

*Airwell*

# ***Service Manual***

HHD009/012/018/024

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Indoor Units	Outdoor Units
AWSI-HHD009-N11	AWAU-YHD009-H11
AWSI-HHD012-N11	AWAU-YHD012-H11
AWSI-HHD018-N11	AWAU-YHD018-H11
AWSI-HHD024-N11	AWAU-YHD024-H11



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REFRIGERANT

R410A

HEAT PUMP

SM HHD 1-A.1 GB

AUG-2017

Version:1

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LIST OF EFFECTIVE PAGES

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## 1. INTRODUCTION

### 1.1 General

HHD series is a monosplit DCI inverter air conditioner. This high-wall mounted type indoor are mainly designed for residential buildings.

The ODU YHD product is a DC inverter outdoor with high technology. By using DC compressor sine wave torque control technology, this product provides more comfort and economical operating.

The whole series includes 4 models 09/12/18/24 in cooling capacity.

### 1.2 Main Features

The unit benefits from the most advanced technological innovations, namely:

- DC inverter technology.
- R410A models
- Microprocessor control and indoor LED display
- High SEER/SCOP , A++/A+ level with Average climate.
- Torque control for compressor running in lower Frequency but with low vibration and little sound.
- Max allowing tubing distance of 25m(Model HHD018/024).
- Up to 10 m vertical high between indoor and outdoor units
- Cooling operation at outdoor temperature down to -15°C.
- Heating operation at outdoor temperature down to -15°C.
- Easy installation and service.
- Sleep mode from remote control to save energy
- ON/OFF timer and clock display
- Vertical auto swing with motorized flap (any position stop)
- Intelligent Deicing
- Memory from power failure
- Rapid cooling/heating
- I-Feel function
- Cold air prevention in heating
- Clean function (Blow dry)
- Self diagnostic (Error indications) for ease of maintenance

### 1.3 Indoor Unit

The indoor unit is wall mounted, and can be easily fitted to many types of residential locations. It includes:

- LED display
- Variable speed with PG motor
- Motorized flap
- High efficiency filtration to ensure a best Air Quality : Advanced filtering combine mechanical, Photo-catalytic + Bi-anti bacterial and observe bad gaseous and smokes.

### 1.4 Control

The microprocessor indoor controller, and an infrared remote control, supplied as standard, provide complete operating function and programming.

Remote control RC 8A:

Compact and economically design, it offers excellent user comfort. Combining modern design with high technology, the RC8A remote control offers powerful functions of real considering of user comfort and energy saving of air-conditioner .

For detail of functions, please refer to Appendix 1

## **1.5 Outdoor Unit**

The outdoor units can be installed as floor or wall mounted units by using a wall supporting bracket. The metal sheets are protected by anti- corrosion paint work allowing long life resistance. All outdoor units are pre-charged. For further information please refer to the Product Data Sheet, Chapter 2.

It includes :

- Compressor mounted in a soundproofed compartment :
- Axial fan driven by DC motor.
- Outdoor coil with hydrophilic louver fins for RC units.
- Outlet air fan grill.
- Interconnecting wiring terminal block.

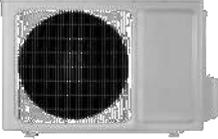
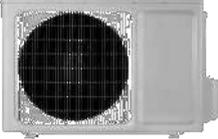
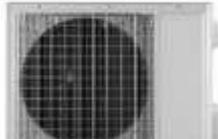
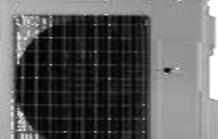
## **1.6 Tubing Connections**

Flare type interconnecting tubing to be produced on site.  
For further details please refer to the Installation Manual.

## **1.7 Inbox Documentation**

Each unit is supplied with its own installation, operation and remote control manuals.

1.8 Matching Table

OUTDOOR UNITS	INDOOR UNITS			
	 AWSI-HHD009-N11	 AWSI-HHD012-N11	 AWSI-HHD018-N11	 AWSI-HHD024-N11
 AWAU-YHD009-H11	<b>V</b>			
 AWAU-YHD012-H11		<b>V</b>		
 AWAU-YHD018-H11			<b>V</b>	
 AWAU-YHD024-H11				<b>V</b>

## 2. PRODUCT DATA SHEET

### Model: AWSI-HHD009-N11 / AWAU-YHD009-H11

Model Indoor Unit		AWSI-HHD009-N11				
Model Outdoor Unit		AWAU-YHD009-H11				
Installation Method of Pipe		Flared				
Characteristics	Units	Cooling	Heating			
			Average	Warm	Cold	
Capacity <sup>(1)</sup>	kW	2,65(0,45-3,23)	2.8(0.45-4.1)			
Pdesign	kW	2,65	2.60	2.60	2.60	
SEER /SCOP <sup>(2)</sup>	W/W	6,1	4	4.6	3.2	
Energy efficiency class		A++	A+	A++	B	
Annual energy consumption	kWh	153	910	792	1707	
Tbiv	°C	N/A	-7	2	-15	
Tol	°C	N/A	-15			
Power supply	V/Ph/Hz	220-240V/Single/50Hz				
Circuit breaker rating	A	10				
Rated power input (Maximum power input)	kW	1,55				
Rated current (Maximum current)	A	6,9				
INDOOR	Fan type & quantity		Cross flow fan x1			
	Fan speeds	H/M/L/VL	RPM	1350/1100/900/700	1350/1140/980/820	
	Air flow <sup>(3)</sup>	H/M/L/VL	m3/hr	280/370/520/600		
	External static pressure	Min-Max	Pa	0		
	Sound power level <sup>(4)</sup>	H/M/L	dB(A)	55		
	Sound pressure level <sup>(5)</sup>	H/M/L/VL	dB(A)	24/30/38/41		
	Moisture removal		l/hr	0,80		
	Condensate drain tube I.D		mm	16		
	Dimensions	WxHxD	mm	770x283x201		
	Weight		kg	8		
	Package dimensions	WxHxD	mm	847x276x345		
	Packaged weight		kg	9,5		
	Stacking height		units	8		
OUTDOOR	Refrigerant control		EEV			
	Compressor type, model		Rotary DC Inverter			
	Fan type & quantity		Axial x 1			
	Fan speeds	H/L	RPM	900		
	Air flow	H/L	m3/hr	1600		
	Sound power level <sup>(4)</sup>	H/L	dB(A)	62		
	Sound pressure level <sup>(5)</sup>	H/L	dB(A)	51		
	Dimensions	WxHxD	mm	776x540x320		
	Weight		kg	28		
	Package dimensions	WxHxD	mm	851x595x363		
	Packaged weight		kg	31		
	Stacking height		Units	4		
	Refrigerant type		R410A			
	Refrigerant charge (standard connecting tubing length)		kg(5m)	0,7		
	Additional charge per 1 meter		gr / 1m	5m<L<15m 15g/m		
Connections between units	Liquid line	In.(mm)	1/4''(6,35mm)			
	Suction line	In.(mm)	3/8''(9,53mm)			
	Max,tubing length	m.	15			
	Max,height difference	m.	10			
Operation control type		Remote control				
Heating elements		kW	NA			
Others						

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).

(2) SEER / SCOP calculation accordance with EN14825.

**Model: AWSI-HHD012-N11 / AWAU-YHD012-H11**

Model Indoor Unit		AWSI-HHD012-N11			
Model Outdoor Unit		AWAU-YHD012-H11			
Installation Method of Pipe		Flared			
Characteristics	Units	Cooling	Heating		
			Average	Warm	Cold
Capacity <sup>(1)</sup>	kW	3,54(0,6-3,96)	3,8(0,6-5,13)		
Pdesign	kW	3,54	2,70	3,20	2,70
SEER /SCOP <sup>(2)</sup>	W/W	6,1	4,0	4,6	3,2
Energy efficiency class		A++	A+	A++	B
Annual energy consumption	kWh	204	945	974	1772
Tbiv	°C	N/A	-7	2	-15
Tol	°C	N/A	-15		
Power supply	V/Ph/Hz	220-240V/Single/50Hz			
Circuit breaker rating	A	Outdoor			
Rated power input (Maximum power input)	kW	1,65			
Rated current (Maximum current)	A	7,3			
INDOOR	Fan type & quantity		Cross flow fan x1		
	Fan speeds	H/M/L/VL	RPM	1350/1150/950/750	1350/1190/1020/850
	Air flow <sup>(3)</sup>	H/M/L/VL	m3/hr	300/410/560/680	
	External static pressure	Min-Max	Pa	0	
	Sound power level <sup>(4)</sup>	H/M/L	dB(A)	56	
	Sound pressure level <sup>(5)</sup>	H/M/L/VL	dB(A)	25/31/39/42	
	Moisture removal		l/hr	1,40	
	Condensate drain tube I.D		mm	16	
	Dimensions	WxHxD	mm	770x283x201	
	Weight		kg	9	
	Package dimensions	WxHxD	mm	847x276x345	
	Packaged weight		kg	10,5	
	Stacking height		units	8	
	OUTDOOR	Refrigerant control		EEV	
Compressor type, model		Rotary DC Inverter			
Fan type & quantity		Axial x 1			
Fan speeds		H/L	RPM	900	
Air flow		H/L	m3/hr	1600	
Sound power level <sup>(4)</sup>		H/L	dB(A)	63	
Sound pressure level <sup>(5)</sup>		H/L	dB(A)	53	
Dimensions		WxHxD	mm	776x540x320	
Weight			kg	29	
Package dimensions		WxHxD	mm	851x595x363	
Packaged weight			kg	32	
Stacking height			Units	4	
Refrigerant type		R410A			
Refrigerant charge (standard connecting tubing length)		kg(5m)	0,85		
Additional charge per 1 meter		gr / 1m	5m<L<15m 15g/m		
Connections between units		Liquid line	In,(mm)	1/4"(6,35mm)	
	Suction line	In,(mm)	3/8"(9,53mm)		
	Max,tubing length	m,	20		
	Max,height difference	m,	10		
Operation control type		Remote control			
Heating elements		kW	NA		
Others					

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).

(2) SEER / SCOP calculation accordance with EN14825.

**Model: AWSI-HHD018-N11 / AWAU-YHD018-H11**

Model Indoor Unit		AWSI-HHD018-N11			
Model Outdoor Unit		AWAU-YHD018-H11			
Installation Method of Pipe		Flared			
Characteristics	Units	Cooling	Heating		
			Average	Warm	Cold
Capacity <sup>(1)</sup>	kW	5,3(1,2-6,2)	5.6(1.1-6.0)		
Pdesign	kW	5,3	4.80	5.20	4.80
SEER /SCOP <sup>(2)</sup>	W/W	6,1	4.0	4.6	3.2
Energy efficiency class		A++	A+	A++	B
Annual energy consumption	kWh	305	1680	1583	3150
Tbiv	°C	N/A	-7	2	-15
Tol	°C	N/A	-15		
Power supply	V/Ph/Hz	220-240V/Single/50Hz			
Circuit breaker rating	A	Outdoor			
Rated power input (Maximum power input)	kW	2,65			
Rated current (Maximum current)	A	11,8			
INDOOR	Fan type & quantity		Cross flow fan x1		
	Fan speeds	H/M/L/VL	RPM	1350/1100/950/800   1400/1200/1050/900	
	Air flow <sup>(3)</sup>	H/M/L/VL	m3/hr	460/560/680/800	
	External static pressure	Min-Max	Pa	0	
	Sound power level <sup>(4)</sup>	H/M/L	dB(A)	60	
	Sound pressure level <sup>(5)</sup>	H/M/L/VL	dB(A)	32/37/40/45	
	Moisture removal		l/hr	1,80	
	Condensate drain tube I.D		mm	16	
	Dimensions	WxHxD	mm	865x305x215	
	Weight		kg	12	
	Package dimensions	WxHxD	mm	948x310x383	
	Packaged weight		kg	15	
	Stacking height		units	8	
OUTDOOR	Refrigerant control		Capillary		
	Compressor type, model		Rotary DC Inverter		
	Fan type & quantity		Axial x 1		
	Fan speeds	H/L	RPM	630	
	Air flow	H/L	m3/hr	3200	
	Sound power level <sup>(4)</sup>	H/L	dB(A)	65	
	Sound pressure level <sup>(5)</sup>	H/L	dB(A)	55	
	Dimensions	WxHxD	mm	955x700x396	
	Weight		kg	46	
	Package dimensions	WxHxD	mm	1029x750x458	
	Packaged weight		kg	50,5	
	Stacking height		Units	3	
	Refrigerant type		R410A		
	Refrigerant charge (standard connecting tubing length)		kg(5m)	R410a / 1,3	
	Additional charge per 1 meter		gr / 1m	5m<L<25m 15g/m	
Connections between units	Liquid line	In,(mm)	1/4"(6,35mm)		
	Suction line	In,(mm)	1/2"(12,7mm)		
	Max,tubing length	m,	25		
	Max,height difference	m,	10		
Operation control type		Remote control			
Heating elements		kW	NA		
Others					

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).

(2) SEER / SCOP calculation accordance with EN14825.

**Model: AWSI-HHD024-N11 / AWAU-YHD024-H11**

Model Indoor Unit		AWSI-HHD024-N11			
Model Outdoor Unit		AWAU-YHD024-H11			
Installation Method of Pipe		Flared			
Characteristics	Units	Cooling	Heating		
			Average	Warm	Cold
Capacity <sup>(1)</sup>	kW	6,5(2,53-6,9)	7,0(2,53-7,6)		
Pdesign	kW	6,5	5,80	5,80	7,20
SEER /SCOP <sup>(2)</sup>	W/W	6,1	4,0	4,8	3,2
Energy efficiency class		A++	A+	A++	B
Annual energy consumption	kWh	373	2030	1692	4725
Tbiv	°C	N/A	-7	2	-15
Tol	°C	N/A	-15		
Power supply	V/Ph/Hz	220-240V/Single/50Hz			
Circuit breaker rating	A	Outdoor			
Rated power input (Maximum power input)	kW	2,80			
Rated current (Maximum current)	A	12,5			
INDOOR	Fan type & quantity		Cross flow fan x1		
	Fan speeds	H/M/L/VL	RPM	1350/1150/1000/850      1400/1200/1000/900	
	Air flow <sup>(3)</sup>	H/M/L/VL	m3/hr	550/700/800/1000	
	External static pressure	Min-Max	Pa	0	
	Sound power level <sup>(4)</sup>	H/M/L	dB(A)	63	
	Sound pressure level <sup>(5)</sup>	H/M/L/VL	dB(A)	34/42/47/51	
	Moisture removal		l/hr	2,00	
	Condensate drain tube I,D		mm	16	
	Dimensions	WxHxD	mm	1007x315x219	
	Weight		kg	14	
	Package dimensions	WxHxD	mm	1076x328x398	
	Packaged weight		kg	17	
	Stacking height		units	7	
	OUTDOOR	Refrigerant control		Capillary	
Compressor type, model		Rotary DC Inverter			
Fan type & quantity		Axial x 1			
Fan speeds		H/L	RPM	800	
Air flow		H/L	m3/hr	4000	
Sound power level <sup>(4)</sup>		H/L	dB(A)	68	
Sound pressure level <sup>(5)</sup>		H/L	dB(A)	58	
Dimensions		WxHxD	mm	980x790x427	
Weight			kg	55,5	
Package dimensions		WxHxD	mm	1083x855x488	
Packaged weight			kg	60,5	
Stacking height			Units	3	
Refrigerant type		R410A			
Refrigerant charge (standard connecting tubing length)		kg(5m)	1,8		
Additional charge per 1 meter		gr / 1m	5m<L<25m 15g/m		
Connections between units		Liquid line	In.(mm)	1/4"(9,53mm)	
	Suction line	In.(mm)	5/8"(15,88mm)		
	Max,tubing length	m.	25		
	Max,height difference	m.	10		
Operation control type		Remote control			
Heating elements		kW	NA		
Others					

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).

(2) SEER / SCOP calculation accordance with EN14825.

### 3. RATING CONDITIONS

Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).

**Cooling:**

Indoor: 27°C DB 19°C WB

Outdoor: 35°C DB

**Heating:**

Indoor: 20°C DB

Outdoor: 7°C DB 6°C WB

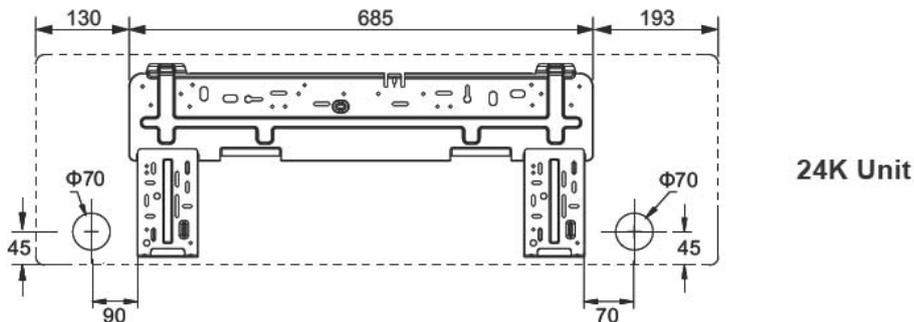
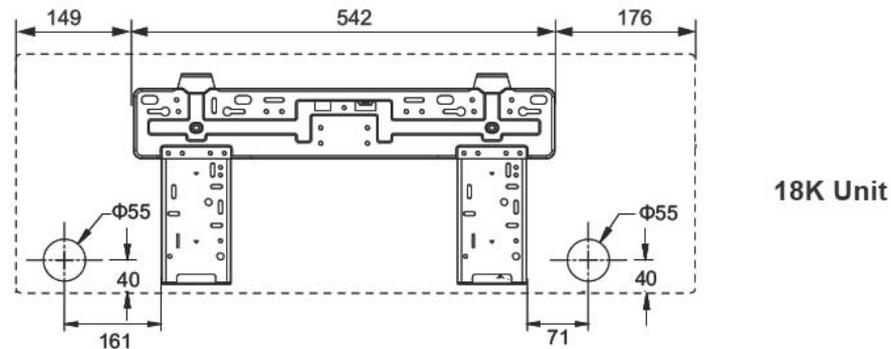
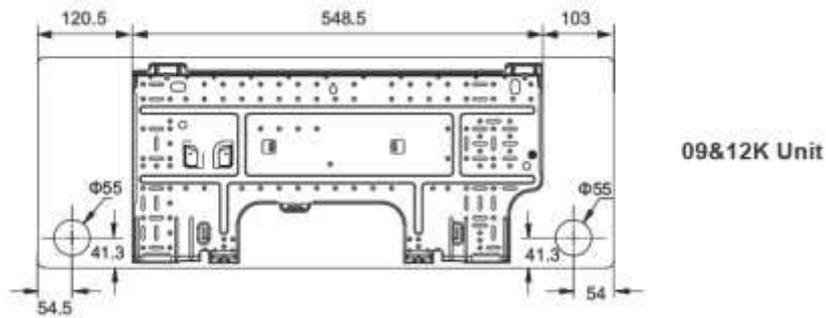
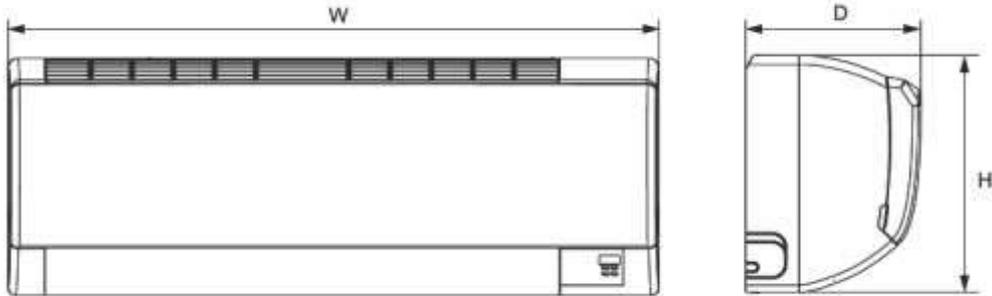
#### 3.1 Operating Limits

R410A

		Indoor	Outdoor
<b>Cooling</b>	Upper limit	32°C DB 23°C WB	43°C DB
	Lower limit	21°C DB 15°C WB	-15°C DB
<b>Heating</b>	Upper limit	27°C DB	24°C DB 18°C WB
	Lower limit	10°C DB	-15°C DB -16°C WB
<b>Voltage</b>		1-PH 50Hz 198 – 264 V	

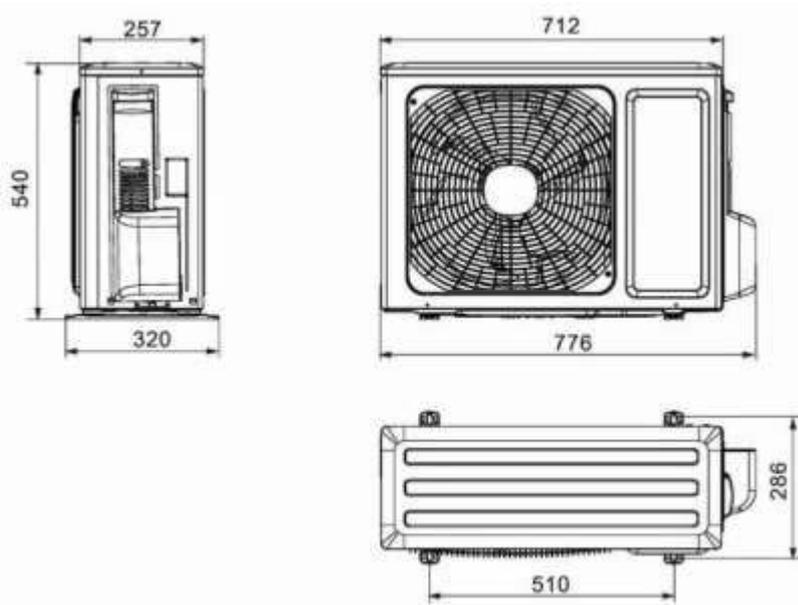
4. OUTLINE DIMENSION

4.1 Indoor: HHD009,HHD012,HHD018,HHD024

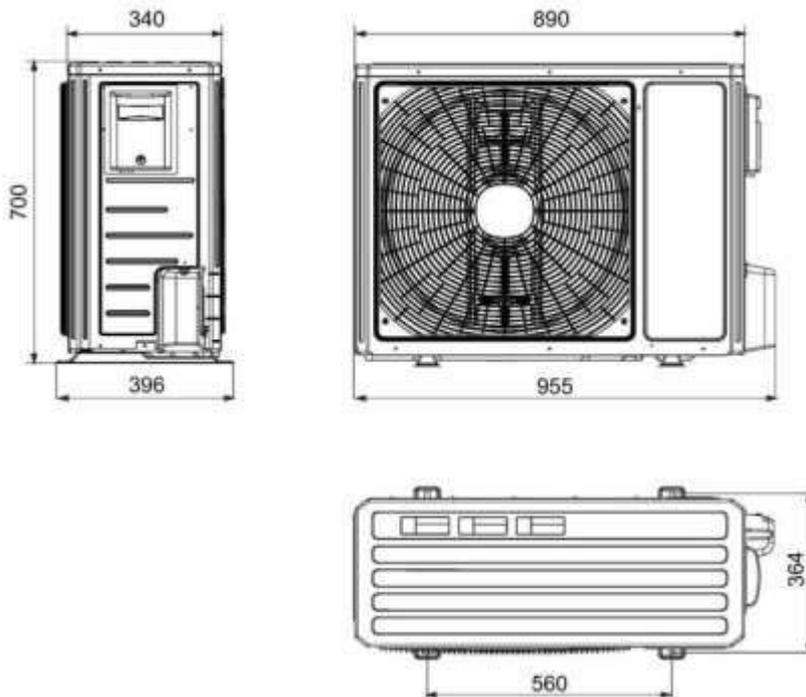


Models	W	H	D
HHD009/012	770	283	201
HHD018	867	305	215
HHD024	1008	319	221

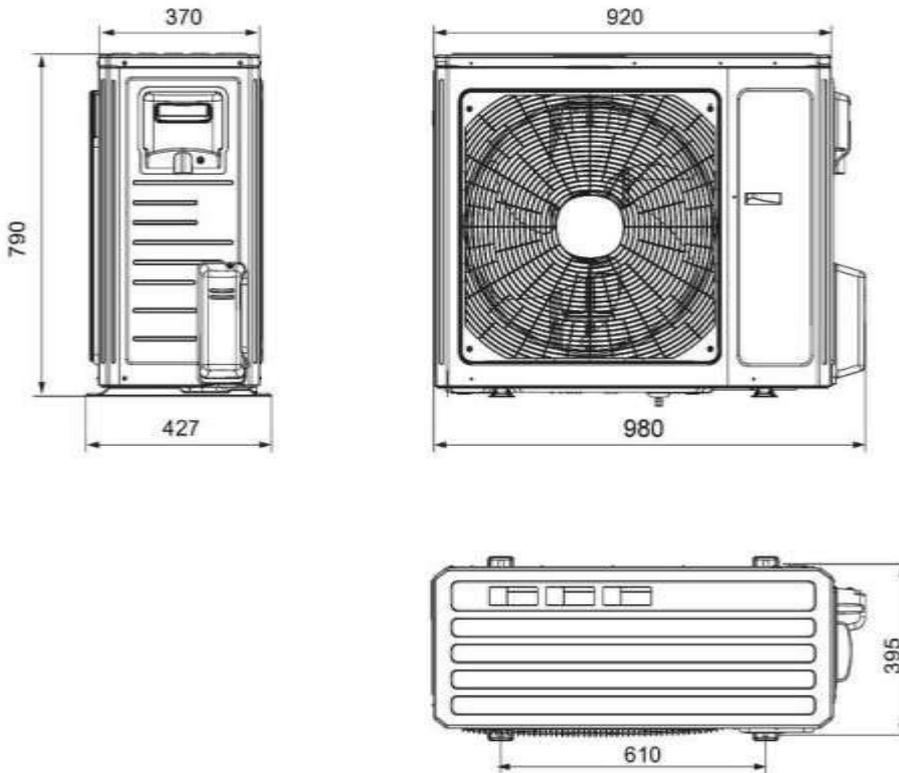
4.2 Outdoor: YHD009, YHD012



4.3 Outdoor: YHD018

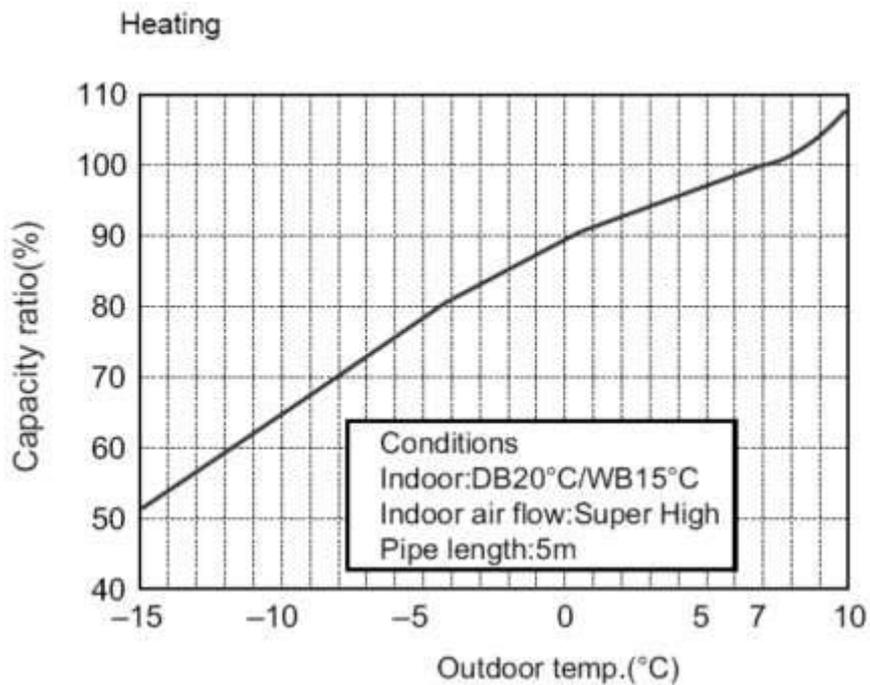
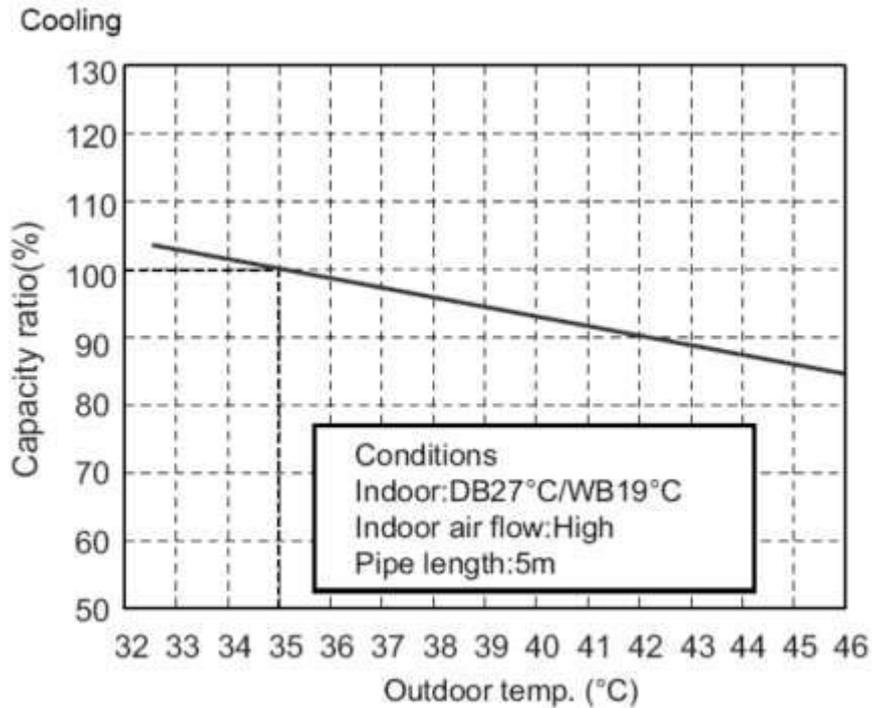


4.4 Outdoor: YHD024

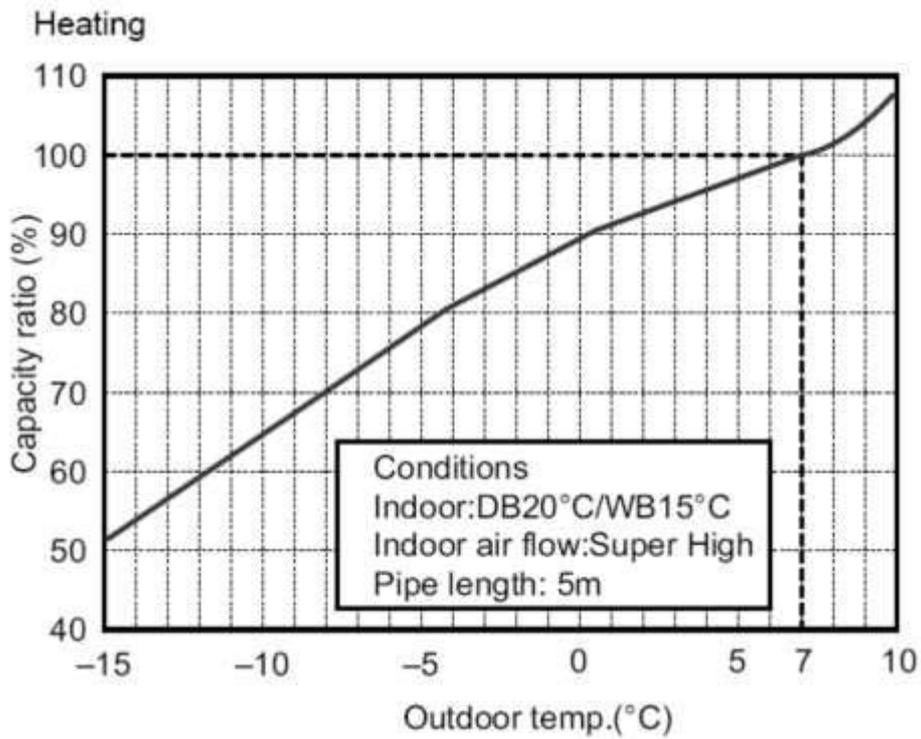
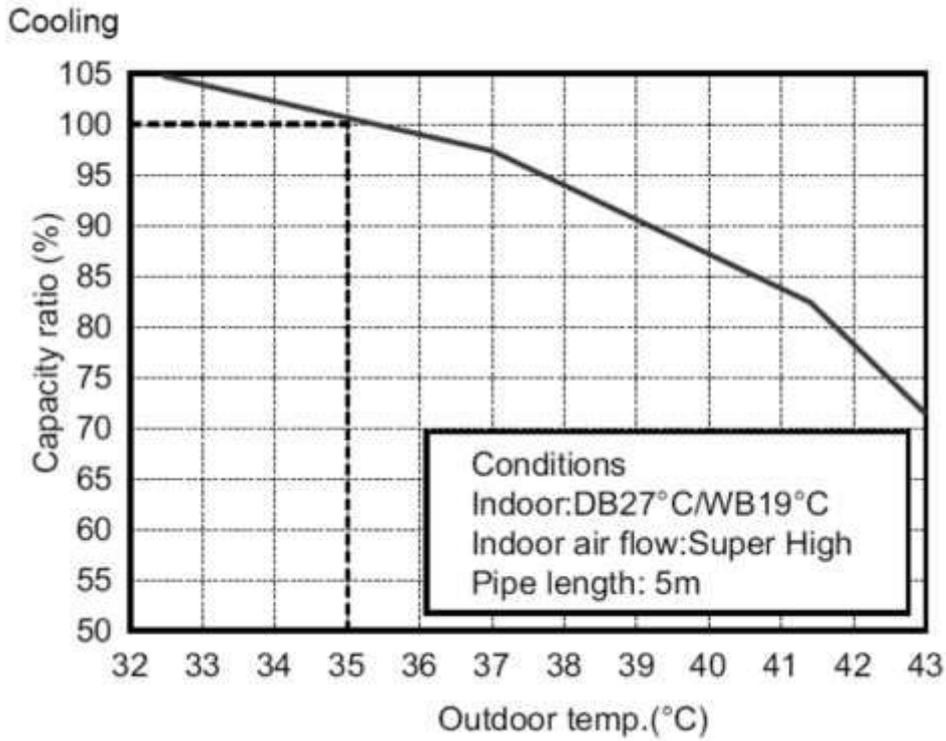


## 5. PERFORMANCE DATA

### 5.1 Model HHD009 + YHD009 ; HHD012 + YHD012



5.2 Model HHD018 + YHD018 ; HHD018 + YHD018



## 6. PRESSURE CURVES

TBD

## 7. SOUND LEVEL CHARACTERISTICS

### 7.1 Sound Pressure Level

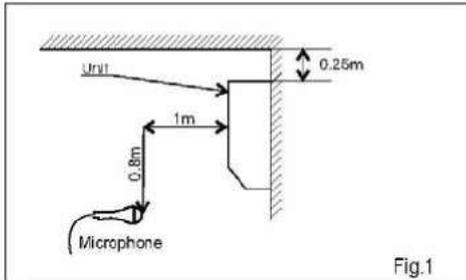


Figure 1. Wall Mounted

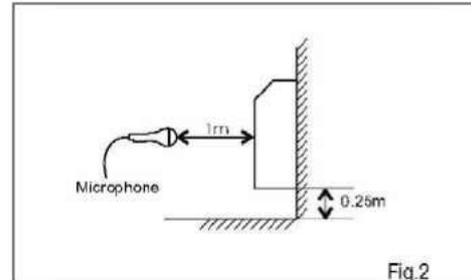


Figure 2. Floor Mounted

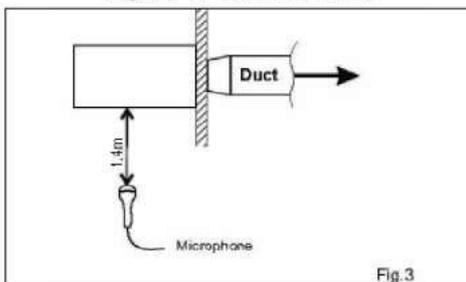


Figure 3. Ducted

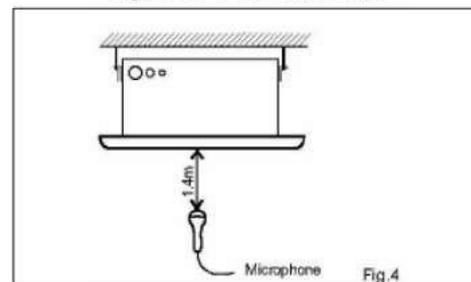


Figure 4. Cassette

7.2 **Soud Pressure Level Spectrum (Measured as Figure 1)**

TBD

## 8. ELECTRICAL DATA

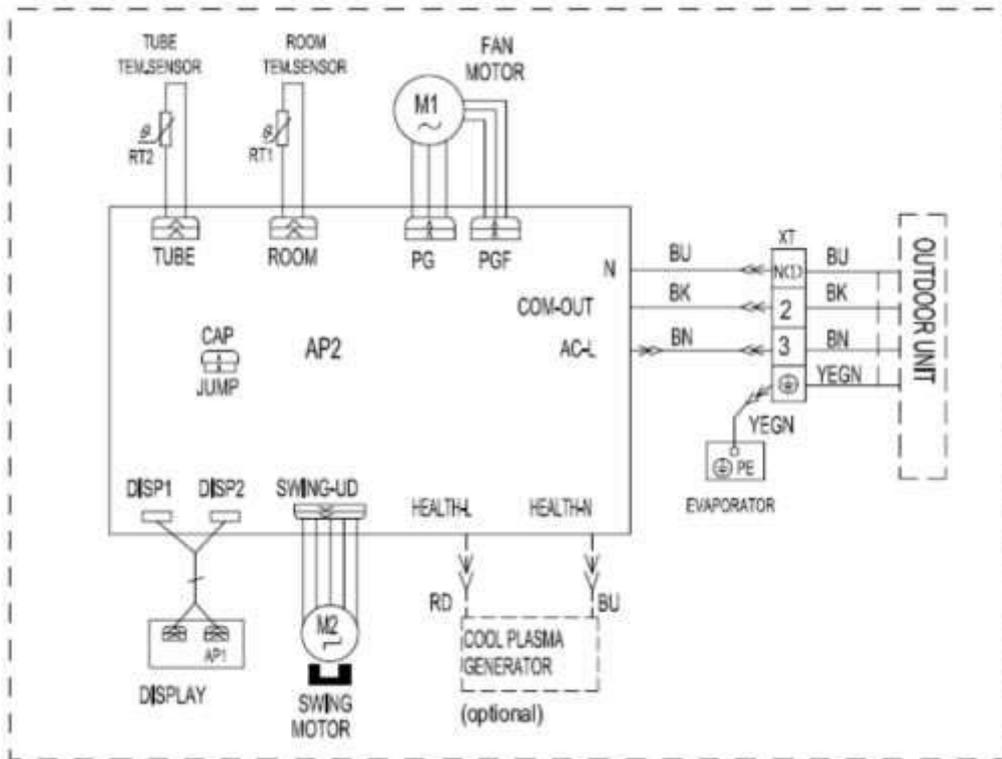
MODEL	YHD009	YHD012	YHD018	YHD024
Power Supply	To outdoor			
	1PH-220-240V-50Hz			
Max Current, A	6.9A	7.3A	11.8A	12.4A
Circuit Breaker,A	10A	10A	16A	16A
Power Supply Wiring No. X Cross Section mm <sup>2</sup>	3x1.5 mm <sup>2</sup>	3x1.5 mm <sup>2</sup>	3x1.5 mm <sup>2</sup>	3x2.5 mm <sup>2</sup>
Interconnecting Cable Model No. X Cross Section mm <sup>2</sup>	4x1.0 mm <sup>2</sup>	4x1.0 mm <sup>2</sup>	4x1.0 mm <sup>2</sup>	4x1.0 mm <sup>2</sup>

### NOTE

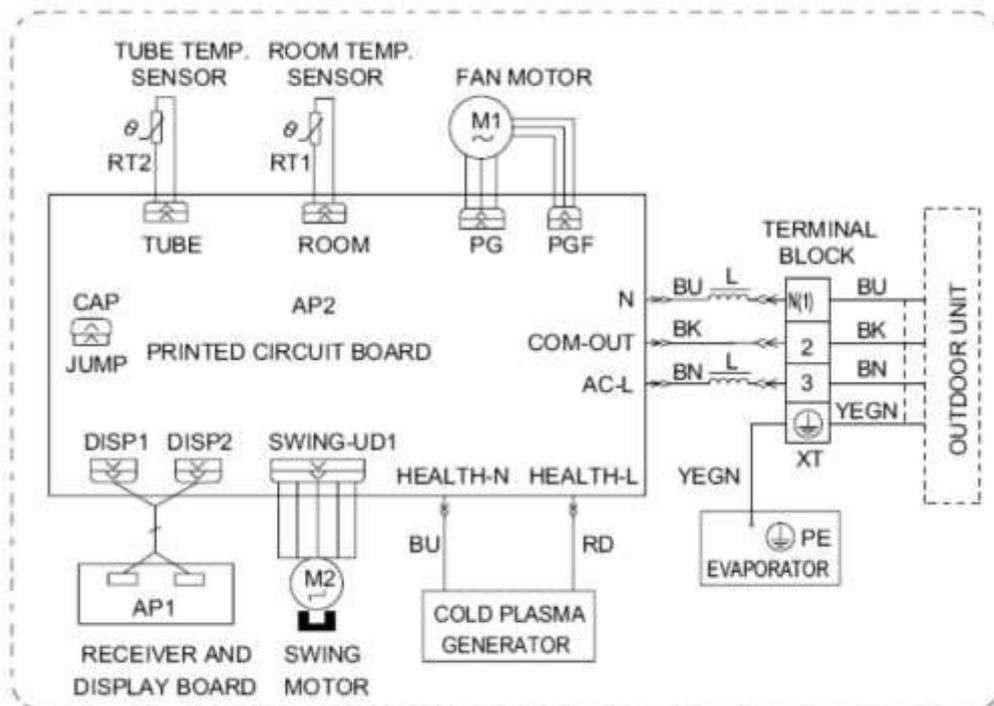
Power wiring cord should comply with local laws and electrical regulations requirements.

## 9. WIRING DIAGRAM

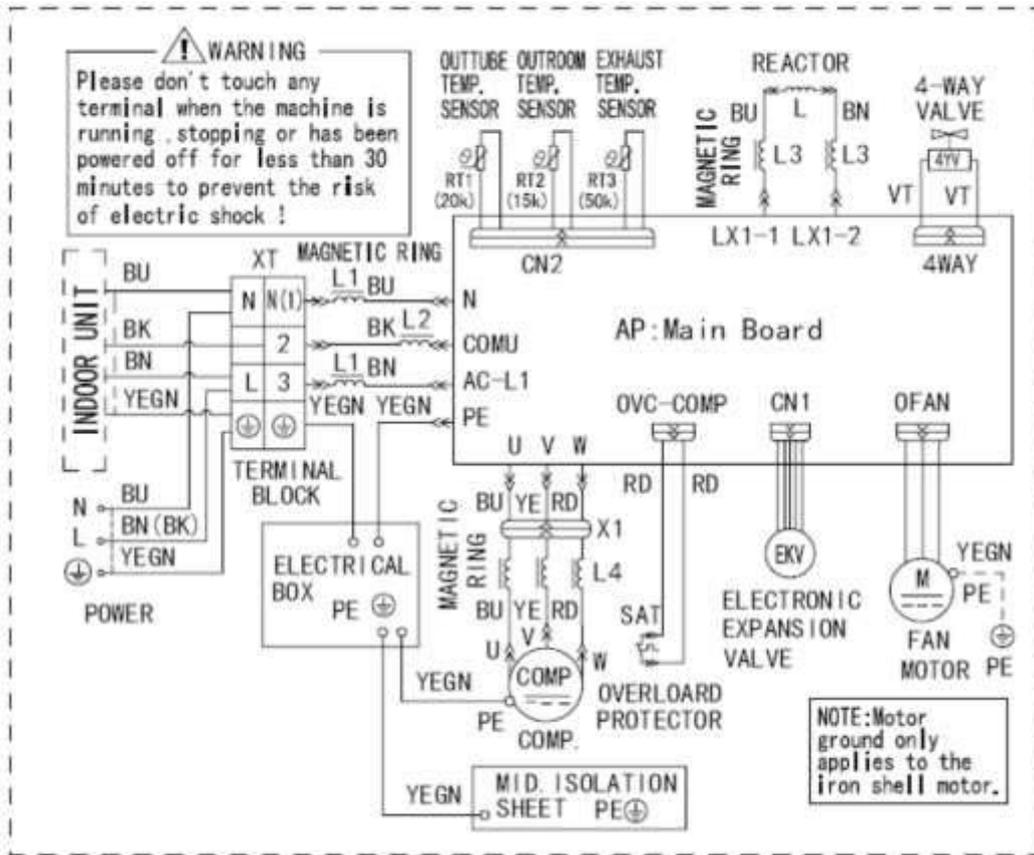
### 9.1 HHD009,HHD012



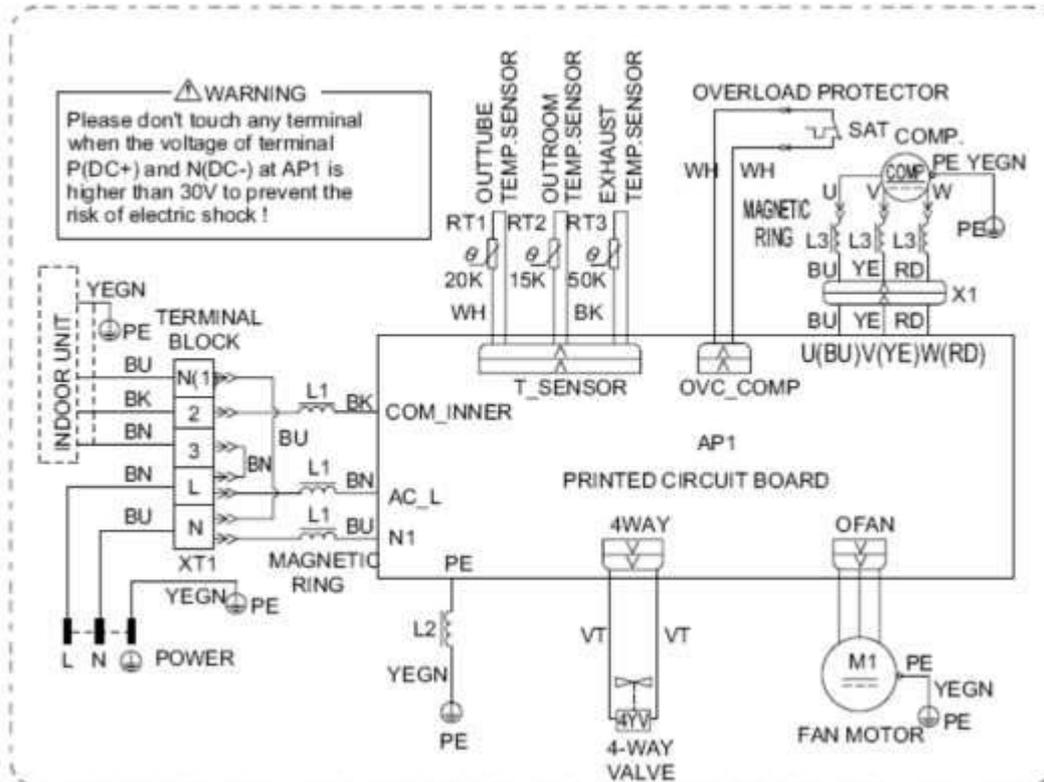
### 9.2 HHD018,HHD024



9.3 YHD009, YHD012

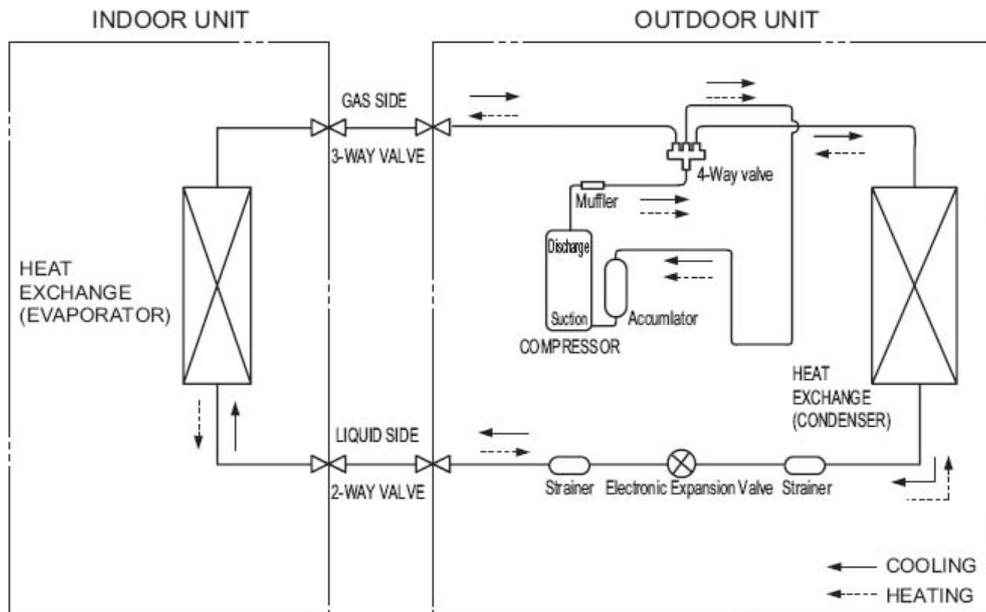


9.4 YHD018, YHD024



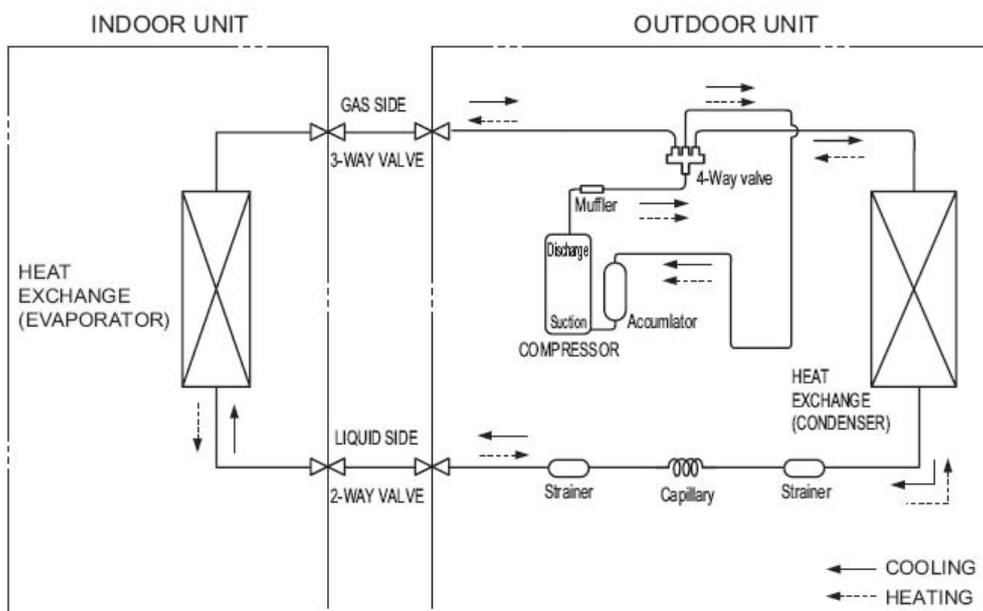
## 10. REFRIGERATION DIAGRAMS

### 10.1 HHD009+YHD009, HHD012+YHD012



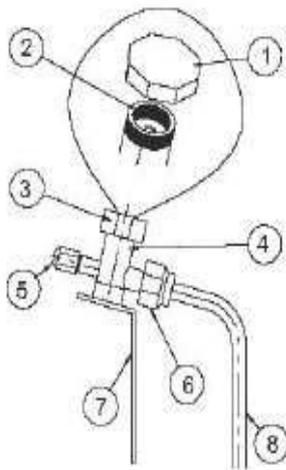
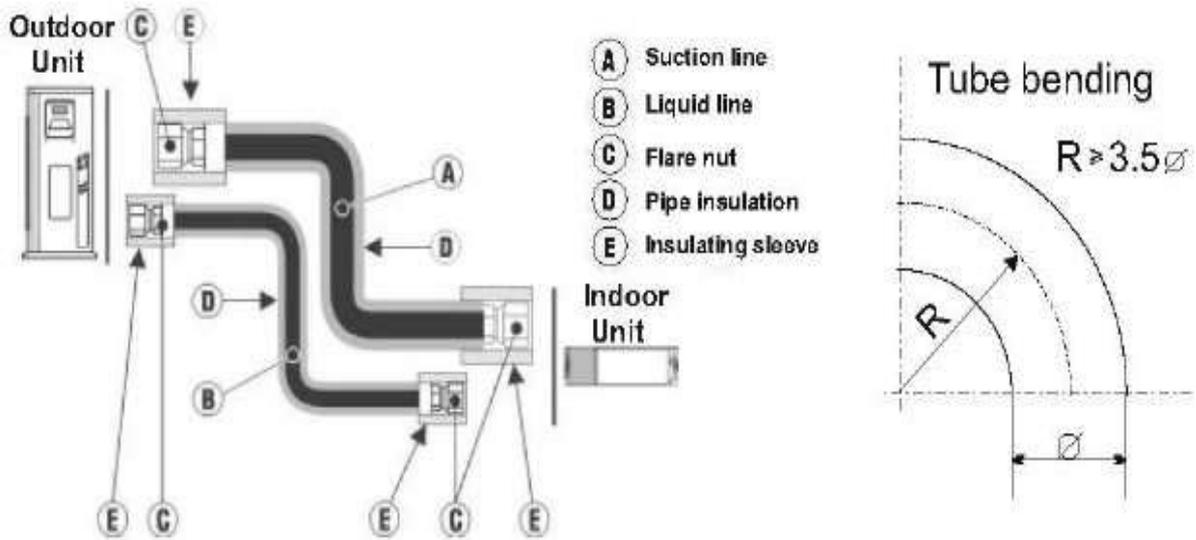
Refrigerant pipe diameter  
 Liquid : 1/4" (6 mm)  
 Gas : 3/8" (9.52 mm)

### 10.2 HHD018+YHD018, HHD024+YHD024



Refrigerant pipe diameter  
 Liquid : 1/4" (6 mm)  
 Gas : 1/2" (12 mm)(18K Unit)  
 Gas : 5/8" (16 mm)(24K Unit)

11. TUBING CONNECTIONS



TUBE (Inch)	1/4"	3/8"	1/2"	5/8"	3/4"
<b>TORQUE (Nm)</b>					
<b>Flare Nuts</b>	15-18	40-45	60-65	70-75	80-85
<b>Valve Cap</b>	13-20	13-20	18-25	18-25	40-50
<b>Service Port Cap</b>	11-13	11-13	11-13	11-13	11-13

1. Valve Protection Cap-end
2. Refrigerant Valve Port (use Allen wrench to open/close)
3. Valve Protection Cap
4. Refrigerant Valve
5. Service Port Cap
6. Flare Nut
7. Unit Back Side
8. Copper Tube

When the outdoor unit is installed above the indoor unit an oil trap is required every 5m along the suction line at the lowest point of the riser. In case the indoor unit is installed above the outdoor, no trap is required.

## 12. CONTROL SYSTEM

### 12.1 Electronic Control

#### 12.1.1 Abbreviations

Abbreviation	Definition
A/C	Air Condition
BMS	Building Management System
PWR	System Power
CTT	Compressor Top Temperature sensor
DCI	DC Inverter
EEV	Electronic Expansion Valve
HE	Heating Element
HMI	Human Machine Interface
HST	Heat Sink Temperature sensor
Hz	Hertz (1/sec) – electrical frequency
ICT	Indoor Coil Temperature (RT2) sensor
IDU	Indoor Unit
MCU	Micro Controller Unit
OAT	Outdoor Air Temperature sensor
OCT	ODU Coil Temperature sensor
ODU	Outdoor Unit
OFAN	Outdoor Fan
PFC	Power Factor Corrector
RAC	Residential A/C
RAT	Room Air Temperature sensor
RC	Reverse Cycle (Heat Pump)
RCT	Remote Control Temperature sensor
RGT	Return Gas Temperature sensor
RPS	Rounds per second (mechanical speed)
RV	Reverse Valve
SB,STBY	Stand By
SUCT	Compressor Suction Temperature sensor
S/W	Software
TBD	To Be Defined
TMR	Timer

#### 12.1.2 System Operation Concept

The control function is divided between indoor and outdoor unit controllers. Outdoor unit is the system 'Master', requesting the indoor unit for cooling/heating capacity supply. The indoor unit is the system 'Slave' and it must supply the required capacity unless it enters into a protection mode avoiding it from supplying the requested capacity.

Target frequency is transferred via indoor to outdoor communication, and the calculation is based on room temperature and set point temperature.

#### 12.1.3 Compressor Frequency Control

The Compressor Frequency Control is based on the PI scheme.

When starting the compressor, or when conditions are varied due to the change of the room condition, the frequency must be initialized according to the  $\Delta D$  value of the indoor unit and the  $Q$  value of the indoor unit.

**Q value:** Indoor unit output determined from indoor unit capacity, air flow rate and other factors.

**1. P control**

Calculate  $\Delta D$  value in each sampling time (20 seconds), and adjust the frequency according to its difference from the frequency previously calculated.

**2. I control**

If the operating frequency is not change more than a certain fixed time, adjust the frequency up and down according to the  $\Delta D$  value.

Obtaining the fixed  $\Delta D$  value

When the  $\Delta D$  value is small- decrease the frequency

When the  $\Delta D$  value is large- increase the frequency

**3. Frequency management when other controls are functioning**

When frequency is drooping;

Frequency management is carried out only when the frequency droops.

For limiting lower limit

Frequency management is carried out only when the frequency rises.

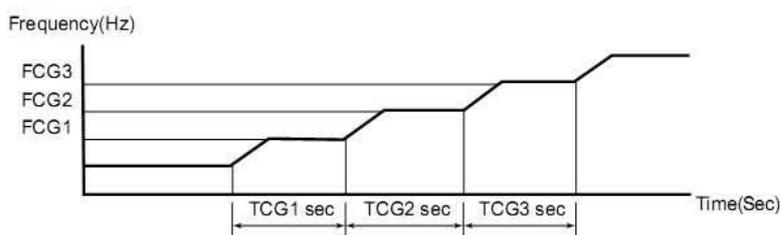
**12.1.3.1 Frequency Changes Control**

Frequency change rate is 1 Hz/sec.

**12.1.3.2 Compressor Starting Control**

When turning the compressor from OFF to ON, the upper limit of frequency must be set as follows. (The function must not be used when defrosting.)

FCG3	88
FCG2	64
FCG1	48
TCG1	240
TCG2	360
TCG3	180



**12.1.3.3 Minimum On and Off Time**

Prohibit to turn ON the compressor for 3 minutes after turning it off.(except during deicing protection)

**12.1.4 Indoor Fan Control**

8 Indoor fan speeds are determined for each model. 4 speeds for COOL modes and 4 speeds for HEAT mode.

Unit Model	Mode	Turbo (Super high)	High	Medium	Low
09	Cooling	1350	1100	900	700
	Heating	1350	1140	980	820
12	Cooling	1350	1150	950	750
	Heating	1350	1190	1020	850
18	Cooling	1350	1100	950	800
	Heating	1400	1200	1050	900
24	Cooling	1350	1150	950	850
	Heating	1450	1200	1000	900

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

In AutoFan user setting, fan speed will be adjusted automatically according to the difference between actual room temperature(RAT) and user set point temperature(SPT).

Indoor Fan speed		High	Medium	Low
RAT-SPT	Cooling	$\geq 2$	(0,2)	$\leq 0$
	Heating	$\leq 1$	(1,3)	$\geq 3$

Each speed will be kept at least 210 seconds even the condition changes

In DRY mode, the automatic fan speed is forced to be low.

#### **12.1.4.1 Turbo Speed**

In COOL and HEAT mode (not available in AUTO, DRY, FAN mode), press the Turbo button, the super high fan speed is selected on Remote control and the indoor fan rotates at super high speed.

### **12.1.5 Outdoor Fan Control**

#### **12.1.5.1 OFAN Speed Type**

The outdoor fan motor is DC motor and variable speeds controlled by driver on outdoor controller.

#### **12.1.5.2 General rules**

1. The outdoor fan is ON when compressor ON during cooling, dring and heating mode.
2. Outdoor fan OFF will delay 30sec when compressor is OFF during cooling and heating mode.
3. Outdoor fan control under outdoor deicing please refer to 12.13.6

### **12.1.6 Refrigerant control**

#### **12.1.6.1 EEV was used in model 09 and 12**

1. EEV operation after power-on: When power on, EEV will open 240 steps and then move back with 540steps. This position will be recognized as 0. Then EEV will open to 480 steps and be ready for system operating.
2. EEV open loop: depends on OAT,RAT,SPT and compressor frequency after compressor starts to operate.

3. Target CTT control: will be performed after compressor operates for 5min. The EEV opening will be updated every 5s.

#### 12.1.6.2 Capillary is used in model 18 and 24

### 12.1.7 Reversing Valve (RV) Control

Reversing valve is on in heat mode.

When the unit is on in heating mode and shift to other modes, RV will be OFF after compressor stops for 2min;

After protection stops, RV will be OFF after 4min;

## 12.2 Fan Mode

In this mode, the indoor fan may run at high, medium, low and automatic speed. The compressor, outdoor fan and 4-way valve will be OFF.

In this mode, the range of setting temperature is 16~30 °C

## 12.3 Cool Mode

### For model 09 and 12

If  $RAT \geq SPT$ , the unit starts cooling operation. In this case, the compressor and outdoor fan will operate and the indoor fan will run at the setting speed.

If  $RAT \leq SPT - 2$ , the compressor will stop operation and the outdoor fan will delay 30 seconds to stop. While the indoor fan will run at the setting speed.

If  $SPT - 2 < RAT \leq SPT$ , the unit will maintain the previous status.

### For model 18 and 24

If  $RAT \geq SPT - 0.5$ , the unit starts cooling operation. In this case, the compressor and outdoor fan will operate and the indoor fan will run at the setting speed.

If  $RAT \leq SPT - 2$ , the compressor will stop operation and the outdoor fan will delay 30 seconds to stop. While the indoor fan will run at the setting speed.

If  $SPT - 2 < RAT \leq SPT$ , the unit will maintain the previous status.

In AutoFan user setting, fan speed will be adjusted automatically according to the SPT and RAT, refer to 12.1.4

### 12.3.1 Range of setting temperature

a) Normally the setting temperature range is 16~30 °C

b) where there is low condition cooling, when outdoor air is lower than 25 °C, the setting temperature range will be 25~30 °C.

## 12.4 Heat Mode

### For Model 09 and 12

If  $RAT \leq SPT + 2$ , the unit will operate in heating mode. The compressor, outdoor fan and 4-way valve will operate and the indoor fan will delay 3min to start at the latest

If  $SPT + 2 \leq RAT \leq SPT + 5$ , the unit will maintain the previous status.

If  $RAT \geq SPT + 5$ , the compressor will stop, the outdoor fan will delay 30s to stop and the indoor fan will blow for 60s at the setting speed. During this period, the fan speed can't be switched.

### For model 18 and 24

If  $RAT \leq SPT + 3.5$ , the unit will operate in heating mode. The compressor, outdoor fan and 4-way valve will operate and the indoor fan will delay 3min to start at the latest

If  $SPT + 3 \leq RAT \leq SPT + 5$ , the unit will maintain the previous status.

If  $RAT \geq SPT + 5$ , the compressor will stop, the outdoor fan will delay 30s to stop and the indoor fan will blow for 60s at the setting speed. During this period, the fan speed can't be switched.

### 12.4.1 Indoor Fan Control in Heat Mode

Indoor fan speed depends on the indoor coil temperature

#### Anti-cold air function

When starting the heating mode, anti-cold air function will be activated and indoor fan operates according to following rules.

##### Case -1 $RAT < 24^\circ\text{C}$ :

When  $ICT \leq 40^\circ\text{C}$  IFAN = Stop for 2 min and then switch to low speed

When  $ICT > 40^\circ\text{C}$  IFAN = Low for 1 min and then switch to set speed

When  $ICT > 42^\circ\text{C}$  IFAN switch to set speed immediately.

##### Case -2 $RAT \geq 24^\circ\text{C}$ :

When  $ICT \leq 42^\circ\text{C}$  IFAN = Low for 1 min and then switch to set speed

When  $ICT > 42^\circ\text{C}$  IFAN switch to set speed immediately.

#### Residual heat blowing function

During heating, when the stopping condition for the compressor is reached, the compressor and the outdoor fan motor stop running while the louver moves to position L. The indoor fan will stop after running for 60s at setting speed.

## 12.5 Auto Cool/Heat Mode

In AUTO mode, the system selects the running mode (COOL/HEAT/FAN) automatically according to the room temperature. The display shows the actual running mode and setting temperature.

There will be 30s delay for mode conversion.

1. When  $RAT \geq 26^\circ\text{C}$ , the cooling mode is selected. The set point temperature is  $25^\circ\text{C}$ .
2. When  $RAT \leq 22^\circ\text{C}$ , the unit runs in heating mode. The set point temperature is  $20^\circ\text{C}$
3. When  $23^\circ\text{C} \leq RAT \leq 25^\circ\text{C}$ , upon initial startup, the unit will enter auto mode and run in automatic fan mode. If the other mode changes into auto mode, the previous running mode will remain.

## 12.6 Dry Mode

Conditions and processes of dry mode is same as the cooling mode, while the indoor fan will run at low speed.

In this mode, the Reverse Valve will be OFF and the temperature setting range is 16~30.

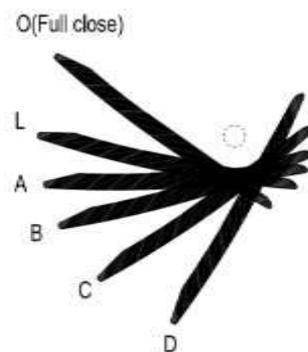
## 12.7 Louver Control

After power on, the up and down swing louver will automatically open and then close completely.

In heating mode, if the swing function is not set, the up and down louver will rotate to maximum in clockwise direction. Then it will rotate to position D. Under other states, the upper and lower air deflector will rotate to level L.

If the swing function is set when starting the unit, the louver will swing between Position L and D, stop in any place between Position L and position D. When the unit is turned off, the air deflector will stay in position O.

The swing is available only when the swing function is set and the indoor fan is running.



## 12.8 Clean function

Clean function enables dring the indoor coil after Cool or Dry mode to avoid mould.

Press CLEAN button in Cool or Dry mode, and the  will be shown on remote control.

Under clean function, the indoor fan will continue operation for 2 min at low speed after the unit is turned OFF.

Clean function is defaulted as OFF after unit is Power ON.

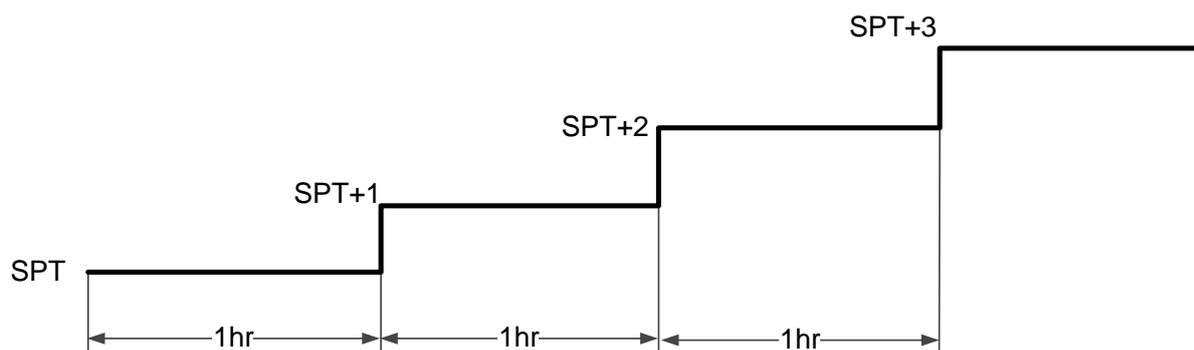
Clean function is not available in Auto, Fan or Heat mode.

## 12.9 Sleep function

Pressing SLEEP button will enable the Sleep function.  will be shown on remote control.

**Sleep function in Cool and Dry mode:**

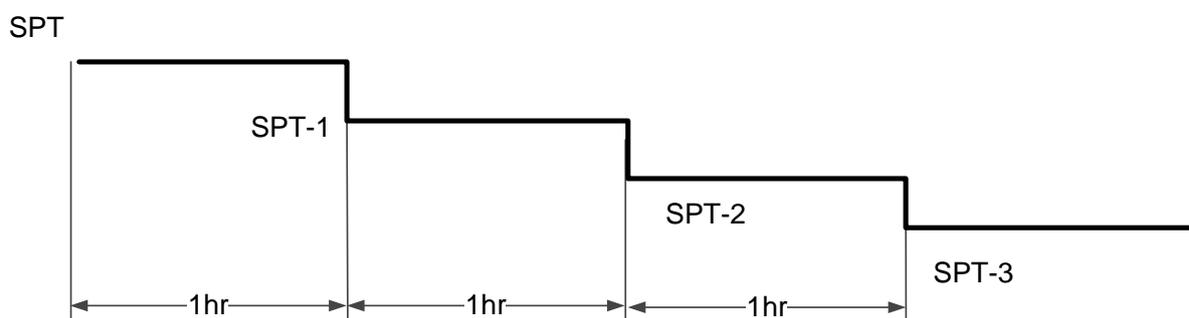
The SPT will be adjusted according to following chart.



## CONTROL SYSTEM

### Sleep function in Heat mode:

The SPT will be adjusted according to following chart.



Press either Sleep button or ON/OFF button can cancel the Sleep function.

Sleep function will not be available in Auto mode or Fan mode.

### 12.10 I-Feel function

I-Feel function maintains the room temperature by comparing the RCT on remote control.

Pressing IFEEL button will enable the I-Feel function.  will be shown on remote control.

Under I-Feel function, remote control sends I-Feel data every 10 min to IDU controller. If the IDU controller does not received I-Feel data after 11 min. I-Feel function will be interrupted and then the AC will work according to RAT on the IDU.

I-Feel function can not be remembered after power failure.

### 12.11 Forced operation (Refrigerant recovery)

#### Enter into Forced Operating:

After the unit is energized for 5mins, press the **Light** button on remote controller for 3 times in 3s successively to enter into Forced Operating Mode.

Fo will be shown from the IDU display. Under Forced Operating, all loads will operate in cooling mode. (The setting fan speed is high fan speed and the setting temperature is 16°C)

#### Exit Forced Operating:

Forced Operating will be exited after receiving any RC commands and then the unit will operate at the current setting command.

Forced operating will be also turned off automatically after 25 mins and continue the operating mode before forced operation.

### 12.12 Forced deicing

#### Enter into Forced deicing

Under the Heat Mode for both indoor and remote control, set the remote control temperature as 16.

press the button of temperature “+,-,+,-,+,-” in 5s successively to enter into Forced deicing

Heating indicator from display will blink ON 10s and OFF 0.5s to indicate the unit is under Forced deicing.

**Exit Forced deicing**

Once the unit finish the deicing process, it will resume normal heating operation.

## 12.13 Protections

There are 4 protection codes.

Normal (Norm) – unit operate normally.

Stop Rise (SR) – compressor frequency can not be raised but does not have to be decreased.

HzDown – Compressor frequency is reduced by 2Hz/s

Stop Compressor (SC) – Compressor is stopped.

### 12.13.1 Indoor Coil Defrost Protection

#### Conditions for Start Controlling

Judge the controlling start with the ICT (Indoor Coil Temperature) after 2 sec from operation start.

During cooling operation, the signals being sent from the indoor unit allow the operating frequency limitation and then prevent freezing of the indoor heat exchanger.

Compressor will stop when  $ICT < 0^{\circ}\text{C}$  for continuous 3 mins.

the outdoor fan will stop after 30 seconds, and the indoor fan and swing motor will keep running in the original mode.

When  $ICT > 6^{\circ}\text{C}$  and the compressor has stopped for 3 minutes, the compressor will resume running in the original mode.

If the unit stops as such protection for 6 times, it can not resume running automatically and display error code **E2**, it can resume by pressing ON/OFF.

During the operating, If compressor operates for more than 10min, the counter of stop operation due to protection will be cleared.

### 12.13.2 Compressor over Heating Protection

The Discharging temperature is used as the compressor's internal temperature. If the discharge temperature rises above a certain level, the operating frequency upper limit is set to keep this temperature from going up further.

When  $CTT > A^{\circ}\text{C}$  compressor will stop.

When  $CTT < B^{\circ}\text{C}$  and compressor has stopped for 3mins, the compressor will resume running in the original mode.

When  $CTT \geq B^{\circ}\text{C}$ , the compressor will Stop Rise (SR) or decrease the frequency (HzDown)

Value	Model 09/12	Model 18/24
A	110	115
B	90	97

If the unit stops as such protection for 6 times, it can not resume running automatically and display error Code **E4**, it can be resumed by pressing ON/OFF.

During the operating, If compressor operates for more than 10min, the counter of stop operation due to protection will be cleared.

### 12.13.3 Indoor Coil over Heating Protection(Heat Mode)

#### Conditions for Start Controlling

Judge the controlling start with the ICT after 2 sec from operation start.

During heating operation, the signals being sent from the indoor unit allow the operating frequency limitation and prevent abnormal high pressure.

When  $ICT > A^{\circ}C$  compressor will stop.

When  $ICT < B^{\circ}C$  and compressor has stopped for 3mins, the compressor will resume running in the original mode.

When  $ICT \geq B^{\circ}C$ , the compressor will Stop Rise (SR) or decrease the frequency (HzDown)

Value	Model 09/12	Model 18/24
A	62	64
B	52	54

If the unit stops as such protection for 6 times, it can not resume running automatically and display the error code **E8**, it can resume by pressing ON/OFF.

During the operating, If compressor operates for more than 10min, the counter of stop operation due to protection will be cleared.

### 12.13.4 Outdoor Coil Overheating protection (Cool/Dry Mode):

During cooling operation, the ODU Coil Overheating Protection is detected by temperature sensor OCT.

When  $OCT > A^{\circ}C$  compressor will stop.

When  $OCT < B^{\circ}C$  and compressor has stopped for 3mins, the compressor will resume running in the original mode.

When  $OCT \geq B^{\circ}C$ , the compressor will Stop Rise (SR) or decrease the frequency (HzDown)

Value	Model 09/12	Model 18/24
A	62	65
B	52	55

If the unit stops as such protection for 6 times, it can not resume running automatically and display the error code **E8**, it can resume by pressing ON/OFF.

During the operating, If compressor operates for more than 10min, the counter of stop operation due to protection will be cleared.

### 12.13.5 Compressor over Current Protection

Detect an input current by the CT during the compressor is running, and set the frequency upper limit from such input current. In case of heat pump model, this control is the upper limit control function of the frequency which takes priority of the lower limit of four way valve activating compensation.

Detail

## CONTROL SYSTEM

**Model 09/12: Compressor will stop when AC current reaches 14.0A for continuously 2.5s.**

**Model 18/24: Compressor will stop when AC current reaches 17.0A for continuously 2.5s.**

If the unit stops as such protection for 6 times, it can not resume running automatically and display error Code **E5**, it can resume by pressing ON/OFF.

During the operating, If compressor operates for more than 10min, the counter of stop operation due to protection will be cleared.

### 12.13.6 Outdoor Coil Deicing Protection

This protection is for Heat Pump Only

This protection is carried out by the cooling cycle (reverse cycle). The defrosting time or outdoor heat exchanger temperature must be more than its setting values when finishing the deicing protection.

In the deicing protection, IFAN is forced OFF.

#### 12.13.6.1 Deicing Starting Conditions

This protection is for Heat Pump Only

This protection is carried out by the cooling cycle (reverse cycle). The defrosting time or outdoor heat exchanger temperature must be more than its setting values when finishing the deicing protection.

In the deicing protection, IFAN is forced OFF.

#### 12.13.6.2 Deicing Protection Procedure

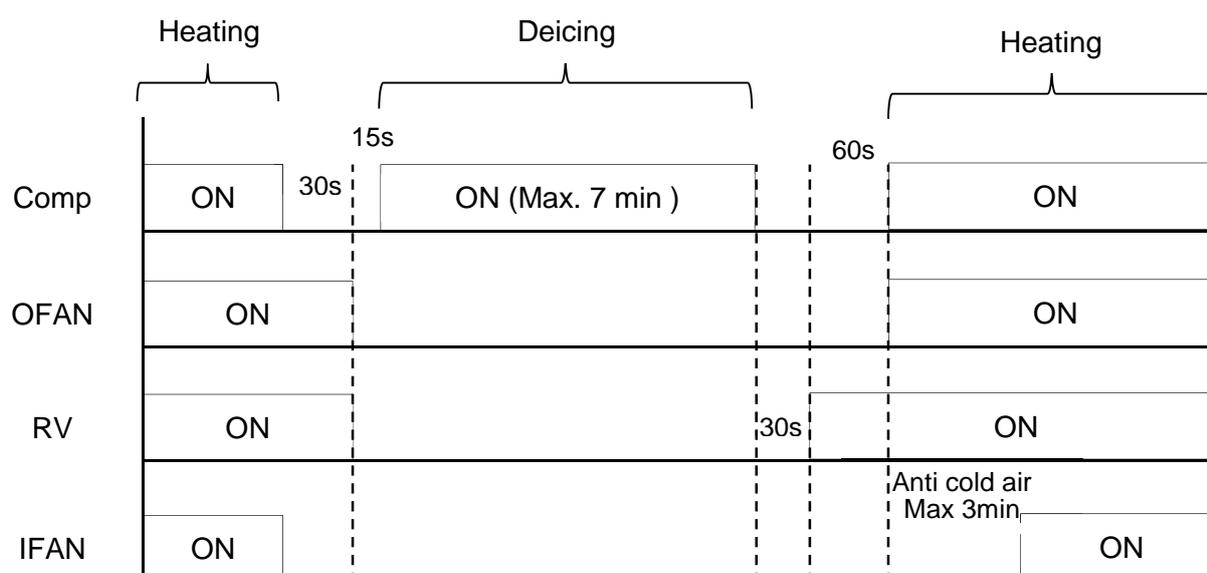
##### Deicing Starting Conditions:

The starting conditions is a function of OAT and (OCT). Under the conditions that the system is in heating operation for certain period (Accumulated time)

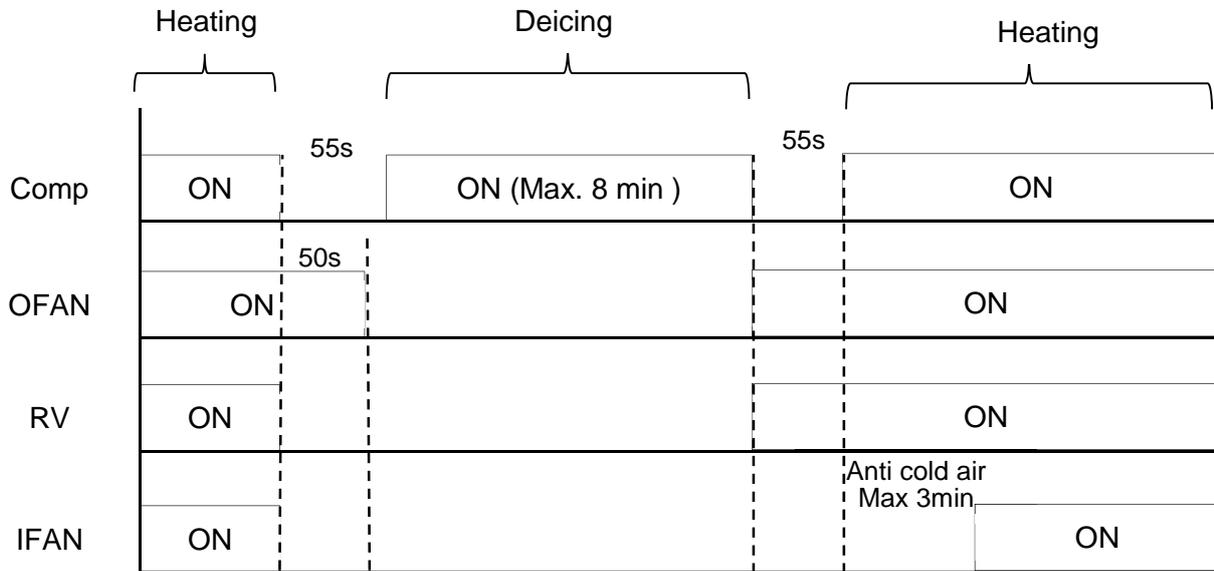
After the deicing starting condition is detected for continuous 3minutes, the de-icing will start.

Compressor, IFAN, OFAN and RV operate according to following chart during deicing.

For Model 09/12:



For Model 18/24:



**12.13.6.3 Exiting Deicing**

OCT ≤ 12°C or  
 OAT < 5°C and OCT ≥ 6°C lasts for more than 80Sec  
 Or De-icing time reaches to maximum deicing time.

**12.13.7 AC Voltage Drop:**

During compressor operation, the system will stop in case of an AC voltage malfunction the unit will resume its operation automatically after 3min.

**12.13.8 Communication malfunction:**

If the unit does not receive correct signal from indoor unit for 3min continuously, the unit will stop and will show communication malfunction protection (E6);  
 if the communication malfunction had been resumed and the compressor had stopped for a period of 3min, the unit will restart its operation.

**12.13.9 Overload protection of compressor**

The Over Load Protector (OLP) is equipped to have the protection by compressor shell temperature.

If OLP is detected OPEN for 3s successively, the system will stop operation.

if OLP is detected CLOSE, and compressor has stopped for 3min, the AC can go back to normal operation.

## CONTROL SYSTEM

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If the unit stops operation due to overload protection of compressor for 3 times successively, the unit can't resume operation automatically and will show **H3** error code, except pressing ON/OFF button.

\* The counter can be cleared if compressor operates for 30min.

### 12.13.10 IPM module protection

After compressor is turned on, Once IPM modular protection signal (by its current or temperature) is detected, the unit will stop operation immediately.

If modular protection is resumed and compressor has stopped for 3min, the complete unit can then be allowed to resume operation.

If the unit stops operation due to modular protection for 3 times successively, the unit can't resume operation automatically and show error code **H5**, except pressing ON/OFF button.

\* If compressor has operates for more than 10 min successively, the counter will be cleared.

### 12.13.11 Modular overheating protection (HST overheating protection)

Protect the IPM modular by reducing compressor frequency or stop compressor according to the Module temperature (HST)

When  $HST \geq 80C$ , compressor frequency will be decreased or stopped increasing.

When  $HST \geq 95C$ , the unit will stop. (Back to normal when  $HST > 87C$  and Comp OFF time  $> 3mins$ .)

If the unit stops operation for 6 times, the unit can't resume its operation and show error code **P8**. Only press ON/OFF button can resume the operation.

\* If compressor has operates for more than 10 min successively, the counter will be cleared.

### 12.13.12 Sensor Failure

When the temperature sensor failure is detected, the unit will stop operation, and error code will be shown accordingly.

#### Error code of Sensor:

F1 – RAT Sensor Failure (short circuit or open circuit for 5s successively)

F2 – ICT Sensor Failure (short circuit or open circuit for 5s successively)

F3 – OAT Sensor Failure (short circuit or open circuit for 30s successively)

F4 – OCT Sensor Failure (short circuit or open circuit for 30s successively, and don't measure within 10 mins after deicing.)

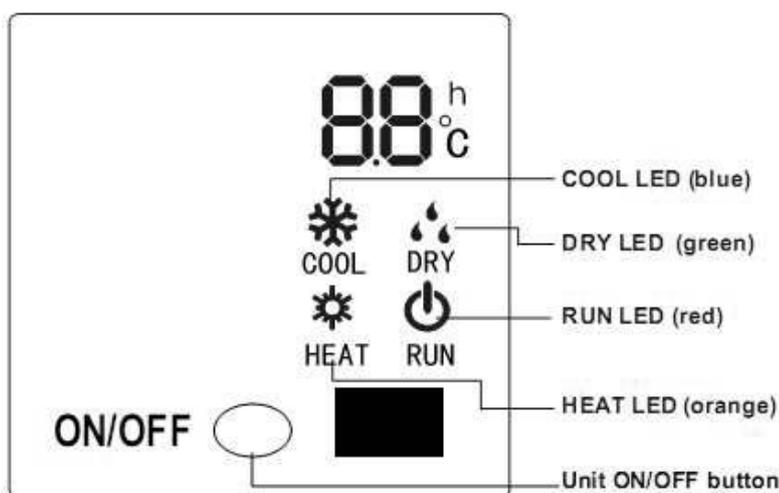
F5 – CTT Sensor Failure (short circuit or open circuit for 30s successively after compressor starts 3 mins)

### 12.14 Operating the Unit from the ON/OFF Button

The ON/OFF button allows to operate the unit in AUTO mode, the microcomputer will monitor the room temperature and select the (COOL, HEAT, FAN) mode automatically, and temperature/Fan speed settings can not be changed.

### 12.15 Indoor Unit Controllers and Indicators

The following is schematic drawing for the display:



RUN INDICATOR	<ol style="list-style-type: none"> <li>1. Lights up when the Air Conditioner is connected to power and the mode is STBY.</li> <li>2. When the unit is turned on remotely, the RUN LED goes out while the current setting running mode is displayed</li> </ol>
COOL INDICATOR DRY INDICATOR HEAT INDICATOR	<ol style="list-style-type: none"> <li>1. Lights up during specified operation mode (COOL/DRY/HEAT).</li> <li>2. HEAT indicator will blink ON 10s and OFF 0.5s under Deicing protection.</li> </ol>
2* 7 segments display	<ol style="list-style-type: none"> <li>1. In normal situation, the setting temperature is displayed.</li> <li>2. Shows outdoor temperature or indoor temperature when receiving the corresponding demand from controller. It resumes displaying setting temperature 5s later</li> <li>3. Shows the alarm code whenever there is an alarm.(Refer to Diagonostic part)</li> </ol>
Unit ON/OFF Button	<p><b>Short pressing(Less than 5s)</b> : Unit will swich between Auto mode and STBY. System will select the COOL/HEAT/FAN mode automatically and temperature/Fan speed settings can not be changed.</p> <p><b>Long pressing (5~10s)</b>: System will enter into Force cooling operating</p>

## 13. TROUBLESHOOTING

### 13.1 ELECTRICAL & CONTROL TROUBLESHOOTING

#### 13.1.1 Precautions before Performing Inspection or Repair

Be cautious during installation and maintenance. Do operation following the regulations to avoid electric shock and casualty or even death due to drop from high attitude.

\* **Static maintenance** is the maintenance during de-energization of the air conditioner. For static maintenance, make sure that the unit is de-energized and the plug is disconnected.

\***Dynamic maintenance** is the maintenance during energization of the unit. Before dynamic maintenance, check the electricity and ensure that there is ground wire on the site. Check if there is electricity on the housing and connection copper pipe of the air conditioner with voltage tester. After ensure insulation place and the safety, the maintenance can be performed.

Take sufficient care to avoid directly touching any of the circuit parts without first turning off the power. At time such as when the circuit board is to be replaced, place the circuit board assembly in a vertical position. Normally, diagnose troubles according to the trouble diagnosis procedure as described below. (Refer to the check points in servicing written on the wiring diagrams attached to the indoor/outdoor units.)

#### **Precautions when inspecting the control section of the outdoor unit:**

A large-capacity electrolytic capacitor is used in the outdoor unit controller (inverter). Therefore, if the power supply is turned off, charge (charging voltage DC280V to 380V) remains and discharging takes a lot of time. After turning off the power source, if touching the charging section before discharging, an electrical shock may be caused.

The outdoor unit can not be started up until the unit is de-energized for 20min

#### 13.1.2 Confirmation

13.1.2.1 Confirmation of Power Supply Confirm that the power breaker operates (ON) normally;

13.1.2.2 Confirmation of Power Voltage Confirm that power voltage is AC220~240V +/- 10%. If power voltage is not in this range, the unit may not operate normally.

**13.1.3 Judgment by Indoor/Outdoor Unit Diagnostics**

Error code from hardware malfunction will be shown immediately whereas other malfunction will be displayed after compressor stops for 200s

When there are several malfunctions, they will be displayed circularly.

Malfunction	2x7 Segments	IDU LEDs	Possible causes / Actions
System High Pressure Protection	E1	OPER Indicator OFF 3s and blink once	1. Refrigerant was superabundant 2. Poor heat exchange (including filter blockage of heat exchanger and bad radiating environment) 3. Ambient temperature is too high.
Indoor Coil Defrost Protection	E2	OPER Indicator OFF 3S and blink twice	1. Poor air-return in indoor unit 2. Fan speed is abnormal 3. Evaporator is dirty.
System block or refrigerant leakage	E3	OPER Indicator OFF 3S and blink 3 times	1. Low-pressure protection 2. Low-pressure protection of system 3. Low-pressure protection of compressor
Compressor over Heating Protection	E4	OPER Indicator OFF 3S and blink 4 times	1. EEV connection problem or damage 2. Refrigerant leakage 3. Poor heat exchange
AC Over Current	E5	OPER Indicator OFF 3S and blink 5 times	1. Supply voltage is unstable 2. Supply voltage is too low and load is too high 3. Evaporator is dirty.
Communication Malfunction	E6	OPER Indicator OFF 3 Sand blink 6 times	1. Wiring mistakes 2. IDU or ODU PCB problem
Indoor/Outdoor Coil Over Heating Protection	E8	OPER Indicator OFF 3S and blink 8 times	1. Too high ambient temperature 2. Poor heat exchange (including blockage and bad radiating environment )
EEPROM problem	EE	HEAT Indicator OFF 3Sand blink15 times	Outdoor main board damaged
Stop rise/HZ down due to HST over heating protection	EU		1. Insufficient grease on heatsink or poor connection of heatsink to PCB 2. Outdoor PCB problem.
Jumper Cap Malfunction	C5	OPER Indicator OFF 3S and blink 15 times	1. No jumper cap insert on main board. 2. Incorrect insert of jumper cap. 3. Jumper cap damaged. 4. Abnormal detecting circuit of main board.
Gathering refrigerant	F0		Normal function
RAT Failure	F1	COOL Indicator OFF 3S and blink once	1. Sensor connection is not good 2. Indoor ambient temp. sensor damaged.(check with sensor resistance value chart) 3. Main board damaged.
ICT Failure	F2	COOL Indicator OFF 3S and blink twice	
OAT Failure	F3	COOL Indicator OFF 3Sand blink3 times	
OCT Failure	F4	COOL Indicator OFF 3Sand blink4 times	
CTT Failure	F5	COOL Indicator OFF 3S and blink 5 times	
HZ down due to overload	F6	COOL Indicator OFF 3S and blink for 6 times	1. Too high ambient temperature 2. Poor heat exchange (including blockage and bad radiating environment )
Hz down due to over current	F8	COOL Indicator OFF 3S and blink 8 times	1. The input supply voltage is too low 2. System pressure is too high and overload
Hz down due to CTT over heating	F9	COOL Indicator OFF 3S and blink 9 times	1. Overload or temperature is too high; 2. Refrigerant is insufficient 3. Malfunction of electric expansion valve (EEV)

## TROUBLESHOOTING



Malfunction	2x7 Segments	IDU LEDs	Possible causes / Actions
Stop rise/HZ down due to IDU defrosting protection	FH		<ol style="list-style-type: none"> <li>Poor air-return in indoor unit</li> <li>Fan speed is abnormal</li> <li>Evaporator is dirty.</li> </ol>
DC Over Voltage	PH	COOL Indicator OFF 3S and blink 11 times	<ol style="list-style-type: none"> <li>AC power supply is higher than 265V</li> <li>Outdoor PCB circuit malfunction</li> </ol>
DC Under Voltage	PL	HEAT Indicator OFF 3S and blink 21 times	<ol style="list-style-type: none"> <li>AC power supply voltage is less than 150VAC</li> <li>Outdoor PCB circuit malfunction</li> </ol>
DC Over Current	P5	COOL Indicator OFF 3S and blink 15 times	<ol style="list-style-type: none"> <li>Abnormal power input voltage.</li> <li>Compressor wiring mistake.</li> <li>Liquid and gas valve are not open.</li> <li>EEV damaged or not proper working</li> <li>Poor heat exchange.</li> <li>Over charged system.</li> </ol>
Charging malfunction of capacitor	PU	HEAT Indicator OFF 3S and blink 17 times	<ol style="list-style-type: none"> <li>Reactor open</li> <li>Charging relay or other components damaged on PCB.</li> </ol>
HST Failure	P7	HEAT Indicator OFF 3S and blink 18 times	<ol style="list-style-type: none"> <li>Senor was broken or damaged</li> <li>PCB temperature detection circuit has problem</li> </ol>
HST over heating protection	P8	HEAT Indicator OFF 3S and blink 19 times	<ol style="list-style-type: none"> <li>Insufficient attachment of IPM module to Heatsink</li> <li>Outdoor PCB problem.</li> </ol>
Compressor overload protection	H3	HEAT Indicator OFF 3S and blink 3 times	<ol style="list-style-type: none"> <li>EEV connection problem or damaged</li> <li>Refrigerant leakage</li> <li>OLP damaged</li> </ol>
IPM protection	H5	HEAT Indicator OFF 3S and blink 5 times	<ol style="list-style-type: none"> <li>Abnormal power input voltage.</li> <li>Compressor wiring mistake.</li> <li>Liquid and gas valve are not open.</li> <li>EEV damaged or not proper working</li> <li>Poor heat exchange.</li> <li>Over charged system.</li> </ol>
No feedback of indoor motor	H6	OPER Indicator OFF 3S and blink 11 times	<ol style="list-style-type: none"> <li>Bad contact of DC motor feedback terminal.</li> <li>Bad contact of DC motor control end.</li> <li>Fan motor is blocked.</li> <li>Motor malfunction.</li> <li>Malfunction of main board rev detecting circuit.</li> </ol>
Desynchronizing of compressor	H7	HEAT Indicator OFF 3S and blink 7 times	<ol style="list-style-type: none"> <li>Abnormal power input voltage.</li> <li>Compressor wiring mistake.</li> <li>Liquid and gas valve are not open.</li> <li>EEV damaged or not proper working</li> <li>Poor heat exchange.</li> <li>Over charged system.</li> </ol>
PFC protection	HC	HEAT Indicator OFF 3S and blink 6 times	<ol style="list-style-type: none"> <li>PFC module assembly problem.</li> <li>Poor heat exchange of Heatsink</li> <li>PFC reactor problem.</li> <li>Abnormal power voltage</li> <li>PFC circuit problem on PCB</li> </ol>
Outdoor DC fan motor malfunction	L3	OPER Indicator OFF 3S and blink 23 times	<ol style="list-style-type: none"> <li>DC fan motor malfunction or blocked</li> <li>Bad connection</li> </ol>
Over Power Protection	L9	OPER Indicator OFF 3S and blink 20 times	To protect the electronic components when detect high power
IDU/ODU Mismatch	LP	OPER Indicator OFF 3S and blink 19 times	Indoor unit and outdoor unit doesn't match
Start-up Failure	LC	HEAT Indicator OFF 3S and blink 11 times	<ol style="list-style-type: none"> <li>Compressor wiring mistake</li> <li>Over charged system</li> <li>System not balanced before compressor starting</li> <li>Compressor problem</li> </ol>

Malfunction	2x7 Segments	IDU LEDs	Possible causes / Actions
ODU Deicing		HEAT Indicator OFF 3S and blink once(during blinking, ON 10s and HEAT Indicator OFF 0.5s)	Its the normal state
Malfunction of phase current detection circuit for compressor	U1	HEAT Indicator OFF 3S and blink 13 times	Outdoor main board damaged
Malfunction of voltage dropping for DC BUS	U3	HEAT Indicator OFF 3S and blink 20 times	Supply voltage is unstable
AC Current detection problem	U5	COOL Indicator OFF 3S and blink 13 times	Outdoor main board damaged
The RV is abnormal	U7	COOL Indicator OFF 3S and blink 20 times	1. Supply voltage is lower than AC175V; 2. Wiring terminal RV is loosened or broken; 3. RV is damaged.
Zero-crossing protection (IDU)	U8	OPER Indicator OFF 3S and blink 17 times	1. Power supply is abnormal 2. Detection circuit of indoor control main board is abnormal.
Outdoor unit zero-cross detecting error	U9		Outdoor main board damaged

### 13.1.4 Checking the refrigeration system

Checking system pressures and other thermodynamic measures should be done when system is in Test Mode (in Test mode, system operates in fixed settings). The performance curves given in this manual are given for unit performance in test mode when high indoor fan speed is selected.

Entering test mode please refer to section 12- Control system.

## 13.2 Simple procedures for checking the Main Parts

### 13.2.1 Checking Mains Voltage.

Confirm that the Mains voltage is between 198 and 264 VAC. If Mains voltage is out of this range, abnormal operation of the system is expected. If in range check the Power (Circuit) Breaker and look for broken or loosed cable lugs or wiring mistake(s).

### 13.2.2 Checking Power Input.

If Indoor unit power LED is unlighted, power down the system and check the fuse of the Indoor unit. If the fuse is OK replace the Indoor unit controller. If the fuse has blown, replace the fuse and power up again.

Checking Power Input procedure for the Outdoor unit is the same as with the Indoor unit.

### 13.2.3 Checking the Outdoor Fan Motor.

For AC motor

Check the voltage between two pins Hi and N of connector OFAN on controller, normal voltage is 220~240VAC.

For DC Motor

Check the voltage between any two pins of connector OFAN on controller, normal voltage is 280~380VDC

### 13.2.4 Checking the Compressor.

The compressor is brushless permanance magnetic DC motor. Three coil resistance is same. Check the resistance between three poles. The normal value should be with the almost same value. Pay attention U,V, W are respective to connect to RED,YELLOW,BLUE wires.

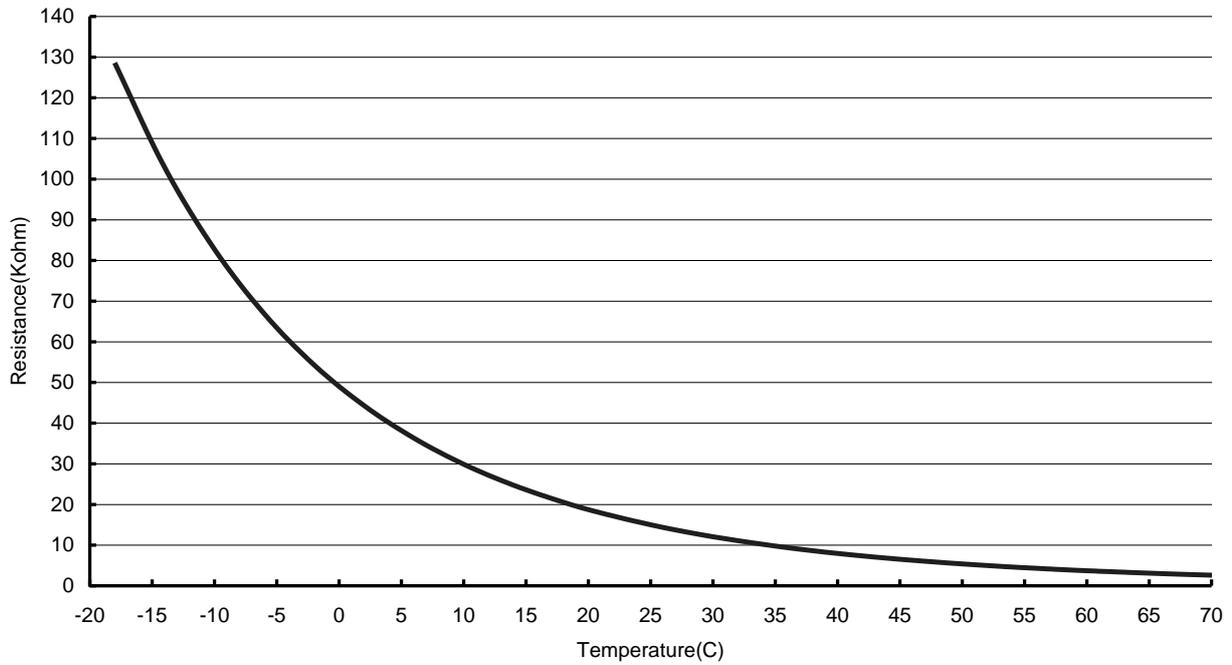
### 13.2.5 Checking the Reverse Valve (RV).

Running in heating mode, check the voltage between two pins of reverse valve connector, normal voltage is 220~240VAC.

## 14. CHARACTERISTICS OF SENSOR

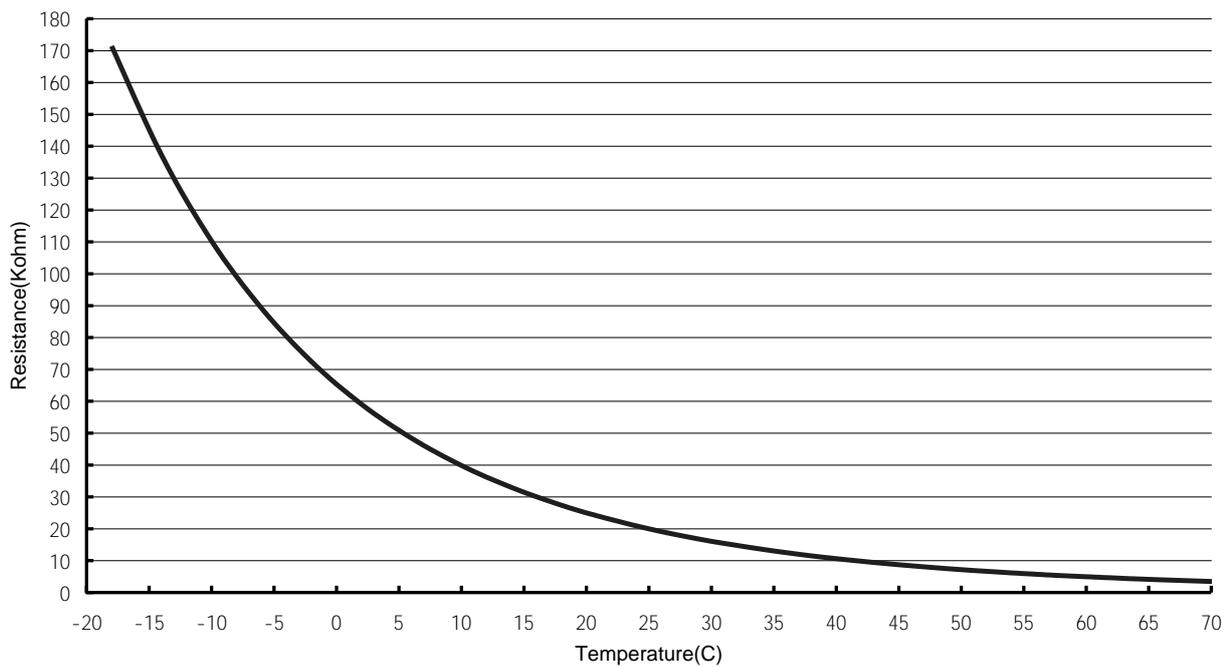
### 14.1.1 RAT/OAT

RAT/OAT R-T chart



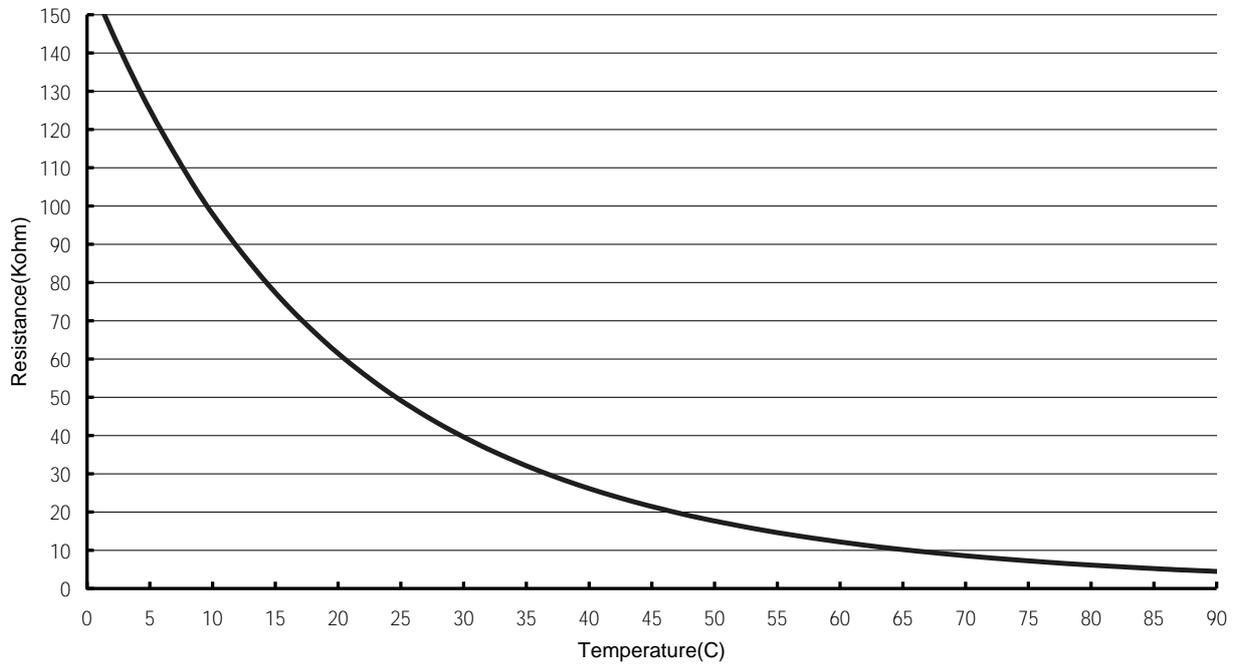
### 14.1.2 ICT/OCT

ICT/OCT R-T Chart



14.1.3 CTT

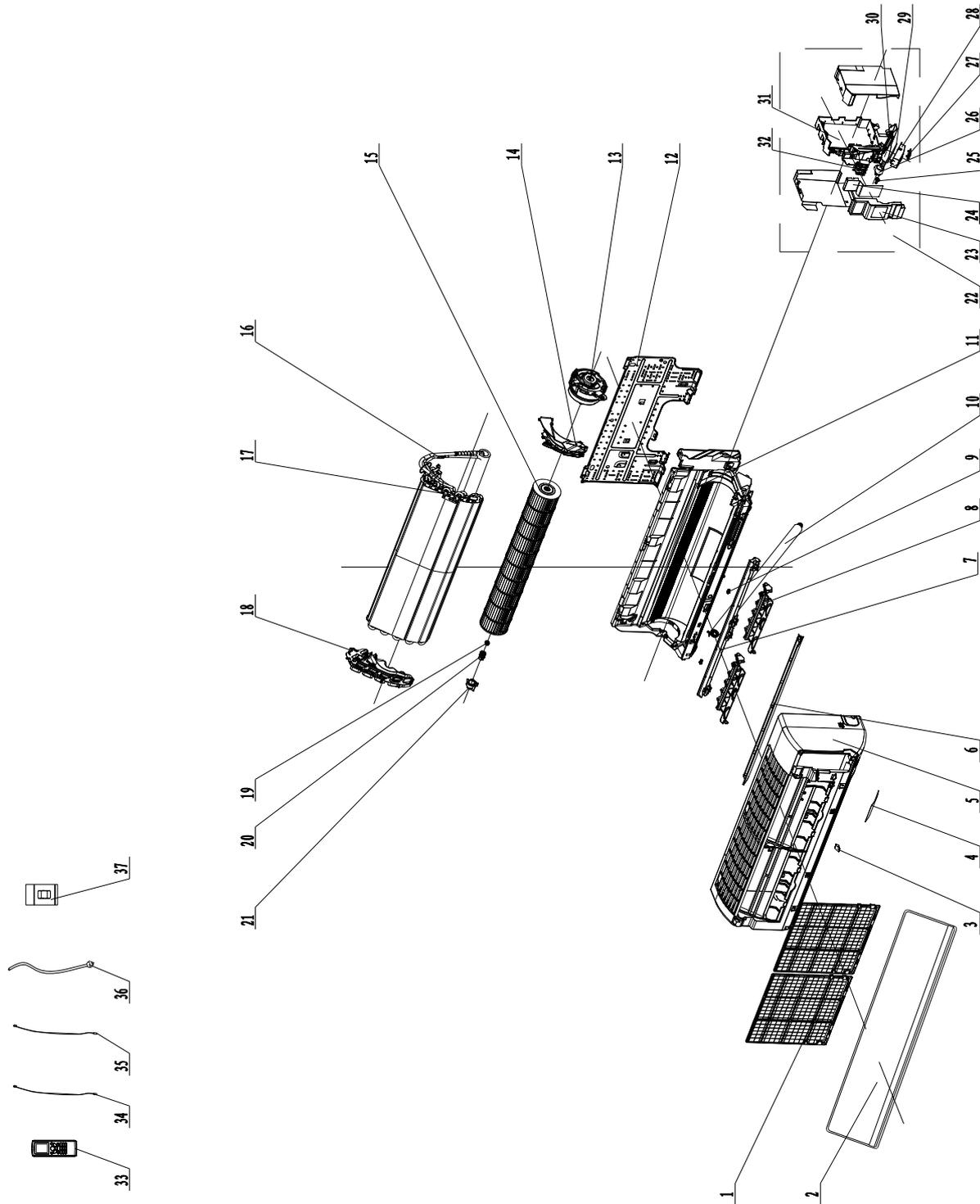
CTT R-T Chart



# 15. EXPLODED VIEW & SPARE PART LIST

## 15.1 Exploded view of indoor unit: HHD009

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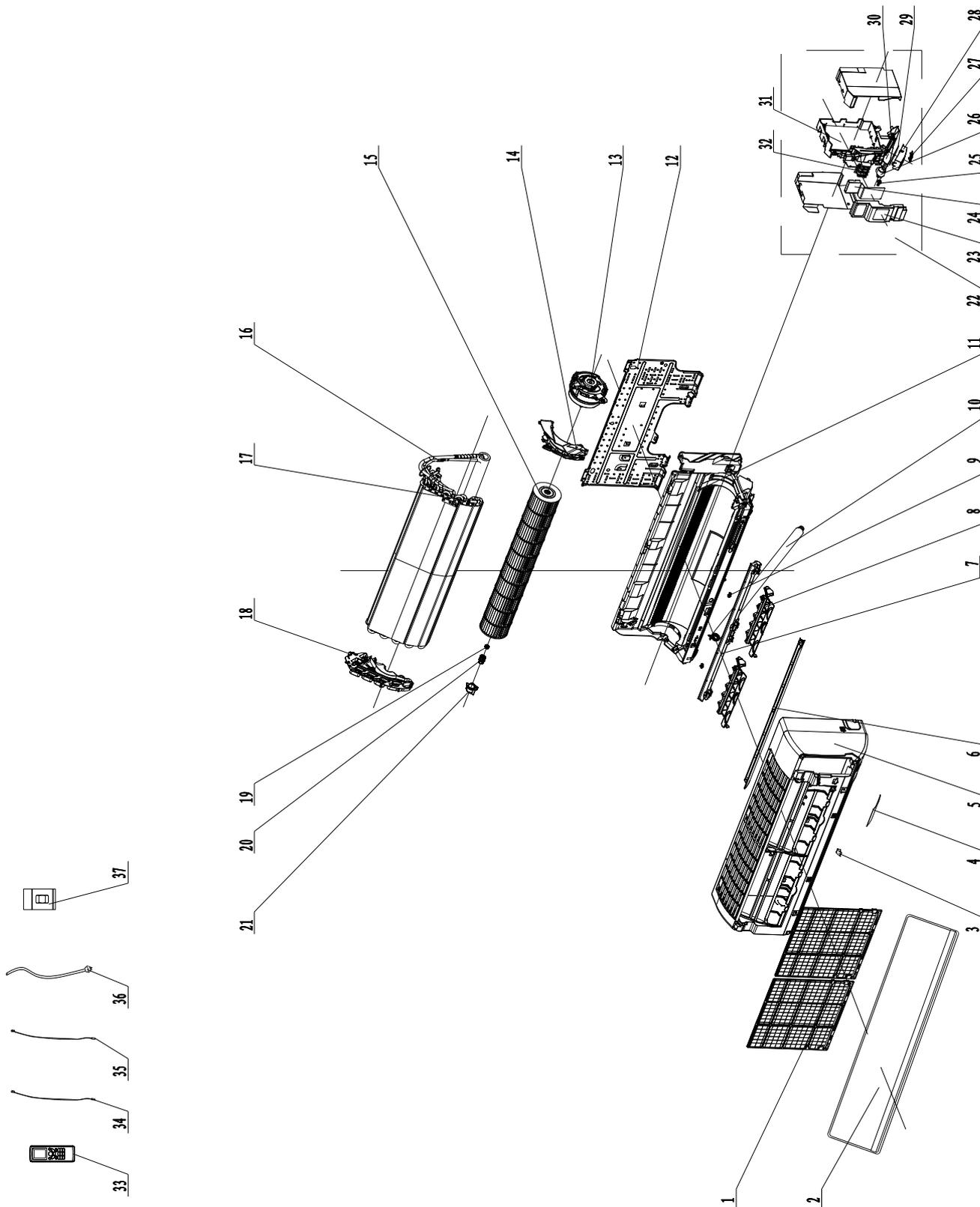


**15.2 Spare part list of indoor Unit: HHD009**

NO.	Part Code	Part Description	qty
1	1112208201	Filter Sub-Assy	2
2	20012823	Front Panel Assy	1
3	24252019	Screw Cover	1
4	63062017	Membrane	1
5	2001237501	Front Case Assy	1
6	10512119	Guide Louver	1
7	26112486	Helicoid Tongue	1
8	10512160	Air Louver	2
9	1054202001	Shaft of Guide Louver	2
10	0523204101	Drainage Pipe Sub-assy	1
11	2220229501	Rear Case assy	1
12	0125201801A	Wall Mounting Frame	1
13	15002020	Motor Sub-Assy	1
14	26112191	Motor Press Plate	1
15	10352423	Cross Flow Fan	1
16	01002957	Evaporator Assy	1
17	05212423	Temp Sensor Sleeving	1
18	24212108	Evaporator Support	1
19	76512210	Fan Bearing	1
20	76712032	Bearing Holder	1
21	10542024	Axile Bush Sub-assy	1
22	10000201391	Electric Box Assy	1
23	20122109	Electric Box Cover Sub-Assy	1
24	01592074	Shield Cover	1
25	73012005	Crank	1
26	1521210701	SteppingMotor	1
27	22242083	Indicator Shield Cover	1
28	22242084	Indicator Light Cover	1
29	30568112	Display Board	1
30	20112086	Electric Box	1
31	30138000407	Main Board	1
32	42011233	Terminal Board	1
33	30510460_K88497	Remote Controller	1
34	390000453	Temperature Sensor	1
35	39000305	Temperature Sensor	1
36	none	Power Cord	0
37	none	Pipe Connection Nut Accessories	0

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15.3 Exploded view of indoor unit: HHD012

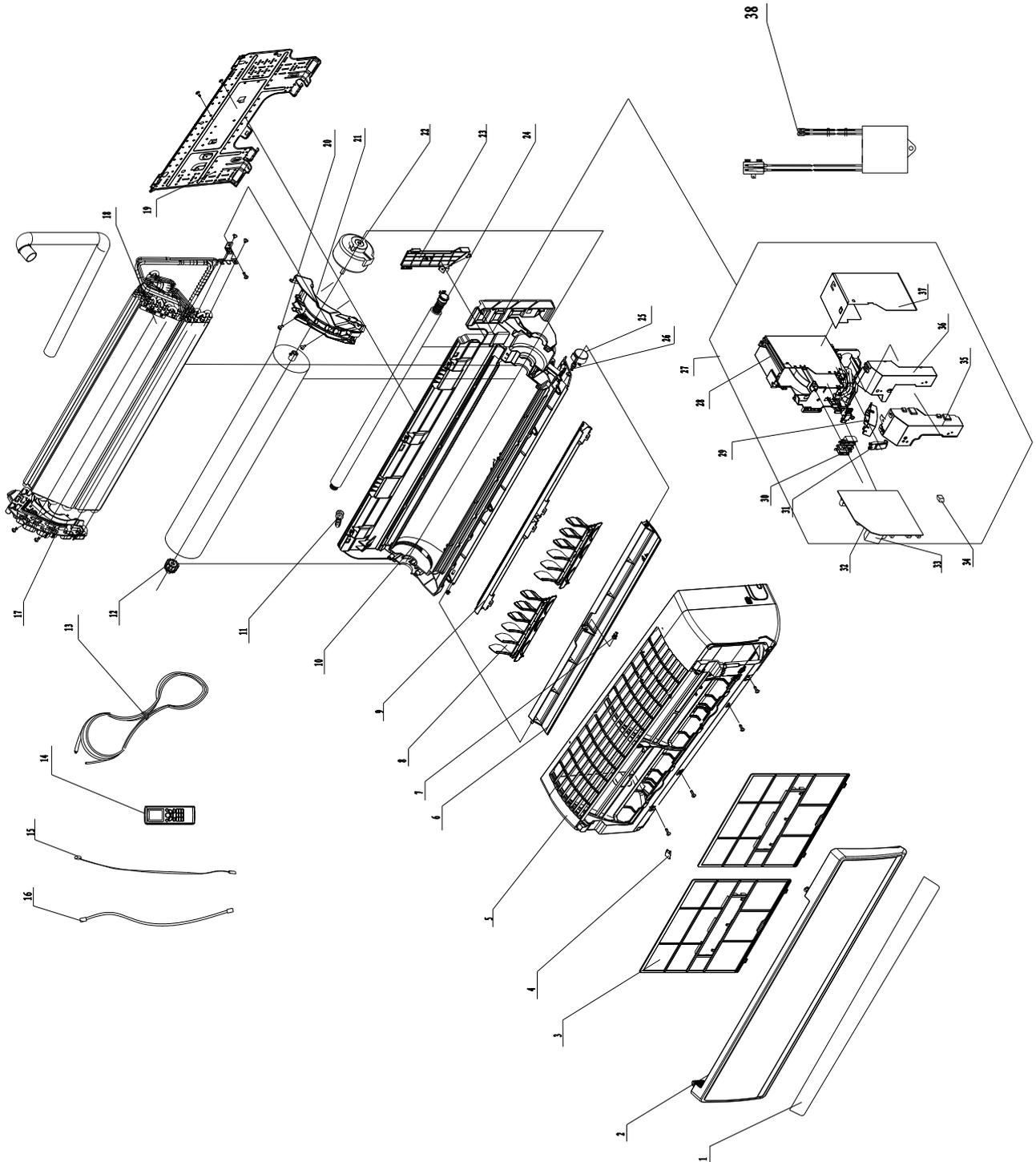


**15.4 Spare part list of indoor Unit: HHD012**

NO.	Part Code	Part Description	qty
1	1112208201	Filter Sub-Assy	2
2	20012823	Front Panel Assy	1
3	24252019	Screw Cover	1
4	63022016	Membrane	1
5	20012824	Front Case Assy	1
6	10512119	Guide Louver	1
7	26112486	Helicoid Tongue	1
8	10512160	Air Louver	2
9	1054202001	Shaft of Guide Louver	2
10	0523204101	Drainage Pipe Sub-assy	1
11	2220229501	Rear Case assy	1
12	0125201801A	Wall Mounting Frame	1
13	15002020	Motor Sub-Assy	1
14	26112191	Motor Press Plate	1
15	10352423	Cross Flow Fan	1
16	01002958	Evaporator Assy	1
17	05212423	Temp Sensor Sleevng	1
18	24212108	Evaporator Support	1
19	76512210	Fan Bearing	1
20	76712032	Bearing Holder	1
21	10542024	Axile Bush Sub-assy	1
22	10000201392	Electric Box Assy	1
23	20122109	Electric Box Cover Sub-Assy	1
24	01592074	Shield Cover	1
25	73012005	Crank	1
26	1521210701	SteppingMotor	1
27	22242083	Indicator Shield Cover	1
28	22242084	Indicator Light Cover	1
29	30568112	Display Board	1
30	20112086	Electric Box	1
31	30138000407	Main Board	1
32	42011233	Terminal Board	1
33	30510460_K88497	Remote Controller	1
34	390000453	Temperature Sensor	1
35	39000305	Temperature Sensor	1
36	none	Power Cord	0
37	none	Pipe Connection Nut Accessories	0

15.5 Exploded view of indoor unit: HHD018

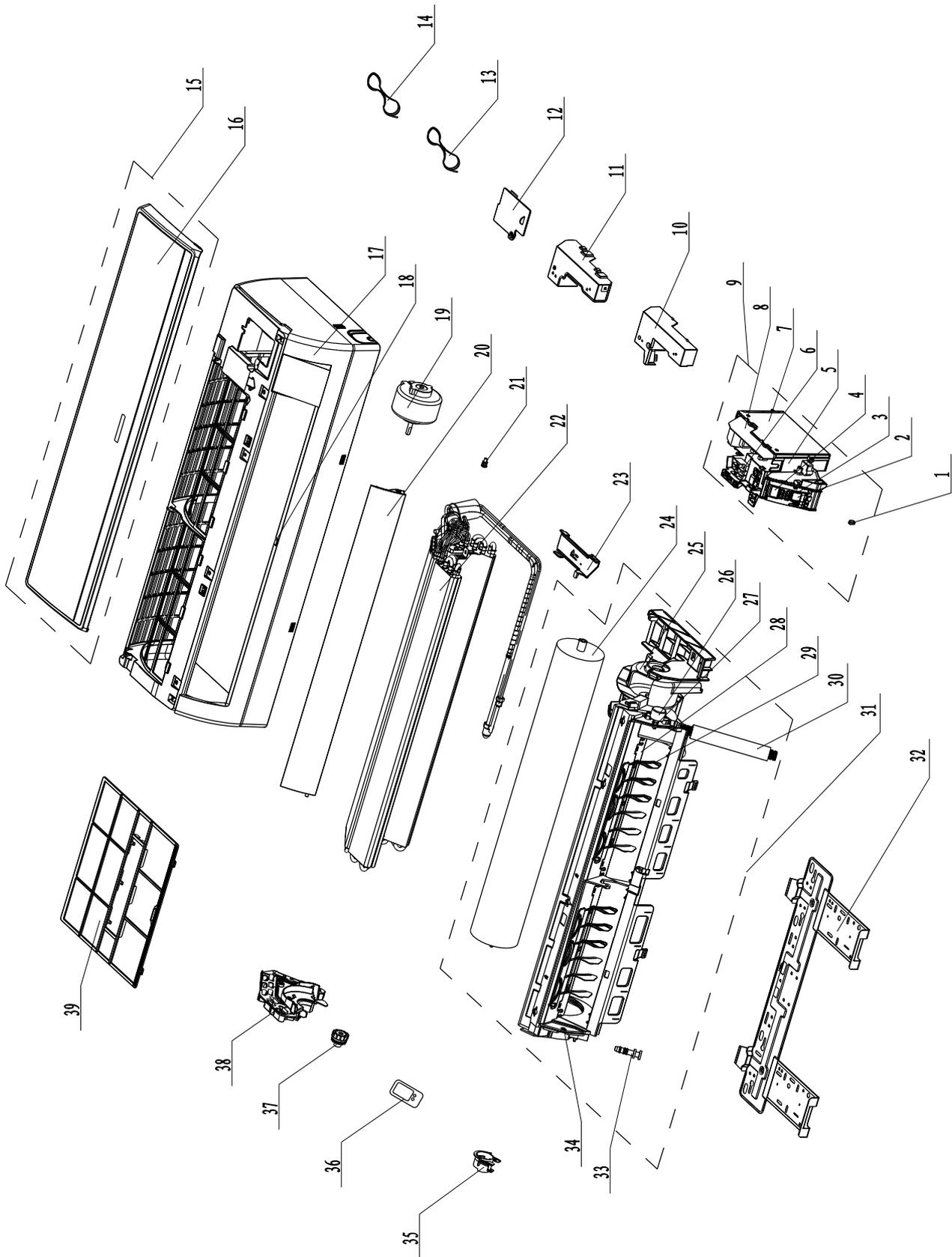
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**15.6 Spare part list of indoor Unit: HHD018**

NO.	Part Code	Part Description	qty
1	none	Decorative Strip	0
2	27230001494	Front Panel	1
3	11122104	Filter Sub-Assy	2
4	242520041	Screw Cover	1
5	20012497	Front Case Assy	1
6	10512140	Guide Louver	1
7	10542036	Axile Bush	1
8	10512160	Air Louver	2
9	26112232	Helicoid Tongue	1
10	22202154	Rear Case assy	1
11	76712012	Rubber Plug (Water Tray)	1
12	7651205102	O-Gasket sub-assy of Bearing	1
13	4002052317	Connecting Cable	1
14	30510460_K88497	Remote Controller	1
15	390000597	Temperature Sensor	1
16	390000451	Temperature Sensor	1
17	24212119	Evaporator Support	1
18	01002320	Evaporator Assy	1
19	01252484	Wall Mounting Frame	1
20	10352036	Cross Flow Fan	1
21	26112231	Motor Press Plate	1
22	15012146	Fan Motor	1
23	2611216401	Connecting pipe clamp	1
24	0523001407	Drainage Hose	1
25	15012086	SteppingMotor	1
26	10582070	Crank	1
27	10000201021	Electric Box Assy	1
28	20112103	Electric Box	1
29	22242084	Indicator Light Cover	1
30	42011233	Terminal Board	1
31	22242083	Indicator Shield Cover	1
32	30138000408	Main Board	1
33	3301074712	Capacitor CBB611A	1
34	4202300115	Jumper	1
35	01592088	Shield Cover of Electric Box Cover	1
36	20122123	Electric Box Cover	1
37	01592087	Shield Cover of Electric Box	1

15.7 Exploded view of indoor unit: HHD024

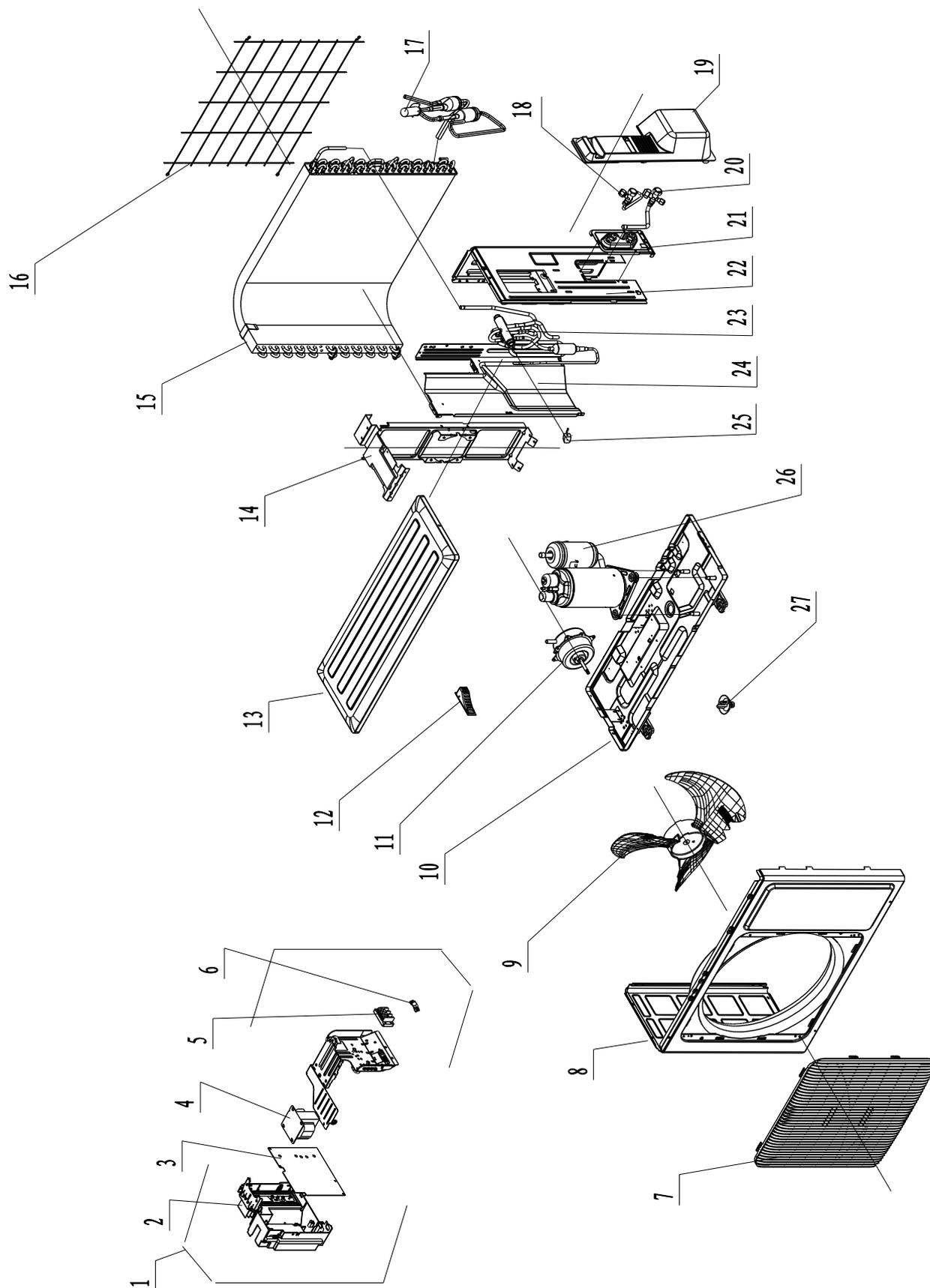


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**15.8 Spare part list of indoor Unit: HHD024**

NO.	Part Code	Part Description	qty
1	4202300127	Jumper	1
2	22242083	Indicator Shield Cover	1
3	22242084	Indicator Light Cover	1
4	30568112	Display Board	1
5	20112103	Electric Box	1
6	42011233	Terminal Board	1
7	01592087	Shield Cover of Electric Box	1
8	30138000409	Main Board	1
9	10000200732	Electric Box Assy	1
10	20122123	Electric Box Cover	1
11	01592088	Shield Cover of Electric Box Cover	1
12	20112081	Electric Box Cover2	1
13	none	Power Coad	0
14	4002052317	Connecting Cable	0
15	20012828	Front Panel Assy	1
16	27230004362	Front Panel	1
17	20012514	Front Case Assy	1
18	24252016	Screw Cover	3
19	15012098	Fan Motor	1
20	10512138	Guide Louver	1
21	10542036	Axile Bush	2
22	01100100032	Evaporator Assy	1
23	26112188	Connecting pipe clamp	1
24	10352030	Cross Flow Fan	1
25	26112330	Motor Press Plate	1
26	1521300101	Stepping Motor	1
27	10582070	Crank	1
28	26112229	Helicoid Tongue	1
29	10512139	Air Louver	3
30	0523001405	Drainage Hose	1
31	00000100023	Rear Case assy	1
32	01252032	Wall Mounting Frame	1
33	76712012	Rubber Plug (Water Tray)	1
34	10512037	Left Axile Bush	1
35	26152025	Ring of Bearing	1
36	30510460_K88497	Remote Controller	1
37	7651205102	O-Gasket sub-assy of Bearing	1
38	24212139	Evaporator Support	1
39	11122091	Filter Sub-Assy	2

15.9 Exploded view of outdoor unit: YHD009,YHD012



**15.10 Spare part list of outdoor Unit: YHD009**

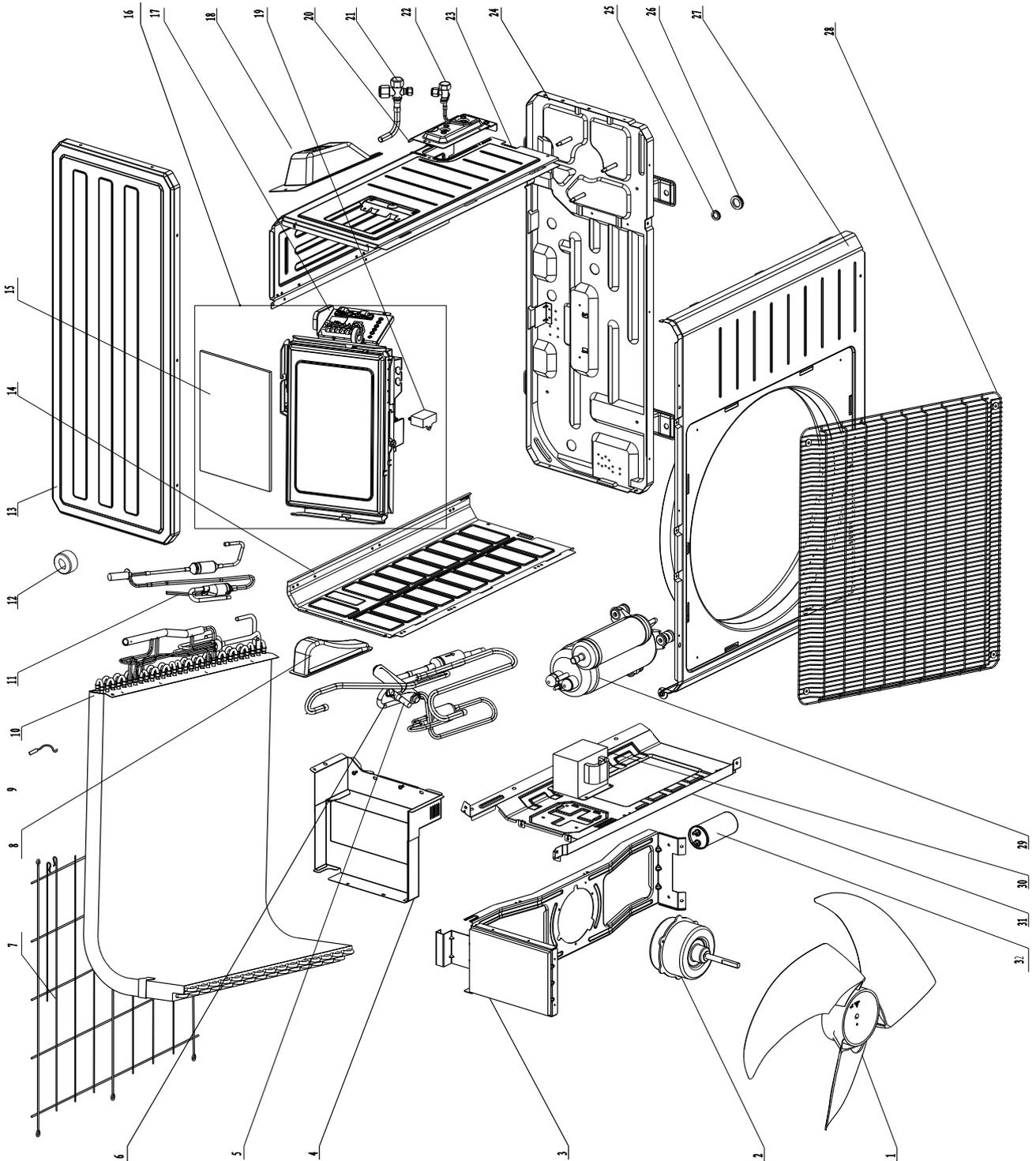
NO.	Part Code	Part Description	qty
1	10000100133	Electric Box Assy	1
2	10000500054	Electric Box Sub-Assy	1
3	30138000460	Main Board	1
4	43130184	Reactor	1
5	42010313	Terminal Board	1
6	71010003	Wire Clamp	1
7	22413049	Front Grill	1
8	0153304811	Front Panel Assy	1
9	10333004	Axial Flow Fan	1
10	02803037P	Chassis Sub-assy	1
11	1501308506	Fan Motor	1
12	01253073	Top Cover Sub-Assy	1
13	01703104	Motor Support	1
14	01163812	Condenser Assy	1
	01100200141	Condenser Assy	1
15	01473009	Rear Grill	1
16	07133978	Electronic Expansion Valve	1
	07135228	Electronic Expansion Valve	1
17	071302391	Cut off Valve	1
18	262334332	Big Handle	1
19	07100003	Valve	1
	0710000301	Valve	1
20	0171314201P	Valve Support	1
21	0130317801	Right Side Plate Sub-Assy	1
22	03073151	4-Way Valve Assy	1
23	0123338502	Clapboard Sub-Assy	1
24	4300040050	Magnet Coil	1
25	00103896G	Compressor and Fittings	1
26	06123401	Drainage Connector	1

**15.11 Spare part list of outdoor Unit: YHD012**

NO.	Part Code	Part Description	qty
1	10000100135	Electric Box Assy	1
2	10000500056	Electric Box Sub-Assy	1
3	30138000457	Main Board	1
4	43130184	Reactor	1
5	42010313	Terminal Board	1
6	71010003	Wire Clamp	1
7	22413043	Front Grill	1
8	0153304810	Front Panel Assy	1
9	10333004	Axial Flow Fan	1
10	02803151P	Chassis Sub-assy	1
11	1501308506	Fan Motor	1
12	26233100	Small Handle	1
13	01253073	Top Cover Sub-Assy	1
14	0170310401	Motor Support	1
15	01100200142	Condenser Assy	1
16	01473009	Rear Grill	1
17	07135228	Electronic Expansion Valve	1
18	071302391	Cut off Valve	1
19	262334332	Big Handle	1
20	07100003	Valve	1
	0710000301	Valve	1
21	0171314201P	Valve Support	1
22	0130317801	Right Side Plate Sub-Assy	1
23	03073145	4-Way Valve Assy	1
24	0123338502	Clapboard Sub-Assy	1
25	4300040050	Magnet Coil	1
26	00103896G	Compressor and Fittings	1
27	06123401	Drainage Connector	1

15.12 Exploded view of outdoor unit: YHD018

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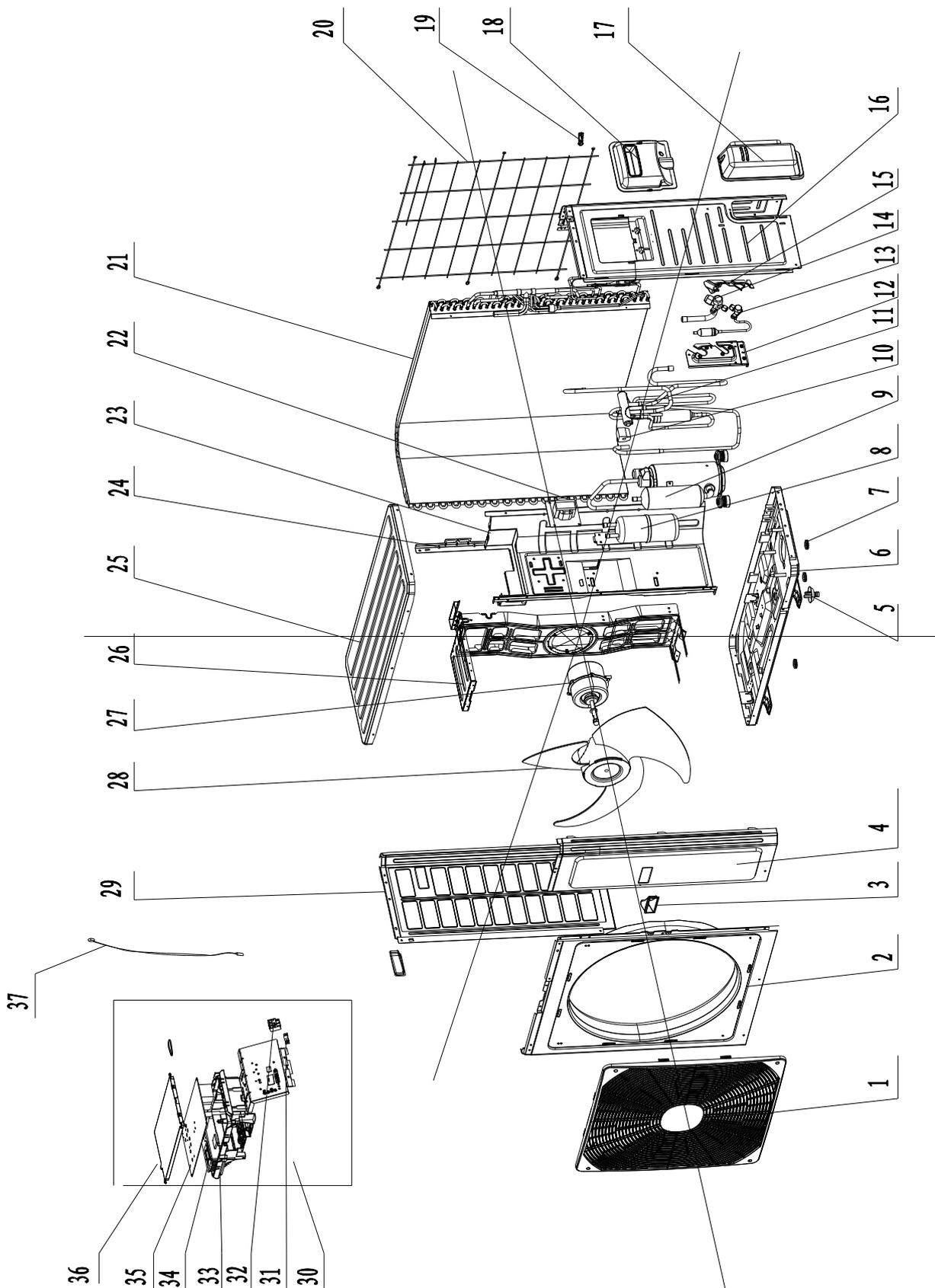


**15.13 Spare part list of outdoor Unit: YHD018**

NO.	Part Code	Part Description	qty
1	10335008	Axial Flow Fan	1
2	1501506402	Fan Motor	1
3	01705067	Motor Support Sub-Assy	1
	01705036	Motor Support Sub-Assy	1
4	none	Electric box (fireproofing)	0
5	4300040045	Magnet Coil	1
6	03073158	4-Way Valve Assy	1
7	01473043	Rear Grill	1
8	none	Left Handle	0
9	3900030901	Temperature Sensor	1
10	01163935	Condenser Assy	1
11	none	Electronic Expansion Valve	0
12	none	Electric expand valve fitting	0
13	01255005P	Coping	1
14	01305093P	Left Side Plate	1
15	20113003	Insulated Board (Cover of Electric Box)	1
16	10000100093	Electric Box Assy	1
17	420101943	Terminal Board	1
18	26233053	Handle	1
19	none	Capacitor CBB61	0
20	01715010P	Valve Support Assy	1
21	0713506703	Cut off Valve	1
22	0713506803	Cut off Valve	1
23	0130329201	Right Side Plate Assy	1
24	02803207P	Chassis Sub-assy	1
25	06813401	Drainage hole Cap	1
	06123401	Drainage Connector	1
26	none	Drainage Plug	0
27	01535013P	Front Panel	1
28	22413045	Front Grill	1
29	00105249G	Compressor and Fittings	1
30	none	Reactor	0
31	01233153	Clapboard Assy	1
32	none	Capacitor CBB65	0

15.14 Exploded view of outdoor unit: YHD024

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**15.15 Spare part list of outdoor Unit: YHD024**

NO.	Part Code	Part Description	qty
1	22415011	Front Grill	1
2	02200200001	Front Panel Assy	1
3	none	left handle	0
4	01305086P	Front Side Plate	1
5	06813401	Drainage hole Cap	1
	06123401	Drainage Connector	1
6	02803255P	Chassis Sub-assy	1
7	06813401	Drainage hole Cap	3
8	07225017	Gas-liquid Separator Assy	1
9	00105249G	Compressor and Fittings	1
10	4300040045	Magnet Coil	1
11	03073144	4-Way Valve Assy	1
12	0171501201P	Valve Support Sub-Assy	1
13	07130239	Cut off Valve	1
14	07133157	Cut off Valve	1
15	01365435P	Baffle(Valve Support)	1
16	0130504401P	Right Side Plate	1
17	22245003	Valve Cover	1
18	26235001	Big Handle	1
	2623500101	Big Handle	1
19	26115004	Wiring Clamp	1
20	01475013	Rear Grill	1
21	01163917	Condenser Assy	1
22	none	Reactor	0
23	01233164	Clapboard Assy	1
24	01175092	Condenser Support Plate	1
25	01255006P	Coping	1
26	01705025	Motor Support Sub-Assy	1
27	15010400000102	Brushless DC Motor	1
	1501403402	Fan Motor	1
28	10335014	Axial Flow Fan	1
29	01305043P	Left Side Plate	1
30	10000100104	Electric Box Assy	1
31	71010003	Wire Clamp	1
	71010103	Wire Clamp	1
32	420101943	Terminal Board	1
33	20113027	Electric Box	1
34	49010252	Radiator	1
35	30138000401	Main Board	1
36	20113003	Insulated Board (Cover of Electric Box)	1
37	3900030901	Temperature Sensor	1

# APPENDIX