Airwell

Service Manual

HDD / HED DCI Series

Indoor Units		Outdoor Units
AWSI-HDD009-H11	*AWSI-HED009-H11*	*AWAU-YDD009-H11*
AWSI-HDD012-H11	*AWSI-HED012-H11*	*AWAU-YDD012-H11*

SM HDDHED 1-A.1 GB

REFRIGERANT | NOVEMBER – 2010 | Version: 1

R410A | HEAT PUMP

LIST OF EFFECTIVE PAGES

Note: Changes in the pages are indicated by a “Revision#” in the footer of each effected page (when none indicates no changes in the relevant page). All pages in the following list represent effected/ non effected pages divided by chapters.

Dates of issue for original and changed pages are:

Original ..... 0 ..... August 2009

Total number of pages in this publication is **111** consisting of the following:

Page No.	Revision No. #		Page No.	Revision No. #		Page No.	Revision No. #

- Zero in this column indicates an original page.

*Due to constant improvements please note that the data on this service manual can be modified with out notice.
**Photos are not contractual

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1. INTRODUCTION

1.1 General

HDD/HED series is a monosplit DCI inverter air conditioner designed for residential buildings.

The **ODU YDD009/012** 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 **IDU HDD/HED-009/012** is a high-wall mounted type indoor with modern apperance.

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 COP,Energy efficiency class A in cooling/heating mode.
- Torque control for compressor running in lower Freqency but with low vibration and little sound.
- Max allowing tubing distance of 15m.
- Up to 5 m vertical high between indoor and outdoor units.
- Cooling operation at outdoor temperature up to 48ºC.
- Heating operation at outdoor temperature down to -15ºC.
- 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 diagnosic (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 8:

- ► Compact and economically design, it offers excellent user comfort.
- ► Combining modern design with high technology, the RC8 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**

1.5 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.
- Outdoor coil with hydrophilic louver fins for RC units.
- Outlet air fan grill.
- Interconnecting wiring terminal block.

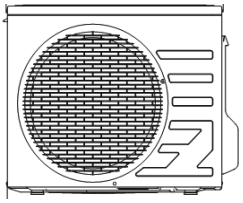
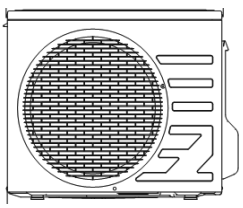
1.6 Tubing Connections

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-HDD009-H11	AWSI-HDD012-H11
		AWSI-HED009-H11	AWSI-HED012-H11
			
	AWAU-YDD009-H11	√	
	AWAU-YDD012-H11		√

2. PRODUCT DATA SHEET

2.1 HDD009 / HED009 // YDD 009

Model Indoor Unit					**HDD/HED009**	
Model Outdoor Unit					**YDD 009**	
Installation Method of Pipe					Flared	
Characteristics				Units	Cooling	Heating
Capacity (4)				kW	0.45-3.23))2.65	0.45-4.1))3.52
Power input (4)				kW	0.2-1.35))0.8	0.2-1.45))0.95
EER (Cooling) or COP(Heating) (4)				W/W	3.30	3.70
Energy efficiency class					A	A
Power supply				V	220-240	
				Ph	1	
				Hz	50	
Rated current				A	6.3	6.8
Power factor					0.97	0.97
Prated (IDU+ODU)				W	1550	
Circuit breaker rating				A	16A	
INDOOR	Fan type & quantity				Crossflow x 1	
	Fan speeds	Cooling	SH/H/M/L	RPM	1300/1100/900/700	
		Heating	SH/H/M/L	RPM	1300/1140/980/820	
	Air flow (1)		SH/H/M/L	m3/hr	630/520/370/280	
	External static pressure		Min	Pa	0	
	Sound power level (2)		SH/H/M/L	dB(A)	51/46/40/34	
	Sound pressure level (3)		SH/H/M/L	dB(A)	41/36/30/24	
	Moisture removal			l/hr	0.8	
	Condensate drain tube I.D			mm	16	
	Dimensions		WxHxD	mm	770x283x201	
	Net Weight			kg	8	
	Package dimensions		WxHxD	mm	844x342x261	
	Packaged weight			kg	11	
OUTDOOR	Refrigerant control				Capillary	
	Compressor type, model				Rotary,Daikin 1YC23AEXD	
	Fan type & quantity				Propeller(direct) x 1	
	Fan speeds		H	RPM	930	
	Air flow		H	m3/hr	1600	
	Sound power level		H	dB(A)	57	
	Sound pressure level (3)		H	dB(A)	47	
	Dimensions		WxHxD	mm	658x550x275	
	Net Weight			kg	28	
	Package dimensions		WxHxD	mm	771x592x348	
	Packaged weight			kg	32	
	Refrigerant type				R410A	
	Standard charge			kg(5m)	0.74	
	Additional charge				15g/m(5m<L<15m)	
	Connections between units	Liquid line		In.(mm)	1/4"(6.35)	
		Suction line		In.(mm)	3/8"(9.53)	
		Max.tubing length		m.	Max. 15	
		Max.height difference		m.	Max. 5	
Operation control type					Remote control	

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.
(2) Airflow in ducted units; at nominal external static pressure.
(3) Sound power in ducted units is measured at air discharge.
(4) Sound pressure level measured at 1 meter distance from unit.

2.2 HDD012 / HED012 // YDD 012

Model Indoor Unit					**HDD/HED012**	
Model Outdoor Unit					**YDD 012**	
Installation Method of Pipe					Flared	
Characteristics				Units	Cooling	Heating
Capacity (4)				kW	3.53(0.6-3.96)	4.1(0.6-5.13)
Power input (4)				kW	1.1(0.22-1.45)	1.14(0.22-1.55)
EER (Cooling) or COP(Heating) (4)				W/W	3.21	3.61
Energy efficiency class					A	A
Power supply				V	220-240	
				Ph	1	
				Hz	50	
Rated current				A	6.5	7.8
Power factor					0.97	0.97
Prated (IDU+ODU)				W	1650	
Starting current				A		
Circuit breaker rating				A	16	
INDOOR	Fan type & quantity				Crossflow x 1	
	Fan speeds	Cooling	SH/H/M/L	RPM	1350/1150/950/750	
		Heating	SH/H/M/L	RPM	1350/1190/1020/850	
	Air flow (1)		SH/H/M/L	m3/hr	680/560/410/330	
	External static pressure		Min	Pa	0	
	Sound power level (2)		SH/H/M/L	dB(A)	52/47/41/35	
	Sound pressure level (3)		SH/H/M/L	dB(A)	42/37/31/25	
	Moisture removal			l/hr	1.5	
	Condensate drain tube I.D			mm	16	
	Dimensions		WxHxD	mm	770x283x201	
	Net Weight			kg	9	
	Package dimensions		WxHxD	mm	844x342x261	
	Packaged weight			kg	12	
OUTDOOR	Refrigerant control				Capillary	
	Compressor type, model				Rotary,Daikin 1YC23AEXD	
	Fan type & quantity				Propeller(direct) x 1	
	Fan speeds		H	RPM	930	
	Air flow		H	m3/hr	1600	
	Sound power level		H	dB(A)	58	
	Sound pressure level (3)		H	dB(A)	48	
	Dimensions		WxHxD	mm	658x550x275	
	Net Weight			kg	30	
	Package dimensions		WxHxD	mm	771x592x348	
	Packaged weight			kg	34	
	Refrigerant type				R410A	
	Standard charge			kg(5m)	1	
	Additional charge				15g/m(5m<L<15m)	
	Connections between units	Liquid line		In.(mm)	1/4"(6.35)	
		Suction line		In.(mm)	3/8"(9.53)	
		Max.tubing length		m.	Max. 15	
		Max.height difference		m.	Max. 5	
Operation control type					Remote control	

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.
(2) Airflow in ducted units; at nominal external static pressure.
(3) Sound power in ducted units is measured at air discharge.
(4) Sound pressure level measured at 1 meter distance from unit.

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

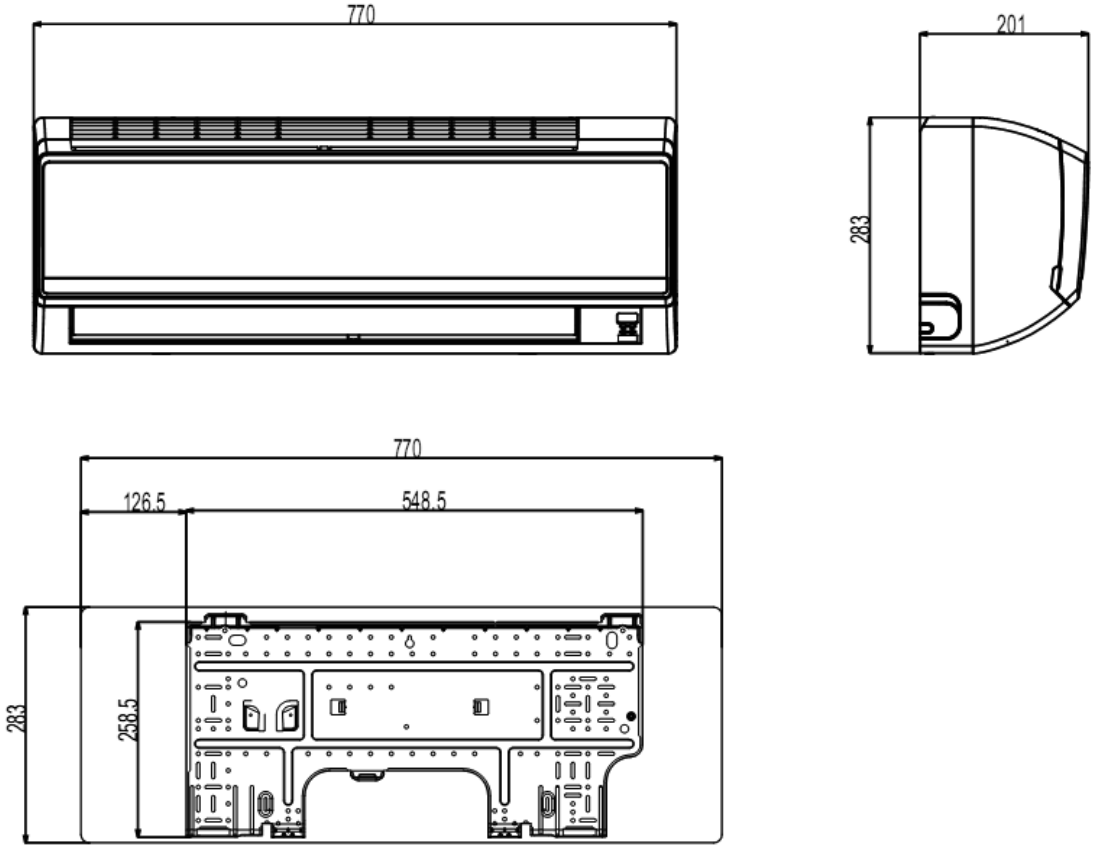
3.1 Operating Limits

3.1.1 R410A

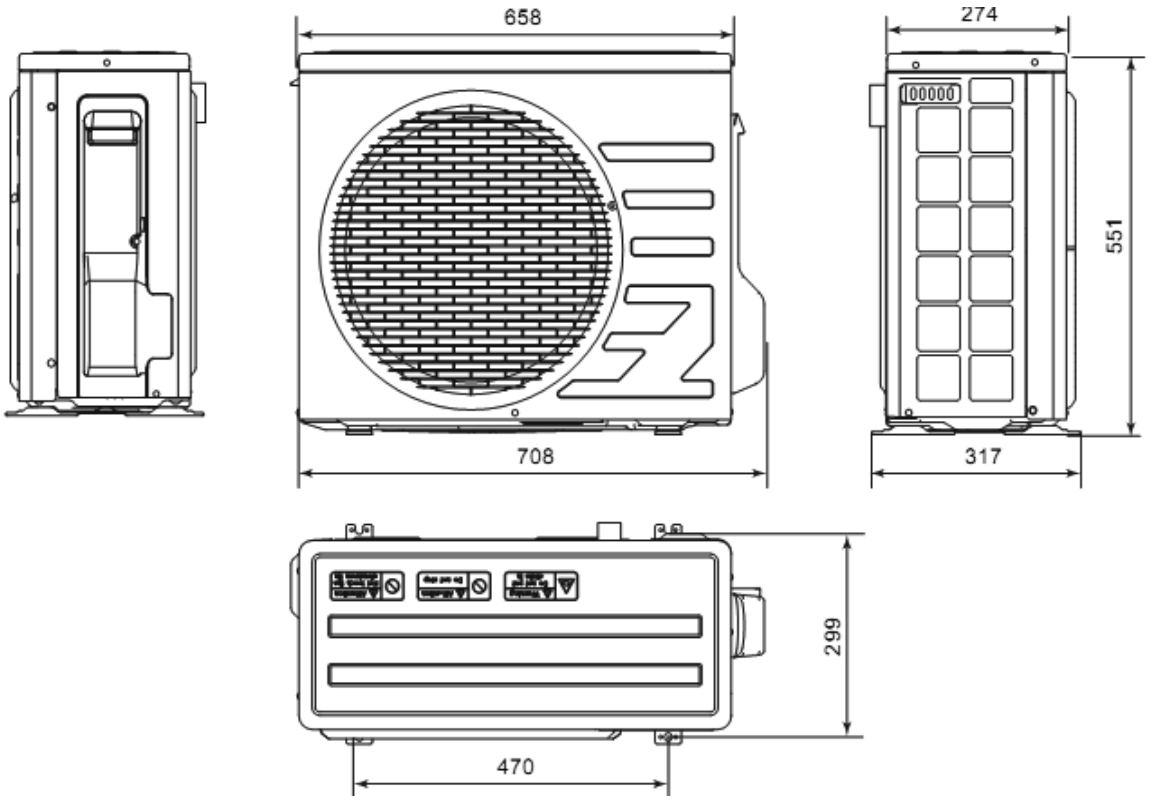
		Indoor	Outdoor
Cooling	**Upper limit**	32°C DB 23°C WB	46°C DB
	Lower limit	21°C DB 15°C WB	10°C DB
Heating	**Upper limit**	27°C DB	24°C DB 18°C WB
	Lower limit	10°C DB	-15°C DB -16°C WB
Voltage		1-PH 50Hz / 198 – 264 V	

4. OUTLINE DIMENSIONS

4.1 Indoor Unit: HDD009, HDD012, HED009, HED012



4.2 Outdoor Units: YDD009, YDD012



5. PERFORMANCE DATA

5.1 HDD009, HED009

5.1.1 Cooling Capacity (kW) – Run Mode

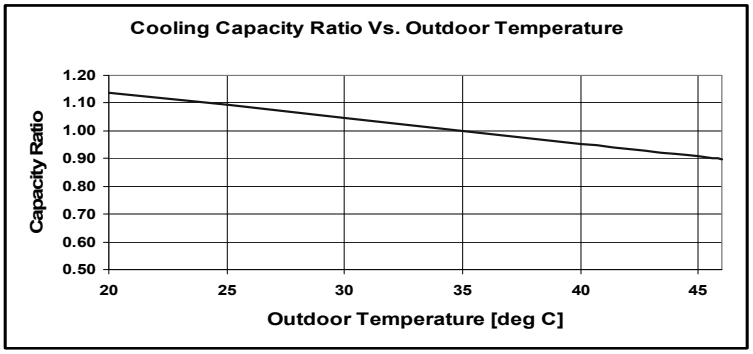
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	2.46	2.62	2.78	2.94	3.10
	SC	1.74	1.78	1.82	1.85	1.89
	PI	0.63	0.64	0.65	0.66	0.68
30	TC	2.34	2.50	2.66	2.82	2.98
	SC	1.70	1.74	1.77	1.81	1.84
	PI	0.70	0.71	0.73	0.74	0.75
35	TC	2.22	2.38	**2.54**	2.70	2.86
	SC	1.66	1.69	**1.73**	1.76	1.80
	PI	0.78	0.79	**0.80**	0.81	0.82
40	TC	2.10	2.26	2.42	2.58	2.74
	SC	1.61	1.65	1.68	1.72	1.75
	PI	0.85	0.86	0.87	0.89	0.90
46	TC	1.96	2.12	2.28	2.44	2.60
	SC	1.56	1.59	1.63	1.67	1.70
	PI	0.94	0.95	0.96	0.97	0.99

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OD – Outdoor

5.1.2 Capacity Correction Factors



5.1.3 Heating Capacity (kW) - Run Mode

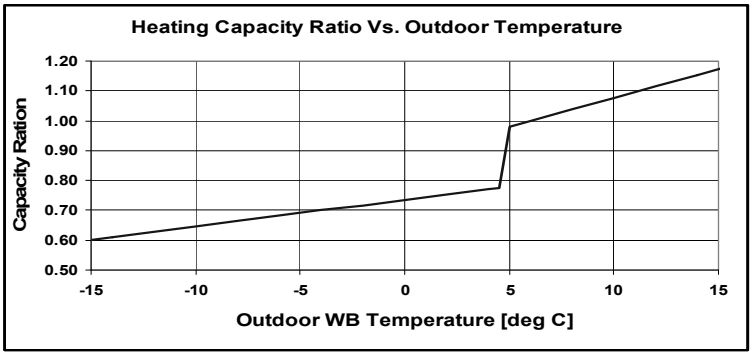
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	2.20	2.05	1.89
	PI	0.58	0.64	0.70
-10/-12	TC	2.45	2.30	2.14
	PI	0.70	0.76	0.82
-7/-8	TC	2.64	2.48	2.33
	PI	0.79	0.85	0.91
-1/-2	TC	2.73	2.58	2.42
	PI	0.83	0.89	0.95
2/1	TC	2.79	2.64	2.49
	PI	0.86	0.92	0.98
7/6	TC	3.61	**3.46**	3.31
	PI	0.91	**0.97**	1.03
10/9	TC	3.81	3.66	3.51
	PI	0.96	1.02	1.08
15/12	TC	4.01	3.86	3.70
	PI	1.02	1.08	1.13
15-24 (Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

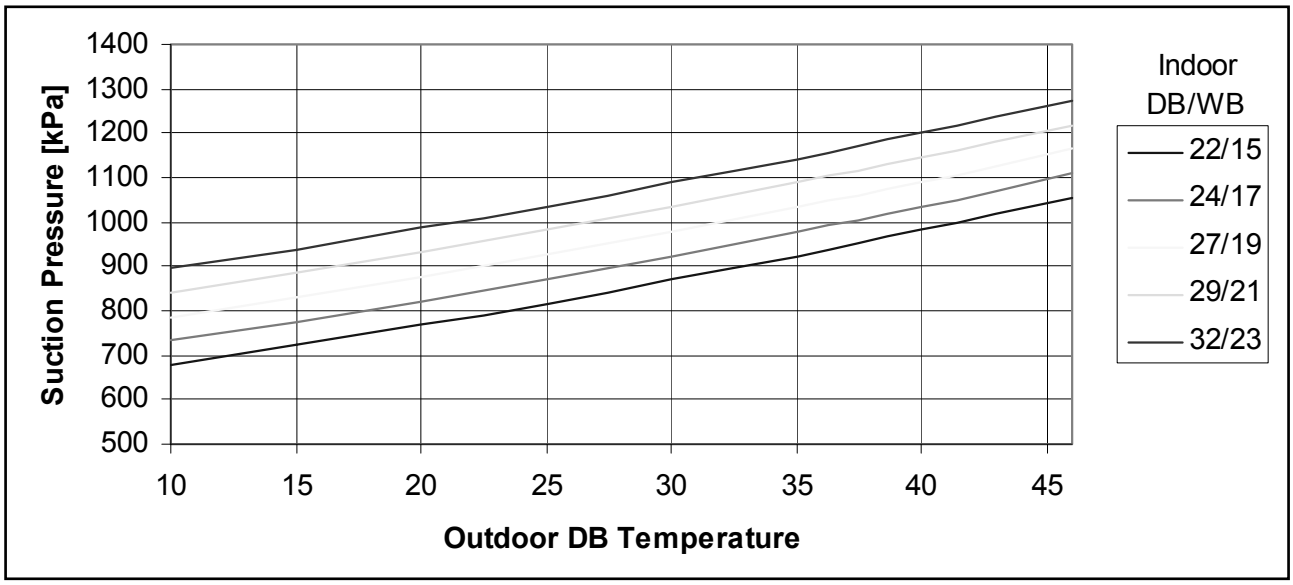
TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

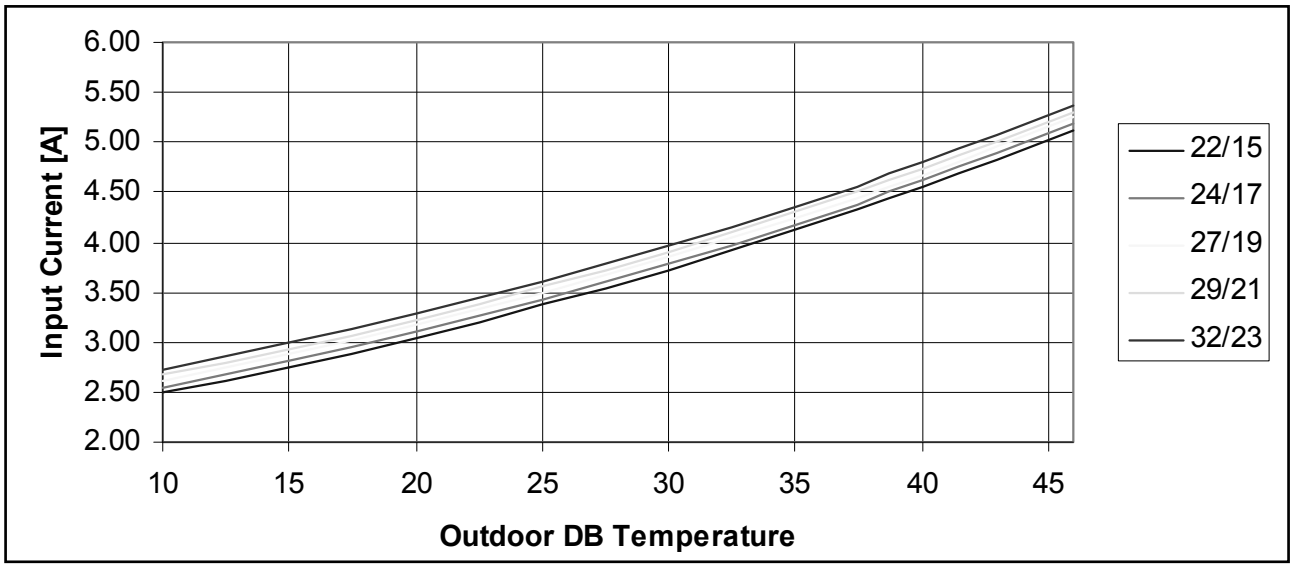
5.1.4 Capacity Correction Factors



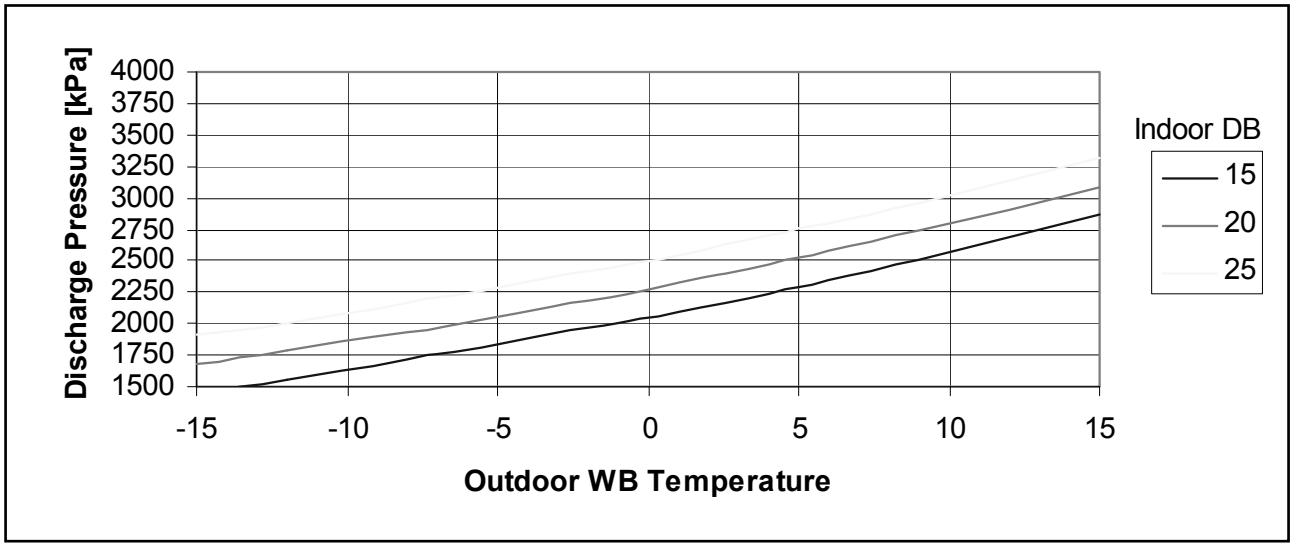
5.1.5 Model: HDD009, HED009

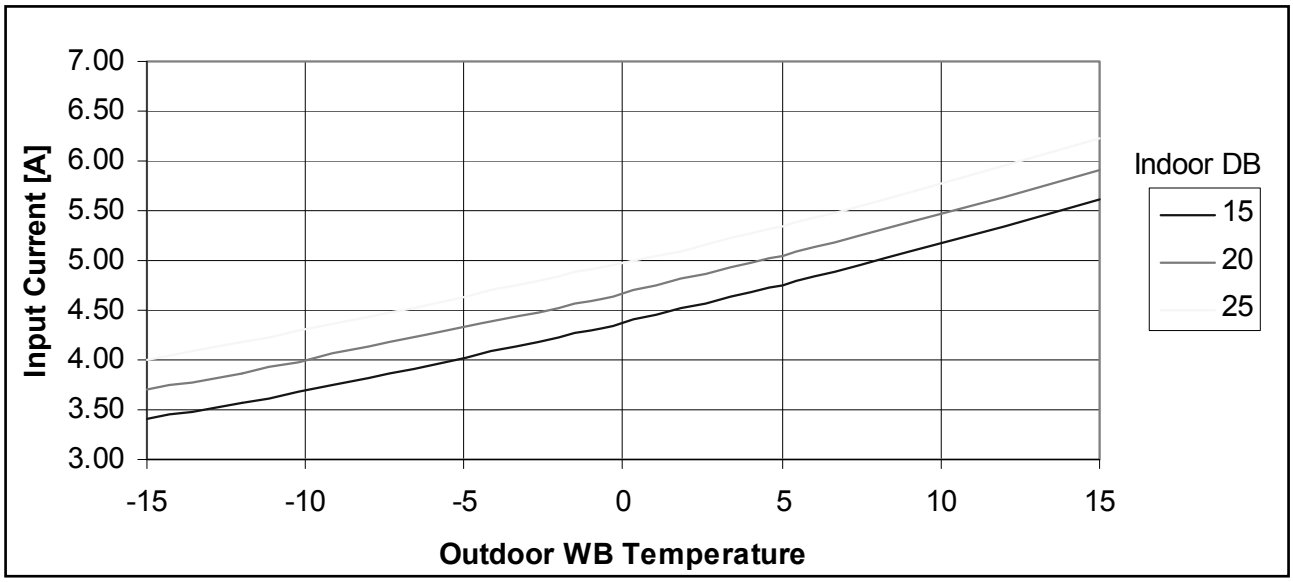
5.1.5.1 Cooling





5.1.5.2 Heating





5.2 HDD012, HED012

5.2.1 Cooling Capacity (kW) - Run Mode

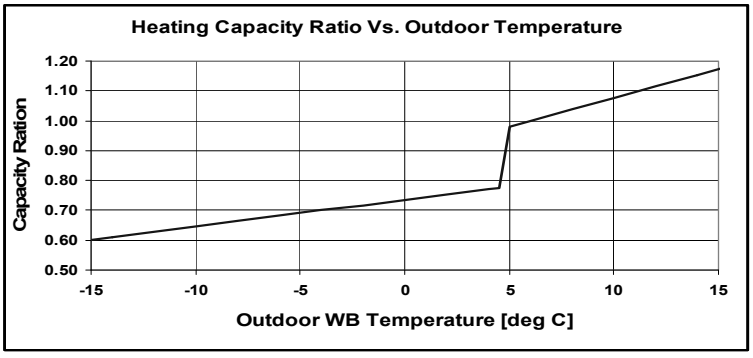
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	3.33	3.55	3.77	3.99	4.21
	SC	2.37	2.42	2.46	2.51	2.56
	PI	0.90	0.91	0.93	0.95	0.96
30	TC	3.17	3.39	3.61	3.83	4.05
	SC	2.31	2.36	2.41	2.45	2.50
	PI	1.00	1.02	1.04	1.05	1.07
35	TC	3.01	3.23	**3.45**	3.67	3.88
	SC	2.25	2.30	**2.35**	2.39	2.44
	PI	1.11	1.12	**1.14**	1.16	1.17
40	TC	2.85	3.07	3.29	3.51	3.72
	SC	2.19	2.24	2.29	2.33	2.38
	PI	1.21	1.23	1.24	1.26	1.28
46	TC	2.66	2.88	3.10	3.31	3.53
	SC	2.12	2.17	2.21	2.26	2.31
	PI	1.34	1.35	1.37	1.39	1.40

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OD – Outdoor

5.2.2 Capacity Correction Factors



5.2.3 Heating Capacity (kW) - Run Mode

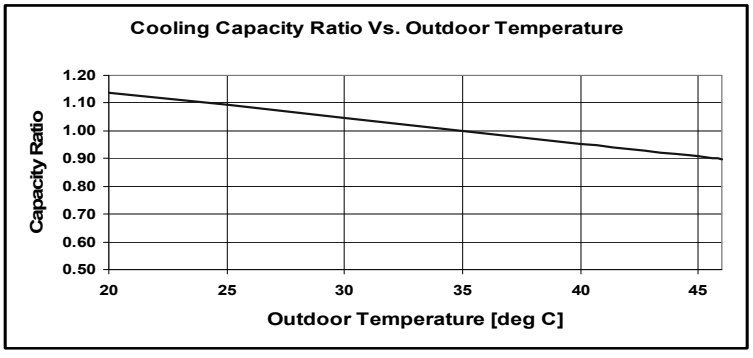
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	2.56	2.38	2.20
	PI	0.71	0.78	0.85
-10/-12	TC	2.85	2.67	2.49
	PI	0.85	0.92	1.00
-7/-8	TC	3.07	2.89	2.71
	PI	0.96	1.03	1.10
-1/-2	TC	3.17	2.99	2.82
	PI	1.02	1.09	1.16
2/1	TC	3.25	3.07	2.89
	PI	1.05	1.12	1.20
7/6	TC	4.20	**4.02**	3.84
	PI	1.11	**1.18**	1.25
10/9	TC	4.43	4.25	4.07
	PI	1.17	1.24	1.32
15/12	TC	4.66	4.48	4.30
	PI	1.24	1.31	1.38
15-24	TC	85 - 105 % of nominal		
(Protection Range)	PI	80 - 120 % of nominal		

LEGEND

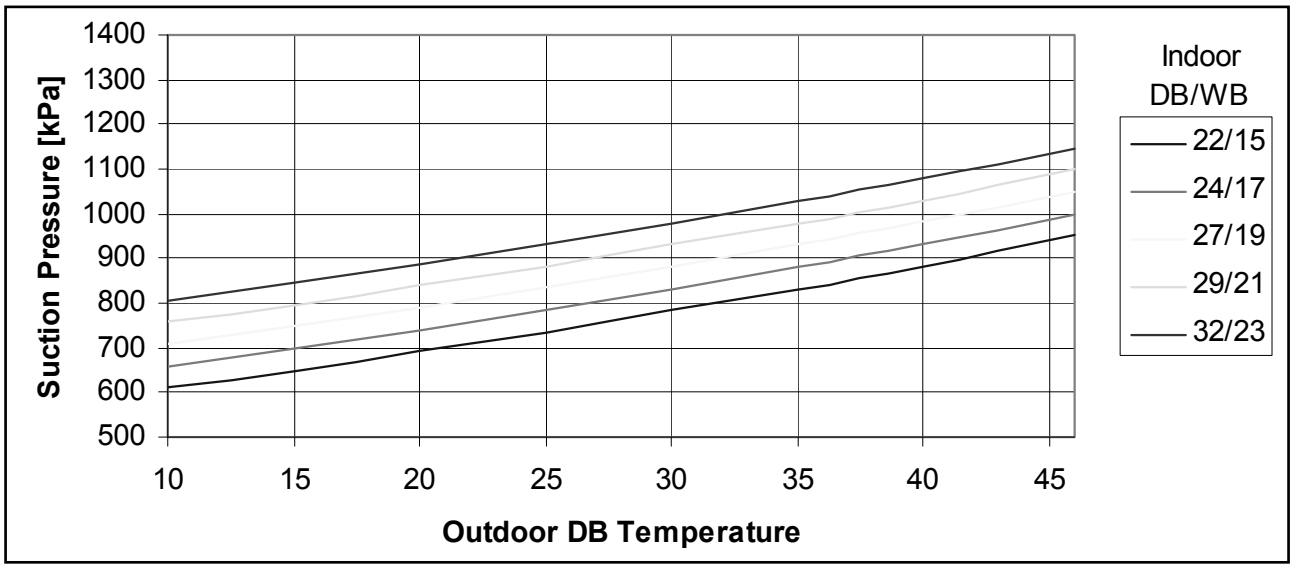
TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

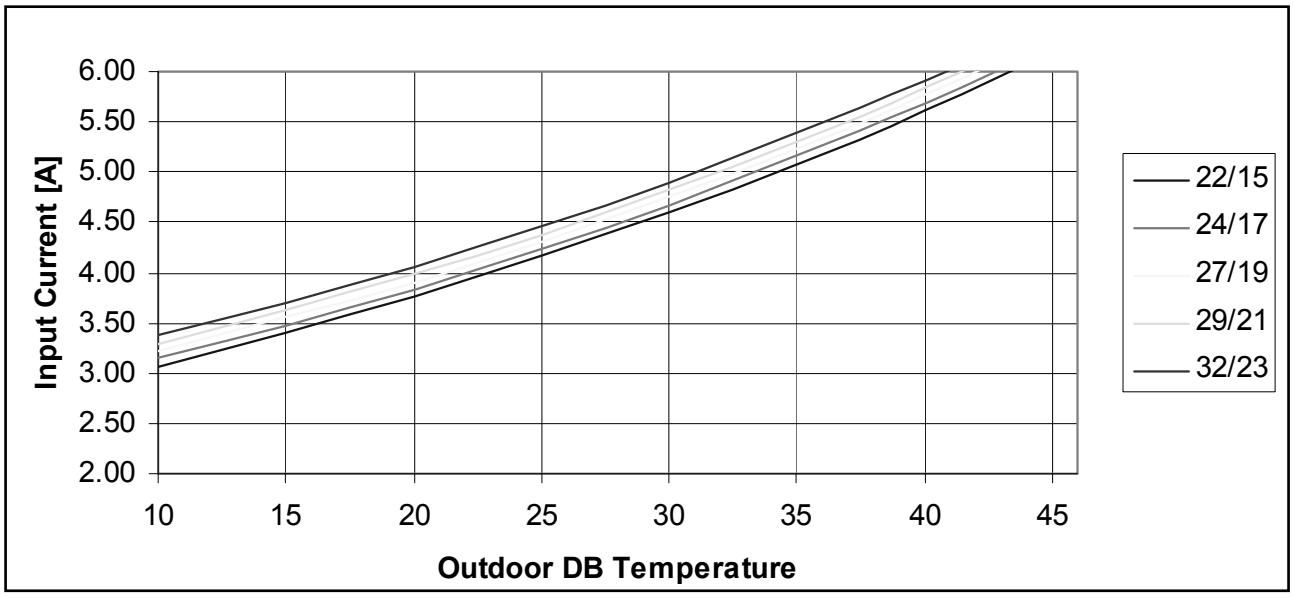
5.2.4 Capacity Correction Factors



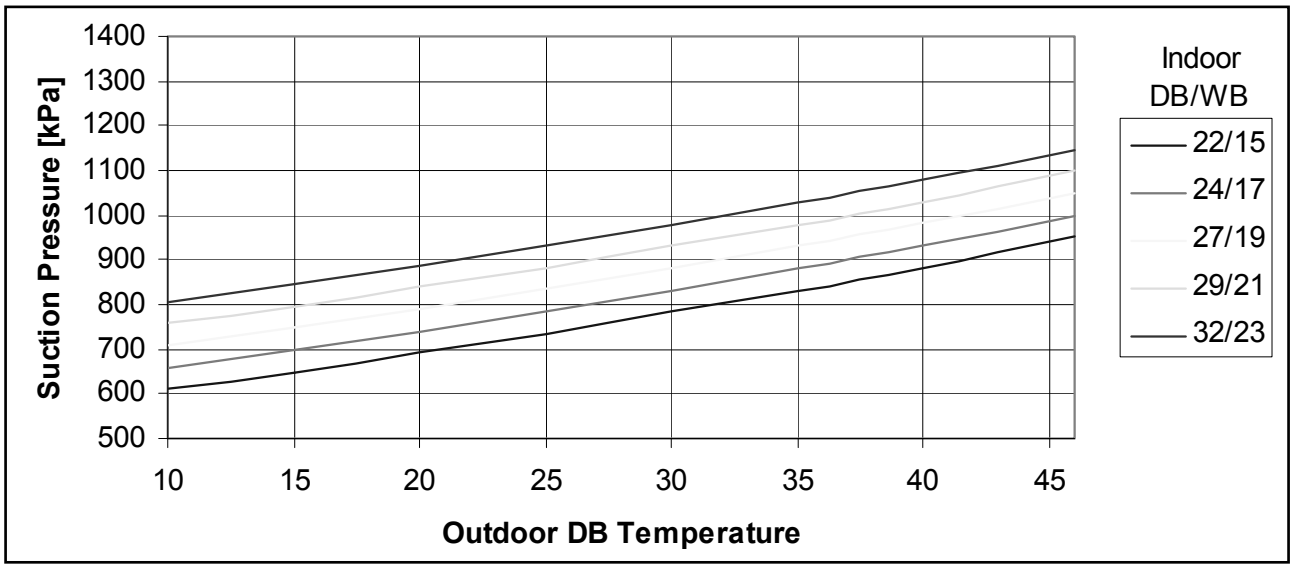
5.2.5 Model: HDD012, HED012

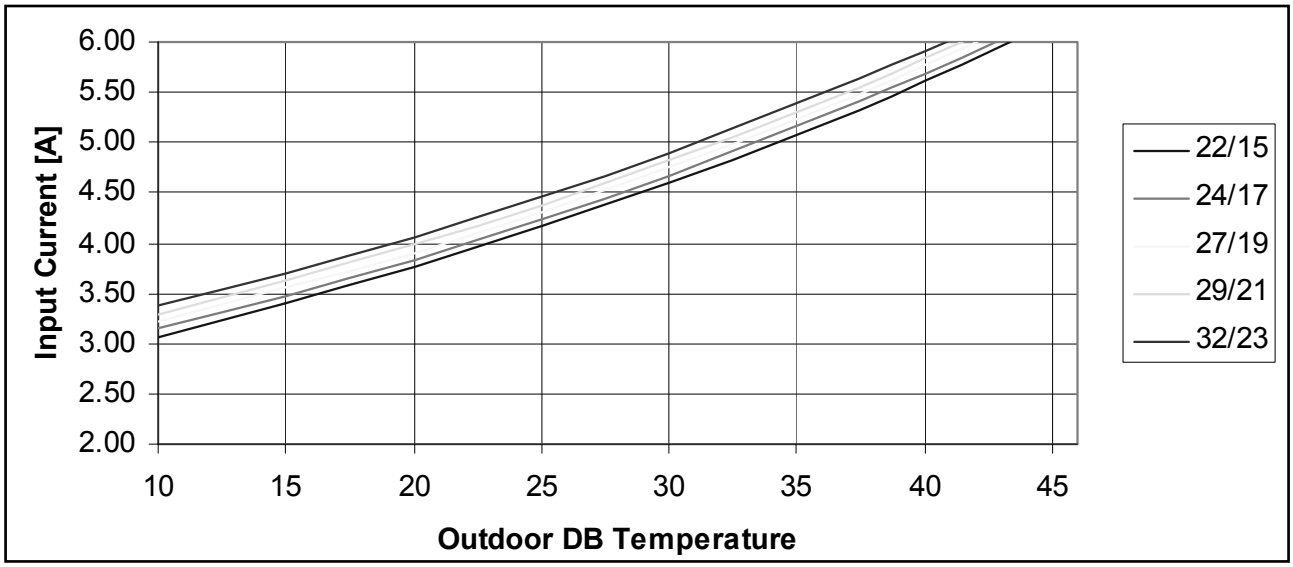
5.2.5.1 Cooling





5.2.5.2 Heating





6. SOUND LEVEL CHARACTERISTICS

6.1 Sound Pressure Level

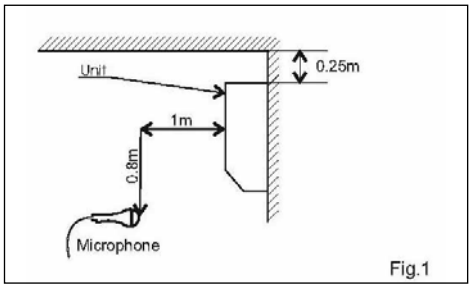
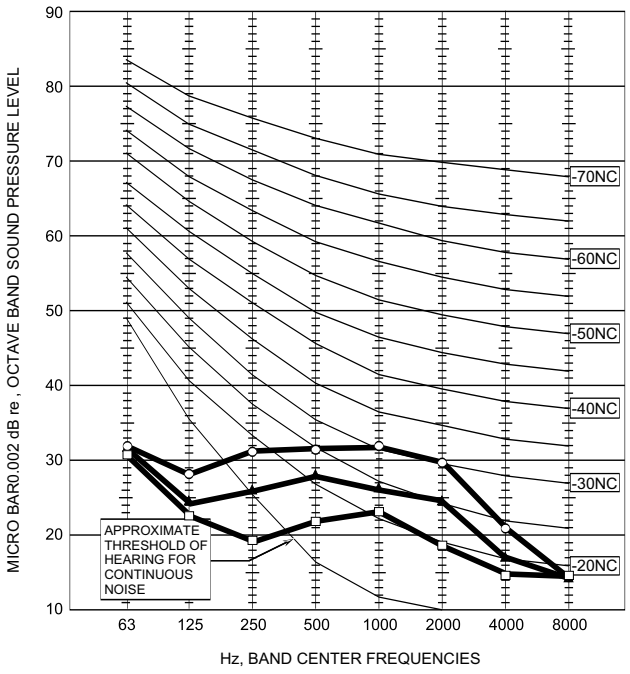


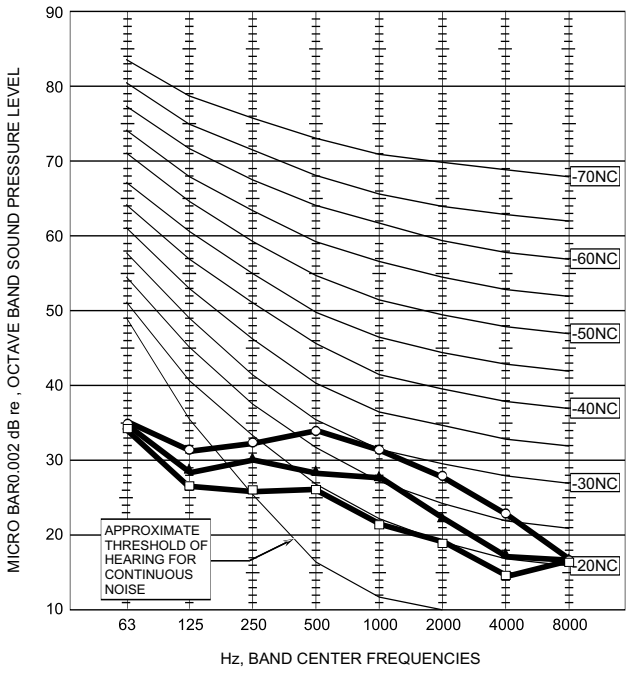
Figure 1. Wall Mounted

6.2 Sound Pressure Level Spectrum (Measured as Figure 1)

HDD009 / HED009



HDD012 / HED012



6.3 Outdoor units

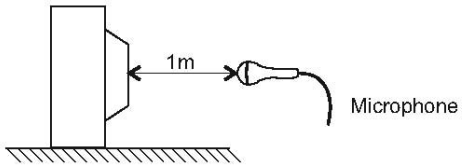
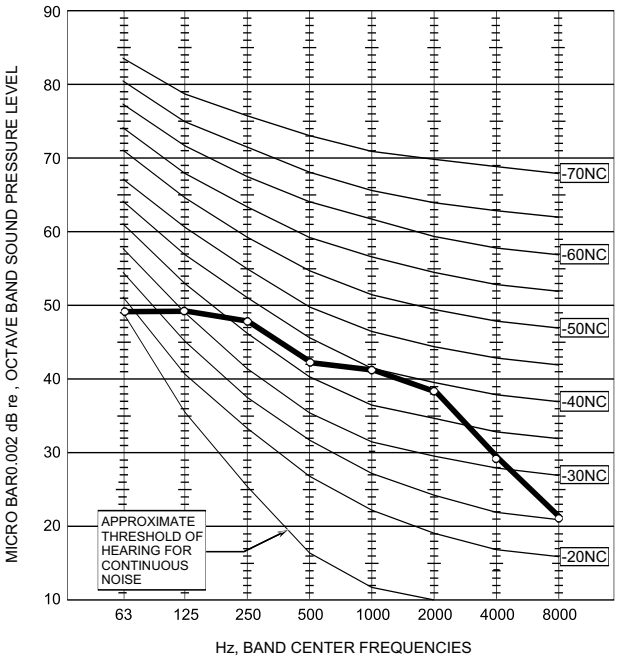


Fig.2

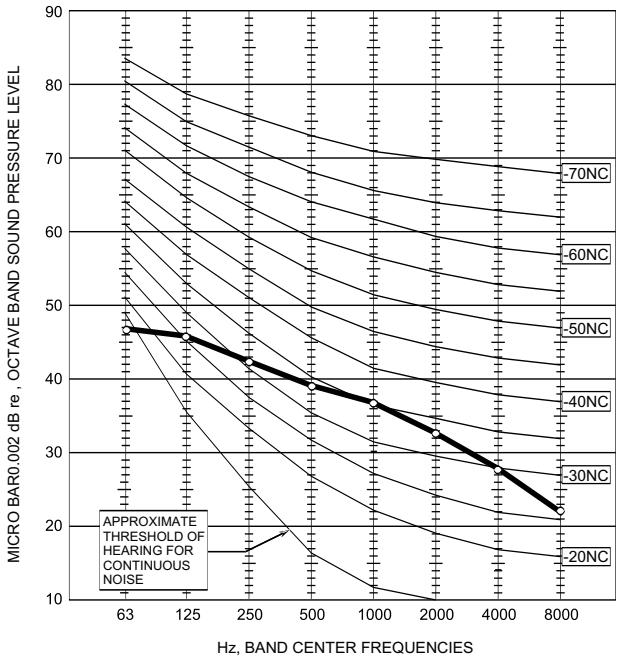
Microphone Distance from Unit

6.4 Sound Pressure Level Spectrum (Measured as Figure 2)

YDD009/YDD012 Cooling



YDD009/YDD012 Heating



7. ELECTRICAL DATA

7.1 Single Phase Units

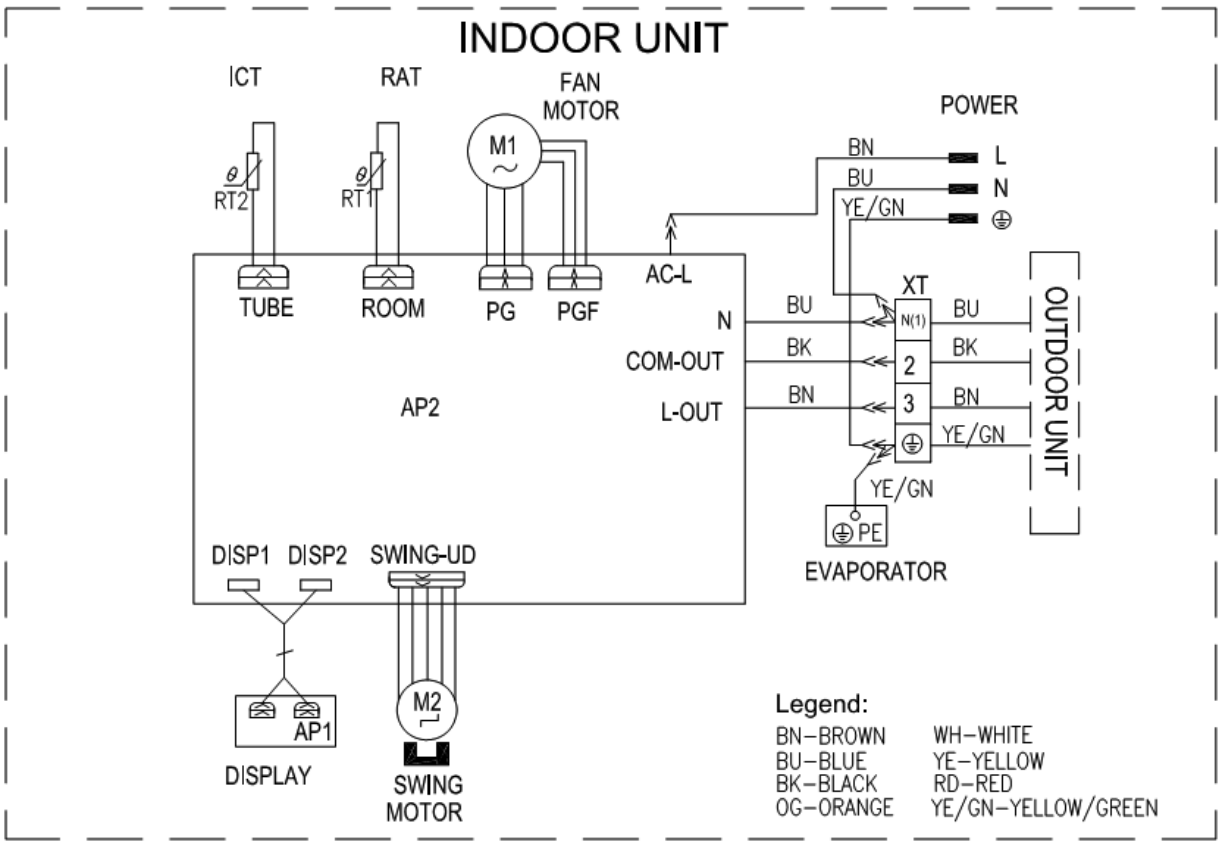
MODEL	YDD009	YDD012
Power Supply	To indoor	
	1PH / 220-240V / 50Hz	
Max Current, A	**6.8**	**7.8**
Circuit Breaker,A	**16.0**	**16.0**
Power Supply Wiring No. X Cross Section mm^2	**3x1.5 mm^2**	**3x1.5 mm^2**
Interconnecting Cable RC Model No. X Cross Section mm^2	**4x1.5 mm^2**	**4x1.5 mm^2**

NOTE

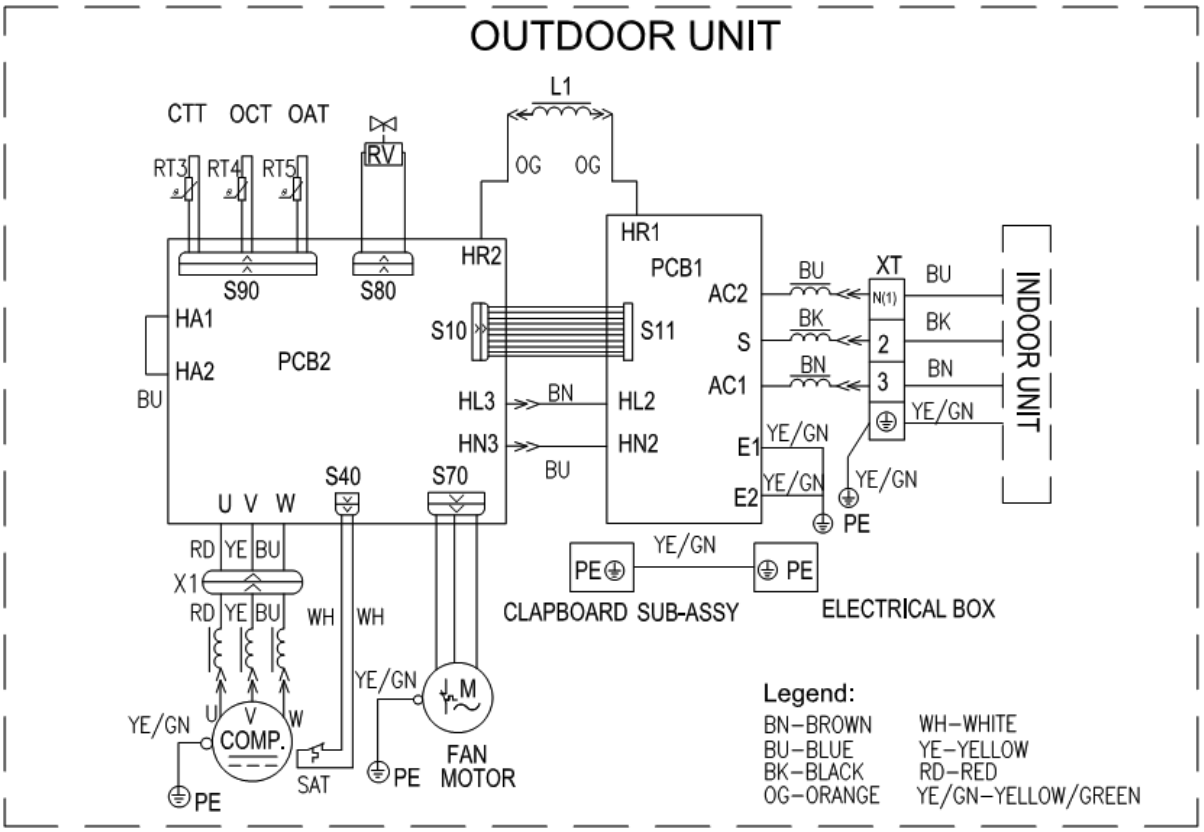
Power wiring cord should comply with local lows and electrical regulations requirements.

8. WIRING DIAGRAMS

8.1 Indoor Units: HDD009, HDD012, HED009, HED012

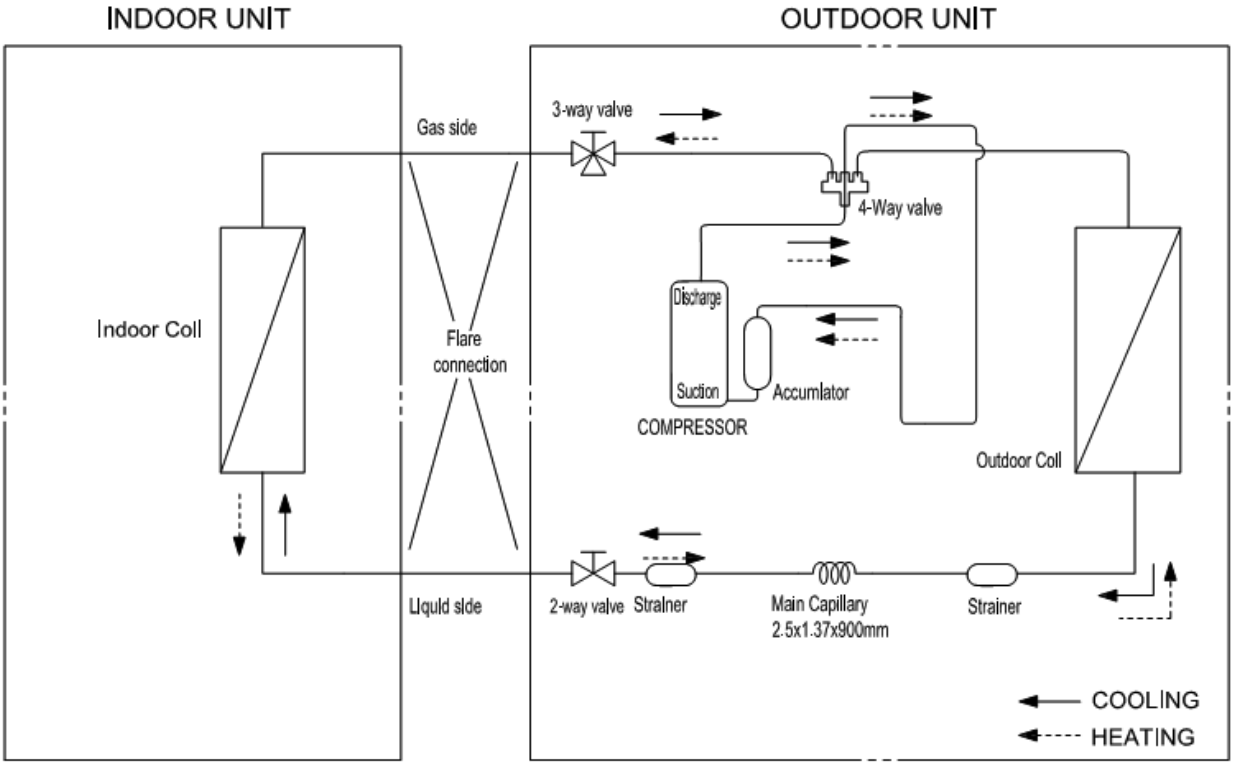


8.2 Outdoor Units: YDD009, YDD012

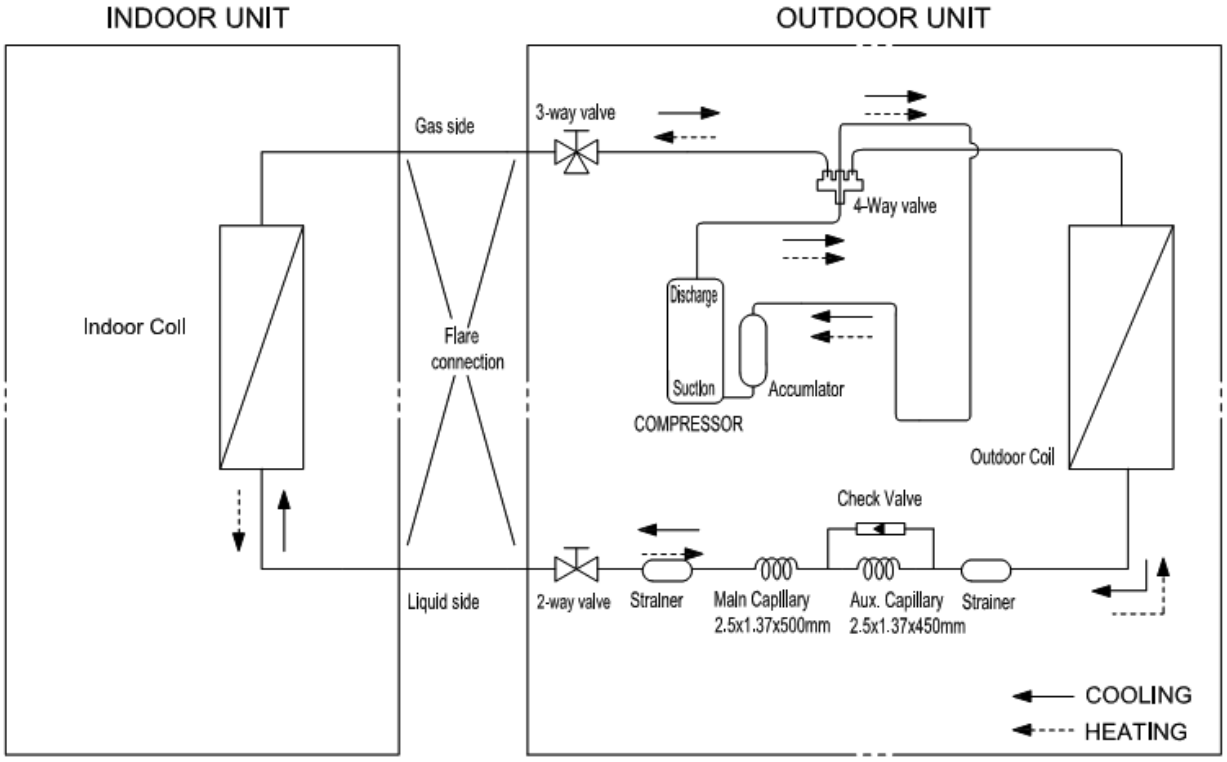


9. REFRIGERATION DIAGRAMS

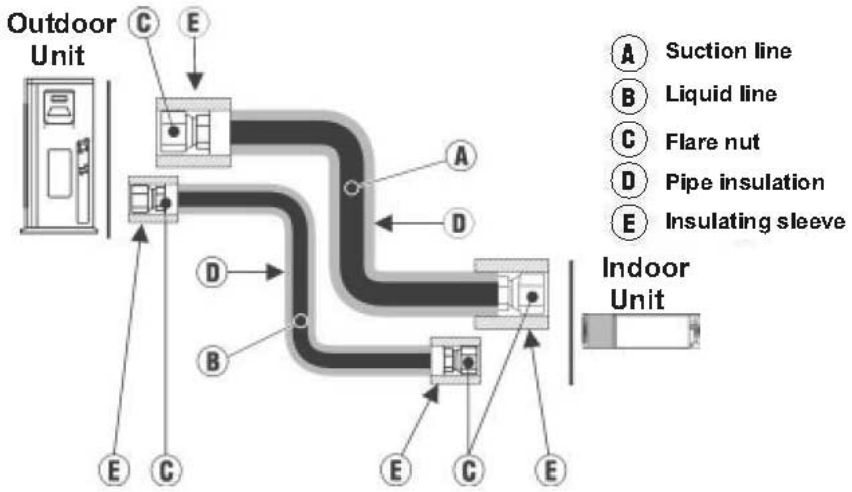
9.1 HDD009 / HED009 // YDD009

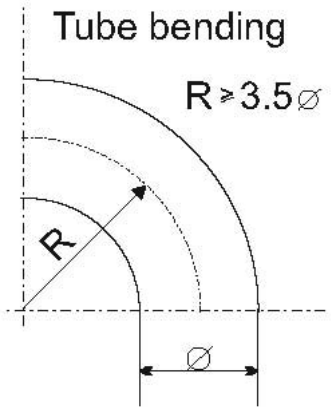


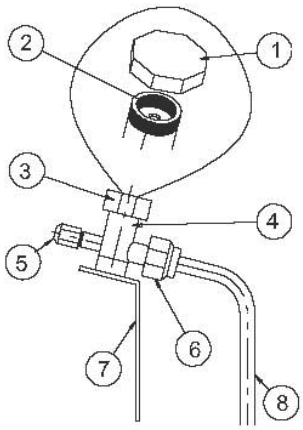
9.2 HDD012 / HED012 // YDD012



10. TUBING CONNECTIONS







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

11 CONTROL SYSTEM

11.1 Electronic Control

11.1.1 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

11.1.2 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 caculation is based on room temperature and set point temperature.

11.1.3 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 **ΔD** 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 **ΔD** 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 **ΔD** value.
Obtaining the fixed **ΔD** value

When the **ΔD** value is small- decrease the frequency
When the **ΔD** 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.

4. Maximum and minimum limits of frequency by PI control

The frequency upper and lower limits are set depending on indoor unit.
When low noise commands come from the indoor unit or when outdoor unit low noise or quiet commands come from indoor unit, the upper limit frequency must be lowered than the usual setting.
(see 11.1.3.1)

11.1.3.1 Frequancy range

The compressor frequency limitation is set by the following table

Mode	Minimum Frequency(MinFreq)		Maximum Frequency(MaxFreq)
	09	12	See following table
Cooling	*16*	*16*	
Heating	*16*	*16*	

The maximum allowed frequency is extracted from the following:

Mode	Night Mode	Maximum Frequency(MaxFreq)	
		09	12
Cooling	ON	*78*	*92*
	OFF	*78*	*92*
Heating	ON	*90*	*95*
	OFF	*98*	*108*

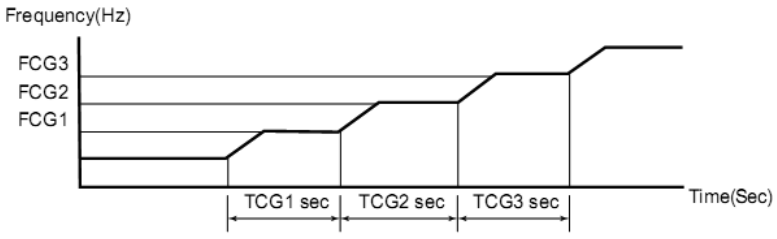
11.1.3.2 Frequency Changes Control

Frequency change rate is 1 Hz/sec.

11.1.3.3 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



11.1.3.4 Minimum On and Off Time

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

11.1.4 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	1300	1100	900	700
	Heating	1300	1140	980	820
12	Cooling	1350	1150	950	750
	Heating	1350	1190	1020	850

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	>=2	(0,2)	<=0
	Heating	<=1	(1,3)	>=3

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

11.1.4.1 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.

11.1.5 Outdoor Fan Control

11.1.5.1 OFAN Speed Type

The outdoor fan motor is a one speed AC motor and controllered by the relay on outdoor controller.

11.1.5.2 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 11.11.5

11.1.6 Refrigerant control

Capiliary is used in model 09 and 12

11.1.7 Reversing Valve (RV) Control

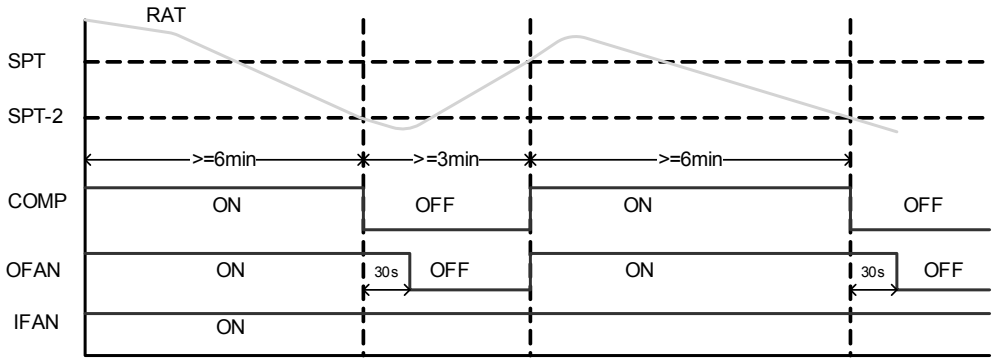
Reversing valve is on in heat mode.
Switching of RV state is done only after compressor is off for over 2 minutes.

11.2 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

11.3 Cool Mode

If RAT≥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≤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 < SPT, the unit will maintain the previous status.



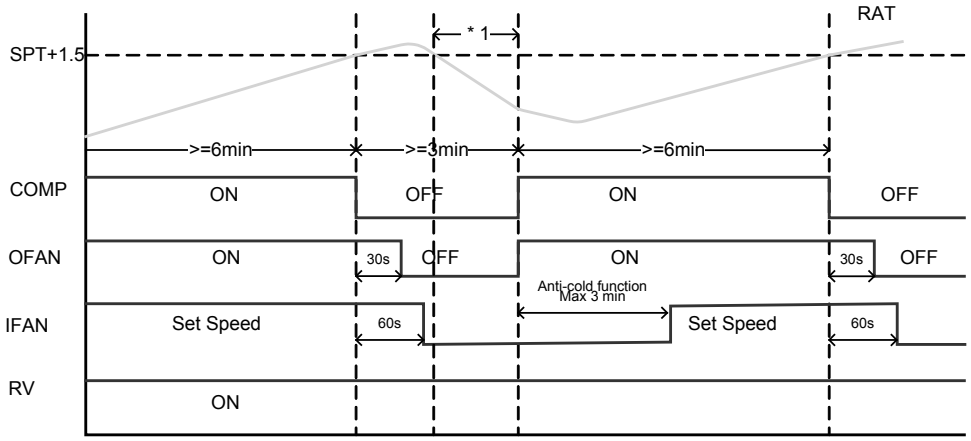
11.3.1 Indoor Fan operation under Cool Mode

When SPT-RAT<0, if indoor fan motor operates at high speed, the fan motor will operate at medium speed. The medium speed or low speed will be maintained; (this condition should be executed when compressor starts up); this function will be excluded in the super high speed; When (RAT-SPT) ≥1 , the fan will return to the setting fan speed.

In AutoFan user setting, fan speed will be adjusted automatically according to the SPT and RAT, rerfer to 11.1.4

11.4 Heat Mode

If RAT<SPT+1.5 AND for certain peiod, 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 RAT≥SPT+1.5, the compressor will stop, the outdoor fan will delay 30s to stop and the indoor fan will blow for 60s at setting speed. During this period, the fan speed can't be switched.



Remark: *1 – accumulated time of RAT<SPT+1.5

11.4.1 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 can run at low speed or stop running. This function will terminate after the unit runs for 3min or the ICT reaches 42 degree.

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.

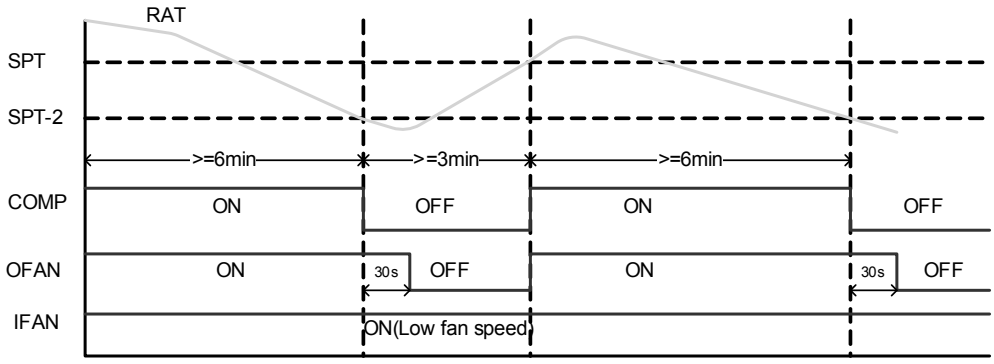
11.5 Auto Cool/Heat Mode

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≥25 °C, the cooling mode is selected.
2. When RAT≤22 °C, the unit runs in heating mode
3. When 22 °C <RAT< 25 °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.

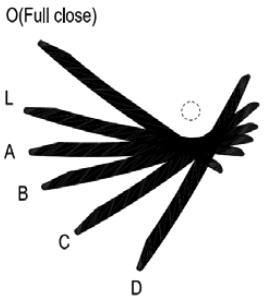
11.6 Dry Mode

If RAT>SPT, the unit starts drying operation. Indoor fan, outdoor fan and compressor will operate and the indoor fan will run at low speed.
If SPT-2≤RAT≤SPT, the unit will keep running in the original mode.
If RAT<SPT-2, the compressor will stop running and the outdoor fan will delay 30 seconds to stop. 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.



11.7 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. there are 7 states for louver: in position L, A, B, C, D, and swing between 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 0.



The swing is available only when the swing function is set and the indoor fan is running.
The louver swing can also be set between L and B, between A and C, between B and D.

11.8 Clean function

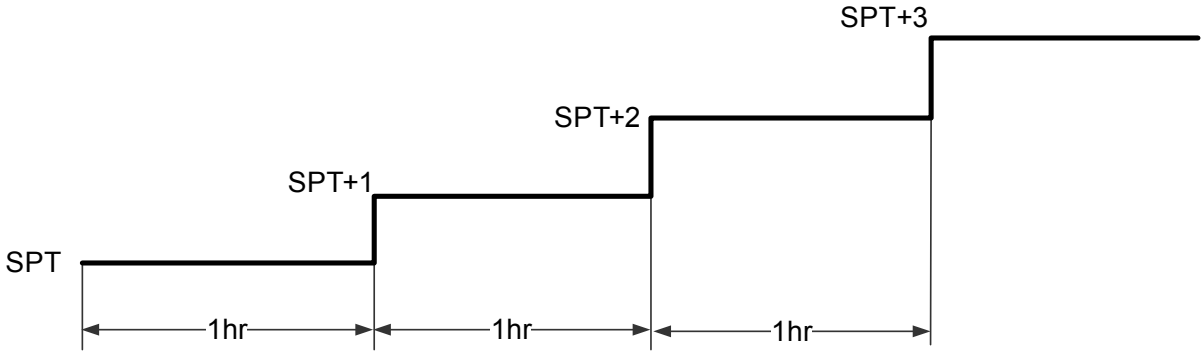
Clean function enables dring the indoor coil after Cool or Dry mode to avoid mould.

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 10 min at low speed after the unit is turned OFF.

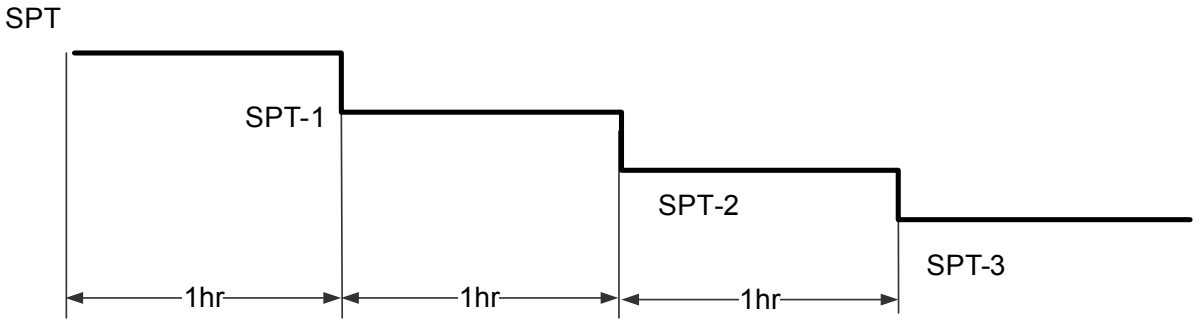
Clean function is defaulted as OFF after unit is Power ON.
Clean function is not available in Auto, Fan or Heat mode.

11.9 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.



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.

11.10 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 funtion, 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.

11.11 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 (For 9k/12k, temperature protection is 4Hz/60s)
Stop Compressor (SC) – Compressor is stopped.

11.11.1 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 <= -1 °C for continuous 3 mins.

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

11.11.2 Indoor Coil over Heating Protection

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.

Compressor will stop when ICT reaches 65 °C

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

11.11.3 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.

Compressor will stop when CTT reaches certain value(see folowing table)

Compressor frequency(Hz)	CTT temperature (Stop compressor)
>50	110 °C
[39,50]	105 °C
<39	100 °C

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

11.11.4 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

Compressor will stop when AC current reaches 14.0A for continuesly 2.5s.

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

11.11.5 Outdoor Coil Deicing Protection

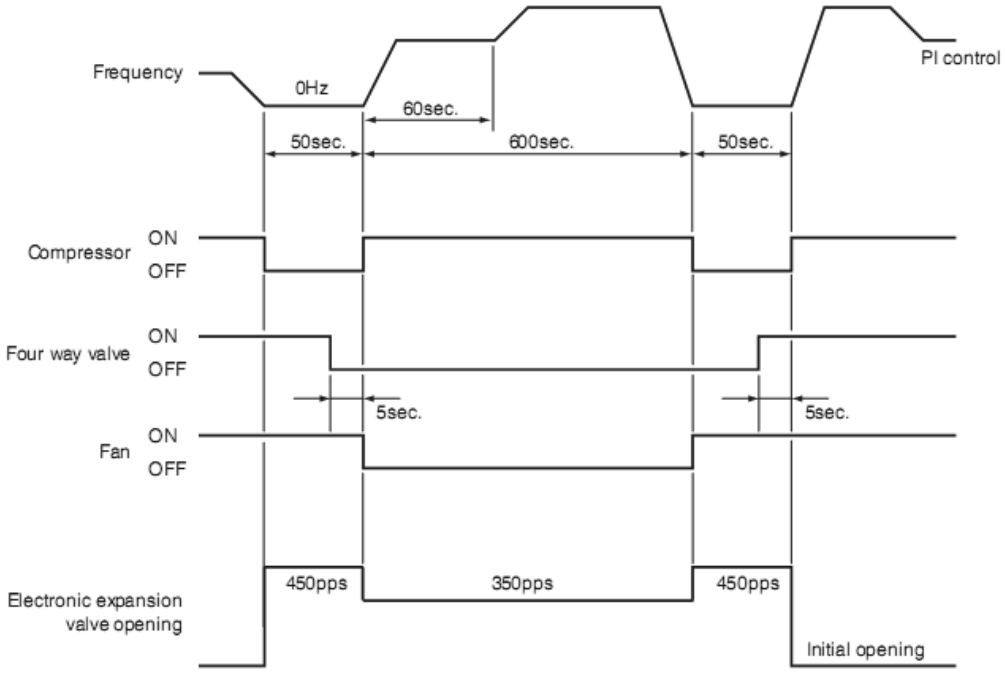
This protection is for Heat Pump Only
This protection is carried out by the cooling cycle (reverse cycle). The defrosting time or outdoor heat exchanger temperature must be more than its setting values when finishing the deicing protection.
In the deicing protection, IFAN is forced OFF.

11.11.5.1 Deicing Starting Conditions

The starting conditions must be made with the outdoor air temperature (OAT) and outdoor coil temperature (OCT). Under the conditions that the system is in heating operation, 6 minutes after the compressor is started and more than 44 minutes of accumulated time pass since the start of the operation or ending the defrosting.

Deicing interval time is changed as a function of deicing time. If deicing time is shorter than former deicing time, the deicing interval time will be increased. If deicing time is longer than former deicing time, the deicing interval time will be decreased.

11.11.5.2 Deicing Protection Procedure



11.11.5.3 Exiting Deicing

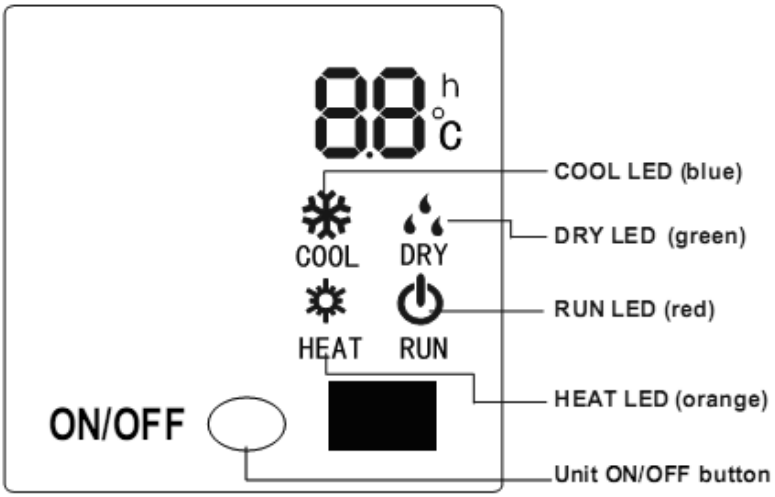
System will exit the deicing until OCT reaches to certain value (depends on OAT) or the deicing time >10mins.

11.12 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.

11.13 Indoor Unit Controllers and Indicators

The following is schematic drawing for the display:



RUN INDICATOR	1. Lights up when the Air Conditioner is connected to power and the mode is STBY. 2. When the unit is turned on remotely, the RUN LED goes out while the current setting running mode is displayed
COOL INDICATOR DRY INDICATOR HEAT INDICATOR	1. Lights up during specified operation mode (COOL/DRY/HEAT).
2* 7 segments display	1. In normal situation, the setting temperature is displayed. 2. Shows outdoor temperature or indoor temperature when receiving the corresponding demand from controller. It resumes displaying setting temperature 5s later 3. Shows H1 during deicing in heating mode. 4. Shows the alarm code whenever there is an alarm.(Refer to Diagonostic part)
Unit ON/OFF Button	**Short pressing(Less than 5s)** : 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. **Long pressing (5~10s):** System will enter into Force cooling operating

11.14 Test Mode

11.14.1 Entering Test Mode

Test mode(Mode of testing capacity) can be achieved through special remote control settings as following table depends on models:

Model	Mode (Shown on display)	Settings of Remote control		Operation of Remote control	Display (2*7 segments)
		Cooling	Heating		
09/12	P0(Minimum capacity)	SPT=16	SPT=27	Press “Sleep” button 4 times in 3 sec.	Show “P0”
	P1(Norminal capacity)	SPT=18	SPT=29		Show “P1”
	P2(Maximum capacity)	SPT=19	SPT=30		Show “P2”
	P3(Medium capacity)	SPT=17	SPT=28		Show “P3”

11.14.2 Unit Operation in Test Mode

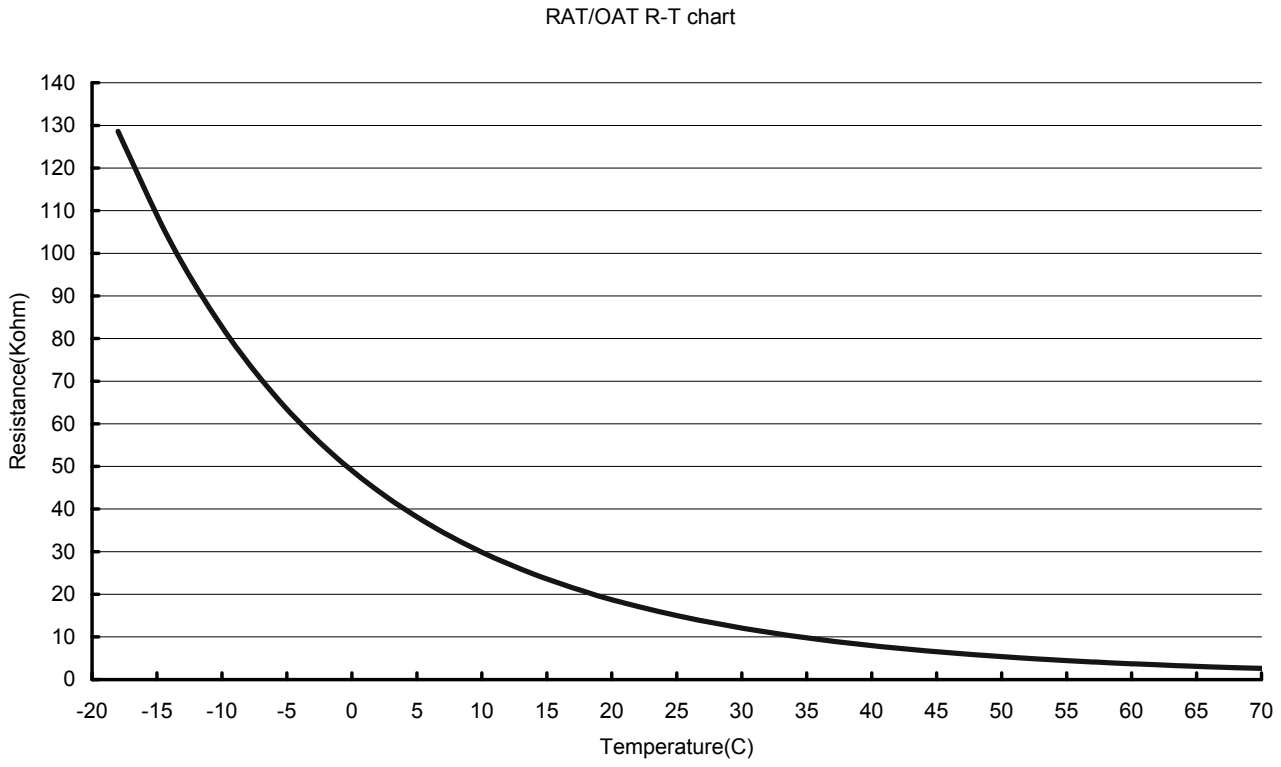
Compressor frequency will be set in the following ways:

Model		09	12
P0(Minimum capacity)	Cooling	16Hz	16Hz
	Heating	24Hz	28Hz
P1(Norminal capacity)	Cooling	53Hz	67Hz
	Heating	72Hz	80Hz
P2(Maximum capacity)	Cooling	78Hz	92Hz
	Heating	98Hz	108Hz
P3(Medium capacity)	Cooling	22Hz	30Hz
	Heating	35Hz	40Hz

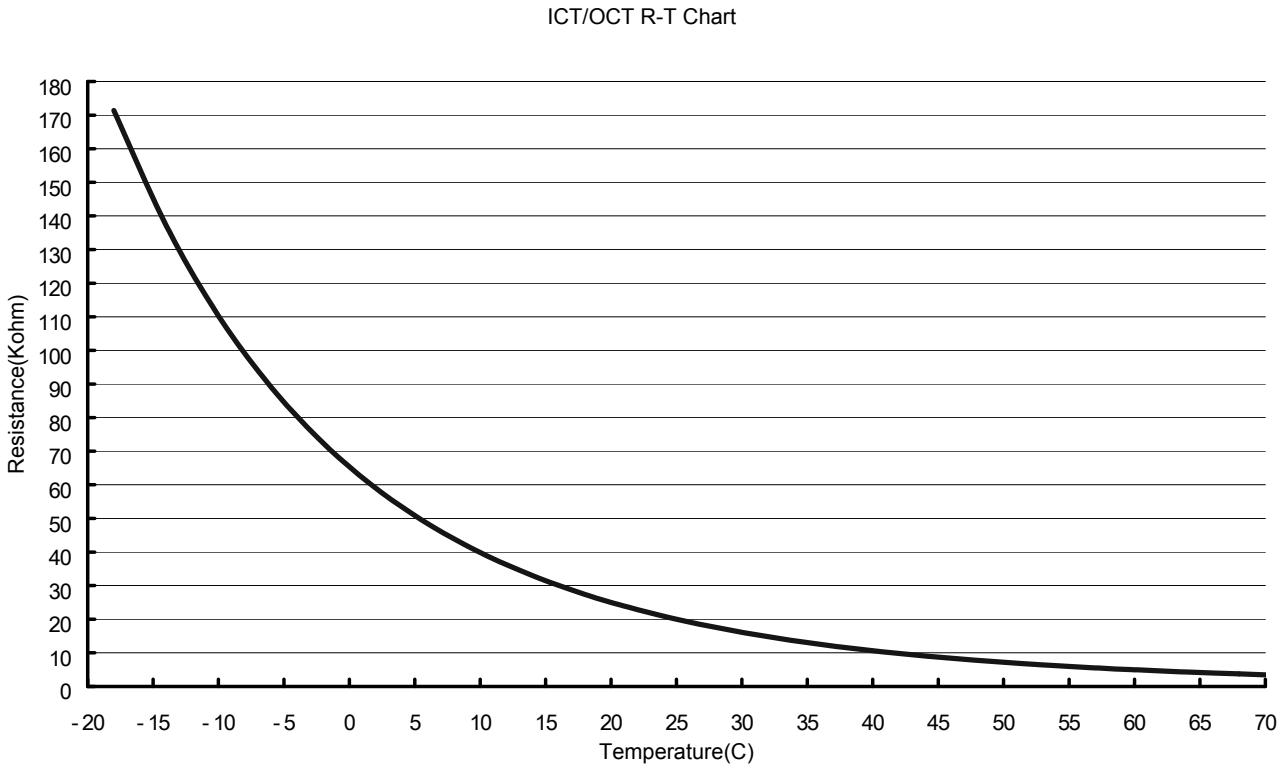
IFAN speed can be adjusted during test mode.

11.15 Characteristics of sensor

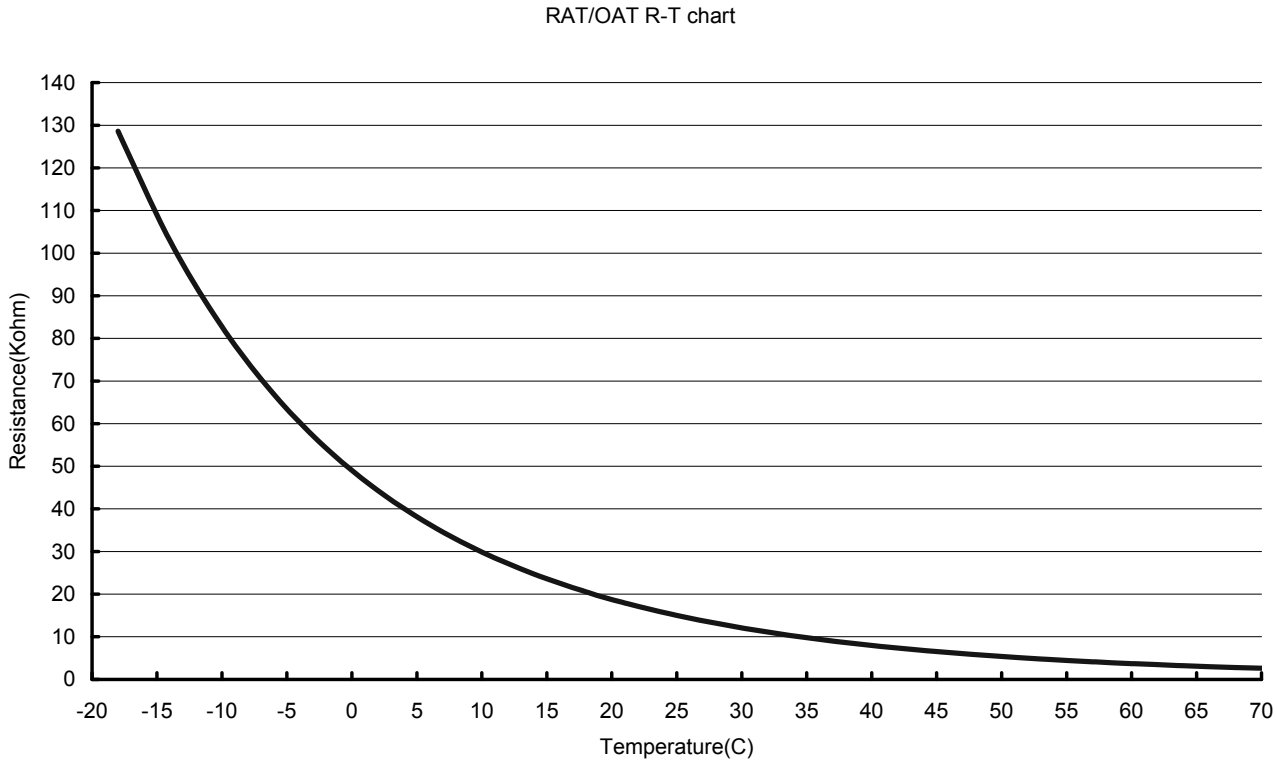
11.15.1 RAT / OAT



11.15.2 ICT / OCT



11.15.3 CTT



12 TROUBLESHOOTING

12.1 ELECTRICAL & CONTROL TROUBLESHOOTING

12.1.1 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.

12.1.2 Confirmation

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

12.1.2.2 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.

12.1.3 Judgment by Indoor/Outdoor Unit Diagnostics

If the malfunction still exists 4min later after stop of unit due to compressor protection, error code will be directly displayed though indoor display. In other situations, error code can be displayed by pressing LIGHT button 6 times within 4s.

2* 7 segments	LEDs	Failure	Possible Reasons
E2	RUN LED- OFF 3s and blink 2 times	Indoor Coil Defrost Protection	1. Poor air-return in indoor unit 2. Fan speed is abnormal 3. Evaporator is dirty.
E4	RUN LED-OFF 3s and blink 4 times	Compressor over Heating Protection	1. EEV connectgion problem or damage 2. Refrigerant leakage 3. Poor heat exchange
E5	RUN LED- OFF 3s and blink 5 times	AC Over current protection	1. I Supply voltage is unstable 2. Supply voltage is too low and load is too high
E6	RUN LED- OFF 3s and blink 6 times	Communication malfunction	1. Wiring mistakes 2. IDU or ODU PCB problem
EE	HEAT LED-OFF 3s and blink 15 times	EEPROM problem	Replace indoor main board
F0	COOL LED- OFF 3s and blink 10 times	Lack of Freon or block protection	
F1	COOL LED- OFF 3s and blink 1 times	RAT failure	1. Senor was broken or damaged 2. PCB temperature detection cuircuit has problem
F2	COOL LED- OFF 3s and blink 2 times	ICT failure	
F3	COOL LED-OFF 3s and blink 3 times	OAT failure	
F4	COOL LED- OFF 3s and blink 4 times	OCT failure	
F5	COOL LED- OFF 3s and blink 5 times	CTT failure	
H3	HEAT LED- OFF 3s and blink 3 times	Compressor overload protection	1. EEV connection problem or damaged 2. Refrigeratn leakage 3. OLP damaged
H4	HEAT LED-OFF 3s and blink 4 times	Overload of system	System is abnormal, check if the evaporator and condenser is dirty and blocked
H6	RUN LED- OFF 3s and blink 6 times	No feedback of indoor motor	1. IFAN motor damaged 2. IFAN motor blocked 3. IDU PCB problem
H7	HEAT LED-OFF 3s and blink 7 times	Sync failure	1. Abnormal power input voltage. 2. Compressor wiring mistake. 3. Liquid and gas valve are not open. 4. EEV damaged or not proper working 5. Poor heat exchage. 6. Over charged system.
Lc	HEAT LED- OFF 3s and blink 11 times	Compressor startup failure	1. Compressor wiring mistake 2. Over charged system 3. System not balanced before compressor starting 4. Compressor problem

2* 7 segments	LEDs	Failure	Possible Reasons
P7	HEAT LED- OFF 3s and blink 18 times	HST failure	1. Senor was broken or damaged 2. PCB temperature detection cuircuit has problem
P8	HEAT LED- OFF 3s and blink 19 times	HST overheating protection	1. Insufficient attachment of IPM module to Heatsink 2. Outdoor PCB problem.
PH	COOL LED- OFF 3s and blink 11 times	DC over voltage	1. AC power supply is higher than 265V 2. Outdoor PCB circuit malfunction
PL	HEAT LED- OFF 3s and blink 21 times	DC under voltage	1. AC power supply voltage is less than 150VAC 2. Outdoor PCB circuit malfunction
U1	HEAT LED- OFF 3s and blink 13 times	Phase current detection malfunction of compressor	Replace outdoor main board
U5	COOL LED-OFF 3s and blink 13 times	AC Current detection problem	Replace outdoor main board.
U7	COOL LED- OFF 3s and blink 20 times	RV is abnormal	1. Supply voltage is lower than AC175V 2. Wiring terminal of RV is loosen or broken 3. RV is damaged
UA	HEAT and COOL LED blink 12 times at the same time	Setting error	Outdoor unit is not matched with indoor unit.
UF	HEAT and COOL LED blinks 7 times at the same time	Zero-crossing protection (IDU)	Replace indoor main board
UH	HEAT and COOL LED blink 8 times at the same time	No motor of outdoor unit feedback	This malfunction may happen when outdoor DC motor is used.
UU	HEAT and COOL LED blink 11 times at the same time	DC over current	□

12.1.4 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 11- Control system.

12.2 Simple procedures for checking the Main Parts

12.2.1 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).

12.2.2 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.

12.2.3 Checking the Outdoor Fan Motor.

Check the voltage between two pins Hi and N of connector S80 on controller, normal voltage is 220~240VAC.

12.2.4 Checking the Compressor.

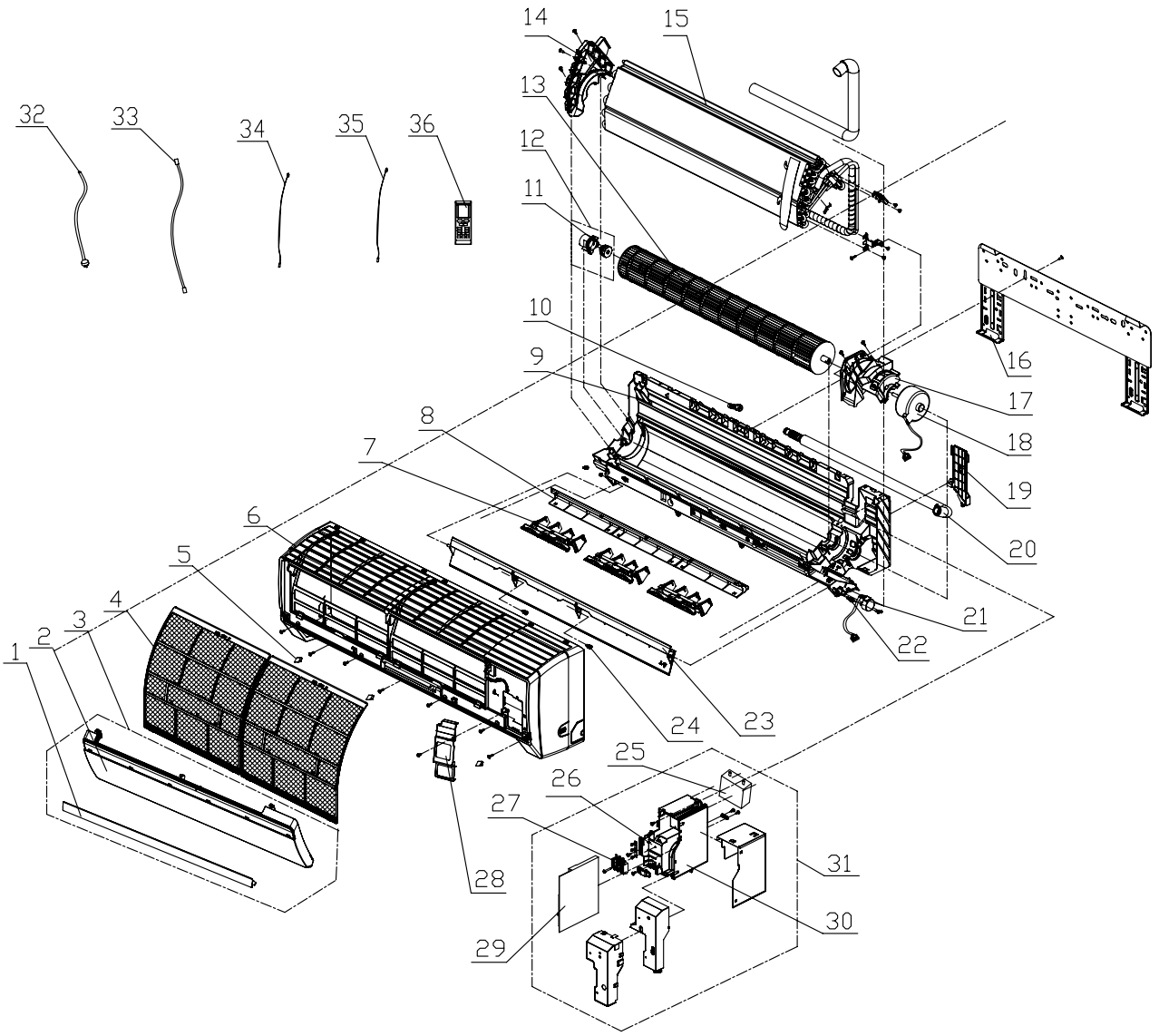
The compressor is brushless permanence magnetic DC motor. Three coil resistance is same. Check the resistance between three poles. The normal value should be ~ 1.764 Ohm (at 20C). Pay attention U,V, W are respective to connect to RED,YELLOW,BLUE wires.

12.2.5 Checking the Reverse Valve (RV).

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

13. EXPLODED VIEWS AND SPARE PARTS LISTS

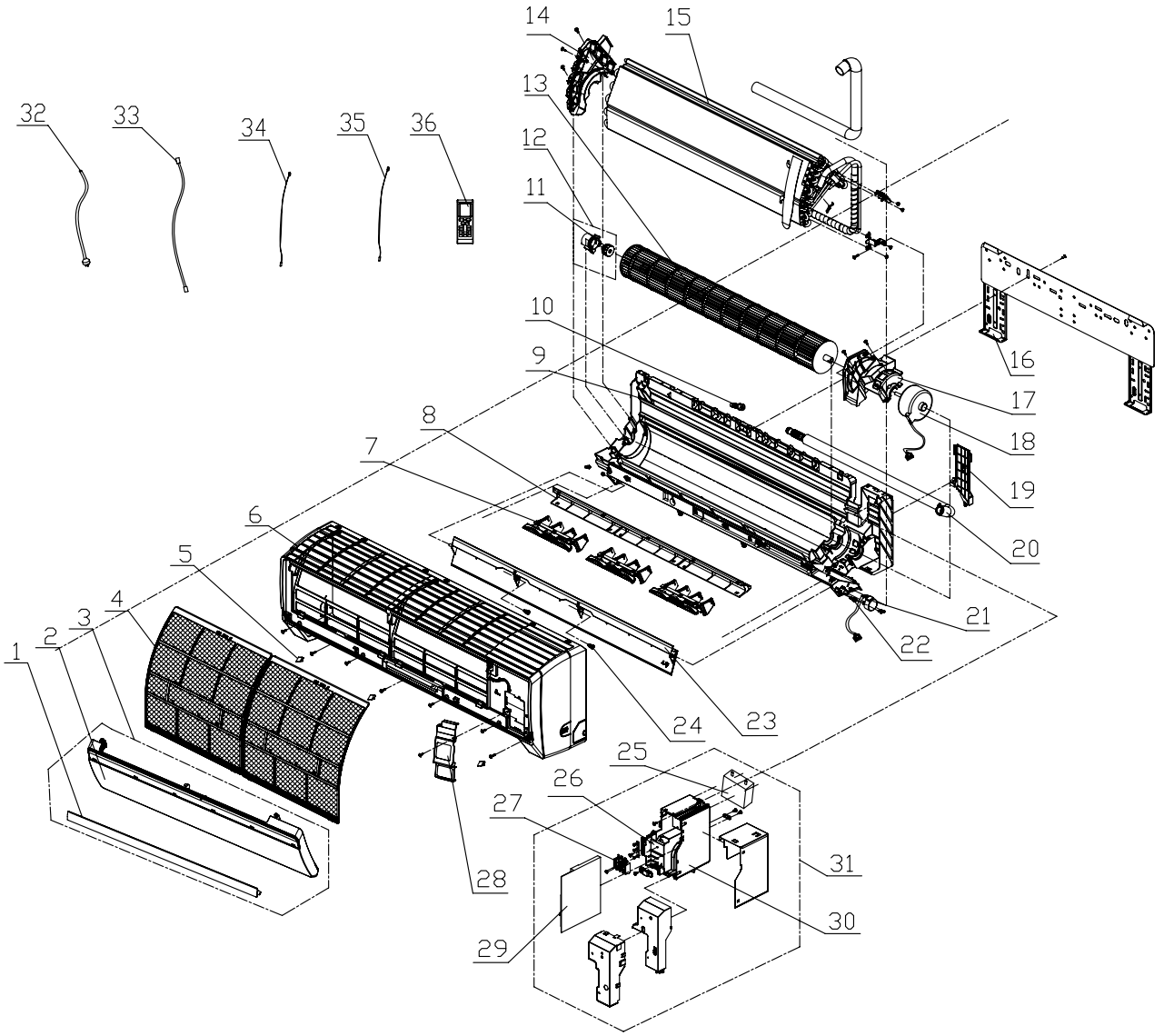
13.1 Indoor Unit: HDD009, HED009



13.2 Indoor Unit: HDD009, HED009

NO.	Part Code	Part Description	qty
1	20192439	Decorative Strip	1
2	20012806	Front Panel	1
3	20012823	Front Panel Assy	1
4	1112208201	Filter Sub-Assy	2
5	24252019	Screw Cap	1
6	20012824	Front Case Assy	1
7	10512160	Air Louver	2
8	26112486	Helicoid tongue	1
9	2220211901_K46462	Rear Case assy	1
10	76712020	Pipe plug (outlet)	1
11	10542024	Axile Bush sub-assy	1
12	76512011	Damping washer sub-assy	1
13	10352423	Cross Flow Fan	1
14	24212108	Evaporator Support	1
15	01002270	Evaporator Assy	1
16	0125201801A	Wall Mounting Frame	1
17	26112191	Motor Press Plate	1
18	15002002	Motor Sub-Assy	1
19	26112218	Baffle Plate	1
20	0523204101	Drainage Pipe Sub-assy	1
21	1521210701	Step Motor	1
22	73012005	Crank	1
23	10512119	Guide Louver	1
24	1054202001	Shaft of guide louver	2
25	3301000213	Capacitor CBB61	1
26	20112086	Electric Box	1
27	42011233	4-bit Terminal Board	1
28	20122109	Electric Box Cover Sub-Assy	1
29	30138120	Main Board	1
30	2020225702	Electric Box Sub-Assy	1
31	2020225302	Electric Box Assy	1
32	400204643	Power Cord	1
33	none	Connecting Cable	0
34	39000305	sensor	1
35	390000453	Ambient Temperature Sensor	1
36	30510136_K46462	Remote Controller	1
	24212910	Support of catechin	2
	11012025	Air Cleaner	1
	111220071	Photocatalysis Filter	1

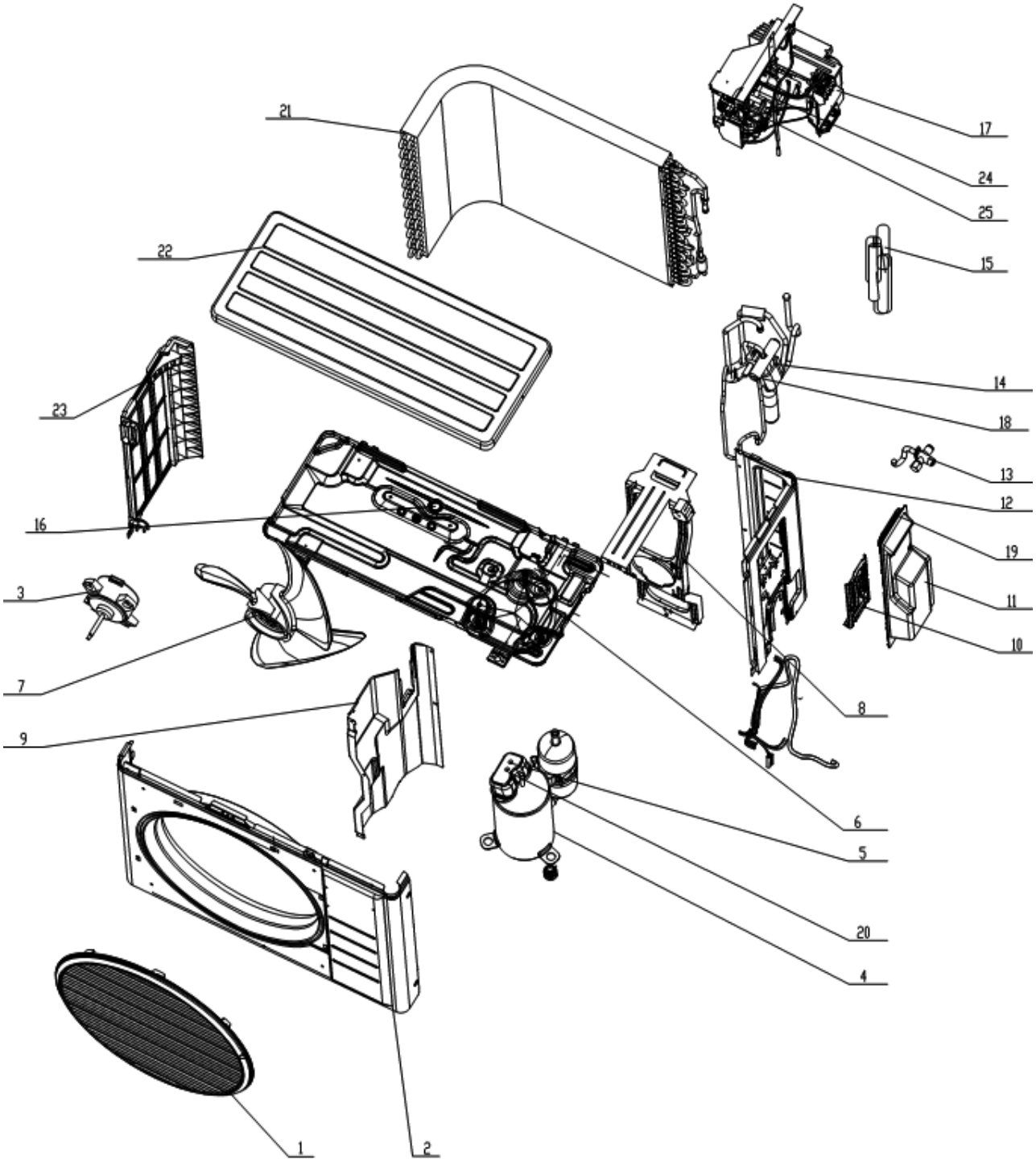
13.3 Indoor Unit: HDD012, HED012



13.4 Intdoor Unit: HDD012, HED012

NO.	Part Code	Part Description	qty
1	20192439	Decorative Strip	1
2	20012806	Front Panel	1
3	20012823	Front Panel Assy	1
4	1112208201	Filter Sub-Assy	2
5	24252019	Screw Cap	1
6	20012824	Front Case Assy	1
7	10512160	Air Louver	2
8	26112486	Helicoid tongue	1
9	2220211901_K46462	Rear Case assy	1
10	76712020	Pipe plug (outlet)	1
11	10542024	Axile Bush sub-assy	1
12	76512011	Damping washer sub-assy	1
13	10352423	Cross Flow Fan	1
14	24212108	Evaporator Support	1
15	01002745	Evaporator Assy	1
16	0125201801A	Wall Mounting Frame	1
17	26112191	Motor Press Plate	1
18	15002002	Motor Sub-Assy	1
19	26112218	Baffle Plate	1
20	0523204101	Drainage Pipe Sub-assy	1
21	1521210701	Step Motor	1
22	73012005	Crank	1
23	10512119	Guide Louver	1
24	1054202001	Shaft of guide louver	2
25	3301000213	Capacitor CBB61	1
26	20112086	Electric Box	1
27	42011233	4-bit Terminal Board	1
28	20122109	Electric Box Cover Sub-Assy	1
29	30138121	Main Board	1
30	20202257	Electric Box Sub-Assy	1
31	20202253	Electric Box Assy	1
32	400204643	Power Cord	1
33	none	Connecting Cable	0
34	39000305	sensor	1
35	390000453	Ambient Temperature Sensor	1
36	30510136_K46462	Remote Controller	1
	24212910	Support of catechin	2
	11012025	Air Cleaner	1
	111220071	Photocatalysis Filter	1

13.5 Outdoor Unit: YDD009, YDD012



13.6 Outdoor Unit: YDD009

NO.	Part Code	Part Description	qty
1	22413018	Front Grill	1
2	01433418P	Cabinet	1
3	15013073	Fan Motor	1
4	0010376101	Compressor and fittings	1
5	00181067	Overload Protector	1
6	0120390901P	Chassis Sub-assy	1
7	1033300901	Axial Flow Fan Sub-Assy	1
8	0170311101	Motor Support	1
9	01233088	Clapboard	1
10	01713089	Valve Support	1
11	26233046	Handle assy	1
12	0130318001	Right Side Plate Sub-Assy	1
13	07133164	Cut-off Valve Assy	1
14	0312323701	4-way Valve Assy	1
15	03103936	Capillary Sub-Assy	1
16	06123024	Drainage Joint	1
17	02603256	Electric Box Assy	1
18	4300040050	Magnet Coil	1
19	26113005	Thermal baffle	1
20	22243001	Terminal cap	1
21	01113463	Condenser Assy	1
22	0125304001	Top Cover Sub-Assy	1
23	20053001	Left Side Plate	1
24	30138087	Main Board	1
25	20113010	Electric Box	1
26	39000304	sensor	1

13.7 Outdoor Unit: YDD012

NO.	Part Code	Part Description	qty
1	22413018	Front Grill	1
2	01433418P	Cabinet	1
3	15013073	Fan Motor	1
4	0010376101	Compressor and fittings	1
5	00181067	Overload Protector	1
6	0120390901P	Chassis Sub-assy	1
7	1033300901	Axial Flow Fan Sub-Assy	1
8	01703111	Motor Support	1
9	01233088	Clapboard	1
10	01713089	Valve Support	1
11	26233046	Handle assy	1
12	0130318001	Right Side Plate Sub-Assy	1
13	07133163	Cut-off Valve Assy	1
14	0312327201	4-way Valve Assy	1
15	03103937	Capillary Sub-Assy	1
16	06123024	Drainage Joint	1
17	0260325601	Electric Box Assy	1
18	4300040050	Magnet Coil	1
19	26113005	Thermal baffle	1
20	22243001	Terminal cap	1
21	01113501	Condenser Assy	1
22	0125304001	Top Cover Sub-Assy	1
23	20053001	Left Side Plate	1
24	30138096	Main Board	1
25	20113010	Electric Box	1
26	39000304	sensor	1

APPENDIX A

INSTALLATION AND OPERATION MANUAL

- ► **OPERATING MANUAL HDD/HED009-012**
- ► **INSTALLATION MANUAL HDD/HED009-012**