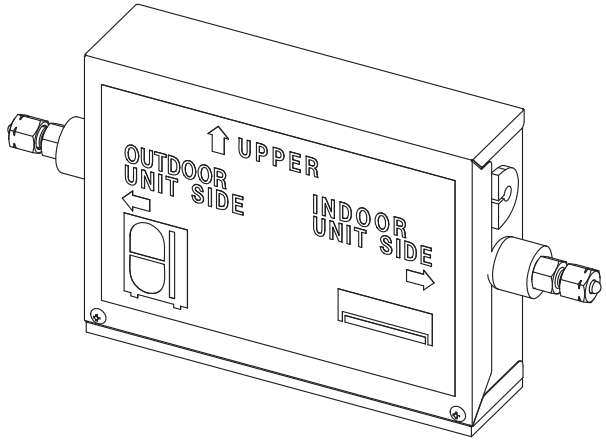
TOSHIBA

R32 or R410A

Installation Manual

PMV Kit

RBM-PMV0361UP-E
RBM-PMV0901UP-E



English

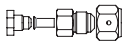
Thank you very much for purchasing TOSHIBA Air conditioner.
Please read this manual carefully before using your PMV Kit.
- Also read the Installation Manual that come with the indoor unit, outdoor unit and optional parts.
- To connect the PMV Kit to an outdoor unit with pipes, a branching joint or header is required. Choose one according to the capacity of the units.

ADOPTION OF R32 OR R410A REFRIGERANT

This Air Conditioner has adopted a refrigerant HFC (R32 or R410A) which does not destroy the ozone layer.
Be sure to check the refrigerant type for outdoor unit to be combined, and then install it.

CONTENTS

ACCESSORY PARTS

Part name	Q'ty RBM-		Shape	Usage
	PMV0361UP-E	PMV0901UP-E		
Installation Manual*	1	1	This manual	(Hand over to customers)
Connection cable (Connected to PMV Kit)	1	1		Connecting cable for PMV control
Heat insulating pipe	2	2		For heat insulating of liquid pipe connection section
Binding band L	2	2		For fixing of PMV Kit
Binding band M	6	6		For fixing of heat insulation pipe For fixing the clamp filter and lead wire
Binding band S	1	1		For bundling of wires
Attached joint and seal pipe	-	2		For connection of Dia.9.5 refrigerant pipes
Clamp filter	2	2		All indoor units
CD-ROM	1	1	-	Installation Manual

*For other languages that do not appear in this Installation Manual, please refer to the enclosed CD-ROM.

1 PRECAUTIONS FOR SAFETY

- Ensure that installation work satisfy all Local, National International regulations.
- Read this “PRECAUTIONS FOR SAFETY” carefully before installation.
- The precautions described below include the important items regarding safety. Observe them without fail.
- After the installation work, perform a test operation to check for any problem.
  Follow the Owner’s Manual to explain how to use and maintain the unit to the customer.
- Turn off the main power supply switch (or breaker) before the unit maintenance.
- Ask the customer to keep the Installation Manual together with the Owner’s Manual.

⚠ WARNING

- **Ask an authorized dealer or qualified installation professional to install / maintain the air conditioner.**
  Inappropriate installation may result in water leakage, electric shock or fire.
- **Turn off the main power supply switch or breaker before attempting any electrical work.**
  Make sure all power switches are off. Failure to do so may cause electric shock.
- **Connect the connecting wire correctly.**
  If the connecting wire is connected in a wrong way, electric parts may be damaged.
- **When moving the air conditioner for the installation into another place, be very careful not to enter any gaseous matter other than the specified refrigerant into the refrigeration cycle.**
  If air or any other gas is mixed in the refrigerant, the gas pressure in the refrigeration cycle becomes abnormally high and it as a result causes pipe burst and injuries on persons.
- **Do not modify this unit by removing any of the safety guards or by by-passing any of the safety interlock switches.**
- **Exposure of unit to water or other moisture before installation may cause a short-circuit of electrical parts.**
  Do not store it in a wet basement or expose to rain or water.
- **After unpacking the unit, examine it carefully if there are possible damage.**
- **Do not install in a place that might increase the vibration of the unit.**
- **To avoid personal injury (with sharp edges), be careful when handling parts.**
- **Perform installation work properly according to the Installation Manual.**
  Inappropriate installation may result in water leakage, electric shock or fire.
- **When the air conditioner is installed in a small room, provide appropriate measures to ensure that the concentration of refrigerant leakage occur in the room does not exceed the critical level.**
- **Install the air conditioner securely in a location where the base can sustain the weight adequately.**
- **Perform the specified installation work to guard against an earthquake.**
  If the air conditioner is not installed appropriately, accidents may occur due to the falling unit.
- **If refrigerant gas has leaked during the installation work, ventilate the room immediately.**
  If the leaked refrigerant gas comes in contact with fire, noxious gas may generate.
- **After the installation work, confirm that refrigerant gas does not leak.**
  If refrigerant gas leaks into the room and flows near a fire source, such as a cooking range, noxious gas might generate.

- **Electrical work must be performed by a qualified electrician in accordance with the Installation Manual. Make sure the air conditioner uses an exclusive power supply.**
  An insufficient power supply capacity or inappropriate installation may cause fire.
- **Use the specified wires to connect them to the terminals. Securely fix them so that the external tension to the wires do not affect the connecting part of the terminals.**
- **Conform to the regulations of the local electricity company when wiring the power supply.**
  Inappropriate grounding may cause electric shock.
- **Do not install the air conditioner in a location subject to a risk of exposure to a combustible gas.**
  If a combustible gas leaks, and stays around the unit, a fire may occur.

⚠ CAUTION

- **This Air Conditioner has adopted a refrigerant HFC (R32 or R410A) which does not destroy the ozone layer.**
  - As the R32 or R410A refrigerant is easily affected by impurities such as moisture, oxidized film, oil, etc., due to the high pressure, be careful not to allow the moisture, dirt, existing refrigerant, refrigerating machine oil, etc., to get mixed up in the refrigeration cycle during the installation work.
  - A special tool for the R32 or R410A refrigerant is required for installation.
  - Use a new and clean piping materials for the connecting pipe so that moisture and dirt are not mixed together during the installation work.

- **Tighten flare nuts using a torque wrench according to the specified method.**
  If the flare nuts are tightened too much, they may later break and cause refrigerant leak.
- **Wear protective gloves during installation.**
  Failure to wear the gloves causes an injury on your hands through contact with parts.

■ Precautions for using R32 refrigerant

The basic installation work procedures are the same as conventional refrigerant (R410A, R22) models.
However, Please read through this manual after understanding the contents below; These safety cautions describe important matters concerning safety to prevent injury to users or other people and damages to property. Please read through this manual after understanding the contents below (meanings of indications), and be sure to follow the description;

	**WARNING** (Risk of fire)	This mark is for R32 refrigerant only. In case that refrigerant type is R32, this unit uses a flammable refrigerant. If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.
	Read the OWNER'S MANUAL carefully before operation.	
	Service personnel are required to carefully read the OWNER'S MANUAL and INSTALLATION MANUAL before operation.	
	Further information is available in the OWNER'S MANUAL, INSTALLATION MANUAL, and the like.	

⚠ WARNING

- Models that use refrigerant R32 and R410A have a different charging port thread diameter to prevent erroneous charging with refrigerant R22 and for safety.
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliance shall be stored in a room without continuously operating ignition sources. (For example: open flames, an operating gas appliance or an operating electric heater.)
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odor.
- The manufacturer may provide other suitable examples or may provide additional information about the refrigerant odor.

⚠ CAUTION

When a flammable refrigerant is used, all appliances shall be charged with refrigerant at the manufacturing location or charged on site as recommended by the manufacturer. A part of an appliance that is charged on site, which requires brazing or welding in the installation shall not be shipped with a flammable refrigerant charge. Joints made in the installation between parts of the refrigerating system, with at least one part charged, shall be made in accordance with the following.

- A brazed, welded, or mechanical connection shall be made before opening the valves to permit refrigerant to flow between the refrigerating system parts. A vacuum valve shall be provided to evacuate the interconnecting pipe and/or any uncharged refrigerating system part.
- Mechanical connectors used indoors shall comply with ISO 14903. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re-fabricated.

- Refrigerant tubing shall be protected or enclosed to avoid damage. Flexible refrigerant connectors (such as connecting lines between the indoor and outdoor unit) that may be displaced during normal operations shall be protected against mechanical damage.

General (Installation space / area)

- The installation of pipe-work shall be kept to a minimum.
- Pipe-work shall be protected from physical damage.
- The compliance with national gas regulations shall be observed.
- The mechanical connections shall be accessible for maintenance purposes.
- In cases that require mechanical ventilation, ventilation openings shall be kept clear of obstruction.
- When disposing of the product is used, be based on national regulations with properly processed.
- The servicing shall be performed only as recommended by the manufacturer.
- Where the appliance using flammable refrigerants is installed, Be aware that;
  - The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
  - The appliance shall be stored in a room without continuously operating open flames (for example an operating gas appliance) and ignition sources (for example an operating electric heater).
  - The appliance shall be stored so as to prevent mechanical damage from occurring.
- Equipment piping in the occupied space shall be installed in such a way to protect against accidental damage in operation and service.
- Precautions shall be taken to avoid excessive vibration or pulsation to refrigerating piping.

- Protection devices, piping and fittings shall be protected as far as possible against adverse environmental effects, for example, the danger of water collecting and freezing in relief pipes or the accumulation of dirt and debris.
- Provision shall be made for expansion and contraction of long runs of piping.
- Piping in refrigerating systems shall be so designed and installed to minimize the likelihood hydraulic shock damaging the system.
- Solenoid valves shall be correctly positioned in the piping to avoid hydraulic shock.
- Solenoid valves shall not block in liquid refrigerant unless adequate relief is provided to the refrigerant system low pressure side.
- Steel pipes and components shall be protected against corrosion with a rustproof coating before applying any insulation.
- Flexible pipe elements shall be protected against mechanical damage, excessive stress by torsion, or other forces. They should be checked for mechanical damage annually.
- The indoor equipment and pipes shall be securely mounted and guarded such that accidental rupture of equipment cannot occur from such events as moving furniture or reconstruction activities.
- Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected.

Unventilated area

- The appliance shall be stored so as to prevent mechanical damage from occurring.

Information on servicing

1. **Check to the area**
   - Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the refrigerating system, the precautions in item 2 to 6 shall be complied with prior to conducting work on the system.
2. **Work procedure**
   - Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapour being present while the work is being performed.
3. **General work area**
   - All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out.
   - Work in confined spaces shall be avoided.
   - The area around the workspace shall be sectioned off.
   - Ensure that the conditions within the area have been made safe by control of flammable material.
4. **Checking for presence of refrigerant**
   - The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres.
   - Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non sparking, adequately sealed or intrinsically safe.
5. **Presence of fire extinguisher**
   - If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available on hand.
   - Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

6. **No ignition sources**
   - No person carrying out work in relation to a refrigeration system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.
   - All possible ignition sources including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space.
   - Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.
7. **Ventilated area**
   - Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.
   - A degree of ventilation shall continue during the period that the work is carried out.
   - The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.
8. **Checks to the refrigeration equipment**
   - Where electrical components are being changed, installer shall be fit for the purpose and to the correct specification.
   - At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt consult the manufacturer's technical department for assistance.
   - The following checks shall be applied to installations using flammable refrigerants.
     - The charge size is in accordance with the room size within which the refrigerant containing parts are installed.
     - The ventilation machinery and outlets are operating adequately and are not obstructed.
     - If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.

- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
- Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

9. Checks to electrical devices

- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures.
- If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with.
- If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.
- Initial safety checks shall include;
  - That capacitors are discharged to avoid possibility of sparking.
  - That there no live electrical components and wiring are exposed while charging, recovering or purging the system.
  - That there is continuity of earth bonding.

10. Repairs to sealed components

- During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc.
- If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected.
- This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
- Ensure that apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres.
- Replacement parts shall be in accordance with the manufacturer's specifications.

NOTE

The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

11. Repair to intrinsically safe components

- Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.
- Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere.
- The test apparatus shall be at the correct rating.
- Replace components only with parts specified by the manufacturer.
- Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

12. Cabling

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects.
- Check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

13. Detection of flammable refrigerants

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks.
- A halide torch (or any other detector using a naked flame) shall not be used.
- Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.)
- Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.
- Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.
- Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode containing chlorine.
- If a leak is suspected, all naked flames shall be removed/ extinguished.
- If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

14. Leak detection methods

- Electronic leak detectors shall be used to detect flammable refrigerants leak, but the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.)
- Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.
- Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25% maximum) is confirmed.
- Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
- If a leak is suspected, all naked flames shall be removed/ extinguished.
- If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.
- Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

15. Removal and evacuation

- When breaking into the refrigerant circuit to make repairs or for any other purpose, Conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consideration.The following procedure shall be adhered to:
  - remove refrigerant;
  - purge the circuit with inert gas;
  - evacuate;
  - purge again with inert gas;
  - open the circuit by cutting or brazing;
- The refrigerant charge shall be recovered into the correct recovery cylinders.
- The system shall be “Flushed” with OFN to render the unit safe.
- This process may need to be repeated several times.
- Compressed air or oxygen shall not be used for purging refrigerant systems.

- Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.
- This process shall be repeated until no refrigerant is within the system.
- When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.
- This operation is absolutely vital if brazing operations on the pipe-work are to take place.
- Ensure that the outlet for the vacuum pump is not close to any ignition sources and that ventilation available.

16. Charging procedures

- In addition to conventional charging procedures, the following requirements shall be followed.
  - Ensure that contamination of different refrigerants does not occur when using charging equipment.
  - Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
  - Cylinders shall be kept upright.
  - Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
  - Label the system when charging is complete (if not already).
  - Extreme care shall be taken not to overfill the refrigeration system.
- Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas.
- The system shall be leak tested on completion of charging but prior to commissioning.
- A follow up leak test shall be carried out prior to leaving the site.

17. Decommissioning

- Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its details.
- It is recommended good practice that all refrigerants are recovered safely.
- Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required to reuse of reclaimed refrigerant.
- It is essential that electrical power is available before the task is commenced.

a) Become familiar with the equipment and its operation.
b) Isolate system electrically.
c) Before attempting the procedure ensure that:
- Mechanical handling equipment is available, if required, for handling refrigerant cylinders;
- All personal protective equipment is available and being used correctly;
- The recovery process is supervised at all times by a competent person;
- Recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.
e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
f) Make sure that cylinder is situated on the scales before recovery takes place.
g) Start the recovery machine and operate in accordance with manufacturer's instructions.
h) Do not overfill cylinders. (No more than 80% volume liquid charge.)
i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

18. Labelling

- Equipment shall be labelled stating that it has been decommissioned and emptied of refrigerant.
- The label shall be dated and signed.
- Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

19. Recovery

- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.
- When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed.
- Ensure that the correct number of cylinders for holding the total system charge are available.
- All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).
- Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order.
- Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriated refrigerants.
- In addition, a set of calibrated weighing scales shall be available and in good working order.

- Hoses shall be complete with leak-free disconnect couplings and in good condition.
- Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release.
- Consult manufacturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged.
- Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.
- The evacuation process shall be carried out prior to returning the compressor to the suppliers.
- Only electric heating to the compressor body shall be employed to accelerate this process.
- When oil is drained from a system, it shall be carried out safely.

2 INSTALLATION OF R32 OR R410A REFRIGERANT AIR CONDITIONER

This PMV Kit adopts the HFC refrigerant (R32 OR R410A) which does not deplete the ozone layer.
Be sure to read and follow the Installation Manuals for indoor and outdoor units for precautions regarding the characteristics of the refrigerant, the tools used, and the refrigerant piping. It is different from the conventional refrigerant (R22).

■ Refrigerant piping

- Piping material used for the conventional refrigerant cannot be used.
- Use copper pipe with 0.8 mm or more thickness for Dia.6.4, Dia.9.5, Dia.12.7 mm.
- Flare nut and flare works are also different from those of the conventional refrigerant. Take out the flare nut attached to the unit of the air conditioner, and use it.

3 SELECTION OF INSTALLATION PLACE

⚠ CAUTION

Do not install the air conditioner at place where combustible gas may leak.
If gas leaks and is collected at surrounding the unit, the production of fire may be caused.

Upon customer's approval, install the air conditioner at a place which satisfies the following conditions.

- Place where it can be installed horizontally.
- Place which can reserve a service space for safe maintenance or check.
- Place where there is no problem even if the drained water flows.
- Place which can be soundproofed (above the ceiling, etc.).
  * Use ceiling board materials with highly soundproof effect (drywalls, etc.).
  Do not install the unit outside; otherwise a trouble may be caused.
- Place where a check opening can be provided.

Avoid installing in the following places.

- Salty place (seaside area) or place with much gas sulfide (hot spring area)
  (If selecting such a place, a special maintenance is required.)
- Place where oil (including machine oil), steam, oil smoke or corrosive gas generates.
- Place where a device generating high frequency (inverter, non-utility generator, medical apparatus, or communication equipment) is set.
  (A bad influence may generate by malfunction of the air conditioner, control trouble, or noise for such equipment.)
- Place where there are something that must not become wet under the unit installed.
  * When the humidity reaches 80% or more, water droplets may fall from the unit, causing the property damage.
- Place where an organic solvents is used.
- Place near a door or window exposed to high humidity outside air.
  (Dew dropping may form.)
- Place where special spray is used frequently.
- Apply electric insulation between metal section of the building and metal section of the air conditioner in conformance with the Local Regulation.

Caution when installing the PMV Kit at a place with low background noise
This PMV Kit has a built-in pulse motor valve (expansion valve), generating refrigerant sounds during operation. Thus, avoid installing it in the following rooms with low background noise and install it in isolated spaces from a living space.

- Room with low background noise: bedrooms, hospital rooms, or hotel rooms.
- Room without ceiling boards where the PMV Kit is not isolated from living space.
- Room with opening part on the ceiling.

■ PMV Kit outline

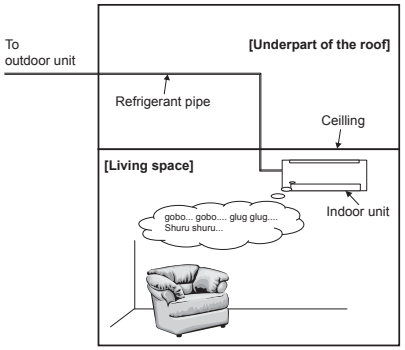
Purpose of using

In the case of very quiet room, and also very nervous for indoor unit noise level, PMV Kit should be installed before indoor unit which should become lower noise level.
Multi-indoor units have Pulse Motor Valve (PMV) for control refrigerant flow.
Multi-air conditioner, in unstable condition, for example starting time, flowing noise of refrigerant or defrosting time can be heard conspicuously.
This refrigerant noise mainly comes from PMV. Especially in very quiet room, for example bed room, somebody feels uncomfortable for this refrigerant noise from PMV.
Main purpose of PMV Kit restrains refrigerant noise which comes from PMV installed in indoor unit.

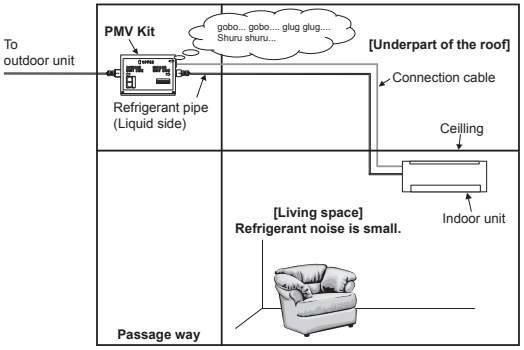
PMV Kit should be installed at out of residence area, for example back of ceiling board or along passage way.
After installed PMV Kit, control function of refrigerant shifts to PMV of PMV Kit and PMV in indoor unit is not used.
After that, refrigerant noise of PMV will be coming from back ceiling board, and refrigerant noise of indoor unit may be restrained.

Image of installation

Without PMV Kit



With PMV Kit



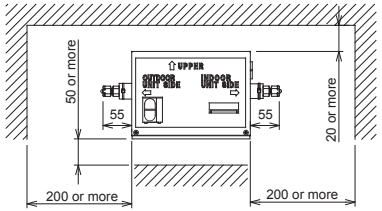
■ Installation space

- Make space for installation and service. (Make space to the electrical parts box cover side for service.)
- When installing the unit inside the ceiling, be sure to create a check port.
  The check port is required when the unit is installed and serviced. (Check port: 450 × 450 or more)
- Keep a clearance of 20 mm or more between the top panel of the unit and the ceiling.
- The length of a connection pipe to the indoor unit should be 2 m to 10 m.

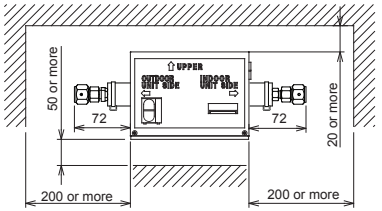
Installation space

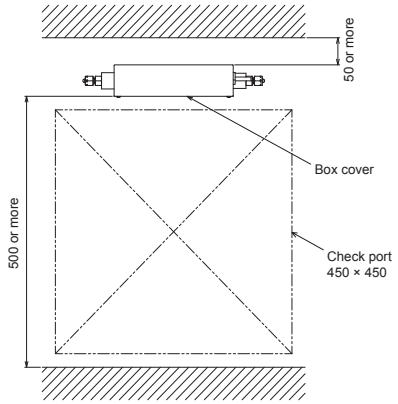
(Unit: mm)

RBM-PMV0361UP-E, RBM-PMV0901UP-E



RBM-PMV0901UP-E (When attached joint is used)





4 INSTALLATION OF PMV KIT

⚠ WARNING

Install the unit securely in the place to sufficiently withstand the weight of the unit.
If the foundation is not sturdy enough, the unit may fall and cause personal injury.

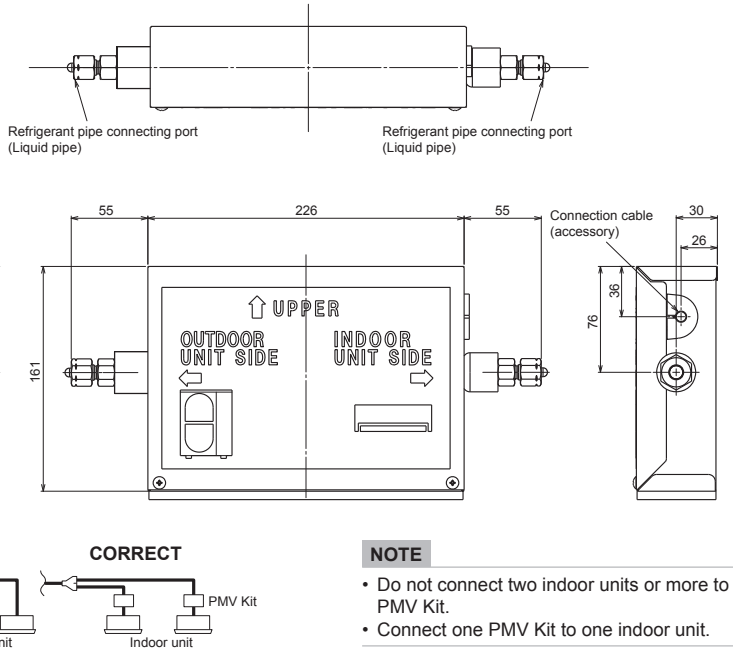
Perform a specified installation work to guard against earthquake.
Improper installation may cause the unit to fall.

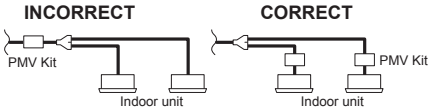
REQUIREMENT

To prevent damage on the PMV Kit or personal injury, follow the instructions below.
- Do not step, or put any heavy object on the packed PMV Kit.
- When carrying the PMV Kit, hold the two hanging brackets and be careful not to apply excessive force to the refrigerant pipes.

External view

(Unit: mm)





NOTE
- Do not connect two indoor units or more to one PMV Kit.
- Connect one PMV Kit to one indoor unit.

5 REFRIGERANT PIPING

⚠ WARNING

If refrigerant gas has leaked during the installation work, ventilate the room immediately.
If the leaked refrigerant gas comes in contact with fire, noxious gas may be generated.

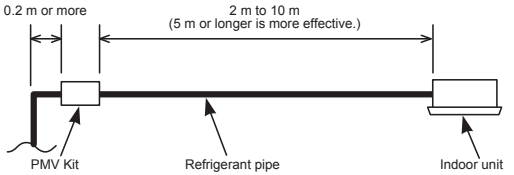
After the installation work, confirm that refrigerant gas does not leak.
If refrigerant gas leaks into the room and flows near a fire source, such as a fan heater, cooking stove or heating unit, noxious gas may be generated.

REQUIREMENT

- In case of a long pipe, provide support brackets with interval of 1.5 - 2 m in order to prevent noise from the pipe.
- When installing the PMV Kit, provide support brackets on the pipe at the both side of the PMV Kit to fix it regardless of the pipe length.
  *For the details, refer to the 6 FIXATION AFTER CONNECTION PIPES (page 15) in this manual.

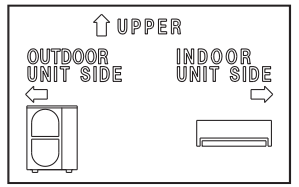
■ Allowable length of refrigerant piping

The straight pipe section should be at least 0.2 m as shown in the figure below.
* Short length of the straight pipe section may cause abnormal sounds.

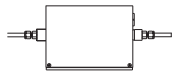


- **Connecting direction of refrigerant pipe**
  When connecting pipes, be careful of direction of the main unit.
  Be sure to install the main unit so that
  [⇧ UPPER] mark on the label directs upward.
  For connection of the refrigerant pipes, follow the arrow mark on the label and connect pipes after confirming directions of the indoor unit and the outdoor unit.

Label

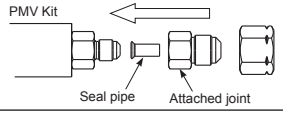


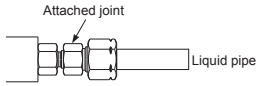
Piping material and dimensions

Model name	Indoor unit capacity type	Diameter of refrigerant pipe	Notes
RBM-PMV0361UP-E	003, 005, 007, 009, 012 type	6.4	
RBM-PMV0901UP-E	014, 015, 018 type	6.4	
	020, 024, 027, 030, 034 type	9.5	

⚠ CAUTION

When connecting Dia.9.5 refrigerant pipes, be sure to insert a seal pipe between PMV main unit and the joint.
If the seal pipe is not inserted, refrigerant leakage is caused.

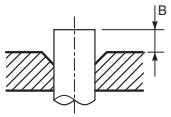




■ Pipe forming / End positioning

◆ Flaring

1. Cut the pipe with a pipe cutter.
   Remove burrs completely.
   Remaining burrs may cause gas leakage.
2. Insert a flare nut into the pipe, and flare the pipe.
   As the flaring sizes of R32 or R410A differ from those of refrigerant R22, the flare tools newly manufactured for R32 or R410A are recommended.
   However, the conventional B tools can be used by adjusting projection margin of the copper pipe.



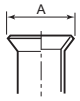
▼ Projection margin in flaring: B (Unit: mm)

RIDGID (Clutch type)

Outside diameter size	R32 or R410A tool used	Conventional tool used
6.4, 9.5	0 - 0.5	1.0 - 1.5

▼ Flaring diameter size: A (Unit: mm)

Outside diameter size	$A^{+0}_{-0.4}$
6.4	9.1
9.5	13.2



⚠ CAUTION

- Do not scratch the inner surface of the flared part when removing burrs.
- Flare processing under the condition of scratches on the inner surface of flare processing part will cause refrigerant gas leak.
- Check that the flared part is not scratched, deformed, stepped, or flattened, and that there are no chips adhered or other problems, after flare processing.
- Do not apply refrigerating machine oil to the flare surface.

■ Connection of refrigerant pipe

Connect all the refrigerant pipes with flare connecting work.

⚠ CAUTION

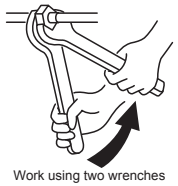
Do not apply excessive torque. Otherwise, the nut may crack depending on the conditions.

Unit: N•m

Outside diameter size	Tightening torque
6.4 mm	14 - 18
9.5 mm	34 - 42

▼ Tightening torque of flare pipe connections

Incorrect connections may cause not only a gas leak, but also a trouble of the refrigeration cycle.
Align the centers of the connecting pipes and tighten the flare nut as far as possible with your fingers. Then tighten the nut with wrenches and torque wrench as shown in the figure.



Work using two wrenches

REQUIREMENT

Tightening with an excessive torque may crack the nut depending on installation conditions.
Tighten the nut within the specified tightening torque.

■ Airtight test / Air purge, etc.

For airtight test, air purge, addition of refrigerant, and gas leak check, follow the Installation Manual attached to the outdoor unit.

REQUIREMENT

Be sure to use the tool such as charge hose exclusive to R32 or R410A.
Do not turn on the power until the airtight test and the vacuuming have finished.
(If turning on the power, the incorporated PMV is closed fully and the period until the vacuuming finishes elongates.)

■ Open fully valves of the outdoor unit

Open the valve fully

Open the valve of the outdoor unit fully. A 4 mm-hexagonal wrench is required for opening the valve.
For details, refer to the Installation Manual attached to the outdoor unit.

■ Gas leak check

Check with a leak detector or soap water whether gas leaks or not, from the pipe connecting section or cap of the valve.

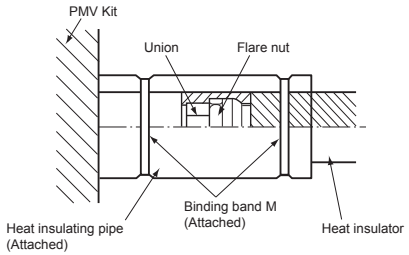
REQUIREMENT

Use a leak detector manufactured exclusively for HFC refrigerant (R32 or R410A, R134a, etc.).

■ Heat insulating process

Perform heat insulating for pipes at liquid side and gas side separately.
In cooling time, temperature at both liquid and gas sides becomes lower.
Therefore, perform heat insulating process sufficiently to avoid dewing.

- For heat insulator of pipe at gas side, be sure to use one with heat-resisting temp. 120°C or more.
- Using the attached heat insulating pipe, perform heat insulating process securely for pipe connecting part of the PMV Kit without clearance.

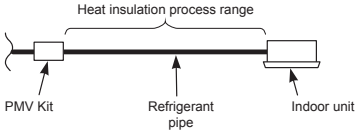


REQUIREMENT

Apply the heat insulation to the pipe connecting section of the PMV Kit securely up to the root without exposure of the pipe. (The pipe exposed outside causes water leak.)

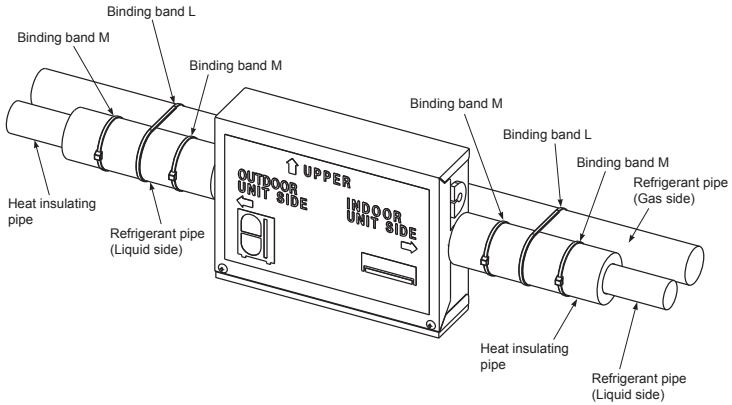
⚠ CAUTION

Apply an extra heat insulation to the liquid pipe between the PMV Kit and the indoor unit depending on using environment. Failure to do so forms condensation around the pipe, causing water droplets.

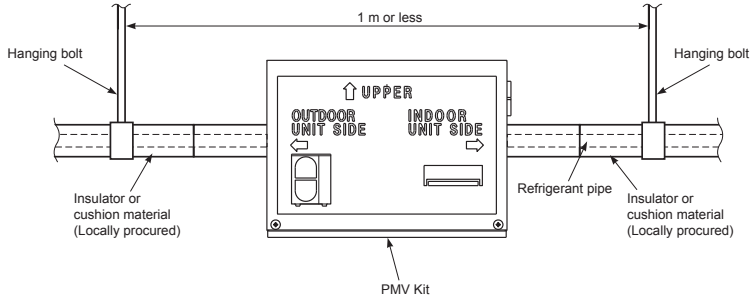


6 FIXATION AFTER CONNECTION PIPES

1. After connection to pipes, fix the PMV Kit using the attached binding band so that it is held closely to the gas pipe.

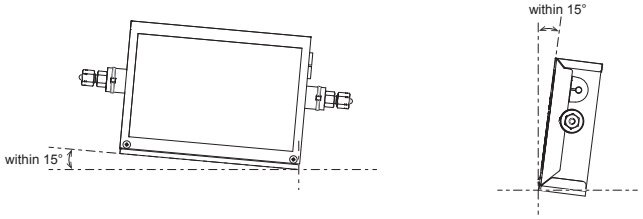


2. To avoid propagation of sound or vibration, wrap cushion material around the liquid pipes of PMV Kit, and then set with the hanging bolts within 1 m intervals. Also, when mounting PMV Kit on the wall, put the cushion material between PMV Kit and the wall to avoid propagation of sound and vibration.



NOTE

- Install PMV Kit as illustrated within 15 degree vertically and horizontally, respectively.



7 ELECTRIC WORK

⚠ WARNING

1. Using the specified wires, ensure to connect the wires, and fix wires securely so that the external strength of the wires do not transmit to the connecting part of the terminals.
Incomplete connection or fixation may cause fire, etc.

2. For electric work, strictly follow to the Local Regulation in each country and the Installation Manual, and use an exclusive circuit.
Capacity shortage of power circuit or incomplete installation may cause an electric shock or fire.

REQUIREMENT

- Perform the electric wiring so that it does not come to contact with the high-temperature part of the pipe. The coating may melt resulted in an accident.
- After connecting wires to the terminal blocks, provide a trap and fix wires with the wire clamp.
- Store the refrigerant piping line and control wiring line in the same line.
- Do not turn on the power of the indoor unit until vacuuming of the refrigerant pipes completes.

■ Wire connections

REQUIREMENT

- Check that power is not supplied to the indoor unit before connecting wires.
- Be sure to put wires through the wire connecting ports on the PMV Kit and the indoor unit.
- If a PMV connector cannot be connected to the P.C. board connector (CN82) in an indoor unit, the PMV Kit may be unavailable to the indoor unit.
- Contact the dealer from whom you purchased the air conditioner to check the applicability to the PMV Kit.

Install the attached clamp filter (Accessory)

Remove an existing PMV lead wire connecting to the connector (CN82) on the P.C. board in the indoor unit, and replace it with the PMV Kit connection wire (approximately 11 m).
For details of installation, see **Work procedure 1, 2 and 3** on the next page.

● Work procedure 1

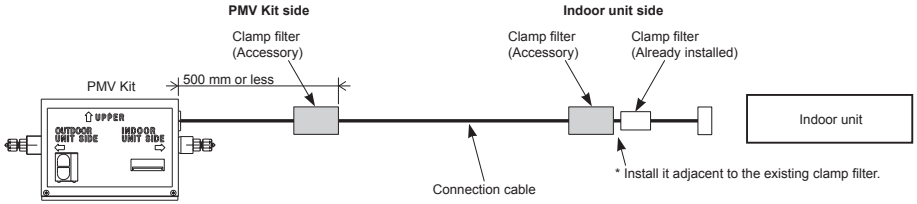
■ Applicable model: High wall type MMK-UP＊＊＊1H＊ and MMK-UP＊＊＊1DHPL＊ series

<PMV Kit connection wiring method>

- To comply with the EMC (Electromagnetic Compatibility) standards, be sure to use the clamp filters that are supplied accessories.

Clamp filter installation positions

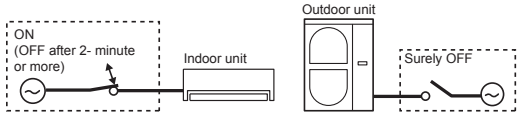
- PMV Kit side: A position 500 mm or less away from the shell of the PMV Kit body.
- Indoor unit side: A position between the PMV Kit body and the existing clamp filter and adjacent to the existing clamp filter.



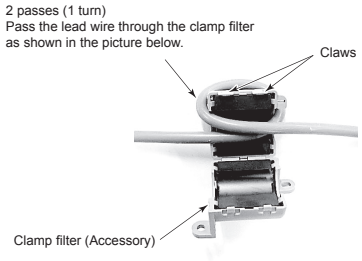
High wall without PMV (MMK-UP＊＊＊1H＊1 and MMK-UP＊＊＊1DHPL＊) omits step 1) and 2).

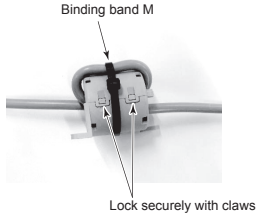
1) After the outdoor unit has been turned off, turn on power supply of the indoor unit only and open fully the pulse motor valve (PMV) built in the indoor unit.
Turn on power supply of the indoor unit only under the condition that power supply of the outdoor unit is OFF.
* If power supply of the outdoor unit is turned on, the PMV of the indoor unit is not fully opened.
* Do not operate the remote controller until the PMV opens fully.

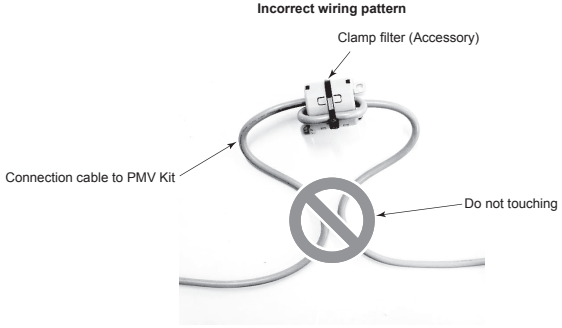
2) When 2 minutes or more passed after turning on power supply of the indoor unit, turn off power supply of the indoor unit.



3) Be sure to install a clamp filter (accessory) on the PMV Kit side and another clamp filter (accessory) on the indoor unit side.
① Take off claws of the clamp filter at 2 positions.
② Pass the connection cable 2 times from the PMV Kit main body around the inner part of the clamp filter.
③ Tighten claws of the clamp filter securely and then lock it.
④ Use the attached binding band to bundle the clamp filter together with connection cable.





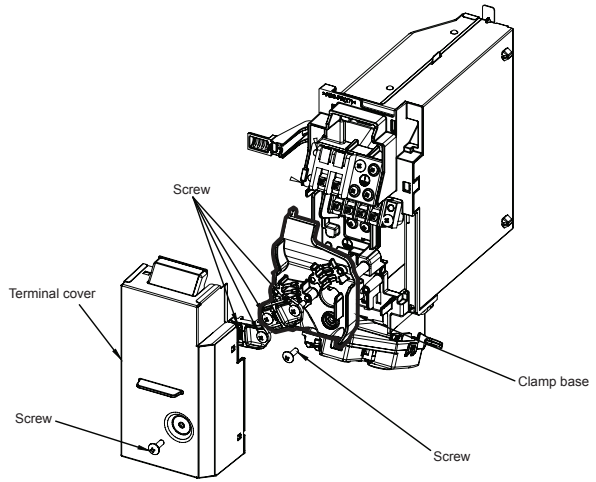


NOTE

- Route the cable in such a way that its portions before and after the clamp filter do not come into contact with each other.
- When an air-conditioner is operated, with a clamp filter (accessories) not attached, it may become the malfunction of an electronic device and the cause of failure in the circumference.

(For MMK-UP＊＊＊1H＊ Series)

1) After turning off the power supply, remove the terminal cover and the clamp base.

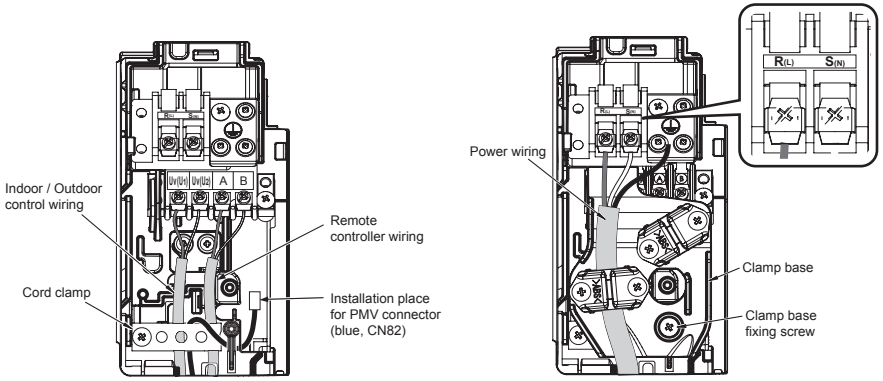


<Removing the terminal cover and the clamp base>

2) Replace the PMV connector built in the indoor unit with the connection cable of PMV Kit.
The lock mechanism is provided at side of PMV connector. Remove the connector by releasing the lock mechanism.

3) The connector of PMV Kit connecting cable is inserted in an indoor unit connector (CN82).

4) Fix the connection cable of PMV Kit with cord clamp for Indoor / Outdoor control wiring and remote controller wiring.

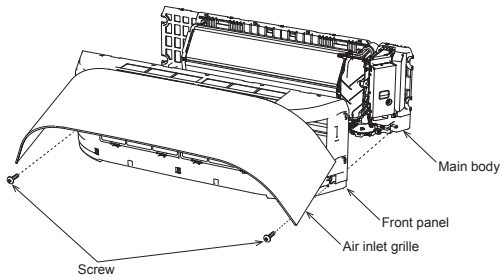


<Connecting connection cable of PMV Kit.>

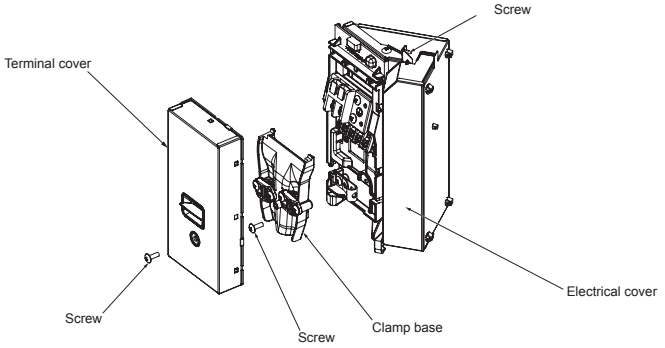
5) Mount the terminal cover and then the work completes.

(For MMK-UP＊＊＊1DHPL＊ Series)

1) After turning off the power supply, remove the front panel and air inlet grille by removing 2 screws securing then secure remove the front panel and air inlet grille from the main body.

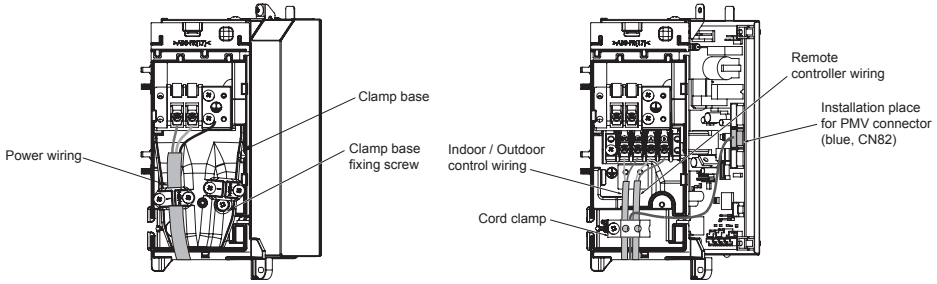


2) Remove the terminal cover, clamp base and electric cover by loosen screw 3 places.



3) The connector of PMV connecting cable is inserted in an indoor unit connector (CN82)

4) Fix the connection cable of PMV Kit with cord clamp for Indoor/Outdoor control wiring and remote controller wiring.



<Connecting connection cable of PMV Kit>

5) Attach the electric cover, clamp base, terminal cover, front panel and air inlet grille by reversing the procedure of its removal.

● Work procedure 2

■ Applicable model:

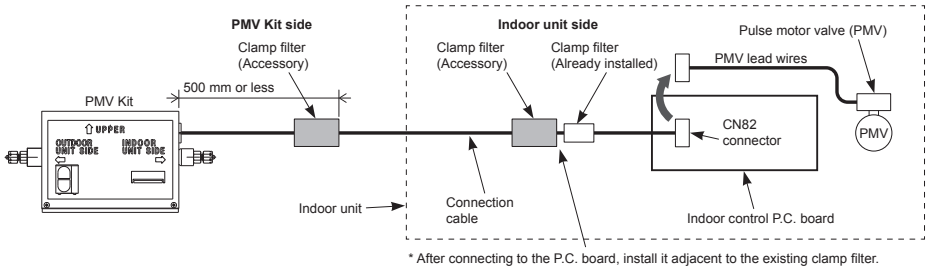
Standard Duct type MMD-UP＊＊＊1BH＊series,
Concealed Duct High Static Pressure type
MMD-UP＊＊＊1H＊series, Compact 4-way Cassette type
MMU-UP＊＊＊1MH＊series

<PMV Kit connection wiring method>

- To comply with the EMC (Electromagnetic Compatibility) standards, be sure to use the clamp filters that are supplied accessories.

Clamp filter installation positions

- PMV Kit side: A position 500 mm or less away from the shell of the PMV Kit body.
- Indoor unit side: A position between the PMV Kit body and the existing clamp filter and adjacent to the existing clamp filter.



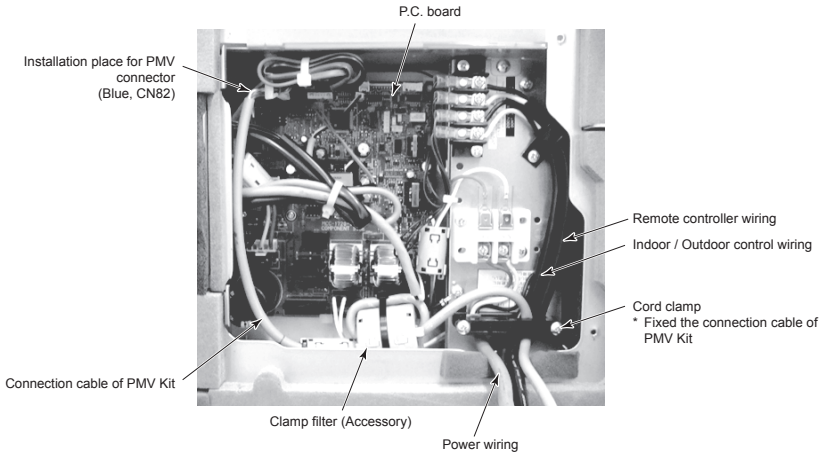
＊ After connecting to the P.C. board, install it adjacent to the existing clamp filter.

1) ~2) Perform the same process as 1) and 2) of Work procedure 1.
3) Be sure to install a clamp filter (accessory) on the PMV Kit side. The operation in this step is the same as the operation in step 3) of Work procedure 1.
4) Open the electrical parts box cover of the indoor unit after power-off and then process wiring work. For details, refer to the Installation Manual attached to the indoor unit.
5) Replace the PMV connector built in the indoor unit with the connection cable of PMV Kit. The lock mechanism is provided at side of PMV connector. Remove the connector by releasing the lock mechanism.
6) Be sure to install another clamp filter (accessory) on the indoor unit side. The operation in this step is the same as the operation in step 3) of Work procedure 1.
7) The clamp filter (accessory) to be installed on the indoor unit side must be placed in the specified position as shown in the picture (next page) and then the PMV Kit connection cable must be routed appropriately.
8) Fix the connection cable of PMV Kit with cord clamp for existing wiring.

NOTE

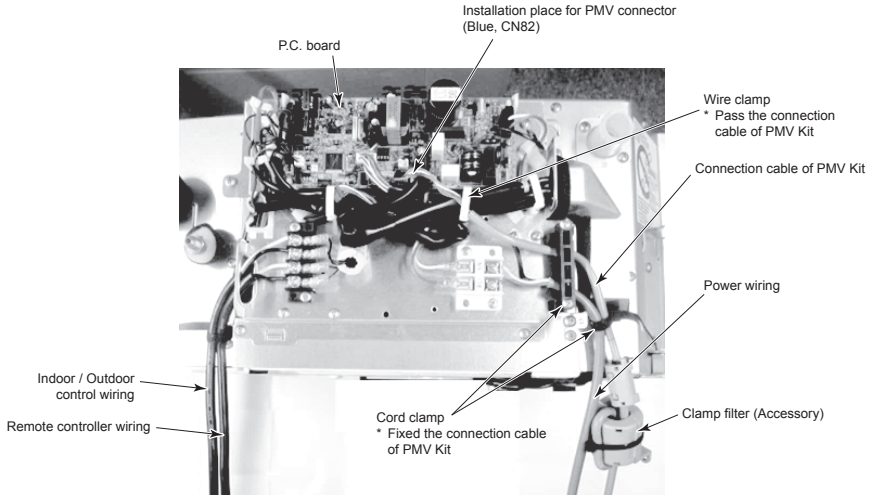
- Follow steps 6), 7), and 8) so that the portions of the cable before and after each of the clamp filters, including the one already installed in the electrical parts box, do not come into contact with each other.
- When an air-conditioner is operated, with a clamp filter (accessories) not attached, it may become the malfunction of an electronic device and the cause of failure in the circumference.

<Standard Duct type>
<Concealed Duct High Static Pressure type>



<Connecting connection cable of PMV Kit.>

<Compact 4-way Cassette type>



<Connecting connection cable of PMV Kit.>

9) Using an attached binding band S, put together the removed PMV lead wires and then store them in the electrical parts box.
10) Mount the electrical parts box cover so as not to pinch wiring, and the work completes.

● Work procedure 3

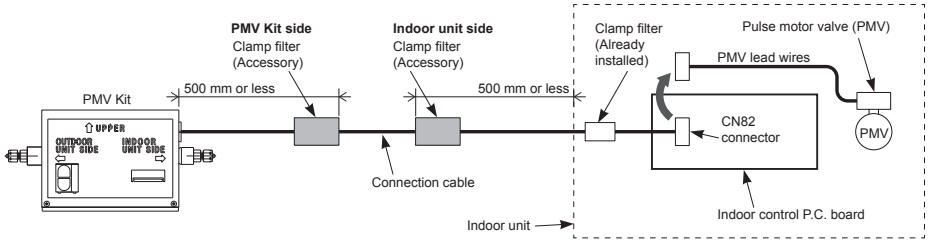
■ Applicable model: All the indoor units except work procedure 1 and 2

<PMV Kit connection wiring method>

- To comply with the EMC (Electromagnetic Compatibility) standards, be sure to use the clamp filters that are supplied accessories.

Clamp filter installation positions

- PMV Kit side: A position 500 mm or less away from the shell of the PMV Kit body.
- Indoor unit side: A position between the PMV Kit body and the existing clamp filter and adjacent to the existing clamp filter.



1) ~2) Perform the same process as 1) and 2) of Work procedure 1.
3) Be sure to install a clamp filter (accessory) on the PMV Kit side. The operation in this step is the same as the operation in step 3) of Work procedure 1.
4) Open the electrical parts box cover of the indoor unit after power-off and then process wiring work. For details, refer to the Installation Manual attached to the indoor unit.
5) Replace the PMV connector built in the indoor unit with the connection cable of PMV Kit. The lock mechanism is provided at side of PMV connector. Remove the connector by releasing the lock mechanism.
6) Be sure to install another clamp filter (accessory) on the indoor unit side. The operation in this step is the same as the operation in step 3) of Work procedure 1.
7) Route the PMV Kit connection cable in such a way that its portions before and after the clamp filter do not come into contact with each other.
8) Secure the PMV Kit connection cable together with the Indoor / Outdoor control wiring by using the existing cord clamp or a commercially available binding band.
9) Using an attached binding band S, put together the removed PMV lead wires and then store them in the electrical parts box.
10) Mount the electrical parts box cover so as not to pinch wiring, and the work completes.

NOTE

When an air-conditioner is operated, with a clamp filter (accessories) not attached, it may become the malfunction of an electronic device and the cause of failure in the circumference.

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