

Hisense

Installation & Maintenance Manual

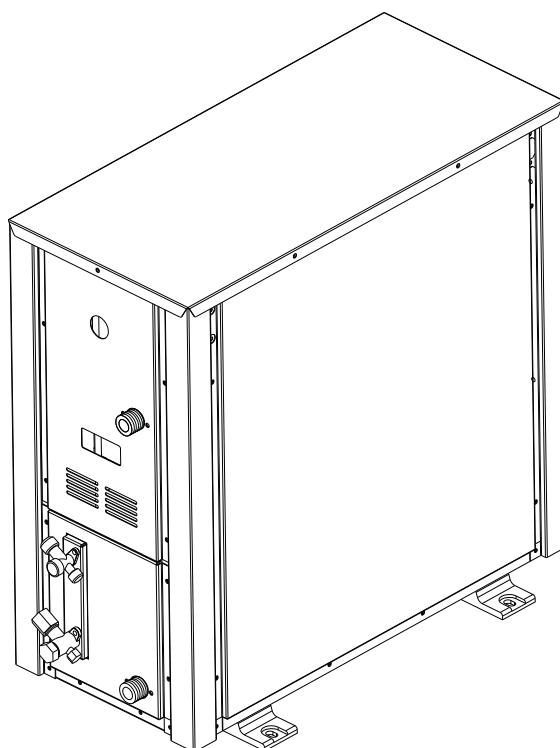
WATER-SOURCE
INVERTER-DRIVEN
MULTI-SPLIT
AIR CONDITIONER
(HEAT PUMP)

- Outdoor Units -

RATED POWER SUPPLY	MODEL
220-240V ~/50HZ	AVWW - 28UCSA AVWW - 38UCSA AVWW - 48UCSA AVWW - 54UCSA
220V ~/60HZ	AVWW - 28U2SA AVWW - 38U2SA AVWW - 48U2SA AVWW - 54U2SA

IMPORTANT:

READ AND UNDERSTAND
THIS MANUAL BEFORE
USING THIS HEAT-PUMP
AIR CONDITIONERS.
KEEP THIS MANUAL FOR
FUTURE REFERENCE.



P 0 0 4 6 7 Q

ORIGINAL INSTRUCTIONS

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.
- 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	32DB/23WB	21DB/15WB
	Water-source	45	10 ※
Heating Operation	Indoor	27DB	15DB
	Water-source	45	10

DB: Dry Bulb, WB: Wet Bulb

※ The water temperature range for reliable cooling operation is 15 °C above. The air conditioner may shutdown during cooling operation while the water temperature is 10 °C ~ 15 °C, as the indoor-unit output is too small or the water temperature is too low.

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. If applied, it will result in uncomfortable air conditioning due to big temperature changes When the operation mode is changed.

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

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 compressed air, nitrogen or refrigerant 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 will be ventilated every 3 to 4 hours.
- Operate the heat pump air conditioner within this range.
 - Regarding installation altitude below 1000m;
 - 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

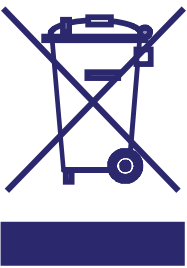
- Upon receiving this product, inspect it for any shipping damage. Claims for damage, either apparent or concealed, should be filed immediately with the shipping company.
- Check the model number, electrical characteristics (power supply, voltage and frequency) and accessories to determine if they are 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.



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.

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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

Please refer to technical manual

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	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
X: Prohibited

●: only for Refrigerant R410A (No Interchangeability with R22)
◆: 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
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	
Vacuum Drying Refrigerant Charge	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	X	X	* 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 Combination of Indoor Unit and Outdoor Unit

- The following indoor units can be combined with the outdoor unit

Table.3.1 Indoor Unit Type List

Indoor Unit	Rated Capacity (KBtu/h)												
	07	09	12	14	17	18	22	24	27	30	38	48	54
Ceiling Ducted Type	○	○	○	○	○	○	○	○	○	○	○	○	○
Low-Height Ceiling Ducted Type	○	○	○	○	○	○	○	○					
Slim Ceiling Ducted Type	○	○	○	○									
4-Way Cassette Type	○	○	○	○	○	○	○	○	○	○	○	○	○
Wall-Mounted Type		○		○		○	○						
Floor-Concealed Type		○		○		○		○					

○: Allow

- Indoor Unit total Capacity must be 50% to 130% for Outdoor Unit Rated Capacity

Table 3.2 System Matching

Outdoor Unit Model Capacity(KBtu/h)	Rated Capacity(KBtu/h)			
	Min. Matching Capacity (KBtu/h)	Max. Matching Capacity (KBtu/h)	Matching Quantity	Min. Single Operate Capacity (KBtu/h)
28	14	36	1 to 4	07
38	18	47	1 to 5	07
48	24	62	1 to 6	07
54	27	70	1 to 7	07

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.

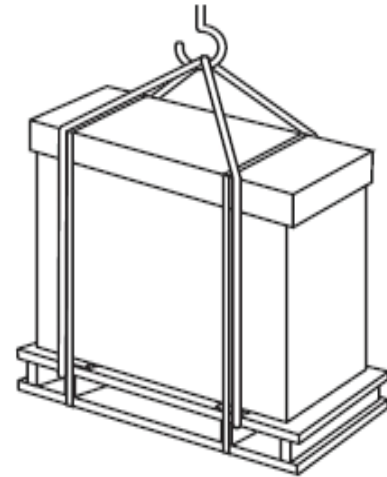


Fig. 3.1 Hanging Work for Transportation

⚠ CAUTION

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

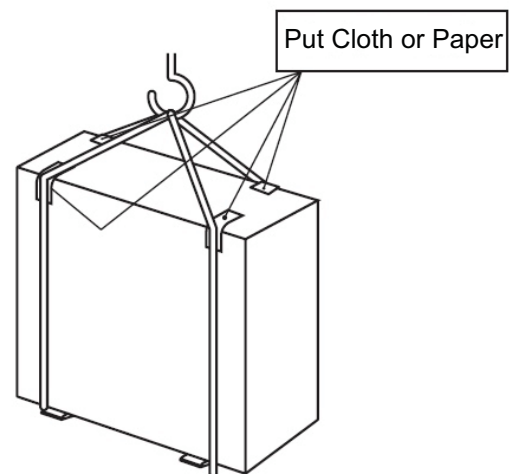


Fig.3.2 Transportation for no wooden base

Outdoor Unit Model (KBtu/h)	Net Weight (kg)
28	70
38~54	80

⚠ 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 Initial Check

- Install the outdoor unit with a sufficient space around the outdoor unit for operation and maintenance as shown in Fig. 4.1.

<Single Installation Space>

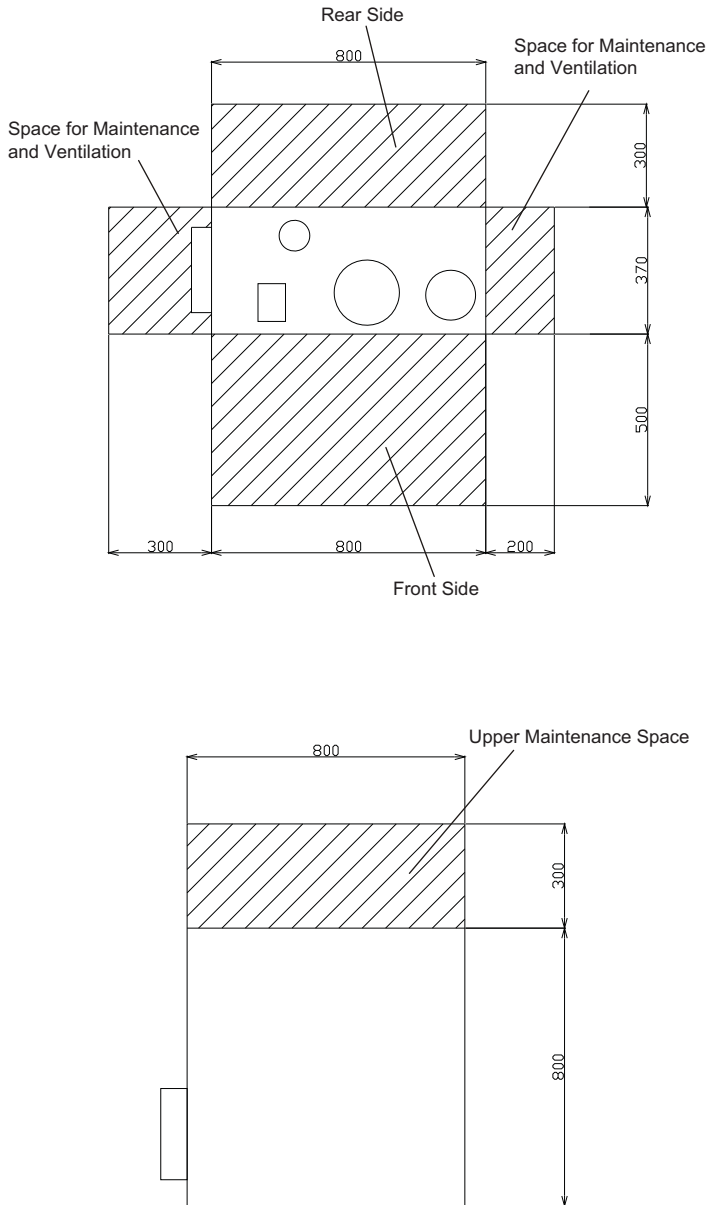


Fig. 4.1 Space for Installation and Maintenance

CAUTION

- Check to ensure the foundation is stable and firm.
- The outdoor unit must be installed in the special room that is dry and soundproof.
- Install the outdoor unit where the sound from the outdoor unit does not affect neighbors.

- Install the outdoor unit where it is in the shade or it will not be exposed to direct sunshine or radiation from high temperature heat source.
- Install the outdoor unit where the temperature is 0~40°C, the relative humidity is under 80%.
- When outdoor unit installed in a closed room, the vents should be set.
- 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.
- Install the outdoor unit in a space with limited access to general public.

<Multiple Installation Space>

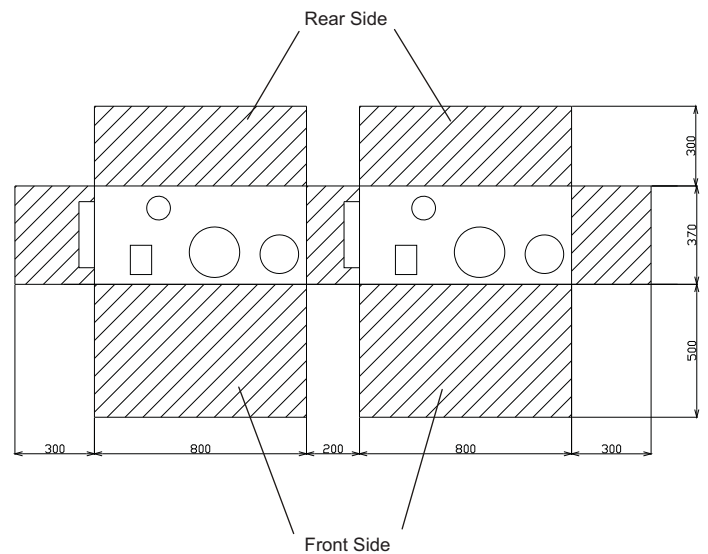


Fig. 4.2 Space for Installation and Maintenance

NOTE

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

4.2 Installation Work

- (1) Secure the outdoor unit with the anchor bolts and add 5mm or thicker washer between the base of outdoor unit and the concrete.

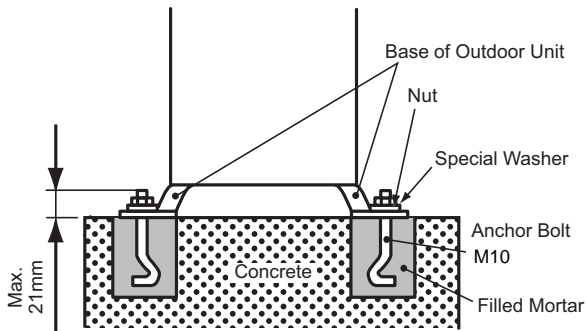


Fig. 4.3 Installation of Anchor Bolts

- (2) When installing the outdoor unit, fix the unit by anchor bolts. Refer to Fig. 4.4 regarding the location of fixing holes.

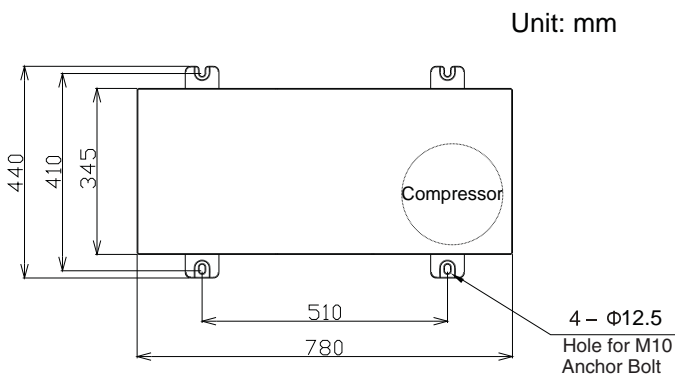
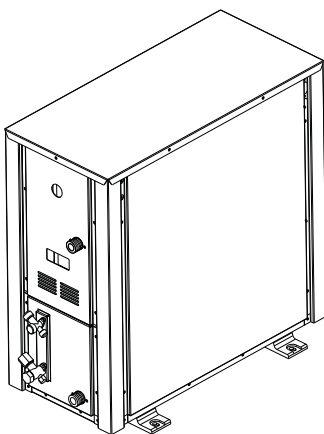


Fig. 4.4 Position of Anchor Bolts

- (3) Install the outdoor unit in the front-rear and right-left direction horizontally. Check to ensure that the gradient in four directions (front, rear, right, left) is within 10mm.



- (4) Provide a strong and correct foundation so that:
 - a) The outdoor unit is not declined.
 - b) Abnormal sound does not occur.
 - c) The outdoor unit does not fall down due to strong wind or earthquake.
- (5) In case of the drain pipe is necessary for the outdoor unit, use the drain kit ($\Phi 18\text{mm}$).
- (6) The connection position of the water pipe is shown in Fig. 4.5.

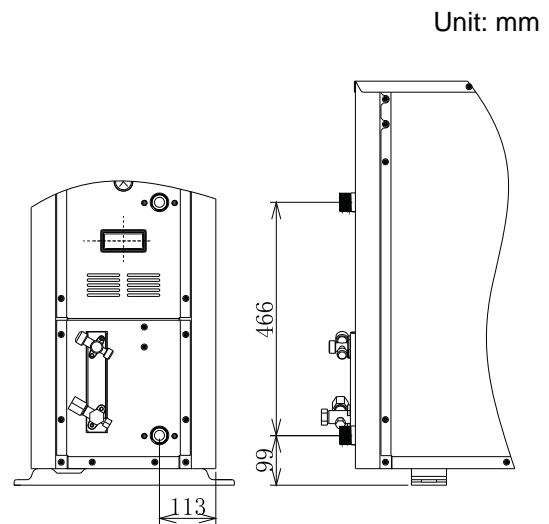


Fig. 4.5 Position of water pipe connection

5. Refrigerant Piping Work

⚠ DANGER

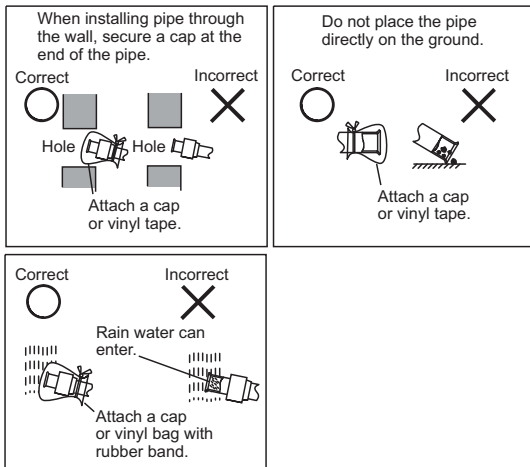
Use refrigerant R410A in the refrigerant cycle. Do not charge oxygen, acetylene or other flammable and poisonous gases into the refrigerant cycle when performing a leakage test or an air-tight test. These types of gases are extremely dangerous and can cause an explosion. It is recommended that compressed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

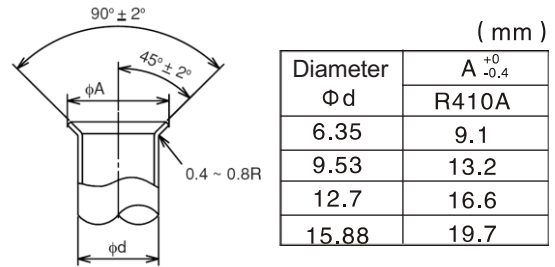
● Cautions for Refrigerant Pipe Ends



⚠ 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.

- Flaring Dimension
Perform the flaring work as shown below.



- Piping Thickness and Material

Use the pipe as below. (mm)

Diameter	R410A	
	Thickness	Material
φ 6.35	0.8	0
φ 9.53	0.8	0
φ 12.7	0.8	0
φ 15.88	1.0	0

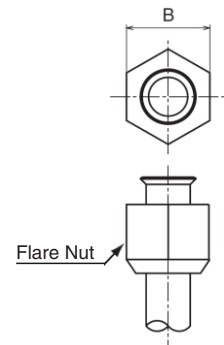
Material is based on a JIS standard (JIS B8607).

- Flare Nut Dimension

Use the flare nut as below.

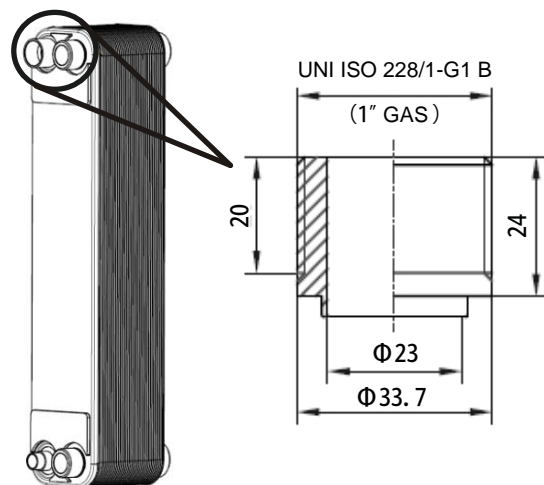
<Flare Nut Dimension B (mm)

Diameter	R410A
φ 6.35	17
φ 9.53	22
φ 12.7	26
φ 15.88	29



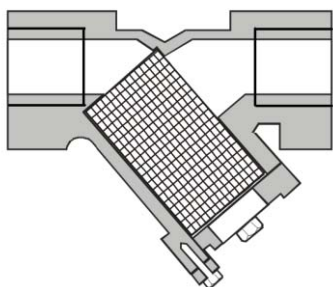
Dimension is based on a JIS standard (JIS B8607).

- Water Pipe Connection of Plate Heat Exchanger



Thread of Water Pipe Connection on Plate Heat Exchanger

- Requirement for Water Inlet Filter (40 mesh recommended)



< Requirement for Filter >

DN	SIZE	Medium	Nominal Pressure
25	1"	Water	2.0MPa

NOTE

- Filter must be installed on the water inlet pipe of the unit in order to prevent the plate heat exchanger from being blocked by impurities.

5.2 Refrigerant Piping Work

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

Table 5.1 Outdoor Unit Pipe Model

Capacity (KBtu/h)	Diameter	Outer Diameter of Pipe (mm)		
		Gas	Liquid	Branch Pipe
28	φ 15.88	φ 9.53	HFQ-052F	
38				
48				
54				

Table 5.2 Indoor Unit Pipe Model

Indoor Unit Capacity (KBtu/h)	Gas Pipe	Liquid Pipe
07 ~ 14	φ 12.7 (1/2)	φ 6.35 (1/4)
17 ~ 18	φ 15.88 (5/8)	φ 6.35 (1/4)
22 ~ 54	φ 15.88 (5/8)	φ 9.53 (3/8)

- Position of Connection Pipes to the Outdoor Unit

< 28 ~ 54 >

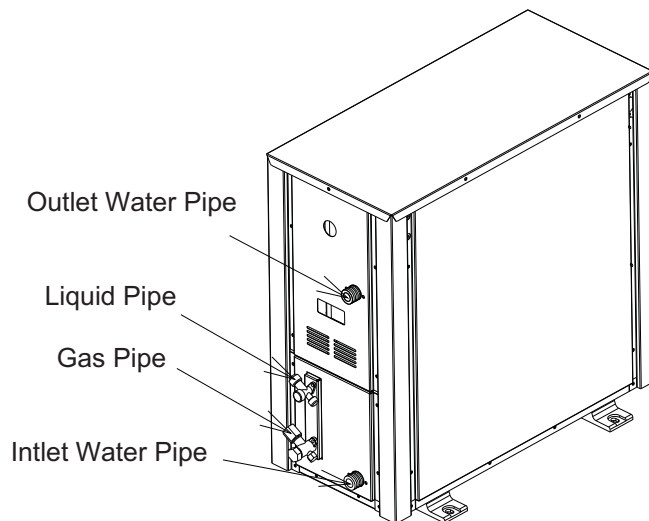


Fig. 5.1 Position of Connection Pipes

● Water Pipe Connection of the Outdoor Unit (recommended)

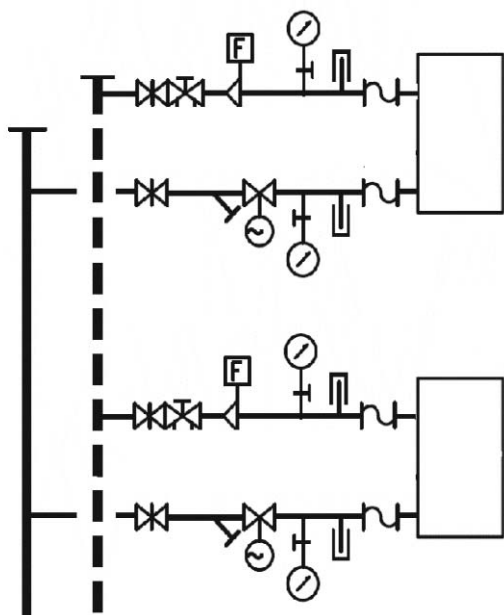


Chart	Name
	Pressure Gauge
	Water Inlet
	Water outlet
	Flexible Connector
	Water Filter
	Thermometer
	Stop Valve
	Control Valve
	Flow Switch

Fig. 5.2 Water Pipe Connection

● Notes for Water Pipe Connection

- (1) Notice the position of connection pipe, do not connect inlet and outlet pipe reversely.
- (2) Water filter must be installed on the unit (40 mesh recommended).
- (3) Please check and ensure the water filter is installed near the unit side.
- (4) Please select the water pipe according to local or national regulation, besides, the size of water should be no less than that of pipe joint on the outdoor unit.
- (5) Insulate water inlet and outlet pipe to avoid from water condensating and freezing.
- (6) Regularly clean the water filter according to the degree of obstruction.
- (7) Discharging all the water in heat exchanger and pipe is suggested throughout the long duration of stoppage in winter to prevent from freezing.
- (8) Please check and clean the unit and accessories in water system thoroughly before the initial startup after long stoppage.

● Essential Requirement for Water Pipe Connection

- (1) Before installation, flush all water pipes thoroughly to ensure no foreign material left in that. Be careful not to flush any foreign material into the plate heat exchanger.
- (2) It is necessary to set a water flow switch on heat exchanger water outlet to realize stop protection. Water flow switch should be connected to terminal TB1 on PCB with shielded cable. Adjust setting value of switch properly according to rated water flow.
- (3) There must be extra bracer to support pipe and pipe joint which can not be supported by the unit.
- (4) Connection pipe and pipe joint on heat exchanger should be removed easily to make operation and clean more convenient.
- (5) It is necessary to install sluice valves on water inlet and outlet of the unit to cut off the water flow in heat exchanger, so that there is no impact on the usage of other units during maintenance.
- (6) Heat exchanger and connection pipe should be connected with flexible joint in order to lower vibration spread and avoid piping crack.
- (7) For easy inspection, thermometers and pressure gauges should be settled on water inlet and outlet. (The outdoor unit is not equipped with thermometers and pressure gauges).
- (8) Drainage joints should be set on lower points in water system to discharge water thoroughly. All higher points should be installed with air exhaust valve in order to exhaust air in pipes. There is no need to insulate air exhaust valve and drainage joint for easy maintainance.
- (9) Insulate all water pipes that have possibility to be iced up. Water pipe can be packed together with an auxiliary heater band in order to avoid frost crack. The heater power source should be equipped with individual fuse.

● Water Flow Installation

- (1) Terminals of water flow switch should be placed in proper position for easy wiring.
- (2) The direction arrow marked on water flow switch should be in accordance with the direction of water flow, target paddle should be perpendicular to the direction of water flow.
- (3) Water flow switch must be installed in straight pipe and the length of straight pipe between the two ends of water flow switch should be 5 times larger than the pipe diameter.
- (4) Water flow switch can be installed on horizontal pipe-line or vertical pipe in which water flows upward and can not be installed on vertical pipe in which water flows downward.
- (5) Water flow switch needs to be interlocked with control system.
- (6) Target paddle needs to be selected and cut on site.

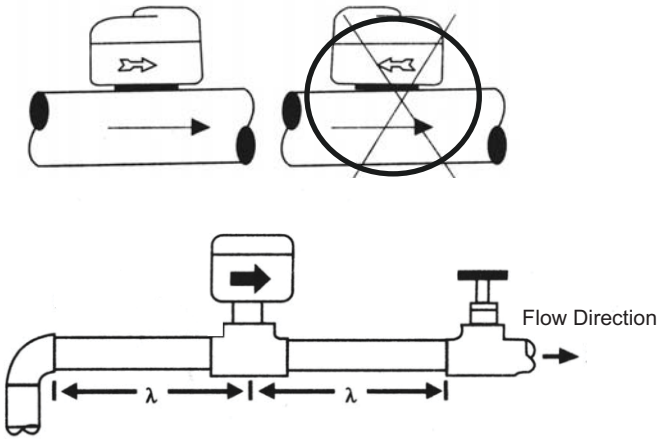


Fig. 5.3 Water Flow Switch Installation

※ The dimension "λ" must be 5 times larger than the diameter of the pipe from nearest elbow or valve to other throttling place.

● Wiring of Terminal TB1

Please wiring as the following table, otherwise, it will cause the damage of PCB.

Terminal	Control Object	Demand
TB 1-PL,PN	Signal Output of Pump	AC 220 0.3A
TB 1-FL, FN	Signal Input of Flow Switch	AC 220 10mA

● Wiring Connection of Flow Switch

Water flow switch is the component for avoiding damage caused by flow reduction. TB1-FL, FN of the unit is signal input of flow switch.

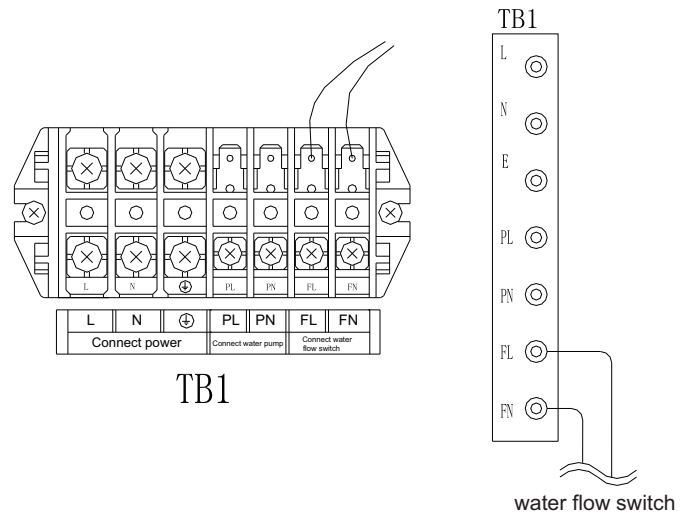


Fig. 5.4 Water Flow Switch Wiring

※ The connecting line between TB1 and water flow switch should be wired near the unit and as short as possible.

● Wiring of Water pump

The running signal of water pump can be sent through terminal TB1-PI, PN of the unit.

CAUTION

- Do not connect pump output signal of several units in parallel, which may cause the damage of control board.
- Please turn on the third key of DSW2, when not using the signal of PL and PN control pump.

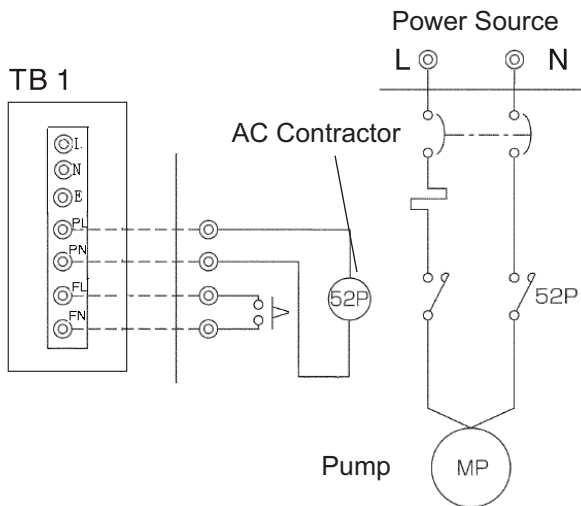


Fig. 5.5 Wiring of Pump

● Water Treatment

Units are recommended to be used in the situation with circulating water cooling tower, especially closed cooling tower.

Water pipes and plate heat exchanger that are used in the place with open cooling tower and poor quality water would be faced with corrosion or sediment, therefore, water-line construction, water-quality monitoring and water treatment is necessary.

(1) Make sure that any scale inhibitor or preservative will not corrode stainless steel or copper product with water treatment company.

(2) Please refer to Water-quality Requirement (JRA-GL-02-1994) released by Japan Refrigeration and Air Conditioning Industry Association for water-management and benchmark. Reference Value Table for middle-lower temperature water is applicable for this unit.

CAUTION

- Water filter must be installed, otherwise, water scale and impurities will damage heat exchanger and water pipes. Installer and user must ensure circulating water quality and no air in water system to prevent the steel parts of heat exchanger from being oxidized by air.

Table. 5.3 Water Quality Requirement (Reference)

	Item	Water		Tendency	
		Recycle Water 20°C<T<60°C	Supplemental Water	Corrosion	Scale
	PH (25°C)	7.0 ~ 8.0	7.0 ~ 8.0	✓	✓
Standard Item	Conductivity (mS/m)(25°C)	<30	<30	✓	✓
	Cl ⁻ (mgCl ⁻ /L)	<50	<50	✓	
	SO ²⁻ (mgSO ₄ ²⁻ /L)	<50	<50	✓	
	Acid (PH4.8) (mgCaCO ₃ /L)	<50	<50		✓
	Total Hardness (mgCaCO ₃ /L)	<70	<70		✓
	Ca Hardness (mgCaCO ₃ /L)	<50	<50		✓
	Si ²⁺ (mgCaSiO ₂ /L)	<30	<30		✓
Reference Item	Fe (mgFe/L)	<1.0	<0.3	✓	✓
	Cu (mgCu/L)	<1.0	<0.1	✓	
	S ²⁻ (mgS ²⁻ /L)	Not detectable	Not detectable	✓	
	NH ₄ ⁺ (mgNH ₄ ⁺ /L)	<0.3	<0.1	✓	
	Cl ⁻ (mgCl ⁻ /L)	<0.25	<0.3	✓	
	CO ²⁻ (mgCO ₂ /L)	<0.4	<4.0	✓	
	Stability Index	-	-	✓	✓

● Refrigerant Piping Connection

- (1) Confirm that the valve is closed.
- (2) Prepare various of field-supplied pipes and elbows. Perform soldered connection according to operating requirements.
- (3) For pipe connection on stop valves, tightening work should be done with double spanner.

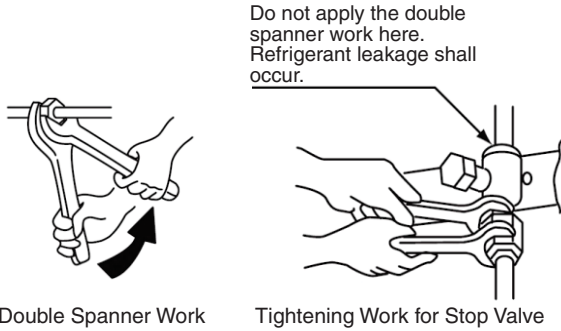


Table. 5.4 Tightening Torque for Flare Nut

Pipe Size	Torque
Φ6.35(1/4)	20N · m (2kgf · m)
Φ9.53(3/8)	40N · m (4kgf · m)
Φ12.7(1/2)	60N · m (6kgf · m)
Φ15.88(5/8)	80N · m (8kgf · m)
Φ19.05(3/4)	100N · m (10kgf · m)

CAUTION

Check to ensure that no pressure increase is observed one hour after vacuum pumping completion.

● Water Piping Connection

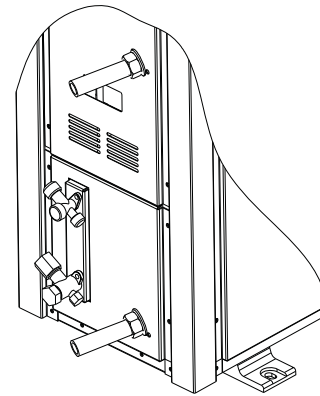
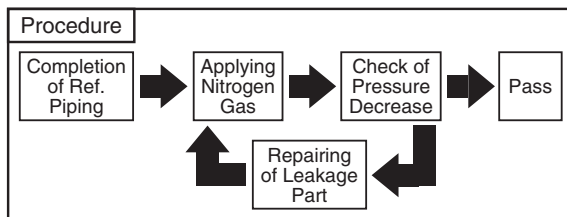


Fig. 5.6 Water Piping Connection

- (1) Connect water pipes with spanner and the torque is 40N · m .
- (2) Please clean the contact surface, remove grease and add chlorate fluxes while welding copper pipe in maintenance. Silver solder with 40 ~ 55% silver should be used for welding.
- (3) The maximum flame temperature in welding is 650℃ . Nitrogen should be filled inside the refrigerant side to prevent oxidation.

● Refrigerant evacuation and charging procedure should be performed according to the following instructions and Fig. 5.8.

- (1) Although the stop valve has been closed before shipment, check to ensure the stop valve is closed before installation.
- (2) Connect the indoor and outdoor unit with field-supplied refrigerant piping. Suspend the refrigerant piping at certain point to prevent them from touch some parts 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) Connect the mani-fold gauge and the vacuum pump or nitrogen cylinder to the check joints of the liquid line and the gas line stop valves, using charging hoses.
the building such as wall, ceiling, etc.
Connect the mani-fold gauge to the check joints of the liquid and gas stop valves in the outdoor unit. Perform the air-tight test with the stop valves closed and the test pressure of nitrogen gas is 4.15MPa.
- (4) Check for any gas leakage at the flare nut connection, or brazed parts by gas leakage tester or foaming agent.



- (5) Connect the mani-fold gauge to the check joints at the both sides.
Continue vacuum pumping work until the pressure reaches 756mmHg or lower for one or two hours.
After vacuum pumping work , close the valve of mani-fold gauge, stop the vaccum pump and keep it for one hour. Check to ensure that the pressure showed on the mani-fold gauge does not increase.
- (6) For charging refrigerant, connect the mani-fold gauge with a refrigerant charging cylinder to the check joint of the liquid line stop vlave, using charging hoses.
- (7) Fully open the gas line stop valve and slightly open the liquid line stop valve.
- (8) Charge refrigerant by opening the valve of mani-fold gauge.
- (9) Charge the required refrigerant with the difference range of $\pm 0.5\text{Kg}$ by operating the system in cooling.
- (10) Fully open the liquid line stop valve after completing refrigerant charge.
- (11) Continue cooling operating for more than 10 minutes to circulate the refrigerant.

⚠ CAUTION

- An excess or a shortage of refrigerant is the main cause of trouble to the units. Charge the correct refrigerant quantity as shown in the item 5.4 and 5.5.
- 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
- Insulate the refrigerant pipes as shown in Fig.5.7.

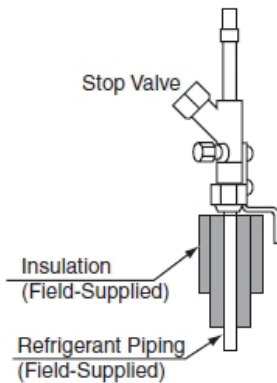
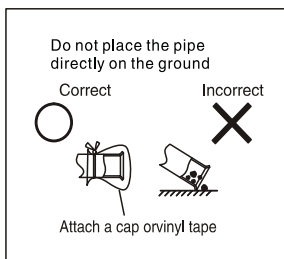


Fig.5.7 Insulation on Pipes

After connecting the refrigerant piping, seal the refrigerant pipes by using the field-supplied insulation material. Insulate the unions and flarenuts at the piping connections completely. Insulate the liquid piping and gas piping completely to avoid decreasing of performance and dewing on the surface of the pipe.

⚠ 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.



5.3 Stop valve

Operation and tightening of the stop valve should be performed according to the following Table 5.5 and 5.6, respectively.

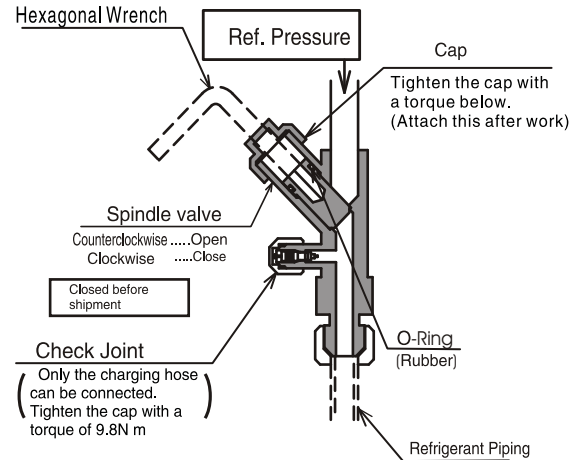


Table 5.5 Hexagonal Wrench Size

Liquid Valve	Gas Valve
8mm	4mm

Table 5.5 Stop Valve Tightening Torque

Tightening Torque of Valve Stem in Stop Valve	
Liquid Valve	Gas Valve
11-14	7-9

⚠ CAUTION

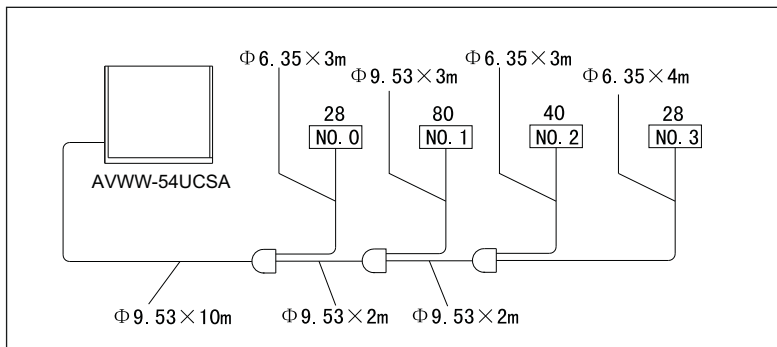
- Do not apply an abnormal big force to the spindle valve at the end of opening (5.0N·m or smaller).
The back seat construction is not provided.
- Do not loosen the stop ring. If the stop ring is loosened, it is dangerous, since the spindle will hop out.
- At the test run, fully open the spindle. If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

5.4 Additional Refrigerant Charge Calculation

Additional Charge of Refrigerant R410A

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.



<Table 1>

Outdoor Unit	Outdoor unit Ref. Charge before shipment W_0 (kg)
28	2.2
38	3.3
48	3.8
54	3.8

NOTE:

W_0 is outdoor unit ref. Charge before shipment.

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

1.1 Additional Refrigerant Charge Calculation for Liquid Piping (W_2 kg)

Take AVWW-54UCSA as an example to fill the following table.

	Pipe Diameter(mm)	Total Piping Length(m)	Additional Charge(kg)
$W_{11} =$	$\Phi 9.53 \dots$	$(10+3+2+2)$	$\times 0.05 = 0.85$
$W_{12} =$	$\Phi 6.35 \dots$	$(3+3+4)$	$\times 0.025 = 0.25$

Total Piping Length 32m Additional Charge $W = W_{11} + W_{12} = 1.1$ (kg)

Additional Charge of this system

	Pipe Diameter(mm)	Total Piping Length(m)	Additional Charge(kg)
$W_{11} =$	$\Phi 9.53 \dots$	<input type="text"/>	$\times 0.05 =$ <input type="text"/>
$W_{12} =$	$\Phi 6.35 \dots$	<input type="text"/>	$\times 0.025 =$ <input type="text"/>

Total Piping Length m Additional Charge $W =$ + = (kg)

2. Charging work

Charge the refrigerant R410A into the system according to the requirement of "installation manual".

3. Record of Additional Charge

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

Total Ref. Charge = W + W_0
 This system = + = kg

Additional Charge	W	<input type="text"/> kg
Total Ref. charge of this system		<input type="text"/> kg
Charging Time		
year	<input type="text"/>	month <input type="text"/> day <input type="text"/>

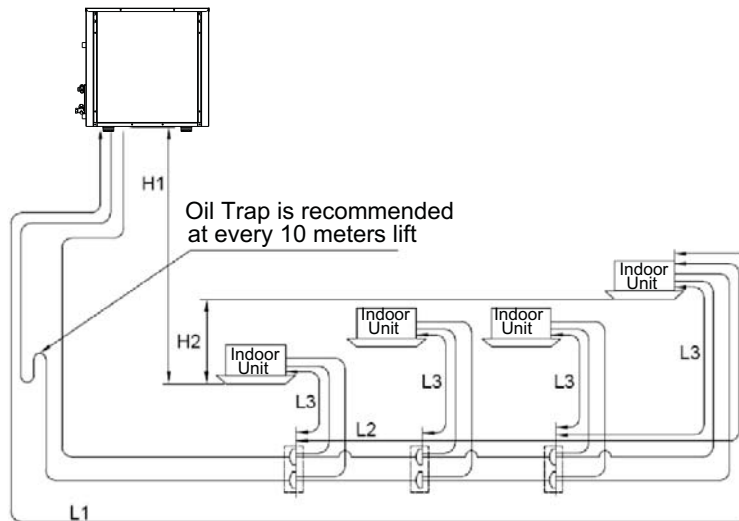
5.5 Refrigerant Piping Work

(1) Configuration Refrigerant Piping According to the Following Table.

Table 5.7 Pipe Dimension of Outdoor Unit

Piping Length Model	Piping External Diameter (mm)		The Maximum Total Piping Length	Branch Pipe Type
	Gas Pipe	Liquid Pipe		
28	φ 15.88	φ 9.53	Actual Length ≤ 45m	HFQ-102F
38			Actual Length ≤ 120m	
48				
54				

(2) Piping System



< Branch Pipe ~ Indoor Unit Piping >

Pipe Dimension Indoor Unit Capacity (KBtu/h)	Gas/Liquid (Φmm)
07 ~ 14	12.7/6.35
17 ~ 18	15.88/6.35
22 ~ 54	15.88/9.53

Item		Applicable Range	
Ref. Pipe Length : L1	28	Within 30m	
	38 ~ 54	Within 75m	
Piping Length from 1st Branch to each I.U. : L2	28	Within 15m	
	38 ~ 54	Within 30m	
Piping Length from each Branch to I.U. : L3	28	Within 8m	
	38 ~ 54	Within 15m	
Lift between I.U. and I.U. : H2	28	Within 5m	
	38 ~ 54	Within 15m	
Lift between I.U. and O.U. : H1	O.U. is Higher	28	Within 15m
		38 ~ 54	Within 30m
	O.U. is Lower	28	Within 15m
		38 ~ 54	Within 30m

- In the case that the selected pipe size of the second branch or after branch is bigger than that of the first branch, use the branch having the same size as the first branch.
- In the case that the selected pipe size after the first branch is bigger than that of the first branch, use the branch having the same size as the first branch.

● Pay Special Attention to Refrigerant Gas Leakage

Pay attention to the indoor critical concentration of refrigerant to avoid accidental gas leakage before installing air conditioning systems.

$$\frac{\text{Totally Charged Refrigerant Quantity in System(kg)}}{\text{Room Space for Each Indoor Unit(m}^3\text{)}} \leq \text{Critical Concentration(kg/m}^3\text{)}$$

0.3(kg/m³)

In the case that the detected concentration is larger than 0.3kg/m³, take the following actions

- 1) Prepare a gas leakage detector and exhaust fan controled by it.
- 2) Open ventilation ports in the wall or door to decrease refrigerant concentration.
(Area of ventilation ports should be 0.15% more than that of floor in the place lower than door)

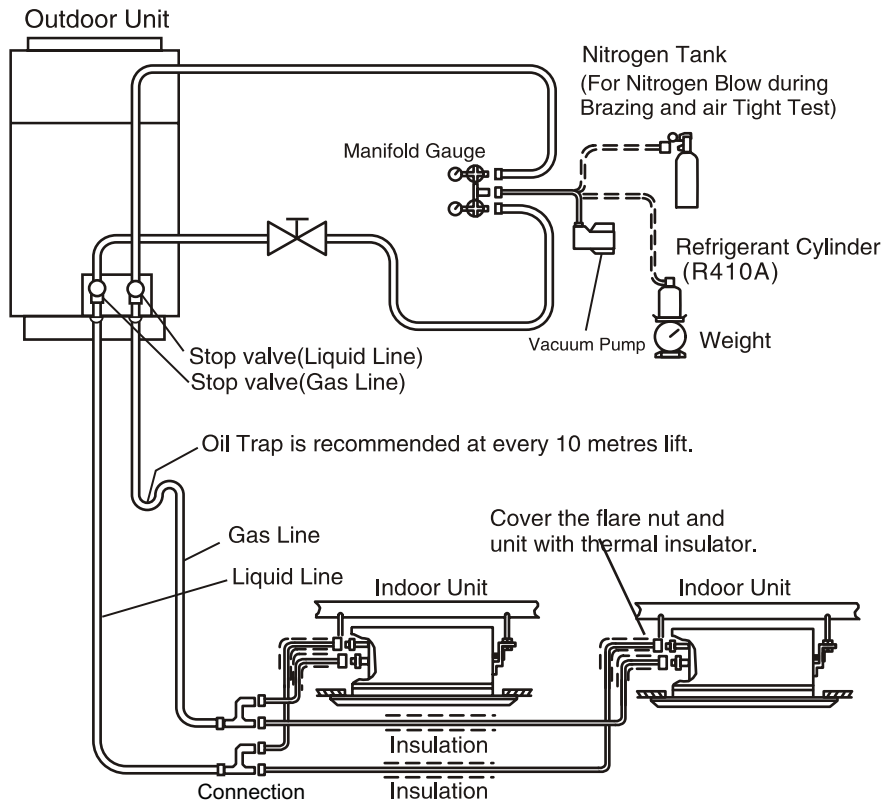


Fig.5.8 Evacuation and Refrigerant Charge

CAUTION

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.

5.6 Branch Pipe for Line Branch

Table 5.8 T Shape Branch Pipe

Branch Pipe	HFQ-102F
Gas Line	
Liquid Line	

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

6. Electrical Writing

! WARNING

- Turn off the main power switch of indoor unit and outdoor unit and wait for more than 3 minutes before electrical wiring work or periodic check.
- Check to ensure that the indoor fan and the outdoor fan have stopped before electrical wires work or periodic check.
- Protect the wires, electrical parts, etc. from rats or other small animals. If they are not protected, rats may gnaw at the unprotected parts and may lead to fire.
- Avoid the wires from touching the refrigerant pipes, steel plate edges and electrical parts. Otherwise, the wires will be damaged and may lead to fire.
- Use a medium sensing speed type ELB(Electric Leakage Breaker, activation speed of 0.1 sec. or less). If not used, it will cause electric shock or fire.
- Tighten screws according to the following torque.

M4: 1.0 ~ 1.3 N · m

M5: 2.0 ~ 2.4 N · m

M6: 4.0 ~ 5.0 N · m

M8: 9.0 ~ 11.0 N · m

M10: 18.0 ~ 23.0 N · m

! CAUTION

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

NOTE

Use the adhesive rubber tube to fix the connecting wires when the wires are not connecting to the outdoor unit.

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 Technical Catalog I. Make sure that the components comply with the National Electrical Code.
 - Connect a power supply wiring to each outdoor unit. Connect an ELB, fuse and main switch (S) to each outdoor unit.
 - Connect a power supply wiring to each indoor unit to be connected to the same outdoor unit. (Max. capacity of one indoor unit group is 70 Kbtu/h.) Connect an ELB, fuse and main switch (S) to each indoor unit group.
- (2) Check to ensure that the power supply voltage is within $\pm 10\%$ of the rated voltage.
- (3) Check the capacity of the electrical wires. The system cannot be started due to the voltage drop, if the power source capacity is too low.
- (4) Check to ensure that the earth wire is connected.

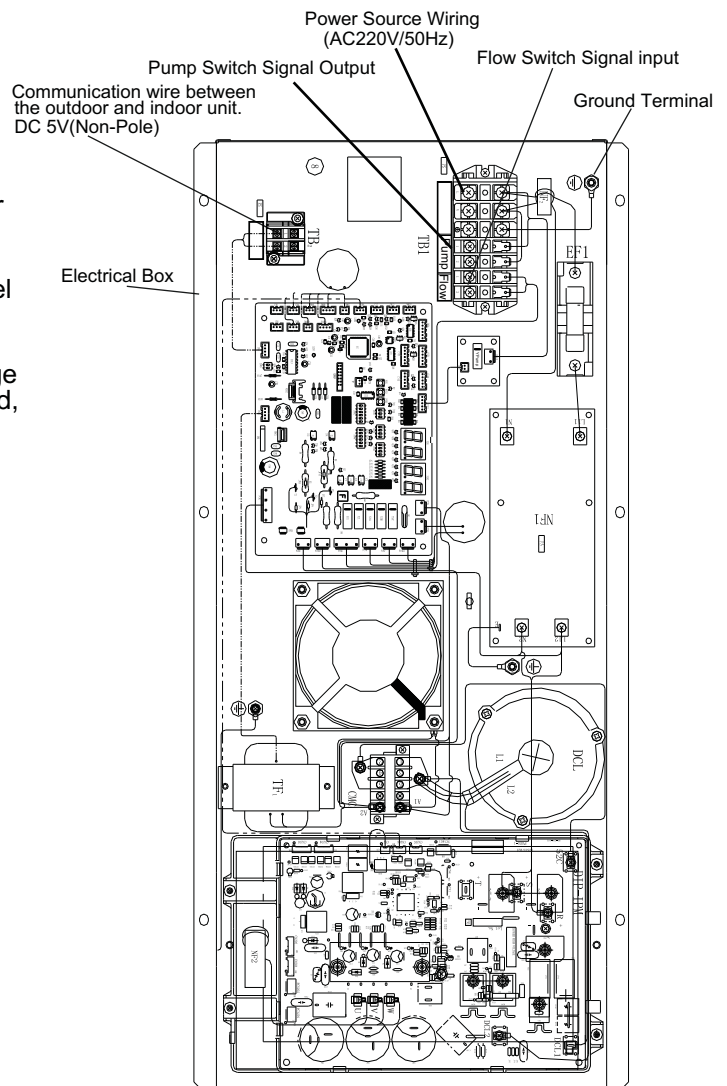


Fig.6.1 Wiring Connection for Outdoor Unit

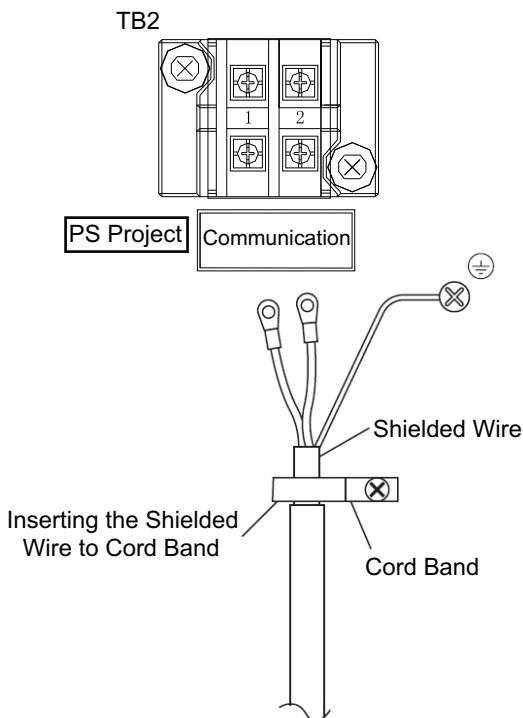
6.2 Electrical Wiring Connection

6.2.1 For Outdoor Unit

The electrical wiring connection for the outdoor unit is shown in Fig.6.1.

- (1) Connect the live wire, neutral wire and ground wire of power supply wires to the L, N and \oplus of terminal board TB1 of outdoor unit. Connect the control line of pump to the PL and PN of TB1 and the flow switch output end to the FL and FN of TB1.
- (2) Connect the Communication line between outdoor and indoor units to terminals 1 and 2 of terminal board TB2.
- (3) Do not wire in front of the fixing screw of the service panel. Otherwise, the screw can not be removed.

Use cord band to fix the shielded twist pair cable for communication between outdoor unit and indoor unit. The earthing connection of shielded twist pair cable is shown in the following figure.



6.2.2 Connecting Between Indoor Unit and Outdoor Unit

Connect the electrical wires between the Indoor unit and the outdoor unit as shown in Fig.6.2.

Check to ensure that the terminal for power source wiring (Terminals L to L and N to N of each terminal board) and communication wire (Terminals 1 to 1 and 2 to 2 of each terminal board) are connected correctly. Otherwise, some component will be damaged.

CAUTION

- (1) Use shield wires(0.75mm²) to prevent interference when the length of communication wire is less than 1,000m and selected according to local code.
- (2) Open a hole near the connection hole of power source wiring when the multiple outdoor units are connected from one power source line.
- (3) The recommended Fuse sizes are shown in Table 6.1.
- (4) In the case that a conduit tube for ground wire is not used, fix ground wire with adhesive on the panel.

CAUTION

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.

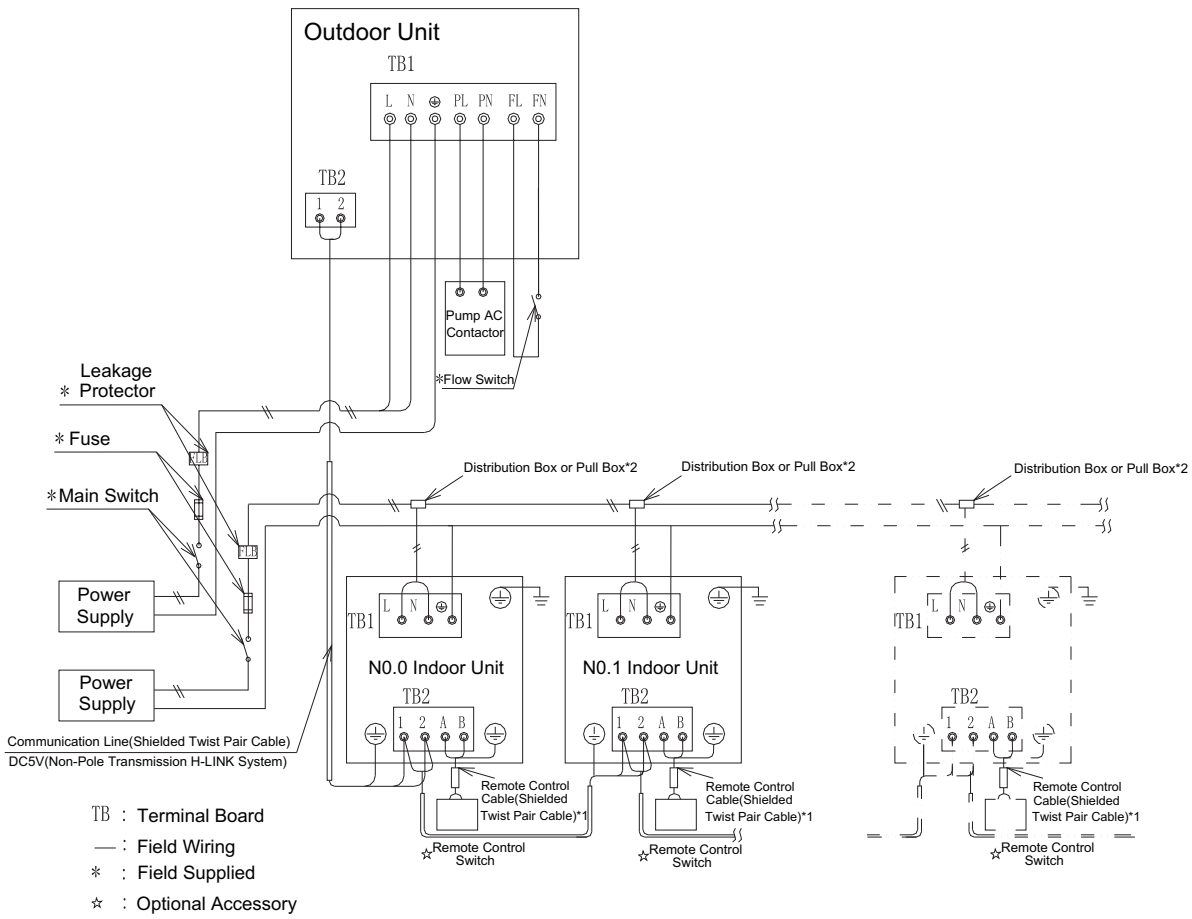


Fig.6.2 Instruction for Electrical Wiring Connection

Table 6.1 Electrical Data Recommended Wiring, Breaker Size/1 Outdoor Unit

Model	Power Supply	Max. Running Current(A)	ELB		Fuse (A)
			Nominal Current(A)	Nominal Sensitive Current(A)	
28	220-240V ~/50HZ	16.9	25	30	25
38					
48	220V ~/60HZ	26	40	30	50
54					

ELB: Earth Leakage Breaker

● Field Minimum Wire Sizes for Power Source

Model	Power Supply	Power Source Cable Size(mm ²)	Earth Wire Size (mm ²)	Transmitting Cable, Pump Control Size (mm ²)
		EN60335-1 *1		EN60335-1 *1
28	220-240V ~/50HZ	2.5	2.5	0.75
38				
48	220V ~/60HZ	4.0	4.0	
54				

NOTES:

- 1) Follow local codes and regulations when selecting field wires.
- 2) The wire sizes marked with *1 in the above table are selected at the maximum current of the unit according to the European Standard, EN60335-1. Use the wires which are not lighter than the ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).
- 3) Use a shielded cable for the transmitting circuit and connect it to ground.
- 4) In the case that power cables are connected in series, add each unit maximum current and select wires below.

According to EN60 335-1	
Current(A)	Wire Size(mm ²)
$i \leq 6$	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

2 : In the case that current exceeds 63A, Don't series connection



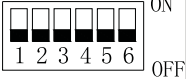

⚠ CAUTION

Install a multi-pole main switch with a space of 3.5mm or more between each phase.

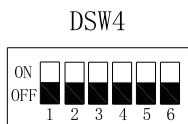
6.3 Outdoor Unit Dip-Switch Setting

Turn off all power switch before setting Dip-Switch, else Dip-Switch is of no effect.

Follow this table setting Dip-Switch, “■” symbol denote the position of Dip-Switch contact joint.

DSW1	DSW2	DSW4	DSW5						
<p>Test Run</p>  <p>All OFF: Shipment Set</p> <p>1 ON: Test Run(Cool)</p> <p>1, 2 ON: Test Run(Heat)</p> <p>4 ON: Compressor Forced Stop</p>	<p>Optional Function Setting</p> <p>All OFF: Shipment Set</p> <p>3 ON: When not using the signal of PL and PN control pump</p> <p>5 ON: Optional Function Setting</p> <p>6 ON: Input Power Setting</p> 	<p>Ref. Cycle No. Setting</p> 	<p>Communication Setting</p> 						
	DSW3	DSW6							
	<p>Capacity Setting</p> <table border="1"> <thead> <tr> <th>28</th> <th>38</th> <th>48</th> </tr> </thead> <tbody> <tr> <td>ON OFF ■ ■ ■ ■</td> <td>ON OFF ■ ■ ■ ■</td> <td>ON OFF ■ ■ ■ ■</td> </tr> </tbody> </table> <p>54</p> <p>ON OFF ■ ■ ■ ■</p>	28	38	48	ON OFF ■ ■ ■ ■	ON OFF ■ ■ ■ ■	ON OFF ■ ■ ■ ■	<p>Pipe length Setting</p> <p>Shipment</p> <p>ON OFF ■ ■ ■</p> <p>I.U.is located higher than O.U.(>20m)</p> <p>ON OFF ■ ■ ■</p> <p>O.U.is located higher than I.U.(>25m)</p> <p>ON OFF ■ ■ ■</p>	
28	38	48							
ON OFF ■ ■ ■ ■	ON OFF ■ ■ ■ ■	ON OFF ■ ■ ■ ■							

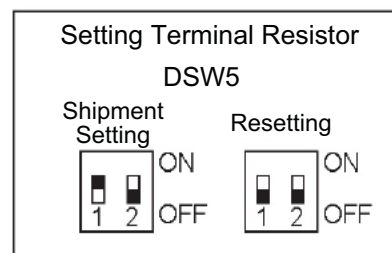
- Communication Setting
It is necessary to set Ref. cycle system No. and terminal resistor connect to Hi-NET system.
- Setting Ref.cycle system No.
Setting Ref.cycle(DSW4)



System No.	00	01	02	03	04	~	63
Setting State	ON OFF ■ ■ ■ ■ ■ ■	ON OFF ■ ■ ■ ■ ■ ■	ON OFF ■ ■ ■ ■ ■ ■	ON OFF ■ ■ ■ ■ ■ ■	ON OFF ■ ■ ■ ■ ■ ■	~	ON OFF ■ ■ ■ ■ ■ ■

Shipment set is 0.
Refrigerant system can be set at 0~63.

- 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 units.



7. Test Run

Test run should be performed according to the Table 7.1 on page 24. And use the Table 7.2 on page 25 for recording test run.

- Check Water Pipe Connection Before Test Run
 - (A) Before test run, reconfirm that all water pipe work is in correct states, water filter has been settled on water entry side and water flow switch has been installed properly.
 - (B) Open shut-off valve and make sure that the plate heat exchanger is filled with circulating water. Start water pump and open exhaust valve to ensure that all air is exhausted from pipe.
 - (C) Read Pressure gauges and thermometers on water inlet and outlet to confirm normal water-line operation, proper water flow rate and correct switching in water system.
 - (D) After the initial test run, clear water filter and ensure no filter clogging.

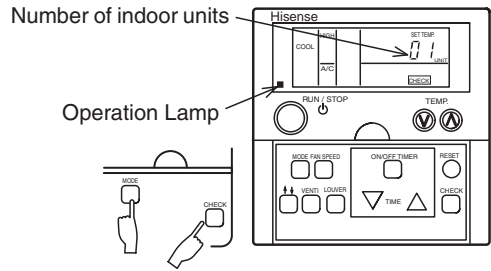
WARNING

- Do not operate the system until all the check points have been cleared.
 - (A) Check to ensure that the refrigerant piping and transmission between outdoor unit and indoor unit are connected to the same refrigerant cycle. If not, it will cause an abnormal operation and a serious accident.
 - (B) Check to ensure that the electrical resistance more than 1 megohm. 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.
- Do not operate the unit within 4 hours after power supply. In case of operating within 4 hours, release the protection control as follows.
 1. Supply power to the outdoor unit and indoor units.
 2. Wait for 30 seconds.
 3. Push PSW1 on PCB more than 3 seconds at the same time.
- 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.
- Check that the refrigerant piping setting and electrical wiring setting are for the same system by operating the indoor unit one by one.

Table 7.1 Checking of Wire Connection by Test Run

NOTE: "TEST RUN" shall be performed with each refrigerant cycle (each outdoor unit).

- (1) Turn ON the power source of the units.
- (2) Procedure for "TEST RUN" mode of remote control switch. Depress the "MODE" and the "CHECK" switches together for more than 3 seconds.



- If the total number of the connected indoor units indicated on the remote control switch are consistent with the actual number of indoor units, the connection of the remote control switch is correct.
- If no indication appears or the number of the units indicated is smaller than the actual number of the units, some abnormalities exist.

(3)

Remote Control Switch Indication	Wrong Portions	Inspection Points after the Power Source OFF
No Indication	<ul style="list-style-type: none"> * The power source of outdoor unit is not turned ON. * The connection of the remote control cable is incorrect. * The connecting wires of power supply line are incorrect or loosed. 	<ul style="list-style-type: none"> 1. Connection between the connector and the wires: Red Wire-No.1, Black Wire-No.2, White Wire-No.3 2. Connecting Points of Remote Control Switch. 3. Contact of Connectors of Remote Control Switch. 4. Connecting Order of each Terminal Board. 5. Screw Fastening of Each Terminal Board.
Counting number of connected units is incorrect	<ul style="list-style-type: none"> * The power source of outdoor unit is not turned ON. * The communication line wiring between indoor unit and outdoor unit is not connected. * The setting of unit number is incorrect. * The connection of control cables between each indoor units are incorrect. (When one remote control switch controls multiple units) 	<ul style="list-style-type: none"> 6. Dip Switch setting on circuit board. 7. Connection on the PCB 8. The same as items 1 to 3.

Back to (1) after checking

- (4) Select TEST RUNNING MODE by depressing "MODE" switch. (COOL or HEAT)

- (5) Depress "RUN/STOP" switch.

- The "TEST RUN" operation will be started. (Last 2 hours)
- NOTE:
The "TEST RUN" operation ignores the temperature limitation and ambient temperature and have a continuous operation, but the protections are alive.

- If the units do not start or the operation lamp on the remote control switch is flashed, some abnormalities exist.

(6)

Remote Control Switch Indication	Unit Condition	Wrong Portions	Inspection Points after the Power Source OFF						
The operation lamp flashes. (1 time/1 sec.) And the Unit No. and Alarm Code "03" flash.	The unit does not start.	<ul style="list-style-type: none"> The power source of outdoor unit is not turned ON. The connecting wires of communication line are incorrect or loosed. 	<ul style="list-style-type: none"> 1. Connecting Order of each Terminal Boards. The fuse on the PCB may be burn down due to miswiring. (There is only one chance to recover through DSW of PCB) <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p style="text-align: center;">Procedures for Recovery When Transmitting Circuit Fuse is burn down.</p> <p style="text-align: center;">1. Connect terminal board wires correctly, 2. Setting position of the dip switches as follows.</p> <table style="width: 100%; text-align: center;"> <tr> <td style="width: 50%;">Indoor PCB DSW7</td> <td style="width: 50%;">Outdoor PCB DSW10</td> </tr> <tr> <td>ON </td> <td>ON </td> </tr> <tr> <td>OFF </td> <td>OFF </td> </tr> </table> </div> <ul style="list-style-type: none"> 2. Wiring Fastening of Terminal Board. 3. Connecting Order of Power Line Between Indoor Units and Outdoor Unit. 	Indoor PCB DSW7	Outdoor PCB DSW10	ON	ON	OFF	OFF
Indoor PCB DSW7	Outdoor PCB DSW10								
ON	ON								
OFF	OFF								
The operation lamp flashes. (1 time/2 sec.)	The unit does not start.	<ul style="list-style-type: none"> Remote control switch is broken or connect incorrectly. Contact of connectors is not good. 	This is the same as items (3)-1 and 2.						
Indication or flash except above.	The unit does not start, or starts once and then stops.	<ul style="list-style-type: none"> The connection of the thermistors or other connectors are incorrect. Tripping of protector exists, or elses. 	Check by the abnormality mode table 7.3. (Do it by service people.)						
The operation lamp flashes. (1 time/1 sec.) And the Unit No. 00 . Alarm Code dd and Unit Code E.00 flash.	The unit does not start.	<ul style="list-style-type: none"> The connection of the remote control switch between indoor units is incorrect. 	Check by the abnormality mode table 7.3. (Do it by service people.)						

Back to (1) after checking

Table.7.2 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 outdoor unit inlet and outlet water pipe connection correct and all pipes been checked for no leakage?
3. Are there any abnormal compressor sounds?
4. Has the unit been operated at least twenty (20) minutes?
5. Check Room Temperature:

Inlet: <u> </u> No.1DB /WB °C, <u> </u> No.2DB /WB °C, <u> </u> No.3DB /WB °C, <u> </u> No.4DB /WB °C,
Outlet: <u> </u> DB /WB °C, <u> </u> DB /WB °C, <u> </u> DB /WB °C, <u> </u> DB /WB °C,
Inlet: <u> </u> No.5DB /WB °C, <u> </u> No.6DB /WB °C, <u> </u> No.7DB /WB °C, <u> </u> No.8DB /WB °C,
Outlet: <u> </u> DB /WB °C, <u> </u> DB /WB °C, <u> </u> DB /WB °C, <u> </u> DB /WB °C,
6. Check the outdoor unit inlet and outlet water temperature, pressure:

Inlet: <u> </u> °C, <u> </u> MPa,
Outlet: <u> </u> °C, <u> </u> Mpa,
7. Check Refrigerant Temperature

Liquid Temperature: <u> </u> °C
Discharge Gas Temperature: <u> </u> °C
8. Check Pressure

Discharge Pressure: <u> </u> MPa
Suction Pressure: <u> </u> MPa
9. Check Voltage

Rated Voltage: <u> </u> V
Operating Voltage: <u> </u> L1-L2 V, <u> </u> L1-L3 V, <u> </u> L2-L3 V
Starting Voltage: <u> </u> V
Phase Imbalance: 1-V/Vm= <u> </u> .
10. Check Compressor Input Running Current

Input: <u> </u> kW	Running Current: <u> </u> A
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11. Is the water flow adequate ?
12. Is the refrigerant charge adequate?
13. Do the operation control devices operate correctly?
14. Do the safety devices (e.g. Flow Switch) operate correctly?
15. Has the unit been checked for refrigerant leakage?
16. Are all cabinet panels fixed?
17. Are all cabinet panels free from rattles?
18. Is the filter of the indoor unit clean?
19. Are the water filters cleaned after the first test run?
20. Are the stop valves open?
21. Is the unit clean inside and outside?
22. Does the drain water flow smoothly from the drain pipe?

Table 7.3 Alarm Code

Code No.	Stop Code	Content of Abnormality	Leading Cause
01	—	Tripping of Protection Device	Failure of Drain Discharge(Water level abnormal)
02	—	Tripping of Protection Device	Failure of High Pressure SW, Water Flow SW
03	05	Abnormality between indoor and outdoor(or indoor)	Incorrect Wiring. Failure of PCB. Tripping of fuse
04	05	Inverter Trip of Outdoor Unit	Failure in Transmission of PCB for Inverter
05	—	Abnormality of Power Source Wiring	Reverse Phase Incorrect Wiring
06	18	Voltage Drop in Outdoor Unit Excessively	Failure of PCB for Inverter. Failure of DM, CB
07	16	Decrease in Discharge Gas Superheat	Excessive Ref. Charge. Failure of Thermistor, Wiring
08	15	Increase in Discharge Gas Temperature	Insufficient Ref. Failure of Thermistor, Wiring
09	08	Abnormal Water Temperature	Low temperature of heat source water(May need to turn off the power to remove alarm)
11	—	Inlet Air Thermistor	Failure of Thermistor, Sensor, Connection
12	—	Outlet Air Thermistor	
13	—	Freeze Protection Thermistor	
14	—	Gas Piping Thermistor	
19	—	Tripping of Protection Device	Failure of Fan Motor, Incorrect Wiring.
21	—	High Pressure Sensor	Failure of Thermistor, Sensor, Connection
22	—	Water Temperature Thermistor	
23	—	Discharge Gas Thermistor	
25	—	Gas Pipe temperature	
26	—	Temperature sensor of outdoor water outlet	
27	—	Temperature sensor of double tube gas outlet	
29	—	Low pressure sensor	
30	—	Connections of CH Units incorrectly	CH Units connect asynchronous warm and cold outdoor unit Indoor-outdoor connection has more than 2 CH units
31	—	Incorrect Setting of Outdoor and Indoor Unit	Incorrect Setting of Capacity Code
35	—	Incorrect Setting of Indoor Unit No.	Existence of the same Indoor Unit Number Existence of the same Outdoor Unit No.
36	—	The Indoor Unit Combined error	The Indoor Unit Ref. error (R22)
38	—	Abnormality of Protective Circuit in Outdoor Unit	Incorrect Connection to PCB in Outdoor Unit.
39	14	Abnormal Current of Compressor	Compressor overcurrent, fuse blows or current sensor fault
43	11	Pressure Ratio Decrease Protection Activating	Failure of Compressor, Inverter, Pow Supply
44	12	Low Pressure Increase Protection Activating	Overload to Indoor in Cooling or to Outdoor in Heating
45	13	High Pressure Increase Protection Activating	Overload Operation. Excessive Refrigerant.
—	26	High Pressure Decrease Protection Activating	Insufficient Refrigerant
47	15	Low Pressure Decrease Protection Activating	Insufficient Refrigerant. Failure of Expansion Valve
48	17	Overload Operation Protection Activating	Failure of Ref. System, Inverter, DM, Heat Exchanger
51	17	Abnormality of Current Sensor for Inverter	Failure of Current Sensor, PCB, Wiring
53	17	IPM Protection Activating	Overheating of Inverter, PCB
54	17	Increase in Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Abnormal of Fan
55	18	No Action in Inverter	Failure of Inverter
57	—	Outdoor Protector Acts	Failure of water switch
EE	—	Compressor Protection	Failure of Compressor
0A	—	Abnormality between Outdoor	Incorrect Wiring
0b	—	Incorrect Setting of Outdoor Unit No.	DSW6 Setting error for Slave Air Conditioning
0c	—	Incorrect Setting of Outdoor Unit No.	DSW6 Setting error for Master Air Conditioning
b1	—	Incorrect Setting of Refrigerant Cycle No.	Ref. Cycle No. More than 64
b5	—	Incorrect Wiring of The Indoor Unit	The Indoor Unit Quantity is more than 16 in Hi-Net.

8. Safety and Control Device Setting

● Compressor Protection

The compressor is protected by the following devices.

- (1) High Pressure Switch: This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.
- (2) Oil Heater: This band type heater protects against oil foaming during cold starting, and it is energized while the compressor is stopped.

Model		28	38-54
For Compressor Pressure Switches (High)	MPa	Automatic Reset, Non-Adjustable (each one for each compressor)	
	Cut-out	$4.15_{-0.15}^{-0.05}$	$4.15_{-0.15}^{-0.05}$
	Cut-in	3.20 ± 0.15	3.20 ± 0.15
Fuse Capacity 220V/50Hz	A	25	50
Oil heater Capacity	W	24X2	28X2
CCP Timer Setting time	min	3	3

9. Maintenance

Regularly inspect units in accordance with the same items as described in the chapter "Test Run". To ensure the reliability and service life, the following additional items should be paid with special attention.

● Plate Heat Exchanger Freezing

Regularly inspect the water temperature difference, pressure difference, detect filter clogging, water reduction or with air inhalation. If circulating water is insufficient or water temperature is out of the normal range, it may give rise to plate heat exchanger freezing.

Stop the unit operating immediately when freezing occurs in plate heat exchanger. Start the unit again until the completion of troubleshooting.

Start-up unit repeatedly will deepen freezing degree of plate heat exchanger. As a result, various damages will appear inside exchanger and cause refrigerant leakage and refrigerant pipes containing water.

● Deposition and Clogging of Water Pipe

After a period of operation, particles, dust from outside and calcium carbonate and other minerals in water will deposit on the surface of plate heat exchanger. Electricity consumption will increase as the aggravating of the deposition. These can lead to insufficient refrigerating capacity or freezing inside of the plate heat exchanger.

※ Regularly clean water filter according to the clogging degree of water filter. If not, water filter may be broken because of its abnormal pressure.

It is strongly recommended that cleaning plate heat exchanger while water filter cleaning is underway. Pay attention to the following tips and the normal cleaning methods.

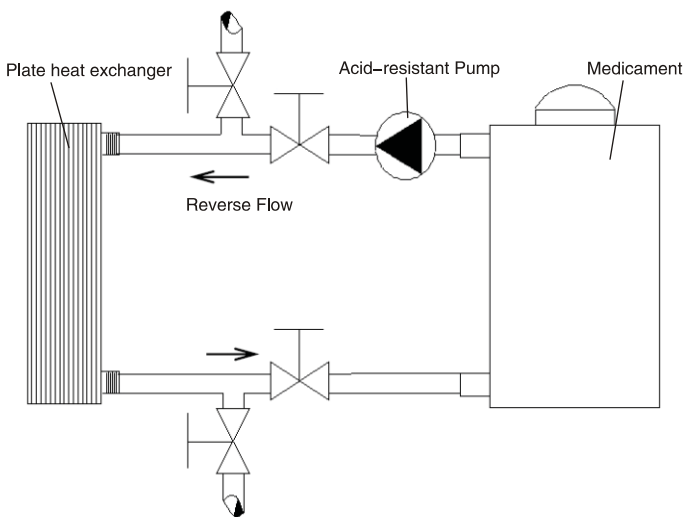


Fig.9.1 Cleaning Loop

⚠ CAUTION

※ Plate heat exchanger cleaning should be conducted by professionals. Please ask an experienced chemical industrial company for processing. Please contact your agent or dealer.

● Cleaning Method

- (1) Select right cleaning agents according to the deposition of dirt on plate heat exchanger. Cleaning agents varies with the deposition of dirt.
- (2) The plate heat exchanger is made of stainless steel, do not use cleaning agent containing chloric acid or fluoride to clean it, otherwise, heat exchanger will be damaged, which results in refrigerant leakage.
- (3) After using the cleaning agents, flush water pipes and heat exchanger with clean water to avoid corrosion of water system and scales reabsorption after cleaning.
- (4) In the case of using cleaning agents, regulate the concentration, cleaning time and temperature of cleaning agents according to the deposition of dirt.
- (5) After cleaning with acid, neutralization treatment of waste liquid is required. Contact the waste water treatment company to treat waste liquid.
- (6) Clean agents and neutralized agents have corrosive and irritative impacts on eyes, skin and nasal mucosa etc. Therefore, cleaning work must be conducted with protective device (such as goggles, protective gloves, protective shoes, protective masks, protective cloth, etc.) to avoid inhalation or contact with these agents.

Clogging Types and Cleaning Agent (Reference)

Clogging Types	Cleaning Agent
Scaling	Citric Acid, Ethylic Acid or ortho-phosphoric acid
Silt	
Rusting	
Dust and Sand Particles	Detergent/Soap, Household Detergent and Hot Water
Oil	
Plastics	
Fiber	

● Cleaning Steps

9.1 Install the Clean Circuit:

- ① Stop the water source VRF system.
- ② Stop circulating water pump in the system.
- ③ Close shut-off valve of water inlet and outlet pipes, and install an anti-acid-type water pump to form water circulation.

9.2 Inspect the Clean Circulating Circuit

Fill cleaning water tank with pure water and start anti-acid-type water pump.

- ① Check and ensure no water leakage.
- ② Check and ensure that water pipe is installed firmly.
- ③ Check and ensure that the cleaning agents will not damage any device near the unit even if the cleaning agents are spilled on it.
- ④ Check and ensure well ventilation.
- ⑤ Check and ensure no abnormal sound during operation.

9.3 Cleaning Work

- ① Drain water from water system of air conditioning system.
- ② Pour cleaning agents from cleaning water tank into plate heat exchanger from its outlet reversely by using anti-acid-type water pump. (In contrast with the normal flow direction).
- ③ Keep the cleaning agents circulating for an appropriate period of time (circulating time depends on the type and concentration of cleaning agents and thickness of dirt.).

9.4 Waste Liquid

- ① Stop anti-acid-type water pump.
- ② Pour waste liquid into waste liquid tank.
- ③ Pour water into cleaning water tank, then start water pump to flush it.
- ④ After cleaning, pour water into waste liquid tank.
- ⑤ Test PH value with PH test paper, and add the neutralizer gradually to neutralize waste liquid.
- ⑥ After neutralization, contact wasted liquid treatment company to process waste liquid.

9.5 Neutralization treatment for water pipe

- ① Pour water into cleaning water tank.
- ② Start anti-acid-type water pump.
- ③ Test PH value with PH test paper, and add the neutralizer gradually until PH=7.
- ④ Keep anti-acid-type water pump running for a period of time to complete neutralization reaction.
- ⑤ Drain water after using.
- ⑥ Run circulating water pump to clean circulating system until no liquid with water scales appears.

9.6 Restart unit

- ① Reconnect pipes of unit as the way they used to be to realize the normal operation.
- ② After cleaning, water treatment (preventive measure) can be performed to prevent the water system from corrosion.



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