HEAT CONTROLLER

# INSTALLATION, OPERATION & MAINTENANCE MANUAL

# InverterFlex® Series Multi-Zone Ducted Indoor Unit

B-VFH09DA-1
B-VFH12DA-1
B-VFH18DA-1
B-VFH24DA-1

Heat Controller • 1900 Wellworth Ave. • Jackson, MI 49203 • (517)787-2100 • www.heatcontroller.com

# User Notice

- The total capacity of the indoor units which runs at the same time can not exceed 150% of that of the outdoor units; otherwise, the cooling (heating) effect of each indoor unit would be poor.
- Switch the main power on 8 hours before starting the unit, helpful for a successful startup.
- It is a normal phenomenon that the indoor unit fan will still run for 20~70 seconds after the indoor unit receives the “stop” signal so as to make full use of after-heat for the next operation.
- When the running modes of the indoor and outdoor units conflict,it will be indicated on the display of the wired controller in five seconds and then the indoor unit will stop. In this case, they will return to the normal condition by harmonizing their running modes: The HEAT mode conflict with each of the COOL mode, DRY mode and FAN mode, while the COOL mode, DRY mode and FAN mode are compatible between each other. If the supply power fails when the unit is running, then the indoor unit will send the “start” signal to the outdoor unit three minutes later after power recovery.
- During installation, the communication cable and the power cord must not be twisted together but instead separated with an interval of at least 1”, otherwise the unit is likely to run abnormally.
- This appliance is not intended for use by persons (including children) 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 to ensure that they do not play with the appliance.

This product must not be disposed together with the domestic waste. This product has to be disposed at an authorized place for recycling of electrical and electronic appliances.

**Thank you for selecting this Heat Controller air conditioner.**
**Before use, please read this manual carefully and keep it for further reference.**

# TABLE OF CONTENTS

# 1 Safety Precautions

Please read this manual carefully before using this unit. Operate it correctly according to the guide in this manual.

Please take special attention to the meaning of these two marks:

⚠ **Warning!** It indicates improper operation which will lead to human casualty or severe injury.

⚠ **Note!** It indicates improper operation which will lead to injury or property damage.

## ⚠ Warning!

- The installation should be performed by a qualified service contractor; otherwise it will cause water leakage, electric shock or fire etc.
- Please install the unit on a surface that is strong enough to withstand the weight of the unit; otherwise, the unit could fall and cause injury or death.
- The drain pipe should be installed as instructed in the manual to guarantee the proper drainage; and should be insulated to prevent condensing; otherwise the improper installation could cause water leakage.
- Do not use or place any inflammable, combustible or noxious substance next to the unit
- In case of abnormal operation (like burning smell etc.), please cut off the main power supply of the unit.
- Keep good ventilation in the room to avoid oxygen deficiency.
- Never insert your finger or any other object into the air outlet/inlet grille.
- Never alter the unit and contact the sales agent or the professional installation personnel for the repair or relocation of the unit.

**Electrical disconnects should meet all local and national codes.**

## ⚠ Caution!

- Before installation, please check that the power supply corresponds with the requirement specified on the nameplate.
- Before using the unit, please check that the piping and wiring are correct to avoid water leakage, refrigerant leakage, electric shock, or fire etc.
- The main power supply must be grounded to avoid the hazard of electric shock. Never connect this earth wire to gas pipe, running water pipe, lightening rod or phone cable’s earth lead.
- Do not allow children operate this unit.
- Do not operate this unit with wet hands.
- Cut off the main power supply prior to the cleaning the unit or replacement of the air filter.
- When the unit is not to be used for a long time, please cut off the main power supply to the unit.
- Do not expose this unit to moist or corrosive environments.

# 2 Installation Location and Matters Needing Attention

The installation of the unit must comply with the national and local safety regulations. The installation quality directly affects the normal use, so the user should not carry out the installation personally, instead, the installation and servicing should be done by technician according to this manual. Only after that, can the unit be energized.

## 2.1 Install in a Location

(1). Where there is no direct sunlight.
(2). Where the top hanger, ceiling and the building structure are strong enough to withstand the weight of the unit.
(3). Where the drain pipe can be easily connected to outside.
(4). Where the flow of the air inlet and outlet are not blocked.
(5). Where the refrigerant pipe of the indoor unit can be easily led to outside.
(6). Where there is no inflammable, explosive substances or their leakage.
(7). Where there is no corrosive gas, heavy dust, salt mist, smog or moisture.

## ⚠ Caution!

A unit which is installed in the following places is likely to run abnormally.

① Where there is oil or gas;
② Alkaline soil off the sea;
③ Where there is sulfur gas(like sulfur hot spring);
④ Where there are devices with high frequency (like wireless devices, electric welding devices, or medical equipment);
⑤ Special circumstances.

## 2.2 Electric Wiring

(1). The installation must be done in accordance with the local and national wiring regulations.
(2). Only a power cord with the rated voltage and exclusive circuit for the air conditioning can be used.
(3). Do not pull the power cord by force.
(4). The electric installation should be carried out by a qualified technician as instructed by the local laws, regulations and also this manual.
(5). The diameter of the power cord should be large enough to meet unit requirements.
(6). Grounding should be reliable and the earth wire should be connected to the dedicated device of the building by the technician. Use appropriately sized disconnect with fusing.

## 2.3 Grounding Requirements

(1). The air conditioner is a Class I appliance, so its grounding must be reliable.
(2). The yellow-green line of the air conditioner is the earth line and can not be used for other purpose, cut off or fixed by the tapping screw; otherwise it would cause a electric shock hazard.
(3). A reliable earth terminal should be provided and the earth wire can not be connected to any of the following places.

① Running water pipe;
② Gas pipe;
③ Sewage pipe;
④ Other places the technician might consider unreliable.

## 2.4 Accessories for Installation

Refer to the packing list for the accessories of the indoor and outdoor units respectively.

# 3 Installation Instructions

## 3.1 Outline Dimension Drawings of the Indoor Unit

**Note:** The unit in the following figures is inches, unless otherwise specified.

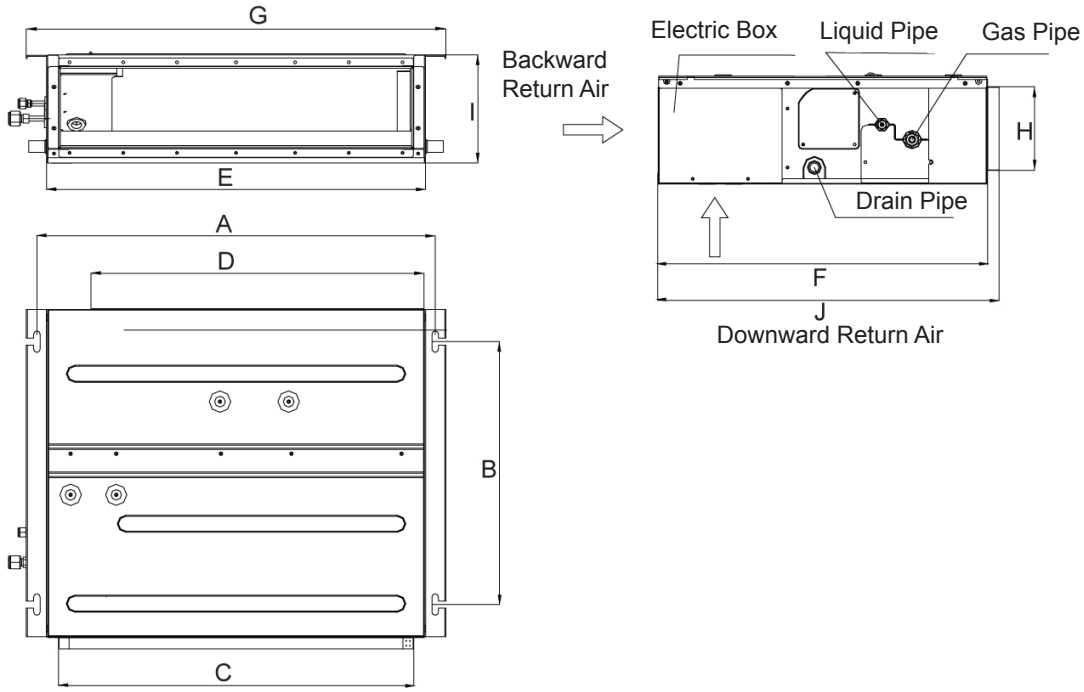
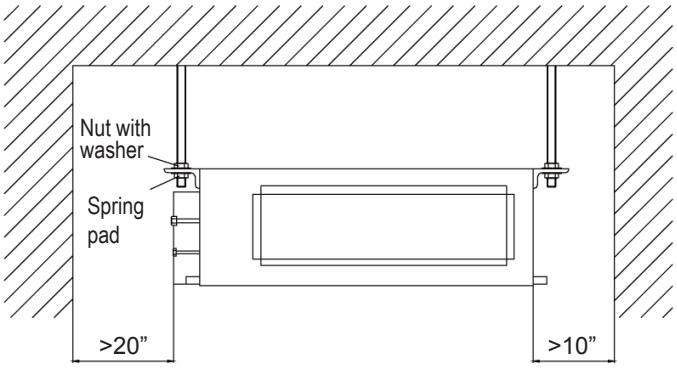



**Fig. 1**

Table 1: Outline Dimensions

| Model \ Item | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| B-VFH09DA-1 | 29.21 | 19.33 | 26 | 24.5 | 27.6 | 24.2 | 30.8 | 6.1 | 7.9 | 25 |
| B-VFH12DA-1 | | | | | | | | | | |
| B-VFH18DA-1 | 37 | 19.33 | 34 | 32.3 | 35.43 | 24.2 | 38.7 | 6.1 | 7.9 | 25 |
| B-VFH21DA-1 | | | | | | | | | | |
| B-VFH24DA-1 | 45 | 19.33 | 41.8 | 40.2 | 43.3 | 24.2 | 46.5 | 6.1 | 7.9 | 25 |

## 3.2 Dimension Requirements on the Installation Space of the Indoor Unit



## 3.3 Installation of the Indoor Unit

(1). Requirements for the Installation Location

1) Ensure the hanger is strong enough to withstand the weight of the unit.
2) The drainage pipe is easy for connection.
3) No obstacle is in the inlet/outlet and the air circulation is in good condition.
4) Ensure the installation space shown in Fig. 2 is left for the access to maintenance.
5) The unit should be far away from any heat source, leakage of flammable, or explosive substances.
6) It is the ceiling type unit (concealed in the ceiling).
7) The power cords and connection lines of the indoor and outdoor units must be at least 40” away from the TV set or radio to avoid the image interference and noise ( even if 40” is kept, noise may be produced due to the strong electromagnetic wave).

(2). Installation of the Indoor Unit

Insert the M10 expansion bolt into the hole, and then knock the nail into the bolt. Refer to the Outline Dimension Drawings of the Indoor Unit for the distance between holes and see Fig. 3 for the installation of the expansion bolt.

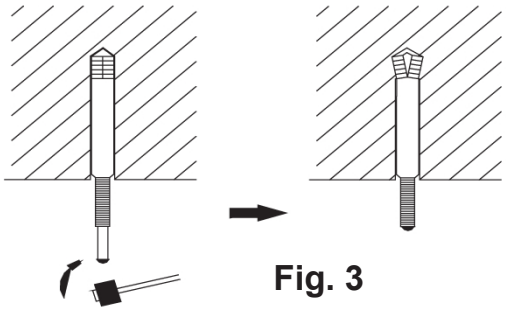


Fig. 3

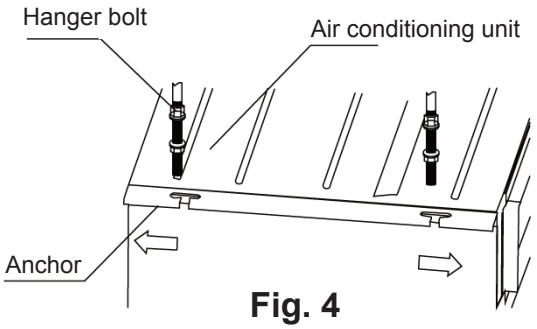



Fig. 4

Install the hanger on the indoor unit, as shown in Fig. 4.
Install the indoor unit on the ceiling, as shown in Fig. 5.

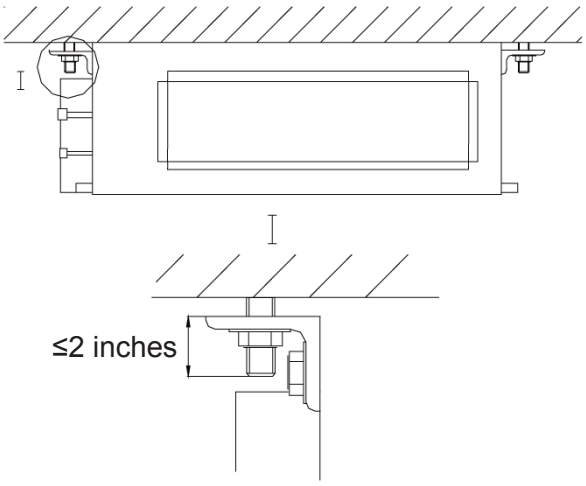



Fig. 5

## ⚠ Caution!

① Prior to the installation, please make a good preparation for all piping (refrigerant pipe, drain pipe) and wiring (wires of the wired controller, wires between the indoor and outdoor unit) of the indoor unit to make the further installation much easier.

② If there is an opening in the ceiling, it is better to reinforce it to keep it flat and prevent it from vibrating. Consult the user and builder for more details.

③ If the strength of the ceiling is not strong enough, a beam made of angle iron can be used and then fix the unit on it.

④ If the indoor unit is not installed in the air conditioned area, please use insulation around the unit to prevent condensing. The thickness of the insulation depends on the actual installation environment.

## 3.4 Horizontally Check of the Indoor Unit

After the installation of the indoor unit, its incline must be checked to make sure the unit is level front to back and keeps an incline of 5° toward the drain pipe right to left, as shown in Fig. 6.

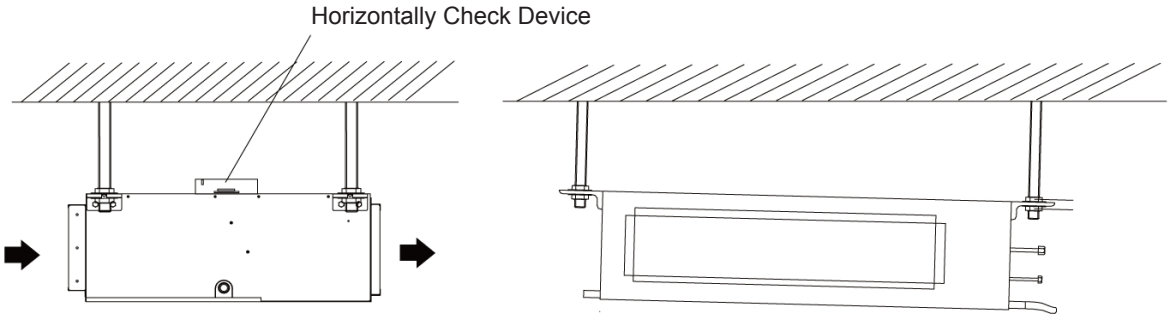



**Fig. 6**

## 3.5 Installation of the Air Supply Duct

(1). Installation of the Rectangular Air Supply Duct

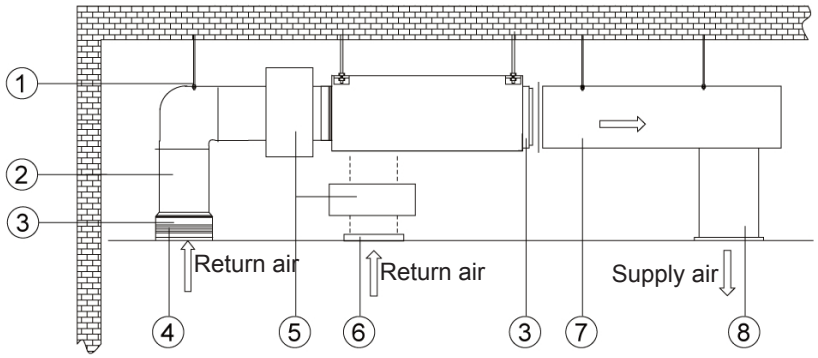



**Fig. 7**

Table 2

| No. | Name | No. | Name |
|---|---|---|---|
| 1 | Hanger | 5 | Plenum Box |
| 2 | Return Air Duct | 6 | Filter Screen |
| 3 | Canvas Connector | 7 | Main Air Supply Duct |
| 4 | Return Air Inlet | 8 | Air Supply Outlet |

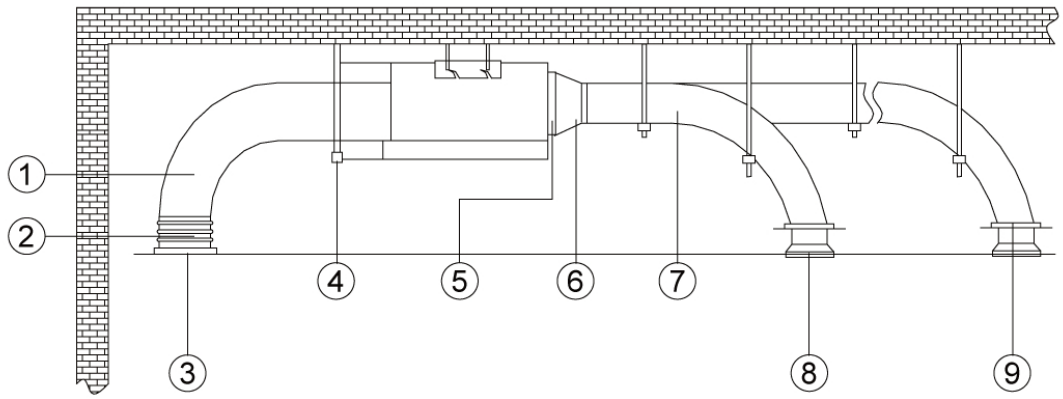



**Fig. 8**

Table 3

| No. | Name | No. | Name |
|---|---|---|---|
| 1 | Return Air Duct | 6 | Transition Duct |
| 2 | Canvas Duct | 7 | Air Supply Duct |
| 3 | Return Air Louver | 8 | Diffuser |
| 4 | Hanger | 9 | Diffuser Joint |
| 5 | Air Supply Outlet | | |

## (3). Installation Steps of the Round Air Supply Duct

1). Pre-install the outlet of the round duct on the transition duct and then fix it by the tapping screw.
2). Place the transition duct to the air outlet of the unit and fix it with rivet
3). Connect the outlet to the duct and then tighten them with tape.
Other installation details are not covered herein.

### ⚠ Caution!

① The maximum length of the duct means the maximum length of the air supply duct plus the maximum length of the return air duct.

② For the unit with the auxiliary electric heating function, if the round duct is to be used, then the straight length of the transition duct can not be less than 8 inches.

③ The duct connection is rectangular and connects with the air inlet/outlet of the indoor unit. Among all air supply outlets, at least one should be kept open. Round duct, it used needs a transition duct sized to match the air supply outlet of the unit. Maintain a minimum separation between the duct transition and diffuser of 6 ft.

## 3.6 Drawings of the Air Supply Outlet and Return Air Inlet

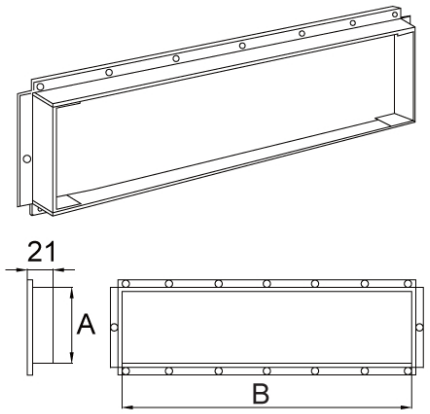



Fig. 9 Air Supply Outlet

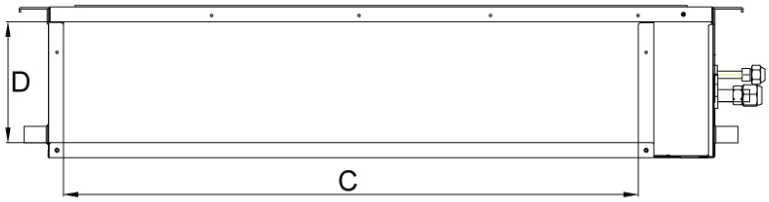



Fig. 10 Air Supply Inlet

Table 4 Dimensions of the Air Supply Outlet and Return Air Inlet (unit inches)

| Model \ Item | A | B | C | D |
|---|---|---|---|---|
| B-VFH09DA-1 | 6.14” | 2.6” | 23” | 6.5” |
| B-VFH12DA-1 | | | | |
| B-VFH18DA-1 | 6.14” | 34” | 30.75” | 6.5” |
| B-VFH21DA-1 | 6.14” | 42” | 38.5” | 6.5” |
| B-VFH24DA-1 | | | | |

## 3.7 Installation of the Return Air Duct

(1). The default installation location of the rectangular flange is in the back and the return air cover plate is in the bottom, as shown in Fig. 11.

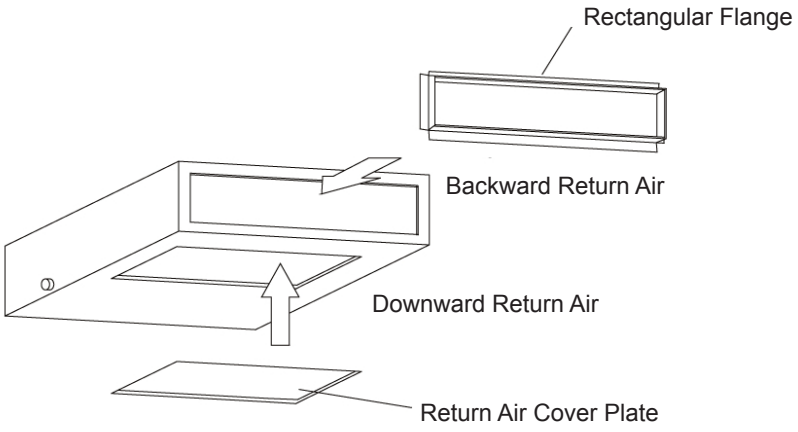



Fig. 11

(2). If the bottom return air is desired, just change the position of the rectangular flange and the return air cover plate.

(3). Connect one end of the return air duct to the return air outlet of the unit by rivets or screws, and the other to the return air louver. For the sake of the convenience to freely adjust the height, a canvas connector will be helpful.

(4). More noise is likely to be produced in the downward return air mode than the backward return air mode, so it is suggested to install a muffler and a plenum box to minimize the noise.

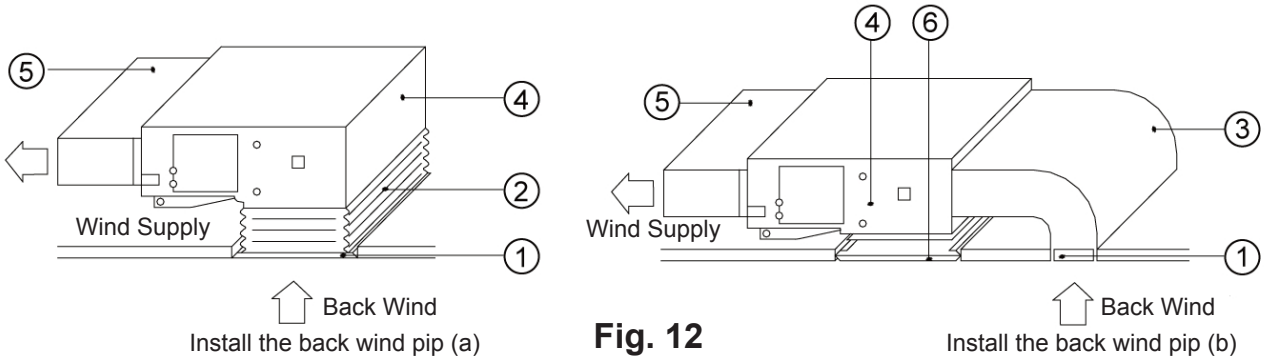



**Fig. 12**

Table 12

| No. | Name | No. | Name |
|---|---|---|---|
| 1 | Return Air Louver (with the filter screen) | 4 | Indoor Unit |
| 2 | Canvas Connector | 5 | Air Supply Duct |
| 3 | Return Air Duct | 6 | Access Grille |

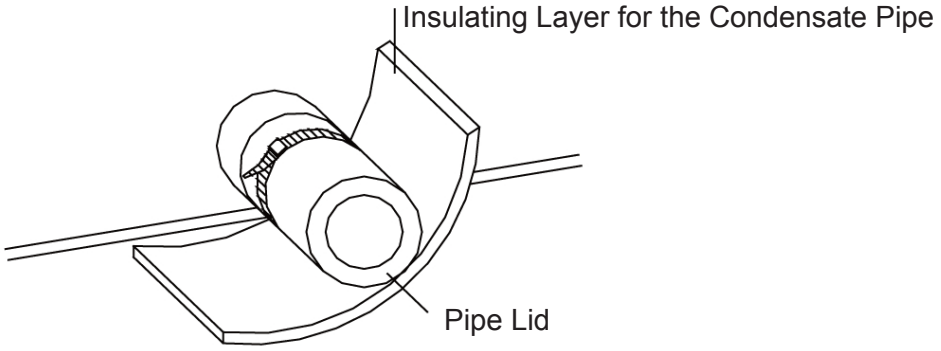



**Fig. 13 Thermal Insulation of the Condensate Pipe**

## 3.8 Installation of the Condensate Pipe

(1). The condensate pipe should keep a incline angle of 5~10°, which can facilitate the drainage of the condensate water. The joints of the condensate pipe should be insulated by the insulation material to prevent condensing (see Fig. 13).
(2). There is a condensate outlet on both left and right sides of the unit. Once one is confirmed to be used, the other should be clogged by a rubber plug, bundled by the binding wire and insulated by the insulation material to avoid water leakage.
(3). The right outlet is defaulted to be clogged with a plug.

## 3.9 Design of the Drain Pipe

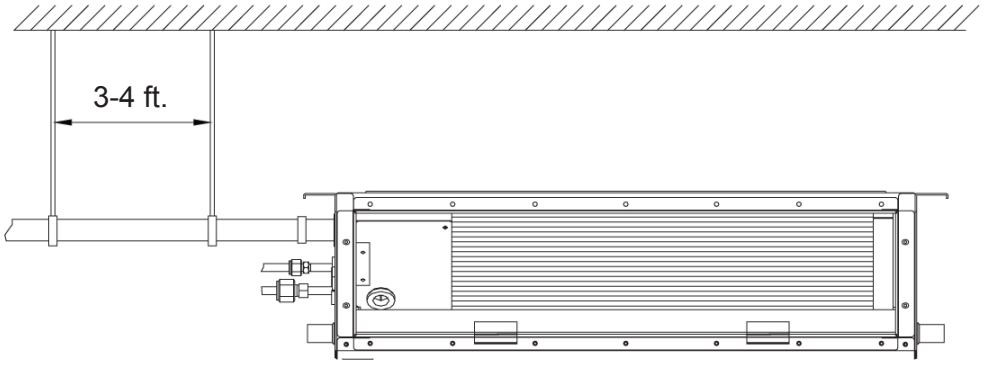
(1). The drain pipe should always keep an inclination angle(1/50~1/100) to avoid the water gathering in some certain place.
(2). During the connection of the drain pipe and device, do not impose too much force on the pipe on one side of the device and the pipe should be suspended close to the device.
(3). The drain pipe can be the ordinary hard PVC pipe which can be purchased locally. During the connection, inset the end of the PVC pipe to the drain outlet, then tighten it with the drain hose and binding wire but never connect the drain outlet and the drain hose by adhesive.

## 3.10 Installation of the Drain Pipe

(1). The diameter of the drain pipe should be larger than or equal to that of the refrigerant pipe (PVC pipe, outer diameter: 1”, wall thickness ≥-.06”.

(2). The drain pipe should be as short as possible and with at least a 1/100 degree of slope to avoid forming air pockets.

(3). A distance 3-4 ft. should be kept between the hangers to avoid the drain hose making a trap.




(Right) with a min. degree of slope 1/100

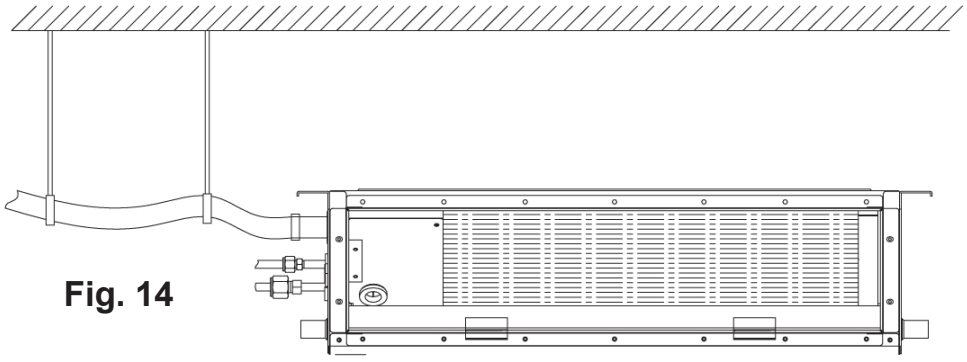


**Fig. 14**

(Wrong)

(5). Insert the drain hose into the drain hole and tighten it with clamps.
(6). Wrap the clamps with large amount of insulation.
(7). The drain hose inside the room also should be insulated.

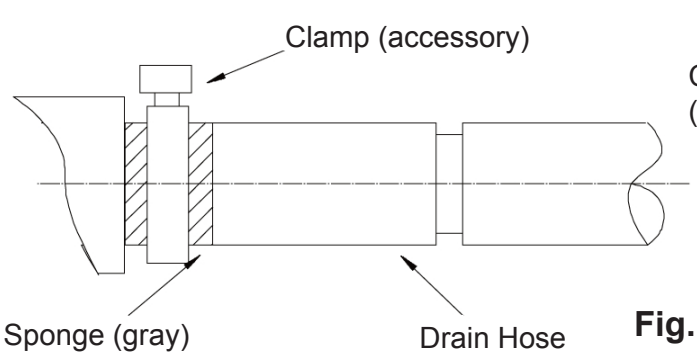
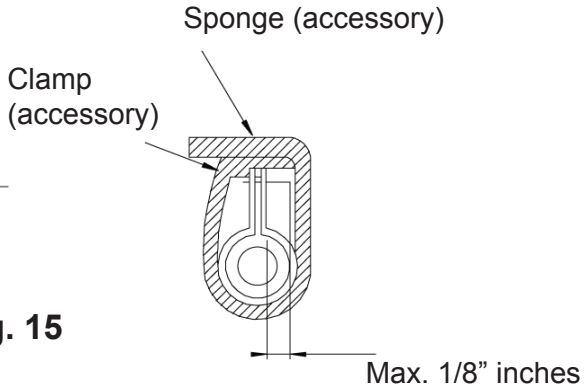



**Fig. 15**



## 3.11 Precautions for the Lift Pipe

The installation height of the lift pipe should be less than 31”. It is recommended to set an inclination angle 1°~2° for the lift pipe toward the drainage direction.

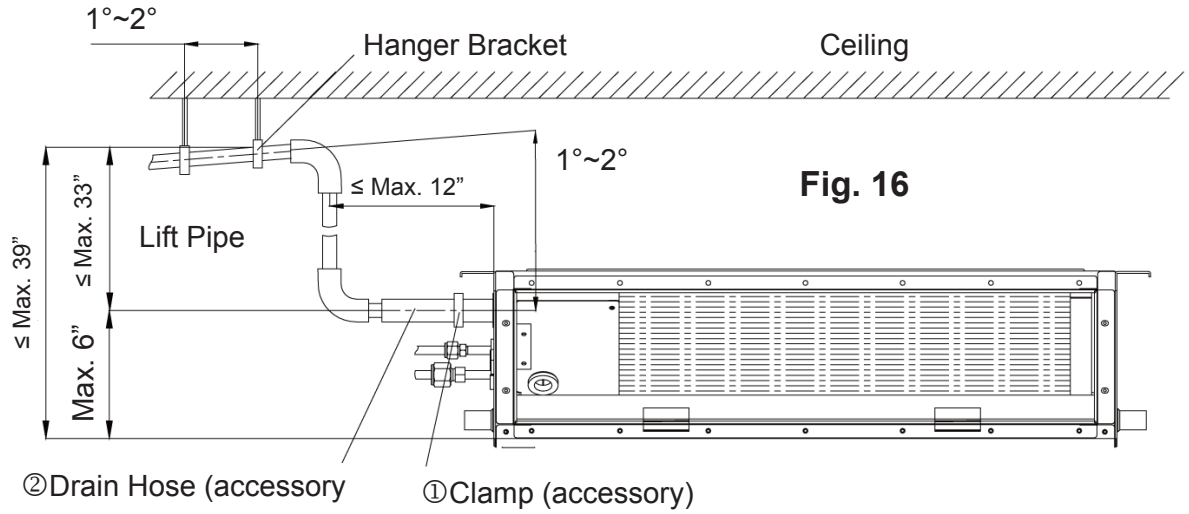
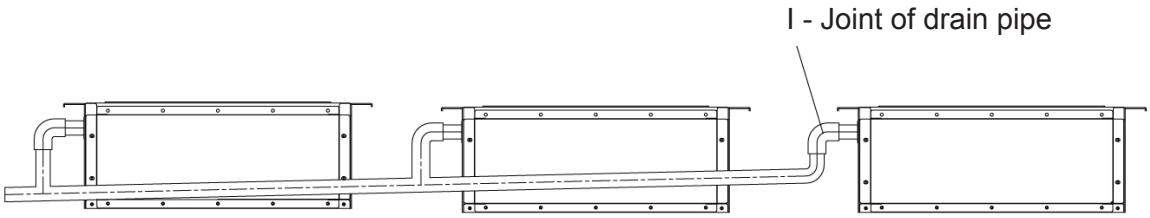



**Fig. 16**

### Notes

① The inclination height of the drain hose should be within 3” so that the outlet of the drain hose does not suffer the external force.

② If multiple drain pipes converge, please follow the installation steps below.




The specification of the joint of the drain pipe should be suitable to the running capacity of the unit.

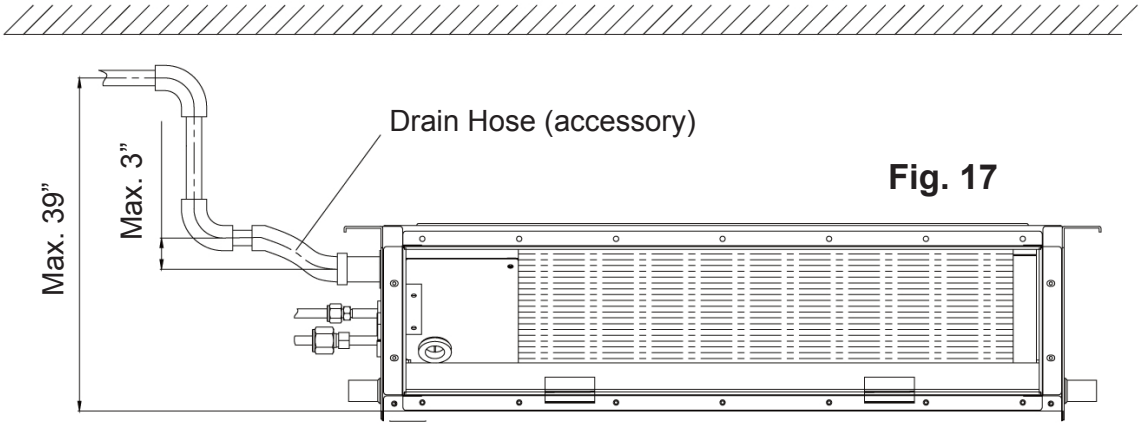



**Fig. 17**

## 3.12 Test for the Drainage System

(1). After the electric installation, please test the drainage system.

(2). During the test, check that water flows through the pipe correctly and observe the joints for leaks. If this unit is installed in the newly built house, it is suggested to take this test prior to the ceiling decoration.

## 3.13 Piping

(1). Let the flare end of the copper pipe point at the screw and then tighten the screw by hand.
(2). The bending degree of the pipe can not be too small; otherwise it will crack. And please use a pipe tube bender to bend the pipe.
(3). Wrap the exposed refrigerant pipe and joints with insulation and then tighten them with the plastic tape.

## ⚠ Caution!

① During the connection of the indoor unit and the refrigerant pipe, never pull any joints of the indoor unit by force; otherwise the capillary pipe or other pipe may crack, which then would result in leakage.

② The refrigerant pipe should be supported by brackets.
If the specification of the outdoor unit pipe joint does not conform to that of the indoor unit, then the joint specification of the outlet pipe of the indoor unit takes precedence. A reducing nipple shall be installed at the joint of the outdoor unit so as to make the joint of the outdoor unit compatible with that of the indoor unit.

## 3.14 Insulation for the Refrigerant Pipe

(1). The refrigerant pipe should be insulated by insulating material and plastic tape in order to prevent condensation and water leakage.

(2). The joints of the indoor unit should be wrapped with the insulating material and no gap is allowed on the joint of the indoor unit, as shown in Fig. 18.

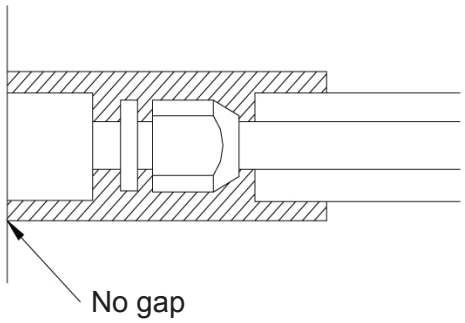



**Fig. 18**

1). Bundle the refrigerant pipe and electric wire together with tape, and separate them from the drain pipe to prevent the condensate water overflowing.
2). Wrap the pipe from the bottom of the outdoor unit to the top of the pipe where it enters the wall. During the wrapping, the latter circle should cover half of the former one.
3). Fix the wrapped pipe on the wall with clamps.

## ⚠ Caution!

① Do not wrap the pipe too tightly; otherwise the insulation effect would be weakened. Additionally, make sure the drain hose is separated from the pipe.
② After that, fill the hole in the wall with sealing material to prevent wind and rain coming into the room.

## 3.15 Wiring between the Wire and the Wiring Terminal

(1). Wiring of the Single-Core Wire
1). Strip the insulating layer at the end of the wire about 1” off with a wire striper.
2). Loosen the screw off on the wiring board of the air conditioning unit.
3). Shape with the pliers at the end of the wire to a circle matching with the size of the screw.
4). Let the screw go through the circle of the wire and then fix it on the wiring board
(2). Wiring of the Multi-Core Wire
1). Strip the outer layer at the end of the wire about 4” off with a wire striper.
2). Loosen the screw off on the wiring board of the air conditioning unit.
3). Fix a wiring terminal matching with the size of the screw to the end of the multi-core wire with the crimpers.
4). Let the screw go through the terminal of the multi-core wire and then fix it to the wiring board.

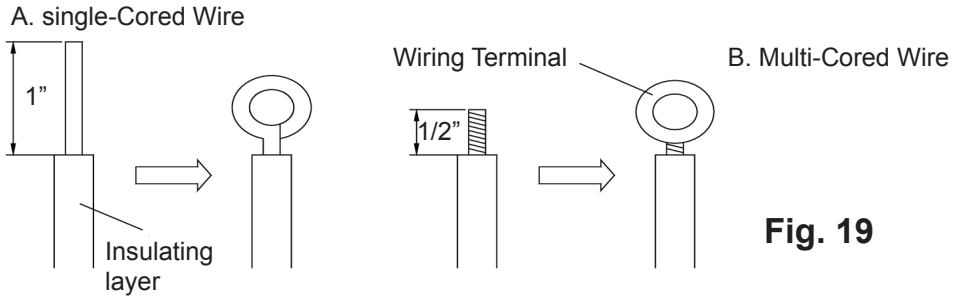



**Fig. 19**

## ⚠ Warning!

① If the power cord or the signal line is damaged, they must be replaced.
② Prior to the wiring, please check the voltage marked on the nameplate and then carry out the wiring following the wiring diagram.
③ A dedicated power cord must be used for the air conditioning unit and the electrical leakage protection switch and air switch must be installed in case of the overload condition.
④ The air conditioning unit must be grounded.
⑤ During the wiring, the wiring terminal or the single-core wire must be used; the direct wiring between the multi-core wire and wiring board would cause fire.
⑥ All wiring should be done strictly in accordance with the wiring diagram; otherwise the improper wiring would cause the air conditioning unit running abnormally or damaged.
⑦ Do not let the electric wires touch the refrigerant pipe, the compressor, the fan or other moving parts.
⑧ Do not modify the wiring inside the indoor unit; otherwise the manufacturer will not assume any responsibility for the damage or abnormal running of the unit.

## 3.16 Wiring of the Power Cord (single-phase)

## ⚠ Caution!

**The power supply for each indoor unit must be uniform.**

① Dismantle the cover of the electric box of the indoor unit.
② Let the power cord go through the rubber ring.
③ Put the 4-core cable through the hole of the chassis and the bottom of the appliance upward, and then connect the power line and the communication line from the outdoor unit to the corresponding terminals N(1), 2, 3 , and grounding terminal of the indoor unit. Wiring shall be done as per the wiring diagram. (Note: Be sure the wire terminals A/B/C/D and piping joints A/B/C/D of the indoor unit match with that of the outdoor unit respectively).
④ Fix the power cord tightly with the binding wire clamp.

**A-VFH30QA-1**

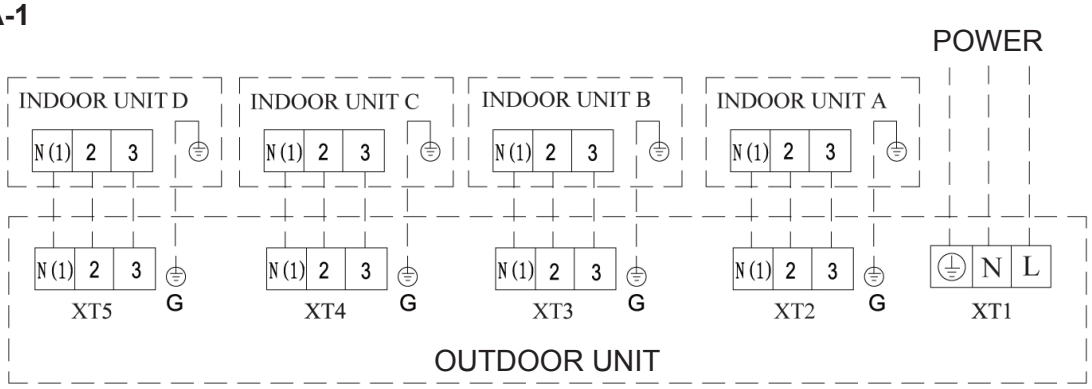



**Fig. 20**

**A-VFH42PA-1**

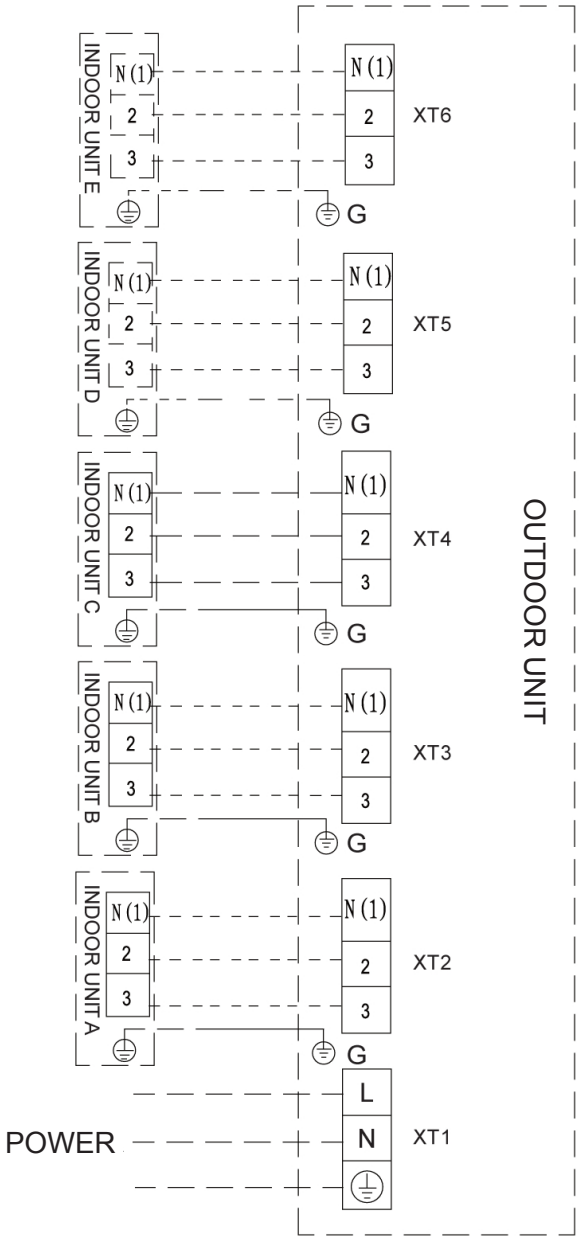



**Fig. 21**

## 3.17 Wiring of the Signal Line of the Wired Controller

(1). Open the cover of the electric box of the indoor unit.
(2). Let the signal line go through the rubber ring.
(3). Insert the signal line to the four-pin socket on the printed circuit board of the indoor unit.
(4). Fix the signal line with the binding wire.

## 3.18 Electric Installation

Table 7

| Indoor Unit | | Power Supply | Running Current (A) | Input Power (W) | | Recommended Power Cord (Selectional Area× Pieces) |
|---|---|---|---|---|---|---|
| Type | Model | | Indoor Fan Motor | Cooling | Heating | |
| Cooling and Heating | B-VFH09DA-1 | 208/230V~60Hz | 0.406 | 75 | 575 | AWG18×4 |
| | B-VFH12DA-1 | 208/230V~60Hz | 0.348 | 65 | 865 | AWG18×4 |
| | B-VFH18DA-1 | 208/230V~60Hz | 0.428 | 80 | 1080 | AWG18×4 |
| | B-VFH21DA-1 | 208/230V~60Hz | 0.588 | 110 | 1610 | AWG18×4 |
| | B-VFH24DA-1 | 208/230V~60Hz | 0.588 | 110 | 1610 | AWG18×4 |

**Notes:**
The sectional area listed above is applicable to the power cord with at most a length of 50 ft. For the longer cord, its sectional area should be enlarged to avoid the cord burning out from over-current.

## 4 Rated Working Conditions

Table 8 Working Temperature Range

| | Indoor side state °F (°C) | | Outdoor side state °F (°C) | |
|---|---|---|---|---|
| | Dry bulb temp. °F (°C) | Wet bulb temp. °F (°C) | Dry bulb temp. °F (°C) | Wet bulb temp. °F (°C) |
| Rated. Cooling | 80.0(26.7) | 67.0(19.4) | 95.0(35.0) | 75.0(23.9) |
| Max. Cooling | 80.0(26.7) | 67.0(19.4) | 115.0(46.1) | 75.0(23.9) |
| Min. Cooling | 67.0(19.4) | 57.0(13.9) | 67.0(19.4) | 57.0(13.9) |
| Rated. Heating | 70.0(21.1) | 60.0(15.6) | 47.0(8.3) | 43.0(6.1) |
| Max. Heating | 80.0(26.7) | — | 75.0(23.9) | 65.0(18.3) |
| Low Ambient Heating | 70.0(21.1) | 60.0(15.6) | 5.0(-15.0) | 3.2(-16.0) |

## 5 Error Analysis

If your conditioning unit runs abnormally, please check the following items before contacting the maintenance serviceman.

Table 9

| Errors | Possible Causes |
|---|---|
| Failed startup | There is no power supply.<br>The breaker opens owing to electrical fault.<br>Voltage is too low. |
| Stop after momentary operation | The air inlet/outlet of the indoor/outdoor unit is clogged. |
| Poor cooling effect | The air filter screen is dirty or clogged.<br>There are too many heat sources or people in the room.<br>The door or window is open.<br>There are obstacles at the air inlet/outlet.<br>The set temperature is too high. |
| Poor heating effect | The air filter screen is dirty or clogged.<br>A door or window is not closed fully.<br>The set temperature is too low. |
| Uncontrollable controller | If the remote controller crashes even if the batteries have been replaced, please open the back cover of it and press the button. “ACL” to bring it back to the normal condition.<br>Is the remote controller in signal receiving range? Is it blocked by obstacles?<br>For the duct type unit, operate the remote controller pointing at the wired controller.<br>Check batteries and change if necessary. |

**Note:**
If the air conditioner still runs abnormally after the above check and handling, please contact the maintenance serviceman at the local appointed service center.

## 6 Maintenance

### ⚠ Caution!

**Take notice of the following items before cleaning your air conditioning unit.**

(1). Cut off the main power supply before touching any wiring device.
(2). Only when the unit is turned off and the main power supply is cut off, can the unit be cleaned to avoid electric shock or injury.
(3). Do not wash the unit with water. It may cause an electric shock.

1). How to clean the filter.

① Never remove the air filter except for cleaning.

② When the air conditioning unit is used in an environment with heavy dust, the air filter should be cleaned often (generally once every two weeks).

2). Maintenance before seasonal use

① Check for clogged inlet / outlet.
② Check if the ground is in good condition.
③ Check if the wiring is in good condition.
④ Check if the indicating lamp of the wired controller blinks after it is energized.

**Note: If there is something abnormal, please consult the after-sales serviceman.**

3). Maintenance after seasonal use.

① Let the air conditioning unit run for half day under the fan mode to dry the inside of the unit.
② If the unit is not to be used for a long time, please shut off the main power supply for energy. conservation, at the same time, the power indicating lamp of the wired control will go off.

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Due to ongoing product improvements, specifications and dimensions are subject to change and correction without notice or incurring obligations. Determining the application and suitability for use of any product is the responsibility of the installer. Additionally, the installer is responsible for verifying dimensional data on the actual product prior to beginning any installation preparations.

Incentive and rebate programs have precise requirements as to product performance and certification. All products meet applicable regulations in effect on date of manufacture; however, certifications are not necessarily granted for the life of a product. Therefore, it is the responsibility of the applicant to determine whether a specific model qualifies for these incentive/rebate programs.

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