

Installation and Operation Manual

EKRV-E[T] Series Variable Multi-System

Applicable model:

EKRV080~1260E(R)1



Before installing the unit, carefully read this document and keep it for future use.

1 Safety Precautions	1
1.1 Preparations	1
1.2 Precautions for Using the R410A Device	1
1.3 Precautions for Installation.....	2
1.4 Precautions for Test Run	2
1.5 Precautions for Removing the Air Conditioner	2
2 Unit Introduction	3
2.1 Nomenclature	3
2.2 ODU Performance Parameters	3
2.3 IDU Classification and ODU Combination.....	40
3 Installation Flowchart	6
4 Installing the ODU	6
4.1 Selecting a Position for Installation	6
4.2 Installing the ODU	6
4.3 Lifting the ODU	7
4.4 Determining Ambient Space of the ODU	7
5 Installing Refrigerant Pipes	10
5.1 Precautions for Installing Pipes	10
5.2 Structure of the Refrigerant Pipe System	10
5.3 Connection of Refrigerant Pipes	17
5.4 Insulating Refrigerant Pipes	20
6 Electrical Wiring and Communication Wire Connection	21
6.1 Safety Precautions.....	21
6.2 Precautions for Electrical Wiring	21
6.3 Wiring Specifications.....	22
6.4 Requirements for COM Wires	22
6.5 Electrical Wiring Diagram	23
6.6 ODU/IDU COM Wire Connection	24
7 Air Tightness Test, Vacuum Evacuation, and Refrigerant Charging	25
7.1 Air Tightness Test.....	25
7.2 Vacuum Evacuation	25
7.3 Refrigerant Charging	26
8 Test Run	27

8.1. Safety Precautions.....	27
8.2 Pre-check Items.....	27
8.3 Test Run Procedure	27
8.4 Test Run Data	35
8.5 Symptoms and Causes	35
9 Unit Maintenance and Servicing	35
9.1 IDU Maintenance	36
9.2 ODU Maintenance	36
10 Unit Safety Instructions	37
10.1 During Unit Working	37
10.2 During Failure.....	37
10.3 Before Use of a Longtime Unused Unit	37
10.4 Unit Disassembling and Removing.....	37
Appendix A: External Dimensions.....	38
Appendix B: Pipe Material and Thickness of R410A	40



To securely and correctly install the air conditioning unit, please read this document before installing the unit and keep it for future use.

1 Safety Precautions

Special attention must be paid during installation. Be aware of the following safety issues throughout preparation, installation, test run, and movement.

1.1 Preparations

- Check the power supply. Power supply and installation must comply with rules and regulations of local departments, for example, the national power supply department.
- Voltage fluctuation should not exceed $\pm 10\%$ of the rated voltage. Power supply wires must be separated from welding transformers; otherwise, the welding transformers will experience severe voltage fluctuation. Install the residual-current circuit breaker (RCCB). Otherwise, electric shock or fire may be caused.
- Only professional technicians who have air conditioner installation qualification certificates can install the air conditioning unit. Improper installation may cause accidents such as water leakage, electric shock or fire.
- Install the air conditioning unit according to requirements of the installation manual. Improper installation may cause accidents such as water leakage, electric shock or fire.
- Set a dedicated circuit that complies with the "engineering standards of electric devices" and "indoor electrical wiring specifications".
- Before installing the ODU, build a solid base and take measures to prevent against typhoon, gale, and earthquake.
- The IDU must be installed at a place that is strong enough to withstand the weight of the unit to avoid the unit falling down and injuring people.
- Prepare protective devices and installation tools. Protective devices such as gloves and uniforms will avoid accidental personal injury.

1.2 Precautions for Using the R410A Device

- Do not use the original refrigerant pipe. The refrigerant or refrigeration oil other than R410A remaining in the original refrigerant pipe contains a lot of chlorine, which may cause deterioration of refrigeration oil in the new unit. In addition, as a high pressure refrigerant, R410A may cause the original pipe to break.
- Seamless pipes made of phosphorus deoxidized copper and copper alloy are recommended. Keep the inner and outer surfaces of the pipe clean, away from harmful sulfides, oxides, dust/dirt, debris, oil, wet gas, and any other impurities. Pollutants in the refrigerant pipe may cause deterioration of the remaining refrigeration oil.
- Store the pipes required for installation indoors and keep both ends sealed until brazing. Keep other connectors such as bends and three-way valves in plastic bags. Otherwise, dust, dirt or wet gas may enter the refrigerant circulating system to cause deterioration of refrigeration oil and failure of compressor.
- Paint ester oil, alcohol oil, or alkylbenzene (a small amount) at the joint of bell-mouthed terminal and flange as refrigeration oil. The refrigeration oil will deteriorate if containing a lot of mineral oil.
- Please charge the refrigeration system with a liquid refrigerant. If the refrigeration system is charged with a gas refrigerant, the composition of the refrigerant in the system will change and the performance of the unit may degrade.
- Do not mix with other refrigerant. If another refrigerant is mixed with R410A, the chlorine contained in the other refrigerant may cause deterioration of the refrigeration oil and refrigerant.
- Select the vacuum pump that carries a reverse check valve. Otherwise, oil in the vacuum pump will flow backwards into the refrigeration system to cause deterioration of refrigeration oil.
- Do not use the following tools that were used for common refrigerant (such as R22) system: pipe pressure test device, charging hose, leakage detector, reverse check valve, refrigerant charging holder, and refrigerant recycle

device. The refrigerant deteriorates if R410A is mixed into common refrigerant and refrigeration oil. The refrigeration oil deteriorates if water is mixed into R410A. R410A does not contain chlorine. Therefore, the leakage detector used for common refrigerant is not applicable to R410A.

- Use the tools carefully. The refrigerant deteriorates if dust, dirt or water enters into the refrigerant circulating system.

1.3 Precautions for Installation

- Do not touch the fins of the heat exchanger. Improper operation may lead to personal injury or damage the fins to degrade the unit performance.
- The ODU must be firmly installed to minimize vibration during running. Cover plates of electric control cases must be tightly installed to prevent dust and water from entering and causing faults or accidents.
- During installation of IDUs, make sure to use air filters, electric heaters, and other components that are specified by EUROKLIMAT.
- If refrigerant leaks during installation, be sure to open doors and windows to maintain ventilation on the field. Prevent refrigerant gas from coming contact with flame; otherwise poisonous gas will be generated.
- If an IDU is installed in a small space, take precautionary measures to avoid concentration of the refrigerant from exceeding safety limit and result in suffocation if the refrigerant leaks due to an accident.
- Electric parts must be protected from moisture and kept far away from water source to avoid accidents such as electric shock and fire.
- Do not change the set values of protective devices or replace them; otherwise performance of units may be degraded, or accidents such as fire or explosion may occur.
- Do not use additives for leak detection.
- Do not pull power wires with excessive force. If they are too tight, they may be snapped and result in startup failure even accidents.
- Make sure that the current capacity and rated power of power cords meet requirements. Improper use of power cords may result in electricity leakage or even a fire.
- The unit must be grounded correctly. Incorrect grounding can cause electric shock. Do not connect earth wires to a lightning conductor or telephone wire.
- IDU water drain pipe must be installed according to the requirements stipulated herein to ensure normal drainage. Besides, the pipe must be covered with a thermal insulation material to avoid water condensation on the outer surface. Improperly installation the pipe will result in leakage and cause damage to furniture or other articles.
- Take care during handling of products. IDUs need several people to handle. Do not use belts to bind the products for handling. ODUs must be lifted with special tools.
- After installation, perform air tightness test to check pipelines for leakage.

1.4 Precautions for Test Run

- Before the test run, energize the main power switch at least 12 hours ahead of time. If you run units immediately after they are powered on, internal parts may be severely damaged. If units will be used frequently, keep the power supply in standby mode all the time.
- Do not touch switches with wet hands, which may cause electric shock.
- Do not start up air conditioners if panels or protective screens are removed. Rotational parts inside the air conditioners may injure people and damage articles.
- In the course of test run or at the very end of test run, do not touch refrigerant pipes. They become very hot or cold during the running of air conditioners, which may scald or freeze people if they are touched.
- After test run, do not shut down the power supply immediately. Wait for 5 minutes at least; otherwise, water may leak.

1.5 Precautions for Removing the Air Conditioner

- Contact dealers of CE and consult professional maintenance personnel.
- Refrigerant of other types cannot be used. If said refrigerant is used, faults may occur.
- For other precautions, refer to section "Precautions for Installation."

2 Unit Introduction

2.1 Nomenclature

$$\frac{\text{EKRV}}{1} \frac{100}{2} \frac{\text{ER}}{3} \frac{1}{4} - \frac{\text{F}}{5} \frac{\text{TB}}{6} \frac{\text{E}}{7} \frac{\text{E}}{8}$$

1. EKR V EUROKLIMAT Variable Multi-System
2. 100 Cooling capacity, 100 = 10HP
3. E Designing SN
4. R Function form – R: cooling and heating type; single cooling type (default)
5. 1 Refrigerant code, 1: R410A; R22: default
6. F Power characteristics, F: 380V/3N~/50Hz
 A: 220V~/50Hz
7. TB Specific descriptions on changes in product specification
8. E Export/domestic sale code: domestic sales (default)

2.2 ODU Performance Parameters

Model		EKR V080ER1	EKR V100ER1	EKR V120ER1	EKR V140ER1	EKR V160ER1	EKR V180ER1	EKR V200ER1	EKR V220ER1	EKR V240ER1	
Capacity	HP	8	10	12	14	16	18	20	22	24	
Power supply		380V/3N~/50Hz									
Rated cooling capacity	kW	25.2	28.0	34.0	40.0	45.0	51.0	56.5	62.0	68.0	
Rated heating capacity	kW	28.0	31.5	37.5	45.0	50.5	57.0	63.0	69.0	75.0	
Rated power of cooling	kW	5.85	6.90	8.62	10.37	12.22	13.55	15.03	16.55	17.24	
Rated power of heating	kW	5.97	7.07	8.96	10.72	12.25	13.62	15.12	16.76	17.92	
Rated current of cooling	A	11.3	13.4	16.4	20.2	23.3	25.8	28.6	31.4	32.7	
Rated current of heating	A	11.4	13.7	17.1	20.4	23.3	25.9	28.7	31.8	34.0	
Outdoor unit max working current	A	22.5	22.8	25.6	29.6	32.2	33.4	37.3	38.6	41.2	
Liquid pipe	mm (inch)	9.52			12.7			15.88			
Gas pipe	mm (inch)	19.05	22.23	25.4			28.6				
Pipe connection mode	Liquid pipe	Connecting bell-mouthed terminal with threaded joint									
	Gas pipe	Connecting bell-mouthed terminal with threaded joint	Welding								
Unit weight	kg	205	215	235	315	325	345	355	365	370	
Sound level	dB(A)	56	57	60	60	60	61	61	61	62	
Refrigerant		R410A									
Dimensions (W x D x H)	(mm)	920×760×1680			1140×835×1680			1655×835×1680			

Model		EKRV260ER1	EKRV280ER1	EKRV300ER1	EKRV320ER1	EKRV340ER1	EKRV360ER1	EKRV380ER1	EKRV400ER1	EKRV420ER1	
Capacity	HP	26	28	30	32	34	36	38	40	42	
Power supply		380V/3N~/50Hz									
Rated cooling capacity	kW	74.0	79.0	85.2	90.0	96.0	102.0	108.0	114.0	119.0	
Rated heating capacity	kW	82.5	88.0	95.0	100.5	107.5	114.0	120.0	127.5	133.0	
Rated power of cooling	kW	18.99	20.84	22.40	23.45	25.77	27.10	27.61	29.36	31.21	
Rated power of heating	kW	19.68	21.21	22.73	23.83	25.87	27.24	28.64	30.40	31.93	
Rated current of cooling	A	36.0	39.5	42.5	44.5	48.9	51.4	52.4	55.7	59.2	
Rated current of heating	A	37.3	40.2	43.1	45.2	49.1	51.7	54.3	57.7	60.6	
Outdoor unit max working current	A	50.3	54.5	60.4	62.2	72.9	73.6	74.8	75.2	78.5	
Liquid pipe	mm	19.05									
Gas pipe	mm	31.8					38.1				
Pipe connection mode	Liquid pipe	Connecting bell-mouthed terminal with threaded joint									
	Gas pipe	Welding									
Unit weight	kg	480	485	510	515	545	550	575	580	585	
Sound level	dB(A)	62	62	63	63	63	63	63	63	64	
Refrigerant		R410A									
Dimensions (W x D x H)	(mm)	1780x835x1680					2615x835x1680				

Note:

- The cooling capacities above are the results of tests performed under the working condition where the indoor dry/wet bulb temperature is 27/19°C and the outdoor dry/wet bulb temperature is 35/24°C.
- The heating capacities above are the results of tests performed under the working condition where the indoor dry/wet bulb temperature is 20/15°C and the outdoor dry/wet bulb temperature is 7/6°C.
- The sound level values above are the averages of measurement values at the four points that are one meter away from the four sides of the unit and whose height is 1/2 of the unit height plus one meter in a half-anechoic chamber. Actual noise values may be higher than the standard due to impact from external environment.
- The specifications are subject to change without notice due to product improvement. For specific parameters, refer to the product nameplate.
- Compared with the cooling and heating type, the single cooling type does not have heating relevant parameters. Other parameters are the same.

2.3 IDU Classification and ODU Combination

1. IDU classification

Name	Cooling Capacity (kW)																			
	1.8	2.2	2.5	2.8	3.2	3.6	4.0	4.5	5.0	5.6	6.3	7.1	8.0	9.0	10.0	11.2	12.5	14.0	16.0	18.0
Ceiling concealed duct unit (Low static pressure)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ceiling concealed duct unit (medium static pressure)		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ceiling concealed duct unit (High static pressure)												●	●	●	●	●	●	●	●	●
One-way cassette IDU		●	●	●	●	●	●													
Two-way cassette IDU		●	●	●	●	●	●	●	●	●	●	●								
Four-way cassette IDU				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ceiling exposed/ floor-standing type				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Name	Cooling Capacity (kW)												
	12.5	14.0	16.0	18.0	25.0	28.0	33.5	45.0	50.0	56.0	61.5	79.0	90.0
High static pressure duct type unit	●	●	●		●	●	●	●	●	●	●	●	●

2. ODU combination

- The following table lists the number of IDUs that can be connected to EKR-V-E series ODUs. During installation, make sure not to exceed the specified number.
- The total capacity of the IDUs can be in the range of 50% to 120% of the rated capacity of the ODUs.

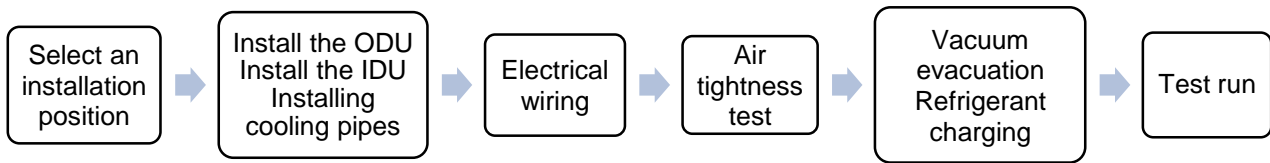
Model	Combination	Allowed maximum	Recommended maximum number of IDUs	Model	Combination	Allowed maximum	Recommended maximum number of IDUs
EKR-V080ER1	Single	16	10	EKR-V700ER1	16+22+32	64	40
EKR-V100ER1	Single	18	11	EKR-V700ER1	28+42	64	40
EKR-V120ER1	Single	22	11	EKR-V720ER1	18+22+32	64	40
EKR-V140ER1	Single	26	16	EKR-V720ER1	30+42	64	40
EKR-V160ER1	Single	26	16	EKR-V740ER1	20+22+32	64	40
EKR-V180ER1	Single	33	21	EKR-V740ER1	32+42	64	40
EKR-V200ER1	Single	37	21	EKR-V760ER1	22+22+32	64	40
EKR-V220ER1	Single	41	21	EKR-V760ER1	16+18+42	64	40
EKR-V240ER1	Single	44	21	EKR-V780ER1	18+28+32	64	40
EKR-V260ER1	Single	48	27	EKR-V780ER1	18+18+42	64	40
EKR-V280ER1	Single	52	27	EKR-V800ER1	16+32+32	64	40
EKR-V300ER1	Single	56	32	EKR-V800ER1	16+22+42	64	40
EKR-V320ER1	Single	60	32	EKR-V820ER1	18+32+32	64	40
EKR-V340ER1	Single	64	37	EKR-V820ER1	18+22+42	64	40
EKR-V340ER1	16+18	64	37	EKR-V840ER1	20+32+32	64	40
EKR-V360ER1	Single	64	40	EKR-V840ER1	42+42	64	40
EKR-V360ER1	18+18	64	40	EKR-V860ER1	22+32+32	64	40
EKR-V380ER1	Single	64	40	EKR-V860ER1	22+22+42	64	40
EKR-V380ER1	16+22	64	40	EKR-V880ER1	24+32+32	64	40
EKR-V400ER1	Single	64	40	EKR-V880ER1	18+28+42	64	40
EKR-V400ER1	18+22	64	40	EKR-V900ER1	26+32+32	64	40
EKR-V420ER1	Single	64	40	EKR-V900ER1	16+32+42	64	40
EKR-V420ER1	20+22	64	40	EKR-V920ER1	28+32+32	64	40
EKR-V440ER1	22+22	64	40	EKR-V920ER1	18+32+42	64	40
EKR-V460ER1	18+28	64	40	EKR-V940ER1	30+32+32	64	40
EKR-V480ER1	16+32	64	40	EKR-V940ER1	20+32+42	64	40
EKR-V500ER1	18+32	64	40	EKR-V960ER1	32+32+32	64	40
EKR-V520ER1	16+18+18	64	40	EKR-V960ER1	22+32+42	64	40
EKR-V540ER1	18+18+18	64	40	EKR-V980ER1	14+42+42	64	42
EKR-V560ER1	16+18+22	64	40	EKR-V1000ER1	16+42+42	64	42
EKR-V560ER1	14+42	64	40	EKR-V1020ER1	18+42+42	64	42
EKR-V580ER1	18+18+22	64	40	EKR-V1040ER1	20+42+42	64	42
EKR-V580ER1	16+42	64	40	EKR-V1060ER1	22+42+42	64	42
EKR-V600ER1	16+22+22	64	40	EKR-V1080ER1	24+42+42	64	42
EKR-V600ER1	18+42	64	40	EKR-V1100ER1	26+42+42	64	45
EKR-V620ER1	18+22+22	64	40	EKR-V1120ER1	28+42+42	64	45
EKR-V620ER1	20+42	64	40	EKR-V1140ER1	30+42+42	64	45
EKR-V640ER1	20+22+22	64	40	EKR-V1160ER1	32+42+42	64	45
EKR-V640ER1	22+42	64	40	EKR-V1180ER1	38+38+42	64	45
EKR-V660ER1	22+22+22	64	40	EKR-V1200ER1	38+40+42	64	45
EKR-V660ER1	24+42	64	40	EKR-V1220ER1	38+42+42	64	45
EKR-V680ER1	18+18+32	64	40	EKR-V1240ER1	40+42+42	64	45
EKR-V680ER1	26+42	64	40	EKR-V1260ER1	42+42+42	64	45

Note:

- If all IDUs are running at the same time, the total capacity of the IDUs shall be smaller than or equal to the capacity of the ODU combination; otherwise, overload running may occur under harsh working condition or in narrow operating range.
- If not all IDUs run at the same time in the system, the total capacity of the IDUs can reach 120% of the total capacity of the ODUs.
- If the system is used in cold zones (ambient temperature below -10°C) or high hot load environments, the total capacity of the IDUs should be smaller than the capacity of the ODU combination and the total pipe length should not exceed 220 m.

3 Installation Flowchart

Air conditioner installation should follow a certain order. The following flowchart describes a recommended installation order. Refer to this flowchart during installation.



4 Installing the ODU

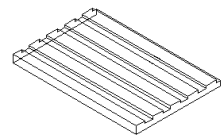
4.1 Selecting a Position for Installation

To achieve better cooling (heating) effect, select the outdoor unit installation position in consideration of the following aspects:

- Do not install the ODU in places where combustible gas may leak. If combustible gas leaks and accumulates around the unit, explosion may occur.
- The installation place shall avoid discharged hot air from being sucked back by the unit and avoid inhaling the hot air of other units. Besides, the installation place shall provide sufficient space for unit maintenance in future.
- The discharge and inhalation pipes shall be free of obstacle and airy in order to ensure heat dissipation of the unit.
- The installation position must be solid enough to bear the weight of the unit and the vibration generated when the unit operates.
- Do not select dirty or oily places or places that contain a lot of salts and sulfide gases.
- Do not install the ODU in places that are vulnerable to gale or typhoon. If condition permits, install auxiliary devices to prevent rain, snow, and direct sunlight.
- The installation place shall be kept away from residential areas to avoid impact of the discharge and noise on residents.

4.2 Installing the ODU

- Use concrete or back stand to build a foundation. Before building, take floor strength, water discharge (water is drained out of the unit when it is running), pipes, and wire routes into consideration. A weak floor will cause the ODU to fall down and result in personal injury.
- Use bolts to firmly anchor ODUs so that they will not fall down in case of earthquake or gale. The ODUs should also be properly installed.
- Underplates and walls may generate vibration and noise (which will transmit to the installation parts), depending on actual conditions. Take anti-vibration measures, such as absorbing cushion or buffer rack. Refer to the table at the right side.
- Corner parts must be properly installed. Improper installation will cause ODUs unstable and feet bent. Note that any tiny improper installation may cause ODUs to fall down and result in personal injury.



Model	080~240	260~420
Number of cushions	4	6
Cushion specification	100 × 100 × 15mm	

Warnings:

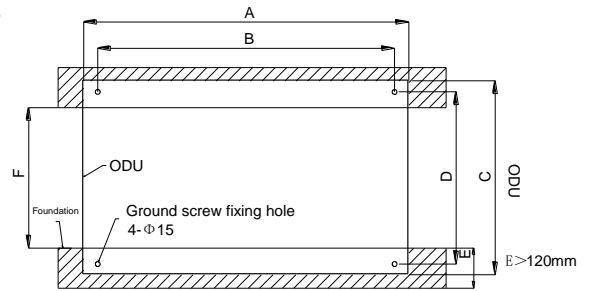
- The foundation must be solid enough to bear the ODU weight and operating weight.
- During downlink pipe routing and downlink wiring, the foundation and base cannot block the pass-through holes of the base. The foundation must be 100 mm high at least so that the pipes can pass through the unit base.

The unit must be installed on a flat, firm, and solid concrete foundation that can bear the unit weight. Embed fixing holes in advance and use bolts to fix the unit. The foundation must be at least 150 mm higher than the ground and 1.5 times wider

than the unit supporting legs. Do not place the unit on a wooden plate; otherwise, noise will be generated. The following table and figure show the dimensions of the foundation and fixing holes.

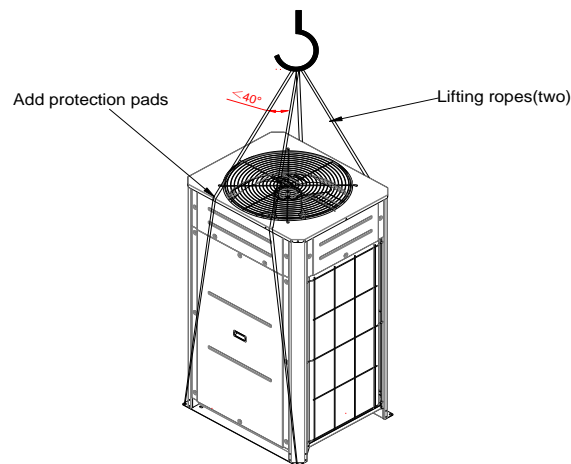
Dimensions of fixing holes (mm)

Model Size	A (Unit Width)	B (Fixing Hole Distance)	C (Unit Depth)	D (Fixing Hole Distance)	F (Base Distance)	Fixing Hole Qty
EKRV080-120ER1-FT	920	890	760	737	560	4
EKRV140-180ER1-FT	1140	1110	835	812	635	4
EKRV200-240ER1-FT	1655	1625	835	800	635	4
EKRV260-320ER1-FT	1780	1750	835	800	635	4
EKRV340-420ER1-FT	2615	2581	835	800	635	4



4.3 Lifting the ODU

Lift the unit according to the method shown in the following figure. When handling the unit, support it at four points. Keep the unit vertical and tilt by no more than 30°. Pay attention to safety during handling and lifting.



Note:

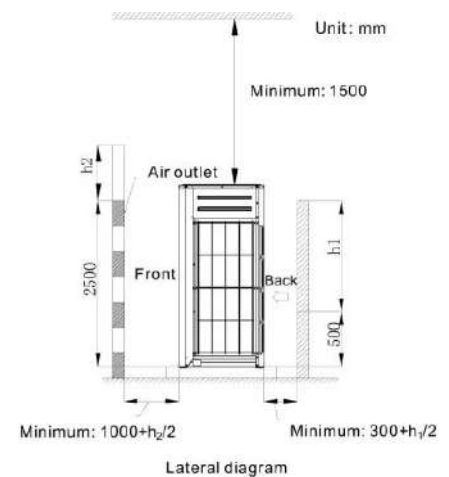
- 1) Take special care during handling of the ODU. Lift the ODU with package to protect it.
- 2) For products that have been delivered with belts for packing, do not use the belts as tools for lifting or handling the products, since it will cause danger.
- 3) Do not touch the heat dissipater of the heat exchanger; otherwise, hands may be cut.

4.4 Determining Ambient Space of the ODU

An ODU can be independently installed in a certain place. Alternatively, multiple ODUs can be installed together in a larger place. For the latter case, pay attention to the arrangement.

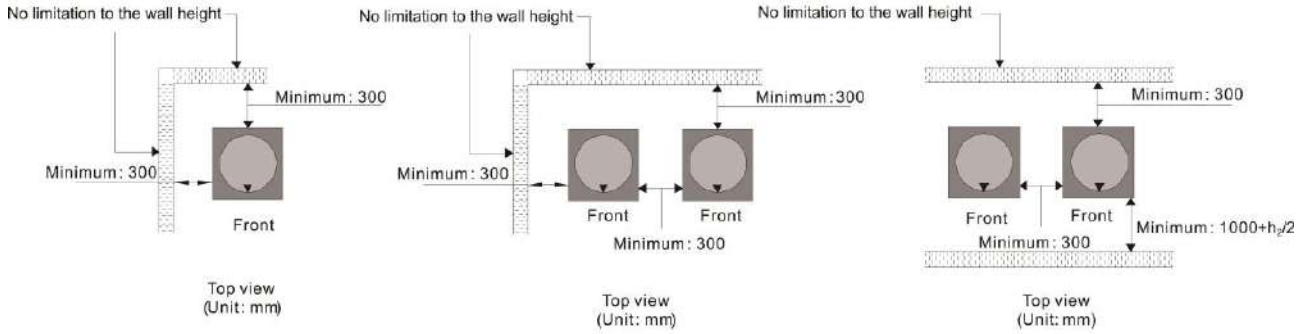
The following describes the requirements during installation. For the installation space for single- or dual-fan units, refer to the figure at the right side.

1. If there is no wall in front or back of the ODU, reserve at least 1000 mm space in front and 300 mm space at lateral sides.
2. If the wall in front of the ODU is higher than 2500 mm, reserve at least $(1000+h_2/2)$ mm space in front.
3. If the wall in back of the ODU is higher than 500 mm, reserve at least $(300+h_1/2)$ mm space in back.
4. If a wall needs to be set in front of the ODU, drill holes on the wall.
5. If the clearance between the ODU top and any obstacle is less than 1500 mm or smaller, set an air guide at the air outlet to avoid short circuit of the return air.
6. If there is an obstacle on the ODU top, the ODU shall be free of any obstacle in the front, back, left, and right faces theoretically. h_1 and h_2 in the following figures indicate h_1 and h_2 of the lateral diagram.



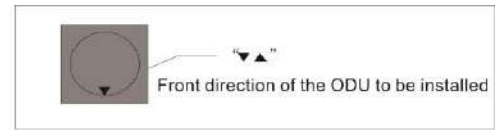
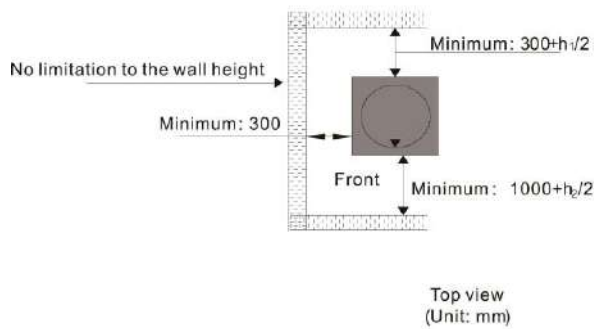
I. Two walls

If the ODU is close to a tall building and two walls, reserve at least 300 mm space in back.

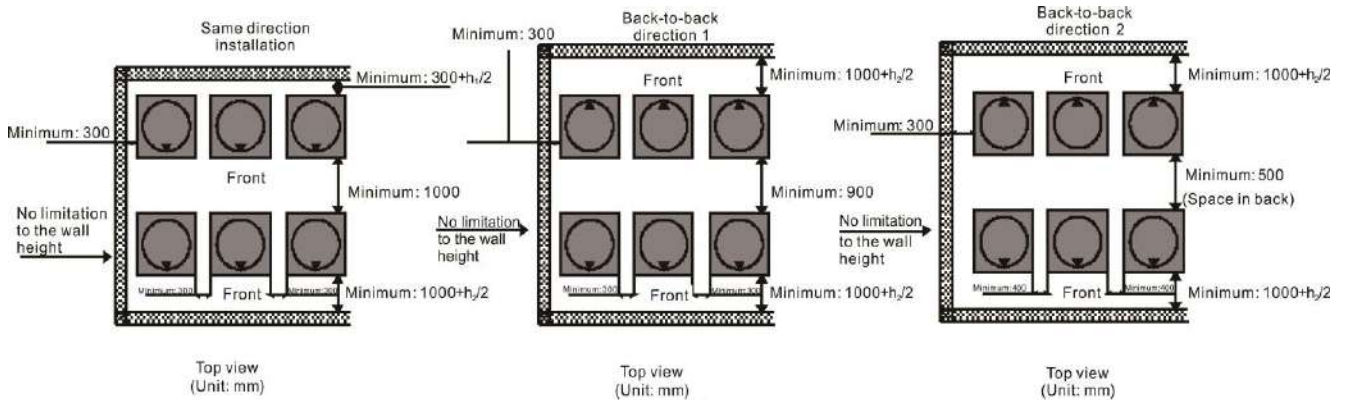


II. Three walls

1) Installing a unit

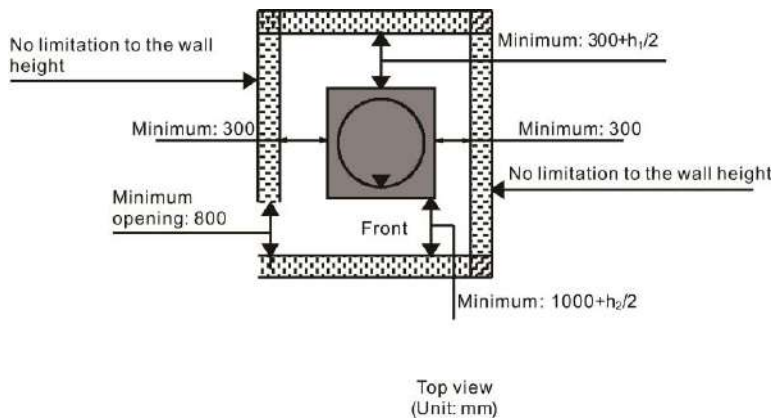


2) Installing multiple units or a series of units

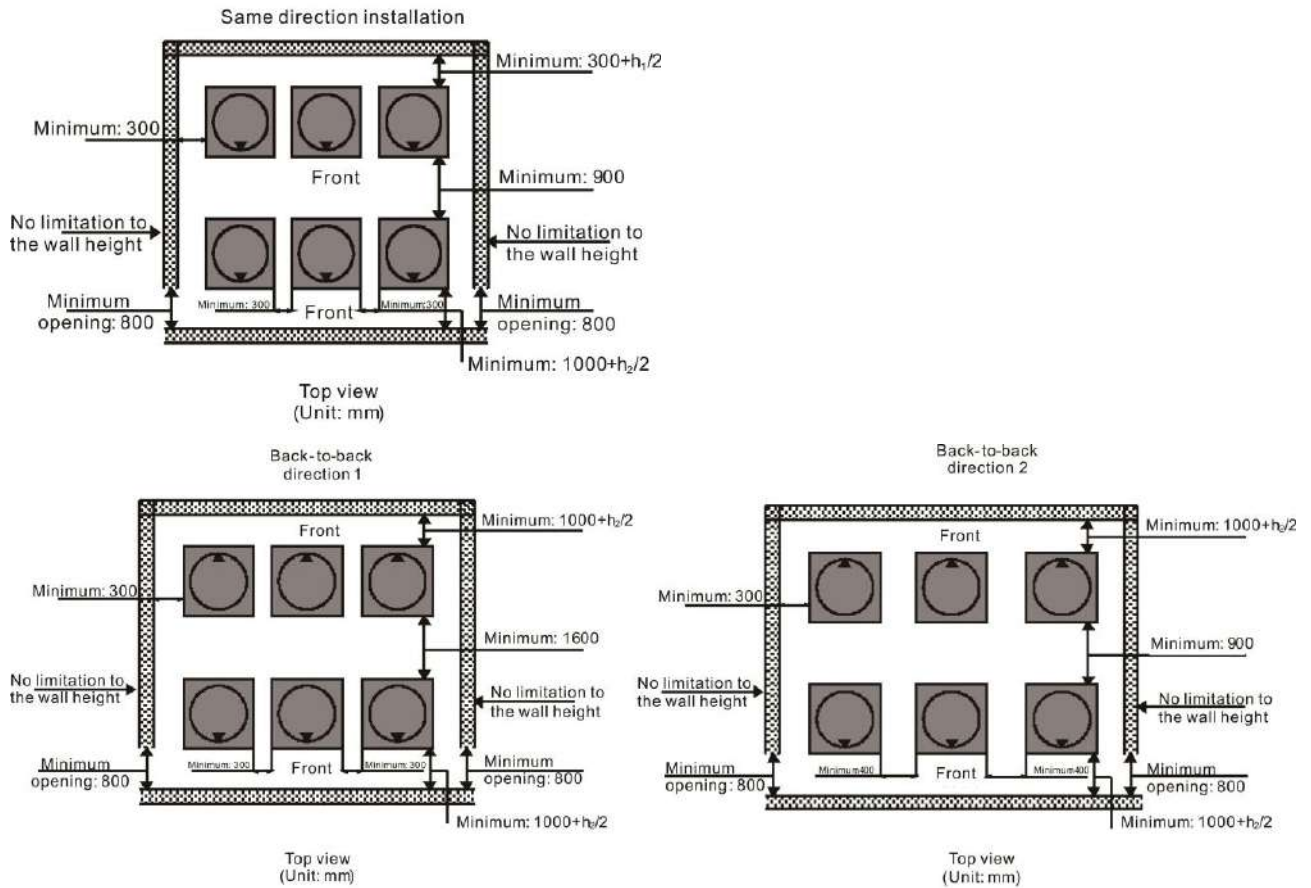


III. Four walls

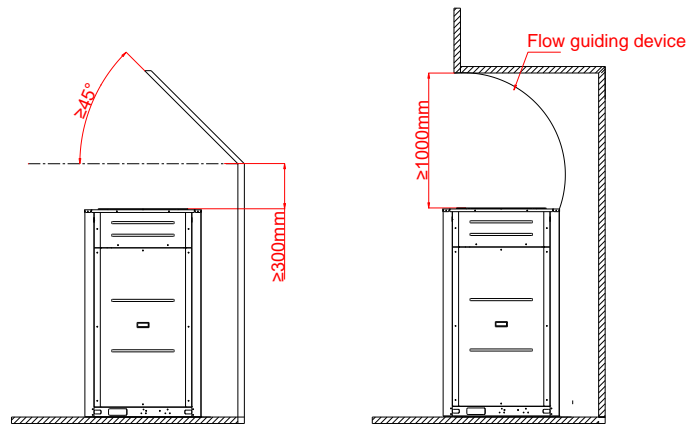
1) Installing a unit



2) Installing multiple units or a series of units

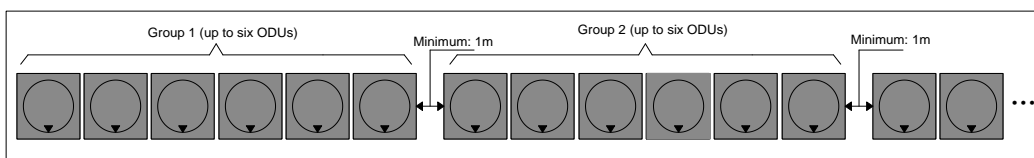


IV. Obstacle on unit top



Note:

- 1) Avoid obstacle on ODU top to avoid short circuit formed by the inlet air and return air.
- 2) The previous dimensions will allow sufficient running and maintenance of the unit when it is running under standard working conditions (running mode: cooling; external ambient temperature: 35°C). If the ambient temperature is high and return air short circuit occurs, adjust the installation dimensions based on actual conditions by calculating the return air flow of the ODU.
- 3) In case of multiple ODU installation, the minimum clearance between two adjacent ODUs shall not be less than 1 m.



- 4) If the unit is surrounded by walls, divide at least one of the walls.

5 Installing Refrigerant Pipes

Variable Multi-System is a cooling system composed of one ODU and multiple IDUs. The ODU and IDUs are integrated using refrigerant pipes. Compared with non-multi-connected units, the heat pump units require more complex pipe connection; therefore, pipeline system design should strictly comply with the structure recommended by EUROKLIMAT. Operators are required to be cautious about pipeline installation so as to ensure that the pipeline is securely welded and kept clean, dry, and chemical free.

The ODU gas pipes and refrigerant pipes are connected by welding; the ODU liquid pipes and IDU gas pipes and liquid pipes are connected by bell-mouthed terminals.

5.1 Precautions for Installing Pipes

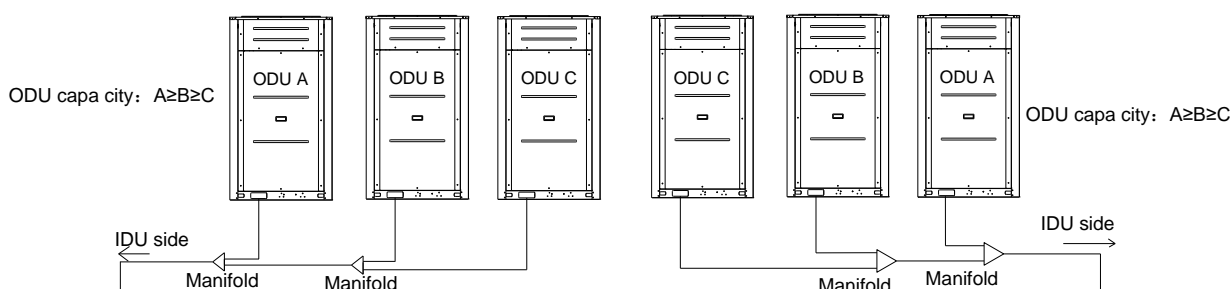
- 1) Refer to related materials to determine pipe diameter and wall thickness. Seamless copper pipes with main composites being phosphorus deoxidized copper are recommended. The copper pipes must be dustless, dry, and pure.
- 2) Do not use refrigerant to discharge air. Use vacuum pumps to extract air.
- 3) Used refrigerant pipes are forbidden to use.
- 4) Do not use cleanser to clean the pipes.
- 5) During installation of air conditioning units, make sure open pipes are sealed at both ends so that dirt, dust, or water cannot enter the cooling system.
- 6) During laying of pipes, make sure water, impurities, and other objects cannot enter the cooling system. Do not perform ODU pipeline connection in rainy days.
- 7) The number of bends should be as less as possible. Long sweep bends are recommended.
- 8) Welding materials that contain antioxidants pose a negative impact on devices. You are advised to use non-oxidizing copper materials to weld pipes. Copper materials of other types may cause damage to the compressor.
- 9) Copper pipes must be insulated. Improper insulation will have an impact on the cooling and heating effect and result in condensate drips.
- 10) During connection of refrigerant pipes, keep the ball valves of ODUs fully-closed (they have been set in factory). Before you complete such operations as IDU/ODU refrigerant pipe connection, leakage test, and vacuum evacuation, do not operate the ball valves.
- 11) Refrigerants that are not specified are not allowed to use. Mixture with other refrigerants or mixture with air will cause circulation fault even result in severe damage to the units.

5.2 Structure of the Refrigerant Pipe System

5.2.1 Precautions for Installing ODUs

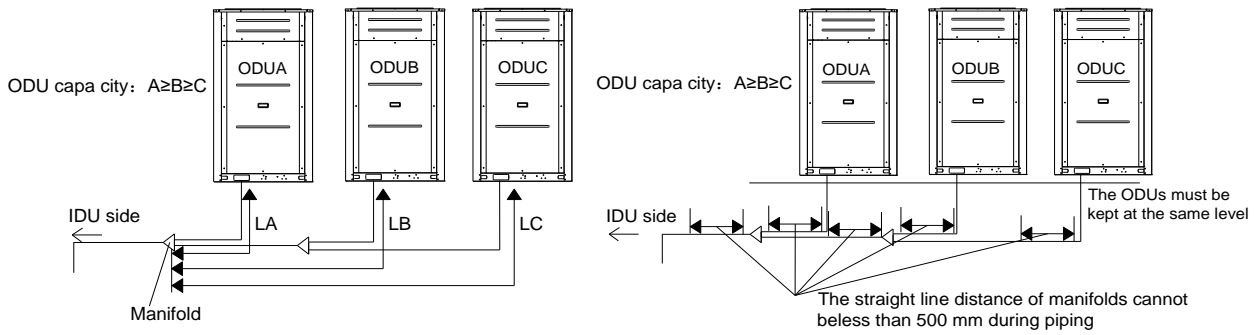
ODU arrangement

ODUs are arranged in the order of $A \geq B \geq C$. ODU A shall be installed close to the IDUs.



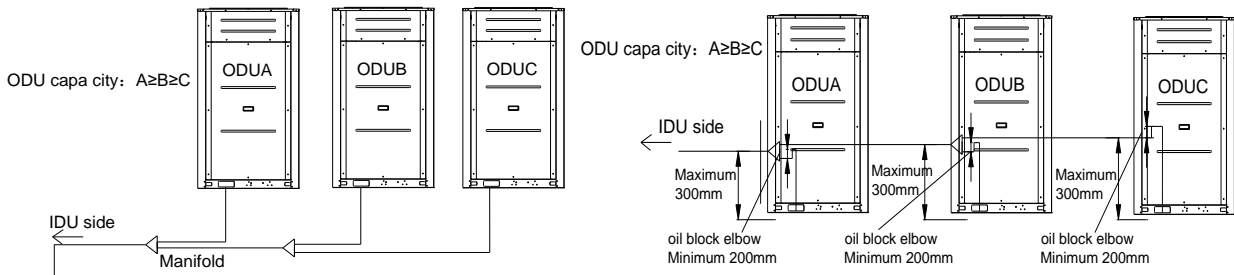
ODU pipe connection

- (1) Pipe length between ODU manifolds and ODUs must meet the requirement $L_A \leq L_B \leq L_C \leq 10\text{m}$.

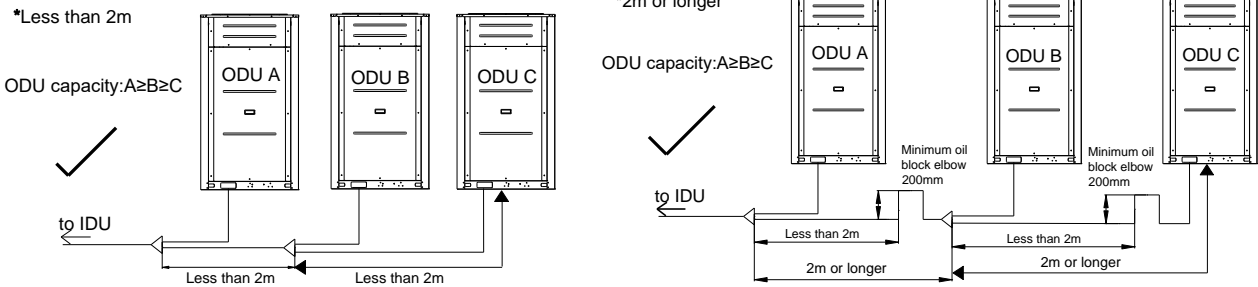


(2) Installation position of ODU manifolds must be lower than the outlet position of the ODU pipes.

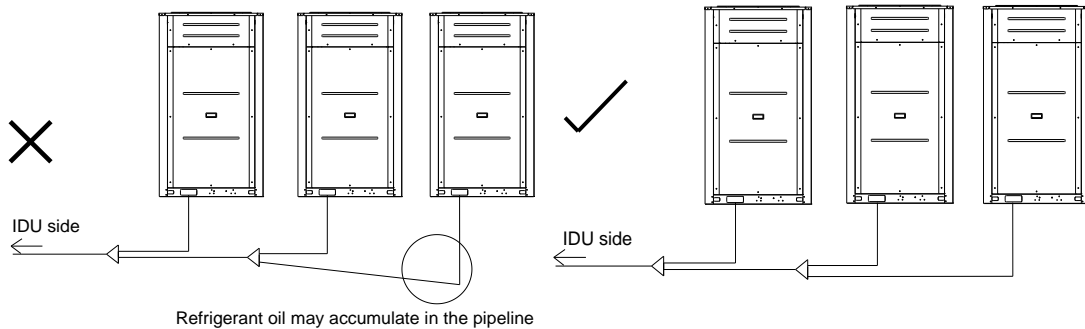
If the installation position of ODU manifolds is higher than the outlet position of the ODU pipes, the distance between the manifolds and ODU bottom shall not exceed 300 mm. Besides, install oil block elbows (200 mm at least) between the ODUs and manifolds.



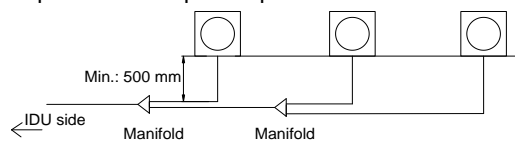
(3) If ODU pipe length is larger than 2 m, install oil block elbows at the gas pipes to avoid refrigerant oil depositing in a single ODU.



(4) ODU pipeline shall be installed in a horizontal state or IDU pipeline shall be installed in a down lean state; otherwise, refrigerant oil may deposit in the pipeline.

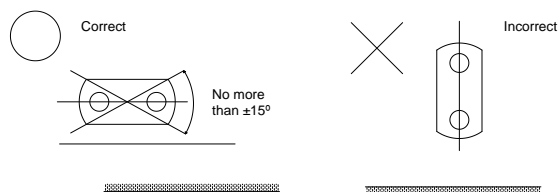


(5) If pipes are installed in front of the ODUs, keep at least 500 mm vertical distance between the ODUs and manifolds to facilitate maintenance. (Compressor replacement requires space not less than 500 mm.)



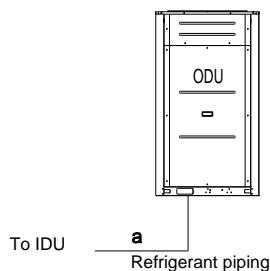
(6) Manifold direction

As shown in the following figure, manifolds must be kept in the same level as ground (horizontal tilt angle $\leq 15^\circ$).



5.2.2 Pipe Specifications of the Variable Multi-System

1) Pipe specifications of EKRVO80ER1~EKRV420ER1 (basic module)



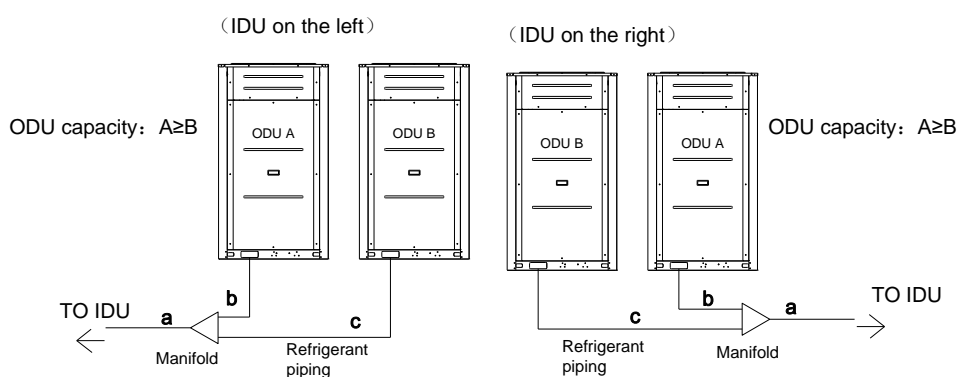
Model		EKRVO80ER1	EKRVI100ER1	EKRVI120ER1	EKRVI140ER1	EKRVI160ER1	EKRVI180ER1	EKRVI200ER1	EKRVI220ER1	EKRVI240ER1
Pipe specifications	Liquid pipe	9.52(3/8")	9.52(3/8")	12.7(1/2")	12.7(1/2")	12.7(1/2")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")
	Gas pipe	19.05(3/4")	22.23(7/8")	25.4(1")	25.4(1")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")
Model		EKRVI260ER1	EKRVI280ER1	EKRVI300ER1	EKRVI320ER1	EKRVI340ER1	EKRVI360ER1	EKRVI380ER1	EKRVI400ER1	EKRVI420ER1
Pipe specifications	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
	Gas pipe	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")

(Φmm)

* Connect ODU pipes according to the requirements in the tables above.

- ① Select manifold model and pipe diameter based on the ODU model provided in the tables above.
- ② If the equivalent length of the main pipe is longer than or equal to 90 m, select a connection pipe with a greater diameter according to requirements in "Connection of Refrigerant Pipes".

2) Pipe specifications of EKRVI340ER1~EKRV840ER1 (combination of two modules)



(Φmm)

Model (Combination)		EKRVI340ER1	EKRVI360ER1	EKRVI380ER1	EKRVI400ER1	EKRVI420ER1	EKRVI440ER1	
Combination mode	ODU A	EKRVI180ER1	EKRVI180ER1	EKRVI220ER1	EKRVI220ER1	EKRVI220ER1	EKRVI220ER1	
	ODU B	EKRVI160ER1	EKRVI180ER1	EKRVI160ER1	EKRVI180ER1	EKRVI200ER1	EKRVI220ER1	
Model of Manifold		ACRV-BP05						
Pipe specifications	a	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	b	Liquid pipe	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")
	c	Liquid pipe	12.7(1/2")	15.88(5/8")	12.7(1/2")	15.88(5/8")	15.88(5/8")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")

(Φmm)

Model (Combination)		EKRV460ER1	EKRV480ER1	EKRV500ER1	EKRV560ER1	EKRV580ER1	EKRV600ER1	
Combination Module	ODU A	EKRV280ER1	EKRV320ER1	EKRV320ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	
	ODU B	EKRV180ER1	EKRV160ER1	EKRV180ER1	EKRV140ER1	EKRV160ER1	EKRV180ER1	
Model of Manifold		ACRV-BP05			ACRV-BP07			
Piping Specification	a	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	41.3(1 5/8")	41.3(1 5/8")	41.3(1 5/8")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	c	Liquid pipe	15.88(5/8")	12.7(1/2")	15.88(5/8")	12.7(1/2")	12.7(1/2")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	25.4(1")	28.6(1 1/8")	28.6(1 1/8")

(Φmm)

Model (Combination)		EKRV620ER1	EKRV640ER1	EKRV660ER1	EKRV680ER1	EKRV700ER1	EKRV720ER1	
Combination Module	ODU A	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	
	ODU B	EKRV200ER1	EKRV220ER1	EKRV240ER1	EKRV260ER1	EKRV280ER1	EKRV300ER1	
Model of Manifold		ACRV-BP07			ACRV-BP08			
Piping Specification	a	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	22.23(7/8")	22.23(7/8")	
		Gas pipe	41.3(1 5/8")	41.3(1 5/8")	41.3(1 5/8")	44.5(1 3/4")	44.5(1 3/4")	44.5(1 3/4")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	c	Liquid pipe	15.88(5/8")	15.88(5/8")	15.88(5/8")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")

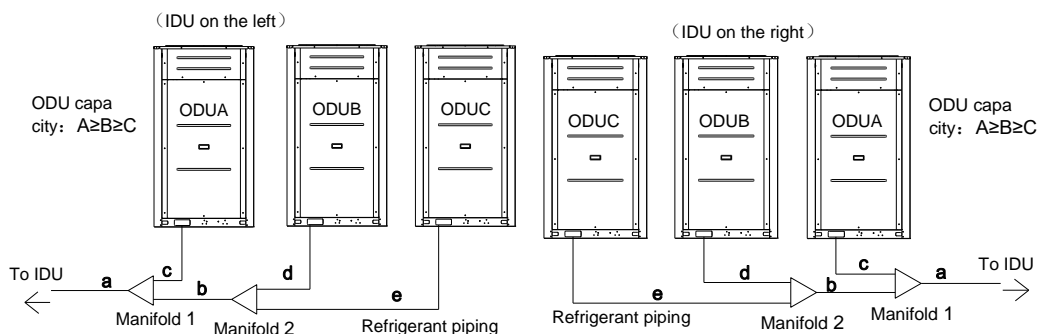
(Φmm)

Model (Combination)		EKRV740ER1	EKRV800ER1	EKRV820ER1	EKRV840ER1
Combination Module	ODU A	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1
	ODU B	EKRV320ER1	EKRV380ER1	EKRV400ER1	EKRV420ER1
Model of Manifold		ACRV-BP09			
Piping Specification	a	Liquid pipe	25.4(1")	25.4(1")	25.4(1")
		Gas pipe	50.8(2")	50.8(2")	50.8(2")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	c	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	38.1(1 1/2")	38.1(1 1/2")

* Connect ODU pipes according to the requirements in the tables above.

- ① Select manifold model and pipe diameter based on the ODU model provided in the tables above.
- ② If the equivalent length of the main pipe is longer than or equal to 90 m, select a connection pipe with a greater diameter according to requirements in "Connection of Refrigerant Pipes".

3) Pipe specifications of EKRV520ER1~EKRV1260ER1 (combination of three modules)



(Φmm)

Model (Combination)		EKRV520ER1	EKRV540ER1	EKRV560ER1	EKRV580ER1	EKRV600ER1	EKRV620ER1	
Combination mode	ODU A	EKRV180ER1	EKRV220ER1	EKRV220ER1	EKRV220ER1	EKRV220ER1	EKRV260ER1	
	ODU B	EKRV180ER1	EKRV180ER1	EKRV180ER1	EKRV220ER1	EKRV220ER1	EKRV260ER1	
	ODU C	EKRV160ER1	EKRV160ER1	EKRV180ER1	EKRV180ER1	EKRV180ER1	EKRV180ER1	
ODU manifold 1		ACRV-BP05			ACRV-BP07			
ODU manifold 2		ACRV-BP05			ACRV-BP05			
Pipe specifications	a	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	41.3(1 5/8")	41.3(1 5/8")	41.3(1 5/8")	41.3(1 5/8")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	38.1(1 1/2")	31.8(1 1/4")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	c	Liquid pipe	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")

	d	Liquid pipe	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")
	e	Liquid pipe	12.7(1/2")	15.88(5/8")	12.7(1/2")	15.88(5/8")	12.7(1/2")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")

(Φmm)

Model (Combination)		EKRV640ER1	EKRV660ER1	EKRV680ER1	EKRV700ER1	EKRV720ER1	EKRV740ER1	
Combination mode	ODU A	EKRV220ER1	EKRV220ER1	EKRV320ER1	EKRV320ER1	EKRV320ER1	EKRV320ER1	
	ODU B	EKRV220ER1	EKRV220ER1	EKRV180ER1	EKRV220ER1	EKRV220ER1	EKRV220ER1	
	ODU C	EKRV200ER1	EKRV220ER1	EKRV180ER1	EKRV160ER1	EKRV180ER1	EKRV200ER1	
ODU manifold 1		ACRV-BP07		ACRV-BP08		ACRV-BP09		
ODU manifold 2		ACRV-BP05		ACRV-BP05		ACRV-BP05		
Pipe specifications	a	Liquid pipe	19.05(3/4")	19.05(3/4")	22.23(7/8")	22.23(7/8")	22.23(7/8")	25.4(1")
		Gas pipe	41.3(1 5/8")	41.3(1 5/8")	44.5(1 3/4")	44.5(1 3/4")	44.5(1 3/4")	50.8(2")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	c	Liquid pipe	15.88(5/8")	15.88(5/8")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")
	d	Liquid pipe	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")
	e	Liquid pipe	15.88(5/8")	15.88(5/8")	15.88(5/8")	12.7(1/2")	15.88(5/8")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")

(Φmm)

Model (Combination)		EKRV760ER1	EKRV760ER1	EKRV780ER1	EKRV780ER1	EKRV800ER1	EKRV800ER1	
Combination mode	ODU A	EKRV320ER1	EKRV420ER1	EKRV320ER1	EKRV420ER1	EKRV320ER1	EKRV420ER1	
	ODU B	EKRV220ER1	EKRV180ER1	EKRV280ER1	EKRV180ER1	EKRV320ER1	EKRV220ER1	
	ODU C	EKRV220ER1	EKRV160ER1	EKRV180ER1	EKRV180ER1	EKRV160ER1	EKRV160ER1	
ODU manifold 1		ACRV-BP09						
ODU manifold 2		ACRV-BP05						
Pipe specifications	a	Liquid pipe	25.4(1")	25.4(1")	25.4(1")	25.4(1")	25.4(1")	25.4(1")
		Gas pipe	50.8(2")	50.8(2")	50.8(2")	50.8(2")	50.8(2")	50.8(2")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	31.8(1 1/4")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	c	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	38.1(1 1/2")	31.8(1 1/4")	38.1(1 1/2")	31.8(1 1/4")	38.1(1 1/2")
	d	Liquid pipe	15.88(5/8")	15.88(5/8")	19.05(3/4")	15.88(5/8")	19.05(3/4")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	31.8(1 1/4")	28.6(1 1/8")	31.8(1 1/4")	28.6(1 1/8")
	e	Liquid pipe	15.88(5/8")	12.7(1/2")	15.88(5/8")	15.88(5/8")	12.7(1/2")	12.7(1/2")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")

(Φmm)

Model (Combination)		EKRV820ER1	EKRV820ER1	EKRV840ER1	EKRV860ER1	EKRV860ER1	EKRV880ER1	
Combination mode	ODU A	EKRV320ER1	EKRV420ER1	EKRV320ER1	EKRV320ER1	EKRV420ER1	EKRV320ER1	
	ODU B	EKRV320ER1	EKRV220ER1	EKRV320ER1	EKRV320ER1	EKRV220ER1	EKRV320ER1	
	ODU C	EKRV120ER1	EKRV180ER1	EKRV200ER1	EKRV220ER1	EKRV220ER1	EKRV240ER1	
ODU manifold 1		ACRV-BP09						
ODU manifold 2		ACRV-BP05						
Pipe specifications	a	Liquid pipe	25.4(1")	25.4(1")	25.4(1")	25.4(1")	25.4(1")	25.4(1")
		Gas pipe	50.8(2")	50.8(2")	50.8(2")	50.8(2")	50.8(2")	50.8(2")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	41.3(1 5/8")
	c	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	38.1(1 1/2")	31.8(1 1/4")	31.8(1 1/4")	38.1(1 1/2")	31.8(1 1/4")
	d	Liquid pipe	19.05(3/4")	15.88(5/8")	19.05(3/4")	19.05(3/4")	15.88(5/8")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	28.6(1 1/8")	31.8(1 1/4")	31.8(1 1/4")	28.6(1 1/8")	31.8(1 1/4")
	e	Liquid pipe	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")

(Φmm)

Model (Combination)		EKRV880ER1	EKRV900ER1	EKRV900ER1	EKRV920ER1	EKRV920ER1	EKRV940ER1
Combination mode	ODU A	EKRV420ER1	EKRV320ER1	EKRV420ER1	EKRV320ER1	EKRV420ER1	EKRV320ER1
	ODU B	EKRV280ER1	EKRV320ER1	EKRV320ER1	EKRV320ER1	EKRV320ER1	EKRV320ER1
	ODU C	EKRV180ER1	EKRV260ER1	EKRV160ER1	EKRV280ER1	EKRV180ER1	EKRV300ER1
ODU manifold 1		ACRV-BP09					
ODU manifold 2		ACRV-BP05					

Pipe specifications	a	Liquid pipe	25.4(1")	25.4(1")	25.4(1")	25.4(1")	25.4(1")	25.4(1")
		Gas pipe	50.8(2")	50.8(2")	50.8(2")	50.8(2")	50.8(2")	50.8(2")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	41.3(1 5/8")	38.1(1 1/2")	41.3(1 5/8")	38.1(1 1/2")	41.3(1 5/8")
	c	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	31.8(1 1/4")	38.1(1 1/2")	31.8(1 1/4")	38.1(1 1/2")	31.8(1 1/4")
	d	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")
	e	Liquid pipe	15.88(5/8")	19.05(3/4")	12.7(1/2")	19.05(3/4")	15.88(5/8")	19.05(3/4")
		Gas pipe	28.6(1 1/8")	31.8(1 1/4")	28.6(1 1/8")	31.8(1 1/4")	28.6(1 1/8")	31.8(1 1/4")

(Φmm)

Model (Combination)		EKRV940ER1	EKRV960ER1	EKRV960ER1	EKRV980ER1	EKRV1000ER1	EKRV1020ER1	
Combination mode	ODU A	EKRV420ER1	EKRV320ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	
	ODU B	EKRV320ER1	EKRV320ER1	EKRV320ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	
	ODU C	EKRV200ER1	EKRV320ER1	EKRV220ER1	EKRV140ER1	EKRV160ER1	EKRV180ER1	
ODU manifold 1		ACRV-BP09			ACRV-BP10			
ODU manifold 2		ACRV-BP05			ACRV-BP07			
Pipe specifications	a	Liquid pipe	25.4(1")	25.4(1")	25.4(1")	25.4(1")	25.4(1")	
		Gas pipe	50.8(2")	50.8(2")	50.8(2")	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	41.3(1 5/8")	38.1(1 1/2")	41.3(1 5/8")	41.3(1 5/8")	41.3(1 5/8")
	c	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	31.8(1 1/4")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	d	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	31.8(1 1/4")	31.8(1 1/4")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	e	Liquid pipe	15.88(5/8")	19.05(3/4")	15.88(5/8")	12.7(1/2")	12.7(1/2")	15.88(5/8")
		Gas pipe	28.6(1 1/8")	31.8(1 1/4")	28.6(1 1/8")	25.4(1")	28.6(1 1/8")	28.6(1 1/8")

(Φmm)

Model (Combination)		EKRV1040ER1	EKRV1060ER1	EKRV1080ER1	EKRV1100ER1	EKRV1120ER1	EKRV1140ER1
Combination mode	ODU A	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1
	ODU B	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1
	ODU C	EKRV200ER1	EKRV220ER1	EKRV240ER1	EKRV260ER1	EKRV280ER1	EKRV300ER1
ODU manifold 1		ACRV-BP10			ACRV-BP10		
ODU manifold 2		ACRV-BP07			ACRV-BP09		
Pipe specifications	a	Liquid pipe	25.4(1")	25.4(1")	25.4(1")	28.6(1 1/8")	28.6(1 1/8")
		Gas pipe	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")
	b	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	22.23(7/8")	22.23(7/8")
		Gas pipe	41.3(1 5/8")	41.3(1 5/8")	41.3(1 5/8")	44.5(1 3/4")	44.5(1 3/4")
	c	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	d	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	e	Liquid pipe	15.88(5/8")	15.88(5/8")	15.88(5/8")	19.05(3/4")	19.05(3/4")
		Gas pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	31.8(1 1/4")	31.8(1 1/4")

(Φmm)

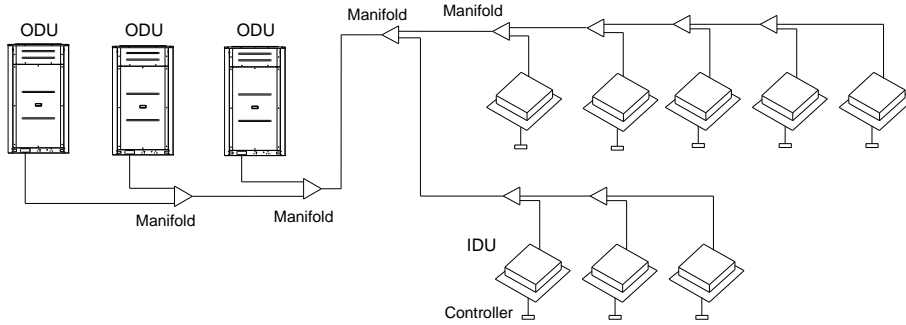
Model (Combination)		EKRV1160ER1	EKRV1180ER1	EKRV1200ER1	EKRV1220ER1	EKRV1240ER1	EKRV1260ER1
Combination mode	ODU A	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1
	ODU B	EKRV420ER1	EKRV380ER1	EKRV400ER1	EKRV420ER1	EKRV420ER1	EKRV420ER1
	ODU C	EKRV320ER1	EKRV380ER1	EKRV380ER1	EKRV380ER1	EKRV400ER1	EKRV420ER1
ODU manifold 1		ACRV-BP10					
ODU manifold 2		ACRV-BP09					
Pipe specifications	a	Liquid pipe	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")	28.6(1 1/8")
		Gas pipe	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")
	b	Liquid pipe	25.4(1")	25.4(1")	25.4(1")	25.4(1")	25.4(1")
		Gas pipe	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")	54.0(2 1/8")
	c	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	d	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")
	e	Liquid pipe	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")	19.05(3/4")
		Gas pipe	31.8(1 1/4")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")	38.1(1 1/2")

* Connect ODU pipes according to the requirements in the tables above.

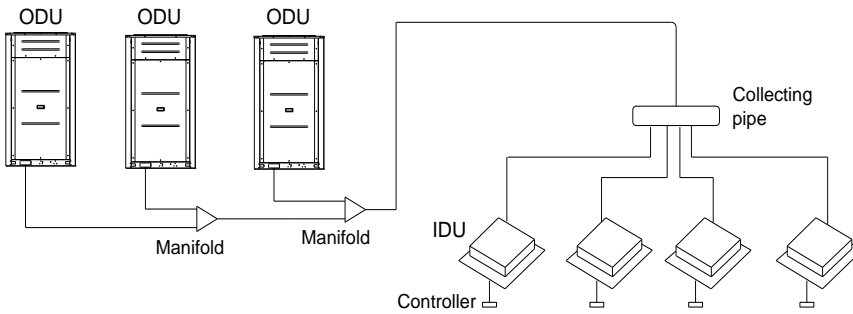
- ① Select manifold model and pipe diameter based on the ODU model provided in the tables above.
- ② If the equivalent length of the main pipe is longer than or equal to 90 m, select a connection pipe with a greater diameter according to requirements in "Connection of Refrigerant Pipes".

5.2.3 Refrigerant Pipe Structure of Variable Multi-System

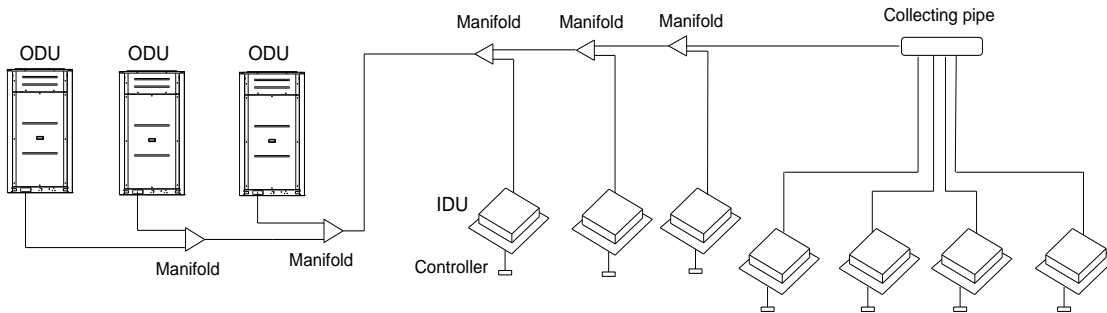
(1) Connection by manifolds



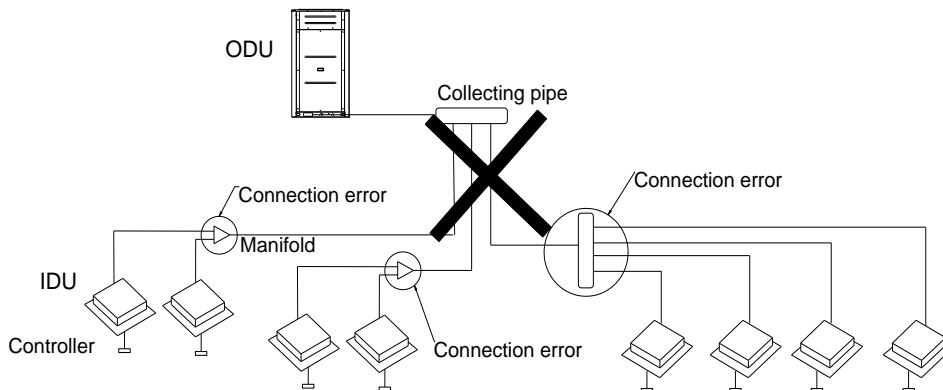
(2) Connection by one collecting pipe



(3) Connection by multiple manifolds and one collecting pipe



(4) A collecting pipe directly connected to IDUs and it cannot be directly. The following connection structure is not allowed.



5.3 Connection of Refrigerant Pipes

Select copper pipes. In a pipeline system of multi-connected air conditioning units, copper pipes fall into main pipes and branch pipes. The main pipes are used for connection of ODUs with branch parts and between branch parts. The branch pipes are used for connection of branch parts with IDUs. The following table lists required pipe specifications for various units and models.

Unit: mm

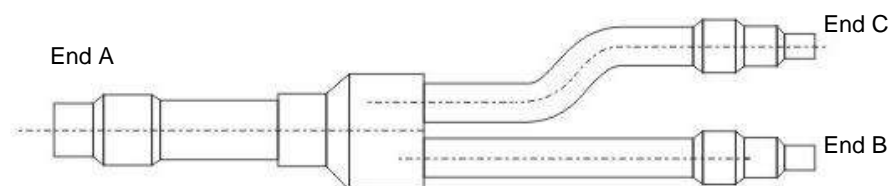
ODU Capacity	Size of Main Pipes for R410A (Equivalent Length of the Main Pipes < 90 m)			Size of Main Pipes for R410A (Equivalent Length of the Main Pipes ≥ 90 m)		
	Liquid pipe	Gas pipe	Primary indoor manifold	Liquid pipe	Gas pipe	Primary indoor manifold
8HP	Φ9.52	Φ19.05	ACRV-BP03	Φ12.7	Φ22.23	ACRV-BP03
10HP	Φ9.52	Φ22.23	ACRV-BP03	Φ12.7	Φ25.4	ACRV-BP04
12~14HP	Φ12.7	Φ25.4	ACRV-BP03	Φ15.88	Φ28.6	ACRV-BP04
16HP	Φ12.7	Φ28.6	ACRV-BP04	Φ15.88	Φ31.8	ACRV-BP05
18~24HP	Φ15.88	Φ28.6	ACRV-BP04	Φ19.05	Φ31.8	ACRV-BP05
26~34HP	Φ19.05	Φ31.8	ACRV-BP05	Φ22.23	Φ38.1	ACRV-BP06
36~54HP	Φ19.05	Φ38.1	ACRV-BP05	Φ22.23	Φ41.3	ACRV-BP07
56~66HP	Φ19.05	Φ41.3	ACRV-BP07	Φ22.23	Φ44.5	ACRV-BP08
68~72HP	Φ22.23	Φ44.5	ACRV-BP08	Φ25.4	Φ50.8	ACRV-BP09
74~96HP	Φ25.4	Φ50.8	ACRV-BP09	Φ28.6	Φ54	ACRV-BP09
98~108HP	Φ25.4	Φ54.0	ACRV-BP10	Φ28.6	Φ66.8	ACRV-BP10
110~126HP	Φ28.6	Φ54.0	ACRV-BP10	Φ28.6	Φ66.8	ACRV-BP10

Note: If the manifolds are larger than the main pipes, diameter of the main pipes should be as large as possible.

IDU Capacity A (kW)	Size of Pipes for R410A		
	Liquid pipe	Gas pipe	Applicable manifold
A < 16 kW	Φ9.52	Φ15.88	ACRV-BP01
16 ≤ A < 22 kW	Φ9.52	Φ19.05	ACRV-BP02
22 ≤ A < 33 kW	Φ9.52	Φ22.23	ACRV-BP03
33 ≤ A < 51 kW	Φ12.7	Φ28.6	ACRV-BP04
51 ≤ A < 71 kW	Φ15.88	Φ28.6	ACRV-BP04
71 ≤ A < 102 kW	Φ19.05	Φ31.8	ACRV-BP05
102 ≤ A < 155 kW	Φ19.05	Φ38.1	ACRV-BP05
155 ≤ A < 187 kW	Φ19.05	Φ41.3	ACRV-BP07
187 ≤ A < 205 kW	Φ22.23	Φ44.5	ACRV-BP08
205 ≤ A < 278 kW	Φ25.4	Φ50.8	ACRV-BP09
278 ≤ A < 312 kW	Φ25.4	Φ54.0	ACRV-BP10
A ≥ 312 kW	Φ28.6	Φ54.0	ACRV-BP10

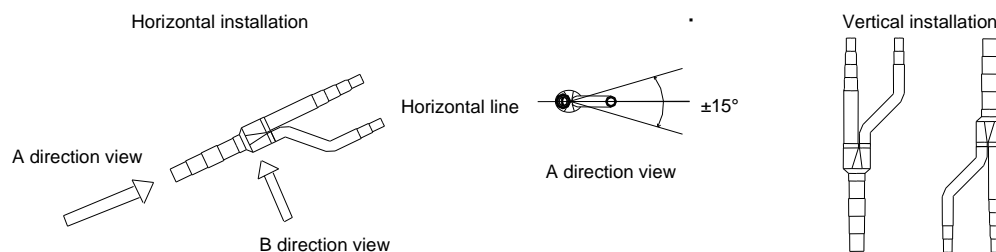
Note: For information about the material and thickness of the branch pipes, refer to Appendix B “Material and Thickness of Branch Pipes of R410A System.”

- Diameter of manifold:



Model of manifold	Category	Diameter of End A (mm)	Diameter of End B (mm)	Diameter of End C (mm)	Reducing Pipe
ACRV-BP01	Gas pipe	19.05/15.88	19.05/15.88/12.7	15.88/12.7	
	Liquid pipe	9.52	9.52/6.35	9.52/6.35	
ACRV-BP02	Gas pipe	19.05/15.88/12.7	15.88/12.7	15.88/12.7	① ID19.05*ID15.88
	Liquid pipe	9.52	9.52/6.35	9.52/6.35	
ACRV-BP03	Gas pipe	19.05/22.23	19.05/15.88	15.88/12.7	① ID25.4*OD22.23 ② ID22.23*OD19.05
	Liquid pipe	12.7/9.52	9.52/6.35	9.52/6.35	
ACRV-BP04	Gas pipe	25.4/28.58/31.8	25.4/19.05/15.88	19.05/15.88/12.7	① ID25.4*OD19.05 ② ID28.6*OD25.4
	Liquid pipe	15.88/12.7	12.7/9.52	12.7/9.52/6.35	
ACRV-BP05	Gas pipe	31.8/38.1	31.8/28.58/25.4	25.4/19.05/15.88	① ID38.1*OD31.8 ② ID28.6*OD25.4
	Liquid pipe	19.05/15.88	19.05/15.88/12.7	15.88/12.7/9.52	③ ID12.7*OD15.88 ④ ID6.35*OD9.52
ACRV-BP06	Gas pipe	31.8/38.1	31.8/28.58/25.4	25.4/19.05/15.88	① ID38.1*OD31.8 ② ID28.6*OD25.4
	Liquid pipe	19.05/15.88	19.05/15.88/12.7	15.88/12.7/9.52	③ ID22.23*OD19.05 ④ ID12.7*OD15.88 ⑤ ID6.35*OD9.52
ACRV-BP07	Gas pipe	The pipe diameter is the same as that for ACRV-BP06 units (including reducing pipes).			① ID41.3*OD38.1 ② ID41.3*OD38.1*OD31.8 ③ ID34.9*OD31.8 (two)
	Liquid pipe				
ACRV-BP08	Gas pipe	38.1/44.5	38.1/31.8/28.58	31.8	
	Liquid pipe	19.05/22.23	19.05/15.88/12.7	19.05	
ACRV-BP09	Gas pipe	38.1/44.5	38.1/31.8/28.58	31.8	① ID41.3*OD38.1 (two) ② ID50.8*OD44.5 ③ ID28.6*OD31.8 ④ ID25.4*OD22.23 ⑤ ID22.23*OD19.05 ⑥ ID15.88*OD19.05 ⑦ ID54.0*OD44.5 ⑧ ID28.6*OD22.23
	Liquid pipe	19.05/22.23	19.05/15.88/12.7	19.05	
ACRV-BP10	Gas pipe	54.0	50.8	50.8	① ID54.0*OD50.8 ② ID66.8*OD54.0 ③ ID28.6*OD25.4 ④ ID25.4*OD28.6 ⑤ ID22.2*OD25.4
	Liquid pipe	28.6	25.4	25.4	

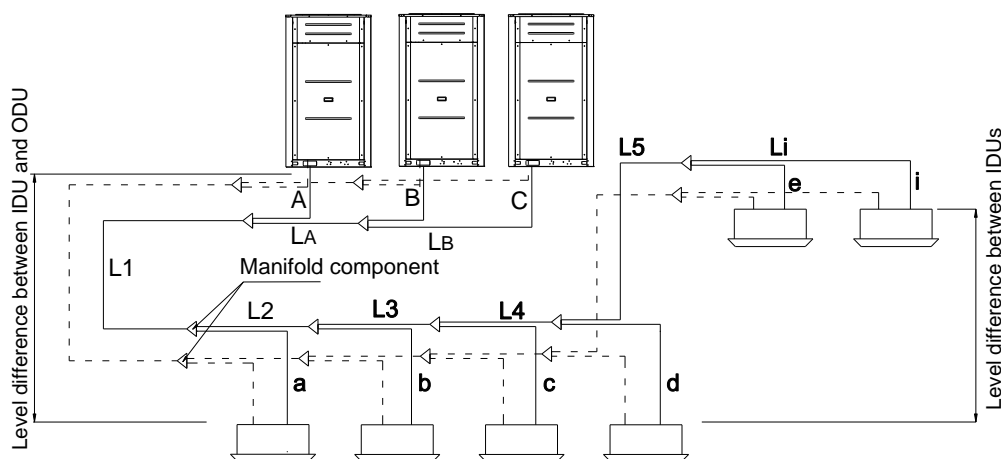
- Manifolds can be installed horizontally or vertically.



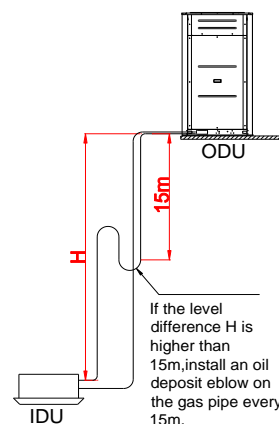
Note:

Note: If the pipeline system is realized by manifolds, make sure to add a 0.5 m direct pipe between two adjacent manifolds; otherwise, refrigerant will not be evenly distributed, thus affecting unit running.

- Constraints on pipe length



			RECOMMENDED VALUE	PIPE PART
Pipe length	Maximum total length	Actual length	≤ 1000 m	$L1+L2+...+Li+a+b+...+i+LA+LB+A+B+C$
	Maximum length	Actual length	≤ 190 m	$L1+L2+...+Li+i+LA+LB+C$
		Equivalent Length	≤ 220 m	
	Equivalent length from the first manifold to the farthest IDU pipe		≤ 40 m	$L2+...+Li+i$
Level difference	Level difference between IDU and ODU	The ODU is on the upper part	≤ 50 m	-
		The ODU is on the lower part	≤ 40 m	-
	Level difference between IDUs		≤ 20 m	-



When the ODU is located above the IDU, if level difference H is smaller than or equal to 15 m, oil deposit elbows are not required; if the level difference is greater than 15 m, install an oil deposit elbow on the gas pipe for every 15 m level difference. Refer to the right figure.

Equivalent length indicates the length when bends and other parts' inner pressure loss is considered. The formula is as follows:

Equivalent length = Actual pipe length + Number of elbows x Equivalent length of each kind of elbow + Number of oil U-bend x Equivalent length of each kind of oil U-bend

The equivalent length at each position of the each branch pipe is 0.5 m, and the equivalent length at each position of the branch collecting pipe is 1.0 m. The following table lists equivalent length of bends and oil deposit elbows.

DIAMETER	Equivalent Length		DIAMETER	Equivalent Length	
	Bend (m)	Oil U-bend		Bend (m)	Oil U-bend
Φ6.35	0.16	/	Φ31.8	0.55	4.0
Φ9.52	0.18	1.3	Φ34.9	0.60	4.4
Φ12.7	0.20	1.5	Φ38.1	0.65	4.7
Φ15.88	0.25	2.0	Φ41.3	0.70	5.0
Φ19.05	0.35	2.4	Φ44.5	0.75	5.5
Φ22.23	0.40	3.0	Φ50.8	0.80	5.5
Φ25.4	0.45	3.4	Φ54.0	0.85	6.0
Φ28.6	0.50	3.7	Φ66.8	0.90	6.5

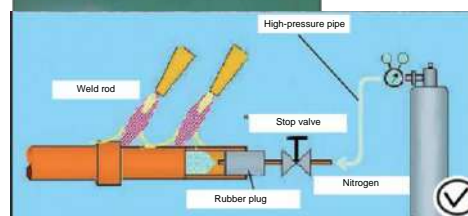
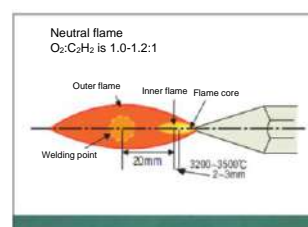
● Precautions for refrigerant pipe connection (welding)

a. Use neutral flame for welding. The flame is controlled by adjusting the amount of the oxygen and acetylene gas ($O_2:C_2H_2$ is 1.0 to 1.2:1). Keep a distance of 20 to 25 mm between the flame core and base metal (for reference); the highest temperature of the flame is located 2 to 3 mm far from the flame core.

b. Charge nitrogen throughout the welding process; otherwise, an oxidized film will be generated which may block the expansion valve, filter, or other system parts. Use a pressure adjustment valve to control the nitrogen flow at 0.05 m³/h or slower. The working pressure range for charging nitrogen is 0.02–0.05 MPa.

Before welding, charge nitrogen for 1 minute to squeeze out air. Quickly heat the pipe and then weld it (throughout the process, keep on charging nitrogen). After welding, you should go on the charging operation for three minutes till the pipe is completely cooled down.

c. After welding, do not use cool water to cool the pipe; otherwise, crack or leakage may occur. Put the pipe under indoor temperature for 3–5 minutes and use a wet cloth to clean the pipe surface.



5.4 Insulating Refrigerant Pipes

The refrigerant pipe must be insulated. Use thick polyethylene materials to wrap the liquid pipe and gas pipe respectively so as to block the clearance existing in the joints (between the IDU and materials) and the insulating materials themselves. Improper insulation may result in condensate dripping. Thus, insulation must be highly valued.

1. The following table lists requirements for composition of insulating materials:

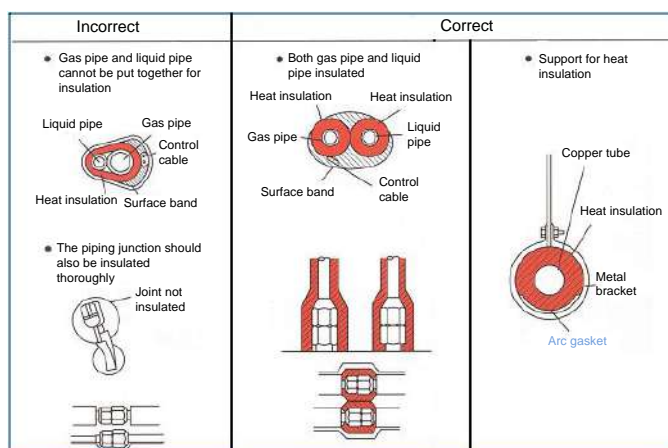
Insulating material	Glass fiber + wire	
	Binder + polyethylene foam + adhesive tape	
Outer coating	Indoor	PVC insulation tape
	Bare floor	Waterproof linen + Bronze asphalt
	Outdoor	Waterproof linen + zinc plate + oil paint

2. The figure at the right side shows how to insulate gas and liquid pipes:

Note: If polyethylene sleeve is used as coating material, asphalt is not required. Wires must not be insulated.

3. Insulation of throughout parts

When you use sand to stuff clearance, cover the throughout parts with steel boards so that insulating materials will not sink. The penetrating part must be insulated and covered with nonflammable materials (vinyl covering layer is not allowed). Insulating materials used to cover pipelines on the assembly site must meet the following specifications:



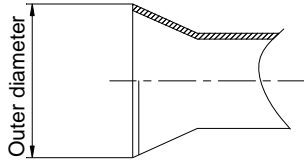
	Pipe Size	
	Diameter: 6.35 to 25.4 mm	Diameter: 28.58 to 66.8mm
Thickness	Minimum: 10 mm	Minimum: 15mm
Temperature resistance	Min.: 100°C	

If pipes are installed in a hot and wet environment (for example, on the top of a building), thickness of insulating materials may be greater than that specified in the preceding table. Note that the specifications specified by customers must be consistent with that in the preceding table.

Note: For better air tightness, the dimensions of the bell-mouthed terminal for R410A system will be set larger than that for other types of refrigerant systems.

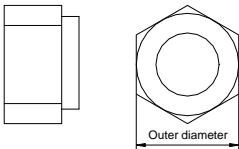
The following table lists diameters of bell-mouthed terminals that are required. (Unit: mm)

Outer Diameter		Outer Diameter
Metric System	Imperial System	
Φ6.35	1/4"	9.0
Φ9.52	3/8"	13.0
Φ12.7	1/2"	16.2
Φ15.88	5/8"	19.4
Φ19.05	3/4"	23.3



The following table lists specifications of nuts corresponding to the bell-mouthed terminals. (Unit: mm)

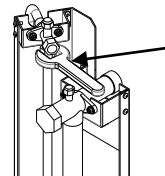
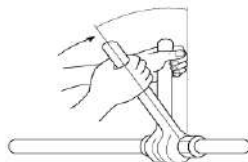
Outer Diameter		Outer Diameter
Metric System	Imperial System	
Φ6.35	1/4"	17.0
Φ9.52	3/8"	22.0
Φ12.7	1/2"	24.0
Φ15.88	5/8"	27.0
Φ19.05	3/4"	36.0



Do not use excessive force when using torque wrench to tighten the bell mouth copper nanoparticles. Please operate according to the torque specified in the following table industry standard JB / T 10648. Otherwise, the copper sub interface may break and cause refrigerant leakage.

When tightening the connecting nut of the stop valve of outdoor unit, align the bell mouth center of the connecting pipe with the stop valve center, and then tighten it with a torque wrench. Do not use double spanners, otherwise, the valve body may be damaged and the refrigerant may leak.

Outer diameter (mm)	Tightening torque (N · m)	Tightening angle (°)
Φ6.35	15~18	60~90
Φ9.52	30~35	60~90
Φ12.7	45~55	30~60
Φ15.88	65~75	30~60
Φ19.05	85~95	20~35



Do not use double spanners, otherwise, the valve body may be damaged and the refrigerant may leak.

6 Electrical Wiring and Communication Wire Connection

6.1 Safety Precautions

Warnings:

- 1) Use a separate power supply for the unit to avoid overload. Only use the fuse and circuit breaker (with electric leakage protection) compatible with the unit operating voltage.
- 2) Use only the attachment specified by EUROKLIMAT, and ask the manufacturer or authorized dealer to provide installation and technical services. Improper installation of controller attachment may lead to unit malfunction or electric shock.

6.2 Precautions for Electrical Wiring

- 1) Circuits of the unit consist of the strong current (power) circuit and control (COM) circuit. The total length of control wire must be less than 1000 m.
- 2) Use special power wire. Never share a power supply with other devices.
- 3) The unit is assembled with converter. Therefore, do not install phase advance capacitor; otherwise, high-frequency wave can lead to capacitor overheating.
- 4) ODU and IDU use different circuits and power for IDU must be supplied in a centralized manner (an IDU is energized by a single-phase power supply). For power wire specifications, see recommended values in the Wiring Specifications table.
- 5) IDU and ODU must be grounded to discharge the electrical charges, thus reducing the affect of interference generated by the converter to other electrical appliances, and preventing the unit shell from being charged due to electric leakage.
- 6) If the power wire and COM wire are deployed in parallel, they should be encased in tubes and kept more than 20 cm distance from each other.
- 7) Shielding measures must be adopted for the control signal circuit. To prevent interference to control signals by strong current signals, shielded twisted pairs must be used (for details about the specifications of the twisted pairs, refer to the figure in the following section).
- 8) The shield layer of the control wire must be connected to the ground wire of the ODU, without disconnection from both wiring terminals.
- 9) Install the residual-current circuit breaker (RCCB) applicable to high-frequency harmonic to prevent exceptions caused by the RCCB.
- 10) The RCCB used for preventing grounding incidents should be used together with the main switch or with the circuit fuse.
- 11) Electrical wires must comply with the IEC60245 requirements.
- 12) The method for connecting a power wire will be available on the circuitry diagram of a product. After wiring, check all wires in the electrical part box for any looseness.

6.3 Wiring Specifications

Model (Combination)	Power supply	Recommended Circuit Breaker	Recommended Power Wire Diameter (mm ²)	
			Main Power Wire ≤ 20 m	Main Power Wire ≥ 20 m
EKRV080~100ER1	380V/3N~/50Hz	32A 4P	4	6
EKRV120ER1	380V/3N~/50Hz	32A 4P	6	10
EKRV140~180ER1	380V/3N~/50Hz	40A 4P	6	10
EKRV200~240ER1	380V/3N~/50Hz	50A 4P	10	16
EKRV260ER1	380V/3N~/50Hz	63A 4P	10	16
EKRV280~320ER1	380V/3N~/50Hz	80A 4P	16	25
EKRV340~420ER1	380V/3N~/50Hz	100A 4P	25	35
EKRV340~360ER1 (Recommended combination 1)	380V/3N~/50Hz	80A 4P	16	25
EKRV380~420ER1 (Recommended combination 1)	380V/3N~/50Hz	100A 4P	25	35

Note:

- 1) The specifications of the circuit breaker and power wire diameter recommended in the above table are based on the wiring requirements of "cable duct under 40°C ambient temperature".
- 2) Select the wire diameter based on national standards. Use only the wire with the diameter not smaller than the recommended one.
- 3) All field installation and wiring must be implemented by professional personnel in accordance with local and national standards.

6.4 Requirements for COM Wires

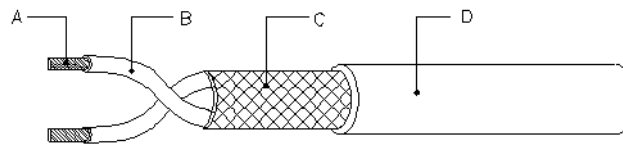


Diagram of shielded twisted pair

As shown in the following figure:

A: Conductor (tinned copper wire strand, with cross-sectional area being 0.5 mm² or 20 AWG at least)

B: Insulator

C: Shielding layer (twined or woven using tinned copper wires, with a shielding ratio of at least 95%)

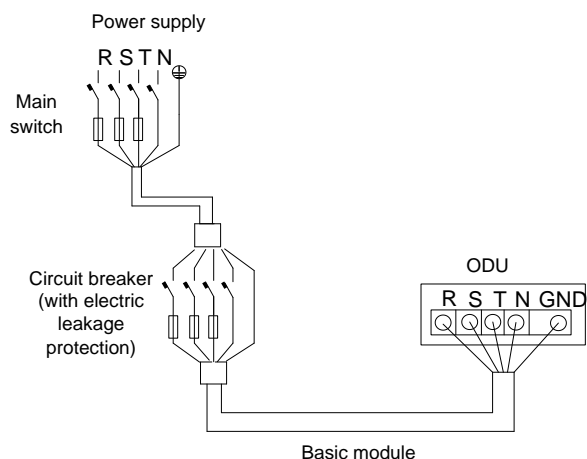
D: Outer sheath (PVC)

Notes:

1. Twisted pairs with dense shield layer and little strand clearance are recommended.
2. Refer to the standards of UL2547 or UL2791 wires.

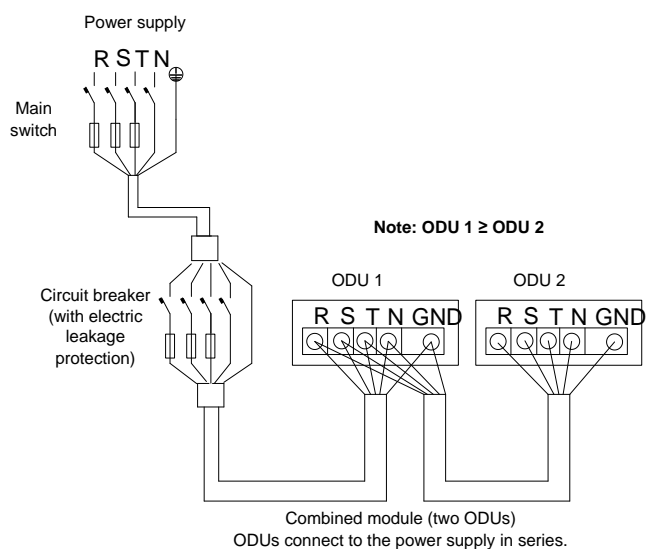
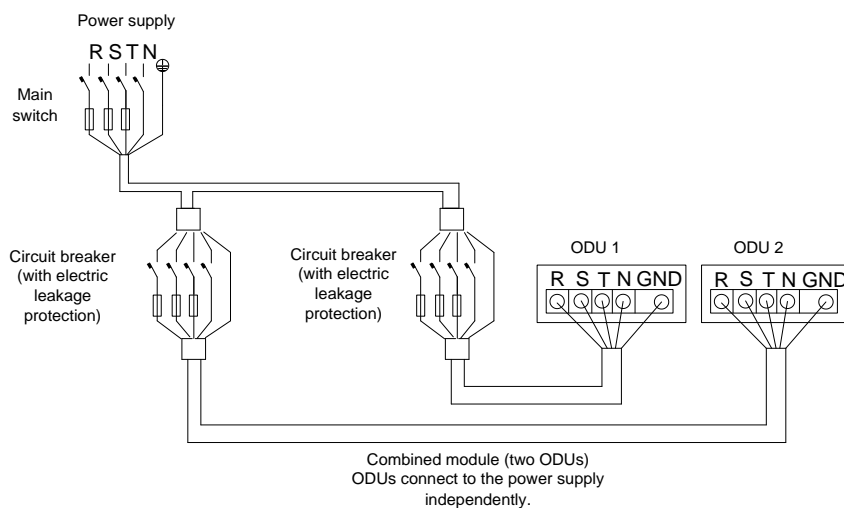
6.5 Electrical Wiring Diagram

6.5.1 Wiring of Basic ODU Modules

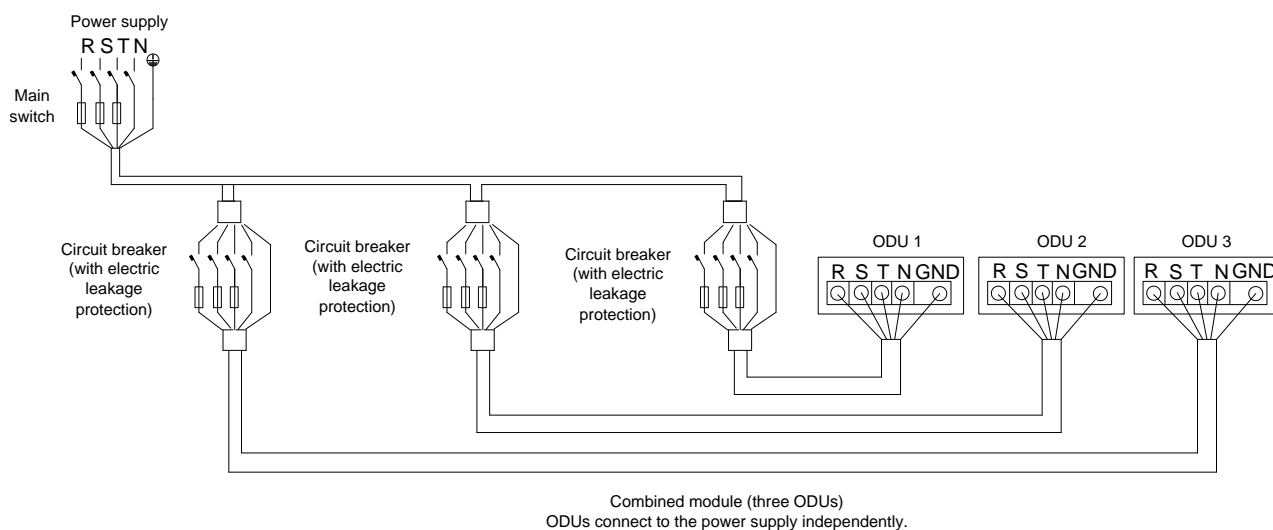


6.5.2 Wiring of Combined Modules

I. A combination of two ODUs can be connected in two forms.



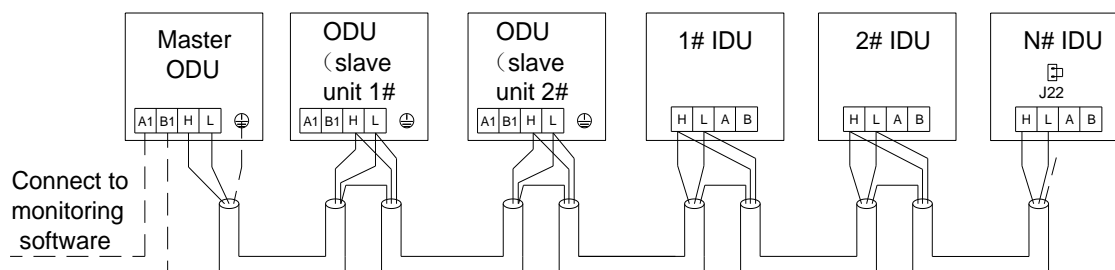
II. A combination of three ODUs can be connected in one form only.

**Note:**

- 1) Power wires of ODUs must be securely connected. The end of conductors must be welded with copper cord end terminal.
- 2) ODUs must be installed with fuse or circuit breaker (with electric leakage protection) and be securely grounded.
- 3) If a combination of two ODUs connects to the power supply in series, the capacity of ODU 1 must be greater than or equal to that of ODU 2.

6.6 ODU/IDU COM Wire Connection

COM wire connection must be compliant with the following figure:

**Note:**

Terminals A and B of IDU and ODU COM wires must be correctly connected, and the ODU shield layer must be grounded; and the IDU shield layer do not need to be grounded; otherwise, communication failure may be caused.

J22 terminal on the last indoor computer master control board in communication between indoor and outdoor computers needs to be short circuited

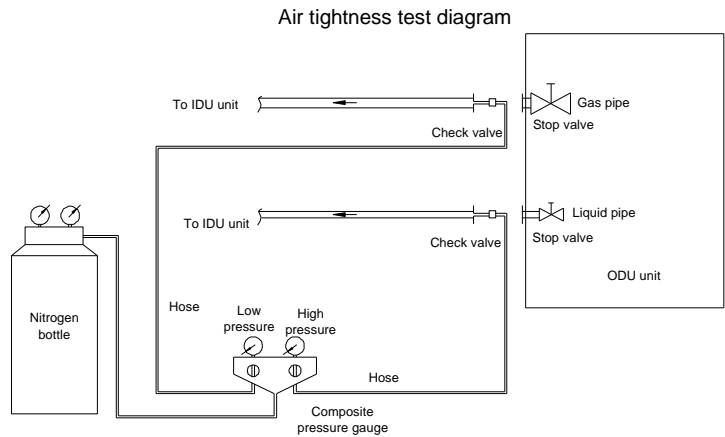
7 Air Tightness Test, Vacuum Evacuation, and Refrigerant Charging

7.1 Air Tightness Test

Before an air tightness test, weld metals to block the ports of the liquid pipe and gas pipe and install an access valve. Charge nitrogen through the access valves so as to increase inner pressure of the pipes and IDUs.

Separate the pipes from the ODUs to avoid nitrogen from entering the ODUs through the ball valve. The gas pipe and liquid pipe cannot be connected to the stop valve until the air tightness test is completed.

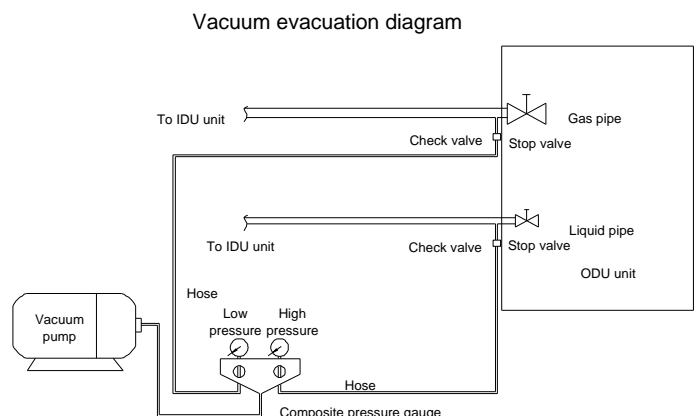
During air tightness test, follow the steps below to avoid lubricant from being affected. If non-azeotropic refrigerant (for example, R410A) is used, leakage will result in change of refrigerant composition and thus affecting performance. Therefore, the operations must be performed carefully. Follow the steps as shown in the following table.



Step	Constraints
<p>Charge nitrogen.</p> <ol style="list-style-type: none"> After charging nitrogen to increase pressure to a specified value (for R410A refrigerant, the pressure must reach 4.15 MPa), wait for about one day. If the pressure does not decrease one day later, the air tightness is good. If the pressure decreases, you can perform the following operation to find the leakage point. Spray blowing agent onto the bell-mouthed terminals, weld parts, flanges, and other positions that may leak to check whether there is bubble forming. After the test, clear the blowing agent. 	<p>If you charge flammable gas or air (containing oxygen), there is a risk of fire or explosion.</p>
<p>Charge refrigerant gas and nitrogen.</p> <ol style="list-style-type: none"> Charge refrigerant gas to increase pressure to about 0.2 MPa and then charge nitrogen to increase the pressure to the specified value (for R410A refrigerant, the pressure must reach 4.15 MPa). During the charging, make sure to pause charging to check whether the pressure is dropping. Use an electronic detector to check the following parts for leakage: bell-mouthed terminals, weld parts, flanges, and other positions that may leak. This method can be used together with the blowing agent. 	<ol style="list-style-type: none"> Refrigerants that are not specified are forbidden to be used. Use the pressure gauge, charging hose, and other parts that are specially designed for R410A. If refrigerant gas inside the tank is used for air tightness test, the composite of the refrigerant will change. Do not use R22 electronic detector to perform the test for R410A. Do not use halogen blowpipes since they cannot detect leakage.

7.2 Vacuum Evacuation

- Before vacuum evacuation, close the ball valve of the ODU. Connect the vacuum pump to the ball valve to evacuate the pipes and IDUs. Note that the access valve is located at the stop valve side of the liquid side and the ball valve side of the gas side. Generally, the evacuation duration must be 24 hours at least. After the vacuum degree reaches the absolute pressure 650 Pa, continue the evacuation for one more hour or longer time.
- Do not use refrigerant to squeeze air from the IDU



and pipe. For a parallel unit system, the balance pipe must be evacuated as well.

- Select the vacuum pump that carries a check valve.

7.3 Refrigerant Charging

● Cause of refrigerant charging

Before delivery, the ODU has been charged with refrigerant of certain amount. The refrigerant does not reach the amount necessary for normal running of units and additional pipes (if any). The charge amount is subject to the unit model and length of refrigerant pipes. In order to facilitate maintenance in future, make sure to note down length and size of each pipe section onto the "Confirmation Table" delivered with the ODU.

● Method of calculating charge amount

1) The following table lists relationship between liquid pipe size and charge amount:

Liquid Pipe Size	Φ28.6	Φ25.4	Φ22.23	Φ19.05	Φ15.88	Φ12.7	Φ9.52	Φ6.35
R410A Amount	550g/m	440g/m	330g/m	230g/m	150g/m	95g/m	55g/m	20g/m

2) The charge amount should be calculated based on the length and size of the added liquid pipe (instead of the length of the gas pipe).

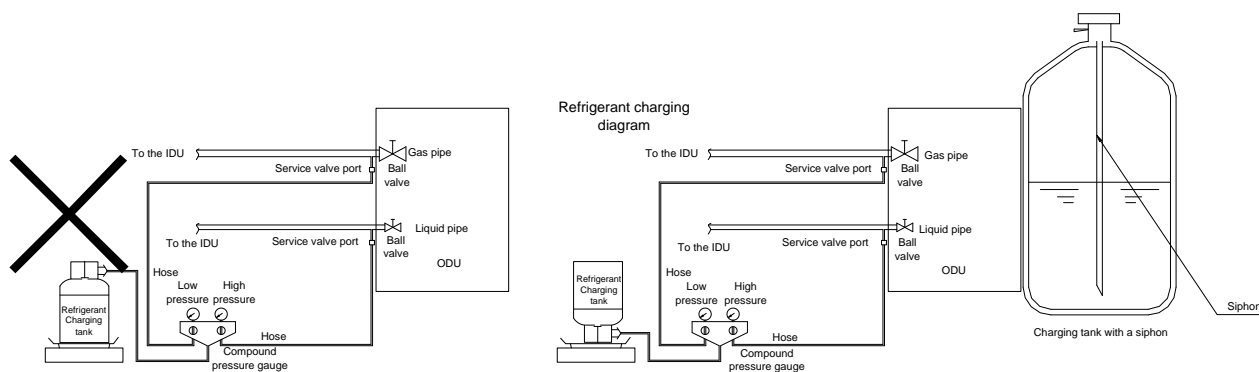
The formula is as follows:

Charge amount (g) = Total length of Φ22.23 liquid pipe (m) × 330 g/m + Total length of Φ19.05 liquid pipe (m) × 230 g/m + Total length of Φ15.88 liquid pipe (m) × 150 g/m + Total length of Φ12.7 liquid pipe (m) × 95 g/m + Total length of Φ9.52 liquid pipe (m) × 55 g/m + Total length of Φ6.35 liquid pipe (m) × 20 g/m

3) The calculation result is rounded off to 0.1 kg. For example, if the calculation result is 28.62 kg, the final result should be 28.7 kg.

● Procedure for adding refrigerant

- 1) Before charging, fully open the gas valve and liquid valve of the ODU.
- 2) If you select an R410A bottle without siphon for charging, make sure to put the bottle upside down. Refer to the charging diagram below to charge refrigerant.



● Example of calculating charge amount

Outer Diameter of Liquid Pipe	Charge Amount per Unit (g/m)	Total Pipe Length (m)	Charge Amount (g)	Total Charge Amount (g)
Φ22.23	330 g/m	10	3300	15050
Φ19.05	230g/m	15	3450	
Φ15.88	150g/m	20	3000	
Φ12.7	95g/m	40	3800	
Φ9.52	55 g/m	20	1100	
Φ6.35	20 g/m	20	400	

Based on the preceding data, R410A charge amount is 15.1 kg.

8 Test Run

Before test run, perform necessary checks to ensure safety. Record related data after the system runs stably.

8.1. Safety Precautions

- 1) Energize the unit for at least 12 hours before starting it for the first time or after a long period of power disconnection.
- 2) During unit running, do not touch any electric component in the electric control box. The voltage of inverter parts during running can reach at least 500 V; therefore, touching them will result in serious consequences.
- 3) To maintain the unit, cut off the power first and wait for about 2 minutes until the inverter discharging is completed. After commissioning or inspection, install the access board back in time to prevent water and impurities from entering into the unit.

8.2 Pre-check Items

- (1) The power-off current of the ODUs and IDUs is correctly set.
- (2) The power supplies and power wires of the ODUs and IDUs are properly connected.
- (3) The ODU DIP switches SW1 and SW2 are correctly set.
- (4) IDU addresses have been set.
- (5) Power has been supplied to the IDUs.
- (6) The COM wire is correctly connected.
- (7) Manifold installation meets requirements.
- (8) The condensate pipes of the IDUs are not block.
- (9) Earthing is correct.
- (10) Insulation is proper (10 MΩ).
- (11) Input voltage is correct (220 V±10%/380 V±10%)
- (12) Pipes are charged with refrigerant only after they are tested and evacuated.
- (13) On the ODU controller, number of IDUs has been set.
- (14) The valves of the ODUs have been opened.

8.3 Test Run Procedure

1) ODU LED display

Mode	LED Display
Reset status upon power-on initialization	REST
Standby status	STOP
Cooling mode	COOL
Heating mode	HEAT
Cooling shutdown mode	CSP
Heating shutdown mode	HSP
Defrosting mode	DF

2) Setting the number of slave units

Press "K1". "NS" appears on the LED display. Press "K2" or "K3" to increase or decrease the slave unit number. Press "K4" to confirm the setting.

3) Setting the number of IDUs

Step	Operation	LED Display
1	"STOP" is displayed on the LED when the unit is in standby status.	STOP
2	Press the "K1" key for three times.	IN**
3	Press the "K4" key once.	IN__
4	Press "K2" and "K3" to select the number of IDUs as follows: Step 1: Press "K2" once to add one IDU. Step 2: Press "K3" once to reduce one IDU. Step 3: Select a number	IN_* IN*_

	and press "K4" to move the number to the third bit.	
5	Set the number on the fourth bit in a method same as above. The combination of two bits is the number of IDUs.	IN**
6	Press "K4" twice to complete setting the number of IDUs.	SE** IN**
7	Press "RST" to finish setting.	REST



4) Automatically registering IDU address

After resetting, the host module press and hold "K2", and then press "RST". Release "RST". "ADAL" is displayed on the LED to enter registration of IDU address and release "K2", "****" is displayed (the number of internal machines has been successfully registered) and then display "STOP" indicating that registration succeeds.



If the registration fails. Check COM wires of each IDU for incorrect connection, rectify faults and register again.

5) Manually querying and registering address on the wired controller


Manually querying the address:

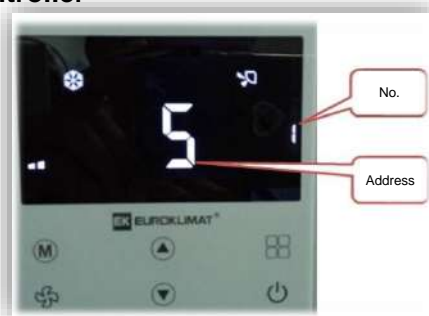
a) Entering the query state: Press and hold  and  at the same time for five seconds.

The parameter content is displayed in the temperature display area and the parameter number is displayed in the timing area.



b) Querying and exiting: Press  or  to scroll in the query state.







Select No. 1. The corresponding number is the address code (as shown in the right figure).


c) Exiting: Press  or do not press any key for 20 seconds to exit the parameter query state.



Manually registering the address (communication failure, taking effect three minutes later):

a) Entering setting: Set the temperature to 20.5°C, select ECO mode and auto wind, press and hold  and  at the same time for five seconds. The parameter content flashes in the temperature display area and the parameter number is displayed in the timing area.

b) Setting method: In the parameter setting state, press  or  to scroll and select number 4 when the parameter number flashes. Press  to flash the parameter content and press  or  to change the current content value. Then, press  to save the change and return to the number flashing state.

c) Exiting: Press  or do not press any key for 20 seconds to exit the parameter setting state.


6) Manually querying and registering address on the remote controller

a. EKCK-B, EKCK-E, EKCK-G, and EKCC IDUs with a remote control lamp board

1) Querying the IDU address:

Press "Cancel" + "Strong" to query the IDU address. Now, the "HEAT" green lamp on the lamp board is constantly on. The blinking times of the "COOL" green lamp indicate the single digit, and the blinking times of the "TIMER" green lamp indicate the tens digit (the EK218 lamp board of inverter IDU). Press any of the other keys to cancel this function.

2) Setting the IDU address (communication failure, taking effect three minutes later):

In shutdown mode or auto mode, set the time to "AM 3:33" and the swing status to "". The following table lists the temperature setting and fan speed for IDUs 0#-59#.

Address	Fan Speed	Temperature setting	Address	Fan Speed	Temperature setting	Address	Fan Speed	Temperature setting	Address	Fan Speed	Temperature setting
0#	Low	16	15#	Medium	16	30#	High	16	45#	Automatic	16
1#	Low	17	16#	Medium	17	31#	High	17	46#	Automatic	17
2#	Low	18	17#	Medium	18	32#	High	18	47#	Automatic	18
3#	Low	19	18#	Medium	19	33#	High	19	48#	Automatic	19
4#	Low	20	19#	Medium	20	34#	High	20	49#	Automatic	20
5#	Low	21	20#	Medium	21	35#	High	21	50#	Automatic	21
6#	Low	22	21#	Medium	22	36#	High	22	51#	Automatic	22
7#	Low	23	22#	Medium	23	37#	High	23	52#	Automatic	23
8#	Low	24	23#	Medium	24	38#	High	24	53#	Automatic	24

9#	Low	25	24#	Medium	25	39#	High	25	54#	Automatic	25
10#	Low	26	25#	Medium	26	40#	High	26	55#	Automatic	26
11#	Low	27	26#	Medium	27	41#	High	27	56#	Automatic	27
12#	Low	28	27#	Medium	28	42#	High	28	57#	Automatic	28
13#	Low	29	28#	Medium	29	43#	High	29	58#	Automatic	29
14#	Low	30	29#	Medium	30	44#	High	30	59#	Automatic	30

After setting the required address, do not press any key on the remote controller within five seconds to finish setting. After setting, query the address to confirm setting success.

Note:

The setting time must be controlled within one minute, that is, set the time to "AM 3:33". Otherwise, the setting is invalid.

b. EKCE-B series:

1) Querying the IDU address:

Press "Cancel" + "Strong" to query the IDU address. The address is abnormally displayed on the LED as a number.

2) Setting the IDU address (**communication failure, taking effect three minutes later**):

In shutdown mode or auto mode, set the time to "AM 3:33" and the swing status to "↓". The following table lists the temperature setting and fan speed for IDUs 0#-59#.

Address	Fan Speed	Temperature setting	Address	Fan Speed	Temperature setting	Address	Fan Speed	Temperature setting	Address	Fan Speed	Temperature setting
0#	Low	16	15#	Medium	16	30#	High	16	45#	Automatic	16
1#	Low	17	16#	Medium	17	31#	High	17	46#	Automatic	17
2#	Low	18	17#	Medium	18	32#	High	18	47#	Automatic	18
3#	Low	19	18#	Medium	19	33#	High	19	48#	Automatic	19
4#	Low	20	19#	Medium	20	34#	High	20	49#	Automatic	20
5#	Low	21	20#	Medium	21	35#	High	21	50#	Automatic	21
6#	Low	22	21#	Medium	22	36#	High	22	51#	Automatic	22
7#	Low	23	22#	Medium	23	37#	High	23	52#	Automatic	23
8#	Low	24	23#	Medium	24	38#	High	24	53#	Automatic	24
9#	Low	25	24#	Medium	25	39#	High	25	54#	Automatic	25
10#	Low	26	25#	Medium	26	40#	High	26	55#	Automatic	26
11#	Low	27	26#	Medium	27	41#	High	27	56#	Automatic	27
12#	Low	28	27#	Medium	28	42#	High	28	57#	Automatic	28
13#	Low	29	28#	Medium	29	43#	High	29	58#	Automatic	29
14#	Low	30	29#	Medium	30	44#	High	30	59#	Automatic	30

After setting the required address, do not press any key on the remote controller within five seconds to finish setting. After setting, query the address to confirm setting success.

Note:

The setting time must be controlled within one minute, that is, set the time to "AM 3:33". Otherwise, the setting is invalid.

7) Error code displayed on the ODU LED

When the unit is faulty, the LED on the ODU can display the corresponding error code.

For a failure of the master unit, the code is ended with "0"; for a failure of slave unit 1, the code is ended with "1"; for a failure of slave unit 2, the code is ended with "2".

The following failures take the master unit as an example:

No.	Error Code	Description	No.	Error Code	Description
1	EC00	0# IDU and ODU communication failure	49	460	INV1 current detection circuit failure
2	ECXX	XX# IDU and ODU communication failure	50	470	INV1 startup failure
3	EC65	All IDU and ODU communication failure	51	480	INV1 compressor out-of-phase failure
4	010	Master unit and slave unit 1 communication failure	52	490	INV2 compressor current protection



5	020	Master unit and slave unit 2 communication failure	53	500	INV2 IPM module protection
6	030	Overhigh discharge pressure of INV1	54	510	INV2 IPM module temperature sensor internal circuit exception
7	040	Tripping of INV1 high pressure switch	55	520	INV2 IPM module over temperature protection
8	050	INV2 /FIX1 high pressure switch tripping off	56	530	INV2 VDC high voltage protection
9	060	INV1 low suction pressure	57	540	INV2 VDC low voltage protection
10	070	Water flow switch off(water cooling)	58	550	INV2 drive and main control board communication failure
11	080	Overhigh discharge temperature of INV1	59	560	INV2 compressor operation out-of-step failure
12	090	Overhigh discharge temperature of INV2 /FIX1	60	570	INV2 current detection circuit failure
13	100	4-way valve failure	61	580	INV2 startup failure
14	110	Memory storage failure (ODU)	62	590	INV2 compressor out-of-phase failure
15	120	Refrigerant leakage	63	600	FAN1 motor current protection
16	130	Ultralow discharge pressure failure	64	610	FAN1 IPM module protection
17	140	Ambient temperature beyond allowed operation range	65	620	FAN1 IPM module temperature sensor internal circuit exception
18	150	High-pressure sensor failure	66	630	FAN1 IPM module over temperature protection
19	160	Low-pressure sensor failure	67	640	FAN1 VDC high voltage protection
20	170	TH1 open/short circuit (INV1 discharge temperature)	68	650	FAN1 VDC low voltage protection
21	180	TH2 open/short circuit (INV2/FIX1 discharge temperature)	69	660	FAN1 drive and main control board communication failure
22	190	TH3 open/short circuit (reserved)	70	670	FAN1 motor out-of-synchronization during running
23	200	TH4 open/short circuit (suction temperature)	71	680	FAN1 current detection circuit failure
24	210	TH5 open/short circuit (low inlet temperature)	72	690	FAN1 startup failure
25	220	TH6 open/short circuit (low outlet temperature)	73	700	FAN1 motor out-of-phase failure
26	230	TH7 open/short circuit (low outlet branch temperature)	74	710	FAN2/FAN3 fan current protection
27	240	TH8 open/short circuit (ambient temperature)	75	720	FAN2/FAN3 IPM module protection
28	250	TH9 open/short circuit (1# heat exchange inlet coil)	76	730	FAN2/FAN3 IPM module temperature sensor internal circuit exception
29	260	TH10 open/short circuit (2# heat exchange inlet coil)	77	740	FAN2/FAN3 IPM module over temperature protection
30	270	Overhigh exhaust pressure of INV2	78	750	FAN2/FAN3 VDC high voltage protection
31	280	Ultralow suction pressure of INV2	79	760	FAN2/FAN3 VDC low voltage protection
32	290	FAN1 overload/Matching failure of fan drive and main control board	80	770	FAN2/FAN3 drive and main control board communication failure
33	300	FAN2/FAN3 overload/Matching failure of fan drive and main control board	81	780	FAN2/FAN3 motor out-of-synchronization during running
34	310	Too-small superheat protection	82	790	FAN2/FAN3 current detection circuit failure
35	320	Frost protection	83	800	FAN2/FAN3 startup failure
36	330	INV1 compressor current protection	84	810	FAN2/FAN3 motor out-of-phase failure
37	340	INV1 IPM module protection	85	820	Communication failure of main control board and INV1 driver board
38	350	Internal circuit exception of INV1 IPM module temperature sensor	86	830	Communication failure of main control board and INV2 driver board
39	360	INV1 IPM module overhigh temperature protection	87	840	Communication failure of main control board and FAN1 driver board
40	370	PFC module protection	88	850	Communication failure of main control board and FAN2/FAN3 driver board
41	380	Internal circuit exception of PFC module temperature sensor	89	860	Matching failure of main control board and INV1 driver board
42	390	PFC module high temperature protection	90	870	Matching failure of main control board and INV2 driver board
43	400	Input power exception failure	91	880	Programs are mismatched between master unit with slave unit

44	410	Overhigh input current protection	92	890	Programs are mismatched between IDU with ODU
45	420	INV1 VDC overhigh voltage protection	93	900	ODU dial-switch is mismatched with program
46	430	INV1 VDC ultralow voltage protection	94	910	ODU is not authorized
47	440	Communication failure of INV1 drive and main control board	95	920	The new fan ratio of IDU exceeds 30%
48	450	INV1 compressor operation out-of-step failure			

8) IDU failure displayed on the wired controller

a. Apply to wire controller EK341, The following failures can be automatically displayed on the wired controller when the unit runs:

No.	Error Code	Description
1	C09	Inlet coil temperature sensor failure
2	C19	Outlet coil temperature sensor failure
3	C29	Return air temperature sensor fault
4	C39	IDU and wired controller communication failure
5	C49	Water flow switch off
6	C59	IDU and ODU communication failure
7	C69	IDU module memory failure
8	C79	No serial number
9	C89	Air outlet 2 temperature sensor fault
10	C99	Freezing-proof protection
11	CA9	Changed IDU address
12	Cb9	Filter cleaning
13	Cc9	ODU is not authorized
14	Cd9	Return air temperature out of range(new fan)

ODU failures are not automatically displayed when the unit runs. Press  and  at the same time to display ODU failures. The error codes are the same as those displayed on the ODU LED. For a failure of the master unit, the code is ended with "0"; for a failure of slave unit 1, the code is ended with "1"; for a failure of slave unit 2, the code is ended with "2".

b. Apply to wire controller EK351、EK352 or EKCK-H series lamp board, The following failures can be automatically displayed on the wired controller or EKCK-H series lamp board when the unit runs:

No.	Error Code	Description	No.	Error Code	Description
1	FE	IDU and wired controller communication failure	10	87	No serial number
2	ER	IDU and lamp board communication failure	11	88	Fan fault
3	80	Inlet coil temperature sensor failure	12	89	Freezing-proof protection
4	81	Outlet coil temperature sensor failure	13	90	IDU address has been modified
5	82	Return air temperature sensor fault	14	91	Filter cleaning
6	83	ODU is not authorized	15	92	Return air temperature out of range(new fan)
7	84	Water flow switch off	16	93	Outlet air temperature sensor fault
8	85	IDU and ODU communication failure	17	94	The wire controller is shielded
9	86	IDU module memory failure			

When IDU is connected to the EK351/EK352 wire controller, only when all the compressors of the external machine are unable to start, the unit will send the clapping code table to the wire controller, the fault does not distinguish between the master and slave machines. When IDU EKCK-H series is connected to the display lamp board, only when all the compressors of the external machine are unable to start, the unit will send the clapping code table to the display lamp board, the fault code flashes, the fault does not distinguish between the master and slave machines. The failure code is as follows:

No.	Error Code	Description	No.	Error Code	Description
1	01	Master unit and slave unit 1 communication failure	36	36	INV1 IPM module overhigh temperature protection
2	02	Master unit and slave unit 2 communication failure	37	37	PFC module protection

3	03	Overhigh discharge pressure of INV1	38	38	Internal circuit exception of PFC module temperature sensor
4	04	Tripping of INV1 high pressure switch	39	39	PFC module high temperature protection
5	05	INV2 /FIX1 high pressure switch tripping off	40	40	Input power exception failure
6	06	INV1 low suction pressure	41	41	Overhigh input current protection
7	07	Water flow switch off	42	42	INV1 VDC overhigh voltage protection
8	08	Overhigh discharge temperature of INV1	43	43	INV1 VDC ultralow voltage protection
9	09	Overhigh discharge temperature of INV2 /FIX1	44	44	Communication failure of INV1 drive and main control board
10	10	4-way valve failure	45	45	INV1 compressor operation out-of-step failure
11	11	Memory storage failure (ODU)	46	46	INV1 current detection circuit failure
12	12	Refrigerant leakage	47	47	INV1 startup failure
13	13	Ultralow discharge pressure failure	48	48	INV1 compressor out-of-phase failure
14	14	Ambient temperature beyond allowed operation range	49	49	INV2 compressor current protection
15	15	High-pressure sensor failure	50	50	INV2 IPM module protection
16	16	Low-pressure sensor failure	51	51	INV2 IPM module temperature sensor internal circuit exception
17	17	TH1 open/short circuit (INV1 discharge temperature)	52	52	INV2 IPM module over temperature protection
18	18	TH2 open/short circuit (INV2/FIX1 discharge temperature)	53	53	INV2 VDC high voltage protection
19	19	TH3 open/short circuit (reserved)	54	54	INV2 VDC low voltage protection
20	20	TH4 open/short circuit (suction temperature)	55	55	INV2 drive and main control board communication failure
21	21	TH5 open/short circuit (low inlet temperature)	56	56	INV2 compressor operation out-of-step failure
22	22	TH6 open/short circuit (low outlet temperature)	57	57	INV2 current detection circuit failure
23	23	TH7 open/short circuit (low outlet branch temperature)	58	58	INV2 startup failure
24	24	TH8 open/short circuit (ambient temperature)	59	59	INV2 compressor out-of-phase failure
25	25	TH9 open/short circuit (1# heat exchange inlet coil)	60	60	Communication failure of main control board and INV1 driver board
26	26	TH10 open/short circuit (2# heat exchange inlet coil)	61	61	Communication failure of main control board and INV2 driver board
27	27	INV2 high discharge pressure	62	62	Communication failure of main control board and FAN1 driver board
28	28	INV2 low suction pressure	63	63	Communication failure of main control board and FAN2/FAN3 driver board
29	29	FAN1 overload/Matching failure of fan drive and main control board	64	64	Matching failure of main control board and INV1 driver board
30	30	FAN2 overload/Matching failure of fan drive and main control board	65	65	Matching failure of main control board and INV2 driver board
31	31	Too-small superheat protection	66	66	Programs are mismatched between master unit with slave unit
32	32	Freezing-proof protection	67	67	Programs are mismatched between IDU with ODU
33	33	INV1 compressor current protection	68	68	ODU dial-switch is mismatched with program
34	34	INV1 IPM module protection	69	69	FAN1 drive failure
35	35	Internal circuit exception of INV1 IPM module temperature sensor	70	70	FAN2/ FAN3 drive failure

9) IDU failure displayed on the remote LED panel

a. Applicable to IDUs in the EKCK-B, EKCK-E, and EKCK-G series, and EKCC IDU with a remote controller

No.	HEAT	TIMER	COOL	Description
1	—	—	Flashing in red	Inlet coil temperature sensor failure
2	—	—	Flashing in green	Outlet coil temperature sensor failure
3	—	Flashing in red	—	Return air temperature sensor fault
4	—	Flashing in red	Flashing in red	Water flow switch off
5	—	Flashing in red	Flashing in green	IDU and ODU communication failure
6	—	Flashing in green	—	IDU module memory failure
7	—	Flashing in green	Flashing in red	Refrigerant leakage
8	—	Flashing in green	Flashing in green	No serial number
9	—	Flashing in yellow	—	Filter cleaning
10	—	Flashing in yellow	Flashing in yellow	outlet air temperaturesensor fault
11	—	Flashing in yellow	Flashing in green	Return air temperature out of range(new fan)
12	Flashing in yellow	Flashing in yellow	—	IDU address has been modified(When connecting to the payment system)
13	Flashing in yellow	Flashing in yellow	Flashing in yellow	ODU is not authorized

ODU failures are not automatically displayed on the LED panel when the unit runs. Press the OK and E-heater keys on the remote controller at the same time to query ODU failures when the unit is shut down.

14	Flashing in red	—	—	Master unit and slave unit 1/2 communication failure
15	Flashing in red	—	Flashing in red	High discharge pressure (master unit/slave unit 1/slave unit 2)
16	Flashing in red	—	Flashing in green	Low suction pressure (master unit/slave unit 1/slave unit 2)
17	Flashing in red	Flashing in red	—	FIX1 overload (master unit/slave unit 1/slave unit 2)
18	Flashing in red	Flashing in red	Flashing in red	High discharge temperature (master unit/slave unit 1/slave unit 2)
19	Flashing in red	Flashing in red	Flashing in green	4-way valve failure (master unit/slave unit 1/slave unit 2)
20	Flashing in red	Flashing in green	—	Ultralow discharge pressure failure
21	Flashing in red	Flashing in green	Flashing in red	Ambient temperature beyond allowed operation range
22	Flashing in red	Flashing in green	Flashing in green	Pressure sensor failure (high pressure/low pressure)
23	Flashing in green	—	—	INV1 drive failure (all failures of INV1 drive)
24	Flashing in green	—	Flashing in red	INV2 drive failure (all failures of INV2 drive)
25	Flashing in green	—	Flashing in green	FAN1 drive failure (all failures of FAN1 drive)
26	Flashing in green	Flashing in red	—	FAN2 drive failure (all failures of FAN2 drive)
27	Flashing in green	Flashing in red	Flashing in red	ODU sensor failure
28	Flashing in green	Flashing in red	Flashing in green	FAN overload
29	Flashing in green	Flashing in green	—	Too-small superheat protection
30	Flashing in green	Flashing in green	Flashing in red	Controller matching failure

b. Applicable to IDUs in the EKBG-B and EKCE-B series

Querying an IDU failure: The error code is normally displayed on the LED and does not flash. When the unit runs, the code is automatically displayed for users to check. The following table lists the error codes.

No.	Error Code	Description
1	C0	Inlet coil temperature sensor failure
2	C1	Outlet coil temperature sensor failure
3	C2	Return air temperature sensor fault (or outlet air temperature)
4	C3	Reserved
5	C4	Water flow switch off
6	C5	IDU and ODU communication failure
7	C6	IDU module memory failure
8	C7	No serial number
9	C8	Fan failure
10	C9	Freezing-proof protection
11	CA	Changed IDU address
12	Cb	Filter cleaning
13	Cc	ODU is not authorized
14	Cd	Return air temperature out of range(new fan)

Querying an ODU failure:

- 1) ODU failures are not automatically displayed when the unit runs. Press the OK and E-heater keys on the remote controller at the same time to display ODU failures when the unit is shut down.
- 2) The number normally displayed on the LED in the middle indicates the error code. If the failure lamp flashes, the master unit is faulty. If the running lamp flashes, slave unit 1 is faulty. If the timing lamp flashes, slave unit 2 is faulty.
- 3) The following table lists the error codes:

No.	Error Code	Description	No.	Error Code	Description
1	01	Master unit and slave unit 1 communication failure	47	47	INV1 startup failure
2	02	Master unit and slave unit 2 communication failure	48	48	INV1 compressor out-of-phase failure
3	03	Overhigh discharge pressure of INV1	49	49	INV2 compressor current protection
4	04	Tripping of INV1 high pressure switch	50	50	INV2 IPM module protection
5	05	INV2/FIX1 high pressure switch tripping off	51	51	INV2 IPM module temperature sensor internal circuit exception
6	06	INV1 low suction pressure	52	52	INV2 IPM module over temperature protection
7	07	Water flow switch off(water cooling)	53	53	INV2 VDC high voltage protection
8	08	Overhigh discharge temperature of INV1	54	54	INV2 VDC low voltage protection

9	09	Overhigh discharge temperature of INV2 /FIX1	55	55	INV2 drive and main control board communication failure
10	10	4-way valve failure	56	56	INV2 compressor operation out-of-step failure
11	11	Memory storage failure (ODU)	57	57	INV2 current detection circuit failure
12	12	Refrigerant leakage	58	58	INV2 startup failure
13	13	Ultralow discharge pressure failure	59	59	INV2 compressor out-of-phase failure
14	14	Ambient temperature beyond allowed operation range	60	60	FAN1 motor current protection
15	15	High-pressure sensor failure	61	61	FAN1 IPM module protection
16	16	Low-pressure sensor failure	62	62	FAN1 IPM module temperature sensor internal circuit exception
17	17	TH1 open/short circuit (INV1 discharge temperature)	63	63	FAN1 IPM module over temperature protection
18	18	TH2 open/short circuit (INV2/FIX1 discharge temperature)	64	64	FAN1 VDC high voltage protection
19	19	TH3 open/short circuit (reserved)	65	65	FAN1 VDC low voltage protection
20	20	TH4 open/short circuit (suction temperature)	66	66	FAN1 drive and main control board communication failure
21	21	TH5 open/short circuit (low inlet temperature)	67	67	FAN1 motor out-of-synchronization during running
22	22	TH6 open/short circuit (low outlet temperature)	68	68	FAN1 current detection circuit failure
23	23	TH7 open/short circuit (low outlet branch temperature)	69	69	FAN1 startup failure
24	24	TH8 open/short circuit (ambient temperature)	70	70	FAN1 motor out-of-phase failure
25	25	TH9 open/short circuit (1# heat exchange inlet coil)	71	71	FAN2/FAN3 fan current protection
26	26	TH10 open/short circuit (2# heat exchange inlet coil)	72	72	FAN2/FAN3 IPM module protection
27	27	INV2 high discharge pressure	73	73	FAN2/FAN3 IPM module temperature sensor internal circuit exception
28	28	INV2 low suction pressure	74	74	FAN2/FAN3 IPM module over temperature protection
29	29	FAN1 overload/Matching failure of fan drive and main control board	75	75	FAN2/FAN3 VDC high voltage protection
30	30	FAN2 overload/Matching failure of fan drive and main control board	76	76	FAN2/FAN3 VDC low voltage protection
31	31	Too-small superheat protection	77	77	FAN2/FAN3 drive and main control board communication failure
32	32	Freezing-proof protection	78	78	FAN2/FAN3 motor out-of-synchronization during running
33	33	INV1 compressor current protection	79	79	FAN2/FAN3 current detection circuit failure
34	34	INV1 IPM module protection	80	80	FAN2/FAN3 startup failure
35	35	Internal circuit exception of INV1 IPM module temperature sensor	81	81	FAN2/FAN3 motor out-of-phase failure
36	36	INV1 IPM module overhigh temperature protection	82	82	Communication failure of main control board and INV1 driver board
37	37	PFC module protection	83	83	Communication failure of main control board and INV2 driver board
38	38	Internal circuit exception of PFC module temperature sensor	84	84	Communication failure of main control board and FAN1 driver board
39	39	PFC module high temperature protection	85	85	Communication failure of main control board and FAN2/FAN3 driver board
40	40	Input power exception failure	86	86	Matching failure of main control board and INV1 driver board
41	41	Overhigh input current protection	87	87	Matching failure of main control board and INV2 driver board
42	42	INV1 VDC overhigh voltage protection	88	88	Programs are mismatched between master unit with slave unit
43	43	INV1 VDC ultralow voltage protection	89	89	Programs are mismatched between IDU with ODU
44	44	Communication failure of INV1 drive and main control board	90	90	ODU module setting mismatched with program
45	45	INV1 compressor operation out-of-step failure	91	91	ODU is not authorized
46	46	INV1 current detection circuit failure	92	92	The new fan ratio of IDU exceeds 30%

8.4 Test Run Data

Before test run, supply power to the system 12 hours ahead of time. This is to preheat the crankcase. In case that the main power supply is interrupted, test run cannot be performed until the system is energized for 2.5 hours.

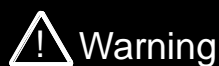
	Suction Pressure (bar)	Discharge Pressure (bar)	Voltage (V)	Current (A)	Suction Temperature (°C)	Ambient Temperature (°C)	Recorded by / Time
1st time							
2nd time							
3rd time							
4th time							
5th time							
6th time							

8.5 Symptoms and Causes

The following symptoms may appear during test run. Note that they do not indicate fault.

Symptoms	Display on the Wired Controller	Causes
The IDUs do not run in cooling or heating mode	The wired controller does not display cooling/heating mode	When a unit runs in cooling mode, other units cannot run in heating mode. When a unit runs in heating mode, other units cannot run in cooling mode.
The fan stops in heating mode.	Defrosting	The fan will stop during defrosting.
The drainage pump does not stop running after units stop.	No display	If there is wastewater left after the units stop, the drainage pump will discharge the wastewater.

9 Unit Maintenance and Servicing



Warning

Before maintenance, be sure to turn off the power and stop the IDU and ODU.

To ensure service life and air conditioning effect of units, periodically service the ODUs and IDUs so that they can run normally.

9.1 IDU Maintenance

Components	Maintenance	Frequency
Air filter screen	1. Open the supply grille. 2. Take out the air filter. 3. Use a soft brush, neutral cleanser and water lower than 40°C to clear dust on the filter and then dry the filter. 4. Re-install the filter after it is completely dry. Note: Do not use gasoline, dehydrant, benzene materials or other chemicals to clean the filter.	Once a month
Panel	Use soft cloth immersed in warm or cool water or neutral cleanser to clear the dirt and dust on the grille and panel. Notice: Do not use gasoline, dehydrant, benzene materials or volatile chemicals, which can cause plastic surfaces to deform.	Once a month
Drain pan and pipe	1. Check whether the drain pan and pipe are clean. Clear the dust and dirt if necessary. 2. Check whether the condensate can flow out of IDUs. Make adjustment if not.	Three times a month
Evaporator	1. Clear dust on fins. 2. Clear anything that may affect air flow in IDUs.	Once a month
Electric parts	1. Check operating current and voltage of the units. 2. Check whether the electric circuit is well connected.	Once a year

9.2 ODU Maintenance

Components	Maintenance	Frequency
Outdoor fan	Check for noise during fan running. If any, contact the maintenance center.	Once a month
Outdoor condenser	1. Clear dust on fins. 2. Clear foreign matters that may affect air flow.	Once a month
Outdoor compressor	1. Check for noise or vibration during compressor running. 2. If any, contact local service personnel.	Once a month
Electric parts	1. Check the operating current and voltage of the unit. 2. Check if the electric circuit is well connected. 3. Check if the controller of the ODU works properly and is displayed properly.	Once a month

Note:

- Do not spray water or use any flammable spray; otherwise, unit fault, electric shock, or fire may occur.
- Do not expose the cleaned filter to direct sunlight or bake it; otherwise, the filter will deform.

10 Unit Safety Instructions

10.1 During Unit Working

Do not use a sharp object to press buttons on the wired controller.

Do not twist or dragging the electric wire of the wired controller to prevent the control wire from being damaged.

Do not use cloth with benzene materials to wrap the wired controller. Use wet cloth with neutral cleaner to wrap it.

Do not block or cover the inlet and outlet ports of IDU and ODU.

Generally, do not blow air directly to people and indoor plants.

10.2 During Failure

Do not modify the unit. Contact your distributor's maintenance engineers for repair. Improper repair may trigger an electric shock or cause a fire.

When a failure is prompted on the wire or remote controller, a unit fails or is abnormal, please stop the air conditioner and contact your distributor's maintenance engineers.

In case of a refrigerant leakage, stop the air conditioner immediately and contact the local distributor's maintenance engineers. If the leakage occurs on an IDU, ventilate the room. Otherwise, it may lead to an anoxia accident.

10.3 Before Use of a Longtime Unused Unit

If the air conditioner will not be used in a long period of time, let the whole unit work for 4 or 5 hours in the air supply mode until the IDUs are completely dry. Otherwise, the filter may be mildewed.

Please turn off the power supply. Otherwise electrical energy will be wasted and bad consequences such as fire and electric shock may be caused.

Power the unit for 12 hours in the standby mode before restarting it.

In summer when the air conditioner is used frequently, do not disconnect the power supply.

10.4 Unit Disassembling and Removing

Contact the local distributor's maintenance engineers if you need to disassemble and move a unit.

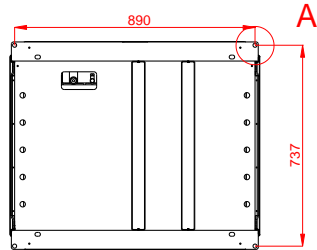
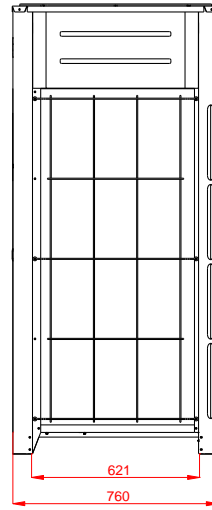
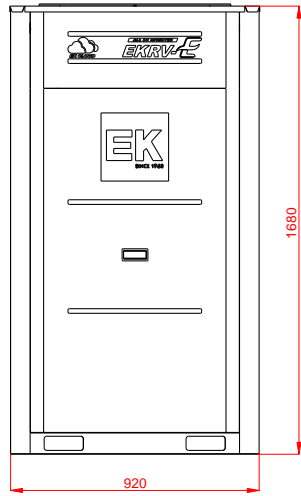
Improper installation may cause electric shock or fire.

Disassembling the pipe improperly may split refrigerant on skin and cause injury. Do not discharge the coolant to the atmosphere, which may pollute the atmosphere.

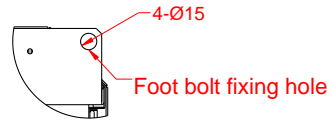
Appendix A: External Dimensions

EKRV080/100/120E(R)1-FT

Unit: mm

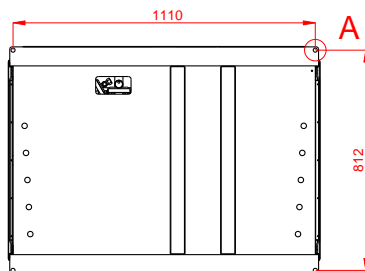
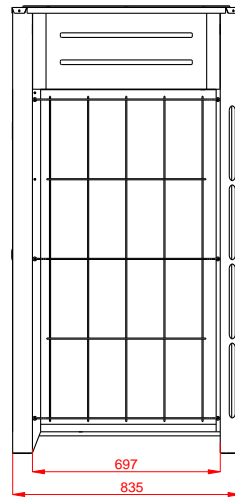
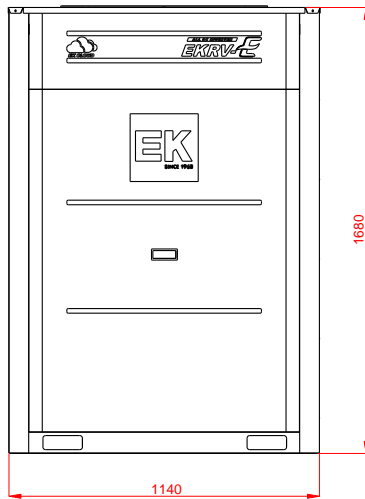


Partial view A

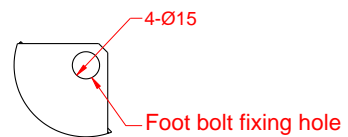


EKRV140/160/180E(R)1-FT

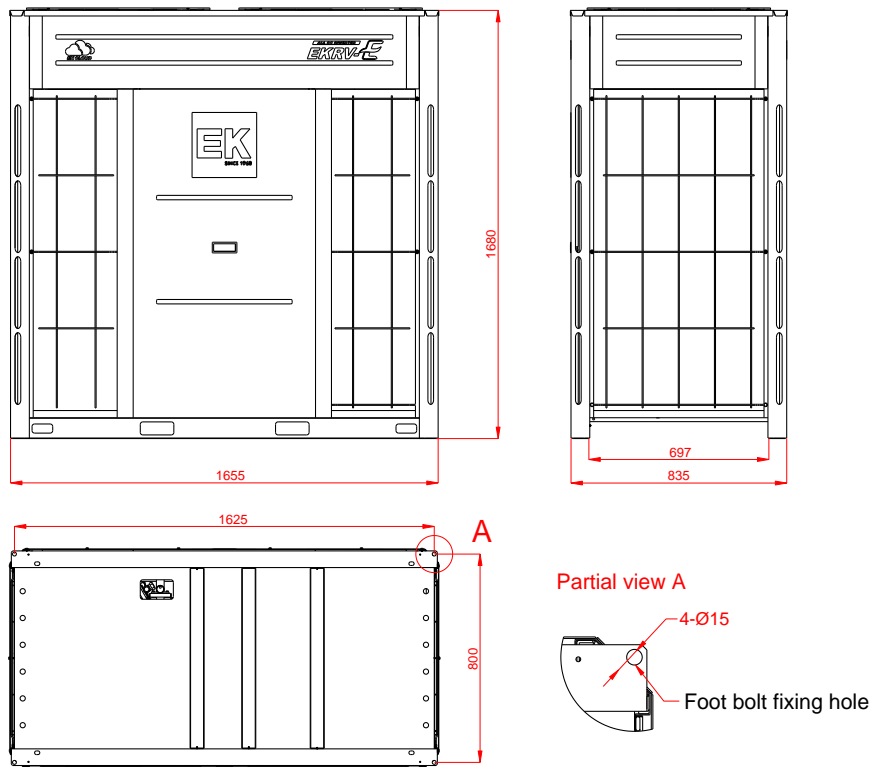
Unit: mm



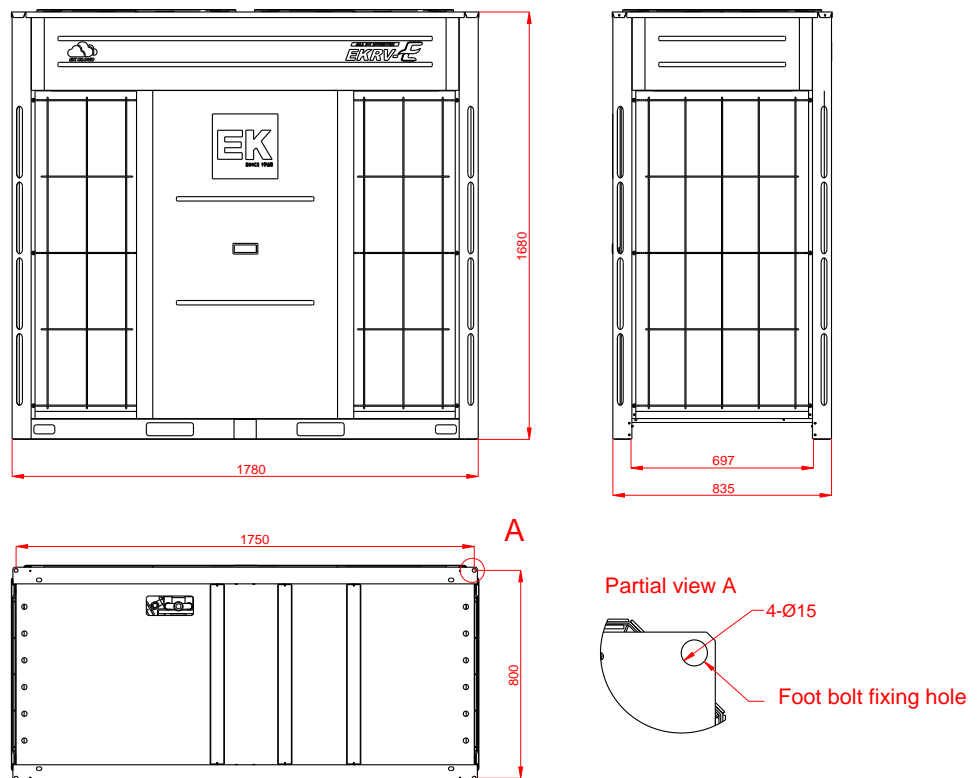
Partial view A



EKRV200/220/240E(R)1-FT

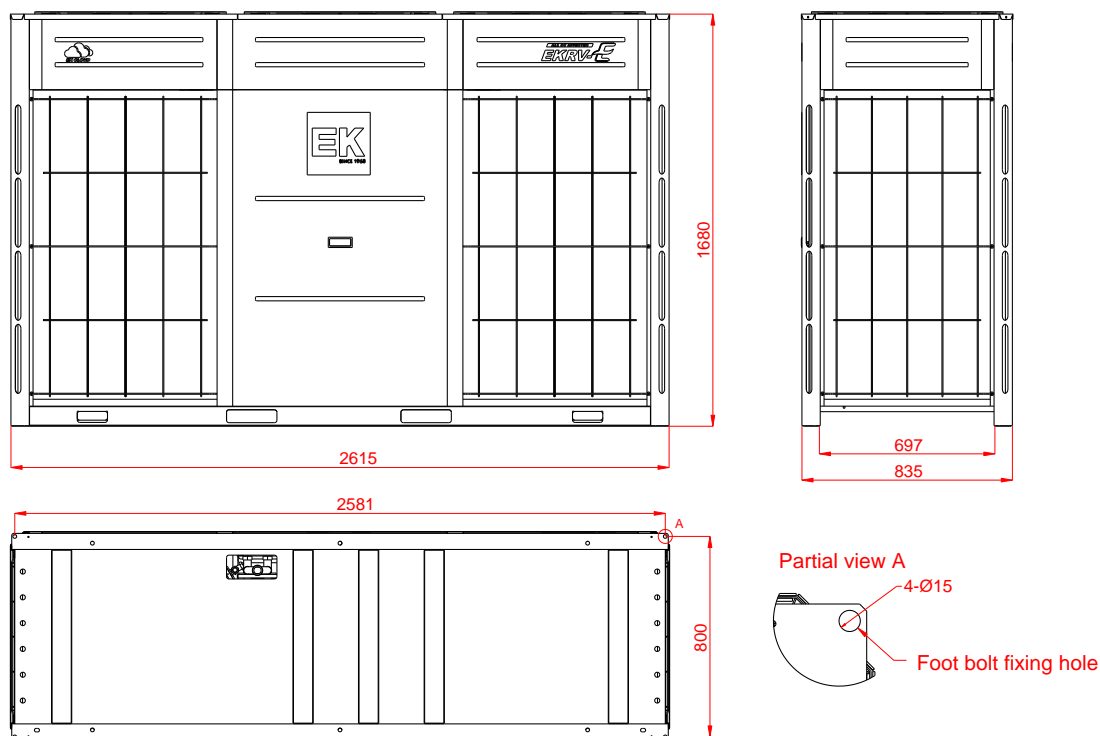


EKRV260/280/300/320E(R)1-FT



EKRV340/360/380/400/420E(R)1-FT

Unit: mm



Appendix B: Pipe Material and Thickness of R410A

Material Differentiation	TP2M				TP2Y2											
	Φ6.4	Φ9.5	Φ12.7	Φ15.9	Φ19.1	Φ22.2	Φ25.4	Φ28.6	Φ31.8	Φ34.9	Φ38.1	Φ41.3	Φ44.5	Φ50.8	Φ54	Φ66.8
Dimension (mm)																
Dimension (inch)	1/4	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2	1-5/8	1-3/4	2	2-1/8	2-5/8
Minimum thickness (mm) of piping	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.1	1.3	1.4	1.5	2.0	2.0	2.0	2.0

- TP2M and TP2Y2 are the pipe material brand and status marks. The thickness and material of selected pipes must be able to resist the designed pressure 4.15 MPa according to the regulations of each country.
- If the unit is used in an environment of severe corrosion, the thickness must be increased by 0.2 mm.
- The value in this table is the minimum thickness of pipes. If the branch pipe needs to be bent or stretched, causing the thickness to thin, increase the wall thickness properly.



We have managed to ensure that all details on the presswork are correct. However, we have been improving units. Therefore, the units, specifications and parameters may be changed without prior notice and are subject to nameplates on machines. We may also modify units and specifications to meet local conditions and customers' requirements. Moreover, not all models suit every market.