

SET-FREE FSXN1



SELECTION REPORT

Project Name: Pipe limits

Reference:

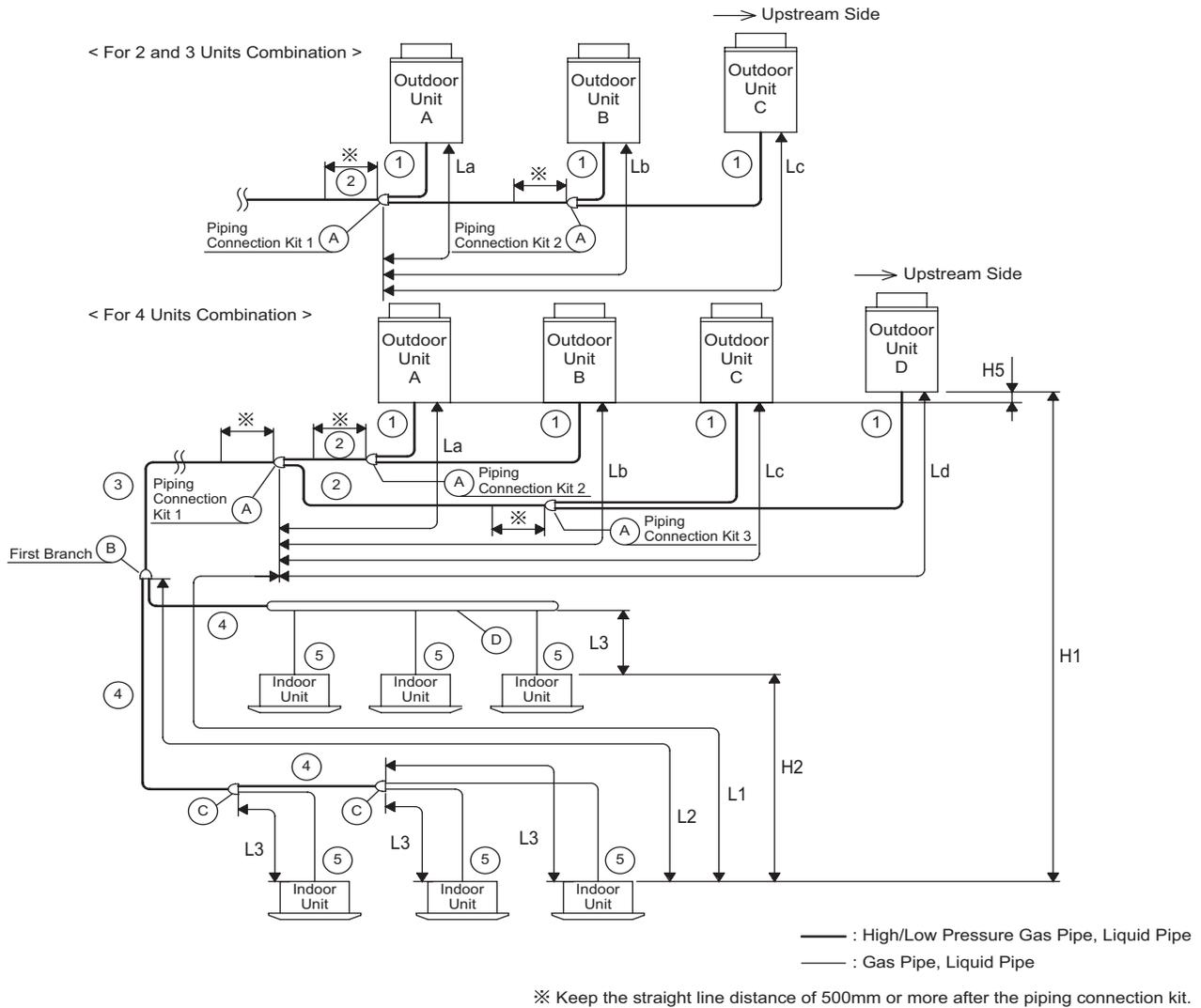
Client Name:

Revision:

Friday, 14 August 2015

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For selecting the pipe sizes between the outdoor unit and the piping connection kit (1), between the piping connection kits (2) and for piping connection kit (A), refer to the items from 6.5.1 to 6.5.4 "Piping Size between Outdoor Units".



Multi-Kit (Optional Parts)

< Line Branch >

Ⓑ First Branch

Outdoor Unit HP	Model
5 - 10	MW-102AN1
12 - 16	MW-162AN1
18 - 24	MW-242AN1
26 - 54	MW-302AN1

Ⓒ Multi-Kit after First Branch

Total Indoor Unit HP	Model
< 12	MW-102AN1
12 - 17.99	MW-162AN1
18 - 25.99	MW-242AN1
≥ 26	MW-302AN1

< Ⓓ Header Branch >

Total Indoor Unit HP	No. of Header Branches	Model
5 - 8	4	MH-84AN
5 - 10	8	MH-108AN

Piping Size (φmm)

③ Main Pipe Diameter (Base Unit or Piping Connection Kit 1 to First Branch) [Multi-Kit of First Branch]

Outdoor Unit HP	Equivalent Piping Length < 100m	
	High/Low Pressure Gas	Liquid
5	15.88	9.52
6 and 8	19.05	9.52
10	22.2	9.52
12 and 14	25.4	12.7
16	28.58	12.7
18 - 24	28.58	15.88
26 - 34	31.75	19.05
36 - 54	38.1	19.05

NOTE:

When the maximum length of the equivalent refrigerant pipe (L1) from the piping connection kit 1 to the indoor unit is over 100m, the pipe size of gas and liquid lines from the piping connection kit 1 to first branch should be increased by one size with reducers (field-supplied).

④ [Pipe Diameter after First Branch]

Total Indoor Unit HP	High/Low Pressure Gas	Liquid
< 6	15.88	9.52
6 - 8.99	19.05	9.52
9 - 11.99	22.2	9.52
12 - 15.99	25.4	12.7
16 - 17.99	28.58	12.7
18 - 25.99	28.58	15.88
26 - 35.99	31.75	19.05
≥ 36	38.1	19.05

NOTE:

* In the case that the piping length from the Multi-Kit at the first branch to the terminal indoor unit is over 40m, the size of the main piping should be increased by one size with reducers (field-supplied). Refer to "Piping Branch Restriction" for details.

* Even if the equivalent refrigerant piping length is more than 100m, no need to increase the pipe size after first branch. If the multi-kit size is larger than the first branch, adjust the multi-kit size to the first branch. In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as before the branch.

⑤ [Pipe Diameter between Multi-Kit and Indoor Unit]

Indoor Unit HP	High/Low Pressure Gas	Liquid
0.8 to 1.5	12.7	6.35 (*)
2.0	15.88	6.35 (*)
2.5 to 6.0	15.88	9.52
8.0	19.05	9.52
10.0	22.2	9.52
16.0	28.58	12.7
20.0	28.58	15.88

(*): When the liquid piping length is longer than 15m, use φ9.52 pipe and reducer (field-supplied).

NOTE:

Item	Mark	Allowable Piping Length	
		≤ the recommended connectable number of Indoor Unit	> the recommended connectable number of Indoor Unit
Total Piping Length	Total Liquid Piping Actual Length	≤ 1,000m	≤ 300m
Maximum Piping Length	Actual Length	≤ 165m	≤ 165m
	Equivalent Length	≤ 190m	≤ 190m
Maximum Piping Length between Multi-kit of 1st Branch and Each Indoor Unit	L2	≤ 90m	≤ 40m
Maximum Piping Length between Each Multi-kit and Each Indoor Unit	L3	≤ 40m	≤ 30m
Piping Length between Piping Connection Kit 1 and Each Outdoor Unit	La, Lb, Lc, Ld	≤ 10m	≤ 10m
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	≤ 50m (*)	≤ 50m (*)
	O.U. is Lower	≤ 40m	≤ 40m
Height Difference between Indoor Units	H2	≤ 30m	≤ 30m
Height Difference between Outdoor Units	H5	≤ 0.1m	≤ 0.1m

(*): Longer piping (up to 90m) is available only for Base Unit (FSXN1: 8-16HP / FSXNH: 5-12HP) (sales on order).

NOTES:

- For 2 and 3 outdoor unit combination, the outdoor unit "A" should be connected to the piping connection kit 1. For 4 outdoor unit combination, the outdoor units "A" and "B" should be connected to the piping connection kit 2 and the outdoor unit "C" and "D" should be connected to the piping connection kit 3. (Refer to the items from 6.5.2 to 6.5.4 for the outdoor unit models.) The details of piping connection kit shall be referred to the installation manual of itself.
- The piping length between outdoor units should be $L_a \leq L_b \leq L_c \leq L_d \leq 10m$.
(If the piping length is incorrect, it may cause failure of outdoor unit due to flowing back the refrigerant.)
- Keep the straight line distance of 500mm or more after the piping connection kit.
- The condition of refrigerant piping installation is different depending on the connected indoor unit quantities. Refer to the table 3.2 "System Combination" in item 3.2 for details.
- Allowable total piping length may become shorter than 1,000m due to the limitation of maximum additional refrigerant amount as following table.

HP	5 - 10	12	14 and 16	18 - 24	26 - 54
Max. Additional Refrigerant Charge (kg)	28	36	40	51	63

- If the piping length (L3) between each multi-kit and indoor unit is considerably longer than other indoor unit, refrigerant may not flow well and also performance may be deteriorated compared to other models.
(Recommended Piping Length: within 15m)
- The piping connection kit is counted from the indoor unit side (as Piping Connection Kit 1).
- Check the gas pipe and liquid pipe are equivalent in terms of the piping length and piping system.
- Use a multi-kit (system components) for the branch pipe of indoor unit.
- Install the indoor unit and multi-kit according to each "Installation & Maintenance Manual".

The number of the main piping branches is not limited under the following restrictions.

< Heat Pump System (2 pipes) >

In the case that the piping length L2 from the Multi-Kit at the first branch to the farthest indoor unit is over 40m, follow the instructions below when performing the field-supplied piping work.

(Example 1)

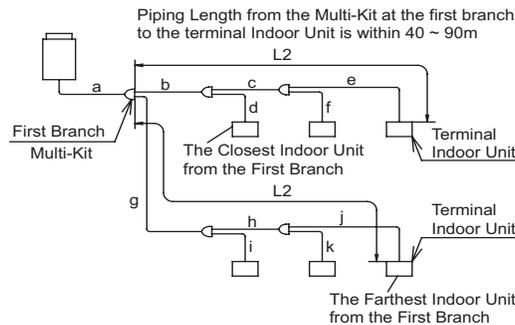
Piping length from the Multi-Kit at the first branch to the terminal indoor unit is within 40~90m.

(1) In the case that the piping length L2 is over 40m, the size of gas and liquid lines "b and c" or "g and h" should be increased by one size with reducers (field-supplied).

*If (a) is smaller than (b, c) after increasing the size, increase the size of (a) to the same size as (b, c).

(2) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the closest indoor unit must be within 40m.

$$*(g+h+j)-(b+d)\leq 40m$$



(Example 2)

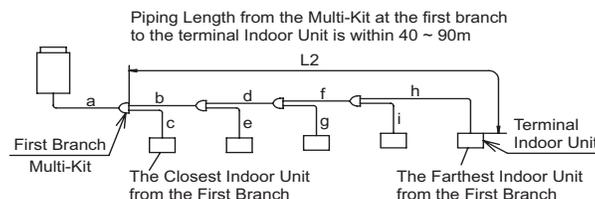
Piping length from the Multi-Kit at the first branch to the terminal indoor unit is within 40~90m.

(1) In the case that L2 is over 40m, the size of gas and liquid lines "b, d and f" should be increased by one size with reducers (field-supplied).

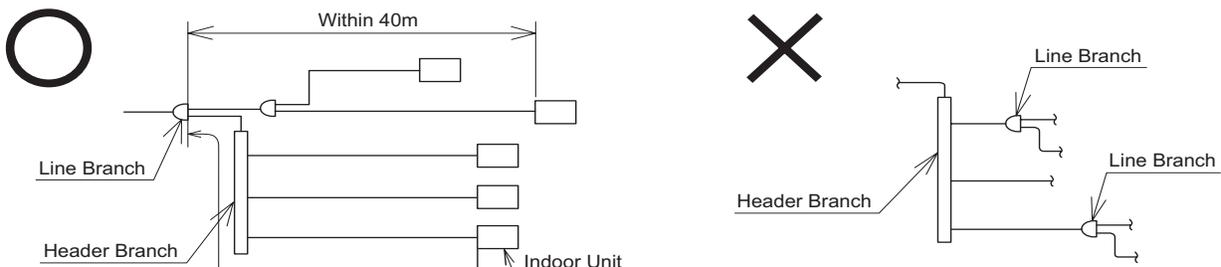
*If (a) is smaller than (b) after increasing the size, increase the size of (a) to the same size as (b).

(2) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the closest indoor unit must be within 40m.

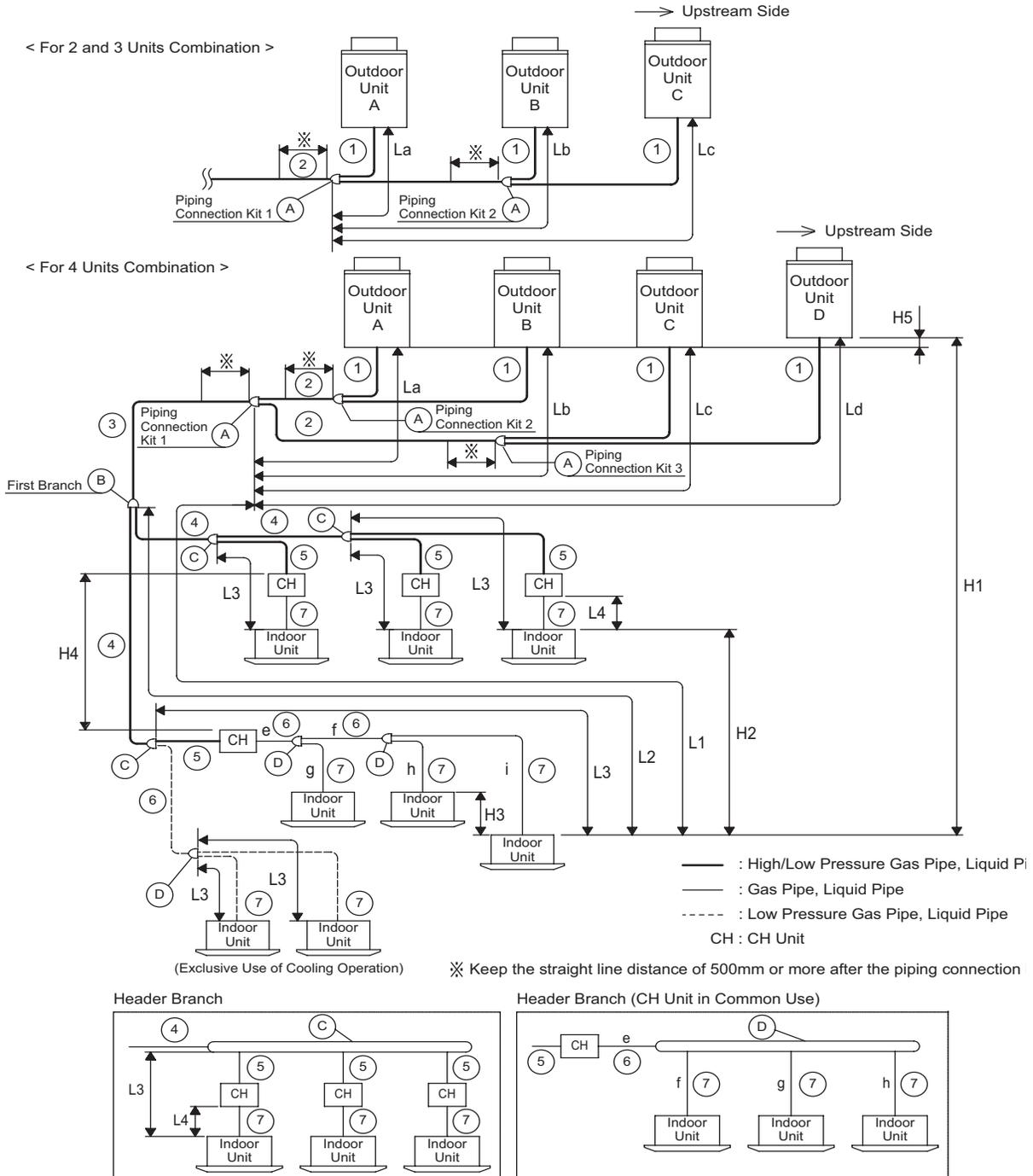
$$*(b+d+f+h)-(c)\leq 40m$$



Header branch can be used with line branch at the 3 pipes portion and 2 pipes portion. Header branch can also be used after the second branch. Do not connect a line branch to a header branch. When using header branch, make sure that the piping length L2 from the Multi-Kit at the first branch to the farthest indoor unit is within 40m.



For selecting the pipe sizes between the outdoor unit and the piping connection kit (1), between the piping connection kits (2) and for piping connection kit (A), refer to the items from 6.6.1 to 6.6.4 "Piping Size between Outdoor Units".



Multi-Kit (Optional Parts)

< Line Branch >

Ⓑ First Branch

Outdoor Unit HP	Model
5 - 10	MW-102XN1
12 - 16	MW-162XN1
18 and 20	MW-202XN1
22 and 24	MW-242XN1
26 - 54	MW-322XN1

Ⓒ Pipe Diameter and Multi-Kit after First Branch
(3 Pipes Portion)

Total Indoor Unit HP	Model
< 6	MW-52XN1
6 - 11.99	MW-102XN1
12 - 17.99	MW-162XN1
18 - 21.99	MW-202XN1
22 - 25.99	MW-242XN1
≥ 26	MW-322XN1

Ⓓ Pipe Diameter and Multi-Kit after First Branch
(2 Pipes Portion)

Total Indoor Unit HP	Model
< 12	MW-102AN1
12 - 17.99	MW-162AN1
18 - 25.99	MW-242AN1

< Header Branch >

Ⓒ for 3 Pipes Portion

Total Indoor Unit HP	No. of Header Branches	Model
5 - 10	8	MH-108XN

Ⓓ for 2 Pipes Portion

Total Indoor Unit HP	No. of Header Branches	Model
5 - 8	4	MH-84AN
5 - 10	8	MH-108AN

Piping Size (φmm)

③ Main Pipe Diameter
(Base Unit or Piping Connection Kit 1 to First Branch)
[Multi-Kit of First Branch] (3 Pipes)

Outdoor Unit HP	Low Pressure Gas	High/Low Pressure Gas	Liquid
5	15.88	12.7	9.52
6 and 8	19.05	15.88	9.52
10	22.2	19.05	9.52
12 and 14	25.4	22.2	12.7
16	28.58	22.2	12.7
18 and 20	28.58	22.2	15.88
22 and 24	28.58	25.4	15.88
26	31.75	25.4	19.05
28 - 34	31.75	28.58	19.05
36	38.1	28.58	19.05
38 - 54	38.1	31.75	19.05

NOTE:

When the maximum length of the equivalent refrigerant pipe (L1) from the piping connection kit 1 to the indoor unit is over 100m, the pipe size of liquid line from the piping connection kit 1 to first branch should be increased by one size with reducers (field-supplied).

④ [Pipe Diameter after First Branch] (3 Pipes)

Total Indoor Unit HP	Low Pressure Gas	High/Low Pressure Gas	Liquid
< 6	15.88	12.7	9.52
6 - 8.99	19.05	15.88	9.52
9 - 11.99	22.2	19.05	9.52
12 - 15.99	25.4	22.2	12.7
16 - 17.99	28.58	22.2	12.7
18 - 21.99	28.58	22.2	15.88
22 - 25.99	28.58	25.4	15.88
26 - 35.99	31.75	28.58	19.05
≥ 36	38.1	31.75	19.05

NOTE:

Even if the equivalent refrigerant piping length is more than 100m, no need to increase the pipe size after first branch. If the multi-kit size is larger than the first branch, adjust the multi-kit size to the first branch. In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as before the branch.

⑤ [Pipe Diameter between CH Unit to Multi-Kit]

CH Unit Model	Max. Combination of Indoor Unit	Available Combination of Indoor Unit Capacity (HP)	Low Pressure Gas	High/Low Pressure Gas	Liquid
CH-6.0N1	7	0.8 - 4.0	15.88	12.7	9.52
		4.1 - 6.0	19.05	15.88	9.52
CH-10.0N1	8	6.1 - 8.0	19.05	15.88	9.52
		8.1 - 10.0	22.2	19.05	9.52

NOTE:

* The liquid pipe is not required to connect to the CH unit.

* In case that the number of connectable indoor unit exceeds four, the high/low pressure gas pipe, gas pipe and liquid pipe ⑤⑥⑦ need to increase one size respectively.

⑥ [Pipe Diameter for 2 Pipes and Multi-Kit]

Total Indoor Unit HP	Gas	Liquid
< 6	15.88	9.52
6 - 8.99	19.05	9.52
9 - 11.99	22.2	9.52
12 - 15.99	25.4	12.7
16 - 17.99	28.58	12.7
18 - 25.99	28.58	15.88

⑦ [Pipe Diameter between Multi-Kit and Indoor Unit] (2 Pipes)

Indoor Unit HP	Gas	Liquid
0.8 to 1.5	12.7	6.35 (*)
2.0	15.88	6.35 (*)
2.5 to 6.0	15.88	9.52
8.0	19.05	9.52
10.0	22.2	9.52

(*): When the liquid piping length is longer than 15m, use φ9.52 pipe and reducer (field-supplied).

NOTE:

The pipe diameter should be the same as the indoor unit piping connection size.

Item	Mark	Allowable Piping Length	
		≤ the recommended connectable number of Indoor Unit	> the recommended connectable number of Indoor Unit
Total Piping Length	Total Liquid Piping Actual Length	≤ 1,000m	≤ 300m
Maximum Piping Length	Actual Length	≤ 165m	≤ 165m
	Equivalent Length	≤ 190m	≤ 190m
Maximum Piping Length between Multi-kit of 1st Branch and Each Indoor Unit	L2	≤ 90m	≤ 40m
Maximum Piping Length between Each Multi-kit and Each Indoor Unit	L3	≤ 40m	≤ 30m
Total Piping Length between CH Unit and Each Indoor Unit	* L4 * e+f+g+h+i	CH-6.0N1: ≤ 30m	CH-6.0N1: ≤ 30m
		CH-10.0N1: ≤ 10m	CH-10.0N1: ≤ 10m
Piping Length between Piping Connection Kit 1 and Each Outdoor Unit	La, Lb, Lc, Ld	≤ 10m	≤ 10m
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	≤ 50m	≤ 50m
	O.U. is Lower	≤ 40m	≤ 40m
Height Difference between Indoor Units	H2	≤ 15m	≤ 15m
Height Difference between Indoor Units using the Same CH Unit	H3	≤ 4m	≤ 4m
Height Difference between CH Units	H4	≤ 15m	≤ 15m
Height Difference between Outdoor Units	H5	≤ 0.1m	≤ 0.1m

NOTES:

- For 2 and 3 outdoor unit combination, the outdoor unit "A" should be connected to the piping connection kit 1. For 4 outdoor unit combination, the outdoor units "A" and "B" should be connected to the piping connection kit 2 and the outdoor unit "C" and "D" should be connected to the piping connection kit 3. (Refer to the items from 6.6.2 to 6.6.4 for the outdoor unit models.) The details of piping connection kit shall be referred to the installation manual of itself.
- The piping length between outdoor units should be $La \leq Lb \leq Lc \leq Ld \leq 10m$.
(If the piping length is incorrect, it may cause failure of outdoor unit due to flowing back the refrigerant.)
- Keep the straight line distance of 500mm or more after the piping connection kit.
- The condition of refrigerant piping installation is different depending on the connected indoor unit quantities.
- Allowable total piping length may become shorter than 1,000m due to the limitation of maximum additional refrigerant amount as following table.

HP	5 - 10	12	14 and 16	18 - 24	26 - 54
Max. Additional Refrigerant Charge (kg)	28	36	40	51	63

- If the piping length (L3) between each multi-kit and indoor unit is considerably longer than other indoor unit, refrigerant may not flow well and also performance may be deteriorated compared to other models.
(Recommended Piping Length: within 15m)
- The piping connection kit is counted from the indoor unit side (as Piping Connection Kit 1).
- In case that the combination of indoor unit capacity is 10HP for CH-10.0N1, the performance may decrease approximate 5% in cooling and 10% in heating.
- The excess of the total capacity may cause insufficient performance and abnormal sound. Be sure to connect within the allowable total capacity.
- For the exclusive cooling operation, connect indoor units with low pressure gas pipe and liquid pipe (without CH unit). The total capacity of the exclusive cooling operation should be smaller than 50% of the total indoor unit capacity.
- In case that a branch is located downstream of the CH unit and also the connected indoor unit capacity is 0.8~1.5HP, use $\phi 15.88$ for the gas pipe.
- Check the gas pipe and liquid pipe are equivalent in terms of the piping length and piping system.
- Use a multi-kit (system components) for the branch pipe of indoor unit and CH unit.
- Install the indoor unit, multi-kit and CH unit according to each "Installation & Maintenance Manual".

The number of the main piping branches is not limited under the following restrictions.

< Heat Recovery System (3 pipes) >

In the case that the piping length L2 from the Multi-Kit at the first branch to the farthest indoor unit is over 40m, follow the instructions below when performing the field-supplied piping work.

(Example 1)

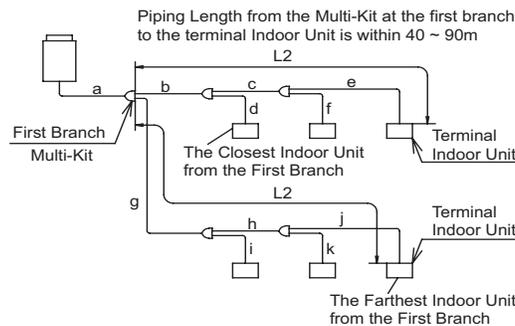
Piping length from the Multi-Kit at the first branch to the terminal indoor unit is within 40~90m.

(1) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the closest indoor unit must be within 40m.

$$*(g+h+j)-(b+d) \leq 40m$$

NOTE:

DO NOT size up the piping for Heat Recovery System. Otherwise, it may cause failure.



(Example 2)

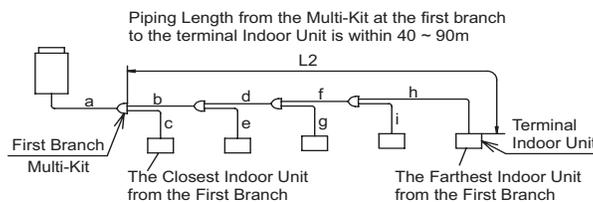
Piping length from the Multi-Kit at the first branch to the terminal indoor unit is within 40~90m.

(1) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the closest indoor unit must be within 40m.

$$*(b+d+f+h)-(c) \leq 40m$$

NOTE:

DO NOT size up the piping for Heat Recovery System. Otherwise, it may cause failure.



Header branch can be used with line branch at the 3 pipes portion and 2 pipes portion. Header branch can also be used after the second branch. Do not connect a line branch to a header branch. When using header branch, make sure that the piping length L2 from the Multi-Kit at the first branch to the farthest indoor unit is within 40m.

