



ACDC12B Solar Air Conditioner Heat Pump

Before installing or using your solar air conditioner, please print and read this manual carefully and keep it for future reference.

Notice To Owner/Installer

This unit is designed for easy installation by an experienced person. It is legal for a homeowner to install it, however we highly recommend using a licensed HVAC technician for installation.

Legal Information About Self-Installing R410A Air Conditioners

A homeowner with a vacuum pump, proper training, and equipment can install this unit. Unless you are experienced with installing air conditioners we recommend you hire a professional installer. The person who installs the system must do all work in compliance with local building and electrical codes.

Are there any restrictions on the purchase of R410A refrigerants?

R410a is not an ozone-depleting substance. At this time the purchase of R410a refrigerant is not restricted in the US. There is no technician certification requirement for those that purchase HFC refrigerants, such as R-410a or R-134a. If you are not licensed, some local HVAC supply companies may refuse to sell you R410a based on a misunderstanding of the law, or because they wish to discourage homeowners from working on their own systems.

Are there any restrictions on the use of R410A refrigerants?

Yes, it is illegal to knowingly vent or release these refrigerants. The venting prohibition applies to R410a, and all other HFC refrigerants, just as it does for ozone-depleting refrigerants like R-22.

Is EPA technician certification required to service R410A systems?

No, at this time EPA technician certification is not required in order to service R-410a systems.

Source: http://www.epa.gov/ozone/title6/phaseout/technicians_contractors_faq.html

Please read this installation manual completely before installing the product. If the power cord is damaged, replacement must be performed by authorized personnel only. Installation work must be performed in accordance with the NEC and local codes. You should contact a licensed service technician for installation, repair, or maintenance.

Improper installation could damage the system and/or void the warranty and could result in injury, death, or property damage.

Version 1.0

INSTALLERS, Please read the following warnings to prevent voiding warranties:



WARNING: Make sure the PV panels are wired in **PARALLEL, NOT SERIES**. Verify voltage is within range prior to connecting to the ODU DC breaker.



WARNING: Voltage from breaker box to ODU disconnect should be 220V (measured between L1 and L2.) See page 13, figure 24.



WARNING: E1 – error codes, “lack of signal” - IDU is not receiving signal from the ODU. (L1 and L2 lines may be swapped, reference **Service manual pg. 32**)



WARNING: Do not use the SIGNAL WIRE As the POWER LINE (L1, L2) or Ground. (reference **Installation Manual Figure 24, pg. 13**)



WARNING: Connect: (AC – AC) and the (DC – DC), at the ODU.

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Please Read and Print This Manual

Inside you will find many helpful hints on how to install and test the air conditioner properly.





CAUTION

- Contact an authorized service technician for repair or maintenance of this unit.
- Contact an authorized installer for installation of this unit.
- The air conditioner is not intended for use by young children or infirmed persons without supervision.
- Young children should be supervised to ensure that they do not play with the air conditioner.
- If the power cord is to be replaced, replacement work shall be performed by authorized personnel only.
- Installation work must be performed in accordance with the national wiring Standards by authorized personnel only.


SAFETY PRECAUTIONS






- Read the follow SAFETY PRECAUTIONS carefully before installation.
- Installation must be performed in accordance with the requirement of NEC and CEC by authorized personnel only.
- Incorrect installation due to ignoring of the instruction will cause harm or damage.

■ Please pay attention to the following indications.

 WARNING	This symbol indicates the possibility of death or serious injury.
 CAUTION	This symbol indicates the possibility of injury or damage to property.

■ The items to be followed are classified by the symbols:

	Symbol denotes item that is PROHIBITED
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 WARNING	
1) Engage a properly trained person for installation. If installation is defective, you may experience water damage, electrical shock, or fire.	
2) Install according to these installation instructions. If installation is defective, you may experience water damage, electrical shock, or fire.	
3) Use the included accessories and specified parts for installation.	
4) Select a proper location for the indoor and outdoor unit make sure the location can support the weight of the unit.	
5) For electrical work, follow the local electrical codes and these installation instructions. Use a dedicated circuit. If electrical circuit capacity or electrical work is not proper, it can cause electrical shock or fire.	
6) Use the specified cable and connect tightly, clamping the cable so that the cable cannot come loose. A loose connection may cause sparks, overheating, fire, or damage the system.	
7) Wiring routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed properly, it will cause heat-up at connection point of terminal causing fire or electrical shock.	
8) When installing the refrigerant tubing connection, make sure not to let any substances other than the specified refrigerant go into refrigeration tube. Otherwise, it may cause lower capacity, abnormally high pressure in the refrigeration cycle, explosion, or injury.	
9) Do not modify the length of the power supply cord or use of extension cord, and do not share the circuit with other electrical appliances.	
 CAUTION	
1) This equipment must be installed with DC ground-fault protection (NEC 2005, Article 690.5) Refer to grounding section In this manual.	
2) Do not install the unit in a location where leakage of flammable gas may occur.	
3) Install drainage line described in the installation instructions. If drainage is not proper, water may accumulate and cause damage.	

Installation Instructions

Select an installation location which is rigid and strong enough to support or hold the unit, and select a location for easy maintenance. Read completely, follow instructions step by step.

Indoor Unit Fig. 1

- Do not expose the indoor unit to heat or steam.
- Select a place where there are no obstacles in front of or around the unit.
- Make sure that condensation drainage tube can be conveniently routed away.
- Do not install near a doorway.
- Ensure the spaces indicated by arrows from the wall, ceiling or other obstacles.
- A place where noise prevention is taken into consideration. Min. 3 ft. from TV or electronic instrument.
- There should not be any direct sunlight on the indoor unit, sunlight may fade the color of the unit.

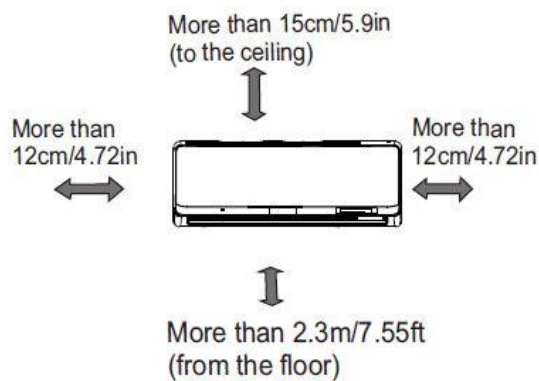


Fig.1

Outdoor unit Fig. 2

- If an awning is built over the outdoor unit it must be done in a way that does not block air flow to the unit.
- Keep the spaces indicated by arrows from wall or other obstacles.
- Do not place animals and plants in the path of the air inlet or outlet.
- Take the air conditioner weight into account and select a place where noise, vibration, and hot air discharged will not be an issue.

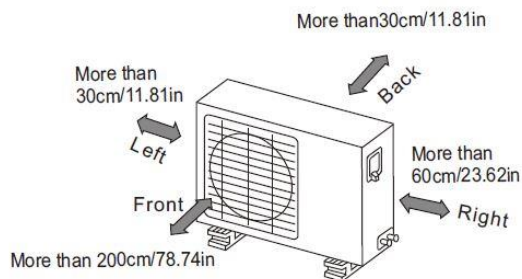


Fig.2

- Do not install in a location exposed to flammable gas.
- Do not install high frequency machines such as a welding machine near the air conditioner.

Rooftop installation:

- If the outdoor unit is installed on a roof structure, be sure to level the unit.
- Ensure the roof structure and anchoring method is adequate for the unit location. Consult local codes regarding rooftop mounting.

Recommended Tools For Installation:

Level gauge	Hex Wrench 5mm
Screwdriver	Leak Detector
Electric Drill	Vacuum pump
Hole Saw Bit	Gauge manifold
Flaring Tool	User's manual
Torque Wrench	Thermometer
Adjustable Wrench	Multi-meter
Tape Measure	Pipe Cutter
R410A Service Port Adaptor	

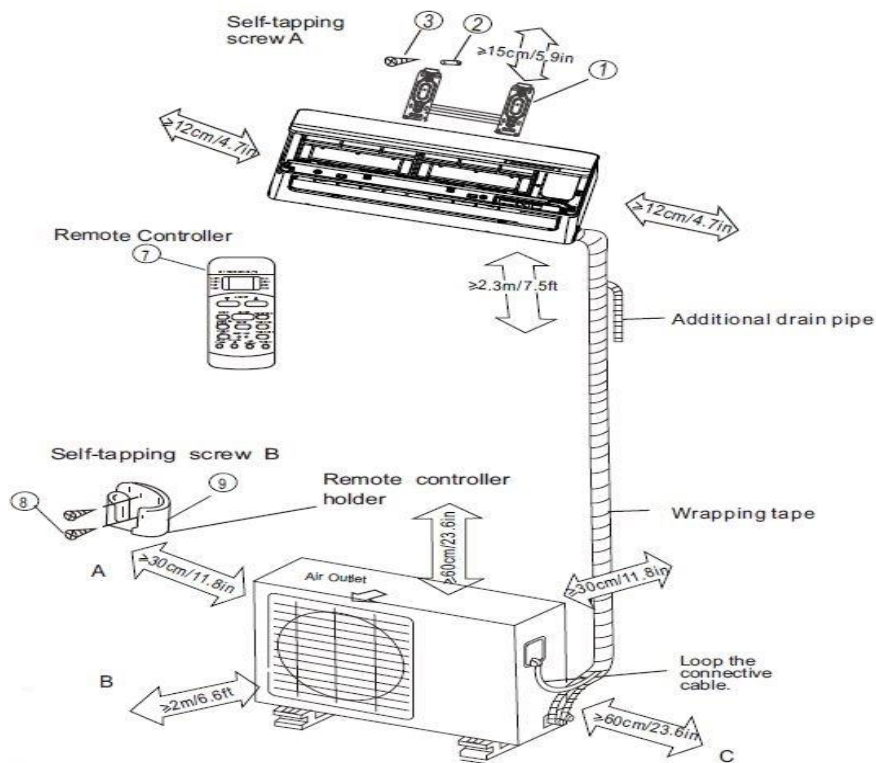


Fig.3

Use a stud finder to locate wall studs. Directions B and C should be free of obstacles.

INSTALLATION INSTRUCTIONS

Connective Pipe and Drainage Installation

- Run the drain hose sloping downward. Do not install the drain hose as illustrated in Fig.7. When connecting extension drain hose, insulate the connecting part of extension drain hose with a shield pipe, do not let the drain hose slack.

- For the right-hand piping, remove the pipe cover from the side panel. (Optional) Install the piping as shown.

NOTE: For 9K/12K model, there is only one side drainage structure design.

If choosing right side drainage connection, another proper drain hose is needed as there is only one drain hose offered by factory. The connection of the drain hose is supposed to be done by qualified installer in case of water leakage.

- Bundle the tubing, connecting cable, and drain hose with tape securely, evenly as shown in Figure on the right.
- The condensed water from the rear of the outdoor unit is gathered in a ponding box and is piped out of the room. Do not put anything else in the box.
- Pass the piping through the hole in the wall.
- Put the upper claw at the back of the indoor unit on the upper hook of the installation plate, move the indoor unit side to side to see that it is securely hooked (see Fig. 9 & 10).
- Piping can be made easy by lifting the indoor unit and placing a spacer between the indoor unit and the wall.
- Push the lower part of the indoor unit up on the wall, then move the indoor unit from side to side, up and down to check if it is hooked securely.
- Bundle the tubing, connecting cable and drain hose securely and evenly with tape as shown in Fig. 12.

CAUTION

- Connect the indoor unit first, then the outdoor unit.
- Do not allow the piping to let out from the back of the indoor unit.
- Be careful not to let the drain hose slack.
- Be sure that the drain hose is located at the lowest side of the bundle. Locating at the upper side can cause drain pan to overflow inside the unit.

- Never intercross or intertwist the power wire with any other wiring.

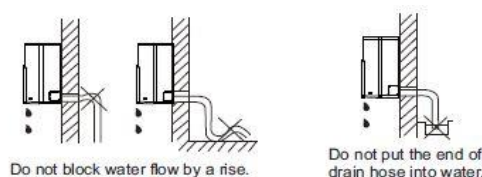


Fig.7

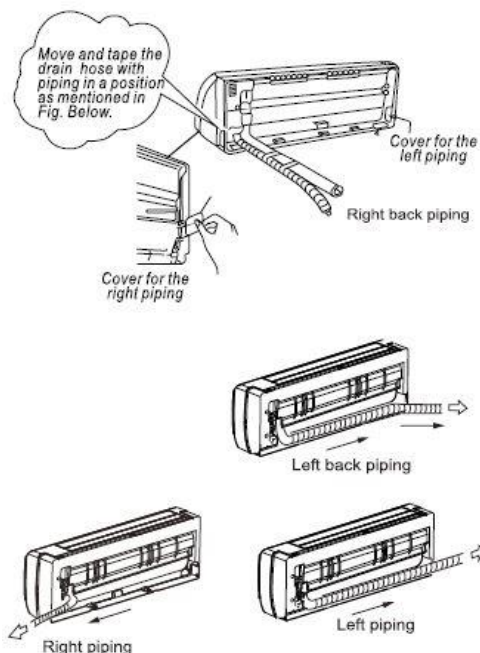


Fig.8

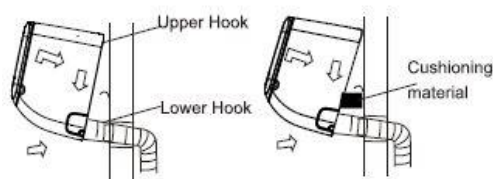


Fig.9

Fig.10

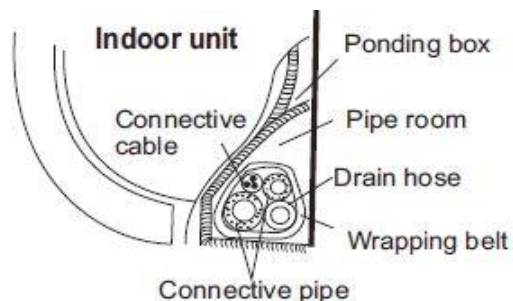


Fig.11

Outdoor Unit installation

Outdoor installation precaution

- Install the outdoor unit on a rigid base to prevent increasing noise level and vibration. Determine the air outlet direction where the discharged air is not blocked. In the case that the installation place is
- exposed to strong wind such as a seaside, make sure the fan operating properly by putting the unit lengthwise along the wall or using a dust or shield plates.
- In windy areas, install the unit to prevent the admission of wind. If you need a wall mount installation, the installation bracket should be installed according to the installation bracket diagram.
- The installation wall should be solid brick, concrete or the same intensity construction, or actions to reinforce, damping supporting should be taken. The connection between bracket and wall, bracket and the air conditioner should be firm, stable and reliable.
- Be sure there is no obstacle which can block radiating air.

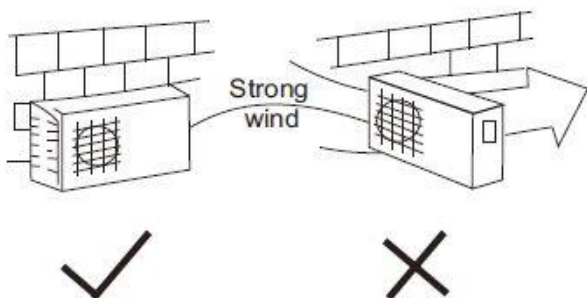


Fig.12

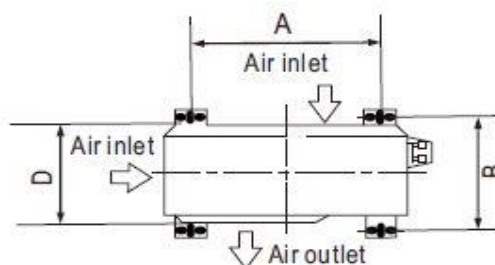


Fig.13

INSTALLATION INSTRUCTIONS

Accessories

Number	Name of Accessories			Qty
1	Installation Plate			1
2	Clip Anchor			5-8(depend on models)
3	Self-tapping Screw A ST3.9x25			5-8(depend on models)
4	Seal (For cooling & heating models only)			1
5	Drain Joint (For cooling & heating models only)			1
6	Connecting pipe Assembly	Liquid side	6.35(1/4in)	Parts you must purchase. The pipe Size may differ from appliance to appliance. Consult the technician for the proper size.
			9.52(3/8in)	
		Gas side	9.52(3/8in)	
			12.77(1/2in)	
			16(5/8in)	
7	Remote controller			1
8	Self-tapping Screw B ST2.9x10		optional parts	2
9	Remote controller holder			1
10	Air freshening filter (installed on Air filter)			1

Note: Except the above parts provided, the other parts needed during installation must be purchased separately. A condensate drain hose extension can be purchased separately from Home Depot, 7/8 OD, 5/8 ID clear plastic tubing.

REFRIGERANT PIPE CONNECTION

Installation of Outdoor Unit

- Anchor the outdoor unit with a bolt and nut # 10 or # 8 tightly and horizontally on a concrete pad or rigid mount.

Outdoor unit dimension mm/in (WxHxD)	Mounting dimensions	
	A (mm/in)	B (mm/in)
700x540x240/29.5x21.3x9.4	458/18	250/9.8
685x430x260/27x16.9x10.2	460/18.1	276/10.9
780x540x250/30.7x21.3x9.8	549/21.6	276/10.9
760x590x285/29.9x23.2x11.2	530/20.9	290/11.4
845x700x320/33.3x27.6x12.6	560/22.1	335/13.2
810x558x310/31.8x21.9x12.2	549/21.6	325/12.8
670x540x265/26.4x21.3x10.4	481/18.9	276/10.9

Drain joint installation

- If a drain elbow is used, the unit should be placed on a stand which is taller than 3cm.
- Fit the seal into the drain elbow, then insert the drain joint into the base pan hole of outdoor unit, rotate 90 to securely assemble them. Connect the drain joint with an extension drain hose (Locally purchased), to prevent water draining off the outdoor unit during the heating mode.

Pipe Length, Maximum elevation and Refrigerant Amount

Pipe Size	Standard Gas Liq.	Maximum Length	Maximum Length	Maximum Elevation	Additional Refrigerant
1/2" 1/4"	5 M	20 M	8 M	20 g/m	

M = Meters 1 M = 3.28 ft.

g = Grams

Refrigerant pipe connection

1. Flaring work

The main cause for refrigerant leakage is caused by a defect in the flaring work. Perform correct flaring work using the following procedure:

A: Cut the pipes and the cable.

- Use the piping kit accessory or pipes purchased locally.
- Measure the distance between the indoor and the outdoor unit.
- Cut the pipes a little longer than the measured distance.
- Cut the cable 1.5m longer than the pipe length.

B: Burr removal

- Completely remove all burrs from the cut cross section of pipe/tube.
- Put the end of the copper tube/pipe in a downward direction as you remove burrs in order to avoid dropping burrs into the tubing.

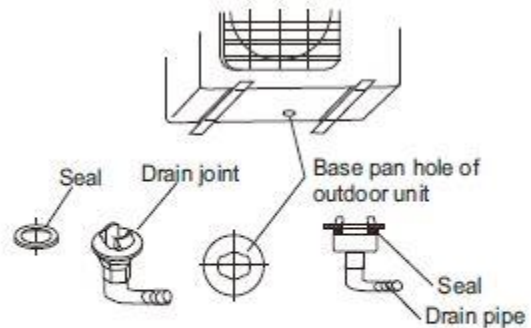


Fig. 14

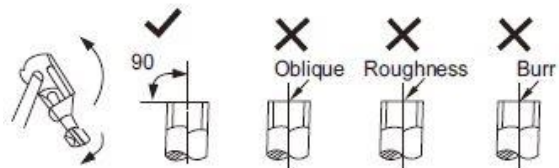


Fig. 15



Fig. 16

C: Putting nut on

Remove flare nuts attached to indoor and outdoor unit, then put them on pipe/tube having completed burr removal.(not possible to put them on after flaring work)

D: Flaring work

Firmly hold copper pipe in a die in the dimension shown in the table below.

Outer diam. (Mm/in)	A(mm/in)	
	Max.	Min.
Φ 6.35/1/4	1.3/0.05	0.7/0.03
Φ 9.52/3/8	1.6/0.06	1.0/0.04
Φ 12.7/1/2	1.8/0.07	1.0/0.04
Φ 16/5/8	2.2/0.09	2.0/0.08

Tightening Connection

- Align the center of the pipes.
- Sufficiently tighten the flare nut with fingers, and then tighten it with a spanner and torque wrench as shown in Fig.20 & 21.

Outer diam. (Mm/in)	Tightening torque (N.cm/lbf.in)	Additional tightening torque(N.cm/lbf.in)
6.35/1/4	1500/132.8	1600/141.59
9.52/3/8	2500/221.34	2600/230.02
12.7/1/2	3500/309.73	3600/318.56
16/5/8	4500/398.23	4700/415.93

- Excessive torque can break nut depending on installation conditions.

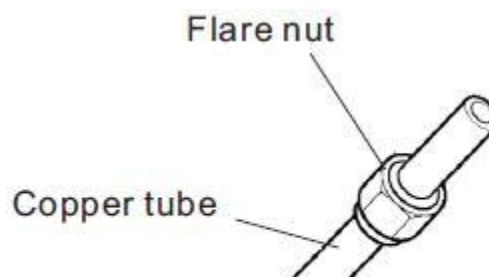


Fig.17

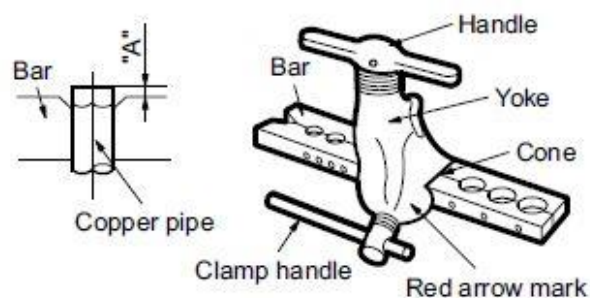


Fig.18

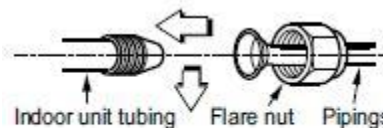


Fig. 19

Fig. 19



Fig.20

Electrical work

Electric safety regulations for the initial Installation

1. If there is any safety issues with the power source, the technician should refuse to install the air conditioner and explain the problem to the customer.
2. Power voltage should be in the range of 90%~110% of the rated voltage.
3. Use a surge protector and main power switch with 1.5 times capacity of Max. Current of the unit. Ensure the air conditioner is well grounded.
4. The appliance shall be installed in accordance with NEC regulations. Do not operate your air conditioner in a wet room such as a bathroom or laundry room.
5. Install an all-pole disconnection device which has at least 3mm clearances in all poles, and has a leakage current that may not exceed 10mA. The residual current device(RCD) must have a rated residual operating current not exceeding 30mA, and disconnection must be incorporated.
6. For units with optional auxiliary electric heater, keep the unit at least 1 meter away from the nearest combustible materials.
7. Reference the attached Electrical Connection Diagram located on the panel of the indoor & outdoor unit to connect the wire.
8. All wiring must comply with local and national electrical codes and be installed by qualified electricians.
9. An individual branch circuit and single receptacle used only for this air conditioner must be available. See the following table for suggested wire sizes and fuse specifications:

Suggest Minimum Wire Size
(**AWG**: American Wire Gage):

Appliance Amps	AWG Wire Size
15	14
20	12
30	10

NOTE:

The wire size of power supply cord and interconnected wire and the current of the fuse or switch are determined by the maximum current indicated on the nameplate which is located on the side panel of the unit. Please refer to the nameplate before selecting the wire size, fuse or switch.

Connecting the cable to the indoor unit

NOTE: Before performing any electrical work, turn off the main power to the system.

1. The inside and outside connecting cable can be connected without removing the front grille.
2. The indoor power cord type is H05VV-F or H05V2V2-F, the outdoor power cord and interconnected cord type is H07RN-F.
3. Lift the indoor unit panel up, remove the electrical box cover by removing the screw.
4. Ensure the color of wires of outdoor unit and the terminal Numbers are the same to the indoors respectively.
5. Wrap those cables not connected with terminals with insulating tape, so that they will not touch any electrical components. Secure the cable onto the control board with the cord clamp.

Connect the cable to the outdoor unit

1. Remove the cover control from the unit by removing the 3 screws. See Fig.23.
2. Dismount caps on the conduit panel.
3. Temporarily mount the conduit tubes (not included) on the conduit panel.
4. Properly connect both the power supply and low voltage lines to the corresponding terminals on the terminal block.
5. Ground the unit in accordance with local codes.
6. Be sure to size each wire allowing several inches longer than the required length for wiring.
7. Use lock nuts to secure the conduit tubes.

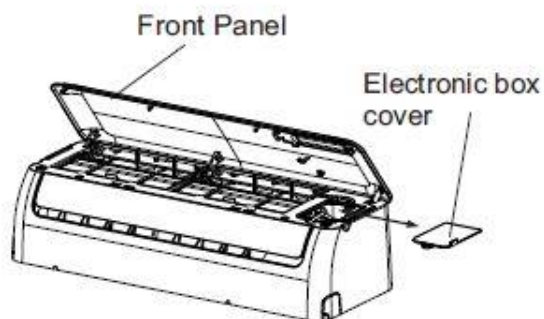


Fig.21

Terminal block of indoor unit

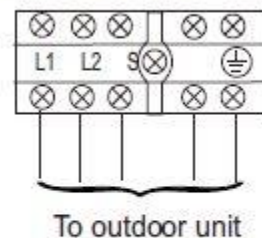


Fig.22

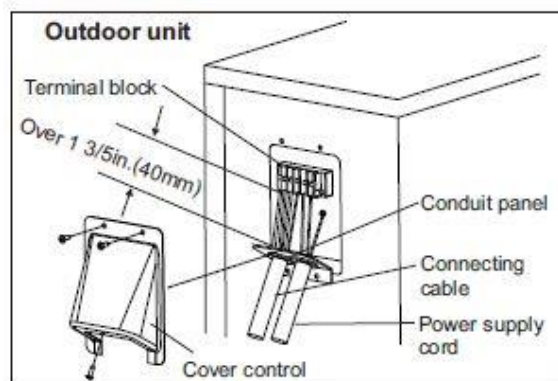


Fig.23

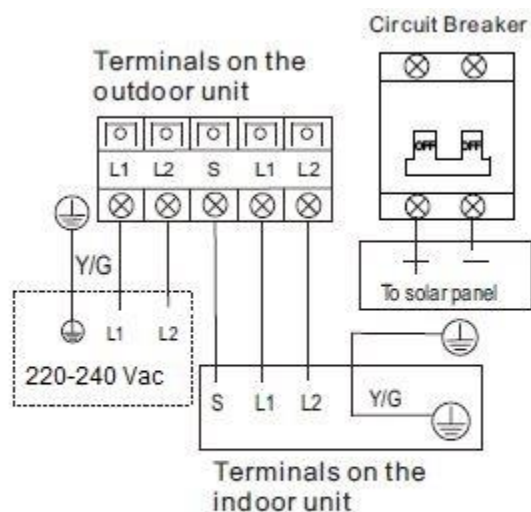


Fig.24

ELECTRICAL WORK

Installation of the solar photovoltaic system

- This guide contains information regarding the installation and safe handling of solar photovoltaic module. All instructions should be read and understood before attempting to install. If there is any question, please contact our support department for further explanation. The installer should conform to all the safety precautions listed in this guide when installing the module. Local codes should also be followed in such installations.
- This manual describes several typical systems of solar photovoltaic, but does not involve the specific structures and installation procedures of the installation. Please consult the supplier for the information of the following assemblies:
 - a) The specifications of the solar photovoltaic system
 - b) Cable material
 - c) Connecting components
 - d) Bracket and support
 - e) Supporting parts
- Before installing a solar photovoltaic system, the installer should become familiar with the mechanical and electrical requirement for such a system. Keep this guide in a safe place for future reference (care and maintenance) and in case of sale or disposal of the module at the end of its useful life.

General

- Installing solar photovoltaic systems may require specialized skills and knowledge. Installation should be performed only by qualified persons.
- All modules come with a permanently attached junction box and #12 AWG terminated in Multi-Contact (MC4) PV-KBT4 (female) or PV-KST4 (male) connectors.
- The installer should assume the risk of all injury that might occur during installation, including without limitation, the risk of electric shock.
- The solar photovoltaic electrical energy production system must comply with the following table for suggested current and voltage specifications.
- When using 30v panels, the max utilization will be 20a x 30v or 600w. Panel configuration of 30v panels is best up to 3 x 250w panels. When using 36v panels, the max utilization is 20a x 36v or 720w and panel configuration is best at 280w-300w x 3 panels.

Unit Maximum Power Draw	20 AMPS
Maximum Operating Voltage (Vmp)	≤ 39 VDC
Minimum Operating Voltage (Vmp)	≥ 29 VDC



One individual module may generate DC voltages greater than 30 volts when exposed to direct sunlight. Contact with a DC voltage of 30V or more is potentially hazardous. Electrical joints such as the wire terminal will cause sparks, burning or deadly electric shock. Please do not touch such terminals directly under any circumstances.

- When disconnecting wires from a photovoltaic module that is exposed to sunlight, an electric arc may result. Such arcs may cause burns, combustion and may otherwise create problems. Therefore, be extremely careful!
- Photovoltaic solar modules convert light energy to direct-current electrical energy. They are designed for outdoor use. Modules may be ground mounted, mounted on rooftops, vehicles, or boats. Proper design of support structures is the responsibility of the system designer and installer. Proper use of mounting holes is suggested in a following paragraph.
- Do not attempt to disassemble the module, and do not remove any attached nameplates or components.



Fig.26

- Do not apply paint or adhesive to module top surface.
- Do not use mirrors or other magnifiers to artificially concentrate sunlight on the module.

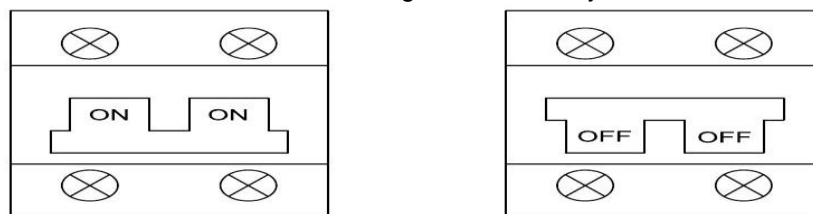


Fig.27

- When installing the system, abide with all local, regional and national statutory regulations.
- Obtain a building permit where necessary. Abide with any local and national regulations when mounting on vehicles or boats.

Safety precaution for installing a solar photovoltaic system

- When installing the solar modules or repairing the air conditioner, ensure the circuit breaker on the solar panel of the outdoor unit is in the "OFF" state (push the switch to "OFF" position). During normal operation, the circuit breaker should be in the "ON" state. The negative conductor is bonded to the frame ground for safety.



- Solar modules produce electrical energy when light strikes on their front surface. The DC voltage may exceed 30V. If modules are connected in series, the total voltage is equal to the sum of the individual module voltages. If modules are connected in parallel, the total current is equal to the sum of individual module currents.

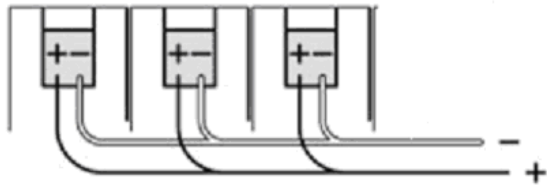


Fig.29

Do NOT Connect in Series.
Parallel Only.

- Keep children well away from the system while transporting and installing mechanical and electrical components.

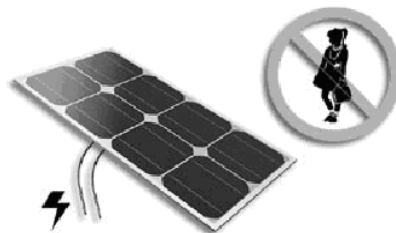


Fig.30

- Completely cover the module with an opaque material during installation to keep electricity from being generated. Do not touch the components or the end of live wires. However, if appropriate protections have been taken during the operation according to the local safety regulations, the above requirement is unnecessary.



Fig.31

- Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic devices while installing or troubleshooting photovoltaic systems.
- Use only insulated tools that are approved for working on electrical installations.



Fig.32

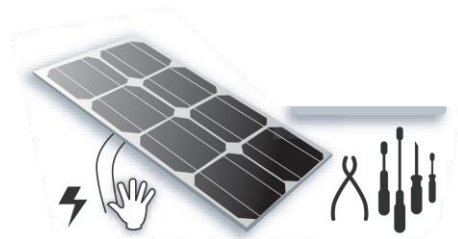


Fig.33

- When performing installation in dry conditions, please ensure the tools used are dry.



Fig 34

- Abide with the safety regulations for all other components used in the system, including wiring and cables, connectors, charge controllers, inverters, storage batteries and rechargeable batteries, etc.
- Use only equipment, connectors, wiring and support frames suitable for use in a solar electric systems. Always use the same type of module within a particular photovoltaic system.
- The module frame must be properly grounded. The grounding wire must be properly fastened to the module frame to assure good electrical contact. Use the recommended type, or an equivalent, connector for this wire.

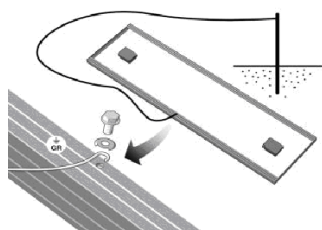


Fig.
35

- Under normal outdoor conditions the module will produce current and voltages that are different than those listed in the data sheet. Data sheet values are values expected at standard test conditions. Accordingly, during system design, values of short-circuit current (I_{sc}) and open-circuit voltage (V_{oc}) marked on UL series modules should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacity, fuse size and size of controls connected to the module or system output.
- The hole in the back of the module frame is used to drain the water, ensure it isn't blocked.

Mechanical Installation

1. Selecting the installation site

- Select a suitable place for installation of the module. The module should not be shaded at any time of the day.
- The module should be facing due south in northern latitudes and due north in southern latitudes for best power production.
- For detailed information on the best elevation tilt angle for the installation, please consult with the solar photovoltaic system supplier.
- Do not use module near the place where the flammable gas may be generated or collected.

2. *Selecting the proper racking system*

- Always observe the instructions and safety precautions included with the support frame to be used with the module.
- Never attempt to drill holes in the glass surface of the module, it will void the warranty.
- Do not drill additional mounting holes in the frame of the module, it will void the warranty.



Fig.37

- Modules must be securely attached to the mounting structure using four mounting points for normal installation. If additional wind or snow loads are considered for the installation, additional mounting points are also used.
- The support frame must be made of durable, corrosion-resistant and UV-resistant material.
- The heat expansion and cold contraction of the support frame should have no affection to its usage and performance.

3. *Ground mount*

- Select the height of the mounting system to prevent the lowest edge of the module from being covered by snow for a long time in winter in areas that experience heavy snowfalls. In addition, assure the lowest portion of the module is placed high enough so that it is not shaded by plants or trees or damaged by sand and stone driven by wind.



Fig.38

4. Roof mount

- When installing a module on a roof or building, ensure that it is securely fastened and cannot fall as a result of wind or snow loads.

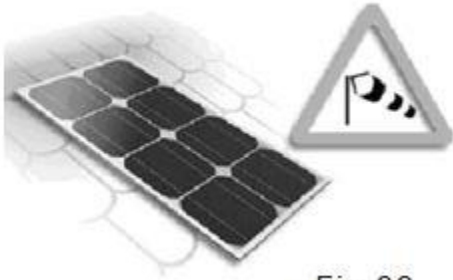


Fig.39

- Provide adequate ventilation under a module for cooling (3inch minimum air space between module and mounting surface).

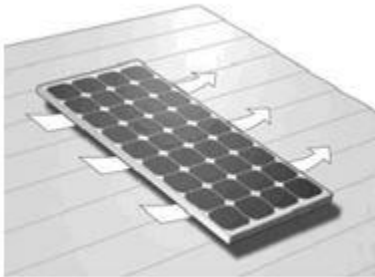


Fig.40

- When installing module on a roof, ensure that the roof construction is suitable. In addition, any roof penetration required to mount the module must properly sealed to prevent leaks. In some cases, a special support frame may be necessary.
- The roof installation of solar modules may affect the fireproofing of the house construction, so it is necessary to use an earth ground fault circuit breaker. Any improper installation may cause accidental injuries.
- When installing the module on a roof or building, do so in calm winds. Installing a module during strong winds may cause accidents.

5. Pole mount

- When installing a module on a pole, choose a pole and module mounting structure that will withstand anticipated winds for the area. The pole must have a solid foundation.



Fig.42

6. General installation

- Module mounting must use the pre-drilled mounting holes in the frame.
- The most common mounting is achieved by mounting the module using the four symmetry points closed to the inner side on the module frame.
- If excessive wind or snow loads are expected, all eight mounting holes must be used.
- If you want to install the module without using the pre-drilled mounting holes in the frame, please consult with the supplier.
- Do not install in the rainy weather, it may cause insulation failure due to moisture, and there is a risk of electric shock.



Fig.43

- Do not attempt to lift the module by grasping the module's junction box while moving.

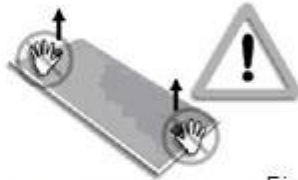


Fig.44

- Do not stand or step on module.



Fig.45

- Do not throw the module or drop anything on the module.



Fig.46

To avoid glass breakage, do not place any heavy objects on the module.
Do not set the module down hard on any surface.
Inappropriate transport and installation may break the glass of the module.

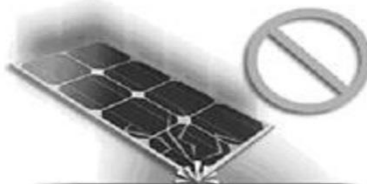


Fig.47

Electrical installation

General installation

- Do not use modules of different configurations in the same system.
- The solar photovoltaic array consists of modules connected in parallel, no more than 3 modules can be used in parallel. Modules in parallel can increase the output current of the solar photovoltaic system, especially for applications requiring high currents, low voltages. If modules are connected in parallel, the total voltage is equal to the sum of individual voltages.



Fig.48

- If modules used in the solar photovoltaic system are not the specified brand of the manufacturer, it must comply with the electrical requirement. The cross section area of cable and the capacity of connector must be selected to suit the maximum system short circuit current, otherwise the cable and the connector will be overheated under high current levels. Modules connected in parallel can use branch connectors as shown in Fig.49. These are available from HotSpot as a kit, and may be ordered in any length. Please contact HotSpot Energy to order. The maximum current of the solar photovoltaic system and the maximum current and voltage capacity of the joints and connective cables should be considered during installation.
- Connection method A: 3 panels, portrait mounted, with branch connectors wired in parallel. See Fig. 49.

Branch connectors

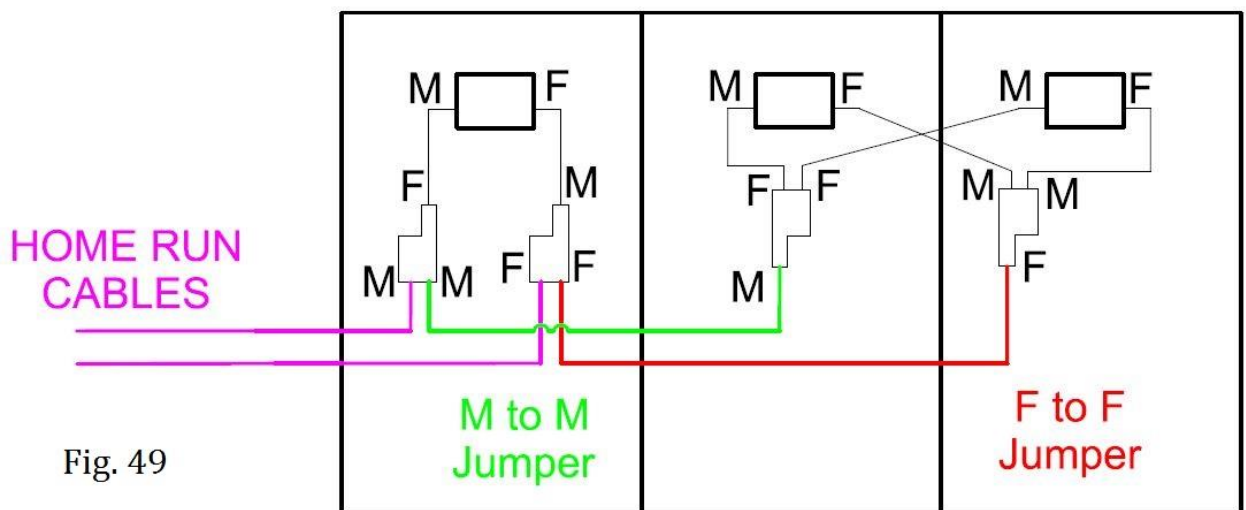


Fig. 49

Shown below, branch connectors are used (BR2).



Fig.52b

If you want to connect the photovoltaic modules by using the cables purchased by yourself, the following requirements must be complied:

- Cable installation should comply with all local regional and national regulations.
- In some countries, an individual circuit breaker used between the solar panel and air conditioner must be installed. Select a circuit breaker in accordance with local regulations with the rated current of 30A.
- The electrician must identify the positive pole and negative pole. Reverse connection may cause permanent damage to the air conditioner.
- Use qualified photovoltaic cables only.
- The cable can resist UV rays and climate of rapid change. The rated voltage of the cable is more than 600V.
- The cross section area of the cable depends on the maximum short circuit current and the length of wire.
- Be very careful when installing the cable at extremely low temperature.
- Recommended to use the cable of cross section area of 4mm or greater, and the wire should be as short as possible to reduce the energy consumption.
- When the modules are connected in parallel, cables must be securely fastened on the support frame which is used for mounting the modules to avoid wire slack.



Fig.53

- Do not place the cable on the sharp edge of the things.



Fig.52

- Attention to the minimum bending radius of the wire.



Fig.53

- Do not unplug the connector when the power is on.



Fig.54

- The conduit must be used on the cable if it is possible for animals or children to touch it.



Fig.55

- The manufacturer of the solar photovoltaic system can supply cables suitable for use in solar electric systems.

If you want to use the connector purchased by yourself the following requirements must be complied:

- Use only connectors specially designed for solar electric systems.
- Use the recommended or specified tools when installing the connectors.
- Do not unplug the connectors when the power is on.
- The connector suitable for the solar photovoltaic system can obtain from the manufacturer.

Electrical connection:

- Completely cover the module with an opaque material during mechanical installation and electrical installation.
- Protect the cables from being damaged.
- Ground mounting must abide with all local regulations.
- Storage batteries cannot be connected with the solar photovoltaic system.

Grounding:

- The module frame must be properly grounded. The grounding wire must be properly fastened to the module frame to assure good electrical contact.
- If the support frame is made of metal, the surface of the frame must be electroplated and have excellent conductivity. The grounding wire must be properly fastened to the support frame.
- There are two pre-drilled mounting holes in the frame, used to install the grounding cable. Each module should connect with the grounding cable.
- We recommend the closed lug when grounding. First insert the ground cable into the jack of the closed lug and weld, then insert the stainless steel bolt (M3) into the tab of the lug, the grounding hole on the frame and finally a nut to secure the entire assembly. The spring washer is required in order to prevent screw loosening and cause improper grounding.
- The grounding resistance must be less than 10 ohms.

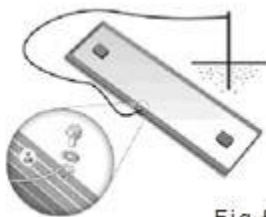


Fig.56

- All modules come with a permanently attached junction box and provide with fitted cables.
- The junction box does not need the customer to install, please contact the manufacturer if there is any problem with the module.

Disclaimer of liability

Because the use of this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic (PV) product are beyond our control, we do not take any responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance. No responsibility is assumed by us for any infringement of patents or other rights of third parties, which may result by using the PV product. No license is granted by modification or otherwise under any patent or patent rights. The information in this manual is based on company's knowledge and experience and is believed to be reliable; but such information including product specification (without limitations) and suggestions do not constitute a warranty, expressed or implied. We reserve the right to change the manual, the PV product, the specifications or product data sheets without prior notice.

GROUNDING PRINCIPALS

Equipment grounding provides protection from shock caused by a ground fault and is required for all PV systems by the NEC. A ground fault occurs when a current-carrying conductor comes into contact with the frame or chassis of an appliance or an electrical box. A person who touches the frame or chassis of the faulty appliance will complete the circuit and receive a shock. The frame or chassis is deliberately wired to a grounding electrode by an equipment grounding electrode conductor. The wire does not normally carry current except in the event of a ground fault. The grounding conductor must be continuous, connecting every non-current carrying metal part of the installation to ground. It must bond or connect to every metal electrical box, equipment chassis, and photovoltaic panel mounting. The grounding wire is never fused, switched, or interrupted in any way. When metal conduit or armored cable is used, a separate equipment ground is not usually necessary since the conduit itself acts as the continuous conductor in lieu of the grounding wire. Grounding wires are still needed to connect appliance frames to the conduit.

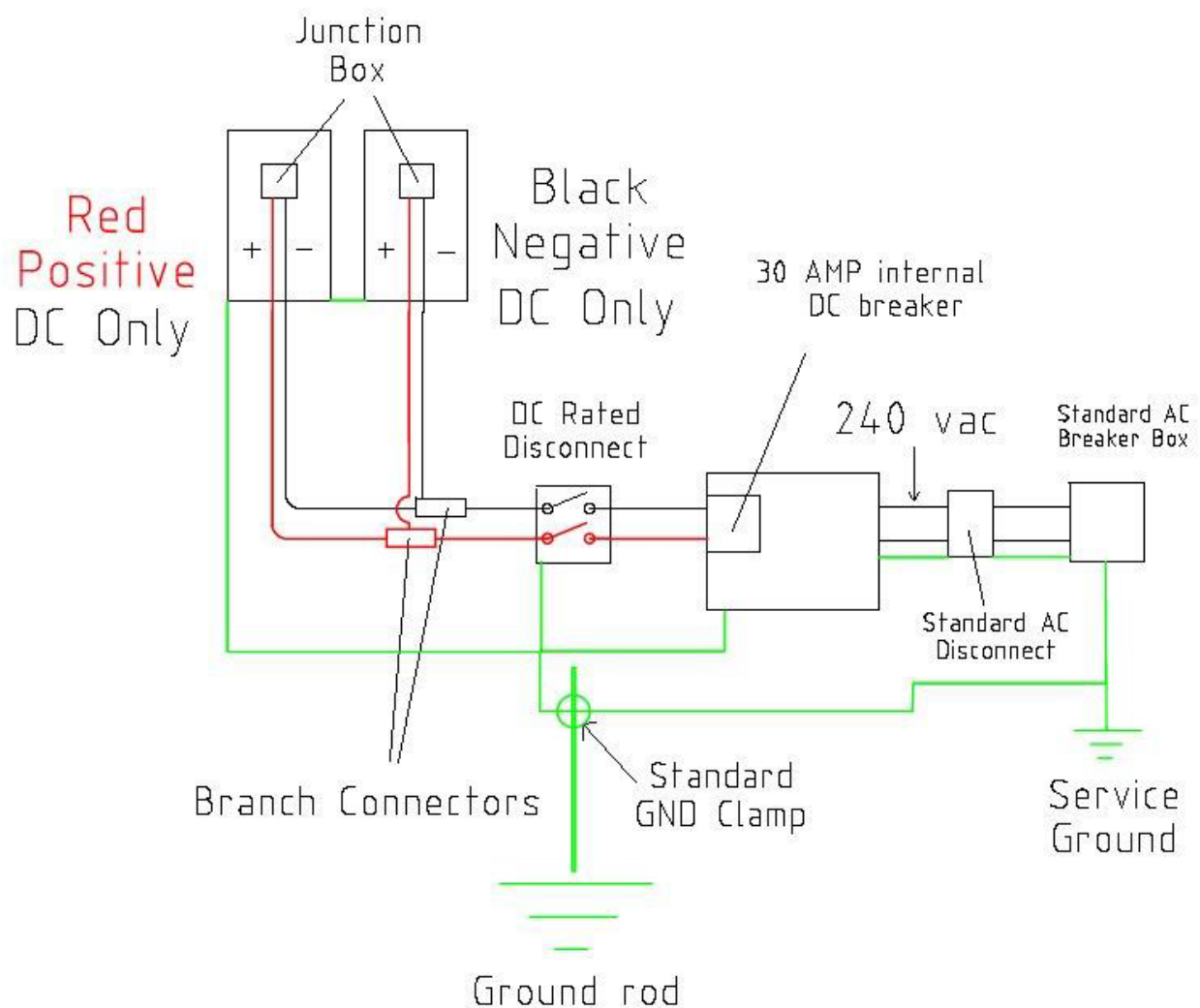
Ground-fault Protection

Roof-mounted DC PV arrays located on dwellings must be provided with DC ground-fault protection (NEC 2005, Article 690.5) Ground-fault protection isolates the grounded conductor (in DC, this is the negative wire) from ground under ground-fault conditions.

Size of Equipment Grounding Conductor

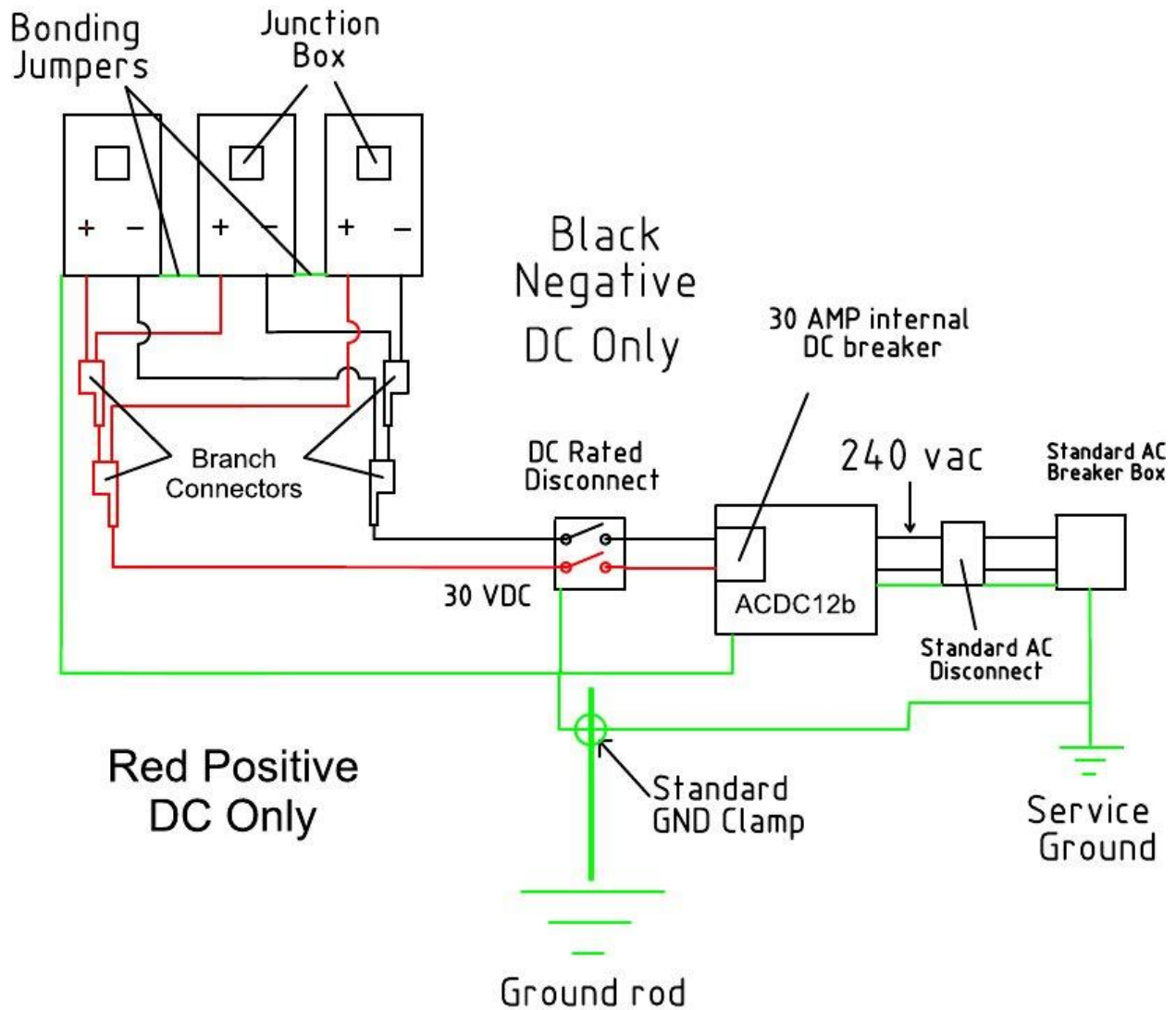
The size of the equipment grounding wire can be as large as the current carrying conductors, both positive and negative wires, but not smaller than specified in NEC 2005, table 250.122.

2 Panel Grounding



Liquid Tight conduit may be used between the Standard AC Disconnect and the 30 AMP internal breaker in the Outdoor Unit. Max 6 ft.

3 Panel Grounding



Liquid Tight conduit may be used between the Standard AC Disconnect and the 30 AMP internal breaker in the Outdoor Unit. Max 6 ft.

AIR PURGING

CAUTION

After complying with the above conditions, prepare the wiring as follows:

- 1) Always install a dedicated power circuit specifically for the air conditioner. Follow all state and local codes when wiring.
- 2) The screw which fastens the wiring in the electrical fitting case are liable to come loose from vibrations which the unit is subjected during the course of transportation. Check them and make sure that they are all tightly fastened. (If they are loose, it could cause the wires to burn-out.)
- 3) Specification of power source.
- 4) Confirm that electrical capacity is sufficient.
- 5) Check the starting voltage is maintained at more than 90 percent of the rated voltage marked on the nameplate.
- 6) Confirm that the cable thickness is as specified in the power source specification.
- 7) Always install an earth leakage circuit breaker in a wet or moist area.
- 8) The following would be caused by voltage drop:
Vibration of a magnetic switch, which will damage the contact point, fuse tripping, disturbance of the normal overload function.
- 9) Always install an electrical disconnect as close to the unit as possible.

Air purging

Air and moisture in the refrigerant system have undesirable effects as indicated below: Pressure in the system rises.

Operating current rises.

Cooling or heating efficiency drops.

Moisture in the refrigerant circuit may freeze and block capillary tubing. Water may lead to corrosion of parts in the refrigeration system.

Therefore, the indoor unit and tubing between the indoor and outdoor unit must be leak tested and evacuated to remove any non-condensables and moisture from the system.

Air purging with vacuum pump

NOTE: Connective pipe length will affect the capacity and energy efficiency of the unit. The nominal efficiency is tested basing on the pipe length of 7.5m (25ft).

The indoor unit and tubing between the indoor and outdoor unit must be leak tested and evacuated to remove any non-condensables and moisture from the system.

Check that each tube (both liquid and gas side tubes) between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed.

Pipe length and refrigerant amount:

Connective pipe length	Air purging method	Additional amount of refrigerant to be charged	
Less than 7.5m/25ft	Use vacuum pump	—————	
More than 7.5m/25ft	Use vacuum pump	Liquid side: 6.35mm / 1/4in R410A: Pipe length-7.5M (25') x 15g/M (0.16oz/ft.)	Liquid side: 9.52mm / 3/8in R410A: Pipe length-7.5M (25') x 30g/M (0.32oz/ft.)

- When moving the unit to a new location, perform evacuation using a vacuum pump.
- Make sure the refrigerant added into the air conditioner is in liquid form in any case.

Use caution when handling the packed valve

- Open the valve stem until it hits against the stopper. Do not try to open it further.
- Securely tighten the valve stem cap with a spanner or the like.
- Valve stem cap tightening torque (See tightening torque table in previous page).

When Using the Vacuum Pump

(For method of using a manifold valve, refer to its operation manual.)

1. Completely tighten the flare nuts, A, B, C, D, connect the manifold valve charge hose to a charge port of the low-pressure valve on the gas pipe side.
2. Connect the charge hose connection to the vacuum pump.
3. Fully open the handle Lo of the manifold valve.
4. Operate the vacuum pump to evacuate. After starting evacuation, slightly loose the flare nut of the Lo valve on the gas pipe side and check that the air is entering (Operation noise of the vacuum pump changes and a compound meter indicates 0 instead of minus)
5. After the evacuation is complete, fully close the handle Lo of the manifold valve and stop the operation of the vacuum pump. Make evacuation for 15

minutes or more and check that the compound meter indicates -76cmHg (-1x10⁵Pa).

6. Turn the stem of the packed valve B about 45° counterclockwise for 6~7 seconds after the gas is coming out, then tighten the flare nut again. Make sure the pressure display in the pressure indicator is a little higher than the atmosphere pressure.
7. Remove the charge hose from the Low pressure charge hose.
8. Fully open the packed valve stems B and A.
9. Securely tighten the cap of the packed valve.

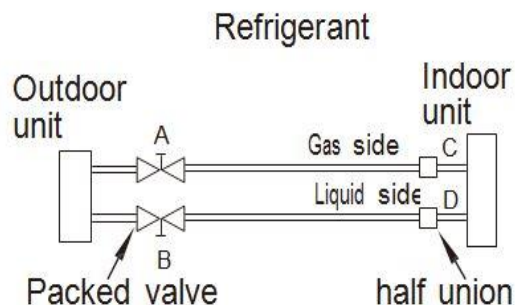


Fig.57

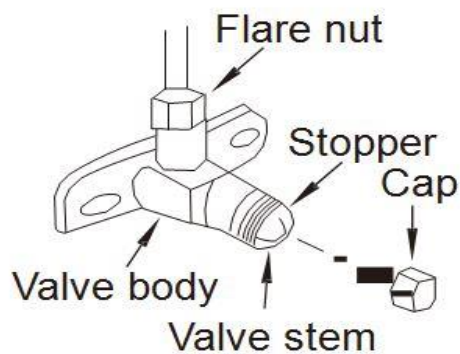


Fig.58

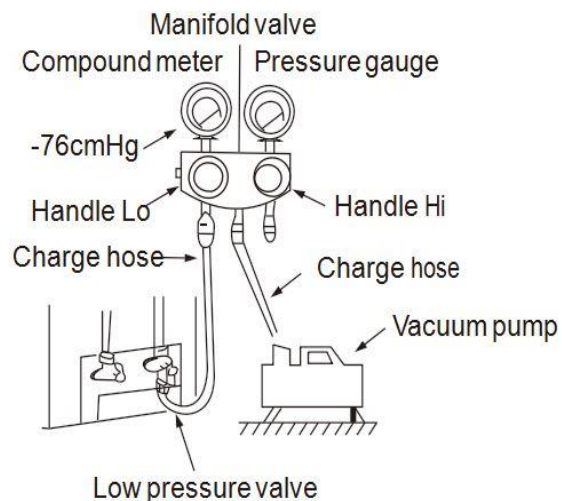


Fig.59

Safety and leakage check

Electrical safety check

Perform the electric safe check after completing installation:

1. Grounding work

After finishing grounding work, measure the grounding resistance by visual detection and a Ohm meter. Make sure the grounding resistance is less than 4 Ohm's.

2. Electrical leakage check (performing during running test).

During test operation after finishing installation, the serviceman can use the multimeter to perform the electrical leakage check. Turn off the unit immediately if leakage occurs, repair before operating the unit.

Gas leak check

1. Soap and water method:

Apply a soapy water or a liquid neutral detergent on the indoor unit connection and outdoor unit connections with a soft brush to check for leakage of the connecting points of the piping. If bubbles come out, the pipes have leakage.

2. Leak detector

Use the leak detector to check for leakage.

CAUTION

A: Lo packed valve

B: Hi packed valve

C and D are ends of indoor unit connection.

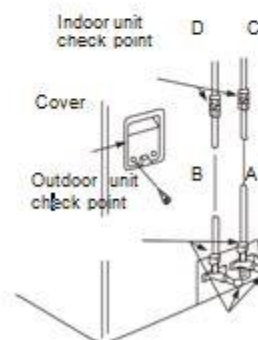


Fig.60

RUNNING TEST

Perform test operation after completing gas leak check at the flare nut connections and electrical safety check.

- Check that all tubing and wiring have been properly connected.
 - Check that the gas and liquid side service valves are fully open.
1. Connect the power, press the ON/OFF button on the remote controller to turn the unit on.
 2. Use the MODE button to select COOL, HEAT, AUTO and FAN to check if all the functions work well.
 3. When the ambient temperature is too low (lower than 17°C/62°F), the unit cannot be controlled by the remote controller to run in cooling mode, manual operation must be used.
 4. Manual operation is used only when the remote controller is disabled or maintenance is necessary. Press the manual control button on the right side of the panel frame to select the AUTO or COOL mode. The unit will operate under Forced AUTO or COOL mode. Run test for 30 minutes minimum.

