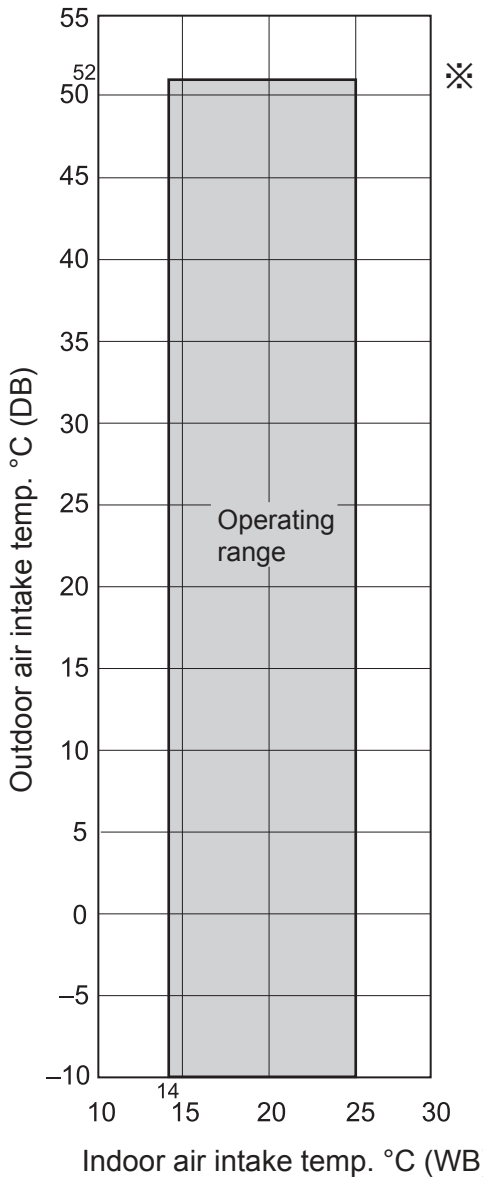
Contents

2. DESIGN OF 2WAY SYSTEM

1. Model Selection and Capacity Calculator

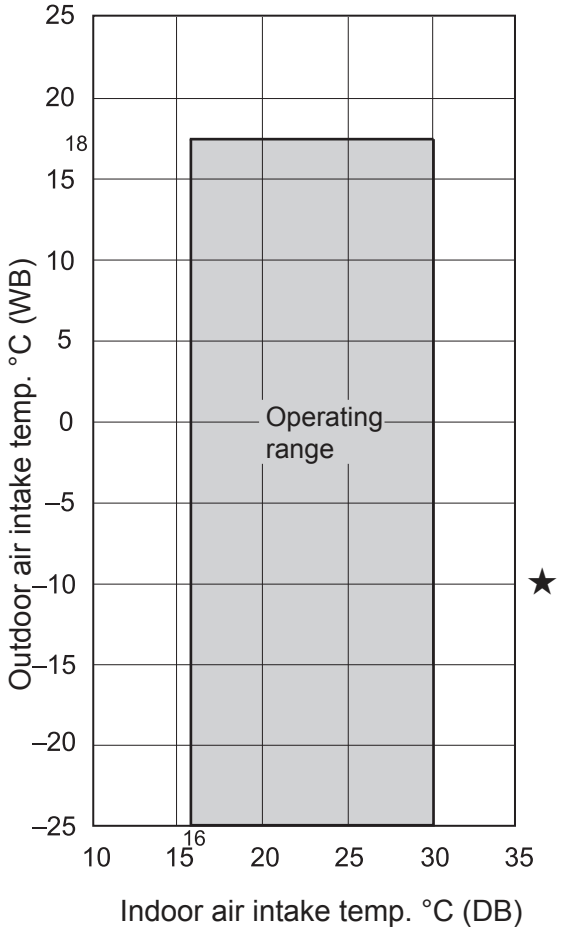
1-1. Operating Range

Cooling



※：When the outdoor air temperature is between 50 to 52°C in cooling mode, the unit Intermittent operation happens.

Heating



★：When the outdoor and indoor unit capacity ratio is above 130 % and below 200 %, the lower limit of operating range for heating outdoor temperature is limited to -10°CWB (standard -25°CWB).

1. Model Selection and Capacity Calculator

1-2. Procedure for Selecting Models and Calculating Capacity

■ **Model Selection Procedure**

Select the model and calculate the capacity for each refrigerant system according to the procedure shown below.

Calculation of the indoor air-conditioning load
- Calculate the maximum air-conditioning load for each room or zone.

↓

Selection of an air conditioning system
- Select the ideal air conditioning system for air conditioning of each room or zone.

↓

Design of the control system
- Design a suitable control system for the selected air conditioning system.

↓

Preliminary selection of indoor and outdoor units
- Make preliminary selections that are within the allowable range for the system. .. 2-1-3 ~ 2-1-9

↓

Check of the tubing length and elevation difference
- Check that the length of refrigerant tubing and the elevation difference are within the allowable ranges..... 2-1-3

↓

Calculation of actual capacity of indoor units

1. Outdoor unit capacity correction 2-1-11
   - Capacity correction for the outdoor unit temperature conditions, indoor unit temperature and indoor/ outdoor ratio.
   - Capacity correction coefficient for outdoor unit tubing length and elevation difference.
   - Surplus capacity correction coefficient for outdoor unit temperature conditions.
   - Capacity correction coefficient for outdoor unit frosting and defrosting during heating operation.
2. Indoor unit capacity correction 2-1-12
   - Capacity correction for the indoor unit temperature conditions.
   - Calculate the Capacity distribution ratio.
   - Distribute the outdoor unit capacity among each indoor unit.
   - Capacity correction coefficient for tubing length and elevation difference.
   - Capacity correction coefficient for outdoor unit.

↓

Recheck of actual capacity of each indoor unit
- If the capacity is inadequate, reexamine the unit combinations.
  Example 1 : Increasing the indoor unit capacity
  Example 2 : Increasing the outdoor unit capacity

↓

Design of tubing
- Create a tubing design which minimizes the amount of additional refrigerant charge as much as possible. ..... 2-1-3 ~ 2-1-9
- If tubing extension for additional unit is expected in the future, create the tubing design with adequate consideration for this extension.
- Select the tubing size for the main tube (LA) up to the 1st distribution joint based on the rated cooling capacity of the outdoor unit. Select tubing sizes after the distribution point based on the total rated cooling capacity of the connected indoor units.

↓

Calculation of additional refrigerant charge amount
- Calculate the additional refrigerant charge from the diameters and lengths of the refrigerant tubing. Even if the wide tubing diameter was increased, determine the additional refrigerant charge based only on the narrow tubing size. 2-1-6, 2-1-9
- Check the minimum indoor capacity (limit density) with respect to the amount of refrigerant. If the limit density is exceeded, be sure to install ventilation equipment or take other corrective steps. 2-1-10

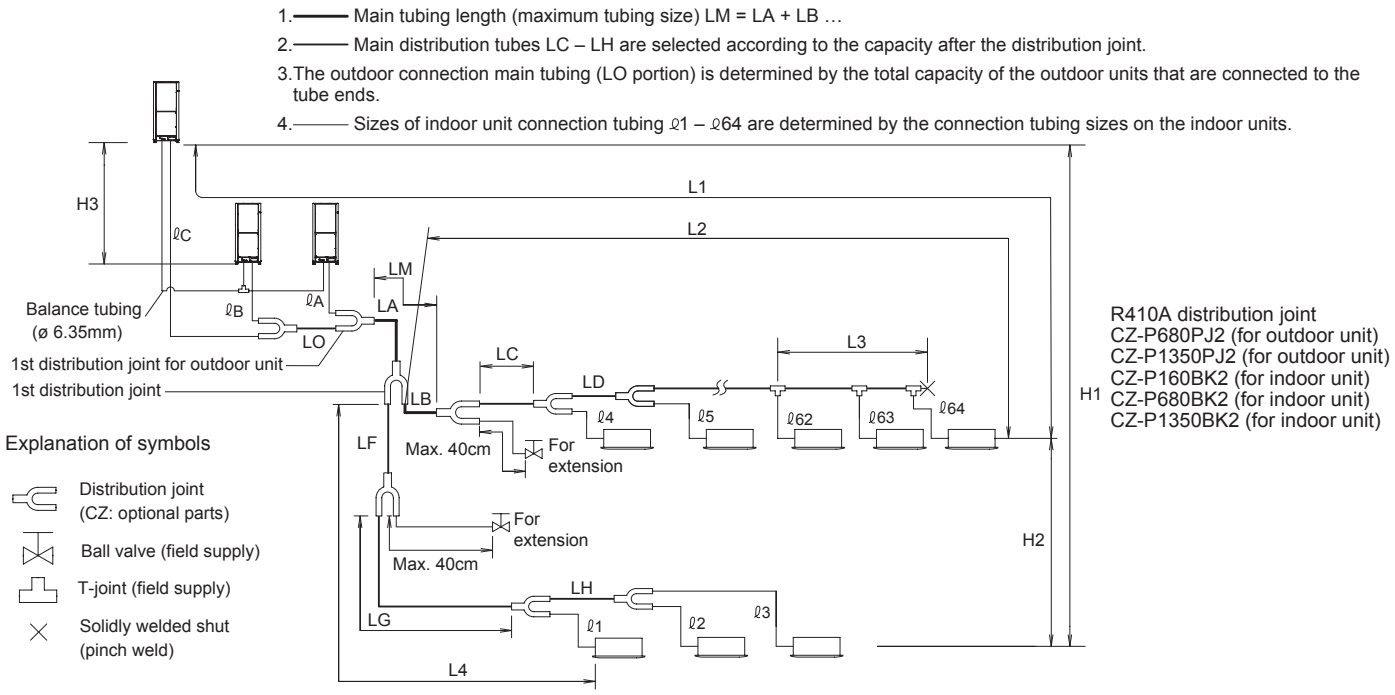
↓

Design of electrical wiring capacity
- Select a wiring capacity according to the method of power supply. 2-3-1

1. Model Selection and Capacity Calculator

1-3. Tubing Length

Select the installation location so that the length and size of refrigerant tubing are within the allowable range shown in the figure below.



NOTE

* Be sure to use special R410A distribution joints (CZ: optional parts) for outdoor unit connections and tubing branches.

Table 2-1-1 Ranges that Apply to Refrigerant Tubing Lengths and to Differences in Installation Heights

Unit: m

Item	Mark	Contents		Length
Allowable tubing length	L1	Max. tubing length	Actual length	≤ 200*2
			Equivalent length	≤ 210*2
	ΔL (L2 – L4)	Difference between max. length and min. length from the 1st distribution joint		≤ 50*5
	LM	Max. length of main tubing (at maximum size) * Even after 1st distribution joint, LM is allowed if at maximum tubing length.		— *3
	ℓ1, ℓ2~ ℓ64	Max. length of each distribution tube		≤ 50*7
	L1 + ℓ1 + ℓ2~ ℓ63 + ℓA + ℓB + LF + LG + LH	Total max. tubing length including length of each distribution tube (only liquid tubing)		≤ 1000
	ℓA, ℓB + LO, ℓC + LO	Maximum tubing length from outdoor's 1st distribution joint to each outdoor unit		≤ 10
Allowable elevation difference	H1	When outdoor unit is installed higher than indoor unit		≤ 50
		When outdoor unit is installed lower than indoor unit		≤ 40
	H2	Max. difference between indoor units		≤ 15*6
	H3	Max. difference between outdoor units		≤ 4
Allowable length of joint tubing	L3	T-joint tubing (field-supply); Max. tubing length between the first T-joint and solidly welded-shut end point		≤ 2

L = Length
H = Height

NOTE

1: The outdoor connection main tubing (LO portion) is determined by the total capacity of the outdoor units that are connected to the tube ends.
2: If the longest tubing length (L1) exceeds 90 m (equivalent length), increase the sizes of the main tubes (LM) by 1 rank for gas tubes and liquid tubes. Use a field supply reducer. Select the tube size from the table of main tubing sizes (Table 2-1-6) and from the table of refrigerant tubing sizes (Table 2-1-10).
3: If the longest main tubing length (LM) exceeds 50 m, increase the main tubing size at the portion before 50 m by 1 rank for the gas tubes. Use a field supply reducer. Determine the length less than the limitation of allowable maximum tubing length.
For the portion that exceeds 50 m, set based on the main tubing size (LA) listed in Table 2-1-6.

1. Model Selection and Capacity Calculator

4: If the size of the existing tubing is already larger than the standard tubing size, it is not necessary to further increase the size.
* If the total amount of refrigerant for the system exceeds the value listed below, then change the size of the tubing to reduce the amount of refrigerant.
Total amount of refrigerant for the system with 1 outdoor unit: 50 kg
Total amount of refrigerant for the system with 2 outdoor units: 80 kg
Total amount of refrigerant for the system with 3 outdoor units or 4 outdoor units: 100 kg

5: When the tubing length exceeds 40 m, increase a longer liquid and gas tubing by 1 rank.
See the section “Refrigerant Pipe” as described below.

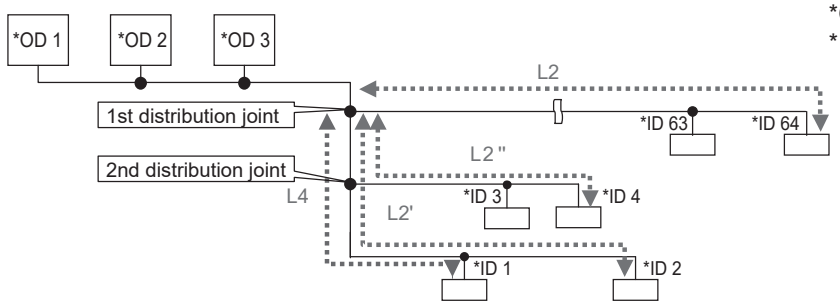
6: If the total distribution tubing length exceeds 500m, maximum allowable elevation difference (H2) between the indoor units is calculated by the following formula. Make sure the indoor unit’s actual elevation difference should fall within the figure calculated as follows.
Unit of account (meter): 15 x (2 - total tubing length(m) ÷ 500)

7: If any of the tubing length exceeds 30m, increase the size of the liquid and gas tubes by 1 rank.

■ Refrigerant Pipe

Tubing size increase [Difference △L from the first distribution joint between maximum and minimum length]

If the △L exceeds 40m, it is necessary to increase both the liquid and gas tubes by one size. Follow the steps below to increase the size.



*OD is the abbreviation of outdoor unit.
*ID is the abbreviation of indoor unit.

1. Check the combined indoor units which the △L exceeds 40m.
Calculate the △L of each combined indoor unit after 1st distribution joint (L2 {L2', L2" ....} -L4).
The L2 (L2 {L2', L2" ....}) indicates the pipe length connected to the farthest indoor unit among each combined indoor unit from 1st distribution joint. The L4 indicates the pipe length connected from the 1st distribution joint to the nearest indoor unit among all connected indoor units to the system. If the calculated △L exceeds 40m, it is necessary to increase by one size of both the liquid and gas tubes. Follow the steps to increase the size.
2. Check the total capacity of each combined indoor unit system.
Calculate the total capacity of indoor units from the 1st distribution joint.
Example: L2": Total capacity of indoor unit 3 and 4
3. Check the portion for increasing the pipe size and length.
Portion to increase the pipe by one size: Increase the pipe size to be directed towards the indoor units from the 1st distribution joint against the indoor unit which the △L exceeds 40m. Pipe length for sizing up: Pipe length becomes different according to the total capacity of indoor units.

Total capacity of indoor units and pipe length for sizing up

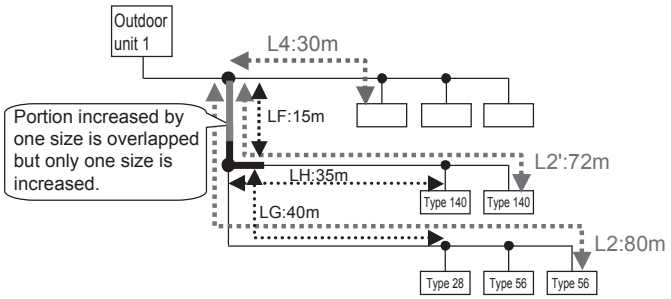
Total capacity of combined indoor units	Length for sizing up
Less than 22.4kW	12m
22.4kW or more and less than 52.4kW	20m
52.4kW or more	28m

* The larger the total capacity, the more it is necessary to increase the pipe length for sizing up.
* If the range of size up portion is improper, it is available to extend the length for sizing up until the next distribution joint is reached.

NOTE:
1. Be sure to use the reducer (field supply) at joint portion between the original pipe and the pipe increased by one size.
2. If there is the necessity to increase by one size from the original pipe size, there can be only one time effective to increase by one size even though the portion for sizing up is overlapped.
3. It may sometimes happen that the diameter of pipe when sized up becomes wider than that of the main pipe LA.

1. Model Selection and Capacity Calculator

Example 1



1. Check the portion for one size increase.

	ΔL	Total capacity of indoor units	Length for sizing up
L2 system	50m	14kW	12m
L2' system	42m	28kW	20m

L2 combined indoor units

Increase the gas and liquid tubes 12m by one size from the 1st distribution joint to be directed towards L2 indoor units.

LF: Increase 12m by one size among 15m.

LG: No increase by one size

L2' combined indoor units

Increase the gas and liquid tubes 20m by one size from the 1st distribution joint to be directed towards L2' indoor units.

LF: Increase all 15m by one size

LH: Increase 5m by one size among 35m.

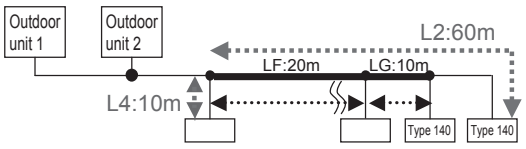
2. Final result

	Before sizing up	After sizing up	Tube length	Size up length
LF	ø 12.7 / ø 28.58	ø 15.88 / ø 31.75	15m	15m
LG	ø 9.52 / ø 15.88	No size up	40m	0m
LH	ø 9.52 / ø 22.22	ø 12.7 / ø 25.4	35m	5m

* The LH is only 5m from the 2nd distribution joint.

* The size increased portion is overlapped at the LF but it has only one size increase.

Example 2



1. Checking the portion for one size increase

	Δ L	Total capacity of indoor units	Length for sizing up
L2 system	50m	70kW	28m

・L2 combined indoor units

Increase the gas and liquid tubes 28m by one size from the 1st distribution joint to be directed towards L2 indoor units.

LF: Increase 20m by one size.

LG: Increase 8m by one size among 10m.

2. Final result

	Before sizing up	After sizing up	Tube length	Size up length
LF	ø 15.88 / ø 28.58	ø 19.05 / ø 31.75	20m	20m
LG	ø 15.88 / ø 28.58	ø 19.05 / ø 31.75	10m	8m

* The LG is only 8m from the 2nd distribution joint.LG

* It is possible to increase the LG to 10m by one size.

1. Model Selection and Capacity Calculator

Additional Refrigerant Charge

Additional refrigerant charge amount is calculated below.

Required amount of additional refrigerant charge
= [(Amount of additional refrigerant charge per meter of each size of liquid tube × its tube length) + (...) + (...)]
+ [(Necessary amount of additional refrigerant charge per outdoor unit) + (...) + (...)]

* Always charge accurately using a scale for weighing.
* If the total amount of refrigerant for the system exceeds the value listed below, change the size of the tubing to reduce the amount of refrigerant.

	with 1 outdoor unit	with 2 outdoor units	with 3 or 4 outdoor units
Total amount of refrigerant for the system	50 kg	80 kg	100 kg

Table 2-1-2 Amount of Additional Refrigerant Charge Per Meter, According to Liquid Tubing Size

Liquid tubing size (mm)	6.35	9.52	12.7	15.88	19.05	22.22
Amount of additional refrigerant charge/m (g/m)	26	56	128	185	259	366

Table 2-1-3 Necessary Amount of Additional Refrigerant Charge Per Outdoor Unit

U-8ME2E8	U-10ME2E8	U-12ME2E8	U-14ME2E8	U-16ME2E8
5.5 kg	5.5 kg	7.0 kg	7.0 kg	7.0 kg

Table 2-1-4 Refrigerant Charge Amount at Shipment (for Outdoor Unit)

U-8ME2E8	U-10ME2E8	U-12ME2E8	U-14ME2E8	U-16ME2E8
5.6 kg	5.6 kg	8.3 kg	8.3 kg	8.3 kg

Table 2-1-5 System Limitations

Max. No. allowable connected outdoor units	4 *2
Max. capacity allowable connected outdoor units	180 kW (64 HP)
Max. connectable indoor units	64 *1
Max. allowable indoor/outdoor capacity ratio	50 – 130 % *3

*1: In the case of 38 HP (Type 107 kW) or smaller units, the number is limited by the total capacity of the connected indoor units.

*2: Up to 4 units can be connected if the system has been extended.

*3: If the following conditions are satisfied, the effective range is above 130 % and below 200 %.
i) Obey the limited number of connectable indoor units.
ii) The lower limit of operating range for heating outdoor temperature is limited to -10°CWB (standard -25°CWB).
iii) Simultaneous operation is limited to less than 130 % of connectable indoor units.

Maximum number of connectable indoor units when connected with minimum capacity

Total horsepower	8	10	12	14	16	18	20	22	24	26	28	30
Connectable indoor unit	13 20*4	16 25*4	19 30*4	23 36*4	26 40*4	29 45*4	33 50*4	36 55*4	40 61*4	43 64*4	46 64*4	50 64*4

Total horsepower	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64
Connectable indoor unit	53 64*4	56 64*4	59 64*4	63 64*4	64	64	64	64	64	64	64	64	64	64	64	64	64

*4: In case of 1.5kW indoor unit connection.
It is increase the risk of drastically lowering of capacity when the outside temperature is below than -10°C.

1. Model Selection and Capacity Calculator

1-4. Tubing Size

Table 2-1-6 Main Tubing Size (LA)

Unit: mm

kW	22.4	28.0	33.5	40.0	45.0	50.0	56.0	61.5	68.0	73.0	78.5	85.0	90.0	96.0
Total system horsepower	8	10	12	14	16	18	20	22	24	26	28	30	32	34
Combined outdoor units	8	10	12	14	16	10 8	10 10	12 10	12 12	16 10	16 12	16 14	16 16	12 12 10
Gas tube	ø19.05	ø22.22	ø25.4		ø28.58					ø31.75				
Liquid tube	ø9.52		ø12.7			ø15.88				ø19.05				

kW	101	107	113	118	124	130	135	140	145	151	156	162	168	174	180
Total system horsepower	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64
Combined outdoor units	12 12 12	16 12 10	16 12 12	16 16 10	16 16 12	16 16 14	16 16 16	16 12 12 10	16 12 12 12	16 16 12 10	16 16 12 12	16 16 16 10	16 16 16 12	16 16 16 14	16 16 16 16
Gas tube	ø38.10													ø41.28	
Liquid tube	ø19.05														

* If future extension is planned, select the tubing diameter based on the total horsepower after extension.
  However, extension is not possible if the resulting tubing size is two ranks higher.
* The balance tube (outdoor unit tube) diameter is ø6.35.
* The refrigerant tubing should be used with R410A refrigerant.
* If the length of the longest tube (L1) exceeds 90 m (equivalent length), increase the main tubing (LM) size by 1 rank for the gas and liquid tubes. Select from Table 2-1-6 and Table 2-1-10. Use field-supply reducers. If the tube diameter is more than ø41.28, use field-supply reducer.
* If the longest main tubing length (LM) exceeds 50 m, increase the main tubing size at the portion before 50 m by 1 rank for the gas tubes.
  For the portion that exceeds 50 m, set based on the main tubing size (LA) listed in the table above.

1. Model Selection and Capacity Calculator

■ Size of Tubing (LO) Between Outdoor Units

Calculate the total relevant horsepower connected to the tube ends of outdoor units and select the size of tubing between outdoor units based on the main tubing size (LA) listed in the table above.

■ Table 2-1-7 Main Tubing Size After Distribution (LB, LC...)

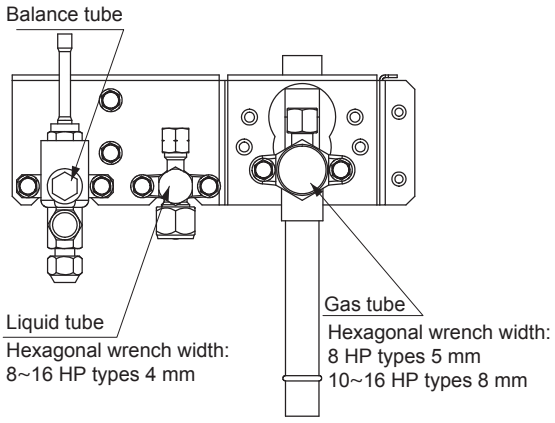
Unit: mm
HP = horsepower

Total capacity after distribution											
	Below kW	7.1 (2.5 HP)	16.0 (6 HP)	22.5 (8.1 HP)	30.0 (11 HP)	42.0 (15 HP)	52.4 (19 HP)	70.0 (25 HP)	98.0 (35 HP)	170.0 (61 HP)	–
	Over kW	–	7.1 (2.5 HP)	16.0 (6 HP)	22.5 (8.1 HP)	30.0 (11 HP)	42.0 (15 HP)	52.4 (19 HP)	70.0 (25 HP)	98.0 (35 HP)	170.0 (61 HP)
Tubing size	Gas tubing (mm)	ø12.7	ø15.88	ø19.05	ø22.22	ø25.4	ø28.58	ø28.58	ø31.75	ø38.1	ø41.28
	Liquid tubing (mm)	ø9.52	ø9.52	ø9.52	ø9.52	ø12.7	ø12.7	ø15.88	ø19.05	ø19.05	ø19.05

Note: In case the total capacity of indoor units connected after distribution exceeds the total capacity of the outdoor units, select the main tubing size for the total capacity of the outdoor units.

■ Table 2-1-8 Outdoor Unit Tubing Connection Size (ℓA – ℓC) Unit: mm

kW	22.4	28.0	33.5	40.0	45.0
Horsepower (HP)	8	10	12	14	16
Gas tubing	ø19.05	ø22.22	ø25.4		ø28.58
	Brazing connection				
Liquid tubing	ø9.52		ø12.7		
	Flare connection				
Balance tubing	ø6.35				
	Flare connection				



■ Table 2-1-9 Indoor Unit Tubing Connection Size

Indoor unit type	15	22	28	36	45	56	60	71	73	90	106	140	160	180	224	280
Gas tube (mm)	ø12.7						ø15.88							ø19.05		ø22.22
Liquid tube (mm)	ø6.35						ø9.52									

■ Table 2-1-10 Refrigerant Tubing

Tubing size (mm)			
Material Temper - O		Material Temper - 1/2 H • H	
ø6.35	t0.8	ø22.22	t1.0
ø9.52	t0.8	ø25.4	t1.0
ø12.7	t0.8	ø28.58	t1.0
ø15.88	t1.0	ø31.75	t1.1
ø19.05	t1.2	ø38.1	over t1.35
		ø41.28	over t1.45
		ø44.45	over t1.55

* When bending the tubes, use a bending radius that is at least 4 times the outer diameter of the tubes.
  In addition, take sufficient care to avoid crushing or damaging the tubes when bending them.
* Use the material of temper - 1/2 H or - H for tubing ø22.22 or more.

1. Model Selection and Capacity Calculator

■ Straight equivalent length of joints

1-5. Straight Equivalent Length of Joints

Design the tubing system by referring to the following table for the straight equivalent length of joints.

Straight Equivalent Length of Joints

Gas tubing size (mm)	**ø12.7**	**ø15.88**	**ø19.05**	**ø22.22**	**ø25.4**	**ø28.58**	**ø31.75**	**ø38.1**	**ø41.28**	**ø44.45**
90° elbow 	0.30	0.35	0.42	0.48	0.52	0.57	0.70	0.79	0.85	0.92
45° elbow 	0.23	0.26	0.32	0.36	0.39	0.43	0.53	0.59	0.64	0.69
U-shape tube bent (R60 - 100 mm) 	0.90	1.05	1.26	1.44	1.56	1.71	2.10	2.37	2.55	2.76
Trap bend 	2.30	2.80	3.20	3.80	4.30	4.70	5.00	5.80	6.80	7.40
Y-branch distribution joint 	Equivalent length conversion not needed.									
Ball valve for service	Equivalent length conversion not needed.									

2

1. Model Selection and Capacity Calculator

■ Check of limit density

WARNING **Always check the gas density limit for the room in which the unit is installed.**

1-6. Check of Limit Density

When installing an air conditioner in a room, it is necessary to ensure that even if the refrigerant gas accidentally leaks out, its density does not exceed the limit level for that room.
If the density could exceed the limit level, it is necessary to provide an opening between the unit and the adjacent room, or to install mechanical ventilation which is interlocked with a leak detector.

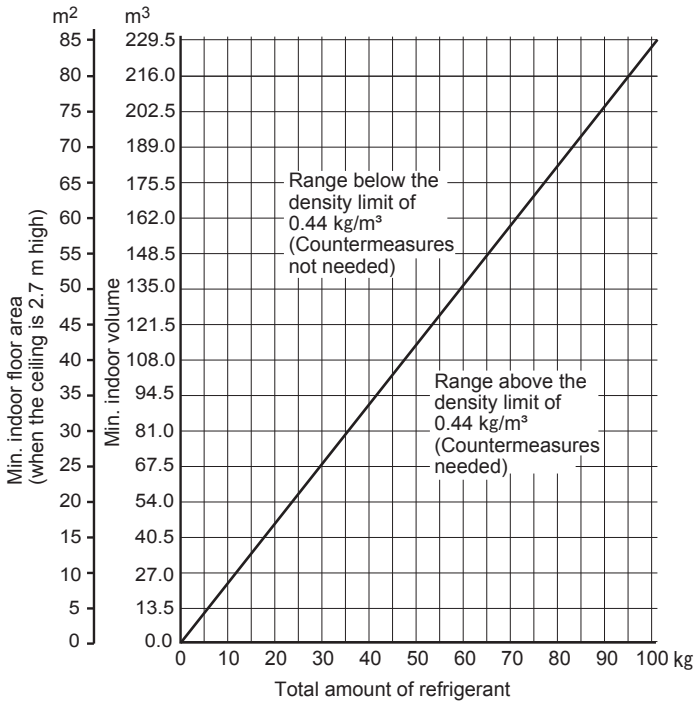
(Total refrigerant charged amount: k_g)

(Min. indoor volume where the indoor unit is installed: m^3)

≤ Limit density 0.44 (k_g/m^3)

The limit density of refrigerant R410A which is used in this unit is 0.44 kg/m³ (ISO 5149).
The shipped outdoor unit comes charged with the amount of refrigerant fixed for each type, so add it to the amount that is charged in the field. (For the refrigerant charge amount at shipment, refer to the unit's nameplate.)

Minimum indoor volume & floor area as against the amount of refrigerant is roughly as given in the following table.



CAUTION **Pay special attention to any location, such as a basement, etc., where leaking refrigerant can accumulate, since refrigerant gas is heavier than air.**

2

1. Model Selection and Capacity Calculator

1-7. Calculation of Actual Capacity of Indoor Unit

■ Calculating the actual capacity of each indoor unit

Because the capacity of a multi air-conditioner changes according to the temperature conditions, tubing length, elevation difference and other factors, select the correct model after taking into account the various correction values. When selecting the model, calculate the corrected capacities of the outdoor unit and each indoor unit.
Use the corrected outdoor unit capacity and the total corrected capacity of all the indoor units to calculate the actual final capacity of each indoor unit.

1. Outdoor unit capacity correction

Outdoor unit capacity correction (kW) = (A) × (B) × (C) × (D)

(A) Capacity correction for the outdoor unit temperature conditions, indoor unit temperature and indoor/ outdoor ratio (kW)

Read the capacity correction for outdoor unit temperature, indoor unit temperature and indoor/ outdoor ratio as shown in the section “8. CAPACITY TABLE”, “1. Capacity of Outdoor Unit” and “2. Cooling Capacity of Indoor Unit”.

* Indoor unit temperature is indoor unit rated capacity - weighted average temperature.

Example

Cooling operation

No.	(a) Rated capacity	(b) Intake temperature	(a) × (b)
1	2.8 kW	19 °C WB	53.2
2	3.6 kW	18 °C WB	64.8
3	4.5 kW	17 °C WB	76.5
4	5.6 kW	16 °C WB	89.6

Rated capacity-weighted average temperature = $\frac{\sum((a)\times(b))}{\sum(a)}$ = 17.2°C WB

* The indoor/ outdoor ratio should be selected according to the real rated capacity.

Example

There are 4 indoor units for class 28, 36, 45, 56 and the outdoor unit HP is 8 (22.4kW in the cooling-mode, 25.0kW in the heating-mode).

No.	Rated cooling capacity	Rated heating capacity
1	2.8 kW	3.2 kW
2	3.6 kW	4.2 kW
3	4.5 kW	5.0 kW
4	5.6 kW	6.3 kW
Total	16.5 kW	18.7 kW
I/O ratio	73.7%	74.8 %

(B) Capacity correction coefficient for outdoor unit tubing length and elevation difference (%)

From the graph of capacity change characteristics resulting from tubing length and elevation difference on page “ 2-1-14 ”, read the capacity correction coefficient.

* Use the lowest capacity changing ratio. Usually, the furthest and highest or the lowest indoor unit is used.

(C) Surplus capacity correction coefficient for outdoor unit temperature conditions (%)

From the graph of surplus capacity characteristics resulting from outdoor temperature on page “ 2-1-13 ”, read the capacity correction coefficient.

(D) Capacity correction coefficient for outdoor unit frosting and defrosting during heating operation (%)

From the outdoor unit heating capacity correction coefficient during frosting / defrosting on page “ 2-1-13 ”, read the capacity correction coefficient.

1. Model Selection and Capacity Calculator

2. Indoor unit capacity correction coefficient

Indoor unit capacity correction (kW) = (G) × (I) × (D)

* Indoor unit capacity correction ≤ (G)

(E) Capacity correction for the indoor unit temperature conditions (kW)

From the graph of indoor capacity characteristics on page " 2-1-14 ", read the capacity correction coefficient for indoor unit temperature conditions.

(E) = Capacity correction coefficient for indoor unit temperature conditions × Rated capacity

(F) Calculate the Capacity distribution ratio (%)

$$(F) = \frac{(E)}{\sum(E)}$$

(G) Distribute the outdoor unit capacity among each indoor unit (kW)

(G) = (A) × (F)

(H) Capacity correction coefficient for tubing length and elevation difference (%)

From the graph of capacity change characteristics resulting from tubing length and elevation difference on page " 2-1-14 ", read the capacity correction coefficient.

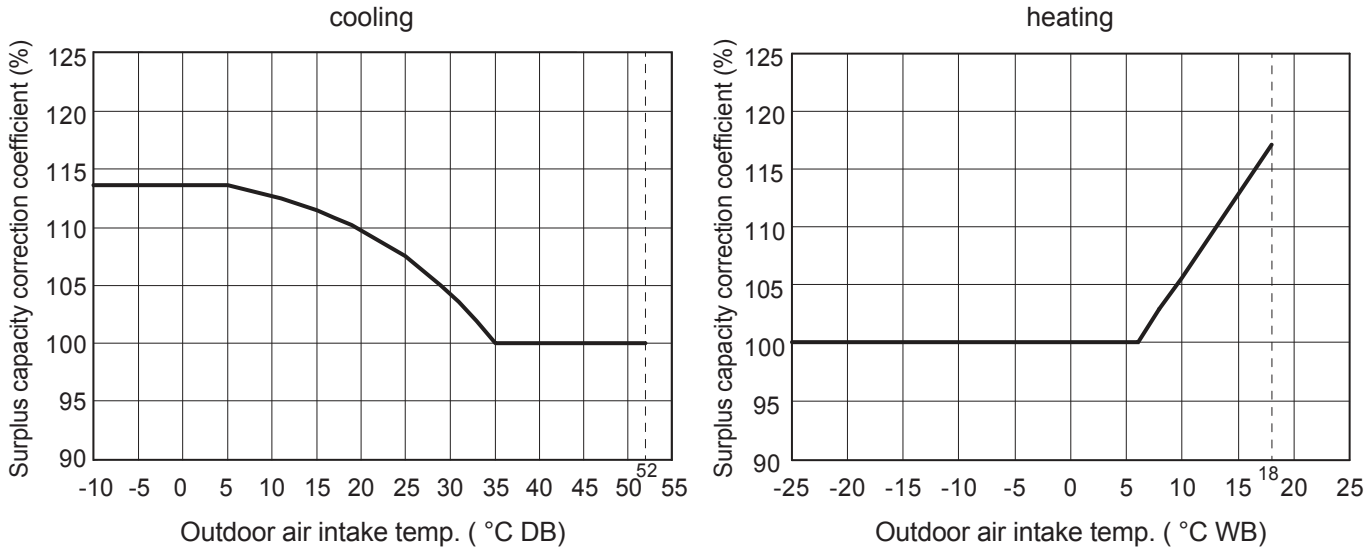
(I) Capacity correction coefficient for outdoor unit (%)

(I) = (H) × (C)

- In the case of (I) ≤ 100%, loss of capacity resulting from the tubing length can be supplied by the outdoor unit capacity.
  - When the outdoor air temperature is lower in cooling mode
  - When the outdoor air temperature is higher in heating mode

1. Model Selection and Capacity Calculator

Surplus capacity correction coefficient (%)



2

3. Graph of capacity correction coefficients

■ **Outdoor unit heating capacity correction coefficient during frosting/defrosting (1 – (4))**

Outdoor intake air temp. (°CWB, RH85%)	–25	–24	–23	–22	–21	–20	–15	–10	–8	–6	–5	–4	–2	–1
Correction coefficient	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.96	0.94	0.91	0.89	0.87	0.87

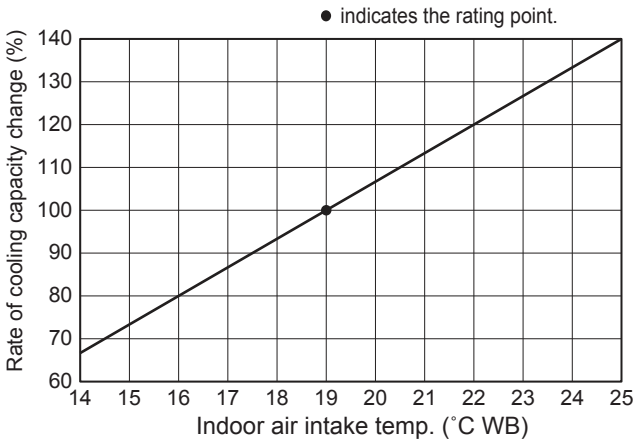
Outdoor intake air temp. (°CWB, RH85%)	0	1	2	3	4	5	6
Correction coefficient	0.87	0.88	0.89	0.91	0.92	0.95	1.0

* To calculate the heating capacity with consideration for frosting/defrosting operation, multiply the heating capacity found from the capacity graph by the correction coefficient from the table above.

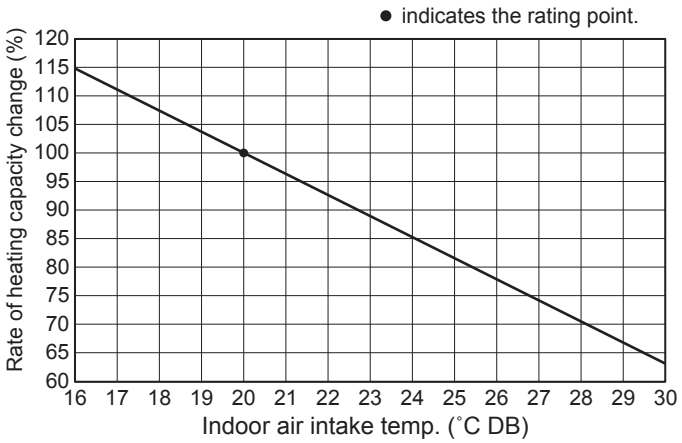
1. Model Selection and Capacity Calculator

■ Graph of indoor unit capacity characteristics (2 – (2))

Indoor unit cooling capacity characteristics



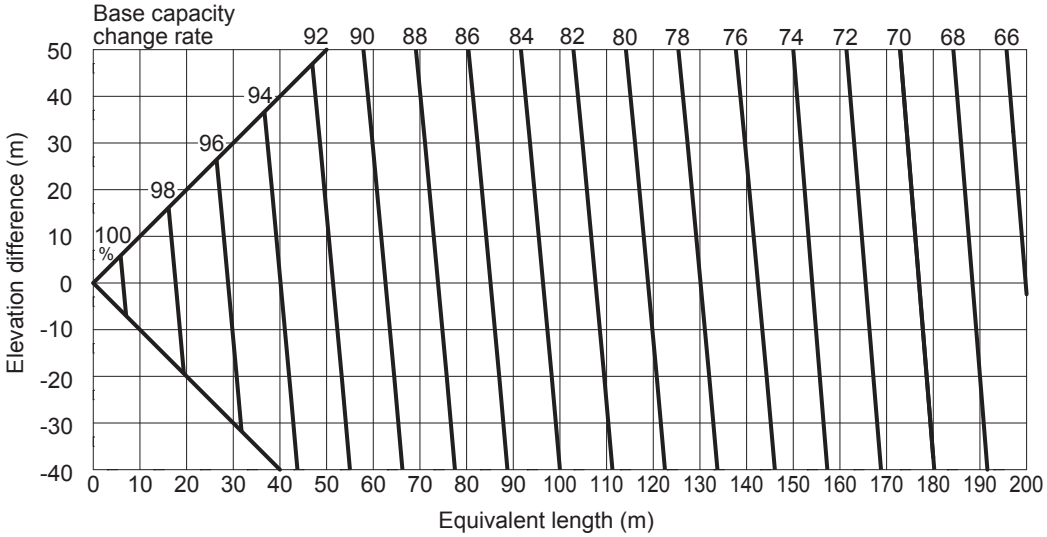
Indoor unit heating capacity characteristics



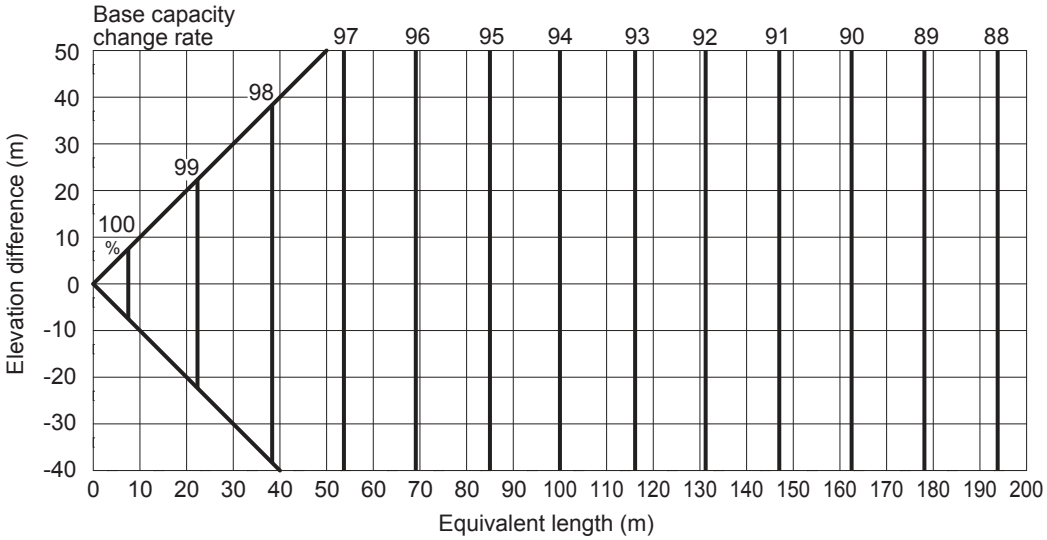
■ Graph of capacity change characteristics resulting from tubing length and elevation difference (1 / 2 – (3))

(Performance correction coefficients by elevation difference of refrigerant tube length [performance change rate ÷ 100] is calculated by the following line map.)

<Cooling>



<Heating>



*The positive side for the elevation difference indicates that the outdoor unit is installed at a higher position than the indoor units. The negative side indicates the opposite.

1. Model Selection and Capacity Calculator

- The capacity loss that is caused by the tubing length can be reduced by increasing the sizes of the gas tubes.
  See Table 2-1-11 and make the appropriate changes. However, be sure that the total length does not exceed the maximum.
  * The only sizes which can be increased are the LM (main tubing with the largest diameter) gas tubes, and the changes are limited to those shown in Table 2-11-11.
    In addition, note that the additional refrigerant charge is determined only by the liquid tube size.

Table 2-1-11 Equivalent Length Correction Coefficient when the Size of the Gas Tubes (LM) is Increased

Standard tubing diameter (gas tube, mm)	ø12.7	ø15.88	ø19.05	ø22.22	ø25.4	ø28.58	ø31.75	ø38.1	ø41.28
Tubing diameter after change (gas tube, mm)	ø15.88	ø19.05	ø22.22	ø25.4	ø28.58	ø31.75	ø38.1	ø41.28	ø44.45
Equivalent length correction coefficient	0.4		0.5			0.6		0.7	

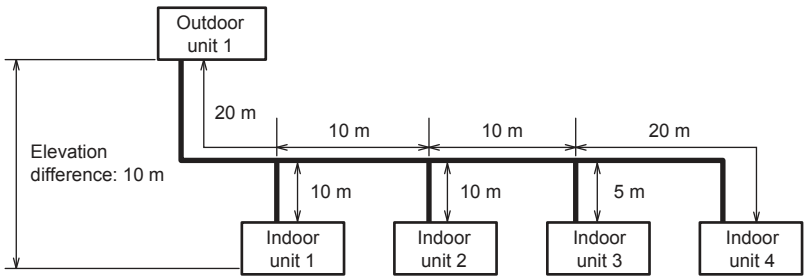
* If the size of the gas tubing (LM) have been increased, apply the correction coefficient from Table 2-1-11 and calculate the equivalent length of the LM section.

Equivalent length of tubing after size increase
= Standard tubing equivalent length × Equivalent length correction coefficient

2. System Design

2-1. System Example

Below are the tables created using the “PAC System Diagram Software”.



Selection conditions
Assume that installation is in a 50 Hz region.

		Outdoor unit	Room1 (indoor unit 1)	Room2 (indoor unit 2)	Room3 (indoor unit 3)	Room4 (indoor unit 4)
Cooling	Air condition (DB / WB)	34.0 / 22.0	27.0 / 20.0	27.0 / 20.0	27.0 / 20.0	27.0 / 20.0
	Max. load (kW)	-	15.8	13.5	5.0	3.5
Heating	Air condition (DB / WB)	3.0 / 2.0	19.0 / 14.0	19.0 / 14.0	19.0 / 14.0	19.0 / 14.0
	Max. load (kW)	-	16.2	14.3	5.4	4.0
Actual tubing length		60 m	30 m	40 m	45 m	60 m
Equivalent length		72 m	36 m	48 m	54 m	72 m

Preliminary selection

	Outdoor unit	Room1 (indoor unit 1)	Room2 (indoor unit 2)	Room3 (indoor unit 3)	Room4 (indoor unit 4)
Selected model	14 HP	Type 160	Type 140	Type 56	Type 36
Load (cooling / heating) (kW)	-	15.8 / 16.2	13.5 / 14.3	5.0 / 5.4	3.5 / 4.0
Rated capacity (cooling / heating) (kW)	40.0 / 45.0	16.0 / 18.0	14.0 / 16.0	5.6 / 6.3	3.6 / 4.2
Actual capacity (cooling / heating) (kW)	-	16.3 / 16.3	13.9 / 14.4	5.51 / 5.64	3.42 / 3.71

Calculate the actual capacity results according to the capacity calculation procedure on page “2-1-11” to “2-1-15”

	Outdoor unit	Room1 (indoor unit 1)	Room2 (indoor unit 2)	Room3 (indoor unit 3)	Room4 (indoor unit 4)
Rated capacity (cooling / heating) (kW)	40.0 / 45.0	16.0 / 18.0	14.0 / 16.0	5.6 / 6.3	3.6 / 4.2
(A) capacity table	41.8 / 46.2	-	-	-	-
(B) Capa. Estmation Coef. : the Equiv.Tube Length	0.882 / 0.958	-	-	-	-
(C) Capa. Estmation Coef. : Temp Conditions	-	1.010 / 1.000	1.010 / 1.000	1.010 / 1.000	1.010 / 1.000
(D) Capa. Estmation Coef. : Frosting / defrosting	- / 0.890	-	-	-	-
(E) Estimation Capacity	-	17.1 / 18.7	14.9 / 16.6	6.0 / 6.5	3.8 / 4.4
(F) Capacity distribution ratio	-	0.408 / 0.404	0.357 / 0.360	0.143 / 0.142	0.092 / 0.094
(G) = (A) × (F)	-	17.1 / 18.7	14.9 / 16.6	6.0 / 6.5	3.8 / 4.4
(H) Capa. Estimation Coef. : the Equiv.Tube Length	-	0.945 / 0.981	0.924 / 0.973	0.914 / 0.969	0.882 / 0.958
(I) = (C) × (H)	-	0.954 / 0.981	0.933 / 0.973	0.923 / 0.969	0.891 / 0.958
Actual capacity (cooling / heating) (kW)	-	16.3 / 16.3	13.9 / 14.4	5.51 / 5.64	3.42 / 3.71

Actual capacity = (G) × (I) × (D)

2. System Design

Indoor unit change

Increase by one rank because the capacity of the indoor unit 4 is lower than the maximum load.
Calculating the actual capacity in the same way as Preliminary selection.

	Outdoor unit	Room1 (indoor unit 1)	Room2 (indoor unit 2)	Room3 (indoor unit 3)	Room4 (indoor unit 4)
Selected model	14 HP	Type 160	Type 140	Type 56	Type 45
Load (cooling / heating) (kW)	-	15.8 / 16.2	13.5 / 14.3	5.0 / 5.4	3.5 / 4.0
Rated capacity (cooling / heating) (kW)	40.0 / 45.0	16.0 / 18.0	14.0 / 16.0	5.60 / 6.30	4.50 / 5.00
Actual capacity (cooling / heating) (kW)	-	16.3 / 16.1	13.9 / 14.2	5.50 / 5.59	4.27 / 4.38

Outdoor unit change

The capacity of the indoor units 1 and 2 is lower than the maximum load.
Increase the capacity of the outdoor unit by one rank because of inability to increase the indoor unit 1 by one rank.
Calculating the actual capacity in the same way as Preliminary selection.

	Outdoor unit	Room1 (indoor unit 1)	Room2 (indoor unit 2)	Room3 (indoor unit 3)	Room4 (indoor unit 4)
Selected model	16 HP	Type 160	Type 140	Type 56	Type 45
Load (cooling / heating) (kW)	-	15.8 / 16.2	13.5 / 14.3	5.0 / 5.4	3.5 / 4.0
Rated capacity (cooling / heating) (kW)	45.0 / 50.0	16.0 / 18.0	14.0 / 16.0	5.60 / 6.30	3.60 / 4.20
Actual capacity (cooling / heating) (kW)	-	16.3 / 16.3	13.9 / 14.4	5.51 / 5.64	4.28 / 4.42

For both cooling and heating in all rooms, actual capacity is now greater than or equal to the maximum load.
Selection is completed

2. System Design

2-2. Example of Tubing Size Selection and Refrigerant Charge Amount

Additional refrigerant charging

Based on the values in Tables 2-1-2, 2-1-3, 2-1-6, 2-1-7, 2-1-8 and 2-1-9, use the liquid tubing size and length, and calculate the amount of additional refrigerant charge using the formula below.

Required additional refrigerant charge (kg) =[366 ×(a) + 259 ×(b) + 185 ×(c) + 128 ×(d) + 56 ×(e) + 26 ×(f)] ×10^{-3} + Necessary amount of additional refrigerant charge per outdoor unit.

(a) : Liquid tubing Total length of ø22.22 (m)
(b) : Liquid tubing Total length of ø19.05 (m)
(c) : Liquid tubing Total length of ø15.88 (m)
(d) : Liquid tubing Total length of ø12.7 (m)
(e) : Liquid tubing Total length of ø9.52 (m)
(f) : Liquid tubing Total length of ø6.35 (m)

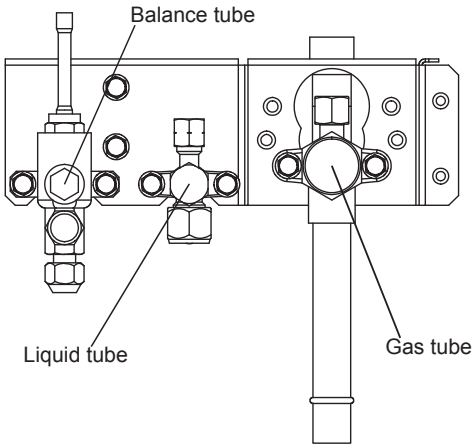
- Charging procedure

  Be sure to charge with R410A refrigerant in liquid form.

  1. After performing a vacuum, charge with refrigerant from the liquid tubing side. At this time, all valves must be in the “fully closed” position.
  2. If it was not possible to charge the designated amount, operate the system in Cooling mode while charging with refrigerant from the gas tubing side. (This is performed at the time of the test run. For this, all valves must be in the “fully open” position. However if only one outdoor unit is installed, a balance tube is not used. Therefore, leave the valves fully closed.)
     Charge with R410A refrigerant in liquid form.
     With R410A refrigerant, charge while adjusting the amount being fed a little at a time in order to prevent liquid refrigerant from backing up.
- After charging is completed, turn all valves to the “fully open” position.
- Replace the tubing covers as they were before.

CAUTION

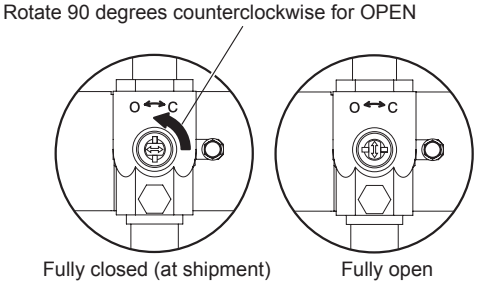
1. **R410A additional charging absolutely must be done through liquid charging.**
2. **The R410A refrigerant cylinder has a gray base color, and the top part is pink.**
3. **The R410A refrigerant cylinder includes a siphon tube. Check that the siphon tube is present. (This is indicated on the label at the top of the cylinder.)**
4. **Due to differences in the refrigerant, pressure, and refrigerant oil involved in installation, it is not possible in some cases to use the same tools for R22 and for R410A.**



* Use a hexagonal wrench and turn to the left to open.

		Gas tube	Liquid tube
Hex wrench width	8 HP	5 mm	4 mm
	10 HP	8 mm	
	12 HP		
	14 HP		
	16 HP		

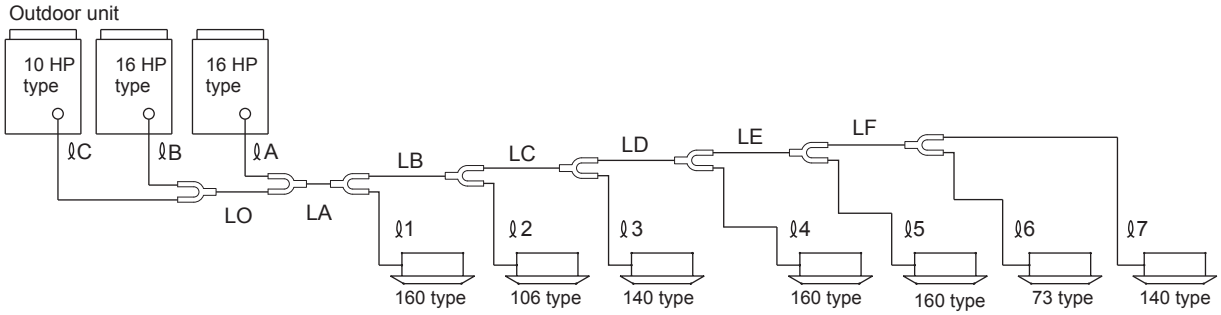
Balance tube



How to turn the tab

2. System Design

Example:



● Example of each tubing length

Main tubing

LO = 2 m	LD = 15 m
LA = 40 m	LE = 10 m
LB = 5 m	LF = 10 m
LC = 5 m	

Distribution joint tubing

Outdoor side	Indoor side	
ℓ A = 2 m	ℓ 1 = 30 m	ℓ 5 = 2 m
ℓ B = 2 m	ℓ 2 = 5 m	ℓ 6 = 6 m
ℓ C = 3 m	ℓ 3 = 5 m	ℓ 7 = 5 m
	ℓ 4 = 5 m	

Note :The maximum tubing length (equivalent length) exceeds 90 m.

● Obtain liquid tubing size from Tables 2-1-2, 2-1-6, 2-1-7, 2-1-8 and 2-1-9.

Main tubing

LO = ø19.05 mm (Total capacity of outdoor unit is 73.5 kW)
LA*= ø22.22 mm (Total capacity of outdoor unit is 118.0 kW)
LB = ø19.05 mm (Total capacity of indoor unit is 77.9 kW)
LC = ø15.88 mm (Total capacity of indoor unit is 67.3 kW)
LD = ø15.88 mm (Total capacity of indoor unit is 53.3 kW)
LE = ø12.7 mm (Total capacity of indoor unit is 37.3 kW)
LF = ø9.52 mm (Total capacity of indoor unit is 21.3 kW)

The longest main tubing length in this example (LM = 40 + 5 = 45 m)
* The tubing size ø19.05 was increased to ø22.22.

Distribution joint tubing

Outdoor side	ℓ A: ø12.7	ℓ B: ø12.7	ℓ C: ø9.52 (from outdoor unit connection tubing)	
Indoor side	ℓ 1: ø9.52	ℓ 2: ø9.52	ℓ 3: ø9.52	ℓ 4: ø9.52
	ℓ 5: ø9.52	ℓ 6: ø9.52	ℓ 7: ø9.52 (from indoor unit connection tubing)	

● Obtain additional charge amount.

Note 1*

The charge amounts per 1 meter are different for each liquid tubing size.

ø22.22 → LA	: 40 m ×0.366 kg/m = 14.640
ø19.05 → LB + LO	: 7 m ×0.259 kg/m = 1.813
ø15.88 → LC + LD	: 20 m ×0.185 kg/m = 3.7
ø12.7 → LE + ℓ A + ℓ B	: 14 m ×0.128 kg/m = 1.792
ø9.52 → ℓ C + LF +(ℓ 1 – ℓ 7)	: 71 m ×0.056 kg/m = 3.976
	Total 25.921 kg

Note 2*

Necessary amount of additional refrigerant charge per outdoor unit (See Table 2-1-3.)

Amount of additional charge per outdoor unit :	U-10ME2E8	5.5	kg
	U-16ME2E8	7.0	kg
	U-16ME2E8	7.0	kg
	Total	19.5	kg

Therefore,

*Note 1 : Amount of additional charge per tubing length :	25.921 kg
*Note 2 : Amount of additional charge per outdoor unit :	19.5 kg

Therefore, the total of additional refrigerant charge amount reaches 45.421 kg.

● Obtain overall refrigerant charge amount.

Overall refrigerant charge amount of the system indicates the calculated value shown above the additional charge amount in addition to the total of the refrigerant charge amount (shown in the Table 2-1-4) at the shipment of each outdoor unit.

Refrigerant charge amount at shipment:

	U-10ME2E8	: 5.6 kg
	U-16ME2E8	: 8.3 kg
	U-16ME2E8	: 8.3 kg
Additional charge amount		: 45.421 kg
	Grand total	: 67.621 kg

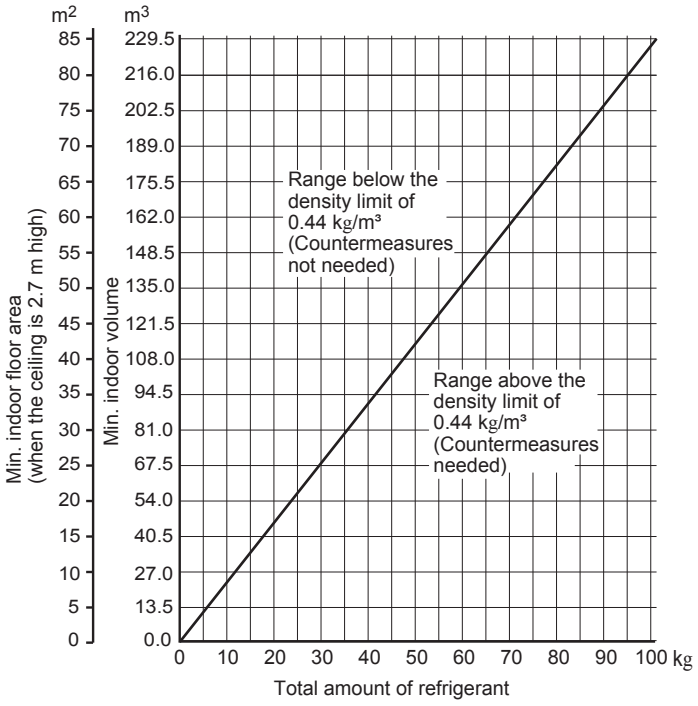
Therefore, overall refrigerant charge amount of the system reaches 67.621 kg.

2. System Design

CAUTION Be sure to check the limit density for the room in which the indoor unit is installed.

Checking of limit density

Density limit is determined on the basis of the size of a room using an indoor unit of minimum capacity.
For instance, when an indoor unit is used in a room (floor area 15 m^2 × ceiling height 2.7 m = room volume 40.5 m^3), the graph at right shows that the maximum overall refrigerant charge amount of limit density (0.44 kg/m^3) that is not required to install a ventilation fan should be calculated as follows.



Due to the room volume,

Maximum overall refrigerant charge amount

= (room volume) × (limit density)

= 40.5 (m^3) × 0.44 (kg/m^3)

= 17.82 kg

Overall refrigerant charge amount for this system is 67.621 (kg). The formula for the minimum room volume should be determined as follows.

Required minimum room volume

= (overall refrigerant charge amount) ÷ (limit density)

= 67.621 (kg) ÷ 0.44 (kg/m^3)

= 153.68 (m^3)

Required minimum floor area

= (minimum room volume) ÷ (ceiling height)

= 153.68 (m^3) ÷ 2.7 (m)

= 56.9 (m^2)

Therefore an opening for ventilation is required.

< Formula for computation >

$$\frac{\text{Overall refrigerant charge amount for the air conditioner: kg}}{\text{(Minimum room volume for indoor unit: } m^3\text{)}} = \frac{67.621\ (kg)}{40.5\ (m^3)} = 1.67\ (kg/m^3) > 0.44\ (kg/m^3)$$

Accordingly, it is necessary to install a ventilation fan for this room.

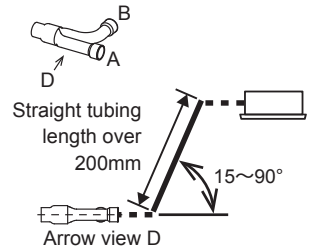
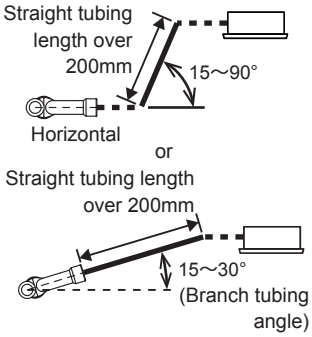
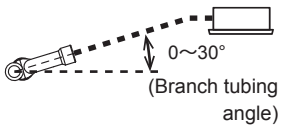
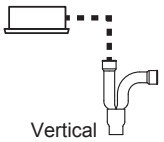
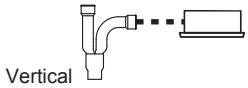
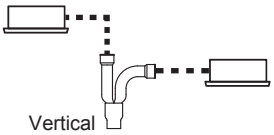
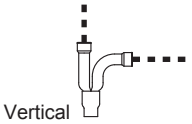
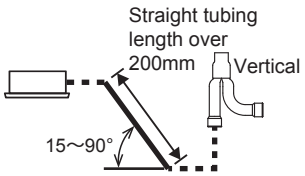
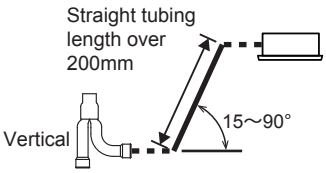
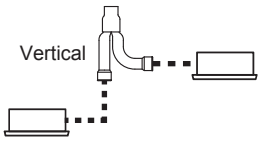
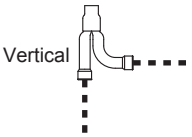
2. System Design

■ Installing distribution joint

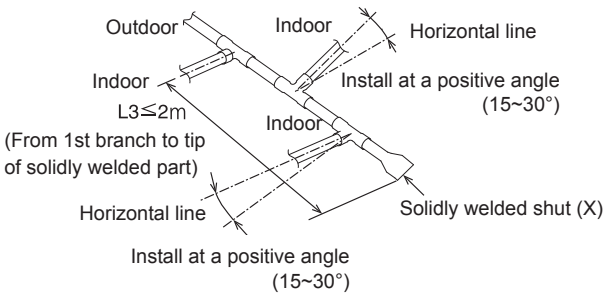
(1) See “How to Attach Distribution Joint” on page 2-7-1, 2-7-2, 2-7-3 and 2-7-4.
(CZ-P680PJ2, CZ-P1350PJ2, CZ-P160BK2, CZ-P680BK2, CZ-P1350BK2)

- When connecting a branch tubing to the indoor unit directly, it is necessary for each branch tubing to install at a positive angle with respect to horizontal in order to prevent accumulation of refrigerant oil in stopped units. See the below chart.

Branch tubing system — Restricted ▪▪▪▪▪ Not restricted

How to install branch tubing 		When connecting branch tubing to indoor unit directly			When not connecting branch tubing to indoor unit directly
		Gas tube		Liquid tube	Gas & liquid tubes
		When connecting to A	When connecting to B		
Horizontal					
Vertical	Upward				
	Downward				

Header branch system (Main tubing is horizontal.)



- Be sure to solidly weld shut the T-joint end (marked by X in the figure). In addition, pay attention to the insertion depth of each connected tube so that the flow of refrigerant within the T-joint is not impeded.
  Be sure to use a commercial available T-joint.
- When using the header joint system, do not make further branches in the tubing.
- Do not use the header joint system on the outdoor unit side.

3. Electrical Wiring

3-1. General Precautions on Wiring

(1) Before wiring, confirm the rated voltage of the unit as shown on its nameplate, then carry out the wiring closely following the wiring diagram.
(2) Provide a power outlet to be used exclusively for each unit, and a power supply disconnect, circuit breaker and earth leakage breaker for overcurrent protection should be provided in the exclusive line.
(3) To prevent possible hazards from insulation failure, the unit must be grounded.
(4) Each wiring connection must be done in accordance with the wiring system diagram. Wrong wiring may cause the unit to misoperate or become damaged.
(5) Do not allow wiring to touch the refrigerant tubing, compressor, or any moving parts of the fan.
(6) Unauthorized changes in the internal wiring can be very dangerous. The manufacturer will accept no responsibility for any damage or misoperation that occurs as a result of such unauthorized changes.
(7) Regulations on wire diameters differ from locality to locality. For field wiring rules, please refer to your LOCAL ELECTRICAL CODES before beginning. You must ensure that installation complies with all relevant rules and regulations.
(8) To prevent malfunction of the air conditioner caused by electrical noise, care must be taken when wiring as follows:
- The remote control wiring and the inter-unit control wiring should be wired apart from the inter-unit power wiring.
- Use shielded wires for inter-unit control wiring between units and ground the shield on both sides.

(9) If the power supply cord of this appliance is damaged, it must be replaced by a repair shop appointed by the manufacturer, because special purpose tools are required.
(10) Use a waterproof conduit for outdoor unit wiring to avoid damaging the wire and to prevent accumulation of liquid inside the unit.

3-2. Recommended Wire Length and Wire Diameter for Power Supply System

Outdoor unit

	(A) Power supply		Time delay fuse or circuit capacity
	Wire size	Max. length	
U-8ME2E8	4 mm²	77 m	20 A
U-10ME2E8	4 mm²	54 m	25 A
U-12ME2E8	6 mm²	65 m	30 A
U-14ME2E8	10 mm²	84 m	35 A
U-16ME2E8	10 mm²	69 m	40 A

or

(A) Power supply		Time delay fuse or circuit capacity
Wire size	Max. length	
6 mm²	115 m	30 A
6 mm²	81 m	30 A
—	—	—
—	—	—
—	—	—

Indoor unit

Type	(B) Power supply	Time delay fuse or circuit capacity
	2.5 mm²	
U2,Y3,K2,M1	Max. 130 m	15 A
F3	Max. 90 m	15 A
T2,F2,G1, L1,D1,P1,R1	Max. 130 m	10 – 16 A
E2	Max. 30 m	10 – 16 A

* Maximum length shows a 2% voltage drop.

Control wiring

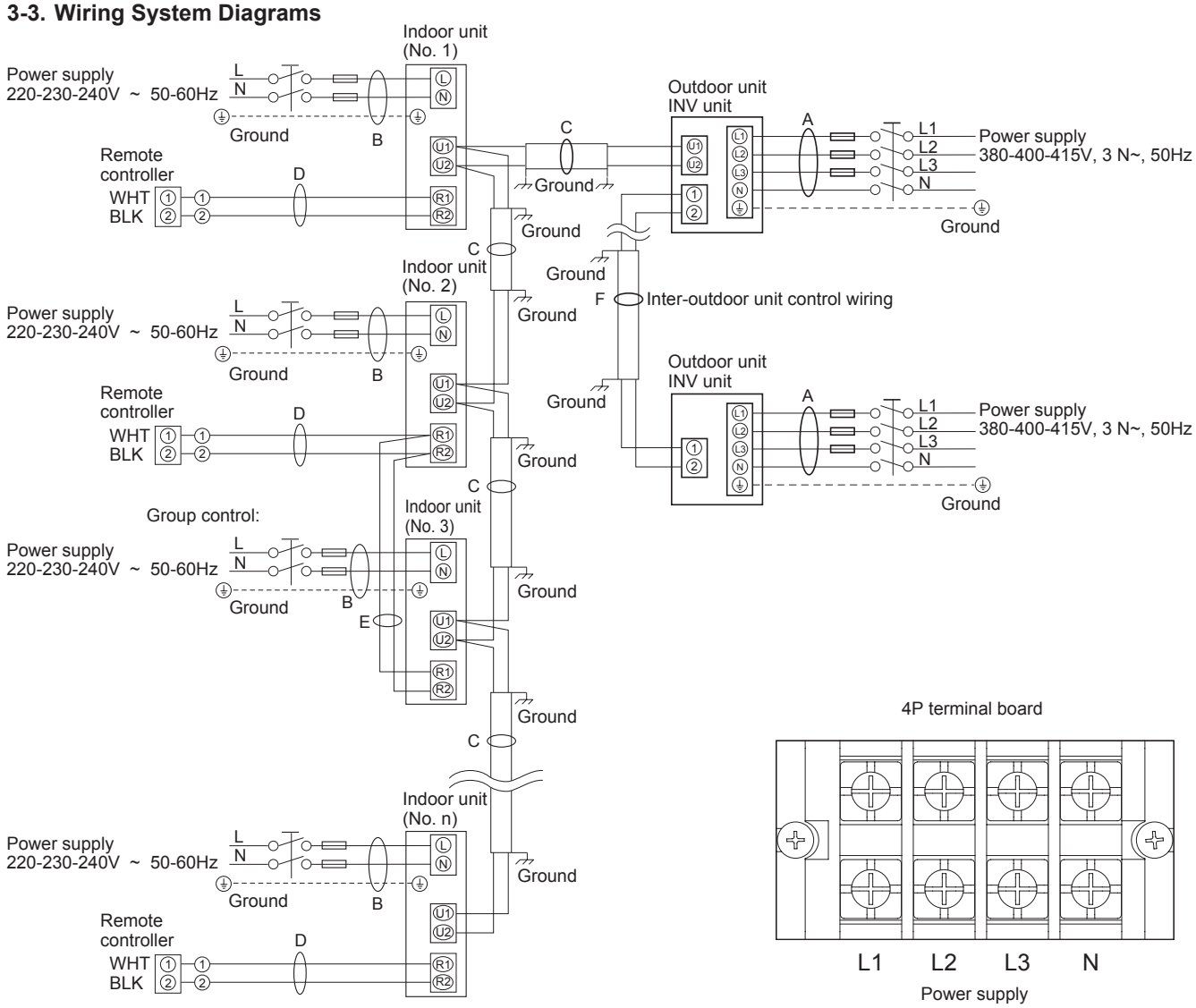
(C) Inter-unit (between outdoor and indoor units) control wiring			(D) Remote control wiring
0.75 mm² **Use shielded wiring***	or	2.0 mm² **Use shielded wiring***	0.75 mm²
Max. 1,000 m		Max. 2,000 m	Max. 500 m

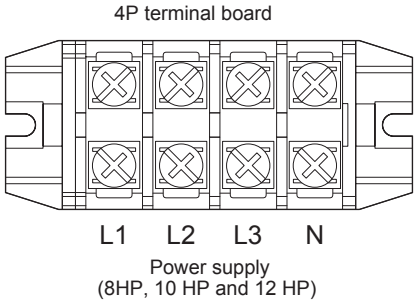
NOTE * With ring-type wire terminal.

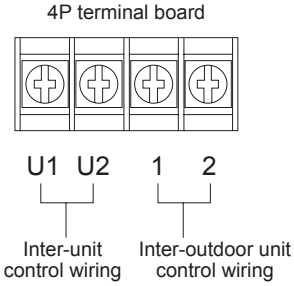
(E) Control wiring for group control	(F) Inter-outdoor unit control wiring
0.75 mm²	0.75 mm² **Use shielded wiring**
Max. 200 m (Total)	Max. 300 m

3. Electrical Wiring

3-3. Wiring System Diagrams







NOTE

(1) See the section “3-2. Recommended Wire Length and Wire Diameter for Power Supply System” for the explanation of “A”, “B” ,“C” ,“D”, “E” and “F” in the above diagram.
(2) The basic connection diagram of the indoor unit shows the 6P terminal board, so the terminal boards in your equipment may differ from the diagram.
(3) Refrigerant Circuit (R.C.) address should be set before turning the power on.
(4) Regarding the R.C. address setting, it can be executed by remote controller automatically. See the section “4. Auto Address Setting” under “Section 5 : TEST RUN”.

Type ME2

3. Electrical Wiring

CAUTION

(1) When linking outdoor units in a network, disconnect the terminal extended from the short plug (CN072, 2P Black, location: right bottom on the outdoor main control PCB) from all outdoor units except any one of the outdoor units.
(When shipping: In shorted condition.)
For a system without link (no connection wiring between outdoor units), do not remove the short plug.
(2) Do not install the inter-unit control wiring in a way that forms a loop. (Fig. 2-3-1)

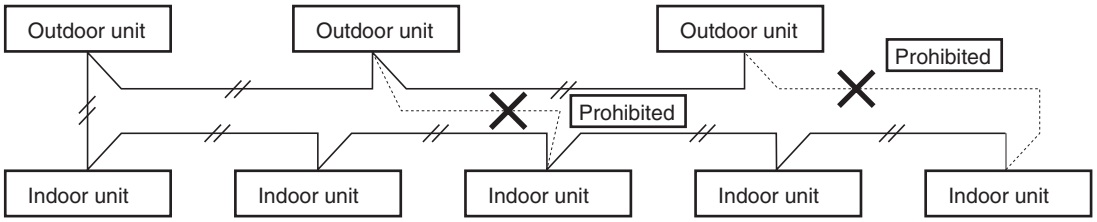


Fig. 2-3-1

(3) Do not install inter-unit control wiring such as star branch wiring. Star branch wiring causes misaddress setting.

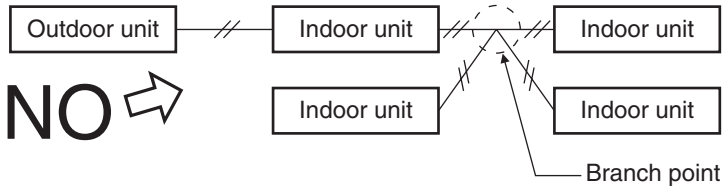


Fig. 2-3-2

(4) If branching the inter-unit control wiring, the number of branch points should be 16 or fewer.

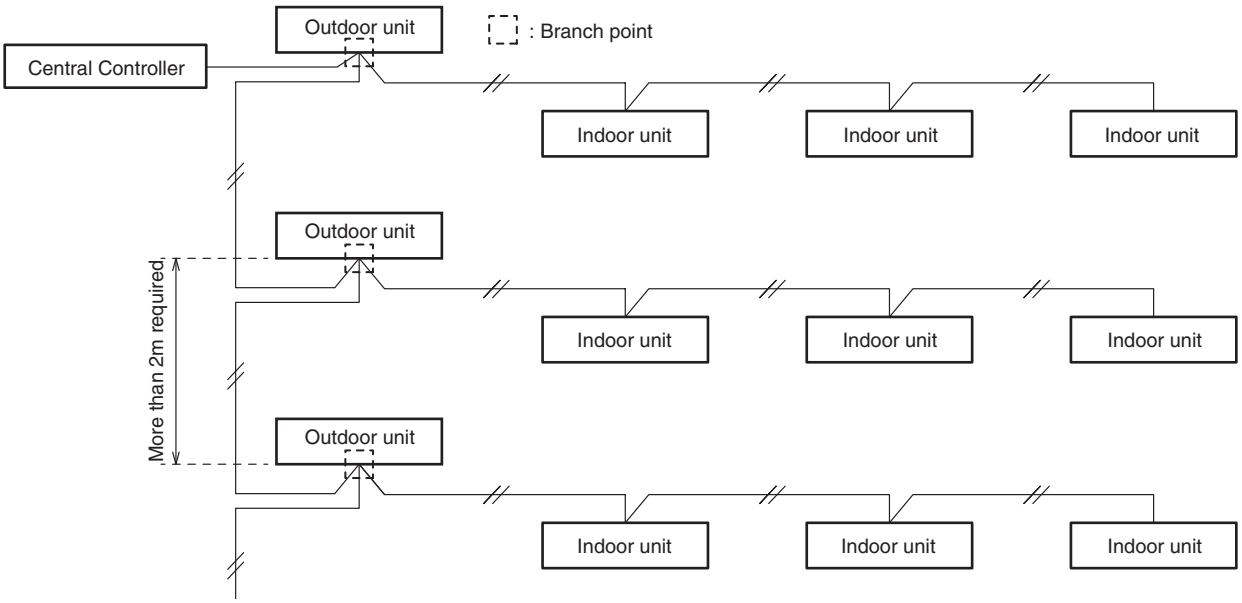


Fig. 2-3-3

3. Electrical Wiring

(5) Use shielded wires for inter-unit control wiring (C) and ground the shield on both sides, otherwise misoperation from noise may occur.
Connect wiring as shown in the section "3-3. Wiring System Diagrams."

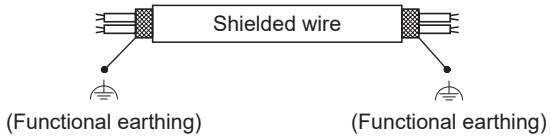


Fig. 2-3-4

(6) • Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 5 or 3 *1.5 mm^2 flexible cord. Type designation 60245 IEC57 (H05RN-F, GP85PCP etc.) or heavier cord.
• Use the standard power supply cables for Europe (such as H05RN-F or H07RN-F which conform to CENELEC (HAR) rating specifications) or use the cables based on IEC standard. (60245 IEC57, 60245 IEC66)

WARNING
Loose wiring may cause the terminal to overheat or result in unit malfunction.
A fire hazard may also exist.
Therefore, ensure that all wiring is tightly connected.

When connecting each power wire to the terminal, follow the instructions on "How to Connect Wiring to Terminal" and fasten the wire securely with the fixing screw of the terminal board.

2

How to Connect Wiring to Terminal

■ For stranded wiring

(1) Cut the wire end with cutting pliers, then strip the insulation to expose the stranded wiring about 10 mm and tightly twist the wire ends. Then attach the ring pressure terminal.

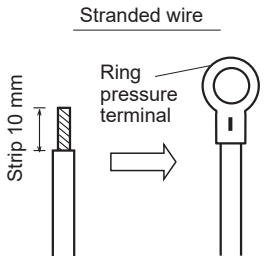


Fig. 2-3-5

(2) Using a Phillips head screwdriver, remove the terminal screw(s) on the terminal board.

(3) Using a ring connector fastener or pliers, securely clamp each stripped wire end with a ring pressure terminal.

(4) Place the ring pressure terminal, and replace and tighten the removed terminal screw using a screwdriver.

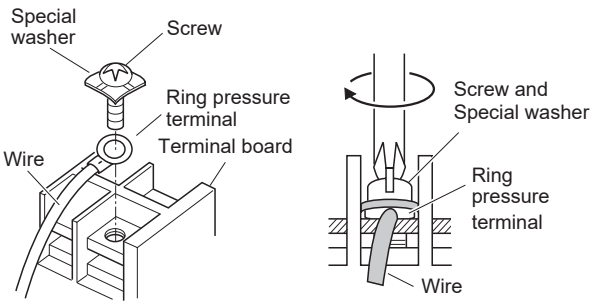


Fig. 2-3-6

■ Examples of shield wires

(1) Remove cable coat not to scratch braided shield.

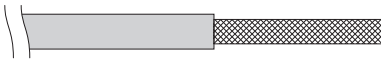


Fig. 2-3-7

(2) Unbraid the braided shield carefully and twist the unbraided shield wires tightly together. Insulate the shield wires by covering them with an insulation tube or wrapping insulation tape around them.

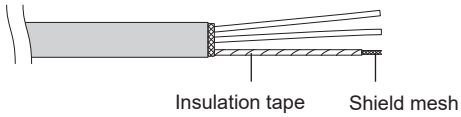


Fig. 2-3-8

(3) Remove coat of signal wire.

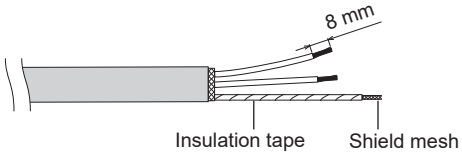


Fig. 2-3-9

(4) Attach ring pressure terminals to the signal wires and the shield wires insulated in Step (2).

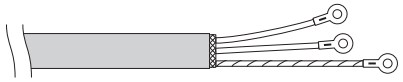


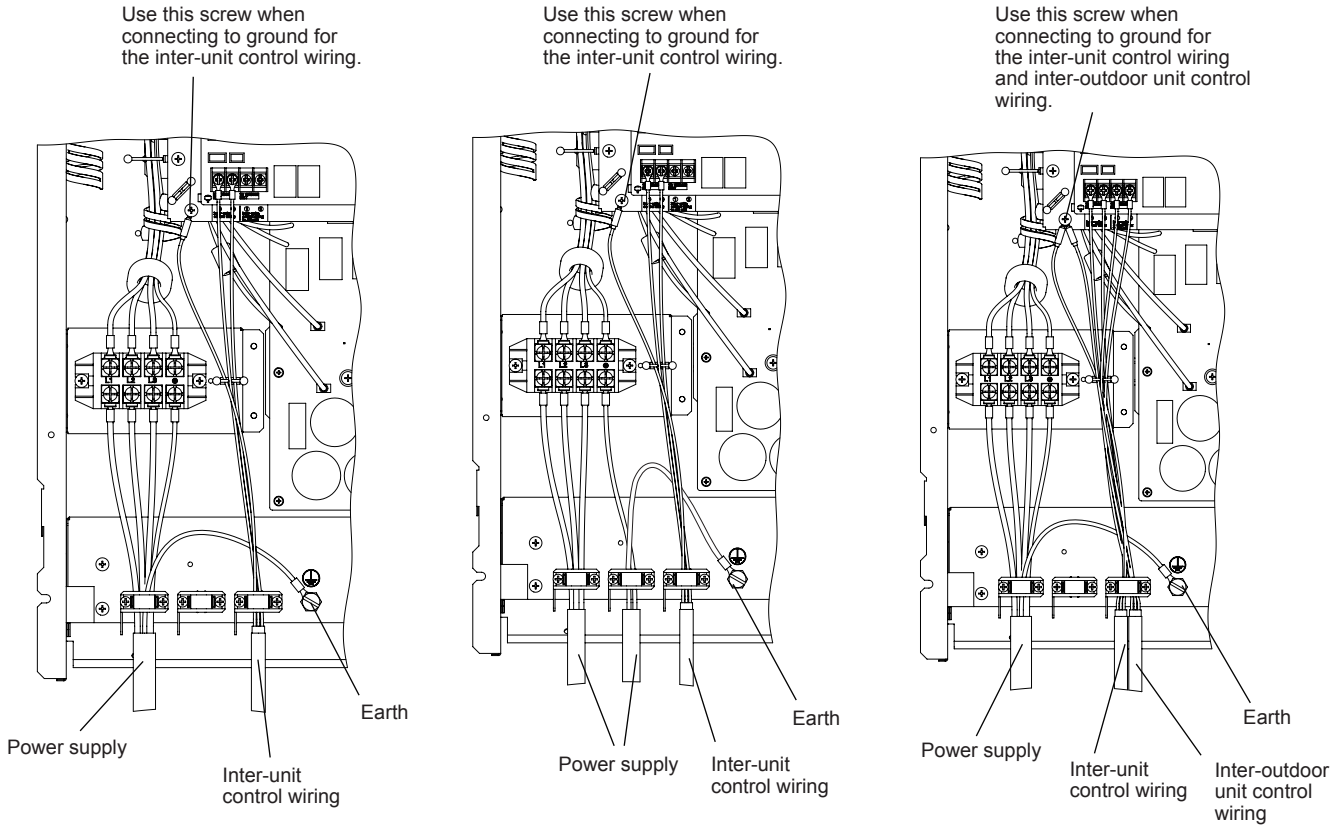
Fig. 2-3-10

■ Earth wire for power supply

The earth wire should be longer than the other lead wires for electrical safety.

3. Electrical Wiring

■ Wiring sample



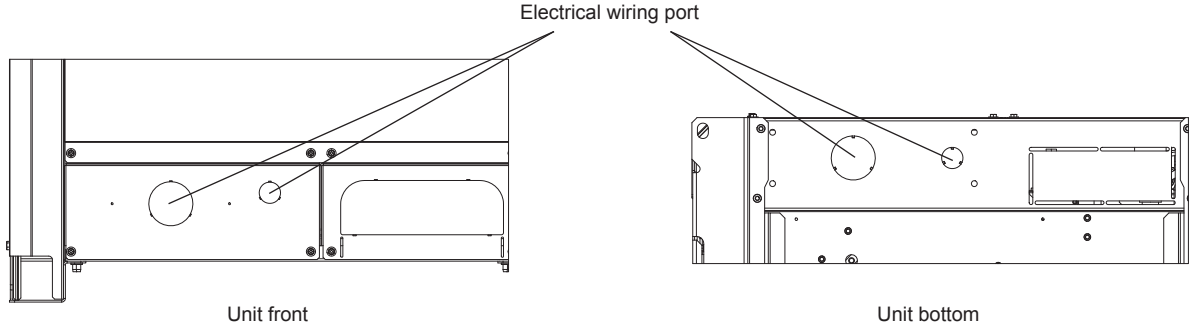
Torque values of power supply terminal board
8/10/12 HP: 2.2N·m±0.05N·m {22 kgf·cm ±0.5 kgf·cm}
14/16 HP: 2.7N·m±0.1N·m {27 kgf·cm ±1 kgf·cm}

Torque value of communication terminal board: 1.3N·m±0.1N·m {13 kgf·cm ±1 kgf·cm}
ATTENTION: Comply with the torque values.
If tightening over torque values, the screw will be damaged.

ATTENTION: Apply an adjustable wrench to the valve vertically not to damage the P.C.board.

NOTE

- Fix the wires with the clamper to the wiring fixture plates (2 locations) and do not allow them to touch the refrigerant tubing and compressor.
- Use a waterproof conduit for outdoor unit wiring to avoid damaging the wire and to prevent accumulation of liquid inside the unit.



4. Installation Instructions

4-1. Selecting the Installation Site for Outdoor Unit

AVOID:

- heat sources, exhaust fans, etc.
- damp, humid or uneven locations
- indoors (no-ventilation location)

DO:

- choose a place as cool as possible.
- choose a place that is well ventilated.
- allow enough room around the unit for air intake/ exhaust and possible maintenance.

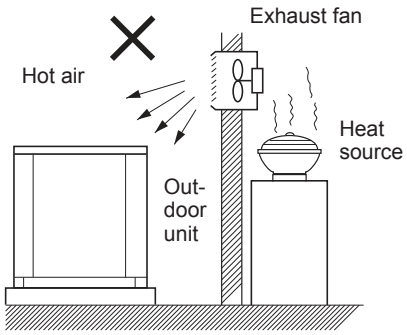
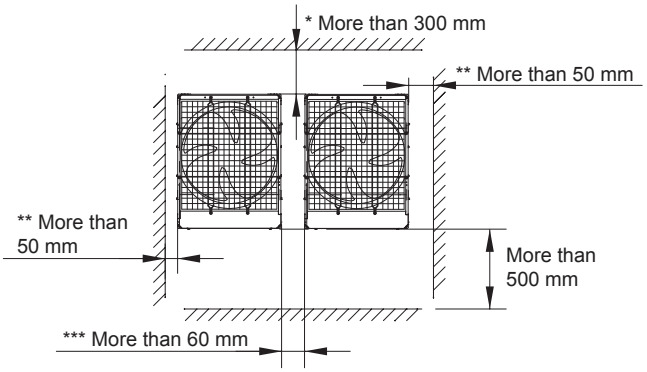


Fig. 2-4-1

Installation Space

Install the outdoor unit where there is enough space for ventilation. Otherwise the unit may not operate properly. Fig. 2-4-2 shows the minimum space requirement around the outdoor units when 3 sides are open and only 1 side is shuttered, with open space above the unit. The mounting base should be concrete or a similar material that allows for adequate drainage. Make provisions for anchor bolts, platform height, and other site-specific installation requirements.

Example of installation of 2 units
(when 3 sides are open and only 1 side is shuttered)



* Make a walk-in space behind the unit to erase maintenance and servicing.

** When setting the anchor bolt to position “B” or “C” (See Fig. 2-4-3), make the space between the unit and the wall more than 250 mm for installation operation.

*** When setting the anchor bolt to position “B” or “C” (See Fig. 2-4-3), make the space between the outdoor units more than 180 mm for installation operation.

Fig. 2-4-2

CAUTION

- **Leave space open above the unit.**
- **Construct louvers or other openings in the wall, if necessary, to ensure adequate ventilation.**

NOTE

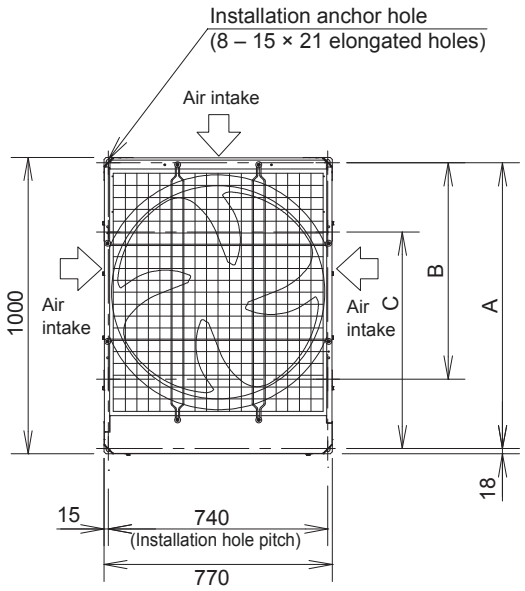
- Do not do any wiring or tubing within 30 cm of the front panel, because this space is needed as a servicing space for the compressor.
- Ensure a base height of 100 mm or more to ensure that drainage water does not accumulate and freeze around the bottom of the unit.
- If installing a drain pan, install the drain pan prior to installing the outdoor unit.

* Make sure there is at least 150 mm between the outdoor unit and the ground.
Also, the direction of the tubing and electrical wiring should be from the front of the outdoor unit.

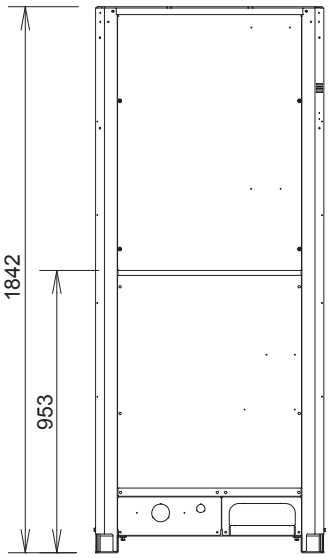
4. Installation Instructions

Unit: mm

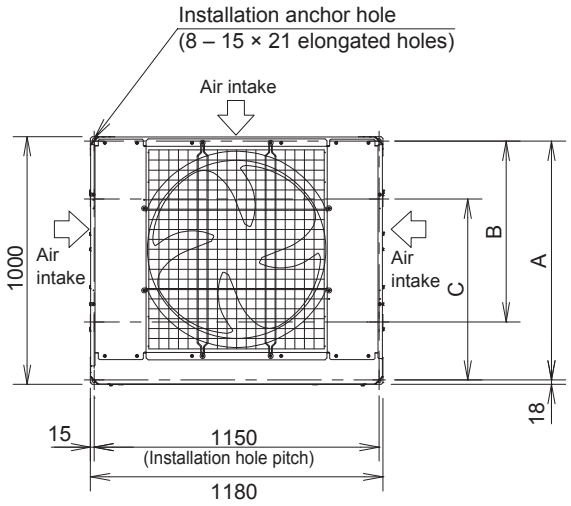
Top view



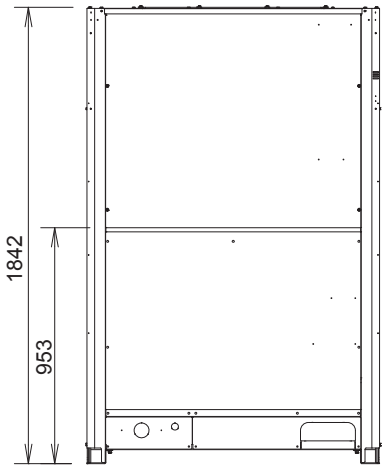
Front view



Top view



Front view



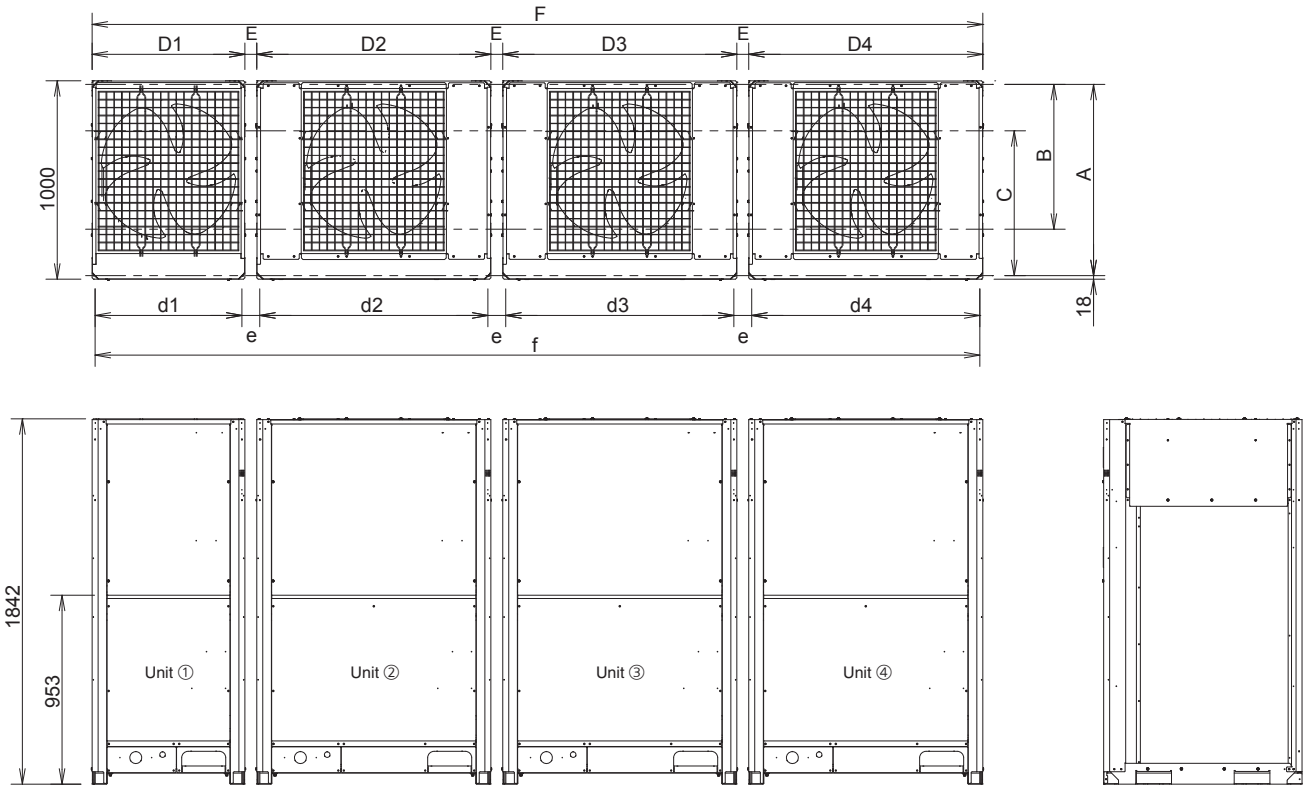
* According to the installation site, you may choose the setting position in the depth direction of the anchor bolt from “A”, “B” or “C”.
A : 964 (Installation hole pitch) * For removing tube forward
B : 730 (Installation hole pitch) * For removing the tube downward
C : 730 (Installation hole pitch)

Fig. 2-4-3

4. Installation Instructions

Combination with various type of outdoor units

Unit: mm



Capacity	Combination				Dimensions of single unit				Distance between units		Dimensions of combination unit		Dimensions of single unit installation hole				Distance between unit installation hole		Dimensions of combination unit installation hole	
	①	②	③	④	D1	D2	D3	D4	E(*1)	E(*2)	F(*1)	F(*2)	d1	d2	d3	d4	e(*1)	e(*2)	f(*1)	f(*2)
8HP	8	—	—	—	770	—	—	—	—	—	770	770	740	—	—	—	—	—	740	740
10HP	10	—	—	—	770	—	—	—	—	—	770	770	740	—	—	—	—	—	740	740
12HP	12	—	—	—	1180	—	—	—	—	—	1180	1180	1150	—	—	—	—	—	1150	1150
14HP	14	—	—	—	1180	—	—	—	—	—	1180	1180	1150	—	—	—	—	—	1150	1150
16HP	16	—	—	—	1180	—	—	—	—	—	1180	1180	1150	—	—	—	—	—	1150	1150
18HP	8	10	—	—	770	770	—	—	60	180	1600	1720	740	740	—	—	90	210	1570	1690
20HP	10	10	—	—	770	770	—	—	60	180	1600	1720	740	740	—	—	90	210	1570	1690
22HP	10	12	—	—	770	1180	—	—	60	180	2010	2130	740	1150	—	—	90	210	1980	2100
24HP	12	12	—	—	1180	1180	—	—	60	180	2420	2540	1150	1150	—	—	90	210	2390	2510
26HP	10	16	—	—	770	1180	—	—	60	180	2010	2130	740	1150	—	—	90	210	1980	2100
28HP	12	16	—	—	1180	1180	—	—	60	180	2420	2540	1150	1150	—	—	90	210	2390	2510
30HP	14	16	—	—	1180	1180	—	—	60	180	2420	2540	1150	1150	—	—	90	210	2390	2510
32HP	16	16	—	—	1180	1180	—	—	60	180	2420	2540	1150	1150	—	—	90	210	2390	2510
34HP	10	12	12	—	770	1180	1180	—	60	180	3250	3490	740	1150	1150	—	90	210	3220	3460
36HP	12	12	12	—	1180	1180	1180	—	60	180	3660	3900	1150	1150	1150	—	90	210	3630	3870
38HP	10	12	16	—	770	1180	1180	—	60	180	3250	3490	740	1150	1150	—	90	210	3220	3460
40HP	12	12	16	—	1180	1180	1180	—	60	180	3660	3900	1150	1150	1150	—	90	210	3630	3870
42HP	10	16	16	—	770	1180	1180	—	60	180	3250	3490	740	1150	1150	—	90	210	3220	3460
44HP	12	16	16	—	1180	1180	1180	—	60	180	3660	3900	1150	1150	1150	—	90	210	3630	3870
46HP	14	16	16	—	1180	1180	1180	—	60	180	3660	3900	1150	1150	1150	—	90	210	3630	3870
48HP	16	16	16	—	1180	1180	1180	—	60	180	3660	3900	1150	1150	1150	—	90	210	3630	3870
50HP	10	12	12	16	770	1180	1180	1180	60	180	4490	4850	740	1150	1150	1150	90	210	4460	4820
52HP	12	12	12	16	1180	1180	1180	1180	60	180	4900	5260	1150	1150	1150	1150	90	210	4870	5230
54HP	10	12	16	16	770	1180	1180	1180	60	180	4490	4850	740	1150	1150	1150	90	210	4460	4820
56HP	12	12	16	16	1180	1180	1180	1180	60	180	4900	5260	1150	1150	1150	1150	90	210	4870	5230
58HP	10	16	16	16	770	1180	1180	1180	60	180	4490	4850	740	1150	1150	1150	90	210	4460	4820
60HP	12	16	16	16	1180	1180	1180	1180	60	180	4900	5260	1150	1150	1150	1150	90	210	4870	5230
62HP	14	16	16	16	1180	1180	1180	1180	60	180	4900	5260	1150	1150	1150	1150	90	210	4870	5230
64HP	16	16	16	16	1180	1180	1180	1180	60	180	4900	5260	1150	1150	1150	1150	90	210	4870	5230

According to the installation site, you may choose the setting position in the depth direction of the anchor bolt from A, B or C.
A: 964: (Installation hole pitch) : For removing tube forward. Use the data with the asterisk (*1) in combination of each unit dimension.
B: 730: (Installation hole pitch) : For removing tube downward. Use the data with the asterisk (*2) in combination of each unit dimension.
C: 730: (Installation hole pitch) : Use the data with the asterisk (*2) in combination of each unit dimension.

4. Installation Instructions

4-2. Installation Standards for Outdoor Unit

■ Installation Standards for Collected Installation of Upward Discharge-Type Outdoor Units

More recently, there has been a tendency to install the collected outdoor units on the roof of the buildings.
In order to match the outdoor units with the exterior appearance, in most cases, customers like to install a noise barrier wall consisting of acoustic louvers around the outdoor units.
If the outdoor units are forcedly installed in a narrow space, it may happen that the normal operation cannot be performed later, because the outdoor units need free space around them to allow fresh air to come back in.
When installing the upward discharge-type collected outdoor units, be sure to follow the standards described below.

* For the installation with the snow duct, the standard described here does not apply. Consult a local dealer in those cases because the installation method becomes different depending on the installation condition.

> The standards described here applies when there are walls, buildings and surroundings within 6m away from the outdoor units.

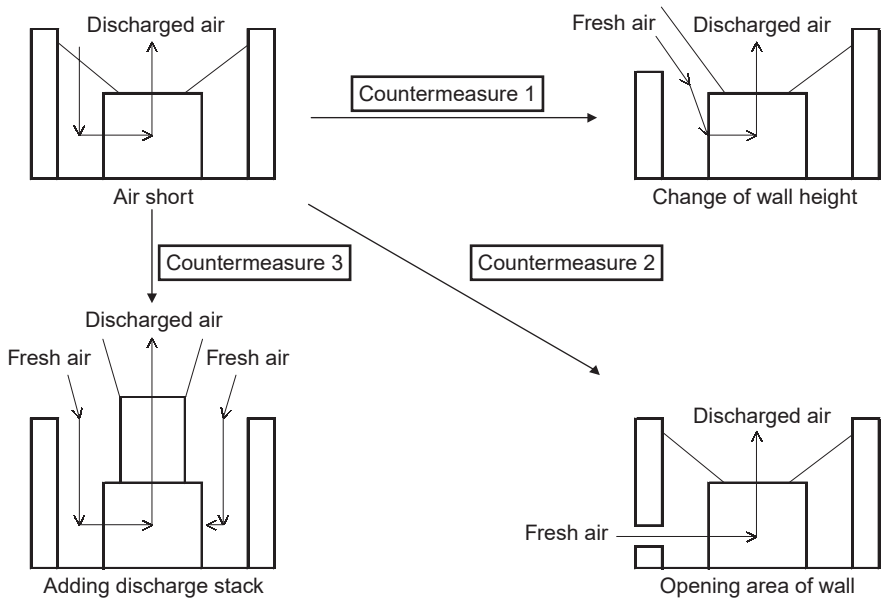
● When installing, it is necessary to confirm the following two points.

1. Keep open space to allow fresh air airflow around the collected installation of outdoor units.
2. Keep open space between the line of outdoor units and keep distance between each outdoor unit.
   If you do not allow enough space and distance between units, the following trouble will occur because the passage for fresh air is reduced even if space around collected installation is kept large enough.

(A) In case that the suction airflow and discharge airflow are separated well like by using discharge stack, etc.:
Air-short cycling is avoided in this case, but the air volume is reduced because of increased the suction airflow speed due to narrow passage and the external static pressure is increased.

(B) In case that the suction airflow and discharge airflow are not separated well:
Narrow passage of air cause higher air speed and negative pressure on suction air side which cause discharged air to return to suction side of the outdoor units. (Air-short cycling.)

Bad example: Air short



4. Installation Instructions

4-2-1. Calculating Method of Collecting Installation Dimensions

Determine the number of outdoor units per one block (block of collected outdoor units)
↓
Check the length per one block (Lb)
↓
Determine the distance between the blocks of outdoor units within the same line of outdoor units (La)
↓
Determine the distance between the lines of outdoor units (outdoor block) (Luu)
↓
Determine the distance between each surface of the wall and outdoor units (Lw)
↓
Determine provisional installation dimension of outdoor units (Lm, Ln)
↓
Calculate the necessary suction area of outdoor units (Sr)
↓
Calculate the intake airflow area from surrounding against outdoor units (S)
↓
Judge the suction area
↓
Check for rate of performance in capacity

In case the judgement condition is not satisfied: → Judge the suction area

Dimensions when collecting and installing collected outdoor units

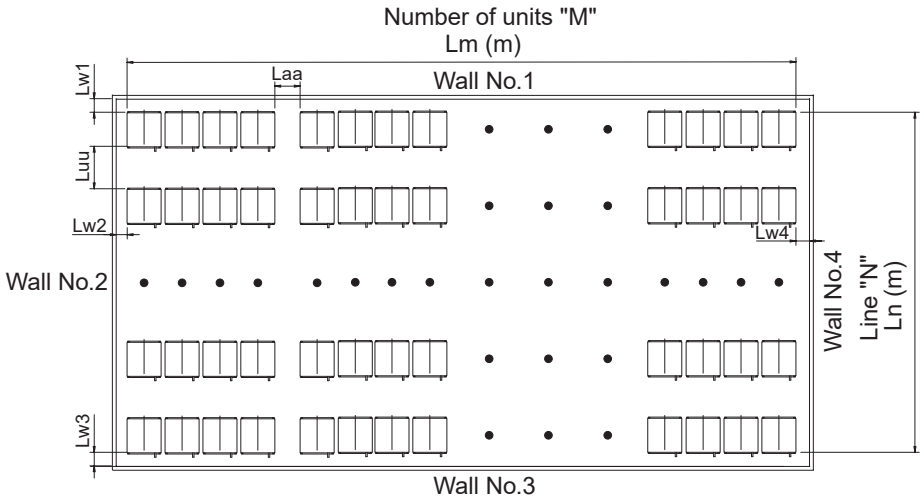


Fig. 2-4-4

4-2-2. Distance Between Outdoor Units and Between Lines of Outdoor Units

If outdoor units are closely installed, the discharged air returns to suction side, causing abnormally high temperature and pressure which could lead to equipment damage and personally injury, which is called "air-short cycling".
In this section we confirm the distance between the outdoor units and distance between the lines of outdoor units.

1. Length of the line of outdoor units (Lm) and distance between blocks of outdoor units

   A block of outdoor units: A block of outdoor units are group of outdoor units installed together in line with minimum distance to each other. Arrange the outdoor units with less than 4 units per one block and less than 64 HP.

   Distance between a block of outdoor units (Laa): Install them with reference to Table 2-4-1.

   Distance between outdoor units within a block: Over 60mm of distance between top panels
   Over 180mm of distance between anchor bolts

   Criteria of length of line (Lm): See the dimensions in Table 2-4-2.

   $Lm = Lb \times N + Laa \times (N-1)$

   Lb : Length of block
   N : Number of blocks of outdoor units
   This formula is made assuming the Laa is equally allocated.

4. Installation Instructions

Installation dimension of outdoor unit (Distance between blocks)

* The length of block (Lb) is calculated by minimum 60mm of the distance between the outdoor units (distance between top panels).

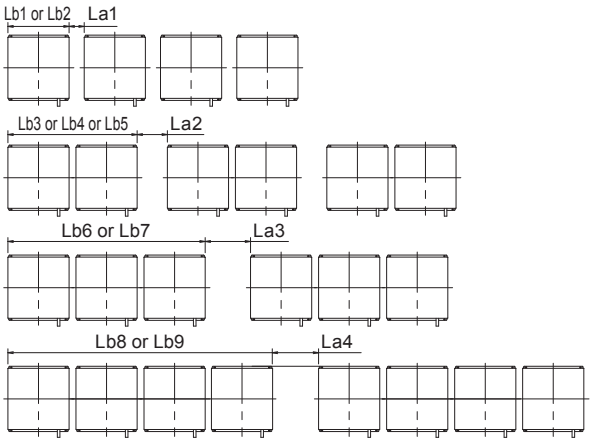


Fig. 2-4-5

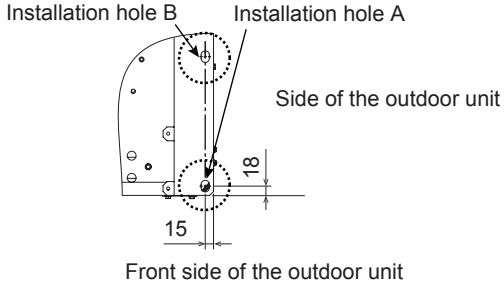
Table 2-4-1 Minimum distance between blocks of outdoor units

Number of outdoor units per one block	Distance between blocks (Laa)
Single installation (La1)	Over 220mm
2 units installation (La2)	Over 440mm
3 units installation (La3)	Over 660mm
4 units installation (La4)	Over 660mm

* This is the minimum value in consideration of collected installation. Whereby, determine the values in consideration of electrical and refrigerant piping works and other necessary spaces.

Table 2-4-2 Minimum distance per one block

Capacity	Combination				Number of units	Minimum distance per one block (mm)			
						In case the installation hole A is used		In case the installation hole B is used In case the snow duct is used	
						Distance between top panels	(Distance between anchor bolts)	Distance between top panels	(Distance between anchor bolts)
8HP	8	-	-	-	1 unit installation	(Lb1) 770	740	(Lb1) 770	740
10HP	10	-	-	-	1 unit installation	(Lb1) 770	740	(Lb1) 770	740
12HP	12	-	-	-	1 unit installation	(Lb2) 1180	1150	(Lb2) 1180	1150
14HP	14	-	-	-	1 unit installation	(Lb2) 1180	1150	(Lb2) 1180	1150
16HP	16	-	-	-	1 unit installation	(Lb2) 1180	1150	(Lb2) 1180	1150
18HP	8	10	-	-	2 units installation	(Lb3) 1600	1570	(Lb3) 1720	1690
20HP	10	10	-	-	2 units installation	(Lb3) 1600	1570	(Lb3) 1720	1690
22HP	10	12	-	-	2 units installation	(Lb4) 2010	1980	(Lb4) 2130	2100
24HP	12	12	-	-	2 units installation	(Lb5) 2420	2390	(Lb5) 2540	2510
26HP	10	16	-	-	2 units installation	(Lb4) 2010	1980	(Lb4) 2130	2100
28HP	12	16	-	-	2 units installation	(Lb5) 2420	2390	(Lb5) 2540	2510
30HP	14	16	-	-	2 units installation	(Lb5) 2420	2390	(Lb5) 2540	2510
32HP	16	16	-	-	2 units installation	(Lb5) 2420	2390	(Lb5) 2540	2510
34HP	10	12	12	-	3 units installation	(Lb6) 3250	3220	(Lb6) 3490	3460
36HP	12	12	12	-	3 units installation	(Lb7) 3660	3630	(Lb7) 3900	3870
38HP	10	12	16	-	3 units installation	(Lb6) 3250	3220	(Lb6) 3490	3460
40HP	12	12	16	-	3 units installation	(Lb7) 3660	3630	(Lb7) 3900	3870
42HP	10	16	16	-	3 units installation	(Lb6) 3250	3220	(Lb6) 3490	3460
44HP	12	16	16	-	3 units installation	(Lb7) 3660	3630	(Lb7) 3900	3870
46HP	14	16	16	-	3 units installation	(Lb7) 3660	3630	(Lb7) 3900	3870
48HP	16	16	16	-	3 units installation	(Lb7) 3660	3630	(Lb7) 3900	3870
50HP	10	12	12	16	4 units installation	(Lb8) 4490	4460	(Lb8) 4850	4820
52HP	12	12	12	16	4 units installation	(Lb9) 4900	4870	(Lb9) 5260	5230
54HP	10	12	16	16	4 units installation	(Lb8) 4490	4460	(Lb8) 4850	4820
56HP	12	12	16	16	4 units installation	(Lb9) 4900	4870	(Lb9) 5260	5230
58HP	10	16	16	16	4 units installation	(Lb8) 4490	4460	(Lb8) 4850	4820
60HP	12	16	16	16	4 units installation	(Lb9) 4900	4870	(Lb9) 5260	5230
62HP	14	16	16	16	4 units installation	(Lb9) 4900	4870	(Lb9) 5260	5230
64HP	16	16	16	16	4 units installation	(Lb9) 4900	4870	(Lb9) 5260	5230



unit : mm

4. Installation Instructions

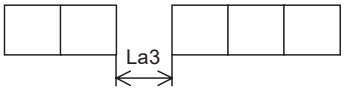
If the number of units are different between each blocks of outdoor units, determine La in the following steps.

Check if the number of units on the blocks on the right and left of the gap La is equal or not.

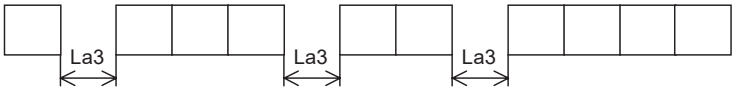
- Equal → Determine the Laa in Fig. 2-4-5 and Table 2-4-1.
- Not equal → Determine the Laa using larger number of units from right or left block

- When not equally divided

Example 1:



Example 2:



2

2. Distance between the lines of outdoor units

Find the maximum horsepower of a line of outdoor units (HP/line) from all the lines. Using this maximum horsepower (HP/line), find the necessary distance between the lines (Luu) derived from the applicable Figure No. in Table 2-4-3.

* If the front side (servicing area) of the outdoor units is facing each other and the distance between the lines (Luu) derived from the applied Figure No. in Table 2-4-3 is less than 1m, keep larger than the distance of 1m.
  Also, if the distance between the lines (Luu) exceeds 1m, keep larger distance between the lines (Luu) derived from the applicable Figure No. in Table 2-4-3.
* Every distance in tables shows a minimum one. Selecting larger distance than tables is required.

Installation method of outdoor unit (Distance between the lines)

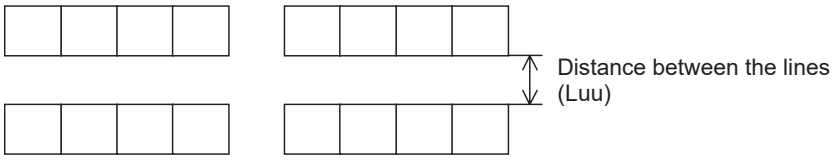


Fig. 2-4-6

Table 2-4-3 Reference figure No. of distance between the lines

Installation condition	Number of lines for installation	Figure No.
1. In the case that the airflow cannnot pass under the outdoor unit (Concrete foundation, etc.)	2 lines, 3 lines, 4 lines	Fig. 2-4-7
	Over 5 lines	Fig. 2-4-8
2. In the case that the airflow can pass under the outdoor unit (Catwalk installation, etc.)		Fig. 2-4-9

Select the necessary distance between the lines (Luu) in Fig. 2-4-7, Fig. 2-4-8, Fig. 2-4-9 and then calculate the installation dimensions (Ln) of the outdoor unit in the following formula.

Dimensions of outdoor unit

N : Number of lines for outdoor units

$Ln = LD \times N + Luu \times (N-1)$

LD = 1m

Ln is prepared when the Luu is considered as in the case of equally divided.

4. Installation Instructions

2 lines, 3 lines, 4 lines : Concrete foundation (Minimum distance between the lines requires 0.5m as open space for service clearance.)

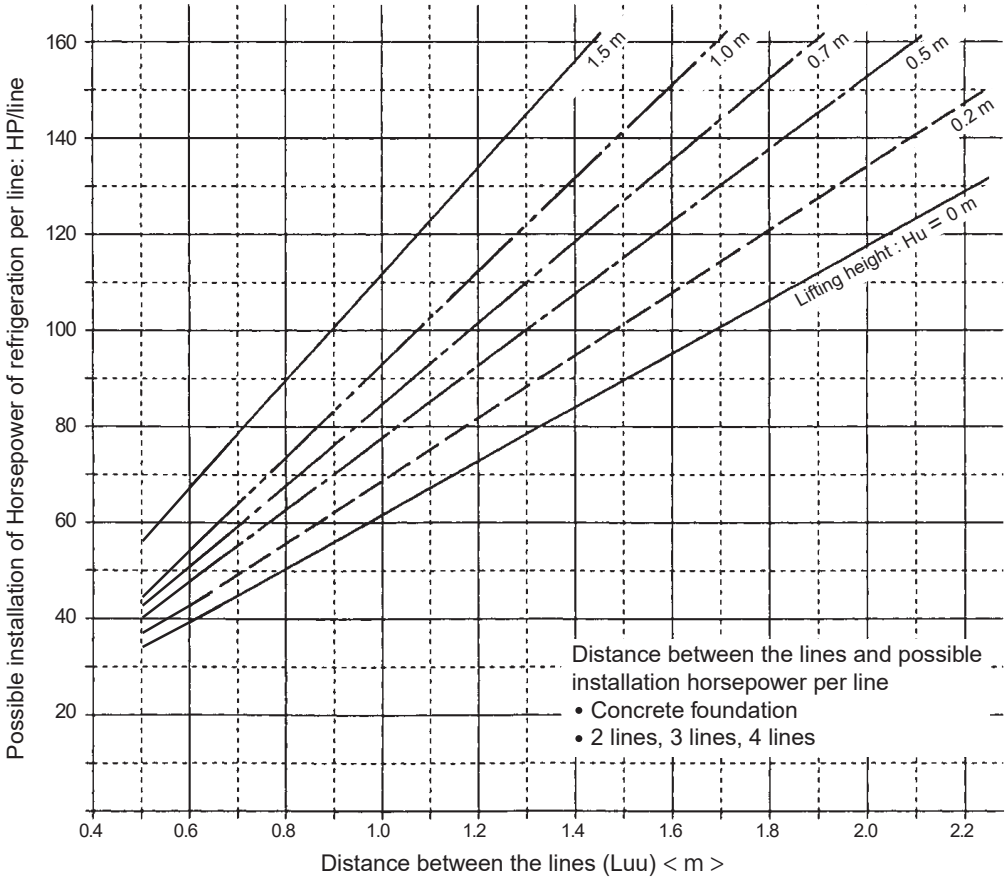


Fig. 2-4-7

Over 5 lines : Concrete foundation (Distance between the lines as open space for service clearance needs minimum 0.5m.)

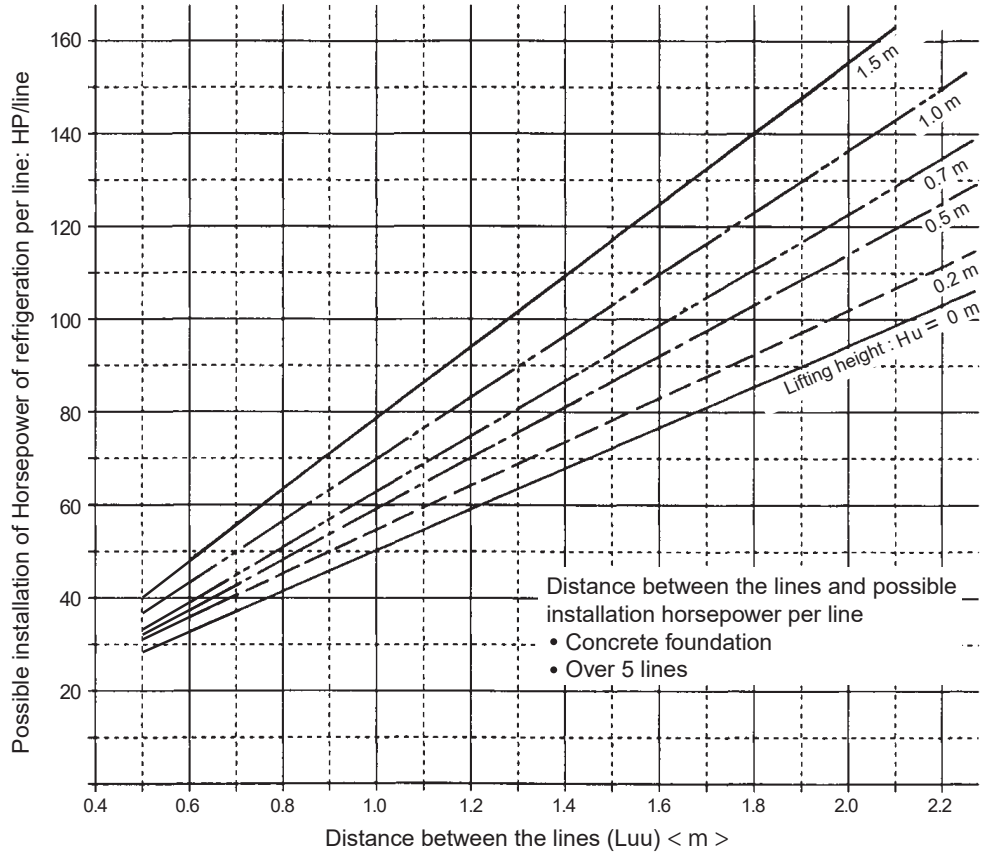


Fig. 2-4-8

Catwalk installation (Minimum distance between the lines requires 0.5m as open space for service clearance.)

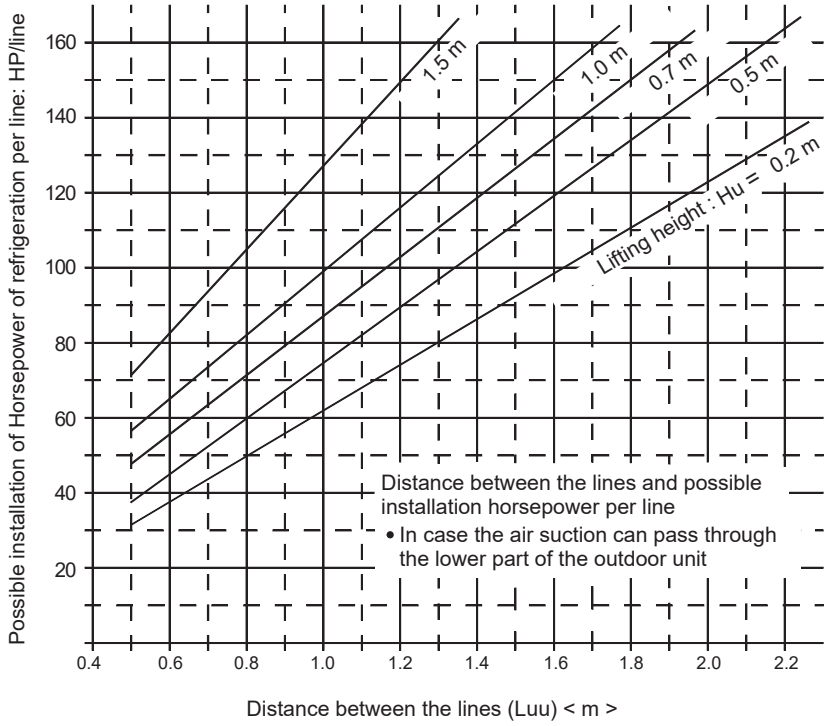


Fig. 2-4-9

4-2-3. Considering Airflow With Collected Outdoor Units

Based on the assumption that the collected outdoor units are installed keeping distance requirements of section 4-1-2 and 4-1-3, the necessary area of fresh air intake is considered in this section

1. Consideration Procedure

Calculation of necessary air intake area
↓
Calculation of airflow area
↓
Calculation of effective suction area
↓
Judgement of suction area

* If the suction area is not sufficient, please take countermeasure like lowering the wall height, enlarging the opening area of the wall or installing discharge stacks, etc.

2. Calculation of necessary suction area

With the total horsepower (PSt) of the collected outdoor units, find the necessary airflow area (Sr) from the surroundings.

Failure points when the necessary suction area is not sufficient

- When both suction and discharge sides are blocked:

  Air volume decreases due to the increase of the external static pressure by the increase of suction speed.

  When both suction and discharge sides are not blocked:

  Suction speed seldom increases and there is reintake of discharged air and air short occurs.

Sr = PSt / 2 Sr : Necessary air intake area (m²)

PSt : Total refrigerant horsepower of outdoor units (HP)

Sr (m²) : Minimum necessary air intake area

4. Installation Instructions

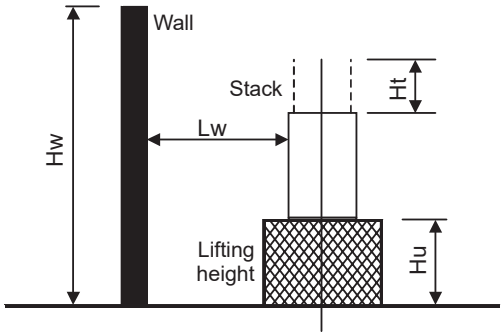


Fig. 2-4-10

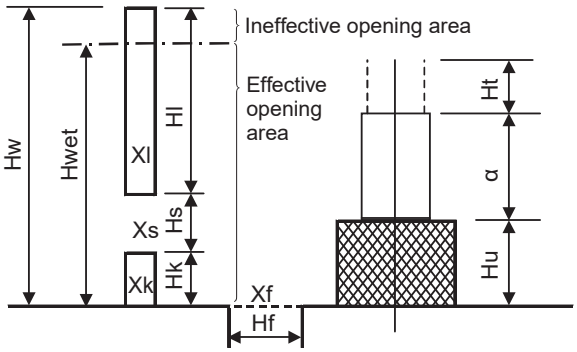


Fig. 2-4-11

H_ : Width (m)
X_ : Opening ratio (%)
α : Height from the bottom of the outdoor unit to the surface of the heat exchanger (m)

3. Effective suction area from the surroundings (Effective suction area: Calculating S)

In this section we calculate the effective suction area from the surroundings in consideration of the obstacles entering into the air intake of the outdoor unit and louver wall around the group of collected outdoor units.

When determining the distance between the group of outdoor units and walls, provisionally assume an expected value of distance to the wall, Lw, and calculate repeately until the necessary air intake area can be obtained.

Step 1

Calculate the suction height (Ha) in the following formula.

Air intake height : Ha = Hu + α + 1.5 × Ht + Lw

Hu : Lifting height (m)

Ht : Stack height (m)

Lw : Distance to the wall (m)

α : Outdoor unit height (m) (= 1.9 m)

Step 2

Calculate the effective suction dimension (Hwet) in the following formula.

Find the dimensions of each part (Fig. 2-4-11).

A) Air that passes through the wall

Hw ≥ Ha : Hwet = (Ha - Hw + Hl) × Xl + Hs × Xs + Hk × Xk + Hf × Xf

Hw < Ha : Hwet = (Ha - Hw) + Hl × Xl + Hs × Xs + Hk × Xk + Hf × Xf

Hw : Actual wall height (m)

Hl : Wall of opening ratio (Xl) : Values derived from the formula (Hw - (Hs + Hk)

Hs : Opening area of opening ratio (Xs)

Hk : Wall of opening ratio (Xk) (foundation part)

Hf : Dimension of floor opening area of opening ratio (Xf)

B) Air that does not pass through the wall

Hw ≥ Ha : Hwet = Hwe = 0

Hw < Ha : Calculate the projected wall height (Hb).

Hb = Hw - Hu - 1.5 × Ht

From the point at the intersection of Hb with Lw in Fig. 2-4-12, read the effective suction height (Hwe).

Hwet = Hwe

4. Installation Instructions

Step 3

Calculate the effective suction length (Le).

If, Lw ≥ 6 m, Lwe = 6 m

If, Lw < 6 m, Lwe = Lw

Le1 = Lwe4 + Lm + Lwe2

Le2 = Lwe1 + Ln + Lwe3

Le3 = Le1

Le4 = Le2

Then, calculate the effective suction area from each wall surface.

S1 = Hwet1 × Le1

S2 = Hwet2 × Le2

S3 = Hwet3 × Le3

S4 = Hwet4 × Le4

St = S1 + S2 + S3 + S4

Step 4

Calculate the sum of effective suction area next to each other.

S12 = S1 + S2

S23 = S2 + S3

S34 = S3 + S4

S41 = S4 + S1

Step 5

<Judgement of suction area>

Regarding the suction area and minimum suction area, it is necessary to satisfy the following conditions No.1 and No.2.

1. Effective suction area (St) is larger than necessary suction area (Sr).
2. Minimum value of sum of two surface areas next to each other (S12, S23, S34, S41) must be over 25% of the (Sr). (Fig. 2-4-13, Fig. 2-4-14)

* If any of the suction area of S12 - S41 is zero, the installation is not good.

If the judgement conditions in Step 5 are satisfied, that is the end of the confirmation.

If the judgement conditions are not satisifed, modify the conditions like the stack height, lifting height, dimension of opening area and opening ratio, etc. and recalculate in the same way as described above.

4. Installation Instructions

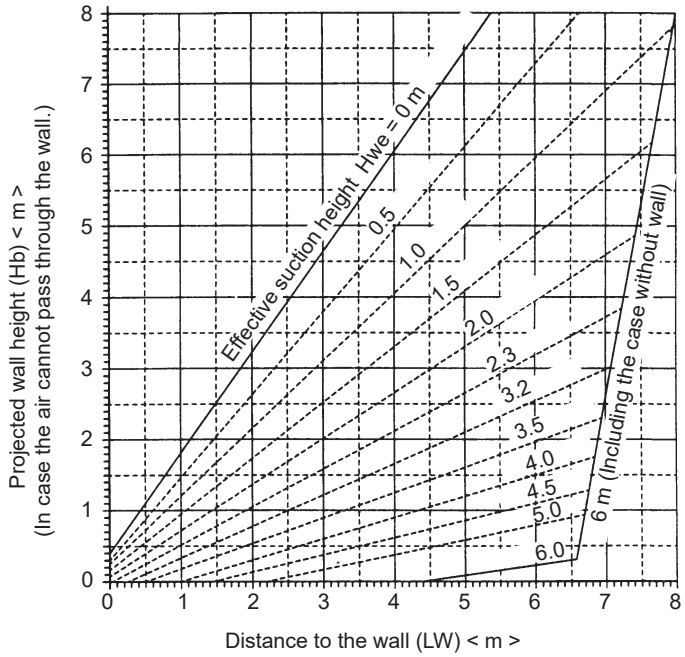


Fig. 2-4-12

In case that the sum of the effective suction area next to each other is zero, installation is not good.

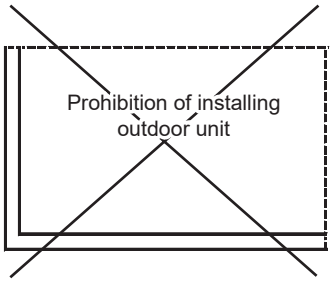


Fig. 2-4-13

Although the effective suction area is zero facing the walls each other, the installation is possible if one of the walls is over 25 % of necessary suction area.

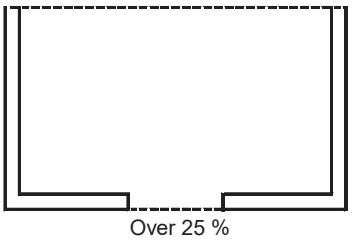


Fig. 2-4-14

4. Installation Instructions

<Example>

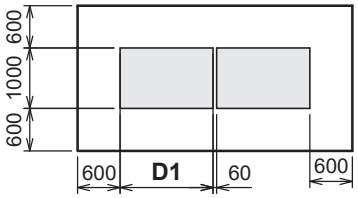
Install the outdoor unit with a sufficient space around the outdoor unit for operation and maintenance.

- Installation conditions: Enclosure wall height 1.8 m, effective aperture ratio of wall 50%, opening dimensions between outdoor units 60 mm.
  * If the installation conditions change, the required dimensions will change.
  * Please see pages 2-4-4 to 2-4-12 for details.
- Provide sufficient space when multiple units are installed in accordance with the requirements illustrated in the following diagrams.
- Please secure the passage to the front and the back.
- The figure shows a combination example of multiple units.

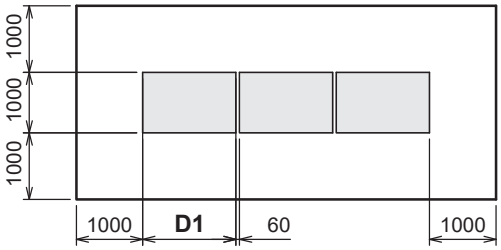
One row

Unit: mm

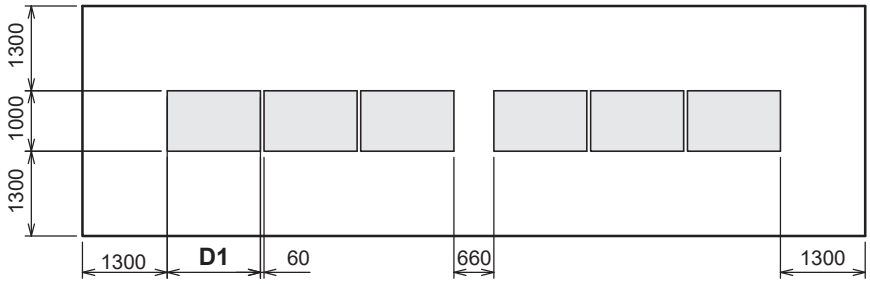
2-continuous installation



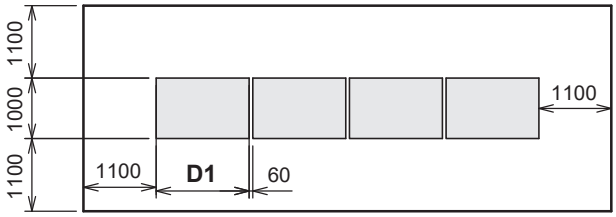
3-continuous installation



3-continuous installation × 2 lines

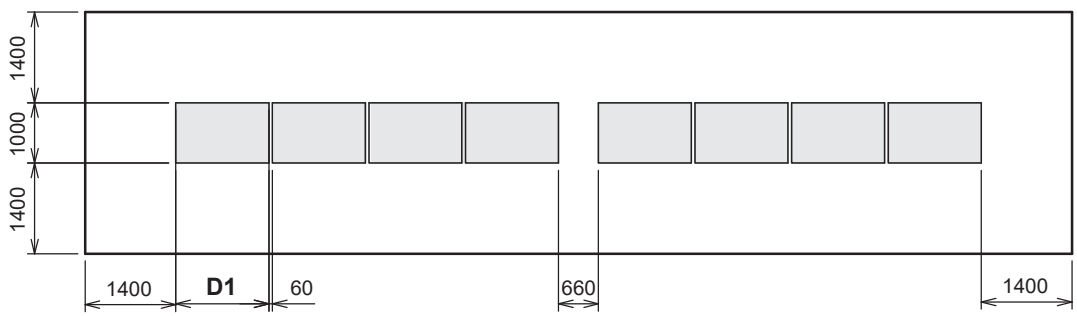


4-continuous installation



D1	8, 10HP	770 mm
	12, 14, 16HP	1180 mm

4-continuous installation × 2 lines

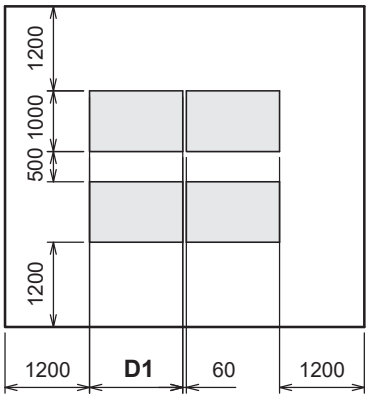


4. Installation Instructions

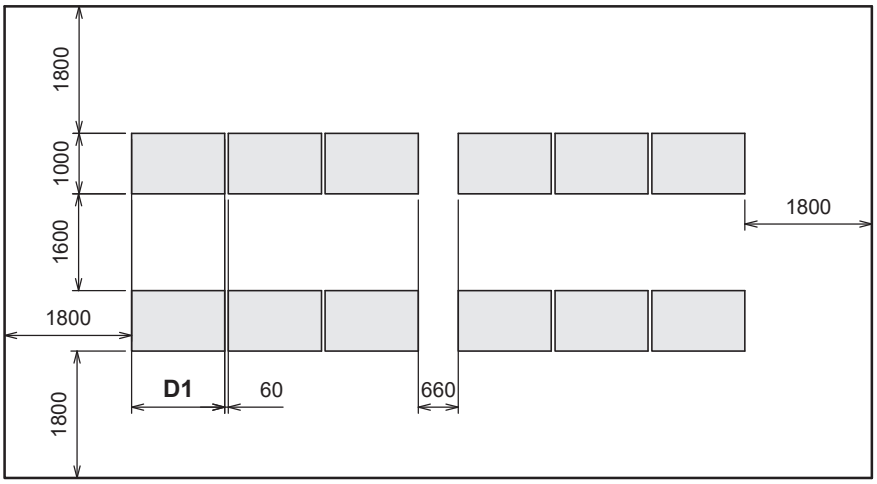
2 rows

Unit: mm

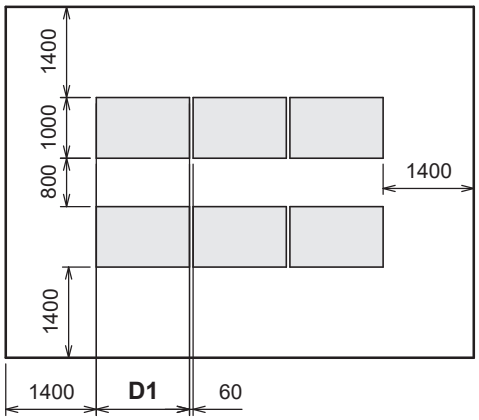
2-continuous installation × 2 rows



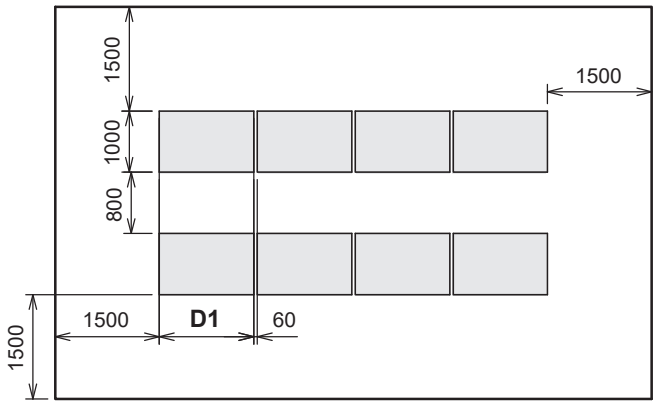
3-continuous installation × 2 lines × 2 rows



3-continuous installation × 2 rows

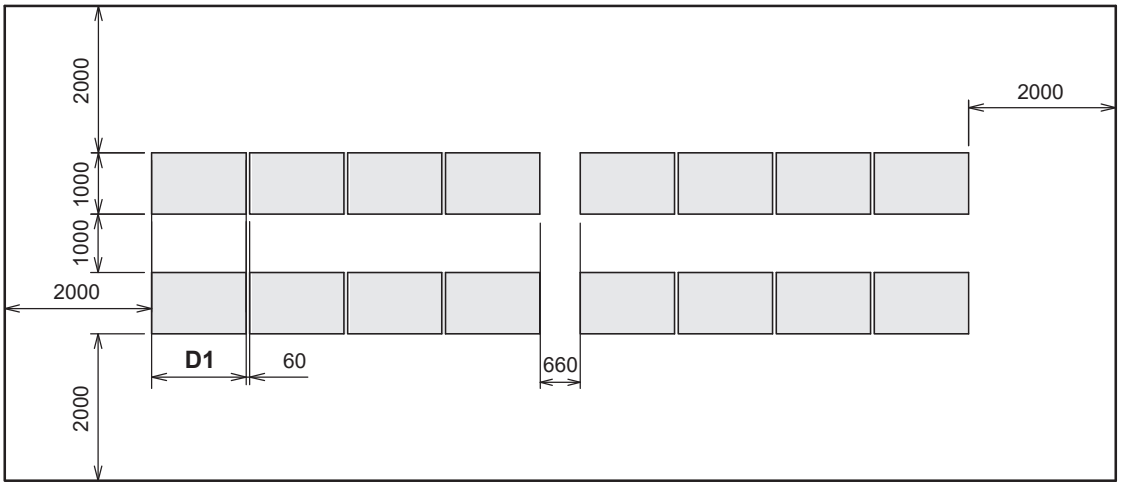


4-continuous installation × 2 rows



D1		
	8, 10HP	770 mm
	12, 14, 16HP	1180 mm

4-continuous installation × 2 lines × 2 rows

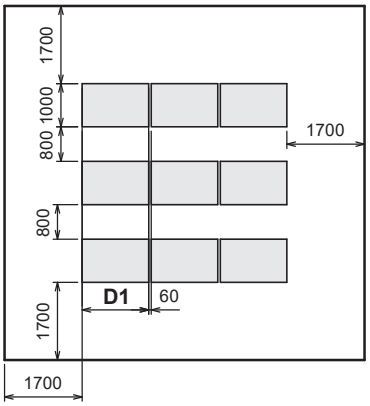


4. Installation Instructions

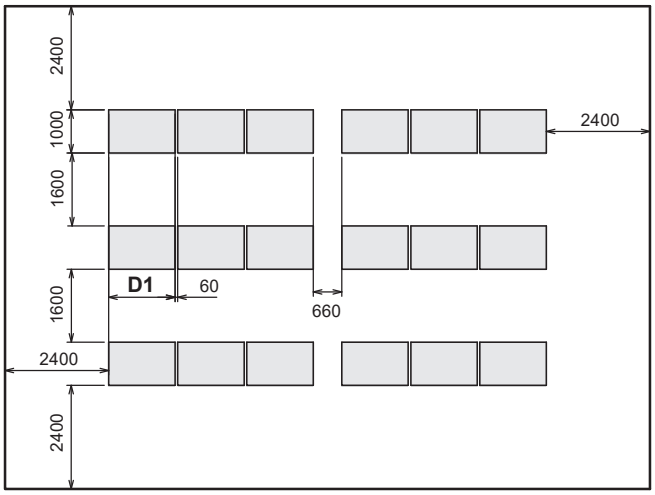
3 rows

Unit: mm

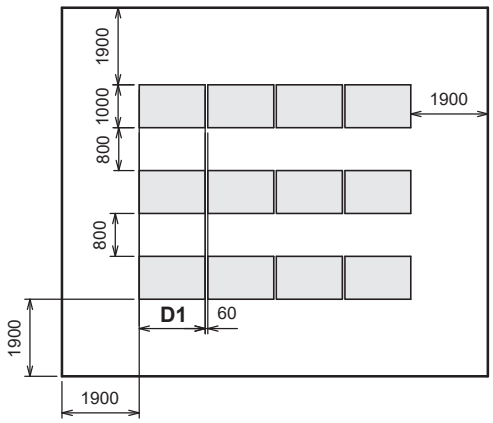
3-continuous installation × 3 rows



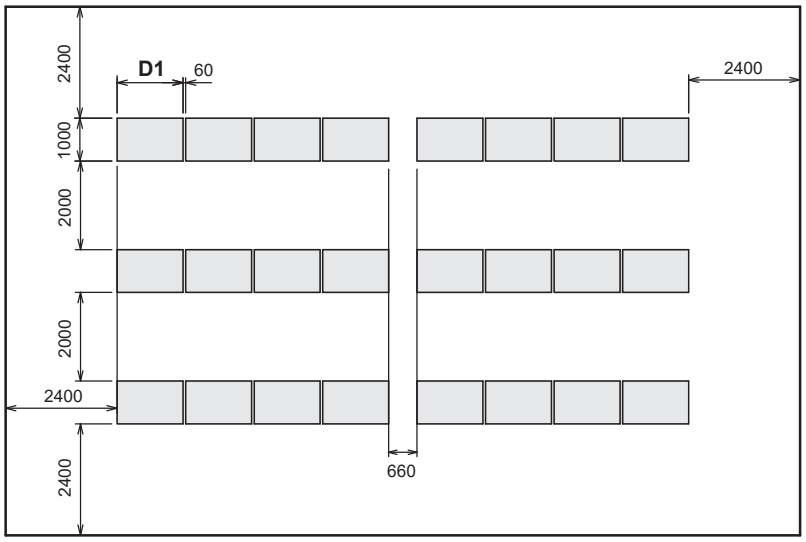
3-continuous installation × 2 lines × 3 rows



4-continuous installation × 3 rows



4-continuous installation × 2 lines × 3 rows



D1	8, 10HP	770 mm
	12, 14, 16HP	1180 mm

4. Installation Instructions

4-3. Shield for Horizontal Exhaust Discharge

It is necessary to install an air discharge chamber (field supply) to direct exhaust from the fan horizontally if it is difficult to provide a minimum space of 2 m between the air-discharge outlet and a nearby obstacle. (Fig. 2-4-15)

CAUTION **In regions with heavy snowfall, the outdoor unit should be provided with a solid, raised platform and snow-proof vents. (Fig. 2-4-16)**

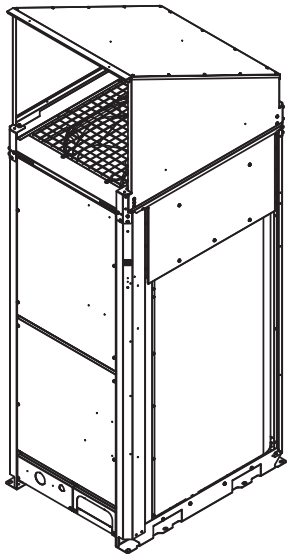


Fig. 2-4-15

4-4. Installing the Outdoor Unit in Heavy Snow Areas

In locations where wind-blown snow can be a problem, snow-proof vents should be fitted to the unit and direct exposure to the wind should be avoided as much as possible. (Fig. 2-4-17)
The following problems may occur if proper countermeasures are not taken:

- The fan in the outdoor unit may stop running, causing the unit to be damaged.
- There may be no air flow.
- The tubing may freeze and burst.
- The condenser pressure may drop because of strong wind, and the indoor unit may freeze.

4-5. Precautions When Installing in Heavy Snow Areas

a) The platform should be higher than the maximum snow depth. (Fig. 2-4-17)
b) The 2 anchoring feet of the outdoor unit should be used for the platform, and the platform should be installed beneath the air-intake side of the outdoor unit.
c) The platform foundation must be solid and the unit must be secured with anchor bolts.
d) When installing on a roof subject to strong wind, countermeasures must be taken to prevent the unit from being overturned.

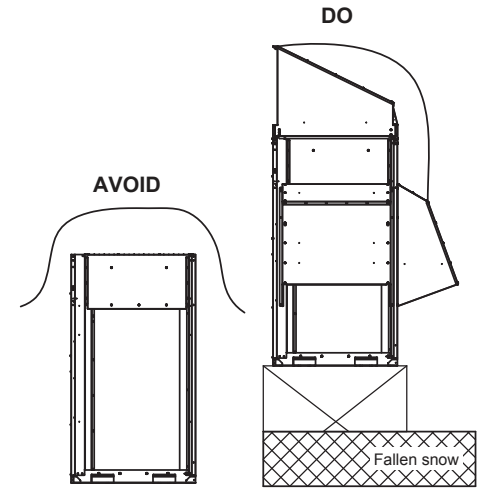


Fig. 2-4-16

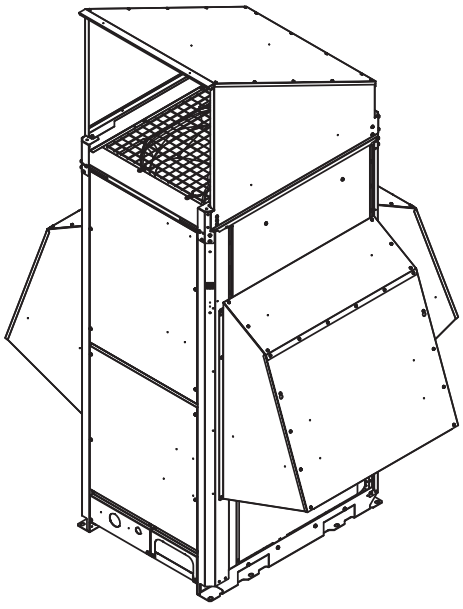


Fig. 2-4-17

4. Installation Instructions

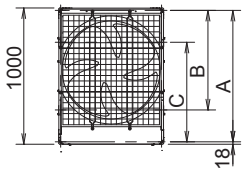
4-6. Dimensions of Wind Ducting

Reference diagram for air-discharge chamber (field supply)

Can be installed so that the air direction is to the front or rear direction.
According to the installation site, you may choose the setting position in the depth direction of the anchor bolt from “A”, “B” or “C”.
Regarding the field supply parts for the detail diagrams, see the section “8. Supplement” on page 2-8-1.

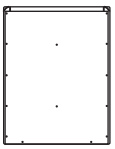
Model : U-8ME2E8, 10ME2E8

unit: mm

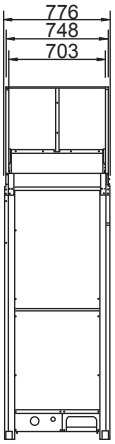


A : 964 (Installation hole pitch) * For removing tube forward
B : 730 (Installation hole pitch) * For removing the tube downward
C : 730 (Installation hole pitch)

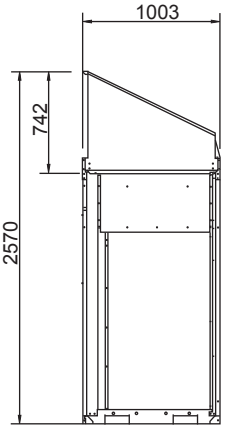
Air direction: Front direction



Top view

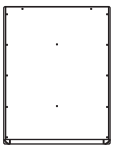


Front view

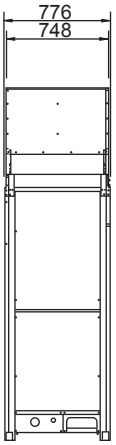


Right side view

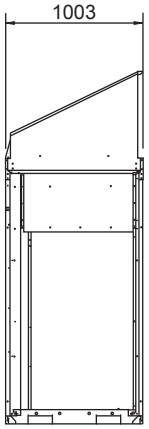
Air direction: Rear direction



Top view



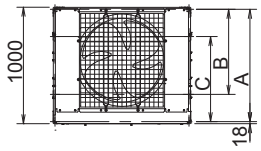
Front view



Right side view

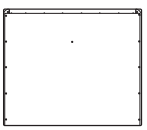
Model : U-12ME2E8, 14ME2E8, 16ME2E8

unit: mm

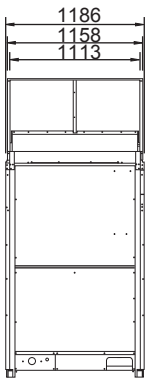


A : 964 (Installation hole pitch) * For removing tube forward
B : 730 (Installation hole pitch) * For removing the tube downward
C : 730 (Installation hole pitch)

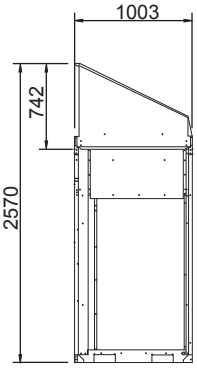
Air direction: Front direction



Top view

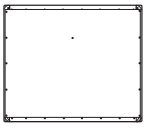


Front view

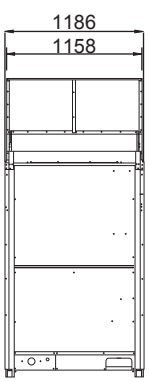


Right side view

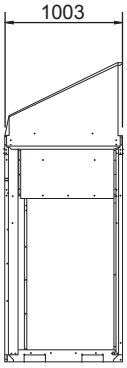
Air direction: Rear direction



Top view



Front view



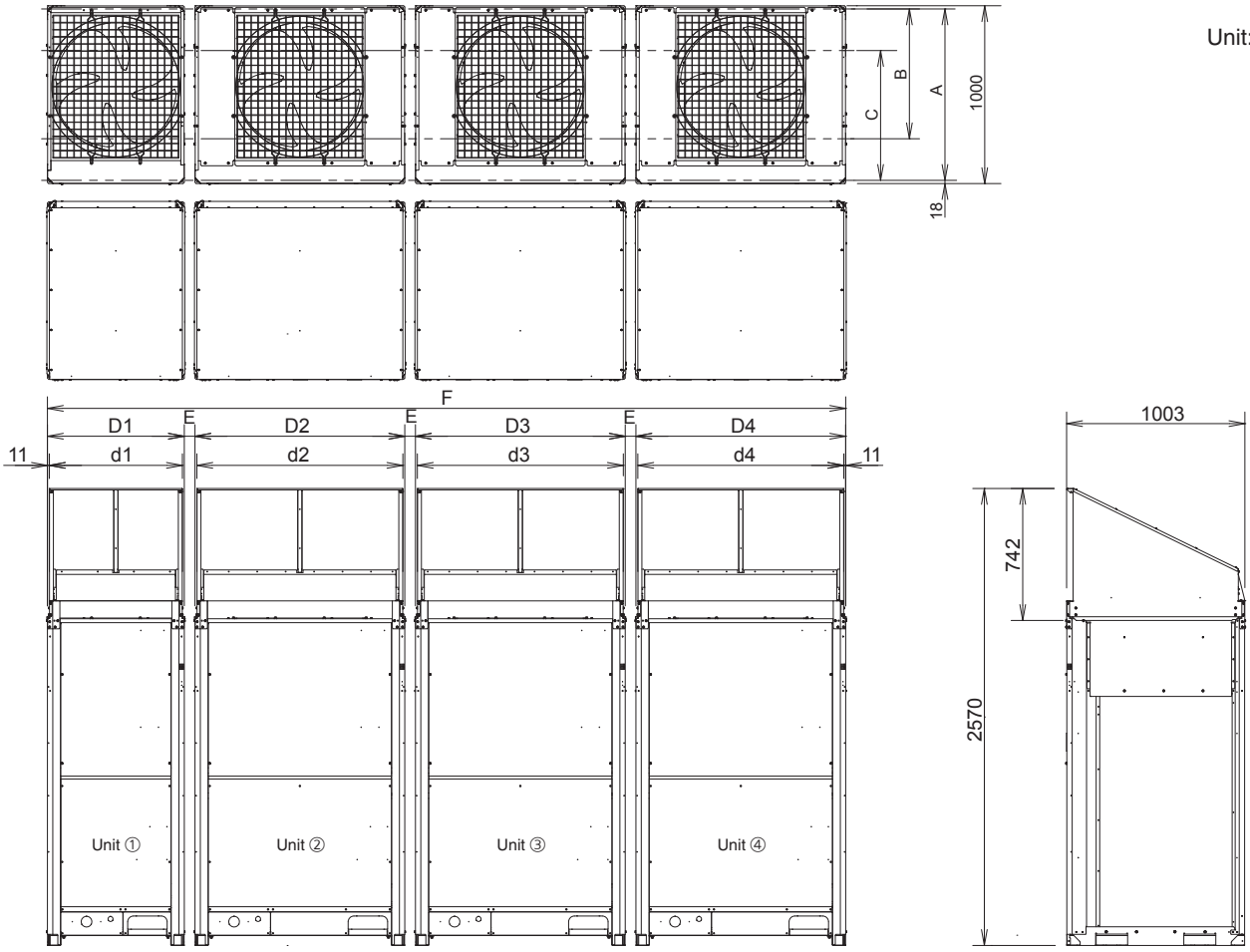
Right side view

4. Installation Instructions

Reference diagram for air-discharge chamber (field supply) (continued)

Can be installed so that the air direction is to the front or rear direction.
According to the installation site, you may choose the setting position in the depth direction of the anchor bolt from “A”, “B” or “C”.

Unit: mm



Capacity	Combination				Separate dimensions of air-discharge chamber								Distance between units		Dimensions of air-discharge chamber	
	①	②	③	④	D1	D2	D3	D4	d1	d2	d3	d4	E(*1)	E(*2)	F(*1)	F(*2)
8HP	8	—	—	—	770	—	—	—	748	—	—	—	—	—	770	770
10HP	10	—	—	—	770	—	—	—	748	—	—	—	—	—	770	770
12HP	12	—	—	—	1180	—	—	—	1158	—	—	—	—	—	1180	1180
14HP	14	—	—	—	1180	—	—	—	1158	—	—	—	—	—	1180	1180
16HP	16	—	—	—	1180	—	—	—	1158	—	—	—	—	—	1180	1180
18HP	8	10	—	—	770	770	—	—	748	748	—	—	60	180	1600	1720
20HP	10	10	—	—	770	770	—	—	748	748	—	—	60	180	1600	1720
22HP	10	12	—	—	770	1180	—	—	748	1158	—	—	60	180	2010	2130
24HP	12	12	—	—	1180	1180	—	—	1158	1158	—	—	60	180	2420	2540
26HP	10	16	—	—	770	1180	—	—	748	1158	—	—	60	180	2010	2130
28HP	12	16	—	—	1180	1180	—	—	1158	1158	—	—	60	180	2420	2540
30HP	14	16	—	—	1180	1180	—	—	1158	1158	—	—	60	180	2420	2540
32HP	16	16	—	—	1180	1180	—	—	1158	1158	—	—	60	180	2420	2540
34HP	10	12	12	—	770	1180	1180	—	748	1158	1158	—	60	180	3250	3490
36HP	12	12	12	—	1180	1180	1180	—	1158	1158	1158	—	60	180	3660	3900
38HP	10	12	16	—	770	1180	1180	—	748	1158	1158	—	60	180	3250	3490
40HP	12	12	16	—	1180	1180	1180	—	1158	1158	1158	—	60	180	3660	3900
42HP	10	16	16	—	770	1180	1180	—	748	1158	1158	—	60	180	3250	3490
44HP	12	16	16	—	1180	1180	1180	—	1158	1158	1158	—	60	180	3660	3900
46HP	14	16	16	—	1180	1180	1180	—	1158	1158	1158	—	60	180	3660	3900
48HP	16	16	16	—	1180	1180	1180	—	1158	1158	1158	—	60	180	3660	3900
50HP	10	12	12	16	770	1180	1180	1180	748	1158	1158	1158	60	180	4490	4850
52HP	12	12	12	16	1180	1180	1180	1180	1158	1158	1158	1158	60	180	4900	5260
54HP	10	12	16	16	770	1180	1180	1180	748	1158	1158	1158	60	180	4490	4850
56HP	12	12	16	16	1180	1180	1180	1180	1158	1158	1158	1158	60	180	4900	5260
58HP	10	16	16	16	770	1180	1180	1180	748	1158	1158	1158	60	180	4490	4850
60HP	12	16	16	16	1180	1180	1180	1180	1158	1158	1158	1158	60	180	4900	5260
62HP	14	16	16	16	1180	1180	1180	1180	1158	1158	1158	1158	60	180	4900	5260
64HP	16	16	16	16	1180	1180	1180	1180	1158	1158	1158	1158	60	180	4900	5260

The air-discharge chamber will be obtained at a local field. According to the installation site, you may choose the setting position in the depth direction of the anchor bolt from A, B or C.
A: 964 (Installation hole pitch) : For removing tube forward. Use the data with the asterisk (*1) in combination of each unit dimension.
B: 730 (Installation hole pitch) : For removing tube downward. Use the data with the asterisk (*2) in combination of each unit dimension.
C: 730 (Installation hole pitch) : Use the data with the asterisk (*2) in combination of each unit dimension.

4. Installation Instructions

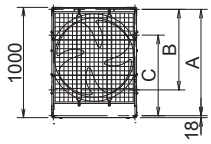
4-7. Dimensions of Snow Ducting

Reference diagram for snow-proof vents (field supply)

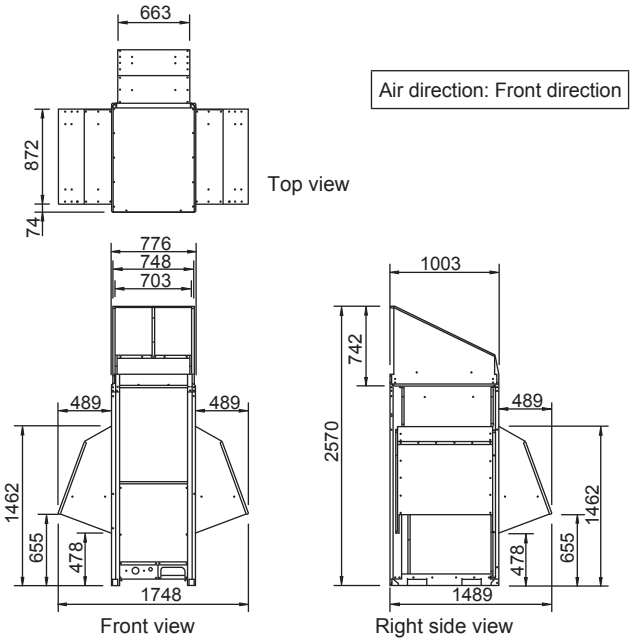
According to the installation site, you may choose the setting position in the depth direction of the anchor bolt from “A”, “B” or “C”.
Regarding the field supply parts for the detail diagrams, see the section “8. Supplement” on page 2-8-1.

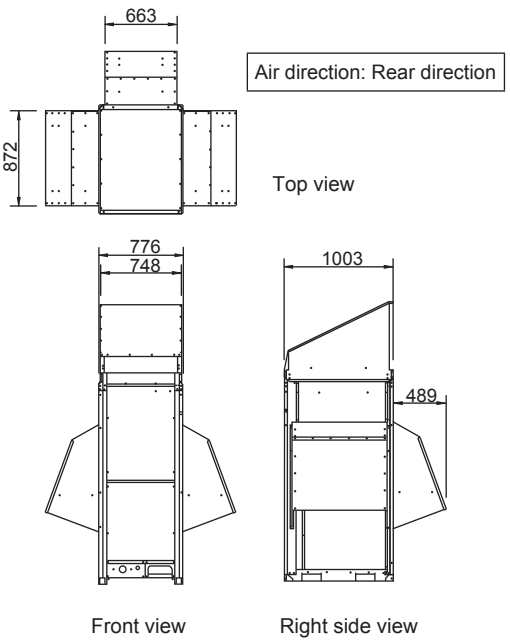
Model : U-8ME2E8, 10ME2E8

unit: mm



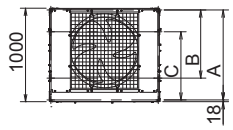
A : 964 (Installation hole pitch) * For removing tube forward
B : 730 (Installation hole pitch) * For removing the tube downward
C : 730 (Installation hole pitch)



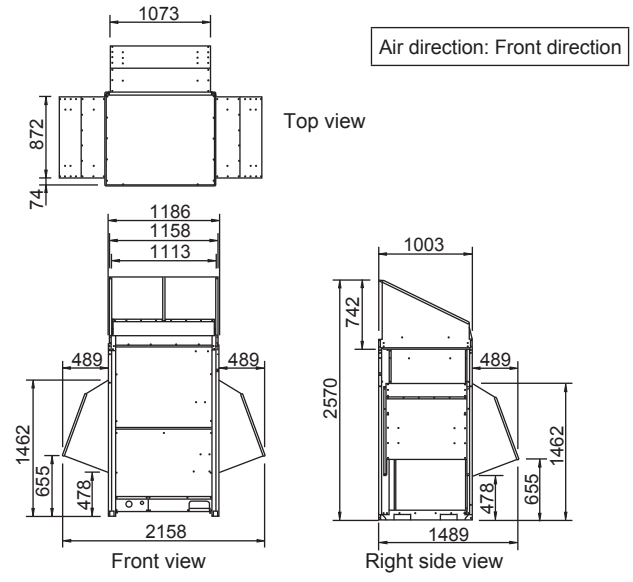


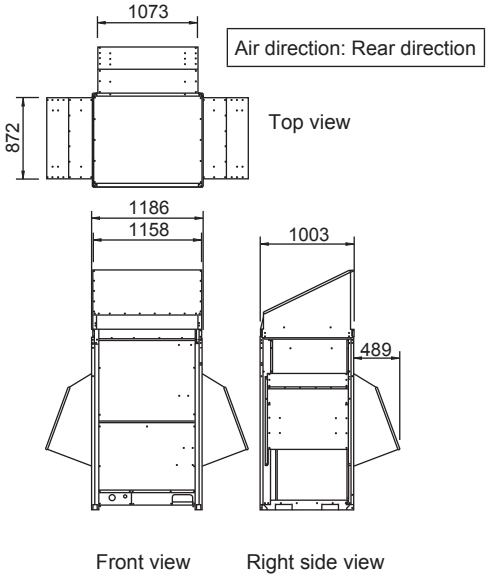
Model : U-12ME2E8,14ME2E8, 16ME2E8

unit: mm



A : 964 (Installation hole pitch) * For removing tube forward
B : 730 (Installation hole pitch) * For removing the tube downward
C : 730 (Installation hole pitch)

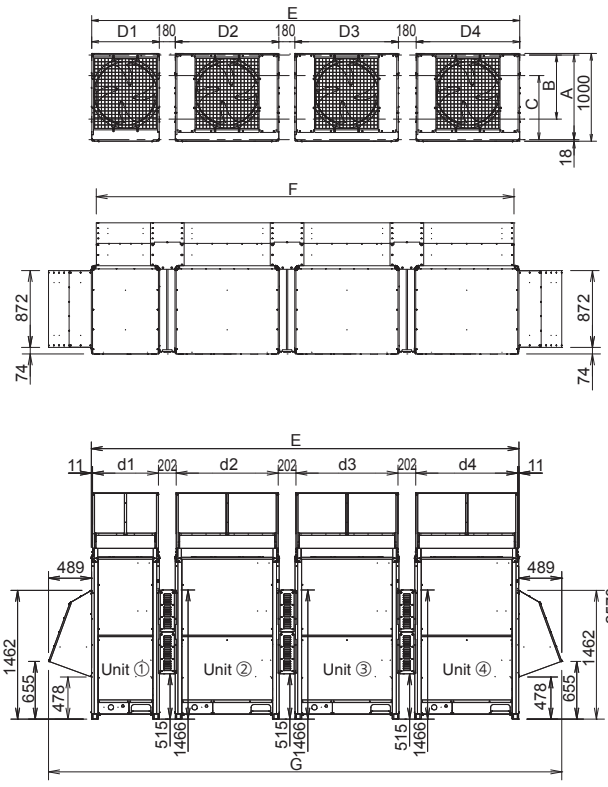




4. Installation Instructions

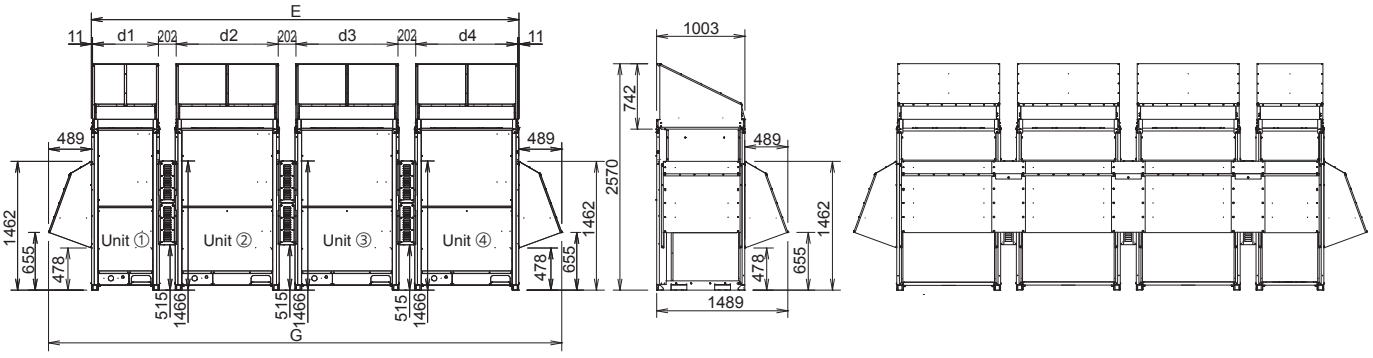
Reference diagram for snow-proof vents (field supply) (continued)

According to the installation site, you may choose the setting position in the depth direction of the anchor bolt from “A”, “B” or “C”.



Unit: mm

The snow-proof vents will be obtained at a local field.
According to the installation site, you may choose the setting position in the depth direction of the anchor bolt from A, B or C.
A: 964 (Installation hole pitch) : For removing tube forward.
B: 730 (Installation hole pitch) : For removing tube downward.
C: 730 (Installation hole pitch)



Capacity	Combination				Separate dimensions of snow-proof vents								Units dimensions	Dimensions of snow-proof vents	
	①	②	③	④	D1	D2	D3	D4	d1	d2	d3	d4	E	F	G
8HP	8	—	—	—	770	—	—	—	748	—	—	—	770	663	1748
10HP	10	—	—	—	770	—	—	—	748	—	—	—	770	663	1748
12HP	12	—	—	—	1180	—	—	—	1158	—	—	—	1180	1073	2158
14HP	14	—	—	—	1180	—	—	—	1158	—	—	—	1180	1073	2158
16HP	16	—	—	—	1180	—	—	—	1158	—	—	—	1180	1073	2158
18HP	8	10	—	—	770	770	—	—	748	748	—	—	1720	1613	2698
20HP	10	10	—	—	770	770	—	—	748	748	—	—	1720	1613	2698
22HP	10	12	—	—	770	1180	—	—	748	1158	—	—	2130	2023	3108
24HP	12	12	—	—	1180	1180	—	—	1158	1158	—	—	2540	2433	3518
26HP	10	16	—	—	770	1180	—	—	748	1158	—	—	2130	3023	3108
28HP	12	16	—	—	1180	1180	—	—	1158	1158	—	—	2540	2433	3518
30HP	14	16	—	—	1180	1180	—	—	1158	1158	—	—	2540	2433	3518
32HP	16	16	—	—	1180	1180	—	—	1158	1158	—	—	2540	2433	3518
34HP	10	12	12	—	770	1180	1180	—	748	1158	1158	—	3490	3383	4468
36HP	12	12	12	—	1180	1180	1180	—	1158	1158	1158	—	3900	3793	4878
38HP	10	12	16	—	770	1180	1180	—	748	1158	1158	—	3490	3383	4468
40HP	12	12	16	—	1180	1180	1180	—	1158	1158	1158	—	3900	3793	4878
42HP	10	16	16	—	770	1180	1180	—	748	1158	1158	—	3490	3383	4468
44HP	12	16	16	—	1180	1180	1180	—	1158	1158	1158	—	3900	3793	4878
46HP	14	16	16	—	1180	1180	1180	—	1158	1158	1158	—	3900	3793	4878
48HP	16	16	16	—	1180	1180	1180	—	1158	1158	1158	—	3900	3793	4878
50HP	10	12	12	16	770	1180	1180	1180	748	1158	1158	1158	4850	4743	5828
52HP	12	12	12	16	1180	1180	1180	1180	1158	1158	1158	1158	5260	5153	6238
54HP	10	12	16	16	770	1180	1180	1180	748	1158	1158	1158	4850	4743	5828
56HP	12	12	16	16	1180	1180	1180	1180	1158	1158	1158	1158	5260	5153	6238
58HP	10	16	16	16	770	1180	1180	1180	748	1158	1158	1158	4850	4743	5828
60HP	12	16	16	16	1180	1180	1180	1180	1158	1158	1158	1158	5260	5153	6238
62HP	14	16	16	16	1180	1180	1180	1180	1158	1158	1158	1158	5260	5153	6238
64HP	16	16	16	16	1180	1180	1180	1180	1158	1158	1158	1158	5260	5153	6238

4. Installation Instructions

4-8. Transporting the Outdoor Unit

When transporting the unit, have it delivered as close to the installation site as possible without unpacking.
Use a hook for suspending the unit respectively according to the type of model. (Figs. 2-4-18-1 to 2-4-18-2)

CAUTION

- When hoisting the outdoor unit, pass lifting belts through the left and right holes of the bottom plate as shown in the Figs. 2-4-18-1 to 2-4-18-2.
  The angle between the lifting belt and top panel must be 70°or more so that the lifting belt does not come into contact with the fan guard.
  Use two lengths of lifting belt 7.5 meters long or longer.
- Hang the lifting belt at an oblique angle of the four corners of the bottom plate.
  If it is hung at other areas, the lifting belt becomes loose and the outdoor unit will be damaged or you may be injured.
- Use protective panels or padding at all locations where the lifting belt contacts the outer casing or other parts to prevent scratching. In particular, use protective material (such as cloth or cardboard) to prevent the edges of the top panel from being scratched.

Model : 12 HP, 14 HP, 16 HP

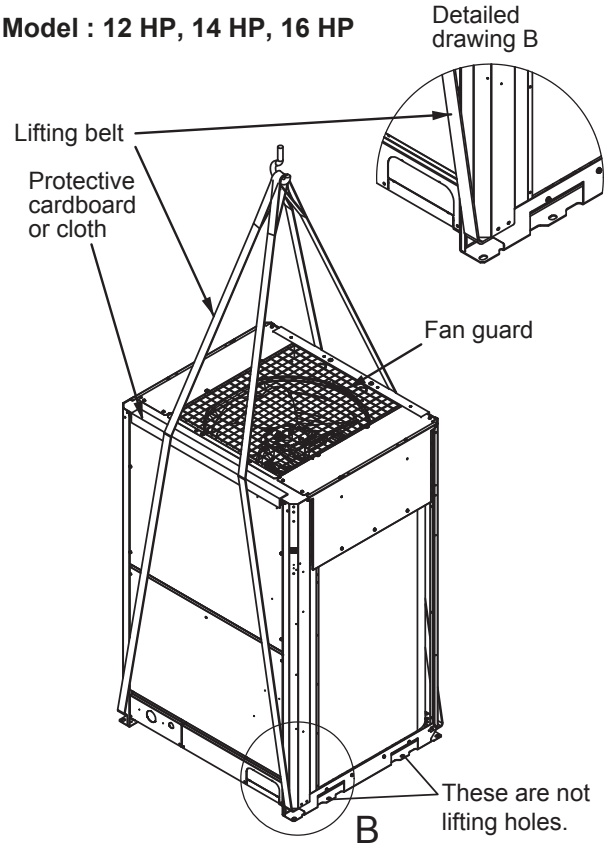


Fig. 2-4-18-2

Model : 8 HP, 10 HP

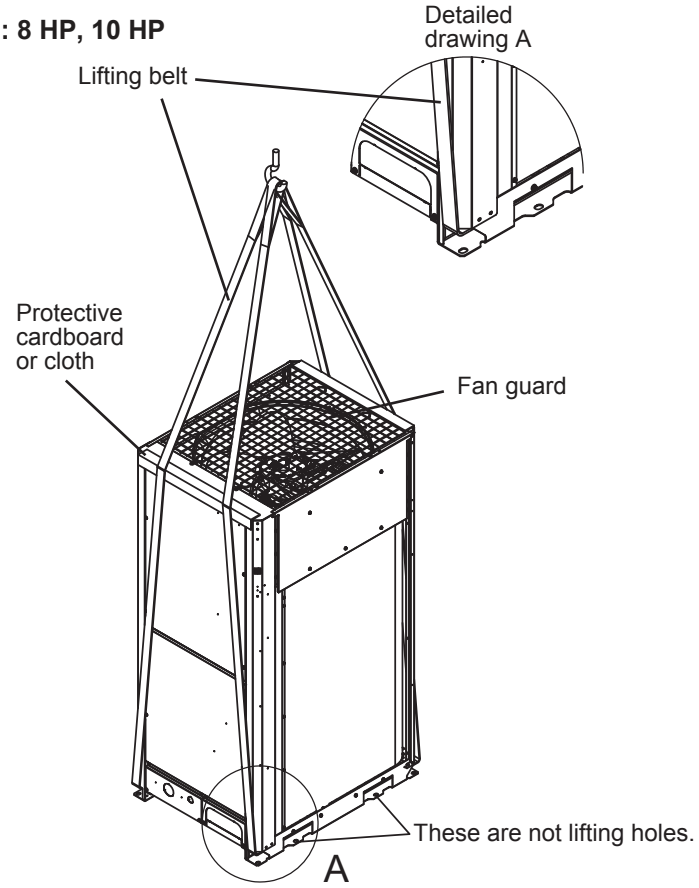


Fig. 2-4-18-1

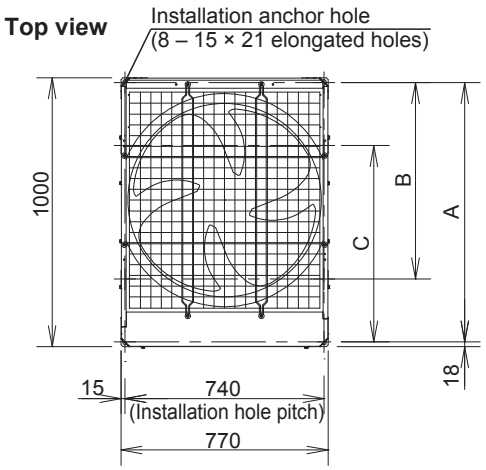
4. Installation Instructions

4-9. Installing the Outdoor Unit

(1) Use four (4) anchor bolts (M12 or similar) to securely anchor the unit.
Regarding the positioning anchor bolts of the depth direction, select one of three types according to the installation site. (See Figs. 2-4-19a-b / “A”, “B” or “C”.)
Normally, select the position “A”. When removing the connection tube in a downward direction, select the position “B”.

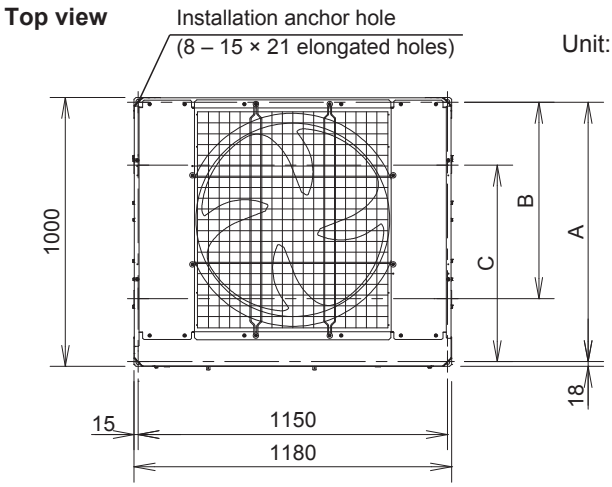
(2) When only using a single outdoor unit, see the Figure 2-4-20.
When making a combination of more than 2 units, see section 4 “1-2. Dimensional Data” and “1-3. Multiple Unit Installation Example” regarding the confirmation of the unit installation holes and unit size.
* When positioning the anchor bolt at “B” or “C”, make a sufficient space between the units or from the wall for installation. (Make a space between the units wider than 180mm and left and right space wider than 250mm from the wall.)

(3) The vibration insulator or the like should be kept secure to satisfy the width and depth of 100mm for the plate legs. (See the dimensions marked by the asterisk at Fig. 2-4-21d - 2-4-21f.) Use a washer from the upper direction larger than the hole size for fixing the installation. The models 18 and 20 have four (4) anchor volts respectively as same as others.
Two models, however, additionally need the vibration insulator under the plate leg at the central location for the installation site.
Screw or wire the vibration insulator at the center of the unit to the rack or the basement.
Be sure to use the same thickness of all vibration insulators and make adjustment so that they will become the same height each other. (Fig. 2-4-20 and Figs. 2-4-21a to 2-4-21f)



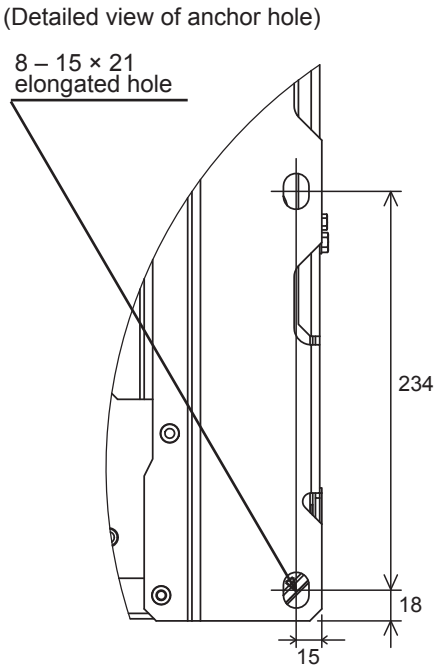
Unit: mm

Fig. 2-4-19a



Unit: mm

Fig. 2-4-19b



Unit: mm

Fig. 2-4-20

- According to the installation site, you may choose the setting position in the depth direction of the anchor bolt from “A”, “B” or “C”.
  A :964 (Installation hole pitch) * The tubing is routed out from the front.
  B :730 (Installation hole pitch) * The tubing is routed out from the bottom.
  C :730 (Installation hole pitch)

4. Installation Instructions

• Below shows vibration insulator position when setting anchor bolt at position A (Figs.2-4-19a and 2-4-19b).

Model : 8 HP, 10 HP, 12 HP, 14 HP, 16 HP

Unit: mm

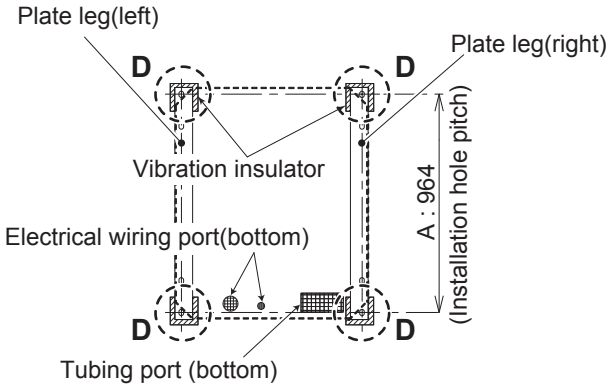


Fig. 2-4-21a

Unit: mm

Detailed view of "D"

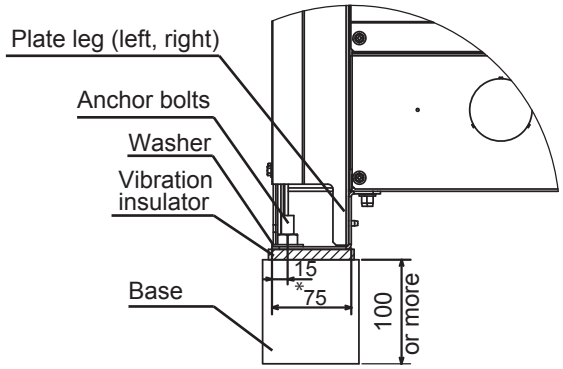


Fig. 2-4-21d

• Below shows vibration insulator position when setting anchor bolt at position B (Figs.2-4-19a and 2-4-19b).

Model : 8 HP, 10 HP, 12 HP, 14 HP, 16 HP

Unit: mm

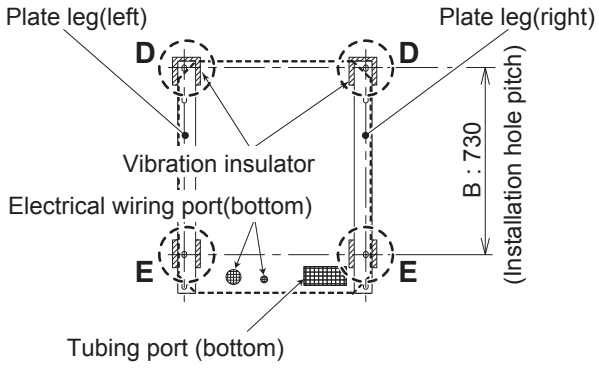


Fig. 2-4-21b

Unit: mm

Detailed view of "E"

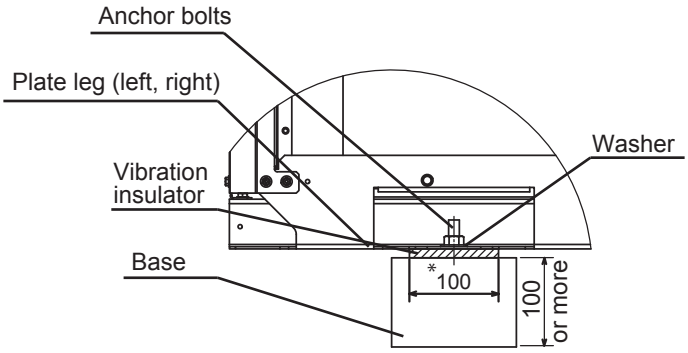


Fig. 2-4-21e

• Below shows vibration insulator position when setting anchor bolt at position C (Figs.2-4-19a and 2-4-19b).

Model : 8 HP, 10 HP, 12 HP, 14 HP, 16 HP

Unit: mm

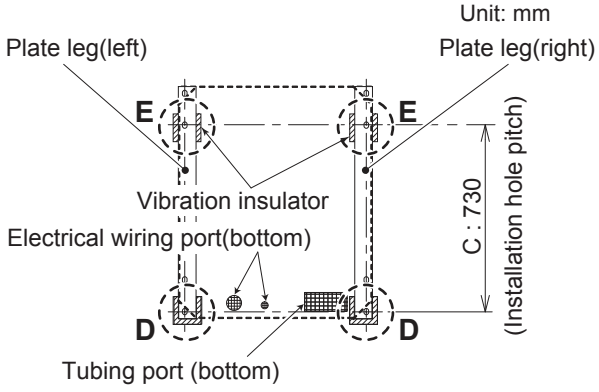


Fig. 2-4-21c

Detailed view of "D"

Unit: mm

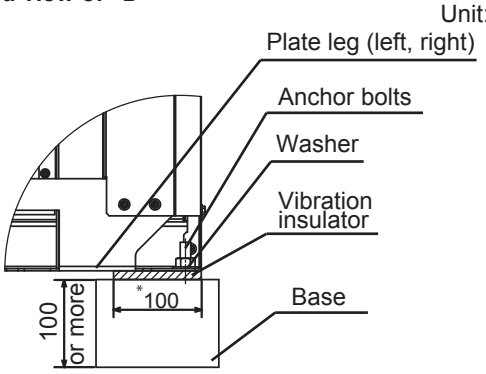


Fig. 2-4-21f

4. Installation Instructions

4-10. Routing the Tubing

- The tubing can be routed out either from the front or from the bottom. (Fig. 2-4-22a)
- The connecting valve is contained inside the unit. Therefore, remove the front panel. (Fig. 2-4-22b)

(1) If the tubing is routed out from the front, punch out the slit part (▨). (Fig. 2-4-23a)

- Be careful not to damage the tubing cover.

(2) If the tubing is routed out from the bottom, use cutting pliers or a similar tool to cut out the tubing outlet slit (part indicated by ▨) from the tubing cover. (Figs. 2-4-22c and 2-4-23b)

- Be careful not to damage the tubing cover.

Model : 8HP, 10HP **Model : 12HP,14HP, 16HP**

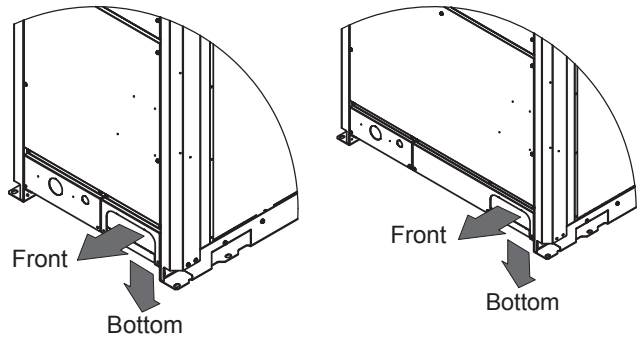


Fig. 2-4-22a

Model : 8HP, 10HP **Model : 12HP, 14HP, 16HP**

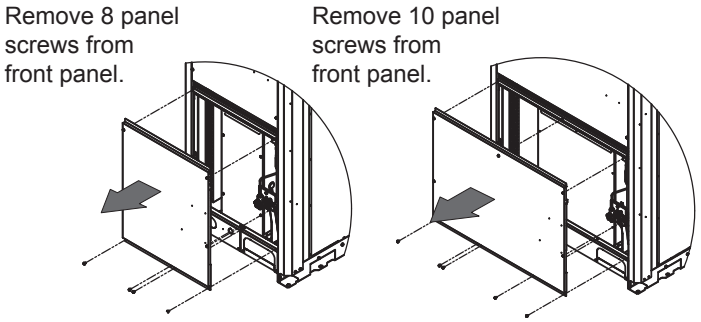


Fig. 2-4-22b

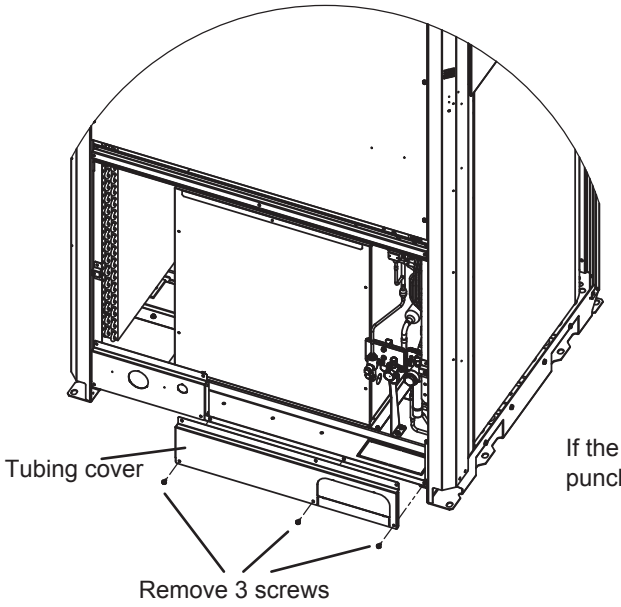
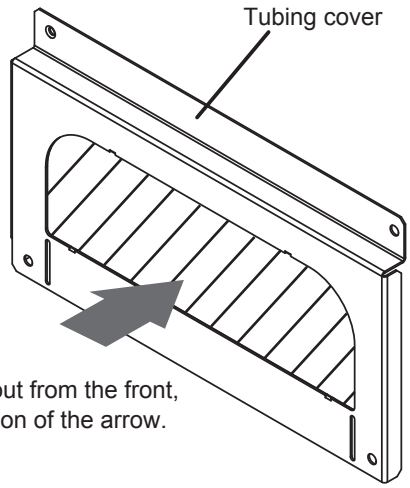
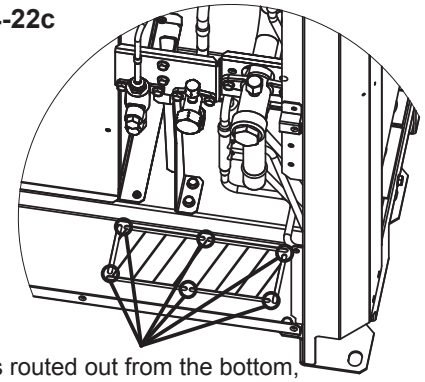


Fig. 2-4-22c



If the tubing is routed out from the front, punch out in the direction of the arrow.

Fig. 2-4-23a



If the tubing is routed out from the bottom, use cutting pliers or a similar tool to cut out the tubing outlet slit from the tubing cover.

Fig. 2-4-23b

4. Installation Instructions

4-11. Prepare the Tubing

- Material: Use seamless phosphorous deoxidized copper tube for refrigeration. Wall thickness shall comply with the applicable legislation. The minimal wall thickness must be in accordance with the table below. For tubes of ø22.22 or larger, use the material of temper 1/2H or H (Hard copper tube). Do not bend the hard copper tube.
- Tubing size
  Use the tubing size indicated in the table below.
- When cutting the tubing, use a tube cutter, and be sure to remove any burrs.
  The same applies to distribution tubing (optional).
- When bending the tubes, bend each tube using a radius that is at least 4 times the outer diameter of the tube.
  When bending, use sufficient care to avoid crushing or damaging the tube.
- For flaring, use a flare tool, and be sure that flaring is performed correctly.

CAUTION

Use sufficient caution during preparation of the tubing.
Seal the tube ends by means of caps or taping to prevent dust, moisture, or other foreign substances from entering the tubes.

Refrigerant tubing

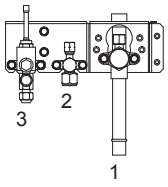
Tubing size (mm)			
Material Temper - O (Soft copper tube)		**Material Temper - 1/2 H, H (Hard copper tube)**	
Outer dia.	**Thickness**	**Outer dia.**	**Thickness**
ø6.35	t0.8	ø22.22	t1.0
ø9.52	t0.8	ø25.4	t1.0
ø12.7	t0.8	ø28.58	t1.0
ø15.88	t1.0	ø31.75	t1.1
ø19.05	t1.2	ø38.1	over t1.35
		ø41.28	over t1.45
		ø44.45	over t1.55

4. Installation Instructions

4-12. Connect the Tubing

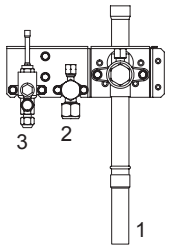
- When operating the refrigerant tube installation in the field, do not apply the flame of welding to the surrounding sheet-metal parts. If necessary, use a wet rag to prevent overheating of the heat exchanger.
- Except for the 16HP model, do not use the supplied connector tubing.

Model : 8 HP, 10 HP, 12 HP, 14 HP (Except 16 HP)



	Refrigerant tubing	Connection method	Supplied parts used?
1	Gas tubing	Brazing	No
2	Liquid tubing	Flare connection	No
3	Balance tube	Flare connection	No

Model : 16 HP



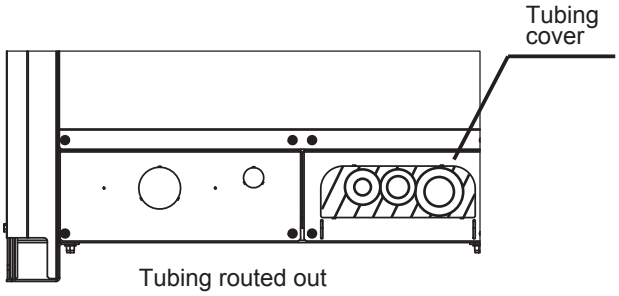
	Refrigerant tubing	Connection method	Supplied parts used?
1	Gas tubing	Brazing	Yes (ø25.4 → ø28.58)
2	Liquid tubing	Flare connection	No
3	Balance tube	Flare connection	No

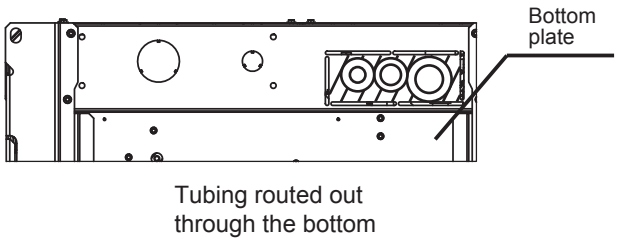
2

Refrigerant tube port

- Use caulking, putty, or a similar material to fill any gaps at the refrigerant tube port (▨) in order to prevent rainwater, dust or foreign substances from entering the unit.

  * Perform this work even if the tubing is routed out in a downward direction.





4. Installation Instructions

● Tighten each cap as specified below.

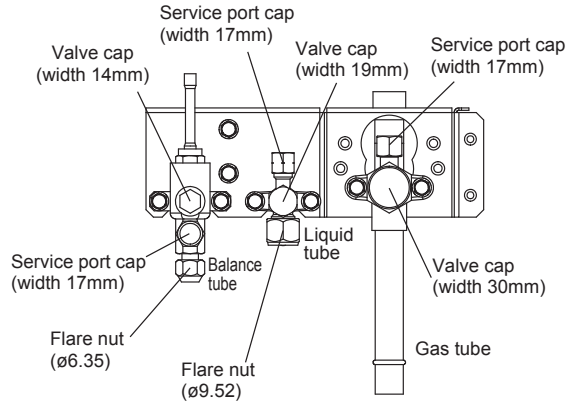
Tightening torque for each cap

Cap tightening torque HP: horsepower

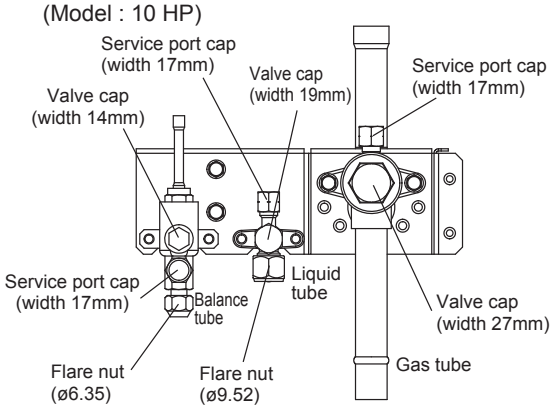
		Unit	8 HP	10 HP	12 HP	14 HP	16 HP
Liquid tube	Valve cap	N · m	20.6 ~ 28.4		48.0 ~ 59.8		
		{kgf · cm}	{206 ~ 284}		{480 ~ 598}		
	Serivce port cap	N · m	10.7 ~ 14.7				
		{kgf · cm}	{107 ~ 147}				
	Flare nut	N · m	34 ~ 42		49 ~ 61		
		{kgf · cm}	{340 ~ 420}		{490 ~ 610}		
Gas tube	Valve cap	N · m	40 ~ 45	47 ~ 53			
		{kgf · cm}	{400 ~ 450}	{470 ~ 530}			
	Serivce port cap	N · m	10 ~ 12				
		{kgf · cm}	{100 ~ 120}				
Balance tube	Valve cap	N · m	20 ~ 25				
		{kgf · cm}	{200 ~ 250}				
	Serivce port cap	N · m	9 ~ 11				
		{kgf · cm}	{90 ~ 110}				
	Flare nut	N · m	14 ~ 18				
		{kgf · cm}	{140 ~ 180}				

2

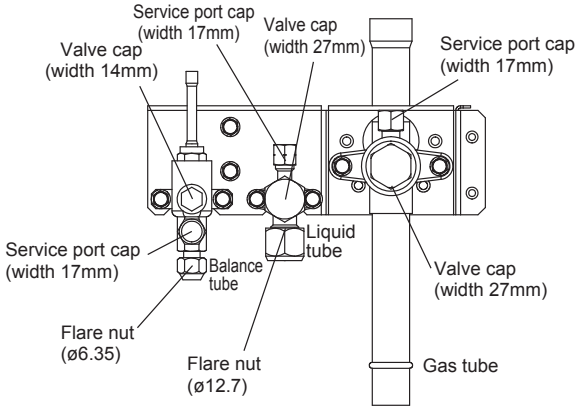
(Model : 8 HP)



(Model : 10 HP)

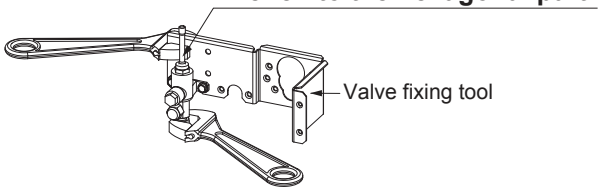


(Model : 12 HP, 14 HP, 16 HP)



4. Installation Instructions

Do not apply an adjustable wrench to the hexagonal part.

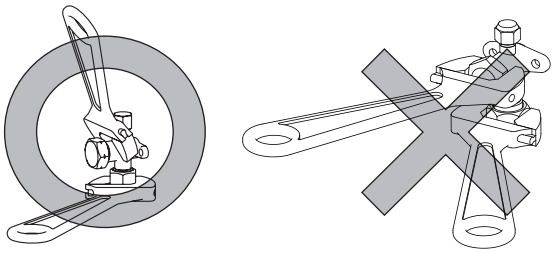


Use two adjustable wrenches when removing or installing the balance tube flare nut.
In particular, do not apply an adjustable wrench to the hexagonal part at the top of the valve.
If force is applied to this part, gas leakage will occur.
Apply an adjustable wrench to settle the fixing tool as shown in the figure. If not used, the valve fixing tool will get distorted.

Use two adjustable wrenches, as shown in the figure, when removing the liquid tube valve flare nut.

1. Do not apply a wrench to the valve cap when removing or installing the flare nuts. Doing so may damage the valve.
2. If the valve cap is left off for a long period of time, refrigerant leakage will occur. Therefore, do not leave the valve cap off.
3. Applying refrigerant oil to the flare surface can be effective in preventing gas leakage, however be sure to use a refrigerant oil which is suitable for the refrigerant that is used in the system.

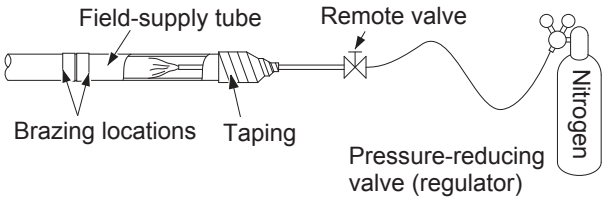
   This unit utilizes R410A refrigerant, and the refrigerant oil is ether oil (synthetic oil). However, hub oil (synthetic oil) can also be used.



2

- Precautions for brazing
  Be sure to replace the air inside the tube with nitrogen to prevent oxide film from forming during the brazing process.
  Be sure to use a damp cloth or other means to cool the valve unit during brazing.

Work method



CAUTION

1. Be sure to use nitrogen
   Oxygen, CO_2, and CFC must not be used.
2. Use a pressure-reducing valve on the nitrogen tank.
3. Do not use agents intended to prevent the formation of oxide film.
   They will adversely affect the refrigeration oil, and may cause equipment failure.
4. The balance tube is not used if only 1 outdoor unit is installed.
   Use the unit in the same conditions as when it was shipped from the factory.

4. Installation Instructions

- Charging procedure

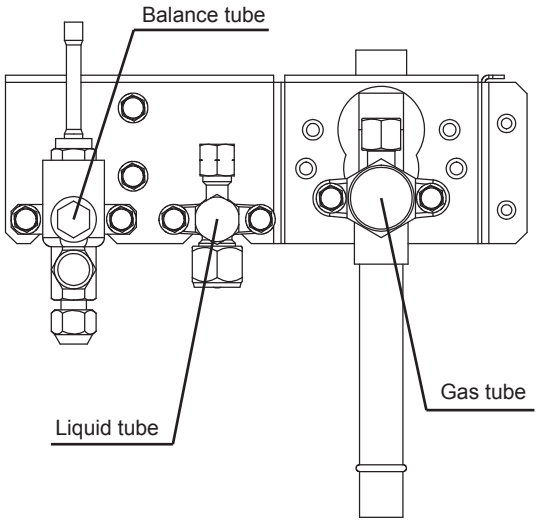
  Be sure to charge with R410A refrigerant in liquid form.

  1. After performing a vacuum, charge with refrigerant from the liquid tubing side. At this time, all valves must be in the “fully closed” position.
  2. If it was not possible to charge the designated amount, operate the system in Cooling mode while charging with refrigerant from the gas tubing side. (This is performed at the time of the test run. For this, all valves must be in the “fully open” position. However if only one outdoor unit is installed, a balance tube is not used.
     Therefore, leave the valves fully closed.) Charge with R410A refrigerant in liquid form.
     With R410A refrigerant, charge while adjusting the amount being fed a little at a time in order to prevent liquid refrigerant from backing up.

- After charging is completed, turn all valves to the “fully open” position.
- Replace the tubing covers as they were before.

CAUTION

1. **R410A additional charging absolutely must be done through liquid charging.**
2. **The R410A refrigerant cylinder has a gray base color, and the top part is pink.**
3. **The R410A refrigerant cylinder includes a siphon tube. Check that the siphon tube is present. (This is indicated on the label at the top of the cylinder.)**
4. **Due to differences in the refrigerant, pressure, and refrigerant oil involved in installation, it is not possible in some cases to use the same tools for R22 and for R410A.**



Use a Hexagonal wrench and turn to the left to open.

		Gas tube	Liquid tube
Hexagonal wrench width	8HP	5mm	4mm
	10HP	8mm	
	12HP		
	14HP		
	16HP		
How to turn the tub		Counterclockwise for OPEN Clockwise for CLOSE	

5. HOW TO PROCESS TUBING

The liquid tubing side is connected by a flare nut, and the gas tubing side is connected by brazing.

5-1. Connecting the Refrigerant Tubing

Use of the Flaring Method

Many of conventional split system air conditioners employ the flaring method to connect refrigerant tubes which run between indoor and outdoor units. In this method, the copper tubes are flared at each end and connected with flare nuts.

Flaring Procedure with a Flare Tool

(1) Cut the copper tube to the required length with a tube cutter. It is recommended to cut approx. 30 – 50 cm longer than the tubing length you estimate.

(2) Remove burrs at the end of the copper tube with a tube reamer or a similar tool. This process is important and should be done carefully to make a good flare. Be sure to keep any contaminants (moisture, dirt, metal filings, etc.) from entering the tubing. (Figs. 2-5-1 and Figs. 2-5-2)

NOTE

When reaming, hold the tube end downward and be sure that no copper scraps fall into the tube. (Fig. 2-5-2)

(3) Remove the flare nut from the unit and be sure to mount it on the copper tube.

(4) Make a flare at the end of copper tube with a flare tool. (Fig. 2-5-3)

NOTE

A good flare should have the following characteristics:

- Inside surface is glossy and smooth
- Edge is smooth
- Tapered sides are of uniform length

Caution Before Connecting Tubes Tightly

(1) Apply a sealing cap or water-proof tape to prevent dust or water from entering the tubes before they are used.

(2) Be sure to apply refrigerant lubricant (ether oil) to the inside of the flare nut before making piping connections. This is effective for reducing gas leaks. (Fig. 2-5-4)

(3) For proper connection, align the union tube and flare tube straight with each other, then screw in the flare nut lightly at first to obtain a smooth match. (Fig. 2-5-5)

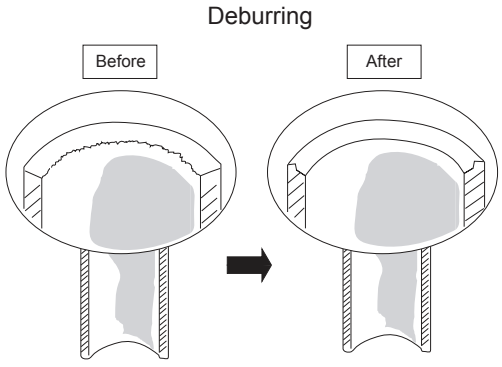


Fig. 2-5-1

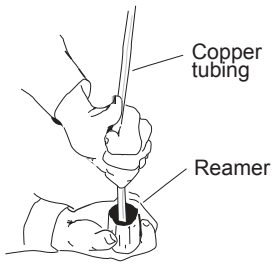


Fig. 2-5-2

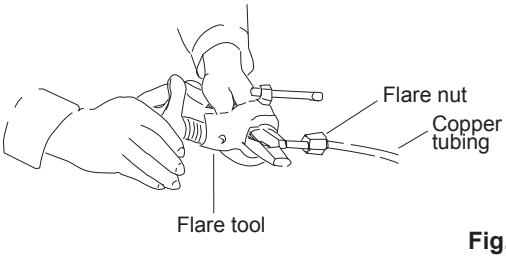


Fig. 2-5-3

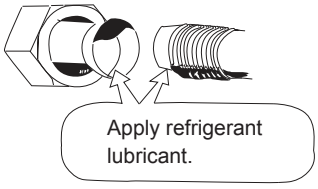


Fig. 2-5-4

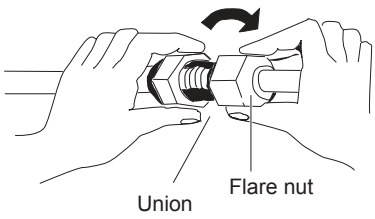


Fig. 2-5-5

- Adjust the shape of the liquid tube using a tube bender at the installation site and connect it to the liquid tubing side valve using a flare.

Cautions During Brazing

- **Replace air inside the tube with nitrogen gas to prevent copper oxide film from forming during the brazing process. (Oxygen, carbon dioxide and Freon are not acceptable.)**
- **Do not allow the tubing to get too hot during brazing. The nitrogen gas inside the tubing may overheat, causing refrigerant system valves to become damaged. Therefore allow the tubing to cool when brazing.**
- **Use a reducing valve for the nitrogen cylinder.**
- **Do not use agents intended to prevent the formation of oxide film. These agents adversely affect the refrigerant and refrigerant oil, and may cause damage or malfunctions.**

5. HOW TO PROCESS TUBING

5-2. Connecting Tubing Between Indoor and Outdoor Units

(1) Tightly connect the indoor-side refrigerant tubing extended from the wall with the outdoor-side tubing.

(2) To fasten the flare nuts, apply the following specified torque:

- When removing the flare nuts from the tubing connections, or when tightening them after connecting the tubing, to use a torque wrench and a spanner. (Fig. 2-5-6)
  If the flare nuts are over-tightened, the flare may be damaged, which could result refrigerant leakage and cause in injury or asphyxiation to room occupants.
- For the flare nuts at tubing connections, be sure to use the flare nuts that were supplied with the unit, or else flare nuts for R410A (type 2). The refrigerant tubing that is used must be of the correct wall thickness as shown in the following table.
- In order to prevent damage to the flare caused by over-tightening of the flare nuts, use the table above as a guide when tightening.
- When tightening the flare nut on the liquid tube, use an adjustable wrench with a nominal handle length of 200 mm.

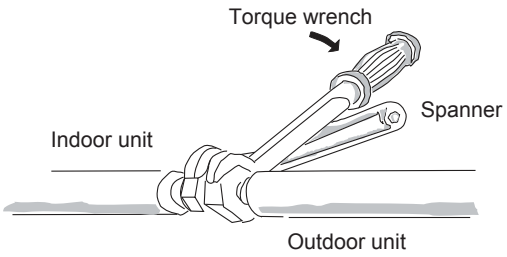


Fig. 2-5-6

Tube diameter	Tightening torque, approximate	Tube thickness
ø6.35 (1/4”)	14 – 18 N · m {140 – 180 kgf· cm}	0.8 mm
ø9.52 (3/8”)	34 – 42 N · m {340 – 420 kgf· cm}	0.8 mm
ø12.7 (1/2”)	49 – 61 N · m {490 – 610 kgf· cm}	0.8 mm
ø15.88 (5/8”)	68 – 82 N · m {680 – 820 kgf· cm}	1.0 mm
ø19.05 (3/4”)	100 – 120 N · m {1000 – 1200 kgf· cm}	1.2 mm

Because the pressure is approximately 1.6 times higher than conventional refrigerant pressure, the use of ordinary flare nuts (type 1) or thin-walled tubes may result in tube rupture, injury, or asphyxiation caused by refrigerant leakage.

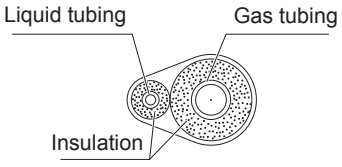
5-3. Insulating the Refrigerant Tubing

Tubing Insulation

- Standard Selection of Insulation Material
  Under the environment of the high temperature and high humidity, the surface of the insulation material is easy to become condensation. This will result in leakage and dew drop. See the chart “Standard Selection of Tubing Insulation” shown below when selecting the insulation material. In case that the ambient temperature and relative humidity are placed above the line of the insulation thickness, the condensation may occasionally make a dew drop on the surface of the insulation material. In this case, select the better insulation efficiency.

  * However, since the condition will be different due to the sort of the insulaton material and the environmental condition of the installation place, see the chart shown below as a reference when making a selection.

Two tubes arranged together



Three tubes arranged together

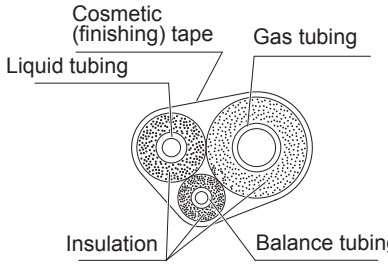
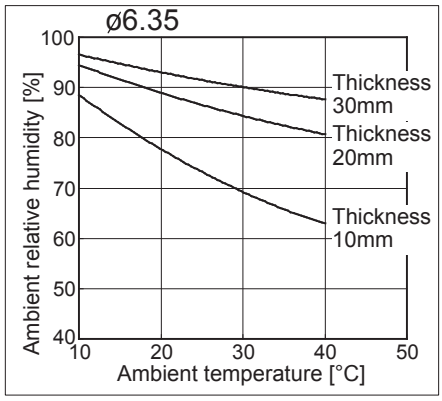


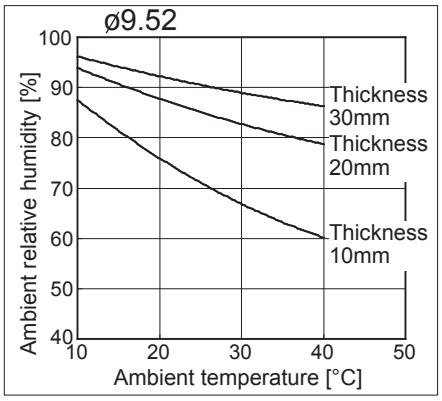
Fig. 2-5-7

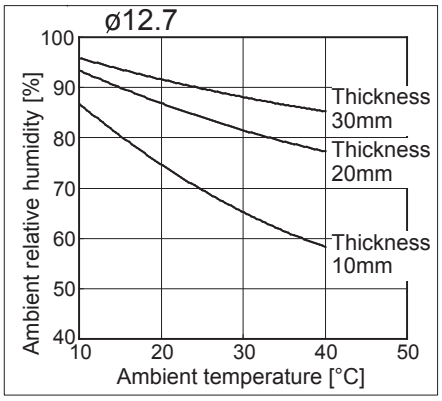
Standard Selection of Tubing Insulation

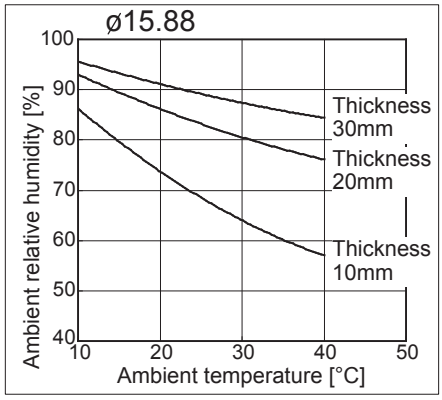
Sort of insulation material	Polyethylene heat resisting material
Upper limits of usage temperature	Gas tubing : 120 °C or above Other tubing : 80 °C or above
Calculating condition	
Thermal conductivity of insulation material	0.043 W/(m · K) (Average temperature 23 °C)
Refrigerant temperature	2 °C

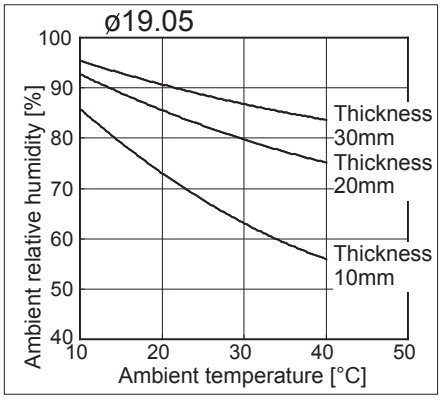
5. HOW TO PROCESS TUBING

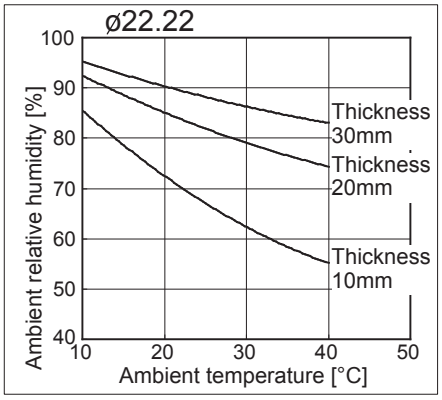


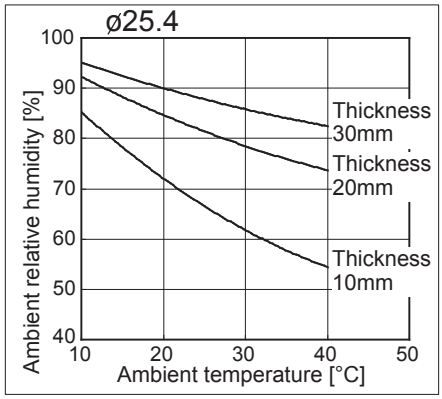


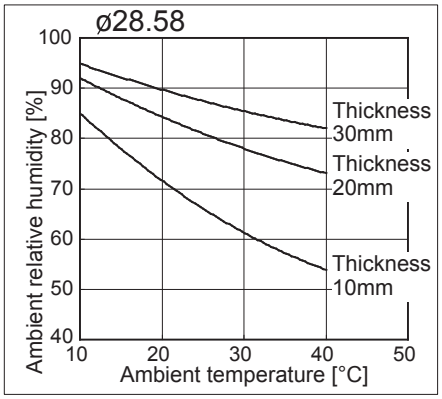


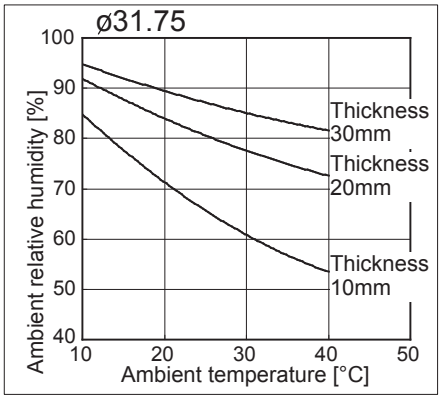


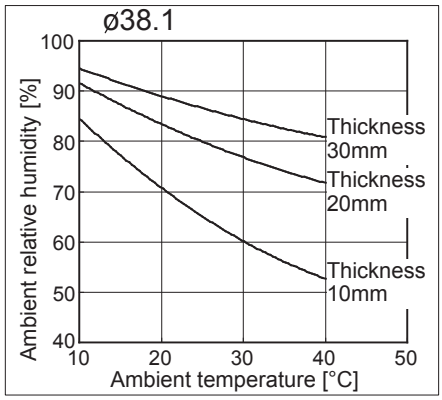


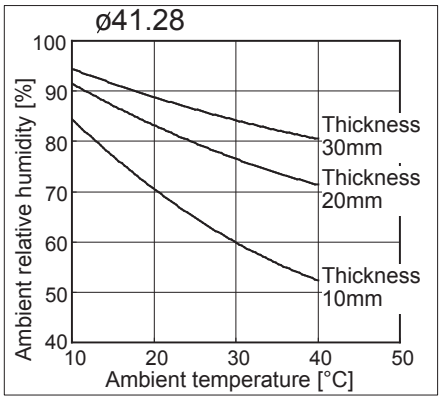


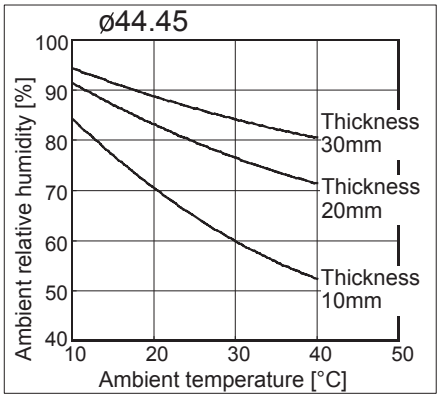












5. HOW TO PROCESS TUBING

CAUTION **If the exterior of the outdoor unit valves has been finished with a square duct covering, make sure you allow sufficient space to use the valves and to allow the panels to be attached and removed.**

Taping the flare nuts

Wind the white insulation tape around the flare nuts at the gas tube connections. Then cover up the tubing connections with the flare insulator, and fill the gap at the union with the supplied black insulation tape. Finally, fasten the insulator at both ends with the supplied vinyl clamps. (Fig. 2-5-8)

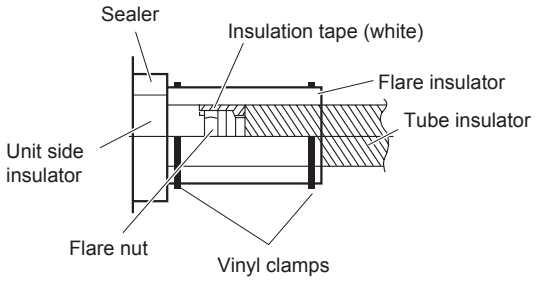


Fig. 2-5-8

Insulation material

The material used for insulation must have good insulation characteristics, be easy to use, be age resistant, and must not easily absorb moisture.

Be sure to use the heat-resistant insulator corresponding to the gas tube of 120°C or above and other tubes of 80°C or above.

CAUTION

After a tube has been insulated, never try to bend it into a narrow curve because it can cause the tube to break or crack.

Never grasp the drain or refrigerant connecting outlets when moving the unit.

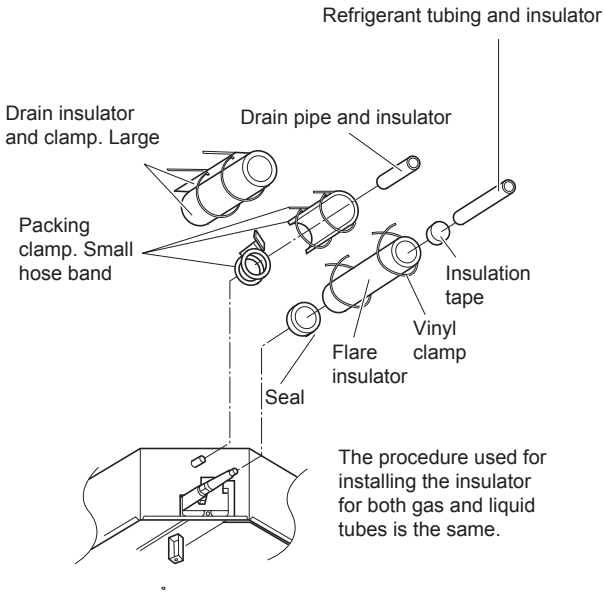


Fig. 2-5-9

5-4. Taping the Tubes

(1) At this time, the refrigerant tubes (and electrical wiring if local codes permit) should be taped together with armoring tape in 1 bundle. To prevent the condensation from overflowing the drain pan, keep the drain hose separate from the refrigerant tubing.

(2) Wrap the armoring tape from the bottom of the outdoor unit to the top of the tubing where it enters the wall. As you wrap the tubing, overlap half of each previous tape turn.

(3) Clamp the tubing bundle to the wall, using 1 clamp approx. each meter. (Fig. 2-5-10)

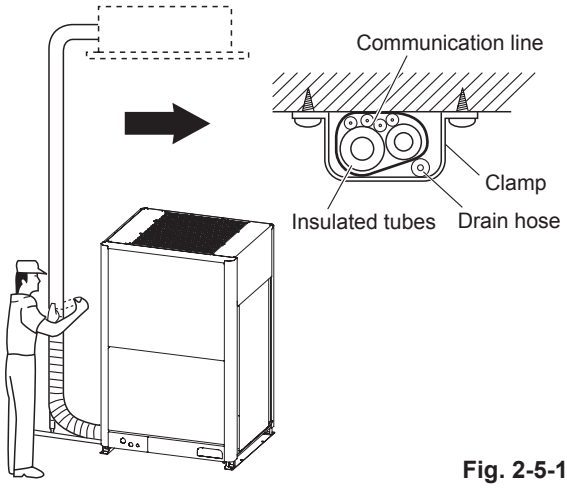


Fig. 2-5-10

NOTE

Do not wind the armoring tape too tightly since this will decrease the heat insulation effect. Also ensure that the condensation drain hose splits away from the bundle and drips clear of the unit and the tubing.

5-5. Finishing the Installation

After finishing insulating and taping over the tubing, use sealing putty to seal off the hole in the wall to prevent rain and draft from entering. (Fig. 2-5-11)

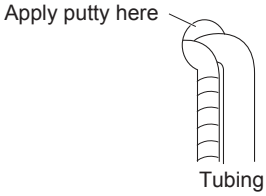


Fig. 2-5-11

6. AIR PURGING

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

- pressure in the system rises
- operating current rises
- cooling (or heating) efficiency drops
- moisture in the refrigerant circuit may freeze and block capillary tubing
- water may lead to corrosion of parts in the refrigerant system

Therefore, the indoor unit and tubing between the indoor and outdoor unit must be leak tested and evacuated to remove any noncondensables and moisture from the system.

Manifold gauge

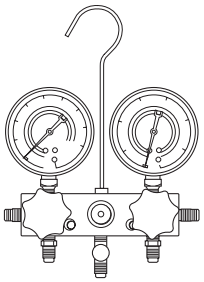


Fig. 2-6-1

■ Air Purging with a Vacuum Pump (for Test Run) Preparation

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

Vacuum pump

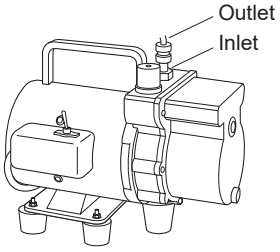


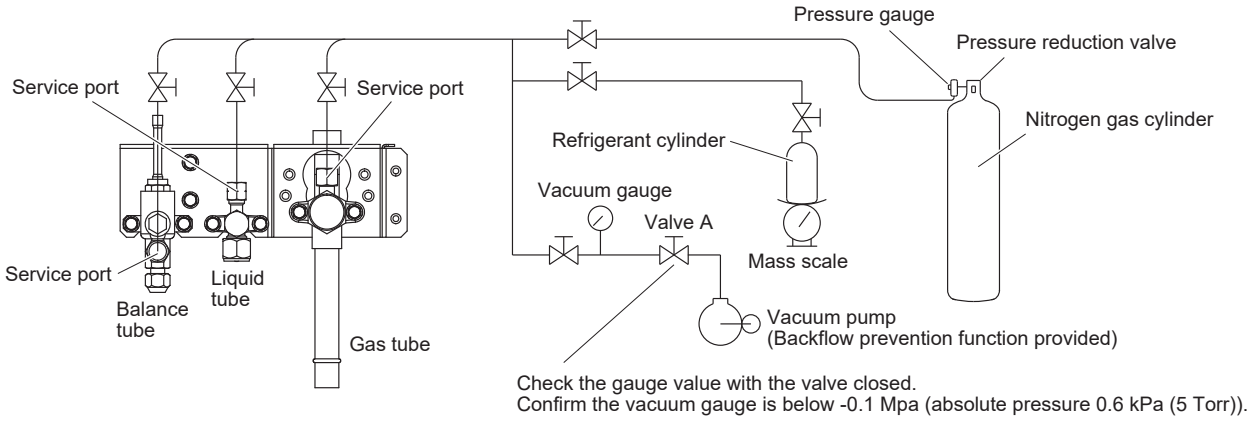
Fig. 2-6-2

2

Leak Test and Evacuation

Do a leak test by performing the following procedures. Confirm that there is no leakage in the connection area.

- Connect the nitrogen gas cylinder, refrigerant cylinder and vacuum pump to the service ports of the gas tube, liquid tube and balance tube as shown in figure. Be sure to keep the valves of gas tube, liquid tube and balance tube closed.



Leak Tightness Test Method :

The design pressure and the pressure of the leak test of this unit is 3.8 MPa.

- Do not pressurize to the default value at once. Pressurize gradually.

(1) Pressurize to 0.5 MPa and then leave it for 5 minutes to ensure that the pressure does not drop.
(2) Pressurize to 1.5 MPa and then leave it for 5 minutes to ensure that the pressure does not drop.
(3) For the test, pressurize to 3.8 MPa and leave it for about 1 day to ensure that the pressure does not drop.
(4) The pressure drops at a rate of approximately 0.01 MPa per 1°C decrease in ambient temperature. Therefore, make a pressure correction. The equation for the pressure correction is given below.

$$\text{Measured absolute pressure} = \frac{(\text{Pressurized absolute pressure}) \times (\text{Measured temperature} + 273)}{(\text{Pressurized temperature} + 273)}$$

(5) In case that the pressure drop is observed, there is a possibility of leakage. Make a correction and perform the leak test again.

6. AIR PURGING

Evacuation Method :

● After performing the leak test, evacuate and perform vacuum drying the indoor unit and tubing.

(1) Confirm that the shut-off valves of gas tube, liquid tube and balance tube are kept closed.
(2) Connect the vacuum pump and vacuum gauge to the service ports of the gas tube, liquid tube and balance tube as shown in figure.
(3) Evacuate and perform vacuum drying the indoor unit and tubing.
(4) Evacuate until the reading of the vacuum gauge reaches less than -0.1 MPa (absolute pressure 0.6 kPa (5 Torr)) or lower.
(5) When the gauge reading is less than -0.1 MPa, run the vacuum pump for over one hour continuously and then evacuate and perform vacuum drying.
(6) Fully close the valve A. Then loosen the hose connected to the vacuum pump and turn off the vacuum pump.
(7) After leaving it for one hour, confirm the pressure of the vacuum gauge does not increase shortly after Step (6) above. Then stop vacuum drying.

In case that the pressure of the vacuum gauge is increased, water might be left inside of the tube or leaked. If any water remains inside the tube, fill with the dry nitrogen (0.05 MPa (gauge pressure)) until the positive pressure is reached. Then evacuate and perform vacuum drying again. (Due to prevention of humid air entering the pipe before returning to positive pressure.)
If there is any water leakage, eliminate leaks and perform the leak test again, and then evacuate and perform vacuum drying again.

NOTE

Be sure to perform the operations from all service ports simultaneously.
It is recommended that the leak test for the tubing among the first unit be checked without connecting to the outdoor unit: tube alone.
Use nitrogen gas for the leak tightness test. (Oxygen, carbon dioxide gas and freon gas shall be prohibited.)

- Be sure to use vacuum gauge. Gauge manifold cannot read precisely.
- Use the vacuum pump with the backflow prevention function. If not, there is a risk that the oil filled in the vacuum pump will flow back when the vacuum pump is stopped.

6. AIR PURGING

CAUTION **Use a cylinder designed for use with R410A respectively.**

Charging additional refrigerant

- Charging additional refrigerant (calculated from the liquid tube length as shown in the section “1-3. Tubing Length”) using the liquid tube service valve.
- Use a balance to measure the refrigerant accurately.
- If the additional refrigerant charge amount cannot be charged at once, charge the remaining refrigerant in liquid form by using the gas tube service valve with the system in cooling operation mode at the time of test run.

Finishing the job

(1) With a hex wrench, turn the liquid tube service valve stem counter-clockwise to fully open the valve.

(2) Turn the gas tube service valve stem counter-clockwise to fully open the valve.

CAUTION **To avoid gas from leaking when removing the charge hose, make sure the stem of the gas tube is turned all the way out (“BACK SEAT” position).**

(3) Loosen the charge hose connected to the gas tube service port (1/4 in.) slightly to release the pressure, then remove the hose.

(4) Replace the 1/4 in. flare nut and its bonnet on the gas tube service port and fasten the flare nut securely with an adjustable wrench or box wrench. This process is very important to prevent gas from leaking from the system.

(5) Replace the valve caps at both gas and liquid service valves and fasten them securely.

This completes air purging with a vacuum pump. The air conditioner is now ready for a test run.

7. Optional Parts

7-1. Distribution Joint Kits

Model name	Cooling capacity after distribution	Remarks	Model name	Cooling capacity after distribution	Remarks
1. CZ-P680PJ2	68.0 kW or less	For outdoor unit	3. CZ-P160BK2	22.4 kW or less*	For indoor unit
2. CZ-P1350PJ2	more than 68.0 kW	For outdoor unit	4. CZ-P680BK2	68.0 kW or less*	For indoor unit
			5. CZ-P1350BK2	more than 68.0 kW *	For indoor unit

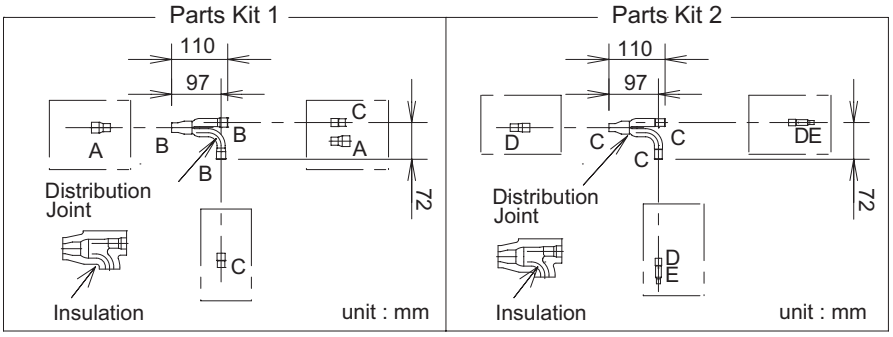
*In case the total capacity of indoor units connected after distribution exceeds the total capacity of the outdoor units, select the distribution tubing size for the total capacity of the outdoor units.

Regarding the cautions when connecting to the indoor unit, see the section "Installing distribution joint" on page 2-2-6.

■ CZ-P160BK2 (for R410A)

How to Attach Distribution Joint

1. Accompanying Parts
   Check the contents of your distribution joint kit.
2. Distribution Joint Kits (with insulation)



- Size of connection point on each part (Shown are inside diameters of tubing)

Size	mm	Inch
Part A	ø19.05	3/4
Part B	ø15.88	5/8
Part C	ø12.7	1/2
Part D	ø9.52	3/8
Part E	ø6.35	1/4

3. Making Branch Connections

- For branching tubes, install 150mm or larger (including reducer) straight tubing up to the point where the tube branches (or after the point where the tubes join together). (Fig. 2-7-1)

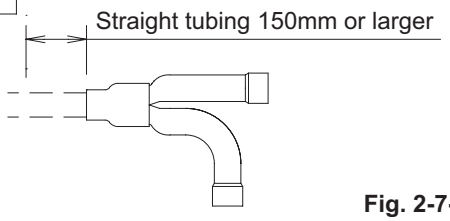


Fig. 2-7-1

- Using a tube cutter, cut the joints at the diameter required to match the outside diameter of the tubing you are connecting. (This is usually done at the installation site.) The tube diameter depends on the total capacity of the indoor unit. Note that you do not have to cut the joints if it already matches the tubing end size. For size selection of the tube diameter, see "■ Table 2-1-9 Indoor Unit Tubing Connection Size".

NOTE

Avoid forceful cutting that may harm the shape of the joints or tubing. (Inserting the tubing will not be possible if the tube shape is not proper.)

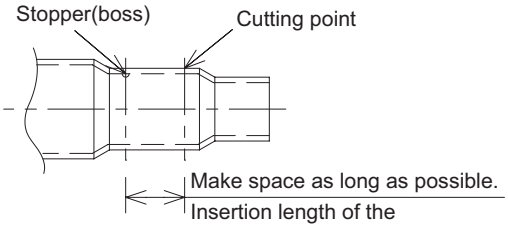
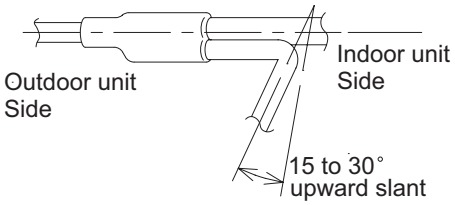
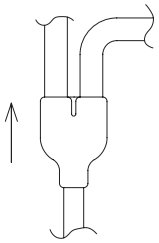


Fig. 2-7-2

- Cut off as far away from stopper as possible. (Fig. 2-7-2)
- After cutting the joints, be sure to remove burrs on the inside of the joints. (If the joints have been squashed or dented badly, reshaped them using a tube spreader.)
- Make sure there is no dirt or other foreign substances inside the distribution joint.
- The distribution joint can be either horizontal or vertical. (Fig. 2-7-3) In the case of horizontal, the L-shaped tubing must be slanted slightly upward (15° to 30°).
- When brazing a pipe E to the reducer of which middle pipe inner dimension is D as shown above chart, cut the middle pipe as long as possible so that the pipe E can be inserted.
- When brazing, replace air inside the tube with nitrogen gas to prevent copper oxide from forming.
- To insulate the distribution joint, use the supplied tubing insulation. (If using insulation other than that supplied, make sure that its heat resistance is 120°C or higher.)
- For additional details, see "■ Installing distribution joint" on page 2-2-6.



In case of horizontal position



In case of vertical position (directed upward)

Fig. 2-7-3

7. Optional Parts

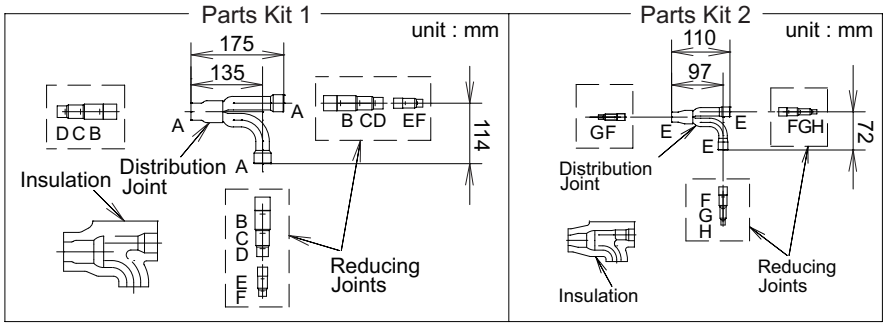
■ CZ-P680BK2 (for R410A)

How to Attach Distribution Joint

1. Accompanying Parts
   Check the contents of your distribution joint kit.

Part Name	Parts Kit 1	Parts Kit 2
Distribution Joints	1	1
Insulations	1	1
Reducing Joints	5	3

2. Distribution Joint Kits (with insulation)



- Size of connection point on each part (Shown are inside diameters of tubing)

Size	mm	Inch
Part A	ø28.58	1-1/8
Part B	ø25.4	1
Part C	ø22.22	7/8
Part D	ø19.05	3/4
Part E	ø15.88	5/8
Part F	ø12.7	1/2
Part G	ø9.52	3/8
Part H	ø6.35	1/4

3. Making Branch Connections

- For branching tubes, install 150mm or larger (including reducer) straight tubing up to the point where the tube branches (or after the point where the tubes join together). (Fig. 2-7-4)
- Using a tube cutter, cut the joints at the diameter required to match the outside diameter of the tubing you are connecting. (This is usually done at the installation site.)
  The tube diameter depends on the total capacity of the indoor unit. Note that you do not have to cut the joints if it already matches the tubing end size. For size selection of the tube diameter, see "■ Table 2-1-9 Indoor Unit Tubing Connection Size".

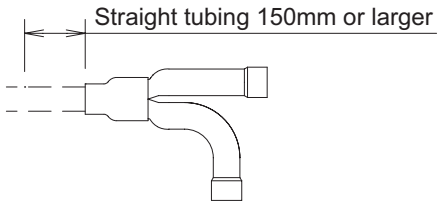


Fig. 2-7-4

NOTE

Avoid forceful cutting that may harm the shape of the joints or tubing. (Inserting the tubing will not be possible if the tube shape is not proper.)

- Cut off as far away from stopper as possible. (Fig. 2-7-5)

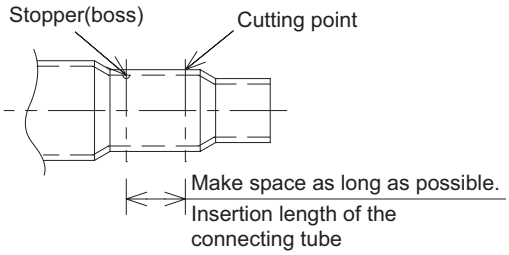
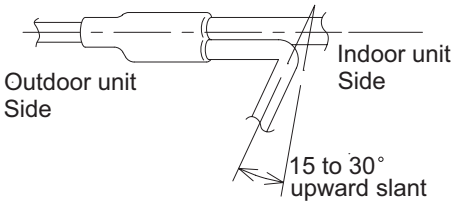
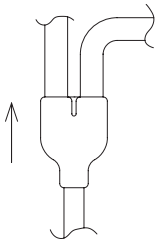


Fig. 2-7-5

- After cutting the joints, be sure to remove burrs on the inside of the joints. (If the joints have been squashed or dented badly, reshaped them using a tube spreader.)
- Make sure there is no dirt or other foreign substances inside the distribution joint.
- The distribution joint can be either horizontal or vertical. (Fig. 2-7-6)
  In the case of horizontal, the L-shaped tubing must be slanted slightly upward (15° to 30°).
- When brazing, replace air inside the tube with nitrogen gas to prevent copper oxide from forming.
- To insulate the distribution joint, use the supplied tubing insulation. (If using insulation other than that supplied, make sure that its heat resistance is 120°C or higher.)
- For additional details, see "■ Installing distribution joint" on page 2-2-6.



In case of horizontal position



In case of vertical position (directed upward or downward)

Fig. 2-7-6

7. Optional Parts

■ CZ-P1350BK2 (for R410A)

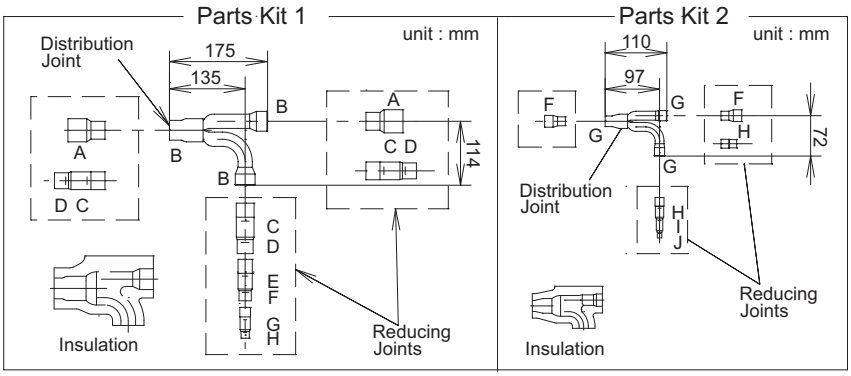
How to Attach Distribution Joint

1. Accompanying Parts

   Check the contents of your distribution joint kit.

Part Name	Parts Kit 1	Parts Kit 2
Distribution Joints	1	1
Insulations	1	1
Reducing Joints	7	4

2. Distribution Joint Kits (with insulation)



- Size of connection point on each part (Shown are inside diameters of tubing)

Size	mm	Inch
Part A	ø38.1	1-1/2
Part B	ø31.75	1-1/4
Part C	ø28.58	1-1/8
Part D	ø25.4	1
Part E	ø22.22	7/8
Part F	ø19.05	3/4
Part G	ø15.88	5/8
Part H	ø12.7	1/2
Part I	ø9.52	3/8
Part J	ø6.35	1/4

3. Making Branch Connections

- For branching tubes, install 150mm or larger (including reducer) straight tubing up to the point where the tube branches (or after the point where the tubes join together). (Fig. 2-7-7)
- Using a tube cutter, cut the joints at the diameter required to match the outside diameter of the tubing you are connecting. (This is usually done at the installation site.) The tube diameter depends on the total capacity of the indoor unit. Note that you do not have to cut the joints if it already matches the tubing end size. For size selection of the tube diameter, see "■ Table 2-1-9 Indoor Unit Tubing Connection Size".

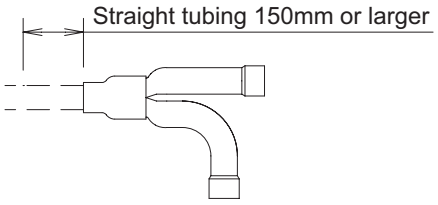


Fig. 2-7-7

NOTE

Avoid forceful cutting that may harm the shape of the joints or tubing. (Inserting the tubing will not be possible if the tube shape is not proper.)

- Cut off as far away from stopper as possible. (Fig. 2-7-8)

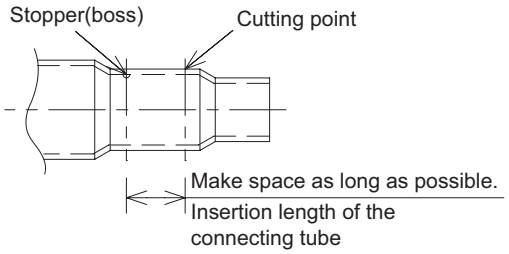


Fig. 2-7-8

- After cutting the joints, be sure to remove burrs on the inside of the joints. (If the joints have been squashed or dented badly, reshaped them using a tube spreader.)
- Make sure there is no dirt or other foreign substances inside the distribution joint.
- When brazing, replace air inside the tube with nitrogen gas to prevent copper oxide from forming.
- To insulate the distribution joint, use the supplied tubing insulation. (If using insulation other than that supplied, make sure that its heat resistance is 120°C or higher.)
- For additional details, see "■ Installing distribution joint" on page 2-2-6.

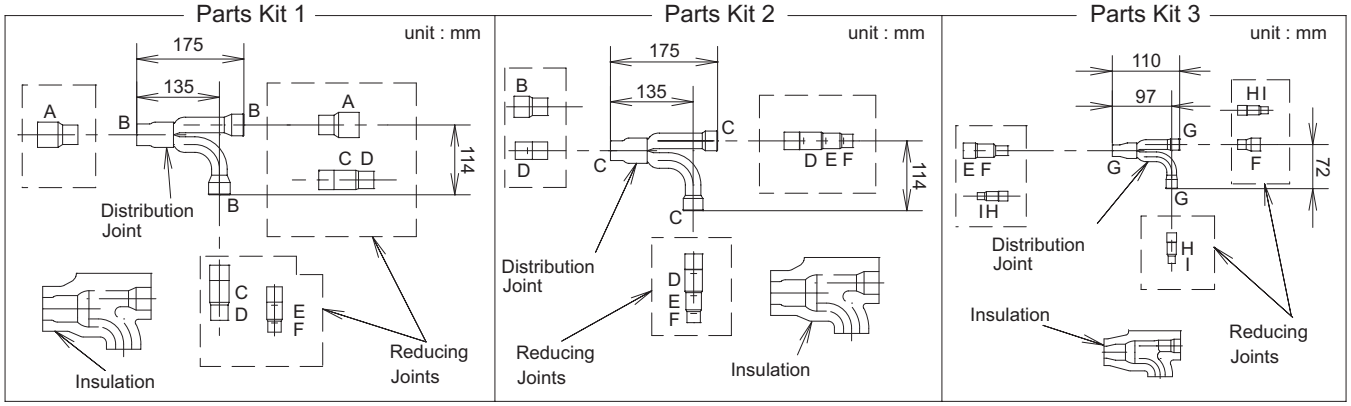
7. Optional Parts

■ CZ-P680PJ2, CZ-P1350PJ2 (for R410A)

Model	Capacity	Parts Kit Combination	
CZ-P1350PJ2	More than 68kW	Parts Kit 1	Parts Kit 3
CZ-P680PJ2	68kW or less	Parts kit 2	Parts Kit 3

How to Attach Distribution Joint

1. Accompanying Parts
   Check the contents of your distribution joint kit.
2. Distribution Joint Kits (with insulation)



- Size of connection point on each part (Shown are inside diameters of tubing)

Size	Part A	Part B	Part C	Part D	Part E	Part F	Part G	Part H	Part I	Part J
mm	ø38.1	ø31.75	ø28.58	ø25.4	ø22.22	ø19.05	ø15.88	ø12.7	ø9.52	ø6.35
Inch	1-1/2	1-1/4	1-1/8	1	7/8	3/4	5/8	1/2	3/8	1/4

* If the gas tube diameter is more than ø38.1, use field-supply reducer.

3. Making Branch Connections
   - For branching tubes, install 150mm or larger (including reducer) straight tubing up to the point where the tube branches (or after the point where the tubes join together). (Fig. 2-7-9)
   - Using a tube cutter, cut the joints at the diameter required to match the outside diameter of the tubing you are connecting. (This is usually done at the installation site.) The tube diameter depends on the total capacity of the indoor unit. Note that you do not have to cut the joints if it already matches the tubing end size. For size selection of the tube diameter, see "■ Table 2-1-9 Indoor Unit Tubing Connection Size" on page 2-1-8.

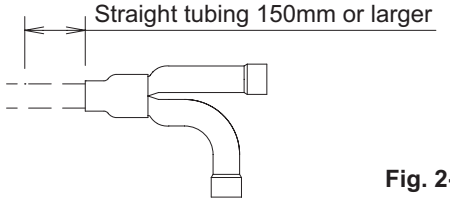


Fig. 2-7-9

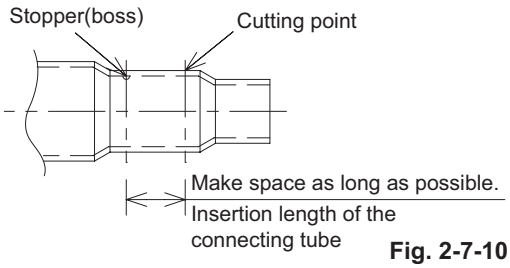


Fig. 2-7-10

NOTE

Avoid forceful cutting that may harm the shape of the joints or tubing. (Inserting the tubing will not be possible if the tube shape is not proper.)

- Cut off as far away from stopper as possible. (Fig. 2-7-10)
- After cutting the joints, be sure to remove burrs on the inside of the joints. (If the joints have been squashed or dented badly, reshaped them using a tube spreader.)
- Make sure there is no dirt or other foreign substances inside the distribution joint.
- The distribution joint can be either horizontal or vertical. (Fig. 2-7-11) In the case of horizontal, the L-shaped tubing must be slanted slightly upward (15˚ to 90˚).
- When brazing, replace air inside the tube with nitrogen gas to prevent copper oxide from forming.
- To insulate the distribution joint, use the supplied tubing insulation. (If using insulation other than that supplied, make sure that its heat resistance is 120°C or higher.)
- For additional details, see "■ Installing distribution joint" on page 2-2-6.

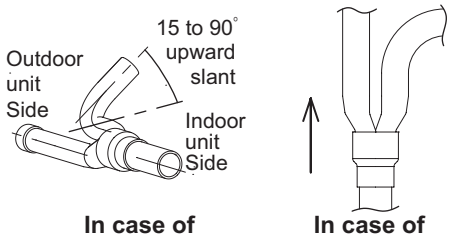


Fig. 2-7-11

Direction of Distribution Joint

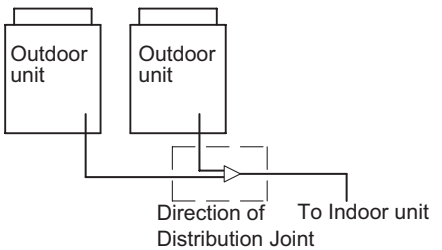


Fig. 2-7-12

7. Optional Parts

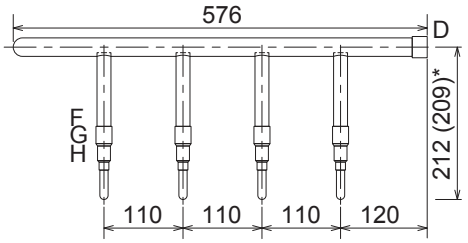
■ CZ-P4HPC2, CZ-P4HP2C2, CZ-P4HP1C2 (for R410A)

Header Tube Kit Installation

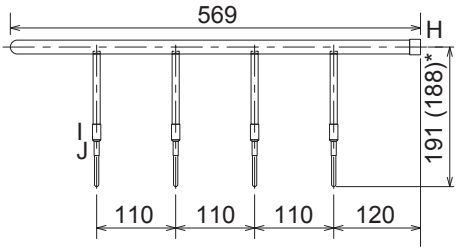
Tube size

Unit : mm

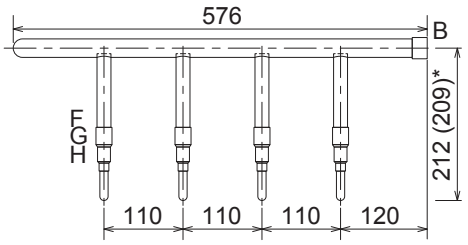
Part No.1 (Gas side)



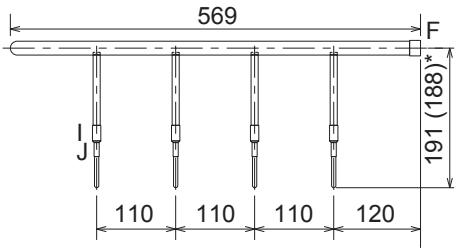
Part No.2 (Liquid side)



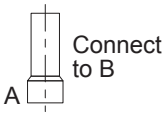
Part No.3 (Gas side)



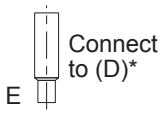
Part No.4 (Liquid side)



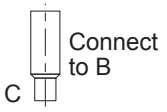
Part No.5



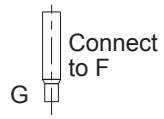
Part No.8



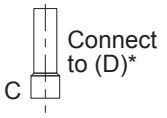
Part No.6



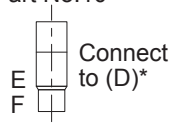
Part No.9



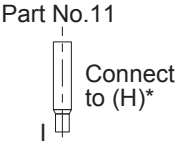
Part No.7



Part No.10



Part No.11



NOTE * The values and alphabets given in the parenthesis indicate the size of CZ-P4HPC2, P4HP1C2.

- Size of connection joint on each part (shown are inside diameter of tubing)

Size	mm	Inch
A	ø38.1	1-1/2
B	ø31.75	1-1/4
C	ø28.58	1-1/8
D	ø25.4	1
E	ø22.22	7/8
F	ø19.05	3/4
G	ø15.88	5/8
H	ø12.7	1/2
I	ø9.52	3/8
J	ø6.35	1/4

※ If the tube diameter is more than ø38.1, use field-supply reducer.

Supplied Parts

	Part No.1	Part No.2	Part No.3	Part No.4	Part No.5	Part No.6	Part No.7	Part No.8	Part No.9	Part No.10	Part No.11
CZ-P4HPC2	○	○					○	○			
CZ-P4HP2C2			○	○	○	○			○		
CZ-P4HP1C2	○	○								○	○

Header Selection

	Total capacity of indoor units (kW) after distribution joint
CZ-P4HPC2	More than 16.1kW to less than 45.0kW
CZ-P4HP2C2	More than 45.1kW
CZ-P4HP1C2	Less than 28.0kW

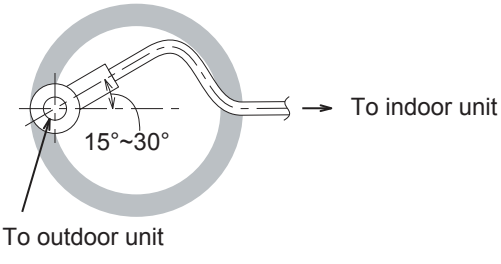
Installation

- Be sure to handle the header tube in the correct direction as shown below.

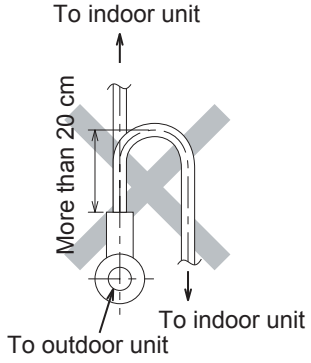
<Horizontal use>

- Be sure to use the tube in the 15-degree to 30-degree tilt position. Regarding the branch tube of the indoor unit side, raise the tube correctly as shown in “Horizontal sideways use” and joint the tube sideways.

Horizontal sideways use

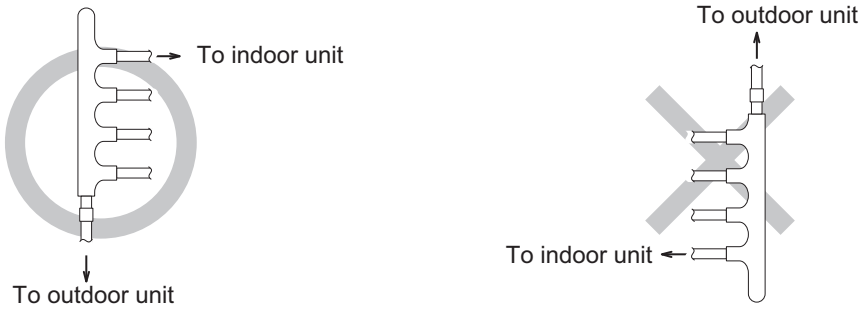


Horizontal upward use



7. Optional Parts

<Vertical use>



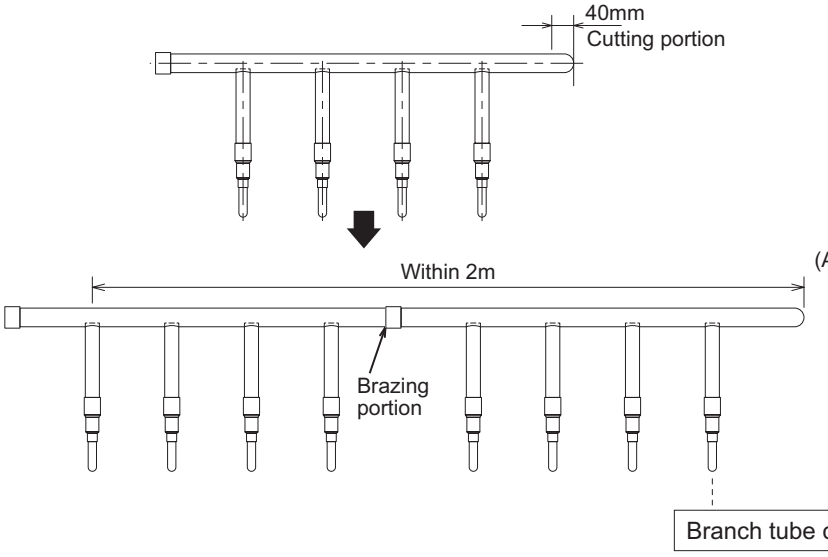
- Cut off the header tube by the pipe cutter according to meet the demand of the local tube size selected in consideration of the total amount of indoor units.
  (It is not necessary to cut off the tube if it is identical to the tip of the size.)

NOTE

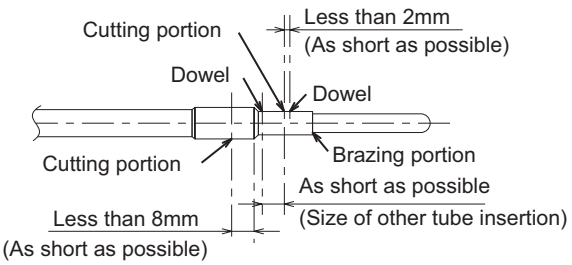
Do not forcibly cut off the tube to escape deformation. (If doing so, connection tube cannot be inserted.)

- When using with 3 indoor units, cut off the tube and joint in the position fitted to the refrigerant tubing size at the side of 3 indoor units. When not to use some of the header tubes, leave as-is.
- When using with 5 to 8 indoor units, joint two header tubes as shown in the figure below. (Limited up to 2 header tubes)
- Maximum length of two header tubes should be within 2m as shown in the figure below.
- Connection of branch-to-branch tube is strictly prohibited.

In case of using header tube kit :



Tube cutting portion :



- After cutting off the tubing, carefully remove burrs from the cut cross section of the tube and make a smooth finish.
  (If there is any hollow on the tube, enlarge the opening port by a mechanical pipe expander.)
- Use the supplied reducer according to the tube size from the side of outdoor unit. In this case, braze it in the local field.
- Check that there is no foreign substance inside the branch tube.
- Use the supplied insulator for the insulation of the branch tube.
  (When using other than that, be sure to insulate it to tolerate the temperature of more than 120°C.)
- See "■ Installing distribution joint" on page 2-2-6 as a reference.

Request for Replacement of Nitrogen When Brazing

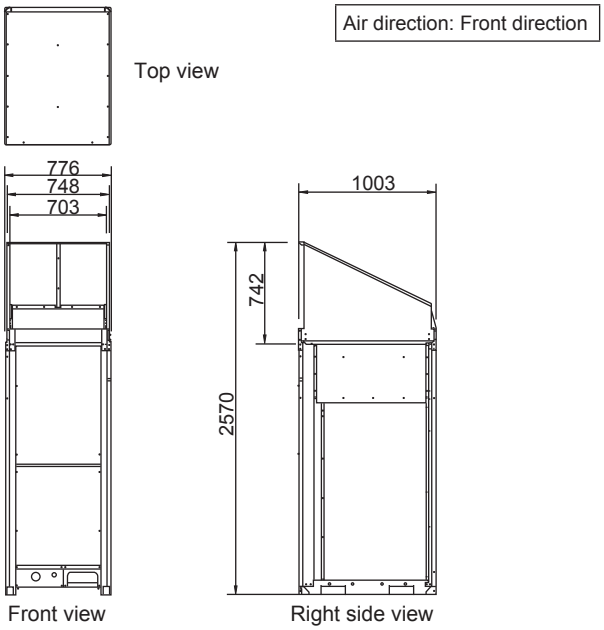
If the replacement of nitrogen was not carried out when brazing the refrigerant tube of the outdoor unit and indoor unit, oxidized scale occurs and the motor valve and strainer become clogged.
This will cause malfunction. It is necessary to replace the air in the tube with the nitrogen gas when brazing the tube and prevent the trouble caused by the oxidized scale.

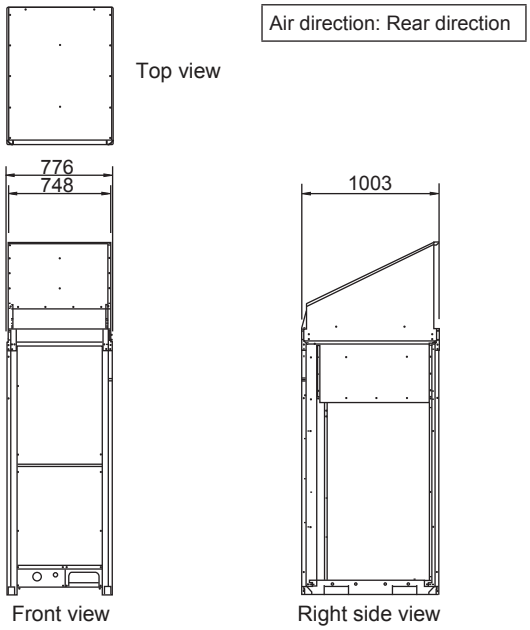
8. Supplement

1. Air-Discharge Chamber (S) (field supply)

Reference Diagram for Air-Discharge Chamber

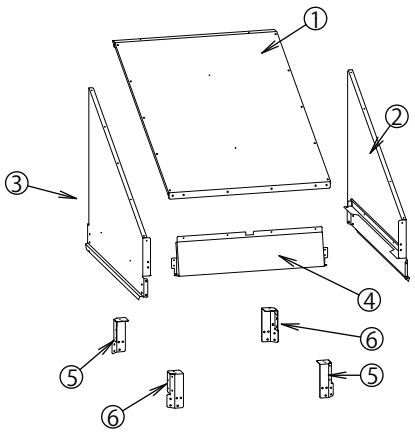
Model : U-8ME2E8, 10ME2E8

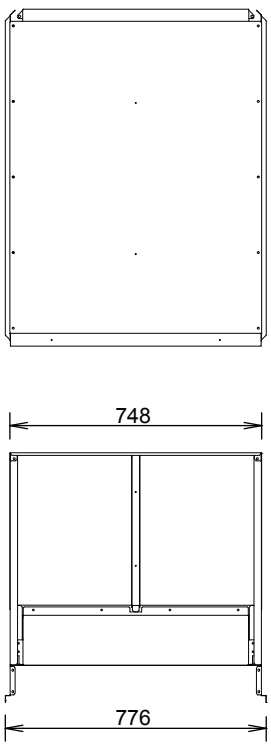




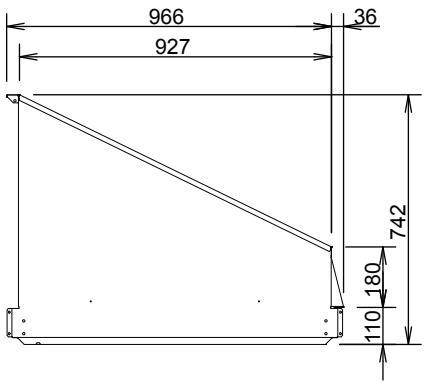
Necessary Assembling Parts

unit: mm





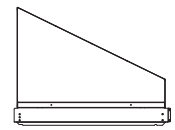
	Parts	Q'ty	Thickness
①	Topside Cover (S)	1	—
②	Side Panel (Left)	1	—
③	Side Panel (Right)	1	—
④	Rear Cover (S)	1	0.8
⑤	Bracket A	2	1.2
⑥	Bracket B	2	1.2
	Tapping Screw (4mm x 12mm)	20	—
	Tap Tight Screw (5mm x 10mm)	32	—



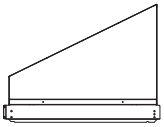
8. Supplement

Installation of Air-Discharge Chamber (S)

- The parts shown below are locally procured parts.
- Choose the parts free from rust or rustless material in order to prevent rust and salt-air damage resistance.
- The parts are available for use of the air-discharge chamber (S) and snow-proof vents (S).
- When using for the snow-proof vents (S) (air-discharge duct), first attach this air-discharge chamber (S) and then the snow-proof vents (S) (air intake duct).



Side Panel (Left)



Side Panel (Right)

Rear Cover (S)

Topside Cover (S)

Bracket A

Bracket B

Bracket B

Parts	Q'ty
Topside Cover (S)	1
Side Panel (Left)	1
Side Panel (Right)	1
Rear Cover (S)	1
Bracket A	2
Bracket B	2
Tapping Screw (4mm x 12mm)	20
Tap Tight Screw (5mm x 10mm)	32

NOTE

- Install the duct where there is well enough for ventilation even if a strong wind is blowing.

Tightening Screws

- The screws for fixing parts indicate by number as shown in the chart.
- Tighten with Tapping Screw (4mm x 12mm) for the number (1).
- Tighten with Tap Tight Screw (5mm x 10mm) for the number (2).
- Remove the screw (C) tightened to the unit. It is available for reuse.

How to Install Air-Discharge Chamber

- The installation work must be carried out with a partner for safety.
- To accomplish the parts assembly, follow the steps below.
- If the parts assembly is performed in a different way, installation will not successfully complete.

1. Bracket Attachment

Attach Bracket A and Bracket B at each corner post of the unit (as shown below).
Tighten with 3 screws respectively per corner post.

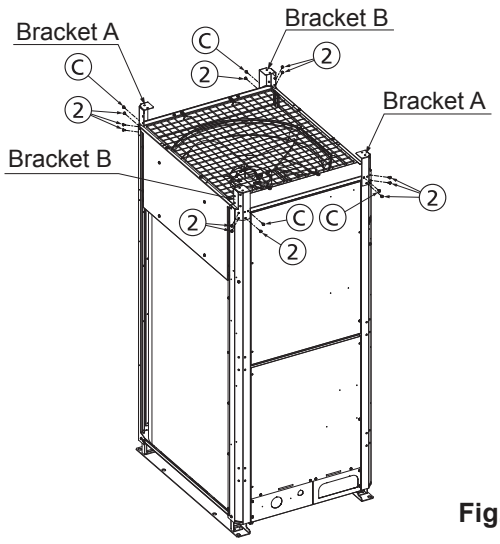


Fig. 2-8-1

8. Supplement

2. Rear Cover (S) Attachment

Attach Rear Cover (S) to the upside of Bracket A and Bracket B.
Tighten with 2 screws from upside.

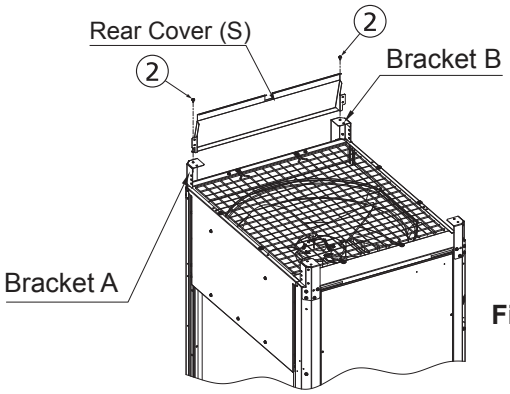


Fig. 2-8-2

3. Side Panel Attachment (Left & Right)

Fix one side panel on the top of the unit.
Place the side panels so that the flap of Rear Cover (S) should fit inside the side panels as shown in the chart.
At first, tighten with 2 screws (5mm x 10mm) respectively from upside marked with an asterisk as shown in the chart.
Then tighten 10 other locations respectively on the sideways of the brackets and rear panel.
Repeat the same procedure as described above for other side panel.

★ : At first, tighten with 4 screws marked with the asterisk.
(① 4mm x 2, ② M5 x 9)

＊ : Same procedure for the right side panel marked with the asterisk

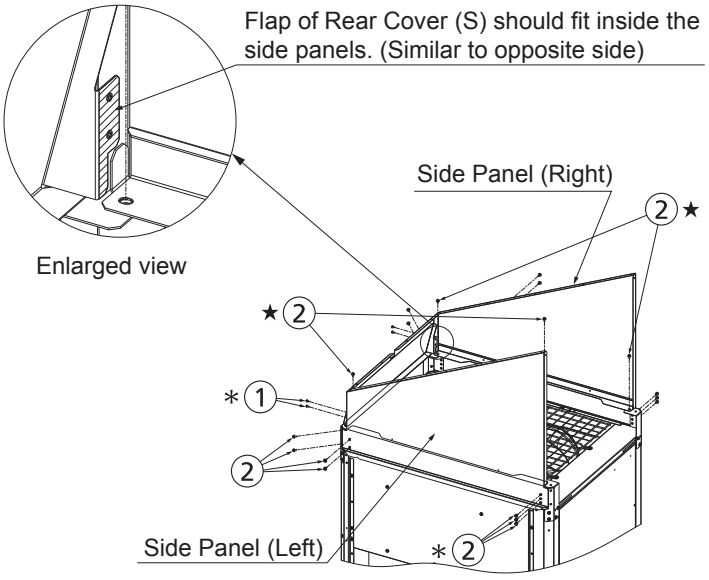


Fig. 2-8-3

4. Topside Cover (S) Attachment

Fix Topside Cover (S), Side Panel (Left and Right) and Rear Cover (S).
Tighten with 16 screws.

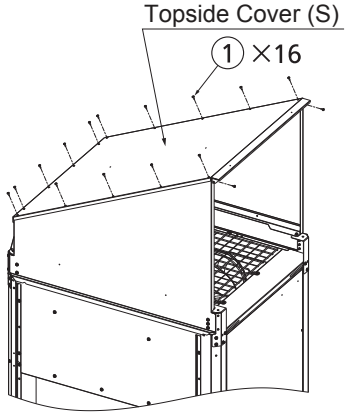


Fig. 2-8-4

8. Supplement

Reference Diagram for Side Panel (Left) (field supply) : 1107-332

RMK	PART NAME	Q'ty
1	COV SIDE L 780	1
2	PL MTG 411	1

unit: mm

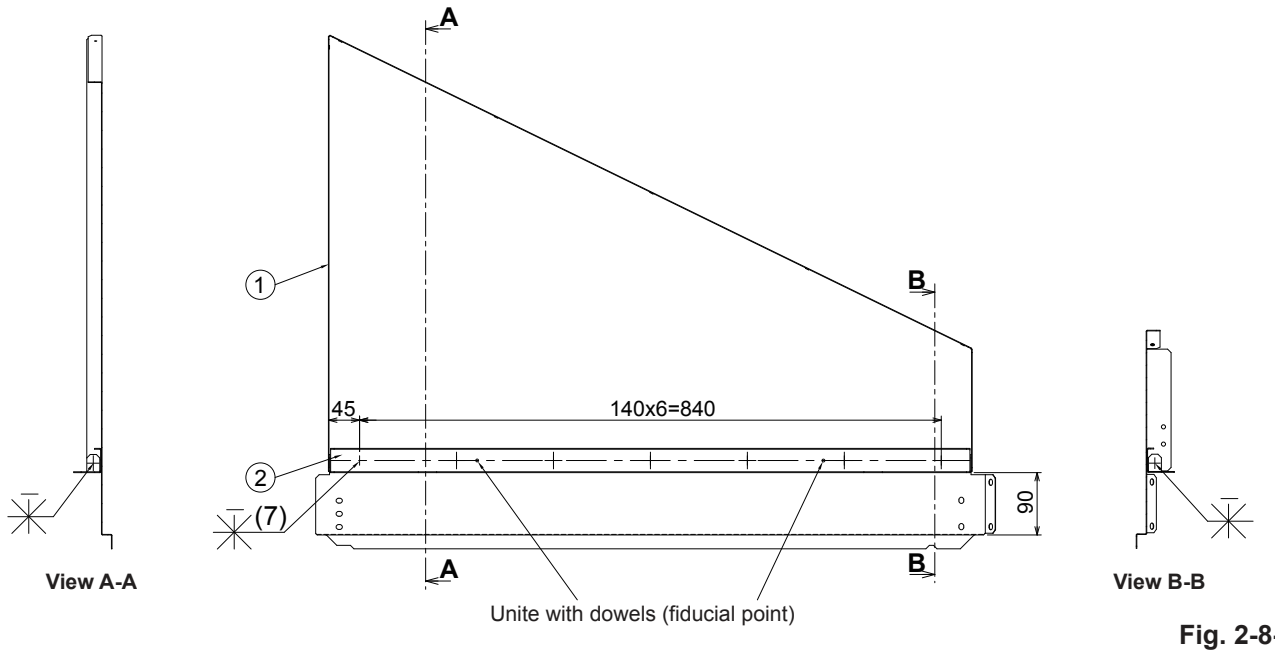


Fig. 2-8-5

Reference Diagram for Side Panel (Left) (field supply) : COV SIDE L 780

unit: mm

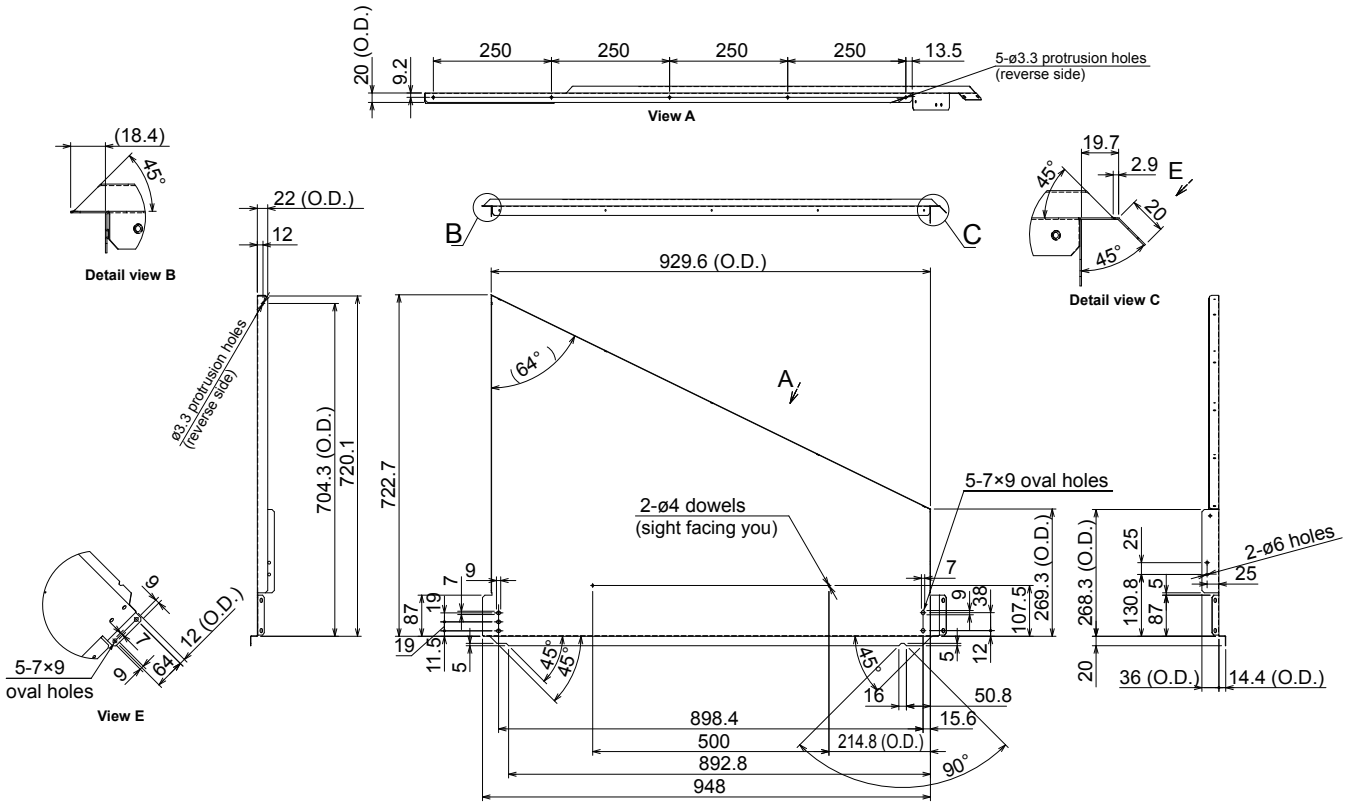


Fig. 2-8-6

8. Supplement

Reference Diagram for Side Panel (Left) (field supply) : PL MTG 411

unit: mm

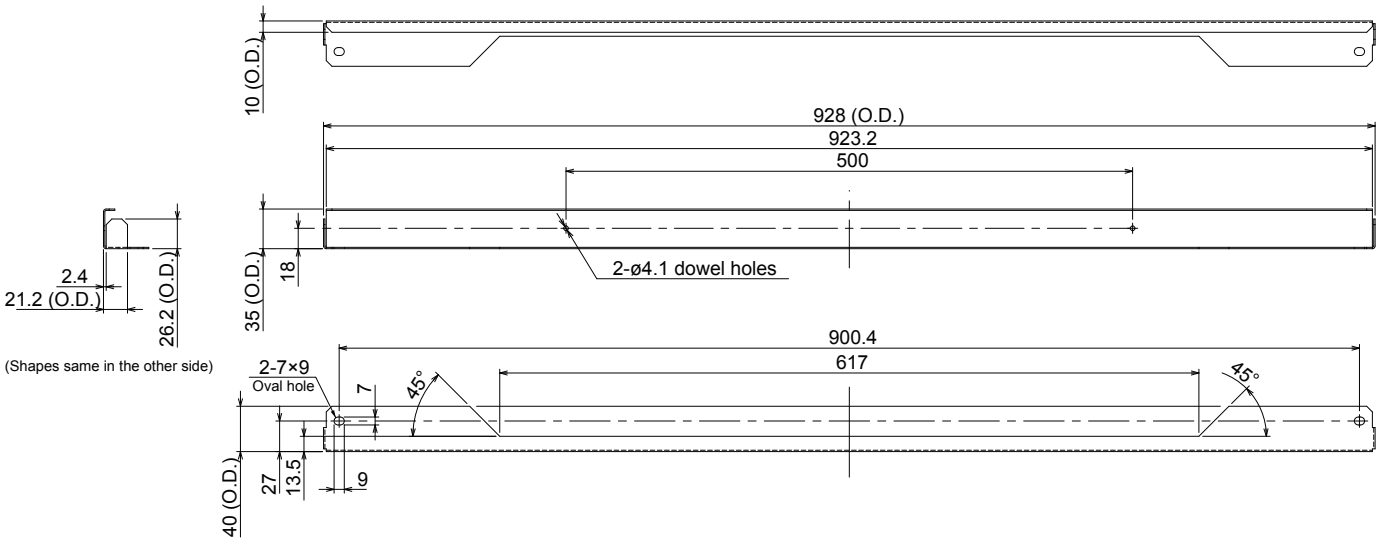


Fig. 2-8-7

8. Supplement

Reference Diagram for Side Panel (Right) (field supply) : 1108-338

RMK	PART NAME	Q'ty
1	COV SIDE R 502	1
2	PL MTG 411*	1

* Same as Fig. 2-8-7

unit: mm

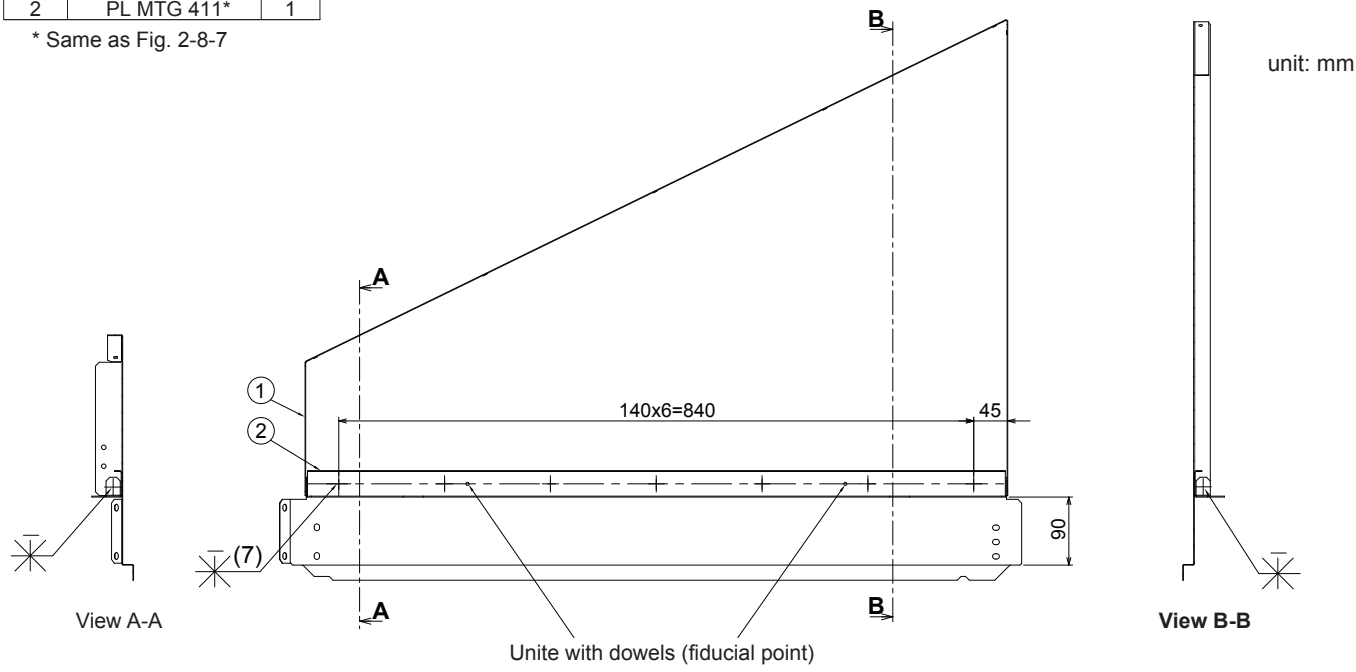


Fig. 2-8-8

Reference Diagram for Side Panel (Right) (field supply) : COV SIDE R 502

unit: mm

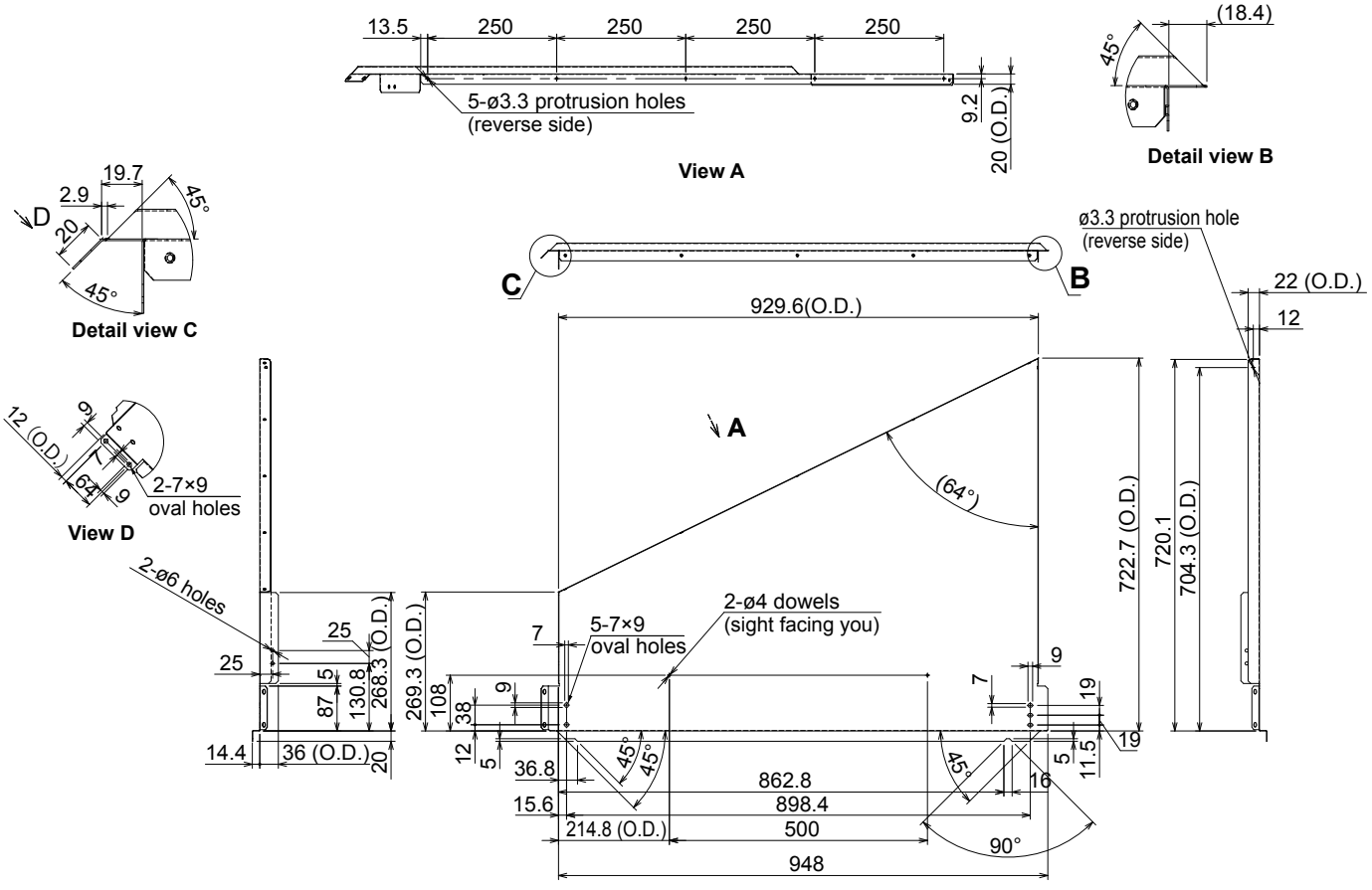
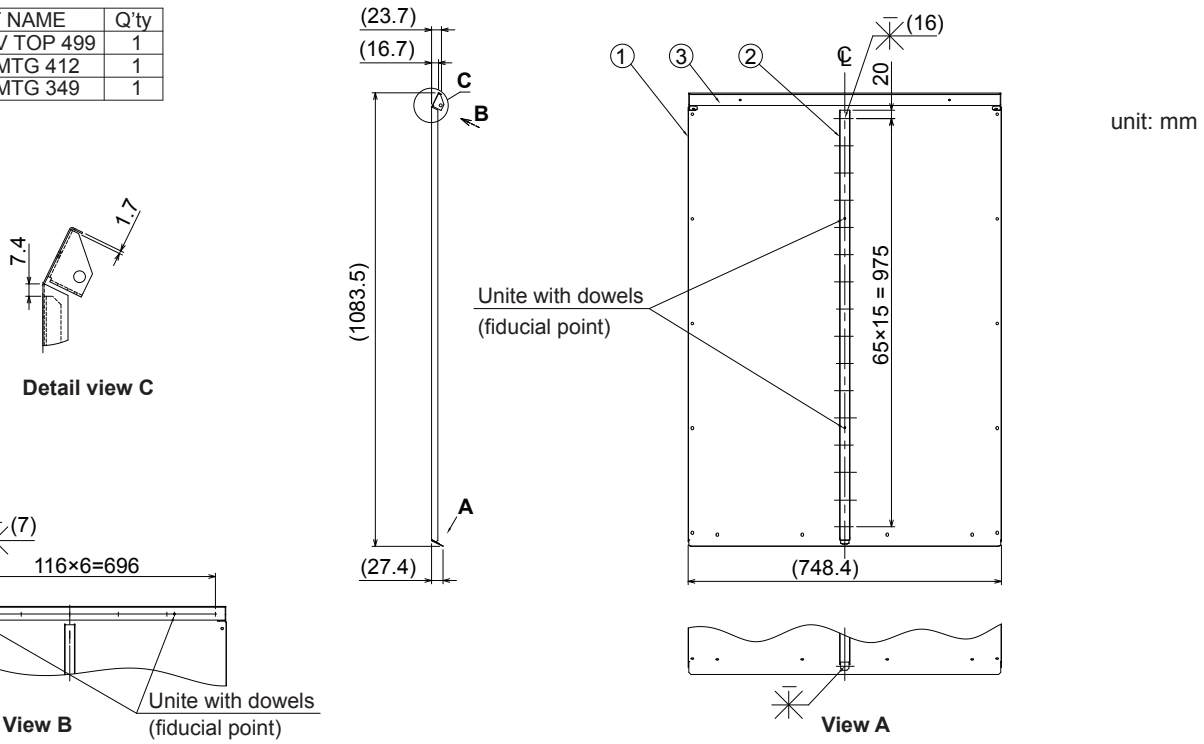


Fig. 2-8-9

8. Supplement

Reference Diagram for Topside Cover (S) (field supply) : 1106-362

RMK	PART NAME	Q'ty
1	COV TOP 499	1
2	PL MTG 412	1
3	PL MTG 349	1

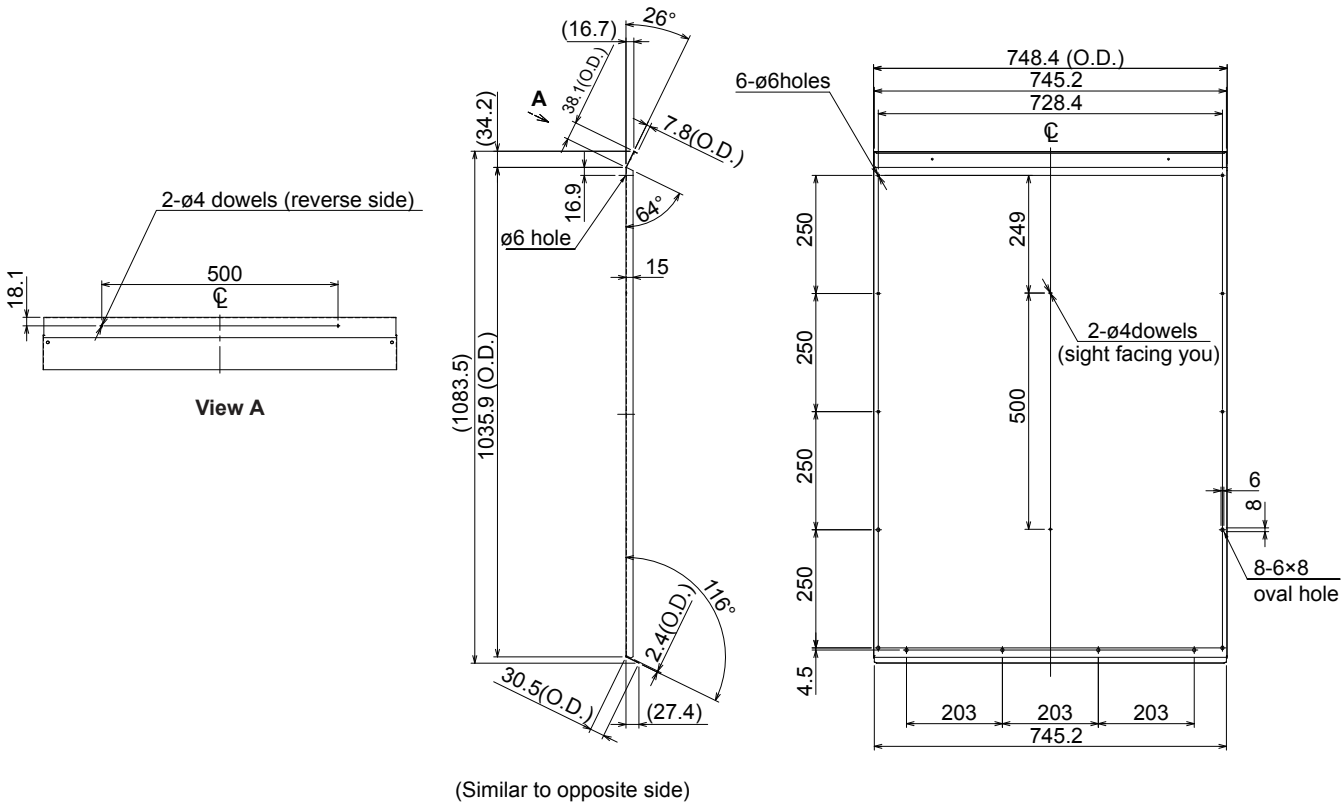


unit: mm

Fig. 2-8-10

Reference Diagram for Topside Cover (S) (field supply) : COV TOP 499

unit: mm



(Similar to opposite side)

Fig. 2-8-11

8. Supplement

Reference Diagram for Topside Cover (S) (field supply) : PL MTG 412

unit: mm

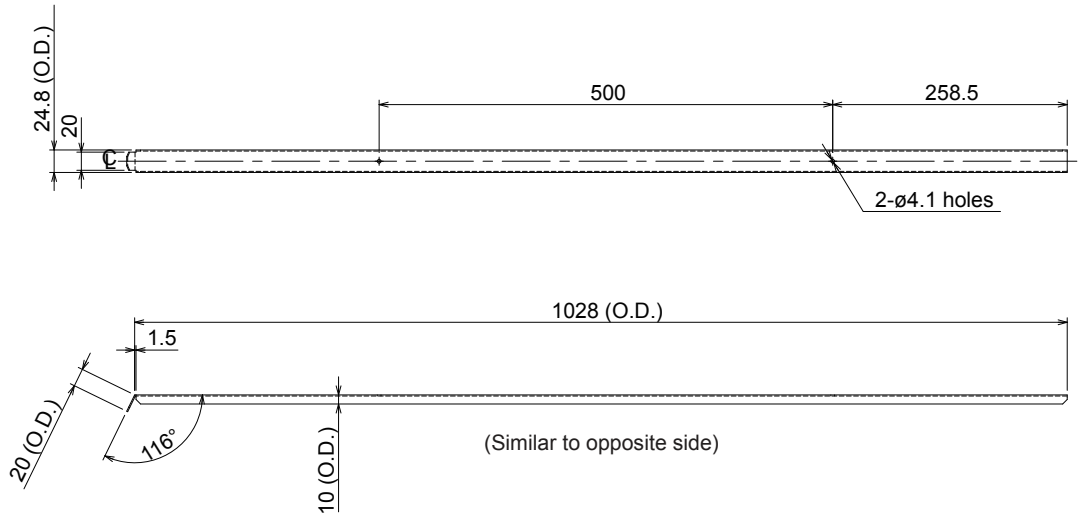


Fig. 2-8-12

Reference Diagram for Topside Cover (S) (field supply) : PL MTG 349

unit: mm

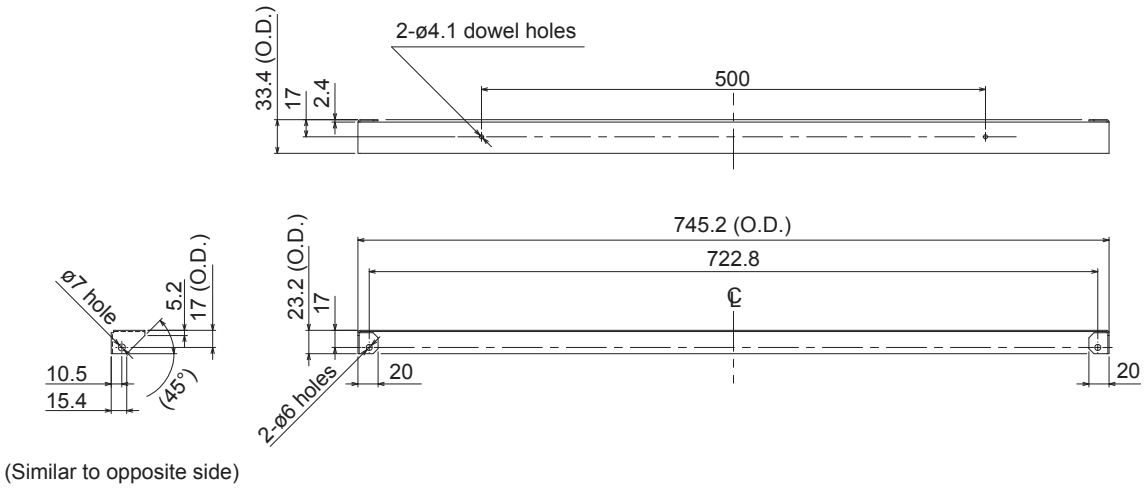


Fig. 2-8-13

8. Supplement

Reference Diagram for Rear Cover (S) (field supply) : 1109-482

unit: mm

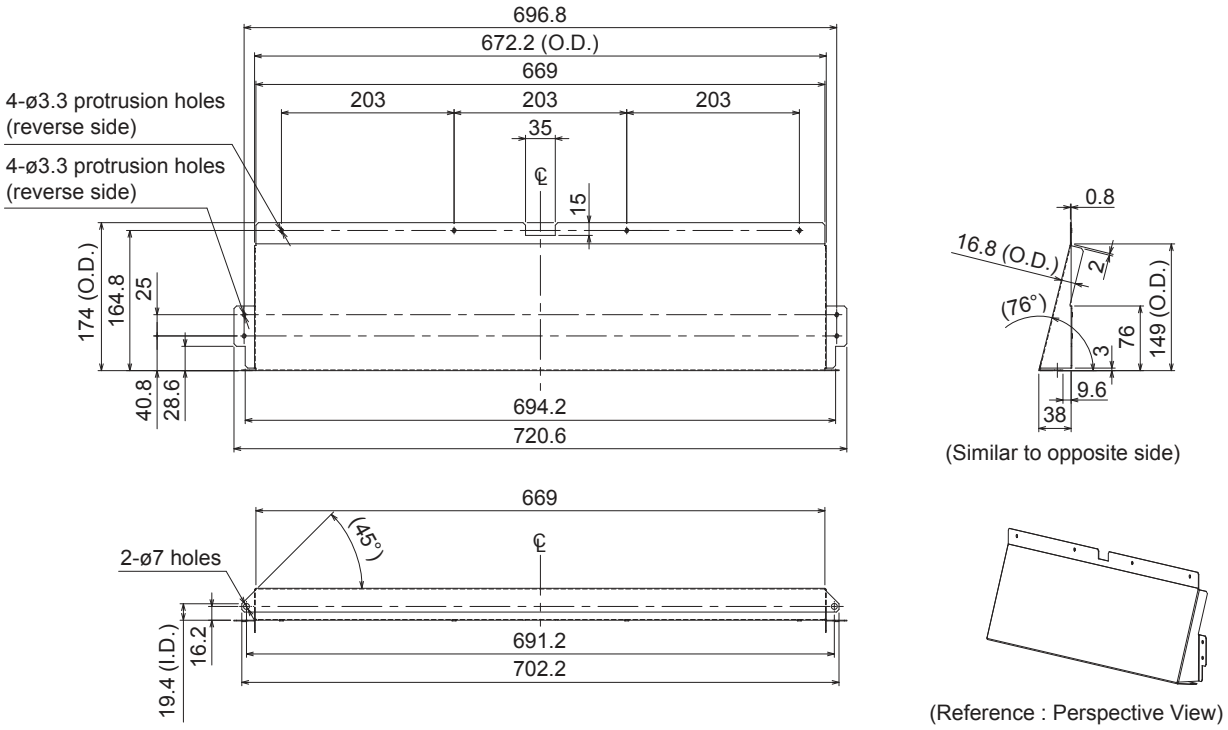


Fig. 2-8-14

Reference Diagram for Bracket A (field supply) : 1136-410

unit: mm

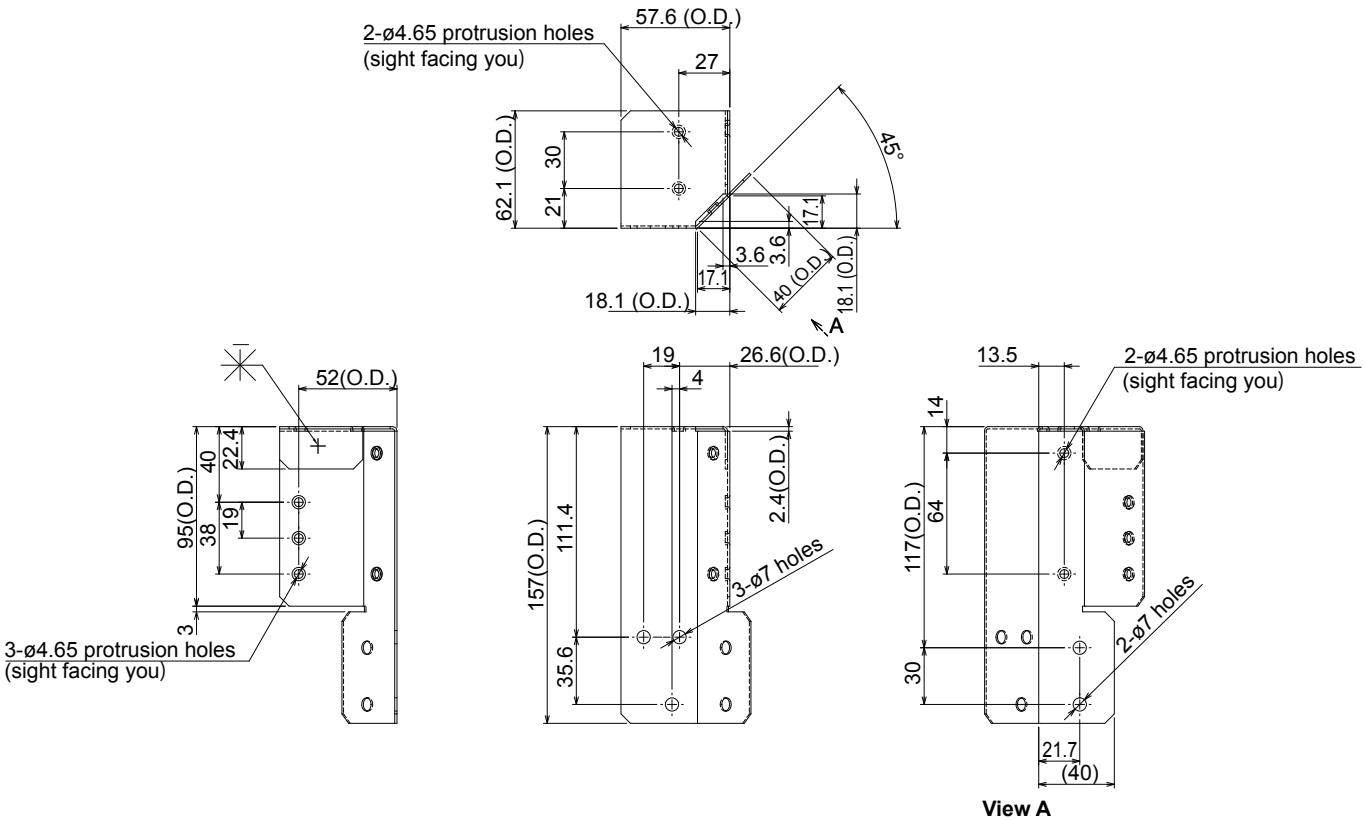


Fig. 2-8-15

8. Supplement

Reference Diagram for Bracket B (field supply) : 1136-409

unit: mm

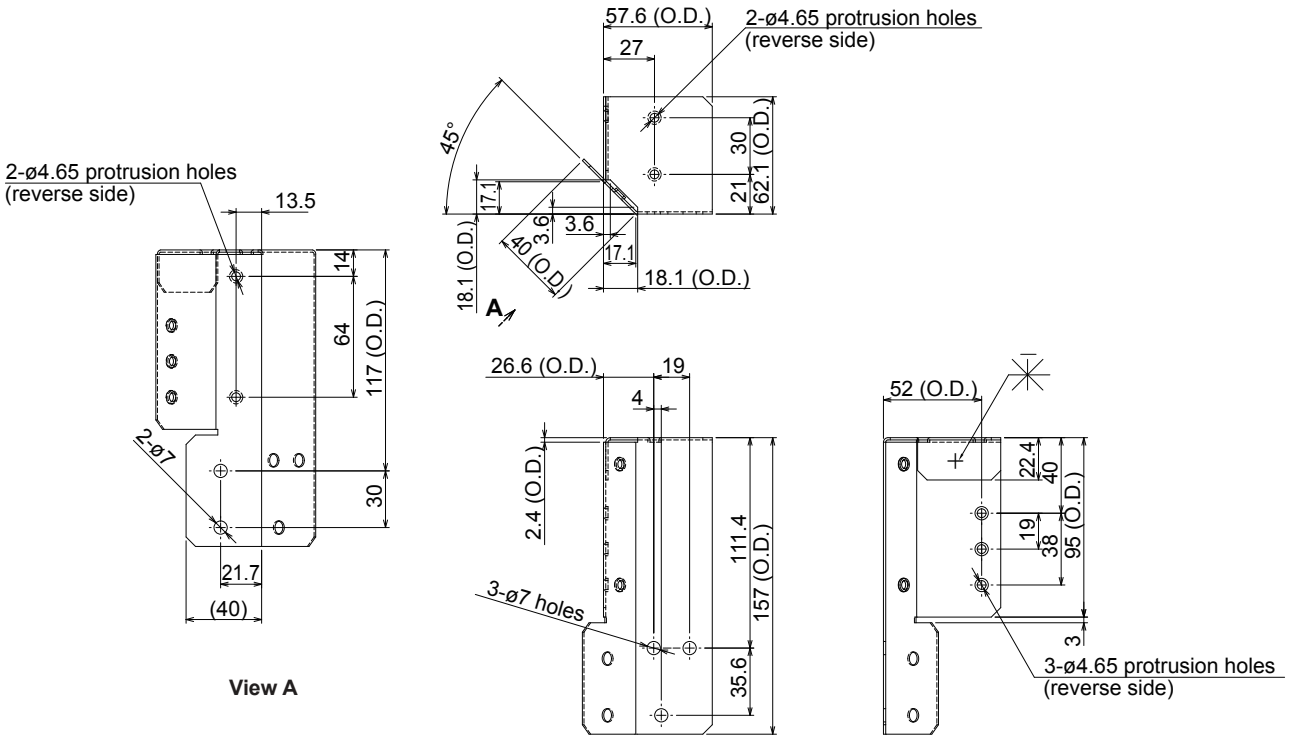


Fig. 2-8-16

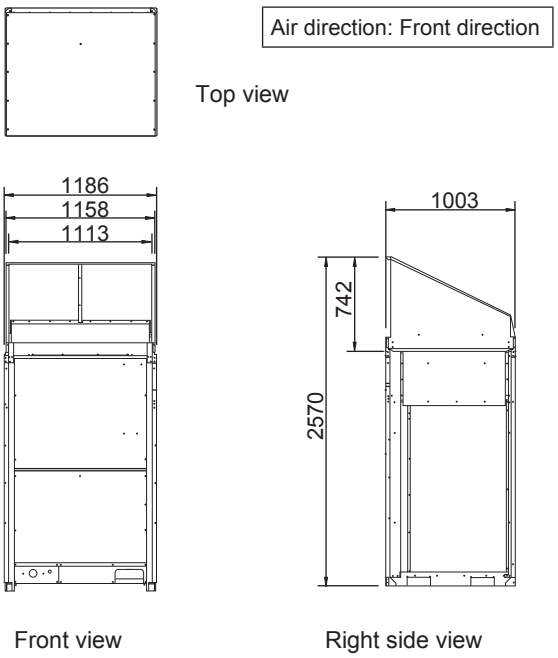
8. Supplement

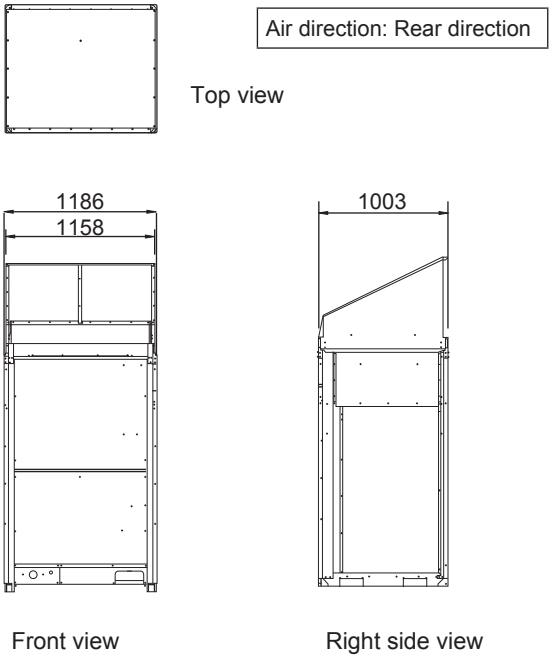
2. Air-Discharge Chamber (M) (field supply)

Reference Diagram for Air-Discharge Chamber

Model : U-12ME2E8, 14ME2E8, 16ME2E8

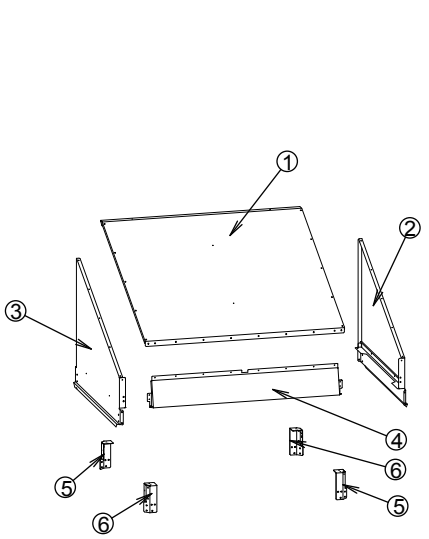
unit: mm

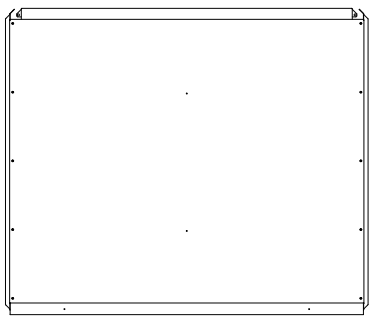




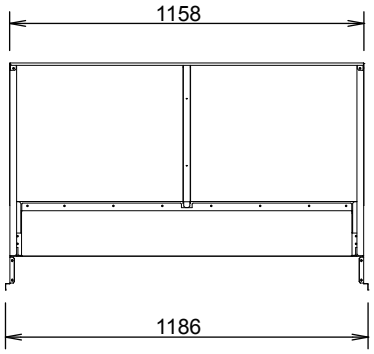
Necessary Assembling Parts

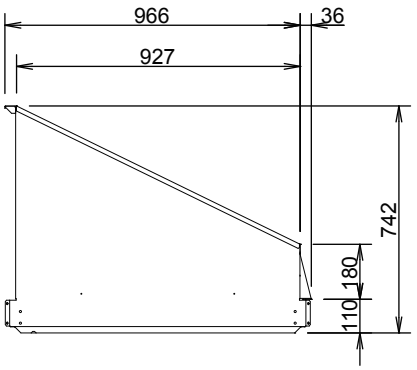
unit: mm





	Parts	Q'ty	Thickness
①	Topside Cover (M)	1	—
②	Side Panel (Left)	1	—
③	Side Panel (Right)	1	—
④	Rear Cover (M)	1	0.8
⑤	Bracket A	2	1.2
⑥	Bracket B	2	1.2
	Tapping Screw (4mm x 12mm)	24	—
	Tap Tight Screw (5mm x 10mm)	32	—

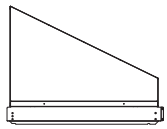


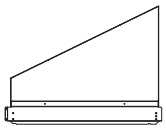


8. Supplement

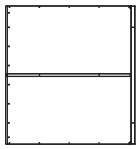
Installation of Air-Discharge Chamber (M)

- The parts shown below are locally procured parts.
- Choose the parts free from rust or rustless material in order to prevent rust and salt-air damage resistance.
- The parts are available for use of the air-discharge chamber (M) and snow-proof vents (M).
- When using for the snow-proof vents (M) (air-discharge duct), first attach this air-discharge chamber (M) and then the snow-proof vents (M) (air intake duct).


Side Panel (Left)


Side Panel (Right)


Rear Cover (M)


Topside Cover (M)


Bracket A


Bracket B

Parts	Q'ty
Topside Cover (M)	1
Side Panel (Left)	1
Side Panel (Right)	1
Rear Cover (M)	1
Bracket A	2
Bracket B	2
Tapping Screw (4mm x 12mm)	24
Tap Tight Screw (5mm x 10mm)	32

NOTE

- Install the duct where there is well enough for ventilation even if a strong wind is blowing.

Tightening Screws

- The screws for fixing parts indicate by number as shown in the chart.
- Tighten with Tapping Screw (4mm x 12mm) for the number ①.
- Tighten with Tap Tight Screw (5mm x 10mm) for the number ②.
- Remove the screw Ⓒ tightened to the unit. It is available for reuse.

How to Install Air-Discharge Chamber

- The installation work must be carried out with a partner for safety.
- To accomplish the parts assembly, follow the steps below.
- If the parts assembly is performed in a different way, installation will not successfully complete.

1. Bracket Attachment

Attach Bracket A and Bracket B at each corner post of the unit (as shown below).
Tighten with 3 screws respectively per corner post.

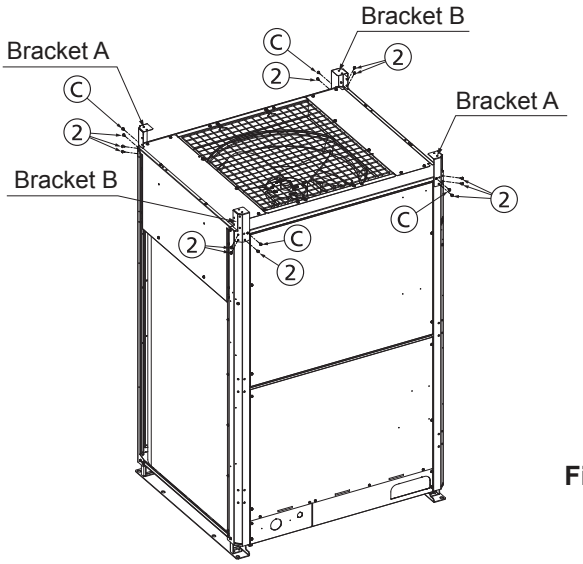


Fig. 2-8-17

8. Supplement

2. Rear Cover (M) Attachment

Attach Rear Cover (M) to the upside of Bracket A and Bracket B.
Tighten with 2 screws from upside.

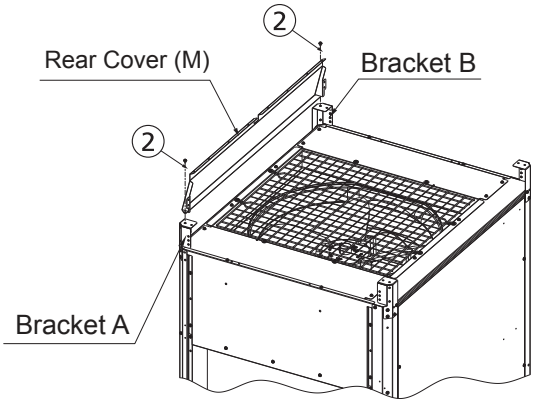


Fig. 2-8-18

3. Side Panel Attachment (Left & Right)

Fix one side panel on the top of the unit.
Place the side panels so that the flap of Rear Cover (M) should fit inside the side panels as shown in the chart.
At first, tighten with 2 screws (5mm x 10mm) respectively from upside marked with an asterisk as shown in the chart.
Then tighten 10 other locations respectively on the sideways of the brackets and rear panel.
Repeat the same procedure as described above for other side panel.

★ : At first, tighten with 4 screws marked with the asterisk.
(① 4mm x 2, ② M5 x 9)

＊ : Same procedure for the right side panel marked with the asterisk

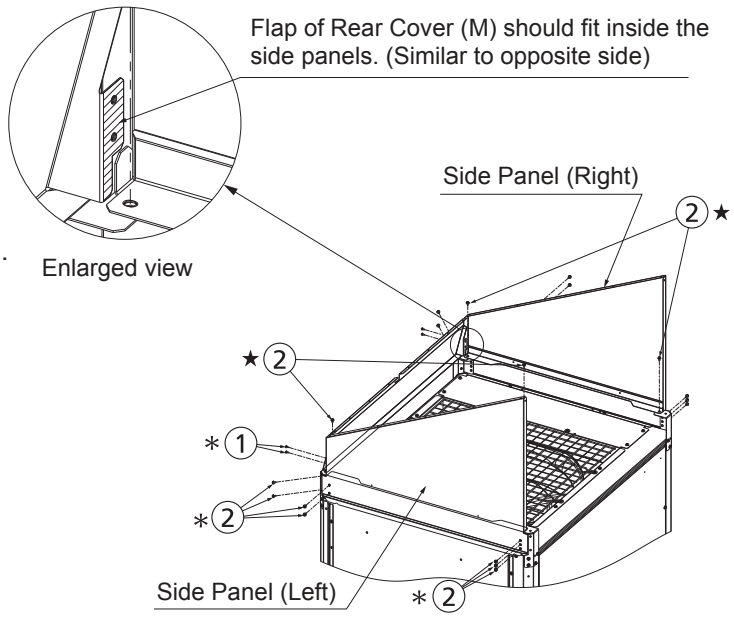


Fig. 2-8-19

4. Topside Cover (M) Attachment

Fix Topside Cover (M), Side Panel (Left and Right) and Rear Cover (M).
Tighten with 20 screws.

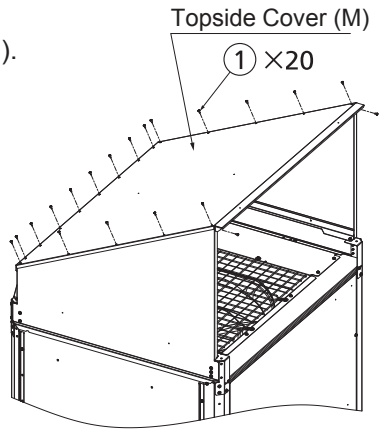


Fig. 2-8-20

8. Supplement

Reference Diagram for Side Panel (Left) (field supply) : 1107-332

RMK	PART NAME	Q'ty
1	COV SIDE L 780	1
2	PL MTG 411	1

The parts are the same as Figure 2-8-5.

Reference Diagram for Side Panel (Right) (field supply) : 1108-338

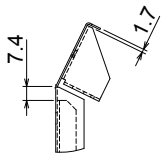
RMK	PART NAME	Q'ty
1	COV SIDE R 502	1
2	PL MTG 411	1

The parts are the same as Figure 2-8-8.

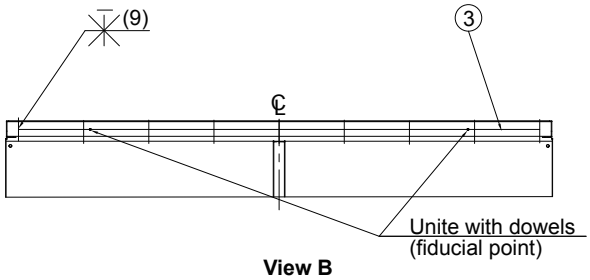
Reference Diagram for Topside Cover (M) (field supply) : 1106-363

RMK	PART NAME	Q'ty
1	COV TOP 498	1
2	PL MTG 412*	1
3	PL MTG 413	1

* Same as Fig. 2-8-12

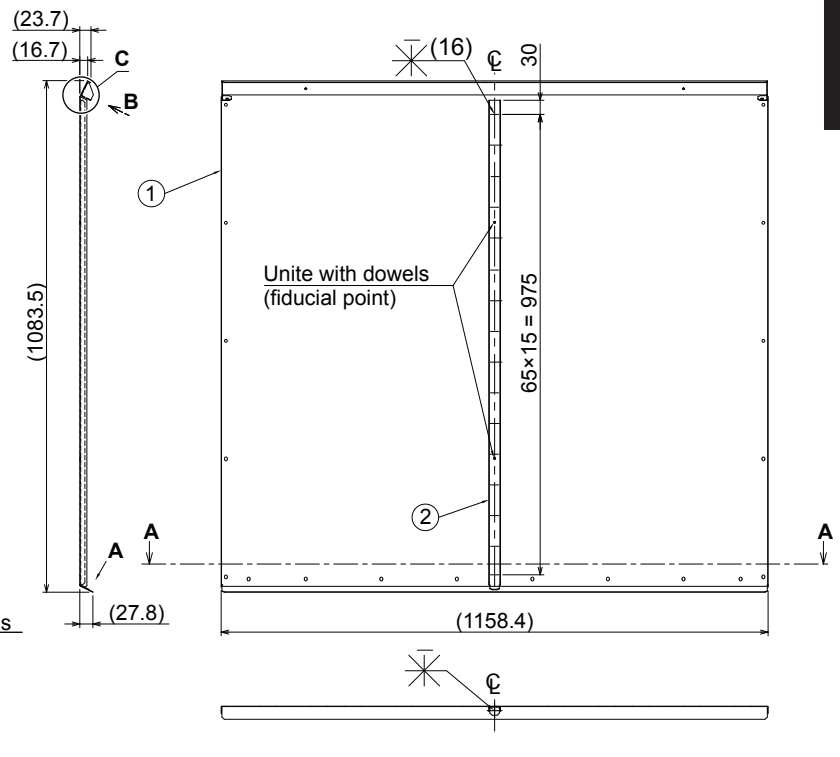


Detail view C



View B

unit: mm



View A-A

Fig. 2-8-21

8. Supplement

Reference Diagram for Topside Cover (M) (field supply) : COV TOP 498

unit: mm

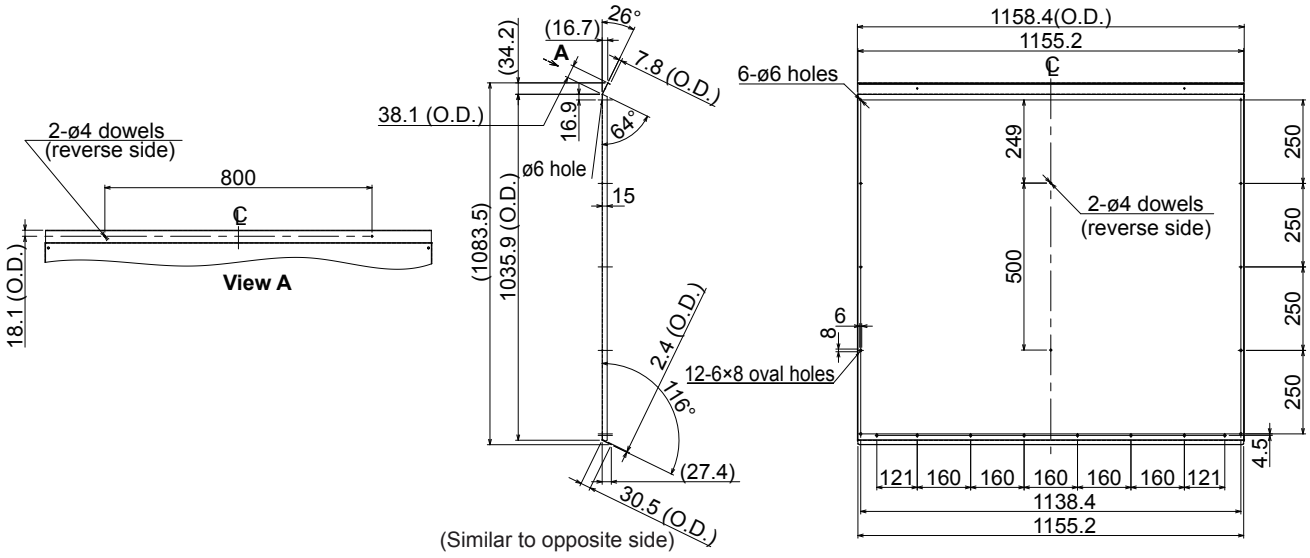


Fig. 2-8-22

Reference Diagram for Topside Cover (M) (field supply) : PL MTG 413

unit: mm

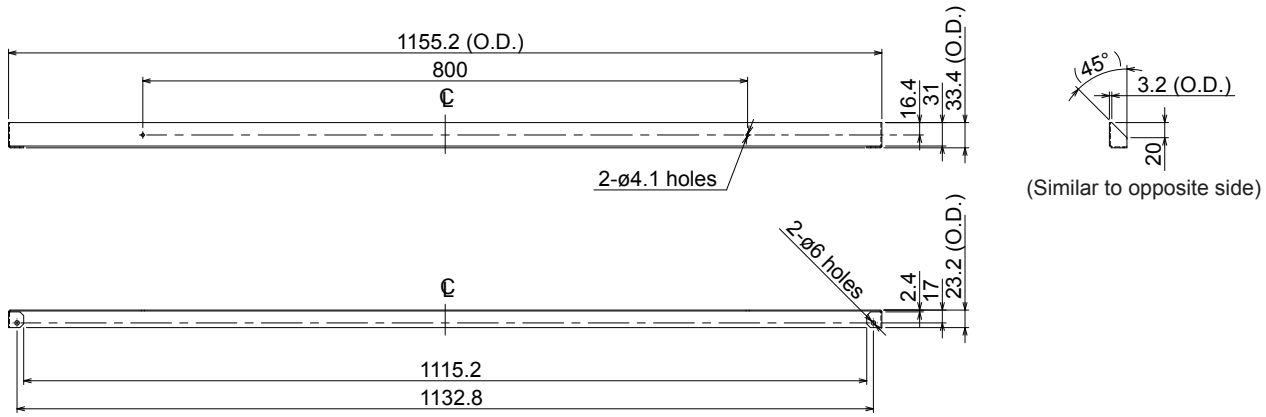


Fig. 2-8-23

8. Supplement

Reference Diagram for Rear Cover (M) (field supply) : 1109-488

unit: mm

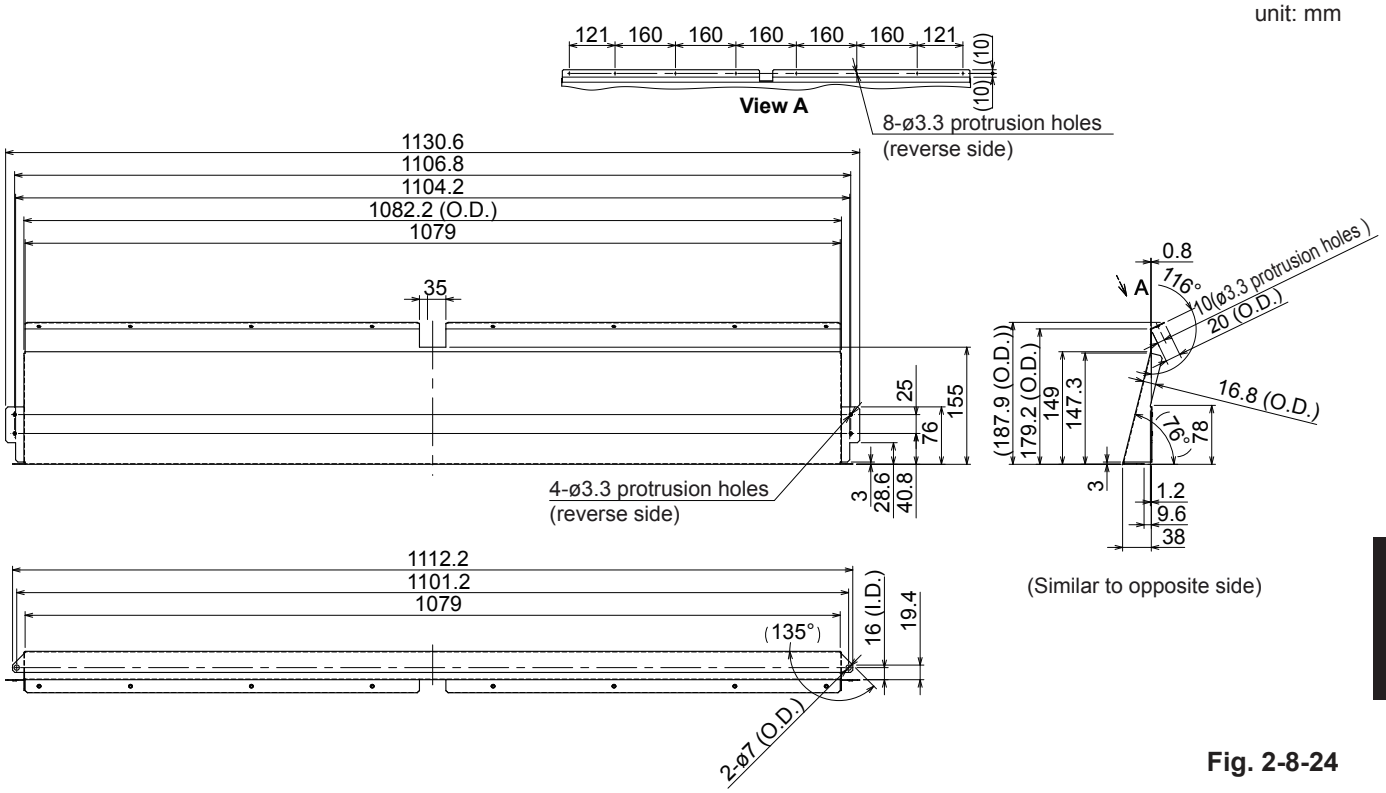


Fig. 2-8-24

Reference Diagram for Bracket A (field supply) : 1136-410

The parts are the same as Figure 2-8-15.

Reference Diagram for Bracket B (field supply) : 1136-409

The parts are the same as Figure 2-8-16.

8. Supplement

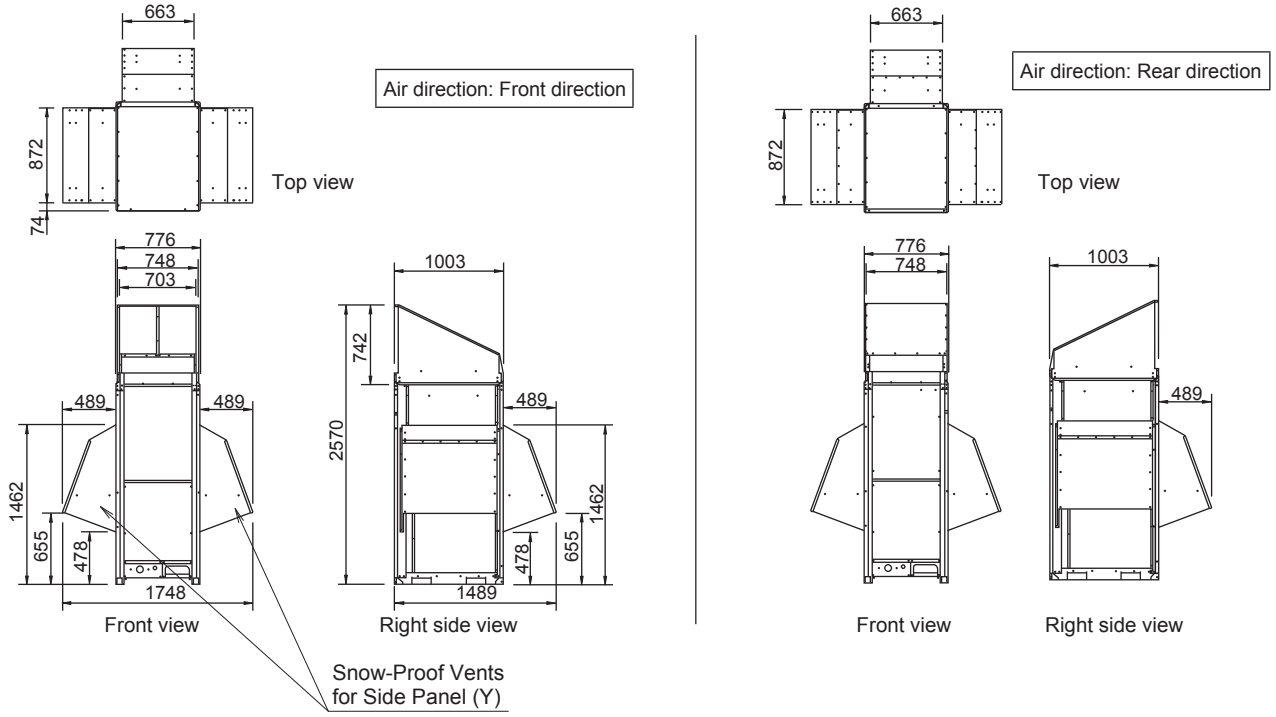
3. Snow-Proof Vents for Side Panel (Y) (Air Intake Duct)(field supply)

Reference Diagram for Snow-Proof Vents (air intake duct)

Model : U-8ME2E8, U-10ME2E8, U-12ME2E8, U-14ME2E8, U-16ME2E8

Example : U-8ME2E8

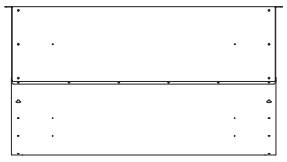
unit: mm

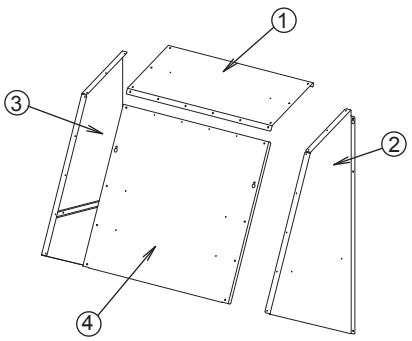


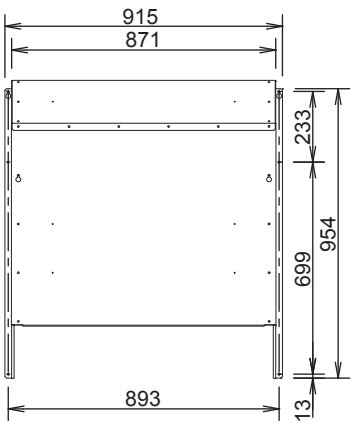
Necessary Assembling Parts

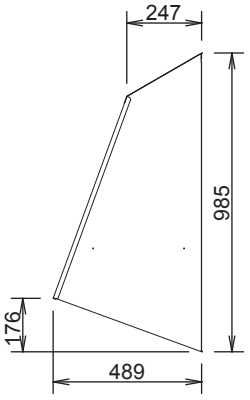
unit: mm

	Parts	Q'ty	Thickness
①	Top Cover (Y)	1	0.8
②	Side Panel (Right)	1	0.8
③	Side Panel (Left)	1	0.8
④	Rear Cover (Y)	1	0.8
	Tapping Screw (4mm x 12mm)	26	—





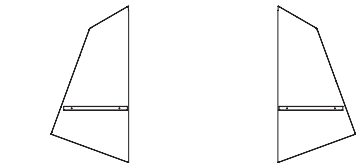


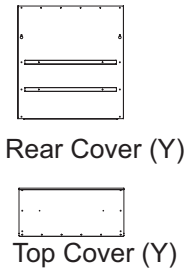


8. Supplement

Installation of Snow-Proof Vents for Side Panel (Y) (air intake duct)

- The parts shown below are locally procured parts.
- The number of pieces shown below indicates the number of installed quantity on one sideways of the unit. (Obtain necessary number of pieces.)
- Choose the parts free from rust or rustless material in order to prevent rust and salt-air damage resistance.
- First install the air-discharge chamber (S,M) (field supply) and then install this snow-proof vents for Side Panel (Y) (air intake duct).
- When setting up a multiple-unit installation, the optional supplemental Installation Kit for Multiple-Unit (field supply) is required.





Parts	Q'ty
Side Panel (Left)	1
Side Panel (Right)	1
Top Cover (Y)	1
Rear Cover (Y)	1
Tapping Screw (4mm x 12mm)	26

NOTE

- Install the air-discharge chamber where there is well enough for ventilation even if a strong wind is blowing.

Tightening Screws

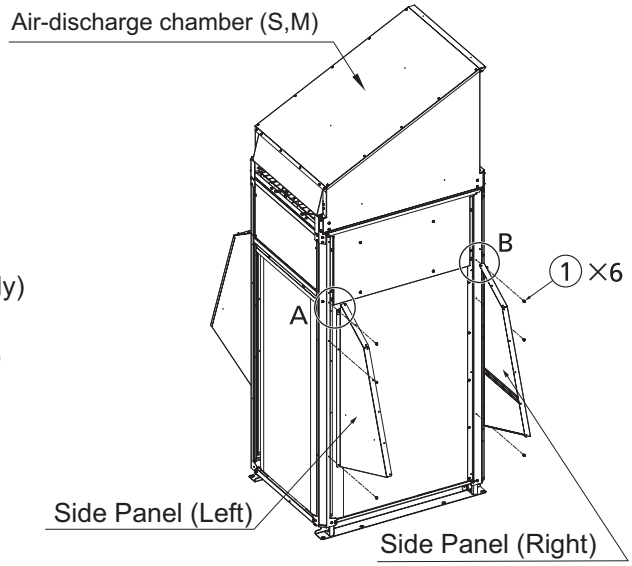
- The screws for fixing parts indicate by number as shown in the chart.
- Tighten with Tapping Screw (4mm x 12mm) for the number ①.

How to Install Snow-Proof Vents for Side Panel (Y) (air intake duct)

To accomplish the parts assembly, follow the steps below.
If the parts assembly is performed in a different way, installation will not successfully complete.

1. How to Install the Snow-Proof Vents for Side Panel(Y) (air intake duct)
   First install the air-discharge chamber (S,M) (field supply) and follow the steps below.
   Regarding the air-discharge chamber (S,M) installation, follow the steps described separately.
2. Side Panel Attachment (Left & Right)
   Attach Side Panel (Left / Right) to the corner post on the side of the unit.
   Attach Side Panel (Left) to the left post and Side Panel (Right) to the right post respectively.
   When installing, tighten the foremost upside screw temporarily. (See detail chart A, B.)
   Attach side panel likely to hook to that screw and then tighten each panel with 2 other screws (total 3 screws) securely.

Example : U-8ME2E8



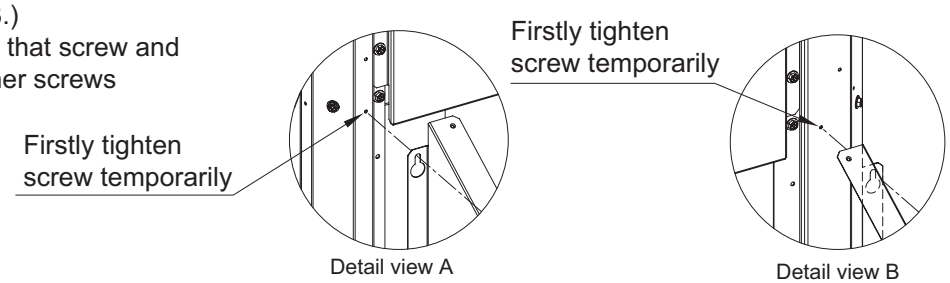


Fig. 2-8-25

8. Supplement

3. Rear Cover (Y) Attachment

Attach Rear Cover (Y) to the top of both side panels as described in step 2 above.
When installing, tighten the second upside screws on both side temporarily.
Attach Rear Cover (Y) likely to hook to that screw and then tighten with 6 other screws (total 8 screws) securely.
See Fig. 2-8-26.

Example : U-8ME2E8

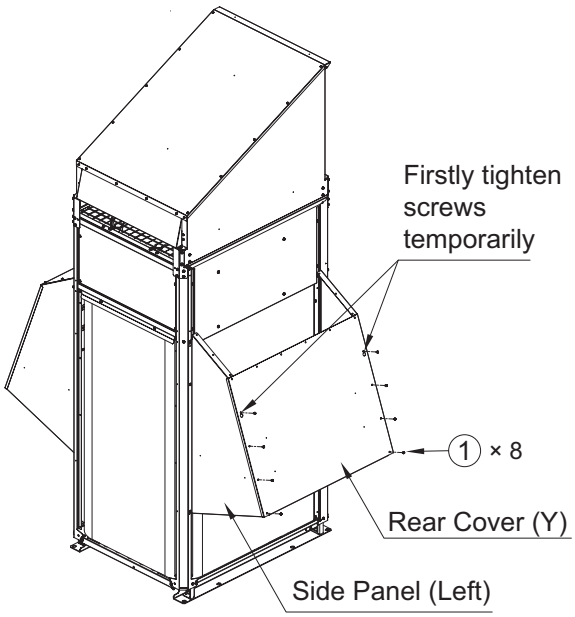


Fig. 2-8-26

4. Top Cover Attachment

Attach the topside cover to upside the rear cover as described in step 3 above and tighten with 12 screws.
See Fig. 2-8-27.

Example : U-8ME2E8

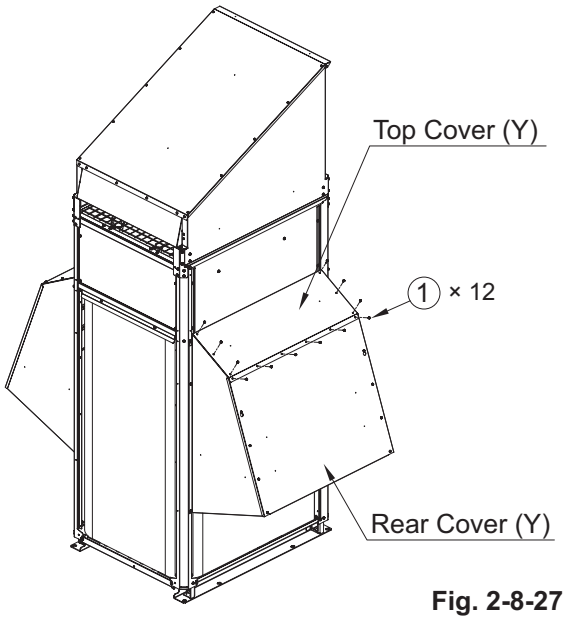


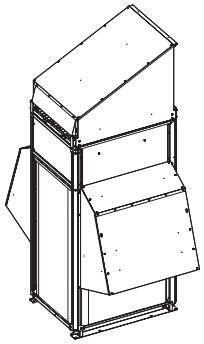
Fig. 2-8-27

5. Opposite Side Attachment

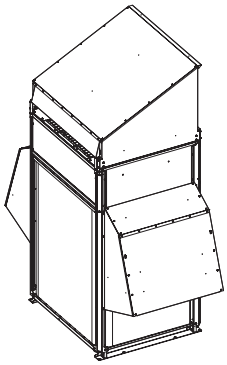
When installing the snow-proof vents for Side Panel (Y) (air intake duct) to the opposite side of the unit, follow steps 2 - 4 described above.

Reference : Brief Assembly Diagram for Each Outdoor Unit

Model : U-8ME2E8
U-10ME2E8



Model : U-12ME2E8
U-14ME2E8
U-16ME2E8



8. Supplement

Reference Diagram for Side Panel (Left) (field supply) : 1107-331

RMK	PART NAME	Q'ty
1	COV SIDE L 779	1
2	PL MTG 359	1

unit: mm

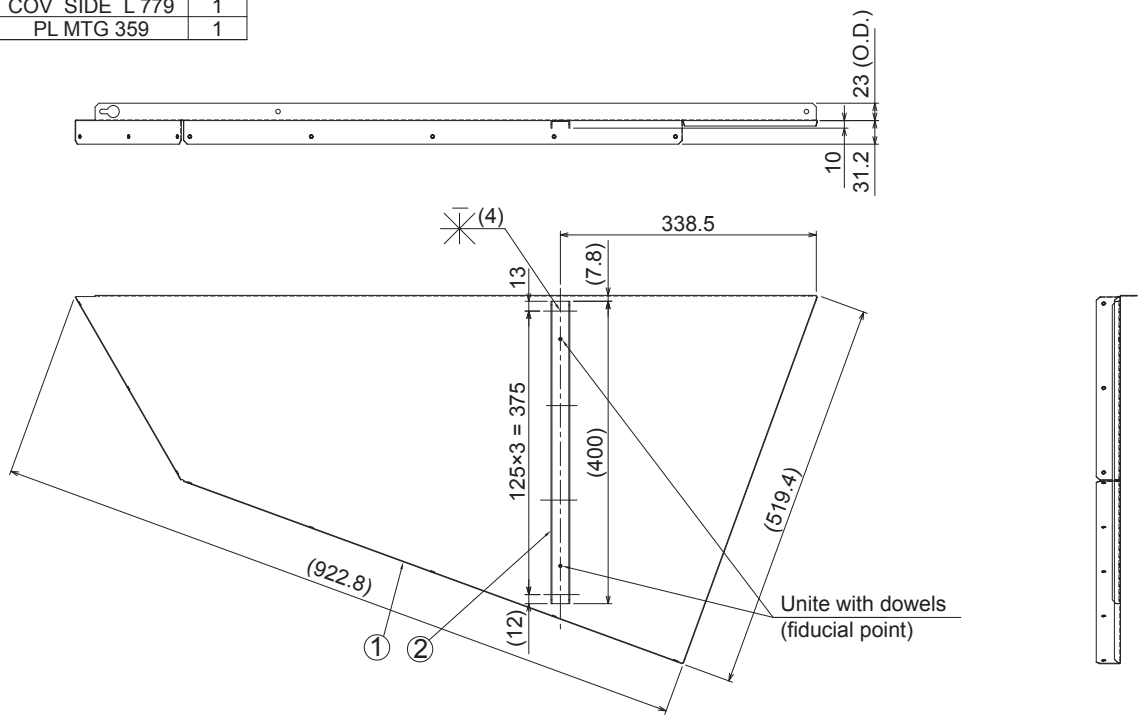


Fig. 2-8-28

Reference Diagram for Side Panel (Left) (field supply) : COV SIDE L 779

unit: mm

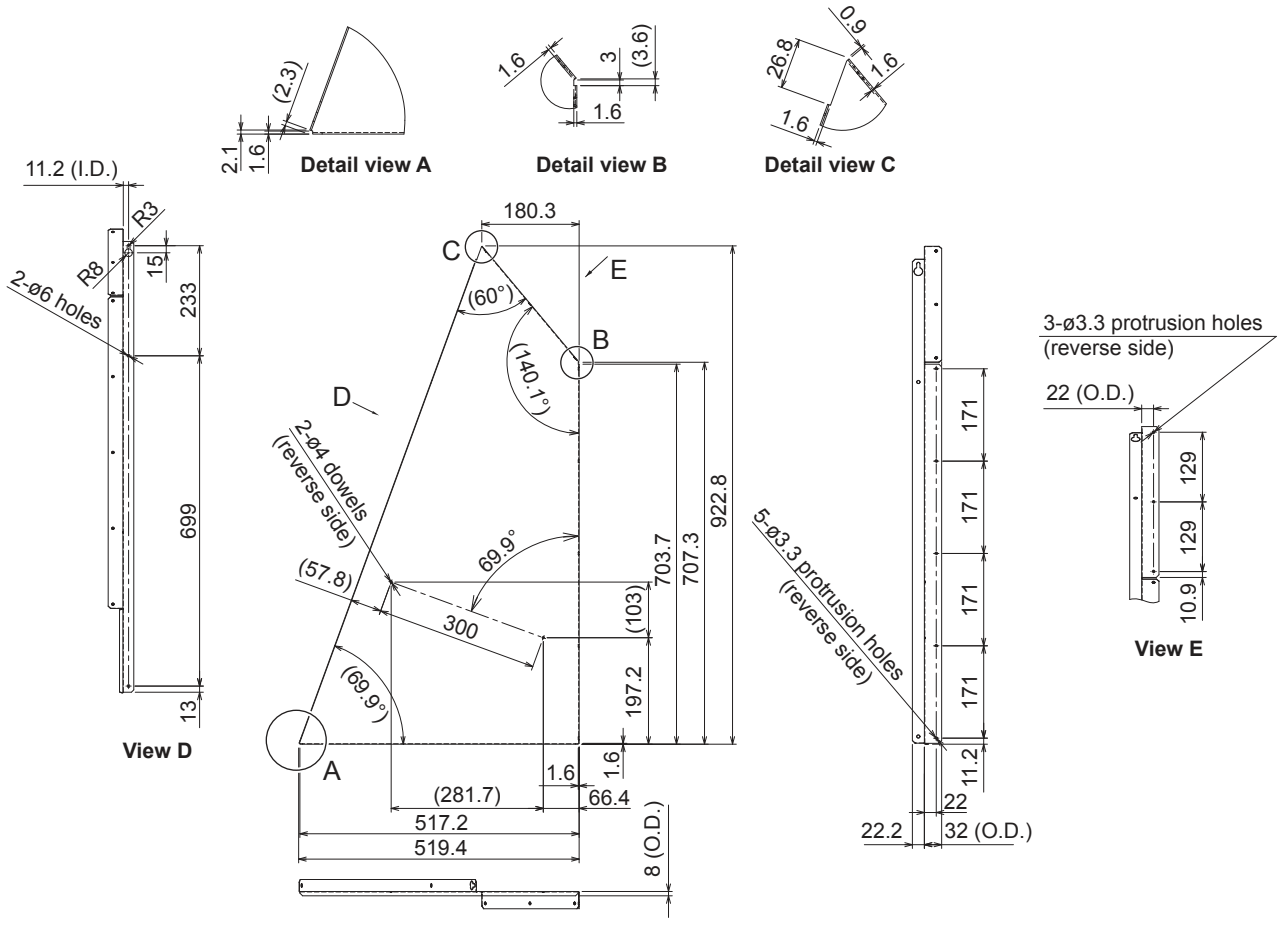


Fig. 2-8-29

8. Supplement

Reference Diagram for Side Panel (Left) (field supply) : PL MTG 359

unit: mm

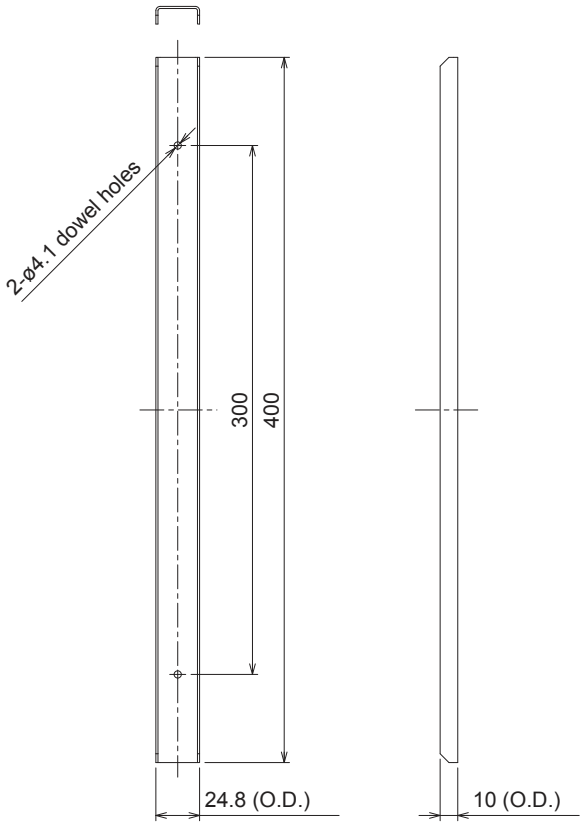


Fig. 2-8-30

8. Supplement

Reference Diagram for Side Panel (Right) (field supply) : 1108-337

RMK	PART NAME	Q'ty
1	COV SIDE R 501	1
2	PL MTG 359*	1

* Same as Fig. 2-8-30

unit: mm

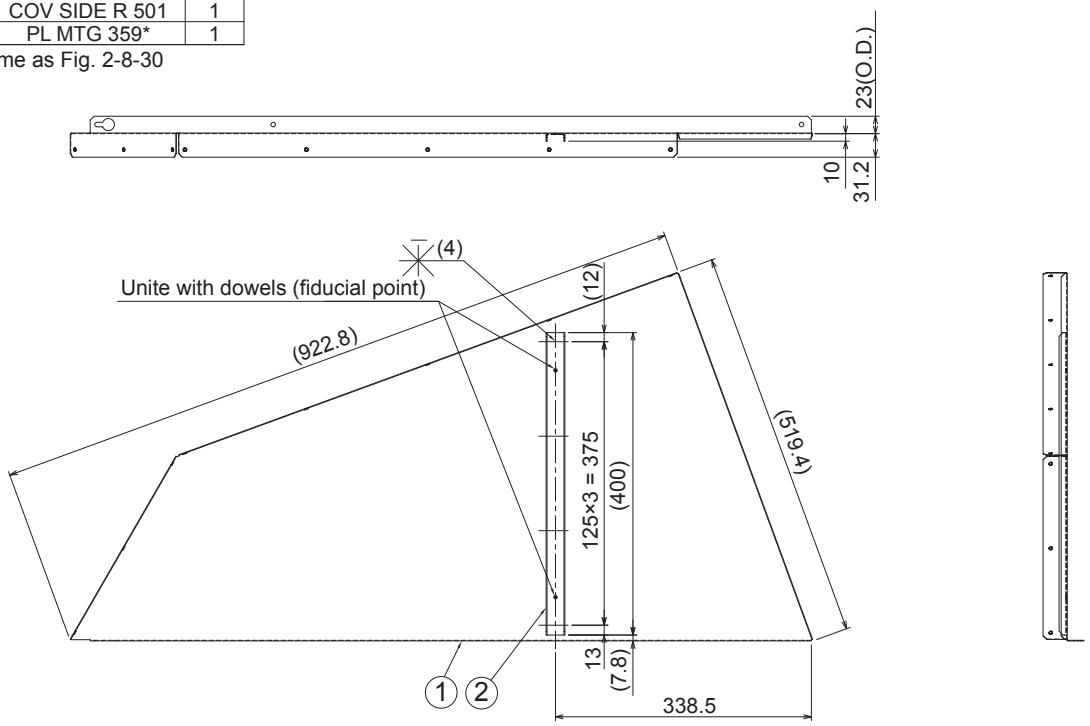


Fig. 2-8-31

Reference Diagram for Side Panel (Right) (field supply) : COV SIDE R 501

unit: mm

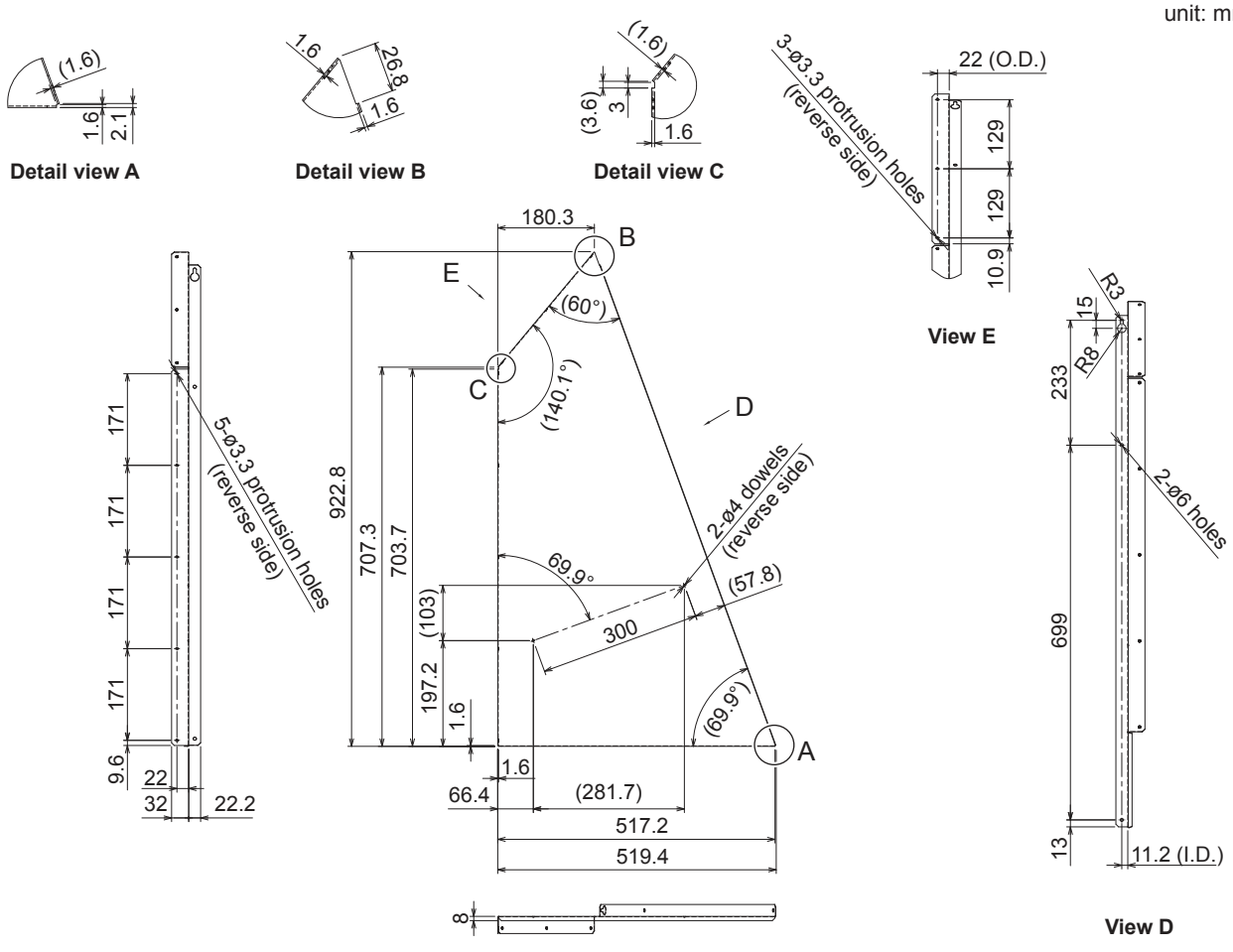


Fig. 2-8-32

8. Supplement

Reference Diagram for Top Cover (Y) (field supply) : 1106-366

RMK	PART NAME	Q'ty
1	Top cover 502	1
2	PL MTG 362	1

unit: mm

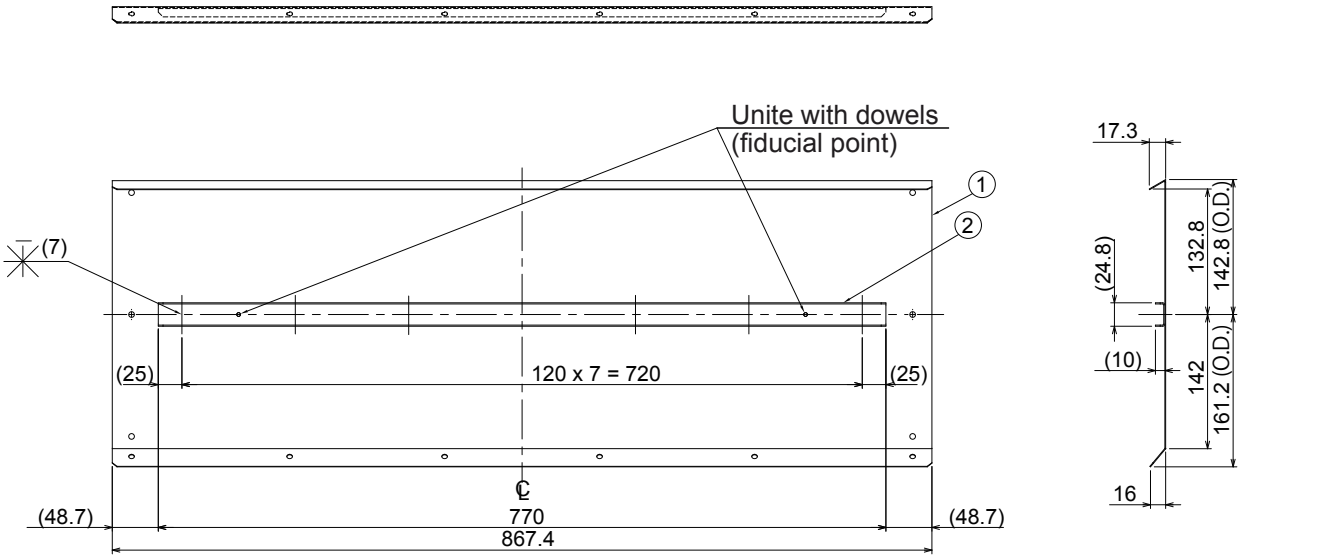


Fig. 2-8-33

Reference Diagram for Top Cover (Y) (field supply) : COV TOP 502

unit: mm

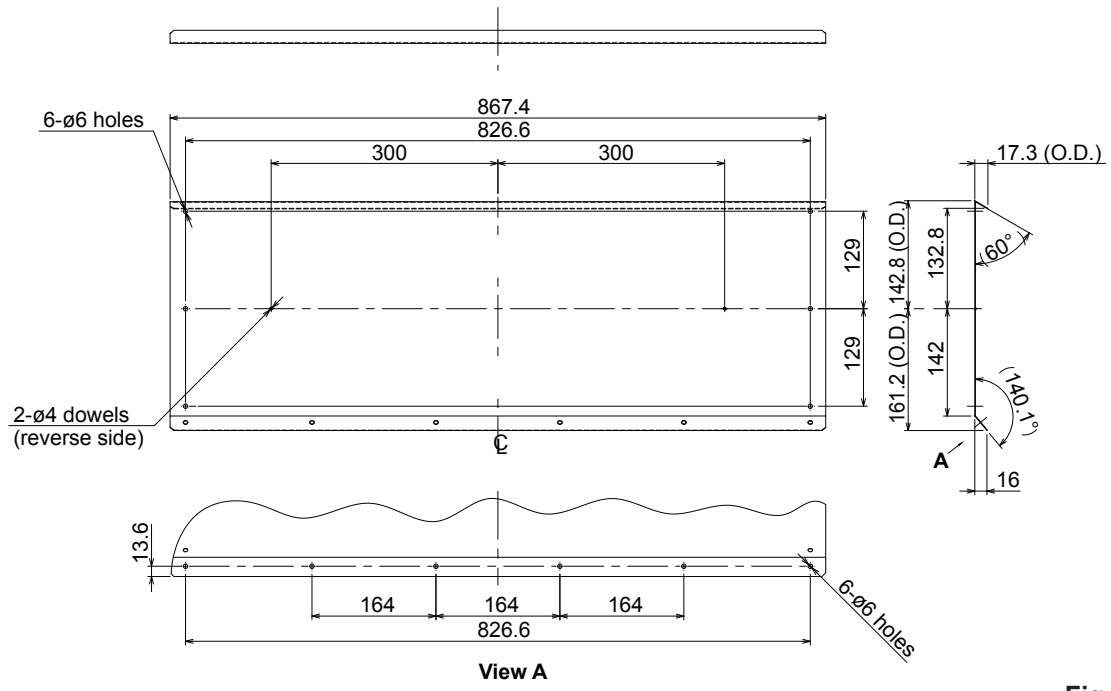


Fig. 2-8-34

8. Supplement

Reference Diagram for Top Cover (Y) (field supply) : PL MTG 362

unit: mm

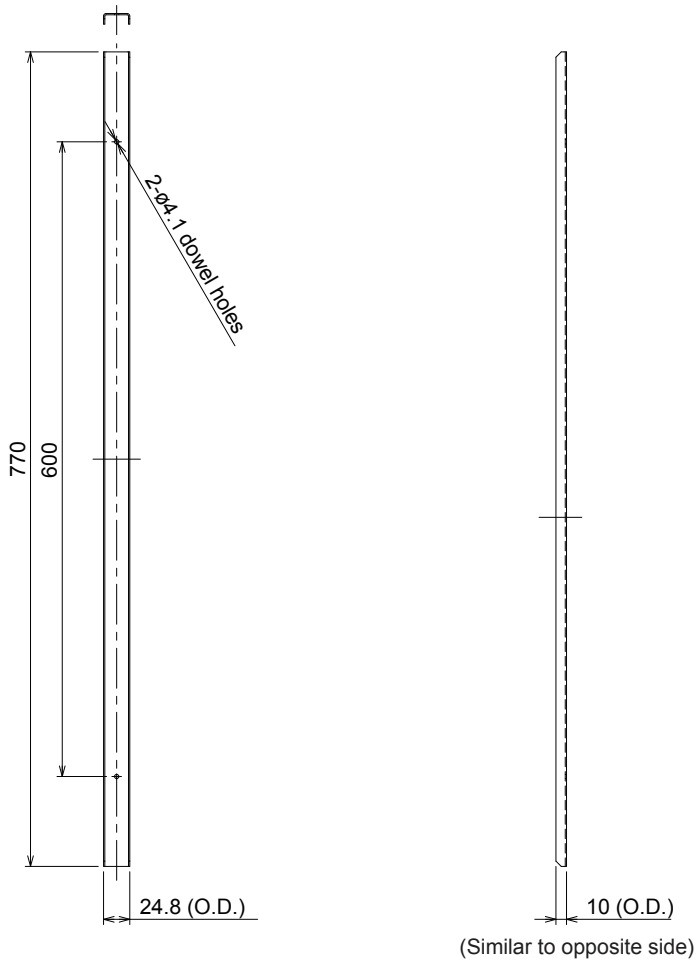


Fig. 2-8-35

8. Supplement

Reference Diagram for Rear Cover (Y) (field supply) : 1109-327

RMK	PART NAME	Q'ty
1	COV REAR 491	1
2	PL MTG 362*	2

* Same as Fig. 2-8-35

unit: mm

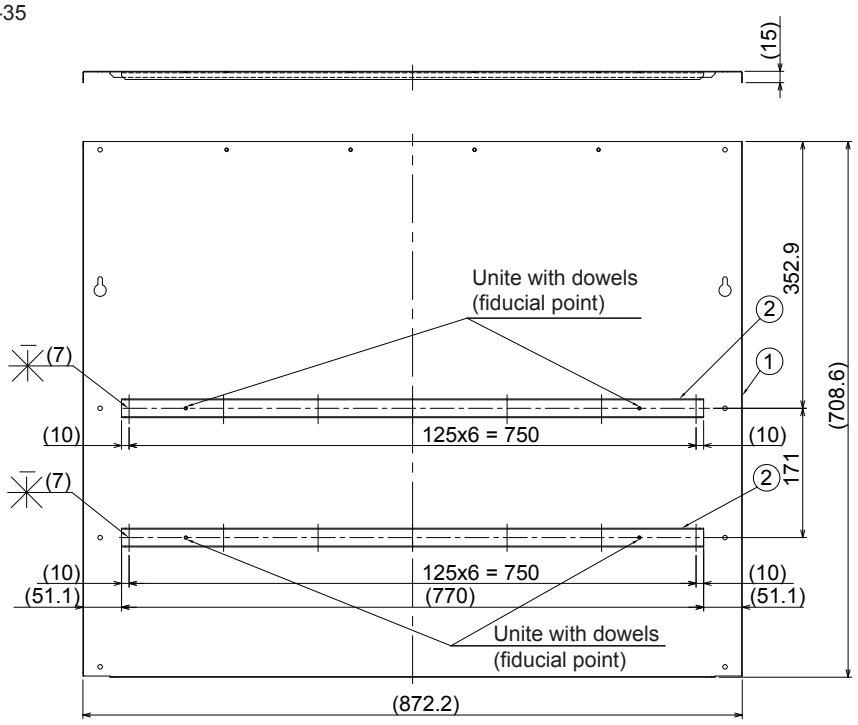


Fig. 2-8-36

Reference Diagram for Rear Cover (Y) (field supply) : COV REAR 491

unit: mm

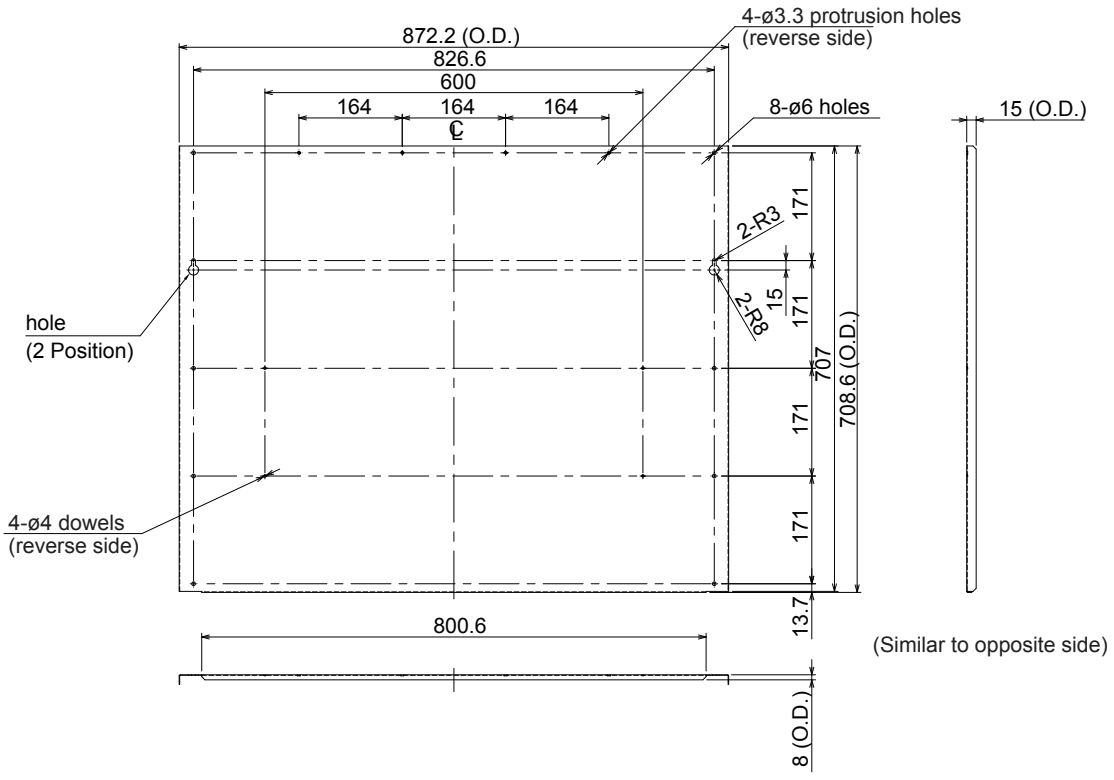


Fig. 2-8-37

8. Supplement

Reference Diagram for Unit PKG (field supply) : 764
Material : Polyethylene form

unit: mm

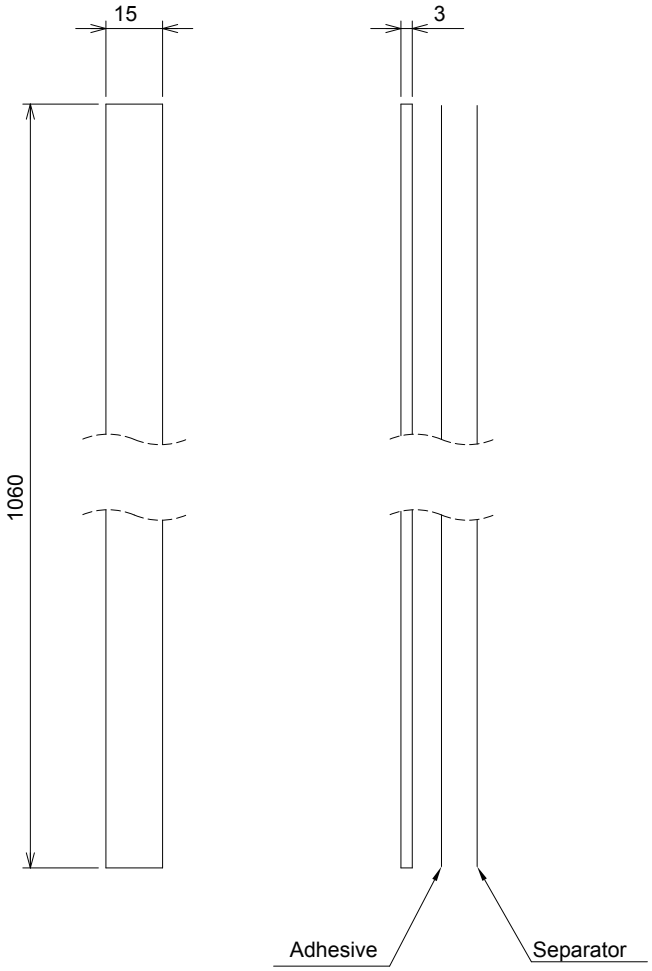


Fig. 2-8-38

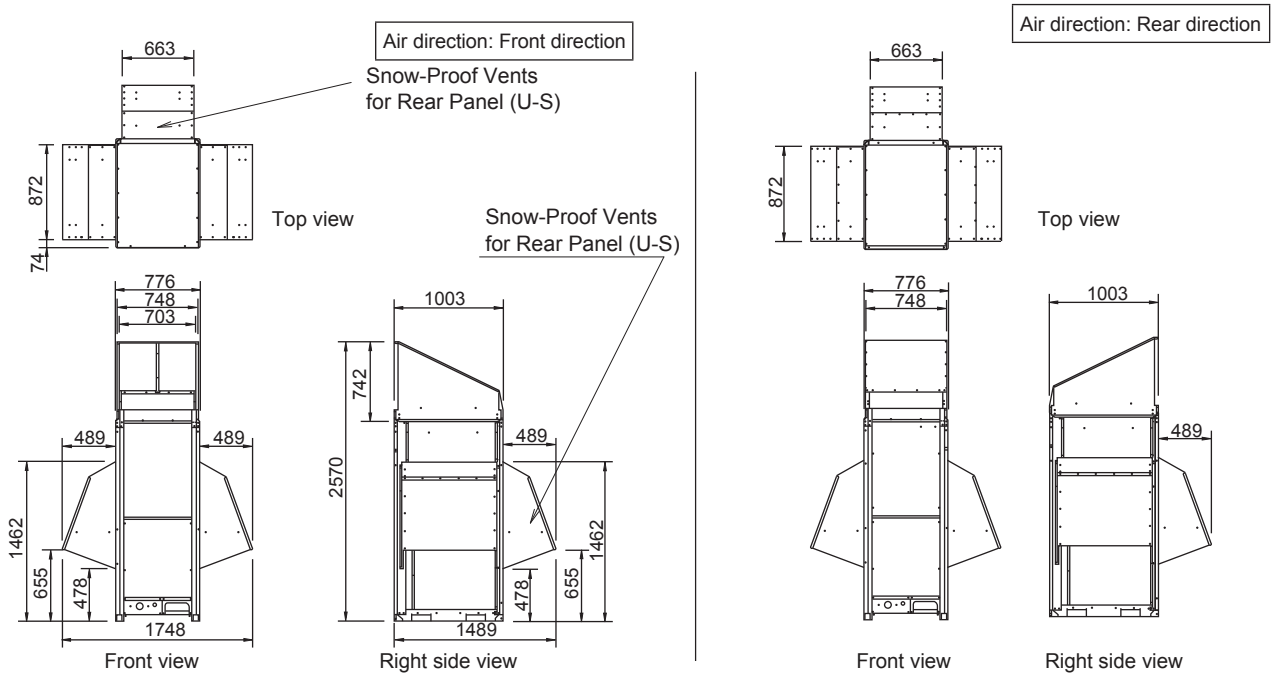
8. Supplement

4. Snow-Proof Vents for Rear Panel (U-S) (Air Intake Duct)(field supply)

Reference Diagram for Snow-Proof Vents (air intake duct)

Model : U-8ME2E8, U-10ME2E8

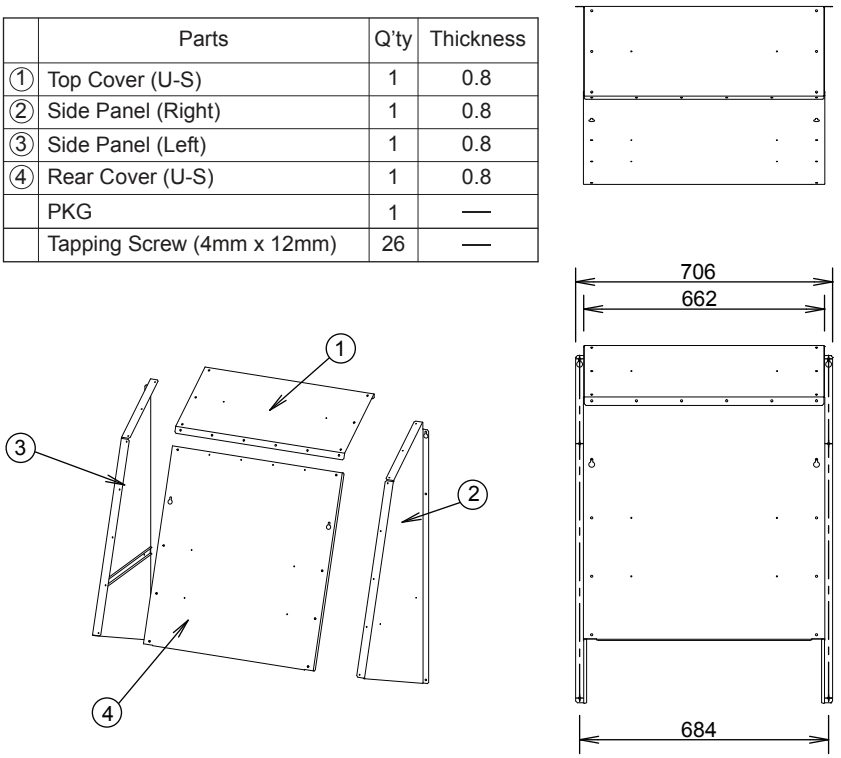
unit: mm



Necessary Assembling Parts

unit: mm

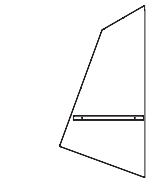
	Parts	Q'ty	Thickness
①	Top Cover (U-S)	1	0.8
②	Side Panel (Right)	1	0.8
③	Side Panel (Left)	1	0.8
④	Rear Cover (U-S)	1	0.8
	PKG	1	—
	Tapping Screw (4mm x 12mm)	26	—



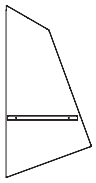
8. Supplement

Installation of Snow-Proof Vents for Rear Panel (U-S) (air intake duct)

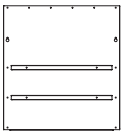
- The parts shown below are locally procured parts.
- The number of pieces shown below indicates the quantity per 1 set.
  The necessary quantity of pieces becomes different according to the type of installation model.
- Choose the parts free from rust or rustless material in order to prevent rust and salt-air damage resistance.
- First install the air-discharge chamber (S) (field supply) and then install this snow-proof vents for Rear Panel (U-S) (air intake duct).
- When setting up a multiple-unit installation, the optional supplemental Installation Kit for Multiple-Unit (field supply) is required.



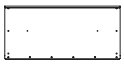
Side Panel (Left)



Side Panel (Right)



Rear Cover (U-S)



Top Cover (U-S)

Parts	Q'ty
Top Cover (U-S)	1
Side Panel (Right)	1
Side Panel (Left)	1
Rear Cover (U-S)	1
PKG	1
Tapping Screw (4mm x 12mm)	26

NOTE

- Install the air-discharge chamber where there is well enough for ventilation even if a strong wind is blowing.

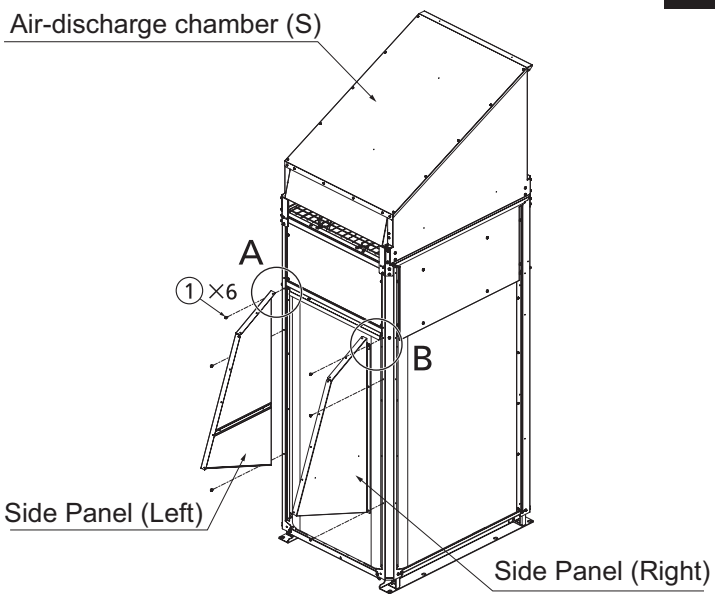
Tightening Screws

- The screws for fixing parts indicate by number as shown in the chart.
- Tighten with Tapping Screw (4mm x 12mm) for the number ①.

How to Install Snow-Proof Vents for Rear Panel (U-S) (air intake duct)

To accomplish the parts assembly, follow the steps below.
If the parts assembly is performed in a different way, installation will not successfully complete.

1. How to Install the Snow-Proof Vents (U-S) (air intake duct) First install the air-discharge chamber (S) (field supply) and follow the steps below. Regarding the air-discharge chamber (S) installation, follow thesteps described separately.
2. Side Panel Attachment (Left & Right)
   Attach Side Panel (Left/Right) to the corner post on the side of the unit.
   Attach Side Panel (Left) to the left post and Side Panel (Right) to the right post respectively.
   When installing, tighten the foremost upside screw temporarily. (See detail chart A, B.)



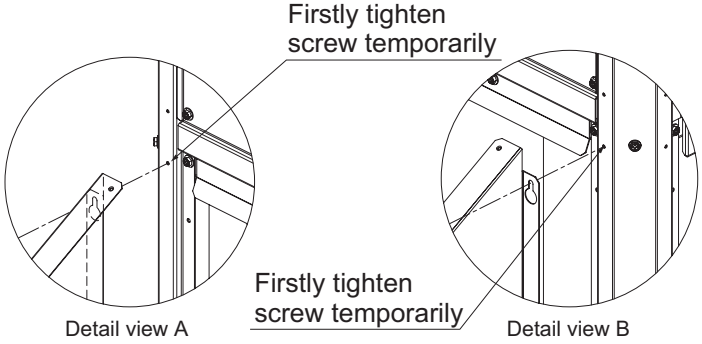


Fig. 2-8-39

8. Supplement

3. Rear Cover Attachment

Attach Rear Cover to the top of both side panels as described in step 2.
When installing, tighten the second upside screws on both sides temporarily.
Attach Rear Cover likely to hook to that screw and then tighten with 6 other screws (total 8 screws) securely.
See Fig. 2-8-40.

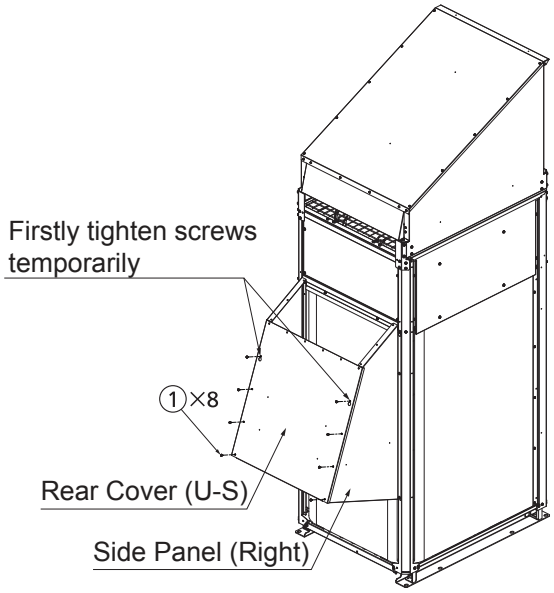


Fig. 2-8-40

4. Top Cover Attachment

Attach Top Cover to upside Rear Cover as described in step 3 above and tighten with 12 screws securely.
See Fig. 2-8-41.

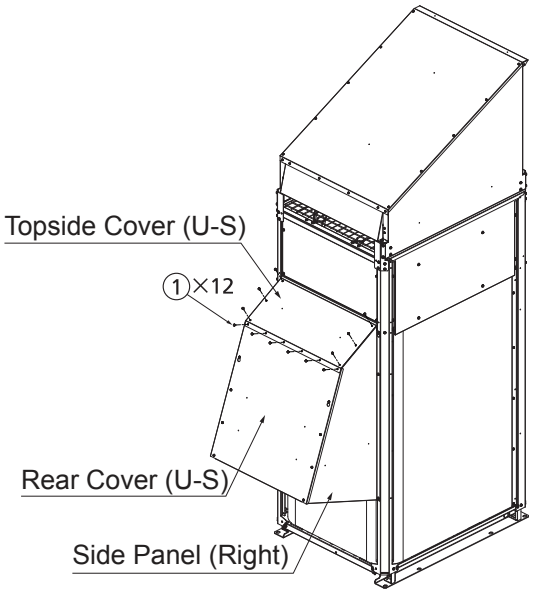


Fig. 2-8-41

8. Supplement

Reference Diagram for Side Panel (Left) (field supply) : 1107-331

The parts are the same as Figure 2-8-28.

Reference Diagram for Side Panel (Right) (field supply) : 1108-337

The parts are the same as Figure 2-8-31.

Reference Diagram for Top Cover (U-S) (field supply)

unit: mm

RMK	PART NAME	Q'ty
1	COV TOP 500	1
2	PKG 763	1

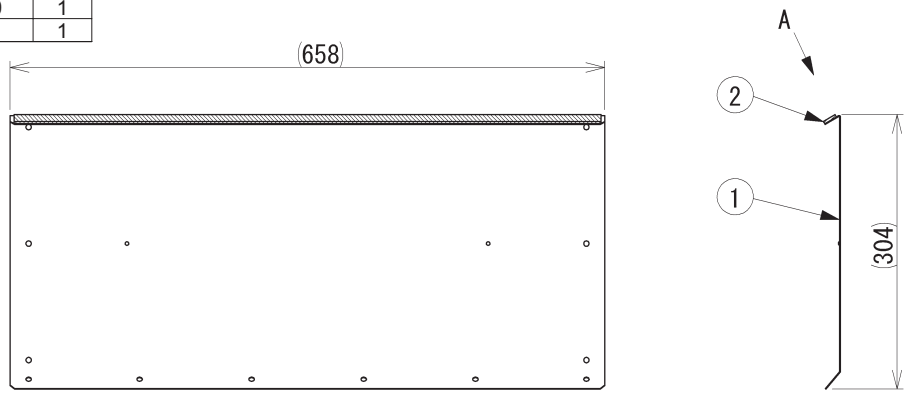
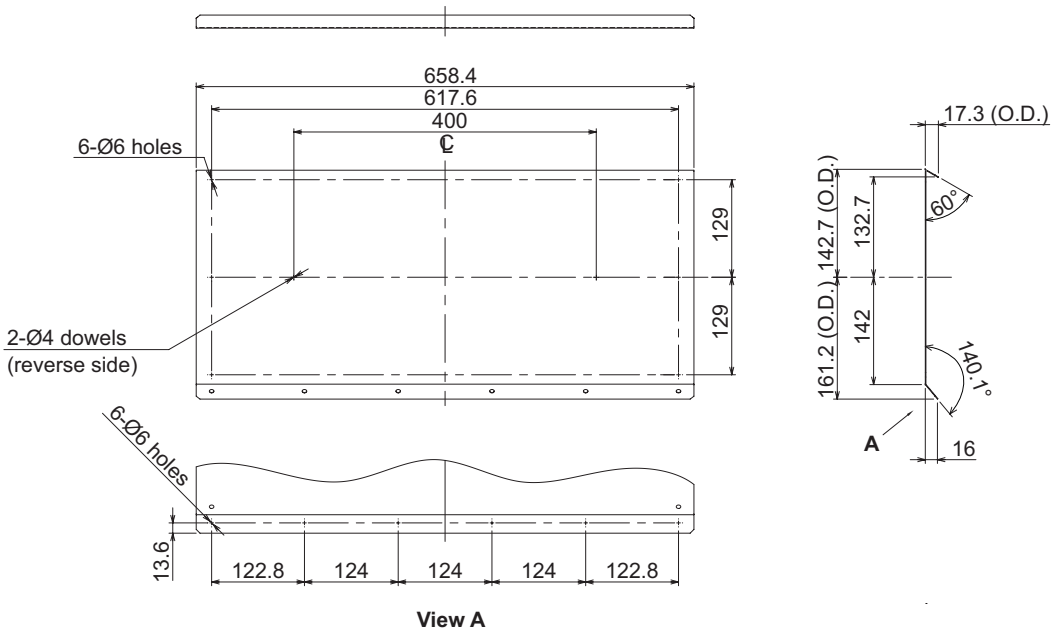


Fig. 2-8-42

Reference Diagram for Topside Cover (U-S) (field supply COV TOP 500) : 1109-500

unit: mm



View A

Fig. 2-8-43

Reference Diagram for PKG (field supply) : 763
Material : Polyethylene form

unit: mm

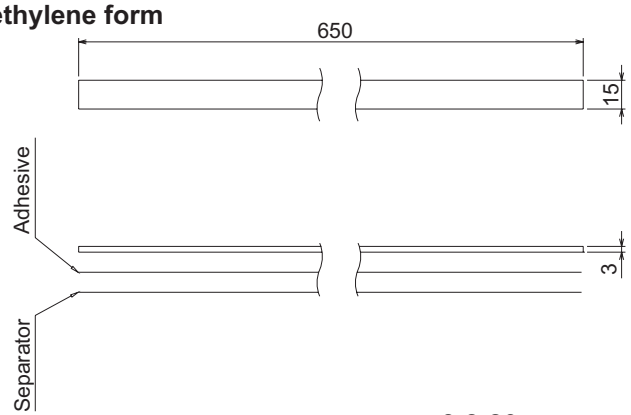


Fig. 2-8-44

8. Supplement

Reference Diagram for Rear Cover (U-S) (field supply) : 1109-325

RMK	PART NAME	Q'ty
1	COV REAR 489	1
2	PL MTG 414	2

unit: mm

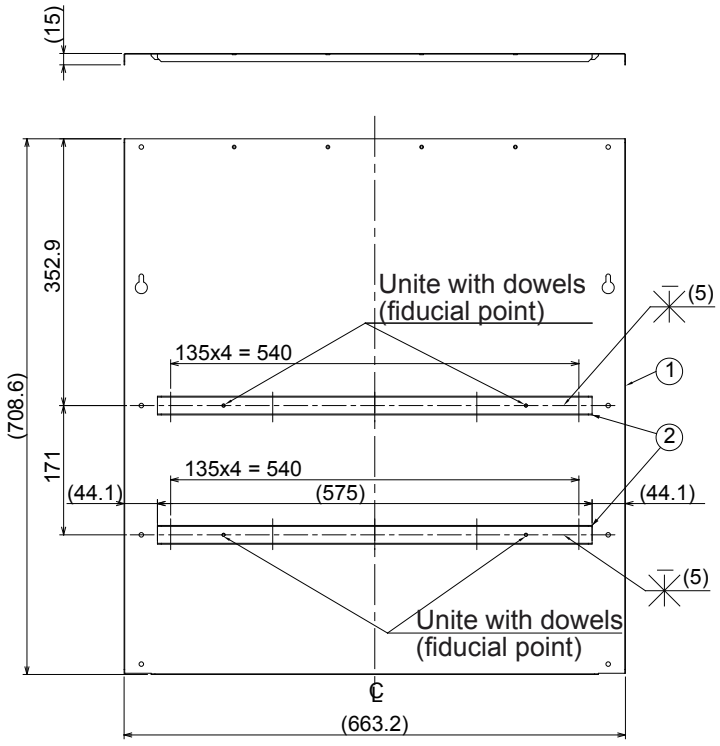


Fig. 2-8-45

Reference Diagram for Rear Cover (U-S) (field supply) : COV REAR 489

unit: mm

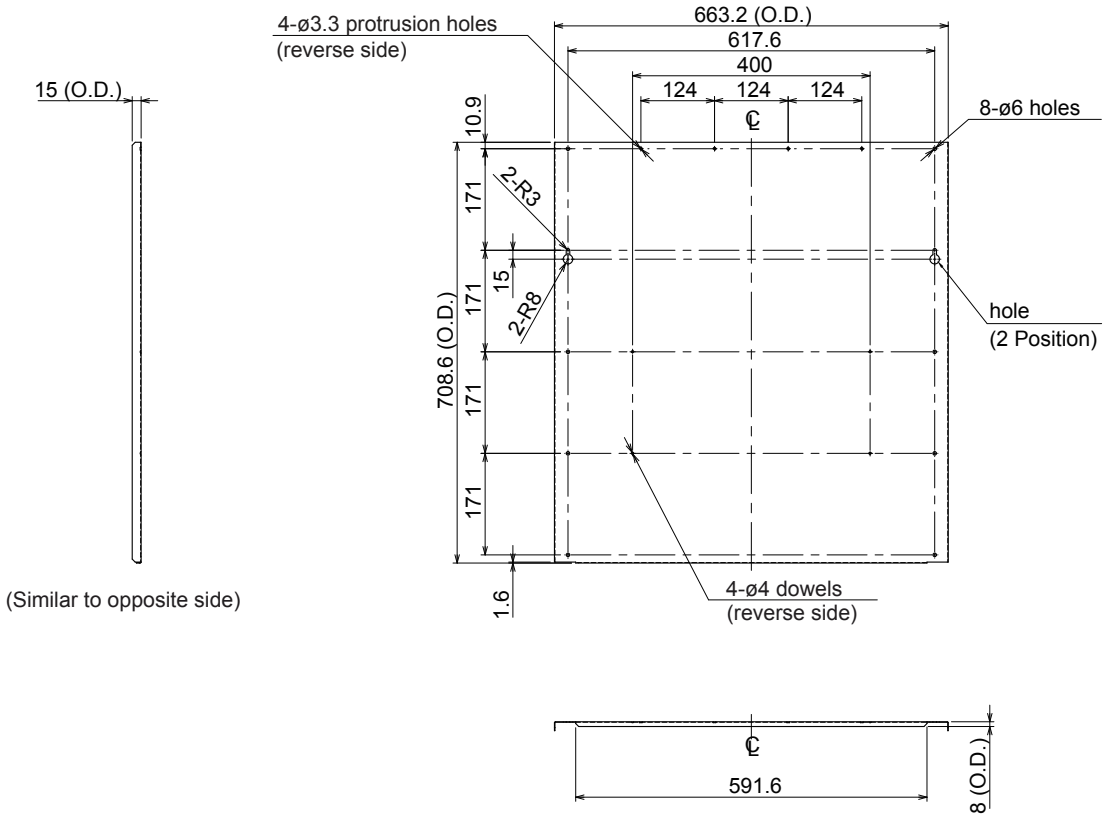


Fig. 2-8-46

8. Supplement

Reference Diagram for Rear Cover (U-S) (field supply) : PL MTG 414

unit: mm

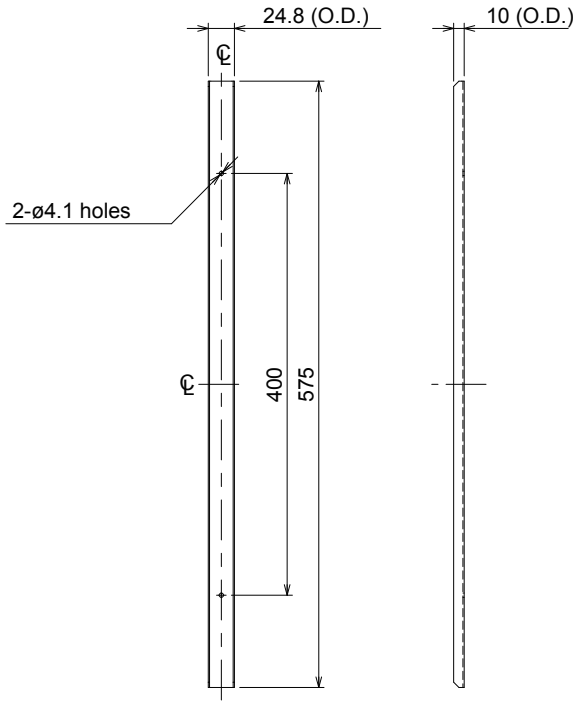


Fig. 2-8-47

8. Supplement

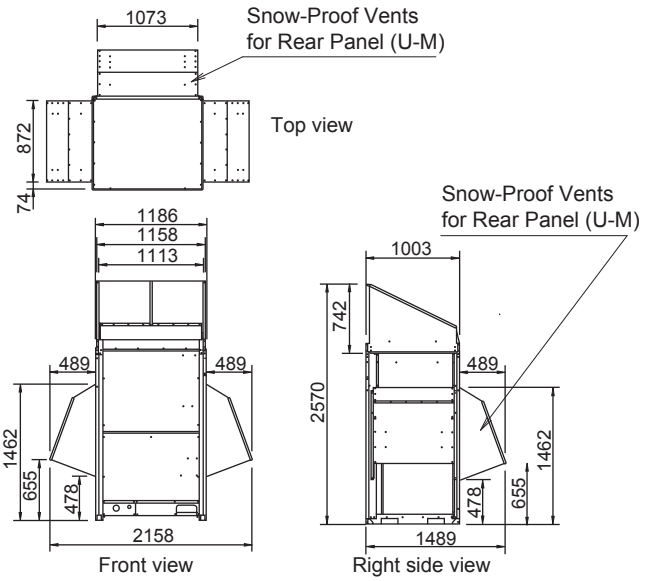
5. Snow-Proof Vents for Rear Panel (U-M) (Air Intake duct)(field supply)

Reference Diagram for Snow-Proof Vents (air intake duct)

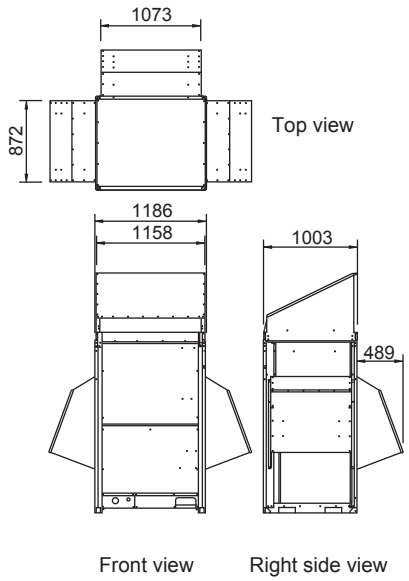
Model : U-12ME2E8, 14ME2E8, U-16ME2E8

unit: mm

Air direction: Front direction



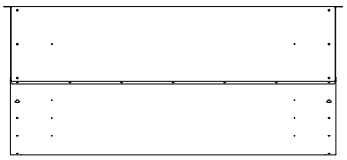
Air direction: Rear direction

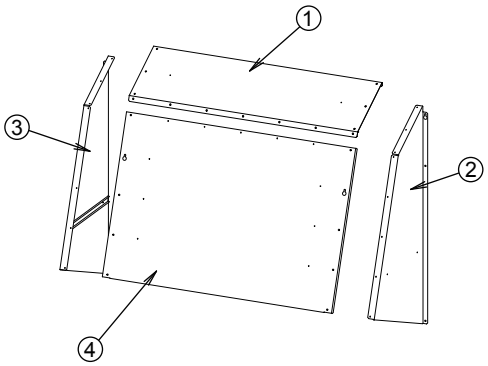


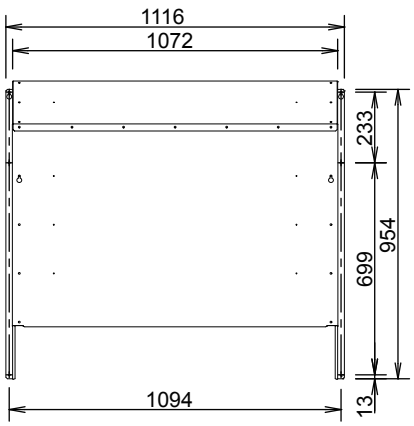
Necessary Assembling Parts

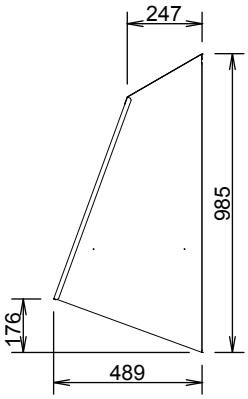
unit: mm

	Parts	Q'ty	Thickness
①	Top Cover (U-M)	1	0.8
②	Side Panel (Right)	1	0.8
③	Side Panel (Left)	1	0.8
④	Rear Cover (U-M)	1	0.8
	Tapping Screw (4mm x 12mm)	27	—





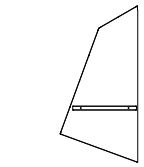


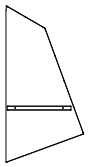


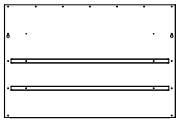
8. Supplement

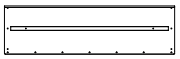
Installation of Snow-Proof Vents for Rear Panel (U-M) (air intake duct)

- The parts shown below are locally procured parts.
- The number of pieces shown below indicates the quantity per 1 set.
- Choose the parts free from rust or rustless material in order to prevent rust and salt-air damage resistance.
- First install the air-discharge chamber (M) (field supply) and then install this snow-proof vents for Rear Panel (M)(air intake duct).
- When setting up a multiple-unit installation, the optional supplemental Installation Kit for Multiple-Unit (field supply) is required.


Side Panel (Left)


Side Panel (Right)


Rear Cover (U-M)


Top Cover (U-M)

Parts	Q'ty
Top Cover (U-M)	1
Side Panel (Right)	1
Side Panel (Left)	1
Rear Cover (U-M)	1
Tapping Screw (4mm x 12mm)	27

NOTE

- Install the air-discharge chamber where there is well enough for ventilation even if a strong wind is blowing.

Tightening Screws

- The screws for fixing parts indicate by number as shown in the chart.
- Tighten with Tapping Screw (4mm x 12mm) for the number ①.

How to Install Snow-Proof Vents for rear panel (U-M) (air intake duct)

To accomplish the parts assembly, follow the steps below.
If the parts assembly is performed in a different way, installation will not successfully complete.

1. How to Install the Snow-Proof Vents for Rear Panel (U-M) (air intake duct) First install the air-discharge chamber (M) (field supply) and follow the steps below. Regarding the air-discharge chamber installation, follow the steps described separately.
2. Side Panel Attachment (Left & Right)

   Attach Side Panel (Left/Right) to the corner post on the side of the unit.
   Attach Side Panel (Left) to the left post and Side Panel (Right) to the right post respectively.
   When installing, tighten the foremost upside screw temporarily. (See detail chart A, B.)
   Attach Side Panel likely to hook to that screw and then tighten each panel with 2 other screws (total 3 screws) securely.

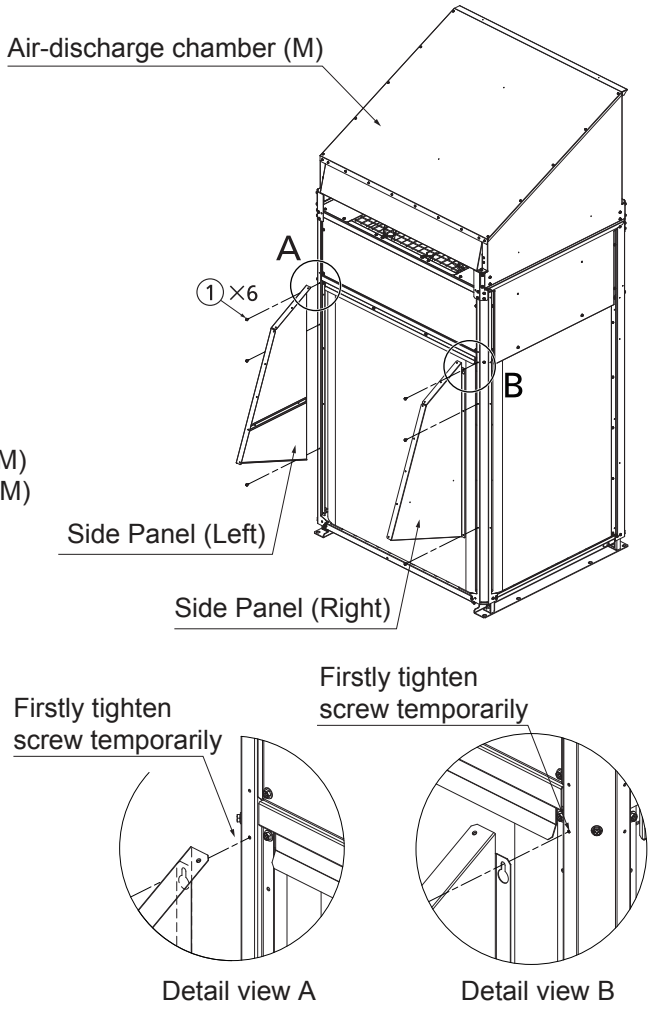


Fig. 2-8-48

8. Supplement

3. Rear Cover Attachment

Attach Rear Cover to the top of both side panels as described in step 2.
When installing, tighten the second upside screws on both sides temporarily.
Attach Rear Cover likely to hook to that screw and then tighten with 6 other screws (total 8 screws) securely. See Fig. 2-8-49.

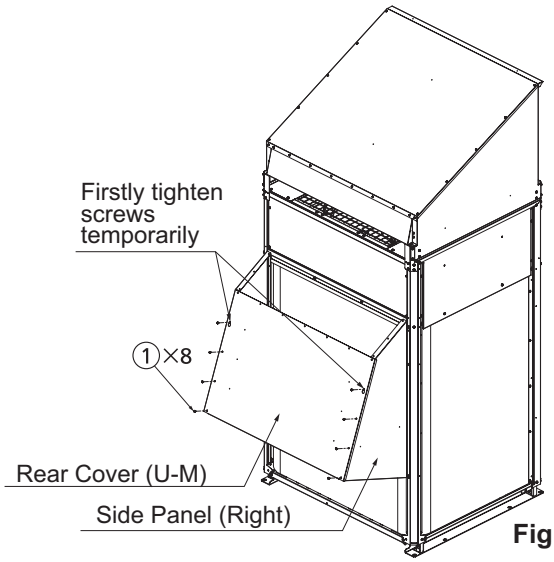


Fig. 2-8-49

4. Top Cover Attachment

Attach Top Cover to upside Rear Cover as described in step 3 above and tighten with 13 screws securely. See Fig. 2-8-50.

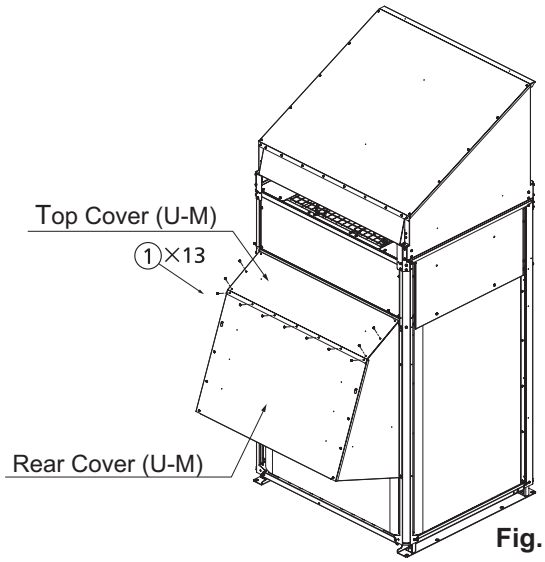


Fig. 2-8-50

8. Supplement

Reference Diagram for Side Panel (Left) (field supply) : 1107-331

The parts are the same as Figure 2-8-28.

Reference Diagram for Side Panel (Right) (field supply) : 1108-337

The parts are the same as Figure 2-8-31.

Reference Diagram for Top Cover (U-M) (field Supply) : 1106-356

RMK	PART NAME	Q'ty
1	COV TOP 501	1
2	PL MTG 415	1
3	PKG 764	1

unit: mm

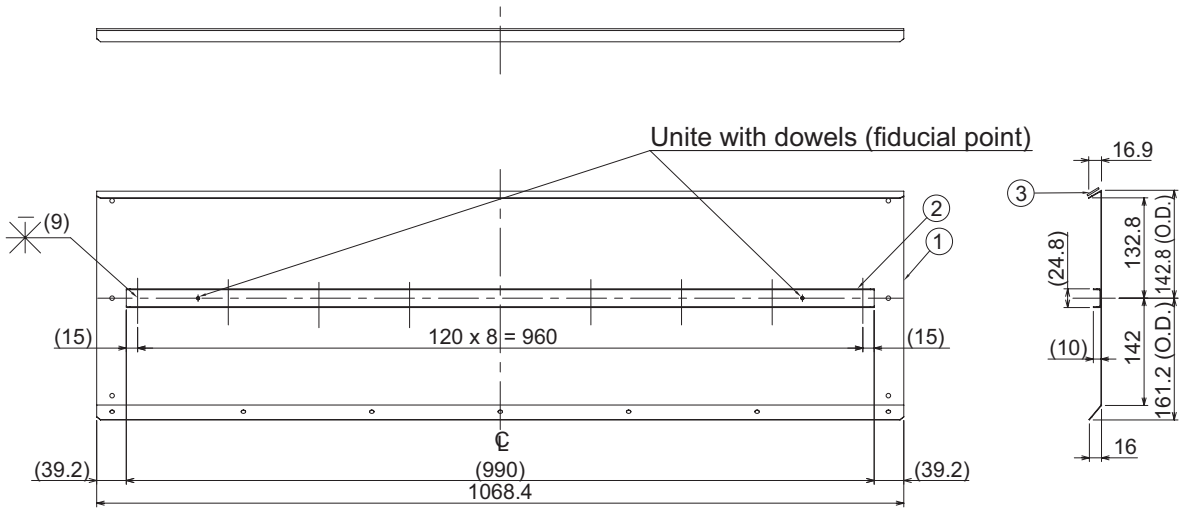


Fig. 2-8-51

Reference Diagram for Top Cover (U-M) (field Supply) : COV TOP 501

unit: mm

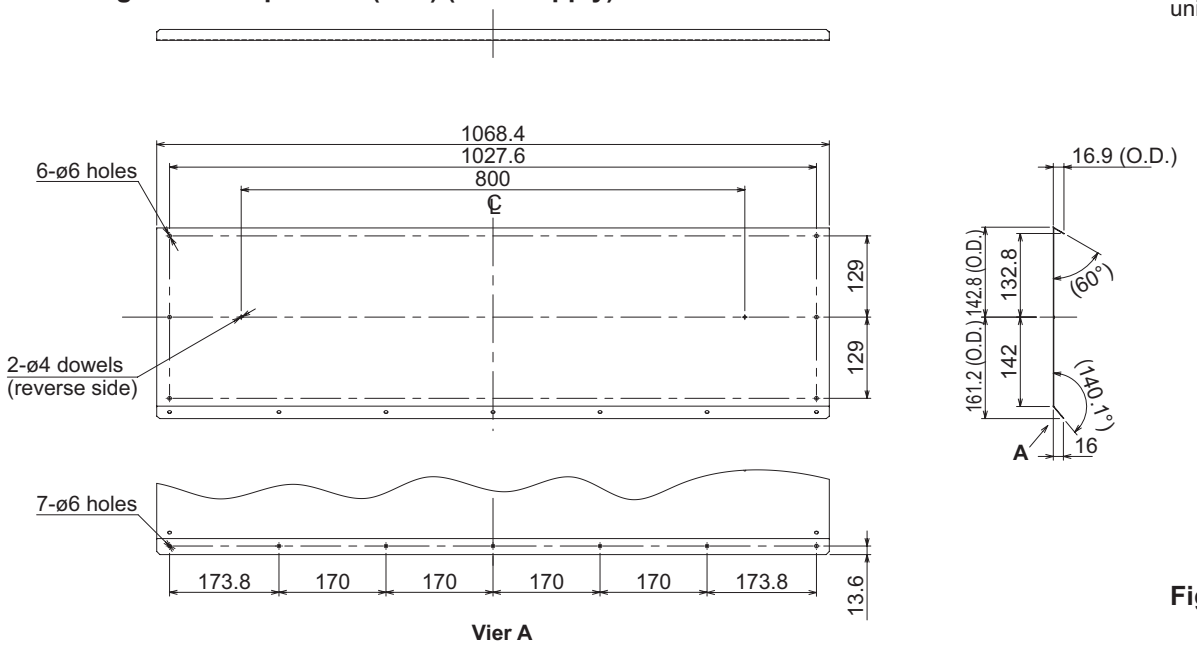


Fig. 2-8-52

8. Supplement

Reference Diagram for Top Cover (U-M) (field supply) : PL MTG 415

unit: mm

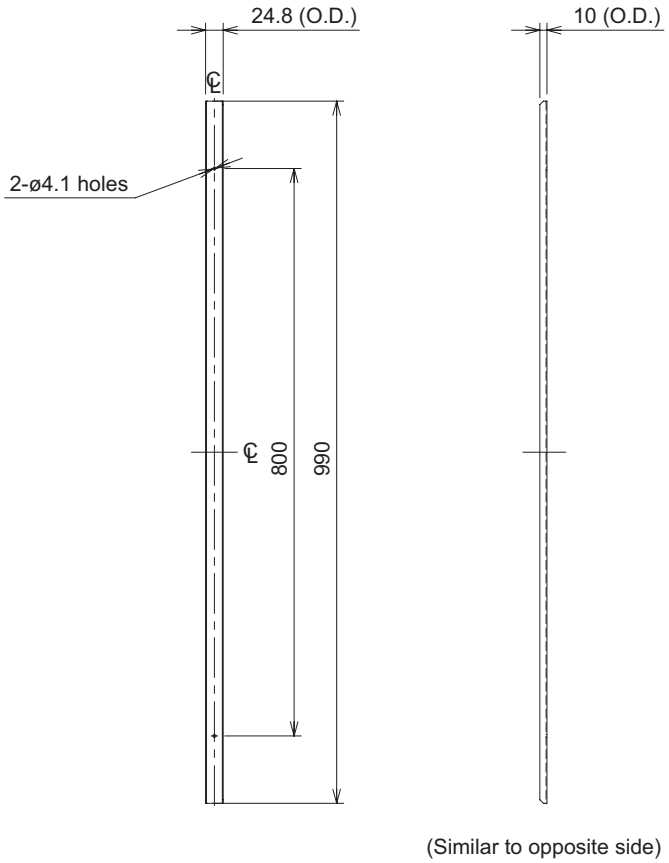


Fig. 2-8-53

Reference Diagram for PKG (field supply) : 764
Material : Polyethylene form

unit: mm

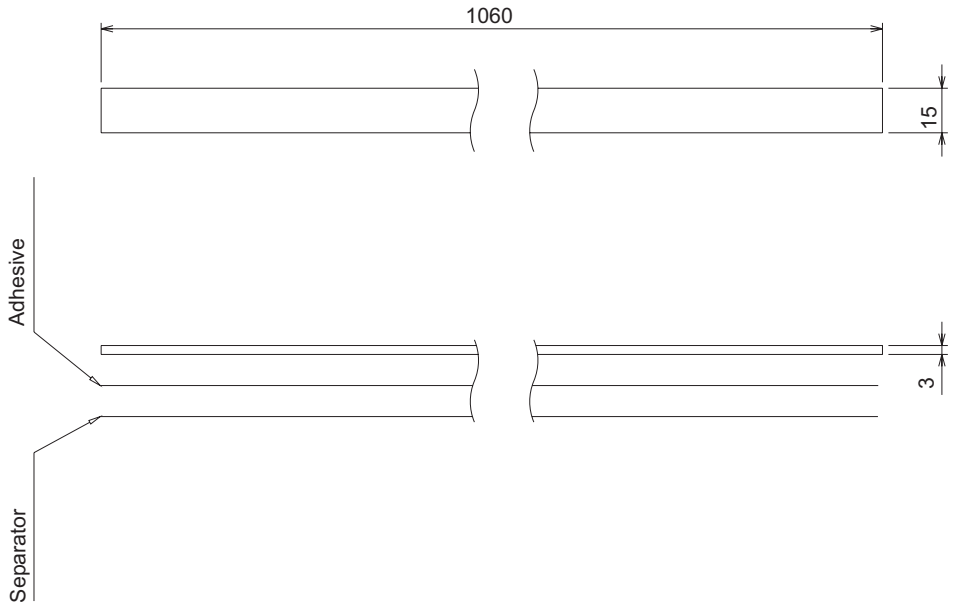


Fig. 2-8-54

8. Supplement

Reference Diagram for Rear Cover (U-M) (field supply) : 1109-326

unit: mm

RMK	PART NAME	Q'ty
1	COV REAR 490	1
2	PL MTG 415*	3

* Same as Fig. 2-8-53

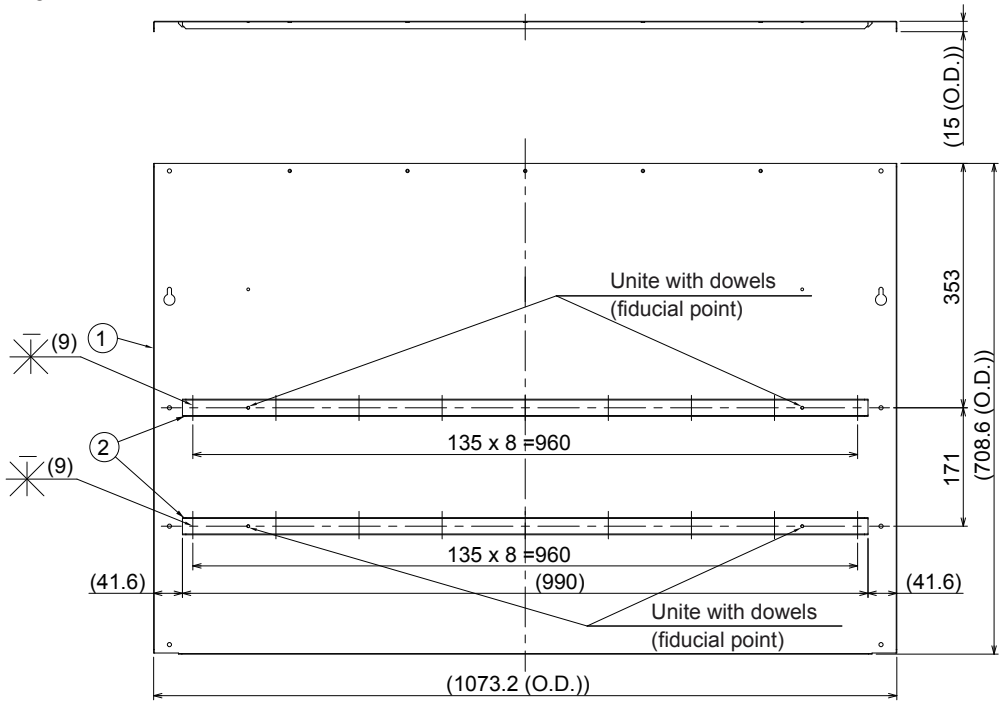


Fig. 2-8-55

Reference Diagram for Rear Cover (U-M) (field supply) : COV REAR 490

unit: mm

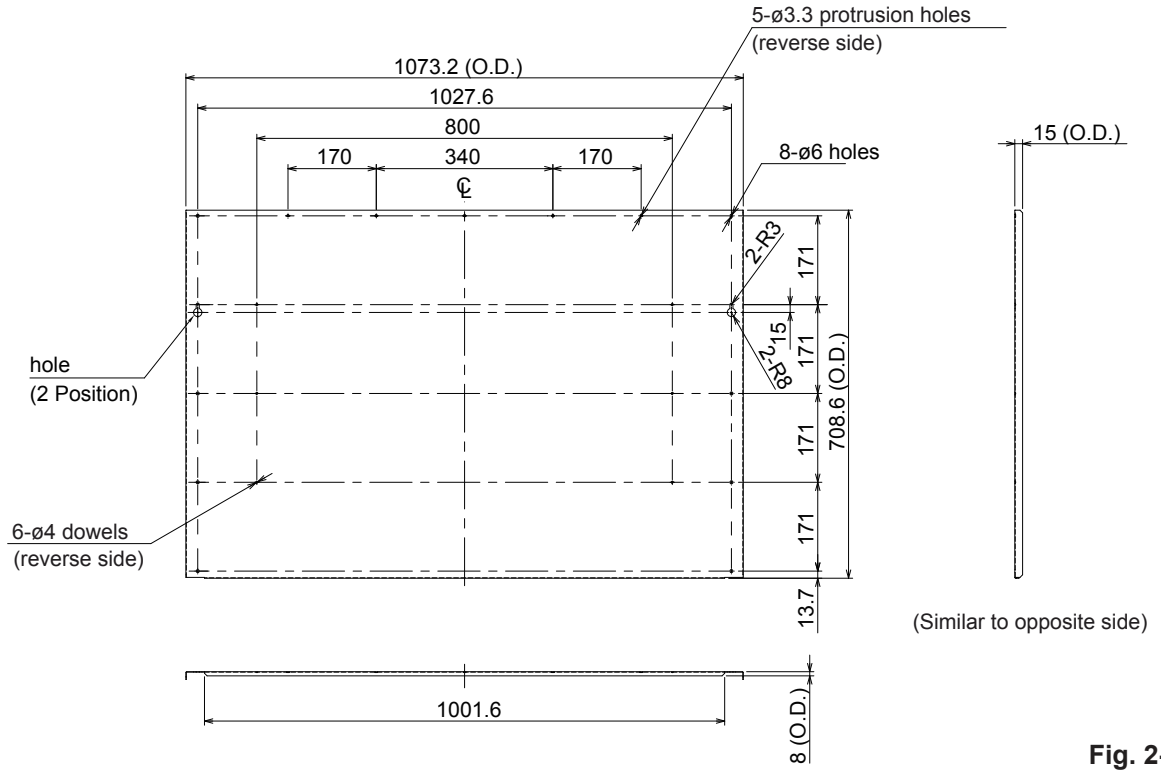


Fig. 2-8-56

Reference Diagram for PKG (field supply) : 764

The parts are the same as Figure 2-8-38.

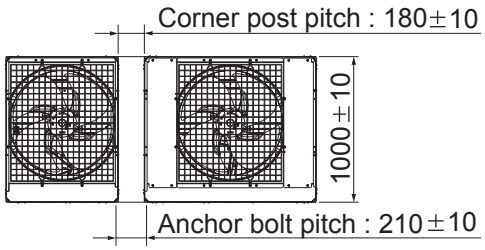
8. Supplement

6. Supplemental Installation Kit for Multiple-Unit (field supply)

- This part is the Supplemental Installation Kit for multiple-unit installation.
- In order to attach this part, the unit must have been installed within the range as shown in the below chart.
- The parts shown below are locally procured parts.
- The number of pieces shown below indicates the quantity per 1 set. (Obtain necessary number of pieces.)
- Choose the parts free from rust or rustless material in order to prevent rust and salt-air damage resistance.
- First install the air-discharge chamber (S,M) (field supply) and then install the snow-proof vents (Y,U-S,U-M) (air intake duct (field supply)).

Installed outdoor unit

unit: mm



Front side

2

Tightening Screws

- The screws for fixing parts indicate by number as shown in the chart.
- Tighten with Tapping Screw (4mm x 12mm) for the number ①.
- Remove the screw Ⓒ tightened to the snow-proof vents (air intake duct). It is available for reuse.

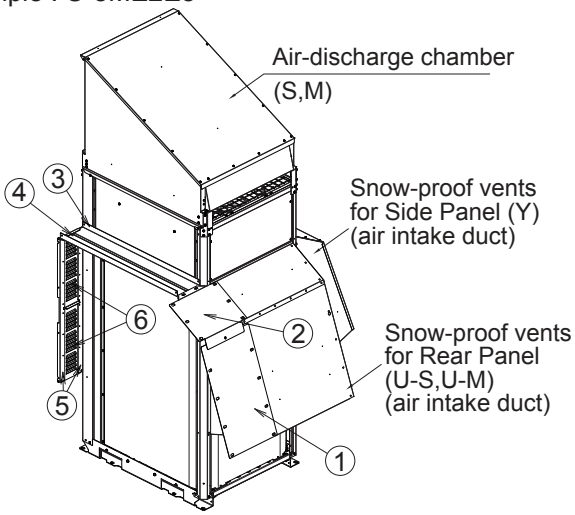
How to Install Installation Kit for Multiple-Unit

The installation work must be carried out with a partner for safety. To accomplish the parts assembly, follow the steps below. If the parts assembly is performed in a different way, installation will not successfully complete.

1. Topside Panel (Right) Attachment

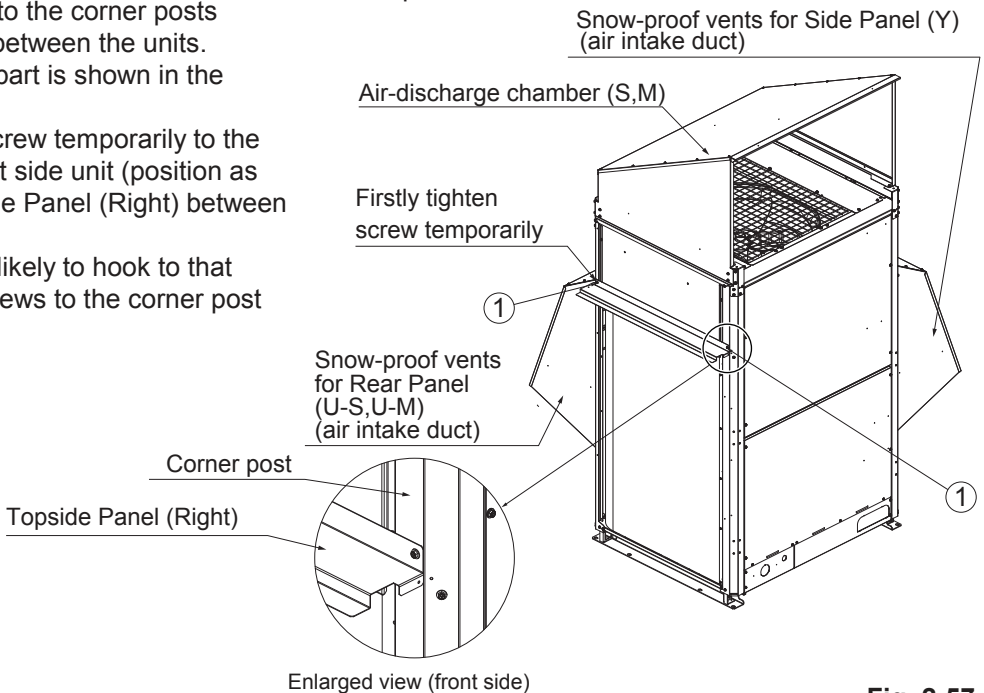
Attach Topside Panel (Right) to the corner posts (2 locations) at the right side between the units.
The installed direction of this part is shown in the chart.
When installing, tighten the screw temporarily to the corner post on the rear of right side unit (position as in the chart) and insert Topside Panel (Right) between the units.
Attach Topside Panel (Right) likely to hook to that screw and tighten with the screws to the corner post of the front side of the unit.

Example : U-8ME2E8



	Parts	Q'ty	Thickness
①	Rear Panel (Lower)	1	0.8
②	Rear Panel (Upper)	1	0.8
③	Topside Panel (Left)	1	0.8
④	Topside Panel (Right)	1	0.8
⑤	Frame	2	0.8
⑥	Front Panel	2	0.8
	Tapping Screw (4mm x 12mm)	33	—
	Washer (Screw for 4mm)	17	—

Example : U-12ME2E8



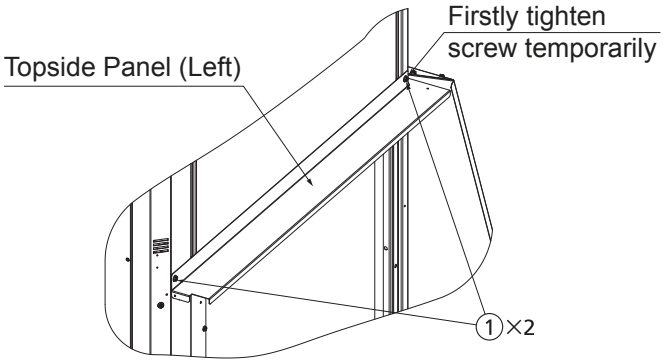
Enlarged view (front side)

Fig. 2-57

8. Supplement

2. Topside Panel (Left) Attachment

Follow the same procedure as described in step 1 above for attaching Topside Panel (Left).
Attach Topside Panel (Left) to the corner posts (2 locations) at the left side between the units.
The installed direction of this part is shown in the below chart.
When installing, tighten the screw temporarily to corner post on the rear of left side unit (position as in the below chart) and insert Topside Panel (Left) between the units.
Attach Topside Panel (Left) likely to hook to that screw and tighten with the screws to the corner post of the front side of the unit.



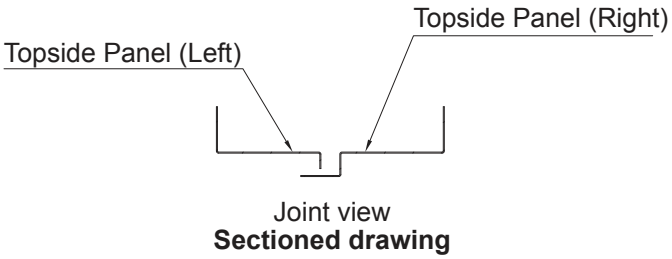


Fig. 2-58

3. Frame Attachment

Attach Frame to the left and right units respectively.
The installation position is located at the front side corner post between the units and Topside Panel (Right/Left) as described in steps 1 and 2 above.
Frame installed direction should be located so that the notches at the center of the part can face each other.
Tighten the corner post to the unit with 4 screws respectively.
Tighten Topside Panel (Right/Left) with 1 screw respectively.

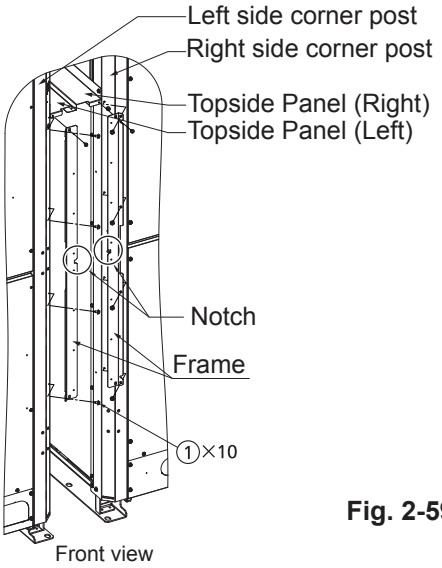


Fig. 2-59

4. Front Panel Attachment

Tighten Front Panel to Frame (Right/Left) with 8 screws respectively as described in step 3 above.
Attach Front panel vertically.
The installed direction of this part is that the louver inside Front Panel is facing outward and the air inlet/outlet port is facing downward.
Also adjust until Front Panel will be positioned at the center of between the units.

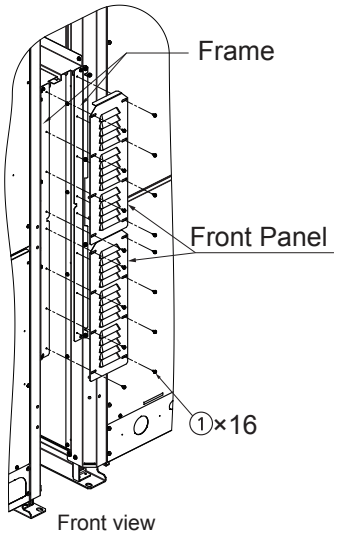


Fig. 2-60

8. Supplement

5. Rear Panel (Lower) Attachment

Attach Rear Panel (Lower) to Rear Cover of snow-proof vents (air intake duct) which has already been installed from upside. (See figure 2-8-61.)
Remove 4 screws respectively on the side between the units attached to Rear Cover (left side unit & right side unit) of snow-proof vents (air intake duct).
Attach the washer to the screw once it was removed.
Using the screw with a washer, attach Rear Panel (Lower) between the left and right rear covers of snow-proof vents (air intake duct) and then tighten the rear panel with 8 screws with washers.

6. Rear Panel (Upper) Attachment

Attach Rear Panel (Upper) to Top Cover of snow-proof vents (air intake duct) which has already been installed from upside. (See figure 2-8-61.)
Remove 3 screws respectively on the side between the units attached to Top Cover (left side unit & right side unit) of the snow-proof vents (air intake duct).
Attach the washer to the screw once it was removed.
Using the screw with a washer, attach Rear Panel (Upper) between the left and right Top Cover of snow-proof vents (air intake duct) and tighten rear panel with 6 screws.
Using the screw with a washer, tighten Rear Panel (Upper) with 1 screw respectively to Topside Panel (Right/Left) as described in steps 1 and 2 above.
Also using 1 screw with a washer, tighten Rear Panel (Lower) as described in step 5 above.

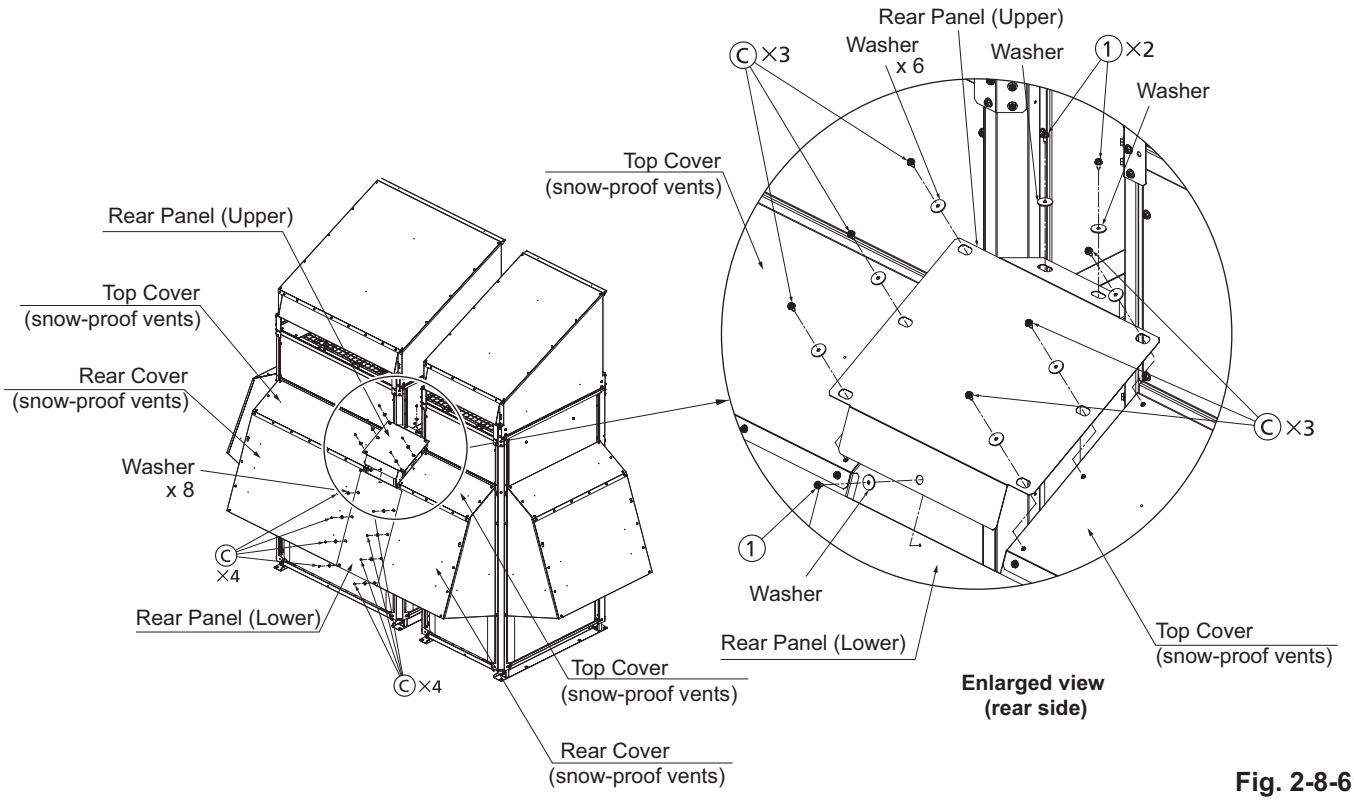


Fig. 2-8-61

8. Supplement

Reference Diagram for Rear Panel (Lower) (field supply) : 2371-004

unit: mm

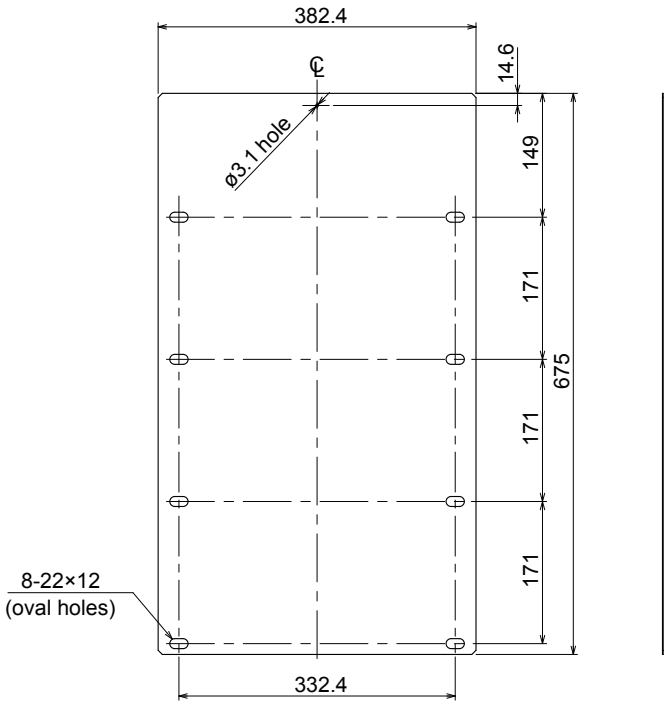


Fig. 2-8-62

Reference Diagram for Rear Panel (Upper) (field supply) : 2371-005

unit: mm

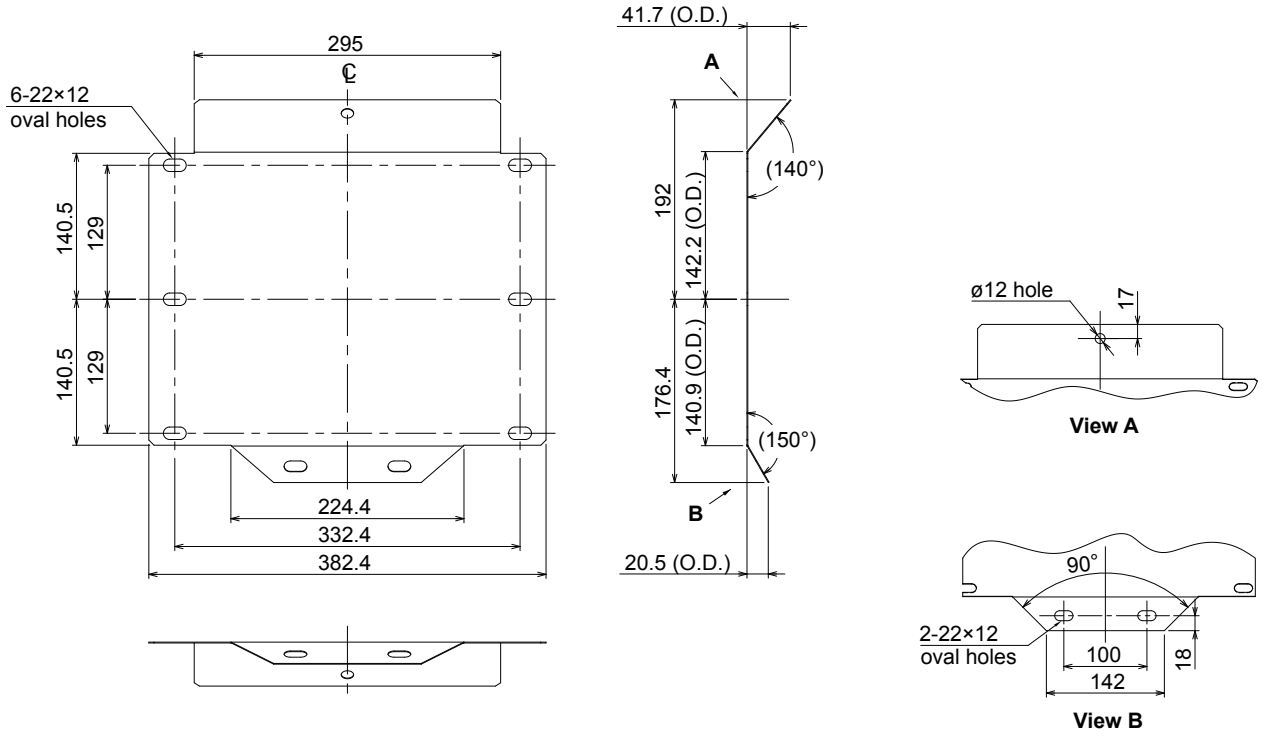


Fig. 2-8-63

8. Supplement

Reference Diagram for Topside Panel (Right) (field supply) : 1136-416

unit: mm

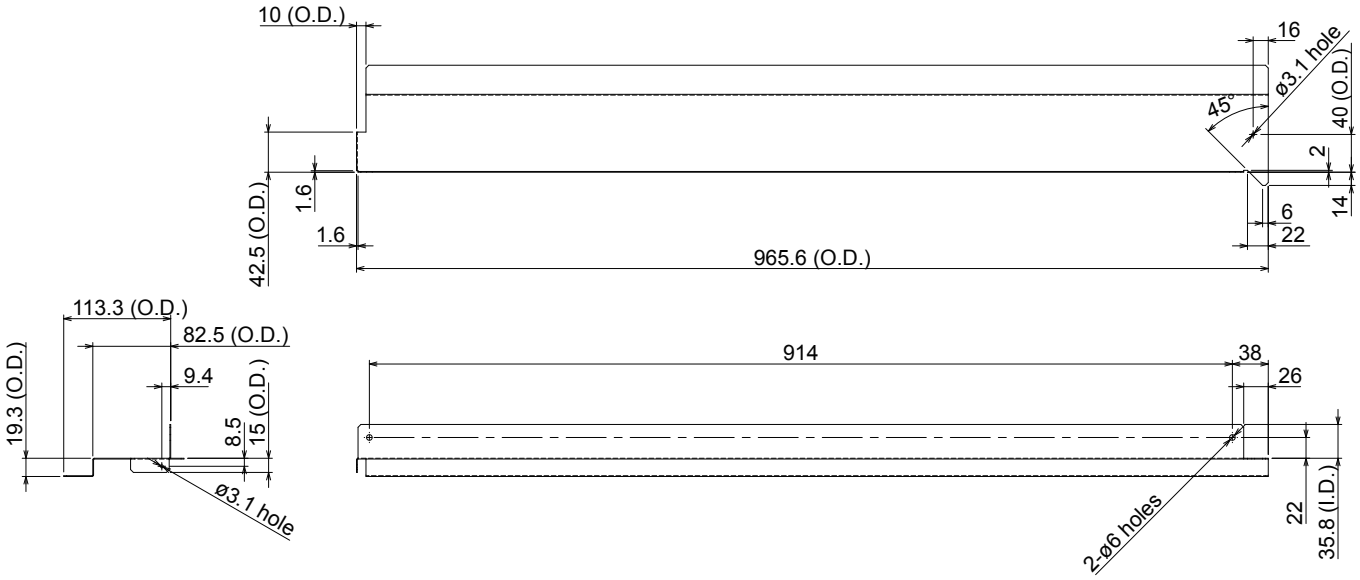


Fig. 2-8-64

Reference Diagram for Topside Panel (Left) (field supply) : 1136-417

unit: mm

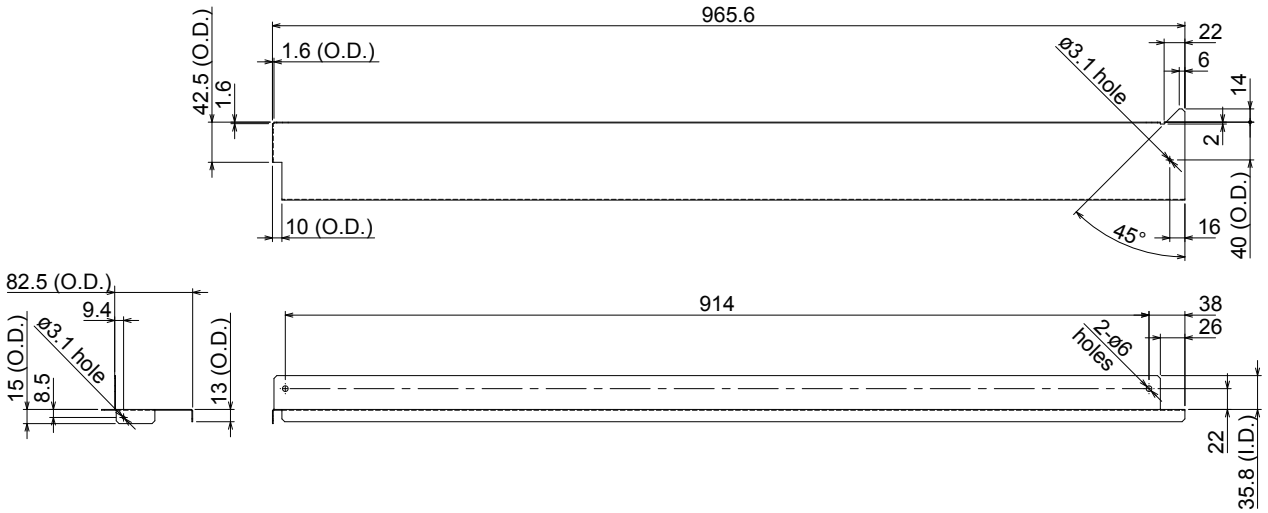


Fig. 2-8-65

8. Supplement

Reference Diagram for Front Panel (field supply) : 2342-952

unit: mm

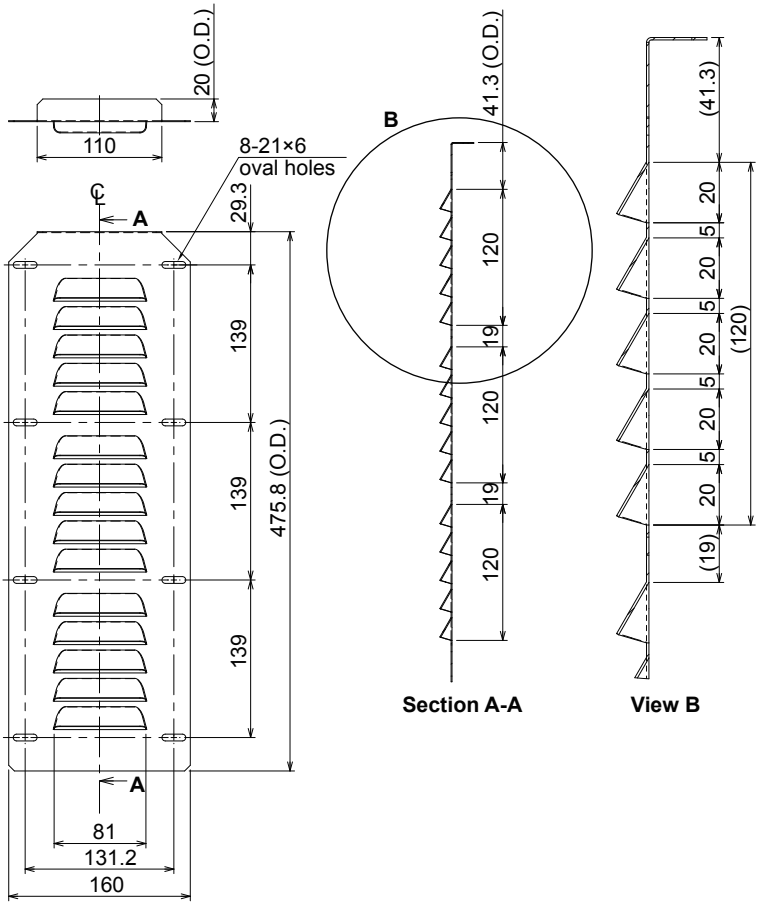


Fig. 2-8-66

Reference Diagram for Frame (field supply) : 1136-358

unit: mm

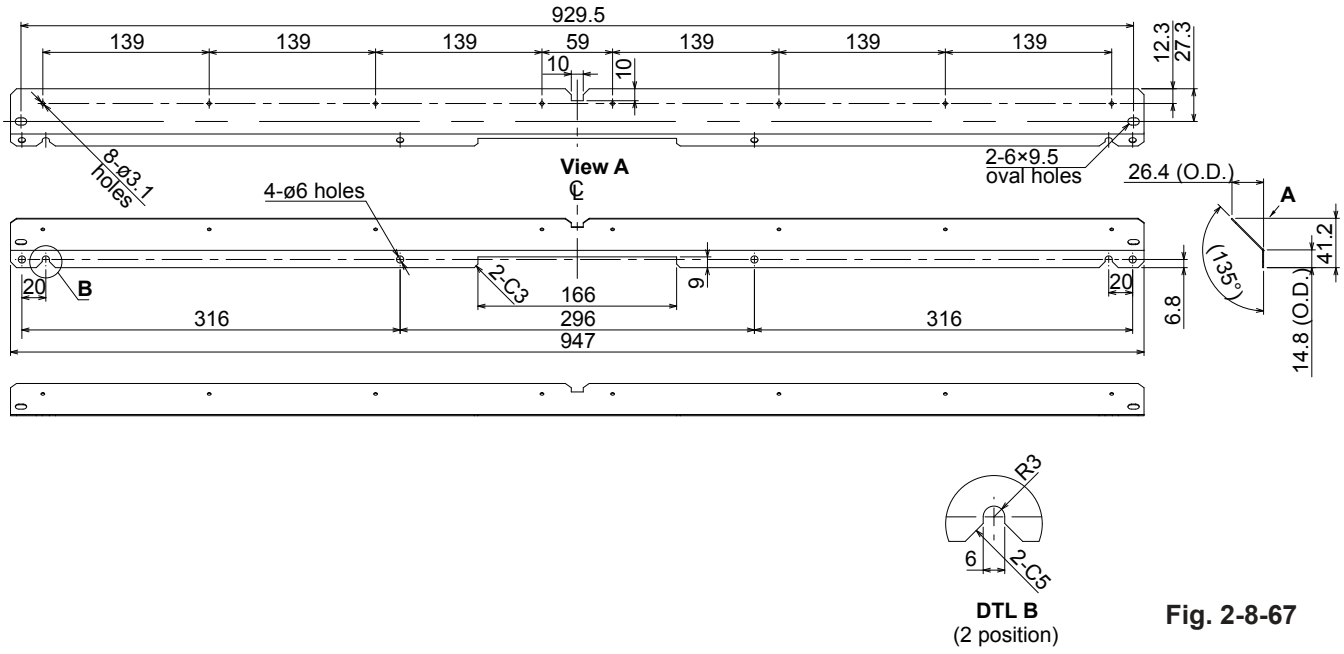


Fig. 2-8-67

– MEMO –