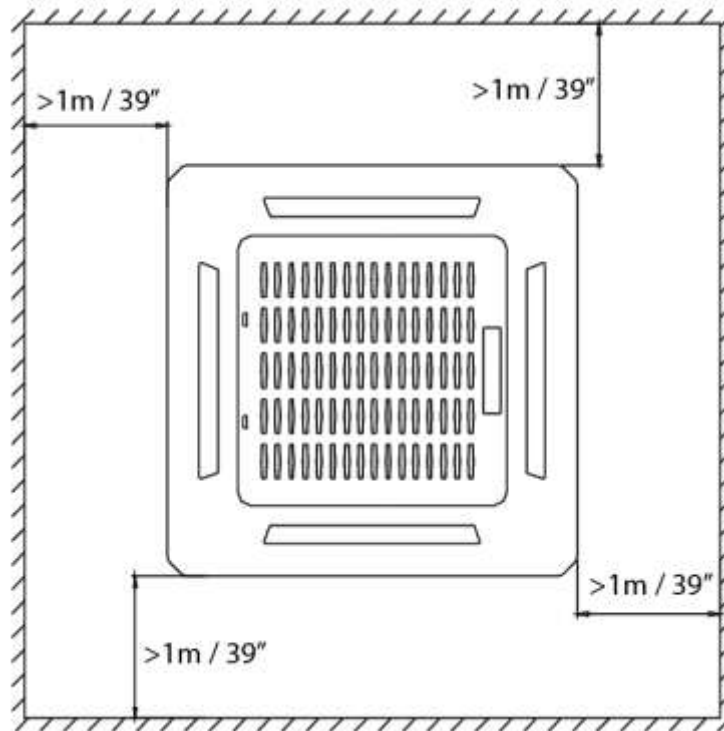
- Reserves the space for air outlet from the side of indoor unit; It's availed to connect air duct from the two sides to the nearby small rooms.



2. Dimensions

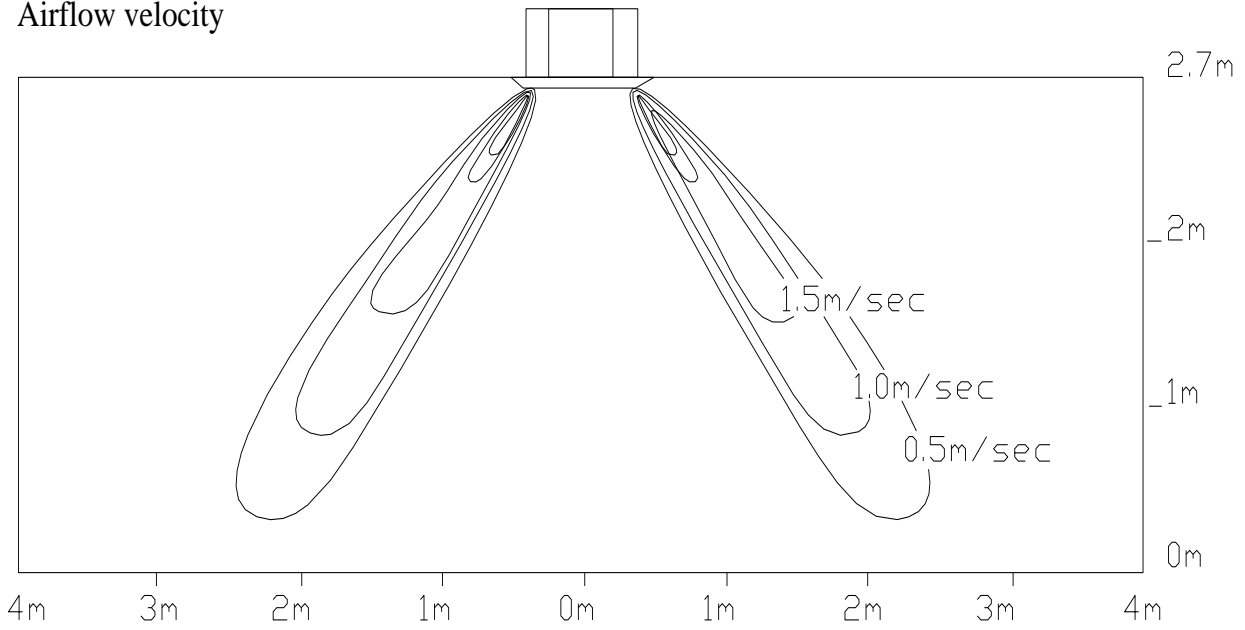


3. Service Space

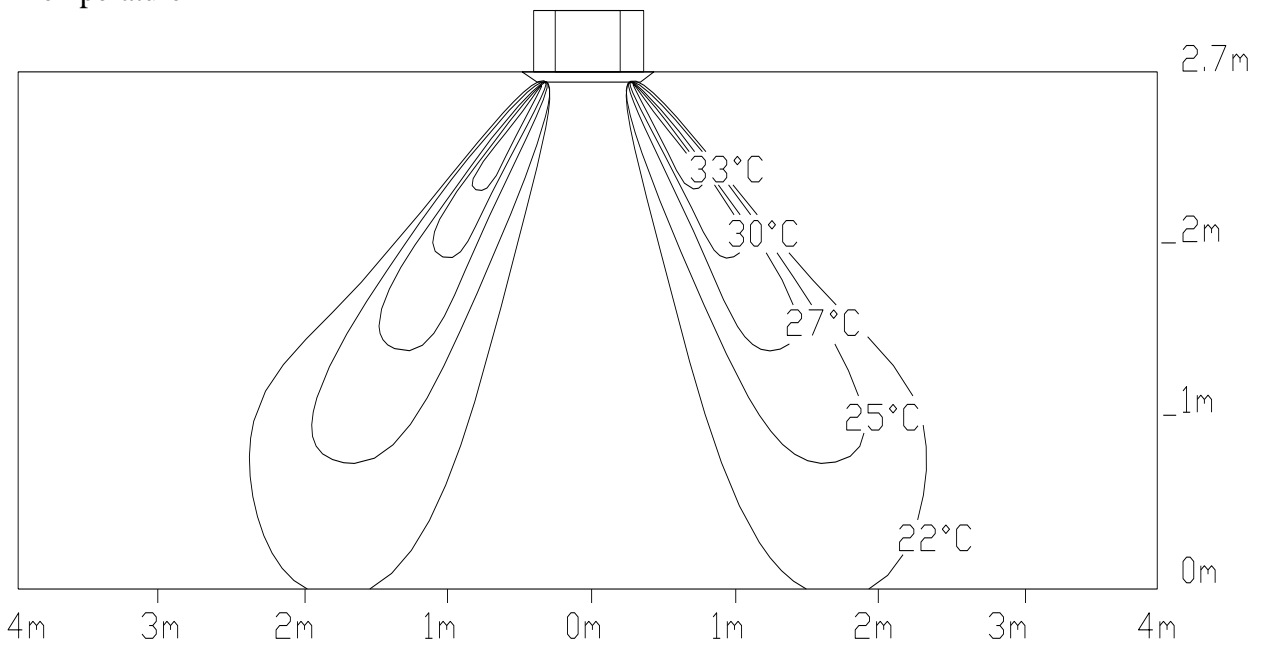


4. Air Velocity and Temperature Distributions(Reference Data)

Airflow velocity



Temperature



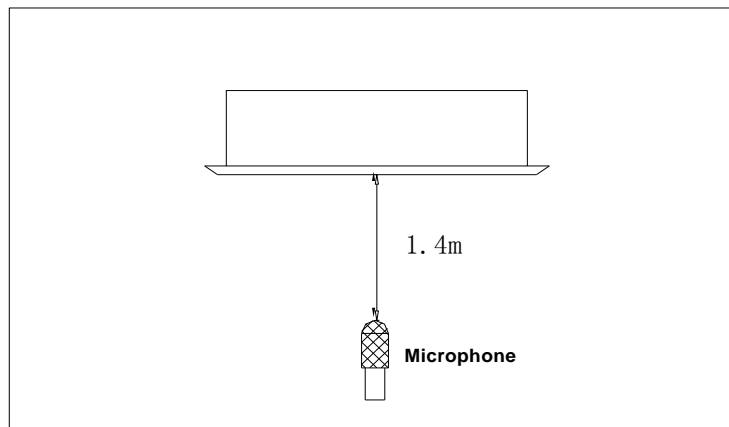
5. Electric Characteristics

Model	Indoor Units				Power Supply
	Hz	Voltage	Min.	Max.	MFA
YTFE12BXE--M-RX	50	220-240V	198V	254V	16
YTGE12BXE--M-RX	50	220-240V	198V	254V	16
YTFE18BXE--M-RX	50	220-240V	198V	254V	16
YTGE18BXE--M-RX	50	220-240V	198V	254V	16

Note:

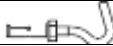












MFA: Max. Fuse Amps. (A)

6. Sound Levels



Model	Noise level dB(A)		
	H	M	L
YTFE12BXE--M-RX	40	36	33
YTGE12BXE--M-RX	42	38	36
YTFE18BXE--M-RX	46	39	36
YTGE18BXE--M-RX	48	41	36

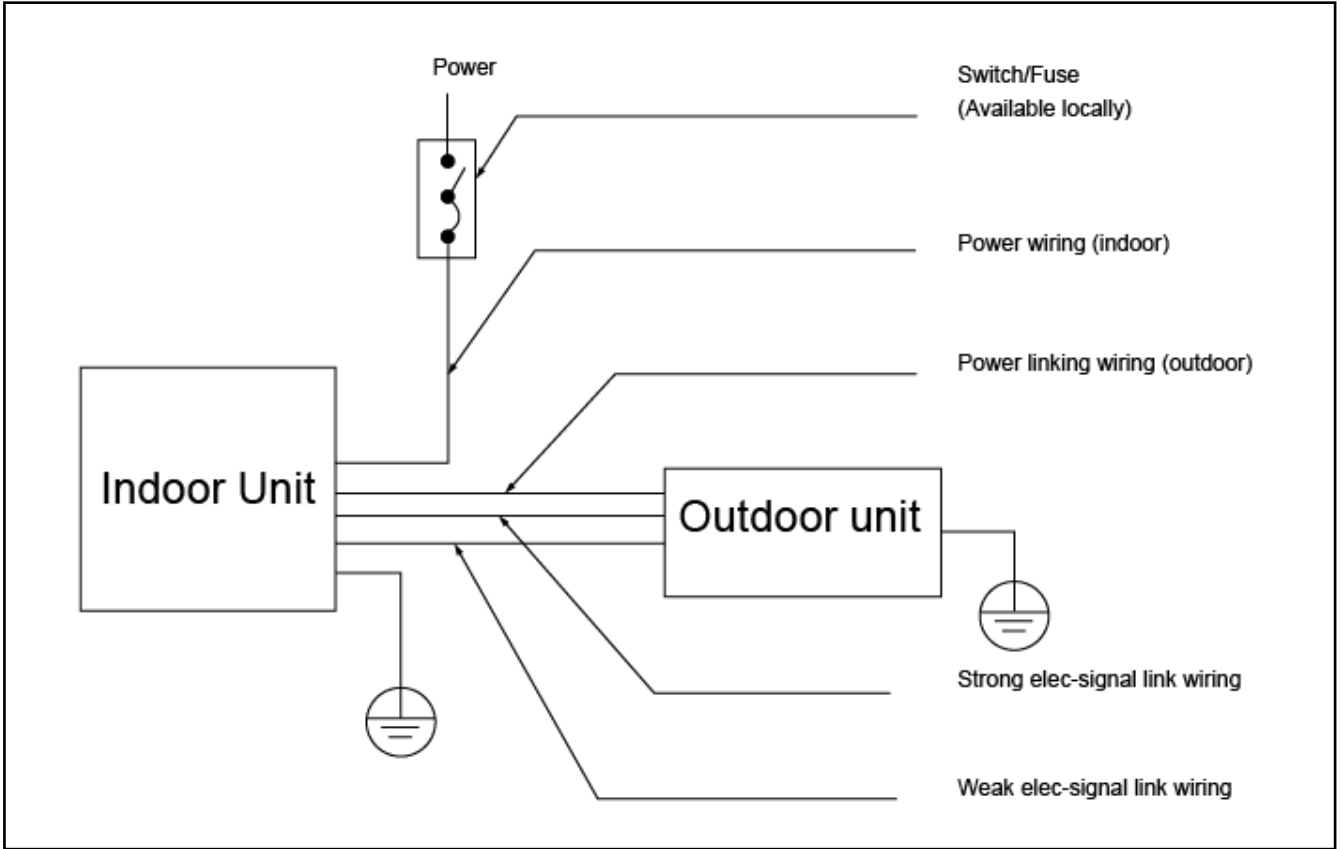
7. Accessories

	Name	Shape	Quantity
Installation fittings	1. Expansible hook		4
	2. Installation hook		4
	3. Installation paper board		1
Drainpipe Fittings	4. Out-let pipe sheath		1
	5. Out-let pipe clasp		1
	6. Tightening band		20
	7. Drain joint		1
Remote controller & Its holder	8. Remote controller		1
	9. Remote controller holder		1
	10. Mounting screw(ST2.9×10-C-H)		2
	11. Alkaline dry batteries (AM4)		2
Others	12. Owner's manual		1
	13. Installation manual		1

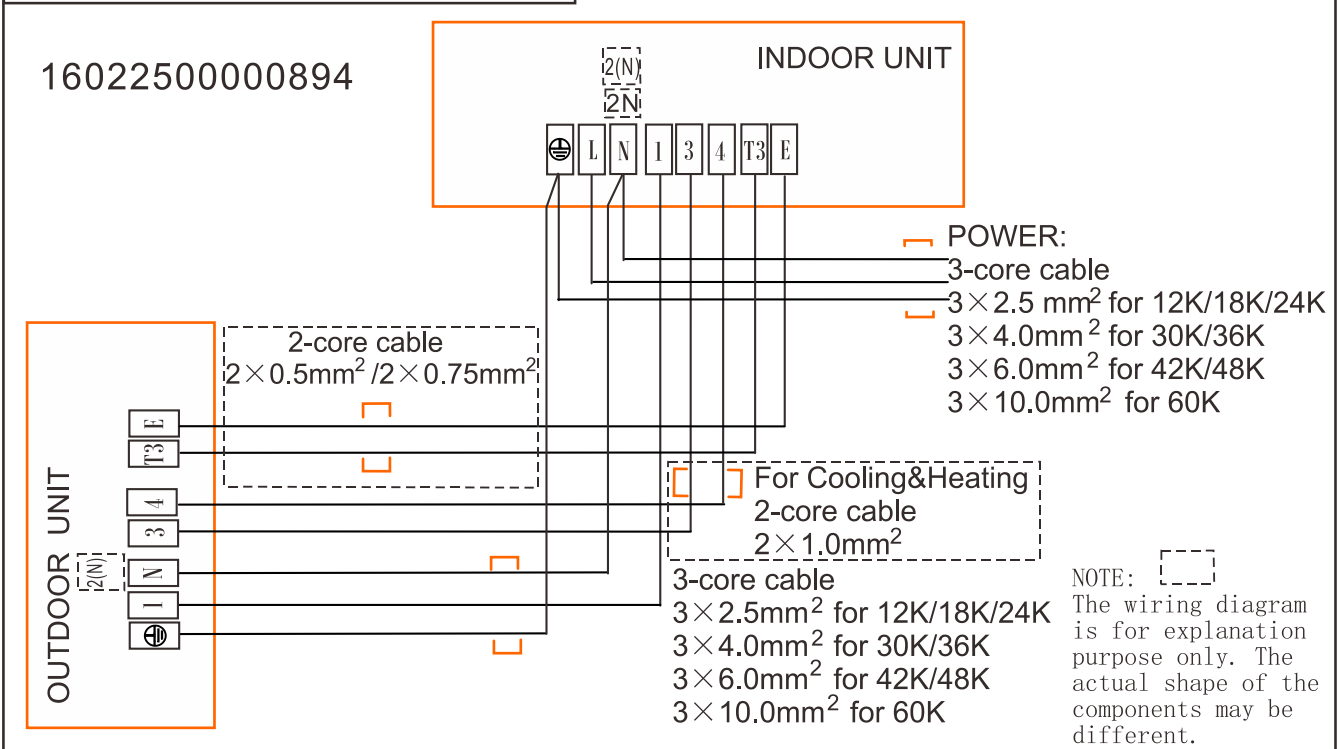
8. The Specification of Power

Type		YTFE12BXE--M-RX YTFE18BXE--M-RX	YTGE12BXE--M-RX YTGE18BXE--M-RX
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)		3×2.5	3×2.5
Indoor/Outdoor Connecting Wiring	Ground Wiring	2.5	2.5
	Outdoor Unit Power Wiring	3×2.5	3×2.5
	Strong Electric Signal	—————	2×1.0
	Weak Electric Signal	(2×0.75/2×0.5)	(2×0.75/2×0.5)

9. Field Wiring



Air Condition Link-Circuit



Super-slim Cassette Type

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1. Features

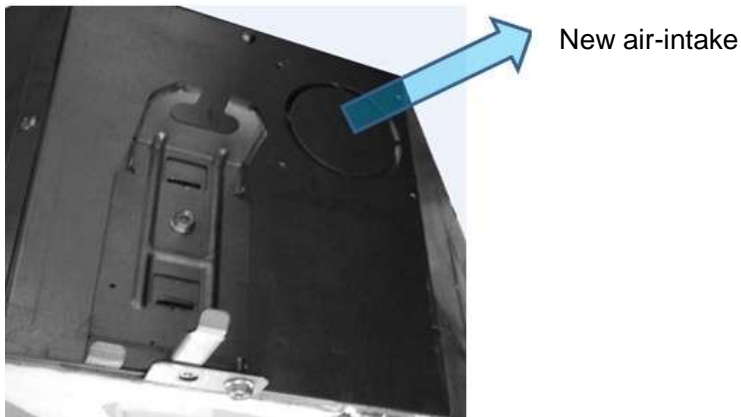
1.1 Overview

- Compact design, super slim body size, less space requiring in installation
- Each louver can be separately controlled, more comfort air blowing is possible.
- Auto-lifting panel design, more convenient to clean and maintain the filter. (optional)



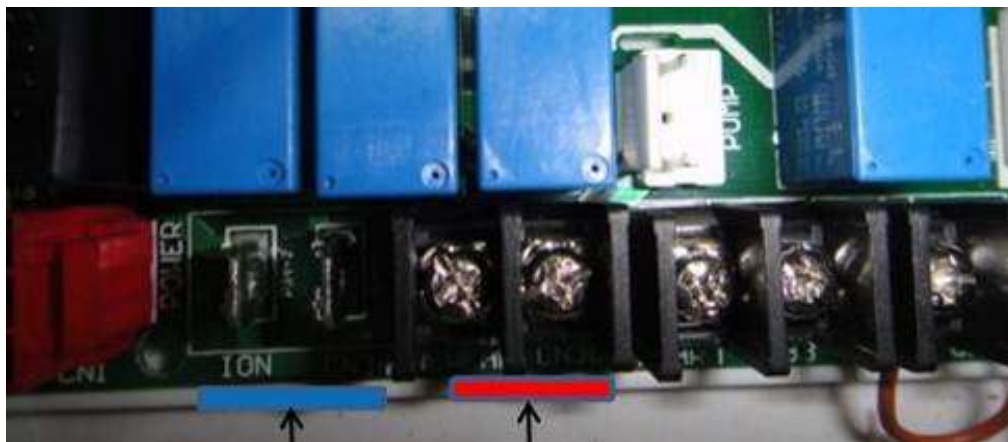
1.2 Fresh air intake function

- Fresh air fulfills air quality more healthy and comfortable.
- Ventilation motor is optional to increase the effect of fresh air.



1.3 Optional ionizer generator

- Ionizer generator is optional to get refreshing air to your room.



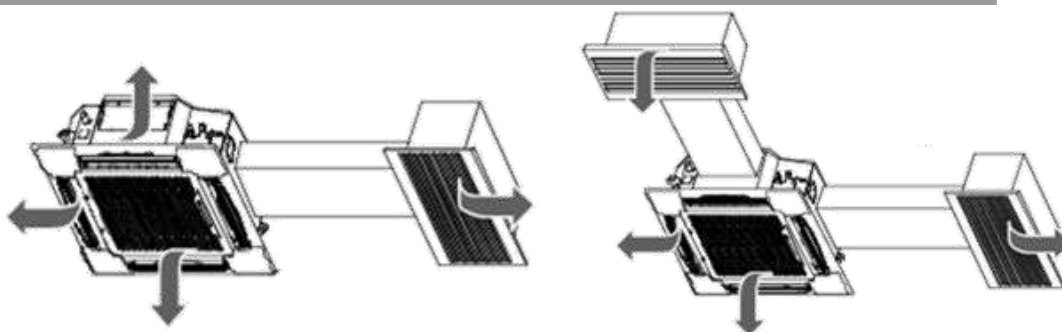
Ionizer generator connector Ventilation motor connector

- Ionizer can be switched on or off by remote controller. When pressing the Clean Air button on the remote controller, Ionizer will work and the indicator light on display board will shine.



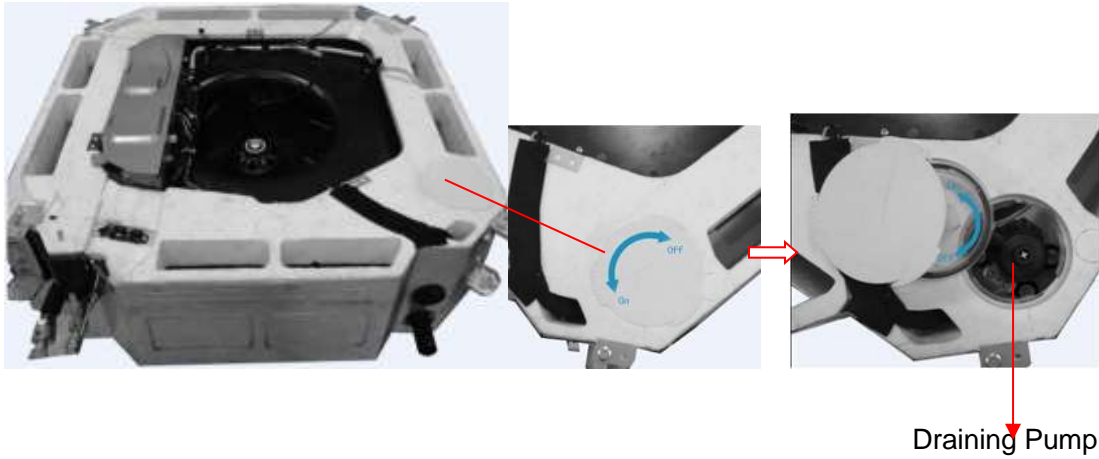
1.4 External air duct design

- Reserve external air duct, more flexible for the air supply.

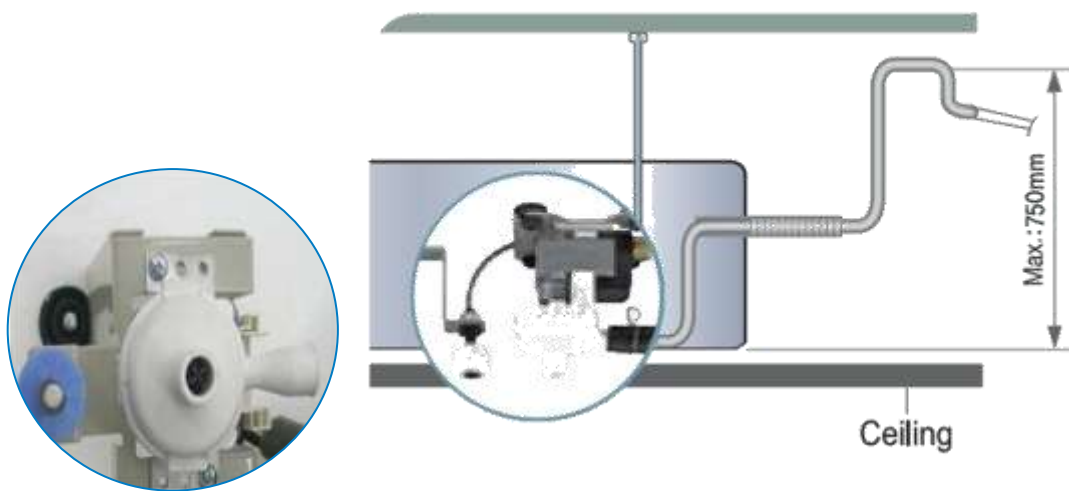


1.5 Built-in draining pump

- Due to the improvement of structure, more convenient to repair or replace the draining pump.

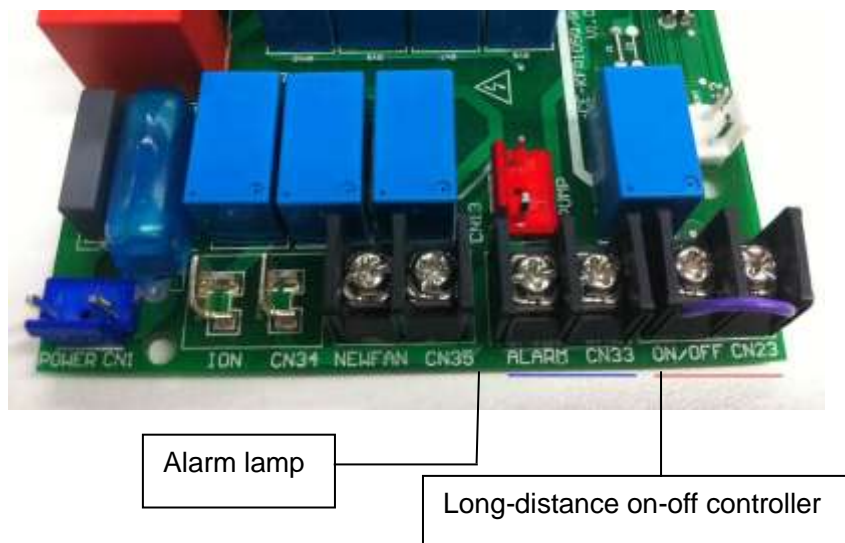


- Built-in draining pump to make sure condensed water drain out reliably.

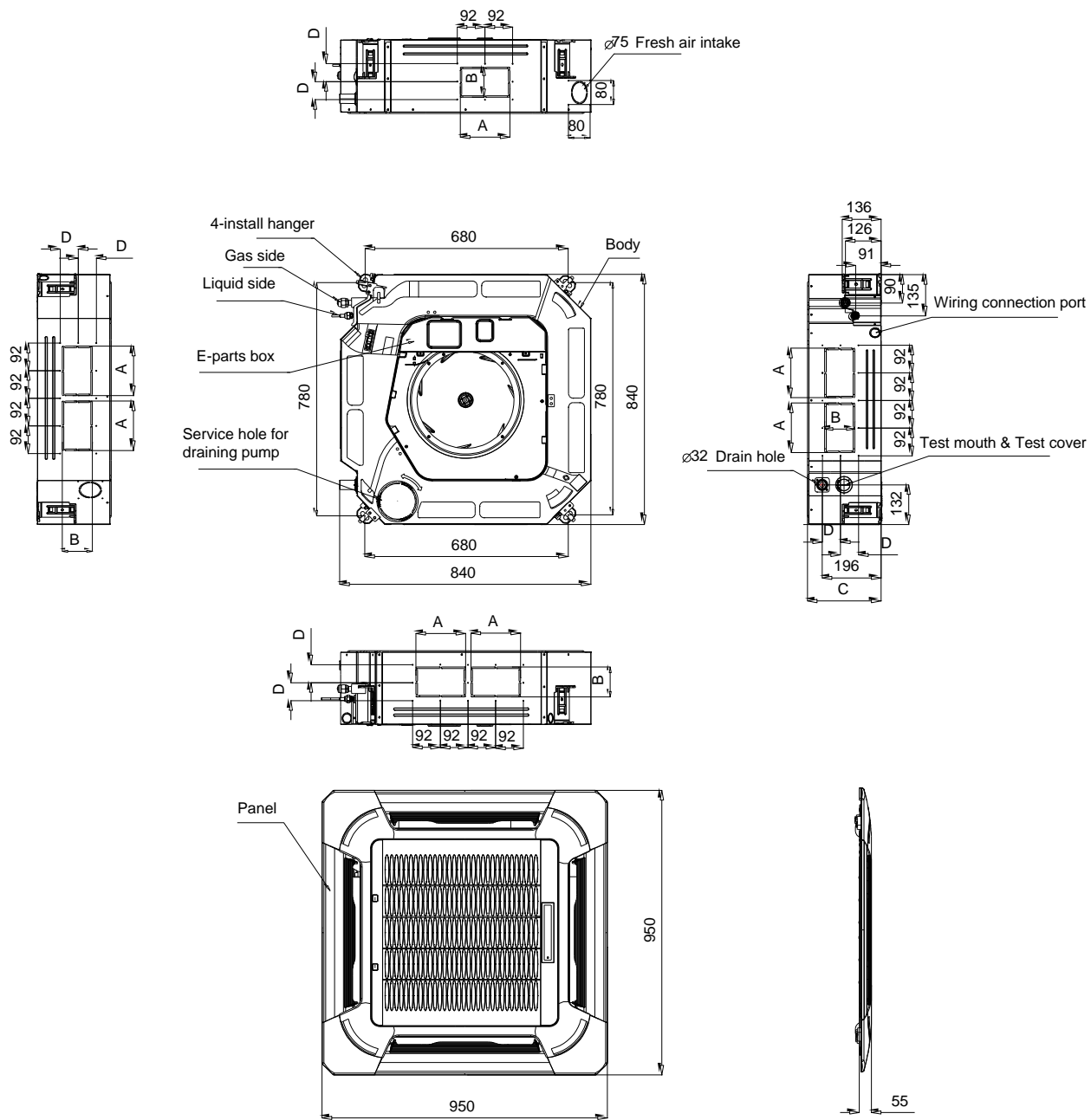


1.6 Terminals for alarm lamp and long-distance on-off controller connection are standard

- Reserve terminals for the connection of alarm lamp and long-distance on-off controller, more human control.

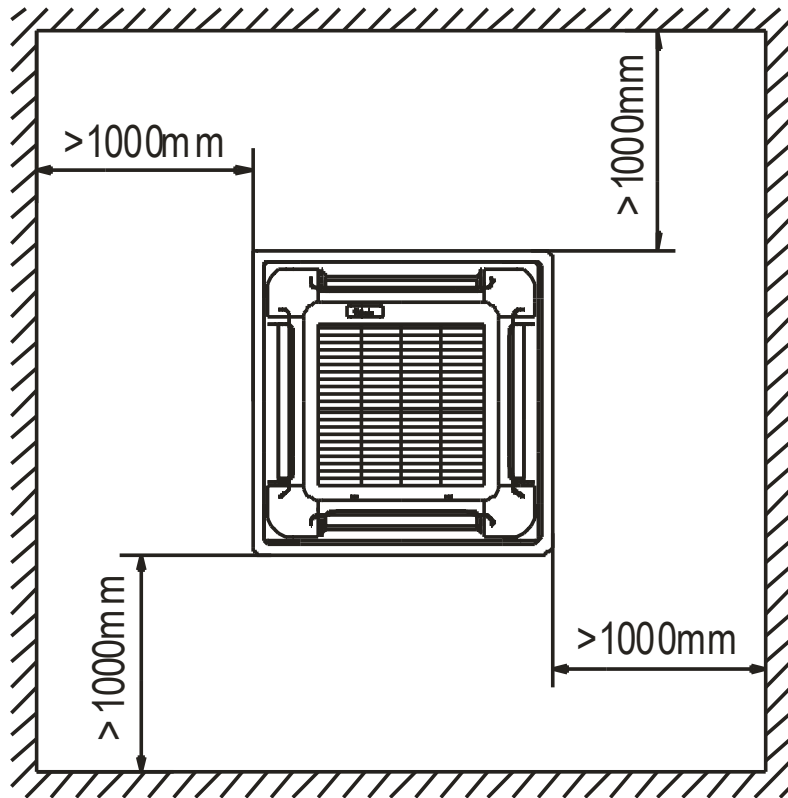


2. Dimensions



				Unit: mm
Model	A	B	C	D
18~24	160	75	205	50
30~48	160	95	245	60
60	160	95	287	60

3. Service Space



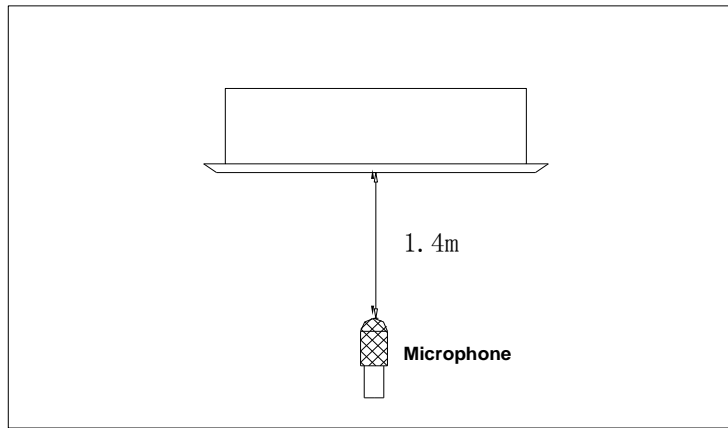
4. Electric Characteristics

Model	Indoor Unit				Power Supply
	Hz	Voltage	Min	Max	MFA
YKGE18BXE--M-RX	50	220-240V	198V	254V	16
YKGE24BXE--M-RX	50	220-240V	198V	254V	25
YKFE24BXE--M-RX	50	220-240V	198V	254V	25
YKFE30BXE--M-RX	50	220-240V	198V	254V	30
YKFE36BXE--M-RX	50	220-240V	198V	254V	30
YKFE36BXO--M-RX	50	380-415V	342V	436V	20
YKGE36BXO--M-RX	50	380-415V	342V	436V	20
YKFE48BXO--M-RX	50	380-415V	342V	436V	20
YKGE48BXO--M-RX	50	380-415V	342V	436V	20
YKFE60BXO--M-RX	50	380-415V	342V	436V	20
YKGE55BXO--M-RX	50	380-415V	342V	436V	20

Notes:



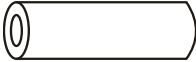











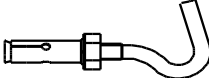

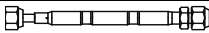
MFA: Max. Fuse Amps. (A)

5. Sound Levels



Model	Noise level dB(A)		
	H	M	L
YKGE18BXE--M-RX	43	40	35
YKGE24BXE--M-RX	50	45	41
YKFE24BXE--M-RX	48	43	38
YKFE30BXE--M-RX	54	50	46
YKFE36BXE--M-RX	54	50	47
YKFE36BXO--M-RX	53	50	47
YKGE36BXO--M-RX	51	47	43
YKFE48BXO--M-RX	54	52	50
YKGE48BXO--M-RX	53	48	44
YKFE60BXO--M-RX	55	53	51
YKGE55BXO--M-RX	53	48	44

6. Accessories

	Name	Shape	Quantity
INSTALLATION FITTINGS	Installation paper board		1
	Bolt M5		4
Tubing & Fittings	Soundproof / insulation sheath		2
Drainpipe Fittings	Out-let pipe		1
	Out-let pipe sheath		1
	Out-let pipe clasp		1
Remote controller & Its Frame	Remote controller & Its Frame		1
	Remote controller holder		1
	Mounting screw(ST2.9x10-C-H)		2
	Remote controller manual		1
	Alkaline dry batteries (AM4)		2
Others	Owner's manual		1
	Installation manual		1
	Network wires		1
Installation accessory (The product you have might not be provided the following accessories	Expansive hook		4
	Installation hook		4
	Orifice		1

7. The Specification of Power

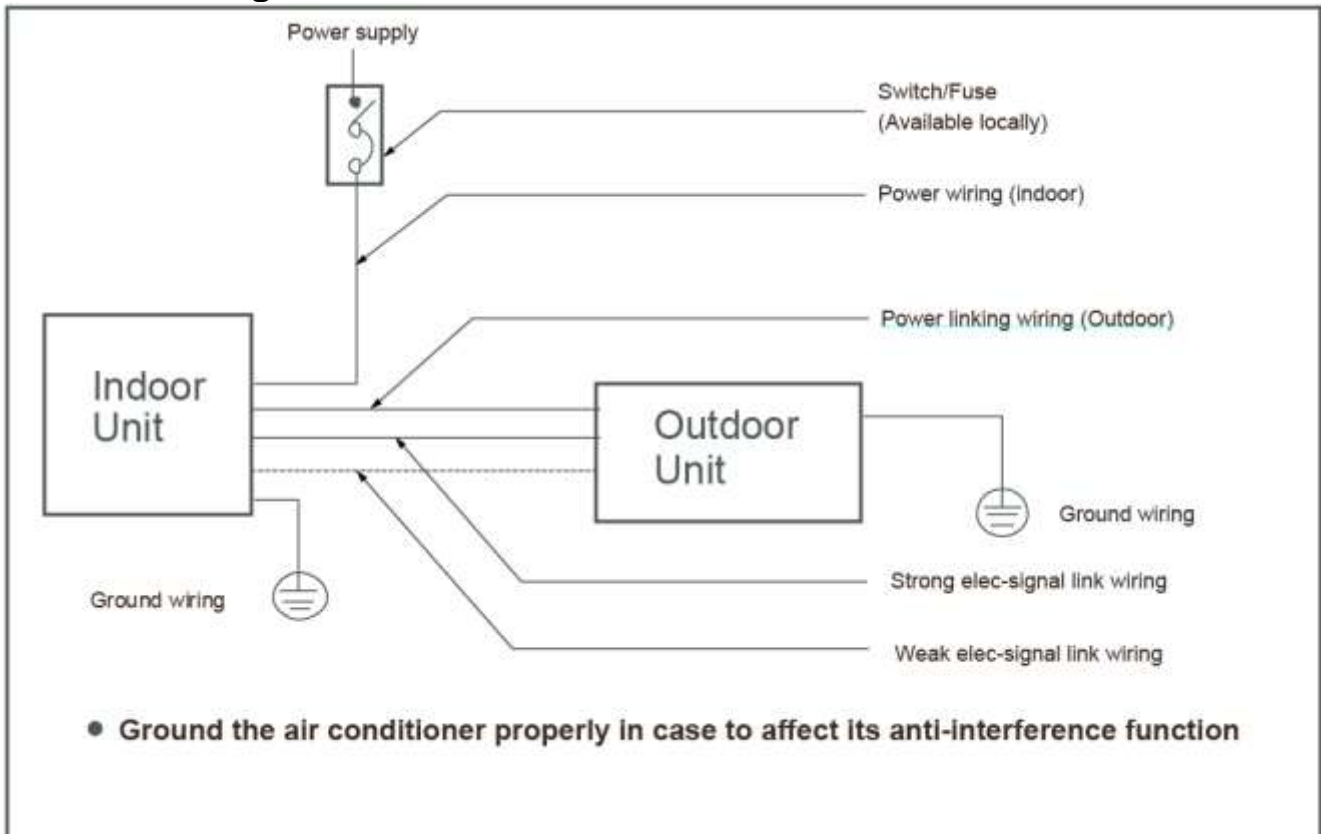
Cooling only:

Model (KBtu/h)		18	24	30-36	36~60
Power	Phase	1-phase	1-phase	1-phase	3-phase
	Frequency and Voltage	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	380-420V, 50Hz
Circuit Breaker/ Fuse (A)		20/16	40/25	50/30	25/20
Indoor Unit Power Wiring (mm ²)		3×2.5	3×2.5	3×4.0	5×2.5
Indoor/Outdoor Connecting Wiring (mm ²)	Ground Wiring	2.5	2.5	4.0	2.5
	Outdoor Unit Power Wiring	3×2.5	3×2.5	3×4.0	5×2.5
	Strong Electric Signal	—————	1×1.0	1×1.0	1×1.0
	Weak Electric Signal	(2×0.75/2×0.5)	(2×0.75)	(2×0.2)	—————

Heating pump:

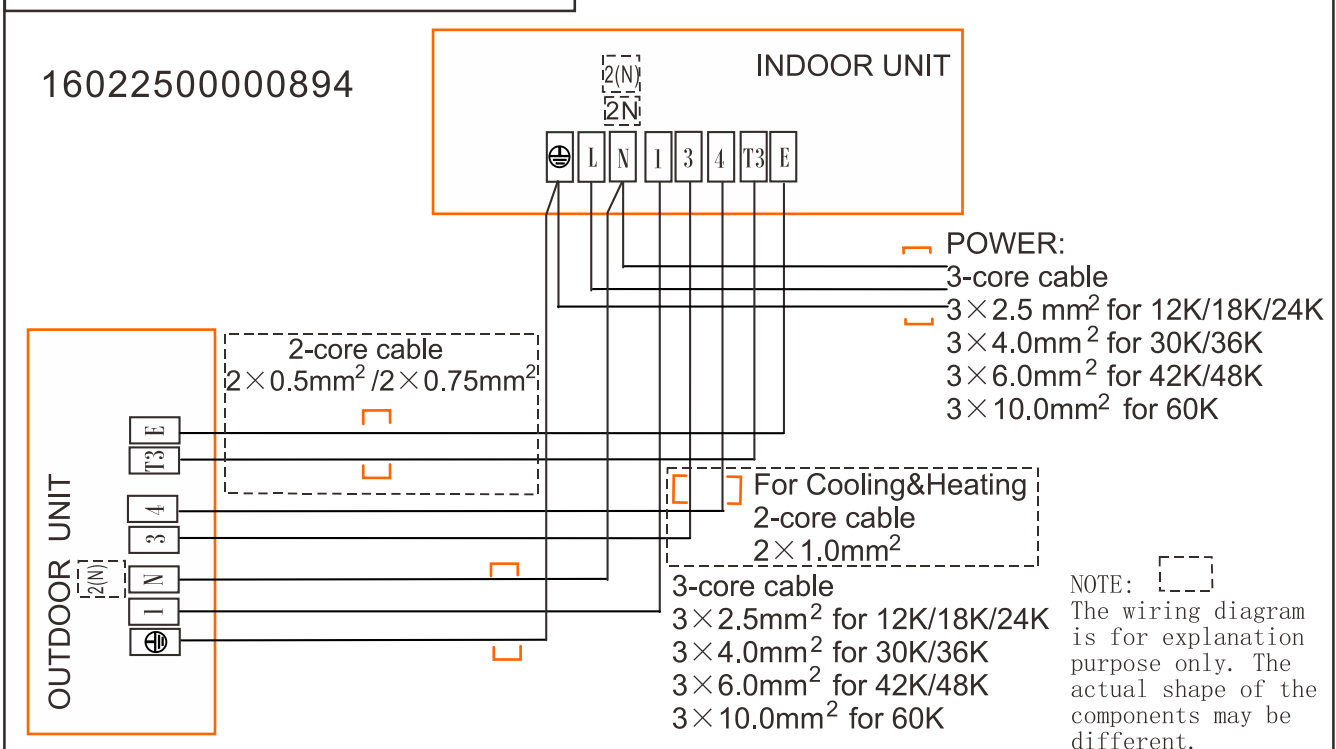
Model(Heat pump)		18000 Btu/h	24000 Btu/h	36000-60000 Btu/h
Power	Phase	1-Phase	1-Phase	3-Phase
	Frequency and Volt	220-240V,50Hz	220-240V,50Hz	380-415V, 50Hz
Circuit Breaker/Fuse(A)		20/16	40/25	25/20
Indoor unit power wiring(mm ²)		3×2.5	3×2.5	5×2.5
Indoor/out-door connecting wiring(mm ²)	Ground wiring	2.5	2.5	2.5
	Outdoor unit power wiring	3×2.5	3×2.5	5×2.5
	Strong electric signal	2×1.0	3×1.0	3×1.0
	Weak electric signal	2×0.75/2×0.5	2×0.2	—————

8. Field Wiring

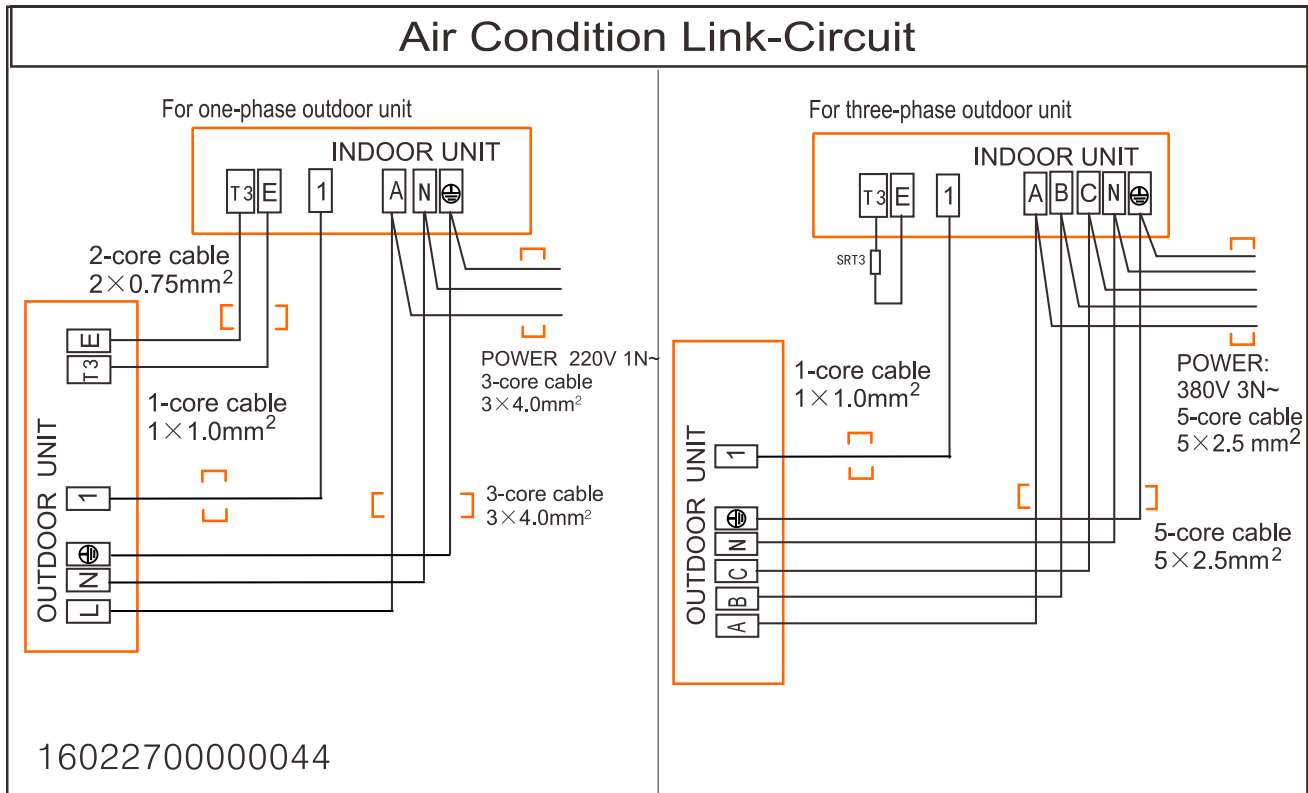


YKGE18BXE--M-RX

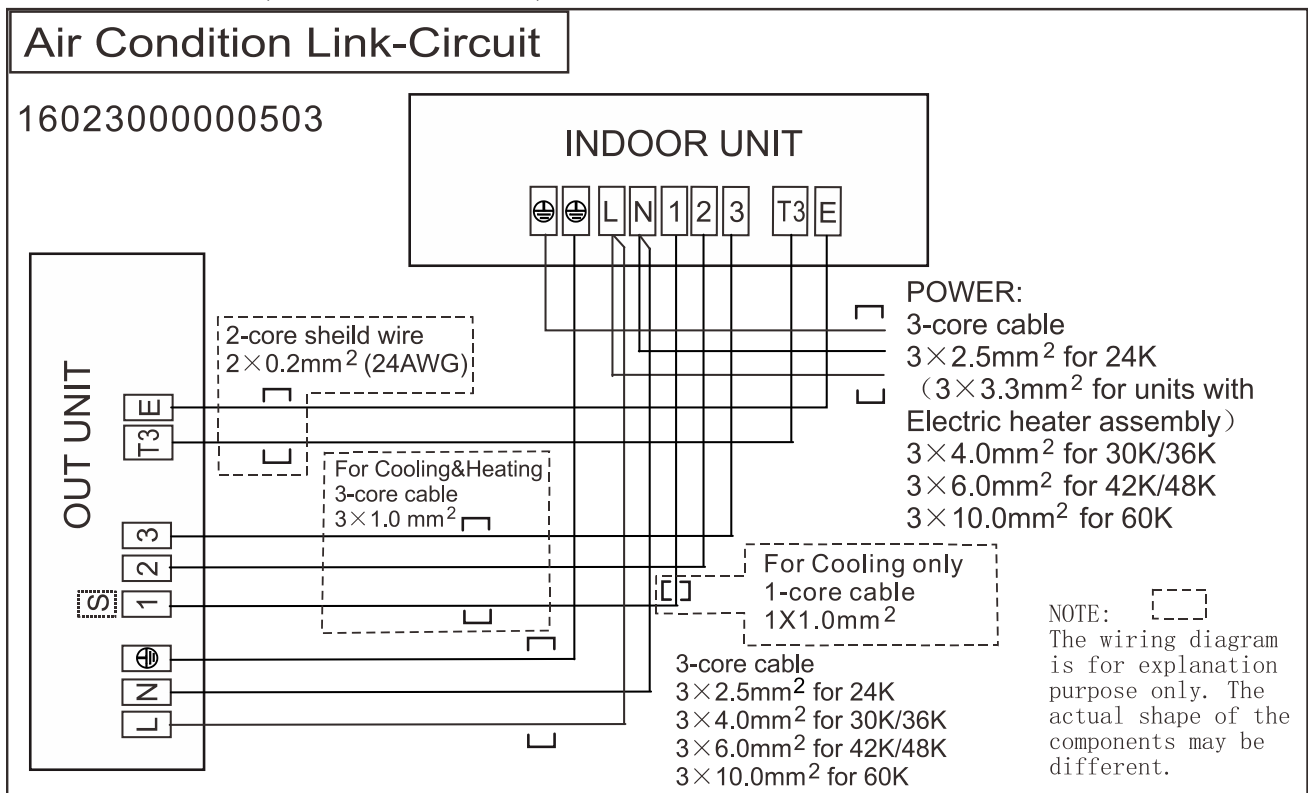
Air Condition Link-Circuit



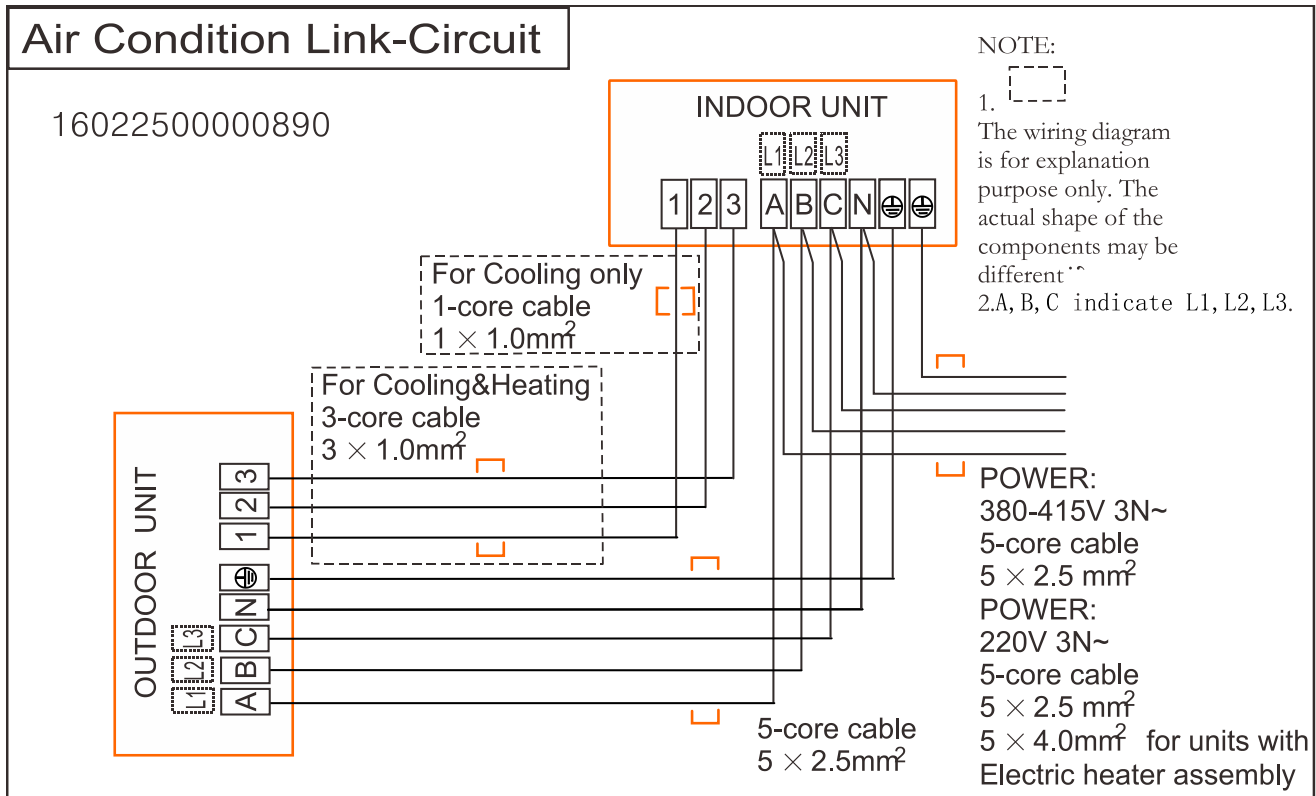
YKFE36BXE--M-RX



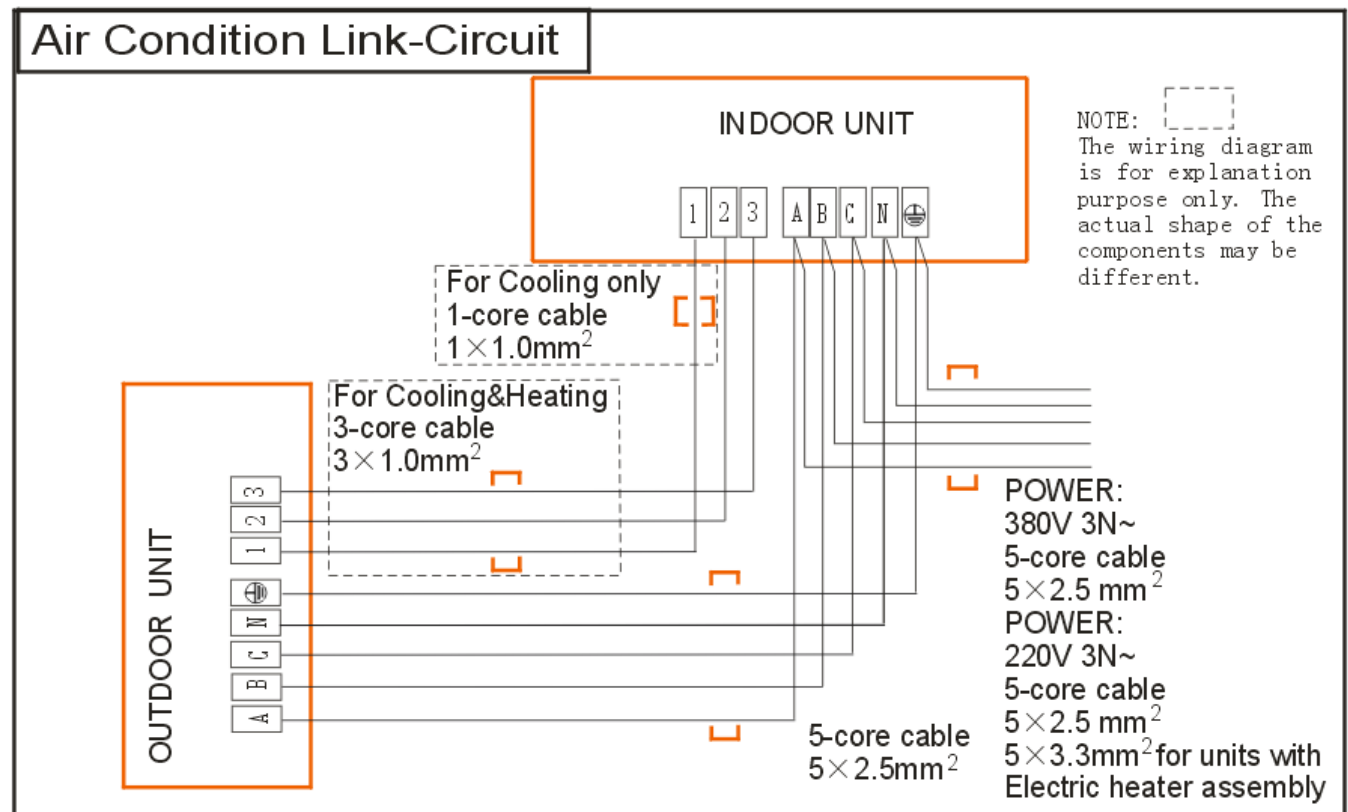
YKGE24BXE--M-RX, YKFE24BXE--M-RX, YKFE30BXE--M-RX



YKFE36BXO--M-RX, YKFE48BXO--M-RX, YKFE60BXO--M-RX



YKGE36BXO--M-RX YKGE48BXO--M-RX YKGE55BXO--M-RX



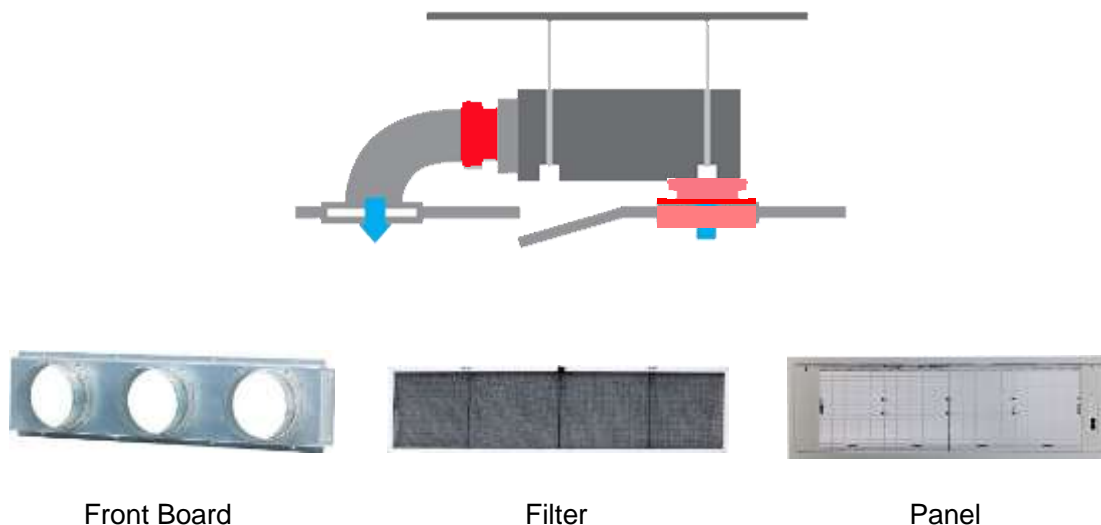
A5 Duct

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1. Features

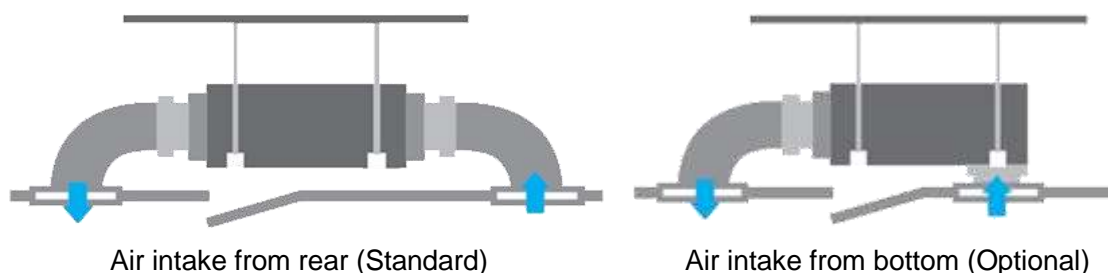
1.1 Installation accessories: (Optional)

- Front Board, Canvas Air Passage, Filter, Panel, for easy installation



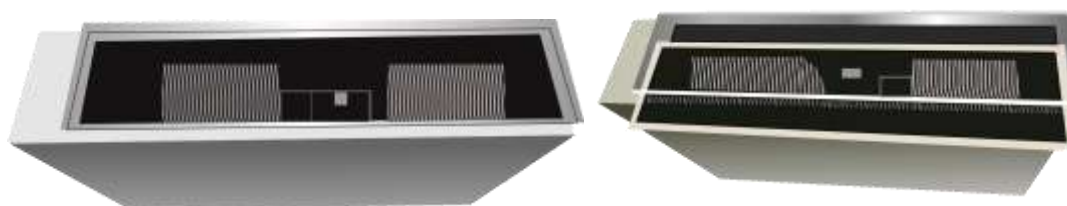
1.2 Easy Installation: Two air inlet styles (Bottom side or Rear side)

- Air inlet from rear is standard for all capacity; air inlet from bottom is optional.
- The size of air inlet frame from rear and bottom is same, it's very easy to move the cover from bottom to rear side, or from rear to the bottom, in order to matching the installation condition.

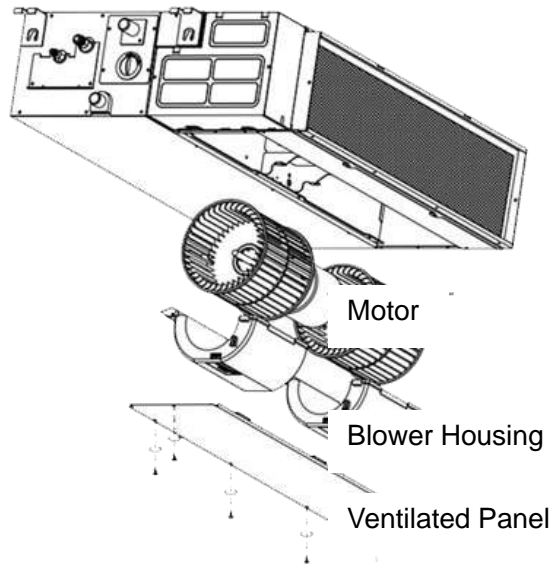


1.3 Easy maintenance

- Clean the filter (Optional, standard product without filter)
It is easy to draw out the filter from the indoor unit for cleaning, even the filter is installed in rear side or bottom side.

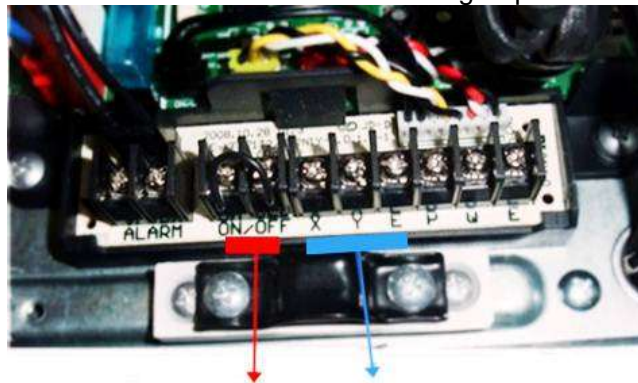


- Replace the motor or centrifugal fan
Remove the ventilated panel firstly. Remove a half of blower housing and take out the motor with centrifugal fan. Directly remove two bolts, and then replace the motor or centrifugal fan easily.



1.4 Reserved remote on-off and central control ports

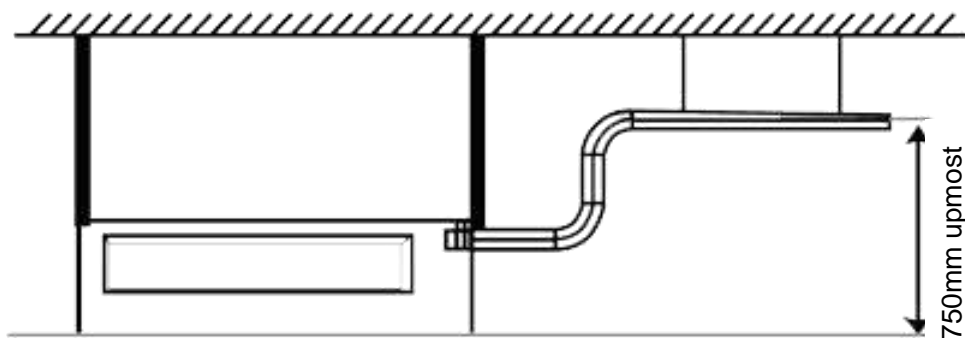
- Reserved remote on-off ports and central control ports, can connect the cable of an on-off controller or a central controller to realize remote on-off control function or group control function.

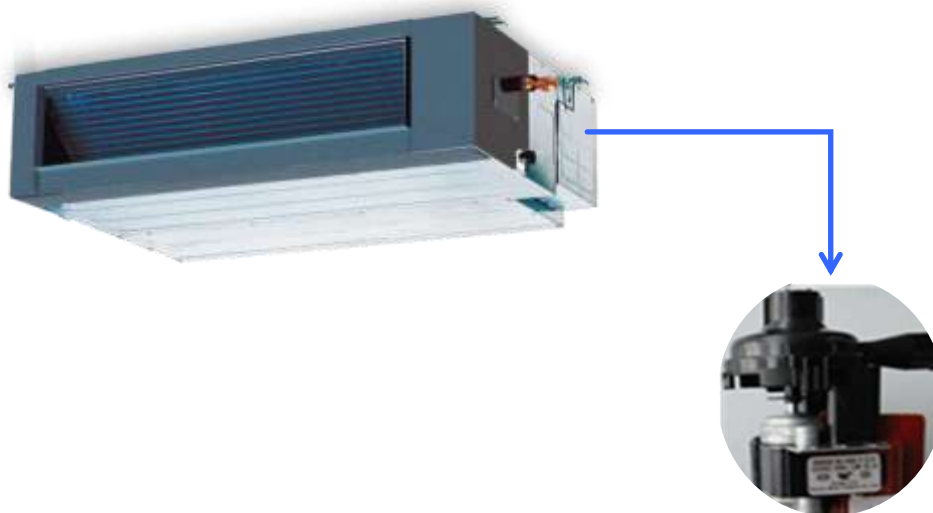


Remote on-off ports Central control ports

1.5 Built-in drain pump (Optional):

- Built-in drain pump can lift the water to 750mm upmost. It's convenient to install drainage piping under most space condition.





1.6 Built-in display board

- The standard indoor unit can be controlled by wired controller.
- There is a display board with a receiver in the E-box. Move out the display, and fix it in other place, even in the distance of 10m. The unit will realized remoter control.
- The wired controller and the display board can display the error code or production code when the chips detect some failure.

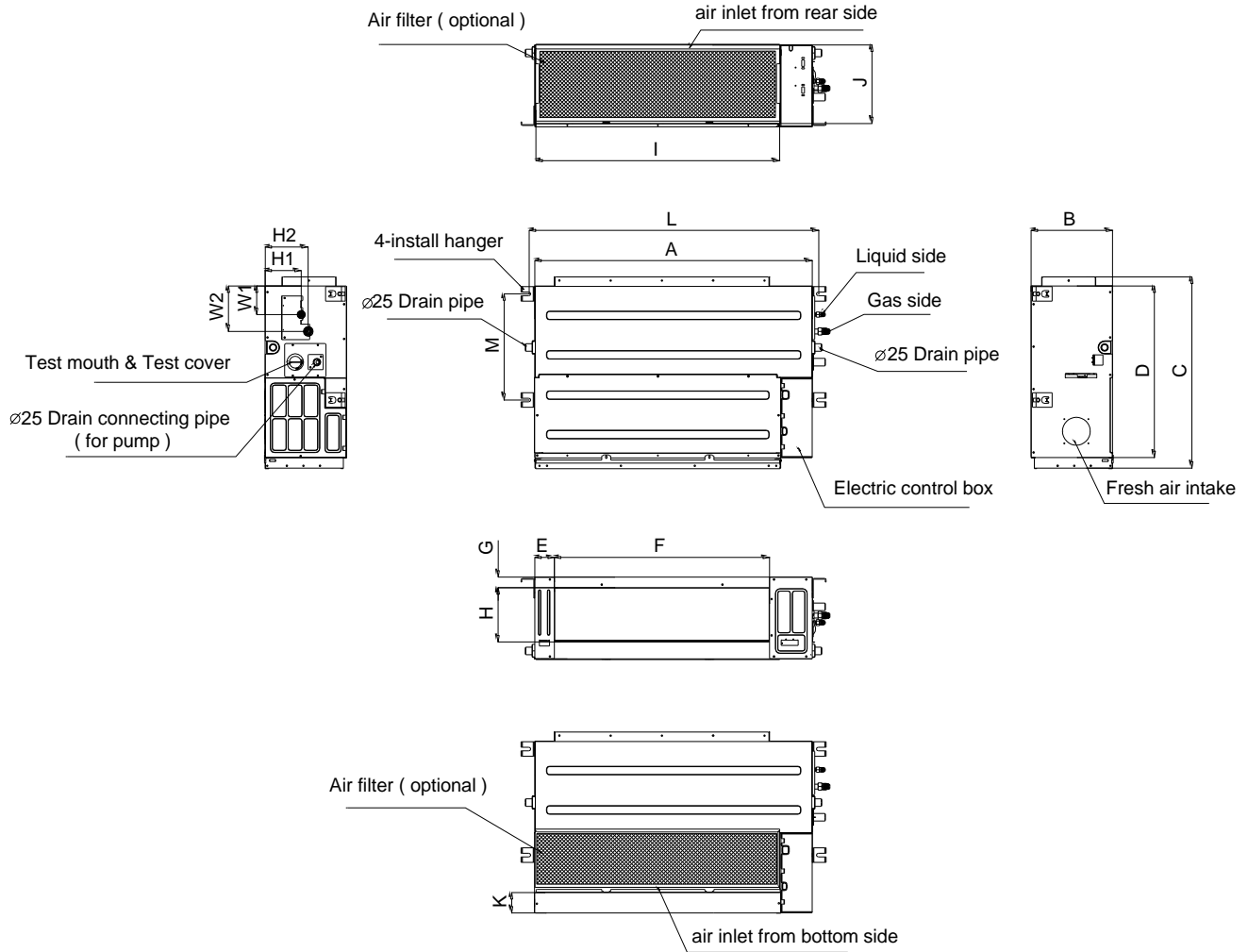
Wired Controller (Standard)



Remote Controller (Optional)



2. Dimensions



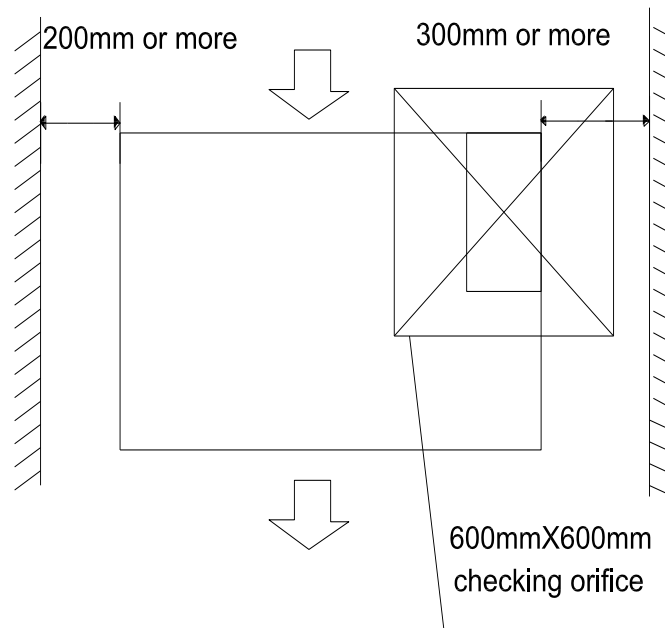
Note: standard product without filter

Model(Btu/h)	Outline dimension(mm)				Air outlet opening size				Air return opening size			Size of install hanger		Size of refrigerant pipe			
	A	B	C	D	E	F	G	H	I	J	K	L	M	H1	H2	W1	W2
	12K	700	210	635	570	65	493	35	119	595	200	80	740	350	120	143	95
18K	920	210	635	570	65	713	35	119	815	200	80	960	350	120	143	95	150
24K	920	270	635	570	65	713	35	179	815	260	20	960	350	120	143	95	150
30/36K	1140	270	775	710	65	933	35	179	1035	260	45	1240	500	120	143	95	150
48K/60K	1200	300	865	800	80	968	40	204	1094	288	45	1240	500	175	198	155	210

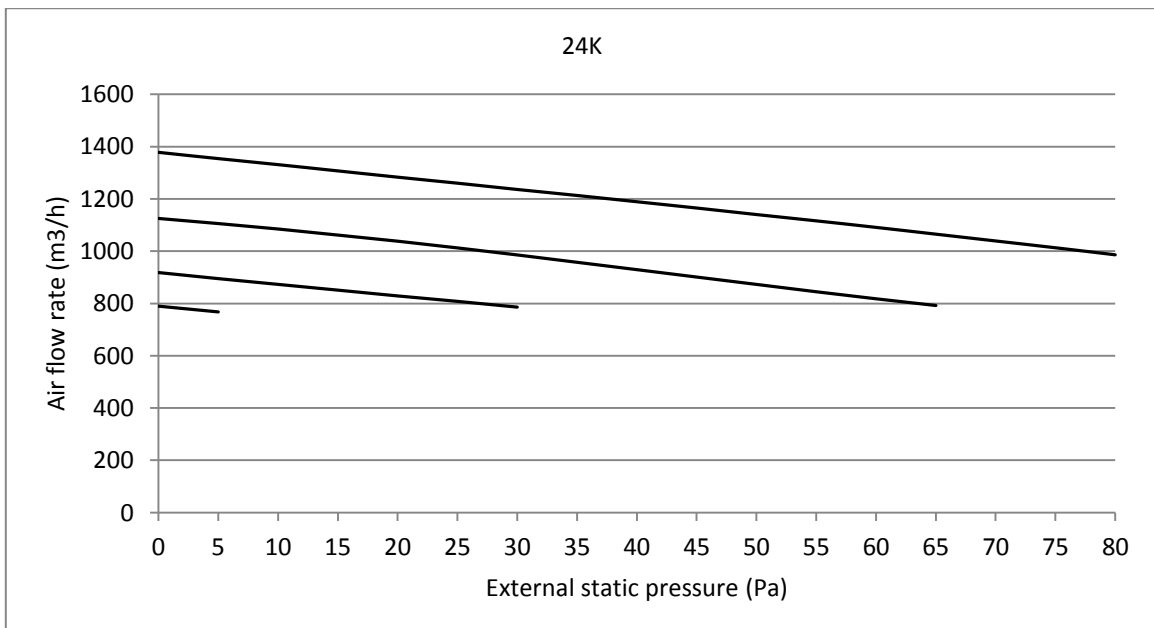
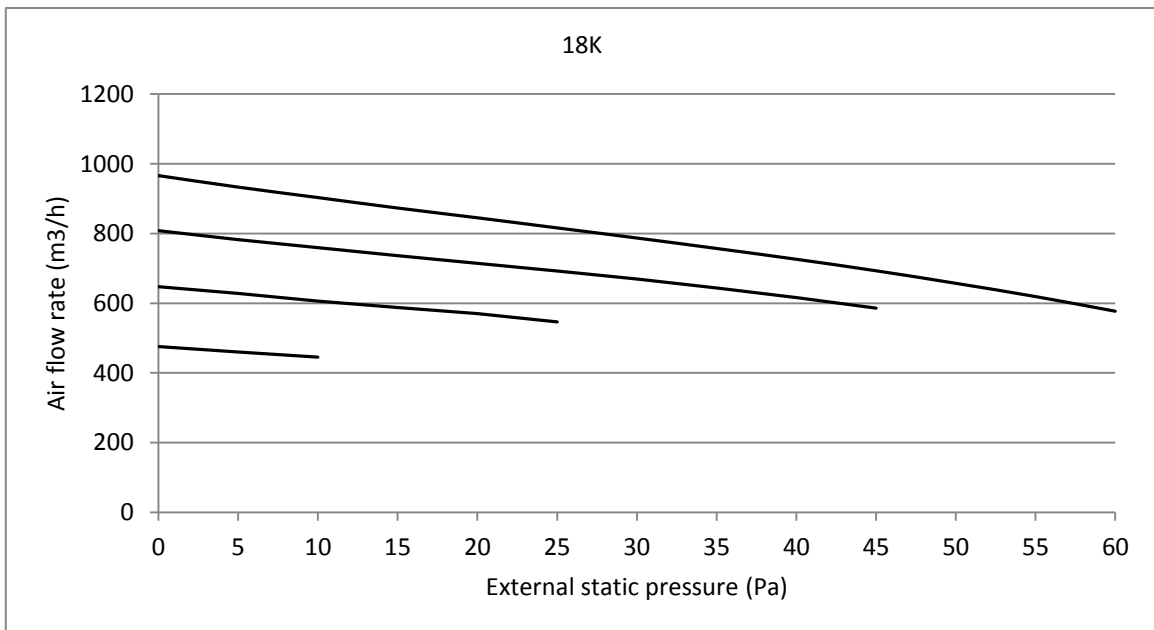
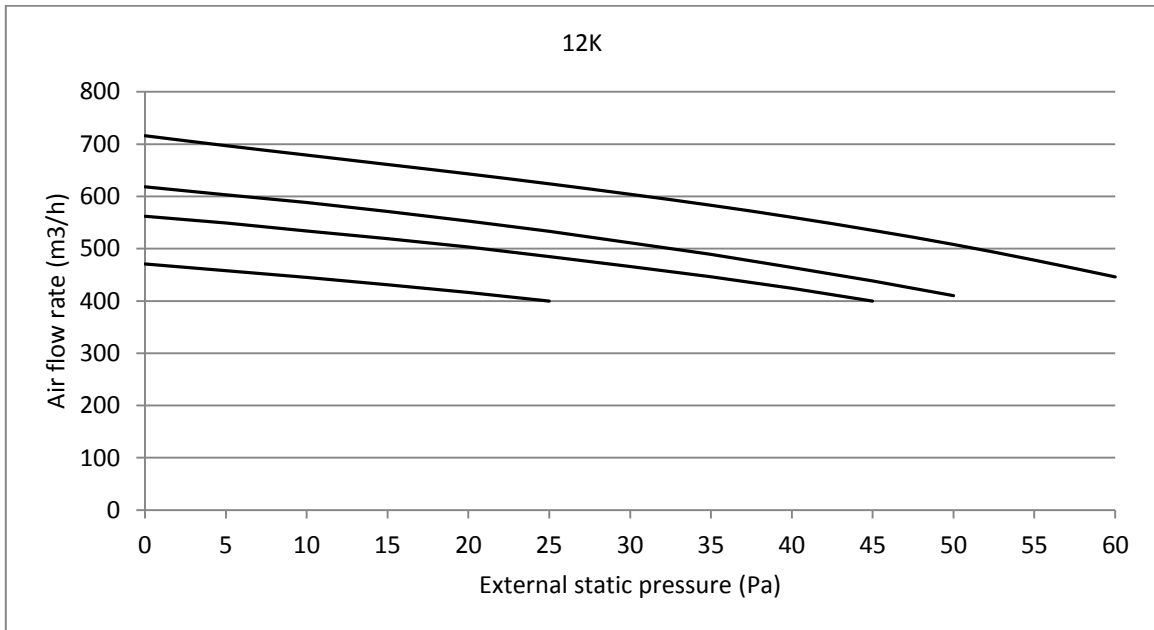
Unit: mm

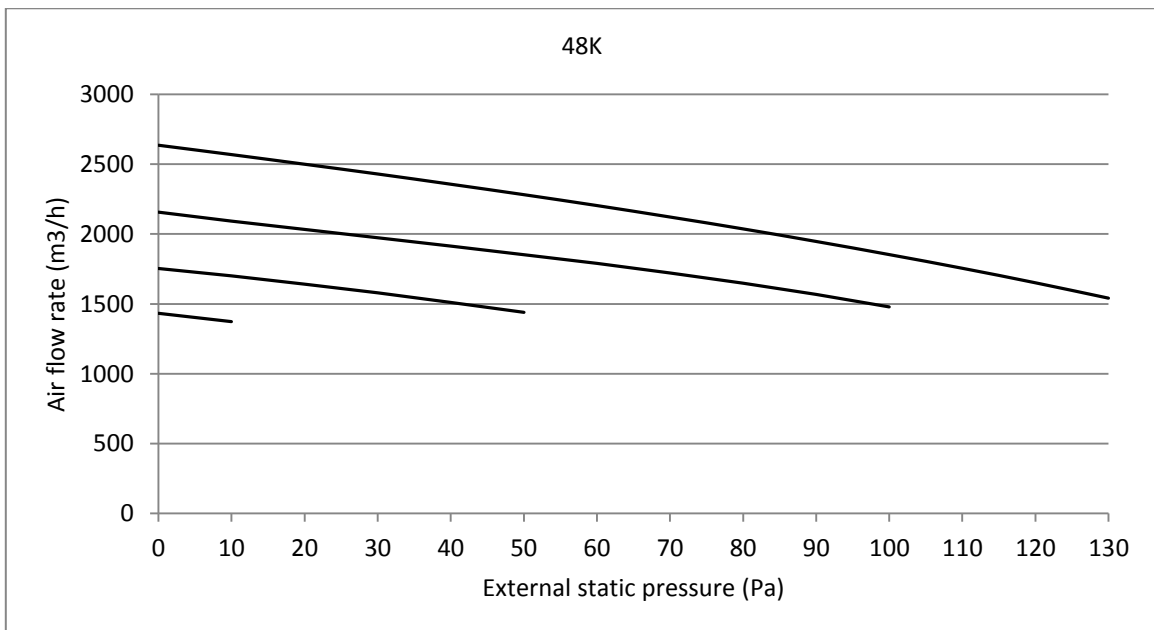
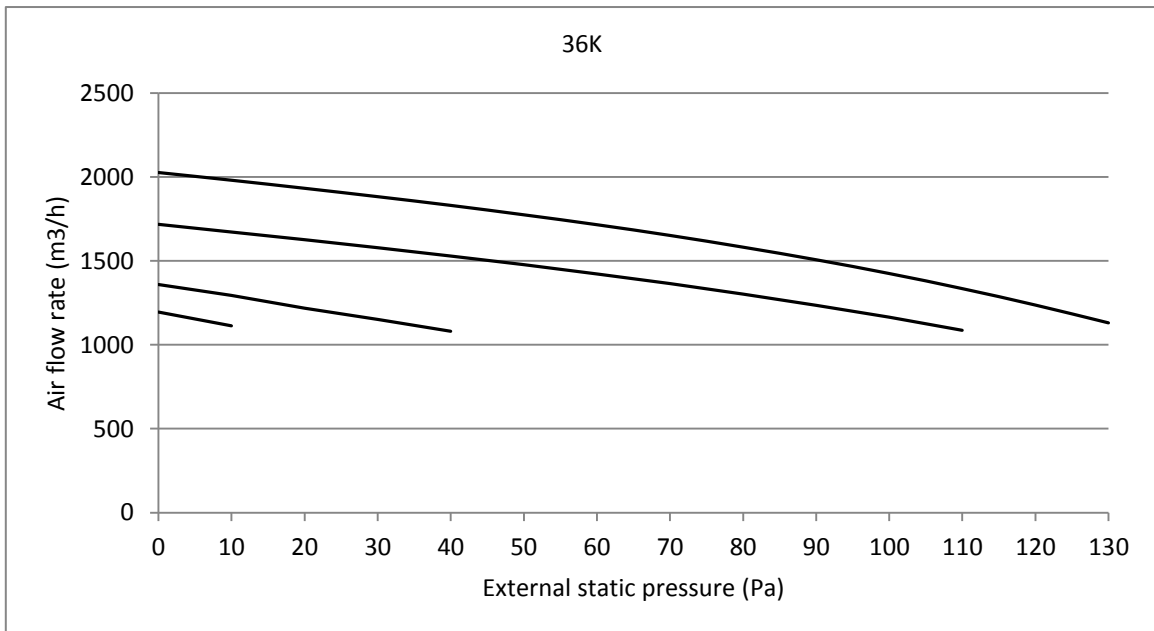
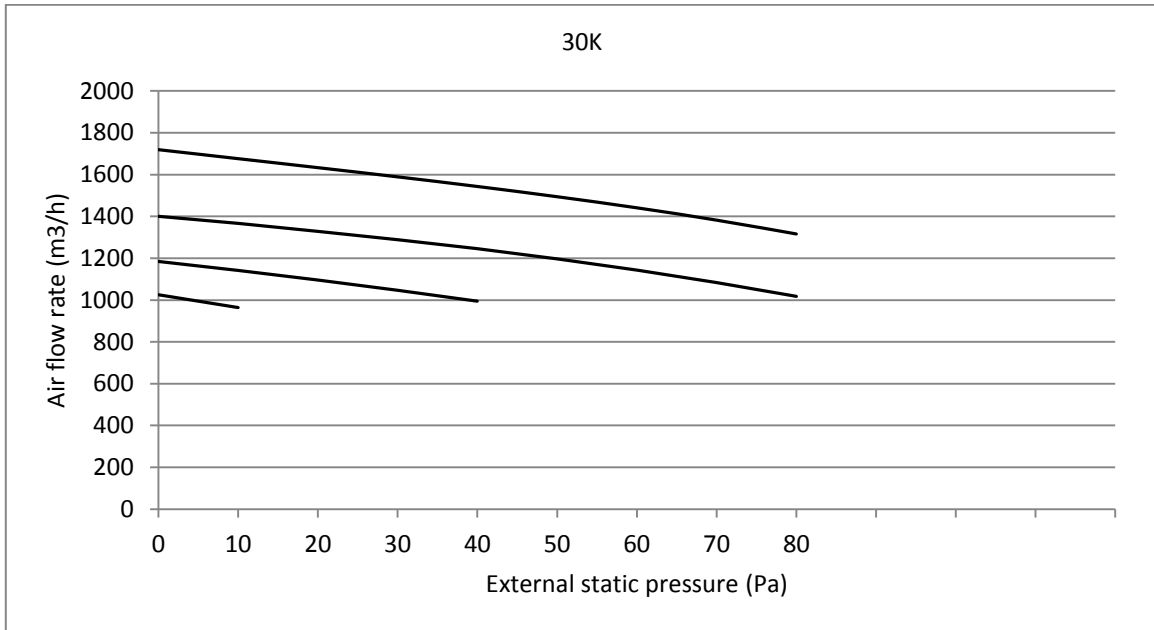
3. Service Space

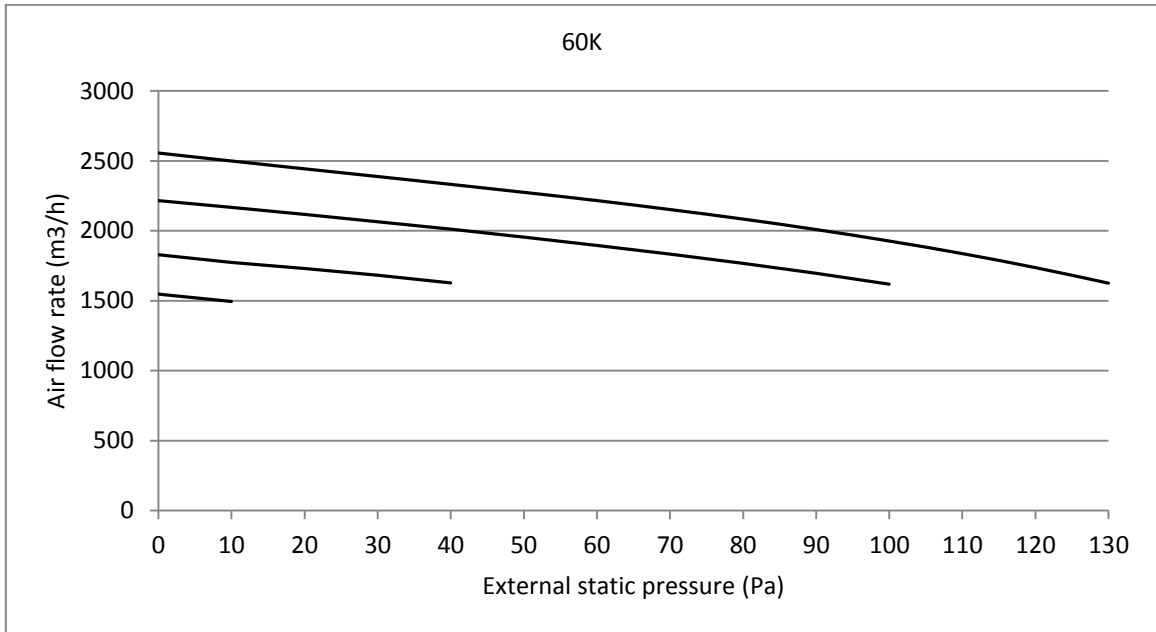
Ensure enough space required for installation and maintenance.



4. Static Pressure







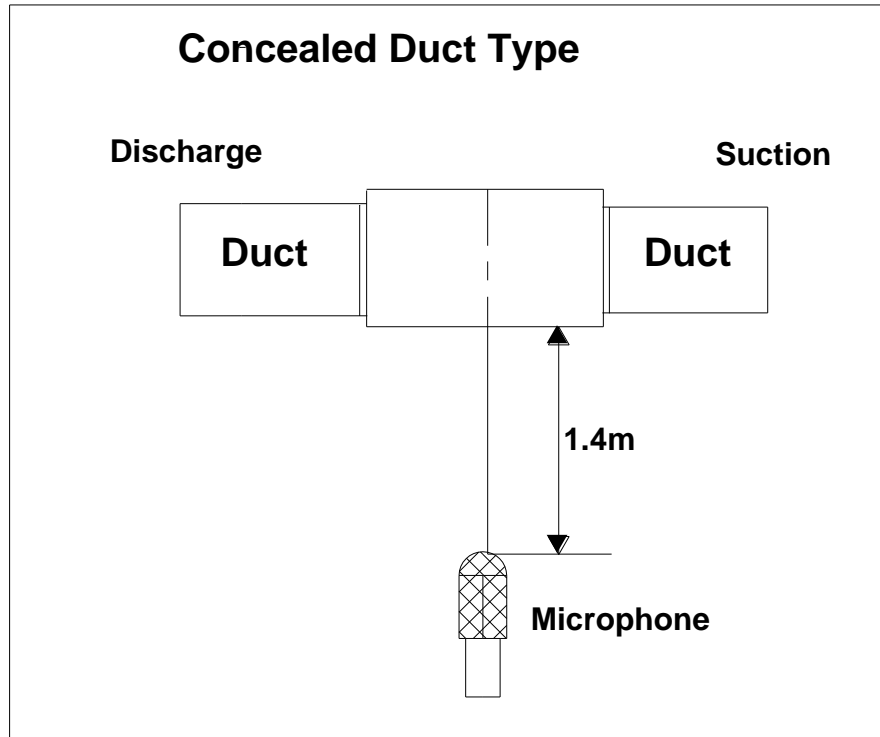
5. Electric Characteristics

Model	Indoor Units				Power Supply
	Hz	Voltage	Min.	Max.	MFA
YEGE12BXE--M-WX	50	220-240V	198V	254V	16
YEGE18BXE--M-WX	50	220-240V	198V	254V	16
YEGE24BXE--M-WX	50	220-240V	198V	254V	25
YEFE12BXE--M-WX	50	220-240V	198V	254V	16
YEFE18BXE--M-WX	50	220-240V	198V	254V	16
YEFE24BXE--M-WX	50	220-240V	198V	254V	25
YFFE30BXE--M-RX	50	220-240V	198V	254V	30
YEFE36BXE--M-WX	50	220-240V	198V	254V	30
YEFE36BXO--M-WX	50	380-415V	342V	436V	20
YEFE48BXO--M-WX	50	380-415V	342V	436V	20
YEFE60BXO--M-WX	50	380-415V	342V	436V	20
YEGE36BXO--M-WX	50	380-415V	342V	436V	20
YEGE48BXO--M-WX	50	380-415V	342V	436V	20
YEGE55BXO--M-WX	50	380-415V	342V	436V	20

Notes:






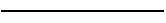
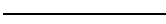
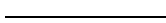
MFA: Max. Fuse Amps. (A)

6. Sound Levels



Model	Noise level dB(A)		
	H	M	L
YEGE12BXE--M-WX	40	36	32
YEGE18BXE--M-WX	43	37	36
YEGE24BXE--M-WX	45	40	38
YEFE12BXE--M-WX	38	34	32
YEFE18BXE--M-WX	40	34	33
YEFE24BXE--M-WX	43	34	31
YFFE30BXE--M-RX	49	40	38
YEFE36BXE--M-WX	51	43	40
YEFE36BXO--M-WX	51	45	43
YEFE48BXO--M-WX	50	44	42
YEFE60BXO--M-WX	52	46	44
YEGE36BXO--M-WX	48	40	37
YEGE48BXO--M-WX	50	45	40
YEGE55BXO--M-WX	47	40	38

7. Accessories

	Name	Shape	Quantity
Tubing & Fittings	Soundproof/insulation sheath		2
	Binding tape		1
	Seal sponge		1
Drainpipe Fittings	Drain joint		1
	Seal ring		1
Wire controller	Wire controller		1
others	Owner's manual		1
	Installation manual		1

8. The Specification of Power

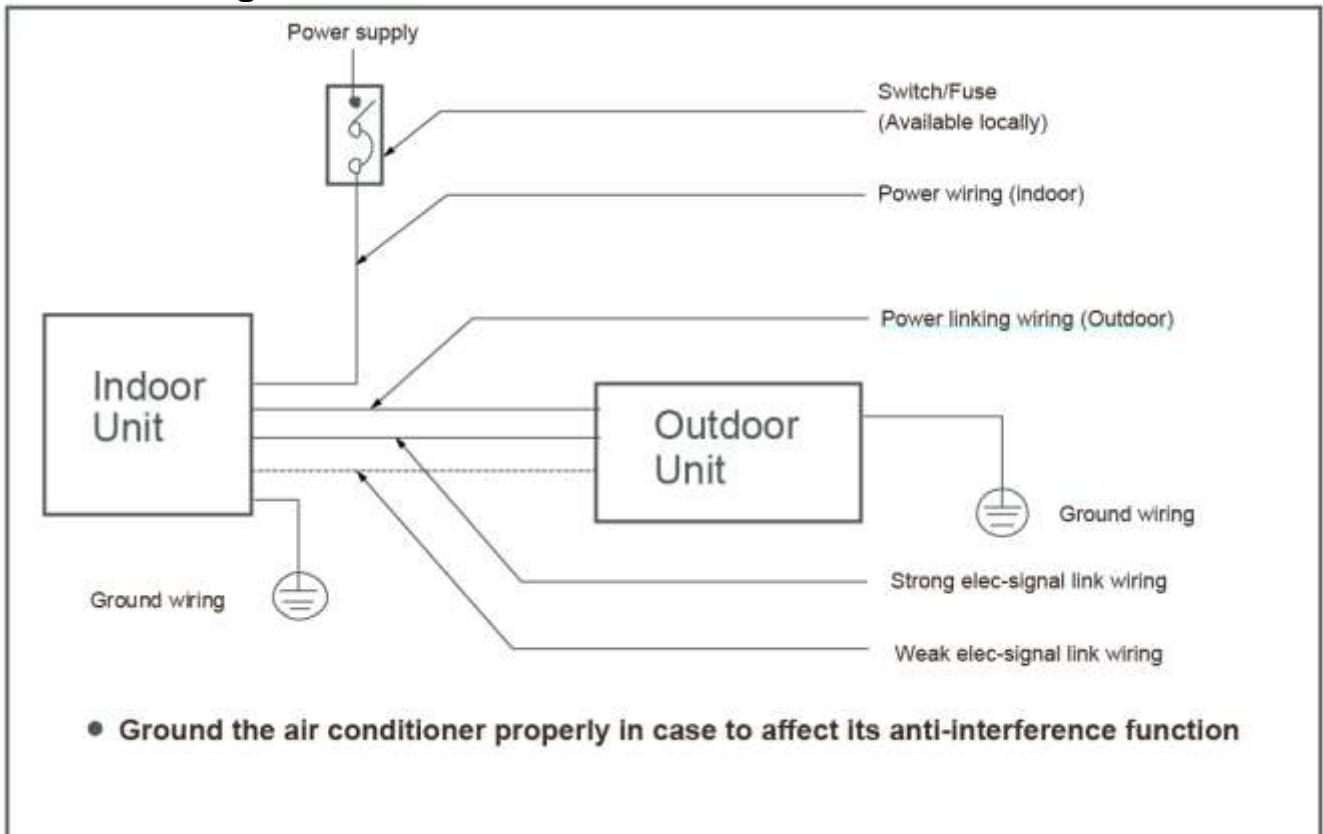
Cooling only:

Model (KBtu/h)		12~18	24	30-36	36~60
Power	Phase	1-phase	1-phase	1-phase	3-phase
	Frequency and Voltage	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	380-420V, 50Hz
Circuit Breaker/ Fuse (A)		20/16	40/25	50/30	25/20
Indoor Unit Power Wiring (mm ²)		3×2.5	3×2.5	3×4.0	5×2.5
Indoor/Outdoor Connecting Wiring (mm ²)	Ground Wiring	2.5	2.5	4.0	2.5
	Outdoor Unit Power Wiring	3×2.5	3×2.5	3×4.0	5×2.5
	Strong Electric Signal	—————	1×1.0	1×1.0	1×1.0
	Weak Electric Signal	—————	(2×0.75)	(2×0.2)	—————

Heating pump:

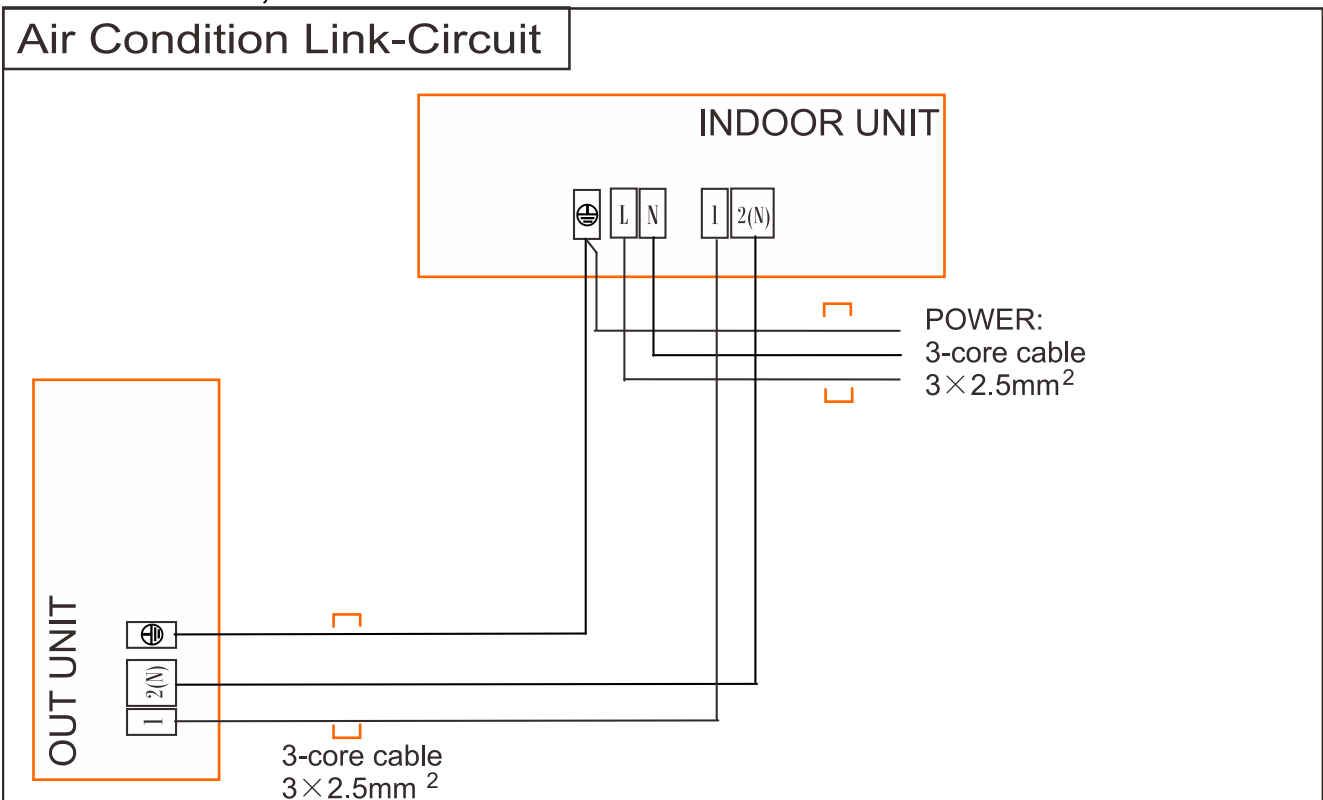
Model		12000 Btu/h 18000 Btu/h	24000 Btu/h	36000-60000 Btu/h
Power	Phase	1-Phase	1-Phase	3-Phase
	Frequency and Volt	220-240V,50Hz	220-240V,50Hz	380-415V, 50Hz
Circuit Breaker/Fuse(A)		20/16	40/25	25/20
Indoor unit power wiring(mm ²)		3×2.5	3×2.5	5×2.5
Indoor/out-door connecting wiring(mm ²)	Ground wiring	2.5	2.5	2.5
	Outdoor unit power wiring	3×2.5	3×2.5	5×2.5
	Strong electric signal	2×1.0	3×1.0	3×1.0
	Weak electric signal	2×0.75/2×0.5	2×0.2	—————

9. Field Wiring



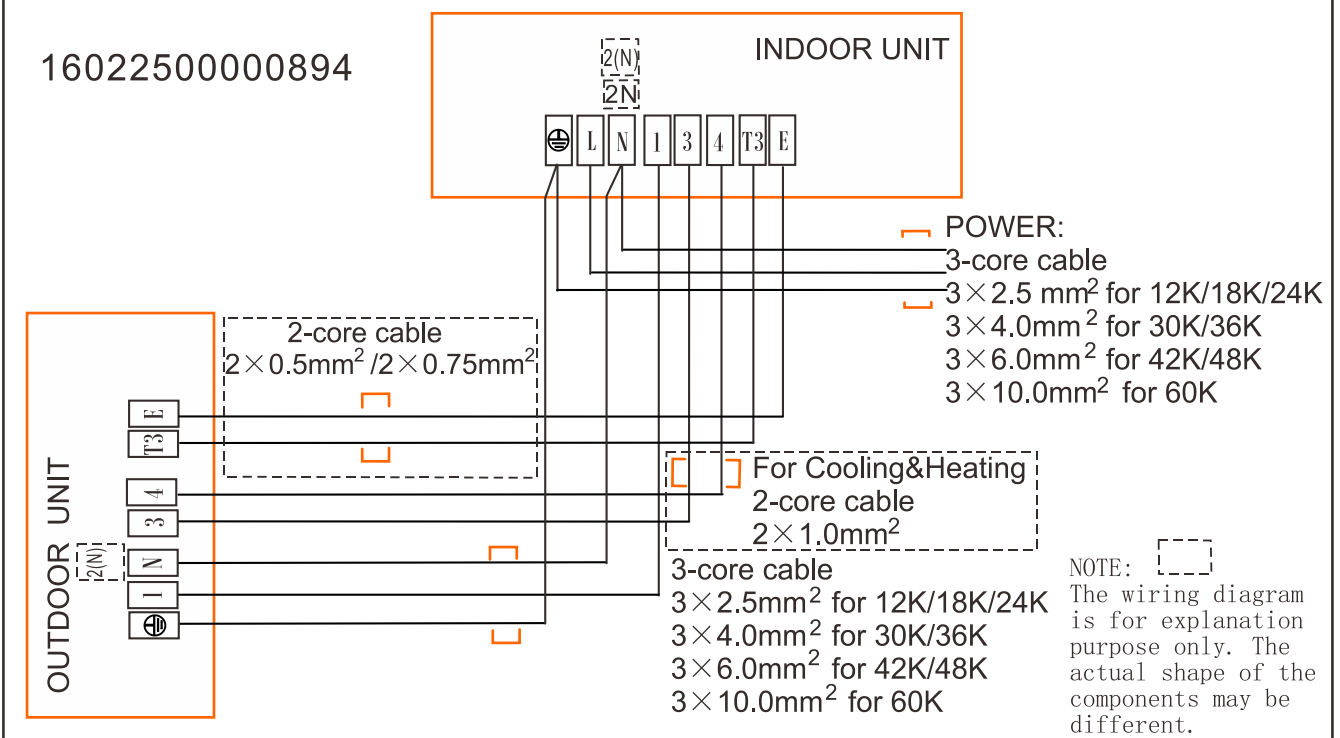
YEFE12BXE--M-WX, YEFE18BXE--M-WX

Air Condition Link-Circuit



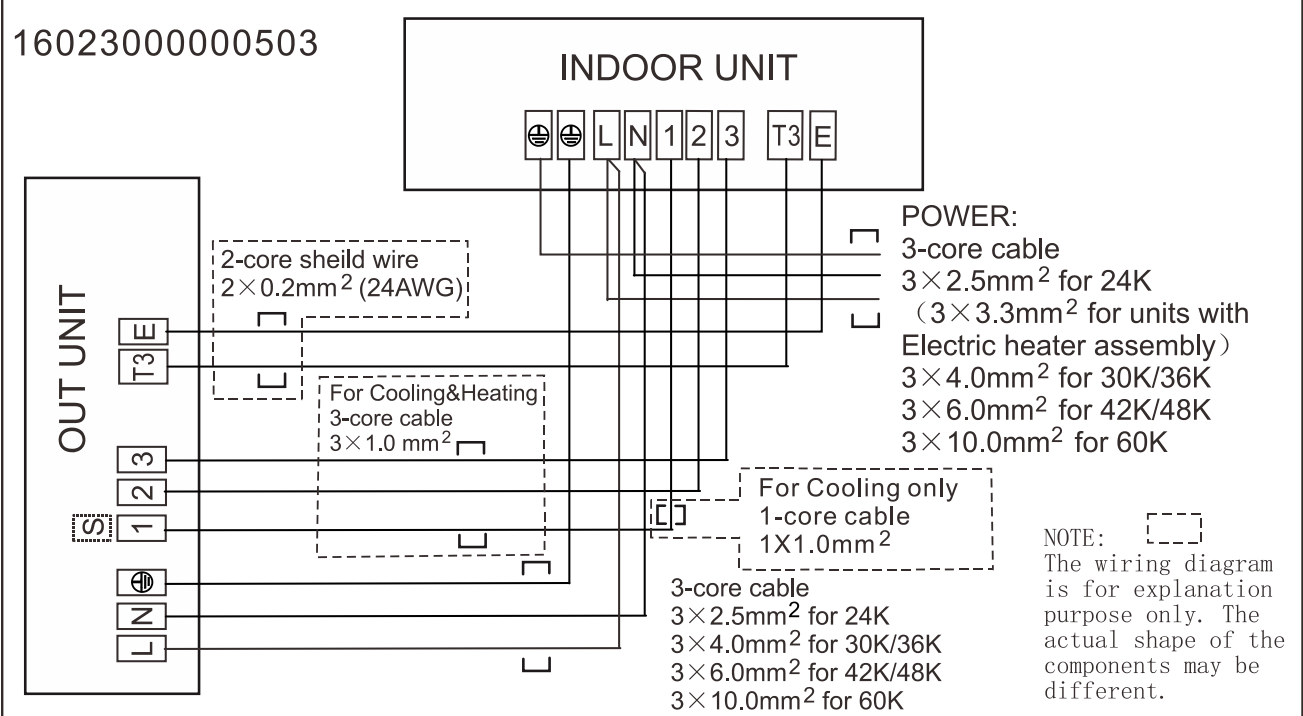
YEGE12BXE--M-WX, YEGE18BXE--M-WX

Air Condition Link-Circuit



YEGE24BXE--M-WX, YEFE24BXE--M-WX, YFFE30BXE--M-RX, YEFE36BXE--M-WX

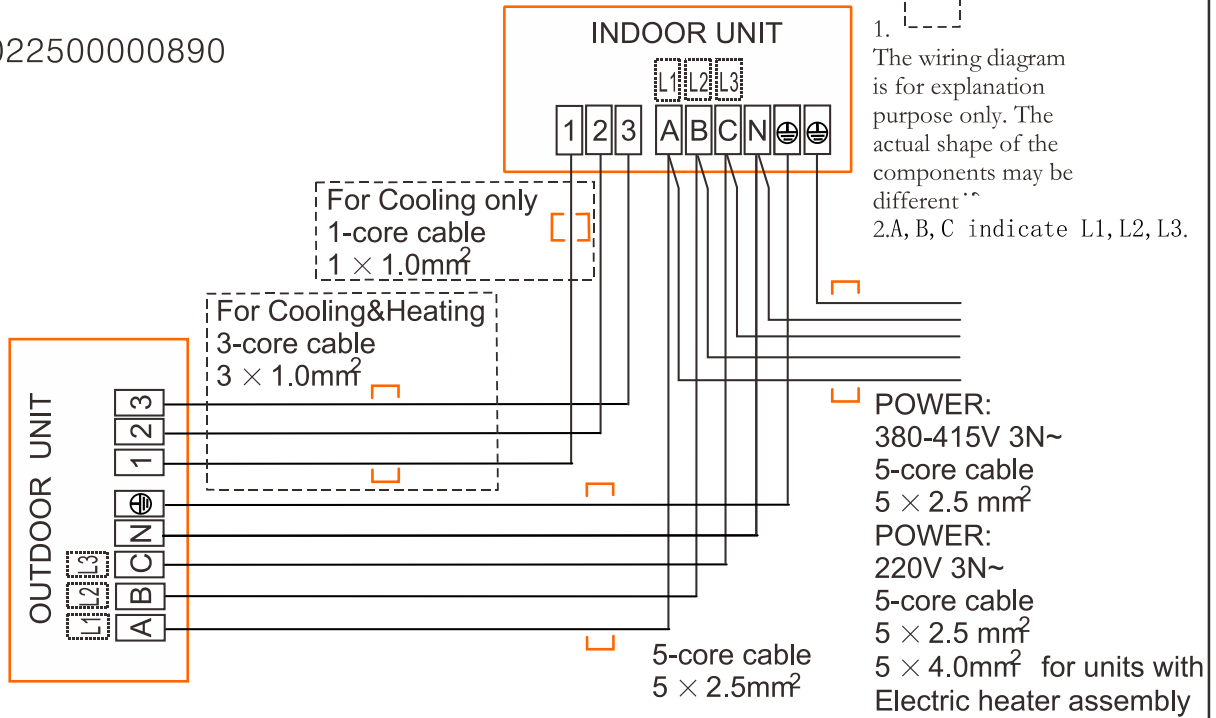
Air Condition Link-Circuit



YEFE36BXO--M-WX, YEFE48BXO--M-WX, YEFE60BXO--M-WX

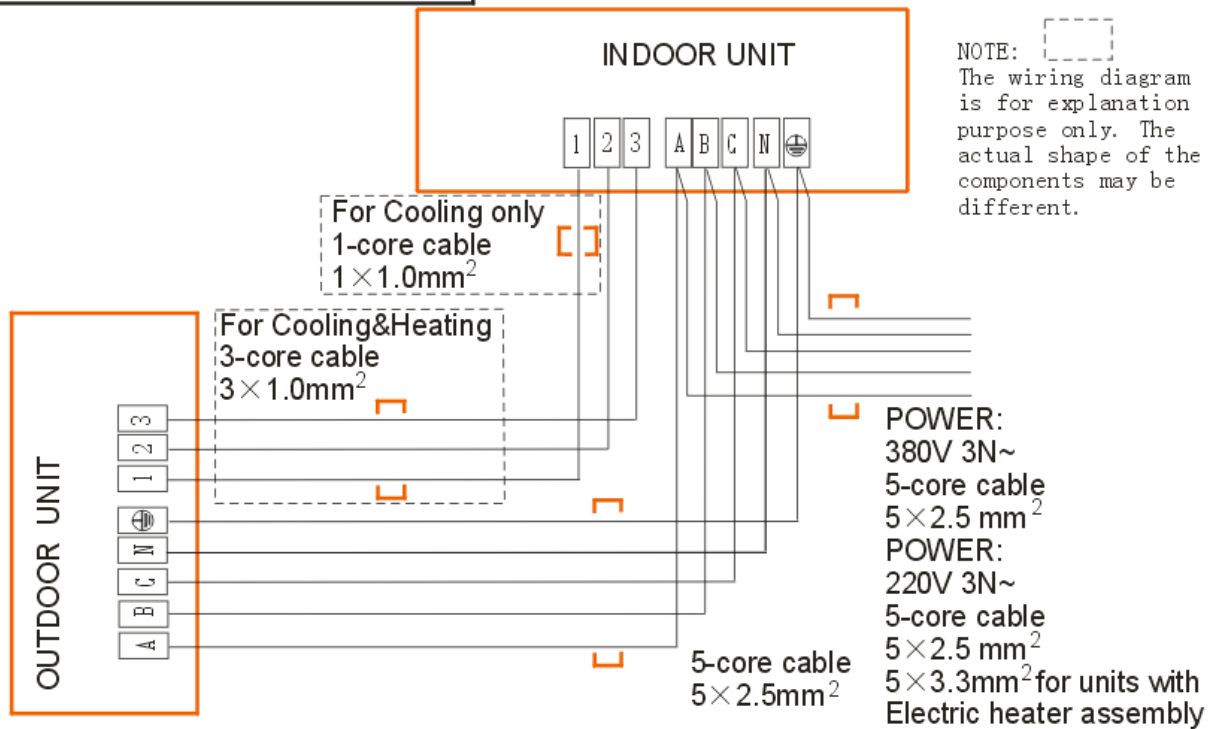
Air Condition Link-Circuit

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YEGE36BXO--M-WX, YEGE48BXO--M-WX, YEGE55BXO--M-WX

Air Condition Link-Circuit



High Static Pressure Duct Type

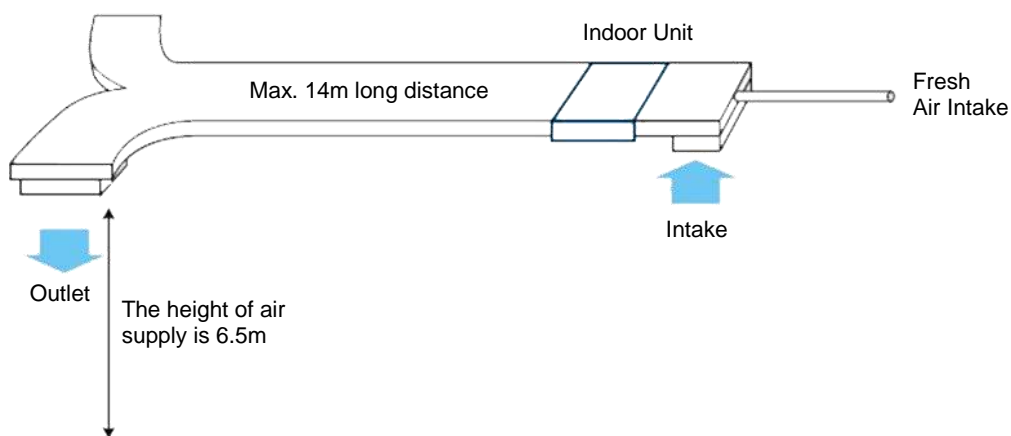
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7. Accessories.....	53
8. The Specification of Power	54
9. Field Wiring	55

1. Features

1.1 High static pressure design

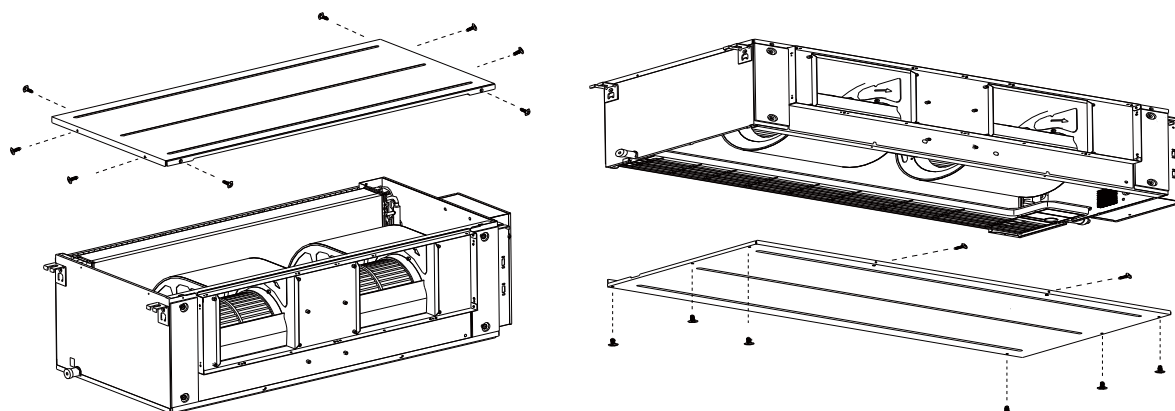
- Max static pressure of indoor unit is 160Pa.
- The longest distance of air supply is 14m, the max height of air supply is 6.5m.
- Specially recommended for spacious and large rooms like large stores and factories.

High static pressure design enables long duct.



1.2 Easy maintenance

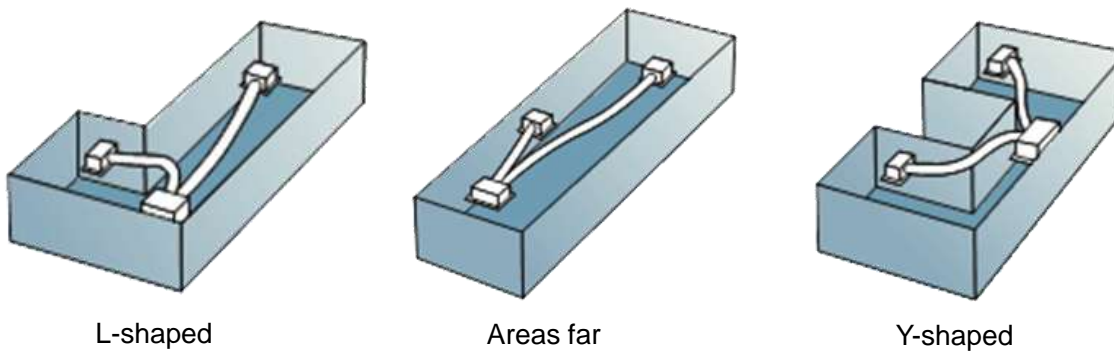
- The unit can be opened from top or bottom.



- The air outlet flange is isolated from either top panel or base panel, which makes the maintenance much easier when connecting duct.

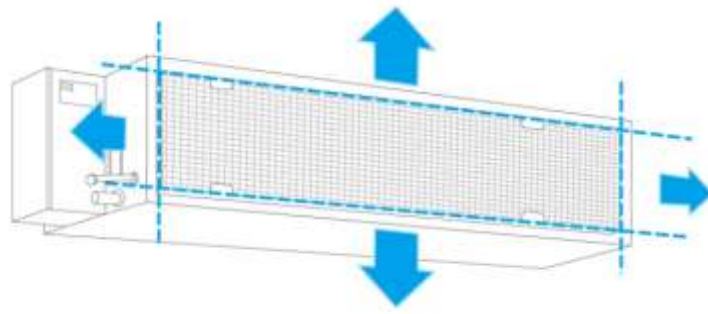
1.3 Flexible Installation

- Different solutions for any shape room by using kinds of air distribution ducts.

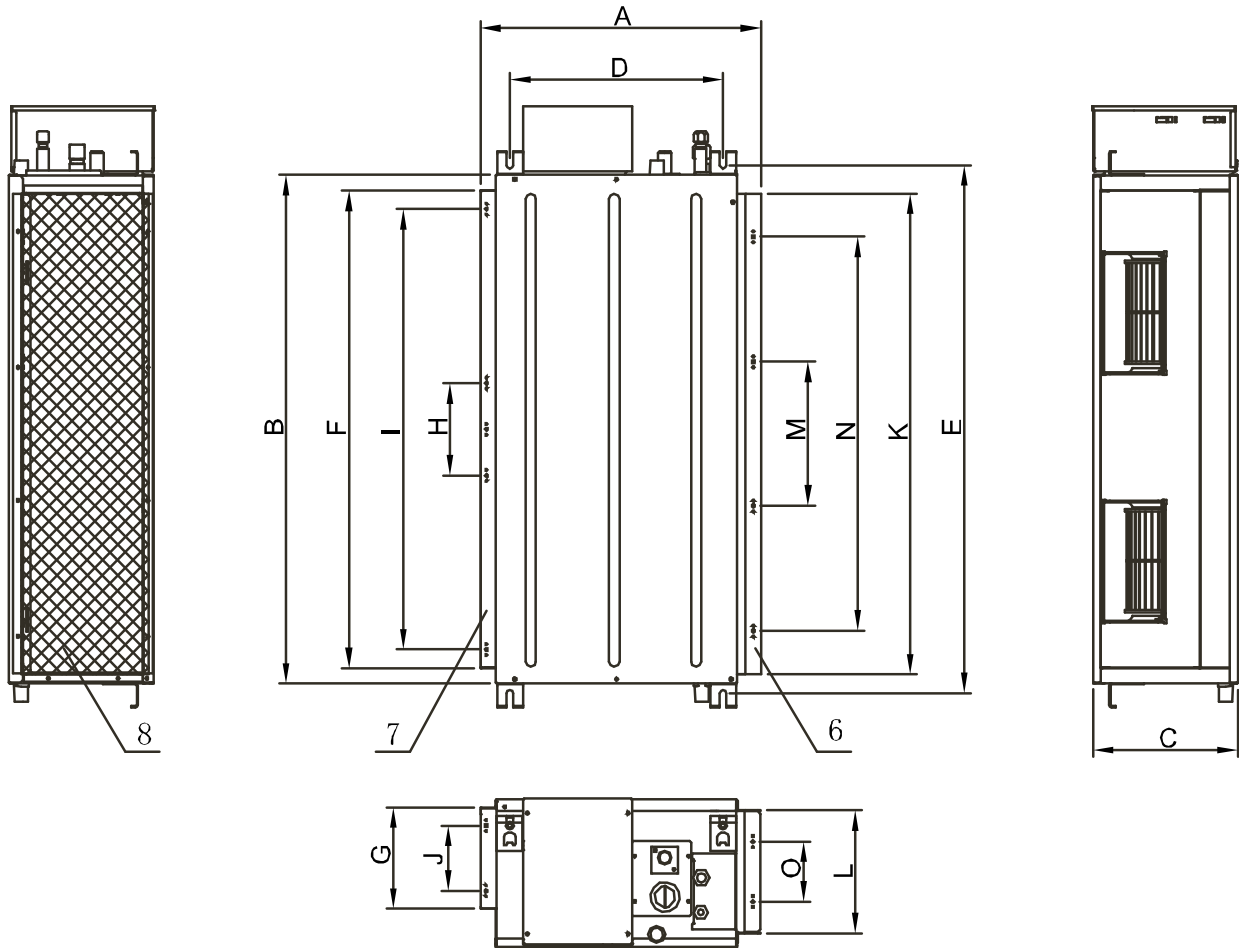


1.4 Easy cleaning filter

- The filter can be easily removed or installed from the rear side for ease of cleaning.



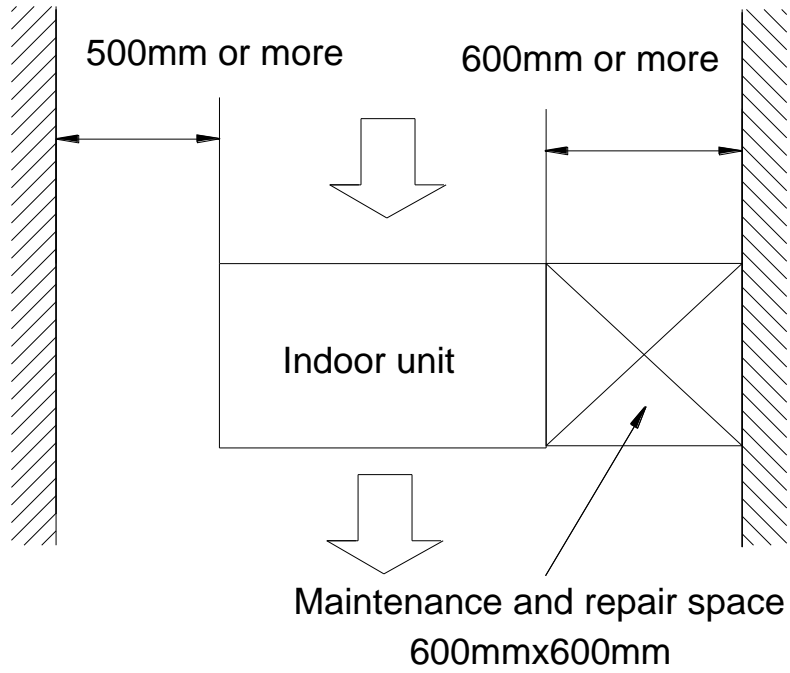
2. Dimensions



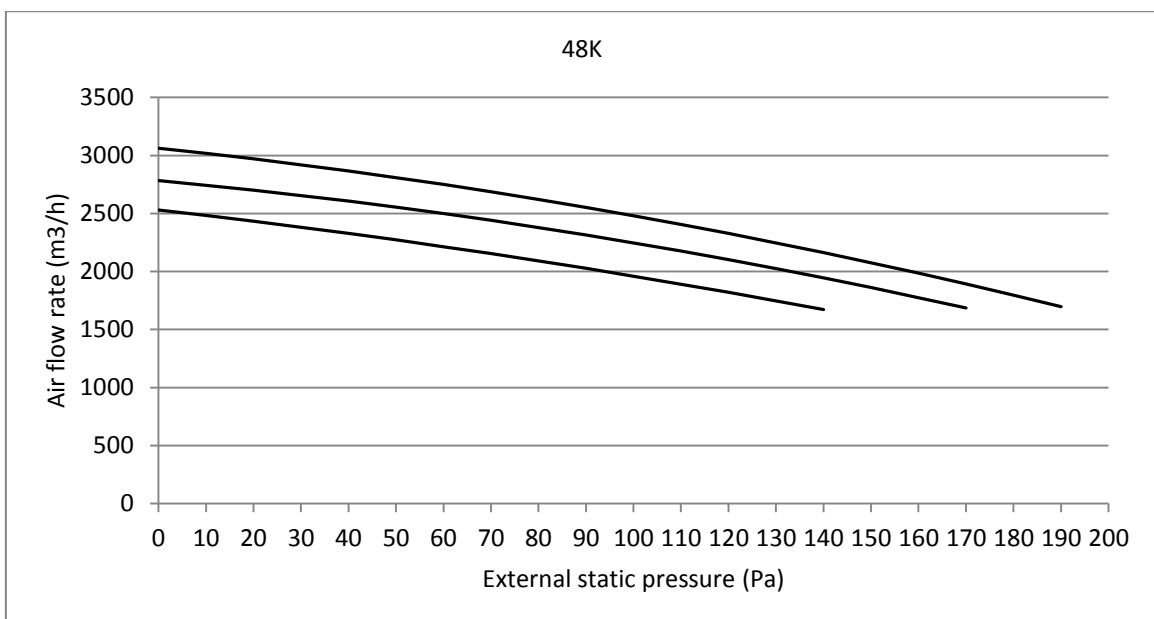
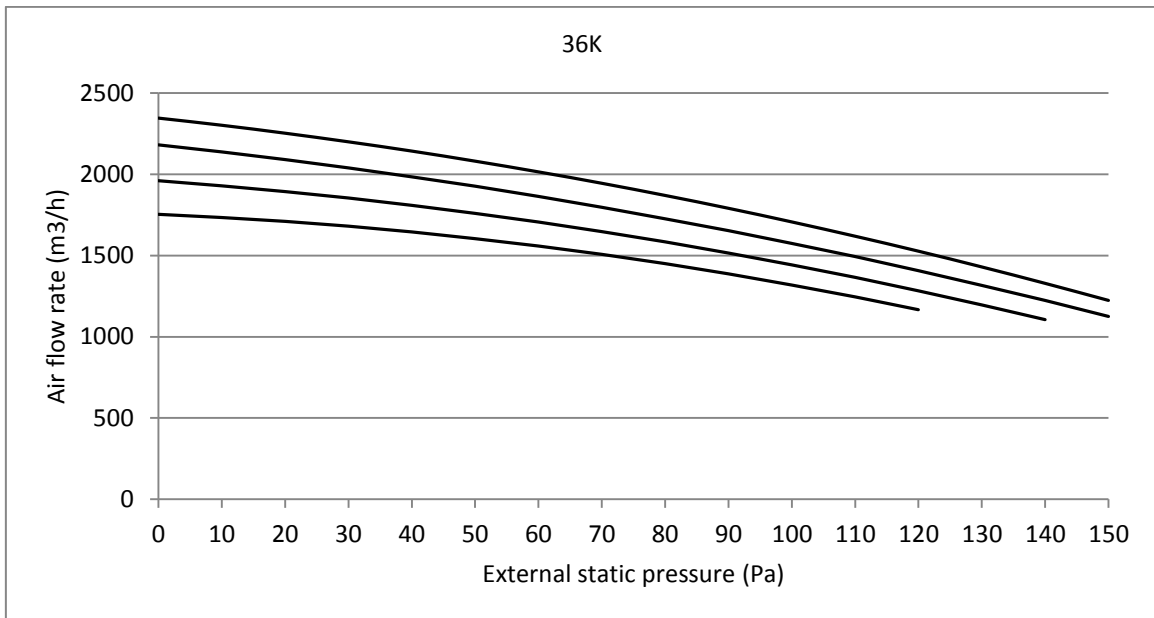
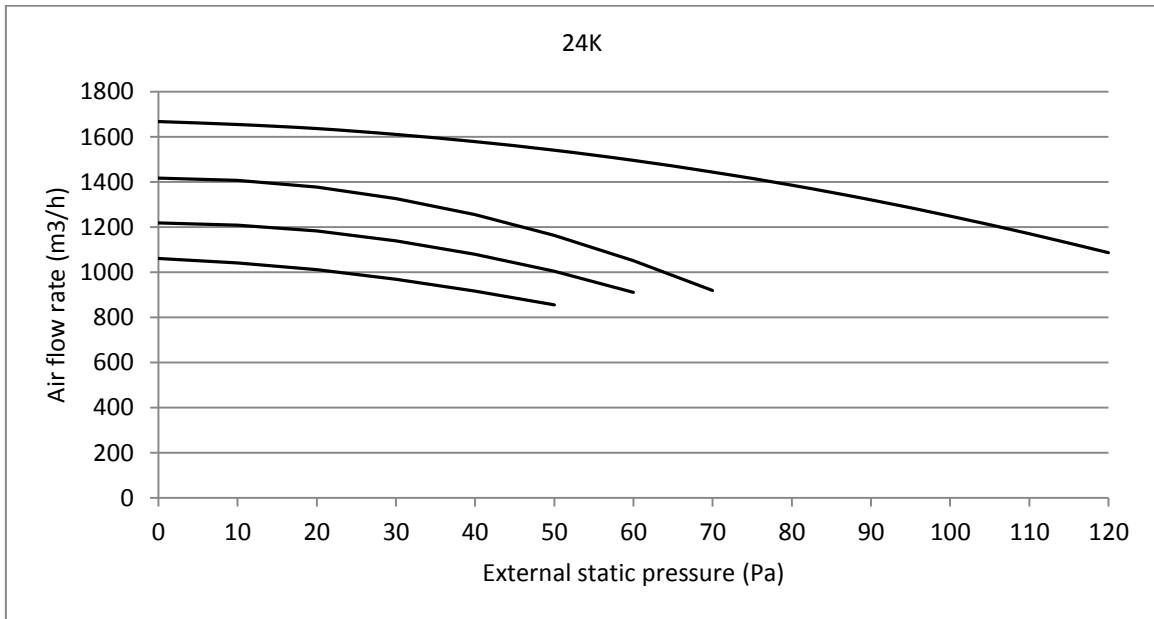
Capacity (KBtu)	Unit: mm														
	Outline dimension			Size of mounted lug		Air outlet opening size					Air inlet opening size				
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
24	525	900	270	397	936	844	185	160	780	120	851	226	215	665	110
36	525	1110	270	397	1146	1054	185	220	960	120	1061	226	315	875	110
48/60	625	1200	380	495	1236	1000	253	270	900	170	1145	334	325	925	130

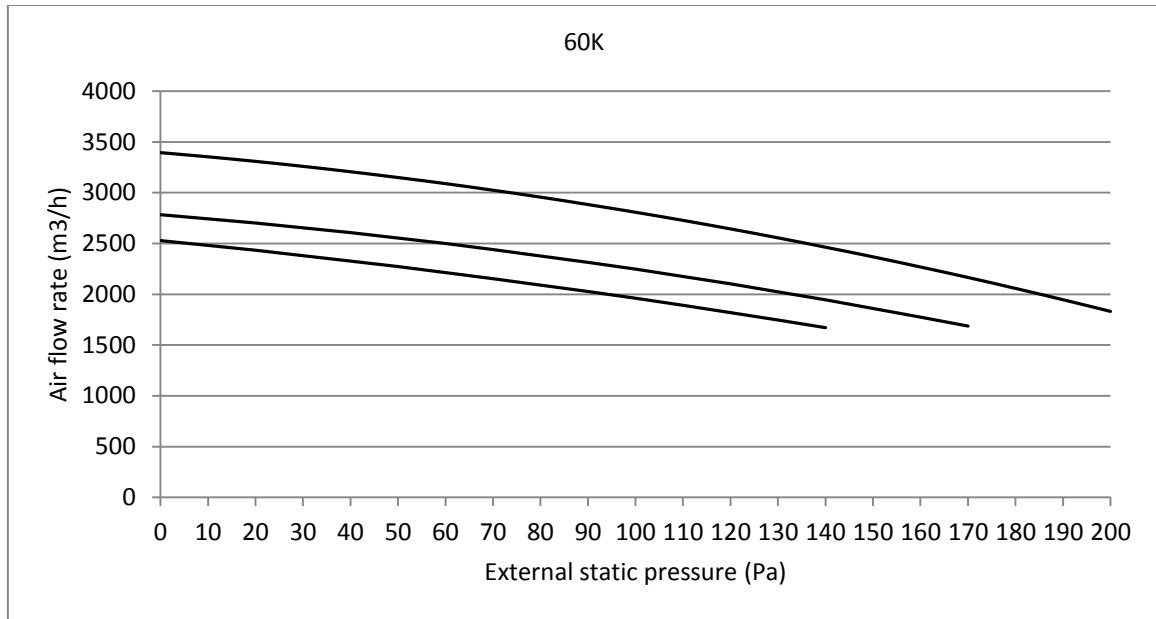
3. Service Space

Ensure enough space required for installation and maintenance.



4. Static Pressure





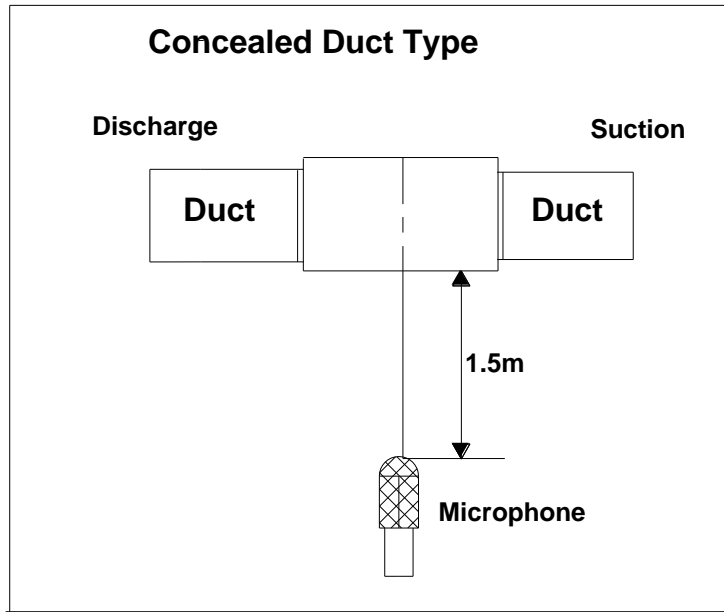
5. Electric Characteristics

Model	Indoor Unit				Power Supply
	Hz	Voltage	Min.	Max.	MFA
YGGE24BXE--M-WX	50	220-240V	198V	254V	25
YGGE36BXO--M-WX	50	380-420V	342V	440V	20
YGGE48BXO--M-WX	50	380-420V	342V	440V	20
YGGE55BXO--M-WX	50	380-420V	342V	440V	20

Notes:









MFA: Max. Fuse Amps. (A)

6. Sound Levels



Model	Noise level dB(A)		
	H	M	L
YGGE24BXE--M-WX	48	42	38
YGGE36BXO--M-WX	53	50	47
YGGE48BXO--M-WX	51	49	46
YGGE55BXO--M-WX	53	51	48

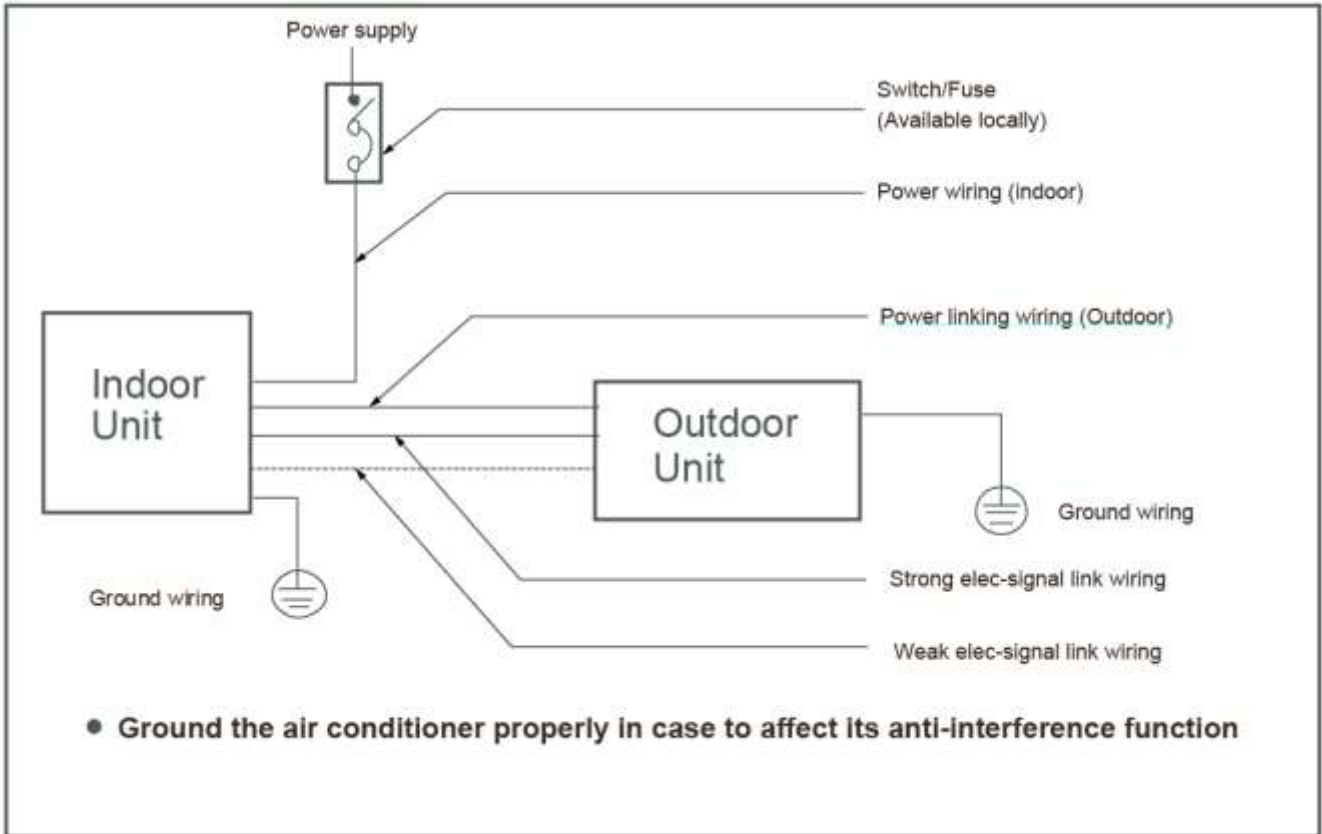
7. Accessories

	Name	Shape	Quantity
Tubing & Fittings	Soundproof / insulation sheath		2
	Drain joint		1
Drainpipe Fittings (for cooling & heating)	Seal ring		1
	Wired controller		1
Wired controller & Its Frame	Owner' s manual of wired controller		1
	Wired controller installation manual		1
	Owner' s manual		1
Others	Installation manual		1

8. The Specification of Power

Model		24000 Btu/h	36000-60000 Btu/h
Power	Phase	1-Phase	3-Phase
	Frequency and Volt	220-240V,50Hz	380-415V, 50Hz
Circuit Breaker/Fuse(A)		40/25	25/20
Indoor unit power wiring(mm ²)		3×2.5	5×2.5
Indoor/out-door connecting wiring(mm ²)	Ground wiring	2.5	2.5
	Outdoor unit power wiring	3×2.5	5×2.5
	Strong electric signal	3×1.0	3×1.0
	Weak electric signal	2×0.2	—————

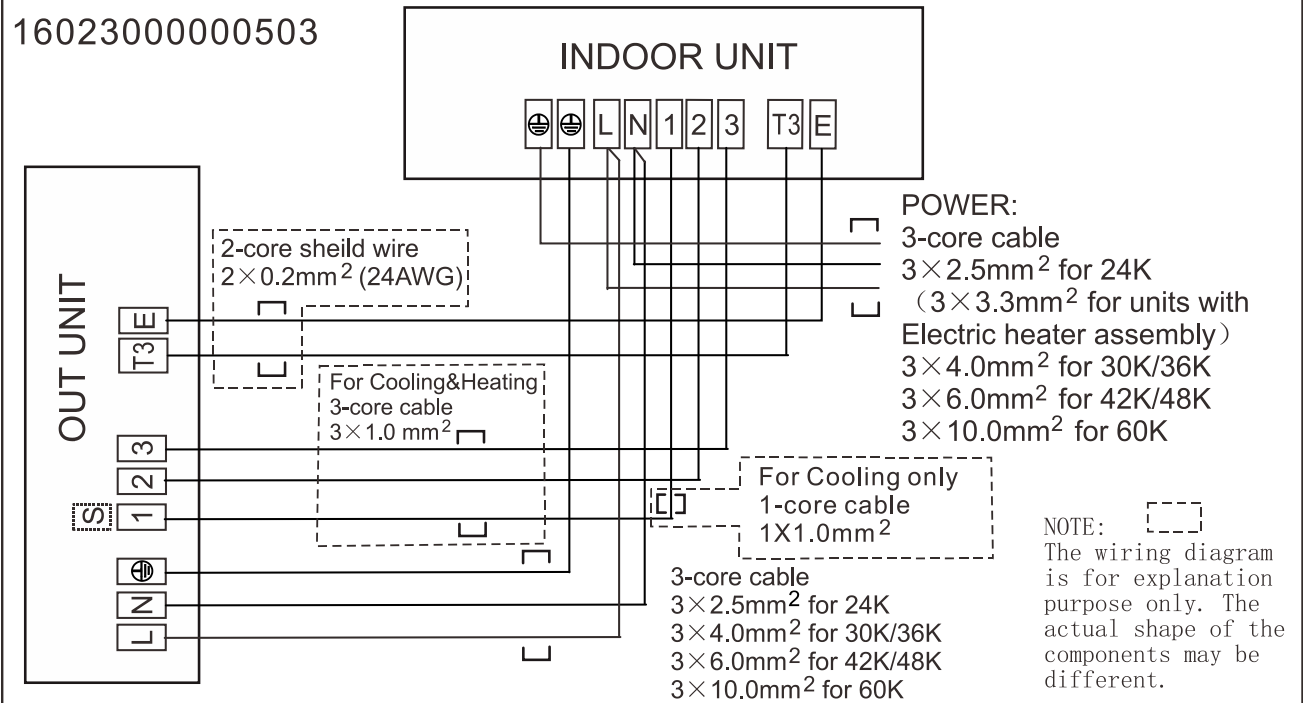
9. Field Wiring



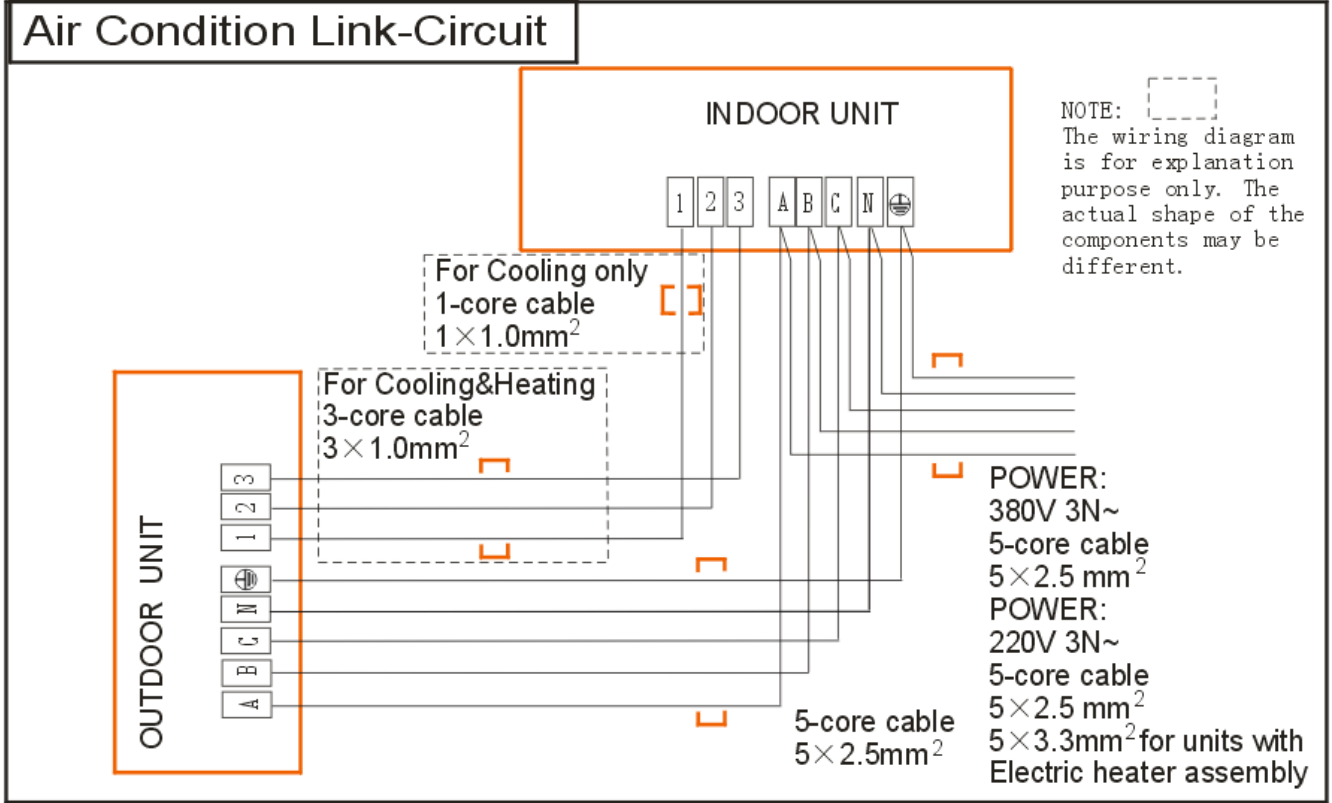
YGGE24BXE--M-WX

Air Condition Link-Circuit

16023000000503



YGGE36BXO--M-WX, YGGE48BXO--M-WX, YGGE55BXO--M-WX



Ceiling & Floor Type

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8. Field Wiring	65

1. Features

1.1. New design, more modern and elegant appearance.

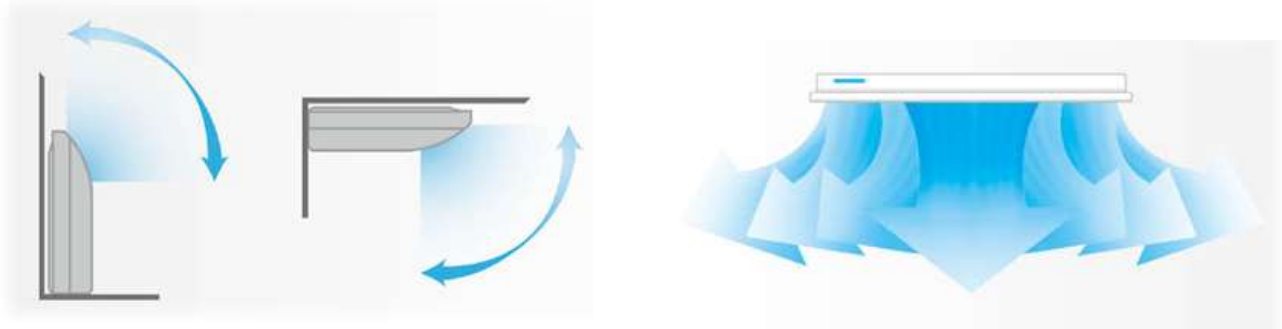


1.2. Convenient installation

- The ceiling type can be easily installed into a corner of the ceiling even if the ceiling is very narrow
- It is especially useful when installation of an air conditioner in the center of the ceiling is impossible due to a structure such as one lighting.

1.3. Two direction auto swing (vertical & horizontal) and wide angle air flow,

- Air flow directional control minimizes the air resistance and produces wilder air flow to vertical direction.
- The range of horizontal air discharge is widened which secures wider air flow distribution to provide more comfortable air circulation no matter where the unit is set up



1.4. Three level fan speed, more humanism design, meets different air-supply requirement.

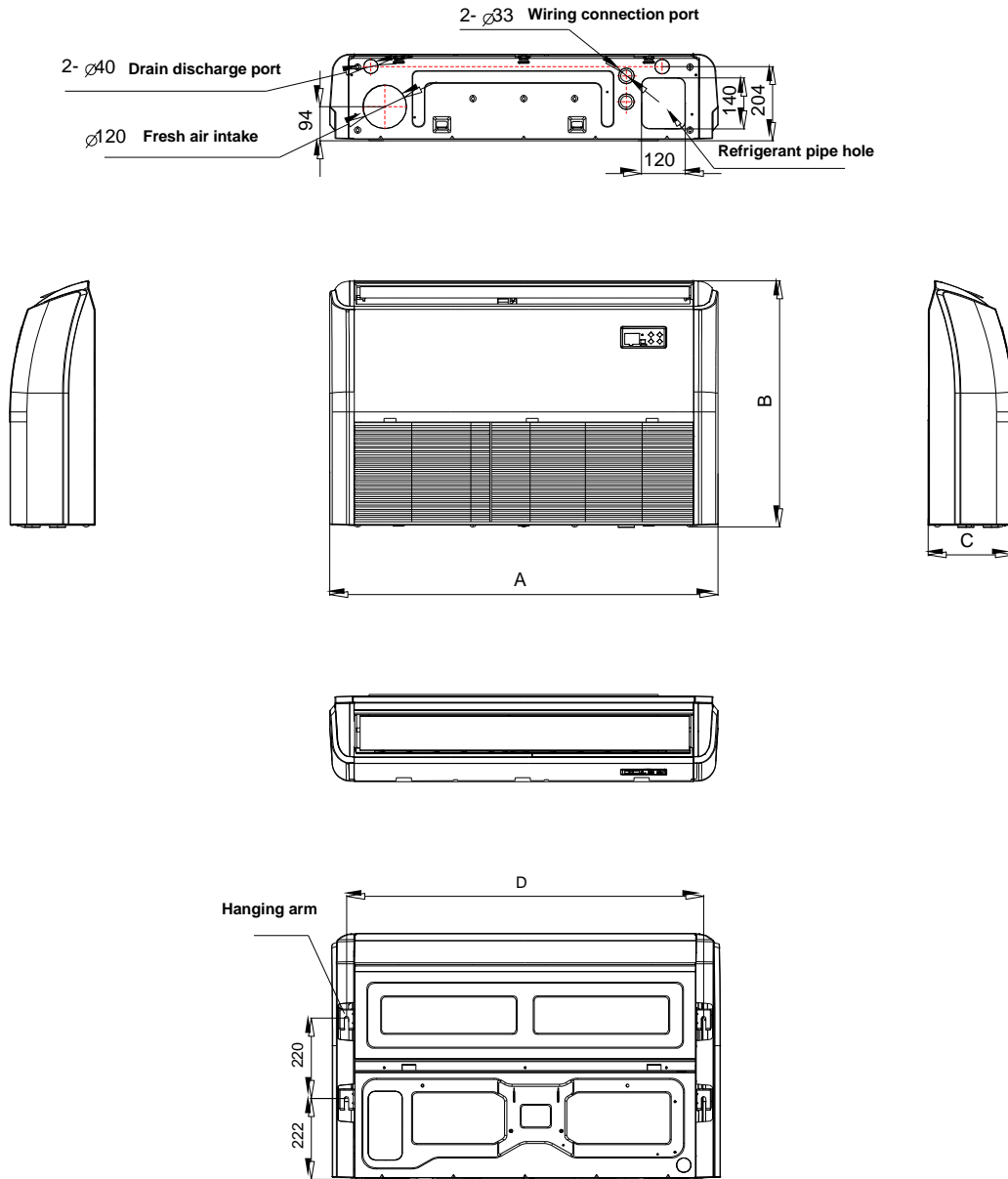
1.5. New foam drain pan with plastic-spraying inner surface



1.6. Easy operation.

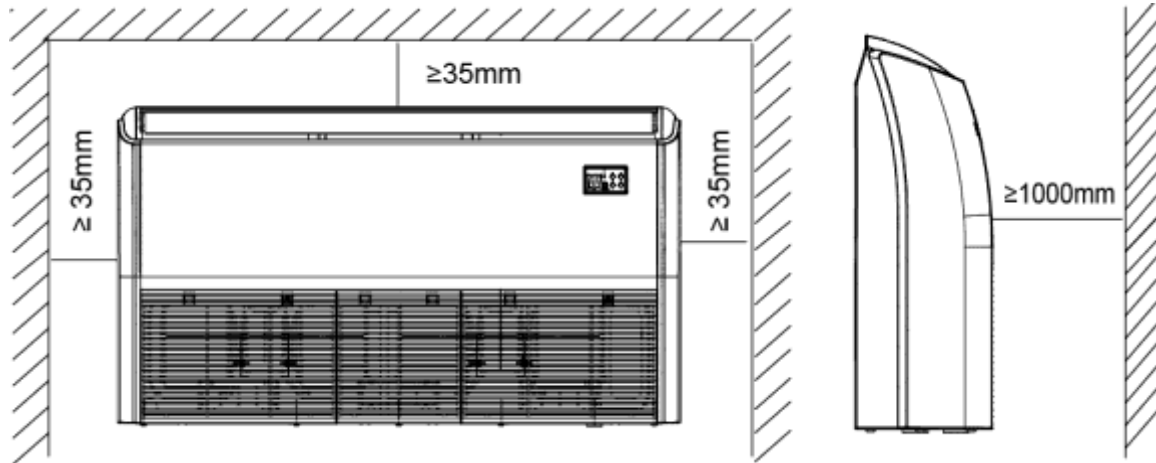
1.7. Remote control and optional wired control method.

2. Dimensions



Capacity (Btu/h)	A	B	C	D
12~24K	1068	675	235	983
30~36K	1285	675	235	1200
48~60K	1650	675	235	1565

3. Service Space



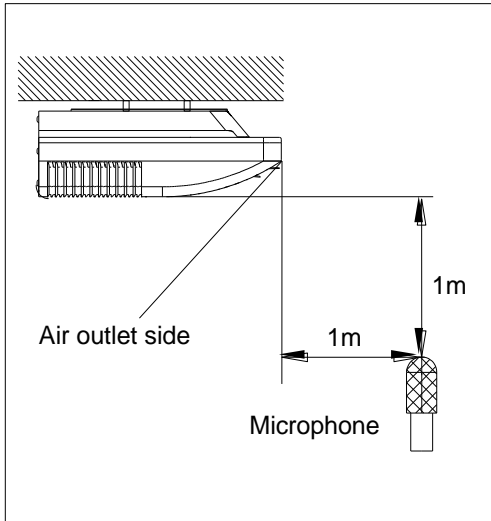
4. Electric Characteristics

Model	Indoor Units				Power Supply
	Hz	Voltage	Min.	Max.	MFA
YFGE12BXE--M-RX	50	220-240V	198V	242V	16
YFGE18BXE--M-RX	50	220-240V	198V	242V	16
YFGE24BXE--M-RX	50	220-240V	198V	242V	25
YFFE18BXE--M-RX	50	220-240V	198V	242V	16
YFFE24BXE--M-RX	50	220-240V	198V	242V	25
YEFE30BXE--M-WX	50	220-240V	198V	242V	30
YFFE36BXE--M-RX	50	220-240V	198V	242V	30
YFFE36BXO--M-RX	50	380-415V	342V	436V	20
YFFE48BXO--M-RX	50	380-415V	342V	436V	20
YFFE60BXO--M-RX	50	380-415V	342V	436V	20
YFGE36BXO--M-RX	50	380-420V	342V	440V	20
YFGE48BXO--M-RX	50	380-420V	342V	440V	20
YFGE55BXO--M-RX	50	380-420V	342V	440V	20

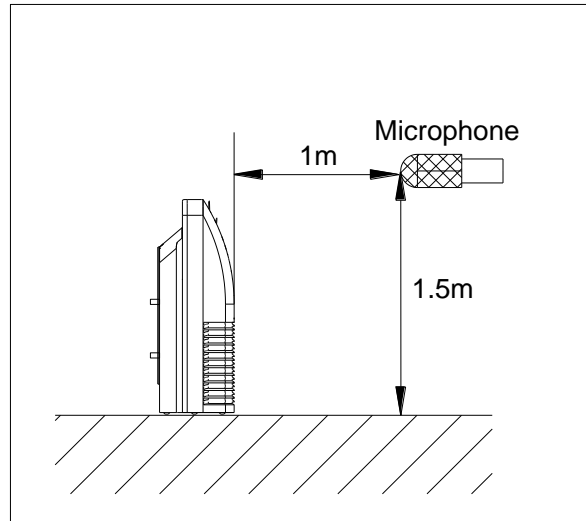
Remark:

MFA: Max. Fuse Amps. (A)

5. Sound Levels









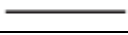
Ceiling



Floor

Model	Noise level dB(A)		
	H	M	L
YFGE12BXE--M-RX	37	33	30
YFGE18BXE--M-RX	53	48	43
YFGE24BXE--M-RX	54	48	44
YFFE18BXE--M-RX	52	48	44
YFFE24BXE--M-RX	52	47	44
YEFE30BXE--M-WX	53	49	46
YFFE36BXE--M-RX	55	52	48
YFFE36BXO--M-RX	54	50	46
YFFE48BXO--M-RX	57	53	50
YFFE60BXO--M-RX	58	55	52
YFGE36BXO--M-RX	53	48	44
YFGE48BXO--M-RX	53	48	44
YFGE55BXO--M-RX	54	49	46

6. Accessories

Remote controller & Its holder	1. Remote controller		1
	2. Remote controller holder		1
	3. Mounting screw (ST2.9x10-C-H)		2
	4. Alkaline dry batteries (AM4)		2
Others	5. Owner's manual		1
	6. Installation manual		1
	7. Remote controller manual		1

7. The Specification of Power

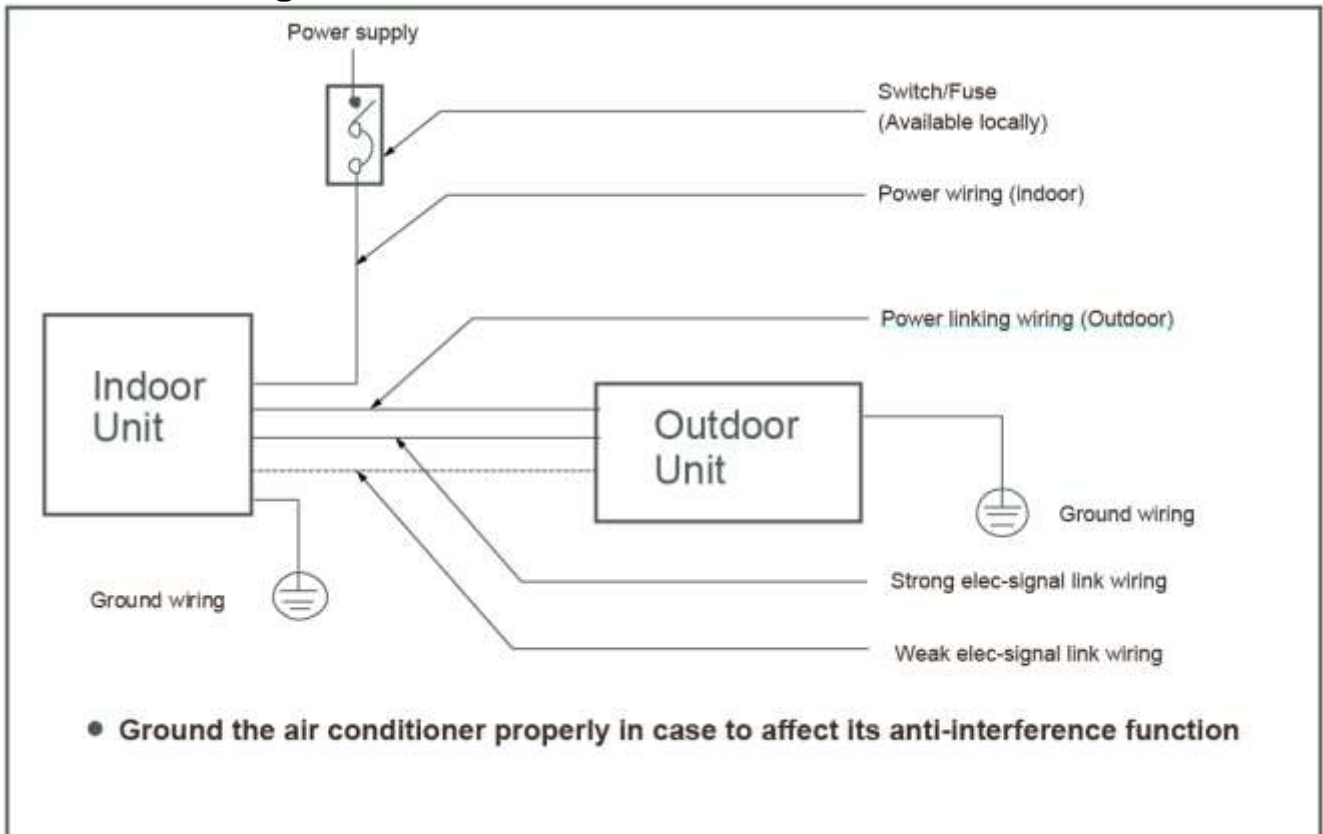
Cooling only:

Model (KBtu/h)		18	24	30-36	36~60
Power	Phase	1-phase	1-phase	1-phase	3-phase
	Frequency and Voltage	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	380-420V, 50Hz
Circuit Breaker/ Fuse (A)		20/16	40/25	50/30	25/20
Indoor Unit Power Wiring (mm ²)		3×2.5	3×2.5	3×4.0	5×2.5
Indoor/Outdoor Connecting Wiring (mm ²)	Ground Wiring	2.5	2.5	4.0	2.5
	Outdoor Unit Power Wiring	3×2.5	3×2.5	3×4.0	5×2.5
	Strong Electric Signal	—————	1×1.0	1×1.0	1×1.0
	Weak Electric Signal	—————	(2×0.75)	(2×0.2)	—————

Heating pump:

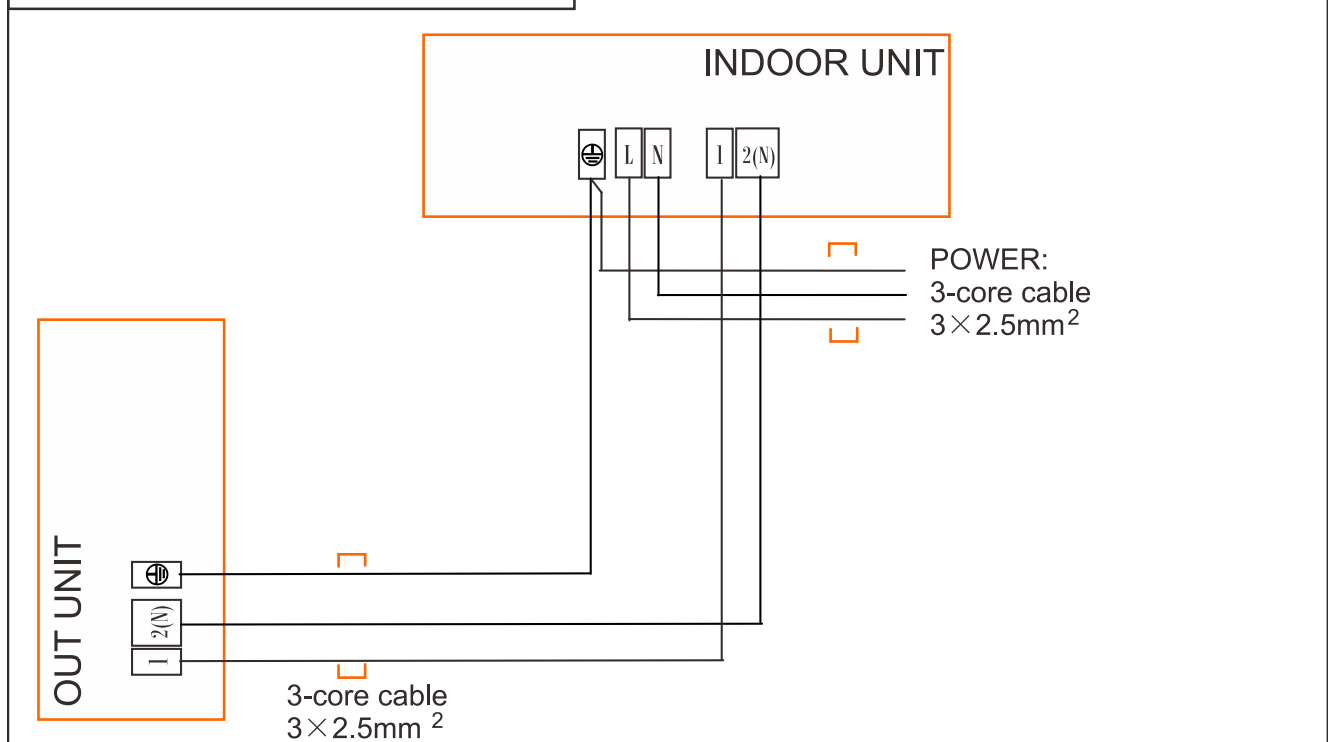
Model(Heating pump)		12000-18000 Btu/h	24000 Btu/h	30000-60000 Btu/h
Power	Phase	1-Phase	1-Phase	3-Phase
	Frequency and Volt	220-240V,50Hz	220-240V,50Hz	380-415V, 50Hz
Circuit Breaker/Fuse(A)		20/16	40/25	25/20
Indoor unit power wiring(mm ²)		3×2.5	3×2.5	5×2.5
Indoor/out-door connecting wiring(mm ²)	Ground wiring	2.5	2.5	2.5
	Outdoor unit power wiring	3×2.5	3×2.5	5×2.5
	Strong electric signal	2×1.0	3×1.0	3×1.0
	Weak electric signal	2×0.75/2×0.5	2×0.2	—————

8. Field Wiring



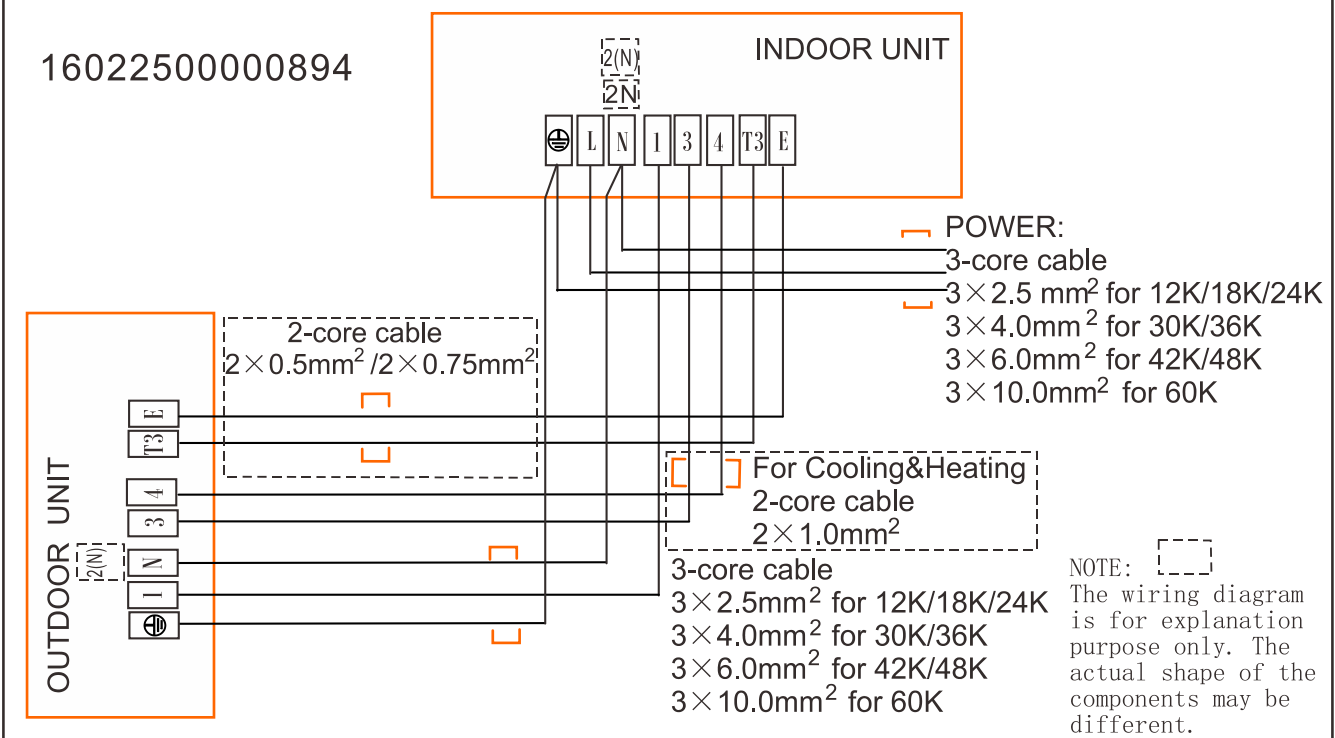
YFFE18BXE--M-RX

Air Condition Link-Circuit



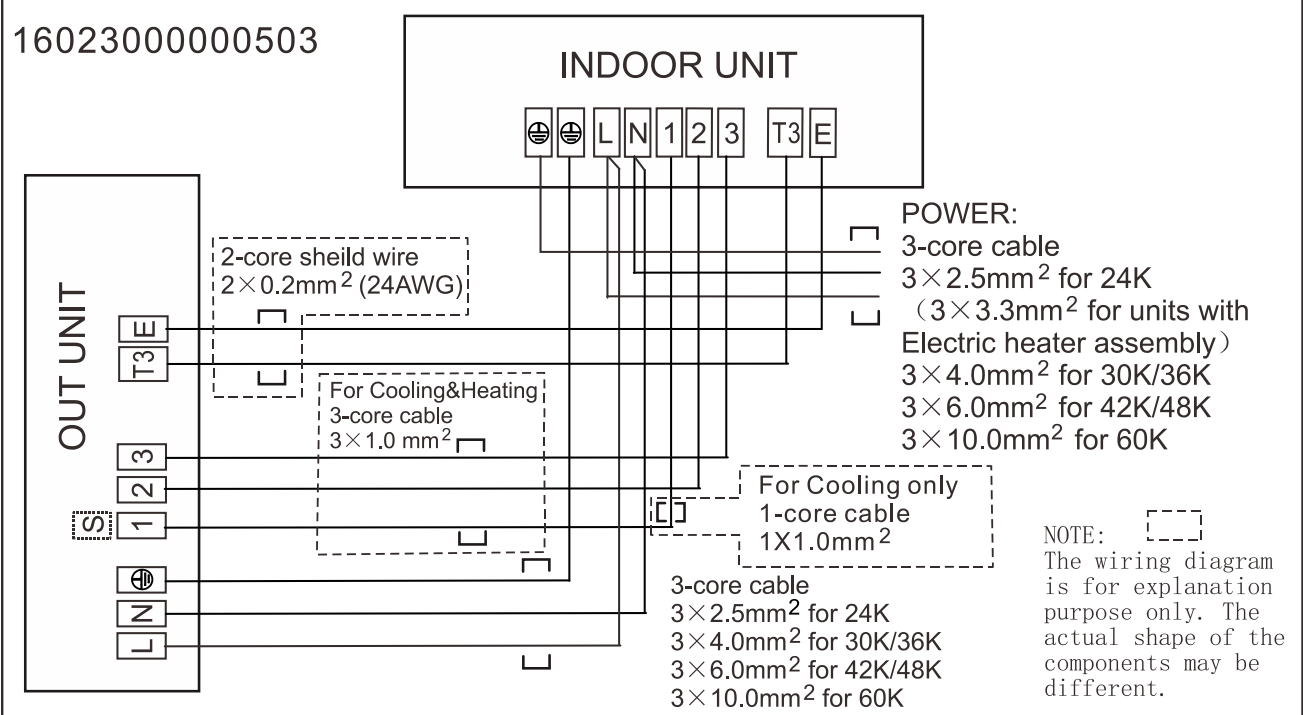
YFGE12BXE--M-RX, YFGE18BXE--M-RX

Air Condition Link-Circuit



YFFE24BXE--M-RX, YFFE24BXE--M-RX, YEFE30BXE--M-WX, YFFE36BXE--M-RX

Air Condition Link-Circuit



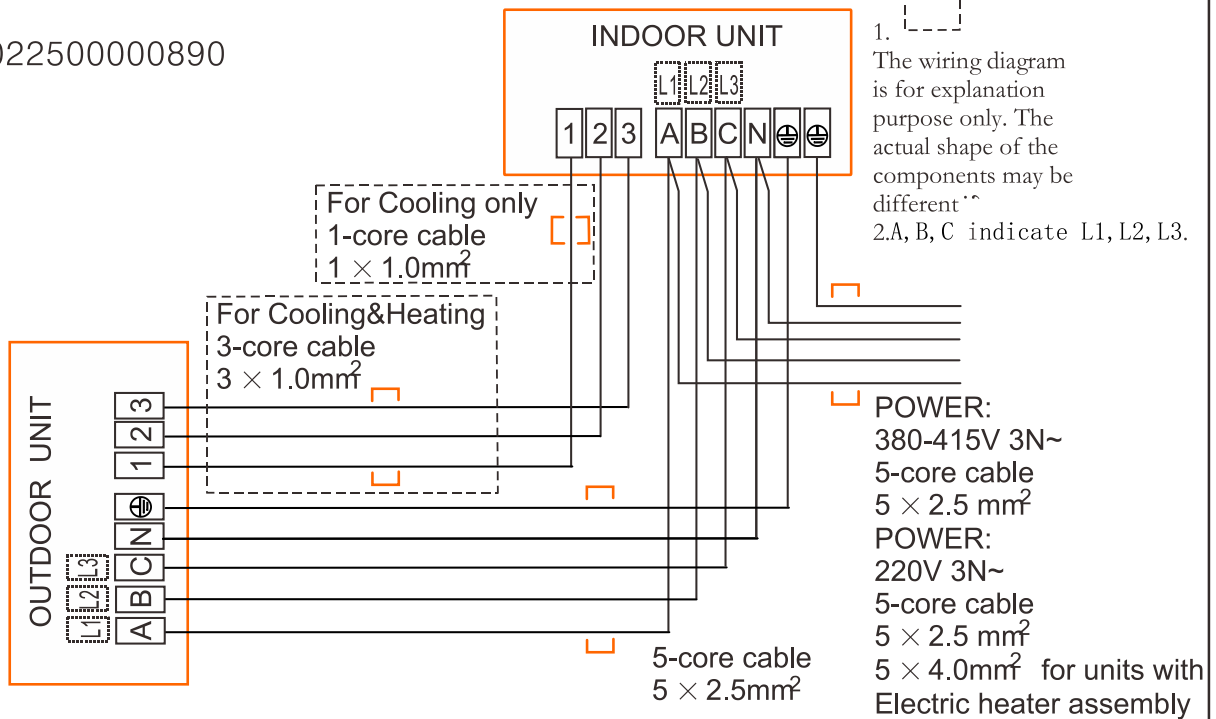
YFFE36BXO--M-RX, YFFE48BXO--M-RX,
YFGE48BXO--M-RX, YFGE55BXO--M-RX

YFFE60BXO--M-RX,

YFGE36BXO--M-RX,

Air Condition Link-Circuit

16022500000890

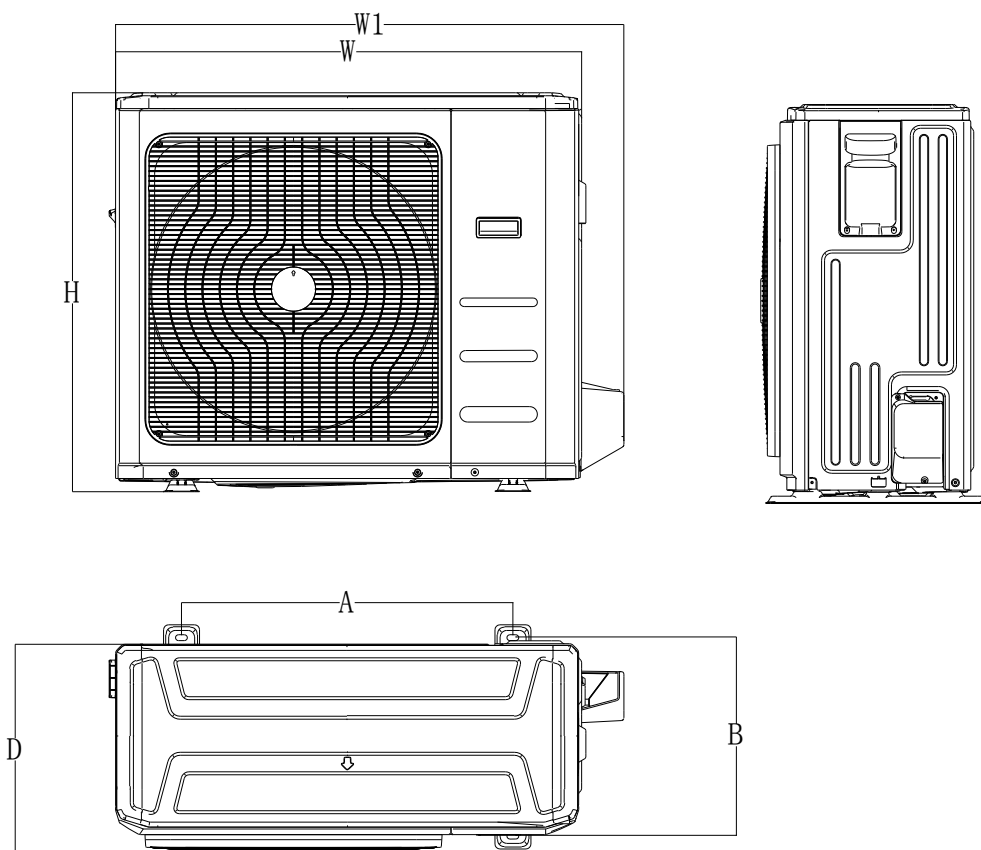


Part 3

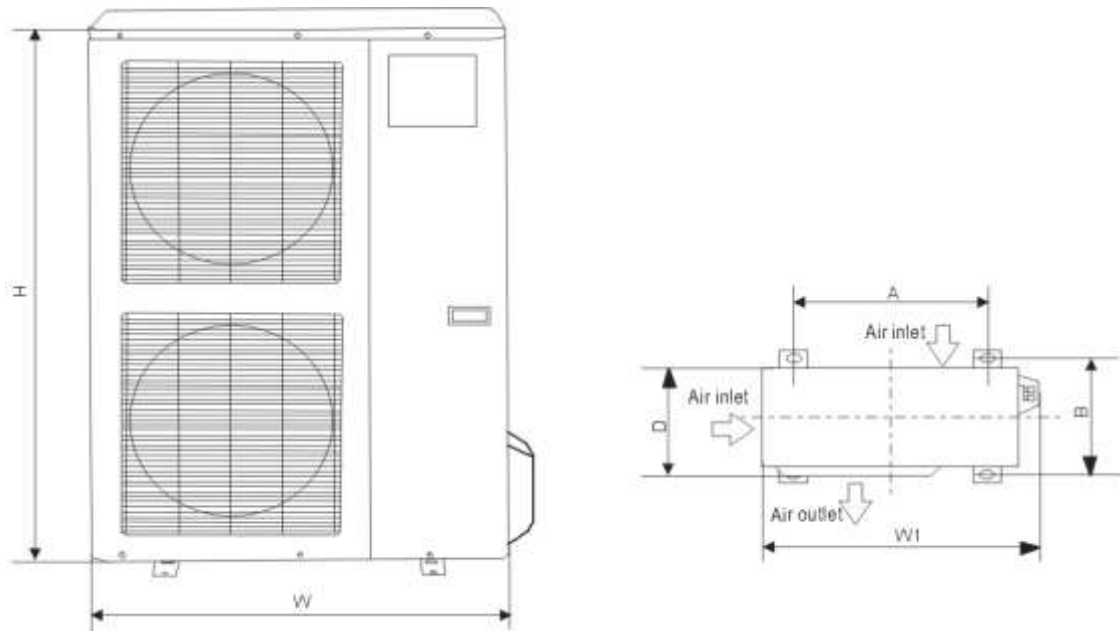
Outdoor Units

1. Dimensions	69
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1. Dimensions

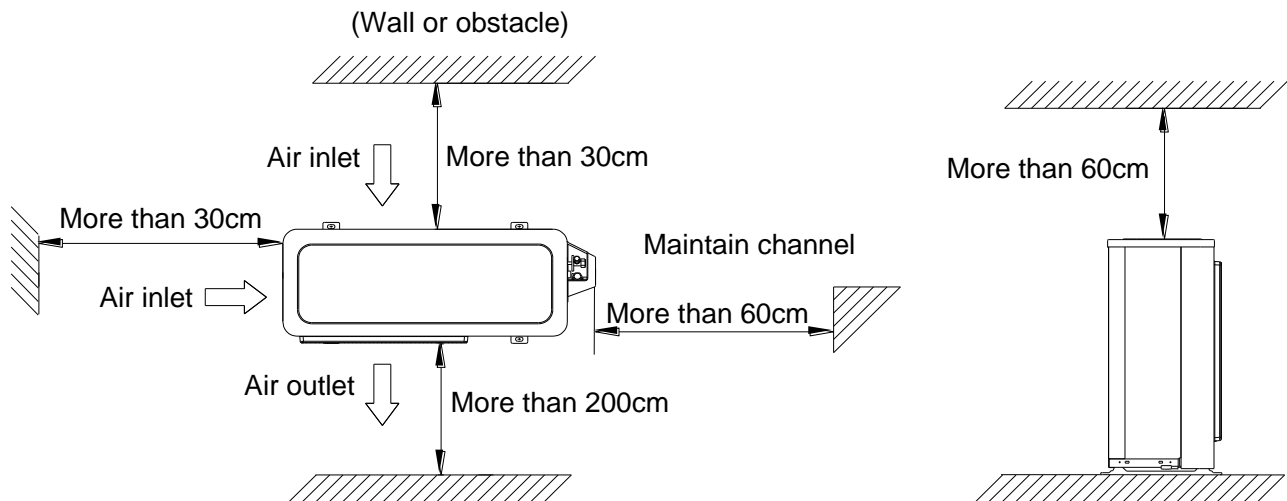


Model	Unit: mm					
	W	D	H	W1	A	B
YUGE12BYE--MO-X	770	300	555	840	487	298
YUFE12BYE--MO-X	770	300	555	840	487	298
YUFE18BYE--MO-X	770	300	555	840	487	298
YUGE18BYE--MO-X	770	300	555	840	487	298
YUGE24BYE--MO-X	845	363	702	914	540	350
YUFE24BYE--MO-X	845	363	702	914	540	350
YUFE30BYE--MO-X	946	410	810	1030	673	403
YUFE36BYE--MO-X	946	410	810	1030	673	403
YUFE36BYO--MO-X	946	410	810	1030	673	403
YUGE36BYO--MS-X	990	345	965	1070	624	366



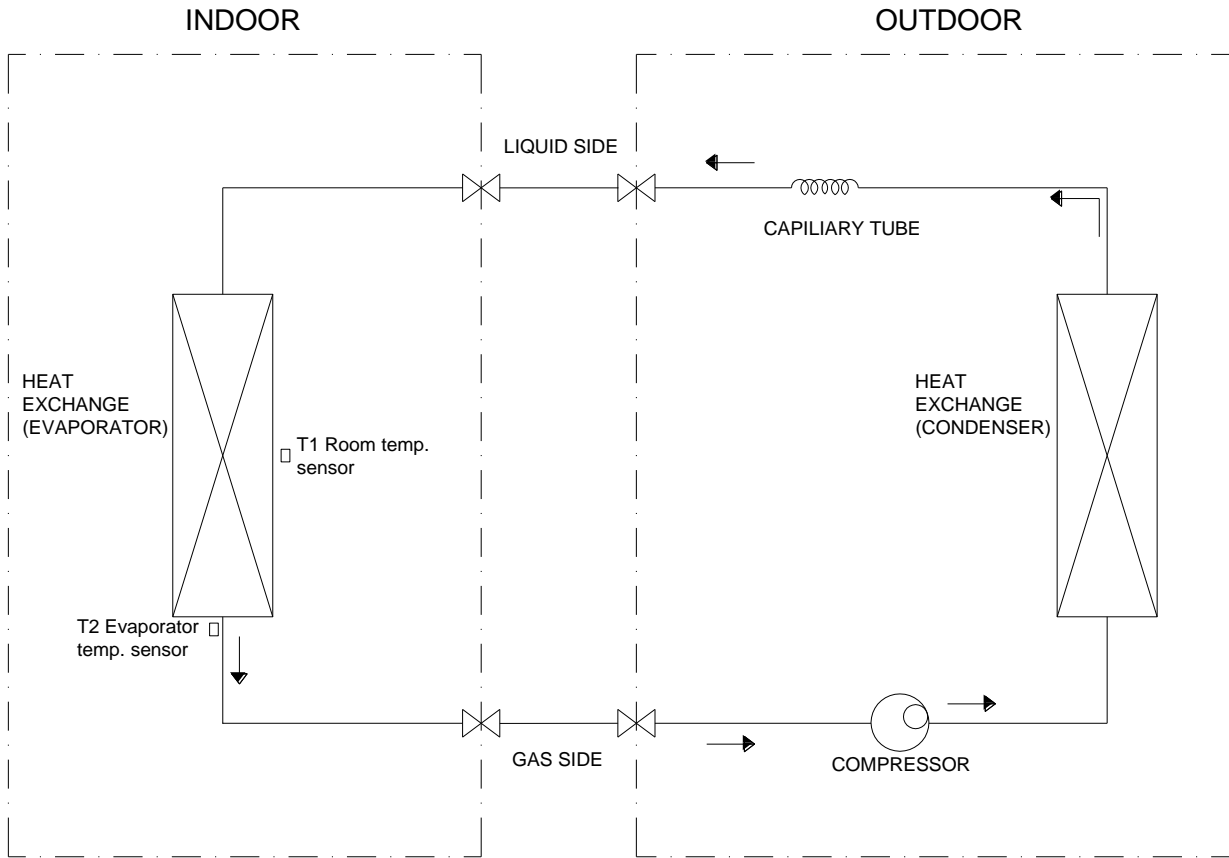
Model	Unit: mm					
	W	D	H	W1	A	B
YUFE48BYO--MS-X	900	350	1170	985	590	378
YUGE48BYO--MS-X	900	350	1170	985	590	378
YUFE60BYO--MS-X	900	350	1170	985	590	378
YUGE55BYO--MS-X	900	350	1170	985	590	378

2. Service Space

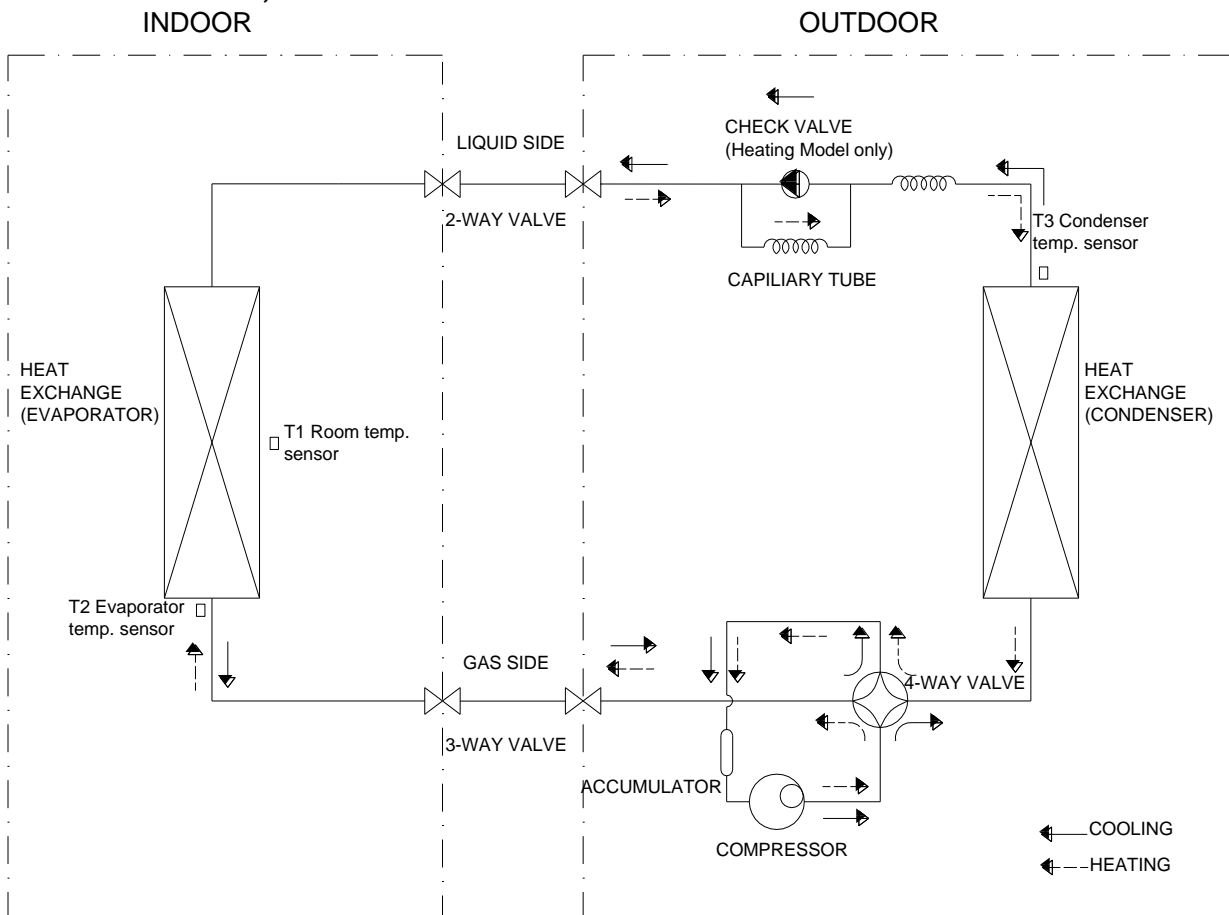


3. Piping Diagrams

YUFE12BYE--MO-X, YUFE18BYE--MO-X



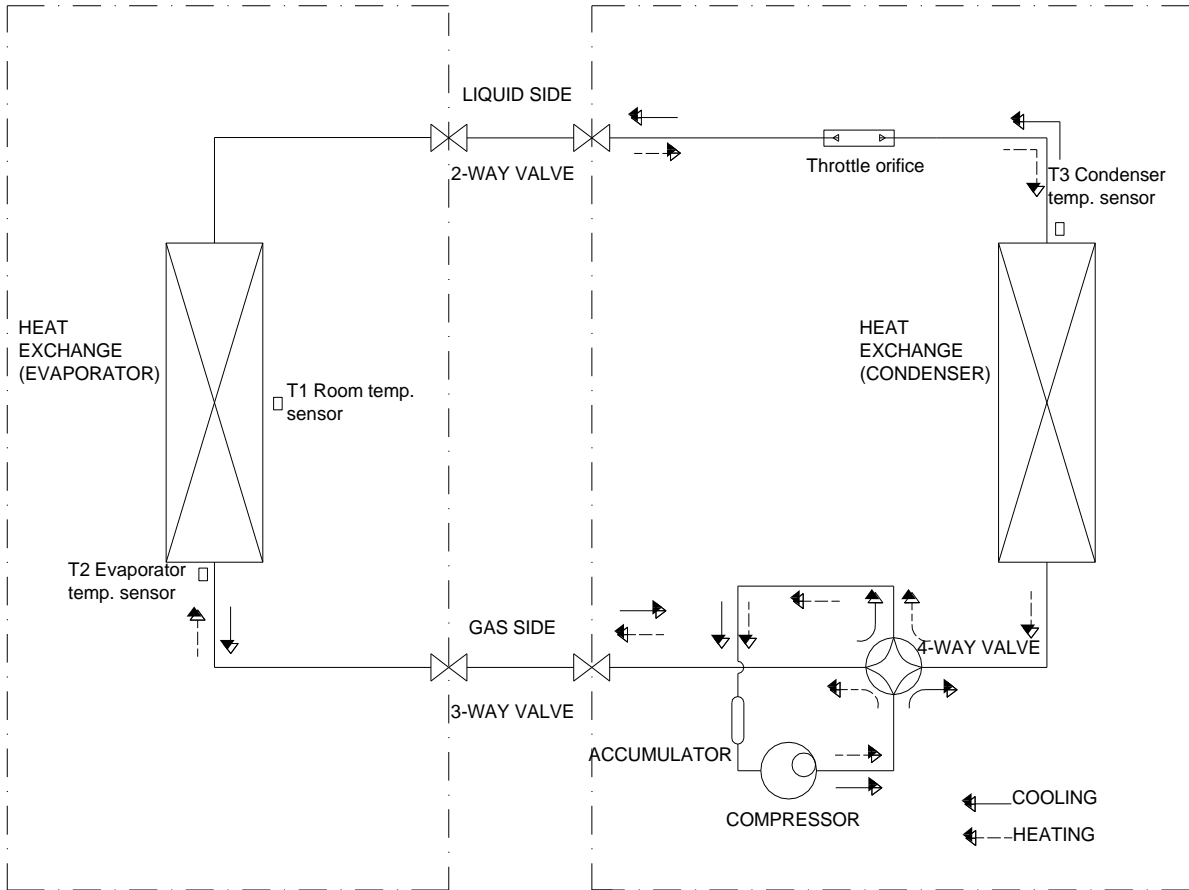
YUGE12BYE--MO-X, YUGE18BYE--MO-X



YUGE24BYE--MO-X

INDOOR

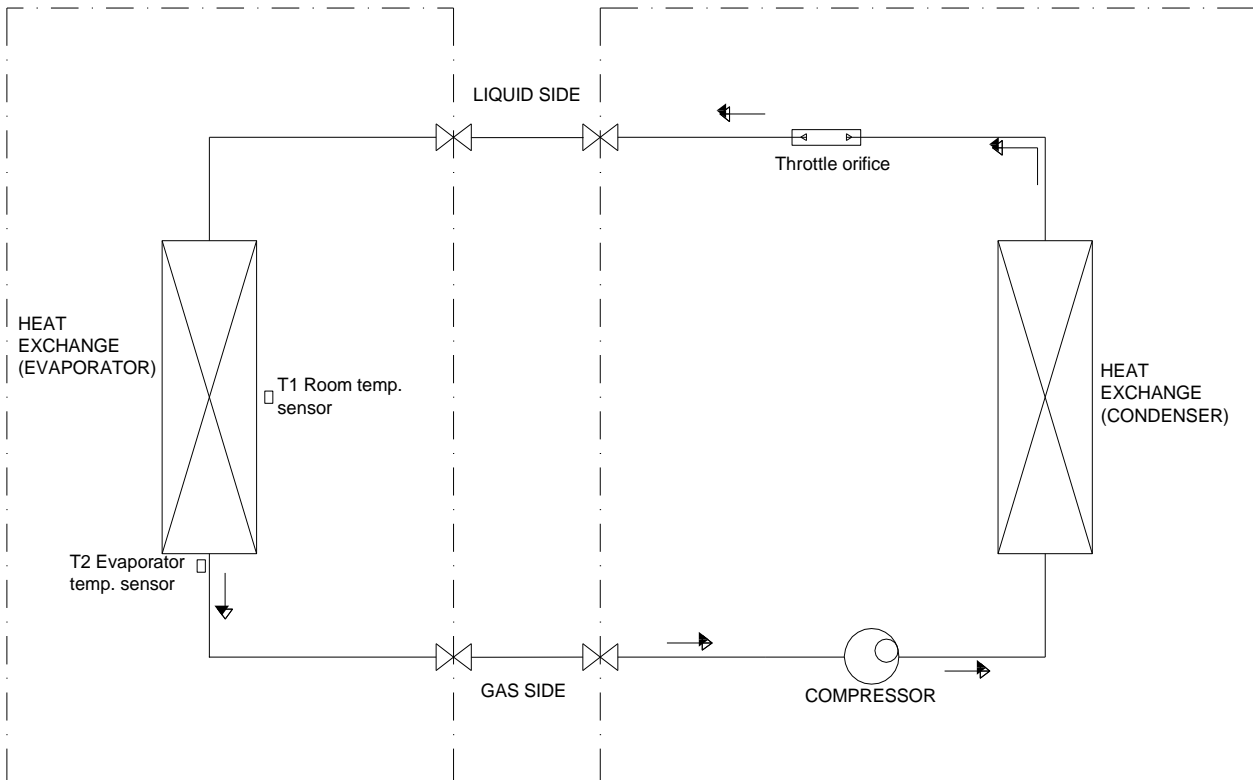
OUTDOOR



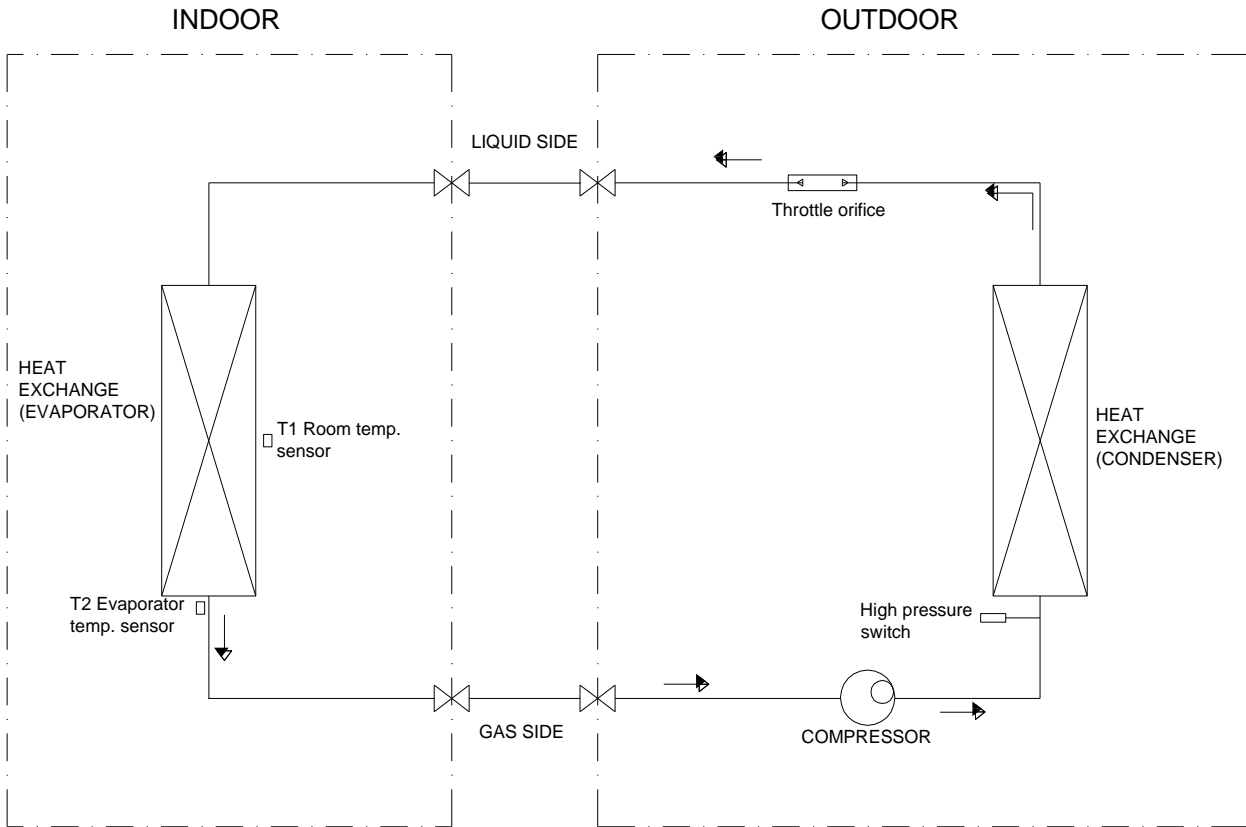
YUFE24BYE--MO-X, YUFE30BYE--MO-X, YUFE36BYE--MO-X

INDOOR

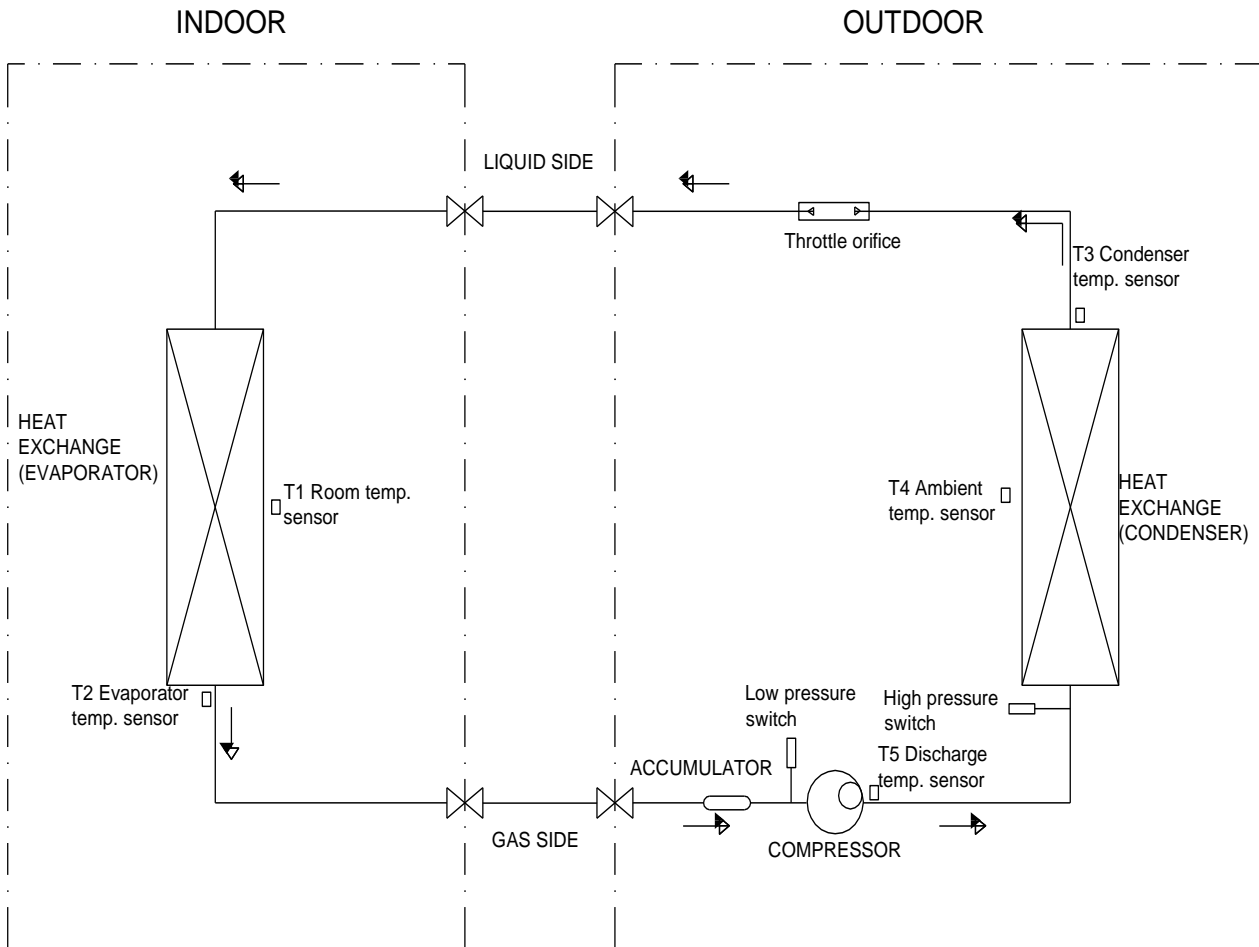
OUTDOOR



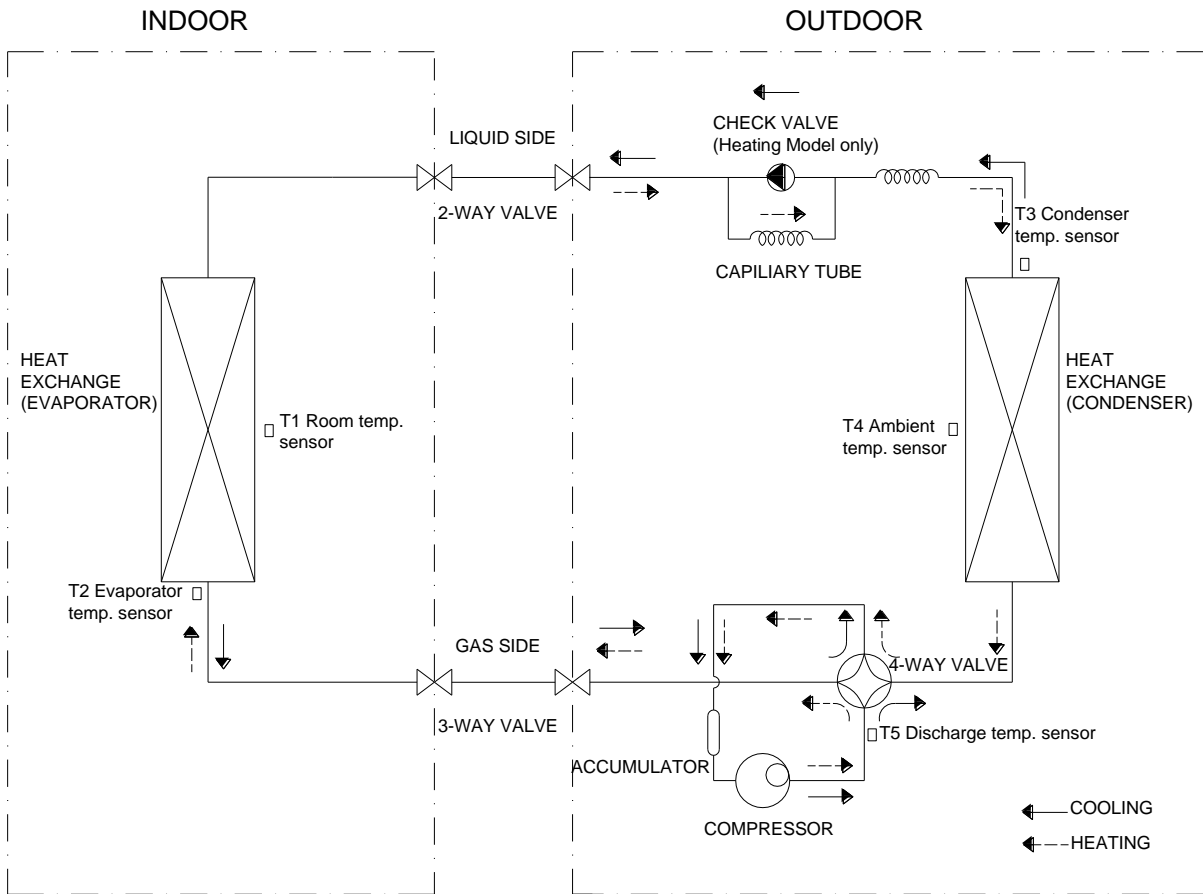
YUFE36BYO--MO-X



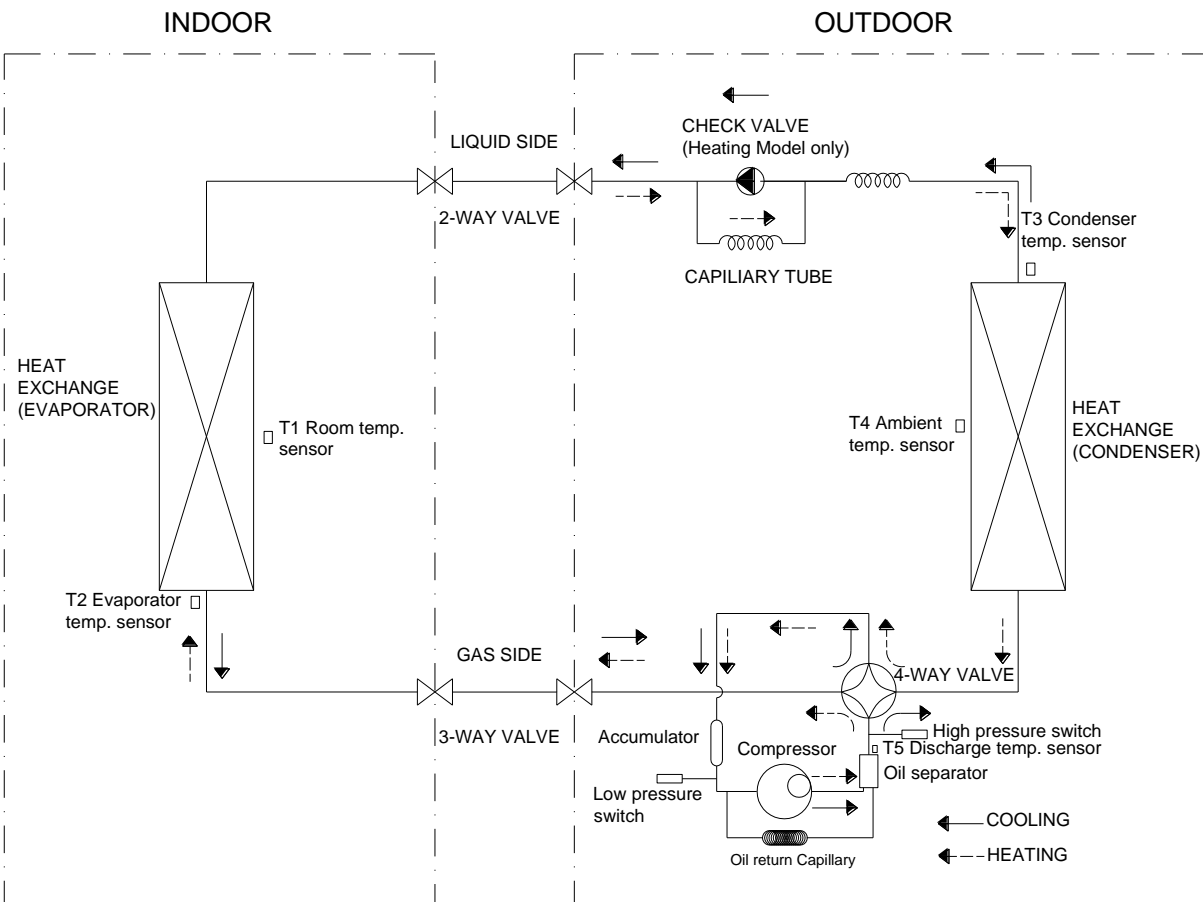
YUFE48BYO--MS-X, YUFE60BYO--MS-X



YUGE36BYO--MS-X



YUGE48BYO--MS-X, YUGE55BYO--MS-X

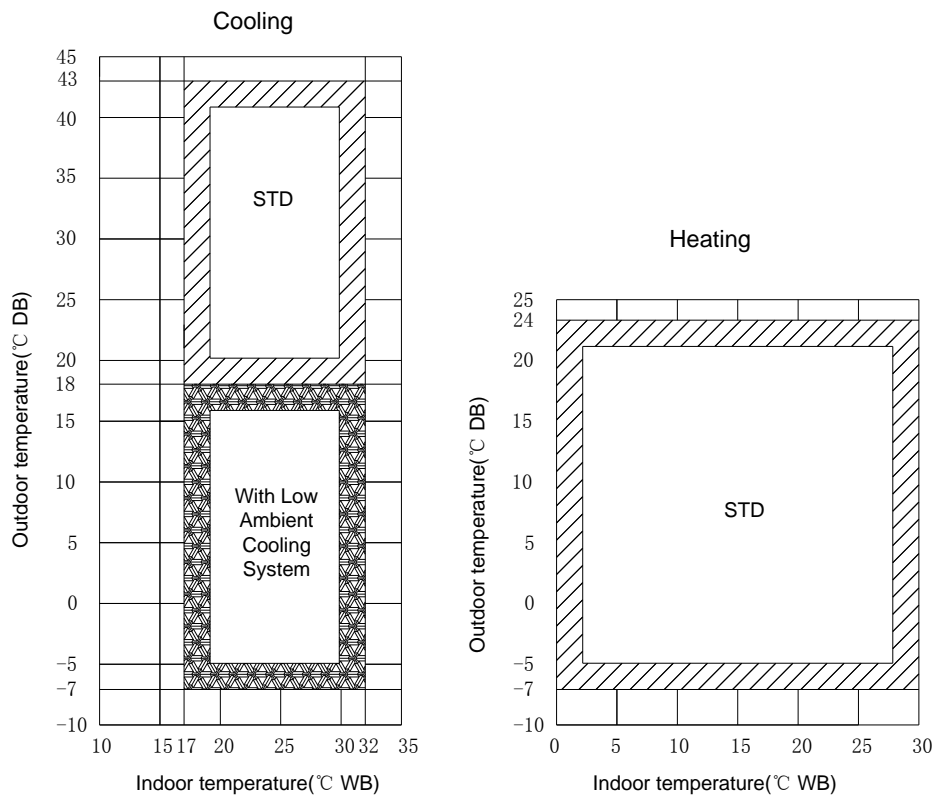


4. Electric Characteristics

Model	Outdoor Unit			
	Hz	Voltage	Min.	Max.
YUGE12BYE--MO-X	50	220~240V	198V	254V
YUFE12BYE--MO-X	50	220~240V	198V	254V
YUFE18BYE--MO-X	50	220~240V	198V	254V
YUGE18BYE--MO-X	50	220~240V	198V	254V
YUGE24BYE--MO-X	50	220~240V	198V	254V
YUFE24BYE--MO-X	50	220~240V	198V	254V
YUFE30BYE--MO-X	50	220~240V	198V	254V
YUFE36BYE--MO-X	50	220~240V	198V	254V
YUFE36BYO--MO-X	50	380~415V	342V	436V
YUFE48BYO--MS-X	50	380~415V	342V	436V
YUFE60BYO--MS-X	50	380~415V	342V	436V
YUGE36BYO--MS-X	50	380~420V	342V	436V
YUGE48BYO--MS-X	50	380~420V	342V	436V
YUGE55BYO--MS-X	50	380~420V	342V	436V

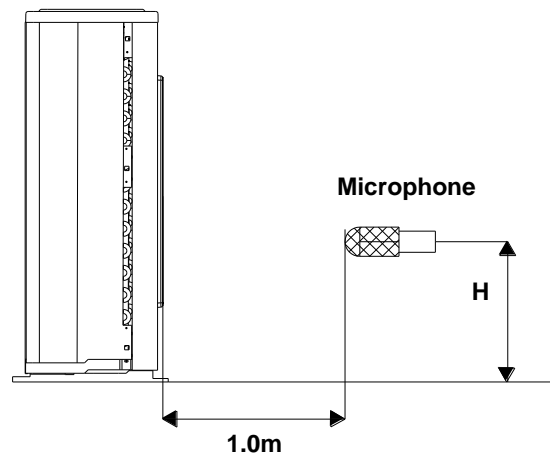
5. Operation Limits

Mode \ Temperature	Cooling operation	Heating operation
Room temperature	17°C~32°C	0°C~30°C
Outdoor temperature	18°C~43°C	-7°C~24°C
	(-7°C~43°C : For the models with low temperature cooling system)	



6. Sound Levels

Outdoor Unit



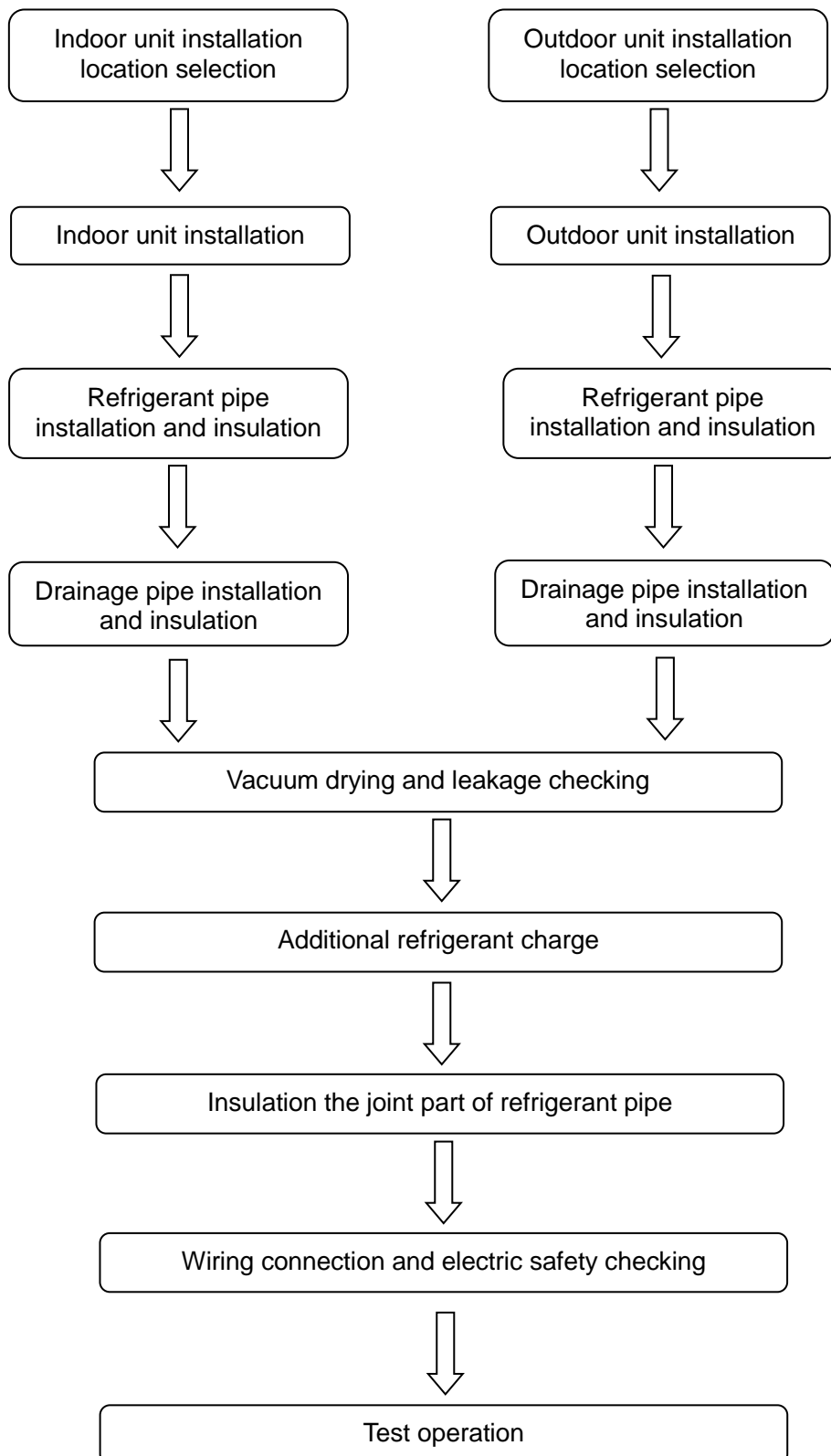
Note: H= 0.5 x height of outdoor unit

Model	Noise level dB(A)
YUGE12BYE--MO-X	59
YUFE12BYE--MO-X	56
YUFE18BYE--MO-X	62
YUGE18BYE--MO-X	62
YUGE24BYE--MO-X	62
YUFE24BYE--MO-X	61
YUFE30BYE--MO-X	61
YUFE36BYE--MO-X	66
YUFE36BYO--MO-X	66
YUFE48BYO--MS-X	62
YUFE60BYO--MS-X	65
YUGE36BYO--MS-X	61
YUGE48BYO--MS-X	63
YUGE55BYO--MS-X	63

Part 4 Installation

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1. Installation Procedure



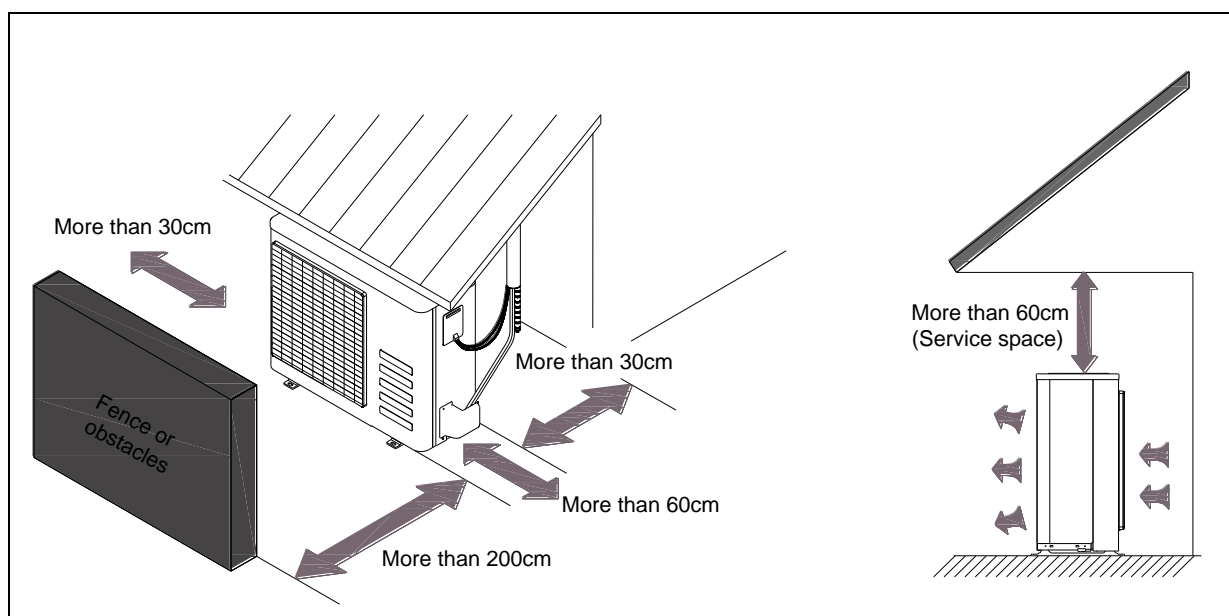
2. Location selection

2.1 Indoor unit location selection

- The place shall easily support the indoor unit's weight.
- The place can ensure the indoor unit installation and inspection.
- The place can ensure the indoor unit horizontally installed.
- The place shall allow easy water drainage.
- The place shall easily connect with the outdoor unit.
- The place where air circulation in the room should be good.
- There should not be any heat source or steam near the unit.
- There should not be any oil gas near the unit
- There should not be any corrosive gas near the unit
- There should not be any salty air near the unit
- There should not be strong electromagnetic wave near the unit
- There should not be inflammable materials or gas near the unit
- There should not be strong voltage vibration.

2.2 Outdoor unit location selection

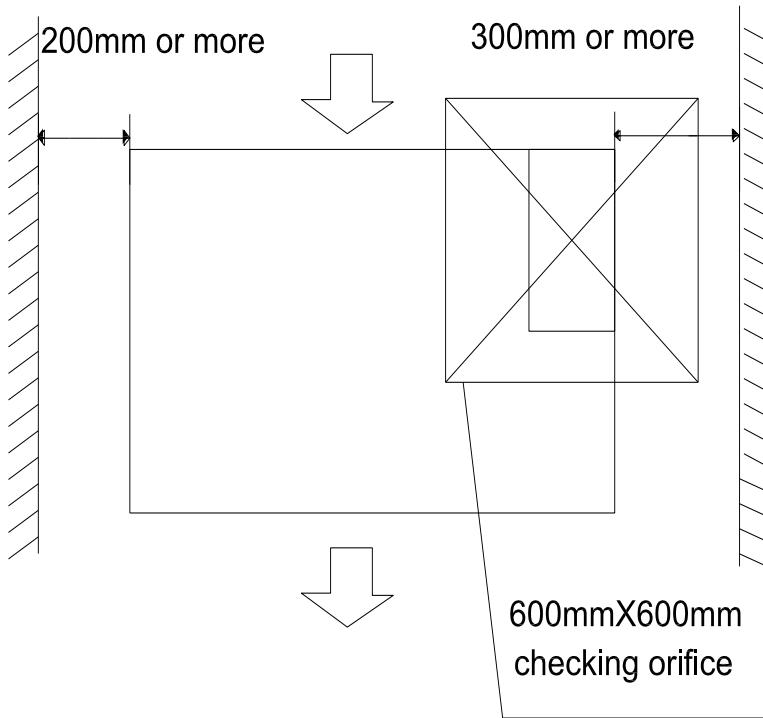
- The place shall easily support the outdoor unit's weight.
- Locate the outdoor unit as close to indoor unit as possible
- The piping length and height drop can not exceed the allowable value.
- The place where the noise, vibration and outlet air do not disturb the neighbors.
- There is enough room for installation and maintenance.
- The air outlet and the air inlet are not impeded, and not face the strong wind.
- It is easy to install the connecting pipes and cables.
- There is no danger of fire due to leakage of inflammable gas.
- It should be a dry and well ventilation place
- The support should be flat and horizontal
- Do not install the outdoor unit in a dirty or severely polluted place, so as to avoid blockage of the heat exchanger in the outdoor unit.
- If is built over the unit to prevent direct sunlight, rain exposure, direct strong wind, snow and other scraps accumulation, make sure that heat radiation from the condenser is not restricted.



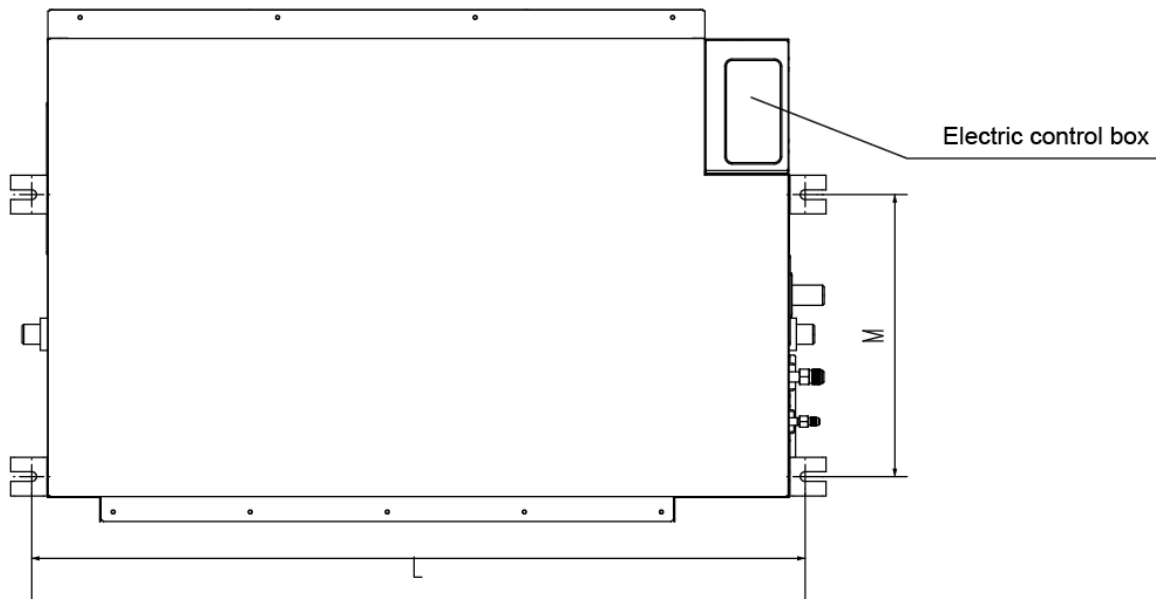
3. Indoor unit installation

3.1 A5 duct indoor unit installation

3.1.1 Service space for indoor unit



3.1.2 Bolt pitch



Capacity (KBtu)	Size of outline dimension mounted plug	
	L	M
12	740	350
18	960	350
24	960	350
30/36	1240	500
48/60	1240	500

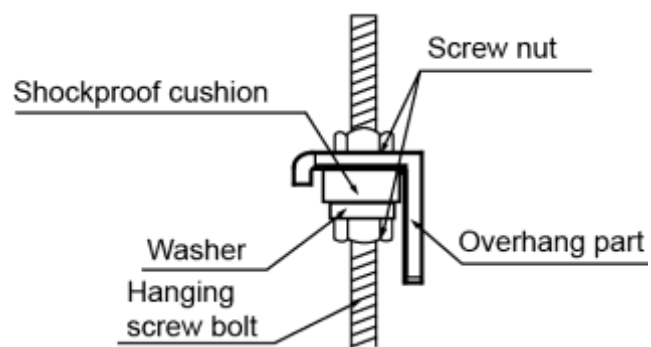
3.1.3 Install the pendant bolt

Select the position of installation hooks according to the hook holes positions showed in upper picture. Drill four holes of $\text{Ø}12\text{mm}$, 45~50mm deep at the selected positions on the ceiling. Then embed the expansible hooks (fittings).



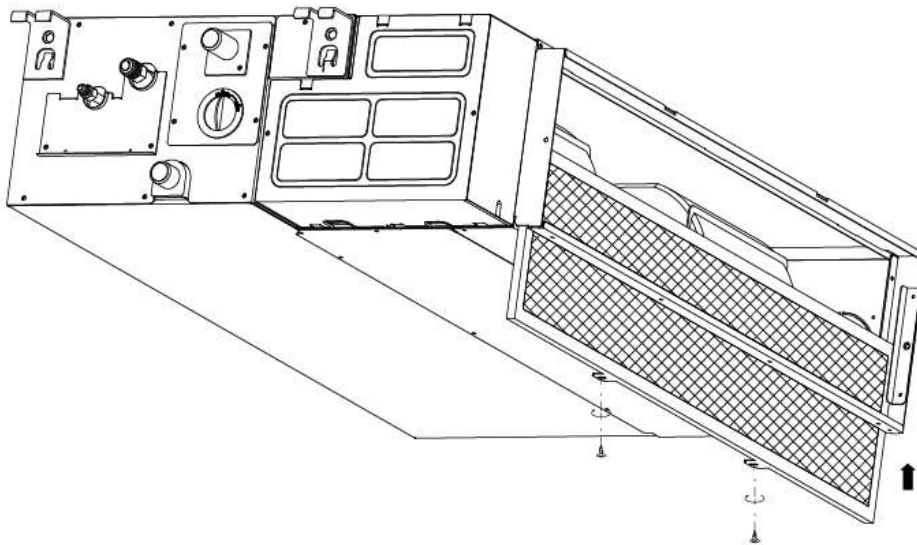
3.1.4 Install the main body

Make the 4 suspender through the 4 hanger of the main body to suspend it. Adjust the hexangular nuts on the four installation hooks evenly, to ensure the balance of the body. Use a leveling instrument to make sure the levelness of the main body is within $\pm 1^\circ$.



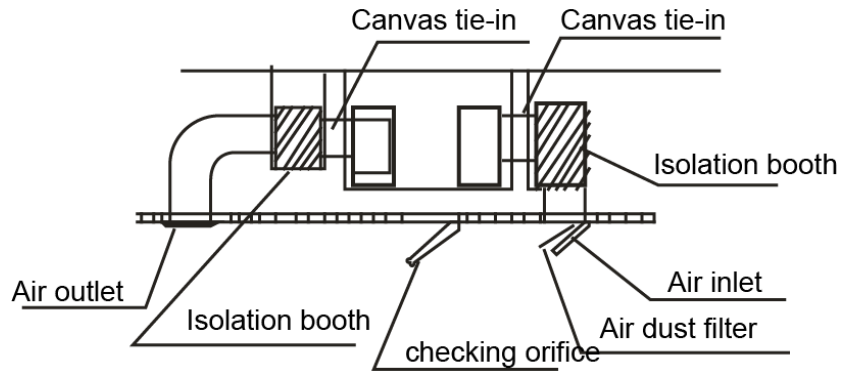
3.1.5 Install the air filter

Insert the air filter through the filter slot and fix it with 2 screws.



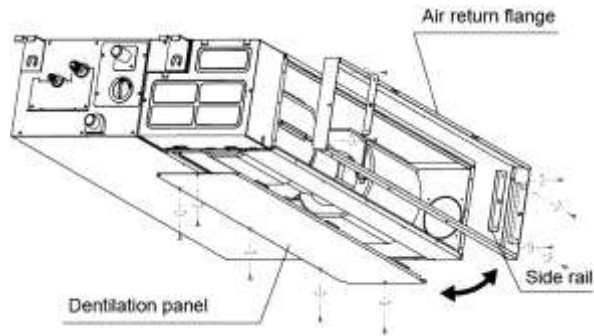
3.1.6 Install the air duct

Please design the air duct as below recommended picture

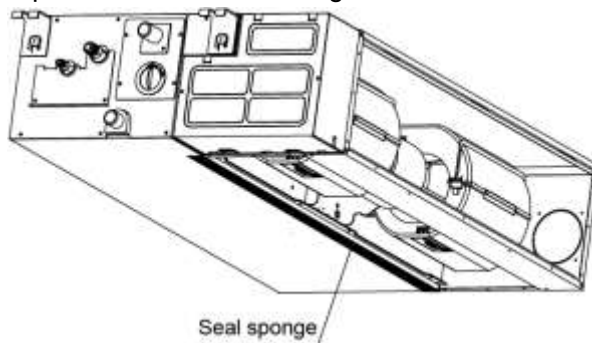


3.1.7 Change the air inlet direction

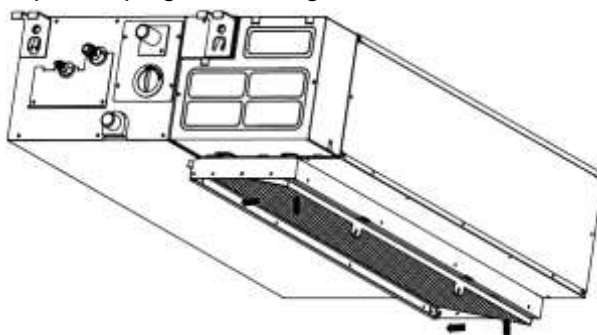
- ① Take off ventilation panel and flange, cut off the staples at side rail.



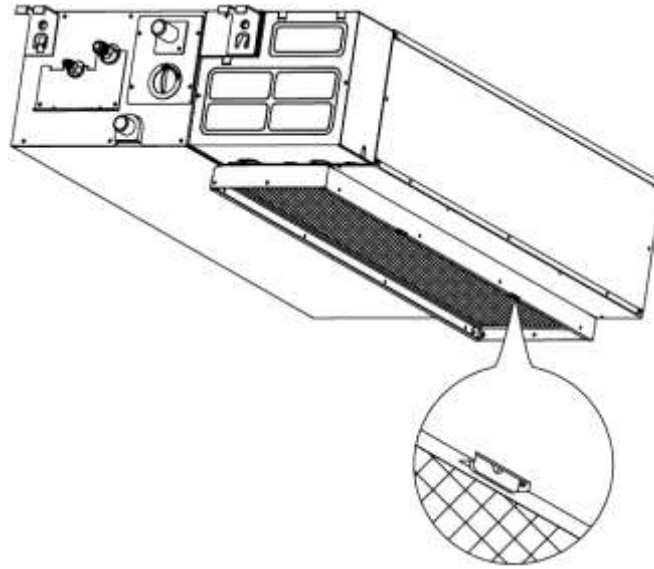
- ② Stick the attached seal sponge as per the indicating place in the following fig, and then change the mounting positions of air return panel and air return flange .



- ③ When install the filter mesh, please plug it into flange inclined from air return opening, and then push up.

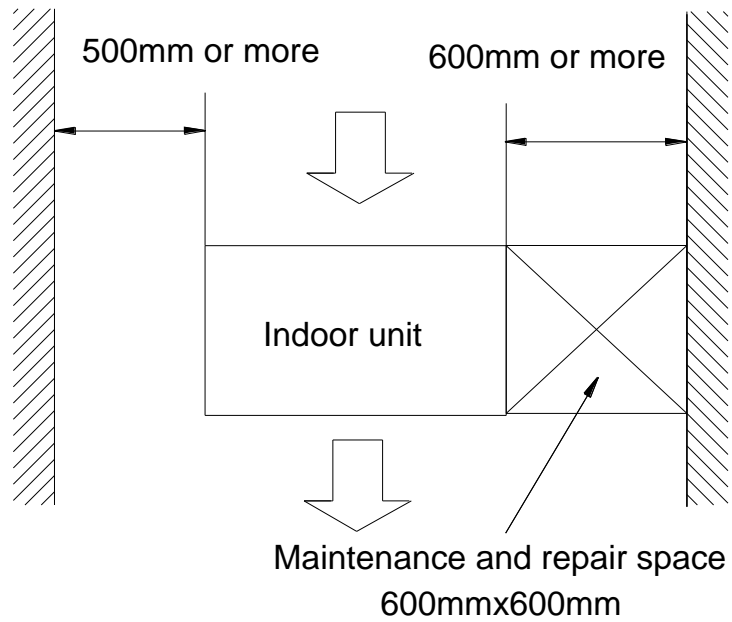


- ④ The installation has finish, upon filter mesh which fixing blocks have been insert to the flange positional holes.

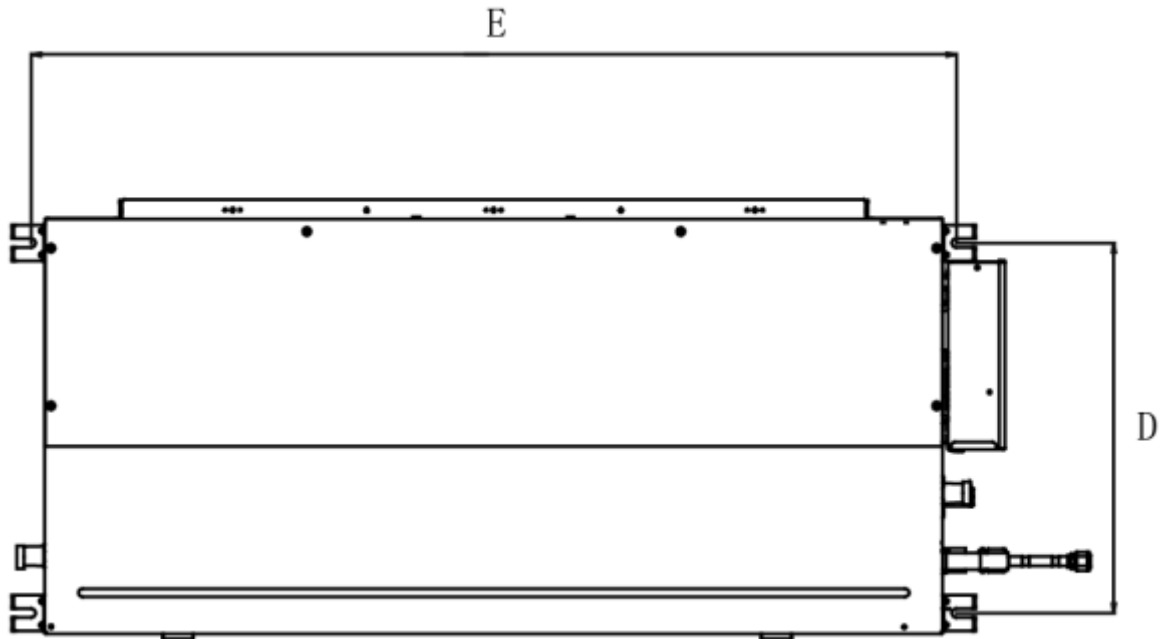


3.2 HESP duct indoor unit installation

3.2.1 Service space for indoor unit



3.2.2 Bolt pitch



Capacity (KBtu)	Size of mounted lug	
	D	E
24	397	936
36	397	1146
48/60	495	1236

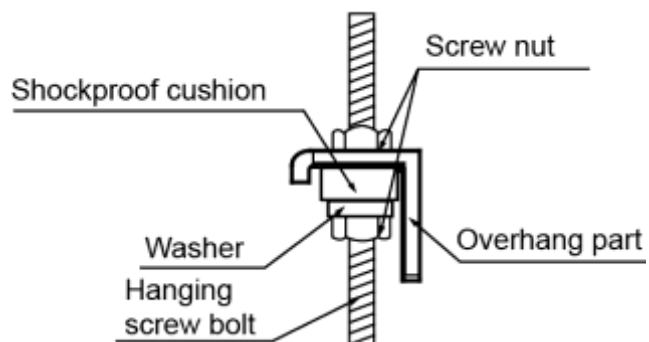
3.2.3 Install the pendant bolt

Select the position of installation hooks according to the hook holes positions showed in upper picture. Drill four holes of $\varnothing 12\text{mm}$, 45~50mm deep at the selected positions on the ceiling. Then embed the expansible hooks (fittings).



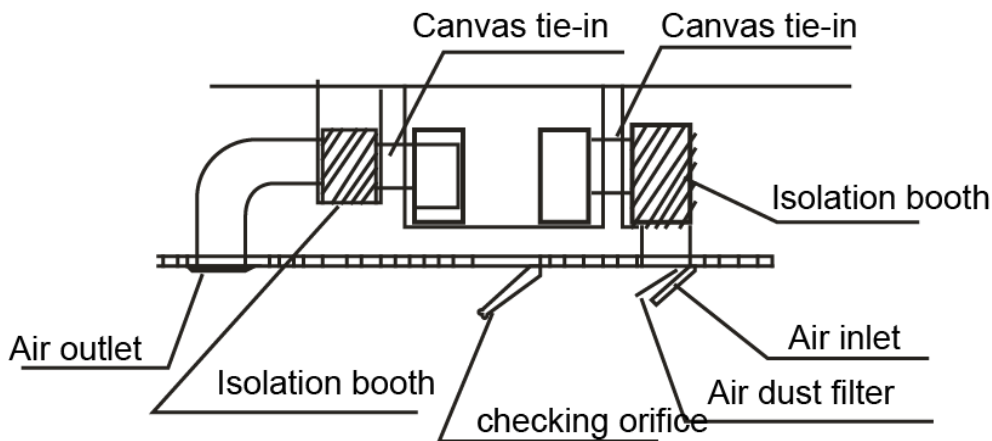
3.2.4 Install the main body

Make the 4 suspender through the 4 hanger of the main body to suspend it. Adjust the hexangular nuts on the four installation hooks evenly, to ensure the balance of the body. Use a leveling instrument to make sure the levelness of the main body is within $\pm 1^\circ$.



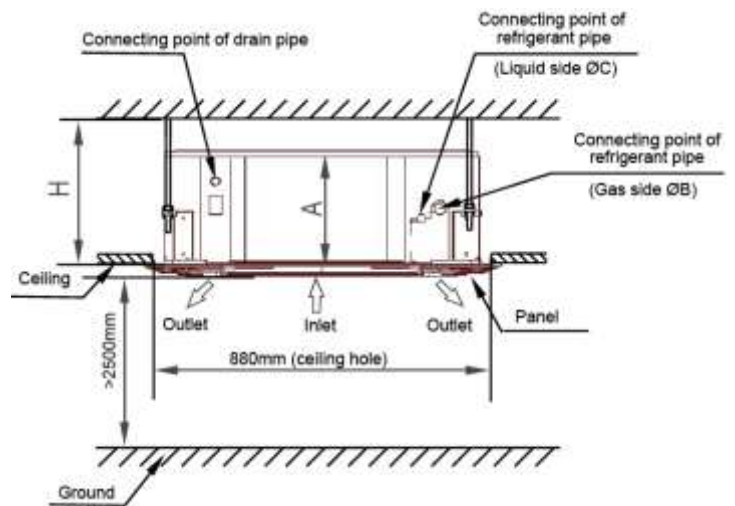
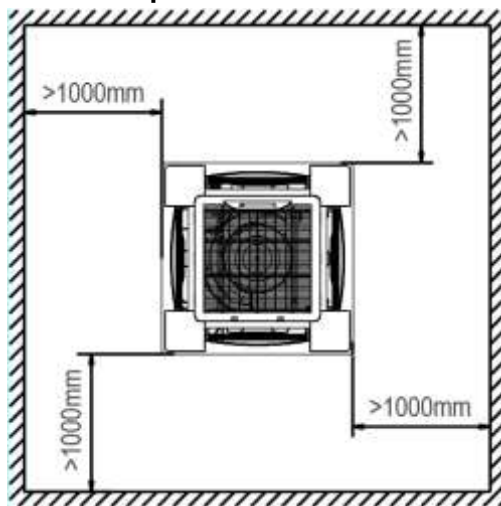
3.2.5 Install the air duct

Please design the air duct as below recommended picture



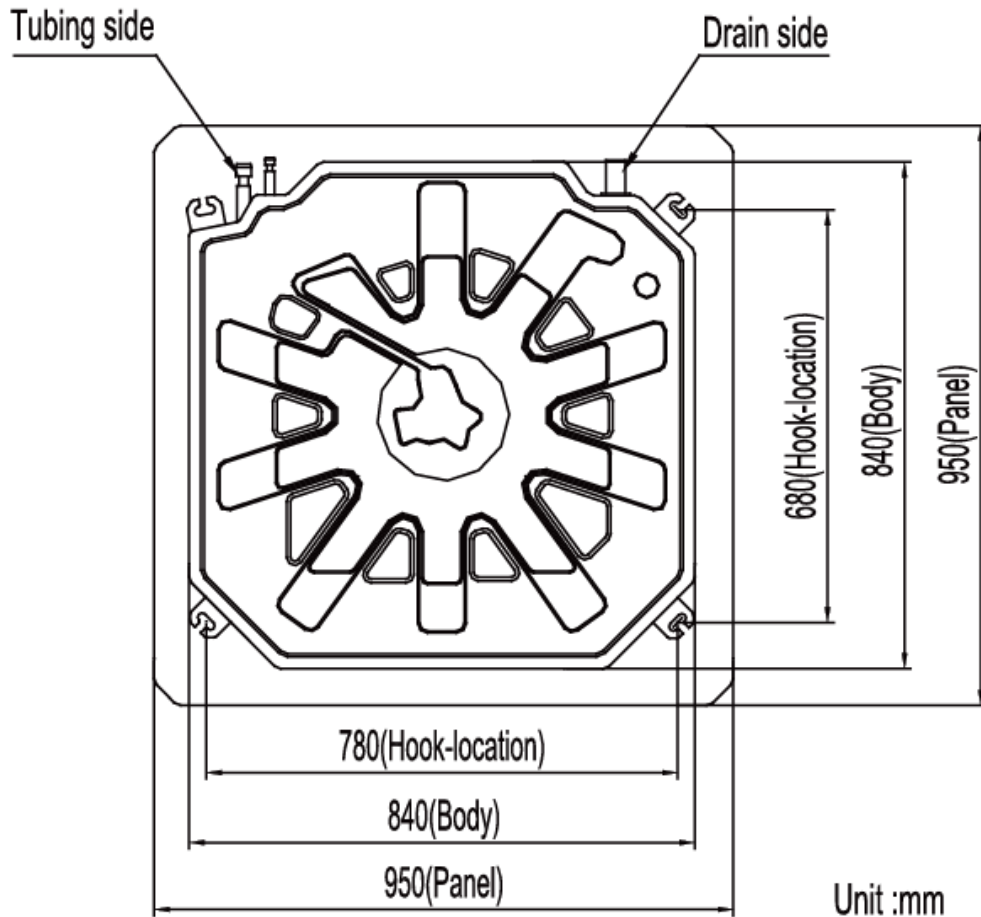
3.3 Super-slim cassette indoor unit installation

3.3.1 Service space for indoor unit



Model	A	H	Remark
18/24	205	>235	Cooling / Cooling & Heating
30~48	245	>275	Cooling / Cooling & Heating
60	287	>317	Cooling / Cooling & Heating

3.3.2 Bolt pitch



3.3.3 Install the pendant bolt

Select the position of installation hooks according to the hook holes positions showed in upper picture. Drill four holes of $\varnothing 12\text{mm}$, 45~50mm deep at the selected positions on the ceiling. Then embed the expansible hooks (fittings).

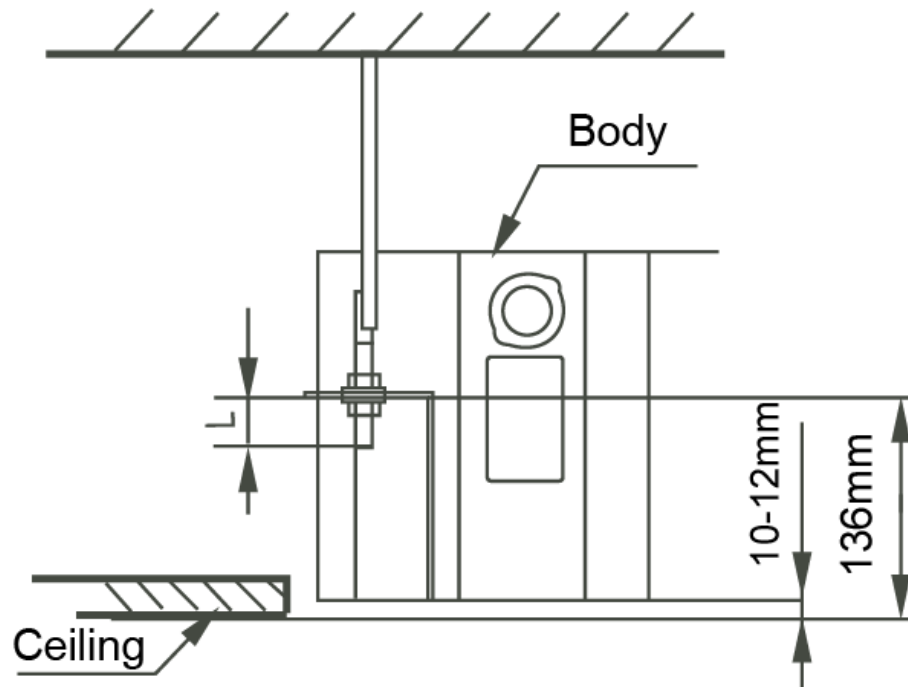


3.3.4 Install the main body

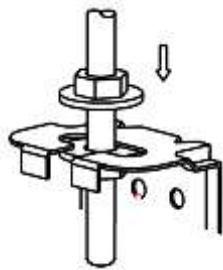
Make the 4 suspender through the 4 hanger of the main body to suspend it. Adjust the hexangular nuts on the four installation hooks evenly, to ensure the balance of the body. Use a leveling instrument to make sure the levelness of the main body is within $\pm 1^\circ$.



Adjust the position to ensure the gaps between the body and the four sides of ceiling are even. The body's lower part should sink into the ceiling for 10~12 mm. In general, L is half of the screw length of the installation hook.

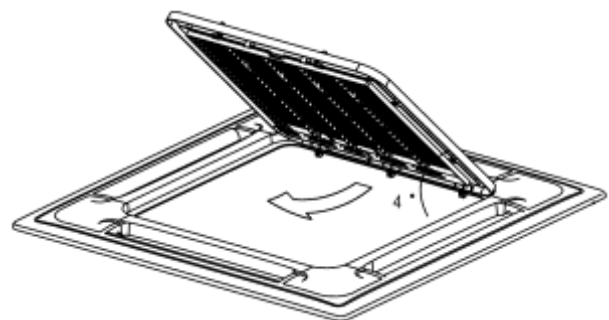
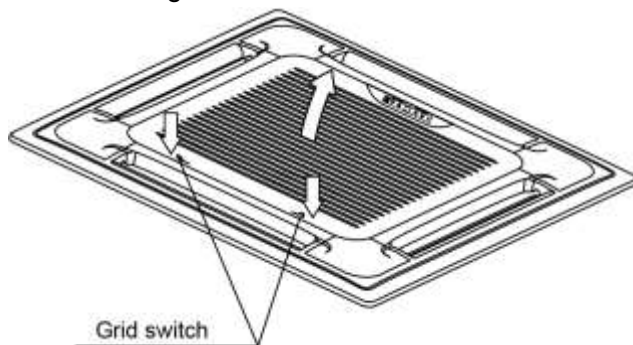


Locate the air conditioner firmly by wrenching the nuts after having adjusted the body's position well.

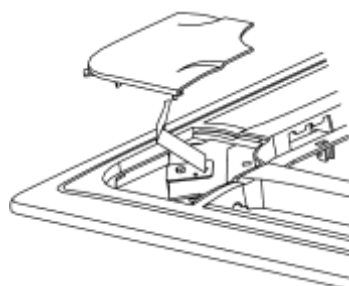


3.3.5 Install the panel

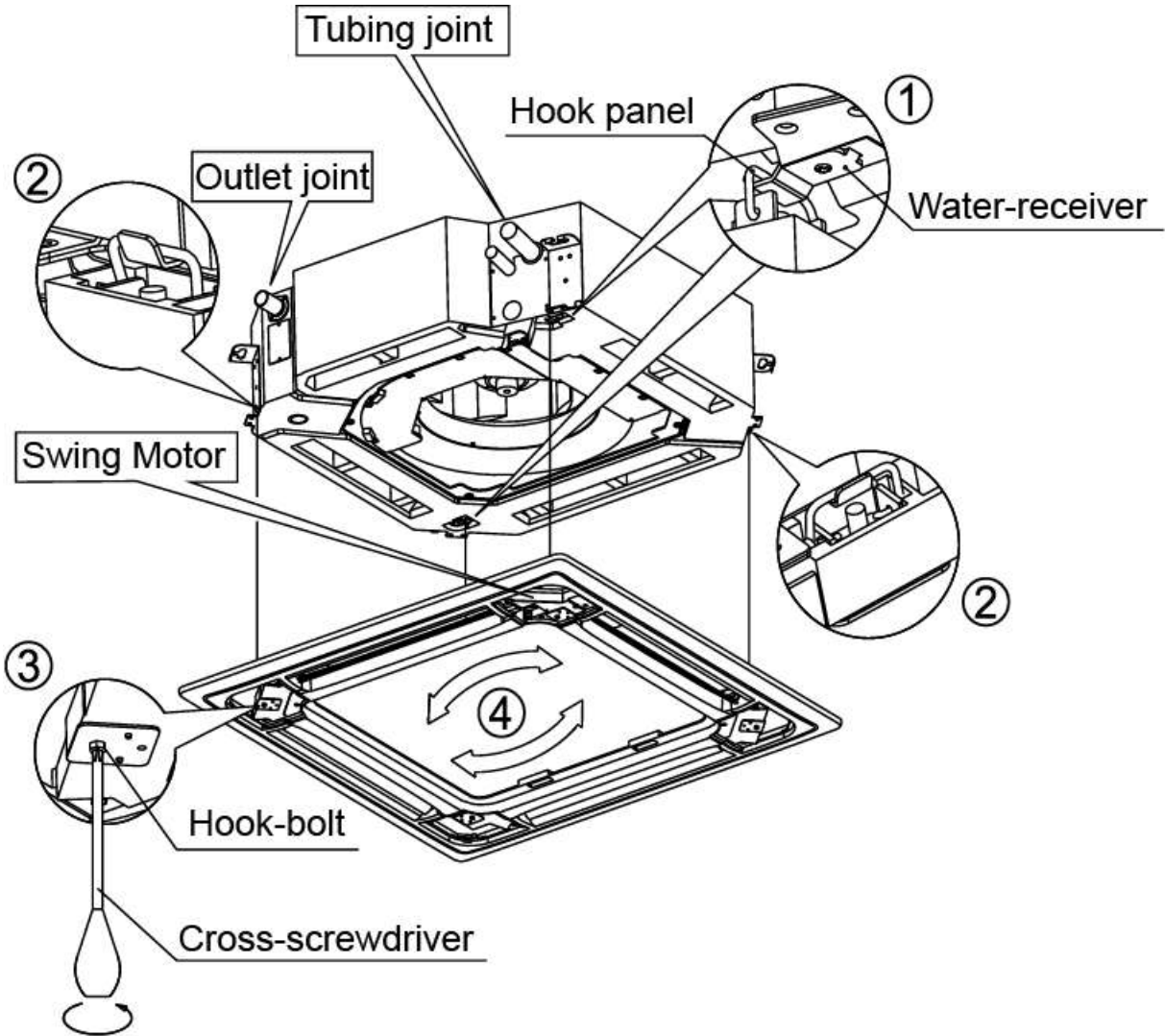
Remove the grille



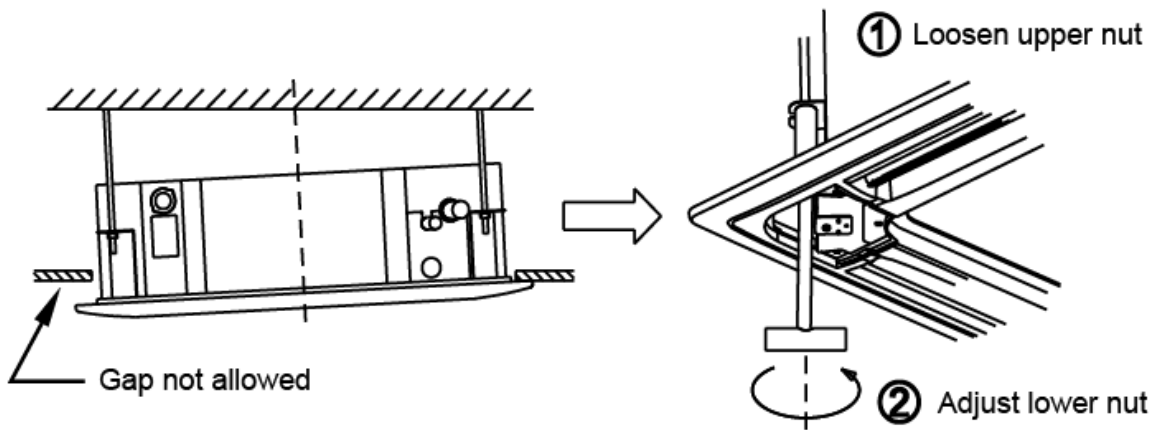
Remove the 4 corner covers.

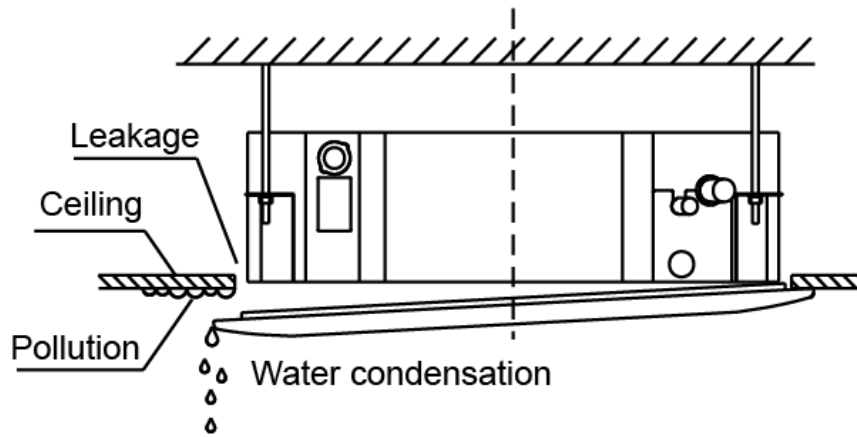


Hang the panel to the hooks on the mainbody. If the panel is with auto-lift grille, please watch the ropes lifting the grille, DO NOT make the ropes entwined or blocked.



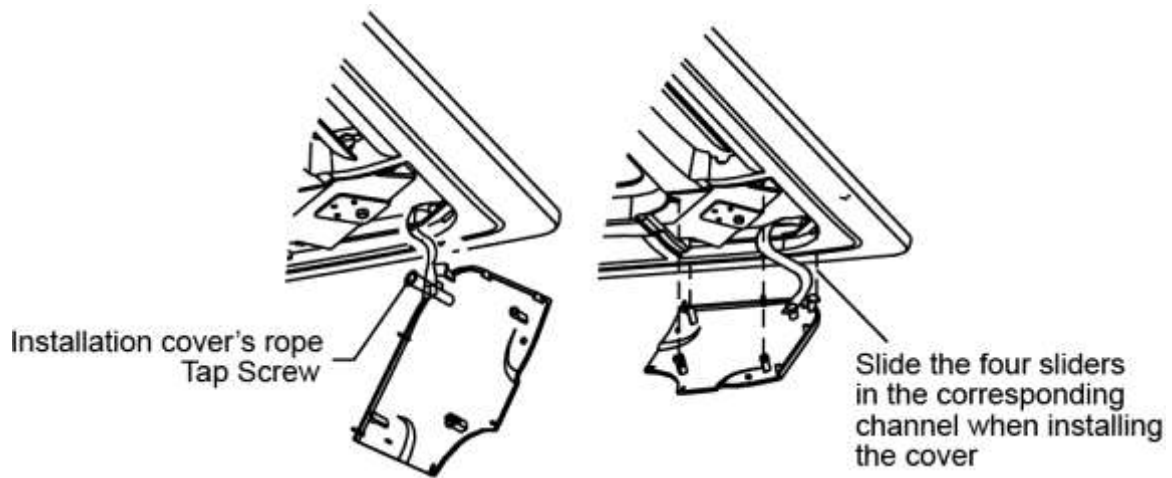
Tighten the screws under the panel hooks till the panel closely stick on the ceiling to avoid condensate water.





Hang the air-in grill to the panel, then connect the lead terminator of the swing motor and that of the control box with corresponding terminators on the body respectively.

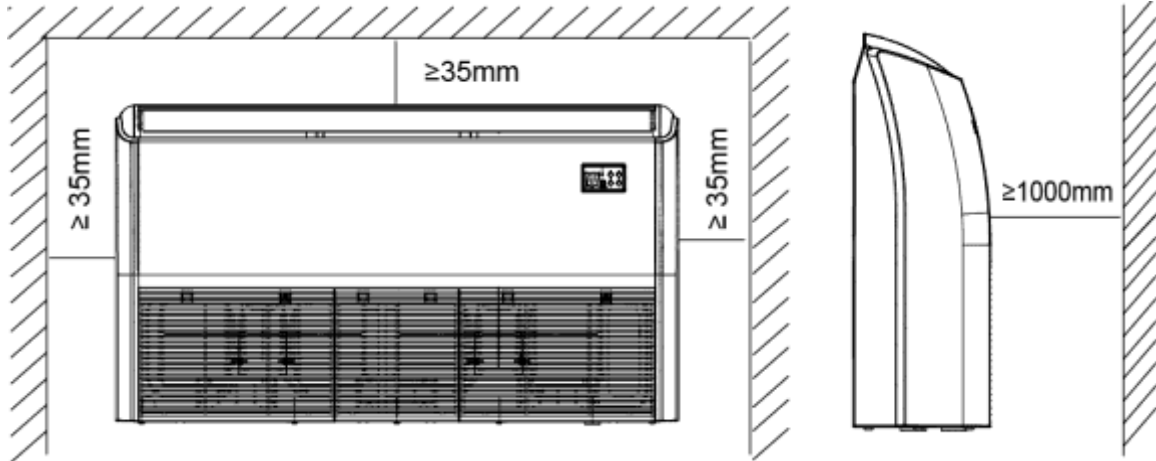
Install the 4 corner covers back.



Note: The panel shall be installed after the wiring connected.

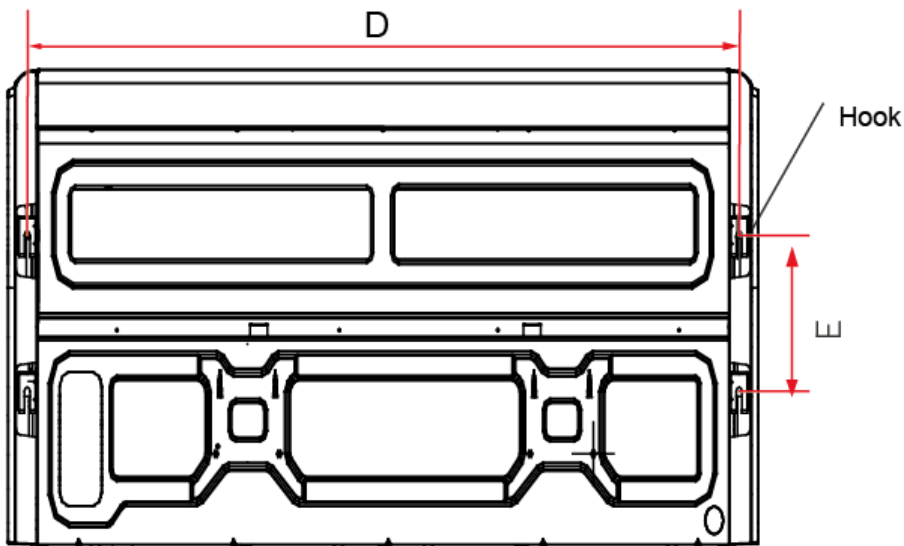
3.7 Ceiling & floor indoor unit installation

3.7.1 Service space for indoor unit



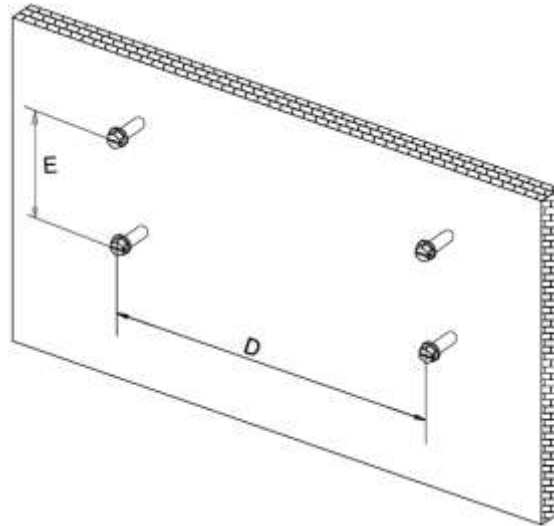
3.7.2 Bolt pitch

① Ceiling installation



Capacity (Btu/h)	D	E
12-24K	983	220
30~36K	1200	220
48-60K	1565	220

② Wall-mounted installation



3.7.3 Install the pendant bolt

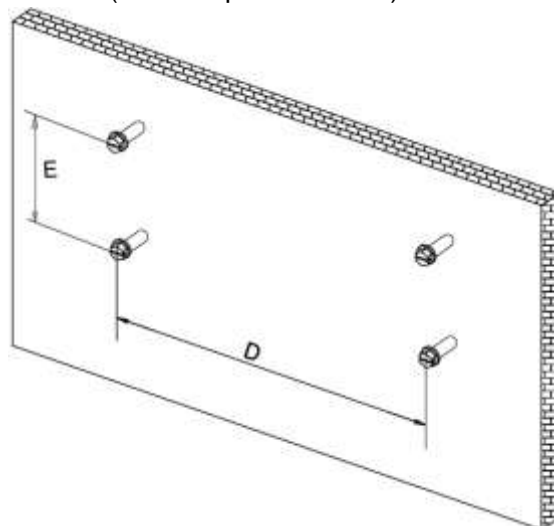
① Ceiling installation

Select the position of installation hooks according to the hook holes positions showed in upper picture. Drill four holes of $\text{Ø}12\text{mm}$, 45~50mm deep at the selected positions on the ceiling. Then embed the expansible hooks (fittings).



② Wall-mounted installation

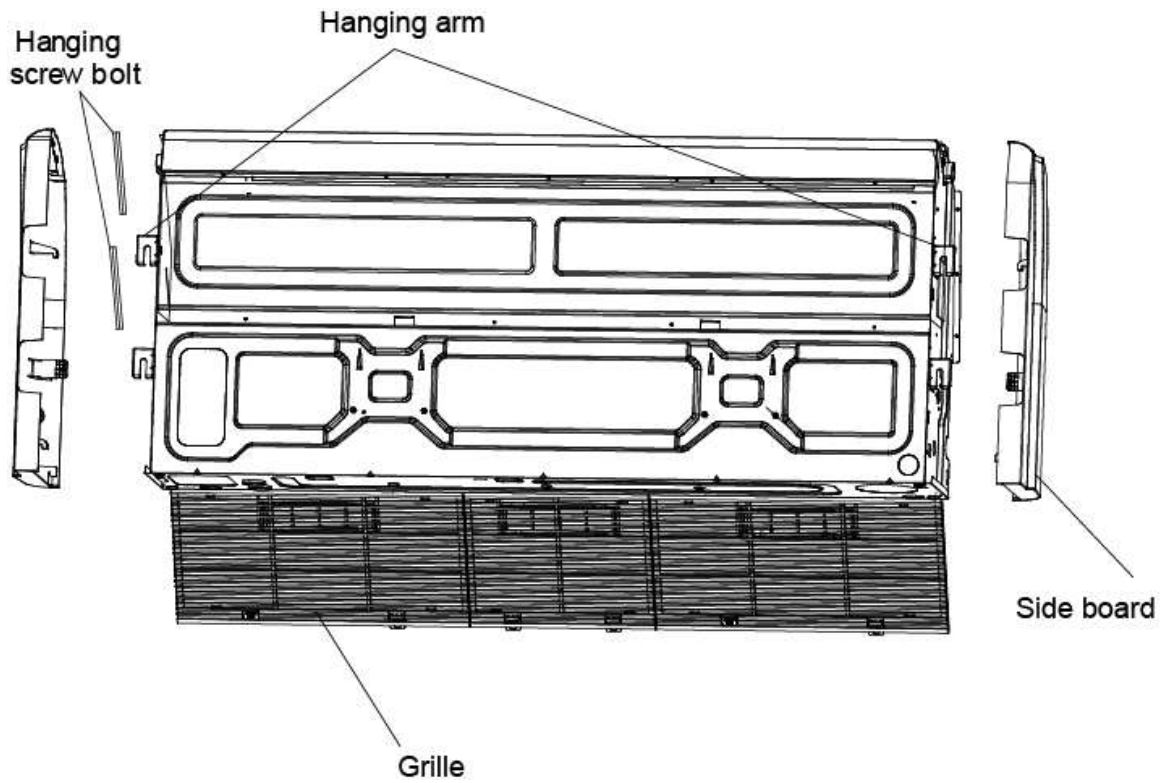
Install the tapping screws onto the wall.(Refer to picture below)



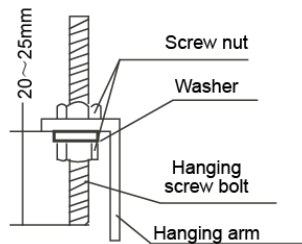
3.7.4 Install the main body

① Ceiling installation (The only installation method for the unit with drain pump)

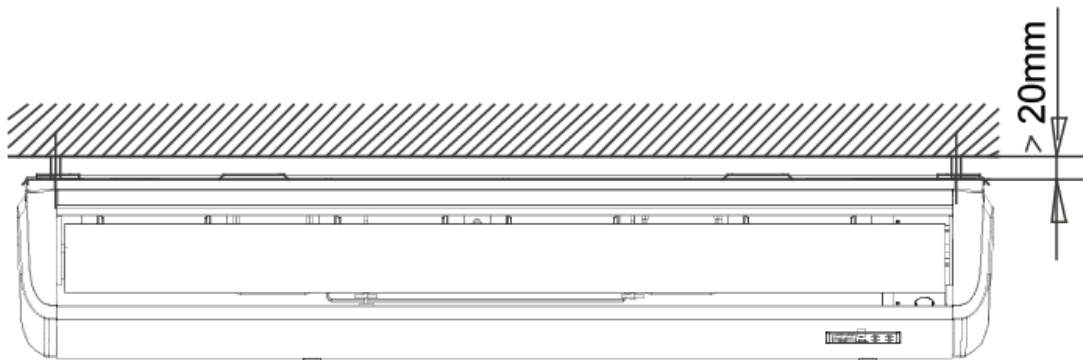
Remove the side board and the grille.

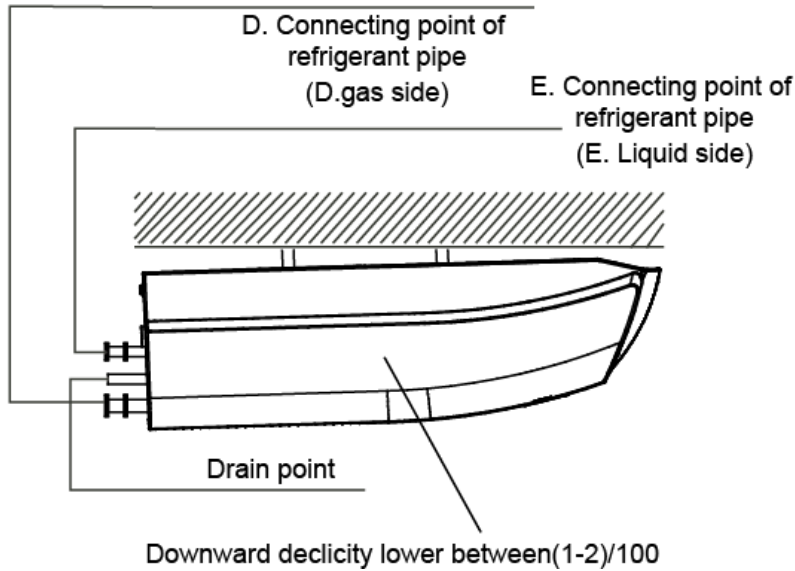


Locate the hanging arm on the hanging screw bolt. Prepare the mounting bolts on the unit.



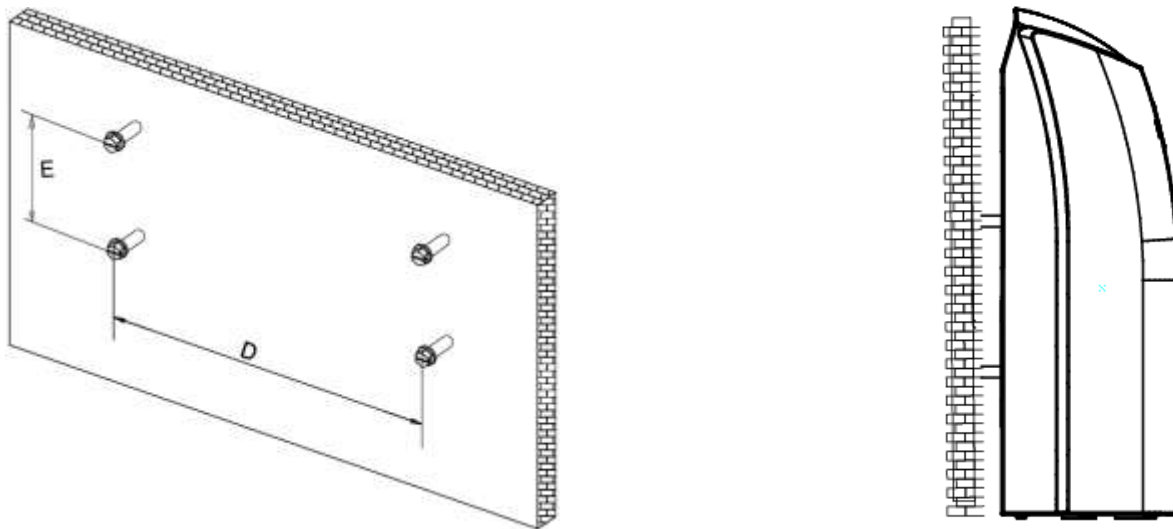
Put the side panels and grilles back.





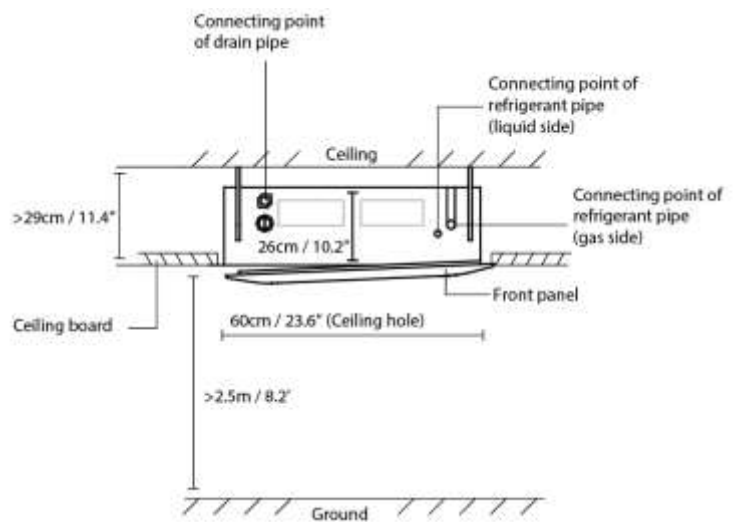
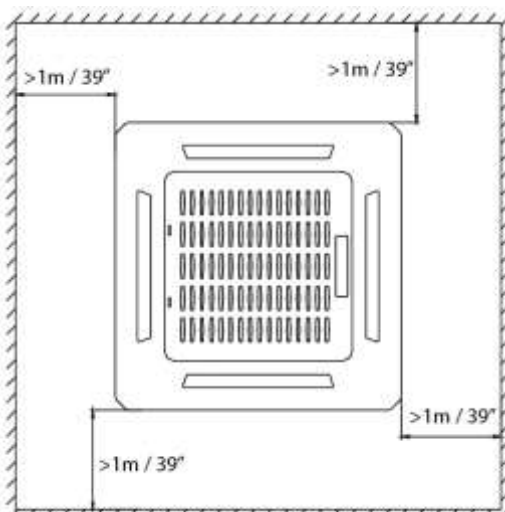
② Wall-mounted installation

Hang the indoor unit by insert the tapping screws into the hanging arms on the main unit. (The bottom of body can touch with floor or suspended, but the body must install vertically.)

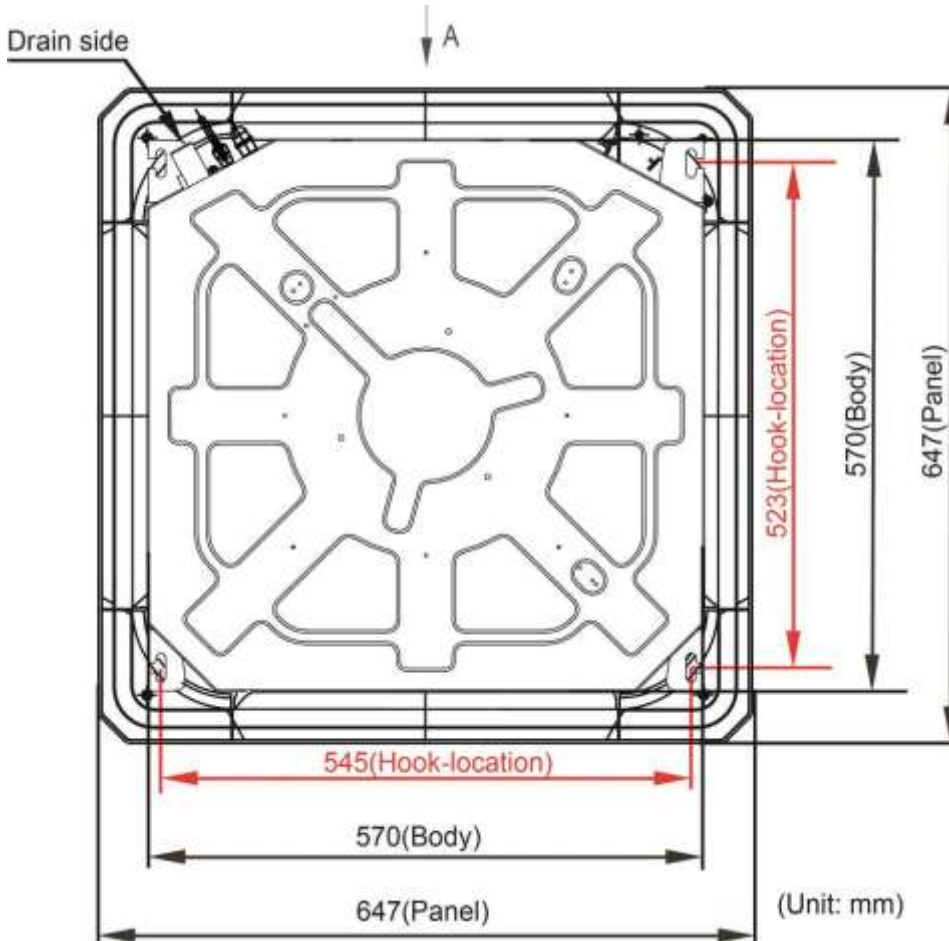


3.8 Compact cassette indoor unit installation

3.8.1 Service space for indoor unit



3.8.2 Bolt pitch



3.8.3 Install the pendant bolt

Select the position of installation hooks according to the hook holes positions showed in upper picture. Drill four holes of $\varnothing 12\text{mm}$, 45~50mm deep at the selected positions on the ceiling. Then embed the expansible hooks (fittings).

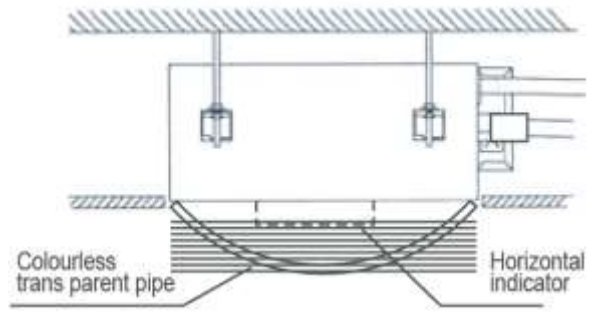


Face the concave side of the installation hooks toward the expansible hooks. Determine the length of the installation hooks from the height of ceiling, then cut off the unnecessary part.

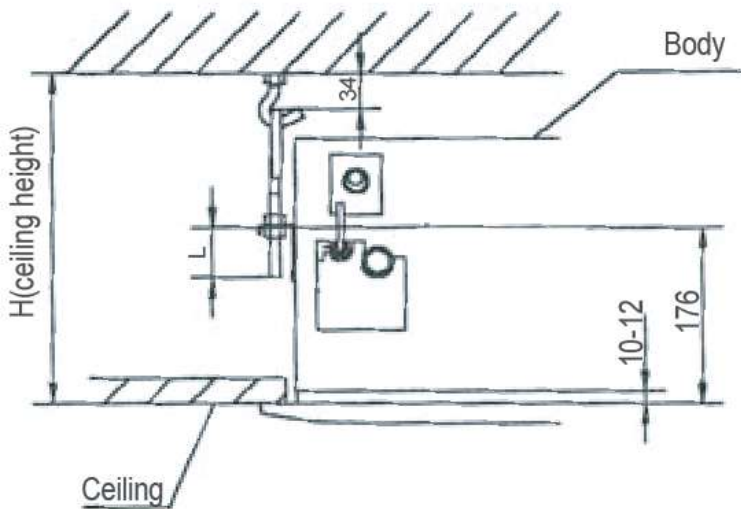
If the ceiling is extremely high, please determine the length of the installation hook depending on the real situation.

3.8.4 Install the main body

Make the 4 suspender through the 4 hanger of the main body to suspend it. Adjust the hexangular nuts on the four installation hooks evenly, to ensure the balance of the body. Use a leveling instrument to make sure the levelness of the main body is within $\pm 1^\circ$.



Adjust the position to ensure the gaps between the body and the four sides of ceiling are even. The body's lower part should sink into the ceiling for 10~12 mm. In general, L is half of the screw length of the installation hook.

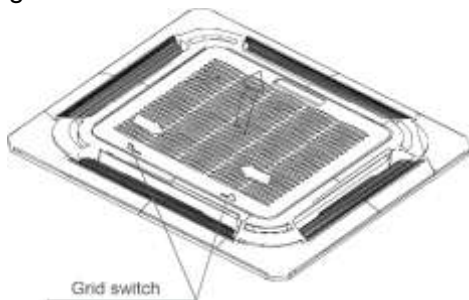


Locate the air conditioner firmly by wrenching the nuts after having adjusted the body's position well.

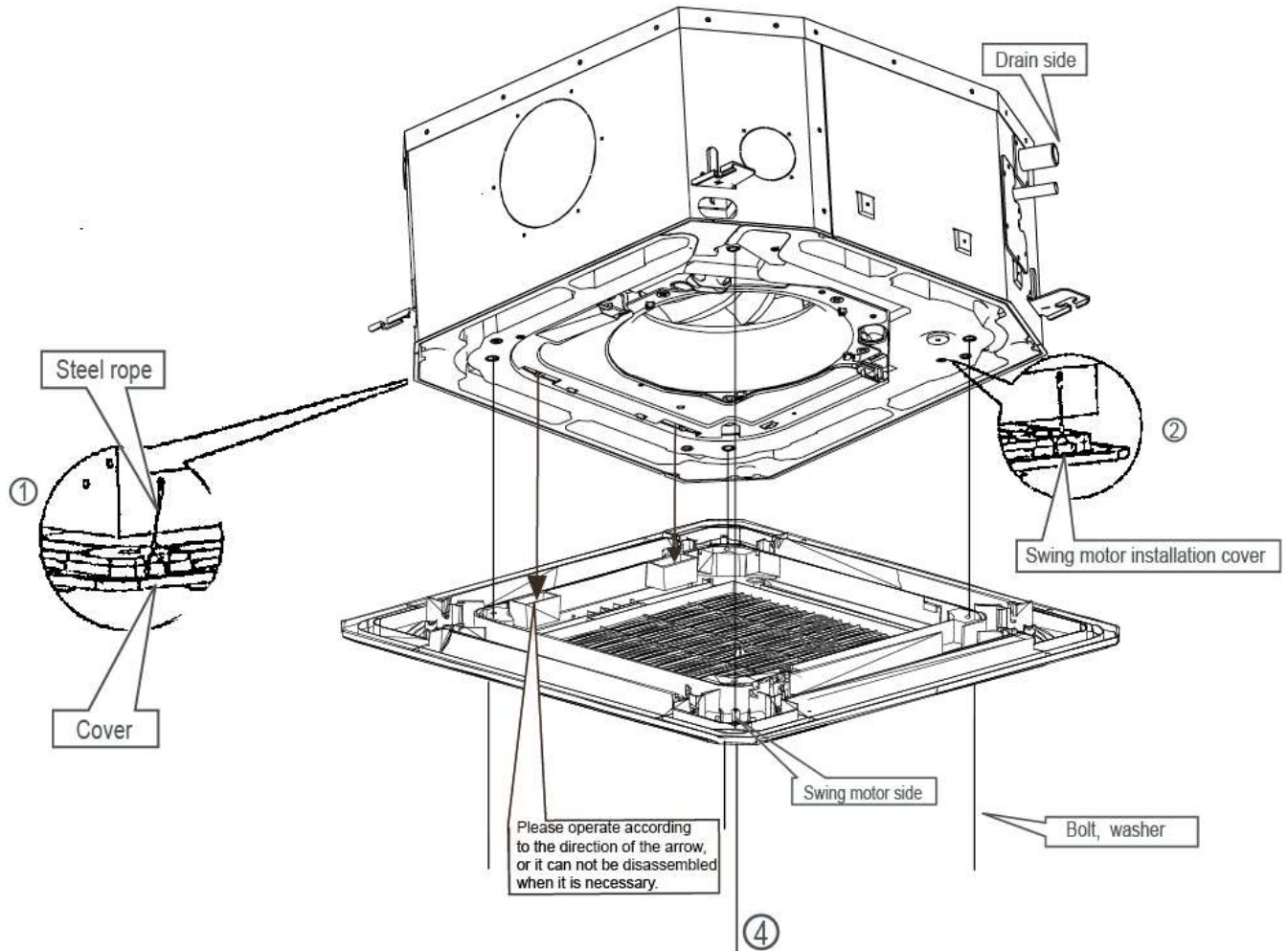


3.8.5 Install the panel

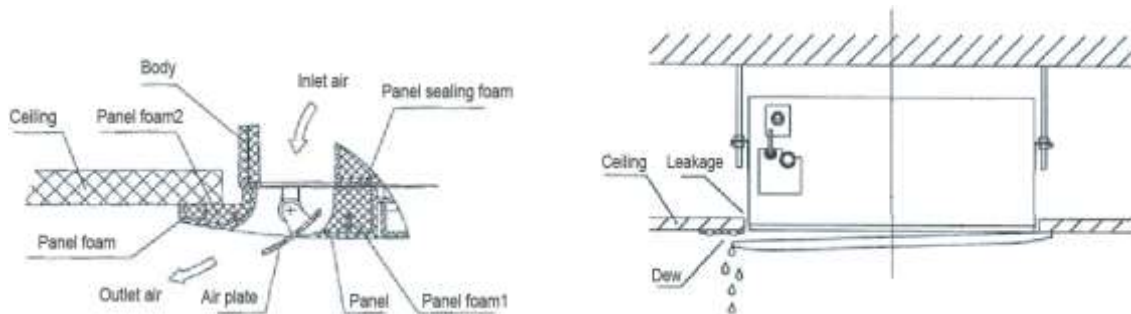
Remove the grille



Hang the panel to the hooks on the mainbody.



Tighten the screws under the panel hooks till the panel closely stick on the ceiling to avoid condensate water.

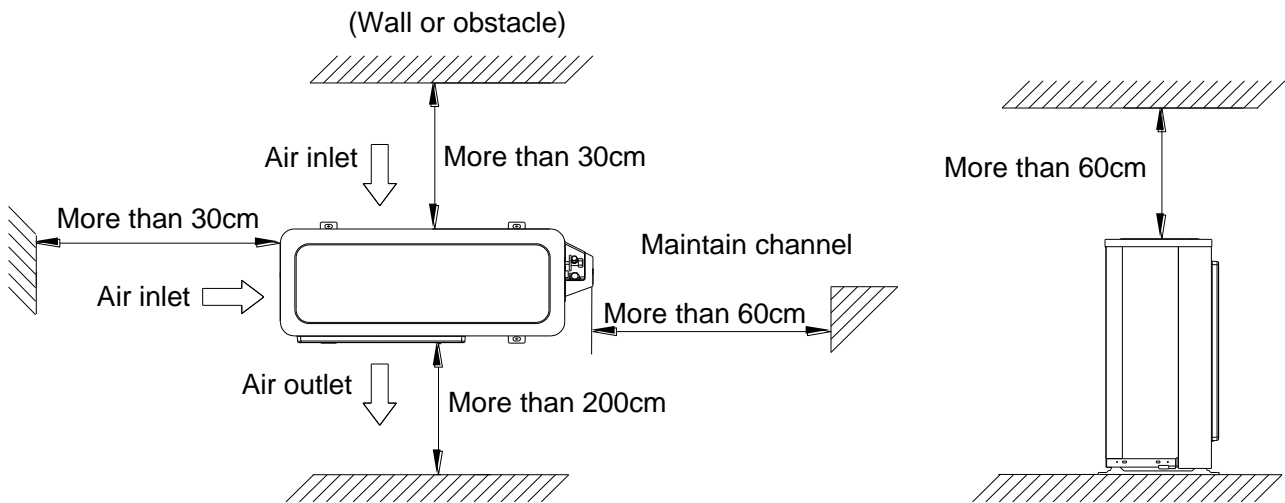


Hang the air-in grill to the panel, then connect the lead terminator of the swing motor and that of the control box with corresponding terminators on the body respectively.

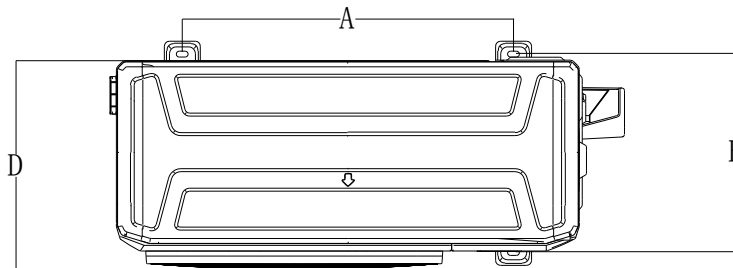
Note: The panel shall be installed after the wiring connected.

4. Outdoor unit installation (Side Discharge Unit)

4.1 Service space for outdoor unit



4.2 Bolt pitch



Model	A	B	D
12/18	487	298	300
24	540	350	363
30/36	673	403	410
YUGE36BYO--MS-X	624	366	396
48	590	378	350
60	590	378	350

4.3 Install the Unit

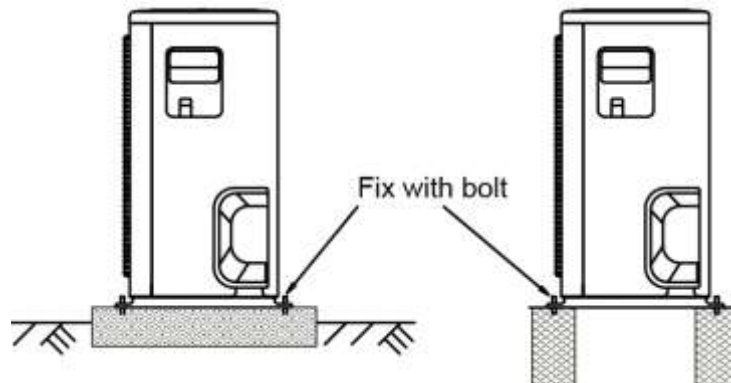
Since the gravity center of the unit is not at its physical center, so please be careful when lifting it with a sling. Never hold the inlet of the outdoor unit to prevent it from deforming.

Do not touch the fan with hands or other objects.

Do not lean it more than 45°, and do not lay it sidelong.

Make concrete foundation according to the specifications of the outdoor units.

Fasten the feet of this unit with bolts firmly to prevent it from collapsing in case of earthquake or strong wind.



5. Refrigerant pipe installation

5.1 Maximum pipe length and height drop

Considering the allowable pipe length and height drop to decide the installation position. Make sure the distance and height drop between indoor and outdoor unit not exceeded the date in the following table.

Capacity	Max. Length	Max. Elevation
12,000Btu/h	15m	8m
18,000Btu/h~24,000Btu/h	25m	15m
30,000Btu/h~36,000Btu/h	30m	20m
42,000Btu/h~60,000Btu/h	50m	30m

5.2 The procedure of connecting pipes

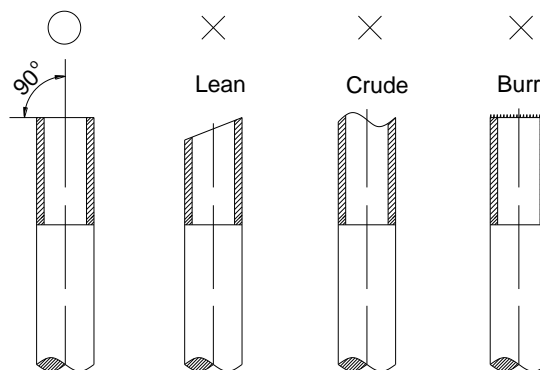
5.2.1 Choose the pipe size according to the specification table.

5.2.2 Confirm the cross way of the pipes.

5.2.3 Measure the necessary pipe length.

5.2.4 Cut the selected pipe with pipe cutter

- Make the section flat and smooth.



5.2.5 Insulate the copper pipe

- Before test operation, the joint parts should not be heat insulated.

5.2.6 Flare the pipe

- Insert a flare nut into the pipe before flaring the pipe
- According to the following table to flare the pipe

Pipe diameter	Flare dimension A (mm)		Flare shape
	Min	Max	
1/4" (6.35)	8.3	8.7	
3/8" (9.52)	12.0	12.4	
1/2" (12.7)	15.4	15.8	
5/8" (15.9)	18.6	19.1	
3/4" (19)	22.9	23.3	

- After flared the pipe, the opening part must be seal by end cover or adhesive tape to avoid duct or exogenous impurity come into the pipe.

5.2.7 Drill holes if the pipes need to pass the wall.

5.2.8 According to the field condition to bend the pipes so that it can pass the wall smoothly.

5.2.9 Bind and wrap the wire together with the insulated pipe if necessary.

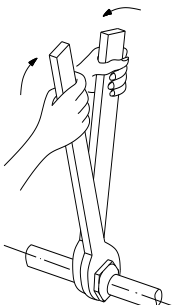
5.2.10 Set the wall conduit

5.2.11 Set the supporter for the pipe.**5.2.12 Locate the pipe and fix it by supporter**

- For horizontal refrigerant pipe, the distance between supporters should not be exceed 1m.
- For vertical refrigerant pipe, the distance between supporters should not be exceed 1.5m.

5.2.13 Connect the pipe to indoor unit and outdoor unit by using two spanners.

- Be sure to use two spanners and proper torque to fasten the nut, too large torque will damage the bellmouthing, and too small torque may cause leakage. Refer the following table for different pipe connection.

Pipe Diameter	Torque		Sketch map
	(kgf.cm)	(N.cm)	
1/4" (6.35)	144~176	1420~1720	
3/8" (9.52)	333~407	3270~3990	
1/2" (12.7)	504~616	4950~6030	
5/8" (15.9)	630~770	6180~7540	
3/4" (19)	990~1210	9270~11860	

6. Drainage pipe installation

Install the drainage pipe as shown below and take measures against condensation. Improperly installation could lead to leakage and eventually wet furniture and belongings.

6.1 Installation principle

- Ensure at least 1/100 slope of the drainage pipe
- Adopt suitable pipe diameter
- Adopt nearby condensate water discharge

6.2 Key points of drainage water pipe installation**6.2.1 Considering the pipeline route and elevation**

- Before installing condensate water pipeline, determine its route and elevation to avoid intersection with other pipelines and ensure slope is straight.

6.2.2 Drainage pipe selection

- The drainage pipe diameter shall not small than the drain hose of indoor unit
- According to the water flowrate and drainage pipe slope to choose the suitable pipe, the water flowrate is decided by the capacity of indoor unit.

Relationship between water flowrate and capacity of indoor unit

Capacity (x1000Btu)	Water flowrate (l/h)
12	2.4
18	4
24	6
30	7
36	8
42	10
48	12
60	14

According to the above table to calculate the total water flowrate for the confluence pipe selection.

For horizontal drainage pipe (The following table is for reference)

PVC pipe	Reference value of inner diameter of pipe (mm)	Allowable maximum water flowrate (l/h)		Remark
		Slope 1/50	Slope 1/100	
PVC25	20	39	27	For branch pipe
PVC32	25	70	50	
PVC40	31	125	88	Could be used for confluence pipe
PVC50	40	247	175	
PVC63	51	473	334	

Attention: Adopt PVC40 or bigger pipe to be the main pipe.

For Vertical drainage pipe (The following table is for reference)

PVC pipe	Reference value of inner diameter of pipe (mm)	Allowable maximum water flowrate (l/h)	Remark
PVC25	20	220	For branch pipe
PVC32	25	410	
PVC40	31	730	Could be used for confluence pipe
PVC50	40	1440	
PVC63	51	2760	
PVC75	67	5710	
PVC90	77	8280	

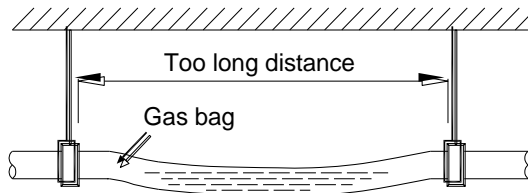
Attention: Adopt PVC40 or bigger pipe to be the main pipe.

6.2.3 Individual design of drainage pipe system

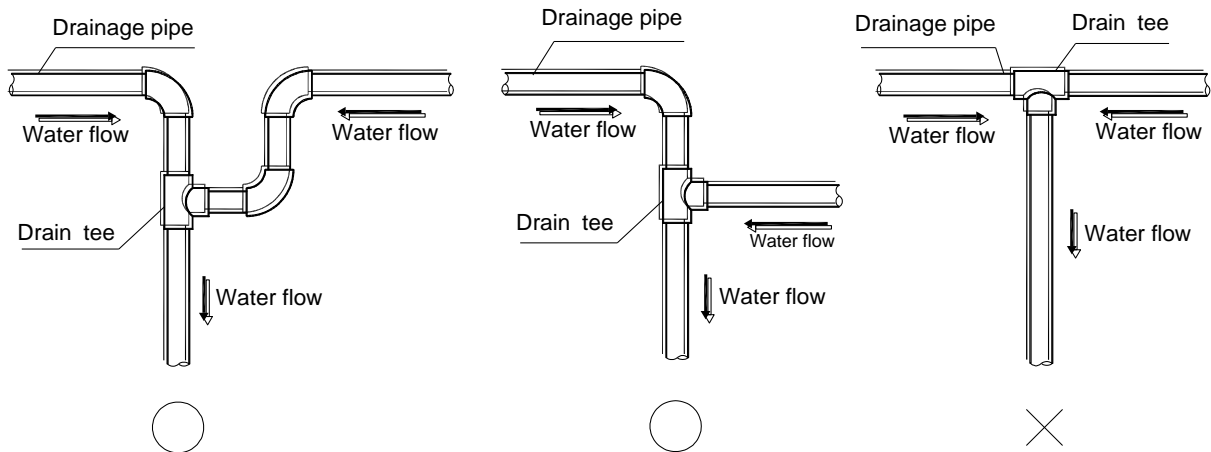
- The drainage pipe of air conditioner shall be installed separately with other sewage pipe, rainwater pipe and drainage pipe in building.
- The drainage pipe of the indoor unit with water pump should be apart from the one without water pump.

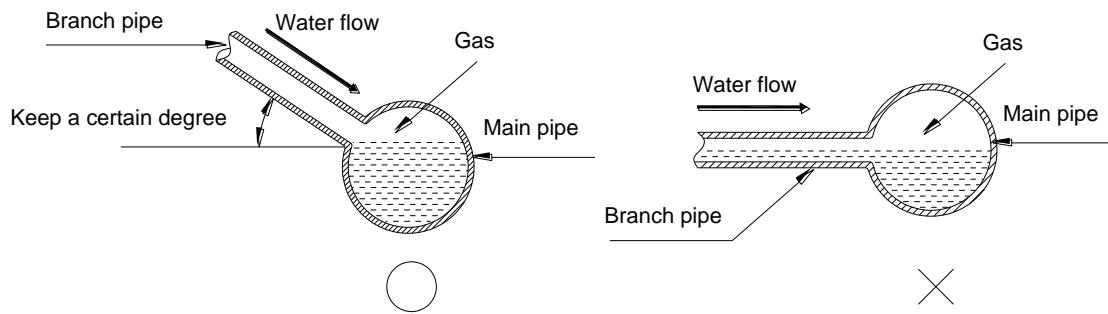
6.2.4 Supporter gap of drainage pipe

- In general, the supporter gap of the drainage pipe horizontal pipe and vertical pipe is respectively 1m~1.5m and 1.5m~2.0m.
- Each vertical pipe shall be equipped with not less than two hangers.
- Overlarge hanger gap for horizontal pipe shall create bending, thus leading to air block.



6.2.5 The horizontal pipe layout should avoid converse flow or bad flow

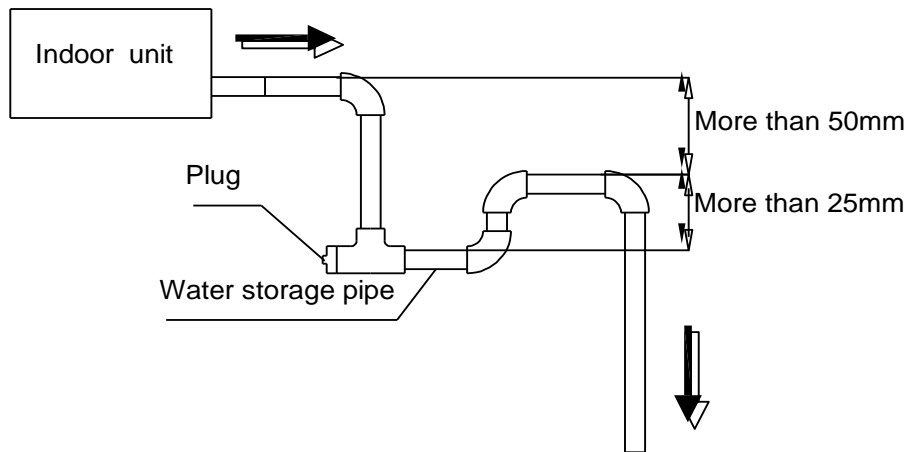




- The correct installation will not cause converse water flow and the slope of the branch pipes can be adjusted freely
- The false installation will cause converse water flow and the slope of the branch pipe can not be adjusted.

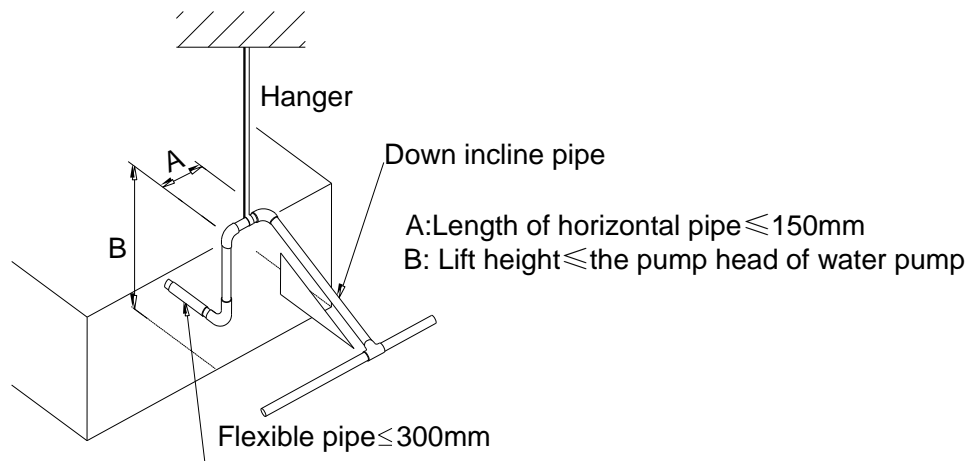
6.2.6 Water storage pipe setting

- If the indoor unit has high extra static pressure and without water pump to elevate the condensate water, such as high extra static pressure duct unit, the water storage pipe should be set to avoid converse flow or blow water phenomena.



6.2.7 Lifting pipe setting of indoor unit with water pump

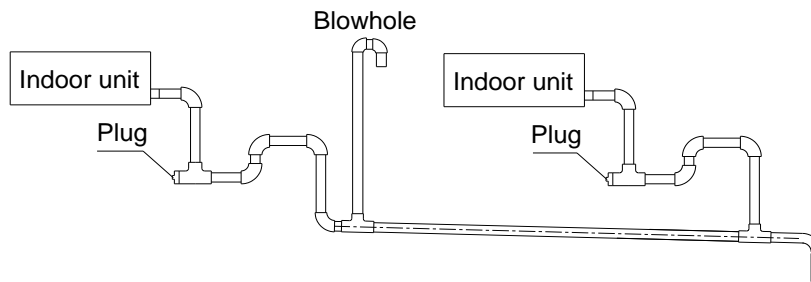
- The length of lifting pipe should not exceed the pump head of indoor unit water pump.
 Pump head of big four way cassette: 750mm
 Pump head of compact four way cassette: 500mm
- The drainage pipe should be set down inclined after the lifting pipe immediately to avoid wrong operation of water level switch.
- Refer the following picture for installation reference.



6.2.8 Blowhole setting

- For the concentrated drainage pipe system, there should design a blowhole at the highest point of main pipe to ensure the condensate water discharge smoothly.

- The air outlet shall face down to prevent dirt entering pipe.
- Each indoor unit of the system should be installed it.
- The installation should be considering the convenience for future cleaning.



6.2.9 The end of drainage pipe shall not contact with ground directly.

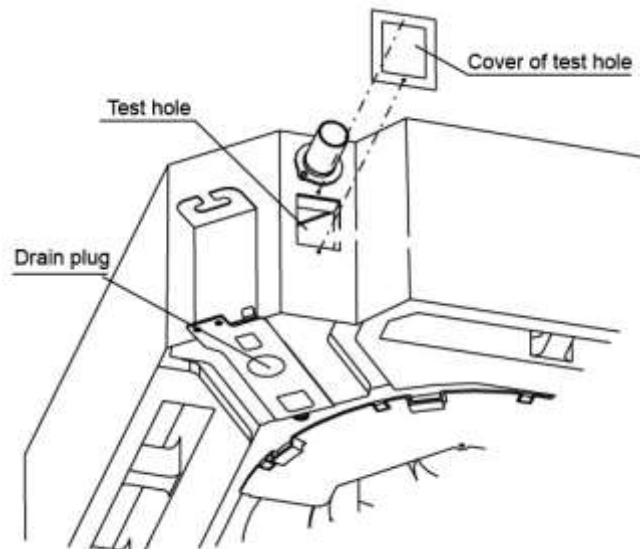
6.3 Drainage test

6.3.1 Water leakage test

After finishing the construction of drainage pipe system, fill the pipe with water and keep it for 24 hours to check whether there is leakage at joint section.

6.3.2 Water discharge test

1. Natural drainage mode(the indoor unit with outdoor drainage pump)
 Infuse above 600ml water through water test hole slowly into the water collector, observe whether the water can discharge through the transparent hard pipe at drainage outlet.
2. Pump drainage mode
- 2.1 Disconnect the plug of water level switch, remove the cover of water test hole and slowly infuse about 2000ml water through the water test hole, be sure that the water will not touch the motor of drainage pump.



- 2.2 Power on and let the air conditioner operate for cooling. Check operation status of drainage pump, and then connect the plug of water level switch, check the operation sound of water pump and observe whether the water can discharge through the transparent hard pipe at drainage outlet. (In light of the length of drainage pipe, water shall be discharged about 1 minute delayed)
- 2.3 Stop the operation of air conditioner, power off the power supply and put the cover of water test hole back to the original place.
 - a. After stopped the air conditioner 3 minutes, check whether there is anything abnormal. If drainage pipes have not been distributed properly, over back-flow water shall cause the flashing of alarm indicator at remote-controlled receiving board and even water shall run over the water collector.
 - b. Continuously infusing water until water level alarmed, check whether the drainage pump could discharge water at once. If water level does not decline under warning water level 3 minutes later, it

shall cause shutdown of unit. When this situation happens, the normal startup only can be recovered by turning down power supply and eliminating accumulated water.

Note: Drain plug at the main water-containing plate is used for eliminating accumulated water in water-containing plate when maintaining air conditioner fault. During normal operation, the plug shall be filled in to prevent leakage.

6.4 Insulation work of drainage pipe

Refer the introduction to the insulation engineering parts.

7. Vacuum Drying and Leakage Checking

7.1 Purpose of vacuum drying

- Eliminating moisture in system to prevent the phenomena of ice-blockage and copper oxidation. Ice-blockage shall cause abnormal operation of system, while copper oxide shall damage compressor.
- Eliminating the non-condensable gas (air) in system to prevent the components oxidizing, pressure fluctuation and bad heat exchange during the operation of system.

7.2 Selection of vacuum pump

- The ultimate vacuum degree of vacuum pump shall be -756mmHg or above.
- Precision of vacuum pump shall reach 0.02mmHg or above.

7.3 Operation procedure for vacuum drying

Due to different construction environment, two kinds of vacuum drying ways could be chosen, namely ordinary vacuum drying and special vacuum drying.

7.3.1 Ordinary vacuum drying

1. When conduct first vacuum drying, connect pressure gauge to the infusing mouth of gas pipe and liquid pipe, and keep vacuum pump running for 1 hour (vacuum degree of vacuum pump shall be reached -755mmHg).
2. If the vacuum degree of vacuum pump could not reach -755mmHg after 1 hour of drying, it indicates that there is moisture or leakage in pipeline system and need to go on with drying for half an hour.
3. If the vacuum degree of vacuum pump still could not reach -755mmHg after 1.5 hours of drying, check whether there is leakage source.
4. Leakage test: After the vacuum degree reaches -755mmHg, stop vacuum drying and keep the pressure for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture or leak source.

7.3.2 Special vacuum drying

The special vacuum drying method shall be adopted when:

1. Finding moisture during flushing refrigerant pipe.
2. Conducting construction on rainy day, because rain water might penetrated into pipeline.
3. Construction period is long, and rain water might penetrated into pipeline.
4. Rain water might penetrate into pipeline during construction.

Procedures of special vacuum drying are as follows:

1. Vacuum drying for 1 hour.
2. Vacuum damage, filling nitrogen to reach 0.5Kgf/cm² .
Because nitrogen is dry gas, vacuum damage could achieve the effect of vacuum drying, but this method could not achieve drying thoroughly when there is too much moisture. Therefore, special attention shall be drawn to prevent the entering of water and the formation of condensate water.
3. Vacuum drying again for half an hour.
If the pressure reached -755mmHg, start to pressure leakage test. If it can not reached the value, repeat vacuum damage and vacuum drying again for 1 hour.

- 4 Leakage test: After the vacuum degree reaches -755mmHg, stop vacuum drying and keep the pressure for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture or leak source.

8. Additional refrigerant charge

- After the vacuum drying process is carried out, the additional refrigerant charge process need to be performed.
- The outdoor unit is factory charged with refrigerant. The additional refrigerant charge volume is decided by the diameter and length of the liquid pipe between indoor and outdoor unit. Refer the following formula to calculate the charge volume.

Diameter of liquid pipe (mm)	Φ6.35	Φ9.52	Φ12.7
Formula	$V=15g/m \times (L-5)$	$V=30g/m \times (L-5)$	$V=65g/m \times (L-5)$

V: Additional refrigerant charge volume (g).

L : The length of the liquid pipe (m).

Note:

- Refrigerant may only be charged after performed the vacuum drying process.
- Always use gloves and glasses to protect your hands and eyes during the charge work.
- Use electronic scale or fluid infusion apparatus to weight refrigerant to be recharged. Be sure to avoid extra refrigerant charged, it may cause liquid hammer of the compressor or protections.
- Use supplementing flexible pipe to connect refrigerant cylinder, pressure gauge and outdoor unit. And The refrigerant should be charged in liquid state. Before recharging, The air in the flexible pipe and manifold gauge should be exhausted.
- After finished refrigerant recharge process, check whether there is refrigerant leakage at the connection joint part.(Using gas leakage detector or soap water to detect).

9. Engineering of insulation

9.1 Insulation of refrigerant pipe

9.1.1 Operational procedure of refrigerant pipe insulation

Cut the suitable pipe → insulation (except joint section) → flare the pipe → piping layout and connection → vacuum drying → insulate the joint parts

9.1.2 Purpose of refrigerant pipe insulation

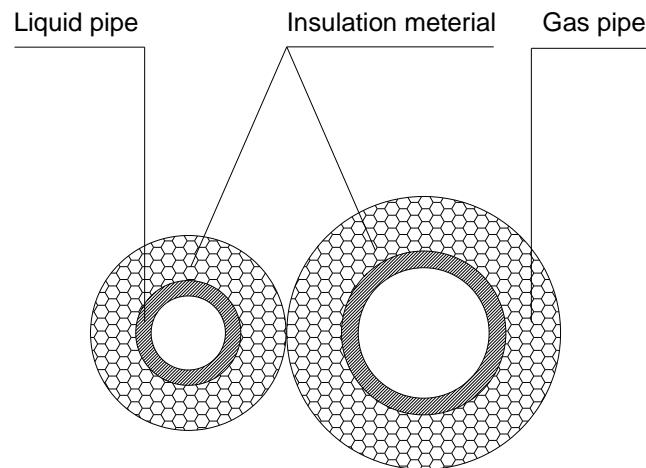
- During operation, temperature of gas pipe and liquid pipe shall be over-heating or over-cooling extremely. Therefore, it is necessary to carry out insulation; otherwise it shall debase the performance of unit and burn compressor.
- Gas pipe temperature is very low during cooling. If insulation is not enough, it shall form dew and cause leakage.
- Temperature of gas pipe is very high (generally 50-100℃) during heating. Insulation work must be carried out to prevent hurt by carelessness touching.

9.1.3 Insulation material selection for refrigerant pipe

- The burning performance should over 120℃
- According to the local law to choose insulation materials
- The thickness of insulation layer shall be above 10mm.If in hot or wet environment place, the layer of insulation should be thicker accordingly.

9.1.4 Installation highlights of insulation construction

- Gas pipe and liquid pipe shall be insulated separately, if the gas pipe and liquid pipe were insulated together; it will decrease the performance of air conditioner.



- The insulation material at the joint pipe shall be 5~10cm longer than the gap of the insulation material.
- The insulation material at the joint pipe shall be inserted into the gap of the insulation material.
- The insulation material at the joint pipe shall be banded to the gap pipe and liquid pipe tightly.
- The linking part should be use glue to paste together
- Be sure not bind the insulation material over-tight, it may extrude out the air in the material to cause bad insulation and cause easy aging of the material.

9.2 Insulation of drainage pipe

9.2.1 Operational procedure of refrigerant pipe insulation

Select the suitable pipe → insulation (except joint section) → piping layout and connection → drainage test → insulate the joint parts

9.2.2 Purpose of drainage pipe insulation

The temperature of condensate drainage water is very low. If insulation is not enough, it shall form dew and cause leakage to damage the house decoration.

9.2.3 Insulation material selection for drainage pipe

- The insulation material should be flame retardant material, the flame retardancy of the material should be selected according to the local law.
- Thickness of insulation layer is usually above 10mm.
- Use specific glue to paste the seam of insulation material, and then bind with adhesive tape. The width of tape shall not be less than 5cm. Make sure it is firm and avoid dew.

9.2.4 Installation and highlights of insulation construction

- The single pipe should be insulated before connecting to another pipe, the joint part should be insulated after the drainage test.
- There should be no insulation gap between the insulation material.

10. Engineering of electrical wiring

10.1 Highlights of electrical wiring installation

- All field wiring construction should be finished by qualified electrician.
- Air conditioning equipment should be grounded according to the local electrical regulations.
- Current leakage protection switch should be installed.
- Do not connect the power wire to the terminal of signal wire.
- When power wire is parallel with signal wire, put wires to their own wire tube and remain at least 300mm gap.
- According to table in indoor part named “the specification of the power” to choose the wiring, make sure the selected wiring not small than the date showing in the table.

- Select different colors for different wire according to relevant regulations.
- Do not use metal wire tube at the place with acid or alkali corrosion, adopt plastic wire tube to replace it.
- There must be not wire connect joint in the wire tube If joint is a must, set a connection box at the place.
- The wiring with different voltage should not be in one wire tube.
- Ensure that the color of the wires of outdoor and the terminal No. are same as those of indoor unit respectively.

11. Test operation

11.1 The test operation must be carried out after the entire installation has been completed.

11.2 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 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.

11.3 Test operation

Set the air conditioner under the mode of "COOLING" by 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 Electrical Control System

- 1. Electrical Control Function 110**
- 2. Troubleshooting..... 115**

1. Electrical Control Function

1.1 Definition

- T1: Indoor room temperature
- T2: Coil temperature of evaporator
- T3: Coil temperature of condenser
- T4: Outdoor ambient temperature
- T5: Compressor discharge temperature
- Ts: Setting temperature

1.2 Main Protection

1.2.1 Time delay at restart for compressor.

1.2.2 Sensor protection at open circuit and breaking disconnection.

1.2.3 Phase check function(for 3-phase models)

If the phase sequence is detected wrong or lack of 1 or 2 phase, the unit won't start and there is error code displayed on outdoor PCB.

1.2.4 Low pressure check function(for 48-60K models)

The low pressure switch should be always closed. If it is open, the system will stop until the fault is cleared. Within 5 minutes after the compressor starts and 4 minutes after defrosting ends, low pressure switch won't be checked.

Note: If this protection occurs 3 times within 20 minutes, it won't recover automatically until the main power is cut off.

1.2.5 Over-current protection(for 48-60K models)

When compressor is running, if the current is over twice of the rated for 3 seconds, the compressor will stop and an error code will be displayed on the outdoor PCB. If the current becomes normal, the compressor will restart after 3 minutes.

1.3 Operation Modes and Functions

1.3.1 Fan mode

- (1) Outdoor fan and compressor stop.
- (2) Temperature setting function is disabled, and no setting temperature is displayed.

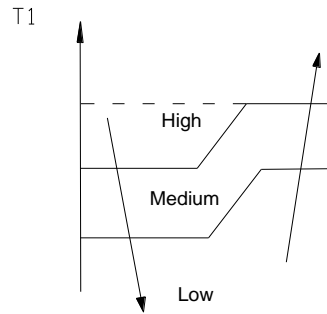
(3) Indoor fan can be set to high/(medium)/low/auto.

(4) The louver operates same as in cooling mode.

(5) Auto fan:
For floor standing units:

Auto fan will be controlled in line with cooling auto fan with temperature set to be 24°C.

For other units:

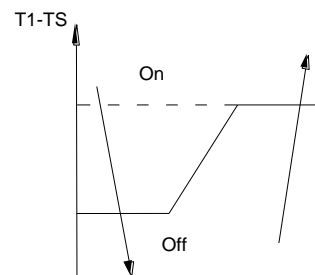


1.3.2 Cooling Mode

1.3.2.1 Compressor running rules

Once the compressor starts up, it will follow the below rules:

When $T1 - T_s$ is higher than setting value, the compressor and outdoor fan will shut off. When $T1 - T_s$ is lower than setting value, the compressor and outdoor fan will start up.



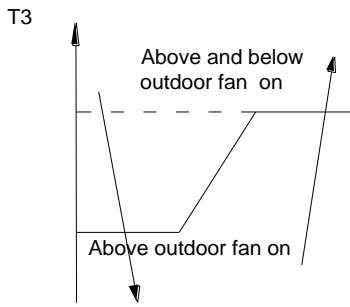
1.3.2.2 Outdoor fan running rules

For single-fan units:

The outdoor fan will run following the compressor

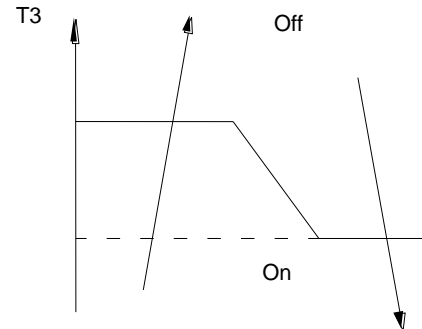
For double-fan units:

The outdoor fan will run according to the value of temp. of T3.



When the evaporator coil temp. T2 keeps lower than setting value for setting time, the compressor and outdoor fan will shut off.

1.3.2.5 Condenser high temperature T3 protection(excluding 12~36k cooling only models)



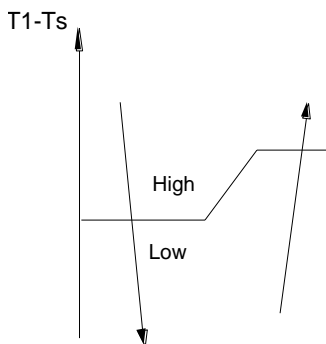
When high condenser temp. T3 is more than setting value, for setting time the compressor will stop.

1.3.2.3 Indoor fan running rules

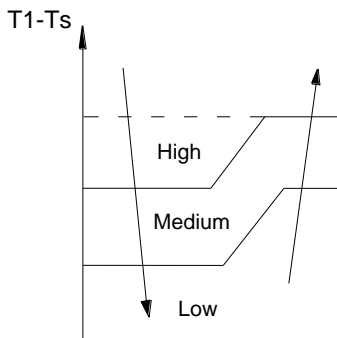
In cooling mode, indoor fan runs all the time and the speed can be selected as high, (medium), low and auto.

The auto fan:

For floor standing units:



For other units:

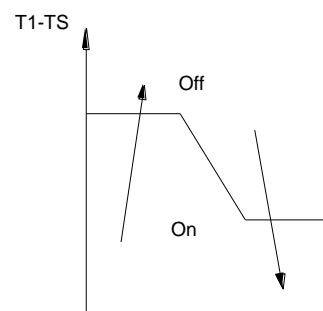


1.3.3 Heating Mode(For heat pump models)

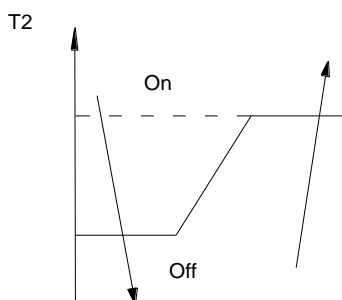
1.3.3.1 Compressor running rules:

Once the compressor starts up, it keeps running 7 minutes, then it will follow the below rules:

When T1-Ts is higher than setting value, the compressor and outdoor fan will shut off. When T1-Ts is lower than setting value, the compressor and outdoor fan will start up.



1.3.2.4 Low evaporator coil temperature T2 protection



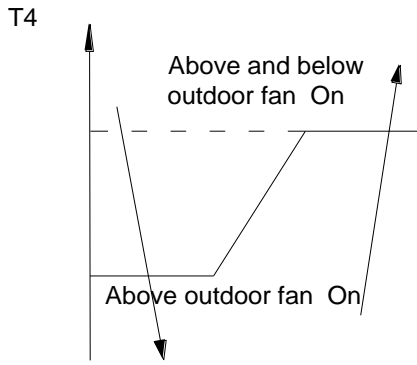
1.3.3.2 Outdoor fan running rules:

For single-fan units:

The outdoor fan will run following the compressor

For double-fan units:

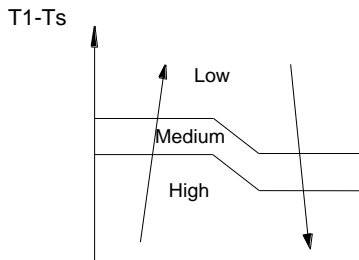
The outdoor fan will run according to the value of temp. of T4.



1.3.3.3 Indoor fan running rules:

When the compressor is on, the indoor fan can be set to high/(medium)/low/auto. And the anti-cold wind function has the priority.

Auto fan action:

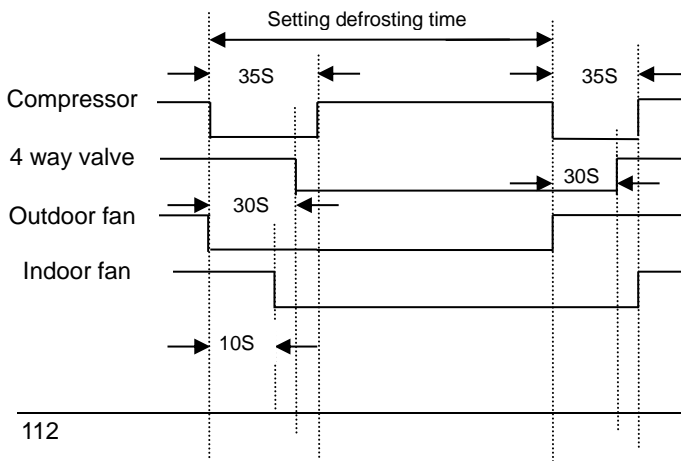


1.3.3.4 Defrosting mode:

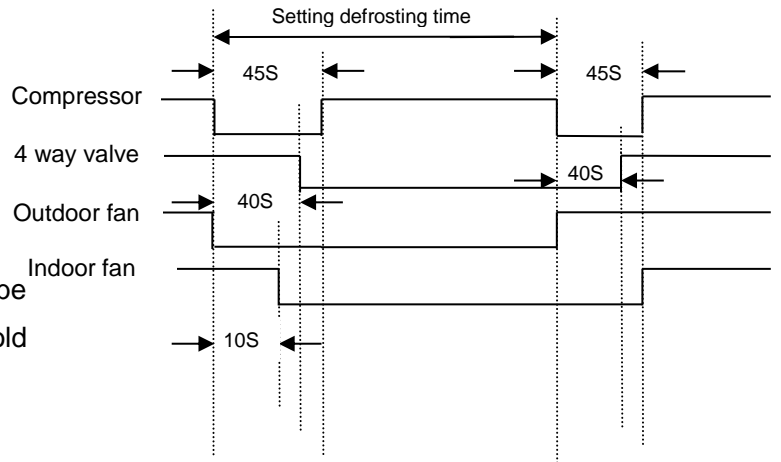
AC will enter the defrosting mode according to the value of temp. of T3 and the value range of temp. change of T3 and also the compressor running time.

Defrosting action:

For 12~30K floor-standing units:



For 12~30 other units:

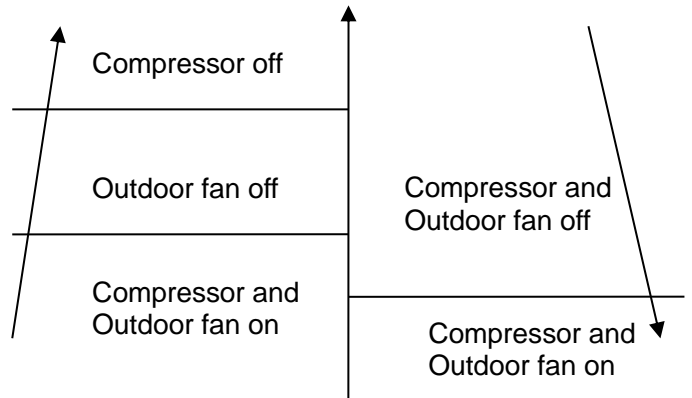


For 36~60K

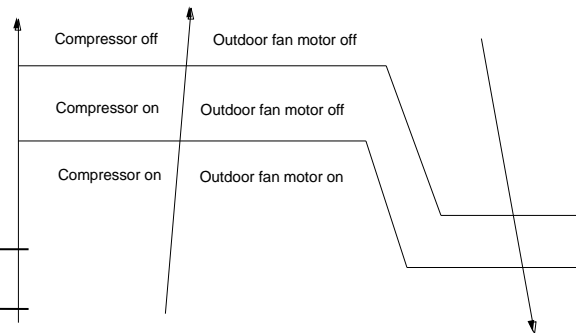
During the defrosting mode, the compressor keep running, indoor and outdoor motor will stop,

1.3.3.5 High evaporator coil temp.T2 protection:

For Ceiling & floor type:



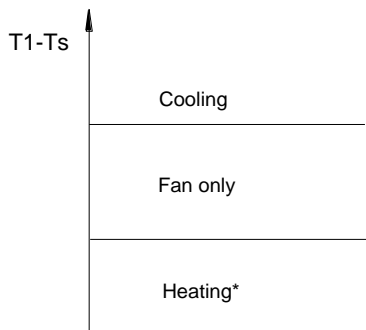
For other units:



1.3.4 Auto-mode

This mode can be chosen with remote controller and the setting temperature can be changed between 17~30°C.

In auto mode, the machine will choose operation mode according to ΔT ($\Delta T = T1 - Ts$).



Indoor fan will run at auto fan of the relevant mode.

The louver operates same as in relevant mode.

If the machine switches mode between heating and cooling, the compressor will keep stopping for 15 minutes and then choose mode according to $T1 - Ts$. If the setting temperature is modified, the machine will choose running function again.

1.3.5 Drying mode

1.3.5.1 The indoor fan will keep running at low speed.

1.3.5.2 All protections are active and the same as that in cooling mode.

1.3.5.3 The louver operates the same as in cooling mode.

1.3.6 Timer function

1.3.6.1 Timing range is 24 hours.

1.3.6.2 Timer on. The machine will turn on automatically when reaching the setting time.

1.3.6.3 Timer off. The machine will turn off automatically when reaching the setting time.

1.3.6.4 Timer on/off. The machine will turn on automatically when reaching the setting "on" time, and then turn off automatically when reaching the setting "off" time.

1.3.6.5 Timer off/on. The machine will turn off automatically when reaching the setting "off" time, and then turn on automatically when reaching the setting "on" time.

1.3.6.6 The timer function will not change the AC current operation mode. Suppose AC is off now, it will not start up firstly after setting the "timer off" function. And when reaching the setting time, the timer LED will be off and the AC running mode has not been changed.

1.3.6.7 The setting time is relative time.

1.3.7 Economy function

1.3.7.1 It is valid in cooling, heating and auto mode.

1.3.7.2. Turning off, changing mode or setting fan speed will cancel economy function.

1.3.7.3 Operation process in sleep mode is as follow:

After pressing ECONOMIC or SLEEP button on the controller, the machine will go into economy mode.

When cooling, the setting temperature rises 1°C every hour, 2 hours later the setting temperature stops rising.

For heat pump models, when they are in heating, the setting temperature reduces 1°C every hour, 2 hours later the setting temperature stops reducing.

1.3.7.4 In this mode, the fan speed is forced into AUTO mode.

1.3.8 Auto-Restart function

The indoor unit is equipped with auto-restart function, which is carried out through an auto-restart module. In case of a sudden power failure, the module memorizes the setting conditions before the power failure. The unit will resume the previous operation setting automatically after 3 minutes when power returns.

1.3.9 Drain pump control (For cassette)

1.3.9.1 Water level check

The water lever will be checked every 5 seconds, if the feedback signal is abnormal, it will be considered as drain water full by the control system.

1.3.9.2 Drain pump control

Electrical Control Function

If there is no water full error, the drain pump will be on when the unit is in cooling mode (including auto-cooling and forced cooling) and dry mode. It will be off when the unit is in heating mode, fan only mode or off state (if the pump is on before the unit is off, it will delay 3 minutes to be off).

If there is a water full error, the drain pump will be on when the error occurs. Afterwards:

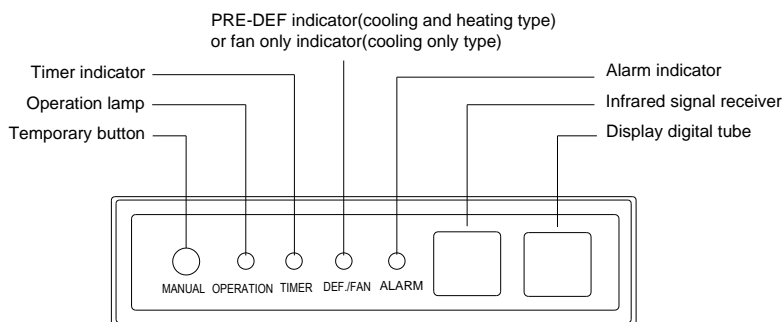
If the error disappears in 3 minutes, the drain pump will work as normal state. (if it is necessary to turn off the pump, it will be off in 1 minute delay.)

If the error is still there in 3 minutes, the drain pump will be off as well as the AC unit. The error can be cleared only when the power of the unit is cut off.

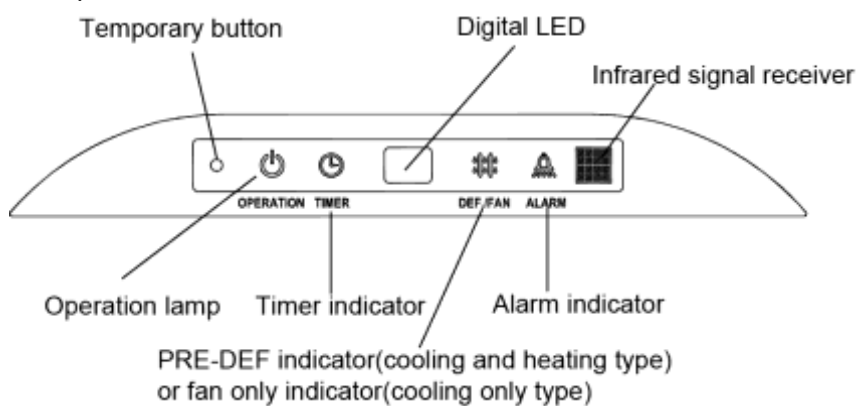
2. Troubleshooting

2.1 Display board

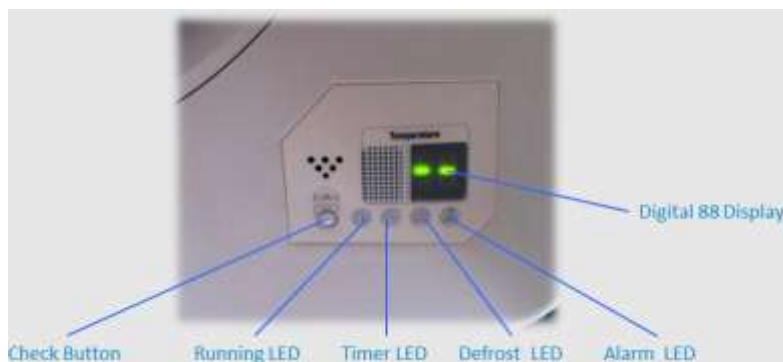
2.1.1 Display board of A5 Duct & HSPD



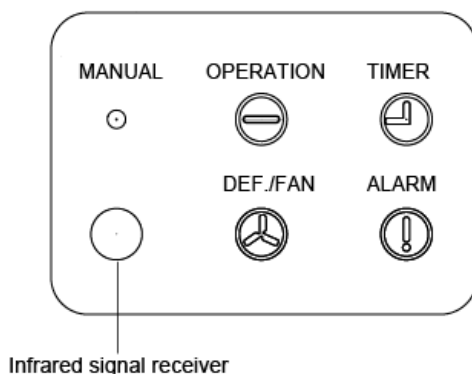
2.1.2 Display board of super slim cassette



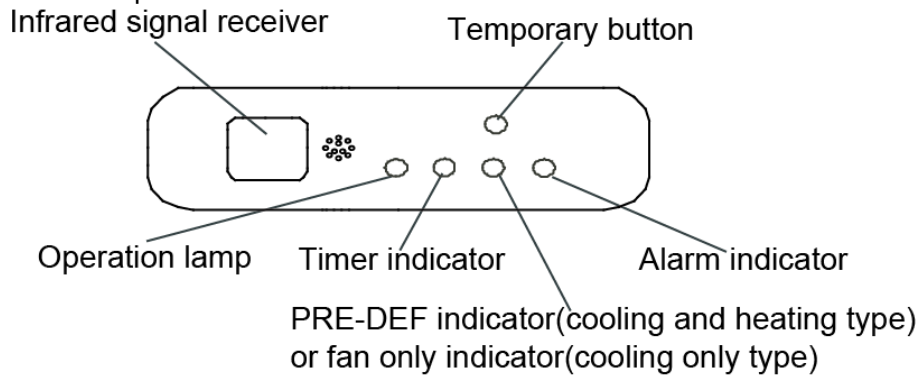
2.1.3 Display board of auto-lifting panel of 4 way cassette



2.1.4 Display board of ceiling & Floor



2.1.5 Display board of Compact cassette



2.2. Self-diagnosis

Indoor unit's LED indication

During malfunction or protection, the indicators and digital LED displays as follow:

For A5 Duct, HSPD, Ceiling & floor type:

No	Malfunction or protection	Operation	Timer	Def/Fan	Alarm	Digital LED Display
1	Open or short circuit of T1 temperature sensor	X	☆	X	X	E2
2	Open or short circuit of T2 temperature sensor	☆	X	X	X	E3
3	Open or short circuit of T3 temperature sensor	X	X	☆	X	E4
4	EEPROM malfunction	☆	☆	X	X	E7

O (on) X(off) ☆(flash at 5Hz)
Note: Digital display is available for duct type.

For Super-slim 4-way Cassette Type:

NO.	Malfunction	Running lamp	Timer lamp	Defrosting lamp	Alarm lamp	Display(digital tube)
1	Open or short circuit of T1 temperature sensor	X	☆	X	X	E2
2	Open or short circuit of T2 temperature sensor	☆	X	X	X	E3
3	Open or short circuit of T3 temperature sensor	X	X	☆	X	E4
4	Indoor EEPROM malfunction	☆	☆	X	X	E7
5	Water-level alarm malfunction	X	X	X	☆	E8
6	Communication malfunction between main PCB and up-down panel PCB	☆	X	☆	☆	F0
7	Up-down panel malfunction	X	☆	☆	☆	F1
8	Up-down panel is not closed	X	O	☆	☆	F2

O (on) X(off) ☆(flash at 5Hz)

For Compact cassette Type:

NO.	Malfunction	Running lamp	Timer lamp	Defrosting lamp	Alarm lamp
1	Open or short circuit of T1 temperature sensor	X	☆	X	X
2	Open or short circuit of T2 temperature sensor	☆	X	X	X
3	Open or short circuit of T3 temperature sensor	X	X	☆	X
4	Indoor EEPROM malfunction	☆	☆	X	X

5	Water-level alarm malfunction	X	X	X	☆
O (on) X(off) ☆(flash at 5Hz)					

LEDs' for the indication of outdoor trouble(for 36-60K models)

Type	Contents	LED1	LED2	LED3
Trouble	Phase sequence	Flash	Off	Off
Trouble	Lack of phase(A,B)	Flash	Off	Off
Trouble	Lack of phase(C)	Off	Off	Off
Trouble	Low pressure protection	Flash	Flash	Off
Trouble	Overload of current	Off	Off	Flash
Trouble	Communication malfunction	Flash	Off	Flash
Trouble	Open or short circuit of T3	Off	Flash	Flash
Trouble	Open or short circuit of T4 or T5 or high pressure protection	Off	Flash	Off
Trouble	High temperature protection of condenser	Flash	Flash	Flash

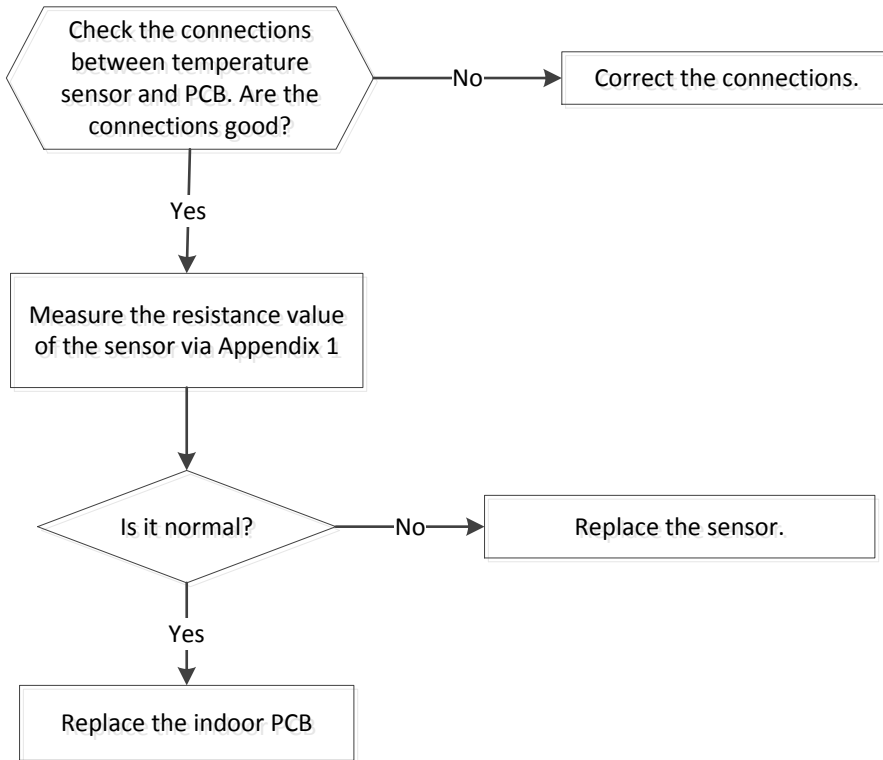
Note:

1. If the LED1-LED3 are flashing slowly, means the system is stand-by.
2. T3: Outdoor condenser temperature sensor
3. T4: Outdoor ambient temperature sensor

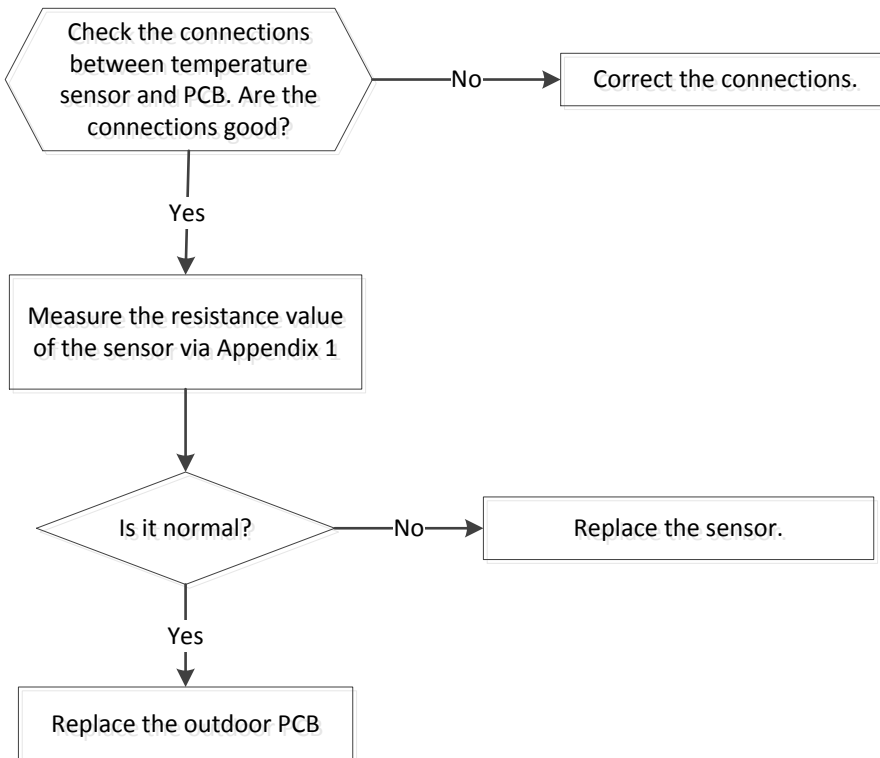
2.3. Solving steps for typical malfunction

(1) For indoor unit

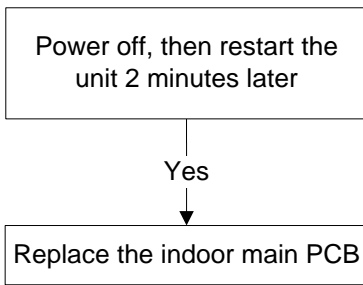
a. Open or short circuit of T1 or T2 temperature sensor



b. Open or short circuit of T3 temperature sensor

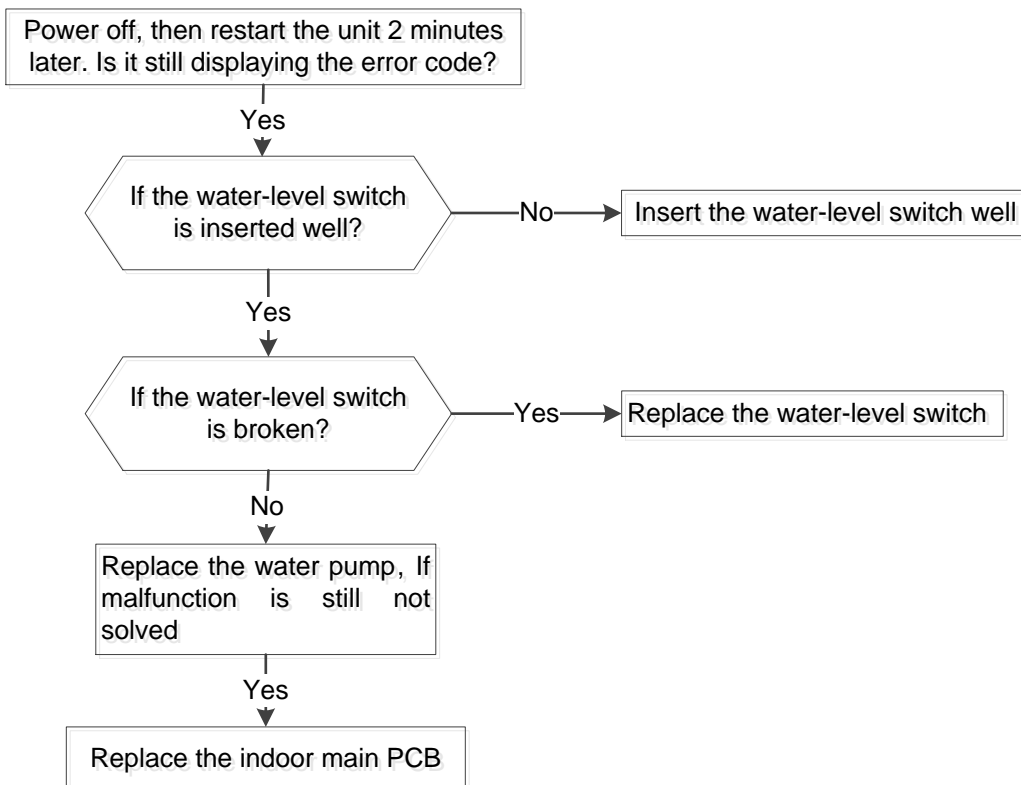


c. EEPROM malfunction

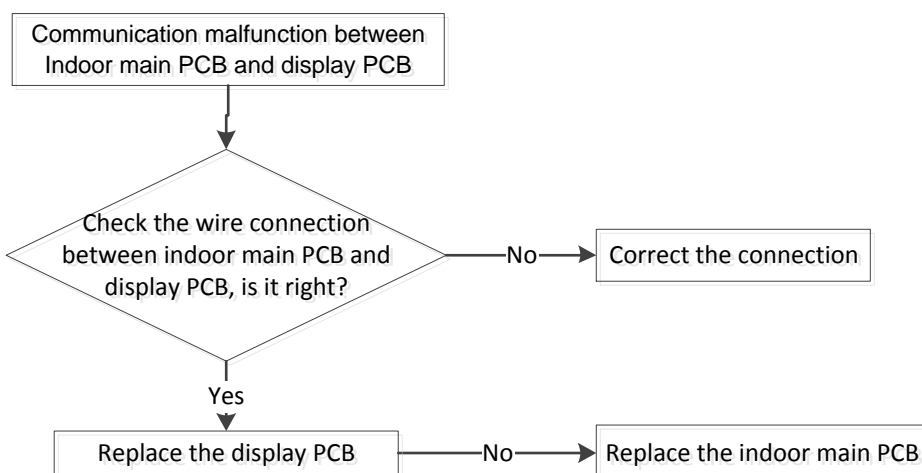


EEPROM: An electrically erasable programmable read-only memory whose contents can be erased and reprogrammed using a pulsed voltage.

d. Water-level alarm malfunction

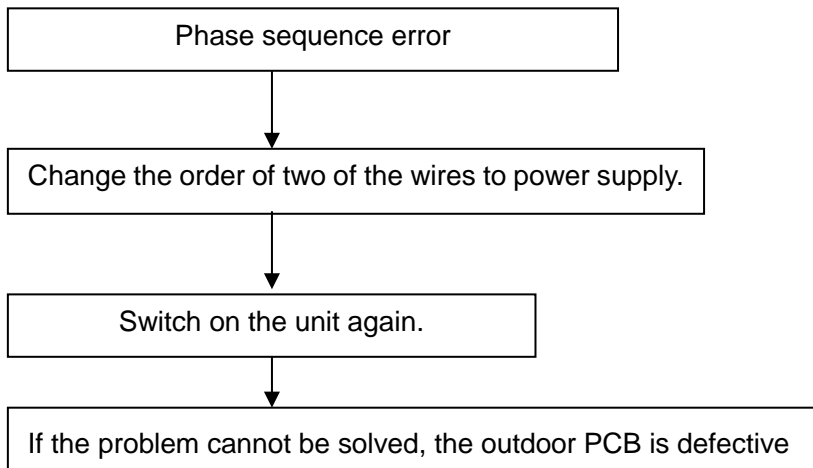


e. Communication malfunction between indoor main PCB and display PCB

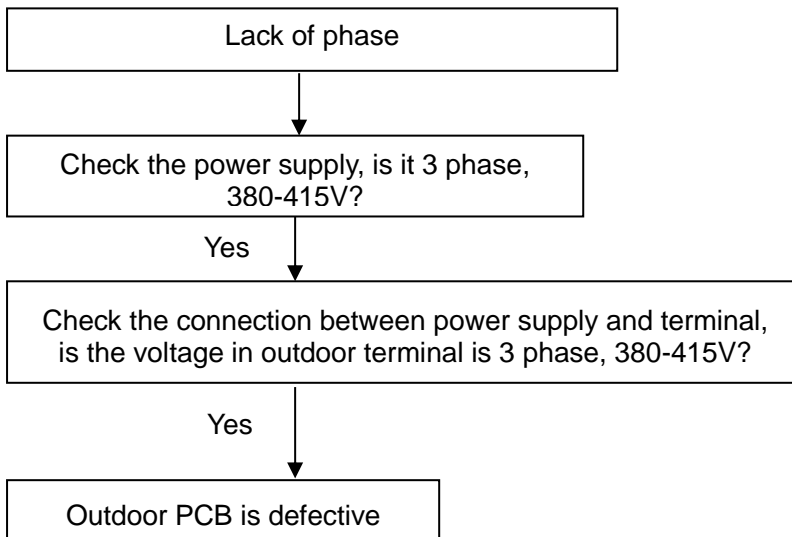


(2) For the outdoor unit

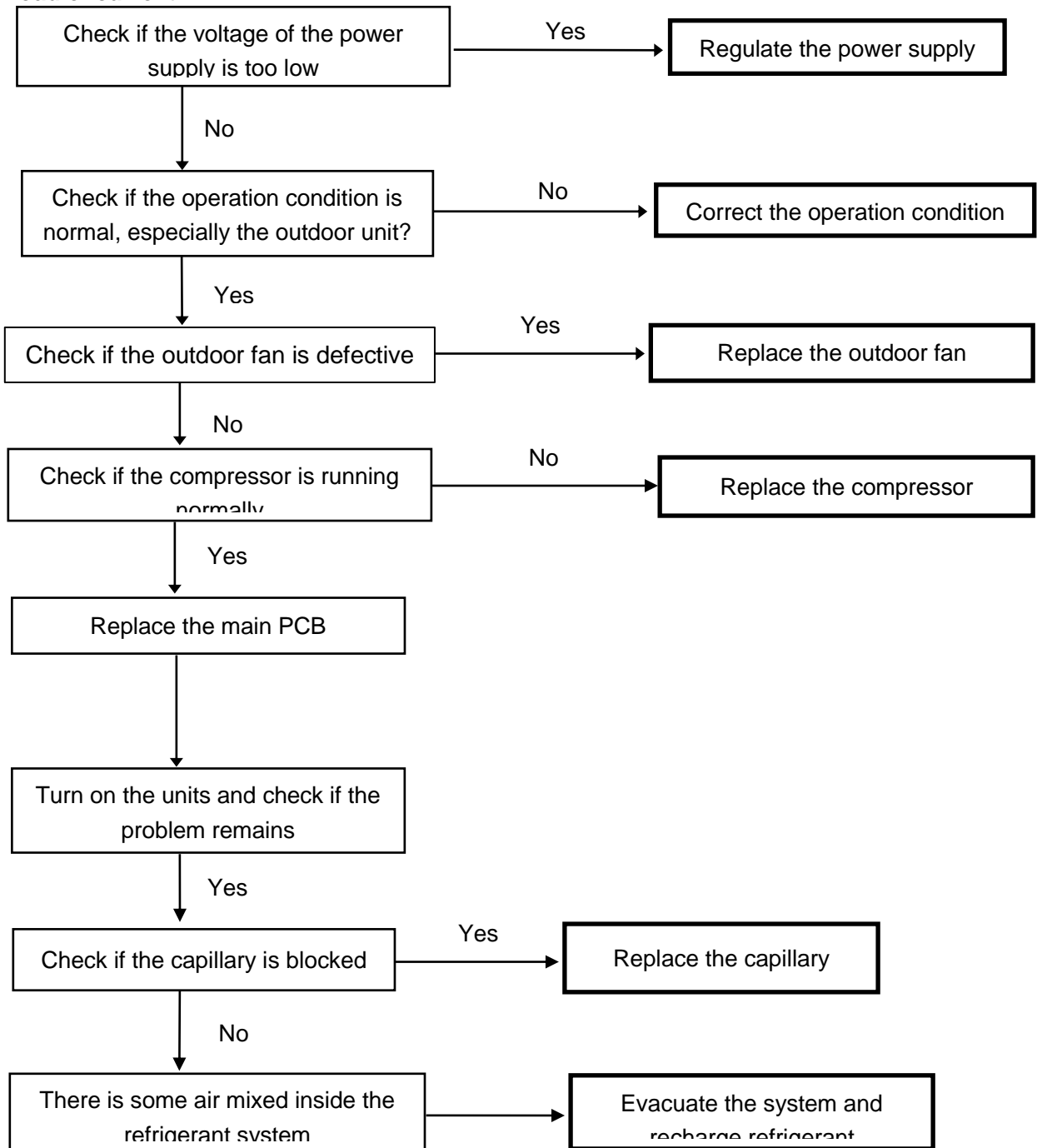
a. Phase sequence error:



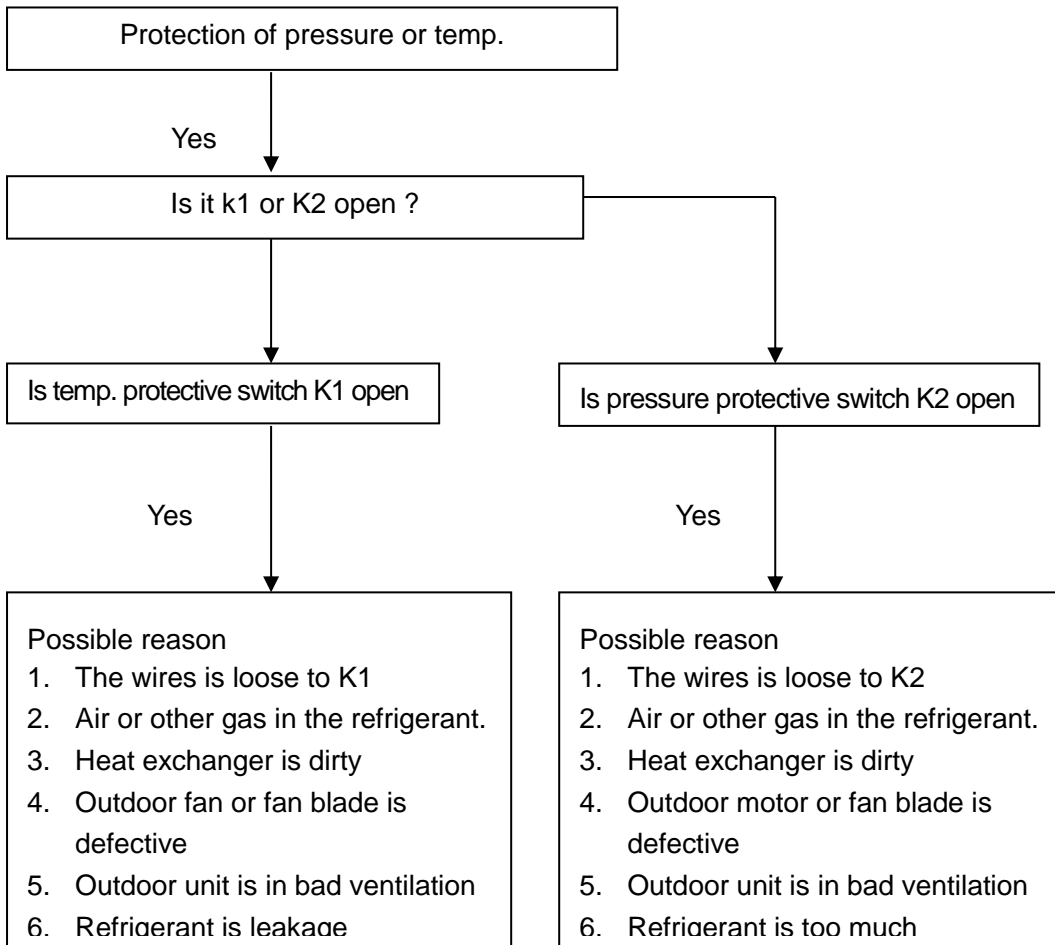
b. Lack of phase



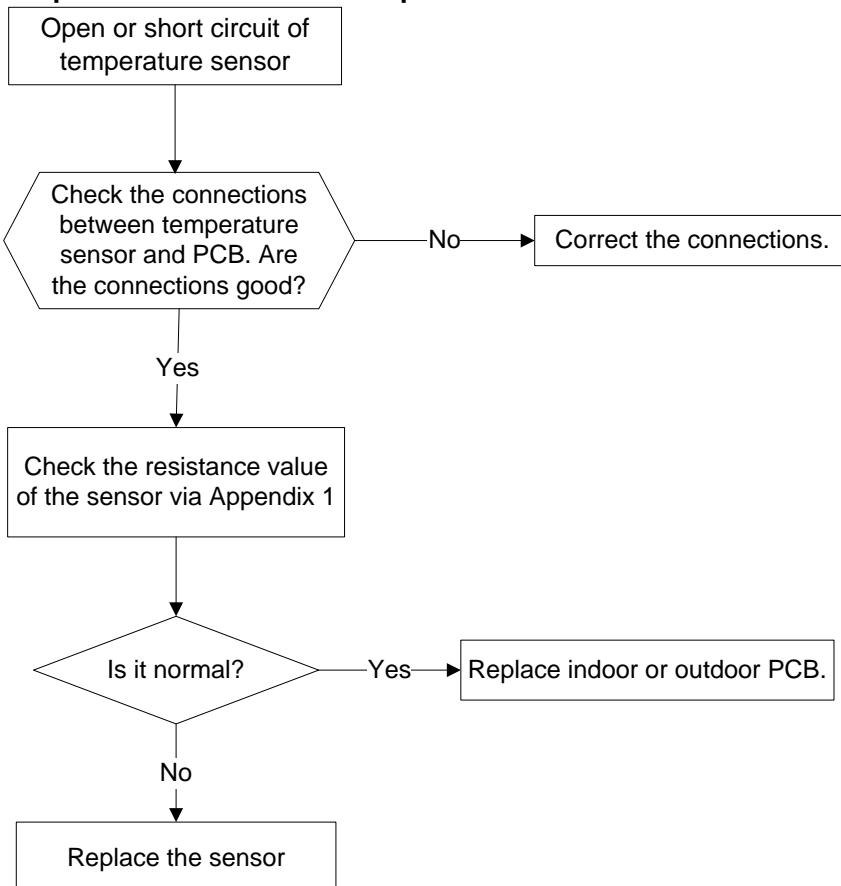
c. Overload of current



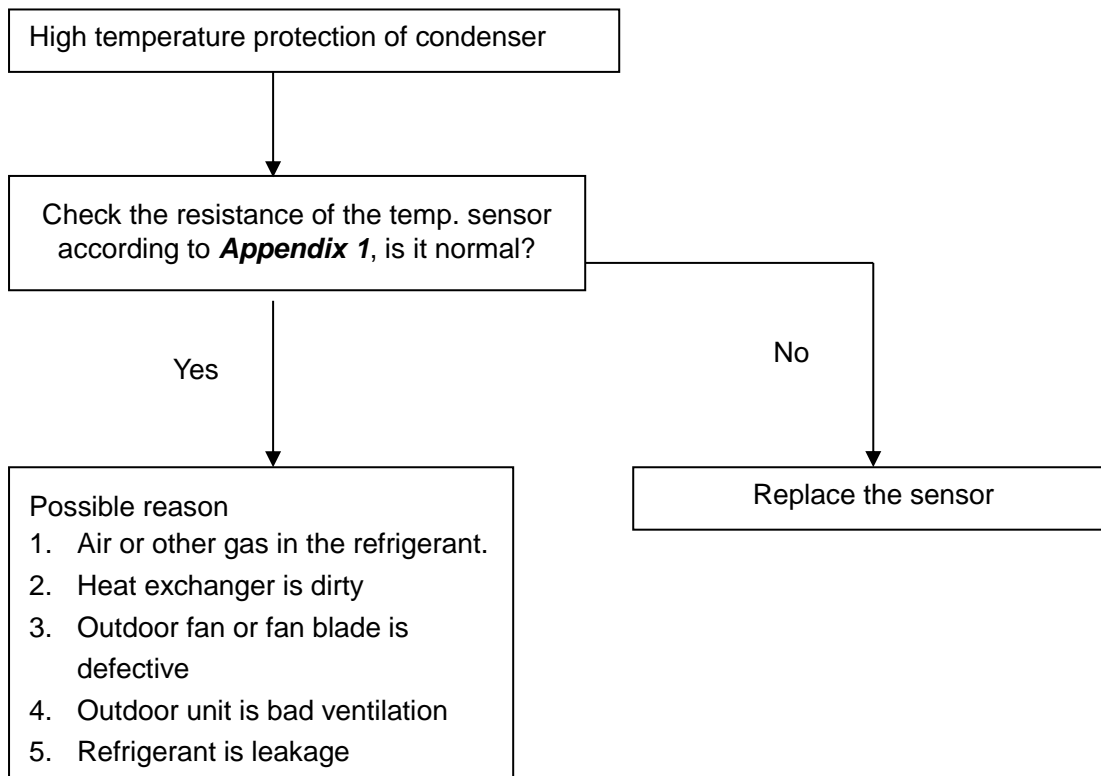
d. Protection of pressure or temp.



e. Open or short circuit of temperature sensor



f. High temperature protection of condenser



Appendix 1 Temperature 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

Appendix 2

Unit: °C---K				Discharge temp. sensor table			
-20	542.7	20	68.66	60	13.59	100	3.702
-19	511.9	21	65.62	61	13.11	101	3.595
-18	483	22	62.73	62	12.65	102	3.492
-17	455.9	23	59.98	63	12.21	103	3.392
-16	430.5	24	57.37	64	11.79	104	3.296
-15	406.7	25	54.89	65	11.38	105	3.203
-14	384.3	26	52.53	66	10.99	106	3.113
-13	363.3	27	50.28	67	10.61	107	3.025
-12	343.6	28	48.14	68	10.25	108	2.941
-11	325.1	29	46.11	69	9.902	109	2.86
-10	307.7	30	44.17	70	9.569	110	2.781
-9	291.3	31	42.33	71	9.248	111	2.704
-8	275.9	32	40.57	72	8.94	112	2.63
-7	261.4	33	38.89	73	8.643	113	2.559
-6	247.8	34	37.3	74	8.358	114	2.489
-5	234.9	35	35.78	75	8.084	115	2.422
-4	222.8	36	34.32	76	7.82	116	2.357
-3	211.4	37	32.94	77	7.566	117	2.294
-2	200.7	38	31.62	78	7.321	118	2.233
-1	190.5	39	30.36	79	7.086	119	2.174
0	180.9	40	29.15	80	6.859	120	2.117
1	171.9	41	28	81	6.641	121	2.061
2	163.3	42	26.9	82	6.43	122	2.007
3	155.2	43	25.86	83	6.228	123	1.955
4	147.6	44	24.85	84	6.033	124	1.905
5	140.4	45	23.89	85	5.844	125	1.856
6	133.5	46	22.89	86	5.663	126	1.808
7	127.1	47	22.1	87	5.488	127	1.762
8	121	48	21.26	88	5.32	128	1.717
9	115.2	49	20.46	89	5.157	129	1.674
10	109.8	50	19.69	90	5	130	1.632
11	104.6	51	18.96	91	4.849		
12	99.69	52	18.26	92	4.703		
13	95.05	53	17.58	93	4.562		
14	90.66	54	16.94	94	4.426		
15	86.49	55	16.32	95	4.294	B(25/50)=3950K	
16	82.54	56	15.73	96	4.167		
17	78.79	57	15.16	97	4.045	R(90°C)=5KΩ±3%	
18	75.24	58	14.62	98	3.927		
19	71.86	59	14.09	99	3.812		

