



SPLIT AIR CONDITIONERS R32 DC INVERTER

# INDOOR UNIT CONSOLE MONO AND MULTI



## INDOOR UNITS

X3I ECO PLUS NEW AF27 HL

X3I ECO PLUS NEW AF35 HL

X3I ECO PLUS NEW AF52 HL

Read this manual carefully before installing and using the air conditioner and keep it for future reference.

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## Thank you for selecting our products

One of the benefits awaiting you with our room air conditioner is not only comfort of life but also good health. This operation instruction brings you the many comfort and technological features your unit has to offer. In addition, it provides you vital information about maintenance, service and economical operating. Take the next few minutes to discover how to get your comfort and economy of the operation from your new room air conditioner.

The figures in this manual may be different with the material objects, please refer to the material objects for reference.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

External static pressures at the appliance was tested is 0 Pa  
Fuse link: T250 V; 3.15 A

Hereby, Our company, declares that this Air Conditioner is in compliance with the essential requirement and other relevant provisions of RE Directive 2014/53/EU. A copy of the full DoC is attached. Wireless frequency range: 2412MHz - 2472MHz  
Maximum Transmit Power: 18dBm



This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

R32: 675

## Explanation of Symbols



Indicates a hazardous situation that, if not avoided, will result in death or serious injury.



Indicates a hazardous situation that, if not avoided, could result in death or serious injury.



Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.

**NOTICE**

Indicates important but not hazard-related information, used to indicate risk of property damage.



Indicates a hazard that would be assigned a signal word WARNING or CAUTION.

## Exception Clauses

Manufacturer will bear no responsibilities when personal injury or property loss is caused by the following reasons.

1. Damage the product due to improper use or misuse of the product;
2. Alter, change, maintain or use the product with other equipment without abiding by the instruction manual of manufacturer;
3. After verification, the defect of product is directly caused by corrosive gas;
4. After verification, the defects are due to improper operation during transportation of product;
5. Operate, repair, maintain the unit without abiding by instruction manual or related regulations;
6. After verification, the problem or dispute is caused by the quality specification or performance of parts and components that produced by other manufacturers;
7. The damage is caused by natural calamities, bad using environment or force majeure.

If it needs to install, move or maintain the air conditioner, please contact dealer or local service center to conduct it at first. Air conditioner must be installed, moved or maintained by appointed unit. Otherwise, it may cause serious damage or personal injury or death.

When refrigerant leaks or requires discharge during installation, maintenance, or disassembly, it should be handled by certified professionals or otherwise in compliance with local laws and regulations.



Appliance filled with flammable gas R32.



Before use the appliance, read the owner's manual first.



Before install the appliance, read the installation manual first.



Before repair the appliance, read the service manual first.

## The Refrigerant

- To realize the function of the air conditioner unit, a special refrigerant circulates in the system. The used refrigerant is the fluoride R32, which is specially cleaned. The refrigerant is flammable and inodorous. Furthermore, it can lead to explosion under certain conditions. But the flammability of the refrigerant is very low. It can be ignited only by fire.
- Compared to common refrigerants, R32 is a nonpolluting refrigerant with no harm to the ozonosphere. The influence upon the greenhouse effect is also lower. R32 has got very good thermodynamic features which lead to a really high energy efficiency. The units therefore need a less filling.

### **WARNING :**

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacture. Should repair be necessary, contact your nearest authorized Service Centre. Any repairs carried out by unqualified personnel may be dangerous. 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.

Appliance shall be installed, operated and stored in a room with a floor area larger than  $X \text{ m}^2$ . (Please refer to table "a" in section of " Safety operation of flammable refrigerant " for Space X.)

Appliance filled with flammable gas R32. For repairs, strictly follow manufacturer's instructions only. Be aware that refrigerants may not contain an odour. Read specialist's manual.





### WARNING

#### **Operation and Maintenance**

- 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 connect air conditioner to multi-purpose socket. Otherwise, it may cause fire hazard.
- Do disconnect power supply when cleaning air conditioner. Otherwise, it may cause electric shock.
- 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 wash the air conditioner with water to avoid electric shock.
- Do not spray water on indoor unit. It may cause electric shock or malfunction.
- After removing the filter, do not touch fins to avoid injury.
- Do not use fire or hair dryer to dry the filter to avoid deformation or fire hazard.



### WARNING

- Maintenance must be performed by qualified professionals. Otherwise, it may cause personal injury or damage.
- Do not repair air conditioner by yourself. It may cause electric shock or damage. Please contact dealer when you need to repair air conditioner.
- Do not extend fingers or objects into air inlet or air outlet. It may cause personal injury or damage.
- Do not block air outlet or air inlet. It may cause malfunction.
- Do not spill water on the remote controller, otherwise the remote controller may be broken.
- When below phenomenon occurs, please turn off air conditioner and disconnect power immediately, and then contact the dealer or qualified professionals for service.
  - Power cord is overheating or damaged.
  - There's abnormal sound during operation.
  - Circuit break trips off frequently.
  - Air conditioner gives off burning smell.
  - Indoor unit is leaking.
- If the air conditioner operates under abnormal conditions, it may cause malfunction, electric shock or fire hazard.
- When turning on or turning off the unit by emergency operation switch, please press this switch with an insulating object other than metal.
- Do not step on top panel of outdoor unit, or put heavy objects. It may cause damage or personal injury.



### WARNING

#### Attachment

- Installation must be performed by qualified professionals. Otherwise, it may cause personal injury or damage.
- Must follow the electric safety regulations when installing the unit.
- According to the local safety regulations, use qualified power supply circuit and circuit break.
- Do install the circuit break. If not, it may cause malfunction.
- An all-pole disconnection switch having a contact separation of at least 3mm in all poles should be connected in fixed wiring.
- Including an circuit break with suitable capacity, please note the following table. Air switch should be included magnet buckle and heating buckle function, it can protect the circuit-short and overload.
- Air Conditioner should be properly grounded. Incorrect grounding may cause electric shock.
- Don't use unqualified power cord.
- Make sure the power supply matches with the requirement of air conditioner. Unstable power supply or incorrect wiring may result in electric shock, fire hazard or malfunction. Please install proper power supply cables before using the air conditioner.
- Properly connect the live wire, neutral wire and grounding wire of power socket.
- Be sure to cut off the power supply before proceeding any work related to electricity and safety.



### WARNING

- Do not put through the power before finishing installation.
- 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.
- The temperature of refrigerant circuit will be high, please keep the interconnection cable away from the copper tube.
- The appliance shall be installed in accordance with national wiring regulations.
- Installation must be performed in accordance with the requirement of NEC and CEC by authorized personnel only.
- The air conditioner is the first class electric appliance. It must be properly grounding with specialized grounding device by a professional. Please make sure it is always grounded effectively, otherwise it may cause electric shock.
- The yellow-green wire in air conditioner is grounding wire, which can't be used for other purposes.
- The grounding resistance should comply with national electric safety regulations.
- The appliance must be positioned so that the plug is accessible.
- All wires of indoor unit and outdoor unit should be connected by a professional.
- If the length of power connection wire is insufficient, please contact the supplier for a new one. Avoid extending the wire by yourself.



### WARNING

- For the air conditioner with plug, the plug should be reachable after finishing installation.
- For the air conditioner without plug, an circuit break must be installed in the line.
- If you need to relocate the air conditioner to another place, only the qualified person can perform the work. Otherwise, it may cause personal injury or damage.
- Select a location which is out of reach for children and far away from animals or plants. If it is unavoidable, please add the fence for safety purpose.
- The indoor unit should be installed close to the wall.

# Maintenance

Before inspection and maintenance of the unit. PLEASE set power switch to "OFF" to cut off the power supply.

## 1 Units

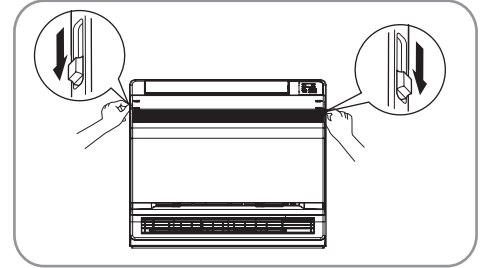
- Indoor unit, Outdoor unit and Remote controller

1. Wipe them with dry soft cloth.

- Front panel

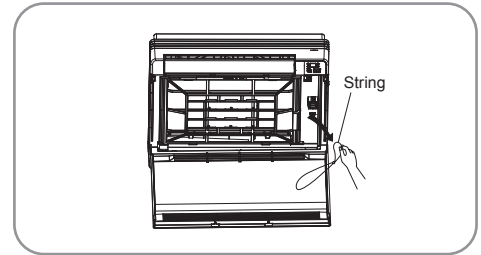
1. Open the front panel.

Slide the two stoppers on the left and right sides inward until they click.



2. Remove the front panel.

- Remove the string.
- Allowing the front panel to fall forward will enable you to remove it.

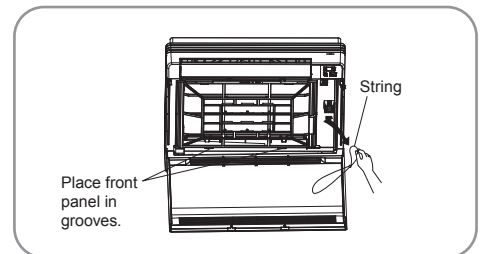


3. Clean the front panel.

- Wipe it with a soft cloth soaked in water.
- Only neutral detergent may be used.
- In case of washing the front panel with water, dry it with cloth, dry it up in the shade after washing.

4. Attach the front panel.

- Insert the front panel into the grooves of the unit (3 places).
- Attach the string to the right, inner-side of the front grille.
- Close the panel slowly.



### CAUTION

- Don't touch the metal parts of the indoor unit. If you touch those parts, this may cause an injury.
- When removing or attaching the front panel, use a robust and stable stool and watch your steps carefully.
- When removing or attaching the front panel, support the panel securely with hand to prevent it from falling.
- For cleaning, do not use hot water above 40°C, benzine, gasoline, thinner, nor other volatile oils, polishing compound, scrubbing brushes, nor other hand stuff.
- After cleaning, make sure that the front panel is securely fixed.

## 2 Filters

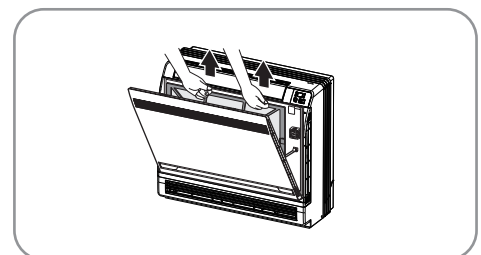
1. Open the front panel.

2. Remove the air filter.

- Press the claws on the right and left of the air filter down slightly, then pull upward.

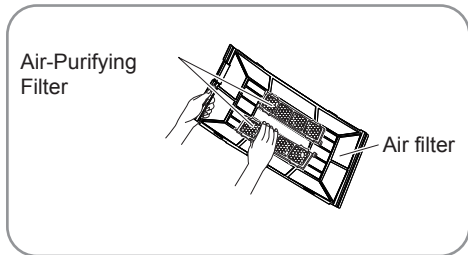
3. Take off the Air-Purifying Filter.

- Hold the tabs of the frame, and remove the claws in 4 places.

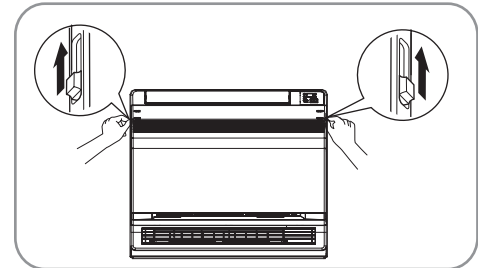


# Maintenance

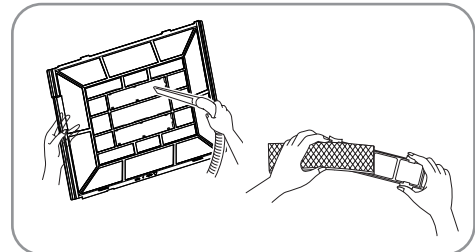
4. Clean or replace each filter.  
See figure.



5. Set the air filter and Air-Purifying Filter as they were and close the front panel.
- Operation without air filters may result in troubles as dust will accumulate inside the indoor unit.



6. Wash the air filters with water or clean them with vacuum cleaner.
- If the dust does not come off easily, wash them with neutral detergent thinned with lukewarm water, then dry them up in the shade.
  - It is recommended to clean the air filters every week.



## 3 Air-Purifying Filter

The Air-Purifying Filter can be renewed by washing it with water once every 6 months. We recommend replacing it once every 3 years.

### • Maintenance

1. Vacuum dusts, and soak in warm water or water for about 10 to 15 minutes if dirt is heavy.
2. Do not remove filter from frame when washing with water.
3. After washing, shake off remaining water and dry in the shade.
4. Since the material is made out of paper, do not wring out the filter when removing water from it.

### • Replacement

Remove the tabs on the filter frame and replace with a new filter.

- Dispose of the old filter as flammable waste.
- Note: Healthy filter is the optional accessory.

## NOTE

- Operation with dirty filters:  
(1) cannot deodorize the air.                      (2) cannot clean the air.  
(3) results in poor heating or cooling.            (4) may cause odour.

# Maintenance

## Check

Check that the base, stand and other fittings of the outdoor unit are not decayed or corroded.
Check that nothing blocks the air inlets and the outlets of the indoor unit and the outdoor unit.
Check that the drain comes smoothly out of the drain hose during COOL or DRY operation. <ul style="list-style-type: none"><li>• If no drain water is seen, water may be leaking from the indoor unit. Stop operation and consult the service shop if this is the case.</li></ul>

## 4 Before a long idle period

1. Operate the "FAN only" for several hours on a fine day to dry out the inside.
  - Press "MODE" button and select "FAN" operation.
  - Press "ON/OFF" button and start operation.
2. After operation stops, turn off the breaker for the room air conditioner.
3. Clean the air filters and set them again.
4. Take out batteries from the remote controller.

## NOTE

- When a multi outdoor unit is connected, make sure the heating operation is not used at the other room before you use the fan operation.

※ Working temperature range		
	Indoor sideDB/WB(°C)	Outdoor sideDB/WB(°C)
Maximum cooling	32/23	43/26
Maximum heating	27/—	24/18

The operating temperature range (outdoor temperature) for cooling unit is -15°C ~ 43°C;  
for cooling and heating unit is -22°C ~ 43°C.

### Working principle and special functions for cooling

#### Principle:

Air conditioner absorbs heat in the room and transmit to outdoor and discharged, so that indoor ambient temperature decreased, its cooling capacity will increase or decrease by outdoor ambient temperature.

#### Anti-freezing function:

If the unit is running in COOL mode and in low temperature, there will be frost formed on the heat exchanger, when indoor heat exchanger temperature decreased below 0°C, the indoor unit microcomputer will stop compressor running and protect the unit.

### Working principle and special functions for heating

#### Principle:

- \* Air conditioner absorbs heat from outdoor and transmits to indoor, in this way to increase room temperature. This is the heat pump heating principle, its heating capacity will be reduced due to outdoor temperature decrease.
- \* If outdoor temperature becomes very low, please operate with other heating equipments.

#### Defrosting:

- \* When outdoor temperature is low but high humidity, after a long while running, frost will form on outdoor unit, that will effect the heating effect, at this time, the auto defrosting function will act, the heat running will stop for 8-10mins.
- \* During the auto defrosting, the fan motors of indoor unit and outdoor unit will stop.
- \* During the defrosting, the indoor indicator flashes, the outdoor unit may emit vapor, This is due to the defrosting, it isn't malfunction.
- \* After defrosting finished, the heating will recover automatically.

#### Anti-cool wind function:

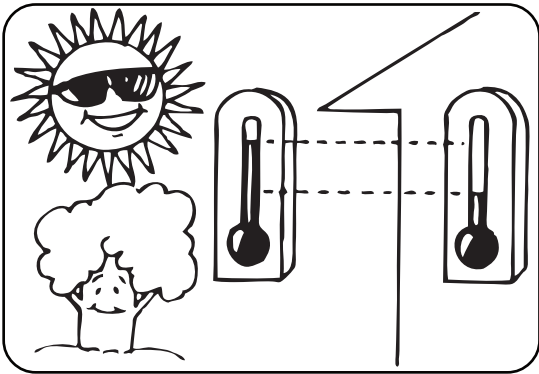
In Heat mode, the following three kinds of status, if indoor heat exchanger hasn't achieve certain temperature that indoor fan motor will not start, in this way to prevent blowing cool wind (within 3mins):

1. Heat operation just started up.
2. After Auto defrosting operation is finished.
3. Heating under low temperature.

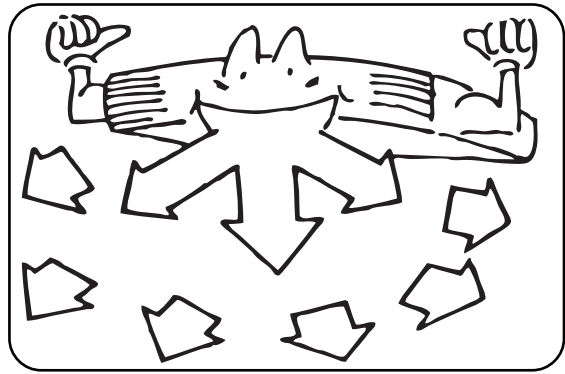
The climate type of this unit is according to the nameplate.

## Operating guide

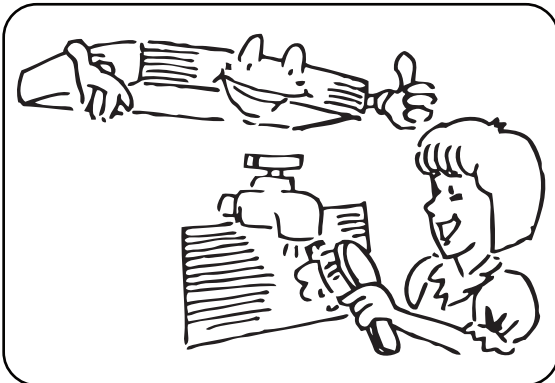
- The temperature should not be set lower than what you need. This would result to increase energy cost.



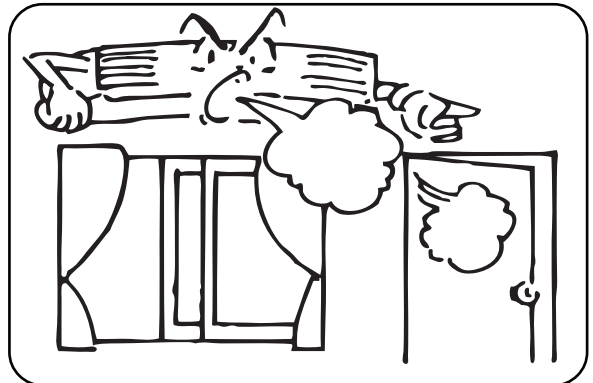
- To distribute cool air through out the room, adjust air flow direction as shown by the arrows (see picture) to diffuse cool air.



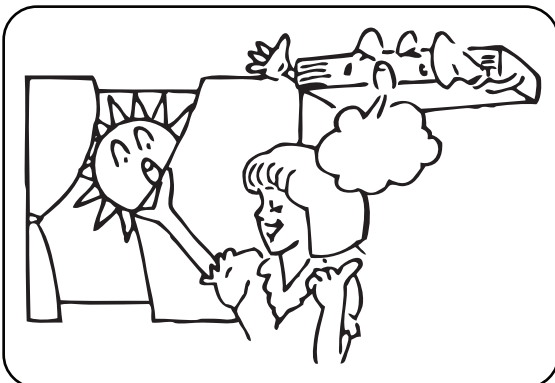
- Clean the air filter every week for higher efficiency.



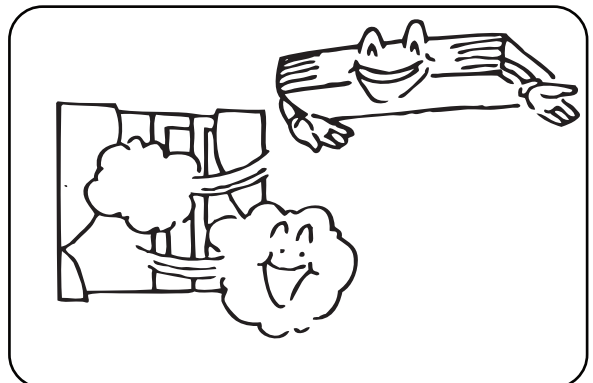
- Close window and door while operating the unit to prevent leakage of cooled air to save energy.



- Draw close curtains or close glass windows when cooling to prevent heat load from sun light which may cause more electricity cost.



- In case of ineffective ventilation, open the window to ventilate the room air once in a while but not too long since cooled air will be uselessly drained out.

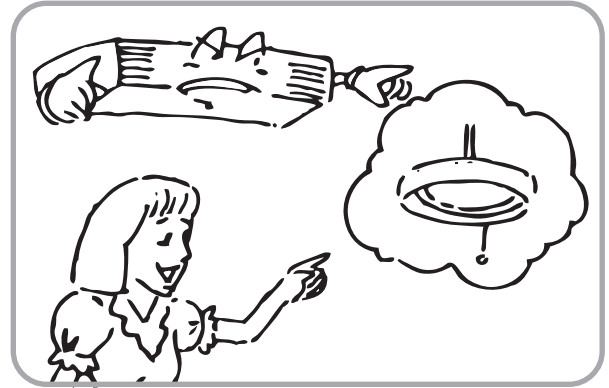


## Precautions

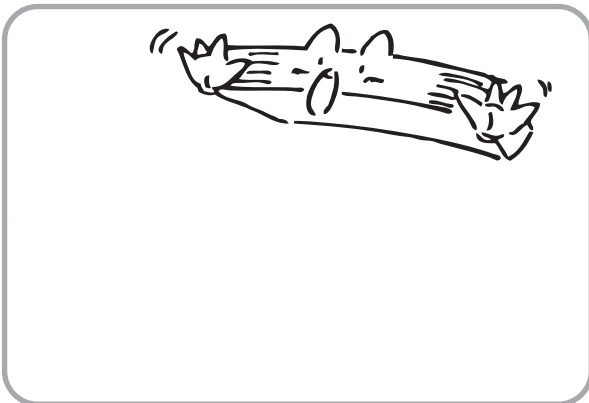
- Check electrical system(voltage and frequency). Use the proper power supply indicated on the unit to operate the airconditioner and only fuses with specified capacity.Do not use pieces of wire instead of fuse.



- Turn off the airconditioner if ,while running, electricity interference occurs.If the unit is not to be used for a long time,cut off the power supply main switch.



- Do not insert objects into the air inlet or outlet when the airconditioner is running as it may cause damage or personal injury .Also pay special attention when children are around.



- Do not locate any obstacle against the air flow direction of indoor and outdoor unit. Inefficient performance or malfunction may result.



- Do not channel the air flow directly at people, especially infants,aged persons or patients.



- Do not locate a heater or any other heat source close to the unit.The heat may deform plastic parts.



## Checking before contact the service man

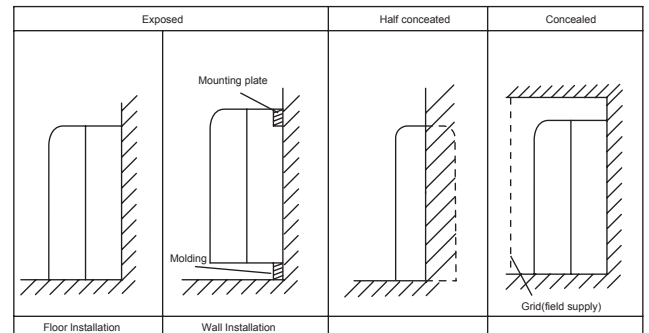
Check the following before contact the service man. You may find the solution to your problems. After checking, if it still does not operate, please contact your local dealer.

PROBLEM	CAUSES
NO operation	<ul style="list-style-type: none"> <li>● Check if electrical wire is damaged &amp; check if breaker switch is still on.</li> <li>● Check if the power supply is in order.</li> <li>● Check if the timer switch is on or not.</li> </ul>
The air conditioner runs but does not cool enough.	<ul style="list-style-type: none"> <li>● Check if the preset temperature is too high.</li> <li>● Check if the sunlight shines directly into the room.</li> <li>● Check if the door and window are opened.</li> <li>● Check if there is anything obstructing the air discharge</li> <li>● Check if the exhaust fan still operates</li> <li>● Check if the air filter is dirty or clogged.</li> </ul>
Vapor or mist fume coming out of the unit while running.	<ul style="list-style-type: none"> <li>● Hot air in the room mixes with cool air. This causes smoke fume.</li> </ul>
Inoperative remote control.	<ul style="list-style-type: none"> <li>● Loosened or disconnected wire between the unit and the display.</li> <li>● Check if the batteries are inserted in correct directions.</li> <li>● Check if the batteries are exhausted or not.</li> </ul>

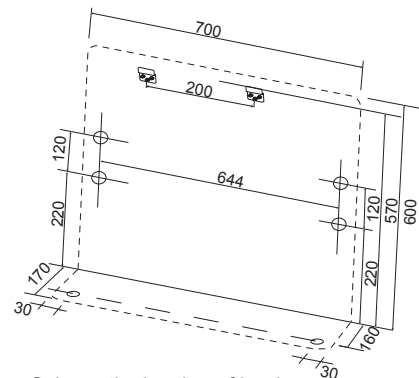
# Installation of indoor unit

## SELECTION OF INSTALLATION LOCATION.

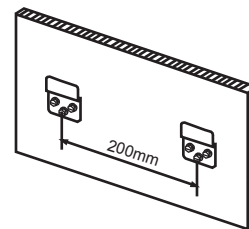
- Such a place where cool air can be distributed throughout the room.
- Such a place where condensation water is easily drained out.
- Such a place that can handle the weight of indoor unit.
- Such a place which has easy access for maintenance.
- The appliance shall not be installed in the laundry.



Location for securing the installation panel.



Schematic drawing of hooks:



## THERE ARE 2 STYLES OF INSTALLATION.

- CEILING TYPE

- FLOOR TYPE

Each type is similar to the other as follows;

### Indoor unit

The indoor unit should be sited in a place where:

- 1) the restrictions on installation specified in the indoor unit installation drawings are met.
- 2) both air intake and exhaust have clear paths met.
- 3) the unit is not in the path of direct sunlight.
- 4) the unit is away from the source of heat or steam.
- 5) there is no source of machine oil vapour (this may shorten indoor unit life).
- 6) cool(warm) air is circulated throughout the room.
- 7) the unit is away from electronic ignition type fluorescent lamps (inverter or rapid start type) as they may shorten the remote controller range.
- 8) the unit is at least 1 metre away from any television or radio set(unit may cause interference with the picture or sound).

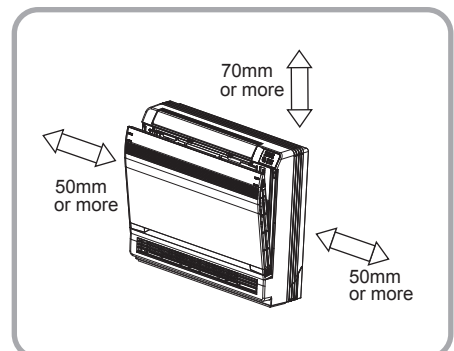
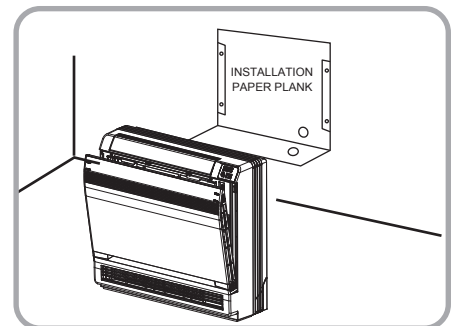
## CAUTIONS FOR INSTALLATION WHERE AIR CONDITIONER TROUBLE IS LIABLE TO OCCUR.

- Where there is too much of oil area.
- Where it is acid base area.
- Where there is irregular electrical supply.

### Indoor Unit Installation Drawings


The indoor unit may be mounted in any of the three styles shown here.

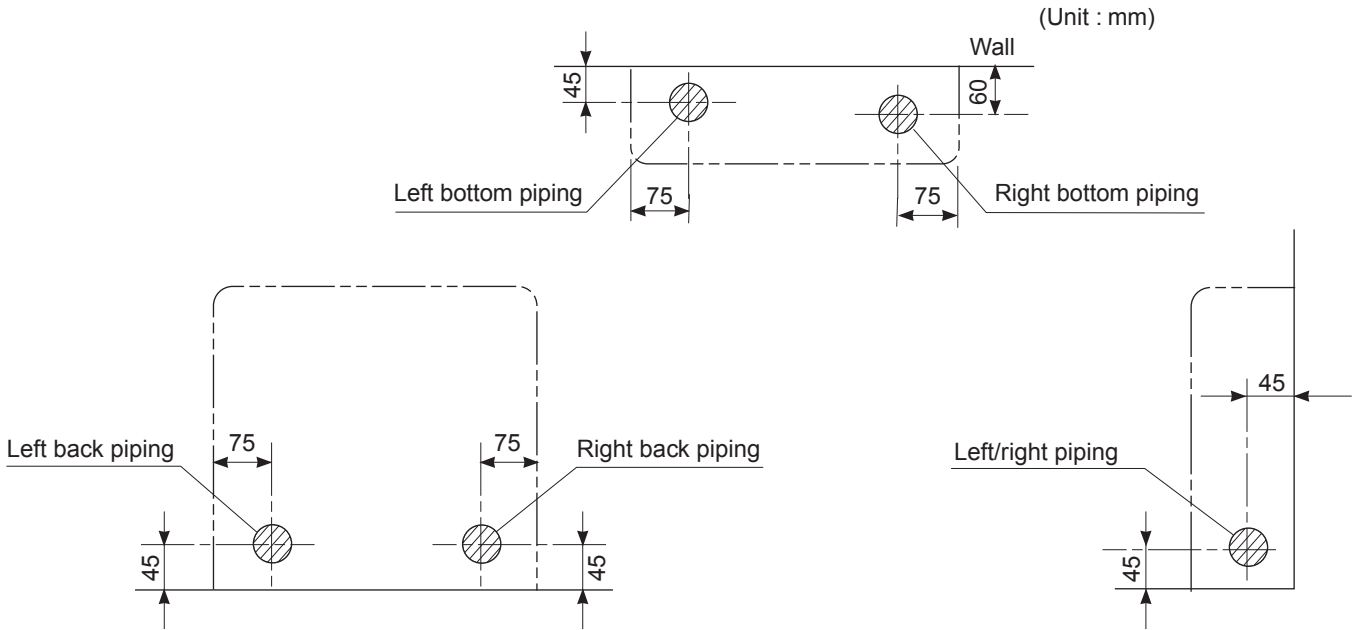
Console unit shall be installed on the ground or the position where is 0.3m from the floor.



# Installation of indoor unit

## Refrigerant piping

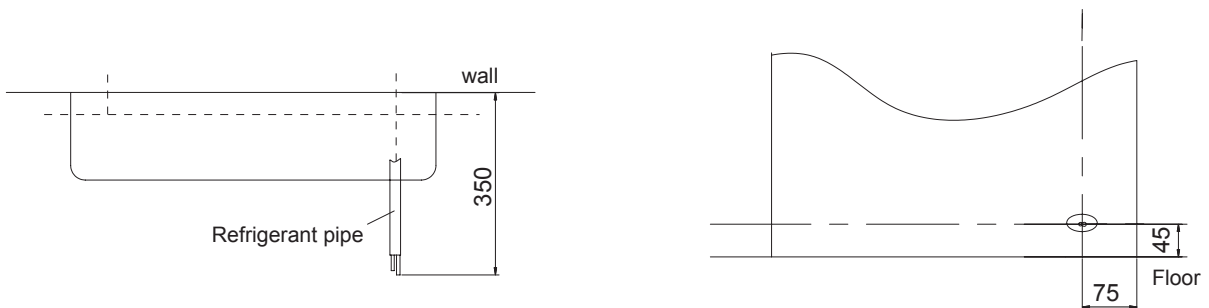
- 1) Drill a hole ( 55mm in diameter ) in the spot indicated by the  symbol in the illustration as below .
- 2) The location of the hole is different depending on which side of the pipe is taken out .
- 3) For piping ,see Connecting the refrigerant pipe ,under Indoor Unit Installation(1).
- 4) Allow space around the pipe for a easier indoor unit pipe connection.



### CAUTION

Min. allowable length

- The suggested shortest pipe length is 2.5m, in order to avoid noise from the outdoor unit and vibration. (Mechanical noise and vibration may occur depending on how the unit is installed and the environment in which it is used.)
- See the installation manual for the outdoor unit for the maximum pipe length.
- For multi-connections ,see the installation manual for the multi-outdoor unit.

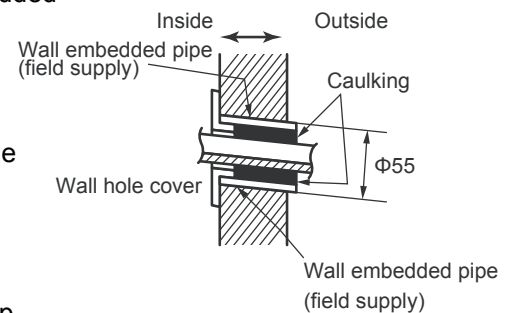


## Installation of indoor unit

### Boring a wall hole and installing wall embedded pipe

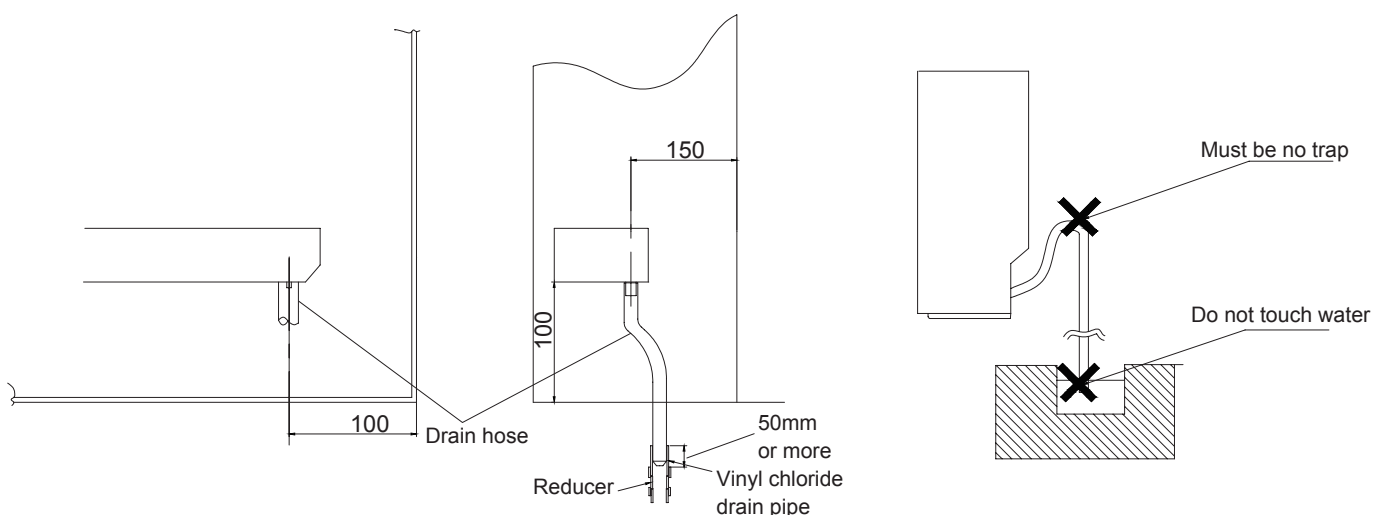
- For walls containing metal frame or metal board ,be sure to use a wall embedded pipe and wall cover in the feed-through hole to prevent water leakage.
- Be sure to caulk the gaps around the pipes with caulking material to prevent water leakage.

- 1)Bore a feed-through hole of 55mm in the wall so it has a down slope toward the outside.
- 2)Insert a wall pipe into the hole.
- 3)Insert a wall cover into wall pipe .
- 4)After completing refrigerant piping, wiring, and drain piping, caulk pipe hole gap with putty.



### Drain piping

- 1)Use commercial rigid polyvinyl chloride pipe (general VP 20 pipe, outer diameter 26mm, inner diameter 20mm ) for the drain pipe.
- 2)The drain hose (outer diameter 18mm at connecting end, 220mm long)is supplied with the indoor unit. Prepare the drain pipe picture below position.
- 3)The drain pipe should be inclined downward so that water will flow smoothly without any accumulation.(Should not be trap.)
- 4)Insert the drain hose to this depth so it won't be pulled out of the drain pipe.
- 5)Insulate the indoor drain pipe with 10mm or more of insulation material to prevent condensation.
- 6)Remove the air filters and pour some water into the drain pan to check the water flows smoothly.

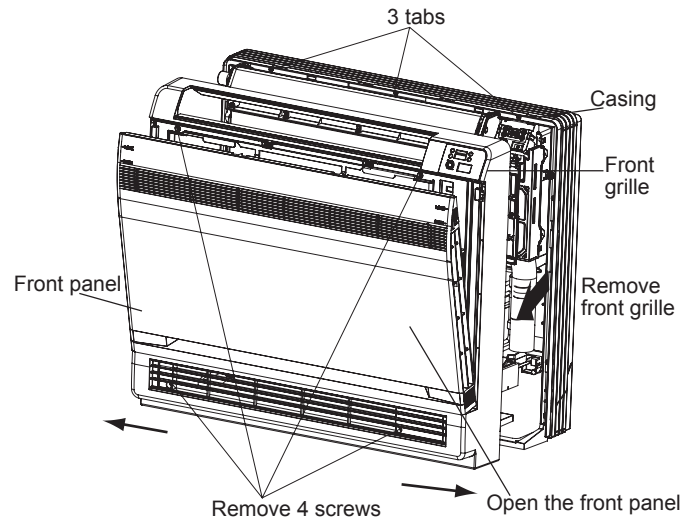


# Installation of indoor unit

## Installing indoor unit

### 1. Preparation

- Open the front panel, remove the 4 screws and dismount the front grille while pulling it forward.
- Follow the arrows to disengage the clasps on the front case to remove it.
- Follow the procedure below when removing the slit portions.

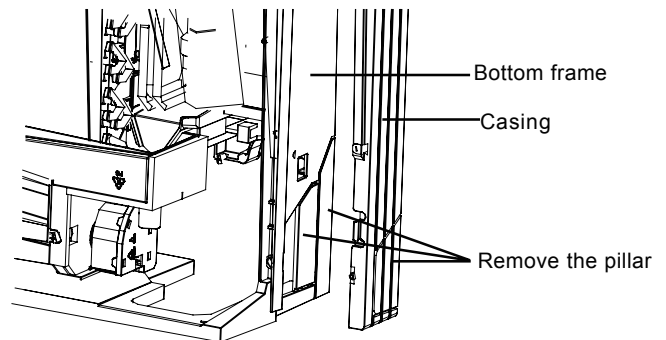
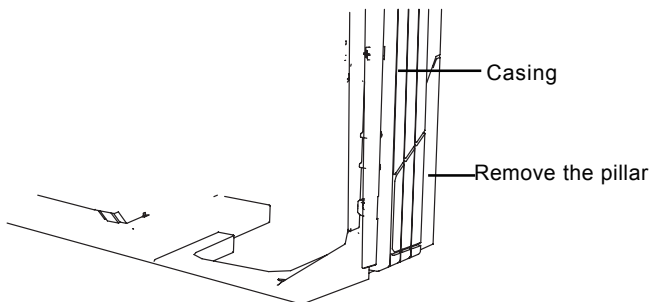
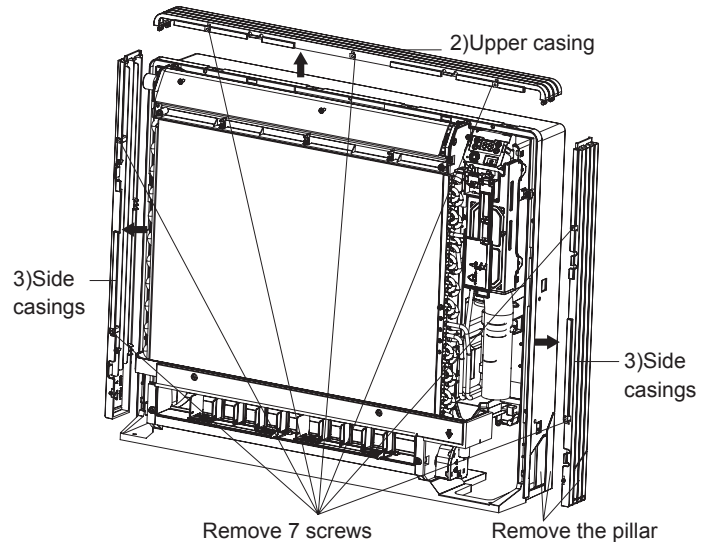


#### ■ For Moldings

- Remove the pillars. (Remove the slit portions on the bottom frame using nippers.)

#### ■ For Side Piping

- Remove the pillars.
  - 1) Remove the 7 screws.
  - 2) Remove the upper casing (2 tabs).
  - 3) Remove the left and right casings (2 tabs on each side).
  - 4) Remove the slit portions on the bottom frame and casings using nippers.
  - 5) Return by following the steps in reverse order (3>2>1).



### 2. Installation

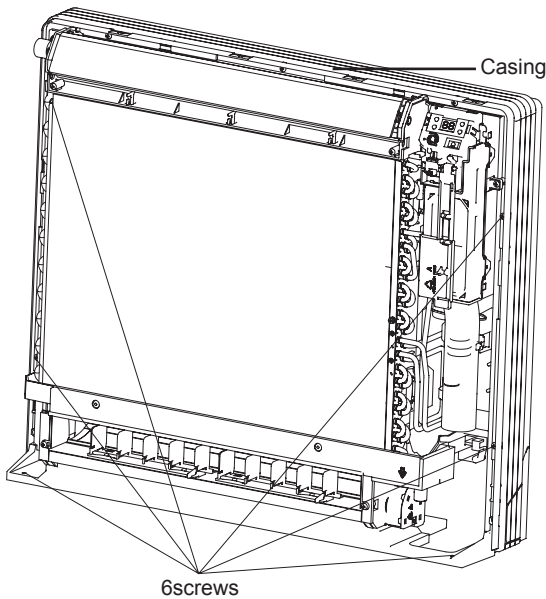
- Secure using 6 screws for floor installations. (Do not forget to secure to the rear wall.)
- For wall installations, secure the mounting plate using 5 screws and the indoor unit using 4 screws.

# Installation of indoor unit

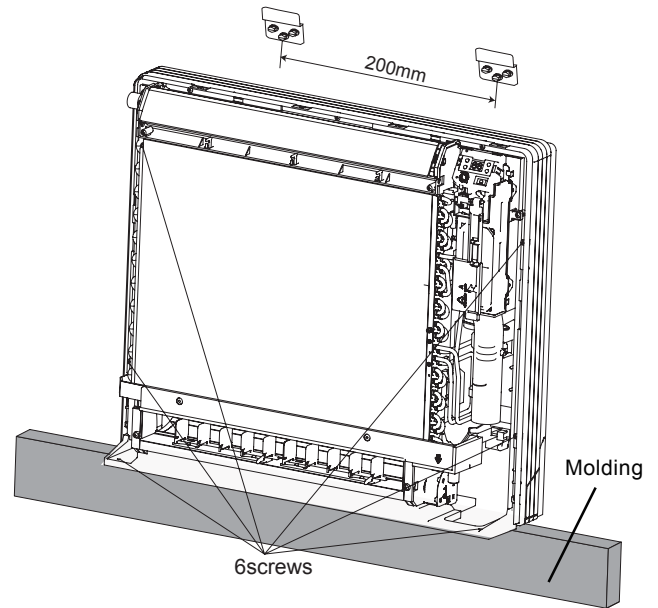
The mounting plate should be installed on a wall which can support the weight of the indoor unit.

- 1) Temporarily secure the mounting plate to the wall, make sure that the panel is completely level, and mark the boring points on the wall.
- 2) Secure the mounting plate to the wall with screws.

Floor Installation



Wall Installation



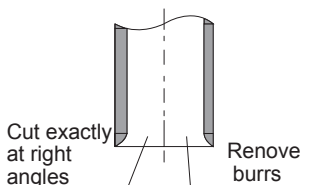
- 3) Once refrigerant piping and drain piping connections are complete, fill in the gap of the through hole with putty. A gap can lead to condensation on the refrigerant pipe, and drain pipe, and the entry of insects into the pipes.
- 4) Attach the front panel and front grille in their original positions once all connections are complete.

## Flaring the pipe end

- 1) Cut the pipe end with a pipe cutter.
- 2) Remove burrs with the cut surface facing downward so that the chips do not enter the pipe.
- 3) Fit the flare nut on the pipe.
- 4) Flare the pipe.
- 5) Check that the flaring is properly made.

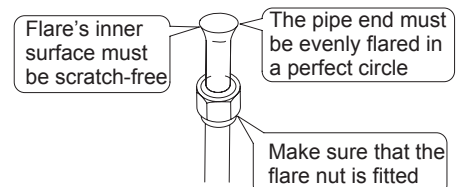
### ! WARNING

- 1) Do not use mineral oil on flared part.
- 2) Prevent mineral oil from getting into the system as this would reduce the lifetime of the units.
- 3) Never use piping which had been used for previous installations. Only use parts which are delivered with the unit.
- 4) Do never install a drier to this R32 unit in order to guarantee its lifetime.
- 5) The drying material may dissolve and damage the system.
- 6) Incomplete flaring may cause refrigerant gas leakage.



Flaring  
Set exactly at the position shown below

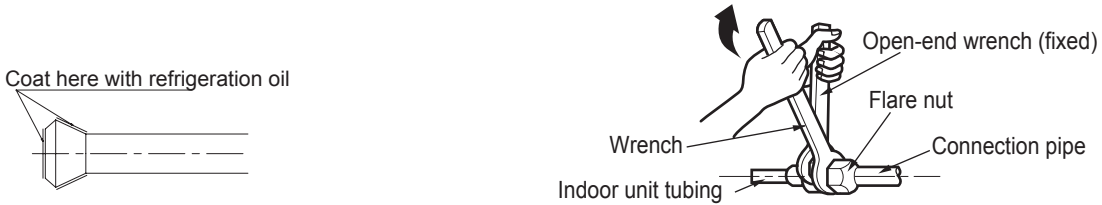
	Flare tool for R32		Conventional flare tool	
	Clutch-type	Clutch-type (Rigid-type)	Clutch-type (Rigid-type)	Wing-nut type (Imperial-type)
A	0-0.5mm	1.0-1.5mm	1.0-1.5mm	1.5-2.0mm



# Installation of indoor unit

## Connecting the refrigerant pipe

1) Use torque wrenches when tightening the flare nuts to prevent damage to the flare nuts and gas leaks.



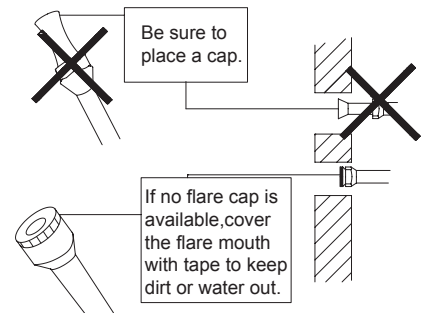
2) Align the centres of both flares and tighten the flares and tighten the flare nuts 3 or 4 turns by hand. Then tighten them fully with the torque wrenches.

3) To prevent gas leakage, apply refrigeration oil on both inner and outer surfaces in the flare. (Use refrigeration oil for R32.)

Flare nut tightening torque		
Gas side		Liquid side
09K/12K	18K	09K/12K/18K
3/8 inch	1/2 inch	1/4 inch
31-35 N.m	50-55 N.m	15-20 N.m

### Caution on piping handling

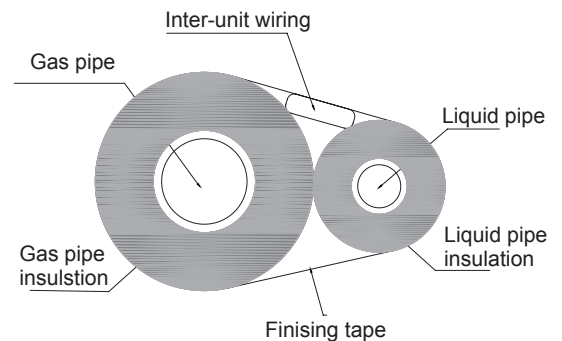
- 1) Protect the open end of the pipe against dust and moisture.
- 2) All pipe bends should be as gentle as possible. Use a pipe bender for bending.  
(Bending radius should be 30 to 40mm or larger.)



### Selection of copper and heat insulation materials

● When using commercial copper pipes and fittings, observe the following:

- 1) Insulation material: Polyethylene foam  
Heat transfer rate: 0.041 to 0.052W/mK (0.035 to 0.045kcal/(mh°C))  
Refrigerant gas pipe's surface temperature reaches 110°C max.  
Choose heat insulation materials that will withstand this temperature.



2) Be sure to insulate both the gas and liquid piping and to provide insulation dimensions as below.

Gas side		Liquid side	Gas pipe thermal insulation		Liquid pipe thermal insulation
09K/12K	18K		09K/12K	18K	
O.D. 9.5mm	O.D. 12.7mm	O.D. 6.4mm	I.D. 12-15mm	I.D. 14-16mm	I.D. 8-10mm
Thickness 0.8mm			Thickness 10mm Min.		

3) Use separate thermal insulation pipes for gas and liquid refrigerant pipes.

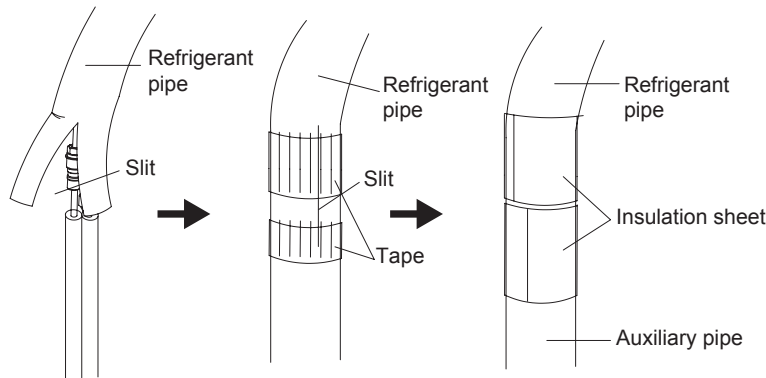
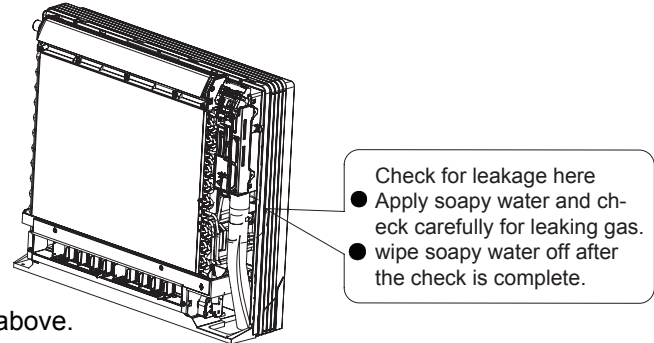
# Installation of indoor unit

## Checking for gas leakage

- 1) Check for leakage of gas after air purging
- 2) See the sections on air purges and gas leak checks in the installation manual for the outdoor unit.

## Attaching the connection pipe

- Attach the pipe after checking for gas leakage, described above.
- 1) Cut the insulated portion of the on-site piping, matching it up with the connecting portion.
  - 2) Secure the slit on the refrigerant piping side with the butt joint on the auxiliary piping using the tape, making sure there are no gaps.
  - 3) Wrap the slit and butt joint with the included insulation sheet, making sure there are no gaps.



## ⚠ CAUTION

- 1) Insulate the joint of the pipes securely. Incomplete insulation may lead to water leakage.
- 2) Push the pipe inside so it does not place undue force on the front grille.

## Reduction joints for MULTI applications:

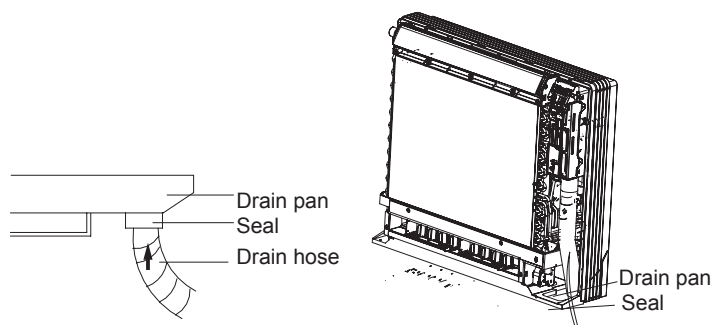
For all indoor units that have a gas pipe diameter other than 9.52 mm (5/8 ") it is necessary to use a reduction joint supplied with the external units, as per the table below:

Model	Standard liquid valve		Standard gas valve		connectors packed in ODU					
	dimension	Qty	size	Qty	dimension	Qty	dimension	Qty	dimension	Qty
ARGO DUAL 14000 UE	φ6.35	2	φ9.52	2	φ6.35 (1/4")→φ9.52(3/8")	0	φ9.52 (3/8")→φ12.7(1/2")	0	φ9.52 (3/8")→φ15.9(5/8")	0
ARGO DUAL 18000 UE	φ6.35	2	φ9.52	2	φ6.35 (1/4")→φ9.52(3/8")	0	φ9.52 (3/8")→φ12.7(1/2")	0	φ9.52 (3/8")→φ15.9(5/8")	0
ARGO TRIAL 21000 UE	φ6.35	3	φ9.52	3	φ6.35 (1/4")→φ9.52(3/8")	0	φ9.52 (3/8")→φ12.7(1/2")	1	φ9.52 (3/8")→φ15.9(5/8")	0
ARGO TRIAL 24000 UE	φ6.35	3	φ9.52	3	φ6.35 (1/4")→φ9.52(3/8")	0	φ9.52 (3/8")→φ12.7(1/2")	2	φ9.52 (3/8")→φ15.9(5/8")	0
ARGO QUADRI 28000 UE	φ6.35	4	φ9.52	4	φ6.35 (1/4")→φ9.52(3/8")	0	φ9.52 (3/8")→φ12.7(1/2")	2	φ9.52 (3/8")→φ15.9(5/8")	0
ARGO QUADRI 36000 UE	φ6.35	4	φ9.52	4	φ6.35 (1/4")→φ9.52(3/8")	2	φ9.52 (3/8")→φ12.7(1/2")	3	φ9.52 (3/8")→φ15.9(5/8")	2
ARGO PENTA 42000 UE	φ6.35	5	φ9.52	5	φ6.35 (1/4")→φ9.52(3/8")	2	φ9.52 (3/8")→φ12.7(1/2")	3	φ9.52 (3/8")→φ15.9(5/8")	3

## Connecting the drain hose

Insert the supplied C drain hose into the socket of the drain pan.

Fully insert the drain hose until it adheres to a seat of the socket.



# Installation of indoor unit

## Wiring

With a Multi indoor unit, install as described in the installation manual supplied with the Multi outdoor unit.

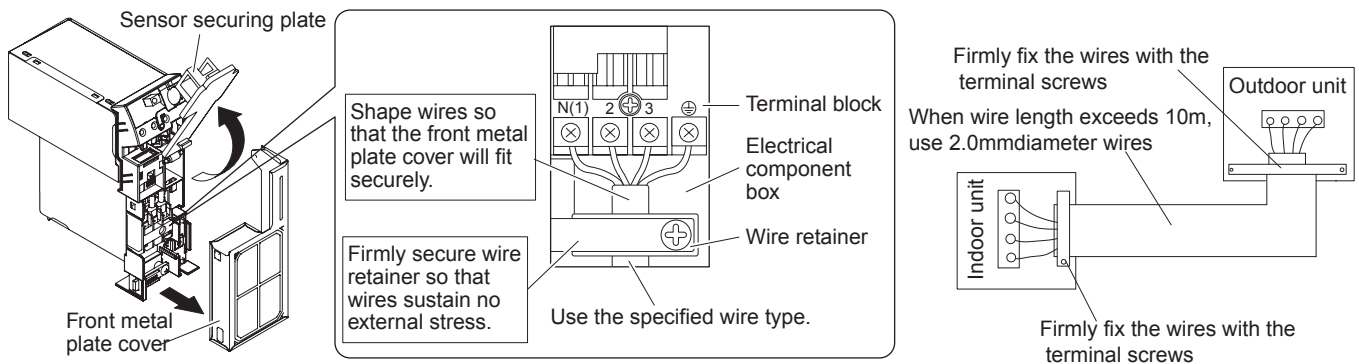
● Live the sensor securing plate, remove the front metal plate cover, and connect the branch wiring to the terminal block.

1) Strip wire ends (15mm)

2) Match wire colours with terminal numbers on indoor and outdoor unit's terminal blocks and firmly screw wires to the corresponding terminals.

3) Connect the earth wires to the corresponding terminals.

4) Pull wires to make sure that they are securely latched up, then retain wires with wire retainer.



## ! CAUTION

- 1) Do not use tapped wires, stranded wires, extension cords, or starburst connections, as they may cause overheating, electrical shock, or fire.
- 2) Do not use locally purchased electrical parts inside the product. (Do not branch the power for the drain pump, etc, from the terminal block.) Doing so may cause electric shock or fire.)

## Refrigerant piping work

- 1 Select copper pipes for gas and liquid as informed in specific table(see the pipe table below)
- 2 For dust and moisture protection, before assembly of the pipe and its insulation,both end of the pipe must be covered.
- 3 Avoid pipe bending as much as possible.If it is necessary, the bending radius must be more than 3cm. or 4cm.

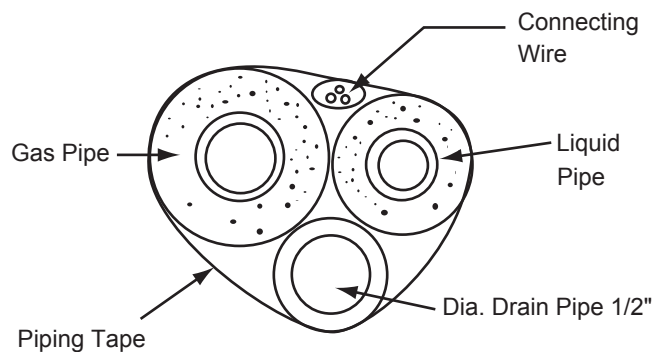
Gas pipe and liquid pipe insulation depends upon copper pipe size and the insulation thickness = 3/8"

**GAS PIPE TABLE**

MODEL	PIPE SIZE
09K	3/8"
12K	3/8"
18K	1/2"

**LIQUID PIPE TABLE**

MODEL	PIPE SIZE
09K	1/4"
12K	1/4"
18K	1/4"



- 4 The connection between an indoor unit and an outdoor unit.
  - Unscrew the flare nut for releasing pressure gas in the indoor unit.If there is no high pressure gas blowing out, it is the signal of a leaking indoor unit.
  - Fit the flare nut to the liquid pipe.Flare the pipe's end with flare tool.
  - Tighten both flare nuts into gas pipe and liquid pipe at the indoor unit with two holding spanners.

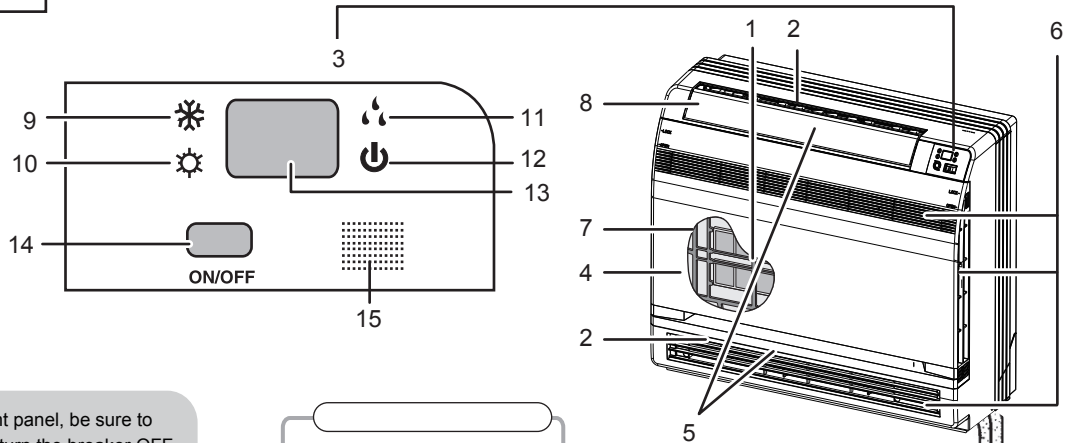
## Routine check after installation

### ● Check after installation

Items to be checked	Possible malfunction	Situation
Has it been fixed firmly?	The unit may drop, shake or emit noise.	
Have you done the refrigerant leakage test?	It may cause insufficient refrigerating capacity.	
Is heat insulation sufficient?	It may cause condensation and dripping.	
Does the unit drain well?	It may cause condensation and dripping.	
Is the voltage in accordance with the rated voltage marked on the nameplate?	It may cause electric malfunction or damage the part.	
Is the electrical wiring and piping connection installed correctly and securely?	It may cause electric malfunction or damage the part.	
Has the unit been connected to a secure earth connection?	It may cause electrical leakage.	
Is the power cord specified?	It may cause electric malfunction or damage the part.	
Has the inlet and outlet been covered?	It may cause insufficient refrigerating capacity.	
Has the length of connection pipes and the refrigerant charge been record?	The refrigerating capacity is not accurate	
Is the inlet and outlet of piping hole been covered?	It may cause insufficient cooling (heating) capacity or waster eletricity.	

# Part names and their functions

## INDOOR UNIT



### ⚠ CAUTION

Before opening the front panel, be sure to stop the operation and turn the breaker OFF. Do not touch the metal parts on the inside of the indoor unit, as it may result in injury.

#### 1. Air-Purifying Filter:

- These filters are attached to the inside of the air filters.
- Note: Healthy filter is the optional accessory.

#### 2. Air outlet

#### 3. Display

#### 4. Front panel

#### 5. Louvers (vertical blades)

- The louvers are inside of the air outlet.

#### 6. Air inlet

#### 7. Air filter

#### 8. Flap (horizontal blade)

#### 9. Cool mode lamp

#### 10. Heat mode lamp

#### 11. Dry mode lamp

#### 12. Run lamp

#### 13. LED display

#### 14. Indoor Unit ON/OFF switch:

- Push this switch once to start operation. Push once again to stop it.
- The operation mode refers to the following table.

Model	Mode	Temperature setting	Air flow rate
COOLING ONLY	AUTO	25°C	AUTO
HEAT PUMP	AUTO	25°C	AUTO

- This switch is useful when the remote controller is missing.

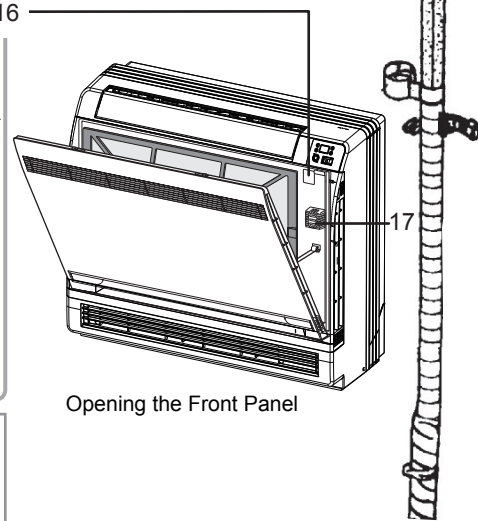
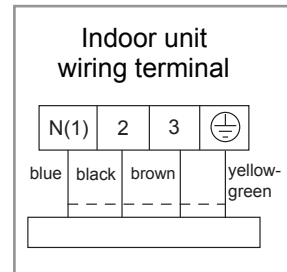
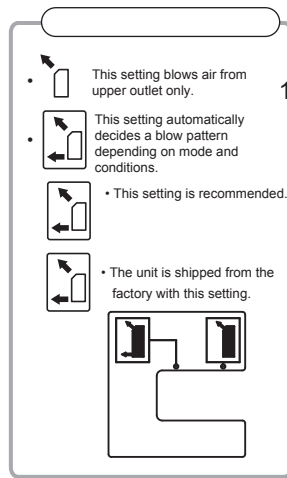
#### 15. Signal receiver:

- It receives signals from the remote controller.
- When the unit receives a signal, you will hear a short beep.
- Settings changed.....beep

#### 16. Air outlet selection switch

#### 17. Room temperature sensor:


- It senses the air temperature around the unit.



## How to use the remote control to operate the unit

### Remote Controller Description



- 1 **ON/OFF**  
Press it to start or stop operation.
- 2 **-** : Press it to decrease temperature setting.
- 3 **+** : Press it to increase temperature setting.
- 4 **MODE**  
Press it to select operation mode (AUTO/COOL/DRY/FAN/HEAT).
- 5 **FAN**  
Press it to set fan speed.
- 6 **SWING**  
Press it set swing angle.
- 7 **I FEEL**
- 8    
Press it to set HEALTH or AIR function.
- 9 **SLEEP**
- 10 **TEMP**
- 11 **QUIET**  
Press it to set QUIET function.
- 12 **CLOCK**  
Press it set clock.
- 13 **T-ON|T-OFF**  
Press it to set auto-off/auto-on timer.
- 14 **TURBO**
- 15 **LIGHT**  
Press it to turn on/off the light.
- 16 **WiFi**

# How to use the remote control to operate the unit

## Remote Controller Description

**Note:**

- This is a general use remote controller, it could be used for the air conditioners with multifunction; For some function, which the model doesn't have, if press the corresponding button on the remote controller that the unit will keep the original running status.

**1 ON/OFF :**

Press this button to turn on the unit .Press this button again to turn off the unit.

**2 —:**

Press this button to decrease set temperature. Holding it down above 2 seconds rapidly decreases set temperature. In AUTO mode, set temperature is not adjustable.

**3 + :**

Press this button to increase set temperature.Holding it down above 2 seconds rapidly increases set temperature. In AUTO mode, set temperature is not adjustable.

**4 MODE :**










Each time you press this button,a mode is selected in a sequence that goes from AUTO, COOL,DRY, FAN,and HEAT \*, as the following:

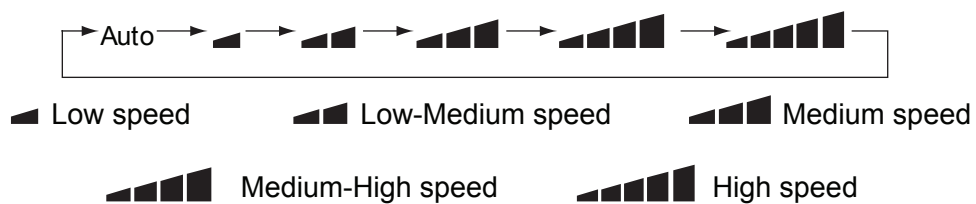



\*Note:Only for models with heating function.

After energization, AUTO mode is defaulted. In AUTO mode, the set temperature will not be displayed on the LED of the indoor, and the unit will automatically select the suitable operation mode in accordance with the room temperature to make indoor room comfortable.

**5 FAN :**

This button is used for setting Fan Speed in the sequence that goes from AUTO, , , , , , to , , , , then back to Auto.



- X-FAN function: Hold fan speed button for 2s in COOL or DRY mode, the icon “” is displayed and the indoor fan will continue operation for a few minutes in order to dry the indoor unit even though you have turned off the unit. After energization, X-FAN OFF is defaulted. X-FAN is not available in AUTO, FAN or HEAT mode.

This function indicates that moisture on evaporator of indoor unit will be blown after the unit is stopped to avoid mould.





- Having set X-FAN function on: After turning off the unit by pressing ON/OFF button indoor fan will continue running for a few minutes. at low speed. In this period, Hold fan speed button for 2s to stop indoor fan directly.
- Having set X-FAN function off: After turning off the unit by pressing ON/OFF button, the complete unit will be off directly.



# How to use the remote control to operate the unit

## 6 SWING:

Press this button to set up &down swing angle, which circularly changes as below:



This remote controller is universal . If any command ,  or  is sent out, the unit will carry out the command as 

 indicates the guide louver swings as: 

## 7 I FEEL:





Press this button to turn on I FEEL function. The unit automatically adjust temperature according to the sensed temperature. Press this button again to cancel I FEEL function.

When I FEEL function is turned on, the remote controller should be put within the area where indoor unit can receive the signal sent by the remote controller.

## 8 /




Press this button to achieve the on and off of health and scavenging functions in operation status.

Press this button for the first time to start scavenging function;

LCD displays "". Press the button for the second time to start health and scavenging functions simultaneously; LCD displays "" and "". Press this button for the third time to quit health and scavenging functions simultaneously. Press the button for the fourth time to start health function; LCD display "". Press this button again to repeat the operation above.

NOTE: This function is applicable to partial of models.

## 9 SLEEP:

- Press this button, can select Sleep 1 (  ), Sleep 2 (  ), Sleep 3 (  ) and cancel the Sleep, circulate between these, after electrified, Sleep Cancel is defaulted.
- Sleep 1 is Sleep mode 1, in Cool mode: sleep status after run for one hour, the main unit setting temperature will increase 1 °C, setting temperature increased 2 °C, the unit will run at this setting temperature; In Heat mode: sleep status after run for one hour, the setting temperature will decrease 1 °C, 2 hours, setting temperature will decrease 2 °C, then the unit will run at this setting temperature.
- Sleep 2 is sleep mode 2, that is air conditioner will run according to the presetting a group of sleep temperature curve.
- Sleep 3- the sleep curve setting under Sleep mode by DIY:
  - (1) Under Sleep 3 mode, press "Turbo" button for a long time, remote control enters into user individuation sleep setting status, at this time, the time of remote control will display "1 hour ", the setting temperature "88" will display the corresponding temperature of last setting sleep curve and blink (The first entering will display according to the initial curve setting value of original factory);
  - (2) Adjust "+" and "-" button, could change the corresponding setting temperature, after adjusted, press "Turbo "button for confirmation;
  - (3) At this time, 1 hour will be automatically increased at the timer position on the remote control, (that are "2 hours " or "3 hours " or "8 hours " ), the place of setting temperature "88" will display the corresponding temperature of last setting sleep curve and blink;
  - (4) Repeat the above step (2) ~ (3) operation, until 8 hours temperature setting finished, sleep curve setting finished, at this time, the remote control will resume the original timer display; temperature display will resume to original setting temperature.
- Sleep3- the sleep curve setting under SLEEP mode by DIY could be inquired:
  - The user could accord to sleep curve setting method to inquire the presetting sleep curve, enter into user individuation sleep setting status, but do not change the temperature, press "Turbo" button directly for confirmation. Note: In the above presetting or enquiry procedure, if continuously within 10s, there is no button pressed, the sleep curve setting within 10s, there is no button pressed, the sleep curve setting status will be automatically quit and resume to display the original displaying. In the presetting or enquiry procedure, press "ON/OFF" button, "Mode" button, "Timer" button or "Sleep" button, the sleep curve setting or enquiry status will quit similarly.

## How to use the remote control to operate the unit

### 10 TEMP:

Press this button, could select displaying the indoor setting temperature or indoor ambient temperature. When the indoor unit firstly power on it will display the setting temperature, if the temperature's displaying status is changed from other status to "🏠", displays the ambient temperature, 5s later or within 5s, it receives other remote control signal that will return to display the setting temperature. if the users haven't set up the temperature displaying status, that will display the setting temperature.

### 11 QUIET:

Press this button, the Quiet status is under the Auto Quiet mode (display "🔇" and "Auto" signal) and Quiet mode (display "🔇" signal) and Quiet OFF (there is no signal of "🔇" displayed), after powered on, the Quiet OFF is defaulted. Note: Under the Quiet mode (Display "🔇" signal), the fan speed is not available.

### 12 CLOCK :

Press CLOCK button, blinking 🕒 . Within 5 seconds, pressing + or - button adjusts the present time. Holding down either button above 2 seconds increases or decreases the time by 1 minute every 0.5 second and then by 10 minutes every 0.5 second. During blinking after setting, press CLOCK button again to confirm the setting, and then 🕒 will be constantly displayed.

### 13 T-ON / T-OFF:

Press T-ON button to initiate the auto-ON timer. To cancel the auto-timer program, simply press this button again.

After press of this button, 🕒 disappears and "ON" blinks. 00:00 is displayed for ON time setting. Within 5 seconds, press + or - button to adjust the time value. Every press of either button changes the time setting by 1 minute. Holding down either button rapidly changes the time setting by 1 minute and then 10 minutes. Within 5 Seconds after setting, press TIMER ON button to confirm.

Press T-OFF button to initiate the auto-off timer. To cancel the auto-timer program, simply press the button again. TIMER OFF setting is the same as TIMER ON.

### 14 TURBO:

Press this button to activate / deactivate the Turbo function which enables the unit to reach the preset temperature in the shortest time. In COOL mode, the unit will blow strong cooling air at super high fan speed. In HEAT mode, the unit will blow strong heating air at super high fan speed.

### 15 LIGHT:

Press LIGHT button to turn on the display's light and press this button again to turn off the display's light. If the light is turned on, 💡 is displayed. If the light is turned off, 💡 disappears.

### 16 WiFi:

Press "WiFi" button to turn on WiFi function, "WiFi" icon will be displayed on the remote controller; Hold "WiFi" button for 5s to turn off WiFi function and "WiFi" icon will disappear. (This function is only available for some models.)

Under off status, press "MODE" and "WiFi" buttons simultaneously for 1s, WiFi module will restore factory settings.

- This function is only available for some models.

### 17 Combination of "+" and "-" buttons: About lock

Press "+" and "-" buttons simultaneously to lock or unlock the keypad. If the remote controller is locked, 🔒 is displayed. In this case, pressing any button, 🔒 blinks three times.

## How to use the remote control to operate the unit

**18** Combination of "MODE " and "-" buttons : About switch between Fahrenheit and centigrade

At unit OFF, press "MODE " and "-" buttons simultaneously to switch between °C and °F .

**19** Combination of " TEMP " and "CLOCK" buttons : About Energy-saving Function

Press "TEMP" and "CLOCK" simultaneously in COOL mode to start energy-saving function. Nixie tube on the remote controller displays "SE". Repeat the operation to quit the function.

**20** Combination of " TEMP " and "CLOCK" buttons : About 8°C Heating Function

Press "TEMP" and "CLOCK" simultaneously in HEAT mode to start 8°C Heating Function Nixie tube on the remote controller displays "8" and a selected temperature of "8°C". (46°F if Fahrenheit is adopted). Repeat the operation to quit the function.

**21** About Back-lighting Function

The unit lights for 4s when energizing for the first time, and 3s for later press.

### Replacement of Batteries

1.Remove the battery cover plate from the rear of the remote controller.

(As shown in the figure)

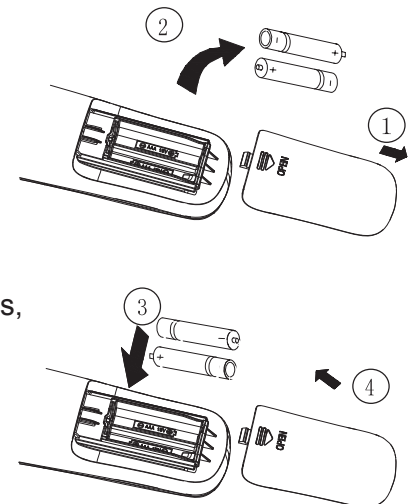
2.Take out the old batteries.

3.Insert two new AAA1.5V dry batteries, and pay attention to the polarity.

4. Reinstall the battery cover plate.

#### ★ Notes:

- When replacing the batteries, do not use old or different types of batteries, otherwise, it may cause malfunction.
- If the remote controller will not be used for a long time, please remove batteries to prevent batteries from leaking.
- The operation should be performed in its receiving range.
- It should be kept 1m away from the TV set or stereo sound sets.
- If the remote controller does not operate normally, please take the batteries out and reinsert them after 30 seconds.If it still can't operate properly, replace the batteries.



Sketch map for replacing batteries

## Configuration of connection pipe

1. Standard length of connection pipe
  - 5m, 7.5m, 8m.
2. Min. length of connection pipe is 3m.
3. Max. length of connection pipe.

Sheet 1 Max. length of connection pipe

Unit: m

Cooling capacity	Max. length of connection pipe
5000Btu/h (1465W)	15
7000Btu/h (2051W)	15
9000Btu/h (2637W)	15
12000Btu/h (3516W)	20
18000Btu/h (5274W)	25

Cooling capacity	Max. length of connection pipe
24000Btu/h (7032W)	25
28000Btu/h (8204W)	30
36000Btu/h (10548W)	30
42000Btu/h (12306W)	30
48000Btu/h (14064W)	30

4. The additional refrigerant oil and refrigerant charging required after prolonging connection pipe
  - After the length of connection pipe is prolonged for 10m at the basis of standard length, you should add 5ml of refrigerant oil for each additional 5m of connection pipe.
  - The calculation method of additional refrigerant charging amount (on the basis of liquid pipe):
 
$$\text{Additional refrigerant charging amount} = \text{prolonged length of liquid pipe} \times \text{additional refrigerant charging amount per meter}$$
  - Basing on the length of standard pipe, add refrigerant according to the requirement as shown in the table. The additional refrigerant charging amount per meter is different according to the diameter of liquid pipe. See Sheet 2.

## Configuration of connection pipe

Sheet 2. Additional refrigerant charging amount for R32

Piping size		Indoor unit throttle	Outdoor unit throttle	
Liquid pipe	Gas pipe	Cooling only, cooling and heating (g / m)	Cooling only (g / m)	cooling and heating (g / m)
1/4"	3/8" or 1/2"	16	12	16
1/4" or 3/8"	5/8" or 3/4"	40	12	40
1/2"	3/4" or 7/8"	80	24	96
5/8"	1" or 1 1/4"	136	48	96
3/4"	—	200	200	200
7/8"	—	280	280	280

Note: The additional refrigerant charging amount in Sheet 2 is recommended value, not compulsory.

## Safety operation of flammable refrigerant

### Qualification requirement for installation and maintenance man

- All the work men who are engaging in the refrigeration system should bear the valid certification awarded by the authoritative organization and the qualification for dealing with the refrigeration system recognized by this industry. If it needs other technician to maintain and repair the appliance, they should be supervised by the person who bears the qualification for using the flammable refrigerant.
- It can only be repaired by the method suggested by the equipment's manufacturer.

### Installation notes

- The air conditioner is not allowed to use in a room that has running fire (such as fire source, working coal gas ware, operating heater).
- It is not allowed to drill hole or burn the connection pipe.
- The air conditioner must be installed in a room that is larger than the minimum room area. The minimum room area is shown on the nameplate or following table a.
- Leak test is a must after installation.

table a - Minimum room area ( m<sup>2</sup>)

Minimum room area( m <sup>2</sup> )	Charge amount (kg)	≤1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5
	floor location	/	14.5	16.8	19.3	22	24.8	27.8	31	34.3	37.8	41.5	45.4	49.4	53.6
window mounted	/	5.2	6.1	7	7.9	8.9	10	11.2	12.4	13.6	15	16.3	17.8	19.3	
wall mounted	/	1.6	1.9	2.1	2.4	2.8	3.1	3.4	3.8	4.2	4.6	5	5.5	6	
ceiling mounted	/	1.1	1.3	1.4	1.6	1.8	2.1	2.3	2.6	2.8	3.1	3.4	3.7	4	

### Maintenance notes

- Check whether the maintenance area or the room area meet the requirement of the nameplate.
  - It's only allowed to be operated in the rooms that meet the requirement of the nameplate.
- Check whether the maintenance area is well-ventilated.
  - The continuous ventilation status should be kept during the operation process.
- Check whether there is fire source or potential fire source in the maintenance area.
  - The naked flame is prohibited in the maintenance area; and the "no smoking" warning board should be hanged.
- Check whether the appliance mark is in good condition.
  - Replace the vague or damaged warning mark.

### Welding

- If you should cut or weld the refrigerant system pipes in the process of maintaining, please follow the steps as below:

## Safety operation of flammable refrigerant

- a. Shut down the unit and cut power supply
  - b. Eliminate the refrigerant
  - c. Vacuuming
  - d. Clean it with N<sub>2</sub> gas
  - e. Cutting or welding
  - f. Carry back to the service spot for welding
- The refrigerant should be recycled into the specialized storage tank.
  - Make sure that there isn't any naked flame near the outlet of the vacuum pump and it's well-ventilated.

### Filling the refrigerant

- Use the refrigerant filling appliances specialized for R32. Make sure that different kinds of refrigerant won't contaminate with each other.
- The refrigerant tank should be kept upright at the time of filling refrigerant.
- Stick the label on the system after filling is finished (or haven't finished).
- Don't overfilling.
- After filling is finished, please do the leakage detection before test running; another time of leak detection should be done when it's removed.

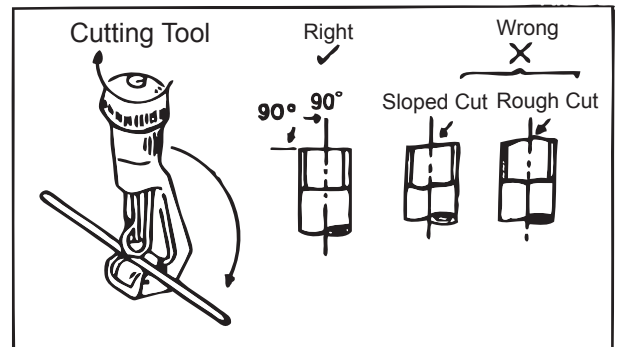
### Safety instructions for transportation and storage

- Please use the flammable gas detector to check before unload and open the container.
- No fire source and smoking.
- According to the local rules and laws.

# Pipe preparation

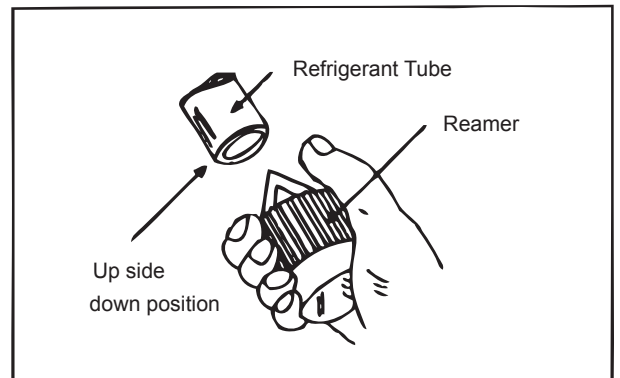
## 1. PIPE & ELECTRICAL WIRE CUTTING

- Use cutting tools easily found in the market.
- Measure precisely both outer & inner pipe.
- Provide a little bit longer pipe than the measurement.
- Wire must be 1.5 m. longer than the refrigerant tube.



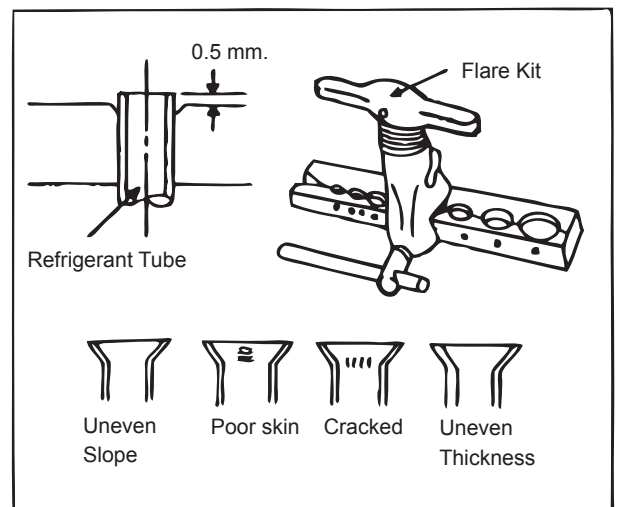
## 2. REAMING

- Clean inside of the inner refrigerant tube.
- While reaming, the tube end must be on the top of the reamer to prevent any dust going back into the tube.



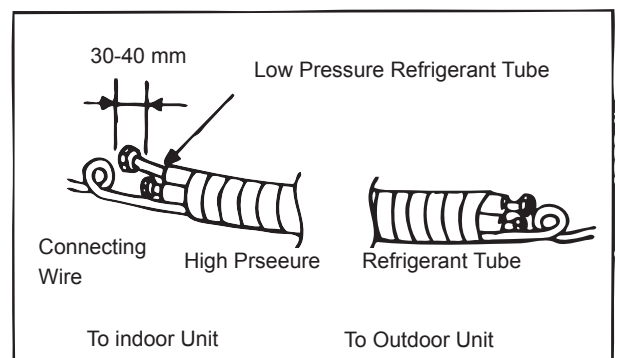
## 3. FLARING THE PIPE END

- Flare both ends of the pipe with flaring kit by fitting the flare nut on the pipe before flaring. Set the die on the pipe so that pipe end is 0.5 mm. above top of the die. Check if the pipe end is even and perfectly round.



## 4. WIRE CONNECTION AND TAPE COVERING

(see the picture on the right side)



- 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.
- 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: this shall be done in a safe manner to avoid possibility of sparking;
  - that no live electrical components and wiring are exposed while charging, recovering or purging the system;
  - that there is continuity of earth bonding.
- Checks to the area
  - Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimised. For repair to the refrigerating system, DD.3.3 to DD.3.7 shall be completed prior to conducting work on the system.
- Work procedure
  - Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed.
- 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.
- 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 toxic or 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.
- Presence of fire extinguisher
  - If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO<sub>2</sub> fire extinguisher adjacent to the charging area.
- No ignition sources
  - No person carrying out work in relation to a refrigerating 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.
- 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.
- Checks to the refrigeration equipment
  - Where electrical components are being changed, they 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 actual refrigerant charge 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.

### • 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: this shall be done in a safe manner to avoid possibility of sparking;
- that no live electrical components and wiring are exposed while charging, recovering or purging the system;
- that there is continuity of earth bonding.

### • 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 the 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 can inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

### • 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.

### • Cabling

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

### • 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.

### • Leak detection methods

The following leak detection methods are deemed acceptable for all refrigerant systems.

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 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. For appliances containing flammable refrigerants, oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

### • Removal and evacuation

When breaking into the refrigerant circuit to make repairs - or for any other purpose - conventional procedures shall be used. However, for flammable refrigerants 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 with inert gas;
- open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders. For appliances containing flammable refrigerants, 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.

For appliances containing flammable refrigerants, 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 is available.

### • 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 minimise the amount of refrigerant contained in them.

- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating 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 refrigerating 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.

### • Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. 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 prior to re-use of recovered 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 refrigerating system unless it has been cleaned and checked.

- **Labelling**

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

- **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 is 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 appropriate refrigerants including, when applicable, flammable 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.

- **General**

That the installation of pipe-work shall be kept to a minimum.

That compliance with national gas regulations shall be observed.

That mechanical connections made in accordance with 22.118 shall be accessible for maintenance purposes.



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