



LCP INVERTER (1:1)

**MODELS:**

**INDOOR UNIT**

Four-way Ceiling Cassette

**KV 24CC-ARF21**

Super slim Cassette

**KV 36CC-ARF21B**

**KV 48CC-ARF21B**

Ceiling-floor Mount: Convertible

**KV 24CM-ARF21**

3<sup>rd</sup> Generation Ceiling-floor

**KV 36CM-ARF21B**

**KV 48CM-ARF21B**

Floor Mounted Type

**KV 36FM-ARF21**

**KV 60FM-ARF21**

**OUTDOOR UNIT**

Universal Outdoor Unit

**KV 24ODU-ARF21**

**KV 36ODU-ARF21/B**

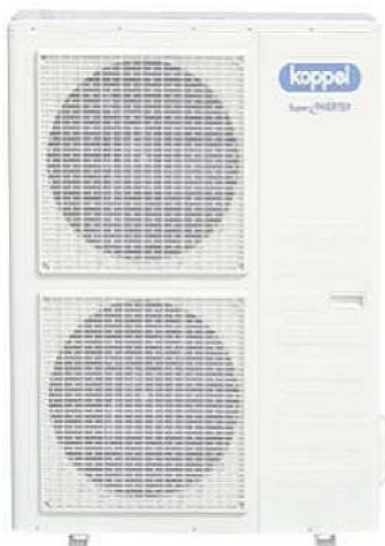
**KV 48ODU-ARF21B**

**KV 60ODU-CRF21**



# SERVICE MANUAL

LIGHT COMMERCIAL AIR CONDITIONING **2014**



# CONTENTS

<b>Part 1 General Information .....</b>	<b>1</b>
<b>Part 2 Indoor Units .....</b>	<b>6</b>
<b>Part 3 Outdoor Units.....</b>	<b>63</b>
<b>Part 4 Installation.....</b>	<b>75</b>
<b>Part 5 Electrical Control System .....</b>	<b>103</b>

# Part 1

## General Information

1. Model Lists.....	2
2. External Appearance.....	3
2.1 Indoor Units .....	3
2.2 Outdoor Units .....	3
3. Nomenclature .....	4
4. Features .....	5

## 1. Model Lists

### 1.1 Indoor Units

R410A (capacity multiplied by 1000Btu/h)

Type	Function	24	36	48	60
Four-way cassette	Cooling	√			
Super-slim Four-way cassette	Cooling		√	√	
Ceiling & floor	Cooling	√			
3 <sup>rd</sup> generation ceiling & floor	Cooling		√	√	
Floor-standing	Cooling		√		√

### 1.2 Outdoor Units

Universal Outdoor unit Model	Compressor type	Compressor Brand	Matched indoor units
KV24ODU-ARF21	Rotary DC Inverter	GMCC	KV24CC-ARF21 KV24CM-ARF21
KV36ODU-ARF21	Rotary DC Inverter	MISTUBISHI	KV36FM-ARF21
KV36ODU-ARF21B	Rotary DC Inverter	MITSUBISHI	KV36CC-ARF21B KV36CM-ARF21B
KV48ODU-ARF21B	Rotary DC Inverter	MITSUBISHI	KV48CC-ARF21B KV48CM-ARF21B
KV60ODU-CRF21	Rotary DC Inverter	MITSUBISHI	KV60FM-ARF21



## 2. External Appearance

### 2.1 Indoor Units

Four-way Cassette



Ceiling & Floor



Super-slim Four-way Cassette



3<sup>rd</sup> Generation Ceiling-floor Type



Floor-standing



### 2.2 Outdoor Units



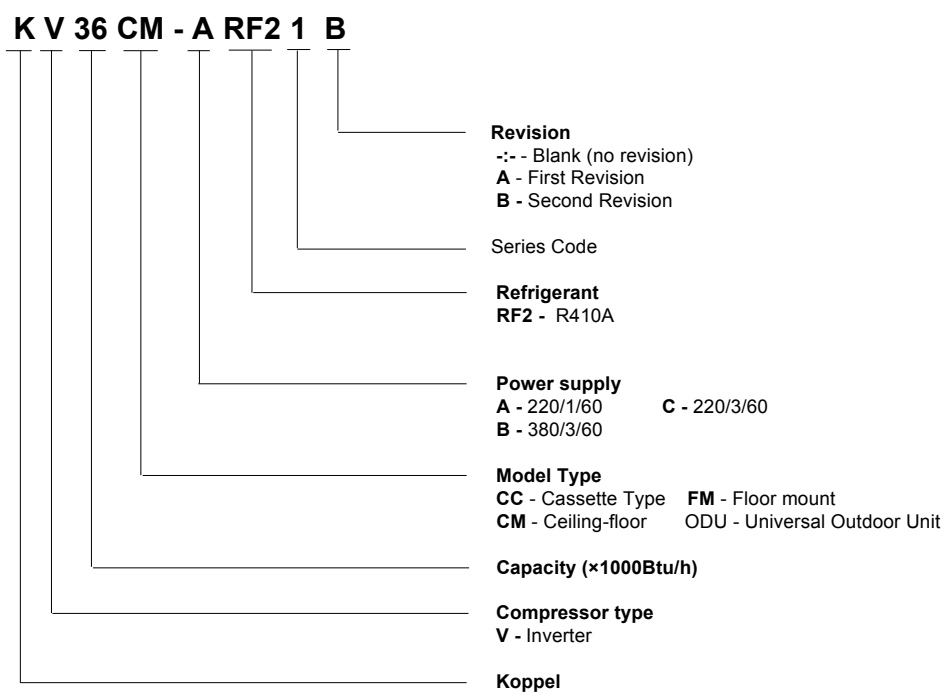
Single fan outdoor unit



Double fan outdoor unit

### 3. Nomenclature

#### 3.1 Indoor / Outdoor Unit



## 4. Features

### 4.1 Universal outdoor unit design

Indoor unit with the same capacity as the outdoor unit can be matched.

### 4.2 High efficiency and energy saving.

Thanks to the DC inverter technology and optimized piping system, the EER and COP of whole series can easily reach A-class.

### 4.3 Low noise and low starting current.

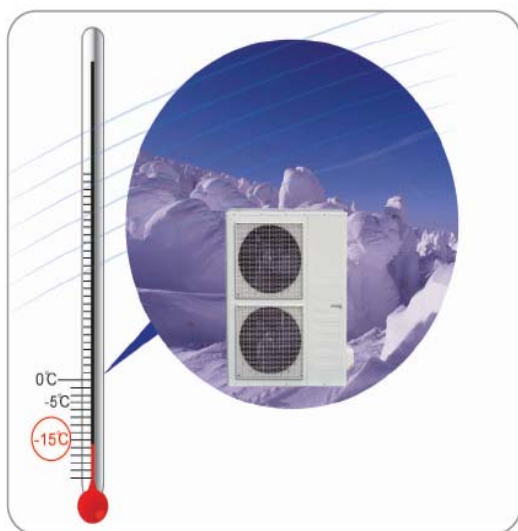
Thanks to the DC inverter technology, the system can work with low noise, and very small starting current.

### 4.4 Intelligent refrigerant adjustment technology.

Throttle part is made up of capillary and electronic expansion valve (EXV). The outdoor unit can output the most accurate capacity in any condition.

### 4.5 Working in cooling mode under -15°C.

Outdoor unit built-in with low ambient kit, it can control the outdoor unit's fan and cooling can be performed throughout the year for computer rooms, banquet halls, etc. Wide operation range covers outdoor temperatures as low as -15°C for cooling.



### 4.6 Indoor & outdoor unit's power supply is separate.

### 4.7 All indoor units have network control function.

### 4.8 All indoor units have Auto-restart function.

## **Part 2**

# **Indoor Units**

<b>Four-way Cassette Type .....</b>	<b>7</b>
<b>Super Slim Cassette Type .....</b>	<b>20</b>
<b>Ceiling &amp; Floor Type .....</b>	<b>33</b>
<b>3<sup>rd</sup> Generation Ceiling &amp; Floor Type .....</b>	<b>45</b>
<b>Floor-standing Type .....</b>	<b>53</b>

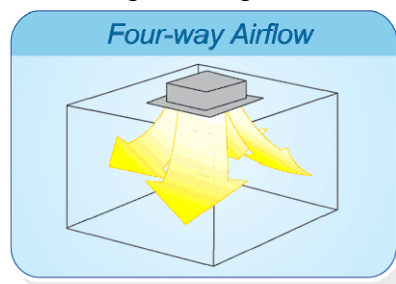
---

# Four-way Cassette T ype

1. Features .....	8
2. Dimensions .....	11
3. Service Space .....	12
4. Wiring Diagrams .....	13
5. Capacity Tables .....	14
6. Air Velocity Distributions(Reference Data) .....	15
7. Electric Characteristics .....	16
8. Sound Levels .....	16
9. Accessories .....	17
10. The Specification of Power .....	18
11. Field Wiring .....	19

## 1. Features

- (1) Low operation noise
  - Streamline plate ensures quietness
  - Creates natural and comfortable environment
- (2) Efficient cooling—Equal, fast and wide range cooling



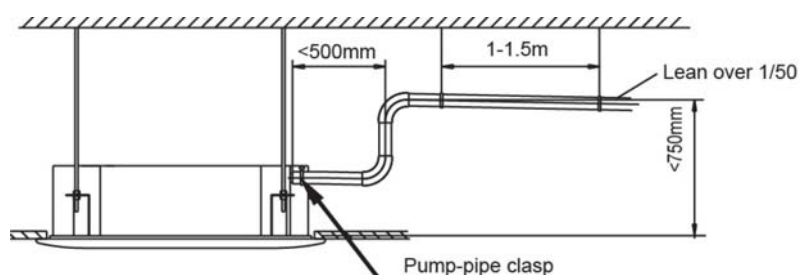
- (3) Excellent performance. The optimal evaporator & sufficient airflow volume guarantees the excellent capacity
- (4) The adoption of the most advanced 3- Dimensional Screw fan
  - Reduces the air resistance passing through
  - Smooths the air flow
  - Makes air speed distribution to the heat exchange uniform



- (5) Fresh air makes life healthier and more comfortable.



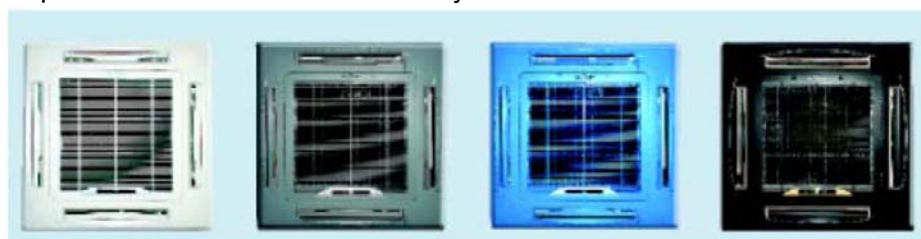
- (6) Drainage pump can take up the condenser water up to 750mm.



- (7) Ultra thin machine body for easy installation and maintenance. 24K:230mm.



(8) Different color panels to be chosen: White、Gray、Blue、Black



White

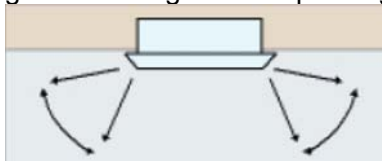
Gray (optional)

Blue (optional)

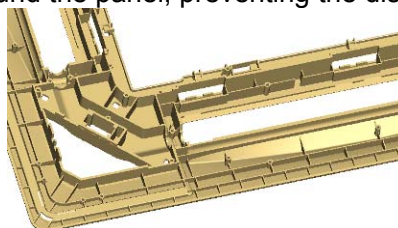
Black (optional)

(9) Swing angle of louver

- 1) Add one more swing motor, one motor drive two louvers. Controlling the interspace of each part, minimizing the angle loss.
- 2) The swing angle of the first louver are 40~42 degrees and the second louver are 37~38 degrees. New evaporator and inner configuration design can acquire high heat-exchanger effect.

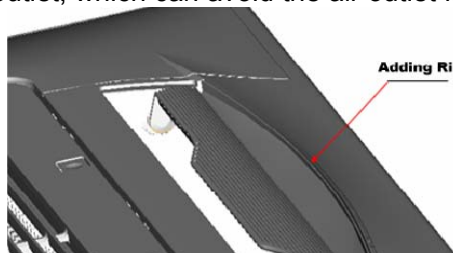


(10) More strengthening rib design around the panel, preventing the distortion of the panel.

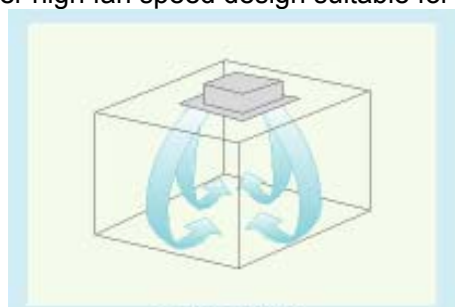


(11) New outlet frame design to make the phenomena of coagulation with great improvement: prevent the condensing water from damaging the air guide strip.

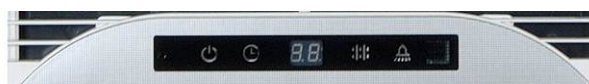
(12) Adding rib on the panel of fan outlet, which can avoid the air outlet flow directly to people.



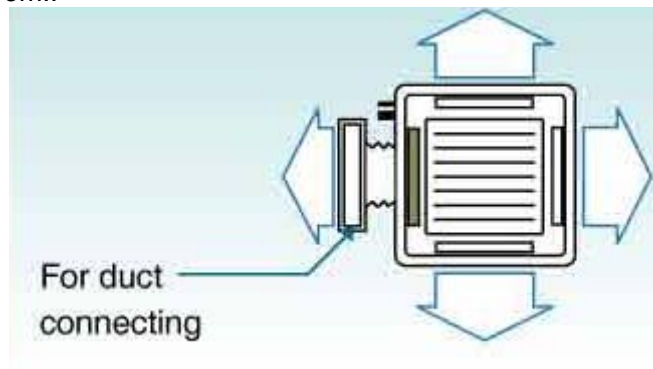
(13) 4 speeds available, optional super high fan speed design suitable for large building over 3m high.



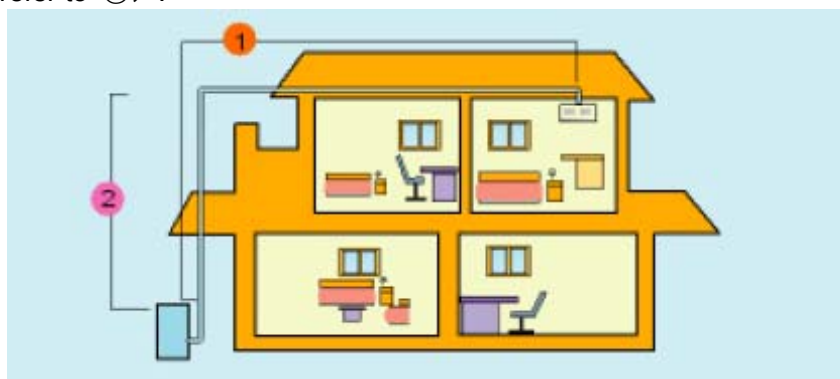
(14) Adding digital tube displaying on the display board. LED can display the Error Code to make malfunction checking easier.



- (15) Reserve spaces for air side-outlet, it is available to connect duct pipe hence air supplying from the four sides to nearby small room..

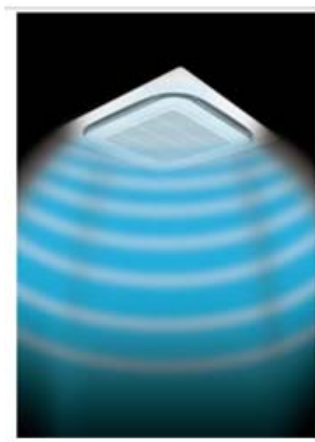


- (16) The connecting pipe and drop height is higher. Max. pipe length up to 50m (refer to ①) , and Max. drop height up to 30m (refer to ②) .



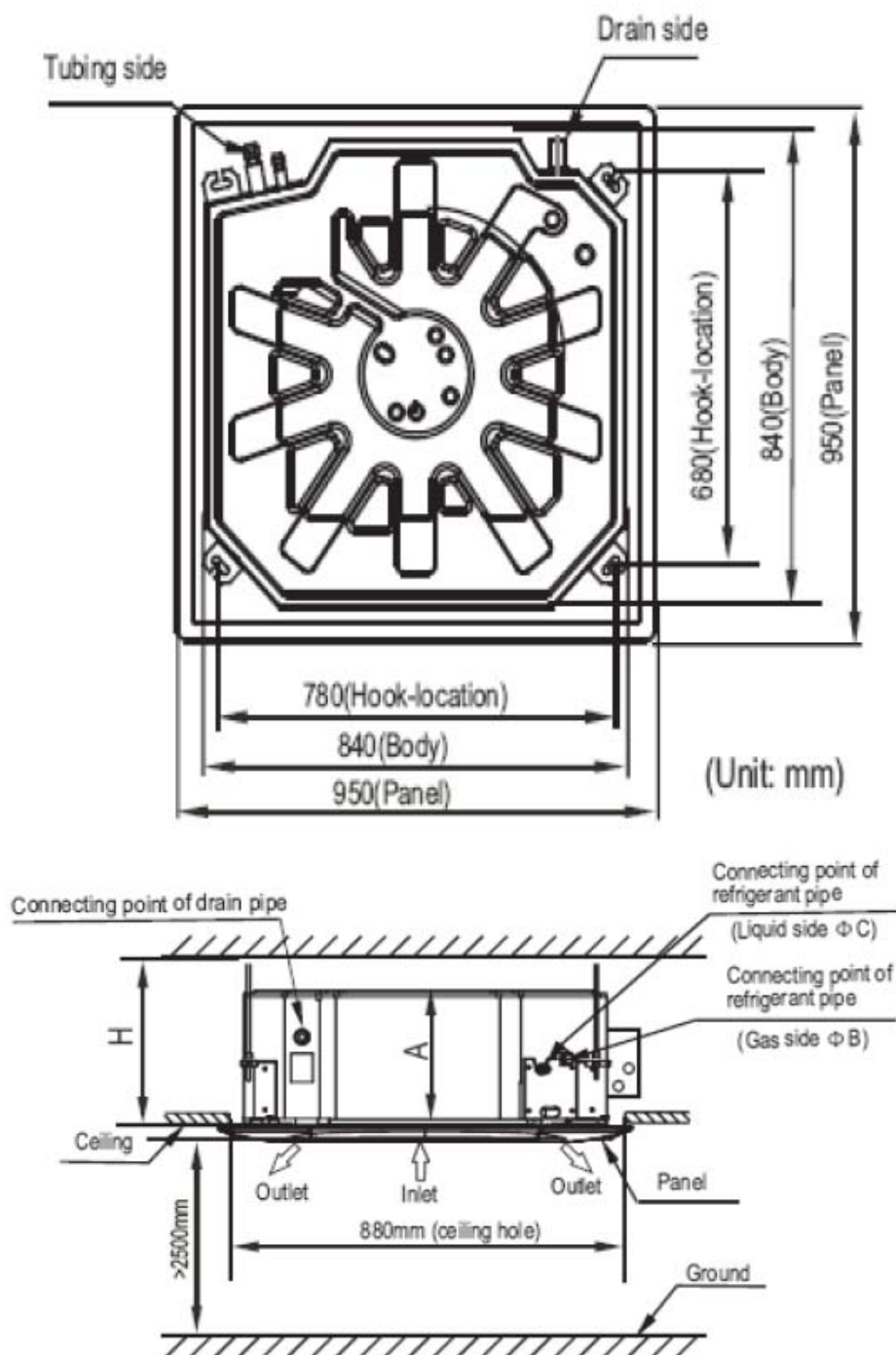
- (17) Optimal design, smaller Control Box, Space saving and convenient for wiring, Using fire resistance galvanized steel for E-box material. Metal box make the control part more stable and prevent damaging.

- (18) New Panel optional: 360 degree air-outlet.





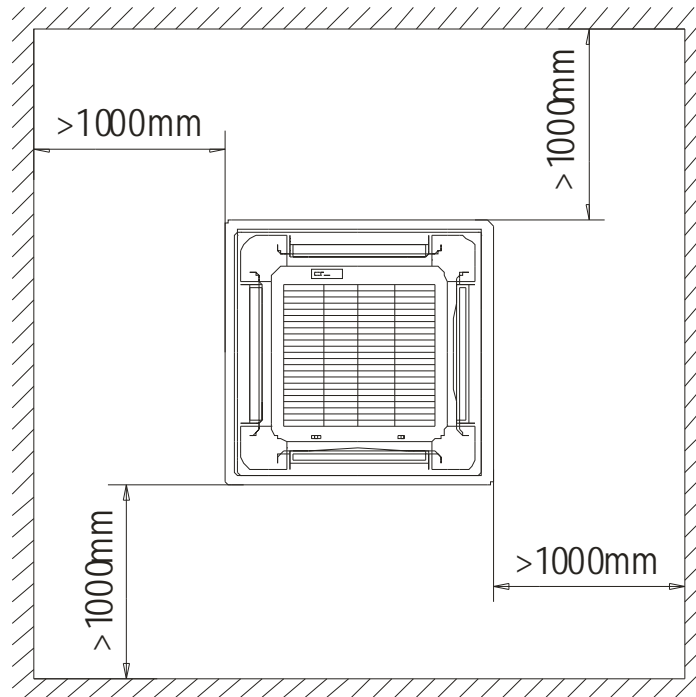
## 2. Dimensions



Unit: mm

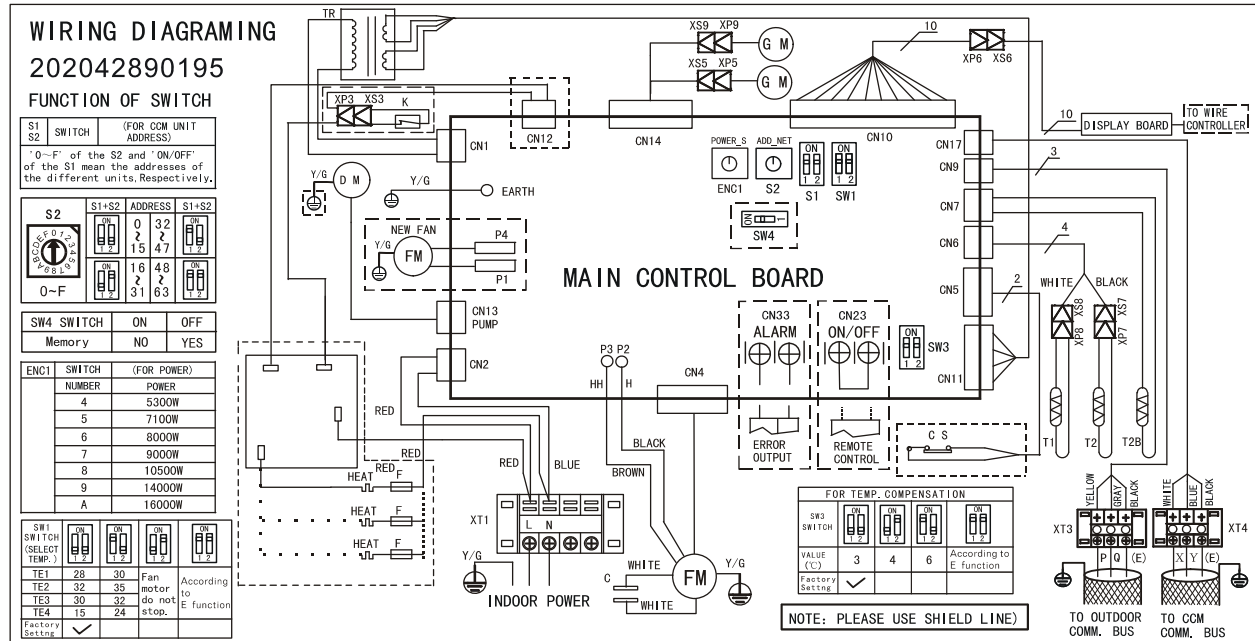
MODEL	A	B	C	H
KV24CC-ARF21	230	$\Phi 15.9$	$\Phi 9.52$	>260

### 3. Service Space



## 4. Wiring Diagrams

KV24CC-ARF21



## 5. Capacity Tables

### 5.1 Cooling Capacity

KV24CC-ARF21

Cooling		Outdoor conditions (DB)			
Indoor Conditions	(kW)	21°C	28°C	35°C	43°C
21/15°C DB/WB	TC	7.52	7.15	6.79	6.50
	SC	5.56	5.51	5.43	5.46
	Input	2.10	2.28	2.38	2.46
24/17°C DB/WB	TC	7.74	7.37	7.01	6.57
	SC	5.80	5.75	5.68	5.52
	Input	2.23	2.38	2.49	2.61
27/19°C DB/WB	TC	7.88	7.52	<b>7.30</b>	6.79
	SC	5.83	5.79	5.69	5.57
	Input	2.28	2.41	<b>2.54</b>	2.66
32/23°C DB/WB	TC	8.03	7.74	7.59	7.01
	SC	6.83	6.73	6.68	6.52
	Input	2.38	2.49	2.66	2.76

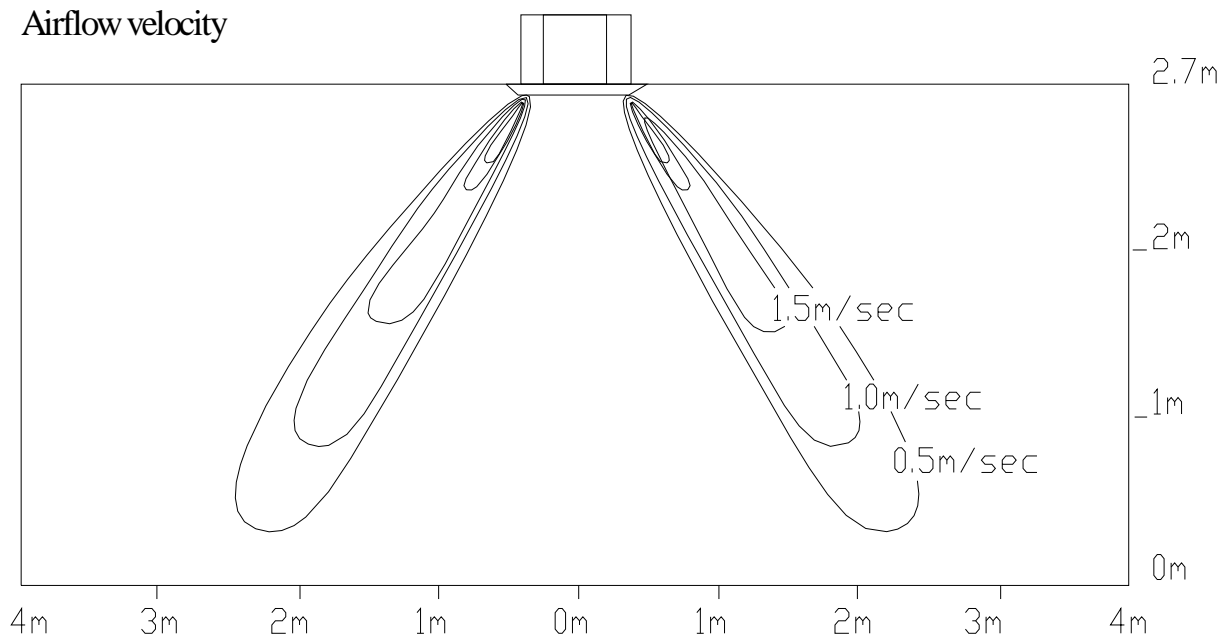
**Notes:**

TC : Total capacity ; kW

SC: Sensible heat capacity ; kW

Input: Input power; kW

## 6. Air Velocity Distributions (Reference Data)



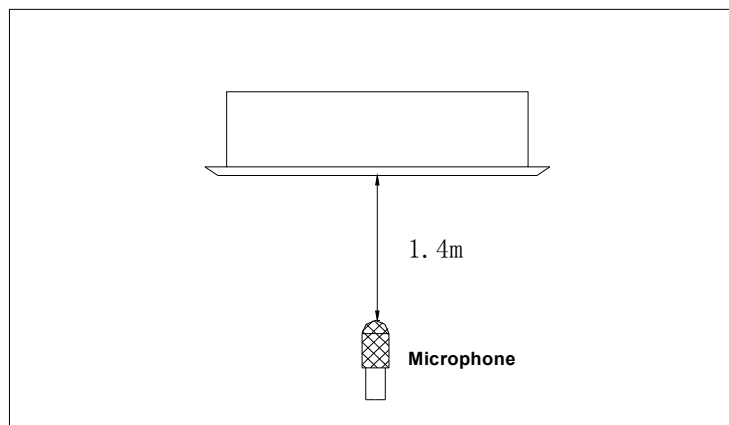
## 7. Electric Characteristics

Model	Indoor Unit				Power Supply
	Hz	Voltage	Min	Max	MFA
KV24CC-ARF21	60	220-230	198	242	10

Note:














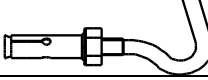

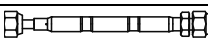
MFA: Max. Fuse Amps. (A)

## 8. Sound Levels



Model	Noise level dB(A)		
	H	M	L
KV24CC-ARF21	42	40.5	39

## 9. Accessories

Installation Fittings	Name	Shape	Quantity
	Installation paper board		1
Tubing & Fittings	Soundproof / insulation sheath(on some models)		1
Drainpipe Fittings	Out-let pipe sheath(on some models)		1
	Out-let pipe clasp(on some models)		1
	Drain joint(on some models)		1
	Seal ring		
Remote controller & Its Frame	Remote controller & Its Frame		1
	Remote controller holder		1
	Mounting screw(ST2.9×10-C-H)		2
	Remote controller manual		1
	Alkaline dry batteries (AM4)		2
Others	Owner's manual		1
	Installation manual		1
Installation accessory (The product you have might not be provided the following accessories)	Expansive hook		4
	Installation hook		4
	Orifice		1

## 10. The Specification of Power

Model		KV24CC-ARF21
INDOOR UNIT POWER	Phase	1-phase
	Frequency and Voltage	220-230V, 60Hz
	POWER WIRING (mm <sup>2</sup> )	3×1.0
	CIRCUIT BREAKER/FUSE(A)	15/10
OUTDOOR UNIT POWER	Phase	1-phase
	Frequency and Voltage	220-230V, 60H
	POWER WIRING (mm <sup>2</sup> )	3X2.5
	CIRCUIT BREAKER/FUSE(A)	30/20
Indoor/Outdoor Connecting Wiring (Weak Electric Signal) (mm <sup>2</sup> )		3×0.5
Indoor/Outdoor Connecting Wiring (Strong Electric Signal) (mm <sup>2</sup> )		—————

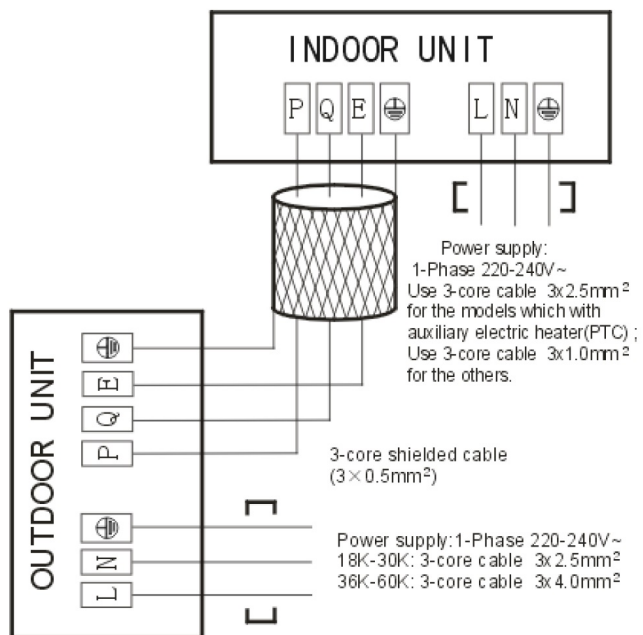


## 11. Field Wiring

KV24CC-ARF21

### Air Condition Link-Circuit

202042890198



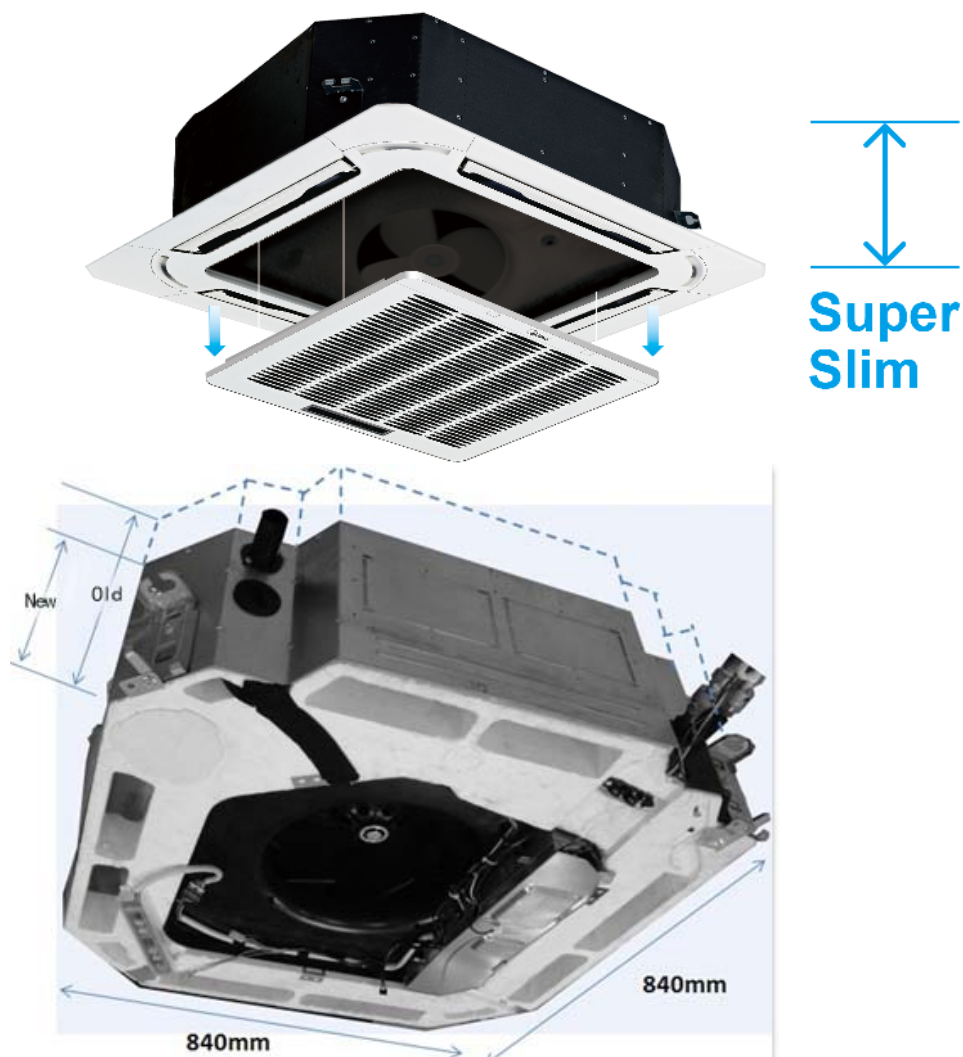
# Super Slim Cassette Type

<b>1. Features .....</b>	<b>21</b>
<b>2. Dimensions.....</b>	<b>25</b>
<b>3. Service Space.....</b>	<b>26</b>
<b>4. Wiring Diagrams .....</b>	<b>27</b>
<b>5. Electric Characteristics .....</b>	<b>28</b>
<b>6. Sound Levels.....</b>	<b>29</b>
<b>7. Accessories .....</b>	<b>30</b>
<b>8. The Specification of Power .....</b>	<b>31</b>
<b>9. Field Wiring .....</b>	<b>32</b>

## 1. Features

### 1.1 Overview

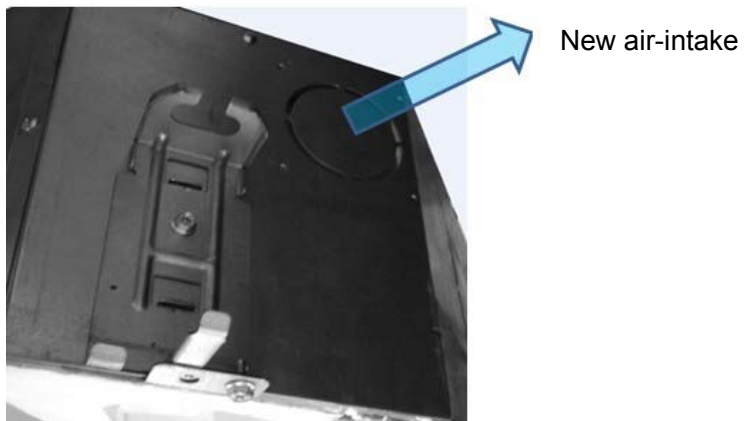
- Compact design, super slim body size, less space required in installation
- Each louver can be separately controlled, more comfortable air blow is possible.
- Auto-lifting panel design, more convenient to clean and maintain the filter. (optional)



	Old Cassette	New Slim Cassette	Reduction
36K-48K	840*300*840	840*245*840	18%↓

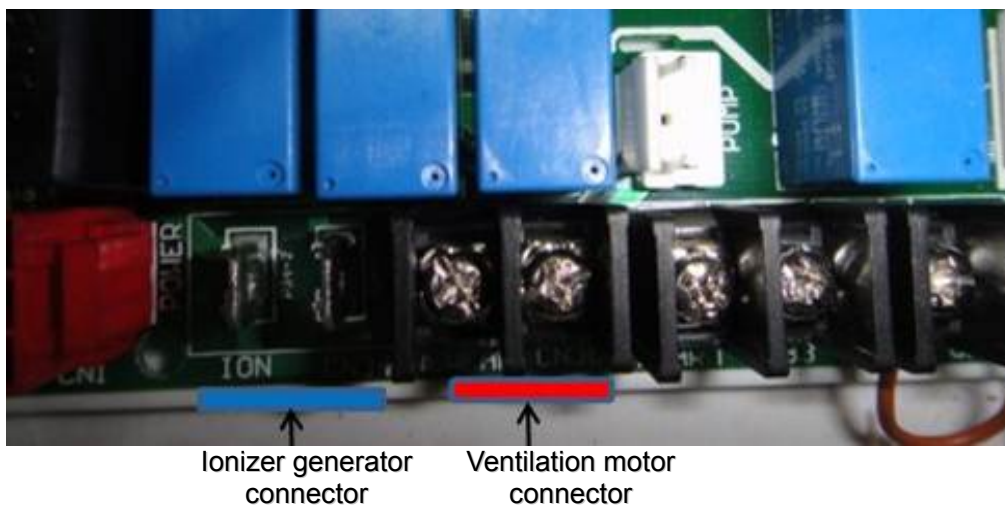
### 1.2 Fresh air intake function

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



### 1.3 Optional ionizer generator

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

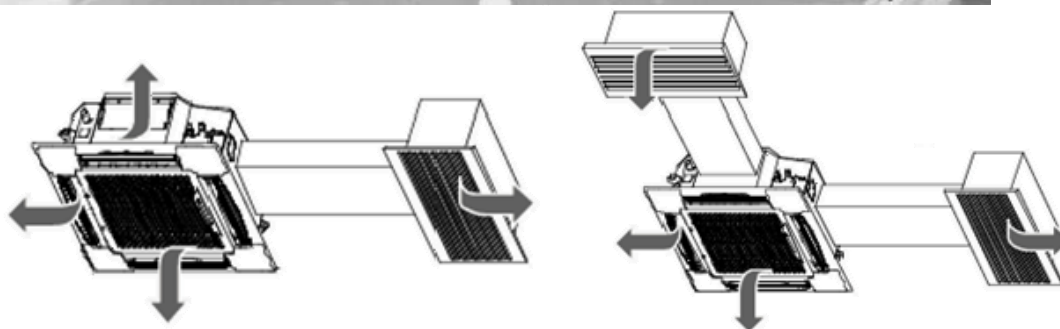


- Ionizer can be switched on or off by remote controller. When pressing the Clean Air button on the remote controller, Ionizer will work and the indicator light on display board will light.



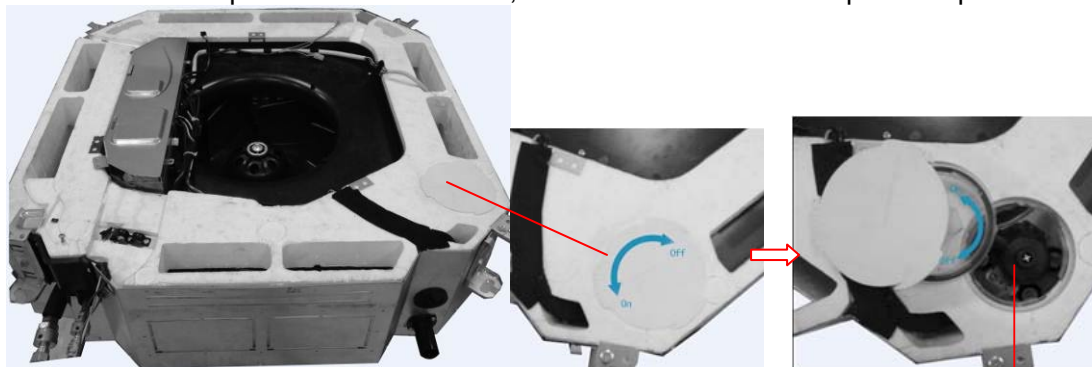
## 1.4 External air duct design

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



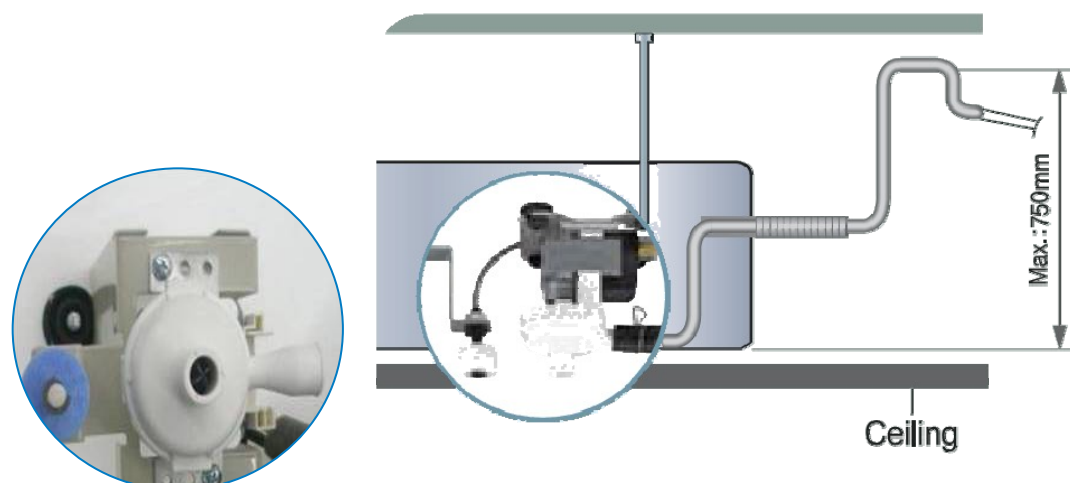
## 1.5 Built-in drain pump

- Due to the improvement of structure, is it more convenient to repair or replace the drain pump.



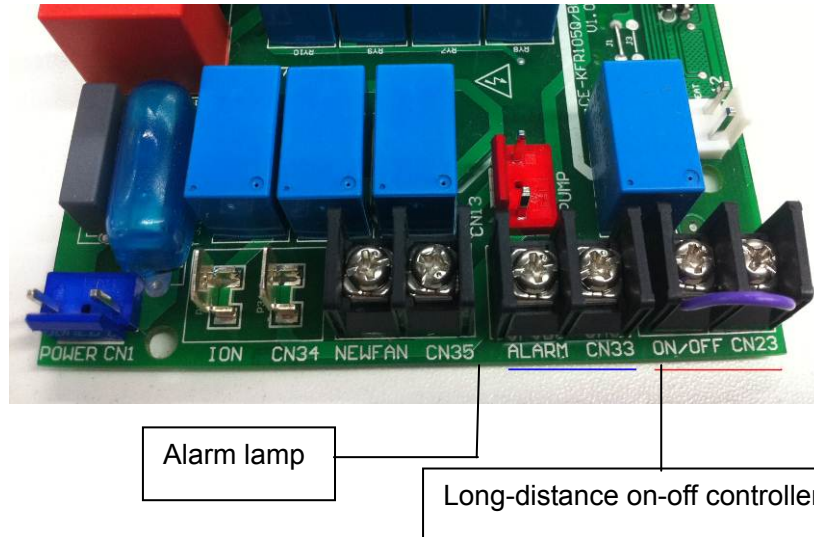
Drain Pump

- With built-in drain pump to make sure that condensed water will 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 interface.



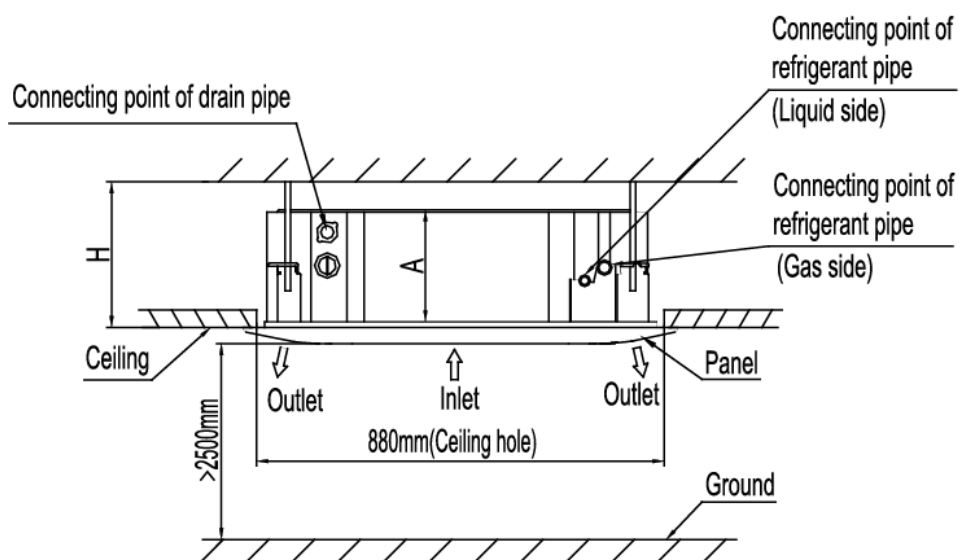
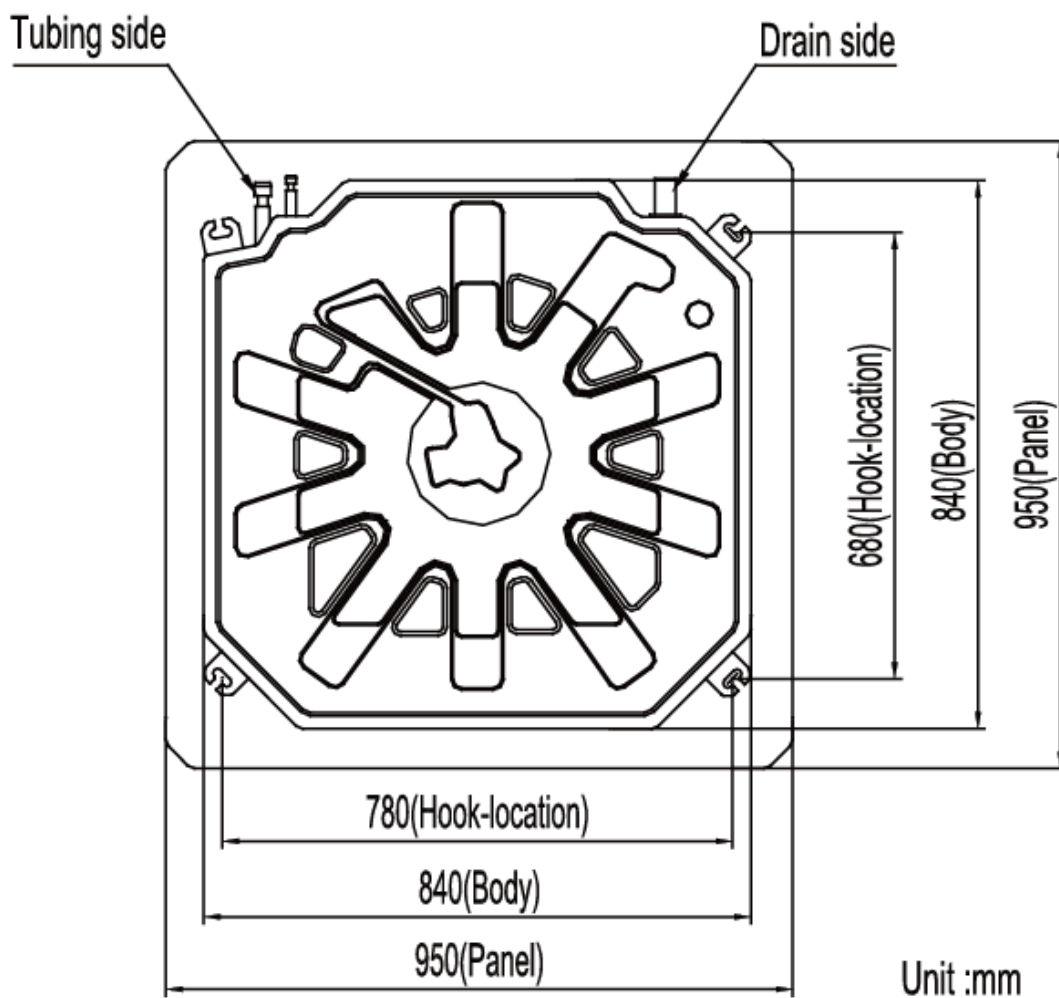
### 1.7 Standard touch screen wired controller

- Touch screen wired controller is standard, with error code indication function. Better man-machine conversation interface.
- Undated structure design, 4-way wire layout design, no raised part at backside, more convenient to place the wires and install the device.
- Remote controller is optional (without auto-lifting panel function).



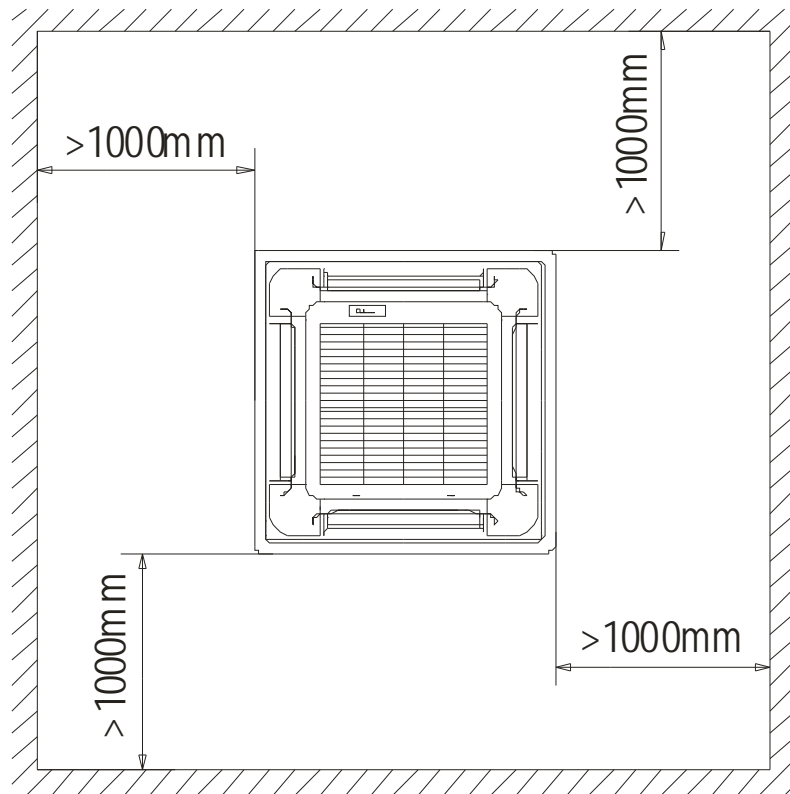


## 2. Dimensions



Capacity (Btu/h)	A	H
36	245	>275
48	245	>275

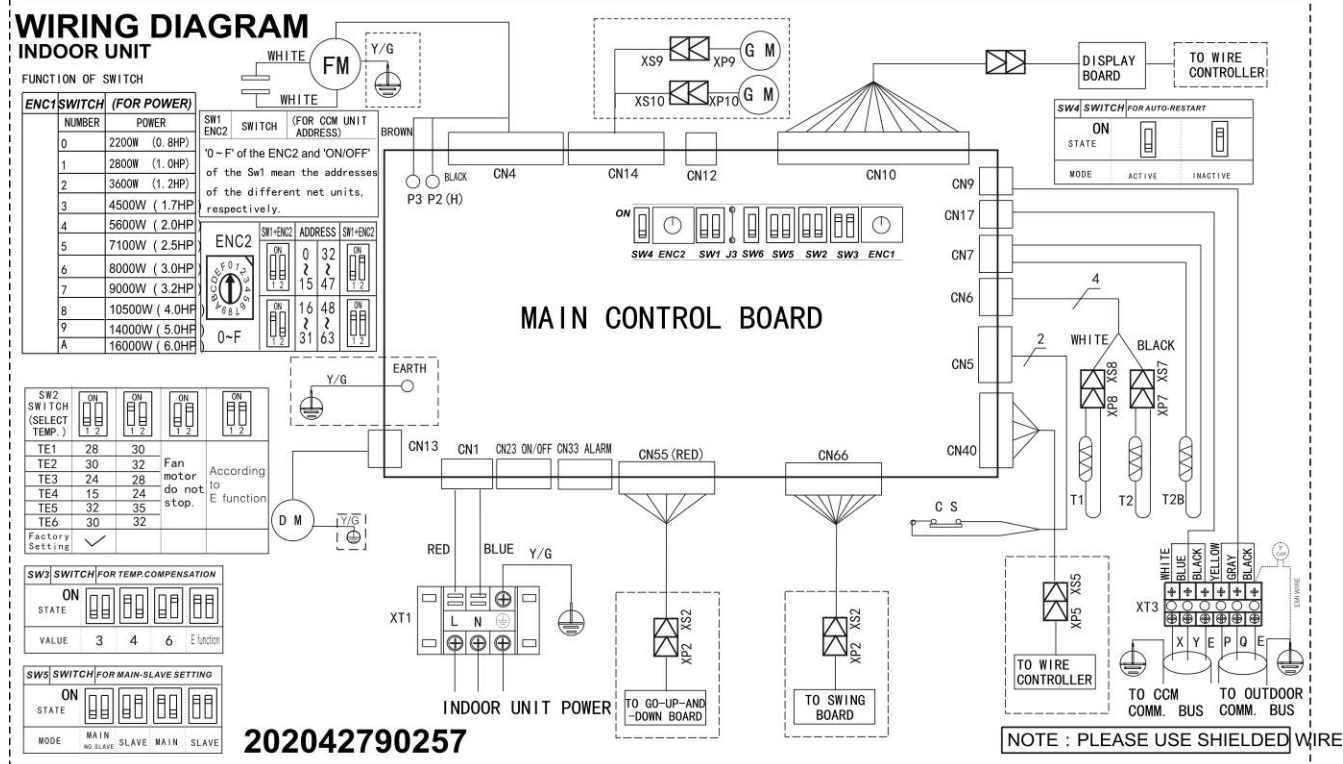
### 3. Service Space



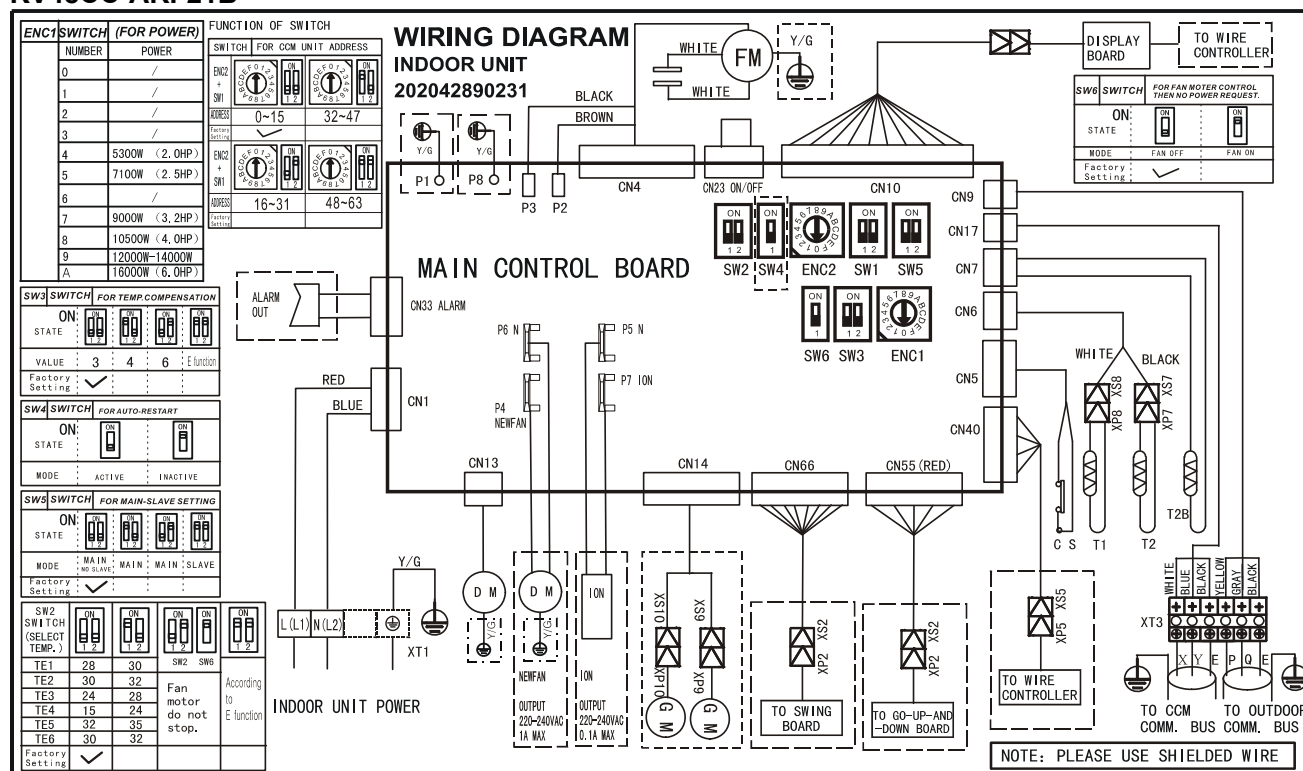


## 4. Wiring Diagrams

### KV36CC-ARF21B



### KV48CC-ARF21B



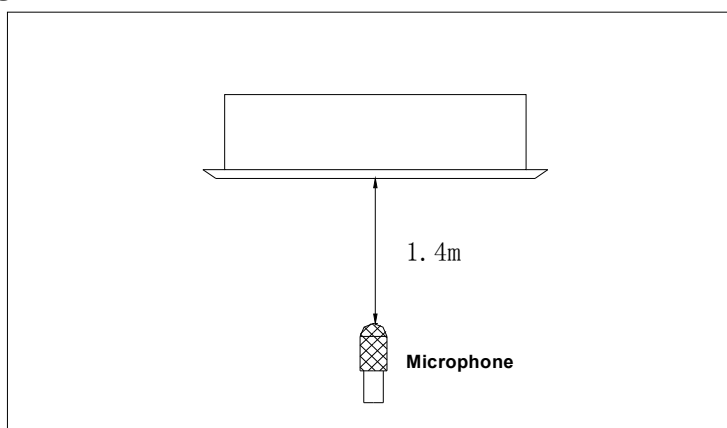
## 5. Electric Characteristics

Model	Indoor Unit				Power Supply
	Hz	Voltage	Min	Max	MFA
KV36CC-ARF21B	60	220-230	198	242	10
KV48CC-ARF21B	60	220-230	198	242	10

Note :














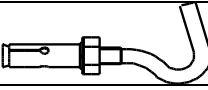
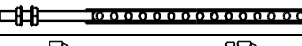
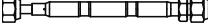
MFA: Max. Fuse Amps. (A)

## 6. Sound Levels



Model	Noise level dB(A)		
	H	M	L
KV36CC-ARF21B	54	49	44
KV48CC-ARF21B	57	53	44

## 7. Accessories

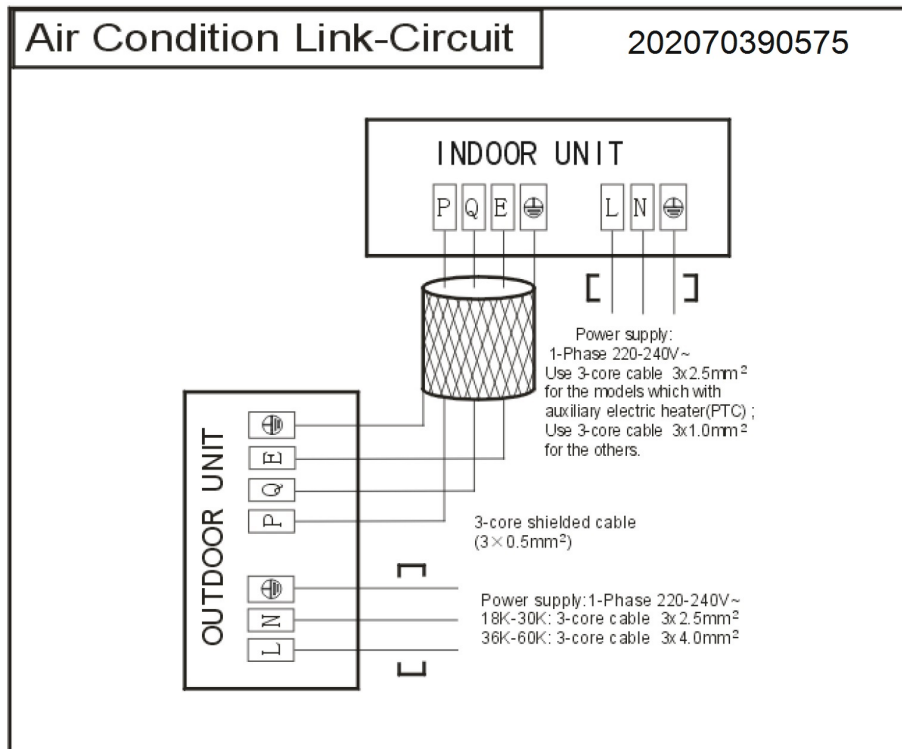
Installation Fittings	Name	Shape	Quantity
	Installation paper board		1
Tubing & Fittings	Soundproof / insulation sheath(on some models)		1
Drainpipe Fittings	Out-let pipe sheath(on some models)		1
	Out-let pipe clasp(on some models)		1
	Drain joint(on some models)		1
	Seal ring		
Remote controller & Its Frame	Remote controller & Its Frame		1
	Remote controller holder		1
	Mounting screw(ST2.9×10-C-H)		2
	Remote controller manual		1
	Alkaline dry batteries (AM4)		2
Others	Owner's manual		1
	Installation manual		1
Installation accessory (The product you have might not be provided the following accessories)	Expansible hook		4
	Installation hook		4
	Orifice		1

## 8. The Specification of Power

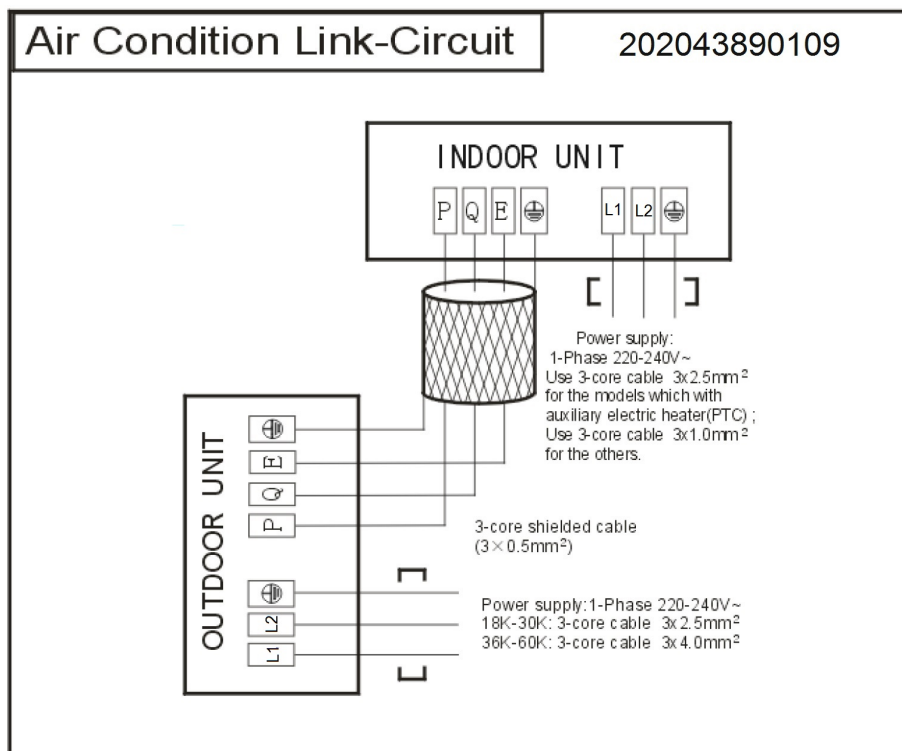
Model		KV36CC-ARF21B	KV48CC-ARF21B
INDOOR UNIT POWER	Phase	1-phase	1-phase
	Frequency and Voltage	220-230V, 60Hz	220-230V, 60Hz
	POWER WIRING (mm <sup>2</sup> )	3×1.0	3×1.0
	CIRCUIT BREAKER/FUSE(A)	15/10	15/10
OUTDOOR UNIT POWER	Phase	1-phase	1-phase
	Frequency and Voltage	220-230V, 60H	220-230V, 60H
	POWER WIRING (mm <sup>2</sup> )	3X4.0	3X4.0
	CIRCUIT BREAKER/FUSE(A)	40/30	40/35
Indoor/Outdoor Connecting Wiring (Weak Electric Signal) (mm <sup>2</sup> )		3×0.5	3×0.5
Indoor/Outdoor Connecting Wiring (Strong Electric Signal) (mm <sup>2</sup> )		————	————

## 9. Field Wiring

KV36CC-ARF21B



KV48CC-ARF21B

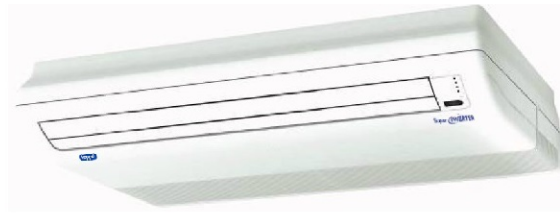


# Ceiling & Floor Type

<b>1. Features .....</b>	<b>34</b>
<b>2. Dimensions .....</b>	<b>35</b>
<b>3. Service Space.....</b>	<b>36</b>
<b>4. Wiring Diagrams .....</b>	<b>37</b>
<b>5. Capacity Tables.....</b>	<b>38</b>
<b>6. Air Velocity Distributions(Reference Data) .....</b>	<b>39</b>
<b>7. Electric Characteristics .....</b>	<b>41</b>
<b>8. Sound Levels .....</b>	<b>41</b>
<b>9. Accessories.....</b>	<b>42</b>
<b>10. The Specification of Power.....</b>	<b>43</b>
<b>11. Field Wiring .....</b>	<b>44</b>

## 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 lighting.

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

- Air flow directional control minimizes the air resistance and produces wider 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, meets different air-supply requirement.

### 1.5. Water proof, by utilizing the absorbent plastic film on water collector

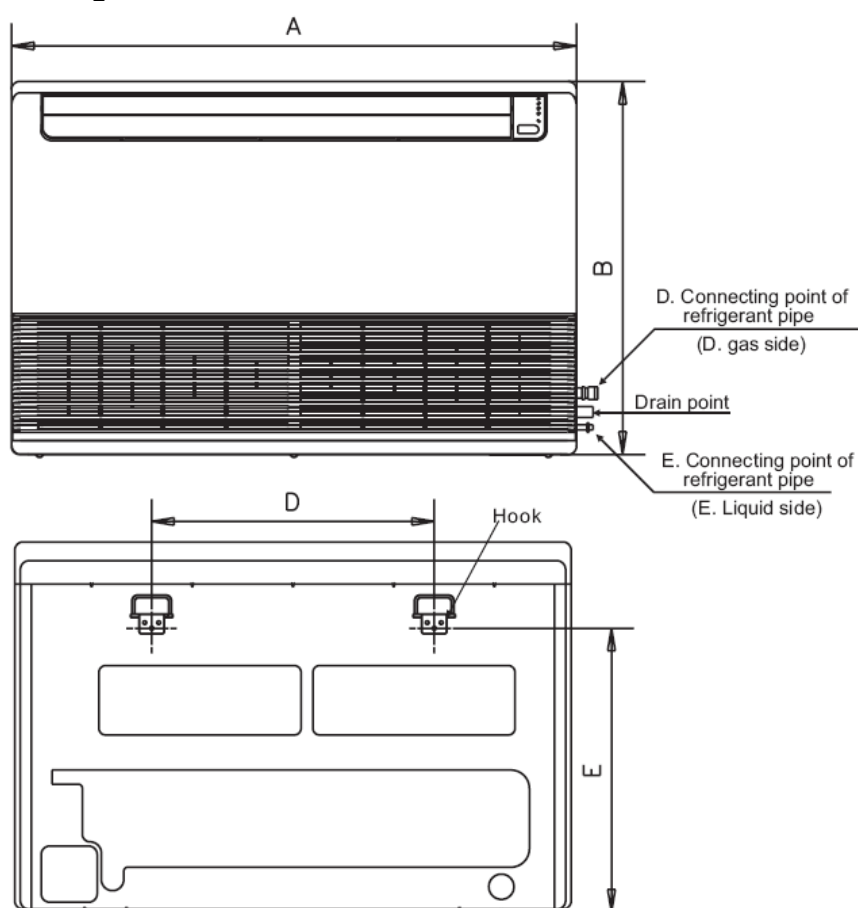
### 1.6. Easy operation.

### 1.7. Remote control and optional wired control method.

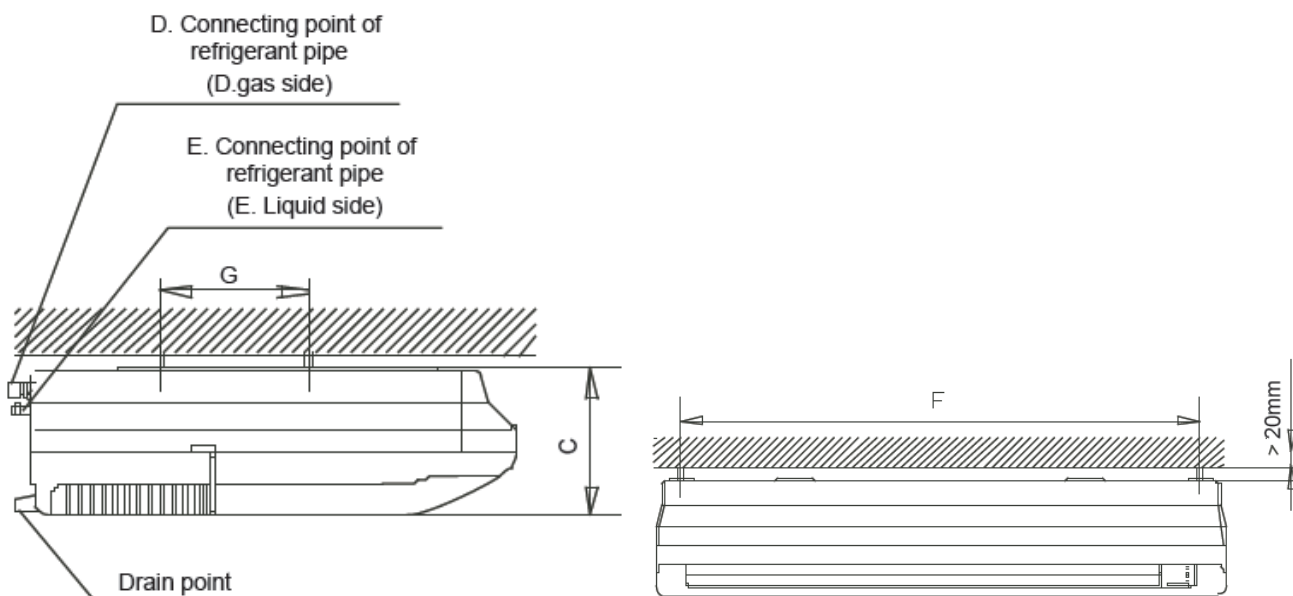


## 2. Dimensions

### a. Wall mounting installation

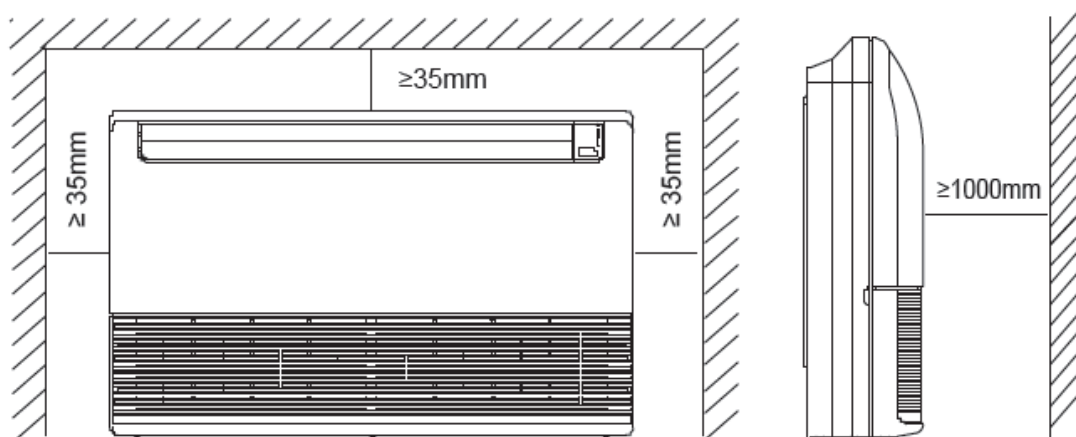


### b. Ceiling installation



Capacity (Btu/h)	A	B	C	D	E	F	G
KV24CM-ARF21	990	660	203	505	506	907	200

### 3. Service Space



## 4. Wiring Diagrams

KV24CM-ARF21

### WIRING DIAGRAMING

202044490396

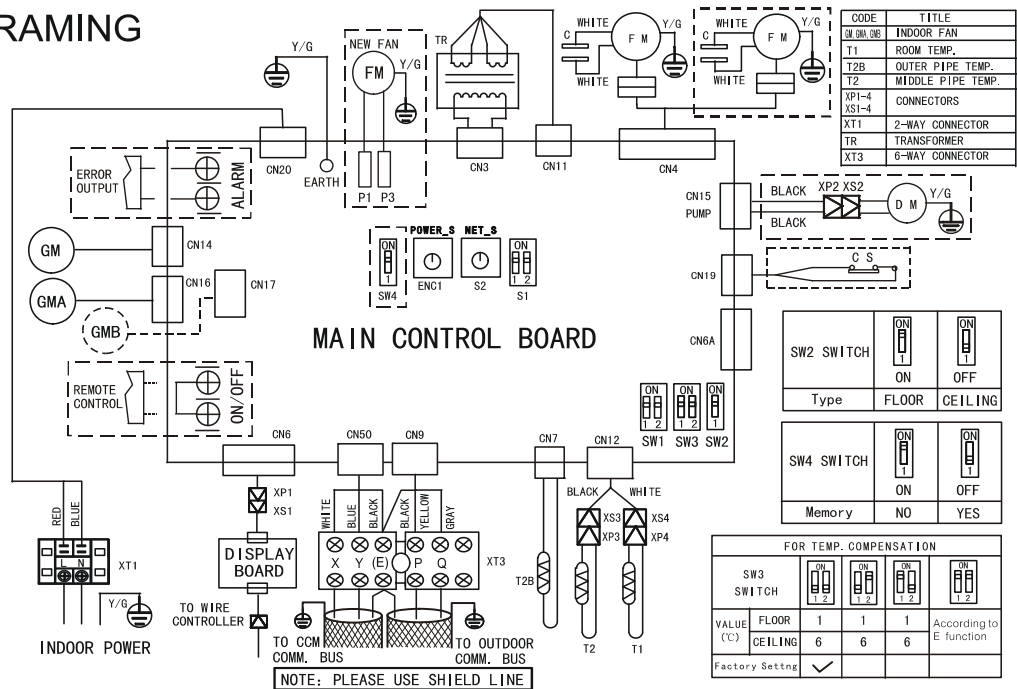
#### FUNCTION OF SWITCH

S1	S2	SWITCH	(FOR COM UNIT ADDRESS)
'0'-'F' of the S2 and 'ON/OFF' of the S1 mean the addresses of the different units. Respectively.			

S2	S1+S2	ADDRESS	S1+S2
0	2	32	2
1	5	47	5
2	8	62	8
3	11	77	11
4	14	92	14
5	17	107	17
6	20	122	20
7	23	137	23
8	26	152	26
9	29	167	29
A	32	182	32

ENC1	SWITCH	(FOR POWER)
NUMBER	POWER	
4	5300W	
5	7100W	
6	8000W	
7	9000W	
8	10500W	
9	14000W	
A	16000W	

SW1 SWITCH (SELECT TEMP.)	ON	ON	ON	ON
TE1	28	30	Fan motor	According to E function
TE2	32	35	do not stop.	
TE3	30	32		
TE4	15	24		
Factory Setting	✓			



## 5. Capacity Tables

### 6.1 Cooling Capacity

KV24CM-ARF21

Cooling		Outdoor conditions (DB)			
Indoor Conditions	(kW)	21°C	28°C	35°C	43°C
21/15°C DB/WB	TC	7.52	7.15	6.79	6.50
	SC	5.56	5.51	5.43	5.46
	Input	2.10	2.28	2.38	2.46
24/17°C DB/WB	TC	7.74	7.37	7.01	6.57
	SC	5.80	5.75	5.68	5.52
	Input	2.23	2.38	2.49	2.61
27/19°C DB/WB	TC	7.88	7.52	<b>7.30</b>	6.79
	SC	5.83	5.79	5.69	5.57
	Input	2.28	2.41	<b>2.54</b>	2.66
32/23°C DB/WB	TC	8.03	7.74	7.59	7.01
	SC	6.83	6.73	6.68	6.52
	Input	2.38	2.49	2.66	2.76

**Notes:**

TC : Total capacity ; kW

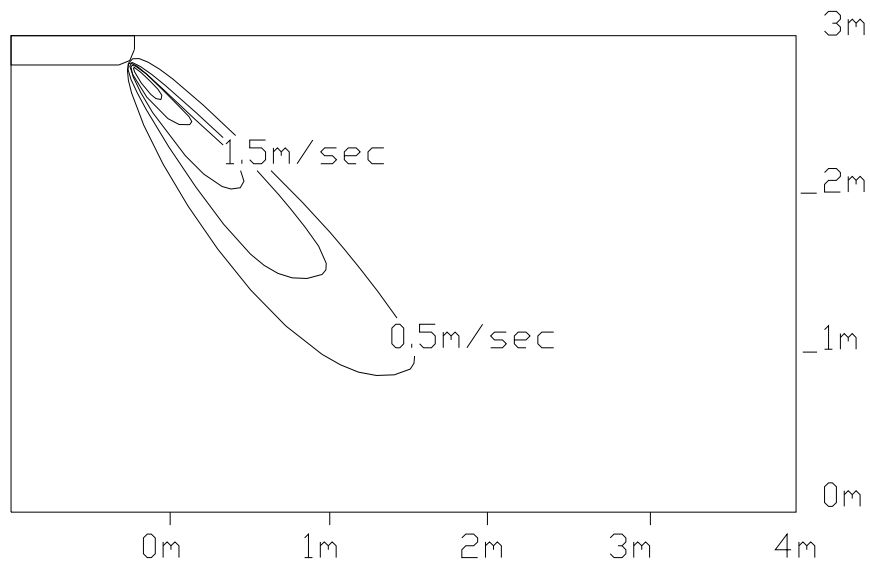
SC: Sensible heat capacity ; kW

Input: Input power; kW

## 6. Air Velocity Distributions(Reference Data)

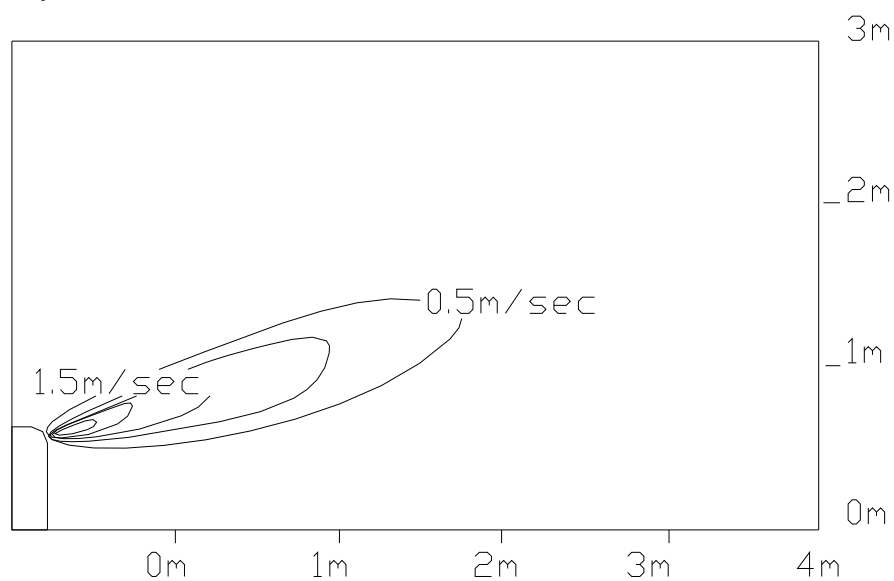
Discharge angle 60° (CEILING)

Airflow velocity



## Discharge angle 60° (FLOOR)

Airflow velocity



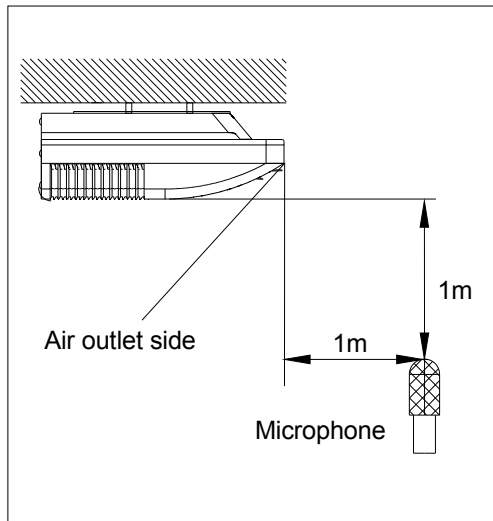
## 7. Electric Characteristics

Model	Indoor Unit				Power Supply
	Hz	Voltage	Min	Max	MFA
KV24CM-ARF21	60	220-230	198	242	10

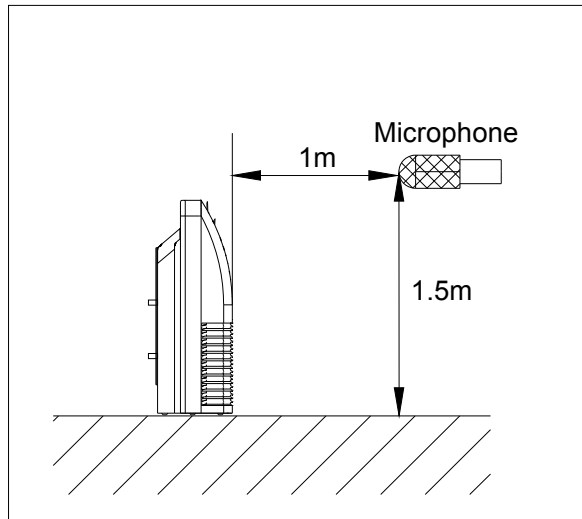
**Note:**

MFA: Max. Fuse Amps. (A)

## 8. Sound Levels












**Ceiling Floor**



Model	Noise level dB(A)		
	H	M	L
KV24CM-ARF21	45	43	40

## 9. Accessories

	Name	Shape	Quantity
Installation fittings	1.Hook		2
	2.Hanging arm		2
Remote controller & Its holder	3. Remote controller		1
	4. Remote controller holder		1
	5. Mounting screw (ST2.9×10-C-H)		2
	6. Alkaline dry batteries (AM4)		2
Others	7. Owner's manual		1
	8. Installation manual		1
	9. Remote controller manual		1



## 10. The Specification of Power

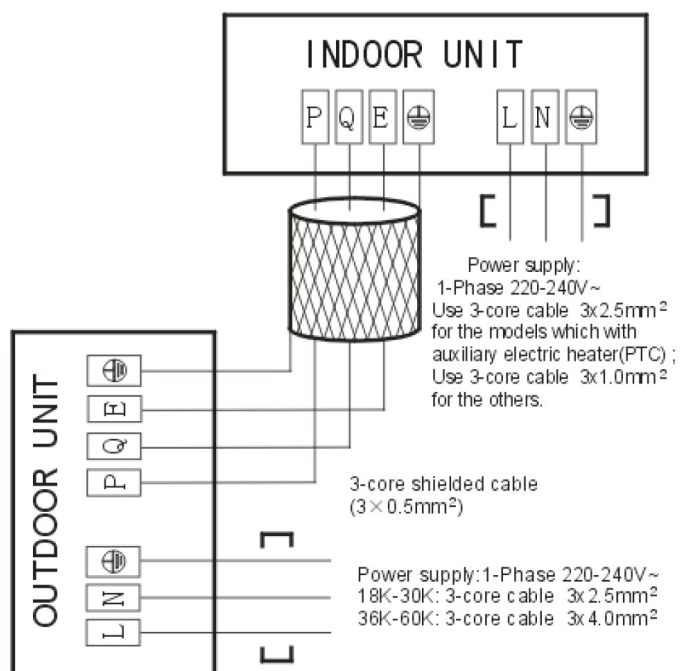
Model		KV24CM-ARF21
INDOOR UNIT POWER	Phase	1-phase
	Frequency and Voltage	220-230V, 60Hz
	POWER WIRING (mm <sup>2</sup> )	3×1.0
	CIRCUIT BREAKER/FUSE(A)	15/10
OUTDOOR UNIT POWER	Phase	1-phase
	Frequency and Voltage	220-230V, 60H
	POWER WIRING (mm <sup>2</sup> )	3X2.5
	CIRCUIT BREAKER/FUSE(A)	30/20
Indoor/Outdoor Connecting Wiring (Weak Electric Signal) (mm <sup>2</sup> )		3×0.5
Indoor/Outdoor Connecting Wiring (Strong Electric Signal) (mm <sup>2</sup> )		—————

## 11. Field Wiring

KV24CM-ARF21

### Air Condition Link-Circuit

202042890198



# **3<sup>rd</sup> Generation Ceiling & Floor Type**

<b>1. Features .....</b>	<b>46</b>
<b>2. Dimensions.....</b>	<b>47</b>
<b>3. Service Space.....</b>	<b>48</b>
<b>4. Wiring Diagrams .....</b>	<b>49</b>
<b>5. Electric Characteristics .....</b>	<b>50</b>
<b>6. Sound Levels.....</b>	<b>50</b>
<b>7. Accessories .....</b>	<b>51</b>
<b>8. The Specification of Power .....</b>	<b>51</b>
<b>9. Field Wiring .....</b>	<b>52</b>

## 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 lighting.

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

- Air flow directional control minimizes the air resistance and produces wider 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, meets different air-supply requirement.

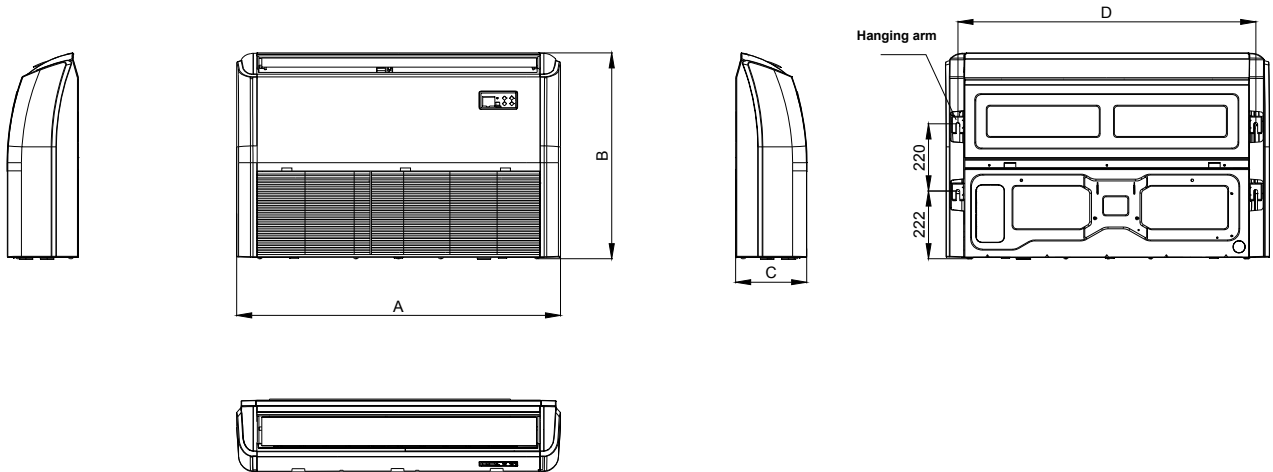
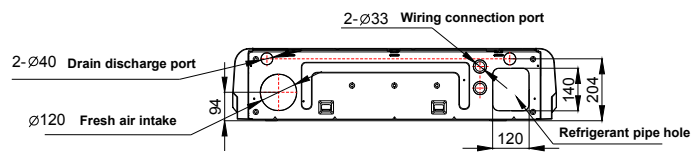
### 1.5. New foam drain pan with plastic-sprayed inner surface



### 1.6. Easy operation.

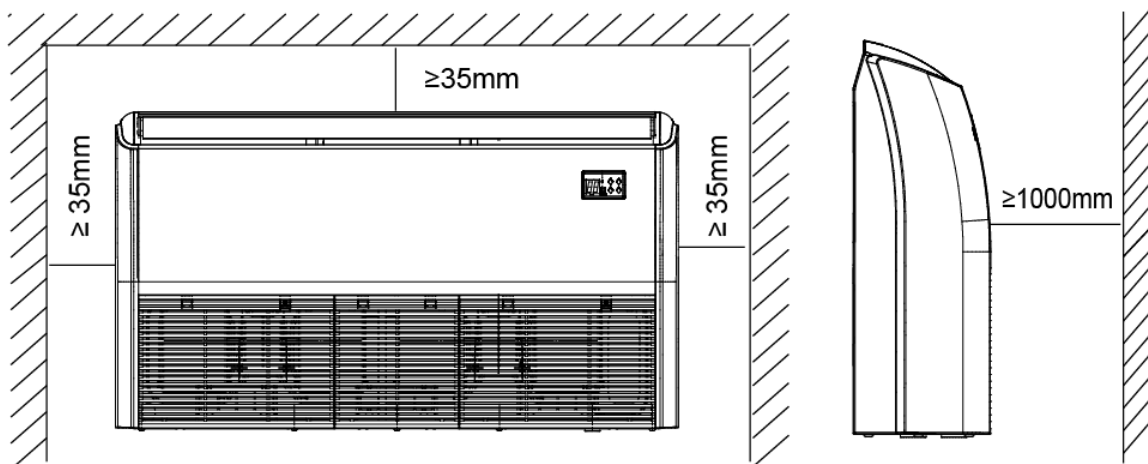
### 1.7. Remote control and optional wired control method.

## 2. Dimensions



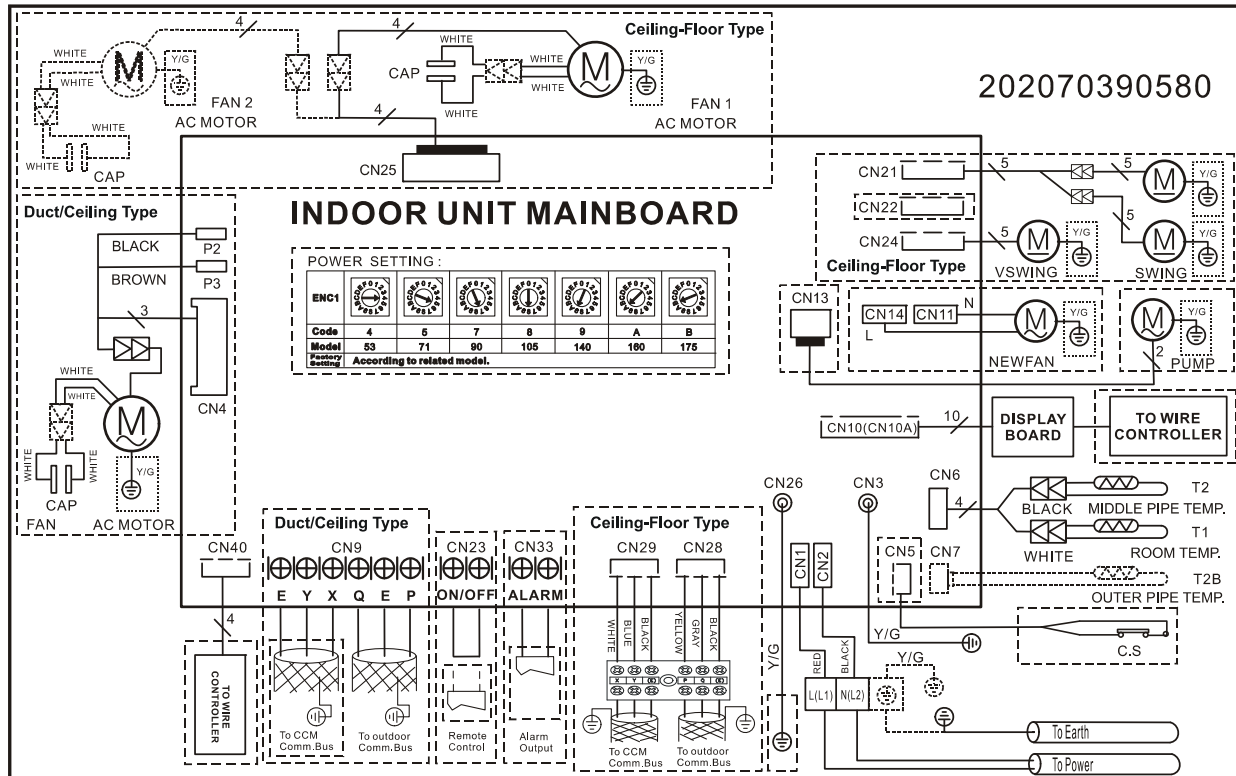
Capacity (Btu/h)	A	B	C	D
36K	1285	675	235	1200
48K	1650	675	235	1565

### 3. Service Space



## 4. Wiring Diagrams

KV36CM-ARF21B KV48CM-ARF21B



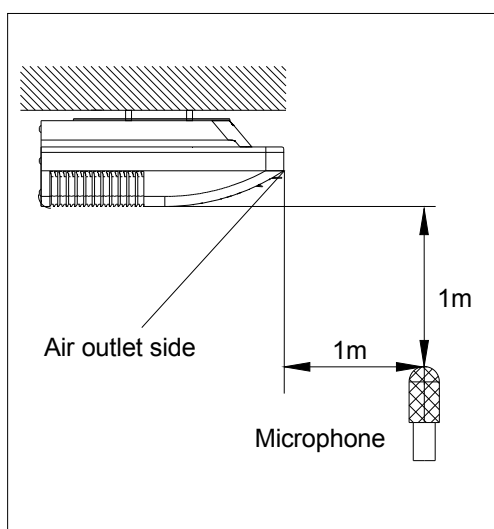
## 5. Electric Characteristics

Model	Indoor Units				Power Supply
	Hz	Voltage	Min.	Max.	MFA
KV36CM-ARF21B	60	220-230V	198V	242V	10
KV48CM-ARF21B	60	220-230V	198V	242V	10

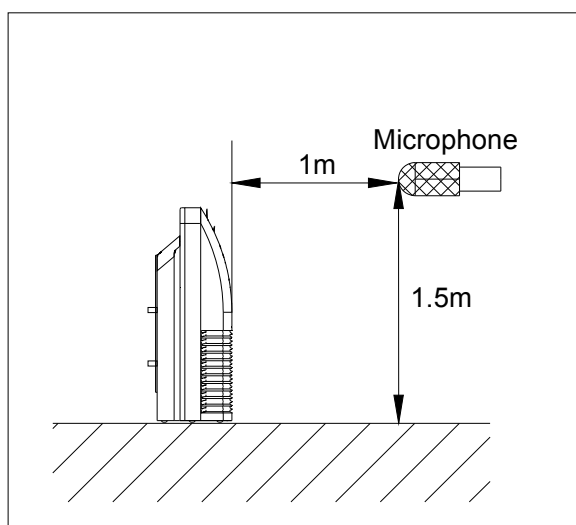
**Note:**

MFA: Max. Fuse Amps. (A)

## 6. Sound Levels



**Ceiling**










**Floor**


Model	Noise level dB(A)		
	H	M	L
KV36CM-ARF21B	54	52	48
KV48CM-ARF21B	58	54	50



## 7. Accessories

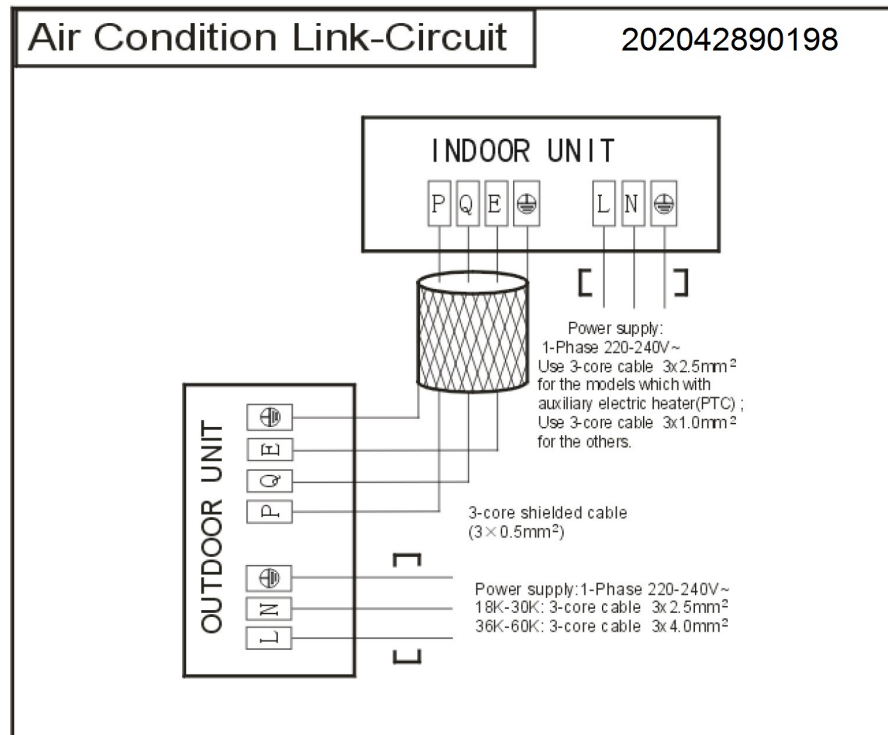
Remote controller & Its holder	1. Remote controller		1
	2. Remote controller holder		1
	3. Mounting screw (ST2.9×10-C-H)		2
	4. Alkaline dry batteries (AM4)		2
Others	5. Owner's manual		1
	6. Installation manual		1
	7. Remote controller manual		1

## 8. The Specification of Power

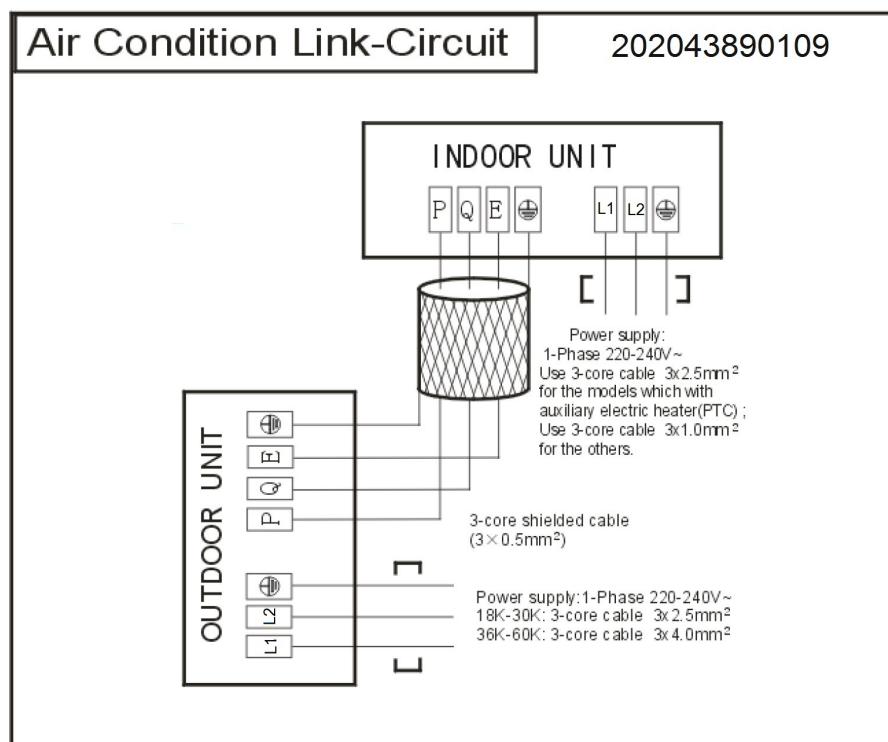
Model		KV36CM-ARF21B	KV48CM-ARF21B
INDOOR UNIT POWER	Phase	1-phase	1-phase
	Frequency and Voltage	220-230V, 60Hz	220-230V, 60Hz
	POWER WIRING (mm <sup>2</sup> )	3×1.0	3×1.0
	CIRCUIT BREAKER/ FUSE(A)	15/10	15/10
OUTDOOR UNIT POWER	Phase	1-phase	1-phase
	Frequency and Voltage	220-230V, 60H	220-230V, 60H
	POWER WIRING (mm <sup>2</sup> )	3X4.0	3X4.0
	CIRCUIT BREAKER/ FUSE(A)	40/30	40/35
Indoor/Outdoor Connecting Wiring (Weak Electric Signal) (mm <sup>2</sup> )		3×0.5	3×0.5
Indoor/Outdoor Connecting Wiring (Strong Electric Signal) (mm <sup>2</sup> )			

## 9. Field Wiring

KV36CM-ARF21B



KV48CM-ARF21B



---

# Floor-standing Type

1. Features .....	54
2. Dimensions .....	55
3. Service Space.....	56
4. Wiring Diagrams .....	57
5. Electric Characteristics .....	58
6. Sound Levels .....	59
7. Accessories .....	60
8. The Specification of Power .....	61
9. Field Wiring .....	62

## 1. Features

### 1.1. Fashionable design, more modern and elegant appearance.



### 1.2. Air Outlet Dustproof

When turned off, the air outlet louver of the unit can be fully closed manually to prevent dust from entering.

### 1.3. Simple and bright panel

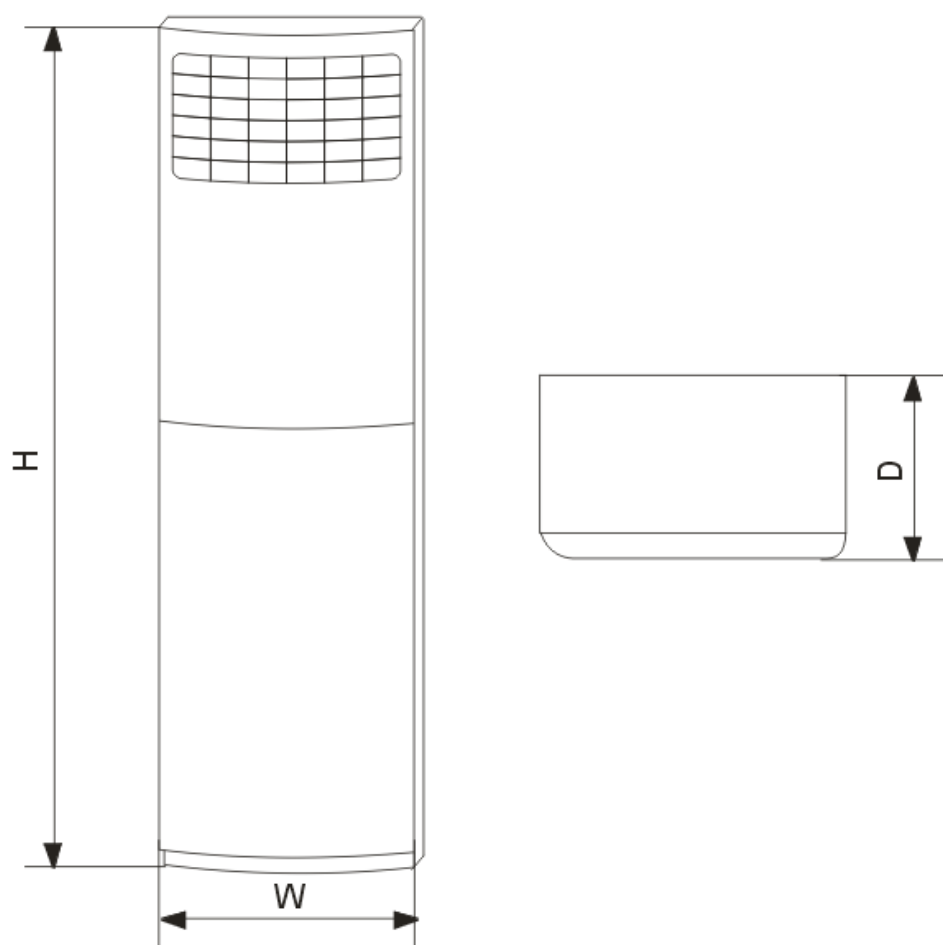
Adopts simple and bright panel, suitable for most different spaces, with good aesthetic design.

### 1.4. Big LCD display, easy to read and operate



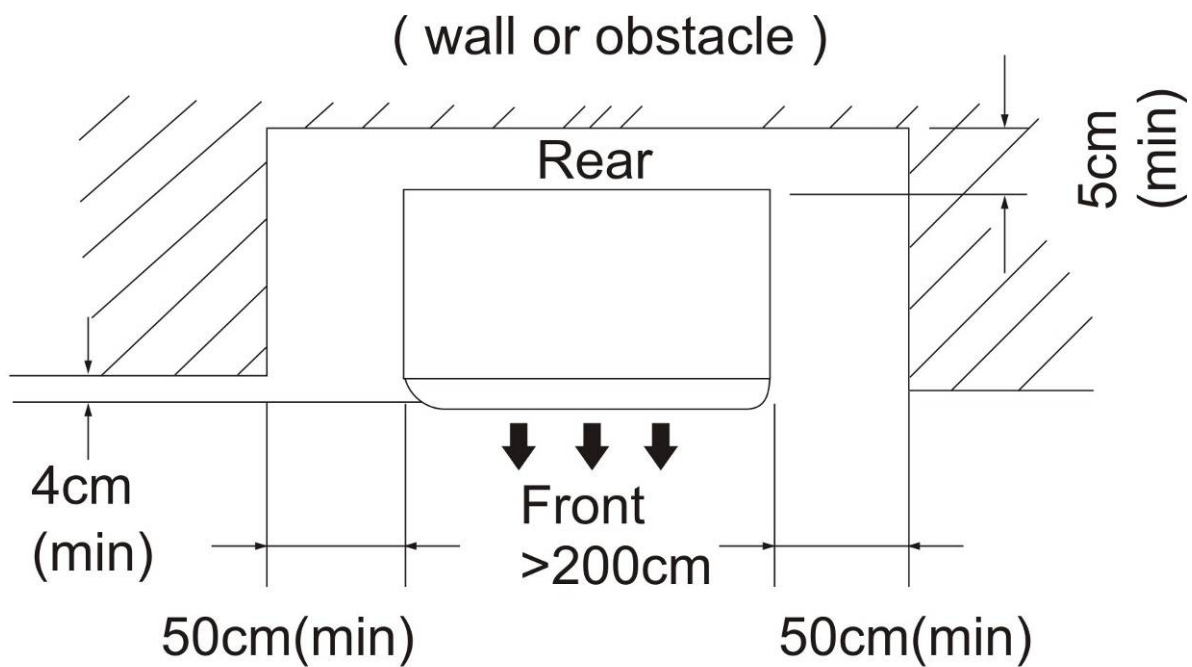
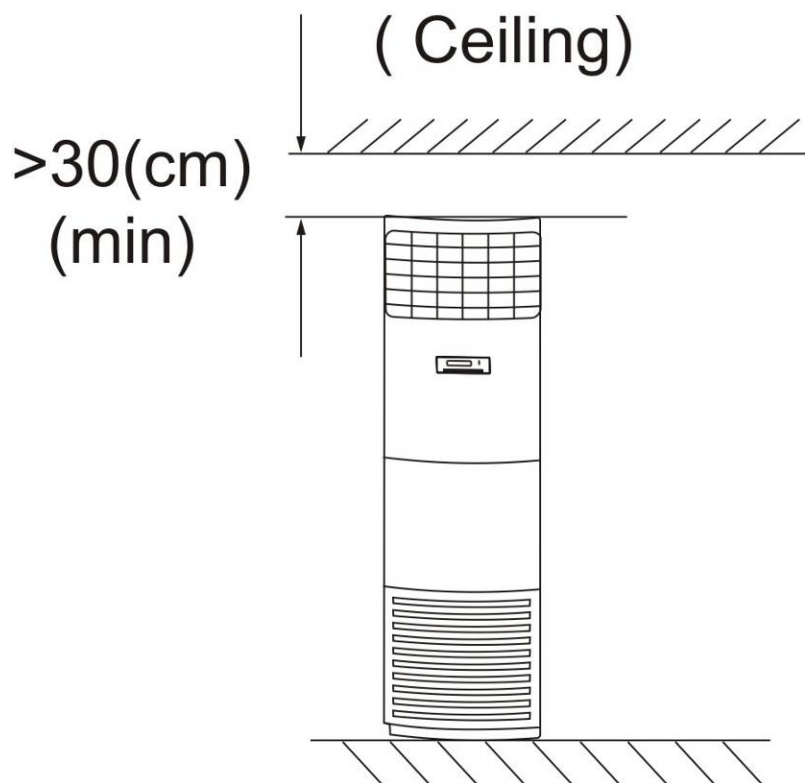
### 1.5. Optional healthy filter and auto-restart function

## 2. Dimensions



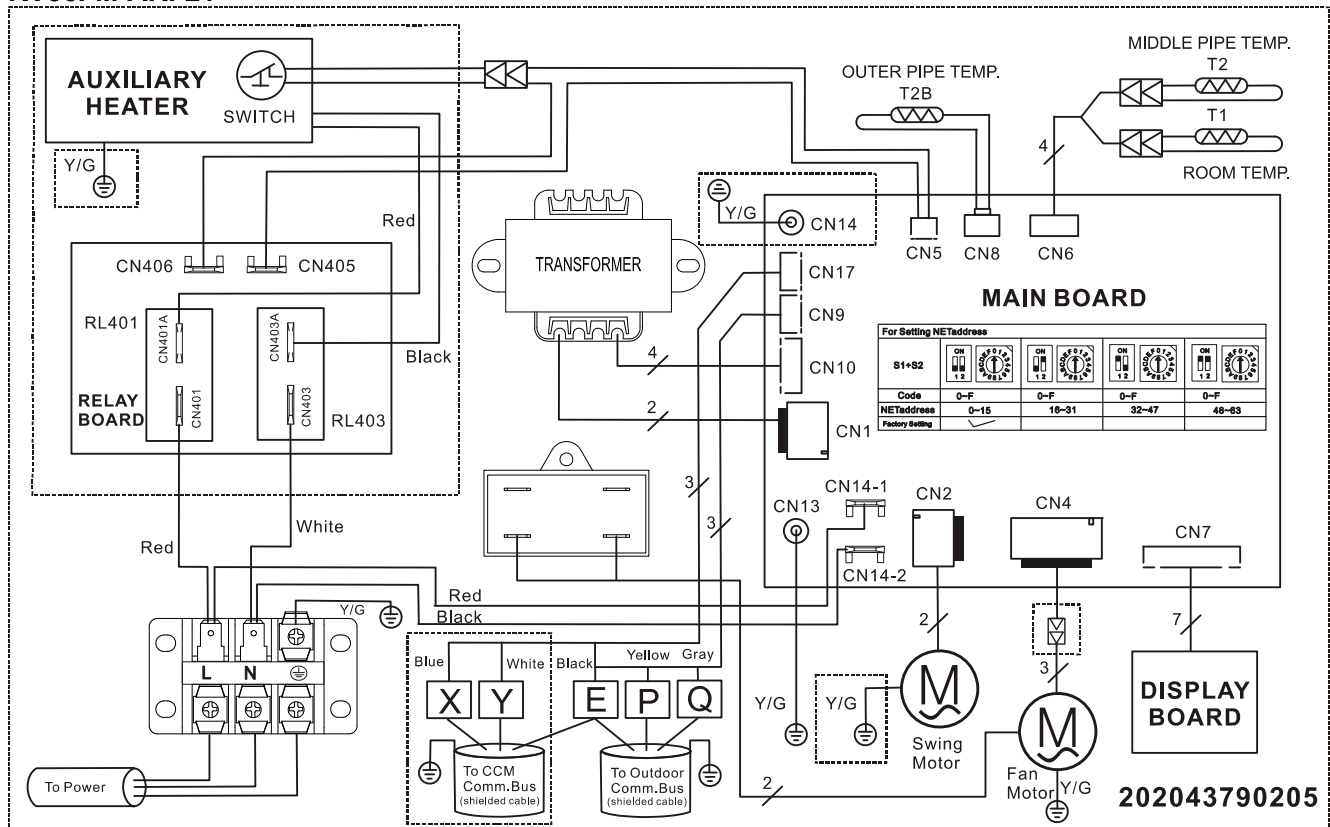
Mode \ Dimension	W(mm)	D(mm)	H(mm)
KV36FM-ARF21	550	350	1800
KV60FM-ARF21	610	390	1925

### 3. Service Space

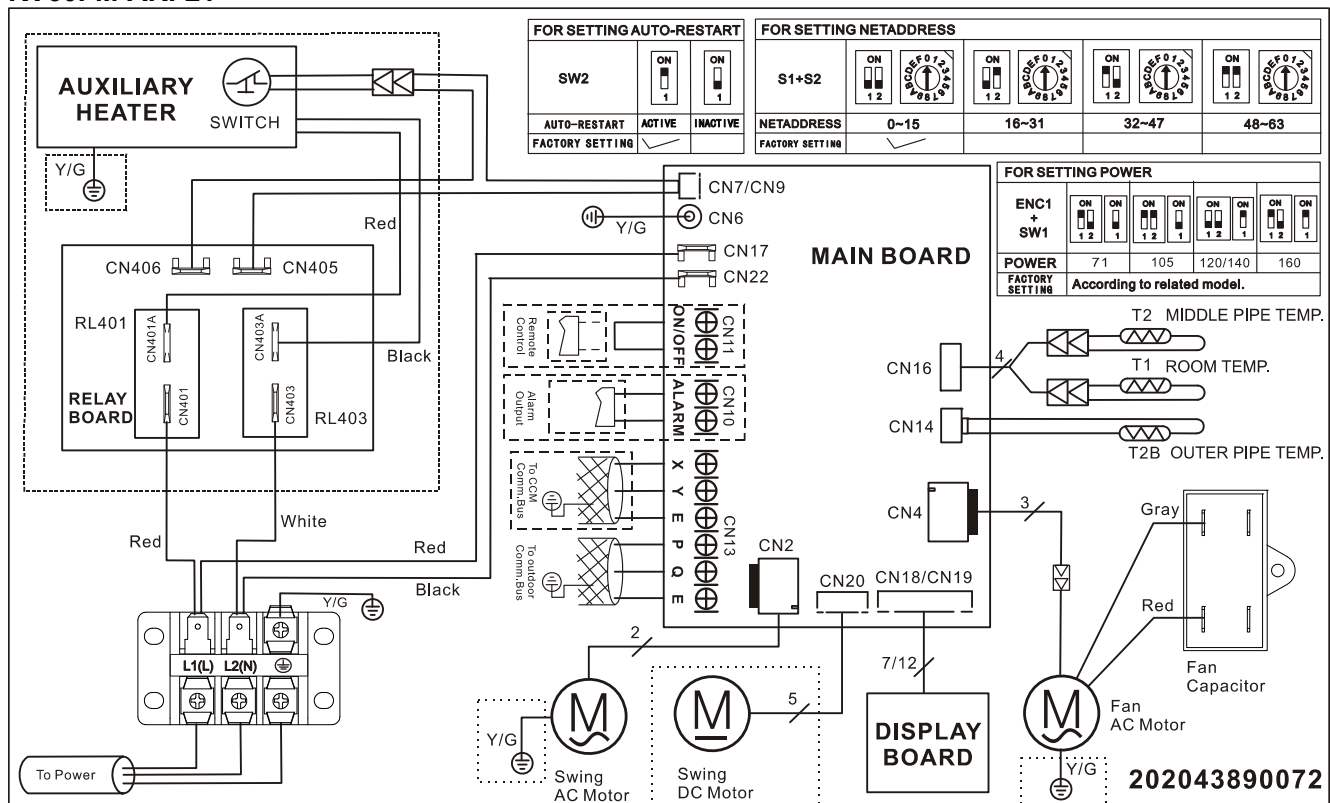


## 4. Wiring Diagrams

### KV36FM-ARF21



### KV60FM-ARF21



## 5. Electric Characteristics

Model	Indoor Units				Power Supply
	Hz	Voltage	Min.	Max.	MFA
KV36FM-ARF21	60	220-230V	198V	242V	10
KV60FM-ARF21	60	220-230V	198V	242V	10

**Note:**








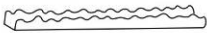


MFA: Max. Fuse Amps. (A)



## 6. Sound Levels

Model	Noise level dB(A)	
	H	L
KV36FM-ARF21	56	51
KV60FM-ARF21	57	51

## 7. Accessories

NO.	Part Name	Quantity	Illustrations
1	Safety Lock	1	
2	Self-tapping Screw 3.9×25	2	
3	Flat Washers	2	
4	Bushing-Sleeve Cover	1	
5	Sound/Heat Insulation Sleeves	2	
6	Seal	1	
7	Drain joint	1	
8	Pipe - hole - protection Ring	1	
9	Remote Battery	2	
10	Remote Control	1	
11	Connection Cables	1	

## 8. The Specification of Power

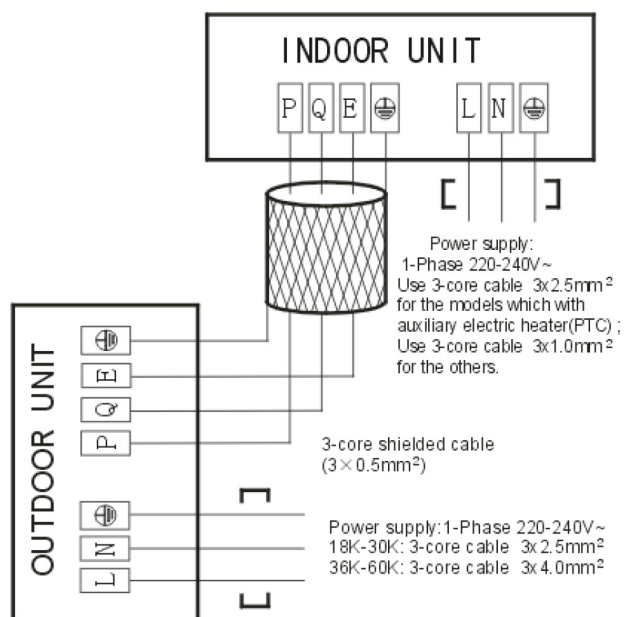
Model		KV36FM-ARF21	KV60FM-ARF21
INDOOR UNIT POWER	Phase	1-phase	1-phase
	Frequency and Voltage	220-230V, 60Hz	220-230V, 60Hz
	POWER WIRING (mm <sup>2</sup> )	3×1.0	3×1.0
	CIRCUIT BREAKER/ FUSE(A)	15/10	15/10
OUTDOOR UNIT POWER	Phase	1-phase	3-phase
	Frequency and Voltage	220-230V, 60H	220-230V, 60H
	POWER WIRING (mm <sup>2</sup> )	3X4.0	4×5.0
	CIRCUIT BREAKER/ FUSE(A)	4030	50/40
Indoor/Outdoor Connecting Wiring (Weak Electric Signal) (mm <sup>2</sup> )		3×0.5	3×0.5
Indoor/Outdoor Connecting Wiring (Strong Electric Signal) (mm <sup>2</sup> )		————	————

## 9. Field Wiring

KV36FM-ARF21

### Air Condition Link-Circuit

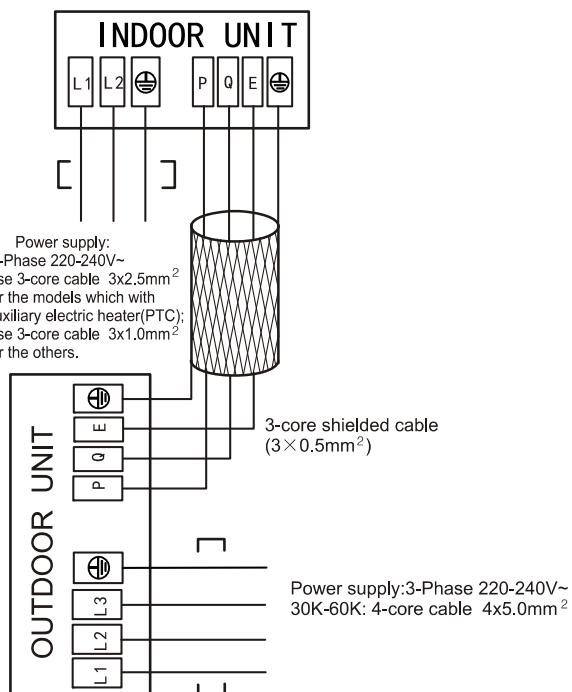
202042890198



KV60FM-ARF21

### Air Condition Link-Circuit

202043890109

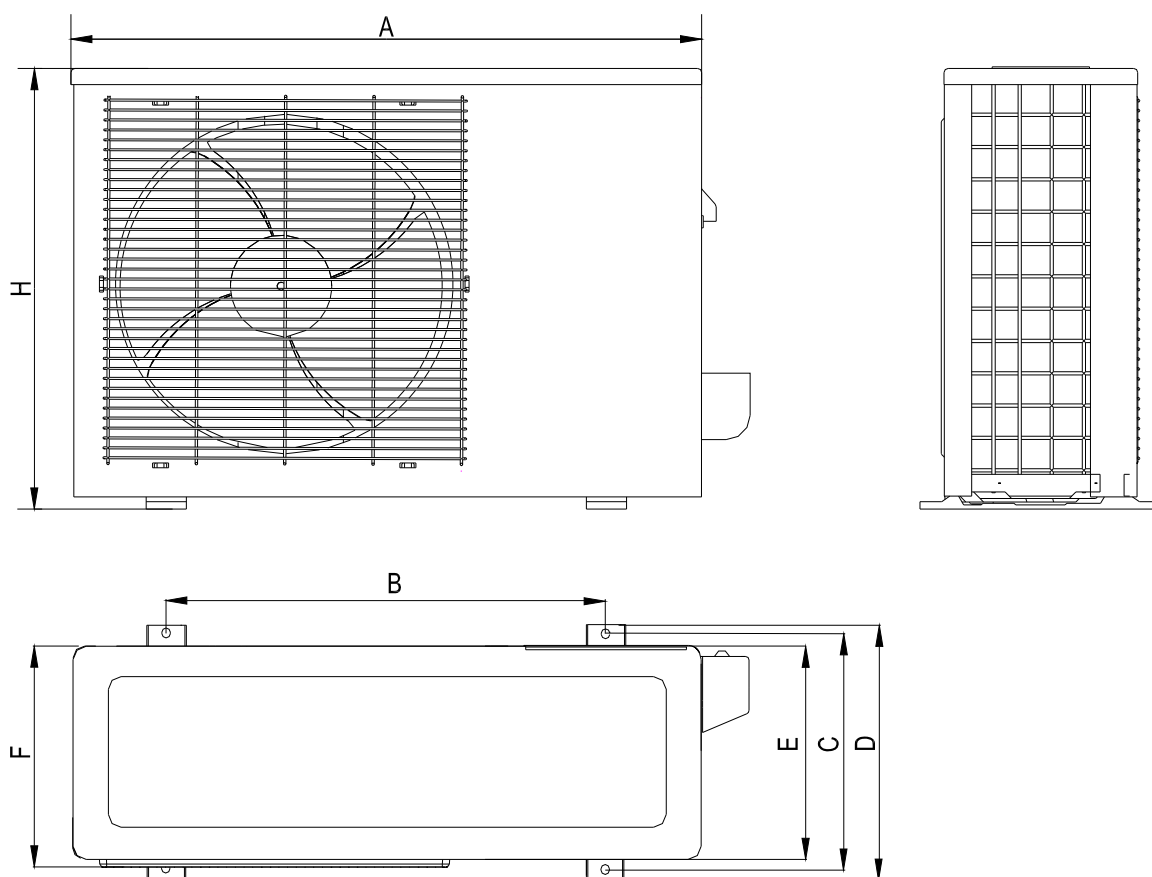


# Part 3

## Outdoor Units

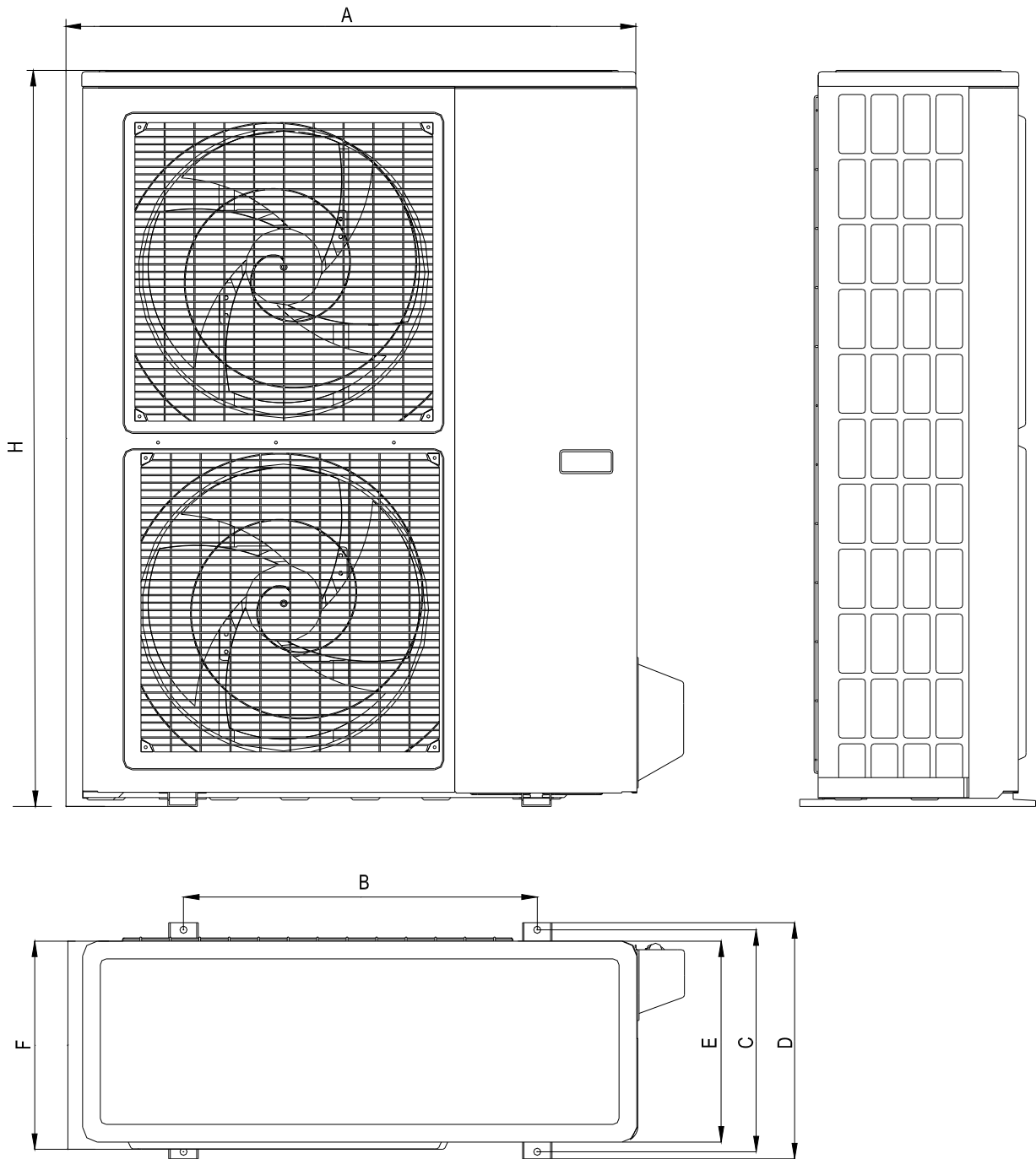
1. Dimensions .....	64
2. Service Space.....	66
3. Piping Diagrams .....	67
4. Wiring Diagrams .....	68
5. Electric Characteristics .....	72
6. Operation Limits .....	73
7. Sound Levels .....	74

## 1. Dimensions



Unit: mm

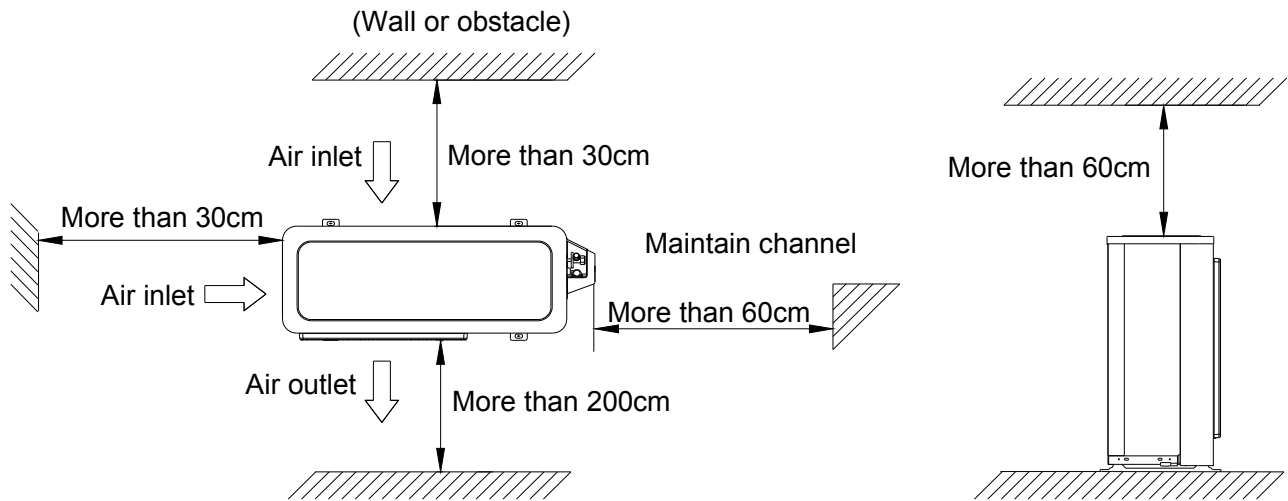
MODEL	A	B	C	D	E	F	H
KV24ODU-ARF21	845	560	335	360	312	320	700
KV36ODU-ARF21 / B	990	624	366	396	340	345	965



Unit: mm

MODEL	A	B	C	D	E	F	H
KV48ODU-ARF21B	938	634	404	448	370	392	1369
KV60ODU-CRF21	938	634	404	448	370	392	1369

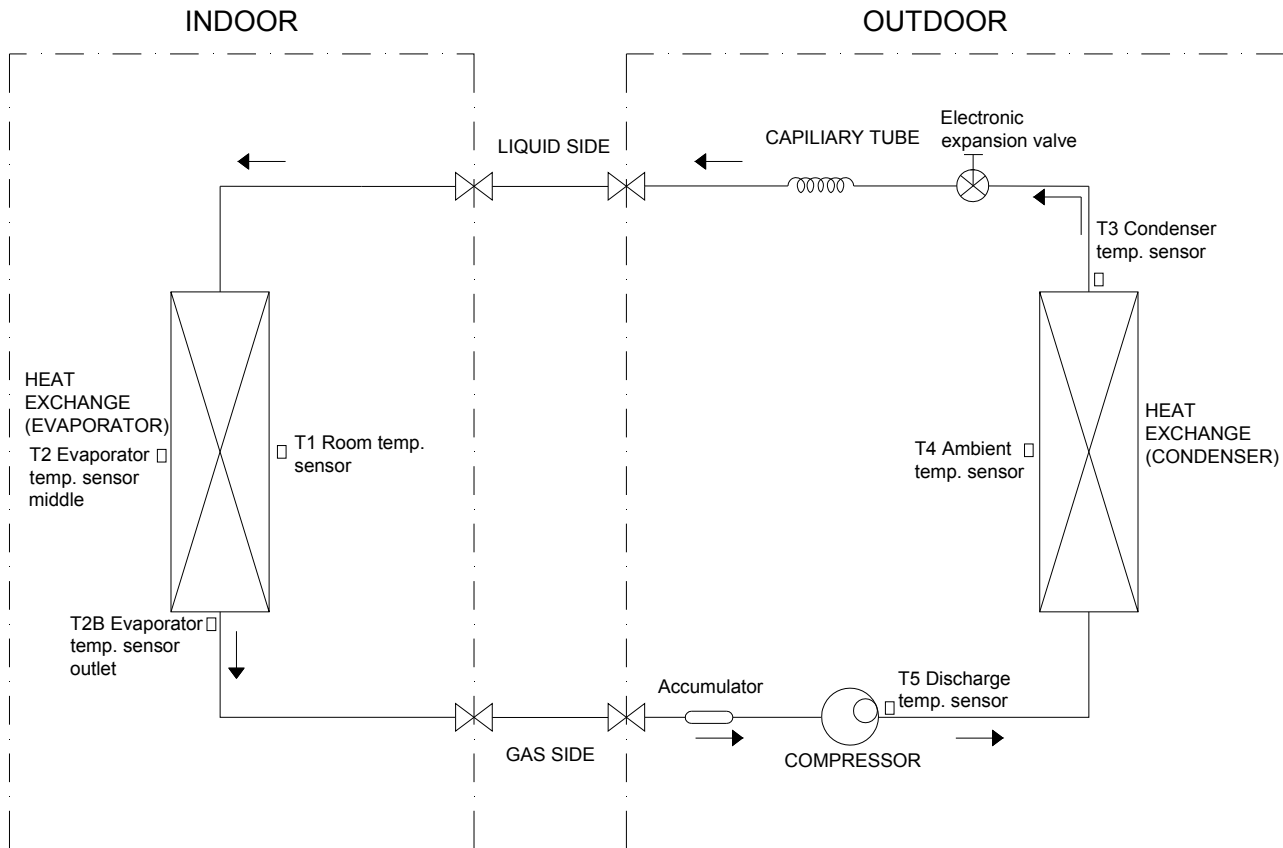
## 2. Service Space





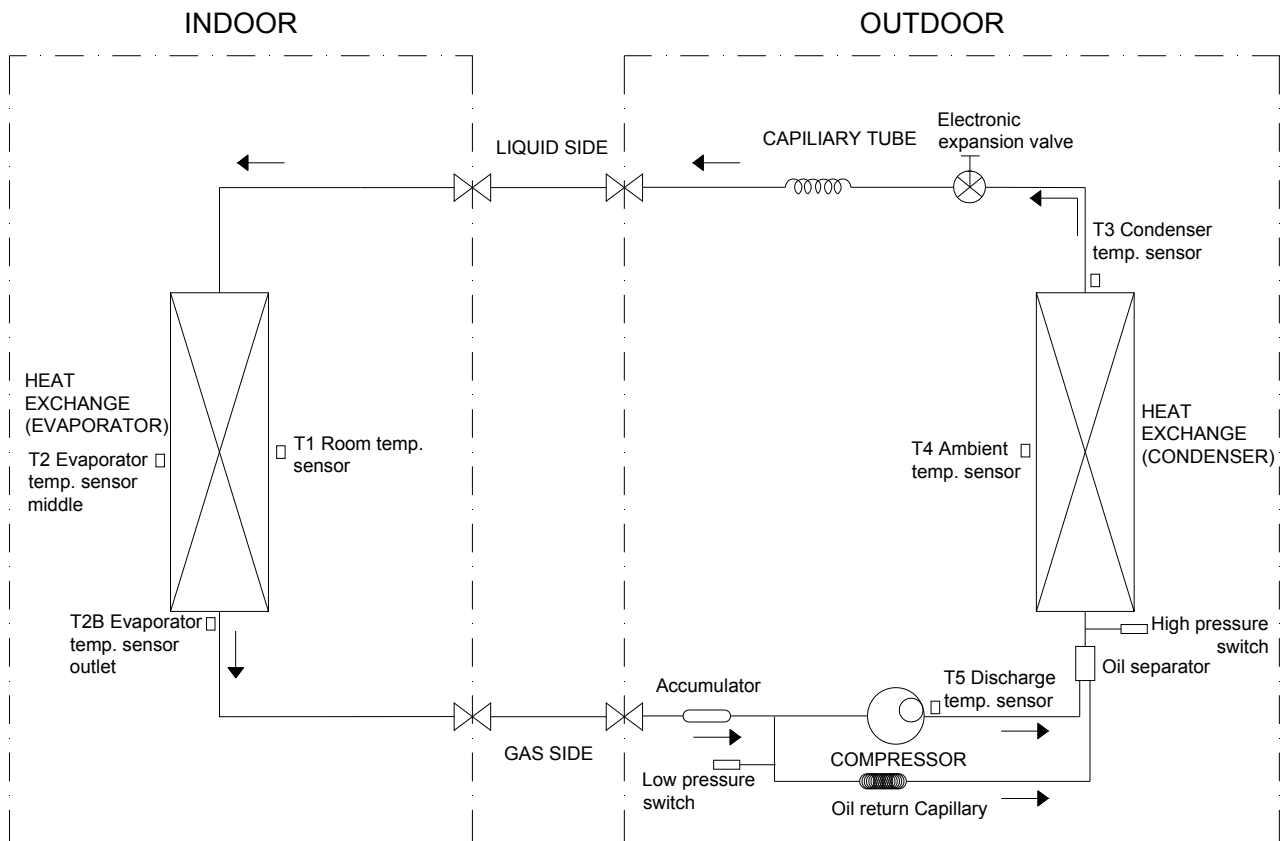
### 3. Piping Diagrams

#### KV24ODU-ARF21



Note: KV24ODU-ARF21 have no EXV.

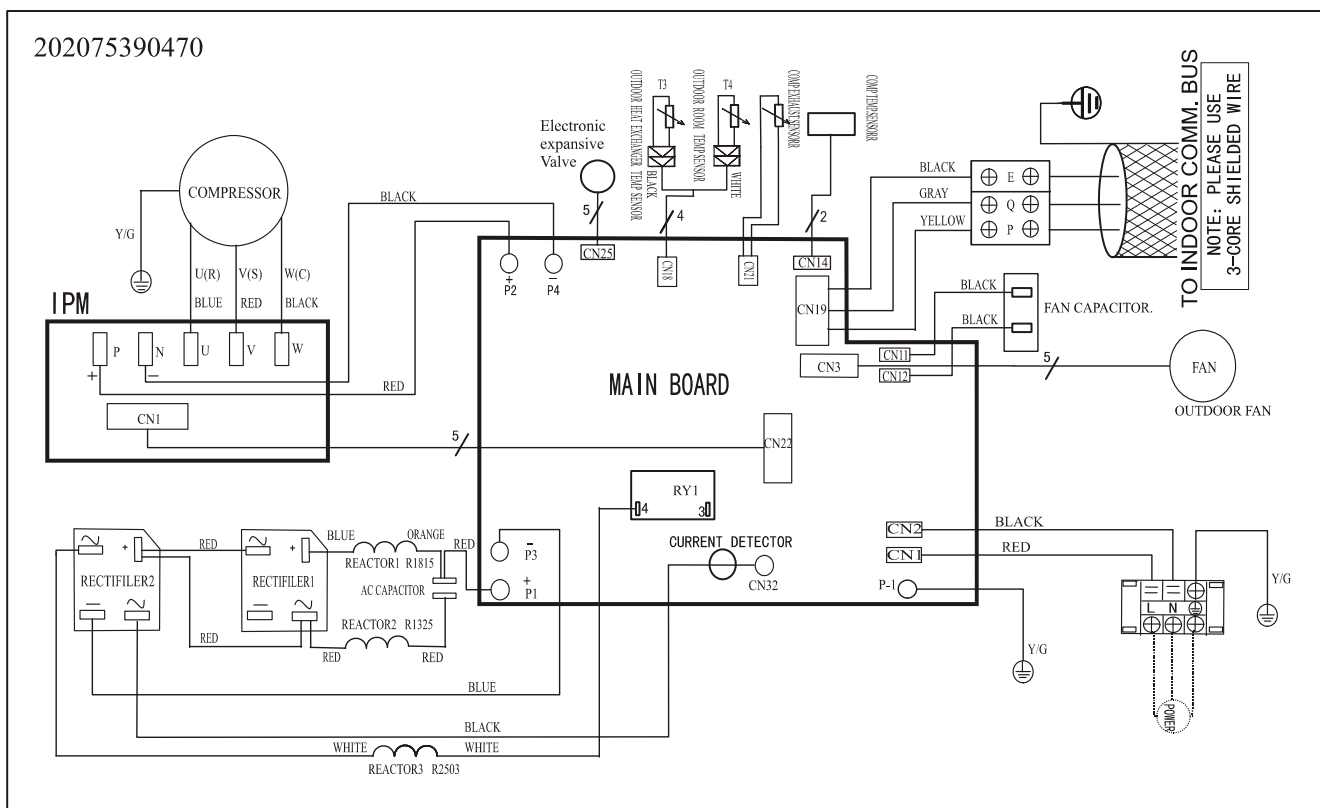
#### KV36ODU-ARF21 / B, KV48ODU-ARF21B, KV60ODU-CRF21



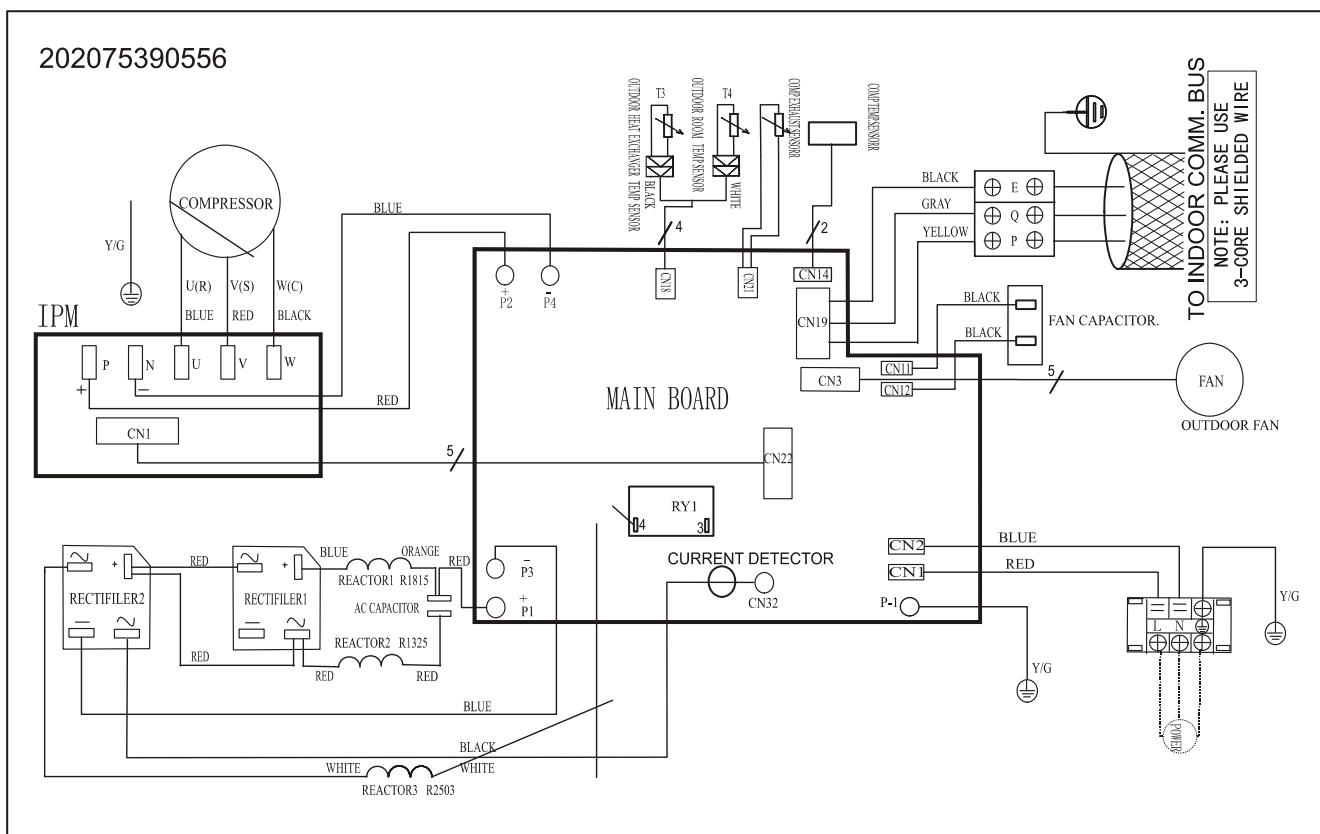
Note: KV36ODU-ARF21 and KV36ODU-ARF21B have no EXV.

## 4. Wiring Diagrams

### KV24ODU-ARF21(220075301510)

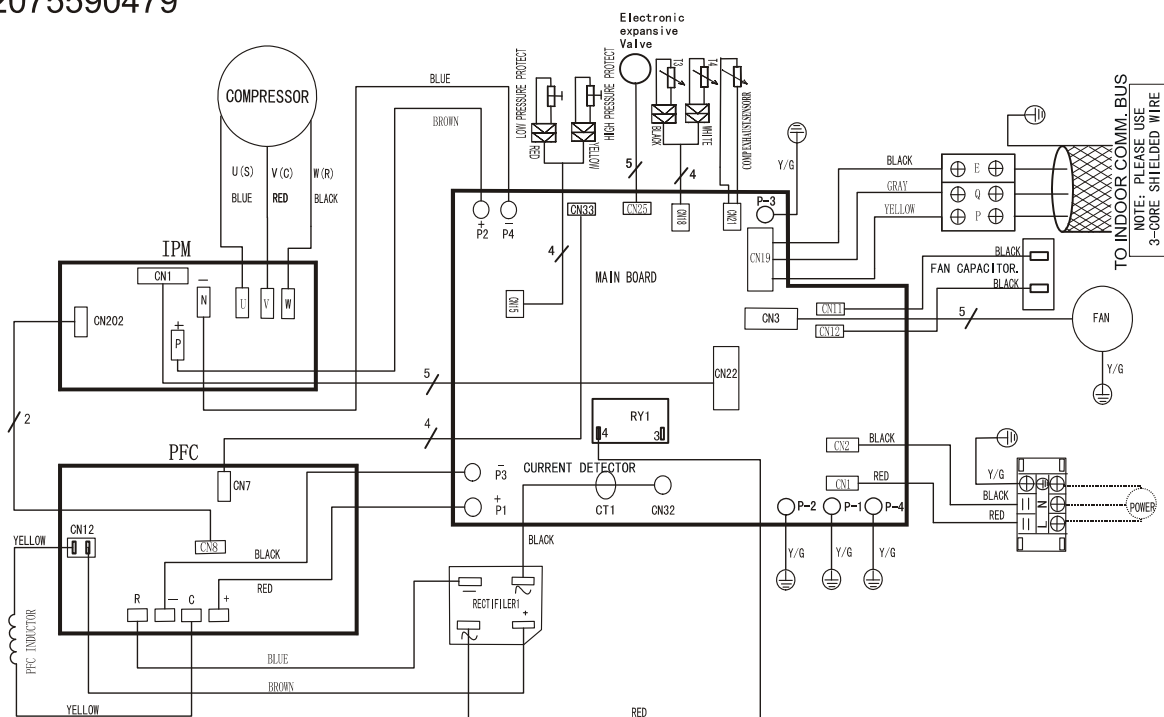


### KV24ODU-ARF21(220075301740)



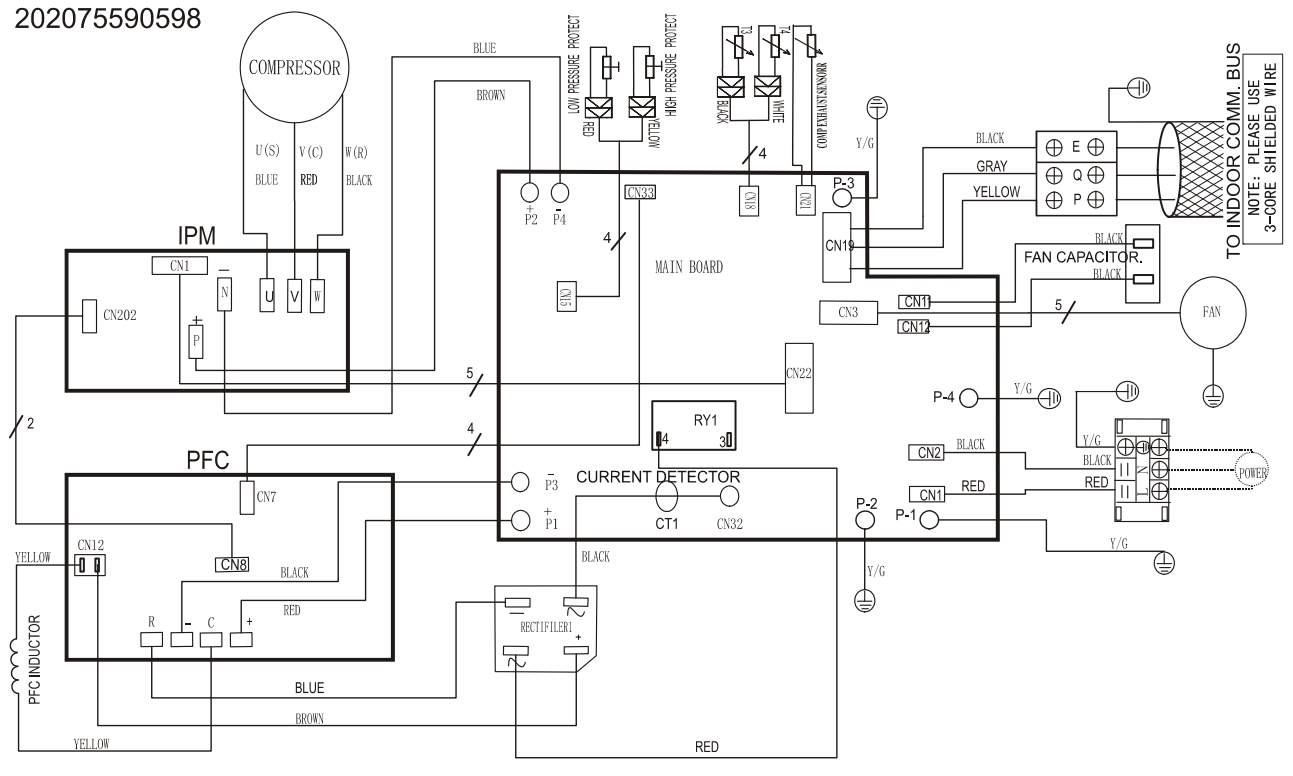
## KV36ODU-ARF21 /B (220075501730)

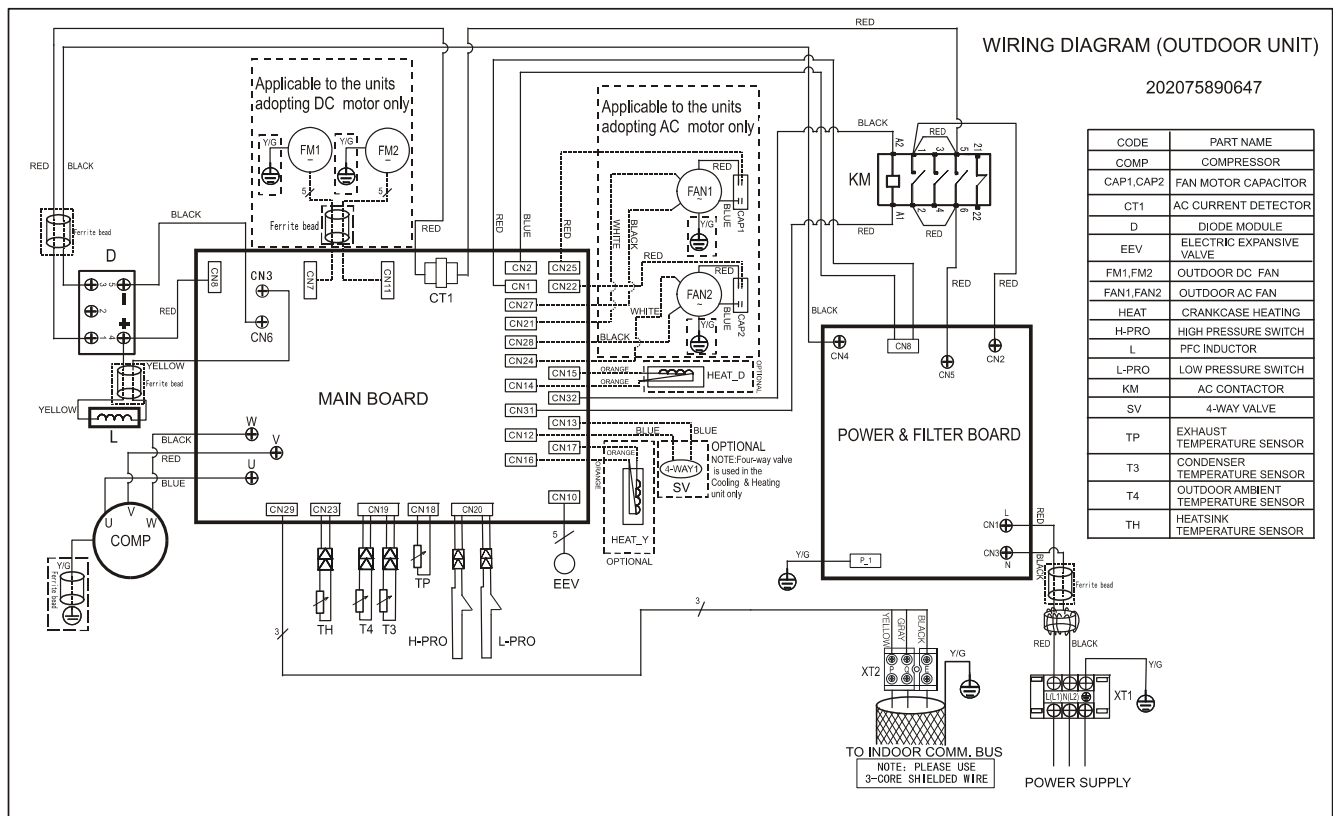
202075590479



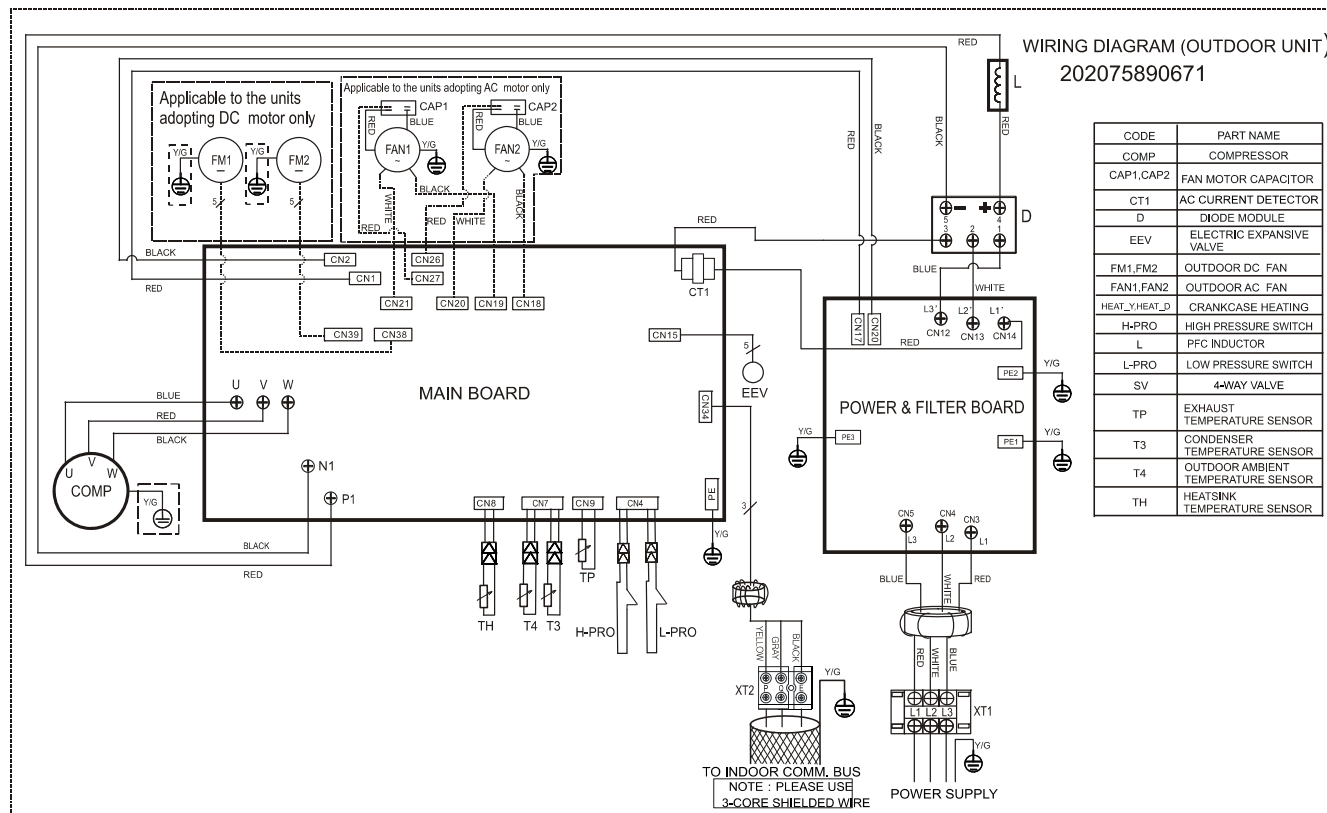
## KV36ODU-ARF21 /B (220075502120)

202075590598



**KV48ODU-ARF21B**

## KV60ODU-CRF21



## 5. Electric Characteristics

Model	Outdoor Unit				Power Supply
	Hz	Voltage	Min.	Max.	MFA
KV24ODU-ARF21	60	220-230	198	242	20
KV36ODU-ARF21 /B	60	220-230	198	242	30
KV48ODU-ARF21B	60	220-230	198	242	35
KV60ODU-CRF21	60	220-230	198	242	40

**Note:**

MFA: Max. Fuse Amps. (A)

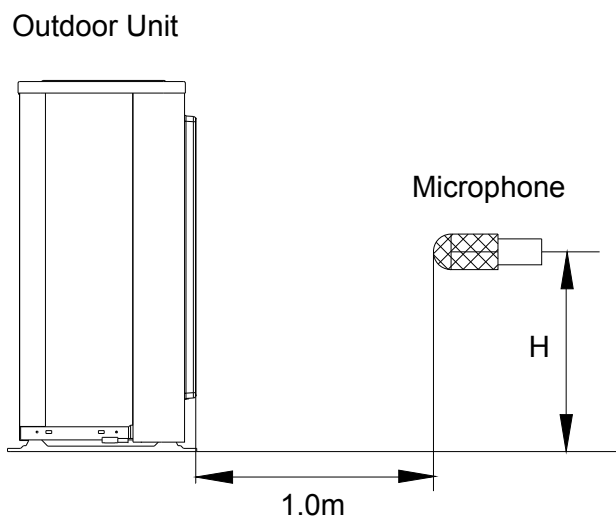
## 6. Operation Limits

Mode \ Temperature	Cooling operation	Drying operation
Room temperature	17°C~32°C	17°C~32°C
Outdoor temperature	0°C~50°C	0°C~50°C
	(-15°C~50°C: For models with low temperature cooling system)	

### CAUTION:

1. If the air conditioner is used beyond the above conditions, certain safety protection features may come into operation and cause the unit to operate abnormally.
2. The room relative humidity should be less than 80%. If the air conditioner operates beyond this figure, the surface of the air conditioner may attract condensation. Please set the vertical air flow louver to its maximum angle (vertically to the floor), and set HIGH fan mode.
3. The optimum performance will be achieved during this operating temperature zone.

## 7. Sound Levels



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

Model	Noise level dB(A)
KV24ODU-ARF21	57
KV36ODU-ARF21 /B	55
KV48ODU-ARF21B	62
KV60ODU-CRF21	60

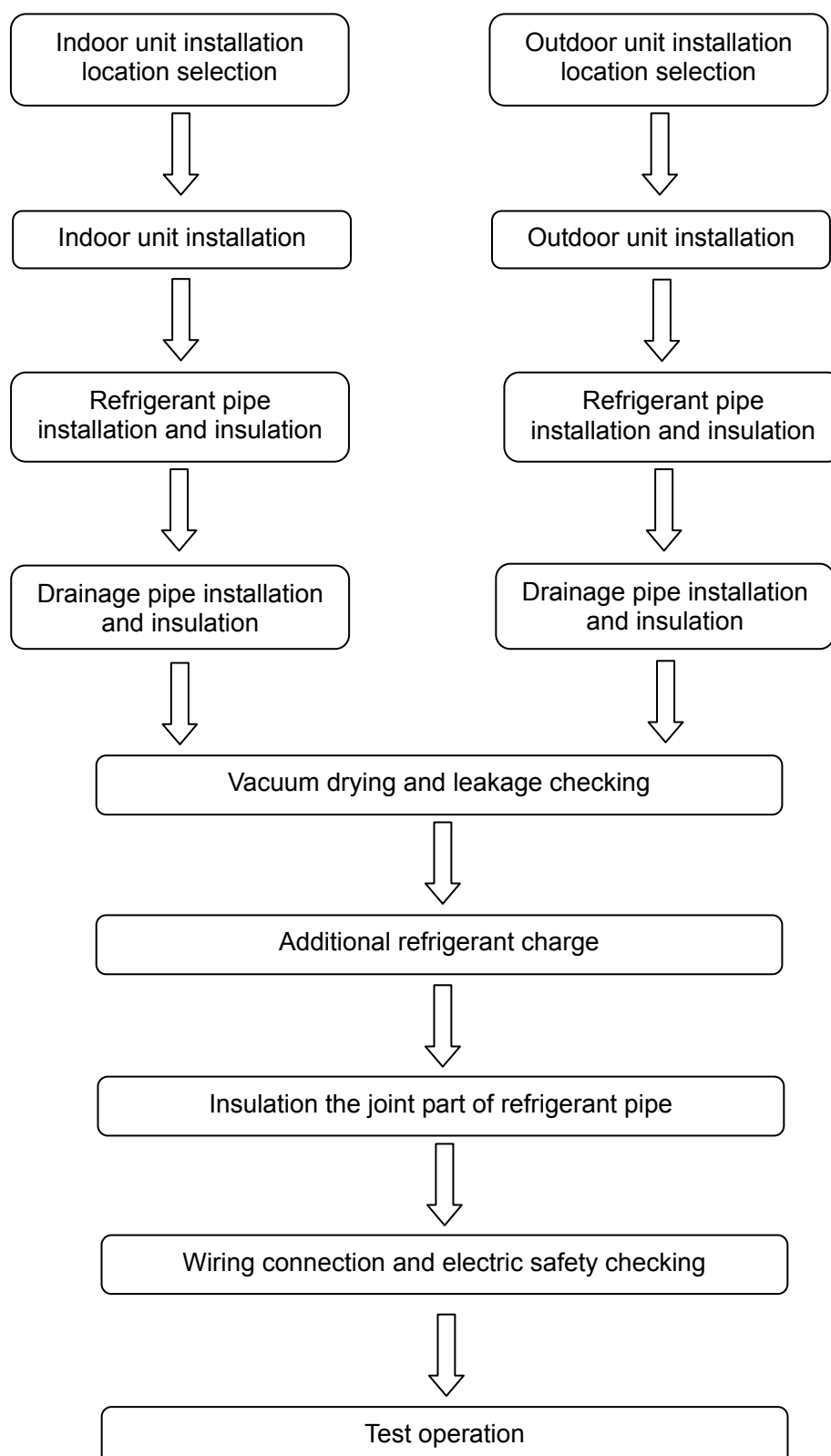


# **Part 4**

## **Installation**

<b>1. Installation Procedure .....</b>	<b>76</b>
<b>2. Location selection .....</b>	<b>77</b>
<b>3. Indoor unit installation .....</b>	<b>78</b>
<b>4. Outdoor unit installation (Side Discharge Unit).....</b>	<b>97</b>
<b>5. Refrigerant pipe installation .....</b>	<b>92</b>
<b>6. Drainage pipe installation .....</b>	<b>94</b>
<b>7. Vacuum Drying and Leakage Checking .....</b>	<b>98</b>
<b>8. Additional refrigerant charge .....</b>	<b>99</b>
<b>9. Engineering of insulation .....</b>	<b>100</b>
<b>10.Engineering of electrical wiring .....</b>	<b>101</b>
<b>11.Test operation .....</b>	<b>102</b>

## 1. Installation Procedure



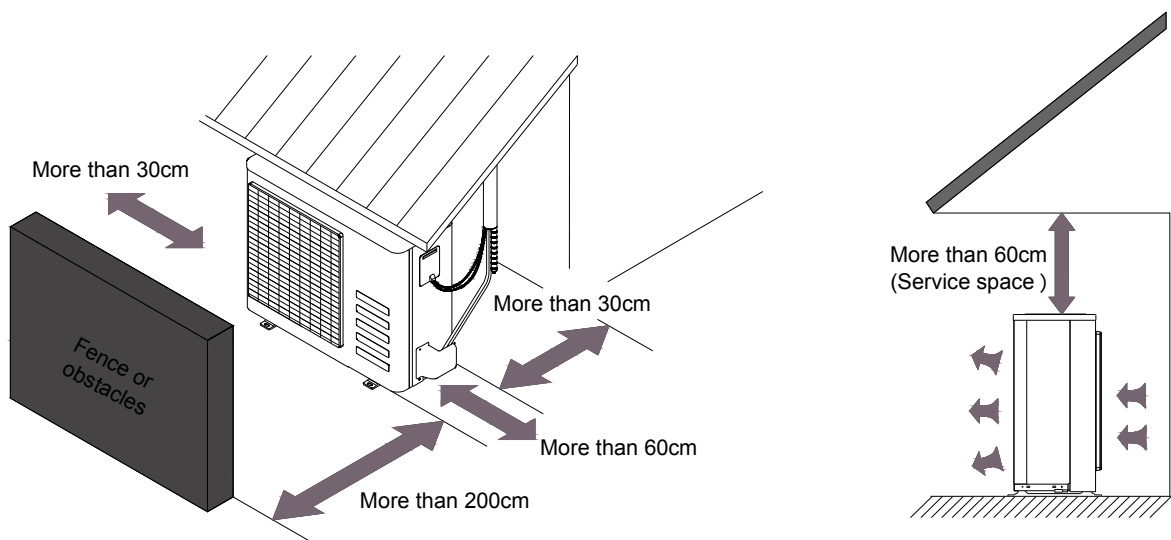
## 2. Location selection

### 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

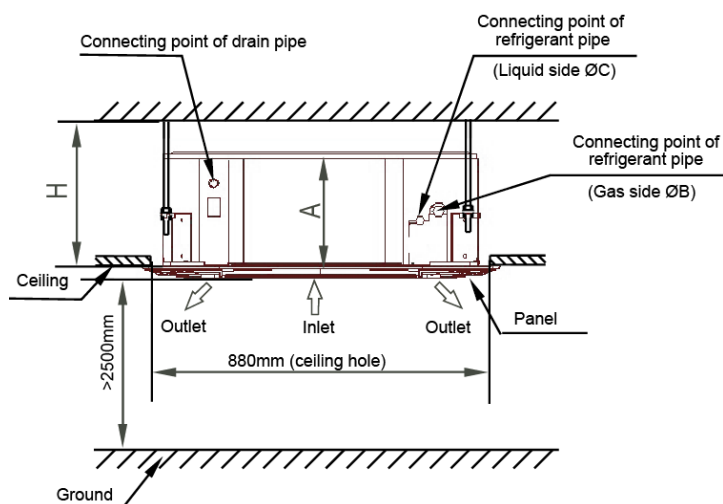
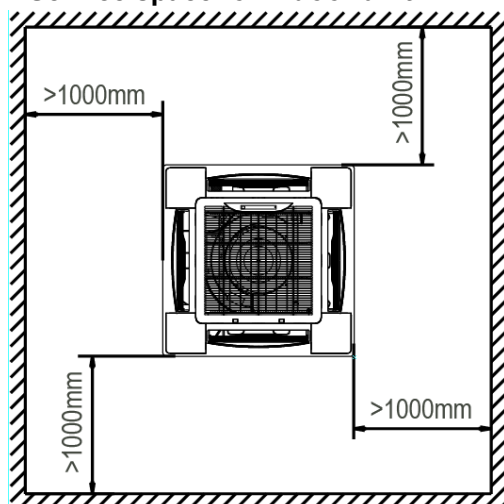
- The place shall easily support the outdoor unit's weight.
- Locate the outdoor unit as close to indoor unit as possible
- The piping length and height drop can not exceed the allowable value.
- The place where the noise, vibration and outlet air do not disturb the neighbors.
- There is enough room 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 ventilated 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 roof 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

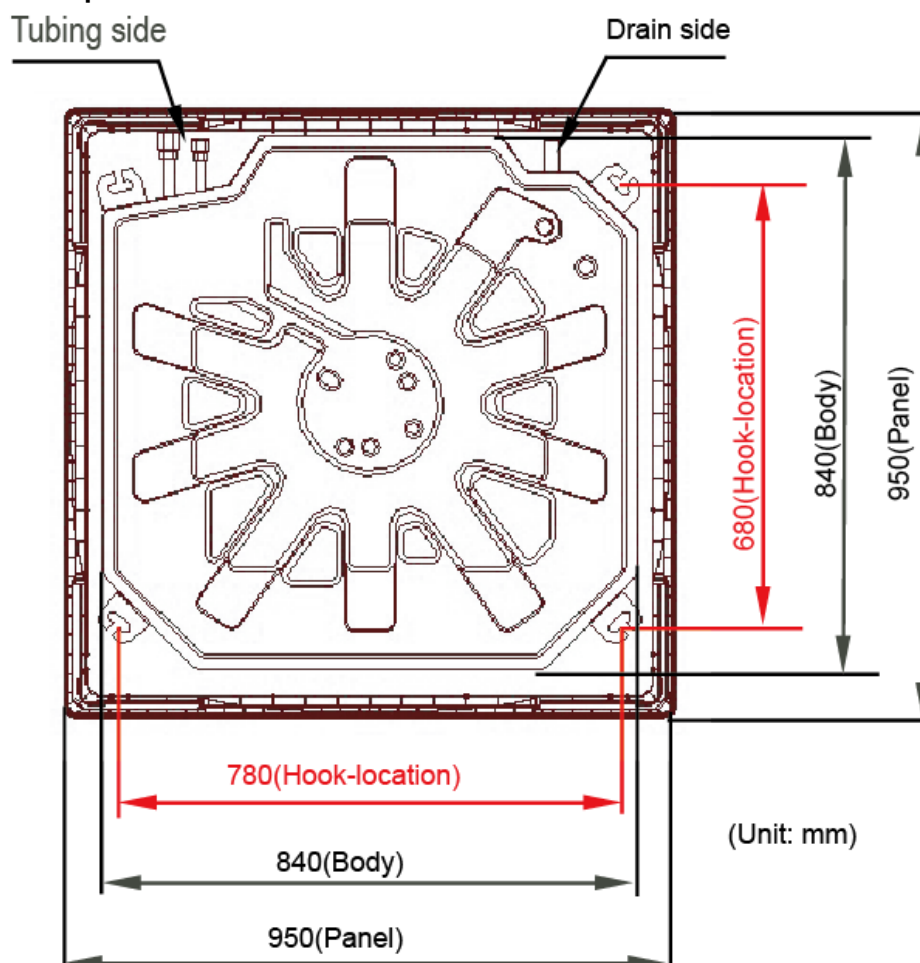
#### 3.1 Cassette indoor unit installation

##### 3.1.1 Service space for indoor unit



Model	A	H		Remark
30-60	300	>330	R410A and R22	Cooling (ARF21)
36-48	245	>275	R410A and R22	Cooling (ARF21B)

##### 3.1.2 Bolt pitch



##### 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  $\varnothing 12\text{mm}$ , 45~50mm deep at the selected positions on the ceiling. Then embed the expansible hooks (fittings).

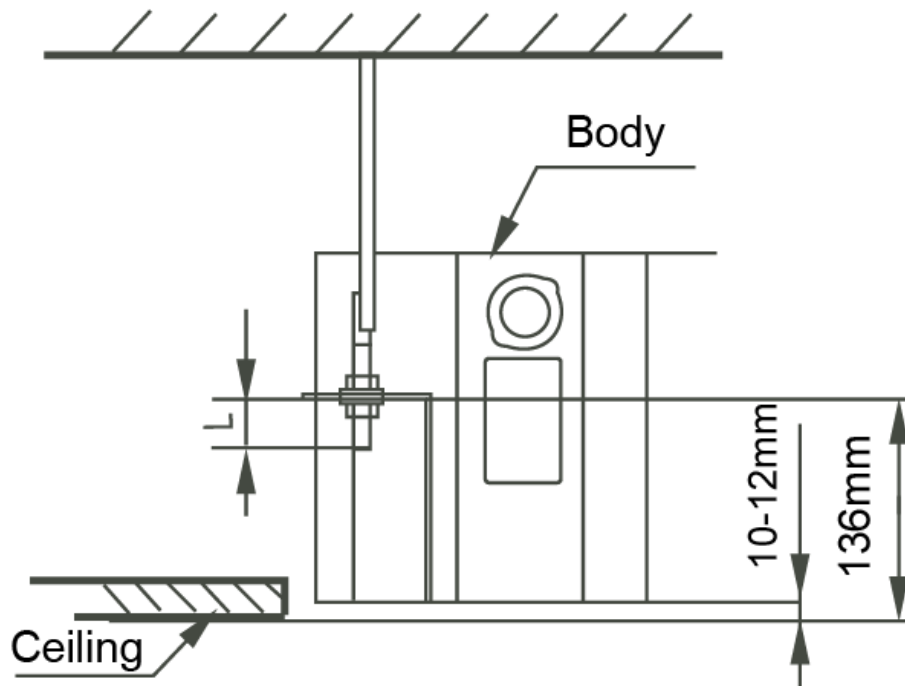


### 3.1.4 Install the main body

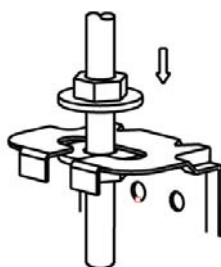
Make the 4 suspender through the 4 hanger of the main body to suspend it. Adjust the hexangular nuts on the four installation hooks evenly, to ensure the balance of the body. Use a leveling instrument to make sure the levelness of the main body is within  $\pm 1^\circ$ .



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.

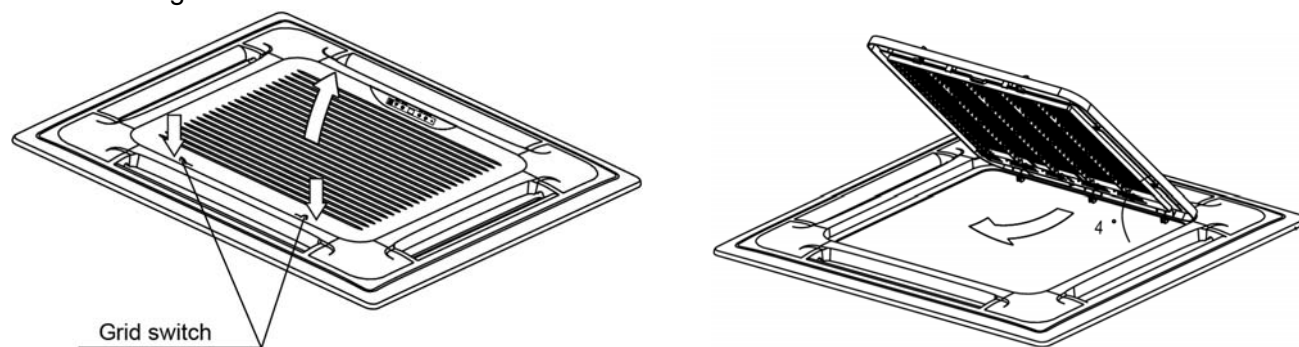


Locate the air conditioner firmly by wrenching the nuts after having adjusted the body's position well.

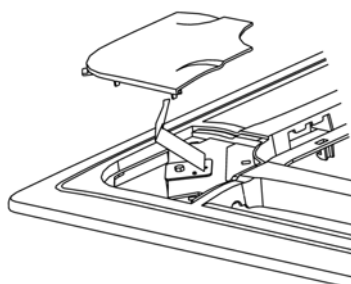


### 3.1.5 Install the panel

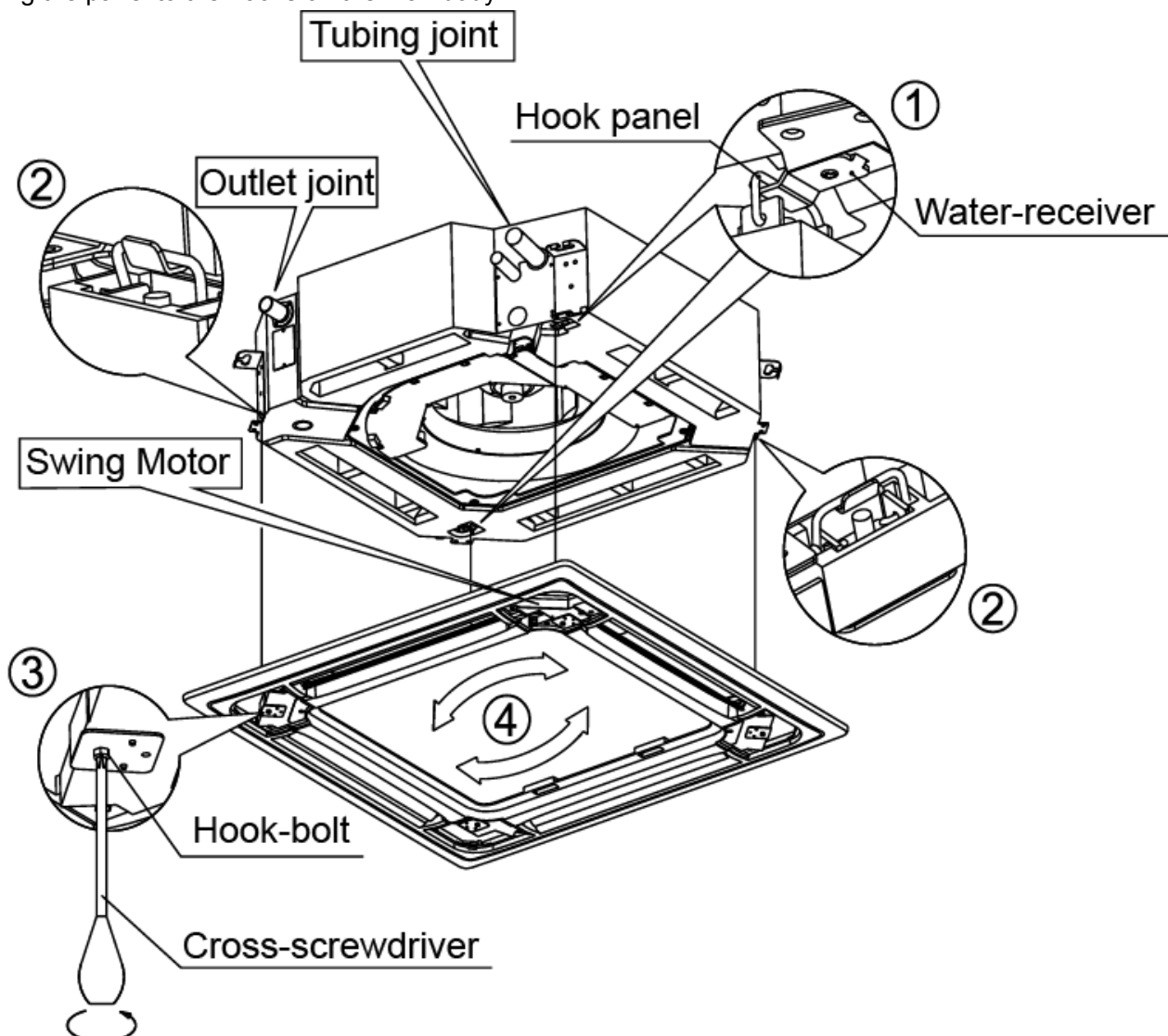
Remove the grille



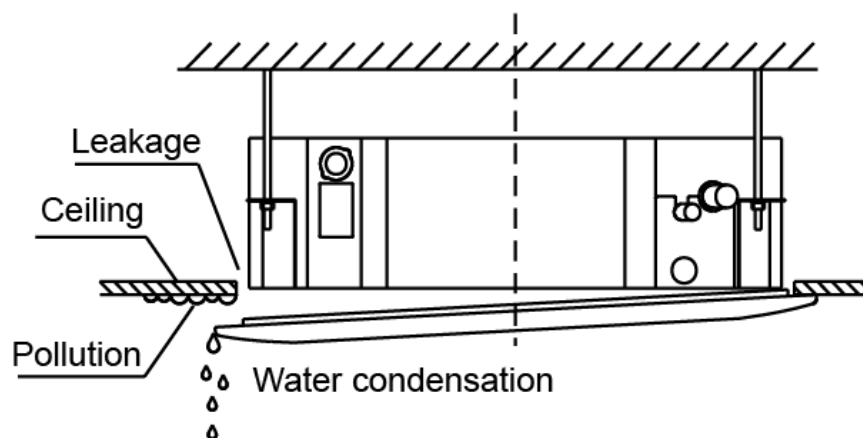
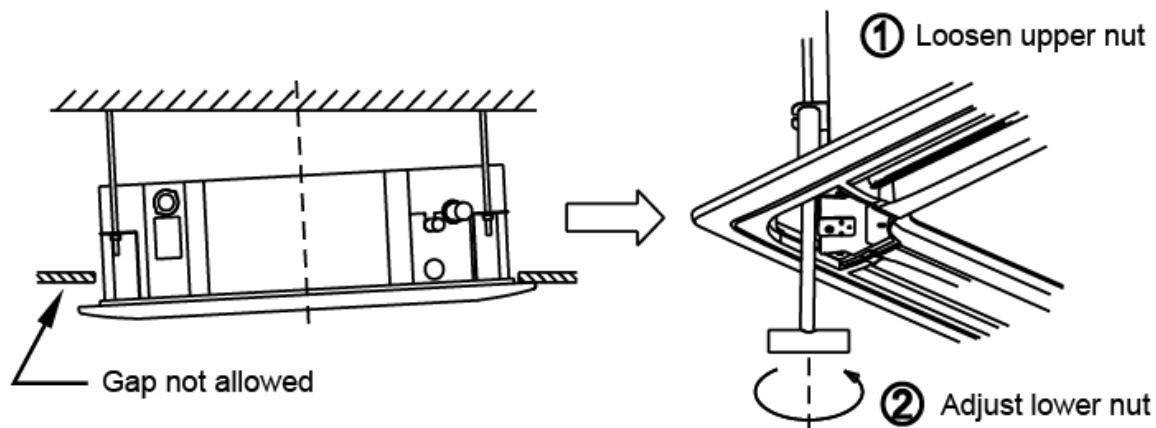
Remove the 4 corner covers.



Hang the panel to the hooks on the mainbody.

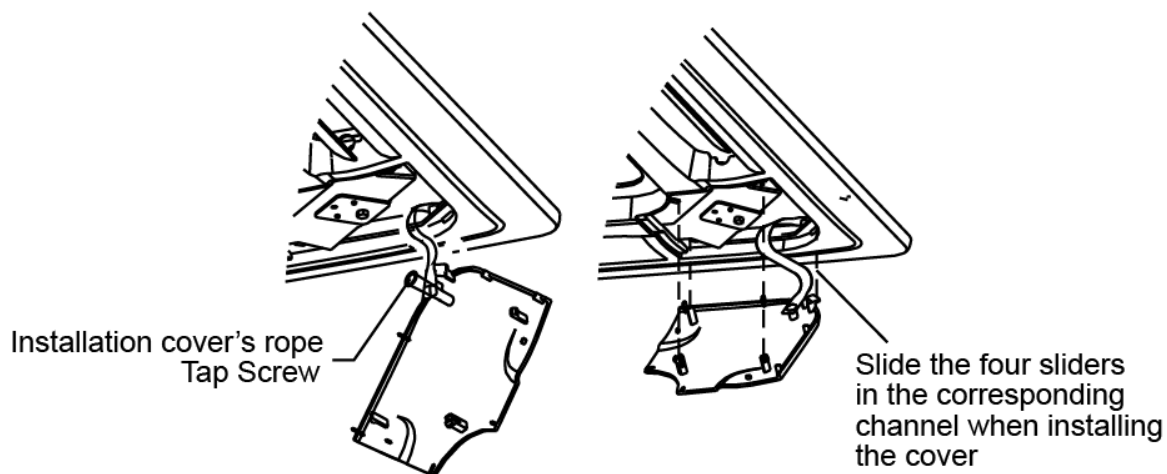


Tighten the screws under the panel hooks till the panel closely stick on the ceiling to avoid condensate water.



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.

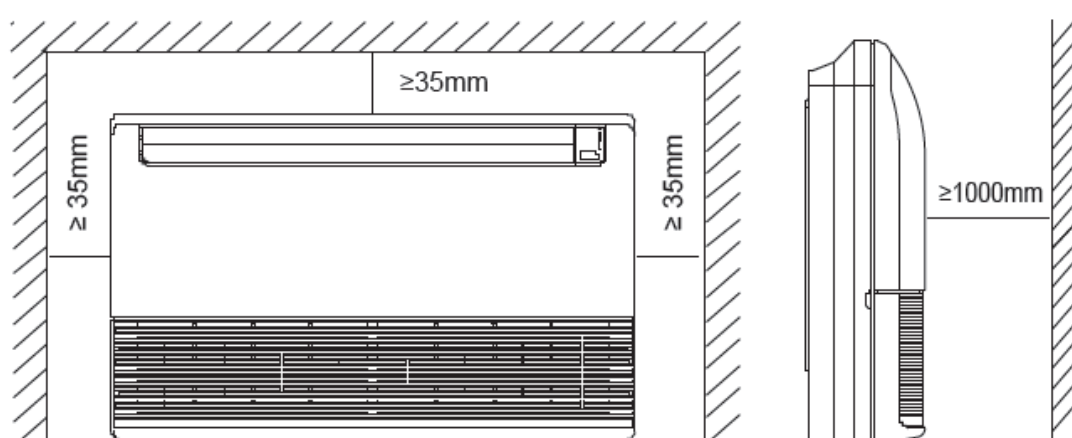
Install the 4 corner covers back.



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

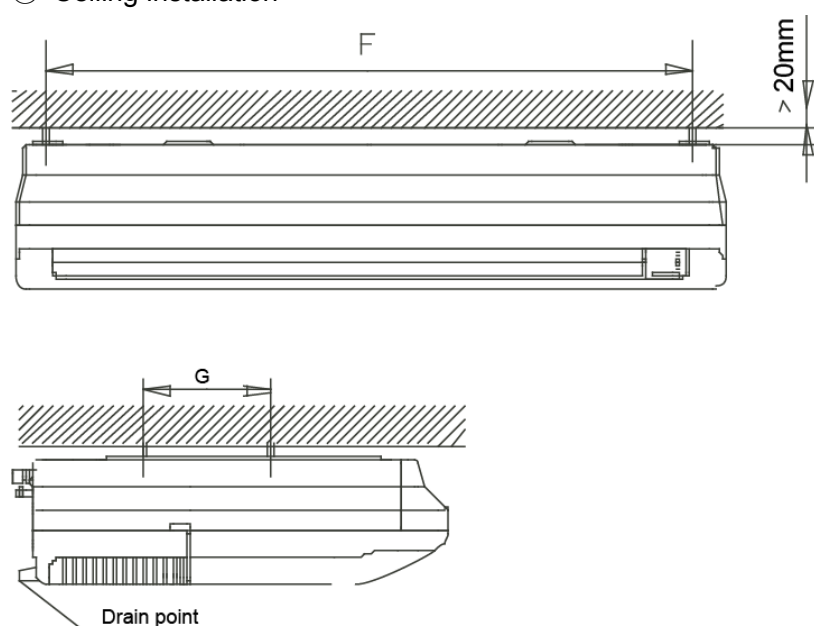
### 3 Ceiling & floor indoor unit installation

#### 3.3.1 Service space for indoor unit



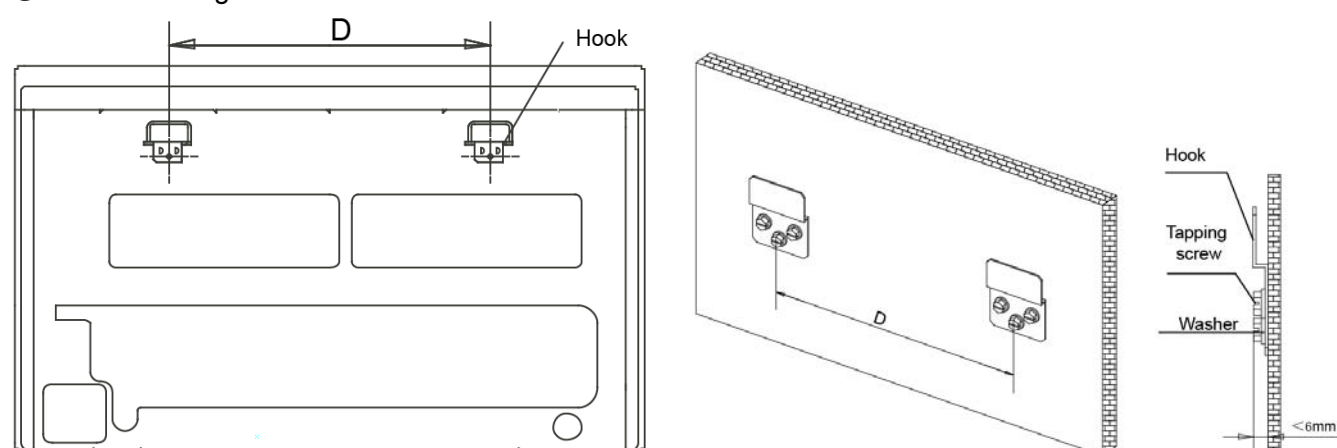
#### 3.3.2 Bolt pitch

##### ① Ceiling installation



Capacity (Btu/h)	D	F	G
KV24CM-ARF21	505	907	200

##### ② Floor standing installation





### 3.3.3 Install the pendant bolt

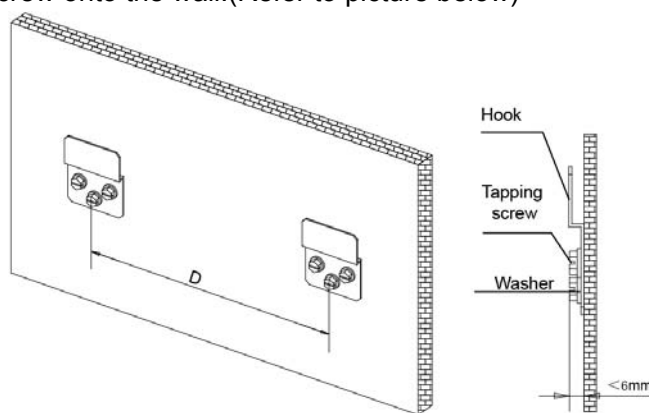
#### ① Ceiling installation

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



#### ② Floor standing installation

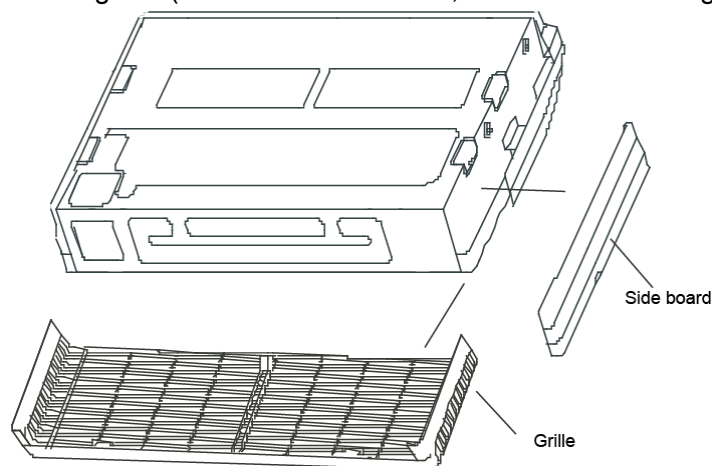
Fix the hook with tapping screw onto the wall. (Refer to picture below)



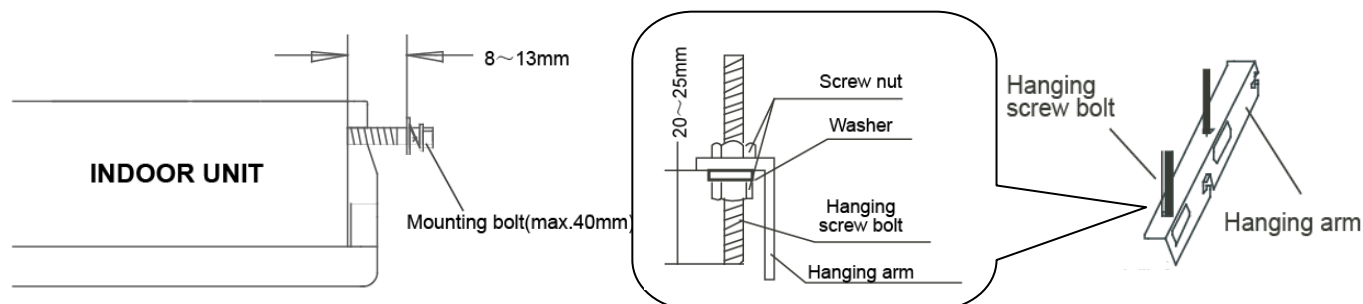
### 3.3.4 Install the main body

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

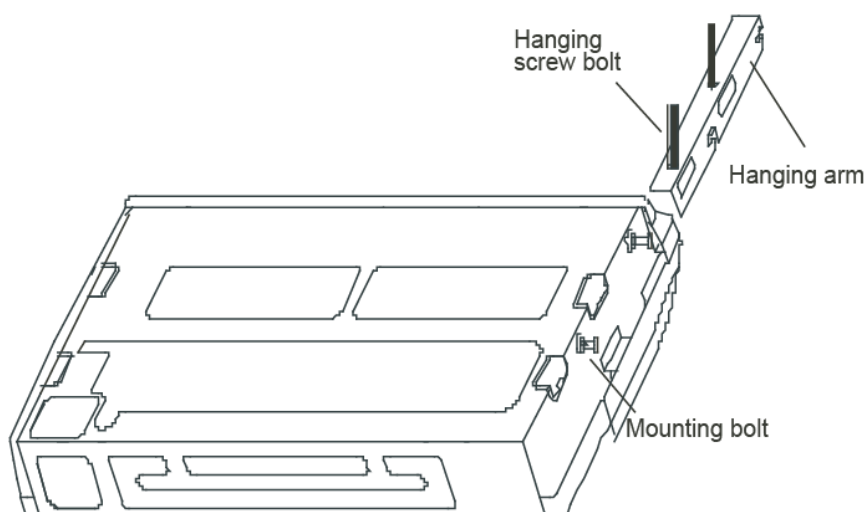
Remove the side board and the grille. (For models 48 and 60, do not remove the grille.)



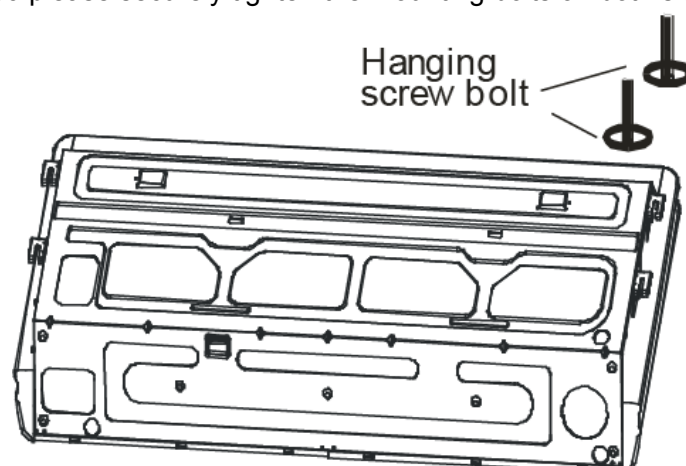
Locate the hanging arm on the hanging screw bolt. Prepare the mounting bolts on the unit.



Hang the unit on the hanging arm by sliding backward. Securely tighten the mounting bolts on both sides.



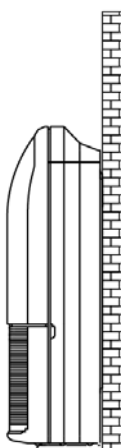
For some of the models 60 please securely tighten the mounting bolts on both sides.



Then install the side panels and grilles back to the main unit.

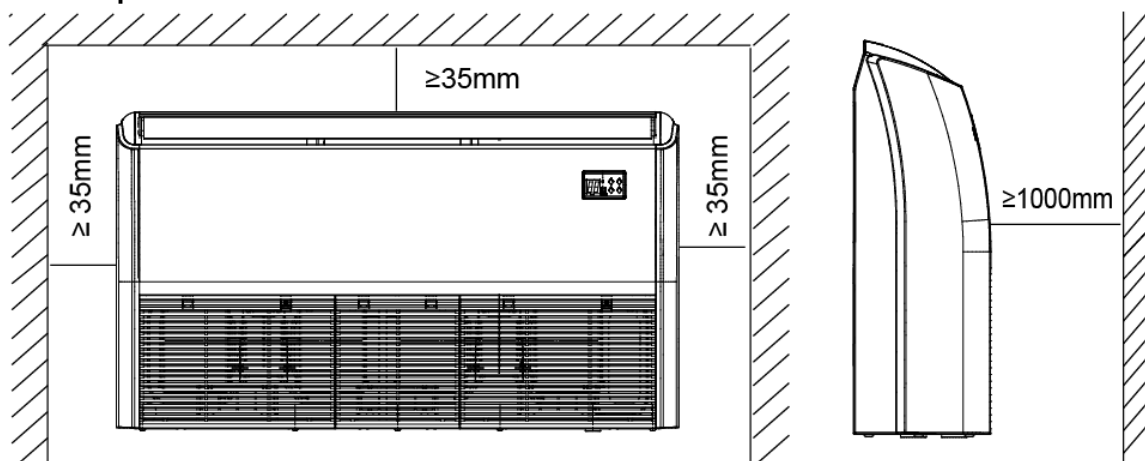
## ② Floor standing installation

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



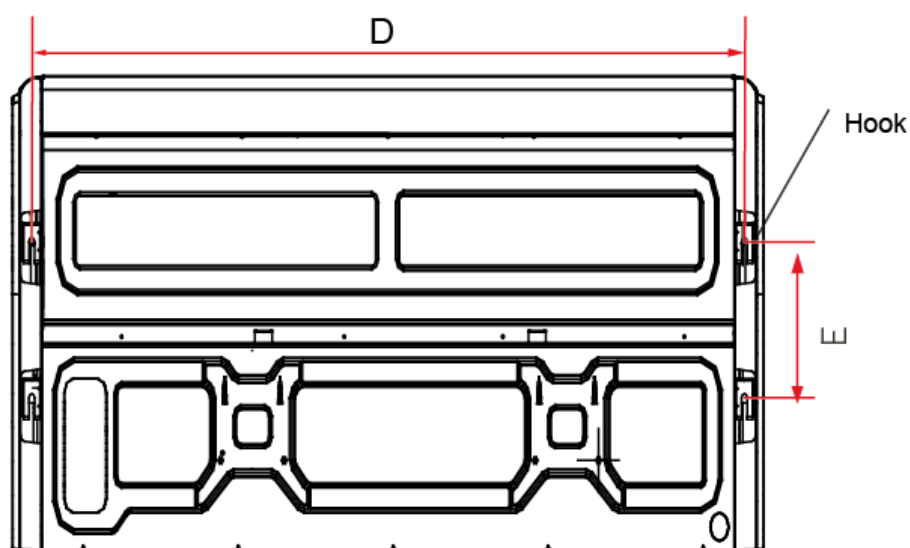
### 3.4 3rd generation ceiling & floor indoor unit installation

#### 3.4.1 Service space for indoor unit



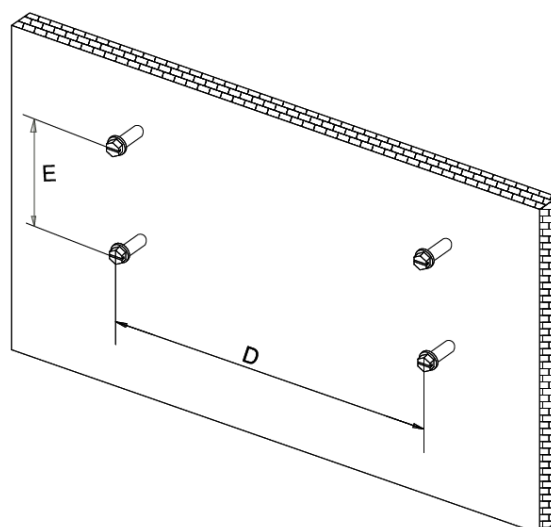
#### 3.4.2 Bolt pitch

##### ① Ceiling installation



Capacity (Btu/h)	D	E
36K	1200	220
48K	1565	220

##### ② Wall-mounted installation



### 3.4.3 Install the pendant bolt

#### ① Ceiling installation

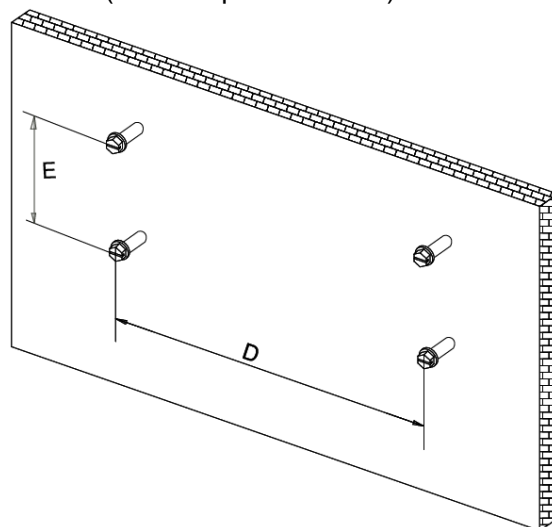
Select the position of installation hooks according to the hook holes positions showed in upper picture.

Drill four holes of  $\varnothing 12\text{mm}$ , 45~50mm deep at the selected positions on the ceiling. Then embed the expansible hooks (fittings).



#### ② Wall-mounted installation

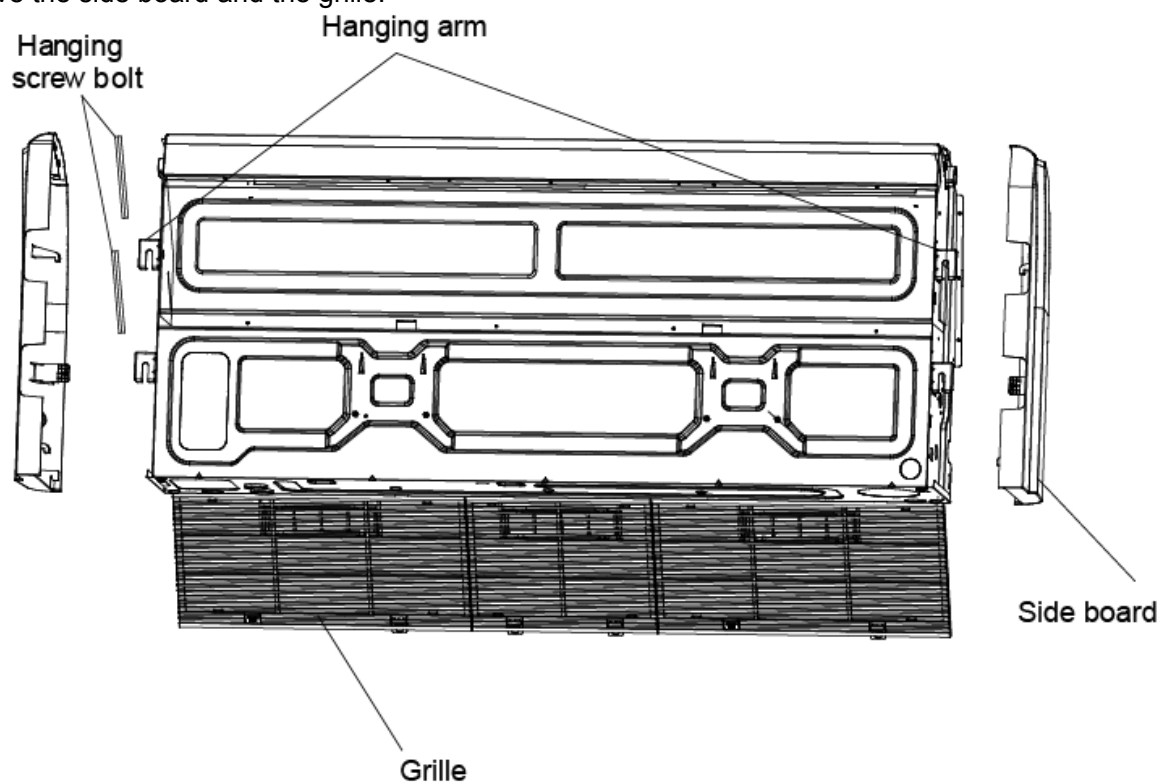
Install the tapping screws onto the wall.(Refer to picture below)



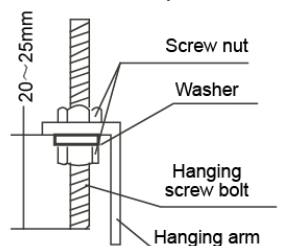
### 3.4.4 Install the main body

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

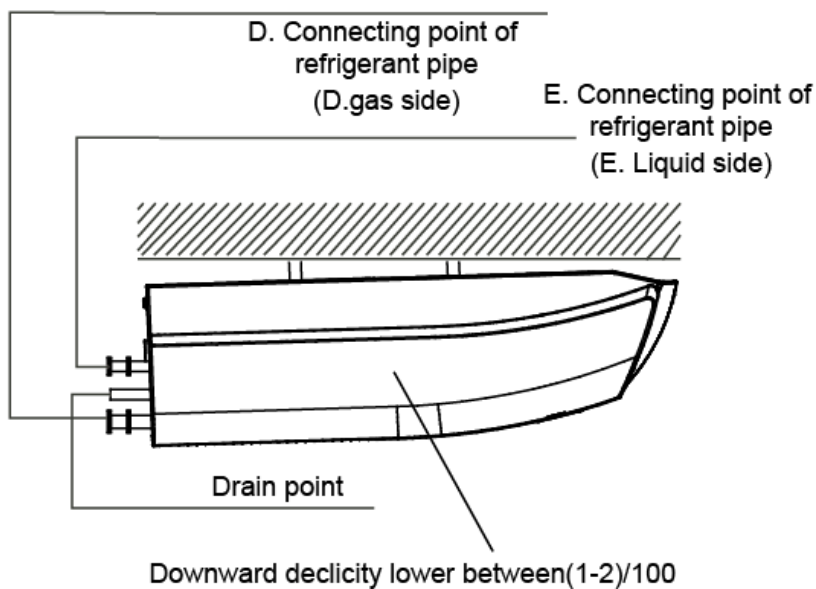
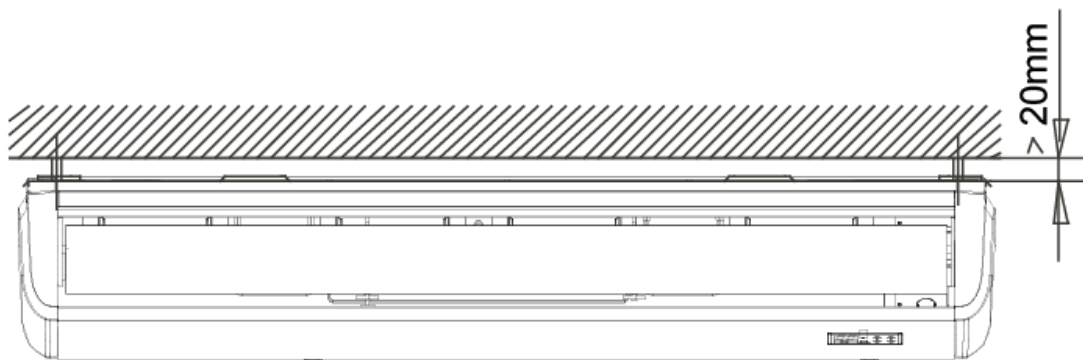
Remove the side board and the grille.



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

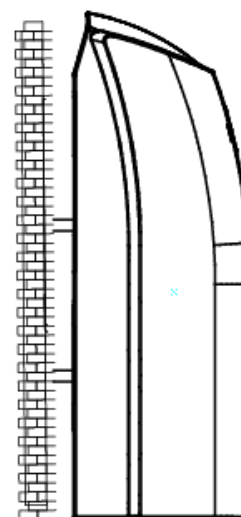
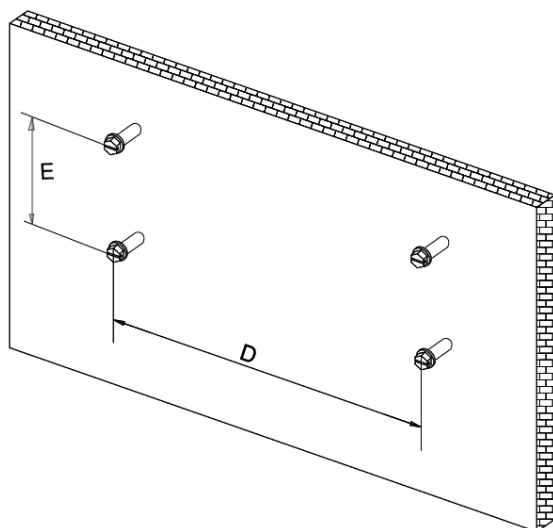


Put the side panels and grilles back.



## 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.)



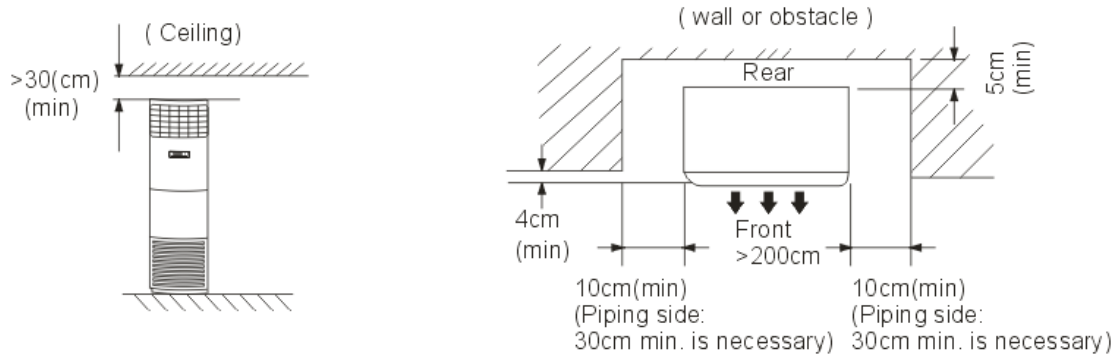
### 3.5 Floor standing indoor unit installation

#### 3.5.1 Service space for indoor unit

- A place which provides the spaces around the indoor unit as required above in the diagram.
- A place where is no obstacle near the inlet and outlet area.
- A place which can bear the weight of the indoor unit.
- A place which allows the air filter to be removed downward.
- A place where the reception range is not exposed to direct sunlight.
- In the center of the room where possible.

3.5.1.1 Please stand the unit in hard and flat ground;

Please reserve space for installation and maintenance.

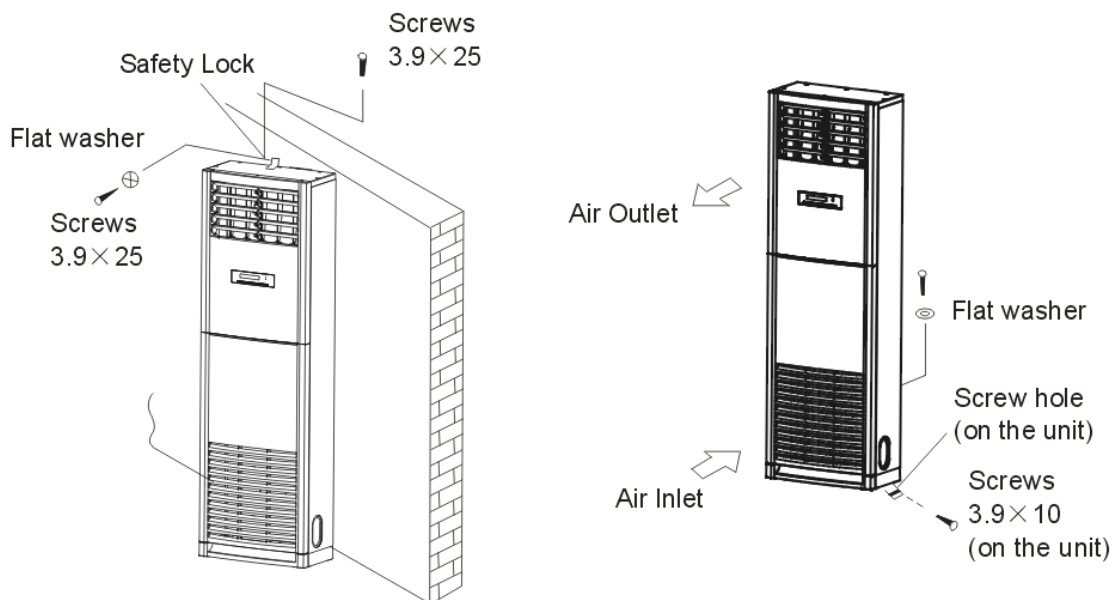


#### 3.5.2 Installing

##### 3.5.2.1. Anti-falling;

To prevent the indoor unit from falling, you must:

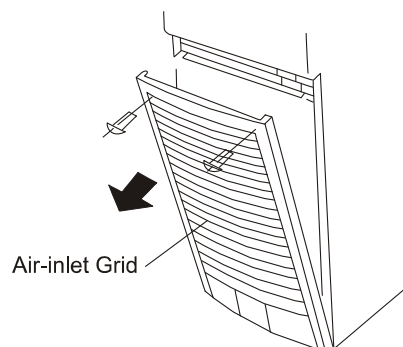
- Pay full attention to the unit because its long outer shape makes it easy to fall;
- Firmly fix the unit to the wall or in the ground to avoid accidental falling.



##### 3.5.2.2. Dismounting the lower front panel

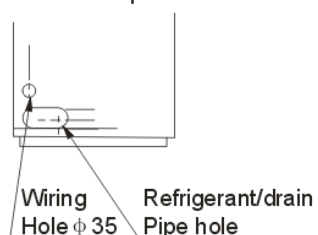
Please take off the lower front panel before connecting the pipes/wires.

Pull down the two knobs on the grille, take off the two screws, then the air-inlet grille goes free.

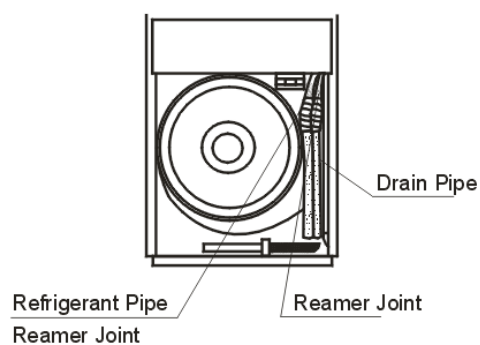
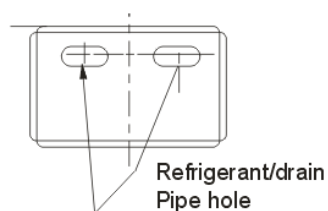


3.5.2.3. Take the Pipe Clip off before connecting the pipes and wiring; fit it when these finished.  
Use accessories to connect the pipes/wires on both sides and back side.

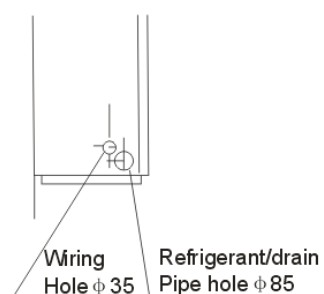
Pipe/wire-hole position on back side



Pipe/wire-hole position on the bottom

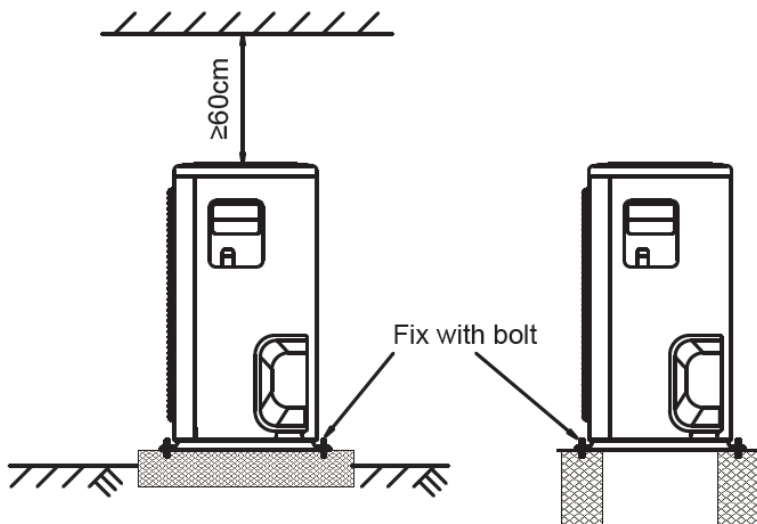
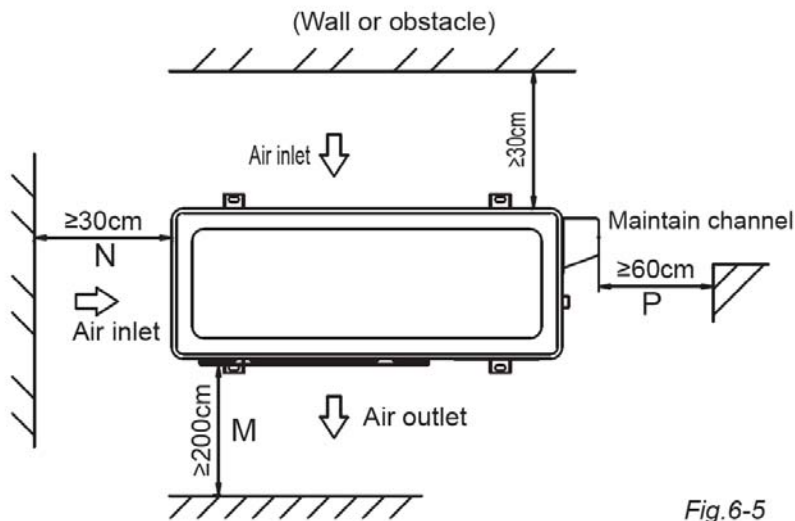


Pipe/wire-hole positions on both sides

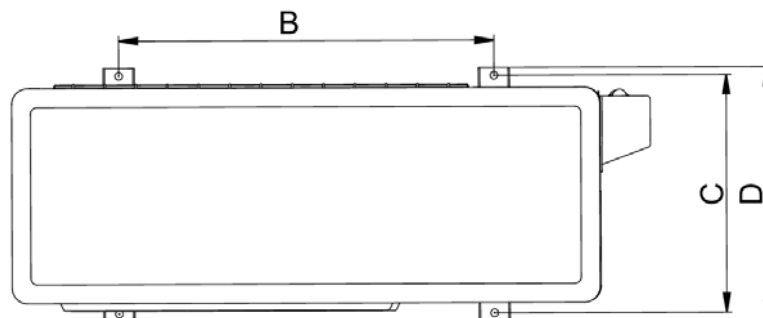


## 4. Outdoor unit installation (Side Discharge Unit)

### 4.1 Service space for outdoor unit



### 4.2 Bolt pitch



Model	B	C	D
24K	560	335	360
36K	624	366	396
48K	634	404	448
60K	634	404	448

### 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.

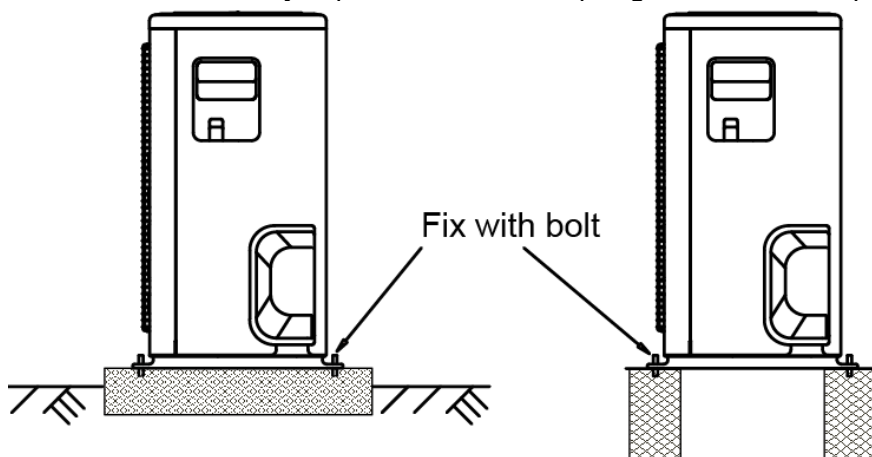


Do not touch the fan with hands or other objects.

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 data in the following table.

Model	Max. Length	Max. Elevation
24,000Btu/h~30,000Btu/h	50m	25m
36,000Btu/h ~60,000Btu/h	65m	30m

### 5.2 The procedure of connecting pipes

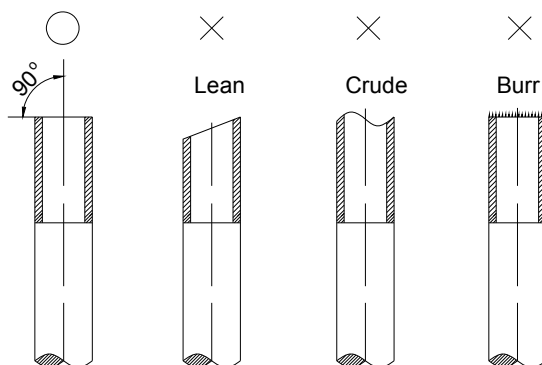
**5.2.1 Choose the pipe size according to the specification table.**

**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.**

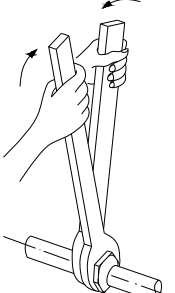
**5.2.9 Bind and wrap the wire together with the insulated pipe if necessary.**

**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. Improper installation could lead to leakage and eventually wet furniture and electrical devices.

### 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 be smaller than the drain hose of indoor unit
- Choose the suitable pipe according to the water flowrate and drainage pipe slope, 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

Calculate the total water flowrate for the confluence pipe selection based on the above table.

#### 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	

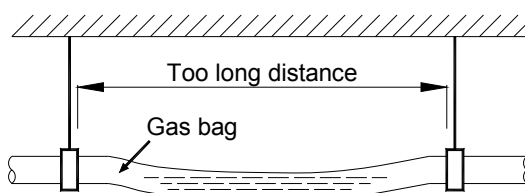
Attention: Adopt PVC40 or bigger pipe to be the main pipe.

### 6.2.3 Individual design of drainage pipe system

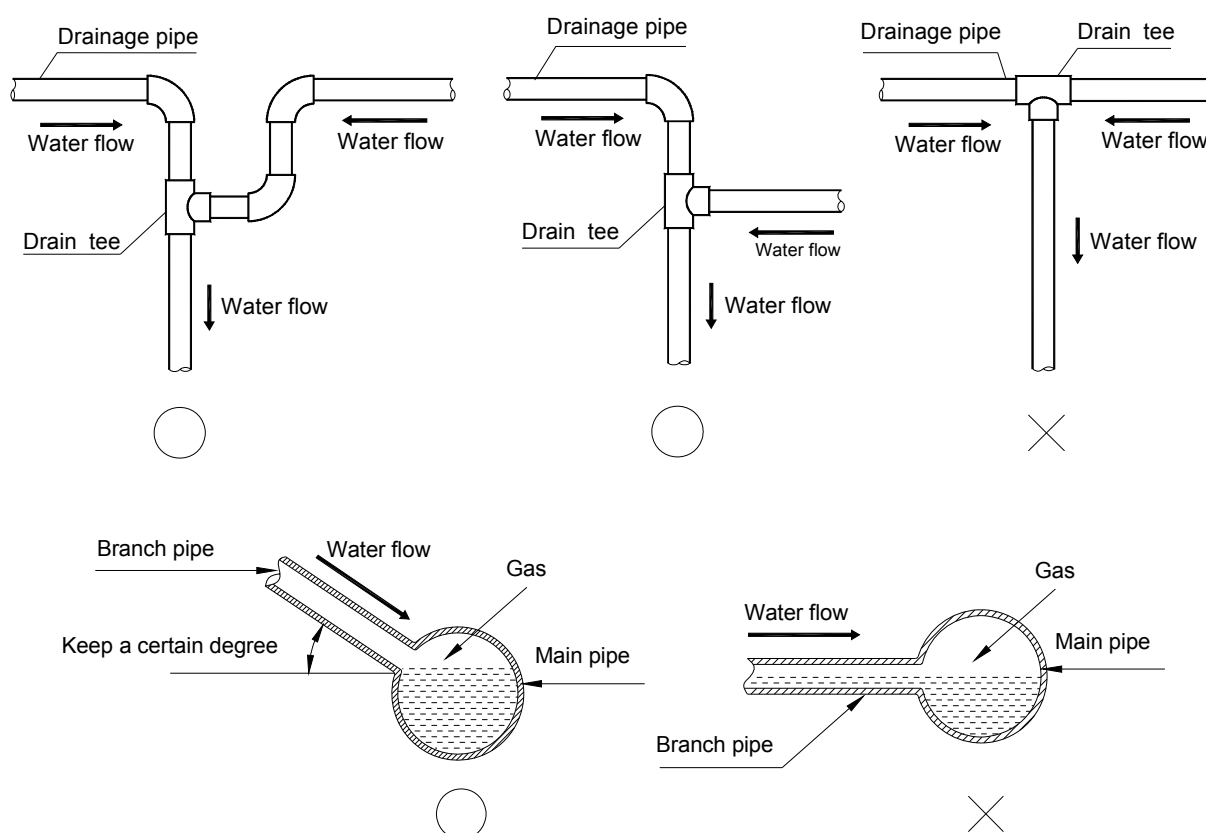
- The drainage pipe of air conditioner shall be installed separately with other sewage pipe, rainwater pipe and drainage pipe in building.
- The drainage pipe of the indoor unit with water pump should be apart from the one without water pump.

### 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.



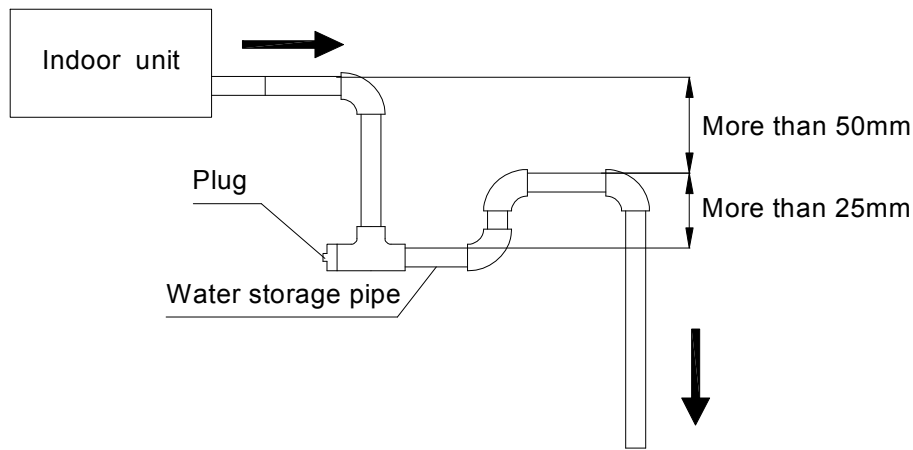
### 6.2.5 The horizontal pipe layout should avoid converse flow or bad flow



- 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.

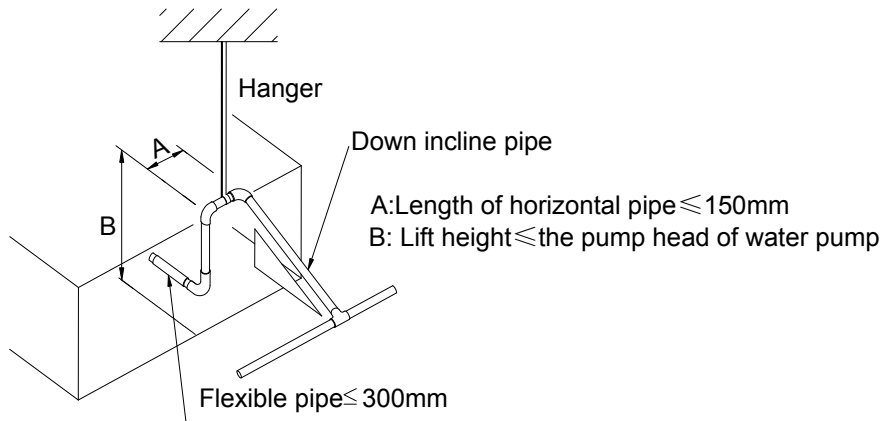
### 6.2.6 Water storage pipe setting

- 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.



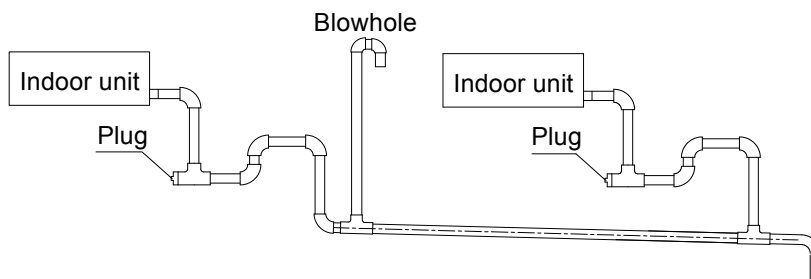
### 6.2.7 Lifting pipe setting of indoor unit with water pump

- 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 be a designed 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.

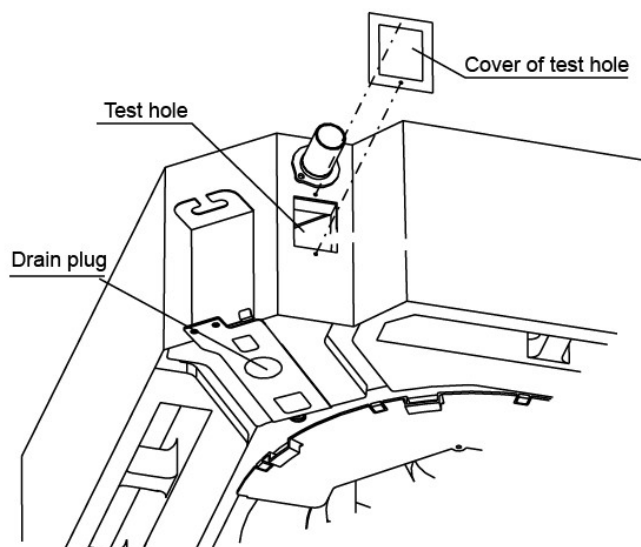
## 6.3 Drainage test

### 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 delay)
- 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 stopping the air conditioner for 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 should be inserted 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 the 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 conducting first vacuum drying, connect pressure gauge to the infusing mouth of gas pipe and liquid pipe, and keep vacuum pump running for 1hour (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/cm<sup>2</sup> .  
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 cannot 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
Formula	$V=15g/m \times (L-5)$	$V=30g/m \times (L-5)$

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

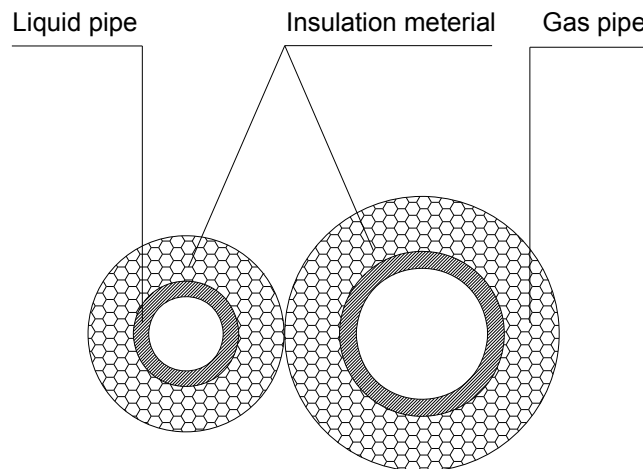
- During operation, temperature of gas pipe and liquid pipe shall be over-heating or over-cooling extremely. Therefore, it is necessary to carry out insulation; otherwise it shall debase the performance of unit and burn compressor.
- Gas pipe temperature is very low during cooling. If insulation is not enough, it shall form dew and cause leakage.
- Temperature of gas pipe is very high (generally 50-100°C) 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°C
- 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 gas pipe and liquid pipe tightly.
- The linking part should be applied with adhesive to paste together
- Be sure not to bind the insulation material over-tightly, 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 to 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 separate wire tube and remain at least 300mm gap.
- Select wiring according to table in indoor part named “the specification of power” , make sure the selected wiring is not smaller than the data shown 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 not be 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.....104
- 2. Troubleshooting.....110
- 3. Controller .....134

# **1. Electrical Control Function**

## **1.1 Definition**

T1: Indoor room temperature

T2: Coil temperature of indoor heat exchanger middle.

T2B: Coil temperature of indoor heat exchanger outlet.

T3: Coil temperature of condenser

T4: Outdoor ambient temperature

T5: Compressor discharge temperature

## **1.2 Main Protection**

### **1.2.1 Time delay at restart for compressor.**

### **1.2.2 Temperature protection of compressor top**

The unit will stop working when the compressor top temp. protector cut off, and will restart after the compressor top temp. protector restart.

### **1.2.3 Temperature protection of compressor discharge**

When the compressor discharge temp. is getting higher, the running frequency will be limited as below rules:

----If  $102^{\circ}\text{C} < T5 < 115^{\circ}\text{C}$ , decrease the frequency to the lower level every 2 minutes till to F1.

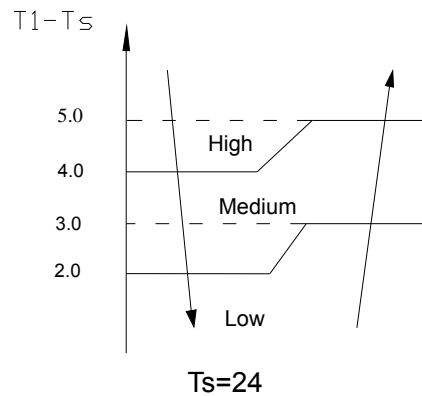
---If  $T5 > 115^{\circ}\text{C}$  for 10 seconds, the compressor will stop and restart till  $T5 < 90^{\circ}\text{C}$ .

### **1.2.4 Sensor protection at open circuit and breaking disconnection.**

### 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/(med)/low/auto.
- (4) The louver operates same as in cooling mode.
- (5) Auto fan:

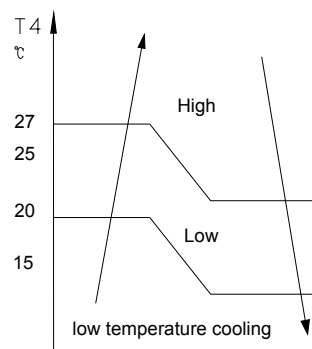


#### 1.3.2 Cooling Mode

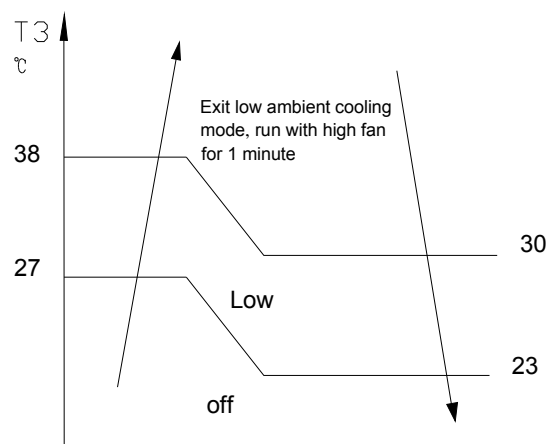
##### 1.3.2.1 Outdoor PMW open angle control

The unit is working in cooling mode with the EXV open 300P for 3 minutes, then adjusting PMW open angle according to the temperature of compressor discharge every 2 minutes.

##### 1.3.2.2 Outdoor fan operation rules



Outdoor fan in low temperature cooling mode acts as follow:



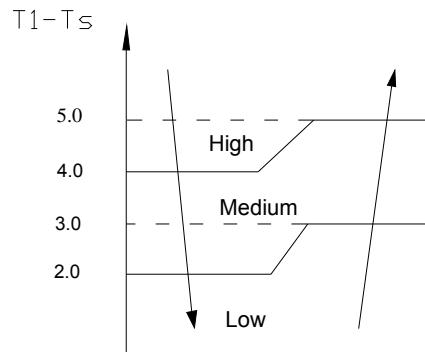
When  $T_4 < 15\text{ }^{\circ}\text{C}$  and  $T_3 < 30\text{ }^{\circ}\text{C}$ , the unit will enter into low ambient cooling mode. The outdoor fan will choose speed according to  $T_3$ .

When  $T_3 \geq 38\text{ }^{\circ}\text{C}$  or when  $T_4 \geq 20\text{ }^{\circ}\text{C}$ , the outdoor fan will choose the speed according to  $T_4$  again.

### 1.3.2.3 Indoor fan operation 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:



### 1.3.2.4 Evaporator low temperature T2 protection.

When  $T_2 < 2\text{ }^{\circ}\text{C}$  and lasts for 3 minutes, the indoor has no capacity demand and resume till  $T_2 \geq 7\text{ }^{\circ}\text{C}$ .

### 1.3.2.5 Condenser high temperature T3 protection

When  $T_3 > 65\text{ }^{\circ}\text{C}$  for 3 seconds, the compressor will shut off. When  $T_3 < 52$ , the compressor will restart.

### 1.3.3 Auto-mode

This mode can be chosen with remote controller and the setting temperature can be changed between  $17\sim 30\text{ }^{\circ}\text{C}$ .

In auto mode, the machine will choose cooling, heating or fan-only mode according to  $\Delta T$  ( $\Delta T = T_1 - T_s$ ).

$\Delta T = T_1 - T_s$	Running mode
$\Delta T \geq 2\text{ }^{\circ}\text{C}$	Cooling
$\Delta T < 2\text{ }^{\circ}\text{C}$	Fan-only

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  $T_1 - T_s$ .

If the setting temperature is modified, the machine will choose running function again.

### 1.3.5 Drying mode

Drying mode works the same as cooling mode in low speed.

All protections are active and the same as that 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, 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 (Sleep mode)**

1.3.7.1 The sleep function is available in cooling, heating(not applicable) or auto mode.

1.3.7.2. Operation process in sleep mode is as follow:

When cooling, the setting temperature rises 1°C (be lower than 30°C) every one hour, 2 hours later the setting temperature stops rising and the indoor fan is fixed at low speed.

When heating(not applicable), the setting temperature decreases 1°C (be higher than 17°C) every one hour, 2 hours later the setting temperature stops rising and indoor fan is fixed at low speed. (Anti-cold wind function has the priority).

1.3.7.3 Operation time in sleep mode is 7 hours. After 7 hours the AC quits this mode but doesn't turn off

1.3.7.4 Timer setting is available

### **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 (not including Swing function) automatically after 3 minutes when power returns.

### **1.3.9 Drain pump control**

Adopt the water-level switch to control the action of drain pump.

Main action under different condition :( every 5 seconds the system will check the water level one time)

1. When the A/C operates with cooling (including auto cooling), dehumidifying, and forced cooling mode, the pump will start running immediately and continuously, till stop cooling.

2. Once the water level increase and up to the control point, LED will alarm and the drain pump open and continue checking the water level. If the water level fall down and LED disarmed (drain pump delay close 1 minute) and operate with the last mode. Otherwise the entire system stop operating ( including the pump) and LED remain alarming after 3 minutes,

### **1.3.10 Point Check Function**

There is a check switch in outdoor PCB.

Press the switch SW1 to check the states of unit when the unit is running.

Press the switch N times it will display the content corresponding to No. N. After getting into the check function, it will display No. N with 1.5s, meanwhile the low bit decimal of digit display flashing, indicated to get into the check function display. After 1.5s, it will display the content corresponding to No. N. the digital display tube will display the following when push SW1 each time.

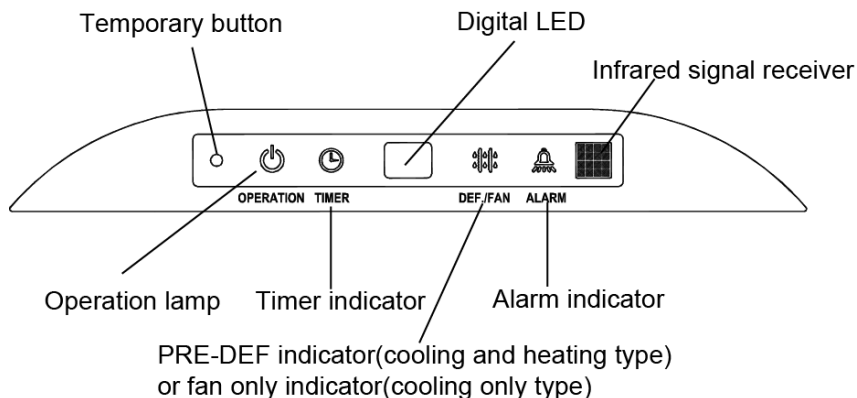
N	Display	Remark		
00	Normal display	Display running frequency, running state or malfunction code		
01	Indoor unit capacity demand code	Actual data*HP*10 If capacity demand code is higher than 99, the digital display tube will show single digit and tens digit. (For example, the digital display tube show "5.0",it means the capacity demand is 15. the digital display tube show "60",it means the capacity demand is 6.0)		
02	Amendatory capacity demand code			
03	The frequency after the capacity requirement transfer			
04	The frequency after the frequency limit			
05	The frequency of sending to 341			
06	Indoor unit evaporator temp.(T2)	If the temp. is lower than 0 degree, the digital display tube will show "0".If the temp. is higher than 70 degree, the digital display tube will show "70".		
07	Condenser pipe temp.(T3)	If the temp. is lower than -9 degree, the digital display tube will show "-9".If the temp. is higher than 70 degree, the digital display tube will show "70". If the indoor unit is not connected, the digital display tube will show: "——"		
08	Outdoor ambient temp.(T4)			
09	Compressor discharge temp.(Tp)	The display value is between 13~120 degree. If the temp. is lower than 13 degree, the digital display tube will show "13".If the temp. is higher than 99 degree, the digital display tube will show single digit and tens digit. (For example, the digital display tube show "0.5",it means the compressor discharge temp. is 105 degree. the digital display tube show "1.6",it means the compressor discharge temp. is 116 degree)  For KV48ODU-ARF21B & KV60ODU-CRF21 The display value is between 13~129 degree. If the temp. is lower than 13 degree, the digital display tube will show "13".		
10	AD value of current	The display value is hex number.		
11	AD value of voltage			
12	Indoor unit running mode code	Off:0, Fan only 1,Cooling:2, Heating:3, Forced cooling:4 For KV48ODU-ARF21B & KV60ODU-CRF21, Off:0, Fan only 1,Cooling:2, Heating:3		
13	Outdoor unit running mode code	Off:0, Fan only 1,Cooling:2, Heating:3, Forced cooling:4		
14	EXV open angle	Actual data/4. If the value is higher than 99, the digital display tube will show single digit and tens digit. For example ,the digital display tube show "2.0",it means the EXV open angle is 120×4=480p.)		
15	Frequency limit symbol	Bit7	Frequency limit caused by IGBT radiator	The display value is hex number. For example, the digital display tube show 2A,then Bit5=1, Bit3=1, Bit1=1. It means frequency limit caused by T4,T3 and current.
		Bit6	Frequency limit caused by PFC	
		Bit5	Frequency limit caused by T4.	
		Bit4	Frequency limit caused by T2.	
		Bit3	Frequency limit caused by T3.	
		Bit2	Frequency limit	

			caused by Tp.	
		Bit1	Frequency limit caused by current	
		Bit0	Frequency limit caused by voltage	
16	DC fan motor speed			
17	IGBT radiator temp.(Reserved)	<p>The display value is between 13~120 degree. If the temp. is lower than 13 degree, the digital display tube will show "13".If the temp. is higher than 99 degree, the digital display tube will show single digit and tens digit. (For example, the digital display tube show "0.5",it means the IGBT radiator temp. is 105 degree. the digital display tube show "1.6",it means the IGBT radiator temp. is 116 degree)</p> <p>For KV48ODU-ARF21B &amp; KV60ODU-CRF21: The display value is between 30~120 degree. If the temp. is lower than 30 degree, the digital display tube will show "30".If the temp. is higher than 99 degree,</p>		
18	Indoor unit number	The indoor unit can communicate with outdoor unit well.		
19	Condenser pipe temp. of 1# indoor unit	<p>If the temp. is lower than 0 degree, the digital display tube will show "0".If the temp. is higher than 70 degree, the digital display tube will show "70". If the capacity demand is 0, , the digital display tube will show "0. If the indoor unit is not connected, the digital display tube will show: "——"</p>		
20	Condenser pipe temp. of 2# indoor unit			
21	Condenser pipe temp. of 3# indoor unit			
22	1# Indoor unit capacity demand code	<p>Actual data*HP*10</p> <p>If capacity demand code is higher than 99, the digital display tube will show single digit and tens digit. (For example, the digital display tube show "5.0",it means the capacity demand is 15. the digital display tube show "60",it means the capacity demand is 6.0). If the indoor unit is not connected, the digital display tube will show: "——"</p>		
23	2# Indoor unit capacity demand code			
24	3# Indoor unit capacity demand code			

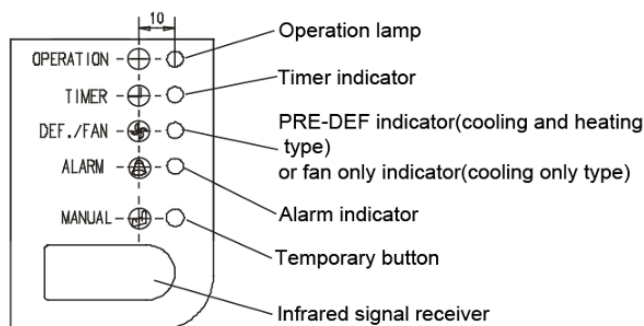
## 2. Troubleshooting

### 2.1 Display board

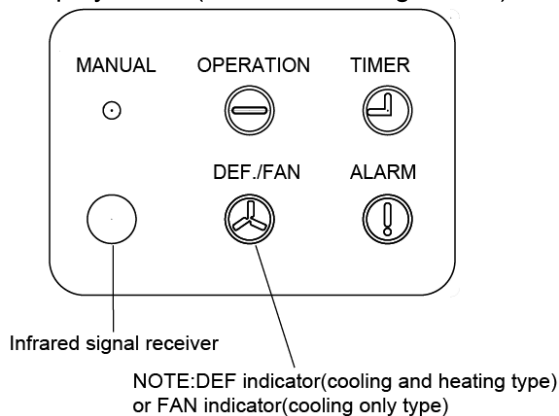
#### 2.1.1 Icon explanation on indoor display board (Big cassette).



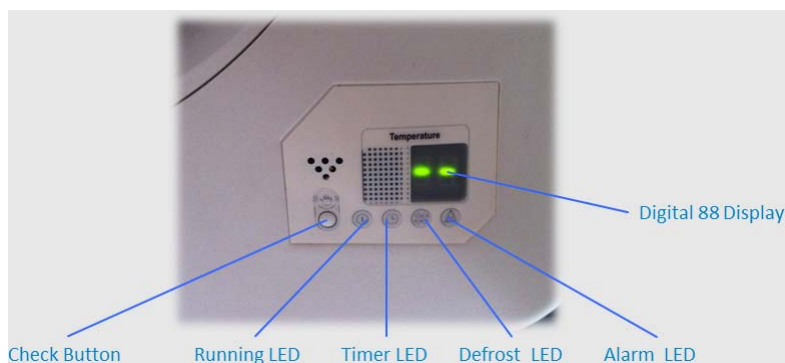
#### 2.1.2 Icon explanation on indoor display board (Ceiling & floor)



#### 2.1.3 Icon explanation on indoor display board (3TR/4TR Ceiling & floor)

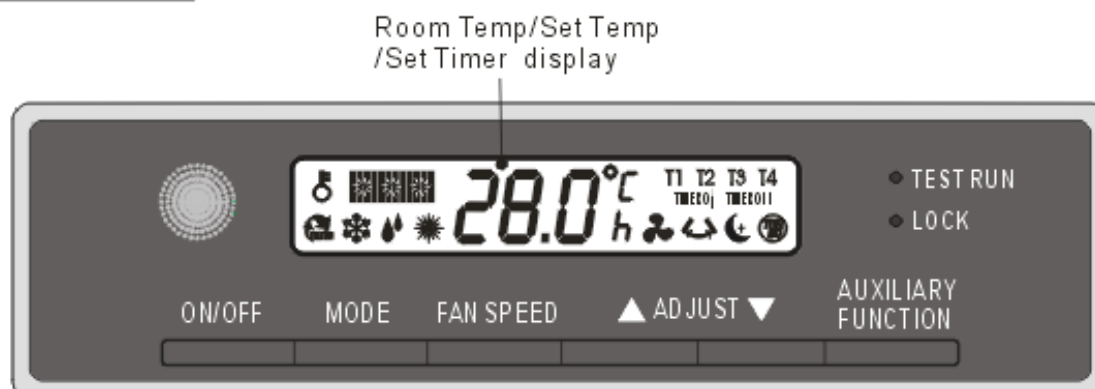


#### 2.1.4 Display board of auto-lifting panel of 4 way cassette



## 2.1.5 Display board of Floor standing

### Unit Control Panel



#### Indicators

- Auto operation display
- Cooling operation display
- Dry operation display
- Heating operation display  
(not applicable)
- Fan operation display

- Swing operation display
- Sleep operation display
- Turbo operation display
- TIMER ON On timer operation display
- TIMER OFF Off timer operation display
- Lock operation display
- Fan speed display

## 2.2 Indoor unit malfunction

NO.	Malfunction	Running lamp	Timer lamp	Defrosting lamp	Alarm lamp	Display(nixie tube)
1	Communication malfunction between indoor and outdoor units.	X	☆	X	X	E1
2	Open or short circuit of T1 temperature sensor	☆	X	X	X	E2
3	Open or short circuit of T2 temperature sensor	☆	X	X	X	E3
4	Open or short circuit of T2B temperature sensor	☆	X	X	X	E4
5	Full-water malfunction	X	X	X	☆	EE
6	EEPROM malfunction	X	X	☆	X	E7
7	Outdoor unit malfunction	X	X	X	◎	Ed
<p>X(off) ☆(flash at 5Hz) ◎(flash at 0.5Hz)</p> <p>Note: Digital display is only available for 4-way cassette.</p>						

### For Cassette and Ceiling Floor models

NO.	Malfunction	Defrosting lamp	Alarm lamp	Running lamp	Timer lamp	Display(digital tube)
1	Communication malfunction between indoor and outdoor units.	X	X	X	☆	E1
2	Open or short circuit of T1 temperature sensor	X	X	☆	X	E2
3	Open or short circuit of T2 temperature sensor	X	X	☆	X	E3
4	Open or short circuit of T2B temperature sensor	X	X	☆	X	E4
5	Full-water malfunction	X	☆	X	X	EE
6	Indoor EEPROM malfunction	☆	X	X	X	E7
7	Outdoor unit malfunction	X	◎	X	X	Ed
8	Indoor fan speed is out of control	☆	☆	X	X	E8
9	Communication malfunction between main PCB and up-down panel PCB	☆	☆	☆	X	F0
10	Up-down panel malfunction	☆	☆	X	☆	F1
11	Up-down panel is not closed	☆	☆	X	O	F2
12	Communication malfunction between master unit and slave unit	X	☆	X	☆	F3
13	Other malfunction of master unit or slave unit	X	☆	☆	X	F4
<p>O (on) X(off) ☆(flash at 5Hz) ◎(flash at 0.5Hz)</p>						

**For Floor standing models**

Display(nixie tube)	Contents
P0	Evaporator low temp. protection
Ed	Outdoor unit malfunction
E1	Indoor / outdoor units communication error
E2	Open or short circuit of T1 temperature sensor
E3	Open or short circuit of T2 temperature sensor
E4	Open or short circuit of T2B temperature sensor
E7	Indoor EEPROM malfunction

## 2.3 Outdoor unit malfunction

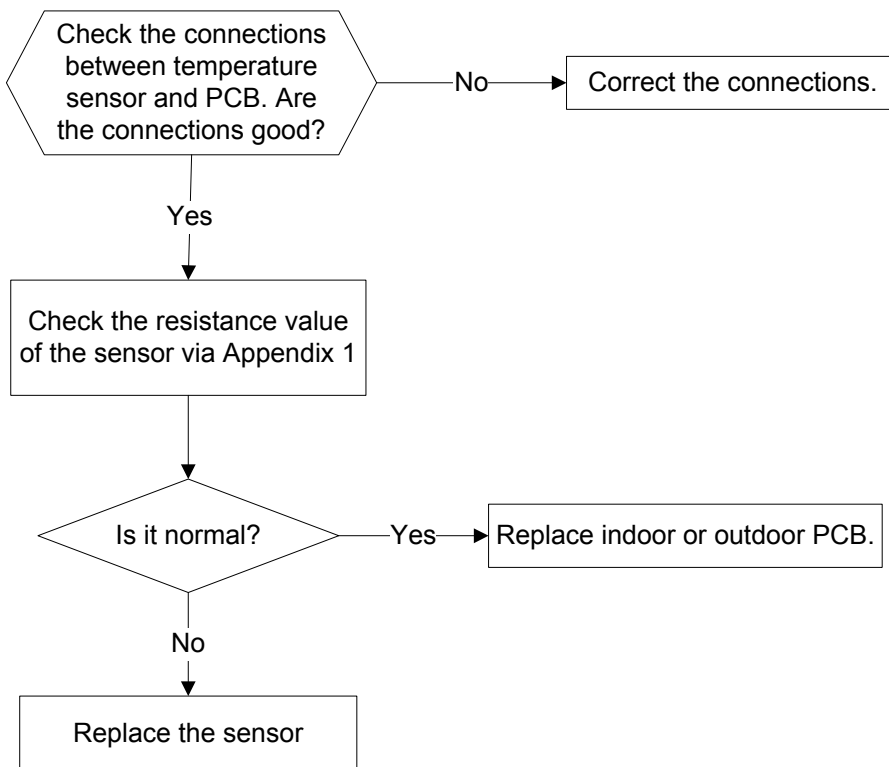
Display	Malfunction or Protection
E0	Outdoor EEPROM malfunction
E2	Indoor / outdoor units communication error
E3	Communication malfunction between IPM board and outdoor main board
E4	Open or short circuit of outdoor temperature sensor
E5	Voltage protection of compressor
P0	Top temperature protection of compressor
P1	High pressure protection(Only for 36K~52K)
P2	Low pressure protection(Only for 36K,~52K)
P3	Current protection of compressor
P4	Discharge temperature protection of compressor
P5	High temperature protection of condenser
P6	IPM module protection
P7	High temperature protection of evaporator



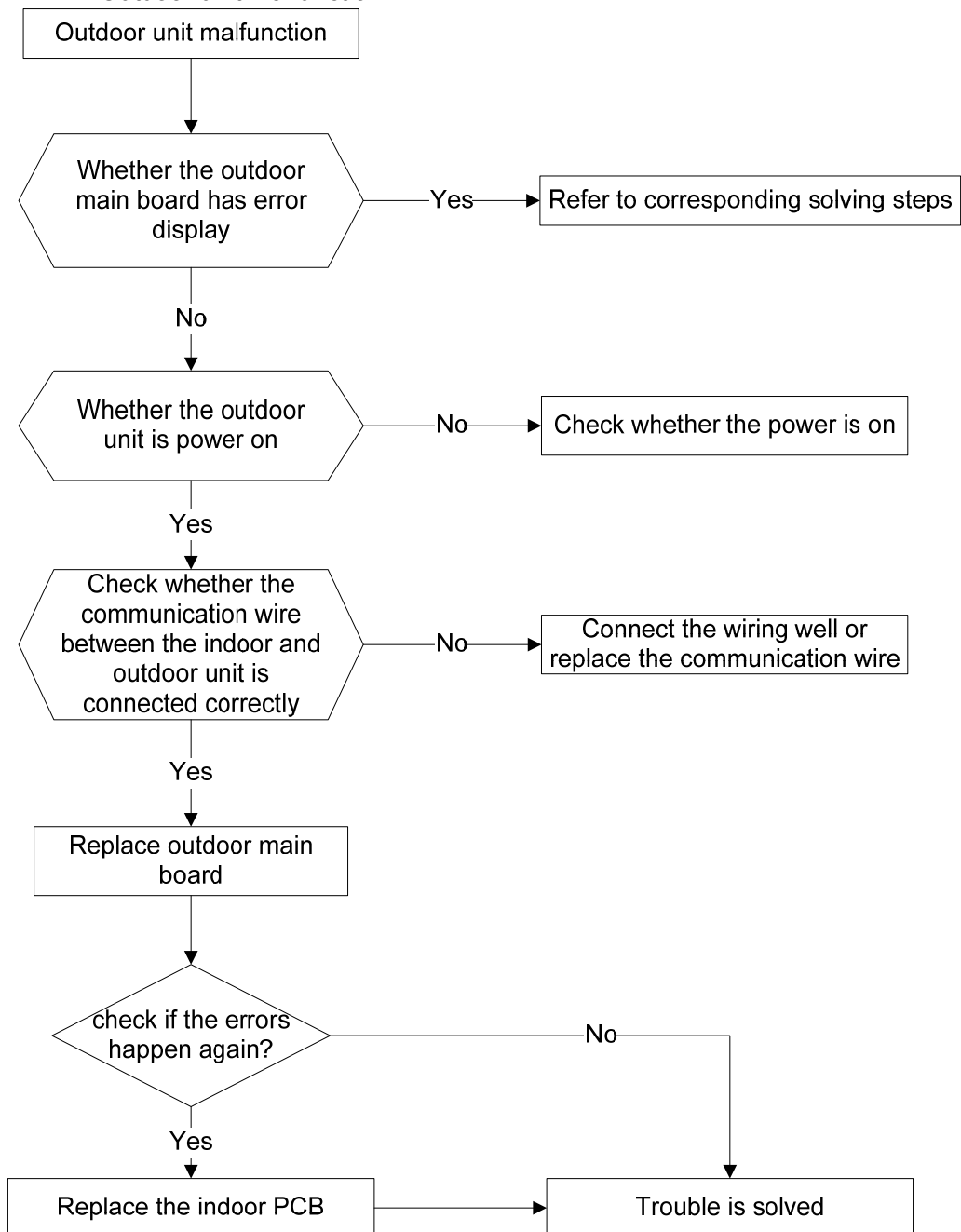
## 2.4 Solving steps for typical malfunction

### 2.4.1 For the indoor unit

#### 2.4.1.1 Open or short circuit of temperature sensor

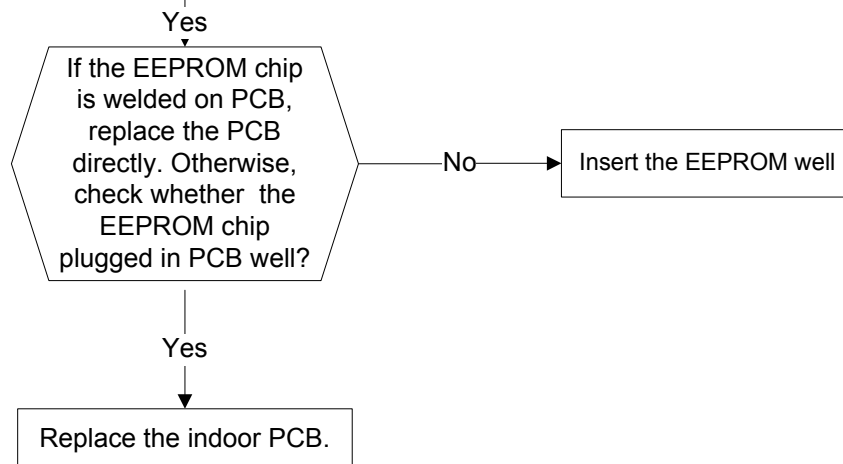


#### 2.4.1.2. Outdoor unit malfunction

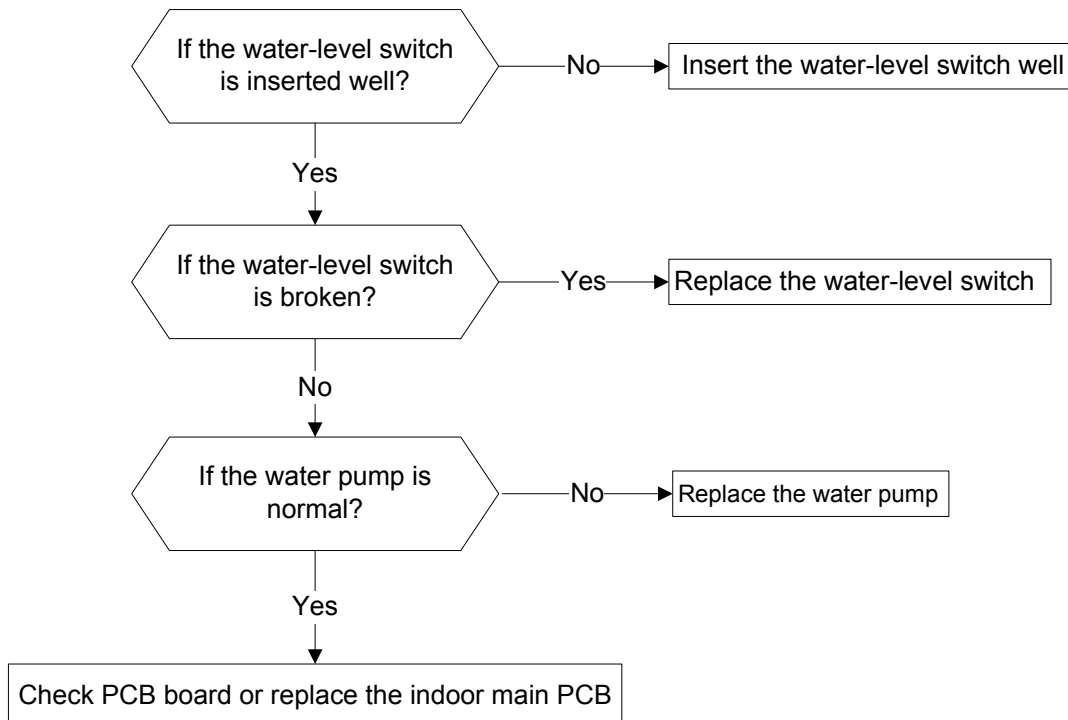


### 2.4.1.3. Indoor EEPROM malfunction

Shut off the power supply and turn it on 5 seconds later. Is it still displaying the error code?



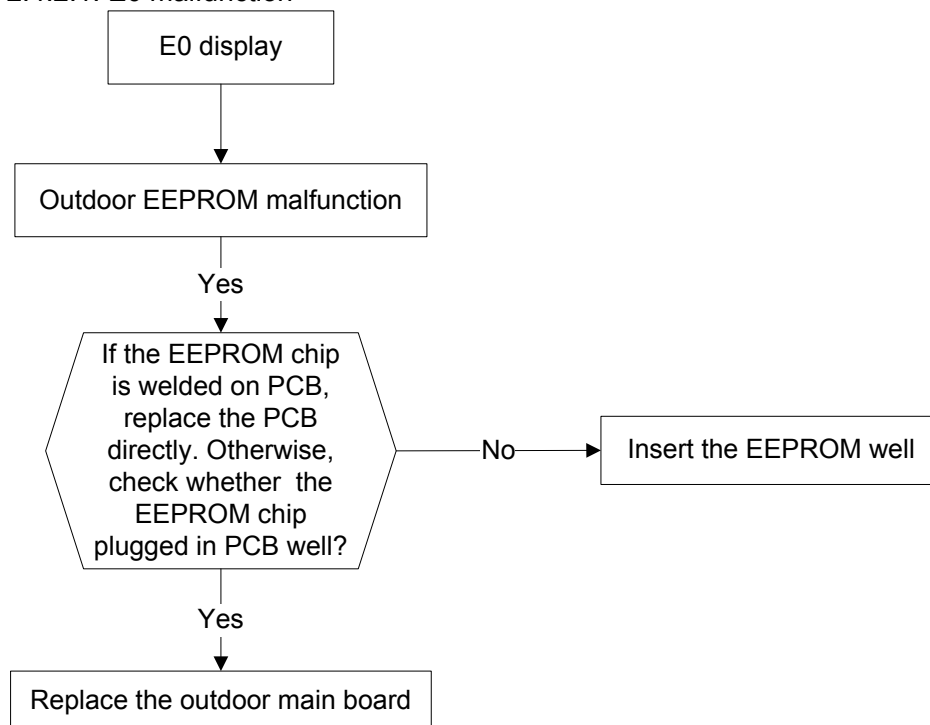
### 2.4.1.4. Full-water malfunction



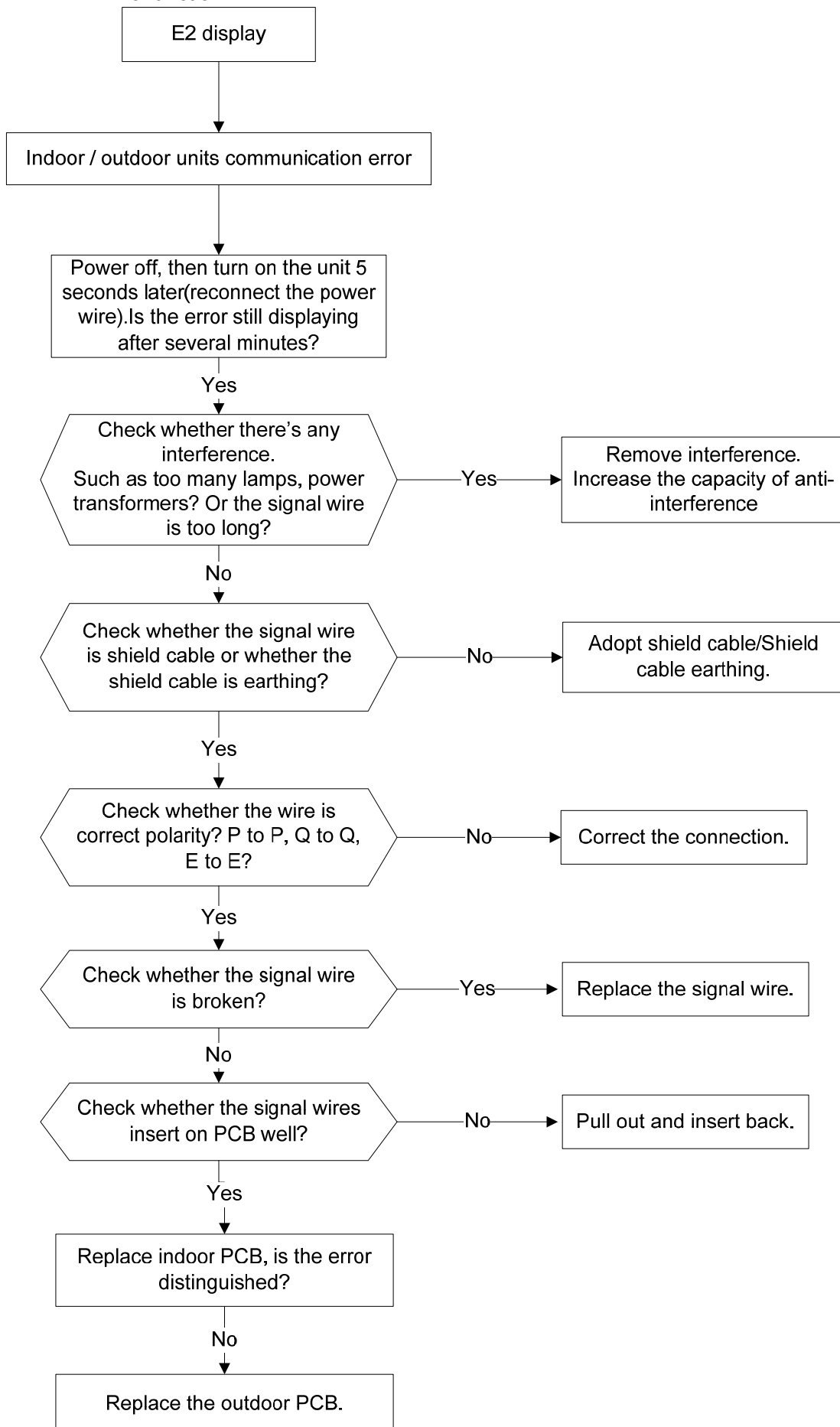
---

## 2.4.2 For the outdoor unit

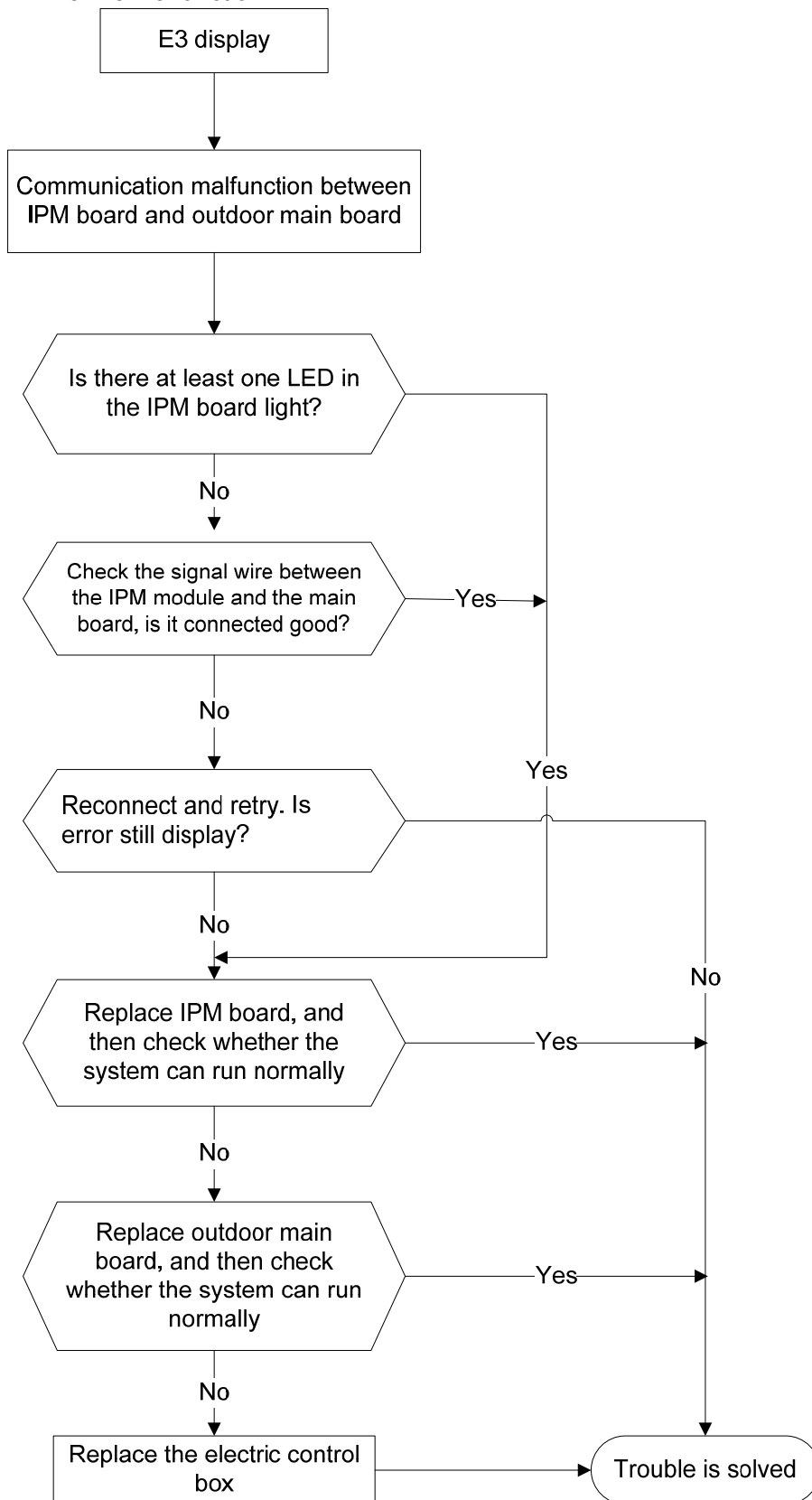
### 2.4.2.1. E0 malfunction



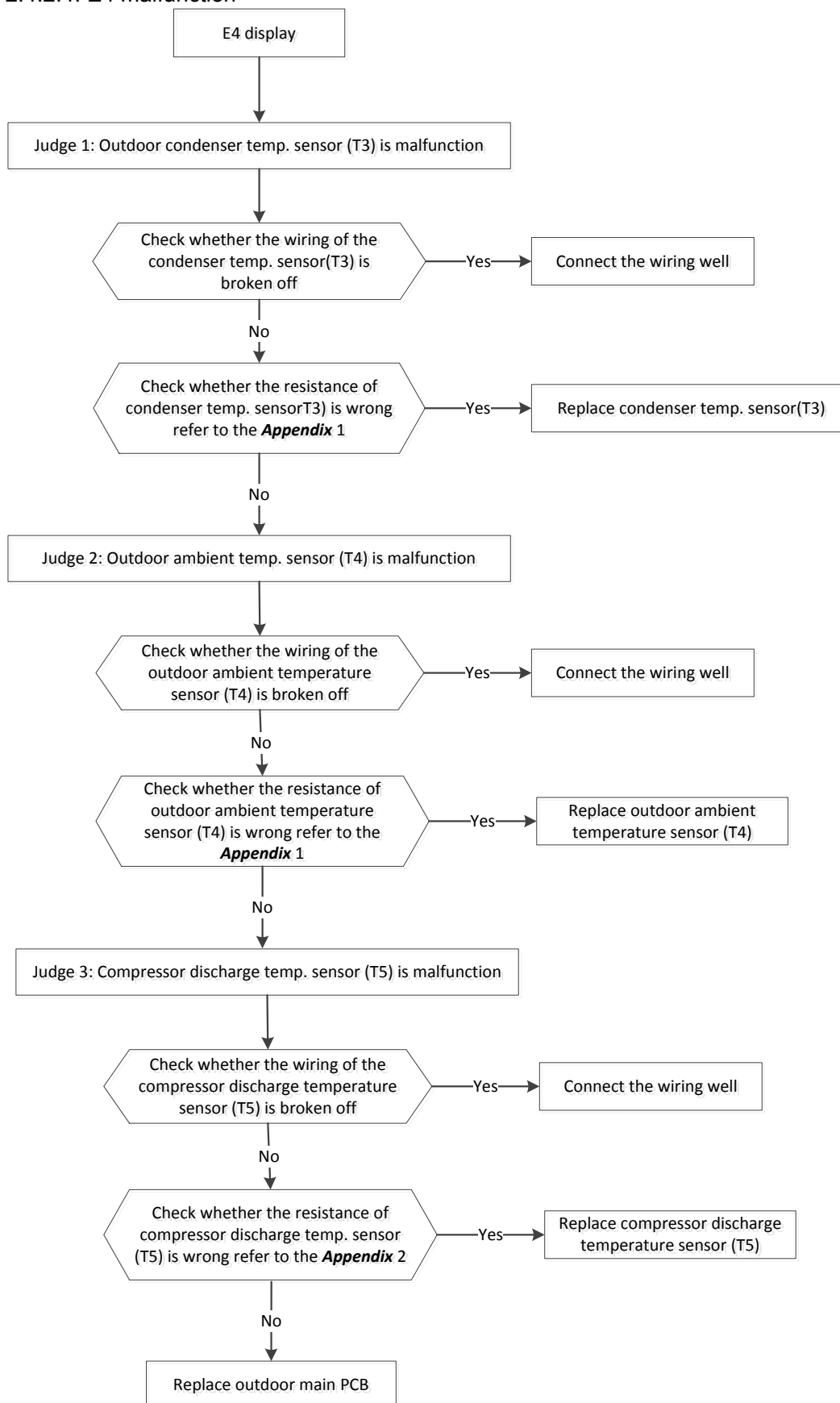
### 2.4.2.2. E2 malfunction



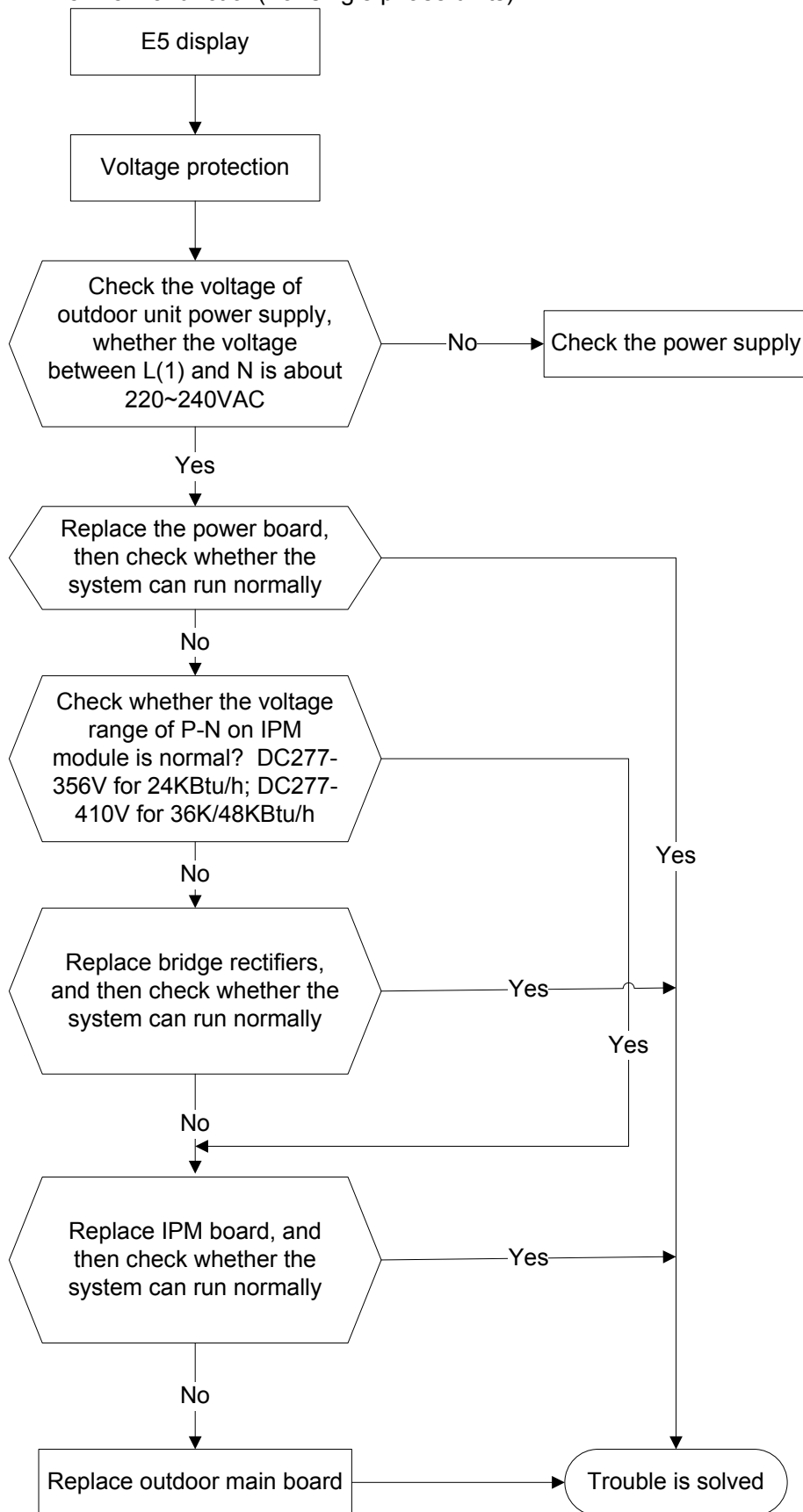
#### 2.4.2.3. E3 malfunction



#### 2.4.2.4. E4 malfunction

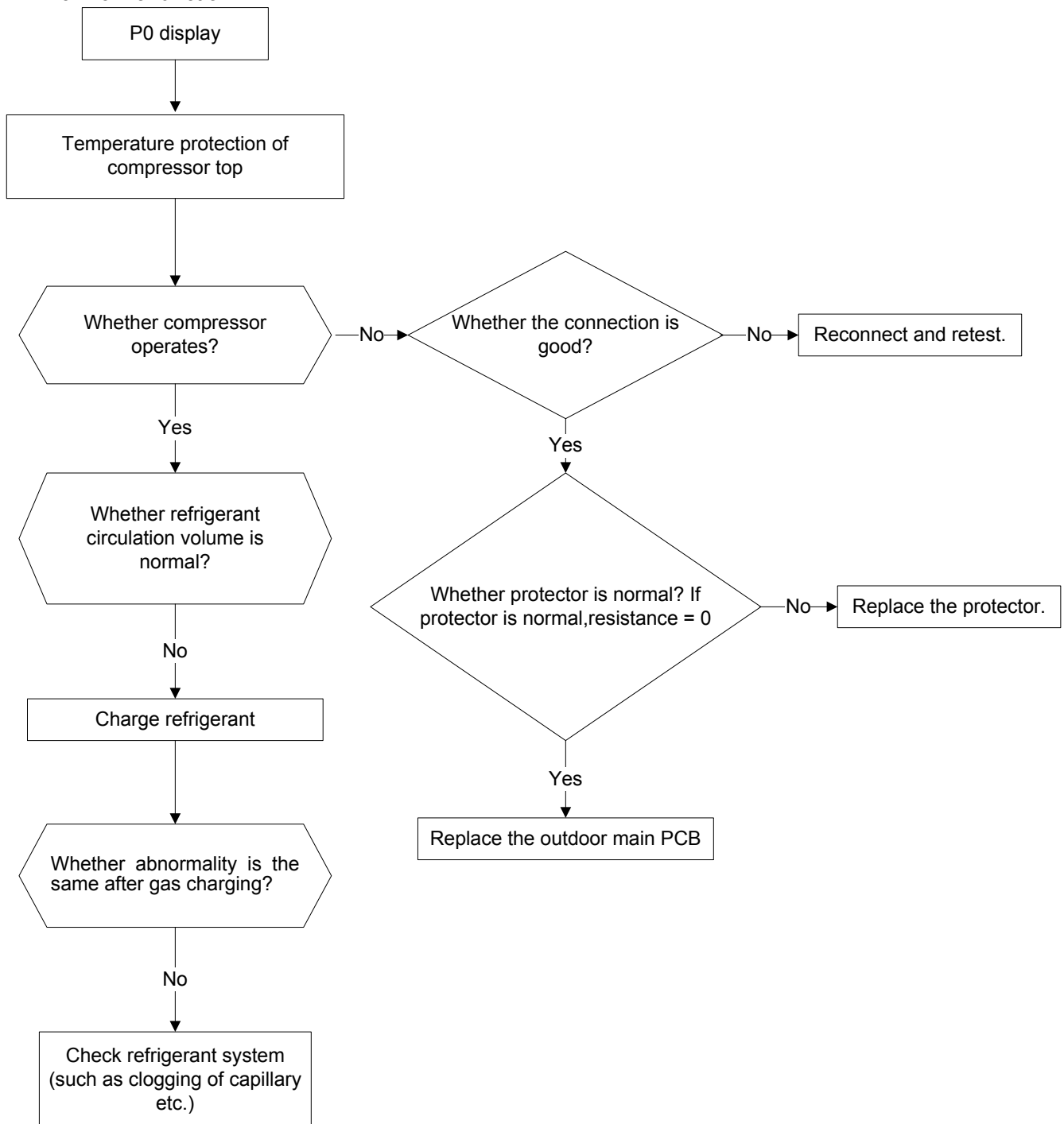


#### 2.4.2.5. E5 malfunction(For single phase units)

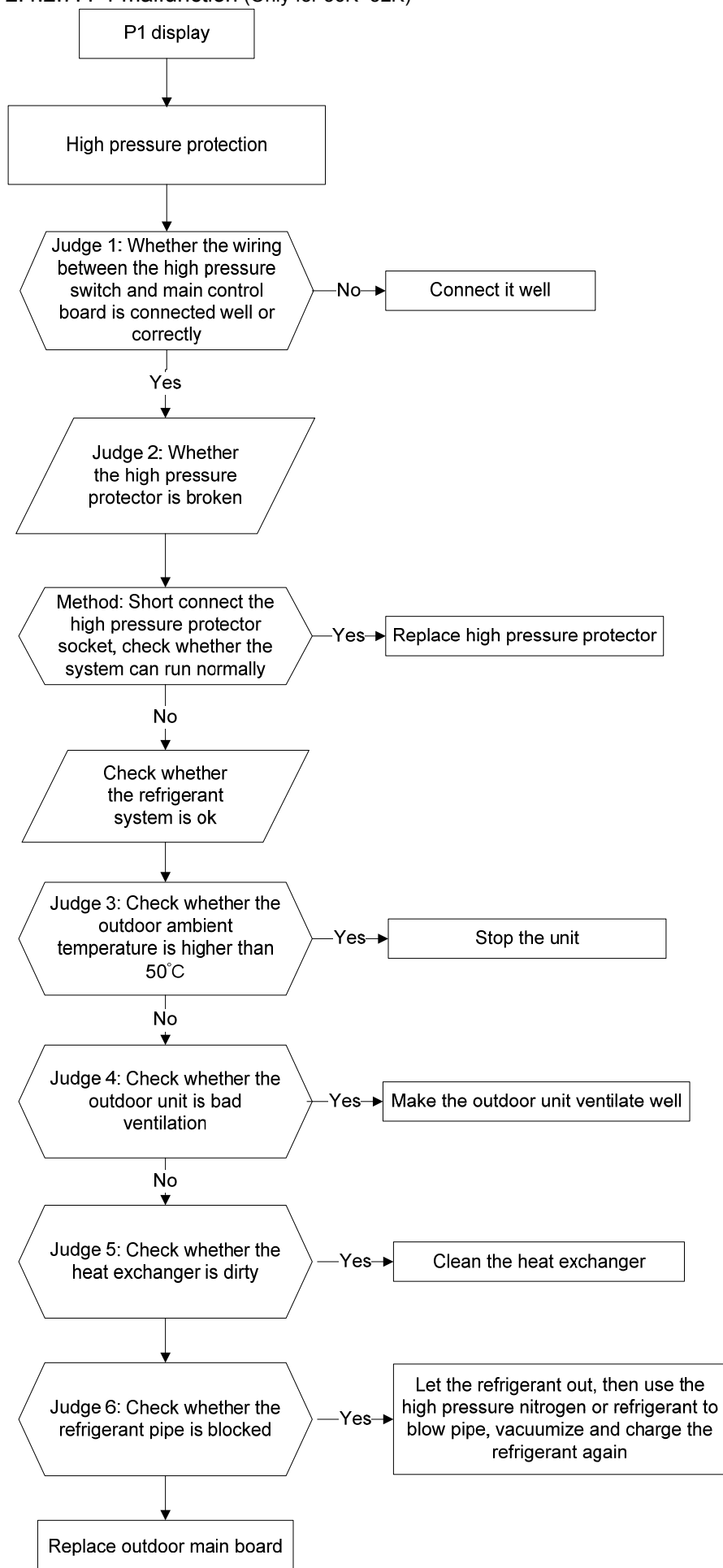




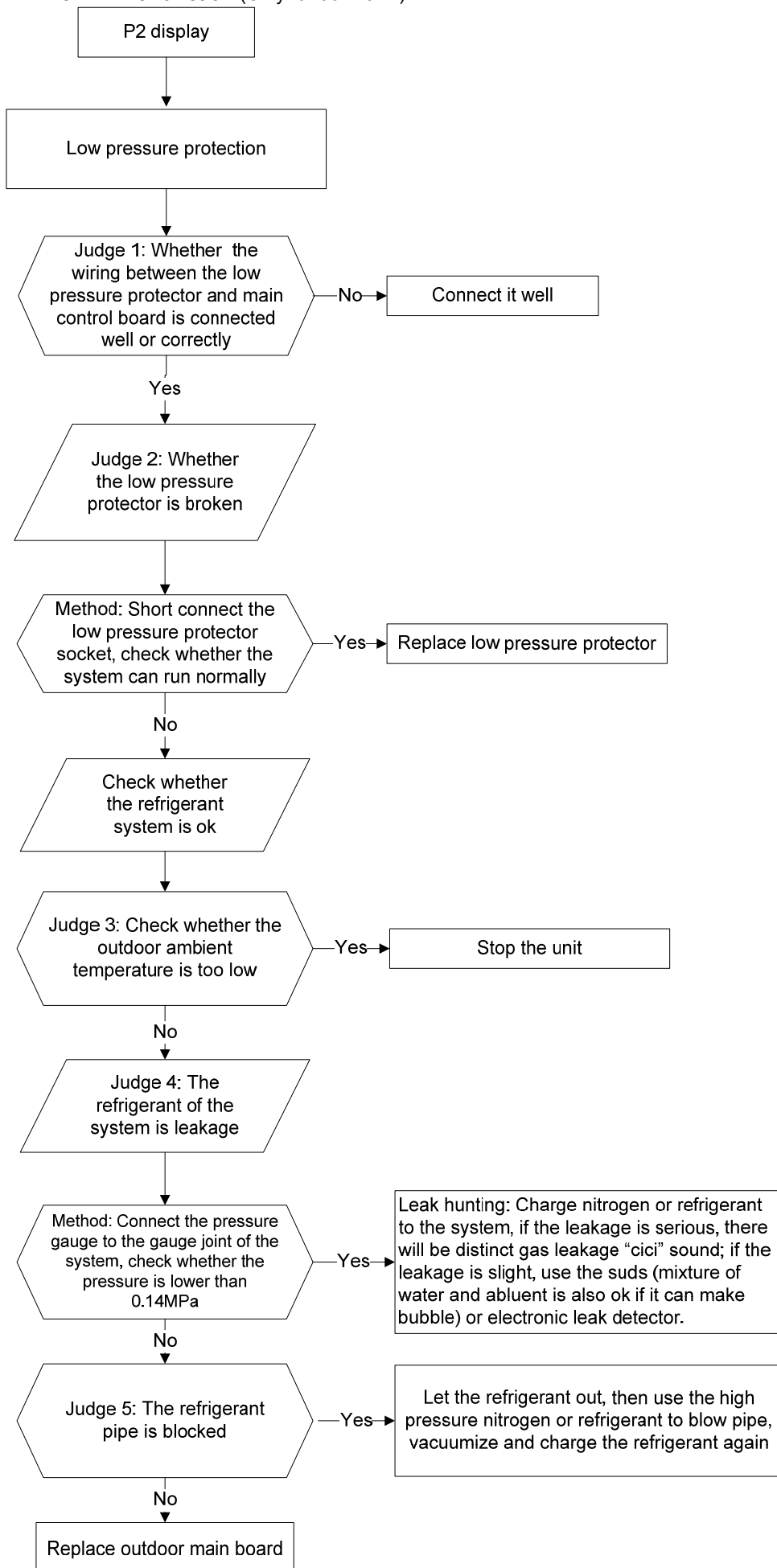
#### 2.4.2.6. P0 malfunction



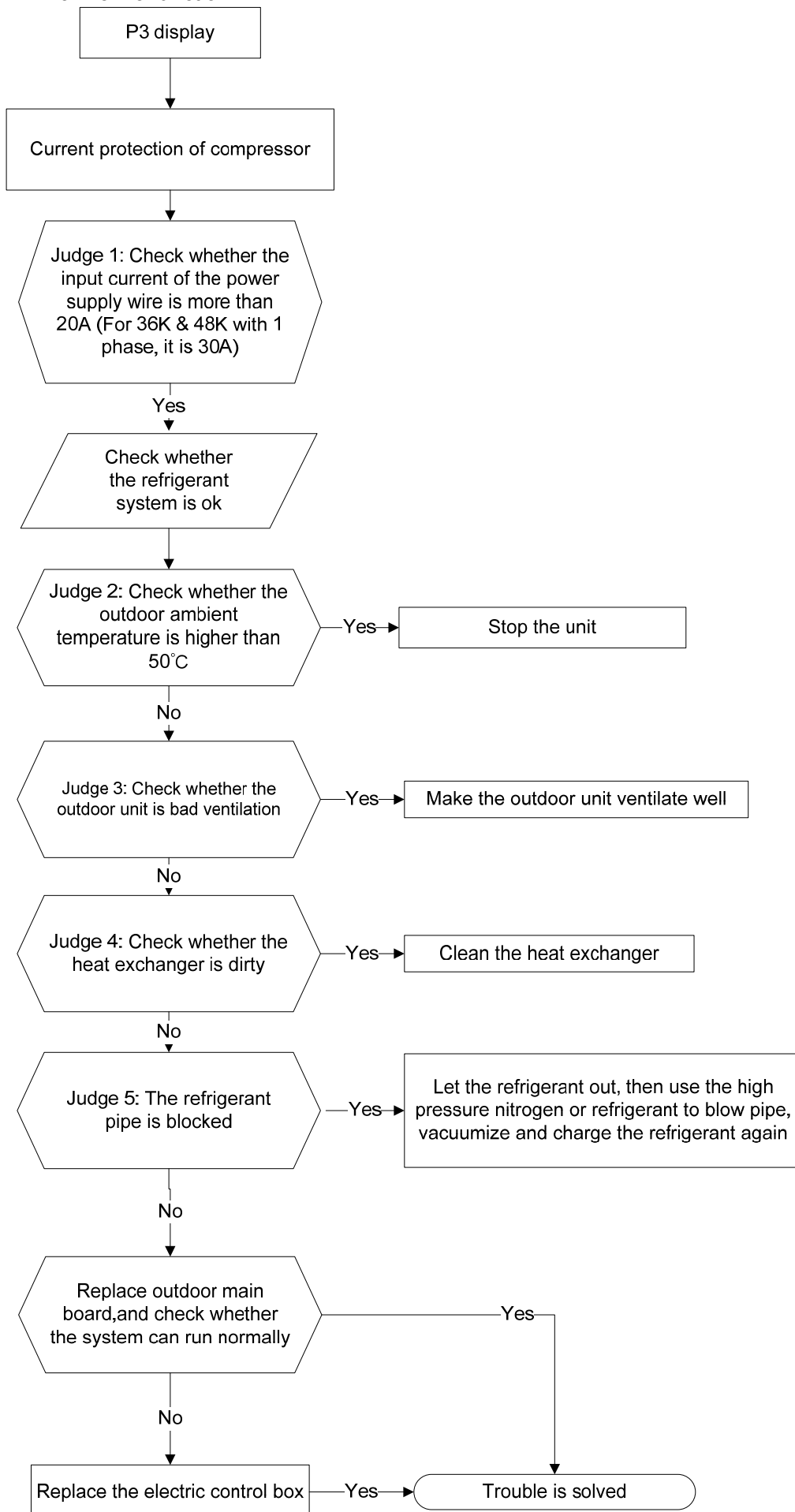
#### 2.4.2.7. P1 malfunction (Only for 36K~52K)



#### 2.4.2.8. P2 malfunction (Only for 36K~52K)

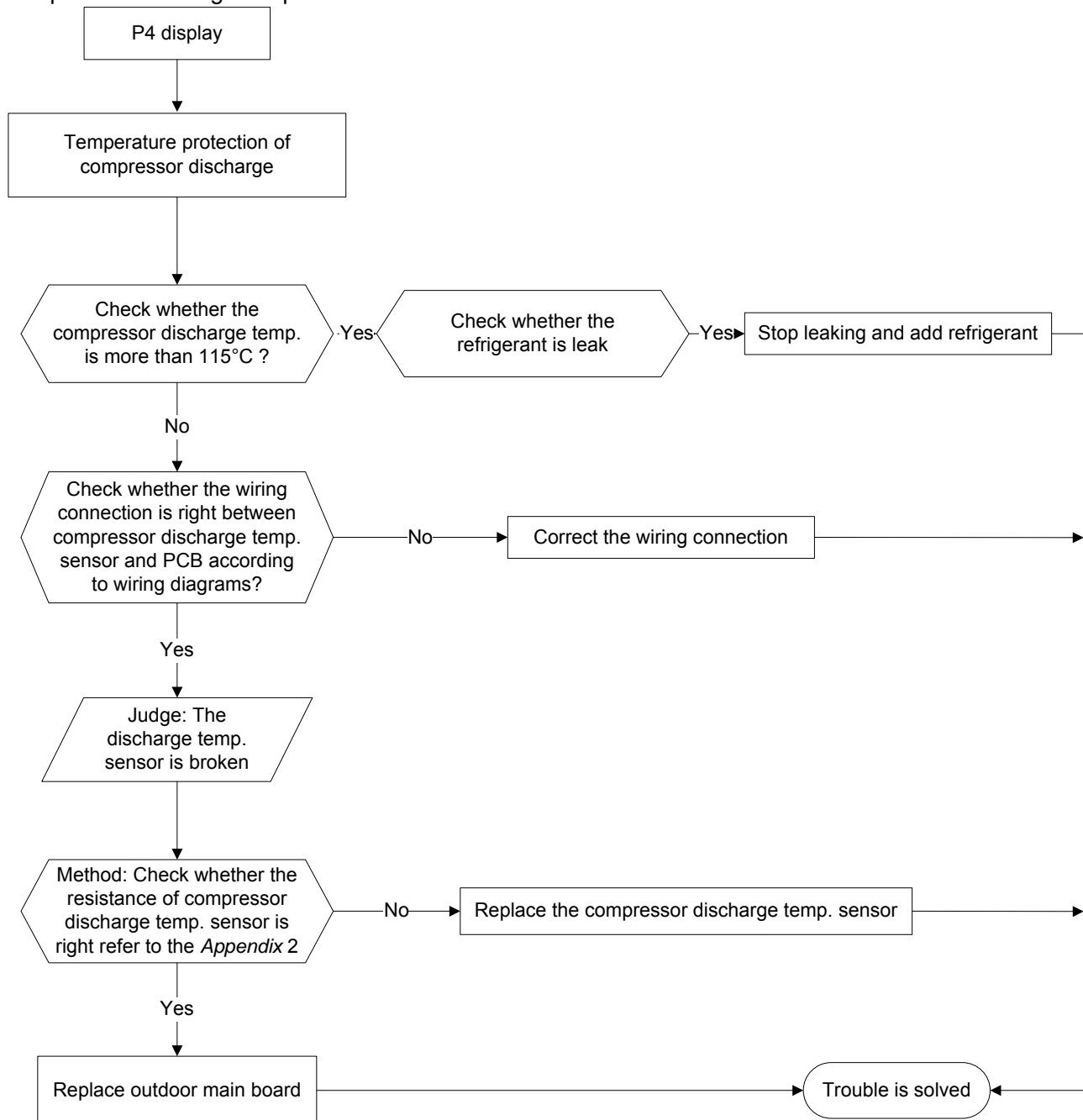


#### 2.4.2.9. P3 malfunction



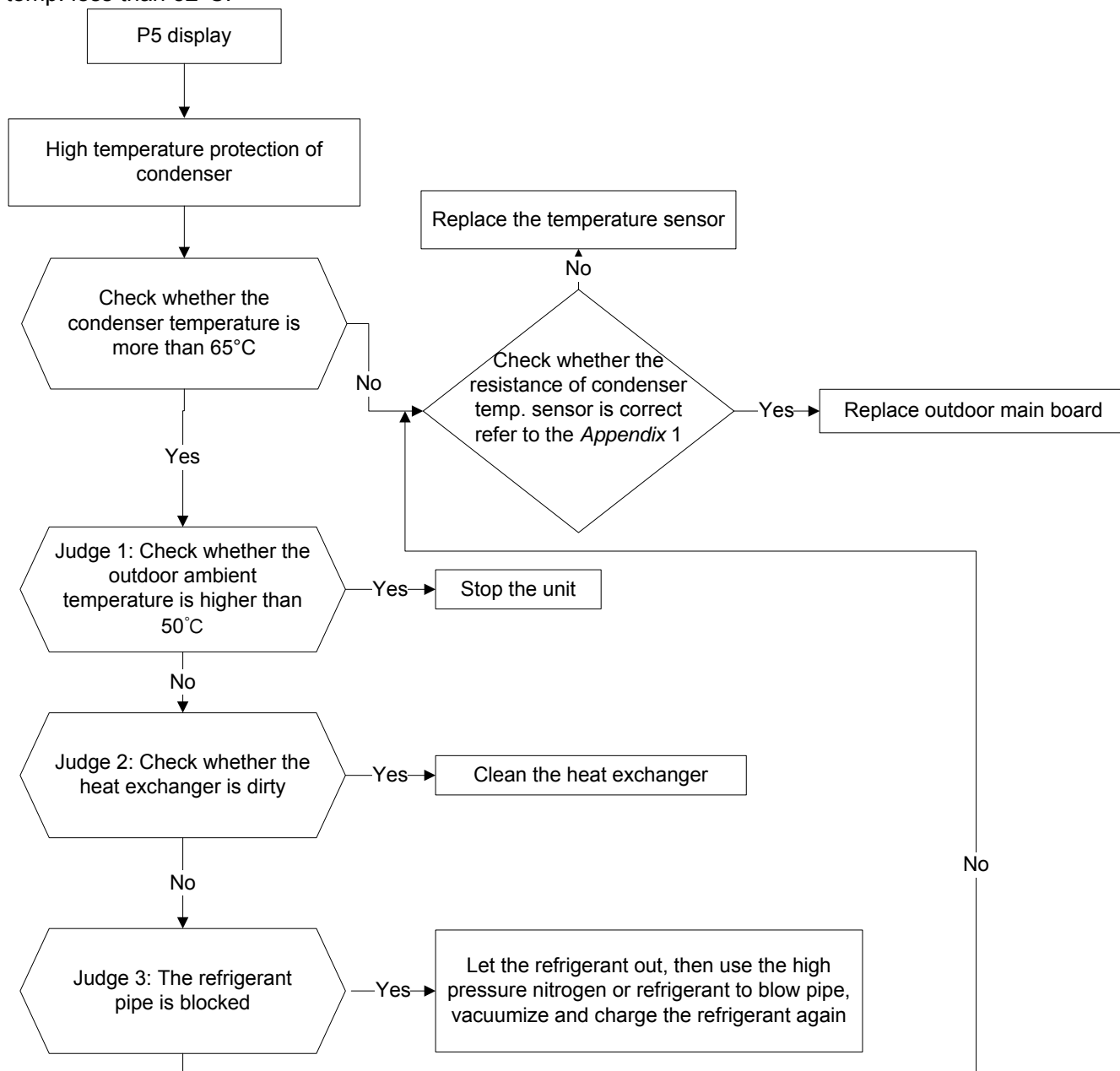
#### 2.4.2.10. P4 malfunction

When compressor discharge temperature is higher than 115°C, the unit will stop, and unit runs again when compressor discharge temperature is lower than 90°C.

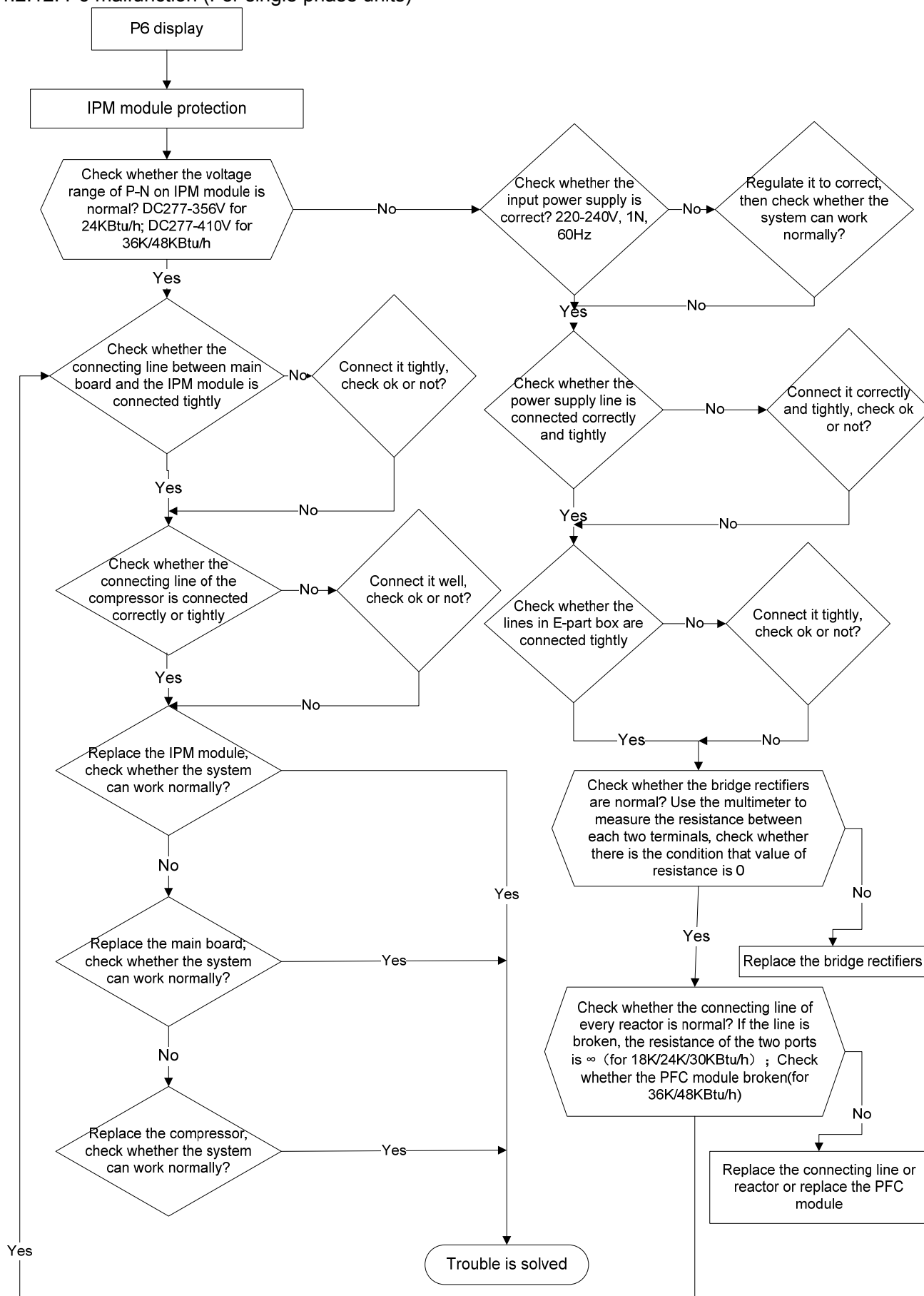


#### 2.4.2.11. P5 malfunction

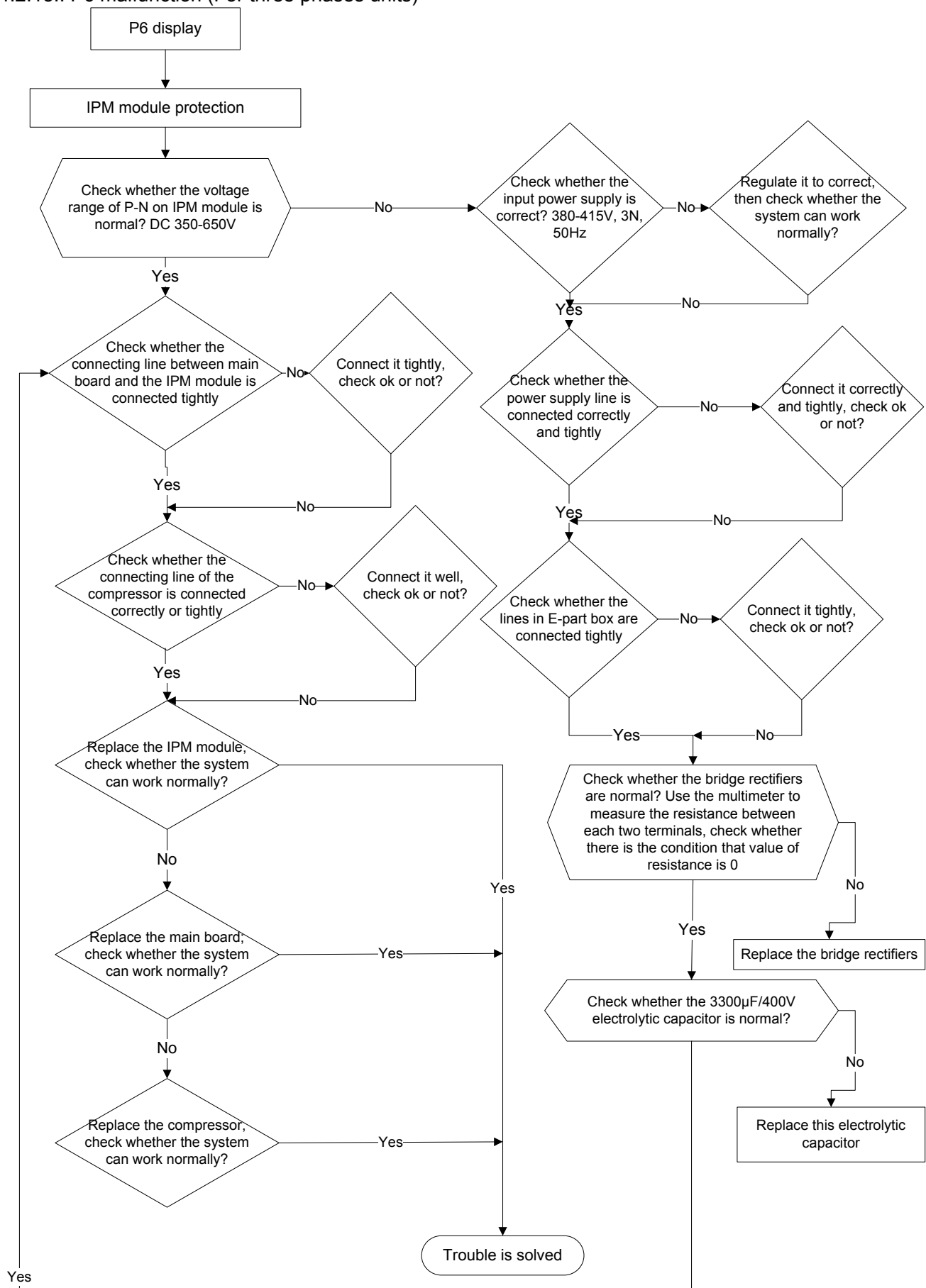
When condenser high temp. is more than 65°C, the unit will stop, and unit runs again when outdoor pipe temp. less than 52°C.



## 2.4.2.12. P6 malfunction (For single phase units)

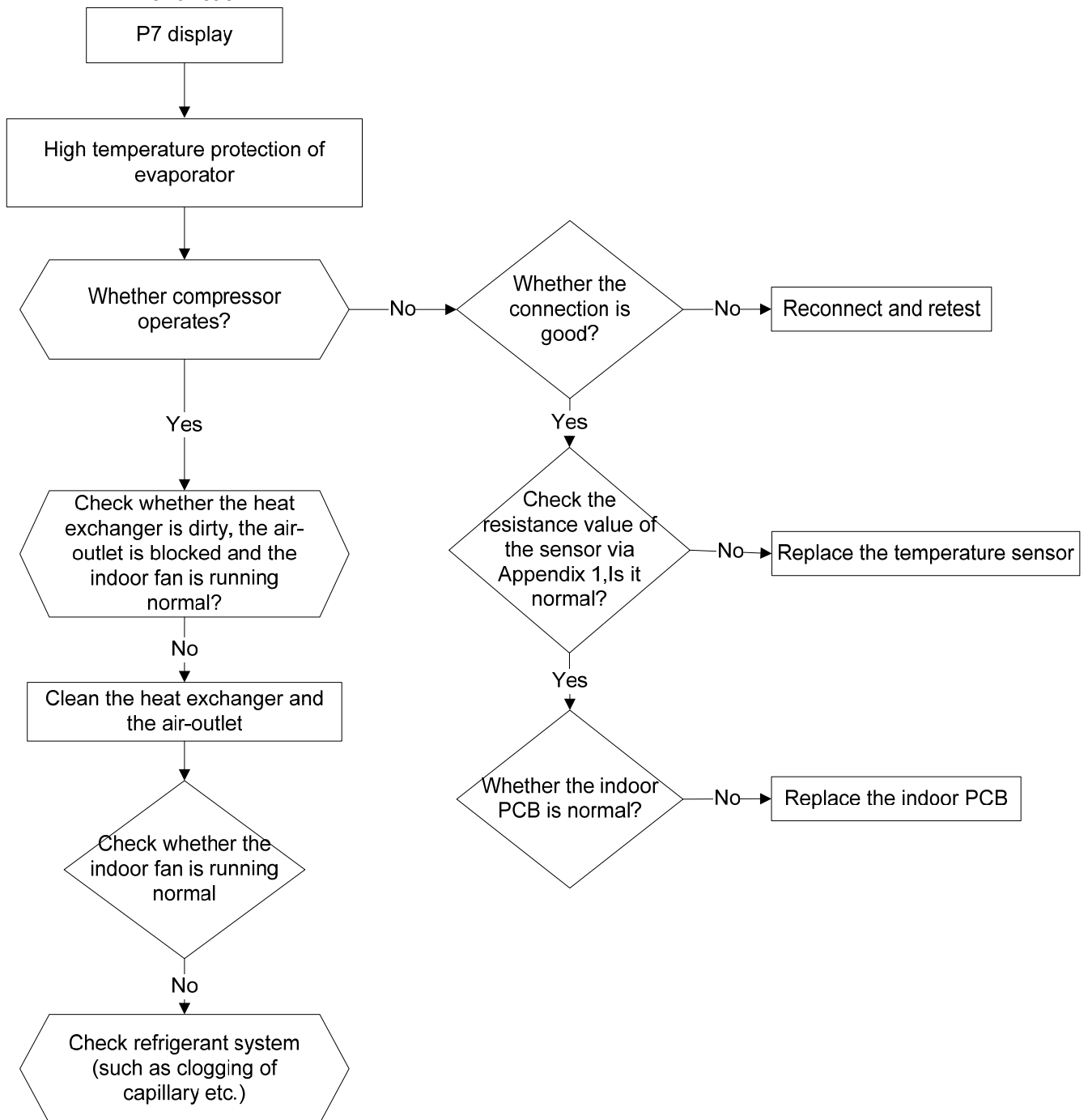


### 2.4.2.13.. P6 malfunction (For three phases units)





#### 2.4.2.14. P7 malfunction



**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	10.000	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

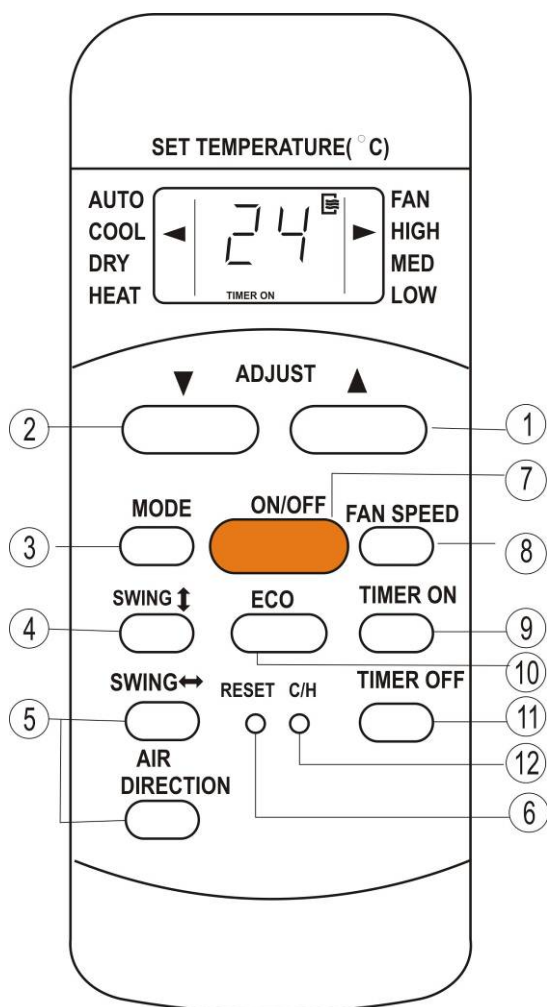
**Appendix 2**

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		

### 3. Controller

#### 3.1 Wireless Remote Controller

##### 3.1.1 RG51Q1/BGE



#### General Function for wireless remote controller:

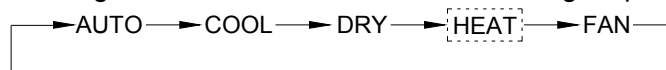
Model	RG51Q1/BGE
Rated voltage	3.0V(2pieces of LR03 7 # batteries)
Min voltage for sending signal of CPU	2.4V
Effective receiving distance	8m~11m
Operation condition	-5~60℃

## Buttons and functions

1. **Adjust ▼** : Decrease the set temp. Keeping pressing will decrease the temp with 1°C per 0.5s.

2. **Adjust ▲** : Increase the set temp. Keeping pressing will increase the temp with 1°C per 0.5s.

3. **MODE**: Once pressing, running mode will be selected in the following sequence:



**NOTE: Heating mode not applicable.**

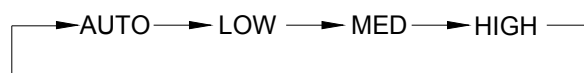
4. **VERT SWING**: Used to stop or start horizontal louver movement or set the desired up/down air flow direction. The louver changes 6 degree in angle for each press. If keep pushing more than 2 seconds, the louver will swing up and down automatically.

5. **HORIZ SWING**: Used to stop or start vertical louver movement.

6. **AIR DIRECTION**: Used to set the desired up/down air flow direction. The louver changes 6 degree in angle for each press.

7. **ON/OFF**: For turning on or turning off the air conditioner.

8. **FAN SPEED**: Fan speed will be selected in following sequence once pressing this button:



9. **TIME ON**: For time ON setting. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour. Adjusting the figure to 0.00 will cancel time ON setting.

10. **ECO**: (Sleep mode) Activate or turn off economic operation mode. It is suggested to turn on this function when sleeping. (Only available when remote controller is used with corresponding unit.)

11. **TIME OFF**: For time OFF setting. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour.

Adjust the figure to 0.00 will cancel time OFF setting.

12. **C/H** (inner located): Press this button with a needle of 1mm to shift the mode between Cooling only and Cooling & Heating according to the feature of the machine. (not applicable for this models)

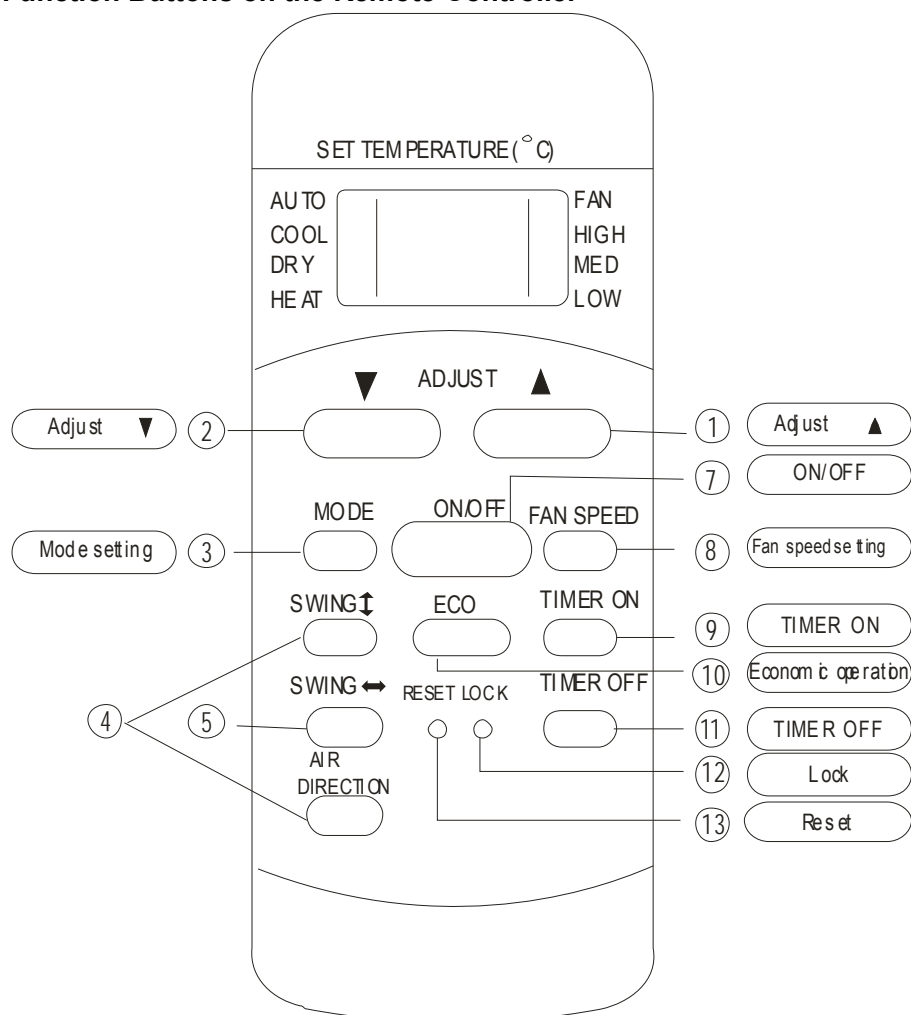
13. **RESET** (inner located): Press this button with a needle of 1mm to cancel the current setting and reset remote controller.

### 3.1.2 RG51C/E

#### Remote Controller Specifications

Model	RG51C/E
Rated Voltage	3.0V
Lowest Voltage of CPU Emitting Signal	2.0V
Reaching Distance	8m (when using 3.0 voltage, it can get 11m)
Environment Temperature Range	-5℃~60℃

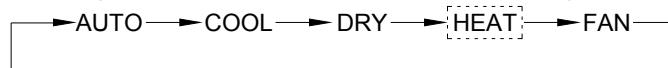
#### Introduction of Function Buttons on the Remote Controller



1. **Adjust ▼** : Decrease the set temp. Keeping pressing will decrease the temp with 1℃ per 0.5s.

2. **Adjust ▲** : Increase the set temp. Keeping pressing will increase the temp with 1℃ per 0.5s.

3. **MODE**: Once pressing, running mode will be selected in the following sequence:



**NOTE: Heating mode not applicable.**

4. **VERT SWING**: Used to stop or start horizontal louver movement. The louver will swing up and down automatically if push this button.

**AIR DIRECTION**: Used to set the desired up/down air flow direction. The louver changes 6 degree in angle for each press.

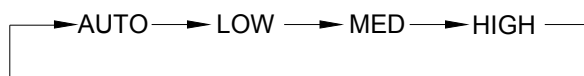
5. **HORIZ SWING**: Used to stop or start vertical louver movement.

6. **FAN SPEED+ MODE**: Press the Mode and Fan speed button simultaneously for 2 seconds. The remote

controls into faceplate setting state and the LCD shows F2. Press the TEMPUP(▲) to control the faceplate up and press the TEMP DOWN(▼) to control the faceplate down. Press any button to exit the faceplate setting state, then the LCD back to the normal display.

**7. ON/OFF:** For turning on or turning off the air conditioner.

**8. FAN SPEED:** Fan speed will be selected in following sequence once pressing this button:



**9. TIME ON:** For time ON setting. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour. Adjusting the figure to 0.00 will cancel time ON setting.

**10. ECO:** (Sleep mode) Select this function during the sleeping time. It can maintain the most comfortable temperature and save energy. This function is available on COOL, HEAT or AUTO mode only .

NOTE: While the unit is running under Energy-saving mode, it would be cancelled if press MODE, FAN SPEED or ON/OFF button.

**11. TIME OFF:** For time OFF setting. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour.

Adjust the figure to 0.00 will cancel time ON setting.

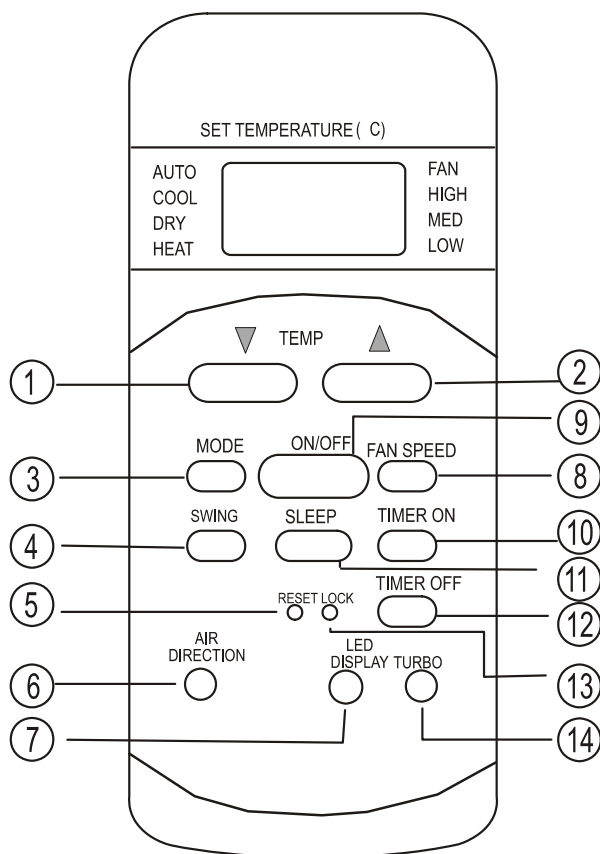
**12. LOCK** (inner located): Push this button to lock in all the current settings, and the remote controller will not accept any operation except that of the LOCK. Use the LOCK mode when you want to prevent settings from being changed accidentally. Press the LOCK button again to cancel the LOCK function. A lock symbol will appear on the remote controller display when the lock function is activated.

**13. RESET** (inner located): Once the recessed RESET button is pressed, all of the current settings will be cancelled and the controller will return to the initial settings..

### 3.1.3 R51M/(C)E

#### Remote Controller Specifications

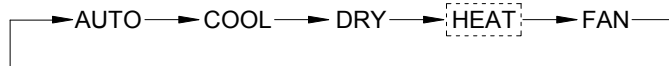
Model	R51M/(C)E
Rated Voltage	3.0V
Reaching Distance	8m
Environment Temperature Range	-5℃~60℃



**1. Adjust ▼** : Decrease the set temp. Keeping pressing will decrease the temp with 1℃ per 0.5s.

**2. Adjust ▲** : Increase the set temp. Keeping pressing will increase the temp with 1℃ per 0.5s.

**3. MODE:** Once pressing, running mode will be selected in the following sequence:



**NOTE: Heating mode not applicable.**

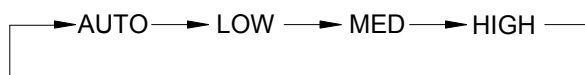
**4. SWING:** Used to stop or start horizontal louver movement. The louver will swing up and down automatically if push this button.

**5. RESET** (inner located): Once the recessed RESET button is pressed, all of the current settings will be cancelled and the controller will return to the initial settings.

**6. AIR DIRECTION:** Press this button to change the swing angle of the louver. The swing angle of the louver is 6 degree for each press. When the louver swing at a certain angle which would affect the cooling and heating effect of the air conditioner, it would automatically change the swing direction . No symbol will appear in the display area when press this button. (Not applicable to units without this function).

**7. LED:** Press this button to clear the digit display in the air conditioner, press it again to activate it (Not available for the units without LED display window).

**8. FAN SPEED:** Fan speed will be selected in following sequence once pressing this button:



**9. ON/OFF:** For turning on or turning off the air conditioner

**10. TIME ON:** For time ON setting. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour. Adjusting the figure to 0.00 will cancel time ON setting.



**11. SLEEP:** Press this button to go into the Energy-Saving operation mode. Press it again to cancel. This function is only can be used on COOL, HEAT and AUTO mode and maintain the most comfortable temperature for you.

**12. TIME OFF:** For time OFF setting. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour.

Adjust the figure to 0.00 will cancel time OFF setting.

**13. LOCK** (inner located): Push this button to lock in all the current settings, and the remote controller will not accept any operation except that of the LOCK. Use the LOCK mode when you want to prevent settings from being changed accidentally. Press the LOCK button again to cancel the LOCK function. A lock symbol will appear on the remote controller display when the lock function is activated.

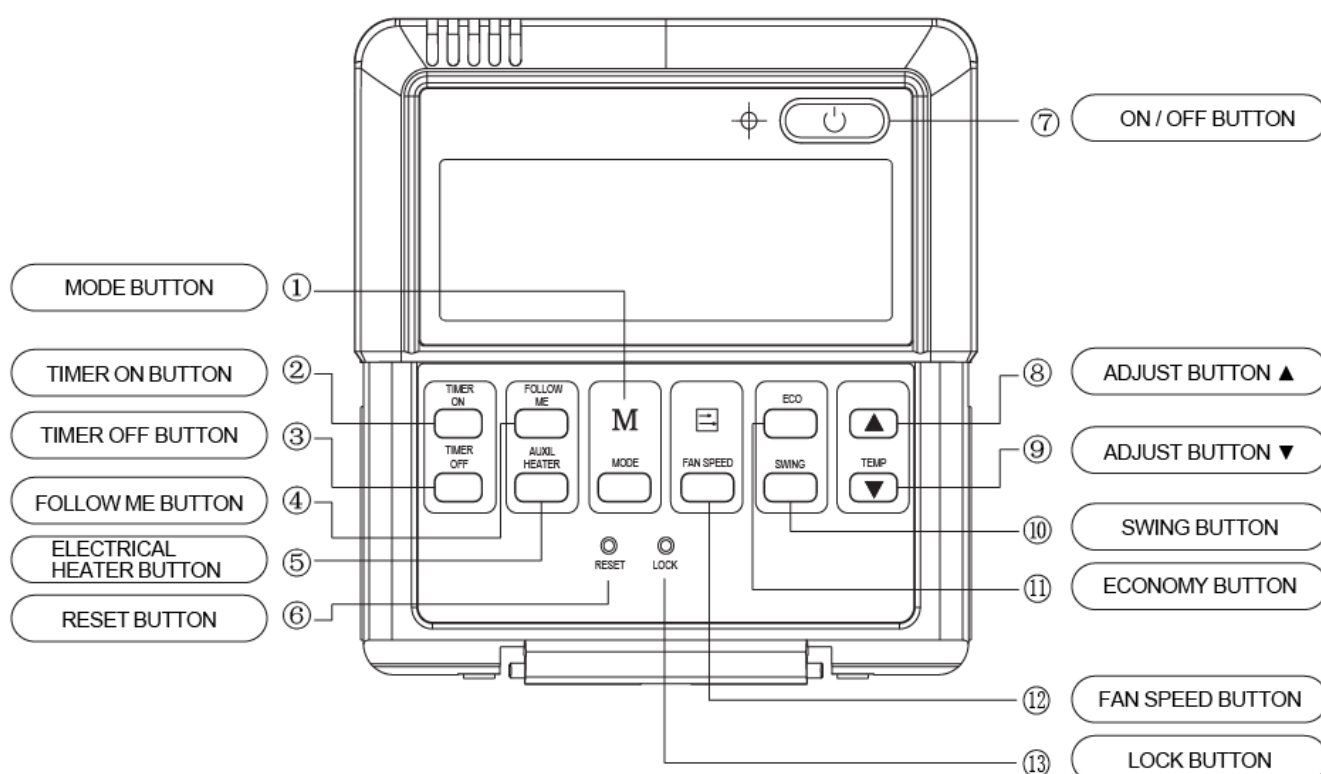
**14. TURBO:** Push this button to activate/cancel the Turbo function which enables the unit to reach the preset temperature in the shortest time. On cooling mode, the unit will blow strong cooling air with super high fan speed. On heating mode (applicable to the unit adopts PTC only), the PTC will bring fast heating operation.

## 3.2 Wired Remote Controller

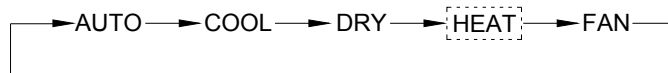
### 3.2.1 KJR-12B



#### Name and functions of buttons on the wire controller

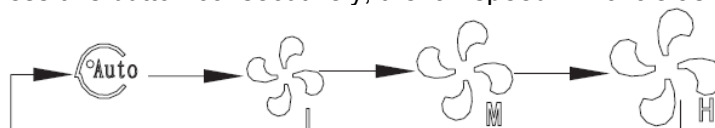


1. Mode button: When press this button, the operation mode change as the following sequence:



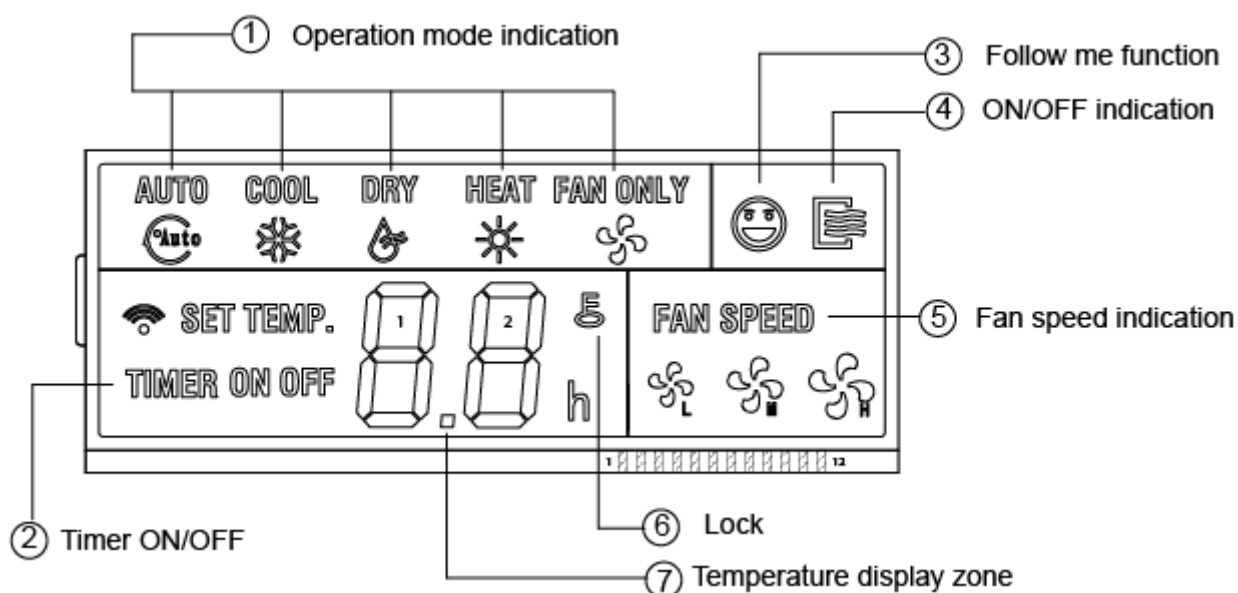
**Remark:** the heating mode is not applicable.

2. Timer on button: Press this button, timer on function is active. Then every press, the time increase 0.5h, after 10h, 1h increasement after each press. If cancel this Function, just set it to "0.0"
3. Timer off button: Press this button, timer off function is active. Then every press, the time increase 0.5h, after 10h, 1h increasement after each press. If cancel this function, just set it to "0.0" .
4. Follow me button: When under cool, heat and auto mode, press this button, follow me function is active. Press again, this function is ineffective.
5. Electrical heater button: If press this button in heat mode, electrical heater function become ineffective.
6. Reset button (hidden): Use a 1mm stick to press in the little hole , then the current setting is canceled . The wire controllers enter into original state.
7. ON/OFF button: When in off state, press this button, the indicator is on, the wire controller enter into on state, and send setting information to indoor PCB. When in on state, press this button, the indicator is off, and send instruction. If timer on or timer off has been set, it cancel this setting then send instruction to stop the machine.
8. Adjust button: Set indoor temperature up. If press and hold on, it will increase at 1degree per 0.5 second.
9. Adjust button: Set indoor temperature down. if press and hold on, it will decrease at 1degree per 0.5 Second.
10. Swing button: First press, start swing function; second press, stop swing. (Match to some model with swing function).
11. Economy operation button: press this button, the indoor unit operates in economy mode, press again, exit this mode (it may be ineffective for some models)
12. Fan speed button: press this button consecutively; the fan speed will circle as follow:



13. Lock button (hidden): When you push the LOCK button, all current settings are locked in and the wire controller does not accept any operation except that of the LOCK button. Use the lock mode when you want to prevent setting from being changed accidentally or play fully. Push the LOCK button again when you want to cancel the LOCK mode.

### Name and function of LCD on the wired controller



1. Operation mode indication: When press" MODE" button, the following mode can be selected in circle.  
Auto Cool Dry Heat Fan only Auto.  
Auto→ Cool→ Dry →Heat→ Fan only →Auto  
Heat mode is not applicable.

2. Timer: When adjust setting on time or only on time is set, the "ON" is lighted. When adjust setting off time or only off time is set, the "OFF" is lighted. If on and off timer are both set, the "ON" and "OFF" are both lighted.
3. Follow me function: There is a temperature sensor inside the wire controller, after setting temperature, it will compare the two temperatures, and the space of wire controller will be the same as setting temperature. It is available under cooling, heating, auto mode.
4. ON/OFF indication: When it is on, the icon display, otherwise it is extinguished.
5. Fan speed indication: There are four fan modes: low, middle, high, auto. For some models, no middle fan then the middle fan is seen as high speed.
6. Lock: When the "LOCK" button is pressed, the icon appears and other buttons is unable, press again, the icon disappears.
7. Temperature display zone: Generally it displays setting temperature; it can be adjusted by press temperature button▲and▼. But in fan mode, no display here.

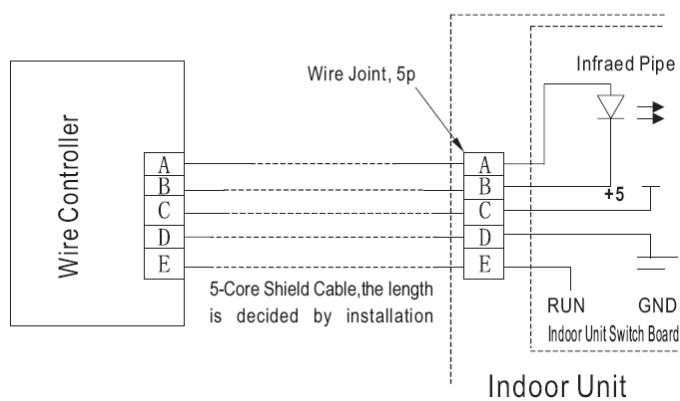
#### Remark:

The wired controller will reset to factory setting with auto mode, auto fan and 24°C setting temperature when the air conditioner restarts after power failure.

And this may cause inconsistent displays on the wired controller and on the air conditioner. You need to readjust the running status through the wired controller.

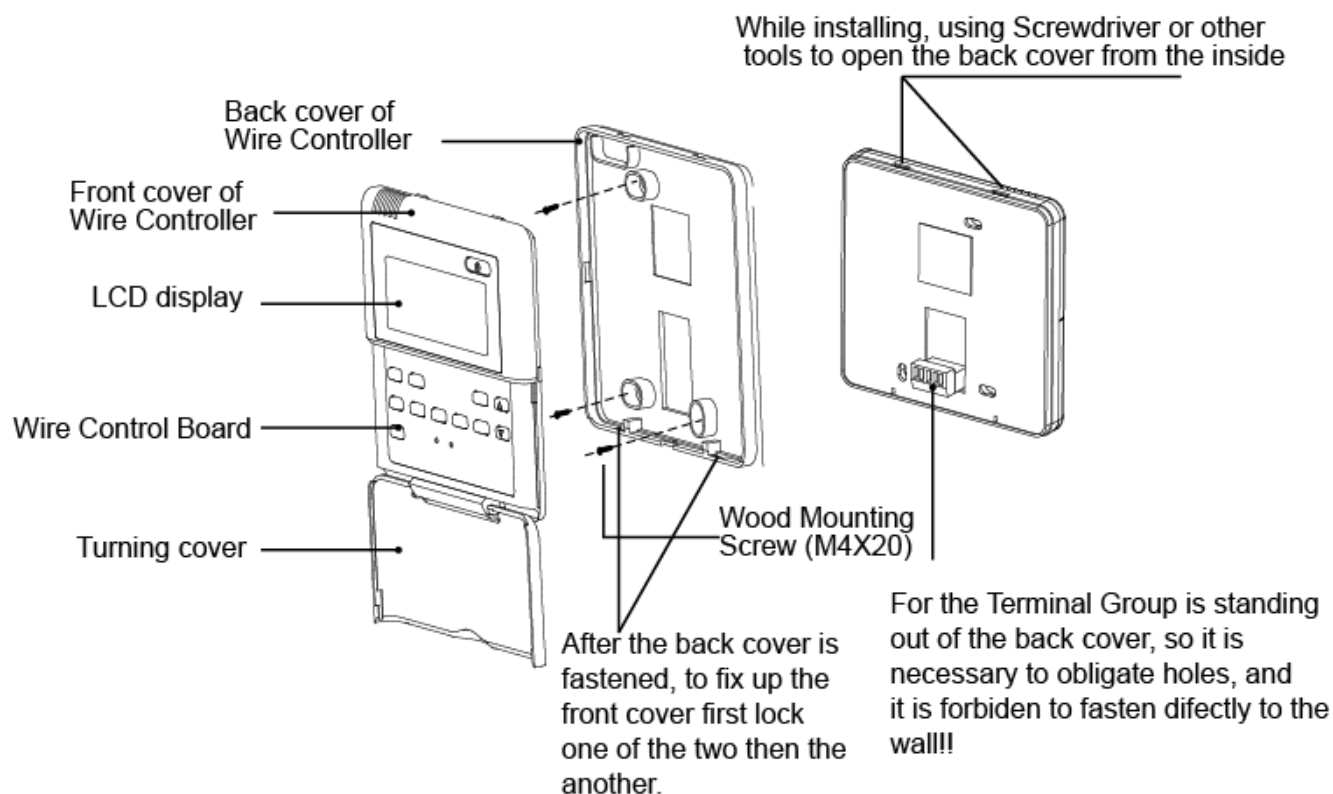
#### Installation

Wiring Principle Sketch:



#### Installation Notice:

When the air conditioner needs the constant frequency wire controller, be sure adding a wire joint with 5 terminal named A, B, C, D, E in indoor unit, and fixing an infrared emitter whose anode and cathode connecting with A and B near the receiver in the indoor unit switch board, then connecting the terminal +5v, GND, Run in the switch board to C,D,E respectively.



#### NOTE

- The connecting wire should be a little longer as to take away the switch board easily for maintenance.
- The connecting wire should be a little longer as to take away the controller easily for maintenance.

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