

2.5 Application data

2.5.1 Installation of outdoor unit

- This manual describes outdoor unit installation work.
- For indoor unit installation and electrical cabling, please refer to page 95.
- When install the unit, be sure to check whether the selection of installation place, power source specifications, usage limitation (piping length, height differences between indoor and outdoor units, power source voltage and etc.) and installation spaces

Designed for R32 refrigerant

Outdoor unit capacity
FDC90 — 155
PSC012D165

Precautions for safety

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

⚡ Never do it under any circumstance. **⚠️ Always do it according to the instruction.**

- Be sure to confirm no anomaly on the equipment by commissioning after completed installation and explain the operating methods as well as the maintenance methods of this equipment to the user according to the owner's manual.
- Keep the installation manual together with owner's manual at a place where any user can read at any time. Moreover if necessary, ask to hand them to a new user
- For 3phase outdoor unit, EN61000-3-2 is not applicable as consent by the utility company or notification to the utility company is given before usage.
- 5 and 6HP units of single phase power source are equipment complying with IEC61000-3-12.

⚠️ WARNING

- ⚡**
- Installation must be carried out by the qualified installer.
If you install the system by yourself, it may cause serious trouble such as water leaks, electric shocks, fire and personal injury, as a result of a system malfunction.
 - Install the system in full accordance with the instruction manual.
Incorrect installation may cause bursts, personal injury, water leaks, electric shocks and fire.
 - Use the original accessories and the specified components for installation.
If parts other than those prescribed by us are used, it may cause fall of the unit, water leaks, electric shocks, fire, refrigerant leak, substandard performance, control failure and personal injury.
 - When installing in small rooms, take prevention measures not to exceed the density limit of refrigerant in the event of leakage accordance with ISO5149.
Consult the expert about prevention measures. If the density of refrigerant exceeds the limit in the event of leakage, lack of oxygen can occur, which can cause serious accidents.
 - Ventilate the working area well in the event of refrigerant leakage during installation.
If the refrigerant comes into contact with naked flames, poisonous gas is produced.
 - After completed installation, check that no refrigerant leaks from the system.
If refrigerant leaks into the room and comes into contact with an oven or other hot surface, poisonous gas is produced.
 - Hang up the unit at the specified points with ropes which can support the weight in lifting for portage. And to avoid jolting out of alignment, be sure to hang up the unit at 4-point support.
An improper manner of portage such as 3-point support can cause death or serious personal injury due to falling of the unit.
 - Install the unit in a location with good support.
Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury.
 - Ensure the unit is stable when installed, so that it can withstand earthquakes and strong winds.
Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury.
 - The electrical installation must be carried out by the qualified electrician in accordance with "the norm for electrical work" and "national wiring regulation" and the system must be connected to the dedicated circuit.
Power source with insufficient capacity and incorrect function done by improper work can cause electric shocks and fire.
 - Be sure to shut off the power before starting electrical work.
Failure to shut off the power can cause electric shocks, unit failure or incorrect function of equipment.
 - Be sure to use the cables conformed to safety standards and cable ampacity for power distribution work.
Unconformable cables can cause electric leak, anomalous heat production or fire.
 - Use the prescribed cables for electrical connection, tighten the cables securely in terminal block and relieve the cables correctly to prevent overloading the terminal blocks.
Loose connections or cable mountings can cause anomalous heat production or fire.
 - Arrange the wiring in the control box so that it cannot be pushed up further into the box. Install the service panel correctly.
Incorrect installation may result in overheating and fire.
 - In connecting the power cable, make sure that no anomalies such as dust deposits, socket clogging or wobble are found and insert the plug securely.
Accumulation of dust, clogging on the socket, or looseness of plugging can cause electric shocks and fire.
 - Be sure not to reuse existing refrigerant pipes
Conventional refrigerant oil or chlorine contained in the conventional refrigerant which is remaining in the existing refrigerant pipes can cause deterioration of refrigerant oil of new unit. And 1.6 times higher pressure of R32 refrigerant than conventional one can cause burst of existing pipe, personal injury or serious accident.
 - Do not perform brazing work in the airtight room
It can cause lack of oxygen.
 - Use the prescribed pipes, flare nuts and tools for R32.
Using existing parts (for R22 or R407C) can cause the unit failure and serious accidents due to burst of the refrigerant circuit.
 - Tighten the flare nut by using double spanners and torque wrench according to prescribed method. Be sure not to tighten the flare nut too much.
Loose flare connection or damage on the flare part by tightening with excess torque can cause burst or refrigerant leaks which may result in lack of oxygen.
 - Do not open the service valves for liquid line and gas line until completed refrigerant piping work, air tightness test and evacuation.
If the compressor is operated in state of opening service valves before completed connection of refrigerant piping work, you may incur frost bite or injury from an abrupt refrigerant outflow and air can be sucked into refrigerant circuit, which can cause burst or personal injury due to anomalously high pressure in the refrigerant.
 - Do not put the drainage pipe directly into drainage channels where poisonous gases such as sulphide gas can occur.
Poisonous gases will flow into the room through drainage pipe and seriously affect the user's health and safety. It can also cause the corrosion of the indoor unit and resultant unit failure or refrigerant leak.
 - Only use prescribed option parts. The installation must be carried out by the qualified installer.
If you install the system by yourself, it can cause serious trouble such as water leaks, electric shocks, fire.
 - Do not perform any change of protective device itself or its setup condition
The forced operation by short-circuiting protective device of pressure switch and temperature control or the use of non specified component can cause fire or burst.
 - Be sure to switch off the power source in the event of installation, inspection or servicing.
If the power source is not shut off, there is a risk of electric shocks, unit failure or personal injury due to the unexpected start of fan.
 - Consult the dealer or an expert regarding removal of the unit.
Incorrect installation can cause water leaks, electric shocks or fire.
 - Stop the compressor before closing valve and disconnecting refrigerant pipes in case of pump down operation.
If disconnecting refrigerant pipes in state of opening service valves before compressor stopping, you may incur frost bite or injury from an abrupt refrigerant outflow and air can be sucked, which can cause burst or personal injury due to anomalously high pressure in the refrigerant circuit.
 - Ensure that no air enters in the refrigerant circuit when the unit is installed and removed.
If air enters in the refrigerant circuit, the pressure in the refrigerant circuit becomes too high, which can cause burst and personal injury.
 - Do not run the unit with removed panels or protections
Touching rotating equipments, hot surfaces or high voltage parts can cause personal injury due to entrapment, burn or electric shocks.
 - Be sure to fix up the service panels.
Incorrect fixing can cause electric shocks or fire due to intrusion of dust or water.
 - Do not perform any repairs or modifications by yourself. Consult the dealer if the unit requires repair.
If you repair or modify the unit, it can cause water leaks, electric shocks or fire.

⚠️ CAUTION

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

Notabilia as a unit designed for R32

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

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

1. BEFORE BEGINNING INSTALLATION

(Check that the models, power source specifications, piping, wiring are correct.)

Indoor and outdoor unit combinations

(1) Combination can be arranged with the conditions (number of units, capacity) shown below.




Indoor unit	Remote control	Connectability
FD○△△KXE6 KXZ Series indoor unit	RC—EX1A (2 cores) RC—E5 (2 cores) RC—E4 (2 cores) RC—E3 (2 cores)	OK
FD○△△KXE4 Series indoor unit	RC—E1 (3 cores)	×

* Only indoor units of the above-listed series can be connected in the refrigerant system.

(2) The combination is possible if in the table below condition (number of units, capacity).

Indoor unit	Outdoor unit				
	90	112	121	140	155
Number of connectable units	1—8	1—8	1—8	1—10	1—10
Total capacity of indoor units	90—135	90—168	90—182	112—210	124—232

[Accessory]

Name	Quantity	Usage location	Attachment position
Edging 	1	Use it for protection of a knock-out hole.	It is attached to the bracket with an adhesive tape in the proximity of the service valve.
User's manual 	1	When the installation work is completed, give instructions to the customer and ask him/her to keep it.	It is attached to the front of a unit.
Round terminal (FDC90~155KXZEN1-W only) 	3	Use it for power source wiring. (One is a backup)	It is attached in the unit.

[Items sold separately]

Refrigerant pipe distribution parts, which are not contained in the package, will be required for installation.
As for refrigerant pipe distribution parts, we offer branching pipe sets (Model type: DIS) and header sets (Model type: HEAD) as parts used on the indoor side of piping.
Please select one suiting your application. In selecting distribution parts, please also refer to "4. REFRIGERANT PIPING."
If you are not sure which parts to select, please consult with your dealer or the manufacturer.
Use refrigerant branching pipe sets and header sets designed exclusively for R32 without fail.

2. INSTALLATION LOCATION

(Obtain approval from the customer when selecting the installation area.)

2-1. Selecting the installation location

- Where air is not trapped.
- Where the installation fittings can be firmly installed.
- Where any object does not prevent inlet or outlet air.
- Out of the heat range of other heat sources.
- Where strong winds will not blow against the outlet air.

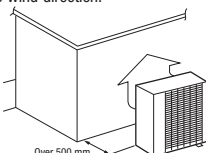
Please note

- If there is a possibility of a short-circuit, then install a flex flow adapter.
- When installing multiple units, provide sufficient intake space so that a short-circuit does not occur.
- In areas where there is snowfall, install the unit in a frame or under a snow hood to prevent snow from accumulating on it.
(Inhibition of collective drain discharge in a snowy country)
- Do not install the equipment in areas where there is a danger for potential explosive atmosphere.
- Install the equipment in a location that can sufficiently support the weight of the equipment.
- If a unit is installed into a special environment as shown below, there will be a danger that the corrosion of the outdoor unit or its malfunctioning is caused. If this is the case, please consult with the distributor from whom you have purchased the unit.
 - Where corrosive gas is generated (such as a hot-spring resort area).
 - Where the unit is subject to sea breezes (coastal area).
 - Where the unit is subject to oil mists.
 - Where equipment generating electromagnetic waves exists in the vicinity.

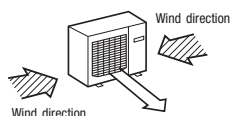
g) When strong winds occur

- Where it is likely that the unit is subjected to strong winds, provide wind guards according to the following guidelines.
Strong winds can cause performance degradation, an accidental stop due to a rise of high pressure and a broken fan.

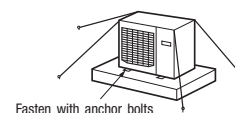
① Place the unit outlet pipe perpendicular to the wind direction.



② Please install so the direction of the air from the blowing outlet will be perpendicular to the direction of the wind.



③ When the foundation is not level, use wires to tie down the unit.

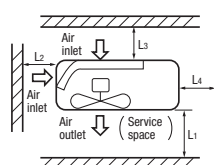
**CAUTION**

Please leave sufficient clearance around the unit without fail.
Otherwise, a risk of compressor and/or electric component failure may arise.

2-2. Installation space (Ex. servicing space)

- Minimum installation space
(Please select an installation point with due attention to the direction of installation of the refrigerant pipe)
(If the installation conditions shown in this drawing are not satisfied, please consult with your dealer or the manufacturer.)
- When units are installed side by side, leave a 10mm or wider service space between the units.
- Walls surrounding the unit in the four sides are not acceptable.
- There must be a 1-meter or larger space in the above.
- A barrier wall placed in front of the exhaust diffuser must not be higher than the unit.

* Please ask to the dealer regarding the options such as the flex flow adapter and the snow guard hood.



		(Unit : mm)		
Size	Sample	I	II	III
L 1	Open	Open	Open	500
L 2	300	5	Open	
L 3	150	300	150	
L 4	5	5	5	

3. UNIT DELIVERY AND INSTALLATION

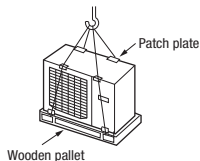
(Take particular care in carrying in or moving the unit, and always perform such an operation with two or more persons.)

CAUTION

When you sling the unit for portage, do not fail to take into consideration the deviation of the gravity center from its center. Improper slinging may cause the unit to lose balance and fall.

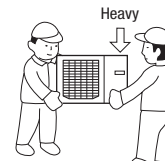
Delivery

- Deliver the unit as close as possible to the installation site before removing it from the packaging.
- If unpacked and deliver cannot be avoided, use a nylon sling or a rope with pads placed where the rope contacts the unit so it is not scratched.

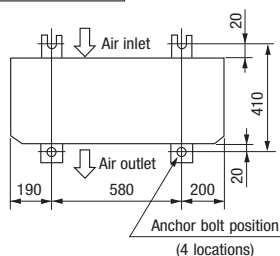


Portage

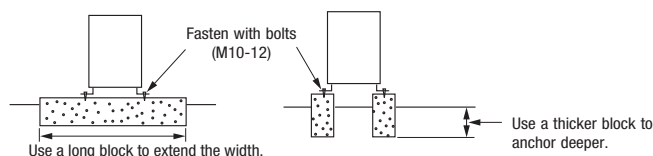
- The right hand side of the unit as viewed from the front (diffuser side) is heavier. A person carrying the right hand side must take heed of this fact. A person carrying the left hand side must hold with his right hand the handle provided on the front panel of the unit and with his left hand the corner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



Bolt fastening positions



- In installing the unit, fix the unit's legs with bolts specified below.



- The protrusion of an anchor bolt on the front side must be kept within 15mm.
- Securely install the unit so that it does not fall over during earthquakes or strong winds, etc.
- Refer to the above illustrations for information regarding concrete foundations.
- Install the unit in a level area. (With a gradient of 5mm or less.)

Improper installation can result in a compressor failure, broken piping within the unit and abnormal noise generation.

Important



In case that the unit operates in cooling mode, when the outdoor temperature is -5°C or lower, please equip a flex flow adapter and a snow guard hood (option) on the unit.

4. REFRIGERANT PIPING

4-1. Determination of piping specifications (Please select from the following matrix according to indoor unit specifications and installation site conditions)

Refrigerant piping restrictions

Please do not fail to observe the following pipe sizes and limitations of use. A failure to observe this instruction can result in a compressor failure or performance degradation.

- Please avoid forming any trap () or bump () in piping as they can cause fluid stagnation.

- Maximum length (To the farthest indoor unit) Within 70m
- Equivalent length (To the farthest indoor unit) Within 95m
- Total pipe length (Combined total length of pipes) Within 100m
- ϕ 9.52 pipe length Within 50m

- Height difference
 - (1) When the outdoor unit is above the indoor unit Within 30m
 - (2) When the outdoor unit is below the indoor unit Within 15m
 - (3) Height difference between indoor units in the same system Within 15m
 - (4) Height difference between indoor units and first branch Within 15m

Refrigerant piping size selection

- Please use pipes clean on both the inside and outside and free from contaminants harmful to operation such as sulfur, oxides, dust, chips, oil, fat and water.
- Use the following material for refrigerant piping.
Material: phosphorus deoxidized seamless copper pipe (C1120T-0, JIS H3300)
- Thickness and size: Please select proper pipes according to the pipe size selection guideline.
(Since this unit uses R32, Select pipes having a wall thickness larger than the specified minimum pipe thickness.)
- For branching pipes, use a genuine branching pipe set or header set at all times.
- Install a branching pipe set, paying attention to the direction of attachment, after you have perused through the installation manual supplied with it.
- The length of piping from outdoor unit to first branch is 1.5m or more.
- For the handling of service valves, please refer to 4-2. Piping work.

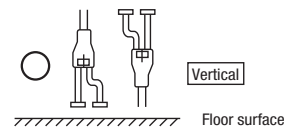
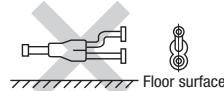
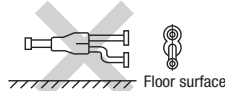
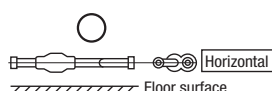
(1) Individual flow division method

- For determination of appropriate branching joint or different diameter pipe joint sizes, please refer to "Branching Pipe Set," (which can be purchased separately).

Attention

- Please use pipes of the pipe size specified for the outdoor unit for the section between the outdoor unit and the first branching joint.
- An appropriate pipe size between branching joints can vary depending on the connected indoor unit capacity (total capacity connected downstream), please select an appropriate pipe size from the table shown on the right.
- The pipe size between the branch pipe and the indoor unit should match that of the indoor unit.
- Always install branch pipes either horizontally or vertically.

Item	Model	Gas pipe	Liquid pipe
Outdoor unit Main pipe	90, 112, 121, 140, 155	ϕ 15.88	ϕ 9.52
Total capacity of indoor units	less than 70	ϕ 12.7	ϕ 9.52
	70 or more	ϕ 15.88	ϕ 9.52

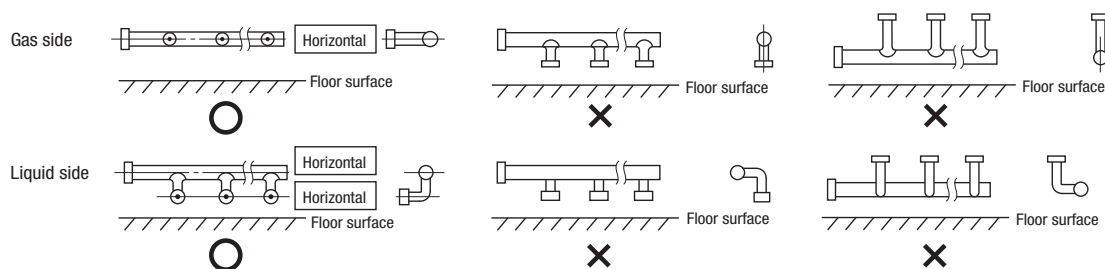


(2) Header Method

- Depending on the number of units connected, connect blind pipes to header branching points (on the indoor unit connection side).
- For determination of appropriate header, different diameter pipe joint and blind pipe sizes, please refer to "Header Set," (which can be purchased separately).

Attention

- For the section between an indoor unit and the header, use a pipe of the diameter specified for the indoor unit.
- To couple with the header, use a different diameter pipe joint to adjust to the pipe diameter specified for the indoor unit.
- The header must be so installed that it branches horizontally (for both gas and liquid)



Unit piping specifications The piping material should be phosphorus deoxidized copper seamless steel pipes. (C1220T, JIS H 3300)

Item	Model	Gas side			Liquid side		
		Pipe diameter (mm)	Minimum pipe wall thickness (mm)	Connection method	Pipe diameter (mm)	Minimum pipe wall thickness (mm)	Connection method
Outdoor unit	90, 112, 121, 140, 155	φ 15.88	1.0	Flare	φ 9.52	0.8	Flare
	15	φ 9.52	0.8		φ 6.35	0.8	
Indoor unit	22	φ 9.52	0.8		φ 6.35	0.8	
	28	φ 9.52	0.8		φ 6.35	0.8	
	36	φ 12.7	0.8		φ 6.35	0.8	
	45	φ 12.7	0.8		φ 6.35	0.8	
	56	φ 12.7	0.8		φ 6.35	0.8	
	71	φ 15.88	1.0		φ 9.52	0.8	
	90	φ 15.88	1.0		φ 9.52	0.8	
	112	φ 15.88	1.0		φ 9.52	0.8	
	140	φ 15.88	1.0		φ 9.52	0.8	
	160	φ 15.88	1.0		φ 9.52	0.8	

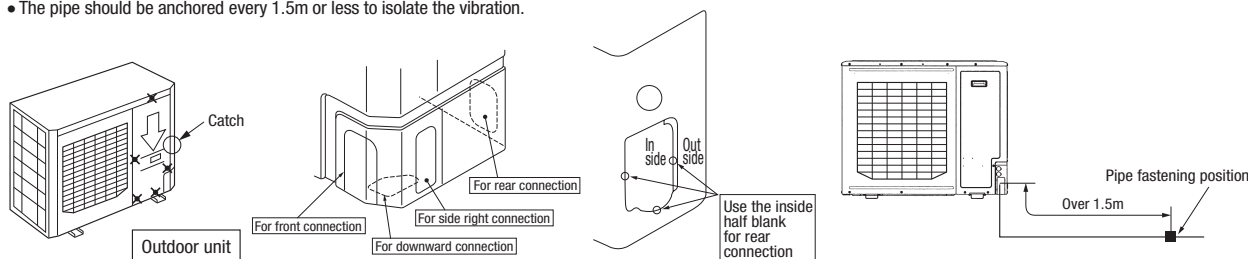
Attention

- Always select pipes meeting the minimum wall thickness requirement.

4-2. Piping work

Piping connection position and the piping remove direction

- First remove the five screws (X mark) of the service panel and push it down into the direction of the arrow mark and then remove it by pulling it toward you.
- The pipe can be laid in any of the following directions: side right, front, rear and downward.
- Remove a knock-out plate provided on the pipe penetration to open a minimum necessary area and attach an edging material supplied as an accessory by cutting it to an appropriate length before laying a pipe.
- In laying pipes on the installation site, cut off the casing's half blank that covers a hole for pipe penetration with nippers.
- If there is a risk of small animals entering from the pipe penetration part, close the part with some sealing material or the like (to be arranged on the installer's part).
- In the case of an installation using a collective drain system, use a port other than the bottom one to take out cables and pipes. If the bottom port is used, seal it thoroughly so that drain water may not spill out.
- Use an elbow (to be arranged on the user's part) to connect control valves to the piping.
- In anchoring piping on the installation site, give 1.5m or a longer distance between an outdoor unit and an anchoring point where the piping is secured as illustrated below. (A failure to observe this instruction may result in a pipe fracture depending on a method of isolating vibrations employed.)
- The pipe should be anchored every 1.5m or less to isolate the vibration.




(1) On-site piping work

Important


- Please take care so that installed pipes may not touch components within a unit.
- **During the pipe installation at site, keep the service valves shut all the time.**
- Give **sufficient protections** (compressed and brazed or by an adhesive tape) **to pipe ends so that any water or foreign matters may not enter the pipes.**
- In bending a pipe, bend it **to the largest possible radius (at least four times the pipe diameter)**. Do not bend a pipe repeatedly to correct its form.
- An outdoor unit's pipe and refrigerant piping are to be flare connected. Flare a pipe after engaging a flare nut onto it. A flare size for R32 is different from that for conventional R407C. Although we recommend the use of flaring tools developed specifically for R32, conventional flaring tools can also be used by adjusting the measurement of protrusion B with a protrusion control gauge.
※ Do not reuse exiting flare, make new flare.
- Tighten a flare joint securely **with two spanners**. Observe flare nut tightening torque specified in the table below.

CAUTION


If you tighten it without using double spanners, you may deform the service valve, which can cause an inflow of nitrogen gas into the outdoor unit.



Copper pipe outer diameter	H
φ 6.35	17
φ 9.52	22
φ 12.7	26
φ 15.88	29



Copper pipe outer diameter	A
φ 6.35	0 -0.4
φ 6.35	9.1
φ 9.52	13.2
φ 12.7	16.6
φ 15.88	19.7



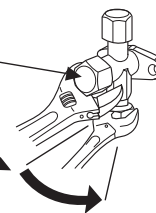
Copper pipe outer diameter	In the case of a rigid (clutch) type	
	With an R32 tool	With a conventional tool
φ 6.35	0—0.5	0.7—1.3
φ 9.52		
φ 12.7		
φ 15.88		

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

Service valve size (mm)	Tightening torque (N-m)	Tightening angle (°)	Recommended length of a tool handle (mm)
φ6.35 (1/4")	14—18	45—60	150
φ9.52 (3/8")	34—42	30—45	200
φ12.7 (1/2")	49—61	30—45	250
φ15.88(5/8")	68—82	15—20	300

Do not hold the valve cap area with a spanner.

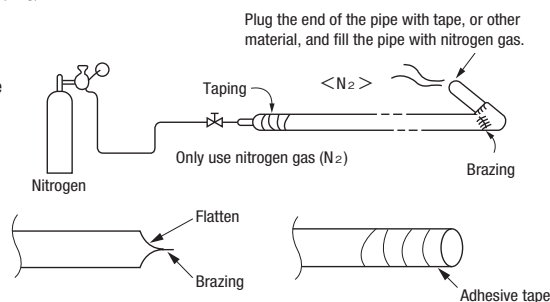
Use a torque wrench. If a torque wrench is not available, fasten the flare nut manually first and then tighten it further, using the left table as a guide.



- Do not apply any oil on a flare joint.
- **Blazing must be performed under a nitrogen gas flow.** Without nitrogen gas, a large quantity of foreign matters (oxidized film) are created, causing a critical failure from capillary tube or expansion valve clogging.
- Brazing of the service valve and the pipes should be performed while cooling the valve body with a wet towel.
- Perform flushing. To flush the piping, charge nitrogen gas at about 0.02MPa with a pipe end closed with a hand. When pressure inside builds up to a sufficient level, remove the hand to flush. (in flushing a pipe, close the other end of the pipe with a plug).

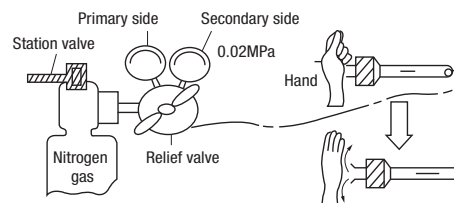
Operation procedure

- ① **During the pipe installation at site, keep the service valves shut all the time.**
- ② **Blazing must be performed under a nitrogen gas flow.** Without nitrogen gas, a large quantity of foreign matters (oxidized film) are created, causing a critical failure from capillary tube or expansion valve clogging.



- ③ Give **sufficient protections** (compressed and brazed or with an adhesive tape) **so that water or foreign matters may not enter the piping.**

- ④ Perform flushing. To flush the piping, charge nitrogen gas at about 0.02MPa with a pipe end closed with a hand. When pressure inside builds up to a sufficient level, remove the hand to flush. (in flushing a pipe, close the other end of the pipe with a plug).



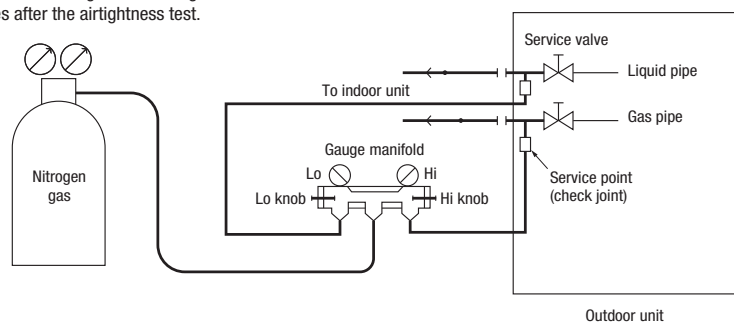
4-3. Air tightness test and air purge (Carry them out according to the following steps.)

Air tightness test

- ① Although an outdoor unit itself has been tested for air tightness at the factory, please check the connected pipes and indoor units for air tightness from the check joint of the service valve on the outdoor unit side. While conducting a test, **keep the service valve shut all the time.**
- ② Since refrigerant piping is pressurized to the design pressure of a unit with nitrogen gas for testing air tightness, please connect instruments according to the drawing below. Under no circumstances should chlorine-based refrigerant, oxygen or any other combustible gas be used to pressurize a system.
Keep the service valve shut all the time. Do not open it under any circumstances.
Be sure to pressurize all of the liquid, gas pipes.
- ③ In pressurizing the piping, do not apply the specified level of pressure all at once, but gradually raise pressure.
 - a) **Raise the pressure to 0.5 MPa, and then stop. Leave it for five minutes or more** to see if the pressure drops.
 - b) **Then raise the pressure to 1.5 MPa, and stop. Leave it for five more minutes** to see if the pressure drops.
 - c) Then raise the pressure to the specified level (4.15 MPa), and record the ambient temperature and the pressure.
 - d) **If no pressure drop is observed with an installation pressurized to the specified level and left for about one day, it is acceptable.** When the ambient temperature changes 1°C, the pressure also changes approximately 0.01 MPa. The pressure, if changed, should be compensated for.
 - e) If a pressure drop is observed in checking e) and a) – d), a leak exists somewhere. Find a leak by applying bubble test liquid to welded parts and flare joints and repair it. After repair, conduct an air-tightness test again.
- ④ Always pull air from the pipes after the airtightness test.

CAUTION

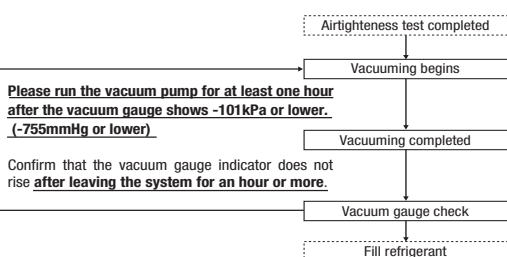
Applying excessive pressure can cause an inflow of nitrogen gas into an outdoor unit.



Vacuuming Please pull air from the check joints of the service valves on both liquid and gas sides.

< Work flow >

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



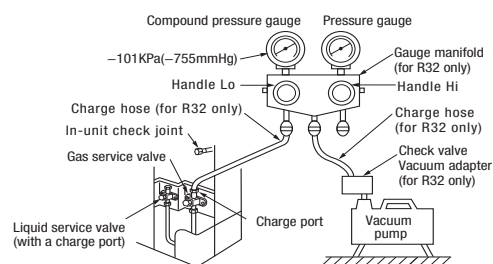
CAUTION

Insufficient vacuuming may result in poor performance falling short of the design capacity, pipe clogging due to residue moisture and/or a compressor failure.

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

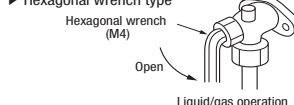
- To prevent a different oil from entering, please assign dedicated tools, etc. to each refrigerant type. Under no circumstances must a gauge manifold and a charge hose in particular be shared with other refrigerant types (R22, R407C, R410A etc.).
- Use a counterflow prevention adapter to prevent vacuum pump oil from entering the refrigerant system.

When a vacuum air purge is completed, remove the valve rod cap nuts and open the service valves (both liquid and gas sides) as illustrated below. After you have made sure that the valves are in the full-open position, tighten the cap nuts (for the valve rods and charge ports).



- You can purge air with either liquid service valve or gas service valve.

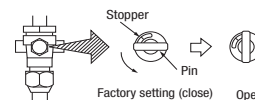
► Hexagonal wrench type



- Open the valve rod until it touches the stopper. You need not apply force to push it further.

► Pin type

Remove the hexagon cap nut, set it as illustrated in the drawing below.



For tightening torque, refer to the table below.

Service valve size (mm)	Tightening torque (N·m)	Cap tightening torque (N·m)	Cap nut tightening torque of check joint (N·m)
φ 9.52 (3/8")	34 — 42	20 — 30	13
φ 15.88(5/8")	68 — 95	30 — 35	13

- When an operation is completed, replace the cap nut and tighten it as before.
- Shaft operation, cap and cap nut is performed by excessive torque, it will become failure and a cause of a leak, please follow a table.

4-4. Additional refrigerant charge

Additional refrigerant charge

Charge additional refrigerant **in the liquid state.**

Be sure to measure the quantity **with a scale in adding refrigerant.**

If you cannot charge all refrigerant with the outdoor unit lying idle, charge it with the unit running in the test run mode. (For the test run method, please refer to Section 8) If operated for a long time with insufficient refrigerant the compressor will be damaged. (In particular, when adding refrigerant during operation, complete the job within 30min.) Fill this unit only with the standard amount of refrigerant (piping length 0m fill quantity).

Determine the amount of refrigerant to be charged additionally using the following formula and put down the amount of refrigerant added on the refrigerant charge volume recording plate provided on the back of the side panel.

● Adding additional refrigerant

Charge additional refrigerant according to the size and length of the liquid piping.

Determine additional charge volume by rounding to the nearest 0.1kg.

Additional fill quantity (kg)=P+I

P: Additional refrigerant quantity for piping (kg)

Item	Standard refrigerant charge volume (kg)	Pipe length for baseline charge volume (m)	Additional charge volume (kg) per meter of refrigerant piping (liquid pipe)	Refrigerant volume charged for shipment at the factory (kg)	Installation's pipe length (m) covered without additional refrigerant charge	Refrigerant pipe size	φ 9.52	φ 6.35
Capacity						Additional charge volume (kg)	0.050	0.020
90, 112, 121, 140, 155	3.2	0	0.050 (Liquid piping φ 9.52)	4.2	20			

● A standard refrigerant charge volume means a refrigerant charge volume for an installation with 0m long refrigerant piping.

● This unit contains factory charged refrigerant covering 20m of refrigerant piping and additional refrigerant charge on the installation site is not required for an installation with up to 20m refrigerant piping.

When refrigerant piping exceeds 20m, additionally charge an amount calculated from the pipe length and the above table for the portion in excess of 20m.

Formula to calculate the volume of additional refrigerant required

Model 90, 112, 121, 140, 155	Refrigerant (necessary) charge volume for piping (kg) = Standard refrigerant charge 3.2kg + φ 9.52 Total length of liquid pipes (m) x 0.050 (kg/m) + φ 6.35 Total length of liquid pipes (m) x 0.020 (kg/m) P = Refrigerant (necessary) charge volume for piping (kg) - Factory charged volume 4.2 (kg)
------------------------------	--

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

● If the pipe length is shorter than 5 m, you should charge a reduced refrigerant volume.

Recover the refrigerant from the system and charge the standard refrigerant charge + the amount for liquid pipe.

I: Additional refrigerant quantity for indoor units (kg)

If the total indoor units capacity is larger than outdoor unit capacity, then calculate the additional refrigerant quantity for indoor units.

$D = \{(\text{Total indoor units capacity}) - (\text{outdoor unit capacity})\}$

$I = D \times 0.005$

When $D > 0$, calculate I using the above equation;

When $D \leq 0$, take it as $I = 0$.

<Example>

When you connect FDC140 to FDT45 x 4 units:

$D = 45 \times 4 - 140 = 40 (> 0)$

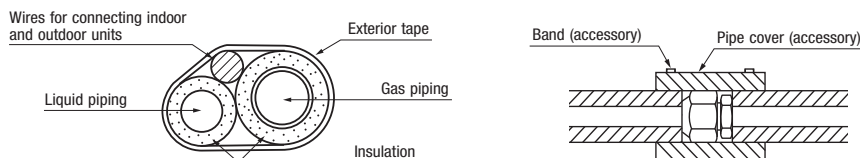
$I = 40 \times 0.005 = 0.2 (\text{kg})$

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

- To prevent a different oil from entering, please assign dedicated tools, etc. to each refrigerant type. Under no circumstances must a gauge manifold and a charge hose in particular be shared with other refrigerant types (R22, R407C, R410A etc.).
- Do not use a charge cylinder under any circumstances. There is a danger that the composition of the refrigerant will change when R32 is transferred to a cylinder.
- When charging refrigerant, use liquid refrigerant from a cylinder.
- Use a Adverse current prevention adapter so that vacuum pump oil does not mix in a system.

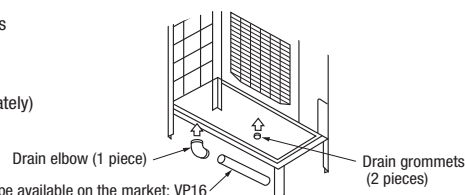
4-5. Heat insulation for prevention of dew condensation

- (1) Dress refrigerant pipes (both gas and liquid pipes) for heat insulation and prevention of dew condensation. Improper heat insulation/anti-dew dressing can result in a water leak or dripping causing damage to household effects, etc.
- (2) Use a heat insulating material that can withstand 120°C or a higher temperature. Poor heat insulating capacity can cause heat insulation problems or cable deterioration.
 - All gas pipes must be securely heat insulated in order to prevent damage from dripping water that comes from the condensation formed on them during a cooling operation or personal injury from burns because their surface can reach quite a high temperature due to discharged gas flowing inside during a heating operation.
 - Wrap indoor units' flare joints with heat insulating parts (pipe cover) for heat insulation (both gas and liquid pipes).
 - Give heat insulation to both gas and liquid side pipes. Bundle a heat insulating material and a pipe tightly together so that no gaps may be left between them and wrap them together with a connecting cable by a dressing tape.
 - Although it is verified in a test that this air conditioning unit shows satisfactory performance under JIS condensation test conditions, both gas and liquid pipes need to be dressed with 10-20mm heat insulation materials additionally above the ceiling where relative humidity exceeds 70%.



5. DRAINAGE

- Where drain water from the outdoor unit causes problems, implement drain piping with drain elbows and drain grommets.
- There are 3 holes in the bottom panel of the outdoor unit to drain condensation.
- Where condensate is guided to a drain, install the unit on a flat base (an option part supplied separately) or concrete blocks.
- Connect a drain elbow as illustrated and plug the other holes with grommets.



6. ELECTRICAL WIRING WORK

Electrical installation work must be performed by an electrical installation service provider qualified by a power provider of the country.

Electrical installation work must be executed according to the technical standards and other regulations applicable to electrical installations in the country.

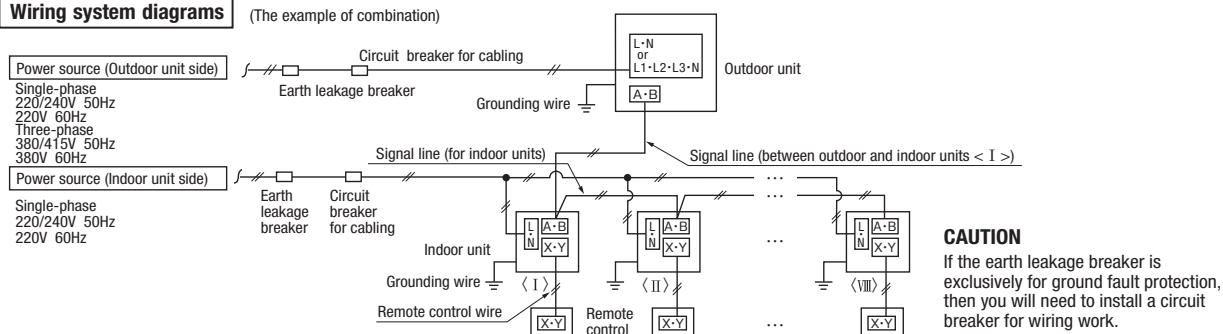
⚠ Please install an earth leakage breaker without fail. The installation of an earth leakage breaker is compulsory in order to prevent electric shocks or fire accidents. (Since this unit employs inverter control, please **use an impulse withstanding type** to prevent an earth leakage breaker's false actuation.)

Please note

- a) Use only copper wires.
 - Do not use any supply cord lighter than one specified in parentheses for each type below.
 - braided cord (code designation 60245 IEC 51), if allowed in the relevant part 2;
 - ordinary tough rubber sheathed cord (code designation 60245 IEC 53);
 - flat twin tinsel cord (code designation 60227 IEC 41)
 - ordinary polyvinyl chloride sheathed cord (code designation 60227 IEC 53).
- Please do not use anything lighter than polychloroprene sheathed flexible cord (cord designation 60245 IEC57) for supply cords of parts of appliances for outdoor use.
- b) **Use separate power sources for the indoor and outdoor units.**
- c) **The power sources for indoor units in the same system should turn on and off simultaneously.**
- d) Ground the unit. Do not connect the grounding wire to a gas pipe, water pipe, lightning rod or telephone grounding wire. A grounding wire must be connected before connecting the power cable. Provide a grounding wire longer than the power cable. If improperly grounded, an electric shock or malfunction may result. Don't connect the grounding wire to a gas pipe because it could cause explosion or ignition if gas leaks.
- e) **The installation of an impulse withstanding type earth leakage breaker is necessary.** A failure to install an earth leakage breaker can result in an accident such as an electric shock or a fire. Do not turn on the power until the electrical work is completed. Be sure to turn off the power when servicing.
- f) Please do not use a condensive capacitor for power factor improvement under any circumstances. (It does not improve power factor, while it can cause an abnormal overheat accident)
- g) For power source cables, use conduits.
- h) Please **do not lay electronic control cables (remote control and signaling lines) and other high current cables together outside the unit.** Laying them together can result in malfunctioning or a failure of the unit due to electric noises.
- i) Power cables and signaling lines must always be connected to the terminal block and secured by cable fastening clamps provided in the unit.
- j) Fasten cables so that they may not touch the piping, etc.
- k) **When cables are connected, please make sure that all electrical components within the electrical component box are not free or not loose on the terminal connection** and then attach the cover securely. (Improper cover attachment can result in malfunctioning or a failure of the unit, if water penetrates into the box.)
- l) Make sure to use circuit breakers (earth leakage breaker and circuit breaker) of proper capacity. Use of breakers of larger capacity could result in trouble on components or fire accident. The circuit breaker should isolate all poles under over current.
- m) Install isolator or disconnect switch on the power source wiring in accordance with the local codes and regulations. The isolator should be locked in OFF state in accordance with EN60204-1.
- n) After maintenance, all wiring, wiring ties and the like, should be returned to their original state and wiring route, and the necessary clearance from all metal parts should be secured.

Wiring system diagrams

(The example of combination)



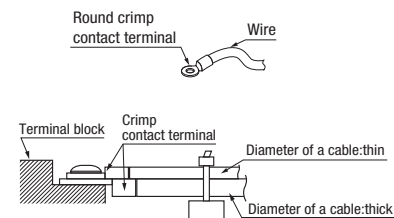
Method of connecting power cables

(1) Method of leading out cables

- As shown on the drawing in Section 4-2, cables can be laid through the front, right, left or bottom casing.
- In wiring on the installation site, cut off a half-blank covering a penetration of the casing with nippers.
- In the case of an installation using a collective drain system, use a port other than the bottom one to take out cables and pipes.
If the bottom port is used, seal it thoroughly so that drain water may not spill out.

(2) Notabilia in connecting power cables

- Connect the ground wire before you connect the power cable. When you connect a grounding wire to a terminal block, use a grounding wire longer than the power cable so that it may not be subject to tension.
- Do not turn on power until installation work is completed. Turn off power to the unit before you service the unit.
- Always connect power cables to the power terminal block.
- To connect a cable to the power terminal block, use a round crimp contact terminal.
- If two cables are to be connected to one terminal, arrange cables in such a manner that you put their crimp contact terminals together back to back. Further, put the thinner cable above the thicker one in arranging cables for such connection.
- Use specified wires in wiring, and fasten them securely in such a manner that the terminal blocks are not subject to external force.
- In fastening a screw of a terminal block, use a correct-size driver.
Fastening a screw of a terminal block with excessive force can break the screw.
- When electrical installation work is completed, make sure that all electrical components within the electrical component box are free of loose connector coupling or terminal connection.



Power source specifications

(1) Outdoor unit power source (Indoor unit is another power source.)

Model	Power source	Cable size for power source (mm ²)	Wire length (m)	Moulded-case circuit breaker (A)		Earth leakage breaker	Earth wire	
				Rated current	Switch capacity		Size (mm ²)	Screw type
90KXZEN1-W	Single-phase 220/240V 50Hz 220V 60Hz	8	32	40	50	40A, 30mA less than 0.1 sec	2	M4
112KXZEN1-W								
121KXZEN1-W								
140KXZEN1-W								
155KXZEN1-W	Three-phase 380/415V 50Hz 380V 60Hz	3.5	46	20	30	20A, 30mA less than 0.1 sec	2	M4
112KXZES1-W								
121KXZES1-W								
140KXZES1-W								
155KXZES1-W								

(2) Indoor unit power source (Outdoor unit is another power source.) & signal line

Combined total capacity of indoor units	Cable size for power source(mm²)	Wire length(m)	Moulded-case circuit breaker (A)		Earth leakage breaker	Signal line (mm²)	
			Rated current	Switch capacity		outdoor-indoor	indoor-indoor
less than 7A	2	21	20	30	20A, 30mA less than 0.1 sec	2 core × 0.75 ※	
less than 11A	3.5						
less than 12A	5.5	33	30	30A, 30mA less than 0.1 sec			
less than 16A	5.5	24					

※Please use a shielded cable.

Please note

- The method of laying cables has been determined pursuant to the Japanese indoor wiring regulations (JEAC8001). (Please adapt it to the regulations in effect in each country)
- Wire length in the table above is the value for when the indoor unit is connect to the power cable in series also the wire size and minimum length when the power drop is less than 2% are shown. If the current exceeds the value in the table above, change the wire size according to the indoor wiring regulations. (Please adapt it to the regulations in effect in each country)
- For details, please refer to the installation manual supplied with the indoor unit.

How to connect signal cables

The communication protocol can be chosen from following two types. One of them is the conventional Superlink (hereinafter previous SL) and the other is the new Superlink II (hereinafter new SL). These two communication protocols have the following advantages and restrictions, so please choose a desirable one meeting your installation conditions such as connected indoor units and center control. When signal cables are connected into a network involving outdoor units, indoor units or center control equipment that do not support new SL, please select communications in the previous SL mode, even if the refrigerant system is separated from theirs.

Communication protocol	Conventional communication protocol (previous SL)	New communication protocol (new SL)
Outdoor unit setting (SW5-5)	ON	OFF (factory setting)
No. of connectable indoor units in a network	Max. 48	Max. 128
No. of connectable outdoor units in a network	Max. 48	Max. 32
Signal cable (total length)	Up to 1000m	Up to 1500m (When 0.75mm ² shielded cable used) Up to 1000m (When 1.25mm ² shielded cable used)
Signal cable (furthest length)	Up to 1000m	Up to 1000m
Connectable units to a network	Units not supporting new SL (FD○A△△KXE4 series) Units supporting new SL (FD○△△KXE6 series) Can be used together. (*1)	Units supporting new SL (FD○△△KXE6 KXZ series)

※1 New SL supporting units and non-supporting units cannot be used together in a same refrigerant system.

● **A signal cable system is operated at DC5V, so never connect it to the power source 220/240V or 380/415V.** If the power source is applied, a protective fuse provided on the board will be actuated. If the protective fuse is actuated, follow the procedure set out below.

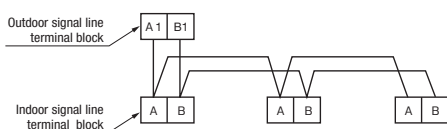
- Turn off power and make sure that 220/240V or 380/415V is not applied to signaling wires.
- In the case of an indoor unit, switch from CNK1 to CNK2 and cut the jumper line JSL1.
- In the case of an outdoor unit, switch from CNX1 to CNX2 and cut the jumper line J10.
- Check signal cable terminal block resistance before you turn on power. If the resistance value is 100 ohms or less, there is possibility that a power cable is connected to a signal cable terminal block.

A typical resistance value is [46000 / (No. of connected FD○A△△KXE4 and KXE5 series units x 5) + (No. of connected FD○△△KXE6 and KXZ series units x 9)].
If the resistance value is 100 ohms or less, tentatively detach signal cables and thus, divide the network into more than one block (to reduce the number of indoor units connected in a network) to check for cabling errors in each such block.

Indoor and outdoor signal wires

- Connect the signal line between indoor unit and outdoor unit to A1 and B1.
- Connect the signal line between outdoor units to A2 and B2.
- Please use a shielded cable for a signal line and connect a shielding earth at all the indoor units and outdoor units.

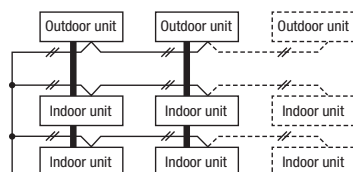
(1) When one outdoor unit is used.



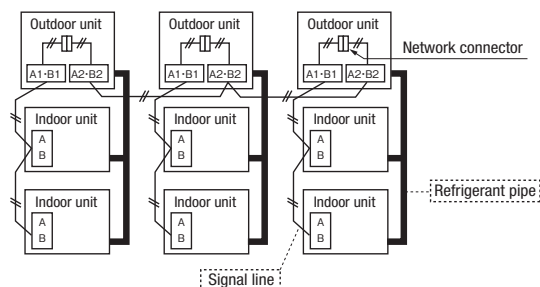
○ Indoor and outdoor signal lines do not have a polarity.
Any of the connections in the following illustration can be made.



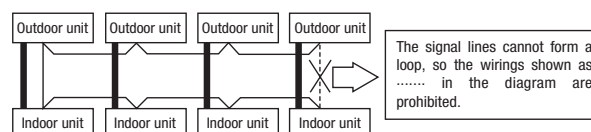
(1) The signal lines can also be connected using the method shown below.



(2) When plural outdoor units are used

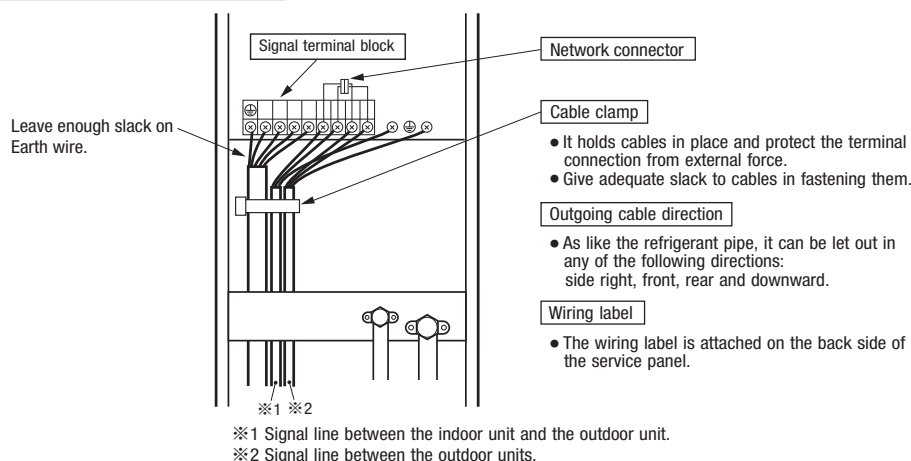


Important ○ Loop wiring prohibited.

**Power cable and signal line connection**

FDC112—155KXZES1-W (Three-phase)

FDC90—155KXZEN1-W (Single-phase)

**Attention**

- For cabling of the power source terminal block, use crimp terminals of the figure shown below.

FDC90—155KXZEN1-W (Single-phase)

FDC112—155KXZES1-W (Three-phase)

**Remote control wiring specifications**

- (1) For the remote control the standard wire is $0.3\text{mm}^2 \times 2$ cores. The max. length is up to 600m. When the wire is more than 100m long, use the wire shown in the table.

Main fuse specification

Specification	Part No.
250V 30A	SSA564A161

Length (m)	Wire size
100 to 200	$0.5\text{mm}^2 \times 2$ cores
to 300	$0.75\text{mm}^2 \times 2$ cores
to 400	$1.25\text{mm}^2 \times 2$ cores
to 600	$2.0\text{mm}^2 \times 2$ cores

7. CONTROL SETTINGS**7-1. Unit address setting**

This control system controls the controls of more than one air-conditioner's outdoor unit, indoor unit and remote control unit through communication control, using the microcomputers built in the respective controllers. Address setting needs to be done for both outdoor and indoor units. Turn on power in the order of the outdoor units and then the indoor units.

Use 1 minute as the rule of thumb for an interval between them.

The communication protocol can be chosen from following two types. One of them is the conventional Superlink (hereinafter previous SL) and the other is the new Superlink II (hereinafter new SL). These two communication protocols have their advantages and restrictions as summarized in a table in "6. ELECTRICAL WIRING WORK" so please choose a desirable one meeting your installation conditions such as connected indoor units and center control.

When signal cables are connected into a network involving outdoor units, indoor units or center control equipment that do not support new SL, please select communications in the previous SL mode, even if the refrigerant system is separated from theirs.

When communication is established after setting addresses, check the communication protocol with the 7 segment display panel of the outdoor unit.

●Address setting methods

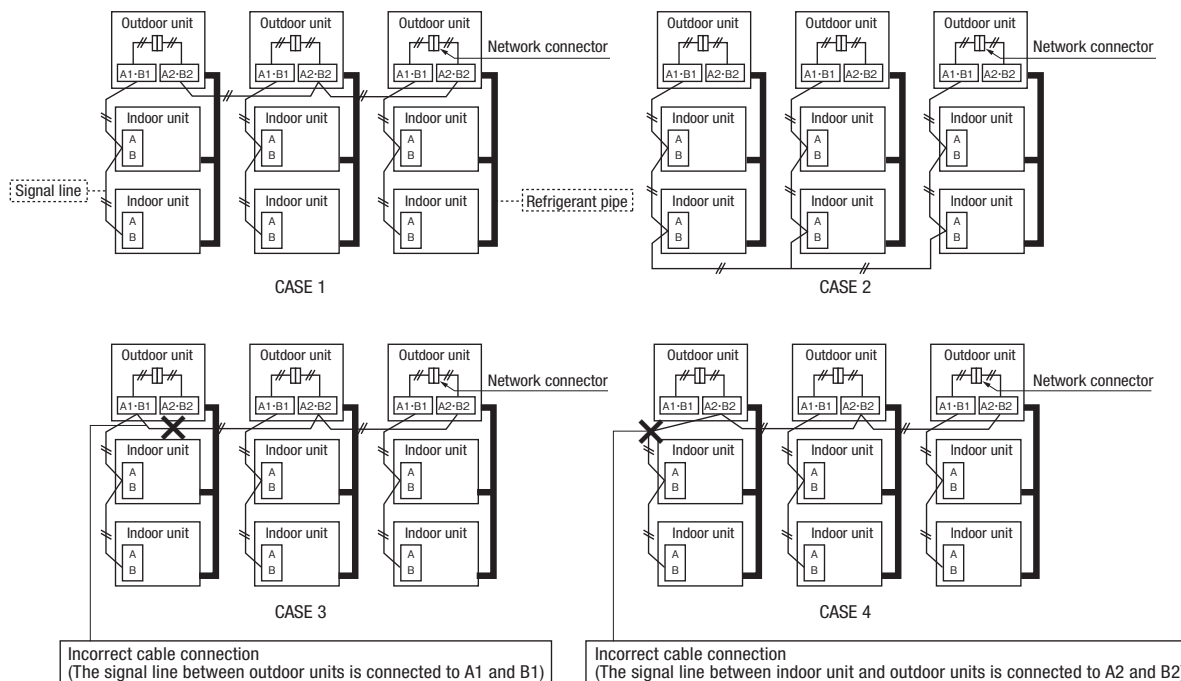
The following address setting methods can be used. The procedure for automatic address setting is different from the conventional one. Please use the automatic address setting function after reading this manual carefully.

Communication protocol		new SL		previous SL	
Address setting method		Automatic	Manual	Automatic	Manual
When only one refrigerant system is involved (signal lines do not link with plural refrigerant systems)		OK	OK	OK	OK
When plural refrigerant systems are linked with signal lines (e.g., to implement center control)	Case 1 When signal lines linking plural refrigerant systems are provided between outdoor units. (When the network connector is disconnected, refrigerant systems are separated each other)	OK※1	OK	×	OK
	Case 2 When signal lines linking plural refrigerant systems are provided between indoor units.	×※2	OK	×	OK

※1 Do not connect the signal line between outdoor units to A1 and B1. This may interrupt proper address setting. (Case 3)

Do not connect the signal line between indoor unit and outdoor unit to A2 and B2. This may interrupt proper address setting. (Case 4)

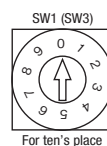
※2 In Case 2, automatic address setting is not available. Set addresses manually.



●Address No. setting

Set SW1 through 4 and SW5-2 provided on the PCB and SW1 & 2 provided on the outdoor unit PCB as shown in the drawings below.

Indoor PCB	SW1, 2 (blue)	For setting indoor No. (The ten's and one's)
	SW3, 4 (green)	For setting outdoor No. (The ten's and one's)
	SW5-2	Indoor No. switch (The hundred's Place) [OFF : 0, ON : 1]
Outdoor PCB	SW1, 2 (green)	For setting outdoor No. (The ten's and one's)



By inserting a flat driver (precision screw driver) into this groove and turn the arrow to point a desired number.

●Summary of address setting methods (figures in [] should be used with previous SL)

	Units supporting new SL			Units NOT supporting new SL		
	Indoor unit address setting		Outdoor unit address setting	Indoor unit address setting		Outdoor unit address setting
	Indoor No. switch	Outdoor No. switch	Outdoor No. switch	Indoor No. switch	Outdoor No. switch	Outdoor No. switch
Manual address setting (previous SL/new SL)	000—127[47](※1)	00—31[47]	00—31[47]	00—47	00—47	00—47
Automatic address setting for single refrigerant system installation (previous SL/new SL)	000	49	49	49	49	49
Automatic address setting for multiple refrigerant systems installation (with new SL only)	000	49	00—31	×	×	×

(※1) Do not set numbers other than those shown in the table, or an error may be generated.

Note: When units supporting new SL are added to a network using previous SL such as one involving FD○A△△KXE4 series units, choose previous SL for the communication protocol and set addresses manually.

- An outdoor unit No., which is used to identify which outdoor unit and indoor units are connected in a refrigerant system, is set on outdoor unit PCB and indoor unit PCB. Give the same outdoor unit No. to all outdoor unit and indoor units connected in same refrigerant system.
- An indoor unit No. is used to identify individual indoor units. Assign a unique number that is not assigned to any other indoor units on the network.

Unless stated otherwise, the following procedures apply, when new SL is chosen for the communication protocol.
When previous SL is chosen, use figures shown in [] in carrying out these procedures.

Manual address setting Generally applicable to new SL/previous SL, use figures in [] with previous SL.

- ① Outdoor unit address setting
Set as follows before you turn on power. Upon turning on power, the outdoor unit address is registered.
Set the **Outdoor Unit No. switch** to a number **00 - 31** [in the case of previous SL: **00 - 47**].
Set a unique number by avoiding the numbers assigned to other outdoor units on the network.
- ② Indoor unit address setting
Set as follows before you turn on power. Upon turning on power, the indoor unit address is registered.
Set the **Indoor Unit No. switch** to a number **000 - 127** [in the case of previous SL: **00 - 47**].
Set the **Outdoor Unit No. switch** to the outdoor unit No. of the associated outdoor unit within the range of **00 - 31** [in the case of previous SL: **00 - 47**].
Set a unique number by avoiding the numbers assigned to other indoor units on the network.
- ③ Turn on power in order from the outdoor unit to indoor units. Give a one-minute or longer interval for them.
* When there are some units not supporting new SL connected in the network, set SW5-5 to ON to choose the previous SL communication mode.
In the case of previous SL, the maximum number of indoor units connectable in a network is 48.

Automatic address setting Generally applicable to new SL/previous SL, use figures in [] with previous SL.

With new SL, you can set indoor unit addresses automatically even for an installation involving multiple refrigerant systems connected with same network, in addition to the conventional automatic address setting of a single refrigerant system installation.
However, an installation must satisfy some additional requirements such as for wiring methods, so please read this manual carefully before you carry out automatic address setting.

(1) In the case of a single refrigerant system installation (Generally applicable to new SL/previous SL, use figures in [] with previous SL.)

- ① Outdoor unit address setting
Set as follows before you turn on power.
Make sure that the **Outdoor Unit No. switch** is set to **49 (factory setting)**.
- ② Indoor unit address setting
Set as follows before you turn on power.
Make sure that the **Indoor Unit No. switch** is set to **000** [in the case of previous SL: **49**] (factory setting).
Make sure that the **Outdoor Unit No. switch** is set to **49 (factory setting)**.
- ③ Turn on power in order from the outdoor unit to indoor units. Give a one-minute or longer interval for them. Unlike the procedure set out in (2) below, you need not change settings from the 7-segment display panel.
- ④ Make sure that the number of indoor units indicated on the 7-segment display panel agrees with the number of the indoor units that are actually connected to the refrigerant system.

(2) In the case of a multiple refrigerant systems installation (Applicable to new SL only. In the case of previous SL, set addresses with some other method.)

(This option is available when the interconnection wiring among refrigerant systems is on the outdoor side and new SL is chosen as the communication protocol.)

Address setting procedure (perform these steps for each outdoor unit)

[STEP1] (Items set before turning on power)

- ① Outdoor unit address setting
Set as follows before you turn on power.
Set the **Outdoor Unit No. switch** to a number **00 - 31**. Set a unique number by avoiding the numbers assigned to other outdoor units on the network.
- ② Indoor unit address setting
Set as follows before you turn on power.
Make sure that the **Indoor Unit No. switch** is set to **000 (factory setting)**.
Make sure that the **Outdoor Unit No. switch** is set to **49 (factory setting)**.
- ③ Isolate the present refrigerant system from the network.
Disengage the **network connectors (white 2P)** of the outdoor units. (Turning on power without isolating each refrigerant system will result in erroneous address setting.)

[STEP2] (Power on and automatic address setting)

- ④ Turn on power to the outdoor unit
Turn on power in order from the outdoor unit to indoor units. Give a one-minute or longer interval for them.
- ⑤ Select and enter "1" in P31 on the 7-segment display panel of each outdoor unit to input "Automatic address start."
- ⑥ Input a starting address and the number of connected indoor units.
Input a starting address in P32 on the 7-segment display panel of each outdoor unit.
- ⑦ When a starting address is entered, the display indication will switch back to the "Number of Connected Indoor Units Input" screen.
Input the number of connected indoor units from the 7-segment display panel of each outdoor unit. Please input the number of connected indoor units for each outdoor unit. (You can input it from P33 on the 7-segment display panel.) When the number of connected indoor units is entered, the 7-segment display panel indication will switch to "AUX" and start flickering.

[STEP3] (Automatic address setting completion check)

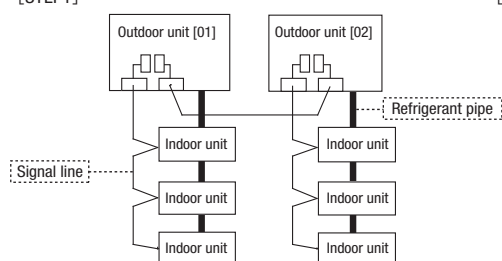
- ⑧ Indoor unit address determination
When the indoor unit addresses are all set, the 7-segment display panel indication will switch to "AUE" and start flickering.
If an error is detected in this process, the display will show "A○○○."
Check the 7-segment display panel of each outdoor unit.
Depending on the number of connected indoor units, it may take **about 30 minutes** before the indoor unit addresses are all set.

[STEP4] (Network definition setting)

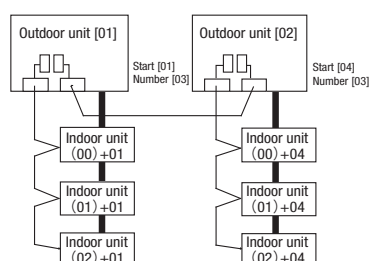
- ⑨ Network connection
When you have confirmed an "AUE" indication on the display of each outdoor unit, **engage the network connectors** again.
- ⑩ Network polarity setting
After you have made sure that the network connectors are engaged, select and enter "1" in P34 on the 7-segment display panel of **any outdoor unit (on only 1 unit)** to specify network polarity.
- ⑪ Network setting completion check
When the network is defined, "End" will appear on the 7-segment display panel. An "End" indication will go off, when some operation is made from the 7-segment display panel or 3 minutes after.

	STEP1	STEP2	STEP3	STEP4
Indoor unit power source	②OFF	④ON	—	—
Outdoor unit power source	①OFF	④ON	—	—
Indoor unit (indoor/outdoor No.Switch)	②indoor000/outdoor 49 (factory setting)	—	—	—
Outdoor unit (outdoor No.Switch)	①01,02(Ex)	—	—	—
Network connectors	③Disconnect(each outdoor unit)	—	—	⑨Connect(each outdoor unit)
Start automatic address setting		⑤ Select "Automatic Address Start" on each outdoor unit.		
Set starting address		⑥ outdoor 01: [01] (Ex) outdoor 02: [04] (Ex)	—	—
Set the number of indoor unit		⑦ outdoor 01: [03] (Ex) outdoor 02: [03] (Ex)	—	—
Polarity setting		—	—	⑩ Set in P34 on the 7-segment display panel of any outdoor unit.
7-segment display		⑦ [AUX] (Blink)	⑧ "AUE"(blink), or "A○○" in error events.	⑪ [End]

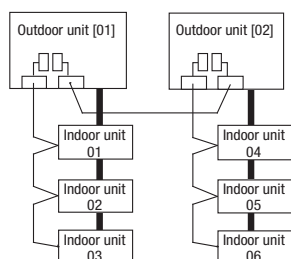
[STEP1]



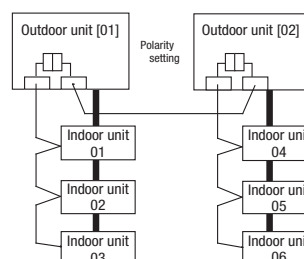
[STEP2]



[STEP3]



[STEP4]



- Within a refrigerant system, indoor units are assigned addresses in the order they are recognized by the outdoor unit. Therefore, they are not necessarily assigned addresses in order from the nearest to the outdoor unit first as depicted in drawings above.
- Make sure that power has been turned on to all indoor units.
- When addresses are set, you can have the registered indoor unit address No.'s and the outdoor unit address No. displayed on the remote control unit by pressing its Inspection switch.
- Automatic address setting can be used for an installation in which plural indoor units are controlled from one remote control unit.
- Once they are registered, addresses are stored in microcomputers, even if power is turned off.
- If you want to change an address after automatic address setting, you can change it from the remote control unit with its "Address Change" function or by means of manual setting. Set a unique address by avoiding the address assigned to other indoor unit on the network when the address is changed.
- Do not turn on power to central control equipment until automatic address setting is completed.
- When addresses are set, be sure to perform a test run and ensure that you can operate all indoor and outdoor units normally. Also check the addresses assigned to the indoor units.

Address change (available only with new SL)




"Address Change" is used, **when you want to change an indoor unit address assigned with the "Automatic Address Setting" function from a remote control unit.** Accordingly, the conditions that permit an address change from a remote control unit are as follows.

	Indoor unit address setting		Outdoor unit address setting
	Indoor No.SW	Outdoor No.SW	Outdoor No.SW
Automatic address setting for single refrigerant system installation	000	49	49
Automatic address setting for multiple refrigerant systems installation	000	49	00—31

If "CHANGE ADD. ▼" is selected with some addresses falling outside these conditions, the following indication will appear for 3 seconds on the remote control "INVALID OPER".






Operating procedure


(1) When single indoor unit is connected to the remote control.

Item	Operation	Display
1 Address change mode	① Press the AIR CON No. switch for 3 seconds or longer.	[CHANGE ADD.▼]
	② Each time when you press the  switch, the display indication will be switched.	[CHANGE ADD.▼] ⇔[MASTER I/U▲]
	③ Press the Set switch when the display shows "CHANGE ADD. ▼" and then start the address change mode, changing the display indication to the "Indoor Unit No. Setting" screen from the currently assigned address.	[I/U 001 O/U 01] (1sec) →[◆ SET I/U ADD.] (1sec) →[I/U 001 ◆] (Blink)
2 To set a new indoor unit No.	④ Set a new indoor unit No. with the  switch. A number indicated on the display will increase or decrease by 1 upon pressing the ▲ or ▼ switch respectively.	[I/U 000▲] ⇔[I/U 001] ⇔[I/U 002] ⇔ . . . ⇔[I/U 127▼]
	⑤ After selecting an address, press the Set switch, and then the indoor unit address No. is defined.	[I/U 002] (2sec)
3 To set a new outdoor unit No.	⑥ After showing the defined indoor address No. for 2 seconds, the display will change to the "Outdoor Address No. Setting" screen. The currently assigned address is shown as a default value.	[I/U 002] (2sec Lighting) →[◆ SET O/U ADD.] (1sec) →[O/U 01 ◆] (Blink)
	⑦ Set a new outdoor unit No. with the  switch. A number indicated on the display will increase or decrease by 1 upon pressing the ▲ or ▼ switch respectively.	[O/U 00▲] ⇔[O/U 01 ◆] ⇔[O/U 02 ◆] ⇔ . . . ⇔[O/U 31▼]
	⑧ After selecting an address, press the Set switch, and then the outdoor unit No. and the indoor unit No. are defined.	[I/U 002 O/U 02] (2sec Lighting) →[SET COMPLETE] (2sec Lighting) →Returns to normal condition.

(2) When plural indoor units are connected to the remote control.

When plural indoor units are connected, you can change their addresses without altering their cable connection.

Item	Operation	Display
1 Address change mode	① Press the AIR CON Unit No. switch for 3 seconds or longer.	[CHANGE ADD▼]
	② Each time when you press the  switch, the display indication will be switched.	[CHANGE ADD▼] ⇔[MASTER I/U▲]
	③ Press the Set switch when the display shows "CHANGE ADD. ▼" The lowest indoor unit No. among the indoor units connected to the remote control unit will be shown.	[◆ SELECT I/U] (1sec) →[I/U 001 O/U 01▲] (Blink)
2 Selecting an indoor unit to be changed address	④ Pressing the  switch will change the display indication cyclically to show the unit No.'s of the indoor units connected to the remote control and the unit No.'s of the outdoor units connected with them.	[I/U 001 O/U 01▲] ⇔[I/U 002 O/U 01◆] ⇔[I/U 003 O/U 01◆] ⇔ . . . ⇔[I/U 016 O/U 01▼]
	⑤ Then the address No. of the indoor unit to be changed is determined and the screen switches to the display "◆ SET I/U ADD."	[◆ SET I/U ADD.] (1sec) →[I/U 001◆] (Blink)
3 Setting a new indoor unit No.	⑥ Set a new indoor unit No. with the  switch. A number indicated on the display will increase or decrease by 1 upon pressing the ▲ or ▼ switch respectively.	[I/U 000▲] ⇔[I/U 001 ◆] ⇔[I/U 002 ◆] ⇔ . . . ⇔[I/U 127▼]
	⑦ After selecting an address, press the Set switch. Then the address No. of the indoor unit is determined.	[I/U 002] (2sec)
4 Setting a new outdoor unit No.	⑧ The display will indicate the determined indoor address No. for 2 seconds and then switch to the "◆ SET O/U ADD." screen. A default value shown on the display is the current address.	[I/U 002] (2sec lighting) ⇔[◆ SET O/U ADD.] (1sec) ⇔[O/U 01 ◆] (Blink)
	⑨ Set a new outdoor unit No. with the  switch. A number indicated on the display will increase or decrease by 1 upon pressing the ▲ or ▼ switch respectively.	[O/U 00▲] ⇔[O/U 01 ◆] ⇔[O/U 02 ◆] ⇔ . . . ⇔[O/U 31▼]
	⑩ After selecting an address, press the Set switch. Then the address of the indoor unit and outdoor unit are determined.	[I/U 002 O/U 02] (2sec lighting) →[◆ SELECT] (1sec lighting) →[I/U SELECTION▼] (lighting)
	⑪ If you want to continue to change addresses, return to step ④.	[Press the  switch] (1sec) →[SET COMPLETE] (2—10sec lighting)
5 Ending the session	⑫ If you want to end the session (and reflect new address settings) In Step ⑩, press the ▼ switch to select "END ▲." If you have finished changing addresses, press the Set switch while "END ▲" is shown. While new settings are being transmitted, "SET COMPLETE" will be indicated. Then the remote control display will change to the normal state.	[END▲] →[SET COMPLETE] (2—10sec lighting) →Normal state
	⑬ If you want to end the session (without reflecting new address settings) Before you complete the present address setting session, press the "ON/OFF" switch. Then the display is change to exit from this mode and switch the display to the normal state. All address settings changed in the session will be aborted and not reflected.	[ON/OFF] →Forced termination

The  switch will continuously change the display indication to the next one in every 0.25 seconds when it is pressed for 0.75 seconds or longer.
If the Reset switch is pressed during an operation, the display indication returns to the one that was shown before the last Set switch operation.
Even if an indoor unit No. is changed in this mode, the registered indoor unit No. before address change mode is displayed when [I/U SELECTION▼] is shown.
When "SET COMPLETE" is shown, indoor unit No.'s are registered.

NOTICE Turn on power to centralized control equipment after the addresses are determined.
Turning on power in wrong order may result in a failure to recognize addresses.

● 7-segment display indication in automatic address setting

Items that are to be set by the customer

Code	Contents of a display	
P30	Communication protocol	1: New SL mode 0: previous SL mode (The communication protocol is displayed ; display only)
P31	Automatic address start	0: Automatic address standby 1: Automatic address start
P32	Input starting address	Specify a starting indoor unit address in automatic address setting.
P33	Input number of connected indoor units	Specify the number of indoor units connected in the refrigerant system in automatic address setting.
P34	Polarity definition	0: Network polarity not defined. 1: Network polarity defined.

7-segment display indication in automatic address setting.

Code	Contents of a display
AUX	During automatic address setting. X: The number of indoor units recognized by the outdoor unit.
AUE	Indoor unit address setting is completed normally.
End	Polarity is defined. (Automatic address) Completed normally.

Address setting failure indication

Code	Contents of a display	Please check
A00	Unable to find any indoor unit that can be actually communicated with.	Are signal lines connected properly without any loose connections? Is power for indoor units all turned on?
A01	The number of the indoor units that can be actually communicated with is less than the number specified in P33 on the 7-segment display panel.	Are signal lines connected properly without any loose connections? Are the network connectors coupled properly? Input the number of connected indoor units again.
A02	The number of the indoor units that can be actually communicated with is more than the number specified in P33 on the 7-segment display panel.	Are signal lines connected properly without any loose connections? Are the network connectors coupled properly? Input the number of connected indoor units again.
A03	Starting address (P32) + Number of connected indoor units (P33) > 128	Input the starting address again. Input the number of connected indoor units again.
A04	While some units are operating in the previous SL mode on the network, the automatic address setting on multiple refrigerant systems is attempted.	Perform manual address setting. Arrange all units to operate in the new SL.

Error indication

Code	Contents of a display	Cause
E2	Duplicating indoor unit address.	• Incorrect manual address setting
E3	Incorrect pairing of indoor-outdoor units.	• An outdoor unit number that does not exist in the network is specified • No master unit exists in combination outdoor unit.
E11	Address setting for plural remote controllers.	• Indoor unit address is set from plural remote controls.
E12	Incorrect address setting of indoor units.	• Automatic address setting and manual address setting are mixed.
E31	Duplicating outdoor unit address.	• Plural outdoor units are exist as same address in same network.
E46	Incorrect setting.	• Automatic address setting and manual address setting are mixed.

7-2. CONTROL SWITCHING

Outdoor unit control settings can be changed with the dipswitch and 7-segment display P $\bigcirc\bigcirc$ setting on the PCB. In changing settings in P $\bigcirc\bigcirc$ on the 7-segment display panel, you can use SW8 (increasing a number shown on the 7-segment display panel: one's place), SW9 (increasing a number shown on the 7-segment display panel: tens place) and SW7 (data write/enter) by pressing them for a prolonged time.

Contents of Control switching	Method of control setting	
	Dipswitch SW setting	P $\bigcirc\bigcirc$ setting on the 7-segment display panel.
Forced cooling/heating mode*2	Switch SW3-7 to ON*1	Select "2" in P07. *1
Cooling test operation	Switch SW5-1 to ON + SW5-2 to ON	—
Heating test operation	Switch SW5-1 to ON + SW5-2 to OFF	—
Pump down	Close the outdoor unit service valves and perform the following operations in the stated order: (1) Switch SW5-2 to ON (2) Switch SW5-3 to ON (3) Switch SW5-1 to ON	—
Demand mode *2 (J13 closed: level input J13 opened: pulse input)	SW4-7:OFF, SW4-8:OFF*1 80% (factory setting) SW4-7:ON, SW4-8:OFF*1 60% SW4-7:OFF, SW4-8:ON*1 40% SW4-7:ON, SW4-8:ON*1 00%	Select "1" in P07. *1
Communication protocol setting	SW5-5 ON: previous SL communication, OFF: new SL communication	—
CnS1 input setting	J13: closed (factory setting) for level input, J13: opened for pulse input	—
Defrost setting	J15: closed (factory setting) for normal defrost, J15: opened for enhanced defrost	—
Operation priority change	—	P01 0: First unit's operation mode 1: Last unit's operation mode 2: Priority of master unit's setting operation mode 3: Priority of required major operation mode
Outdoor fan snow guard control	—	P02 0: invalid (factory setting) 1: valid
Outdoor fan snow guard control operation time setting	—	P03 30sec (factory setting) 10, 30—600sec
Capacity save mode *3	—	P04 OFF: invalid (factory setting) 000, 040, 060, 080 [%]
Silent mode setting *2	—	P05 0 (factory setting) — 3: the larger the number, the stronger the effect.
External output (CnZ1) function assignment	—	P06
External input (CnS1) function assignment	—	P07
Spare	—	P08—29

*1 The switching is activated when both SW and P $\bigcirc\bigcirc$ are changed.

*2 The switching is activated when a signal is input to CnS1.

*3 Capacity restriction is effected without a signal input to CnS1 in the capacity save mode.

The external input function of CnS1 can be changed by changing the setting in P07 on the 7-segment display panel. When a signal is input to CnS1, the following functions are enabled.

	CnS1 closed	CnS1 opened
"0" : External operation input	Operation permitted	Operation prohibition
"1" : Demand input	Invalid	Valid
"2" : Cooling/heating forced input	Heating	Cooling
"3" : Silent mode input 1 ^{*1}	Valid	Invalid
"4" : Spare	—	—
"5" : Outdoor fan snow guard control input	Valid	Invalid
"6" : Test run external input 1 (equivalent to SW5-1)	Test run start	Normal operation
"7" : Test run external input 2 (equivalent to SW5-2)	Cooling test run	Heating test run
"8" : Silent mode 2 ^{*2}	Valid	Invalid
"9" : Spare	—	—

*1 Switch valid/invalid depending on the outdoor temperature.

*2 Any time valid not depending on the outdoor temperature.

The external output function of CnZ1 can be changed by changing the setting in P06 on the 7-segment display panel.

"0" : Operation output
"1" : Error output
"2" : Compressor ON output
"3" : Fan ON output
"4 – 9" : Spare

7-3. External input and output specifications.

Contents	Specification	Connector on PCB
External input CnS1	Non-voltage contact (DC12V)	J.S.T(NIHIATSU) B02B-XAKS-1-T
External output CnZ1	DC12V output	MOLEX 5566-02A-RE

8. TEST OPERATION

Before beginning operation

- Make sure that a measurement between the power source terminal block and ground, when measured with a 500V megger tester, is greater than 1 MΩ.**
When the unit is left for a long time with power OFF or just after the installation, there is possibility that the refrigerant is accumulated in the compressor and the insulation resistance between the contact terminals for power source and grounding decreases to 1MΩ or around.
When the insulation resistance is 1MΩ or more, the insulation resistance will rise with crank case heater power ON for 6 hours or more because the refrigerant in the compressor is evaporated.
- Please check the resistance of the signaling line terminal block before power is turned on. If a resistance measurement is 100Ω or less, it suggests a possibility that power cables are connected to the signaling line terminal block. (Please check wiring refer to section 6.ELECTRICAL WIRING WORK)
- Be sure to turn on the crank case heater 6 hours before operation.**
- Make sure that the bottom of the compressor casing is warm.** (Outdoor temperature + 5°C or more)
- Be sure to fully open the service valves (liquid, gas) for the outdoor unit.
Operating the outdoor unit with the valves closed may damage the compressor.
- Check that the power to all indoor units has been turned on. If not, a failure may occur.**

CAUTION

Please make sure that the service valves (gas, liquid) are full open before a test run. Conducting a test run with any of them in a closed position can result in a compressor failure.

Check operation

It is recommended to practice the check operation before the test run.

(You may test run or perform normal operation even if the check operation is not performed.)

For details of check operation, refer to the technical manual.

Important:

- Before starting the check operation, complete the address setting of indoor and outdoor units and the refrigerant charge.
- You cannot check precisely unless proper quantity of refrigerant is charged.
- You cannot perform the check operation when the system is stopped under abnormal condition.
- You cannot perform the check operation when total capacity of connected indoor units is less than 80% of outdoor units.
- You cannot perform the check operation if the communication protocol is previous SL.
- Don't perform the check operation at the same time on a plural number of refrigerant systems. You cannot check precisely.
- Perform the check operation within the applicable temperature range (Outdoor air temperature: 0 - 43°C, indoor air temperature: 10 - 32°C). You cannot start the check operation if it is out of the applicable temperature range.
- You cannot check the fresh air ventilation indoor unit. (You can check indoor units other than the fresh air ventilation indoor unit on the same refrigerant system.)
- You cannot perform the check operation if the connected indoor unit is only one in one refrigerant system.
- You cannot perform the check operation if it is set at 0% in the demand mode or capacity save mode.

(1) Check item

Check operation allows confirming the following points.

- Whether the service valve is closed or not (Open/close check)
- Whether refrigerant pipes and signal line are connected properly on indoor/outdoor units or not (Mismatch check)
- Whether the indoor unit expansion valve operates properly or not (Expansion valve failure check)

(2) Procedure of check operation**(a) Start of check operation**

- Confirm that all of SW3-7 (Forced cooling/heating mode), SW5-1 (Test run), SW5-2 (Test run cooling setting) and SW5-3 (Pump-down operation) are turned OFF.
- Change then SW3-5 (Check operation) OFF→ON to start the check operation.
- It takes normally about 15 - 30 minutes from the start to the end of check operation. (Max. 80 minutes)

(b) Termination of check operation and result display

- As the check operation terminates, the system stops automatically and displays the result on the 7-segment indicator.

<Normal termination>

- "CHO End" is shown on the 7-segment indicator.
- Return SW3-5 to OFF setting. 7-segment indicator returns to normal display.

<Termination by error>

- Error is displayed on the 7-segment indicator.
- Correct the abnormal condition referring to the "Check Point" column, and return SW3-5 to OFF.
- Restart then the check operation from (2) (a).

7-segment display during check operation

Code	Data	Content
H1	Max. remaining time	• Preparing for check operation. Indicates the maximum remaining time (minute).
H2	Max. remaining time	• During the check operation. Indicates the maximum remaining time (minute).
CHO	End	• Normal termination of check operation.

Display on 7-segment indicator after check operation

Code	Data	Content	Check Point
CHL	---	Service valve is closed. (Refrigerant circuit is choked somewhere.)	<ul style="list-style-type: none"> • Is the service valve of outdoor unit closed? • Is the low pressure sensor normal? (Detection pressure can be confirmed on 7-segment indicator.) • Is the coil connector of indoor unit expansion valve connected? • Is the expansion valve coil of indoor unit detached from the valve body? • Is the heat exchanger sensor of indoor unit normal? (Check for sensor disconnection.)
CHU	Abnormal indoor unit No.	Mismatch of refrigerant pipes/signal line. Refrigerant is not circulated in the abnormal indoor unit.	<ul style="list-style-type: none"> • Are refrigerant pipes/signal line connected properly between indoor and outdoor units? • Is the coil connector of indoor unit expansion valve connected? • Is the expansion valve coil of indoor unit detached from the valve body? • Is the heat exchanger sensor of indoor unit normal? (Check for sensor disconnection.)
CHJ	Abnormal indoor unit No.	Expansion valve does not operate properly on the abnormal indoor unit.	<ul style="list-style-type: none"> • Is the coil connector of indoor unit expansion valve connected? • Is the expansion valve coil of indoor unit detached from the valve body? • Is the heat exchanger sensor of indoor unit normal? (Check for sensor disconnection.)
CHE	---	Termination of check operation by error	<ul style="list-style-type: none"> • Is any error (E??) indicated on indoor or outdoor units? • Is signal line connected without loose? • Was any SW setting changed during check operation?
CHE	Abnormal indoor unit No.	Termination of check operation by error. Indicated indoor unit is under abnormal condition.	<ul style="list-style-type: none"> • Is any error (E??) indicated on indoor or outdoor units? • Is signal line connected without loose? • Is the power source turned ON at the indoor unit side?

*Errors other than the above may be indicated by the detection of error. In such occasion, correct the matter by referring to the technical manual.

*Code and Data are indicated alternately by 4-second intervals.

Test operation**(1) Test run from an outdoor unit.**

Whether CnS1 is set to ON or OFF, you can start a test run by using the SW5-1 and SW5-2 switches provided on the outdoor unit PCB.

Select the test run mode first.

Please set SW5-2 to ON for a cooling test run or OFF for a heating test run. (It is set to OFF at the factory for shipment)

Turning SW5-1 from OFF to ON next will cause all connected indoor units to start.

When a test run is completed, please set SW5-1 to OFF.

Note: During a test run, an indoor unit cannot be operated from the remote control unit (to change settings). ("Under centralized control" is indicated)

(2) Method of starting a test run for a cooling operation from an outdoor unit: please operate a remote control unit according to the following steps.**(a) Start of a cooling test run**

- Operate the unit by pressing the **[START/STOP]** button.
- Select the "COOLING" mode with the **[MODE]** button.
- Press the **[TEST RUN]** button for 3 seconds or longer.

The screen display will be switched from "Select with ITEM ◆"→"Determine with **[SET]**"→"Cooling test run ▼".

- When the **[SET]** button is pressed while "Cooling test run ▼" is displayed, a cooling test run will start. The screen display will be switched to "COOLING TEST RUN."

(b) Termination of a cooling test run

- When the **[START/STOP]** button or the "TEMP SET   button is pressed, a cooling test run will be terminated.

Transfer

- Use the instruction manual that came with the outdoor unit to explain the operation method to the customer.
- Please ask the customer to keep this installation manual together with the user's manual of his indoor units.
- Instruct the customer that the power should not be turned off even if the unit is not to be used for a long time. This will enable operation of the air-conditioner any time. (Since the compressor bottom is warmed by the crank case heater, seasonal compressor trouble can be prevented.)





9. CAUTIONS FOR SERVICING (for R32 and compatible machines)



- (1) To avoid mixing of different types of oil, use separate tools for each type of refrigerant.
- (2) To avoid moisture from being absorbed by the ice machine oil, the time for when the refrigerant circuit is open should be kept as short as possible. (Within 10 min. is ideal.)
- (3) For other piping work, airtightness testing, vacuuming, and refrigerant charging, refer to section 4, REFRIGERANT PIPING.
- (4) Diagnostic Inspection Procedures
For the meanings of failure diagnosis messages, please refer to the technical manual.
- (5) 7-segment LED indication
Data are indicated when so chosen with the indication selector switch. For the details of indication, please refer to the technical manual.


2.5.2 Safety precautions in handling air-conditioners with flammable refrigerant


R32 REFRIGERANT USED

PSA012B839G 

	This equipment uses flammable refrigerants. If the refrigerant is leaked, together with an external ignition source, there is a possibility of ignition.		There is information included in the user's manual and/or installation manual.
	The user's manual should be read carefully.		A service personnel should be handling this equipment with reference to the installation manual.

- This safety precaution sheet is for R32 refrigerant. If you want to know the type of refrigerant in the unit, check the label attached to the outdoor unit.
- The precautionary items mentioned below are distinguished into two levels,  **WARNING** and  **CAUTION**.

 **WARNING** : Wrong installation would cause serious consequences such as injuries or death.

 **CAUTION** : Wrong installation might cause serious consequences depending on circumstances.

WARNING

- Strict compliance of the domestic laws must be observed when disposing the appliance.
- 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 odour.
- The ducts connected to an appliance shall not contain a potential ignition source.

CAUTION

1. General

- The installation of pipe-work shall be kept to a minimum.
- Pipe-work shall be protected from physical damage.
- Compliance with national gas regulations shall be observed.
- Mechanical connections shall be accessible for maintenance purposes.
- Keep any required ventilation openings clear of obstruction.
- Servicing shall be performed only as recommended by the manufacturer.
- 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 fitting shall be protected as far as possible against adverse effects for example, the danger of water collection 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 designed and installed to minimize the likelihood hydraulic shock damaging the system.
- The indoor equipment and pipes shall be securely mounted and guarded to avoid accidental rupture of equipment from moving furniture or reconstruction activities.
- Instructions for wiring to external zoning dampers and/or mechanical ventilation, to ensure that upon detection of a leak, the zoning dampers are driven fully open and additional mechanical ventilation is activated.
- For appliances using A2L refrigerants, connected via an air duct system to one or more rooms, the supply and return air shall be directly ducted to the space. Open areas such as false ceilings shall not be used as a return air duct.
- The following information requirements apply for enhanced tightness refrigerating systems using A2L refrigerants.
- Where safety shut off valves are specified, the minimum room area may be determined based on the maximum amount of refrigerant that can be leaked as determined in GG.12.2. (IEC 60335-2-40:2018)
- Where safety shut off valves are specified, the location of the valve in the refrigerating system relative to the occupied spaces shall be as described in GG.12.1. (IEC 60335-2-40:2018)

2. Unventilated areas

- The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
- If the refrigerant charge amount in the system is ≥ 1.84 kg, an unventilated area where the appliance is installed shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.

3. Qualification of workers

- The staff in servicing operations must hold the national qualification or other relevant qualifications.

4. Information on servicing

- 4.1 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, 4.2 to 4.6 shall be completed prior to conducting work on the system.
- 4.2 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.
- 4.3 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.
- 4.4 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 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.
- 4.5 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 CO₂ fire extinguisher adjacent to the charging area.

4.6 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 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.

4.7 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.

4.8 Checks to the refrigerating 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 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 the visible and legible. Markings and signs that are illegible shall be corrected,
 - refrigerating 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.

⚠ CAUTION

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

5. 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.

6. 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.

NOTE

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

7. 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.

8. 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 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.

Examples of leak detection fluids are

- bubble method
- fluorescent method agents

- 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.
- Removal of refrigerant shall be according to Item.9.

9. 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; (optional for A2L)
 - evacuate; (optional for A2L)
 - purge with inert gas; (optional for A2L)
 - open the circuit by cutting or brazing.
- The refrigerant charge shall be recovered into the correct recovery cylinders.
- For appliances containing flammable refrigerants, other than A2L refrigerants, the system shall be "flushed" with OFN to render the unit safe for flammable refrigerants.
- 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, other than A2L refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing 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 oxygen-free nitrogen 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.

10. 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 of lines shall be as short as possible to minimise the amount of refrigerant contained in them.
 - Cylinders shall be kept in an appropriate 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.

11. 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.
 - Become familiar with the equipment and its operation.
 - Isolate system electrically.
 - 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.
 - Pump down refrigerant system, if possible.
 - If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
 - Make sure that cylinder is situated on the scales before recovery takes place.
 - Start the recovery machine and operate in accordance with instructions.
 - Do not overfill cylinders. (No more than 80 % volume liquid charge).
 - Do not exceed the maximum working pressure of the cylinder, even temporarily.
 - 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.
 - Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked.

12. 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.

⚠ CAUTION**13. 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.

14. Other safety precautions

- A brazed, welded, or mechanical connection shall be made before opening the valves to permit refrigerant to flow between the refrigerating system parts.
- Flammable refrigerant used, refrigerant tubing protected or enclosed to avoid mechanical damage (IEC/EN 60335-2-40/A1).
- Tubing protected to extent that it will not be handled or used for carrying during moving of product (IEC/EN 60335-2-40/A1).
- Flammable refrigerant used, low temperature solder alloys, such as lead/tin alloys, not acceptable for pipe connections (IEC/EN 60335-2-40/A1).
- Do not use flare nut indoor which is locally procured.

Selection of installation location for the indoor unit

- Minimum installation area for indoor unit

⚠ CAUTION

The indoor unit shall be installed in a room with minimum installation area or more according to the refrigerant charge amount (factory refrigerant charge +additional refrigerant charge).

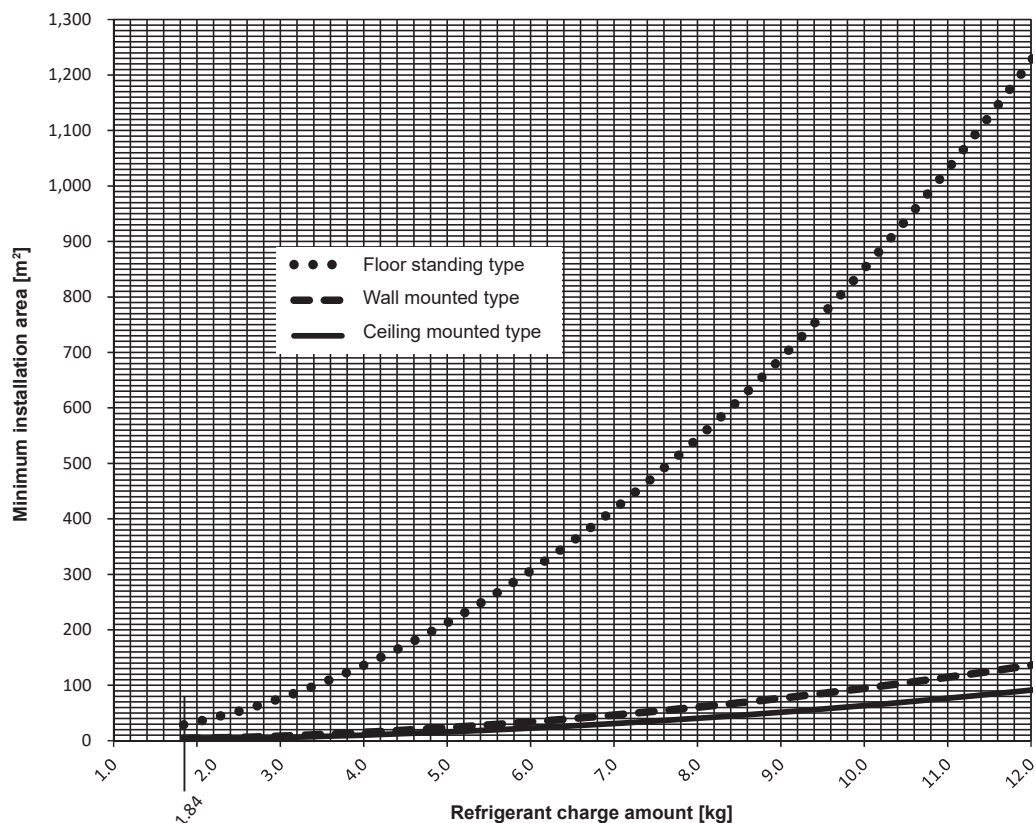
For factory refrigerant charge, refer to the outdoor unit label model name or installation sheet.

For additional refrigerant charge, refer to the outdoor unit installation sheet.

- If the refrigerant charge amount in the system is < 1.84kg, there are no additional minimum floor area requirements.
- If the refrigerant charge amount in the system is ≥ 1.84 kg, you need to comply with additional minimum floor area requirements as described in the following table.
- For further details regarding the installation location of indoor unit, refer to technical manual.

Refrigerant charge amount [kg]		1.00	1.50	1.84	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
minimum installation area [m²]	Ceiling mounted type H=2.2m	No requirements		3.7	4.0	4.5	5.0	5.5	6.0	6.7	7.8	9.0	10.2	11.5	12.9
	Wall mounted type H=1.8m			3.7	4.0	4.5	5.0	7.2	8.6	10.0	11.6	13.3	15.2	17.1	19.2
	Floor standing type H=0.6m*			29	34	43	53	64	77	90	104	120	136	154	172
Refrigerant charge amount [kg]		5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	12.0
minimum installation area [m²]	Ceiling mounted type H=2.2m	16	19	23	27	31	36	41	46	51	57	63	70	77	91
	Wall mounted type H=1.8m	24	29	34	40	46	53	61	68	77	85	95	104	115	136
	Floor standing type H=0.6m*	213	258	306	360	417	479	545	615	689	768	851	938	1030	1226

*For floor standing units, the value of installation height (H) is considered 0.6m to comply to IEC 60335-2-40:2018 Clause GG.2.



- Ceiling opening area

⚠ CAUTION

In case of installing the indoor unit in an enclosed ceiling space, ensure there is a sufficient ventilation opening around the unit.

In the event of refrigerant leakage, this countermeasure would prevent an increased concentration of refrigerant.