Contents

1. OUTLINE OF 2WAY SYSTEM

1. Line-up

Outdoor Units

Class	8 HP	10 HP	12 HP	14 HP	16 HP
Model Name	U-8ME2E8	U-10ME2E8	U-12ME2E8	U-14ME2E8	U-16ME2E8

Connecting Indoor Units

Type	Indoor Unit Type	Rated Capacity						
		15	22	28	36	45	56	60
U2	4-Way Cassette		S-22MU2E5B S-22MU2E5A	S-28MU2E5B S-28MU2E5A	S-36MU2E5B S-36MU2E5A	S-45MU2E5B S-45MU2E5A	S-56MU2E5B S-56MU2E5A	S-60MU2E5B S-60MU2E5A
Y3	4-Way Cassette 60 × 60	S-15MY3E	S-22MY3E	S-28MY3E	S-36MY3E	S-45MY3E	S-56MY3E	
K2	Wall-Mounted	S-15MK2E5B S-15MK2E5A	S-22MK2E5B S-22MK2E5A	S-28MK2E5B S-28MK2E5A	S-36MK2E5B S-36MK2E5A	S-45MK2E5B S-45MK2E5A	S-56MK2E5B S-56MK2E5A	
T2	Ceiling				S-36MT2E5A	S-45MT2E5A	S-56MT2E5A	
F3	Middle Static Pressure Duct	S-15MF3E5A	S-22MF3E5A	S-28MF3E5A	S-36MF3E5A	S-45MF3E5A	S-56MF3E5A	S-60MF3E5A
F2	Low Silhouette Ducted	S-15MF2E5A	S-22MF2E5A	S-28MF2E5A	S-36MF2E5A	S-45MF2E5A	S-56MF2E5A	S-60MF2E5A
M1	Slim Low Static Ducted	S-15MM1E5B S-15MM1E5A	S-22MM1E5B S-22MM1E5A	S-28MM1E5B S-28MM1E5A	S-36MM1E5B S-36MM1E5A	S-45MM1E5B S-45MM1E5A	S-56MM1E5B S-56MM1E5A	
G1	Floor Console		S-22MG1E5N S-22MG1E5A	S-28MG1E5N S-28MG1E5A	S-36MG1E5N S-36MG1E5A	S-45MG1E5N S-45MG1E5A	S-56MG1E5N S-56MG1E5A	
L1	2-Way Cassette		S-22ML1E5	S-28ML1E5	S-36ML1E5	S-45ML1E5	S-56ML1E5	
D1	1-Way Cassette			S-28MD1E5	S-36MD1E5	S-45MD1E5	S-56MD1E5	
P1	Floor Standing		S-22MP1E5	S-28MP1E5	S-36MP1E5	S-45MP1E5	S-56MP1E5	
R1	Concealed Floor Standing		S-22MR1E5	S-28MR1E5	S-36MR1E5	S-45MR1E5	S-56MR1E5	

Type	Indoor Unit Type	Rated Capacity				
		71 / 73	90	106	140	160
U2	4-Way Cassette	S-73MU2E5B S-73MU2E5A	S-90MU2E5B S-90MU2E5A	S-106MU2E5B S-106MU2E5A	S-140MU2E5B S-140MU2E5A	S-160MU2E5B S-160MU2E5A
K2	Wall-Mounted	S-73MK2E5B S-73MK2E5A		S-106MK2E5B S-106MK2E5A		
T2	Ceiling	S-73MT2E5A		S-106MT2E5A	S-140MT2E5A	
F3	Middle Static Pressure Duct	S-73MF3E5A	S-90MF3E5A	S-106MF3E5A	S-140MF3E5A	S-160MF3E5A
F2	Low Silhouette Ducted	S-73MF2E5A	S-90MF2E5A	S-106MF2E5A	S-140MF2E5A	S-160MF2E5A
L1	2-Way Cassette	S-73ML1E5				
D1	1-Way Cassette	S-73MD1E5				
P1	Floor Standing	S-71MP1E5				
R1	Concealed Floor Standing	S-71MR1E5				

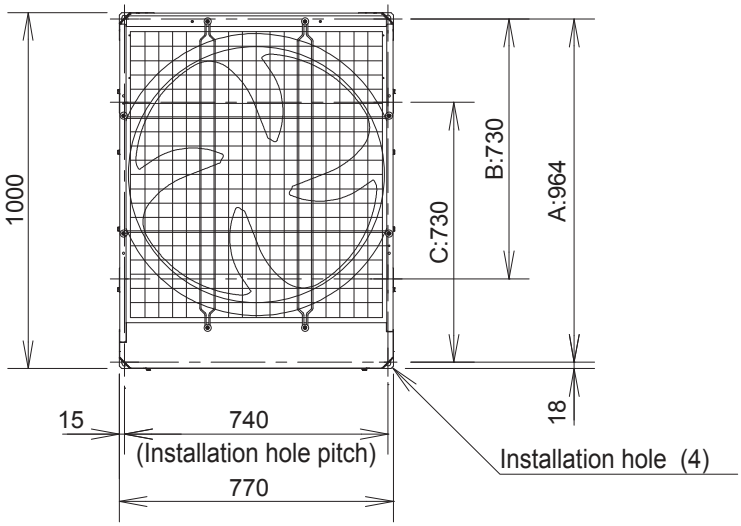
Type	Indoor Unit Type	Rated Capacity		
		180	224	280
E2	High Static Pressure Ducted	S-180ME2E5	S-224ME2E5	S-280ME2E5

1. Line-up

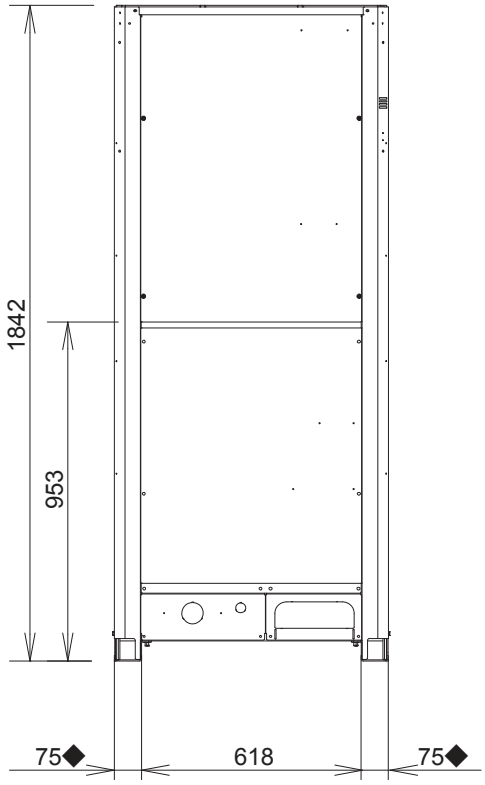
Outdoor units

Model	U-8ME2E8	U-10ME2E8
Capacity: kW Cooling / Heating	22.4 / 25.0	28.0 / 31.5

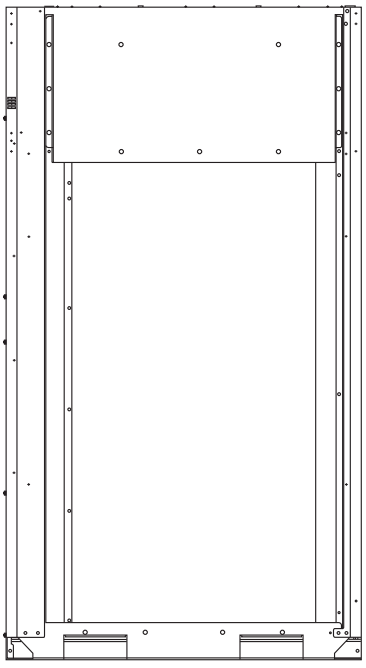
unit: mm



Top view



Front view



Side view

◆ Installation fixing bracket Installation side

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

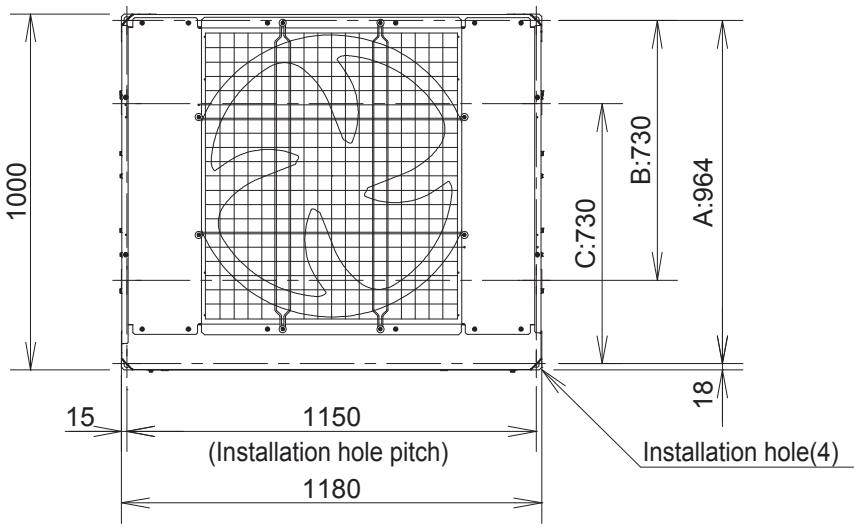
A : 964 (Installation hole pitch) * The tubing is routed out from the front.
B : 730 (Installation hole pitch) * The tubing is routed out from the bottom.
C : 730 (Installation hole pitch)

1. Line-up

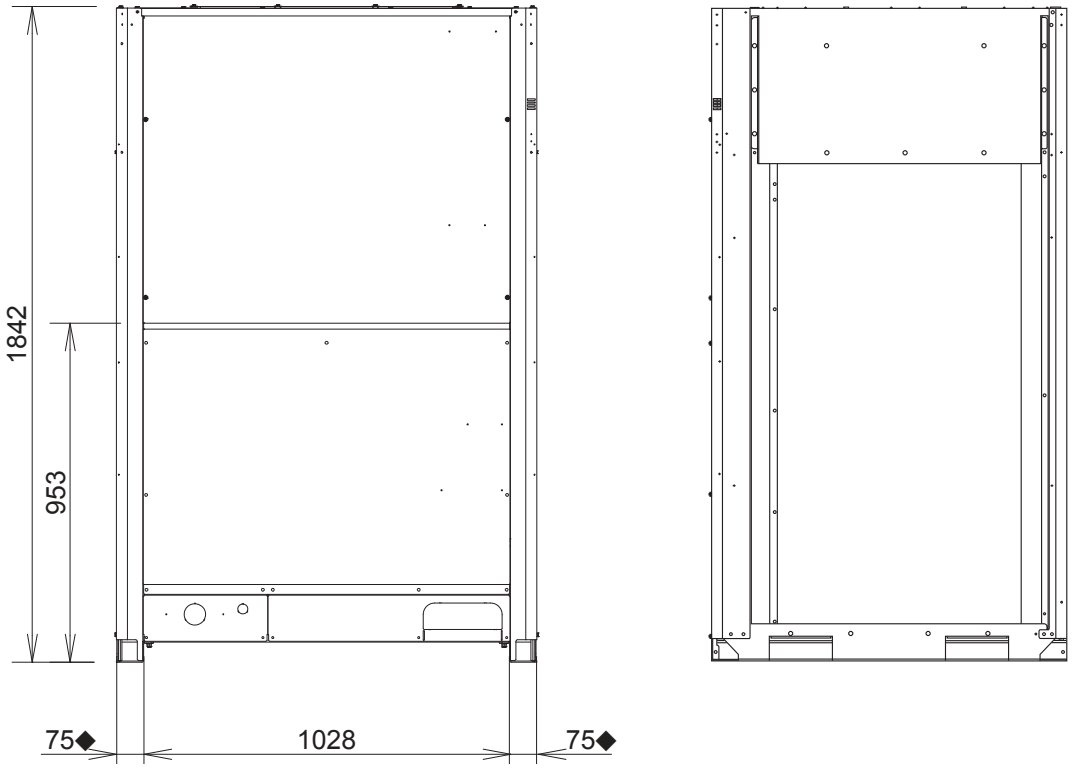
Outdoor units

Model	U-12ME2E8	U-14ME2E8	U-16ME2E8
Capacity: kW Cooling / Heating	33.5 / 37.5	40.0 / 45.0	45.0 / 50.0

unit: mm



Top view



Front view

Side view

◆ Installation fixing bracket Installation side

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.
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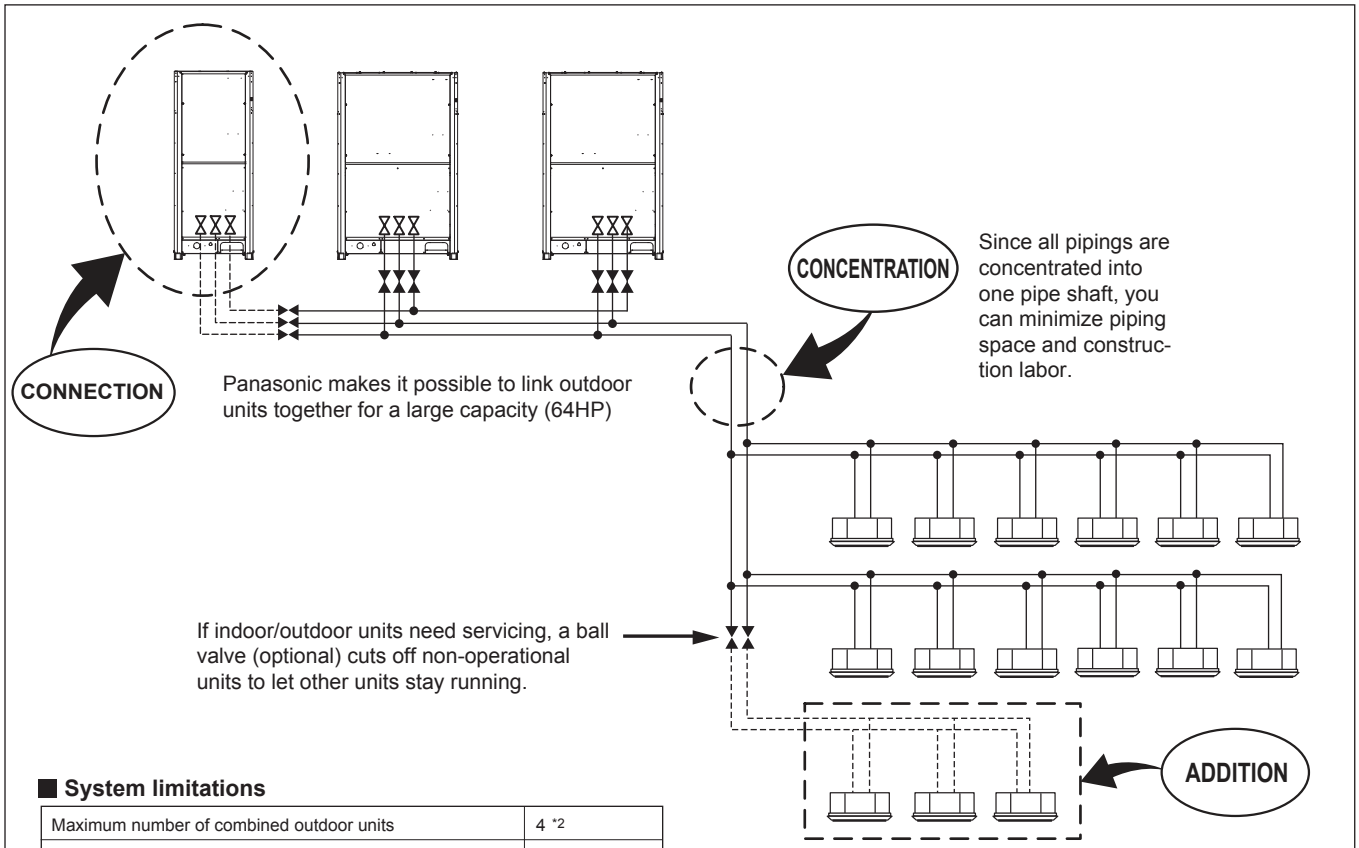
C : 730 (Installation hole pitch)

2. Features of 2WAY SYSTEM

■ Outline of 2WAY SYSTEM



■ System limitations

Maximum number of combined outdoor units	4 *2
Maximum horsepower of combined outdoor units	180kW (64 HP)
Maximum number of connectable indoor units	64 *1
Indoor/outdoor unit capacity ratio	50~130% *3
Maximum actual piping length	200 m
Maximum level difference (when outdoor unit is lower)	50 (40) m
Maximum total piping length	1000 m

If your indoor capacity load changes in the future, it's easy to add on both indoor and outdoor units using the same pipings.

* If the additional installment of outdoor and indoor units are expected, the size of refrigerant piping should be decided according to the total capacity after the addition.

*1: In the case of 38 HP 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.

2. Features of 2WAY SYSTEM

■ Combination of outdoor units

Total horse power / Type (HP)	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64
8	1					1																							
10		1				1	2	1		1				1		1		1				1		1		1			
12			1					1	2		1			2	3	1	2		1			2	3	1	2		1		
14				1								1								1								1	
16					1					1	1	1	2			1	1	2	2	2	3	1	1	2	2	3	3	3	4

1

2. Features of 2WAY SYSTEM

■ Capacity control

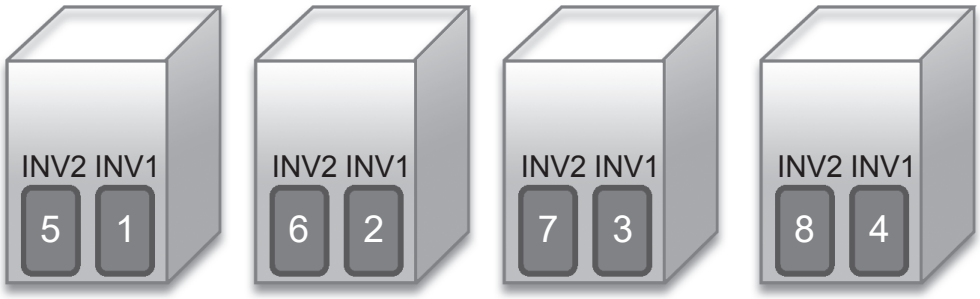
The compressor combination (All PC inverter compressor) allows very smooth capacity control from 0.8 HP to 64 HP.

Realization of smooth capacity control from 0.8HP to 64HP

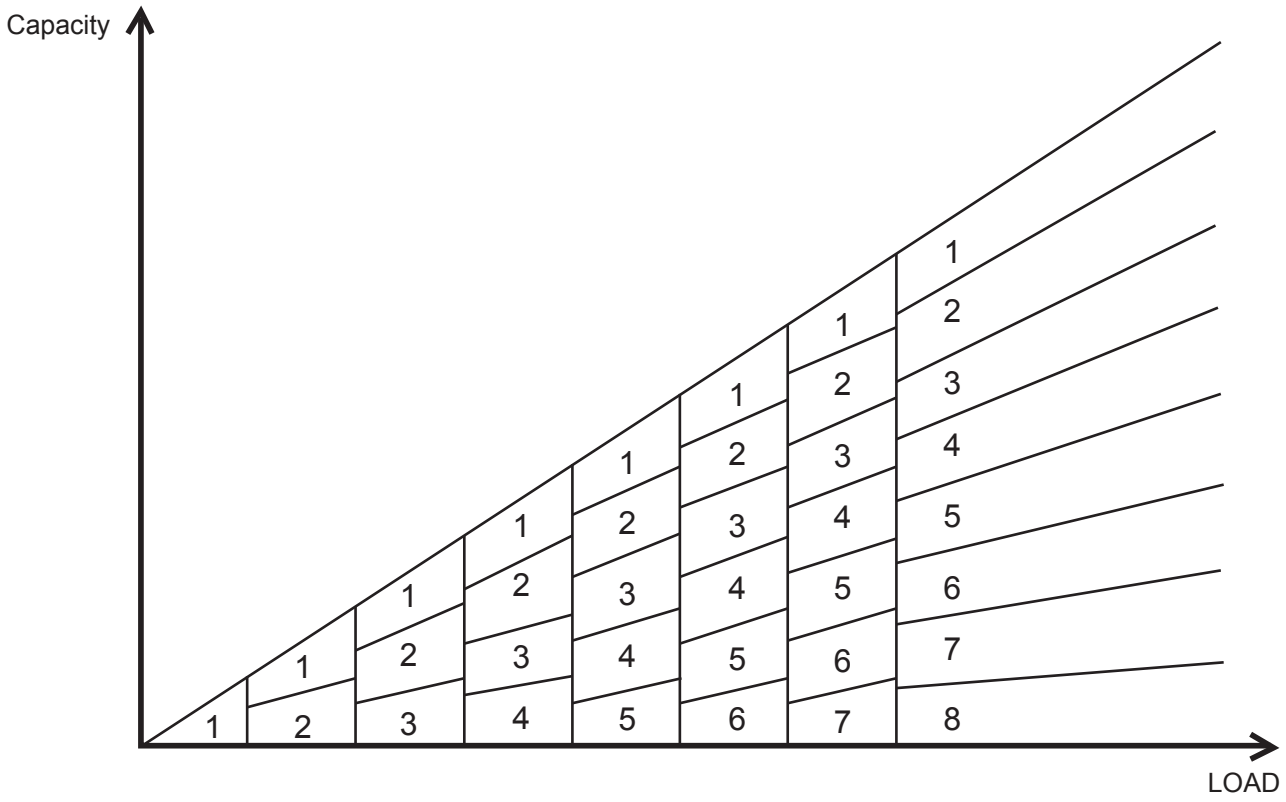
Capacity control is possible smoothly with a DC inverter compressor.
The graph shown in the below is the image of the operating combination of compressors in case of 64HP system.
In actual operation, the combination will be changed by operationg condition, operating time amount, priority of compressor and so on.

	Unit 1	Unit 2	Unit 3	Unit 4
Comp. HP	16HP	16HP	16HP	16HP
INV1 comp.	8	8	8	8
INV2 comp.	8	8	8	8

* 64HP = U-16ME2E8 x 4



In case of 64 HP system



– MEMO –

Contents

9. RENEWAL

1. Precautions on Renewal Design & Installation

1. General

VRF [*1] adopts the refrigerant R410A that has a higher pressure than conventional refrigerants, but it uses high-precision microcomputer control to enable operation at a "design pressure of 3.3 MPa", which is around the same as that before the refrigerant R410A was adopted. This means that you can use refrigerant tubing for R22 [*2]. Furthermore, if certain conditions are satisfied, you can reuse existing tubing by attaching one VRF Renewal Kit (CZ-SLK2) to each outdoor unit.
When performing the work, check the "DESIGN of VRF SYSTEM" section together with this section.

Operating Range (Outdoor unit)
Cooling : -10 ~ 43℃ (DB)
Heating : -25 ~ 18℃ (WB)

NOTE

*1. Systems for 2WAY VRF.
*2. Refrigerant tubing R22 has a maximum working pressure of 3.3 MPa and can be used for refrigerants such as R22 and R407C.

2. Basic Points for Using Existing Tubing

For existing tubing to be reused, the condition of the tubing needs to satisfy the basic points of "Safety" and "Cleanliness". First, confirm that the condition of the existing tubing satisfies the following check items.

■ **Safety**

- The existing unit shall be an air conditioner for use with R22/R407C/R410A refrigerant.
  The reuse of existing tubing and the like that has been used for an application other than air conditioning (refrigerating device, etc.) is prohibited because it is difficult to know the situation.
- The tubing shall not be dented, cracked, corroded, etc.
  Checking whether existing tubing is damaged, dented, and the like and the reliability of tubing strength is the responsibility of the installer performing the installation and is not guaranteed by us.
- The maximum working pressure of branches shall be 3.3 MPa or more. Furthermore, the branches shall be our genuine products.
  We do not guarantee the tubing strength of any branch that is not a genuine product of us.
- The thermal insulation material shall not be decayed and peeling off.
  If there is no thermal insulation installed on the liquid tubing, thermal insulation needs to be installed.

■ **Cleanliness**

- Check one of the refrigerant oil is used in the existing unit as shown below.

  Mineral oil: SUNISO, FLEOLE S, MS
  Synthetic oil: Type of alkyl benzene (HAB, barrel-freeze), type of ester (only PVE)

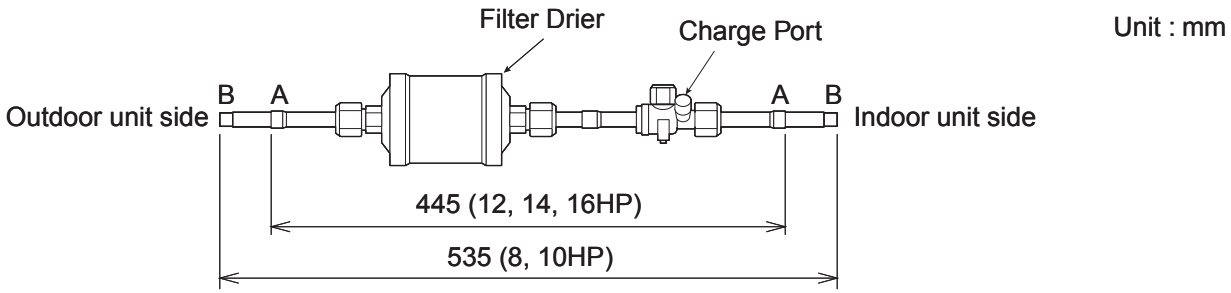
  NOTE: In case that the existing unit is the type of GHP, in addition, PAG oil (HP-55/7/9, PR, etc.) is used, pipe cleaning is necessary. If the unit is continously used without cleaning, winding insulation failure occurs. In the case of using SUNISO or the type of ether (FV xxxx S Series) for the GHP outdoor unit, it is not necessary to clean the unit. In this case, be sure to check the type of refrigerant oil in the existing unit.
- The existing tubing shall be connected to the indoor unit and outdoor unit and be air tight.
  Using tubing that is dirty inside as is may cause a failure of the new equipment.
- When using the existing unit, there is no trouble caused by foreign materials such as rare short circuited, moisture choke or oxidized scale inside the tubes. If any trouble occurs, appropriate measures shall be carried out on a timely basis.

1. Precautions on Renewal Design & Installation

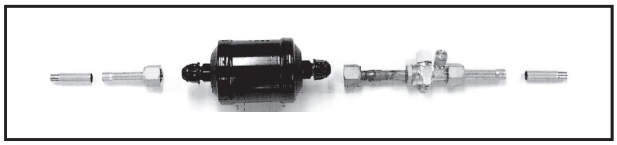
3. VRF Renewal Kit and Sight Glass

The following shows an overview of the VRF Renewal Kit (CZ-SLK2) that is required when existing tubing is reused. If the exact tube length and tube size of the existing tubing are uncertain, attach a sight glass in accordance with the figure below. It will be used for checking the amount of additional refrigerant charge (calculating the amount in Judgment 4).

■ **VRF Renewal Kit: CZ-SLK2**



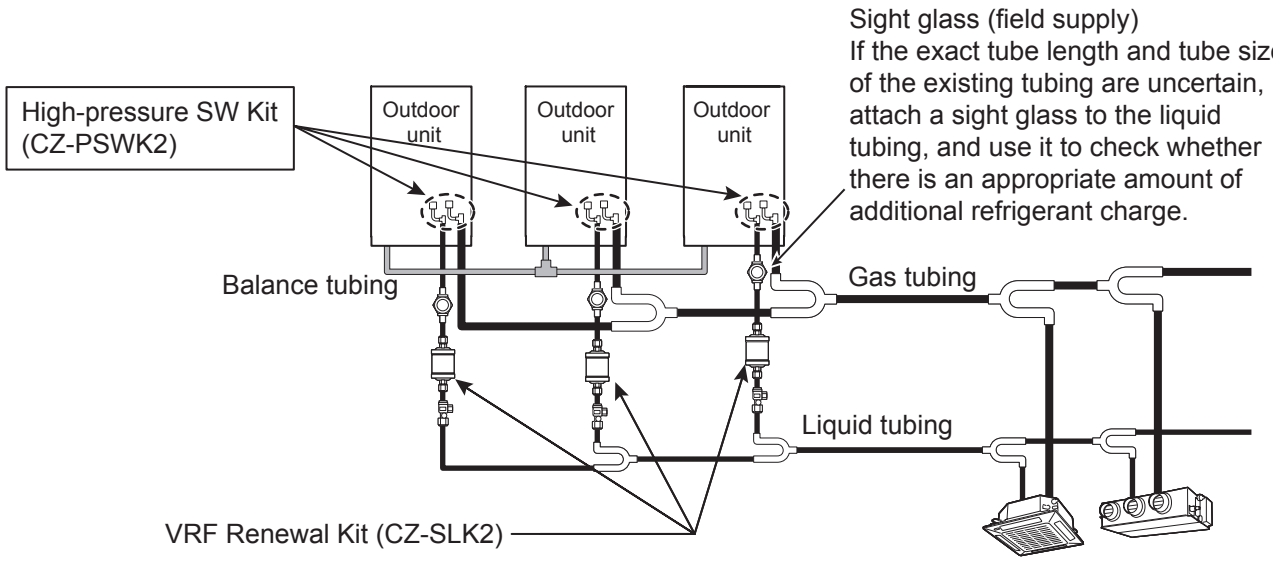
Connecting tube dimensions
A : ø12.7 (12, 14, 16HP)
B : ø9.52 (8, 10HP)



NOTE

If the tube size does not match that of the existing tubing, use a reducer (field supply) to adjust the tube diameter.

■ **Attaching the VRF Renewal Kit, sight glass and High-pressure SW kit**

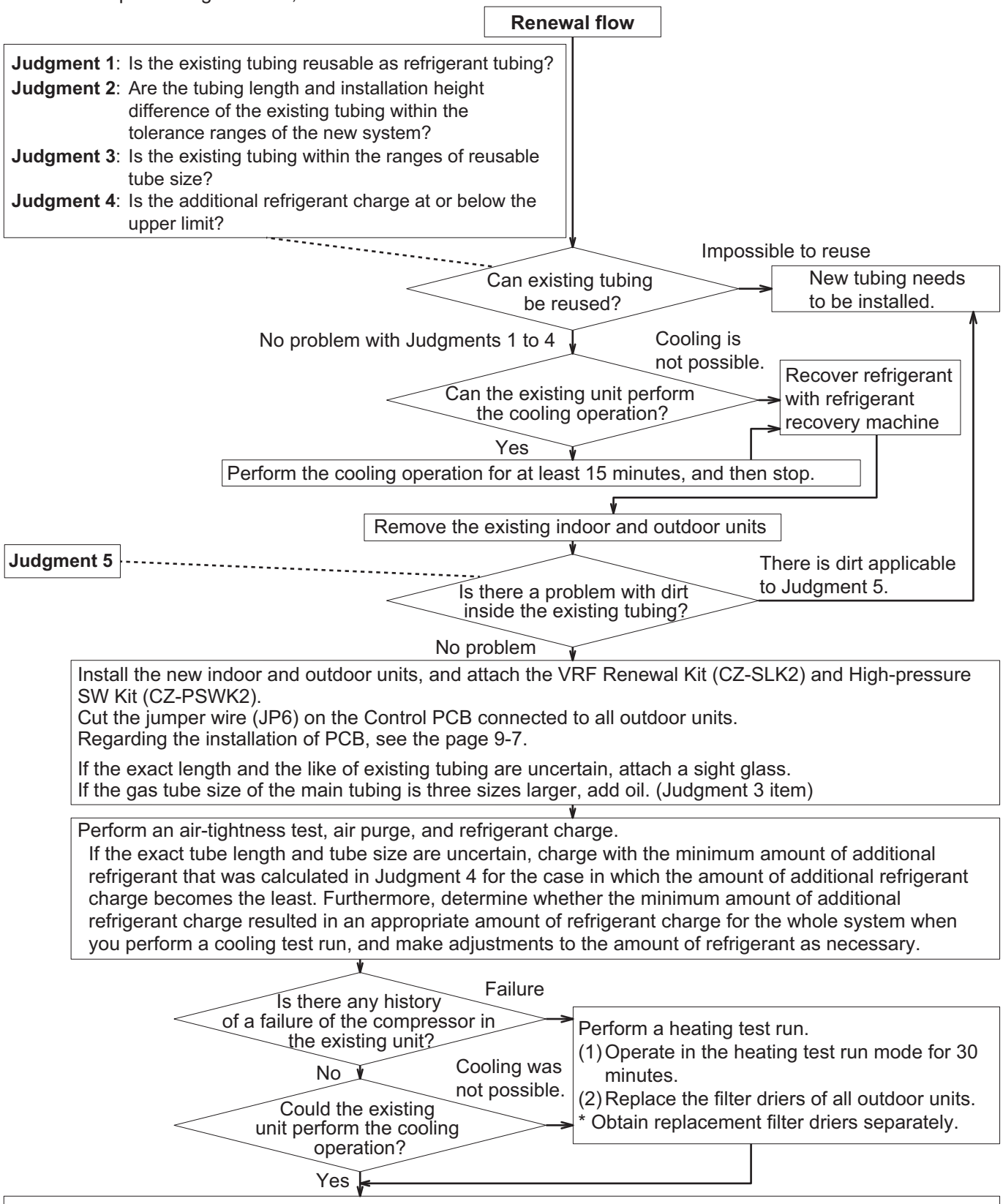


- VRF Renewal Kit (CZ-SLK2) shall be attached to the liquid tubing of all outdoor units.
- There is no need to remove the VRF Renewal Kit (CZ-SLK2) after a test run is performed because normal operation is possible while it is attached.
- When attaching the VRF Renewal Kit (CZ-SLK2), care shall be taken with regards to the installation location and orientation of the filter drier and ball valve. If a mistake is made, the refrigerant in the system needs to be recovered when the filter drier is replaced, which will make maintenance difficult.
- Thermal insulation material (field supply: heat resistance of 80°C or higher and thickness of 10 mm or greater) shall be applied to the VRF Renewal Kit (CZ-SLK2).
- The filter drier of the VRF Renewal Kit (CZ-SLK2) may need to be replaced depending on the condition of the existing unit. Use a Danfoss DMB 164 as the replacement filter drier.

1. Precautions on Renewal Design & Installation

4. Procedure for Renewal

After checking "2. Basic Points for Using Existing Tubing", perform the work in accordance with the renewal flow below. When performing the work, also check the "DESIGN of VRF SYSTEM" section.

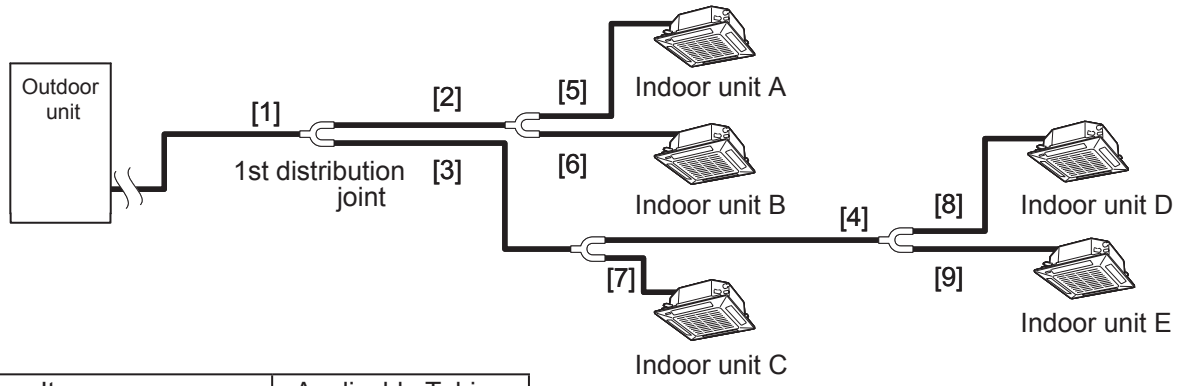


1. Precautions on Renewal Design & Installation

5. Judging Whether Possible to Reuse Existing Tubing: Judgments 1 to 5

It is necessary to check whether the existing tubing satisfies the following Judgments 1 to 5 while referring to the figure below. If the existing tubing does not satisfy the following conditions, new tubing needs to be installed.

Sample Image of Tubing of Existing Unit



Item	Applicable Tubing
Main tubing*1	[1]
Main tubing after distribution*1	[2][3][4]
Indoor unit connection tube	[5][6][7][8][9]

Fig. 9-1

*1: If “main tubing after distribution” is the same size as “main tubing”, it shall be considered to be “main tubing”. For example, if the tube size of [3] is the same as the tube size of [1], “main tubing” is [1] + [3].

■ **Judgment 1**

Is the refrigerant tubing reusable?

Check whether the existing refrigerant tubing is reusable (the refrigerant tubing is for R22 or has the same or a higher design pressure than refrigerant tubing for R22). Wall thickness shall comply with the applicable legislation. Table 9-1 shows the minimal wall thickness of reusable refrigerant tubing. Also check the maximum working pressure for branches separately.

Table 9-1 Usable Refrigerant Tubing (Seamless phosphorous deoxidized copper tube for refrigeration)

Material	Material Temper - O					Material Temper - 1/2H, H								
Outer dia. (mm)	6.35	9.52	12.7	15.88	19.05	19.05	22.22	25.4	28.58	31.75	38.1	41.28	44.45	50.8
Thickness (mm)	0.80	0.80	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.15	1.20	1.25	1.40

■ **Judgment 2**

Are the tubing length and installation height difference of the existing tubing within the tolerance ranges of the new system?

The refrigerant tubing length and installation height difference must be within the tolerance ranges of the tubing length and installation height difference of the new system.

1. Precautions on Renewal Design & Installation

■ **Judgment 3**

Is the existing tubing within the reusable tube size ranges?

Check whether the tube sizes of the existing refrigerant tubing are within the usable ranges.
Tables 9-2 to 9-4 show the usable tube size ranges for each of the main tubing, main tubing after distribution, and indoor unit connection tubing.
The existing tube sizes must be checked to determine whether they are within the ranges in these tables.
Furthermore, extra oil may need to be added depending on the gas tube sizes of the main tubing, main tubing after distribution.

Table 9-2 Usable Tube Size Ranges for Main Tubing [1]

OutdoorUnit HP	Gas tubing (mm)											Liquid tubing (mm)						
	12.7	15.88	19.05	22.22	25.4	28.58	31.75	38.1	41.28	44.45	50.8	6.35	9.52	12.7	15.88	19.05	22.22	25.4
8			◎	○	○	●							◎	○	○	○	○	○
10				◎	○	○	●						◎	○	○	○	○	○
12					◎	○	○	●						◎	○	○	○	○
14					◎	○	○	●						◎	○	○	○	○
16						◎	○	○	●					◎	○	○	○	○
18						◎	○	○	●						◎	○	○	○
20						◎	○	○	●						◎	○	○	○
22						◎	○	○	●						◎	○	○	○
24						◎	○	○	●						◎	○	○	○
26							◎	○	○	●						◎	○	○
28							◎	○	○	●						◎	○	○
30							◎	○	○	●						◎	○	○
32							◎	○	○	●						◎	○	○
34							◎	○	○	●						◎	○	○
36								◎	○	○	●					◎	○	○
38								◎	○	○	●					◎	○	○
40								◎	○	○	●					◎	○	○
42								◎	○	○	●					◎	○	○
44								◎	○	○	●					◎	○	○
46								◎	○	○	●					◎	○	○
48								◎	○	○	●					◎	○	○
50								◎	○	○	●					◎	○	○
52								◎	○	○	●					◎	○	○
54								◎	○	○	●					◎	○	○
56								◎	○	○	●					◎	○	○
58								◎	○	○	●					◎	○	○
60								◎	○	○	●					◎	○	○
62									◎	○	○					◎	○	○
64									◎	○	○					◎	○	○

*1. Marking with ◎ shows the standard size. Marking with ○ shows available for the sizes.
*2. If the extension is planned in the future and tubing size is checked after expansion, see the location of total HP after expansion if the combination of outdoor units in the table above is not convenient.
*3. The balance tube (outdoor unit tubing) is ϕ6.35.
*4. If the maximum tubing length (L1) exceeds 90m (equivalent length), it is impossible to use the tube marked with ◎ in the Main Tubing Size Table (as well as gas and liquid tubes).
*5. Even in case of excluding No.4, if the main tube (LM) exceeds maximum length of 50m, only the gas tube marked with ◎ cannot be used within 50m in length for the main tube. Liquid tube is available for use.
*6. When using the tube marked with ● in the Main Tubing Size Table, additional oil charge is necessary. Add 30cc/m of oil.

Table 9-3 Usable Tube Size Ranges for Main Tubing after Distribution [2][3][4]

Total volume after the branch The parenthesis shows the equivalent horsepower.		Gas tubing (mm)											Liquid tubing (mm)						
over	below	12.7	15.88	19.05	22.22	25.4	28.58	31.75	38.1	41.28	44.45	50.8	6.35	9.52	12.7	15.88	19.05	22.22	25.4
—	7.1(2.5)	◎	○	○	●									◎	○	○	○	○	○
7.1(2.5)	16.0(6)		◎	○	○	●								◎	○	○	○	○	○
16.0(6)	22.5(8.1)			◎	○	○	●							◎	○	○	○	○	○
22.5(8.1)	30.0(10)				◎	○	○	●						◎	○	○	○	○	○
30.0(10)	42.0(15)					◎	○	○	●						◎	○	○	○	○
42.0(15)	52.4(19)						◎	○	○	●					◎	○	○	○	○
52.4(19)	70.0(25)						◎	○	○	●						◎	○	○	○
70.0(25)	98.0(35)							◎	○	○	●						◎	○	○
98.0(35)	170.0(61)								◎	○	○	●					◎	○	○
170.0(61)	—									◎	○	○					◎	○	○

*1. Marking with ◎ shows the standard size. Marking with ○ shows available for the sizes.
*2. Be careful the main tubing size after distribution shall not exceed the main tubing size.
*3. If the total volume of connected indoor units after distribution exceeds the total volume of outdoor units, select the main tubing size in consideration of the total volume of outdoor units.
*4. It is possible to use tube marked with ● in the Main Tubing Size Table after the branch by additional oil charge within the length of 50m.

1. Precautions on Renewal Design & Installation

Table 9-4 Usable Tube Size Ranges for Indoor Unit Connection Tubing [5][6][7][8][9]

Type Indoor unit	Gas tubing (mm)											Liquid tubing (mm)						
	12.7	15.88	19.05	22.22	25.4	28.58	31.75	38.1	41.28	44.45	50.8	6.35	9.52	12.7	15.88	19.05	22.22	25.4
15	◎											◎	○					
22	◎											◎	○					
28	◎											◎	○					
36	◎											◎	○					
45	◎	○										◎	○					
56	◎	○										◎	○					
60		◎										△	◎					
71/73		◎										△	◎					
90		◎	○									△	◎					
106		◎	○										◎					
140		◎	○										◎					
160		◎	○										◎					
180			◎	○	○								◎	○				
224			◎	○	○								◎	○				
280				◎	○	○							◎	○				

*1. Marking with ◎ shows the standard size. Marking with ○ shows available for the sizes.
*2. The tube marked with △ in the Indoor Unit Connecting Tubing Size Table can be used when the following conditions are all satisfied.
1. Luck of capacity or refrigerant flow noise does not occur in the existing indoor unit.
2. The existing indoor unit is the type of 6300-7500kcal/h.
3. The length of tube ϕ6.35 is within 10m.
4. The elevation difference between indoor units (H2) is within 4m.

■ **Judgment 4**

Is the additional refrigerant charge at or below the upper limit?

Check that the amount of additional refrigerant charge for the existing refrigerant tubing is at or below the upper limit that is determined from the number of outdoor unit connections.

Calculate the amount of additional refrigerant charge from the liquid tubing size and total tubing length using the same criteria as for standard units (VRF).

Table 9-5 shows the calculation formula for the amount of additional refrigerant charge.

Check the existing liquid tubing size and total tubing length of each size, and calculate the amount of additional refrigerant charge from that result.

Also, check that the calculation result is at or below the upper limit for the amount of additional refrigerant charge determined by the number of outdoor unit connections that is shown in Table 9-6.

- **If the exact tube length and tube size of the existing tubing are uncertain:**
  If the exact tube length and tube size of the existing tubing are uncertain, assume the case in which the amount of additional refrigerant charge becomes the most (liquid tube = thick and tube length = long) and conversely, the case in which the amount of additional refrigerant charge becomes the least (liquid tube = thin and tube length = short), and calculate the amount of additional refrigerant charge for each case. When you determine the amount of refrigerant, the result calculated for the maximum amount of additional refrigerant charge must be at or below the upper limit.
  Furthermore, make sure you calculate the minimum amount of additional refrigerant for the case in which the amount of additional refrigerant charge becomes the least because it will be required when the actual renewal work is performed.

Table 9-5 Calculation of Amount of Additional Refrigerant Charge

Liquid Tube Size (mm)	Total Tube Length (m)		Amount of Additional Refrigerant Charge (g/m)		Sub-total (g)
ϕ 6.35		x	26	=	
ϕ 9.52		x	56	=	
ϕ 12.7		x	128	=	
ϕ 15.88		x	185	=	
ϕ 19.05		x	259	=	
ϕ 22.22		x	366	=	
ϕ 25.4		x	490	=	

Total (kg)

Table 9-6 Number of Outdoor Unit Connections and Upper Limit for Amount of Additional Refrigerant Charge

Number of Outdoor Units	Upper Limit for Amount of Additional Refrigerant Charge
1	50 kg
2	80 kg
3	100 kg
4	100 kg

1. Precautions on Renewal Design & Installation

■ **Judgment 5**

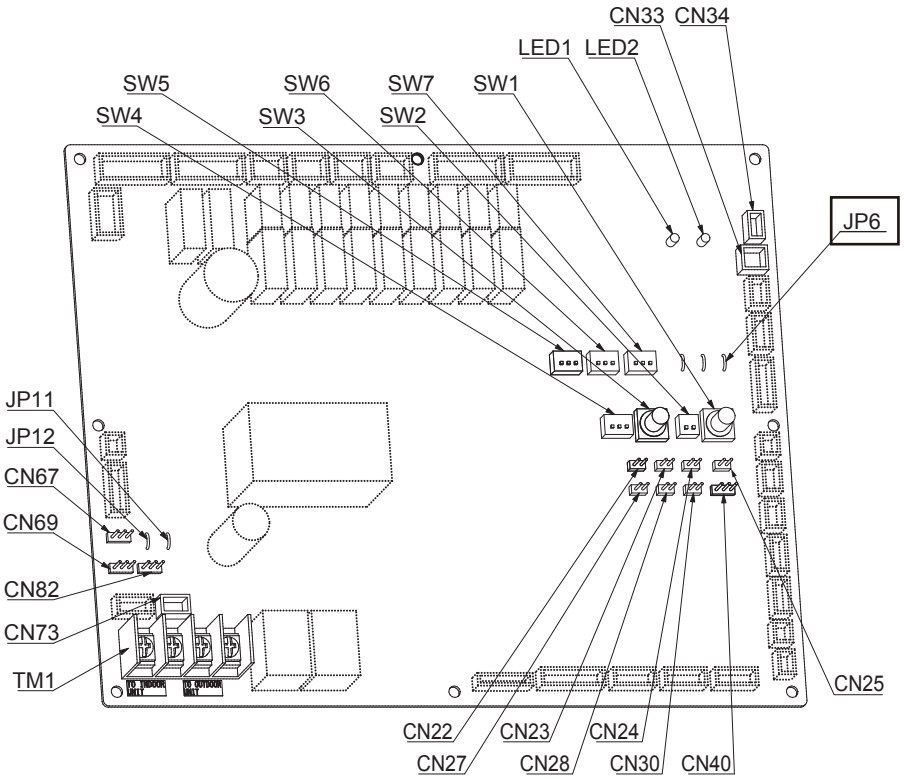
Is there a problem with dirt inside the existing tubing?

After the existing units are removed, new tubing needs to be installed if the existing tubing is in any of the following situations.

- There is apparently a large amount of discolored oil remaining inside the existing tubing.
  See the item "4. Oil color standards for renewal" in the chapter 2 "Reference".
- There is apparently a large amount of residue or wear debris remaining inside the existing tubing.
  Oil collected with a finger feels gritty or looks glittery.

Control PCB of outdoor unit

When reusing the existing tubes, it is necessary to cut out the jumper wire JP6 connected to all outdoor units.
See page 9-3 under the section “4. Procedure for Renewal”.



1. Precautions on Renewal Design & Installation

6. Heating Test Run and Cooling Test Run

a) Heating Test Run

If refrigerant recovery could not be implemented by performing the cooling operation with the existing unit or if there is history of a failure of the compressor in the existing unit, perform the tubing cleaning operation with a heating test run.

Furthermore, it is necessary to replace the filter drier of the VRF Renewal Kit (CZ-SLK2) after you perform the tubing cleaning operation.

Obtain and prepare a replacement filter drier in advance.

Step 1 : Perform a heating test run for 30 minutes.

- If a heating test run cannot be performed because there is an insufficient amount of refrigerant, add the required minimum amount of refrigerant.

Step 2 : Stop the outdoor units manually.

Step 3 : Need to replace all filter driers of the VRF Renewal Kit (CZ-SLK2).

The tubing cleaning operation with the heating test run is now complete.

b) Cooling Test Run

If the exact tube length and tube size of the existing tubing are uncertain, the current condition should be one in which the additional charging of the minimum amount of refrigerant calculated in Judgment 4 has been performed. Under the condition, perform a cooling test run, adjust the appropriate amount of system refrigerant while checking the condition of flowing refrigerant with the sight glass.

Step 1 : Start the cooling test run, and wait until the operating condition of the system stabilizes.

Step 2 : After operation stabilizes, visually observe the flowing refrigerant through the sight glass attached to the liquid tubing. If flashing becomes visible, add refrigerant by degrees until flashing disappears.

- Add refrigerant in increments of approximately 1 kg.
- Check flashing after adding refrigerant when operation has stabilized after approximately 10 minutes has elapsed.
- The amount of additional refrigerant must not exceed the maximum amount of additional refrigerant calculated in Judgment 4.

Step 3 : For when maintenance is performed, fill in the total amount of additional refrigerant charge on the label inside the outdoor unit.

The adjustment of the system refrigerant charge amount with the cooling test run is now complete.

2. Reference

1. Purposes for Attaching VRF Renewal Kit (CZ-SLK2)

The VRF Renewal Kit: CZ-SLK2 has functions for collecting small wear debris and residue that pass through the strainer and absorbing moisture.
When existing tubing is reused, the VRF Renewal Kit can be used in addition to the strainer attached to the outdoor unit to collect the wear debris and residue that remains inside the existing tubing in order to prevent them entering inside the outdoor unit.
Furthermore, perform the tubing cleaning operation with a heating test run if there is the possibility of residue remaining inside the existing tubing (heating test run in flow for judging whether to reuse existing tubing).
However, if the tubing cleaning operation is performed, the filter drier of the VRF Renewal Kit must be replaced after the cleaning operation is performed.
Furthermore, it has been verified that a small amount of residue and the like is not a problem if a VRF Renewal Kit is attached, but if there is apparently a large amount of discolored oil or residue, the existing tubing cannot be used because there is danger of the strainer and VRF Renewal Kit becoming clogged (Judgment 5 in flow for judging whether to reuse existing tubing).

2. Type of oil

VRF series are filled with oil at the time of shipment.

The type of oil differs depending on the application and refrigerant to be used.
Furthermore, the recent diversification of compressor types as well as the severe conditions of use mean that the additives may differ even if the type is the same.
When reusing existing tubing, the old oil remaining inside the tubing will mix with the oil for the new unit, so perform an evaluation test by mixing an oil for R22 shown below to check that there is no problem.

• Check one of the refrigerant oil is used in the existing unit as shown below.

Mineral oil: SUNISO, FLEOLE S, MS
Synthetic oil: Type of alkyl benzene (HAB, barrel-freeze), type of ester (only PVE)

NOTE: In case that the existing unit is the type of GHP, in addition, PAG oil (HP-55/7/9, PR, etc.) is used, pipe cleaning is necessary. If the unit is continously used without cleaning, winding insulation failure occurs. In the case of using SUNISO or the type of ether (FV xxxx S Series) for the GHP outdoor unit, it is not necessary to clean the unit. In this case, be sure to check the type of refrigerant oil in the existing unit.

3. Oil discoloration

There are two causes of oil discoloration.

1. Oxide scale or minute wear debris floating in the oil results in the oil appearing discolored.
   The quality of the oil itself has not changed, so the oil can be sufficiently cleaned with the VRF Renewal Kit if there is just a little bit of dirt.
   However, if the oil contains a large amount of wear debris and feels gritty when touched with a fingertip or there is apparently a large amount of residue, the existing piping cannot be used.

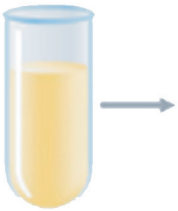
2. The oil is exposed to high temperatures for long periods of time resulting in the oil itself becoming discolored.
   Lubrication of the compressor has deteriorated because the lubrication performance of the oil itself has been greatly reduced. Therefore, the existing tubing cannot be used.
   However, it has been verified that there is no adverse effect on the lubrication performance of the new system when there is only a small amount of oil that is discolored as described above.

Remark :
Residual chlorine that causes metal to corrode may sometimes be included in the old oil.
As a countermeasure, add additives for catching the chlorine content into the oil in the VRF series so that no problem occurs.

2. Reference

4. Oil color standards for renewal

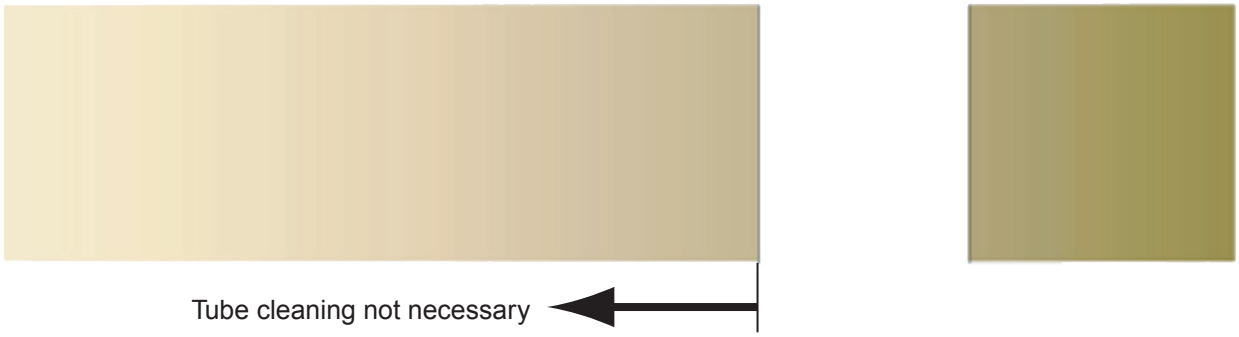
In a test tube with a diameter of approximately 2 cm, collect a sample of 3 to 5 cm of oil for renewal, and then check the oil comparing with the pattern of colors below.



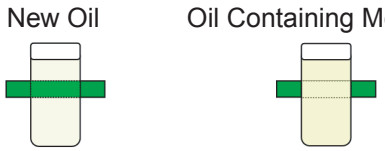
Applicable Oil

Mineral oil : Suniso, Freol S and MS

Synthetic fluid : Alkyl benzene-type (HAB, Barrel-freeze), ester-type, ether-type (PVE only)



If moisture is mixed with the oil, an increase in friction (abnormal friction) or rusting may result in damage to the system.
If moisture is mixed with the oil and the oil is whitish, it is necessary to clean the tubing or install a new tubing.



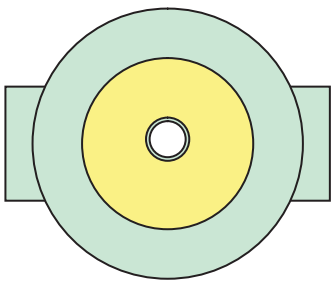
New oil is transparent. If moisture mixes with the oil, the oil emulsifies and the level of transparency is reduced, so it becomes difficult to see through to the other side of the test tube.

5. Standards for judging refrigerant with sight glass

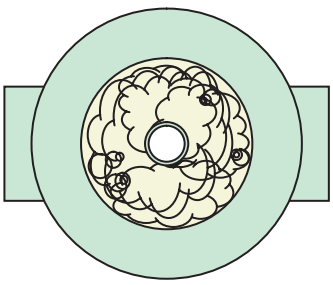
If the exact tube length and tube size of existing tubing are uncertain, you can check with the sight glass whether there is an appropriate amount of additional refrigerant charge.
Check the condition after operation has stabilized during the cooling test run.

Outdoor unit stopped ⟷ Outdoor unit activated

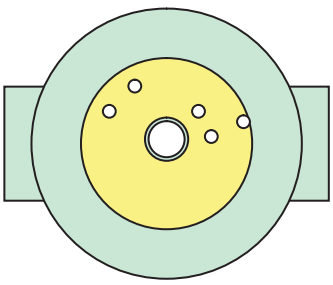
Refrigerant not activated :
As the refrigerant is transparent, the bottom of the sight glass is visible.



Flashing :
The amount of refrigerant is not satisfied with the standard level.
The refrigerant forms bubbles and seems whitish overall.
Add refrigerant until the appropriate level is reached.



A few bubbles occur :
There seems to be nothing inside the sight glass because the refrigerant is transparent and full.
When the operating condition changes, a few bubbles occur.
No additional refrigerant charge required.



3. INSTALLATION INSTRUCTIONS (VRF Renewal Kit)

Check the parts of the VRF Renewal Kit (CZ-SLK2) you purchased.

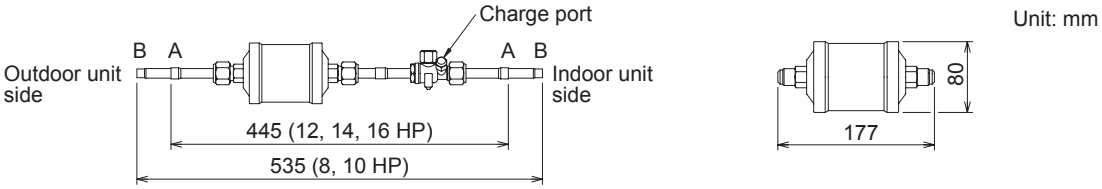
Name	Shape	Quantity	Name	Shape	Quantity
(1) Filter drier		1	(3) Tube 1 (for ø12.7)		2
(2) Valve		1	(4) Tube 2 (for ø9.52)		2

1. How to attach the VRF Renewal Kit (CZ-SLK2)

1-1. Assemble and use parts (1) to (4) in the figure above in accordance with the table below.

Outdoor Unit Type	Parts	Quantity	Outdoor Unit Type	Parts	Quantity
8, 10 HP	(1), (2)	1	12, 14, 16 HP	(1), (2)	1
	(3), (4)	2		(3)	2

1-2. Connect each part in accordance with the figure below.



A	B
ø12.7	ø9.52

Connection part dimensions (shows tube inside diameters)

- Attach the valve to the indoor unit side as viewed from the filter drier.
- If the tube size does not match the existing tube size, use a reducer (obtain locally) to adjust the tube diameter.

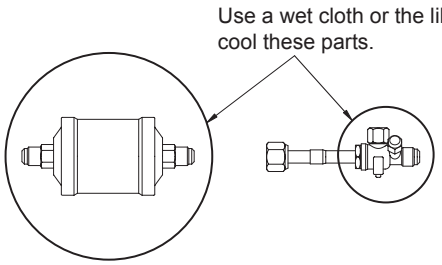
1-3. Attach the VRF Renewal Kit to each outdoor unit.

1-4. Cut the existing tubing on site with a pipe cutter or the like and attach the VRF Renewal Kit according to the rough indication of the dimensions for attaching the VRF Renewal Kit shown in the figure above.

2. Tightening flare nuts and brazing

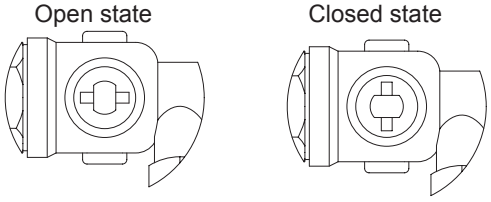
- Use a tightening torque of 55±6 N·m for the flare nuts.
- Be sure to use a wet cloth or the like to cool the valve main part and filter drier when you perform the brazing process.

Also, be sure to replace the air inside the tube with nitrogen to prevent the formation of an oxide film when you perform the brazing process.
There is a risk of system mulfunction through clogging of the strainer or refrigerant circuit when the brazing is performed without nitrogen gas replacement in the tube.



3. Opening and closing the valve

The valve is opened at the time of shipment from the factory.



4. Leak testing

Perform a leak test for the brazing parts and flare connections parts.
For the leak test, refer to " Installation Instructions" supplied with the outdoor unit.

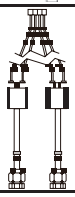
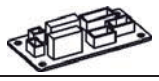
5. Attaching thermal insulation material

Make sure the thermal insulation (obtain locally) covers the entire kit.
Use thermal insulation material with a heat resistance of at least 80°C and thickness of at least 10 mm.

Installation Instructions (High Pressure Switch Kit)

Refer to the Installation Instructions supplied with the outdoor unit.

ACCESSORIES **NOTE: Check all supplied parts before installation.**

No.	Part name	Figure	Q'ty
①	Connection tubing (Φ9.52)		1
②	Connection tubing (Φ12.7)		1
④	Connection tubing (Φ19.05)		1
⑤	Connection tubing (Φ22.22)		1
⑥	Connection tubing (Φ25.4)		1
⑧	High pressure switch (HPS label attached to liquid tube side)		1
⑨	Clamper T30R (140mm)		7
⑫	Relay PCB		1
⑬	Spacer (SPLSN-6U)		4
⑭	Lead wire (Relay PCB $^{2P}_{BLK}$ ～ CR PCB $^{2P}_{BLK}$)		1
⑮	Lead wire (Relay PCB $^{2P}_{GRN}$ ～ HIC1 PCB $^{3P}_{WHT}$)		1
⑯	Lead wire (Relay PCB $^{3P}_{GRN}$ ～ HIC2 PCB $^{3P}_{WHT}$)		1
⑰	Lead wire (63PH2 Short-circuit connector)		1

4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

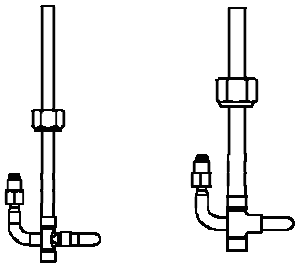
HOW TO INSTALL

1. Process of Tube and Connection Tubing

- Material: Use C1220T phosphorus deoxidized copper specified in JIS H3300 "Copper and Copper Alloy Seamless Pipes and Tubes". (1/2H material & H material for outer diameter over Φ22.22, O material for others)
- Use the tubing size that is shown in the table at the right.
- When cutting the tube, remove burrs at the end of copper tube with a tube reamer.
- When bending the tube, bend radius should be at least 4 times the outer diameter of the tube. Be careful not to crush or scratch it.
- Before flaring procedure, remove the flare nut of the liquid tubing valve (2WAY) and assemble Part① and Part② as shown in the figure.
- Use the flare tools for flaring procedure securely.

Table 1 Refrigerant tubing

Tubing size (mm)			
O material		1/2H, H material	
Outer diameter	Thickness	Outer diameter	Thickness
Φ9.52	T0.8	Φ22.22	T1.0
Φ12.7	T0.8	Φ25.4	T1.0
Φ15.88	T1.0	Φ28.58	T1.0
Φ19.05	Over T1.0		



Part ① Part ②

2. Connection Tubing

- Before brazing the gas tubing valve (2WAY ME2 series), connect the high pressure switch for gas tubing (2WAY ME2 series) of Part⑧ into Part① and Part②.
- When finished connecting the high pressure switch for liquid tubing (2WAY ME2 series) and brazing Part① and Part② by the local delivery, braze the gas tubing valve (2WAY ME2 series).
- Regarding the type of 2WAY, make use of the connection tube supplied with the outdoor unit together.
- To fasten the flare nuts, use two adjustable wrenches or spanners. Tightening torque should be 16±2 N·m. If the flare nuts are over-tightened, the flare may be damaged.
- Precautions for brazing

  When brazing, do nitrogen replacement inside the tube to prevent the oxide layer. Use a wet cloth to make the valve cool when brazing.

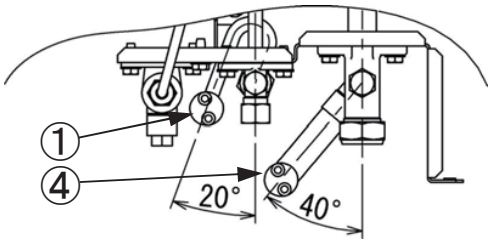
4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

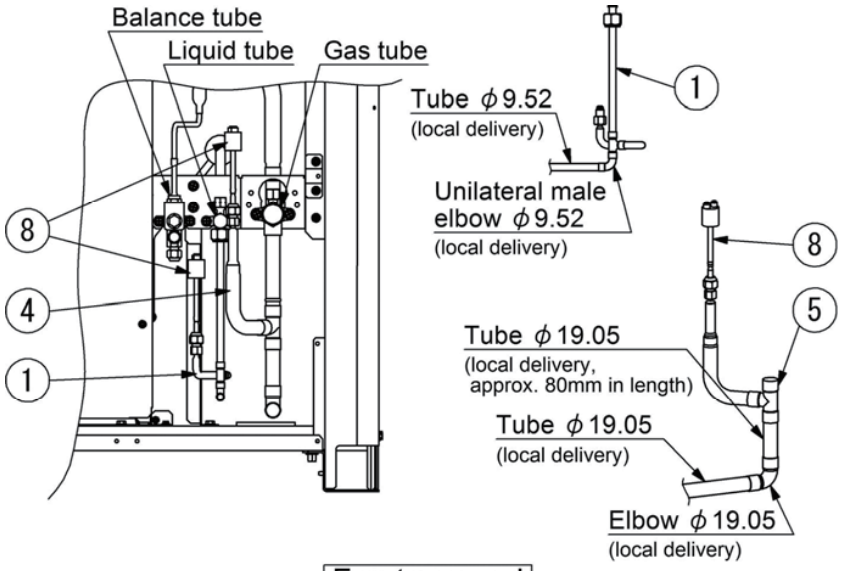
2WAY8HP (ME2 series)

Refrigerant tube	Connection	Accessories
Liquid tube	Flaring	Part①＋Part⑧(HPS label attached)
Gas tube	Brazing	Part④＋Part⑧

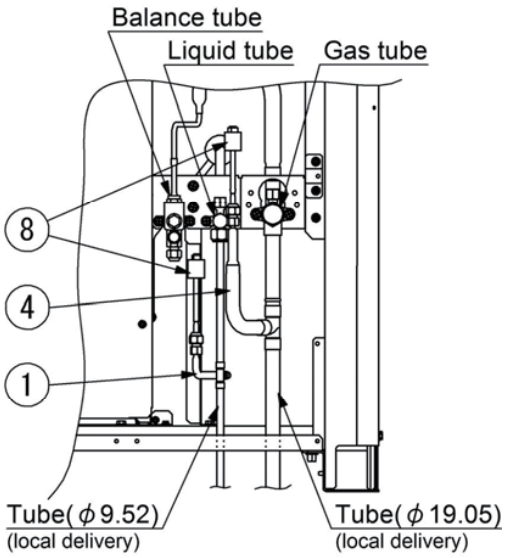
Install Part① so that the tube, as shown in the figure, and the tube distributed in local delivery can be fixed at an approx. 20° angle.

Install Part④ so that the tube, as shown in the figure, and the tube distributed in local delivery can be fixed at an approx. 40° angle.





Front removal



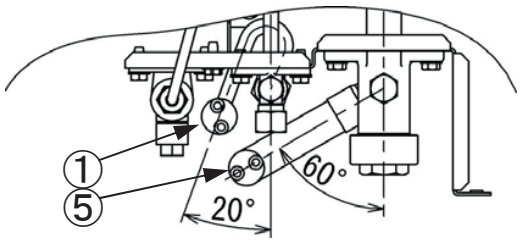
Lower removal

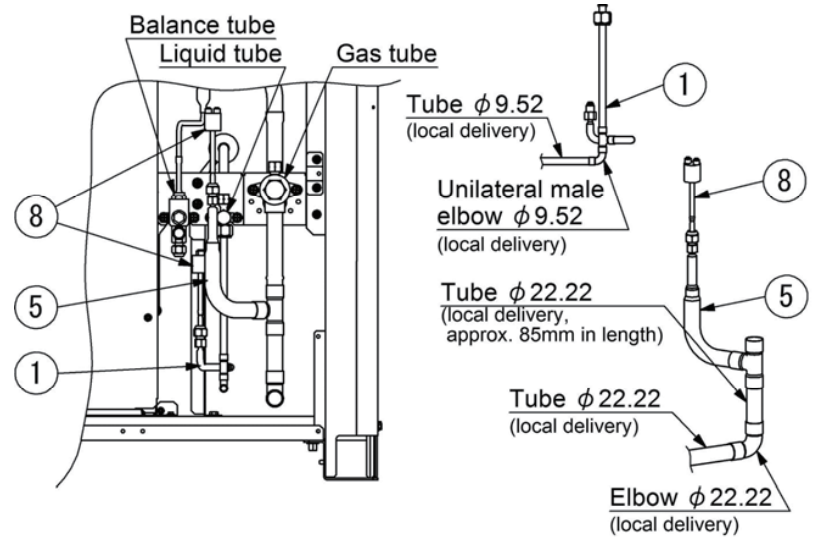
2WAY 10HP (ME2 series)

Refrigerant tube	Connection	Accessories
Liquid tube	Flaring	Part①＋Part⑧(HPS label attached)
Gas tube	Brazing	Part⑤＋Part⑧

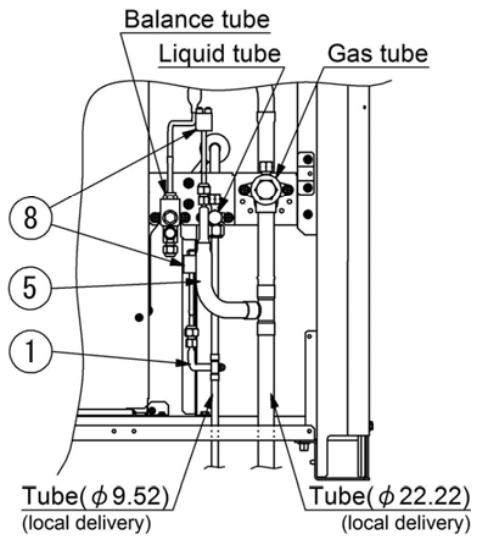
Install Part① so that the tube, as shown in the figure, and the tube distributed in local delivery can be fixed at an approx. 20° angle.

Install Part⑤ so that the tube, as shown in the figure, and the tube distributed in local delivery can be fixed at an approx. 60° angle.





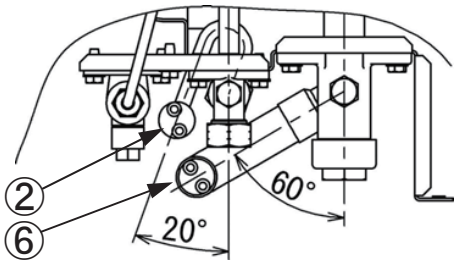
Front removal



Lower removal

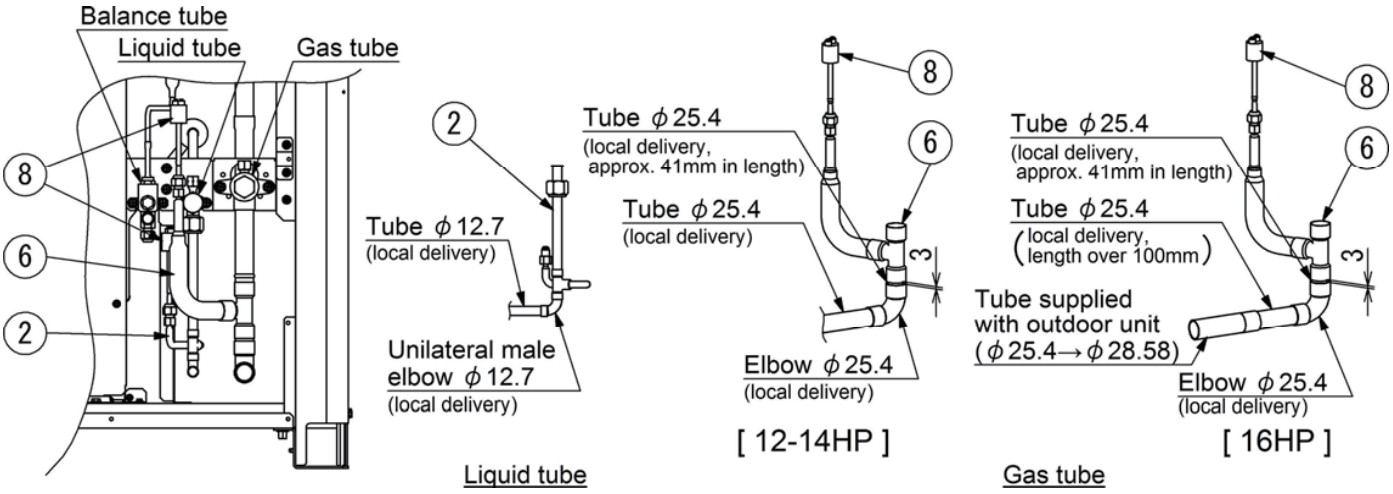
4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

2WAY 12-16HP (ME2 series)

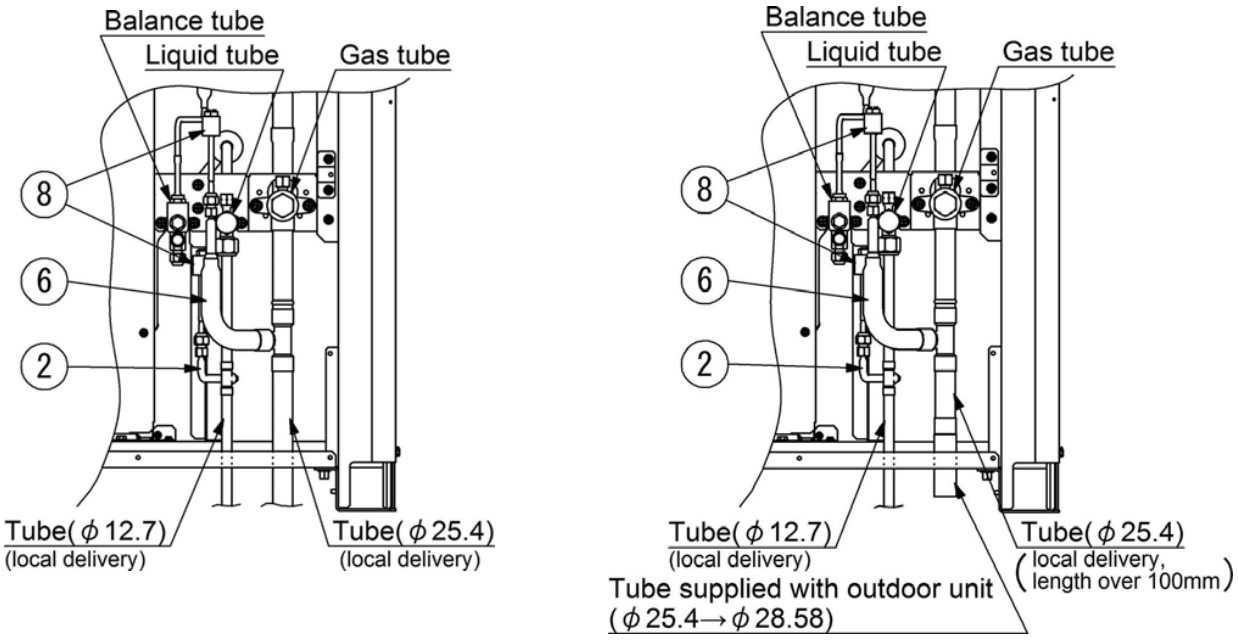


Refrigerant tube		Connection	Accessories
Liquid tube		Flaring	Part②+Part⑧(HPS label attached)
Gas tube	12-14HP	Brazing	Part⑥+Part⑧
	16HP	Brazing	Part⑥+Part⑧ +Tube supplied with outdoor unit (φ25.4→φ28.58)

Install Part② so that the tube, as shown in the figure, and the tube distributed in local delivery can be fixed at an approx. 20° angle.
Install Part⑥ so that the tube, as shown in the figure, and the tube distributed in local delivery can be fixed at an approx. 60° angle.



Front removal



Lower removal

4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

3. Wiring Connection

Connect the wire for High Pressure switch using Part⑧. See next page for details.

4. Airtight Test

Refer to the installation instructions supplied with the outdoor unit. Make sure the airtight test pressure should be increased to 3.3MPaG by the nitrogen and check there is no leakage.

5. Checking Operation for High Pressure Switch of Kit Part

With the condition of airtight test pressure of 3.3MPaG by the nitrogen, turn the power ON in all systems.

Press the remote control operation button. If the Alarm P04 is displayed, High Pressure switch functions normally.

6. Tube Vacuuming and Additional Refrigerant Charge

Refer to the installation instructions supplied with the outdoor unit.

7. Insulating the Refrigerant Tubing

Refer to the installation instructions supplied with the outdoor unit and insulate and tape over the tubing.

8. Checking Operation for High Pressure Switch in the Unit

Operate the unit in the test heating mode and fully open the gas valve after 5–minute drive. If the unit operates for a while and the compressor is stopped, High Pressure switch is functioning normally.

4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

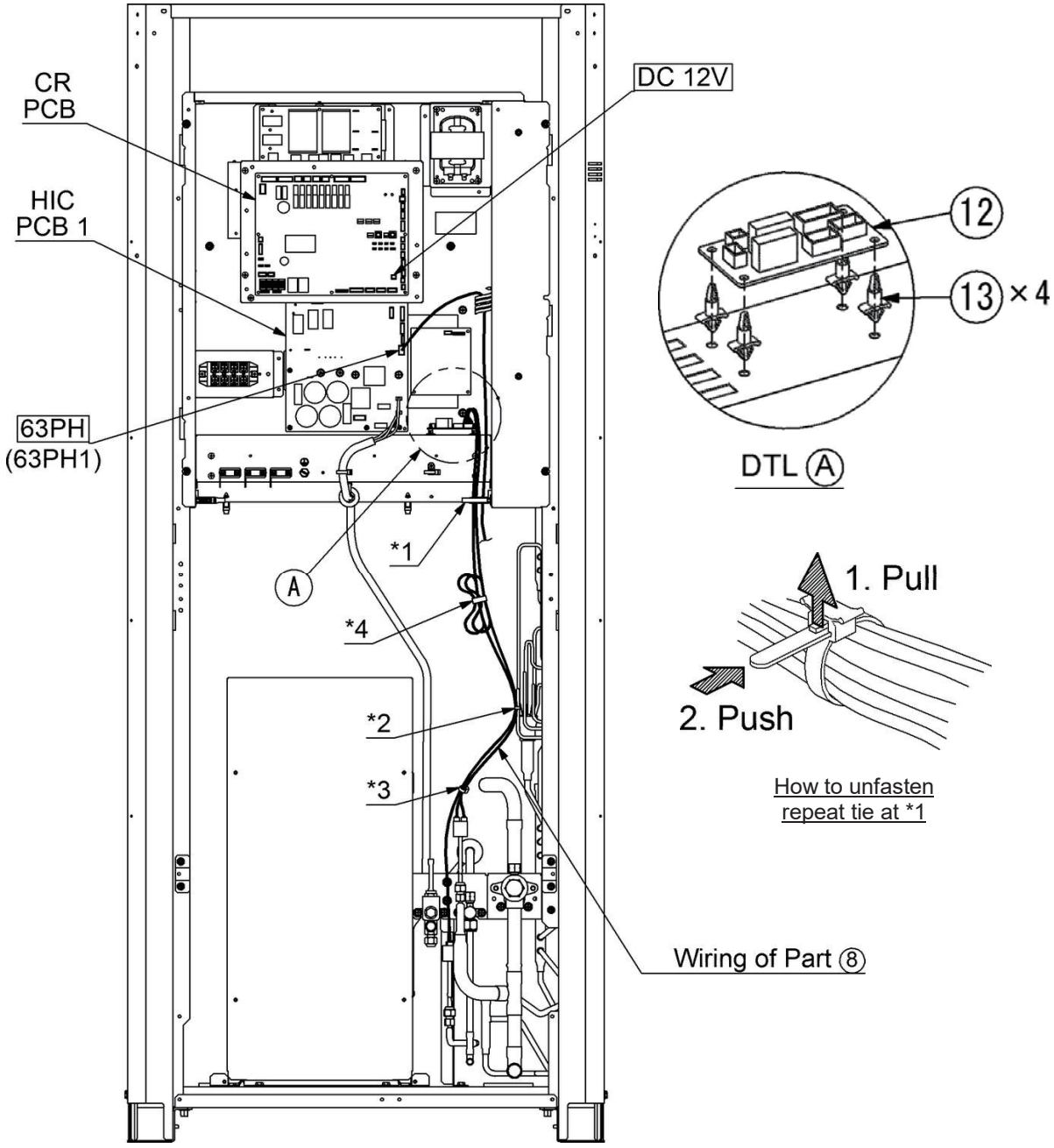
WIRING PROCESS OF HIGH PRESSURE SWITCH KIT

1. Inside Wiring

■2WAY 8-10HP (ME2 series)

Be cautious that the lead wires should not touch other pipes and valves directly.

1. Install the PCB ⑫ by using Spacer ⑬ in the Control box as shown in the DTL Ⓐ.
2. Disconnect the lead wire of the pressure switch (63PH1) of the outdoor unit from the PCB.
3. Wiring the lead wire of Part ⑧ as shown in the figure.
   *1: Unfasten the repeat tie of outdoor unit and then bundle it with other lead wires.
   *2: The lead wire of Part ⑧ are bundled to the capillary tube of the heat-exchanger by Band ⑨.
   *3: Bundle the lead wires of the gas / liquid pressure switch of Part ⑧ by Band ⑨ placed at the location shown in the figure.
   *4: The extra length of wires should be bundled by Band ⑨ at the location shown in the figure.

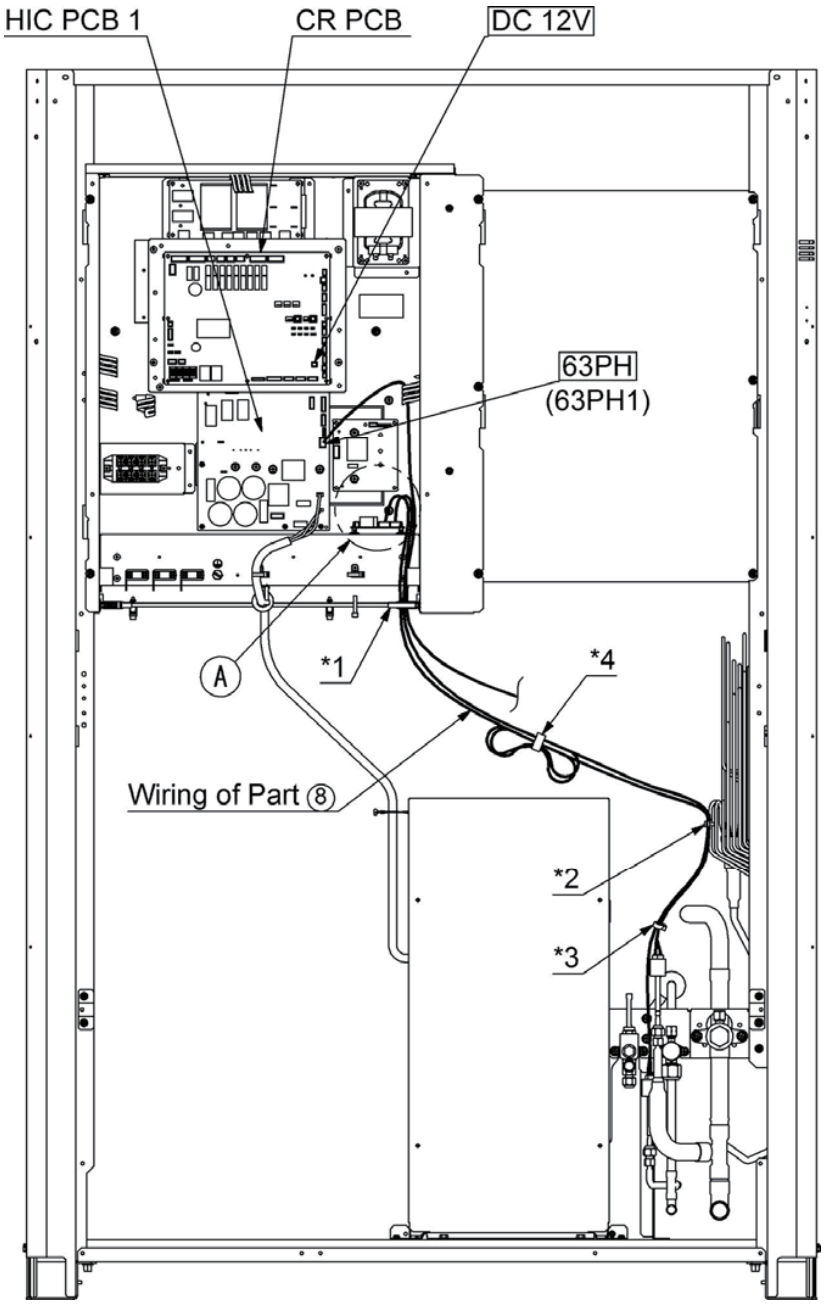


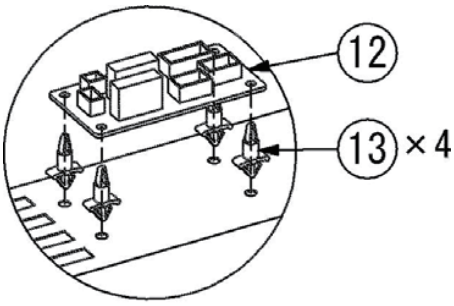
4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

■2WAY 12HP（ME2 series）

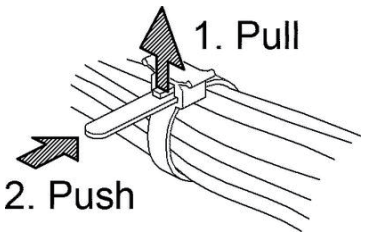
Be cautious that the lead wires should not touch other pipes and valves directly.

1. Install the PCB ⑫ by using Spacer ⑬ in the Control box as shown in the DTL Ⓐ.
2. Disconnect the lead wire of the pressure switch (63PH1) of outdoor unit from the PCB.
3. Wiring the lead wire of Part ⑧ as shown in the figure.
   *1: Unfasten the repeat tie of the outdoor unit and then bundle it with other lead wires.
   *2: The lead wire of Part ⑧ are bundled to the capillary tube of the heat-exchanger by Band ⑨.
   *3: Bundle the lead wires from the gas / liquid pressure switch of Part ⑧ by Band ⑨ placed at the location shown in the figure.
   *4: The extra length of wire should be bundled by Band ⑨ placed at the location shown in the figure.





DTL Ⓐ



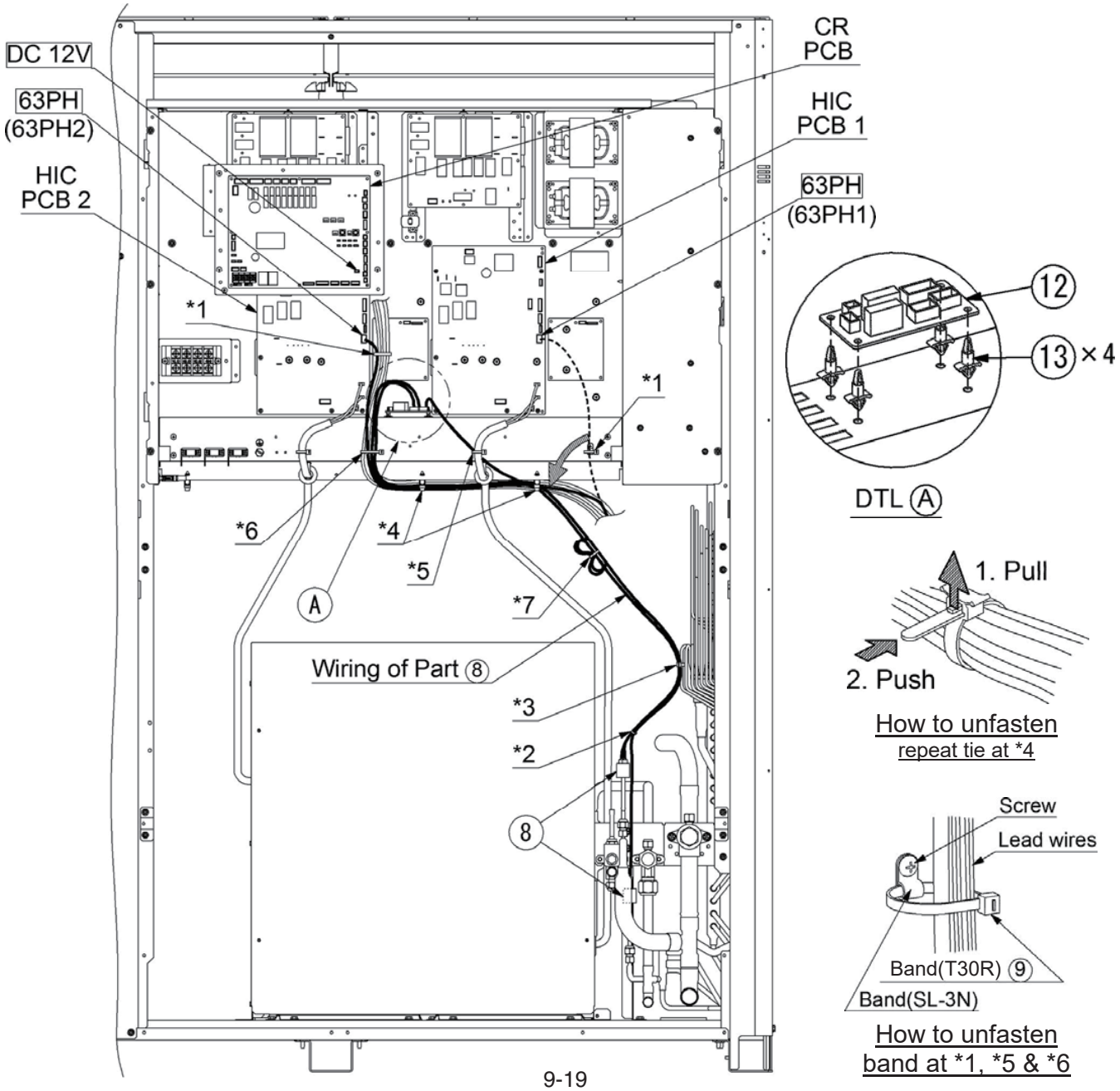
How to unfasten repeat tie at *1

4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

■2WAY 14-16HP（ME2 series）

Be cautious that the lead wires should not touch other pipes and valves directly.

1. Install PCB ⑫ by using Spacer ⑬ in the Control box as shown in the DTL Ⓐ.
2. Disconnect the lead wires of the pressure switch (63PH1/63PH2) of the outdoor unit from the PCB. Cut at the two points of the band (T30R) marked with the *1.
3. Wiring the lead wire of Part ⑧ as shown in the figure.
   - *2: Bundle the lead wires of the gas / liquid pressure switch of Part ⑧ by band ⑨ placed at the location shown in the figure.
   - *3: The lead wire of Part ⑧ are bundled to the capillary tube of the heat-exchanger by Band ⑨.
   - *4: Unfasten the repeat tie of the outdoor unit and then bundle it with other lead wires. The lead wire (63PH1) disconnected under the Step 2 described above is bundled with the repeat tie on the right side.
   - *5: Cut the band (T30R) and then bundle the lead wire (63PH1) disconnected under the Step 2 described above with the lead wire from the compressor.
   - *6: Cut the band (T30R) and then bundle the lead wire of Part ⑧ with other lead wires by band ⑨.
   - *7: The extra length of wire should be bundled by Band ⑨ placed at the location shown in the figure.

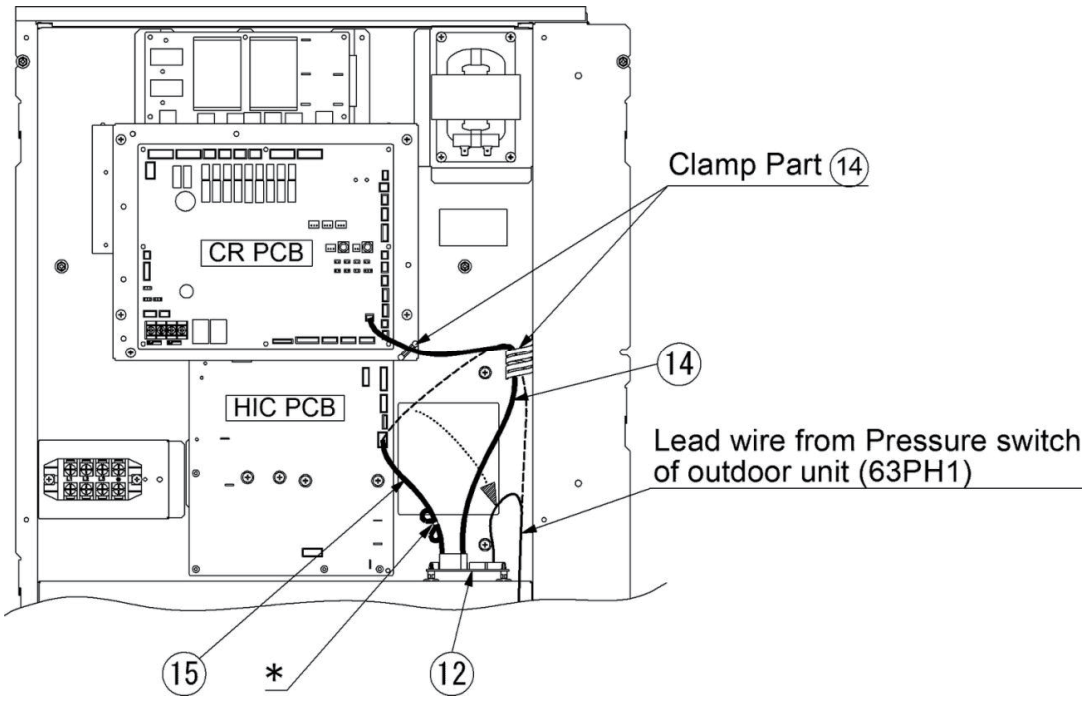


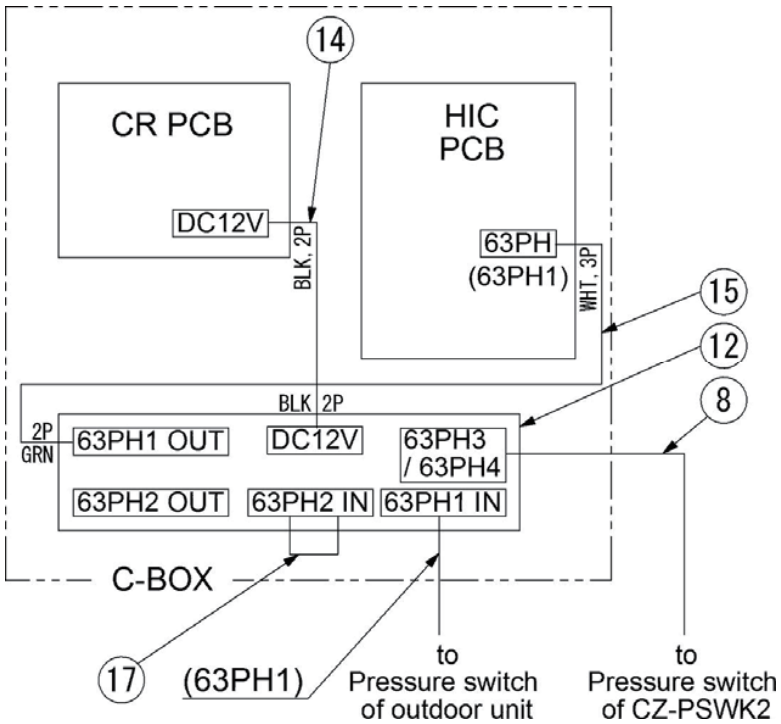
4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

2. C-BOX Inside Wiring

■2WAY 8-12HP（ME2 series）

Make connections as shown in the figure below.
The lead wire disconnected at "Inside wiring" should be connected to the [63PH1 IN] of Part⑫.
Part⑰ are connected to [63PH2 IN] of Part⑫.
* Extra length of wire should be bundled by band⑨placed at the location in the figure.



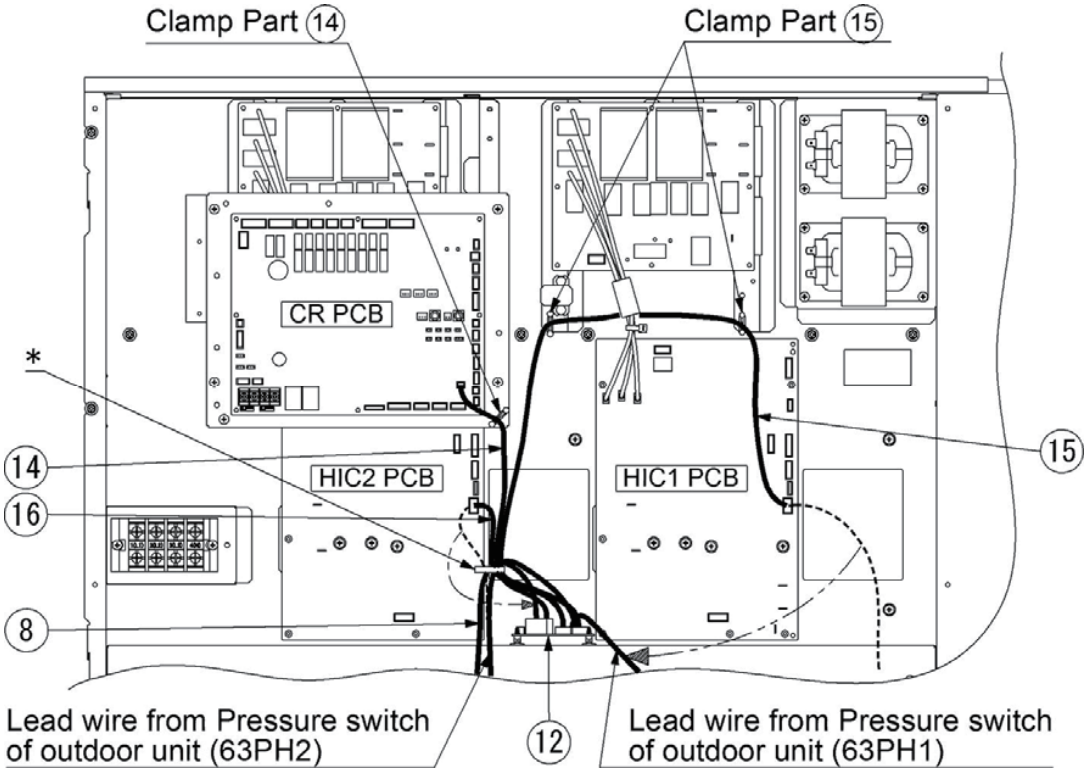


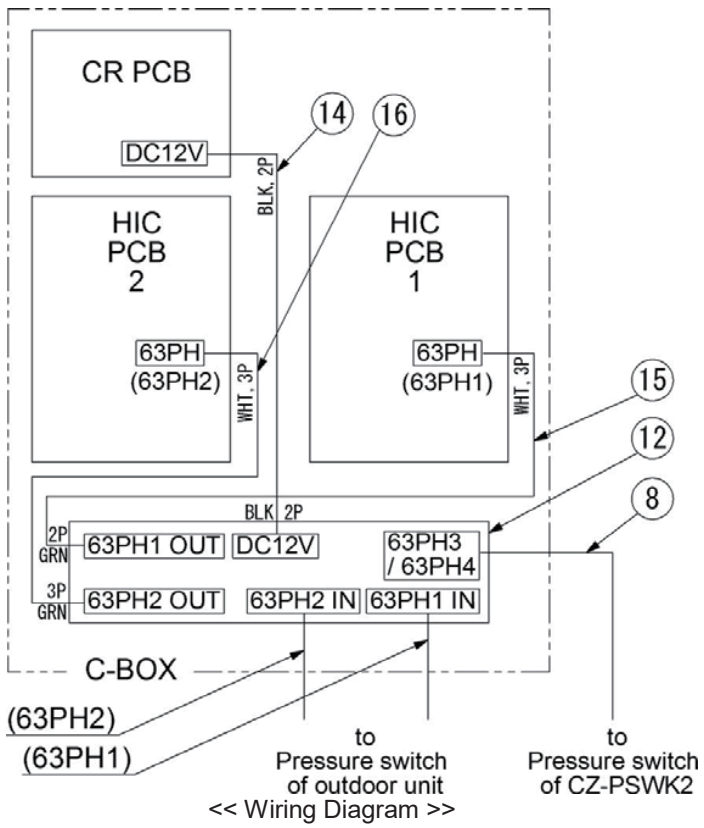
<< Wiring Diagram >>

4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

■2WAY 14-16HP（ME2 series）

Make connections as shown in the figure below.
The lead wires of 63PH1 and 63PH2 disconnected at "Inside wiring"
should be connected each to the [63PH1 IN] and the [63PH2 IN] of Part⑫.
Bundle the lead wires of Part⑧, ⑭, ⑮, ⑯, 63PH1 and 63PH2 with other wires
at the * position shown in the figure.





<< Wiring Diagram >>

4. INSTALLATION INSTRUCTIONS (High Pressure Switch Kit)

■2WAY (ME2 series)

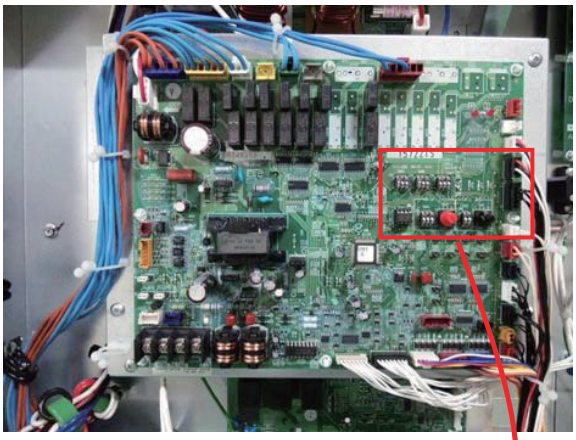


Fig. 1 : CR PCB

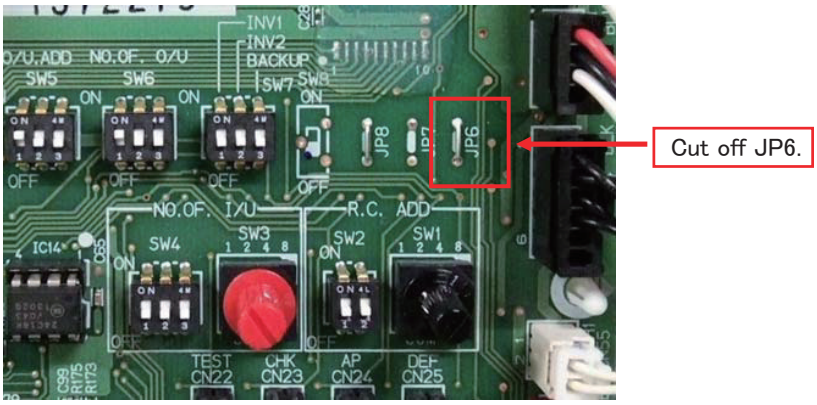


Fig. 5 : JP6 (2WAY ME2 series)

NOTE : Always turn off the power before working on the given circuit to avoid electrical shock or damage to the electrical wiring or devices and then cut off JP6.