

VRF AIR-CONDITIONER
(HEAT PUMP)

Technical Catalog

- Technical Data -
- Installation and Operation -
- Service and Maintenance -

Outdoor Units

AVW-28HJFH	AVW-54HKFH
AVW-34HJFH	AVW-76HKFH
AVW-38HJFH	AVW-96HKFH
AVW-43HJFH	AVW-114HKFH
AVW-48HJFH	AVW-76H9FH
AVW-54HJFH	AVW-96H9FH
AVW-43HKFH	AVW-114H9FH
AVW-48HKFH	



IMPORTANT NOTICE

- Hisense pursues a policy of continuing improvement in design and performance of products. The right is therefore reserved to vary specifications without notice.
- Hisense cannot anticipate every possible circumstance that might involve a potential hazard.
- This heat pump air conditioner is designed for standard air conditioning only.
- Do not use this heat pump air conditioner for other purposes such as drying clothes, refrigerating foods or for any other cooling or heating process.
- No part of this manual may be reproduced without written permission.
- The following words (DANGER, WARNING and CAUTION) are used to identify levels of hazard seriousness. Definitions for identifying hazard levels are provided below with their respective signal words.

⚠ DANGER	:	Immediate hazards which WILL result in severe personal injury or death.
⚠ WARNING	:	Hazards or unsafe practices which COULD result in severe personal injury or death.
⚠ CAUTION	:	Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.
NOTE	:	Useful information for operation and/or maintenance.

- If you have any questions, contact your distributor or dealer of Hisense.
- This manual gives a common description and information for this heat pump air conditioner which you operate as well as for other models.
- Install air conditioning according to the local standard.
- This heat pump air conditioner has been designed for the following temperatures. Operate the heat pump air conditioner within this range.

Temperature		(°C)	
		Maximum	Minimum
Cooling Operation	Indoor	23 WB	15WB
	Outdoor	46 DB	-5 DB
Heating Operation	Indoor	30 DB	15 DB
	Outdoor	15.5 WB	-20(-15)* WB

DB: Dry Bulb
WB: Wet Bulb

* -15°C Applicable to the following models only : AVW-28HJFH AVW-34HJFH AVW-43HJFH AVW-43HKFH.

Attention

This system has been designed for only cooling or heating operation.
Do not apply this system to the rooms where individual cooling and heating operation are required at the same time.

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DESIGN

1. Features

1.1 Outdoor Unit Series

Model		AVW-28HJFH	AVW-34HJFH	AVW-43HJFH	AVW-38HJFH	AVW-48HJFH	AVW-54HJFH
Outdoor Unit Power Supply		220-240V ~ 50/60Hz					
Nominal Cooling Capacity	kBtu/h	27.3	34.1	42.7	38.2	47.8	52.9
Nominal Heating Capacity	kBtu/h	32.4	38.2	47.8	42.7	54.6	61.4

Model		AVW-43HKFH	AVW-48HKFH	AVW-54HKFH	AVW-76HKFH	AVW-96HKFH	AVW-114HKFH
Outdoor Unit Power Supply		380-415V 3N~ 50/60Hz					
Nominal Cooling Capacity	kBtu/h	42.7	47.8	52.9	76.5	95.6	114.3
Nominal Heating Capacity	kBtu/h	47.8	54.6	61.4	85.3	107.5	128

Model		AVW-76H9FH	AVW-96H9FH	AVW-114H9FH
Outdoor Unit Power Supply		220V 3~ 60Hz		
Nominal Cooling Capacity	kBtu/h	76.5	95.6	114.3
Nominal Heating Capacity	kBtu/h	85.3	107.5	128

1.2 System Features

Inverter-Driven Home Central Air-conditioning

The inverter-driven home central air-conditioning Hi-Smart Hseries product is characterized by energy-saving, high efficiency, comfort, environmental protection, stability and reliability. In order to meet the requirement of increasing the control intelligence of equipment and of comfort, the intelligent control, energy-saving operation and comfortableness are more and more important. Especially the business building, building office, villa, apartment and residential area etc. need an intelligent and comfortable environment all year round. The better air conditioning solution can be provided for these buildings by inverter-driven compressor that the structure has been improved.

Hi-Smart H Series – Adopting R410A Refrigerant

Hisense is always devoted to developing the more energy-saving and environmentally protective air conditioning system, regarding the reduction of greenhouse effect and global environment protection as our responsibility. By using the environmentally protective refrigerant R410A without damage to the ozone layer as well as the energy-saving technology, the Hi-Smart Hseries product can be more applicable for the demands of global environmental protection.

Table Indoor Unit Type List

Indoor Unit Type	Nominal Power(kBtu/h)																	
	05	07	09	12	14	15	17	18	19	22	24	27	30	38	48	54	76	96
Ceiling Ducted Type (Low Static Pressure)		○	○	○	○		○	○		○	○	○	○	○	○	○	○	○
Ceiling Ducted Type (High Static Pressure)		○	○	○	○		○	○		○	○	○	○	○	○	○	○	○
Low-Height Ceiling Ducted Type		○	○	○	○		○	○		○	○							
Low-Height Ceiling Ducted Type (DC)	○	○	○	○	○		○	○		○	○							
Slim Ceiling Ducted Type		○	○	○	○													
1-Way Cassette Type		○	○	○	○		○			○								
2-Way Cassette Type		○	○	○	○			○			○							
4-Way Cassette Type			○	○	○		○	○		○	○	○	○	○	○	○		
mini 4-Way Cassette Type	○	○	○	○		○	○		○									
Wall-Mounted Type		○	○	○	○		○	○		○	○							
Ceiling and Floor Type							○	○		○	○	○	○	○	○			
Floor-Concealed Type			○		○			○			○							
Console Type	○	○	○	○		○	○											

○ : Available

- A maximum total capacity of 125% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

Table System Combination

Model	Minimum Individual Operation Capacity (kBtu/h)	Minimum Combination Quantity	Maximum Combination Quantity	Recommend Combination Quantity	Combination Range
AVW-28HJFH	05	1	5	3	50%~125%
AVW-34HJFH	05	1	6	4	
AVW-43HJFH	05	1	8	5	
AVW-43HKFH	05	1	8	5	

- A maximum total capacity of 150% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

Model	Minimum Individual Operation Capacity (kBtu/h)	Minimum Combination Quantity	Maximum Combination Quantity	Recommend Combination Quantity	Combination Range
AVW-38HJFH	05	1	9	5	50%~150%
AVW-48HJFH	05	1	11	5	
AVW-54HJFH	05	1	11	5	
AVW-48HKFH	05	1	11	5	
AVW-54HKFH	05	1	11	5	

- A maximum total capacity of 150% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

Outdoor Unit Model	Indoor Unit				
	Minimum Combination Capacity (kBtu/h)	Maximum Combination Capacity (kBtu/h)	Combination Quantity	Recommend Combination Quantity	Minimum Individual Operation Capacity (kBtu/h)
AVW-76HKFH	38	114	1~15	8	05
AVW-96HKFH	48	144	1~17	10	05
AVW-114HKFH	57	171	1~19	10	05

- A maximum total capacity of 130% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

Outdoor Unit Model	Indoor Unit			
	Minimum Combination Capacity (kBtu/h)	Maximum Combination Capacity (kBtu/h)	Combination Quantity	Minimum Individual Operation Capacity (kBtu/h)
AVW-76H9FH	38	98	1 ~ 10	07
AVW-96H9FH	48	124	1 ~ 10	07
AVW-114H9FH	57	148	1 ~ 10	07

- (*1) The connect ratio should not be bigger than 100% for systems where all indoor units may operate at the same time; otherwise, overload operation may occur in harsh conditions or narrow range.
- (*2) Capacity ratio must be 100% when only one indoor unit is connected, and the refrigerant additional charge should be reduced according to the indoor unit type.
- (*3) The capacity of indoor unit should be modified when the capacity ratio exceed 100% or the combination quantity exceed the recommend quantity.

Modified capacity = Nominal capacity × Correction factor

Correction factors are defined as follows:

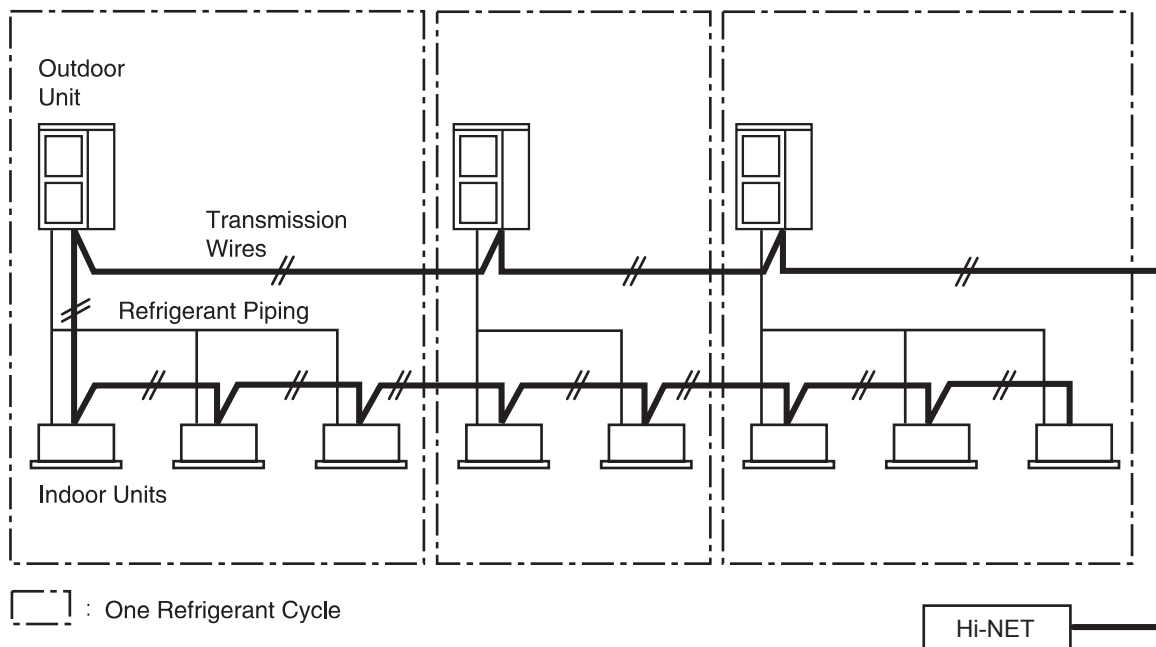
Indoor Unit Type	Model	Correction Factor
Wall mounted	07/09	2.0
2-way cassette	07/09/12	2.0

Hi-NET System

The latest **Hi-NET** wiring system requires only two transmission wires connecting each indoor unit with outdoor unit for up to **64** refrigerant cycles, thus all indoor units and outdoor units are connected in series.

- The total wiring length is remarkably reduced.
- Only one connection is required for the wiring between the indoor unit and outdoor unit.
- Easy wiring connection to the central stations

Example of Hi-NET System



< Specifications >

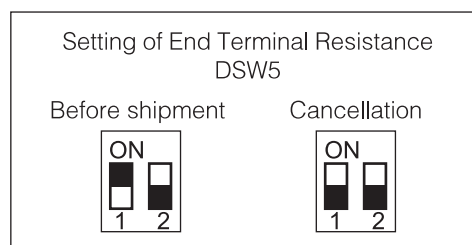
- 1) Transmission: It is shield twist pair whose sectional area is more than or equal to 0.75 mm^2 .
- 2) Polarity of Transmission: Non-polar
- 3) Maximum connecting quantity of outdoor units: **64** sets for each **Hi-NET** system.
- 4) Maximum connecting quantity of indoor units: **64** sets for refrigerant system and **128 indoor units** for each **Hi-NET** system.
- 5) Maximum transmission length: Total 1000 m (including **Hi-NET**)
- 6) Voltage: DC 5V.

Note:

1. In case of applying Hi-NET system, the setting of DIP switch is required. The alarm will be given if the DIP switch is not set or improperly set (because of transmission error).

■ Setting of End Terminal Resistance

Before shipment, the No.1 pin in DSW5 should be turned to the "ON" position. If one Hi-NET is connected with two or more outdoor units, the No.1 pin in DSW5 should be turned to the "OFF" position from the second outdoor unit. This setting is not needed if only one outdoor unit is used.



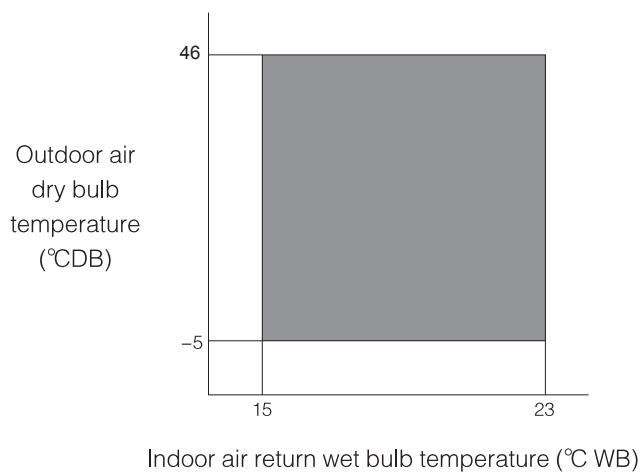
New Transmission System

A non-polar shielded twist pair is applied for the transmission wires connecting indoor units and outdoor unit so as to eliminate the damage caused by misconnection.

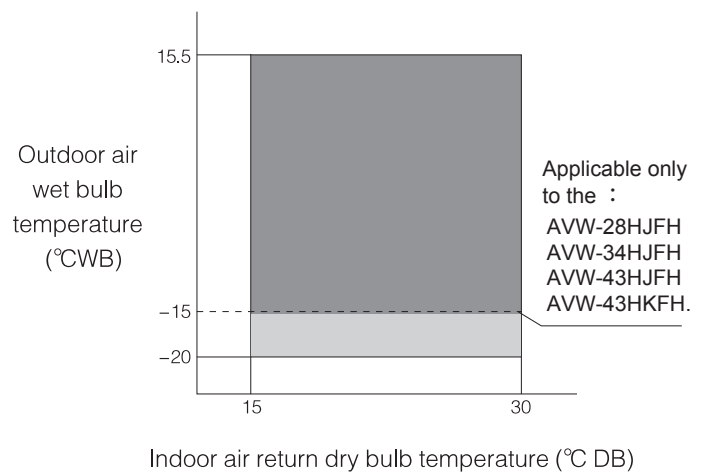
Wide Operation Range

This unit has been designed for cooling operation under ambient temperatures -5°C . This feature enables cooling to be obtained even in winter on buildings with high internal heat gains due to lighting, people and machines, particularly in areas such as shops, lecture rooms, data processing areas etc. And the heating operation under ambient temperature -20°C can be also performed.

Cooling operation



Heating operation

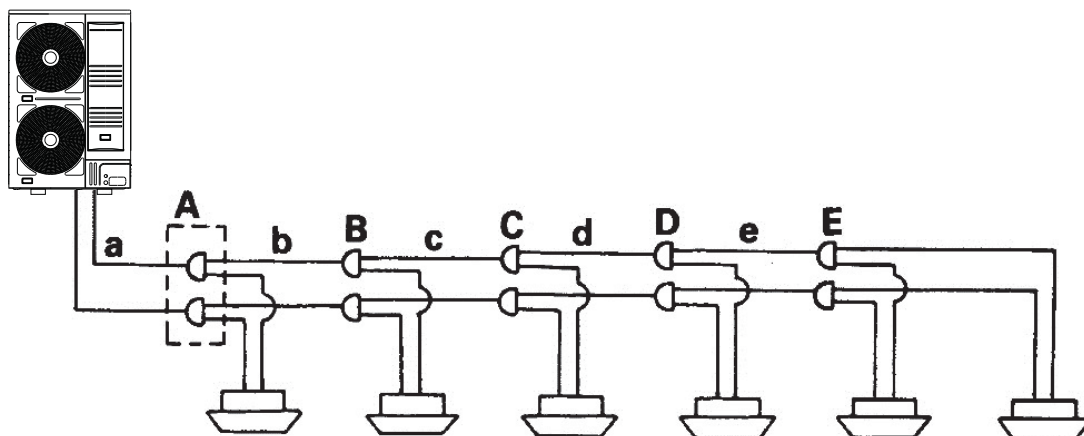


 : Operation control range

Greatly Minimized Piping Work by “Uni-Piping System”

This new uni-piping system can be applied only if the diameters of refrigerant main pipelines are same. Owing to adopting the uniform pipe diameter, the pipeline construction is very simplified.

The simplified design can avoid the complex pipeline diameter selection work. The two refrigerant pipelines can only be needed for refrigerant return circuit. All pipeline connectors can also be supplied based on the field demands. These improvements make that all problems are settled in the installation processes. This type of new uni-piping system save the construction of working-hour and labor, so undoubtedly it can be regarded as an innovation. (Only used for uni-piping)



Applicable Model	Pipe Size	Moded of Branch pipe
	a~e	A
AVW-28HJFH	Φ15.88/Φ9.53	HFQ-052F
AVW-34HJFH	Φ15.88/Φ9.53	
AVW-43HJFH	Φ15.88/Φ9.53	
AVW-38HJFH	Φ15.88/Φ9.53	
AVW-48HJFH	Φ15.88/Φ9.53	
AVW-54HJFH	Φ15.88/Φ9.53	
AVW-43HKFH	Φ15.88/Φ9.53	
AVW-48HKFH	Φ15.88/Φ9.53	
AVW-54HKFH	Φ15.88/Φ9.53	HFQ-162F(*1)
AVW-76HKFH	Φ22.2/Φ12.7	
AVW-96HKFH	Φ25.4/Φ12.7	
AVW-114HKFH	Φ25.4/Φ12.7	
AVW-76H9FH	Φ19.05/Φ12.7	
AVW-96H9FH	Φ22.2/Φ12.7	
AVW-114H9FH	Φ25.4/Φ12.7	

(*1)

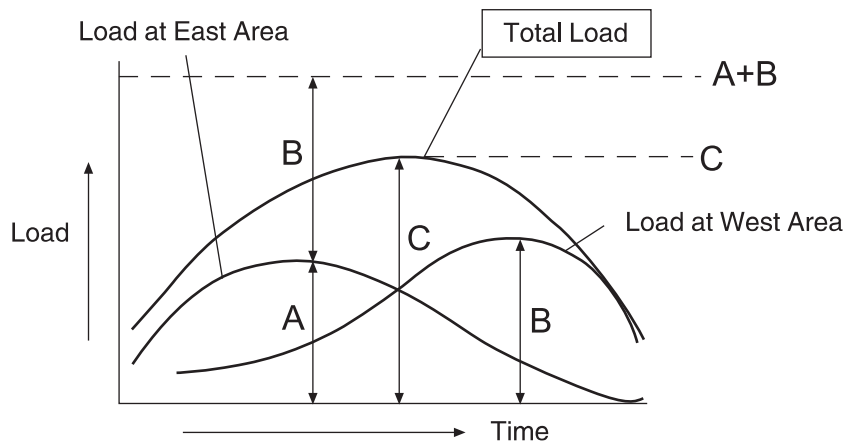
Model	EL	Gas/Liquid (φ mm)	Branch pipe Model
AVW-76H9FH	≤ 70m	19.05/9.53	HFQ-102F
	≥ 70m	19.05/12.7	HFQ-162F

EL: Equivalent Total Distance Between Indoor Unit
and Outdoor Unit in Meters
(Equivalent One-Way Piping Length)

Required total capacity of outdoor unit can be reduced

In the same air conditioning system, compared with the common split type air conditioning, adopting the Hi-Smart H unit is better. The total capacity of outdoor unit of the latter is reduced by 30% than that of former. As shown in the following Figure, in a typical building, the heat load peak value at east area corresponds with 29kBtu/h at morning however at west area corresponds with 34kBtu/h at afternoon. Therefore, normally, the air conditioning of capacity of 29kBtu/h+34kBtu/h=63kBtu/h must be configured. However, actually, the load instant peak value only occurs at midday for the whole building, corresponding with the system capacity of 48kBtu/h. Therefore, the 48kBtu/h Hi-Smart H series unit can only be selected. Under the command of its control system, its capacity can meet the load demands for east area or west area of the whole building. So the capacity= $(63-48)/63 \times 100=24\%$ of air conditioning can be saved.

Example of Building Air Conditioning:



- Common split type – Its total capacity selection is based on the total sum of each maximum load value ($=A+B$);



- Hi-Smart H Series – Its total capacity selection is based on the maximum of total constant load values.

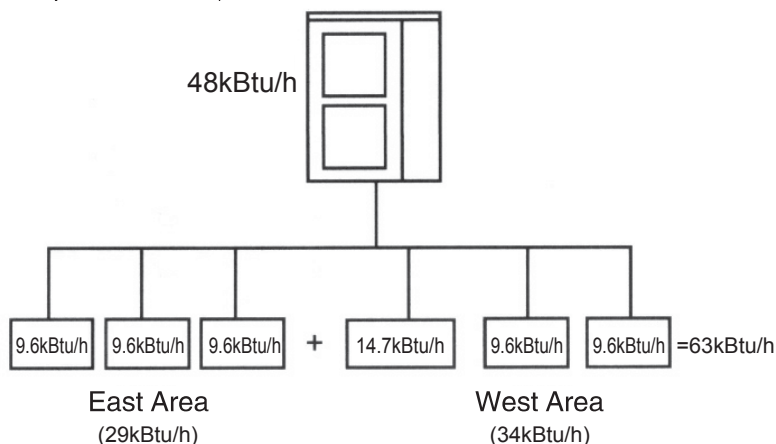
$$(A+B):C=1:0.80\sim0.85$$

Owing to the system is composed of several indoor units, the part of indoor units can only be operated.

Hi-Smart H Series

Supply the refrigerant based on the load in each room.

Load diversity = $48/63=0.76$;



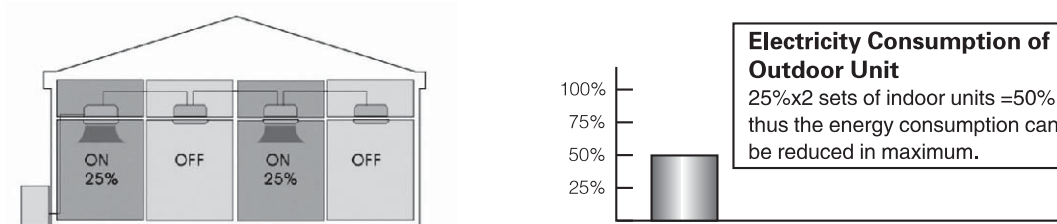
Capacity of Indoor Unit (kBtu/h)

Unique Energy-saving Technology

Adopting the Hisense patent products, such as the high efficient DC inverter-driven rotary compressor, precise inverter-driven control and DC fan motor and the special technology, adopting the intelligent automatic operation system based on the actual load, the energy and operation cost can be saved and the system energy efficiency rate can be increased for outdoor unit.

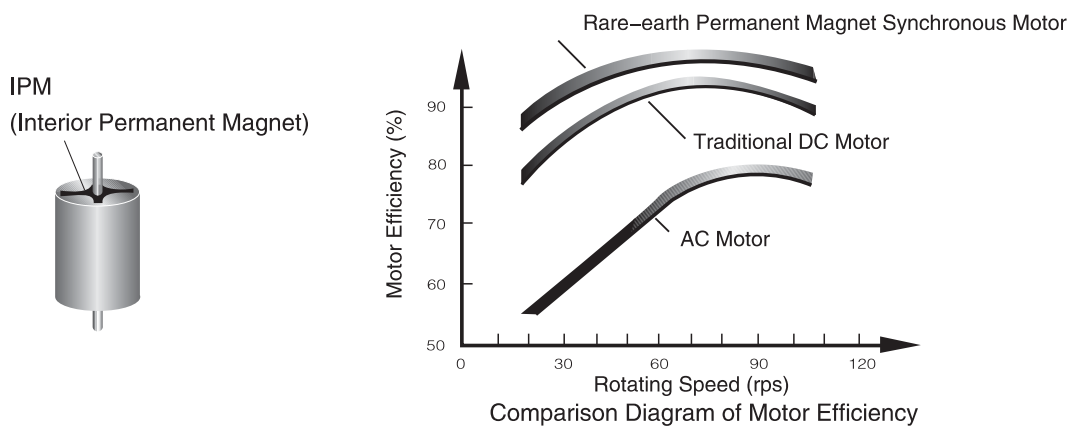
Respectively Control for Indoor Unit

The Hi-Smart H series produces can be respectively controlled based on the demand of user. The indoor unit in each room can be respectively opened or stopped. The operation state of compressor, operation frequency and output capacity of intelligent adjustable main machine can be controlled by main machine based on the operation state of indoor unit, thus avoiding the unnecessary power waste.



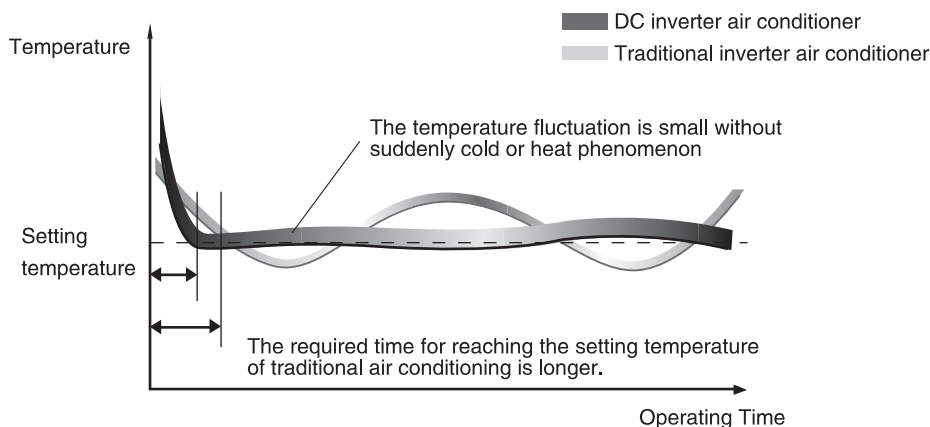
Unique Rare-earth Permanent Magnet Synchronous Motor

The rare-earth permanent magnet synchronous motor is the clustered motor that efficiency can be greatly increased in low-frequency and middle frequency; at the same time the IPM (rotor embedded type) technology is adopted, thus the torque can be increased by 20% and the motor efficiency can be further increased. Its energy can be very saved comparing with AC motor and traditional DC motor.

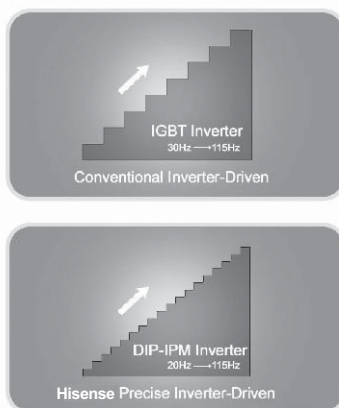


Precise Inverter Technique

The Hisense precise inverter technique adopts the PAM (pulse amplitude modulation), PWM (pulse width modulation) and PFC (power factor correction) with combined control technique. When starting, the inverter make the indoor temperature rapidly reach the setting value through accelerating the rotational frequency of compressor with the aim of PAM. After the indoor temperature reaches the setting value, the indoor temperature can be effectively and accurately kept by inverter through controlling the rotary speed of compressor with the help of PWM, without consuming more energy. The precise inverter technology can make the unit be characterized by larger power, high efficiency, stable operation, comfortable, energy-saving and 99.5% of power factor, with the advantages of energy-saving effect, economic operation and naturally comfortable indoor environment.



The working frequency can be continuously, accurately and freely adjusted based on the change of system capacity through the precise inverter technology from 20Hz to 115Hz to control the motor speed accurately. The capacity output can be automatically and accurately adjusted based on the actual air conditioning load.

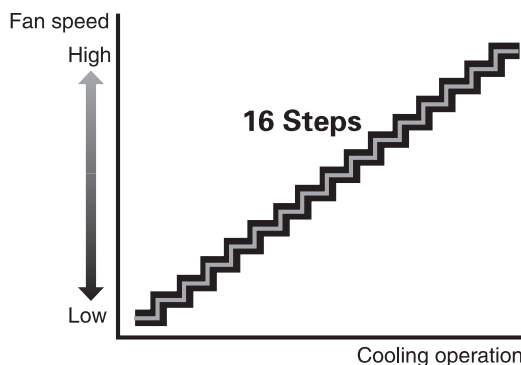


Comparison of Conventional Inverter-driven and Precise Inverter-driven

16-Step Fan Speed Control of Outdoor Unit

The fan speed of outdoor unit can be controlled by 16-step according to ambient temperature changing. Compared with the traditional fan, this wide-band adjustable mode has the following features:

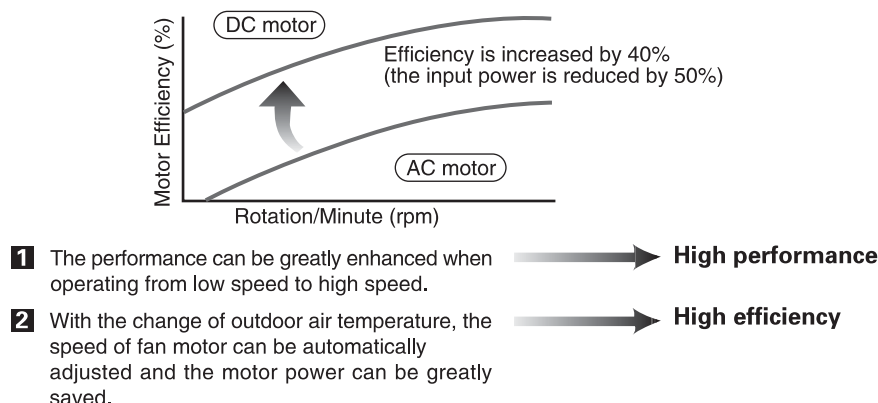
- ◆ Greatly ensuring the stability of discharge and suction pressures of compressor and increasing the service life of compressor;
- ◆ Ensuring the stability of dynamic allocation of flow (capacity) of indoor unit and reducing the indoor temperature fluctuation;
- ◆ Strengthening the rapid response of control system;
- ◆ In the mean while, ensuring the stable, permanent and reliable operation of unit.



Sketch for 16-step speed regulation of outdoor unit fan under the cooling condition

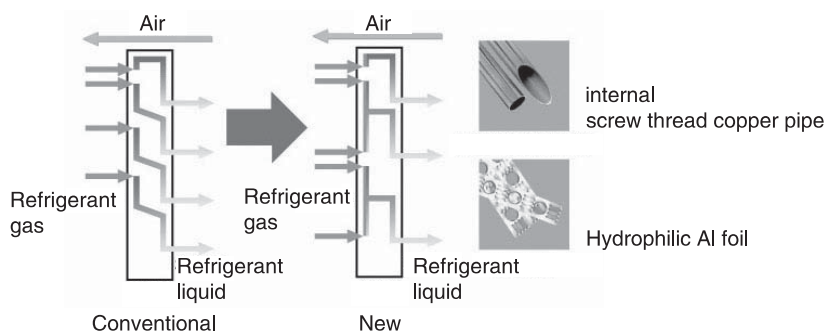
DC Fan Motor

Compared with the traditional AC motor, the efficiency of AC motor is greatly increased. In addition, the gust effect can be reduced through controlling the rotary speed of fan. The machine can be stably operated even if the head wind speed is up to 10m/s.



New Heat Exchanger

With the specially designed “2 in 1” refrigerant flow, the heat exchanging efficiency of heat exchanger can be optimized, the heat exchanging effect is better and the system efficiency is higher.



RoHS Response

Hisense actively takes measures of strictly controlling the use of harmful substance to Europe RoHS command. The RoHS is fully named as “Restriction of Hazardous Substances”, specifying the six harmful substances of Lead, Mercury, Cadmium, Hexavalent Chromium, PBDE or PBB which are forbidden to use in the electrical and electronic equipments. The purpose of this command is to protect the human health and ensure that the recovery and treatment of rejected electrical and electronic equipments meet the environmental requirement.



Substance	RoHS limit value	Typical test method
Lead	1000ppm	Wet chemical treatment or X ray fluorescence
Cadmium	100ppm	Wet chemical treatment or X ray fluorescence
Hexavalent chromium	1000ppm	Wet chemical treatment or X ray fluorescence
Mercury	1000ppm	Wet chemical treatment or X ray fluorescence
PBB/PBDE	1000ppm	GCMS, FTTR, or X ray fluorescence

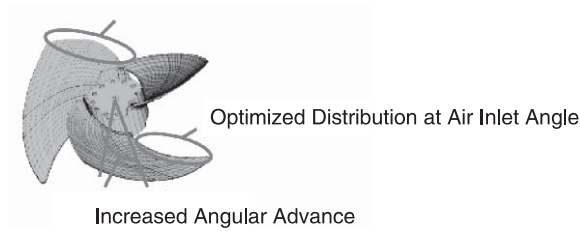
Environmental Friendly Refrigerant Protects Environment

Hi-Smart H Series adopts the R410A environmental friendly refrigerant which has acquired the world's recognition and is no harm to human body. With the highly efficient energy saving, it will not damage the globe ozone layer. By transferring temperature, humidity, fresh air and health to all spaces, you can enjoy the comfortable and fresh air conditioning environment.

Top-Class Quiet – Enjoying the Quiet Life

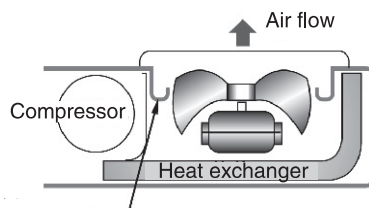
Super High-stream Fan

The fan is designed with the best flow distribution and a new type fan blade that can reduce the turbulence developed around the fan. The rotary speed can be controlled and the noise can be reduced through increasing the fan mouth diameter.



Adoption of New Bell-mouth

The new bell-mouth minimizes flow friction, resulting in smooth flow and low sound.

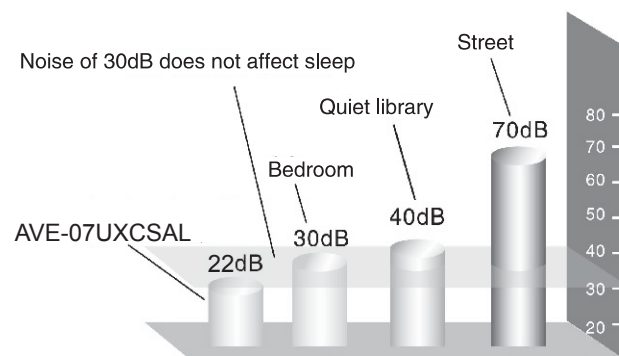


Reaching the Lowest Noise Value in Industry

With the unique night-time operation setting function, the outdoor unit can make that the noise is reduced by 5–6dB(A) compared with day normal operation when operating at night with full load. The lowest value is 48 dB(A) (AVW-43HJFH).

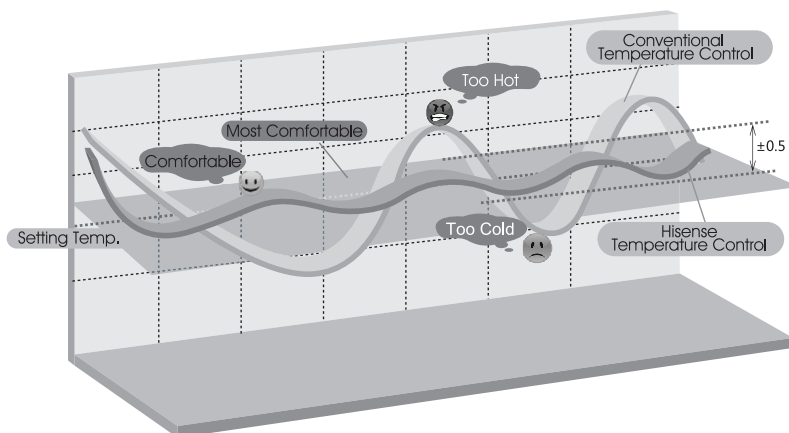


The operation noise of Slim Ceiling ducted type AVE-07UXCSAL with lowest noise in industry can be lowest to 22dB(A).



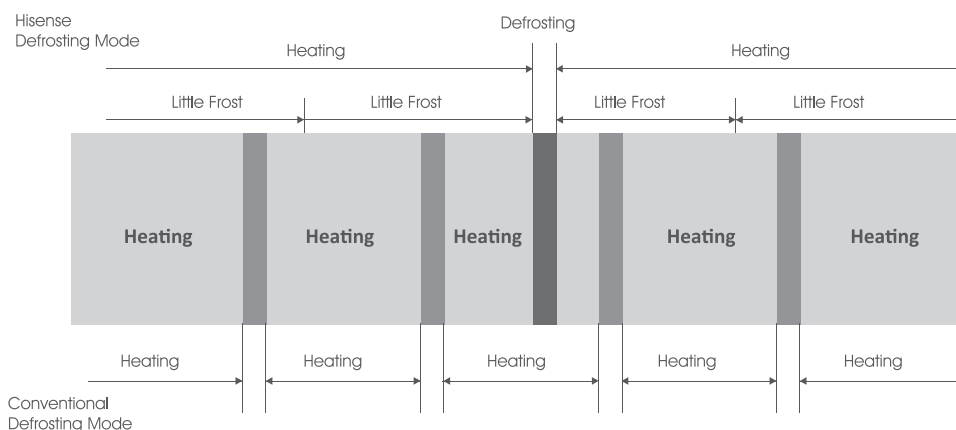
3D Temperature Control Technology

Hi-Smart H series sets temperature sensors on air outlet/air inlet of indoor units and remote controller to detect the temperature change of indoor and outdoor sensitive points accurately and regulate indoor temperature automatically, which can maintain the room temperature within 0.5 °C of setting temperature and satisfy the indoor comfort requirement.



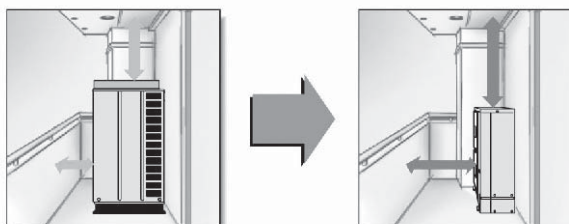
Intelligent Defrosting Technology

Hi-Smart H adopts the leading intelligent defrosting technology and precisely calculates the defrosting time, which largely increases effective heating operation time in winter and ensure heating capacity.



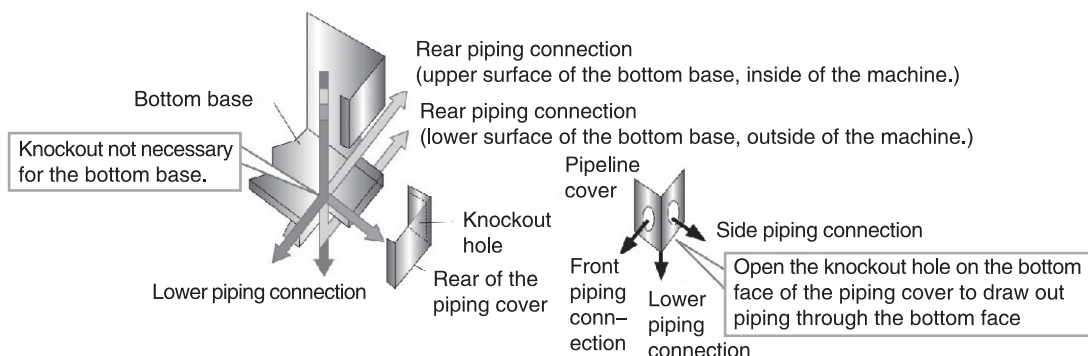
Compact Size and Saving Space

The main machine of system is characterized by compact volume, light weight, small size and easy installation. It can be installed in the concealed places, such as work veranda or storage room, which can simultaneously meet the cold and heating requirements for several rooms. Furthermore, the reasonable arrangement of outdoor unit will not damage the overall aesthetic appearance of building.



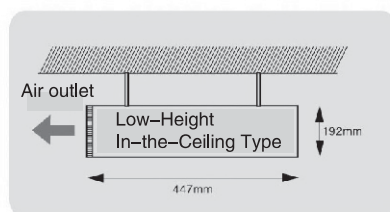
Free Connection

The connection direction of Hi-Smart H Series refrigerant pipeline is free. Any side of outdoor unit can be connected with pipeline (front, back, side and bottom) for easy installation, which can be freely applicable for any location.



Concealed Installation for Matching the Decoration

Different from the traditional wall type and cabinet type, the indoor units of home central air conditioning are mostly concealed in the ceiling. Only the air outlet can be seen. The thickness of Hisense low-height in-the-ceiling (duct) type is only 192mm to leave more space for designer and for matching the high-grade decoration indoors.

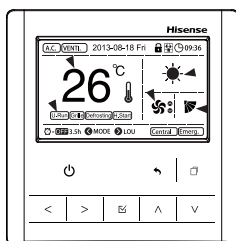


The pipe and wire are exposed outside, which is not aesthetic.

The concealed indoor unit can be perfectly matched with the decoration.

Various Controllers

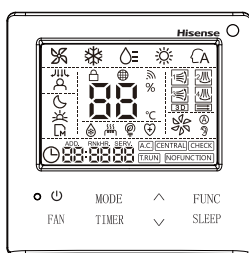
The indoor unit can use the various controlling for control, which can achieve the single control or concentrated control for mostly convenient use of user.



Remote Control Switch HYXE-J01H

Remote Control Switch:

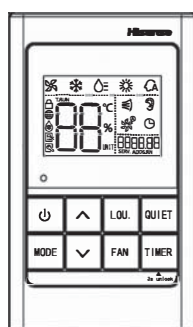
- COOL / HEAT / DRY / FAN / AUTO
- High fan, middle fan, low fan / Swing Louver
- Temperature setting / I.U. Timer setting
- Filter indicator
- Total heat exchanger operation control
- Check function
- Alarm code display function
- Increasing the wind speed function



Wired remote controller
Model No.HYXE-M01H

Remote Control Switch:

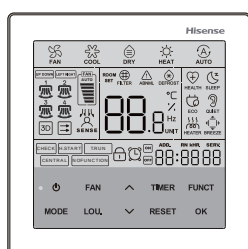
- COOL / HEAT / DRY / FAN / AUTO
- High fan, middle fan, low fan / Swing Louver
- Temperature setting / I.U. Timer setting
- Filter indicator
- Total heat exchanger operation control
- Check function
- Alarm code display function
- Increasing the wind speed function



Wired remote controller
Model No.HYXE-S01H

Remote Control Switch:

- COOL / HEAT / DRY / FAN / AUTO
- High fan, middle fan, low fan / Swing Louver
- Temperature setting / I.U. Timer setting
- Filter indicator
- Total heat exchanger operation control
- Check function
- Alarm code display function
- Increasing the wind speed function



Wired remote controller
Model No.HYXE-VA01

Remote Control Switch:

- COOL / HEAT / DRY / FAN / AUTO
- High fan, middle fan, low fan / Swing Louver
- Temperature setting / I.U. Timer setting
- Filter indicator
- Total heat exchanger operation control
- Check function
- Alarm code display function
- Increasing the wind speed function



Wireless Remote Control Switch:

- COOL / HEAT / DRY / FAN / AUTO
- High fan, middle fan and low fan
- Swing Louver
- Temperature setting
- I.U. Timer setting
- Filter indicator

Wireless Remote Control Switch
HYE-L01



Wireless Remote Control Switch:

- COOL / HEAT / DRY / FAN / AUTO
- High fan, middle fan and low fan
- Swing Louver
- Temperature setting
- I.U. Timer setting
- Filter indicator

Wireless Remote Control Switch
HYE-W01

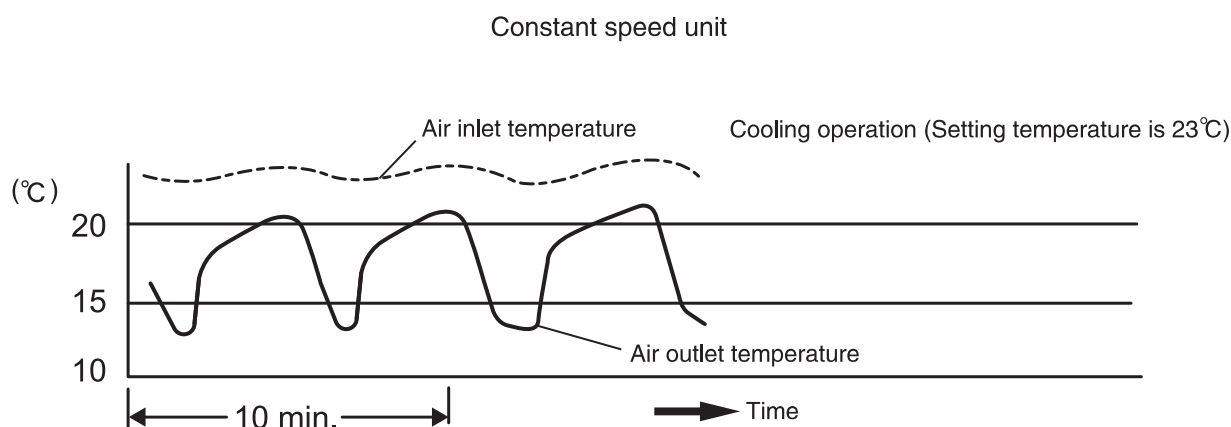
1.3 System Control

New Transmission System

The indoor and outdoor units are connected by a shield twist pair of non-polarity.

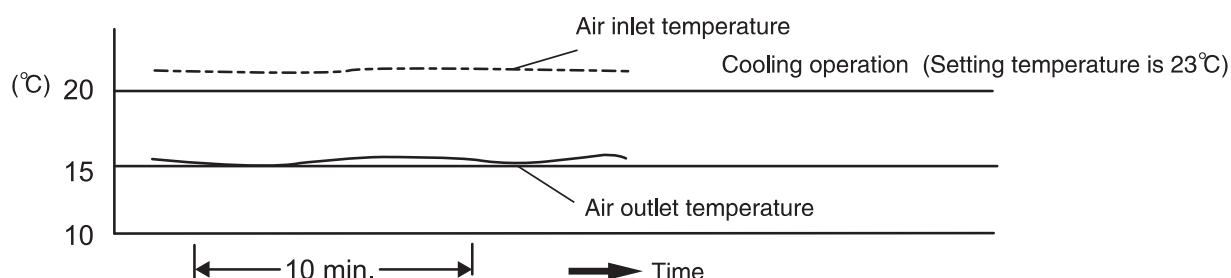
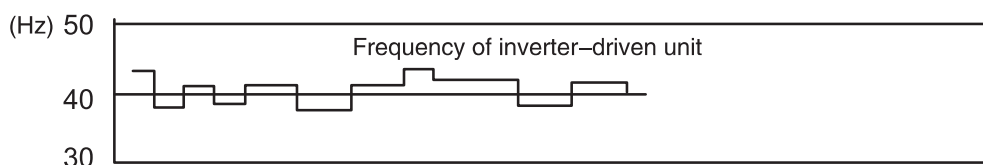
Wider inverting range to ensure the accurate control

The operation frequency of compressor of Hi-Smart H series outdoor unit can be automatically adjusted within the wider range from 20 Hz to 115 Hz, to avoid the frequent open/close controlling of machine unit and achieve the smooth and stable operation. The control range for this new type wider capacity meets the requirement not only of larger space, but also of smaller space, such as guest rooms and management rooms. Owing to the compressor can be operated at a high speed when defrosting, the defrosting is very quick.



Inverter-driven unit

Variable frequency

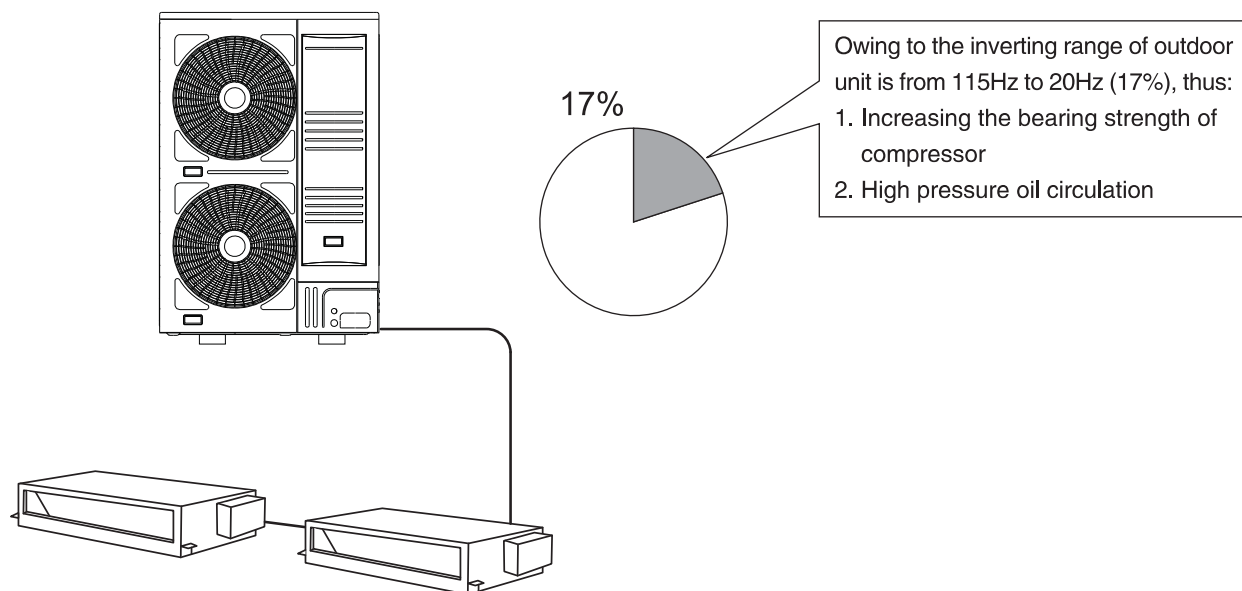


Note: The above is for the temperature decreasing situation of air outlet.

Electronic Capacity Control

The capacity of outdoor unit can be continuously changed from 20Hz to 115Hz through inverter. The wider operation range can be ensured through increasing the bearing strength of compressor and function of interior oil separating. Therefore, this air conditioning system can be well adjusted based on the load changing within one day.

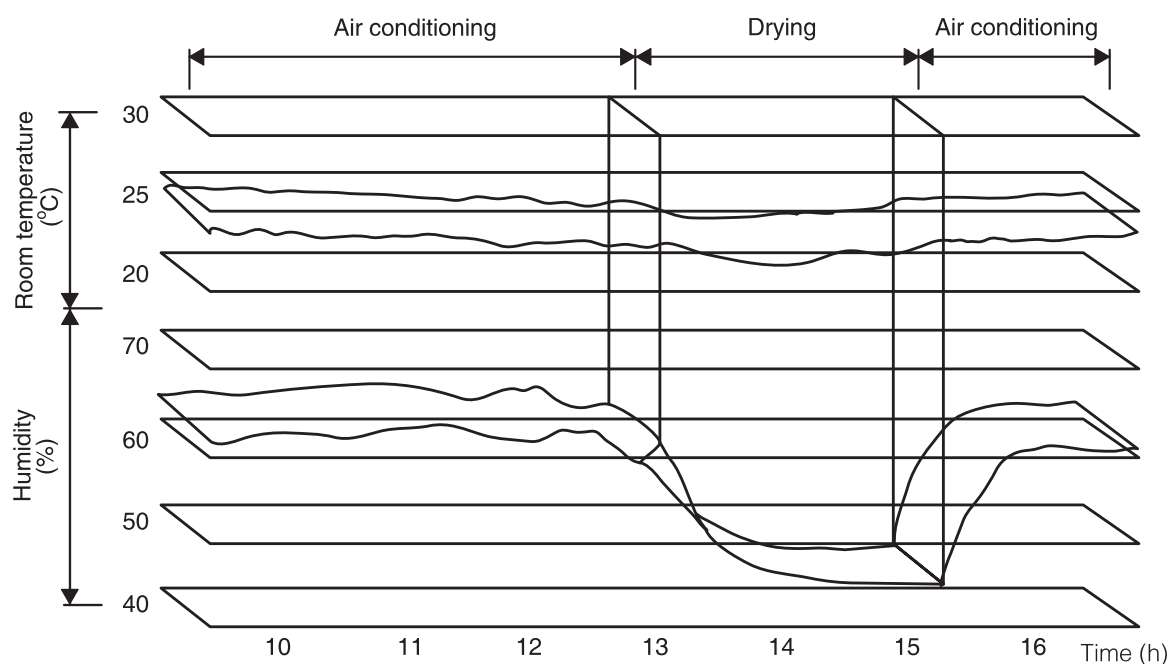
In addition, with the inverter-driven compressor, the capacity of indoor unit can be controlled through detecting the air return temperature and setting room temperature. Therefore, the comfortable situation of air conditioner can be achieved even in the very small room not using the “ON/OFF” switch of control equipment.



1.4 Drying Operation

This system can play a function of dehumidification effect combining with the inverter-driven and air flow control of indoor unit, at the same time, the room temperature fluctuation is hardly effected.

Room temperature and humidity variation during dry operation.



1.5 Test Run and Self-Diagnosis Control

Test run and self-diagnosis function of multi-functional remote control switch and control board of outdoor unit

The high-quality control can be achieved through the new remote control switch, with the new self-diagnosis function, the operation situation of indoor unit and outdoor unit can be rapidly checked. In addition, the alarm data for abnormal situation of machine unit can be easily stored in the computer.

The self-diagnosis function can be achieved through the control board of outdoor unit, the operation data of several units such as the opening of electronic expansion valve can be shown on the seven-segment digital display of the control board.

With these functions, the period is shortened and the working capacity is reduced for the test run and maintenance work of machine unit.

- Diagnose with the remote control switch

The PCB control board can be checked using the LCD remote control switch (optional). Therefore, the check for PCD will be quick and accurate.

- Data memory of the remote control switch

If the abnormal situation occurs, the LCD remote control switch can display the alarm code for quick fault diagnosis.

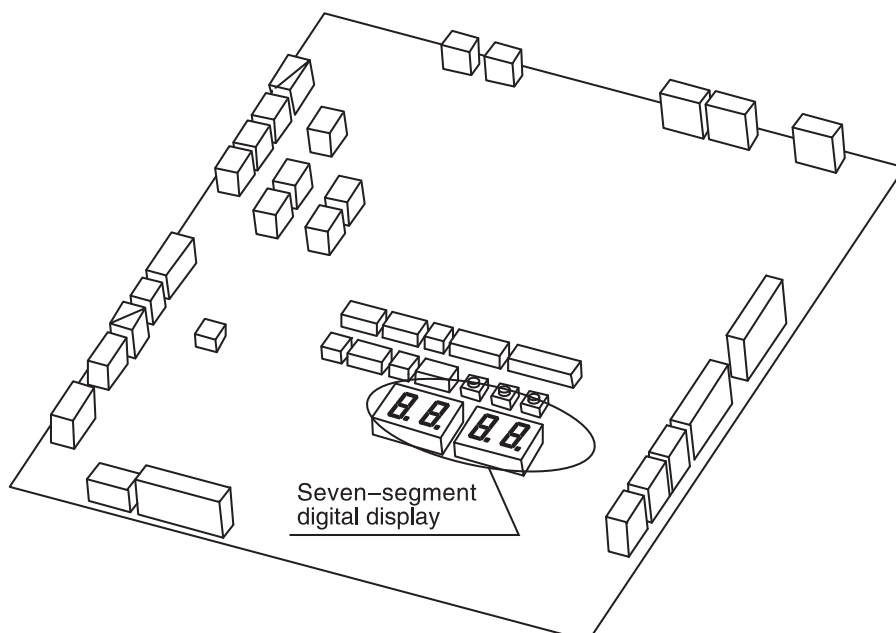
Self-diagnosis function

- Diagnosis is done by using the seven-segment digital display of outdoor unit

The PCB of outdoor unit is equipped with the seven-segment digital display, showing various operation modes, such as:

- Outdoor temperature
- Gas discharge temperature
- Evaporating temperature during heating
- Condensating temperature
- Gas discharge pressure
- Gas suction pressure
- Operation time of compressor

In addition, it can also provide the quick and accurate test run data or normal operation data.



2. General Data

General Data of Outdoor Unit

Model			AVW-28HJFH	AVW-34HJFH	AVW-43HJFH	AVW-38HJFH	AVW-48HJFH	AVW-54HJFH
Power Supply		-	220~240V ~ 50/60Hz					
Cooling Operation	Nominal Capacity	Btu/h	27300	34100	42700	38200	47800	52900
		kW	8.0	10.0	12.5	11.2	14.0	15.5
	Power Consumption	kW	1.93	2.34	2.98	2.60	3.46	4.21
		EER		4.15	4.27	4.19	4.31	4.05
Heating Operation	Nominal Capacity	Btu/h	32400	38200	47800	42700	54600	61400
		kW	9.5	11.2	14.0	12.5	16.0	18.0
	Power Consumption	kW	2.37	3.01	4.15	2.78	3.71	4.47
		COP		4.01	3.72	3.37	4.50	4.31
Cabinet Color		-	Ivory White					
Sound Pressure Level (Cooling/Heating)		dB(A)	50/52	53/55	54/57	50/52	52/54	53/55
Out Dimension (H×W×D)		mm	800×950×370	800×950×370	800×950×370	1380×950×370	1380×950×370	1380×950×370
Packing Dimension (H×W×D)		mm	951×1070×515	951×1070×515	951×1070×515	1531×1070×515	1531×1070×515	1531×1070×515
Net Weight		kg	65	73	78	93	95	97
Gross Weight		kg	74	83	88	112	112	112
Refrigerant Category			R410A					
Refrigerant Flow Control			Micro-Computer Control Expansion Valve					
Compressor	Brand		HIGHLY (Rotary)					
	Quantity		1	1	1	1	1	1
	Drive Mode		DC					
Refrigerant Oil Type			HAF68D1C		α 68HES-H			
Heat Exchanger			Multi-Pass Cross-Finned Tube					
Condenser Fan	Model		Propeller Fan					
	Quantity		1	1	1	2	2	2
	Drive Mode		DC					
Air Flow Rate		m³/min	46.5	69.0	78.0	90.0	90.0	100.0
Motor Output(Pole)		kW	0.051 (8)	0.138 (8)	0.138 (8)	0.051 (8)	0.051 (8)	0.051 (8)
Connections			Flare-Nut Connection(With Flare Nuts)					
Refrigerant Piping	Liquid Line	mm(in.)	Φ9.53(3/8)	Φ9.53(3/8)	Φ9.53(3/8)	Φ9.53(3/8)	Φ9.53(3/8)	Φ9.53(3/8)
	Gas Line	mm(in.)	Φ15.88(5/8)	Φ15.88(5/8)	Φ15.88(5/8)	Φ15.88(5/8)	Φ15.88(5/8)	Φ15.88(5/8)
Refrigerant Charge (before shipment)		kg	2.5	2.8	2.8	3.8	3.8	4.1
Max. number of connectable IDU			5	6	8	9	11	11
Matching range			50%~125%			50%~150%		
Max. Piping Length		m	25	25	25	75	75	75
Height Difference	Between ODU & IDU	m	20	20	20	30	30	30
	Between IDUs	m	3.5	3.5	3.5	10	10	10
Operation Range	Cooling	℃ DB	-5~46					
	Heating	℃ WB	-15~15.5			-20~15.5		
Branch pipe			HFQ-052F					
Approximate Packing Measurement		m³	0.44	0.44	0.44	0.87	0.87	0.87

Model			AVW-43HKFH	AVW-48HKFH	AVW-54HKFH	AVW-76HKFH	AVW-96HKFH	AVW-114HKFH
Power Supply		-	380~415V 3N~ 50/60Hz					
Cooling Operation	Nominal Capacity	Btu/h	42700	47800	52900	76500	95600	114300
		kW	12.5	14.0	15.5	22.4	28.0	33.5
	Power Consumption	kW	3.81	3.92	4.44	6.36	7.80	10.60
	EER		3.28	3.57	3.49	3.52	3.59	3.16
Heating Operation	Nominal Capacity	Btu/h	47800	54600	61400	85300	107500	128000
		kW	14.0	16.0	18.0	25.0	31.5	37.5
	Power Consumption	kW	3.68	4.03	4.74	5.81	7.00	10.11
	COP		3.80	3.97	3.80	4.30	4.50	3.71
Cabinet Color		-	Ivory White					
Sound Pressure Level (Cooling/Heating)		dB(A)	55/57	48/50	50/52	58/60	59/61	59/61
Out Dimension (H×W×D)		mm	800×950×370	1380×950×370	1380×950×370	1650×1100×390	1650×1100×390	1650×1100×390
Packing Dimension (H×W×D)		mm	951×1070×515	1531×1070×515	1531×1070×515	1806×1185×530	1806×1185×530	1806×1185×530
Net Weight		kg	84	103	103	160	170	170
Gross Weight		kg	98	119	119	181	195	195
Refrigerant Category			R410A					
Refrigerant Flow Control			Micro-Computer Control Expansion Valve					
Compressor	Brand		Hitachi(Scroll)					
	Quantity		1	1	1	1	1	1
	Drive Mode		DC					
Refrigerant Oil Type			FVC68D			FV68H		
Heat Exchanger			Multi-Pass Cross-Finned Tube					
Condenser Fan	Model		Propeller Fan					
	Quantity		1	2	2	2	2	2
	Drive Mode		DC					
Air Flow Rate		m³/min	75.0	90.0	100.0	150.0	163.0	163.0
Motor Output(Pole)		kW	0.138 (8)	0.051 (8)	0.051 (8)	0.138 (8)	0.138 (8)	0.138 (8)
Connections			Flare-Nut Connection(With Flare Nuts)					
Refrigerant Piping	Liquid Line	mm(in.)	Φ9.53(3/8)	Φ9.53(3/8)	Φ9.53(3/8)	Φ12.7(1/2)	Φ12.7(1/2)	Φ12.7(1/2)
	Gas Line	mm(in.)	Φ15.88(5/8)	Φ15.88(5/8)	Φ15.88(5/8)	Φ22.2(7/8)	Φ25.4(1/1)	Φ25.4(1/1)
Refrigerant Charge (before shipment)		kg	3.0	3.6	3.6	7.0	9.0	9.0
Max. number of connectable IDU			8	11	11	15	17	19
Matching range			50%~125%	50%~150%				
Max. Piping Length		m	50	75	75	100	100	100
Height Difference	Between ODU & IDU	m	20	30	30	40	40	40
	Between IDUs	m	3.5	15	15	15	15	15
Operation Range	Cooling	℃ DB	-5~46					
	Heating	℃ WB	-15~15.5	-20~15.5				
Branch pipe			HFQ-052F			HFQ-162F		
Approximate Packing Measurement		m³	0.44	0.87	0.87	1.00	1.00	1.00

Model			AVW-76H9FH	AVW-96H9FH	AVW-114H9FH
Power Supply		-	220V 3~ 60Hz		
Cooling Operation	Nominal Capacity	Btu/h	76500	95600	114300
		kW	22.4	28.0	33.5
	Power Consumption	kW	6.30	8.30	10.70
	EER		3.56	3.37	3.13
Heating Operation	Nominal Capacity	Btu/h	85300	107500	128000
		kW	25.0	31.5	37.5
	Power Consumption	kW	5.9	7.8	9.9
	COP		4.24	4.04	3.79
Cabinet Color		-	Ivory White		
Sound Pressure Level (Cooling/Heating)		dB(A)	53/55	56/58	56/61
Out Dimension (H×W×D)		mm	1650×1100×390	1650×1100×390	1650×1100×390
Packing Dimension (H×W×D)		mm	1806×1185×530	1806×1185×530	1806×1185×530
Net Weight		kg	168	168	171
Gross Weight		kg	179	179	182
Refrigerant Category			R410A		
Refrigerant Flow Control			Micro-Computer Control Expansion Valve		
Compressor	Brand	Hitachi(Scroll)			
	Quantity	1	1	1	
	Drive Mode	DC			
Refrigerant Oil Type			FVC68D		
Heat Exchanger			Multi-Pass Cross-Finned Tube		
Condenser Fan	Model	Propeller Fan			
	Quantity	2	2	2	
	Drive Mode	DC			
Air Flow Rate		m³/min	121	150	163
Motor Output(Pole)		kW	0.138	0.138	0.138
Connections			Flare-Nut Connection(With Flare Nuts)		
Refrigerant Piping	Liquid Line	mm(in.)	Φ9.53(3/8)	Φ12.7(1/2)	Φ12.7(1/2)
	Gas Line	mm(in.)	Φ19.05(3/4)	Φ22.2(7/8)	Φ25.4(1/1)
Refrigerant Charge (before shipment)		kg	5.0	5.5	6.5
Max. number of connectable IDU			10	10	10
Matching range			50%~150%		
Max. Piping Length		m	100	100	100
Height Difference	Between ODU & IDU	m	40	40	40
	Between IDUs	m	15	15	15
Operation Range	Cooling	℃ DB	-5~46		
	Heating	℃ WB	-20~15.5		
Branch pipe			HFQ-162F (HFQ-102F)		
Approximate Packing Measurement		m³	1.00	1.00	1.00

Model	EL	Branch pipe Model
AVW-76H9FH	≤ 70m	HFQ-102F
	≥ 70m	HFQ-162F

EL: Equivalent Total Distance Between Indoor Unit and Outdoor Unit in Meters (Equivalent One-Way Piping Length)

Notes: 1. The nominal cooling capacity and heating capacity are based on following conditions:

Cooling Operation Conditions

Indoor Air Inlet Temperature: 27 °C DB (80 °F DB)
19.0 °C WB (66.2 °F WB)

Outdoor Air Inlet Temperature: 35 °C DB (95 °F DB)

Heating operation condition:

Indoor air inlet temperature: 20 °C DB (68 °F DB)

Outdoor air inlet temperature: 7 °C DB (45 °F DB)

6 °C WB (43 °F WB)

Pipeline length: 7.5m Pipe Lift: 0m

2. The sound pressure level is based on following conditions:

1.5 meters from floor level, and 1 meter from the unit service cover surface.

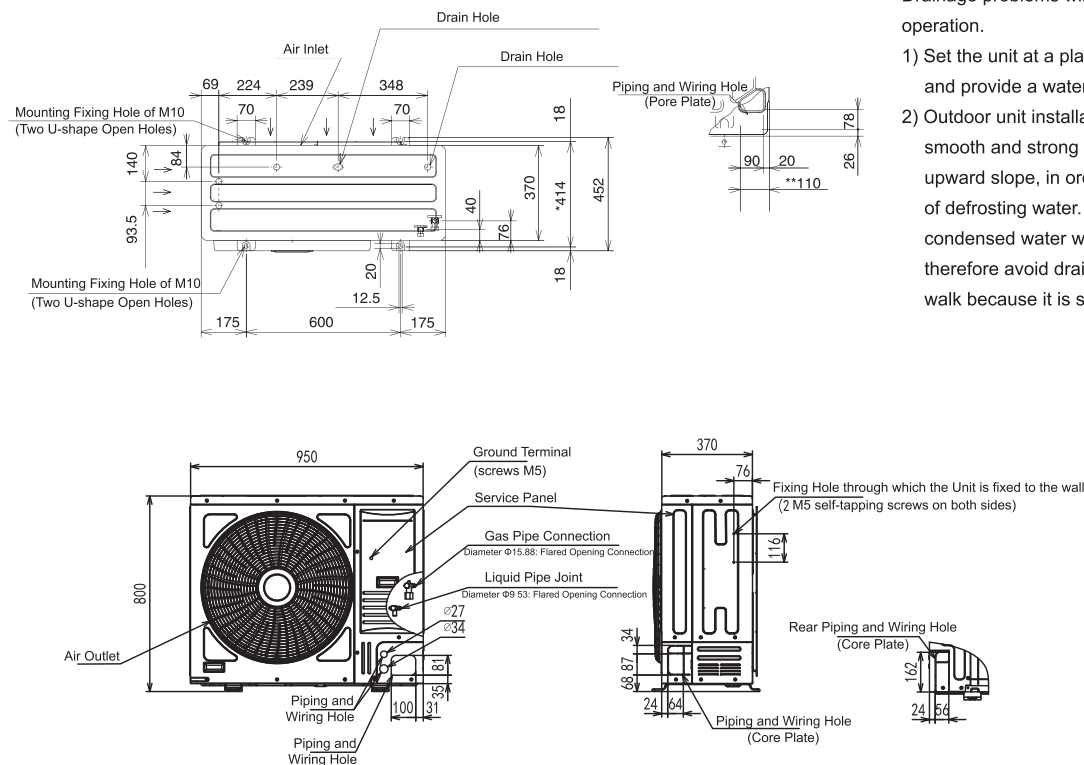
The above data was measured in an anechoic chamber so that reflected sound should be taken into consideration in the field.

3. Dimensional Data

3.1 Dimensional Data of Outdoor Unit

Model: AVW-28HJFH, AVW-34HJFH, AVW-43HJFH
AVW-43HKFH

Unit: mm

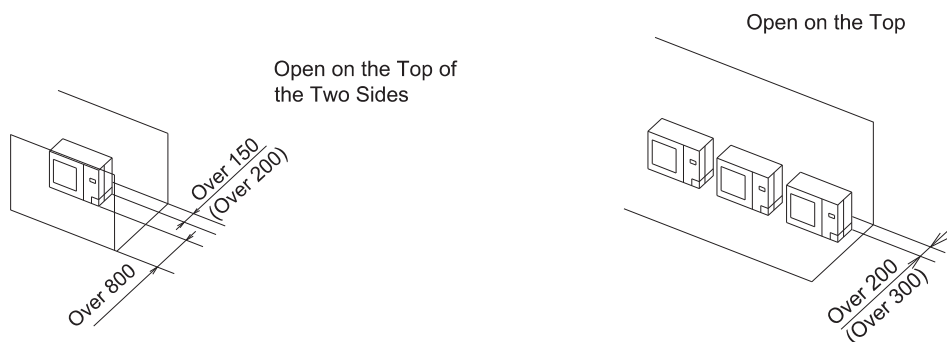


Caution:

Drainage problems will occur in defrosting operation.

- 1) Set the unit at a place with smooth drainage, and provide a waterspout.
- 2) Outdoor unit installation should ensure smooth and strong foundation without upward slope, in order to facilitate discharge of defrosting water. In cold weather, the condensed water will be turned into ice, therefore avoid draining where people often walk because it is slippery.

Service Space



The size inside () is used for 4HP and 4.5HP.

100mm space is required at the side of service cover.
The size inside () is used for 4HP and 4.5HP.

About Installation Site

Please install it in a place that is not against the wind (wind blowing straight to the fan), to prevent the snow blown into the inner unit.

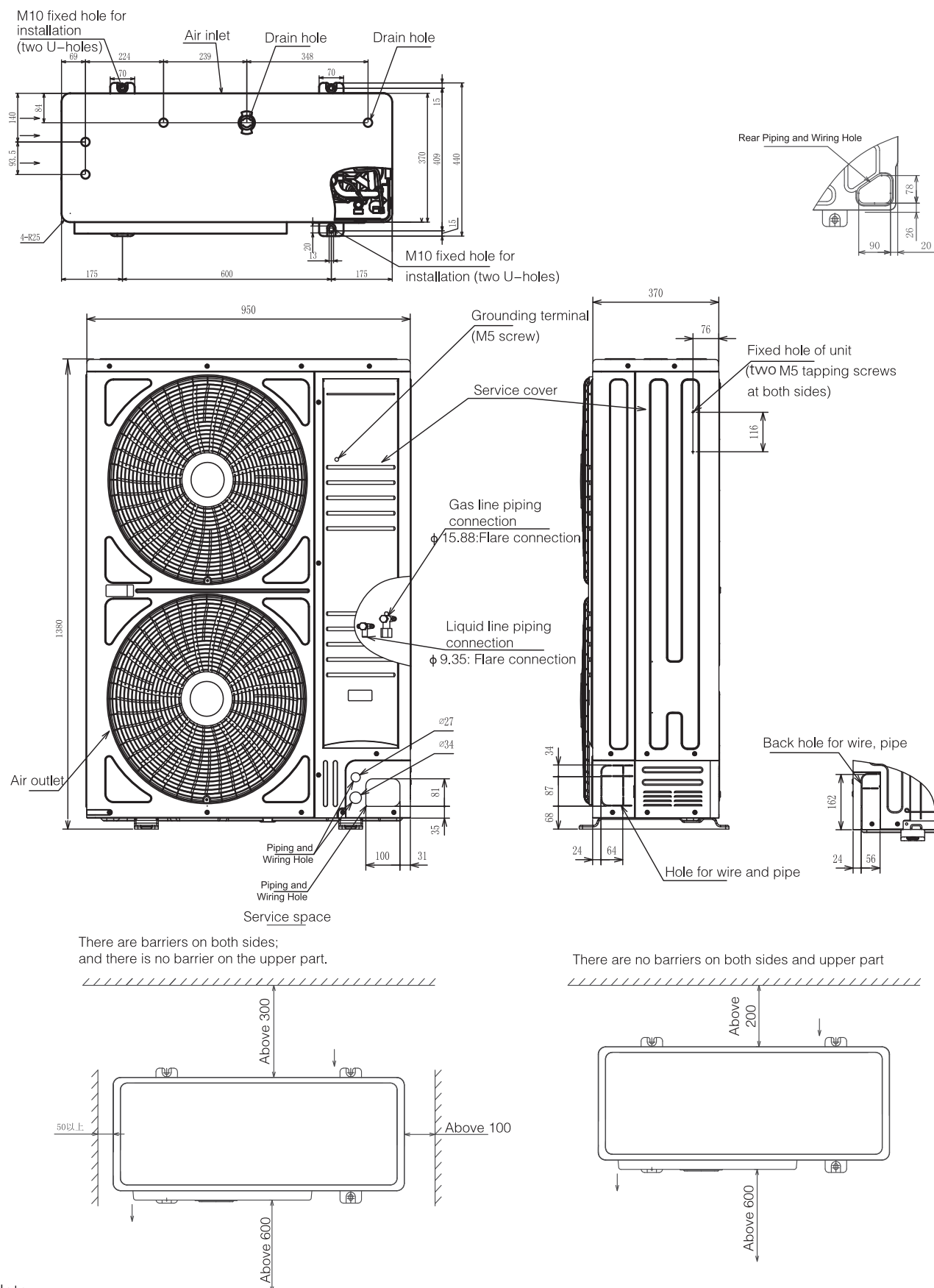
- 1) Select a place with high intensity and good stability to perform infrastructure construction; be sure it is secure and strong.
- 2) The unit air outlet had better not face strong wind.
- 3) If air outlet faces strong wind, please apply optional component to prevent wind.

Note:

1. The outdoor unit refrigerant has been charged at the factory; for field refrigerant pipe charge, see "Additional Refrigerant Charge".
2. The unit is equipped with stop valve; field refrigerant pipes are connected to stop valve through flare opening.
3. Illustrated 110 dimension marked with ** is to avoid possible conflict with the foundation, etc. in piping from the bottom.
4. Dimension marked with * is the location dimension of anchor holes.

Model: AWW-38HJFH, AWW-48HJFH, AWW-54HJFH, AWW-48HKFH, AWW-54HKFH

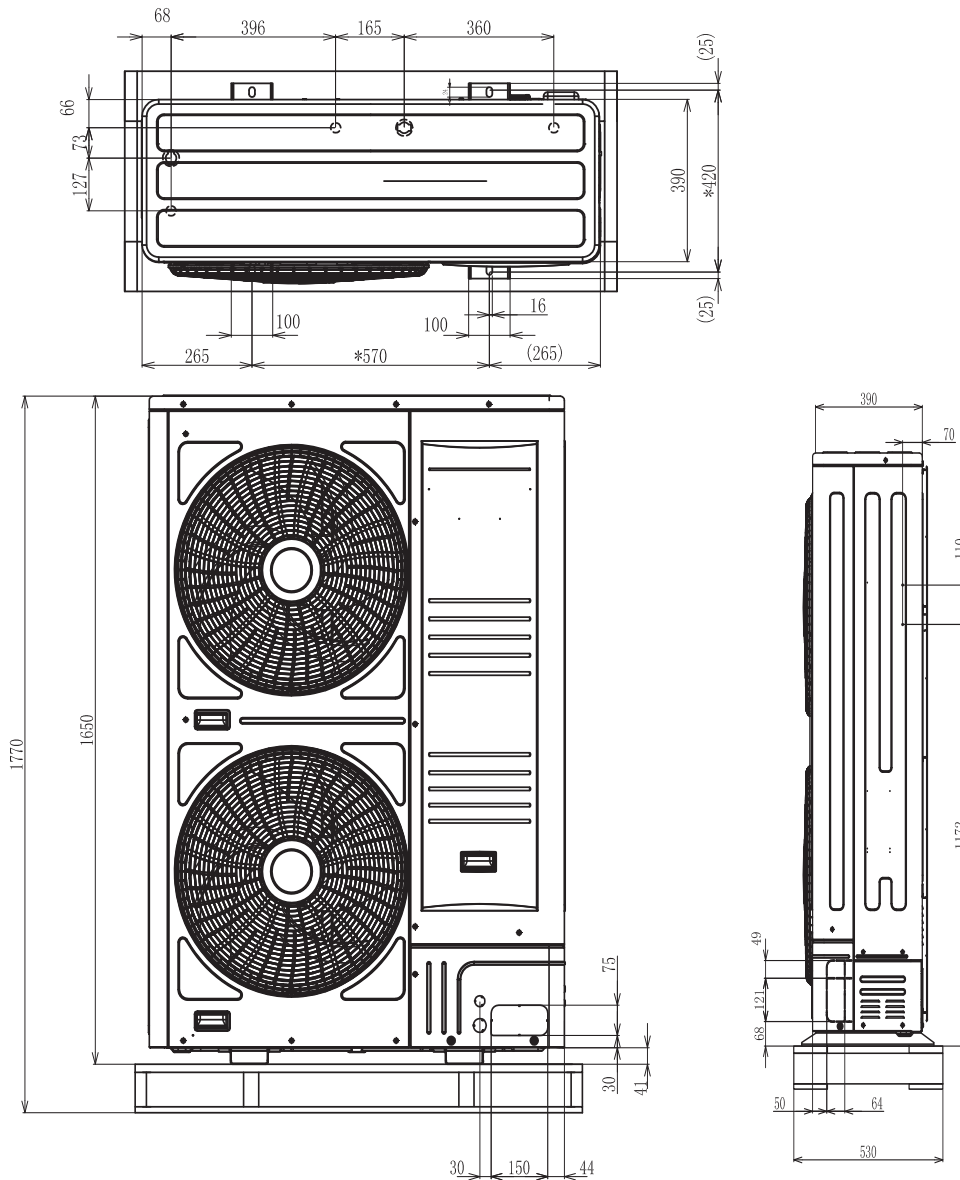
Unit: mm



Note:

1. Stop valve is installed in the hood.
2. The interval dimension between fixed bolts for installation is 600x410.

AVW-76HKFH,AVW-96HKFH,AVW-114HKFH,AVW-76H9FH,AVW-96H9FH,AVW-114H9FH



Unit: mm

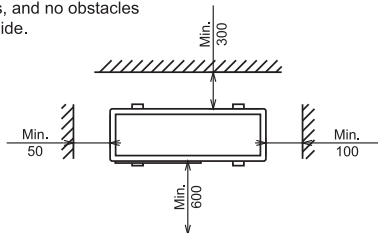
Drain Water

Drain water is caused during heating or defrosting operation.

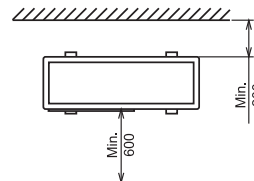
- 1) Choose a place where well drainage is available.
 - 2) Do not provide an upward slope from the unit to avoid reverse flow of the drain.
- Provide a second drainpan under the outdoor unit to correct drain water securely.

Service Space

In case of obstacles on both sides, and no obstacles of upper side.



In case of no obstacles on both sides, and upper side.



NOTES:

1. Although refrigerant has been charged into this unit additional refrigerant charge is required according to piping length.
2. There are stop valves in the cabinet.
3. In the case that dimension of 170 marked with is provided, it is possible to perform piping work from the bottom without interference such as foundation, etc.
4. The dimension marked with * indicates the mounting pitch dimension for anchor bolts.
5. If the piping length is over 70 meters, the liquid pipe diameter should be $\phi 12.7$ instead of $\phi 9.53$. (AVW-76H9FH Only)

4.Selection Data

4.1 Operation Space

Install the outdoor unit with a sufficient space around the outdoor unit for operation and maintenance as shown below.

AVW-28/34/43HJFH,AVW-43HKFH

Obstacles in Above

When obstacles is in above, it is should be ensured that the distance between the top of units and obstacles is more than 500mm, besides the space for installation and maintenance is satisfied.

(mm)

Single Installation	Single Installation	Multiple Installation
Upper Side is Open Keep a distance of 100mm between service cover and wall. The dimension in "()" is for the model of 34 and 43.	Above of two sides of the unit is open. (Occasion of obstacles in the obverse side of the units) The dimension in "()" is for the model of 34 and 43.	Upper Side is Open Keep a distance of more than 100mm between other units. The dimension in "()" is for the model of 34 and 43.

AVW-38/48/54HJFH,AVW-48/54HKFH

(mm)

Single Installation	Single Installation	Multiple Installation
Upper Side is Open Keep a distance of 100mm between right side at least	Left,Right&Upper Side is Open	Multiple Installation Keep a distance of 100mm between right side at least

AVW-76/96/114HKFH,AVW-76/96/114H9FH

Install the outdoor unit with a sufficient space around the outdoor unit for operation and maintenance as shown below.

(1) Obstacles on Inlet Side

(a) Upper Side is Open.

(mm)

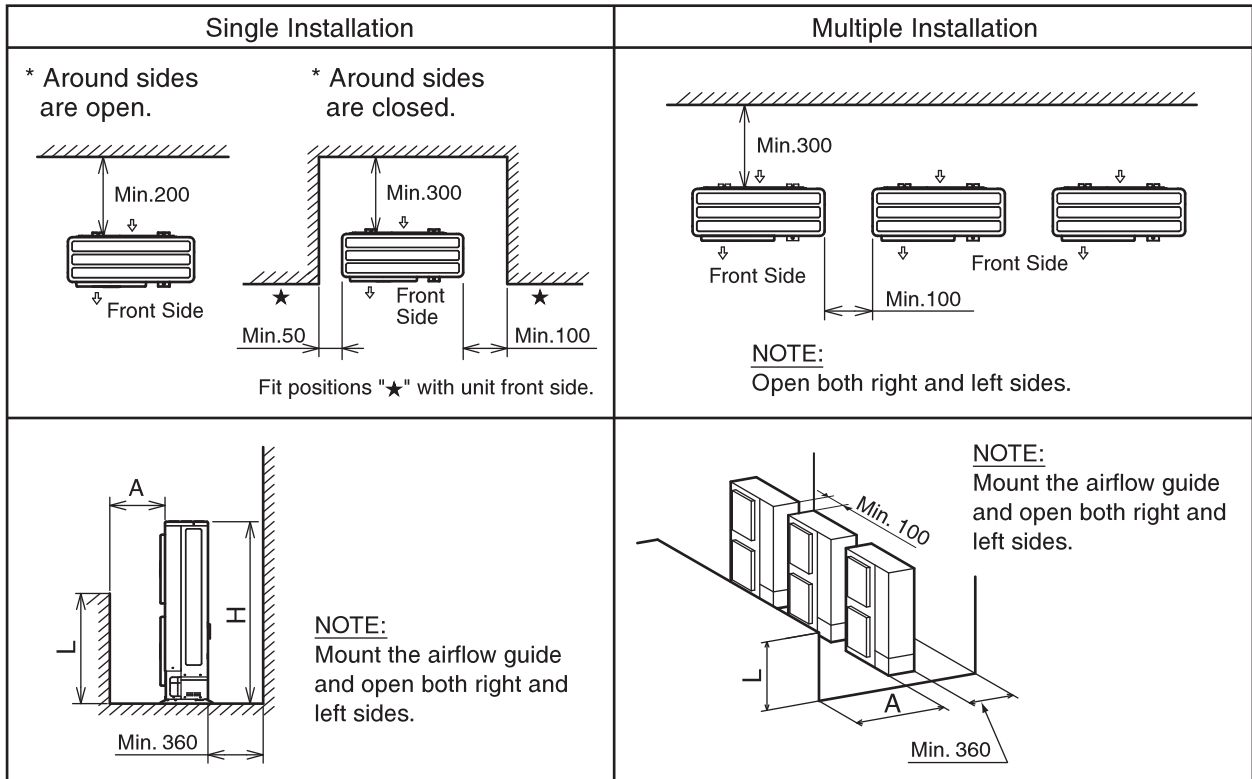


Fig. 4.1 Installation Space (1)

(b) Obstacles in Above

(mm)

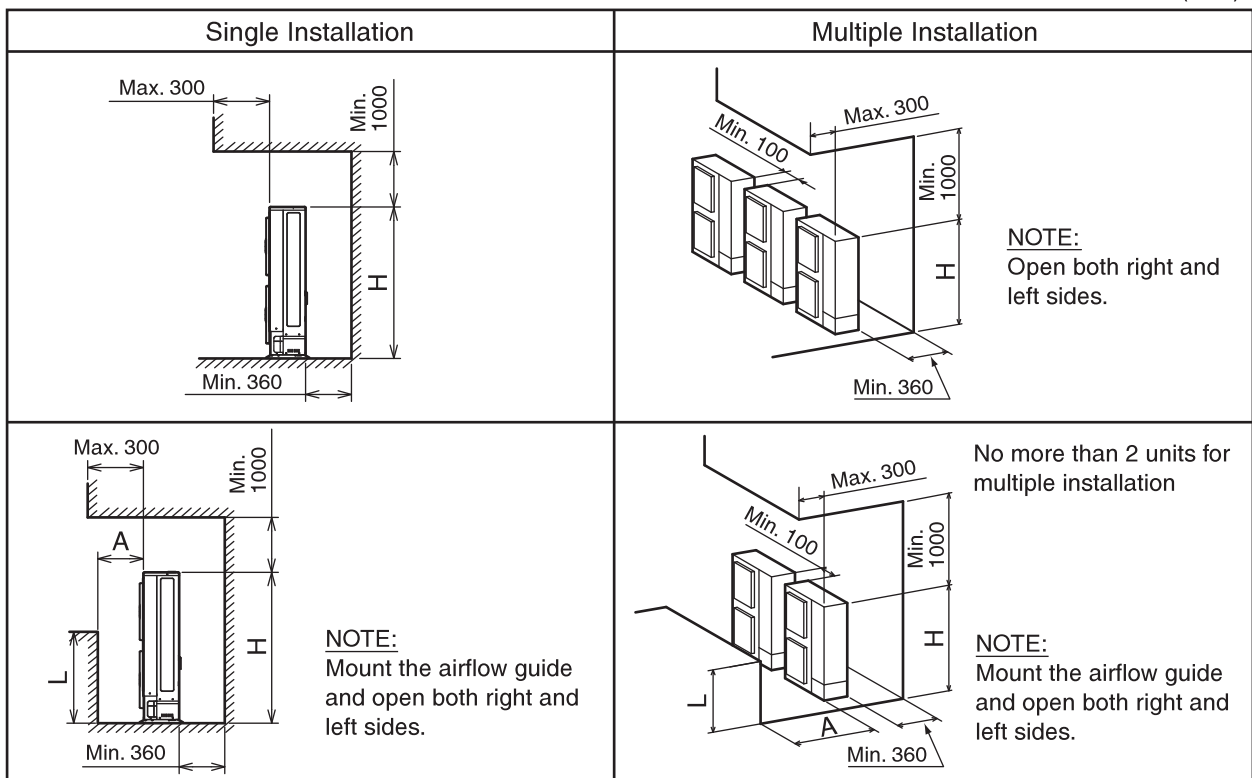


Fig. 4.2 Installation Space(2)

(2) Obstacles on Discharge Side

(a) Upper Side is Open.

(mm)

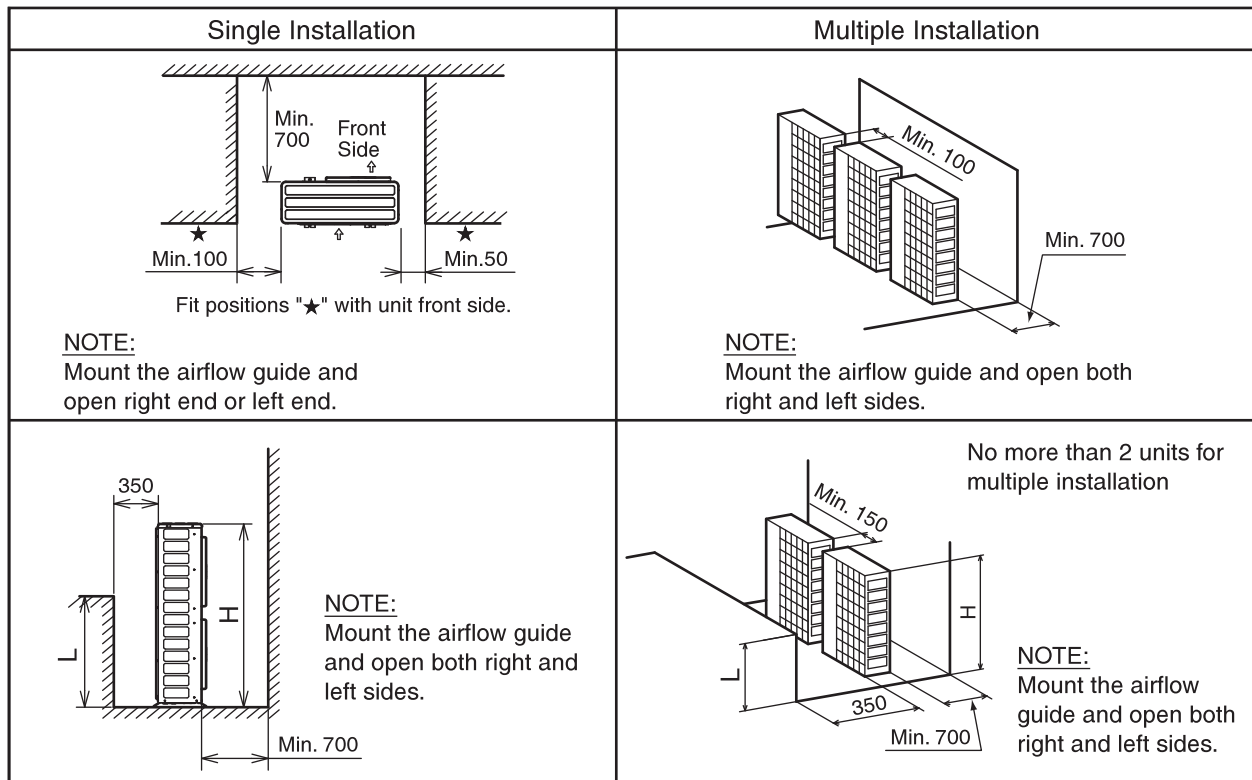
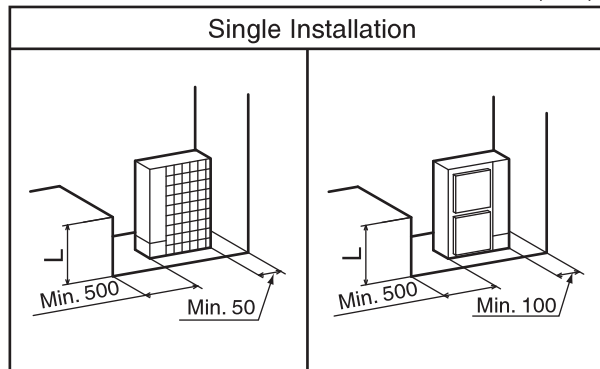


Fig. 4.3 Installation Space (3)

(3) Obstacles in Right and Left

(a) Upper Side is Open.

(mm)



(b) Obstacles in Above

(mm)

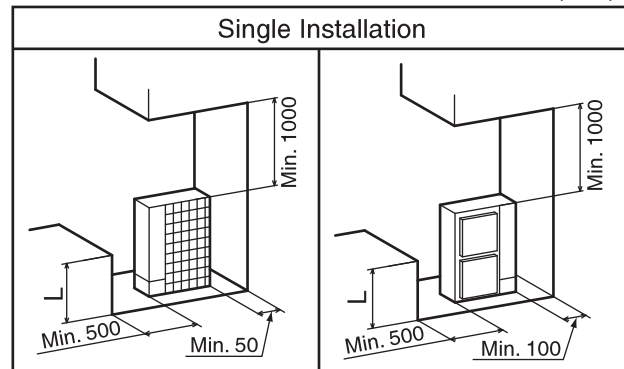


Fig. 4.4 Installation Space (4)

NOTE

If L is larger than H, mount the units on a base so that H is greater or equal to L.

H: Unit Height (1650mm) + Base Concrete Height

L	A
$0 < L \leq 1/2H$	600 or more
$1/2H < L \leq H$	1400 or more

In this situation ensure that the base is closed and does not allow the airflow to short circuit. In each case, install the outdoor unit so that the discharge flow is not short-circuited.

(4) Multi-Row and Multiple Installations

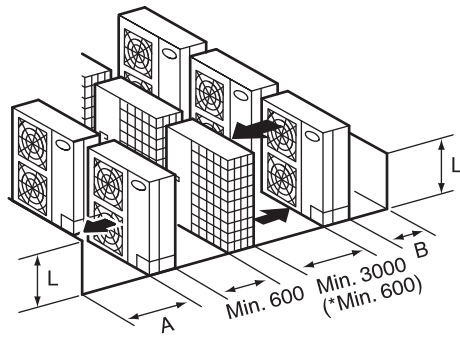


Fig. 4.5 Installation Space (5)

Keep a distance of more than 15mm between other units and do not put obstacles on the right and left sides. Dimension B is as shown below.

L	A	B
$0 < L \leq 1/2H$	600 or more	300 or more
$1/2H < L \leq H$	1400 or more	350 or more

NOTE:

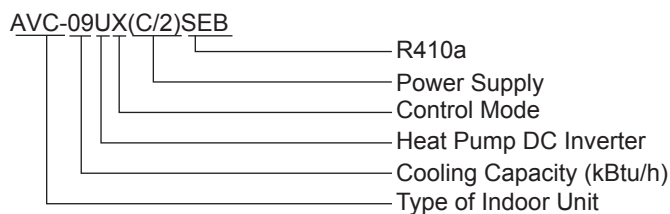
If L is larger than H, mount the units on a base so that H is greater or equal to L.

In this situation ensure that the base is closed and does not allow the airflow to short circuit.

When the mark * dimension is secured, be sure to mount the airflow guide.

4.2 Selection Guide

(1) Model Description



Indoor Unit Type

Ceiling Ducted Type (Low Static Pressure)	AVD
Ceiling Ducted Type (High Static Pressure)	AVD
Low-Height Ceiling Ducted Type	AVE
Low-Height Ceiling Ducted Type (DC)	AVE
Slim Ceiling Ducted Type	AVE
1-Way Cassette Type	AVY
2-Way Cassette Type	AVL
4-Way Cassette Type	AVC
mini 4-Way Cassette Type	AVC
Wall-Mounted Type	AVS
Ceiling and Floor Type	AVV
Floor-Concealed Type	AVH
Console Type	AVK

Note:

When selecting the indoor unit and outdoor unit, the total capacity of indoor units should match with that of outdoor unit.

(2) Indoor Unit Standard Capacity

Horsepower(HP) Capacity		0.5	0.8	1.0	1.3	1.5	1.8	2.0
Cooling Capacity	kW	1.5	2.2	2.8	3.6	4.3	5.0	5.6
	Btu/h	5,100	7,500	9,600	12,300	14,700	17,000	19,100
Heating Capacity	kW	2.0	2.5	3.3	4.2	4.9	5.6	6.5
	Btu/h	6,800	8,500	11,100	14,300	16,700	19,100	22,200

Horsepower(HP) Capacity		2.3	2.5	3.0	3.3	4.0	5.0	6.0
Cooling Capacity	kW	6.3	7.1	8.4	9.0	11.2	14.2	16.0
	Btu/h	21,500	24,200	28,700	31,700	38,000	48,400	54,600
Heating Capacity	kW	7.5	8.5	9.6	10.0	13.0	16.3	18.0
	Btu/h	25,600	29,000	32,800	34,100	44,400	55,500	61,400

(3) Standard Capacity of Outdoor Unit:

Model		AVW-28HJFH	AVW-34HJFH	AVW-38HJFH	AVW-43HJFH	AVW-48HJFH	AVW-54HJFH
Power Supply		220-240V ~ 50/60Hz					
Cooling Capacity	kW	8.0	10.0	11.2	12.5	14.0	15.5
	Btu/h	27,300	34,100	38,200	42,700	47,800	52,900
Heating Capacity	kW	9.5	11.2	12.5	14.0	16.0	18.0
	Btu/h	32,400	38,200	42,700	47,800	54,600	61,400

Model		AVW-43HKFH	AVW-48HKFH	AVW-54HKFH	AVW-76HKFH	AVW-96HKFH	AVW-114HKFH
Power Supply		380-415V 3N~ 50/60Hz					
Cooling Capacity	kW	12.5	14.0	15.5	22.4	28.0	33.5
	Btu/h	42,700	47,800	52,900	76,500	95,600	114,300
Heating Capacity	kW	14.0	16.0	18.0	25.0	31.5	37.5
	Btu/h	47,800.0	54,600.0	61,400.0	85,300.0	107,500.0	128,000.0

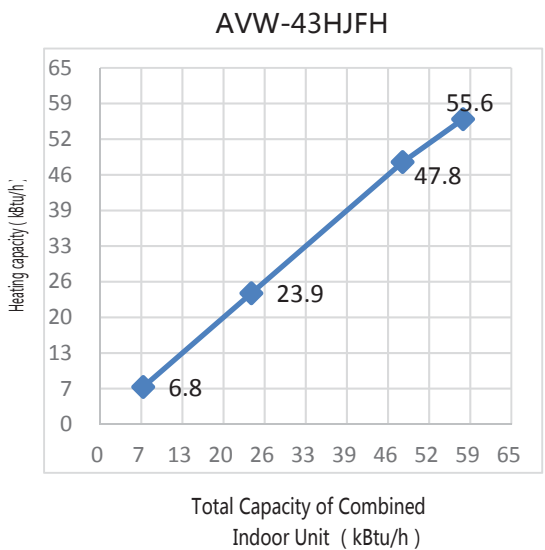
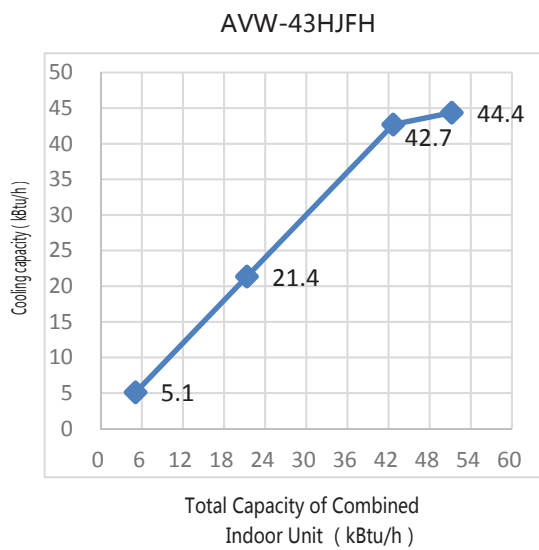
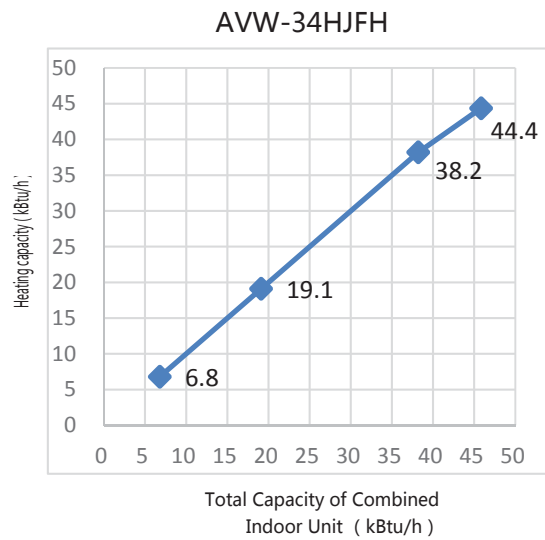
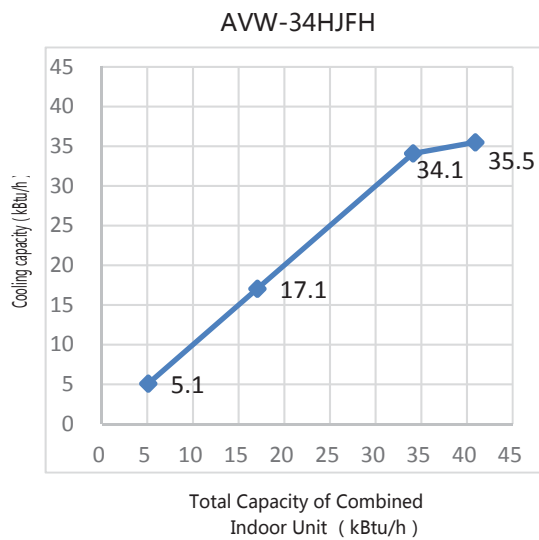
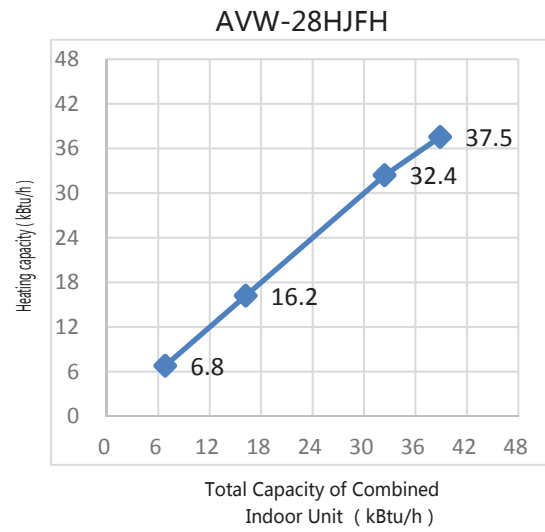
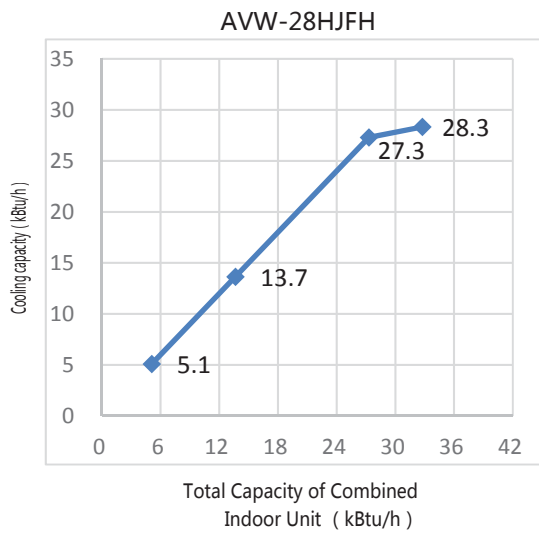
Model		AVW-76H9FH	AVW-96H9FH	AVW-114H9FH
Power Supply		220V 3~ 60Hz		
Cooling Capacity	kW	22.4	28.0	33.5
	Btu/h	76,500	95,600	114,300
Heating Capacity	kW	25.0	31.5	37.5
	Btu/h	85,300	107,500	128,000

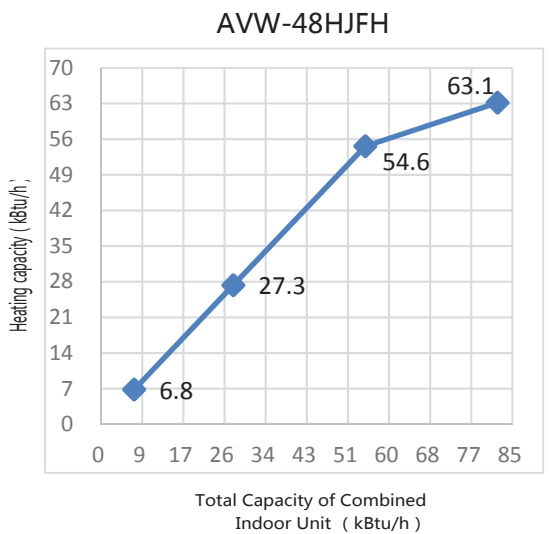
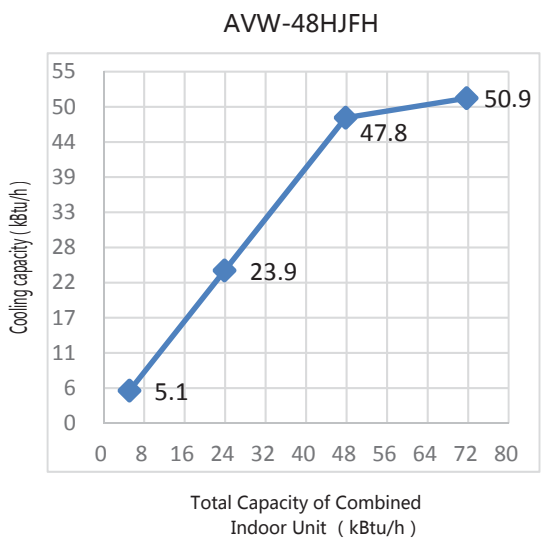
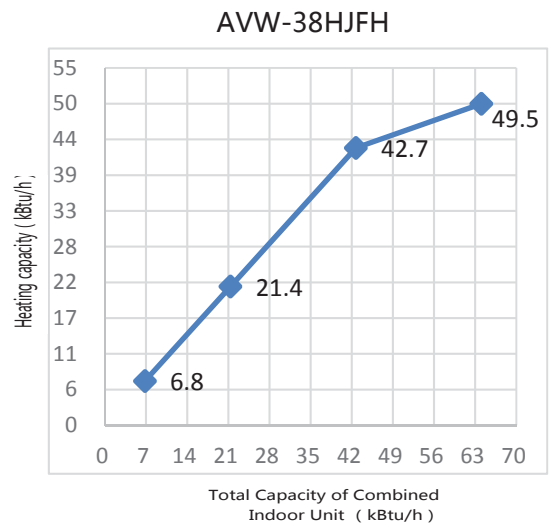
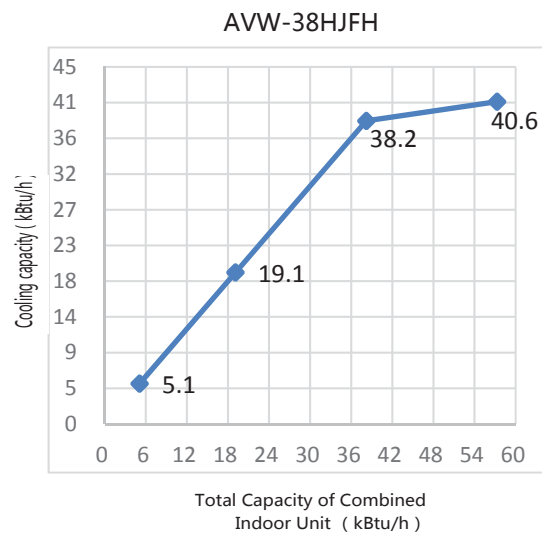
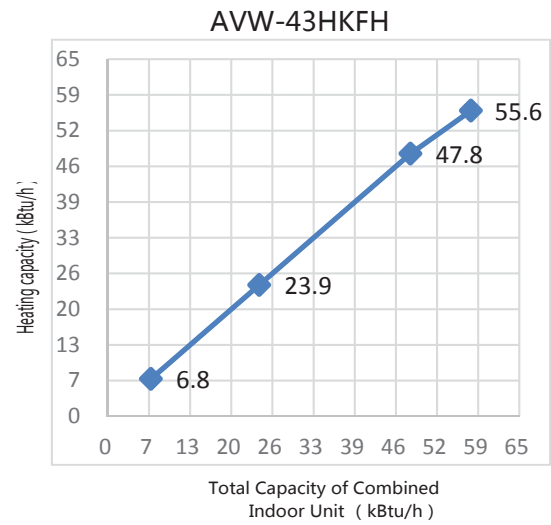
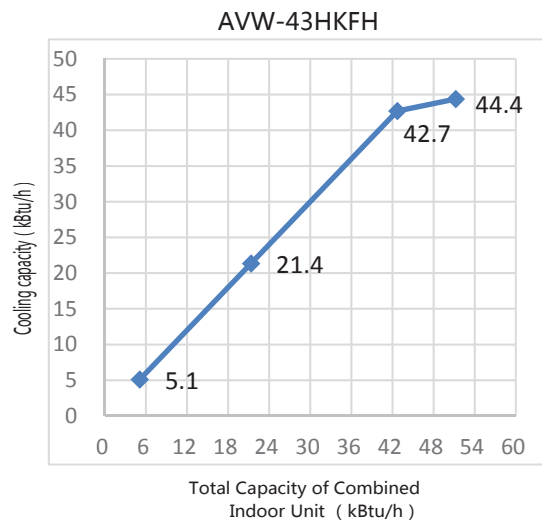
(4) The standard capacity of outdoor unit is referred as the total capacity of all indoor units equals to that of outdoor unit (Combination rate is 100%). Please refer to the parameter shown in 4.3 "Capacity Performance Curve of Outdoor Unit", if the total capacity of all indoor units does not equal to that of outdoor unit.

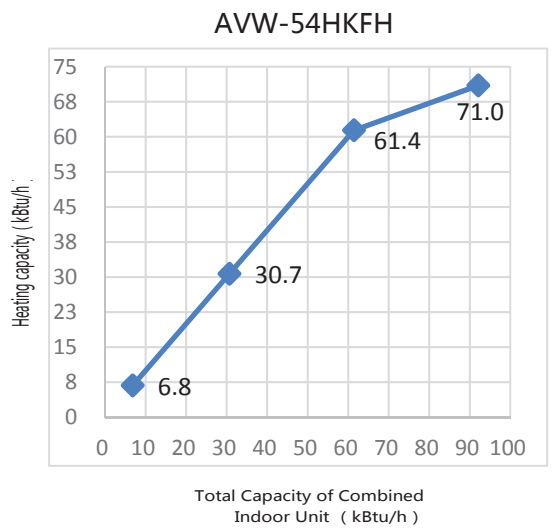
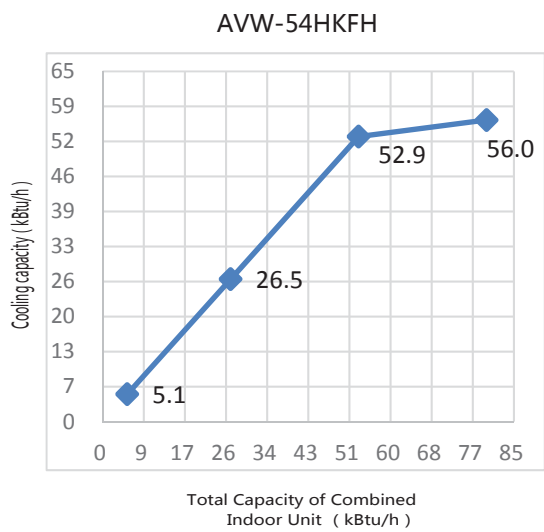
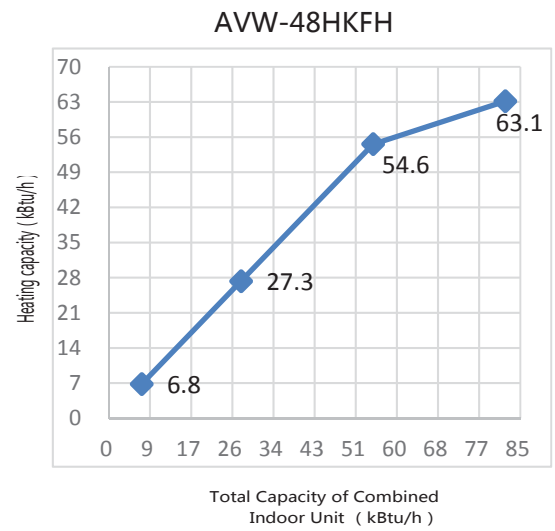
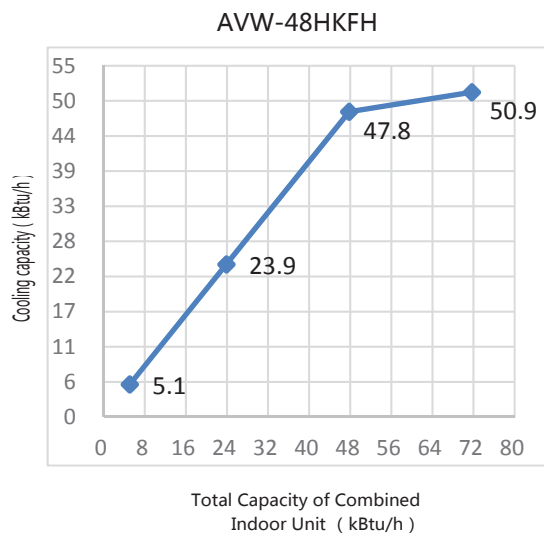
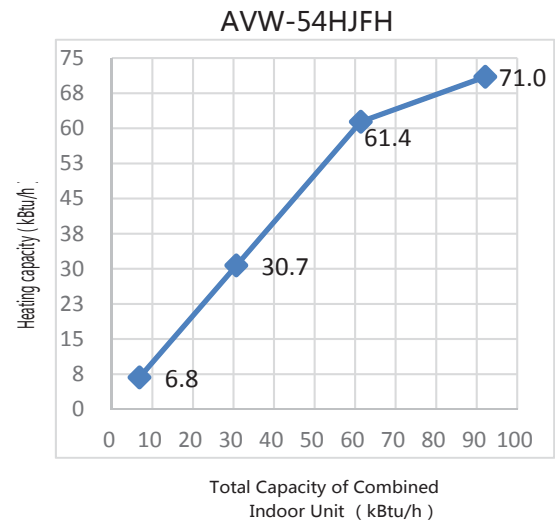
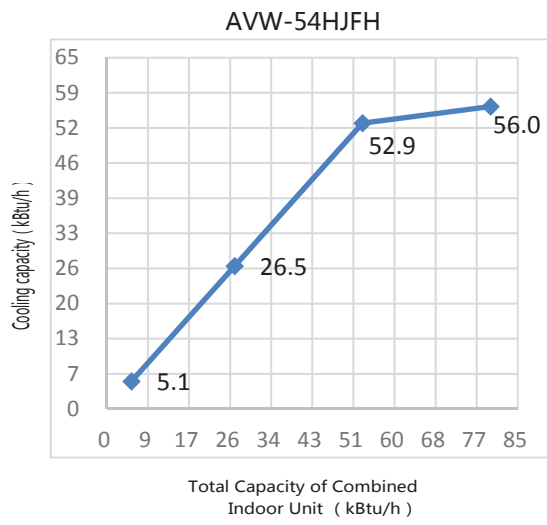
(5) Maximum actual capacity of outdoor unit

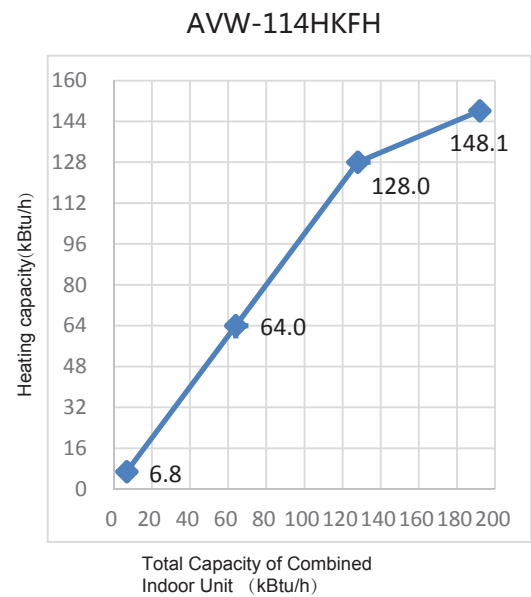
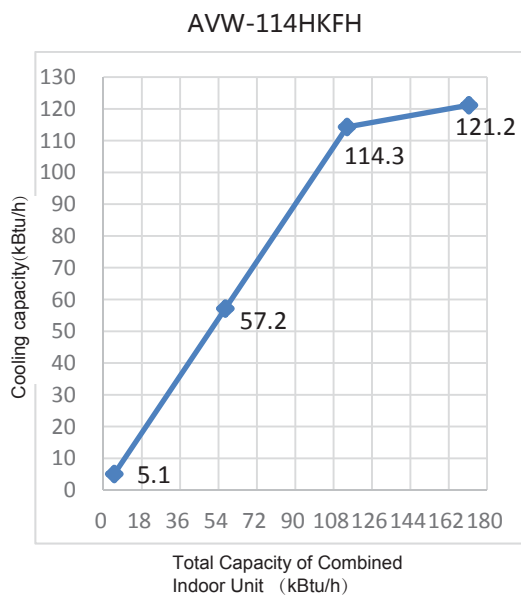
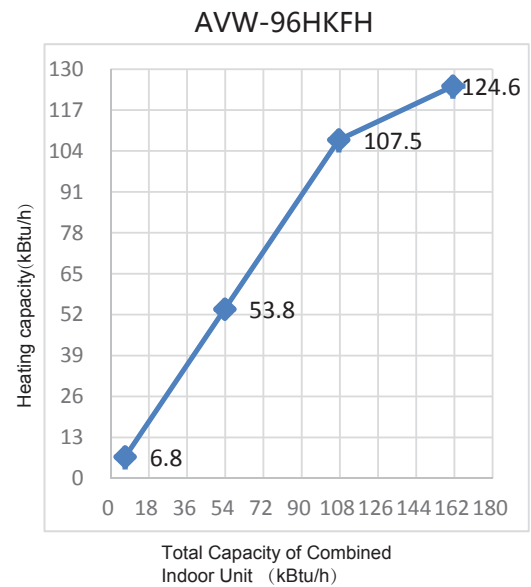
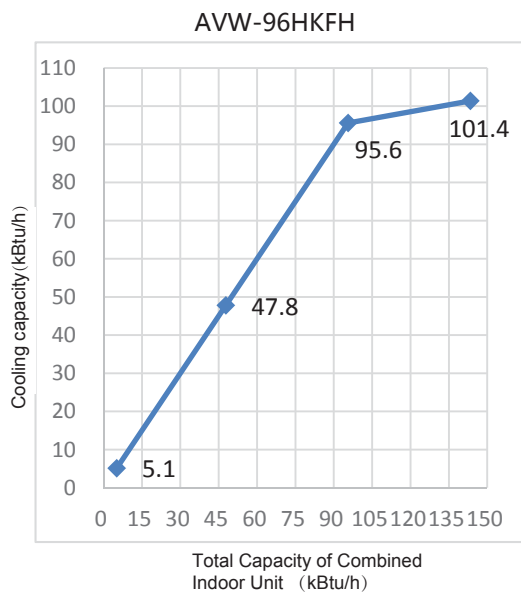
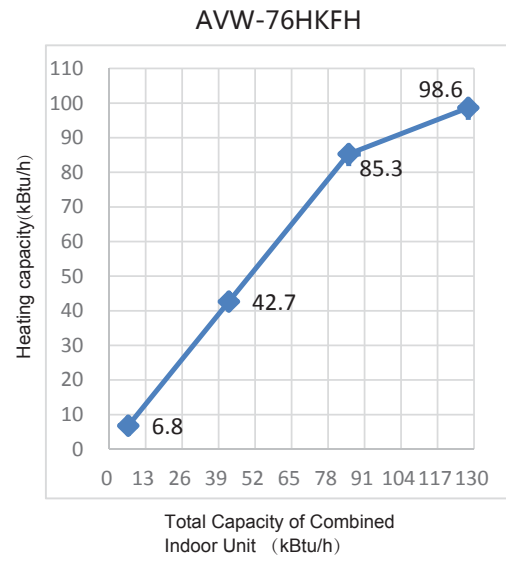
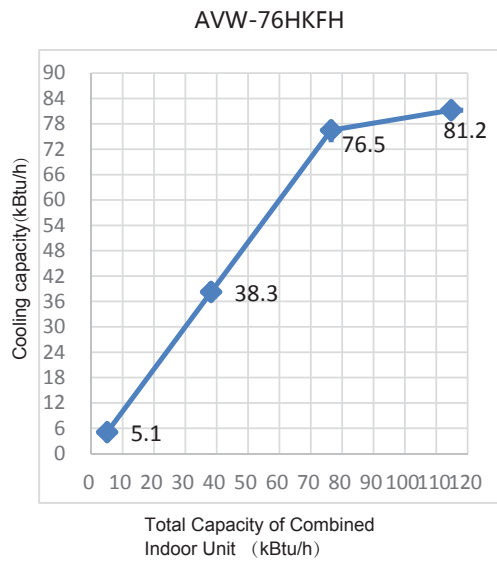
Maximum actual capacity of outdoor unit = (capacity of outdoor unit under nominal working condition X correction factor of capacity of all indoor units X pipe length and height difference correction factor X working temperature correction factor).

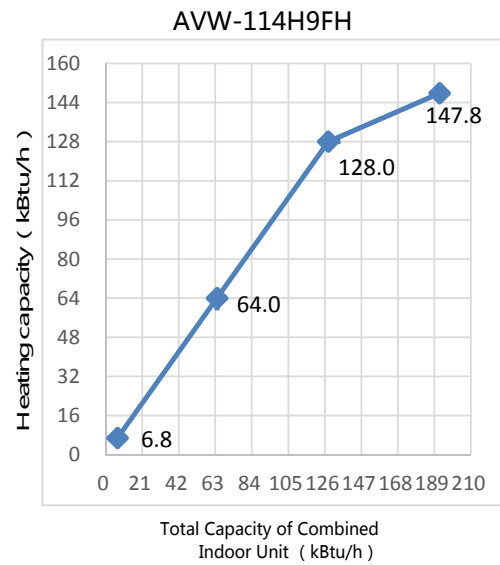
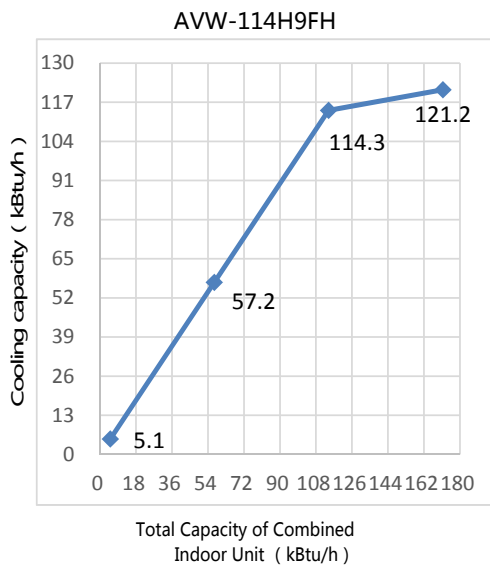
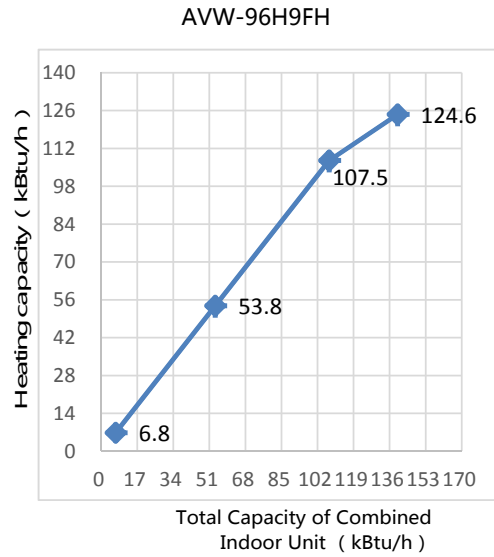
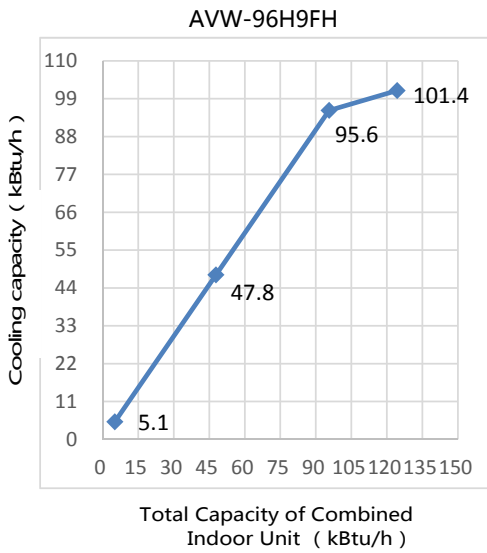
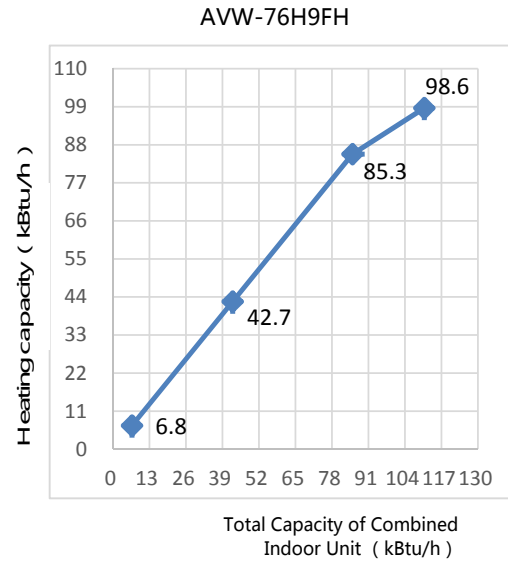
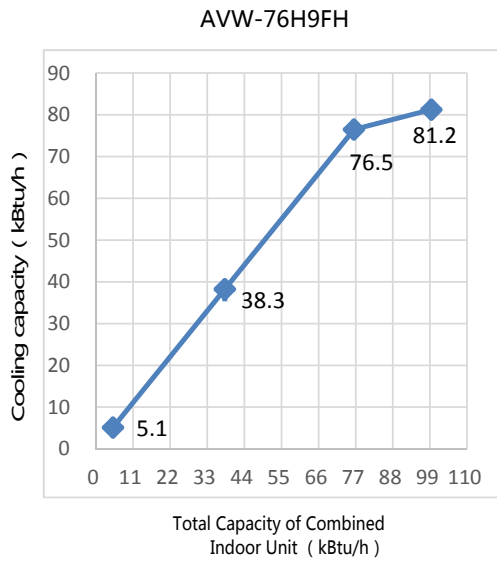
4.3 Capacity Performance Curve of Outdoor Unit











4.4 Piping Length Correction Factor

Correction factor of cooling capacity of unit and corresponding pipe length

The cooling capacity can be corrected according to the following formula:

$$CCA = CC \times F$$

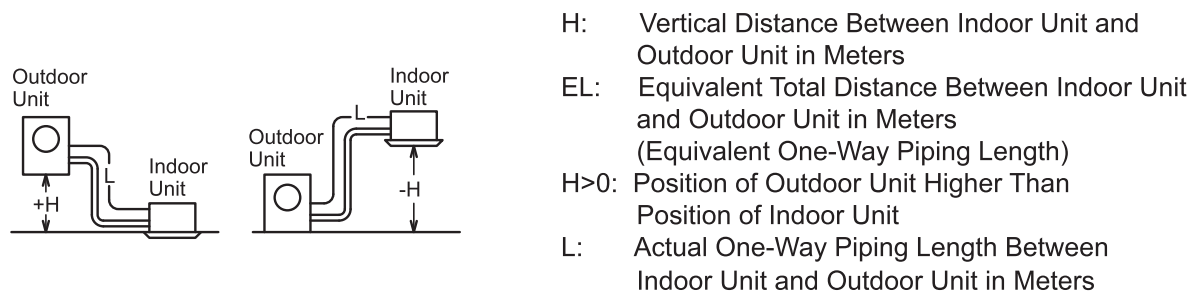
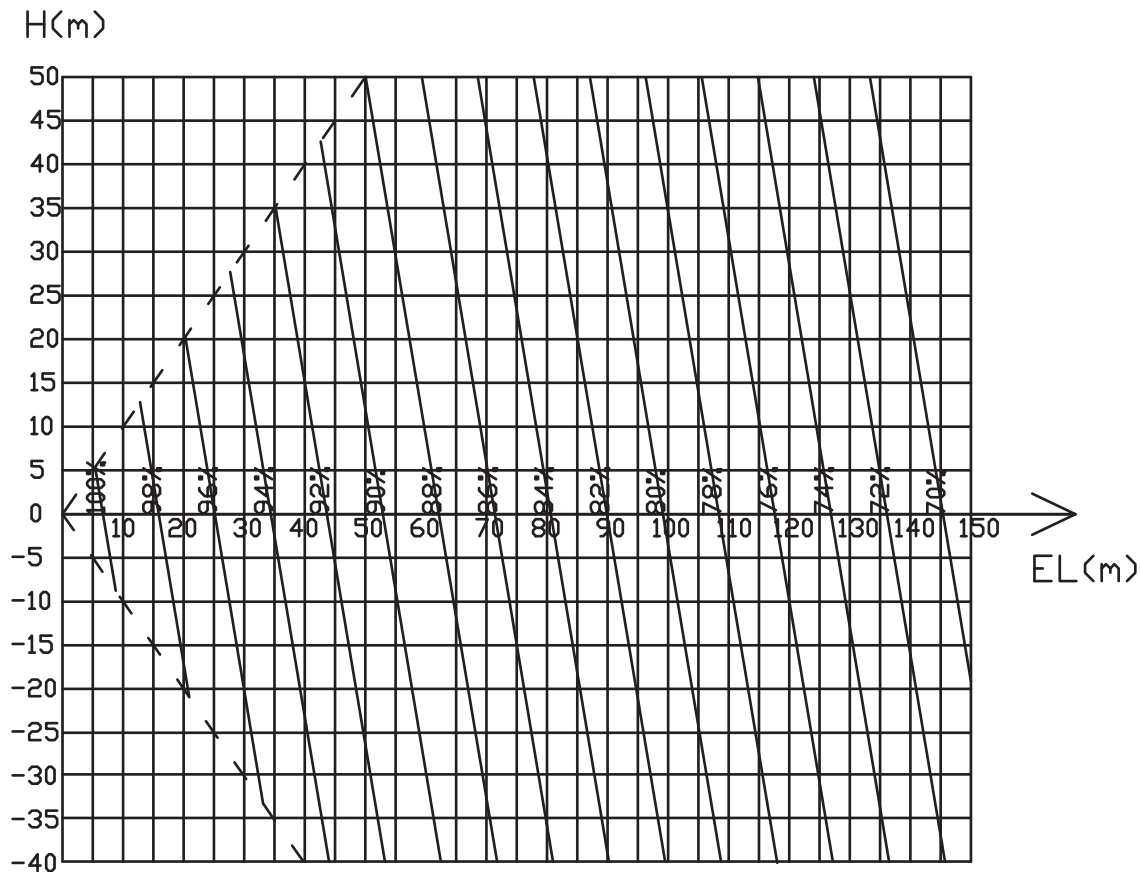
CCA: Actual cooling capacity after correction (kW)

CC: Cooling capacity in the system capacity characteristic table (kW)

F: The correction factor can be found in the following curve based on the equivalent pipe length

For other pipeline accessories, it can be considered based on the equivalent pipeline length:

- One 90° elbow is equivalent to 0.5m;
- One 180° bend is equivalent to 1.5m;
- One multi-kit is equivalent to 0.5m;



* H and EL please refer to <Installation Part>
5.2.Refrigerant Piping Work

Correction factor of heating capacity of unit and corresponding pipe length

The heating capacity can be corrected according to the following formula:

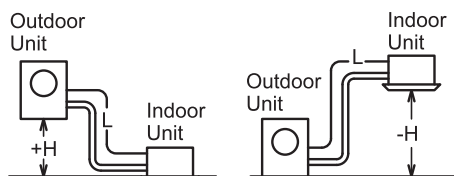
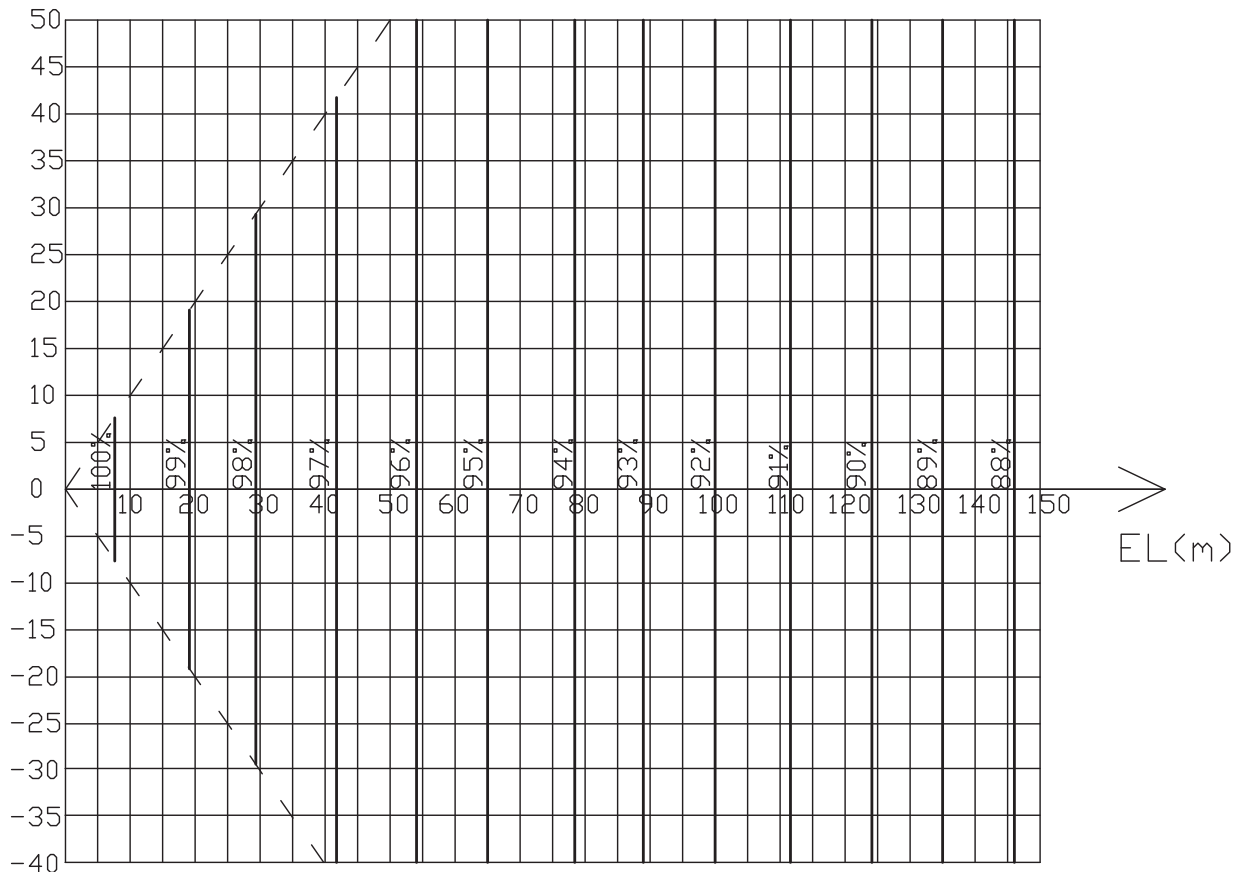
$$HCA = HC \times F$$

HCA: Actual heating capacity after correction (kW)

HC: Heating capacity in the system capacity characteristic table (kW)

F: The correction factor can be found in the following curve based on the equivalent pipe length

H(m)



- H: Vertical Distance Between Indoor Unit and Outdoor Unit in Meters
- EL: Equivalent Total Distance Between Indoor Unit and Outdoor Unit in Meters (Equivalent One-Way Piping Length)
- H>0: Position of Outdoor Unit Higher Than Position of Indoor Unit
- L: Actual One-Way Piping Length Between Indoor Unit and Outdoor Unit in Meters

* H and EL please refer to <Installation Part>
5.2.Refrigerant Piping Work

4.5 Defrosting Correction Factor

The frosting situation of unit or defrosting operation process is not considered in the heating capacity of unit shown in the above table.

Considering the frosting situation and defrosting operation process, the heating capacity of unit can be corrected based on the following formula.

Correction value of heating capacity = Correction factor X heating capacity

Outdoor dry bulb temperature (°CDB) (relative humidity is 85% RH)	-7	-5	-3	0	3	5	7
Correction Factor	0.95	0.93	0.88	0.85	0.87	0.90	1.0

Note: The correction factor is not available for the operation of unit under special situation, such as in snow weather or in the conversion process for operation mode.

5. Electrical Data

Model(kBtu/h)	Power Supply	MCA	Power Supply Line (Φ mm ²)	Transmission Supply Line (Φ mm ²)	MOP	ELB	
						Rated Current (A)	Current Sensitivity (mA)
AVW-28HJFH	220-240V~50/60Hz	19.5	4.0	0.75	40	25	30
AVW-34HJFH	220-240V~50/60Hz	27.5	6.0	0.75	40	32	30
AVW-43HJFH	220-240V~50/60Hz	31.5	6.0	0.75	50	40	30
AVW-38HJFH	220-240V~50/60Hz	28	6.0	0.75	50	40	30
AVW-48HJFH	220-240V~50/60Hz	28	6.0	0.75	50	40	30
AVW-54HJFH	220-240V~50/60Hz	28	6.0	0.75	50	40	30
AVW-76H9FH	220V 3 ~60Hz	22	4.0	0.75	63	30	30
AVW-96H9FH	220V 3 ~60Hz	29	6.0	0.75	63	40	30
AVW-114H9FH	220V 3 ~60Hz	37	10.0	0.75	63	50	100
AVW-43HKFH	380-415V 3N~50/60Hz	16.2	4.0	0.75	25	25	30
AVW-48HKFH	380-415V 3N~50/60Hz	16.2	4.0	0.75	25	25	30
AVW-54HKFH	380-415V 3N~50/60Hz	16.2	4.0	0.75	25	25	30
AVW-76HKFH	380-415V 3N~50/60Hz	20.5	6.0	0.75	40	32	30
AVW-96HKFH	380-415V 3N~50/60Hz	26	6.0	0.75	40	32	30
AVW-114HKFH	380-415V 3N~50/60Hz	26	6.0	0.75	40	32	30

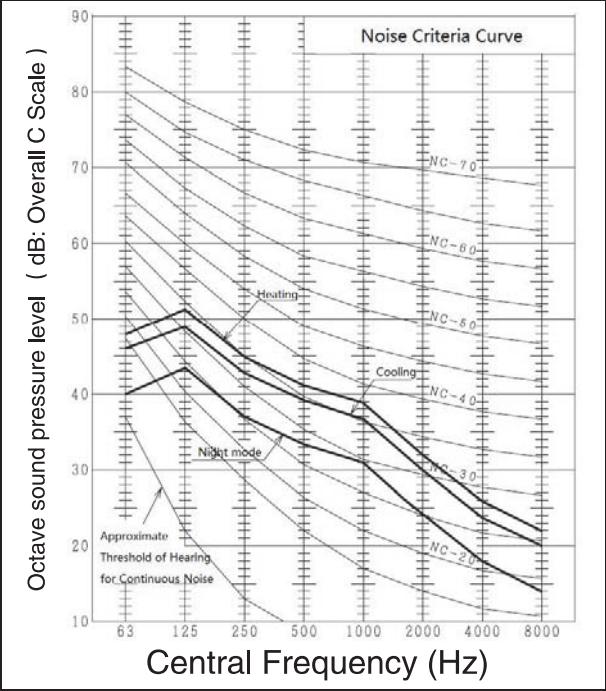
Notes:

1. Please select the models of power Supply line、Transmission Supply Line、ELB and Fuse by referring to the above table.
2. The Cascade connection from the main module is not allowed for power line of combination module.

6. Sound Data

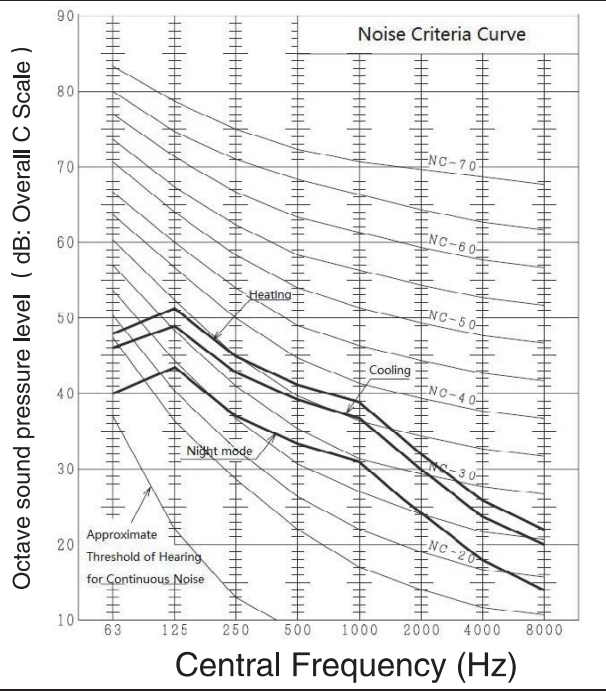
Model: AVW-28HJFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



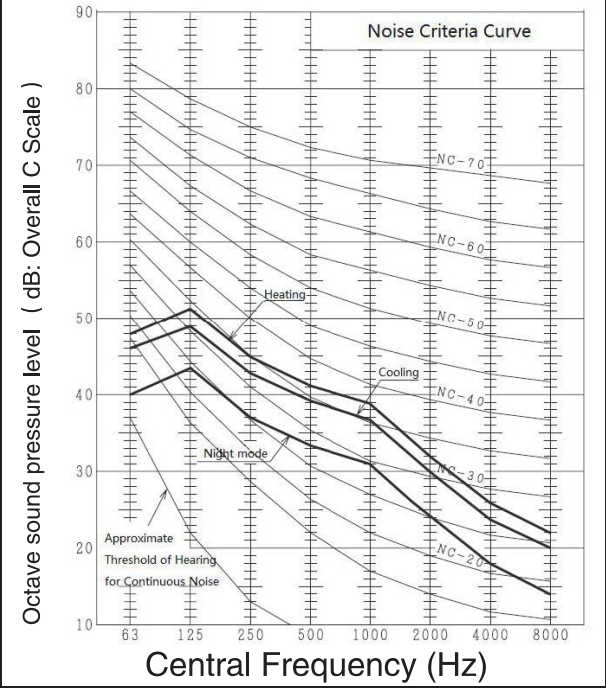
Model: AVW-34HJFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



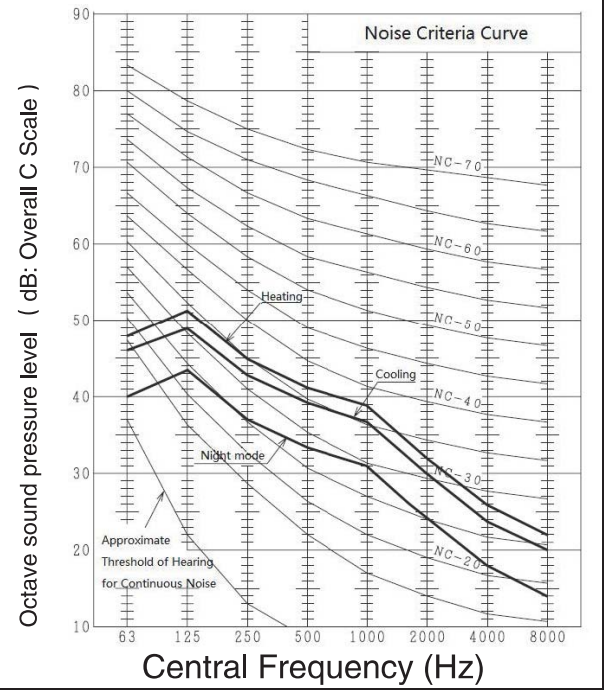
Model: AVW-43HJFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



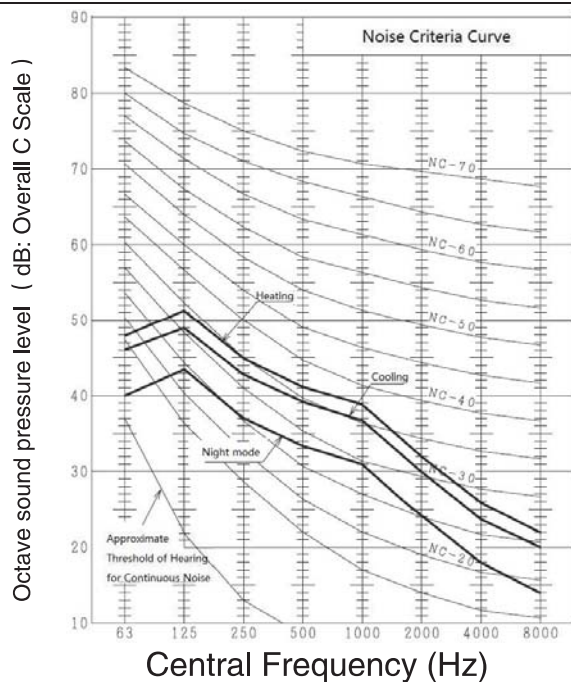
Model: AVW-43HKFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



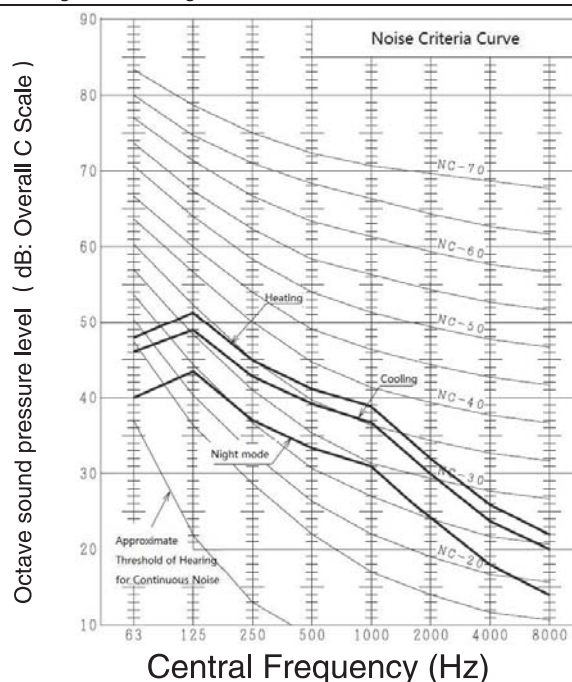
Model: AVW-38HJFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



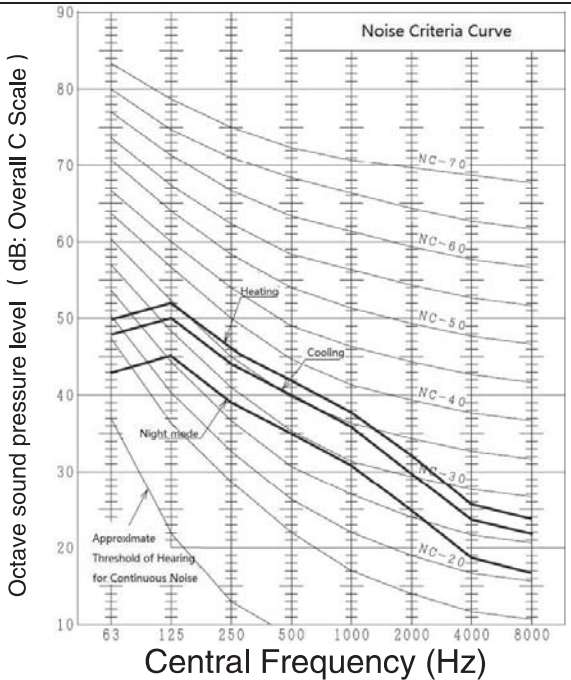
Model: AVW-48HJFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



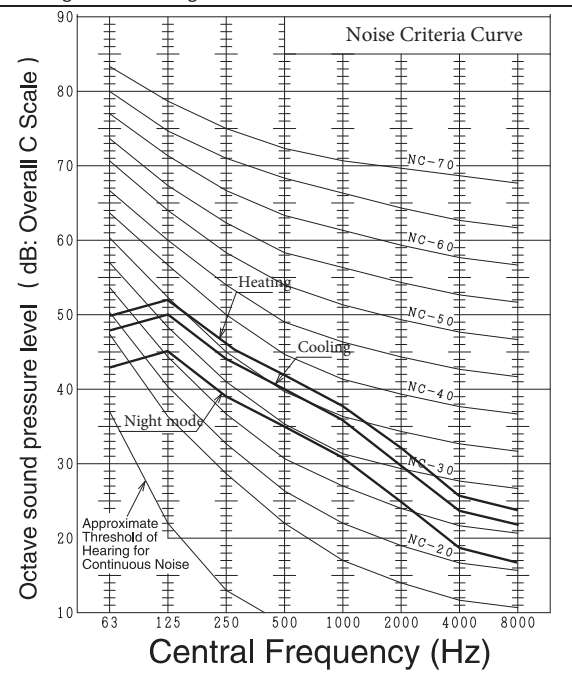
Model: AVW-54HJFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



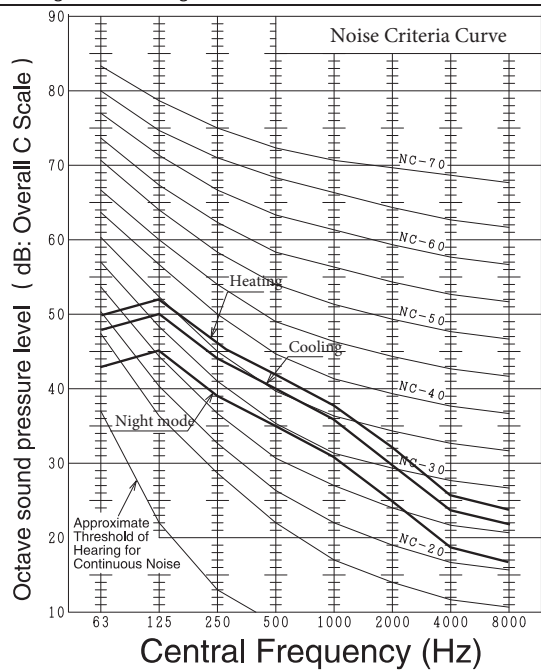
Model: AVW-48HKFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



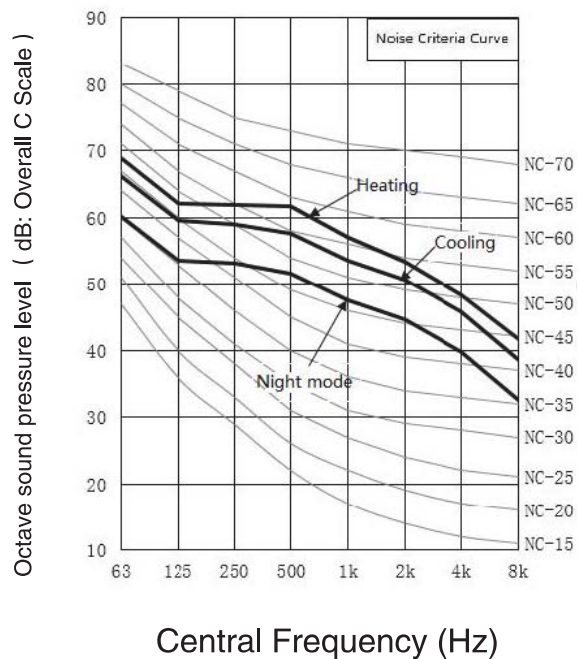
Model: AVW-54HKFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



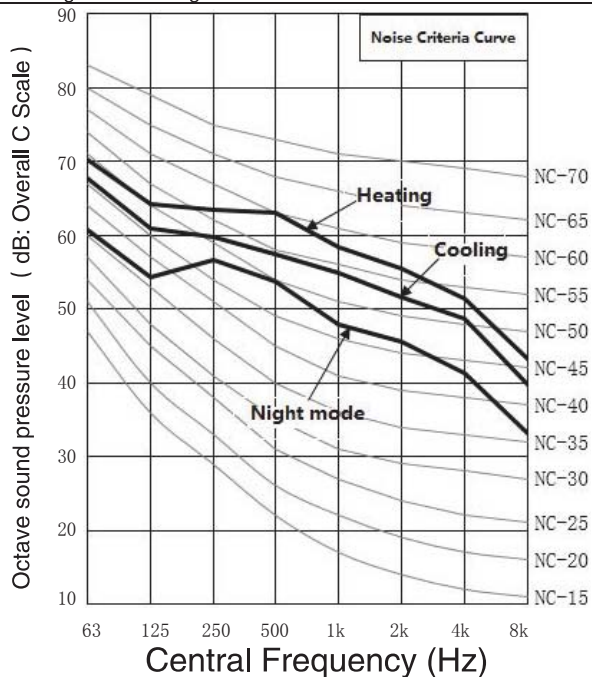
Model: AVW-76HKFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



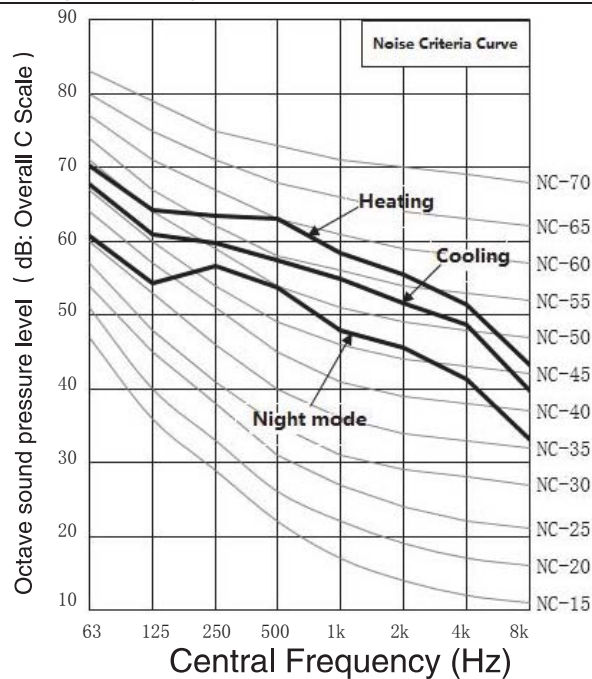
Model: AVW-96HKFH

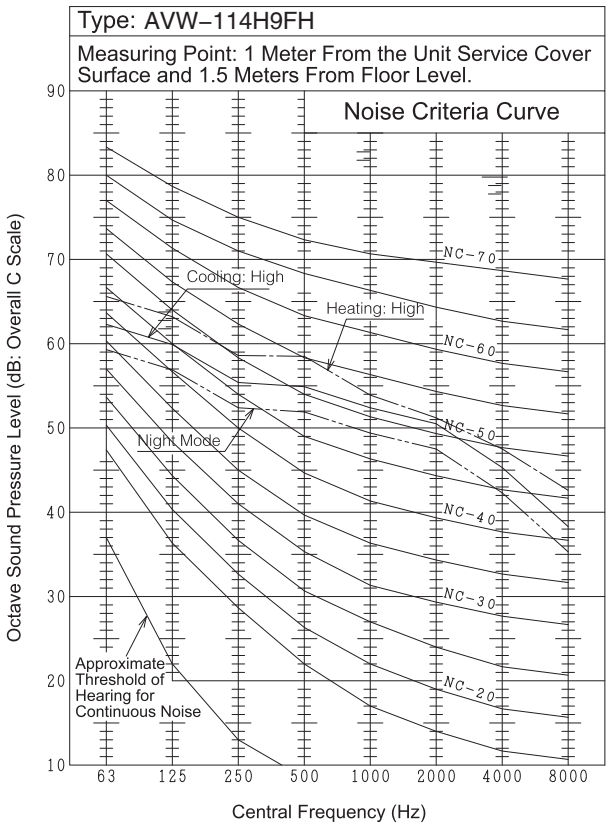
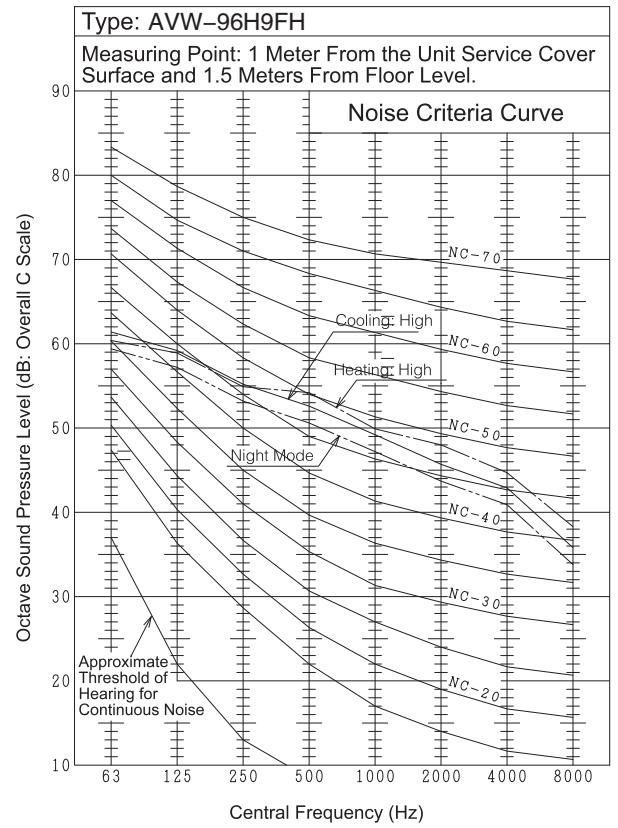
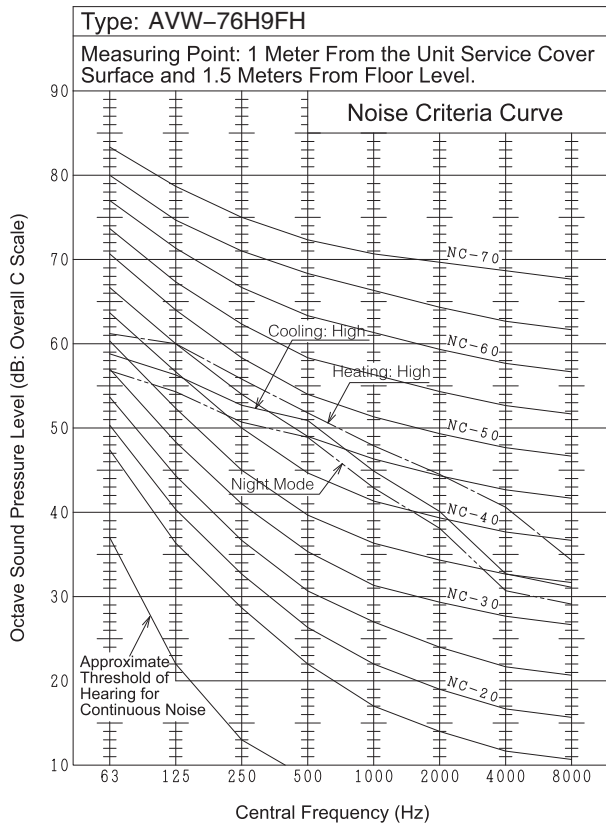
Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground



Model: AVW-114HKFH

Measuring point: 1 m distancing from the front panel of unit and 1.5m higher than the ground





7. Working Range

Power Supply

- Working Voltage: 90%~110% of the rated voltage;
- Voltage Imbalance: The voltage deviation of each phase measured at main power wire end should be within 3%.
- Starting Voltage: It should be higher than 85% of the rated voltage.

Temperature Range

Temperature range is shown in the following table:

Temperature		(°C)	
		Maximum	Minimum
Cooling Operation	Indoor	23 WB	15WB
	Outdoor	46 DB	-5 DB
Heating Operation	Indoor	30 DB	15 DB
	Outdoor	15 .5 WB	-20(-15)* WB

DB: Dry Bulb
WB: Wet Bulb

* -15°C Applicable to the following models only : AVW-28HJFH AVW-34HJFH AVW-43HJFH AVW-43HKFH.

8. Component Data

Heat exchanger and fan of outdoor unit

Model				AVW-28HJFH	AVW-34HJFH	AVW-43HJFH
Heat exchanger	Type of heat exchanger			Multi-Pass Cross-Finned Tube		
	Tube	Material	—	Copper tube		
		Outer diameter	Φ mm	7.0	7.0	7.0
		Quantity of rows	—	2	2.5	2.5
		Quantity of columns	—	38	57	57
	Fin	Material	—	Aluminum		
		Pitch	mm	1.9	1.9	1.9
	Maximum working pressure		MPa	4.15	4.15	4.15
	Total Face Area		m ²	0.77	0.77	0.77
	Quantity		—	1	1	1
Air delivery part	Fan	Type	—	Propeller Fan		
		Outer diameter	Φ mm	544	544	544
		Revolution	rpm	505	780	780
		Nominal air flow	m ³ /min.	49.5	69	78
	Fan motor	Type	—	DC Motor		
		Starting method	—	DC Driven		
		Nominal output power	W	51	138	138
		Quantity	—	1	1	1
		Insulation Class	—	E	E	E

Model				AVW-43HKFH	AVW-48HKFH	AVW-54HKFH
Heat exchanger	Type of heat exchanger			Multi-Pass Cross-Finned Tube		
	Tube	Material	—	Copper tube		
		Outer diameter	Φ mm	7.0	7.0	7.0
		Quantity of rows	—	2.6	2	2
		Quantity of columns	—	57	132	132
	Fin	Material	—	Aluminum		
		Pitch	mm	1.9	1.9	1.9
	Maximum working pressure		MPa	4.15	4.15	4.15
	Total Face Area		m ²	0.77	1.36	1.36
	Quantity		—	1	1	1
Air delivery part	Fan	Type	—	Propeller Fan		
		Outer diameter	Φ mm	544	544	544
		Revolution	rpm	780	600+516	600+516
		Nominal air flow	m ³ /min.	78	100	100
	Fan motor	Type	—	DC Motor		
		Starting method	—	DC Driven		
		Nominal output power	W	138	51+5	51+5
		Quantity	—	1	2	2
		Insulation Class	—	E	E	E

Model				AVW-76HKFH	AVW-96HKFH	AVW-114HKFH
Heat exchanger	Type of heat exchanger			Multi-Pass Cross-Finned Tube		
	Tube	Material	—	Copper tube		
		Outer diameter	Φ mm	7.0	7.0	7.0
		Quantity of rows	—	2	3	3
		Quantity of columns	—	80	120	120
	Fin	Material	—	Aluminum		
		Pitch	mm	1.4	1.4	1.4
	Maximum working pressure		MPa	4.15	4.15	4.15
	Total Face Area		m ²	1.86	1.86	1.86
	Quantity		—	2	2	2
Air delivery part	Fan	Type	—	Propeller Fan		
		Outer diameter	Φ mm	544	544	544
		Revolution	rpm	803+770	830+800	830+800
		Nominal air flow	m ³ /min.	150	163	163
	Fan motor	Type	—	DC Motor		
		Starting method	—	DC Driven		
		Nominal output power	W	138+138	138+138	138+138
		Quantity	—	2	2	2
		Insulation Class	—	E	E	E

Model				AVW-38HJFH	AVW-48HJFH	AVW-54HJFH
Heat exchanger	Type of heat exchanger			Multi-Pass Cross-Finned Tube		
	Tube	Material	—	Copper tube		
		Outer diameter	Φ mm	7.0	7.0	7.0
		Quantity of rows	—	2	2	2.5
		Quantity of columns	—	132	132	132
	Fin	Material	—	Aluminum		
		Pitch	mm	1.9	1.9	1.9
	Maximum working pressure		MPa	4.15	4.15	4.15
	Total Face Area		m ²	1.36	1.36	1.36
	Quantity		—	1	1	1
Air delivery part	Fan	Type	—	Propeller Fan		
		Outer diameter	Φ mm	544	544	544
		Revolution	rpm	568+464	568+464	600+516
		Nominal air flow	m ³ /min.	90	90	100
	Fan motor	Type	—	Drip-Proof Type Enclosure		
		Starting method	—	DC Driven		
		Nominal output power	W	74+74	74+74	74+74
		Quantity	—	2	2	2
		Insulation Class	—	E	E	E

Model			AVW-76H9FH	AVW-96H9FH	AVW-114H9FH
Heat exchanger	Type of heat exchanger		Multi-Pass Cross-Finned Tube		
	Tube	Material	Copper tube		
		Outer diameter	Φ mm	7.0	7.0
		Quantity of rows	—	2	2
		Quantity of columns	—	80	80
	Fin	Material	Aluminum		
		Pitch	mm	1.9	1.9
		Maximum working pressure	MPa	4.15	4.15
		Total Face Area	m ²	1.86	1.86
	Quantity		—	2	2
Air delivery part	Fan	Type	Propeller Fan		
		Outer diameter	Φ mm	544	544
		Revolution	rpm	399+745	630+772
		Nominal air flow	m ³ /min.	121	150
	Fan motor	Type	Drip-Proof Type Enclosure		
		Starting method	DC Driven		
		Nominal output power	W	170+120	170+120
		Quantity	—	2	2
		Insulation Class	—	E	E

Compressor

Model			AVW-28/34HJFH	AVW-43HJFH, AVW-38/48/54HJFH
Compressor Model			ATL232SDNC9AU	ATH-356SDPC9FQ
Airtight Pressure	Discharge Pressure	MPa	4.15	4.15
	Suction Pressure	MPa	2.21	2.21
Compressor Motor	Type	—	PMSM (Permanent Magnet Synchronous Motors)	PMSM (Permanent Magnet Synchronous Motors)
	Starting Mode	—	Start Simultaneously	Start Simultaneously
	Technology	—	4	4
	Insulation Class	—	E	E
Refrigeration Oil	Trademark	—	HAF68D1C	α 68HES-H
	Charge Volume	L	0.88 ± 0.02	1.65

Model			AVW-43/48/54HKFH
Compressor Model			E500HHD-36D2
Airtight Pressure	Discharge Pressure	MPa	4.2
	Suction Pressure	MPa	2.21
Compressor Motor	Type	—	PMSM (Permanent Magnet Synchronous Motors)
	Starting Mode	—	Start Simultaneously
	Technology	—	4
	Insulation Class	—	E
Refrigeration Oil	Trademark	—	FVC68D
	Charge Volume	L	1.2

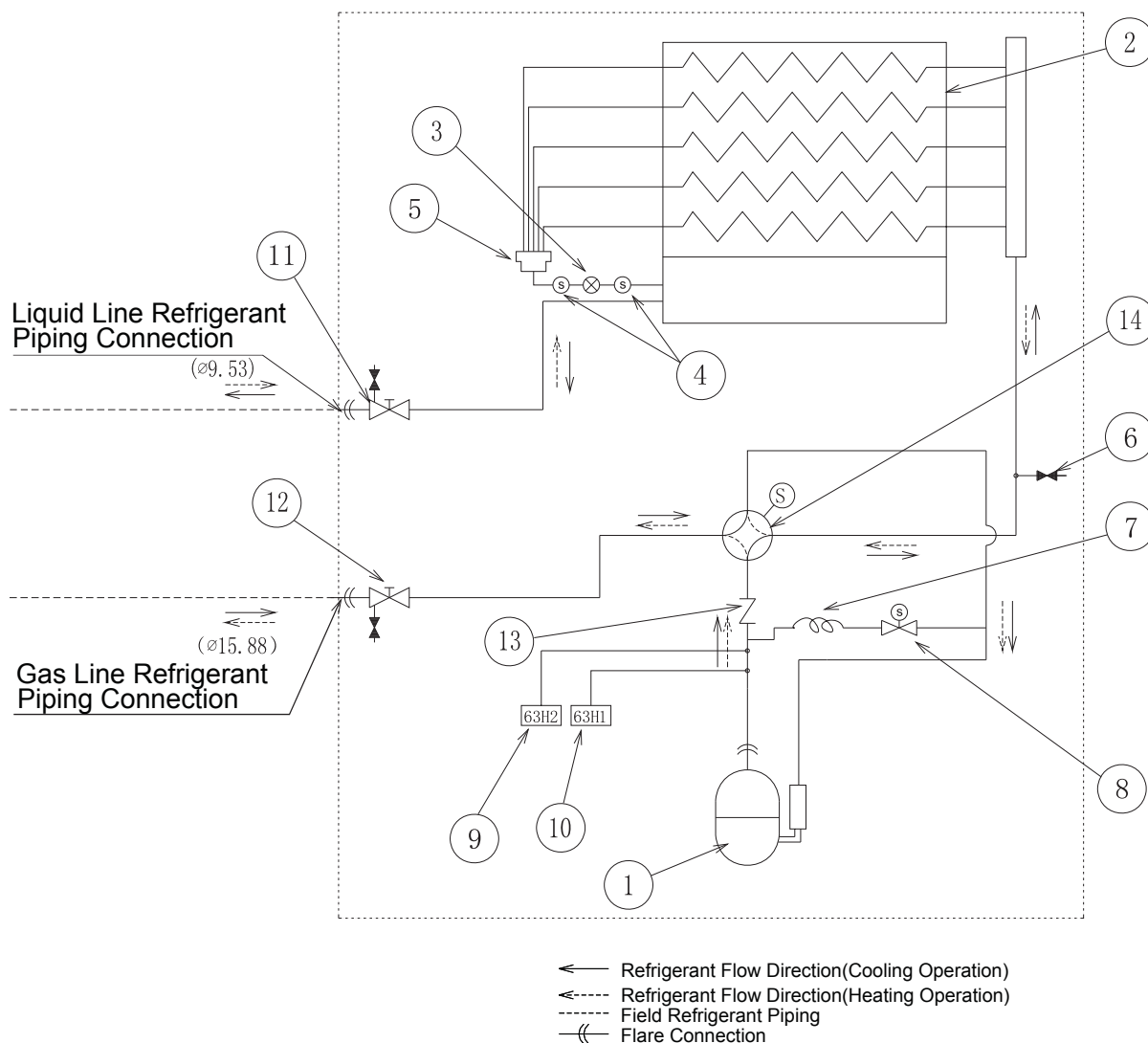
Model			AVW-76/96/114HKFH	AVW-76/96/114H9FH
Compressor Model			E656DHD	
Style			Hermetic Scroll Type	
Air Tight Pressure	Discharge	MPa	4.20	
	Suction	MPa	2.21	
Compressor Motor	Type	—	Special Squirrel-cage 3-phase Motor	
	Starting Method	—	Inverter Driven	
	Poles	—	4	
	Insulation Class	—	E	
Oil	Type	—	FVC68D	
	Charge	L	1.9	

9. Control System

9.1 Refrigerant Cycle

<Refrigerant Cycle>

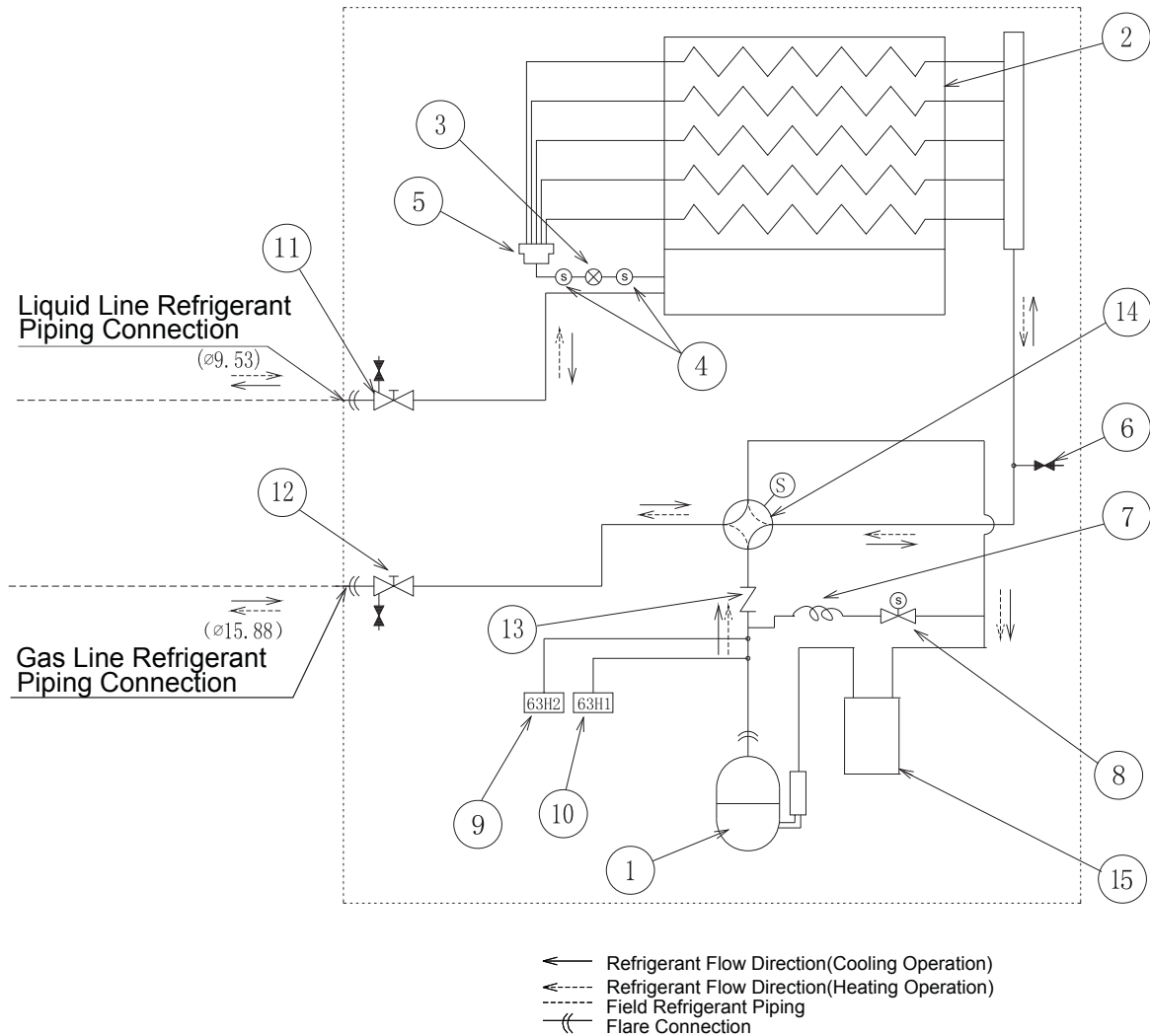
Outdoor Unit-AVW-28HJFH



NO.	Part Name	Remark
1	Compressor	
2	Heat Exchanger	
3	Electrical Expansion Valve	
4	Strainer	
5	Distributor	
6	Check Joint	
7	SVA Capillary Tube	
8	Solenoid Valve	
9	Pressure Switch	Controlling
10	Pressure Switch	Pressure Protect
11	Stop Valve for Liquid Line	
12	Stop Valve for Gas Line	
13	Check Valve	
14	Reversing Valve	

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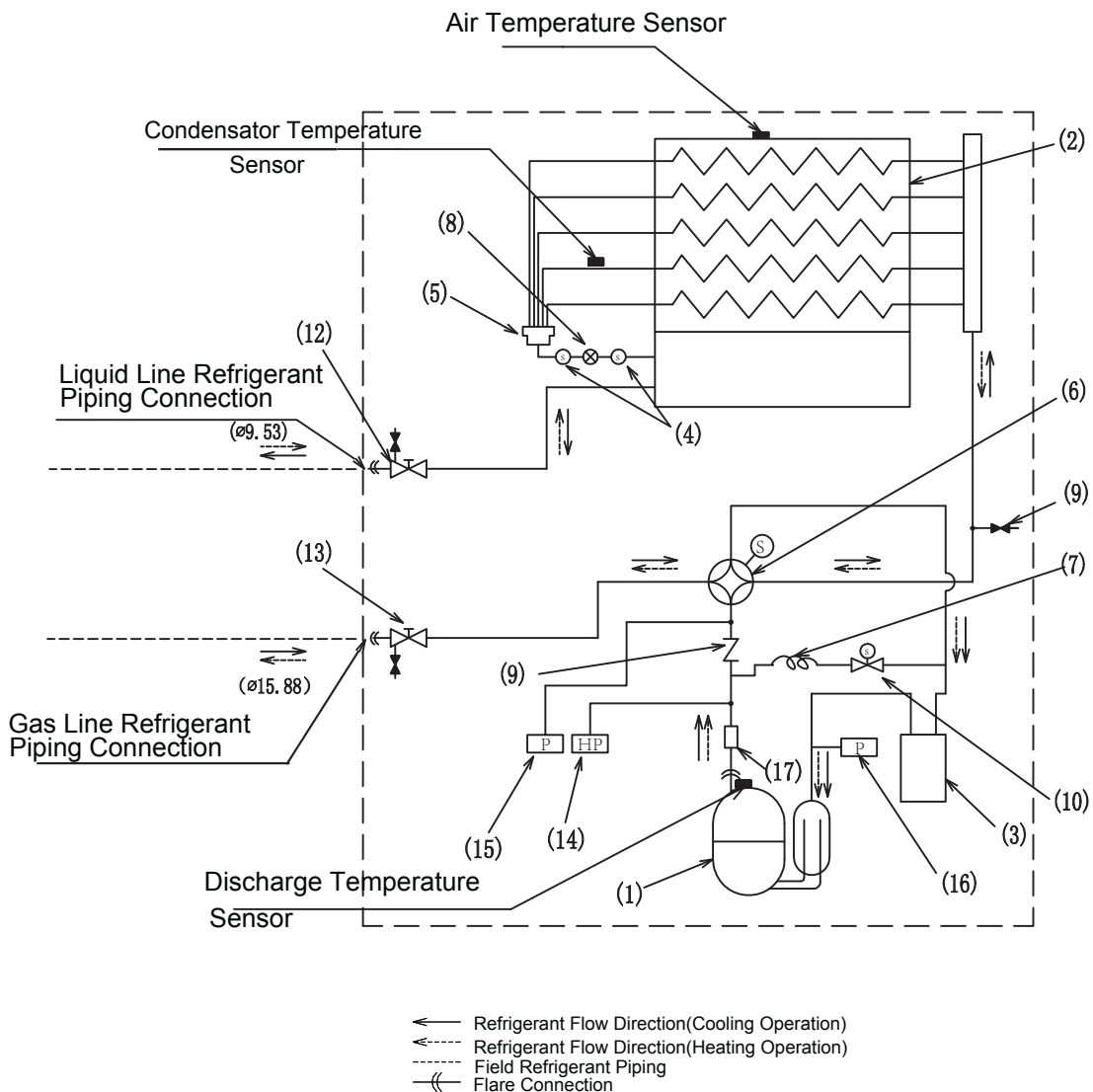
Outdoor Unit-AVW-34HJFH



NO.	Part Name	Remark
1	Compressor	
2	Heat Exchanger	
3	Electrical Expansion Valve	
4	Strainer	
5	Distributor	
6	Check Joint	
7	SVA Capillary Tube	
8	Solenoid Valve	
9	Pressure Switch	Controlling
10	Pressure Switch	Pressure Protect
11	Stop Valve for Liquid Line	
12	Stop Valve for Gas Line	
13	Check Valve	
14	Reversing Valve	
15	Gas & Liquid Separator	

<Refrigerant Cycle>

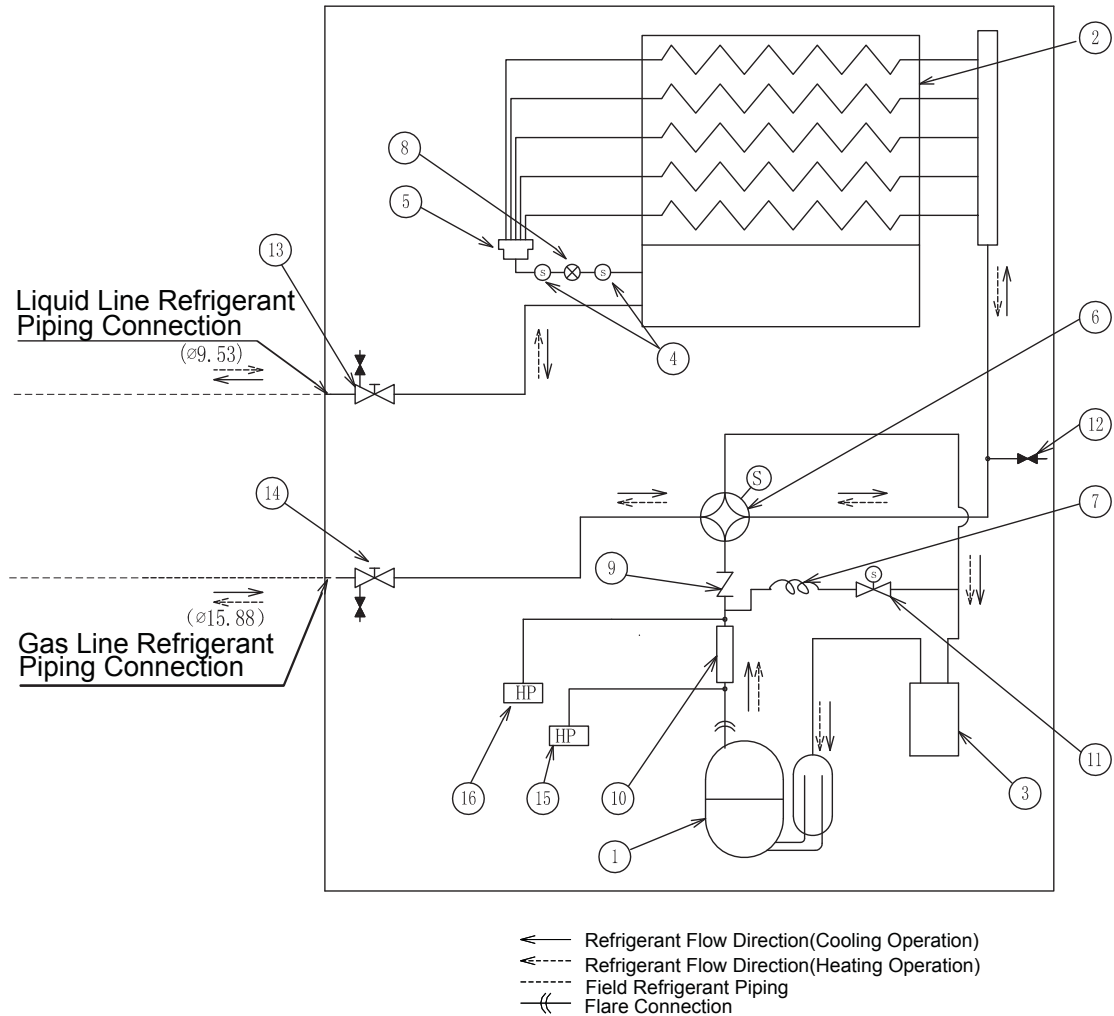
Outdoor Unit-AVW-38/48/54HJFH



NO.	Part Name	Remark
1	Compressor	
2	Heat Exchanger	
3	Gas & Liquid Separator	
4	Strainer	
5	Distributor	
6	Reversing Valve	
7	Capillary Tube	Bypass
8	Electrical Expansion Valve	
9	Check Valve	
10	Solenoid Valve	Bypass
11	Check Joint	
12	Stop Valve for Liquid Line	Bypass
13	Stop Valve for Gas Line	
14	Pressure Switch	High Pressure Protect
15	Pressure Sensor	High Pressure
16	Pressure Sensor	Low Pressure
17	Expansion Muffler	

<Refrigerant Cycle>

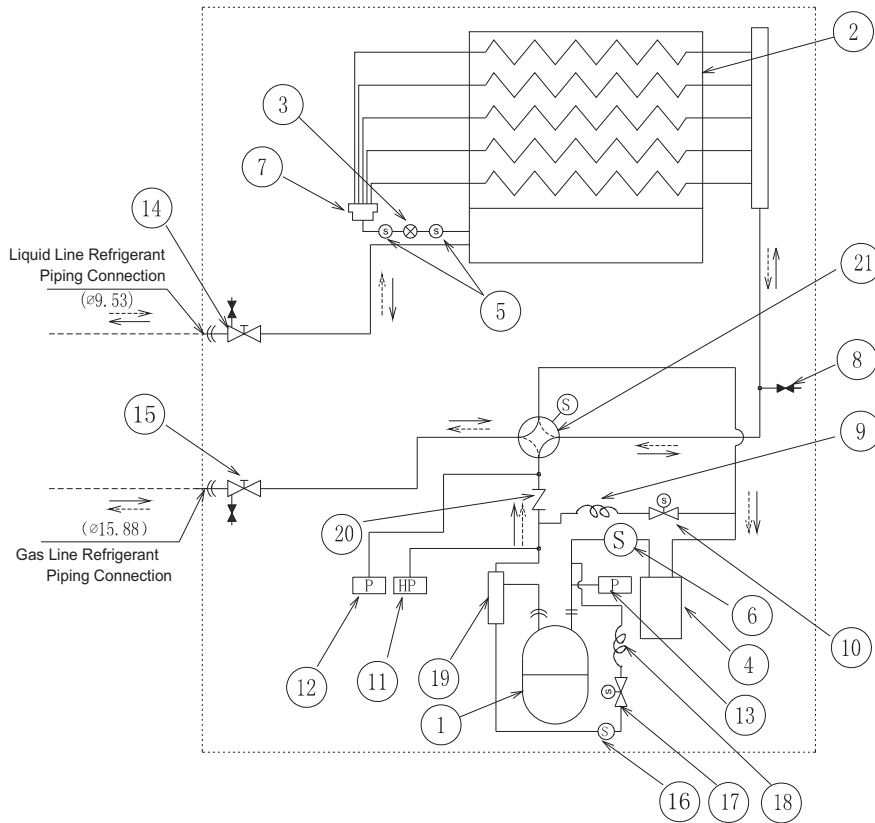
Outdoor Unit-AVW-43HJFH



NO.	Part Name	Remark
1	Compressor	
2	Heat Exchanger	
3	Gas & Liquid Separator	
4	Strainer	
5	Distributor	
6	Reversing Valve	
7	Capillary Tube	
8	Electrical Expansion Valve	
9	Check Valve	
10	MufflerPressure Switch	
11	Solenoid Valve	
12	Check Joint	
13	Stop Valve for Liquid Line	
14	Stop Valve for Gas Line	
15	Pressure Switch	Pressure Protect
16	Pressure Switch	Controlling

<Refrigerant Cycle>

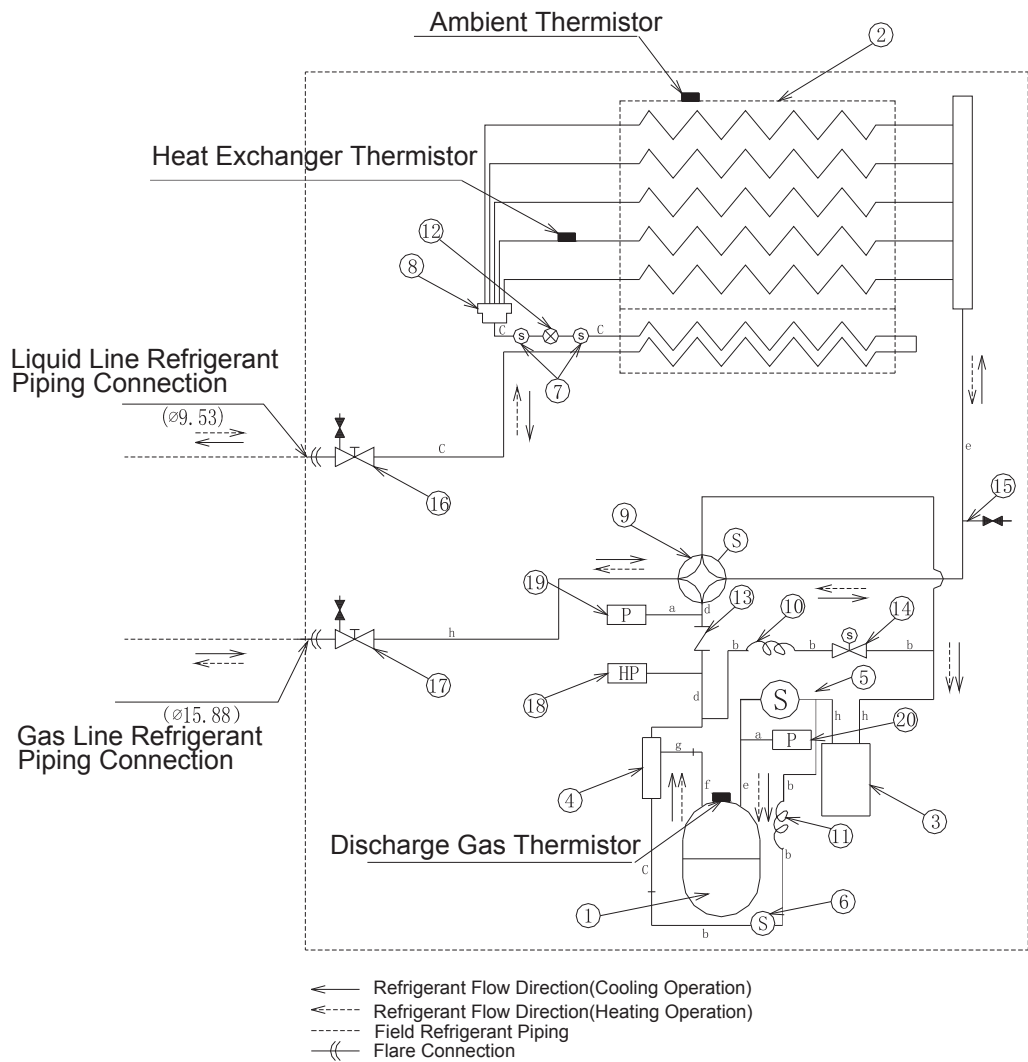
Outdoor Unit-AVW-43HKFH



Mark	Part Name
①	Compressor
②	Heat Exchanger
③	Electronic Expansion Valve
④	Accumulator
⑤	Strainer
⑥	Strainer
⑦	Distributor
⑧	Check Joint
⑨	Capillary Tube
⑩	Bypass Solenoid Valve
⑪	Pressure Switch for Protection
⑫	High Pressure Sensor
⑬	Low Pressure Sensor
⑭	Stop Valve for Liquid Line
⑮	Stop Valve for Liquid Line
⑯	Strainer
⑰	Return Oil Solenoid Valve
⑱	Return Oil Capillary Tube
⑲	Oil Separator
⑳	Check Valve
㉑	Reversing Valve

- ← Refrigerant Flow Direction(Cooling Operation)
- ←--- Refrigerant Flow Direction(Heating Operation)
- Field Refrigerant Piping
- ⌋⌋ Flare Connection

<Refrigerant Cycle>
Outdoor Unit-AVW-48/54HKFH

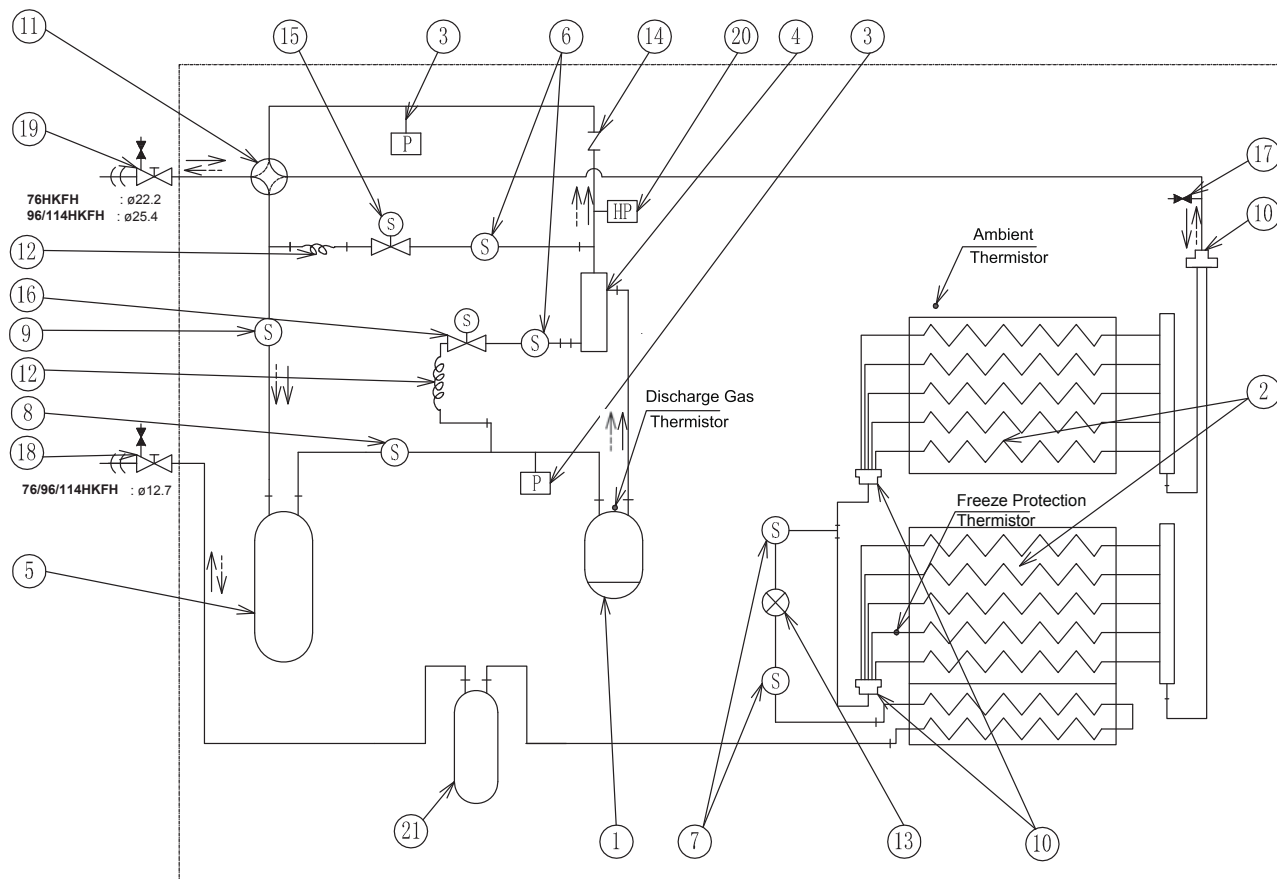


NO.	Part Name	Remark
1	Compressor	
2	Heat Exchanger	
3	Accumulator	
4	Oil Seperator	
5	Strainer	
6	Strainer	
7	Strainer	
8	Distributor	
9	Reversing Valve	
10	Capillary Tube	Bypass
11	Capillary Tube	Return Oil
12	Electrical Expansion Valve	
13	Check Valve	
14	Solenoid Valve	Bypass
15	Check Joint	
16	Stop Valve for Liquid Line	
17	Stop Valve for Gas Line	
18	Pressure Switch	High Pressure Protect
19	Pressure Sensor	High Pressure
20	Pressure Sensor	Low Pressure

NO.	O.D. × T	Material
a	Φ6.35 × 0.7 t	C1220T-0
b	Φ6.35 × 1.07 t	
c	Φ9.53 × 0.8 t	
d	Φ12.7 × 1.0 t	
e	Φ15.88 × 1.0 t	
f	Φ15.88 × 1.2 t	
g	Φ15.88 × 1.65 t	
h	Φ19.05 × 1.2 t	

<Refrigerant Cycle>

Outdoor Unit-AVW-76/96/114HKFH

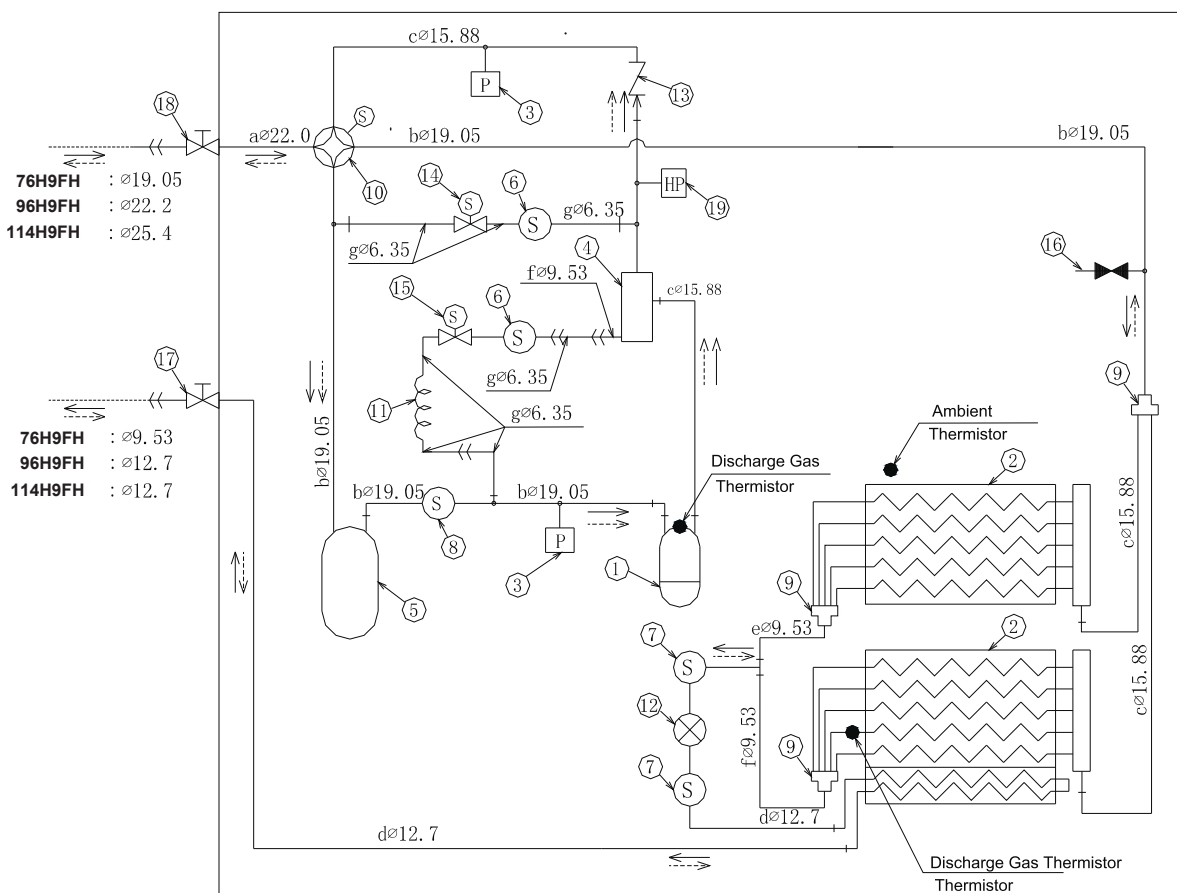


- ← : Refrigerant Flow Direction (Cooling Operation)
- ←- - : Refrigerant Flow Direction (Heating Operation)
- - - : Field Refrigerant Piping
- ⌋⌋ : Flare Connection
- + : Brazing Connection
- ++ : Flange Connection

Mark	Part Name
①	Compressor
②	Heat Exchanger
③	Sensor for Refrigerant Pressure
④	Oil Separator
⑤	Accumulator
⑥	Strainer
⑦	Strainer
⑧	Strainer
⑨	Strainer
⑩	Distributor
⑪	Reversing Valve
⑫	Capillary Tube
⑬	Electronic Expansion Valve
⑭	Check Valve
⑮	Bypass Solenoid Valve
⑯	Oil Return Solenoid Valve
⑰	Check Joint
⑱	Stop Valve for Liquid Line
⑲	Stop Valve for Gas Line
⑳	Pressure Switch
㉑	High Pressure Reservoir

<Refrigerant Cycle>

Outdoor Unit-AVW-76/96/114H9FH



- ← : Refrigerant Flow Direction (Cooling Operation)
- ← : Refrigerant Flow Direction (Heating Operation)
- : Field Refrigerant Piping
- ⌋⌋ : Flare Connection
- ⌋ : Brazing Connection
- ⌋⌋ : Flange Connection

Mark	Part Name
(1)	Compressor
(2)	Heat Exchanger
(3)	Sensor for Refrigerant Pressure
(4)	Oil Separator
(5)	Accumulator
(6)	Strainer(3/8)
(7)	Strainer(1/2)
(8)	Strainer(3/4)
(9)	Distributor
(10)	Reversing Valve
(11)	Capillary Tube
(12)	Electronic Expansion Valve
(13)	Check Valve
(14)	Solenoid Valve
(15)	Solenoid Valve
(16)	Check Joint
(17)	Stop Valve for Liquid Line
(18)	Stop Valve for Gas Line
(19)	High Pressure Switch for Protection

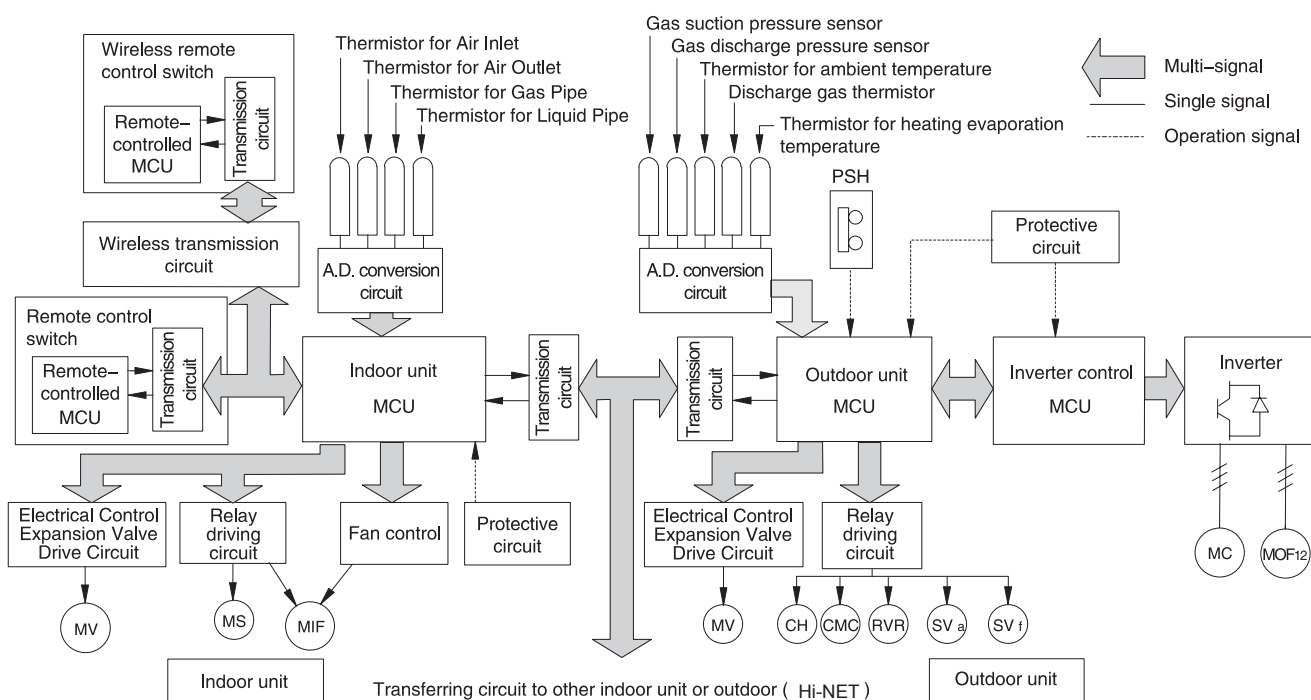
9.2 Function Control Unit

Table 1 lists the control system of refrigerating cycle separately

Table 1. Refrigerant Cycle Control

Control Item	Measures	
	Cooling Operation	Heating Operation
Revolution of Outdoor Fan	Control discharge pressure: Pd	The pressure can be controlled based on the outdoor air temperature
Opening degree of electronic expansion valve of outdoor unit	Full open	Control the Temperature of discharge gas superheat: Td SH
Opening degree of electronic expansion valve of indoor unit	1. Control the balance between the indoor units; 2. Control the temperature difference between gas-liquid pipe of indoor heat exchanger; 3. Control the Temperature of discharge gas superheat: Td SH	1. Control the temperature difference of inlet and outlet indoors; 2. Balance the temperature difference between the gas-liquid pipes of each indoor unit.
Inverter frequency of compressor	1. Refrigerant cycles of indoor unit should be fully operated; 2. Pd control.	1. Refrigerant cycles of indoor unit should be fully operated; 2. Pd control.

The network of control system can be displayed in the following table



Symbol	Name
MC	Motor of compressor
MIF	Fan motor of indoor unit
MOF ₁₂	Fan motor of outdoor unit
MS	Motor of auto-louver
MV	Electronic expansion valve

Symbol	Name
CMC	Electromagnetic contactor
RVR	Four-way valve
SV _{a, f}	Solenoid valve
PSH	Pressure switch
CH	Crankcase heater

9.3 System Control

9.3.1 Remote controller installed indoors

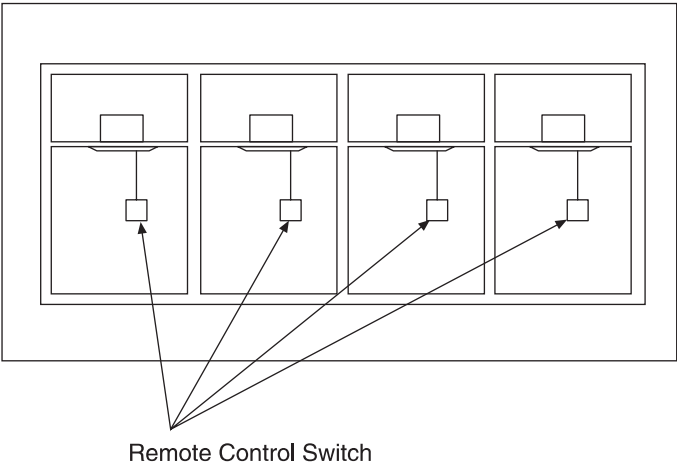
Individual operation system

“One to one” control – one indoor unit is controlled by one remote control switch.

Control mode	One to one
Operation mode	Independent
(1) ON/OFF	Yes
(2) Operation mode setting	Yes *
(3) Indoor temperature setting	Yes
(4) Fan speed setting	Yes
(5) Time setting	Yes
(6) ON/OFF by timer control	Yes
(7) Operation display	Yes
(8) Alarm display	Yes
(9) Self-check display	Yes
(10) Test mode	Yes

* Cooling and heating cannot be operated simultaneously.

Independent control

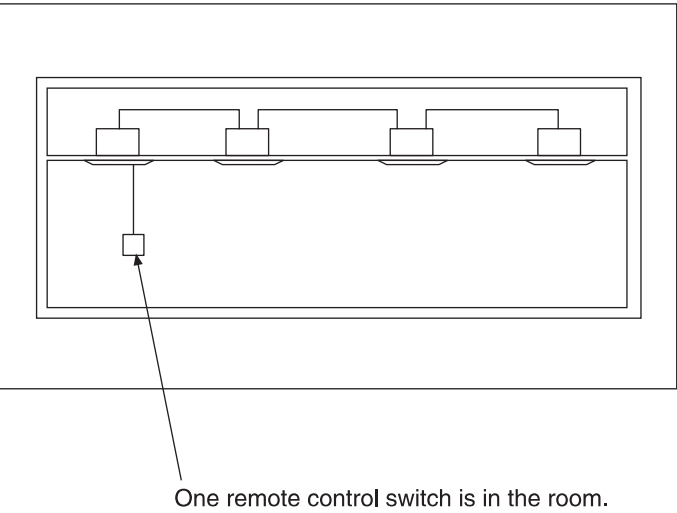


Group control operation system

One remote control switch can simultaneously control sixteen indoor units. This system is available for wider places, such as hospital, rest hall of hotel and restaurant, etc. All indoor units can be opened or closed quickly and easily using one remote controller.

Control mode	One remote controller
Operation mode	Based on group as unit
(1) ON/OFF	Yes
(2) Operation mode setting	Yes
(3) Indoor temperature setting	Yes
(4) Fan speed setting	Yes
(5) Time setting	Yes
(6) ON/OFF by timer control	Yes
(7) Operation display	Yes
(8) Alarm display	Yes
(9) Self-check function	Yes
(10) Test mode	Yes

Centralized control

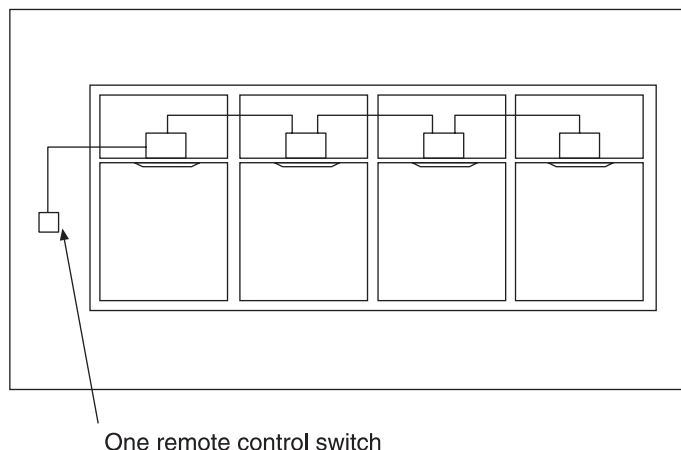


9.3.2 Group Control from a Remote Place

One remote controller can be installed at the position far away from the site, which can simultaneously control sixteen indoor units. This system is especially available for the open air conditioning sites, such as hospital, rest hall of hotel and building. All unit switches can be opened or closed quickly and easily using one remote controller.

Control mode	Grouped control
Operation mode	Independent
(1) ON/OFF	Yes
(2) Operation mode setting	Yes
(3) Indoor temperature setting	Yes
(4) Fan speed setting	Yes
(5) Time setting	Yes
(6) ON/OFF by timer control	Yes
(7) Operation display	Yes
(8) Alarm display	Yes
(9) Self-check function	Yes
(10) Test mode	Yes

Simultaneously control



9.3.3 Control in a Room / Control from a Remote Place

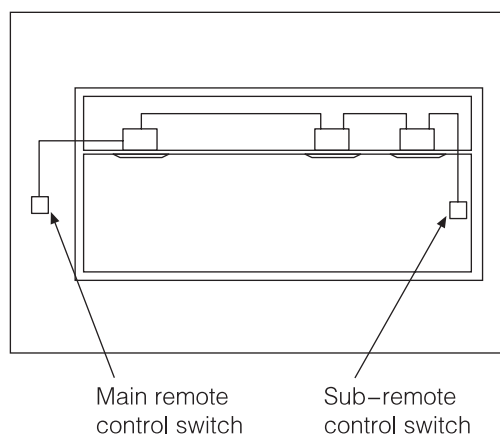
Sixteen indoor units can be controlled using main remote control switch and sub-remote control switch in maximum.

Simultaneous Operation System

Two remote control switches can be used for controlling mostly 16 sets of indoor units; one remote control switch is installed in the room and the other is installed in the remote central control room. This system is very available for open air conditioning site, such as rest hall of hotel and dining room.

Control mode	Selected remote controller used in room	Remote controller selected for long distance
Operation mode	One group	One group
(1) ON/OFF	Yes	Yes
(2) Operation mode setting	Yes *	Yes *
(3) Indoor temperature setting	Yes	Yes
(4) Fan speed setting	Yes	Yes
(5) Time setting	Yes	Yes
(6) ON/OFF by timer control	Yes	Yes
(7) Operation display	Yes	Yes
(8) Alarm display	Yes	Yes
(9) Self-check function	Yes	Yes
(10) Test mode	Yes	Yes

Two remote controlling

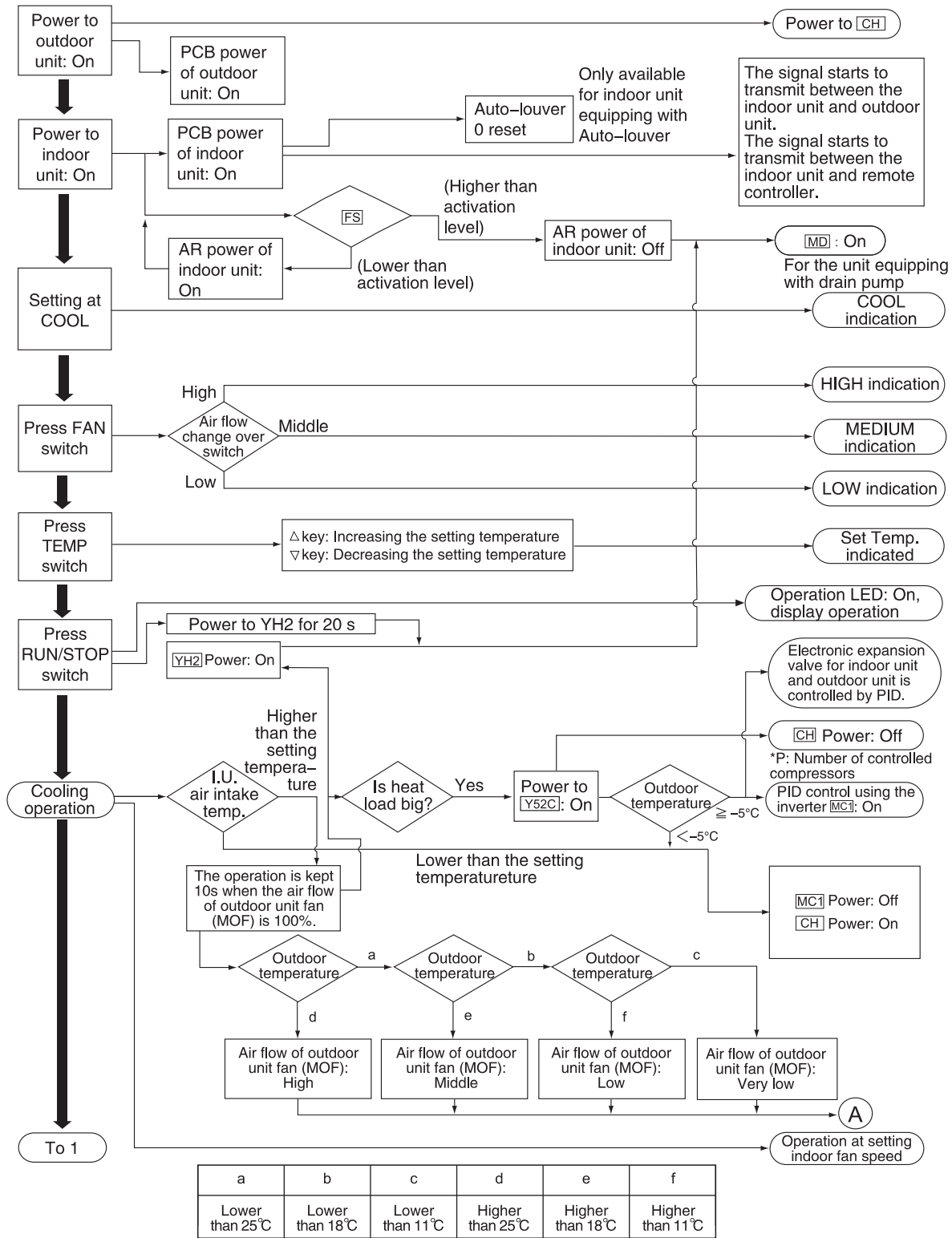


Note:

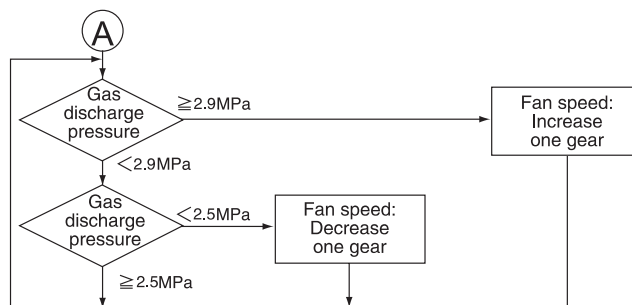
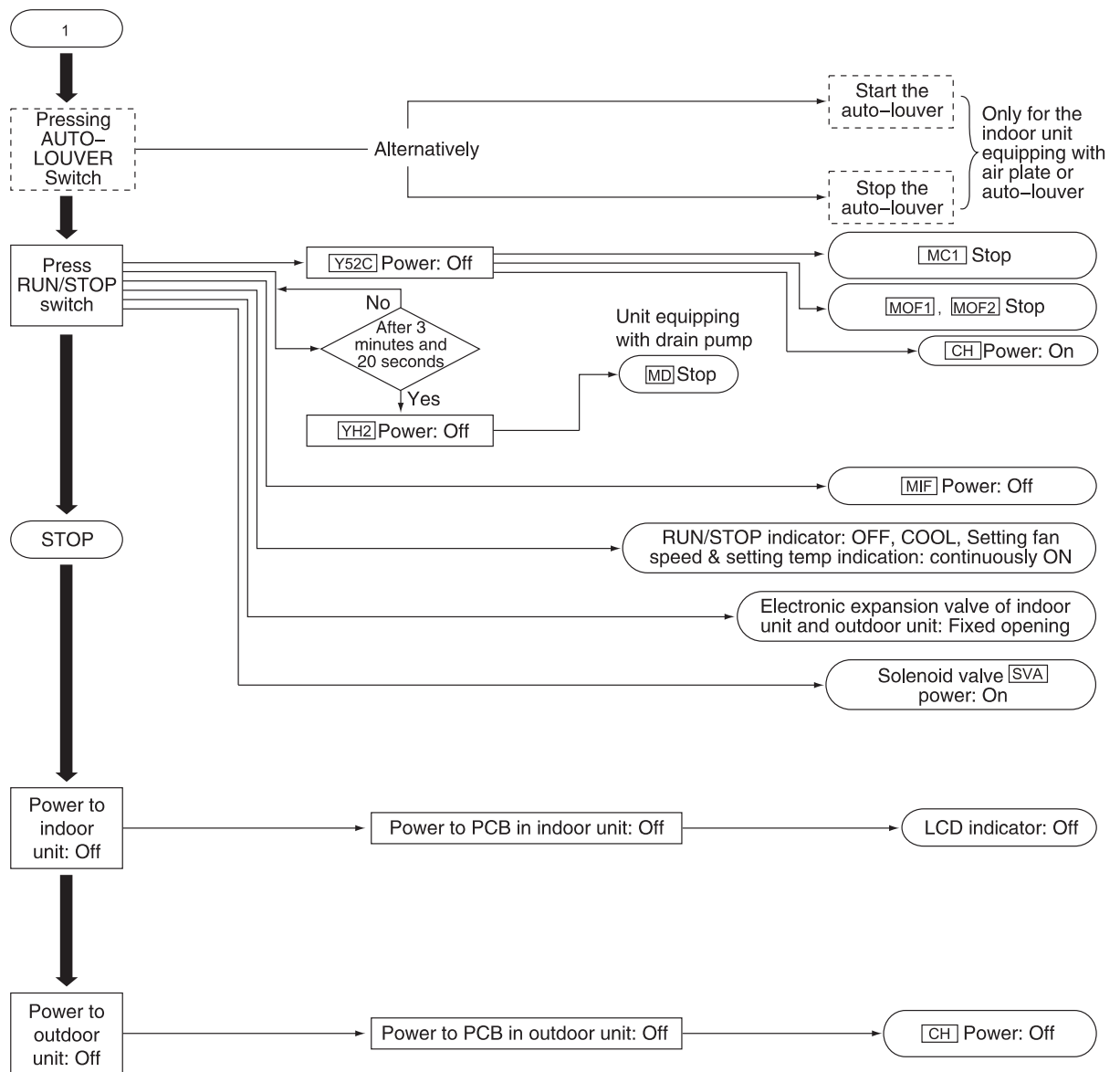
In this system, the remote controller set at last has the priority.

9.4 Standard Operation Procedure

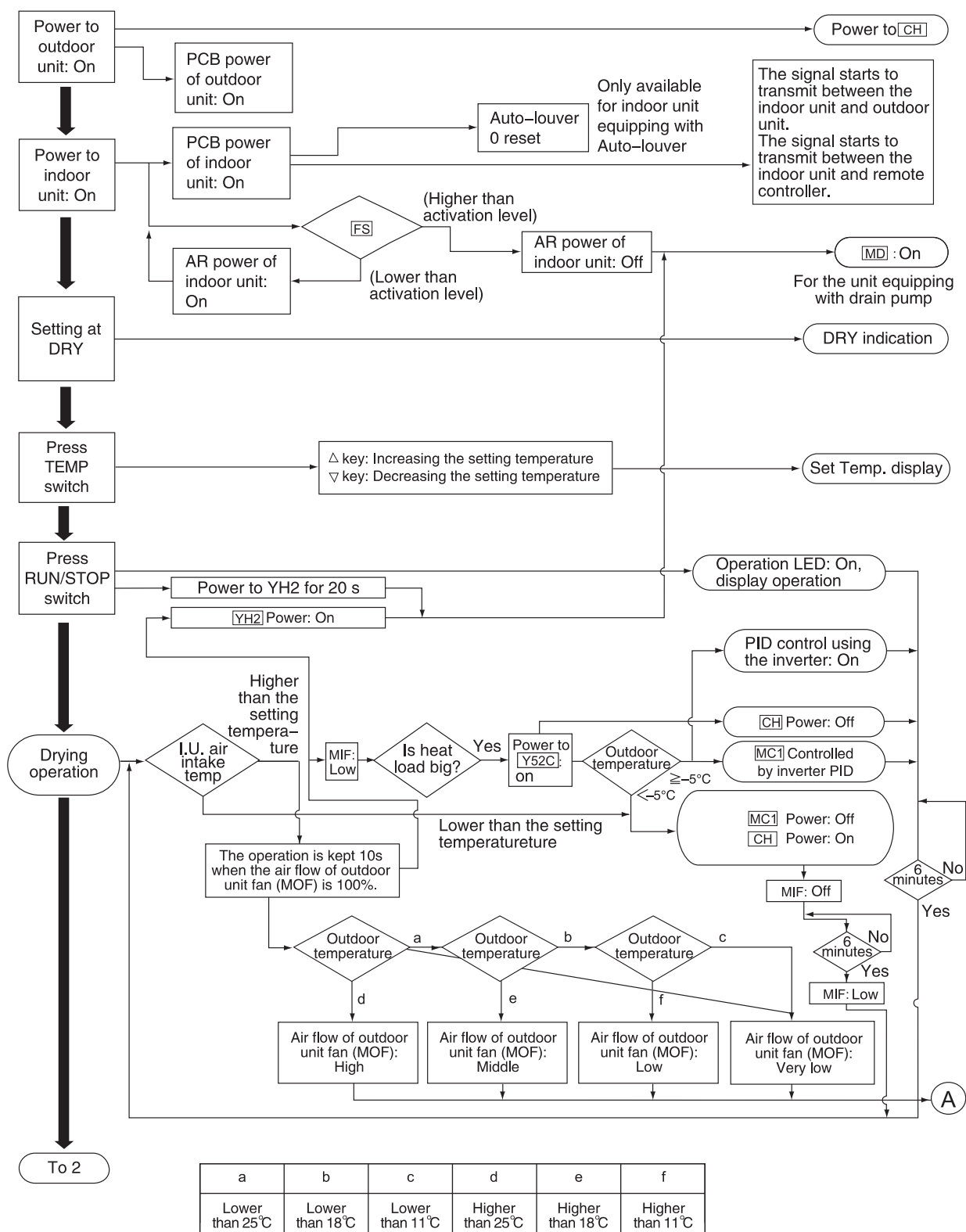
Cooling Operation



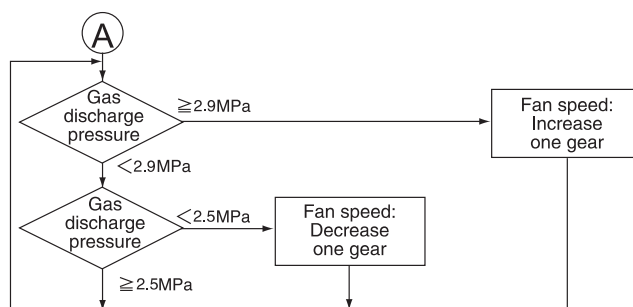
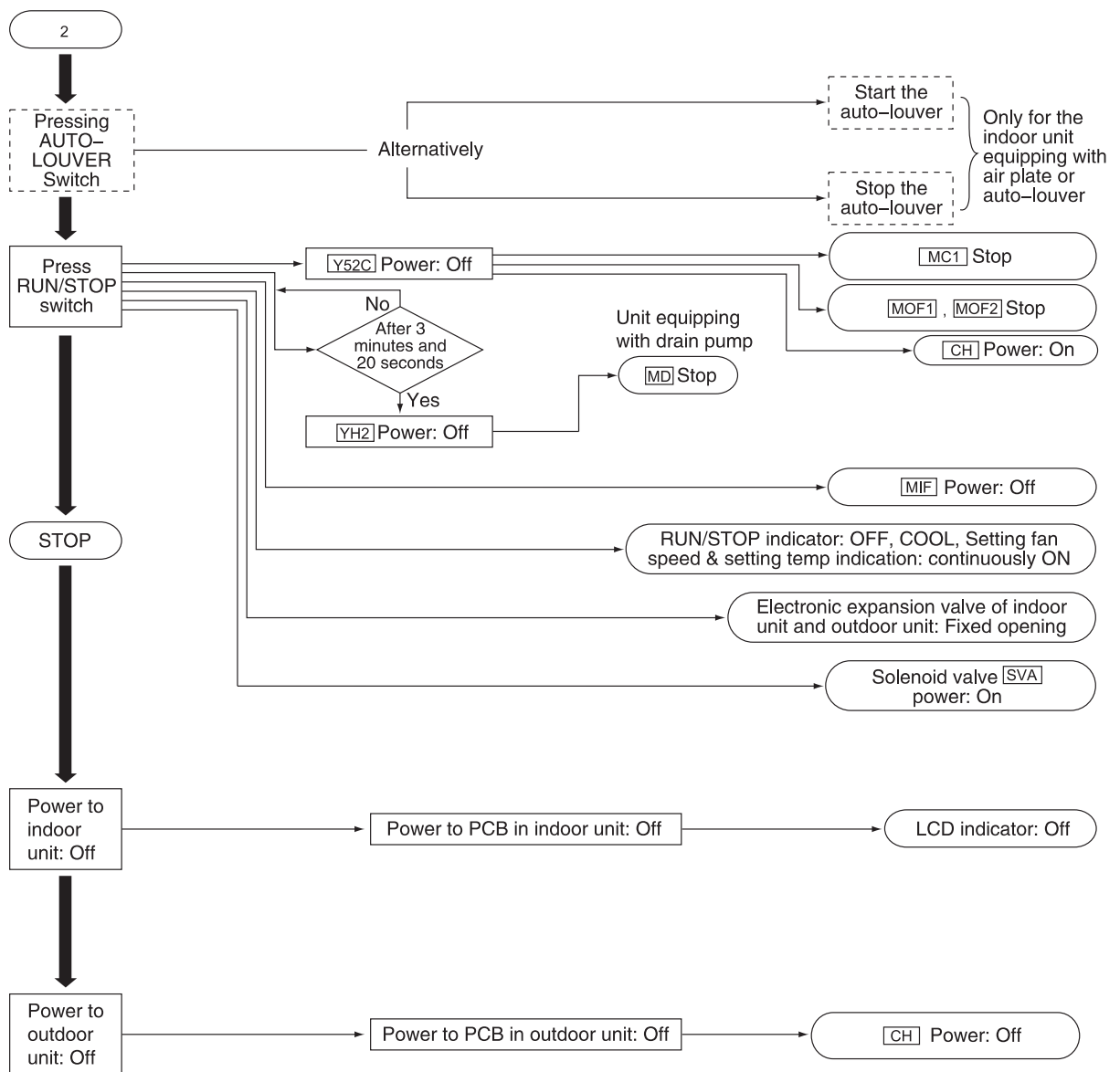
Cooling Operation



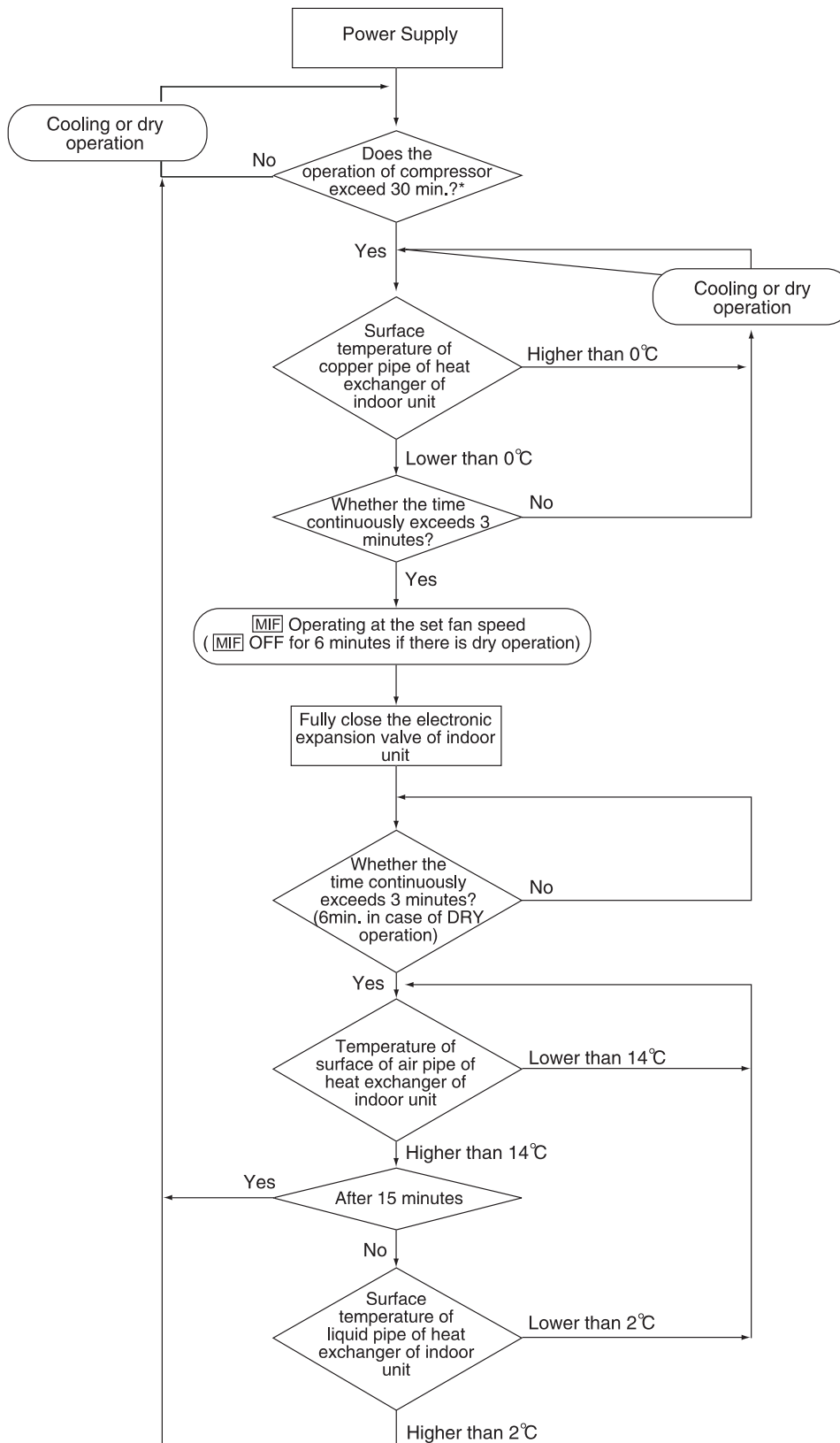
Drying Operation



Drying Operation

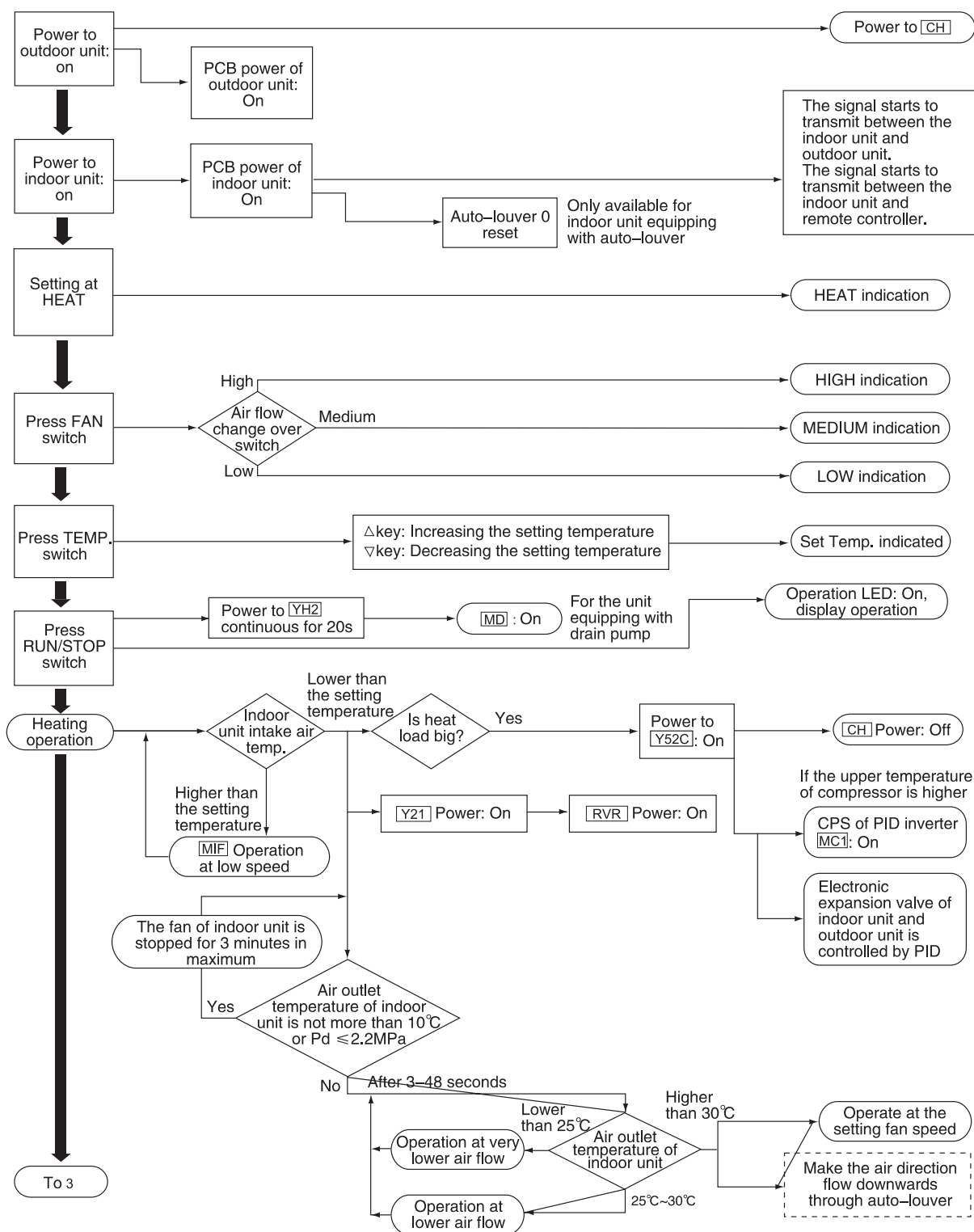


Freezing Protection Control during Cooling or Dry Operation

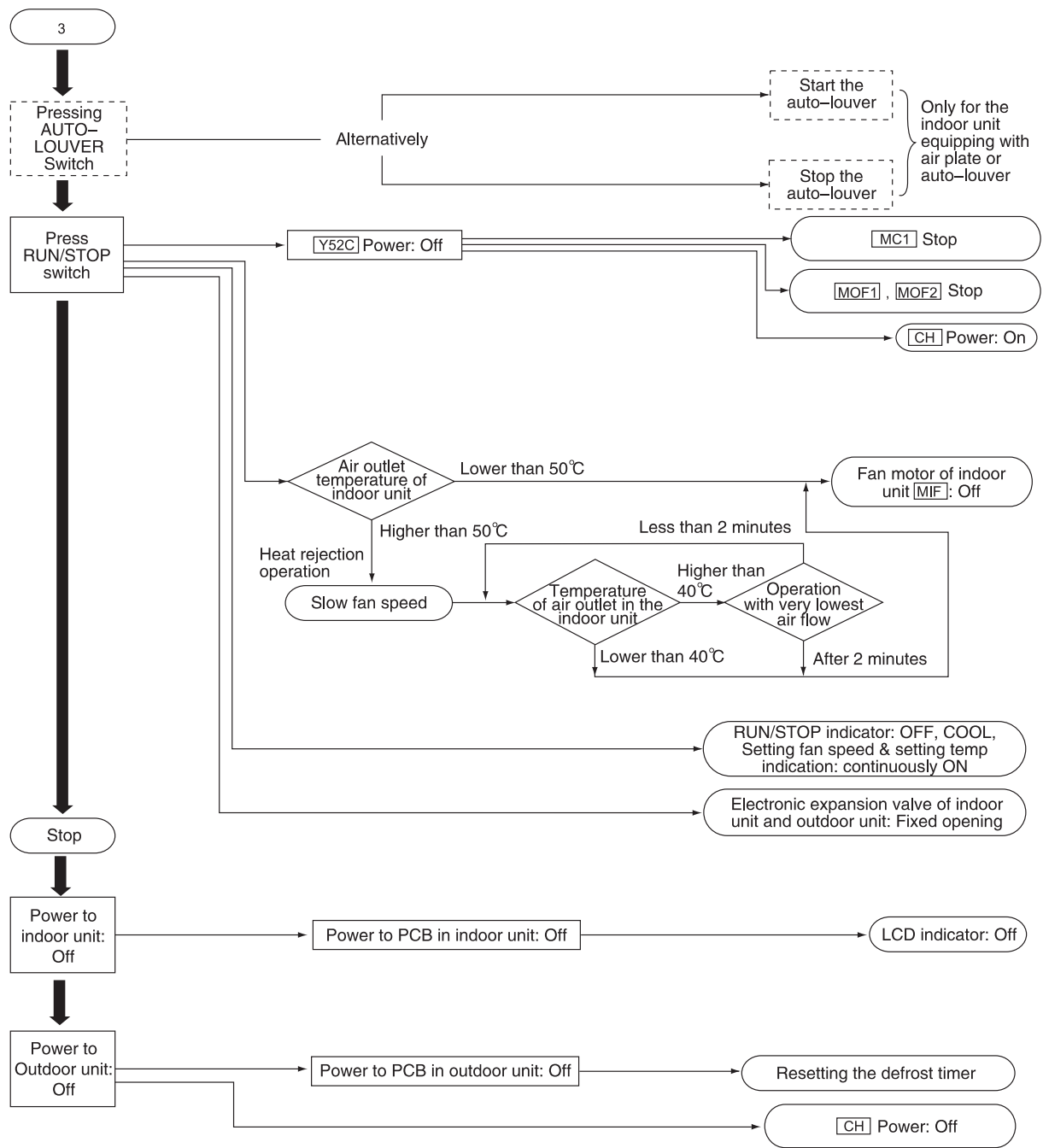


*: The operation time of compressor should be confirmed based on the operation condition.

Heating Operation

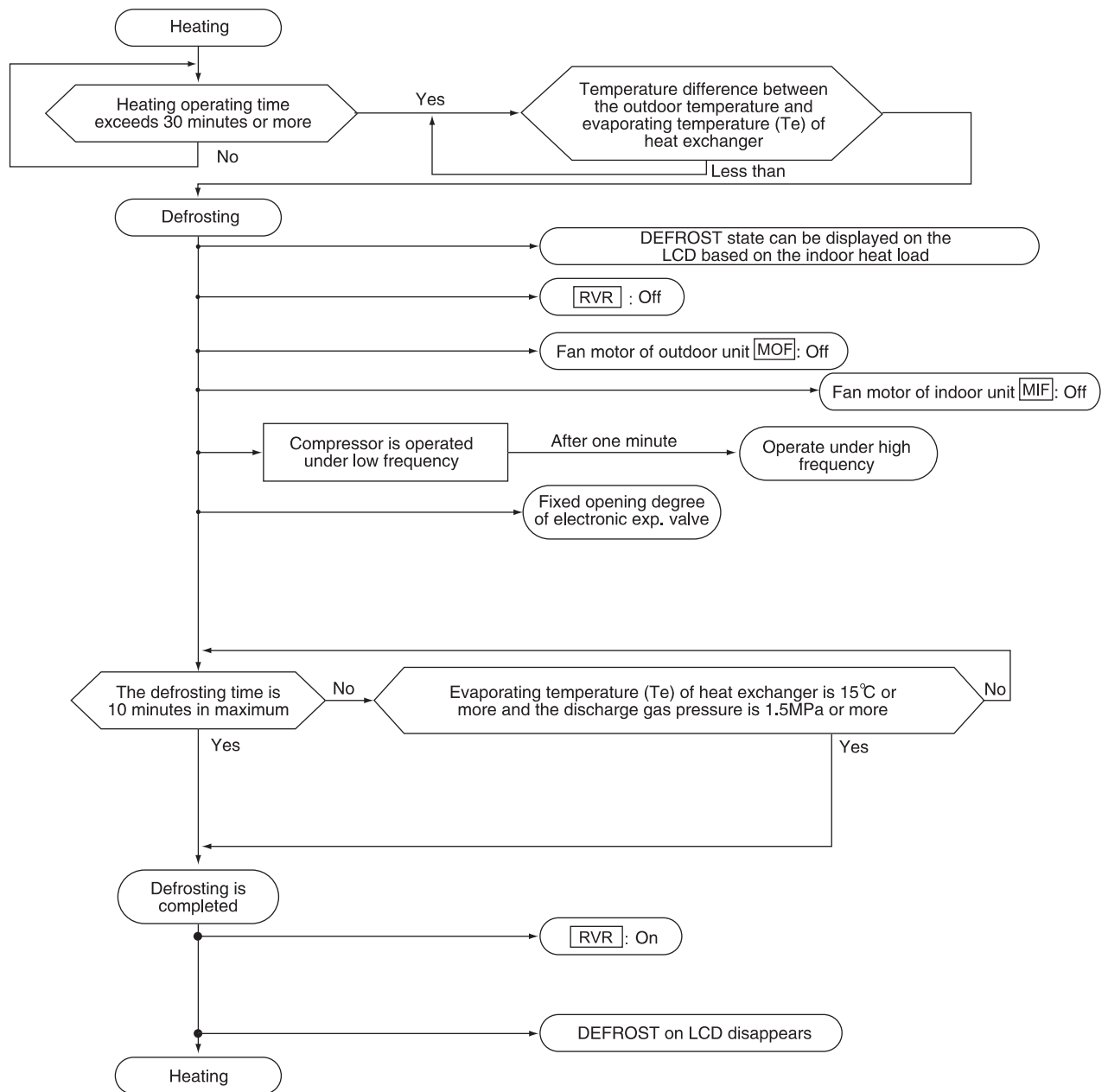


Heating Operation

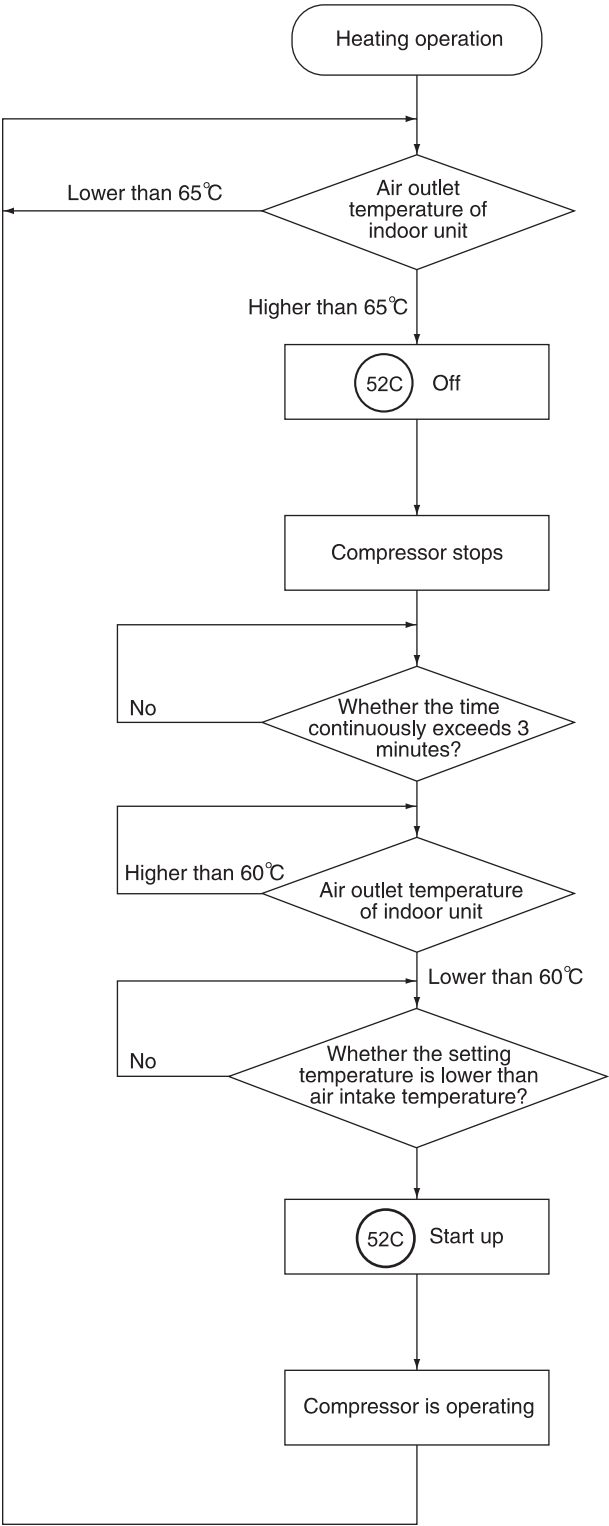


 : Unequipped, optional component

Defrosting Operation



Air Blowing Temperature Overheat Protection



9.5 Protection and Safety Control

Compressor Protection

Protect the compressor by the following devices and their combined device.

High Pressure Switch – If the discharge pressure of compressor exceeds the setting value, this switch will be cut off (tipped off).

Oil Heater – This band type heater protects against oil carry-over during cold starting, as it is energized while the compressor is stopped.

Fan Motor Protection

The automatic temperature controller is set in the motor coil of fan and can be automatically cut off (tipped off) if the temperature of coil of fan motor exceeds the setting value.

9.6 Safety and Control Device Setting

Outdoor Unit Model(KBtu/h)		AVW-28HJFH	AVW-34HJFH	AVW-43HJFH	AVW-43HKFH	
Pressure Switch High Pressure	Cut-Out	MPa	4. 15 ^{-0.05} _{-0.20}	4. 15 ^{-0.05} _{-0.20}	4. 15 ^{-0.05} _{-0.20}	4. 15 ^{-0.05} _{-0.20}
	Cut-In	MPa	3. 2 ^{+0.15} _{-0.20}	3. 2 ^{+0.15} _{-0.20}	3. 2 ^{+0.15} _{-0.20}	3. 2 ^{+0.15} _{-0.20}
Control Switch High Pressure	Cut-Out	MPa	2. 85±0. 1	2. 85±0. 1	2. 85±0. 1	2. 85±0. 1
	Cut-In	MPa	3. 6 ⁰ _{-0.15}	3. 6 ⁰ _{-0.15}	3. 6 ⁰ _{-0.15}	3. 6 ⁰ _{-0.15}
Fuse on Main Circuit		A	40	50	50	25
CCP Timer Set Time		min.	3	3	3	3
Temperature Controller of Fan Motor			Automatic Reset,Non-Adjustable			
	Cut-Out	℃	120±5	120±5	120±5	120±5
	Cut-In	℃	110～60	110～60	110～60	110～60
Control Circuit Fuse		A	5	5	5	5

Outdoor Unit Model(KBtu/h)		AVW-38/48/54HJFH	AVW-48/54HKFH	
For Compressor Pressure Switch High Pressure		Automatic Reset,Non-Adjustable	Automatic Reset,Non-Adjustable	
	Cut-Out	M Pa	4.15 ^{-0.05} _{-0.20}	4.15 ^{-0.05} _{-0.20}
	Cut-In	M Pa	3.2 ^{+0.15} _{-0.20}	3.2 ^{+0.15} _{-0.20}
Fuse on Main Circuit	A	50	25	
Compressor Crank Heater Power	W	60+28	28 × 4	
CCP Timer Set Time	Min	Non-Adjustable 3	Non-Adjustable 3	
Control Circuit Fuse	A	5	5	

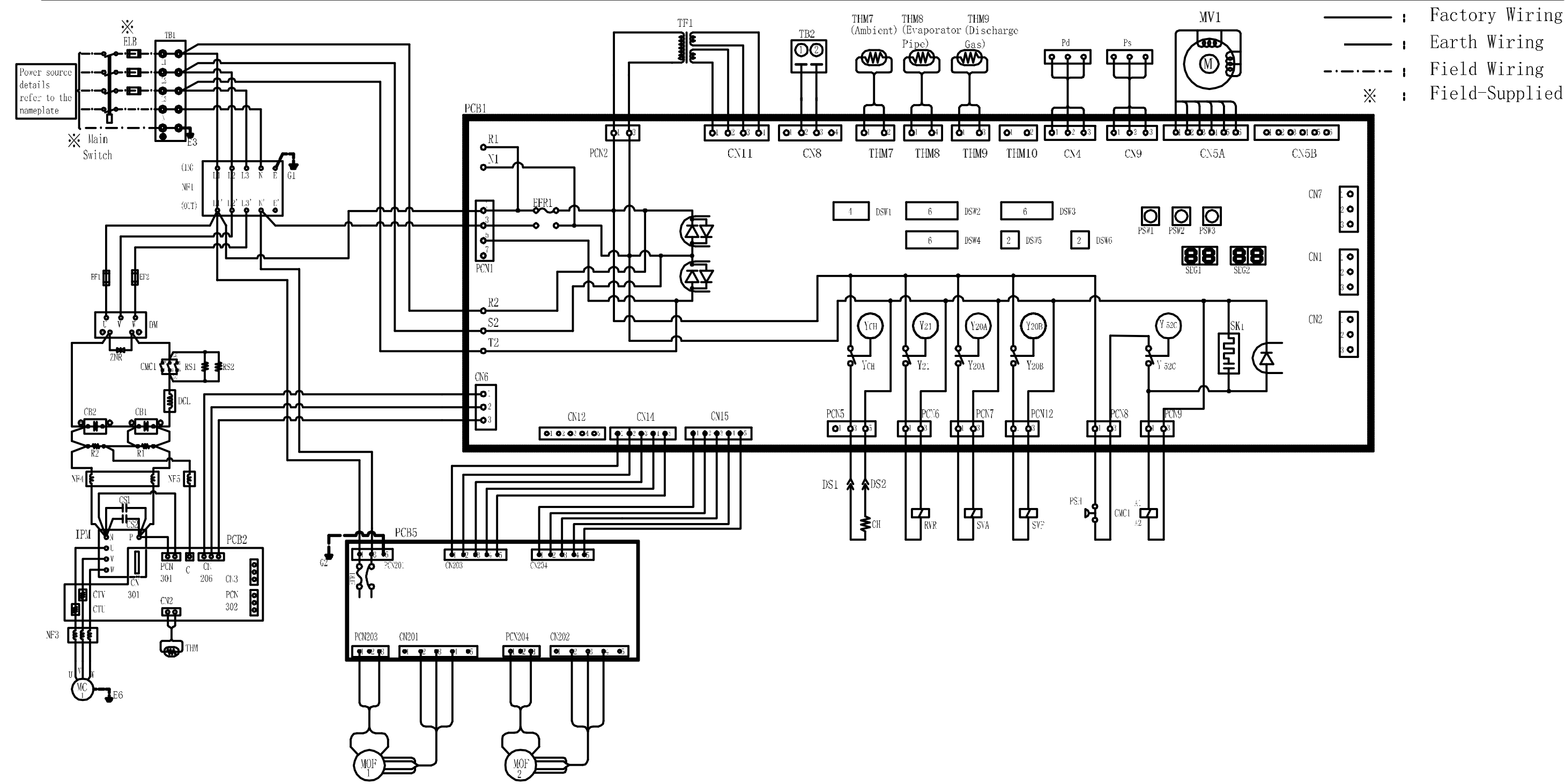
Model		AVW-76HKFH	AVW-96/114HKFH
For Compressor Pressure Switch HighCut-Out	MPa	Automatic Reset, Non-Adjustable 4.15-0.05-0.154.15-0.05-0.15	
Cut-In	MPa	3.2±0.15	3.2±0.15
Fuse on Main Circuit	A	40	40
CCP Timer Setting Time	min.	Non-Adjustable 3	Non-Adjustable 3
For Condenser Fan Motor Internal Thermostat		Automatic Reset, Non-Adjustable (each one for each motor)	
DCCut-Out	°C	120±5	
Cut-In	°C	110~60	110~60
Fuse Capacity on PCB1, 5	A	5	5
Fuse Capacity on PCB3	A	10	10

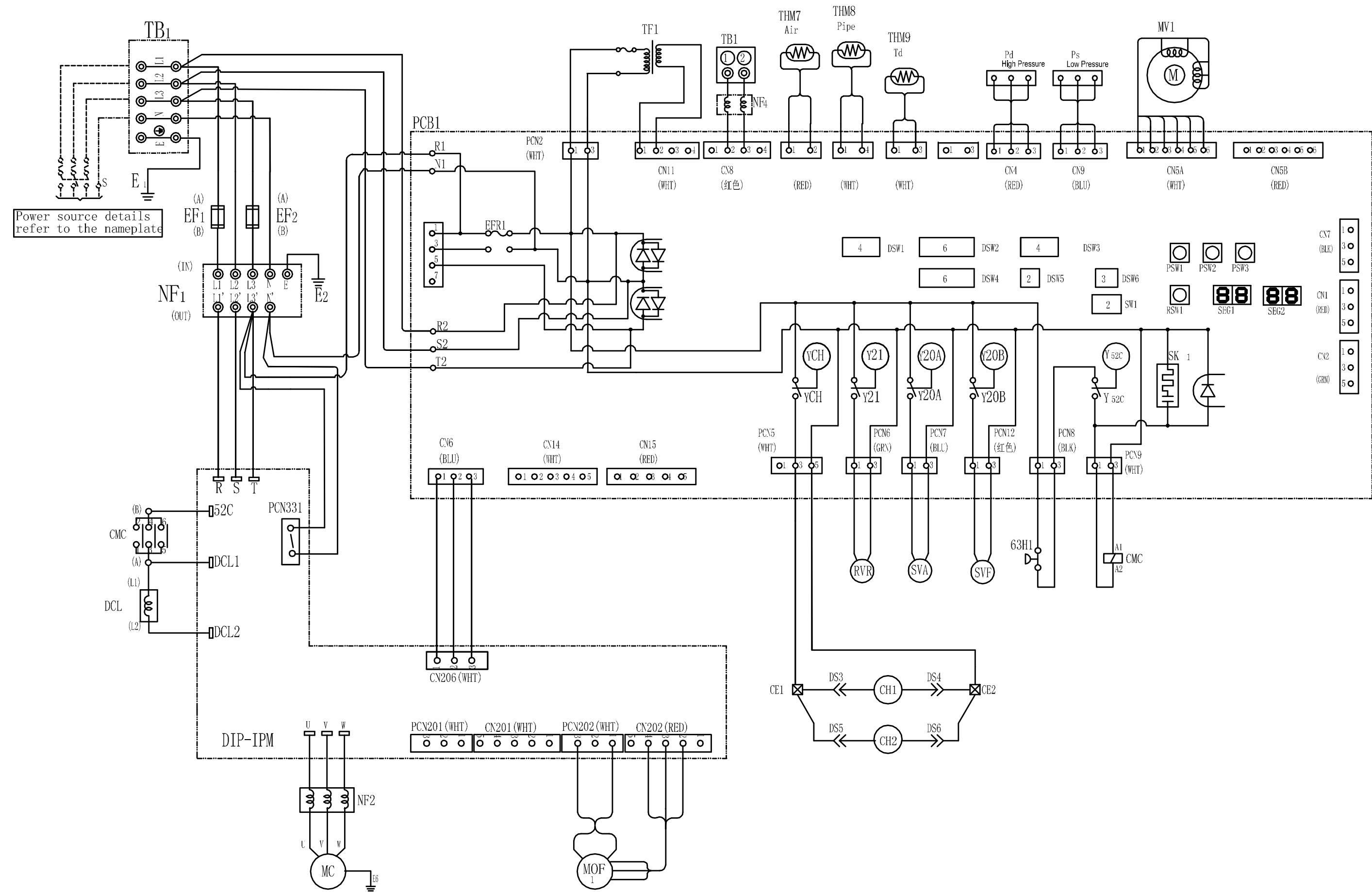
Model		AVW-76H9FH	AVW-96H9FH	AVW-114H9FH
For Compressor Pressure Switch High Cut-Out	MPa	Automatic Reset, Non-Adjustable 4.15 -0.05 -0.15 4.15 -0.05 -0.15 4.15 -0.05 -0.15		
Cut-In	MPa	3.2±0.15	3.2±0.15	3.2±0.15
Fuse on Main Circuit	A	60	60	60
CCP Timer Setting Time	min.	3	Non-Adjustable 3	3
For Condenser Fan Motor Internal Thermostat		Automatic Reset, Non-Adjustable (each one for each motor)		
DC Cut-Out	°C	120±5	120±5	120±5
AC Cut-Out	°C	135±5	135±5	135±5
Cut-In	°C	110~60	110~60	110~60
For Control Circuit Fuse Capacity on PCB1, 5	A	5	5	5
Fuse Capacity on PCB3	A	10	10	10

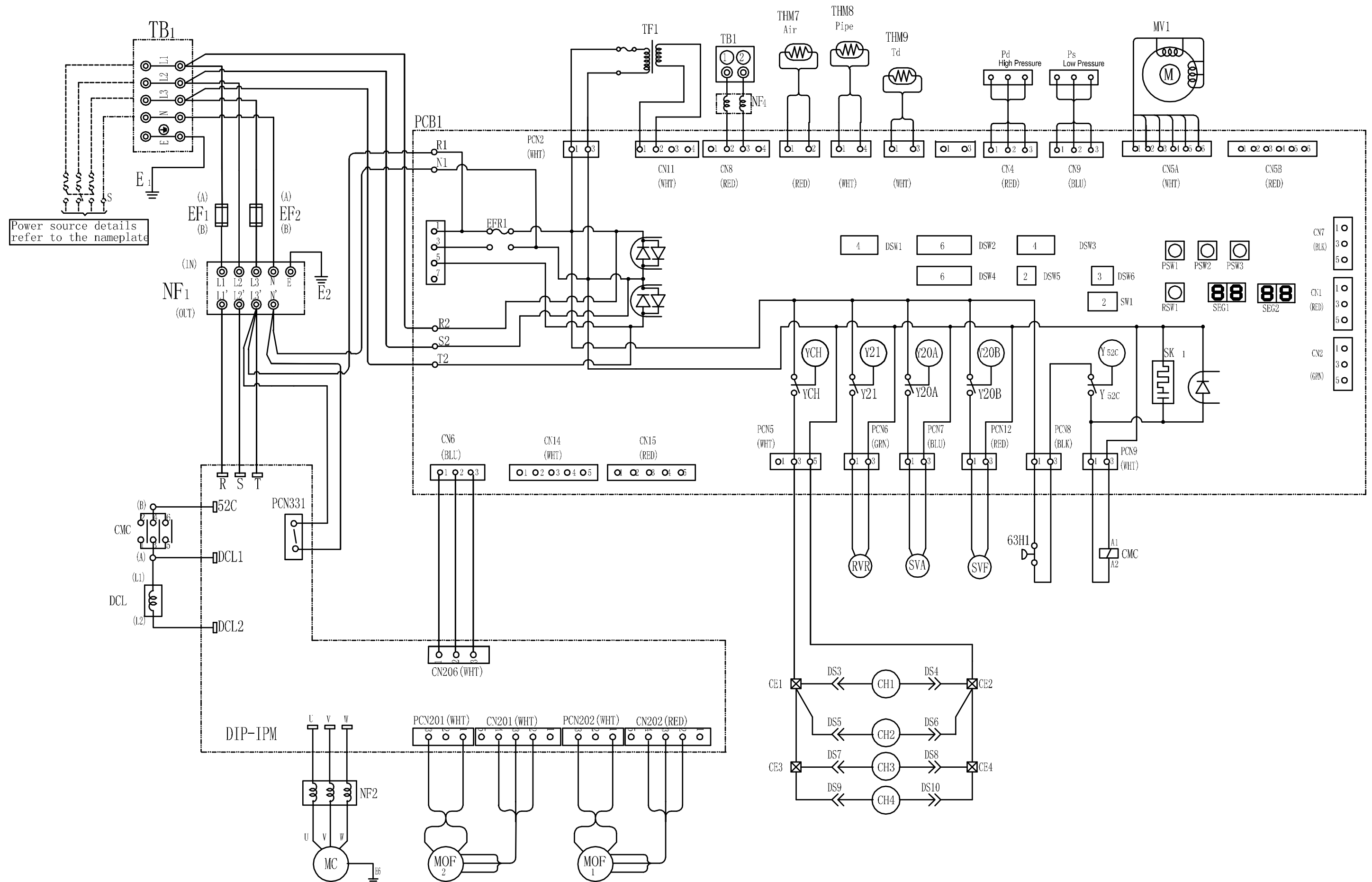
9.7 Electrical Wiring Diagram

AVW-76/96/114HKFH

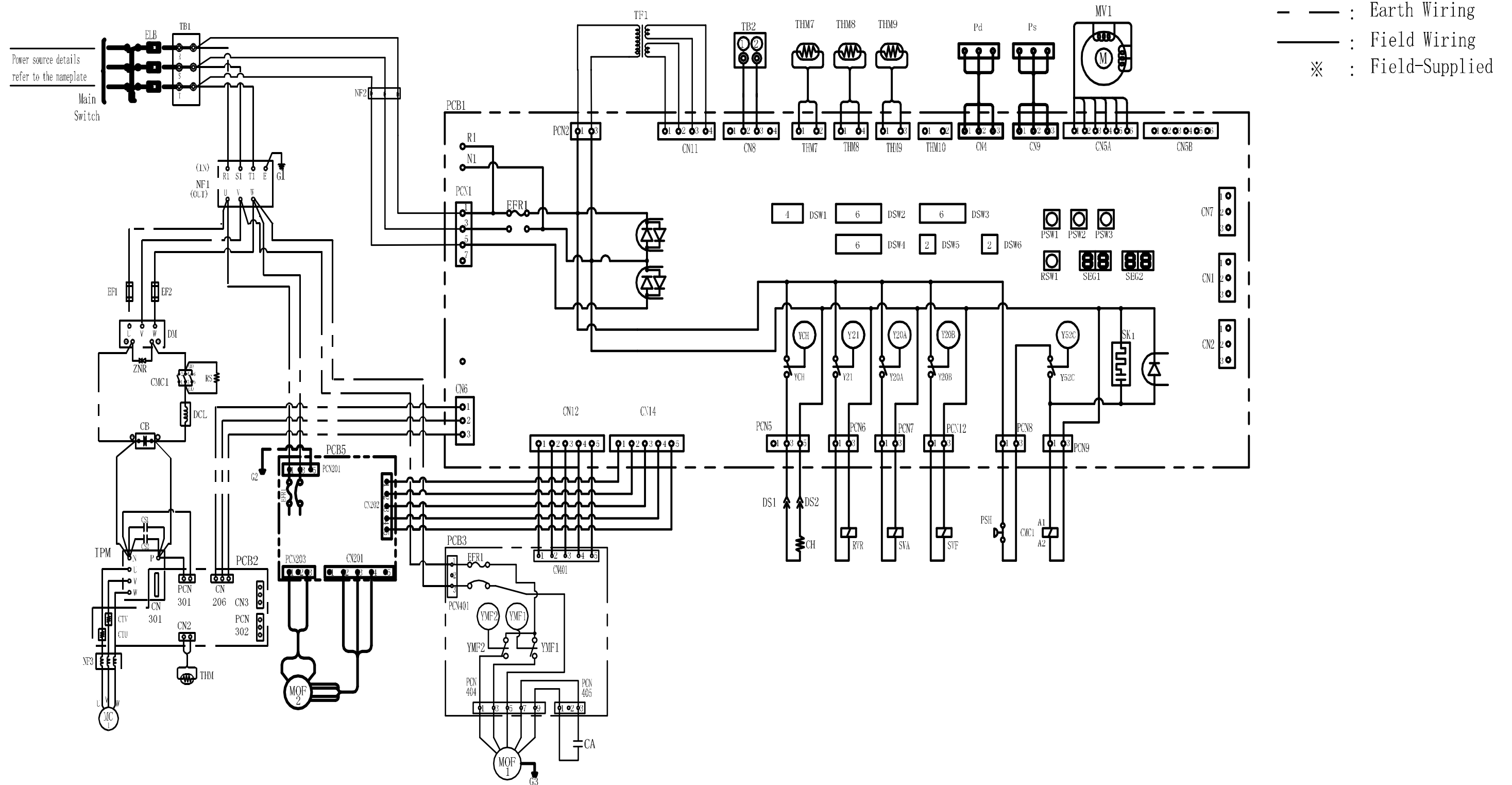
Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 3 minutes before electrical wiring work or a periodical check is performed.

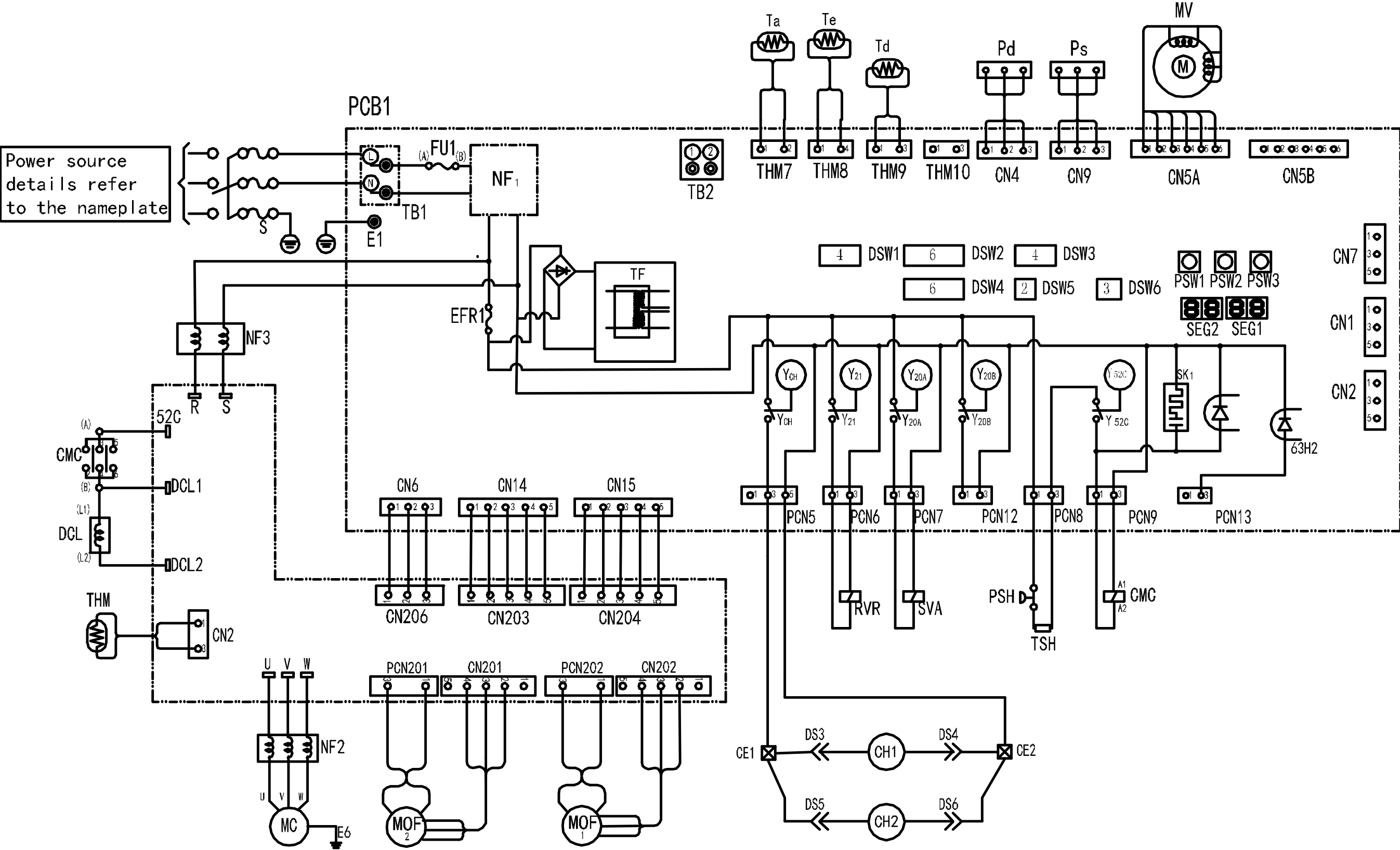


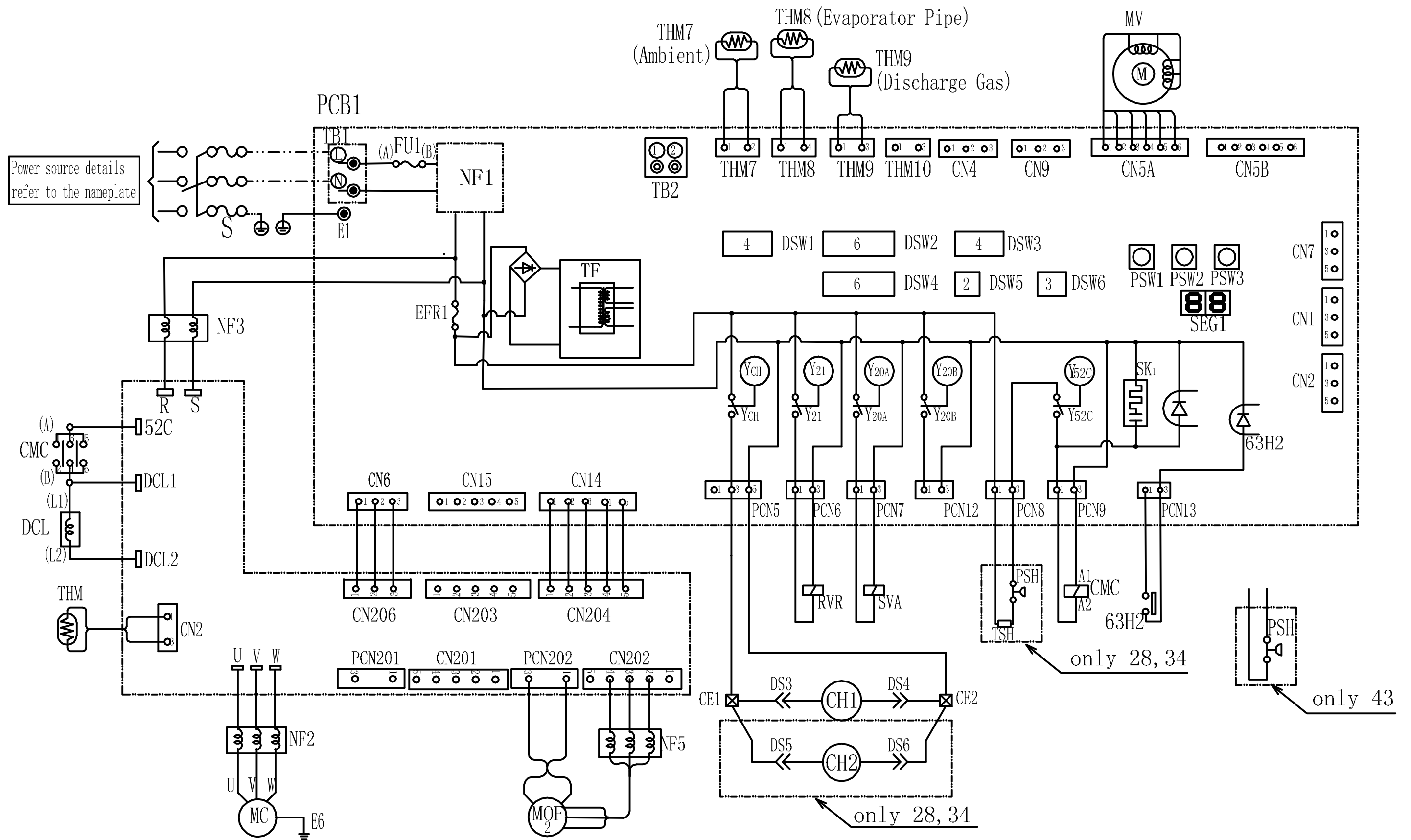




Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 1 minute before electrical wiring work or a periodical check is performed.







INSTALLATION

IMPORTANT NOTICE

- HISENSE pursues a policy of continuing improvement in design and performance of products. The right is therefore reserved to vary specifications without notice.
- HISENSE cannot anticipate every possible circumstance that might involve a potential hazard.
- This heat pump air conditioner is designed for standard air conditioning only. Do not use this heat pump air conditioner for other purposes such as drying clothes, refrigerating foods or for any other cooling or heating process.
- The installer and system specialist shall secure safety against leakage according to local regulations or standards. The following standards may be applicable if local regulations are not available. British Standard, BS4434.
- No part of this manual may be reproduced without written permission.
- Signal words (DANGER, WARNING and CAUTION) are used to identify levels of hazard seriousness. Definitions for identifying hazard levels are provided below with their respective signal words.

▲ DANGER

: Immediate hazards which WILL result in severe personal injury or death.

▲ WARNING

: Hazards or unsafe practices which COULD result in severe personal injury or death.

▲ CAUTION

: Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

NOTE

: Useful information for operation and/or maintenance.

- It is assumed that this heat pump air conditioner will be operated and serviced by English speaking people. If this is not the case, the customer should add safety, caution and operating signs in the native language.
- If you have any questions, contact your distributor or dealer of HISENSE.
- This manual gives a common description and information for this heat pump air conditioner which you operate as well as for other models.
- Install these air conditioners by local regulations or standards.
- This heat pump air conditioner has been designed for the following temperatures. Operate the heat pump air conditioner within this range .

Temperature		(°C)	
		Maximum	Minimum
Cooling Operation	Indoor	23 WB	15WB
	Outdoor	46 DB	-5 DB
Heating Operation	Indoor	30 DB	15 DB
	Outdoor	15 .5 WB	-20(-15)* WB

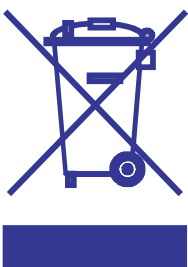
DB: Dry Bulb
WB: Wet Bulb

* -15°C Applicable to the following models only : AVW-28HJFH AVW-34HJFH AVW-43HJFH AVW-43HKFH.

NOTE:

These air conditioners only are applicable of cooling or heating mode,do not operate cool and heat mode together, if operate cool and heat mode at the same time,air conditioner system will be fluctuated for large difference in temperature for changing operate mode.

This manual should be considered as a permanent part of the air conditioning equipment and should remain with the air conditioning equipment.



Correct Disposal of this product

This marking indicates that this product should not be disposed with other household wastes. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

SAFETY SUMMARY

DANGER

- Use refrigerant R410A in the refrigerant cycle. Do not charge oxygen, acetylene or other flammable and poisonous gases into the refrigerant cycle when performing a leakage test or an air-tight test. These types of gases are extremely dangerous and can cause an explosion. It is recommended that nitrogen be used for these types of tests.
- Do not pour water into the indoor or outdoor unit. These products are equipped with electrical parts. If poured, it will cause a serious electrical shock.
- Do not touch or adjust safety devices inside the indoor or outdoor units. If these devices are touched or readjusted, it may cause a serious accident.
- Do not open the service cover or access panel for the indoor or outdoor units without turning OFF the main power supply.
- Refrigerant leakage can cause difficulty with breathing due to insufficient air. Turn OFF the main switch, extinguish any naked flames and contact your service contractor, if refrigerant leakage occurs.
- The installer and system specialist shall secure safety against refrigerant leakage according to local regulations or standards.
- Use an ELB (Electric Leakage Breaker). In the event of a fault, there is danger of an electric shock or a fire if it is not used.
- Do not install the outdoor unit where there is a high level of oil mist, flammable gases, salty air or harmful gases such as sulphur.

WARNING

- Do not use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately one (1) meter from the system.
- If circuit breaker or fuse is often activated, stop the system and contact your service contractor.
- Do not perform installation work, refrigerant piping work, drain piping and electrical wiring connection without referring to our installation manual. If the instructions are not followed, it may result in a water leakage, electric shock or a fire.
- Check that the ground wire is securely connected. If the unit is not correctly grounded, it lead electric shock. Do not connect the ground wiring to gas piping, water piping, lightning conductor or ground wiring for telephone.
- Connect a fuse of specified capacity.
- Do not put any foreign material on the unit or inside the unit.
- Make sure that the outdoor unit is not covered with snow or ice, before operation.
- Before performing any brazing work, check to ensure that there is no flammable material around.
When using refrigerant be sure to wear leather gloves to prevent cold injuries.
- Protect the wires, electrical parts, etc. from rats or other small animals.
If not protected, rats may gnaw at unprotected parts and which may lead to a fire.
- Fix the cables securely. External forces on the terminals could lead to a fire.

SAFETY SUMMARY

CAUTION

- Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.
- Supply electrical power to the system to energize the oil heater for 12 hours before start-up after a long shutdown.
- Do not step or put any material on the product.
- Provide a strong and correct foundation so that;
 - a. The outdoor unit is not on an incline.
 - b. Abnormal sound does not occur.
 - c. The outdoor unit will not fall down due to a strong wind or earthquake.
- The appliance is not to be used by children or person with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised they do not play with the appliance.

NOTE:

- It is recommended that the room be ventilated every 3 to 4 hours.
- The heating capacity of the heat pump unit is decreased according to the outdoor air temperature. Therefore, it is recommended that auxiliary heating equipment be used in the field when the unit is installed in a low temperature region.
- Operate the heat pump air conditioner within this range.
 - Regarding installation altitude below 1000 meters;
 - Regarding frequency of supply power within $\pm 1\%$ Hz of rated frequency.
 - Regarding transport storage temperature within $-25\sim 55^{\circ}\text{C}$.

CHECKING PRODUCT RECEIVED

- Upon receiving this product, inspect it for any shipping damage.
Claims for damage, either apparent or concealed, should be filed immediately with the shipping company.
- Check the model number, electrical characteristics (power supply, voltage and frequency) and accessories to determine if they are correct.
- The standard utilization of the unit shall be explained in these instructions.
- Therefore, the utilization of the unit other than those indicated in these instructions is not recommended.
- Please contact your local agent, as the occasion arises.
- HISENSE's liability shall not cover defects arising from the alteration performed by a customer without HISENSE's consent in a written form.

1. Safety Summary

! WARNING

- Do not perform installation work, refrigerant piping work, drain piping and electrical wiring connection without referring to the installation manual.
- Check that the ground wire is securely connected.
- Connect a fuse of specified capacity.

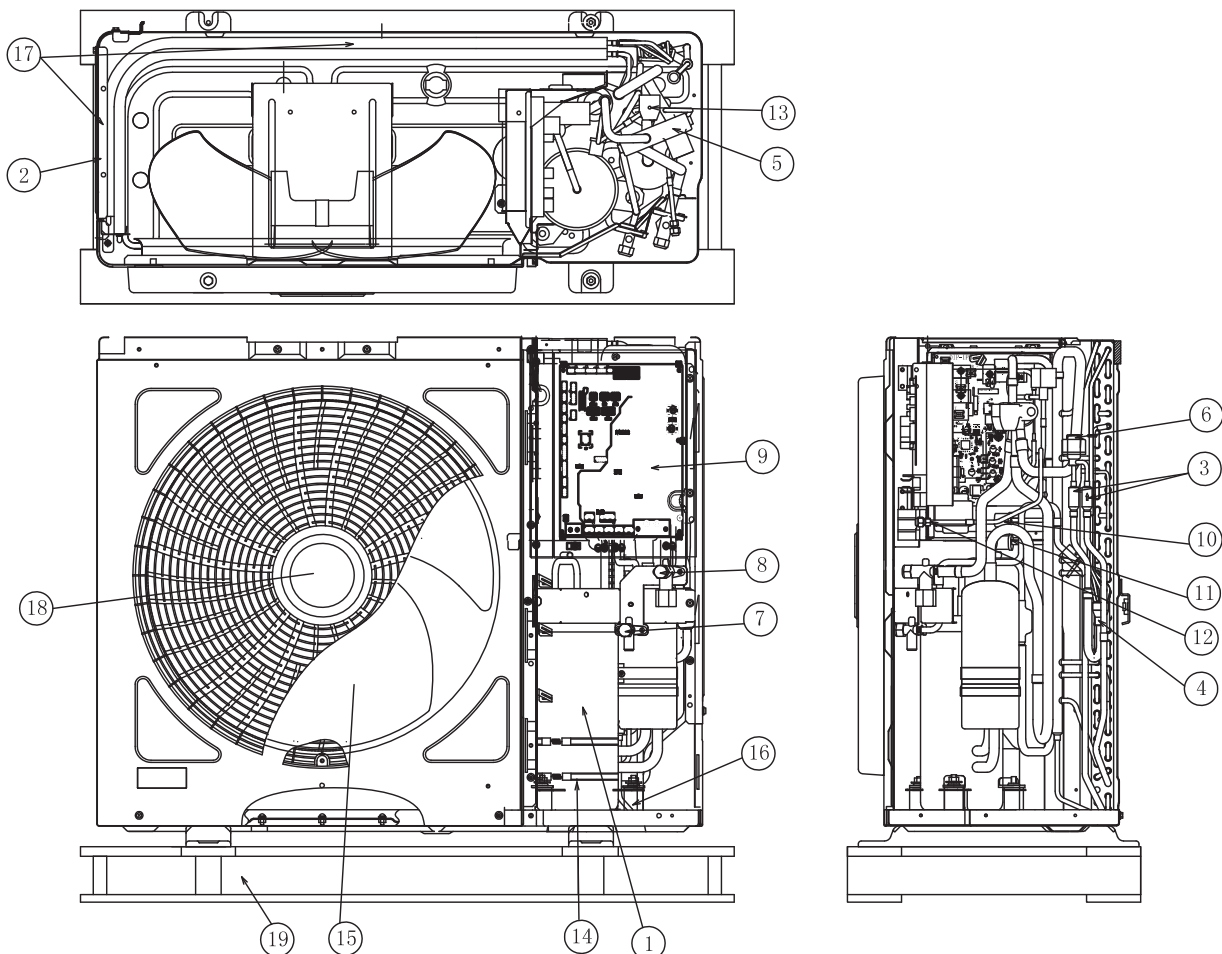
! CAUTION

Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.

2. Structure

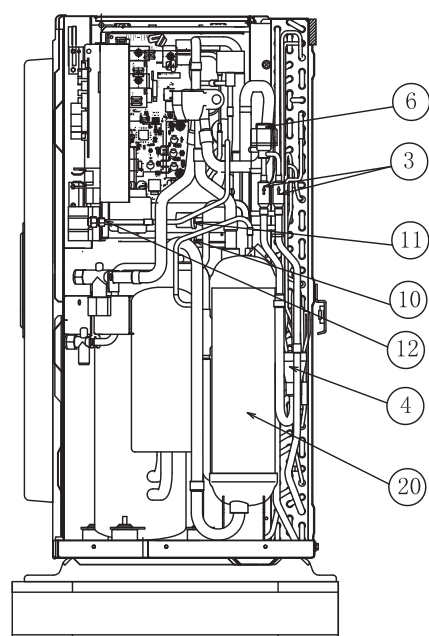
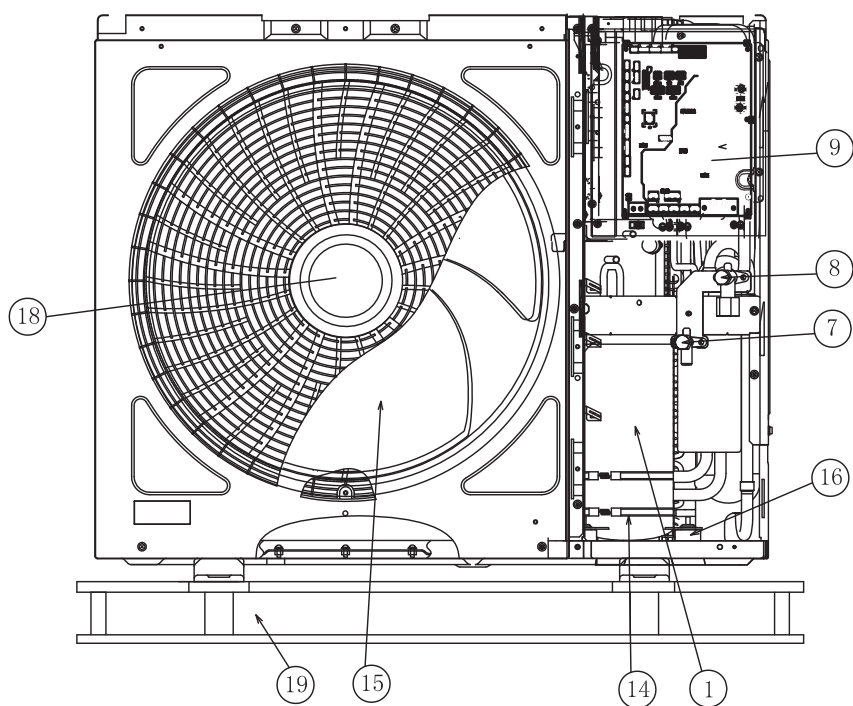
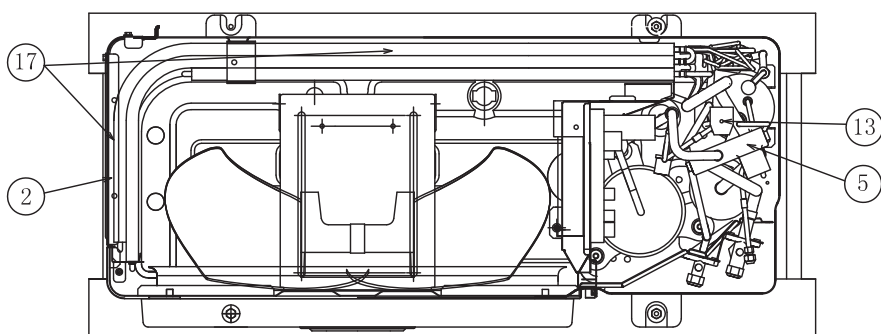
2.1 Outdoor Unit & Refrigerant Cycle

<Outdoor Unit -AVW-28HJFH>



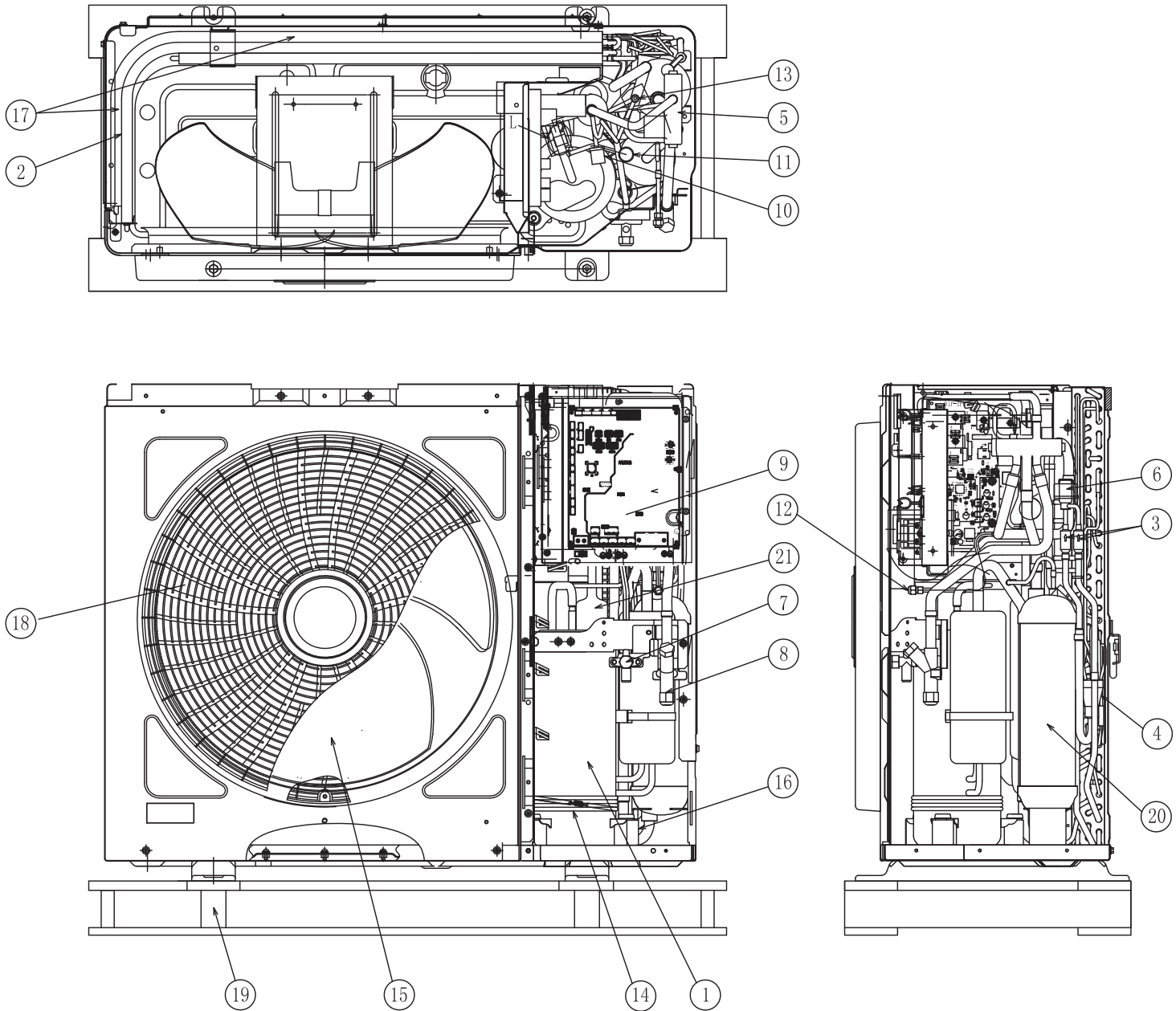
No.	Part Name	No.	Part Name
1	Compressor	14	Crankcase Heater
2	Heat Exchanger	15	Propeller Fan
3	Strainer	16	Vibration Absorbing Rubber
4	Distributor	17	Air Inlet
5	Reversing Valve	18	Air Outlet
6	Electrical Expansion Valve	19	Base assembly
7	Stop Valve for Liquid Line		
8	Stop Valve for Gas Line		
9	Electrical Box		
10	Pressure Switch for Controlling		
11	High Pressure Switch		
12	Check Joint for High/Low Pressure(Cool/Heat)		
13	Bypass Solenoid Valve		

<Outdoor Unit-AVW-34HJFH>



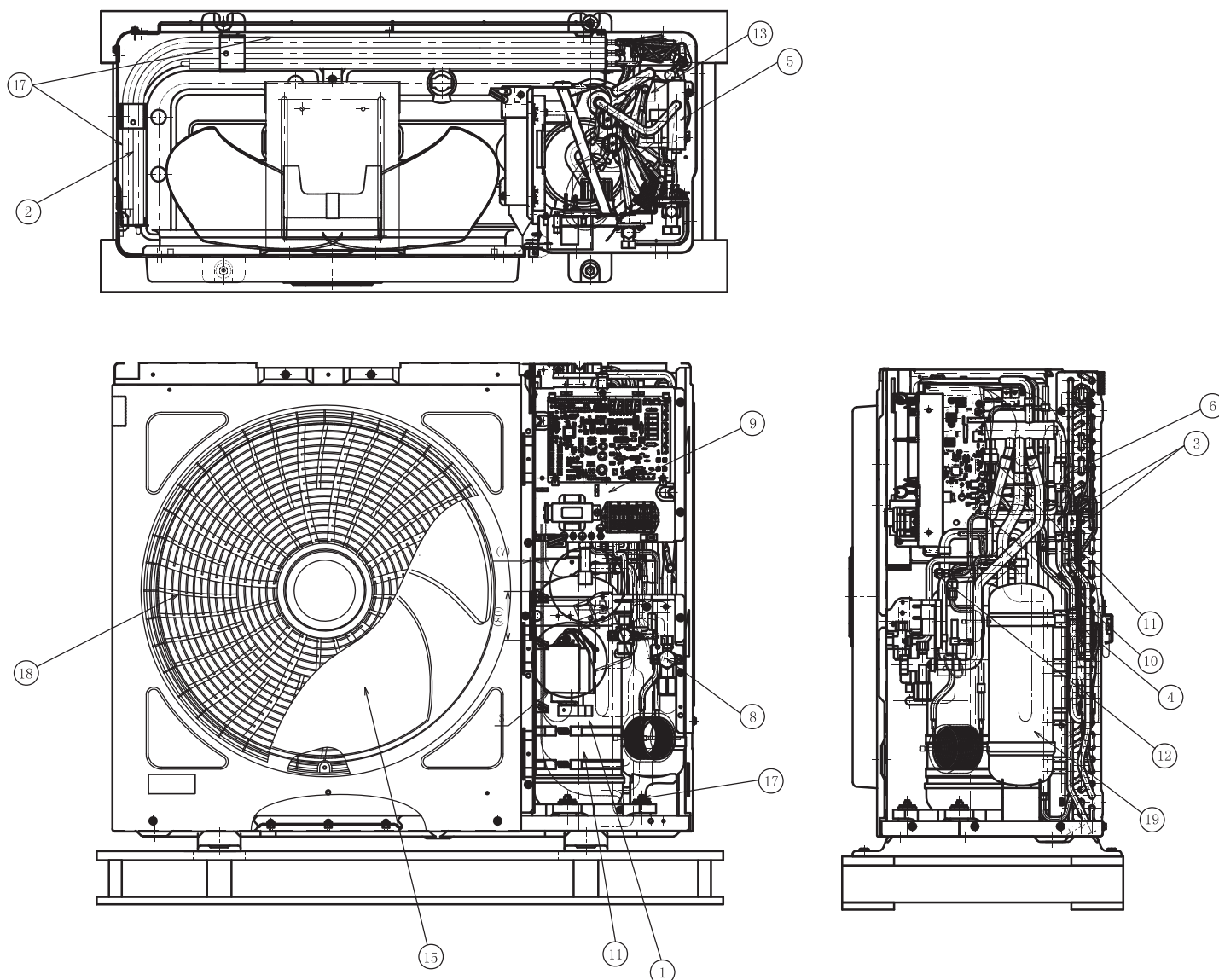
No.	Part Name	No.	Part Name
1	Compressor	14	Crankcase Heater
2	Heat Exchanger	15	Propeller Fan
3	Strainer	16	Vibration Absorbing Rubber
4	Distributor	17	Air Inlet
5	Reversing Valve	18	Air Outlet
6	Electrical Expansion Valve	19	Base assembly
7	Stop Valve for Liquid Line	20	Gas & Liquid Separator
8	Stop Valve for Gas Line		
9	Electrical Box		
10	Pressure Switch for Controlling		
11	High Pressure Switch		
12	Check Joint for High/Low Pressure(Cool/Heat)		
13	Bypass Solenoid Valve		

<Outdoor Unit-AVW-43HJFH>



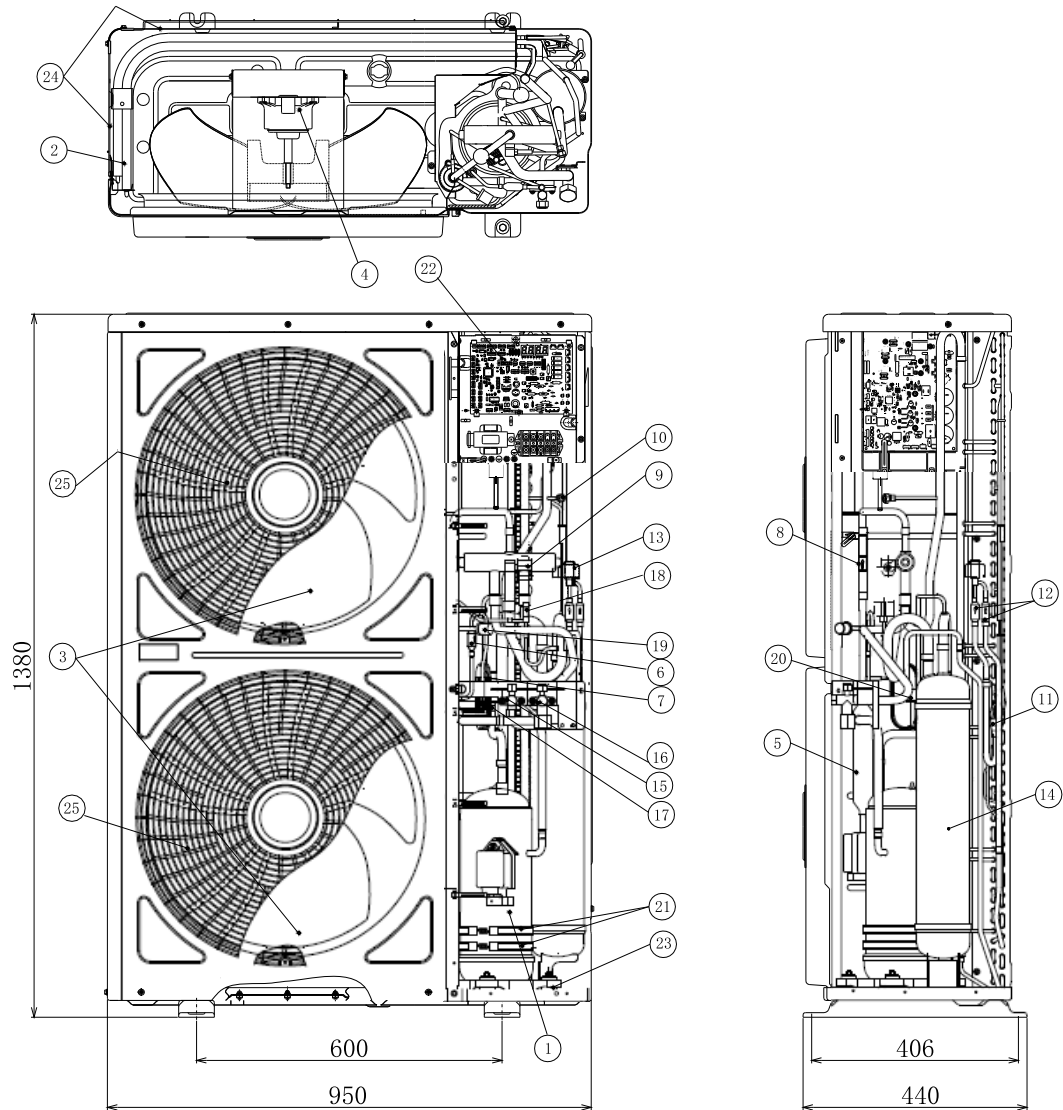
No.	Part Name	No.	Part Name
1	Compressor	14	Crankcase Heater
2	Heat Exchanger	15	Propeller Fan
3	Strainer	16	Vibration Absorbing Rubber
4	Distributor	17	Air Inlet
5	Reversing Valve	18	Air Outlet
6	Electrical Expansion Valve	19	Base assembly
7	Stop Valve for Liquid Line	20	Gas & Liquid Separator
8	Stop Valve for Gas Line	21	Muffler
9	Electrical Box		
10	Pressure Switch for Controlling		
11	High Pressure Switch		
12	Check Joint for High/Low Pressure(Cool/Heat)		
13	Bypass Solenoid Valve		

<Outdoor Unit-AVW-43HKFH>



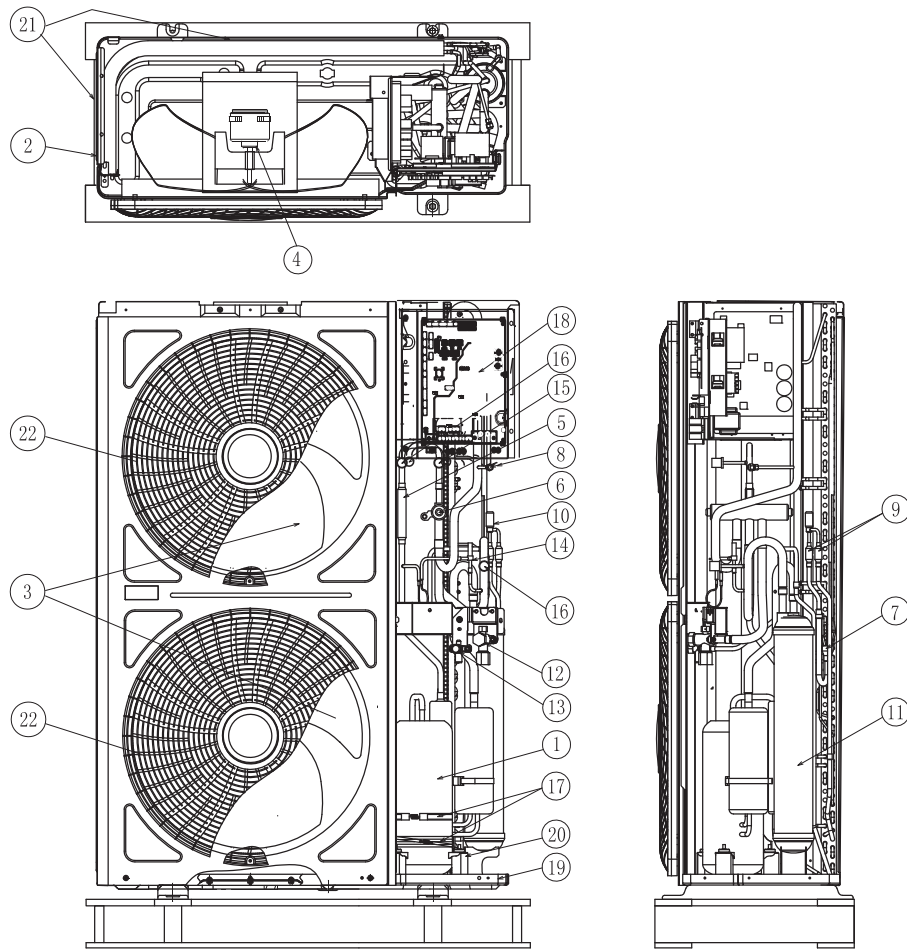
No	Part Name	No	Part Name
1	Compressor	13	High Pressure Switch for Protection
2	Heat Exchanger	14	Strainer
3	Strainer	15	Solenoid Valve(SVF)
4	Distributor	16	Solenoid Valve(SVA)
5	Reversing Valve	17	Pressure Sensor of High Pressure
6	Micro-Computer Control Expansion Valve	18	Pressure Sensor of Low Pressure
7	Stop Valve for Liquid Line	19	Crankcase Heater
8	Stop Valve for Gas Line	20	Propeller Fan
9	Accumulator	21	Vibration Absorbing Rubber
10	Electrical Box	22	Air Inlet
11	Oil Separator	23	Air Outlet
12	Check Joint for High/Low Pressure (Cool/Heat)		

<Outdoor Unit-AVW-48/54HKFH>



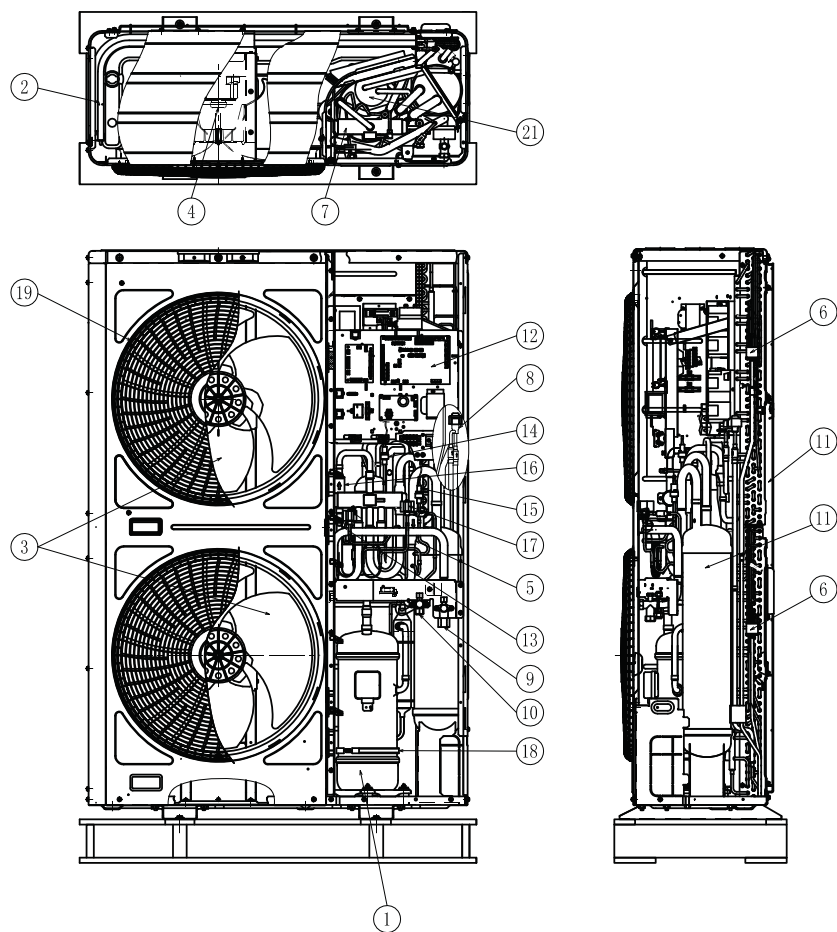
No.	Part Name	No.	Part Name
1	Compressor	14	Accumulator
2	Heat Exchanger	15	Stop Valve for Liquid Line
3	Propeller Fan	16	Stop Valve for Gas Line
4	Fan Motor	17	Strainer
5	Oil Separator	18	Bypass Solenoid Valve
6	Strainer	19	High Pressure Switch
7	Oil Return Capillary Tube	20	Pressure Sensor
8	Check Valve	21	Crankcase Heater
9	Reversing Valve	22	Electrical Box
10	Check Joint for High/Low Pressure(Cool/Heat)	23	Vibration Absorbing Rubber
11	Distributor	24	Air Inlet
12	Strainer	25	Air Outlet
13	Electrical Expansion Valve		

<Outdoor Unit-AVW-38/48/54HJFH>



No.	Part Name	No.	Part Name
1	Compressor	14	Bypass Solenoid Valve
2	Heat Exchanger	15	High Pressure Switch
3	Propeller Fan	16	Pressure Sensor
4	Fan Motor	17	Crankcase Heater
5	Check Valve	18	Electrical Box
6	Reversing Valve	19	Base assembly
7	Distributor	20	Vibration Absorbing Rubber
8	Check Joint for High/Low Pressure(Cool/Heat)	21	Air Inlet
9	Strainer	22	Air Outlet
10	Electrical Expansion Valve	23	
11	Gas & Liquid Separator	24	
12	Stop Valve for Gas Line	25	
13	Stop Valve for Liquid Line	26	

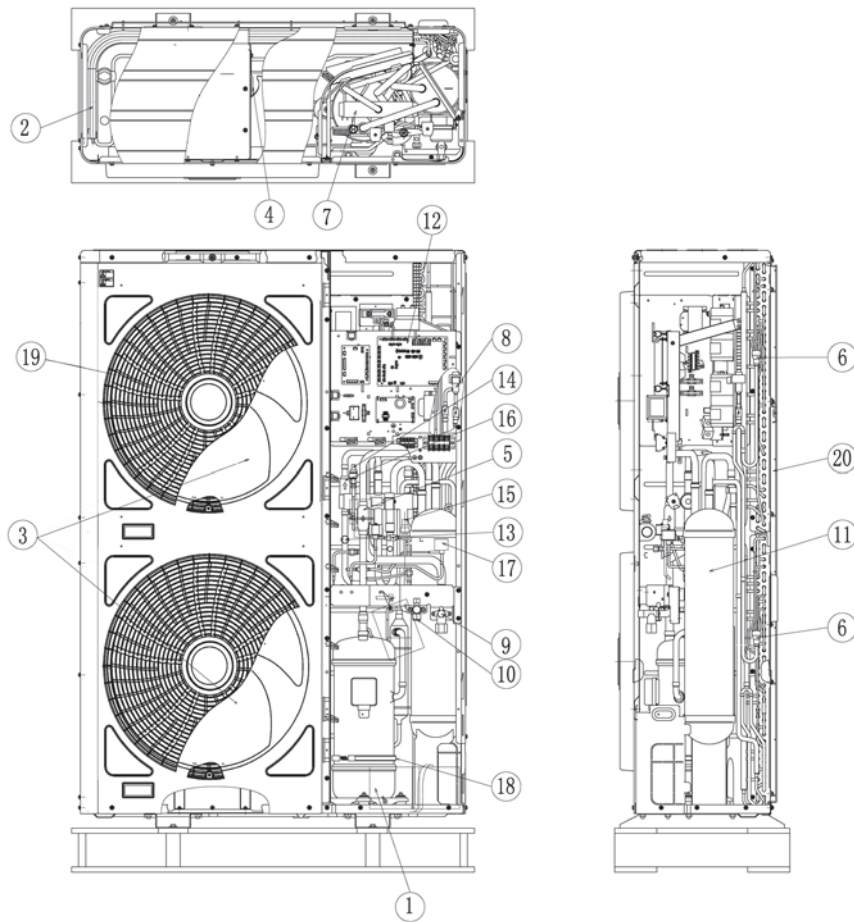
<Outdoor Unit> AVW-76/96/114HKFH



No.	Part Name	No.	Part Name
1	Compressor	12	Electrical Box
2	Heat Exchanger	13	High Pressure Switch for Protection
3	Propeller Fan	14	High Pressure Sensor
4	Fan Motor	15	Low Pressure Sensor
5	Strainer	16	Check Valve
6	Distributor	17	Solenoid Valve
7	Reversing Valve	18	Crankcase Heater
8	Micro-Computer Control Expansion Valve	19	Air Outlet
9	Stop Valve for Gas Line	20	Air Inlet
10	Stop Valve for Liquid Line	21	High Pressure Reservoir
11	Accumulator		

<Outdoor Unit>

AVW-76/96/114H9FH



No.	Part Name	No.	Part Name
1	Compressor	12	Electrical Box
2	Heat Exchanger	13	High Pressure Switch for Protection
3	Propeller Fan	14	Low Pressure Sensor
4	Fan Motor	15	High Pressure Sensor
5	Strainer	16	Check Valve
6	Distributor	17	Solenoid Valve
7	Reversing Valve	18	Crankcase Heater
8	Micro-Computer Control Expansion Valve	19	Air Outlet
9	Stop Valve for Gas Line	20	Air Inlet
10	Stop Valve for Liquid Line	21	
11	Accumulator		

2. Structure

2.1 Outdoor Unit and Refrigerant Cycle

<Refrigerant Cycle>

Refer to section 9.1

2.2 Necessary Tools and Instrument List for Installation

No.	Tool	No.	Tool	No.	Tool	No.	Tool
1	Handsaw	6	Copper Pipe Bender	11	Spanner	16	Leveller
2	Phillips Screwdriver	7	Manual Water Pump	12	Charging Cylinder	17	Clamper for Solderless Terminals
3	Vacuum Pump	8	Pipe Cutter	13	Gauge Manifold	18	Hoist (for Indoor Unit)
4	Refrigerant Gas Hose	9	Brazing Kit	14	Cutter for Wires	19	Ammeter
5	Megohmmeter	10	Hexagon Wrench	15	Gas Leak Detector	20	Voltage Meter

Use tools and measuring instruments only for the new refrigerant which is directly touch to refrigerant.

◇: Interchangeability is available with current R22

●: only for Refrigerant R410A (No Interchangeability with R22)

×: Prohibited

◆: only for Refrigerant R407C (No Interchangeability with R22)

Measuring Instrument and Tool		Interchangeability with R22		Reason of Non-Interchangeability and Attention (★: Strictly Required)	Use
		R410A	R407C		
Refrigerant Pipe	Pipe Cutter Chamfering Reamer	◇	◇	-	Cutting Pipe Removing Burrs
	Flaring Tool	◇ ●	◇	* The flaring tools for R407C are applicable to R22.	Flaring for Tubes
	Extrusion Adjustment Gauge	●	-	* If using flaring tube, make dimension of tube larger for R410A. * In case of material 1/2H, flaring is not available.	Dimensional Control for Extruded Portion of Tube after Flaring
	Pipe Bender	◇	◇	* In case of material 1/2H, bending is not available. Use elbow for bend and braze.	Bending
	Expanding Tool	◇	◇	* In case of material 1/2H, expanding of tube is not available. Use socket for connecting tube.	Expanding Tubes
	Torque Wrench	●	◇	* For φ12.7, φ15.88, spanner size is up 2mm.	Connection of Flare Nut
		◇	◇	* For φ6.35, φ9.53, φ19.05, spanner size is the same.	
	Brazing Tool	◇	◇	* Perform correct brazing work.	Brazing for Tubes
	Nitrogen Gas	◇	◇	* Strict Control against Contamin (Blow nitrogen during brazing.)	Prevention from Oxidation during Brazing
Vacuum Drying Refrigerant Charge	Lubrication Oil (for Flare Surface)	●	◆	* Use a synthetic oil which is equivalent to the oil used in the refrigeration cycle. * Synthetic oil absorbs moisture quickly.	Applying Oil to the Flared Surface
	Refrigerant Cylinder	●	◆	* Check refrigerant cylinder color. ★ Liquid refrigerant charging is required regarding zeotropic refrigerant.	Refrigerant Charging
	Vacuum Pump	◇	◇	★ The current ones are applicable. However, it is required to mount a vacuum pump adapter which can prevent from reverse flow when a vacuum pump stops, resulting in no reverse oil flow.	Vacuum Pumping
	Adapter for Vacuum Pump	* ●	◆		
	Manifold Valve	●	◆	* No interchangeability is available due to higher pressures when compared with R22.	Vacuum Pumping, Vacuum Holding, Refrigerant Charging and Check of Pressures
	Charging Hose	●	◆	* Do not use current ones to the different refrigerant. If used, mineral oil will flow into the cycle and cause sludges, resulting in clogging or compressor failure. Connection diameter is different; R410A: UNF1/2, R407C: UNF7/16.	
	Charging Cylinder	×	×	* Use the weight scale.	-
	Weight Scale	◇	◇	-	Measuring Instrument for Refrigerant Charging
	Refrigerant Gas Leakage Detector	* ●	◆	* The current gas leakage detector (R22) is not applicable due to different detecting method.	Gas Leakage Check

*: Interchangeability with R407C.

3. Transportation and Handling

3.1 Indoor Unit&Outdoor Unit Matching

- Below Indoor Unit matching Hi SmartH outdoor unit.

Table 3 1.Indoor Unit Model

Indoor Unit Type	Nominal Power(kBtu/h)																	
	05	07	09	12	14	15	17	18	19	22	24	27	30	38	48	54	76	96
Ceiling Ducted Type (Low Static Pressure)		○	○	○	○		○	○		○	○	○	○	○	○	○	○	○
Ceiling Ducted Type (High Static Pressure)		○	○	○	○		○	○		○	○	○	○	○	○	○	○	○
Low-Height Ceiling Ducted Type		○	○	○	○		○	○		○	○							
Low-Height Ceiling Ducted Type (DC)	○	○	○	○	○		○	○		○	○							
Slim Ceiling Ducted Type		○	○	○	○													
1-Way Cassette Type		○	○	○	○		○			○								
2-Way Cassette Type		○	○	○	○			○			○							
4-Way Cassette Type			○	○	○		○	○		○	○	○	○	○	○	○		
mini 4-Way Cassette Type	○	○	○	○		○	○		○									
Wall-Mounted Type		○	○	○	○		○	○		○	○							
Ceiling and Floor Type							○	○		○	○	○	○	○	○			
Floor-Concealed Type			○		○			○			○							
Console Type	○	○	○	○		○	○											

○ : Available

- A maximum total capacity of 125% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

Table System Combination

Model	Minimum Individual Operation Capacity (kBtu/h)	Minimum Combination Quantity	Maximum Combination Quantity	Recommend Combination Quantity	Combination Range
AVW-28HJFH	05	1	5	3	50%~125%
AVW-34HJFH	05	1	6	4	
AVW-43HJFH	05	1	8	5	
AVW-43HKFH	05	1	8	5	

- A maximum total capacity of 150% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

Table System Combination

Model	Minimum Individual Operation Capacity (kBtu/h)	Minimum Combination Quantity	Maximum Combination Quantity	Recommend Combination Quantity	Combination Range
AVW-38HJFH	05	1	9	5	50%~150%
AVW-48HJFH	05	1	11	5	
AVW-54HJFH	05	1	11	5	
AVW-48HKFH	05	1	11	5	
AVW-54HKFH	05	1	11	5	

- A maximum total capacity of 150% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

Outdoor Unit Model	Indoor Unit				
	Minimum Combination Capacity (kBtu/h)	Maximum Combination Capacity (kBtu/h)	Combination Quantity	Recommend Combination Quantity	Minimum Individual Operation Capacity (kBtu/h)
AVW-76HKFH	38	114	1~15	8	05
AVW-96HKFH	48	144	1~17	10	05
AVW-114HKFH	57	171	1~19	10	05

- A maximum total capacity of 130% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

Outdoor Unit Model	Indoor Unit			
	Minimum Combination Capacity (kBtu/h)	Maximum Combination Capacity (kBtu/h)	Combination Quantity	Minimum Individual Operation Capacity (kBtu/h)
AVW-76H9FH	38	98	1 ~ 10	07
AVW-96H9FH	48	124	1 ~ 10	07
AVW-114H9FH	57	148	1 ~ 10	07

- (*1) The connect ratio should not be bigger than 100% for systems where all indoor units may operate at the same time; otherwise, overload operation may occur in harsh conditions or narrow range.
- (*2) Capacity ratio must be 100% when only one indoor unit is connected, and the refrigerant additional charge should be reduced according to the indoor unit type.
- (*3) The capacity of indoor unit should be modified when the capacity ratio exceed 100% or the combination quantity exceed the recommend quantity.

Modified capacity = Nominal capacity × Correction factor

Correction factors are defined as follows:

Indoor Unit Type	Model	Correction Factor
Wall mounted	07/09	2.0
2-way cassette	07/09/12	2.0

3.2 Transportation

Transport the product as close to the installation location as practical before unpacking.

!

CAUTION

Do not put any material on the product.
Apply two lifting wires onto the outdoor unit,
when lifting it by crane.

- Hanging Method
When hanging the unit, ensure a balance of the unit, check safety and lift up smoothly.
(1) Do not remove any packing materials.
(2) Hang the unit under packing condition with two (2) ropes, as shown in Fig. 3.1.

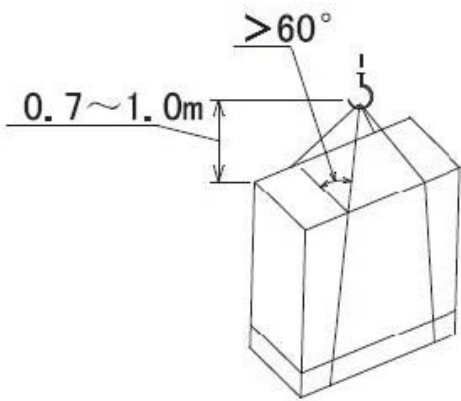


Fig. 3.1 Hanging Work for Transportation

!

CAUTION

If have no package to move,Please protect with cloth or paper

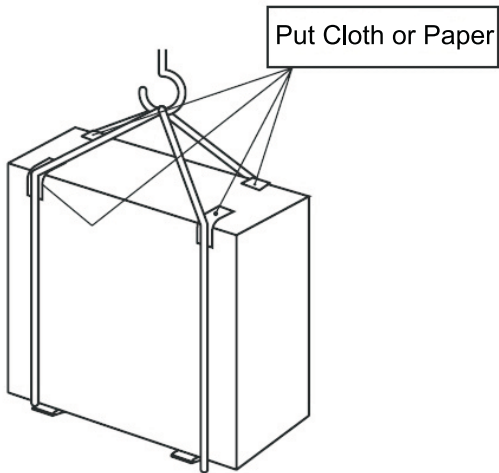


Fig.3.2 Transportation for no wooden base

(kg)

Outdoor Unit Model (KBut/h)	Net Weight
AVW-28HJFH	65
AVW-34HJFH	73
AVW-43HJFH	78
AVW-38HJFH	93
AVW-48HJFH	95
AVW-54HJFH	97
AVW-43HKFH	84
AVW-48HKFH	103
AVW-54HKFH	103
AVW-76HKFH	160
AVW-96HKFH	170
AVW-114HKFH	170
AVW-76H9FH	168
AVW-96H9FH	168
AVW-114H9FH	171

!

WARNING

Do not put any foreign material into the outdoor unit and check to ensure that none exists in the outdoor unit before the installation and test run. Otherwise, a fire or failure, etc. may occur.

4. Outdoor Unit Installation

4.1 Factory-Supplied Accessories

Check to ensure that the following accessories are packed with the outdoor unit.

Table 4.1 Factory-Supplied Accessories

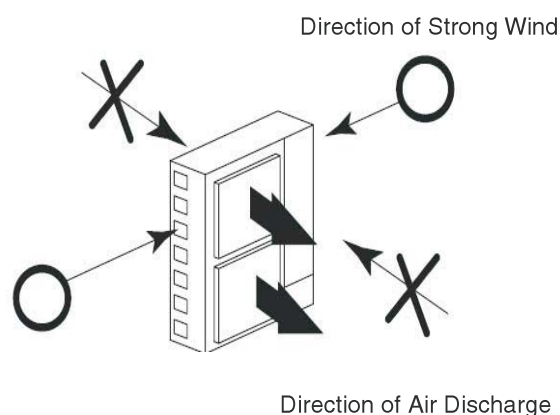
Accesso	Q'ty	Recommend
Washer	4	for Anchor Bolts

NOTE

If any of these accessories are not packed with the unit, please contact your contractor.

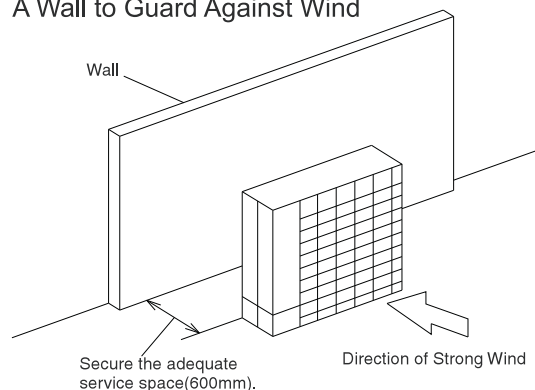
4.2 Initial Check

- Install the outdoor unit where good ventilation is available, and where it is dry.
- Install the outdoor unit where the sound or the discharge air from the outdoor unit does not affect neighbors or surrounding vegetation. The operating sound at the rear or right/left sides is higher than the value in the catalog at the front side.
- Check to ensure that the foundation is flat, level and sufficiently strong.
- Do not install the outdoor unit where there is a high level of oil mist, salty air or harmful gases such as sulphur.
- Do not install the outdoor unit where the electromagnetic wave is directly radiated to the electrical box.
- Install the outdoor unit as far as practical, being at least 3 meters from the electromagnetic wave radiator.
- When installing the outdoor unit in snow-covered areas, mount the field-supplied hoods at the discharge side of the outdoor unit and the inlet side of the heat exchanger.
- Install the outdoor unit where it is in the shade or it will not be exposed to direct sunshine or direct radiation from high temperature heat source.
- Do not install the outdoor unit where dust or other contamination could block the outdoor heat exchanger.
- Install the outdoor unit in a space with limited access to general public.
- Do not install the outdoor unit in a space where a seasonal wind directly blows to the outdoor heat exchanger or a wind from a building space directly blows to the outdoor fan.



- In case of installation in the open spaces unavoidably where there is no buildings or surrounding structures, adopt the wind guard set or install near the wall to avoid facing the wind directly. Ensure that the service space should be secured.

A Wall to Guard Against Wind



NOTE:

If the extreme strong wind blows directly against the air discharge portion, the fan may rotate reversely and be damaged.

CAUTION

Aluminum fins have very sharp edges. Pay attention to the fins to avoid any injury.

NOTE

Install the outdoor unit on a roof or in an area where people except service engineers can not touch the outdoor unit.

4.3 Service Space

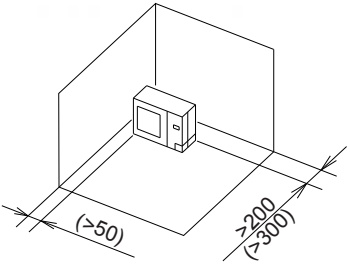
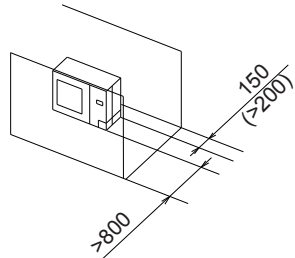
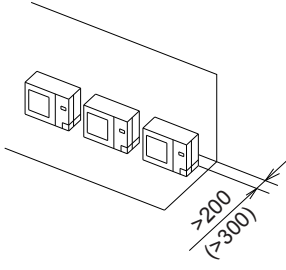
Install the outdoor unit with a sufficient space around the outdoor unit for operation and maintenance as shown below.

AVW-28/34/43HJFH,AVW-43HKFH

Obstacles in Above

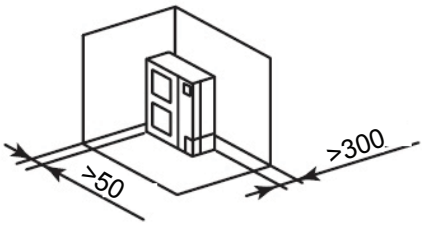
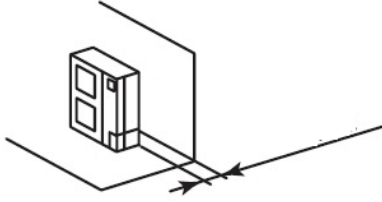
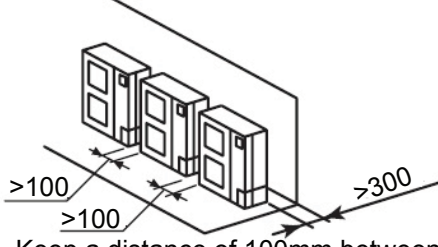
When obstacles is in above, it is should be ensured that the distance between the top of units and obstacles is more than 500mm, besides the space for installation and maintenance is satisfied.

(mm)

Single Installation	Single Installation	Multiple Installation
Upper Side is Open  Keep a distance of 100mm between service cover and wall. The dimension in "()" is for the model of 34 and 43.	Above of two sides of the unit is open. (Occasion of obstacles in the obverse side of the units)  The dimension in "()" is for the model of 34 and 43.	Upper Side is Open  Keep a distance of more than 100mm between other units. The dimension in "()" is for the model of 34 and 43.

AVW-38/48/54HJFH,AVW-48/54HKFH

(mm)

Single Installation	Single Installation	Multiple Installation
Upper Side is Open  Keep a distance of 100mm between right side at least	Left,Right&Upper Side is Open 	Multiple Installation  Keep a distance of 100mm between right side at least

AVW-76/96/114HKFH,AVW-76/96/114H9FH

Install the outdoor unit with a sufficient space around the outdoor unit for operation and maintenance as shown below.

(1) Obstacles on Inlet Side

(a) Upper Side is Open.

(mm)

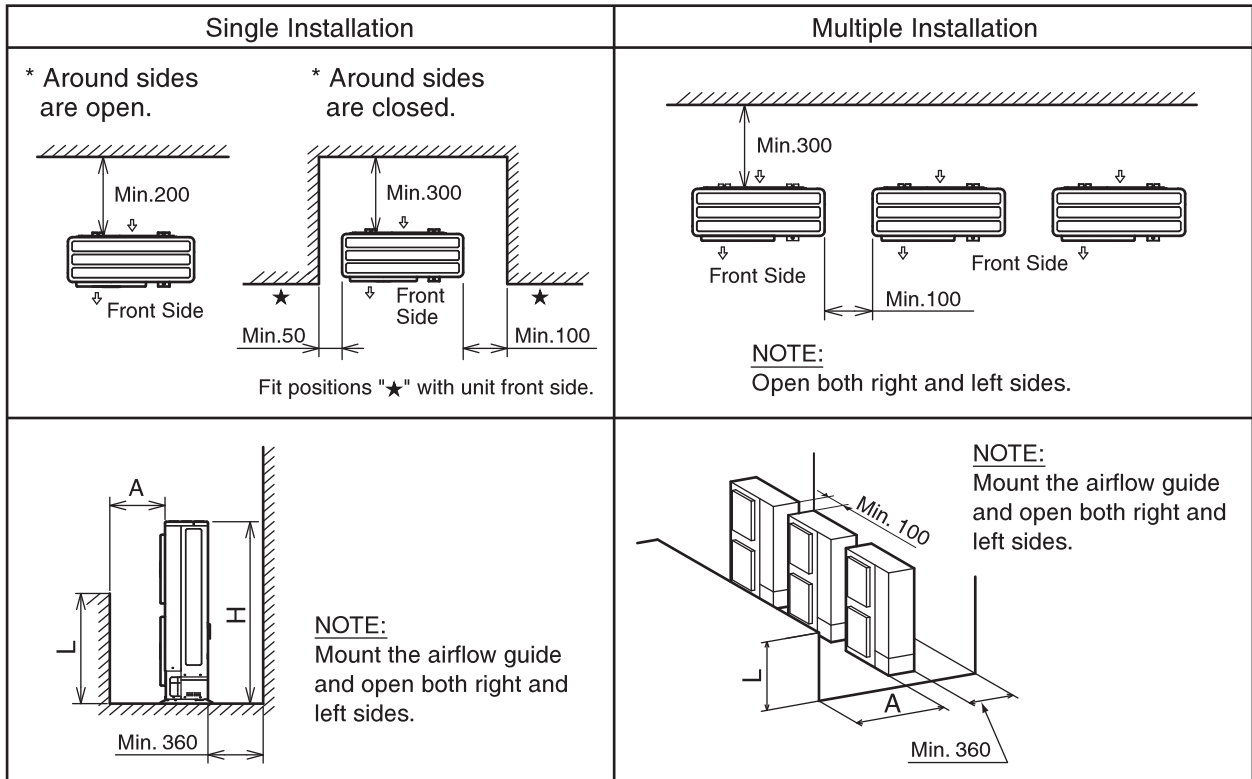


Fig. 4.1 Installation Space (1)

(b) Obstacles in Above

(mm)

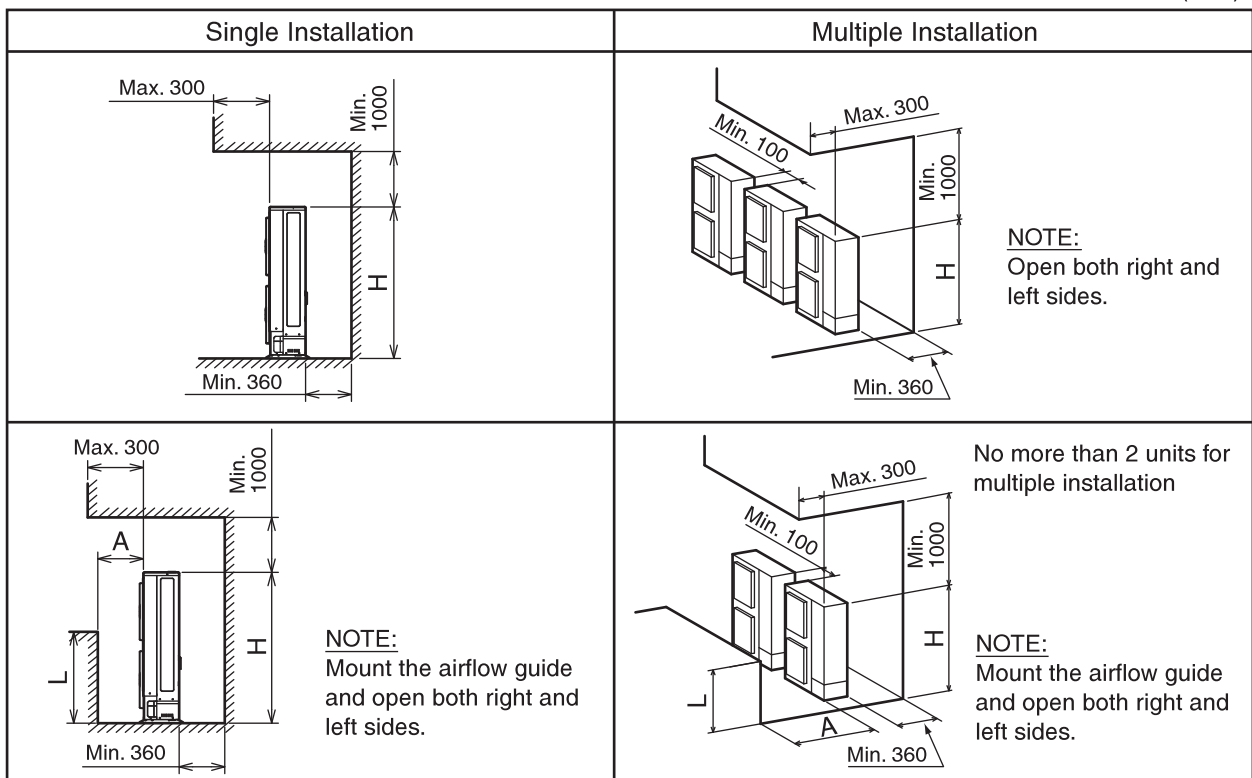


Fig. 4.2 Installation Space(2)

(2) Obstacles on Discharge Side

(a) Upper Side is Open.

(mm)

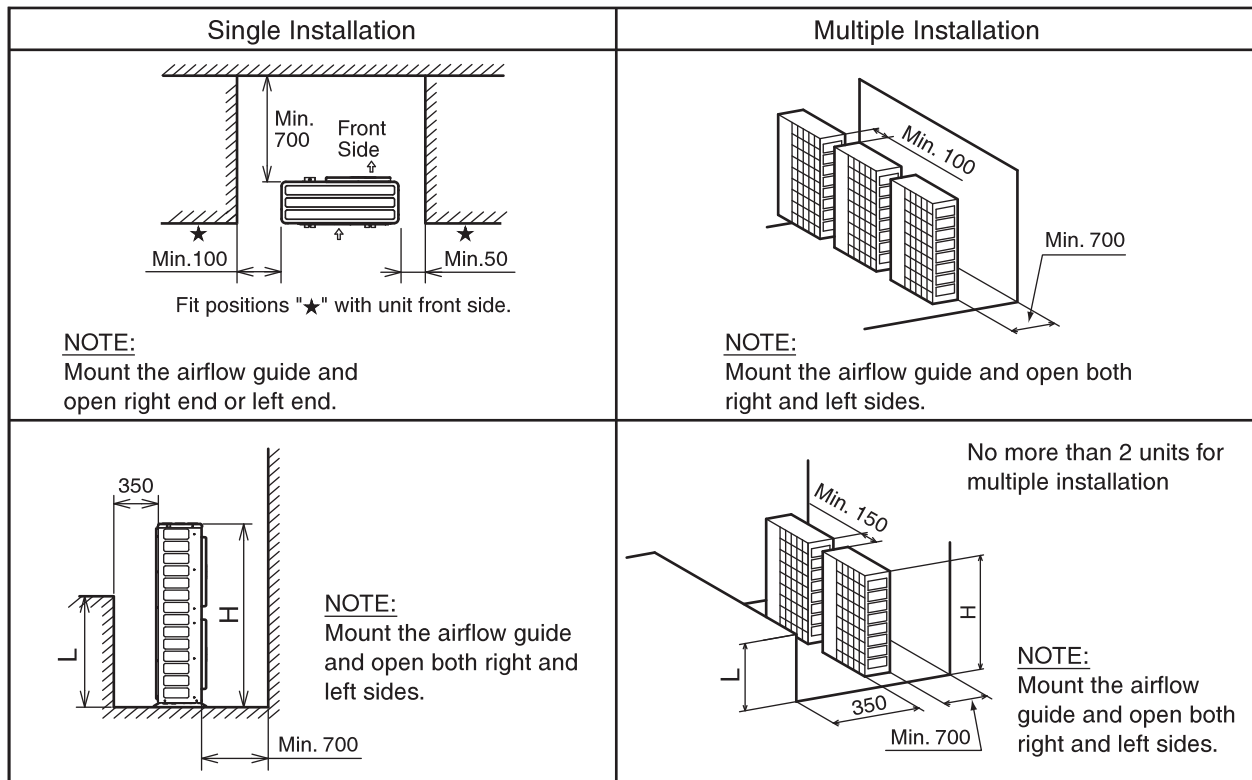
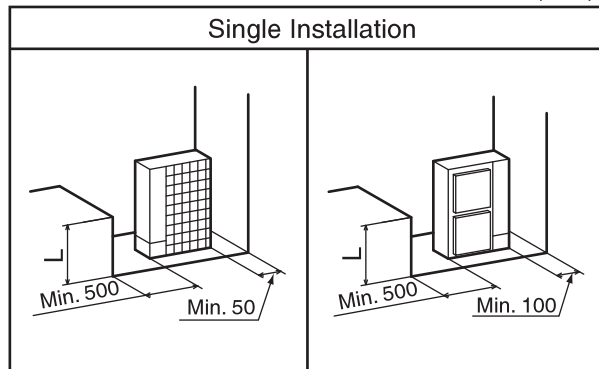


Fig. 4.3 Installation Space (3)

(3) Obstacles in Right and Left

(a) Upper Side is Open.

(mm)



(b) Obstacles in Above

(mm)

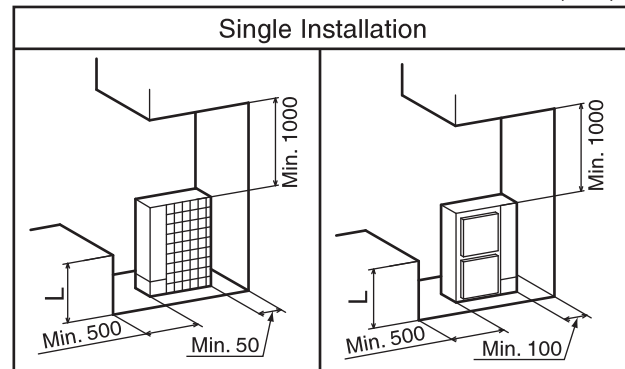


Fig. 4.4 Installation Space (4)

NOTE

If L is larger than H, mount the units on a base so that H is greater or equal to L.

H: Unit Height (1650mm) + Base Concrete Height

L	A
$0 < L \leq 1/2H$	600 or more
$1/2H < L \leq H$	1400 or more

In this situation ensure that the base is closed and does not allow the airflow to short circuit. In each case, install the outdoor unit so that the discharge flow is not short-circuited.

(4) Multi-Row and Multiple Installations

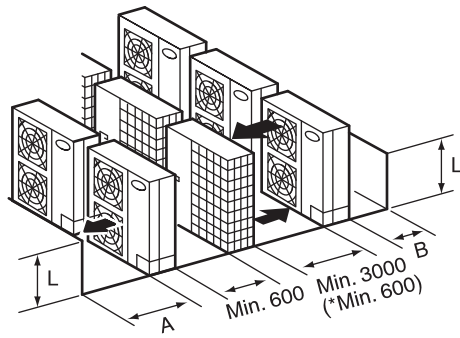


Fig. 4.5 Installation Space (5)

Keep a distance of more than 15mm between other units and do not put obstacles on the right and left sides. Dimension B is as shown below.

L	A	B
$0 < L \leq 1/2H$	600 or more	300 or more
$1/2H < L \leq H$	1400 or more	350 or more

NOTE:

If L is larger than H, mount the units on a base so that H is greater or equal to L.

In this situation ensure that the base is closed and does not allow the airflow to short circuit.

When the mark * dimension is secured, be sure to mount the airflow guide.

4.4 Installation Work

- (1) Secure the outdoor unit with the anchor bolts.

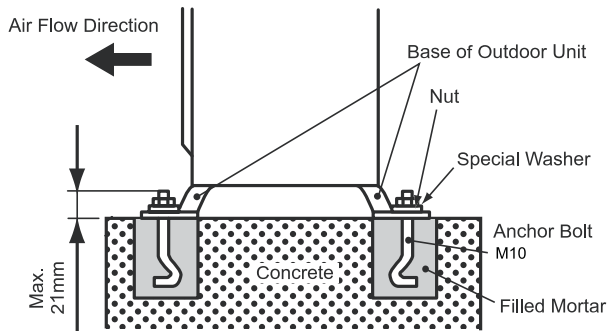


Fig. 4.2 Installation of Anchor Bolts

Fix the outdoor unit to the anchor bolts by special washer of factory-supplied accessory.

- (2) When installing the outdoor unit, fix the unit by anchor bolts. Refer to Fig. 4.3

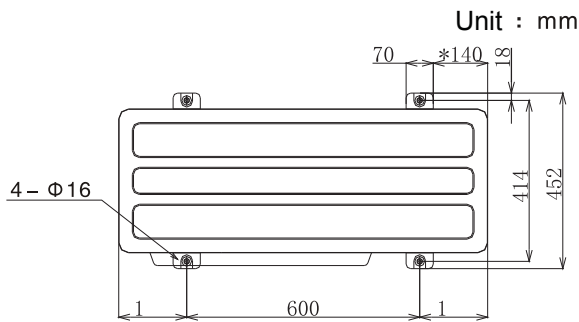


Fig. 4.3.a Position of Anchor Bolts

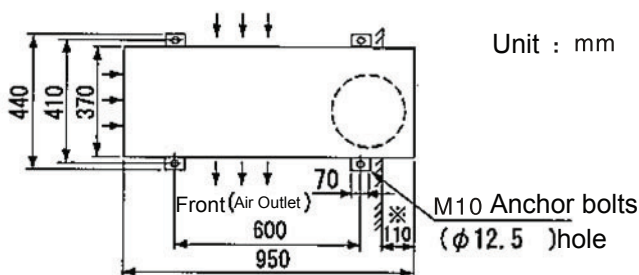


Fig. 4.3.b Position of Anchor Bolts

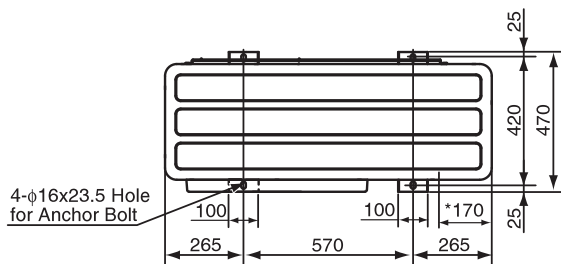


Fig. 4.3.c Position of Anchor Bolts

NOTE:

When the mark * dimension is secured, piping work from bottom side is easy without interference of foundation.

- (3) Example of fixing outdoor unit by anchor bolts.

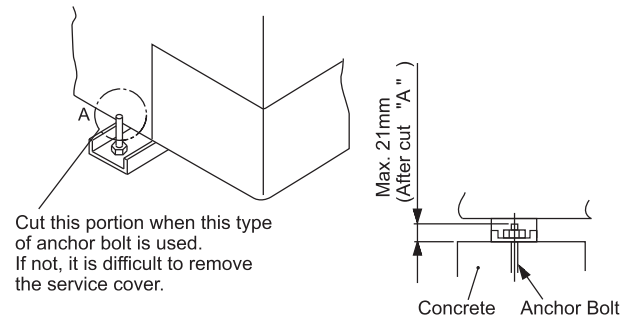


Fig. 4.4 Fixing Example

- (4) Fix the outdoor unit firmly so that declining, making noise, and falling down by strong wind or earthquake is avoided.

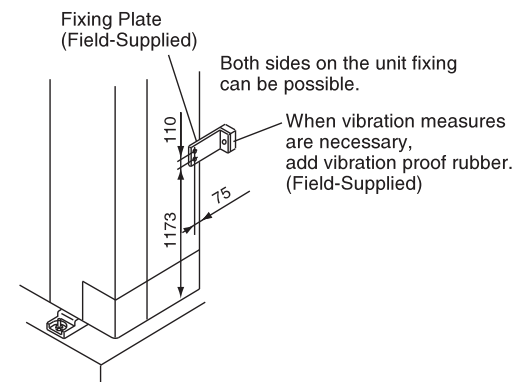
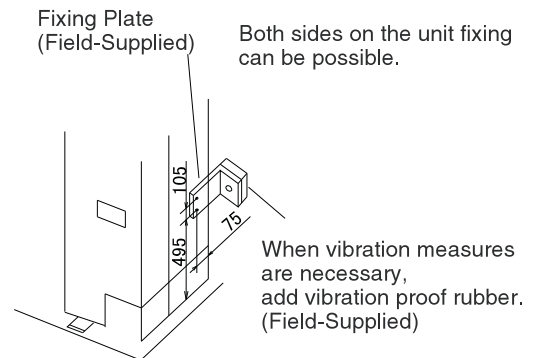
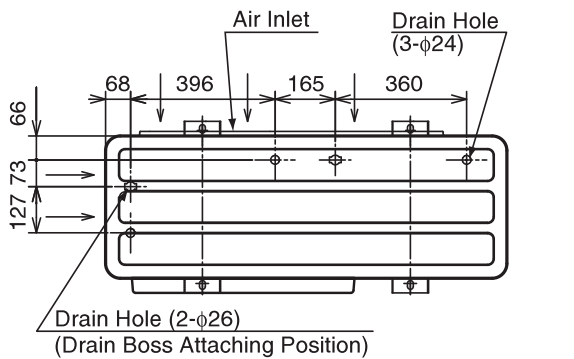


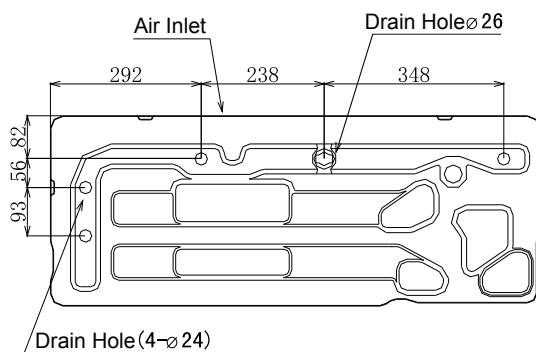
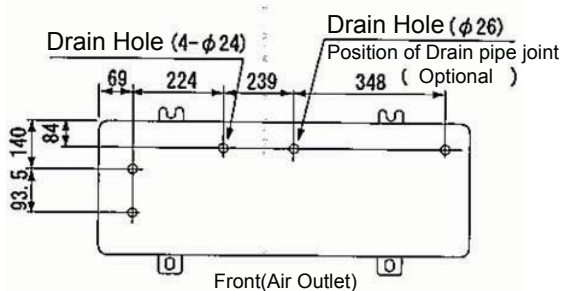
Fig. 4.5 Additional Fixing Arrangement

- (5) When installing the unit on a roof or a veranda, drain water sometimes turns to ice in a cold morning. Therefore, avoid draining in an area where people often use because it is slippery.

- (6) In case of the drain piping is necessary for the outdoor unit, use the drain-kit (DC-01Q :Optional Parts) .

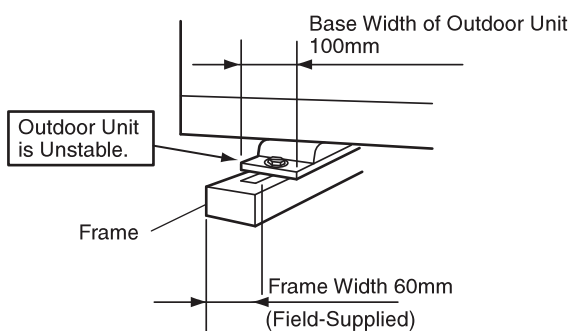


(unit:mm)

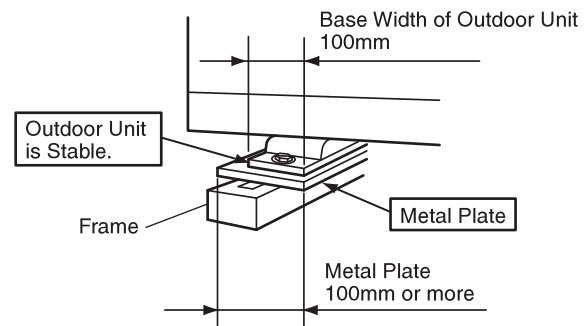


- (7) The whole of the base of the outdoor unit should be installed on a foundation. When using vibration-proof mat, it should also be positioned the same way. When installing the outdoor unit on a field-supplied frame, use metal plates to adjust the frame width for stable installation as shown in Fig. 4.6.

Incorrect



Correct



Recommended Metal Plate Size (Field-Supplied)

Material: Hot-Rolled Mild Steel Plate (SPHC)
Plate Thickness: 4.5T

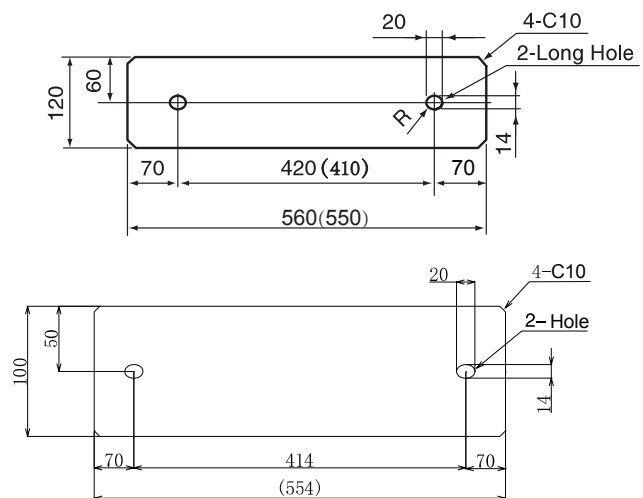


Fig. 4.6 Frame and Base Installation

5. Refrigerant Piping Work

⚠ DANGER

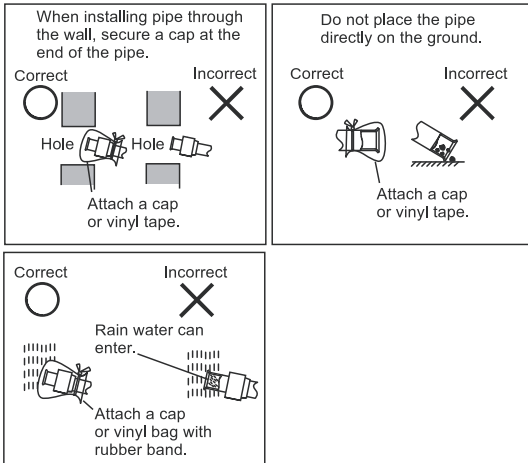
Use refrigerant R410A in the refrigerant cycle. Do not charge oxygen, acetylene or other flammable and poisonous gases into the refrigerant cycle when performing a leakage test or an air-tight test. These types of gases are extremely dangerous and can cause an explosion. It is recommended that compressed air, nitrogen or refrigerant be used for these types of tests.

5.1 Piping Materials

- (1) Prepare locally-supplied copper pipes.
- (2) Select the piping size from the Table 5.1.
- (3) Select clean copper pipes. Make sure there is no dust and moisture inside of the pipes. Blow the inside of the pipes with nitrogen or dry air, to remove any dust or foreign materials before connecting pipes.

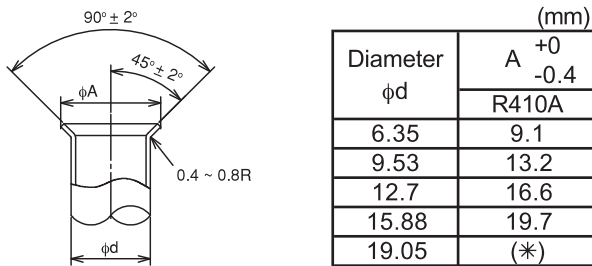
NOTE

● Cautions for Refrigerant Pipe Ends



● Flaring Dimension

Perform the flaring work as shown below.



(*) It is impossible to perform the flaring work with 1/2H material. In this case, use an accessory pipe (with a flare).

● Piping Thickness and Material

Use the pipe as below.

Diameter	R410A (mm)	
	Thickness	Material
φ6.35	0.8	O
φ9.53	0.8	O
φ12.7	0.8	O
φ15.88	1.0	O
φ19.05	1.0	1/2H
φ22.2	1.0	1/2H
φ25.4	1.0	1/2H
φ28.6	1.0	1/2H

Material is based on a JIS standard (JIS B8607).

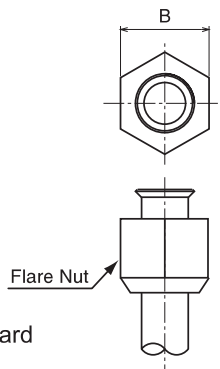
● Flare Nut Dimension

Use the flare nut as below.

<Flare Nut Dimension B (mm)>

Diameter	R410A
φ6.35	17
φ9.53	22
φ12.7	26
φ15.88	29
φ19.05	36

Dimension is based on a JIS standard (JIS B8607).



CAUTION

- Cap the end of the pipe when the pipe is to be inserted through a hole.
- Do not put pipes on the ground directly without a cap or vinyl tape at the end of the pipe.

5.2 Refrigerant Piping Work

- (1) Ensure that the directions for refrigerant piping work according to the tables.

Table 5.1 Limitation of Outdoor Unit

Capacity (Kbtu/h)	Diameter Outer Diameter of Pipe (mm)		
	Gas	Liquid	Branch Pipe
AVW-28HJFH	Φ15.88	Φ9.53	HFQ-052F
AVW-34HJFH			
AVW-43HJFH			
AVW-38HJFH			
AVW-48HJFH			
AVW-54HJFH			
AVW-43HKFH			
AVW-48HKFH			
AVW-54HKFH			
AVW-76HKFH	Φ22.2	Φ12.7	HFQ-162F (HFQ-102) Refer to Page7
AVW-96HKFH	Φ25.4	Φ12.7	
AVW-114HKFH	Φ25.4	Φ12.7	
AVW-76H9FH	Φ19.05	Φ9.53	
AVW-96H9FH	Φ22.2	Φ12.7	
AVW-114H9FH	Φ25.4	Φ12.7	

Table Indoor Unit Pipe Model

Indoor Unit Pipe Model	Gas Pipe	Liquid Pipe
05~14	φ 12.7	φ 6.35
17~18	φ 15.88	φ 6.35
22~48	φ 15.88	φ 9.53
76	φ 19.05	φ 9.53
96	φ 22.2	φ 9.53

(2) Additional Refrigerant Charge R410A

Although refrigerant has been charged into this unit, it is required that additional refrigerant be charged according to piping length.

Refer to 5.8

Table (a) Refrigerant Pipe System

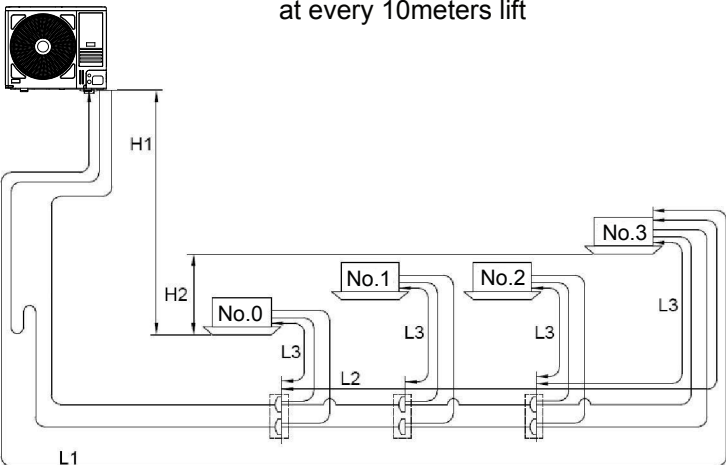
Item \ System		Branch pipe for Line Branch	
Example One outdoor unit joint four indoor units, pipe materials are acquired from local		Outdoor Unit 	Oil Trap is recommended at every 10meters lift
Max.Pipe Length	AVW-28HJFH	L1≤25m	
	AVW-34HJFH	L1≤25m	
	AVW-43HJFH	L1≤50m	
	AVW-43HKFH	L1≤50m	
High Distance between Outdoor and Indoor Unit	Outdoor is Higher than Indoor Unit	AVW-28HJFH	H1≤20m
		AVW-34HJFH	
		AVW-43HJFH	
		AVW-43HKFH	
	Indoor is Higher than Outdoor Unit	AVW-28HJFH	H1≤20m
		AVW-34HJFH	
		AVW-43HJFH	
		AVW-43HKFH	
Max.High Distance between Indoor and Indoor or Indoor and Branch Pipe	AVW-28HJFH	H2≤3.5m	
	AVW-34HJFH		
	AVW-43HJFH		
	AVW-43HKFH	H2≤3.5m	
Max.Pipe Length between the First Branch Pipe and Indoor Unit	AVW-28HJFH	L2≤10m	
	AVW-34HJFH	L2≤15m	
	AVW-43HJFH	L2≤20m	
	AVW-43HKFH	L2≤20m	
Pipe Length From every Branch Pipe to Indoor Unite	AVW-28HJFH	L3≤5m	
	AVW-34HJFH	L3≤5m	
	AVW-43HJFH	L3≤10m	
	AVW-43HKFH	L3≤10m	

Table (b) Refrigerant Pipe System (1PHASE)

System		Branch pipe for Line Branch
Example One outdoor unit joint six indoor units, pipe materials are acquired from local		Oil Trap is recommended at every 10meters lift $H1 \leq 30m$ $H2 \leq 10m$ $L \leq 30m$ $L_t \leq 75m$
Max.Pipe Length	Max.Saving Length L_t	$L_t \leq 75m$
	Total Pipe Length $L_{to} = L_t + L_0 + L_1 + L_2 + L_3 + L_4$	$L_{to} \leq 120m$
High Distance between Outdoor and Indoor Unit	Outdoor is Higher than Indoor Unit	$H1 \leq 30m$
	Indoor is Higher than Outdoor Unit	$H1 \leq 30m$
Max.High Distance between Indoor and Indoor or Indoor and Branch Pipe		$H2 \leq 10m$
Max.Pipe Length between Branch Pipe and Indoor	From "a" Branch Pipe to Indoor of Max. Distance	$L \leq 30m$
	From every Branch Pipe to Indoor of connecting	$L_0, L_1, L_2, L_3, L_4, L_5 \leq 10m$
Choose Branch Pipe	AVW-38/48/54HJFH	"a、b、c、d、e" with HFQ-052F

Table (c) Refrigerant Pipe System(3 PHASE)

Item	System
Example of system Base on the connection of the one outdoor unit and six indoor units as example. The pipes should be provided at site.	Line Branch System Outdoor Unit Oil Trap is recommended at every 30meters lift $H1 \leq 30m$ $H2 \leq 15m$ No.0 No.1 No.2 No.3 No.4 No.5 L0 L1 L2 L3 L4 L5 a b c d e $L \leq 30m$ $L_t \leq 75m$
Max.Pipe Length	Max. Length of econcmic pipe L_t $L_t \leq 75m$
Max.Pipe Length	Total Length of pipe $L_{to} = L_t + L_0 + L_1 + L_2 + L_3 + L_4$ $L_{to} \leq 120m$
Max.height difference between Outdoor and Indoor Unit	Situation that position of outdoor unit is higher than that of indoor unit $H1 \leq 30m$
Max.height difference between Outdoor and Indoor Unit	Situation that position of indoor unit is higher than that of outdoor unit $H1 \leq 30m$
Max.height difference between all indoor units or the indoor unit and multi-Kit	$H2 \leq 15m$
Max.Pipe Length between Branch Pipe and Indoor	From "a" Branch Pipe to Indoor of Max. Distance $L \leq 30m$
Max.Pipe Length between Branch Pipe and Indoor	From every Branch Pipe to Indoor of connecting $L_0, L_1, L_2, L_3, L_4, L_5 \leq 15m$
Choose Branch Pipe	AVW-48/54HKFH "a、 b、 c、 d、 e" with HFQ-052F

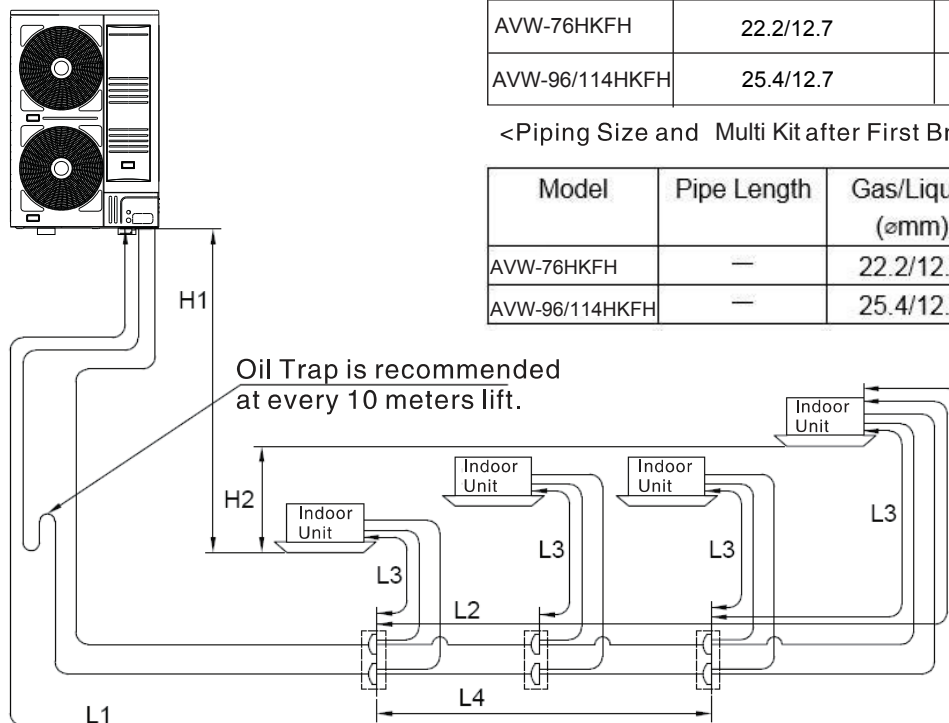
Table (d) Refrigerant Pipe System(3 PHASE)

<Outdoor Unit to First Branch>

Outdoor Unit	Gas/Liquid (Φmm)	First Branch
AVW-76HKFH	22.2/12.7	HFQ-162F
AVW-96/114HKFH	25.4/12.7	HFQ-162F

<Piping Size and Multi Kit after First Branch>

Model	Pipe Length	Gas/Liquid (ømm)	Multi Kit Model
AVW-76HKFH	—	22.2/12.7	HFQ-162F
AVW-96/114HKFH	—	25.4/12.7	



<Multi-kit to Indoor Unit>

Indoor Unit Capacity(kBtu/h)	Piping Size	Gas/Liquid (Φ mm)	Max.Length of Liquid Pipe
05~14		12.7/6.35	15m
18		15.88/6.35	15m
24~48		15.88/9.53	15m
76		19.05/9.53	15m
96		22.2/9.53	15m

Item		Applicable Range
Ref. Pipe Length: L1	Actual	Within 100m
	Equivalent	Within 125m
Piping Length from 1 st Branch to each I.U.: L2		Within 40m
Piping Length from each Branch to I.U.: L3		Within 15m
Lift between I.U. and O.U.: H1	O.U. is Higher	Within 50m
	O.U. is lower	Within 40m
Lift between I.U. and O.U.: H2		Within 15m
Total Length of I.U. Piping		Within 250m

Table (e) Refrigerant Pipe System(3 PHASE)

<Outdoor Uni to First Branch>

Outdoor Unit	Gas/Liquid (Φ mm)	
	(Equivalent Piping Length≤70m)	(Equivalent Piping Length>70m)
AVW-76H9FH	19.05/9.53	19.05/12.7
AVW-96H9FH	22.2/12.7	22.2/12.7
AVW-114H9FH	25.4/12.7	25.4/12.7

<Piping Size and Branch pipe after First Branch>

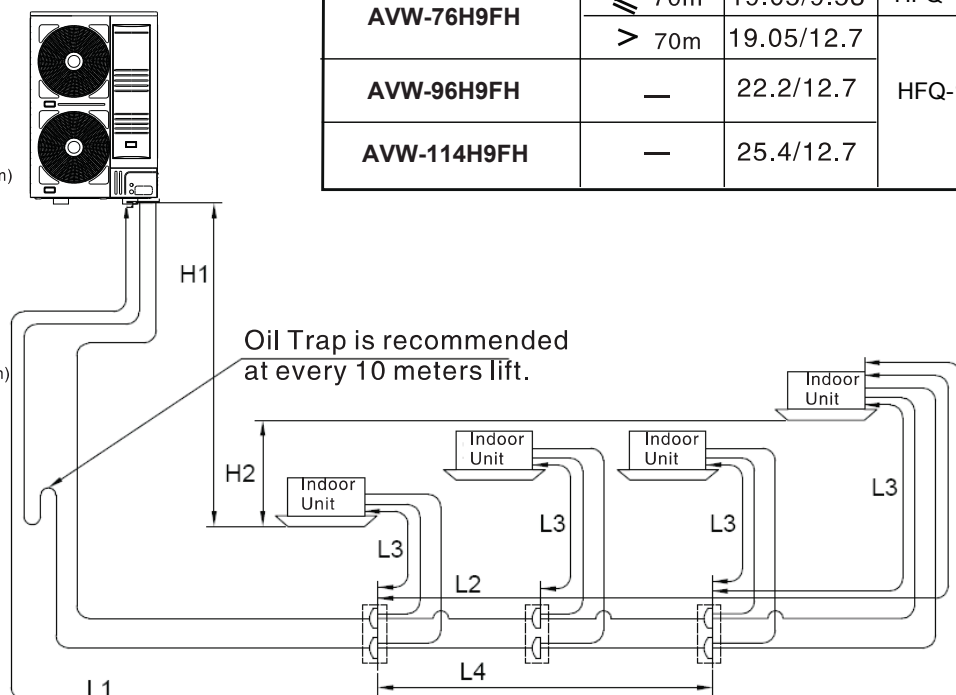
Model	Pipe Length	Gas/Liquid (Φ mm)	Branch pipe Model
AVW-76H9FH	≤ 70m	19.05/9.53	HFQ-102F
	> 70m	19.05/12.7	HFQ-162F
AVW-96H9FH	—	22.2/12.7	
AVW-114H9FH	—	25.4/12.7	

<First Branch>
(Equivalent Piping Length<70m)

Outdoor Unit Capacity (kbtu/h)	Branch pipe
AVW-76H9FH	HFQ-102F
AVW-96114H9FH	HFQ-162F

<First Branch>
(Equivalent Piping Length>70m)

Outdoor Unit Capacity (kbtu/h)	Branch pipe
AVW-76H9FH	HFQ-162F
AVW-96114H9FH	HFQ-162F



<Multi-kit to Indoor Unit>

Piping Size Indoor Unit Capacity(kbtu/h)	Gas/Liquid (Φ mm)	Max.Length of Liquid Pipe
05~14	12.7/6.35	15m
18	15.88/6.35	15m
24~48	15.88/9.53	15m
76	19.05/9.53	15m
96	22.2/9.53	15m

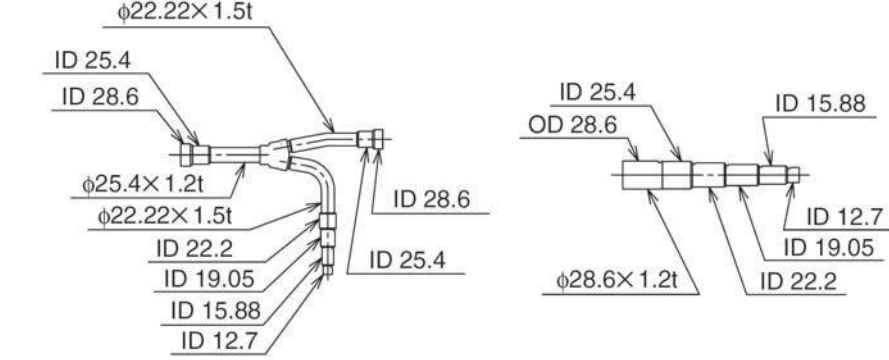
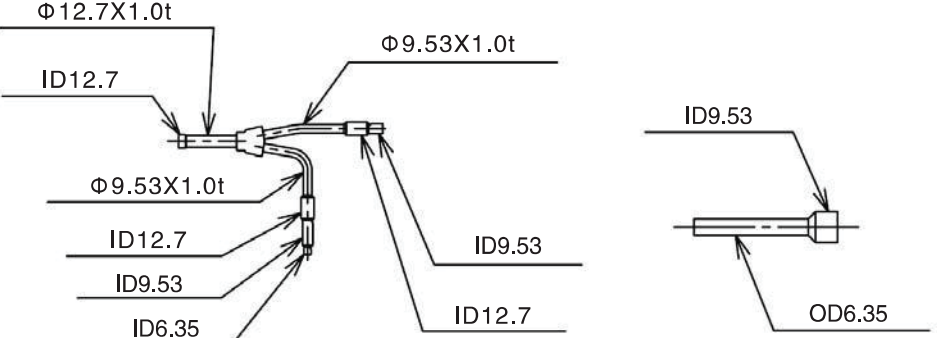
Item		Applicable Range
Ref. Pipe Length: L1	Actual	Within 100m
	Equivalent	Within 125m
Piping Length from 1 st Branch to each I.U.: L2		Within 40m
Piping Length from each Branch to I.U.: L3		Within 15m
Lift between I.U. and O.U.: H1	O.U. is Higher	Within 50m
	O.U. is lower	Within 40m
Lift between I.U. and O.U.: H2		Within 15m
Total Length of I.U. Piping		Within 250m

5.3 Branch Pipe for Line Branch

Table T Shape Branch Pipe

Branch	HFQ-052F
Gas Line	
Liquid Line	
Branch	HFQ-102F
Gas Line	
Liquid Line	

Unit : mm , ID: Inner Diameter , OD: Outer Diameter

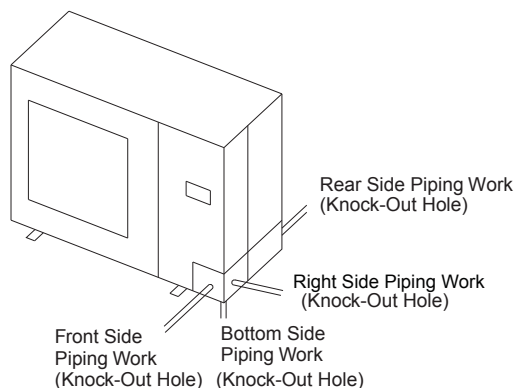
Branch	HFQ-162F
Gas Line	
Liquid Line	

Unit: mm , ID: Inner Diameter OD:Outer Diameter

5.4 Piping Connection

Pipes can be connected from 4 directions.

AVW-28/34/43HJFH, AVW-43HKFH



AVW-38/48/54HJFH, AVW-48/54HKFH
AVW-76/96/114HKFH, AVW-76/96/114H9FH

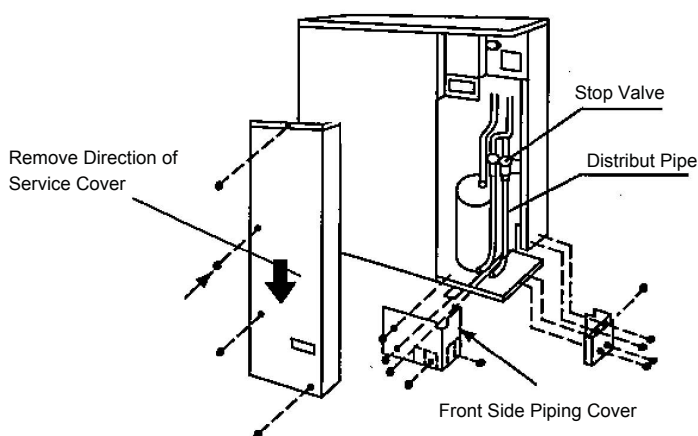
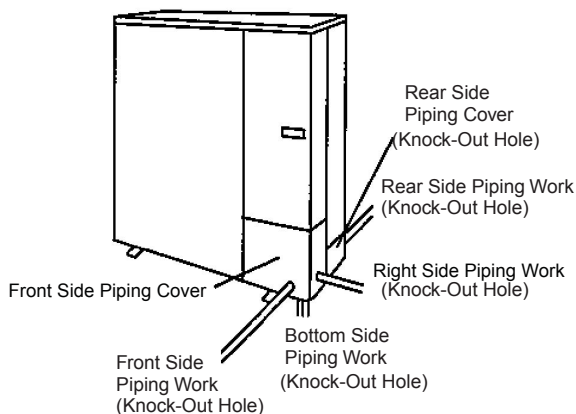


Fig. 5.1 Piping Direction

Precautions for Removal and Installation of Service Lid

Service Lid Removal & Installation Gist

① Remove the fastening screw of service lid as shown in the right figure

- Note -
Press and hold the service lid by hand when removing the screw.
Service lid may slip down autonomously.

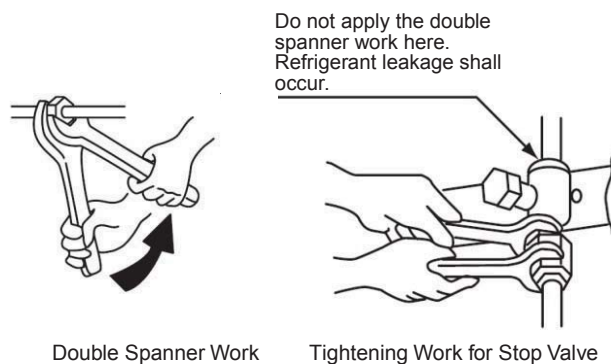
② Press and hold the service lid forward slowly by hand and then taking it off downward.

Service Lid

Mounting Grab (3)

Fig. 5.2 Removal and Installation of Service Lid

- (1) Confirm that the valve is closed.
- (2) Prepare a field-supplied bend pipe for liquid line. Connect it to the liquid valve by flare nut through the square hole of bottom base.
- (3) For Gas Piping Connection
Prepare a field-supplied bend pipe for gas line. Braze it and the factory-supplied pipe flange at the outside of the unit.



Pipe Size	Tightening Torque for Flare Nut
φ6.35 (1/4)	20N·m
φ9.53 (3/8)	40N·m
φ12.7 (1/2)	60N·m
φ15.88 (5/8)	80N·m
φ19.05 (3/4)	100N·m

- (4) Pipes can be connected from 4 directions as shown Fig. 5.1. Make a knock-out hole in the front pipe cover or bottom base to pass through the hole.

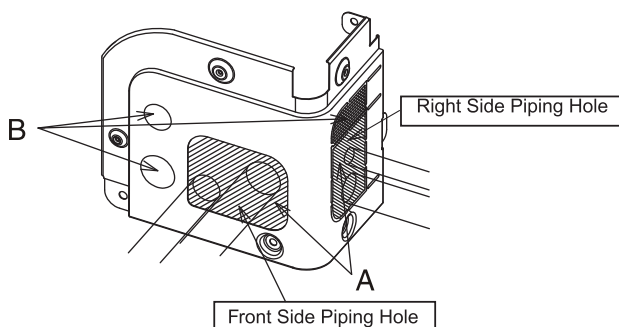
After removing the pipe cover from the unit, punch out the holes following the guide line with screwdriver and a hammer.

Then, cut the edge of the holes and attach insulation (Field-Supplied) for cables and pipes protection.

(a) Connect Front and Right Side Pipe

Select the correct knock-out size depending on whether it is for power wiring or transition wiring.

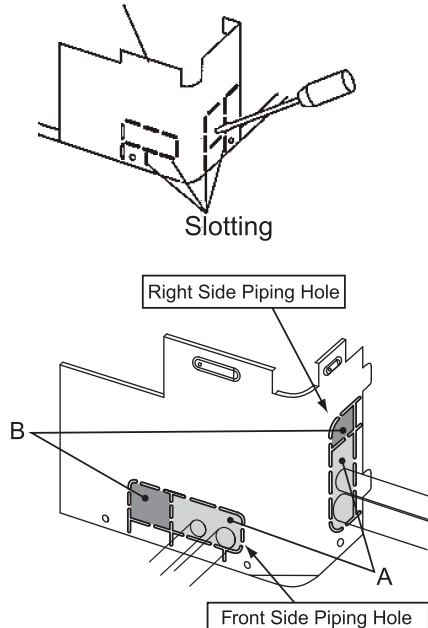
AVW-28/34/43HJFH,AVW-43HKFH



AVW-38/48/54HJFH,AVW-48/54HKFH
AVW-76/96/114HKFH,AVW-76/96/114H9FH

Then, cut the edge of the holes and attach insulation (Field-Supplied) for cables and pipes protection.

Front pipe cover



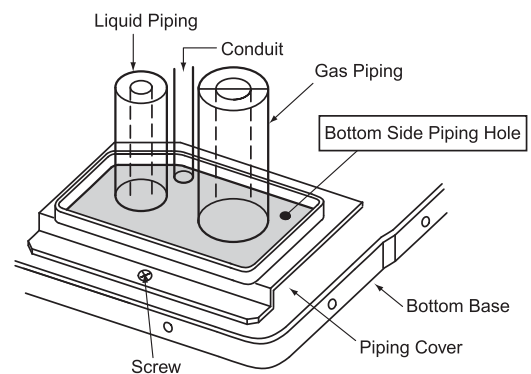
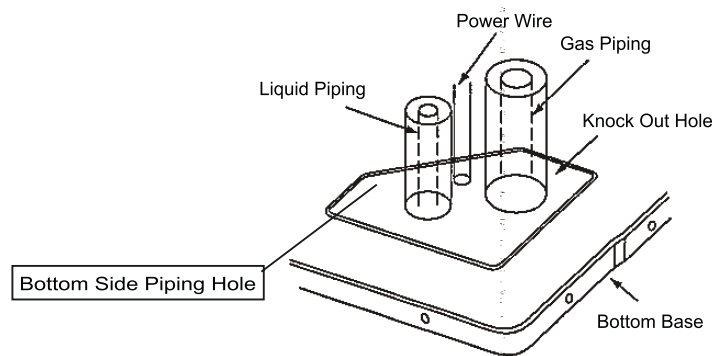
It is available to correct the liquid or gas piping, power wiring less than 14mm² and transition wiring form "A" part.

NOTE:

When using conduit, check to the tube size before removing "B" part.

(b) Bottom Side Piping Work

After removing bottom of the piping cover, perform piping and wiring works.

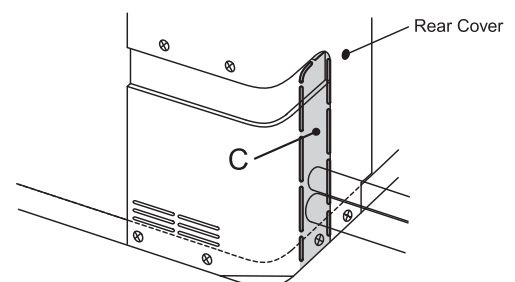
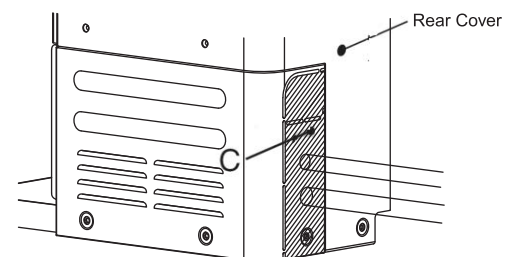


NOTE:

Prevent the cables from coming into direct contact with the piping.

(c) Rear Piping Work

After removing rear piping cover, punch out the "C" holes along the guide line.

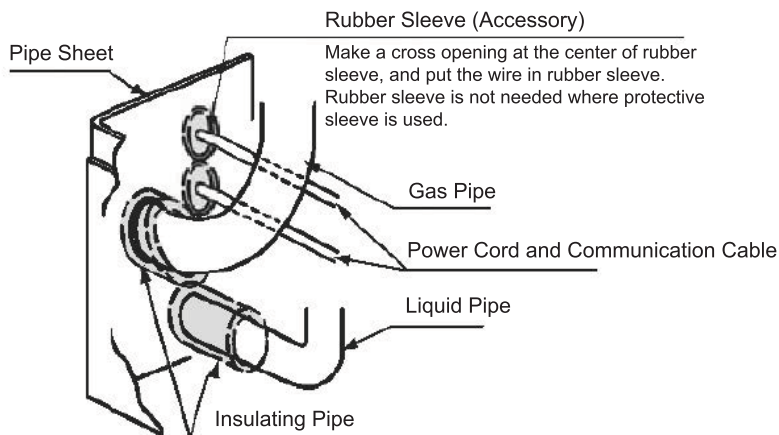


NOTE:

To avoid damage protect cables and pipes with adequate insulation (Field-Supplied).

- (5) To prevent gaps use a rubber bush and insulation(Field-Supplied) adequately when installing the piping cover. Cut the lower side guide line of the piping cover when attaching work is difficult. If not, it will be included water in the unit and electrical parts will be damaged.

AVW-38/48/54HJFH,AVW-48/54HKFH
AVW-76/96/114HKFH,AVW-76/96/114H9FH



Make thermal insulation as shown in the figure, and make sure no gap exists between pipe and opening.

In the case of difficulty in installation, the insulating pipe shall be cut off as shown in the figure.

Interior of Unit with Piping Connected at the Front Part

- (6) Use a pipe bender or elbow(Field-Supplied) for bending work when connecting pipe.

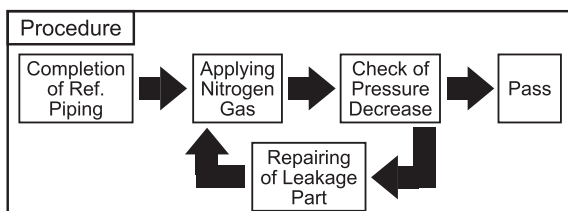
5.5 Air Tight Test

- (1) The stop valve has been closed before shipment, however, make sure that the stop valves are closed completely.
- (2) Connect the indoor unit and the outdoor unit with field-supplied refrigerant piping. Suspend the refrigerant piping at certain points and prevent the refrigerant piping from touching the weak part of the building such as wall, ceiling, etc. (If touched, abnormal sound may occur due to the vibration of the piping. Pay special attention in case of short piping length.)
- (3) Apply the oil thinly at the seat surface of the flare nut and pipe before tightening. And when tightening the flare nut, use two spanners.

Refrigerant Oil is field-supply.

Model: α68HES-H (Ether Oil)
FVB68D (Ether Oil)

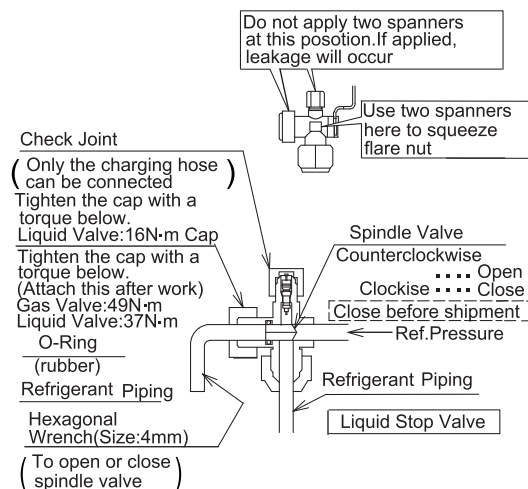
Manufacturer: IDEMITSU KOSAN Co., Ltd.



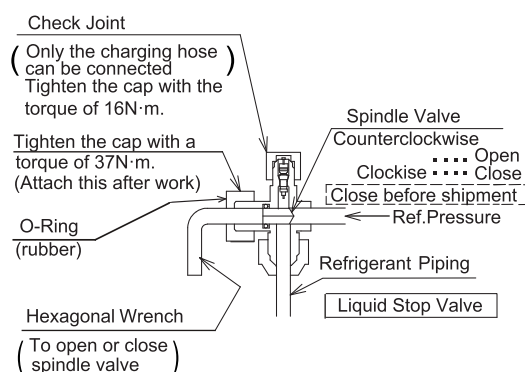
(4) Stop Valve

Operation of the stop valve should be performed according to the below.

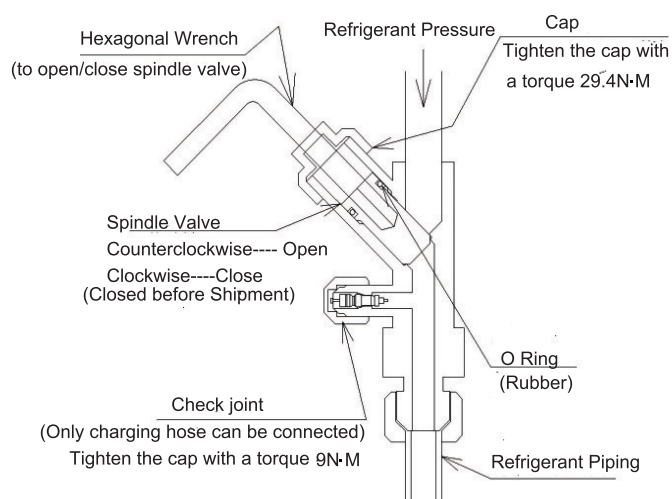
<Stop Valve for AVW-28/34HJFH and AVW-43HKFH>



<Liquid Valve for AVW-43HJFH>



<Gas Valve for AVW-43HJFH>



Spindle Valve Torque (N·m)

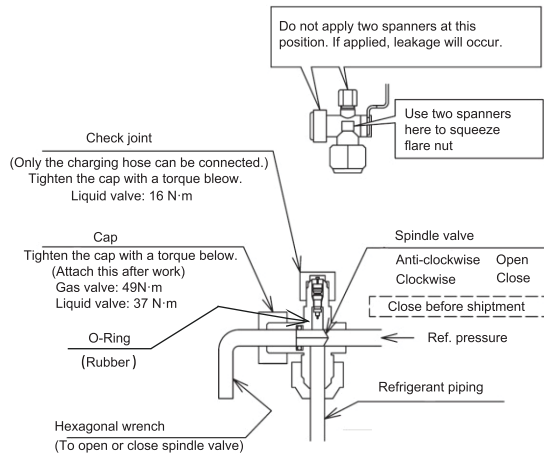
Gas	Liquid
9 ~ 11	7 ~ 9

Hexagonal Wrench Size (mm)

Gas	Liquid
5	4

AVW-76/96/114HKFH,AVW-76/96/114H9FH

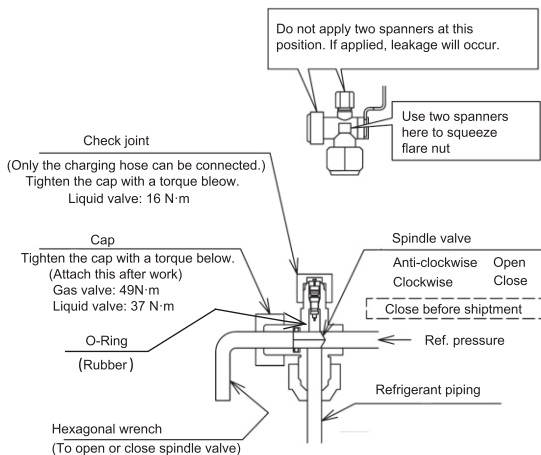
<Gas Valve>



Spindle Valve Torque (N·m)

Gas	Liquid
9~11	7~9

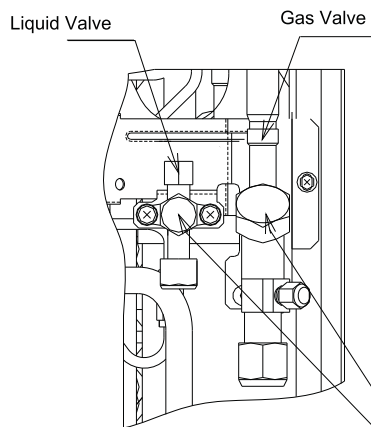
<Liquid Valve>



Hexagonal Wrench Size (mm)

Gas	Liquid
8	4

AVW-38/48/54HJFH,AVW-48/54HKFH

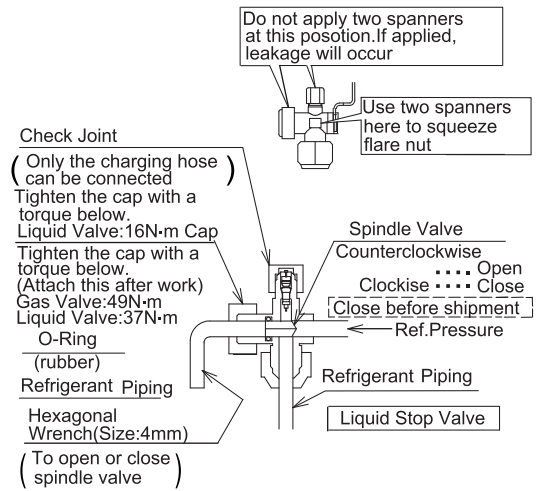


Stop Valve Core for Opening and closing

Fig.5.3 Stop Valve Position

Operation of the stop valve should be performed according to the below.

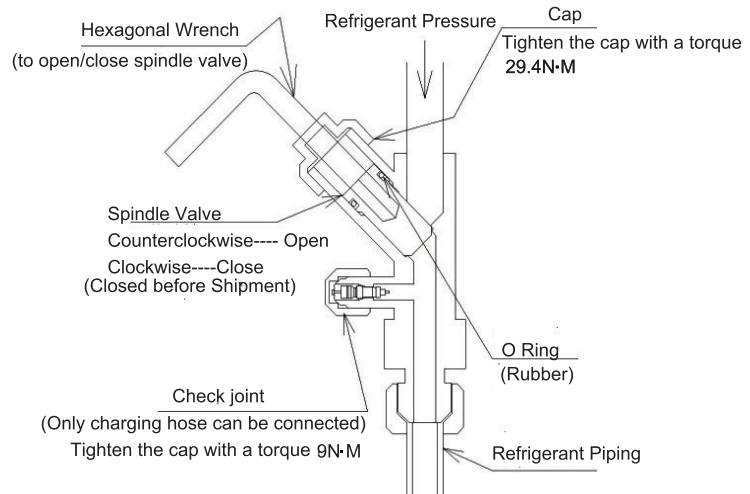
<Stop Valve>



Spindle Valve Torque (N·m)

Gas	Liquid
11~14	7~9

<Gas Valve>



Hexagonal Wrench Size (mm)

Gas	Liquid
8	4

⚠ CAUTION

After pipe and nut cap connected,when make air test , open the stop valve spindle cap,make sure valve closed already(clock wise).

- Tighten nut cap below torque,great torque will bring on refrigerant leakage of valve spindle.

Pipe Diameter	Tighten Torque
Φ6.35(1/4)	14 ~ 18N · m
Φ9.53(3/8)	34 ~ 42N · m
Φ12.7(1/2)	49 ~ 61N · m
Φ15.88(5/8)	68 ~ 82N · m

- Make air tighten test after valve spindle turn off closely.

Note:

Do not connect nut cap on test joint,supply for connecting refrigerant charge soft pipe.It have no effect for system capacity when connect joint cap and valve cap opened together "pu chi" light sound.

⚠ CAUTION

- **Do not apply an abnormal big force to the spindle valve at the end of opening (5.0N· m or smaller).
The back seat construction is not provided.**
- **Do not loosen the stop ring. If the stop ring is loosened, it is dangerous, since the spindle will hop out.**

5.6 Vacuum Pumping and charge refrigerant

- (1) Connect a mani-fold gauge to the check joints at the both sides.

Continue vacuum pumping work until the pressure reaches 756mmHg or lower for one to two hours.

After vacuum pumping work, stop the mani-fold valve's valve, stop the vacuum pump and leave it for one hour. Check to ensure that the pressure in the mani-fold gauge does not increase.

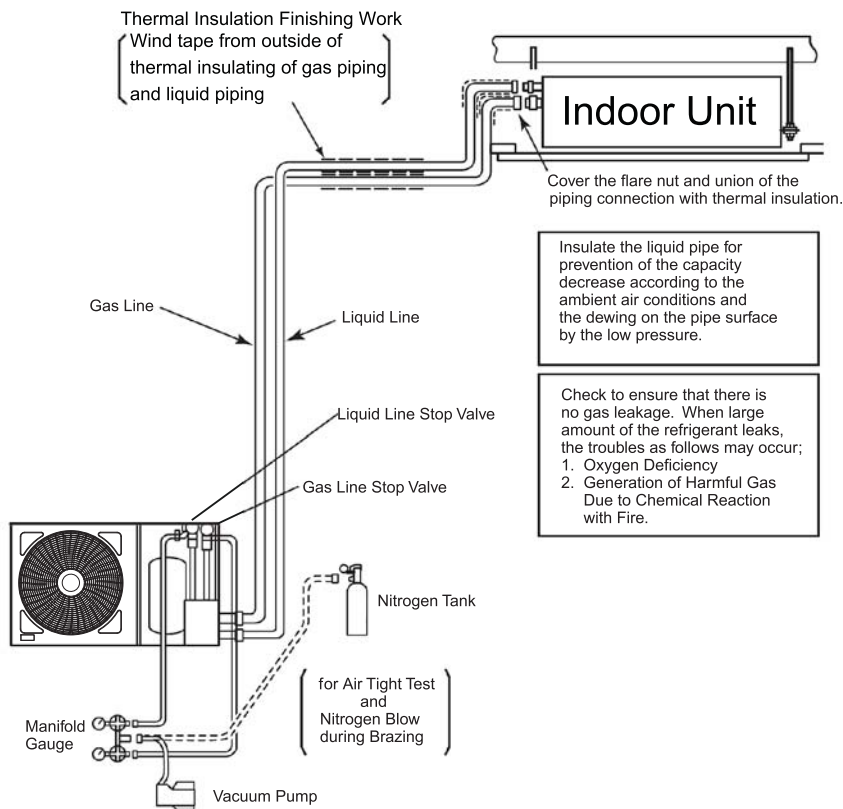
Note:

1. This unit is only for the refrigerant R410A. The manifold gauge and the charging hose should be exclusive use for R410A.
2. If vacuum degree of -0.1MPa (756mmHg) is not available, it is considered of gas leakage or entering moisture. Check for any gas leakage once again. If no leakage exists, operate the vacuum pump for more than one to two hours.
- (2) Connect adjusted valve and charge kettle to check joint of liquid valve.
- (3) Fully open the gas valve and liquid valve slowly.
- (4) Open adjusted valve to add refrigerant (must be refrigerant is liquid).
- (5) Operate cool mode,charge stated refrigerant.
- (6) Confirm the capacity of charging refrigerant with balance.an excess or a shortage of refrigerant is cause of trouble to the units.
- (7) Fully open the liquid valve.

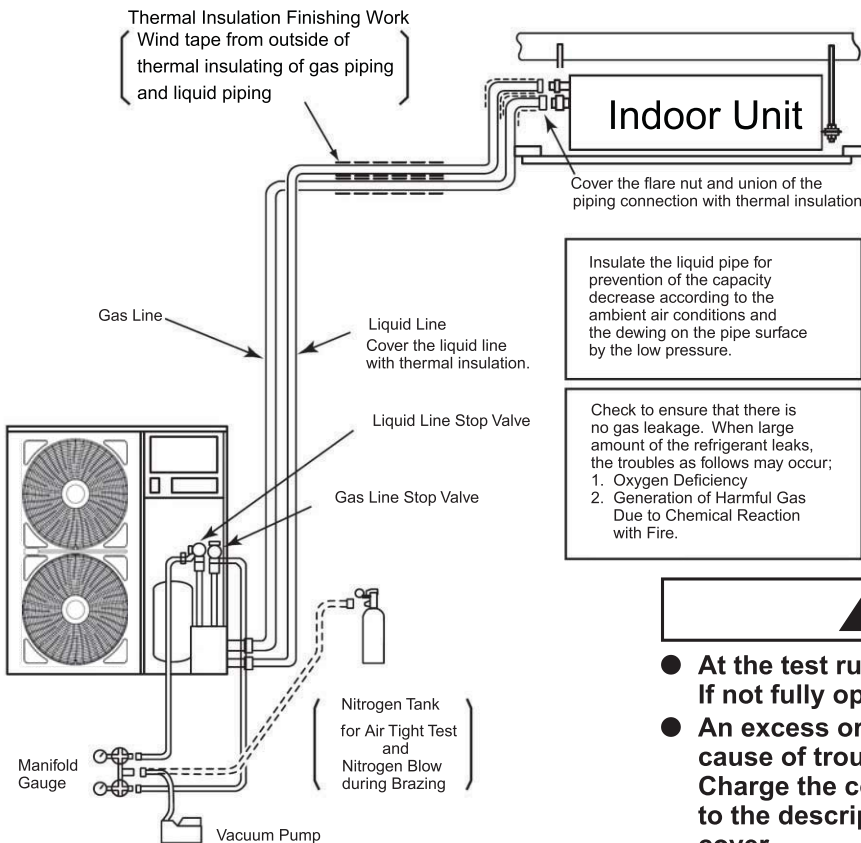
- (5) Connect the gauge manifold using charging hoses with a nitrogen cylinder to the check joints of the liquid line and the gas line stop valves.
Perform the air-tight test.
Do not open the stop valves. Apply nitrogen gas pressure of 4.15MPa.
- (6) Check for any gas leakage at the flare nut connections, or brazed parts by gas leak detector or foaming agent.
- (7) After the air tight test, release nitrogen gas.

**Never use the refrigerant charged in the outdoor unit for air purging.
Insufficient refrigerant will lead to failure.**

AVW-28/34/43HJFH,AVW-43HKFH



AVW-38/48/54HJFH,AVW-48/54HKFH AVW-76/96/114HKFH,AVW-76/96/114H9FH



CAUTION

- At the test run, fully open the spindle. If not fully opened, the devices will be damaged.
- An excess or a shortage of refrigerant is the main cause of trouble to the units.
Charge the correct refrigerant quantity according to the description of label at the inside of service cover.
- Check for refrigerant leakage in detail. If a large refrigerant leakage occurs, it will cause difficulty with breathing or harmful gases would occur if a fire was being used in the room.

1. Maximum Permissible Concentration of HFC GAS R410A charged in the DC INVERTER is an incombustible and non-toxic gas.
However, if leakage occurs and gas fills a room, it may cause suffocation. The maximum permissible concentration of HCFC gas, R410A in air is 0.3kg/m³, according to the refrigeration and air conditioning facility standard (KHK S 0010) by the KHK (High Pressure Gas Protection Association) Japan. Therefore, some effective measure must be taken to lower the R410A concentration in air below 0.3kg/m³, in case of leakage.

2. Calculation of Refrigerant Concentration

- (1) Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of objective rooms.
- (2) Calculate the room volume V (m³) of each objective room.
- (3) Calculate the refrigerant concentration C (kg/m³) of the room according to the following equation.

$$\frac{R: \text{Total Quantity of Charged Refrigerant (kg)}}{V: \text{Room Volume (m}^3\text{)}} = C: \text{Refrigerant Concentration} \leq 0.3 \text{ (kg/m}^3\text{)}$$

If local codes or regulations are specified, follow them.

5.7 Caution of Pressure Measurement by Check Joint

When the pressure is measured, use the check joint of gas stop valve ((A) in the figure below) and use the check joint of liquid piping (C) in the figure below).

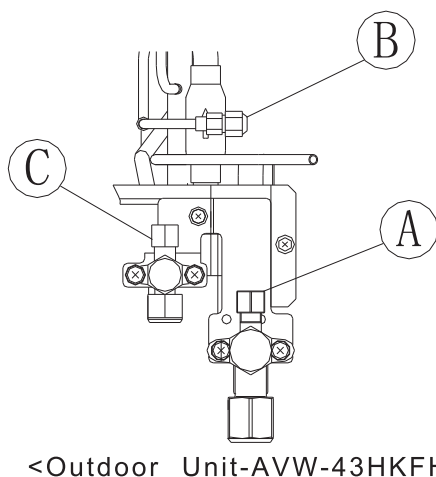
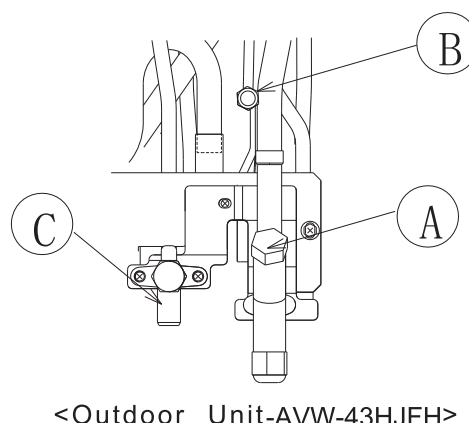
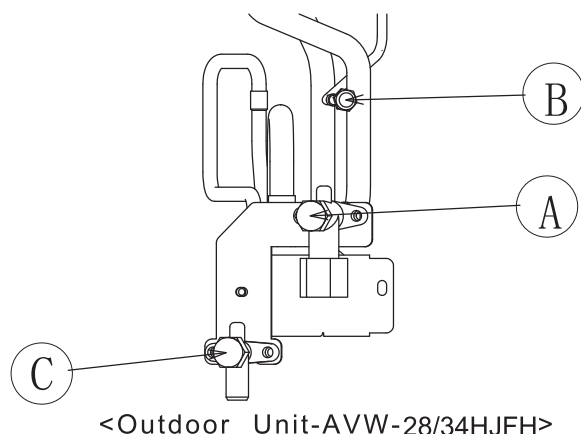
At that time, connect the pressure gauge according to the following table because of high pressure side and low pressure side changes by operation mode.

	Cooling Operation	Heating Operation
Check Joint for Gas Stop Valve "A"	Low Pressure	High Pressure
Check Joint for Piping "B"	High Pressure	Low Pressure
Check Joint for Liquid Stop Valve "C"	Exclusive for Vacuum Pump and Refrigerant Charge	

NOTE:

Be careful that refrigerant and oil do not splash to the electrical parts at removing the charge hoses.

AVW-28/34/43HJFH,AVW-43HKFH



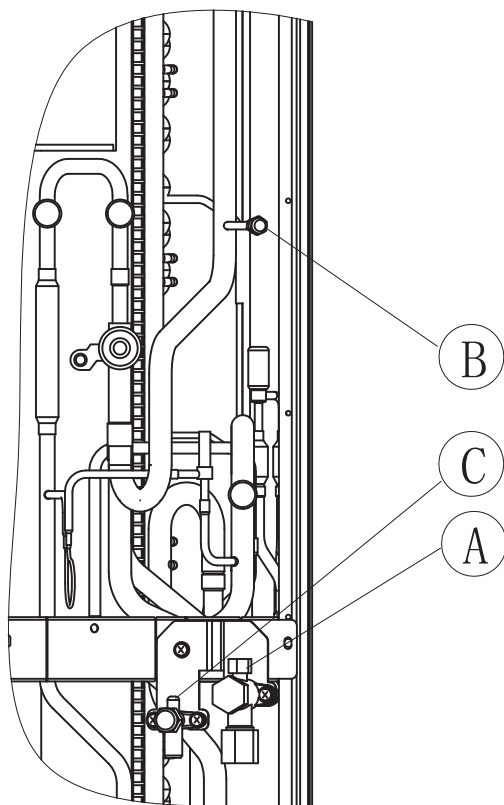


Fig 5.4 (a) Check Joint Position(1 PHASE)

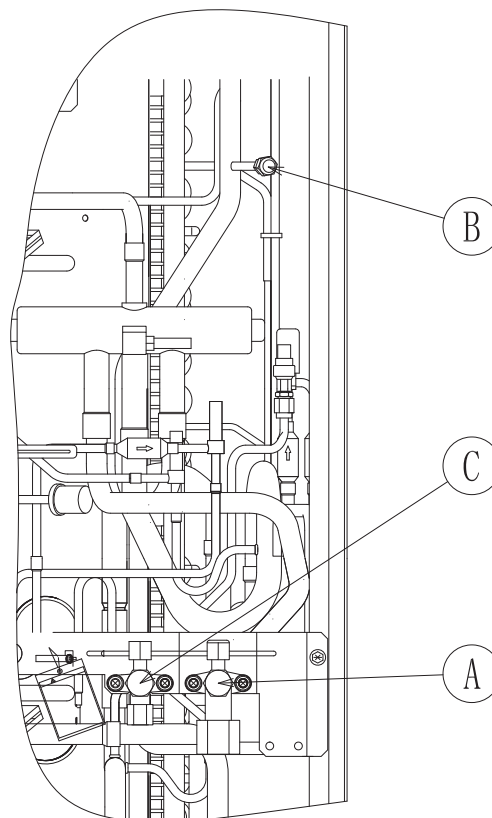
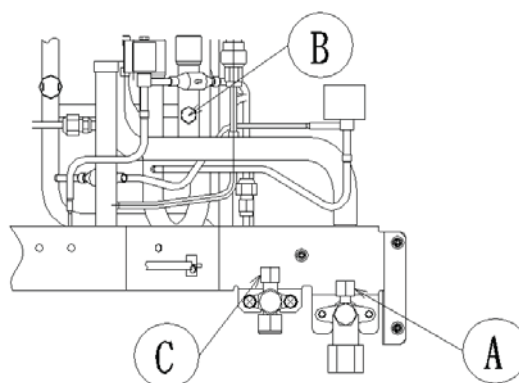


Fig 5.4 (b) Check Joint Position(3 PHASE)

AVW-76/96/114HKFH,AVW-76/96/114H9FH



NOTE:

1. Maximum Permissible Concentration of HFC GAS R410A charged in the DC INVERTER is an incombustible and non-toxic gas.
However, if leakage occurs and gas fills a room, it may cause suffocation. The maximum permissible concentration of HCFC gas, R410A in air is 0.3kg/m³, according to the refrigeration and air conditioning facility standard (KHK S 0010) by the KHK (High Pressure Gas Protection Association) Japan. Therefore, some effective measure must be taken to lower the R410A concentration in air below 0.3kg/m³, in case of leakage.
2. Calculation of Refrigerant Concentration
 - (1) Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of objective rooms.
 - (2) Calculate the room volume V (m³) of each objective room.
 - (3) Calculate the refrigerant concentration C (kg/m³) of the room according to the following equation.

$$\frac{\text{R: Total Quantity of Charged Refrigerant (kg)}}{\text{V: Room Volume (m}^3\text{)}} = \text{C: Refrigerant Concentration} \leq 0.3 \text{ (kg/m}^3\text{)}$$

If local codes or regulations are specified, follow them.

5.8 Additional Refrigerant Charge

It is necessary additional refrigerant charge as follows.

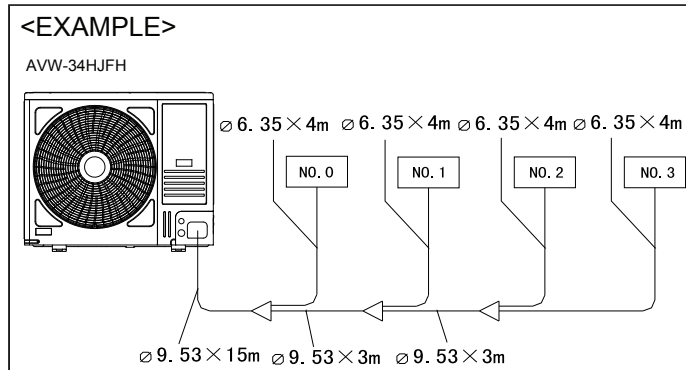
Additional Refrigerant Charge Calculation

Although refrigerant has been charged into this unit, it is required that additional refrigerant be charged according to piping length.

- Determine an additional refrigerant quantity according to the following procedure, and charge it into the system.
- Record the additional refrigerant quantity to facilitate service activities thereafter.

Model: AVW-28/34/43HJFH AVW-43HKFH

1. Calculating Method of Additional Refrigerant Charge (W kg)



See Example for Model AVW-34HJFH, and fill in the following table.

Pipe Diameter (mm) Total Piping Length (m) Additional Charge (kg)

$$W_{11} = \Phi 9.53 \dots (15 + 3 + 3) \times 0.03 = 0.63$$

$$W_{12} = \Phi 6.35 \dots (4 + 4 + 4 + 4) \times 0.02 = 0.32$$

Total Piping Length 37m Additional Charge $W = W_{11} + W_{12} = 0.95$ (kg)

Pipe Diameter (mm) Total Piping Length (m) Additional Charge (kg)

$$W_{11} = \Phi 9.53 \dots \boxed{} \times a = \boxed{}$$

$$W_{12} = \Phi 6.35 \dots \boxed{} \times b = \boxed{}$$

Total Piping Length $\boxed{}$ m

Additional Ref.Charge $W = W_{11} \boxed{} + W_{12} \boxed{} = \boxed{}$ (kg)

2. Charging Work

Charge refrigerant (R410A) into the system as follows.

- For charging refrigerant, connect the gauge mani-fold using charging hoses with a refrigerant cylinder to the check joint of the liquid line stop valve.
- Fully open the gas line stop valve and slightly open the liquid line stop valve.
Charge refrigerant by opening the gauge manifold valve.
- Charge the required refrigerant by operating the system in cooling.
Ensure to charge correct volume by utilizing a weight scale. An excess or shortage of refrigerant is the main cause of trouble to the units.
Fully open the liquid line stop valve after completing refrigerant charge.

3. Record of Additional Charge

Record the refrigerant charging quantity in order to facilitate maintenance and servicing activities.

Total refrigerant charge of this system is calculated in the following formula.

$$\begin{aligned} \text{Total Ref. Charge of This System} &= W + W_0 \\ \text{This System} &= \boxed{} + \boxed{} = \boxed{} \text{ kg} \end{aligned}$$

Total Additional Charge W $\boxed{}$ kg

Total Ref. Charge of This System $\boxed{}$ kg

Date of Ref. Charge Work

Day $\boxed{}$ Month $\boxed{}$ Year $\boxed{}$

<Table 1>

Outdoor Unit Capacity(KBtu/h)	W0: Outdoor Unit Ref.Charge	a	b	Max. Total Ref.Charge (kg)
AVW-28HJFH	2.5	0.03	0.02	3.3
AVW-34HJFH	2.8	0.03	0.02	4.8
AVW-43HJFH	2.8	0.03	0.02	5.2
AVW-43HKFH	3.0	0.04	0.02	4.5

NOTE:

W0 is outdoor unit ref. charge before shipment.

4. Notice of Additional Charge

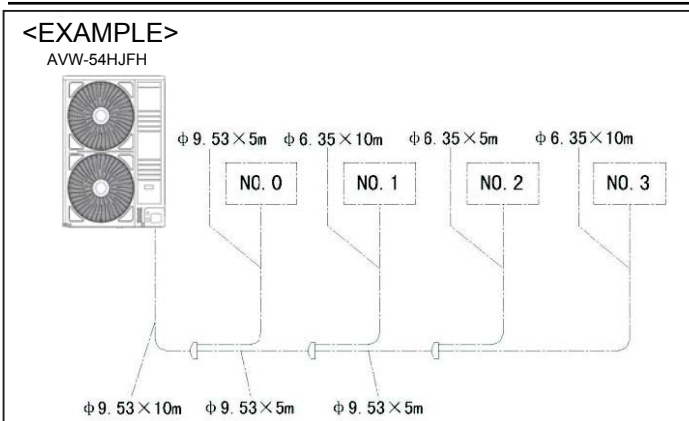
When the system is connected one-to-one, the connection ratio must be 100%, and the additional refrigerant need to be reduced as the following requirements:

Table . Reduced Refrigerant Charge for Special Indoor Units

Model	Connection ratio	Indoor Unit Type			
		Duct type	4-Way Cassette Type	2-Way Cassette Type	Celling & Floor Type
		Refrigerant reduction/g			
AVW-28HJFH	100%	200	—	—	—
AVW-34HJFH		150	—	150	150

Model: AVW-38/43/54HJFH AVW-48/54HKFH

1. Calculating Method of Additional Refrigerant Charge



See Example for Model AVW-54HJFH, and fill in the following table.

Pipe Diameter (mm)	Total Piping Length (m)	Additional Charge (kg)
W11= φ 9.53....	(10 + 5 + 5 + 5)	× 0.04 = 1
W12= φ 6.35....	(10 + 10 + 5)	× 0.02 = 0.50
W2 =		0
Total Piping Length	50m	
Additional Ref.Charge W = W1 + W2 = W11 + W12 + W2 = 1.5 (kg)		

Pipe Diameter (mm)	Total Piping Length (m)	
W11= φ 9.53....	× a	=
W12= φ 6.35....	× b	=
Total Piping Length	m	
Additional Ref.Charge W1 = W11 + W12 = (kg)		
W2 = (kg)		
Total Ref.Charge Wt = W0 + W1 + W2 = + + = (kg)		

Additional Refrigerant Charge according to Table.

Table . Additional Refrigerant Charge Calculation

Model	W0: Ref.Charge before shipment (kg)	W1: Additional Ref.Charge according to piping (kg/m)		W2: Additional Ref.Charge according to Connection Ratio (kg/m)		Wt: Total Ref. Charge (kg)	Max. Total Ref. Charge (kg)
		a	b	100%~130%	130%~150%		
AVW-38HJFH	3.8	0.04	0.02	0.15kg for each 10% ^①	0.60kg for each 10% ^①	W0+W1+W2	7.9
AVW-48HJFH	3.8	0.04	0.02				7.9
AVW-54HJFH	4.1	0.04	0.02				7.9
AVW-48HKFH	3.6	0.05	0.02				9.6
AVW-54HKFH	3.6	0.05	0.02				9.6
NOTE:①Less than 10% is calculate as 10%.							

2. Charging Work

Charge refrigerant (R410A) into the system as follows.

- (1) For charging refrigerant, connect the gauge mani-fold using charging hoses with a refrigerant cylinder to the check joint of the liquid line stop valve.
- (2) Fully open the gas line stop valve and slightly open the liquid line stop valve.
Charge refrigerant by opening the gauge manifold valve.
- (3) Charge the required refrigerant by operating the system in cooling.
Ensure to charge correct volume by utilizing a weight scale. An excess or shortage of refrigerant is the main cause of trouble to the units.
Fully open the liquid line stop valve after completing refrigerant charge.

3. Record of Additional Charge

Record the refrigerant charging quantity in order to facilitate maintenance and servicing activities.

Total refrigerant charge of this system is calculated in the following formula.

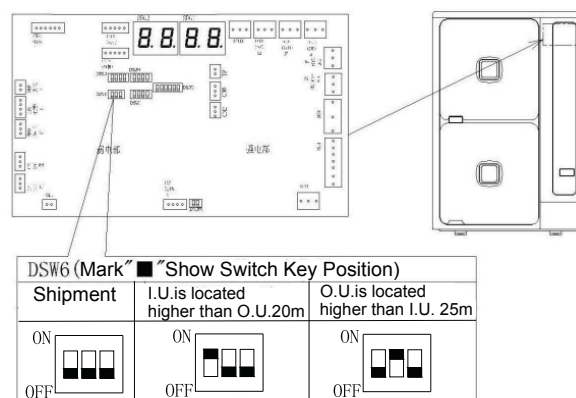
$$\begin{aligned} \text{Total Ref. Charge of This System} &= W0+W1+W2 \\ \text{This System} &= \boxed{} + \boxed{} = \boxed{} \text{ kg} \end{aligned}$$

Total Additional Charge W		kg
Total Ref. Charge of This System		kg
Date of Ref. Charge Work		
Day	Month	Year

4. Dip-Switch Setting for Piping Length

Follow below ,setting the Dip-Switch for piping length.

PCB1



5. Notice of Additional Charge

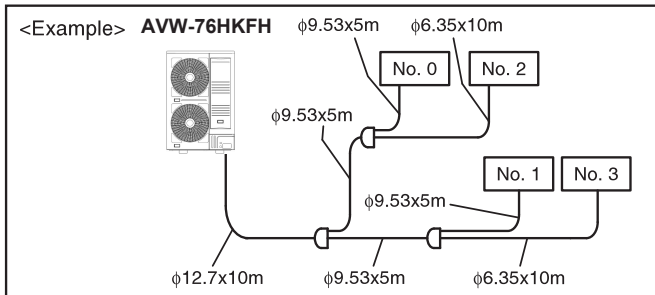
When the system is connected one-to-one, the connection ratio must be 100%, and the additional refrigerant need to be reduced as the following requirements:

Table 5.8 Reduced Refrigerant Charge for Special Indoor Units

Model	Connection ratio	Indoor Unit Type			
		Duct type	4-Way Cassette Type	2-Way Cassette Type	Celling & Floor Type
AVW-38HJFH	100%	150	—	—	—
AVW-48HJFH			200	—	200
AVW-54HJFH		400	200	600	—
AVW-48HKFH		—	200	—	200
AVW-54HKFH		400	200	600	—

Model: AVW-76/96/114HJFH

1. Calculating Method of Additional Refrigerant Charge (W kg)



See Example for Model **AVW-76HKFH**, and fill in the following table.

Pipe Diameter (mm)	Total Piping Length (m)	Additional Charge (kg)
φ12.7	(10)	x 0.12 = 1.2
φ9.53	(5 + 5 + 5 + 5)	x 0.07 = 1.4
φ6.35	(10 + 10)	x 0.03 = 0.6
Total Piping Length	50m	Additional Charge W ₁ = 3.2 (kg)

Pipe Diameter (mm)	Total Piping Length (m)	Additional Charge (kg)
φ12.7		x 0.12 =
φ9.53		x 0.07 =
φ6.35		x 0.03 =
Total Piping Length	m	Additional Charge W = (kg)

<Table 1>

Outdoor Unit	W ₀ : Outdoor Unit Ref. Charge (kg)
AVW-76HKFH	7.0
AVW-96/114HKFH	9.0

NOTE:
W₀ is outdoor unit ref. charge before shipment.

CAUTION

- Max. additional refrigerant charge: 13.5kg
Be sure to contact the manufacturer when this value is exceeded.

2. Charging Work

Charge refrigerant (R410A) into the system as follows.

- (1) For charging refrigerant, connect the gauge mani-fold using charging hoses with a refrigerant cylinder to the check joint of the liquid line stop valve.
- (2) Fully open the gas line stop valve and slightly open the liquid line stop valve.
Charge refrigerant by opening the gauge mani-fold valve.
- (3) Charge the required refrigerant by operating the system in cooling.
Ensure to charge correct volume by utilizing a weight scale. An excess or shortage of refrigerant is the main cause of trouble to the units.
Fully open the liquid line stop valve after completing refrigerant charge.

3. Record of Additional Charge

Record the refrigerant charging quantity in order to facilitate maintenance and servicing activities.

Total refrigerant charge of this system is calculated in the following formula.

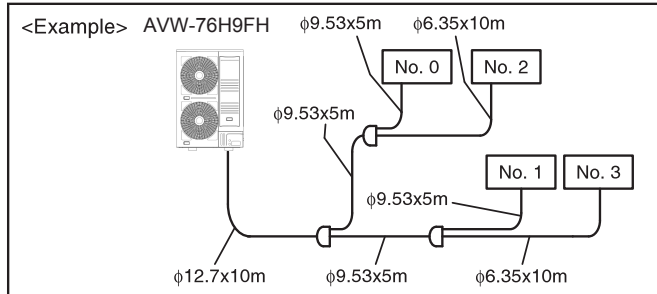
$$\begin{aligned} \text{Total Ref. Charge of This System} &= W + W_0 \\ \text{This System} &= \text{ } + \text{ } = \text{ } \text{ kg} \end{aligned}$$

Total Additional Charge W	kg
Total Ref. Charge of This System	kg
Date of Ref. Charge Work	
Day	Month Year

If total piping length is more than 30m, it is necessary additional refrigerant charge as follows.

Model: AVW-76/96/114H9FH

1. Calculating Method of Additional Refrigerant Charge (W kg)



See Example for Model AVW-76H9FH, and fill in the following table.

Pipe Diameter (mm)	Total Piping Length (m)	Additional Charge (kg)
φ12.7	(10)	x 0.12 = 1.2
φ9.53	(5 + 5 + 5 + 5)	x 0.07 = 1.4
φ6.35	(10 + 10)	x 0.03 = 0.6

Total Piping Length 50m Additional Charge $W = W_1 = 3.2(\text{kg})$

Pipe Diameter (mm)	Total Piping Length (m)	Additional Charge (kg)
φ12.7		x 0.12 =
φ9.53		x 0.07 =
φ6.35		x 0.03 =
Total Piping Length	m	Additional Charge $W =$ (kg)

<Table 1>

Outdoor Unit	W ₀ : Outdoor Unit Ref. Charge (kg)
AVW-76H9FH	5.0
AVW-96H9FH	5.5
AVW-114H9FH	6.5

NOTE:

W₀ is outdoor unit ref. charge before shipment.

2. Charging Work

Charge refrigerant (R410A) into the system as follows.

- (1) For charging refrigerant, connect the gauge mani-fold using charging hoses with a refrigerant cylinder to the check joint of the liquid line stop valve.
- (2) Fully open the gas line stop valve and slightly open the liquid line stop valve.
Charge refrigerant by opening the gauge mani-fold valve.
- (3) Charge the required refrigerant by operating the system in cooling.
Ensure to charge correct volume by utilizing a weight scale. An excess or shortage of refrigerant is the main cause of trouble to the units.
Fully open the liquid line stop valve after completing refrigerant charge.

3. Record of Additional Charge

Record the refrigerant charging quantity in order to facilitate maintenance and servicing activities.

Total refrigerant charge of this system is calculated in the following formula.

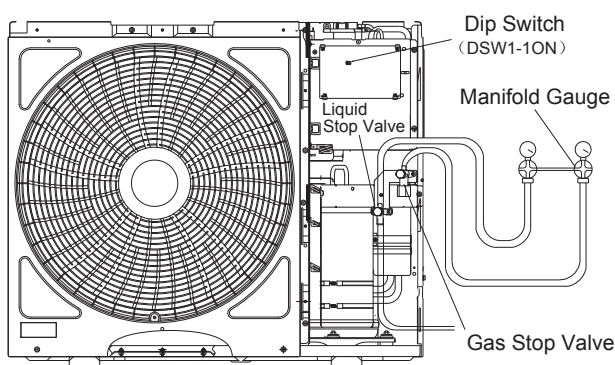
$$\begin{aligned} \text{Total Ref. Charge of This System} &= W + W_0 \\ \text{This System} &= \text{ } + \text{ } = \text{ } \text{ kg} \end{aligned}$$

Total Additional Charge W		kg
Total Ref. Charge of This System		kg
Date of Ref. Charge Work		
Day	Month	Year

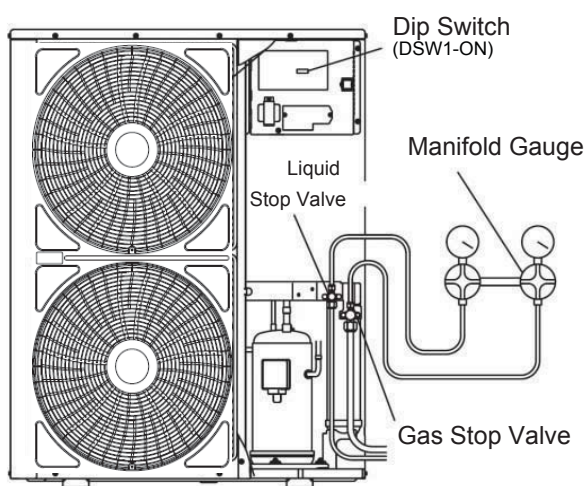
5.9 Collecting Refrigerant

When the refrigerant should be collected into the outdoor unit due to indoor/outdoor unit relocation, collect the refrigerant as follows.

- (1) Attach the manifold gauge to the gas stop valve and the liquid stop valve.
- (2) Turn ON the power source.
- (3) Set the DSW1-1 pin of the outdoor unit PCB at the "ON" side for cooling operation. Close the liquid stop valve and collect the refrigerant.
- (4) When the pressure at lower pressure side (gas stop valve) indicates -0.01MPa (684mmHg), perform the following procedures immediately.
 - * Close the gas stop valve.
 - * Set the DSW1-1 pin at the "OFF" side. (To stop the unit operation.)
- (5) Turn OFF the power source



<Outdoor Unit-28/34> for Example



CAUTION

Measure the low pressure by the pressure gauge and keep it not to decrease than -0.01MPa . If the pressure is lower than -0.01MPa , the compressor may be faulty.

6. Electrical Wiring

WARNING

- Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 3 minute before electrical wiring work or a periodical check is performed.
- Check to ensure that the indoor fan and the outdoor fan have stopped before electrical wiring work or a periodical check is performed.
- Protect the wires, electrical parts, etc. from rats or other small animals. If not protected, rats may gnaw at unprotected parts and at the worst, a fire will occur.
- Avoid the wirings from touching the refrigerant pipes, plate edges and electrical parts inside the unit. If not do, the wires will be damaged and at the worst, a fire will occur.

CAUTION

- Tightly secure the power source wiring using the cord clamp inside the unit.

NOTE

Fix the rubber bushes with adhesive when conduit tubes to the outdoor unit are not used.

6.1 General Check

- (1) Make sure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data. Make sure that the components comply with National Electrical Code (NEC).
- (2) Check to ensure that the voltage of power supply is within $\pm 10\%$ of nominal voltage and earth phase is contained in the power supply wires. If not, electrical parts will be damaged.
- (3) Check to ensure that the capacity of power supply is enough.
If not, the compressor will be not able to operate cause of voltage drop abnormally at starting.
- (4) Check to ensure that the earth wire is connected.
- (5) Check to ensure that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts.
If not, do not operate the system until the electrical leakage is found and repaired.

6.2 Electrical Wiring Connection

- (1) Connect the power supply wires to the terminal board in the electrical control box of both outdoor unit and indoor unit. And connect the earth wire to the electrical control box of outdoor unit. In addition, connect the earth wire to earth screw in the electrical control box of indoor unit. Refer to Fig. 6.2.

- (2) Connect the wires between the outdoor and indoor units to terminals 1 and 2 on the terminal board. If power supply wiring is connected to 1 and 2 of terminal board (TB1), printed circuit board will be damaged. Refer to Fig. 6.1.

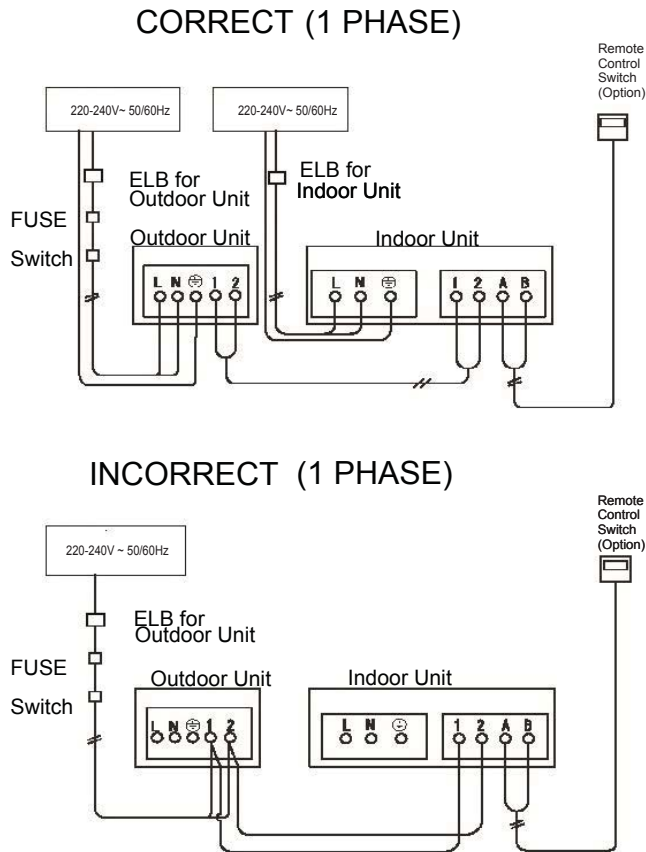


Fig. 6.1(a) 1 phase indoor unit and outdoor unit communication wire connection

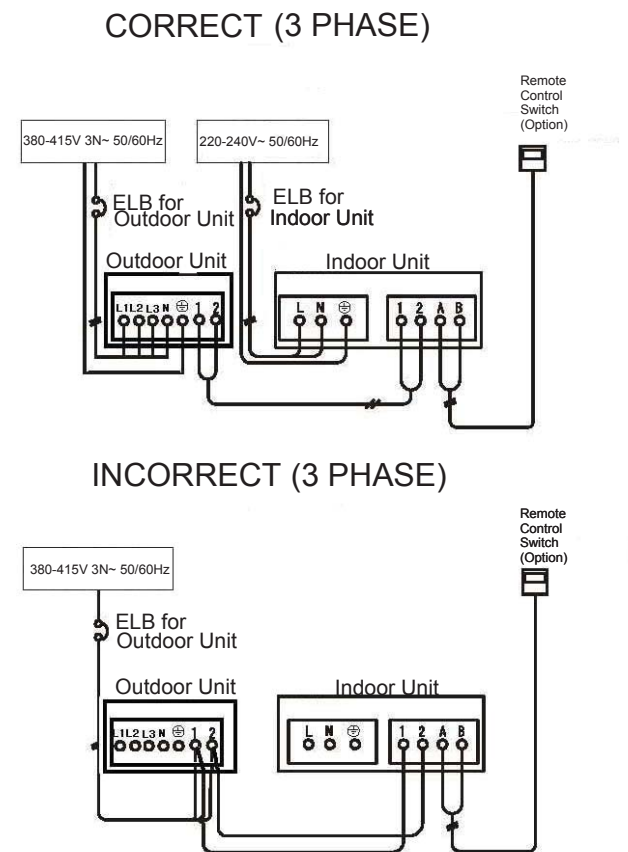


Fig. 6.1(b) 3 phase indoor unit and outdoor unit communication wire connection

Do not connect the Power Source Line to the terminal 1 and 2. These terminals are for the Control. If connected, the printed circuit board will be damaged.

- (3) Do not wire in front of the fixing screw of the service panel. If do, the screw can not be removed.
- (4) Use twist pair cable with shielded for control between outdoor unit and indoor unit, control wiring between indoor units, wiring (1 and 2) for remote control switch and transmission wiring (A and B) for remote control switch.

NOTES:

1. In case of total wiring length at intermediate wiring between outdoor unit and indoor unit and between indoor units is less than 100m, it is possible to use the normal wiring (more than 0.75mm²) except twist pair cable.
2. Total wiring length for remote control switch can be extended up to 500m. If total wiring length less than 30m, it is possible to use the normal wiring (0.3mm²) except twist pair cable.

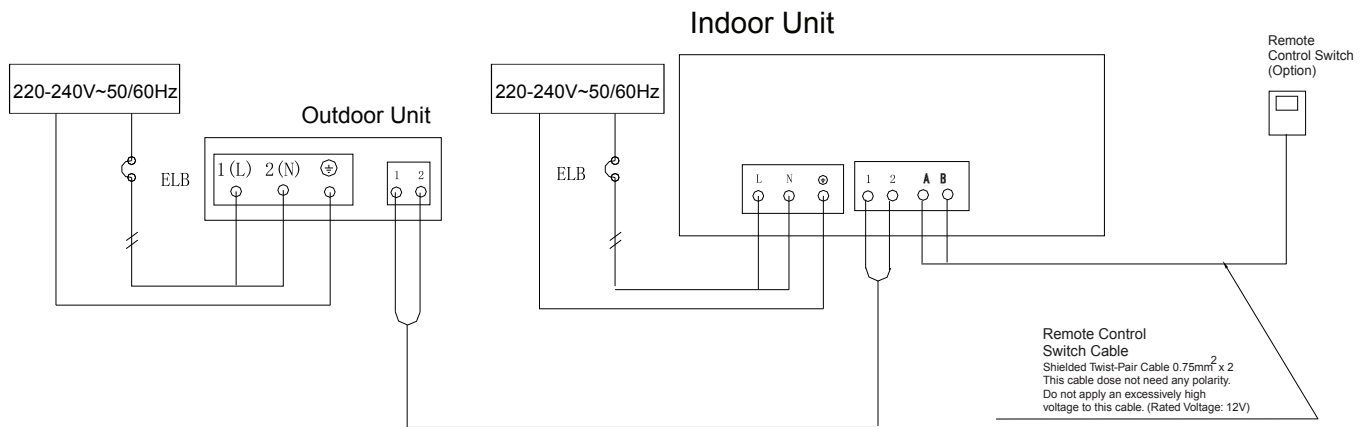


Fig. 6.2 (a) Wiring Connection for Indoor & Outdoor (1 PHASE)

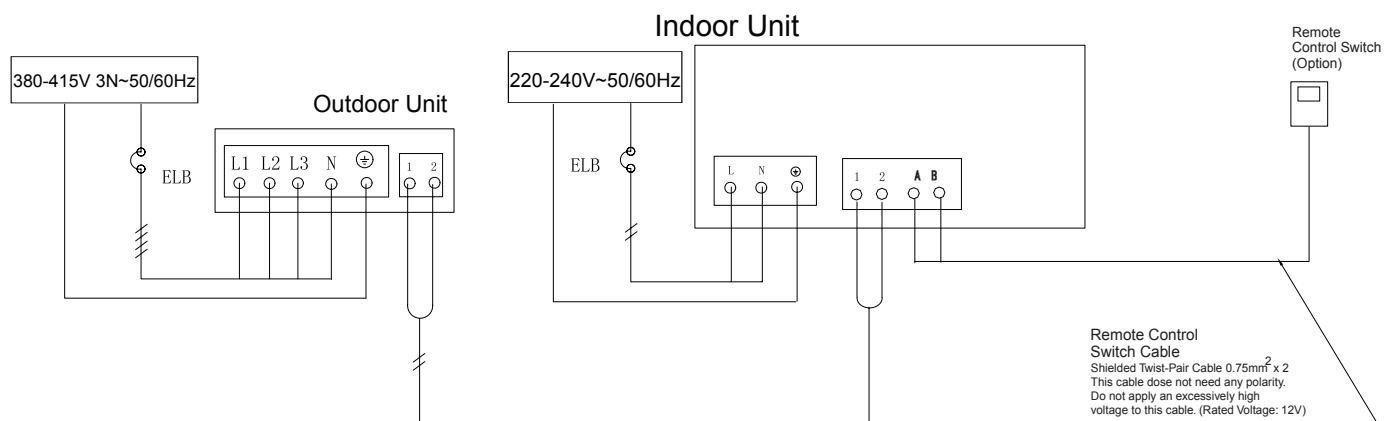


Fig. 6.2 (b) Wiring Connection for Indoor & Outdoor (3 PHASE)

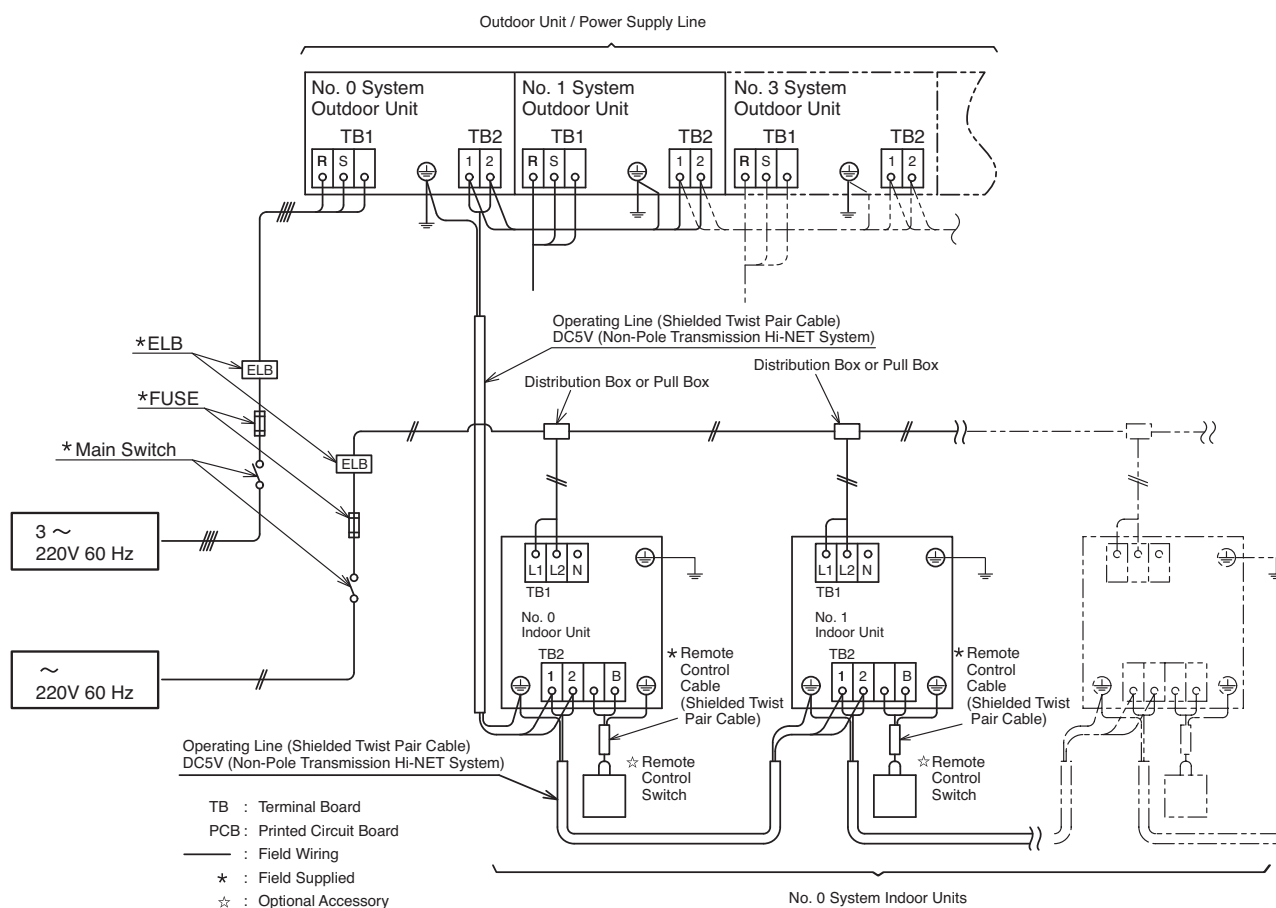


Fig. 6.2 (c) Instruction for Electrical Wiring Connection (220V 3~ 60Hz)

- (5) The recommended fuse sizes etc. are shown in 6.1.
- (6) In the case that a conduit tube for field-wiring not used, fix rubber bushes with adhesive on the panel.

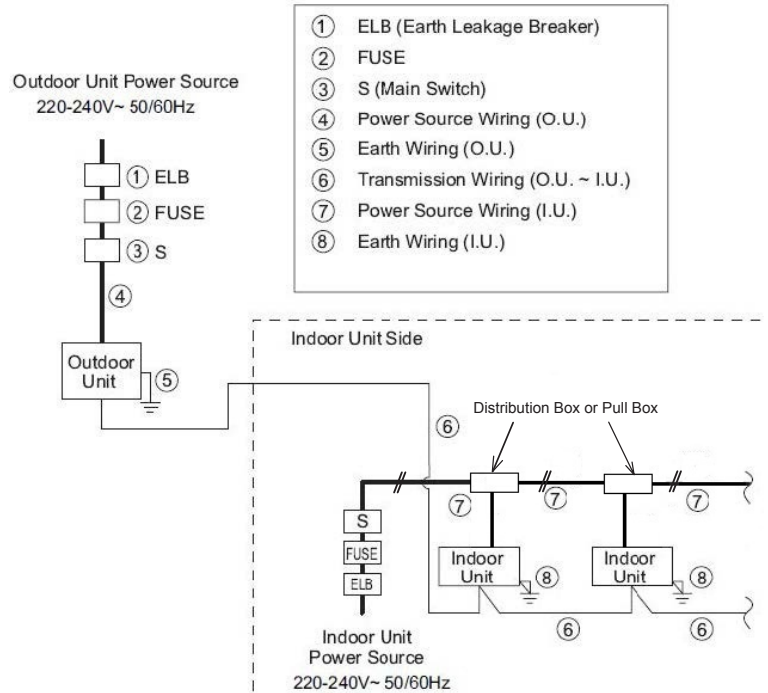
⚠ WARNING

- Install an ELB in the power source.
If ELB is not used, it will cause electric shock or fire at the worst.
 - The tightening torque of each screw shall be as follows.
 - M4: 1.0 to 1.3 N-m
 - M5: 2.0 to 2.5 N-m
 - M6: 4.0 to 5.0 N-m
 - M8: 9.0 to 11.0 N-m
 - M10: 18.0 to 23.0 N-m
- Keep the above tightening torque when wiring work.
- Install main switch and ELB for each system separately. Select the high response type ELB that is acted within 0.1 second.
 - Separate the control wiring between outdoor unit and indoor unit more than approximately 5 to 6cm from power supply wiring. Do not use a coaxial cable.

NOTE:

Supply the power source of outdoor units and indoor units respectively.

- (1) Power Source Wiring
Power source wiring is fundamentally according to this method.
- (1) Power Source Wiring



Electrical Data and Recommended Wiring, Breaker Size/1 Outdoor Unit

Model(kBtu/h)	Power Supply	MCA	Power Supply Line (Φmm ²)	Transmission Supply Line (Φmm ²)	MOP	ELB	
						Rated Current (A)	Current Sensitivity (mA)
AVW-28HJFH	220-240V~50/60Hz	19.5	4.0	0.75	40	25	30
AVW-34HJFH	220-240V~50/60Hz	27.5	6.0	0.75	40	32	30
AVW-43HJFH	220-240V~50/60Hz	31.5	6.0	0.75	50	40	30
AVW-38HJFH	220-240V~50/60Hz	28	6.0	0.75	50	40	30
AVW-48HJFH	220-240V~50/60Hz	28	6.0	0.75	50	40	30
AVW-54HJFH	220-240V~50/60Hz	28	6.0	0.75	50	40	30
AVW-76H9FH	220V 3 ~60Hz	22	4.0	0.75	63	30	30
AVW-96H9FH	220V 3 ~60Hz	29	6.0	0.75	63	40	30
AVW-114H9FH	220V 3 ~60Hz	37	10.0	0.75	63	50	100
AVW-43HKFH	380-415V 3N~50/60Hz	16.2	4.0	0.75	25	25	30
AVW-48HKFH	380-415V 3N~50/60Hz	16.2	4.0	0.75	25	25	30
AVW-54HKFH	380-415V 3N~50/60Hz	16.2	4.0	0.75	25	25	30
AVW-76HKFH	380-415V 3N~50/60Hz	20.5	6.0	0.75	40	32	30
AVW-96HKFH	380-415V 3N~50/60Hz	26	6.0	0.75	40	32	30
AVW-114HKFH	380-415V 3N~50/60Hz	26	6.0	0.75	40	32	30

*1 Refer to the NOTES for selection of the power source cable size.

ELB: Earth Leakage Breaker

NOTES:

- (1) Field wiring shall be in conformity to local laws and regulations, and all wiring operations must be performed by qualified professionals.
- (2) Refer to relevant standards for above-noted power cord size.
- (3) Where power cord is connected through junction box in series, be sure to determine the total current and choose wires based on the table below.
- (4) As a minimum, the chosen power cord shall be compliant with requirements on neoprene sheathed wire #57 as stated in IEC60245-1, while the power cord shall be made from copper conductor.
- (5) The wiring specifications for weak-current communication circuit shall not be lower than that for RVV(S)P shielded wires or equivalent, and the shielding layer shall be grounded.
- (6) A switch that can ensure all-pole disconnection shall be installed between power supply and air conditioning unit in such a manner that the contact spacing shall not be less than 3mm.
- (7) Once the power cord is damaged, the dealer or the professionals from designated maintenance department must be contacted in a timely manner for repair and replacement.
- (8) For the installation of power cord, the ground wire must be longer than the current-carrying conductor.

Current (A)	Wire Size (mm ²)	※1: DO NOT connect wires in series when the current exceeds 63A.
$i \leq 6$	2.5	
$6 < i \leq 10$	2.5	
$10 < i \leq 16$	2.5	
$16 < i \leq 25$	4	
$25 < i \leq 32$	6	
$32 < i \leq 40$	10	
$40 < i \leq 63$	16	
$63 < i$	※1	

AVW-28/34/43HJFH,AVW-43HKFH,AVW-38/48/54HJFH,AVW-48/54HKFH,
AVW-76/96/114HKFH,AVW-76/96/114H9FH

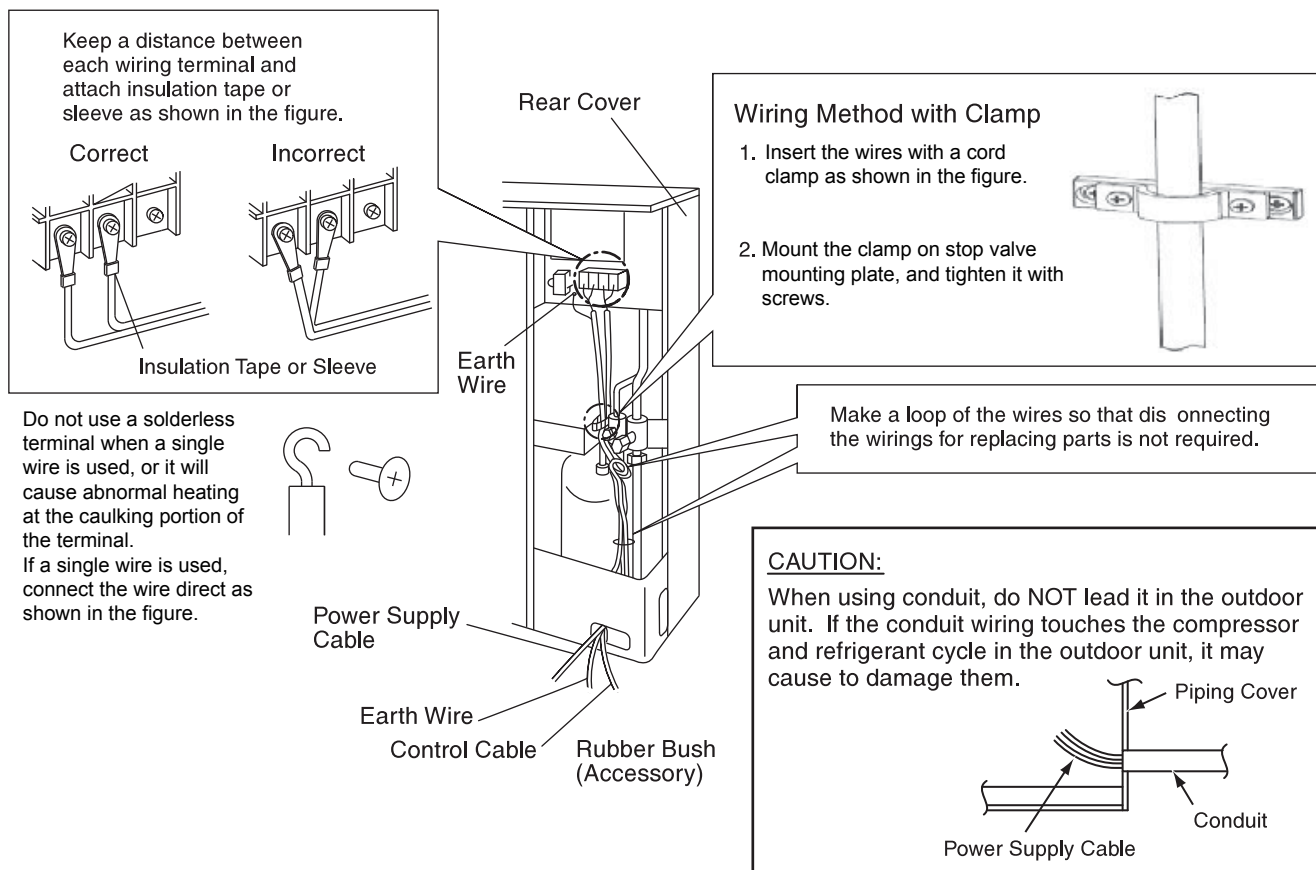


Fig. 6.3 Wiring Connection of Outdoor Unit

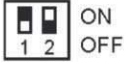
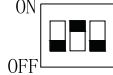
■ Field Minimum Wire Sizes for Power Source of Indoor Unit

- Connect correct series indoor unit.
- Use an ELB (Electric Leakage Breaker). If not used, it will cause an electric shock or a fire.
- Do not operate the system until all the check points have been cleared.

CAUTION

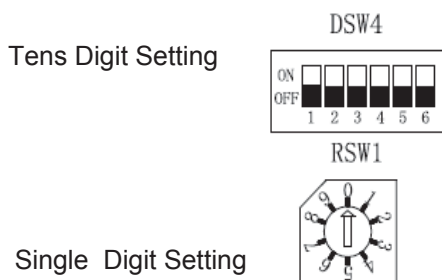
Install a multi-pole main switch with a space of 3.0mm or more between each phase.

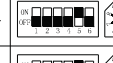
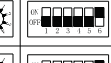
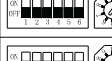
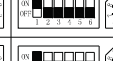
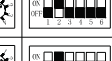
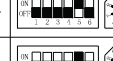
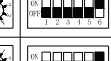
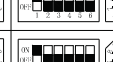
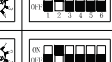
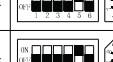
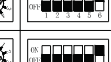
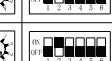
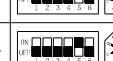
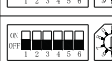
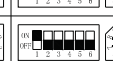
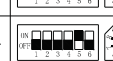
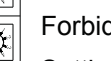
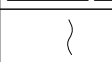
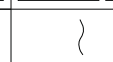
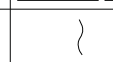
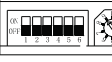
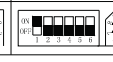
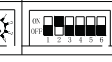
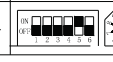
7. Outdoor Unit Dip-Switch Setting

DSW1	DSW2	DSW4	DSW5
 1 ON: Test Run(Cool) Test 1、2ON: Run(Heat) 4 ON: Compressor Forced Stop	ALL OFF:Shipment Set 5ON: Optional Function Setting 6 ON: Input Power Setting 	Ref. Cycle No. Setting 	Communication Setting 
	DSW3	DSW6	
	Capacity Setting 	Pipe length Setting Shipment  I.U.is located higher than O.U.(>20m)  O.U.is located higher than I.U.(>25m) 	

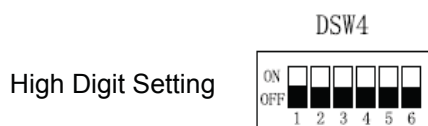
- Communication Setting
It is necessary to set Ref. cycle system No. and terminal resistor connect to Hi-NET system.

- Setting Ref.cycle system No. (3 PHASE)
Setting Ref.cycle (DSW4&RSW1)



Digital Unit	0	1	2	~	5	6
0				~		
1				~		
2				~		
3				~		
4				~		
5				~		
}	}	}	}	}	}	Forbid Setting
9				~		

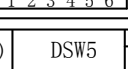
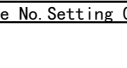
- Setting Ref.cycle system No. (1 PHASE)
Setting Ref.cycle (DSW4)



Ten A Bit	0	1	2	3	4	~	62	63
0						~		

AVW-28*

DSW(PCB1) Setting (Shipment)

DSW1 (Test Operation)	DSW2(Optional Function Setting)	DSW3(Capacity Setting)
ON  OFF 	28 ON  OFF 	28 ON  OFF 
DSW4(Ref. Cycle No. Setting)	DSW5	DSW6 (Pipe length Setting)
ON  OFF  Ref. Cycle No. Setting 0~63	ON  OFF 	Shipment I. U. is located higher than 0. U. (>65.62ft.) O. U. is located higher than 1. U. (>82.02ft.) ON  OFF 

AVW-76*

DSW1 (Test Operation)	DSW2 (Optional Function Setting)
ON  OFF 	ON  OFF 
DSW4 (Ref. Cycle No. Setting)	DSW1 (Ref. Cycle No. Setting)
ON  OFF  Setting for the ten digit	 Setting for the last digit
DSW5 (Operation Setting)	DSW6 (Piping length Setting)
ON  OFF 	ON  OFF 
DSW3 (Capacity Setting)	
76 ON  OFF 	96 ON  OFF 
114 ON  OFF 	

● Terminal Resistor Setting

The first key of DSW5 is "ON" position shipment.
It is not necessary to set when Hi-NET joint one outdoor unit.

It is necessary to set the first key of DSW5 to "OFF" position from the second outdoor unit when a Hi-NET system joint more outdoor unit

Setting Terminal Resistor

DSW5	
Shipment Setting	Resetting
 ON OFF	 ON OFF

8. Test Run

Test run should be performed according to the 8.1 on page 135. And use the Table 8.2 on page 137 for recording test run.

! WARNING

- Do not operate the system until all the check points have been cleared.
 - (A) Check and confirm Ref. pipe system and communication wire link to same Ref. cycle system.
 - (B) Check to ensure that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts. If not, do not operate the system until the electrical leakage is found and repaired.
 - (C) Check to ensure that the stop valves of the outdoor unit are fully opened, and then start the system.
 - (D) Check to ensure that the switch on the main power source has been ON for more than 12 hours, to warm the compressor oil by the oil heater.
- Pay attention to the following items while the system is running.
 - (A) Do not touch any of the parts by hand at the discharge gas side, since the compressor chamber and the pipes at the discharge side are heated higher than 90°C.
 - (B) DO NOT PUSH THE BUTTON OF THE MAGNETIC SWITCH(ES). It will cause a serious accident.
- Do not touch any electrical components for more than three minutes after turning OFF the main switch.
- Operate every indoor unit one by one, check and confirm their Ref. cycle and connect wire joint to same Ref. cycle system.

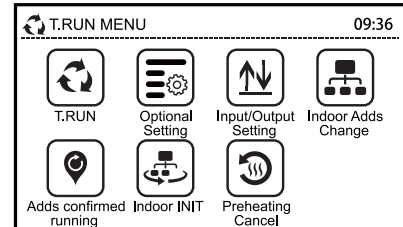
8.1 Checking of Wire Connection by Test Run

(1) Turn ON the power supply for all the indoor units.

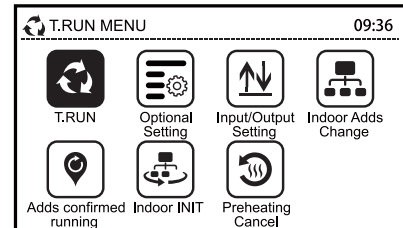
(2) For the models with the auto-address function, wait for 3 minutes approximately. The addressing is automatically performed. (There is a case that 5 minutes is required according to the setting condition.) After that, select using language from “Menu”. Refer to the operation manual for details.

(3) Press and hold “” (menu) and “” (return) simultaneously for at least 3 seconds.

a. The test run menu will be displayed.

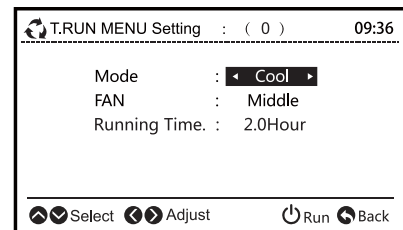


b. Select “” and press “”. The test run settings will be displayed.

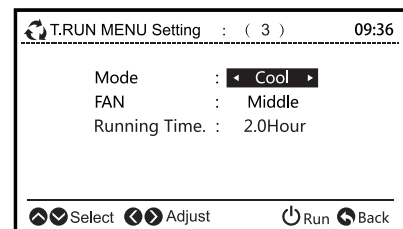


NOTE

When “0” is indicated, the auto-address function may be performing. Cancel “Test Run” mode and set it again.

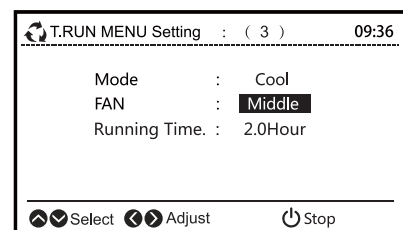


(4) The total number of the indoor units connected is indicated on the LCD (liquid crystal display). The case of the twin combination (one (1) set with two (2) indoor units) is indicated “2”, and the triple combination (one (1) set with three (3) indoor units) is indicated “3”.



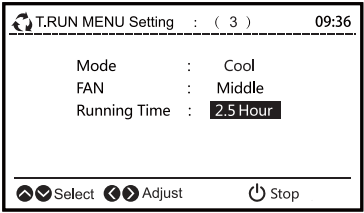
- a. If the indicated number is not equal to the actual connected number of indoor unit, the auto-address function is not performed correctly due to incorrect wiring, the electric noise or etc. Turn OFF the power supply and correct the wiring after checking the following points; (Do not repeat turning ON and OFF within 10 seconds.)
 - Power supply for indoor unit is not turned ON or incorrect wiring.
 - Incorrect connection of connecting cable between indoor units or incorrect connection of controller cable.
 - Incorrect setting of rotary switch and dip switch (the setting is overlapped) on the indoor units PCB.
- b. Press “” (run/stop) to start the test run.
- c. Press “< > ^ v” and set each item.

(5) Press “” (run/stop). At this time, 2-hour OFF timer will be set automatically.

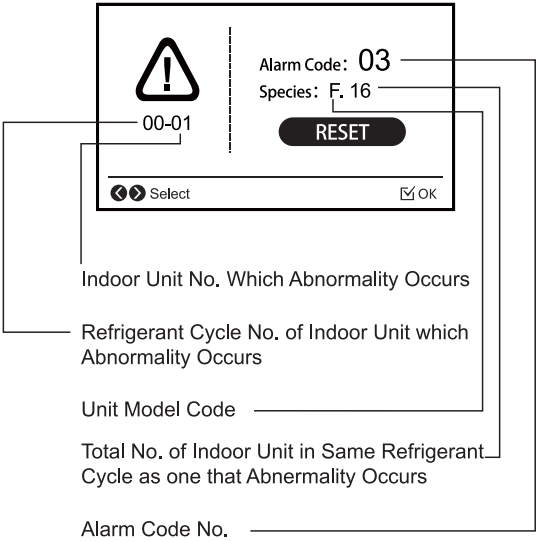


(6) The temperature detections by the thermistors are invalid though the protection devices are valid during the test run.

(7) To finish the test run, press “⏻” (run/stop) again or pass over the set test run time. When changing the test run time, press “^” or “v” to select “Running Time”. Then, set the test run time (30 to 600 minutes) by pressing “<” or “>”.



- The RUN indicator on the remote control switch flashes when some abnormalities such as protection devices activated occur during the test run as well as the RUN indicator (red) on the indoor unit flashes (0.5 second ON/ 0.5 second OFF). Additionally, the alarm code, the unit model code and connected number of indoor units will be displayed on the LCD as shown in the figure below. If the RUN indicator on HYXE-J01H flashes, it may be a failure in the transmission between the indoor unit and the remote control switch (loosening of connector, disconnecting wiring or breaking wire, etc.). Consult to authorized service engineers if abnormality can not be recovered.



8.2 Test Run and Maintenance Record

MODEL:	SERIAL. No.	COMPRESSOR MFG. No.
CUSTOMER'S NAME AND ADDRESS:		DATE:

1. Is the rotation direction of the indoor coil fan correct? ☐
2. Is the rotation direction of the outdoor coil fan correct? ☐
3. Are there any abnormal compressor sounds? ☐
4. Has the unit been operated at least twenty (20) minutes? ☐
5. Check Room Temperature

Inlet:	No. 1 DB	/WB	°C,	No. 2 DB	/WB	°C,	No.3 DB	/WB	°C,	No.4 DB	/WB	°C
Outlet:	DB	/WB	°C,	DB	/WB	°C,	DB	/WB	°C,	DB	/WB	°C
6. Check Outdoor Ambient Temperature

Inlet:	DB	°C,	WB	°C
Outlet:	DB	°C,	WB	°C
7. Check Refrigerant Temperature

Liquid Temperature:	°C
Discharge Gas Temperature:	°C
8. Check Pressure

Discharge Pressure:	MPa
Suction Pressure:	MPa
9. Check Voltage

Rated Voltage:	V
Operating Voltage:	V _i
Starting Voltage:	V
10. Check Compressor Input Running Current

Input:	kW
Running Current:	A
11. Is the refrigerant charge adequate? ☐
12. Do the operation control devices operate correctly? ☐
13. Do the safety devices operate correctly? ☐
14. Has the unit been checked for refrigerant leakage? ☐
15. Is the unit clean inside and outside? ☐
16. Are all cabinet panels fixed? ☐
17. Are all cabinet panels free from rattles? ☐
18. Is the filter clean? ☐
19. Is the heat exchanger clean? ☐
20. Are the stop valves open? ☐
21. Does the drain water flow smoothly from the drain pipe? ☐

8.3 Alarm Code

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device	Activation of Float Switch, High Level in Drain Pan
02	Outdoor Unit	Activation of Protection Device	Activation of PSH, Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing
03	Transmission	Abnormality between Indoor and Outdoor (or Outdoor and Outdoor)	Incorrect Wiring, Loose Terminals, Disconnect Wire, Tripping of Fuse
04	Transmission	Abnormality between Inverter PCB and Outdoor PCB Abnormality between Fan Controller and Outdoor PCB	Transmission Failure (Loose Connector)
05	Supply Phase	Abnormality Power Source Phases	Incorrect Power Source, Connection to Reversed-Phase, Open Phase
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Drop, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring
08	Cycle	Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring
11	Sensor on Indoor Unit	Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19	Fan Motor	Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Locking
21	Sensor on Outdoor Unit	High Pressure Sensor	Incorrect Wiring, Disconnecting Wiring
22		Outdoor Air Thermistor	
23		Discharge Gas Thermistor	
24		Evaporating Piping Thermistor	
29		Low Pressure Sensor	
31	System	Incorrect Capacity of Outdoor Unit and Indoor Unit	Incorrect Setting of Capacity Combination
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No.
38		Abnormality of Protective Circuit in Outdoor Unit	Failure of Protection Detecting Circuit (Failure of Protection Detecting Device, Abnormality of Outdoor PCB, Incorrect Wiring of PCB)
43	Protection Device	Activation of Low Pressure Decrease Protection Device	Defective Compression (Failure of Compressor of Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection Device	Overload at Cooling, High Temp. at Heating, Locking (Loose Connector)
45		Activation of High Pressure Increase Protection Device	Overload Operation (Clogging, Short-Pass), Pipe Clogging, Insufficient Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection Device (Vacuum Operation)	Insufficient Refrigerant, Refrigerant Piping Clogging, Locking (Loose Connector)
48		Activation of Inverter Overcurrent Protection Device	Overload Operation, Compressor Failure
51	Sensor	Abnormal Current Sensor	Current Sensor Failure
53	Inverter	Inverter Error Signal Detection	Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short-Circuit)
54		Increase of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Abnormal Fan
55		Inverter Failure	Inverter PCB Failure
57	Outdoor Fan Motor	Abnormality of Fan Motor	Disconnecting Wiring or Incorrect Wiring between Control PCB (PCB1) and Fan Relay PCB (PCB3, PCB5), Failure of Fan Motor
EE	Compressor	Compressor Protection Alarm	Failure of Compressor
b1	Outdoor Unit No. Setting	Incorrect Outdoor Unit No. Setting	Over 64 No. is Set for Address or Refrigerant Cycle.
b5	Indoor Unit No. Setting	Incorrect Indoor Unit No. Setting	More than 17 Non-Corresponding to H-LINKII Units are Connected to One System.

9. Safety and Control Device Setting

● Compressor Protection

High Pressure Switch: This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.

Outdoor Unit Model		AVW-28HJFH	AVW-34HJFH	AVW-43HJFH	AVW-43HKFH
Pressure Switch High Pressure	Cut-Out	MPa	Automatic Reset,Non-Adjustable		
	Cut-In	MPa			
Control Switch High Pressure	Cut-Out	MPa			
	Cut-In	MPa			
Fuse on Main Circuit		A			
CCP Timer Set Time		min.			
Temperature Controller of Fan Motor	Cut-Out	℃	Automatic Reset,Non-Adjustable		
	Cut-In	℃			
Control Circuit Fuse		A			

Outdoor Unit Model		AVW-38/48/54HJFH	AVW-48/54HKFH
For Compressor Pressure Switch High Pressure	Cut-Out	M Pa	Automatic Reset, Non-Adjustable
	Cut-In	M Pa	Automatic Reset, Non-Adjustable
Fuse on Main Circuit	A	50	25
Compressor Crank Heater Power	W	60+28	28 × 4
CCP Timer Set Time	Min	Non-Adjustable 3	Non-Adjustable 3
Control Circuit Fuse	A	5	5

Model		AVW-76HKFH	AVW-96/114HKFH
For Compressor Pressure Switch High Cut-Out	MPa	Automatic Reset, Non-Adjustable 4.15 -0.05 -0.15	
Cut-In	MPa	3.2±0.15	3.2±0.15
Fuse on Main Circuit	A	40	40
CCP Timer Setting Time	min.	Non-Adjustable 3	Non-Adjustable 3
For Condenser Fan Motor Internal Thermostat		Automatic Reset, Non-Adjustable (each one for each motor)	
DC Cut-Out	°C	120±5	
Cut-In	°C	110~60	110~60
Fuse Capacity on PCB1, 5	A	5	5
Fuse Capacity on PCB3	A	10	10

Model		AVW-76H9FH	AVW-96H9FH	AVW-114H9FH
For Compressor Pressure Switch High Cut-Out	MPa	Automatic Reset, Non-Adjustable 4.15 -0.05 -0.15		
Cut-In	MPa	3.2±0.15	3.2±0.15	3.2±0.15
Fuse on Main Circuit	A	60	60	60
CCP Timer Setting Time	min.	3	Non-Adjustable 3	3
For Condenser Fan Motor Internal Thermostat		Automatic Reset, Non-Adjustable (each one for each motor)		
DC Cut-Out	°C	120±5	120±5	120±5
AC Cut-Out	°C	135±5	135±5	135±5
Cut-In	°C	110~60	110~60	110~60
For Control Circuit Fuse Capacity on PCB1, 5	A	5	5	5
Fuse Capacity on PCB3	A	10	10	10

MAINTENANCE & SERVICE

1. Maintenance

1.1 Regular Inspection

In order to ensure the operation reliability and prolong the service life, please pay attention to the following additional items.

1) For Indoor Unit and Outdoor Unit

a) Fan and Fan Motor

- Lubrication – All fan motors are pre-lubricated and sealed at the factory. Therefore, no lubricating maintenance is required.
- Sound and Vibration – Inspect for abnormal sound and vibration.
- Rotation – Inspect for rotation and rotating speed. It should clockwise rotate and check the rotary speed.
- Insulation – Inspect for electrical insulation resistance.

b) Heat Exchanger

- Clogging – Inspect and remove any accumulated dirt and dust from the heat exchanger at regular intervals. As for outdoor unit, other obstacles such as growing lawn and paper, which might restrict air flow, should also be removed.

c) Piping Connection

- Leakage – Inspect for refrigerant leakage at piping connection.

d) Cabinet

- Stain and Lubrication – Inspect and remove any stain and lubrication.
- Fixing Screw – Inspect and fix loosened or lost screws.
- Insulation – Inspect and repair peeled thermal insulation material on cabinet.

e) Electrical Equipment

- Activation – Inspect for abnormal activation of the AC contactor, auxiliary relay, PCB and etc.
- Line Condition – Pay attention to working voltage, amperage and phase balance. Inspect for faulty contact caused by loosened terminal connections, oxidized contacts, foreign matter, and other items. Inspect for electrical insulation resistance.

f) Control and Protective Devices

- Setting – Do not readjust the setting in the field unless the setting is maintained at a point other than the point listed in “SAFETY AND CONTROL DEVICE SETTING” .

2) For Indoor Unit

a) Air Filter

- Cleaning – Inspect and remove any accumulated dirt and dust according to “Filter Cleaning” .

b) Drain Pan, Drain-up Mechanism and Drain Pipe

- Drain Line – Inspect and clean the condensate drain line at least twice a year.
- Drain-up Mechanism – Inspect for activation of drain-up mechanism.

c) Float Switch

- Activation – Inspect for activation of float switch.

3) For Outdoor Unit

a) Compressor

- Sound and Vibration – Inspect for abnormal sound and vibration.
- Activation – Inspect for that the voltage drop of power supply line is within 16% at start and within 2% during operation.

b) Reverse Valve

- Activation – Inspect for any abnormal activation sound.

c) Strainer

- Clogging – Inspect for that no temperature difference between both ends.

d) Earth Wire

- Earth Wire – Inspect for continuity to the earth.

e) Oil Heater

- Activation – The oil heater should be activated at least 12 hours before start-up, by switching ON the main power source.

4) For Remote Control Switch

- Switch and Indication – Inspect for activation of switch

1.2 Filter Cleaning

CAUTION

Do not operate the system without the air filter to protect the indoor unit heat exchanger against being clogged.

Turn OFF the main power switch before taking out the filter. (The previous operation mode may appear.)

1.2.1 Take Out the Filter

The indication, "FILTER" is shown on the display of the remote control switch after approximately 1,200 hour operation.

Take out the air filter according to the following steps.

Step 1

Remove the air intake grille. Push the grab of air intake grille away in the direction of arrow as shown in the figure, and open the air intake grille until its angle to panel surface is approx. 45°.

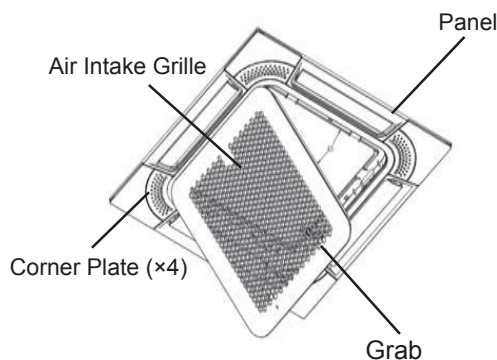


Fig. Method for Removal of Air Intake Grille

CAUTION

Please don't attempt to pull out the air intake grille when its angle to panel surface is 90°.

Step 2

Hold the slope while putting up the air intake grille.

Step 3

Draw the air intake grille out forward.

1.2.2 Clean the Filter

Clean the air filter according to the following steps.

Step 1

Use a vacuum cleaner or let water flow onto the air filter for removing the dirt from the air filter.

CAUTION

Do not use hot water higher than approximately 40°C.

Step 2

Dry the air filter in the shade after shaking off moisture.

1.2.3 Reset of Filter Indication

After cleaning the air filter, press the "RESET" button. The FILTER indication will disappear and the next filter cleaning time will be set.

For other indoor units, please refer to the related information of Indoor Units Technical Catalog.

2. Troubleshooting

2.1 Initial Troubleshooting

2.1.1 This is Not Abnormal

1) Smells from Indoor Unit

Smell adheres on indoor unit after a long period of time. Clean the air filter and panels or allow a good ventilation.

2) Sound from Deforming Parts

During system starting or stopping, an abrading sound might be heard. However, this is due to thermal deformation of plastic parts. It is not abnormal.

3) Steam from Outdoor Heat Exchanger

During defrosting operation, ice on the outdoor heat exchanger is melted, resulting in making steam.

4) Dew on Air Panel

When the cooling operation continues for a long period of time under high humidity conditions (higher than 27°C DB/80% R.H), dew can form on the air panel.

5) Refrigerant Flow Sound

While the system is being started or stopped, sound from the refrigerant flow may be heard.

2.1.2 Not Cooling or Heating Well

- Check for obstruction of air flow of the outside or inside units.
- Check if too much heat source exists in the room.
- Check if the air filter is clogged with dust.
- Check to see if the doors or windows are opened or not.
- Check if the temperature condition is not within the operation range.

2.1.3 Not Operated

- Check for electrical wiring.
- Check for DIP switch setting.
- Check whether the "SET TEMP" is set at the correct temperature.
- In the case that "RUN" lamp on remote control switch is flickering every 2 seconds, refer to "Service Manual" because abnormality of some device is suspected.

2.2 Troubleshooting by Alarm Code

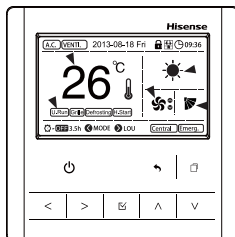
The Alarm Codes shown below are indicated when a fault occurs during operation.

CAUTION: Before servicing electric parts, cut off power supply completely.

Indication	Trouble	Possible Causes	Action
RUN lamp flashes for 2 seconds.	Failure inTransmission between Indoor Unit and Remote Control Switch	Remote Control Cable BrokenContact Failure in Remote Control Cable IC or Microcomputer Defective	Locate the cause and repair. Check by remote control self-checking function. (See Service Manual.)

RUN lamp flashes 5 times (5 seconds) with unit number and alarm code displayed.

Remote Control Switch



“Failure”

03

Unit No.3

02

Alarm Code of "Outdoor Unit Protection Activated"

Indication of Unit Number in Remote Control Switch

Unit No.0	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Unit No.7
00	01	02	03	04	05	06	07
Unit No.8	Unit No.9	Unit No.10	Unit No.11	Unit No.12	Unit No.13	Unit No.14	Unit No.15
08	09	10	11	12	13	14	15

NOTE:
Alarm code is also indicated on 7-segment display on outdoor unit PCB1, if a trouble occurs.

2.3 Troubleshooting in Check Mode

Each “Check Menu” item and its function are explained in the following table.

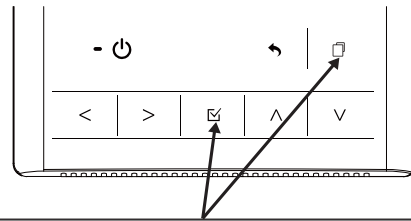
Check menu item	Function
Check 1	Sensor condition of air conditioner will be monitored and indicated.
Check 2	Sensor data of air conditioner prior to alarm occurrence will be indicated.
Alarm Record	Previous alarm record (date, time, alarm code) will be indicated. ※
Species	Model name and manufacturing number will be indicated.
IDU/ODU Diagnosis	The result of PCB check will indicated.
Self Diagnosis	Checking of remote control switch will be carried out.

※ To Erase Alarm Record

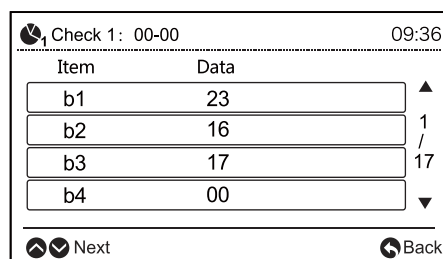
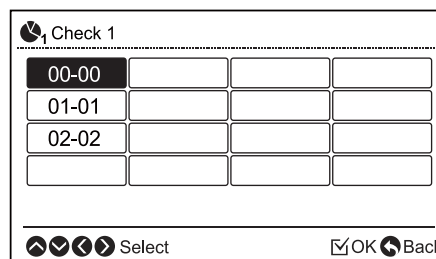
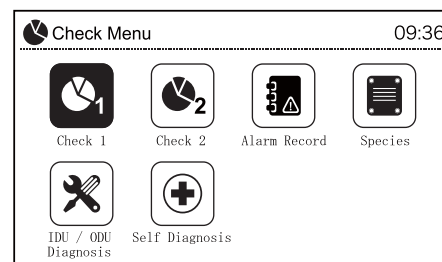
Press “” when the abnormality record is indicated. After that, the confirmation screen will be displayed.

Select “Yes” and press “” so that the alarm record will be deleted.

Indication of Check Menu

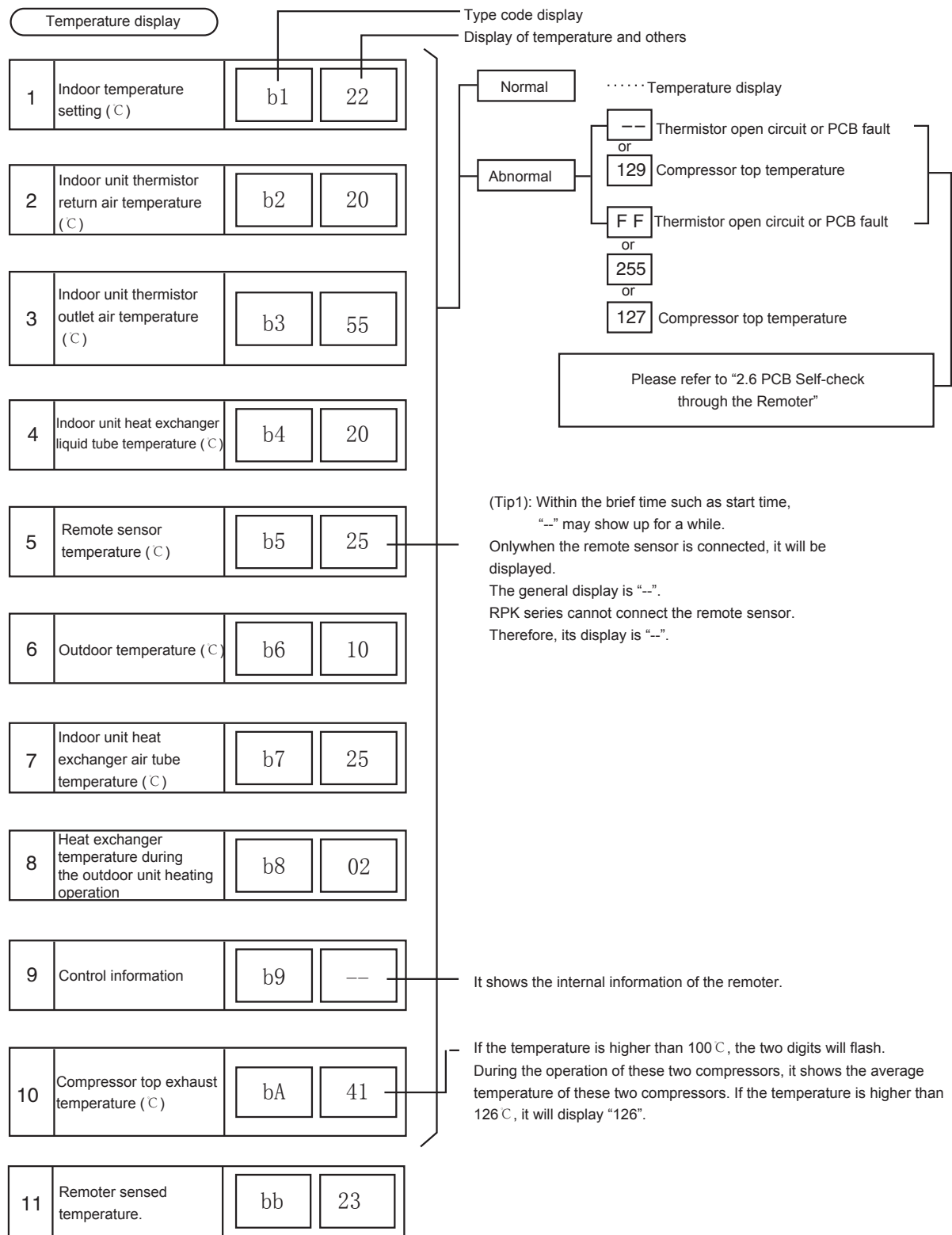


Press and hold “” (menu) and “” simultaneously for at least 3 seconds during the normal mode. The check menu will be displayed.



2.3.1 Contents of Check Mode 1

Press check1 button, the next content will be displayed. Press ^ v the previous content will be displayed.

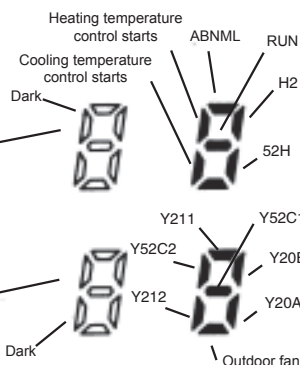


12	Remoter sensed humidity (optional).	bC	00
----	-------------------------------------	----	----

Microcomputer output/ input display

13	Indoor unit microcomputer input/ output.	C1	
----	--	----	---

14	Outdoor unit microcomputer input/ output.	C2	
----	---	----	---



Symbols with the letter "Y" are PCB relays.

Shutdown cause display

15	Cause for shutdown	d1	01
----	--------------------	----	----

Abnormal occurrences counter

16	Abnormal occurrence times	E1	01
----	---------------------------	----	----

17	Indoor unit momentary power failure occurrence times.	E2	00
----	---	----	----

18	Remoter and indoor unit transmission error occurrence times	E3	00
----	---	----	----

19	Frequency converter abnormal occurrence times	E4	00
----	---	----	----

Automatic louver state display

20	Louver sensor	F1	00
----	---------------	----	----

00	Stop the operation and turn off the power
01	Temperature control switch (Tip1)
02	Alarm (Tip2)
03	Freeze protection, overheat protection
05	Outdoor unit momentary power failure, reset (Tip3)
06	Indoor unit momentary power failure, reset (Tip4)
07	Cease of cooling operation due to low outdoor temperature and cease of heating operation due to high outdoor temperature
09	It needs four-way valves to shift to the shutdown
10	It needs forced shutdown.
11	Restart due to the reduced pressure ratio
12	Restart due to the increased low pressure
13	Restart due to the increased high pressure
15	Restart due to the excessively high exhaust temperature and low air inlet pressure.
16	Restart due to the reduced exhaust superheat
17	Restart due to the tripping of the frequency converter
18	Restart due to the reduced voltage
19	Expansion valve opening change protection
20	Indoor unit run mode shift (Tip5)
21	Forced temperature controlled shutdown
22	Forced temperature controlled shutdown (Preheating)
26	Insufficient high pressure, restart

(Tip1): Term definition

Temperature controlled startup: The indoor unit requires the running of the compressor.

Temperature controlled shutdown: The indoor unit does not require the running of the compressor.

(Tip2): Even if the poweroff is caused by the "AlarmABNML", "02" will not always be displayed.

(Tip3): If the communication between the frequency converter PCB and control PCB cannot be carried out within 30 seconds, the outdoor unit will be closed down. In this case, the shutdown is the cause for d1-05 and the alarm code "04" may be displayed.

(Tip4): If the communication between the indoor unit and outdoor unit cannot be carried out within 3 minutes, the outdoor unit will be closed down. In this case, the shutdown is the cause for d1-06 and the alarm code "03" may also be displayed.

(Tip5): "20" will be displayed in different modes of the indoor units. It can be numbered to 99.

If over 99, "99" will always be displayed.

(Tip1): If the communication error lasts for 3 minutes, the occurrence times will be added with 1.

(Tip2): The reserved parameters can be removed with the method indicated in 2.6 "PCB Self-Check through the Remoter".

Next page

Compressor pressure/ frequency display			
21	Exhaust pressure (high pressure) (0.1MPa)	H1	18

22	Air inlet pressure (low pressure) (0.01MPa)	H2	04
----	---	----	----

23	Control information	H3	44
----	---------------------	----	----

It shows the internal information of the remoter. There's no special meaning.

24	Operation frequency (Hz)	H4	44
----	--------------------------	----	----

When two compressors are running together, it displays the total frequency.

Indoor unit capacity display

25	Indoor unit capacity	J1	08
----	----------------------	----	----

Indoor unit capacity is shown as below.

26	Outdoor unit number	J2	U. n
----	---------------------	----	------

27	Cooling system number	J3	01
----	-----------------------	----	----

28	Cooling system number	J4	00
----	-----------------------	----	----

Indoor unit capacity code:

Code	Indoor unit capacity mark	Horsepower
06	22	0.8
08	28	1.0
10	36	1.3
11	40	1.5
13	45	1.8
14	50	2.0
16	56	2.3
18	63	2.5
20	71	2.8
22	80	3.0
26	90	3.3
32	112	4.0
40	140	4.5

"n" represents the total quantity of indoor units.

n= 01-16

Expansion valve opening display

29	Indoor unit expansion valve opening (%)	L1	20
----	---	----	----

30	Outdoor unit expansion valve MV1 opening (%)	L2	99
----	--	----	----

J3:01-16 (01, decimal display before delivery (DSW5))
J4:00-0F (00, hexadecimal display before delivery (DSW5))

31	Outdoor unit expansion valve MV2 opening (%)	L3	99
----	--	----	----

In case of the unit without expansion valves, it displays the same digits.

32	Control information	L4	00
----	---------------------	----	----

Estimated current display

	Compressor working current (A)	P1	25
--	--------------------------------	----	----

When several compressors are running at the same time, it displays the total current.
When the inverter compressor is running, it displays the current on the frequency converter side.

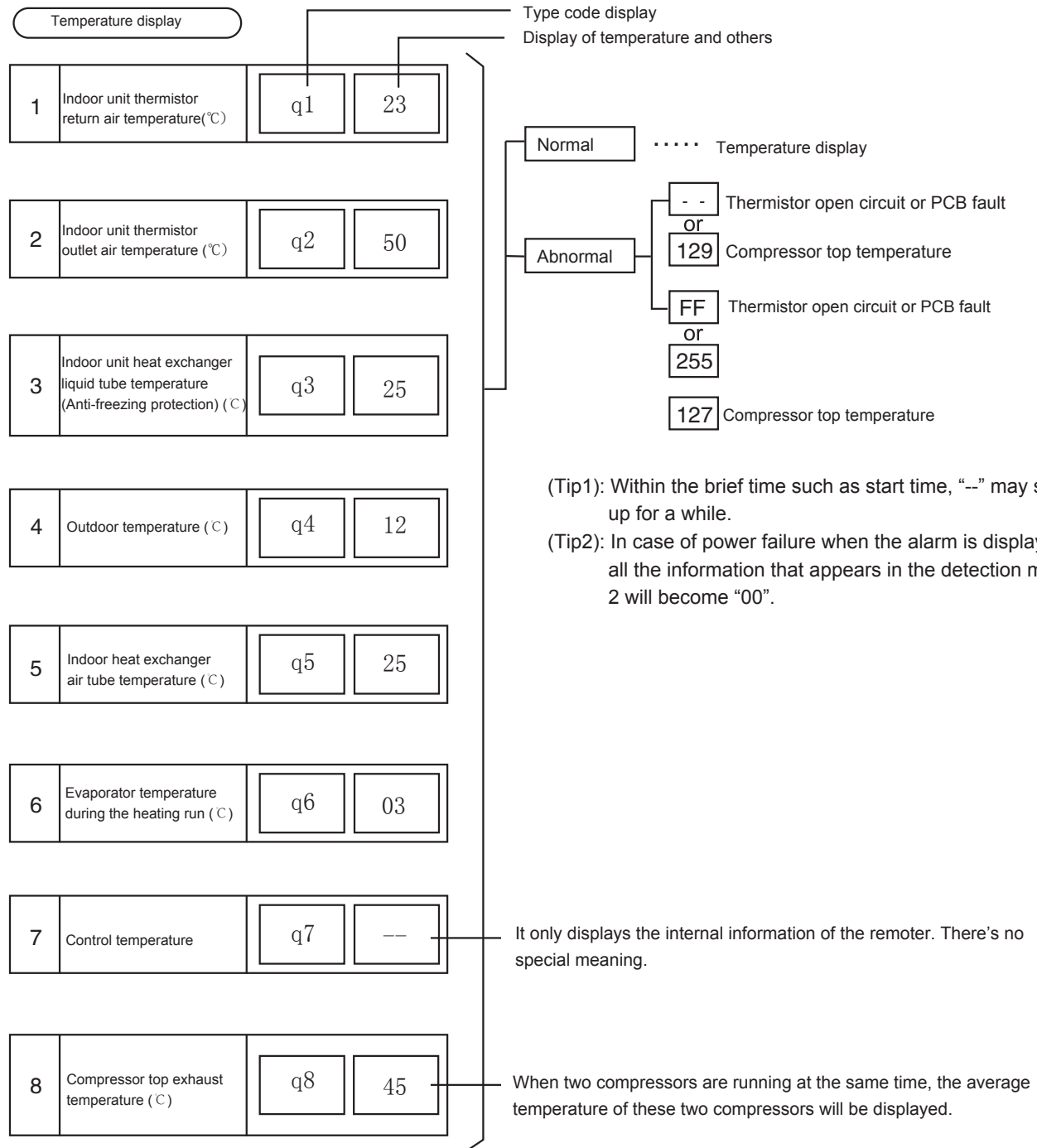
Back to temperature display

Temperature display

2.3.2 Contents of Check Mode 2

When over three units are connected to one remoter, the updated parameters of the first three indoor units will be displayed.

Press 'check2" button, the next content will be displayed. Press "V" the previous content will be displayed.



Next page

Compressor pressure/ frequency display			
9	Exhaust pressure (high pressure) (0.1MPa)	q9	18

10	Air inlet pressure (low pressure) (0.1MPa)	qA	04
----	--	----	----

11	Control information	qb	44
----	---------------------	----	----

It displays the internal information of the remoter.
There's no special meaning.

12	Operation frequency (Hz)	qC	44
----	-----------------------------	----	----

When two compressors are running at the same time,
it'll display the total frequency.

Expansion valve opening display			
13	Indoor unit expansion valve opening (%)	qd	20

14	Outdoor unit expansion valve MV1 opening (%)	qE	99
----	---	----	----

Estimated current display			
15	Compressor working current (A)	qF	20

When two compressors are running at the same
time, it'll display the total current.

Back to temperature display

Temperature Indication

2.4 Troubleshooting by 7-Segment Display

2.4.1 Simple Checking by 7-Segment Display

1 * Turn on All Indoor Units

* All the Indoor Units Connected to the Outdoor Unit

2 Turn on the Outdoor Unit

3 Auto-addressing Starts

Outdoor Unit
Circuit Board
PCB1

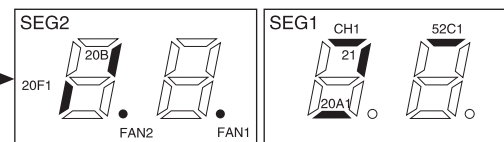
During auto-addressing, the following items can be checked
using the outdoor unit's on-board 7-segment LED display.

- (1) Disconnection of power supply to the indoor unit.
- (2) Reverse connection of the operating line between the
outdoor and indoor units.
- (3) Duplication of indoor unit number.

2.4.2 Checking Method by 7-Segment Display

By using the 7-segment display and check switch (PSW) on the PCB1 in the outdoor unit, check each part of refrigerant cycle and operation. During the data check, do not touch other electrical parts except for the following switches to avoid electrical shock. The tools can not touch the electrical part. Otherwise, the electrical part may be damaged.

Items	Item display		Data display	
	Test No.	Display	Display	Display content description
Outdoor chip output state	01	57	-	Please refer to the displayed position in the right chart.
Indoor operation capacity	02	07	24	Display "themoon" indoor unit capacity
Required converter frequency	03	41	100	Unit Hz
The number of operating compressors	04	11	1	
The number of fan speed shifts	05	00	5	Display outdoor unit fan shifts (0-16); the greater the figure, the larger the speed.
Outdoor unit expansion valve openness	06	00	50	Displayed in %. The greater the figure, the larger the openness.
Outlet pressure	08	00	18	Unit Mpa
Inlet pressure	09	05	05	Unit Mpa
Compressor top temperature	10	10	05	Unit C
Heat exchanger liquid side temperature	11	10	30	Unit C
Outdoor temperature	12	10	35	Unit C
Inverter compressor current	14	11	20	Unit A. Displays the primary (input) current of the frequency converter
Indoor unit expansion valve openness Unit No. O-F	15	10	20	Displayed in %. The greater the figure, the larger the openness. Only displays connected indoor units
Indoor liquid tube temperature Unit No. O-F	16	10	20	Unit C. Only displays connected indoor units
Indoor air tube temperature Unit No. O-F	17	10	5	Unit C. Only displays connected indoor units
Indoor inlet temperature Unit No. O-F	18	10	25	Unit C. Only displays connected indoor units
Indoor outlet temperature Unit No. O-F	19	10	18	Unit C. Only displays connected indoor units
Indoor capacity Unit No. O-F	20	10	6	Displays capacity of all indoor units
Indoor unit shutdown cause Unit No. O-F	21	10	01	Display cause for indoor unit shutdown. Please refer to the cause code in the right chart.
Retract control to prevent from low pressure ratio	22	11	1	0: Retract control not started 1: Retract control started
Retract control to prevent from increasing high pressure	23	13	1	0: Retract control not started 1: Retract control started
Retract control to prevent from increasing frequency conversion module temperature	24	14	1	0: Retract control not started 1: Retract control started
Retract control to prevent from increasing outlet air temperature	25	15	1	0: Retract control not started 1: Retract control started
Retract control to prevent from low TdSH	26	16	1	0: Retract control not started 1: Retract control started
Retract control to prevent from overheat	27	17	1	0: Retract control not started 1: Retract control started
Control information	28	11	50	
Outdoor unit alarm code	30	11	02	Display the updated alarm code for outdoor unit shutdown
Cause code for frequency converter shutdown	31	11	1	Display cause for frequency converter shutdown. Please refer to the right chart for the cause code contents
Indoor connection capacity	33	11	52	Connected indoor unit capacity, displayed in 3.5 times
Connected indoor unit quantity	34	11	4	
Refrigerant system address	35	11	2	0-63



[Cause code chart for indoor unit shutdown]

Display	Display content description
00	Shut down, power off
01	Temperature control off
02	Alarm
03	Anti-freezing protection, overheat protection
05	Outdoor momentary power failure, chip reset
06	Indoor momentary power failure, chip reset
07	Low outdoor temperature, cooling halted High outdoor temperature, heating halted
10	Request, forced shutdown
11	Low pressure ratio, restart
12	Increasing low pressure, restart
13	Increasing high pressure, restart
15	Abnormal vacuum Outlet air temperature increased, restart
16	Low exhaust superheat, restart
17	Frequency converter tripping, restart
18	Low voltage(overvoltage), restart And other causes leading to the restart of the frequency converter
19	Prevent the change of expansion valve openness, restart
20	Different run modes of the indoor and outdoor units
21	Forced temperature controlled shutdown
22	Forced temperature controlled shutdown (preheating)
26	Low high pressure, restart

CHEC CANCEL — To cancel the check mode, please press PSW2 for over 3 seconds.

Indoor unit capacity code chart

Code	Indoor unit capacity mark	Horsepower
05	06	0.6
06	07	0.8
08	09	1.0
10	12	1.3
13	14	1.8
14	17	2.0
16	18	2.3
18	22	2.5
20	24	2.8

Remarks:

- Even when it gives the alarm to stop the machine, the shutdown code may not be displayed as "02" sometimes. Before the alarm, in case of temperature controlled shutdown due to other causes, it may display other shutdown cause codes.
- For units connected to the frequency converter, when the communication between the frequency converter module and outdoor unit base board has stopped for 30 seconds, the outdoor unit chip will be reset. Therefore, the shutdown cause code in case of 04 alarm may be displayed as 05 sometimes.
- When the communication between the indoor and outdoor units has stopped for 3 minutes, the indoor unit chip will be reset. Therefore, the shutdown cause code in case of 03 alarm may be displayed as 06 sometimes.
- When it displays "21", please the shutdown cause of other units.

Frequency converter shutdown cause

Code	Cause	Unit shutdown cause code	Remark	
			Restart display	Alarm code
1	Auto stop of the transistor module (ISPM error) (overcurrent, low voltage, short circuit protection)	17	P17	59
2	Momentary over current	17	P17	52
3	Frequency converter radiator failure, protection control	17	P17	54
4	Electronic temperature control action	17	P17	52
5	Reduced frequency converter voltage (insufficient voltage)	18	P18	06
6	Overcurrent	18	P18	06
7	Communications failure	05	-	04
8	Current sensor failure	17	P17	51
9	Momentary power loss detection	18	-	-
11	Frequency converter chip reset	10	-	-
12	Compressor grounding detection (only for startup)	17	P17	53
13	Open phase detection	18	-	-

Code	Cause	Unit shutdown cause code	Remark	
			Restart display	Alarm code
16	Frequency converter action	18	P 18	55
17	Communication failure	18	P 18	55
18	Protection device action	-	-	02
19	Protection detection Device fault	18	-	38
20	63H early reset	18	-	-

2.5 Protection Control Code on 7-Segment Display

- 1) In the protection control mode, the protection control code will be on the seven segment digital display.
- 2) After canceling the protection function, the displayed symbols will also disappear.
- 3) When several protection controls are functioning at the same time, the protection codes will be displayed by priority (the priority order is as follows)
 - a) Protection control codes related to the frequency control comes before the others

<Priority order>

(1) Pressure ratio control	(P01)
(2) Pd protection control	(P02)
(3) Current protection control	(P03)
(4) Frequency converter module temperature increase protection control	(P04)
(5) Td increase protection	(P05)
(6) Ps protection control	(P06)
(7) Pd decrease protection	(P09)
(8) Required current control	(P0A)

b) For restart control, if there's no protection control display related to the frequency control, it will display the last restart.

Code	Protection control	Code	Protection control
P01	Pressure ratio control	P11	Pressure ratio decrease restart control
P02	High pressure increase protection	P12	Low pressure increase restart control
P03	Frequency converter current protection control	P13	High pressure increase restart control
P04	Frequency converter module cooling fin temperature increase protection	P15	Vacuum, Td increase restart control
P05	Td increase protection	P16	TdSH decrease restart control
P06	Low pressure decrease protection	P17	Frequency converter tripping restart control
P0A	Required current control	P18	Voltage decrease restart control
P09	High pressure decrease protection	P26	High pressure decrease restart control

Note) "P01~5.C" in the retract control is displayed as "PC1~5.C".

- 1) If there's no need to display protection control, the restart display will be on for 30 minutes.
- 2) All the restart displays will disappear after the indoor unit sends out shutdown signals.
- 3) In case of an operation failure, the protection control code on the 7 segment digital display will be replaced by the alarm code; meanwhile, the same alarm code will also be displayed on the wired remote controller.

In order to adapt to the change of temperature or other factors, the abnormal situations can be prevented by frequency control or others of the protection control function. The action conditions of the protection control function are as follows.

Table Protection control code action conditions

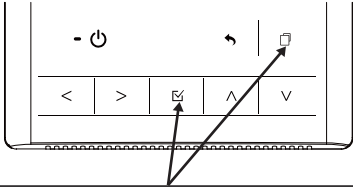
Code	Protection control name	Action conditions	Remarks
P01	Pressure ratio control	Pressure ratio $> 9 \rightarrow$ reduce frequency $((P_d+0.1)/(P_s+0.1)) \leq 2.2$, $\rightarrow$ increase frequency	Ps: Compressor air inlet pressure [MPa]
P02	High pressure protection control	$P_d \geq 3.6 \text{ MPa} \rightarrow$ reduce frequency	Pd: Compressor exhaust pressure [MPa]
P03	Current protection control	Over current during the twice frequency conversion $\rightarrow$ reduce frequency	
P04	Protection control against frequency converter module cooling fin temperature increase	Frequency converter module cooling fin temperature $\geq 89^\circ\text{C} \rightarrow$ reduce frequency	
P05	Protection control against exhaust temperature increase	High temperature at the top of the compressor $\rightarrow$ reduce frequency (different frequencies lead to different temperature upper limits)	-
P06	Protection control against insufficient low pressure	Insufficient low pressure $\rightarrow$ reduce frequency (different environment temperature leads to different pressure lower limits)	-
P09	Protection control against insufficient high pressure	Insufficient compressor exhaust pressure $\rightarrow$ increase frequency	-
P0A	Required current control	Compressor operation current $\geq$ required value $\rightarrow$ reduce frequency	Required set value: The setting is input from outside. Overall current upper limit of a normal compressor can be set to 80%, 70%, 60%.
P11	Restart control against low pressure ratio	Pressure ratio $((P_d+0.1)/(P_s+0.1)) < 1.8$	In case of 3 actions within 30 minutes, the alarm code is 43
P12	Restart control against low pressure increase	$P_s > 1.5 \text{ MPa}$	In case of 3 actions within 30 minutes, the alarm code is 44
P13	Restart control of high pressure	$P_d > 3.8 \text{ MPa}$	In case of 3 actions within 30 minutes, the alarm code is 45
P15	Vacuum, restart control against exhaust temperature increase	$P_s < 0.09 \text{ MPa}$ lasts for 12 minutes, or the exhaust temperature $\geq 132^\circ\text{C}$ lasts for 10 minutes, or the exhaust temperature $\geq 140^\circ\text{C}$ lasts for 5s	In case of 3 actions within 1 hour, the alarm code is 47(Ps) or 08 (exhaust pressure)
P16	Restart control against insufficient exhaust superheat	Exhaust superheat below 10deg lasts for 30 minutes	In case of 3 actions within 120 minutes, the alarm code is 07
P17	Restart control against tripping frequency converter	Frequency converter module stops automatically, electronic temperature controller is started and the current sensor malfunctions	In case of 3 or 6 actions within 30 minutes, the alarm code is 48, 51, 53
P18	Restart control against low voltage or over voltage	Low voltage or over voltage of frequency converter circuit, CB capacity	In case of 3 actions within 30 minutes, the alarm code is 06
P26	Restart control against insufficient high pressure	$P_d < 1.00 \text{ MPa}$ lasts for 1 hour	No alarm

Note :

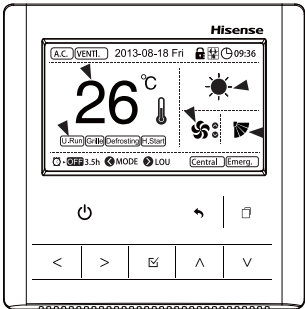
- 1) In the protection control mode (alarm shutdown not included), the protection control code will be displayed.
- 2) In the protection control mode, it'll display the protection control code and the code hour when the protection control is canceled.
- 3) In the restart control mode, the monitor state will last for 30 minutes.

2.6 Self-Checking of PCB using Remote Control Switch

The function test of the indoor and outdoor unit PCB can be performed with the following fault location procedures.



Press and hold “” (menu) and “” simultaneously for at least 3 seconds during the normal mode. The check menu will be displayed.



Check Menu 09:36

Check 1

Check 2

Alarm Record

Species

IDU / ODU
Diagnosis

Self Diagnosis

IDU/ODU Diagnosis

00-00			
01-01			
02-02			

Select

OK Back

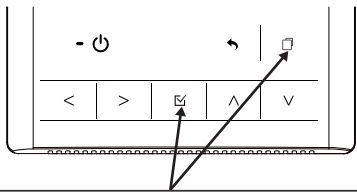
IDU/ODU Diagnosis

DG Result 1 : In Progress
DG Result 2 : In Progress
DG Result 3 : In Progress

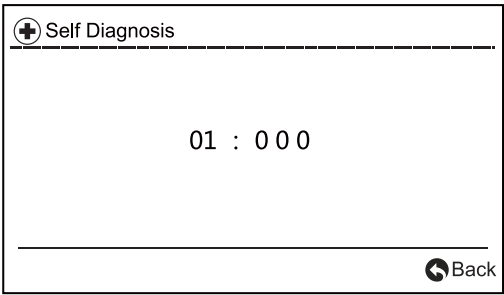
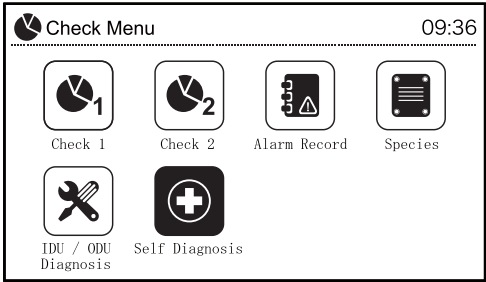
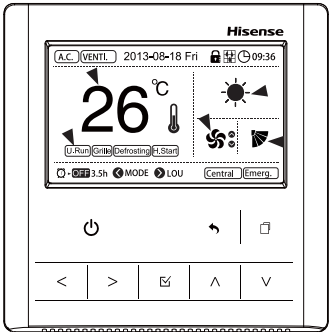
Back

Display	Content
00	Normal
01	Malfunctions in the following circuits (open circuit, short circuit, etc)
02	Return air temperature thermistor
03	Supply air temperature thermistor
04	Liquid tube temperature thermistor
05	Remote thermistor fault
06	Air tube temperature thermistor
08	Remote sensor
0A	Central controller transmission
0b	EEPROM
EE	Zero crossing input fault
	Indoor unit PCB
07	Indoor unit communication in the detection mode
F4	Outdoor unit communication
F5	49FC input fault
F6	63H2 input fault
F7	Detection circuit protection code
F8	Phase detection
FA	Frequency converter transmission
Fb	High pressure sensor
FC	Compressor exhaust temperature thermistor
Fd	Low pressure sensor
FF	Heat exchanger evaporator temperature thermistor
	Outdoor unit PCB
	Environment temperature thermistor

2.7 Self-Checking of Remote Control Switch



Press and hold “” (menu) and “” simultaneously for at least 3 seconds during the normal mode . The check menu will be displayed.



3. Caution on Refrigerant Leakage

3.1 Maximum Permissible Concentration of HFC Gas

The refrigerant R410A, charged in the Hi-Smart H system, is an incombustible and non-toxic gas. However, if leakage occurs and gas fills a room, it may cause suffocation.

The maximum permissible concentration of R410A in air is $\leq 0.3 \text{ kg/m}^3$, according to the refrigeration and air conditioning facility standard (KHK S 0010) by the KHK (High Pressure Gas Protection Association) Japan.

Therefore, some effective measure must be taken to lower the R410A concentration in air below 0.3 kg/m^3 , in case of leakage.

3.2 Calculation of Refrigerant Concentration

1. Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of rooms to be air-conditioned.
2. Calculate the room Volume V (m^3) of each room.
3. Calculate the refrigerant concentration C (kg/m^3) of the room according to the following equation.

$$\frac{R: \text{Total Quantity of Charged Refrigerant (kg)}}{V: \text{Room Volume}} = C \text{ (Refrigerant concentration)} \leq 0.3(\text{kg/m}^3)$$

3.3 Countermeasure for Refrigerant Leakage According to KHK Standard

The facility shall be arranged as follows referring to the KHK standards, so that the refrigerant concentration will be below 0.3 kg/m^3 .

1. Provide a shutterless opening which will allow fresh air to circulate into the room.
2. Provide a doorless opening of 0.15% or more size to the floor area.
3. Provide a ventilator, linked with a gas leak detector, of $0.4 \text{ m}^3/\text{min}$. or more ventilating capacity of the air conditioning system utilizing refrigerant R410A.
1 ton = Displacement of compressor $\text{m}^3/\text{h} \times 5.7$
4. Pay attention to the installation place, such as a basement, etc., where refrigerant may stay since it is heavier than air.