MITSUBISHI HEAVY INDUSTRIES

PSC012D174C
202303

INSTALLATION MANUAL FOR OUTDOOR UNIT

Inverter driven split PAC
FDC125VNP-W
Designed for R32 refrigerant

English is Original

◎This installation manual deals with outdoor units and general installation specifications only. For indoor units, refer to the respective installation manuals supplied with the units.
◎When install the unit, be sure to check whether the selection of installation place, power supply specifications, usage limitation (piping length, height differences between indoor and outdoor units, power supply voltage and etc.) and installation spaces

SAFETY PRECAUTIONS

- We recommend you to read this "SAFETY PRECAUTIONS" carefully before the installation work in order to gain full advantage of the functions of the unit and to avoid malfunction due to mishandling.
- The precautions described below are divided into ⚠WARNING and ⚠CAUTION. The matters with possibilities leading to serious consequences such as death or serious personal injury due to erroneous handling are listed in the ⚠WARNING and the matters with possibilities leading to personal injury or damage of the unit due to erroneous handling including probability leading to serious consequences in some cases are listed in ⚠CAUTION. **These are very important precautions for safety. Be sure to observe all of them without fail.**
- The meaning of "Marks" used here are as shown below.

⃠	Never do it under any circumstance.	❗	Always do it according to the instruction

- Units of single phase power source are equipment complying with IEC 61000-3-12.
- Be sure to confirm no anomaly on the equipment by commissioning after completed installation and explain the operating methods as well as the maintenance methods of this equipment to the user according to the owner's manual.
- Keep the installation manual together with owner's manual at a place where any user can read at any time. Moreover if necessary, ask to hand them to a new user.

⚠ WARNING

- **Installation must be carried out by the qualified installer.**
  If you install the system by yourself, it may cause serious trouble such as water leaks, electric shocks, fire and personal injury, as a result of a system malfunction.
- **Install the system in full accordance with the instruction manual.**
  Incorrect installation may cause bursts, personal injury, water leaks, electric shocks and fire.
- **Use the original accessories and the specified components for installation.**
  If parts other than those prescribed by us are used, It may cause fall of the unit, water leaks, electric shocks, fire, refrigerant leak, substandard performance, control failure and personal injury.
- **When installing in small rooms, take prevention measures not to exceed the density limit of refrigerant in the event of leakage accordance with ISO5149.**
  Consult the expert about prevention measures. If the density of refrigerant exceeds the limit in the event of leakage, lack of oxygen can occur, which can cause serious accidents.
- **Ventilate the working area well in the event of refrigerant leakage during installation.**
  If the refrigerant comes into contact with naked flames, poisonous gas is produced.
- **After completed installation, check that no refrigerant leaks from the system.**
  If refrigerant leaks into the room and comes into contact with an oven or other hot surface, poisonous gas is produced.
- **Hang up the unit at the specified points with ropes which can support the weight in lifting for portage. And to avoid jolting out of alignment, be sure to hang up the unit at 4-point support.**
  An improper manner of portage such as 3-point support can cause death or serious personal injury due to falling of the unit
- **Install the unit in a location with good support.**
  Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury.
- **Ensure the unit is stable when installed, so that it can withstand earthquakes and strong winds.**
  Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury.
- **The electrical installation must be carried out by the qualified electrician in accordance with "the norm for electrical work" and "national wiring regulation", and the system must be connected to the dedicated circuit.**
  Power supply with insufficient capacity and incorrect function done by improper work can cause electric shocks and fire,
- **Be sure to shut off the power before starting electrical work.**
  Failure to shut off the power can cause electric shocks, unit failure or incorrect function of equipment.
- **Be sure to use the cables conformed to safety standard and cable ampacity for power distribution work.**
  Unconformable cables can cause electric leak, anomalous heat production or fire.
- **Use the prescribed cables for electrical connection, tighten the cables securely in terminal block and relieve the cables correctly to prevent overloading the terminal blocks.**
  Loose connections or cable mountings can cause anomalous heat production or fire.
- **Arrange the wiring in the control box so that it cannot be pushed up further into the box. Install the service panel correctly.**
  Incorrect installation may result in overheating and fire.
- **Do not perform brazing work in the airtight room**
  It can cause lack of oxygen.
- **Use the prescribed pipes, flare nuts and tools for R32.**
  Using existing parts (for R22 or R407C) can cause the unit failure and serious accidents due to burst of the refrigerant circuit.
- **Tighten the flare nut by using double spanners and torque wrench according to prescribed method. Be sure not to tighten the flare nut too much.**
  Loose flare connection or damage on the flare part by tightening with excess torque can cause burst or refrigerant leaks which may result in lack of oxygen.
- **Do not open the service valves for liquid line and gas line until completed refrigerant piping work, air tightness test and evacuation.**
  If the compressor is operated in state of opening service valves before completed connection of refrigerant piping work, you may incur frost bite or injury from an abrupt refrigerator outflow and air can be sucked into refrigerant circuit, which can cause burst or personal injury due to anomalously high pressure in the refrigerant
- **Only use prescribed optional parts. The installation must be carried out by the qualified installer.**
  If you install the system by yourself, it can cause serious trouble such as water leaks, electric shocks, fire.
- **Do not perform any change of protective device itself or its setup condition**
  The forced operation by short-circuiting protective device of pressure switch and temperature controller or the use of non specified component can cause fire or burst.
- **Be sure to switch off the power supply in the event of installation, inspection or servicing.**
  If the power supply is not shut off, there is a risk of electric shocks, unit failure or personal injury due to the unexpected start of fan. Do not service for at least 5 minutes after turning off the power.
- **Consult the dealer or an expert regarding removal of the unit.**
  Incorrect installation can cause water leaks, electric shocks or fire.
- **Stop the compressor before closing valve and disconnecting refrigerant pipes in case of pump down operation.**
  If disconnecting refrigerant pipes in state of opening service valves before compressor stopping, you may incur frost bite or injury from an abrupt refrigerant outflow and air can be sucked, which can cause burst or personal injury due to anomalously high pressure in the refrigerant circuit.
- **Use an all-pole circuit breaker with a contact gap of 3 mm or more.**
  This provides complete disconnection under Overvoltage Category Ⅲ.
- **Ensure that no air enters in the refrigerant circuit when the unit is installed and removed.**
  If air enters in the refrigerant circuit, the pressure in the refrigerant circuit becomes too high, which can cause burst and personal injury.
- **Do not run the unit with removed panels or protections**
  Touching rotating equipments, hot surfaces or high voltage parts can cause personal injury due to entrapment, burn or electric shocks.
- **Be sure to fix up the service panels.**
  Incorrect fixing can cause electric shocks or fire due to intrusion of dust or water.
- **Do not perform any repairs or modifications by yourself. Consult the dealer if the unit requires repair.**
  If you repair or modify the unit, it can cause water leaks, electric shocks or fire.

⚠ CAUTION

- **Carry out the electrical work for ground lead with care**
  Do not connect the ground lead to the gas line, water line, lightning conductor or telephone line's ground lead. Incorrect grounding can cause unit faults such as electric shocks due to short-circuiting. Never connect the grounding wire to a gas pipe because if gas leaks,it could cause explosion or ignition.
- **Use the circuit breaker for all pole with correct capacity.**
  Using the incorrect circuit breaker, it can cause the unit malfunction and fire.
- **Install isolator or disconnect switch on the power supply wiring in accordance with the local codes and regulations.**
  The isolator should be locked in accordanced with EN60204-1.
- **Take care when carrying the unit by hand.**
  If the unit weights more than 20kg, it must be carried by two or more persons. Do not carry by the plastic straps, always use the carry handle when carrying the unit by hand. Use gloves to minimize the risk of cuts by the aluminum fins.
- **Dispose of any packing materials correctly.**
  Any remaining packing materials can cause personal injury as it contains nails and wood. And to avoid danger of suffocation, be sure to keep the plastic wrapper away from children and to dispose after tear it up.
- **Pay attention not to damage the drain pan by weld spatter when welding work is done near the indoor unit.**
  If weld spatter entered into the indoor unit during welding work, it can cause pin-hole in drain pan and result in water leakage. To prevent such damage, keep the indoor unit in its packing or cover it.
- **Be sure to insulate the refrigerant pipes so as not to condense the ambient air moisture on them.**
  Insufficient insulation can cause condensation, which can lead to moisture damage on the ceiling, floor, furniture and any other valuables.
- **Be sure to perform air tightness test by pressurizing with nitrogen gas after completed refrigerant piping work.**
  If the density of refrigerant exceeds the limit in the event of refrigerant leakage in the small room, lack of oxygen can occur, which can cause serious accidents.
- **Perform installation work properly according to this installation manual.**
  Improper installation can cause abnormal vibrations or increased noise generation.
- **Earth leakage breaker must be installed**
  If the earth leakage breaker is not installed, it can cause fire or electric shocks.
- **Do not use any materials other than a fuse with the correct rating in the location where fuses are to be used.**
  Connecting the circuit with copper wire or other metal thread can cause unit failure and fire.
- **Do not install the unit near the location where leakage of combustible gases can occur.**
  If leaked gases accumulate around the unit, it can cause fire.
- **Do not install the unit where corrosive gas (such as sulfurous acid gas etc.) or combustible gas (such as thinner and petroleum gases) can accumulate or collect, or where volatile combustible substances are handled.**
  Corrosive gas can cause corrosion of heat exchanger, breakage of plastic parts and etc. And combustible gas can cause fire.
- **Secure a space for installation, inspection and maintenance specified in the manual.**
  Insufficient space can result in accident such as personal injury due to falling from the installation place.
- **When the outdoor unit is installed on a roof or a high place, provide permanent ladders and handrails along the access route and fences and handrails around the outdoor unit.**
  If safety facilities are not provided, it can cause personal injury due to falling from the installation place.
- **Do not install nor use the system close to the equipment that generates electromagnetic fields or high frequency harmonics**
  Equipment such as inverters, standby generators, medical high frequency equipments and telecommunication equipments can affect the system, and cause malfunctions and breakdowns. The system can also affect medical equipment and telecommunication equipment, and obstruct its function or cause jamming.
- **Do not install the outdoor unit in a location where insects and small animals can inhabit.**
  Insects and small animals can enter the electric parts and cause damage or fire. Instruct the user to keep the surroundings clean.
- **If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.**
- **Do not use the base flame for outdoor unit which is corroded or damaged due to long periods of operation.**
  Using an old and damage base flame can cause the unit falling down and cause personal injury.
- **This appliance is intended to be used by expert or trained users in shops, in light industry and on farms, or for commercial use by lay persons.**
- **Do not install the unit in the locations listed below**
  ・Locations where carbon fiber, metal powder or any powder is floating.
  ・Locations where any substances that can affect the unit such as sulphide gas, chloride gas, acid and alkaline can occur.
  ・Vehicles and ships
  ・Locations where cosmetic or special sprays are often used.
  ・Locations with direct exposure of oil mist and steam such as kitchen and machine plant.
  ・Locations where any machines which generate high frequency harmonics are used.
  ・Locations with salty atmospheres such as coastlines
  ・Locations with heavy snow (If installed, be sure to provide base flame and snow hood mentioned in the manual)
  ・Locations where the unit is exposed to chimney smoke
  ・Locations at high altitude (more than 1000m high)
  ・Locations with ammonic atmospheres (e.g. organic fertilizer).
  ・Locations with calcium chloride (e.g. snow melting agent).
  ・Locations where heat radiation from other heat source can affect the unit
  ・Locations without good air circulation.
  ・Locations with any obstacles which can prevent inlet and outlet air of the unit
  ・Locations where short circuit of air can occur (in case of multiple units installation)
  ・Locations where strong air blows against the air outlet of outdoor unit
  It can cause remarkable decrease in performance, corrosion and damage of components, malfunction and fire.
- **Do not install the outdoor unit in the locations listed below.**
  ・Locations where discharged hot air or operating sound of the outdoor unit can bother neighborhood.
  ・Locations where outlet air of the outdoor unit blows directly to an animal or plants. The outlet air can affect adversely to the plant etc.
  ・Locations where vibration can be amplified and transmitted due to insufficient strength of structure.
  ・Locations where vibration and operation sound generated by the outdoor unit can affect seriously. (on the wall or at the place near bed room)
  ・Locations where an equipment affected by high harmonics is placed. (TV set or radio receiver is placed within 5m)
  ・Locations where drainage cannot run off safely.
  It can affect surrounding environment and cause a claim
- **The appliance is not to be used 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.**
  ・Children being supervised not to play with the appliance.
  ・This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge, if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.
  ・Children shall not play with the appliance.
  ・Cleaning and user maintenance shall not be made by children without supervision.
- **Do not use the unit for special purposes such as storing foods, cooling precision instruments and preservation of animals, plants or art.**
  It can cause the damage of the items.
- **Do not touch any buttons with wet hands**
  It can cause electric shocks
- **Do not touch any refrigerant pipes with your hands when the system is in operation.**
  During operation the refrigerant pipes become extremely hot or extremely cold depending the operating condition, and it can cause burn injury or frost injury.
- **Do not clean up the unit with water**
  It can cause electric shocks
- **Do not operate the outdoor unit with any article placed on it.**
  You may incur property damage or personal injure from a fall of the article.
- **Do not step onto the outdoor unit.**
  You may incur injury from a drop or fall.
- **Disposal and cleaning of refrigerant should be handled by a qualified specialist.**
  Contact the sales company for details.

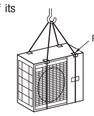
Notabilia as a unit designed for R32

- Do not use any refrigerant other than R32. R32 will rise to pressure about 1.6 times higher than that of a conventional refrigerant.
  A cylinder containing R32 has a pink indication mark on the top.
- A unit designed for R32 has adopted a different size indoor unit operation valve charge port and a different size check joint provided in the unit to prevent the charging of a wrong refrigerant by mistake. The processed dimension of the flared part of a refrigerant pipe and a flare nut's parallel side measurement have also been altered to raise strength against pressure. Accordingly, you are required to arrange dedicated R32 tools listed in the table on the right before installing or servicing this unit.
- Do not use a charge cylinder. The use of a charge cylinder will cause the refrigerant composition to change, which results in performance degradation.
- In charging refrigerant, always take it out from a cylinder in the liquid phase.
- All indoor units must be models designed exclusively for R32. Check connectable indoor unit models in a catalog, etc. (A wrong indoor unit, if connected into the system, will impair proper system operation)

	Dedicated R32 tools
a)	Gauge manifold
b)	Charge hose
c)	Electronic scale for refrigerant charging
d)	Torque wrench
e)	Flare tool
f)	Protrusion control copper pipe gauge
g)	Vacuum pump adapter
h)	Gas leak detector

1. HAULAGE AND INSTALLATION (Take particular care in carrying in or moving the unit, and always perform such an operation with two or more persons.)

⚠ CAUTION When a unit is hoisted with slings for haulage, take into consideration the offset of its gravity center position.
If not properly balanced, the unit can be thrown off-balance and fall.

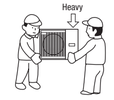


1) Delivery

- Deliver the unit as close as possible to the installation site before removing it from the packaging.
- When some compelling reason necessitates the unpacking of the unit before it is carried in, use nylon slings or protective wood pieces so as not to damage the unit by ropes lifting it.

2) Portage

- The right hand side of the unit as viewed from the front (diffuser side) is heavier. A person carrying the right hand side must take heed of this fact. A person carrying the left hand side must hold with his right hand the handle provided on the front panel of the unit and with his left hand the corner column section.



3) Selection of installation location for the outdoor unit

Be sure to select a suitable installation place in consideration of following conditions.
○ A place where it is horizontal, stable and can endure the unit weight and will not allow vibration transmittance of the unit.
○ A place where it can be free from possibility of bothering neighbors due to noise or exhaust air from the unit.
○ A place where the unit is not exposed to oil splashes.
○ A place where it can be free from danger of flammable gas leakage.
○ A place where drain water can be disposed without any trouble.
○ A place where the unit will not be affected by heat radiation from other heat source.
○ A place where snow will not accumulate.
○ A place where the unit can be kept away 5m or more from TV set and/or radio receiver in order to avoid any radio or TV interference.
○ A place where good air circulation can be secured, and enough service space can be secured for maintenance and service of the unit safely.
○ A place where the unit will not be affected by electromagnetic waves and/or high-harmonic waves generated by other equipment.
○ A place where chemical substances like sulfuric gas, chloric gas, acid and alkali (including ammonia), which can harm the unit, will not be generated and not remain.
○ A place where strong wind will not blow against the outlet air blow of the unit.
○ Do not install the unit in places which exposed to sea breeze (e.g. coastal area) or calcium chloride (e.g. snow melting agent), exposed to ammonia substance (e.g. organic fertilizer).

4) Caution about selection of installation location

(1) If the unit is installed in the area where the snow will accumulate, following measures are required.
The bottom plate of unit and intake, outlet may be blocked by snow.

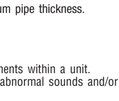
1.Install the unit on the base so that the bottom is higher than snow cover surface, and draining water is secured.



2.Provide a snow hood to the outdoor unit on site.



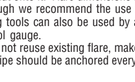
3.Install the unit under eaves or provide the roof on site.



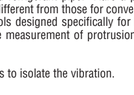
Since drain water generated by defrost control may freeze, following measures are required.
- Don't execute drain piping work by using a drain elbow and drain grommets (accessories). [Refer to Drain piping work.]

(2) If the unit can be affected by strong wind, following measures are required.
Strong wind can cause damage of fan (fan motor), or can cause performance degradation, or can trigger anomalous stop of the unit due to rising of high pressure.

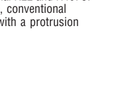
1.Install the outlet air blow side of the unit to face a wall of building, or provide a fence or a windbreak screen.



2.Install the outlet air blow side of the unit in a position perpendicular to the direction of wind.



3.The unit should be installed on the stable and level foundation. If the foundation is not level, tie down the unit with wires.

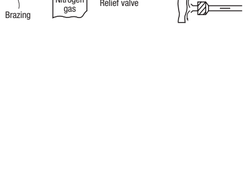


5) Installation space

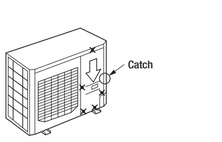
(mm)

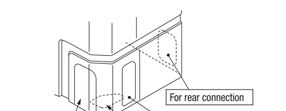
Size \ Example installation	I	II	III
L1	Open	Open	500
L2	300	250	Open
L3	100	150	100
L4	250	250	250

- Walls surrounding the unit in the four sides are not acceptable.
- There must be a 1-meter or larger space in the above.
- When more than one unit are installed side by side, provide a 250mm or wider interval between them as a service space. In order to facilitate servicing of controllers, provide a sufficient space between units so that their top plates can be removed easily.
- Where a danger of short-circuiting exists, install guide louvers.
- When more than one unit are installed, provide sufficient intake space consciously so that short-circuiting may not occur.
- Where piling snow can bury the outdoor unit, provide proper snow guards.



6) Installation





- In installing the unit, fix the unit's legs with bolts specified on the left.
- The protrusion of an anchor bolt on the front side must be kept within 15 mm.
- Securely install the unit so that it does not fall over during earthquakes or strong winds, etc.
- Refer to the left illustrations for information regarding concrete foundations.
- Install the unit in a level area. (With a gradient of 5 mm or less.)
  Improper installation can result in a compressor failure, broken piping within the unit and abnormal noise generation.

7) To run the unit for a cooling operation, when the outdoor temperature is –5°C or lower.

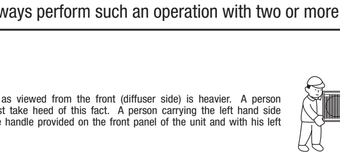
- When the outdoor air temperature is -5°C or lower, provide a snow hood to the outdoor unit on site, so that strong wind will not blow against the outdoor heat exchanger directly. Regarding outline of a snow hood, consult a dealer.

2. REFRIGERANT PIPING WORK

1) Restrictions on unit installation and use

- Check the following points in light of the indoor unit specifications and the installation site.
- Observe the following restrictions on unit installation and use. Improper installation can result in a compressor failure or performance degradation.

Restrictions			Dimensional restrictions	Marks appearing in the drawing on the right
Indoor unit	FDT, FDE, FDU, FDUM, FDUA	Main pipe length	30m or less	L
Elevation difference between indoor and outdoor units		When the outdoor unit is positioned higher	20m or less	H
		When the outdoor unit is positioned lower	20m or less	H



⚠ CAUTION
- The use restrictions appearing in the table above are applicable to the standard pipe size combinations shown in the table below. Where an existing pipe system is utilized, different one-way pipe length restrictions should apply depending on its pipe size. For more information, please see " 5. UTILIZATION OF EXISTING PIPING."

2) Determination of pipe size

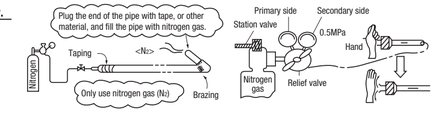
Determine refrigerant pipe size according to the following guidelines based on the indoor unit specifications.

	Gas pipe	Liquid pipe
Outdoor unit connected	ø15.88 Flare	ø9.52 Flare
Refrigerant piping (branch pipe L)	ø15.88	ø9.52
Indoor unit connected	ø15.88	ø9.52

Pipe brazing

Brazing must be performed under a nitrogen gas flow.

Without nitrogen gas, a large quantity of foreign matters (oxidized film) are created, causing a critical failure from capillary tube or expansion valve clogging.



3) Refrigerant pipe wall thickness and material

- Select refrigerant pipes of the table shown on the right wall thickness and material as specified for each pipe size.

NOTE Select pipes having a wall thickness larger than the specified minimum pipe thickness.

Pipe diameter [mm]	ø9.52	ø15.88
Minimum pipe wall thickness [mm]	0.8	1.0
Pipe material*	O-type pipe	O-type pipe

*Phosphorus deoxidized seamless copper pipe ICS 23.040.15, ICS 77.150.30

4) On-site piping work

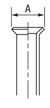
⚠ IMPORTANT Take care so that installed pipes may not touch components within a unit.
If touching with an internal component, it will generate abnormal sounds and/or vibrations.

- Regarding the change in the size of liquid pipe;
  Use the reducer at indoor unit side. Reducer set is available in the outdoor unit as accessory.

How to remove the side cover

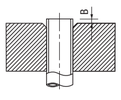
First remove the five screws (× mark) of the service panel and push it down into the direction of the arrow mark and then remove it by pulling it toward you.

- Carry out the on site piping work with the operation valve fully closed.
- Give sufficient protection to a pipe end (compressed and blazed, or with an adhesive tape) so that water or foreign matters may not enter the piping.
- Bend a pipe to a radius as large as practical.(R100–R150) Do not bend a pipe repeatedly to correct its form.
- Flare connection is used between the unit and refrigerant pipe. Flare a pipe after engaging a flare nut onto it. Flare dimensions for R32 are different from those for conventional R22 and R407C. Although we recommend the use of flaring tools designed specifically for R32, conventional flaring tools can also be used by adjusting the measurement of protrusion B with a protrusion control gauge.
  ※Do not reuse existing flare, make new flare.
- The pipe should be anchored every 1.5m or less to isolate the vibration.



Flared pipe end : A (mm)

Copper pipe outer diameter	A 0 –04
ø9.52	13.2
ø15.88	19.7



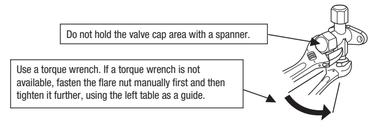
Copper pipe protrusion for flaring : B (mm)

Copper pipe outer diameter	In the case of a rigid (clutch) type	
	With an R32 tool	With a conventional tool
ø9.52	0～0.5	1.0～1.5
ø15.88		

⚠ CAUTION **Do not apply force beyond proper fastening torque in tightening the flare nut.**

Fix both liquid and gas operation valves at the valve main bodies as illustrated on the right, and then fasten them, applying appropriate fastening torque.

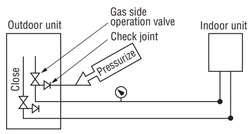
Operation valve size (mm)	Tightening torque (N-m)	Tightening angle (°)	Recommended length of a tool handle (mm)
ø9.52 (3/8")	34～42	30～45	200
ø15.88 (5/8")	68～82	15～20	300



5) Air tightness test

① Although outdoor and indoor units themselves have been tested for air tightness at the factory, check the connecting pipes after the installation work for air tightness from the operation valve's check joint equipped on the outdoor unit side. While conducting a test, keep the operation valve shut all the time.
a) Raise the pressure to 0.5 MPa, and then stop. Leave it for five minutes to see if the pressure drops.
b) Then raise the pressure to 1.5 MPa, and stop. Leave it for five more minutes to see if the pressure drops.
c) Then raise the pressure to the specified level (4.15 MPa), and record the ambient temperature and the pressure.
d) If no pressure drop is observed with an installation pressurized to the specified level and left for about one day, it is acceptable. When the ambient Temperature fall 1℃, the pressure also fall approximately 0.01 MPa. The pressure, if changed, should be compensated for.
e) If a pressure drop is observed in checking e) and a) – d), a leak exists somewhere. Find a leak by applying bubble test liquid to welded parts and flare joints and repair it. After repair, conduct an air-tightness test again.

② In conducting an air-tightness test, use nitrogen gas and pressurize the system with nitrogen gas from the gas side. Do not use a medium other than nitrogen gas under any circumstances.

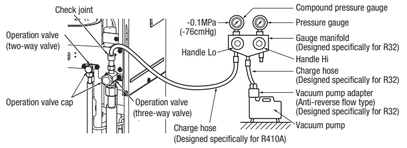


6) Evacuation

<Work flow>

Airtightness test completed
↓
Vacuuming begins
Run the vacuum pump for at least one hour after the vacuum gauge shows -101kPa or lower. (-755mmHg or lower)
↓
Vacuuming completed
Confirm that the vacuum gauge indicator does not rise even if the system is left for one hour or more.
↓
Vacuum gauge check
↓
Fill refrigerant

When the system has remaining moisture inside or a leaky point, the vacuum gauge indicator will rise.
Check the system for a leaky point and then draw air to create a vacuum again.



Pay attention to the following points in addition to the above for the R32 and compatible machines.

○To prevent a different oil from entering, assign dedicated tools, etc. to each refrigerant type. Under no circumstances must a gauge manifold and a charge hose in particular be shared with other refrigerant types (R22, R407C, etc.).
○Use a counterflow prevention adapter to prevent vacuum pump oil from entering the refrigerant system.

Securely tighten the operation valve cap and the check joint blind nut after adjustment.

Operation valve size (mm)	Operation valve cap tightening torque (N·m)	Check joint blind nut tightening torque (N·m)
ø9.52 (3/8")	20～30	10～12
ø15.88 (5/8")	30～40	

7) Additional refrigerant charge

(1) Calculate a required refrigerant charge volume from the following table.

Indoor unit	Additional charge volume (kg) per meter of refrigerant piping (liquid pipe ø9.52)	Refrigerant volume charged for shipment at the factory (kg)	Installation's pipe length (m) covered without additional refrigerant charge
FDT, FDE FDU, FDUM, FDUA	0.054	2.2	15

●This unit contains factory charged refrigerant covering 15m of refrigerant piping and additional refrigerant charge on the installation site is not required for an installation with up to 15m refrigerant piping.
When refrigerant piping exceeds 15m, additionally charge an amount calculated from the pipe length and the above table for the portion in excess of 15m.
●If an existing pipe system is used, a required refrigerant charge volume will vary depending on the liquid pipe size. For further information, please see "5. UTILIZATION OF EXISTING PIPING."
●For an installation measuring 15m or shorter in pipe length, please charge the refrigerant volume charged for shipment at the factory, when you recharge refrigerant after servicing etc.

Formula to calculate the volume of additional refrigerant required

Additional charge volume (kg) = { Main pipe length (m) – Length covered without additional charge 15 (m) } x 0.054 (kg/m)

*When an additional charge volume calculation result is negative, it is not necessary to charge refrigerant additionally.

(2) Charging refrigerant

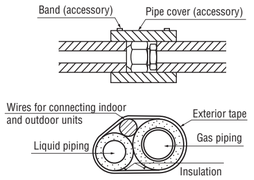
●Since R32 refrigerant must be charged in the liquid phase, you should charge it, keeping the container cylinder upside down or using a refrigerant cylinder equipped with a siphon tube.
●When you find it difficult to charge a required amount, fully open the outdoor unit valves on both liquid and gas sides and charge refrigerant from the gas (suction) side service port, while running the unit in the cooling mode. In doing so, care must be taken so that refrigerant may be discharged from the cylinder in the liquid phase all the time. When the cylinder valve is throttled down or a dedicated conversion tool to change liquid-phase refrigerant into mist is used to protect the compressor, however, adjust charge conditions so that refrigerant will gasify upon entering the unit.
●In charging refrigerant, always charge a calculated volume by using a scale to measure the charge volume.
●When refrigerant is charged with the unit being run, complete a charge operation within 30 minutes.
Running the unit with an insufficient quantity of refrigerant for a long time can cause a compressor failure.

NOTE Put down the refrigerant volume calculated from the pipe length onto the caution label attached on the back side of the service panel.

8) Heating and condensation prevention

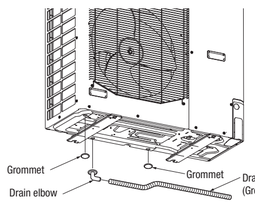
(1) Dress refrigerant pipes (both gas and liquid pipes) for heat insulation and prevention of dew condensation.
· Improper heat insulation/anti-dew dressing can result in a water leak or dripping causing damage to household effects, etc.

(2) Use a heat insulating material that can withstand 120℃ or a higher temperature. Poor heat insulating capacity can cause heat insulation problems or cable deterioration.
· All gas pipes must be securely heat insulated in order to prevent damage from dripping water that comes from the condensation formed on them during a cooling operation or personal injury from burns because their surface can reach quite a high temperature due to discharged gas flowing inside during a heating operation.
· Wrap indoor units' flare joints with heat insulating parts (pipe cover) for heat insulation (both gas and liquid pipes).
· Give heat insulation to both gas and liquid side pipes. Bundle a heat insulating material and a pipe tightly together so that no gaps may be left between them and wrap them together with a connecting cable by a dressing tape.
· **Both gas and liquid pipes need to be dressed with 20 mm or thicker heat insulation materials above the ceiling where relative humidity exceeds 70%.**

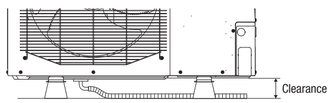


3. DRAIN PIPING WORK

- Execute drain piping by using a drain elbow and drain grommets supplied separately as accessories, where water drained from the outdoor unit is a problem.
- Water may drip where there is a larger amount of drain water. Seal around the drain elbow and drain grommets with putty or adequate caulking material.
- Condensed water may flow out from vicinity of operation valve or connected pipes.
- Where you are likely to have several days of sub-zero temperatures in a row, do not use a drain elbow and drain grommets. (There is a risk of drain water freezing inside and blocking the drain.)
- Do not use drain elbow and grommet made of plastic for drain piping when base heater for outdoor unit is used. Plastic grommet and elbow will be damaged and burnt in worst case.
- Prepare another drain tray made of metallic material for collecting drain when base heater is used.



- When condensed water needs to be led to a drain, etc., install the unit on a flat base (supplied separately as a locally procured part) or concrete blocks.
Then, secure space for the drain elbow and the drain hose.



4. ELECTRICAL WIRING WORK

For details of electrical cabling, refer to the indoor unit installation manual.

PSC012D174C

Electrical installation work must be performed by an electrical installation service provider qualified by a power provider of the country.
Electrical installation work must be executed according to the technical standards and other regulations applicable to electrical installations in the country.

- Do not use any power source cable lighter than one specified in parentheses for each type below.
  - braided cord (code designation 60245 IEC 51)
  - ordinary tough rubber sheathed cord (code designation 60245 IEC 53)
  - flat twin tinsel cord (code designation 60227 IEC 41)
  Use polychloroprene sheathed flexible cord (code designation 60245 IEC57) for power source cables of parts of appliances for outdoor use.
- Ground the unit. Do not connect the grounding wire to a gas pipe, water pipe, lightning rod or telephone grounding wire.
If improperly grounded, an electric shock or malfunction may result.
- A grounding wire must be connected before connecting the power cable. Provide a grounding wire longer than the power source cable.
- The installation of an impulse withstanding type earth leakage breaker is necessary.
A failure to install an earth leakage breaker can result in an accident such as an electric shock or a fire.
- Do not turn on the power until the electrical work is completed.
- Do not use a condensive capacitor for power factor improvement under any circumstances. (It dose not improve power factor, while it can cause an abnormal overheat accident)
- For power source cables, use conduits.
- Do not lay electronic control cables (remote control and signaling wires) and other cables together outside the unit. Laying them together can result in the malfunctioning or a failure of the unit due to electric noises.
- Fasten the cables so that those may not touch the piping, etc.
- When cables are connected, make sure that all electrical components within the electrical component box are free of loose connector coupling or terminal connection and then attach the cover securely. (Improper cover attachment can result in malfunctioning or a failure of the unit, if water penetrates into the box.)
- Never use a shield cable.
- Always use a three-core cable for an indoor-outdoor connecting cable.
Never use a shield cable.
- Connect a pair bearing a common terminal number with an indoor-outdoor connecting wire.
- In cabling, fasten cables securely with cable clamps so that no external force may work on terminal connections.

In case of faulty wiring connection, indoor unit dose not operate. Then, run lamp turns on and timer lamp blinks.

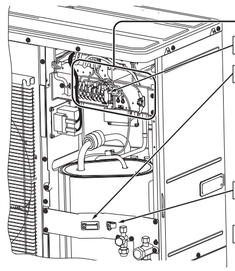
Use cables for interconnection wiring to avoid loosening of the wires. CENELEC code for cables Required field cables.

H05RNR4G1.5 (Example) or 60245IEC57

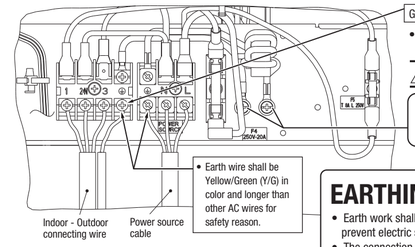
H	Harmonized cable type
05	300/500 volts
R	Natural-and/or synth. rubber wire insulation
N	Polychloroprene rubber conductors insulation
R	Stranded core
4or5	Number of conductors
G	One conductor of the cable is the earth conductor (yellow/green)
1.5	Section of copper wire (mm²)

Main fuse specification

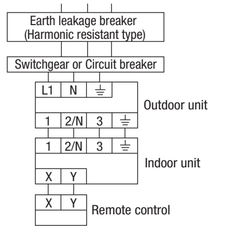
Specification	Part No.
250V 20A	SSA564A136A



Power source cable, indoor - outdoor connecting wire circuit diagram



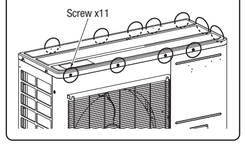
Power source cable, indoor-outdoor connecting wires



When change the Printed circuit board, take off the top panel.

How to remove the top panel

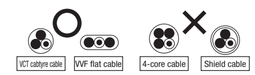
Remove the screws of the top panel.



- Always perform grounding system installation work with the power source cable unplugged.
- Connect a pair bearing a common terminal number with an indoor-outdoor connecting wire.
- In cabling, fasten cables securely with cable clamps so that no external force may work on terminal connections.
- Grounding terminals are provided in the terminal block.

- Use Polychloroprene sheathed flexible cord (code designation 60245 IEC57, IEC60335-2-40) with cross-sectional area of 3.5 mm² for power source cable of outdoor unit.

(POWER SOURCE CABLE)
CENELEC code for cables requiring fields cables.
H05RNR3G3.5



EARTHING WORK

- Earth work shall be carried out without fail in order to prevent electric shock and noise generation.
- The connection of the earth cable to the following substances causes dangerous failures, therefore it shall never be done. (City water pipe, Town gas pipe, TV antenna, lightning conductor, telephoneline, etc.)

CAUTION Always use an earth leakage circuit breaker designed for inverter circuits to prevent a faulty operation.

Power source	Power cable thickness (mm²)	MAX. over current (A)	Cable length (m)	Grounding wire thickness	Indoor -outdoor wire thickness × number
Single phase 3 wire 220-240V 50Hz 220V 60Hz	3.5	18	21	ø1.6	ø1.6x3

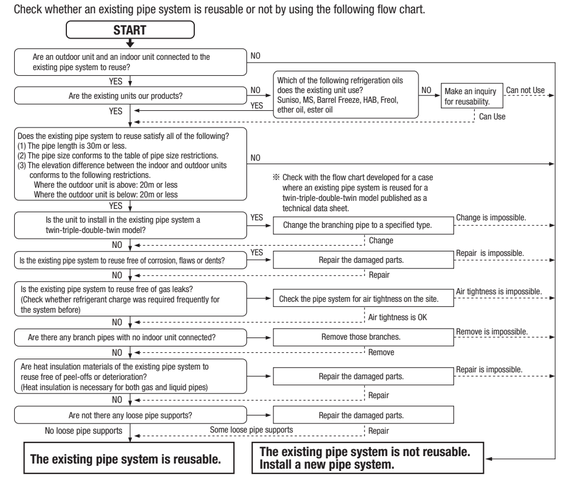
※At the connection with the duct type indoor unit.

Power source	Power cable thickness (mm²)	MAX. over current (A)	Cable length (m)	Grounding wire thickness	Indoor -outdoor wire thickness × number
Single phase 3 wire 220-240V 50Hz 220V 60Hz	3.5	20	19	ø1.6	ø1.6x3

- The specifications shown in the above table are for units without heaters. For units with heaters, refer to the installation instructions or the construction instructions of the indoor unit.
- Switchgear or Circuit breaker capacity which is calculated from maximum over current should be chosen along the regulations in each country.
- The cable specifications are based on the assumption that a metal or plastic conduit is used with no more than three cables contained in a conduit and a voltage drop is 2%. For an installation falling outside of these conditions, follow the internal cabling regulations. Adapt it to the regulation in effect in each country.

5. UTILIZATION OF EXISTING PIPING

Check whether an existing pipe system is reusable or not by using the following flow chart.



<Table of pipe size restrictions>

◎: Standard pipe size ○: Usable △: Restricted to shorter pipe length limits

Additional charge volume per meter of pipe		54g/m	110g/m
Pipe size	Liquid pipe	ø9.52	ø12.7
	Gas pipe	ø15.88	ø15.88
	Usability	◎	△
	Maximum one-way pipe length	30	12
	Length covered without additional charge	15	6

- **Consult with our distributor in the area, if you need to recover refrigerant and charge it again.**
- Any combinations of pipe sizes not listed in the table are not usable.

Formula to calculate additional charge volume

Additional charge volume (g) =
{Main pipe length (m) – Length covered without additional charge shown in the table (m)} X Additional charge volume per meter of pipe shown in the table (g/m)

※ If you obtain a negative figure as a result of calculation, no additional refrigerant needs to be charged.
Example) When an FDC125 is installed in a 10m long existing pipe system (liquid ø12.7, gas ø15.88), the quantity of refrigerant to charge additionally should be (10m–6m) x 110g/m = 440g.

WARNING

<Where the existing unit can be run for a cooling operation.>
Carry out the following steps with the excising unit (in the order of (1), (2), (3) and (4))
(1) Run the unit for 30 minutes for a cooling operation.
(2) Stop the indoor fan and run the unit for 3 minutes for a cooling operation (returning liquid)
(3) Close the liquid side operation valve of the outdoor unit and pump down (refrigerant recovery)
(4) Blow with nitrogen gas. ※ If discolored refrigeration oil or any foreign matters is discharged by the blow, wash the pipe system or install a new pipe system.
  - For the flare nut, do not use the old one, but use the one supplied with the outdoor unit. Process a flare to the dimensions specified for R32.

<Where the existing unit cannot be run for a cooling operation.>
Wash the pipe system or install a new pipe system.
- If you choose to wash the pipe system, contact our distributor in the area.

INSTALLATION TEST CHECK POINTS

Check the following points again after completion of the installation, and before turning on the power. Conduct a test run again and ensure that the unit operates properly.
Explain to the customer how to use the unit and how to take care of the unit following the instruction manual.

After installation

☐ Power cables and connecting wires are securely fixed to the terminal block.
☐ The power source voltage is correct as the rating.
☐ The drain hose is fixed securely.
☐ Operation valve is fully open.
☐ No gas leaks from the joints of the operation valve.
☐ The pipe joints for indoor and outdoor pipes have been insulated.
☐ The screw of the side cover is tightened securely.