

				Connectable indoor units (City Multi)													
Model type		Model name		04	05	06	08	12	15	18	24	27	30	36	48	54	60
Ceiling cassette	4-way flow	PLFY-EL/EM	NEMU					•	•	•	•		•	•	•		
	2 by 2	PLFY-L/M	NFMU		•		•	•	•	•							
	1-way flow	PMFY-M	NCMU			•	•	•	•								
Multi-position		PV FY-L/M	NAMU				•	•		•	•		•	•	•	•	•

*1 When connected to PEFY-M-NMHU, the maximum allowable external static pressure is 0.8 in. wg. (200 Pa).

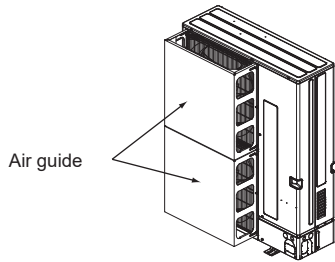
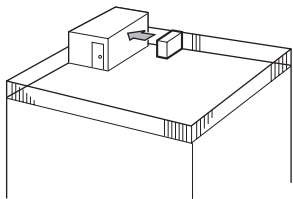
				Connectable indoor units (M, P, S series)							
Model type		Model name		06	09	12	15	18	24	30	36
Wall-mounted	Deluxe	MSZ-FX-NL		•	•	•	•	•			
	Standard	MSZ-GX-NL		•	•	•	•	•	•		
	Designer	MSZ-EX-NL2			•	•	•	•			
Ceiling concealed	Low static pressure	SEZ-AD-NL			•	•	•	•			
	Middle static pressure	PEAD-AA-NL			•	•	•	•	•	•	•
Ceiling cassette	4-way flow	PLA-AE-NL				•		•	•	•	•
	2 by 2	SLZ-AF-NL			•	•	•				
	1-way flow	MLZ-KX-NL		•	•	•		•			
Floor standing		MFZ-KX-NL			•	•	•	•			
Standard multi-position air handler		SVZ-AP-NL				•		•	•	•	•
A-Coil		PAA-AA/BA/CA-NL						•	•	•	•

3-4. Ventilation and service space

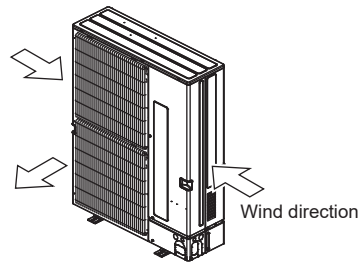
■ Windy location installation

When installing the outdoor unit on a rooftop or other location unprotected from the wind, situate the air outlet of the unit so that it is not directly exposed to strong winds. Strong wind entering the air outlet may impede the normal airflow and a malfunction may result. The following shows 3 examples of precautions against strong winds.

1. Face the air outlet towards the nearest available wall about 20" (500 mm) away from the wall.
2. Install an optional air guide if the unit is installed in a location where strong winds from a typhoon, etc. may directly enter the air outlet.



3. Position the unit so that the air outlet blows perpendicularly to the seasonal wind direction, if possible.



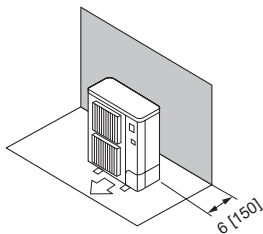
■ When there are obstacles around the unit

- The dimensions given along the arrows in the figures below are required to guarantee the air conditioner’s performance. Install the unit in a place as wide as possible for later service or repairs.
- Minimum dimensions are given in the figures below. When there is an obstacle above the unit, maximum dimensions are also given.
- Refer to the figures for each case.

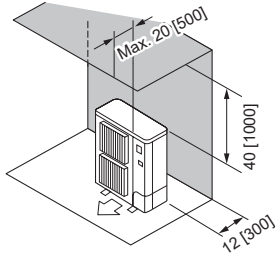
in. [mm]

When installing a single outdoor unit

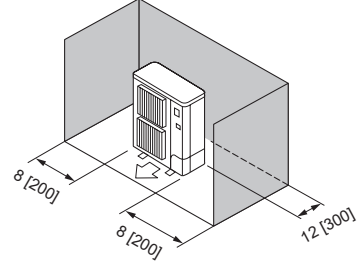
a. Obstacles at rear



b. Obstacles at rear and above

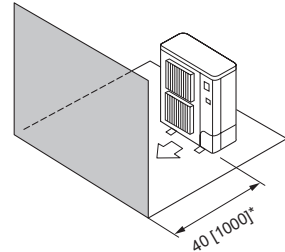


c. Obstacles at rear and sides



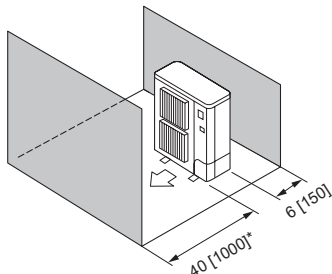
d. Obstacles at front

- When using optional air outlet guides, the clearance is 20 in. [500 mm] or more.



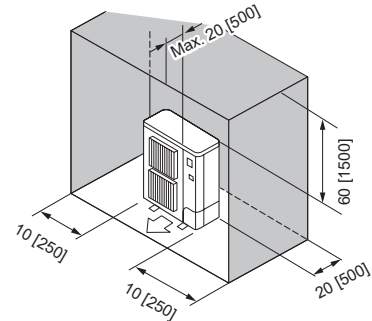
e. Obstacles at front and rear

- When using optional air outlet guides, the clearance is 20 in. [500 mm] or more.



f. Obstacles at rear, sides, and above

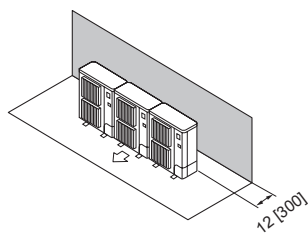
- Do not install optional air outlet guides for upward airflow.



When installing multiple outdoor units

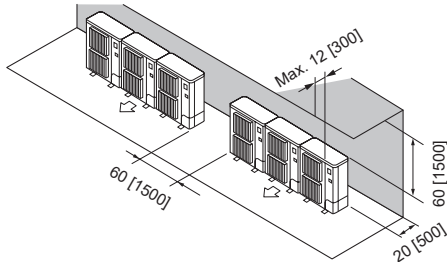
Leave a space of 1" (25 mm) or more between the units.

g. Obstacles at rear



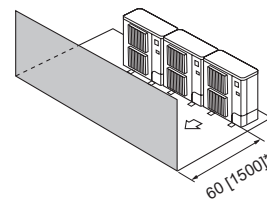
h. Obstacles at rear and above

- 4 or more units must not be installed side by side.
- Do not install the optional air outlet guides for upward airflow.



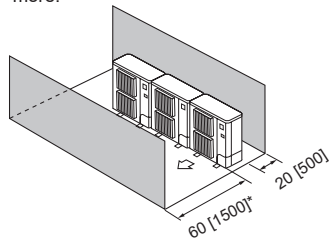
i. Obstacles at front

- When using optional air outlet guides, the clearance is 40" (1000 mm) or more.



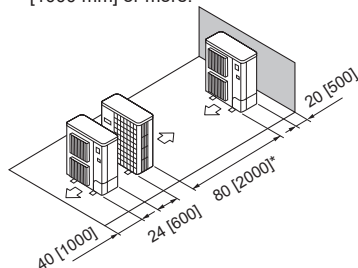
j. Obstacles at front and rear

- When using optional air outlet guides, the clearance is 40 in. [1000 mm] or more.



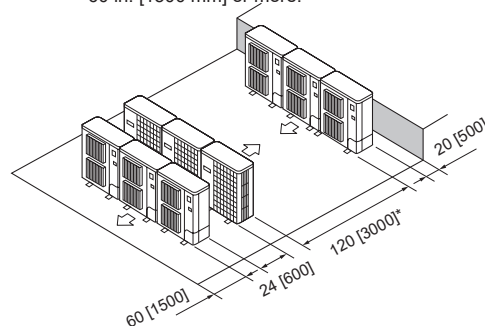
k. Single parallel arrangement

- When using optional air outlet guides installed for upward airflow, the clearance is 40 in. [1000 mm] or more.



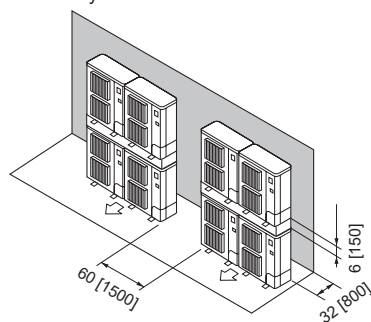
l. Multiple parallel arrangement

- When using optional air outlet guides installed for upward airflow, the clearance is 60 in. [1500 mm] or more.



m. Stacked arrangement

- Maximum of 2 units can be stacked.
- 3 or more stacked units must not be installed side by side.

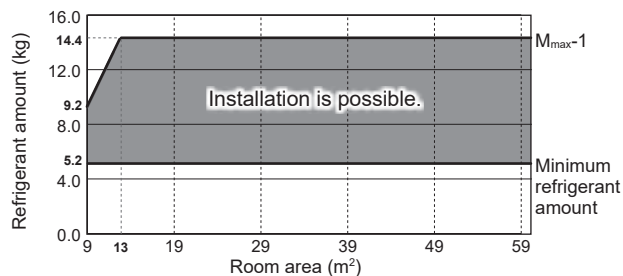


3-5. Minimum installation area

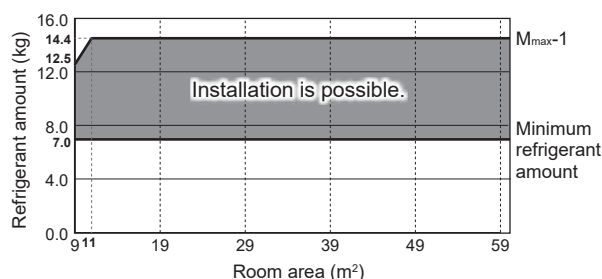
■ Precautions for the indoor unit installation location

- Read the installation manual of each indoor unit because there are restrictions on installation height depending on the model.
- Observe the refrigerant amount in the table below for the floor area where the indoor unit is installed.
- When using ducted systems for one or more rooms, first determine the system's refrigerant amount, and then refer to the installation manual of the indoor unit to check each room's restriction for minimum area.

MXZ-SM36/48NL



MXZ-SM60NL, MXZ-SM36/42/48/60NLHZ



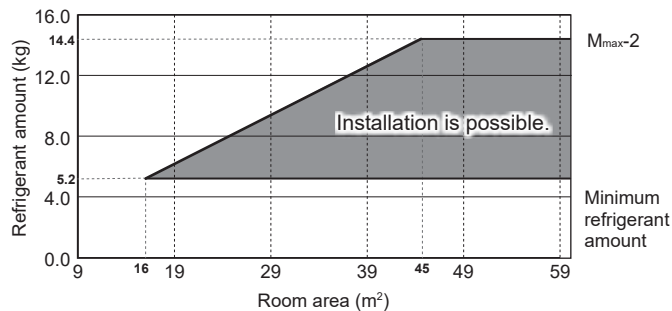
Minimum installation area and refrigerant amount

M _{max} -1							
MXZ-SM36/48NL				MXZ-SM60NL MXZ-SM36/42/48/60NLHZ			
A _{min} *1		M _{max}		A _{min} *1		M _{max}	
[m²]	[ft²]	[kg]	[lbs, oz]	[m²]	[ft²]	[kg]	[lbs, oz]
9	97	9.2	20 4	9	97	12.5	27 8
10	108	10.6	23 5	10	108	14.3	31 8
11	118	11.9	26 3	11	118	14.4	31 11
12	129	13.2	29 1	12	129	14.4	31 11
13	140	14.4	31 11	13	140	14.4	31 11
14	151	14.4	31 11	14	151	14.4	31 11
15	161	14.4	31 11	15	161	14.4	31 11
16	172	14.4	31 11	16	172	14.4	31 11
17	183	14.4	31 11	17	183	14.4	31 11
18	194	14.4	31 11	18	194	14.4	31 11
19	205	14.4	31 11	19	205	14.4	31 11
20	215	14.4	31 11	20	215	14.4	31 11

*1. The installation restrictions are determined based on refrigerant leak amount because shut-off valves are mounted on the outdoor unit. Calculate M_{max} based on the minimum installation area.

When installing indoor units in the lowest floor of the basement

MXZ-SM36/48/60NL, MXZ-SM36/42/48/60NLHZ

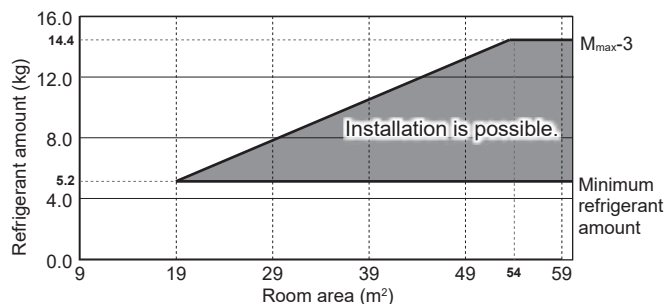


- *2. When installing an indoor unit in the lowest floor of the basement, make sure refrigerant does not accumulate. Calculate M_{max} based on the total area of the lowest floor of the basement.

M_{max-2} (When installing indoor units in the lowest floor of the basement)			
MXZ-SM36/48/60NL MXZ-SM36/42/48/60NLHZ			
$TA^{1/2}$		M_{max}	
[m ²]	[ft ²]	[kg]	[lbs, oz]
9	97	2.9	6 6
10	108	3.2	7 0
11	118	3.5	7 11
12	129	3.9	8 9
13	140	4.2	9 4
14	151	4.5	9 14
15	161	4.8	10 9
20	215	6.5	14 5
25	269	8.1	17 13
30	323	9.7	21 6
35	377	11.3	24 14
40	431	13.0	28 10
45	484	14.4	31 11
50	538	14.4	31 11
55	592	14.4	31 11
60	646	14.4	31 11

When disabling the refrigerant sensor of the indoor unit

MXZ-SM36/48/60NL, MXZ-SM36/42/48/60NLHZ



- *3. Refrigerant sensors can be disabled in some indoor units. Calculate M_{max} based on the installation area of the room where refrigerant sensor is to be disabled.

M_{max-3} (When disabling the refrigerant sensor of the indoor unit)			
MXZ-SM36/48/60NL MXZ-SM36/42/48/60NLHZ			
$A^{1/3}$		M_{max}	
[m ²]	[ft ²]	[kg]	[lbs, oz]
9	97	2.4	5 4
10	108	2.7	5 15
11	118	2.9	6 6
12	129	3.2	7 0
13	140	3.5	7 11
14	151	3.7	8 2
15	161	4.0	8 13
20	215	5.4	11 14
25	269	6.7	14 12
30	323	8.1	17 13
35	377	9.4	20 11
40	431	10.8	23 12
45	484	12.1	26 10
50	538	13.5	29 12
55	592	14.4	31 11
60	646	14.4	31 11

3-6. Precautions for R454B system

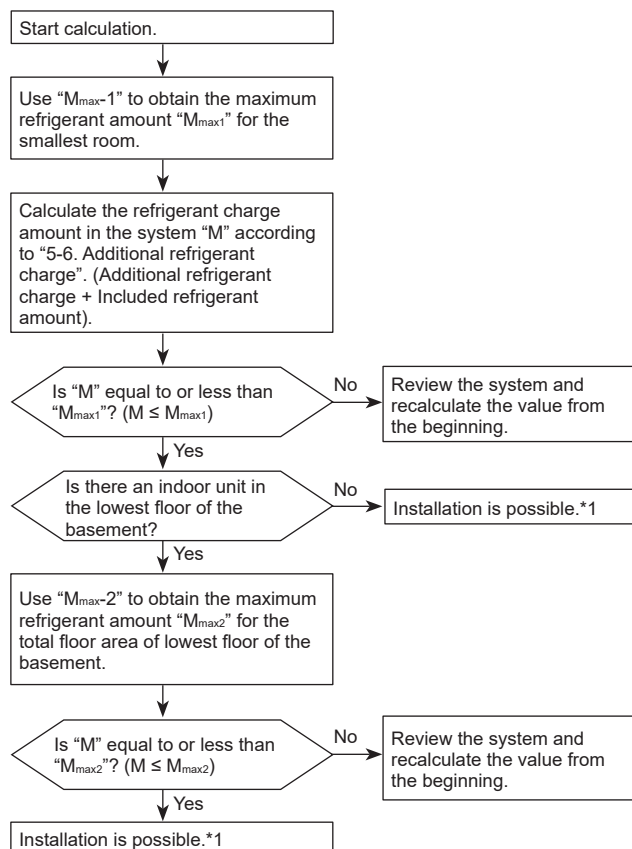
The air conditioner uses R454B, a mildly flammable refrigerant. This system is supported by the safety standard complying with the Enhanced Tightness Refrigerant System of UL60335-2-40. Install the unit according to the following requirements so that the system can satisfy the standards.

- For piping connection, use a mechanical joint (brazing and flare connection, etc.) complying with the latest version of ISO14903. Ensure that the piping installed in a room is securely protected from damage due to an external force.
- Be sure to install an indoor unit in a room where the conditions indicated in "3-5. Minimum installation area" are satisfied.
- When the power sources of the outdoor unit, indoor unit, and branch box are different, power the outdoor unit last.
- LEAK DETECTION SYSTEM installed. Unit must be powered except for service.
- Put the attached label on breaker, and explain it to customers. When the wiring circuit breaker or isolating switch is OFF, a leak detection system is not working because electricity is not supplied.
- A refrigerant sensor is required for this system. When it detects a refrigerant leak or abnormality, the system closes the shut-off valves and performs refrigerant recovery.
- Turn on the DIP switch 6-6 after a test run. This enables the system to perform refrigerant recovery even if communication fails.
- The indoor unit is equipped with a refrigerant sensor. Remove the refrigerant sensor to simulate the indoor unit operating in the refrigerant recovery mode (mitigation action). When the refrigerant recovery operation is successfully completed, the fan of the outdoor unit stops. The indoor unit operates in refrigerant recovery mode for a maximum of 10 minutes.
- Take appropriate measures when servicing the air conditioner. Otherwise, the air conditioner may not operate again after refrigerant recovery.
- The sensor must be replaced after it detects a refrigerant leak. Refer to the installation manual of the indoor unit.
- Refrigerant sensors can be disabled in some indoor units when M_{max-3} (see "3-5. Minimum installation area") is satisfied. Refer to the installation manual of the indoor unit for details of disabling the refrigerant sensor.
- Pay special attention to the installation locations, such as a basement, etc. where refrigeration gas can accumulate, since refrigerant is heavier than the air. When installing an indoor unit in the lowest floor of the basement, M_{max-2} (see "3-5. Minimum installation area") shall be satisfied.
- For some indoor units, an alarm will go off when a refrigerant leak is detected. Additionally, an alarm is available by installing the optional MA remote controller with alarm or the optional alarm kit. For details, refer to the manual of each optional part.
- To avoid the risk of fire, when the wall mounted indoor unit is connected, flare connections shall be installed in the indoor unit or outdoor unit.

3-7. Calculation of the minimum installation area

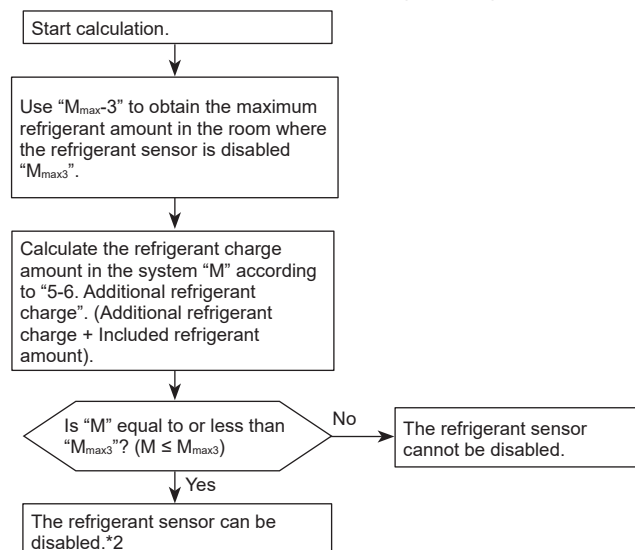
The maximum allowable refrigerant amount is calculated based on the floor area of each room where the system is connected so that the system can satisfy the safety standards. Refer to "3-5. Minimum installation area" to calculate the maximum allowable refrigerant amount for the smallest room where the indoor unit is to be installed. Follow the flowchart below.

Check the installation area 1



*1. Move on to the flowchart on the right when you want to disable a refrigerant sensor in any room.

Check the installation area 2 (When disabling the refrigerant sensor)

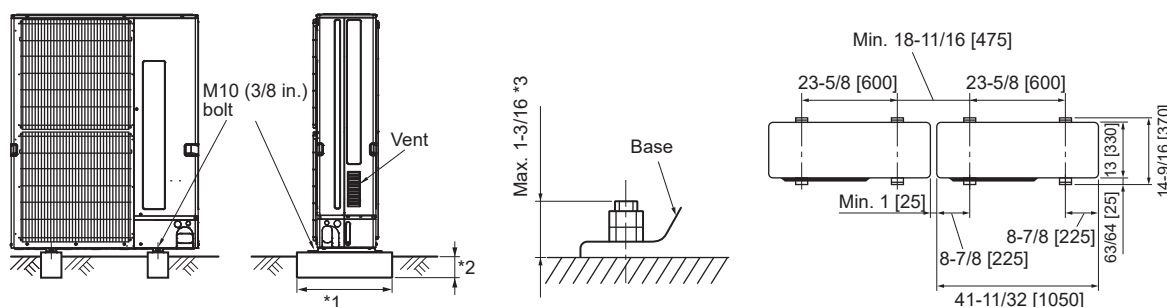


*2. Note that the refrigerant sensor cannot be disabled in some indoor unit.

4. Installing the outdoor unit

Be sure to install the unit in a sturdy and level surface to prevent rattling noises during operation. (See the figures below.)

in. [mm]



- *1. The dimension of the foundation should be as long as possible.
- *2. The foundation must be deeply set in the ground.
- *3. Make sure that the length between the bottom surface of the base and the top of the foundation bolt is within 1-3/16 in. [30 mm]. Secure the base of the unit firmly with 4-M10 foundation bolts in a sturdy location.

Foundation specifications

Foundation bolt	M10 (3/8 in.)
Thickness of concrete	4-23/32 in. [120 mm]
Length of bolt	2-3/4 in. [70 mm]
Weight-bearing capacity	705 lbs [320 kg]

Installing the outdoor unit

- Do not block the vent. If the vent is blocked, operation will be hindered and breakdown may result.
- In addition to the unit base, use the installation holes on the back of the unit to attach wires, etc., if necessary to install the unit. Use self-tapping screws (ø13/16 × 19/32 in. [ø5 × 15 mm] or less) and install on site.

⚠ Warning:

- The unit must be securely installed on a structure that can sustain its weight. If the unit is mounted on an unstable structure, it may fall down and cause damage or injuries.
- The unit must be installed according to the instructions in order to minimize the risk of damage from earthquakes, typhoons, or strong winds. An incorrectly installed unit may fall down and cause damage or injuries.

⚠ Caution:

- Install the unit on a rigid structure to prevent excessive operation sound or vibration.

5. Installing refrigerant piping

5-1. Precautions for devices that use R454B refrigerant

- Carefully read "2.2 Before installation" to "2.6 Using R454B refrigerant air conditioners" for installing air conditioners with R454B refrigerant.
- Use ester oil, ether oil, or alkylbenzene oil (small amount) as the refrigeration oil applied to the flared sections.
- Use C1220 copper phosphorus, for copper and copper alloy seamless pipes, to connect the refrigerant pipes. Use refrigerant pipes with the thicknesses specified in the table "Pipe length and thickness" below. Make sure the inside of the pipes are clean and do not contain any harmful contaminants such as sulfuric compounds, oxidants, debris, or dust.

⚠ Warning:

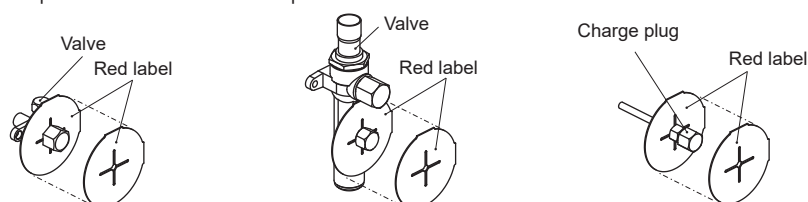
When installing, relocating, or servicing the outdoor unit, use only the specified refrigerant (R454B) to charge the refrigerant circuit. Do not mix it with any other refrigerant and do not allow air to remain in the circuit. If the air is mixed with the refrigerant, it can cause abnormal high pressure in the refrigerant circuit, and may result in an explosion and other hazards. The use of any refrigerant that is not specified for the system will cause mechanical failure, system malfunction, or unit breakdown. In the worst case, this could lead to a serious impediment to securing product safety.

Pipe length and thickness

Pipe length	Thickness
1/4 in. [ø6.35 mm], 3/8 in. [ø9.52 mm], 1/2 in. [ø12.7 mm]	1/32 in. [0.8 mm]
ø5/8 in. [ø15.88 mm], 3/4 in. [ø19.05 mm]	5/128 in. [1.0 mm]

Note:

- Do not use pipes thinner than those specified above.
- The thicknesses listed in the table above are based on Japanese standards. Use pipes with a maximum working pressure of 601 psig [4.15 MPa] or higher according to local standards.
- Red labels on the valves and the charge plugs indicate that flammable refrigerant is used. If you removed them for piping work, be sure to return them to their original positions after the work is completed.



5-2. Selecting pipe size

Piping preparation

Specifications of commercially available pipes

Outside diameter	Insulation thickness	Insulation material
1/4 [ø6.35]	5/16 [8]	Heat resisting foam plastic 0.045 specific gravity
3/8 [ø9.52]	5/16 [8]	
1/2 [ø12.7]	5/16 [8]	
5/8 [ø15.88]	5/16 [8]	
3/4 [ø19.05]	5/16 [8]	

Conversion table

Nominal	Outside diameter
1/4 F	1/4 [ø6.35]
3/8 F	3/8 [ø9.52]
1/2 F	1/2 [ø12.7]
5/8 F	5/8 [ø15.88]
3/4 F	3/4 [ø19.05]

⚠ Caution:

Be sure to use the insulation appropriate for the thickness. Excessive thickness may cause incorrect installation of the indoor unit and a lack of thickness, which may cause dew dripage.

⚠ Warning:

When pumping down the refrigerant, stop the compressor before disconnecting the refrigerant pipes. The compressor may burst and cause injury if any foreign substance, such as air, enters the system.

Pipe size

Pipe size between the outdoor unit and the first branch joint/header/box or between the branch joint and branch header/box

Model	Liquid pipe	Gas pipe
SM36/42/48	3/8 [ø9.52]	5/8 [ø15.88]
SM60		3/4 [ø19.05] (5/8 [ø15.88*])

* Only for pipes between the branch joint and each branch box when 2 branch boxes are connected to SM60 and the total capacity of indoor units is 53 kBtu/h or less.

Pipe size between the indoor unit to the branch joint/header/box

Indoor unit series	Model number	Liquid pipe	Gas pipe
City Multi	04, 05, 06, 08, 12, 15, 18	1/4 [ø6.35]	1/2 [ø12.7]
	24, 27, 30, 36, 48, 54	3/8 [ø9.52]	5/8 [ø15.88]
	60	3/8 [ø9.52]	3/4 [ø19.05]
M or S series	06, 09, 12	1/4 [ø6.35]	3/8 [ø9.52]
	15, 18	1/4 [ø6.35]	1/2 [ø12.7]
	24, 30, 36	3/8 [ø9.52]	5/8 [ø15.88]
P series	09	1/4 [ø6.35]	3/8 [ø9.52]
	12, 15, 18	1/4 [ø6.35]	1/2 [ø12.7]
	24, 30, 36	3/8 [ø9.52]	5/8 [ø15.88]

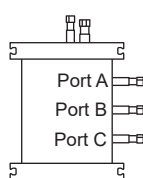
Note:

- When both of the following items are satisfied, the gas pipe size shall be increased by one size.
 - All connected indoor units are A-COIL type (PAA).
 - Total piping length is 32 ft [10 m] or shorter.

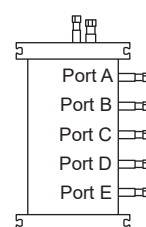
Valve size of branch box

Pipe	To indoor unit					To outdoor unit
	A	B	C	D	E	
Liquid pipe	1/4 [ø6.35]	1/4 [ø6.35]	1/4 [ø6.35]	1/4 [ø6.35]	1/4 [ø6.35]	3/8 [ø9.52]
Gas pipe	3/8 [ø9.52]	3/8 [ø9.52]	3/8 [ø9.52]	3/8 [ø9.52]	1/2 [ø12.7]	5/8 [ø15.88]

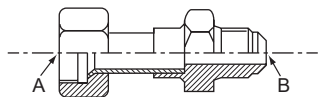
3-branch model



5-branch model



Different-diameter joint (optional part)



Model name	Connected pipes diameter		Diameter A	Diameter B
PAC-SJ88RJ-E	3/8 [ø9.52]	→ 1/2 [ø12.7]	3/8 [ø9.52]	1/2 [ø12.7]
PAC-SK88RJ-E	1/2 [ø12.7]	→ 3/8 [ø9.52]	1/2 [ø12.7]	3/8 [ø9.52]
PAC-SK89RJ-E	1/2 [ø12.7]	→ 5/8 [ø15.88]	1/2 [ø12.7]	5/8 [ø15.88]
PAC-SJ87RJ-E	1/4 [ø6.35]	→ 3/8 [ø9.52]	1/4 [ø6.35]	3/8 [ø9.52]
PAC-SK90RJ-E	3/8 [ø9.52]	→ 5/8 [ø15.88]	3/8 [ø9.52]	5/8 [ø15.88]
PAC-SK87RJ-E	5/8 [ø15.88]	→ 3/4 [ø19.05]	5/8 [ø15.88]	3/4 [ø19.05]

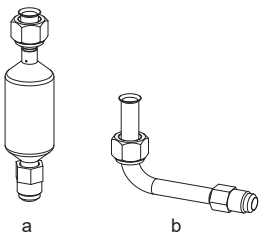
Branch joint/header

Type	Model name	Connection method
2-branch joint	MSDD-50AR2-E*	flare
	MSDD-50BR-E*	brazing
2-branch joint	CMY-Y62-G-E	-
4-branch header	CMY-Y64-G-E	-
8-branch header	CMY-Y68-G-E	-

* For installation procedure, refer to the installation manuals of MSDD-50AR2-E and MSDD-50BR-E.

Accessories of the outdoor unit

The parts shown below are included (only for MXZ-SM36/48NL). Use them for on-site piping.



- a. Muffler x1
b. Joint pipe-L.....x1

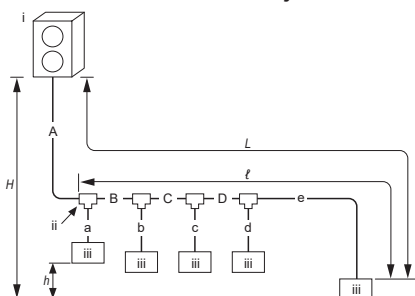
5-3. Pipe length and height difference

Note:

- For the pipe size of the sections indicated by capital letters (A, B, C, ...) and small letters (a, b, c, ...) in the figures below, see "Pipe size" in "5-2 Selecting pipe size".
- If the pipe size of the indoor unit is different, use a different-diameter joint. Connect the joint directly to the branch box side. See "Branch joint/header" in "5-2 Selecting pipe size".
- Use an optional branch piping kit as a branch joint/header. See "Branch joint/header" in "5-2 Selecting pipe size".
- The lineup of a connectable indoor unit depends on a district/areas/country.

Connection without a branch box

■ Connection with branch joints

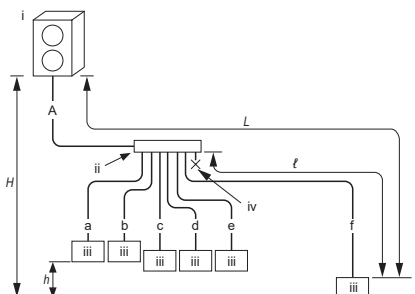


- i. Outdoor unit
ii. First branch joint
iii. Indoor unit
L: Farthest piping length
l: Farthest piping length after first branch joint
H: Height difference between outdoor unit and indoor unit
h: Height difference between indoor units

		SM36/48NL	SM36/42/48/60NLHZ SM60NL
Permissible length	Total piping length (A+B+C+D+a+b+c+d+e)	≤ 787 ft [240 m]	≤ 492 ft [150 m]
	L (A+B+C+D+e)	≤ 262 ft [80 m]	≤ 262 ft [80 m]
	l (B+C+D+e)	≤ 98 ft [30 m]	
Permissible height difference	H	When the outdoor unit is set higher than the indoor units ≤ 164 ft [50 m]	
		When the outdoor unit is set lower than the indoor units ≤ 131 ft [40 m] (98 ft [30 m]*)	≤ 131 ft [40 m]
	h	≤ 49 ft [15 m]	

*When PKFY-L/M04/06/08/12NLMU is included.

■ Connection with a branch header

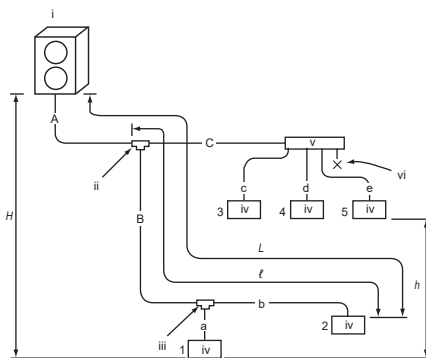


- i. Outdoor unit
ii. First branch header
iii. Indoor unit
iv. Cap
L: Farthest piping length
l: Farthest piping length after first branch header
H: Height difference between outdoor unit and indoor unit
h: Height difference between indoor units

		SM36/48NL	SM36/42/48/60NLHZ SM60NL
Permissible length	Total piping length (A+a+b+c+d+e+f)	≤ 787 ft [240 m]	≤ 492 ft [150 m]
	L (A+f)	≤ 262 ft [80 m]	≤ 262 ft [80 m]
	l (f)	≤ 98 ft [30 m]	
Permissible height difference	H	When the outdoor unit is set higher than the indoor units ≤ 164 ft [50 m]	
		When the outdoor unit is set lower than the indoor units ≤ 131 ft [40 m] (98 ft [30 m]*)	≤ 131 ft [40 m]
	h	≤ 49 ft [15 m]	

*When PKFY-L/M04/06/08/12NLMU is included.

■ Connection with both a branch header and branch joints



- i. Outdoor unit
 ii. First branch joint
 iii. Branch joint
 iv. Indoor unit
 v. Branch header
 vi. Blind caps
 L: Farthest piping length
 l : Farthest piping length after first branch joint
 H: Height difference between outdoor unit and indoor unit
 h: Height difference between indoor units

		SM36/48NL	SM36/42/48/60NLHZ SM60NL
Permissible length	Total piping length (A+B+C+a+b+c+d+e)	≤ 787 ft [240 m]	≤ 492 ft [150 m]
	L (A+B+b)	≤ 262 ft [80 m]	≤ 262 ft [80 m]
	l (B+b)	≤ 98 ft [30 m]	
Permissible height difference	H	When the outdoor unit is set higher than the indoor units When the outdoor unit is set lower than the indoor units	≤ 164 ft [50 m] ≤ 131 ft [40 m] (98 ft [30 m]*)
	h		≤ 49 ft [15 m]

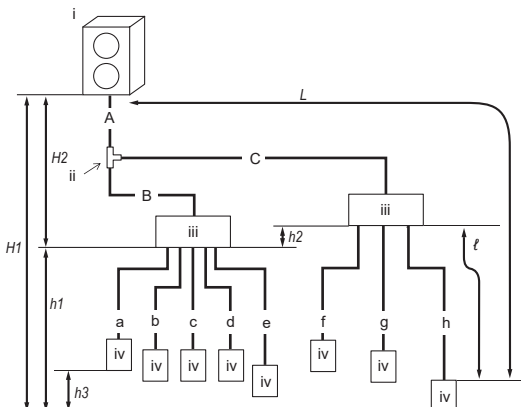
*When PKFY-L/M04/06/08/12NLMU is included.

Note:

- Pipes cannot be branched after the header joint.

Connection with branch box

- This unit has flared connections on each indoor unit and branch box and outdoor unit sides.
- Remove the valve cover of the outdoor unit, then connect the pipe.
- Refrigerant pipes are used to connect the branch boxes and the outdoor unit.



- i. Outdoor unit
 ii. First branch joint
 iii. Branch box
 iv. Indoor unit
 L: Farthest piping length
 l : Farthest piping length after branch box
 H1: Height difference between outdoor unit and indoor unit
 H2: Height difference between outdoor unit and branch box
 h1: Height difference between branch box and indoor unit
 h2: Height difference between branch boxes
 h3: Height difference between indoor units

		SM36/42/48/60
Permissible length	Total piping length (A+B+C+a+b+c+d+e+f+g+h)	≤ 492 ft [150 m]
	L^1 (A+C+h)	≤ 262 ft [80 m]
	Total piping length between the outdoor unit and branch boxes (A+B+C)	≤ 180 ft [55m]
	Piping length between first branch joint and farthest branch box (C)	≤ 98 ft [30 m]
	l (h)	≤ 82 ft [25 m]
	Total piping length between branch boxes and indoor units (a+b+c+d+e+f+g+h)	≤ 312 ft [95 m]
Permissible height difference	H1	When the outdoor unit is set higher than indoor units When the outdoor unit is set lower than indoor units
	H2	When the outdoor unit is set higher than branch box When the outdoor unit is set lower than branch box
	$h1+h2$	≤ 49 ft [15 m]
	$h2$	≤ 49 ft [15 m]
	$h3$	≤ 39 ft [12 m]
	Number of bends	A+B+a , A+B+b , A+B+c , A+B+d , A+B+e , A+C+f , A+C+g , A+C+h

*1. The piping specification table does not provide a minimum piping length. However, when an indoor unit is connected with piping less than 16 ft [5 m], it could produce intermittent noise during normal system operation in very quiet environments. Please be aware of this important information when installing and locating an indoor unit in such environments.

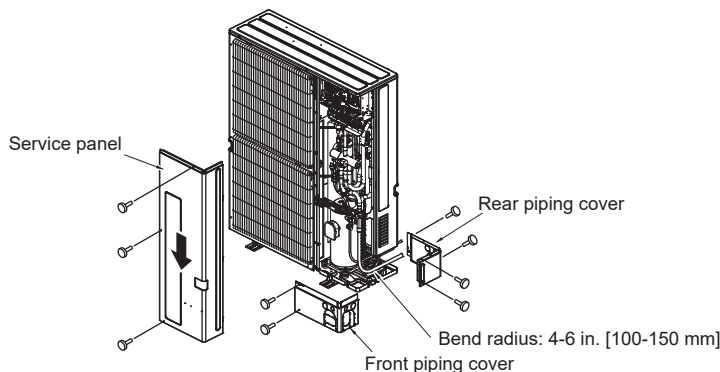
5-4. Procedures for installing refrigerant piping

⚠ Warning:

When installing the unit, securely connect the refrigerant pipes before starting the compressor.

1. Removing panels

Remove the service panel (3 screws), the front piping cover (2 screws), and the rear piping cover (4 screws).



2. Connecting pipes

Note:

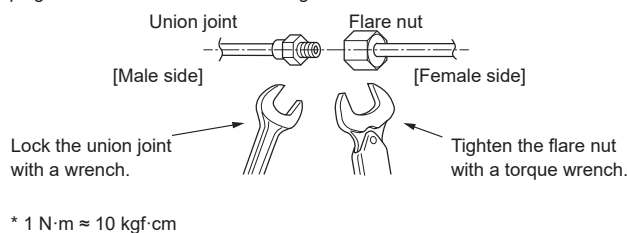
- When bending the pipes, be careful not to break them. Bend radius shall be 4 to 6 in. (100 to 150 mm).
- Make sure that the pipes do not contact the compressor. Otherwise, abnormal noise or vibration may result.
- For MXZ-SM36/48NL
 - Make sure that the valves are closed before connecting the muffler and the extended pipe.
 - When extending the pipe downward, connect the muffler and the extended pipe.
 - When extending the pipe forward, sideward, or backward, connect the muffler, the joint pipe-L (make it point to the extending direction), and then the extended pipe.
- For MXZ-SM36/42/48/60NLHZ and MXZ-SM60NL
 - Make sure that the valves are closed before connecting the extended pipe.

⚠ Caution:

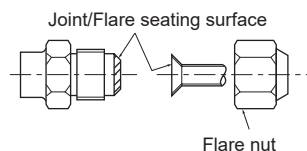
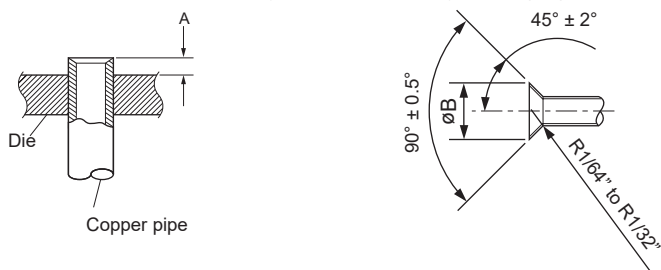
Be sure to connect the muffler for MXZ-SM36/48NL, otherwise abnormal vibration or noise may occur.

- Always start connecting pipes from the indoor unit.
 - Use the flare nuts shown in the table below.
 - Flare nuts must be tightened with a torque wrench. Use 2 wrenches to tighten piping connections as shown in the figure below.

Outside dimension of copper pipe	Outside dimension of flare nut	Tightening torque ft-lbs [N·m*]
1/4 [ø6.35]	17 (43/64)	10 - 13 [14 - 18]
1/4 [ø6.35]	22 (7/8)	25 - 30 [34 - 42]
3/8 [ø9.52]	22 (7/8)	25 - 30 [34 - 42]
3/8 [ø9.52]	26 (1-3/64)	35 - 44 [49 - 61]
1/2 [ø12.7]	26 (1-3/64)	35 - 44 [49 - 61]
1/2 [ø12.7]	29 (1-9/64)	49 - 59 [68 - 82]
5/8 [ø15.88]	29 (1-9/64)	49 - 59 [68 - 82]
5/8 [ø15.88]	36 (1-27/64)	71 - 87 [100 - 120]
3/4 [ø19.05]	36 (1-27/64)	71 - 87 [100 - 120]



- Flare the liquid and gas pipes and apply a thin layer of refrigeration oil (on site). Be sure to apply refrigerant oil to the flare and joint seating surface before tightening a flare nut.
 - When using an usual flaring tool, refer to the figures and table below.
 - To ensure the dimension A, you can use a size adjustment gauge.



Outside dimension of copper pipe	Dimension A		Dimensions øB
	Flaring tool for R32/R410A/R454B (Clutch type)	Flaring tool for R22/R407C (Clutch type)	
1/4 [ø6.35]	0 - 1/64 [0 - 0.5]	3/64 - 1/16 [1.0 - 1.5]	5/16 - 3/8 [8.7 - 9.1]
3/8 [ø9.52]			1/2 - 33/64 [12.8 - 13.2]
1/2 [ø12.7]			41/64 - 21/32 [16.2 - 16.6]
5/8 [ø15.88]			49/64 - 25/32 [19.3 - 19.7]
3/4 [ø19.05]			15/16 - 61/64 [23.6 - 24.0]

- For connection, first align the center, then tighten the first 3 to 4 turns of flare nut by hand.

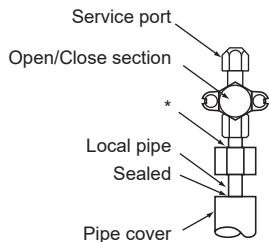
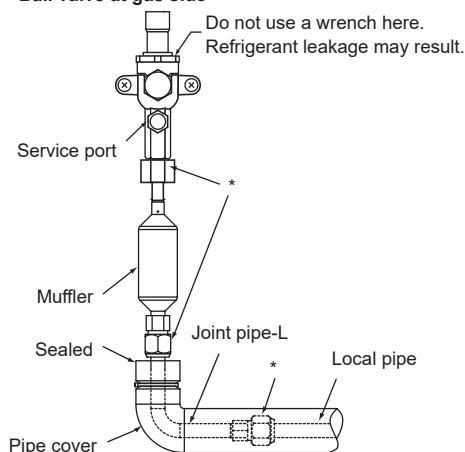
3. Nitrogen pressure test method for refrigerant pipes

After connecting the refrigerant pipes, check the connected pipes and the indoor unit for gas leaks. Use leak detector or soapy water.

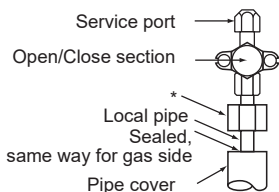
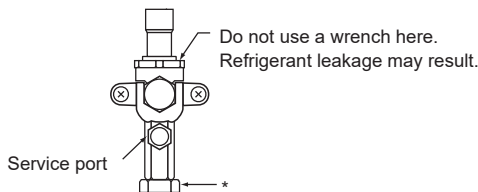
- Connect the testing tools.
 - Make sure both of the 2 valves are closed. See the figure below for the valves.
 - Add pressure to the refrigerant circuit through the service port of the liquid stop valve and the gas valve.
- Add pressure little by little. Do not add pressure to the specified pressure all at once.
 - Pressurize to 73 psig [0.5 MPa, 5.1 kgf/cm²G], wait 5 minutes, and make sure the pressure does not decrease.
 - Pressurize to 218 psig [1.5 MPa, 15.3 kgf/cm²G], wait 5 minutes, and make sure the pressure does not decrease.
 - Pressurize to 601 psig [4.15 MPa, 42.3 kgf/cm²G] and measure the surrounding temperature and refrigerant pressure.
- If the specified pressure holds for about 1 day and does not decrease, the pipes have passed the test and there are no leaks.
 - If the surrounding temperature changes by 1.8°F [1°C], the pressure will change by about 1.5 psig [0.01 MPa, 0.1 kgf/cm²G]. Make the necessary corrections.
- If the pressure decreases in steps 2 or 3, there is a gas leak. Find the point where the gas leaks.

Note:

- Field-made refrigerant joints indoors shall be tightness tested. The method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the MAXIMUM ALLOWABLE PRESSURE. No leak shall be detected.

MXZ-SM36/48NL**Stop valve at liquid side****Ball valve at gas side**

*Use 2 wrenches to tighten piping connections.

MXZ-SM60NL, MXZ-SM36/42/48/60NLHZ**Stop valve at liquid side****Ball valve at gas side**

*Use 2 wrenches to tighten piping connections.

4. Vacuum evacuation

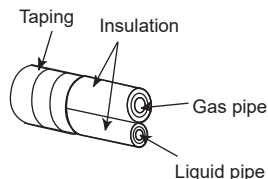
- Evacuate the air from the indoor unit and the connection piping.
Evacuate with the valve of the outdoor unit closed and evacuate both the connection piping and the indoor unit from the service port provided on the valve of the outdoor unit using a vacuum pump. (Always evacuate from the service port of both liquid pipe and gas pipe.) After the vacuum reaches 0.0943 psig/5 Torr [650 Pa (abs)], continue evacuation for at least 1 hour or more. Then, stop the vacuum pump and leave it for 1 hour. Ensure the degree of vacuum has not increased. (If the degree of vacuum increase is larger than 0.01886 psig/1.0 Torr [130 Pa], water might have entered. Apply pressure to dry nitrogen gas up to 7.25 psig [0.05 MPa, 0.51 kgf/cm²G] and vacuum again.)
- Note: Never perform air purging using refrigerant.
- Vacuumize the refrigerant circuit through the service port of the liquid and gas stop valves. And then open the stop valves completely (for both the liquid and gas stop valves). The outdoor unit has the shut-off valves, so the refrigerant line of the indoor and outdoor units are not connected until the air conditioner operates after being energized.
- If the stop valves are left closed and the unit is operated, the compressor and control valves will be damaged.
- Use a leak detector or soapy water to check for gas leaks at the pipe connection sections of the outdoor unit.
- Do not use the refrigerant from the unit to purge air from the refrigerant circuit.
- After the valve work is completed, tighten the valve caps to the correct torque: 14 to 18 ft·lbs [20 to 25 N·m] (200 to 250 kgf·cm). Failure to replace and tighten the caps may result in refrigerant leakage. In addition, do not damage the insides of the valve caps as they act as a seal to prevent refrigerant leakage.

Note: Triple Evacuation

- Evacuate the system to 4,000 microns from both service valves. System manifold gauges must not be used to measure vacuum. A micron gauge must be used at all times.
- Break the vacuum with Nitrogen (N₂) into the discharge service valve to 0 psig [0 MPa, 0 kgf/cm²G].
- Evacuate the system to 1,500 microns from the suction service valve.
- Break the vacuum with Nitrogen (N₂) into the discharge service valve to 0 psig [0 MPa, 0 kgf/cm²G].
- Evacuate the system to 500 microns. System must hold the vacuum at 500 microns for a minimum of 1 hour.
- Conduct a rise test for a minimum of 30 minutes.

5. Insulation work**⚠ Caution:**

Be sure to wrap insulation around the piping. Direct contact with the bare piping may result in burns or frostbite.



- Conduct sufficient anti-condensation and insulation work to prevent water dripping from the refrigerant piping. (liquid pipe/gas pipe)
- Increase insulation depending on the environment where the refrigerant piping is installed. Otherwise, condensation may occur on the surface of the insulation material. (Insulation material heat-resistant temperature: 248°F [120 °C]; thickness: 5/8 in. [15 mm] or more) Note that when the refrigerant piping is used in locations subject to high temperature and humidity such as in the attic, further addition of insulation may be required.
- To insulate the refrigerant piping, apply heat-resistant polyethylene foam between the indoor unit and insulation material as well as to the net between the insulation material filling all gaps. (Condensation forming on the piping may result in condensation in the room or burns when contacting the piping.)
- The indoor parts of the drain pipe should be wrapped with polyethylene foam insulation materials (specific gravity of 0.03, thickness of 3/8 in. [9 mm] or more).
- Use sealant to seal the ends of the thermal insulation around the pipe connection sections to prevent water from entering the thermal insulation.

Refrigerant pipes are protectively wrapped

- The pipes can be protectively wrapped up to a diameter of 3-9/16" [ø90 mm] before or after connecting the pipes. Cut out the knockout in the pipe cover following the groove and wrap the pipes.

Pipe inlet gap

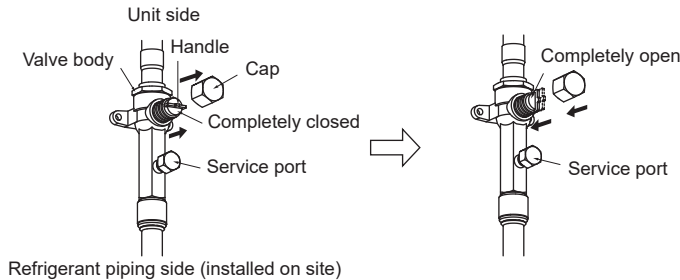
- Use putty or sealant to seal the pipe inlet around the pipes so that no gaps remain. (If the gaps are not closed, noise may be emitted or water and dust may enter the unit, resulting in a breakdown.)

5-5. Valve opening methods

The valve opening method varies according to the outdoor unit model. Use the appropriate method to open the valves.

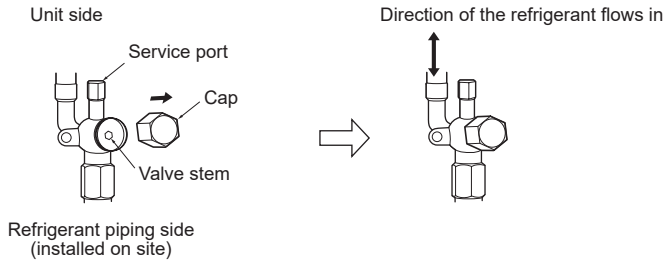
■ Gas side

1. Remove the cap, pull the handle toward you and rotate the valve 1/4 turn in a counterclockwise direction to open it.
2. Make sure that the stop valve is open completely, push in the handle and rotate the cap back to its original position.



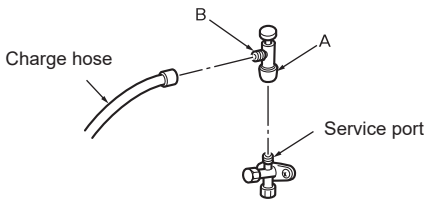
■ Liquid side

1. Remove the cap and turn the valve rod counterclockwise as far as it will go with the use of a 3/16" [4 mm] hexagonal wrench. Stop turning when it hits the stopper.
2. Make sure that the stop valve is open completely and rotate the cap back to its original position.



■ Precautions when using the charge valve

Do not over-tighten the service port during installation, otherwise the valve core may be deformed and loosen, causing a gas leak. After positioning the section B in the desired direction, turn the section A only and tighten it. Do not further tighten the sections A and B together after tightening the section A.



Note:

- The figure in the left is only an example. The stop valve shape, service port position, etc., may vary according to the model.

- Warning:**
- When opening or closing the valve below freezing temperatures, refrigerant may spurt out from the gap between the valve stem and the valve body, resulting in injuries.
 - When installing the unit, securely connect the refrigerant pipes before starting the compressor.

5-6. Additional refrigerant charge

Additional refrigerant charge

Refrigerant for the indoor units and the extended piping is not included in the outdoor unit when the unit is shipped from the factory. Therefore, charge each refrigerant piping system with additional refrigerant at the installation site. In addition, in order to carry out service, enter the size and length of each liquid pipe and additional refrigerant charge amounts in the spaces provided on the "Refrigerant amount" plate on the outdoor unit.

- Note:**
- When the unit is stopped, charge the unit with the additional refrigerant through the liquid stop valve after the pipe extensions and indoor units have been vacuumized.
 - When the unit is operating, add refrigerant to the gas check valve using a safety charger. Do not add liquid refrigerant directly to the check valve.

Calculation of additional refrigerant charge

■ Calculating formula and reference values

Additional refrigerant charge	=	Amount for the liquid pipe size of ø6.35	+	Amount for the liquid pipe size of ø9.52	+	Total capacity of connected indoor units	Amount for the indoor units
		(ft) × 0.22 (oz/ft) (m) × 20.0 (g/m)		(ft) × 0.58 (oz/ft) (m) × 54.0 (g/m)		SM36/48/60NL SM36/42/48/60NLHZ	
						27 or less	8 lbs 14 oz [4.0 kg]
						28 to 54	11 lbs 1 oz [5.0 kg]
						55 or more	11 lbs 8 oz [5.2 kg]

■ Included refrigerant amount when shipped from the factory

- MXZ-SM36/48NL: 2 lbs 11 oz [1.2 kg]
- MXZ-SM36/42/48/60NLHZ, MXZ-SM60NL: 6 lbs 10 oz [3.0 kg]

■ Calculation example

Condition

Outdoor unit: MXZ-SM48NL	A: ø9.52 98 ft [30 m]
Indoor unit 1: Model 24	a: ø9.52 49 ft [15 m]
Indoor unit 2: Model 15	b: ø6.35 32 ft [10 m]
Indoor unit 3: Model 08	c: ø6.35 32 ft [10 m]
Indoor unit 4: Model 08	d: ø6.35 66 ft [20 m]

Calculation

- The total length of each liquid line: $\phi 9.52: A + a = 30 + 15 = 148 \text{ ft [45 m]}$
 $\phi 6.35: b + c + d = 10 + 10 + 20 = 131 \text{ ft [40 m]}$
- The total capacity of connected indoor units: $24 + 15 + 08 + 08 = 55$
- Additional refrigerant charge: $131 \text{ ft} \times 0.22 \text{ oz/ft} + 148 \text{ ft} \times 0.58 \text{ oz/ft} + 11 \text{ lbs } 8 \text{ oz} = 18 \text{ lbs } 11 \text{ oz}$
 $[40 \text{ m} \times 20.0 \text{ g/m} / 1000 + 45 \text{ m} \times 54.0 \text{ g/m} / 1000 + 5.2 \text{ kg} = 8.5 \text{ kg}] \text{ (rounded up)}$

Explanation

- Calculate the additional refrigerant charge using the liquid pipe size and length of the extended piping and total capacity of connected indoor units.
- Calculate the additional refrigerant charge using the procedure shown above, and charge with the additional refrigerant.
- Round up the first decimal place of the calculated value. (For example, if the calculated value is 6.01 kg, the amount of additional refrigerant charge is 6.1 kg.)
- The amount of additional refrigerant, which is calculated from the total capacity of indoor units and the combination of extended pipes, must not exceed the following amount:
MXZ-SM36/48NL: 29 lbs 1 oz [13.2 kg]
MXZ-SM36/42/48/60NLHZ, MXZ-SM60NL: 25 lbs 2 oz [11.4 kg]

Note:

- After charging the refrigerant, fill in "DATE OF FIRST CHARGE", "ADDITIONAL CHARGE", and "TOTAL CHARGE" columns on the name plate.

6. Drainage piping work

Drainage pipe connection for outdoor units

When drain piping is necessary, use the following drain socket or the drain pan (optional part). However, they cannot be used for MXZ-SM36/42/48/60NLHZ (Hyper Heating model).

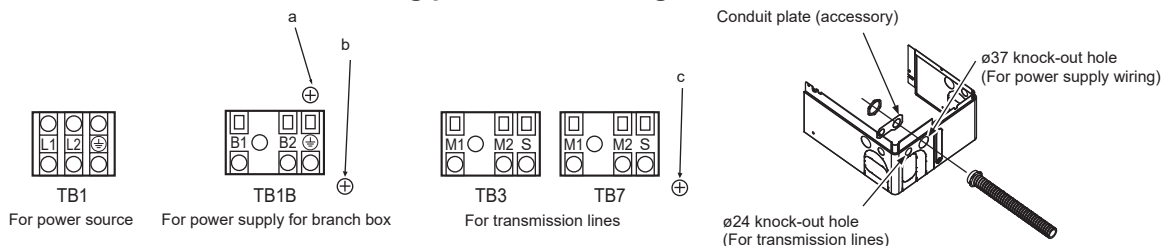
- Drain socket: PAC-SG61DS-E
- Drain pan: PAC-SH97DP-E

7. Electrical work

7-1. Caution

- Follow ordinance of your governmental organization for technical standard related to electrical equipment, wiring regulations and guidance of each electric power company.
- Use self-extinguishing distribution cables for power supply wiring.
- Wiring for control (hereinafter referred to as transmission lines) shall be apart from power supply wiring by 2 in. [5 cm] or more so that it is not influenced by electric noise from power supply wiring. (Do not insert the transmission lines and power supply wiring in the same conduit.)
- Be sure to provide designated grounding work to the outdoor unit.
- Give some allowance to wiring for electrical part box of indoor and outdoor units, because the box is sometimes removed at service work.
- Never connect the main power source to the terminal block of the transmission line. If connected, electrical parts will be burnt out.
- Use 2-core shielded wire for transmission lines. If transmission lines of different systems are wired with the same multiple-core cable, the resultant poor transmitting and receiving will cause erroneous operations.
- Only the specified transmission line shall be connected to the terminal block for outdoor unit transmission. Erroneous connection does not allow the system to operate.
 - Connect the transmission line connected with the indoor unit to TB3. (TB3 is a terminal block for the transmission line.)
 - Connect others to TB7. (TB7 is a terminal block for centralized control.)
- If connecting with the upper class controller or conducting group operation in different refrigerant systems, the transmission line is required between the outdoor units. Connect the transmission line between the terminal blocks for centralized control (2-wire line with no polarity). When conducting group operation in different refrigerant systems without connecting to the upper class controller, replace the insertion of the short circuit connector of one outdoor unit from CN41 to CN40.
- Before turning on the outdoor unit, be sure to turn on the indoor units and the branch boxes.

7-2. Control box and connecting positions of wiring



- Screw on the electrical parts box for ground connection (TB3)
 - Screw on the electrical parts box (TB1B)
 - Screw on the electrical parts box for ground connection (TB7)
- Connect the wiring between the outdoor unit and the indoor unit/branch box to TB3 on the outdoor unit. Connect the wiring between the outdoor unit and the centralized control system to TB7 on the outdoor unit. When using shielded wires, connect the ground of the shielded wire to the shield terminal S on TB3 or TB7. If the connection of the short circuit connector has been changed from CN41 to CN40, connect the shield terminal S on TB7 to the screw "c" using the included lead wire. Note that the shield terminal S on TB3 is connected to the screw "a" when the unit is shipped from the factory.
 - Conduit plates are provided. Remove the knock-out pieces from the piping cover, pass the power supply wiring and the transmission lines through the appropriate knock-out holes, and connect the wires to the terminal block.
 - TB1B is for supplying power to the branch box (208/230 V, max. 6A).
 - Fix power supply wiring to the terminal block by using buffer bushing for tensile force (PG connection or the like).

⚠ Caution:

Never connect the transmission line for the branch box or the transmission line of the central control system to TB1B. If the transmission lines are connected, the indoor unit, branch box or system controller could be damaged.

7-3. Wiring transmission cables

■ Types of transmission cables

Transmission lines for:	Types:	Diameter:	Remarks:
Outdoor unit to indoor unit/ branch box	2-core shielded wire CVVS, CPEVS or MVVS	More than 1.25 mm ² [AWG 16]	Maximum wiring length: Within 656 ft [200 m]
MA remote controller	2-core sheathed wire (unshielded) CVV	0.3 to 1.25 mm ² [AWG 22 to AWG 16] (0.75 to 1.25 mm ² [AWG 18 to AWG 16]) Connected with simple remote controller	Maximum wiring length: Within 656 ft [200 m]

■ Unit, symbol, and connectable number

Unit	Symbol	Number of connectable units
Outdoor unit	OC	—
Indoor unit	City Multi series	M-IC
		MXZ-SM36
		MXZ-SM42
		MXZ-SM48
	M, S, P series (A-Control)	A-IC
		MXZ-SM60
		MXZ-SM36
		MXZ-SM42
		MXZ-SM48
		MXZ-SM60
Branch box	BC	0 to 2 per outdoor unit *1
Remote controller	MA	Maximum of 2 per group
	Wireless	WL-RC
		—

*1. The number of connectable units may be limited depending on some conditions such as capacity of the indoor unit or equivalent power consumption of each unit.

Note:

- See below for the symbols not indicated in the table above:
TB: Terminal block
L, ℓ : Length of the transmission line
The number in the parenthesis is an address.
- Refer to the installation manual of the optional parts as well for the restrictions of connectable indoor units.

1. Operation system with MA-RC

Wiring methods for the operation examples shown below

- Use feed wiring to connect the terminals M1 and M2 on TB3 of OC to the terminals M1 and M2 on TB5 of each M-IC. Use non-polarized 2-core wires.
- Connect the terminals 1 and 2 on TB15 of each M-IC with the terminal block of MA-RC.
- For group operation, connect terminals 1 and 2 on TB15 of each M-IC. Use non-polarized 2-core wire.
- For group operation, set the M-IC with the most functionality in the group as the main M-IC. You only need to set the address for the main M-IC. Set the smallest address to the main M-IC.
- Combination of the 3 operation examples shown below are possible.

Permissible length

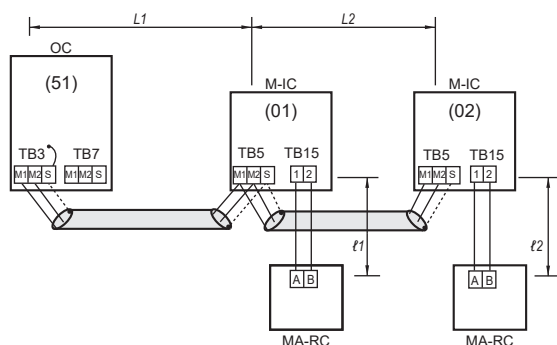
Section	Length	Diameter
Maximum length between M-IC and OC ($L1+L2$)	≤ 656 ft [200 m]	AWG 16 [1.25 mm ²] or more
Length between M-IC and MA-RC ($\ell1, \ell2, \ell3+\ell4, \ell5, \ell6+\ell7$)	≤ 656 ft [200 m]	AWG 22 to AWG 16 [0.3 to 1.25 mm ²]

Note:

- If the length is 32 ft [10 m] or greater, use an AWG 16 [1.25 mm²] shielded wire. In this case, the wire length shall satisfy the following inequality.
"Maximum length between M-IC and OC" + "Length between M-IC and MA-RC" ≤ 656 ft [200m]

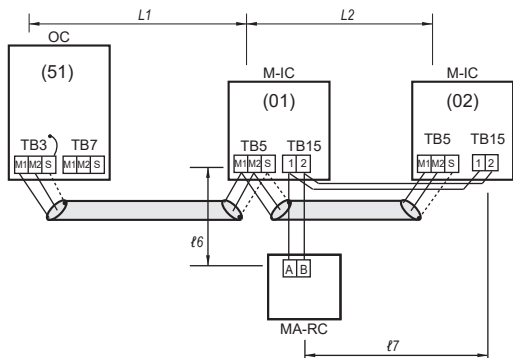
■ Standard operation (1 MA-RC for each M-IC)

Good

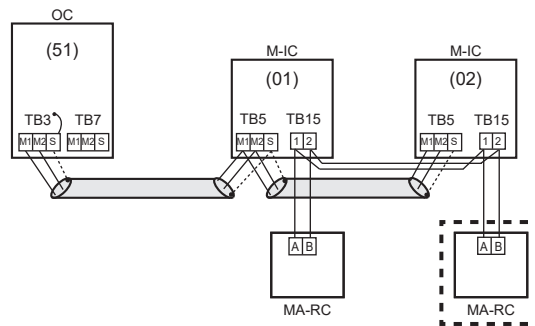


■ Group operation (Multiple M-ICs operate together by 1 MA-RC.)

Good



No good



The second MA-RC cannot be connected with TB15 of the same M-IC that the first MA-RC is connected.

2. Group operation system with 2 or more OCs and an MA-RC

Wiring methods for the operation example shown below

- Always use shielded wires when making connections between OC and M-IC, OC and OC, or M-IC and M-IC wiring.
- Use feed wiring to connect the terminals M1, M2, and S on TB3 of OC to the terminals M1, M2, and S on TB5 of M-IC.
- Connect the terminals 1 and 2 on TB15 of M-IC to the terminal block on the MA-RC. Use non-polarized 2-core wires.
- Connect the terminals M1, M2, and S on TB7 of each OC.
- Do not change the jumper connector CN41 on the outdoor multi controller circuit board.
- Grounding with the terminal S on TB7 is unnecessary. Connect the terminal S on the power supply unit to ground.
- Address settings (on the outdoor unit PCB) are required.

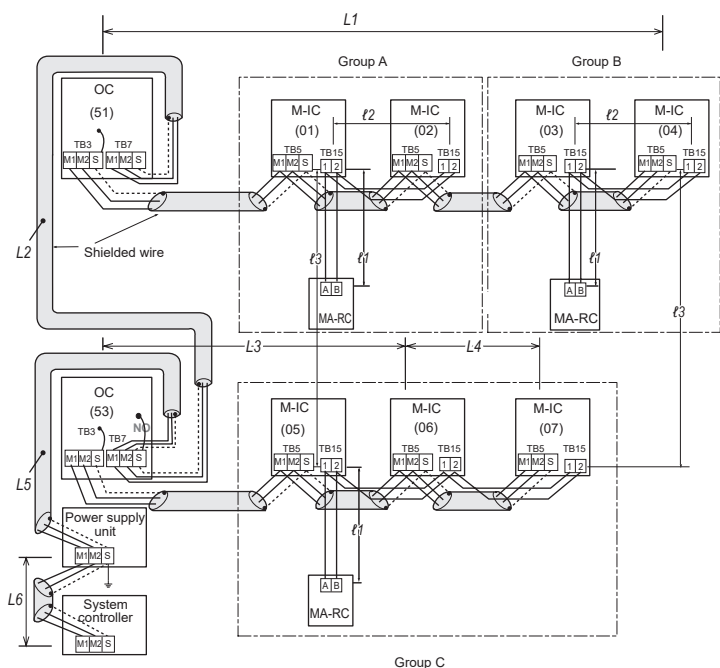
Permissible length

Section	Length	Diameter
Maximum line length via OC ($L1+L2+L3+L4$, $L1+L2+L5+L6$)	≤ 1640 ft [500 m]	AWG 16 [1.25 mm ²] or more
Maximum length between M-IC and OC ($L1$, $L3+L4$, $L2+L5$, $L6$)	≤ 656 ft [200 m]	AWG 16 [1.25 mm ²] or more

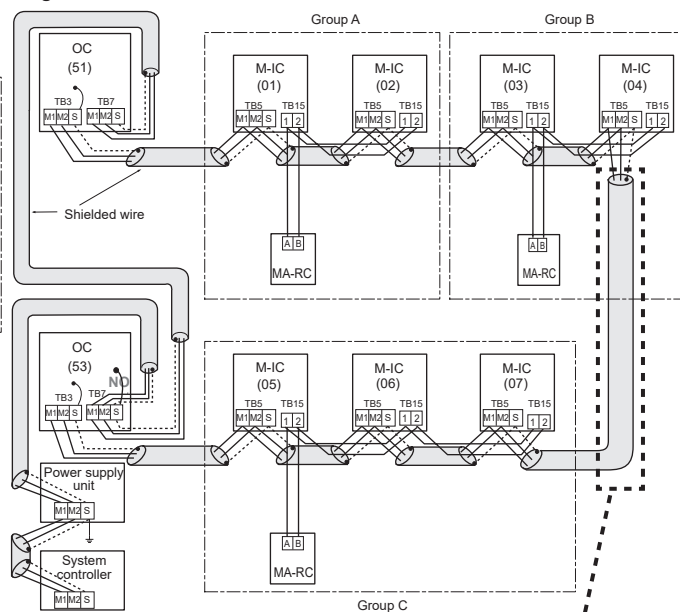
Address setting on PCB

Unit	Range	Remarks
Main M-IC	001 to 050	Use the smallest address in the M-ICs in the same group.
Sub M-IC	001 to 050	The address must be in sequence with the main M-IC address.
OC	051 to 100	Add 50 to the smallest M-IC address. The address is automatically set to "100" if "01-50" is entered.
MA-RC	-	Address setting is not necessary.

Good



No good



Never connect TB5 of M-IC with that have been connected to different OC.

3. Operation system with BC and A-IC

Wiring methods for the operation example shown below

- Always use shielded wire when making connections between OC and BC or OC and OC wiring.
- Use feed wiring to connect the terminals M1, M2, and S on TB3 of OC to the terminals M1, M2, and S on TB5 of BC.
- Connect the terminals 1 and 2 on TB5/TB15 of A-IC to the terminal block on the MA-RC. Use non-polarized 2-core wires.
- Connect the terminals M1, M2, and S on TB7 of each OC.
- Do not change the jumper connector CN41 on the outdoor multi controller circuit board.
- Grounding with the terminal S on TB7 is unnecessary. Connect the terminal S on the power supply unit to ground.
- Address settings (on the outdoor unit PCB) are required.

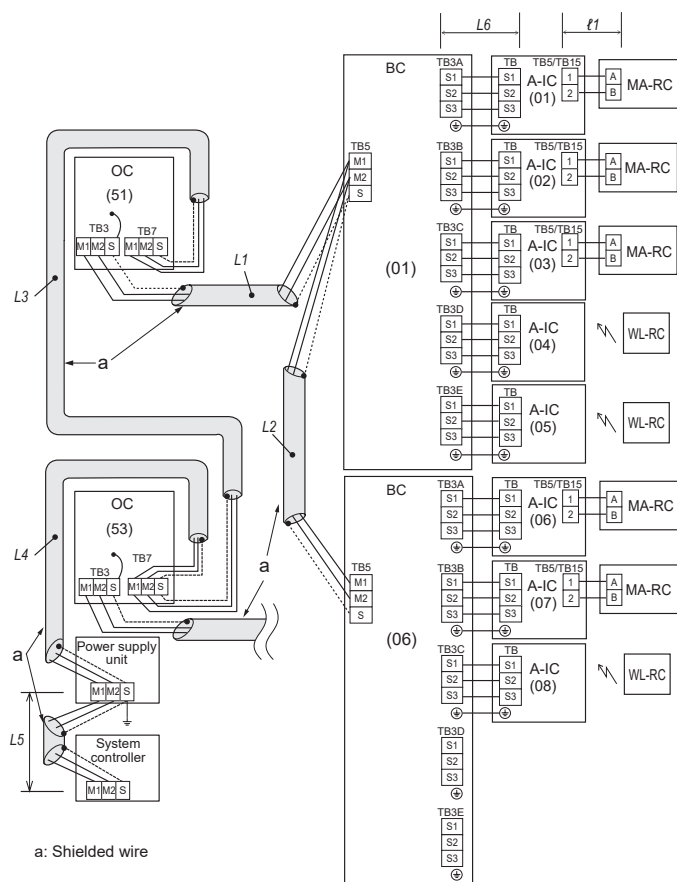
Permissible length

Section	Length	Diameter
Maximum line length via OC ($L1+L2+L3+L4+L5$)	≤ 1640 ft [500 m]	AWG 16 [1.25 mm ²] or more
Maximum length between BC and OC ($L1+L2$, $L3+L4$, $L5$)	≤ 656 ft [200 m]	AWG 16 [1.25 mm ²] or more
Maximum length between BC and A-IC ($L6$)	≤ 82 ft [25 m]	AWG 16 [1.25 mm ²]
Length between A-IC and remote controller ($\ell 1$)	≤ 656 ft [200 m]	AWG 22 to AWG 16 [0.3 to 1.25 mm ²]*

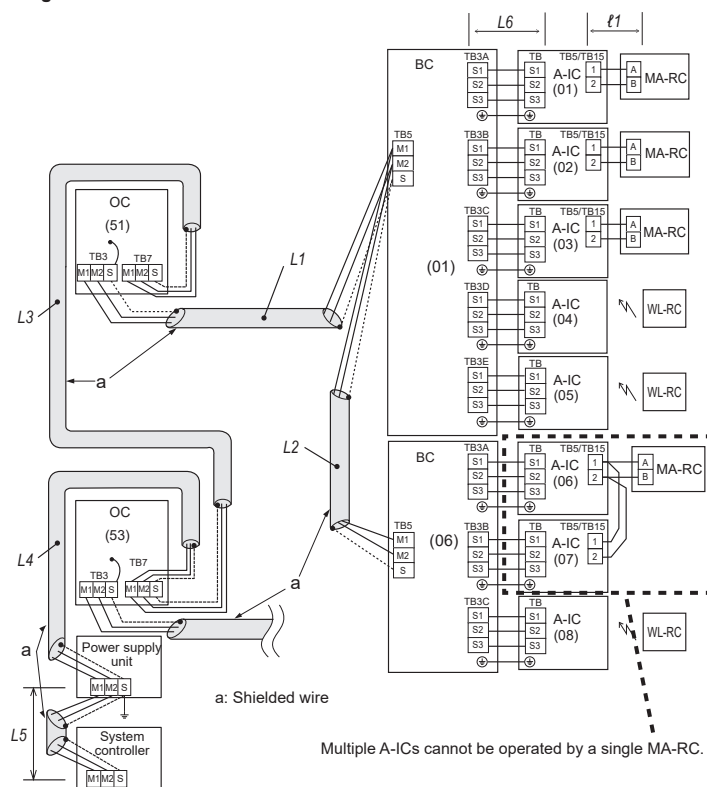
Address setting on PCB

Unit	Range	Remarks
BC	001 to 050	Decide the BC address so that the address of the port does not exceed 50.
A-IC (Ports on BC)	001 to 050	Set addresses to the ports on BC where an A-IC is connected. The address of the first port is the same as that of BC, and the addresses of the other ports are set in sequence. For example, when 5 A-ICs are connected and the BC address (the first port address) is set to 01, the other port addresses are 02, 03, 04, and 05.
OC	051 to 100	Add 50 to the BC address. The address is automatically set to "100" if "01-50" is entered.
MA-RC	-	Address setting is not necessary.

Good



No good



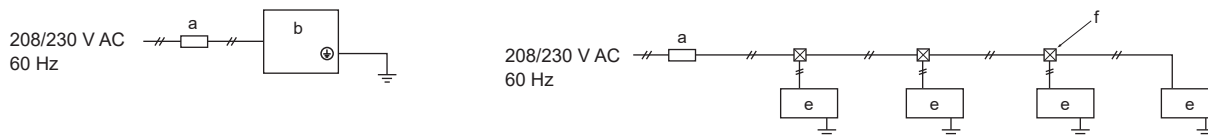
Note:

- Different refrigerant systems cannot be connected together.

7-4. Wiring of main power supply and equipment capacity

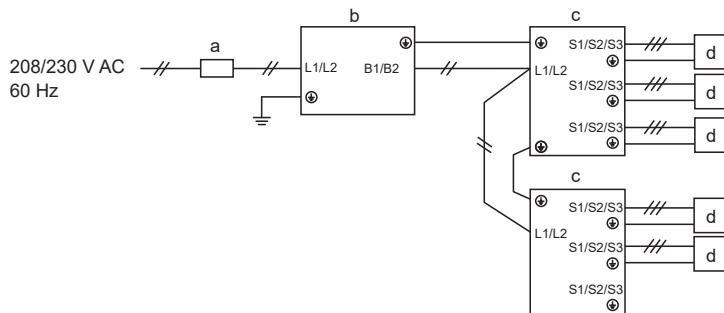
Schematic drawing of wiring

■ Without a branch box

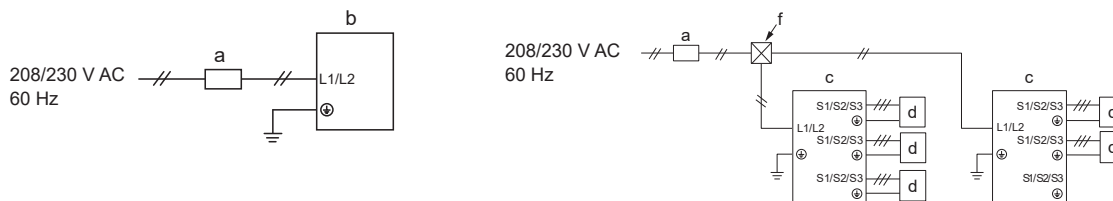


■ With a branch box

When power is supplied from an outdoor unit



When power is supplied separately



- a. Switch (Ground fault circuit interrupter)
- b. Outdoor unit
- c. Branch box
- d. A-Control indoor unit (M, S, P series indoor unit)
- e. City multi series indoor unit
- f. Pull box

Note:

- A separate power supply is required for the City Multi indoor unit, as it cannot be powered by an outdoor unit.

Thickness of main power supply wires

When power is supplied separately

Model		Power supply	Minimum wire thickness (mm ² [AWG])		Conduit size	Breaker for wiring*1
			Main cable *2	Ground		
Outdoor unit	36/48NL	208/230 V AC, 60 Hz	5.3 [AWG 10]	5.3 [AWG 10]	1*3	30 A
	36/42/48NLHZ		8.4 [AWG 8]	8.4 [AWG 8]	1*3	40 A
	60NL		8.4 [AWG 8]	8.4 [AWG 8]	1*3	40 A
	60NLHZ		13.3 [AWG 6]	13.3 [AWG 6]	1	45 A
Branch box			Refer to the installation manual of the branch box.			

Model		Ground fault circuit interrupter (if necessary)	Minimum circuit ampacity	Maximum rating of overcurrent protector device
Outdoor Unit	36/48NL	30 A 30 mA 0.1 sec. or less	36 A	64 A
	36/42/48NLHZ	40 A 30 mA 0.1 sec. or less	45 A	80 A
	60NL	40 A 30 mA 0.1 sec. or less	45 A	80 A
	60NLHZ	45 A 30 mA 0.1 sec. or less	45 A	80 A
Branch box		Refer to the installation manual of branch box.		

When power is supplied from the outdoor unit

Model		Power supply	Minimum wire thickness (mm ² [AWG])		Conduit size	Breaker for wiring*1
			Main cable *2	Ground		
Outdoor unit	36/48NL	208/230 V AC, 60 Hz	8.4 [AWG 8]	8.4 [AWG 8]	1*3	40 A
	36/42/48NLHZ		13.3 [AWG 6]	13.3 [AWG 6]	1	45 A
	60NL		13.3 [AWG 6]	13.3 [AWG 6]	1	50 A
	60NLHZ		13.3 [AWG 6]	13.3 [AWG 6]	1	55 A
Branch box			Refer to the installation manual of the branch box.			

Model		Ground fault circuit interrupter (if necessary)	Minimum circuit ampacity	Maximum rating of overcurrent protector device
Outdoor Unit	36/48NL	40 A 30 mA 0.1 sec. or less	42 A	70 A
	36/42/48NLHZ	45 A 30 mA 0.1 sec. or less	51 A	86 A
	60NL	50 A 30 mA 0.1 sec. or less	55 A	90 A
	60NLHZ	55 A 30 mA 0.1 sec. or less	55 A	90 A
Branch box		Refer to the installation manual of the branch box.		

*1. Please follow applicable federal, state, or local codes to prevent potential leakage/electric shock. Or install a ground fault circuit interrupter for the prevention of leakage and electric shock.

*2. Use copper supply wires. Use electric wires with a rated voltage greater than 300 V.

*3. Although the conduit size is larger than the size specified for the wire thickness according to the UL standards, use a conduit size of 1 inch.

Note:

- If a ground fault circuit interrupter is used, it should be compatible with higher harmonics as this unit is equipped with an inverter. Using an inadequate breaker can cause the incorrect operation of inverter.

ON/OFF capacities

Total operating current of the indoor unit	Minimum wire thickness (mm ² /AWG)			Ground fault circuit interrupter (option)*1	Local switch (A)		Breaker for wiring (NFB)
	Main cable	Branch	Ground		Capacity	Fuse	
F*2 = 15 A or less	2.1/14	2.1/14	2.1/14	15 A current sensitivity *3	15	15	15
F*2 = 20 A or less	3.3/12	3.3/12	3.3/12	20 A current sensitivity *3	20	20	20
F*2 = 30 A or less	5.3/10	5.3/10	5.3/10	30 A current sensitivity *3	30	30	30

- *1. The ground fault circuit interrupter should support inverter circuit.
The ground fault circuit interrupter should combine using of local switch or circuit breaker.
- *2. Please take the larger value of F1 or F2 as the value for F.
 $F1 = \text{Total operating maximum current of the indoor units} \times 1.2$
 $F2 = \{V1 \times (\text{Quantity of Type 1})/C\} + \{V1 \times (\text{Quantity of Type 2})/C\} + \{V1 \times (\text{Quantity of Type 3})/C\} + \{V1 \times (\text{Quantity of Type 4})/C\} + \dots + \{V1 \times (\text{Quantity of Type 11})/C\}$
 See the table below for values of V1 and V2.

Calculation examples of "F2"

- Condition: PEFY-NMSU × 4 + PEFY-NMAU × 1, C = 8 (Refer to sample chart below.)
- Calculation: $F2 = 18.6 \times 4/8 + 30.5 \times 1/8$
 $= 13.11$
 $= 16 \text{ A breaker (Tripping current} = 8 \times 16 \text{ A at 0.01 second)}$

- *3. Current sensitivity is calculated using the following formula.
 $G1 = V2 \times (\text{Quantity of Type 1}) + V2 \times (\text{Quantity of Type 2}) + V2 \times (\text{Quantity of Type 3}) + \dots + V2 \times (\text{Quantity of Type 11}) + V3 \times (\text{Wire length [km]})$

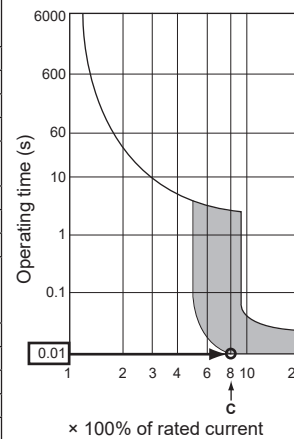
G1	Current sensitivity
30 or less	30 mA 0.1 second or less
100 or less	100 mA 0.1 second or less

Wire thickness (mm ² /AWG)	V3
2.1/14	48
3.3/12	56
5.3/10	66

Values of V1 and V2

Indoor unit		V1	V2
Type 1	PEAD-AA-NL	30.5	2.4
Type 2	SVZ-AP-NL, PAA-AA/BA/CA-NL	26.9	2.4
Type 3	SEZ-AD-NL	18.6	3.4
Type 4	SLZ-AF-NL	17.1	2.4
Type 5	MSZ-FX-NL, MSZ-GX-NL, MFZ-KX-NL, MSZ-EX-NL2, MLZ-KX06NL	7.4	2.4
Type 6	Branch box	5.1	3.0
Type 7	PVFX-L-NAMU	38.0	1.6
Type 8	PEFY-L/M-NMAU	30.5	2.3
Type 9	PCFY-L/M-NKMU, PLA-AE-NL, PLFY-EL/EM-NEMU, PLFY-L/M-NFMU, PKFY-L/M-NLMU, PMFY-M-NCMU, PKFY-L/M-NKMU	19.8	2.4
Type 10	PEFY-L/M-NMSU	18.6	2.4
Type 11	MLZ-KX09-18NL	9.9	2.4
Type 12	PEFY-M-NMHU	31.4	2.4
Type 13	PVFX-M08-54NAMU	34.0	2.6
Type 14	PVFX-M60NAMU	26.9	2.6

Example chart of operating characteristics



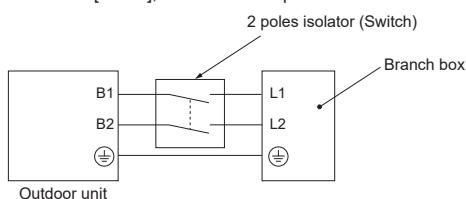
C: Factor of the rated current (minimum value) at the operating time of 0.01 second
Please check the operating characteristics of your breaker as "C" differs depending on the breaker.

Note:

- Use a separate power supply for the outdoor unit and the indoor unit.
- Bear in mind ambient conditions (ambient temperature, direct sunlight, rain water, etc.) when proceeding with the wiring and connections.
- The wire size is the minimum value for metal conduit wiring. The power cord size should be 1 rank thicker considering voltage drops. Make sure the power-supply voltage does not drop more than 10%.
- Specific wiring requirements should adhere to the wiring regulations of the region.
- Power supply cables of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (design 60245 IEC57). For example, use wiring such as YZW.
- Install an earth line longer than power cables.
- Never splice the power cable or the indoor-outdoor-branch box connection cable, otherwise it may result in a smoke, a fire or communication failure.
- Be sure to connect the outdoor-branch box/indoor-branch box connecting cables directly to the units (no intermediate connections). Intermediate connections can lead to communication errors if water enters the cables and causes insufficient insulation to ground or a poor electrical contact at the intermediate connection point. If an intermediate connection is necessary, be sure to take measures to prevent water from entering the cables.

Warning:

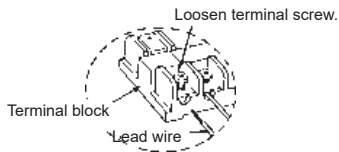
- Be sure to use specified wires to connect so that no external force is imparted to terminal connections. If connections are not fixed firmly, it may cause heating or fire.
- Be sure to use the appropriate type of overcurrent protection switch. Note that generated overcurrent may include some amount of direct current.
- Be sure to attach the terminal block covers/panel of the outdoor unit securely. If it is not attached correctly, it could result in a fire or an electric shock due to dust, water, etc.
- Please turn off the main power supply when servicing. And do not touch the B1, B2 terminals when the power is energized. If the isolator should be used between the outdoor unit and the branch box/indoor unit and the branch box, please use the 3-pole type or 2-pole type isolator. (Please refer to the figure below.)
- Turn on the main power when the ambient temperature is -13°F [-25°C] or higher.
- At -13°F [-25°C], the unit will require at least 4 hours of stand-by before operation due to warm electrical parts.



Caution:

- Be careful not to make mis-wiring.

- Firmly tighten the terminal screws to prevent loosening.
- After tightening, pull the wires lightly to confirm that they not move.
- If the connecting wire is incorrectly connected to the terminal block, the unit does not operate normally.
- Some installation site may require attachment of a ground fault circuit interrupter. If no ground fault circuit interrupter is installed, it may cause an electric shock.
- Do not use anything other than breaker and fuse with correct capacity. Using fuse and wire or copper wire with too large capacity may cause a malfunction of unit or fire.
- Properly route wiring so as not to contact the sheet metal edge or a screw tip.
- Refer to the figure below for connection details.



- After using the isolator, be sure to turn off and on the main power supply to reset the system. Otherwise, the outdoor unit may not be able to detect the branch box(es) or indoor units.

7-5. Address settings

Switches for address settings

■ Outdoor unit

- Rotary switch



SWU2
(Tens digit)



SWU1
(Ones digit)

- Range: 51-100
- Remarks: Add 50 to the smallest indoor unit or branch box address.

■ Branch box

- Rotary switch



SW12
(Tens digit)



SW11
(Ones digit)

- Range: 01-50
- Remarks: Decide the branch box address first. (Branch box address = Port A address) The other port addresses are set sequentially.
For example, when 5 indoor units are connected and the branch box address (port A address) is set to 01, the other port addresses are 02, 03, 04, and 05.
The branch box address of 47 is not allowable because the port E address exceeds 50 in this case (A: 47, B: 48, C: 49, D: 50, E: 51).

Example when an indoor unit is connected to each port							Remarks
Port	A	B	C	D	E	-	-
SW1	1 ON	2 ON	3 ON	4 ON	5 ON	6 -	Set SW1 to ON when an indoor unit is connected, and to OFF when an indoor unit is not connected. SW1-6 is not used.
Address	01	02	03	04	05	-	SW11, 12 Sequential number

■ M, S, P series indoor unit

Address settings are not required for M, S, P series indoor units.

■ City Multi series indoor unit

- Rotary switch



SW12
(Tens digit)



SW11
(Ones digit)

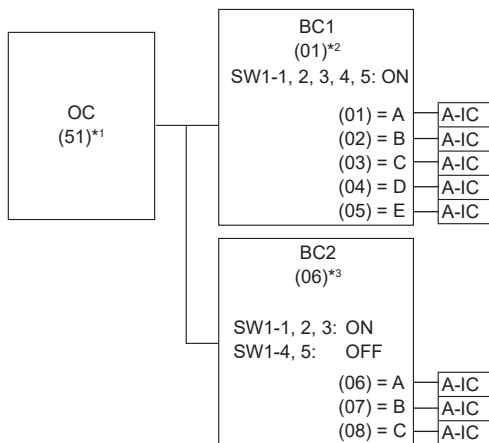
- Range: 01-50

Examples

See below for the symbols.

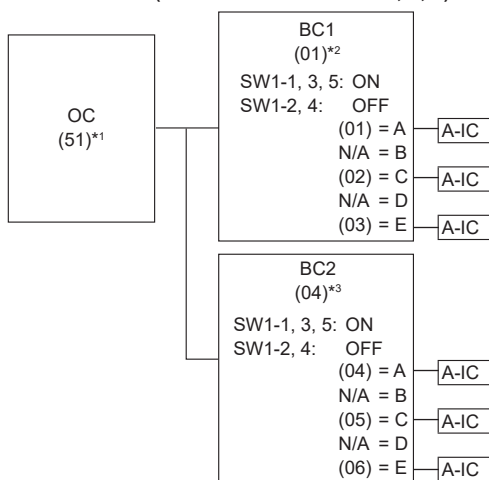
- OC: Outdoor unit
- BC: Branch box
- A-IC: A-Control indoor unit (M, S, P series indoor unit)
- The number in the parenthesis is an address.

Ex. 1: OC + BC1 (5 A-ICs are connected to A, B, C, D, E) + BC2 (3 A-ICs are connected to A, B, C)



- *1. OC address
Start address of BC1 + 50 = 01 + 50 = 51
- *2. BC1 address
A-port address = Start address = 01
B-port address = Start address + 1 = 02
C-port address = Start address + 2 = 03
D-port address = Start address + 3 = 04
E-port address = Start address + 4 = 05
- *3. BC2 address
Start address of BC2
= The largest number in the port addresses of BC1 + 1
= 05 + 1 = 06
A-port address = Start address = 06
B-port address = Start address + 1 = 07
C-port address = Start address + 2 = 08

Ex. 2: OC + BC1 (3 A-ICs are connected to A, C, E) + BC2 (3 A-ICs are connected to A, C, E)



- *1. OC address
Start address of BC1 + 50 = 01 + 50 = 51
- *2. BC1 address
A-port address = Start address = 01
B-port address = N/A
C-port address = Start address + 1 = 02
D-port address = N/A
E-port address = Start address + 2 = 03
- *3. BC2 address
Start address of BC2
= The largest number in the port addresses of BC1 + 1
= 03 + 1 = 04
A-port address = Start address = 04
B-port address = N/A
C-port address = Start address + 1 = 05
D-port address = N/A
E-port address = Start address + 2 = 06

8. Test run

8-1. Before the test run

- After completing installation, wiring, and piping of the indoor and outdoor units, check for refrigerant leakage, looseness in power supply wiring or transmission lines, wrong polarity, and connection of a phase in the supply.
- Use a 500-volt megohmmeter to check that the resistance between the power supply terminals and ground is at least 1 MΩ.
- Do not carry out this test on the terminals for transmission lines (low voltage circuit).

Warning:

Do not use the air conditioner if the insulation resistance is less than 1 MΩ.

■ **Insulation resistance**

After installation or after the power source to the unit has been cut for an extended period, the insulation resistance will drop below 1 MΩ due to refrigerant accumulation in the compressor. This is not a malfunction. Perform the following procedures.

1. Remove the wires from the compressor and measure the insulation resistance of the compressor.
2. When the insulation resistance is below 1 MΩ, the resistance may have been dropped due to refrigerant accumulation in the compressor.
3. Connect the wires to the compressor and supply power to warm up the compressor for 12 hours.
 - To operate the compressor with refrigerant accumulation, it must be warmed up at least 12 hours to prevent breakdown.
 - The resistance will rise above 1 MΩ after 12 hours when the insulation resistance has been dropped due to refrigerant accumulation.
 - The time necessary to warm up the compressor varies according to atmospheric conditions and refrigerant accumulation.
4. Measure the insulation resistance again. If the insulation resistance rises above 1 MΩ, the compressor is not faulty.

Caution:

- The compressor will not operate unless the power supply phase connection is correct.
- When the power sources of the outdoor unit, indoor unit, and branch box are different, power the outdoor unit last.
- Turn on the power at least 12 hours before starting operation. Starting operation immediately after turning on the main power switch can result in severe damage to internal parts.
- Always keep the power on except during maintenance for safety.

Note:

- The following must be checked as well.
 - Confirm that LED on the control board of the outdoor unit does not flash. It flashes when the outdoor unit is faulty.
 - Confirm that both the gas and liquid stop valves are completely open.

8-2. Test run

Using remote controller

Refer to the installation manual of the indoor unit for details.

- Be sure to perform the test run for each indoor unit. Make sure each indoor unit operates properly following the installation manual attached to the unit.
- If you perform the test run for all indoor units at once, you cannot detect any erroneous connection of the refrigerant pipes and the connecting wires.
- The compressor operation is not available for 3 minutes at least after the power is supplied.
- The compressor can emit noise just after turning on the power supply or when the outside temperature is low.
- Depending on the operating conditions, the outdoor unit fan may stop while the compressor is operating, but this is not a malfunction.

About the restart protective mechanism

- Once the compressor stops, the restart preventive device activates so the compressor will not operate for 3 minutes to protect the air conditioner.

Using SW6 in the outdoor unit

Note:

- When performing a test run from the outdoor unit, all indoor units operate. Therefore, you cannot detect any erroneous connection of refrigerant pipes and the connecting wires. If it aims at detection of any erroneous connection, be sure to carry out the test run from remote controller according to "7-2-1. Using remote controller".

SW6 setting for test run

- Cooling operation: Set SW6-1 to ON; Set SW6-2 to OFF.
- Heating operation: Set SW6-1 to ON; Set SW6-2 to ON.

After performing the test run, set SW6-1 to OFF.

- A few seconds after the compressor starts, a clanging noise may be heard from the inside of the outdoor unit. The noise is coming from the check valve due to the small difference in pressure in the pipes. The unit is not faulty.
- To change the test run operation mode during the test run, stop the test run by turning SW6-1 to OFF first. Change the test run operation mode with SW6-2, and then resume the test run by turning SW6-1 to ON.

8-3. Refrigerant collecting (Pump down)

Perform the following procedure to collect refrigerant when moving an indoor unit or an outdoor unit.

1. Turn off the circuit breaker.
2. Connect the low pressure side of the gauge manifold to the service port of the gas side stop valve.
3. Close the liquid stop valve.
4. Supply power (circuit breaker).
 - Startup of the indoor-outdoor communication takes about 3 minutes after the power (circuit breaker) is turned on. Start the pump-down operation after 3 to 4 minutes since the power (circuit breaker) is turned ON.
5. Perform a test run for cooling operation (SW6-1: ON and SW6-2: OFF). The compressor (outdoor unit) and ventilators (indoor and outdoor units) will start operating and the test run for cooling operation begins. Immediately after performing the test run for cooling operation, set the outdoor service switch SW6-5 (pump down switch) from OFF to ON.
 - Do not continue to operate for a long time with the switch SW6-5 set to ON. Make sure to switch it to OFF after pump down is completed.
 - Only set the SW6-1 to ON if the unit is stopped. However, even if the unit is stopped and the SW6-1 is set to ON less than 3 minutes after the compressor stops, the refrigerant collecting operation cannot be performed. Wait until compressor has been stopped for 3 minutes and then set the SW6-1 to ON again.
6. Fully close the gas stop valve when the pressure on the gauge drops 7.1 - 0.0 psig (approximately 0.5 - 0.0 kgf/cm²)
7. Stop the air conditioner operation (SW6-1: OFF and SW6-2: OFF). Set the outdoor service switch SW6-5 from ON to OFF.
8. Turn off the power supply (circuit breaker).
 - If too much refrigerant has been added to the air conditioner system, the pressure may not drop to 7.1 psig (0.5 kgf/cm²). If this occurs, use a refrigerant collecting device to collect all of the refrigerant in the system, and then recharge the system with the correct amount of refrigerant after the indoor and outdoor units have been relocated.

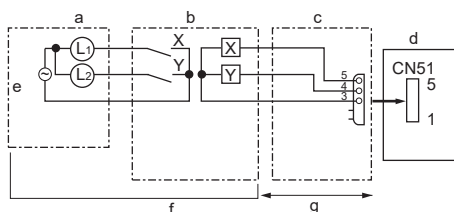
⚠ Warning:

- When pumping down the refrigerant, stop the compressor before disconnecting the refrigerant pipes. The compressor may burst and cause injury if any foreign substance, such as air, enters the system.
- Do not perform pump down work when there is a gas leak. The intake of air or other gases causes abnormally high pressure in the refrigeration cycle, which may cause explosion or injury.

9. Special Functions

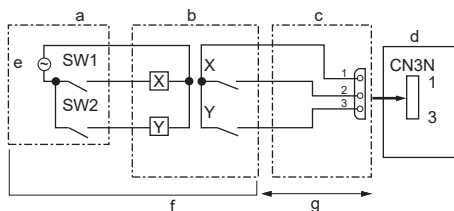
9-1. Outdoor unit input/output connector

■ State (CN51)



- a. Remote control panel
- b. Relay circuit
- c. External output adapter (PAC-SA88HA-E)
- d. Outdoor unit control board
- e. Output power supply
- f. Procure locally.
- g. Max. 32 ft [10 m]
- L1: Error display output
- L2: Compressor operation output
- X, Y: Relay (Coil rating: ≤ 0.9 W, 12 V DC)

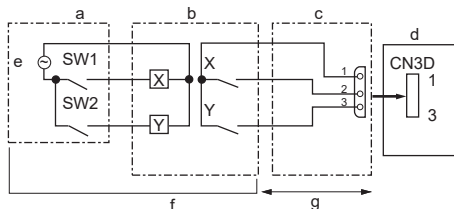
■ Auto change over (CN3N)



- a. Remote control panel
- b. Relay circuit
- c. External input adapter (PAC-SC36NA-E)
- d. Outdoor unit control board
- e. Relay power supply
- f. Procure locally.
- g. Max. 32 ft [10 m]
- SW1: Switch
- SW2: Switch
- X, Y: Relay (Contact rating: ≥ 0.1 A, 15 V DC)
- Minimum applicable load: ≤ 1 mA)

	ON	OFF
SW1	Heating	Cooling
SW2	Validating SW1	Invalidating SW1

■ Silent Mode (CN3D)



- a. Remote control panel
- b. Relay circuit
- c. External input adapter (PAC-SC36NA-E)
- d. Outdoor unit control board
- e. Relay power supply
- f. Procure locally.
- g. Max. 32 ft [10 m]
- SW1: Switch
- SW2: Switch
- X, Y: Relay (Contact rating: ≥ 0.1 A, 15 V DC)
- Minimum applicable load: ≤ 1 mA)

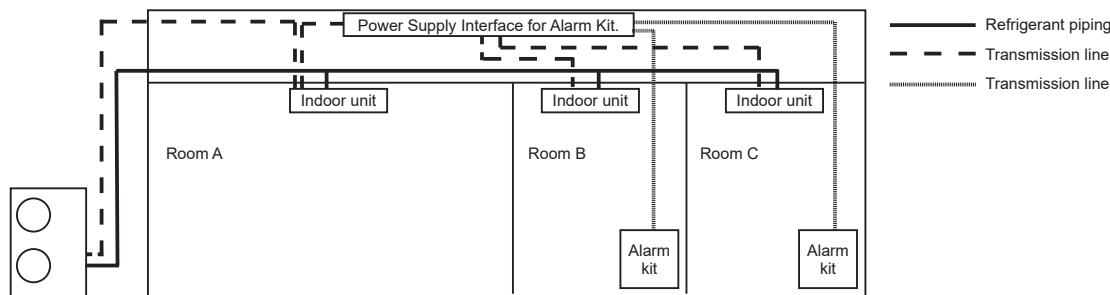
	SW1	SW2	Function
Silent mode	ON	-	Silent mode operation

9-2. Precautions when connecting the alarm kit

Connect the alarm kit to the Power Supply Interface for Alarm Kit. Maximum of 8 alarm kits can be connected to the Power Supply Interface for Alarm Kit. For installation details, refer to the manual of the alarm kit and Power Supply Interface for Alarm Kit. (Both are optional parts.)

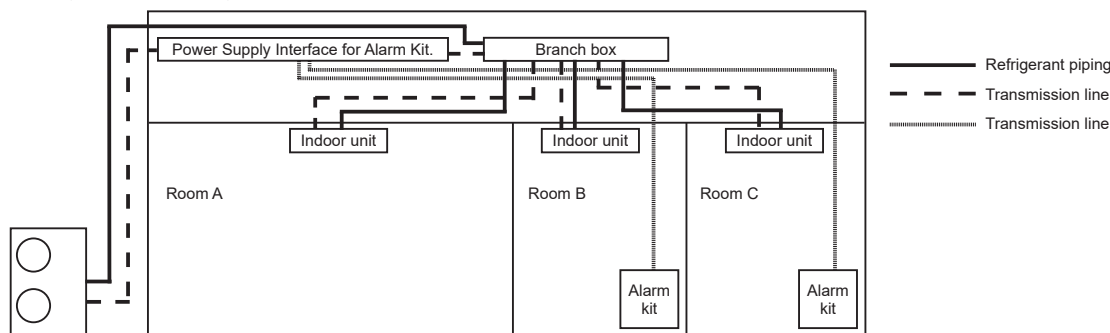
For City Multi system

- Install the Power Supply Interface for Alarm Kit above the indoor unit installed in the room where you want to install the alarm kit.
- If the indoor unit under the Power Supply Interface for Alarm Kit detects a refrigerant leak, all the alarm kits connected to the Power Supply Interface for Alarm Kit will go off.



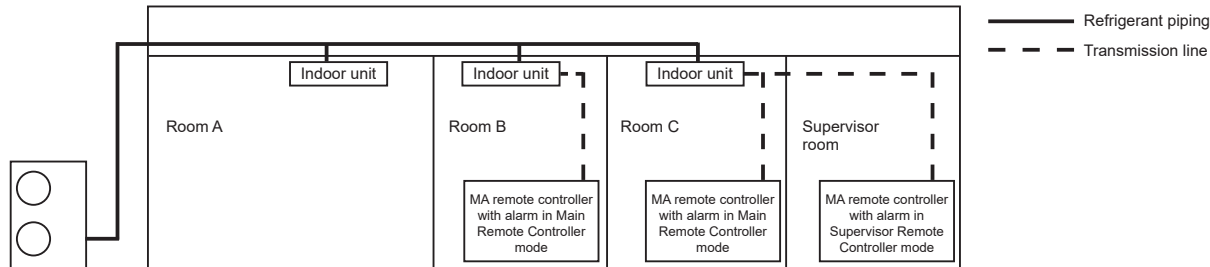
For branch box system

- Install the Power Supply Interface for Alarm Kit above the branch box connected to the indoor unit installed in the room where you want to install the alarm kit.
- If the indoor unit under the branch box to which Power Supply Interface for Alarm Kit is connected detects a refrigerant leak, all the alarm kits connected to the Power Supply Interface for Alarm Kit will go off.
- Only one Power Supply Interface for Alarm Kit can be connected per branch box.



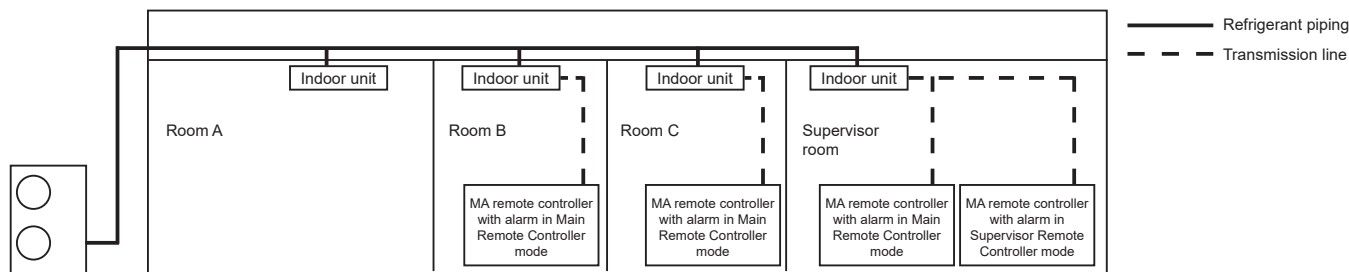
9-3. Precautions when connecting MA remote controller in Supervisor Remote Controller mode

- Install the supervisor alarm where required, such as in a hotel or hospital.
- The mode of the MA remote controller with alarm can be changed to the Main Remote Controller mode or Supervisor Remote Controller mode.
- For the setting when MA remote controller in Supervisor Remote Controller mode is connected, refer to the installation manual of the MA remote controller with alarm.



When the supervisor room also has an indoor unit with the same refrigerant system

- When the supervisor room also has an indoor unit with the same refrigerant system, set each MA remote controller to Supervisor Remote Controller mode and Main Remote Controller mode. Do not set both two MA remote controllers to Supervisor Remote Controller mode.
- Refer to the installation manual of the MA remote controller with alarm for details.



Supplier's Declaration of Conformity
47 CFR §2.1077 Compliance Information

Unique Identifier: MXZ-SM*NL(HZ)* series

Responsible Party - U.S. Contact Information
Mitsubishi Electric Trane HVAC US LLC
1340 Satellite Blvd, Suwanee, GA
30024
United States
+1-800-433-4822

FCC Compliance Statement
This device complies with part 18 of the FCC Rules.

This product is designed and intended for use in the residential, commercial and light-industrial environment.
Please be sure to put the contact address/telephone number on this manual before handing it to the customer.

mitsubishi electric corporation

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO100-8310, JAPAN