LG TOTAL HVAC SOLUTION PROVIDER

ENGINEERING PRODUCT DATA BOOK

SINGLE ZONE

Heat pump 60Hz/R410A

6CSL0-01B (Replaces 6CSL0-01A)

LG
Life's Good

SINGLE ZONE

- General Information
- Indoor Units
- Outdoor Units
- Design and installation

SINGLE ZONE
Introduction

Preface

New era brings more sophisticated and advanced buildings which in turn demands specialized and optimized direct expansion air conditioning systems. Also energy efficiency, environment friendly, low noise and low maintenance cost are the features which are essential for these systems.

As a part of vertical integration LG makes all the key components in house, which gives an edge to LG to make better and latest technology products with best quality in optimized time.

SINGLE ZONE systems with are equipped with DC inverter technology and R410A refrigerant is perfect solution to various installation locations.

LG **SINGLE ZONE** system consists of a single common outdoor unit for single indoor unit, such as ceiling cassette.

This Engineering product data book incorporates information about the product itself, its installation and designing for **SINGLE ZONE** system.

The comprehensive study of this book will improve your knowledge about the system and its application in details.

LG Electronics Inc.

Air Conditioning & Energy Solution Company

Step by step SINGLE ZONE system selection process (reference)

(1) **Calculate or obtain the maximum heat load for the area(s) to be air conditioned**

(2)

Indoor unit specifications

Outdoor unit specifications

Capacity coefficient factor

Air flow and temperature distributions

(3)

Selection of the control system

Control wiring method

Description of devices

(4)

Electrical wiring

Electrical characteristics

Field wiring

⚠CAUTION

1. Air conditioners should not be installed in areas where corrosive gases, such as acid gas or alkaline gas, are produced.
2. If the outdoor unit is installed close to the sea shore, direct exposure to the sea breeze should be avoided and choose an outdoor unit with anti-corrosion treatment.

SINGLE ZONE

Part 1 General information

1. Model Line up
2. Nomenclature
3. Individual Control System

SINGLE ZONE
1. Model Line up

1.1 Indoor Units

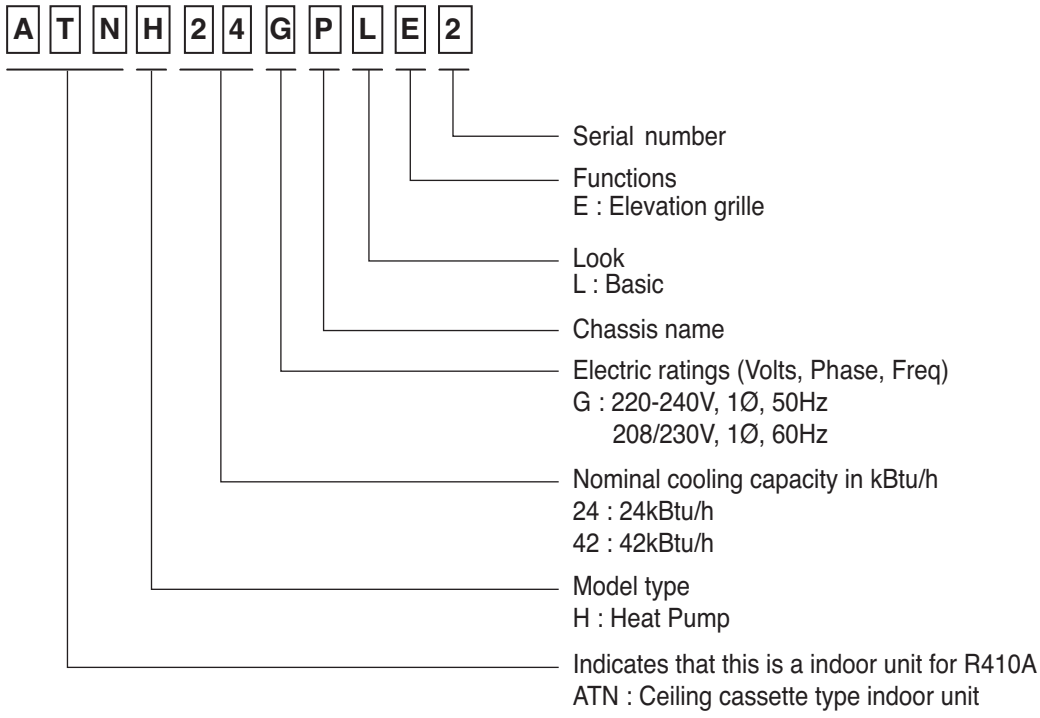
Category	Type	Chassis		Model Name	
				Capacity, Btu/h(kW)	
				24,000 (7.03)	42,000 (12.3)
Ceiling cassette	4way		TP	ATNH24GPLE2 [LCN247HV]	
			TM		ATNH42GMLE2 [LCN427HV]

1.2 Outdoor Units

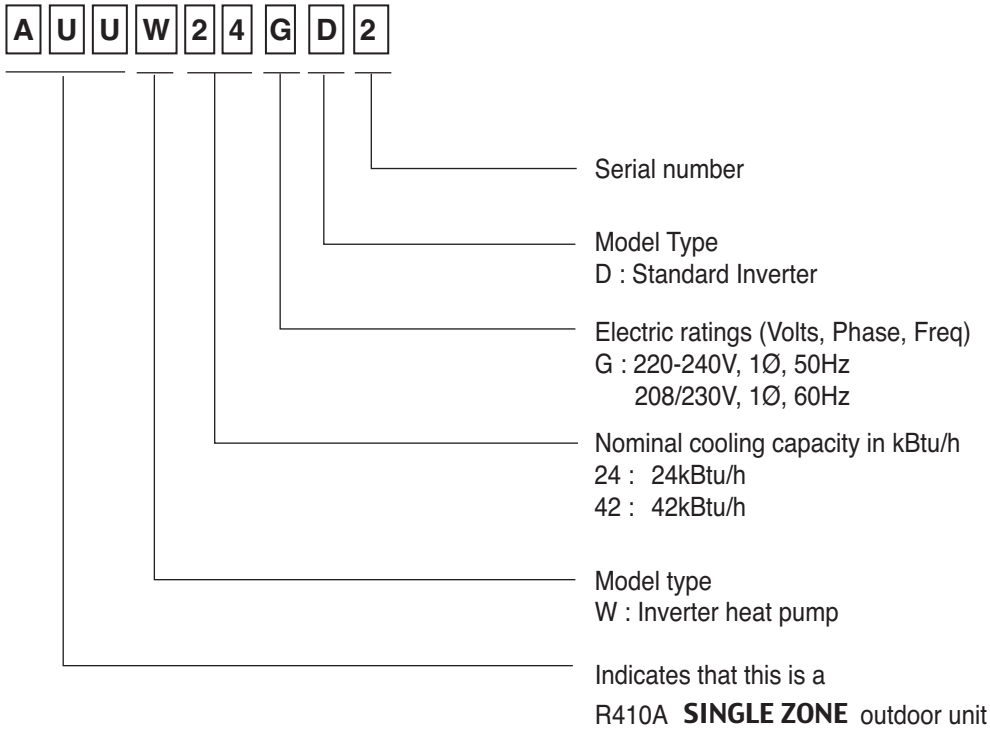
Nominal Capacity	Btu/h	24,000	42,000
	kW	7.03	12.3
Model Names		AUUW24GD2 [LUU247HV]	AUUW42GD2 [LUU427HV]
Power supply		208/230V, 1Ø, 60Hz	
Chassis			

SINGLE ZONE
2. Nomenclature

2.1 Indoor Units (Global)



2.2 Outdoor Units (Global)



3. Individual Control System

3.1 Control systems (standard)

These controllers will be provided with the respective indoor units.

Type	Individual controller	Applicable model
Wired remote controller	 PQRCVSL0QW	Ceiling cassette

SINGLE ZONE

Part 2 Product data

- Indoor units
- Outdoor units

SINGLE ZONE

■ Indoor units

Ceiling cassette 4-way

SINGLE ZONE
1. Ceiling cassette 4-way

1.1 List of functions

Category	Functions	ATNH24GPLE2 [LCN247HV] ATNH42GMLE2 [LCN427HV]
Air flow	Air supply outlet	4
	Airflow direction control (left & right)	X
	Airflow direction control (up & down)	Auto
	Auto swing (left & right)	X
	Auto swing (up & down)	O
	Airflow steps (fan/cool/heat)	4 / 5 / 4
	Chaos wind(auto wind)	O
	Jet cool/heat	O / X
	Swirl wind	O
Air purifying	Triple filter (Deodorizing)	X
	Plasma air purifier	PTPKM0
	Allergy Safe filter	X
	Long-life prefilter (washable / anti-fungus)	O
Installation	Drain pump	O
	E.S.P. control*	X
	Electric heater	X
	High ceiling operation*	O
	Auto Elevation Grille*	PTEGM0
Reliability	Hot start	O
	Self diagnosis	O
	Soft dry operation	O
Convenience	Auto changeover	O
	Auto cleaning	X
	Auto operation(artificial intelligence)	X
	Auto Restart	O
	Child lock*	O
	Forced operation	O
	Group control*	O
	Sleep mode	O
	Timer(on/off)	O
	Timer(weekly)*	O
	Two thermistor control*	O
Individual control	Wired remote controller	O
	Deluxe wired remote controller	PQRCUDS0 / PQRCUDS0B / PQRCUDS0S
	Simple wired remote controller	PQRCVCL0Q / PQRCVCL0QW
	Simple Wired remote controller(for hotel use)	PQRCHCA0Q / PQRCHCA0QW
	Wireless remote controller	PQWRHDF0
CAC network function	General central controller (Non LGAP)	X
	Network Solution(LGAP)	O
	Dry contact	PQDSA(1) / PQDSB(1)/PQDSBC / PQDSBNGCM1
	PI 485(for Indoor Unit)	X
Special function kit	Zone controller	X
	CTI(Communication transfer interface)	X
	Electronic thermostat	X
Others	Remote temperature sensor	PQRSTA0
	Telecom shelter controller	X

Note

1. * : These functions need to connect the wired remote controller.

O : Applied X : Not applied

Accessory model name : Installed at field, ordered and purchased separately by the corresponding model name, supplied with separate package.

1. Ceiling cassette 4-way

1.2 Specifications

Model Name				ATNH24GPLE2 [LCN247HV]	ATNH42GMLE2 [LCN427HV]
Power Supply			V, Ø, Hz	208/230, 1, 60	208/230, 1, 60
Power Input			W	60	120
Running Current			A	0.60	1.00
Casing Color			-	-	-
Dimensions	Body	W x H x D	mm	840 × 204 × 840	840 × 288 × 840
		W x H x D	inch	33-1/16 x 8-1/32 x 33-1/16	33-1/16 x 11-11/32 x 33-1/16
Net Weight	Body		kg (lbs)	20.5 (45.2)	24.6 (54.2)
Heat Exchanger	(Row x Column x Fins per inch) x No.		-	(2 x 8 x 19) x 1	(2 x 12 x 21) x 1
	Face Area		m^2 (ft^2)	0.35 (3.77)	0.53 (5.65)
Fan	Type		-	Turbo Fan	Turbo Fan
	Air Flow Rate	H / M / L	m^3/min	17.0 / 15.0 / 13.0	30.0 / 28.0 / 26.0
		H / M / L	ft^3/min	600 / 530 / 459	1,060 / 989 / 918
Fan Motor	Type		-	BLDC	BLDC
	Output		W x No.	60 x 1	124 x 1
Dehumidification Rate			*l* /h (pts/h)	2.4 (5.1)	3.6 (7.7)
Sound Pressure Level		H / M / L	dB(A)	38 / 36 / 34	46 / 44 / 40
Sound Power Level			dB(A)	57	65
Piping Connections	Liquid		mm(inch)	Ø 9.52 (3/8)	Ø 9.52 (3/8)
	Gas		mm(inch)	Ø 15.88 (5/8)	Ø 15.88 (5/8)
	Drain (O.D. / I.D.)		mm(inch)	Ø 32.0(1-1/4) / 25.0(31/32)	Ø 32.0(1-1/4) / 25.0(31/32)
Safety Devices			-	Fuse	Fuse
			-	Thermal Protector for Fan Motor	Thermal Protector for Fan Motor
Power and Communication Cable (included Earth)			No. x mm^2 (AWG)	4C x 0.75 (18)	4C x 0.75 (18)
Decoration Panel	Model Name		-	PT-UMC	PT-UMC
	Casing Color		-	Morning Fog	Morning Fog
	Dimensions	W x H x D	mm	950 × 25 × 950	950 × 25 × 950
		W x H x D	inch	37-13/32 x 31/32 x 37-13/32	37-13/32 x 31/32 x 37-13/32
	Net weight		kg (lbs)	5.0 (11.0)	5.0 (11.0)

Notes :

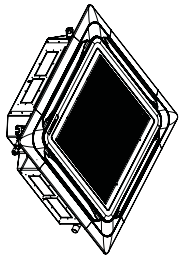
1. Wiring cable size must comply with the applicable local and national code.
2. Due to our policy of innovation some specifications may be changed without notification.
3. Sound Level Values are measured at Anechoic chamber.
   Therefore, these values can be increased owing to ambient conditions during operation.
4. Acceptable operating voltage: 187V-253V

1. Ceiling cassette 4-way

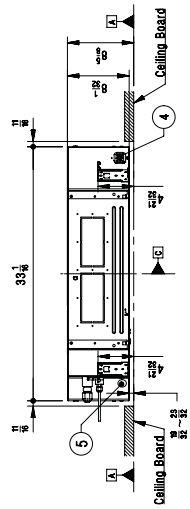
1.3 Dimensions

TP Chassis

ATNH24GPLE2 [LCN247HV]

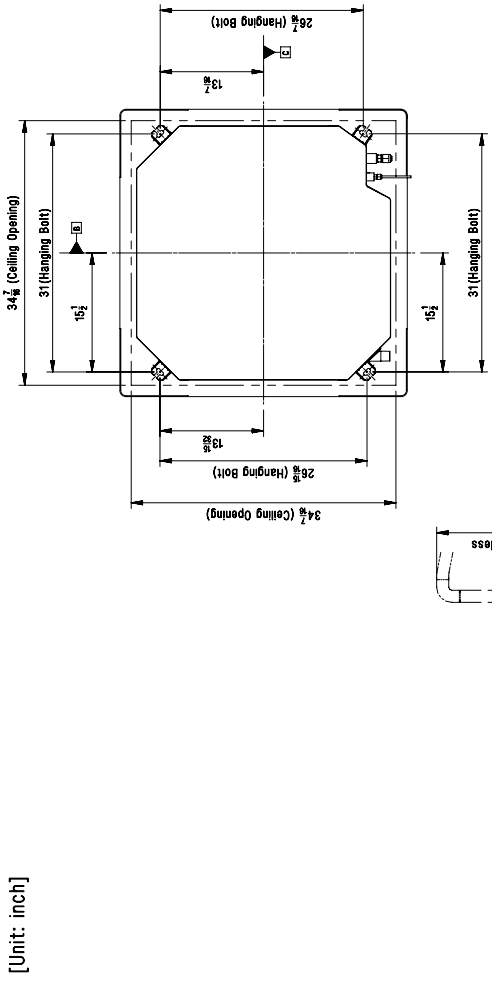


3D VIEW



Installation position of body

No.	Part Name	Description
10	Flexible Drain Hose	Supplied with product
9	Decoration Corner Cover	Supplied with panel
8	Decoration Panel (Accessory)	PT-UMC
7	Air Outlet	-
6	Air Inlet	-
5	Wired remote controller wire routing hole	-
4	Power and communication cable routing hole	-
3	Drain Pipe Connection	-
2	Liquid Pipe Connection	-
1	Gas Pipe Connection	-



[Unit: inch]

Symbols

- Datum line
- Refrigerant/Drain Piping Direction

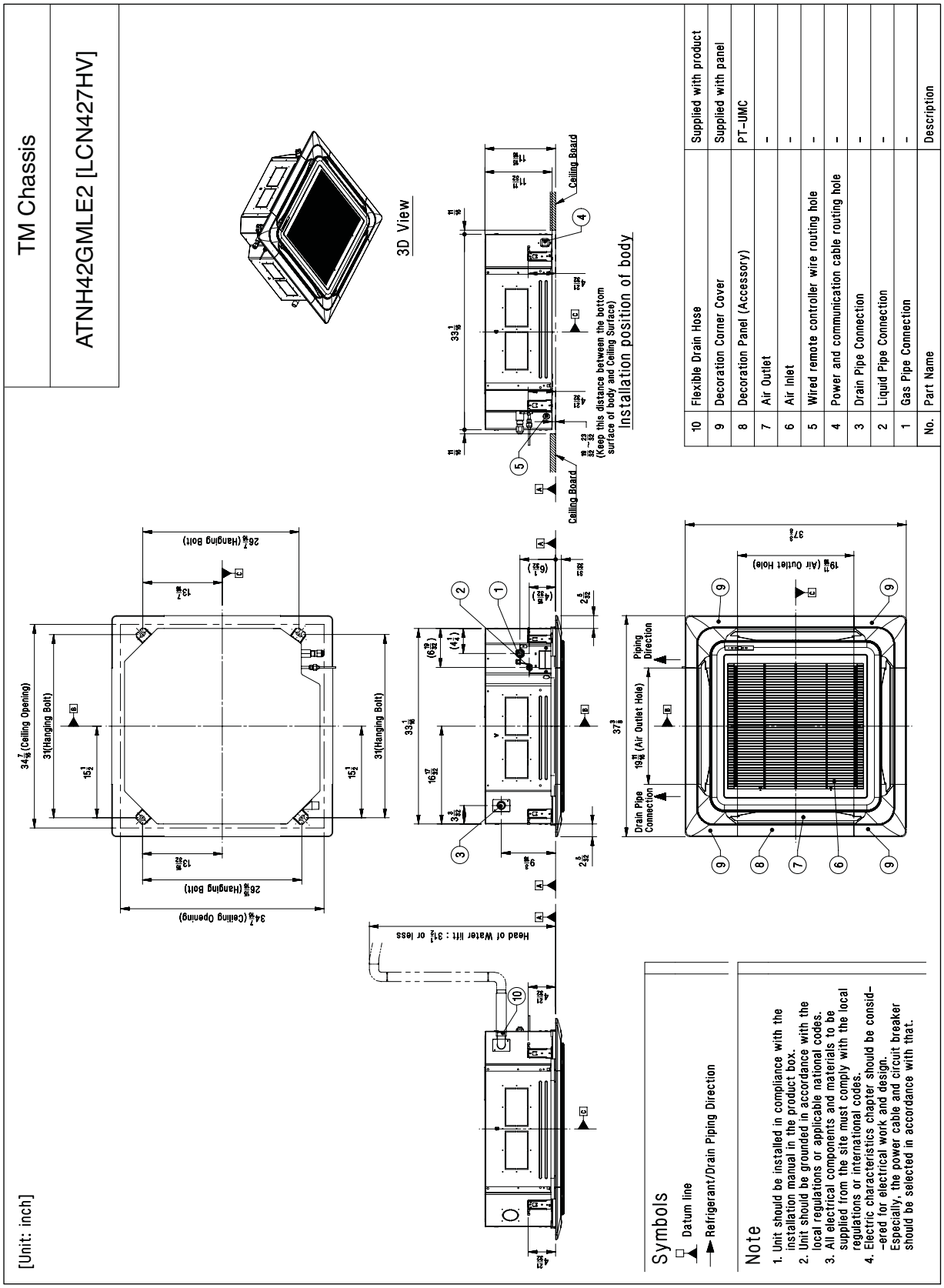
Note

1. Unit should be installed in compliance with the installation manual in the product box.
2. Unit should be grounded in accordance with the local regulations or applicable national codes.
3. All electrical components and materials to be supplied from the site must comply with the local regulations or international codes.
4. Electric characteristics chapter should be consid-ered for electrical work and design. Especially, the power cable and circuit breaker should be selected in accordance with that.

1. Ceiling cassette 4-way

TM Chassis

ATNH42GMLE2 [LCN427HV]



No.	Part Name	Description
10	Flexible Drain Hose	Supplied with product
9	Decoration Corner Cover	Supplied with panel
8	Decoration Panel (Accessory)	PT-UMC
7	Air Outlet	-
6	Air Inlet	-
5	Wired remote controller wire routing hole	-
4	Power and communication cable routing hole	-
3	Drain Pipe Connection	-
2	Liquid Pipe Connection	-
1	Gas Pipe Connection	-

Symbols

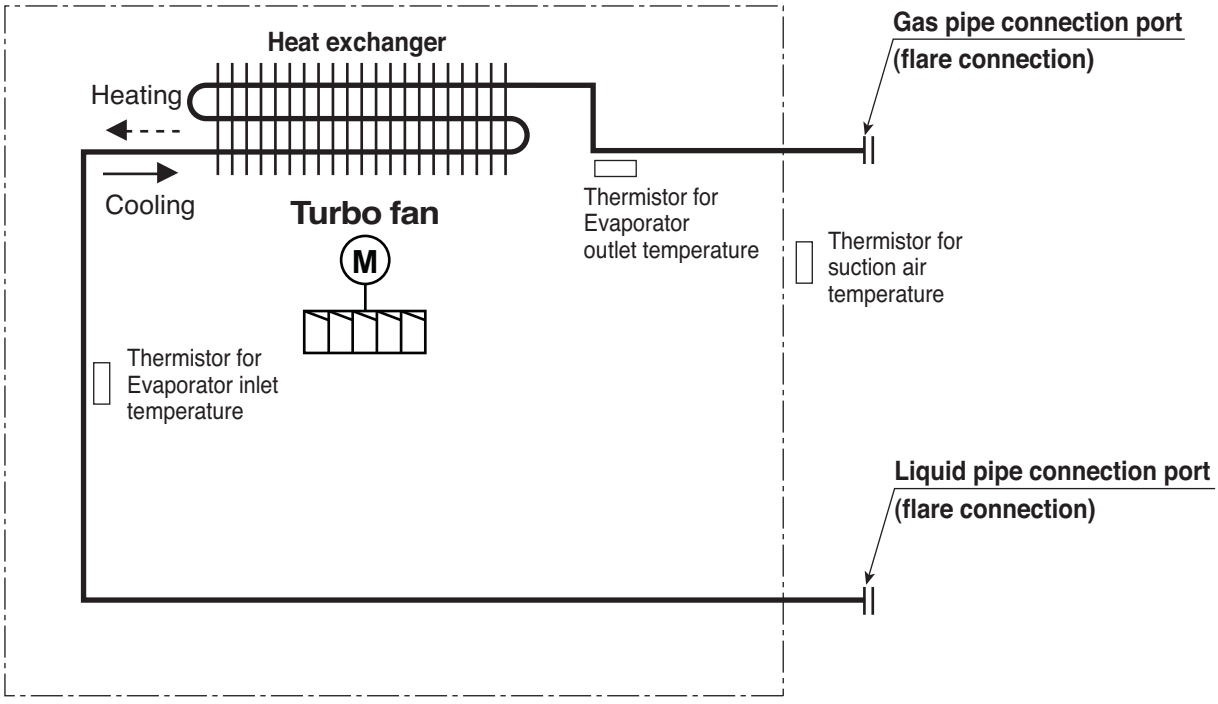
- Datum line
- Refrigerant/Drain Piping Direction

Note

1. Unit should be installed in compliance with the installation manual in the product box.
2. Unit should be grounded in accordance with the local regulations or applicable national codes.
3. All electrical components and materials to be supplied from the site must comply with the local regulations or international codes.
4. Electric characteristics chapter should be considered for electrical work and design. Especially, the power cable and circuit breaker should be selected in accordance with that.

[Unit: inch]

1.4 Piping diagrams



Description	PCB Connector
Thermistor for suction air temperature	CN-ROOM
Thermistor for evaporator inlet temperature	CN-PIPE / IN
Thermistor for evaporator outlet temperature	CN-PIPE / OUT

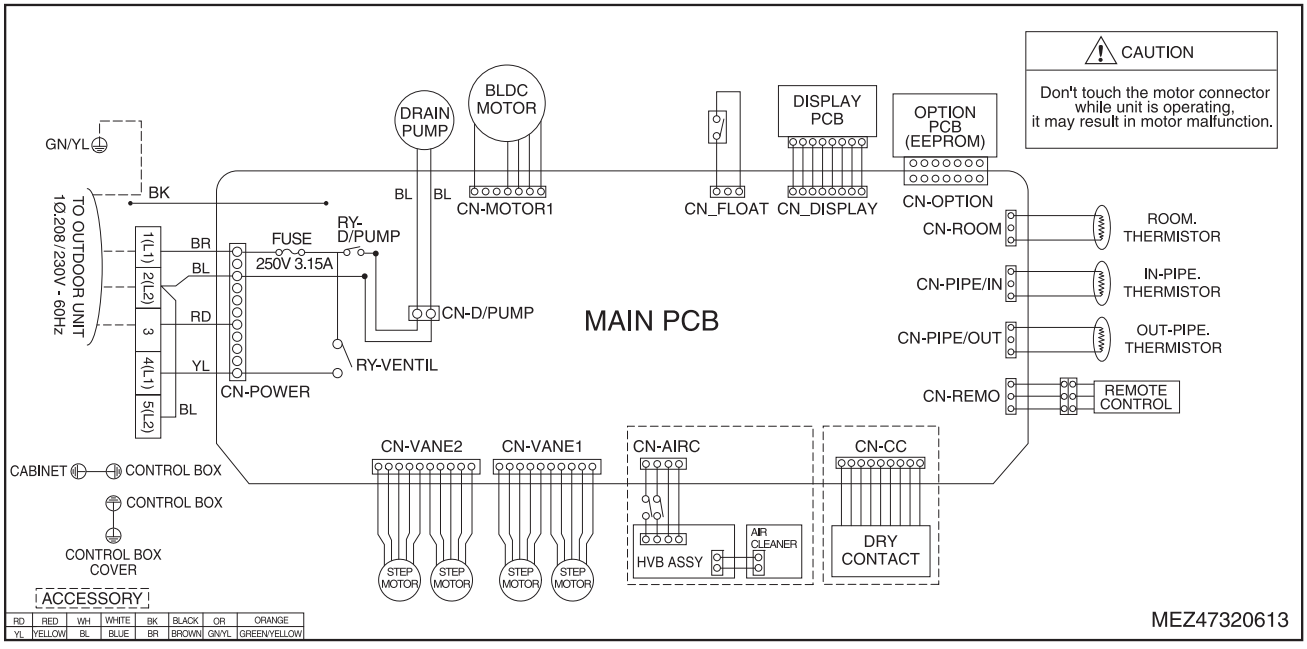
■ Refrigerant pipe connection port diameters

[Unit:mm(inch)]

Model	Gas	Liquid
ATNH24GPLE2 [LCN247HV]	Ø15.88(5/8)	Ø9.52(3/8)
ATNH42GMLE2 [LCN427HV]		

1.5 Wiring diagrams

Models : ATNH24GPLE2 [LCN247HV] / ATNH42GMLE2 [LCN427HV]

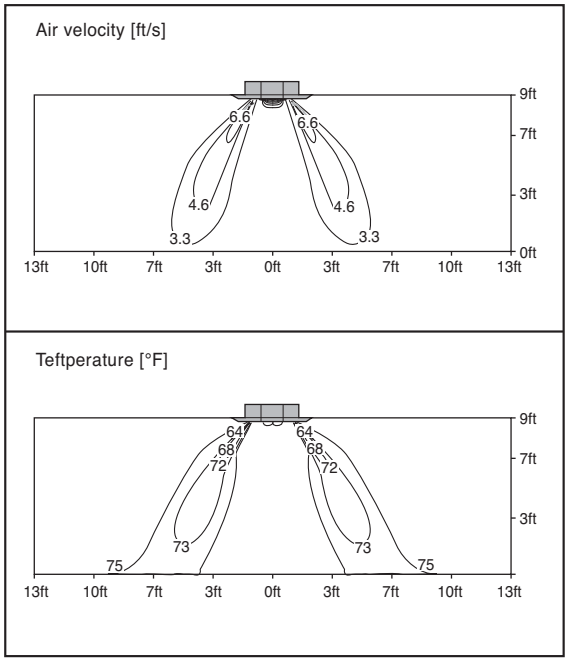


1.6 Air flow and temperature distributions (reference data)

Models : ATNH24GPLE2 [LCN247HV]

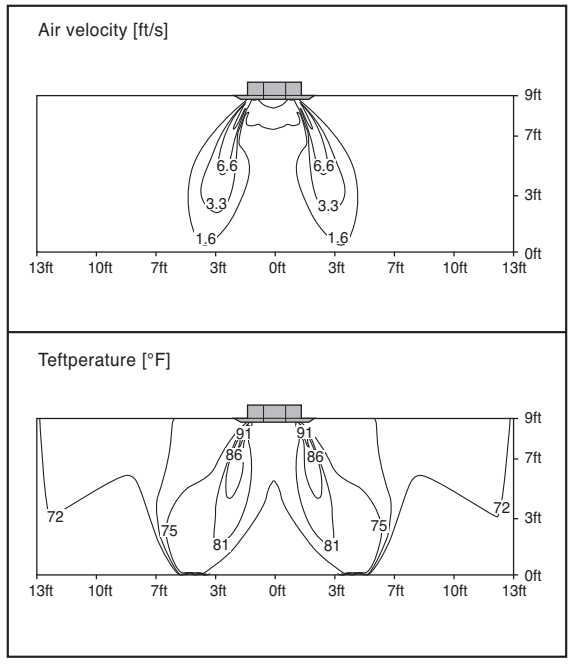
Cooling

Discharge angle: 40°



Heating

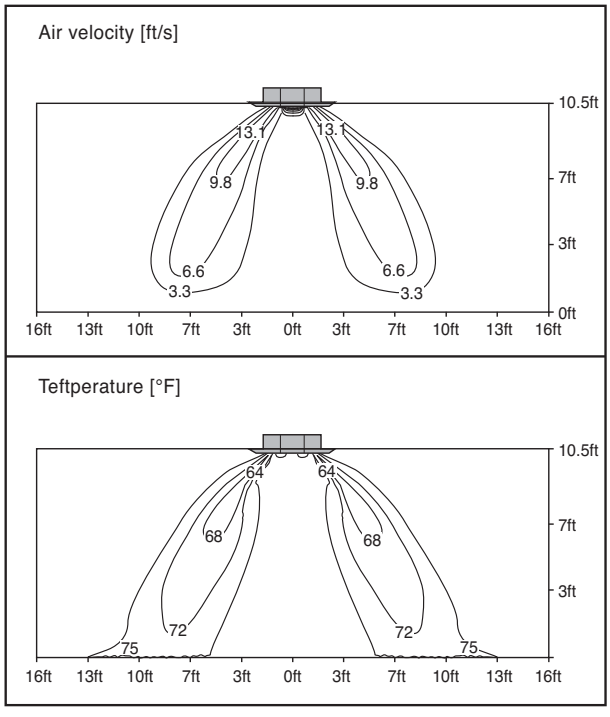
Discharge angle: 50°



Models : ATNH42GMLE2 [LCN427HV]

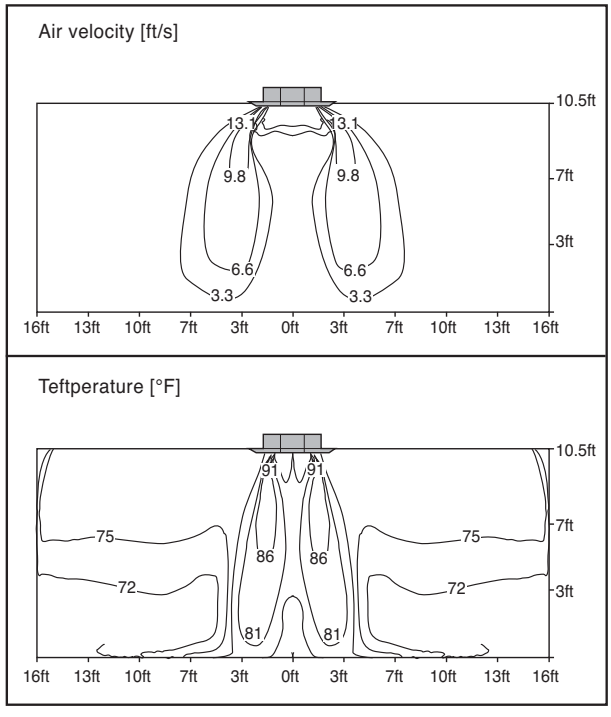
Cooling

Discharge angle: 40°



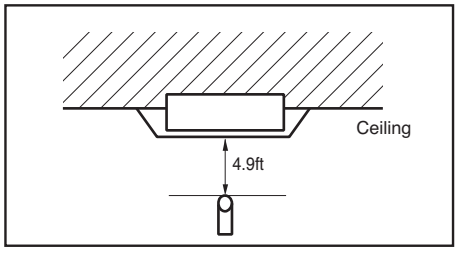
Heating

Discharge angle: 50°



1.7 Sound levels

Overall



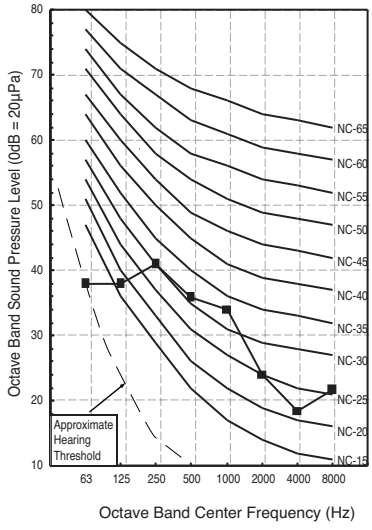
Notes:

- Sound measured at 4.9ft away from the center of the unit.
- Data is valid at free field condition.
- Data is valid at nominal operation condition.
- Reference accoustic pressure 0dB=20μPa.
- Sound level will vary depending on a range of factors such as the construction(acoustic absorption coefficient) of particular room in which the equipment is installed.
- The operating conditions are assumed to be standard.

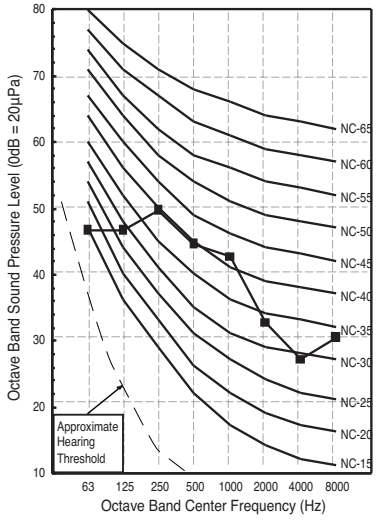
Model	Sound pressure Levels [dB(A)]		
	H	M	L
ATNH24GPLE2 [LCN247HV]	38	36	34
ATNH42GMLE2 [LCN427HV]	46	44	40

Sound pressure level

ATNH24GPLE2 [LCN247HV]



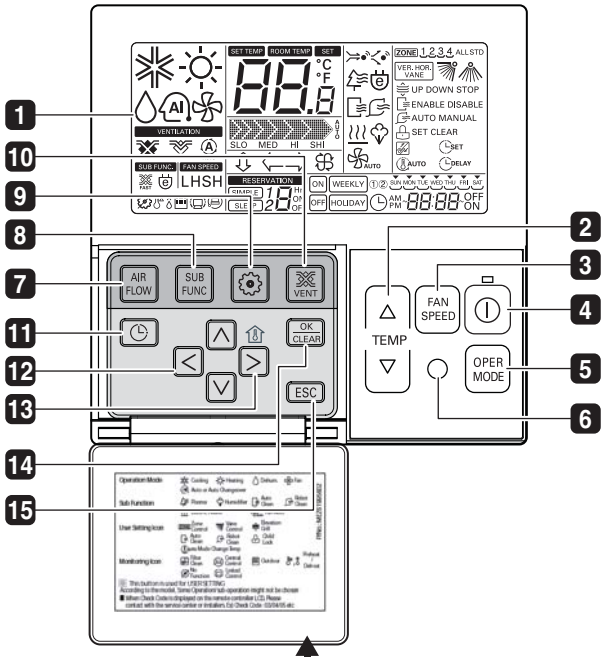
ATNH42GMLE2 [LCN427HV]



1.8 Controller

Wired remote controller

Model name : PQRCVSL0QW (White Color_Supplied) / PQRCVSL0 (Black Color_Accessory)



Please attach the inform label inside of the door.
Please choose proper language depend on your country.

1 **OPERATION INDICATION SCREEN**

2 **SET TEMPERATURE Button**

3 **FAN SPEED Button**

4 **ON/OFF Button**

5 **OPRATION MODE SELECTION Button**

6 **WIRELESS REMOTE CONTROLLER RECEIVER**
• Some products don't receive the wireless signals.

7 **AIR FLOW Button**

8 **SUBFUNCTION Button**

9 **FUNCTION SETTING Button**

10 **VENTILATION Button**

11 **RESERVATION**

12 **UP,DOWN,LEFT,RIGHT Button**
• To check the indoor temperature, press button.

13 **ROOM TEMPERATURE Button**

14 **SETTING/CANCEL Button**

15 **EXIT Button**

❊ Some functions may not be operated and displayed depending on the product type.

Note :

❊ Display temperature can be different from actual room temperature if the remote controller is installed at the place where sun-rays are falling directly or the place nearby heat source.
❊ The actual product can be different from above contents depending upon model type.
❊ When using simultaneous operation system, whenever press remote controller button, system will approximately operate after 1~2 minutes.

SINGLE ZONE

■ Outdoor units

DC Inverter SINGLE ZONE

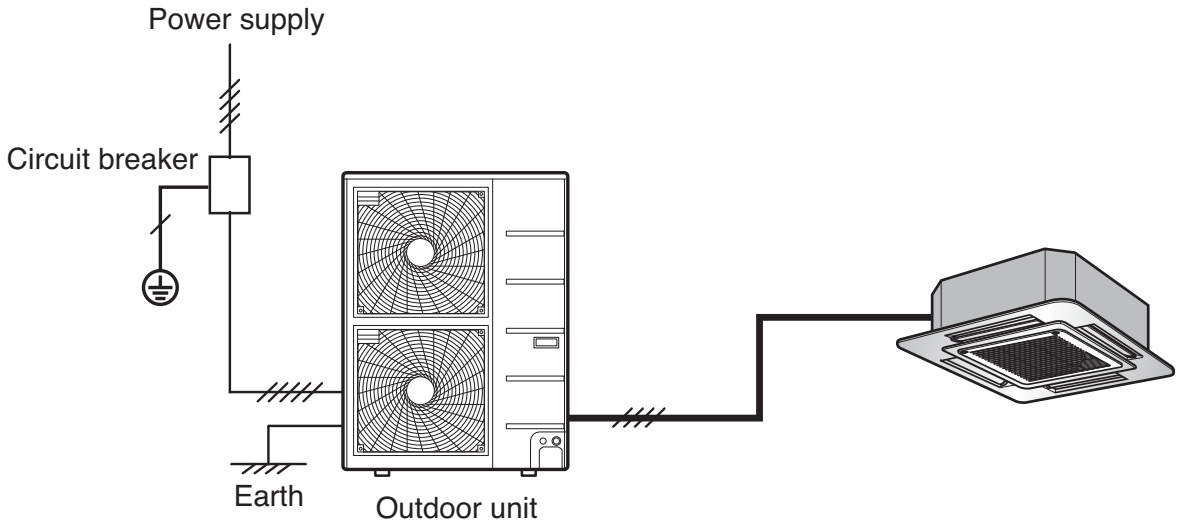
1. DC Inverter SINGLE ZONE

1.1 Power supply

Type	Outdoor unit	Capacity (kBtu/h)	Circuit breaker capacity	Power supply	Voltage range
1Phase Inverter	AUUW24GD2 [LUU247HV]	24.0	30A	208/230V, 1Ø, 60Hz	MIN.:187 MAX.:253
	AUUW42GD2 [LUU427HV]	42.0	40A		

External wiring procedure

- The power supply work is needed only to the outdoor unit. The power supply to the BD unit and the indoor unit is conducted through the communication wiring. Therefore, the power supply work can be carried out at just one place of the outdoor unit. It will simplify the work procedure and save cost.
- Wiring cable size must comply with the applicable local and national codes.



1.2 List of functions

Category	Functions	AUUW24GD2 [LUU247HV]	AUUW42GD2 [LUU427HV]
Reliability	Defrost / Deicing	O	O
	High pressure switch	X	X
	Low pressure switch	X	X
	Phase protection	X	X
	Restart delay (3-minutes)	O	O
	Self diagnosis	O	O
	Soft start	O	O
Convenience	Test function	X	X
	Night Silent Operation	O	O
	Wiring Error Check	X	X
	Peak Control	O	O
	Mode Lock	O	O
	Forced Operation (Outdoor Unit)	O	O
Network function	Network soluation(LGAP)	O	O

Device		AUUW24GD2 [LUU247HV]	AUUW42GD2 [LUU427HV]
Central Controller	Simple Controller	X	X
	Function controller	X	X
	Function Scheduler	X	X
	AC Ez	PQCSZ250S0	PQCSZ250S0
	AC Smart II	PQCSW320A1E	PQCSW320A1E
	Option Kit (SD card type)	PQCSE341A0 / PQCSE342A0	PQCSE341A0 / PQCSE342A0
	ACP(Advanced Control Platform)	PQCPA11A0E / PQCPB11A0E	PQCPA11A0E / PQCPB11A0E
	AC Manager	X	X
	PI485	PMNFP14A0/PMNFP14A1	PMNFP14A0/PMNFP14A1
	DO(Digital Output) Kit	PQNFP00T0	PQNFP00T0
BNU (Building Network Unit)	LONWORKS Gateway	PQNFB16A1	PQNFB16A1
	BACnet Gateway	PQNFB17B0	PQNFB17B0
Installation	Y branch	X	X
	Header branch	X	X
	Air Guide	X	X
ODU Dry Contact		X	PQDSBCDVM0
Low Ambient Kit		O (Logical operation)	O (Logical operation)

[Note]
• O: Applied, • X: Not applied
Accessory model name : Installed at field, ordered and purchased separately by the corresponding model name, supplied with separate package.

1.3 Specifications

Combination	Outdoor unit			AUUW24GD2 [LUU247HV]	AUUW42GD2 [LUU427HV]
	Indoor unit			ATNH24GPLE2 [LCN247HV]	ATNH42GMLE2 [LCN427HV]
Capacity	Cooling	Min.~Rated~Max.	kW	2.84 ~ 7.03 ~ 7.81	5.00 ~ 12.3 ~ 13.8
		Min.~Rated~Max.	Btu/h	9,700 ~ 24,000 ~ 26,700	17,100 ~ 42,000 ~ 47,100
	Heating	Min.~Rated~Max.	kW	3.20 ~ 7.91 ~ 8.80	5.00 ~ 13.8 ~ 15.4
		Min.~Rated~Max.	Btu/h	10,900 ~ 27,000 ~ 30,000	17,100 ~ 47,000 ~ 52,600
Power Input	Cooling	Rated	kW	1.91	4.07
	Heating	Rated	kW	2.60	4.05
Running Current	Cooling	Rated	A	10.5	19.0
	Heating	Rated	A	14.2	22.0
EER / COP			Btu/h·W	12.56 / -	10.31 / -
SEER / HSPF			Btu/h·W	17.00 / 9.70	17.00 / 8.60

Note :

1. All data are based on the following conditions:
   - Cooling Temperature : Indoor 27°C(80.6°F) DB / 19°C(66.2°F) WB
     Outdoor 35°C(95°F) DB / 24°C(75.2°F) WB
   - Heating Temperature : Indoor 20°C(68°F) DB / 15°C(59°F) WB
     Outdoor 7°C(44.6°F) DB / 6°C(42.8°F) WB
   - Piping Length : Interconnected Pipe Length = 7.6m(25ft)
   - Difference Limit of Elevation (Outdoor ~ Indoor Unit) is Zero.
2. Due to our policy of innovation some specifications may be changed without notification.

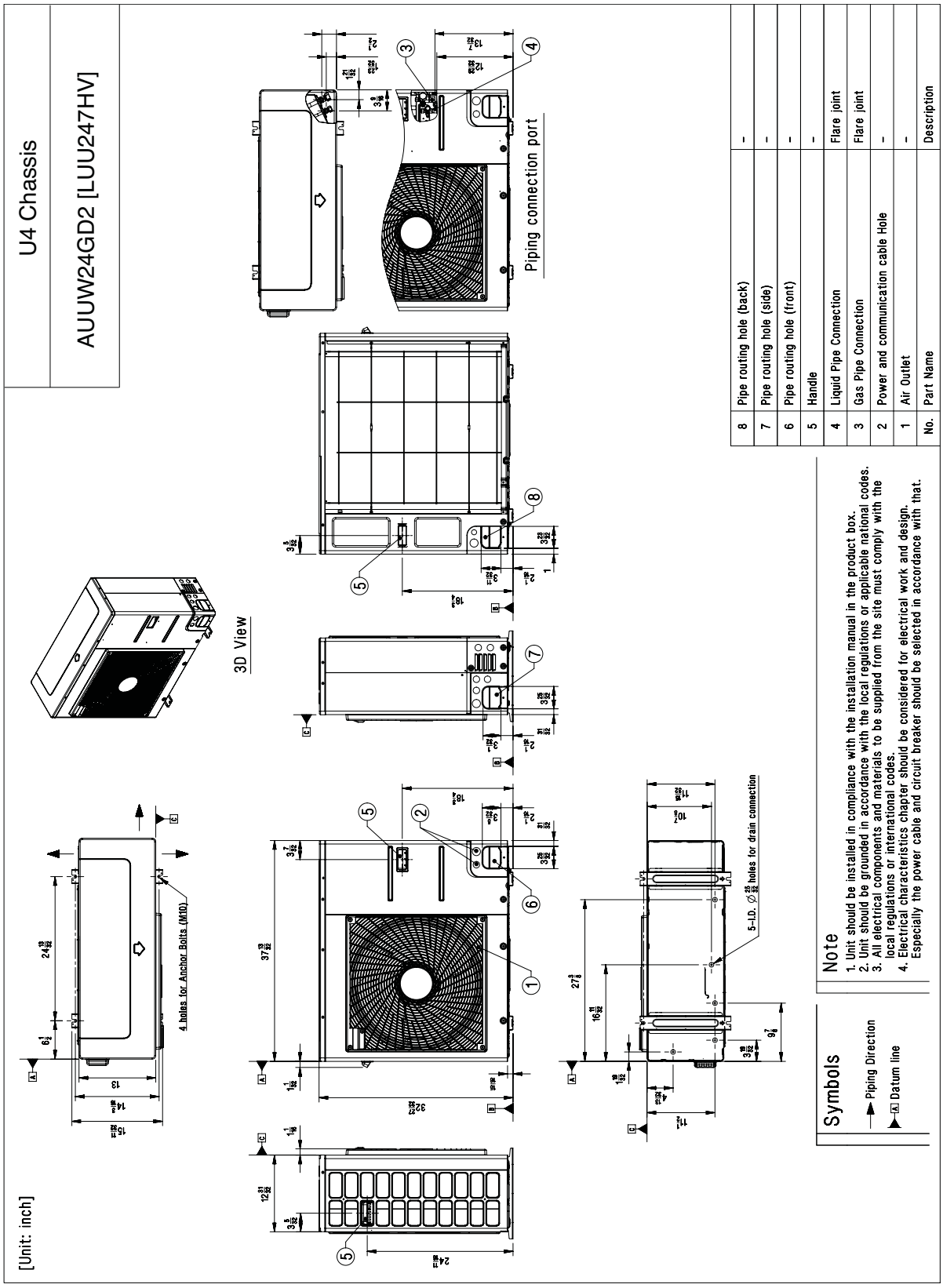
1. DC Inverter SINGLE ZONE

Model Name				AUUW24GD2 [LUU247HV]	AUUW42GD2 [LUU427HV]
Power Supply			V , Ø , Hz	208/230, 1, 60	208/230, 1, 60
Starting Current	Cooling	Max.	A	-	-
	Heating	Max.	A	-	-
Wiring Connections	Power Supply Cable (included Earth)		No. x mm² (AWG)	3C x 2.5 (12)	3C x 5.0 (10)
Casing Color			-	Warm Gray	Warm Gray
Dimensions		W x H x D	mm	950 × 834 × 330	950 × 1,380 × 330
		W x H x D	inch	37-13/32 x 32-27/32 x 13	37-13/32 x 54-11/32 x 13
Net Weight			kg (lbs)	60.0 (132.3)	92.0 (202.8)
Compressor	Type		-	Twin Rotary	Twin Rotary
	Model		Model x No.	GJT240MAA x 1	GPT442MBA x 1
	Motor type		-	BLDC	BLDC
	Motor Output		W x No.	2,137 x 1	4,000 x 1
Refrigerant	Type		-	R410A	R410A
	Precharged Amount		g (oz)	2,000 (70.5)	3,400 (119.9)
	Chargeless-Pipe Length		m (ft)	7.6 (25.0)	7.6 (25.0)
	Additional Charging Volume		g/m (oz/ft)	40 (0.43)	40 (0.43)
	Control		-	Electronic Expansion Valve	Electronic Expansion Valve
Refrigerant Oil	Type		-	FVC68D	FVC68D
	Charged volume		cc x No.	900 x 1	1,300 x 1
Heat Exchanger	(Row x Column x Fins per inch) x No.		-	(2 x 38 x 14) x 1	(2 x 32 x 14) x 2
Fan	Type		-	Propeller	Propeller
	Air Flow Rate		m³/min(ft³/min) x No.	58(2,048) x 1	55(1,942) x 2
Fan Motor	Type			BLDC	BLDC
	Output		W x No.	124.0 x 1	124.0 x 2
Sound Pressure Level	Cooling	Rated	dB(A)	48	52
	Heating	Rated	dB(A)	52	54
Sound Power Level		Rated	dB(A)	62	67
Piping Connections	Liquid	Outer Dia.	mm(inch)	Ø 9.52 (3/8)	Ø 9.52 (3/8)
	Gas	Outer Dia.	mm(inch)	Ø 15.88 (5/8)	Ø 15.88 (5/8)
Piping Length		Max.	m (ft)	50 (164.0)	75 (246.1)
Maximum Height Difference	Outdoor Unit ~ Indoor Unit	Max.	m (ft)	30 (98.4)	30 (98.4)
Operation Range (Outdoor Temperature)	Cooling	Min. ~ Max.	°C DB (°F DB)	-15 (5.0) ~ 48 (118.4)	-15 (5.0) ~ 48 (118.4)
	Heating	Min. ~ Max.	°C WB (°F WB)	-18 (-0.4) ~ 18 (64.4)	-18 (-0.4) ~ 18 (64.4)

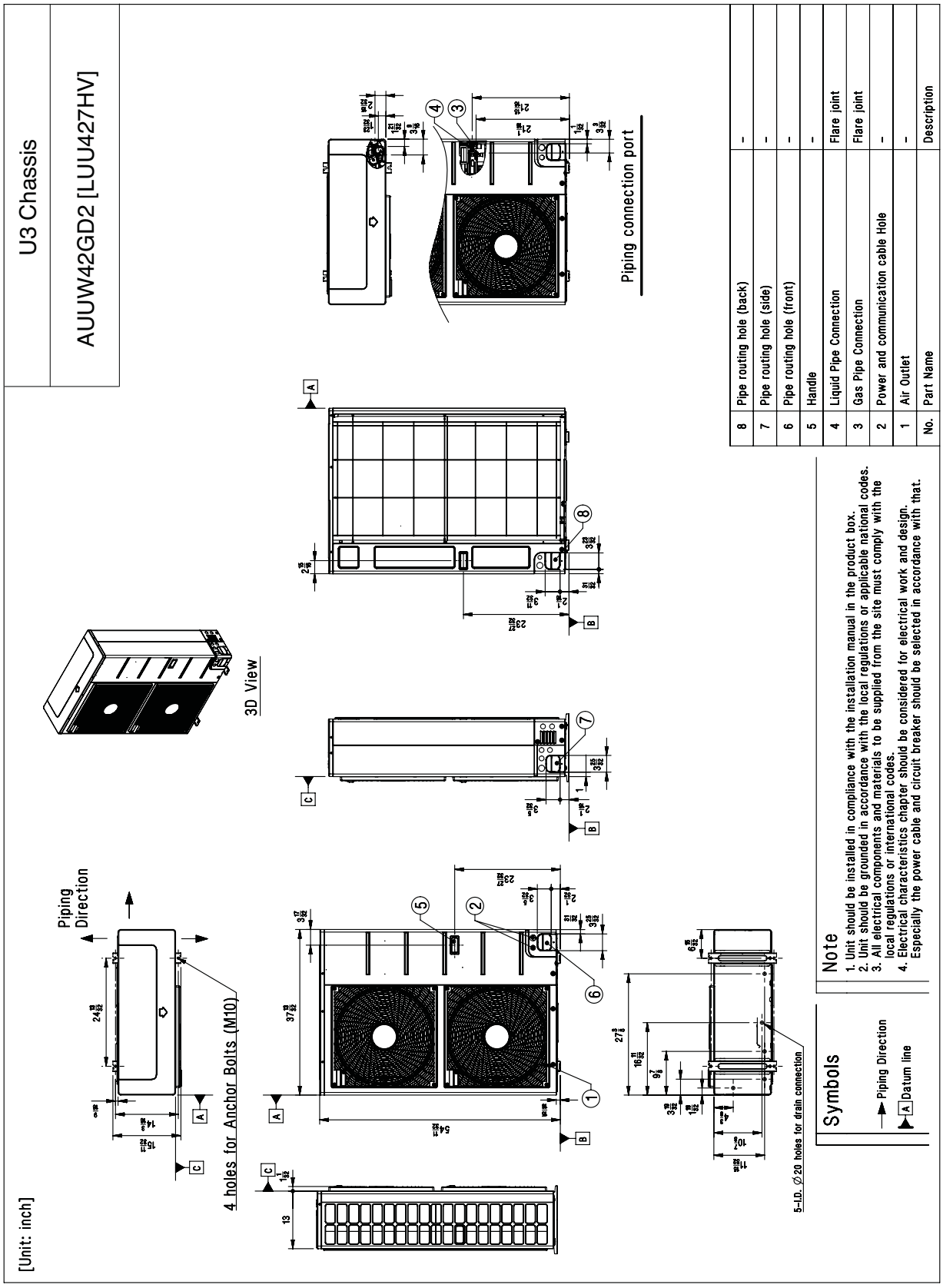
Note :

1. Wiring cable size must comply with the applicable local and national code.
2. Due to our policy of innovation some specifications may be changed without notification.
3. Sound Level Values are measured at Anechoic chamber.
   Therefore, these values can be increased owing to ambient conditions during opration.
4. For detailed electrical information, please refer to electric characteristics.

1.4 Dimensions

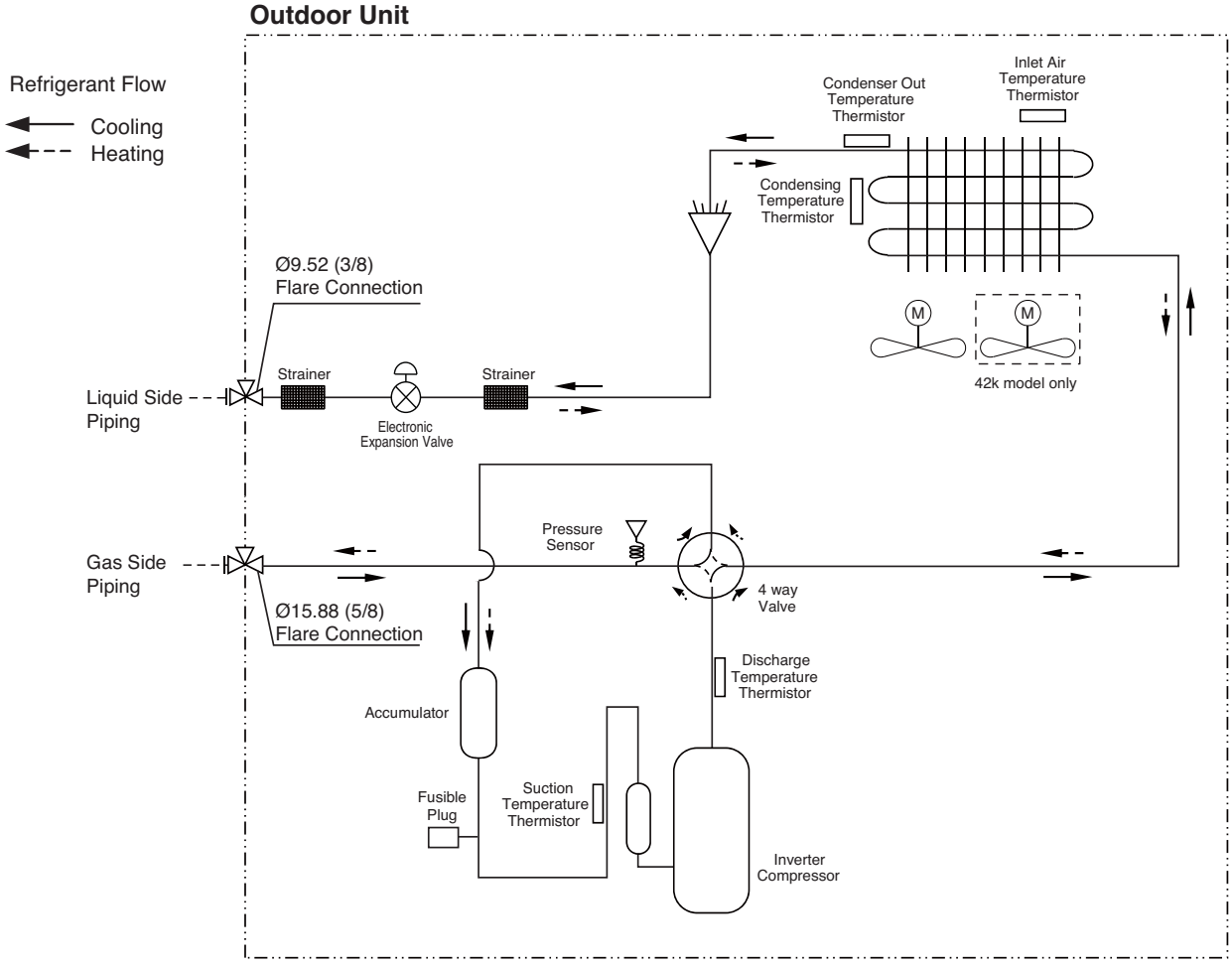


1. DC Inverter SINGLE ZONE



No.	Part Name	Description
8	Pipe routing hole (back)	-
7	Pipe routing hole (side)	-
6	Pipe routing hole (front)	-
5	Handle	-
4	Liquid Pipe Connection	Flare joint
3	Gas Pipe Connection	Flare joint
2	Power and communication cable Hole	-
1	Air Outlet	-

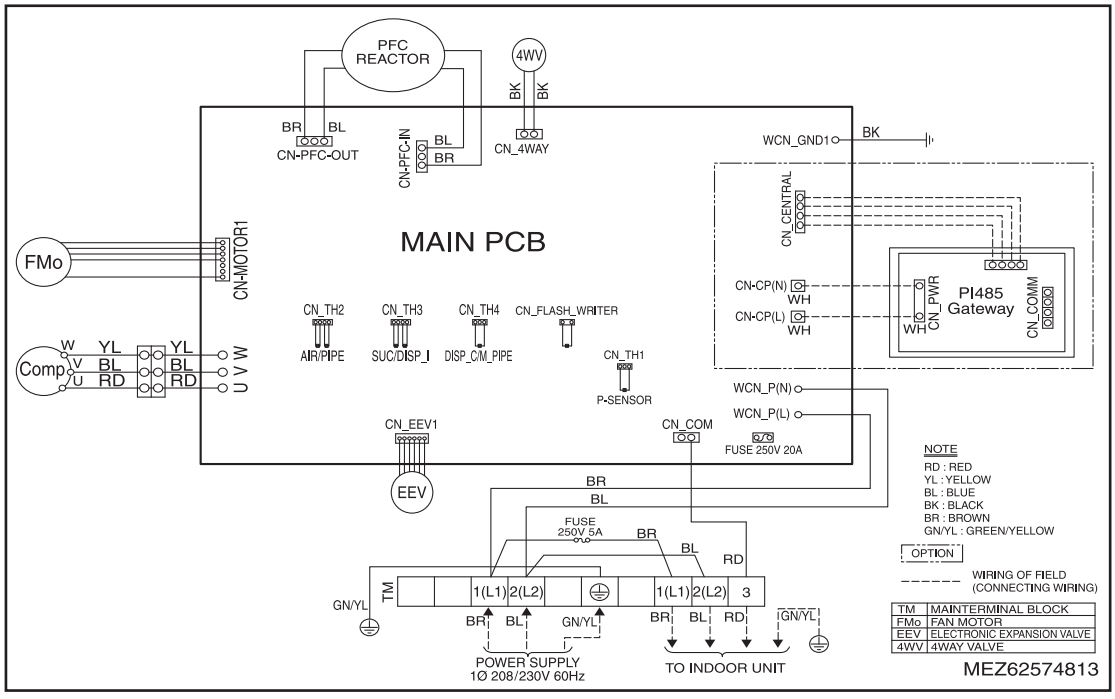
1.5 Piping diagrams



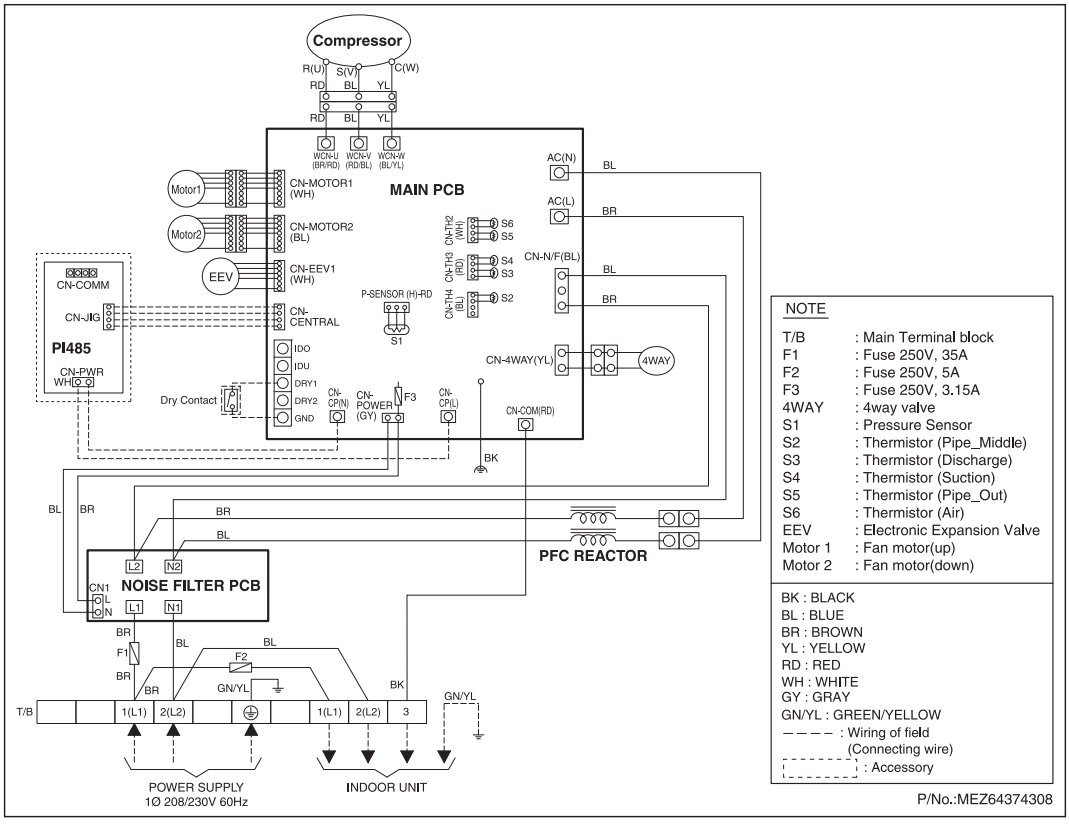
Description	PCB Connector	
	AUUW24GD2 [LUU247HV]	AUUW42GD2 [LUU427HV]
Suction Temperature Thermistor	CN_TH3	CN_TH3
Discharge Temperature Thermistor		
Condenser Out Temperature Thermistor	CN_TH2	CN_TH2
Inlet Air Temperature Thermistor		
Condensing Temperature Thermistor	CN_TH4	CN_TH4
Pressure Sensor	CN_TH1	P-SENSOR(H)

1.6 Wiring diagrams

Models : AUUW24GD2 [LUU247HV]



Models : AUUW42GD2 [LUU427HV]



1.7 Capacity tables

Models : AUUW24GD2 [LUU247HV] + ATNH24GPLE2 [LCN247HV]

• Cooling Capacity

Outdoor Air Temperature	Indoor Air Temperature : °FDB / °FWB																	
	68.0 / 57.2			71.6 / 60.8			77.0 / 64.4			80.6 / 66.2			86.0 / 71.6			89.6 / 75.2		
°FDB	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
68.0	23.53	19.68	1.05	24.98	19.94	1.43	26.43	20.11	1.55	27.15	20.29	1.56	29.33	20.70	1.56	30.78	21.08	1.55
77.0	22.51	19.05	1.10	23.95	19.34	1.44	25.39	19.55	1.56	26.11	19.74	1.58	28.28	20.18	1.61	29.72	20.59	1.62
89.6	21.13	18.28	1.48	22.57	18.63	1.75	24.00	18.89	1.83	24.72	19.10	1.85	26.87	19.61	1.90	28.31	20.05	1.93
95.0	20.49	17.66	1.65	21.92	18.03	1.87	23.35	18.31	1.94	24.00	18.48	1.91	26.20	19.05	2.00	27.63	19.50	2.04
104.0	19.59	17.12	1.81	21.02	17.53	1.95	22.45	17.85	1.98	23.16	18.08	1.99	25.30	18.66	2.02	26.73	19.13	2.06
109.4	19.05	16.52	1.78	20.48	16.95	1.86	21.91	17.28	1.86	22.62	17.52	1.85	24.76	18.11	1.87	26.19	18.60	1.91
114.8	18.51	16.01	1.59	19.94	16.46	1.61	21.37	16.81	1.58	22.08	17.06	1.56	24.22	17.67	1.56	25.65	18.16	1.60
118.4	17.43	15.23	1.37	18.80	15.68	1.35	20.17	16.04	1.28	20.85	16.28	1.26	22.91	16.89	1.25	24.28	17.37	1.28

• Heating Capacity

Outdoor Air Temperature	Indoor Air Temperature : °FDB											
	60.8		64.4		68.0		69.8		71.6		75.2	
°FWB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
-0.4	19.99	2.14	19.65	2.16	19.40	2.18	19.30	2.20	19.22	2.21	18.92	2.26
5.0	20.30	2.12	20.10	2.15	19.96	2.19	19.91	2.21	19.88	2.24	19.64	2.29
14.0	21.36	2.07	21.33	2.12	21.32	2.17	21.32	2.20	21.32	2.23	21.12	2.30
23.0	23.15	2.16	23.18	2.23	23.19	2.29	23.19	2.32	23.18	2.36	22.90	2.42
32.0	24.73	2.33	24.71	2.39	24.65	2.45	24.60	2.49	24.53	2.52	24.33	2.58
42.8	27.45	2.49	27.27	2.55	27.00	2.60	26.83	2.62	26.63	2.65	26.42	2.69
50.0	29.00	2.59	28.64	2.64	28.45	2.68	28.45	2.70	28.41	2.71	27.94	2.74
59.0	31.47	2.76	31.37	2.79	31.43	2.81	31.22	2.81	30.96	2.81	30.61	2.83
64.4	32.94	2.85	32.52	2.86	32.22	2.86	31.80	2.85	31.32	2.84	30.47	2.83

• Symbol

DB : Dry bulb temperature [°F]
WB : Wet bulb temperature [°F]
TC : Total capacity [kBtu/h]
SHC : Sensible capacity [kBtu/h]
PI : Power Input [kW]
(Comp.+ indoor fan motor+outdoor fan motor)

• Notes

1. All capacities are net. A deduction (cooling mode) or an addition (heating mode) of Capacity due to operating heat of indoor unit motor is reflected.
2. ▭ indicates rated capacity at the standard temperature condition.
   - Heating mode Outdoor conditions : 85%RH. However, the condition on nominal capacity is 7°CDB/6°CWB(44.6°FDB/42.8°FWB)
3. Direct interpolation is permissible. Do not extrapolate.
4. Capacities are based on the following conditions:
   - Interconnecting Piping Length : 7.6m(25ft)
   - Level Difference : Zero.

1. DC Inverter SINGLE ZONE

Models : AUUW42GD2 [LUU427HV] + ATNH42GMLE2 [LCN427HV]

• Cooling Capacity

Outdoor Air Temperature	Indoor Air Temperature : °FDB / °FWB																	
	68.0 / 57.2			71.6 / 60.8			77.0 / 64.4			80.6 / 66.2			86.0 / 71.6			89.6 / 75.2		
°FDB	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
68.0	41.18	34.00	2.25	43.72	34.45	3.05	46.25	34.74	3.30	47.52	35.05	3.33	51.32	35.75	3.33	53.86	36.41	3.31
77.0	39.39	32.90	2.35	41.91	33.41	3.07	44.44	33.77	3.31	45.70	34.10	3.36	49.48	34.86	3.42	52.01	35.57	3.45
89.6	36.98	31.57	3.15	39.50	32.18	3.72	42.01	32.62	3.90	43.26	32.99	3.95	47.03	33.87	4.04	49.54	34.63	4.12
95.0	35.86	30.51	3.52	38.36	31.14	3.99	40.85	31.62	4.14	42.00	31.92	4.07	45.85	32.91	4.27	48.35	33.68	4.35
104.0	34.29	29.58	3.86	36.78	30.28	4.16	39.28	30.83	4.22	40.53	31.23	4.23	44.28	32.22	4.30	46.78	33.04	4.39
109.4	33.34	28.54	3.79	35.84	29.27	3.96	38.34	29.85	3.96	39.59	30.27	3.95	43.34	31.29	3.99	45.83	32.12	4.07
114.8	32.40	27.65	3.40	34.90	28.42	3.44	37.40	29.04	3.36	38.65	29.46	3.33	42.39	30.52	3.33	44.89	31.37	3.41
118.4	30.50	26.31	2.93	32.90	27.08	2.87	35.30	27.70	2.74	36.50	28.12	2.69	40.09	29.17	2.66	42.49	30.01	2.73

• Heating Capacity

Outdoor Air Temperature	Indoor Air Temperature : °FDB											
	60.8		64.4		68.0		69.8		71.6		75.2	
°FWB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
-0.4	34.80	3.34	34.21	3.36	33.77	3.40	33.60	3.42	33.46	3.45	32.93	3.51
5.0	35.34	3.30	34.98	3.35	34.75	3.41	34.66	3.45	34.60	3.48	34.19	3.57
14.0	37.18	3.22	37.12	3.30	37.11	3.39	37.11	3.43	37.12	3.48	36.76	3.58
23.0	40.30	3.37	40.35	3.47	40.37	3.57	40.37	3.62	40.35	3.67	39.86	3.77
32.0	43.04	3.62	43.02	3.72	42.91	3.82	42.82	3.87	42.70	3.92	42.36	4.02
42.8	47.77	3.88	47.46	3.97	47.00	4.05	46.70	4.09	46.36	4.12	45.99	4.19
50.0	50.49	4.03	49.86	4.11	49.52	4.17	49.52	4.20	49.46	4.22	48.63	4.26
59.0	54.78	4.30	54.62	4.34	54.71	4.37	54.35	4.38	53.90	4.38	53.29	4.41
64.4	57.34	4.44	56.62	4.46	56.09	4.45	55.36	4.44	54.52	4.42	53.04	4.40

• Symbol

DB : Dry bulb temperature [°F]
WB : Wet bulb temperature [°F]
TC : Total capacity [kBtu/h]
SHC : Sensible capacity [kBtu/h]
PI : Power Input [kW]
(Comp.+ indoor fan motor+outdoor fan motor)

• Notes

1. All capacities are net. A deduction (cooling mode) or an addition (heating mode) of Capacity due to operating heat of indoor unit motor is reflected.
2. ▭ indicates rated capacity at the standard temperature condition.
   - Heating mode Outdoor conditions : 85%RH. However, the condition on nominal capacity is 7°CDB/6°CWB(44.6°FDB/42.8°FWB)
3. Direct interpolation is permissible. Do not extrapolate.
4. Capacities are based on the following conditions:
   - Interconnecting Piping Length : 7.6m(25ft)
   - Level Difference : Zero.

1.8 Capacity coefficient factor

1) Rate of change in capacity due to the Main piping length

Rate of change in cooling capacity

Piping length(m(ft))		5(16.4)	10(32.8)	15(49.2)	20(65.6)	30(98.4)	40(131.2)	50(164.0)	60(196.9)	70(229.7)	75(246.0)
Rate of change in capacity(%)	24k	100	99.3	97.9	96.6	93.8	91.1	88.4	-	-	-
	42k	100	99.3	97.9	96.6	93.8	91.1	88.4	85.6	82.9	81.5

Rate of change in heating capacity

Piping length(m(ft))		5(16.4)	10(32.8)	15(49.2)	20(65.6)	30(98.4)	40(131.2)	50(164.0)	60(196.9)	70(229.7)	75(246.0)
Rate of change in capacity(%)	24k	100	99.7	99.2	98.7	97.7	96.6	95.6	-	-	-
	42k	100	99.7	99.2	98.7	97.7	96.6	95.6	94.6	93.5	93

2) Calculation of actual system capacity

① Outdoor unit standard maximum capacity
Q_{rated} [from specification table]
② Outdoor unit capacity at Ti, To temperature.
$Q_{(Ti, To)}$ [from capacity table]
③ Outdoor unit capacity coefficient factor
$F_{(Ti, To)} = Q_{(Ti, To)} / Q_{rated}$
④ Piping correction factor
F_{piping} for piping length [from capacity coefficient factor table]
⑤ Indoor Unit actual capacity
$Q_{actual} = Q_{rated} \times F_{(Ti, To)} \times F_{piping}$

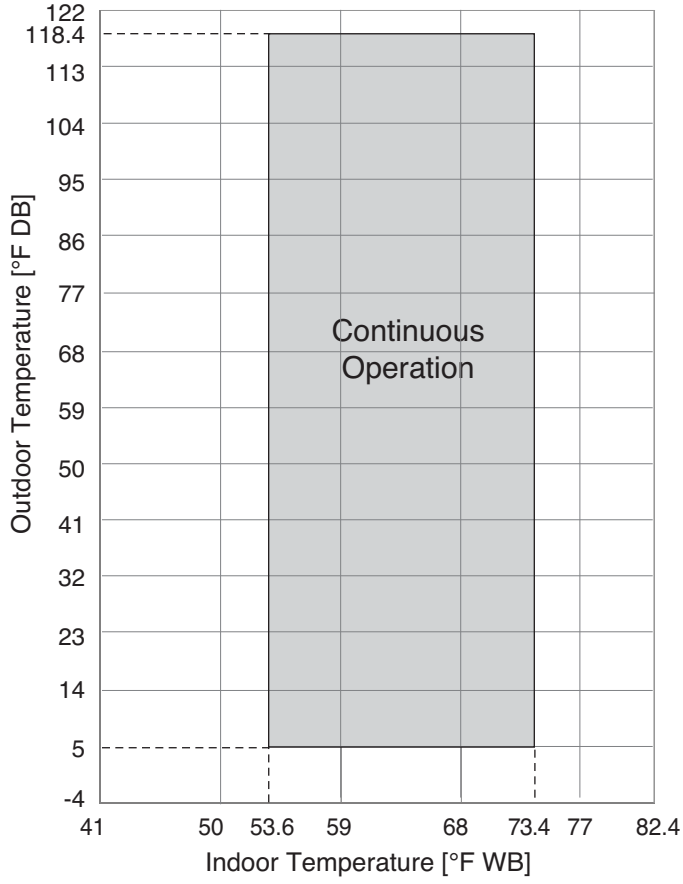
Example)

- **Outdoor unit model : AUUW24GD2 [LUU247HV]**
- **Indoor units (ATNH24GPLE2 [LCN247HV])**
- **Outdoor temperature : 104°FDB**
- **Indoor temperature: 66.2 °FWB**
- **Piping length (ODU to IDU):49.2 ft**
- **Indoor unit actual cooling capacity in A room?**

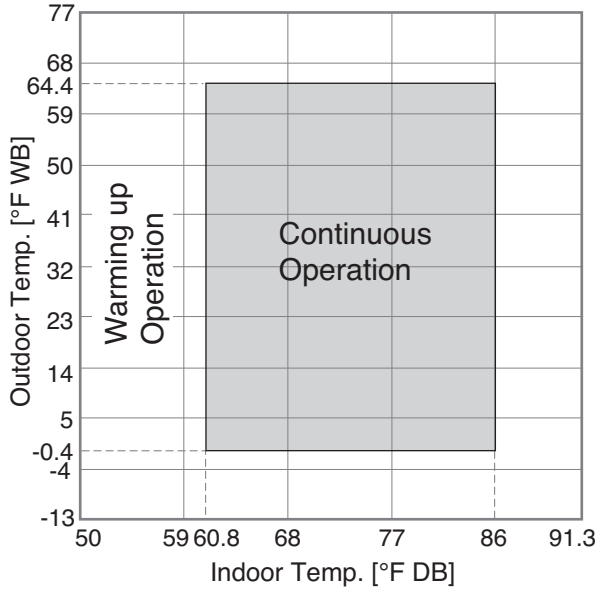
- Q_{rated} : 24,000 Btu/h
- $Q_{(Ti, To)}$: 23,160 Btu/h
- $F_{(Ti, To)}$: 23.16 / 24.0 = 96.5%
- F_{piping} = 97.9%
- Q_{actual} = 24,000 x 0.965 x 0.979 = 22,673.6 Btu/h

1.9 Operation range

Cooling



Heating



1.10 Electric characteristics

Unit				Power		Compressor			OFM	
Model	Phase	Hz	Voltage	MCA	MOP	MSC	RLA		kW	FLA
							Cooling	Heating		
AUUW24GD2 [LUU247HV]	1Ø	60	Min.:187, Max.:253	18.1	31.6	-	10.0	13.5	0.124	0.6
AUUW42GD2 [LUU427HV]				24.1	41.6	-	15.5	17.5	0.124 x 2	0.6 x 2

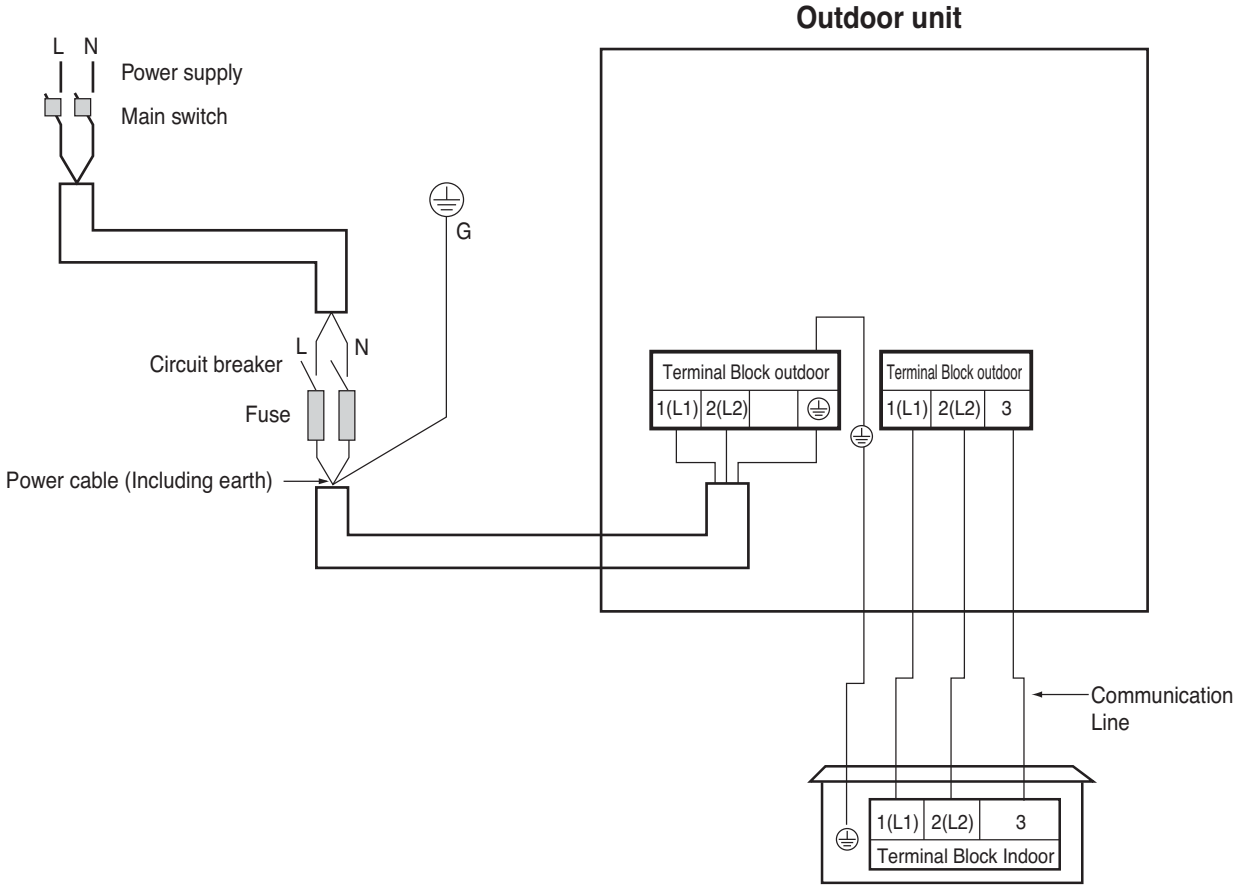
Notes :

1. Voltage range
   Voltage supplied to the unit terminals should be within the minimum and maximum range
2. Maximum allowable voltage unbalance between phase is 2 %
3. MCA / MOP
   MCA = (1.25 x Load1) + Load2 + Load3
   MOP = (2.25 x Load1) + Load2 + Load3
   - Load1 : Rated running current of largest motor (compressor or other motor)
   - Load2 : sum of current for all other motors
   - Load3 : any other load rated 1.0A or more
4. Select wire spec. based on the MCA
5. Recommended circuit breaker is ELCB (Earth Leakage circuit breaker)
6. MSC & RLA are measured as the compressor only test condition.
7. OFM is measured as the outdoor unit test condition

MCA : Minimum Circuit Amperes (A)
MOP : Maximum rating over current protective device
MSC : Maximum Starting Current
RLA : Rated Load Amperes (A)
OFM : Outdoor Fan Motor
kW : Fan Motor rated output (kW)
FLA : Full Load Amperes (A)

1.11 Field wiring diagrams

1. All wiring must comply with LOCAL REGULATIONS.
2. Select a power source that is capable of supplying the current as required by the air conditioner.
3. Feed the power source to the unit via a distribution switch board designed for this purpose.
4. The terminal screws inside the control box may be loose due to vibration during transport.
   Check the screws for loose connection.
   (Running the air conditioner with loose connection can overload and damage electrical components.)
5. Always ground the air conditioner with a grounding wire and connector to meet the LOCAL REGULATION.

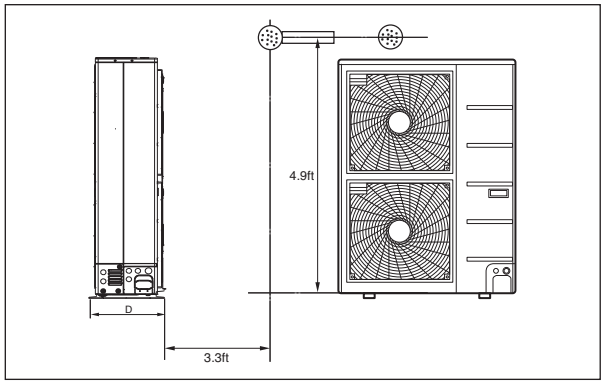


Notes:

1. All wirings, components and materials to be procured on the site should be according to the standard
2. Use copper conductor only
3. Install circuit breaker for safety
4. Unit should be grounded in compliance with the applicable local and national codes
5. Wiring cable size must comply with the applicable local and national code.

1.12 Sound levels

Overall

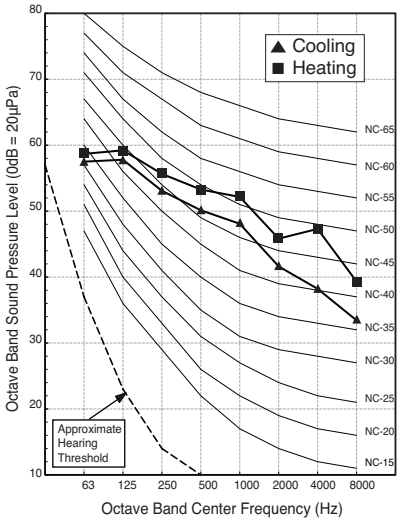


Notes:
- Sound measured at 3.3ft away from the center of the unit.
- Data is valid at free field condition
- Data is valid at nominal operation condition
- Reference accoustic pressure 0dB = 20μPa
- Sound level will vary depending on a range of factors such as the construction(acoustic absorption coefficient) of particular room in which the equipment is installed.
- The operating conditions are assumed to be standard

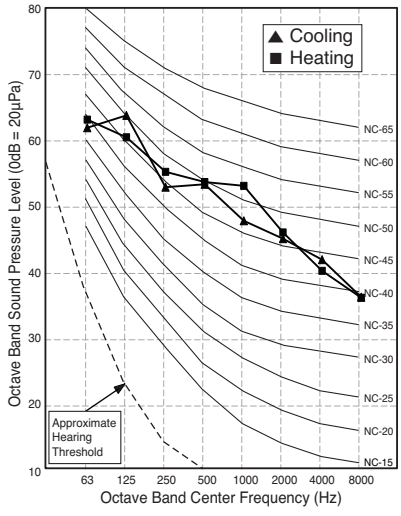
Model	Sound pressure Levels [dB(A)]	
	Cooling	Heating
AUUW24GD2 [LUU247HV]	48	52
AUUW42GD2 [LUU427HV]	52	54

Sound pressure level

AUUW24GD2 [LUU247HV]



AUUW42GD2 [LUU427HV]



SINGLE ZONE

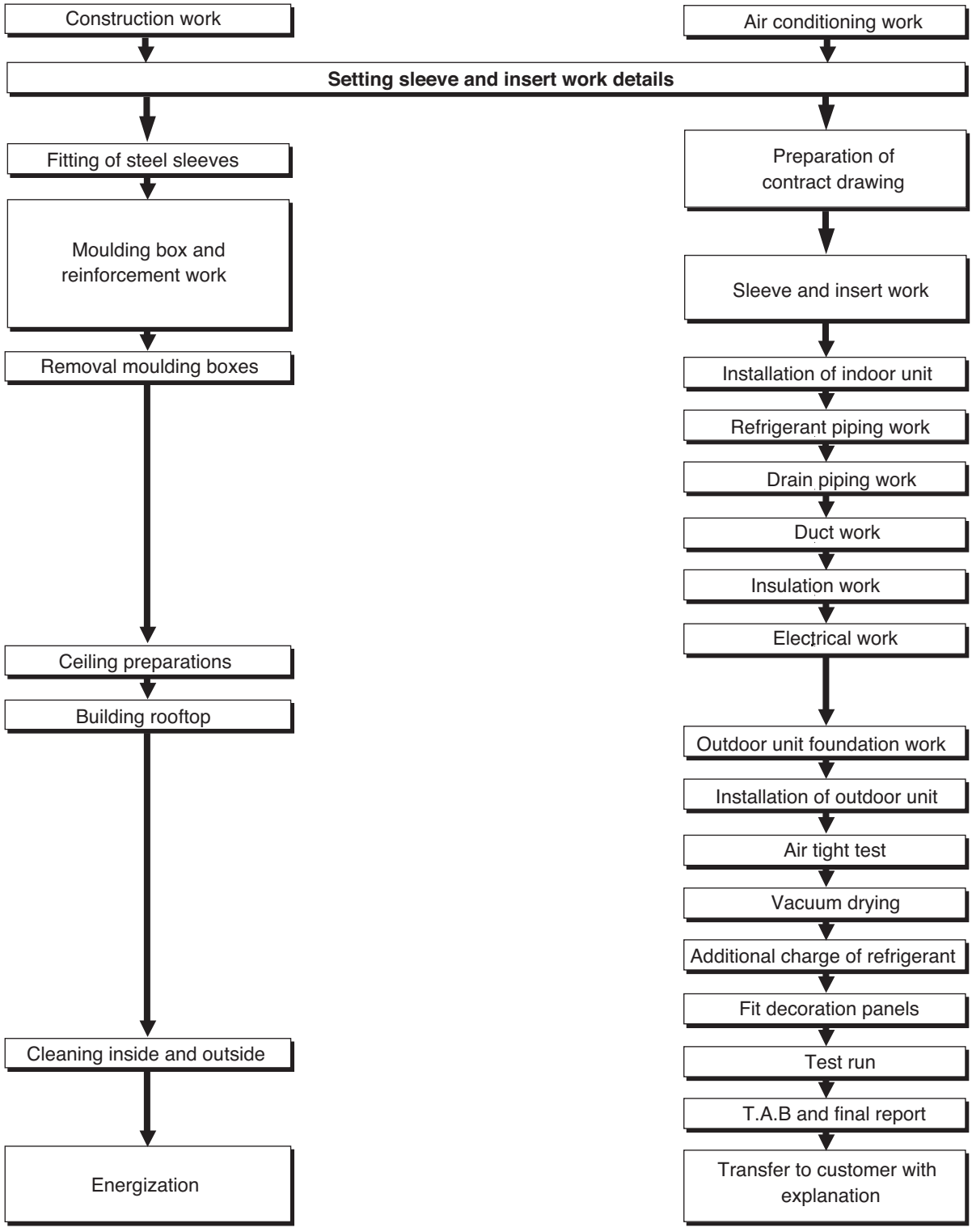
Design and installation

1. General installation guideline
2. Guideline for each installation process
3. Installation of indoor unit
4. Installation of outdoor Unit

1. General installation guideline

1.1 Installation process & Guideline

Striking a balance between system installation & general construction work.



1. The division of the work should be thoroughly clarified.
2. keep a constant check on the progress of the construction work to avoid deviations from the air conditioning work schedule.

1.2 Checking the drawing

Installation procedure	Remarks
Determination of work scope	Check and confirm required loads calculation, model selection, drawings etc.
Preparation of contract drawings	Make a relationship between outdoor ,indoor controller and option connection clear. (prepare control circuit diagram)
Sleeve and insert works	Determine sleeve position, size and counts as required
Installation of indoor units	Check model name to make sure the fitting is made correctly
Refrigerant piping works	Special attention to dryness , cleanness and tightness
Drain pipe works	Make sure that the drain pipe diameter is big enough and adjust it to downward gradient
Duct works	Make sure airflow is sufficient
Insulation works	Make sure no gap is left where the insulating materials are joined
Electrical work	Multiple core cable must not be used (suitable cable should be selected)
Outdoor unit foundation works	The foundation must be vibration proof and in level
Installation of outdoor units	Avoid airflow short circuit and ensure sufficient space is allowed for servicing
Air tight test	For 24 hours at 3.8MPa(551.1psi_R410A) or 2.8MPa (406.1psi_R22) there must be no drop in pressure
Vacuum drying	Less than 5 Torr (At least more than 1hr)
Additional charge of refrigerant	Charge the refrigerant accurately by using a charging cylinder
Fit decoration panels	Make sure there are no gaps left between facing materials used on the ceiling
Test run	Follow the testing operation check sheet
Transfer to customer with explanation	Explain to customer or operator the manual etc

2. Guideline for each installation process

2.1 Sleeve and insert work

2.1.1 Positioning of the pipe holes

1. The through holes for the drain piping should be positioned such that pipes have a downward gradient (the gradient must be at least 1/100.The thickness of the insulating materials must also be taken into consideration.)
2. The diameter of the through holes for the refrigerant piping should include an allowance for the thickness of the heat insulation materials.
3. Attention should be paid to the construction of the beam themselves since there are sometimes parts of the beam which cannot be used to accommodate through holes.

2.1.2 Selection of sleeve

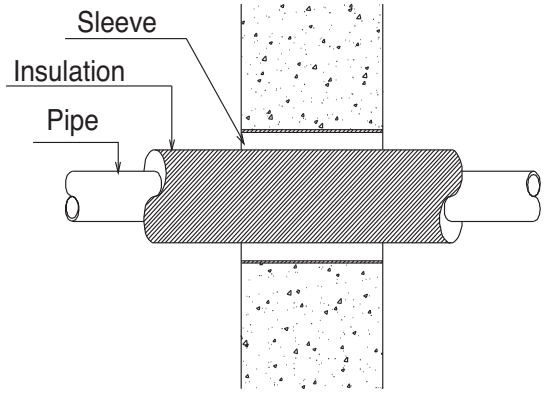
Sleeve work should be performed to make a space for passing pipe through the wall or ground under construction.

For example if gas pipe and liquid pipe is 1/2inch, 1/4inch the sleeve diameter is minimum 3.1 inch

Gas pipe diameter	1/2"
Liquid pipe diameter	1/4"
Insulation thickness(gas pipe)	13/32" x 2
Insulation thickness(liquid pipe)	13/32" x 2
0.8inch surplus	32/25"
Total sleeve diameter	3-1/8"

* Assumption : Gas pipe insulation thickness and liquid pipe insulation thickness is 13/32 inch and 13/32 inch respectively

2.1.3 Sleeve type



NOTE

Sleeve type should be considered as per local regulation & laws.

⚠CAUTION

1. In high voltage generation places, water-proof flexible conduit should be used. (in substation room, in elevator room)
2. Conduit should be chosen in accordance with electrical installation regulation.

NOTE

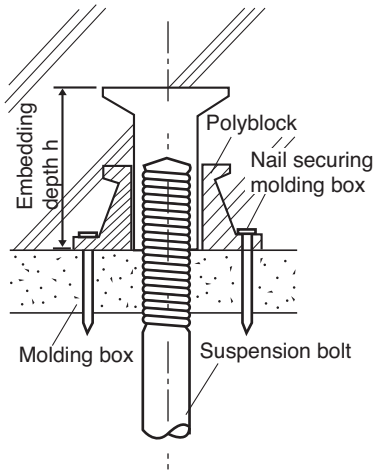
Cable conduit should be considered under the local regulation & laws.

2.1.4 Insert work and support work

An insert is a metal tool which is inserted into a floor or beam before the concrete is set such that fittings such as duct , pipes or suspension bolts for hanging units can be fitted into the place later. The positioning of the inserts must be decided early.

1. Insert work

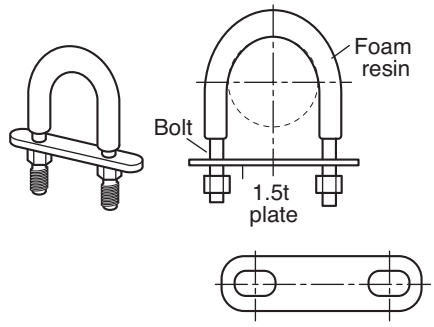
Example : Through holes in a reinforced concrete beam



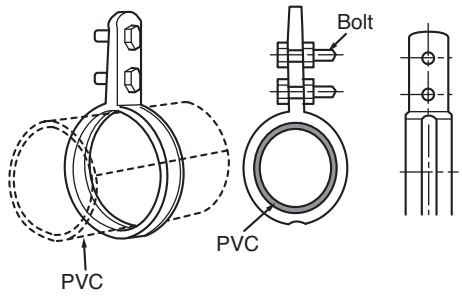
2. Guideline for each installation process

2. Support work.

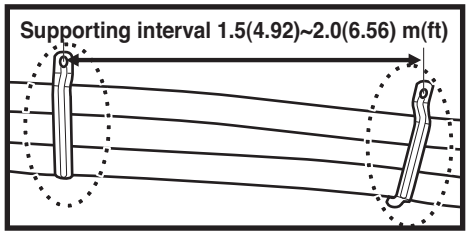
■ Insulated U-bolt type supporting



■ Insulated O-ring band type supporting



■ Saddle supporting

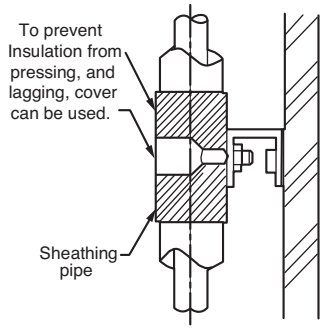


⚠CAUTION

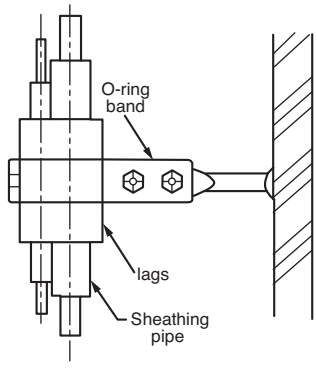
During saddle supporting work, insulation should not be pressed by saddle as this can lead to tearing of insulation and thus falling of condensed water during product operation.

a) Supporting with insulated pipe

① U-bolt supporting

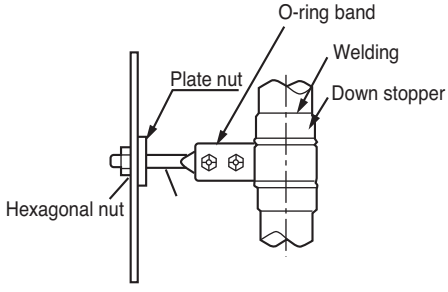


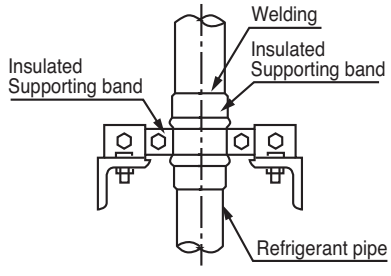
② 0-ring band supporting



b) Down stopper supporting

One point supporter (200(440.9) kg(lbs))





2. Guideline for each installation process

2.2 Refrigerant piping work

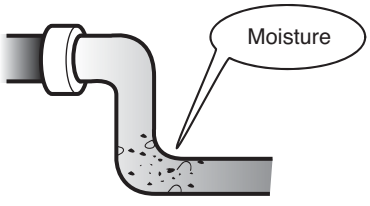
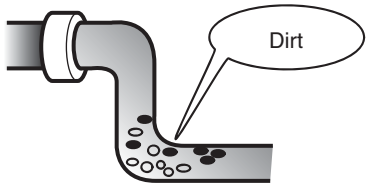
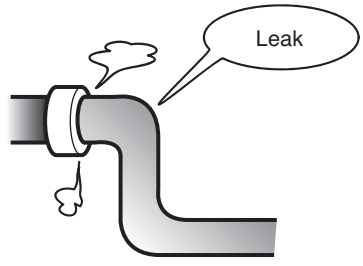
2.2.1 Principles of refrigerant piping

The " principles of refrigerant piping " must be strictly observed.

	Cause of problem	Action to avoid problem
Dry	-Rainwater, work water, etc gets into pipes from outside -Moisture generated inside pipe due to condensation	Flushing → Pipe covering → Vacuum drying
Clean	-Formation of oxides inside pipes during soldering -Dirt,dust or other extraneous material gets into pipes from outside	Replace Nitrogen → Pipe covering Flushing → Pipe covering
Air tight	-Leak from soldered area -Leak from flared area -Leak from flange area	Use the proper materials Adhere strictly to standard soldering work practice. Adhere strictly to standard flaring work practice. Adhere strictly to standard flaring connection work practice.

• The end of all copper pipes should be capped to protect them from dust or water particles while safe keeping

The 3 princples of refrigerant piping work

Dry	Clean	Air tight
Make sure there is no moisture inside the pipes	Make sure there is no dirt inside the pipes	Make sure the refrigerant does not leak out.
		

2.2.2 Flaring work

Main cause for gas leakage is due to defect in flaring work. Carry out correct flaring work in the following procedure.

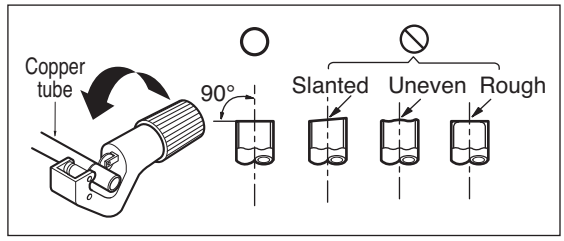
Cut the pipes and the cable.

① Use the piping kit accessory or the pipes purchased locally.

② Measure the distance between the indoor and the outdoor unit.

③ Cut the pipes a little longer than measured distance.

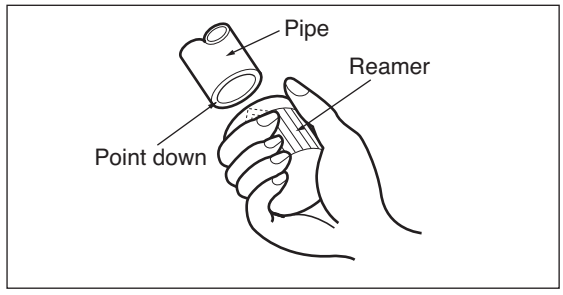
④ Cut the cable 1.5(4.92) m(ft) longer than the pipe length.



2) Burrs removal

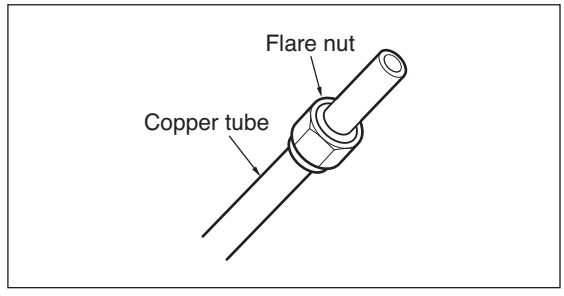
① Completely remove all burrs from the cut cross section of pipe/tube.

② Put the end of the copper tube/pipe in a downward direction as you remove burrs in order to avoid dropping of burrs into the tubing.



3) Putting nut on

① Remove flare nuts attached to indoor and outdoor unit, then put them on pipe/tube having completed burr removal.(not possible to put them on after flaring work)

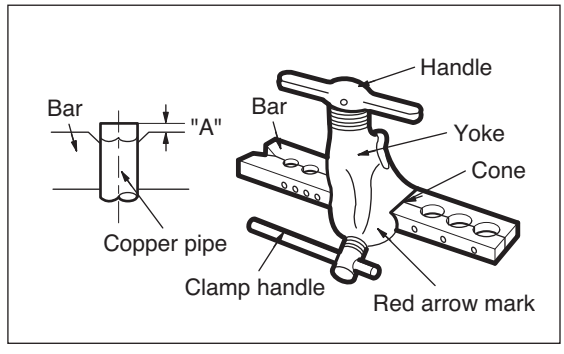


4) Flaring work

① Carry out flaring work using flaring tool as shown below.

② Firmly hold copper pipe in a die in the dimension shown in the table below.

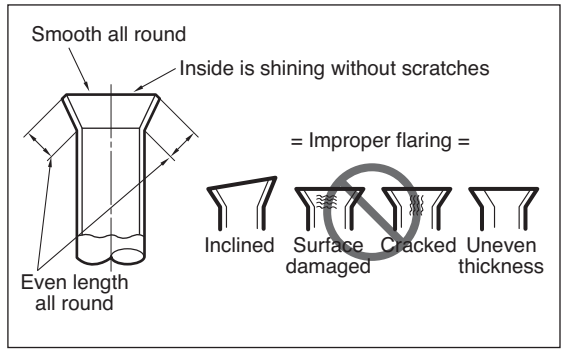
Outer diameter		A	
mm	inch	mm	inch
Ø6.35	1/4	1.1~1.3	0.04~0.05
Ø9.52	3/8	1.5~1.7	0.06~0.07
Ø12.7	1/2	1.6~1.8	0.06~0.07
Ø15.88	5/8	1.6~1.8	0.06~0.07
Ø19.05	3/4	1.9~2.1	0.07~0.08



5) Check after flaring

① Compare the flared work with figure on right side.

② If flare is found to be defective, cut off the flared section and do flaring work again.



2. Guideline for each installation process

NOTE **Choice of material for refrigerant piping**
Copper pipe selection

a. The wall thickness of the refrigerant piping should comply with relevant local and national regulation for R410A the design pressure is 3.8MPa(551.1psi)
b. If not, we recommend to use with phosphorus deoxidized copper type
c. Generally used copper pipe specifications as follows;

Unit : mm(inch)

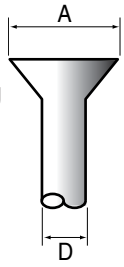
Size(ø)mm(inch)	Thickness	
	R22	R410A
6.35(1/4)	0.7(0.028)	0.8(0.031)
9.52(3/8)	0.8(0.031)	0.8(0.031)
12.70(1/2)	0.8(0.031)	0.8(0.031)
15.88(5/8)	0.8(0.031)	1.0(0.039)
19.05(3/4)	0.8(0.031)	1.0(0.039)

* Never use the pipe which is mixed scrap or a pipe used somewhere else
The method how to distinguish the pipe mixed scarp : check the oxidization evidence after leaving the pipe for 24hour.

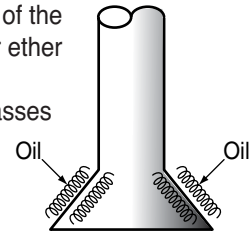
⚠CAUTION

Flare connection and procedure

1. Stiffened pipe must always be annealed at least once prior to the flaring work.
2. A pipe cutter must be used to cut the pipe. (A large pipe cutter must be used where the pipe has a large diameter. When cutting a pipe which is too big for the pipe cutter a metal saw may be used but care must be taken to ensure that the debris from sawing does not get into the pipe.)



3. Set the flaring tool to make sure the flare size remains within the prescribed limits.
4. Coat the inner and outer surface of the flare with refrigerator oil (Ester or ether oil).
(this ensures that the flare nut passes smoothly, preventing the pipe from twisting.)
Do not use SUNISO-4GS oil.



External diameter of pipe D		Pipe widening dimension A
(in)	(mm)	
1/4	6.35	8.6~9.0
3/8	9.52	12.6~13.0
1/2	12.7	15.8~16.2
5/8	15.88	19.0~19.4
3/4	19.05	22.9~23.3

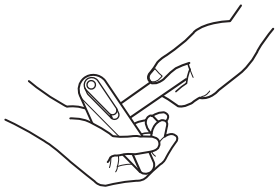
⚠CAUTION

1. Burrs should be carefully removed.
2. 2 spanners should be used to grip the pipe.
3. The flare nut must be inserted before starting the flaring operation.
4. The appropriate amount of torque should be used to tighten the flare nut.
5. Check that there is no superficial damage to the surface of the flare.

NOTE

Flange connection and procedure

1) Cut the pipe using a pipe cutter.

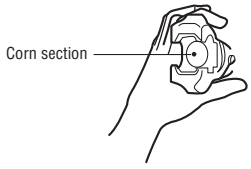


2) The cut edge has burrs.
(the amount of burrs becomes larger when pipe wall is thick)

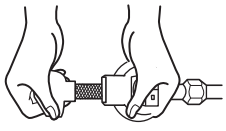
3) Remove the burrs using a reamer
(Be careful not to let particles enter the pipe.
Point the pipe end downward during cutting)

4) Clean the inside of the pipe
(use a thin stick with a cloth wrapped around it)

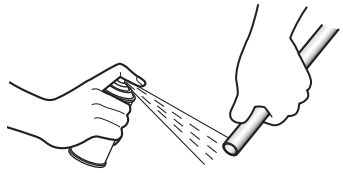
5) Before flaring , clean the cone section of the flaring tool.



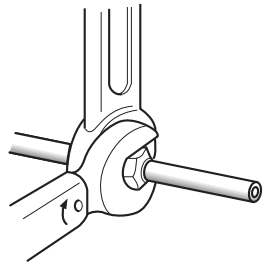
6) Flare the pipe.
Rotate the flaring tool 3 or 4 turns after a clicking sound is produced. this results in a clean flared surface



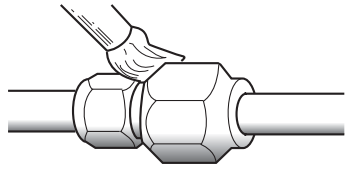
7) Apply refrigerant oil on the inside and outside of the flared section.
(Do not apply SUNISO oil)
(Be careful to keep dust away)



8) Tighten the flare nut. (Use a torque wrench to apply the proper tightening force)



9)
- Check for gas leaks.
(Check at the threaded section of the flare nut for gas leak)
- Spay –type gas leak detecting products are available on the market.
- Soap water may be used to check for leaks , but use only neutral soap to prevent corrosion of the flare nut.
- Be sure to wipe the nut area clean after the gas leak check.



2.2.3 Pipe connection flaring

NOTE

1. After installation completion make sure to open the valve. operating the unit with the valve shut off will destroy the compressor (Refer to the Additional refrigerant charge detail information)
2. Use R410A to add refrigerant. All field piping must be installed by a licensed refrigeration technician
3. Must comply with local and national standard regulations.

CAUTION

Improper piping and flaring can lead to the leakage of refrigerant

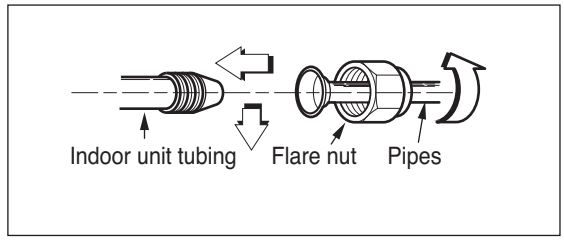
NOTE

For flaring work of the piping, follow the instructions in the installation manual to each unit.

1) Connecting the piping to the indoor unit and drain hose to drain pipe

① Align the center of the piping and sufficiently tighten the flare nut by hand.

② Tighten the flare nut with a wrench. Wrap the insulation material around the connecting portion.

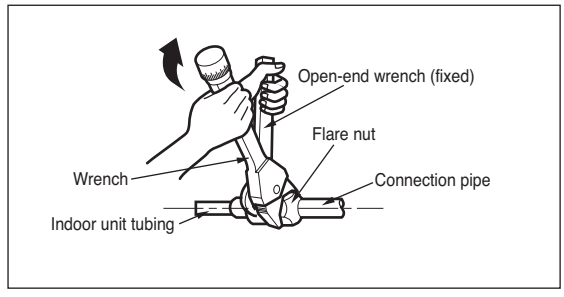


2) Wrap the insulation material around the connecting portion.

① Overlap the connection pipe insulation material and the indoor unit pipe insulation material. Bind them together with vinyl tape so that there is no gap.

② Wrap the area which accommodates the rear piping housing section with vinyl tape.

③ When the piping is passed through a tray, duct work or a sleeve the insulation wrapping on the pipe is not required.

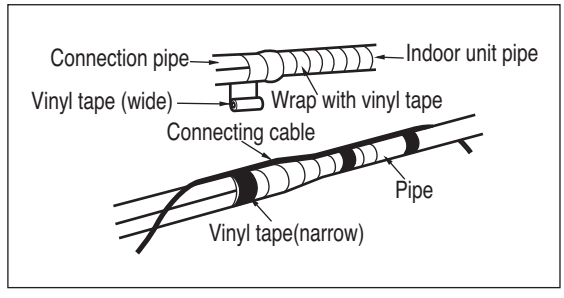


3) Close up a socket out of use with a brass cap.

① Align the center of the piping and sufficiently tighten the brass cap by hand.

② Tighten the brass cap with a wrench.

③ Wrap the area contacted with insulation.



CAUTION

Over tightening of the flare nuts in the pipes may cause nuts to crack or the refrigerant to leak.

CAUTION

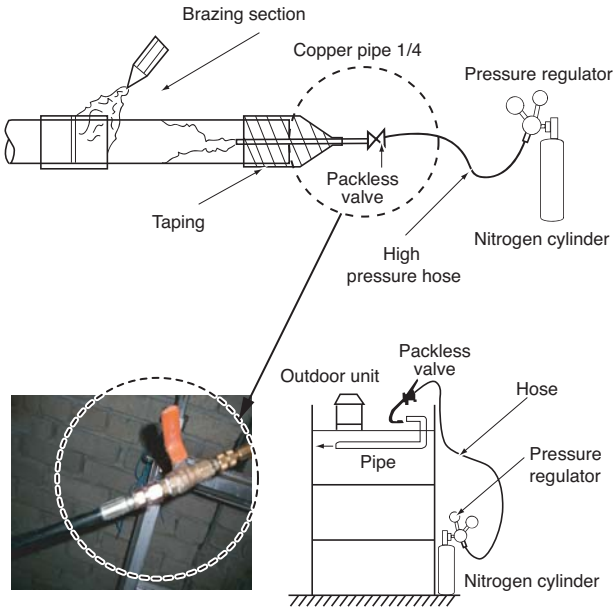
Never use the plastic cap during closing.

2.2.4 Brazing work

⚠CAUTION

Brazing of refrigerant piping :
The following precaution should be taken.
1. Do not use flux when brazing copper to copper refrigerant piping.
   (Particularly for the HFC refrigerant piping)
   Therefore, use the phosphor copper brazing filler metal (BCuP) which does not require flux.
   (Flux has extremely harmful influence on refrigerant piping systems. For instance, if the chlorine based flux is used, it will cause pipe corrosion or, in particular, if the flux contains fluorine, it will damage the refrigerant oil.)

1. Niorogen flushing method (During brazing)



⚠CAUTION

Nitrogen Brazing
a. This procedure is designed to prevent formation of oxidation film by filling piping with inert gas. Note that excessive gas pressure will generate pinholes at brazed points. (Nitrogen gas: Supply pressure 0.05~0.1kg/cm²G(0.71~1.42psi))
b. When supplying inert gas, be sure to open one end of piping.

If brazing work is carried out without passing nitrogen gas through the pipes then it allows the formation of oxidation bubbles on the inside surface of the pipes.

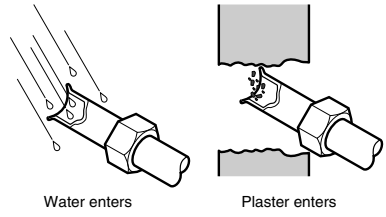
These oxidation bubbles are then carried along inside the pipes to cause damage to various members of the system such as valve or compressors and the system ceases to function properly.

In order to avoid this problem nitrogen is passed through the pipe while the soldering work is being carried out.

This operation work is known as nitrogen replacement.(Air is replaced by nitrogen)

This is standard work during all brazing works.

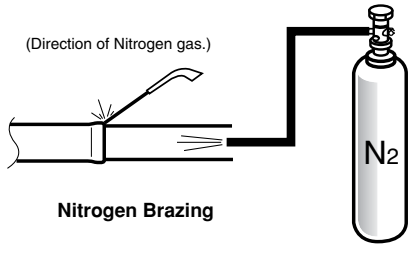
⚠CAUTION



Make sure to keep the connecting piping dry (away from water) , clean (away from dust) , and air tight (avoid refrigerant leakage)

⚠CAUTION

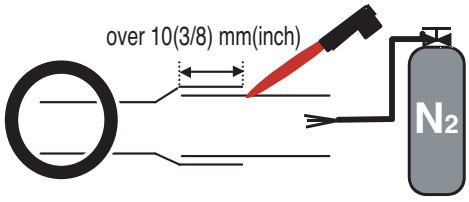
Pipe bending
Annealed copper pipe with small diameter (Ø6.35(1/4) mm(inch) or Ø9.52(3/8) mm(inch)) can be easily bent manually. In this case, secure large R (radius) for the bend section and gradually bend pipe. If annealed copper pipe is large in diameter (Ø15.88(5/8) mm(inch) or over), bend pipe with bender. Use bender appropriate for the pipe diameter.



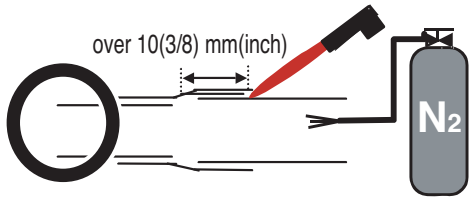
Nitrogen Brazing

2. Guideline for each installation process

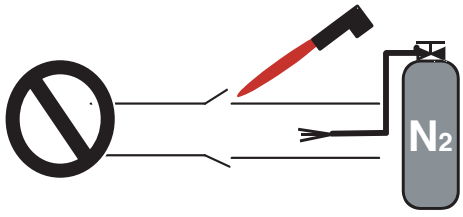
Brazing work should be carried out either downwards or sideways.
An upward direction should be avoided wherever possible(to prevent leakage).



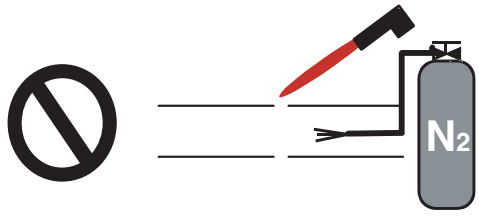
(Expending pipe brazing)



(Pipe brazing with socket)



(Flare part brazing)



(Butt-brazing)

Table 1: Correlation of nozzle tip and size of refrigeration piping

[Unit:mm(inch)]

Piping size	Nozzle tip No.							Brazing filler diameter Ø		
	# 200	# 225	# 250	# 315	# 400	# 450	# 500	1.6(1/16)	2.4(3/32)	3.2(1/8)
Ø6.35(1/4)										
Ø9.52(3/8)										
Ø12.7(1/2)										
Ø15.9(5/8)										
Ø19.1(3/4)										
Ø22.2(7/8)										
Ø25.4(1)										
Ø31.8(1-1/4)										
Ø38.1(1-1/2)										
Ø44.5(1-25/32)										

CAUTION

1. Generally expending pipe brazing is performed with pan-coil type copper pipe, and socket blazing is performed with straight copper pipe.
2. Do not perform flare part brazing or butt-brazing.
3. Brazing should be performed on welding table.
4. Any dust should enter in the pipe while brazing.
5. Distance of copper pipe support spacing is within 1(3.28)~2(6.56) m(ft)
6. The copper pipe should not be secured directly by metal brackets.

2.2.5 Refrigerant pipe flushing

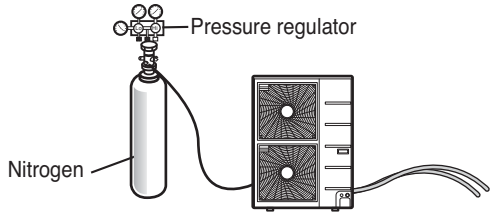
Flushing is a method of cleaning extraneous matter out of pipes using pressurized gas.

NOTE

Refrigerant pipe flushing of 3 major effects
1. Removal of oxidation bubbles formed inside copper pipes when “nitrogen replacement is insufficient” during soldering work
2. Removal of extraneous material and moisture from pipes when covering has been insufficient
3. Checks connections in pipes linking outdoor and indoor units (Both liquid and gas pipes)

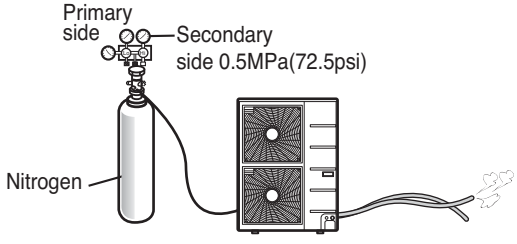
① Set pressure regulator on nitrogen cylinder.

② Connect the charge hose from pressure regulator to service port on the liquid pipe side of the outdoor unit before its connection to BD unit or indoor unit.



③ Open the main valve on the nitrogen cylinder and set the pressure regulator to 0.5MPa(72.5psi)

④ Ensure that nitrogen is flowing through the pipe properly.

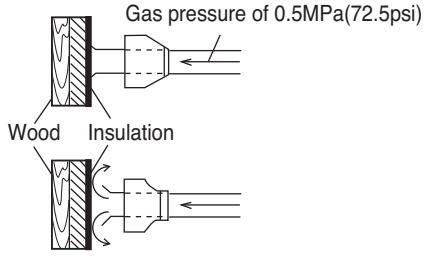


⑤ For flushing block the end of the pipe with wood insulation block.

⑥ When the pressure becomes great remove the block quickly.

⑦ Do step 6 & 7 repeatedly till cleanness is ensured.

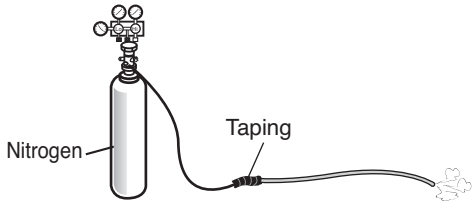
⑧ Connect the charge hose from pressure regulator to service port on the gas pipe side of outdoor unit before its connection to BD unit or indoor unit.



⑨ Flow the steps 3, 4, 5, 6, 7.

⑩ In case of BD unit system, before connecting to indoor units, each pipe should be flushed individually.

⑪ Flow the steps 3, 4, 5, 6, 7.



CAUTION

After welding the pipe, nitrogen flushing is strongly recommended.

2.3 Drain piping work

The purpose of drain piping is to prevent damage of products and ceiling materials by proper draining of dew condensation which is generated from the evaporator of indoor unit when the hot vapors come in contact with the evaporator.

1. Application

Pipes for draining water generated from indoor unit on cooling operation

Specification for drain piping

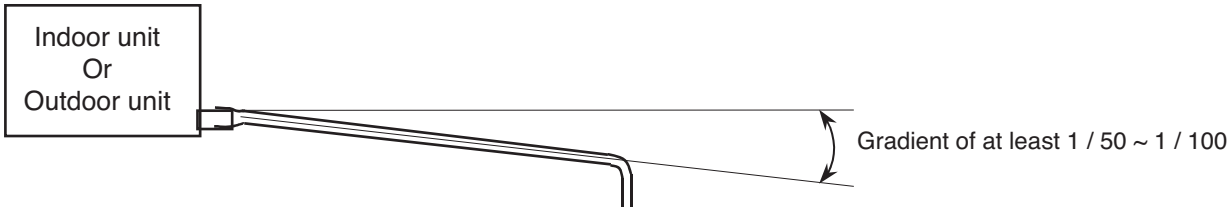
Type		Drain pipe diameter (External/ Internal)	Drain pump	Drain pump discharge head [mm(inch)]	Drain amount (at 10mm height)
					cm^3/min (lpm)
SINGLE ZONE	Cassette 4 way	32(1-1/4) / 25(31/32) mm(inch)	Standard	800(31-1/2)	400 (0.4)

[Reference Table] Drain amount per capacity

kW	Air flow rate		Drain amount (lpm)	Remark
	CMH	CFM		
2.04	8.0	4.7	0.128	Indoor temp. : 26°C(78.8°F) Indoor humidity RH : 85% Outlet temp. :14°C(57.2°F) Outlet temp. RH: 50%
2.33	8.5	5.0	0.137	
2.91	10.5	6.2	0.169	
4.36	11.5	6.8	0.185	
5.82	17.0	10.0	0.273	
7.28	19.0	11.2	0.305	
8.73	21.0	12.4	0.337	
10.2	23.0	13.5	0.369	
11.6	25.0	14.7	0.402	
14.6	34.0	20.0	0.546	

2.3.1 Drain pipe slope and support

- Slope gradient for drain should be 1/50~1/100 and PVC pipes should be used.
- Support hanger should be at 1(3.28)~1.5(4.92) (m(ft)) interval to prevent from loosing and dropping.
- Drain pipe insulation
  : The inside temperature of drain pipe is about 10°C(50°F). When high temperature and humidity air touches the surface of pipe, dew condensation occurs. To prevent that, drain pipe keeps warm using insulation with polyethylene 10mm(0.39inch) thickness.



1. Application

Refrigerant pipe length contracts and expands on heating and cooling repeatedly. So supporting work is needed not to hinder each copper pipe connection part.

2. Supporting distance for common drain pipe

[Table]The interval of the supporting hanger for drainage pipe

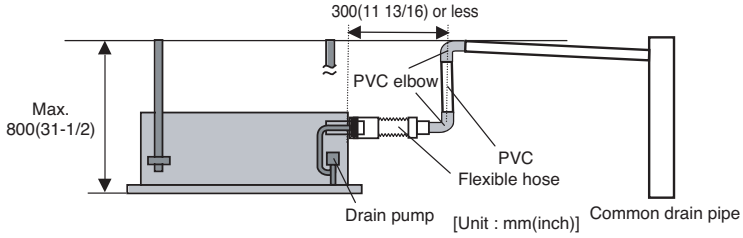
Pipe diameter [mm(inch)]	Ø20(25/32)~40(1-9/16)	Ø40(1-9/16)~50(1-31/32)	Ø65(2-9/16)~125(4-15/16)
Max. interval[m(ft)]	Below 1.0(3.28)	Below 1.2(3.94)	Below 1.5(4.92)

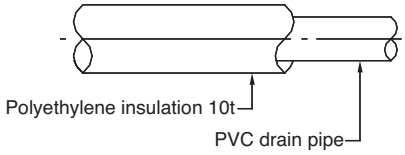
3. Anchor bolt supporting work

Anchor bolt supporting work should be used for supporting a heavy indoor unit to ceiling.
Clamp hanger supporting work is for hanging refrigerant pipe, drain pipe and cables.
It can prevent vibrating noise from passing through pipe.
We recommend set anchor bolt for supporting indoor unit and strong anchor bolt for supporting pipes and cables

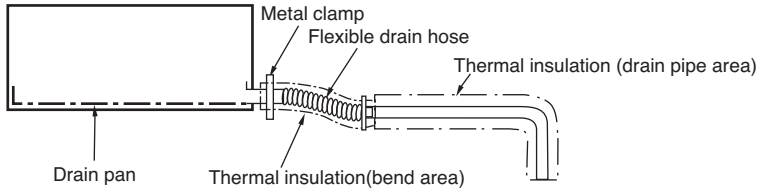
2.3.2 Drain pipe trap

Models with drain pump:





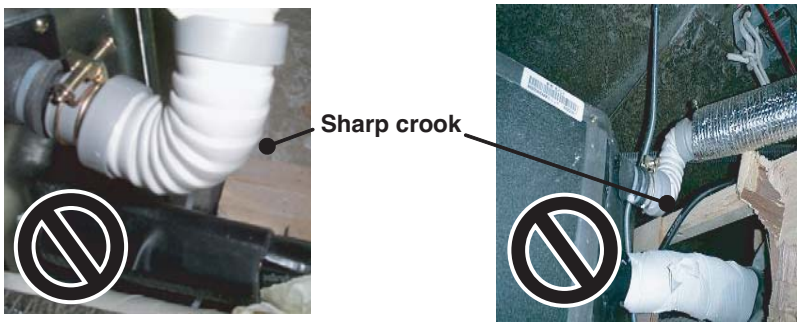
Models without drain pump



2.3.3 Caution for drain piping work

Notice on drain working

1. Drain pipe should be insulated all connected joints and ends.



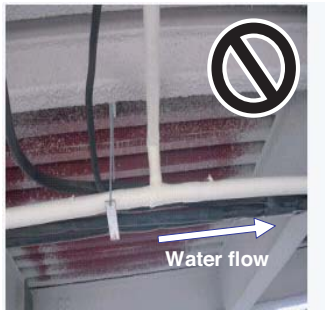
CAUTION

Flexible tube should be connected with clamp concentrically.

If not, water will leak from the connection.

<clamp connection>

2. No reverse slope for drain connection

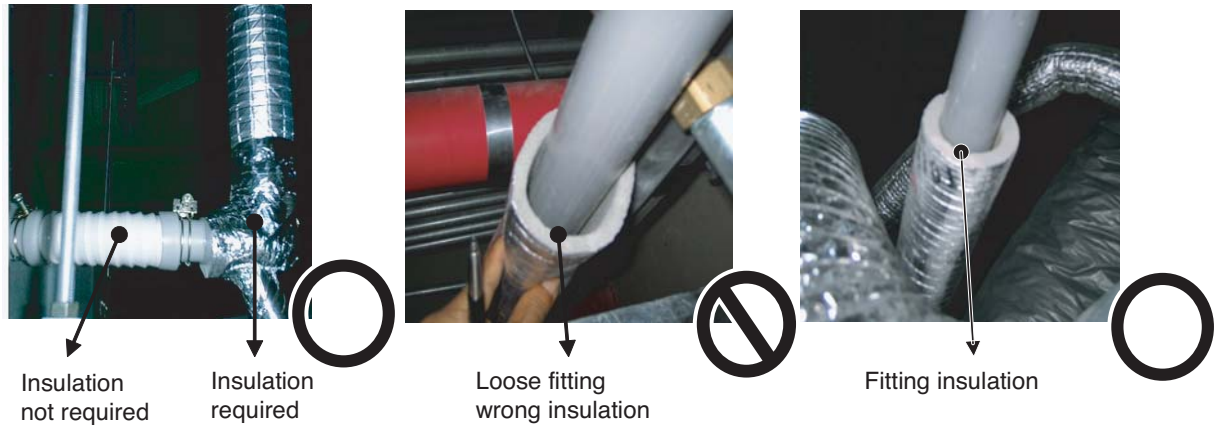


<Reverse slope>

2. Guideline for each installation process

Drain pipe insulation

- Drain pipe should be insulated all connected joints and ends.



- Do not use the loose fitting insulation.

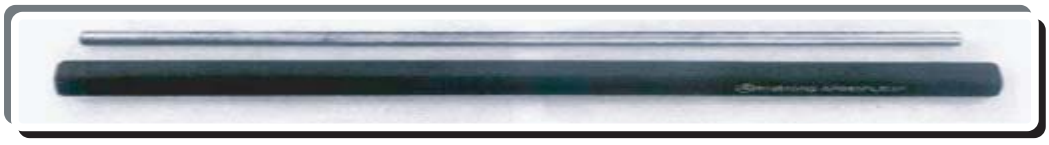
Drain water leakage test

- Water leakage test should be performed 24 hours later after drain work finishing.
- In the test, only water should be used. Other liquids are unacceptable.

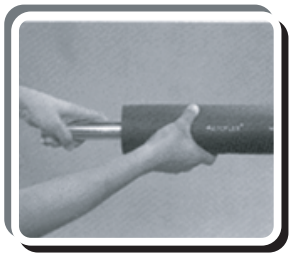
2. Guideline for each installation process

2.4 Insulation work

2.4.1 Insulation



1) Operational steps



① EPDM length should be more longer than pipe length.
Do not extend EPDM by force.

② Put the pipe in EPDM insulation carefully so that the pipe will not get damaged with EPDM.

③ Bond on both side of cut surfaces of move sure to use the correct type of bond for EPDM cut surface attaching.

④ Dry it until it becomes thick, sticky and does not get detached.

2) Bending vertical side of insulation

① Use the original uncut insulation material.

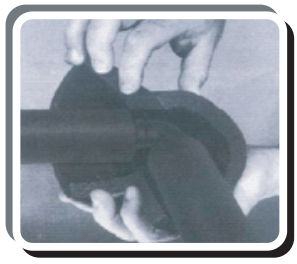
② Only in specialcase is the vertical cutting of the insulation allowed.

③ Bond both sides of the surface of EPDM and press them together for long lasting bonding.

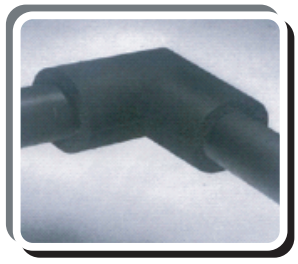
④ Dry it until it becomes thick and sticky.

3) ' L' Fitting connection part insulation

① All of the fitting connecting parts should be insulated.
Bring face to face the each end of EPDM on fitting connection part.



② Make fitting cover to fit the EPDM insulation fitting cover should be overlapped with insulation min 1 inch (2.5cm).



③ Bond the both cutting sides of fitting cover.

2.4.2 Forming the piping

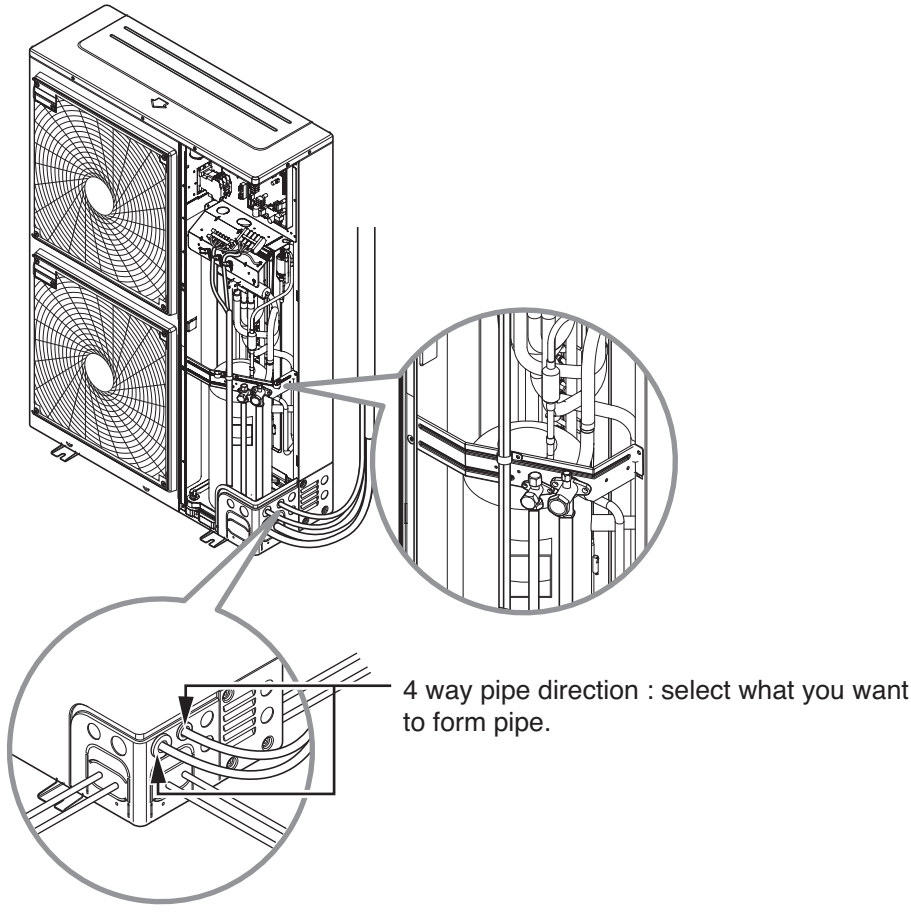
1) Form the piping by wrapping the connecting portion of the indoor unit with insulation material and secure it with two kinds of vinyl tape.

- If you want to connect an additional drain hose, the end of the drain outlet should be routed above the ground. Secure the drain hose appropriately.

2) In cases where the outdoor unit is installed below the indoor unit perform the following.

① Tape the piping, drain hose and transmission cable from down to up.

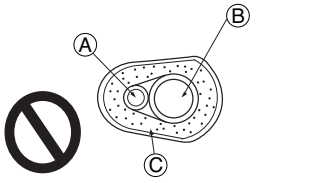
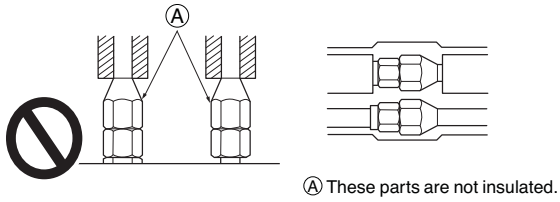
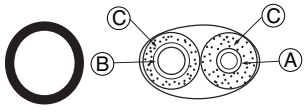
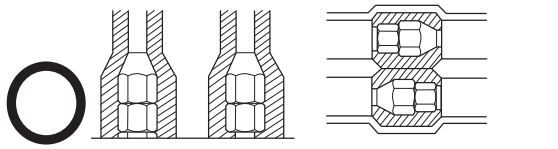
② Secure the tapped piping along the exterior wall using saddle or equivalent.



2.4.3 Essential points of thermal insulation

1) Thermal insulation of refrigerant piping

Be sure to give insulation work to refrigerant piping by covering liquid pipe and gas pipe separately with enough thickness heat-resistant insulation materials, so that no gap is observed in the joint between indoor unit and insulating material, and insulating materials themselves.
When insulation work is insufficient, there is a possibility of condensation drip, etc. pay special attention to insulation work to ceiling plenum.

Wrong method	• Do not insulate gas or low pressure pipe and liquid or high pressure pipe together.  Ⓐ Liquid pipe Ⓑ Gas pipe Ⓒ Insulation	• Be sure to fully insulate connecting portion.  Ⓐ These parts are not insulated.
Correct method	 Ⓐ Liquid pipe Ⓑ Gas pipe Ⓒ Insulation	

2) Caution during insulation work

- In case the cables are installed in the conduit, a finishing tape is not required.
- Defect and insufficient insulation can cause condensation drops.
- Binding the insulation too tight may result in dew drops.
- Be sure not to tie rap the insulation but put special taping or the clamp at the connecting portion.
- The insulation overlapping part at the piping connection must be a distance from the flaring part at the pipe connection.

2. Guideline for each installation process

3) Insulation tube thickness

① Thickness decision of insulation tube

- Insulation material: EPDM or polyethylene foam
- Thermal conductivity 0.035 kcal~0.040kcal/m·h°C(0.024~0.027Btu/ft·h°F)
- Heat resistance = 212°F(Cooling only) or more
  248°F(Heat pump) or over

② The thickness of the thermal insulation material must be determined in the light of the pipe sizes.

Pipe size	Thickness of insulation material
6.35(1/4) ~ 25.4(1) mm(inch)	10(13/32) mm(inch) or more
25.4(1) mm(inch) ~	15(19/32) mm(inch)

③ It will be necessary to increase the thickness of insulation in the above table when conditions are hot and humid.

④ Where a customer supplies his own specifications then these must be adhered to.

⚠CAUTION

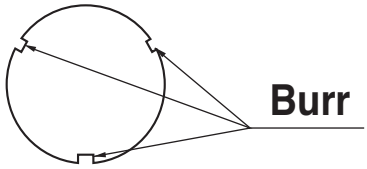
Outdoor temperature and hummidity around the cooling piping might exceed 86°F and RH80%, reinforce the insulation on the cooling piping (at least 13/16 inch thick)

2.5 Electrical work

2.5.1 Precautions

⚠CAUTION

When knocking out knock holes
- To punch a knock hole, hit on it with a hammer.
- After knocking out the holes, we recommend you paint the edges and areas around the edges using paint to prevent rusting.
- When passing electrical wiring through the knock holes, remove any burrs from the knock holes and wrap the wiring with protective tape to prevent damage.



If there are any possibilities that small animals or insects enter the system through the knock holes, plug the holes with packing materials (to be prepared onsite).

Use a conduit for the cable
- Outside the unit, make sure the thin signal cable (i.e. for the remote control, between units, etc.) and the thick electric wiring do not pass near each other and use of the shield signal cable is recommended.
  Otherwise, the outdoor unit may be affected by electrical noise (external noise), and malfunction or fail.
- Secure the wiring with the accessory clamps so that it does not touch the piping.
- Make sure the wiring and the electric parts box cover do not stick up above the structure, and close the cover firmly.

⚠CAUTION

Do not operate the air conditioner until the refrigerant piping work is completed.
(Operating the air conditioner before the refrigerant piping work is completed may damage the compressor.)
- Install an earth leakage circuit breaker.
  Since this is a inverter air conditioner. In order to prevent malfunction of the earth leakage breaker itself, use a breaker resistant to higher harmonics.
- After finishing the electric work, confirm that each electric part and terminal inside the electric parts box is connected securely.

NOTE

- Only professional electricians having sufficient knowledge should perform the electrical wiring work.
  Perform the electrical wiring work in accordance with the electrical wiring diagram.
  Make sure to set OFF the branch switch and over current breaker before starting the work.
- Install an earth leakage breaker.
- Perform grounding to the indoor units and outdoor units.
- Do not connect the ground wire to gas pipes, sewage pipes, lightning rods telephone ground wires.
- Gas pipes ···· Can explode or catch fire if gas leaks.
- Sewage pipes···· Provides no grounding effect if hard plastic pipes are used.
- Telephone ground wires and lightening rods ···· dangerous when struck by lightening due to abnormal rise in the ele trical potential in the ground.

2. Guideline for each installation process

- Use only copper wires.
- Make sure to shut down the power before starting the electric wiring work.
  Do not set ON any switch until the work is completed.
- The outdoor unit has an inverter compresser which generates noise and charges the outer casing with the leakag current.
  The outdoor unit should be grounded so that the effect of the generated noise on othe equipment can be reduced, and that the outer casing can be discharged.
- Never install a phase advancing capacitor for power factor improvement.
  (Even if it is installed, the power factor is not improved. And if it is installed, the outdoor unit is abnormally overheated.)
- Use specified electric wires in the wiring, and connect them securely.
  Fix them in such a way that external force is not applied at the terminals
  (transmission wiring in the local field and ground terminal).
- Never push excessive electric wires into the units.
- Protect electric wires with conduit tubes or other proper tubes so that they will not be damaged by edges of knock holes.
- Do not use multi conductor cable which have more than 5 wires in one core.

2.5.2 Control wiring / power supply

1) All wiring must comply with LOCAL REGULATIONS.

2) Select a power source that is capable of supplying the current as required by the air conditioner.

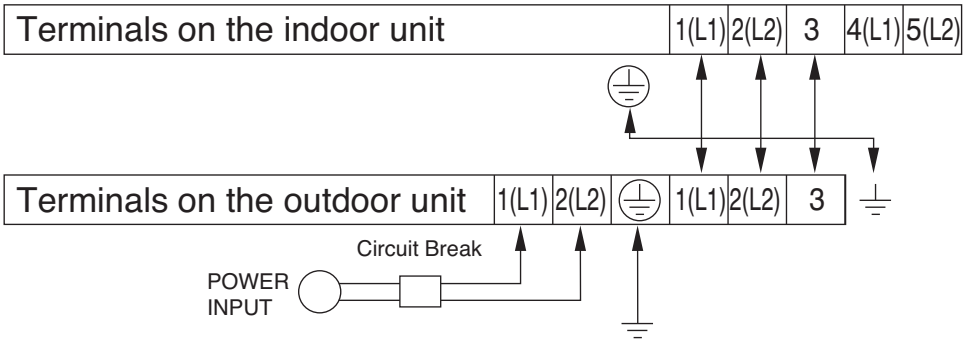
3) Feed the power source to the unit via a distribution switch board designed for this purpose.

4) The terminal screws inside the control box may be loose due to vibration during transport.
Check the screws for loose connection.
(Running the air conditioner with loose connection can overload and damage electrical components.)

5) Always ground the air conditioner with a grounding wire and connector to meet the LOCAL REGULATION.

DC inverter SINGLE ZONE

1Phase model



How to connect wiring to the terminals

■ For strand wiring

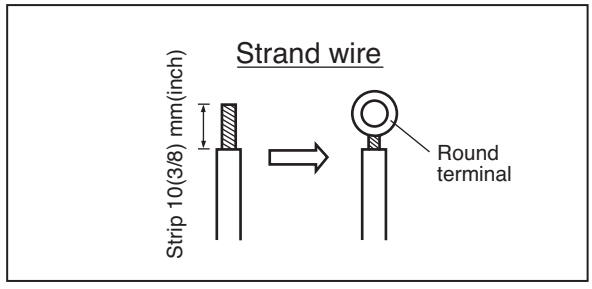
1) Cut the wire end with a wire cutter or wire-cutting pliers, then strip the insulation to expose the strand wiring about 10(3/8) mm(inch).

2) Using a screwdriver, remove the terminal screw(s) on the terminal plate.

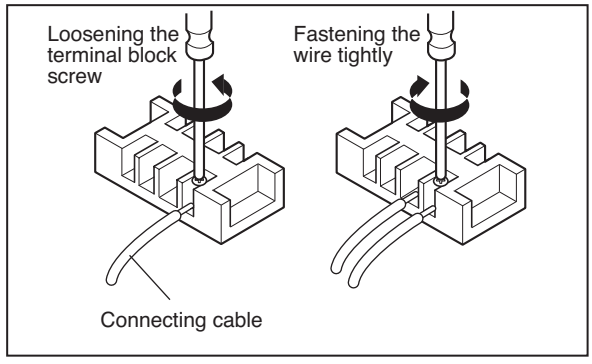
3) Using a round terminal fastener or pliers, securely clamp each stripped wire end with a round terminal.

4) Position the round terminal wire, and replace and tighten the terminal screw using a screwdriver.

Power supply cable



Connecting Cable

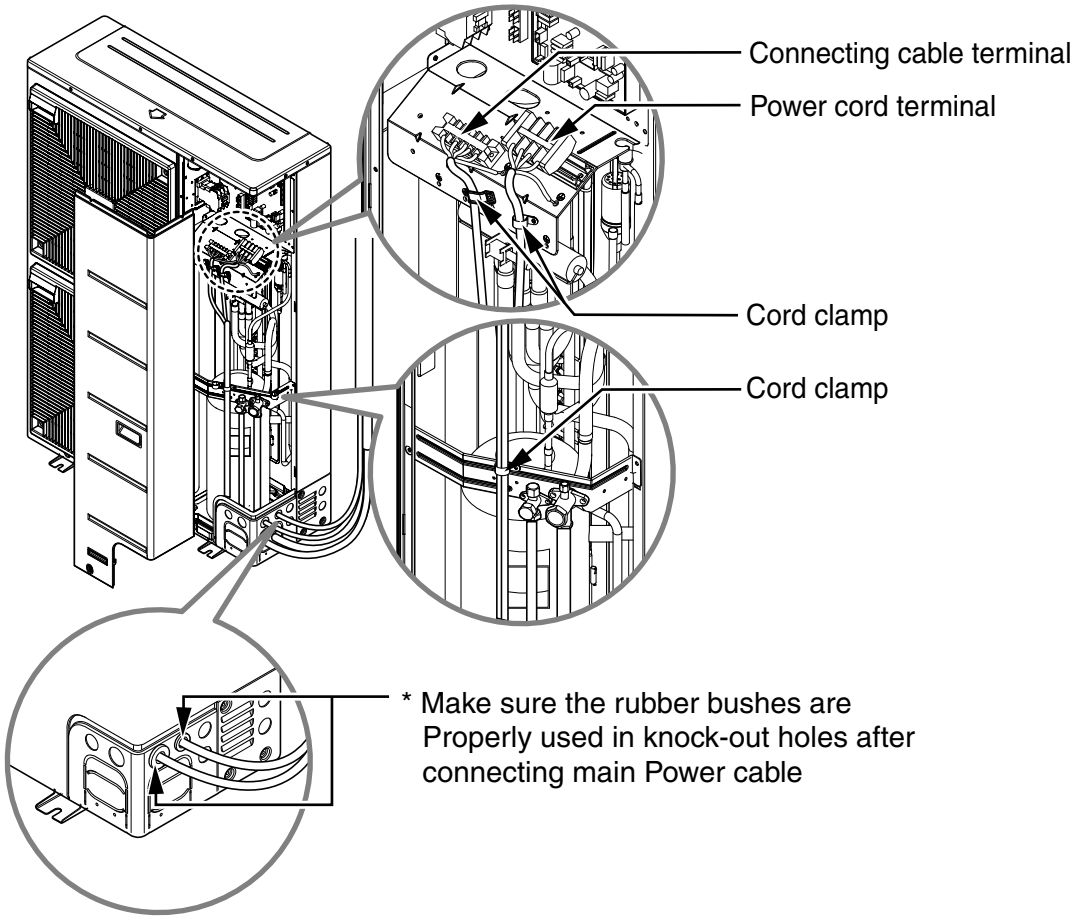


2. Guideline for each installation process

Connecting the cable to Outdoor Unit

- Remove the side panel for wiring connection.
- Use the cord clamp to fix the cord.
- Earthing work
  - Case 1 :Terminal block of Outdoor Unit have ⏚ mark.
- Connect the cable of diameter 1.6mm²(15AWG) or more to the earthing terminal provided in the control box and do earthing.
  - Case 2 :Terminal block of Outdoor Unit don't have ⏚ mark.
- Connect the cable of diameter 1.6mm²(15AWG) or more, to the panel of control box, marked as ⏚ and fasten with earth screw.

❊ Please check !!



⚠CAUTION

- The circuit diagram is not subject to change without notice.
- Be sure to connect wires according to the wiring diagram.
- Connect the wires firmly, so that not to be pulled out easily.
- Connect the wires according to color codes by referring the wiring diagram.

2.6 Leakage test

2.6.1 Leakage test

Air and moisture remaining in the refrigerant system have undesirable effects as indicated below.

① Pressure in the system rises.
② Operating current rises.
③ Cooling (or heating) efficiency drops.
④ Moisture in the refrigerant circuit may freeze and block capillary tubing.
⑤ Water may lead to corrosion of parts in the refrigeration system. Therefore, the indoor/outdoor unit and connecting tube must be checked for leak tight, and vacuumed to remove incondensable gas and moisture in the system.

Checking method

1) Preparation

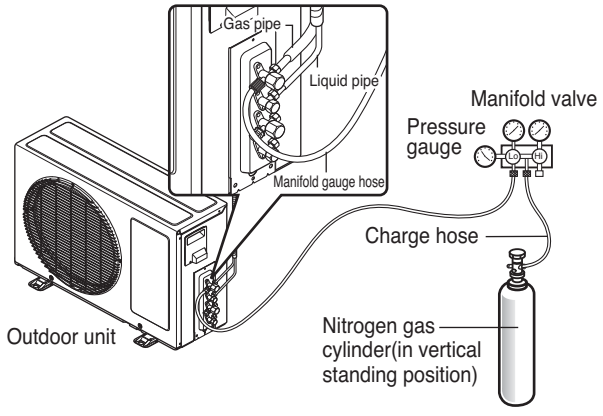
• Check that each pipe (both liquid and gas side pipes) between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed. Remove the service valve caps from both the gas and the liquid side on the outdoor unit. Check that both the liquid and the gas side service valves on the outdoor unit are kept closed at this stage.

2) Leakage test

• Connect the manifold valve (with pressure gauges) and dry nitrogen gas cylinder to this service port with charge hoses.

⚠CAUTION

Be sure to use a manifold valve for leakage test. If it is not available, use a stop valve for this purpose. The "Hi" knob of the manifold valve must always be kept close.



⚠CAUTION

To avoid nitrogen entering the refrigerant system in a liquid state, the top of the cylinder must be higher than its bottom when you pressurize the system. Usually, the cylinder is used in a vertical standing position.

1. Do a leakage test of all joints of the Tubing (both indoor and outdoor) and both gas and liquid side service valves. Bubbles indicate a leak. Be sure to wipe off the soap with a clean cloth.
2. After the system is found to be free of leaks, relieve the nitrogen pressure by loosening the charge hose connector at the nitrogen cylinder. When the system pressure is reduced to normal, disconnect the hose from the cylinder.

2.6.2 Essential points of testing

The key to successful testing is strict adherence to the following procedure:

a) The liquid and gas piping in each refrigerant system should be pressurized in turn in accordance with the following steps. (Nitrogen gas must be used.)

Step 1: increase pressure to 0.3MPa(43.5psi) for 3 minutes or more
Step 2: increase pressure to 1.5MPa(217.6psi) for 3 minutes or more — Indicates existence of major leaks

Step 3: increase pressure to 3.8MPa(551.1psi) for approxmate 24 hours — Indicates existence of major leaks

Increasing the system pressure to 3.8MPa(551.1psi) does not guarantee the identification of minor leaks if pressure is maintained for only a short time. It is therefore recommended that the system remain pressurized in accordance with Step 3 above for at least 24 hours.

NOTE

Piping should not be pressured more than 3.8MPa(551.1psi).

b) Check for pressure drop

If there is no drop in pressure then the test is deemed a success.

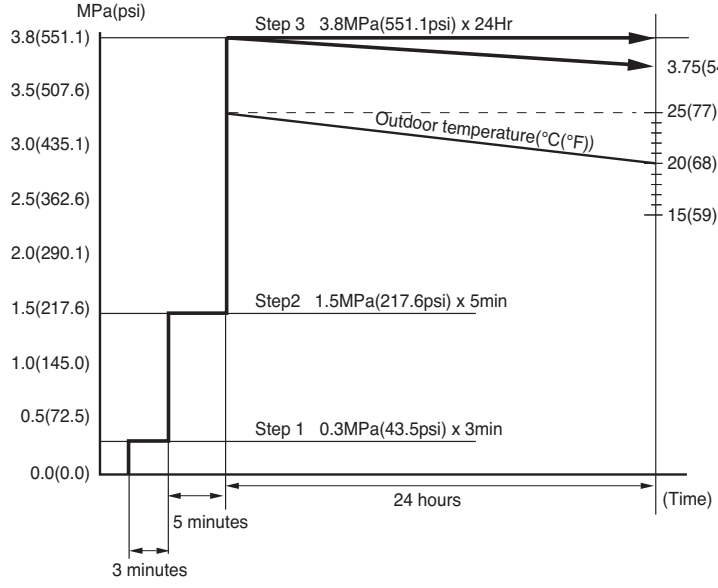
If the pressure drops then the leak must be located. See following page.

However, if there is a change in the ambient temperature between the pressurizing stage and the time when you check for a drop in pressure then you will have to adjust your calculations accordingly since a change of 1°C(1.8°F) can account for a pressure change of approximately 0.01MPa(1.45psi).

Compensating adjustment value:
(temperature at time of pressurizing – temperature at time of checking) × 0.01(1.45)

Example:

During of pressurizing: 3.8MPa(551.1psi) at 25(77) °C(°F)
24 hours later: 3.75MPa(543.9psi) at 20(68) °C(°F)
Although the gauge pressure is dropped from 3.8MPa(551.1psi) to 3.75MPa(543.9psi), it can be safely assumed that there is no leakage because the gauge pressure can also drop due to the change in outdoor temperature.



2.6.3 Checking for leakage

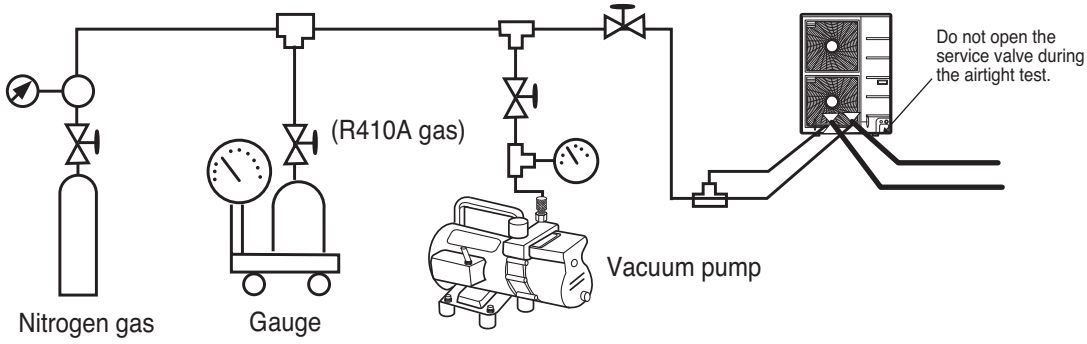
[Check 1] (Where pressure falls while carrying out Steps 1 to 3 described on previous page)

- Check by measure gage.....gas detector.
- Check by ear.....Listen for the sound of a major leakage.
- Check by hand.....Check for leak by feeling around jointed sections with hand.
- Bubble check .....Bubbles will reveal the presence of a leakage.

[Check 2] (When searching for a minor leak or when there has been a fall in pressure while the system has been fully pressurized but the source of the leak cannot be traced.)

1. Release the nitrogen until the pressure reaches 0.3MPa(43.5psi).
2. Increase pressure to 1.5MPa(217.6psi) using gaseous refrigerant(R410).
3. Search for the source of the leakage using a leackage detector such as a halide torch or a propane or electrronic detector.
4. If the source of the leakage still cannot be traced then repressurize with nitrogen up to 3.8MPa(551.1psi) and check again. (The pressure must not be increased to more than 3.8MPa(551.1psi)

(System sample)



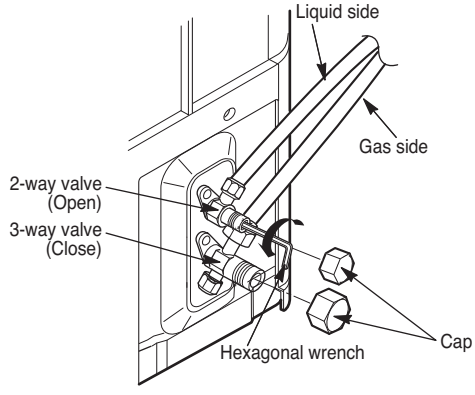
Important points

1. Where the lengths of piping involved are particularly long then the air tight test should be carried out block by block.
   1) Indoor side
   2) Indoor side + vertical pipes
   3) Indoor side + vertical pipes + outdoor side

⚠CAUTION

Soap water method

1. Remove the caps from the 2-way and 3-way valves.
2. Remove the service-port cap from the 3-way valve.
3. To open the 2-way valve turn the valve stem counterclockwise approximately 90°, wait for about 2~3 sec, and close it.
4. Apply a soap water or a liquid neutral detergent on the indoor unit connection or outdoor unit connections by a soft brush to check for leakage of the connecting points of the piping.
5. If bubbles appear then those points have leakage.



2.7 Vacuum drying works

2.7.1 What is Vacuum drying?

Vacuum drying is : The use of a vacuum pump to vaporize(gasify) the moisture (liquid) inside the pipe and expel it leaving the pipes completely dry inside.
At 1 atm(760mmHg) the boiling point (evaporating temperature) of water is 100°C(212°F) but if a vacuum is created inside the pipes using a vacuum pump then the boiling point is rapidly reduced as the degree of the vacuum is increased.
If the boiling point is reduced to a level below that of the ambient temperature then the moisture in the pipes will evaporate.

Example

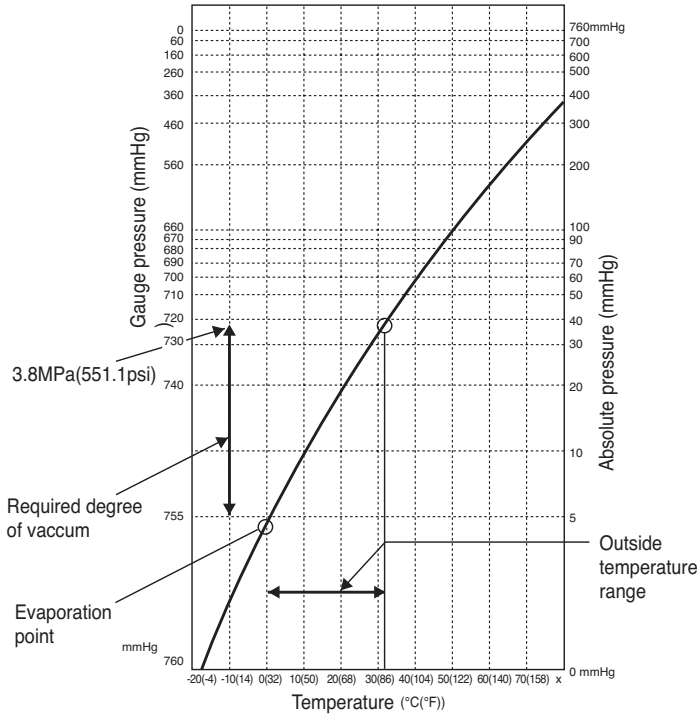
When outside temperature is 11.7°C(53.1°F) as shown in the table on the right , the degree of vacuum must be lowered below -750mmHg

Boilng point of water(°C(°F))	The degree of a vacuum	Pressure		
	mmHg	Pa	psi	Torr
40 (104)	-705	7333	1.1	55
30 (86)	-724	4800	0.7	36
26.7(80.1)	-735	3333	0.5	25
24.4(75.9)	-738	3066	0.4	22
22.2(72)	-740	2666	0.4	20
20.6(69.1)	-742	2400	0.3	18
17.8(60)	-745	2000	0.3	15
15.0(59)	-747	1733	0.3	13
11.7(53.1)	-750	1333	0.2	10
7.2(45.1)	-752	1066	0.2	8
0(32)	-755	667	0.1	5

The evacuation of air conditioner piping provides the following effects.

1. Vaccum drying
2. Removes air and nitrogen(used in air-tightness test) from the inside of pipes.

Therefore , it is necessary to ensure that both purposes have been achieved in the vacuum drying operation.

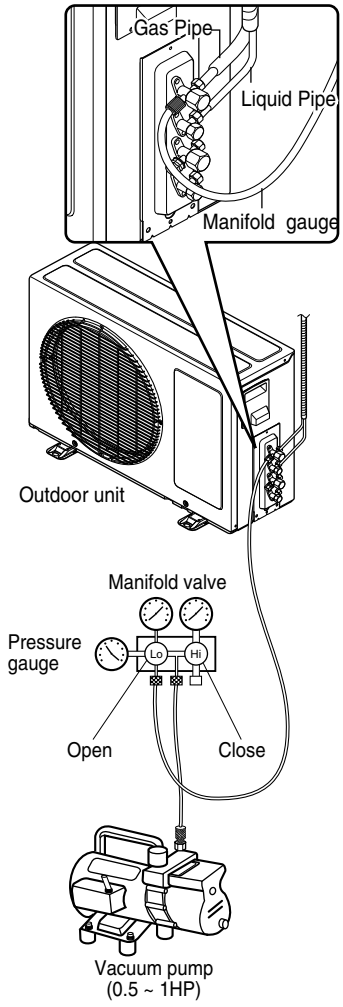


NOTE

Key point: Maintain a vacuum level of -755mmHg

2.7.2 Evacuation

1. Connect the manifold hose end described in the preceding steps to the vacuum pump to evacuate the tubing and indoor unit. Confirm the "Lo" knob of the manifold valve is open. Then, run the vacuum pump. The operation time for evacuation varies with tubing length and capacity of the pump. The following table shows the time required for evacuation.
2. When the desired vacuum is reached, close the "Lo" knob of the manifold valve and stop the vacuum pump.



CAUTION

Finishing the job

1. With a service valve wrench, turn the valve stem of liquid side valve counter-clockwise to fully open the valve.
2. Turn the valve stem of gas side valve counter-clockwise to fully open the valve.
3. Loose the charge hose connected to the gas side service port slightly to release the pressure, then remove the hose.
4. Replace the flare nut and fasten the flare nut securely with an adjustable wrench. This process is very important to prevent leakage from the system.
5. Replace the valve caps at both gas and liquid side service valves and fasten them tight. This completes air purging with a vacuum pump. The air conditioner is now ready for test run.

2.7.3 Choosing a vacuum pump

The necessity for counter flow prevention

After the vacuum process of the refrigerant cycle, the inside of the hose will be vacuumed after stopping the vacuum pump, the oil of vacuumpump may flow back. Moreover, if the vacuum pump stops during the operation for some reason. Therefore, in order to prevent the counter flow from the vacuum pump, a check valve is reguired.

1) Vacuum pump performance

The 2 most important things for determining vacuum pump performance are as follows:

(1) Exhaust velocity

(2) Degree of vacuum

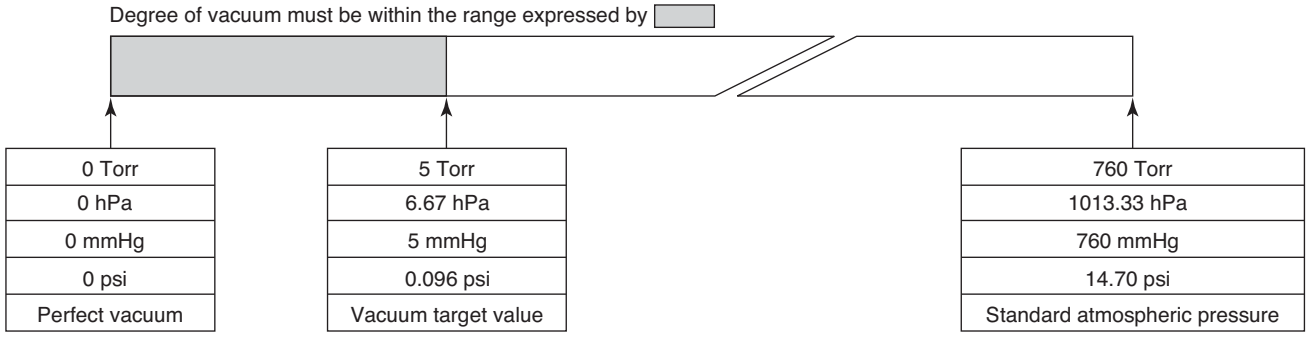
(1) Exhaust velocity

Exhaust volume is usually expressed as l/min or ft^3/min. The larger the number, the faster the vacuum is achieved. Generally speaking, the faster the exhaust velocity, the larger and heavier the vacuum pump itself is. Commercially available vacuum pumps (exhaust velocity of 20~30 ℓ/min(0.71~1.06 ft^3/min) usually take an extremely long time to achieve vacuum. (We recommend a vacuum pump of approx. 60~100 ℓ/min(2.12~3.53 ft^3/min)

(2) Degree of vacuum

Ultimate vacuum varies largely according to use of the vacuum pump. Vacuum pumps used for vacuum forming cannot be used for vacuum drying. (A vacuum pump with a high degree of vacuum is required.)
When selecting a vacuum, you should select one which is capable of achieving 0.2 Torr of ultimate vacuum.
Degree of vacuum is expressed in Torr, micron, mmHg, Pascal(Pa), and psi. The units correlate as follows:

	Unit	Standard atmospheric pressure	Perfect vacuum
Gauge Pressure	kg/cm^2	0	-1.033
Absolute Pressure	kg/cm^2abs	1.033	0
Torr	Torr	760	0
Micron	Micron	760000	0
mmHg	mmHg	760	0
hPa	hPa	1013.33	0
psi	psi	14.70	0



2. Guideline for each installation process

2) Vacuum pump maintenance

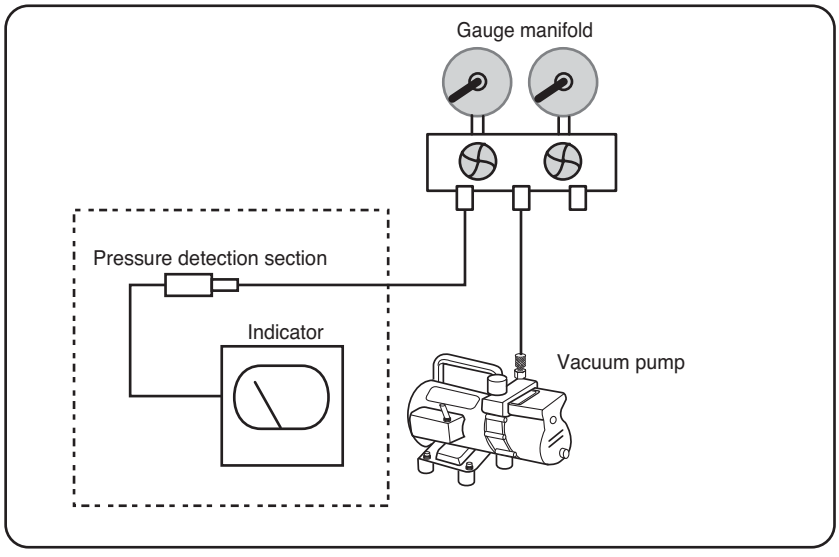
Because of their nature, most vacuum pumps contain large amounts of oil which lubricates bearings, etc., and functions to enhance airtightness of pistons. When using a vacuum pump to discharge air from refrigerant piping, moisture in the air tends to get mixed in with the oil. You must therefore change oil periodically and make sure the proper oil level is maintained. (Perform periodic inspections in accordance with the operating instructions.)

3) Degree of vacuum measurement

An extremely accurate vacuum gauge is required to test degree of vacuum. You cannot accurately measure degree of vacuum with the compound gauge on the gauge manifold. A Pirani vacuum gauge is required to measure degree of vacuum accurately. Because Pirani gauges are very sensitive and require extreme care when using, they are not very suitable for use in the field. You should therefore use the Pirani gauge to calibrate the attached vacuum gauge on the gauge manifold and the degree of vacuum of the vacuum pump.

4) Calibration method

1. Connect a Pirani vacuum gauge and the gauge manifold vacuum gauge (760 mmHg) to the vacuum pump at the same time, and run the pump for about 3 minutes.
2. Make sure the reading of the Pirani vacuum gauge is 5 Torr or less. The reading of conventional vacuum pumps lowers to about 0.2 Torr.
   If the reading is not 5 Torr or less, check the vacuum pump oil. (Oil is low in many cases.)
3. Check the attached gauge on the gauge manifold. Adjust the gauge if the reading is not exactly correct.
4. Adjust the gauge manifold valve so that the Pirani vacuum gauge reads 5 Torr.
5. Mark the position indicated by the gauge manifold gauge with an oil based ink pen.
6. Use the mark of the gauge manifold as a target when vacuuming in the field.



(Reference) Types of vacuum pump with respect to maximum degree of vacuum

Type	Maximum degree of vacuum	Use	
	Expulsion capacity	Vacuum drying	Air expulsion
Oil rotary (Oil using)	0.02 mmHg	Suitable	Suitable
	100 ℓ /min(3.53 ft³/min)		
Oilless rotary (No need of oil)	10 mmHg	Unsuitable	Suitable
	50 ℓ /min(1.77 ft³/min)		
	0.02 mmHg	Suitable	Suitable ← Many handy pumps fall into this category
	40 ℓ /min(1.41 ft³/min)		

2.7.4 Vacuum drying procedure

There are two vacuum drying methods and the appropriate one should always be chosen to confirm with individual local conditions.
[Normal vacuum drying].....The standard method

[Operational steps]

1. Vacuum drying (1st time): Connect a manifold gauge to the service port of the liquid or gas pipe and operate the vacuum pump for at least 2 hours.
   (The degree of vacuum produced should be in excess of 5 Torr)
   If after 2 hours the vacuum produced has not exceeded 5 Torr then either there is moisture in the pipe or there is a leak.
   Operate the vacuum pump for further one more hour.
   If, even after 3 hours, the vacuum has not reached 5 Torr then check the system for a leak.

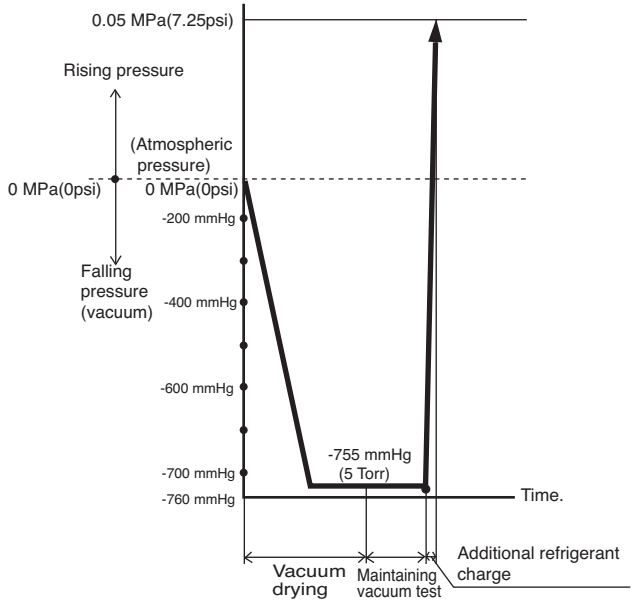
2. Carry out vacuum test.
   Produce a vacuum in excess of 5 Torr and do not release it for an hour or more. Check the vacuum gauge to make sure that it has not risen. (If the gauge rise then there is still moisture in the pipe or there is a leak somewhere.)

3. Additional charge of refrigerant.
   Connect the charging cylinder to the liquid pipe service port and charge with the required amount of refrigerant.

4. Open stop valve to the full.
   Open the stop valve on the liquid and the gas pipes to the full.

NOTE

Vacuums should be produced in both the liquid and the gas pipes.
(Because there are a large number of functional components in the indoor unit which cut off the vacuum mid-way through)



2.8 Additional charge of refrigerant

2.8.1 Refrigerant charging instructions

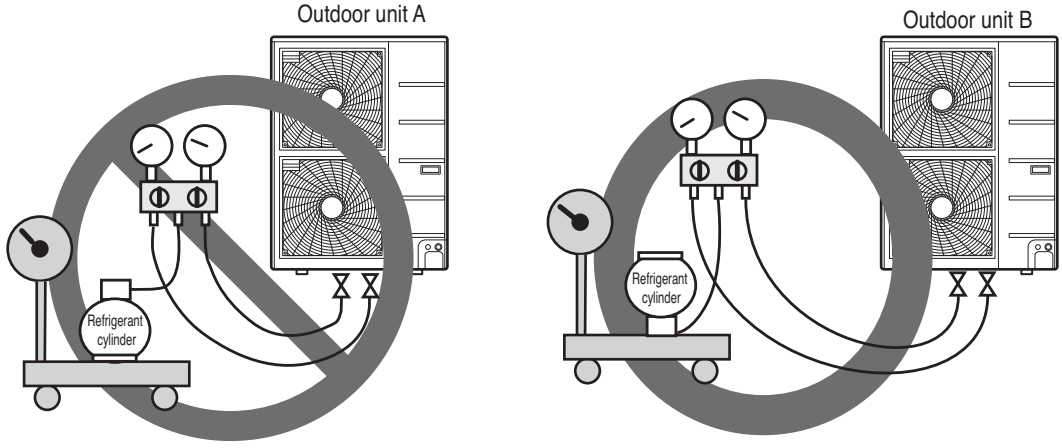
Refrigerant charging

1. The results of all calculations must be recorded. (make a list)
2. The refrigerant will need to be additionally charged when the distance between the outdoor Unit and the most distant indoor unit is more than length (refer to section 8 outdoor unit installation condition)
3. The additional charging operation should be carried out by input of liquid into the liquid pipes from a charging cylinder following completion of the Vacuum drying operation.
4. When the additional charging operation cannot be satisfactorily completed , use the action of the compressor to complete the additional charging during the test run.

R-410A is a non-azeotrope refrigerants. Therefore , these refrigerants must be charged in the Liquid state.
When charging the refrigerant into equipment from the cylinder , turn the refrigerant cylinder upside down.

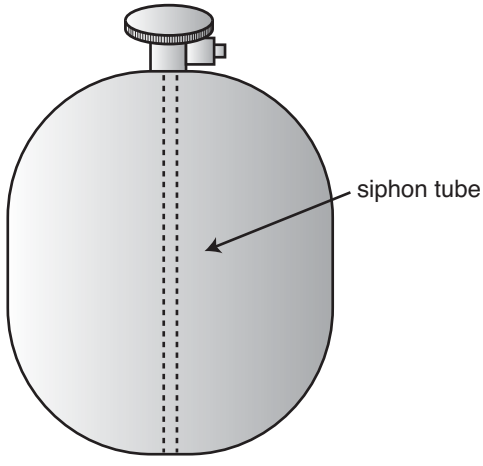
NOTE

Make sure that the refrigerant (liquid) is taken out from the bottom part of the refrigerant cylinder.
Do not take out the refrigerant (gas) at the upper of the refrigerant cylinder for charging.



CAUTION

- Since some refrigerant cylinders differ in the internal mechanism, it is necessary to examine the cylinder carefully. (Some cylinders have a siphon tube to eliminate the need for turning it upside down)



2.9 Trial test run operation

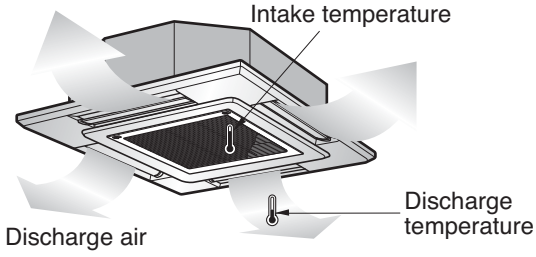
2.9.1 Test run procedure

Check the following before turning power on

- Wrong power wiring , loosed screws
- Wrong control transmission wiring , loose screws
- Piping size , presence of thermal insulation
- Measurement of main power circuit insulation → Use a mega-tester
- Addition or refrigerant if required → Be sure to record the additional quantity of refrigerant
- Fully open respective stop valves on liquid, gas
- Turn on outdoor unit power

2.9.2 Evaluation performance

Evaluation of the performance
Operate unit for 15~20 minutes, then check the system refrigerant charge:
1. Measure the pressure of the gas side service valve.
2. Measure the temperature of the intake and discharge of air.
3. Ensure the difference between the intake temperature and the discharge is more than 8°C (14.4°F)



4. For reference, the gas side pressure of optimum condition is as below. (Cooling)

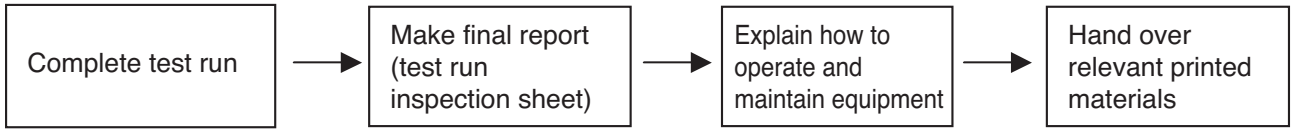
Refrigerant	Outside ambient Temp.	The pressure of the gas side service valve.
R410A	35°C (95°F)	8.0~10.0kg/cm^{2}G (113.8~142.2psi)

NOTE

If the actual pressure is higher than shown, the system is most likely overcharged so extra refrigerant should be removed.
If the actual pressure is lower than shown, the system is most likely undercharged so extra refrigerant should be added.
The air conditioner is now ready for use.

2.9.3 Transfer to customer with explanation

1. Operational step



a) The measurements taken during the test run should be recorded and kept on a test run inspection sheet.

b) Do not forget to record the length of the refrigerant piping and the refrigerant additional charging volume on the plate on the back of the outdoor unit external notice board, as this information will be required for servicing the system.

c) Explain to the customer how to operate and maintain the equipment and let him try it.

d) Assemble all the relevant diagrams and other printed matter which is required to operate the system and hand over to the customer (on the spot) and request him to keep it handy.

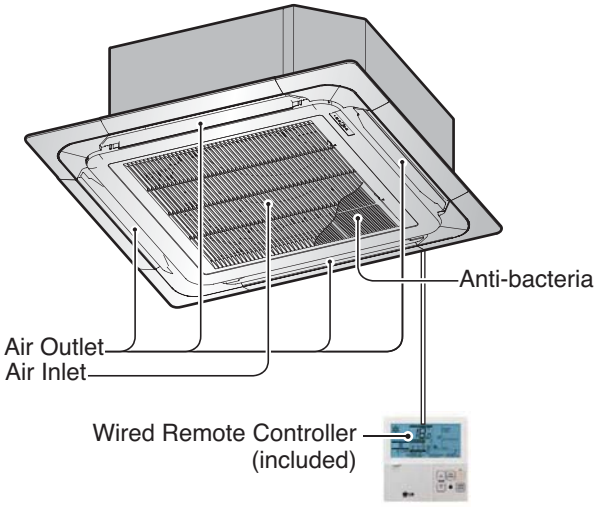
e) Service contact address.

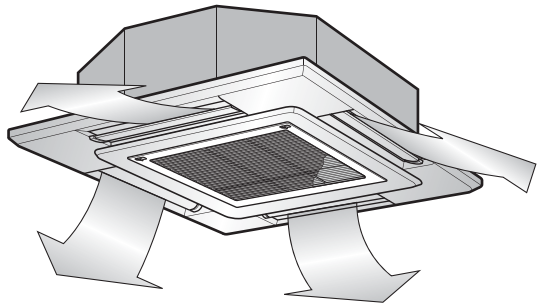
- List of equipment which has been delivered
- Installation drawing ..... It is essential to prepare a control wiring diagram which clarifies the refrigerant system and the control system.
- 1 set of operation manuals
- Names of those responsible for the work (emergency contact address)
- Equipment guarantees.

3. Installation of indoor unit

3.1 Ceiling cassette 4-way

- Please read the instruction sheets completely before installing the product.
- When the power cord is damaged, replacement work shall be performed by authorized personnel only.
- Installation work must be performed in accordance with the national wiring standards by authorized personnel only.

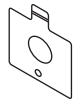
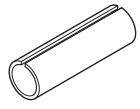




3.1.1 Accessories

Check whether the following accessories are included with your unit.

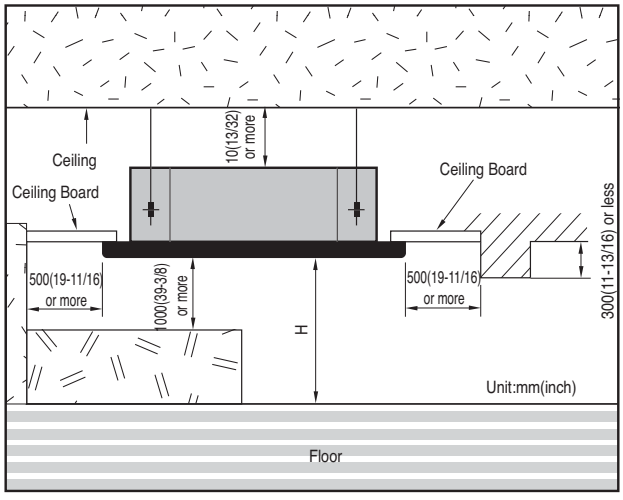
1) Standard accessories

Name	Drain hose	Clamp metal	Washer for hanging backet	Clamp	Conduit Bracket	Insulation for fitting	(Other)
Quantity	1 EA	1 EA	8 EA	8 EA	1 EA	1 SET	
Shape					 Conduit Bracket  Screw(M4) 1EA	 for gas pipe  for liquid pipe	• Paper pattern for installation • Owner's manual • Installation manual

3. Installation of indoor unit

3.1.2 Selection of the best location

- There should not be any heat source or steam near the unit.
- There should not be any obstacles to the air circulation.
- There should be provision of easy condensate drain.
- Taking into accounting the noise prevention criteria, spot the installation location.
- Do not install the unit near the door way.
- Keep proper distances, of the unit, from ceiling, fence, floor, walls and other obstacles as shown in figure.
- The indoor unit must have the maintenance space.



NOTE

Above figure means minimum value. Please keep these value at least.

- 24kBtu/h (TP Chassis) model H
  = At least 1800(70-7/8) , 3600(141-23/32) or less

- **High Ceiling mode selection (TP Chassis)**

Unit : mm(inch)

No	Ceiling Height	Mode Selection
1	H ≤ 2300(90-9/16)	Low Ceiling
2	2300(90-9/16inch) < H ≤ 2700(106-5/16)	Standard
3	2700(106-5/16) < H ≤ 3100(122-1/16)	High Ceiling
4	3100(122-1/16) < H ≤ 3600(141-23/32)	Super High Ceiling

- 42kBtu/h (TM Chassis) model H
  = At least 1800(70-7/8) , 4200(165-11/32) or less

- **High Ceiling mode selection (TM Chassis)**

Unit : mm(inch)

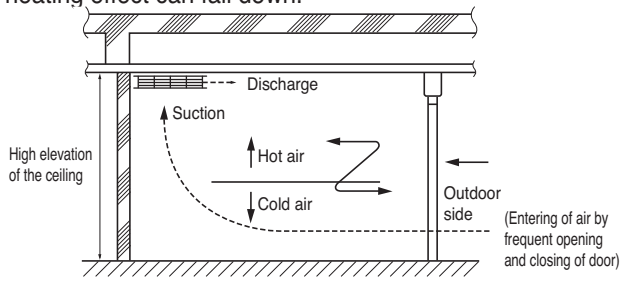
No	Ceiling Height	Mode Selection
1	H ≤ 2700(106-5/16)	Low Ceiling
2	2700(106-5/16) < H ≤ 3200(125-31/32)	Standard
3	3200(125-31/32) < H ≤ 3600(141-23/32)	High Ceiling
4	3600(141-23/32) < H ≤ 4200(165-11/32)	Super High Ceiling

3.1.3 Precautions regarding cassette indoor unit installation

1) Main points about the indoor installation

- **In case of high height ceiling**

In general commercial places and offices though the height of the ceiling is 2.3m(7.54ft)~2.7m(8.86ft), the ceiling height can be 3.1m(10.2ft)~3.6m(11.8ft). In such cases because of the temperature difference with the floor the heating effect can fall down.

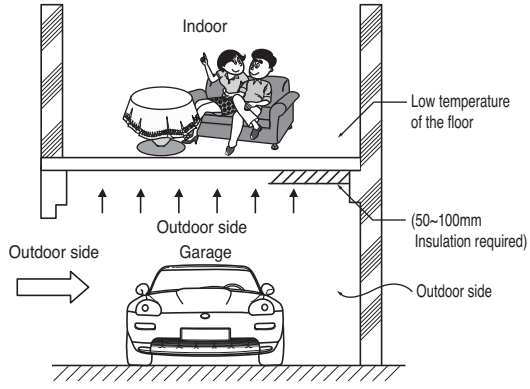


- **Countermeasure method**

① Air conditioner must be able to operate in high ceiling conditioner.
② Plan to install the circulator.
③ The air discharge port is made to give more airflow to the down wood directions.
④ The gate or exit of the building is protected by dual door system.

2) In case the floor or surfaces of the place to be air conditioned is in direct contact with the outdoor air

- **The floor of the heating room indirect contact with the storeroom, garage or the outside air receives the cold air at the floor and the floor temperature decrease will feel cold at the feet.**



In such places where the feet comes in direct contact with floors will give a cold feeling to the floor.

3. Installation of indoor unit

• **Countermeasure:**

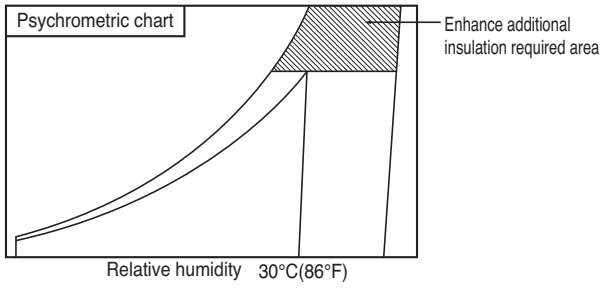
- Use the carpet on the floor (compared to the tiles the carpet over it will have a 3 degree rise in temperature)
- Insulating the floor.
- Floor heating

CAUTION

• **Case of cold air intake:**
The duct surface will have the dew drops so a insulation on the duct is a must.(Insulation material: a glass wool of thickness 25(31/32)mm(inch) will be appropriate.)

3) In case of high temperature or high humidity between the false ceiling and ceiling slab(near by the sea, river, lake, spa)

• **In case of temperature of 30 degree and humidity above 80%, the units body as well as the piping insulation should be strengthened. Refer to the picture given below.**

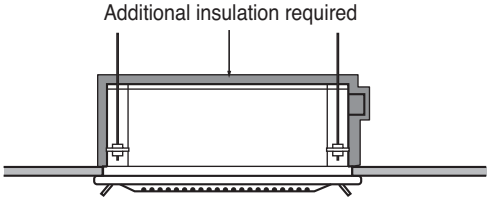


• **Places having the temperature and humidity of the surrounding and the**

The surrounding water sources(sea, river etc.)

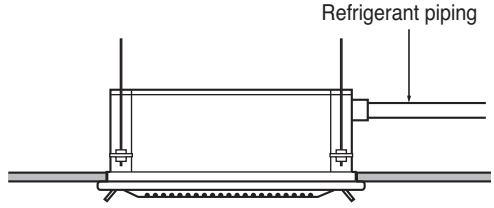
In case the steam is generated between the false ceiling and the ceiling slab

Due to some nearby by steam source.
- Indoor unit: Insulate the unit body with some insulation like glass wool atleast 10(3/8)mm(inch) in thickness.

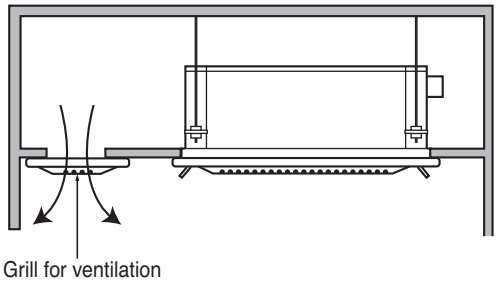


• In case of the multi flow type, use the high humidity kit. Otherwise the dew drops can be seen in the unit body.

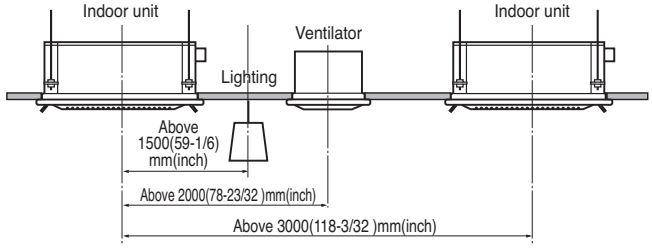
• Refrigerant piping: Increase the piping insulation thickness with thickness above 20(25/32)mm(inch).



• Others: Inside the ceiling near th air tight seal places (no escape of the humidity)



• **In case of multiple indoor cassette units (recommended)**



3.1.4 Ceiling opening dimensions and hanging bolt location

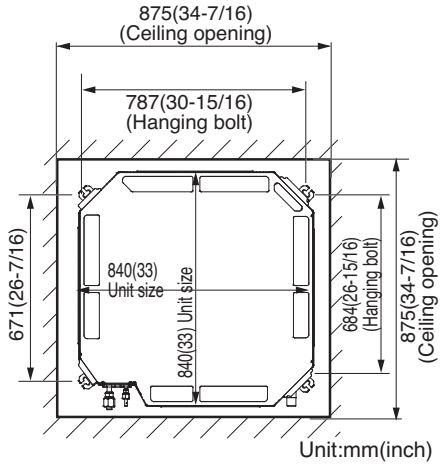
① The dimensions of the paper pattern for installation are the same as those of the ceiling opening dimensions.

② Select and mark the position for fixing bolts and piping hole.

③ Decide the position for fixing bolts slightly tilted to the drain direction after considering the direction of drain hose.

④ Drill the hole for anchor bolt on the wall.

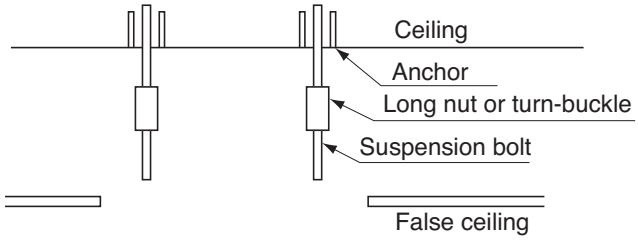
TP/TM Model



Unit:mm(inch)

1) Install the suspension bolts.

(Use either a W3/8" or M10 size bolt) Use a hole-in anchor for existing ceilings, and a sunken insert, sunken anchor or other field supplied parts for new ceilings to reinforce the ceiling to bear the weight of the unit. Adjust clearance from the ceiling before proceeding further.



NOTE

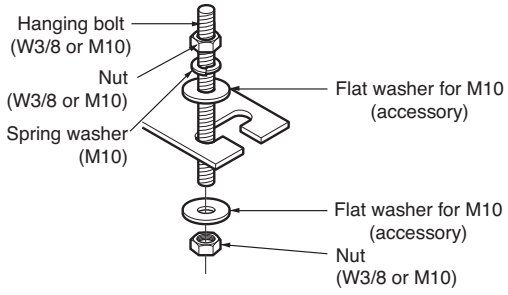
All the above parts are field suppiled.

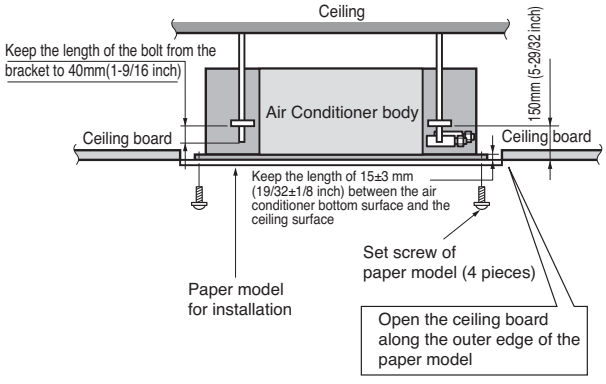
3.1.5 Indoor unit installation

• Installing of the accessories (except for the decoration panel) before installing the indoor unit is easier.

1) Install the indoor unit temporarily.

• Attach the hanger bracket to the suspension bolt. Be sure to fix it securely by using a nut and washer from the upper and lower sides of the hanger bracket.





• The following parts are local purchasing.
- Hanging Bolt - W 3/8 or M10
- Nut - W 3/8 or M10
- Spring Washer - M10
- Plate Washer - M10

2) For new ceilings

(1) Refer to the paper pattern for ceiling opening dimension.

• The center of the ceiling opening is indicated on the paper pattern for installation.
The center of the unit is indicated on the label attached to the unit and on the paper pattern for installation.

• First remove paper packaging material from the 4 corners of the paper pattern for installation , fix the paper pattern to the unit with screws.

• Ceiling height is shown on the side of the paper pattern for installation. Adjust the height of the unit according to this indication.

< Ceiling work >

(2) Adjust the unit to the right position for installation.

(3) Assure that the unit is horizontal.

• The indoor unit is equipped with a built-in drain pump and float switch. At each of the unit's 3 corners, verify that it is level by using awater-level or a water-filled vinyl tube. (Otherwise it will result in the malfunctioning of unit and cause water to drip.)

(4) Remove the washer fixing plate used for preventing the washer from falling and tighten the upper nut.

(5) Remove the paper pattern for installation

3) For existing ceilings

(1) Adjust the height and position of the unit.

(2) Perform steps 3 and 4 in "5.1 For new ceilings".

3.1.6 Connecting pipes to the indoor unit

1) Refrigerant piping work

please refer “REFRIGERANT PIPING WORK”.

2) Piping insulation

① Perform heat insulation work completely on both gas and the liquid pipe. Because improper insulation will result condensate formation over pipe.

② Use the heat insulation material for the refrigerant piping which has an excellent heat resistance (over 120°C(248°F)).

③ Precautions in high humidity circumstance:

④ Refer to insulation work

⚠CAUTION

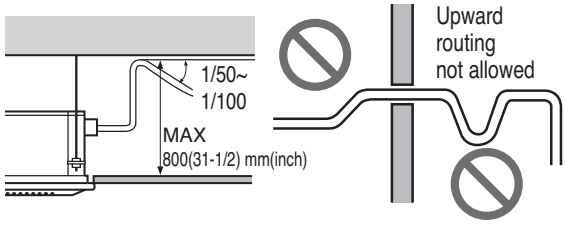
• Make sure to insulate any field piping all the way to the piping connection inside the unit. Any exposed piping may cause condensation or burns if touched.

3. Installation of indoor unit

3) Indoor unit drain piping

- Drain piping must have downward (1/50 to 1/100): be sure not to provide up-and-down slope to prevent reverse flow.
- During drain piping connection, be careful not to exert extra force on the drain port on the indoor unit.
- The outside diameter of the drain connection on the indoor unit is 32mm(1-1/4inch).

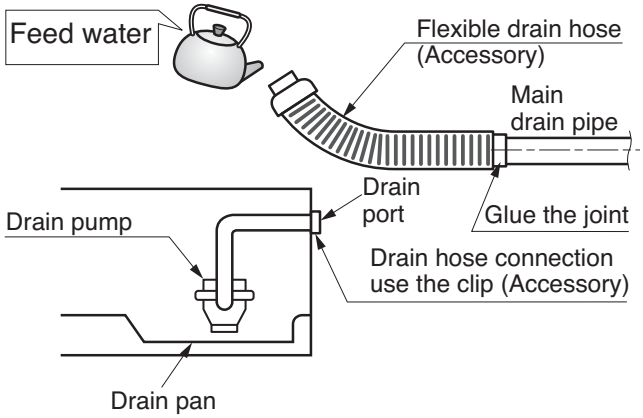
Piping material: Polyvinyl chloride pipe
25(31/32)mm(inch) and pipe fittings



- Be sure to install heat insulation on the drain piping.

Heat insulation material: Polyethylene foam with thickness more than 10(13/32)mm(inch).

4) Drain test

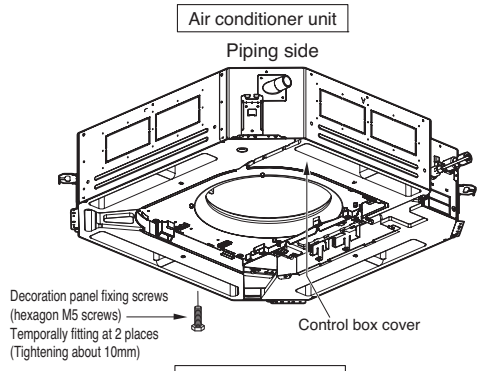


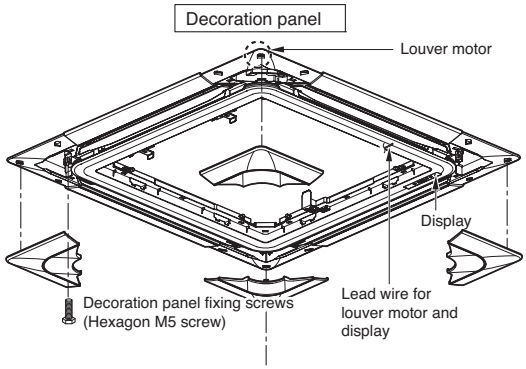
• TP/TM Chassis

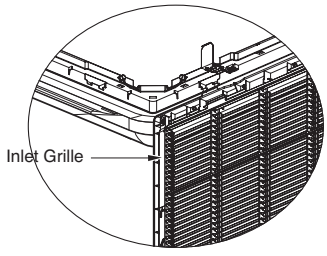
The decoration panel has its installation direction.

Before installing the decoration panel, always remove the paper template.

1. Temporarily fix two decoration panel fixing screws (hexagon M5 screw) on the unit body. (Tighten by amount 10mm(13/32inch) in length.)
   The fixing screws (hexagon M5 screw) are included the indoor unit box.
2. Remove the air inlet grille from the decoration panel. (Remove the hook for the air inlet grille cord.)
3. Hook the decoration panel key hole (⊂⊃) on the screws fixed in step above, and slide the panel so that the screws reach the key hole edge.
4. Retighten completely two temporarily fixed screws and other two screws. (Total 4 screws)
5. Connect the louver motor connector and display connector.
6. After tightening these screws, install the air inlet grille (including the air filter).

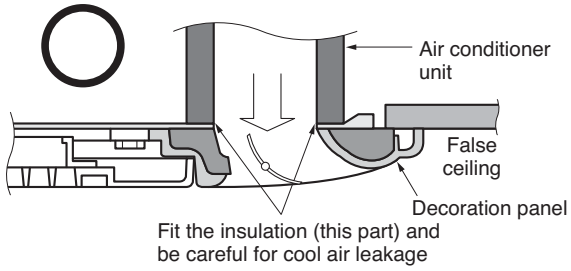


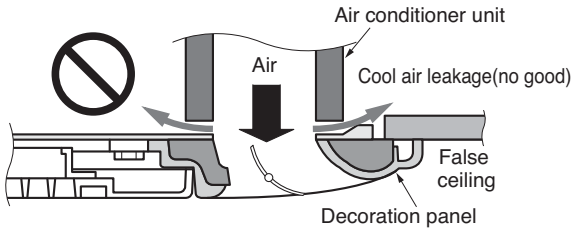




CAUTION

Install certainly the decoration panel.
Cool air leakage causes sweating.
➔ Water drops fall.





3.1.8 Electric wiring work

1) General instructions

① All field supplied parts and materials, electric works must conform to local codes.
Use copper wire only.

② Follow the "WIRING DIAGRAM" attached to the unit body to wire the outdoor unit, indoor units and the remote controller.

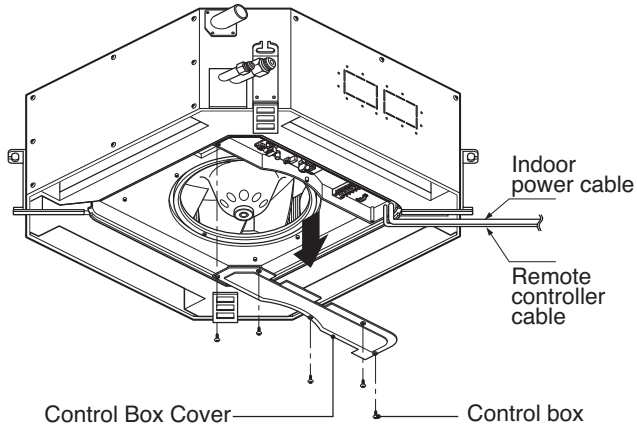
③ All wiring must be performed by an authorized electrician.

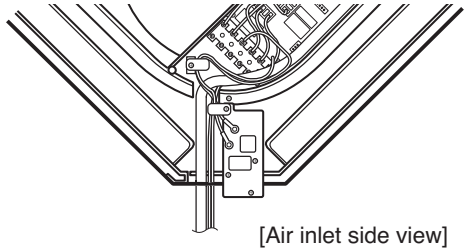
④ This system consists of multiple indoor units. Mark each indoor unit as unit A, unit B..., and be sure the terminal board wiring to the outdoor unit and indoor units are properly matched. If wiring and piping between the outdoor unit and an indoor units are mismatched, the system may cause a malfunction.

⑤ A circuit breaker capable of shutting down the power supply to the entire system must be installed.

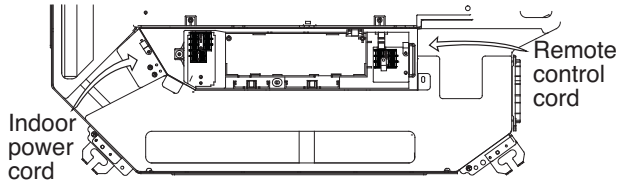
2) Wiring Connection

① Open the control box cover and connect the Remote controller cord and Indoor power wires.





[Air inlet side view]



② Make sure to attach the sealing material (field supplied) to hole of wiring to prevent the infiltration of foreign particle from outside. Otherwise a short-circuit may occur inside the electric parts box

③ When clamping the wires, be sure no pressure is applied to the wire connections by using the included clamping material to make appropriate clamps. Also, when wiring, make sure the cover on the electric parts box fits snugly by arranging the wires neatly and attaching the electric parts box cover firmly. When attaching the electric parts box cover, make sure no wires get caught in the edges. Pass wiring through the holes to prevent damage to them.

④ Make sure the remote controller wiring, the wiring between the units, and other electrical wiring do not pass through the same locations outside of the unit, separating them properly, otherwise electrical noise (external static) could cause product malfunction.

3. Installation of indoor unit

⚠WARNING

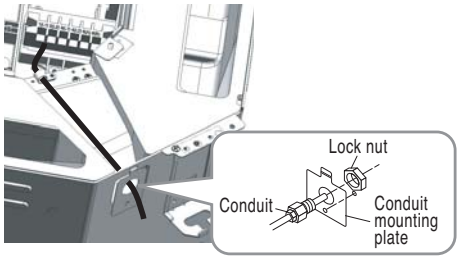
• Make sure that the screws of the terminal are not loose.

3) Conduit connection

① Remove the busing rubber product attached on the indoor unit.

② Join the conduit and the conduit bracket together using nut.

③ Set the connecting cable into the terminal block of indoor unit, and tighten set screw to lock the conduit bracket to the indoor unit.

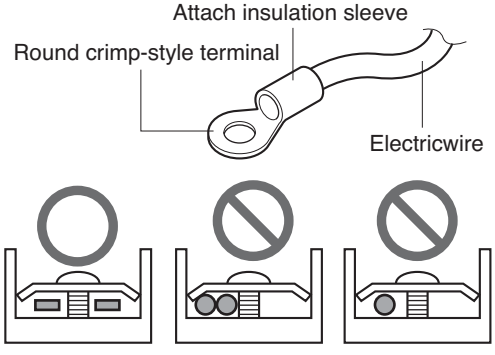


NOTE

1. Use round crimp-style terminals for connecting wires to the power supply terminal block. If unavailable, observe the following points when wiring.

• Do not connect wires of different gauge to the same power supply terminal. (Looseness connection may cause overheating.)

• Use the specified electric wire. Connect the wire securely to the terminal. Lock the wire down without applying excessive force to the terminal.



Connect wires of the same gauge to both sides

2. Tightening torque for the terminal screws.

• Use the correct screwdriver for tightening the terminal screws. If the blade of screwdriver is too small, the head of the screw might be damaged, and the screw will not be properly tightened.

• If the terminal screws are tightened too hard, screws might be damaged.

3. Do not connect wires of different gauge to the same grounding terminal. Loose connection may deteriorate protection.

4. At the unit, keep proper separation between transmissio and power supply wiring.
The equipment may malfunction if subjected to electrical (external) noise.

5. Never connect power supply wiring to the terminal block for remote controller wiring. A mistake of the sort could damage the entire system.

6. Use only specified wire and tightly connect wires to terminals. Be careful that wires should not place external stress on terminals. Keep wiring in neat order and so as not to obstruct other equipment such as popping open the electric parts box cover. Make sure the cover closes tight. Incomplete connections could result in overheating, and in worst case, electric shock or fire.

⚠CAUTION

After the confirmation of the above conditions, prepare the wiring as follows:

1) Never fail to have an individual power circuit specifically for the air conditioner. As for the method of wiring, be guided by the circuit diagram posted on the inside of control cover.
2) The screw which fasten the wiring in the casing of electrical fittings are liable to become loose from vibrations to which the unit is subjected during the course of transportation. Check them and make sure that they are all tightly fastened. (If they are loose, it could cause burn-out of the wires.)
3) Confirm the specification of power source.
4) Confirm that electrical capacity is sufficient.
5) See to that the starting voltage is maintained at more than 90 percent of the rated voltage marked on the name plate.
6) Confirm that the cable thickness is as specified in the power source specification. (Particularly note the relation between cable length and thickness.)
7) Always install an earth leakage circuit breaker in a wet or moist area.
8) The following would be caused by voltage drop.
   • Vibration of a magnetic switch, which will damage the contact point, fuse breaking, disturbance of the normal function of the overload.
9) The means for disconnection from a power supply shall be incorporated in the fixed wiring and have an air gap contact separation of at least 3mm in each active(phase) conductors.

4. Installation of outdoor unit

4.1 Safety Precautions

Please strictly follow the instructions given in the Installation manual .Improper installation by ignoring the instructions can lead to damage to life and property.
Make sure to read the following safety instructions very carefully and throughly .

⚠WARNING	This symbol indicates the possibility of death or serious injury.
⚠CAUTION	This symbol indicates the possibility of injury or damage to properties.

■ The meanings of the symbols used in this manual are as shown below.

⃠	**Be sure not to do.**
❗	**Be sure to follow the instruction.**

⚠WARNING

Do not use a defective or underrated circuit breaker.
• There is risk of fire or electric shock.

Do not use a multi consent. Always use this appliance on a dedicated circuit and breaker.
• Otherwise it can cause electric shock or fire.

For electrical work, contact the dealer, seller, a qualified electrician, or an authorized service center. Do not disassemble or repair the product by yourself.
• There is risk of fire or electric shock.

Always ground the product as per the wiring diagram. Do not connect the ground wire to gas or water pipes lightening rod or telephone ground wire.
• There is risk of fire or electric shock.

Install the panel and the cover of control box securely.
• There is risk of fire or electric shock due to dust , water etc.

Use the correctly rated breaker or fuse.
• There is risk of fire or electric shock.

If the power cable or cord has scratches or skin peeled off or deterioted then immediately replace it.
• There is risk of fire or electric shock.

For installation, removal or reinstall, always contact the dealer or an authorized service center.
• There is risk of fire, electric shock, explosion, or injury.

Do not install the product on a defective foundation. Be sure that the installation area does not deteriorate with age.
• If the foundation collapses, the air conditioner could fall with it, causing property damage, product failure, and personal injury.

Never install the outdoor unit at a place from where it can fall down.
• The falling outdoor unit can cause damage or injury or even death of a person and also damage or malfunctioning of the product itself.

When the product is soaked (flooded or submerged) in water, contact an authorized service center for repair before using it again.
• There is risk of fire or eletric shock.

In outdoor units the the step up capacitor supplies high voltage electricity to the electrical components. Be sure to discharge the capacitor completely before conducting the repair work.
• An charged capacitor can cause electrical shock.

4. Installation of outdoor unit

Be sure to use only those parts which are listed in the svc parts list. Never attempt to modify the equipment.
• The use of inappropriate parts can cause an electrical shock, excessive heat generation or fire.

Indoor/outdoor wiring connections must be secured tightly and the cable should be routed properly so that there is no force pulling the cable at the connection terminals.
• Improper or loose connections can cause excessive heat heat generation or fire.

Safely dispose off the packing materials.
• Things like screws, nails, batteries, broken things etc after installation or svc can cause injury to small kids. Tear away and throw away the plastic packaging bags so that children will not play with them.

Make sure to check that the power cable plug is not dirty, loose or broken, then only insert the plug completely.
• Dirty,loose or broken power plug can cause electric shock or fire.

During svc be sure to check the refrigerant to the used.
• Incorrect refrigerant used can prevent the normal operation of the unit.

When installing the unit, use the installation kit provided with the product.
• Otherwise the unit may fall and cause severe injury .

Do not touch, operate, or repair the product with wet hands.
• There is risk of electric shock or fire.

Do not place a heater or other appliances near the power cable.
• There is risk of fire and electric shock.

Do not allow water to run into electric parts. Install the unit away from water sources
• There is risk of fire, failure of the product, or electric shock.

Do not store or use or even allow flammable gas or combustibles near the product.
• There is risk of fire or failure of product.

If strange sounds, smell or smoke comes from the product, immediately turn the breaker off or disconnect the power supply cable.
• There is risk of electric shock or fire.

Do not open the front grill of the product during operation. (Do not touch the electrostatic filter, if the unit is so equipped.)
• There is risk of physical injury, electric shock, or product failure.

Turn the main power off when cleaning or repairing the product.
• There is risk of electric shock.

When the product is not to be used for a long time, turn off the circuit breaker.
• There is risk of product damage or failure, or unintended operation.

Take care to ensure that nobody especially kids could step on or fall onto the outdoor unit.
• This could result in personal injury and product damage.

4. Installation of outdoor unit

⚠ CAUTION

Use two or more people to lift and transport the product.
• Avoid personal injury.

Do not install the product where it will be exposed to sea wind (salt spray) directly.
• It may cause corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient operation.

Keep level even when installing the product.
• To avoid vibration or noise.

Do not install the product where the noise or hot air from the outdoor unit could damage or disturb the neighborhoods.
• It may cause a problem for your neighbors and hence dispute.

Always check for gas (refrigerant) leakage after installation or repair of product.
• Low refrigerant levels may cause failure of product.

Do not block the inlet or outlet of air flow.
• It may cause product failure.

Do not step on or put anyting on the product.
• There is risk of personal injury and failure of product.

Do not insert hands or other objects through the air inlet or outlet while the product is operating.
• There are sharp and moving parts that could cause personal injury.

Be cautious when unpacking and installing the product.
• Sharp edges could cause injury. Be especially careful of the case edges and the fins on the condenser and evaporator.

If the refrigerant gas leaks during the repair, do not touch the leaking refrigerant gas.
• The refrigernat gas can cause frostbite (cold burn).

Do not tilt the unit when removing or uninstalling it.
• The condensed water inside can cause spill and wet the furniture and the floor.

Do not mix air or gas other than the specified refrigerant used in the system.
• If air enters the refrigerant system, an excessively high pressure results, causing equipment damage or injury.

If the refrigerant gas leaks during the installation or operation ventilate the area immediately.
• Otherwise it can be harmfull for your health.

Do not expose your skin or kids or plants to the cool or hot air draft.
• This could harm to your health.

Use a firm stool or ladder when cleaning, maintaining or repairing the product at an height.
• Be careful and avoid personal injury.

Dismantling the unit , treatment of the refrigerant oil, oil and eventual parts should be done in accordance with local and national standards.

4. Installation of outdoor unit

4.1.1 Points for explanation about operations

The items with WARNING and CAUTION marks in the operation manual are the items pertaining to possibillties for bodily injury and material damage in addition to the general usage of the product. Accordingly, it is necessary that you make a full explanation about the described contents and also ask your customers to read the operation manual.

4.1.2 Note to the installer

Be sure to instruct customers how to properly operate the unit (especially cleaning filters, operating different functions, and adjusting the temperature) by having them carry out operations themselves while looking at the manual.

4.1.3 Selecting installation site for outdoor units

Select an installation site where the following conditions are fulfilled and that meets with your customer's approval.

1. Location strong enough to bear the weight of the unit.
2. Location accessible and having enough clearance for inspection and service in the future.
3. Location allowing easy condensate drainage suitable gradient of the unit and the drain pipe.
4. Piping between the indoor and outdoor unit is possible within the allowable limits.
5. Location free from electrical noise.
6. Location allowing optimum air distribution without any blocking to air flow.
7. Location having no risk of flammable gas leakage.
8. Location free from mineral oil mist or an oil spray or vapor eg in kitchen .It could result in leakage .
9. Location free from corrosive gases such as sulphurous acid gas because it corrodes the copper pipes or soldered parts resulting in leakage .
10. Location free from any machinery emitting electromagnetic waves which may disturb the control system thus causing malfunction of the unit .
11. Location free from flammable gases , carbon fibre , or ignitable dust suspensions in the air or where volatile flames are handled like gasoline or thinner. Operating in such conditions may result in fire .
12. Install the indoor and outdoor units, power supply wiring and connecting wires at least 1m(3.2ft). away from televisions or radios in order to prevent image interference or noise. (Depending on the radio waves, a distance of 1m(3.2ft). may not be sufficient enough to eliminate the noise.)
13. Consider whether the place where the unit will be installed can support the full weight of the unit, and reinforce it with boards and beams, etc. if needed before proceeding with the installation. Also, reinforce the place to prevent vibration and noise before installing. (The installation pitch can be found on the paper pattern for installation (3), so refer to it when considering the necessity for reinforcing the location.)
14. Obey the local and national regulations and limits regarding airconditioner installation.
15. Location free from lavatory (NH3.etc.). NH3 gas will cause corrosion of outdoor unit metallic parts.

4. Installation of outdoor unit

4.1.4 For the following items, take special care during construction and check after installation is finished

1. Items to be checked after completion of work

Items to be checked	If not properly done, what is likely to occur	Check
Are the indoor and outdoor unit fixed firmly?	The units may drop, vibrate or make noise.	
Is the gas leak test finished?	It may result in insufficient cooling.	
Is the unit fully insulated?	Condensate water may drip.	
Does drainage flow smoothly?	Condensate water may drip.	
Does the power supply voltage correspond to that shown on the name plate?	The unit may malfunction or the components burn out.	
Are wiring and piping correct?	The unit may malfunction or the components burn out.	
Is the unit safely grounded?	It may be dangerous at electric leakage.	
Is wiring size according to specifications?	The unit may malfunction or the components burn out.	
Is something blocking the air outlet or inlet of either the indoor or outdoor units?	It may result in insufficient cooling.	
Are refrigerant piping length and additional refrigerant charge noted down?	The refrigerant charge in the system is not clear.	

⚠CAUTION

- **Be very careful about product transportation.**
  Some products use PP bands for packaging. Do not use any PP bands for a means of transportation. It is dangerous.
- **Safely dispose of the packing materials.**
  Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries.
  Tear apart and throw away plastic packaging bags so that children will not play with them. If children play with a plastic bag which was not torn apart, they face the risk of suffocation.

NOTE

- **Install the indoor and outdoor units, power supply wiring and connecting wires at least 1m(3.2ft). away from televisions or radios in order to prevent image interference or noise.**
  (Depending on the radio waves, a distance of 1m(3.2ft). may not be sufficient enough to eliminate the noise.)

4. Installation of outdoor unit

4.1.5 Before installation

- **During product unpacking and removing it from the packing case, be sure to lift it without exerting any pressure on other parts, especially, horizontal flaps, the refrigerant piping, drain piping, and other resin parts.**
- Be sure to remove a cushion (corrugated paper) located between the heat exchanger and the right air filter.
- Be sure to check the type of R410A refrigerant to be used before installing the unit. (Using an incorrect refrigerant will prevent normal operation of the unit.)
- The accessories needed for installation must be retained in your custody until the installation work is completed. Do not discard them!
- Decide upon a line of transport.
- Leave the unit inside its packaging while moving, until reaching the installation site. Where unpacking is unavoidable, use a sling of soft material or protective plates together with a rope when lifting, to avoid damage or scratches to the unit.
- For the installation of an outdoor unit, refer to the installation manual attached to the outdoor unit.
- When using the wireless remote controller, refer to the installation manual attached to the wireless remote controller.
- Entrust installation to the place of purchase or an authorized serviceman. Improper installation could lead to leaks and in worst cases, electric shock of fire.
- Use only parts provided with the unit or parts satisfying required specifications. Unspecified parts could cause the unit to fall out of place, or could lead to leaks and, in the worst cases, electric shock or fire.

4.2 Introduction

This installation guidance describes the procedures for outdoor unit installation, piping, wiring, and control between outdoor units, indoor units and controller.
Installation of the indoor units is not described in this part. Please refer to the installation guidance manual which supplied with indoor units for their respective installation.

4.2.1 Lifting method

1. When carrying the unit suspended, pass the ropes under the unit and use the two fork lift slots each at the front and rear.
2. Always lift the unit with ropes attached at four points so that impact is not applied to the unit.
3. Attach the ropes to the unit at an angle of 40° or less.
4. Use two ropes at least 7m(23.0ft) long.

⚠CAUTION

Be very careful when carrying the product.

- PP bands are used to pack some products. Do not use them as a mean for transportation because they are dangerous.
- Do not touch heat exchanger fins with your bare hands. Otherwise you may get a cut.
- Tear plastic packaging bag and scrap it so that children cannot play with it. Otherwise plastic packaging bag may suffocate children to death.
- When carrying in outdoor unit, be sure to support it at four points. Carrying in and lifting with 3-point support may make outdoor unit unstable, resulting in a fall of it.

4.2.2 Inspecting and handling the unit

At the time of delivery, the package should be checked for any damage from out side and inside, If damaged then it should be reported to the carrier claims agent immediately . When handling the unit refer to following cautions:

1. Handle the unit with care. Keep the unit upright in order to avoid inside components damage.
2. If a forklift is to be used it should pass the forklift arms through the openings at the bottom of the unit.
3. If a crane is used, lift the unit preferably with 2 ropes of at least 7m(23.0ft) length.
4. When lifting the unit with a crane, always use protectors to prevent belt damage and pay attention to the position of the unit's center of gravity.
5. Bring the unit in original package to prevent damage during local transport.

4.3 Foundation

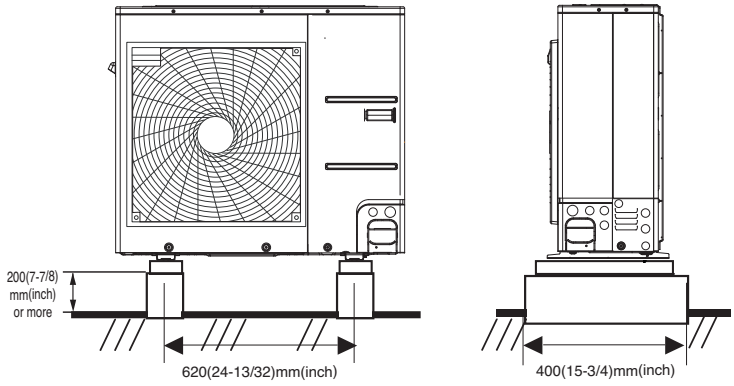
SINGLE ZONE

For good drain of outdoor unit, keep the bottom height from icing upward.

AUUW24GD2 [LUU247HV]

<Basic intensity>

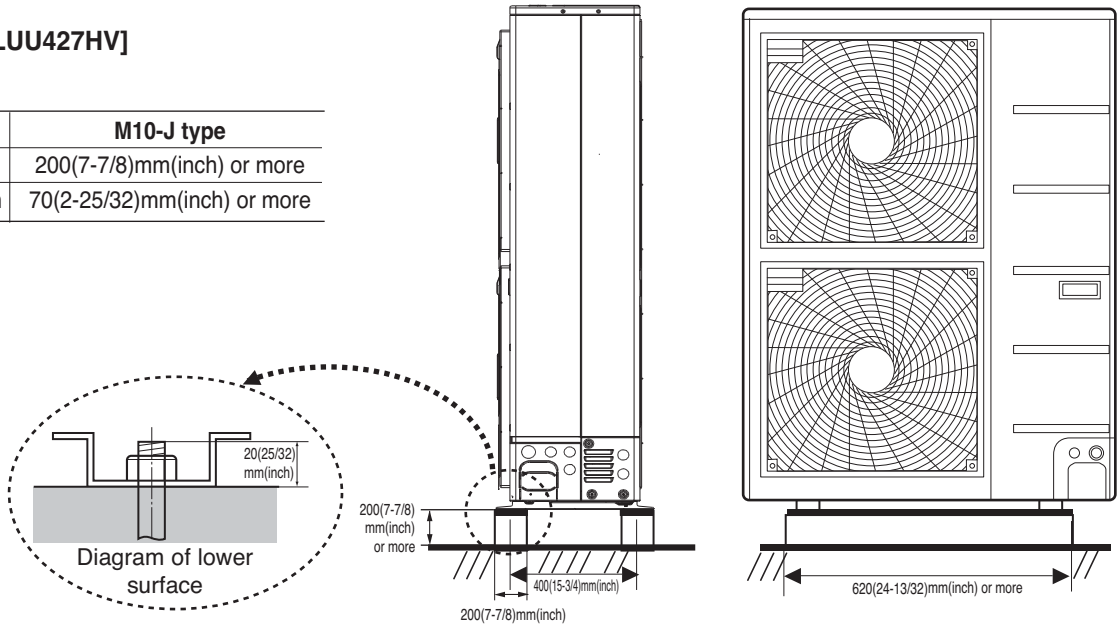
Bolt Factor	M10-J type
Concrete height	200(7-7/8)mm(inch) or more
Bolt inserted depth	70(2-25/32)mm(inch) or more



AUUW42GD2 [LUU427HV]

<Basic intensity>

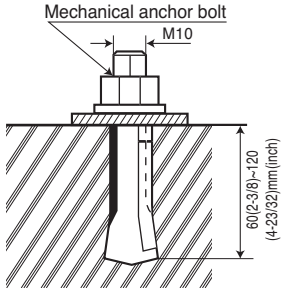
Bolt Factor	M10-J type
Concrete height	200(7-7/8)mm(inch) or more
Bolt inserted depth	70(2-25/32)mm(inch) or more



4.4 Settlement of the outdoor unit

- Anchor the outdoor unit with a bolt and nut tightly and horizontally on a concrete or rigid mount.
- When installing on the wall, roof or rooftop, anchor the mounting base securely with a nail or wire assuming the influence of wind and earthquake.
- In the case when the vibration of the unit is conveyed to the house, secure the unit with an anti-vibration rubber.

Bolt construction work



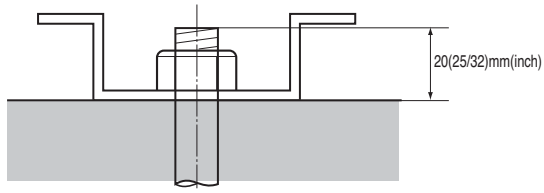
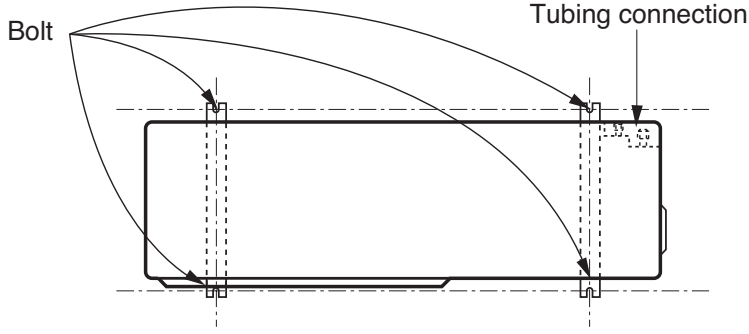


Diagram of lower surface

Settlement draw of outdoor units



⚠CAUTION

- The ingredients of foundation : Cement : Sand : Gravel for the concrete should 1 : 2 : 4 ratio
- The foundation surface should be finished with mortar.
- The edges of foundation should be rounded.
- A drain passage should be made around the foundation to thoroughly drain water away from the equipment installation area.
- If installing the outdoor units on the roof, the roof's strength have to be checked.
- Care should be taken for weather - proofing
- Blocking all gaps of outdoor unit, for passing piping and wiring, using sealing material (Field supply) (Animals and bugs might enter in the machine.)

4.5 Selection of the best location

This **SINGLE ZONE** unit is suitable for installation in a residential and commercial environmental situation.
If installed near a household appliance it can cause electromagnetic interference.
The units should be installed in a location that meets the following requirements:

1. A robust and strong base which can support the weight of the unit and will not degrade easily
2. If an awning is built over the unit to prevent direct sunlight or rain exposure, make sure that the discharge air of the condenser is not restricted.
3. It is recommended that the outdoor unit should be fenced to avoid animals or plants being exposed in the direct path of the discharged air .
4. Ensure proper spaces between the unit and its surrounding as given in the figure.
5. Ensure that the water shall not cause any damage by overflowing in case of water condensation
6. The noise, vibration and hot discharged air of the outdoor unit should not annoy the surrounding environment.
7. Ensure that there is no damage to the pipes in long run as it may cause the refrigerant leakage.
8. In case the outdoor may have heavy snow :
   a. Make foundation at a suitable height not for ice to grow upward.
   b. Fit a suitable hood or a awning over the unit not to attach outdoor unit heat exchanger directly.
   c. In very cold snowing area, please consult with your consultant.
9. Rooftop Installations : If the outdoor unit is installed on a roof structure, be sure to level the unit. Ensure the roof structure and anchoring method are adequate for the unit location. Consult local codes regarding rooftop mounting.

⚠CAUTION

An inverter air conditioner can cause electronic noise generated from broadcasting frequency. Make sure to maintain proper distances between the products and electric wires keeping away from stereo, TV set or other appliances
1. Branch switch, over current breaker
2. Remote controller
3. Cool/heat selector
4. Radio or TV set
5. Wireless microphone

If frequency signal of AM broadcasting or TV Set is non stable, keep distances of 3m(9.8ft) or more from product and use electric wire along with conduit tubes for power and transmission cable.

⚠CAUTION

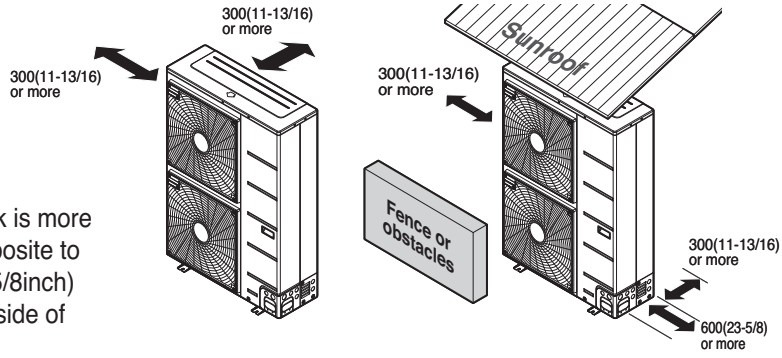
1. Actually the R410A refrigerant is not toxic, nonflammable and odor free. Any how if the refrigerant is leaked then its concentration may exceed the allowable limit depending on the related space volume.
   Due to this, it is necessary to take measures for the volume size against leakage.
2. Do not install unit in following locations.
   - Locations where sulfurous acids or this kind of other corrosive gases might be help to corrode of copper piping and soldered joints, and can cause refrigerant leakage.
   - Locations such as kitchens or cuisine which contain a lot of hot oil or steam or where oil may splatter to the product. Can cause the unit to make leak or other serious problem.
   - Locations where electromagnetic waves is prevalent. The electromagnetic waves may cause the control system to malfunction or causing an abnormal operation.
   - Locations where inflammable gas might leak, where combined gasoline, methane or other volatile substances, carbon dust and other incendiary substances are found in the atmosphere. Leaked gas may accumulate around the unit, can cause an serious explosion.

4.6 Clearance space

4.6.1 Clearance around outdoor unit

SINGLE ZONE

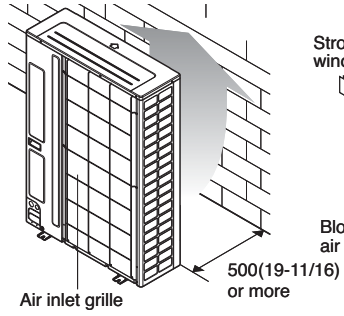
- Ensure that the space around the back is more than 300mm(11-13/16inch) on the opposite to the PCB side and secure 600mm(23-5/8inch) space near the compressor and PCB side of the air conditioner for service.



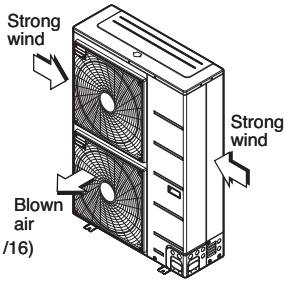
❉ Outdoor unit is representative. Actual appearance of outdoor unit may be different but clearances will stay the same.

Unit : mm(inch)

- Install the unit so that its discharge port faces to the wall of the building. Keep a distance 500mm(19-11/16inch) or more or more between the unit and the wall surface.
- Supposing the wind direction during the operation season of the air conditioner, install the unit so that the discharge port is set at right angle to the wind direction.



Turn the air outlet side toward the building's wall, fence or windbreak screen.



Set the outlet side at a right angle to the direction of the wind.

❉ Outdoor unit is representative. Actual appearance of outdoor unit may be different but clearances will stay the same.

Unit : mm(inch)

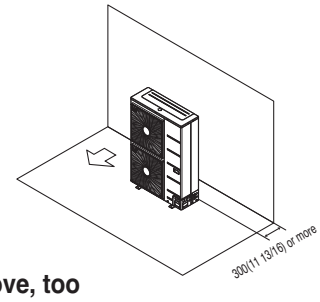
4. Installation of outdoor unit

Clearance of side discharge unit [Unit:mm(inch)]

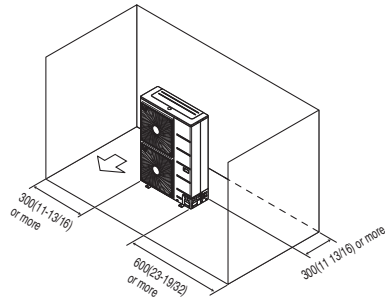
1) Where there is an obstacle on the air intake side:

■ **No obstacle above**

• Obstacle on the suction side only

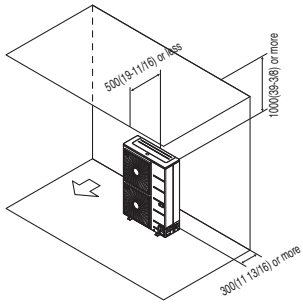


• Obstacle on the both sides

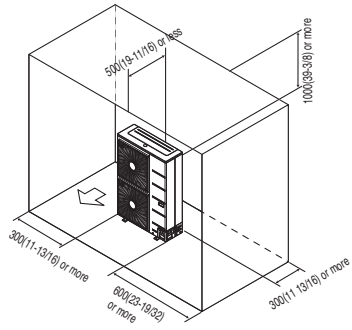


■ **Obstacle above, too**

• Obstacle on the air intake side, too

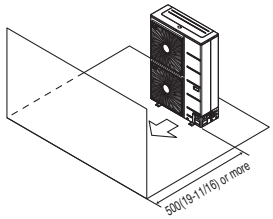


• Obstacle on the air intake side, and both sides

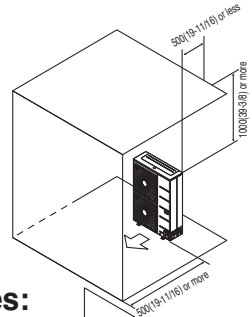


2) Where there is an obstacle on the discharge side:

■ **No obstacle above**



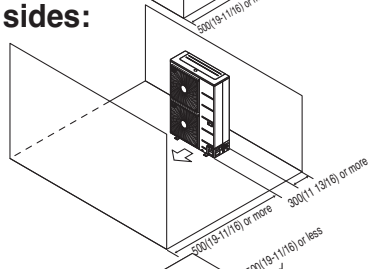
■ Obstacle above, too



3) Where there are obstacles on both suction and discharge sides:

■ **Where the obstacles on the discharge side is higher than the unit:**

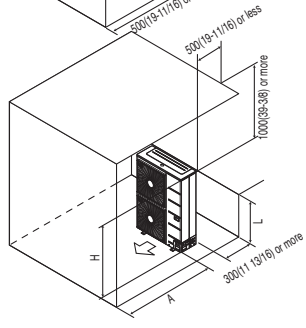
• No obstacle above



• Obstacle above, too

The relations between H, A and L are as follows:

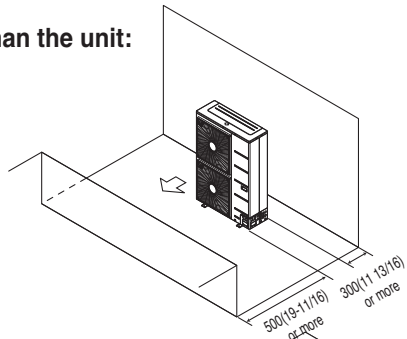
	L	A[mm(inch)]
L ≤ H	0 < L ≤ 1/2H	750(29 1/32)
	1/2H < L	1 000(39 3/8)
H < L	Set the stand as: L ≤ H	



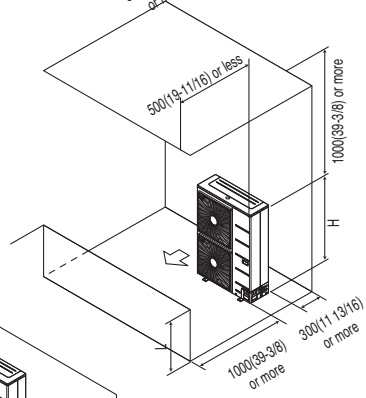
Close the bottom of the installation frame to prevent the discharged air from being bypassed.

4. Installation of outdoor unit

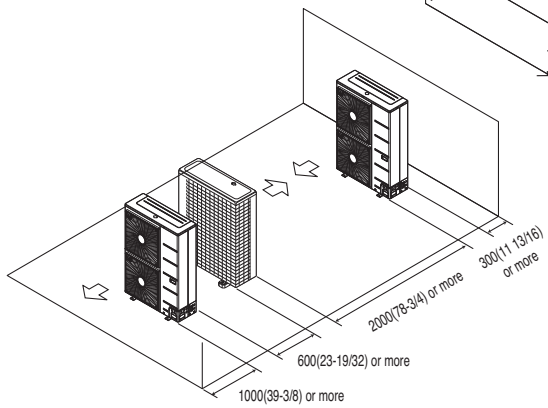
■ **Where the obstacles on the discharge side is lower than the unit:**
• No obstacle above



• Obstacle above, too
'L' should be lower than 'H'.
Close the bottom of the installation frame to prevent the discharged air from being bypassed.



4) Series installation



4.6.2 Air guide work

In case of out door unit is located outdoor cabin of apartment or flats, then the efficiency can drop and system pressure increases thus finally damaging the compressor or other components in the system by heat short circuit.

[Example]

<Without air guide>
Safety dorice activation

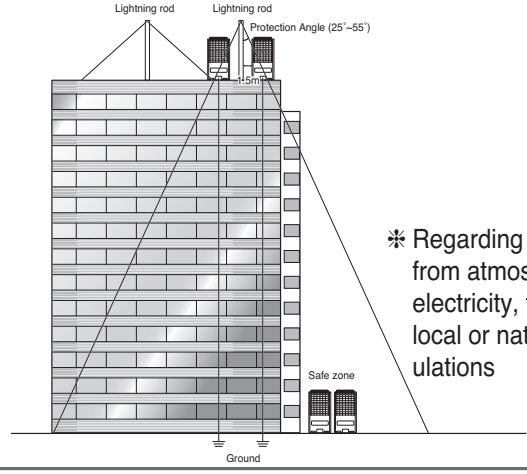
<With air guide>
Normal operation

4.6.3 Lightning safety zone

1) To protect outdoor unit from lightning, it should be placed within lightning safety zone.

Safety zone

Building Height [ft]	66	98	148	197
Protection Angle [˚]	55	45	35	25



2) Power cable and communication cable should be 4.9ft away from lightning rod.

3) High resistance grounded system should be performed against induced lightning or indirect stroke.

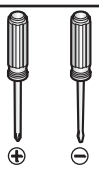
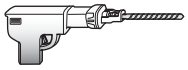
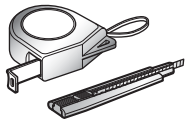
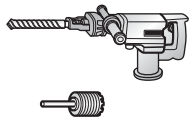
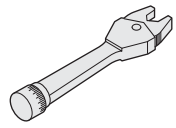
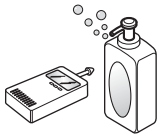
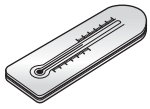
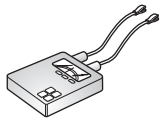
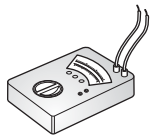
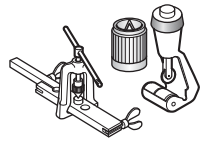
4) If the building has no lightning protection, outdoor may be damage from lightning. This should be informed to customer or building owner in advance.

※ Regarding the safety from atmosphere electricity, follow the local or national regulations

4.7 Outdoor unit piping

4.7.1 Outdoor unit piping

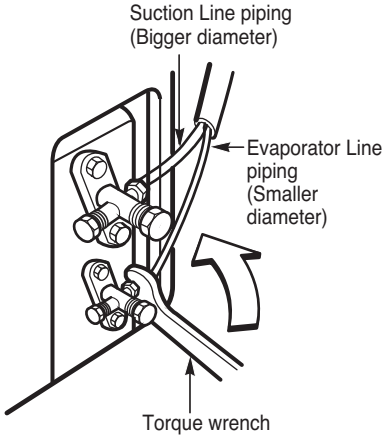
Required tools

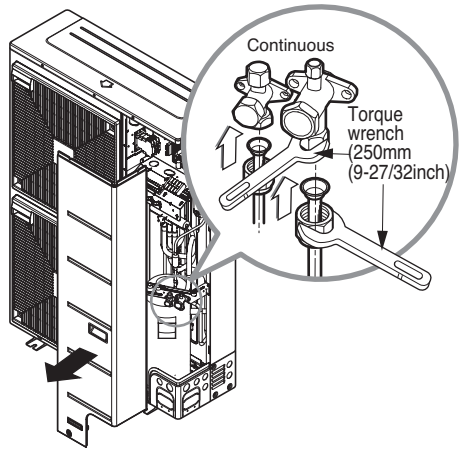
					
Screw Driver	Drill M/C f 3.5/F14.5	Measuring Tape, Blade	Core drill	Spanner	Torque Wrench
					
Soap Foam	Thermometer	Hexagonal wrench(4mm, 5mm)	Hook Meter	Multi Tester	Flare Set

4.7.2 Connecting piping

Tighten the flare nut with torque wrench until the wrench clicks.

• When tightening the flare nut with torque wrench, ensure the direction for tightening follows the arrow on the wrench.





❊ When tighten the pipe, hold the haxagonal body.

4.8 Outdoor unit installation requirments

4.8.1 Piping elevation and length

Capacity	Pipe Size Unit : mm(inch)		Length A Unit : [m(ft)]		Elevation Unit : [m(ft)]		*Additional refrigerant Unit: g/m(oz/ft)
	Gas	Liquid	Standard	Max.	Standard	Max.	
24,000 Btu/h	15.88 (5/8)	9.52 (3/8)	7.6(25.0)	50(164.0)	5(16)	30(98.4)	40(0.43)
42,000 Btu/h	15.88 (5/8)	9.52 (3/8)	7.6(25.0)	75(246.1)	5(16)	30(98.4)	40(0.43)

⚠CAUTION

1. Regulation for refrigerant leakage
   : the amount of refrigerant leakage should satisfy the following equation for human safety.

$$\frac{\text{Total amount of refrigerant in the system}}{\text{Volume of the room at which indoor unit of the least capacity is installed}} \leq 0.3\text{kg/m}^3\ (0.019\ \text{lb/ft}^3)$$

2. If the above equation can not be satisfied, then follow the following steps.

① Selection of air conditioning system: select one of the followings.
- Effective opening part Installation
- Reconfirmation of outdoor unit capacity and piping length
- Reduction of the amount or refrigerant
- 2 or more security device installation of alarm for gas leakage

② Change indoor unit type
: installation position should be over 2m(6.6ft) from the floor (Cassette type)

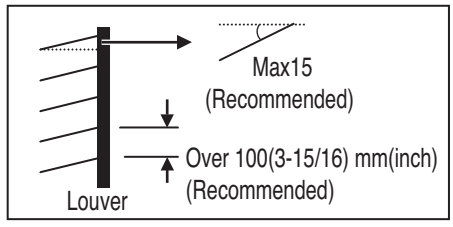
③ Adoption of ventilation system
: choose ordinary ventilation system or building ventilation system

④ Limitation in piping work
: design for earthquake-proof and prevention against thermal stress

4.9 Outdoor unit cabin

4.9.1 Outdoor Cabin louver requirement

1. Outdoor cabin type : Manual door open type
2. Louver angle : less than 15° on the horizontal base
3. Louver interval: over 100(3-15/16) mm(inch) (recommend)
4. Louver shape : wing type or plane type

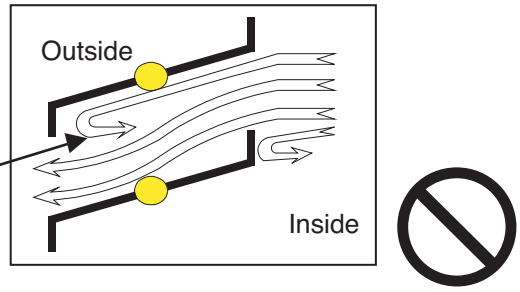


Section

CAUTION

- Opening rate and suction should be considered for louvered outdoor room.
- Do not use 'S' type louver.

Noise can occur due to the backward flow of the air passing through the louver blade

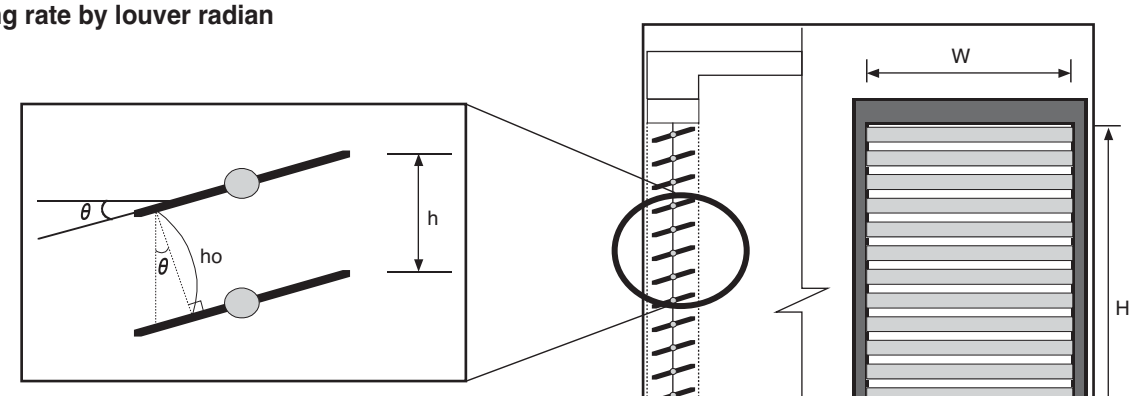


NOTE

The problem in case the louver opening rate is small.

1. Noise can occur due to the increased velocity of the air passing through louver blade.
2. Noise can occur due to the louver blade vibrations.
3. Drop in outdoor fan performance (Excess static pressure damage can cause drop in the performance as well as outdoor heat exchange efficiency).
4. In case the louver opening rate is small or there is insufficient air flow exchange, it might stop the air conditioner.

Opening rate by louver radian



θ 15
ho = h * COS θ
Total face area(A) = H * W
Number of open space (N) = (number of louver - 1)
Effective face area(Af) = ho * W * N
Louver opening rate (n) = Af/A

∴ Af = A * n

Effective face area of cross section

[Side view] **[Front view]**

LG
Life's Good

P/No.: MFL67502802

LG Electronics

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The air conditioners manufactured by LG have received ISO9001 certificate for quality assurance and ISO14001 certificate for environmental management system.