

System design

AIRSTAGE™ VR-II

Variable Refrigerant Flow System

Simultaneous cooling & heating operation with
Heat Recovery System



- [1] Refrigerant cycle design**
- [2] Installation limitation**
- [3] Piping design**
- [4] Breaker ▪ Wiring design**

[1] Refrigerant cycle design

- **Connectable unit & capacity range limitations**
- **Cooling only unit limitation**
- **RB unit number of unit / capacity limitation**
- **Outdoor unit combination**

Refrigerant cycle design

Connectable unit & capacity range limitations < Europe model >

< Space saving combination >

HP	Cooling Capacity (kw)	Outdoor unit quantity	Maximum connectable indoor unit	Connectable cooling capacity range
8	22.4	1	15	50% to 150%
10	28.0	1	16	
12	33.5	1	17	
14	40.0	1	21	
16	45.0	1	24	
18	50.4	2	27	
20	56.0	2	30	
22	61.5	2	32	
24	67.0	2	35	
26	73.0	2	39	
28	78.5	2	42	
30	85.0	2	45	
32	90.0	2	48	
34	95.0	3	50	
36	100.5	3	53	
38	106.5	3	57	
40	112.0	3	60	
42	118.0	3	63	
44	123.5	3	64	
46	130.0	3	64	
48	135.0	3	64	

Refrigerant cycle design

Connectable unit & capacity range limitations < Europe model >

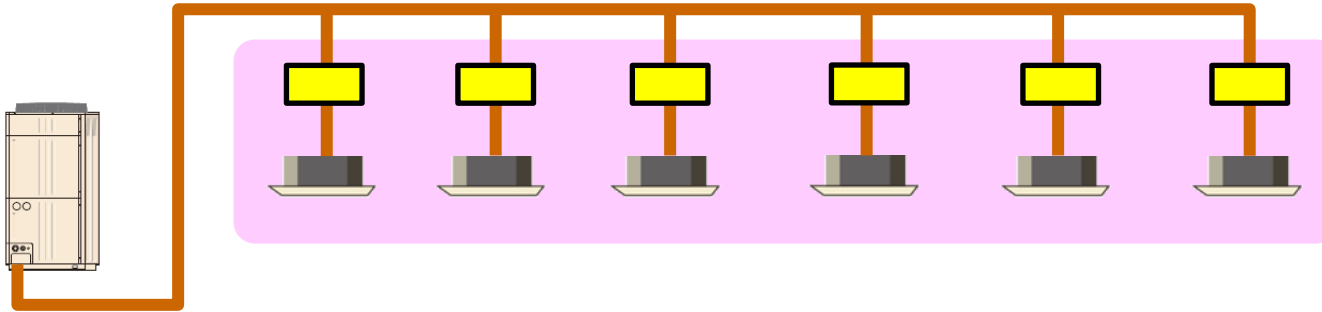
< Energy efficiency combination >

HP	Cooling Capacity (kw)	Outdoor unit quantity	Maximum connectable indoor unit	Connectable cooling capacity range
16	44.8	2	24	50% to 150%
22	62.4	2	33	
24	67.2	3	36	
26	72.8	3	39	
28	78.4	3	42	
30	84.0	3	45	
32	90.4	3	48	
34	96.0	3	51	
36	102.4	3	54	
38	108.0	3	57	
40	113.0	3	60	
42	120.0	3	64	
44	125.0	3	64	

Refrigerant cycle design

Connectable capacity range limitations

Connect so that the total indoor unit connection capacity is within 50 to 150% of the total outdoor unit connection capacity.



Total Indoor Unit Capacity ratio = Total Outdoor unit Capacity 50 ~ 150 % ⇒ OK

Ex. Outdoor unit : AJYA90GALH (28.0kW)

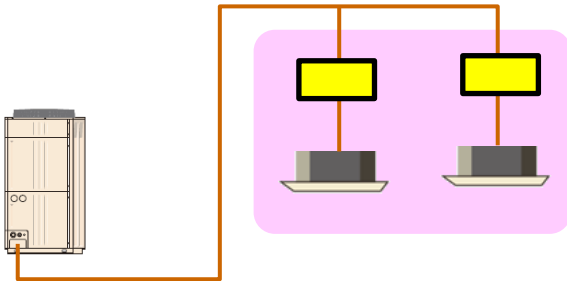
Total Indoor unit capacity : 14 ~ 42kW → OK

Refrigerant cycle design

Connectable capacity range limitations

If indoor unit connected capacity is too small compared to the system capacity:

- The liquid return will be too great → Compressor damage
 - The refrigerant will concentrate in the operating unit
- Continuous operation will become difficult due to triggering of the protection in response to the pressure high-rise, etc, and noise will be generated by the refrigerant flow when heating



Total Indoor Unit Capacity \leq Total outdoor unit capacity x 50%

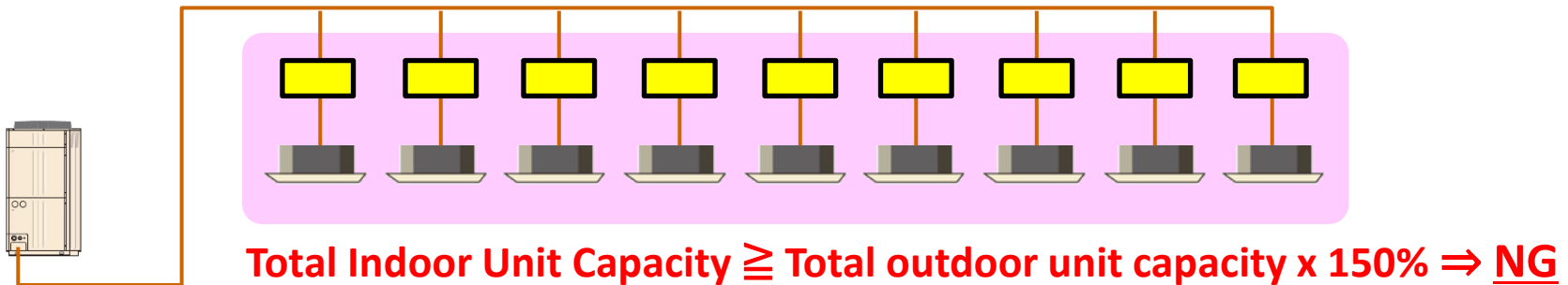
⇒ NG

Refrigerant cycle design

Connectable capacity range limitations

If the indoor unit connected capacity is larger than the system capable capacity:

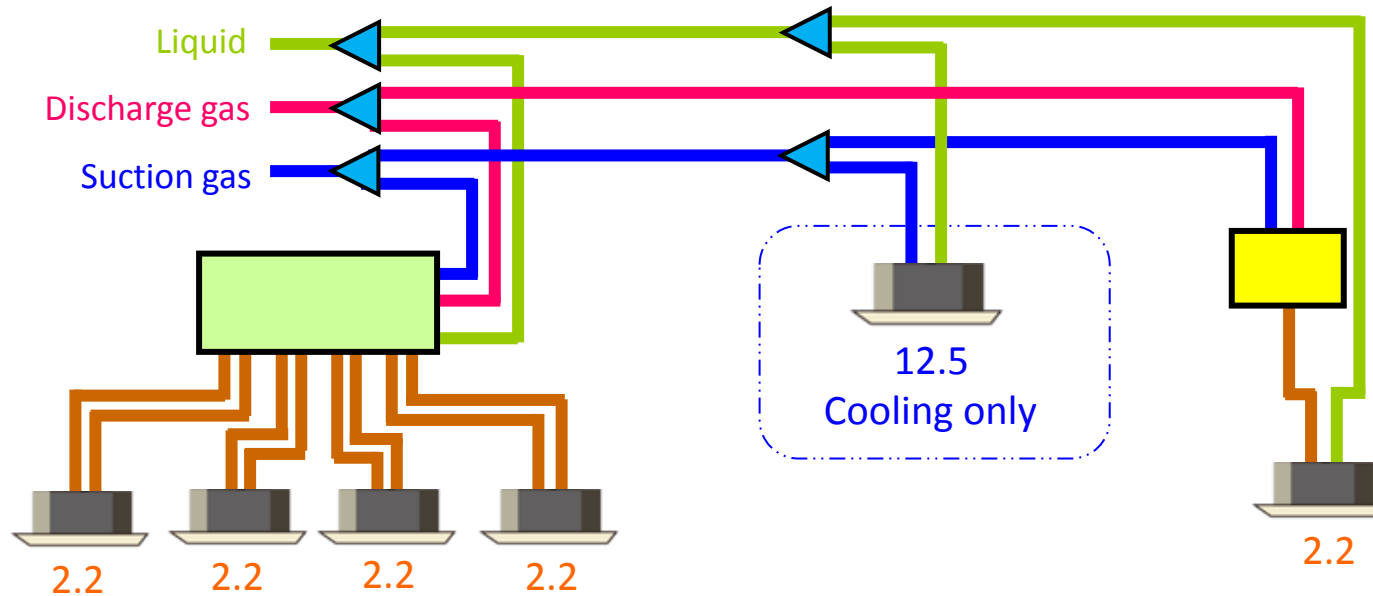
- Insufficient system performance → Insufficient cooling and heating
- When heating, refrigerant will collect non-operating indoor units resulting in an insufficient refrigerant circulation volume → Insufficient cooling and heating
- The refrigerant oil will not return → compressor damage



Refrigerant cycle design

Cooling Only Unit Capacity Limitations

- The capacity of cooling only indoor units connected to 1 refrigerant cycle must be **50% or less of the total capacity** of all connected indoor units.

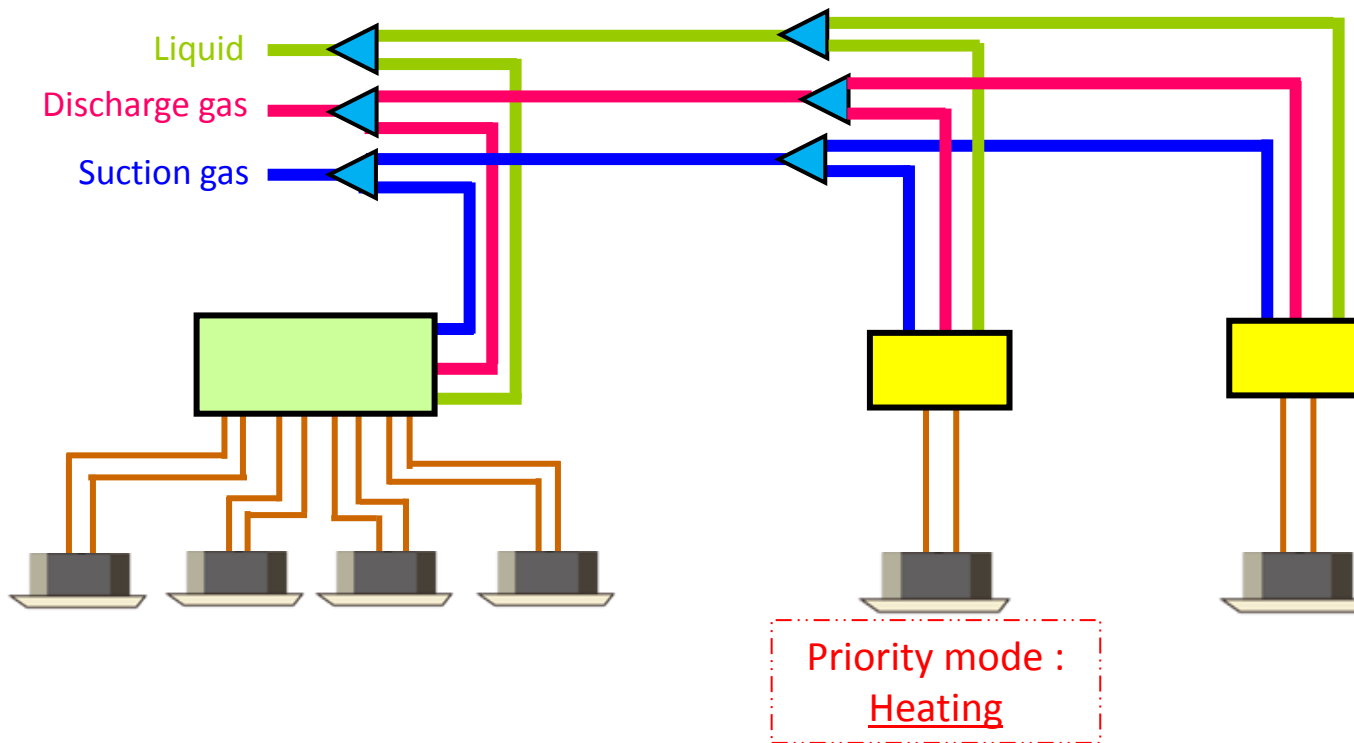


$$\frac{\text{Cooling only indoor unit capacity}}{\text{Total indoor unit capacity}} = \frac{12.5}{2.2 \times 5 + 12.5} \times 100 = \mathbf{53.2\% \text{ NG}}$$

If 50% or more of the indoor unit total capacity is connected for cooling only . . .
→ Since amount of high pressure gas is small, the system enters the excessive refrigerant state

Refrigerant cycle design

Heating Only Unit Limitations



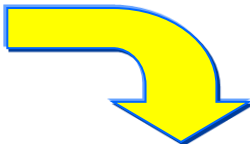
When you want to use for heating only, set the priority mode with the DIP-SW inside the RB unit.

Refrigerant cycle design

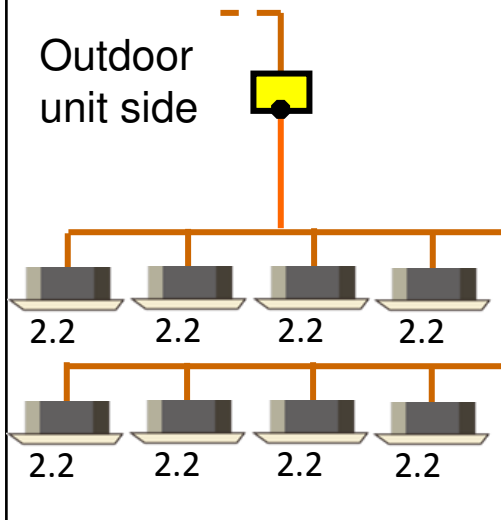
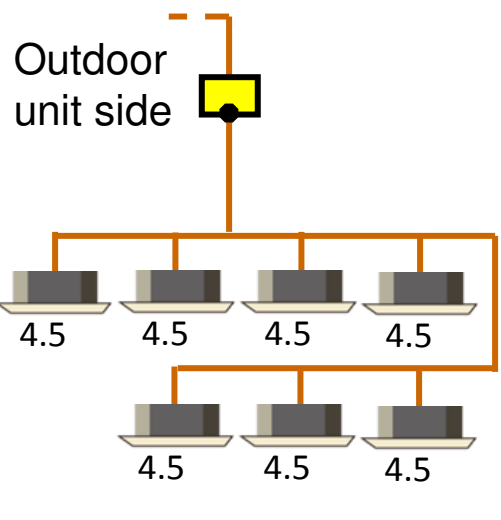
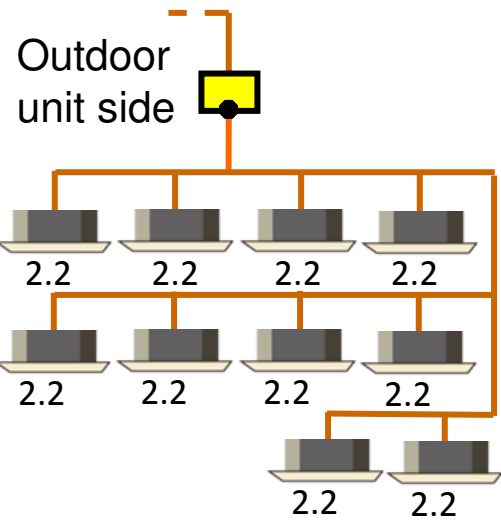
Number of Units/Capacity Limitations (RB unit / Single Type)

Model Name	Number of Units	Capacity
UTP-RX01AH	3 units or less	2.2 ~ 8.0 kW
UTP-RX01BH	8 units or less	2.2 ~ 18.0 kW
UTP-RX01CH	8 units or less	2.2 ~ 28.0 kW

 :RB unit (S)



Ex: UTP-RX01CH connection

System [kW]			
Number of units	OK	OK	NG (10 units)
Capacity [kW]	OK	NG ($4.5 \times 7 = 31.5\text{kW}$)	OK
Judgment	OK	NG	NG

Refrigerant cycle design

Number of Units/Capacity Limitations (RB unit / Multiple type)

Model Name	Number of RB units	Indoor unit/Branch	Capacity	
			1 Branch	Total
UTP-RX04BH	1 unit	Up to 8 units	Up to 18.0kW	Up to 56.0kW
	2 units series	Up to 8 units	Up to 18.0kW	Up to 56.0kW

Ex: UTP-RX04BH connection



System [kW]			
Number of units	OK	OK	NG (9 units)
Capacity[kW]	OK	NG($8.8 \times 3 = 26.4\text{kW}$)	NG($2.2 \times 9 = 19.8\text{kW}$)
Judgment	OK	NG	NG

Refrigerant cycle design

Outdoor unit combination < Europe model >

< Space saving combination >

HP	Cooling Capacity (kW)	Model name	Combination		
			Outdoor unit 1 (Master)	Outdoor unit 2 (Slave 1)	Outdoor unit 3 (Slave 2)
8	22.4	AJ*A72GALH	AJ*A72GALH	-	-
10	28.0	AJ*A90GALH	AJ*A90GALH	-	-
12	33.5	AJ*108GALH	AJ*108GALH	-	-
14	40.0	AJ*126GALH	AJ*126GALH	-	-
16	45.0	AJ*144GALH	AJ*144GALH	-	-
18	50.4	AJ*162GALH	AJ*A90GALH	AJ*A72GALH	-
20	56.0	AJ*180GALH	AJ*A90GALH	AJ*A90GALH	-
22	61.5	AJ*198GALH	AJ*108GALH	AJ*A90GALH	-
24	67.0	AJ*216GALH	AJ*108GALH	AJ*108GALH	-
26	73.0	AJ*234GALH	AJ*144GALH	AJ*A90GALH	-
28	78.5	AJ*252GALH	AJ*144GALH	AJ*108GALH	-
30	85.0	AJ*270GALH	AJ*144GALH	AJ*126GALH	-
32	90.0	AJ*288GALH	AJ*144GALH	AJ*144GALH	-
34	95.0	AJ*306GALH	AJ*108GALH	AJ*108GALH	AJ*A90GALH
36	100.5	AJ*324GALH	AJ*108GALH	AJ*108GALH	AJ*108GALH
38	106.5	AJ*342GALH	AJ*144GALH	AJ*108GALH	AJ*A90GALH
40	112.0	AJ*360GALH	AJ*144GALH	AJ*108GALH	AJ*108GALH
42	118.0	AJ*378GALH	AJ*144GALH	AJ*144GALH	AJ*A90GALH
44	123.5	AJ*396GALH	AJ*144GALH	AJ*144GALH	AJ*108GALH
46	130.0	AJ*414GALH	AJ*144GALH	AJ*144GALH	AJ*126GALH
48	135.0	AJ*432GALH	AJ*144GALH	AJ*144GALH	AJ*144GALH

Select by matching the outdoor unit combination of each capacity to the models in the tables.

Note that the data of capacity table, etc. cannot be presented for the combinations other than those given in the tables.

Refrigerant cycle design

Outdoor unit combination < Europe model >

< Energy saving combination >

HP	Cooling Capacity (kW)	Model name	Combination		
			Outdoor unit 1 (Master)	Outdoor unit 2 (Slave 1)	Outdoor unit 3 (Slave 2)
16	44.8	AJ*144GALHH	AJ*A72GALH	AJ*A72GALH	-
22	62.4	AJ*198GALHH	AJ*126GALH	AJ*A72GALH	-
24	67.2	AJ*216GALHH	AJ*A72GALH	AJ*A72GALH	AJ*A72GALH
26	72.8	AJ*234GALHH	AJ*A90GALH	AJ*A72GALH	AJ*A72GALH
28	78.4	AJ*252GALHH	AJ*A90GALH	AJ*A90GALH	AJ*A72GALH
30	84.0	AJ*270GALHH	AJ*A90GALH	AJ*A90GALH	AJ*A90GALH
32	90.4	AJ*288GALHH	AJ*126GALH	AJ*A90GALH	AJ*A72GALH
34	96.0	AJ*306GALHH	AJ*126GALH	AJ*A90GALH	AJ*A90GALH
36	102.4	AJ*324GALHH	AJ*126GALH	AJ*126GALH	AJ*A72GALH
38	108.0	AJ*342GALHH	AJ*126GALH	AJ*126GALH	AJ*A90GALH
40	113.0	AJ*360GALHH	AJ*144GALH	AJ*126GALH	AJ*A90GALH
42	120.0	AJ*378GALHH	AJ*126GALH	AJ*126GALH	AJ*126GALH
44	125.0	AJ*396GALHH	AJ*144GALH	AJ*126GALH	AJ*126GALH

Select by matching the outdoor unit combination of each capacity to the models in the tables.

Note that the data of capacity table, etc. cannot be presented for the combinations other than those given in the tables.

[2] Installation limitation

Installation limitation

- **Installation limitation - Outdoor unit -**
- **Installation limitation - RB unit -**
- **Installation limitation - Indoor unit -**

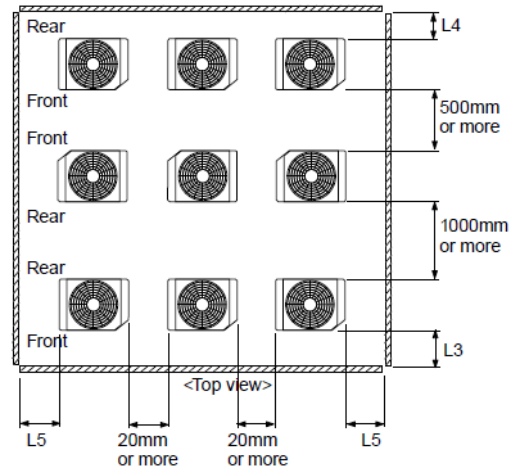
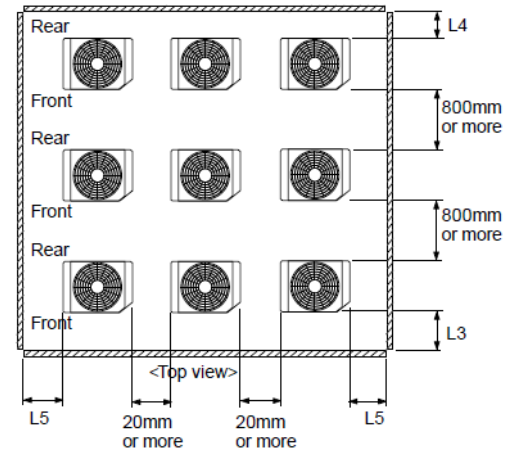
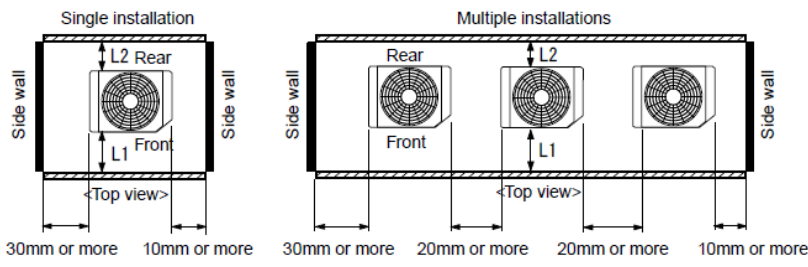
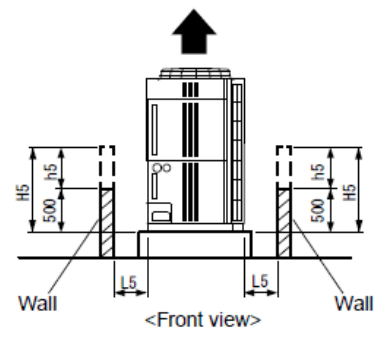
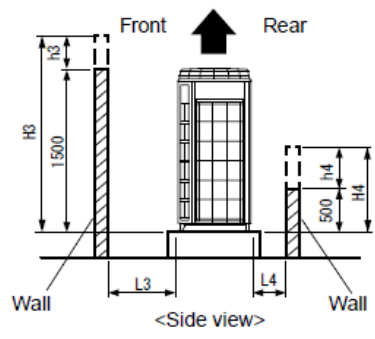
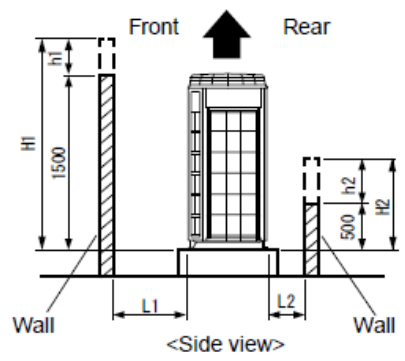
Installation limitation

Installation limitation - Outdoor unit -

- Installation limitation

Wall height condition	Necessary installation space
When H1 is 1500(mm) or less	$L1 \geq 500$ (mm)
When H1 is 1500(mm) or more	$L1 \geq 500 + h1 + 2$ (mm)
When H2 is 500(mm) or less	$L2 \geq 100$ (mm)
When H2 is 500(mm) or more	$L2 \geq 100 + h2 + 2$ (mm)

Wall height condition	Necessary installation space
When H3 is 1500(mm) or less	$L3 \geq 500$ (mm)
When H3 is 1500(mm) or more	$L3 \geq 500 + h3 + 2$ (mm)
When H4 is 500(mm) or less	$L4 \geq 200$ (mm)
When H4 is 500(mm) or more	$L4 \geq 200 + h4 + 2$ (mm)
When H5 is 500(mm) or less	$L5 \geq 200$ (mm)
When H5 is 500(mm) or more	$L5 \geq 200 + h5 + 2$ (mm)



Same as V-II series

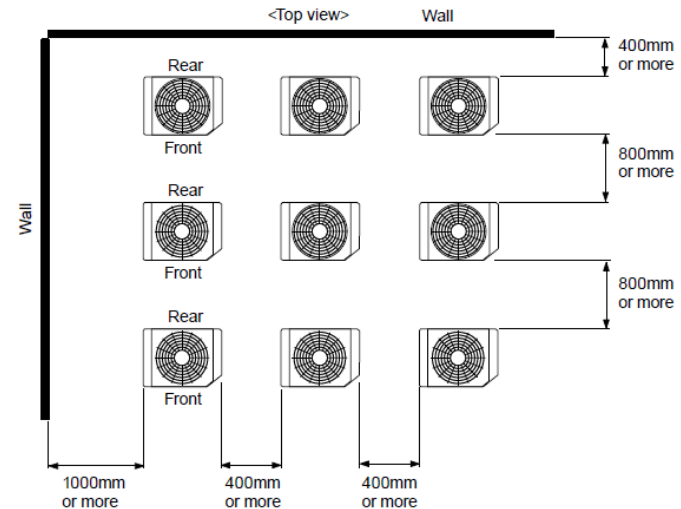
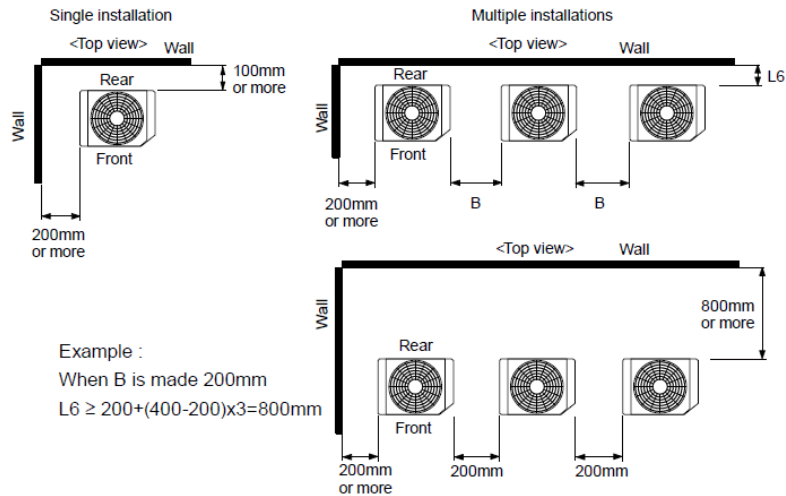
Installation limitation

Installation limitation - Outdoor unit -

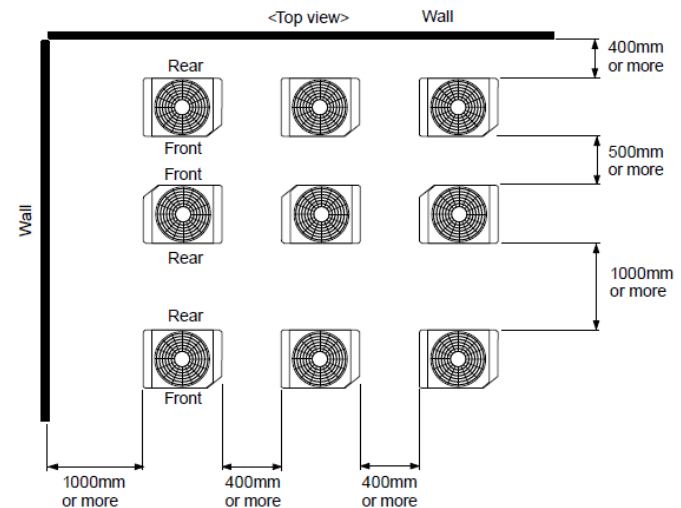
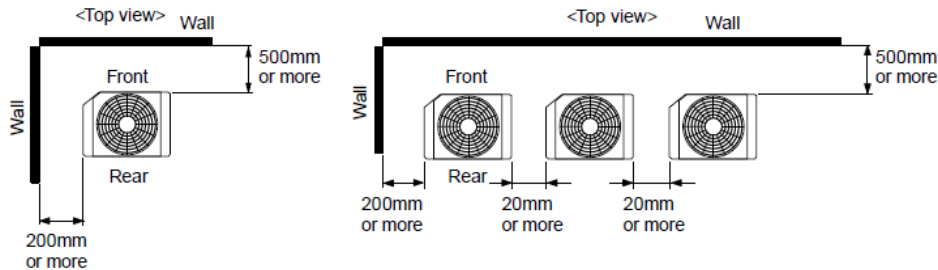
Condition	Necessary installation space
When $B \geq 400$ (mm)	$L6 \geq 200$ (mm)
When $20 \leq B < 400$ (mm)	$L6 \geq 200 + (400-B) \times 3$ (mm)

Same as V-II series

When installing with the REAR of the outdoor unit facing the wall side



When installing with the FRONT of the outdoor unit facing the wall side



Installation limitation

Installation limitation - Outdoor unit -

When installing the Outlet duct & Static pressure setting

When there are obstacles above the product, keep the minimum installation height as shown in the figure and install the outlet duct.

When installing the outlet duct, you must set the high static pressure mode with the push-button switch. (Similar when installing anti-snow hood)

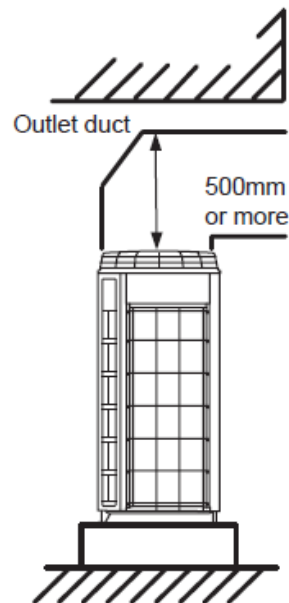
Setting high static pressure mode

Follow the instructions in the table below to set the high static pressure mode.

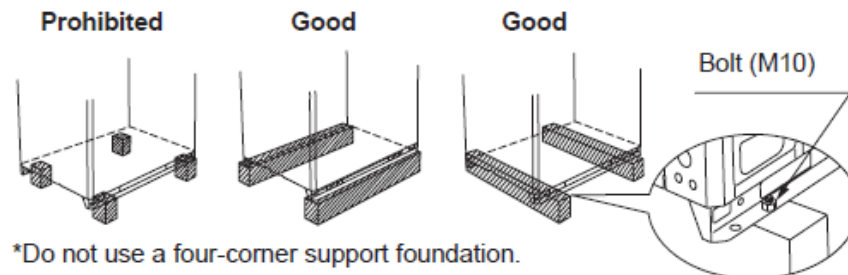
Condition	High static pressure mode setting ^{*2}
Static Pressure (SP) ^{*1} : $0 \leq SP \leq 30$ (Pa)	Set to Mode 1
Static Pressure (SP) ^{*1} : $30 < SP \leq 80$ (Pa)	Set to Mode 2

*1. Static pressure is the air flow resistance that includes the discharge duct resistance & the other additional resistance like discharge grill and so on.

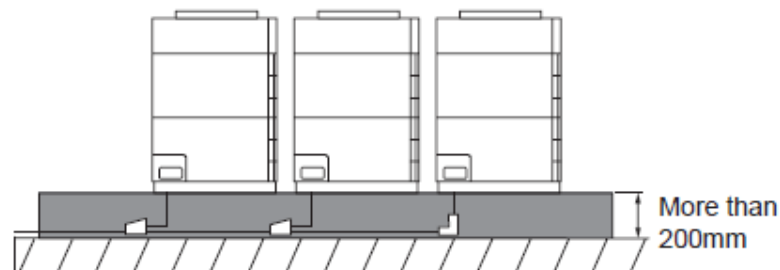
*2. Refer to the section on Push Switch Setting in "Chapter 7 Field Setting".



Installation unit



*Do not use a four-corner support foundation.



When installing piping from the bottom of the outdoor units, the required space under the outdoor unit ≤ 200 mm.

Same as V-II series

Installation limitation

Bad installation example (1)

Short circuit of discharge air flow



Short circuit of discharge air flow



Short circuit of discharge air flow



Installation limitation

Bad installation example (2)

Space behind outdoor unit is too short



Poor discharge design hence, short circuit

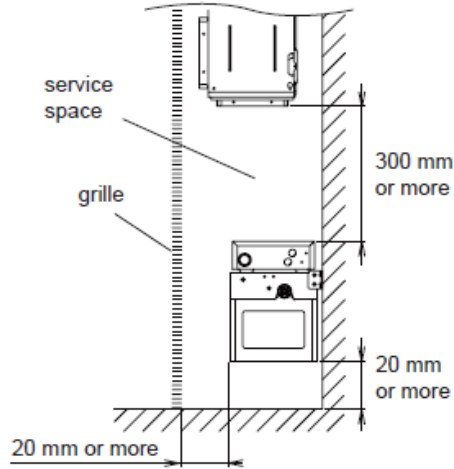


Short circuit of discharge air flow

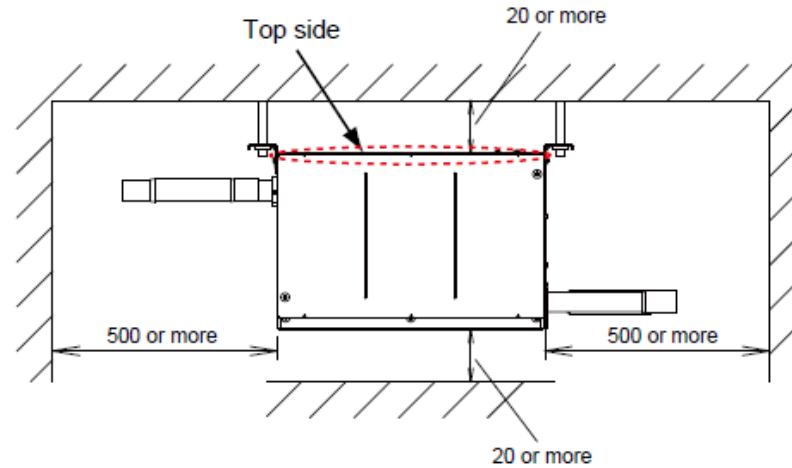
Installation limitation

Installation limitation - RB unit (Single type) -

- Service space -



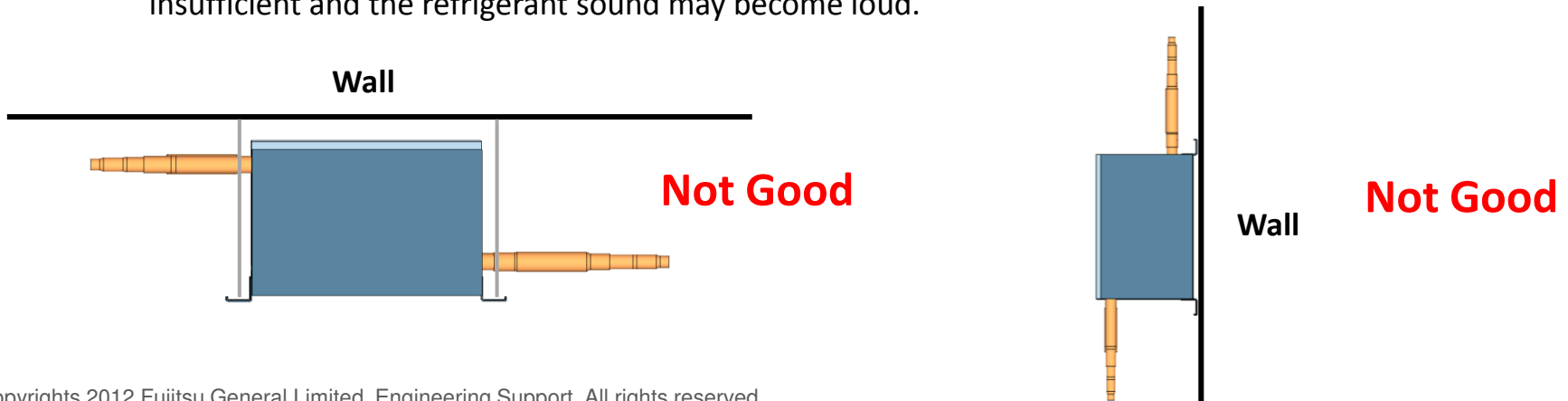
- Installation limitation -



Bad installation example

Installing the RB unit in the opposite direction or vertically is prohibited.

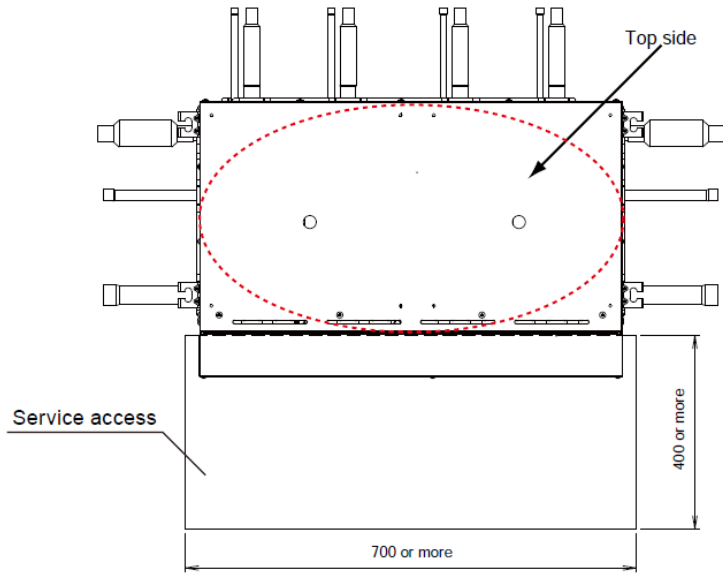
Reason: Solenoid valves will malfunction and depending on circumstances, the capacity may become insufficient and the refrigerant sound may become loud.



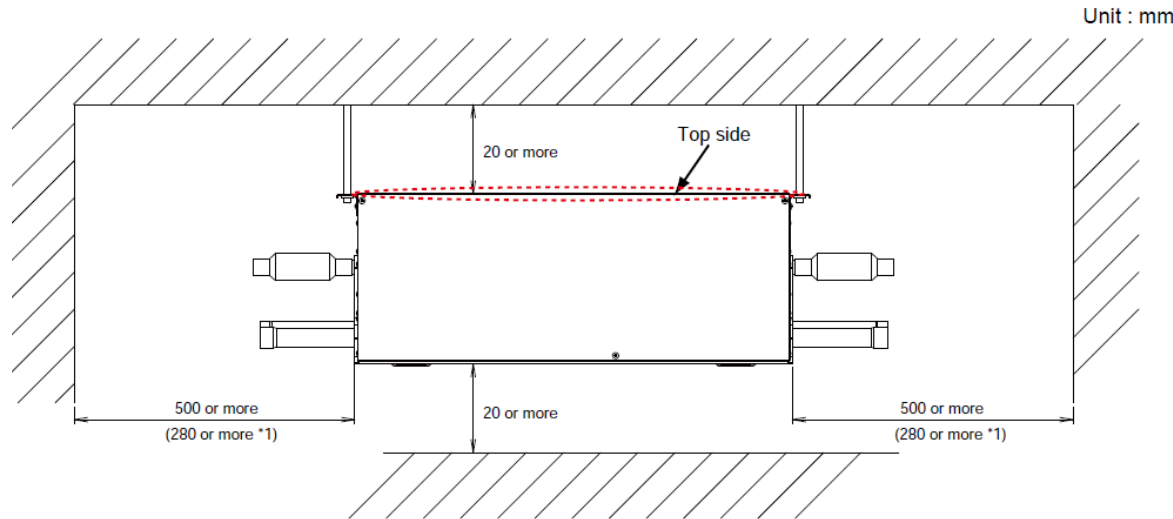
Installation limitation

Installation limitation - RB unit (Multi type) -

- Service space -



- Installation limitation -

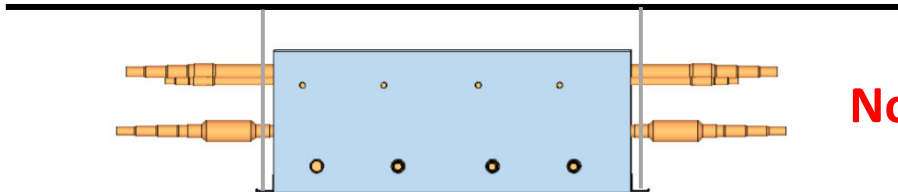


Bad installation example

Installing the RB unit in the opposite direction or vertically is prohibited.

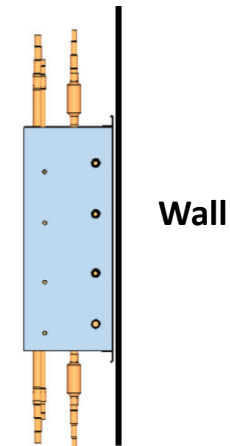
Reason: Solenoid valves will malfunction and depending on circumstances, the capacity may become insufficient and the refrigerant sound may become loud.

Wall



Not Good

Not Good



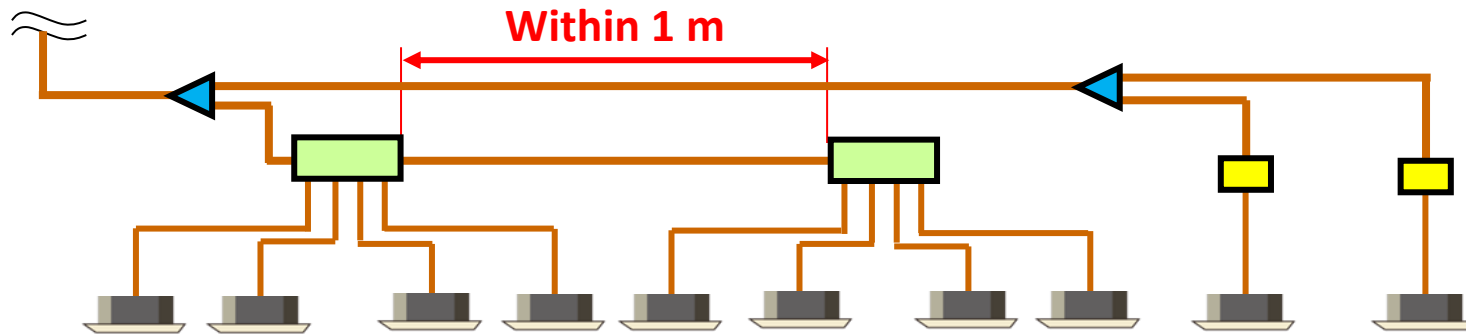
Wall

Installation limitation

Installation limitation - RB unit (Multi type) -

- Bad installation example -

- Piping length between RB units: **within 1 m**



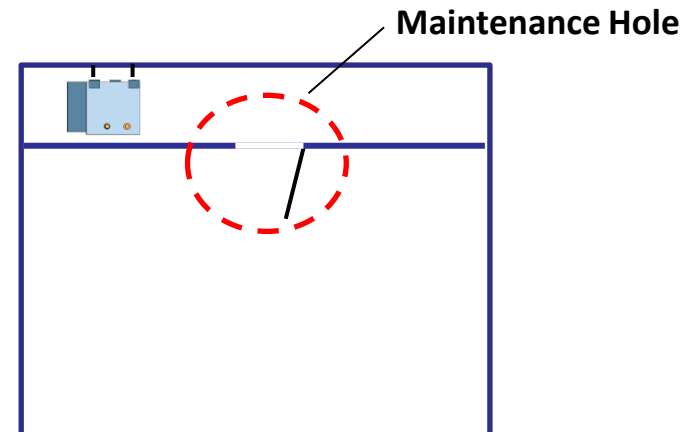
Reason :

- Designed so that this installation is possible because the competitor can connect 8 units.
- If more than 1m, the refrigerant split flow will not be distributed optimally and will cause the indoor unit capacity to drop.

Installation Point - RB unit -

Always provide a maintenance hole near the RB unit installation site.

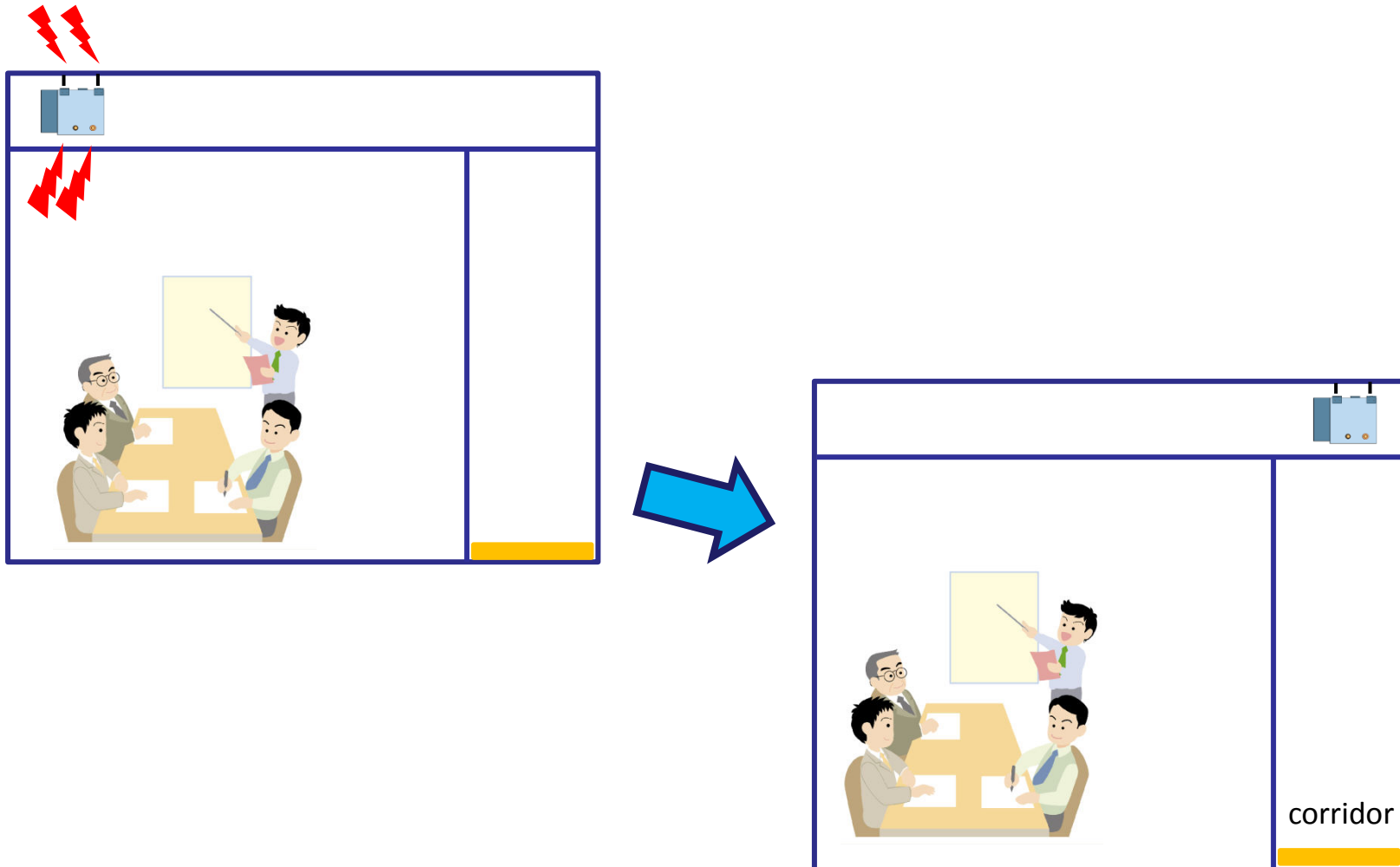
Even if a maintenance hole cannot be provided near the RB unit installation site, provide an installation hole where maintenance is possible.



Installation limitation

Places where the RB unit should not be installed

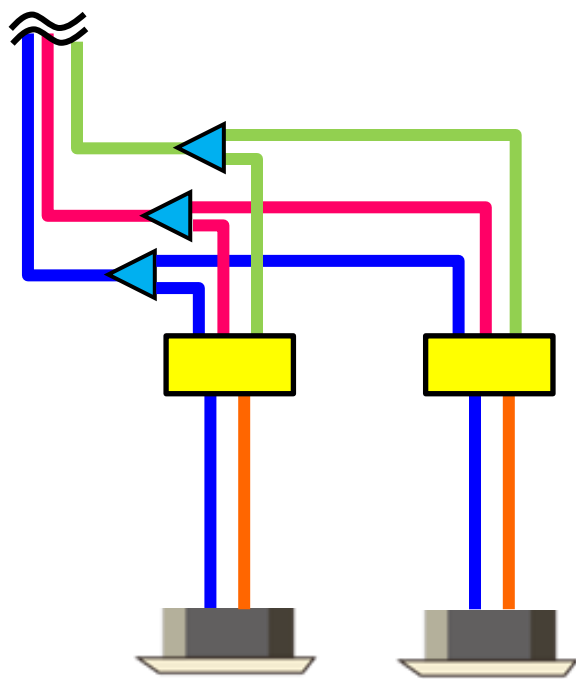
If the RB unit is installed behind the ceiling, etc. of a quiet room, the sound of the solenoid valves and the sound at equal pressure will reverberate around the room. If the RB unit is installed behind the ceiling of a corridor, etc., these sounds will be difficult to hear.



Installation limitation

Installation limitation - Indoor unit -

▪ Case of VR-II series

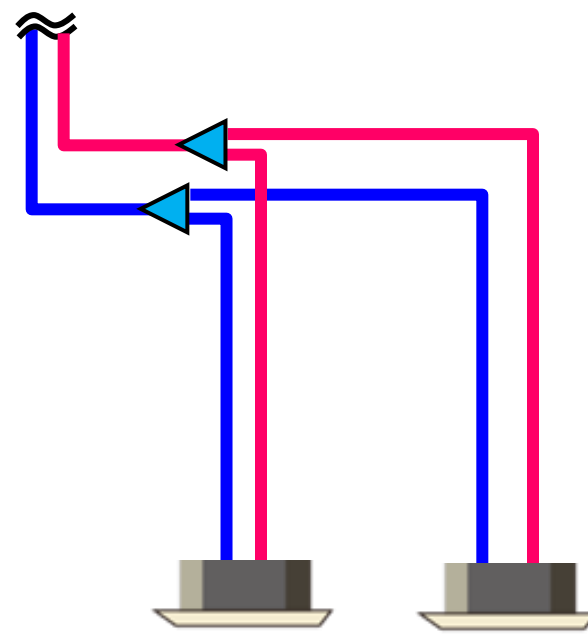


AUXD24GALH

AUXD24LALH

NG

▪ Case of V-II, J-II series



AUXD24GALH

AUXD24LALH

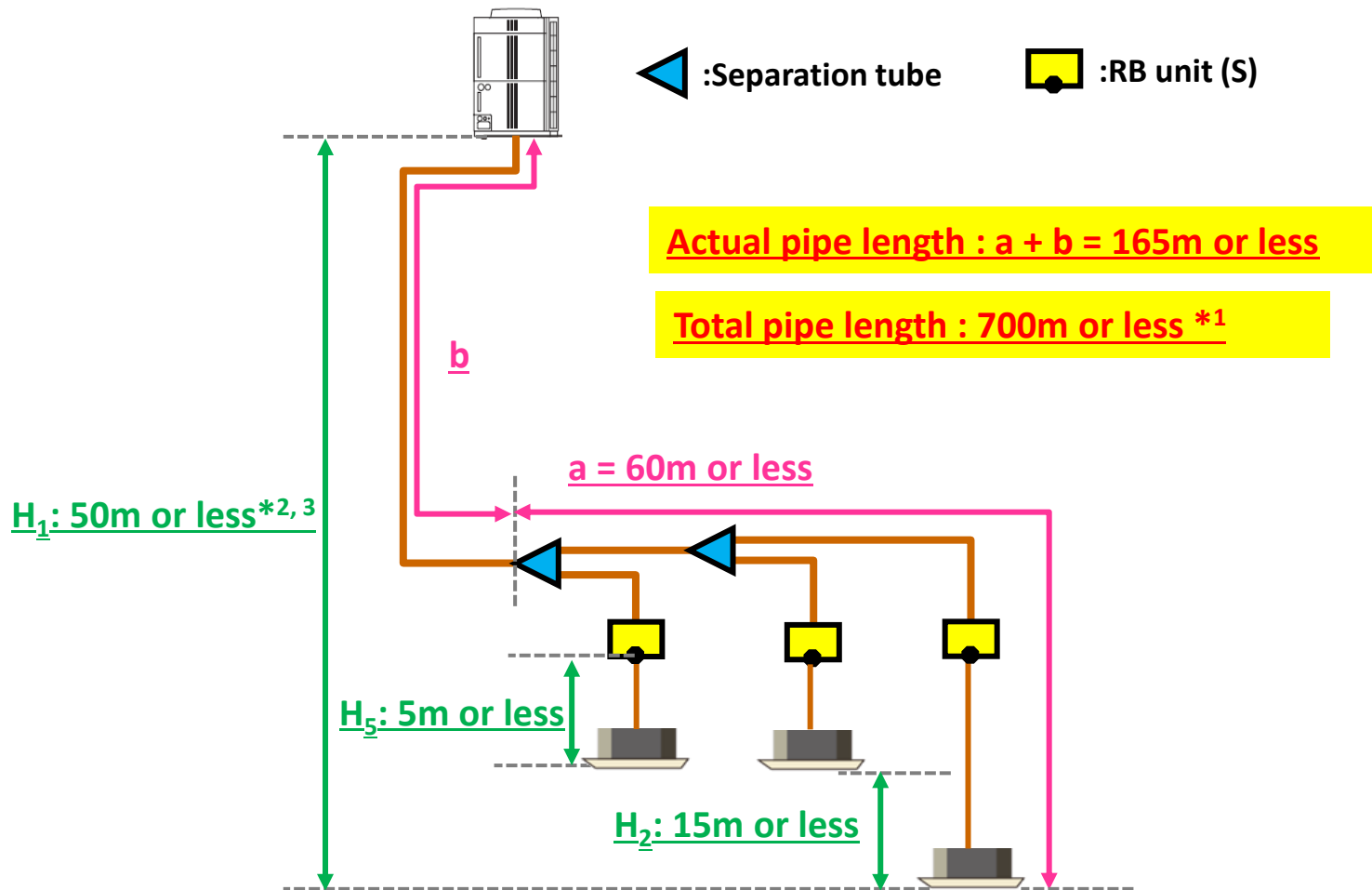
OK

[3] Piping design

- **Pipe length limitation**
- **Pipe size selection**
- **Installation precaution**

Piping design

Pipe length limitation (Case of 1 outdoor unit connected)



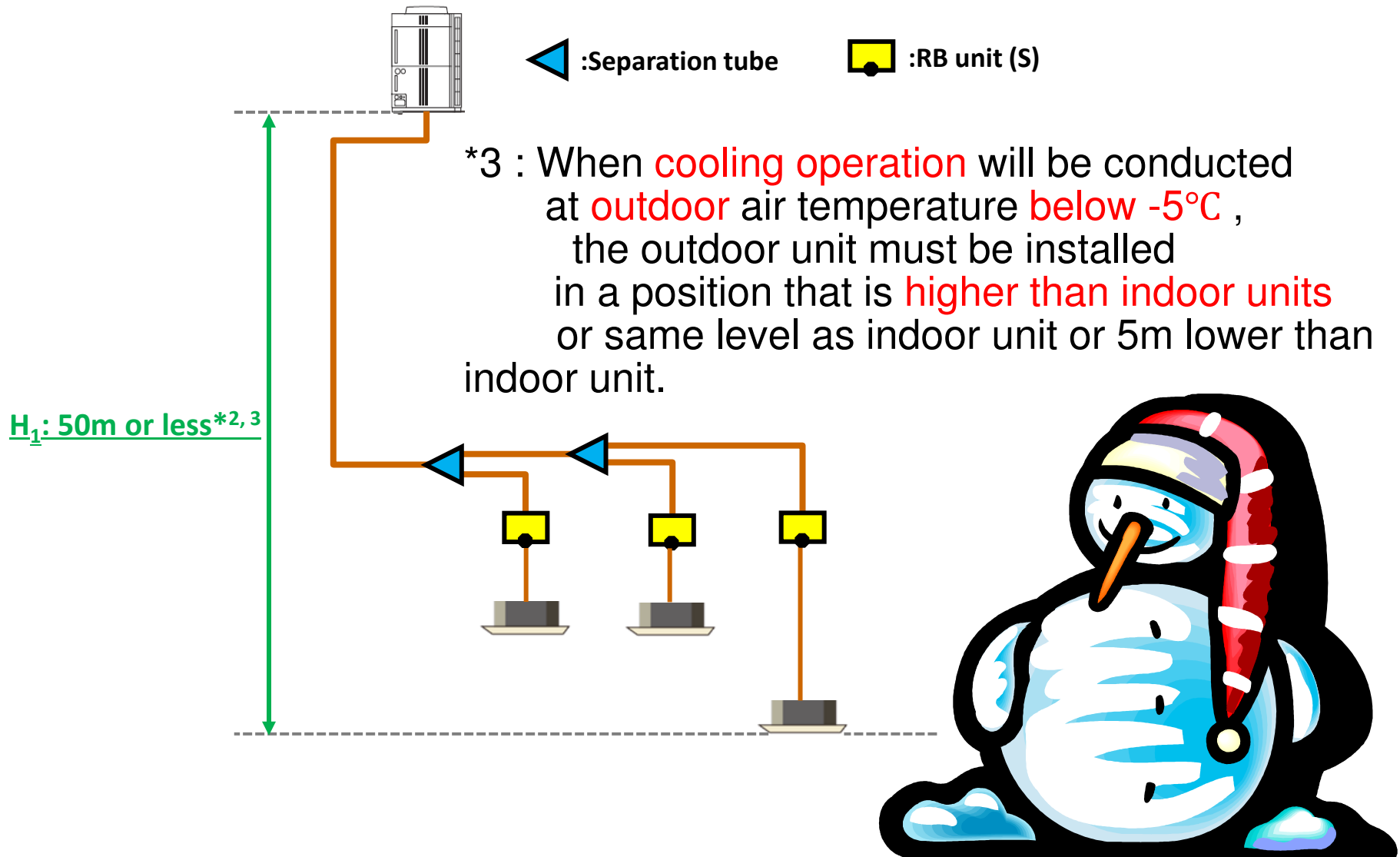
*1 : Total pipe length is limited by the condition that total refrigerant amount should not exceed 35kg.

*2 : When outdoor unit is installed below, 40m.

*3 : When cooling operation will be conducted at outdoor air temperature below -5°C , the outdoor unit must be installed in a position that is higher than indoor units or same level as indoor unit or 5m lower than indoor unit.

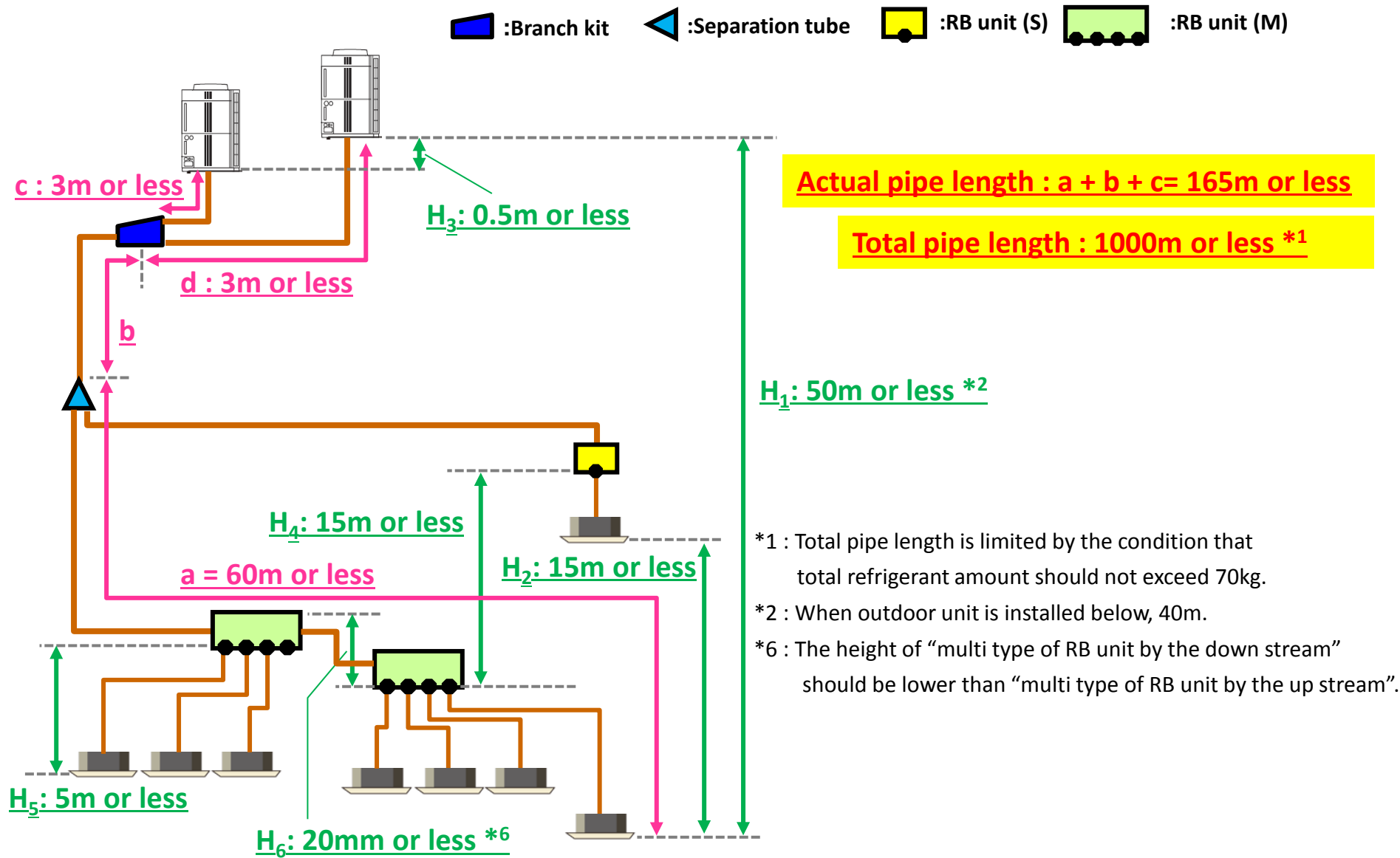
Piping design

Pipe length limitation (Case of 1 outdoor unit connected)



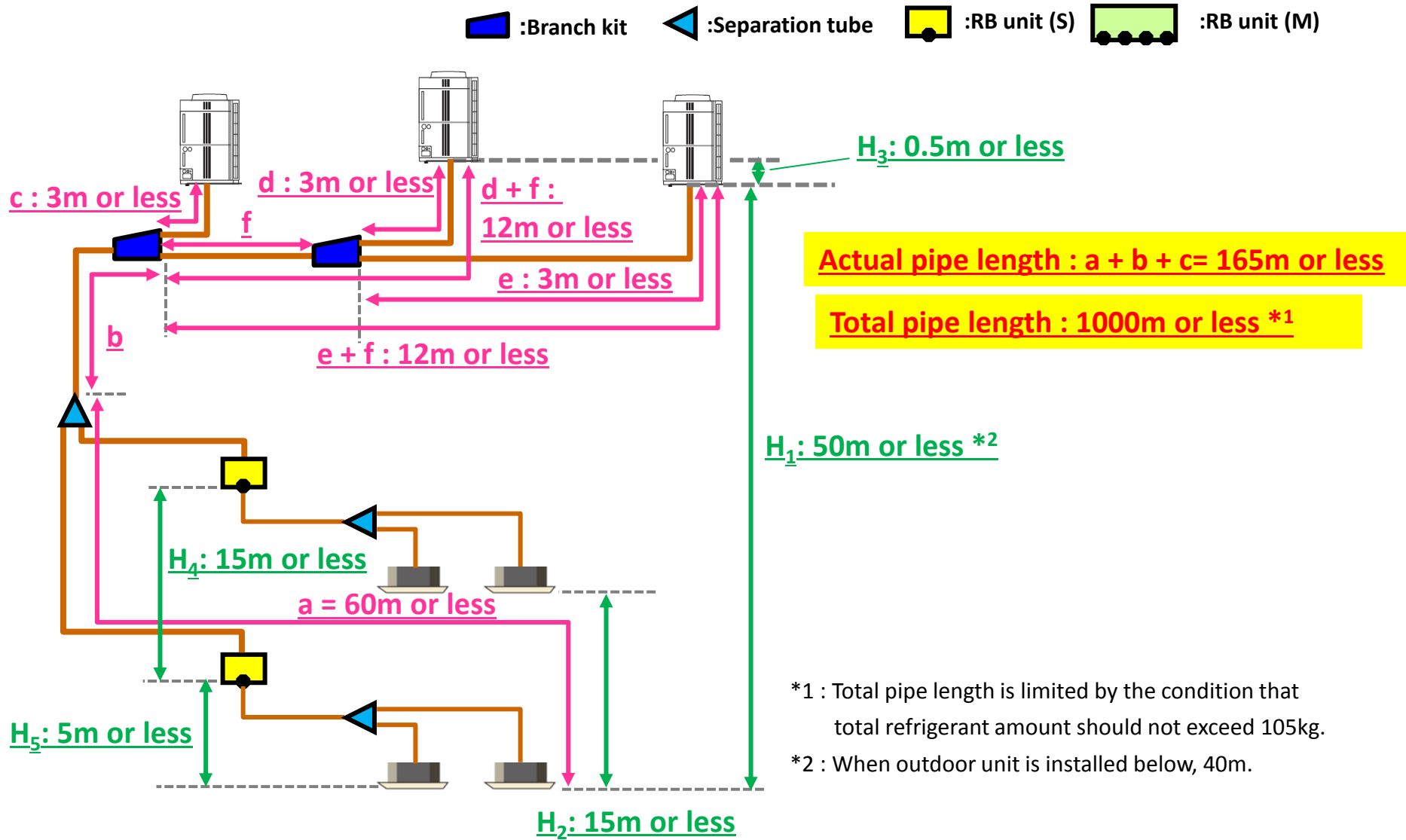
Piping design

Pipe length limitation (Case of 2 outdoor unit connected)



Piping design

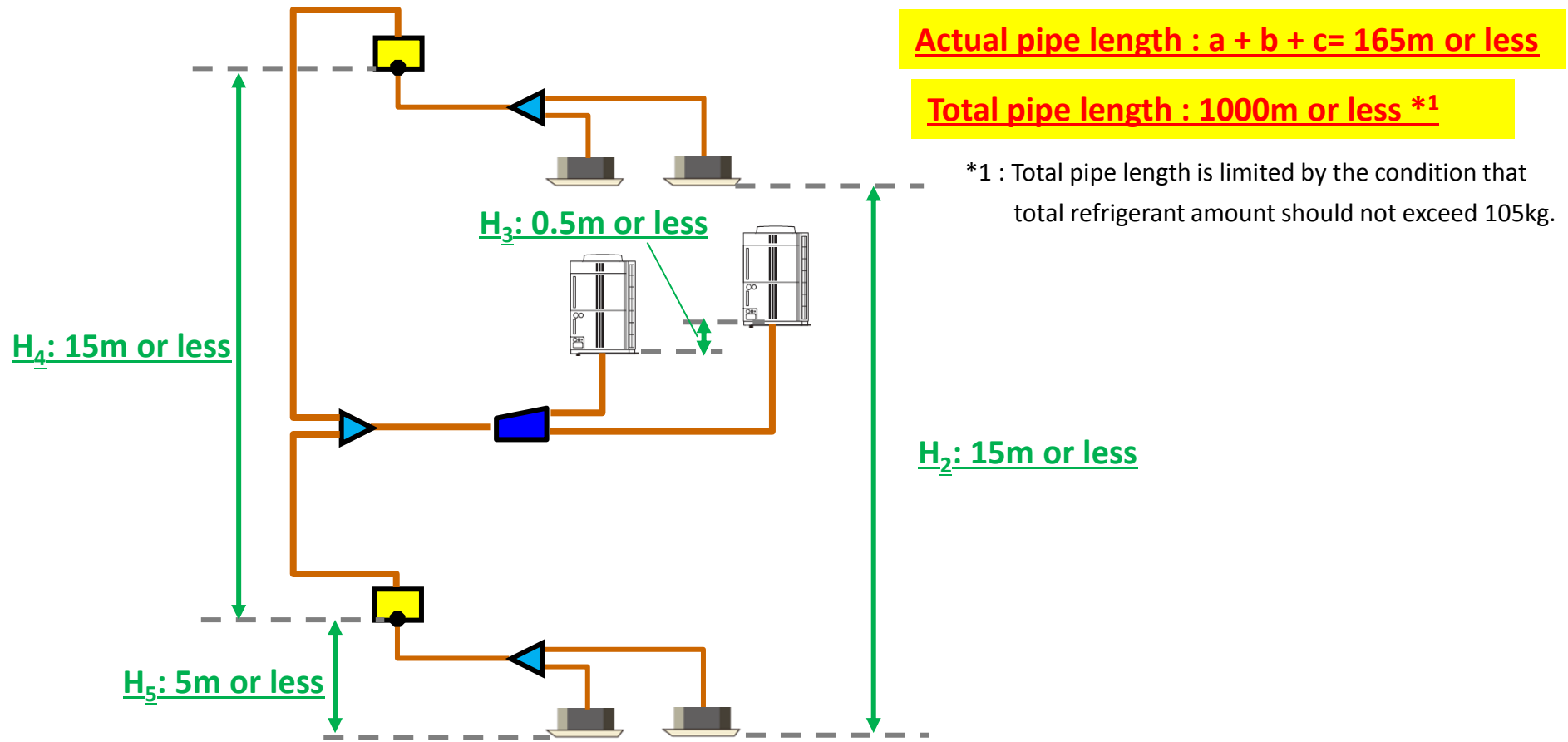
Pipe length limitation (Case of 3 outdoor unit connected)



Piping design

Pipe length limitation (Case of indoor units in both upper side and lower side of the outdoor unit)

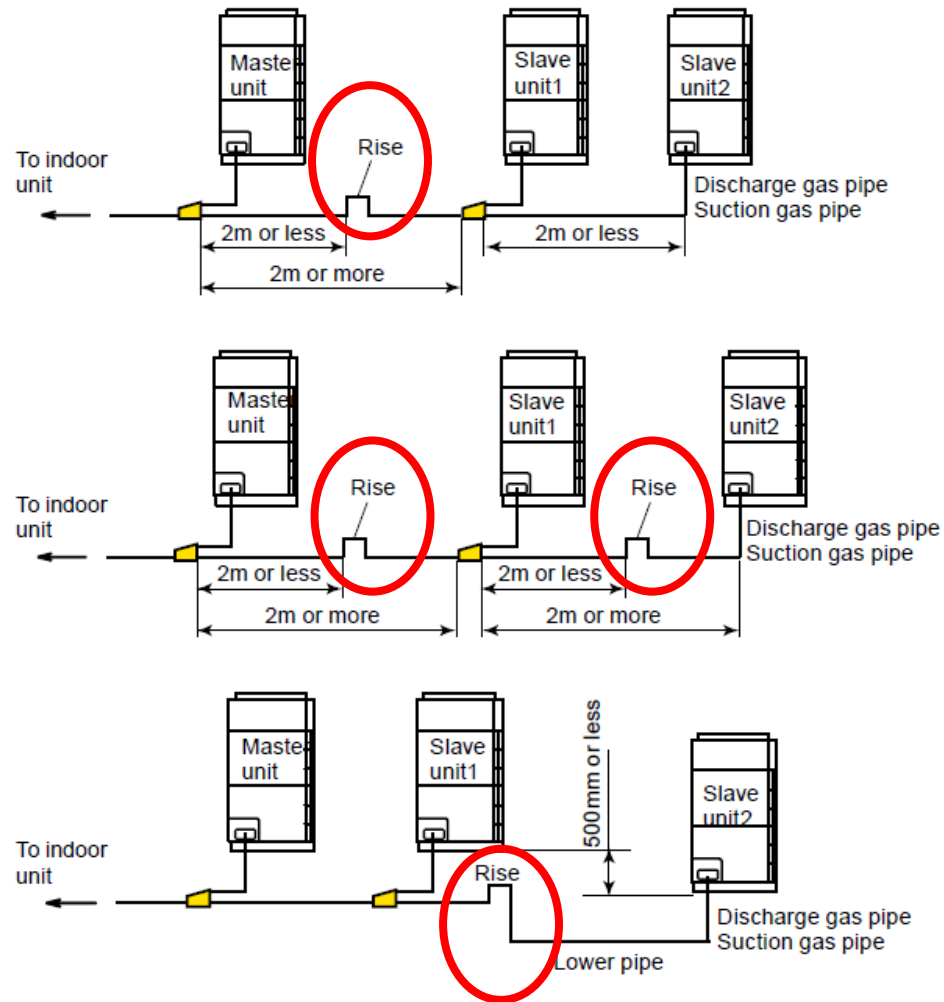
 :Branch kit  :Separation tube  :RB unit (S)  :RB unit (M)



Piping design

Piping design limitation

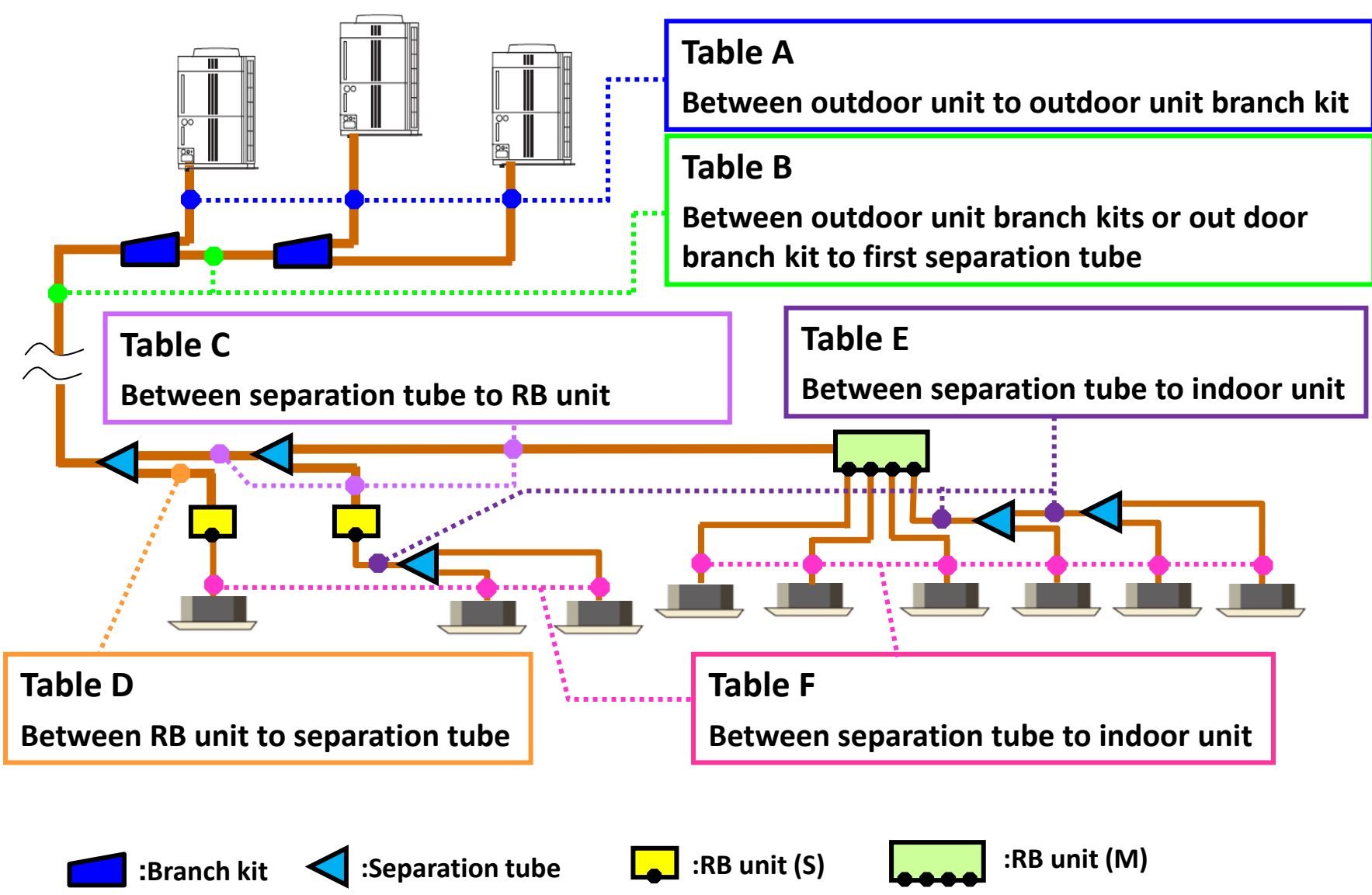
Case of pipe length between outdoor unit branch kit and outdoor unit branch kit or slave unit is longer than 2m or lower pipe line exists between outdoor units



Rise height : 200mm or more

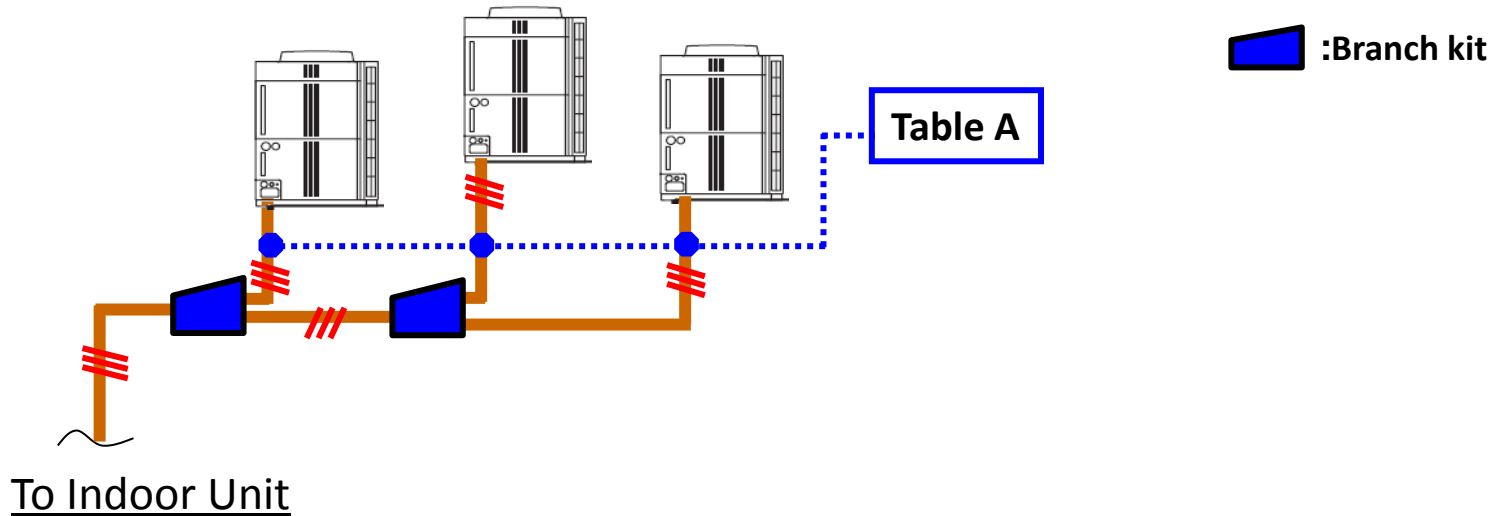
Piping design

Pipe size selection



Piping design

■ Pipe Size Table A (Between outdoor unit to outdoor unit branch kit)



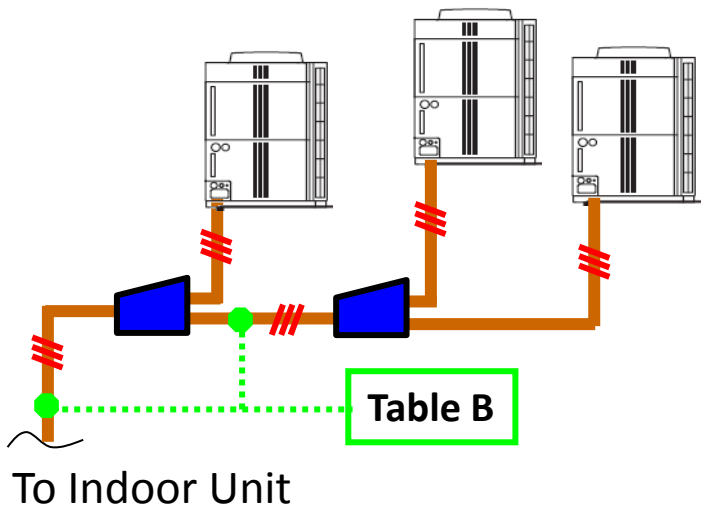
HP	Model code	Outdoor unit cooling capacity [kW]	Pipes diameter [mm] (in)		
			Liquid	Discharge gas	Suction gas
8	72	22.4	12.70(1/2")	15.88(5/8")	22.22(7/8")
10	90	28.0	12.70(1/2")	19.05(3/4")	22.22(7/8")
12	108	33.5	12.70(1/2")	19.05(3/4")	28.58(1-1/8")
14	126	40.0	12.70(1/2")	22.22(7/8")	28.58(1-1/8")
16	144	45.0	12.70(1/2")	22.22(7/8")	28.58(1-1/8")

Piping design

■ Pipe Size Table B

(Between outdoor unit branch kit or outdoor branch kit to first separation tube)

 :Branch kit



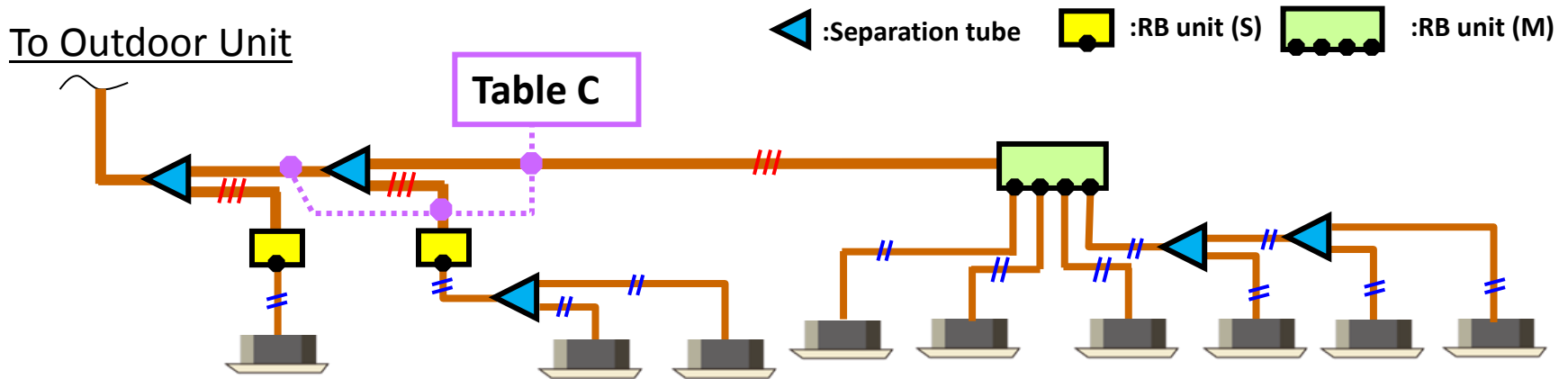
Total cooling capacity of outdoor unit [kW]	Out side Diameter [mm] (in)		
	Liquid	Discharge Gas	Suction gas
22.4	12.70(1/2")	15.88(5/8")	22.22(7/8")
22.5 to 28.0	12.70(1/2")	19.05(3/4")	22.22(7/8")
28.1 to 33.5	12.70(1/2")	19.05(3/4")	28.58(1-1/8")
33.6 to 45.0	12.70(1/2")	22.22(7/8")	28.58(1-1/8")
45.1 to 56.0	15.88(5/8")	22.22(7/8")	28.58(1-1/8")
56.1 to 78.5	15.88(5/8")	28.58(1-1/8")	34.92(1-3/8")
78.6 to 96.0	19.05(3/4")	28.58(1-1/8")	34.92(1-3/8")
96.1 to 102.4	19.05(3/4")	28.58(1-1/8")	41.27(1-5/8")
102.5 or more	19.05(3/4")	34.92(1-3/8")	41.27(1-5/8")

Piping design

■ Pipe Size Table C

Between separation tube to RB unit

If multiple I.U. are connected to RB unit, at that time, RB side 3-pipes dimension can be selected from "Table-C".



Total cooling capacity of indoor unit [kW]	Out side Diameter [mm] (in)		
	Liquid	Discharge Gas	Suction gas
4.4 to 11.1	9.52(3/8")	12.70(1/2")	15.88(5/8")
11.2 to 13.9	9.52(3/8")	12.70(1/2")	19.05(3/4")
14.0 to 22.3	12.70(1/2")	15.88(5/8")	22.22(7/8")
22.4 to 28.0	12.70(1/2")	19.05(3/4")	22.22(7/8")
28.1 to 44.7	12.70(1/2")	19.05(3/4")	28.58(1-1/8")

Total cooling capacity of outdoor unit [kW]	Out side Diameter [mm] (in)		
	Liquid	Discharge Gas	Suction gas
44.8 to 46.9	15.88(5/8")	19.05(3/4")	28.58(1-1/8")
47.0 to 56.0	15.88(5/8")	22.22(7/8")	28.58(1-1/8")
56.1 to 80.0	15.88(5/8")	28.58(1-1/8")	34.92(1-3/8")
80.1 to 95.0	19.05(3/4")	28.58(1-1/8")	34.92(1-3/8")
95.1 or more	19.05(3/4")	28.58(1-1/8")	41.27(1-5/8")

Piping design

■ Pipe Size Table D

Between RB unit to separation tube

If single I.U. is connected to RB unit, at that time, RB side 3-pipes dimension can be selected from “Table-D”.

To Outdoor Unit

◀ :Separation tube ◻ :RB unit (S) ◻ :RB unit (M)

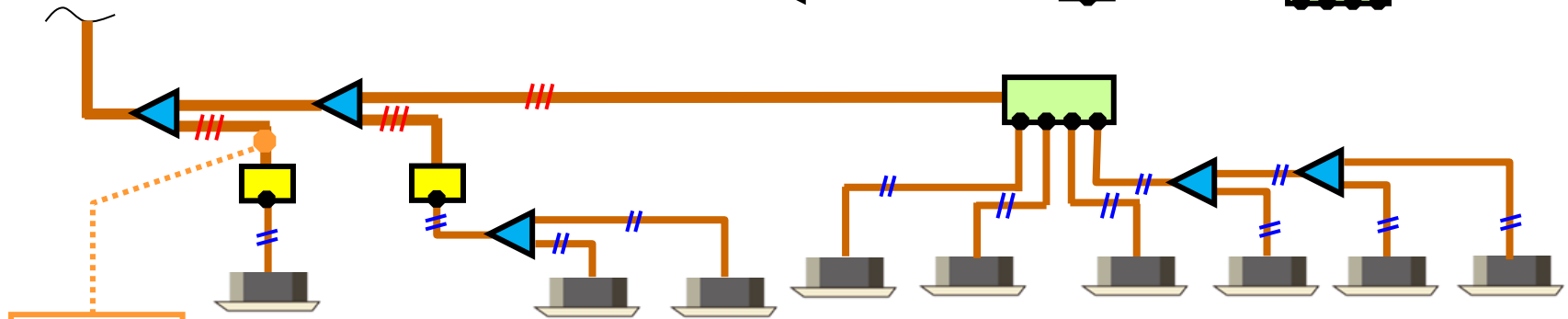


Table D

Model code	Indoor unit cooling capacity [kW]	Pipes diameter [mm] (in)		
		Liquid	Discharge gas	Suction gas
07, 09, 12, 14	2.2, 2.8, 3.6, 4.5	6.35 (1/4")	9.52 (3/8")	12.70(1/2")
18, 24, 30	5.6, 7.1, 8.0, 9.0	9.52 (3/8")	12.70 (1/2")	15.88 (5/8")
36, 45, 54	11.2, 12.5, 14.0	9.52 (3/8")	12.70 (1/2")	19.05 (3/4")
60	18.0	9.52 (3/8")	15.88 (5/8")	19.05 (3/4")
72, 90	22.4, 25.0	12.70 (1/2")	19.05 (3/4")	22.22 (7/8")

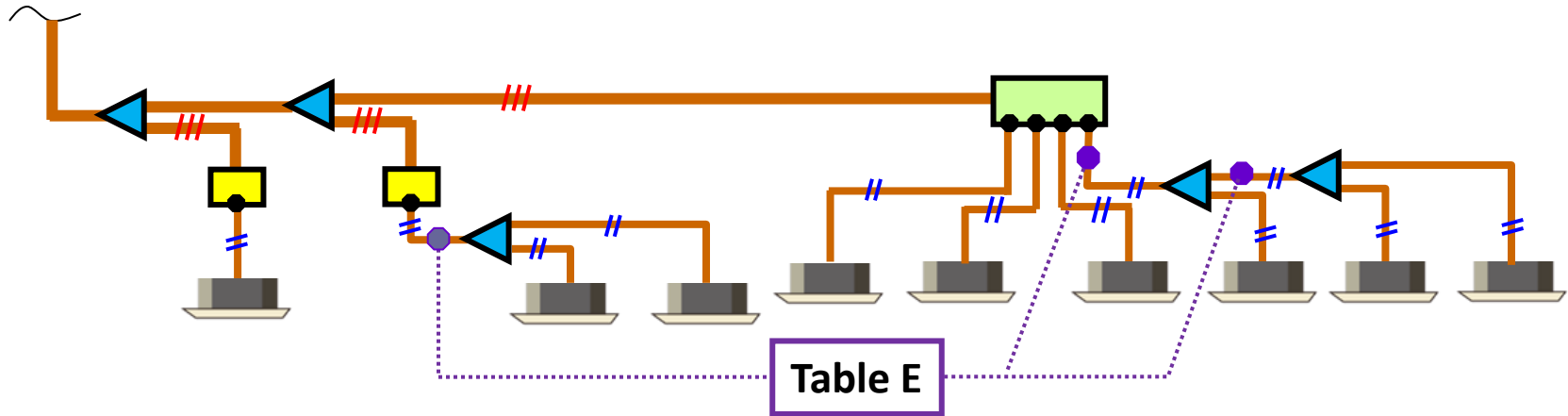
Piping design

■ Pipe Size Table E

Between RB unit or separation tubes to separation tubes

To Outdoor Unit

◀ :Separation tube ◻ :RB unit (S) ◻ :RB unit (M)



Total cooling capacity of indoor unit [kW]	Pipes diameter [mm] (in)	
	Liquid	Suction gas
4.4 to 11.1	9.52 (3/8")	15.88 (5/8")
11.2 to 13.9	9.52 (3/8")	19.05 (3/4")
14.0 to 28.0	12.70 (1/2")	22.22 (7/8")
28.1 to 44.7	12.70 (1/2")	28.58 (1-1/8")

Total cooling capacity of indoor unit [kW]	Pipes diameter [mm] (in)	
	Liquid	Suction gas
44.8 to 56.0	15.88 (5/8")	28.58 (1-1/8")
56.1 to 80.0	15.88 (5/8")	34.92 (1-3/8")
80.1 to 95.0	19.05 (3/4")	34.92 (1-3/8")
95.1 or more	19.05 (3/4")	41.27 (1-5/8")

Piping design

■ Pipe Size Table F

Between RB unit and separation tubes to indoor unit

To Outdoor Unit

◀ :Separation tube ◻ :RB unit (S) ◻ :RB unit (M)

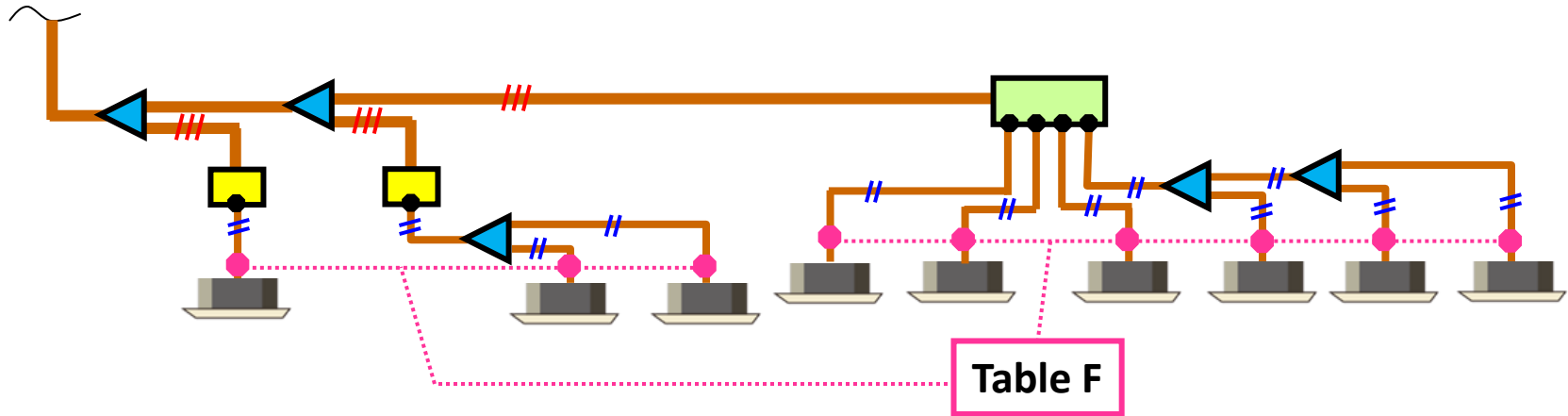
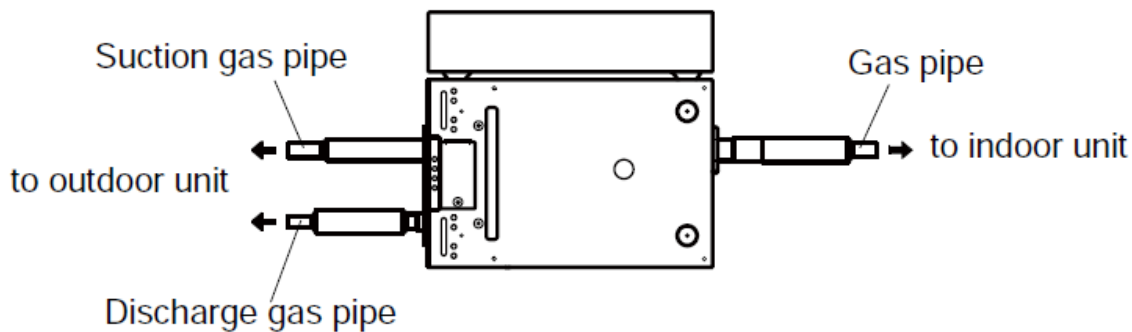


Table F

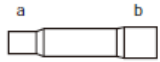
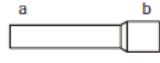
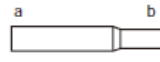


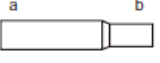
Indoor unit capacity [kW]	Pipes diameter [mm] (in)	
	Liquid	Suction gas
2.2, 2.8, 3.6, 4.5	6.35(1/4")	12.70(1/2")
5.6, 7.1, 8.0, 9.0	9.52(3/8")	15.88(5/8")
11.2, 12.5, 14.0	9.52(3/8")	19.05(3/4")
18.0	9.52(3/8")	19.05(3/4")
22.4, 25.0	12.70(1/2")	22.22(3/4")

Piping design

Pipe size selection (Single RB unit)



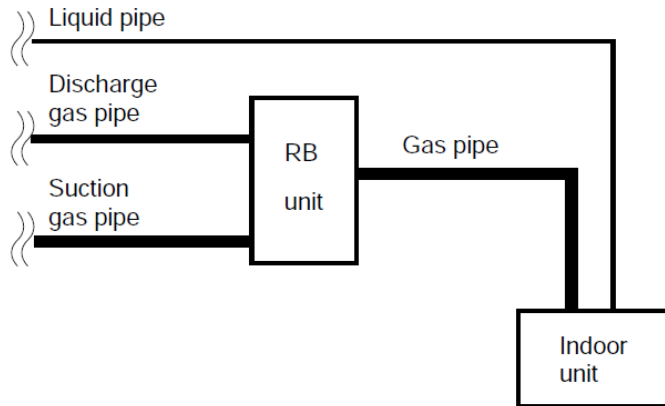
Model name	Discharge Gas pipe	Suction Gas pipe	Gas pipe
UTP-RX01AH	9.52 (3/8")	12.70 (1/2")	12.70 (1/2")
UTP-RX01BH	12.70 (1/2")	19.05 (3/4")	19.05 (3/4")
UTP-RX01CH	19.05 (3/4")	22.22 (7/8")	22.22 (7/8")

Reducer type	UTP-RX01AH	UTP-RX01BH	UTP-RX01CH
Reducer-A  a: $\phi 9.52$ [O.D.] b: $\phi 12.7$ [I.D.]	4	-	-
Reducer-B  a: $\phi 12.7$ [O.D.] b: $\phi 15.88$ [I.D.]	2	1	-
Reducer-C  a: $\phi 12.7$ [O.D.] b: $\phi 9.52$ [I.D.]	-	1	-
Reducer-D  a: $\phi 19.05$ [O.D.] b: $\phi 22.22$ [I.D.]	-	1	-
Reducer-E  a: $\phi 19.05$ [O.D.] b: $\phi 12.7$ [I.D.] c: $\phi 15.88$ [I.D.]	-	2	-
Reducer-F  a: $\phi 19.05$ [O.D.] b: $\phi 15.88$ [I.D.]	-	-	1

Piping design

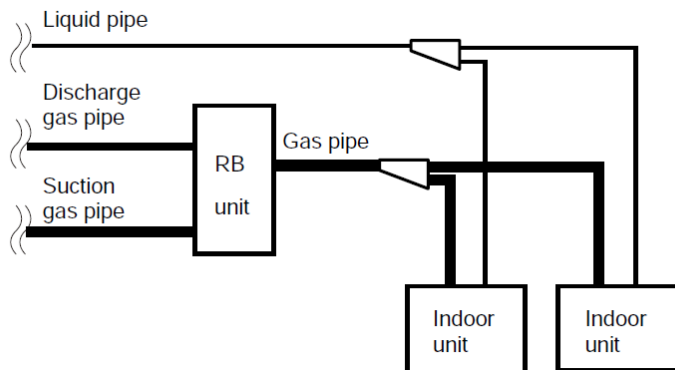
Pipe size selection (Single RB unit)

Connection pipe selection for when only 1 indoor unit is connected.



Model name	Indoor unit capacity (kW)	Liquid pipe	Discharge Gas pipe	Suction Gas pipe	Gas pipe
UTP-RX01AH	2.2, 2.8, 3.6, 4.5	6.35 (1/4")	9.52 (3/8")	12.70 (1/2")	12.70 (1/2")
	5.6, 7.1, 8.0	9.52 (3/8")	12.70 (1/2") +Reducer-A	15.88 (5/8") +Reducer-B	15.88 (5/8") +Reducer-B
UTP-RX01BH	2.2, 2.8, 3.6, 4.5	6.35 (1/4")	9.52 (3/8") +Reducer-C	12.70 (1/2") +Reducer-E	12.70 (1/2") +Reducer-E
	5.6, 7.1, 8.0, 9.0	9.52 (3/8")	12.70 (1/2")	15.88 (5/8") +Reducer-E	15.88 (5/8") +Reducer-E
	11.2, 12.5, 14.0	9.52 (3/8")	12.70 (1/2")	19.05 (3/4")	19.05 (3/4")
	18.0	9.52 (3/8")	15.88 (5/8") +Reducer-B	19.05 (3/4")	19.05 (3/4")
UTP-RX01CH	22.4, 25.0	12.70 (1/2")	19.05 (3/4")	22.22 (7/8")	22.22 (7/8")

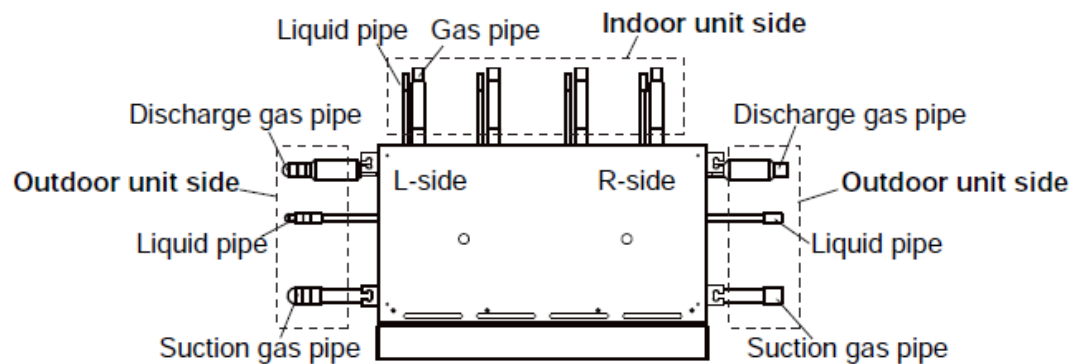
Connection pipe selection for when 2 or more indoor units are connected.



Model name	Total capacity of indoor unit (kW)	Liquid pipe	Discharge Gas pipe	Suction Gas pipe	Gas pipe
UTP-RX01AH	4.4 to 8.0	9.52 (3/8")	12.70 (1/2") +Reducer-A	15.88 (5/8") +Reducer-B	15.88 (5/8") +Reducer-B
UTP-RX01BH	4.4 to 11.1	9.52 (3/8")	12.70 (1/2")	15.88 (5/8") +Reducer-E	15.88 (5/8") +Reducer-E
	11.2 to 13.9	9.52 (3/8")	12.70 (1/2")	19.05 (3/4")	19.05 (3/4")
	14.0 to 18.0	12.70 (1/2")	15.88 (5/8") +Reducer-B	22.22 (7/8") +Reducer-D	22.22 (7/8") +Reducer-D
UTP-RX01CH	18.1 to 22.3	12.70 (1/2")	15.88 (5/8") +Reducer-F	22.22 (7/8")	22.22 (7/8")
	22.4 to 28.0	12.70 (1/2")	19.05 (3/4")	22.22 (7/8")	22.22 (7/8")

Piping design

Pipe size selection (Multi RB unit)



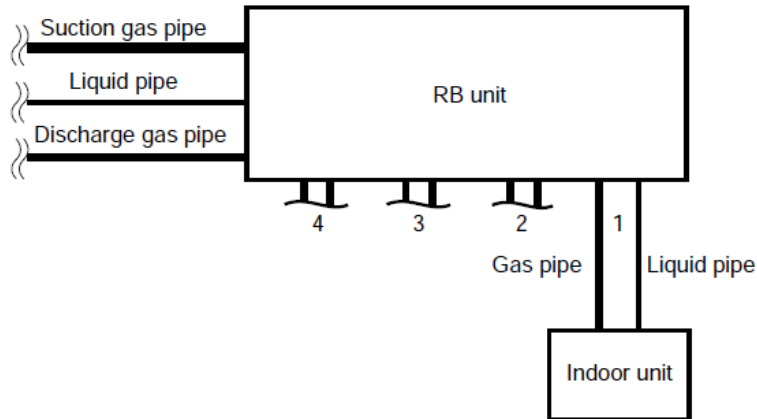
Outdoor unit side [mm (in.)]			Indoor unit side [mm (in.)]	
Liquid pipe	Discharge Gas pipe	Suction Gas pipe	Liquid pipe	Gas pipe
15.88 (5/8")	22.22 (7/8")	28.58 (1-1/8")	9.52 (3/8")	19.05 (3/4")

Reducer type		UTP-RX01CH
Reducer-G	 a: $\varnothing 9.52$ [O.D.] b: $\varnothing 12.7$ [I.D.]	4
Reducer-H	 a: $\varnothing 9.52$ [O.D.] b: $\varnothing 6.35$ [I.D.]	4
Reducer-I	 a: $\varnothing 19.05$ [O.D.] b: $\varnothing 22.22$ [I.D.]	2
Reducer-J	 a: $\varnothing 19.05$ [O.D.] b: $\varnothing 12.7$ [I.D.] c: $\varnothing 15.88$ [I.D.]	2
Reducer-K	 a: $\varnothing 28.58$ [O.D.] b: $\varnothing 22.22$ [I.D.] c: $\varnothing 19.05$ [I.D.] d: $\varnothing 15.88$ [I.D.]	2
Reducer-L	 a: $\varnothing 22.22$ [O.D.] b: $\varnothing 19.05$ [I.D.] c: $\varnothing 15.88$ [I.D.] d: $\varnothing 12.7$ [I.D.]	2
Reducer-M	 a: $\varnothing 15.88$ [O.D.] b: $\varnothing 12.7$ [I.D.] c: $\varnothing 9.52$ [I.D.]	2

Piping design

Pipe size selection (Multi RB unit)

Connection pipe selection for when only 1 indoor unit is connected.

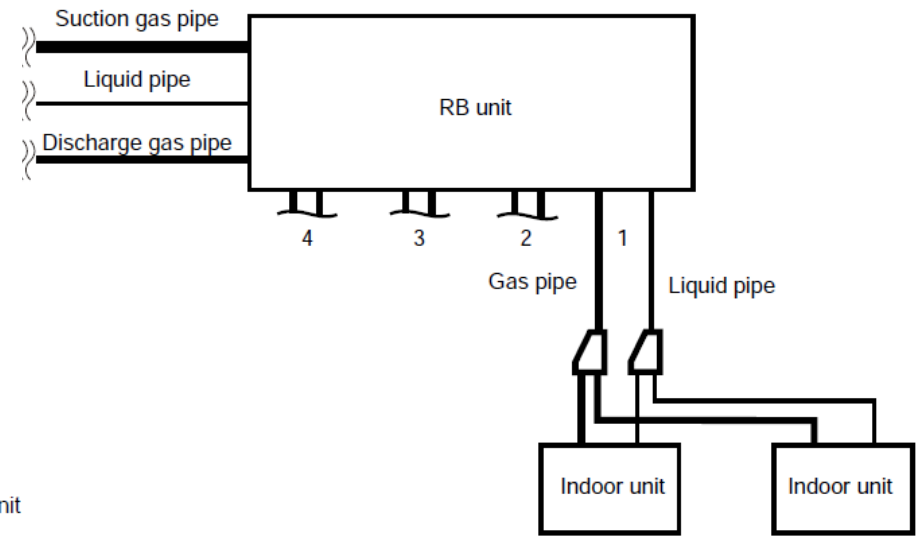


Note: Please be sure to connect indoor unit to furthest port (position 1) from outdoor unit

Total capacity of indoor unit (kW)	Outdoor unit side [mm (in.)]		
	Liquid pipe	Discharge Gas pipe	Suction Gas pipe
2.2 to 11.1	9.52 (3/8") +Reducer-M	12.70 (1/2") +Reducer-L	15.88 (5/8") +Reducer-K
11.2 to 13.9	9.52 (3/8") +Reducer-M	12.70 (1/2") +Reducer-L	19.05 (3/4") +Reducer-K
14.0 to 22.3	12.70 (1/2") +Reducer-M	15.88 (5/8") +Reducer-L	22.22 (7/8") +Reducer-K
22.4 to 28.0	12.70 (1/2") +Reducer-M	19.05 (3/4") +Reducer-L	22.22 (7/8") +Reducer-K
28.1 to 44.7	12.70 (1/2") +Reducer-M	19.05 (3/4") +Reducer-L	28.58 (1-1/8")
44.8 to 46.9	15.88 (5/8")	19.05 (3/4") +Reducer-L	28.58 (1-1/8")
47.0 to 56.0	15.88 (5/8")	22.22 (7/8")	28.58 (1-1/8")

Indoor unit capacity (kW)	Indoor unit side [mm (in.)]	
	Liquid pipe	Gas pipe
2.2, 2.8, 3.6, 4.5	ø6.35 (1/4") +Reducer-H	12.70 (1/2") +Reducer-J
5.6, 7.1, 8.0, 9.0	ø9.52 (3/8")	15.88 (5/8") +Reducer-J
11.2, 12.5, 14.0, 18.0	ø9.52 (3/8")	19.05 (3/4")

Connection pipe selection for when 2 or more indoor units are connected.



Note: Please be sure to connect indoor unit to furthest port (position 1) from outdoor unit.

Total capacity of indoor unit (kW)	Outdoor unit side [mm (in.)]		
	Liquid pipe	Discharge Gas pipe	Suction Gas pipe
2.2 to 11.1	9.52 (3/8") +Reducer-M	12.70 (1/2") +Reducer-L	15.88 (5/8") +Reducer-K
11.2 to 13.9	9.52 (3/8") +Reducer-M	12.70 (1/2") +Reducer-L	19.05 (3/4") +Reducer-K
14.0 to 22.3	12.70 (1/2") +Reducer-M	15.88 (5/8") +Reducer-L	22.22 (7/8") +Reducer-K
22.4 to 28.0	12.70 (1/2") +Reducer-M	19.05 (3/4") +Reducer-L	22.22 (7/8") +Reducer-K
28.1 to 44.7	12.70 (1/2") +Reducer-M	19.05 (3/4") +Reducer-L	28.58 (1-1/8")
44.8 to 46.9	15.88 (5/8")	19.05 (3/4") +Reducer-L	28.58 (1-1/8")
47.0 to 56.0	15.88 (5/8")	22.22 (7/8")	28.58 (1-1/8")

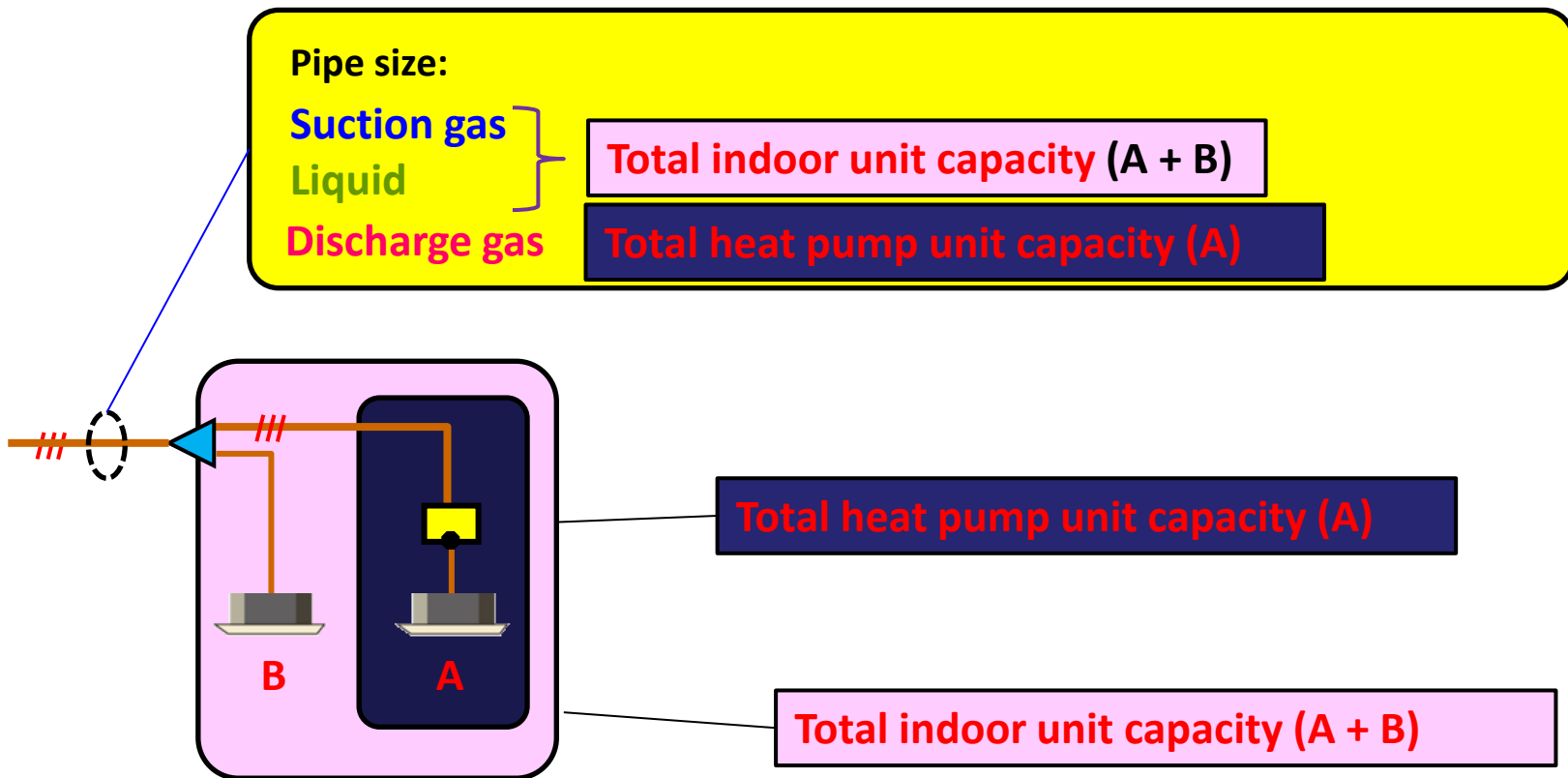
Total capacity of indoor unit (kW)	Indoor unit side [mm (in.)]	
	Liquid pipe	Gas pipe
2.2 to 11.1	ø9.52 (3/8")	15.88 (5/8") +Reducer-J
11.2 to 13.9	ø9.52 (3/8")	19.05 (3/4")
14.0 to 18.0	12.70 (1/2") +Reducer-G	22.22 (7/8") +Reducer-I

Piping design

Pipe size selection (Case of connecting indoor unit of cooling only type)

Select the pipe size of a system with cooling only connection indoor unit as shown below.

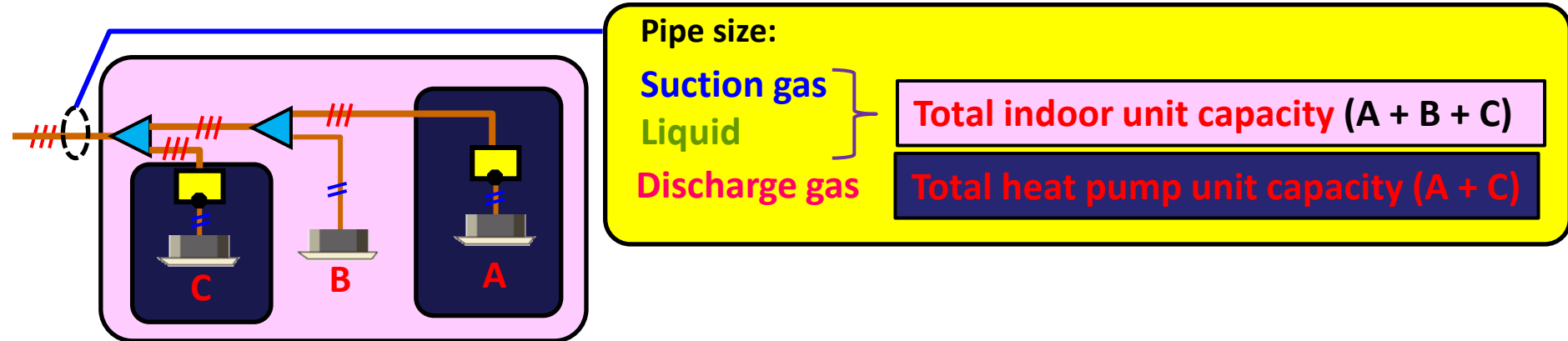
Example 1 ◀ :Separation tube ◻ :RB unit (S)



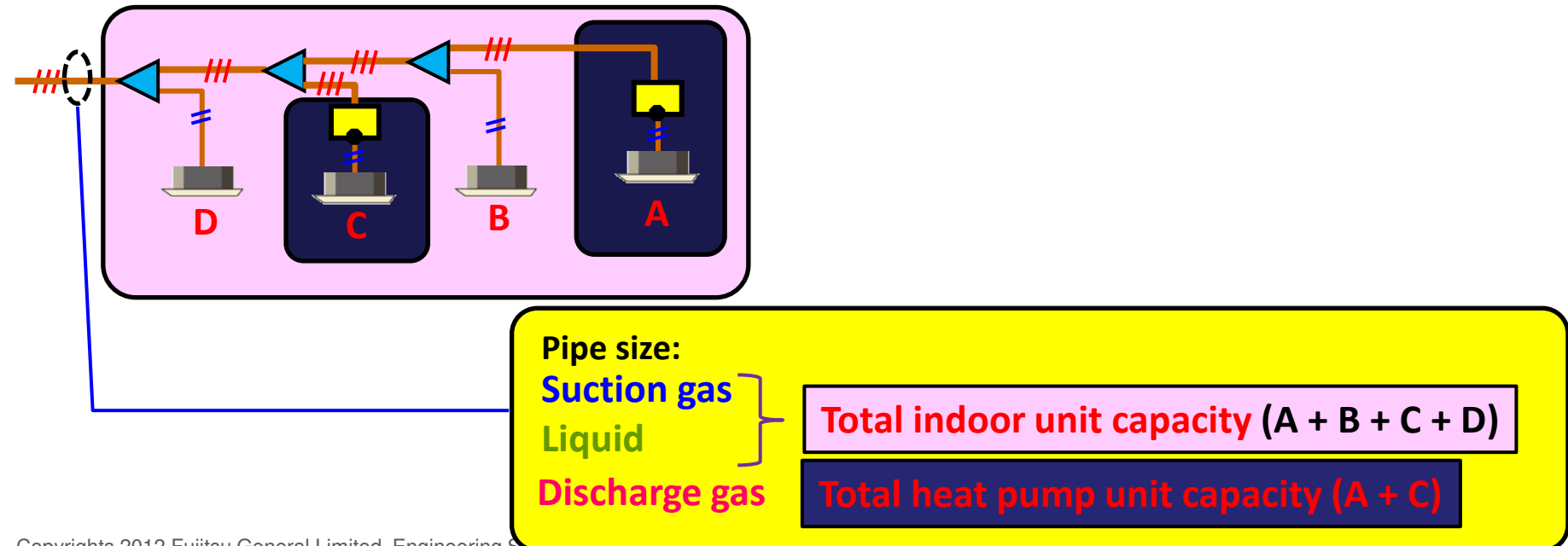
Piping design

Pipe size selection (Case of connecting indoor unit of cooling only type)

Example 2 ◀ :Separation tube ◻ :RB unit (S)



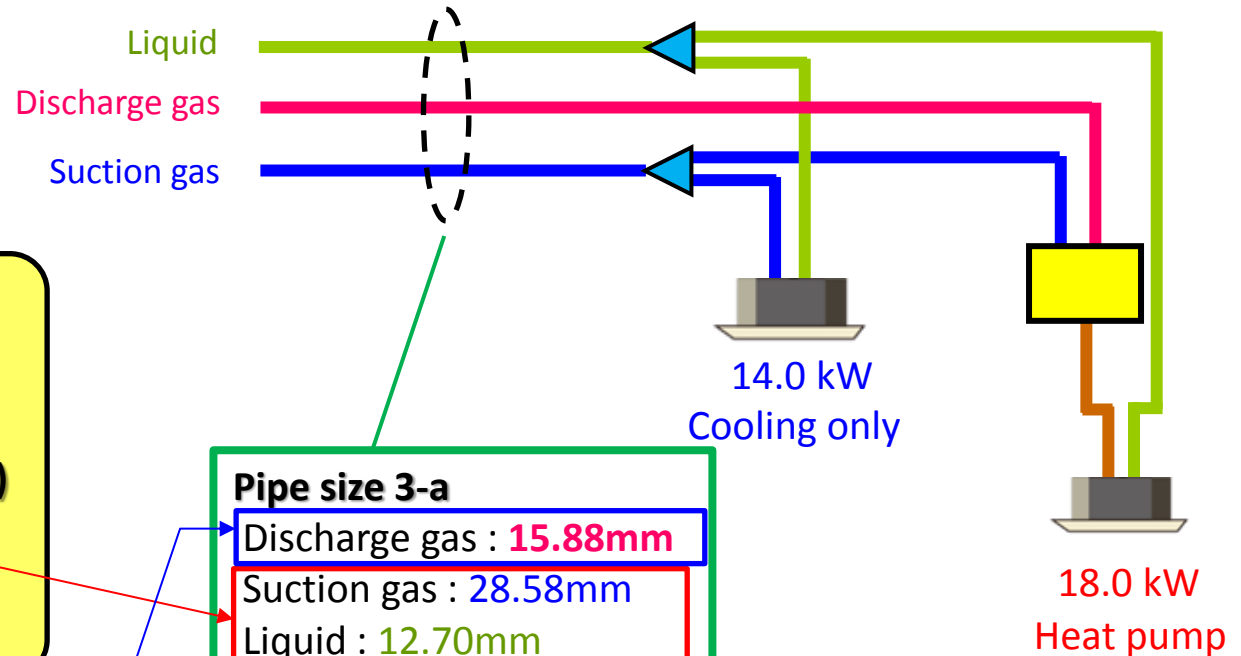
Example 3



Piping design

Pipe size selection (Case of connecting indoor unit of cooling only type)

◀ : Separation tube ◻ : RB unit (S)



①

Total Capacity :

$$14.0 + 18.0 = \underline{32 \text{ kW}}$$

Pipe size (Refer to "Table C")

Suction gas : 28.58mm

Liquid : 12.70mm

②

Total Heat pump unit capacity :

18.0 kW

Pipe size (Refer to "Table D")

Discharge gas : 15.88mm

Pipe size 3-a

Discharge gas : 15.88mm

Suction gas : 28.58mm

Liquid : 12.70mm

Piping design

Table for Additional charge calculation (Europe model)

Model	HP	A	B
		Factory charged amount (kg)	Additional amount for outdoor unit (kg)
AJ*A72GALH	8	11.80	3.00
AJ*A90GALH	10	11.80	3.00
AJ*108GALH	12	11.80	3.00
AJ*126GALH	14	11.80	6.80
AJ*144GALH	16	11.80	6.80

Diameter of liquid pipe (mm)	C
	Additional amount for pipe length (kg/m)
ø6.35	0.021
ø9.52	0.058
ø12.70	0.114
ø15.88	0.178
ø19.05	0.268

Calculation formula

$$A = \begin{array}{|c|} \hline \text{Outdoor unit 1} \\ \hline \text{factory charged amount} \\ \hline \text{kg} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Outdoor unit 2} \\ \hline \text{factory charged amount} \\ \hline \text{kg} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Outdoor unit 3} \\ \hline \text{factory charged amount} \\ \hline \text{kg} \\ \hline \end{array}$$

$$B = \begin{array}{|c|} \hline \text{Outdoor unit 1} \\ \hline \text{additional amount for} \\ \hline \text{outdoor unit} \\ \hline \text{kg} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Outdoor unit 2} \\ \hline \text{additional amount for} \\ \hline \text{outdoor unit} \\ \hline \text{kg} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Outdoor unit 3} \\ \hline \text{additional amount for} \\ \hline \text{outdoor unit} \\ \hline \text{kg} \\ \hline \end{array}$$

$$C = \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.268} \\ \hline \text{of } \varnothing 19.05\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array} + \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.178} \\ \hline \text{of } \varnothing 15.88\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array} + \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.114} \\ \hline \text{of } \varnothing 12.70\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array} + \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.058} \\ \hline \text{of } \varnothing 9.52\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array} + \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.021} \\ \hline \text{of } \varnothing 6.35\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array}$$

Calculation total amount in a system (Check)

$$\text{Total amount} = A + B + C \leq \begin{array}{l} 35.0 \text{ (kg) } 1 \text{ Outdoor Unit} \\ 70.0 \text{ (kg) } 2 \text{ Outdoor Units} \\ 105.0 \text{ (kg) } 3 \text{ Outdoor Units} \end{array}$$

$$\text{Additional Charge} = B + C$$

Piping design

Table for Additional charge calculation (Oceania model)

Model	HP	A	B
		Factory charged amount (kg)	Additional amount for outdoor unit (kg)
AJTA72GALH	8	11.80	3.00
AJTA90GALH	10	11.80	3.00
AJT108GALH	12	11.80	6.80
AJT126GALH	14	11.80	6.80

Diameter of liquid pipe (mm)	C
	Additional amount for pipe length (kg/m)
ø6.35	0.021
ø9.52	0.058
ø12.70	0.114
ø15.88	0.178
ø19.05	0.268

Calculation formula

$$A = \begin{array}{|c|} \hline \text{Outdoor unit 1} \\ \hline \text{factory charged amount} \\ \hline \text{kg} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Outdoor unit 2} \\ \hline \text{factory charged amount} \\ \hline \text{kg} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Outdoor unit 3} \\ \hline \text{factory charged amount} \\ \hline \text{kg} \\ \hline \end{array}$$

$$B = \begin{array}{|c|} \hline \text{Outdoor unit 1} \\ \hline \text{additional amount for} \\ \hline \text{outdoor unit} \\ \hline \text{kg} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Outdoor unit 2} \\ \hline \text{additional amount for} \\ \hline \text{outdoor unit} \\ \hline \text{kg} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Outdoor unit 3} \\ \hline \text{additional amount for} \\ \hline \text{outdoor unit} \\ \hline \text{kg} \\ \hline \end{array}$$

$$C = \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.268} \\ \hline \text{of } \varnothing 19.05\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array} + \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.178} \\ \hline \text{of } \varnothing 15.88\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array} + \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.114} \\ \hline \text{of } \varnothing 12.70\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array} + \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.058} \\ \hline \text{of } \varnothing 9.52\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array} + \begin{array}{|c|c|} \hline \text{Total length} & \text{x 0.021} \\ \hline \text{of } \varnothing 6.35\text{mm} & \text{kg/m} \\ \hline \text{liquid pipe} & \\ \hline \text{m} & \\ \hline \text{kg} & \\ \hline \end{array}$$

Calculation total amount in a system (Check)

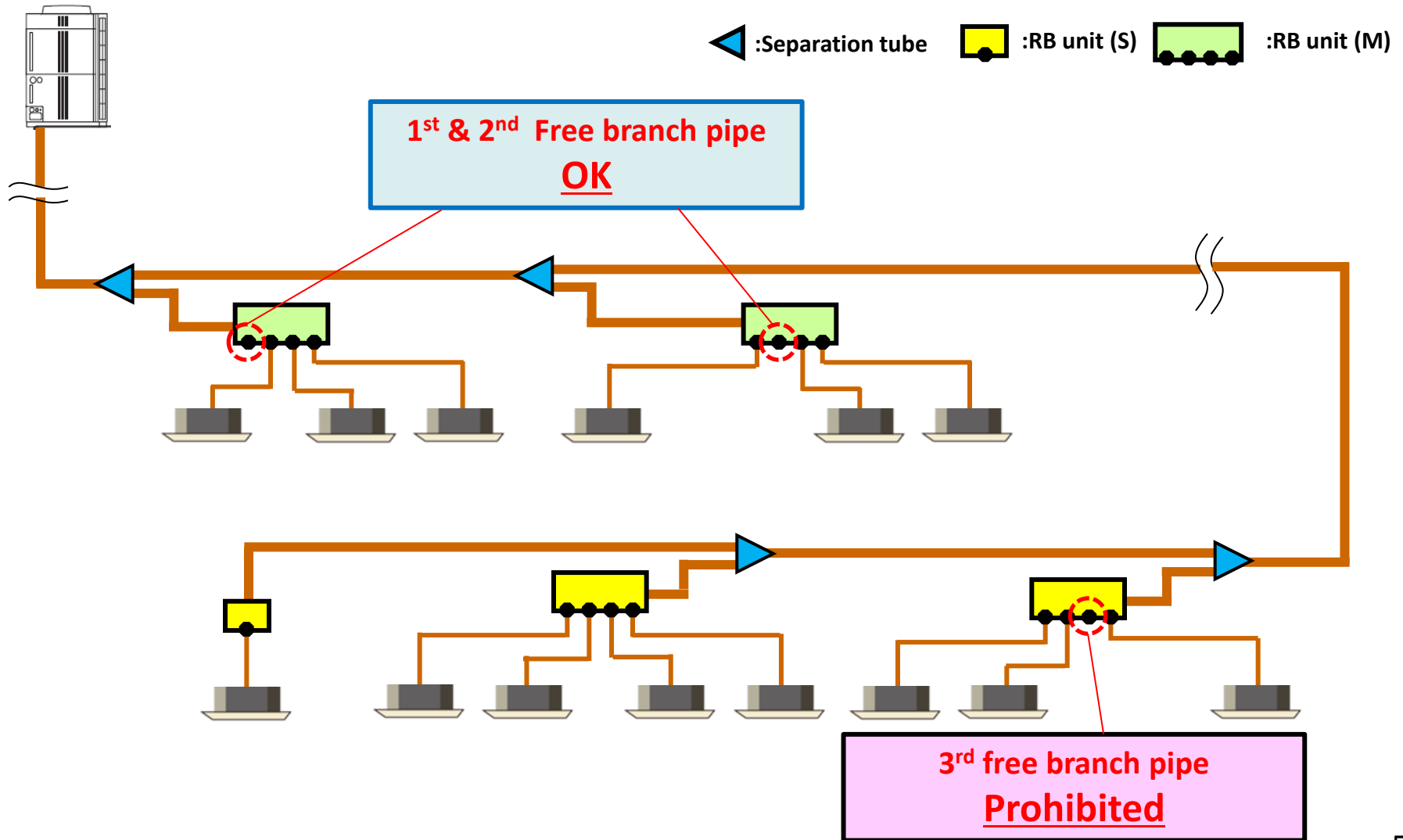
$$\text{Total amount} = A + B + C \leq \begin{array}{l} 35.0 \text{ (kg) } 1 \text{ Outdoor Unit} \\ 70.0 \text{ (kg) } 2 \text{ Outdoor Units} \\ 105.0 \text{ (kg) } 3 \text{ Outdoor Units} \end{array}$$

$$\text{Additional Charge} = B + C$$

Piping design

Installation precaution (Outdoor unit ~ RB unit ~ indoor unit)

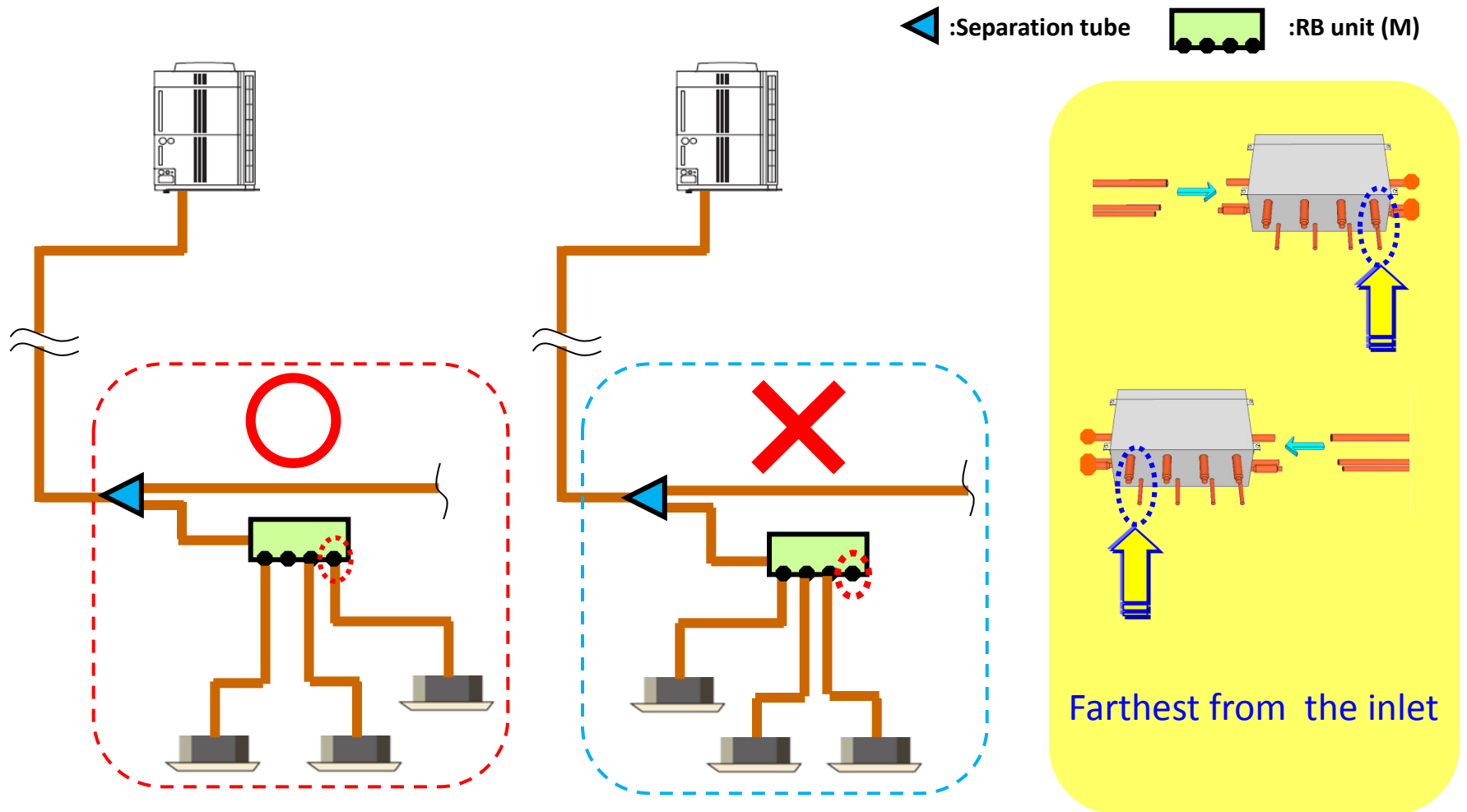
- Keep free branch with in **2 or less** per one refrigerant cycle.



Piping design

Installation precaution (Outdoor unit ~ RB unit ~ indoor unit)

- When connecting 3branch, always connect **farthest port from the inlet**

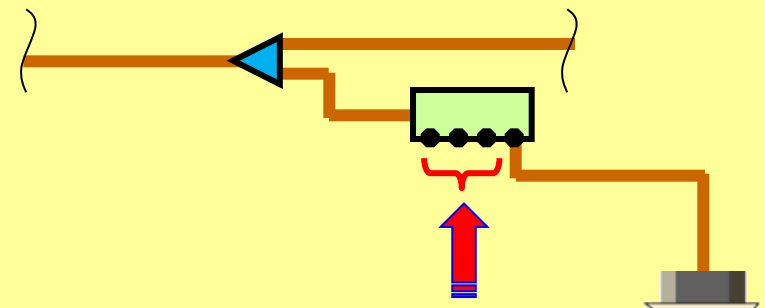
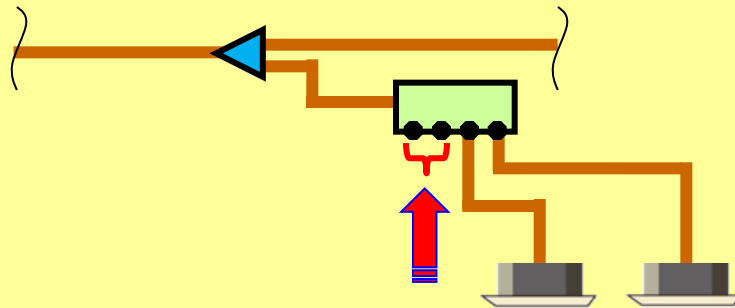
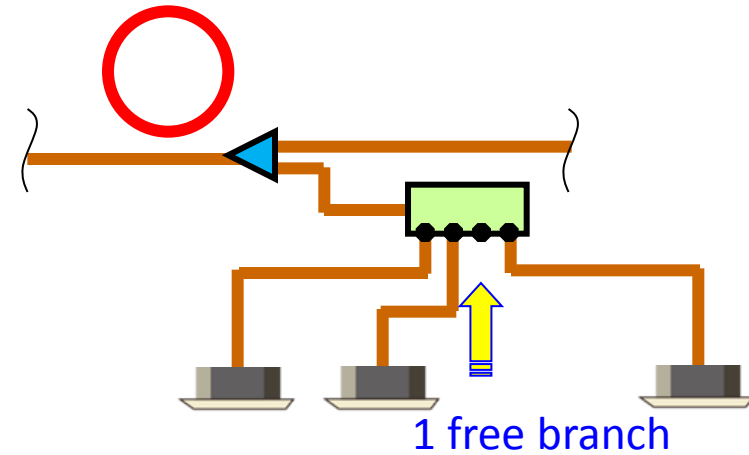
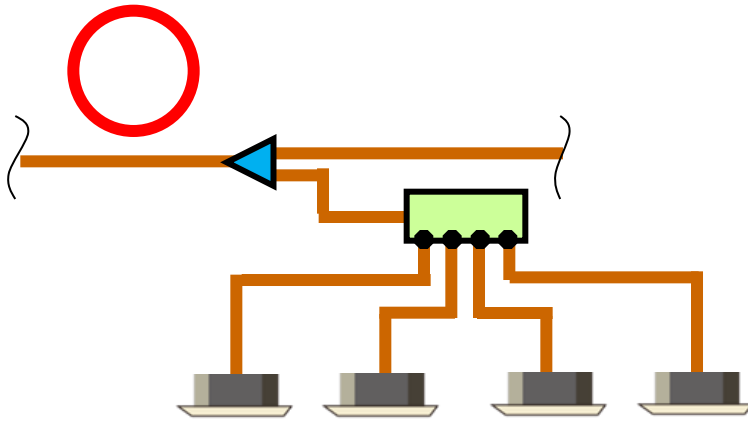


Piping design

Installation precaution (Outdoor unit ~ RB unit ~ indoor unit)

- Always connect **3 branch or more**

◀ :Separation tube  :RB unit (M)



2 free branch

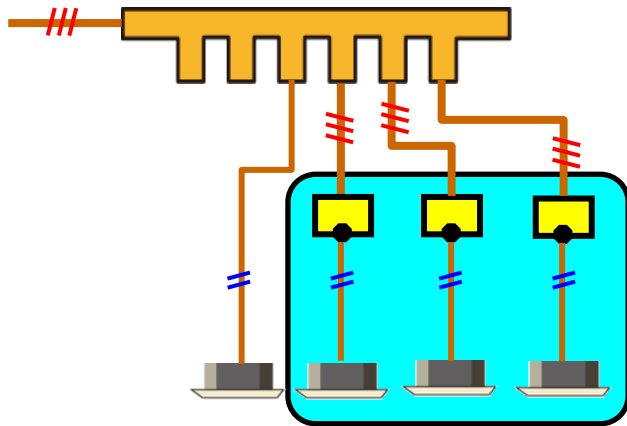
3 free branch



Piping design

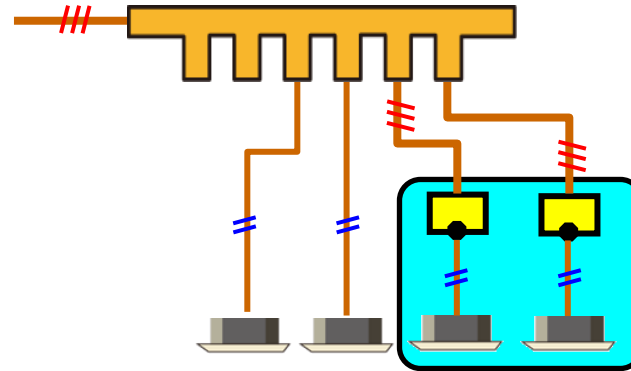
Installation precaution (Outdoor unit ~ RB unit ~ indoor unit)

Good installation

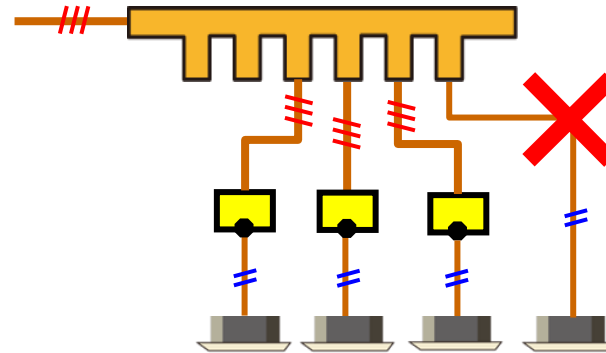


3 or more RB units are installed in port of header

Bad installation



3 less than RB units are installed in port of header



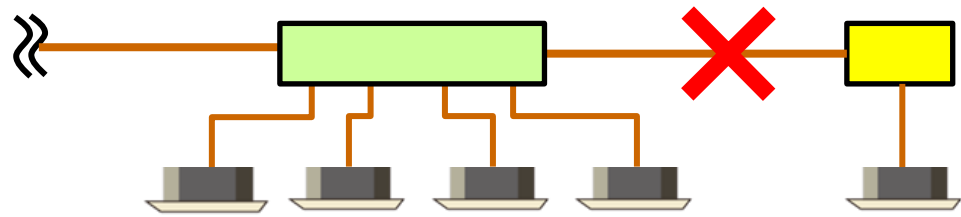
Do not connected indoor unit of cooling only type farthest port of header

Piping design

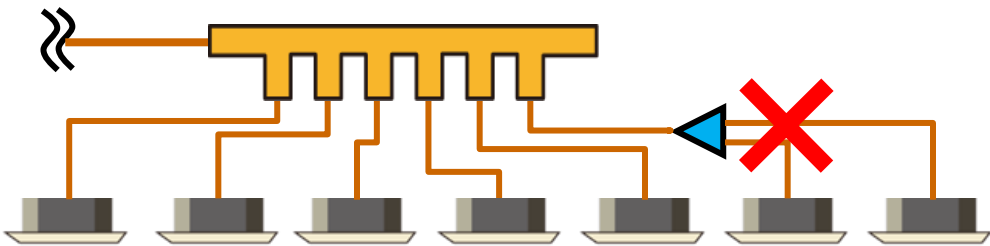
Installation precaution (Outdoor unit ~ RB unit ~ indoor unit)

◀:Separation tube ◻:RB unit (S) ◻:RB unit (M)

Connecting a Single type RB unit next to a Multi type RB unit is prohibited.



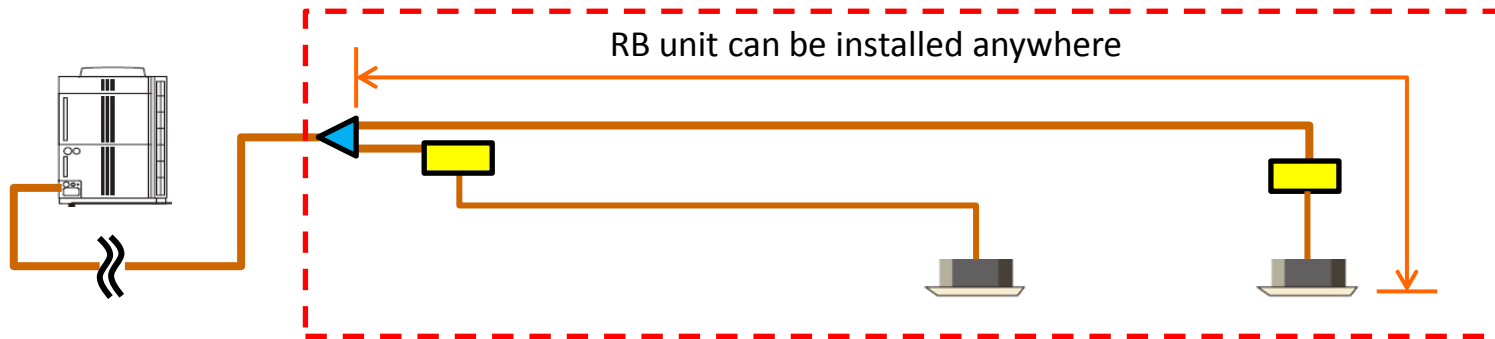
▪ Separation tube is not installed in the down stream of header



Piping design

Installation precaution (Between first separation tube to RB unit)

There is a First separation tube ~ Indoor unit $\leq 60\text{m}$ restriction, but there are no restrictions on the RB unit installation site between First separation tube and Indoor unit.



● When RB unit installed near Separation tube



◇ Advantages

- Since the number of places designed with 2 pipes is large, piping cost is low.
- Since installation separated from living space is possible, sound is low.

◇ Disadvantage

- Difficult to find out the RB unit during service maintenance

● When RB unit installed near Indoor unit



◇ Advantage

- Maintenance is easy.

◇ Disadvantage

- Since the number of places designed with 3 pipes is large, piping cost is high.

Separation tube

Change to separation tube

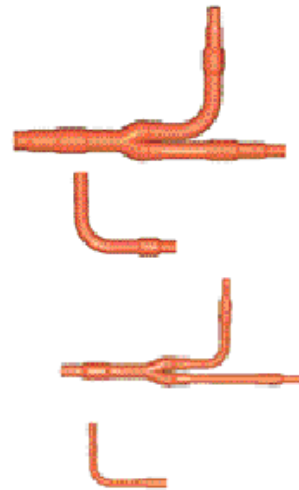
<Indoor unit separation tube>

UTR-BP090/180/567X



<Outdoor unit branch kit>

UTR-CP567X



Piping design

● Outdoor unit Branch kit

System	Model	Q`ty
2 outdoor units	UTP-DX567X	1
3 outdoor units		2

● Indoor unit separation tube

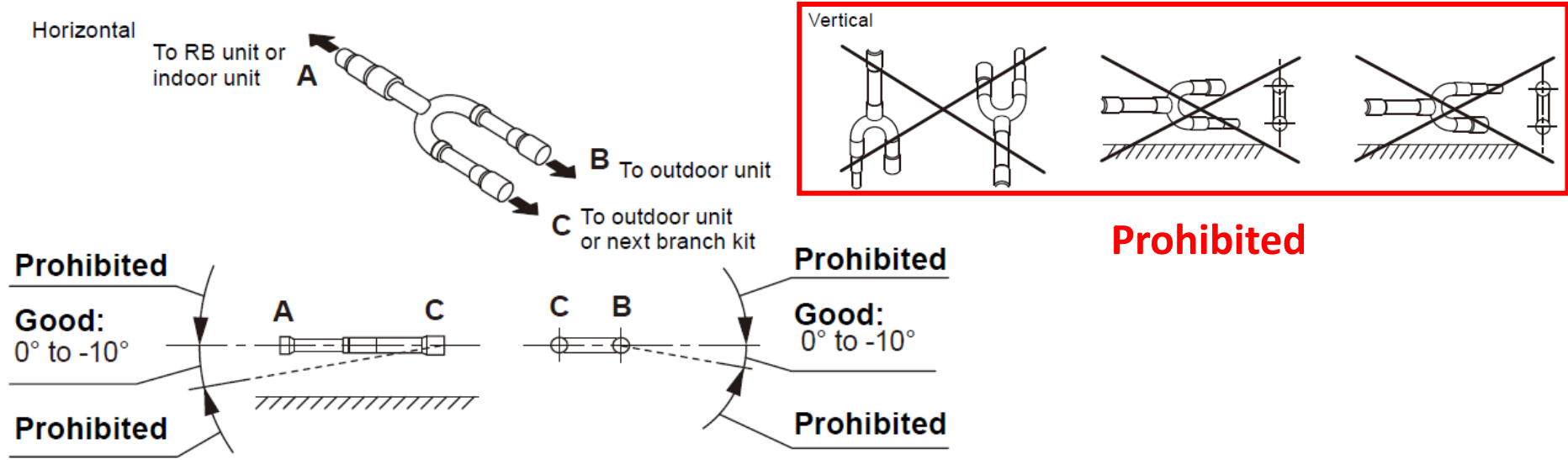
Total cooling capacity of indoor unit (kW)	Separation tube	
	For 2 pipes	For 3 pipes
28.0 or less	UTP-AX090A or UTR-BP090X	UTP-BX090A
28.1 to 56.0	UTP-AX180A or UTR-BP180X	UTP-BX180A
56.1 or more	UTP-AX567A or UTR-BP567X	UTP-BX567A

● Indoor unit separation tube

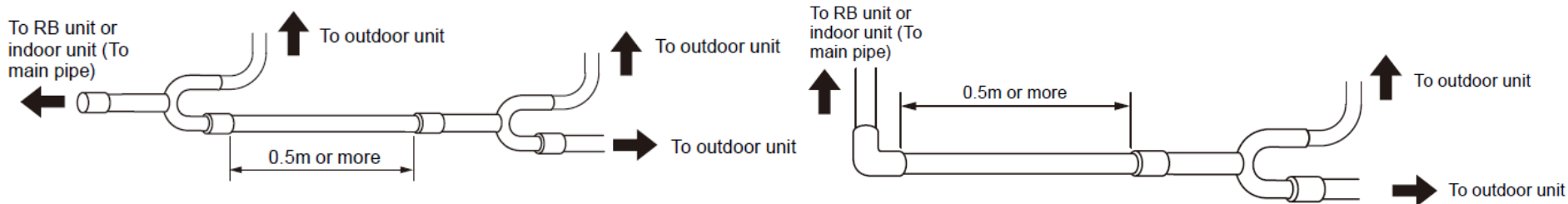
Total cooling capacity of indoor unit (kW)	Separation tube			
	For 2 pipes		For 3 pipes	
	3-6 Branches	3-8 Branches	3-6 Branches	3-8 Branches
28.0 or less	UTR-H0906L	UTR-H0908L	UTP-J0906A	UTP-J0908A
28.1 to 56.0	UTR-H1806L	UTR-H1808L	UTP-J1806A	UTP-J1808A

Piping design

Restriction for installation angle (Outdoor unit branch kit)



Straight pipe length

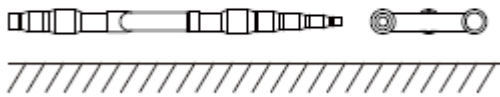


Leave the distance 0.5m or more for straight part to outdoor branch kit

Piping design

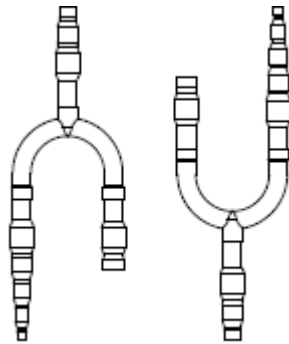
Restriction for installation angle (indoor unit separation tube)

Horizontal

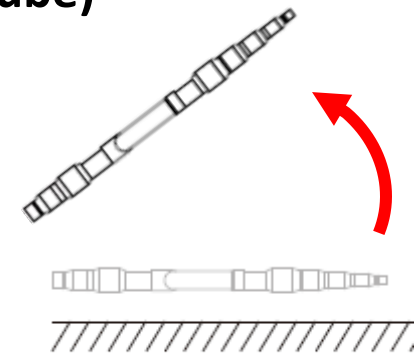


Good

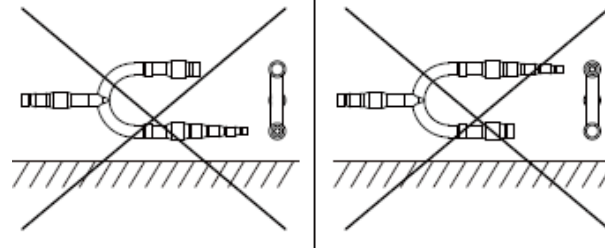
Vertical



Good

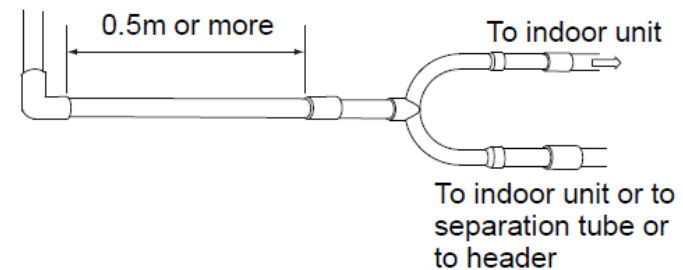
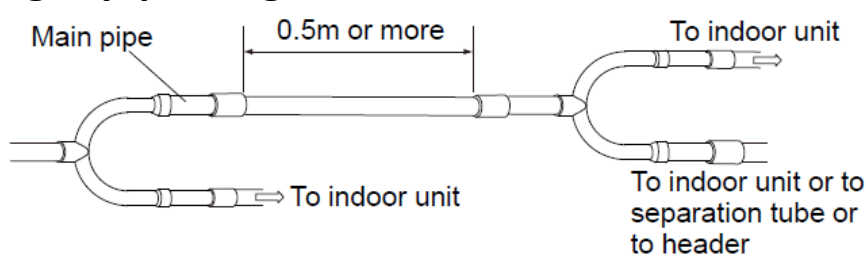


Good



Prohibited

Straight pipe length



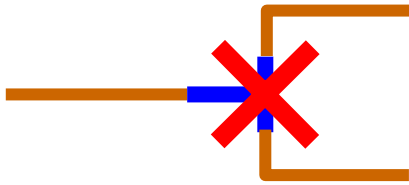
Keep the distance 0.5m or more for straight part to separation tube

⇒ In order to prevent the outdoor unit malfunction and generation of refrigerant noise

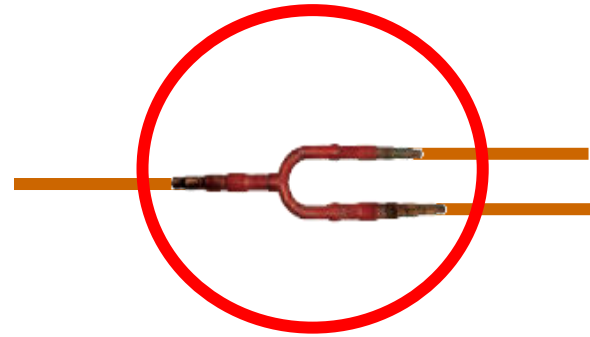
Piping design

Installation precaution (Separation tube)

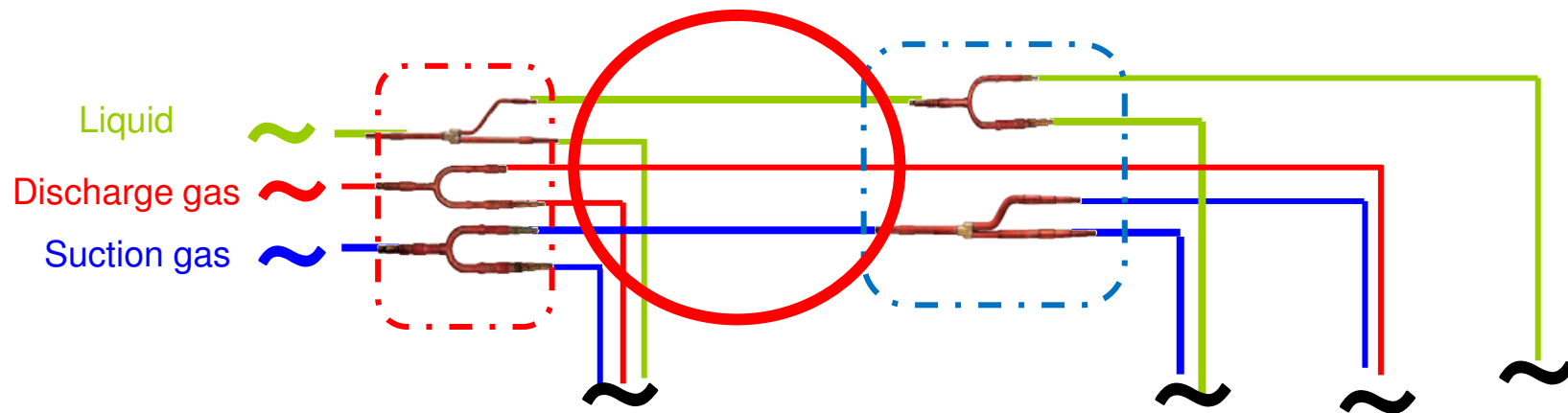
To process the branch, do not use T-shaped pipe, which causes a uneven refrigerant flow.



T- shaped pipe



There is no problem even if new Separate tube and old Separation tube are mixed.



Piping design

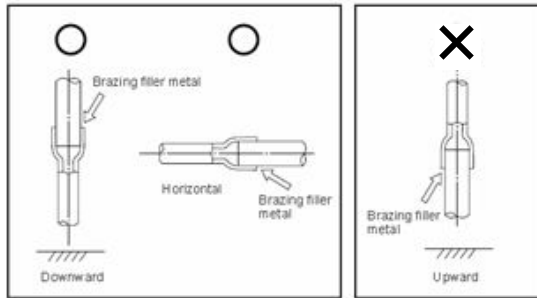
Installation precaution (Brazing work)

< Keep the pipe dry & clean >

- Care must be taken during **brazing work**

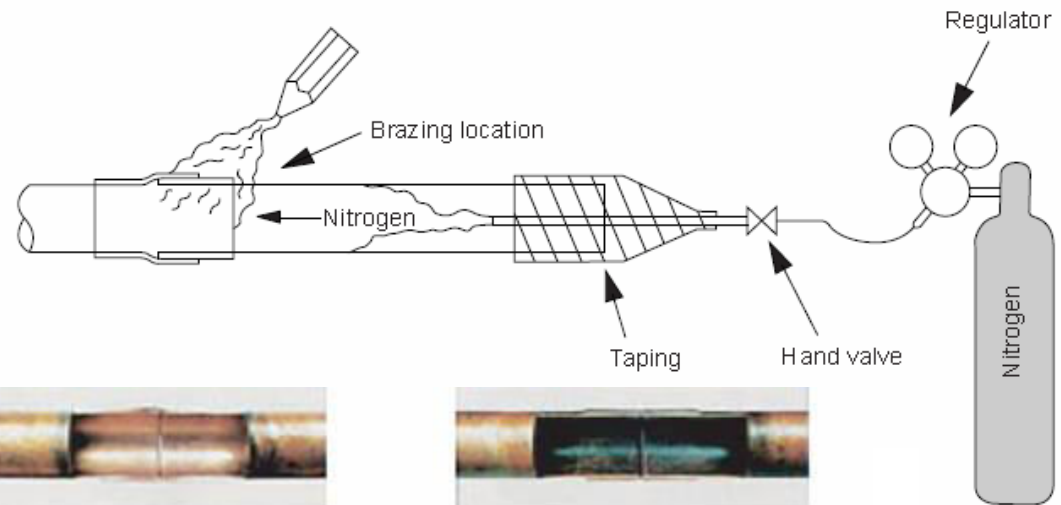
Note:

- When brazing, the air in the pipes must be replaced with nitrogen in order to prevent oxidation scale
- Don't use the flux to braze pipe. It becomes the cause of corrosion
- For brazing material, use phosphor copper that does not require flux



Position of joint during brazing

<Work method>



Nitrogen blow performed
(No oxidation scale)



Nitrogen blow not performed
(Oxidation scale)

[4] Breaker ▪ Wiring design

- **Breaker selection & Power cable design**
- **Transmission wiring design**
- **Signal Amplifier install design**
- **Remote controller line wiring design**

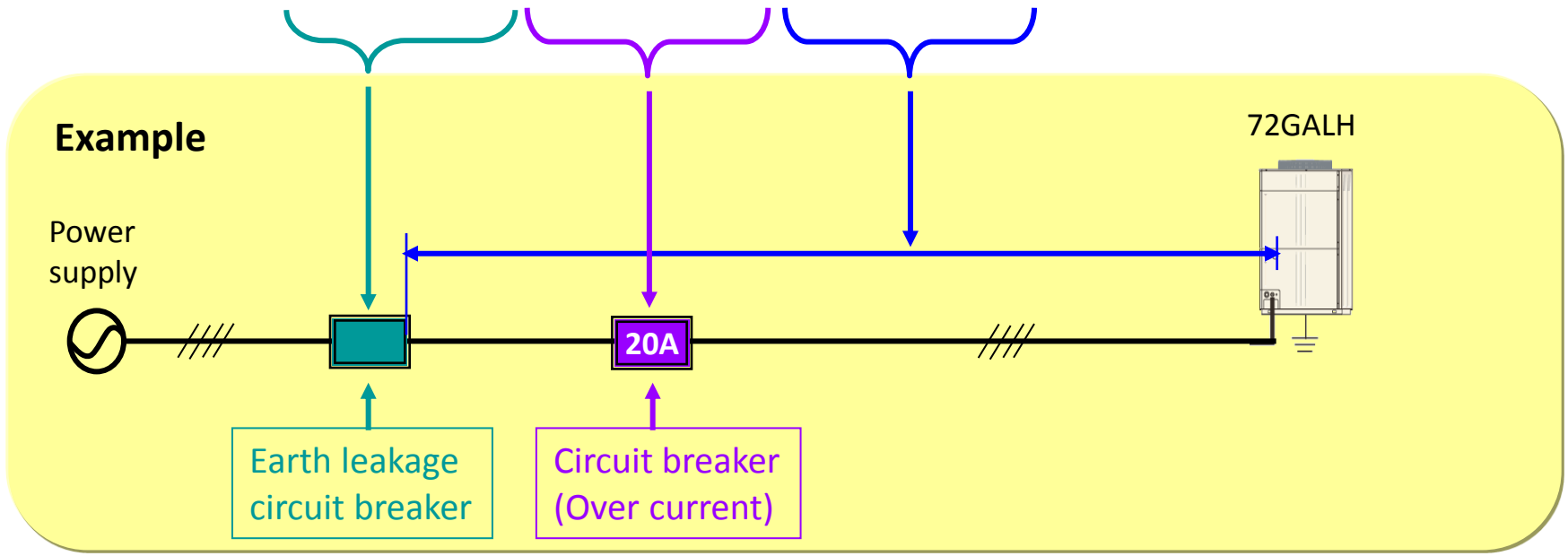
Breaker - Wiring design

Circuit Breaker & Earth leakage Breaker & Cable size (Outdoor unit)

< Europe model >

Model name	Earth leakage Breaker*	Fuse Capacity	Recommended cable size	Remarks
AJ*A72GALH	100mA 0.1sec or less	20 A	4 mm ²	3N to 400V 50Hz 4Wire + ground
AJ*A90GALH		25 A	6 mm ²	
AJ*108GALH		25 A	6 mm ²	
AJ*126GALH		40 A	10 mm ²	
AJ*144GALH		40 A	10 mm ²	

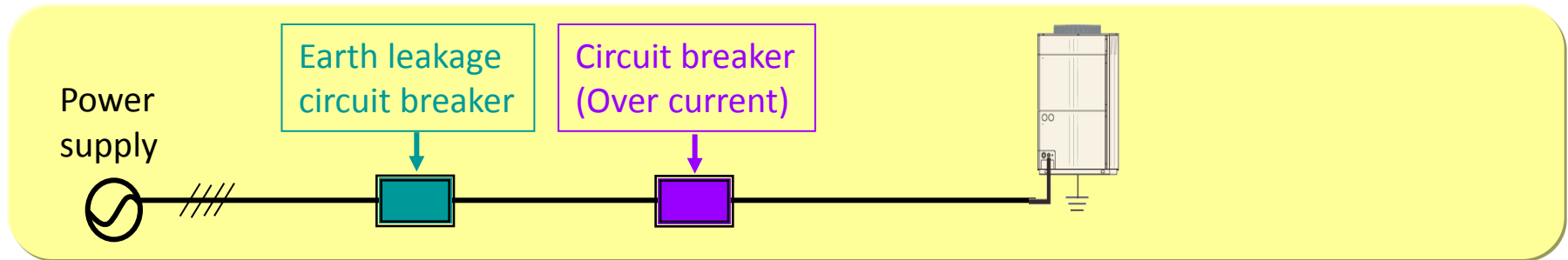
* This device has an inverter, so use devices that support higher harmonics products for prevent malfunction.



Breaker - Wiring design

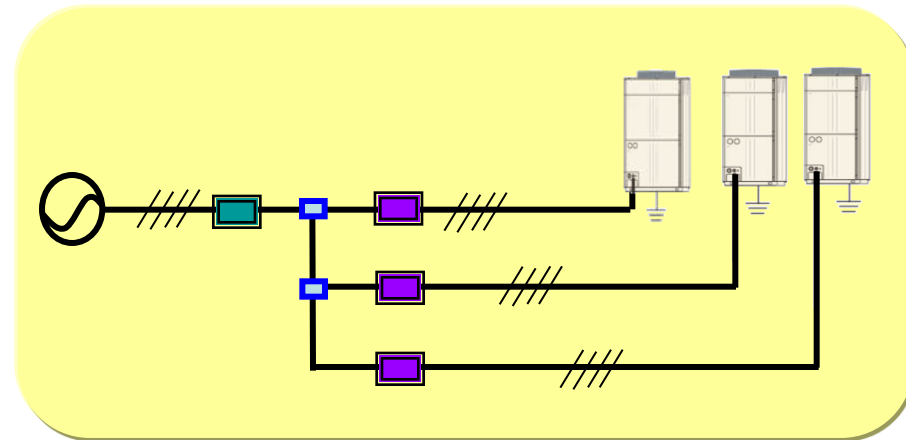
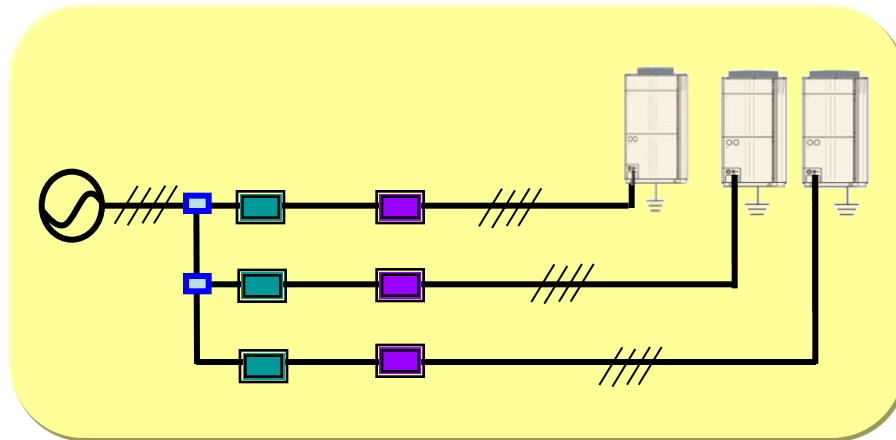
Wiring diagram example

- Single outdoor unit



- Multiple outdoor units

■ : Pull box



Note

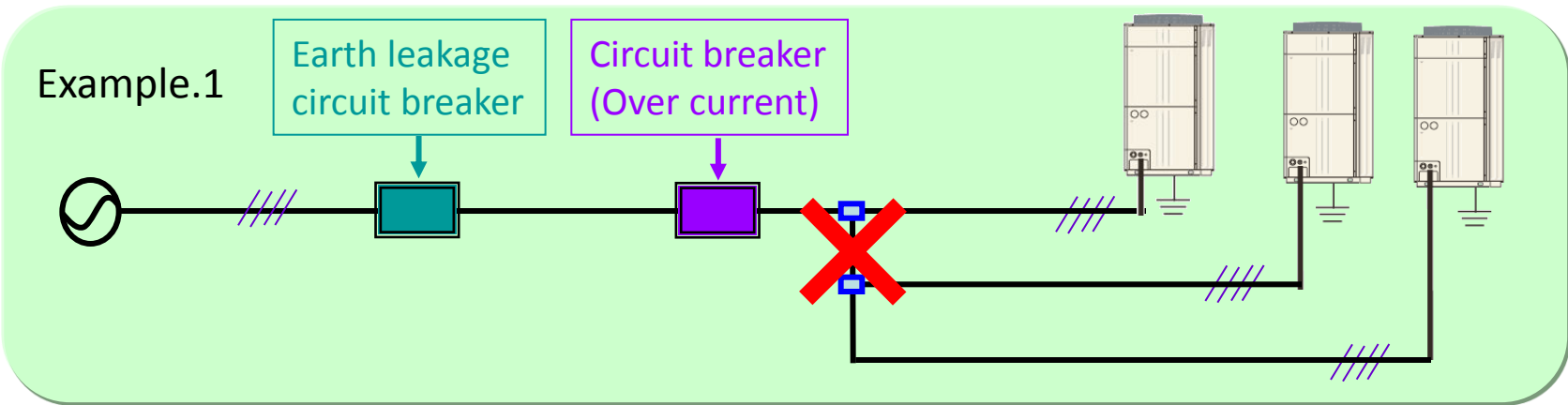
1. The power wiring must comply with the rules of the local power company and the electrical equipment standards.
2. Use a pull box to branch the electricity.

Breaker - Wiring design

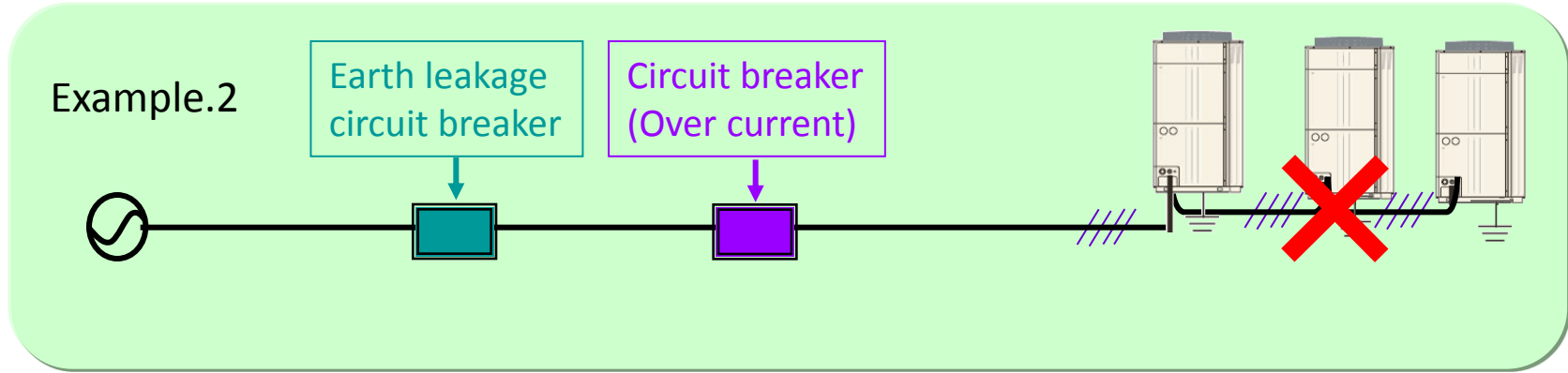
Wiring limitation

- Grouping multiple outdoor units in the same refrigerant system under 1 breaker.

■ : Pull box



- Bridging between outdoor units via the outdoor unit built-in terminal block R.S.T.



Breaker - Wiring design

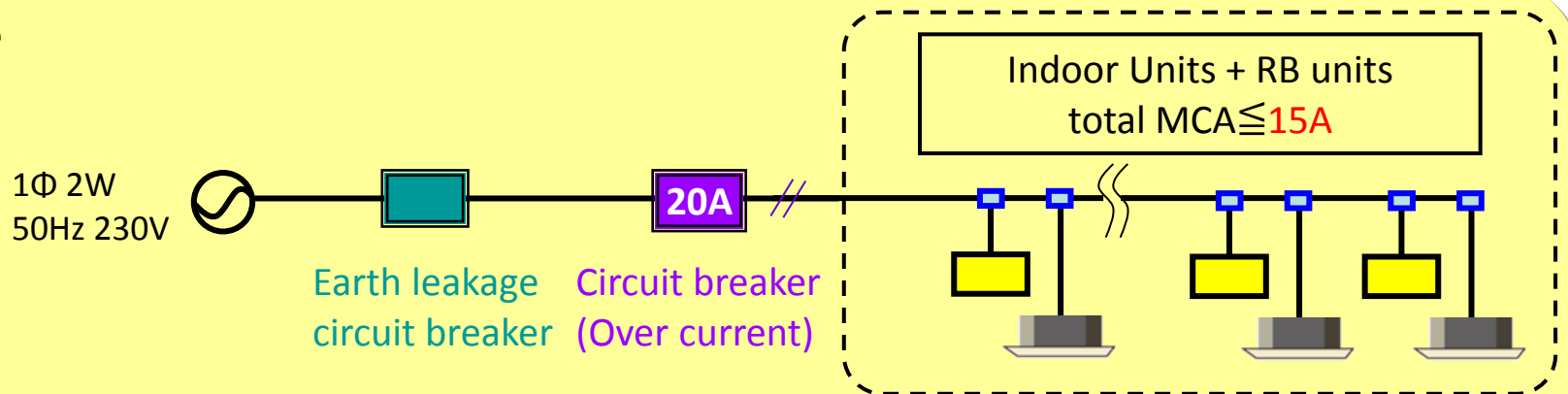
Circuit Breaker & Earth leakage Breaker & Cable size (Indoor unit & RB unit)

Model name	Circuit Breaker	Recommended cable
Indoor unit & RB unit	20A	2.5mm ²

- Breaker and number of connected units calculation

The number of connected indoor units must satisfy the following requirements.

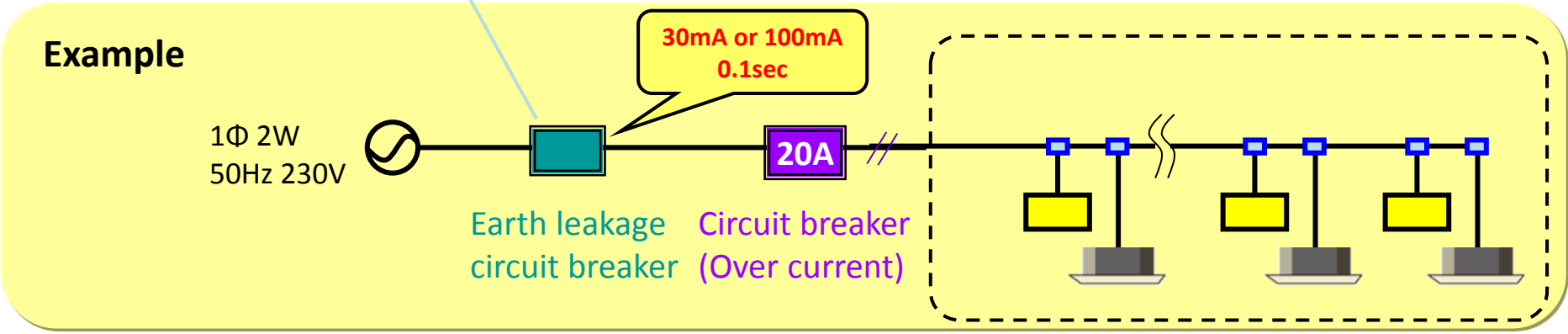
Example



Breaker - Wiring design

Earth leakage Breaker & Maximum connectable indoor unit & RB unit

Breaker capacity	Maximum connectable indoor unit & RB unit
30mA, 0.1sec or less	44 or less
100mA, 0.1sec or less	45 to 128





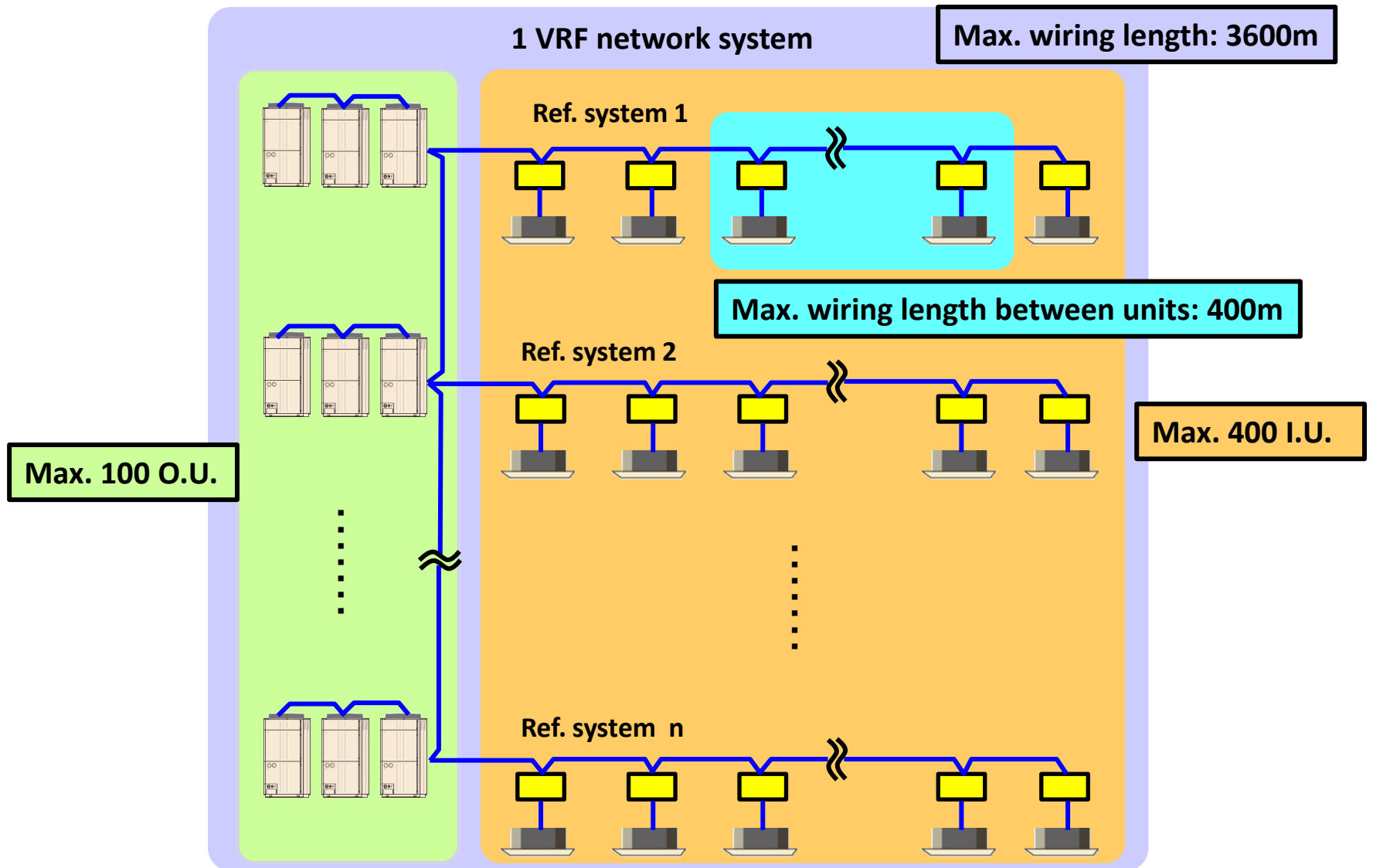
- Breaker selection & Power cable design
- Transmission wiring design
- Signal Amplifier install design
- Remote controller line wiring design

Breaker - Wiring design

Wiring design (Transmission Cable)

- Maximum connectable units & Maximum wiring length

 : RB unit (S)
 : Transmission line



Breaker - Wiring design

Wiring design (Wiring method)

[1] Parallel wiring

Wiring each refrigerant system

Systems available for this wiring

- VR-II system

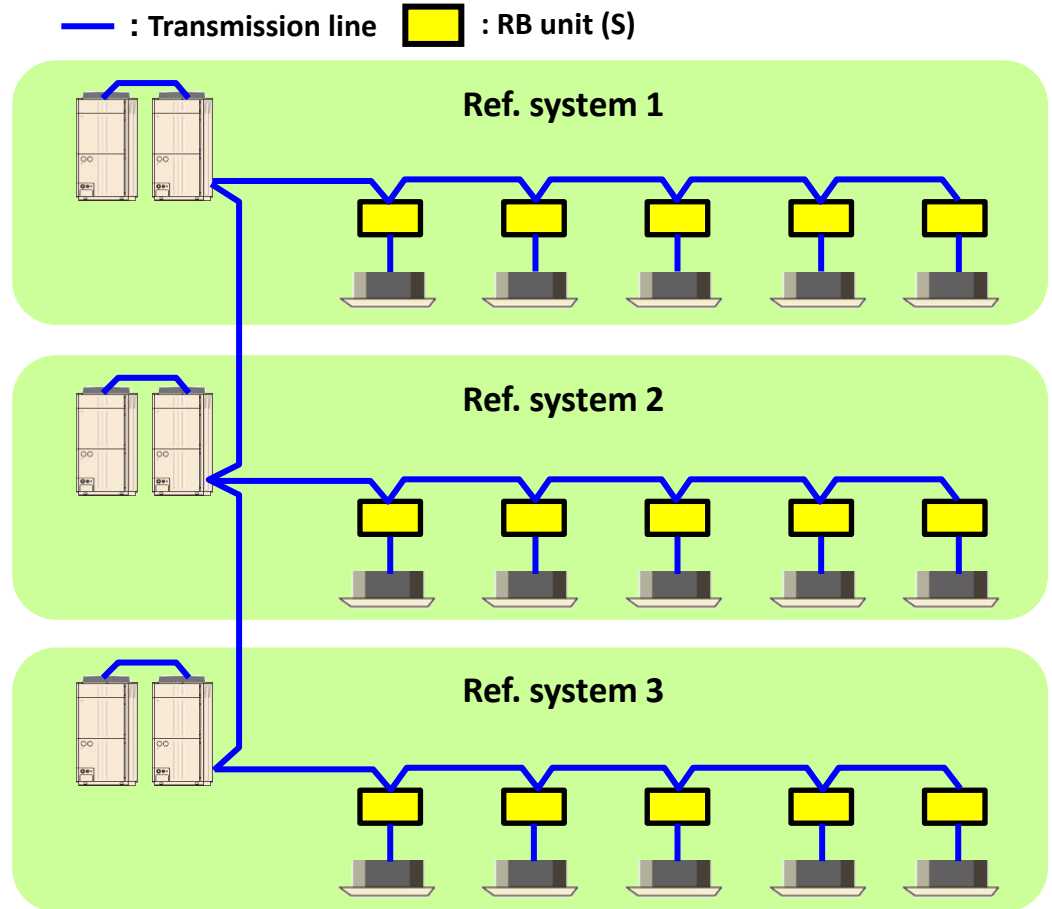
Case of less than 320 indoor units installed

- V-II system

- J-II system

- Mixed VR-II and V-II, J-II system

Case of less than 320 indoor units installed

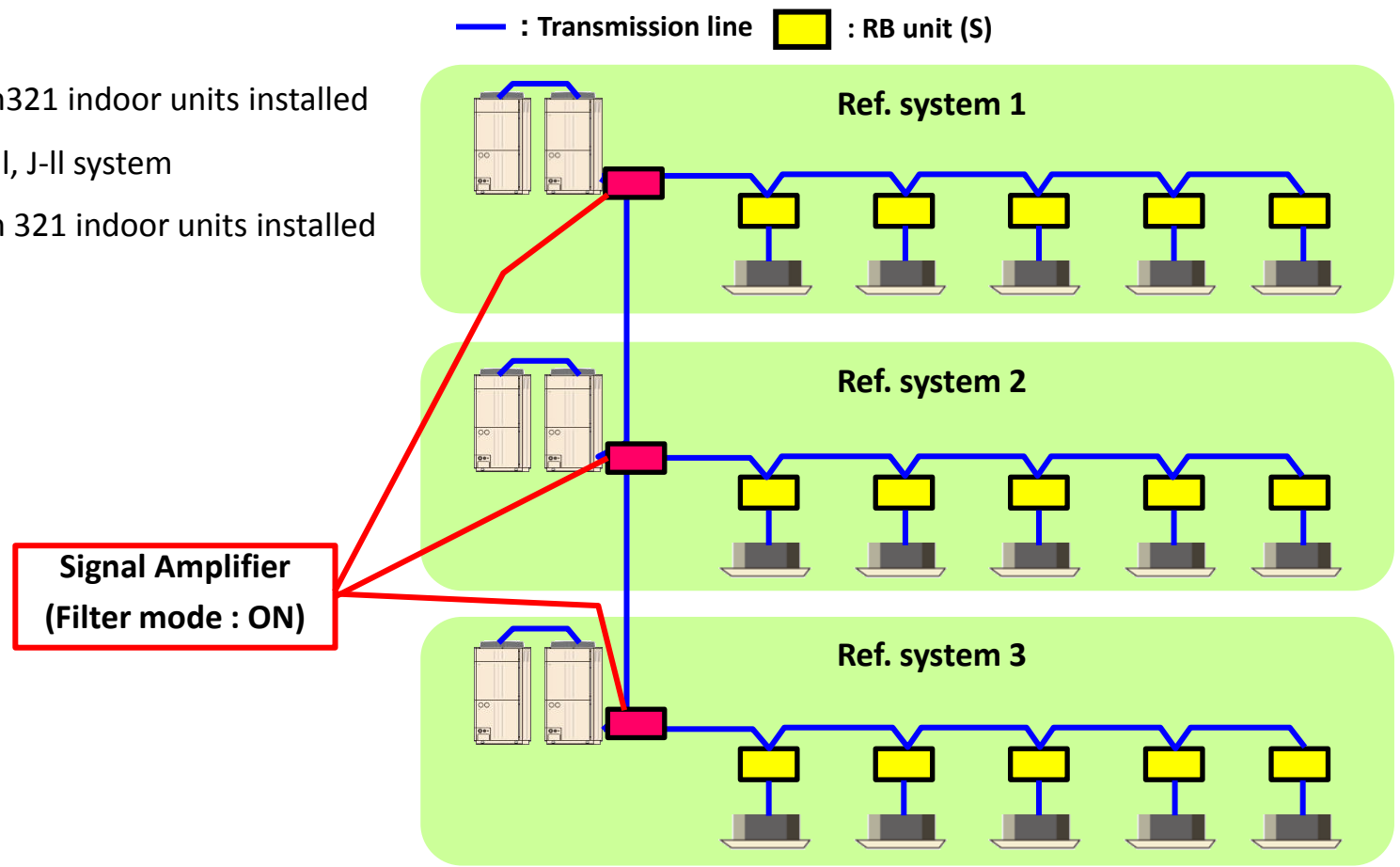


Wiring design (Wiring method)

[2] Parallel wiring with signal amplifier (Filter mode : ON)

Systems available for this wiring

- VR-II system
Case of more than 321 indoor units installed
- Mixed VR-II and V-II, J-II system
Case of more than 321 indoor units installed



Breaker - Wiring design

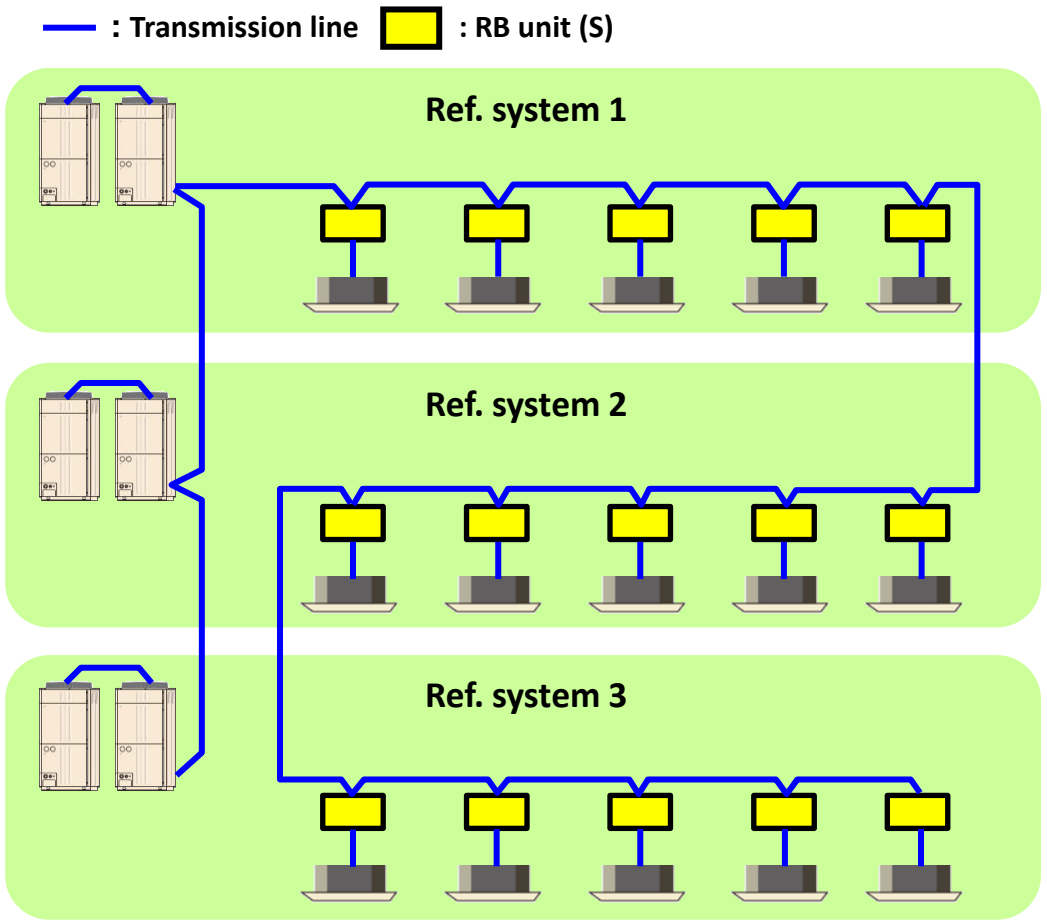
Wiring design (Wiring method)

[3] Serial wiring

Continuous connection method of transmission lines at the indoor unit side



Systems available for this wiring

- VR-II system (Address setting : Manual)
 Case of less than 320 indoor units installed
- V-II system (Address setting : Manual)
- J-II system (Address setting : Manual)
- Mixed VR-II and V-II, J-II system
 Case of less than 320 indoor units installed

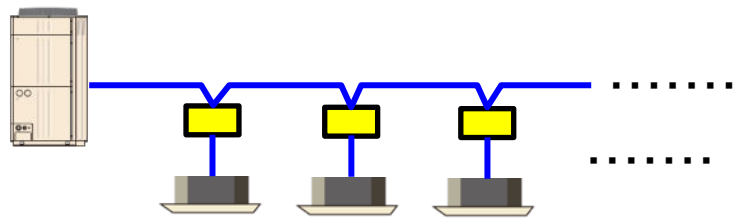


Breaker - Wiring design

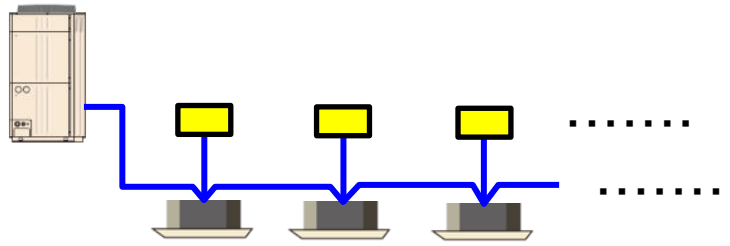
Wiring design (Wiring method)

 : RB unit (S)
 : Transmission line

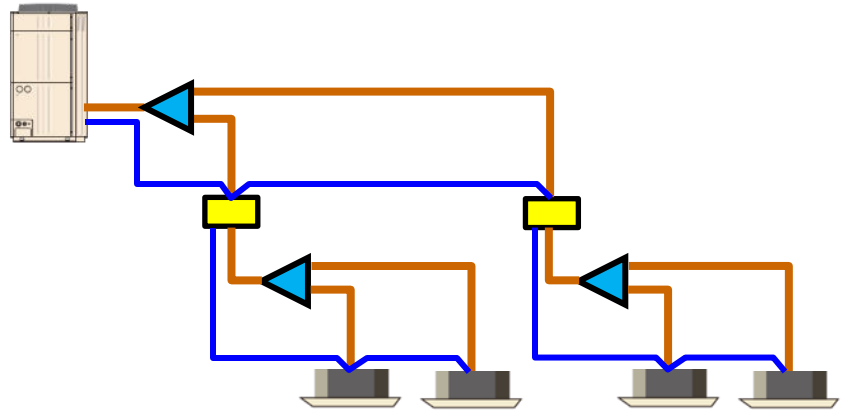
Standard wiring method



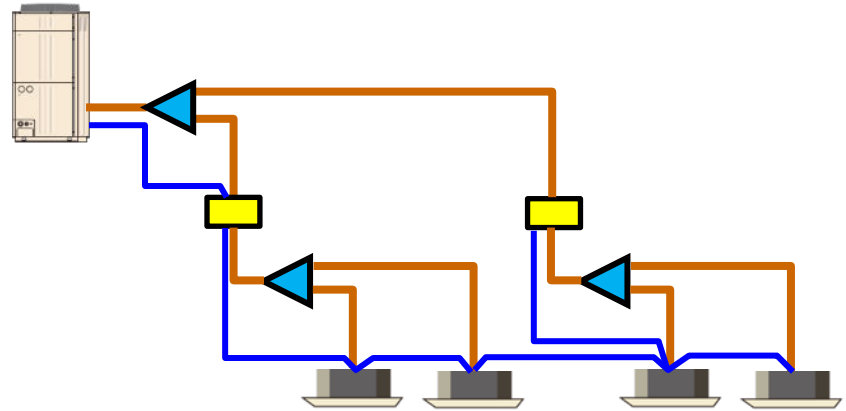
Prohibited wiring method



Standard wiring method



Prohibited wiring method



Breaker - Wiring design

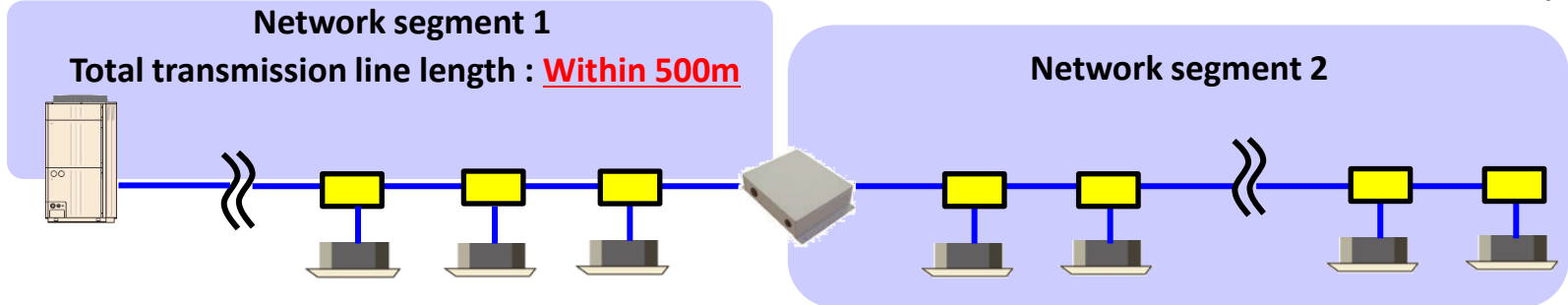
Wiring design (Network segment)

- 1 Network segment rules

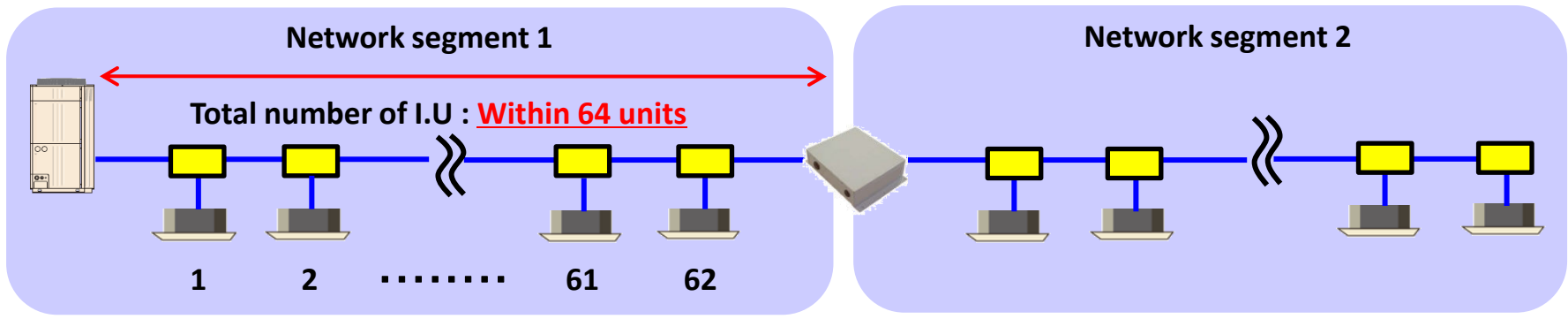
Segment inside	Limitation
Transmission line	500m or less
Number of unit	64units or less
Terminal resister is required	1 (Outdoor unit Dip-SW or Signal Amplifier)

- Total transmission line length within 500m

: RB unit (S)
 : Transmission line



- Total number of indoor unit within 64 units.



Breaker - Wiring design

Wiring design (Network segment)

- Count of unit -

		Count
Outdoor unit	Master unit	1
	Slave unit	0
All indoor unit		1
RB unit	Single type	0
	Multi type	0 or 1*
Controller	System controller	1
	Touch panel controller	1
	Central remote controller	1
	Group remote controller	0
	Wireless remote controller	0

* : Refer to next page

		Count
Controller	Wired remote controller (Touch panel)	0
	Wired remote controller	0
	Simple remote controller	0
	IR receiver unit	0
Convertor	External switch controller	0
	Network convertor	1
	Network convertor for LonWorks	1
	BACnet gateway	1
	Signal amplifier	1
Maintenance	Service tool	1
	Web monitoring tool	1
Option	Other optional parts	0

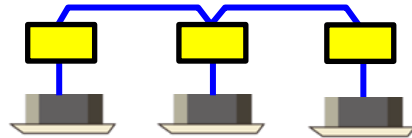
Breaker - Wiring design

Wiring design (Network segment)

- Point!

— : Transmission line  :RB unit (S)  :RB unit (M)

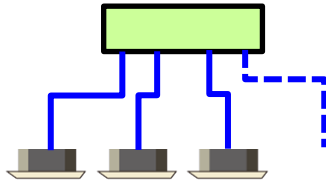
Ex.1



Segment No. 1 2 3

In the case of Single RB, for Unit, indoor units are counted and RB units are not counted.

Ex.2



Segment No. 1 2 3 4

When there is a vacant Multi RB unit port, the vacant port is counted.

- Breaker selection & Power cable design
- Transmission wiring design
- Signal Amplifier install design
- Remote controller line wiring design

Breaker - Wiring design

Signal Amplifier (UTY-VSGXZ1)

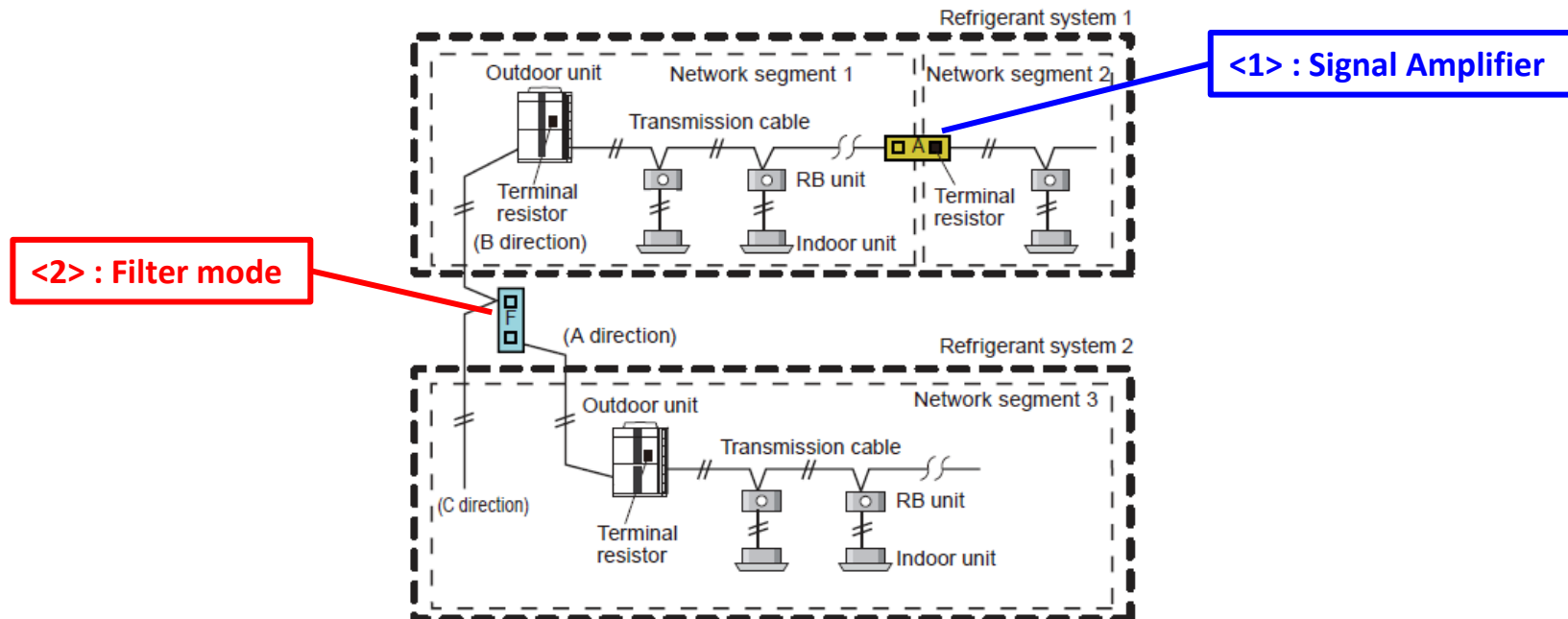
- Signal Amplifier have two functions (Add to the new function)

[1] : Signal Amplifier

- A signal amplifier prevents the loss of communication signal over long communication cable lengths.
- A signal amplifier has a role to cut the network segment.

[2]: Filter mode

To suppress the data transmission volume by adding an RB unit, the Filter mode must be set.



Breaker - Wiring design

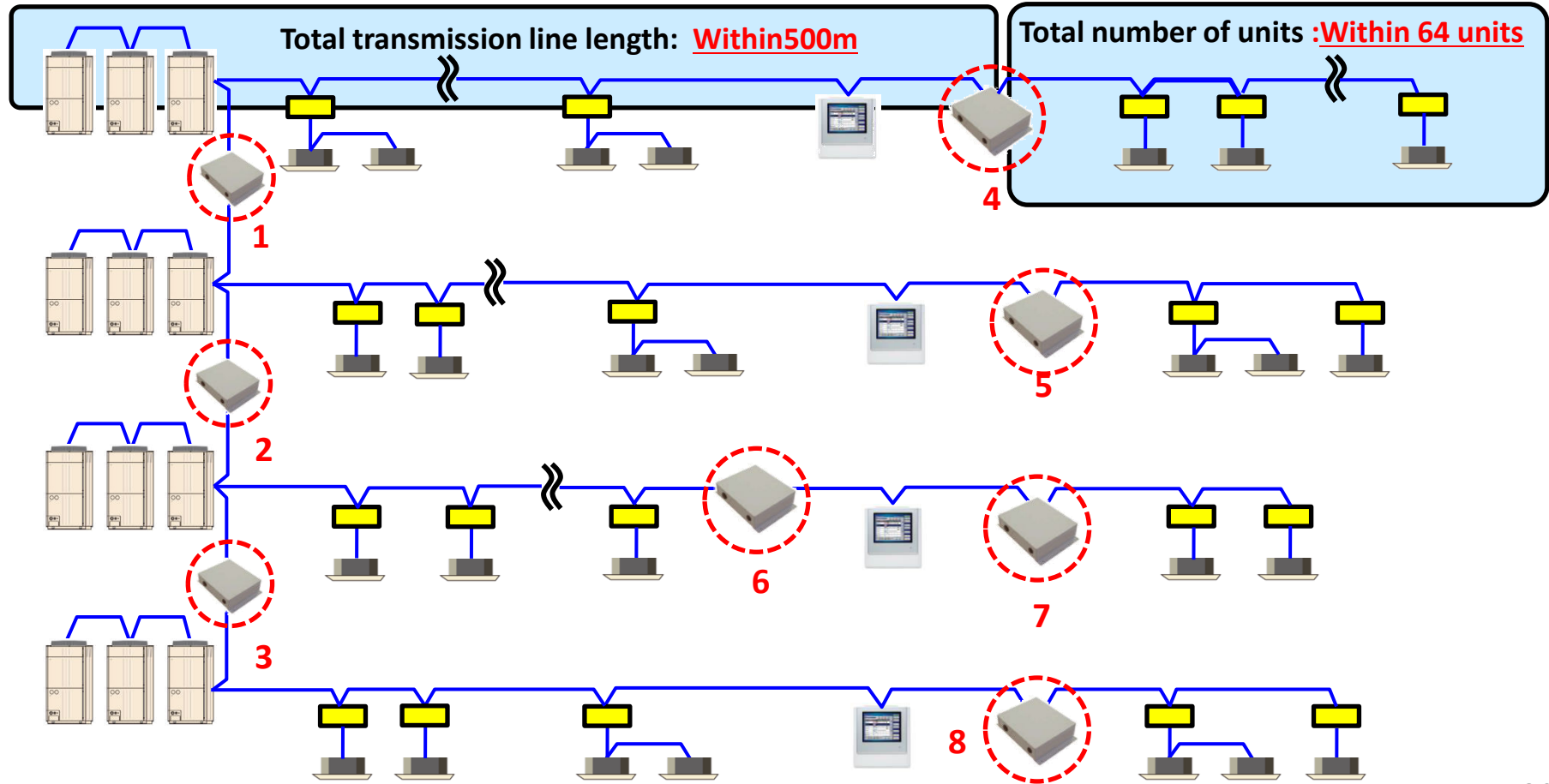
Installation restriction of signal amplifier

In the following cases, Signal Amplifier (Filter mode: OFF) must be installed.

- Total transmission line length: Within 500m.
- Max. wiring length of between units within 500m.
- Total number of unit less than 64.
- Up to 8 Signal amplifiers can be installed in 1 VRF network system.

Same as V-II system

■ : RB unit (S)
— : Transmission line

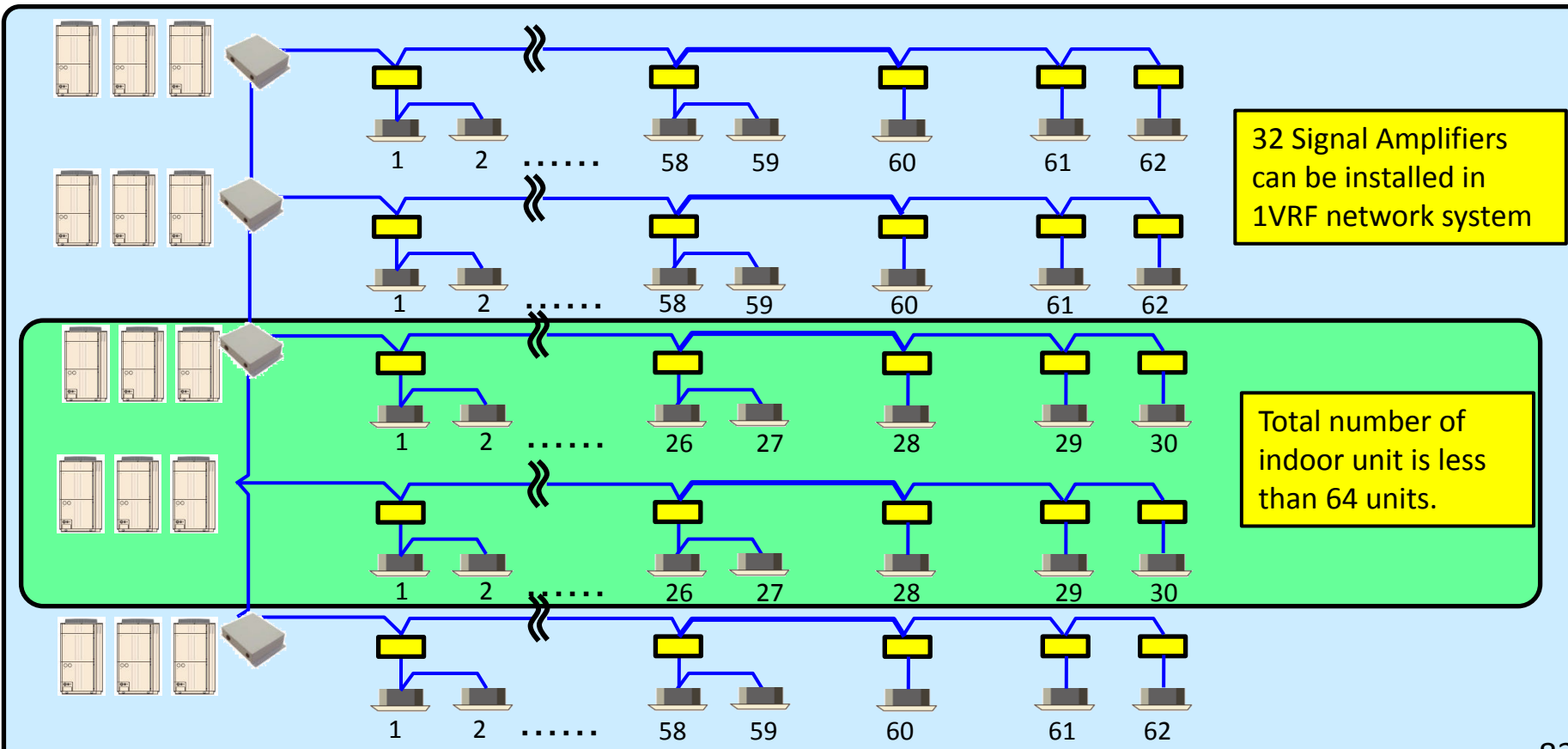


Breaker - Wiring design

Installation restriction of signal amplifier

In this cases, necessary to install the signal amplifier (Filter mode : ON).

- Case of over 321 indoor unit is installed. (VR-II system is installed)
 - One Signal Amplifier (Filter mode: ON) is installed at each refrigerant system.
 - However, if the number of indoor units is 64 or less, a Signal Amplifier (Filter mode: ON) stepping over the refrigerant systems is installed.
 - The number of signal amplifier (Filter mode : ON) can be installed to 32 units of VRF network system.



Breaker - Wiring design

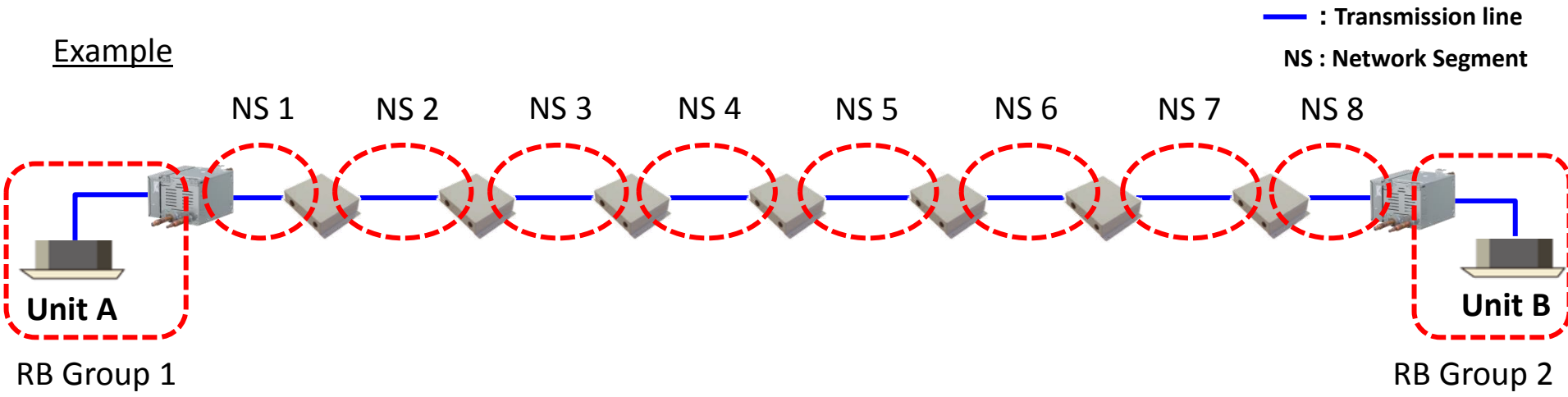
Installation restriction of signal amplifier

When 7 or more Signal Amplifiers are installed in 1 VRF network system , care must be given to the wiring method.

- Rule of Network Segment and RB Group

Total of number of Network Segment and RB Group on the transmission line that connected each unit must be 9 or less

Example



Start of Network Segment

End of Network Segment

RB Group and Network Segment between unit A and B

2 RB Group + 8 Network Segment = 10 \geq 9 ← **Not Good**

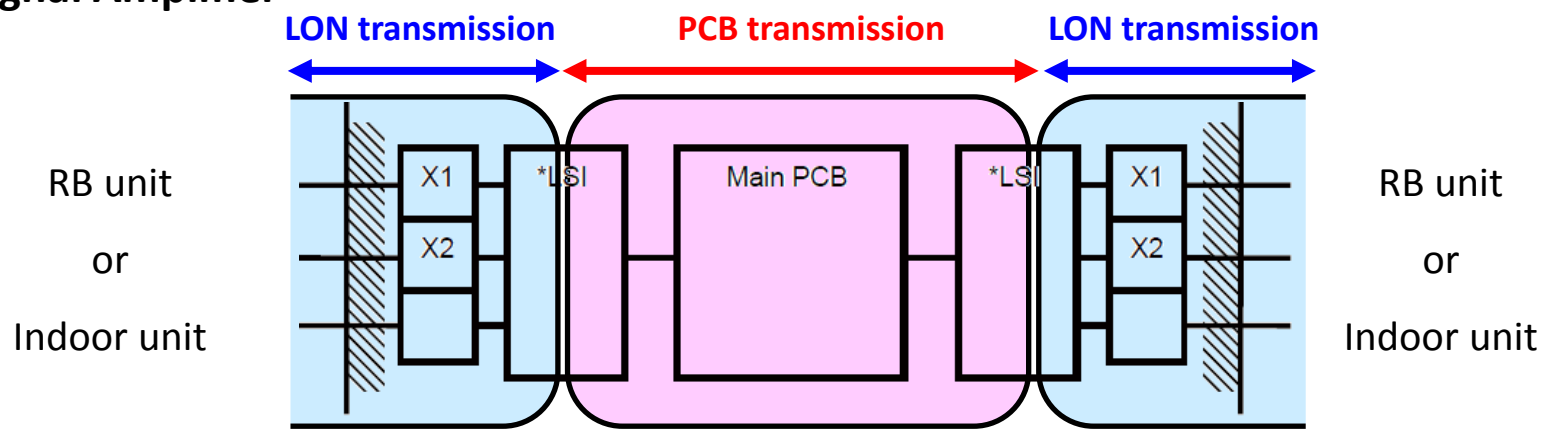
Breaker - Wiring design

Installation restriction of signal amplifier

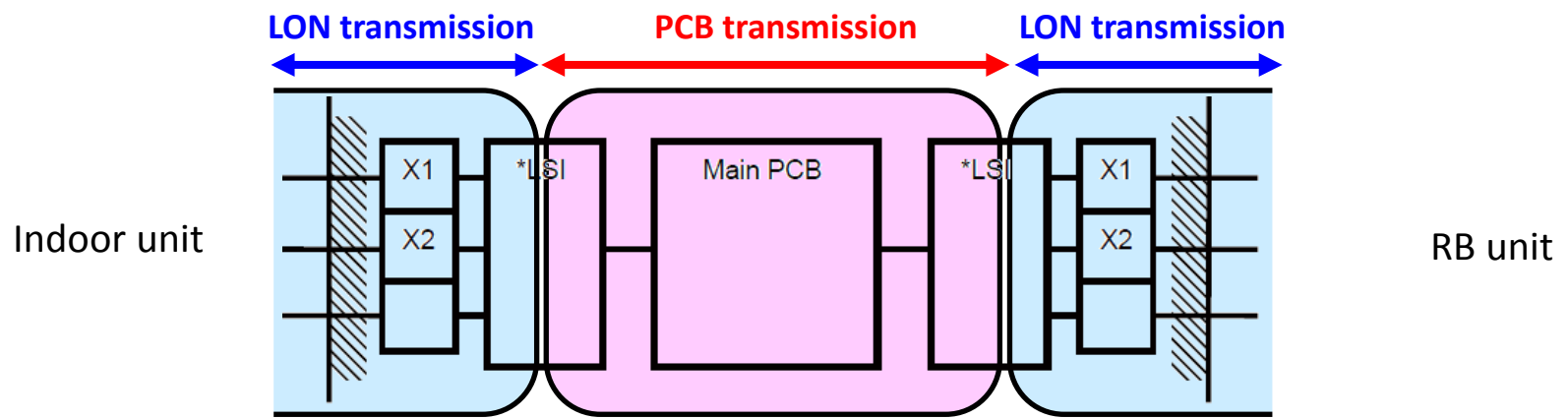
● How to divide network segment and RB Group

With a Signal Amplifier and RB unit, to perform PCB communication between connections, the segment is cut

< Signal Amplifier >



< RB unit >

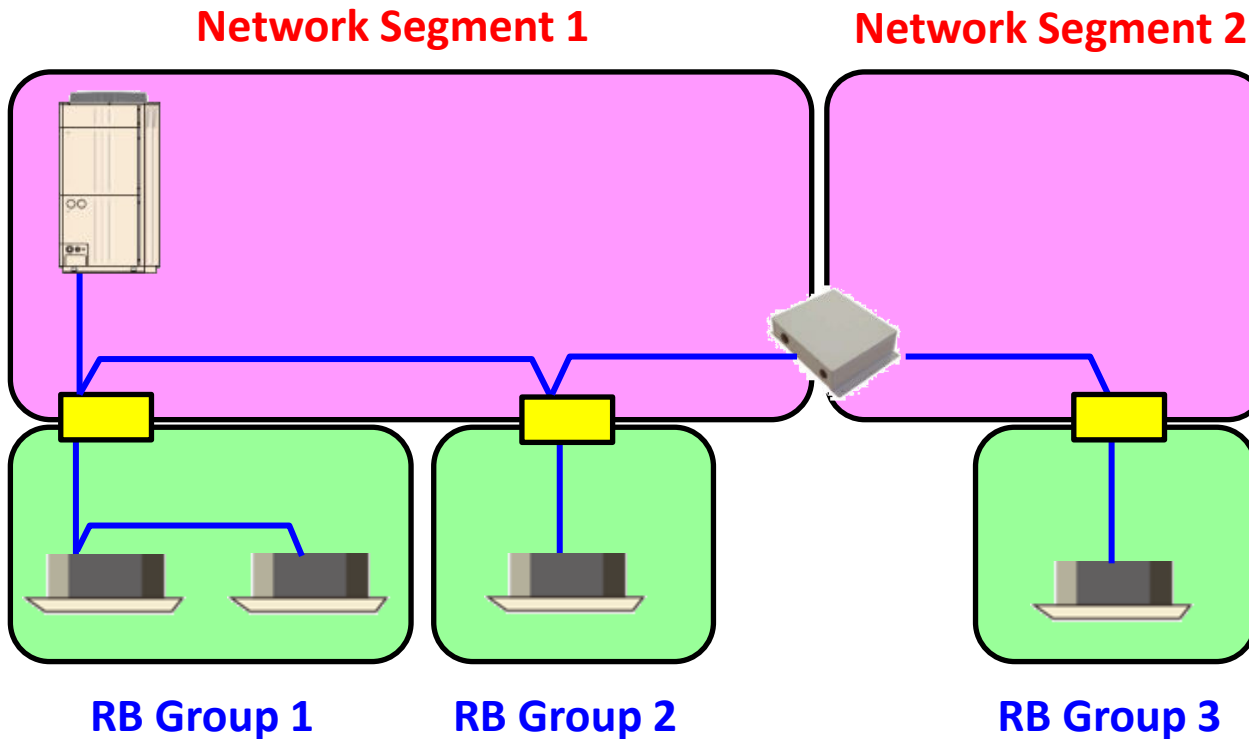


Breaker - Wiring design

Installation restriction of signal amplifier

● Divided network is defined as Network Segment


 : RB unit (S)
 : Transmission line



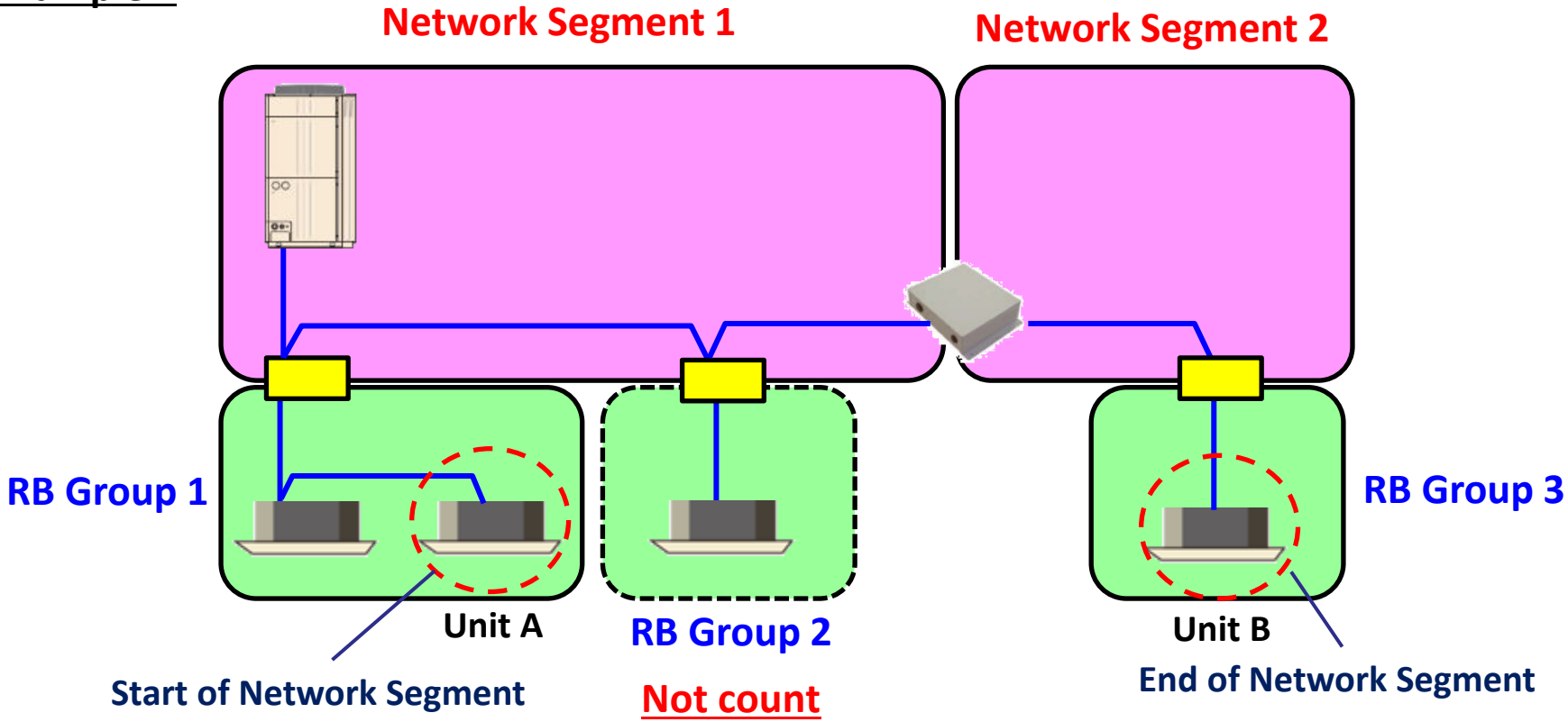
Breaker - Wiring design

Installation restriction of signal amplifier

● How to counted Network Segment and RB Group between each unit

 : RB unit (S)
 : Transmission line

Example 1



Network Segment and RB Group though from unit A to unit B

2 RB Group + 2 Network Segment = 4 ≤ 9 **OK**

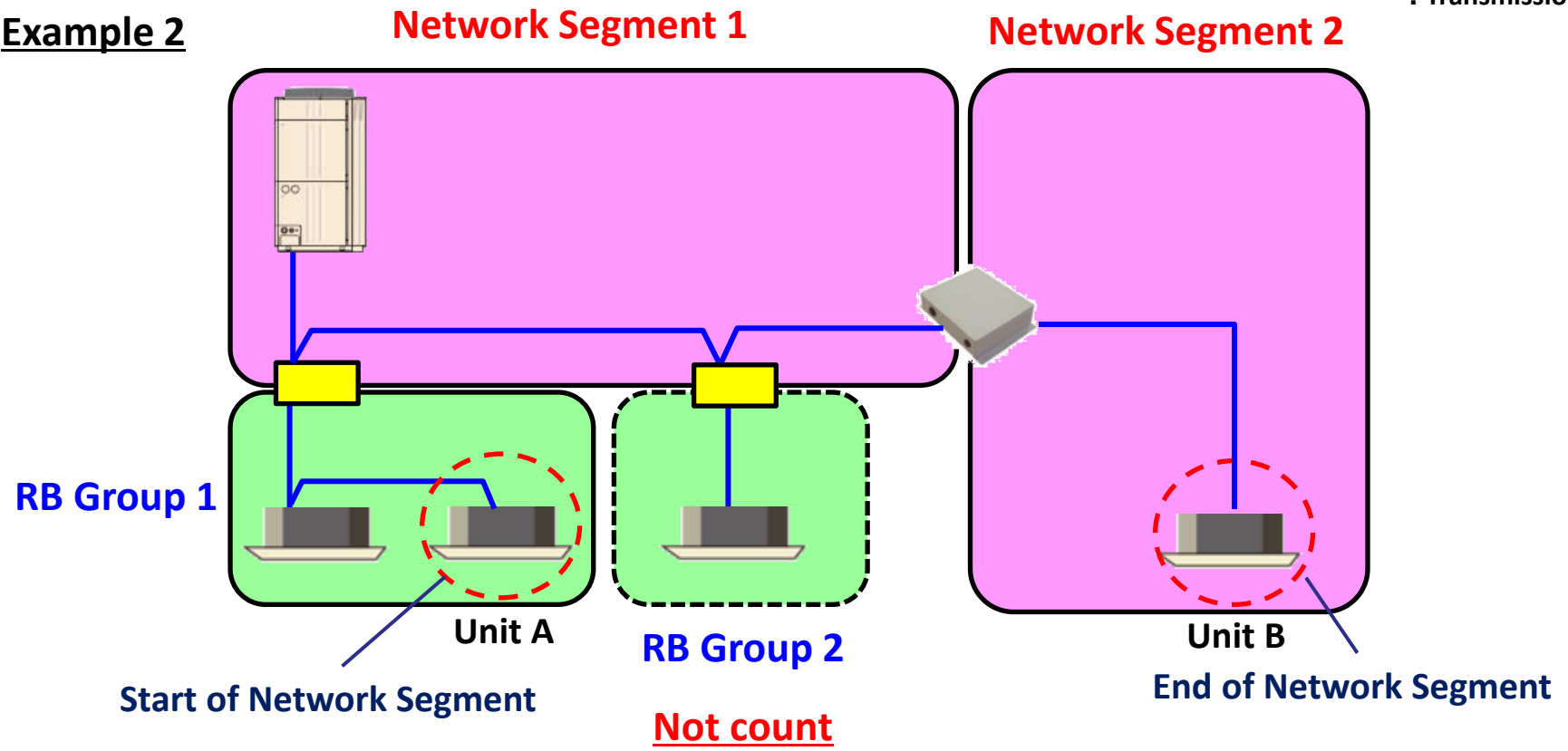
Breaker - Wiring design

Installation restriction of signal amplifier

● How to counted Network Segment and RB Group between each unit

■ : RB unit (S)
— : Transmission line

Example 2



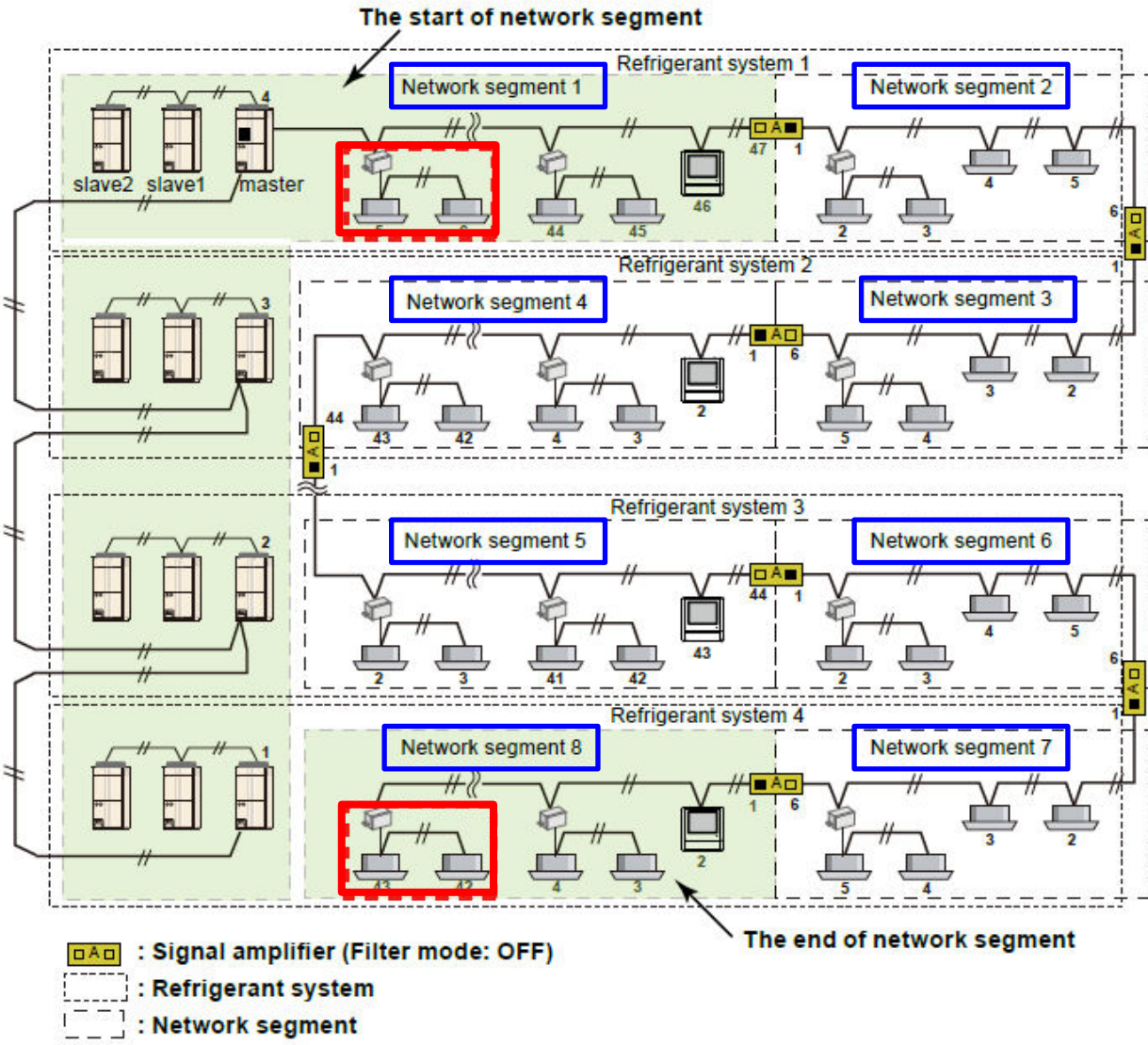
Network Segment and RB Group though from unit A to unit B

1 RB Group + 2 Network Segment = 3 ≤ 9 OK

Breaker - Wiring design

Installation restriction of signal amplifier

Example 3



Network segment = 8

RB Group = 2

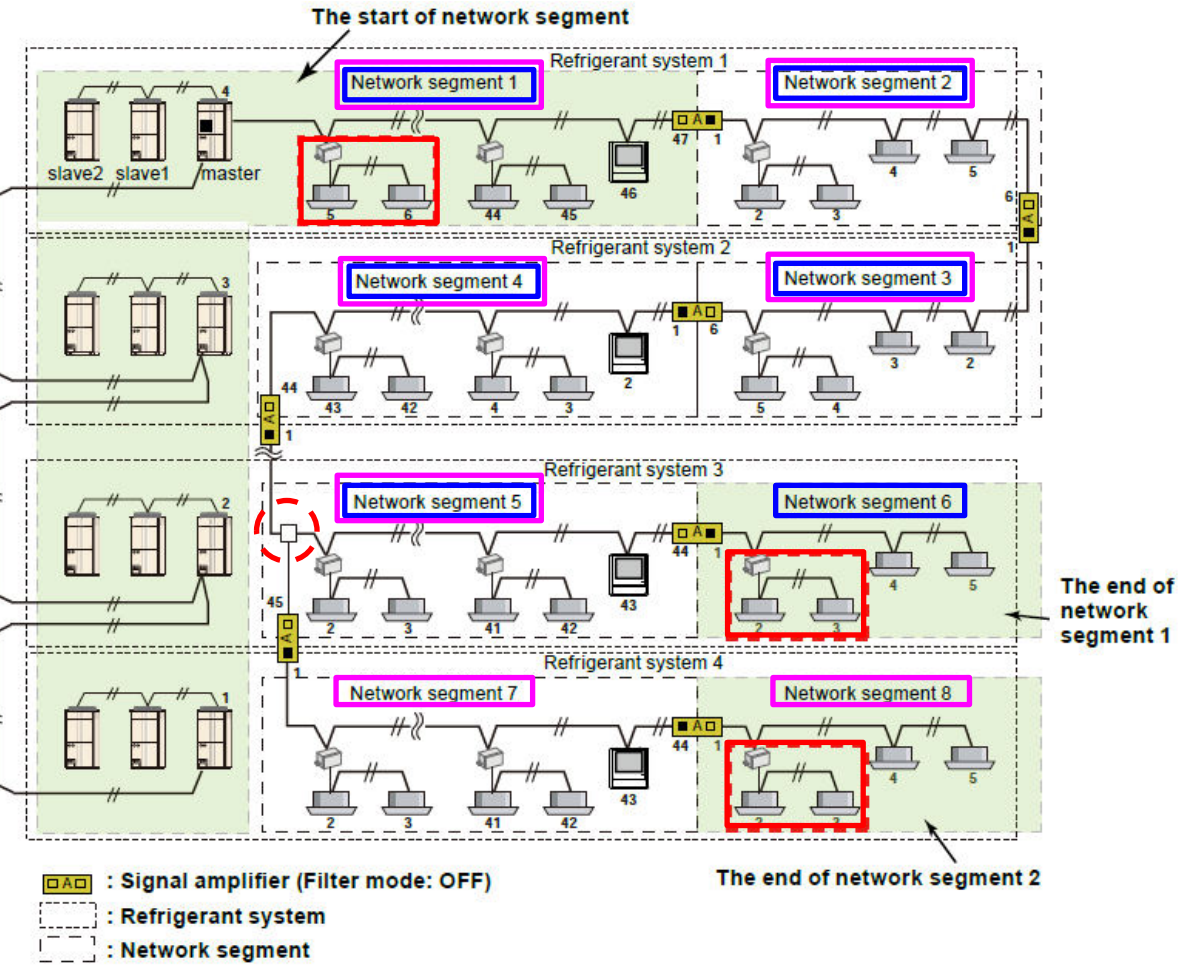
Total number of network segment and RB Group = 10

Not Good

Breaker - Wiring design

Installation restriction of signal amplifier

Branching transmission route



< Route 1 >

Network segment = 6

RB Group = 2

Total number of network segment and RB Group = 8

OK

< Route 2 >

Network segment = 7

RB Group = 2

Total number of network segment and RB Group = 9



OK

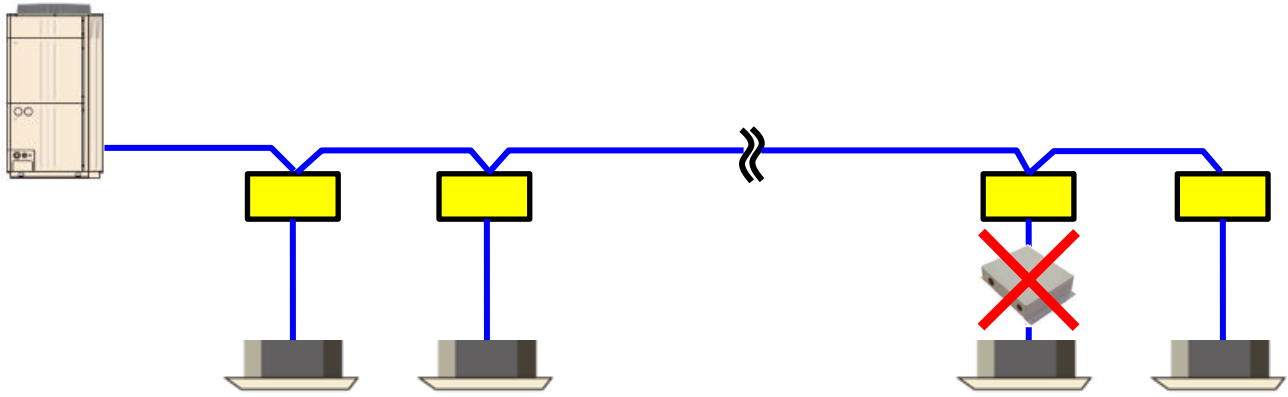
Breaker - Wiring design

Wiring design (Installation prohibition of Signal Amplifier)

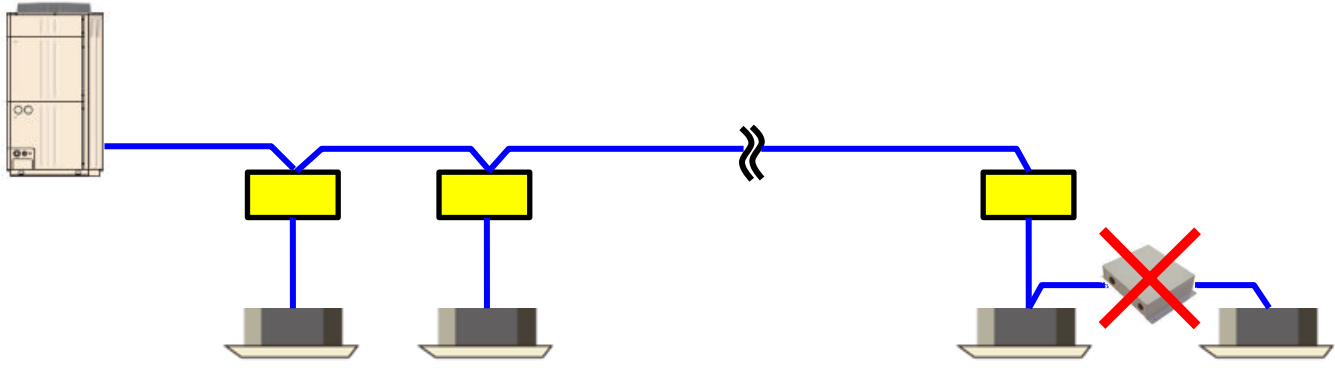
Signal Amplifier is not installed in the downstream of RB unit.

Example 1

-  : RB unit (S)
-  : Transmission line



Example 2



- **Breaker selection & Power cable design**
- **Transmission wiring design**
- **Signal Amplifier install design**
- **Remote controller line wiring design**

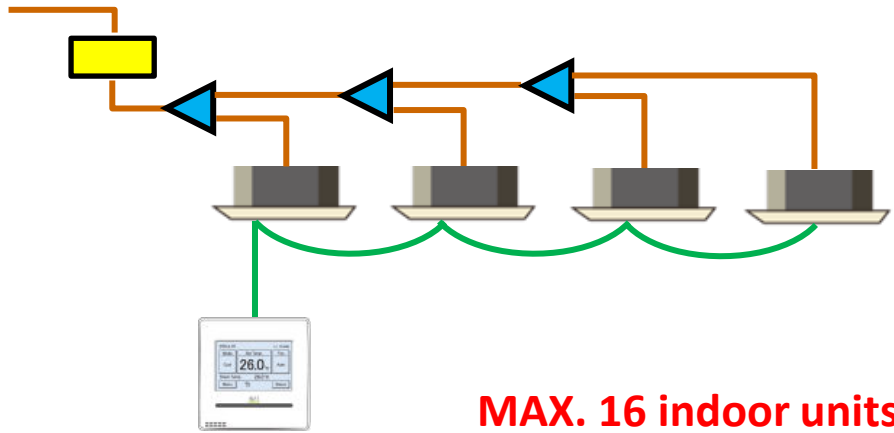
Breaker - Wiring design

Wiring design (Remote Controller Cable)

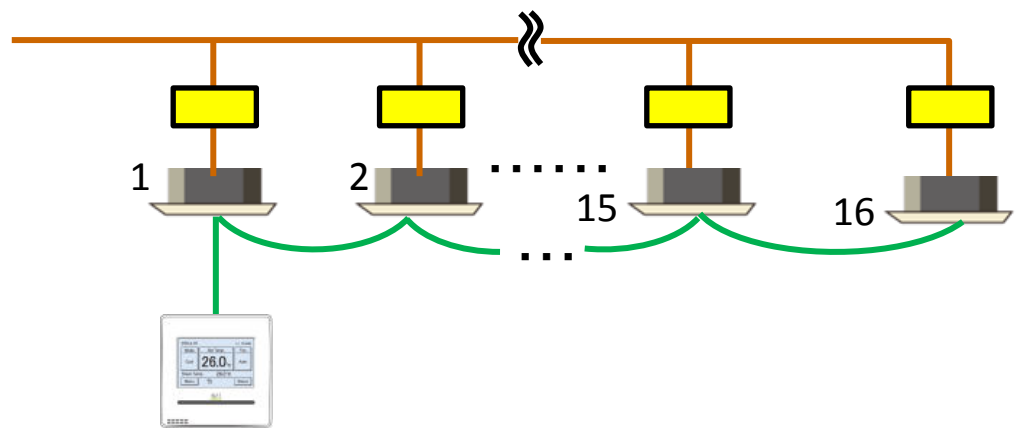
- Remote Controller Group wiring rule

Up to 16 indoor units can be made a remote controller group.

- ◀ : Separation tube
- : RB unit (S)
- : Remote controller cable line



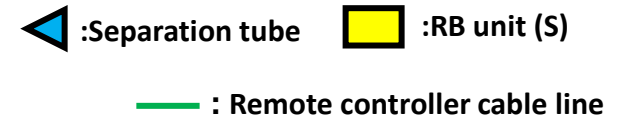
MAX. 16 indoor units can be connected in VR-II system.



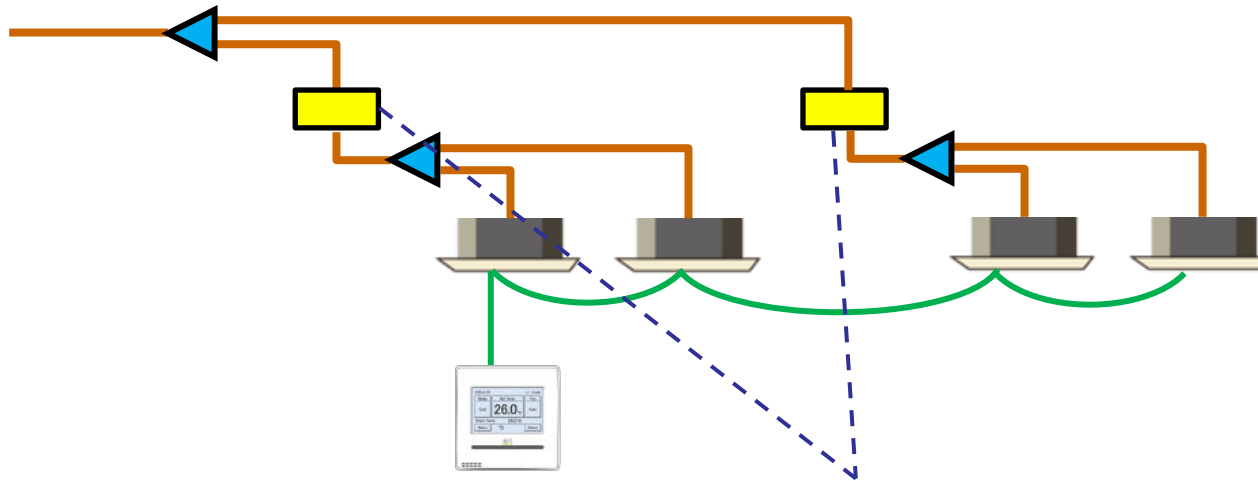
Breaker - Wiring design

Wiring design (Remote Controller Cable)

- Remote Controller Group wiring rule



When indoor units which connected to different RB units are operated by one wired remote controller, Operation mode selecting switch setting can not be performed.






Operation mode selecting switch (SET2)
can not be performed.

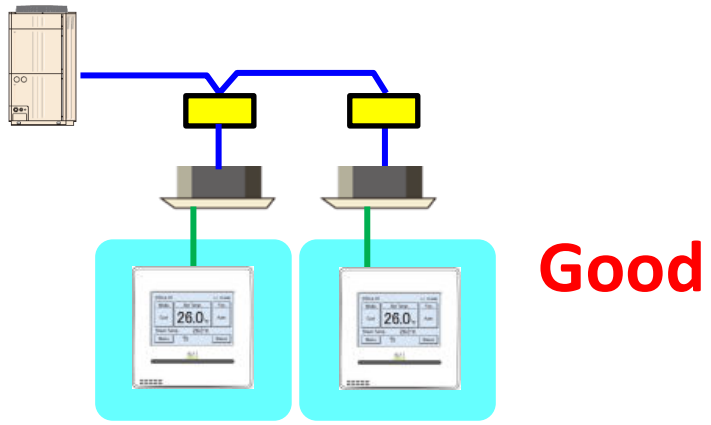
Breaker - Wiring design

Wiring design (Remote Controller Cable)

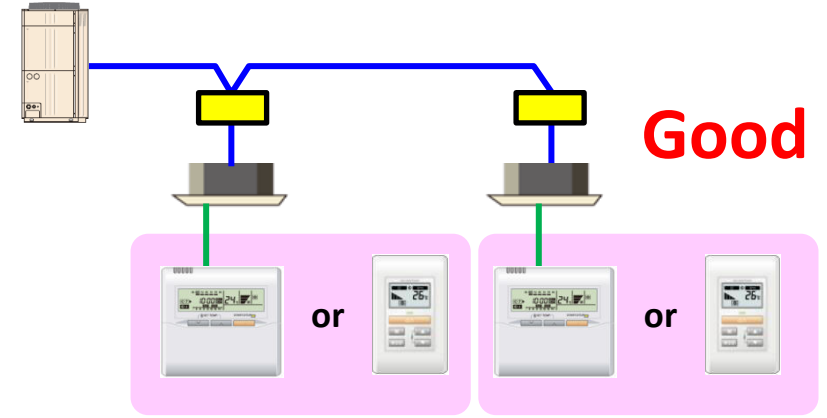
- 2-wire remote controller & 3-wire remote controller

-  : RB unit (S)
-  : Transmission line
-  : Remote controller cable line

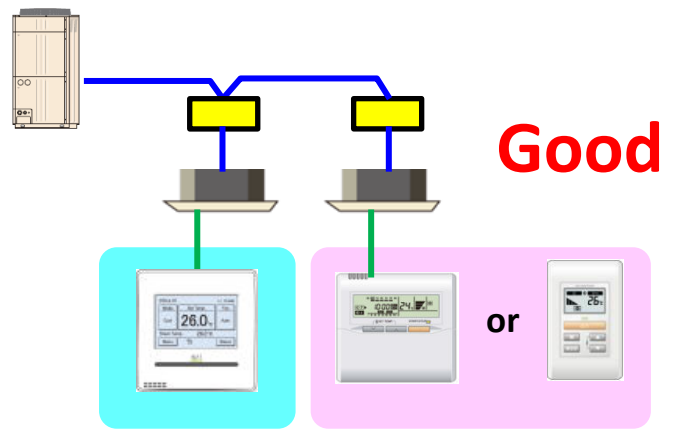
①. When only 2-wire remote controller used



②. When only 3-wire remote controller used






③. When 2-wire and 3-wire remote controllers mixed



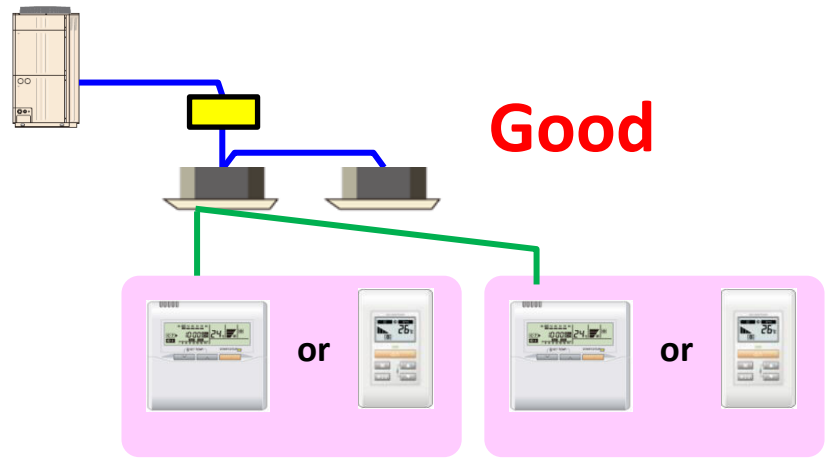
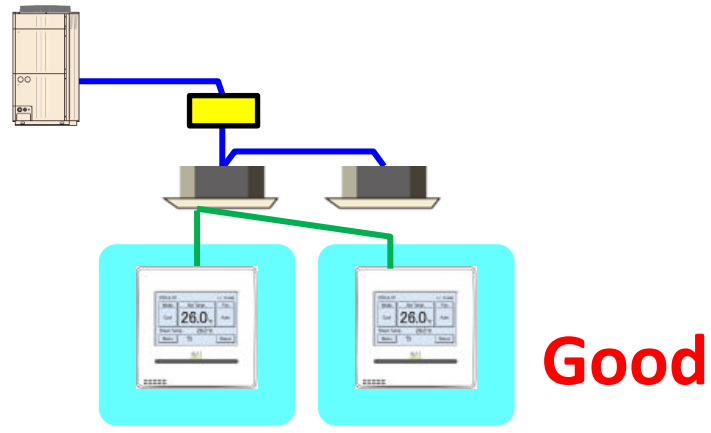
Breaker - Wiring design

Wiring design (Remote Controller Cable)

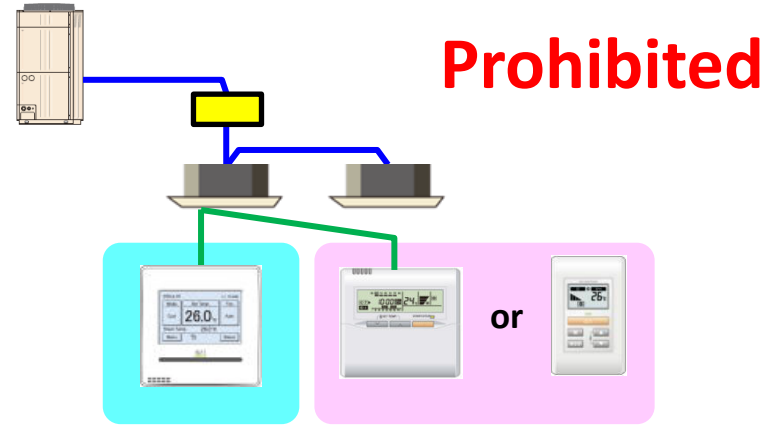
- 2-wire remote controller & 3-wire remote controller

-  : RB unit (S)
-  : Transmission line
-  : Remote controller cable line

①. When 3-wire remote controller or 2-wire remote controllers used in the one indoor unit

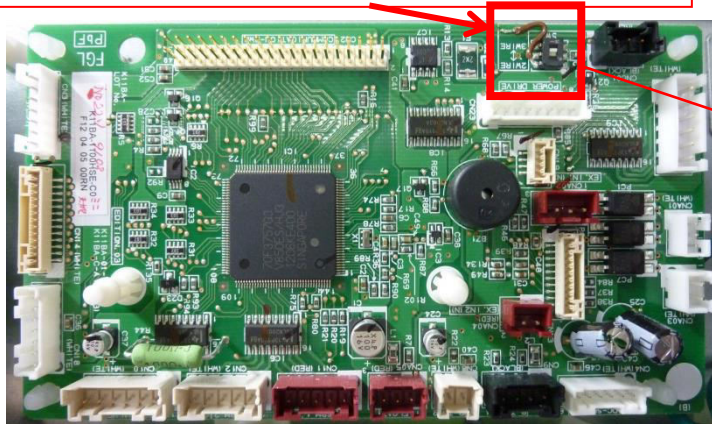





②. When 2-wire and 3-wire remote controllers mixed in the one indoor unit



PCB setting for Remote Controller

DIP SW (newly added): SW that switches between the non-polar 2-wire type and 3-wire type

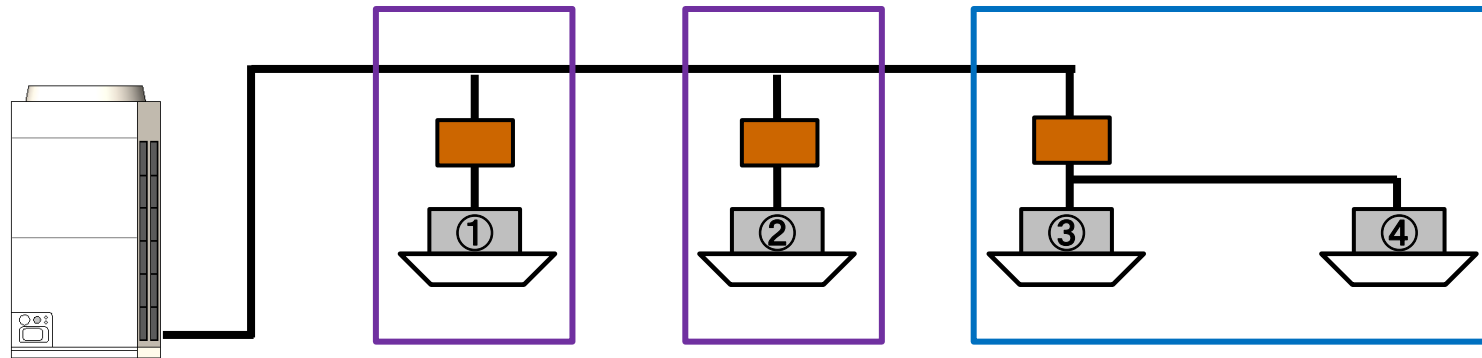


DIP SW for RC on VR-II	Connected Remote Controller	Factory setting
2 WIRE	For new touch panel wired RC 	
3 WIRE	For standard RC 	

Remote Controller Group

- Selectable operation mode has been different by RB connection

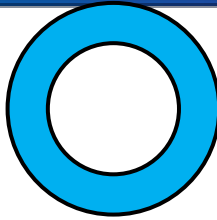
< System >



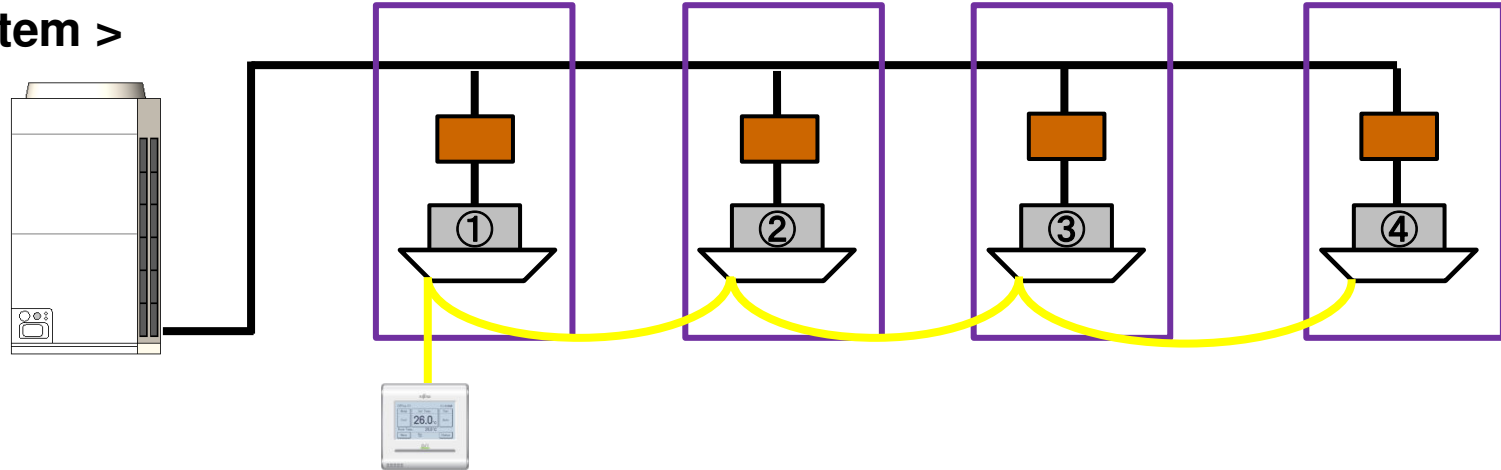
<Selectable operation mode>

	Indoor 1	Indoor 2	Indoor 3	Indoor 4
COOL	○	○	○	○
DRY	○	○	○	○
HEAT	○	○	○	○
AUTO	○	○	△ (Master I.U. only)	△ (Master I.U. only)
FAN	○	○	×	×

Remote Controller Group



< System >



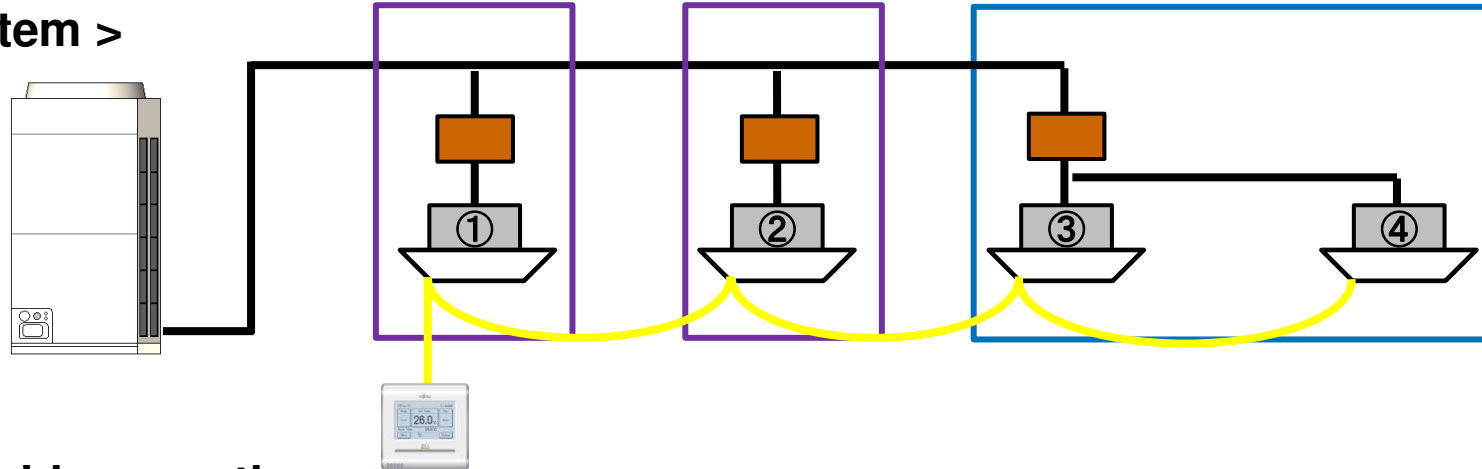
<Selectable operation mode>

	Indoor 1	Indoor 2	Indoor 3	Indoor 4
COOL	○	○	○	○
DRY	○	○	○	○
HEAT	○	○	○	○
AUTO	○	○	○	○
FAN	○	○	○	○

Remote Controller Group



< System >



<Selectable operation mode>

	Indoor 1	Indoor 2	Indoor 3	Indoor 4
COOL	○	○	○	○
DRY	○	○	○	○
HEAT	○	○	○	○
AUTO	○	○	△ (Master I.U. only)	△ (Master I.U. only)
FAN	○	○	×	×