

# SYSVRF AIR EVO C HP Q



## Outdoor unit Mini VRF Heat Pump INSTALLATION MANUAL



|   |    |
|---|----|
| PRECAUTIONS.....                        | 1  |
| ATTACHED FITTINGS.....                  | 2  |
| OUTDOOR UNIT INSTALLATION.....          | 3  |
| INSTALL THE CONNECTING PIPE.....        | 4  |
| ELECTRICAL WIRING.....                  | 9  |
| TEST RUNNING.....                       | 12 |
| PRECAUTIONS ON REFRIGERANT LEAKAGE..... | 12 |
| TURN OVER TO CUSTOMER.....              | 12 |

## 1. PRECAUTIONS

- Ensure that all Local, National and International regulations are satisfied.
- Read this "PRECAUTIONS " carefully before Installation.
- The precautions described below include the important items regarding safety. Observe them without fail.
- After the installation work, perform a trial operation to check for any problem.
- Follow the Owner's Manual to explain how to use and maintain the unit to the customer.
- Turn off the main power supply switch (or breaker) before maintenance the unit .
- Ask the customer that the Installation Manual and the Owner's Manual should be kept together .



### CAUTION

— — — — —  
New Refrigerant Air Conditioner Installation

**THIS AIR CONDITIONER ADOPTS THE NEW HFC REFRIGERANT(R410A)WHICH DOES NOT DESTROY OZONE LAYER.**

The characteristics of R410A refrigerant are; Hydrophilic, oxidizing membrane or oil, and its pressure is approx.1.6 times higher than that of refrigerant R22. Accompanied with the new refrigerant, refrigerating oil has also been changed ,Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigerating oil does not enter the refrigerating cycle. To prevent charging an incorrect refrigerant and refrigerating oil, the sizes of connecting sections of charging port of the main unit and installation tools are charged from those for the conventional refrigerant.

Accordingly the exclusive tools are required for the new refrigerant (R410A):

For connecting pipes, use new and clean piping designed for R410A, and please care so that water or dust does not enter. Moreover, do not use the existing piping because there are problems with pressure-resistance force and impurity in it.



### CAUTION

— — — — —  
Do not connect the Appliance from Main Power Supply.

This unit must be connected to the main power supply by means of a switch with a contact separation of at least 3 mm. The installation fuse must be used for the power supply line of this conditioner.



### WARNING

If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.

An all-pole disconnection switch having a contact separation of at least 3mm in all poles should be connected in fixed wiring.

The appliance shall be installed in accordance with national wiring regulations.

The temperature of refrigerant circuit will be high, please keep the interconnection cable away from the copper tube.

An all-pole disconnection device which has at least 3mm separation distance in all pole and a residual current device(RCD)with the rating of above 10mA shall be incorporated in the fixed wiring according to the national rule.

The power cord type designation is H05RN-R/H07RN-F or above. Ask an authorized dealer or qualified installation professional to install/maintain the air conditioner.

Inappropriate installation may result in water leakage, electric shock or fire.

**Turn off the main power supply switch or breaker before attempting any electrical work.**

Make sure all power switches are off. Failure to do so may cause electric shock.

**Connect the connecting cable correctly.**

If the connecting cable is connected in a wrong way, electric parts may be damaged.

**When moving the air conditioner for the installation into another place, be very careful not to enter any gaseous matter other than the specified refrigerant into the refrigeration cycle.**

If air or any other has is mixed in refrigerant, the gas pressure in the refrigeration cycle becomes abnormally high and it may resultingly causes pipe burst and injuries on persons.

**Do not modify this unit by removing any of the safety guards or by by-passing any of the safety interlock switches.**

**Exposure of unit to water or other moisture before installation may cause a short-circuit of electrical parts.**

Do not store it in a wet basement or expose to rain or water.

**After unpacking the unit, examine it carefully if there are possible damage.**

**Do not install in a place that might increase the vibration of the unit.**

**To avoid personal injury (with sharp edges), be careful when handling parts.**

**Perform installation work properly according to the Installation Manual.**

Inappropriate installation may result in water leakage, electric shock or fire.

**When the air conditioner is installed in a small room, provide appropriate measures to ensure that the concentration of refrigerant leakage occur in the room does not exceed the critical level.**

**Install the air conditioner securely in a location where the base can sustain the weight adequately.**

**Perform the specified installation work to guard against an earthquake.**

If the air conditioner is not installed appropriately, accidents may occur due to the falling unit.

**If refrigerant gas has leaked during the installation work, ventilate the room immediately.**

If the leaked refrigerant gas comes in contact with fire, noxious gas may generate.

**After the installation work, confirm that refrigerant gas does not leak.**

If refrigerant gas leaks into the room and flows near a fire source, such as a cooking range, noxious gas might generate.

**Electrical work must be performed by a qualified electrician in accordance with the Installation Manual. Make sure the air conditioner uses an exclusive power supply.**

Equipment complying with IEC 61000-3-12

An insufficient power supply capacity or inappropriate installation may cause fire.

**Use the specified cables for wiring connect the terminals securely fix. To prevent external forces applied to the terminals from affecting the terminals.**

**Be sure to provide grounding.**

Do not connect ground wires to gas pipes, water pipes, lightning rods or ground wires for telephone cables.

**Conform to the regulations of the local electric company when wiring the power supply.**

Inappropriate grounding may cause electric shock.

**Do not install the air conditioner in a location subject to a risk of exposure to a combustible gas.**











If a combustible gas leaks, and stays around the unit, a fire may occur.

#### Required tools for installation work

- 1) Philips screw driver
- 2) Hole core drill(65mm)
- 3) Spanner
- 4) Pipe cutter
- 5) Knife
- 6) Reamer
- 7) Gas leak detector
- 8) Tape measure
- 9) Thermometer
- 10) Mega-tester
- 11) Electro circuit tester
- 12) Hexagonal wrench
- 13) Flare tool
- 14) Pipe bender
- 15) Level vial
- 16) Metal saw
- 17) Gauge manifold (Charge hose:R410A special requirement)
- 18) Vacuum pump (Charge hose:R410A special requirement)
- 19) Torque wrench
  - 1/4(17mm)16N•m (1.6kgf•m)
  - 3/8(22mm)42N•m (4.2kgf•m)
  - 1/2(26mm)55N•m (5.5kgf•m)
  - 5/8(15.9mm)120N•m (12.0kgf•m)
- 20) Copper pipe gauge adjusting projection margin
- 21) Vacuum pump adapter

## 2. ATTACHED FITTINGS

Please check whether the following fittings are of full scope. If there are some spare fittings , please restore them carefully.

|                       | NAME                                | SHAPE   | QUANTITY |
|-----------------------|-------------------------------------|---|----------|
| INSTALLATION FITTINGS | 1. Outdoor unit installation manual |  | 1        |
|                       | 2. Outdoor unit owner's manual      |  | 1        |
|                       | 3. TECHNICAL DATE MANUAL            |  | 1        |
|                       | 4. ERP INFORMATION MANUAL           |  | 1        |
|                       | 5. Water outlet pipe connector      |  | 1        |
|                       | 6.Seal ring(8kW)                    |  | 1        |
|                       | 7.Rubber wire ring (10/12kW)        |  | 2        |
|                       | 8.Network matching wires            |  | 2        |
|                       | 9.Connecting pipe (16kW)            |  | 1        |
|                       | 10.L-shaped pipe(14kW)              |  | 1        |



### NOTE

- Check if any accessory in the above figure is missing. All the accessories must be kept properly.
- All the fittings should be Systemair fittings.
- Wired/Remote controller — purchase separately
- Outlet sealant — purchase separately.
- All the figures in the manual explain only the general appearance and dimensions of the unit. The air conditioner you purchased may not be completely consistent with the appearance and functions listed in the figures. Please refer to the actual product.

### Refrigerant Piping

Piping kit used for the conventional refrigerant cannot be used.  
 Use copper pipe with 0.8 mm or more thickness for φ9.5.  
 Use copper pipe with 1.0 mm or more thickness for φ15.9.  
 Use copper pipe with 1.0 mm or more thickness for φ19.0.  
 Flare nut and flare works are also different form those of the conventional refrigerant.take out the flare nut attached to the main unit of the air conditioner, and use it.

### Before installation

Be careful to the following items before installation.

#### Air purge

For air purge, use a vacuum pump.

Do not use refrigerant charged in the outdoor unit for air purge.  
 (The refrigerant for air purge is not contained in the outdoor unit.)

#### Electrical cabling

Be sure to fix the power cables and indoor/outdoor connecting cables with clamps so that they do not contact with the cabinet, etc.

#### Installation Place

A place which provides a specified space around the outdoor unit.  
 A place were the operation noise and discharged air are not given to your neighbors.

A place that is not exposed to a strong wind.

A place that does not block a passage.

When the outdoor unit is installed in an elevated position, make sure it's four feet securely installed.

There must be sufficient space for carrying in the unit.

A place where the drain water does not make any problem.

## CAUTION

- Install the outdoor unit at a place where discharge air is not blocked. When an outdoor unit is installed in a place that is always exposed to a strong wind like a coast or on a high storey of a building, secure a normal fan operation by using a duct or a wind shield.
- When installing the outdoor unit in a place that is constantly exposed to a strong wind such as the upper stairs or rooftop of a building, apply the windproof measures referring to the following examples.
- Install the unit so that its discharge port faces to the wall of the building. Keep a distance of 2000mm or more between the unit and the wall surface.

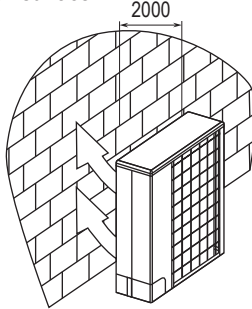


Fig. 2-1

- Supposing the wind direction during the operation season of the discharge port is set at right angle to the wind direction.

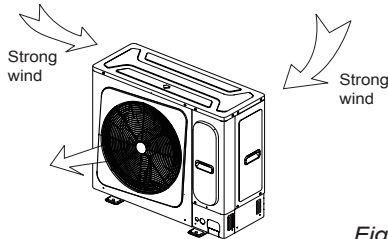


Fig. 2-2

- Installation in the following places may result in some troubles. Do not install the unit in such places below.
  - A place full of machine oil.
  - A place full of sulphuric gas.
  - A place where high-frequency radio waves are likely to be generated as from audio equipment, welders, and medical equipment.

## 3. OUTDOOR UNIT INSTALLATION

### 3.1 Installation place

Please keep away from the following place, or malfunction of the machine may be caused:

- There is combustible gas leakage.
- There is much oil (including engine oil) ingredient.
- There is salty air surrounding (near the coast)
- There is caustic gas (the sulfide, for example) existing in the air (near a hot spring)
- A place the heat air expelled out from the outdoor unit can reach your neighbor's window.
- A place that the noise interferes your neighbors every day life.
- A place that is too weak to bear the weight of the unit
- Uneven place.
- Insufficient ventilation place.

- Near a private power station or high Frequency equipment.
- Install indoor unit, outdoor unit, power cord and connecting wire at least 1m away from TV set or radio to prevent noise or picture interference.
- Install the unit in the place that can offer enough space for installation and maintenance. Don't install it in the place that has a high requirement for noise, such as the bed room.

The insulation of the metal parts of the building and the air conditioner should comply with the regulation of National Electric Standard.



## CAUTION

Keep indoor unit, outdoor unit, power supply wiring and transmission wiring at least 1 meter away from televisions and radios. This is to prevent image interference and noise in those electrical appliances. (Noise may be generated depending on the conditions under which the electric wave is generated, even if 1 meter is kept.)

### 3.2 Installation space (Unit:mm)

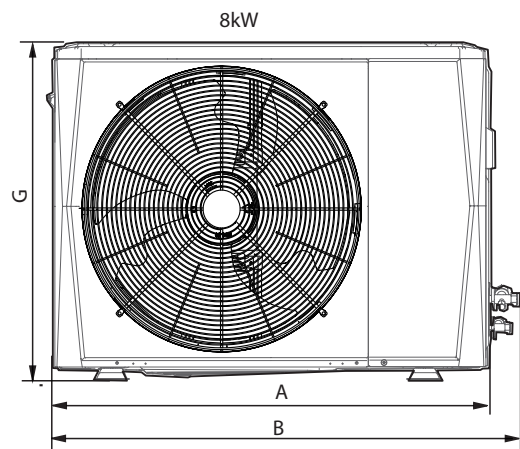


Fig. 3-1

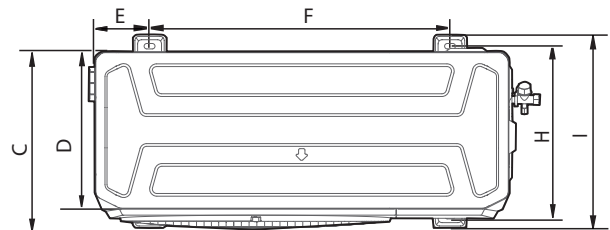


Fig. 3-2

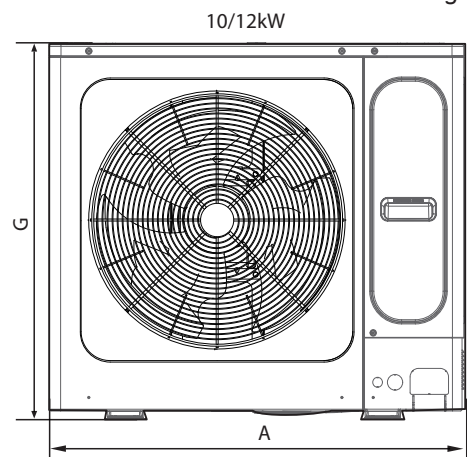


Fig. 3-3



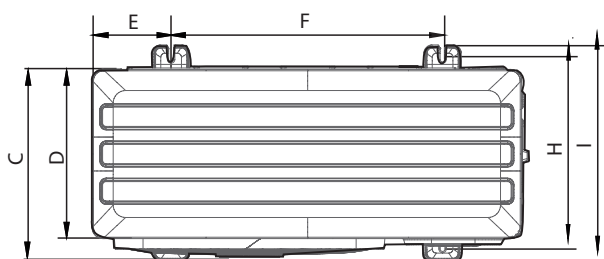
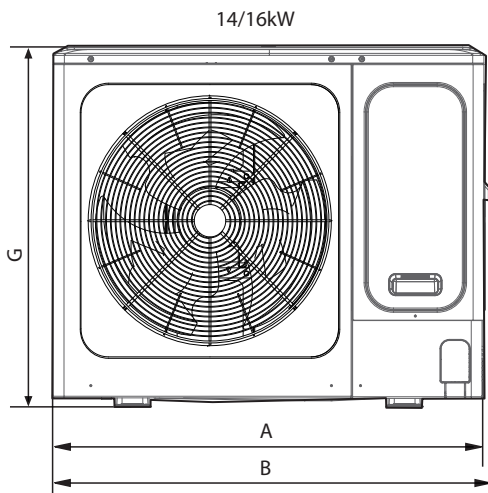
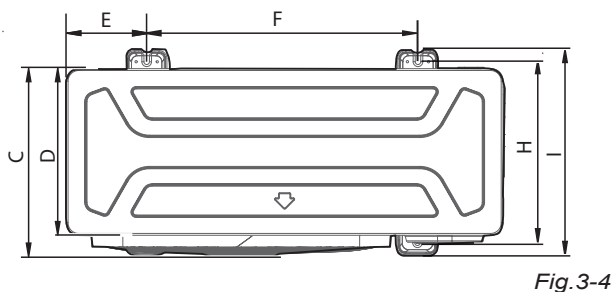
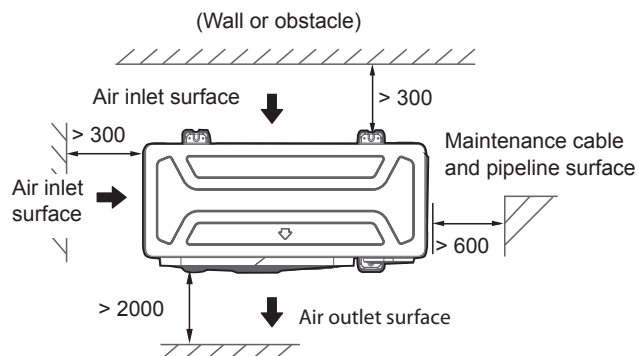


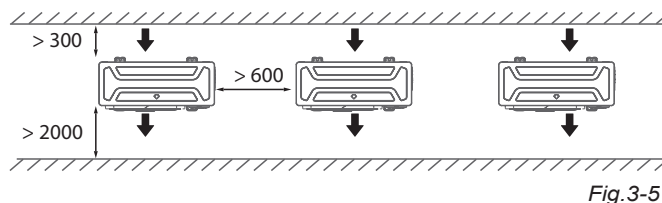
Table 3-1 (unit: mm)

| Model       | 80               | 100/120          | 140/160          |
|-------------|------------------|------------------|------------------|
| A           | 910              | 950              | 1040             |
| B           | 982              | /                | 1053             |
| C           | 390              | 406              | 452              |
| D           | 345              | 360              | 410              |
| E           | 120              | 175              | 191              |
| F           | 663              | 590              | 656              |
| G           | 712              | 840              | 865              |
| H           | 375              | 390              | 463              |
| I           | 426              | 440              | 523              |
| Drawing No. | Fig.3-1, Fig.3-2 | Fig.3-3, Fig.3-4 | Fig.3-5, Fig.3-6 |

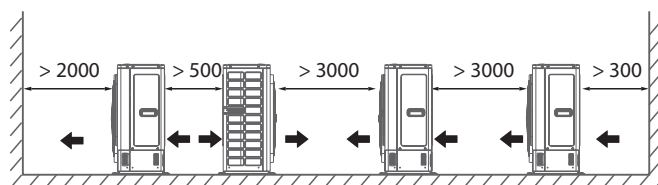
- Single unit installation



- Parallel connect the two units or above

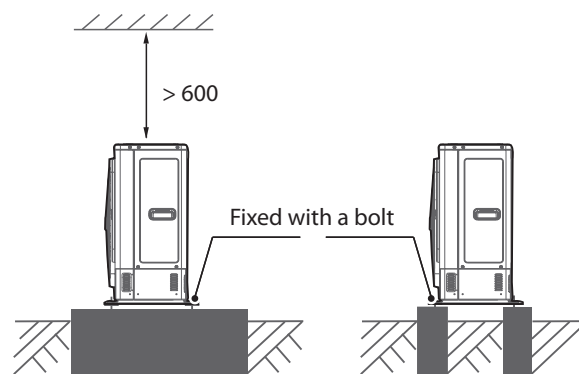


- Parallel connect the front with rear sides



### 3.3 Moving and installation

- Since the gravity center of the unit is not at its physical center, so please be careful when lifting it with a sling.
- Never hold the inlet of the outdoor unit to prevent it from deforming.
- Do not touch the fan with hands or other objects.
- Do not lean it more than 45°, and do not lay it sidelong.
- Make concrete foundation according to the specifications of the outdoor units.(refer to Fig.3-7)
- Fasten the feet of this unit with bolts firmly to prevent it from collapsing in case of earthquake or strong wind. (refer to Fig.3-7)





## NOTE

All the pictures in this manual are for explanation purpose only. They may be slightly different from the air conditioner you purchased(depend on model).The actual shape shall prevail.

## 4. INSTALL THE CONNECTING PIPE

Check whether the height drop between the indoor unit and outdoor unit, the length of refrigerant pipe, and the number of the bends meet the following requirements:

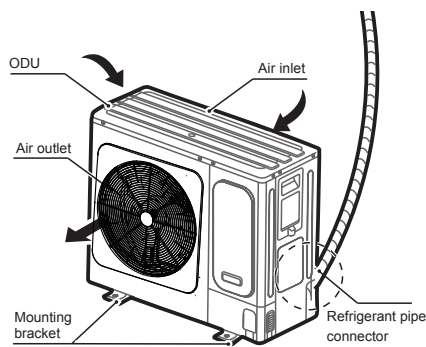


Fig. 4-1

### 4.1 Refrigerant piping



## CAUTION

Please pay attention to avoid the components while connect to the connecting pipes.

To prevent the refrigerant piping from oxidizing inside when welding, it is necessary to charge nitrogen, or oxide will chock the circulation system.

### The indoor and outdoor connecting pipe interface and power line outlet

Vavious piping and viring patterns can be selected,such as out from the front ,the back the side ,and undersurface, etc. (The follow display the locations of several piping and wiring knock-off interfaces )

Table 4-1

|                |               |               |                       |
|----------------|---------------|---------------|-----------------------|
|                |               |               |                       |
| Front out pipe | Side out pipe | Back out pipe | Undersurface out pipe |



## CAUTION

Side out pipe: please remove the L-shape metal plate, otherwise can not wiring.

Back out pipe:please wipe off the piping support rubber blanket beside the inner outlet pipe cover of the machine while back side getting out pipes.

Front out pipe: cut the frontal hole of the pipe-outlet plate.The method of the out pipe in the same way of the back out pipe.

Undersurface outlet pipe: the knock out should from inside to outside, and then piping and wiring through this.Pay attention to the piping the fat connecting pipe should out from the largest hole, otherwise the pipes will be rubbed. Please do the moth proofing for the knocked out hole, to avoid the pest processing into and destroy the components.

### 4.2 Leak Detection

Use soapy water or a leak detector to check whether air leaks at each joint.

A and B indicate check valves of ODU.

C and D indicate IDU connecting pipe ports.

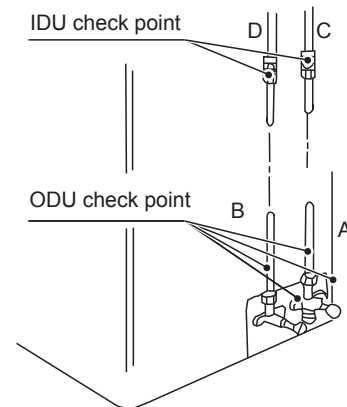


Fig. 4-2

### 4.3 Heat Insulation

Carry out heat insulation treatment for the pipes at the gas and liquid sides respectively. Pipes on the liquid and air sides have a low temperature during cooling. Take suficient insulation measures to prevent condensation (see the figure on the right).

■ The gas-side pipe must be treated with the closed-cell foam insulation material, which reaches the non-fammable level of B1 and heat resistance of over 120 °C.

■ When the outer diameter of the copper pipe is not greater than  $\Phi 12.7$  mm, the thickness of insulation layer should be greater than 15 mm.

■ When the outer diameter of copper pipe is equal to or greater than  $\Phi 15.9$  mm, the thickness of insulation layer should be greater than 20 mm.

■ The attached insulation material for the part of the IDU where the pipe connects must undergo heat insulation treatment that aves no gaps.

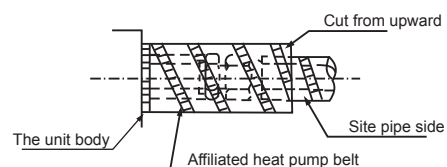


Fig. 4-3

## 4.4 Connecting method

### Select refrigerant pipe

Table 4-2

| Pipe definition                     | Pipe connect position   | Code             |
|-------------------------------------|---|------------------|
| Main pipe                           | The pipe between outdoor unit to the first branch of indoor unit.                           | L1               |
| The main pipes of indoor unit       | The pipe after the first branch do not direct connect with the indoor unit.                 | L2~L5            |
| The branch pipes of indoor unit     | The pipe after the branch connect with the indoor unit.                                     | a, b, c, d, e, f |
| Indoor unit branch pipes components | The pipes connect with the main pipe, the branch pipe and the the main pipe of indoor unit. | A, B, C, D, E    |

#### The first connect method

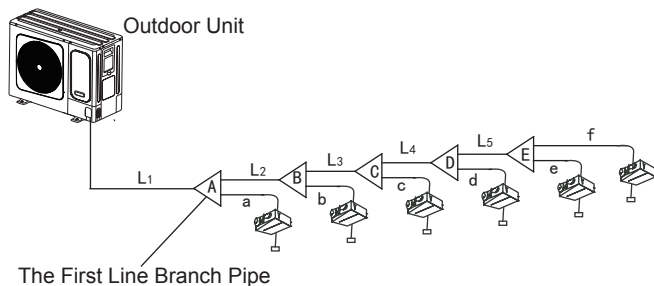


Fig. 4-4

#### The second connect method

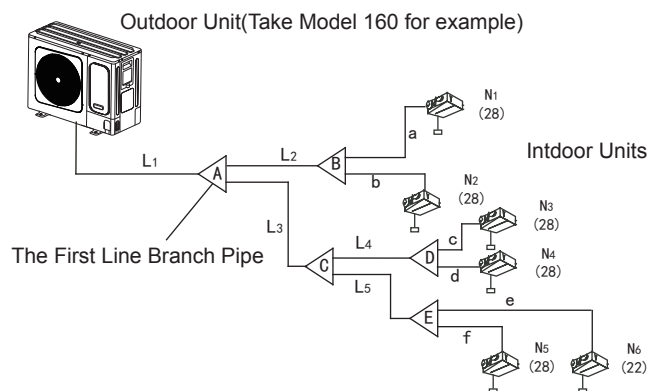


Fig. 4-5



### NOTE

- Use the special-purpose branch branches provided by Systemair only. Failing to do so may lead to severe system malfunction.
- If the distance from the first branch pipe to the last IDU exceeds 15 m, use connection method 2.
- The connection distance between the IDU and branch pipe should not exceed 15 m.

## 4.4 Confirmation for the diameters of indoor unit connecting pipes

- R410A Indoor unit connecting pipes diameters 4-3.
- Example 1: In the Fig.4-5, The downstream inner units of the L2, and its total capacity is  $28 \times 2 = 56$ , refers to the Table 4.4, the air/liquid side of L2 is:  $\Phi 15.9/\Phi 9.5$ .

R410A Indoor unit connecting pipes diameters

Table 4-3

| Total capacity of the downstream inner units | Main pipe size (mm) |             | Branch Pipe |
|--|---------------------|-------------|-------------|
|  | Air pipe            | liquid pipe |             |
| $A < 160$                                    | $\Phi 15.9$         | $\Phi 9.5$  | FQZHN-01D   |
| $160 \leq A < 230$                           | $\Phi 19.1$         | $\Phi 9.5$  | FQZHN-01D   |

## 4.5 Confirmation for the diameters of outdoor unit connecting pipes

R410A outdoor unit connecting pipes diameters

Table 4-4

| Total capacity of The outdoor units | Main pipe size when the total equivalent piping length of liquid + air side is <90m |                  |                            | Main pipe size when the total equivalent piping length of liquid + air side is $\geq 90$ m |                  |                            |
|-------------------------------------|---|------------------|----------------------------|--|------------------|----------------------------|
|                                     | air side (mm)   | liquid side (mm) | The first Line Branch Pipe | air side (mm)  | liquid side (mm) | The first Line Branch Pipe |
| $A < 155$                           | $\Phi 15.9$   | $\Phi 9.5$       | FQZHN-01D                  | $\Phi 19.1$  | $\Phi 9.5$       | FQZHN-01D                  |
| $155 \leq A < 230$                  | $\Phi 19.1$   | $\Phi 9.5$       | FQZHN-01D                  | $\Phi 22.2$  | $\Phi 9.5$       | FQZHN-02D                  |



### NOTE

- The straight distance between copper pipe turning and the contiguous branch pipe is at least 0.5 m.
- The straight distance between the contiguous branch pipes is at least 0.5 m.
- The straight distance which the branch pipes connected to the IDU is at least 0.5 m.

#### Select branch joint

Select the branch joint according to the total designed capacity of indoor units which it connects to. If this capacity is more than that of the outdoor unit, then select the connection according to the outdoor unit.

- The selection of branch header depends on the quantity of branches it connects to.

#### Connection method

Table 4-5

|             | Gas side           | Liquid side        |
|-------------|--------------------|--------------------|
| 8kW         | Flaring            | Flaring            |
| 10kW        | Welding or Flaring | Flaring            |
| 12kW        | Welding or Flaring | Flaring            |
| 14kW        | Welding or Flaring | Flaring            |
| 16kW        | Welding or Flaring | Flaring            |
| Indoor unit | Flaring            | Flaring            |
| Branch pipe | Welding or Flaring | Welding or Flaring |

#### Piping sizes at the branch pipe

Table 4-6

| Refrigerant | Indoor Unit Capacity A(x100W) | Gas Side (Φ)      | Liquid Side (Φ)  |
|-------------|-------------------------------|-------------------|------------------|
| R410A       | $A \leq 45$                   | 12.7(Flaring nut) | 6.4(Flaring nut) |
|             | $A \geq 56$                   | 15.9(Flaring nut) | 9.5(Flaring nut) |

■ Pipe diameter of the connector in the outdoor unit's body

Table 4-7

| MODEL<br>(kW) | Pipe diameter of outdoor unit's connector(mm) |             |
|---------------|---|-------------|
|               | Gas Side                                      | Liquid Side |
| 8             | Φ 15.9  | Φ 9.5       |
| 10            | Φ 15.9  | Φ 9.5       |
| 12            | Φ 15.9  | Φ 9.5       |
| 14            | Φ 15.9  | Φ 9.5       |
| 16            | Φ 19.1  | Φ 9.5       |

Table 4-8

| Outdoor Unit<br>(kW) | Capacity of<br>ODU<br>(horsepower) | Max.<br>Number<br>of IDUs | Sum Capacity<br>of IDUs<br>(horsepower) |
|----------------------|------------------------------------|---------------------------|---|
| 8                    | 2.5                                | 4                         | 50%~130%                                |
| 10                   | 3                                  | 6                         | 50%~130%                                |
| 12                   | 4                                  | 7                         | 50%~130%                                |
| 14                   | 5                                  | 8                         | 50%~130%                                |
| 16                   | 6                                  | 9                         | 50%~130%                                |



### CAUTION

The total capacity of the IDUs must not exceed 130% of the load of the ODU.

When the capacity of IDUs is greater than 100% of the load, the output of the IDUs will be de-rated.

Table 4-9

| Capacity<br>ranking | Capacity<br>(horsepower) | Capacity<br>ranking | Capacity<br>(horsepower) |
|---------------------|--------------------------|---------------------|--------------------------|
| 18                  | 0.6                      | 80                  | 2.5                      |
| 22                  | 0.8                      | 10.5                | 3                        |
| 28                  | 1                        | 120                 | 4                        |
| 36                  | 1.25                     | 140                 | 5                        |
| 45                  | 1.7                      | 160                 | 6                        |
| 56                  | 2                        |                     |                          |

■ When the outdoor unit connects one indoor unit

Table 4-10

| MODEL<br>(kW) | The max height drop(m)      |                                | The length of<br>refrigerant<br>pipe(m) | The number<br>of bends |
|---------------|-----------------------------|--------------------------------|---|------------------------|
|               | When outdoor<br>unit is top | When outdoor<br>unit is bottom |   |                        |
| 8             | 10                          | 10                             | 8                                       | less than 10           |
| 10            | 20                          | 20                             | 8                                       |                        |
| 12            | 20                          | 20                             | 8                                       |                        |
| 14            | 30                          | 20                             | 8                                       |                        |
| 16            | 30                          | 20                             | 8                                       |                        |

## 4.6 Illustration

Outdoor Unit(Take Model 160 for example)

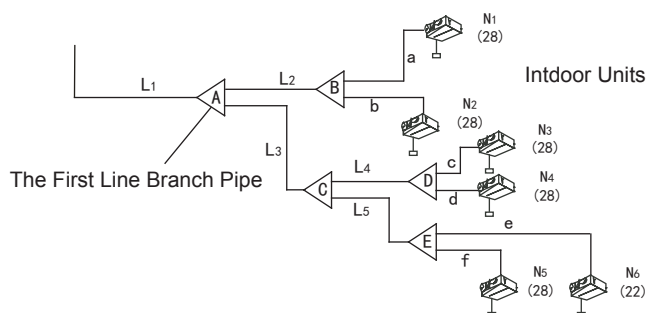


Fig.4-6

Caution: Suppose in the displayed piping system, the total equivalent piping length of air side + liquid side is longer than 90m.

● Indoor unit branch pipe

Inner branch pipes are a~f, the size selection please refers to Table4-6. Note: The max. length of the branch pipe should not longer than 15m.

● The main pipes of indoor unit and the indoor unit branch pipe components

■ The downstream inner units of the main pipe L2 are N1, N2, and its total capacity is  $28 \times 2 = 56$ , the size of pipe L2 is  $\Phi 15.9/\Phi 9.5$ , and the branch pipe B should be FQZHN-01D.

■ The downstream inner units of the main pipe L4 are N3, N4, and its total capacity is  $28 \times 2 = 56$ , the size of pipe L4 is  $\Phi 15.9/\Phi 9.5$ , and the branch pipe D should be FQZHN-01D.

■ The downstream inner units of the main pipe L5 are N5, N6, and its total capacity is  $28 + 22 = 50$ , the size of pipe L5 is  $\Phi 15.9/\Phi 9.5$ , and the branch pipe E should be FQZHN-01D.

■ The indoor unit below to the main pipe L3 are N3~N6, and its total capacity is  $28 \times 3 + 22 = 106$ , the size of pipe L3 is  $\Phi 15.9/\Phi 9.5$ , and he branch pipe C should be FQZHN-01D.

■ The indoor unit below to the main pipe A are N1~N6, and its total capacity is  $28 \times 5 + 22 = 162$ , and the branch pipe should be FQZHN-01D, and because the total piping length of liquid + air side is  $\geq 90m$ , check Table.4-4, and the first branch pipe should apply FQZHN-02D, and according to the principle of maximum value, it should apply FQZHN-02D.

● Main pipe (Please refer to Fig.4-5 and Fig.4-7)

In Fig.4-6, the main pipe L1, the outdoor unit capacity is 16kW, and check the Fig.4-7 to get the size of gas pipe/liquid pipe is  $\Phi 19.1/\Phi 9.5$ , and aslo the total equivalent length of liquid side and gas side pipes is  $>90m$ , then check the Fig.4-4 to get the size of gas pipe/liquid pipe is  $\Phi 22.2/\Phi 9.5$ , and according to the maximum value principle, it should apply the  $\Phi 22.2/\Phi 9.5$ .

● Allowable length and altitude difference of refrigerant pipe

table 4-11

|             |   |                   | Permitted value  | Piping   |
|-------------|---|-------------------|--|--|
| Pipe Length | Total Pipe Length(Actual)   |                   | $\leq 50\text{m}$ (8kW)<br>$\leq 65\text{m}$ (10/12kW)<br>$\leq 100\text{m}$ (14/16kW) | $L1+L2+L3+L4+L5 +a+b+c+d+e+f$  |
|             | Maximum Piping(L)   | Actual Length     | $\leq 35\text{m}$ (8kW)<br>$\leq 45\text{m}$ (10/12kW)<br>$\leq 60\text{m}$ (14/16kW)  | $L1+L2+L3+L4+L5+f$ (The first connect method)<br>or $L1+L3+L5+f$ (The second connect method) |
|             |   | Equivalent Length | $\leq 40\text{m}$ (8kW)<br>$\leq 50\text{m}$ (10/12kW)<br>$\leq 70\text{m}$ (14/16kW)  |  |
|             | Pipe Length(from the first line branch pipe to furthest indoor unit)(m) |                   | $\leq 20\text{m}$  | $L2+L3+L4+L5+f$ (The first connect method)<br>or $L3+L5+f$ (The second connect method)       |
|             | Pipe Length(from the nearest branch pipe equivalent length(m)           |                   | $\leq 15\text{m}$  | a, b, c, d, e  |
| Drop Height | Indoor Unit-Outdoor Unit Drop Height(H)                                 | Outdoor Unit up   | $\leq 10\text{m}$ (8kW)<br>$\leq 20\text{m}$ (10/12kW)<br>$\leq 30\text{m}$ (14/16kW)  | _____  |
|             |   | Outdoor Unit Down | $\leq 10\text{m}$ (8kW)<br>$\leq 20\text{m}$ (10/12kW)<br>$\leq 20\text{m}$ (14/16kW)  | _____  |
|             | Indoor Unit to Indoor Unit Drop Height(H)                               |                   | $\leq 8\text{m}$   | _____  |

Note: When the total equivalent piping length of liquid + gas side is  $\geq 90\text{m}$ , it must increase the size of air side main pipe. Besides, according to the distance of refrigerant pipe and the over matched state of inner unit, when the capacity is decreasing it still can increase the gas side main pipe size.

● The first connect method

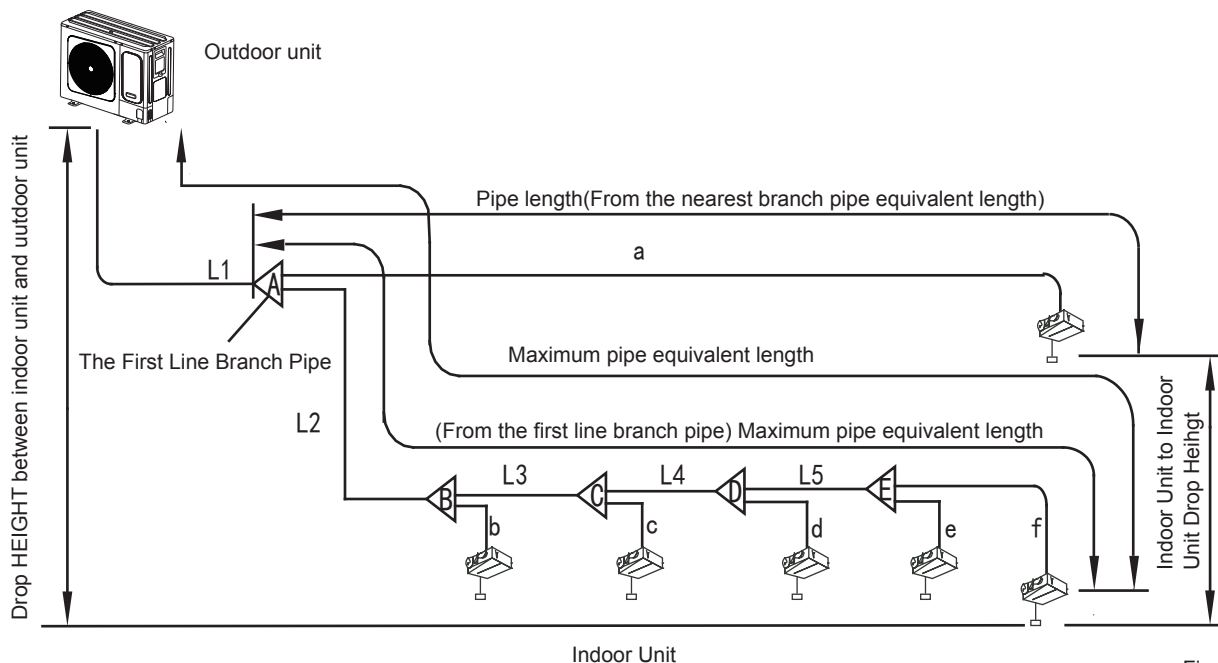


Fig.4-7



- The second connect method

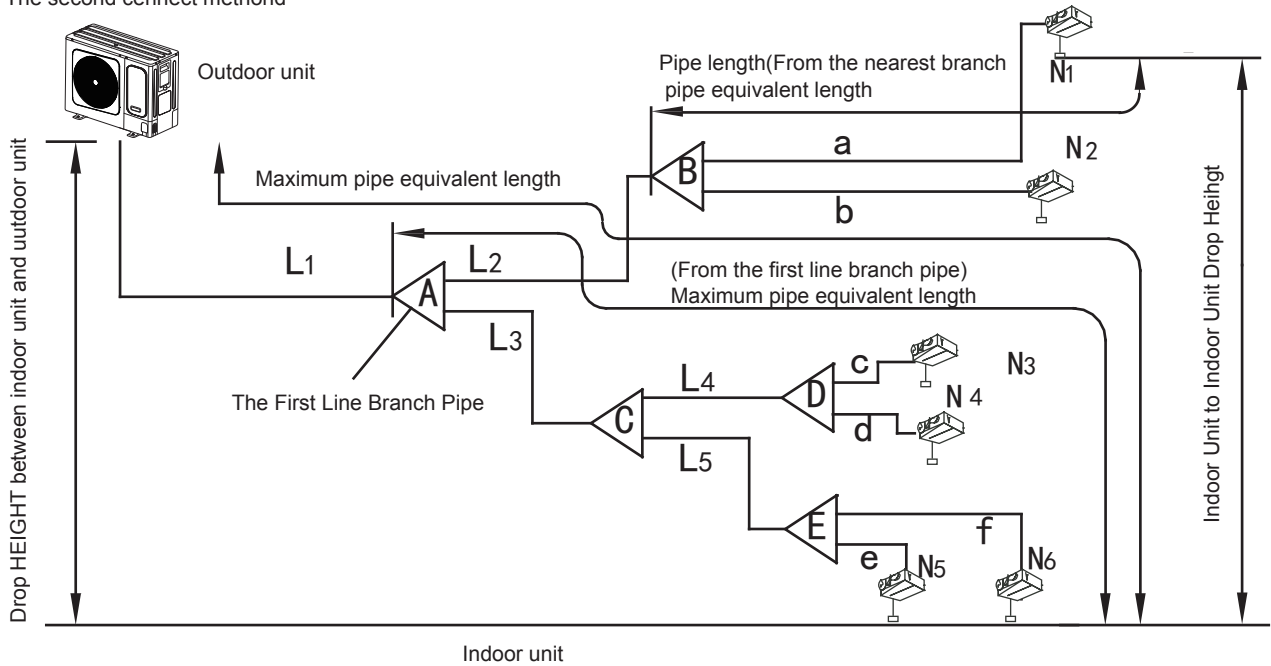


Fig.4-8

#### 4.7 Remove Dirt or Water in the Piping

Make sure there is no any dirt or water before connecting the piping to the outdoor units.

Wash the piping with high pressure nitrogen, never use refrigerant of outdoor unit.

#### 4.8 Airtight Test

Air tightness test – nitrogen must be used. (See the figure on the right for the location of the maintenance access).

Increase the pressure from the liquid pipe and gas pipe to 4.0 MPa at the same time (not exceeding 4.0 MPa). If the pressure does not drop in 24 hours, the test is passed.

When the pressure drops, check the leakage position (after you make sure that there is no leakage, discharge the nitrogen).



#### CAUTION

Never use oxygen, combustible gas, or poisonous gas in the air tightness test.

To prevent damage to the equipment, the pressure must not be held for too long.

#### 4.9 Air Purge with Vacuum Pump

- Use a vacuum pump that can evacuate the pipe to the pressure of less than -100.7 kPa (5 Torr, -755mmHg). When the pump is stopped, do not let the pump oil flow back into the refrigerant pipe.
- The liquid and gas pipes should be evacuated with a vacuum pump for more than two hours to the pressure of less than -100.7kPa. Then, place the pipes with the pressure of less than -100.7 kPa for more than one hour, and check whether the reading of the vacuum gauge rises. (If the reading rises, there is residual water or gas leakage in the system. The leakage must be checked and solved and the test should be performed again.)
- Water may enter into pipes in the following conditions: the installation is carried out in rainy seasons and the installation period is long; the pipes are condensed inside; rainwater enters the pipes.

After the above vacuum drying of two hours, use nitrogen to increase the pressure to 0.05 MPa (vacuum breaking), and use a vacuum pump to decrease the pressure to lower than -100.7kPa or below and hold the pressure for one hour (vacuum drying).

(If the pressure cannot be decreased to lower than -100.7 kPa after two-hour vacuumizing, repeat the vacuum breaking and vacuum process.) After that, place the vacuum pipes for one hour, and then check whether the reading of the vacuum gauge rises.



#### CAUTION

Use a vacuum pump to perform the vacuumizing process. Do not use refrigerant gas to discharge air.

Use a vacuum pump that can vacuumize the pipe to the pressure of less than -100.7 kPa (5 Torr, -755 mmHg). When the pump is stopped, do not let the pump oil flow back into the refrigerant pipe.

In order to prevent the entry of impurities, the R410A special tool must be used to ensure the compression strength. Use a flling hose with a top rod to connect to the maintenance access of the check valve or the refrigerant flling port.

#### 4.10 Refrigerant Amount to be Added

Calculate the amount of the R410A refrigerant to be added based on the diameter and length of the liquid pipes of the ODU and IDUs.

- When the outdoor unit connects 1 indoor unit:

Table 4-12

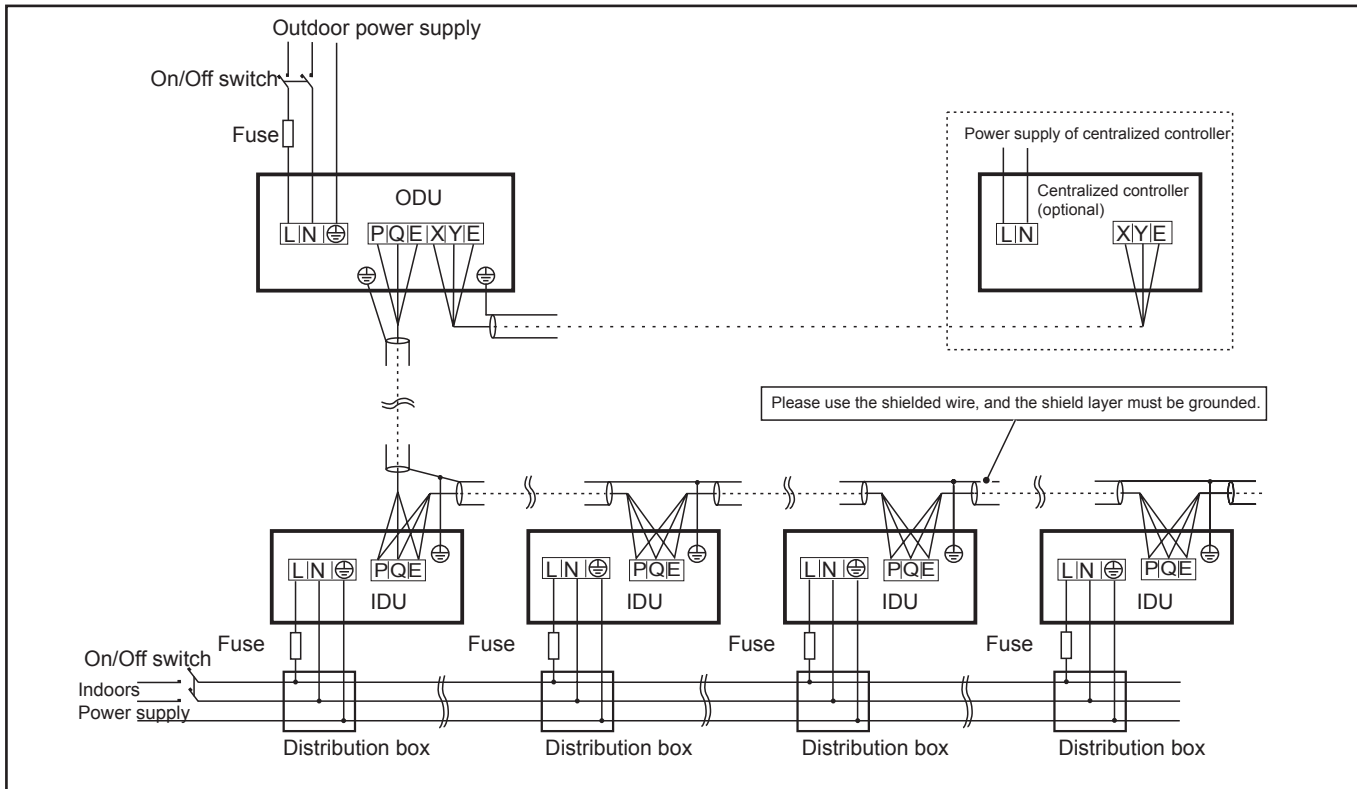
| Liquid Side Piping Diameter | Refrigerant to be Added Permeter Piping |
|-----------------------------|---|
| Φ6.4                        | 0.022kg                                 |
| Φ9.5                        | 0.054kg                                 |
| Φ12.7                       | 0.110kg                                 |
| Φ15.9                       | 0.170kg                                 |



#### NOTE

Additional refrigerant volume of divergent pipe is 0.1kg per item (Consider the liquid side of divergent pipe only)

## 5. ELECTRICAL WIRING



ODU electrical control system connection diagram

Fig. 5-1



### CAUTION

- Please select power source for indoor unit and outdoor unit respectively
- The power supply has specified branch circuit with leakage protector and manual switch.
- The outdoor unit model which corresponding to different outdoor unit power supply should refer to the nameplate.(Please set all the

indoor unit power of one system into the same branch circuit.)

- Please put the connective wire system between indoor unit and outdoor unit with the refrigerant system together.
- Use 3-core shielded wire as indoor unit and outdoor unit signal wire.
- The installation should comply with local electric standard.
- Power wiring should be engaged by specialized electrician.

### 5.1 Outdoor Unit Wiring

#### ■ The Specification of Power

Table 5-1

| Power Source |              | 220-240V~ 1Ph 50Hz |           |           |           |           |
|--------------|--------------|--------------------|-----------|-----------|-----------|-----------|
| Model        | Capacity(kW) | 8                  | 10        | 12        | 14        | 16        |
| Power Supply | Hz           | 50                 | 50        | 50        | 50        | 50        |
|              | Voltage      | 220-240            | 220-240   | 220-240   | 220-240   | 220-240   |
|              | Min.(V)      | 198                | 198       | 198       | 198       | 198       |
|              | Max.(V)      | 264                | 264       | 264       | 264       | 264       |
|              | MCA          | 21.25              | 28.75     | 35        | 40        | 40        |
|              | TOCA         | 18.1A              | 24A       | 29A       | 33A       | 33A       |
|              | MFA          | 25                 | 32        | 40        | 40        | 40        |
| Compressor   | MSC          | Soft start         | Soft star | Soft star | Soft star | Soft star |
|              | RLA          | 9.45               | 9.45      | 15.5      | 15.5      | 15.5      |
| OFM          | kW           | 0.08               | 0.17      | 0.17      | 0.17      | 0.17      |
|              | FLA          | 1.0                | 1.52      | 1.52      | 1.52      | 1.52      |



### CAUTION

Equipment complying with IEC 61000-3-12.  
A disconnection device having an air gap contact separation in all active conductors should be incorporated in the fixed wiring according to the National Wiring Regulation.



### CAUTION

The reserved function is indicated in broken line table,users can select it when necessary.

#### Indoor/Outdoor Unit Signal Wire

Connect the wire according to their numbers.

Wrong connection may cause malfunction .

#### Wiring Connection

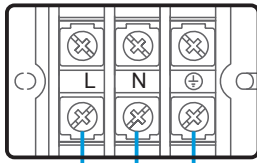
Seal the wiring connection with the insulation material , or the condensing dew will be caused.



## NOTE

The air-conditioners can connect with Central Control Monitor (CCM). Before operation, please wiring correctly and set system address and network address of indoor units

### ■ Wiring Terminal Description



ODU power supply  
220V~240V 50Hz

Fig. 5-2

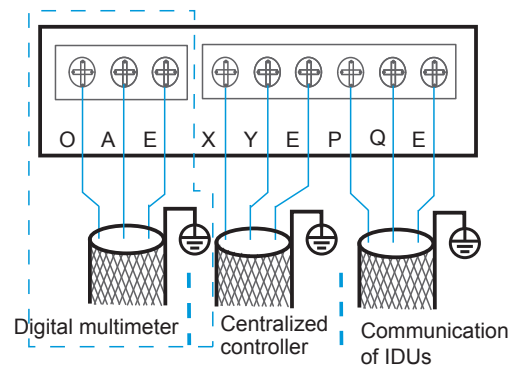


Fig. 5-3



## CAUTION

Only the dedicated meter of Systemair can be used on the unit. For the wiring method of the meter, please consult Systemair's professional service personnel.

No digital multimeter interface for 8kW; and reserved digital multimeter interface for 10kW, 12kW, 14kW and 16kW.

The arrangement of OAE, XYE and PQE depends on the unit

### ■ Wiring Terminal Description

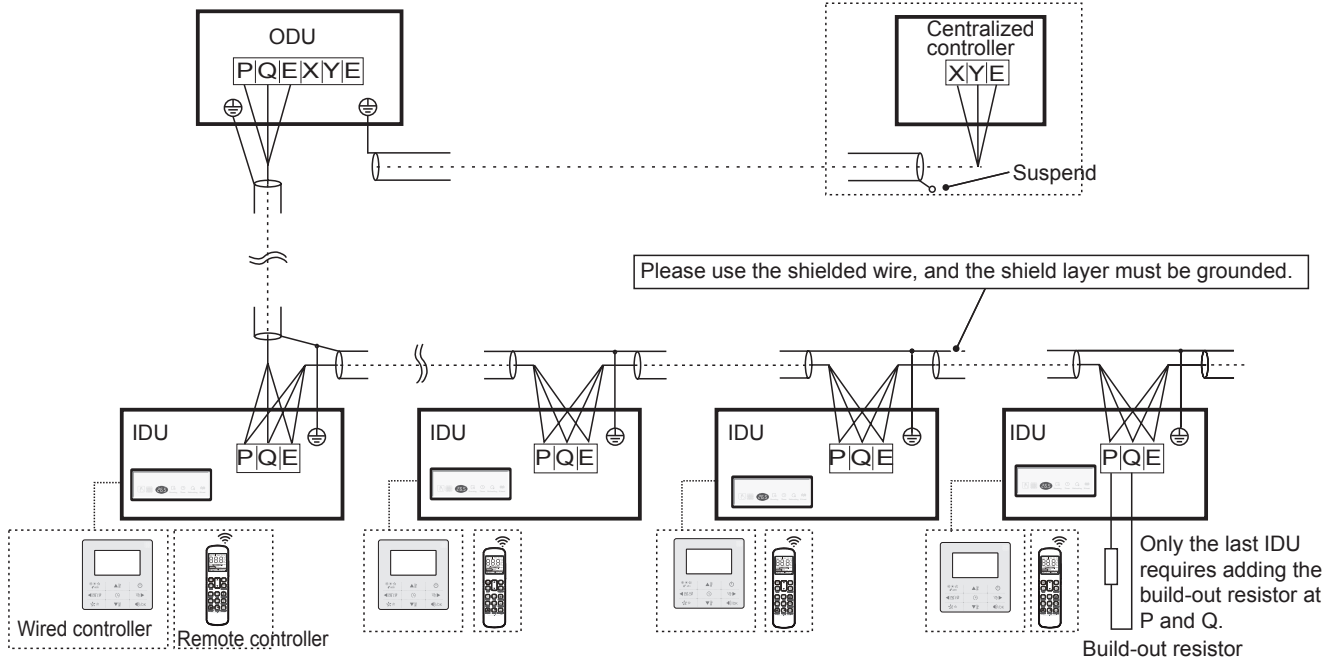


Fig. 5-4

## CAUTION

- When the power cable is parallel to the signal wire, make sure that they are enclosed in respective conduits and are kept a reasonable wire spacing. (Distance between power cables: less than 10A-300mm; less than 50A-500mm)
- The three-core shielded cable is used as the signal cables of the IDUs and ODU, and the shield layer must be grounded as required.
- The display box and build-out resistor are IDU accessories. The remote controller, centralized controller and wired controller are optional accessories. If necessary, contact the local distributor for purchase. (Note: The BP3 series IDUs provide standard remote controllers.)

## 5.2 Indoor Unit Wiring

### ● Power Supply

Table 5-2

| Capacity(kW)   |                       | 1.8~16                           |
|--|-----------------------|----------------------------------|
| Indoor Unit Power  | Phase                 | 1-Phase                          |
|  | Voltage and Frequency | 220-240V~ 50Hz                   |
|  | Power Wiring Size     | Refer to Table 5-3 for wire size |
| Circuit Breaker (A)  |                       | 16                               |
| Indoor Unit /Outdoor Unit Signal Wire (mm <sup>2</sup> )<br>(Weak electric signal) |                       | 3-core shielded wire<br>3X0.75   |

### 5.2.2 Safety device requirements

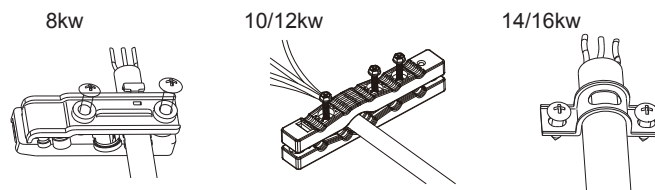
1. Select the wire diameters( minimum value) individually for each unit based on the table 5-1 and table 5-2, where the rated current in table 5-1 means MCA in table 5-3. In case the MCA exceeds 40A, the wire diameters should be selected according to the national wiring regulation.
2. Maximum allowable voltage range variation between phases is 2%.
3. Select circuit breaker that having a contact separation in all poles not less than 3 mm providing full disconnection, where MFA is used to select the current circuit breakers and residual current operation breakers:

Table 5-3

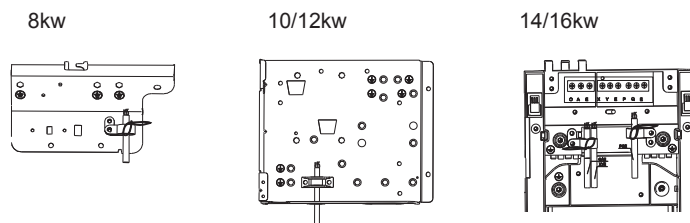
| Rated current of appliance(A) | Nominal cross-sectional area (mm <sup>2</sup> ) |                        |
|-------------------------------|---|------------------------|
|                               | Flexible cords                                  | Cable for fixed wiring |
| ≤3                            | 0.5 and 0.75                                    | 1 to 2.5               |
| >3 and ≤6                     | 0.75 and 1                                      | 1 to 2.5               |
| >6 and ≤10                    | 1 and 1.5                                       | 1 to 2.5               |
| >10 and ≤16                   | 1.5 and 2.5                                     | 1.5 to 4               |
| >16 and ≤25                   | 2.5 and 4                                       | 2.5 to 6               |
| >25 and ≤32                   | 4 and 6   | 4 to 10                |
| >32 and ≤50                   | 6 and 10  | 6 to 16                |
| >50 and ≤63                   | 10 and 16                                       | 10 to 25               |

### 5.2.3 The method of fixing the power cord and signal line:

#### 1.The method of fixing the power cord :



#### 2.The method of fixing the signal wire :



The fixed mode of signal wire 8kw and 14/16kw is shown in the figure. The signal wire goes through the wire clamp, and the cable is tightly tied to the clamp with a belt to prevent the signal wire from moving up and down.

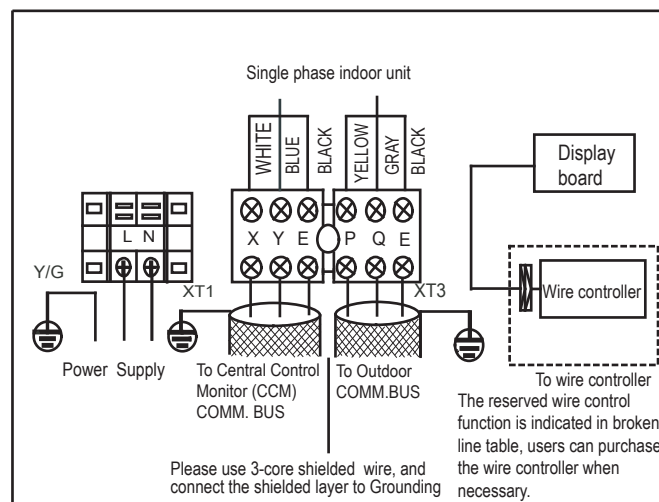


Fig. 5-5

1. Signal wire is 3-core, polarized wire. Use 3-core shield wire to prevent interference. The grounding method now is grounding the closed end of the shield wire and opening (insulating) at the end. Shield is to be grounded.
2. The control between outdoor unit and indoor unit is BUS type. Addresses is set on field during the installation.



## CAUTION

Indoor/Outdoor unit signal wire is low voltage circuit. Do not let it touch the high voltage power wire and put it to gather with power cord in the same wire distribution pipe.



## NOTE

The wire diameter and continuous length is under the condition that the voltage vibration is within 2%. If the continuous length is exceed showing value, choose the wire diameter follow relevant regulation.

### Indoor unit power supply wiring

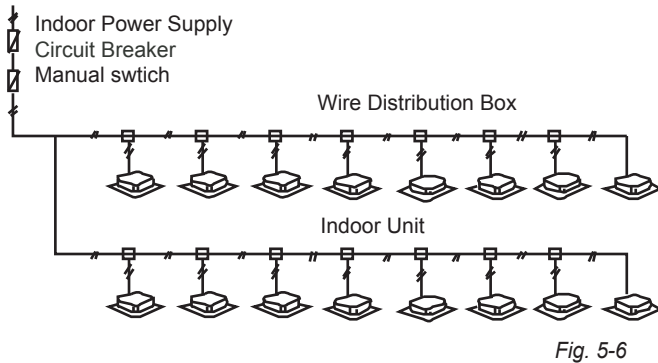


Fig. 5-6



## CAUTION

1. Refrigerant piping system, indoor unit-indoor unit connection signal wires and indoor unit-outdoor unit connection signal wire are in the same system.
2. When power cord is parallel with signal wire, please put them into separate wire distribution pipes, and leave a proper distance. (Reference distance: It is 300mm when current capacity of power cord is less than 10A, or 500mm when 50A).

- Please use shield wire as indoor unit/outdoor unit signal wire.

### Indoor/Outdoor unit signal wire wiring

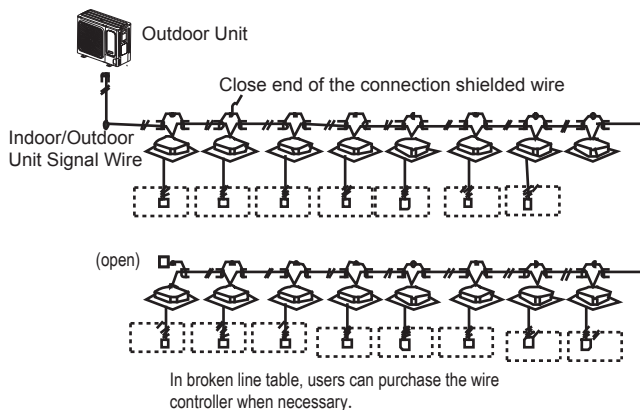


Fig. 5-7

## 6. TEST RUNNING

Operate according to "gist for test running" on the electric control box cover.

## CAUTION

- Test running can not start until the outdoor unit has been connected to the power for 12hr.
- Test running can not start until all the valves are affirmed open.
- Never make the forced running. (Or the protector sits back, danger will occur.)

## 7. PRECAUTIONS ON REFRIGERANT LEAKAGE

This air conditioner(A/C) adopts innocuous and nonflammable refrigerant. The locating room of the A/C should big enough that any refrigerant leakage is unable to reach critical thickness. So certain essential action can be taken on time.

- Critical thickness-----the Max. thickness of Freon without any harm to person.
- Refrigerant critical thickness: 0.44[kg/m<sup>3</sup>] for R410A.

Confirm the critical thickness through follow steps, and take necessary actions.

1. Calculate the sum of the charge volume (A[kg]) Total Refrigerant volume of 10HP=factory refrigerant volume + superaddition
2. Calculate the indoor cubage (B[m<sup>3</sup>]) (as the minimum cubage.
3. Calculate the refrigerant thickness

$$\frac{A[\text{kg}]}{B[\text{m}^3]} \leq \text{critical thickness}$$

Counter measure against over high thickness

1. Install mechanical ventilator to reduce the refrigerant thickness under critical level. (ventilate regularly)
2. Install leak alarm facility related to mechanical ventilator if you can not regularly ventilate.

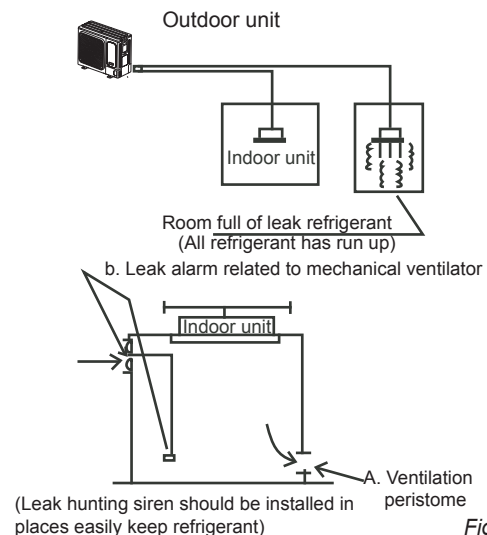


Fig. 7-1





## NOTE

Please press "constraint cool" button to carry out refrigerant recycling process. Keep the low pressure above 0.2MPa, otherwise compressor may be burnt out.

### 7.1 Important information for the used refrigerant

This product has the fluorinated gas, it is forbidden to release to air.

Refrigerant type: R410A; Volume of GWP: 2088;

GWP=Global Warming Potential

| Model | Factory charge |                                   |
|-------|----------------|-----------------------------------|
|       | Refrigerant/kg | tonnes CO <sub>2</sub> equivalent |
| 8kW   | 2.20           | 4.59                              |
| 10kW  | 2.35           | 4.91                              |
| 12kW  | 3.00           | 6.26                              |
| 14kW  | 3.40           | 7.10                              |
| 16kW  | 3.80           | 7.93                              |

#### Attention:

##### Frequency of Refrigerant Leak Checks

- 1) For equipment that contains fluorinated greenhouse gases in quantities of 5 tonnes of CO<sub>2</sub> equivalent or more, but of less than 50 tonnes of CO<sub>2</sub> equipment, at least every 12 months, or where a leakage detection system is installed, at least every 24 months.
- 2) For equipment that contains fluorinated greenhouse gases in quantities of 50 tonnes of CO<sub>2</sub> equivalent or more, but of less than 500 tonnes of CO<sub>2</sub> equipment, at least every six months, or where a leakage detection system is installed, at least every 12 months.
- 3) For equipment that contains fluorinated greenhouse gases in quantities of 500 tonnes of CO<sub>2</sub> equivalent or more, at least every three months, or where a leakage detection system is installed, at least every six months.
- 4) Non-hermetically sealed equipment charged with fluorinated greenhouse gases shall only be sold to the end user where evidence is provided that the installation is to be carried out by an undertaking certified person.
- 5) Only certificated person is allowed to do installation, operation and maintenance.

## 8. TURN OVER TO CUSTOMER

The owner's manual of indoor unit and owner's manual of outdoor unit must be turned over to the customer. Explain the contents in the owner's manual to the customers in details.

## 8.1 Information requirements for air-to-air conditioners

### Cooling mode:

| Information requirements for air-to-air conditioners  |               |       |                                     |  |  |              |       |                   |
|---|---------------|-------|-------------------------------------|--|--|--------------|-------|-------------------|
| Model(s): SYSVRF 120 AIR EVO C HP Q;<br>Test matching indoor units form, non-duct: SYSVRF CASSETTE 36 Q + 3× SYSVRF CASSETTE 28 Q*  |               |       |                                     |  |  |              |       |                   |
| Outdoor side heat exchanger of air conditioner:air  |               |       |                                     |  |  |              |       |                   |
| Indoor side heat exchanger of air conditioner:air   |               |       |                                     |  |  |              |       |                   |
| Type:compressor driven  |               |       |                                     |  |  |              |       |                   |
| If applicable:driver of compressor:electric motor   |               |       |                                     |  |  |              |       |                   |
| Item  | Symbol        | Value | Unit                                |  | Item   | Symbol       | Value | Unit              |
| Rated cooling capacity  | $P_{rated,c}$ | 12.22 | kW                                  |  | Seasonal space cooling energy efficiency   | $\eta_{s,c}$ | 230.6 | %                 |
| Declared cooling capacity for part load at given outdoor temperatures $T_j$ and indoor 27/19°C (dry/wet bulb)   |               |       |                                     |  | Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for part load at given outdoor temperatures $T_j$ |              |       |                   |
| $T_j=+35^\circ\text{C}$   | $P_{dc}$      | 12.22 | kW                                  |  | $T_j=+35^\circ\text{C}$  | $EER_d$      | 2.83  | -                 |
| $T_j=+30^\circ\text{C}$   | $P_{dc}$      | 9.10  | kW                                  |  | $T_j=+30^\circ\text{C}$  | $EER_d$      | 4.98  | -                 |
| $T_j=+25^\circ\text{C}$   | $P_{dc}$      | 5.94  | kW                                  |  | $T_j=+25^\circ\text{C}$  | $EER_d$      | 8.54  | -                 |
| $T_j=+20^\circ\text{C}$   | $P_{dc}$      | 4.33  | kW                                  |  | $T_j=+20^\circ\text{C}$  | $EER_d$      | 9.06  | -                 |
|   |               |       |                                     |  |  |              |       |                   |
| Degradation co-efficient for air conditioners(*)  | $C_{dc}$      | 0.25  | -                                   |  |  |              |       |                   |
| Power consumption in modes other than "active mode"   |               |       |                                     |  |  |              |       |                   |
| Off mode  | $P_{OFF}$     | 0.017 | kW                                  |  | Crankcase heater mode  | $P_{CK}$     | 0.009 | kW                |
| Thermosat-off mode  | $P_{TO}$      | 0.073 | kW                                  |  | Standby mode   | $P_{SB}$     | 0.017 | kW                |
| Other items   |               |       |                                     |  |  |              |       |                   |
| Capacity control  | variable      |       |                                     |  | For air-to-air air conditioner:air flow rate,outdoor measured  | -            | 5000  | m <sup>3</sup> /h |
| Sound power level,outdoor   | $L_{WA}$      | 70    | d B                                 |  |  |              |       |                   |
| GWP of the refrigerant  |               | 2088  | kg CO <sub>2</sub><br>eq (100years) |  |  |              |       |                   |
| Contact details   |               |       |                                     |  |  |              |       |                   |
| (*)If Cdc is not determined by measurement then the default degradation coefficient of heat pumps shall be 0.25   |               |       |                                     |  |  |              |       |                   |
| Where information relates to multi-split air conditioners,the test result and performance data may be obtained on the basis of performance of the outdoor unit ,with a combination of indoor unit(s) recommended by the manufacturer or importer. |               |       |                                     |  |  |              |       |                   |

**Heating mode:**

| Information requirements for air-to-air conditioners   |               |       |                                    |  |   |              |       |                   |
|--|---------------|-------|------------------------------------|--|---|--------------|-------|-------------------|
| Model(s): SYSVRF 120 AIR EVO C HP Q;<br>Test matching indoor units form, non-duct: SYSVRF CASSETTE 36 Q + 3×SYSVRF CASSETTE 28 Q*  |               |       |                                    |  |   |              |       |                   |
| Outdoor side heat exchanger of air conditioner:air   |               |       |                                    |  |   |              |       |                   |
| Indoor side heat exchanger of air conditioner:air  |               |       |                                    |  |   |              |       |                   |
| Indication if the heater is equipped with a supplementary heater:no  |               |       |                                    |  |   |              |       |                   |
| If applicable:driver of compressor:electric motor  |               |       |                                    |  |   |              |       |                   |
| Parameters shall be declared for the average heating season,parameters for the warmer and colder heating seasons are optional  |               |       |                                    |  |   |              |       |                   |
| Item   | Symbol        | Value | Unit                               |  | Item  | Symbol       | Value | Unit              |
| Rated heating capacity   | $P_{rated,h}$ | 13.96 | kW                                 |  | Seasonal space heating energy efficiency  | $\eta_{s,h}$ | 169.8 | %                 |
| Declared heating capacity for part load at indoor temperature 20°C and outdoor temperatures $T_j$  |               |       |                                    |  | Declared coefficient of performance or gas utilisation efficiency/auxiliary energy factor for part load at given outdoor temperatures $T_j$ |              |       |                   |
| $T_j=-7^{\circ}\text{C}$   | $P_{dh}$      | 7.12  | kW                                 |  | $T_j=-7^{\circ}\text{C}$  | $COP_d$      | 3.01  | -                 |
| $T_j=+2^{\circ}\text{C}$   | $P_{dh}$      | 5.06  | kW                                 |  | $T_j=+2^{\circ}\text{C}$  | $COP_d$      | 3.99  | -                 |
| $T_j=+7^{\circ}\text{C}$   | $P_{dh}$      | 3.34  | kW                                 |  | $T_j=+7^{\circ}\text{C}$  | $COP_d$      | 6.01  | -                 |
| $T_j=+12^{\circ}\text{C}$  | $P_{dh}$      | 3.47  | kW                                 |  | $T_j=+12^{\circ}\text{C}$   | $COP_d$      | 7.34  | -                 |
| $T_{biv}$ =bivalent temperature  | $P_{dh}$      | 7.90  | kW                                 |  | $T_{biv}$ =bivalent temperature   | $COP_d$      | 3.01  | -                 |
| $T_{OL}$ =operation temperature  | $P_{dh}$      | 7.12  | kW                                 |  | $T_{OL}$ =operation temperature   | $COP_d$      | 1.84  | -                 |
| Bivalent temperature   | $T_{biv}$     | -7    | °C                                 |  |   |              |       |                   |
|  |               |       |                                    |  |   |              |       |                   |
| Degradation coefficient for heat pumps(**)   | $C_{dh}$      | 0.25  | -                                  |  |   |              |       |                   |
| Power consumption in modes other than "active mode"  |               |       |                                    |  | Supplementary heater  |              |       |                   |
| Off mode   | $P_{OFF}$     | 0.017 | kW                                 |  | Back-up heating capacity(*)   | $e_{bu}$     | 1.82  | kW                |
| Thermosat-off mode   | $P_{TO}$      | 0.011 | kW                                 |  | Type of energy input  |              |       |                   |
| Crankcase heater mode  | $P_{CK}$      | 0.009 | kW                                 |  | Standby mode  | $P_{SB}$     | 0.017 | kW                |
| Other items  |               |       |                                    |  |   |              |       |                   |
| Capacity control   | variable      |       |                                    |  | For air-to-air heat pump:air flow rate,outdoor measured   | -            | 5000  | m <sup>3</sup> /h |
| Sound power level,outdoor  | $L_{WA}$      | 70    | d B                                |  |   |              |       |                   |
| GWP of the refrigerant   |               | 2088  | kg CO <sub>2</sub><br>eq(100years) |  |   |              |       |                   |
| Contact details  |               |       |                                    |  |   |              |       |                   |
| (*)  |               |       |                                    |  |   |              |       |                   |
| (**)If $C_{dh}$ is not determined by measurement then the default degradation coefficient of heat pumps shall be 0.25  |               |       |                                    |  |   |              |       |                   |
| Where information relates to multi-split heat pumps,the test result and performance data may be obtained on the basis of performance of the outdoor unit ,with a combination of indoor unit(s) recommended by the manufacturer or importer |               |       |                                    |  |   |              |       |                   |

Certified: 

[www.systemair.com](http://www.systemair.com)

16100101A04593 V.H