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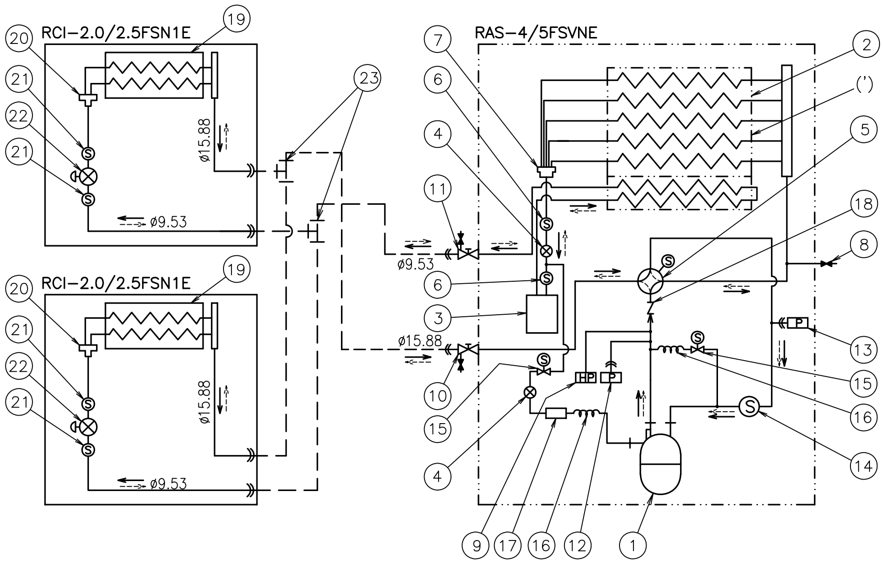
6.3.2. RAS-4/5FSVNE



—>	<- - -	— — —	Connection symbol	Flange symbol	Brazing symbol	R410A	4.15 MPa
Refrigerant flow for cooling	Refrigerant flow for heating	Refrigerant piping in the installation	Connection with flare nut	Flange connection	Brazing connection	Refrigerant :	Airtight test pressure

(*) If the equivalent piping length is more than 100 m, see chapter 7 (Piping and Refrigerant Charge).
(') The exchanger has 5 steps in unit RAS-5.

no	Item	no	Item	no	Item
1	Compressor	9	High-Pressure Switch for Protection	17	Silencer
2	Heat exchanger	10	Stop Valve for gas line	18	Check valve
3	Receiver	11	Stop Valve for liquid line	19	Heat Exchanger Indoor
4	Expansion valve	12	Low pressure Sensor	20	Distributor Indoor
5	4-way Valve	13	High pressure sensor	21	Strainer Indoor
6	Filter	14	Filter	22	Expansion Valve Indoor
7	Distributor	15	Solenoid Valve (Gas Bypass)	23	Multi-Kit E-102SN
8	Check joint	16	Capillary tube		

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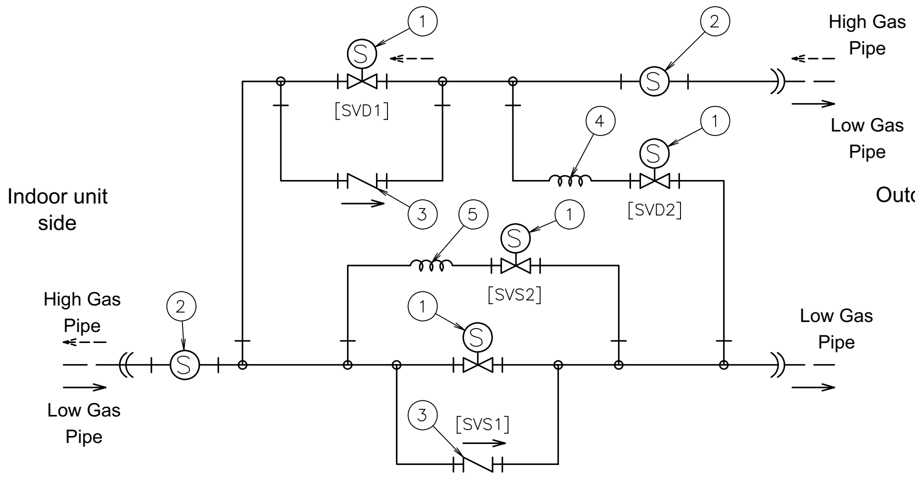
6.4. Accessories

6.4.1. CH-4.0~12.0NE



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						R410A	4.15 MPa
Refrigerant flow for cooling	Refrigerant flow for heating	Refrigerant piping in the installation	Connection with flare nut	Flange connection	Brazing connection	Refrigerant :	Airtight test pressure

The inscription between brackets "()" appears in the electrical wiring diagram. Refer to Service Manual SMGB0032.

(*) Only if all the units are in cooling mode.

no	Item
1	Solenoid Valve
2	Filter
3	Check valve
4	Capillary tube
5	Capillary tube

7 . Piping and refrigerant charge

This chapter describes how to connect that refrigerant piping and how to change the refrigerant quantity in the system for the Hitachi SET FREE FSN(1)(E)/FXN(E)/FSVNE Series.

Contents

7.1. Refrigerant Piping Selection

The Set-Free system was designed to take into consideration all possible installation types. Therefore. HITACHI is using two different refrigerant pipe distributors: Multiple connection kits system and distributor system.

The multiple connections kit system is available for two pipes system and for three pipes systems. The distributor system is also available for two pipe systems and for three pipe systems only after the CH-Unit.
The three pipes system (FXN(E)) is using only two pipes after the CH-Unit.

Piping System	3 Pipes Systems	2 Pipes Systems	
	FXN(E)	FSN(1)(E)	FSVNE
Multy kit	●	●	●
Distributor	● (*)	●	●

(*) Only after CH-Unit

● : Available

7.1.1. Minimum and maximum number of indoor units per outdoor unit

The new Hi-Multi Set Free Series allows you to connect more indoor units per outdoor unit. The various possible combinations are shown in the following table. The maximum number of indoor units to be connected has increased because of the reduction in power consumption.

Outdoor unit	Indoor unit			
	Maximum Combination Capacity (HP)	Minimum number of indoor units	Maximum indoor units	Minimum individual operational power requirement (HP)
RAS-3FSVNE	3.90	1	4	0.8
RAS-4FSVNE	5.20	1	6	0.8
RAS-5FSVNE	6.50	1	7	0.8
RAS-5FSN	6.50	1	8	0.8
RAS-8FSN1E/FXNE	10.40	2	13	0.8
RAS-10FSN1E/FXNE	13.00	2	16	0.8
RAS-12FSN1E/FXNE	15.60	2	16	0.8
RAS-14FSN1	18.20	2	20	0.8
RAS-16FSN1/FXN	20.80	2	20	0.8
RAS-18FSN1/FXN	23.40	2	20	0.8
RAS-20FSN1/FXN	26.00	2	20	0.8
RAS-24FSN1/FXN	31.00	2	27*	0.8*
RAS-28FSN1	36.40	2	31*	0.8*
RAS-30FXN	39.00	2	32*	0.8*
RAS-32FSN1/FXN	41.60	2	32*	0.8*
RAS-36FSN	46.80	4	32*	0.8*
RAS-42FSN	54.60	5	32*	0.8*

(*) Total number of 0.8 HP and 1.0 HP units is limited to 12. RAS-36/42FSN has a limit of 16 units.

WARNINGS:

The liquid piping and the gas piping must be of the same length and run along the same route.

Install Multi-Kits (Optional Accessory as system parts) must be used for the branch pipe to the Indoor Unit.

Install Multi-Kits at the same horizontal level.

NOTES:

(1) See sections 7.1.3 and 7.1.4 for additional information

OU: Outdoor unit

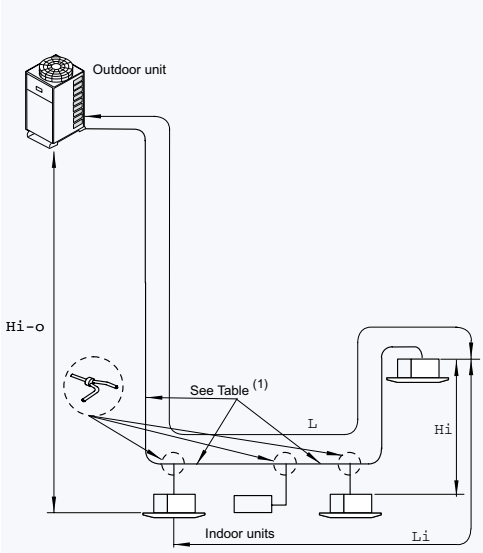
IU: Indoor unit

7.1.2. Range of refrigerant piping

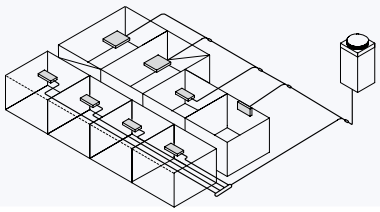
The piping selection and distribution must be designed according to the specifications described in the Warnings section.

◆ **Two Pipes System FSN(1)(E)**

(m)

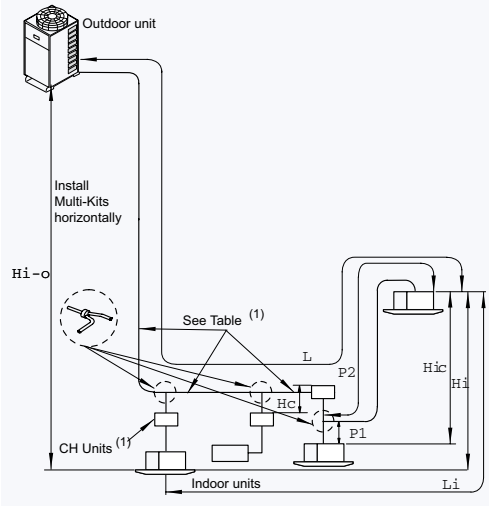


Item		Maximum Applicable Range FSN(1)(E)
Length between OU and farthest IU (L)	Actual	150
	Equivalent	175
Piping length from 1st Multi-Kit to the furthest IU (Li)		40
Total length from OU to all IU		300
Piping length from each Multi-Kit to IU		30
Height difference (Hi-o) between the OU and the IU (OU higher than the IU/ OU lower than the IU)		50/40
Height difference (Hi) between IUs		15

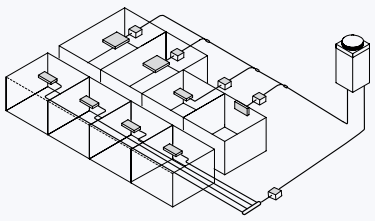


◆ **Three Pipes System FXN(E)**

(m)

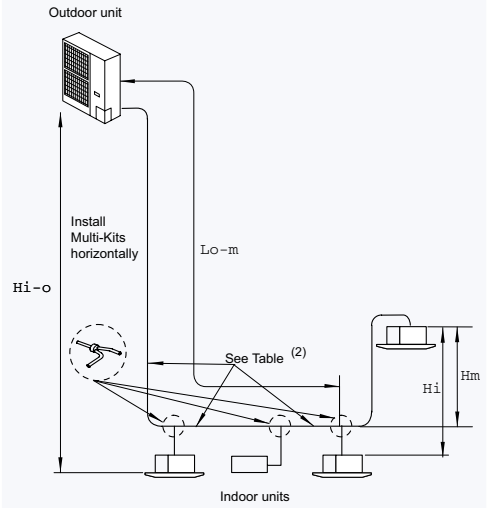


Item		Maximum Applicable Range FXN(E)
Length between OU and farthest IU (L)	Actual	150
	Equivalent	175
Piping length from 1st Multi-Kit to the furthest IU (Li)		40
Total length from OU to all IU		300
Piping length from each Multi-Kit to IU		30
Height difference (Hi-o) between the OU and the IU (OU higher than the IU / OU lower than the IU)		50/40
Height difference (Hi) between IUs		15
Lift between IUs connected to same CH (Hic)		4
Difference of Piping lenght (P2-P1) between each IU to same CH unit		5
Height Difference between CH units (Hc)		15

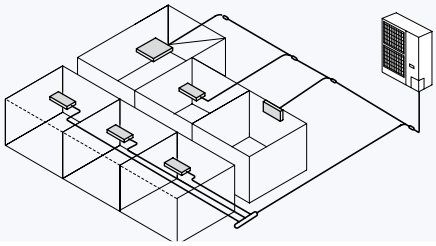


◆ Two Pipes System FSVNE

(m)



Item	Maximum Applicable Range FSVNE			
	3 HP			4/5 HP
Actual length from OU to the furthest Multi-Kit (Lo-m)	Number of Indoor Units			65
	2	3	4	
	40	35	25	
Total length from OU to all IU	65			135(1)
Piping length from each Multi-Kit to the IUs (2)	10			
Height difference (Hi-o) between the OU and the IU (OU higher than the IU / OU lower than the IU)	25 / 25			
Height difference (Hi) between IUs	10			
Height difference between Multi-Kit and IU (Hm-i)	5			



NOTES:

(1) If the piping length is >80 m you have to add 0.4 l of FVC68D type oil..

(2) See section 7.1.6 for additional information

OU: Outdoor unit

IU: Indoor unit

7.1.3. Refrigerant piping length

The refrigerant piping between the indoor and outdoor units must be designed using the following chart.

Maintain the design point within the dark area of the chart. which shows the height difference according to piping length.

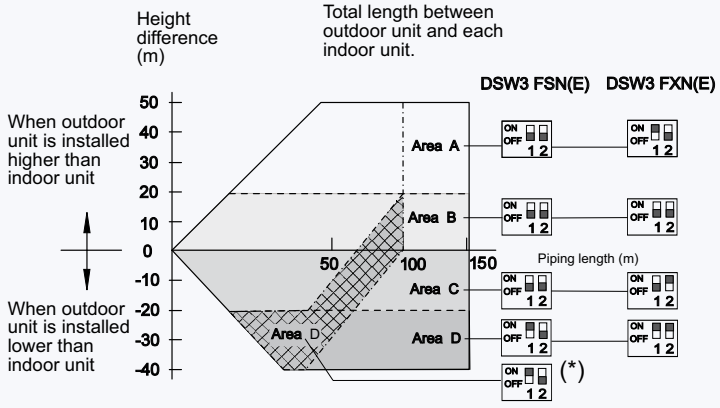
NOTES:

DSW: Dip Switch on Outdoor Unit PCB (DSW3 must be set when the Outdoor Unit is installed lower than Indoor Unit with height difference indicated and when longer piping is required).

The division lines are shown in the following diagrams.

(*) Only for RAS-36/42 when the liquid pipe diameter is 19.05 mm

FSN(E)/FXN(E)



NOTES:

For FSN(1)(E) models. piping size is shown in the tables in figures 1 and 2.

DSW: Dip Switch on Outdoor Unit PCB (DSW3 must be set when the Outdoor Unit is installed lower than Indoor Unit with a height difference of approximately 20 m and when longer piping is required).

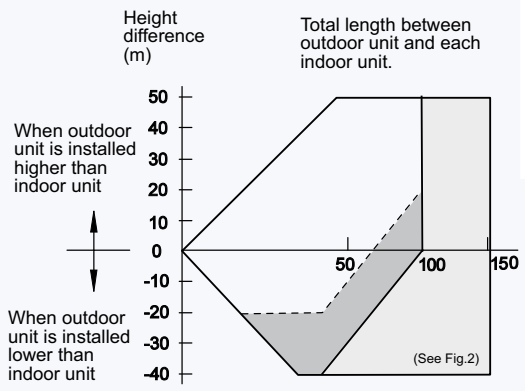
The division lines are shown in figures 1 and 2.

CAUTION:

In case that the total piping length is long and the Outdoor Unit is installed lower than the Indoor Units by more than Height indication; perform the DSW setting correctly according to figures.

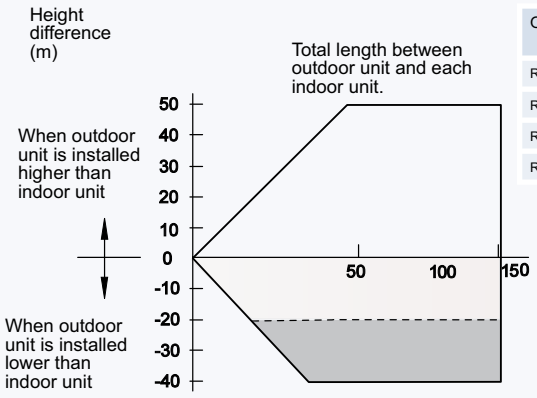
If the Outdoor Unit is installed lower than the Indoor Units by more than the Height indicated and it is outside of the area (Area B) shown in the figures. change the side of the main liquid piping and perform the DSW setting correctly according to the figures.

FSN1(E) (Fig.1)



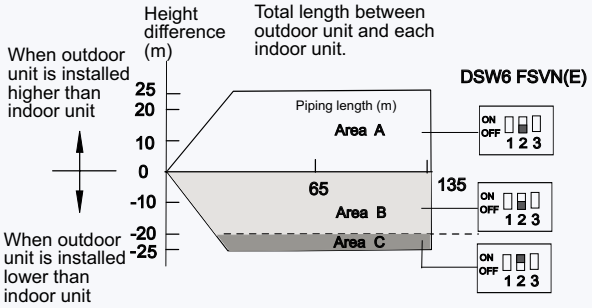
Outdoor units	Liquid Pipe diameter
RAS-5.8.10FSN(1)(E)	Ø 9.53
RAS-12.14.16FSN1(E)	Ø 12.70
RAS-18.20.24FSN1	Ø 15.88
RAS-28/32FSN1	Ø 19.05

FSN1(E) (Fig.2)



Outdoor units	Liquid Pipe diameter
RAS-5.8.10FSN(1)(E)	Ø 12.70
RAS-12.14.16FSN1(E)	Ø 15.88
RAS-18.20.24FSN1	Ø 19.05
RAS-28/32FSN1	Ø 22.20

FSVN(E)



7.1.4. Piping Size and Multiple connections kit for the FSN(1)(E) system

In addition to the Epoch-making “Uni-Piping System”. where the same pipe size as the main refrigerant pipe can be used. the “Down-Pipe System” is also available for piping cost reduction.

As shown in the following table. the “Uni-piping” system is not available for 12~42 HP machines.

Piping systems		
unit	Uni-Piping	Down-Size
RAS-5FSN	●	-
RAS-8FSN1E	●	●
RAS-10FSN1E	●	●
RAS-12FSN1E	○	●
RAS-14FSN1	○	●
RAS-16FSN1	○	●
RAS-18FSN1	○	●
RAS-20FSN1	○	●
RAS-24FSN1	○	●
RAS-28FSN1	○	●
RAS-32FSN1	○	●
RAS-36FSN	○	●
RAS-42FSN	○	●

● Available
○ Not available

NOTES:

In case of Uni-Piping system. the pipe size and the Multi-Kit from Outdoor unit to the last Multi-Kit is the same.

If the size of the Multi-Kit positioned after the 2nd kit is bigger than the 1st. use a kit of the same size as the 1st.

If the pipe size after the 1st branch is bigger than the pipe size between the Outdoor Unit and the 1st kit. use the pipe of the same size as the 1st kit.

If you want to use the “Unpiping” system for other configurations that are not shown in the table. consult with your distributor.

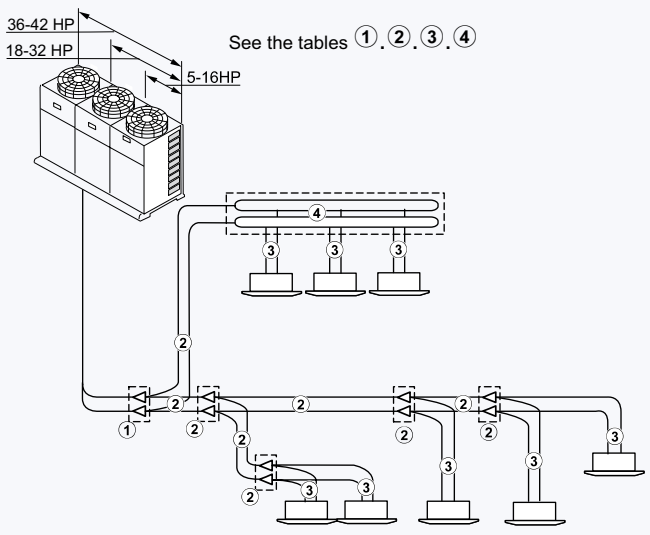


Table 1:

◆ **Table ①: Outdoor Unit ~ 1st Multi-Kit**

If the equivalent piping length is less than 100 m. use the following pipe size:

Unit	Pipe size (Ø mm)		Multy kit
	Gas	Liquid	
RAS-5FSN	15.88	9.53	E-102SN
RAS-8FSN1E	19.05	9.53	E-102SN
RAS-10FSN1E	22.20	9.53	E-102SN
RAS-12FSN1E	25.40 (28.60)	12.70	E-162SN
RAS-14FSN1	25.40 (28.60)	12.70	E-162SN
RAS-16FSN1	28.60	12.70	E-162SN
RAS-18FSN1	28.60	15.88	E-242SN
RAS-20FSN1	28.60	15.88	E-242SN
RAS-24FSN1	28.60	15.88	E-242SN
RAS-28FSN1	31.75 (34.92)	19.05	E-302SN
RAS-32FSN1	31.75 (34.92)	19.05	E-302SN
RAS-36FSN	38.1	19.05	E-302SN
RAS-42FSN	38.1	19.05	E-302SN

In case that the equivalent piping length is more than 100 m use the following pipe size:

Unit	Pipe size (Ø mm)		Multi-kit
	Gas	Liquid	
RAS-5FSN	19.05	12.70	E-102SN
RAS-8FSN1E	22.20	12.70	E-102SN
RAS-10FSN1E	25.40 (28.60)	12.70	E-162SN
RAS-12FSN1E	28.60	15.88	E-242SN
RAS-14FSN1	28.60	15.88	E-242SN
RAS-16FSN1	31.75 (34.92)	15.88	E-302SN
RAS-18FSN1	31.75 (34.92)	19.05	E-302SN
RAS-20FSN1	31.75 (34.92)	19.05	E-302SN
RAS-24FSN1	31.75 (34.92)	19.05	E-302SN
RAS-28FSN1	38.10 (41.27)	22.20	E-302SN
RAS-32FSN1	38.10 (41.27)	22.20	E-302SN
RAS-36FSN	44.45	22.20	E-302SN(*)
RAS-42FSN	44.45	22.20	E-302SN(*)

NOTES:

(*) If E302SN is connected in this case. use an expander of Ø38.1→Ø44.45 (supplied by the installer)

The pipe size must be the same of the piping connection hole of the Outdoor Unit.

Table 2:

◆ **Table ②: 1st multi-kit ~ Last multi-kit**

Total Capacity of Indoor Units	Pipe size (Ø mm)		Multi-kit
	Gas	Liquid	
HP<16	15.88	9.53	E-102SN
6≤HP<9	19.05	9.53	E-102SN
9≤HP<13	22.20	9.53	E-102SN
13≤HP<16	25.40 (28.60)	12.70	E-162SN
16≤HP<18	28.60	12.70	E-162SN
18≤HP<26	28.60	15.88	E-242SN
26≤HP<36	38.10	19.05	E302SN
36≤HP<42	38.10	19.05	E-302SN
42≤HP	38.10	19.05	E-302SN

The multi-kit selected must be compatible with pipe selected in table (1).
See chapter 7.2 for more information

Table 3:

◆ **Table ③: Multi-Kit ~ Indoor Unit**

Indoor unit capacity (HP)	Pipe size (Ø mm)		Maximum Length of Liquid Pipe
	Gas	Liquid	
from 0.8 to 1.5	12.70	6.35*	15 m
2	15.88	6.35*	15 m
2.5 to 6	15.88	9.53	30 m
8	25.40 (28.60)	9.53	30 m
10	25.40 (28.60)	9.53	30 m

NOTES:

(*) In case that the liquid pipe for the Indoor Unit is longer than 15m. use the pipe with a diameter of 9.53.

The pipe size must be the same size of the piping connection hole of the I.U.

The pipe shown in table 3 is applicable for both: the line branch and the header branch.

Table 4:

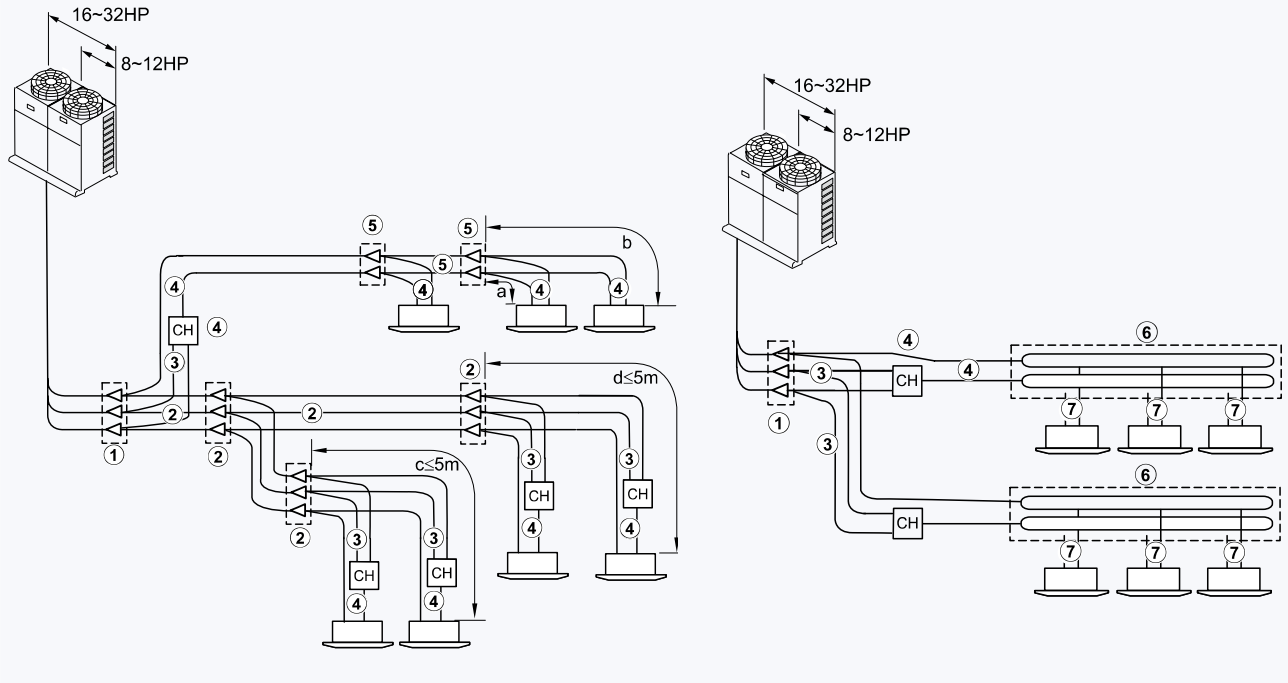
◆ **Table ④: Distributor system**

Applicable Model	Pipe size (Ø mm)		Multi-Kit Model	
	Gas	Liquid	3~4 Outputs	3~8 Outputs
RAS-5FSN	15.88	9.53	E-84HSN	E-108HSN
RAS-8FSN1E	19.05	9.53		
RAS-10FSN1E	22.20	9.53	–	
RAS-12FSN1E	25.40 (28.60)	12.70		
RAS-14FSN1	25.40 (28.60)	12.70		
RAS-16FSN1	28.60	12.70		
RAS-18FSN1	28.60	15.88		
RAS-20FSN1	28.60	15.88		
RAS-24FSN1	28.60	15.88		
RAS-28FSN1	31.75 (34.92)	19.05		
RAS-32FSN1	31.75 (34.92)	19.05		
RAS-36FSN	38.10	19.05		
RAS-42FSN	38.10	19.05		

Maximum capacity 10 HP for each Multikit.

7.1.5. Piping Size and Multiple connections kit for the FXN(E) system

The “Down Pipe System” is the system used for the FXN(E) range.



As shown in the following table. the “Uni-piping” system is not available for FXN(E) machines.

Piping systems		
unit	Uni-Piping	Down-Size
RAS-8FXN(E)	✗	●
RAS-10FXN(E)	✗	●
RAS-12FXNE	✗	●
RAS-16FXN	✗	●
RAS-18FXN	✗	●
RAS-20FXN	✗	●
RAS-24FXN	✗	●
RAS-30FXN	✗	●
RAS-32FXN	✗	●

● Available
✗ Not available

Table 1:

◆ **Table ①: 3 pipes part of Outdoor Unit ~ 1st Multikit**

If the equivalent piping length is **less** than 100 m. use the following pipe size:

unit	Pipe size (Ø mm)			Multi-kit
	Gas Low	Gas High	Liquid	
RAS-8FXN(E)	19.05	15.88	9.53	E-102XN
RAS-10FXN(E)	22.20	19.05	9.53	E-102XN
RAS-12FXNE	25.40 (28.60)	19.05	12.70	E-162XN
RAS-16FXN	28.60	22.20	12.70	E-162XN
RAS-18FXN	28.60	22.20	15.88	E-202XN
RAS-20FXN	28.60	22.20	15.88	E-202XN
RAS-24FXN	28.60	25.40	15.88	E-242XN
RAS-30FXN	31.75 (34.92)	28.60	19.05	E-322XN
RAS-32FXN	31.75 (34.92)	28.60	19.05	E-322XN

In case that the equivalent piping length is **more than** 100 m. use the following pipe size:

unit	Pipe size (Ø mm)			Multi-kit
	Gas Low	Gas High	Liquid	
RAS-8FXN(E)	22.20	19.05	12.70	E-102XN
RAS-10FXN(E)	25.40 (28.60)	22.20	12.70	E-102XN
RAS-12FXNE	28.60 (31.75)	22.20	12.70	E-162XN
RAS-16FXN	31.75 (34.92)	25.40 (28.6)	15.88	E-162XN
RAS-18FXN	31.75 (34.92)	25.40 (28.6)	15.88	E-322XN
RAS-20FXN	31.75 (34.92)	25.40 (28.6)	19.05	E-322XN
RAS-24FXN	31.75 (34.92)	28.60 (31.75)	19.05	E-322XN
RAS-30FXN	38.10 (41.27)	31.75 (34.92)	22.20	E-322XN
RAS-32FXN	38.10 (41.27)	31.75 (34.92)	22.20	E-322XN

Table 2:

◆ Table ②: 3 pipe part of the 1st Multi-kit ~ Last Multi-kit

Total Capacity of Indoor Units	Pipe size (Ø mm)			Multi-kit
	Gas Low	Gas High	Liquid	
HP<16	15.88	12.70	9.53	E-52XN
6≤HP<9	19.05	15.88	9.53	E-102XN
9≤HP<12	22.20	19.05	9.53	
12≤HP<16	25.40 (28.60)	22.20	12.70	E-162XN(*)
16≤HP<18	28.60	22.20	12.70	
18≤HP<22	28.60	22.20	15.88	E-202XN
22≤HP<26	28.60	25.40	15.88	E-242XN
26≤HP	31.75	28.60	19.05	E-322XN

NOTE:

(*) In case that E-162XN is connected to 0.8~2HP Indoor Units. use Ø9.53→Ø6.35 reducer (field supplied).

Table 3:

◆ Table ③: 3 pipes part of Multi-kit ~ CH unit

Total Capacity of Indoor Units	Pipe size (Ø mm)		No.0 Group
	Gas Low	Gas High	
HP≤4	15.88	12.70	CH-4.0NE
4<HP<8	19.05	15.88	CH-8.0NE
8≤HP≤12	22.20	19.05	CH-12.0N

Table 4:

◆ Table ④: 2 pipes part of CH Unit ~ 1st Multi-kit

No.0 Group	Pipe size (Ø mm)		Multy kit
	Gas	Liquid	
CH-4.0NE	15.88	9.53	E-102SN
CH-8.0NE	19.05	9.53	
CH-12.0NE	22.20	9.53	

Table 5:

◆ Table ⑤: 2 pipe part of the Multi-kit ~ Last Multi-kit

Total Capacity of Indoor Units	Pipe size (Ø mm)		Multy kit
	Gas	Liquid	
HP<16	15.88	9.53	E-102SN
6≤HP<9	19.05	9.53	
9≤HP<12	22.20	9.53	

☛ **Table 6:**

◆ **Table ⑥: 2 pipes part of distributor**

Applicable Model	Pipe size (Ø mm)		Multi-Kit Model	
	Gas	Liquid	3~4 multi-kits	3~8 multi-kits
RAS-8FXN(E)	19.05	9.53	E-84HSN(1)*	E-108HSN(1)*
RAS-10FXN(E)	22.20	9.53		
RAS-12FXNE	25.40 (28.60)	12.70	–	
RAS-16FXN	28.60	12.70		
RAS-18FXN	28.60	15.88		
RAS-20FXN	28.60	15.88		
RAS-24FXN	28.60	15.88		
RAS-30FXN	31.75	19.05		
RAS-32FXN	31.75	19.05		

* Maximum capacity 10 HP for each Multikit.

☛ **Table 7:**

◆ **Table ⑦: From Multi-kit to Indoor Unit**

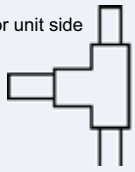
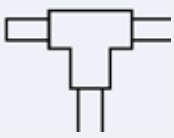
Indoor unit capacity (HP)	Pipe size (Ø mm)		Max. Allowable Length
	Gas	Liquid	
from 0.8 to 1.5	12.7	6.35(1)	15 m
2	15.88	6.35(1)	15 m
2.5 to 6	15.88	9.53	30 m
8	19.05	9.53	30 m
10	22.20	9.53	30 m

Select the suitable CH-Unit by considering the following table.

Model	Indoor Unit Quantity	Total Indoor Capacity (HP)
CH-4.0NE	from 1 to 5	HP≤4(2)
CH-8.0NE	from 1 to 8	4≤HP≤8(3)
CH-12.0NE	from 1 to 5	8≤HP≤12

The piping shown in the previous table can apply to the multikit as well as to the distributor.

In the line branch. the length of the pipe between the terminal branch (farthest from the O.U.) of three pipes (specified in the figure as “c” and “d”) and the Indoor Unit must be less than 5 m. if it is longer than 5 m use a T-branch to the liquid pipe of three pipes as shown below.

Right	Wrong
Outdoor unit side 	Outdoor unit side 

NOTES:

(1) In case that the length of pipe to the Multi-Kit exceeds 15m with the Indoor Unit 1HP to 2HP. the size of the liquid pipe should be increased to Ø9.53 respectively. Use a field supplied reducer.

(2) If the total capacity connected to the CH-Unit is 4.0 HP. the maximum capacity that the indoor unit can provide diminishes 5% in cooling mode and 10% in heating mode.

(3) If the total capacity connected to the CH-Unit is 8 HP. the maximum capacity that the indoor unit can provide diminishes 5% in cooling mode and 10% in heating mode.

7.1.6. Piping Size and Multiple connections kit for the FVSNE system

The “Uni-Piping System” is used for FSVNE units. This system uses the same pipe size as the main refrigerant pipe.

Piping systems	
Unit	Uni-Piping
RAS-3~5FSVNE	●

● Available
✕ Not available

NOTES:

For FSVNE. the pipe size and the Multi-Kit from Outdoor Unit to the last Multi-Kit is the same.

If the size of the Multi-Kit positioned after the 2nd kit is bigger than the 1st. use a kit of the same size as the 1st.

If the pipe size after the 1st branch is bigger than the pipe size between the Outdoor Unit and the 1st kit. use the pipe of the same size as the 1st kit.

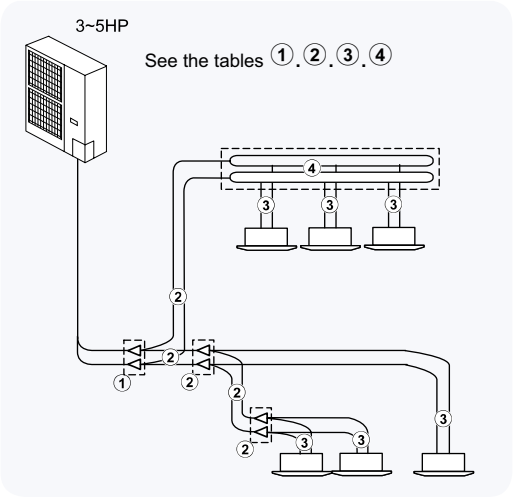


Table 1:

◆ **Table ①: Outdoor Unit ~ 1st Multi-Kit**

Unit	Pipe size (Ø mm)		Multy kit
	Gas	Liquid	
RAS-3~5FSVNE	15.88	9.53	E-102SN

The pipe size must be the same of the piping connection hole of the Outdoor Unit.

Table 2:

◆ **Table ②: 1st Multi-Kit ~ Last Branch**

Total Capacity of Indoor Units	Pipe size (Ø mm)		Multy kit
	Gas	Liquid	
HP<5.99	15.88	9.53	E-102SN

Table 3:

◆ **Table ③: Multi-Kit ~ Indoor Unit**

Indoor unit capacity (HP)	Pipe size (Ø mm)		Maximum Length of Liquid Pipe
	Gas	Liquid	
from 0.8 to 1.5	12.70	6.35*	10 m
2	15.88	6.35*	10 m
2.5 to 5	15.88	9.53	10 m

The pipe size must be the same size of the piping connection hole of the I.U.

Table 4:

◆ **Table ④: Distributor**

Applicable Model	Pipe size (Ø mm)		Multi-Kit Model	
	Gas	Liquid	3~4 Branches	3~8 Branches
RAS-3~5FSVNE	15.88	9.53	E-84HSN	E-108HSN

NOTE:

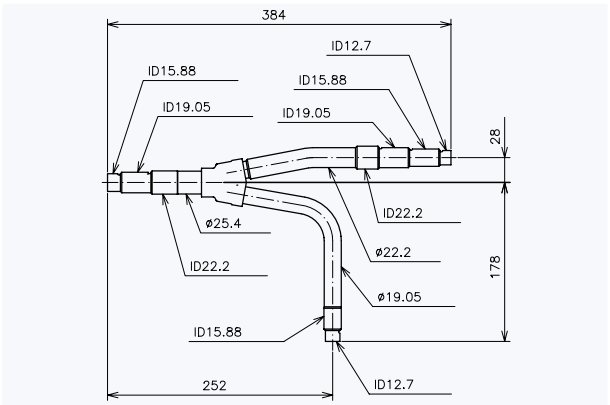
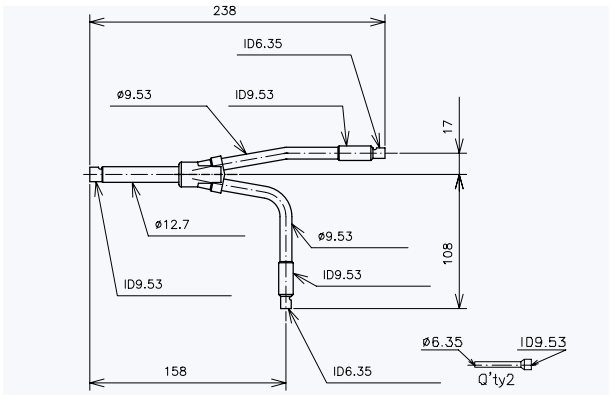
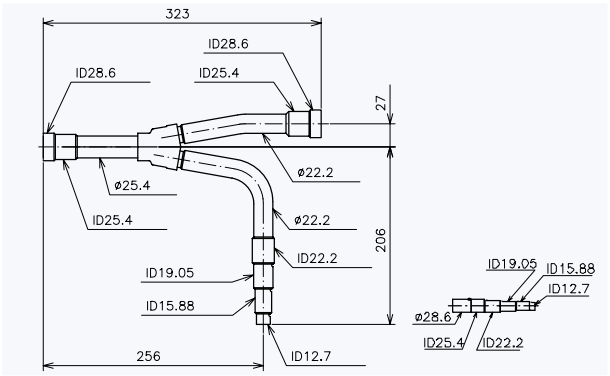
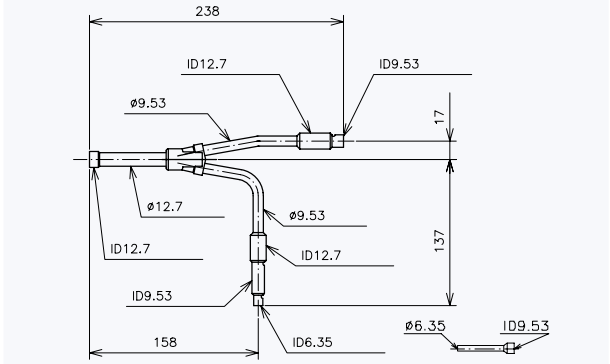
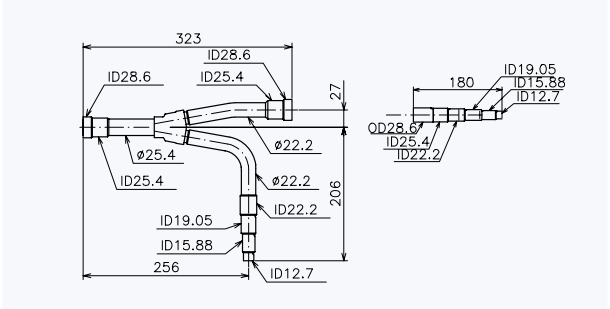
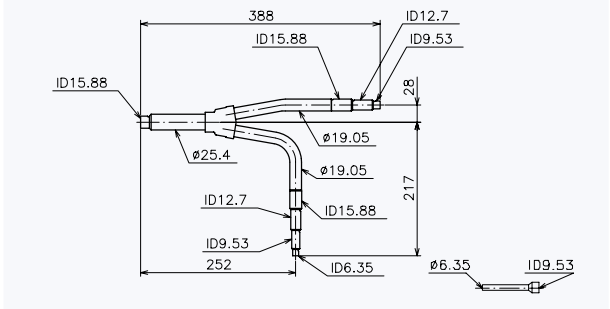
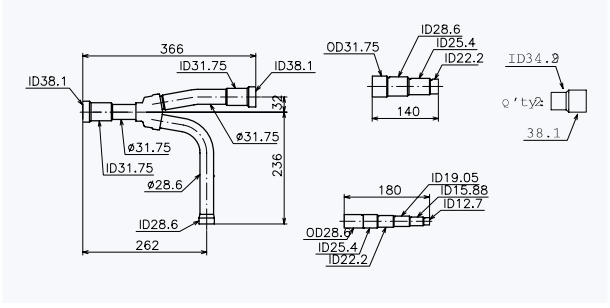
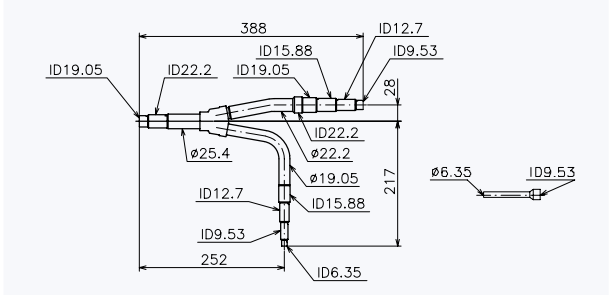
The piping shown in the previous table can apply to the multikit as well as to the distributor.

7

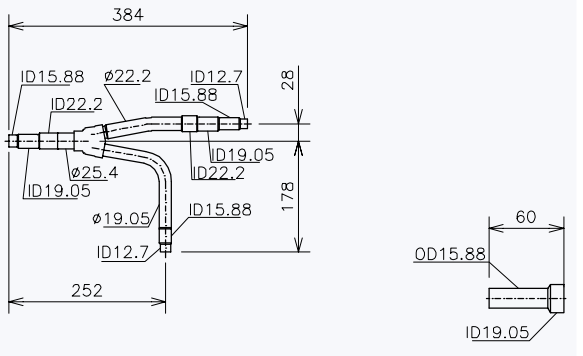
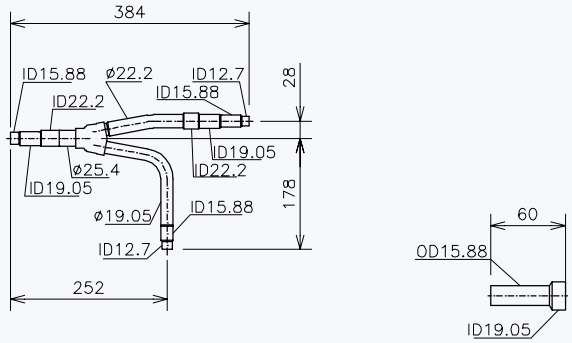
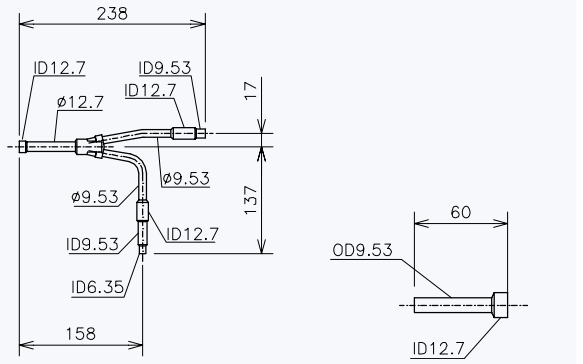
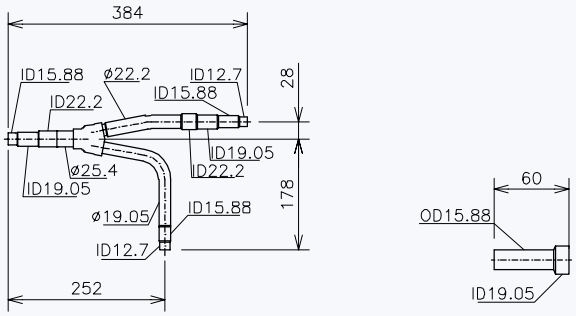
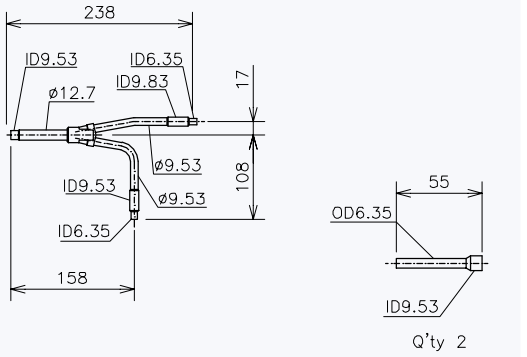
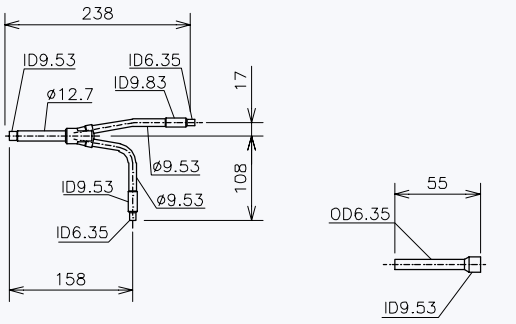
7.2. Multi-Kits and distributors

7.2.1. Size data

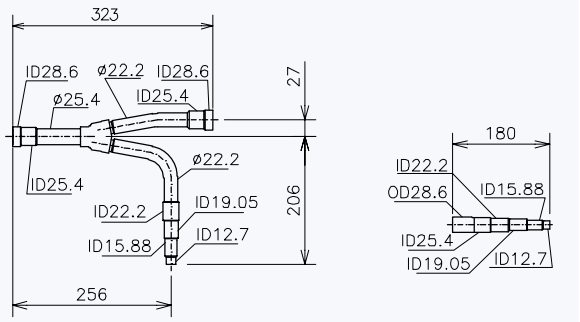
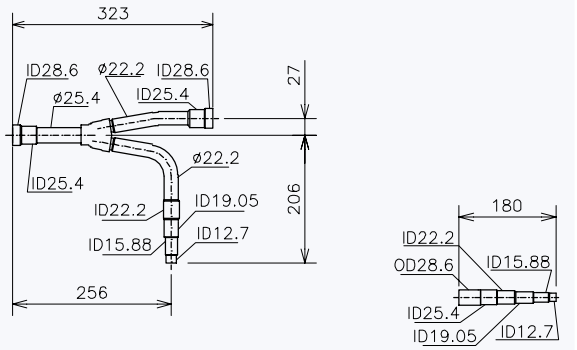
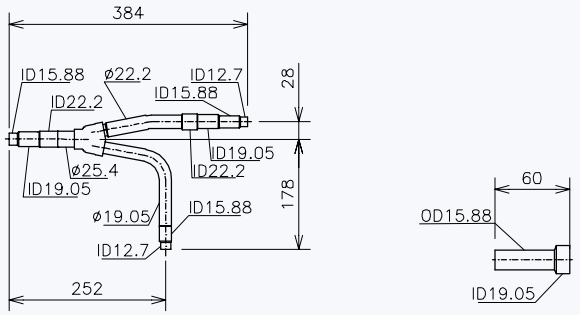
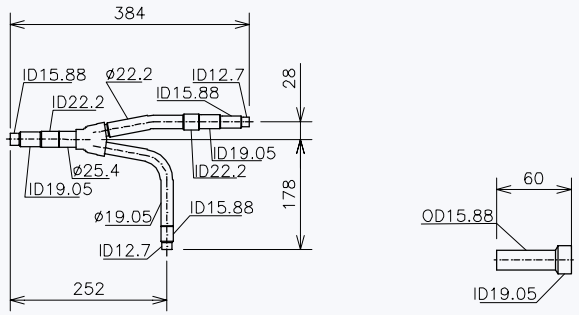
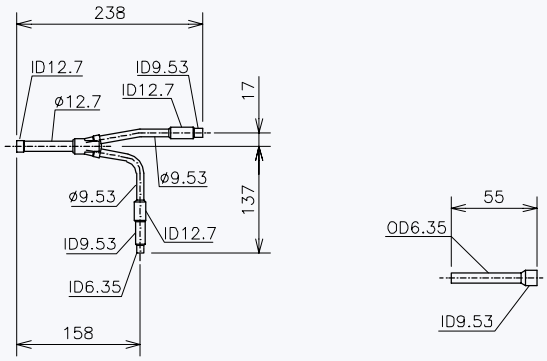
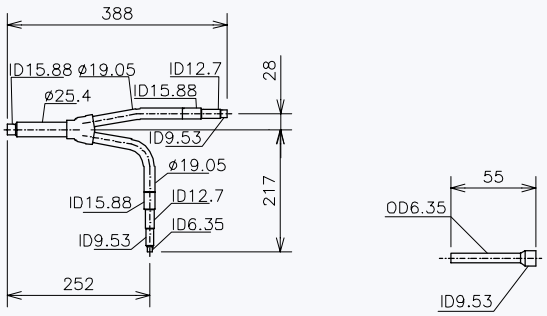
◆ **Multi-Kit for FSN(1)(E)**

	GAS PIPING	LIQUID PIPING
E-102SN		
E-162SN		
E-242SN		
E-302SN		

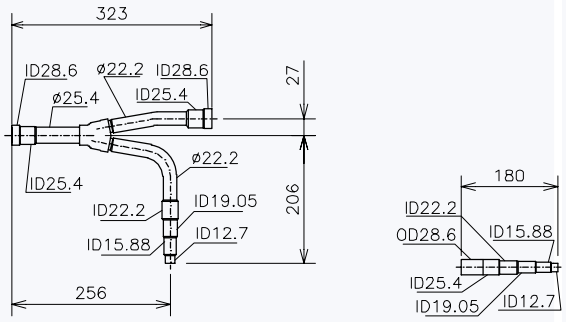
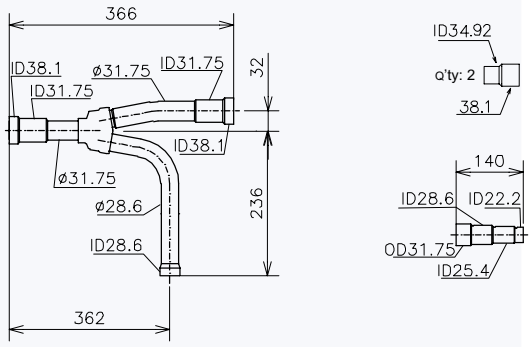
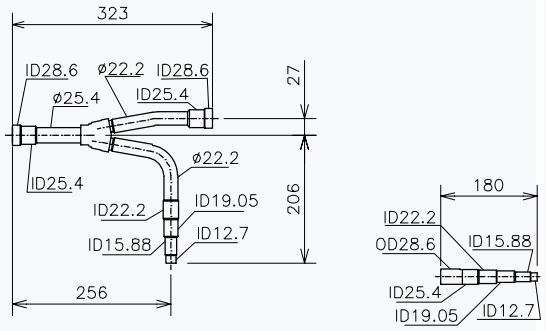
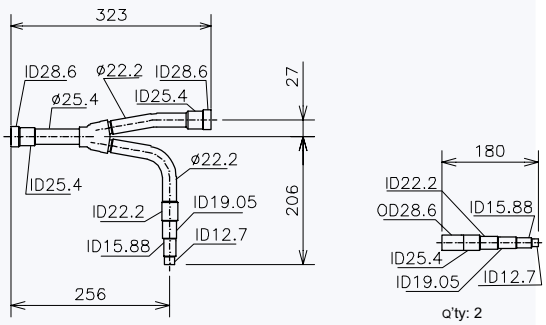
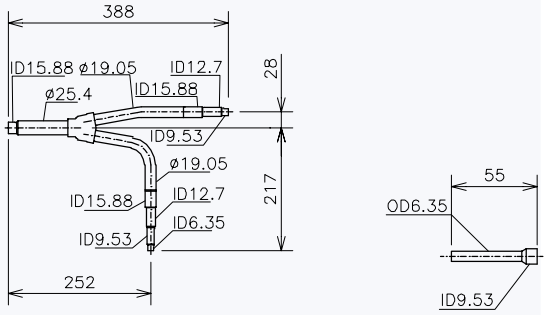
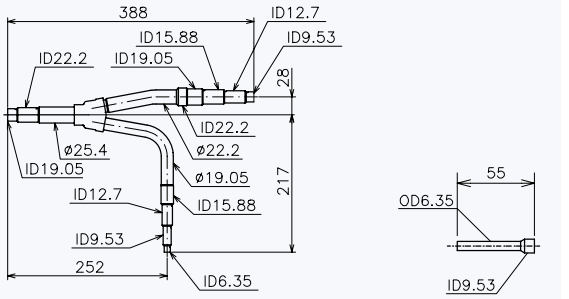
◆ Multi-Kit for FXN(E)

	E-52XN	E-102XN
GAS LINE (LOW)		
GAS LINE (HIGH)		
LIQUID PIPING		

◆ Multi-Kit for FXN(E) (cont.)

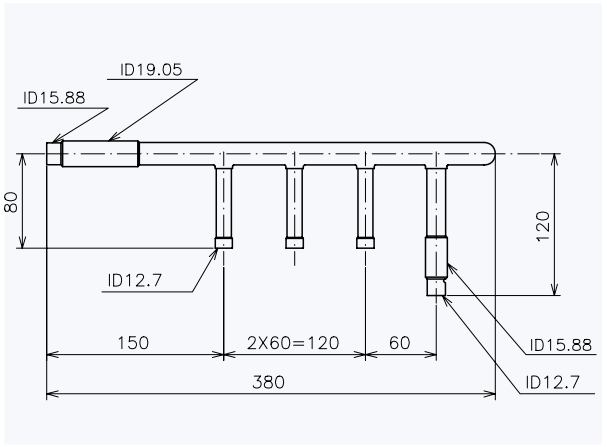
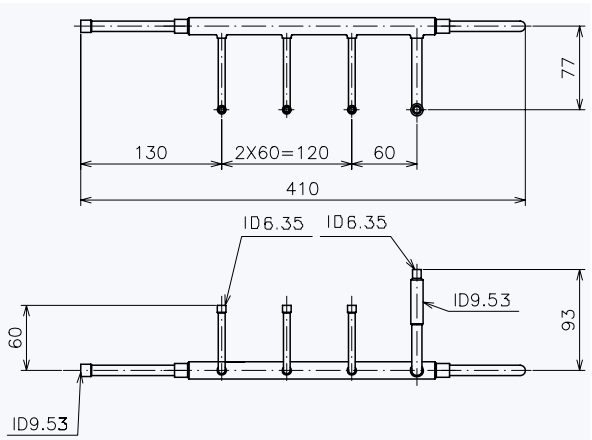
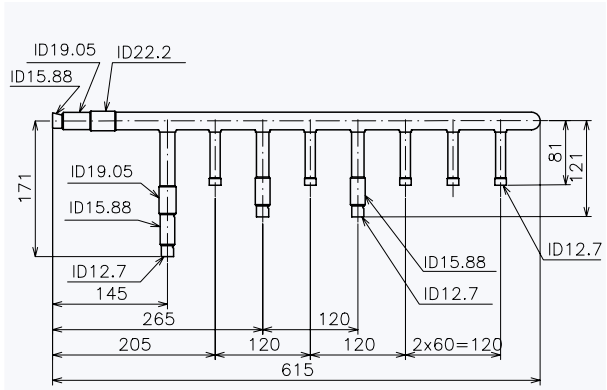
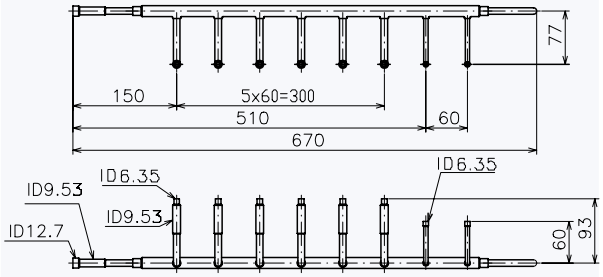
	E-162XN	E-202XN
GAS LINE (LOW)		
GAS LINE (HIGH)		
LIQUID PIPING		

◆ **Multi-Kit for FXN(E) (cont.)**

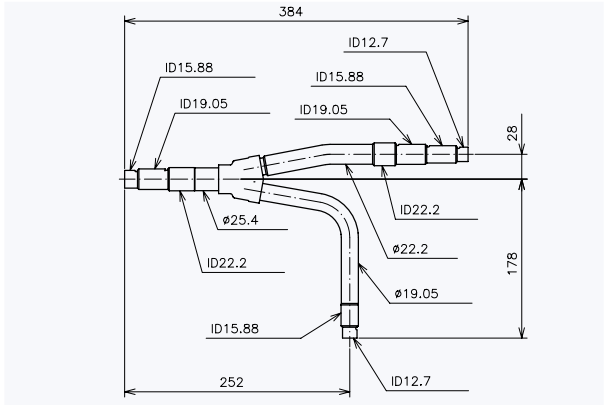
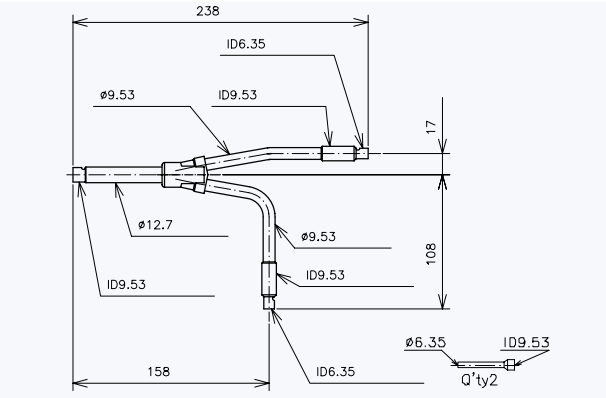
	E-242XN	E-322XN
GAS LINE (LOW)		
GAS LINE (HIGH)		
LIQUID PIPING		

7

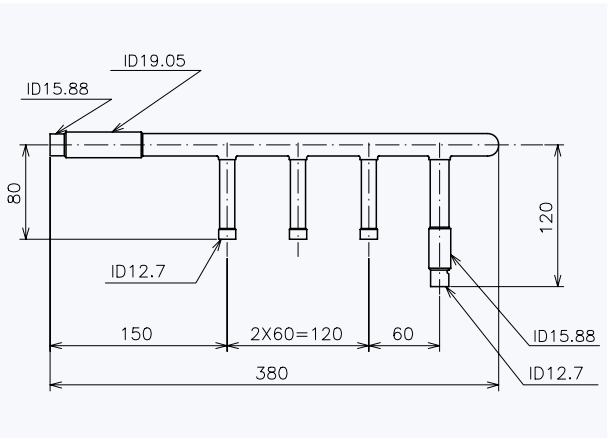
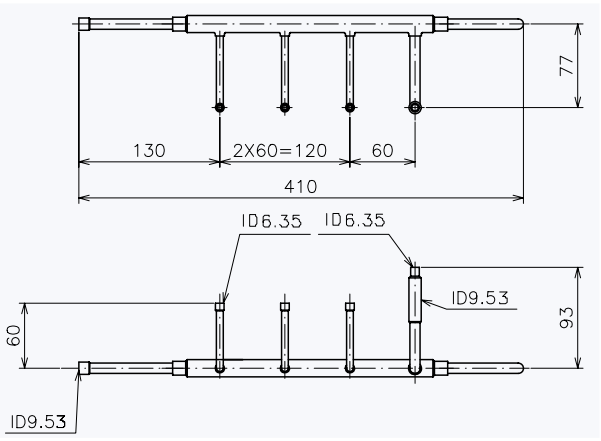
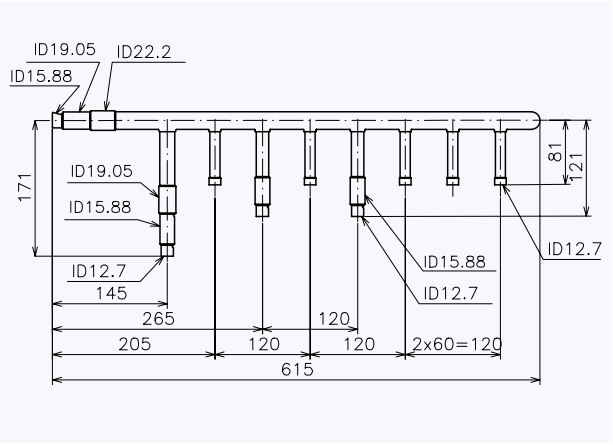
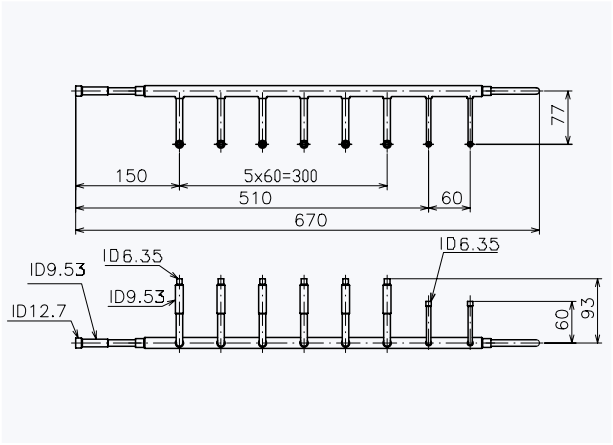
◆ Distributor for FSN(1)(E) and FXN(E)

	GAS PIPING	LIQUID PIPING
E-84HSN(1)		
E-108HSN(1)		

◆ Multi-Kit for FSVNE

	GAS PIPING	LIQUID PIPING
E-102SN		

◆ Distributor for FSVNE

	GAS PIPING	LIQUID PIPING
E-84HSN		
E-108HSN		

7

☛ **Distribution Method**

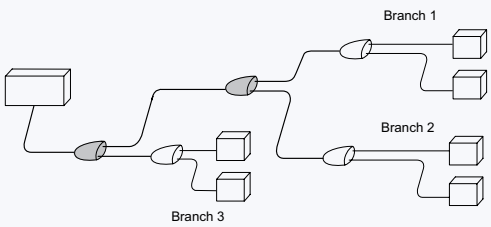
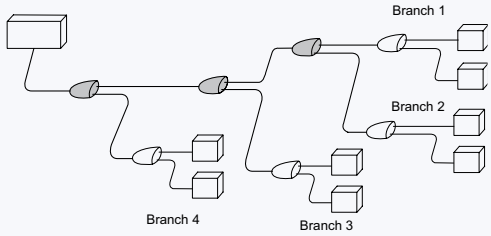
7.2.2. Distribution Method

◆ **Multy kit**

With line distribution method. it is possible to make the first or the second main pipe distribution within the third branch. And do not make the main pipe distribution. at or after the fourth branch.

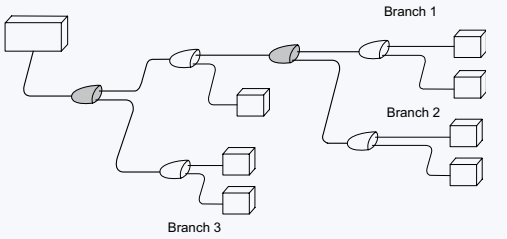
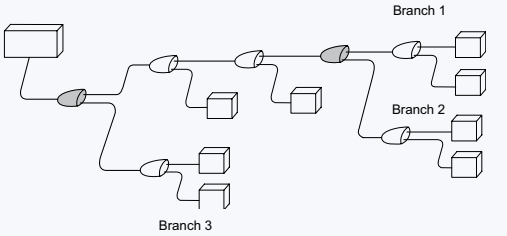
☛ Method 1:

◈ Branching method in 2nd multi-kit

Correct (More adequate distribution)	Wrong
	

☛ Method 2:

◈ Branching method in 3rd multi-kit

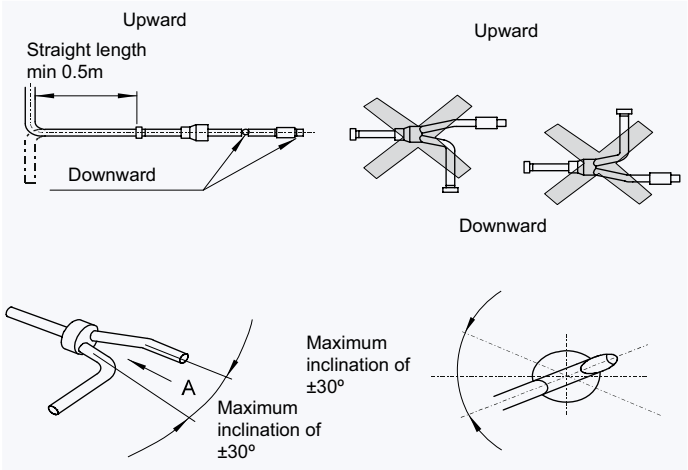
Correct (Distribution allowed)	Wrong
	

(Main Pipe Distribution: Distribution from One Multi-Kit to Two Multi-Kits)

☛ Installation Position:

◈ Installation Position

Horizontal	
Right	Wrong



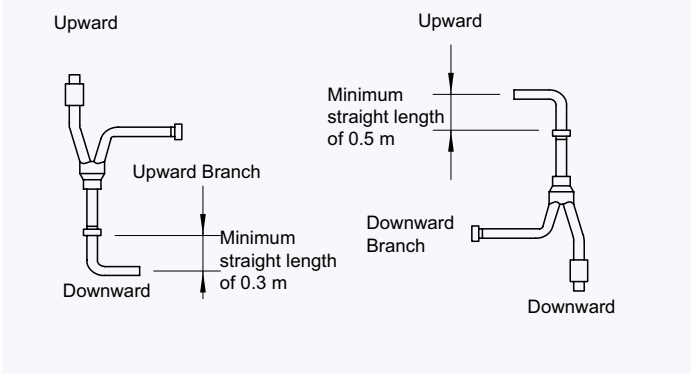
NOTE:

Locate the branch pipes on the same horizontal plane.

Make the straight length a minimum of 0.5m after the vertical bend

Vertical

Right	Right

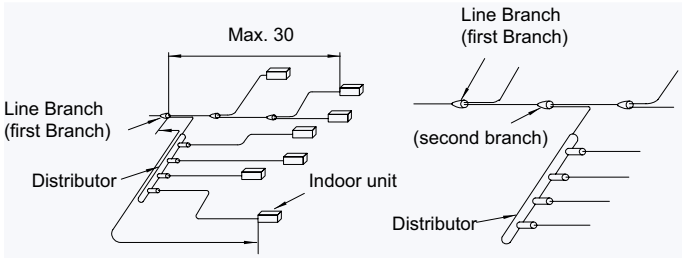


Combination of Multi-Kits

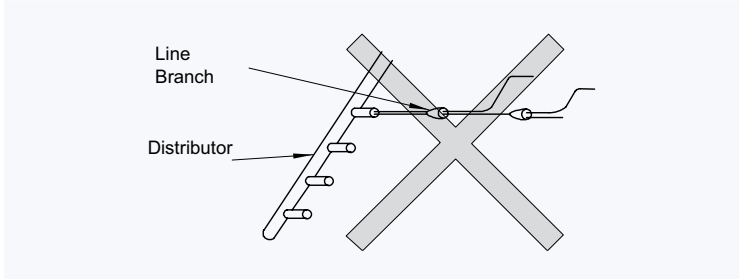
◆ Combination of Multi-Kits

It is possible to connect the input of a distributor to a chain of multikits (up to the second of multikit).

Right



Wrong



NOTE:

Do not connect a multi-kit to a distributor socket.

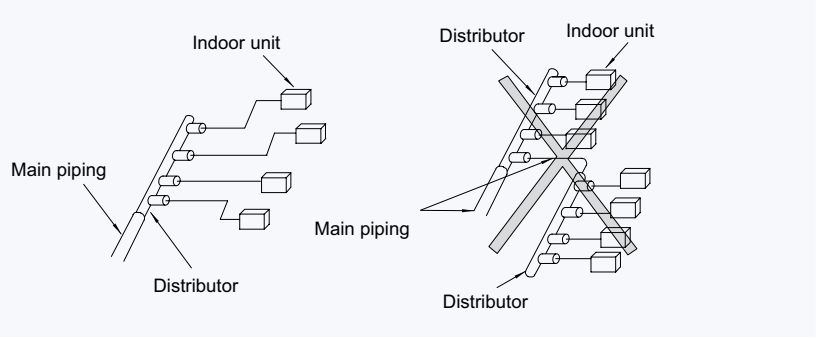
7

☛ Distributor

◆ Distributor

◈ Branching method

Right	Wrong

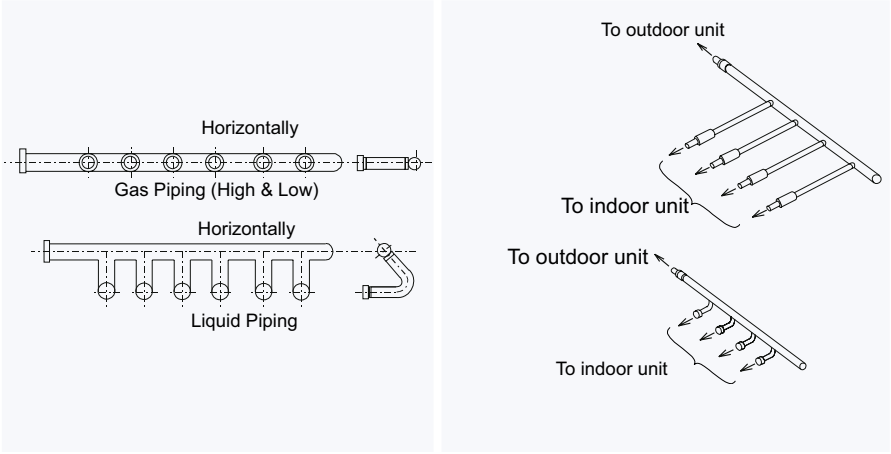


NOTE:
Do not connect two distributors consecutively.

◈ Installation Position

☛ Installation Position:

Horizontal



NOTE:
Install the connector horizontally.

CAUTION:
Seal the end of the distributor that is not connected. by brazing the factory-supplied closing pipes.

7.2.3. Piping materials

1. Prepare locally-supplied copper pipes.
2. Select the pipe size of a suitable thickness and material. Use the table below to select the required piping.

Nominal diameter		Thickness (mm)	Copper type
(mm)	(in.)		
6.35	1/4	0.80	Rolled
9.53	3/8	0.80	Rolled
12.70	1/2	0.80	Pipe/roll
15.88	5/8	1.00	Rolled
19.05	3/4	1.00	Pipe/roll
22.23	7/8	1.00	Pipe/roll
25.40	1	1.00	Piping
28.60	1-1/8	1.25	Piping
34.93	1-3/8	1.25	Piping
41.28	1-5/8	1.25	Piping
44.45	1-3/4	1.25	Piping

NOTE:

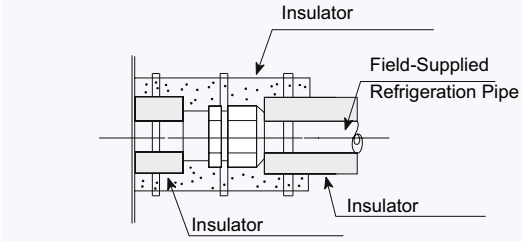
If copper pipe is used for piping bigger than Ø19.05 flaring work can not be performed.
If necessary. use a joint adapter.

3. Use clean copper pipes. Make sure there is no dust and moisture inside. Blow the inside of the pipes through with oxygen-free nitrogen to remove any dust and foreign materials before connecting pipes.
4. After connecting the refrigerant piping. seal the open space between the knockout hole and refrigerant pipes by using insulation material as shown below:

CAUTION:

Do not use saws. grindstones or other tools which might create copper dust.

When cutting pipes. secure the part to be soldered as shown in chapter 2 of the Service Manual (SMES0048)

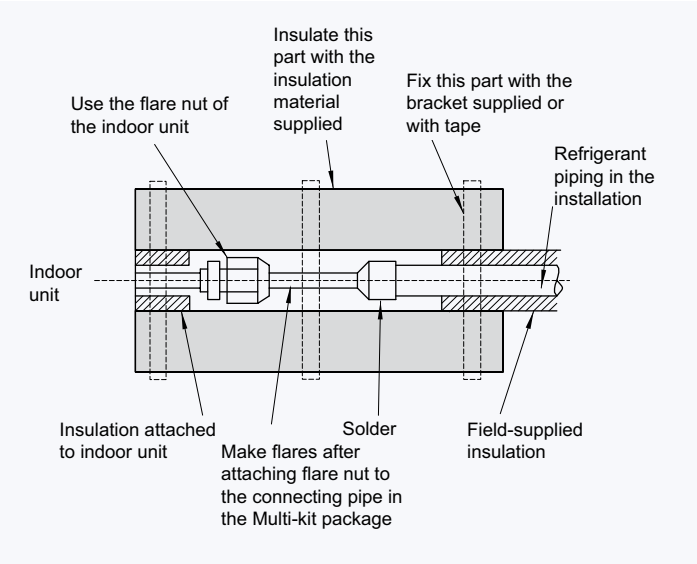


Piping connections

When connecting liquid piping for the unit where the piping is longer than 15 meters. apply a piping size of Ø9.53. Fix the connecting pipe as shown in the following figure. Use the insulation attached to the indoor unit.

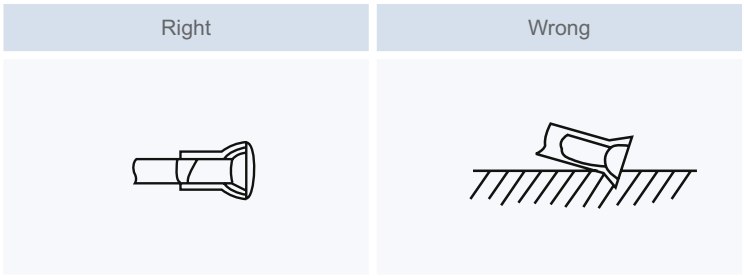
NOTE:

A system with no moisture or oil contamination will give maximum performance and life-cycle as compared with a poorly prepared system.



CAUTION:

- Cap the end of the pipe when the pipe is to be inserted through a hole.
- Do not place pipes directly on the ground without a cap or vinyl tape covering the end.



- If piping installation cannot be completed until the following day or longer. solder the ends of the piping closed and load with oxygen-free nitrogen using an access device such as a Schrader valve to avoid moisture and contamination by extraneous particles.
- Do not use insulation material that contents NH3 because can damage cooper pipe material and can be a source of future leakage.

◆ **Insulation**

NOTE:

When polyethylene foam is applied. a thickness of 10mm for the liquid piping and 15mm to 20mm for the gas piping is recommended.

Attach insulation packet with multi-kit to each branch utilizing vinyl tape. Also attach insulation to field-supplied piping to prevent capacity decrease due to ambient air conditions and dewing on pipe surface caused by low pressure.

CAUTION:

Perform insulation work when the surface temperature reaches the room temperature. Otherwise it is possible that the insulation will melt.

If the ends of the piping system are open after accomplishing piping work. securely attach caps or vinyl bags to the ends of the piping. avoiding the invasion of moisture and dust.

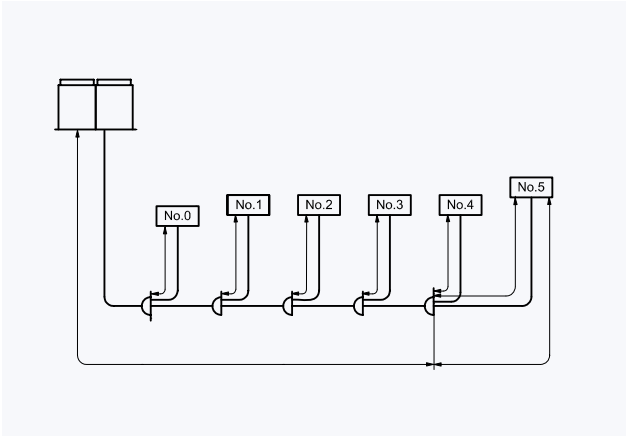
7.3. Amount of refrigerant loaded

7.3.1. Guide to calculating additional refrigerant load (R410A)

Although refrigerant has already been loaded into this unit. additional refrigerant needs to be loaded based on length of piping and indoor units.

A. The additional quantity of refrigerant should be determined according to the following procedure and loaded into the system.

B. Make a note of the additional quantity of refrigerant in order to facilitate subsequent servicing.



Refrigerant Charging Calculation:

Calculating Method of Additional Refrigerant Charge (W Kg)

Calculate the additional refrigerant charge amount according to steps 1.1 to 1.2.

Step 1:

1.1.Calculation of the additional refrigerant charge for liquid piping(W_1 kg)

(Fill in the following table)

Pipe diameter (mm)	Total pipe length (m)	Additional Charge (Kg/m)	Subtotal (Kg)
22.2		0.390	
19.05		0.280	
15.88		0.190	
12.7		0.120	
9.53		0.07	
6.35		0.03	
Quantity of additional refrigerant charge for liquid piping (W_1) = kg			

1.2. W_0 is the Outdoor Unit refrigerant charge before shipment.

Outdoor unit FSN(E)	Outdoor Unit Ref. Charge W_o (kg)
RAS-5FSN	5.4
RAS-8FSN1E	7.0
RAS-10FSN1E	8.5
RAS-12FSN1E	9.0
RAS-14FSN1	13.0
RAS-16FSN1	13.0
RAS-18FSN1	19.0
RAS-20FSN1	19.0
RAS-24FSN1	23.0
RAS-28FSN1	25.0
RAS-32FSN1	26.0
RAS-36FSN	31.0
RAS-42FSN	32.0

Outdoor unit FXN(E)	Outdoor Unit Ref. Charge W_o (kg)
RAS-8FXN(E)	8.5
RAS-10FXN(E)	9.5
RAS-12FXN(E)	10.0
RAS-16FXN	19.0
RAS-18FXN	19.0
RAS-20FXN	19.0
RAS-24FXN	26.0
RAS-30FXN	26.0
RAS-32FXN	26.0

Outdoor Unit FSVNE	Outdoor Unit Ref. Charge W W_o (kg)
RAS-3FSVNE	1.7
RAS-4FSVNE	2.8
RAS-5FSVNE	3.0

1.3.Refrigerant charge of the indoor units that need additional charge

Power	Additional charge W_2 (kg)
0.8~6.0	0
8.0-10.0	1

☛ Step 2:

2 Calculation of Total Additional Charge Amount (W kg). Enter weights W_1 and W_2 calculated in points 1.1 and 1.3 into the following formula.

Total quantity of additional charge $W = W_1 + W_2$

- Load

  Load the refrigerant (R410A) into the system according to the instructions described in the “Service Manual”.

- Record of Additional Charge

  Record the Refrigerant Charge quantity in order to facilitate maintenance and servicing activities.

  Total refrigerant load in this system is calculated with the following formula.

This system: W = [ ] + [ ] = [Kg]

Total additional load W	
Total Ref. Charge of this System	
Date of refrigerant load	
Year [ ] Month [ ] Day	

Total Ref. Charge of this System = [W_0] + [W]

This System = [ ] + [ ] = [Kg]

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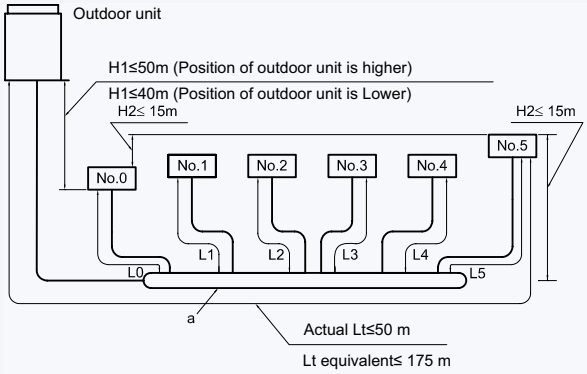
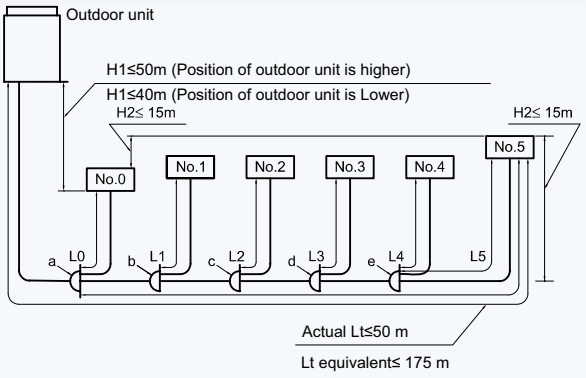
7.3.2. Samples

◆ **Total System of SET-FREE (FSN(1)(E) series)**

ITEM			MULTI-KITS SYSTEM
Example of Systems This figure shows examples of 6 Indoor Units combined with one Outdoor Unit. The refrigerant pipes are shown as single line in the diagrams. However. liquid line piping and gas line piping are required in the field.			
Total piping length			≤ 300 m
Maxmum piping length	Actual Length		Lt ≤ 150 m
	Equivalent Length		Lt ≤ 175 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.		H1 ≤ 50 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.		H1 ≤ 40 m
Maximum Lift between Each Indoor Unit. or Multi-Kit and indoor Unit			H2 ≤ 15 m
Maximum Piping Length between Multi-Kit and Indoor Unit	Between the “a” kit and the farthest Indoor Unit		L ≤ 40 m
	Between Each Multi-Kit and Each Indoor Unit		L0. L1. L2. L3. L4. L5 ≤ 30 m
Selecting the distributor.		RAS-10/12FSN1(E)	Use E-108HSN
		RAS-8FSN1(E)	Use E-108HSN
		RAS-5FSN	Use E-108HSN
Quaintly of Additional Refrigerant Charge The quantity is calculated by the following equation: $W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ 1) W_{11} (kg): (Total Length (m) of Ø19.05 Liquid Piping) x 0.28 W_{12} (kg): (Total Length (m) of Ø15.88 Liquid Piping) x 0.19 W_{13} (kg): (Total Length (m) of Ø12.7 Liquid Piping) x 0.12 W_{14} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07 W_{15} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.030 2) W_2 (kg): Total quantity of Additional Refrigerant of Each Indoor Unit (kg)		Liquid Piping	**Example: For RAS-5FSN** Mark / Lt-L5 / L0 / L1 / L2 / L3 / L4 / L5 Size / Ø9.53 / Ø6.35 / Ø6.35 / Ø6.35 / Ø6.35 / Ø6.35 / Ø6.35 Length / 61 / 5 / 3 / 5 / 3 / 3 / 5 W_{14} = 61 x 0.07 = 4.27 W_{15} = (5+3+5+3+5+3) x 0.03 = 0.72
		Indoor unit	**Example: For RAS-5FSN** Indoor Unit No.. / 0 / 1 / 2 / 3 / 4 / 5 Corresponding power (HP) / 1 / 1 / 1 / 1 / 1 / 1 Additional refrigerant Quantity / Indoor units that do not require ref. charge W_2 = 0
		Total	$W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ = 0 + 0 + 0 + 0 + 4.27 + 0.72 + 0 = 4.99 kg

ITEM		MULTI-KITS UNI-PIPING SYSTEM
Example of Systems This figure shows examples of 6 Indoor Units combined with one Outdoor Unit. The refrigerant pipes are shown as a single line in the diagrams. However. liquid line piping and gas line piping are required in the field.		
Total piping length		≤ 300 m
Maxmum piping length	Actual Length	Lt ≤ 150 m
	Equivalent Length	Lt ≤ 175 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.	H1 ≤ 50 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.	H1 ≤ 40 m
Maximum Lift between Each Indoor Unit. or Multi-Kit and indoor Unit		H2 ≤ 15 m
Maximum Piping Length between Multi-Kit and Indoor Unit	Between the “a” kit and the farthest Indoor Unit	L ≤ 40 m
	Between Each Multi-Kit and Each Indoor Unit	L0. L1. L2. L3. L4. L5 ≤ 30 m
Choice of each Multi-kit	RAS-10FSN1(E)	Use E-102SN at “a. b. c. d and e”).
	RAS-8FSN1(E)	Use E-102SN at “a. b. c. d and e”).
	RAS-5FSN	Use E-102SN at “a. b. c. d and e”).
Quantity of Additional Refrigerant Charge The quantity is calculated by the following equation: $W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ 1) W_{11} (kg): (Total Length (m) of Ø19.05 Liquid Piping) x 0.28 W_{12} (kg): (Total Length (m) of Ø15.88 Liquid Piping) x 0.19 W_{13} (kg): (Total Length (m) of Ø12.7 Liquid Piping) x 0.12 W_{14} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07 W_{15} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03 2) W_2 (kg): Total quantity of Additional Refrigerant of Each Indoor Unit (kg)	Liquid Piping	**Example: For RAS-8FSN1E** Mark: Lt-L5 | L0 | L1 | L2 | L3 | L4 | L5 Size: Ø9.53 | Ø6.35 | Ø6.35 | Ø6.35 | Ø6.35 | Ø6.35 | Ø6.35 Length: 51 | 5 | 3 | 5 | 3 | 5 | 3 W_{14} = 51 x 0.07 = 3.57 W_{15} = (5+3+5+3+5+3) x 0.03 = 0.72
	Indoor unit	**Example: For RAS-8FSN1E** Indoor Unit No.. | 0 | 1 | 2 | 3 | 4 | 5 Corresponding power (HP) | 1 | 1 | 1 | 1 | 2 | 2 Additional refrigerant Quantity | Indoor units that do not require ref. charge W_2 = 0
	Total	$W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ = 0 + 0 + 0 + 0 + 3.57 + 0.72 + 0 = 4.29 kg

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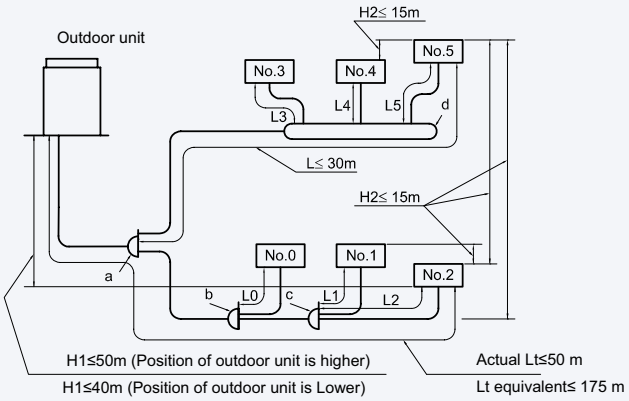
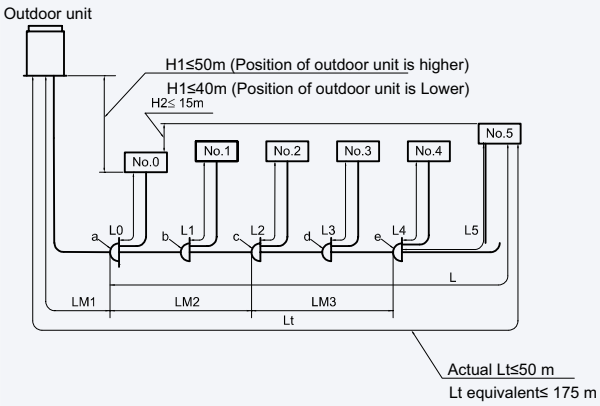
ITEM			DISTRIBUTOR AND MULTI-KITS UNI-PIPING SYSTEM
Example of Systems This figure shows examples of 6 Indoor Units combined with one Outdoor Unit. The refrigerant pipes are shown as a single line in the diagrams. However. liquid line piping and gas line piping are required in the field.			
Total piping length			≤ 300 m
Maxmum piping length	Actual Length		Lt ≤ 150 m
	Equivalent Length		Lt ≤ 175 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.		H1 ≤ 50 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.		H1 ≤ 40 m
Maximum Lift between Each Indoor Unit. or Multi-Kit and indoor Unit			H2 ≤ 15 m
Maximum Piping Length between Multi-Kit and Indoor Unit	Between the “a” kit and the farthest Indoor Unit		L ≤ 40 m
	Between Each Multi-Kit and Each Indoor Unit		L0. L1. L2. L3. L4. L5 ≤ 30 m
		RAS-5/8FSN(1)(E)	Use E-102SN at “a. b and c”. E-84HSN at “d”.
		RAS-10FSN1(E)	Use E-102SN at “a. b and c”. E-108HSN at “d”.
Quantity of Additional Refrigerant Charge The quantity is calculated by the following equation: $W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ 1) W_{11} (kg): (Total Length (m) of Ø19.05 Liquid Piping) x 0.28 W_{12} (kg): (Total Length (m) of Ø15.88 Liquid Piping) x 0.19 W_{13} (kg): (Total Length (m) of Ø12.7 Liquid Piping) x 0.12 W_{14} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07 W_{15} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03 2) W_2 (kg): Total quantity of Additional Refrigerant of Each Indoor Unit (kg)		Liquid Piping	**Example: For RAS-10FSN1E** Mark: Lt+L-(L2+L5) | L0 | L1 | L2 | L3 | L4 | L5 Size: Ø9.54 | Ø6.35 | Ø6.35 | Ø6.35 | Ø6.35 | Ø6.35 | Ø6.35 Length: 71 | 5 | 3 | 5 | 3 | 5 | 3 W_{14} = 71 x 0.07 = 4.97 W_{15} = (5+3+5+3+5+3) x 0.03 = 0.72
		Indoor unit	**Example: For RAS-10FSN1E** Indoor Unit No.. | 0 | 1 | 2 | 3 | 4 | 5 Corresponding power (HP) | 1 | 1 | 2 | 2 | 2 | 2 Additional refrigerant Quantity | Indoor units that do not require ref. charge In order from the smaller Indoor Unit W_2 = 0
		Total	$W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ = 0 + 0 + 0 + 0 + 4.97 + 0.72 + 0 = 5.69 kg

ITEM		MULTI-KITS SYSTEM WITH REDUCTION
Example of Systems **This figure shows examples of 6 Indoor Units combined with one Outdoor Unit.** **The refrigerant pipes are shown as a single line in the diagrams.** **However. liquid line piping and gas line piping are required in the field.**		
Total piping length		≤ 300 m
Maxmum piping length	Actual Length	Lt ≤ 150 m
	Equivalent Length	Lt ≤ 175 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.	H1 ≤ 50 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.	H1 ≤ 40 m
Maximum Lift between Each Indoor Unit. or Multi-Kit and indoor Unit		H2 ≤ 15 m
Maximum Piping Length between Multi-Kit and Indoor Unit	Between the “a” kit and the farthest Indoor Unit	L ≤ 40 m
	Between Each Multi-Kit and Each Indoor Unit	L0. L1. L2. L3. L4. L5 ≤ 30 m
Choice of each Multi-kit	RAS-12/14/16FSN1(E)	Use E-162SN at a. b. and E-102SN at c. d and e.

Quantity of Additional Refrigerant Charge

The quantity is calculated by the following equation:

$W\ (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$

1) W_{11} (kg): (Total Length (m) of Ø19.05 Liquid Piping) x 0.28

W_{12} (kg): (Total Length (m) of Ø15.88 Liquid Piping) x 0.19

W_{13} (kg): (Total Length (m) of Ø12.7 Liquid Piping) x 0.12

W_{14} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07

W_{15} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03

2) W_2 (kg): Total quantity of Additional Refrigerant of Each Indoor Unit (kg)

Liquid Piping

Example: For RAS-16FSN1

Mark	LM1	LM2	LM3	L0	L1	L2	L3	L4	L5
Size	Ø12.7	Ø12.7	Ø9.53	Ø6.35	Ø6.35	Ø6.35	Ø6.35	Ø9.53	Ø9.53
Length	40	10	10	10	15	5	5	4	3

W_{13} = (40+10) x 0.120 = 6

W_{14} = (10+4+3) x 0.07 = 1.19; W_{15} = (10+15+5+5) x 0.03 = 1.05

Indoor unit

Example: For RAS-16FSN1

Indoor Unit No..	0	1	2	3	4	5
Corresponding power (HP)	2	2	2	2	4	4
Additional refrigerant Quantity	Indoor units that do not require ref. charge					

In order from the smaller Indoor Unit

W_2 = 0

Total

$W\ (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$

= 0 + 0 + 6 + 0 + 1.19 + 1.05 + 0 = 8.24 kg

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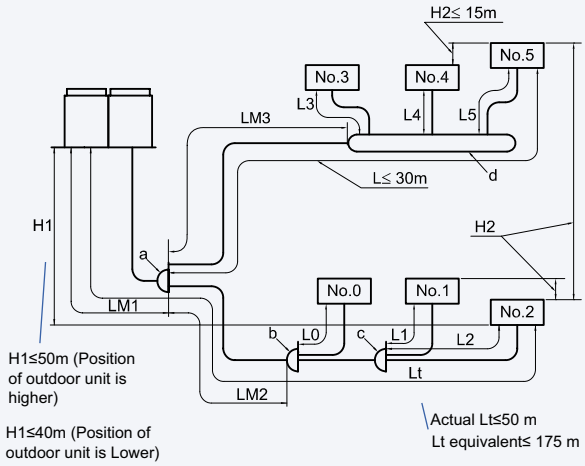
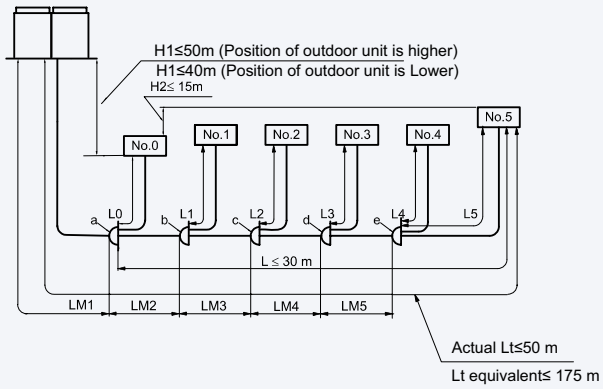
ITEM		DOWN-SIZE DISTRIBUTOR AND MULTI-KITS SYSTEM WITH REDUCTION
Example of Systems This figure shows examples of 6 Indoor Units combined with one Outdoor Unit. The refrigerant pipes are shown as a single line in the diagrams. However. liquid line piping and gas line piping are required in the field.		
Total piping length		≤ 300 m
Maxmum piping length	Actual Length	Lt ≤ 150 m
	Equivalent Length	Lt ≤ 175 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.	H1 ≤ 50 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.	H1 ≤ 40 m
Maximum Lift between Each Indoor Unit. or Multi-Kit and indoor Unit		H2 ≤ 15 m
Maximum Piping Length between Multi-Kit and Indoor Unit	Between the “a” kit and the farthest Indoor Unit	L ≤ 40 m
	Between Each Multi-Kit and Each Indoor Unit	L0. L1. L2. L3. L4. L5 ≤ 30 m
Choice of each Multi-kit		**Example: For RAS-20FSN1** Mark: Multy kit; a: E-242SN; b.c: E-102SN; d: E-84HSN
Quantity of Additional Refrigerant Charge The quantity is calculated by the following equation: $W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ 1) W_{11} (kg): (Total Length (m) of Ø19.05 Liquid Piping) x 0.28 W_{12} (kg): (Total Length (m) of Ø15.88 Liquid Piping) x 0.19 W_{13} (kg): (Total Length (m) of Ø12.7 Liquid Piping) x 0.12 W_{14} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07 W_{15} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03 2) W_2 (kg): Total quantity of Additional Refrigerant of Each Indoor Unit (kg)	Liquid Piping	**Example: For RAS-20FSN1** Mark: LM1 LM2 LM3 L0 L1 L2 L3 L4 L5 Size: Ø15.88 Ø9.53 Ø9.53 Ø6.35 Ø6.35 Ø9.53 Ø9.53 Ø9.53 Ø9.53 Length: 50 20 20 5 3 5 3 5 3 W_{12} = (40+10) x 0.19 = 9.5 W_{14} = (20+20+5+3+5+3) x 0.07 = 3.92; W_{15} = (5+3) x 0.03 = 0.24
	Indoor unit	**Example: For RAS-20FSN1** Indoor Unit No.. 0 1 2 3 4 5 Corresponding power (HP) 2 2 4 4 4 4 Additional refrigerant Quantity: Indoor units that do not require ref. charge In order from the smaller Indoor Unit W_2 = 0
	Total	$W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ = 0 + 9.5 + 0 + 3.92 + 0.24 + 0 = 13.66 kg

ITEM		LINE BRANCH SYSTEM WITH REDUCTION
Example of Systems This figure shows examples of 6 Indoor Units combined with one Outdoor Unit. The refrigerant pipes are shown as a single line in the diagrams. However. liquid line piping and gas line piping are required in the field.		
Total piping length		≤ 300 m
Maxmum piping length	Actual Length	Lt ≤ 150 m
	Equivalent Length	Lt ≤ 175 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.	H1 ≤ 50 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.	H1 ≤ 40 m
Maximum Lift between Each Indoor Unit. or Multi-Kit and indoor Unit		H2 ≤ 15 m
Maximum Piping Length between Multi-Kit and Indoor Unit	Between the “a” kit and the farthest Indoor Unit	L ≤ 40 m
	Between Each Multi-Kit and Each Indoor Unit	L0. L1. L2. L3. L4. L5 ≤ 30 m

Choice of each Multi-kit

Example: For RAS-32FSN1

Mark	a	b.c	d	e
Multy kit	E-302SN	E-242SN	E-162SN	E-102SN

Quantity of Additional Refrigerant Charge

The quantity is calculated by the following equation:

$W\ (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$

1) W_{11} (kg): (Total Length (m) of Ø19.05 Liquid Piping) x 0.28
   W_{12} (kg): (Total Length (m) of Ø15.88 Liquid Piping) x 0.190
   W_{13} (kg): (Total Length (m) of Ø12.7 Liquid Piping) x 0.120
   W_{14} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07
   W_{15} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03
2) W_2 (kg): Total quantity of Additional Refrigerant of Each Indoor Unit (kg)

Liquid Piping

Example: For RAS-32FSN1

Mark	LM1	LM2	LM3	LM4	LM5	L0	L1	L2	L3	L4	L5
Size	Ø19.05	Ø15.88	Ø15.88	Ø12.7	Ø9.53	Ø9.53	Ø9.53	Ø9.53	Ø9.53	Ø9.53	Ø9.53
Length	10	10	10	5	5	10	15	5	5	4	3

W_{11} = 10 x 0.28 = 2.8; W_{12} = (10+10) x 0.19 = 3.8;
W_{13} = 5 x 0.12 = 0.6; W_{14} = (5+10+15+5+5+4+3) x 0.07 = 3.29

Indoor unit

Example: For RAS-32FSN1

Indoor Unit No..	0	1	2	3	4	5
Corresponding power (HP)	5	5	5	5	5	5
Additional refrigerant Quantity	Indoor units that do not require ref. charge					

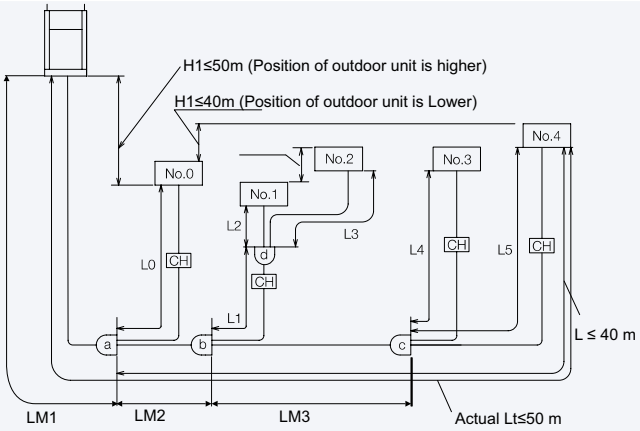
W_2 = 0

Total

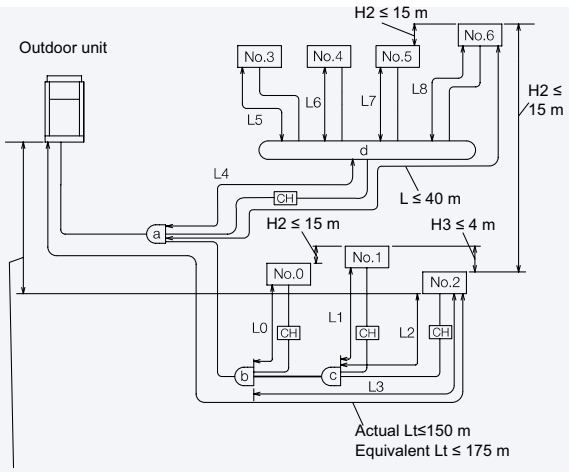
$W\ (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$
= 2.8 + 3.8 + 0.6 + 3.29 + 0 + 0 = 10.49 kg

7

◆ Total System of SET-FREE (FXN series)

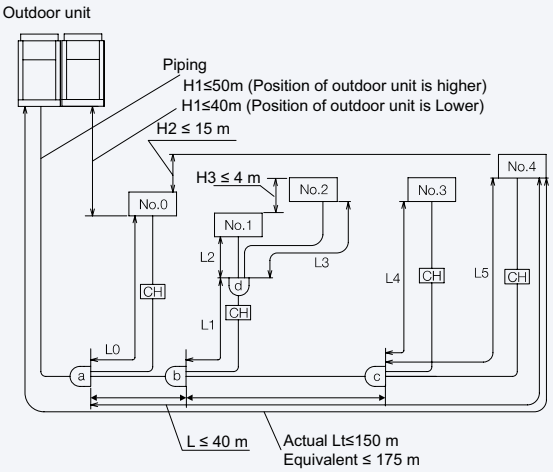
ITEM		LINE BRANCH SYSTEM DOWN-SIZE SYSTEM
Example of Systems This figure shows examples of 5 Indoor Units combined with one Outdoor Unit. The refrigerant pipes are shown as a single line in the diagrams. However. low and high pressure gas piping is required in the installation between the outdoor unit and the CH unit. The gas pipe is also necessary between the CH unit and the Indoor Unit. Liquid pipe is going from Multi-Kit to Indoor Unit.		
Total piping length		≤ 300 m
Maxmum piping length	Actual Length	Lt ≤ 150 m
	Equivalent Length	Lt ≤ 175 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.	H1 ≤ 50 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.	H1 ≤ 40 m
Maximum Lift between Each Indoor Unit. or Multi-Kit and indoor Unit		H2 ≤ 15 m
Maximum Lift between Each Indoor Unit connected to the same CH unit.		H3 ≤ 4 m
Maximum Piping Lift between Each CH unit.		≤ 15 m
Maximum Piping Length between Multi-Kit and Indoor Unit	Between the “a” kit and the farthest Indoor Unit	L ≤ 40 m
	Between Each Multi-Kit and Each Indoor Unit	L0. L1+ L2. L1+ L3. L4. L5 ≤ 30 m
	Between last Multi-Kit and the farthest Indoor Unit	(*1)L4. L5 ≤ 5 m
Choice of each Multi-kit		**Example: For RAS-8FXNE** Mark: a,b = Multy kit E-102XN; c = E-52XN; d = E-102SN In case of using Indoor Unit as exclusive cooling. use Multi-Kit of FSN1(E)
Quantity of Additional Refrigerant Charge The quantity is calculated by the following equation: W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2 1) W_{11} (kg): (Total Length (m) of Ø19.05 Liquid Piping) x 0.28 W_{12} (kg): (Total Length (m) of Ø15.88 Liquid Piping) x 0.19 W_{13} (kg): (Total Length (m) of Ø12.7 Liquid Piping) x 0.12 W_{14} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07 W_{15} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03 2) W_2 (kg): Total quantity of Additional Refrigerant of Each Indoor Unit (kg)	Liquid Piping	**Example: For RAS-8FXNE** Mark: LM1 LM2 LM3 L1 L0 L2 L3 L4 L5 Size: Ø9.53 / Ø6.35 Length: 20 10 10 2 13 8 8 5 5 W_{14} = (20 +10 +10 + 2) x 0.07 = 2.94; W_{15} = (13+8+8+5+5) x 0.03 = 1.17
	Indoor unit	**Example: For RAS-8FXN(E)** Indoor Unit No.. 0 1 2 3 4 Corresponding power (HP) 1 1.5 1.5 2 2 Additional refrigerant Quantity: Indoor units that do not require ref. charge
	Total	W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2 = 0 + 0 + 0 + 2.94 + 1.17 + 0 = 4.11 kg

(1*): If piping length between main Multi-Kit “c” and the farthest Indoor Unit is longer than 5m. use the T-branch from the kit for the liquid piping. See section 7.1.5).

ITEM		MULTI-KITS SYSTEM WITH REDUCTION
Example of Systems This figure shows an example of 7 Indoor Units combined with one Outdoor Unit. The refrigerant pipes are shown as a single line in the diagrams. However. low and high pressure gas piping is required in the installation between the outdoor unit and the CH unit. The gas pipe is also necessary between the CH unit and the Indoor Unit. Liquid pipe is going from Multi-Kit to Indoor Unit.		
Total piping length		≤ 300 m
Maxmum piping length	Actual Length	Lt ≤ 150 m
	Equivalent Length	Lt ≤ 175 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.	H1 ≤ 50 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.	H1 ≤ 40 m
Maximum Lift between Each Indoor Unit. or Multi-Kit and indoor Unit		H2 ≤ 15 m
Maximum Lift between Each Indoor Unit connected to the same CH unit.		H3 ≤ 4 m
Maximum Piping Lift between Each CH unit.		≤ 15 m
Maximum difference of piping length between each Indoor Unit and same CH Unit.		-
Maximum Piping Length between Multi-Kit and Indoor Unit	Between the “a” kit and the farthest Indoor Unit	L ≤ 40 m
	Between Each Multi-Kit and Each Indoor Unit	L0. L1. L2. L5. L6. L7. L8 ≤ 30 m
	Between the multikit and the farthest Indoor Unit	(*1)L1. L2 ≤ 5 m
Choice of each Multi-kit		**Example: For RAS-10FXN(E)** Mark: a = Multy kit E-102XN; b,c = E-52XN; d = E-84HSN In case of using Indoor Unit as exclusive cooling. use Multi-Kit of FSN1(E)
Quantity of Additional Refrigerant Charge The quantity is calculated by the following equation: W (kg) = $W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ 1) W_{11} (kg): (Total Length (m) of Ø19.05 Liquid Piping) x 0.28 W_{12} (kg): (Total Length (m) of Ø15.88 Liquid Piping) x 0.190 W_{13} (kg): (Total Length (m) of Ø12.7 Liquid Piping) x 0.120 W_{14} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07 W_{15} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03 2) W_2 (kg): Total quantity of Additional Refrigerant of Each Indoor Unit (kg)	Liquid Piping	**Example: For RAS-10FXN(E)** Mark: Lt-L3; L4; L3-L2; L0; L1; L2; L5; L6; L7; L8 Size: Ø9.53; Ø6.35 Length: 20; 10; 10; 2; 13; 8; 8; 5; 5; 12 W_{14} = (48+4) x 0.07 = 3.64; W_{15} = (4+6+7+4+10+10+10+12) x 0.03 = 1.89
	Indoor unit	**Example: For RAS-10FXN(E)** Indoor Unit No.. 0 1 2 3 4 5 6 Corresponding power (HP) 1 1.5 1.5 2 2 2 2 Additional refrigerant Quantity: Indoor units that do not require ref. charge
	Total	W (kg) = $W_{11}+W_{12}+W_{13}+W_{14}+W_{15+}W_2$ = 0 + 0 + 0 + 3.64 + 1.89 = 5.53 kg

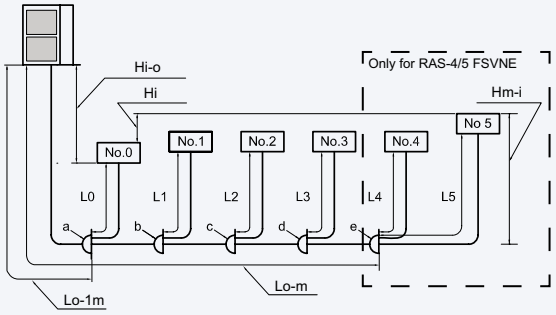
(1*): If piping length between main Multi-Kit “c” and the farthest Indoor Unit is longer than 5m. use the T-branch from the kit for the liquid piping. See section 7.1.5).

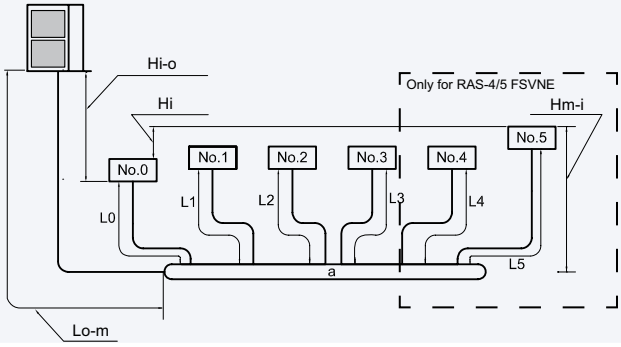
7

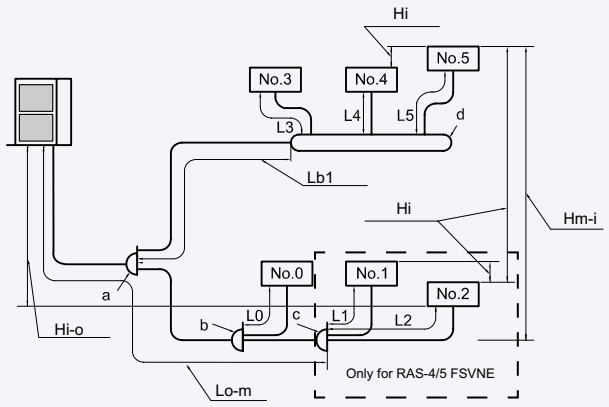
ITEM		MULTI-KITS SYSTEM WITH REDUCTION
Example of Systems This figure shows an example of 5 Indoor Units combined with one Outdoor Unit. The refrigerant pipes are shown as a single line in the diagrams. However. low and high pressure gas piping is required in the installation between the outdoor unit and the CH unit. The gas pipe is also necessary between the CH unit and the Indoor Unit. Liquid pipe is going from Multi-Kit to Indoor Unit.		
Total piping length		≤ 300 m
Maxmum piping length	Actual Length	Lt ≤ 150 m
	Equivalent Length	Lt ≤ 175 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.	H1 ≤ 50 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.	H1 ≤ 40 m
Maximum Lift between Each Indoor Unit. or Multi-Kit and indoor Unit		H2 ≤ 15 m
Maximum Lift between Each Indoor Unit connected to the same CH unit.		H2 ≤ 4 m
Maximum Piping Lift between Each CH unit.		≤ 15 m
Maximum Piping Length between Multi-Kit and Indoor Unit	Between the “a” kit and the farthest Indoor Unit	L ≤ 40 m
	Between Each Multi-Kit and Each Indoor Unit	L0. L1+ L2. L1+ L3. L4. L5 ≤ 30 m
	Between last Multi-Kit and the farthest Indoor Unit	(*1)L4. L5 ≤ 5 m
Choice of each Multi-kit		**Example: For RAS-20FXN(E)** Mark: a,b = Multy kit E-202XN; c = E-102XN; d = E-102SN In case of using Indoor Unit as exclusive cooling. use Multi-Kit of FSN1(E)
Quantity of Additional Refrigerant Charge The quantity is calculated by the following equation: $W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ 1) W_{11} (kg): (Total Length (m) of Ø19.05 Liquid Piping) x 0.28 W_{12} (kg): (Total Length (m) of Ø15.88 Liquid Piping) x 0.19 W_{13} (kg): (Total Length (m) of Ø12.7 Liquid Piping) x 0.12 W_{14} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07 W_{15} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03 2) W_2 (kg): Total quantity of Additional Refrigerant of Each Indoor Unit (kg)	Liquid Piping	**Example: For RAS-20FXN** Mark: Lt - L = 40; LM1 = 10; LM2 = 10; L1 = 8; L2 = 2; L3 = 4; L4 = 11; L5 = 12; L0 = 11 Size: Ø15.88 / Ø9.53 / Ø6.35 W_{12} = (40+10) x 0.190 = 9.5; W_{14} = (10+8+2+4+11+12) x 0.07 = 3.29; W_{15} = 11 x 0.03 = 0.33
	Indoor unit	**Example: For RAS-20FXN** Indoor Unit No.. 0 1 2 3 4 Corresponding power (HP) 2 4 4 5 5 Additional refrigerant Quantity: Indoor units that do not require ref. charge
	Total	$W = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_2$ = 0 + 9.5 + 0 + 3.29 + 0.33 + 0= 13.12 kg

(1*): If piping length between main Multi-Kit “c” and the farthest Indoor Unit is longer than 5m. use the T-branch from the kit for the liquid piping. See section 7.1.5).

◆ Total System of SET-FREE (FSVNE series)

<table>
<tr><th colspan="3">ITEM</th><th>MULTI-KITS UNI-PIPING SYSTEM</th></tr>
<tr><td colspan="3">Example of Systems
These figures show examples of 6 Indoor Units combined with one Outdoor Unit.
The refrigerant pipes are shown as single line in the diagrams.
However. liquid line piping and gas line piping are required in the field.</td><td> 
</td></tr>
<tr><td rowspan="2">Total Piping Length</td><td>From Outdoor Unit to the furthest Multi-Kit</td><td><table><tr><th colspan="3">3FSVNE</th></tr><tr><th colspan="3">Number of Indoor Units</th></tr><tr><th>2</th><th>3</th><th>4</th></tr><tr><td>Lo-m ≤ 40 m</td><td>Lo-m ≤ 35 m</td><td>Lo-m ≤ 25 m</td></tr></table></td><td><table><tr><th>4/5FSVNE</th></tr><tr><td>Lo-m ≤ 65 m</td></tr></table></td></tr>
<tr><td>From Outdoor Unit to all Indoor Units</td><td colspan="2">Lo-m + L0 + L1 + L2 + L3 ≤ 65 for 3FSVNE
Lo-m + L0 + L1 + L2 + L3 + L4 + L5 ≤ 135 for 4/5FSVNE</td></tr>
<tr><td colspan="2">Maximum Piping Length Between Each Multi-Kit and Each Indoor Unit</td><td>L0. L1. L2. L3. L4. L5 ≤ 10 m</td></tr>
<tr><td rowspan="2">Maximum Lift between Outdoor and Indoor Unit</td><td>In the case that the position of Outdoor Unit is higher than that of Indoor Unit.</td><td>Hi-o ≤ 25 m</td></tr>
<tr><td>In the case that the position of Outdoor Unit is lower than that of Indoor Unit.</td><td>Hi-o ≤ 25 m</td></tr>
<tr><td colspan="2">Maximum Lift between Each Indoor Unit</td><td>Hi ≤ 10 m</td></tr>
<tr><td colspan="2">Maximum Piping Height between Multi-Kit and Indoor Unit</td><td>Hm-i ≤ 5 m</td></tr>
<tr><td colspan="2">Choice of each Multi-kit</td><td>For RAS-3~5FSVNE<table><tr><th>Mark</th><th>a,b,c,d,e</th></tr><tr><td>Multy kit</td><td>E-102SN</td></tr></table></td></tr>
<tr><td colspan="2" rowspan="2">Quaintly of Additional Refrigerant Charge
The quantity is calculated by the following equation:
W (kg) = W_{11}+W_{12}
1) W_{11} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07
2) W_{12} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03</td><td>Liquid Piping</td><td>Example: For RAS-5FSVNE<table><tr><th>Mark</th><th>L_0-1 m</th><th>L0</th><th>L1</th><th>L2</th><th>L3</th><th>L4</th><th>L5</th></tr><tr><td>Size</td><td>Ø9.53</td><td>Ø6.35</td><td>Ø6.35</td><td>Ø6.35</td><td>Ø6.35</td><td>Ø6.35</td><td>Ø6.35</td></tr><tr><td>Length</td><td>21</td><td>5</td><td>3</td><td>5</td><td>3</td><td>5</td><td>3</td></tr></table>W_{11} = 21 x 0.07 = 1.47
W_{12} = (5+3+5+3+5+3) x 0.03 = 0.72</td></tr>
<tr><td>Total</td><td>W = W11 + W12 = 1.47 +0.72 = 2.19 kg</td></tr>
</table>

<table>
<tr><th colspan="2">ITEM</th><th colspan="2">DISTRIBUTOR UNI-PIPING SYSTEM</th></tr>
<tr><td colspan="2">Example of Systems
These figures show examples of 6 Indoor Units combined with one Outdoor Unit.
The refrigerant pipes are shown as a single line in the diagrams.
However. liquid line piping and gas line piping are required in the field.</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="2">Total Piping Length</td><td>From Outdoor Unit to the furthest Multi-Kit</td><td colspan="2"><table><tr><th colspan="3">3FSVNE</th></tr><tr><th colspan="3">Number of Indoor Units</th></tr><tr><td>2</td><td>3</td><td>4</td></tr><tr><td>Lo-m ≤ 40 m</td><td>Lo-m ≤ 35 m</td><td>Lo-m ≤ 25 m</td></tr></table><table><tr><th>4/5FSVNE</th></tr><tr><td>Lo-m ≤ 40 m</td></tr></table></td></tr>
<tr><td>From Outdoor Unit to all Indoor Units</td><td colspan="2">Lo-m + L0 + L1 + L2 + L3 ≤ 65 for 3FSVNE
Lo-m + L0 + L1 + L2 + L3 + L4 + L5 ≤ 135 for 4/5FSVNE</td></tr>
<tr><td colspan="2">Maximum Piping Length Between Each Multi-Kit and Each Indoor Unit</td><td colspan="2">L0. L1. L2. L3. L4. L5 ≤ 10 m</td></tr>
<tr><td rowspan="2">Maximum Lift between Outdoor and Indoor Unit</td><td>In the case that the position of Outdoor Unit is higher than that of Indoor Unit.</td><td colspan="2">Hi-o ≤ 25 m</td></tr>
<tr><td>In the case that the position of Outdoor Unit is lower than that of Indoor Unit.</td><td colspan="2">Hi-o ≤ 25 m</td></tr>
<tr><td colspan="2">Maximum Lift between Each Indoor Unit</td><td colspan="2">Hi ≤ 10 m</td></tr>
<tr><td colspan="2">Maximum Piping Height between Multi-Kit and Indoor Unit</td><td colspan="2">Hm-i ≤ 5 m</td></tr>
<tr><td colspan="2">Choice of each Multi-kit</td><td>RAS-3~5 FSVNE</td><td>Use E-84HSN at “a”</td></tr>
<tr><td colspan="2" rowspan="2">Quantity of Additional Refrigerant Charge
The quantity is calculated by the following equation:
W (kg) = W_{11}+W_{12}
1) W_{11} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.06
2) W_{12} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03</td><td>Liquid Piping</td><td>Example: In case of RAS-5FSVNE<table><tr><th>Mark</th><th>L_0-1 m</th><th>L0</th><th>L1</th><th>L2</th><th>L3</th><th>L4</th><th>L5</th></tr><tr><td>Size</td><td>Ø9.53</td><td>Ø6.35</td><td>Ø6.35</td><td>Ø6.35</td><td>Ø6.35</td><td>Ø6.35</td><td>Ø6.35</td></tr><tr><td>Length</td><td>32</td><td>5</td><td>3</td><td>5</td><td>3</td><td>5</td><td>3</td></tr></table>W_{11} = 32 x 0.07 = 2.24
W_{12} = (5+3+5+3+5+3) x 0.03 = 0.72</td></tr>
<tr><td>Total</td><td>W = W_{11} + W_{12} = 2.24 +0.72 = 2.96 kg</td></tr>
</table>

ITEM			DISTRIBUTOR AND MULTI-KITS UNI-PIPING SYSTEM
Example of Systems These figures show examples of 6 Indoor Units combined with one Outdoor Unit. The refrigerant pipes are shown as a single line in the diagrams. However. liquid line piping and gas line piping are required in the field.			
Total Piping Length	From Outdoor Unit to the furthest Multi-Kit		3FSVNE Number of Indoor Units: 2 — Lo-m ≤ 40 m; 3 — Lo-m ≤ 35 m; 4 — Lo-m ≤ 25 m 4/5FSVNE: Lo-m ≤ 40 m
	From Outdoor Unit to all Indoor Units		Lo-m + Lb1 + L0 + L1 + L2 + L3 ≤ 65 for 3FSVNE Lo-m + Lb1 + L0 + L1 + L2 + L3 + L4 + L5 ≤ 135 for 4/5FSVNE
Maximum Piping Length Between Each Multi-Kit and Each Indoor Unit			L0. L1. L2. L3. L4. L5 ≤ 10 m
Maximum Lift between Outdoor and Indoor Unit	In the case that the position of Outdoor Unit is higher than that of Indoor Unit.		Hi-o ≤ 25 m
	In the case that the position of Outdoor Unit is lower than that of Indoor Unit.		Hi-o ≤ 25 m
Maximum Lift between Each Indoor Unit			Hi ≤ 10 m
Maximum Piping Height between Multi-Kit and Indoor Unit			Hm-i ≤ 5 m
Choice of each Multi-kit		RAS-3~5 FSVNE	Use E-102SN at “a. b. c” and E-84HSN at “d”
Quantity of Additional Refrigerant Charge The quantity is calculated by the following equation: W (kg) = W_{11}+W_{12} 1) W_{11} (kg): (Total Length (m) of Ø9.53 Liquid Piping) x 0.07 2) W_{12} (kg): (Total Length (m) of Ø6.35 Liquid Piping) x 0.03		Liquid Piping	**Example: In case of RAS-5FSVNE** Mark: L_0-m +Lb1 — L0 — L1 — L2 — L3 — L4 — L5 Size: Ø9.53 — Ø6.35 — Ø6.35 — Ø6.35 — Ø6.35 — Ø6.35 — Ø6.35 Length: 31 — 5 — 3 — 5 — 3 — 5 — 3 W_{11} = 31 x 0.07 = 2.17 W_{12} = (5+3+5+3+5+3) x 0.03 = 0.72
		Total	W = W_{11} + W_{12} = 2.17 +0.72 = 2.89 kg

7.4. Caution in the case of refrigerant leakage

The installers and those responsible for drafting the specifications are obliged to comply with local codes and regulations for safety requirements in the case of refrigerant leakage.

7.4.1. Maximum permissible concentration of HCFC gas

The refrigerant R410A. charged in the SET-FREE FSN(1)(E) system. is an incombustible and non-toxic gas. However. if leakage occurs and the gas spreads throughout the room. it may cause asphyxiation. The maximum permissible concentration of the HCFC gas and the R410A in the air is 0.44 kg/m³. according to the refrigeration and air conditioning system standard (KHK S 0010) by the KHK (High-Pressure Gas Protection Association) of Japan.

Therefore. some effective measure must be taken to lower the R410A concentration in air below 0.44 kg/m³. in case of leakage.

7.4.2. Calculating refrigerant concentration

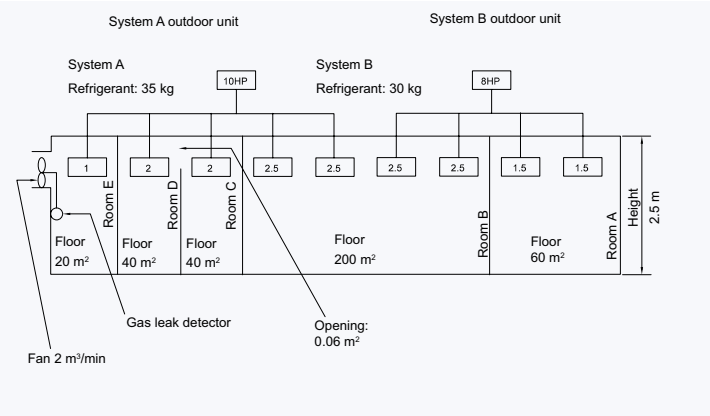
1. Calculate the total quantity of refrigerant R (kg) loaded in the system by connecting all the indoor units in the rooms to be air-conditioned.
2. Calculate the room volume V (m³) of each room.
3. Calculate the refrigerant concentration C (kg/m³) of the room according to the following equation:

$$\frac{R}{V} = C$$

R: total quantity of refrigerant loaded (kg)
V: room volume (m³)
C: refrigerant concentration (≤0.44* kg/m³ for R410A)

NOTE:

(*) Use this value only for reference because this value is not fixed yet.



Room	R (kg)	V (m³)	C (kg/m³)	Countermeasure
A	30	150	0.2	-
B	65	500	0.13	-
C	35	100	0.35	-
D	35	100	0.35	-
C+D	35	200	0.175	-
E	35	50	0.7	2m³/min

7.4.3. Countermeasure for refrigerant leakage according to KHK standards

The facility must have the following features in case of fire:

1. It must have an unshuttered opening to allow fresh air to circulate into the room.
2. It must have an opening with no door measuring 0.15% or more of the floor area.
3. It must have a ventilator. connected to a gas leak detector. with a ventilating capacity of 0.5 m³/min or higher per Japanese refrigeration ton (= compressor displacement volume 8.5 m³/h) of the air conditioning system using the refrigerant.

Outdoor unit model	FSN(1)(E) Tonnes	FXN(E) Tonnes
RAS-5	2.27	-
RAS-8	4.11	3.76
RAS-10	4.11	4.04
RAS-12	4.11	4.24
RAS-14	6.57	-
RAS-16	6.57	5.81
RAS-18	7.11	6.21
RAS-20	7.11	7.58
RAS-24	10.83	9.35
RAS-28	12.97	-
RAS-30	-	12.12
RAS-32FSN	14.12	12.12
RAS-36FSN	13.83	-
RAS-42FSN	16.26	-

4. Pay special attention to places where refrigerant can accumulate. for example in basements etc.. since refrigerant is heavier than air.

8. Electrical data

This chapter describes the electrical requirements for each unit of the Hitachi SET FREE FSN(E)/FXN(E)/FSVNE series.

Contents

8.1. Indoor units

Unit Model		Main power of the unit			Applicable Voltage		Indoor unit (fan motor)			
		U [V]	PH	f [Hz]	U max. [V]	U min. [V]	IPT [kW]	RNC [A]	Max.IPT [kW]	Max. Cur [A]
RCI(M) 4-way cassette type	RCIM-1.0FSN	220/240	1	50	253	207	0.05	0.3	0.07	5.0
	RCIM-1.5FSN						0.06	0.4	0.08	5.0
	RCIM-2.0FSN						0.07	0.4	0.08	5.0
	RCI-1.0FSN1E	230	1	50	253	207	0.04	0.2	0.04	5.0
	RCI-1.5FSN1E						0.05	0.2	0.05	5.0
	RCI-2.0FSN1E						0.05	0.2	0.05	5.0
	RCI-2.5FSN1E						0.06	0.3	0.06	5.0
	RCI-3.0FSN1E						0.09	0.4	0.09	5.0
	RCI-3.5FSN1E						0.09	0.4	0.09	5.0
	RCI-4.0FSN1E						0.11	0.7	0.11	5.0
	RCI-5.0FSN1E						0.14	0.8	0.14	5.0
	RCI-6.0FSN1E						0.18	1.0	0.18	5.0
RCD 2-way cassette type	RCD-1.0FSN	220/240	1	50	253	207	0.06	0.2	0.09	5.0
	RCD-1.5FSN						0.08	0.4	0.10	5.0
	RCD-2.0FSN						0.08	0.4	0.10	5.0
	RCD-2.5FSN						0.10	0.5	0.13	5.0
	RCD-3.0FSN						0.12	0.6	0.15	5.0
	RCD-4.0FSN						0.13	0.6	0.17	5.0
	RCD-5.0FSN						0.19	0.9	0.24	5.0
RPC Ceiling type	RPC-2.0FSNE	230	1	50	253	207	0.13	0.5	0.18	5.0
	RPC-2.5FSNE						0.13	0.6	0.18	5.0
	RPC-3.0FSNE						0.17	0.8	0.23	5.0
	RPC-3.5FSNE						0.17	0.8	0.23	5.0
	RPC-4.0FSNE						0.18	0.8	0.24	5.0
	RPC-5.0FSNE						0.23	1.1	0.31	5.0
	RPC-6.0FSNE						0.23	1.1	0.31	5.0
Indoor unit In-the-ceiling type	RPI-0.8FSN1E	230	1	50	253	207	0.08	0.4	0.12	5.0
	RPI-1.0FSN1E						0.08	0.4	0.12	5.0
	RPI-1.5FSN1E						0.10	0.7	0.15	5.0
	RPI-2.0FSN1E	230	1	50	253	207	0.21	0.9	0.28	5.0
	RPI-2.5FSN1E						0.24	1.2	0.38	5.0
	RPI-3.0FSN1E						0.26	1.2	0.38	5.0
	RPI-3.5FSN1E						0.26	1.2	0.38	5.0
	RPI-4.0FSN1E						0.38	1.7	0.50	5.0
	RPI-5.0FSN1E						0.40	1.8	0.50	5.0
	RPI-6.0FSN1E						0.40	1.8	0.50	5.0
	RPI-8.0FSNE	230	1	50	253	207	1.01	4.7	1.78	10.0
	RPI-10.0FSNE						1.15	5.2	2.03	10.0
	RPIM-0.8FSN1E	230	1	50	253	207	0.07	0.3	0.09	5.0
	RPIM-1.0FSN1E						0.07	0.3	0.09	5.0
RPK Wall type	RPK-1.0FSN2M	230	1	50	253	207	0.03	0.2	0.04	5.0
	RPK-1.5FSN2M						0.03	0.3	0.04	5.0
	RPK-2.0FSN2M						0.03	0.3	0.04	5.0
	RPK-2.5FSN2M						0.04	0.3	0.05	5.0
	RPK-3.0FSN2M						0.04	0.3	0.05	5.0
	RPK-4.0FSN2M						0.06	0.5	0.09	5.0
RPF Floor Type	RPF-1.0FSNE	230	1	50	253	207	0.04	0.2	0.05	5.0
	RPF-1.5FSNE						0.05	0.2	0.07	5.0
	RPF-2.0FSNE						0.09	0.4	0.12	5.0
	RPF-2.5FSNE						0.09	0.4	0.12	5.0
RPFI Floor-Concealed Type	RPFI-1.0FSNE	230	1	50	253	207	0.04	0.2	0.05	5.0
	RPFI-1.5FSNE						0.05	0.2	0.07	5.0
	RPFI-2.0FSNE						0.09	0.4	0.12	5.0
	RPFI-2.5FSNE						0.09	0.4	0.12	5.0

U: Power Voltage
PH Phase (φ)
f: Frequency
RNC: Operating current
IPT: Total input power
Cur: Current

NOTE:
The specifications in these tables are subject to change without notice to allow HITACHI to bring the latest innovations to its customers

8.2. Outdoor units

8.2.1. FSN(1)(E) Models

Unit Model	Main unit power			Applicable Voltage		Motor Compressor					Outdoor unit (fan motor)			Max. IPT [kW]	Max. Cur [A]
	U [V]	PH	f [Hz]	U max. [V]	U min. [V]	PH	STC [A]	Cooling Operation		Heating operation		PH	RNC [A]	IPT[kW]		
								RNC [A]	IPT [kW]	RNC [A]	IPT [kW]					
RAS-5FSN	380/415	3	50	457	342	3	7.9/7.2	7.3/6.7	4.40	7.0/6.4	4.20	1	1.10/1.01	0.23	5.4	9.6
RAS-8FSN1E	400	3	50	440	360	3	16.0	9.5	5.80	9.1	5.50	1	1.25/1.15	0.26	8.5	14.0
RAS-10FSN1E							16.0	12.2	7.40	12.1	7.20	1	2.38/2.18	0.50	12.1	20.0
RAS-12FSN1E							16.0	15.2	9.40	15.9	9.60	1	2.38/2.18	0.50	13.6	22.0
RAS-14FSN1	380/415	3	50	457	342	3	86.0	19.3/17.7	11.60	17.9/16.4	10.50	1	4.03/3.69	0.84	17.4	29.0
RAS-16FSN1							89.0	22.8/20.9	13.70	19.9/18.3	11.70	1	4.03/3.69	0.84	20.4	34.0
RAS-18FSN1							113.0	21.6/19.8	13.00	22.0/20.1	12.90	1	6.89/6.32	1.44	20.4	34.0
RAS-20FSN1							115.0	27.4/24.8	16.40	26.0/23.8	15.60	1	6.89/6.32	1.44	23.0	38.0
RAS-24FSN1							116.0	33.0/30.3	19.20	30.9/28.3	17.70	1	9.96/9.13	2.08	29.0	50.0
RAS-28FSN1							125.0	42.0/38.5	24.30	37.0/33.8	21.20	1	9.96/9.13	2.08	36.5	63.0
RAS-32FSN1							134.0	48.0/44.0	27.80	41.7/38.0	23.90	1	9.96/9.13	2.08	44.6	77.0
RAS-36FSN							158.0	46.7/42.8	31.50	36.6/33.5	25.70	1	13.0/11.9	2.72	40.3	70.4
RAS-42FSN							172.0	56.7/51.9	37.20	46.9/42.9	31.60	1	13.0/11.9	2.72	46.8	81.7

U: Power Voltage
PH Phase (φ)
f: Frequency
STC: Starting Current
RNC: Operating current
IPT: Input power
Cur: Current

NOTES:

1. *The above performance data is based on 7.5 m equivalent piping length and 0 m piping lift.*
   These data are based on the same conditions as the nominal heating and cooling capacities.
2. *Model RAS-5FSN is equipped with an inverter-driven compressor.*
   Models RAS-8~42FSN1(E) are equipped with an inverter compressor with one, two, three, four or five ON/OFF controlled compressors.

8.2.2. FXN(E) Models

Unit Model	Main unit power			Applicable Voltage		Motor Compressor					Outdoor unit (fan motor)			Max. IPT [kW]	Max. Cur [A]
	U [V]	PH	f [Hz]	U max. [V]	U min. [V]	PH	STC [A]	Cooling Operation		Heating operation		PH	RNC [A]	IPT [kW]		
								RNC [A]	IPT [kW]	RNC [A]	IPT [kW]					
RAS-8FXNE	400	3	50	440	360	3	81.0	10.6	6.70	9.5	6.00	1	1.2/1.1	0.26	11.60	14.2
RAS-10FXNE							86.0	13.2	8.30	13.8	8.60	1	2.3/2.1	0.50	12.90	18.0
RAS-12FXNE							88.0	17.1	10.80	16.0	10.10	1	2.3/2.1	0.50	16.20	22.2
RAS-16FXN	380/415	3	50	457	342	3	94.0/86.0	20.2/18.5	12.10	20.9/19.1	12.10	1	6.8/6.3	1.44	20.50	32.8
RAS-18FXN							106.0/97.0	22.8/23.1	13.60	23.3/23.6	13.50	1	6.8/6.3	1.44	28.30	33.5
RAS-20FXN							106.0/97.0	26.9/24.6	16.10	27.0/24.7	16.00	1	6.8/6.3	1.44	28.30	36.9
RAS-24FXN							116.0/106.0	35.9/32.8	20.30	35.0/32.1	19.70	1	9.9/9.1	2.08	36.20	49.7
RAS-30FXN							134.0/123.0	49.3/45.1	27.90	45.6/41.7	25.80	1	9.9/9.1	2.08	47.90	66.2
RAS-32FXN							134.0/123.0	52.7/53.2	29.50	44.5/44.9	25.20	1	9.9/9.1	2.08	47.90	75.2

U: Power Voltage
PH Phase (φ)
f: Frequency
STC: Starting Current
RNC: Operating current
IPT: Input power
Cur: Current

NOTES:

1. *The above performance data is based on 7.5 m equivalent piping length and 0 m piping lift.*
   These data are based on the same conditions as the nominal heating and cooling capacities.
2. *RAS-8~32FXN(E) models and are equipped with an inverter-driven compressor with one, two, three, four or five ON/OFF controlled compressors.*

8.2.3. FSVNE models

Unit Model	Main unit power			Applicable Voltage		Motor Compressor					Outdoor unit (fan motor)			Max. IPT [kW]	Max. Cur [A]
								Cooling Operation		Heating operation					
	U [V]	PH	f [Hz]	U max. [V]	U min. [V]	PH	STC [A]	RNC [A]	IPT [kW]	RNC [A]	IPT [kW]	PH	RNC [A]	IPT [kW]		
RAS-3FSVNE	230	1	50	253	207	1	6.5	10.7	2.16	11.9	2.41	1	10.5/9.6	2.26	5.39	25.0
RAS-4FSVNE							10.5	15.0	3.07	15.3	3.13	1	14.7/13.5	3.13	7.55	35.0
RAS-5FSVNE							15	19.2	3.94	20.0	4.11	1	18.8/17.3	4.06	7.76	36.0

U: Power Voltage
PH Phase (φ)
f: Frequency
STC: Starting Current
RNC: Operating current
IPT: Input power
Cur: Current

NOTES

1, The above performance data is based on 7.5 m equivalent piping length and 0 m piping lift.

2. This data is based on the same conditions as the nominal heating and cooling capacities. Refer to the notes of the Unit's General Data.
Specifications in these tables are subject to change without notice in order that HITACHI can bring the latest innovations to their customers.

8.3. Complementary systems

◆ **For KPI units**

Unit Model	Main unit power			Applicable Voltage		KPI unit (fan motor)			
	U [V]	PH	f [Hz]	U max. [V]	U min. [V]	RNC [A]	IPT [kW]	Max.IPT [kW]	Max. Cur [A]
KPI-2521	230	1	50	253	207	0.6	0.12	0.16	5.0
KPI-5021						1.0	0.22	0.31	5.0
KPI-8021						1.8	0.41	0.55	5.0
KPI-10021						2.3	0.52	0.64	5.0

U: Power Voltage
PH Phase (φ)
f: Frequency
STC: Starting Current
RNC: Operating current
IPT: Input power
Cur: Current

NOTE

Specifications in these tables are subject to change without notice in order that HITACHI may bring the latest innovations to their customers.

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9. Electrical wiring and setup

This chapter describes the Electrical Wiring Connection and shows how to set the Dip Switches and the H-Link System of the new Hitachi SET FREE FSN(1)(E)/FXN(E)/FSVNE series.

Contents

9.1. General verification

ATTENTION:

- *Turn OFF the main power switch on the indoor and outdoor units before carrying out electrical wiring or regular checks.*
- *Check to ensure that the indoor and outdoor fans have stopped before carrying out electrical wiring or regular checks.*
- *Protect wires, drainpipe, electrical parts, etc. from rats or other small animals. Otherwise these animals may gnaw the pieces and possibly cause a fire.*
- *Make sure the wires are not touching the refrigerant pipes, plate edges and electrical parts on the inside of the unit. Otherwise the wires will be damaged and may cause a fire.*

CAUTION:

Secure the wires firmly with the clamp to the inside of indoor unit.

NOTE:

Fix the rubber bushes with adhesive when the ducts to the outdoor unit are not used.

1. Make sure that the field-supplied electrical components (main power switches, circuit breakers, wires, duct connectors and wire terminals) have been properly selected according to the electrical data given in this technical catalog. Make sure that the components comply with the National Electrical Code (NEC)
2. Check to ensure that the power supply voltage is within 10% of the rated voltage.
3. Check the capacity of the electrical wires. If the power source capacity is too low, the system cannot be started due to the voltage drop.
4. Check to ensure that the earth wire is connected.
5. Main power source switch
   Install a multi-pole switch with a space of 3.5 mm or more between each phase.

9.2. Setting and function of DIP switches for outdoor units

NOTE:
The "■" mark indicates the position of the DIP switches. The figures show the settings before shipment or after selection.

By using switch DSW4, the unit is started or stopped after 10 to 20 seconds after the switch is operated.

CAUTION:
Before setting DIP switches, first turn off power source. If the switches are set without turning off the power source, the settings are invalid.

◈ Quantity and Position of Dip Switches

The PCB in the outdoor unit is operated with 8 types of dip switches and 3 types of push switch.

9.2.1. FSN(1)(E)/FXN(E) units

DSW1: Refrigerant No. Setting.
Setting is required if H-Link is used. Setting before shipment is all OFF (refrigerant cycle no. 0). In the same Refrigerant Cycle set the same refrigerant cycle no. for the outdoor unit and for the indoor units as shown in chapter 3 Service Manual 0048.

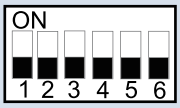
	Cycle num 0
Settings before shipment	

DSW2: Capacity Settings.
No setting is required. Each outdoor unit is set before shipment as shown in chapter 3 of the Service Manual SMGB0048.

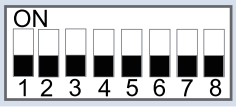
DSW3: Height difference.
Setting is required as indicated in chapter 3 of Service Manual SMGB0048.

Settings before shipment	

DSW4: Test Operation & Service Settings.
Setting is required. This dip switch is used for servicing as indicated in chapter 3 of Service Manual SMGB0048.

Settings before shipment	

DSW5: Emergency operation of the compressor.
No setting is required. All compressors are running except the compressor selected, as indicated in chapter 3 of Service Manual SMGB0048.

Setting before shipment 400 V-50 Hz Power supply	

DSW6: Piping Length.
Setting is required. Set the dip switch according to your requirements, as indicated in chapter 3 of Service Manual SMGB0048.

Setting before shipment Length < 25 m	

DSW7: Power supply setting.
Setting is required. Set the dip switch according to your requirements, as indicated in chapter 3 of Service Manual SMGB0048.

Setting before shipment (400 V)	

DSW10: Transmission setting.
Setting is required for cancellation of end resistance and fuse protection, as indicated in chapter 3 of Service Manual SMGB0048.

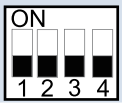
Settings before shipment	

Push Switch

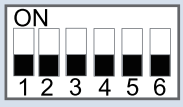
Manual discharge	PSW1
For Check	PSW2 PSW3

9.2.2. FSVN(E) Units

DSW1: Test run.
Setting is required as indicated in chapter 3 of Service Manual SMGB0048.

Settings before shipment	

DSW2: Setting optional functions.
Setting is required as indicated in chapter 3 of Service Manual SMGB0048.

Settings before shipment	

DSW3: Capacity.
Setting is required as indicated in chapter 3 of Service Manual SMGB0048.

DSW4: Set refrigerant no.
Setting is required as indicated in chapter 3 of Service Manual SMGB0048.

Settings before shipment	

DSW5: Transmission setting.
Setting is required for cancellation of end resistance and fuse protection, as indicated in chapter 3 of Service Manual SMGB0048.

Settings before shipment	

DSW6: Piping Length.
Setting is required. Set the dip switch according to your requirements, as indicated in chapter 3 Service Manual 0048.

Settings before shipment	

9.3. Setting and function of DIP switches for indoor units

NOTE:
The "■" mark indicates the position of the DIP switches. The figures show the settings before shipment or after selection.

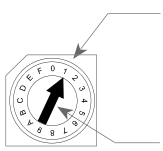
CAUTION:
Before setting DIP switches, first turn off power source. If the switches are set without turning off the power source, the settings are invalid.

◈ Quantity and position of the DIP switches.

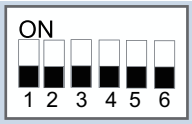
The PCB in the indoor unit operates with 5 types of DIP switches, and one rotary switch.

9.3.1. Indoor units

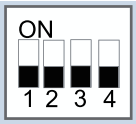
RSW: Setting unit number.
Setting is required. Set the number of all indoor units respectively and serially, by following setting position shown in chapter 3 of Service Manual SMGB0048. Numbers must start from "1" for every outdoor unit.



DSW6: (RPK only)

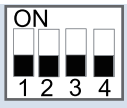
Settings before shipment	

DSW2: Setting optional functions. (RPK FSN2M only)
No setting is required. This switch is utilized for setting the optional functions as indicated in chapter 3 of Service Manual SMGB0048.

Settings before shipment	

DSW3: Capacity code setting.
No setting is required as it was done before shipment. This DIP switch is used for setting the capacity code corresponding to the power of the indoor unit as indicated in chapter 3 of Service Manual SMGB0048.

DSW5: Refrigerant No. Setting.
This setting is required. Setting before shipment is all OFF (refrigerant cycle no. 0). In the same refrigerant cycle, set the same cycle number for the Outdoor Unit and for the Indoor Units as indicated in chapter 3 of Service Manual SMGB0048.

Settings before shipment	

DSW6: Setting unit model code. (Not available for RCI and RPK)Setting is not required. This switch is used for setting the model code corresponding to the indoor unit type as indicated in chapter 3 of Service Manual SMGB0048.

DSW7: Fuse Recover and Remote Control Selection
Setting required for fuse recover or PC-2H2 / PC-P1HE selection as indicated in chapter 3 of Service Manual SMGB0048.

Settings before shipment	

Setting before shipment (RPK-1/1.5FSN2M)	

DSW8: Not used(RCI only)

Settings before shipment	

DSW8: Not used(RCIM only)

Settings before shipment	

SSW: Remote Control (except RPK, RCD).

	New	Old
PC-P1HE/PC-P2HTE Before Shipment.		
PC2H2 (see DSW7)		

9.4. Setting of DIP switches for complementary systems and accessories

9.4.1. Complementary systems

- System: Total heat exchanger - KPI

DSW5:

Settings before shipment	

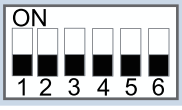
- System: Econofresh Kit - EG

Use DIP switches of the PCB of the RPI indoor units.

9.4.2. Accessories

- Accesory: CH Box

DSW2:

Settings before shipment	

DSW5:

Settings before shipment	

9.5. Common wiring

ATTENTION:
Pay attention to the connection of the operating line. Incorrect connection may cause failure of the PCB.

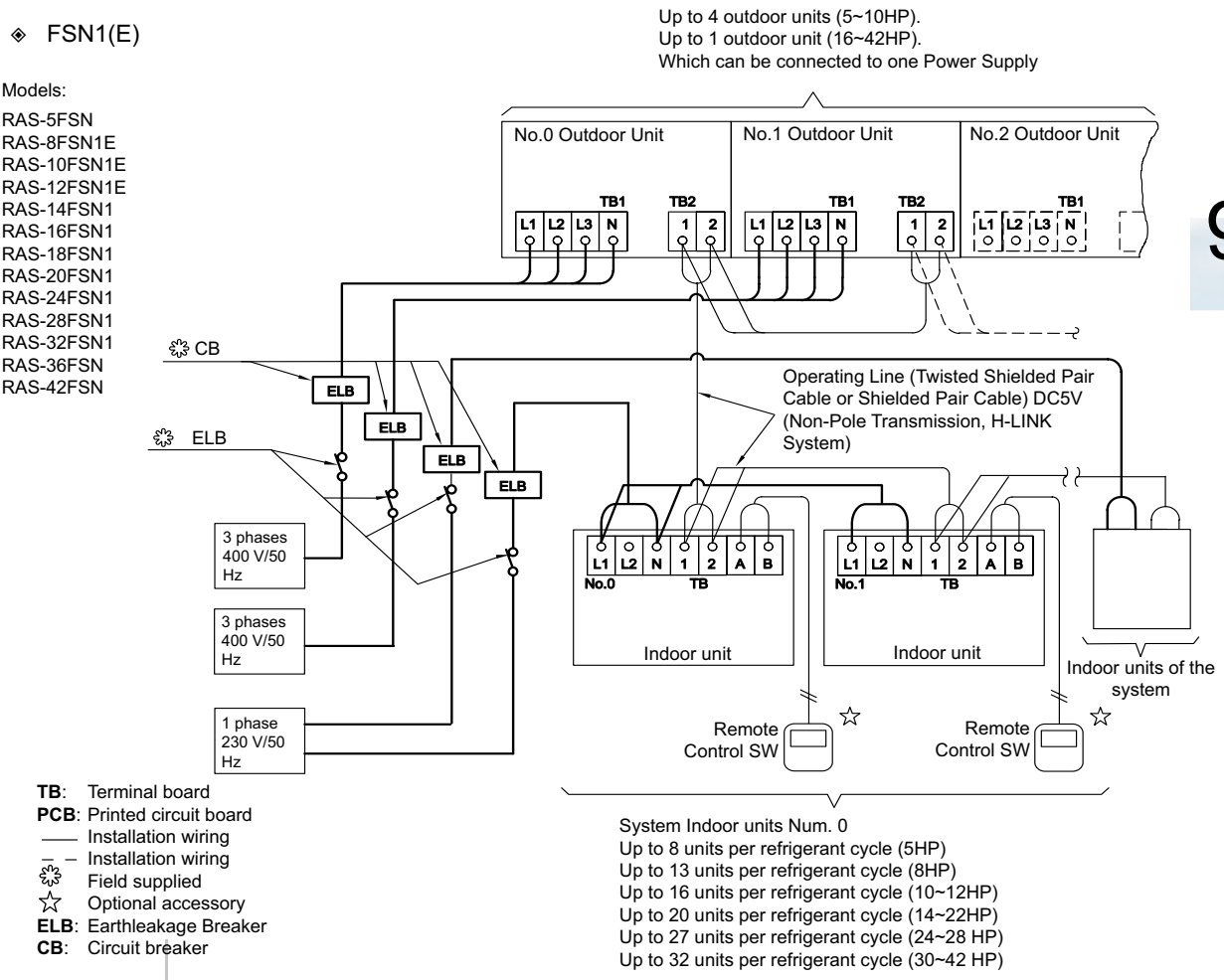
9.5.1. Electrical wiring between indoor and outdoor unit

Connect the electrical wires between the indoor unit and the outdoor unit, as shown below.

- When installing the electrical wiring, follow local codes and regulations.
- The refrigerant piping and the control wiring are connected to the units in the same refrigerant cycle.
- Use shielded twisted pair cable or twisted cable (more than 0.75 mm²) for operation wiring between the outdoor unit and the indoor unit, and operation wiring between the indoor units.
- Use a 2-core wire for the operating line (Do not use wire with more than 3 cores).
- Use shielded wires for intermediate wiring to protect the units from noise obstacle at length of less than 300 m. The size must comply with local code.
- For FXN(E) series it is recommended to connect the indoor unit and the CH unit in the same electrical circuit.
- Open a hole near the connection hole of power source wiring when multiple outdoor units are connected from a single power source line.
- The recommended breaker sizes are shown in the table of electrical data and recommended wiring, breaker size\1 O.U.
- If a conduit tube for the field wiring is not used, fix the rubber bushes on the panel with adhesive.
- All field wiring and equipment must comply with local and international codes.

◈ FSN1(E)

Models:
RAS-5FSN
RAS-8FSN1E
RAS-10FSN1E
RAS-12FSN1E
RAS-14FSN1
RAS-16FSN1
RAS-18FSN1
RAS-20FSN1
RAS-24FSN1
RAS-28FSN1
RAS-32FSN1
RAS-36FSN
RAS-42FSN

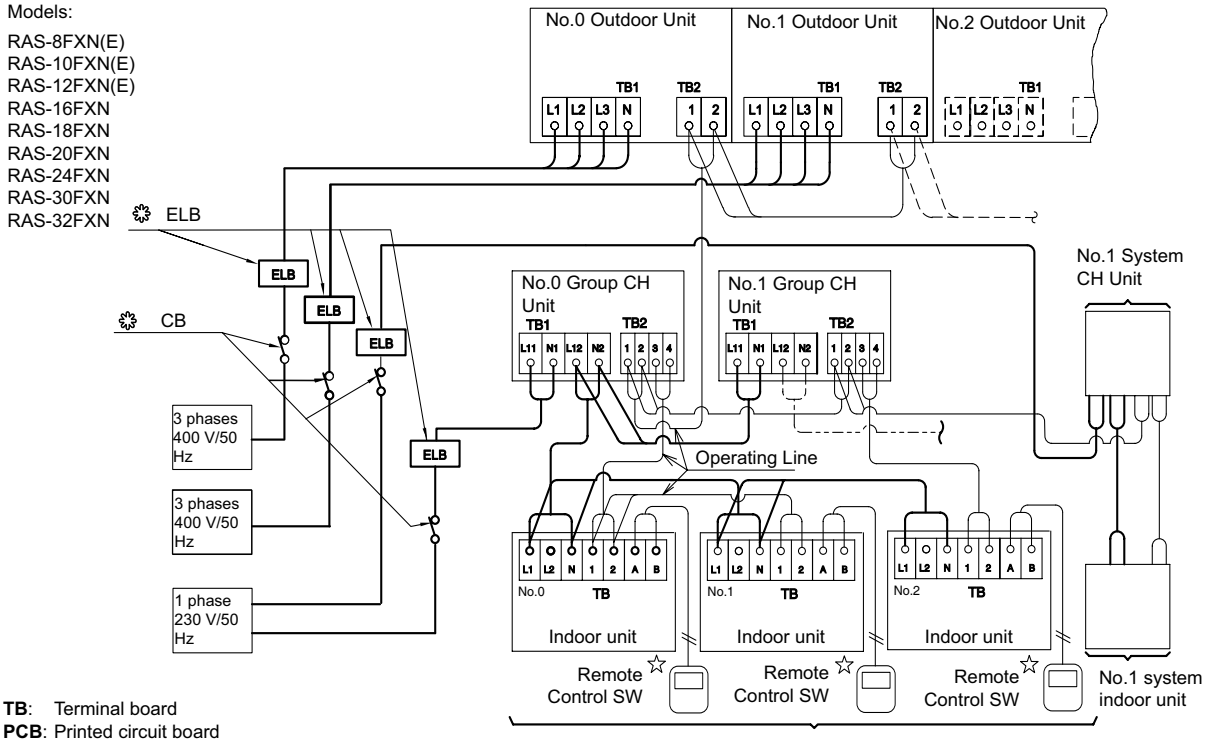


TB: Terminal board
PCB: Printed circuit board
—— Installation wiring
– – Installation wiring
Field supplied
☆ Optional accessory
ELB: Earthleakage Breaker
CB: Circuit breaker

◈ FXN(E)

Models:

RAS-8FXN(E)
RAS-10FXN(E)
RAS-12FXN(E)
RAS-16FXN
RAS-18FXN
RAS-20FXN
RAS-24FXN
RAS-30FXN
RAS-32FXN



TB: Terminal board
PCB: Printed circuit board
—— Installation wiring
– – Installation wiring
Field supplied
☆ Optional accessory
ELB: Earthleakage Breaker
CB: Circuit breaker

System Indoor units Num. 0
Up to 8 units per refrigerant cycle (5HP)
Up to 13 units per refrigerant cycle (8HP)
Up to 16 units per refrigerant cycle (10~12HP)
Up to 20 units per refrigerant cycle (16~22HP)
Up to 27 units per refrigerant cycle (24~26 HP)
Up to 32 units per refrigerant cycle (30~32 HP)

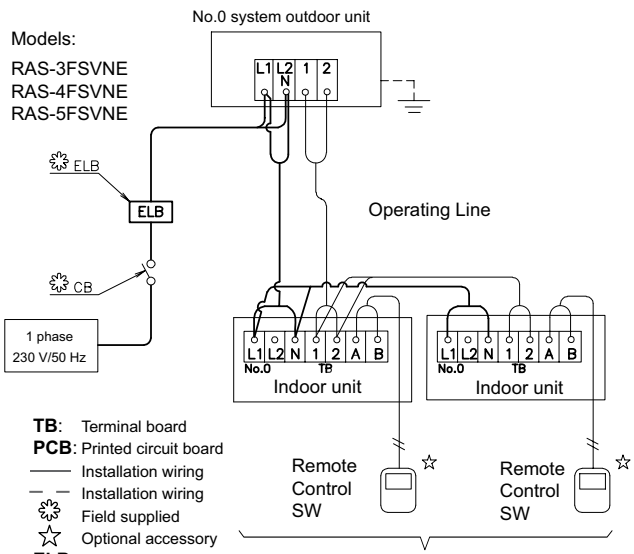
NOTE:

In the case that 17~32 Indoor Units are connected to one Outdoor Unit, the CH-Unit can not be connected to different refrigerant cycles Indoor Units.

◈ FSVNE

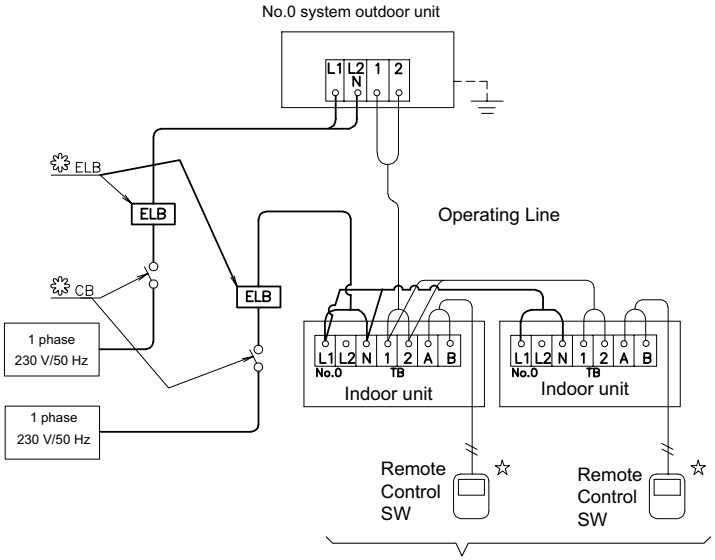
Models:

RAS-3FSVNE
RAS-4FSVNE
RAS-5FSVNE



TB: Terminal board
PCB: Printed circuit board
—— Installation wiring
– – Installation wiring
Field supplied
☆ Optional accessory
ELB: Earthleakage Breaker
CB: Circuit breaker

System Indoor units Num. 0
Up to 4 units per refrigerant cycle (3HP)
Up to 6 units per refrigerant cycle (4HP)
Up to 7 units per refrigerant cycle (5HP)



System Indoor units Num. 0
Up to 4 units per refrigerant cycle (3HP)
Up to 6 units per refrigerant cycle (4HP)
Up to 7 units per refrigerant cycle (5HP)

9.6. Wiring Size

◈ Connection wiring

The minimum thickness of the wiring that must be used in the installation.

- Indoor units

Model	Power supply	Maximum current	Size of power source cable	Size of transmission cable
			EN60 335-1 ❶	EN60 335-1 ❶
RCI(M)-1.0~6.0	1~ 230V 50Hz	5.0 A	0.75 mm²	0.75 mm²
RCD-1.0~5.0				
RPI(M)-0.8~6.0				
RPK-0.8~4.0				
RPF(I)-1.0~2.5				
RPC-2.0~6.0				
RPI-8/10		10.0 A	1.5 mm²	

- Outdoor units

Model		Power supply	Maximum current	Size of power source cable	Size of transmission cable
				EN60 335-1 ❶	EN60 335-1 ❶
FSVNE	RAS-3FSVNE	1~ 230V 50Hz	25.0 A	4 mm²	0.75 mm²
	RAS-4FSVNE		35.0 A	6 mm²	
	RAS-5FSVNE		36.0 A	6 mm²	
FSN(1)(E)	RAS-5FSN	3N~ 380/415V 50Hz	9.6 A	2.5 mm²	
	RAS-8FSN1E	3N~ 400V 50Hz	14.0 A	2.5 mm²	
	RAS-10FSN1E		20.0 A	2.5 mm²	
	RAS-12FSN1E		22.0 A	2.5 mm²	
	RAS-14FSN1	3N~ 380/415V 50Hz	29.0 A	4 mm²	
	RAS-16FSN1		34.0 A	6 mm²	
	RAS-18FSN1		34.0 A	6 mm²	
	RAS-20FSN1		38.0 A	10 mm²	
	RAS-24FSN1		50.0 A	10 mm²	
	RAS-28FSN1		63.0 A	10 mm²	
	RAS-32FSN1		77.0 A	-	
	RAS-36FSN		70.4 A	-	
	RAS-42FSN		81.7 A	-	
FXN(E)	RAS-8FXNE	3N~ 400V 50Hz	14.2 A	2.5 mm²	
	RAS-10FXNE		18.0 A	2.5 mm²	
	RAS-12FXNE		22.2 A	2.5 mm²	
	RAS-16FXN	3N~ 380/415V 50Hz	32.8 A	6 mm²	
	RAS-18FSN		33.5 A	6 mm²	
	RAS-20FXN		36.9 A	10 mm²	
	RAS-24FXN		49.7 A	10 mm²	
	RAS-30FXN		66.6 A	-	
	RAS-32FXN		75.2 A	-	

NOTE:
Follow local codes and regulations when selecting field wires, circuit breakers and earth leakage breakers.

Do not use wires that are lighter than the ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).

The earth cable size must comply with local code: IEC 245, no. 571.

The wire sizes shown in the table above and marked with ❶ have been selected at the maximum current of the unit according to the European Standard, EN60 335-1.

Select the wires according to the following table.

Selection according to EN60 335-1		Selection According to MLFC (Cable Temperature of 60ºC)	
Current i (A)	Wire size	Current i (A)	Wire size
I ≤ 6	0.75 mm²	I ≤ 15	0.5 mm²
6 < i ≤ 10	1 mm²	15 < i ≤ 18	0.75 mm²
10 < i ≤ 16	1.5 mm²	18 < i ≤ 24	1.25 mm²
16 < i ≤ 25	2.5 mm²	24 < i ≤ 34	2 mm²
25 < i ≤ 32	4 mm²	34 < i ≤ 47	3.5 mm²
32 < i ≤ 40	6 mm²	47 < i ≤ 62	5.5 mm²
40 < i ≤ 63	10 mm²	62 < i ≤ 78	8.0 mm²
63 < i		78 < i ≤ 112	14.0 mm²
		112 < i ≤ 147	22.0 mm²

◈ Main switch protection

Select the main switches according to the following table.

- Indoor units

Model	Power supply	CB	ELB No. of poles/A/mA
All indoor units (*)	1~ 230V 50Hz	6 A	2/40/30
RPI-8/10		15 A	

NOTE:
(*) Except RPI-8/10

- Outdoor units

	Model	Power supply	CB	ELB No. of poles/A/mA
FSVNE	RAS-3FSVNE	1~ 230V 50Hz	25 A	2/40/30
	RAS-4FSVNE		32 A	
	RAS-5FSVNE		32 A	
FSN(1)(E)	RAS-5FSN	3N~ 380/415V 50Hz	10 A	4/40/30
	RAS-8FSN1E	3N~ 400V 50Hz	16 A	
	RAS-10FSN1E		20 A	
	RAS-12FSN1E		25 A	
	RAS-14FSN1	3N~ 380/415V 50Hz	32 A	
	RAS-16FSN1		40 A	
	RAS-18FSN1		40 A	
	RAS-20FSN1		40 A	
	RAS-24FSN1		63 A	4/63/100
	RAS-28FSN1		63 A	
	RAS-32FSN1		80 A	4/100/100
	RAS-36FSN		80 A	
	RAS-42FSN		100 A	
FXN(E)	RAS-8FXNE	3N~ 400V 50Hz	16 A	4/40/30
	RAS-10FXNE		20 A	
	RAS-12FXNE		25 A	
	RAS-16FXN	3N~ 380/415V 50Hz	40 A	
	RAS-18FXN		40 A	
	RAS-20FXN		40 A	
	RAS-24FXN		63 A	4/63/100
	RAS-30FXN		80 A	4/100/100
	RAS-32FXN		80 A	

NOTE:
ELB: Differential switch.
CB: Magnetothermic switch.

9.7. H-LINK System

The H-LINK is the wiring connection system between units.

The H-LINK wiring system only needs:

- Two (2) transmission wires connecting each indoor unit and outdoor unit for up to 16 refrigerant cycles.
- Connection wiring for all indoor and outdoor units in the series.

9.7.1. Application

The H-LINK system can be applied to the following models:

Indoor unit		Outdoor unit	
RCI RCIM RCD RPC RPI(M) RPK RPF RPFI	*System Free*	RAS-5~42FSN(1)(E) RAS-8~32FXN(E) RAS-3~5FSVNE	*Set Free & Mini Set Free*

ATTENTION:
The H-LINK system cannot be applied to the models with the old cycle, nor to the units that have an old transmission.

NOTE:
CSNET WEB is an optional complementary software that can be applied via internet to the system and which provides a total and centralized control of all the units.

9.7.2. Features

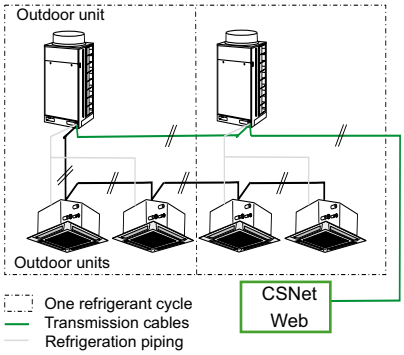
- The total wiring length is greatly reduced compared with traditional connections.
- Only one (1) connection is required for the wiring between the indoor unit and outdoor unit.
- The wiring connection to the complementary central controllers devices is easy.

9.7.3. Specifications

- Transmission cable: 2-wire.
- Polarity of transmission cable: non-polar wire.
- Maximum number of outdoor units that can be connected: 16 units per H-LINK system.
- Maximum number of indoor units that can be connected: 128 units per H-LINK system.
- Maximum wiring length: Total 1000 m (including CSNET WEB)
- The maximum wiring length can be increased by up to 5000 m by using up to four PSC-5HR units.
  (See section 9.8 of this catalog.)
- Recommended cable: shielded twisted pair cable, over 0.75 mm² (equivalent to KPEV-S).
- Voltage: 5V DC.

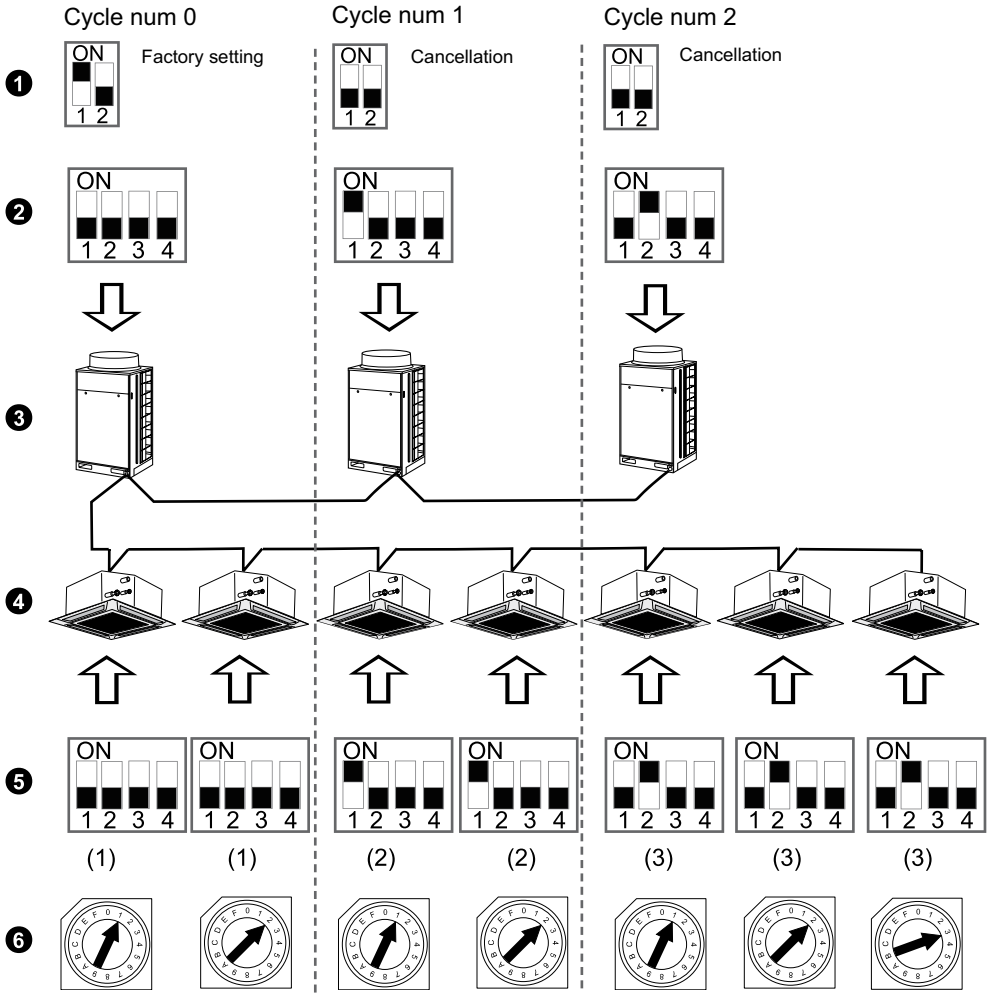
ATTENTION:
For the H-LINK System you must use Twisted Shielded Pair Cable or Shielded Pair Cable.

Example of H-LINK connection



9.7.4. Setting DIP switches for units

DIP Switch setting of indoor PCB and Outdoor PCB.



Mark	Indication Content
❶	DSW10 (end terminal resistance)
❷	DSW1 (refrigerant cycle)
❸	Outdoor unit
❹	Indoor units
❺	DSW5 (refrigerant cycle)
❻	RSW (address of indoor unit)

For further information, refer to service manual SMGB0048

ATTENTION:

The maximum quantity of units to be connected is 16 outdoor units and 64 indoor units (including Utopia and/or Set-Free, Mini Set-Free and DC Inverter).

Do not install wiring in a loop.

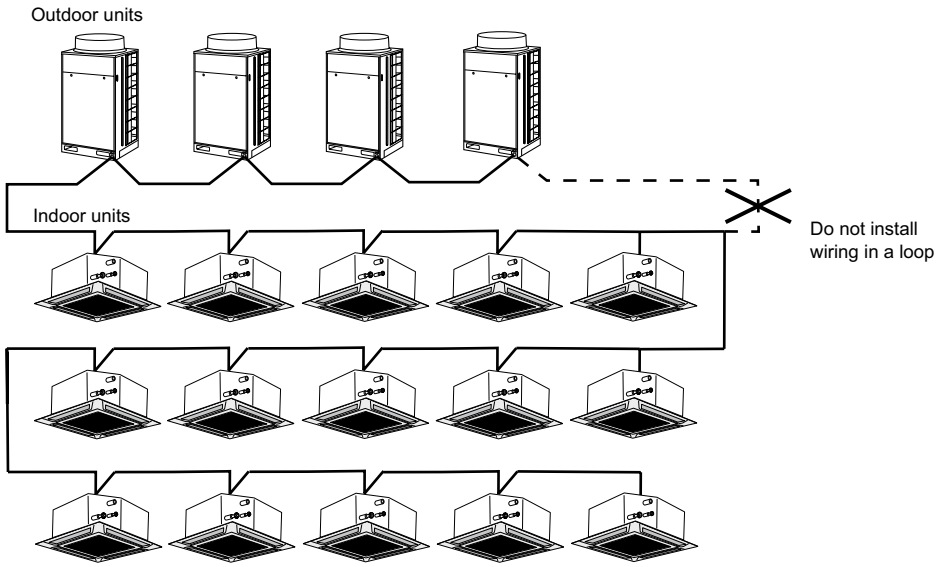
If the H-LINK system is not applied when carrying out the electrical wiring as shown above, it must be used once the wiring of the instrument is completed. The DIP switches must therefore be set as specified in the section "Setting the DIP switches on the PCB".

9.7.5. Examples of H-LINK system:

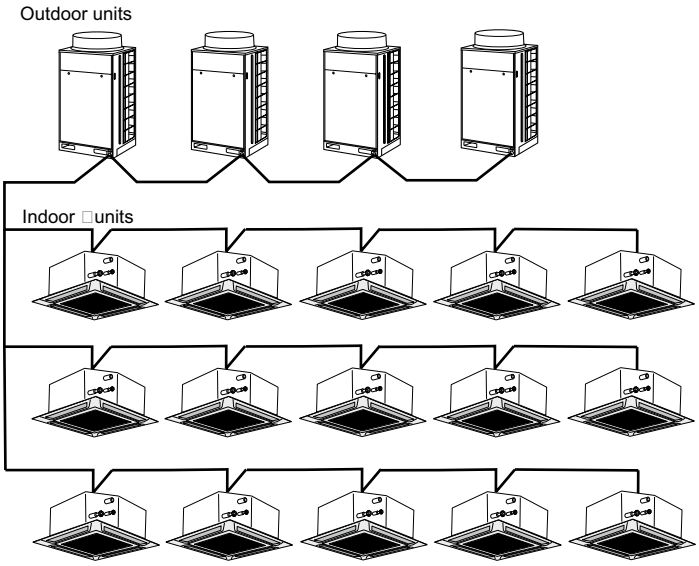
◈ Two cases:

(1) Use of H-LINK system for air conditioning systems without a central control device (CSNET WEB or PSC-5S).

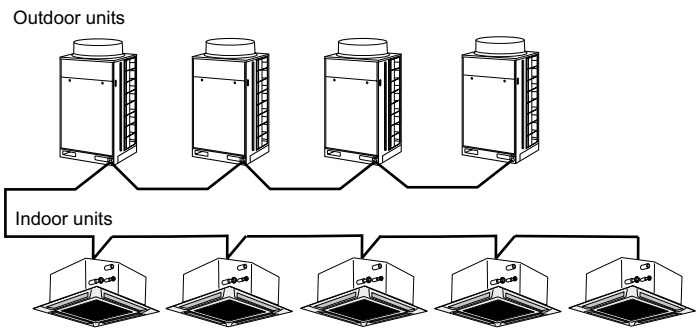
- Line Connection with all units (including Utopia and/or Set-Free, Mini Set-Free and DC Inverter)



- Line connection for each floor

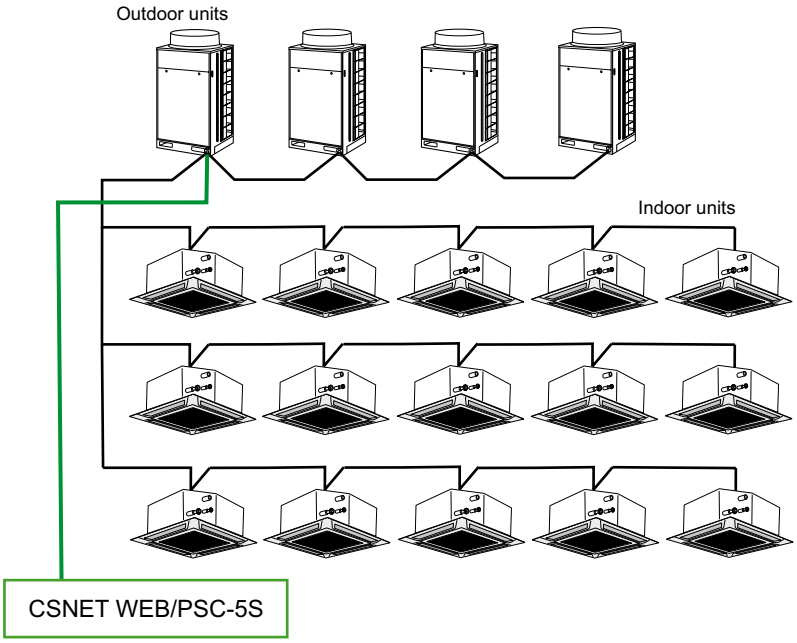


- Connection with one main line and with the branch lines for the units

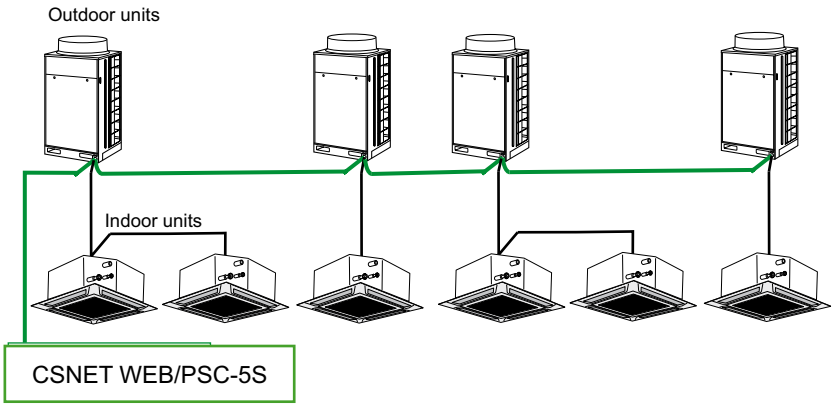


(2) Use of H-LINK system for air conditioning systems with a central control device (CSNET WEB or PSC-5S).

- If the central control device is applied when carrying out electrical wiring, In this case, the CSNET WEB Wiring could be connected at any point of the H-Link wiring.



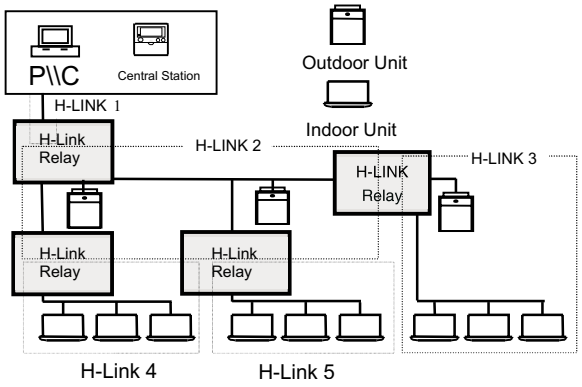
- If the central control device is not applied when carrying out electrical wiring, the H-Link wiring must be connected to all the systems. The easiest method is usually to connect the outdoor units.



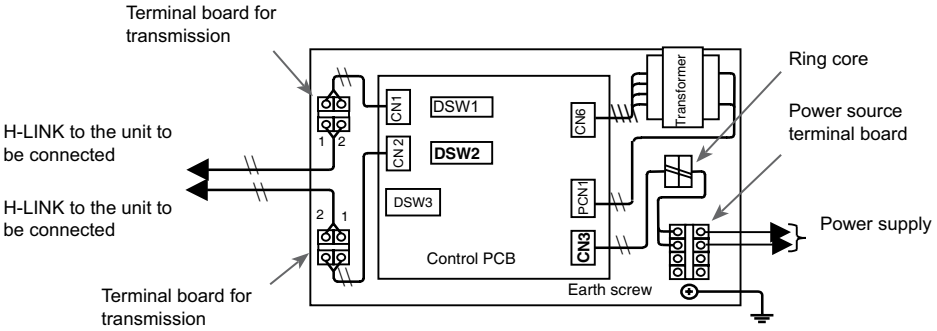
9.8. PSC-5HR

The PSC-5HR (H-link relay) is an accessory that allows use of CSNET WEB when the length of the system wiring is over 1000 meters.

9.8.1. Example of a system with PSC-5HR



9.8.2. Internal layout of the components.



NOTE:

You can install a maximum of four H-LINK relays in one system.

Make sure that the number of connections is the following:
- *Ref. System Quantity: maximum 16*
- *Number of indoor units: within 128*

Total length of each H-LINK divided: up to 1000m

If the H-LINK is divided into five blocks as shown, set the end terminal resistance in each H-LINK relay.

CAUTION:

Make sure that the power source voltage is correct.

An incorrect wiring may cause a breakdown of the transformer PSC-5HR or the units.

Especially, DO NOT connect the power source to the terminal board for transmission.

DO NOT install the H-LINK wires along the power supply wire or any other signal wires, etc. If you install the H-LINK wires along these wires, the electrical noise may cause a malfunction. If you need to install the H-LINK wires near these wires, leave a distance of 15 cm or more. Or alternatively, insert the wires into a steel pipe and ground one end of the pipe.

HITACHI
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10. Remote Control Switches

This chapter describes the operation procedures for the Remote control switches of Hitachi SET FREE FSN(1)(E)/FXN(E)/FSVNE series.

Contents

(Continue in the next page)

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HITACHI
Inspire the Next

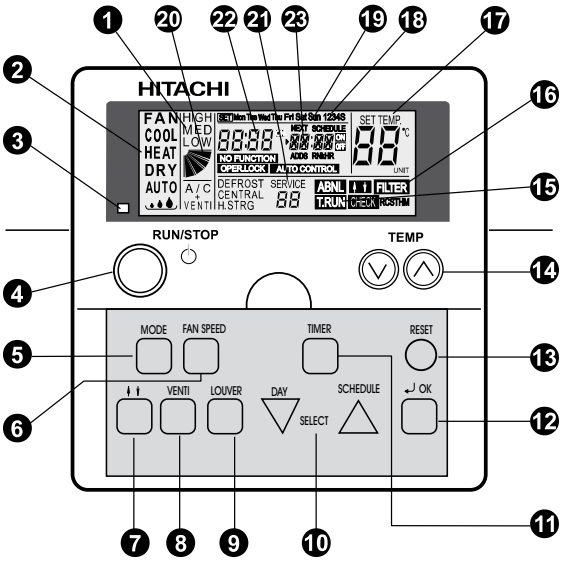
Contents (Cont.)

NOTE:
HITACHI products have different optional Remote Controls. Therefore, the user may request the Remote Control he needs. In the following pages, all possible functions and operations are explained. Please, refer to Chapter 4 (SM0048 rev0) to obtain information about installation and wiring connection.

CAUTION:
Press switches only with fingers. Do not press switches with any other item, as it may damage the switches.

10.1.PC-P2HTE - Wall-mounted Remote Control with Timer

Liquid crystal display (LCD)



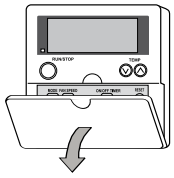
Model: PC-P2HTE

◈ Features:

This device allows you to control the unit's basic operations such as temperature and humidity. It also includes daily ON/OFF control operations throughout the week. It also includes other additional functions which are explained below in this section.
This device can control up to 16 indoor units in the same operation mode.

NOTE:

- *If the LOW fan speed is selected and the outdoor temperature is higher than 21°C, the compressor is subjected to an excessive load when operating in heating mode.*
  Therefore, the fan speed should be set to HIGH or MEDIUM to avoid activating the safety devices.
- *When the system is restarted after a shutdown of more than approximately 3 months, the system should be checked by your service provider.*
- *Turn off the main switch when the system is to be inoperative for a long period of time. Otherwise the system consumes electricity as the oil heater remains active even though the compressor is stopped.*



To open the cover, pull in the direction of the arrow.

1. Fan speed indicator
   Indicates the ventilation speed selected:
   - (High / Medium / Low)

   Indicates if the total heat exchanger has been selected.
   - A/C only air conditioning
   - VENTI only ventilation
   - A/C + VENTI if both are selected
2. Operation mode indicator
   Indicates the operation mode selected:
   - (Fan / Cool / Heat / Dry / Auto)
3. Run indicator (red lamp)
4. RUN/STOP switch
5. MODE (operation mode selection) switch
6. FAN SPEED (fan speed selection) switch
7. Up & down panel operation switch
8. VENTI (ventilator operation) switch
9. LOUVER (deflector panel) switch
10. SELECT (Day/Schedule) switches
11. ON/OFF TIMER switch
    Used to activate or deactivate the timer operation.
12. OK switch
13. RESET (Filter Reset Switch)
    After cleaning the air filter, press the "RESET" button. FILTER indication will disappear and the next filter cleaning time is reset. It also stops the run procedure.
14. TEMP (temperature setting) switches
15. T.RUN (test run indication)
    Check (check indication)
    These tests appear when TEST RUN or CHECK are being performed.
16. ABNML (alarm) indicator
17. SET TEMP (set temperature) indicator
18. 1234S indicator (setting schedule number)
19. Mon Tue ... Sun indicator (day of the week indicator).
    Indicates that central station or CSNet control is operating.
20. Swing louver indicator
    DEFROST indicator
21. SERVICE mode indicator.
    Indicates the change to special operations
22. Time indicator.
23. Time indicator. (Indicates the programmed time).

10.1.1. Operation Procedure for Cooling, Heating, Dry and Fan Operations

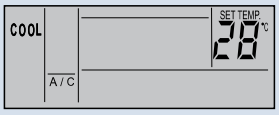
Before operation:

Turn on the electrical power supply to the system approximately 12 hours before start-up after a long shutdown. Do not start the system immediately after connecting the power supply, because the compressor may be damaged if it is not sufficiently heated.
Make sure the outdoor unit is not covered with ice or snow. If itis, remove the ice or snow with warm water (no hotter than 50°C).
If the water temperature is over 50°C, the plastic parts may be damaged.

CAUTION

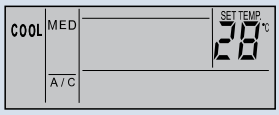
◈ Turn on the power supply.
Three vertical lines will appear on the liquid crystal display, with the indication A/C or VENTI.

◈ Press the MODE switch.
By repeatedly pressing the MODE switch, the indication changes from COOL, through HEAT, DRY to FAN, in that order (in the case of cooling-only models, COOL, DRY and FAN).
(The figure shows when the “COOL” mode setting is selected).



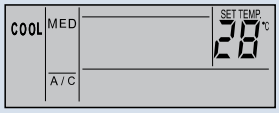
◈ Press the RUN/STOP switch.
The RUN indicator (red) lights up. The system starts automatically.

NOTE:
Setting temperature, fan speed and air louver direction.
The setting is memorized after the first time and does not require resetting every day. When the setting needs be changed, refer to the section “Setting the Temperature, Fan Speed and Air Louver Direction”.



◈ Turn off (STOP)
Press the RUN/STOP switch again. The RUN indicator (red) goes out The system stops automatically.

NOTE:
The fan may continue operating for approximately 2 minutes after the heating operation is stopped.

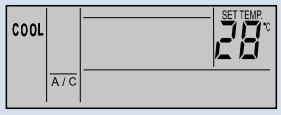


10.1.2 Setting the Temperature, Fan Speed and Air Louver Direction

◈ DO NOT touch the OK switch.
The OK switch is used only for servicing.
If the OK switch is pressed by mistake and the mode is changed from operation to check mode, press the OK switch again for approximately 3 seconds, wait 10 seconds and then press again: the mode will change back to normal.

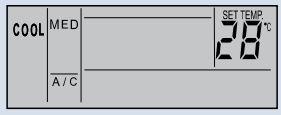
ATTENTION

◈ Setting the temperature
Set the temperature by pressing the TEMP ⌃ or ⌄ switch.
The temperature increases 1°C when the ⌃ switch is pressed (max 30°C).
The temperature decreases 1°C when the ⌄ switch is pressed (min. 19°C for COOL, DRY and FAN modes; min. 17°C for HEAT mode). (The figure shows the temperature set to 28°C).



◈ Setting fan speed
Press the FAN SPEED switch.
When the FAN SPEED switch is pressed repeatedly, the indication changes from HIGH to MEDIUM to LOW, in that order.
For normal operation, set the fan speed to HIGH.
(The figure shows the fan speed set to MED.)

NOTE:
In the DRY mode, the fan speed automatically changes to LOW, and cannot be altered (however, the indication shows the current setting).



◈ Setting the swing louver direction

Press the SWING LOUVER switch: the louver begins to swing. Pressing the switch again fixes the position of the swing louver.
Pressing the switch repeatedly stops and swings the louver successively.

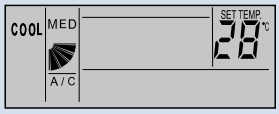
◈ Fixed position

The indication shows the air flow direction.

◈ Automatic swing position

The indications move continuously corresponding to the louver swing.

NOTE:
In the heating operation, the louver angle changes automatically.



10.1.3. Operation Procedure for Ventilation

This function is available only when the total heat exchanger is connected.
If the procedures below are performed when the total heat exchanger is not connected, the NO FUNCTION indication blinks for 5 seconds.

ATTENTION

◈ Ventilation

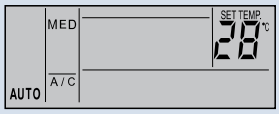
Press the VENTI switch
By repeatedly pressing the VENTI switch, the indication changes from A/C through VENTI and A/C+VENTI, in that order.
(The figure shows the A/C + VENTI setting).

NOTE:
Contact your distributor or HITACHI dealer for detailed information.
If the mode is changed to VENTI during individual operation of the air conditioner, the air conditioner will stop.
If the mode is changed to A/C during individual operation of the total heat exchanger, the total heat exchanger will stop.

10.1.4. Operation Procedure for Automatic Cooling/Heating Operation

The automatic cooling/heating operation must be set using the optional function. Contact your distributor or HITACHI dealer for more detailed information.
This function enables the operation mode (cooling or heating) to be changed automatically according to the temperature difference between the set temperature and the suction air temperature.
If the suction air temperature exceeds the set temperature by 3°, the operation changes to COOL mode. If it is 3°C lower than the set temperature, the operation changes to HEAT mode.

NOTE:
If the heating operation is set at the LOW fan speed, the protective devices will often cause the system to stop. In this case, set the fan speed to HIGH or MED.
If the outside temperature is over approximately 21°C, the heating operation is not available.
The temperature difference between the cooling and heating operations is quite considerable when this function is used. This function cannot therefore be used for air conditioning a room where accurate control of temperature and humidity is required.



10.1.5. Procedure for Setting the Swing Louver

Setting the swing louver

1. When the SWING LOUVER switch is pressed, the swing louver starts its operation. The range of the angle of swing is approximately 70° from the horizontal to the vertical position. When the "◥" symbol is moving, this indicates the continuous operation of the louver.

2. When the swinging operation of the louver is not required, press the SWING LOUVER switch again. The louver stops at the angle indicated by the direction of the "◥" symbol.

3. The discharge air angle is fixed at 20° for the RCI series and 40° for RCD series during the start-up of the heating and defrosting operation when the thermostat is on. When the outlet air temperature exceeds approximately 30 °C, the louvers start to swing.

Fixing the louver

1. For COOL and DRY modes, the discharge air angle can be changed to 5 different positions. For the heating operation, it can be changed to 7 positions.

2. To fix the louver position, first press the SWING LOUVER switch to start the louver swinging, and then press again when the louver reaches the required position.

3. The discharge air angle is fixed at 20° for the RCI series and 40° for the RCD series during the start-up of the heating and defrosting operation when the thermostat is on.When the outlet air temperature exceeds approximately 30 °C, the louvers start to swing.

When the louvers are fixed at an angle of 55° for RCI, 65° for RCD or 70° for both during the heating operation, and the operation mode is changed to cooling, the louvers will be automatically fixed at an angle of 45° for RCI or 60° for RCD.

NOTE:

There is a time lag between the actual angle of the louver and the indication on the liquid crystal display. When the SWING LOUVER switch is pressed, the louver will not stop immediately. The louver will move one extra swing. If the louvers are moved when cleaning or for any other reason, select the auto setting mode to move the four louvers to the same position.

RCI (4-way cassette type)

Indication							
Louver angle (approx.)	Approx. 20°	Approx. 25°	Approx. 30°	Approx. 35°	Approx. 45°	Approx. 55°	Approx. 70°
Cooling	Angle Range						
Heating	Angle Range						

Angle range

Recommended angle

RCD (2-way cassette type)

Indication							
Louver angle (approx.)	Approx. 40°	Approx. 45°	Approx. 50°	Approx. 55°	Approx. 60°	Approx. 65°	Approx. 70°
Cooling	Angle Range						
Heating	Angle Range						

Angle range

Recommended angle

RPK (Wall-mounted type)

Indication							
Louver angle (approx.)	Approx. 35°	Approx. 40°	Approx. 45°	Approx. 50°	Approx. 55°	Approx. 60°	Approx. 70°
Cooling	Angle Range						
Louver angle (approx.)	Approx. 40°	Approx. 45°	Approx. 50°	Approx. 55°	Approx. 60°	Approx. 65°	Approx. 70°
Heating	Angle Range						

Angle range

Recommended angle

RPC (Ceiling-mounted type)

Indication							
Louver angle (approx.)	Horizontal	Approx. 15°	Approx. 30°	Approx. 40°	Approx. 50°	Approx. 60°	Approx. 80°
Cooling	Angle Range						
Heating	Angle Range						

Angle range

Recommended angle

Do not turn the air louver by hand. The louver mechanism may be damaged if moved (in all units).

CAUTION:

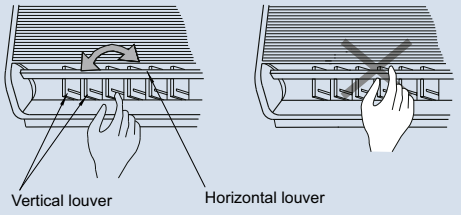
◈ Wall-mounted type (RPK):

Adjust the vertical louvers by hand to discharge air in the required direction.

Do not swing blade 1 to the left and blade 2 to the right of the vertical louvering.

◈ Automatic setting of the louver:

When the unit is not in operation, two air louvers stop automatically in the closed position.

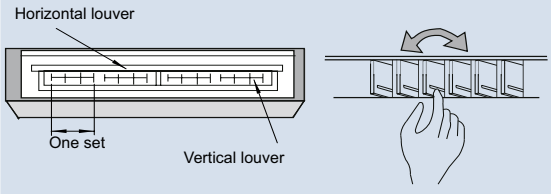


◈ Ceiling-mounted type (RPC):

The vertical louver consists of four sets of louvers. Adjust the vertical louvers by hand to discharge air in the required direction.

NOTE:

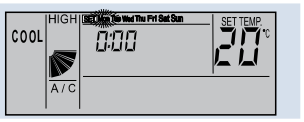
The models which do not have a swing louver will not show the above indications on the remote control. In this case, the louver must be adjusted manually.



10.1.6. Timer Operation Procedure

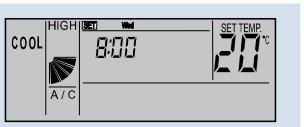
◈ Setting current day and time

1. Hold down the SELECT (▽) DAY switch for more than 3 seconds to change to current day setting mode. SET is indicated and the day blinks. All the days except the current day are indicated.

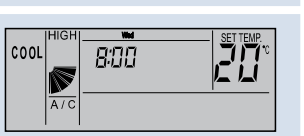


2. Hold down the SELECT (▽) DAY switch until the current day blinks, then press OK.
The date is indicated, and the time blinks.

3. Press the SELECT (△▽) DAY / SCHEDULE switches to adjust the “hour” setting, and then press again. “Hour” is indicated and “minutes” blinks.

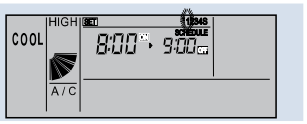


4. Press the SELECT (△▽) DAY / SCHEDULE switches to adjust the “minutes” setting, and then press again. The current time setting mode ends and returns to normal mode. “Minutes” is indicated and the SET indication goes out. The “seconds” start from zero.

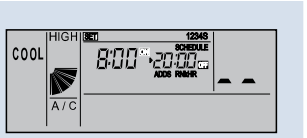


◈ Setting the timer (programming)

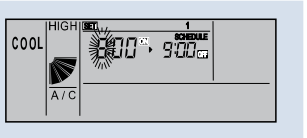
1. Press the TIMER switch. SET and SCHEDULE are indicated. Schedule number “1” blinks and other numbers are indicated.



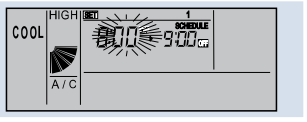
2. When the SCHEDULE switch (△) is pressed, the schedule number moves
[1] → [2] → [3] → [4] → [S] → [1]→….
* Select [S] to set the ON/OFF time and temperature shifts.
* By pressing the TIMER switch, the SET and SCHEDULE indicators go out and the mode changes back to normal.



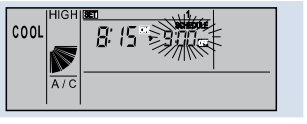
3. When the OK switch is pressed, the selected schedule number is indicated. The other schedule number indicators go out, and the ON time “hour” indicator for the number selected blinks.



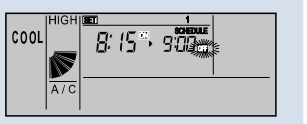
4. Press the SELECT (△▽) DAY / SCHEDULE switches to adjust the “hour” setting, and then press again. “Hour” is indicated and “minutes” blinks.



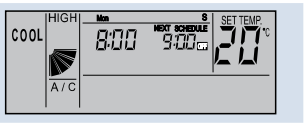
5. Press the SELECT (△▽) DAY / SCHEDULE switches to adjust the “minutes” setting, and then press again. “Minutes” is indicated and the OFF time “hour” setting blinks.



6. Set the OFF time the same way as the ON time. After setting the “minutes”, the OFF time is indicated. If the schedule number [1][2][3][4] is selected, the indication changes to set the schedule number shown in 2. If [S] is selected, see the section on setting temperature shifts for details.



7. By pressing the (△▽) DAY / SCHEDULE switches, the SET and SCHEDULE indicators go out and the mode returns to normal.

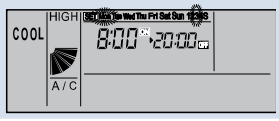


◈ Defining the schedule to be applied

1. Hold down the (△▽) DAY / SCHEDULE switches for more than 3 seconds and the SET indicator appears. All the days and schedule numbers are indicated.

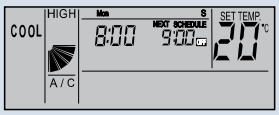
2. Press the (△▽) DAY / SCHEDULE switches until the day you wish to set blinks. When pressed, the day blinks [Mon] → [Tue] →… → [Sun]→ [Mon~Sun] → [Mon~Fri] → [Sat, Sun] → [Mon]... If several days are blinking, the same setting will be applied to all the days.

3. Press the (△) DAY switch until the schedule number you wish to set blinks.



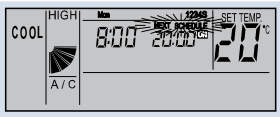
4. Press the (▽) SCHEDULE, and the SCHEDULE indication appears. Then the schedule number indicated in step 3 is applied to the days set in step 2. Press the OK switch to activate or deactivate the schedule. If the schedule is activated, the word SCHEDULE is lit up.

5. Press the TIMER switch and the mode returns to normal.

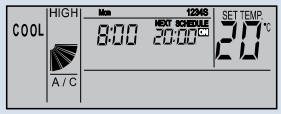


◈ Cancelling the timer

In the normal mode, hold down the (△▽) DAY / SCHEDULE switches for more than 3 seconds. The NEXT SCHEDULE indicator blinks. (Cancellation of all the timer)

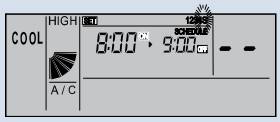


While the timer is in cancellation mode, hold down the (△▽) DAY / SCHEDULE switches for more than 3 seconds. NEXT SCHEDULE is indicated. (Timer activation)



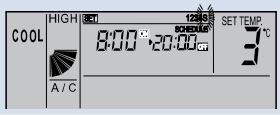
◈ Setting the temperature shifts (energy saving mode)

1. Set the ON/OFF operation as in steps 1 and 2 of the “Setting the timer” section, and then select “S” as the schedule number.

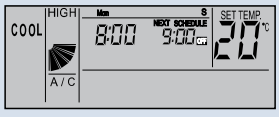


2. Set the ON/OFF operation in steps 4,5 and 6 of the “Setting the timer” section, and set the ON/OFF time. The temperature setting is then indicated.

3. Select the temperature shift with the ⌃⌄ switches. “3” or “5” can be selected. If the reset switch is pressed at this time, the temperature shift is not set and the indication “- -“ appears. When the TIMER switch is pressed, the temperature is indicated and the mode changes to schedule number selection.



4. When the TIMER switch is pressed, the SET and SCHEDULE indicators go out and the mode returns to normal.



NOTE:

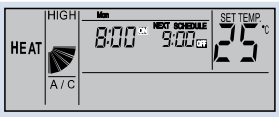
1. *When this operation is performed, the temperature shift indicator changes.*
2. *When this operation is performed, the temperature setting of the CSNET WEB or PSC-5S has a normal range, while the remote control setting may be changed to a new range.*
3. *The increase or decrease in the temperature setting during the scheduled time (±3 ºC or ±5 ºC) varies according to the operation mode.*

- If the system is operating in FAN, COOL or DRY mode, the temperature variation is + .

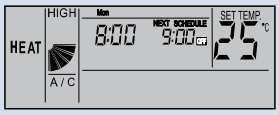
- If the system is operating in HEAT, mode, the temperature variation is - .

◈ Automatic operation with heating (anti-freeze protection)

1. In normal mode, hold down the switch for more than 3 seconds to change the operation mode. The automatic heating setting is activated and the ON indicator appears to the right of the current time. The ON indication blinks during the automatic heating operation.



Cancellation
While the system is operating in the automatic heating mode, hold down the MODE switch for more than 3 seconds to change back to normal mode.
The automatic heating setting is deactivated, and the ON indication to the right of the current time goes out.

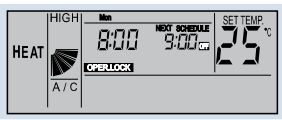


NOTE:
If the temperature in the room is lower than a predefined value[1], the heating will start up automatically. When the room temperature reaches the set temperature, the operation stops.*
**1 The temperatures 5,10,or 15ºC can be selected using an optional setting.*

◈ Operation locking method

To prevent incorrect use of the switches, the switch operation * can be locked.

1. In normal mode, hold down the SELECT ⌃⌄ switch for more than 3 seconds. The operation lock is activated and the OPER.LOCK indication appears. If a switch is pressed while it is locked, the indication OPER. LOCK blinks.

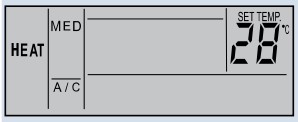


Cancellation
While the locking operation is activated, hold down the ⌃⌄ switch and SELECT simultaneously for more than 3 seconds to return to normal mode. The locking operation will be cancelled and the OPER. LOCK indication goes out.

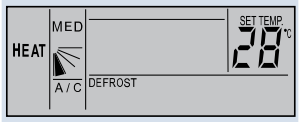
NOTE:
**The switch to be locked can be selected from "operation mode change", "temperature setting", "airflow" and "autolouver" by an optional setting (F8~Fb) of up to 4 items.*
The setting can be changed from CSNET or the sub-remote controller.

10.1.7. Indications under Normal Conditions

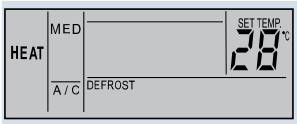
◈ Thermo-controller
When the thermo-controller is operated, the fan speed changes to LOW, and the indication remains unchanged. (Only in heating mode)



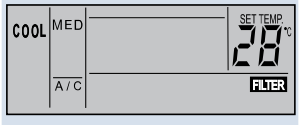
◈ Defrosting
When the system is operating in the defrost mode, the DEFROST indication is shown.
The indoor fan slows down or stops (depending on the setting selected).
The louver is fixed horizontally at 35°. However, the LCD indication is still activated.
(The figure shows the DEFROST setting).



When the unit stops during the defrosting operation, the RUN indicator (red) goes out.
However, the operation continues to show the DEFROST indication, and the unit starts up once the defrost operation is finished.



◈ Filter
Clogged filter: The "FILTER" indication appears when the filter is clogged with dust, etc.
Clean the filter: Press the RESET switch after cleaning the filter. The "FILTER" indication goes out.



10.1.8. Indications under Abnormal Conditions

◈ Disfunction

The RUN indicator (red) blinks.
The ALARM indicator appears on the liquid crystal display.
The indoor unit number, the alarm code and the model code are indicated on the liquid crystal display. If several indoor units are connected, the above items are indicated one by one for each of them.
Make a note of the indications and contact your HITACHI service provider.

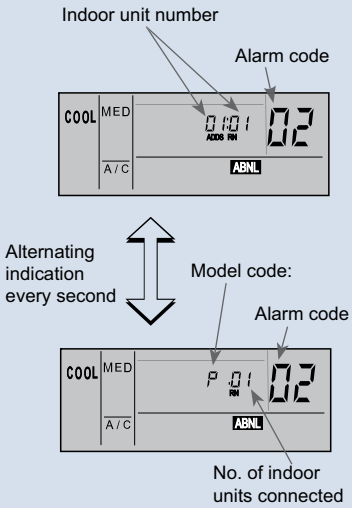
◈ Power failure

All the indications disappear.
If the unit stops because of a power failure, it will not restart even when the power returns. Perform the start-up operations again.
If the power failure lasts less than 2 seconds, the unit will automatically start up again.

◈ Electrical noise

The indications may all be OFF and the unit stopped. This is because the microcomputer has been activated in order to protect the unit from electrical noise.

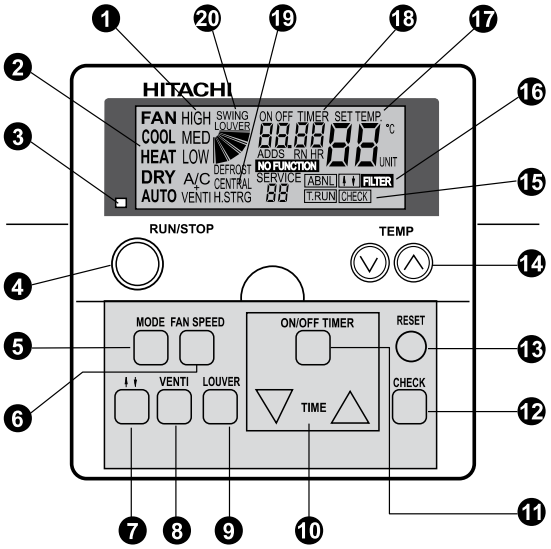
NOTE:
If the wireless remote control switch is used for the wall-mounted indoor unit, remove the connectors (CN25) connected to the indoor PCB. If they are not removed, the unit will not operate.
The memorized data can not be erased unless the remote control switch is initialized.



Model code	
Indication	**Model**
H	Heat pump
P	Inverter
F	Multi
C	Only cooling
E	Others

10.2.PC-P1HE - Wall mounted Remote Control

Liquid crystal display (LCD)



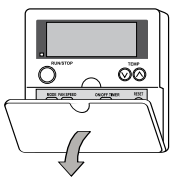
Model: PC-P1HE

◈ Features:

This device lets you control the unit's basic functions such as temperature and moisture, as well as a wide range of additional functions that will be described later in this chapter.
This device can control up to 16 indoor units with the same operation mode.

NOTE:

- *If LOW fan speed is selected and the outdoor temperature is higher than 21°C, excessive load is given to the compressor at heating operation. Therefore, set the fan speed to HIGH or MEDIUM, since safety devices may be activated.*
- *When the system is started after a shutdown longer than approximately 3 months, it is recommended that the system be checked by your service contractor.*
- *Turn OFF the main switch when the system is stopped for a long period of time. If the main switch is not turned OFF, electricity is consumed, because the oil heater is always energized during compressor stopping.*



To open the cover, pull in the direction of the arrow.

1. Fan speed indicator
   Indicates the ventilation speed selected:
   - (High / Medium / Low)

   Indicates if the total heat exchanger has been selected.
   - A/C only air conditioning
   - VENTI only ventilation
   - A/C + VENTI if both are selected
2. Operation mode indicator
   Indicates the operation mode selected:
   - (Fan / Cool / Heat / Dry / Auto)
3. Run indicator (Red Lamp)
4. RUN/STOP Switch
5. MODE (Operation Mode Selection) Switch
6. FAN SPEED (Fan Speed Selection) Switch
7. Up & Down Panel Operation Switch
8. VENTI (Ventilator Operation) Switch
9. LOUVER (deflector panel) switch
10. TIME (Time Setting) Switch
    Increases and decreases the Set Time for timer operation
11. ON/OFF TIMER Switch
    Used to activate or deactivate the timer operation.
12. CHECK Switch
13. RESET (Filter Reset Switch)
    After cleaning the air filter, press the "RESET" button. FILTER indication will disappear and the next filter cleaning time is reset. It also stops the run procedure.
14. TEMP (Temperature Setting) Switch
15. T.RUN (Test Run Indication)
    Check (Check Indication)
    These Tests appear when TEST RUN or CHECK is being performed
16. ABNML (Alarm)
    Indicator FILTER Indicator
17. SET TEMP (Setting Temperature) Indicator
18. ON/OFF Timer (Timer Operation Indicator)
    Alarm Code Indicator
    NO FUNCTION Indicator
19. CENTRAL (Central Control Indicator Operation)
    Indicates that central station or CSNet is being performed.
20. Swing Louver Indicator
    DEFROST Indicator

10.2.1. Operation Procedure for Cooling, Heating, Dry and Fan Operations

Before Operation:

Supply electrical power to the system for approximately 12 hours before start-up after long shutdown.
Do not start the system immediately after power supply, it may cause a compressor failure, because the compressor is not heated well. Make sure that the outdoor unit is not covered with snow or ice.
If covered, remove the snow or the ice by using hot water (less than 50°C).
If the water temperature is higher than 50°C, it will cause damage to plastic parts.

CAUTION

◈ Turn on the power supply.
Three vertical lines appear on the liquid crystal display A/C or VENTI is indicated on the liquid crystal display.

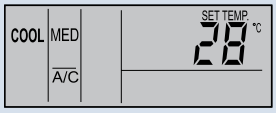
◈ Press the MODE switch.
By repeatedly pressing the MODE switch, the indication is changed in order of COOL, HEAT, DRY and FAN (In case of Cooling Only model, COOL, DRY and FAN).
(The figure shows when setting “COOL” mode is selected).

◈ Press RUN/STOP Switch.
The RUN indicator (Red) is ON. The system starts automatically.

NOTE:
Setting of Temperature, Fan Speed and Air Louver Direction.
The setting condition is memorized after setting once, therefore daily setting is not required.
In case that the setting is required to be changed, refer to “operation procedure for Temperature, Fan Speed and Air Louver Direction Setting”.

◈ Turned OFF (STOP)
Depress the “RUN/STOP” switch. The RUN indicator turns off (red).
The system stops automatically.

NOTE:
There could be a case when the fan runs during approximately 2 minutes after the heating operation is stopped.



10.2.2. Operation Procedure for Temperature, Fan Speed and Air Louver Direction Setting

◈ DO NOT touch the CHECK switch.
The CHECK switch is used only when servicing.
In case that the CHECK switch is pressed by mistake and the operation mode is changed to the check mode, press the CHECK switch again for approximately 3 seconds, and press the CHECK switch once again after 10 seconds: operation mode is changed to normal.

ATTENTION

◈ Temperature Setting
Adjust the temperature by pressing TEMP ⌃ or ⌄ switch.
The temperature is increased by 1ºC by pressing switch ⌃ (máx. 86.00°F).
The temperature decreases by 1ºC by pressing switch ⌄ (min. 19°C in case of COOL, DRY and FAN mode, min. 17°C in case of HEAT mode). (The figure shows when setting temperature is 28 °C).

◈ Setting FAN Speed
Press the FAN SPEED switch.
When the FAN SPEED switch is pressed repeatedly, the indication changes in the rotation of HIGH, MEDIUM and LOW
For standard operation, set the fan speed at HIGH.
(The figure shows when setting MED speed).

NOTE:
In case of DRY mode, the fan speed is automatically changed to LOW, and can not be changed (However, the indication shows the present setting condition).

◈ Setting of Swing Louver Direction

Press the SWING LOUVER switch: the swing louver starts to swing. Press the SWING LOUVER switch again, the swing louver is fixed.
By repeatedly pressing the SWING LOUVER switch, the swing louver stops and swings successively.

◈ When Fixed

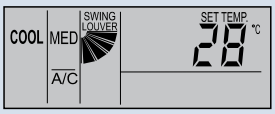
The indication shows the air flow direction.

◈ Auto Swing position

The indications move continuously corresponding to the louver swing.

NOTE:

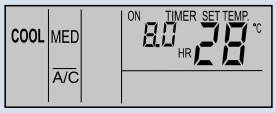
In case of heating operation, the louver angle is automatically changed.



10.2.3. Operation Procedure for Time Guard

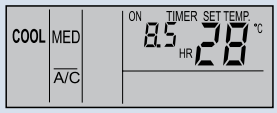
◈ Press the ON/OFF TIMER switch.

ON TIMER is indicated in case that the system is stopped.
OFF TIMER is indicated in case that the system is running.
(The figure shows when setting ON TIMER).



◈ Press the TIME switch ▲ or ▼ and set the required time.

The time is increased by 30 minutes by pressing switch ▲ (máx. 24 hours) and decreased by 30 minutes by pressing the ▼ switch (Min. 0.5 hours).
In case that the required time is not set, the set time is automatically set at 8.00 hours.
(The figure shows when setting 8.5 hours for timer operation)



◈ Cancel setting

Press the ON/OFF TIMER switch again.

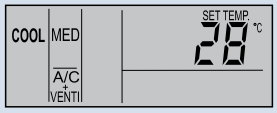
10.2.4. Operation Procedure for Ventilation

This function is available only when the total heat exchanger is connected.
When the procedures below are performed without the total heat exchanger connected, NO FUNCTION blinks for 5 seconds.

ATTENTION

◈ Ventilation

Press the VENTI switch
By repeatedly pressing the VENTI switch, the indication is changed in order of A/C, VENTI and A/C+VENTI.
(The figure shows the A/C + VENTI setting).



NOTE:

Contact your distributor or HITACHI dealer for detailed information.
If the mode is changed to VENTI during individual operation of the air conditioner, the air conditioner is stopped.
In case that the mode is changed to A/C during individual operation of the total heat exchanger, the total heat exchanger is stopped.

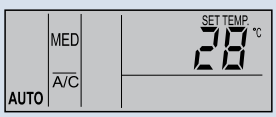
10

10.2.5. Operation Procedure for Automatic Cooling/Heating Operation

The automatic cooling/heating operation is required to be set by the optional function.
Contact your distributor or HITACHI dealer for detailed information.
This function is to change operation mode, cooling or heating automatically according to the temperature difference between the set temperature and the suction air temperature.In the case that the suction air temperature is higher than the set temperature by 3°C, the operation is changed to COOL mode, and lower than the set temperature by 3°C, the operation is changed to HEAT mode.

NOTE:

In case of heating operation at the LOW fan speed, the operation often stops due to the operation of protective devices. In such cases, set the fan speed at HIGH or MED.
In case that the outdoor temperature is higher than approximately 21°C, the heating operation is not available.
The temperature difference between cooling and heating operation is quite big in case of using this function. Therefore, this function can not be used for the air conditioning of the room where requires accurate control of temperature and humidity.



10.2.6. Procedure for Setting the Swing Louver

Swing louver setting

1. When the SWING LOUVER switch is pressed, the swing louver starts its operation. The range of the swinging angle is approximately 70° from the horizontal position to the downward position. When the "◥" mark is moving, it indicates conitnous operation of the louver.

2. When the swinging operation of the louver is not required, press the SWING LOUVER switch again. The louver is stopped at an angle indicated by the direction of this mark "◥".

3. Discharge air angle is fixed (at 20° for RCI series and 40° for RCD series) during start-up of heating operation and defrosting operation when thermostat is ON. When the outlet air temperature reaches above 30 °C, swinging of louvers is started.

Fixing of Louver

1. In the case of cooling and dry operation, discharge air angle can be changed at 5 positions. In the case of heating operation, it can be changed at 7 positions

2. To fix the louver position, first press the SWING LOUVER switch to start the louver swinging, and then press the SWING LOUVER switch again when the louver reaches the required position.

3. Discharge air angle is fixed (at 20° for RCI series and 40° for RCD series) during start-up of heating operation and defrosting operation when thermostat is ON.. When the outlet air temperature reaches above 30 °C, swinging of louvers is started.

4. When the louvers are fixed at an angle 55° RCI, 65° RCD or 70° both during heating operation and the operation mode is changed to cooling operation, louvers will be automatically fixed at an angle of 45° RCI, 60° RCD.

NOTE:
There is a time lag between the actual angle of the louver and the liquid crystal indication. When the SWING LOUVER switch is pressed, the louver will not stop immediately. The louver will move one extra swing. If the louvers are moved due to cleaning or for any reason, set Auto Setting mode to place the four louvers in in the same position.

RCI (4-way cassette type)

Indication							
Louver angle (approx.)	Approx. 20°	Approx. 25°	Approx. 30°	Approx. 35°	Approx. 45°	Approx. 55°	Approx. 70°
Cooling	Angle Range						
Heating	Angle Range						

Angle range
Recommended angle

RCD (2-way cassette type)

Indication							
Louver angle (approx.)	Approx. 40°	Approx. 45°	Approx. 50°	Approx. 55°	Approx. 60°	Approx. 65°	Approx. 70°
Cooling	Angle Range						
Heating	Angle Range						

Angle range
Recommended angle

RPK (Wall-mounted type)

Indication							
Louver angle (approx.)	Approx. 35°	Approx. 40°	Approx. 45°	Approx. 50°	Approx. 55°	Approx. 60°	Approx. 70°
Cooling	Angle Range						
Louver angle (approx.)	Approx. 40°	Approx. 45°	Approx. 50°	Approx. 55°	Approx. 60°	Approx. 65°	Approx. 70°
Heating	Angle Range						

Angle range
Recommended angle

RPC (Ceiling-mounted type)

Indication							
Louver angle (approx.)	Horizontal	Approx. 15°	Approx. 30°	Approx. 40°	Approx. 50°	Approx. 60°	Approx. 80°
Cooling	Angle Range						
Heating	Angle Range						

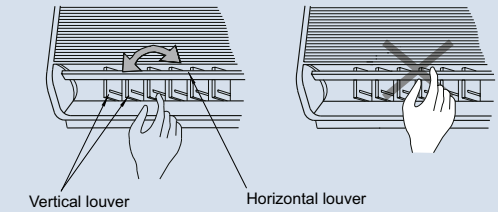
Angle range
Recommended angle

Do not turn the air louver by hand. If moved, the louver mechanism could be damaged! (In all units)

CAUTION:

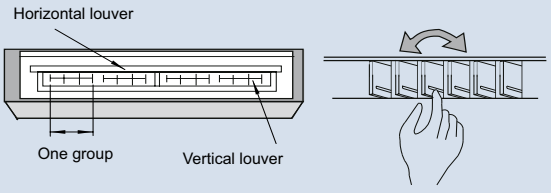
◈ Wall Type (RPK):
Adjust the vertical deflectors by hand to discharge air in the required direction.
Do not swing 1 blade at left side and 2 blade at right side of the vertical deflection.

◈ Automatic Setting of louver
When the unit operation is stopped, two air louvers are stopped at closing position automatically.



◈ Ceiling Type (RPC):
The vertical deflector consists of four sets of deflectors. Adjust the vertical deflectors by hand to discharge air in the required direction.

NOTE:
For models without automatic swing louver the above indications are not available through R.C.S. The swing Louver should be adjusted by hand in this case.



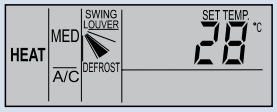
10.2.7. Indications when in Normal Condition

◈ Thermo-controller

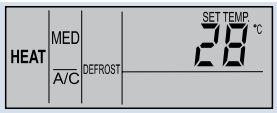
When the thermo-controller is operated, the fan speed is changed to LOW, and the indication is not changed. (Only in the heating operation)

◈ Defrosting

When the defrost operation is performed, DEFROST indication is ON.
The indoor fan is slowed down or stopped (depends of selection)
The louver is fixed at the horizontal or 35° position. However, the louver indication of LCD continues to activate.
(The figure shows when setting DEFROST is ON).



When the unit is stopped during defrost operation, the RUN indicator(Red) is OFF.
However, the operation continues with DEFROST indication, and the unit is started after the defrost operation is finished.



◈ Filter

Filter Clogging: The FILTER indication is ON when the filter is clogged with dust, etc.
Clean up the filter: Press the RESET switch after cleaning the filter. The FILTER indication is OFF.

10.2.8. Indications in Normal Conditions

◈ Abnormal

The RUN indicator (red) flickers.
"ALARM" is indicated on the liquid crystal display.
The indoor unit number, the alarm code and the model code are indicated on the liquid crystal display.
In the case that the plural indoor units are connected, the above items for each indoor unit are indicated one by one.
Check the contents of the indications and contact your HITACHI service contractor.

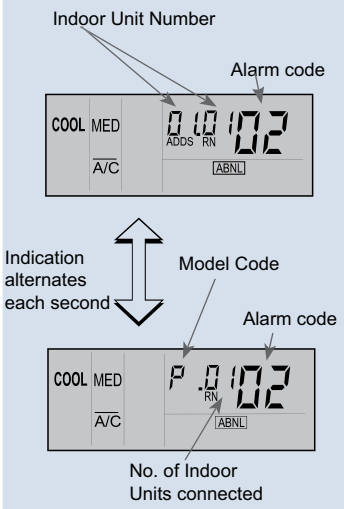
◈ Power Failure

All the indications are OFF.
Once the unit is stopped by power failure, the unit will not be started again although the power recovers. Perform the starting procedures again.
In case of power failure within 2 seconds, the unit will be started again automatically.

◈ Electric Noise

There could be a case that all the indications are OFF and the unit is stopped. This is occurred by the activation of the micro computer for the unit protection from the electric noise.

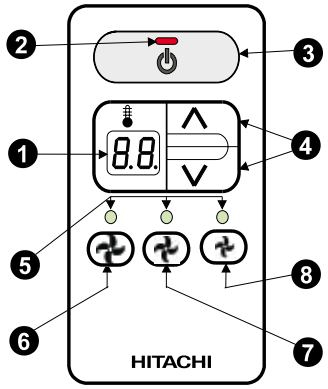
NOTE:
If the wireless remote control switch is used for the wall type indoor unit, remove the connectors (CN25) connected to the indoor PCB. If not removed, the unit can not operated. The memorized data can not be erased unless the remote control switch is initialized.



Model code	
Indication	**Model**
H	Heat pump
P	Inverter
F	Multi
C	All Cool
E	Others

10

10.3.PC-P5H - Wire Remote Controller (Optional)



Model: PC-P5H

◈ Features:

This device (with cable) lets you control all of the unit's basic functions.

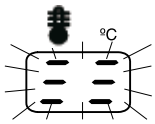
NOTE:

- *Swing Louver Setting is not available. Select by Central Station or other remote control switch.*
- *Default: Auto Swing.*
- *If the remote control switch is defined in not available mode from the central station, the setting is not available.*

❶ Temperature indication
❷ RUN LED (red)
❸ RUN/STOP Switch
❹ Temperature Setting Switch
❺ FAN SPEED (Green)
❻ FAN SPEED Switch Hi Speed
❼ FAN SPEED Switch medium speed
❽ FAN SPEED Switch: low speed

◈ **To Start**

1.- When turning ON the indoor unit, initial process will start.



2.- Set at your required temperature by pressing the ❹ switch.
The set temperature is indicated on the ❶ display.

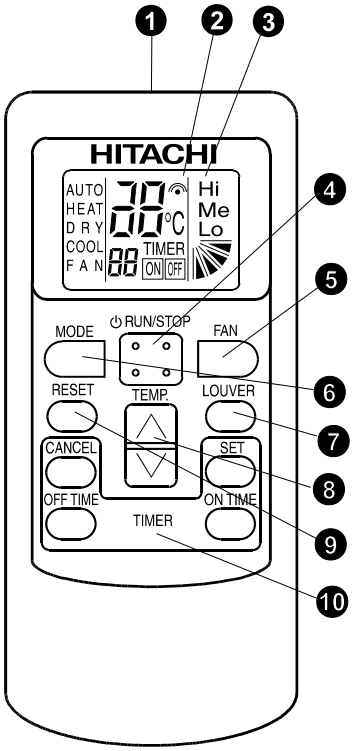
3.- Select one of the fan speed by pressing the ❻, ❼, ❽ switches.
The set fan speed is indicated by the green LED ❺.

4 - Press Switch ❸. The red LED turns on ❷.

◈ **Stoppage**

1.- Press the Switch ❸. Air Conditioning is stopped and all the LEDs are turned OFF. In order to restart, press switch ❸.

10.4.PC-LH3A - Wireless Remote Control (Optional)



Model: PC-LH3A

◈ Features:

This device is used to send operation mode, timer setting, etc. commands to the indoor unit. Face the transmitter of the controller toward the receiver of the indoor unit and press the switch of required operation so that commands (by infrared rays) are sent to the indoor unit. The distance for transmitting is approximately 6 meters as a maximum. (The appropriate distance for transmitting will get shorter if the transmitting angle is not vertical to the receiver or an electronic type light is used in the room, etc.).

❶ Transmitter

Point the transmitter towards the receiver of the indoor unit when sending commands. The Transmitting indication on the liquid crystal display flashes when sending commands.

❷ Transmission indication

❸ Liquid Crystal Display Indication

The set temperature, timer operation, position of air louver, operation mode, air flow mode, etc. are indicated.

The diagram of the display shown on the left is for explanation purposes only. The display will differ during actual operation.

❹ ON/OFF Switch

Operation of the unit can be started or stopped by pressing this switch.

❺ Fan speed switch

Press this switch to select the fan speed. By repeatedly pressing the button, the setting will change sequentially through HIGH, MED and LOW. (Fan speed is fixed at low for dry operation).

❻ MODE Selection Switch

By repeatedly pressing the mode switch, the unit cycles through the different operating modes in the order of: HEAT, DRY, COOL and FAN. To select auto operation, press the switch for more than 3 seconds.

If the switch is pressed again, it will return to FAN mode.

❼ Louver Angle Switch

The airflow angle and auto-louver operation can be set by this switch. When pressing the switch, the angle is changed in the following order. (In cool or dry operation modes, steps 1-5 and Auto swing are available).

❽ TEMP Switch

The setting temperature can be adjusted using the switch.

❾ Reset Switch

(1) Press RESET to turn off the filter indicator lamp after filter cleaning.

(2) If the unit is stopped abnormally due the protection devices etc... press the RESET switch to cancel the control stoppage after the cause of abnormality has been removed.

❿ TIMER Switches:

Four switches control the timer operation.

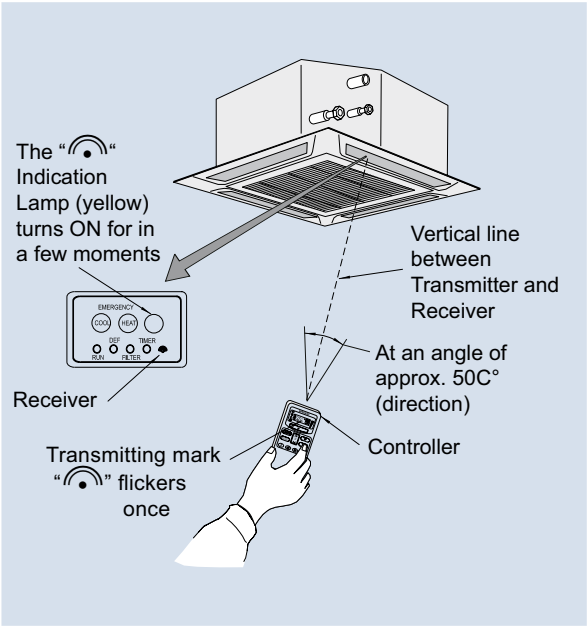
The set time can be changed by pressing ON TIME or OFF TIME and is set by pressing the SET switch. Timer operation can be cancelled using CANCEL.

10.4.1 Operation Procedure

When operating the controller, face the transmitter toward the receiver of the indoor unit and press the switch for the required operation as followings.
The operation commands are sent by pressing the required operation switch by facing the transmitter of the controller toward the receiver of the indoor unit.

When the commands are sent, the "((•))" of the LCD of the remote control flickers once.
The indication lamp (yellow) on the receiver part of the indoor unit turns ON for an instant when the indoor unit receives the commands.

ATTENTION:
In case that the indication lamp (yellow) does not turn ON although the commands are sent, the commands are not received by the indoor unit. In such a case, send the commands again.
The transmitter of the controller must be oriented vertically in relation to the receiver, and the permissible angle for transmitting is 50°. However, the appropriate distance for transmission is halved when the angle is 50 degrees, and is also reduced when electronic type lighting is used in the room.
In case that two indoor units are installed side by side, the commands from the controller may be received by both indoor units. The function to identify each indoor unit is not applicable.



10.4.2. Receiver Kit

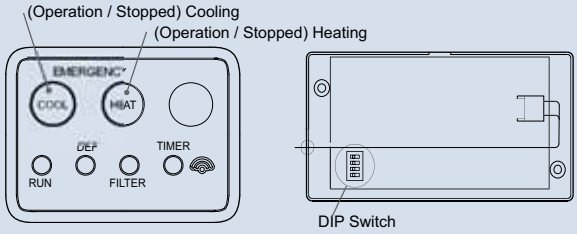
One of these receiver Kits is required for indoor units to receive the signal when using wireless remote control switch (PC-LH3A).

Compatible Models:

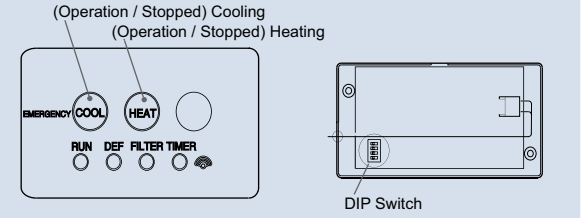
Model	On the Wall	On the Panel
RCI-(1.0~6.0)	PC-RLH11	PC-RLH8
RCIM-(1.0~2.0)		PC-RLH13
RCD-(1.0~5.0)		PC-RLH9
RPC-(2.0~6.0)		-
RPI-(0.8~10.0)		-
RPK-(1.0~4.0)		-
RPF(I)-(1.0~2.5)		-

NOTE:
In case another Remote Controller is used together with PC-RLH8/9/11/13, one of them must be set as Sub, setting pin 1 of SW3 to ON (see next page)

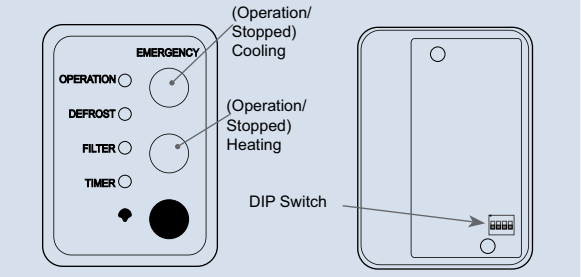
◈ PC-RLH8



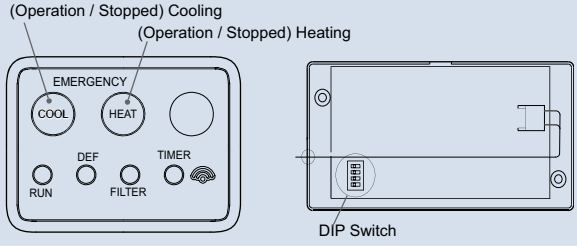
◈ PC-RLH9



◈ PC-RLH11



◈ PC-RLH13

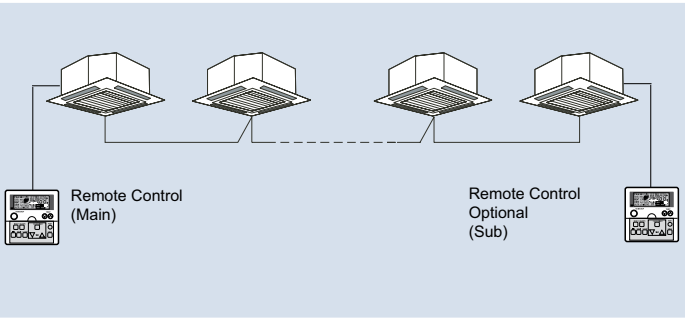


10.4.3. Operation for multiple Indoor Units

◈ Installation of Control for Multiple Units

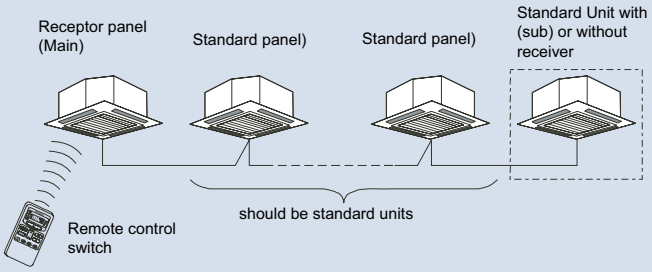
In case of operating multiple indoor units (Max. 16 units) simultaneously by a single control (wireless or remote), the receiver kit or the remote controller should be applied only to the unit for operation, and the other units should be without receiver kit or remote controller (for wired control). If plural receiver kits for control are required to be used, max. two receiver kits or remote controllers can be installed.

If two controllers are used, set Main and Sub for receiver kits or remote controllers by the following procedures.



NOTE:

- *It is also possible to combine a remote controller and a Wireless Controller with the same group of Units.*
- *RPK units cannot be connected simultaneously with built-in Receiver. If multiple RPK wants to be used simultaneously by a single control, PC-RLH11 should be installed. If you want tu use several RPK units simultaneously with only one remote control switch, you must use a PC-RLH11 or other remote control switch.*



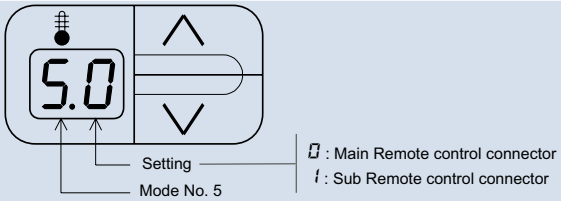
ATTENTION:

Turn OFF all the power sources before procedures such as wiring, setting the rotary switch, etc.

◈ Setting of Sub receiver kit for Remote controllers

PC-P5H:

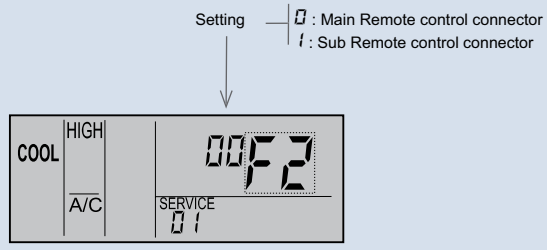
1. Press the check (🔧) (🔧) and (🔧) switches simultaneously for more than 3 seconds.
2. Press (🔧) three times till Mode Number is "5".
3. Press switch ⌃⌄ to set the suitable number as showed in the picture beside (Sub or Main).



When this setting is changed, cut off the power supply of all indoor units after returning the normal mode

PC-P1HE:

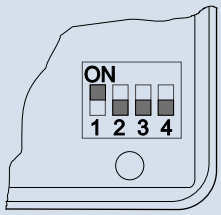
1. Press the CHECK switch and the RESET switch simultaneously more than 3 seconds to access the optional setting mode.
2. Press ∨ or ∧ and define the service to 01.
3. Press the CHECK switch.
4. Select code F2 by pressing the TIME switch ∨ o ∧.
5. Press switch ⌃⌄ to set the suitable number as shown in the picture (Sub or Main).



◈ Setting of Sub receiver kit for Wireless control

PC-RLH8/9/11/13:

1. Remove rear cover.
2. Set pin No. 1 of Dip Switch SW3 to ON.



NOTE:

Refer to Service Manual (SMGB0048) for more information about setting of "sub" for controllers.

◈ Wiring Procedures between Indoor Units

1. Perform the wiring work as follows.
The total length of the cable must be within 500 meters.

Cable references are shown below:

PC-RLH8/9/11	PRC-10E1	PRC-15E1	PRC-20E1	PRC-30E1
Cord length	10m	15m	20m	30m

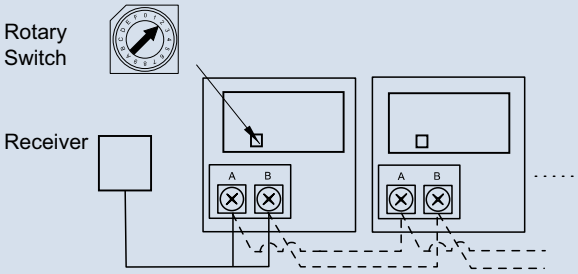
2. Fix the connecting control cable between indoor units at certain points with bands not to run along the power supply cable inside of the indoor unit.
You must perform the same wiring outside the indoor unit. Keep a distance of more than 30 cm between the control cable and the power supply cable, or ground one end of a conduit tube after inserting the control cable in the metal conduit tube.

3. Set the RSW switches on the printed circuit board in the electrical box of each indoor unit as shown in the next figure.

4. Check the number of Indoor Units Connected when running the test.

NOTE:
The 7-segment indication of the receiver part and the remote controller shows the number of the indoor units connected in case that the test running is performed by the controller. However, the number can not be indicated for some models. In such a case, check the number by the wired controller PC-P1HE.

WARNING:
Turn OFF all the power source before the following procedures such as wiring, setting the rotary switch, etc.
Rotary switch must start in 1.

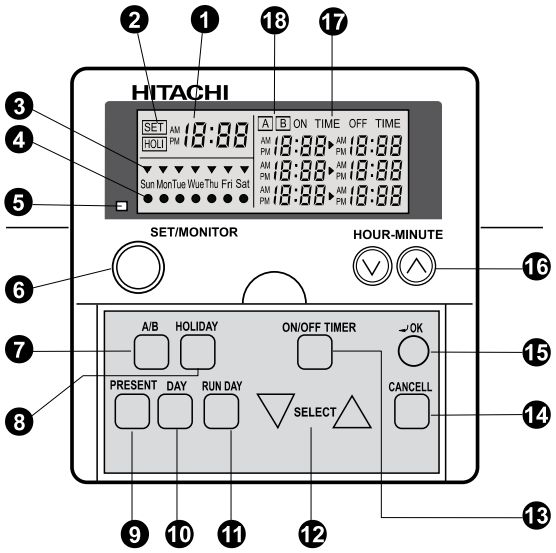


RSW Setting

1st unit	2nd unit	3rd unit	4th unit
5th unit	6th unit	7th unit	8th unit
9th unit	10th unit	11th unit	12th unit
13th unit	14th unit	15th unit	16th unit

10.5.PSC-5T - Wall-mounted 7-Day Timer (Optional)

Liquid crystal display (LCD)



Model: PSC-5T

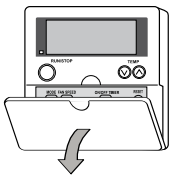
◈ Features:

With this device you can control the daily on/off operation of the unit throughout the week.
This device is a complement for the devices that do not include functionality (PC-P1HE / PC-P5H / PC-P5S).

◈ Functions:

1. ON/OFF setting time in a week
2. ON/OFF setting in available three (3) times a day
3. OFF setting for special Holiday day
4. Indication of Present Time
5. Running time is indicated

NOTE:
The current time and the ON/OFF setting time are indicated in 12 hours units (AM 00:00-11:59, PM 00:00-11:59)



When opening the cover, pull the cover in the direction of the arrow.

❶ Indication of Current Time

❷ Indication of Setting Time and Holiday

This indicates the Operation Mode, SET or MONITOR, and the Holiday if it is selected.

❸ Indication of Current Day of the week

❹ Indication of Running Day of the week

Whenever the running day is set, this light is on.

❺ Run indicator (Red Lamp)

❻ Operation Mode Change Switch (SET/MONITOR)

By depressing this switch the control timer is changed to the setting mode, the SET indication is turned on and the ▼ mark flickers.

By depressing again, the SET mode is turned off and the setting mode is changed to monitor mode.

❼ Change Switch of Setting Pattern (A/B)

There are two (2) patterns (A and B) set for the weekly schedule.

Each pattern can be set with three (3) times ON/OFF setting for each day of the week.

By pressing this switch the activated pattern (A or B) is selected.

❽ Holiday Setting Switch

By pressing this switch when the SET indication is on, the HOLI indication is turned on and the selected day is set as a holiday. Depressing it again, the holiday setting is canceled.

❾ Setting Switch of Current time

By pressing this switch the SET indicator and ▼ mark flicker and current time can be set.

❿ Setting Switch of Day of a Week

Day of week is selected by this switch when SET display is flickering or indicated.

Depressing this switch, the ▼ mark moves in the order of “Sun > Mon > ... > Sat. By pressing the DAY after Sat, all the ▼ marks are selected. If you press again, the ▼ mark goes back to Sun.

⓫ Setting Switch of Running Day (RUN DAY)

By pressing the RUN DAY switch, the selected day is set as the running day and the ● mark is turned on. Pressing again it is turned off and the selected day is cancelled

⓬ Change Switch of SELECT Setting

By pressing the SELECT switch the 1, 2 or 3 of ON TIME and OFF TIME is selected.

⓭ Change Switch of ON/OFF TIMER Setting

When SET display is flickering, by depressing the ON/OFF TIMER the timer is changed to the ON/OFF time setting mode and the hour indication of ON TIME flickers.

⓮ CANCEL Switch of Setting Time

By pressing this switch when timer is set, the indication of ON TIME or OFF TIME is changed to -.--.

⓯ OK Switch

By pressing this switch the selection on setting process is accepted.

⓰ Setting Switch of HOUR-MINUTE

By pressing ⌃ or ⌄, the hour and minutes are set, when indicated, or SET flickers.

⓱ Indication of ON TIME and OFF TIME Setting

It indicates the setting conditions of the selected day

⓲ Indication of Weekly Scheduled Pattern (A or B)

10.5.1. Setting Present Day and Present Time

◈ (<Example> current Day: Friday, Present Time: 5:15 PM).

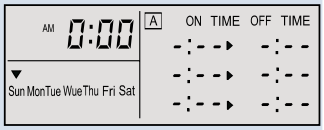
During the setting mode, the setting of the present time is not available when depressing the PRESENT switch more than 3 seconds.

ATTENTION

1. Supply power to the unit

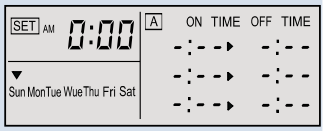
WARNING:
Supply power the unit more than 12 hours before unit operation for compressor protection. Do not cut off power during the term of using air conditioner

The on the right figure shows current time at AM 0:00 on Sunday. (When the power is turned ON, the present time is not set.).



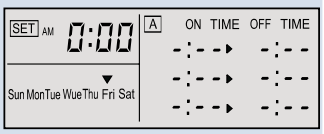
2. Depress the PRESENT switch for more than 3 seconds.

The display to current time setting mode, and the SET indicator and the ▼ mark flicker.
The figure on the right shows a case where neither the ON time nor the OFF time are set.



3. Set the ▼ mark to the current day by pressing the DAY switch.

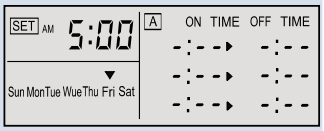
Press the OK switch after setting the current day, the ▼ mark is turned on and the hour indication flickers.
The right figure shows the case of setting the day at Friday.



4. Set hour indication to the current hour by pressing the HOUR/MINUTE ⌃ or ⌄ switch.

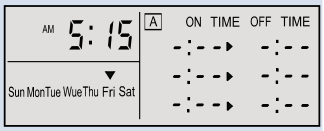
Press the OK switch after setting the current hour, the hour indication is turned on and the minute indication flickers.
The right figure shows the case of setting the hour at PM 5.

NOTE:
AM 12:00 is displayed as PM 00:00



5. Set current minute indication by pressing the HOUR/MINUTE ⌃ or ⌄ switch.

Press the OK switch after setting the current minute; the current day and time are fixed, and the current time setting mode is changed to the monitor mode. The minute indication is turned on and the SET indication is turned off.
The figure on the right shows the case of setting the minute to 15.



10.5.2. Changing Weekly Schedule Pattern (A or B)

There are 2 (two) patterns (A or B) set for the weekly schedule.
Each pattern can be set with 3 (three) times ON/OFF settings for each weekly day.
<Function>
To select the mode for setting and operating the schedule.
The schedule of A or B pattern can be set for each week and changed for a season.

1. Depress the SET/MONITOR
The control timer is changed to the setting mode and the SET indication is turned on.

2. Depress the A/B switch.
The set pattern is changed (from A to B) by pressing the A/B switch.
The figure on the right shows the case of selecting set pattern B.

3. Depress the SET/MONITOR
The SET mode is turned off and the setting mode is changed to the monitor mode.

10.5.3. Time Setting for: Start/Stop

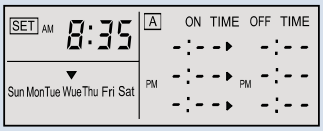
(<Example> A pattern, Friday, Setting 2, PM 1:00 (ON) / PM 5:00 (OFF)

In case that the remote control switch (PC-2H2) is used together, both setting of ON TIME and OFF TIME are required for setting 1, 2 and 3. (The setting of ON TIME (or OFF TIME) only is not available).
In case that the central station (PSC-5S or PC-P1H) is used together, the setting of ON TIME (or OFF TIME) only is available.

ATTENTION

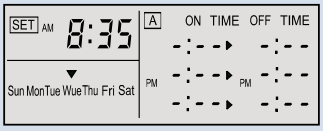
1. Depress the SET/MONITOR

   The control timer is changed to the setting mode, the SET indication is turned on and the ▼ mark flickers.
   The figure on the right shows the case of changing to the setting mode.



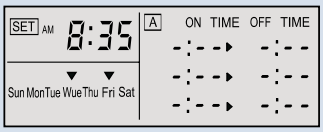
2. Select A or B pattern by depressing the A/B switch.

   Refer to “B”. Changing weekly Schedule pattern A or B for changing the pattern



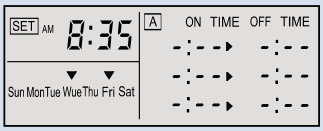
3. Select the weekly day to set ON/OFF control by depressing the DAY switch

   By pressing the DAY switch, the flickering ▼ mark moves in the order of “Sun ⑭ Mon ⑭ ... ⑭ Sat. When you press DAY after Sat., all of the ▼ marks flicker (from Sun to Sat). In this case, the setting is the same for all days of a week.
   By pressing the DAY switch once again, the flickering ▼ mark returns to the Sun position.

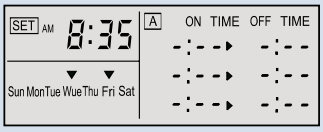


4. Depress the ON/OFF TIME switch.

   The Timer is changed to the ON/OFF time setting mode and the ON TIME indication flickers.
   The right figure shows the case of changing to the ON/OFF time setting mode

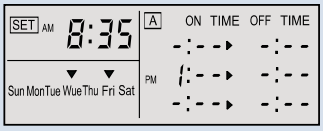


5. Select setting 1,2 or 3 by pressing the SELECT switch.
   By pressing the SELECT switch, the hour indication flickers.
   The right figure shows the case of selecting the setting 2.



6. Set the ON TIME hour indication by pressing the HOUR/MINUTE ⌃ or ⌄ switch..

   After setting the hour indication, press the OK switch and the minute indication of ON TIME to be set flickers.
   The figure on the right shows the case of setting the hour to PM 1:--

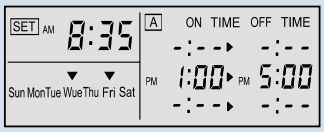


7. Set the minute indication of ON TIME by pressing the HOUR/MINUTE ⌃ or ⌄ switch.

   After setting the minute indication, depress the OK switch and the hour indication of OFF TIME to be set is flickered.
   The right figure shows the case of setting the hour PM 1:00:00 AM.

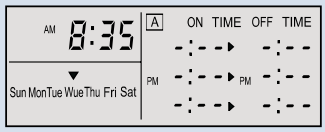
8. Set the time of OFF TIME by the same procedure of setting the time of ON TIME

   After setting the time of OFF TIME, the flickering indication of OFF TIME is turned on and the ON/OFF time setting mode is changed to the setting mode.
   The figure on the right to shows the case of setting the hour to PM 5:00.



9. Press the SET/MONITOR switch.

   The SET indication is turned off and the control timer is changed to the monitor mode.
   The right figure shows the case of indicating the setting condition of the present day.



By Pressing the CANCEL switch when setting ON time (procedure 6) or OFF time (procedure 8), the indication of ON TIME or OFF TIME is changed to :. Pressing the “OK” switch in this condition cancels the setting.

ATTENTION

10.5.4. Setting for Running Day

<Function>
To set the day for actual operation of the running schedule set before. (Although the ON time and OFF time are set, the schedule operation is not available unless the running day is set.)

(<Example> B pattern, Tuesday

1. Depress the SET/MONITOR

   The timer is changed to the setting mode, the SET indication is turned on and the ▼ mark flickers.

2. Select A or B pattern by depressing the A/B switch.

   The figure on the right shows the case of selecting set pattern B.

3. Select the running day by depressing the DAY switch.

   Refer to step 3. “Setting ON/OFF Time” for the indication of the ▼ mark.
   The figure on the right shows the case of selecting Tuesday.

4. Press the RUN DAY switch, the selected day is set as the running day and the ● mark is turned on at the selected day.

   By pressing the RUN DAY switch again, the running day setting is canceled and the ● mark is turned off.
   The figure on the right shows the case of selecting Tuesday.

5. Depress the SET/MONITOR

   The SET indication is turned off and the control timer is changed to the monitor mode.

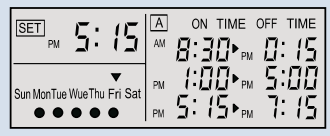
10.5.5. Holiday setting

<Function> To cancel the running schedule temporarily.
The schedule operation is canceled only once at the day set as “holiday”. After that, the schedule operation is available again. This function is used if there are any irregular holidays.

(<Example> B pattern, Tuesday

1. Depress the SET/MONITOR

   The timer is changed to the setting mode, the SET indication is turned on and the ▼ mark flickers.

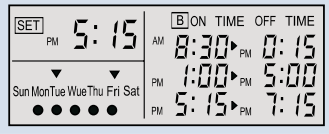


2. Select A or B pattern by depressing the A/B switch.

   The figure on the right shows the case of selecting set pattern B.

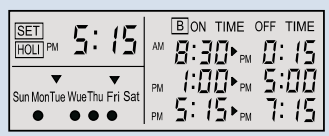
3. Select the day to be set as holiday by depressing the DAY switch.

   Refer to step 3. “Setting ON/OFF Time” for the indication of the ▼ mark.
   The figure on the right shows the case of selecting Tuesday.



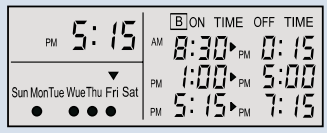
4. Depress the HOLIDAY switch, the HOLI indication is turned on and the selected day is set as holiday.

   If the selected day is not set as running day, the ● mark turns off. The holiday setting is not available for the day. (If all days of a week are selected, only the running day is et as a holiday).
   By pressing the HOLIDAY switch again, the holiday setting is canceled.



5. Press “SET/MONITOR”.

   The “SET” indication is turned off and the control timer is changed to the monitor mode.



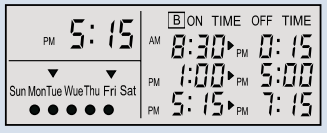
If the current day is set as a as holiday, the holiday setting is available from that time and the scheduled operation is canceled until the next day. In that case, the same day after a week is not “holiday”.

ATTENTION

10.5.6. Checking Contents of Setting

1. Press the DAY with the switch in monitor mode (when the SET indication is turned off);

   The ▼ market moves and the setting contents of the day with the ▼ mark is indicated.
   The figure on the right shows the case of selecting Tuesday.

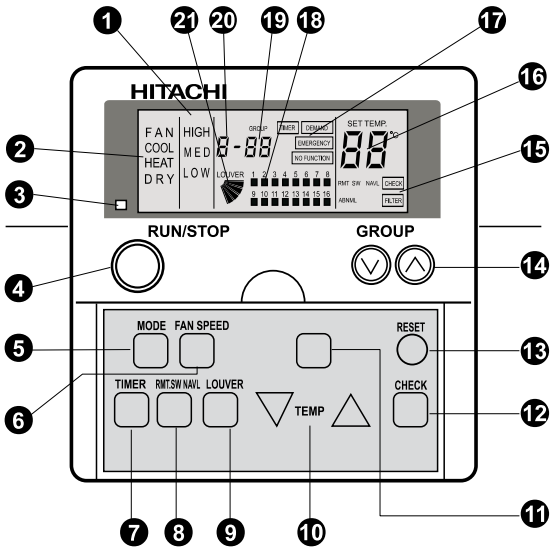


CAUTION:
The control timer has a built-in back-up battery and the clock function is available during 2 weeks in case of power failure.
If the power failure continues more than 2 weeks, set the current time again.
The RUN indicator is turned on at ON time and turned off at OFF time.
If the indoor unit operation is started or stopped by the remote control switch or the central station used together with the timer, the RUN indicator is not changed.
The flickering of the RUN indicator shows an abnormal condition of the Timer.
Check to ensure that the wiring connection and the setting of DIP switches are correct.
If the RUN indicator is still flickered after checking, contact your distributor or HITACHI dealer.

CAUTION:
It may take approximately 15 seconds to start (or stop) operation after ON time (or OFF time) according to the controller used together.
Operation cannot start nor stop when in setting mode.
After completing setting, activate the timer control mode. (After the timer has been in setting mode during three minutes, it will automatically change to monitor mode).
In the case that the Timer is used with the central station (PSC-5S), the setting by the central station is required. Refer to next section 10.5 and section 4.3 in Service Manual (SMGB0048) of the central Station for more details.

10.6.PSC-5S - Wall-mounted Central Station (Optional)

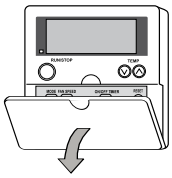
Liquid crystal display (L.C.D)



Model: PSC-5S

◈ Features:

This device lets you control all of the unit's basic functions such as temperature and moisture as well as other additional functions that are described below in this chapter.
This device can control up to 64 indoor units, with the possibility of grouping them in four different function modes.



When opening the cover, pull the cover in the direction of the arrow.

1. Fan speed indicator
   Indicates the selected fan speed for the group shown: High/Medium/Low.

2. Mode indication
   It indicates the operation Mode selected for the group shown: FAN, COOL, HEAT, DRY.
   Automatic mode is available if this function is activated.

3. Run indicator (Red Lamp)

4. ON/PFF switch
   Changes the Operation Status of each unit, ON/OFF.

5. Operation mode selection switch
   FAN, COOL, HEAT, DRY

6. Fan speed selection switch
   HIGH, MEDIUM, LOW

7. Timer selection switch
   By pressing this switch, the signal from the Control Timer (PSC-5T) schedule is available and the TIMER indication is turned on. Pressing again, TIMER is turned off and the schedule is not available.

8. RMT.SW AVL/NAVL switch
   By pressing this switch, control by each Remote Control is prohibited or not. When RMT.SW NAVAL is indicated the Remote Control Switch is prohibited

NOTE:

When monitoring mode is selected, the above mentioned operation modes and setting temperature are indicated.

9. LOUVER (Swing Louver Operation) Switch
   By pressing this switch the swing louver position or operation is selected.

10. Temperature Setting Switch

11. This Switch is not used.

12. Check switch
    By pressing this switch, CHECK is indicated and Master or Slave unit can be set.

13. RESET switch
    By pressing this switch, the CHECK function is canceled. The FILTER indication can be turned off too.

14. Group selection switch
    By pressing this switch, the group number to be controlled is changed from 01 to 16. After 16, AA is shown, and then all the units are controlled simultaneously. Pressing again, 01 is shown and the sequence starts again.

15. CHECK, FILTER, RMT Indication. SW NAVAL and ABNMLCHECK is shown when this switch is pressed.RMT.SW NAVAL indicates that the corresponding switch is pressed.ABNML indicates that one or several units of a same group have an abnormal condition.

16. Temperature indication

17. TIMER, DEMAND, EMERGENCY and NO FUNCTION indication
    TIMER is show when this switch is pressed.
    DEMAND is indicated when the demand input is set by the outside input function.
    EMERGENCY is indicated when the emergency stop signal is input by the outside input function.
    NO FUNCTION is indicated when the pressed switch is not available

18. Group operation
    The ∩ mark shows the operation conditions of each group.
    OFF means STOP.
    ∩ ON means Operation and Flickering means abnormality.

19. Group Number Indication

20. Check Model Number indication

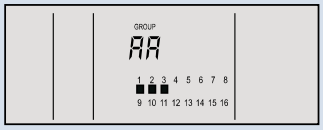
21. Swing Louver Indication

10.6.1. Group Selection and Monitoring Unit Operation Status

The central station can control up to 16 groups individually or simultaneously.
(The selected groups can be operated and the unit operation status of the groups can be monitored).

NOTE:
The group number is changed by pressing the GROUP switch. The group without setting is not indicated.

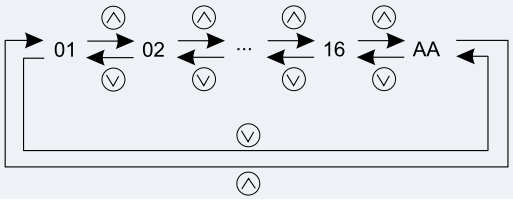
1. Supply power to the unit

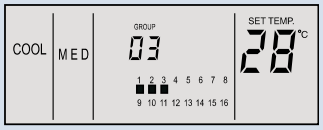


ATTENTION:
Supply power the unit more than 12 hours before unit operation for compressor protection.
Do not cut off power during while using the air conditioner

2. Depress the GROUP switch.

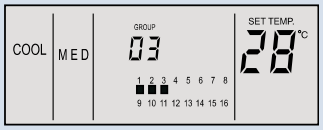
Every time the GROUP switch is pressed, the group number to be controlled is changed in the order as shown below. In case of AA, all the units are controlled simultaneously.





3. When selecting the group, the setting conditions of each group are indicated.

When the remote control switch used, the content of the setting is indicated.
1■~16■ shows the operating conditions of each group as follows:
- Turned OFF (■): stopped
- Turned ON (): In operation
- Flickering (■): abnormality



The Run indicator (Red Lamp) shows the following:
- Turned OFF: All Groups are stopped
- Turned ON: more than 1 Group in Operation
- Flickering: more than 1 Group in Abnormal Condition

In case of group AA, the indications (operation mode, setting temperature, air flow, louver angle and RMT.SW NAVL are indicated only when all groups are in the same setting.

NOTE:
The indication of setting temperature shows no temperature setting.

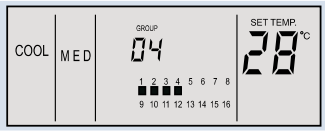
10.6.2. Setting of Operation Mode

<FUNCTIONS>

- COOL
  Funtion: To cool the room temperature by distributing the cooled air
- HEAT
  Function: To heat the room temperature by distributing the heated air
- DRY
  Function: To dehumidify more than standard cooling operation.
- FAN
  Function: To circulate the room air.

1. Depress the GROUP switch and select the group.

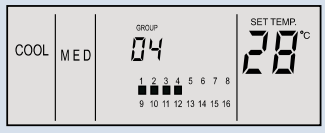
(Refer to item 2 of “A. Group Selection and Monitoring Unit Operation Status” in previous page)
The right figure shows the case of selecting group 4.



2. Depress the MODE switch.

The operation mode is changed in the followingn order:

FAN → COOL → HEAT → DRY



NOTE:

- *The above indications show the case of setting operation mode for group 4.*
  The same setting procedure shall be performed for other groups. If the same setting is used for all groups, select group number AA.
- *Some operation modes can not be set according to the unit model. Contact to HITACHI dealer or your distributor for details.*

10.6.3. Setting of Temperature, Fan Speed and Louver Angle

NOTE:

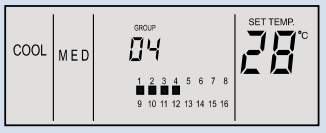
- *Do not touch the CHECK switch. The CHECK switch is only for service use.*
- *When the CHECK switch is depressed by a mistake and the central station is changed to the check mode, depress the RESET switch to cancel.*

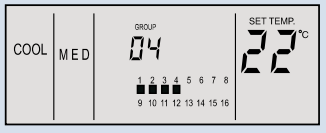
1. Depress the GROUP switch and select the group.

(Refer to item 2 of Group Selection and Monitoring Unit Operation Status in previous page).
The right figure shows the case of selecting group 4.

<TEMPERATURE>

Set temperature by pressing TEMP switch.
By pressing “⌃” switch, the temperature is increased by 1°C (Maximum: 86.00°F).
When you press the “⌄” switch, the temperature is decreased by 1°C (minimum: 19°C, for Cool, Dry and Fan mode, minimum 17°C for Heat mode).
When pressing “⌃” for 3 seconds at set temperature at 30°C, or pressing for 3 seconds at the minimum set temperature, the temperature is not set and the indication of setting temperature is “--”. In this case, press “⌃” or “⌄”; the indication of setting temperature returns to the minimum temperature or 30°C.
The figure on the right shows the case of setting at 22°C.





NOTE:

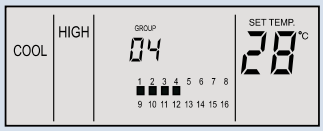
The examples show the setting range for standard model. The setting range may be different according to the connected unit model.

<FAN SPEED>

Press the FAN SPEED switch. By depressing the “FAN SPEED” switch, the indication is changed in the following order:

HIGH → MED → LOW

The figure on the right shows the case of setting HIGH speed.

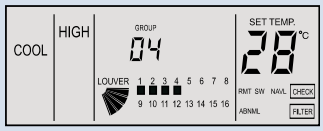


NOTE:
In case of dry operation, the fan speed is automatically changed and fixed at the “LOW” fan speed. In this case, the fan speed can not be changed (The indication remains at the setting condition).

<LOUVER ANGLE>

Press the AUTO LOUVER switch.
Each time the AUTO LOUVER switch is pressed, the indication of the louver angle is changed. Press the AUTO LOUVER switch at the “ ” position; the indication is changed to “ ” to indicate that the mode is set at Auto-Swing. Press the AUTO LOUVER switch again, the indication changes to “ ”.

The figure on the right shows the case of setting Auto-Swing.



◈ Example: In the Case of 4-Way Cassette Type.

NOTE:
- *The fixing angle of the louver shown beside is the case of 4-way cassette type Indoor Unit. The fixing angle is different according to unit model. Refer to the operation manual of each model for details.*
- *There exists a time lag between the indicated louver position on the LCD and the actual louver angle during operation.*
  Therefore, when setting the louver, set the angle according to the indicated louver angle on the LCD.
- *When the AUTO LOUVER switch is depressed, the louver may not stop immediately.*

Indication							
Louver Angle (approx.)	Approx. 20°	Approx. 25°	Approx. 30°	Approx. 40°	Approx. 45°	Approx. 55°	Approx. 70°
Cooling / Dry			Angle Range				
Heating			Angle Range				

Angle Range

Recommended Angle

ATTENTION:
The louver angle is automatically changed during heating operation for unit control.

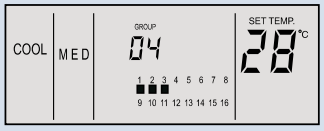
When heating operation is started When dry operation is started When temperature controller is activated	→	The louver angle is automatically changed.	→	When the discharged air temperature is increased over 30°C, the louver angle automatically returns to the set position.

The LCD indication remains at the setting condition.

10.6.4. Unit Operation

1. Depress the GROUP switch and select the group.

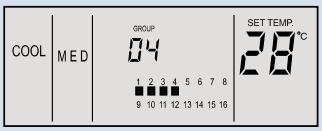
(Refer to item 2 “Group Selection and Monitoring Unit Operation Status” in previous pages)
The right figure shows the case of selecting group 4.



2. Press RUN/STOP Switch.

If the selected group is in operation, the group is stopped by pressing the “RUN/STOP” switch.
In case that the selected group is not in operation, the group is started by depressing RUN/STOP switch.
In case of group AA, depress RUN/STOP switch, and;

a. All the groups are stopped (when all the groups are stopped (RUN lamp is OFF)).
b. All the groups will start up (if more than 1 group is in operation (RUN lamp is ON)).



NOTE:
- *The indications above show the case of setting operation mode for group 4.*
- *The same setting procedure shall be performed for other groups. In case of the simultaneous operation of all groups, select group number AA.*

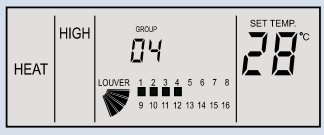
10.6.5. Prohibiting Operation by Remote Control Switch

<FUNCTION>

To prohibit the operation by the remote control switch.
When this function is available, the CENTRAL indication appears on the LCD on the remote control switch and the operation by the remote control switch is not available.

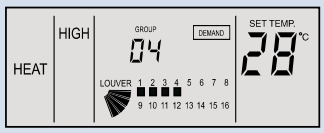
1. Depress the GROUP switch and select the group.

(Refer to item 2 “Group Selection and Monitoring Unit Operation Status” in previous pages).
The figure on the right shows the case of selecting group 4.



2. Depress the RNT.SW NAVL switch.

Every time the “RMT. SW NAVL switch is pressed, the RMT. SW NAVL indication turns on and off alternately.



The above indications show the case of setting operation mode for group 4.
The same setting procedure shall be performed for the other groups. If the same setting is used for all groups, select group number AA.
Although the RMT. SW NAVL” function is set, in case of operation by means of the central station, the unit can be stopped and restarted by means of the Remote Control Switch.
If the unit is not used with the remote control switch, the RMT. SW NAVL function will have to be set.
If it is used together with other controllers, do not set the RMT. SW NAVL function. Don’t adjust to the RMT. SW NAVL function either by means of other controller since a malfunction may occur.
If the temperature (--) is not set, it can be adjusted with the remotecontrol switch while the RMT. SW NAVL function is available.

ATTENTION

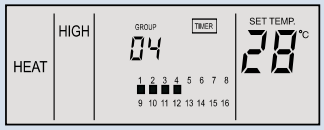
10.6.6. Timer Operation

<FUNCTION>

To set the schedule operation available or not available by the signal from the control timer in case of connection with the control timer (PSC-5T; Option).
The scheduled operation can be set as available or not available individually for each unit, however, the operation schedule the same for all units.

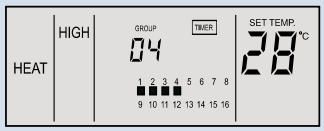
1. Depress the GROUP switch and select the group.

(Refer to item 2 “Group Selection and Monitoring Unit Operation Status” in previous pages).
The figure on the right shows the case of selecting group 4.



2. Depress the TIMER switch.

Each time the TIMER switch is pressed, the TIMER indication is turned ON and OFF alternately.
The group with timer setting is operated according to setting by the signal from the control timer.
The figure on the right shows the case of setting timer operation.

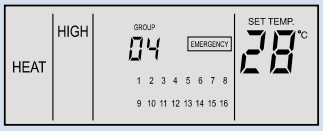


NOTE:
- *The above indications show the case of setting operation mode for group 4.*
- *The same setting procedure shall be performed for other groups. In case of the simultaneous operation of all groups, select group number AA.*

10.6.7. Other LCD Indications

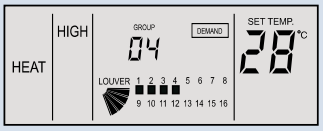
<EMERGENCY>

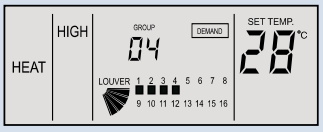
The EMERGENCY is indicated when the emergency stop signal is input by the outside input function.
During the emergency stoppage, indoor units are stopped and the operation by the remote control switch is not available.
Contact your distributor or dealer of HITACHI for details.



<DEMAND>

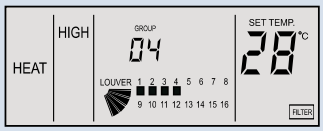
The DEMAND is indicated when the demand input is set by the outside input function.
The indication is indicated for the group with demand setting and the DEMAND indication flickers when the demand signal is input.
Contact your distributor or dealer of HITACHI for details.





<FILTER>

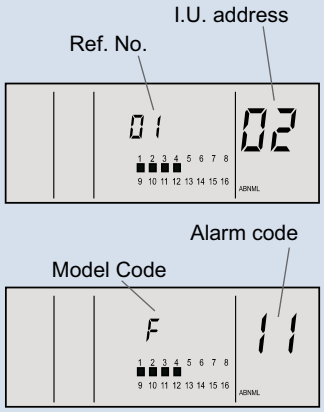
Filter Clogging:
When the FILTER indicator is shown, it means that the air filter of the indoor unit is clogged. Clean the air filter. After cleaning, press the RESET switch and the FILTER indication is turned OFF.



10.6.8. Indication in Abnormal Conditions

<ABNORMAL>

The Run Lamp (Red Lamp) is flickered when there is a group in abnormal condition.
The “ALARM” is indicated on the LCD.
The “■” indication flickers for the group that is in an Abnormal Condition.
Depress the GROUP switch and select the group with alarm, the indication of unit No. model code, alarm code and the normal indication is repeatedly indicated (There is a case that the model code may not be indicated according to the unit model).
If several units are in abnormal status, theprevious indication is shown alternately.
Check the contents of LCD indication and contact your distributor or dealer of HITACHI for details.



<POWER FAILURE>

All the indications are disappeared.
In case of unit stoppage due to the power failure, the unit is not started again after the power recovery. Perform the starting operation again.
In case of instant power failure within 2 seconds, the unit is automatically started again.

<ELECTRICAL NOISE>

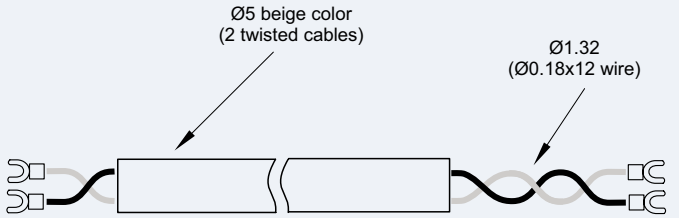
All the indications disappeared, and the unit operation may be stopped with the protection against electrical noise device. Perform the starting operation again.

10.7.Remote Control Optional Accessories

10.7.1. Remote Control Cable (PRC-10E1~PRC-30E1)

◈ For PC-P1HE, PSC-5S, PC-P5H and PC-RLH8/9/11

Connect a control twisted cable (0.75 mm² x 2 wires) in the installation, with soldering, or use an optional extension remote control cable. For the details of the optional remote control cable, refer to the following table:

Model	Length (m)	Type of Cable	Specifications
PRC-10E1	10	TPC	
PRC-15E1	15	TPC	
PRC-20E1	20	TPC	
*PRC-30E1	30	TPC	

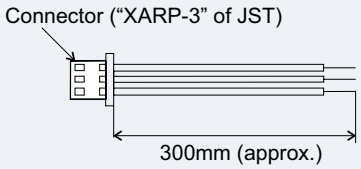
	A	B
Cable color	Black	Spring

* : Production is started after receipt of orders.
TPC: Twisted pair cable

10.7.2. 3P Connector cable

This connector is used when a remote ON/OFF device is connected or signals come from the printed circuit boards of the indoor and outdoor units.

One set contains five 3P connector cables.

Model	Application	Remarks	Specifications
PCC -1A	Optional functions of Outdoor Unit PCB	JST connector XARP-3 If a long cord is needed, connect field supplied wires (0.5mm²) with soldering.	

11. Available optional functions

This chapter gives a brief explanation of the available optional functions for the Hitachi SET FREE FSN(1)(E)/FXN(E)/ FSVNE series.

Contents

11.1. Available optional functions for indoor units

The following table gives information on the optional functions that are available for the FSN(1)(E) Series. For more information, see chapter 7 of the service manual, code SMGB0048.

Available options		Indoor units								
Optional function	Explanation	RCI	RCD	RPC	RPI(M)	RPK	RPF	RPFI	KPI	ECONO-FRESH
Remote control ON/ OFF function	This function enables the system to be stopped and started remotely. This optional function is very useful in hotels and office buildings to control the indoor units from the building management system.	●	●	●	●	●	●	●	●	●
Cancellation of commands by remote control after forced stoppage	This function stops the indoor unit and cancels the commands from the remote controller while it is activated.	●	●	●	●	●	●	●	●	●
Cooling or heating operation mode setting	This function enables the operation mode to be changed remotely.	●	●	●	●	●	●	●	●	●
Control using the field-supplied room thermostat	This function enables the unit to be controlled using an external thermostat. This can reduce the problems caused by stratification of indoor air.	●	●	●	●	●	●	●	●	●
Control using the remote temperature sensor	Instead of using the inlet air thermistor to control the unit, this uses the average between the inlet air thermistor and the remote temperature sensor.	●	●	●	●	●	●	●	●	●
Signal capture	This function provides information on the unit's operations so the necessary devices can be activated.	●	●	●	●	●	●	●	●	●
Automatic operation when power supply is ON	This function retains the unit's settings if the power supply is interrupted. The unit will restart when power is restored.	●	●	●	●	●	●	●	●	●
Function for restarting after power failure	This function retains the unit's settings if the power supply is interrupted. The unit will restart when power is restored if the unit was ON before the power failure	●	●	●	●	●	●	●	●	●
Optional sensor connection	This function connects an enthalpic sensor or a CO_2 concentration sensor.	◐	◐	◐	◐	◐	◐	◐	◐	●

● Available

◐ Not available

11.2. Outdoor Units Available Optional Functions

Optional functions		Outdoor Units Series		
Optional function	Explanation	FSN(1)(E)	FXN(E)	FSVNE
Fixing Operation Mode(Heating / Cooling)	This function fixes the operation mode, heating or cooling. If indoor unit is set on Heating (Cooling) mode when Cooling (Heating) mode is fixed, the indoor unit will be Thermo-OFF.	●	●	●
Thermostatic stoppage order.	When this function is activated the compressor is stopped and the indoor units are put under Thermo-OFF condition.	●	●	●
Snow sensor	This function operates all the outdoor fans at full speed during compressor stoppage if it detects the snow sensor is covered.	●	●	○
Enforced stoppage	This function produces and emergency stoppage, compressor and indoor fans do not operate.	●	●	○
Changeover of defrosting condition	This function changes the defrosting operation conditions. It is especially useful in cold areas.	●	●	●
Demand Current Control	This function regulates Outdoor running current, 60%, 70%, 80%, if demanded current is above set current the indoor unit capacity is reduced still thermo off if needs	●	●	○
Indoor unit fan control during thermo-OFF at heating	This function activates the Indoor fans as a cycle (2 min ON, 6 min OFF) in order to reduce the unpleasent aspects of Indoor Thermo-OFF working conditions.	●	●	●
Cancellation of heating outdoor ambient temperature limit	This function allows to operate in heating mode without upper ambient temperatures restriction.	●	●	●
Cancellation of cooling outdoor ambient temperature limit	This function allows to operate in cooling mode without low ambient temperatures restriction.	●	●	●
Night mode (low sound) operation	This function decreases the sound levels of the units, and the cooling capacity is also decreased.	●	●	●
Slow defrost setting	When this function is activated the indoor fan speed at defrost mode changes to slow instead of stopping the fan.	●	●	●
Cancellation of Outdoor Hot-Start Limit	This function allows to start the Outdoor unit without waiting the Temperature of compressor is bigger than 40ºC	●	●	●
Piping length setting	This function indicates to the unit the distance between the Outdoor and the farthest indoor unit is bigger than 100 m.	●	●	○
Low noise setting	This function reduces the maximum speed of the fan motor, consequently the noise level is reduced.	●	●	○
Wave function setting	This function regulates Outdoor running current, if demanded current is above set current the indoor unit capacity is reduced still thermo off if needs. The running current control is not a fixed value it is changing between a maximum value.	●	●	○
Signal capture	This function provides information on the unit's operations so the necessary devices can be activated.	●	●	○

● Available

○ Not available

11.3. Optional functions available for remote controllers

◆ PC-P2HTE/PC-P1HE

Item	Optional functions	Setting condition	Contents	Indication Content
b1	Removal of heating temperature calibration	00	Not available	This function is used to eliminate the 4 ºC temperature shift.
		01	Available	
b2	Circulation function with Heating Thermo-OFF	00	Not available	This function is used to avoid stratification of air.
		01	Available	
b3	Enforced 3-minute minimum compressor operation time	00	Not available	This function is used to protect the compressor when it is frequently started and stopped
		01	Available	
b4	Change of filter cleaning time	00	Filter	With this function it is possible to alter the time at which the remote controller indicates that the air filter needs to be changed.
		01	100 hours	
		02	1200 hours	
		03	2500 hours	
		04	No indication	
b5	Fixing the operation mode	00	Not available	This function eliminates the possibility of changing operation mode.
		01	Available	
b6	Fixing the set temperature	00	Not available	This function eliminates the possibility of changing set temperature.
		01	Available	
b7	Fixing operation as an exclusive cooling unit	00	Not available	This function eliminates the heating mode.
		01	Available	
b8	Automatic COOL/HEAT operation	00	Not available	This function changes automatically from Cool to Heat operation.
		01	Available	
b9	Fixing the air volume	00	Not available	This function eliminates the possibility of changing fan speed.
		01	Available	
C1	Not Prepared	-	-	-
C2	Not Prepared			
C3	Not Prepared			
C4	Drain pump in heating operation	00	Not available	This function is used to activate the drain pump in Heating mode.
		01	Available	
C5	Static pressure selection	00	Medium static pressure (factory setting)	This function is used to change the static pressure levels from the remote controller on the RPI units.
		01	High static pressure	
		02	Low static pressure	
	Increasing Fan Speed (RCI,RCD)	00	Normal	This function is used to change the fan speed in the case of high ceilings.
		01	Speed increase 1	
		02	Speed increase 2	
C6	High speed with heating Thermo-OFF	00	Not available	This function is used to increase the fan speed when the thermostat is OFF.
		01	Available	
C7	Cancelling of Enforced 3 Minutes Minimum Operation Time of Compressor	00	Not available	This function is used to cancel the “enforced 3 minutes minimum operation time of compressor”.
		01	Available	

Item	Optional functions	Setting condition	Contents	Indication Content
C8	Remote control switch thermistor	00	Control using indoor suction thermistor	This function is used to control the unit with the remote control thermistor.
		01	Control using the remote control thermistor	
		02	Control using average value of indoor suction thermistor and remote control thermistor	
C9	Not Prepared	-	-	-
CA	Not Prepared	-	-	-
Cb	Selection of forced stoppage logic	00	Forced stoppage input at contact A	This function is used to select the forced stoppage logic.
		01	Forced stoppage input at contact B	
CC	Not Prepared	-	-	-
d1	Power supply 1 ON/OFF	00	Not available	This function retains the unit's settings if the power supply is interrupted. The unit will restart when power is restored.
		01	Available	
d2	Not Prepared	-	-	-
d3	Power supply 2 ON/OFF	00	Not available	This function retains the unit's settings if the power supply is interrupted. The unit will restart when power is restored if the unit was ON before the power failure
		01	Available	
E1	(Econofresh) All Fresh Operation	00	Not available	This function is able to open the outdoor air damper .
		01, 02	Available	
	(KPI) Ventilation mode	00	Automatic Ventilation	This function is used to set the ventilation mode of the total heat exchanger.
		01	Ventilation using the total heat exchanger	
		02	Bypass Ventilation (No Total Heat Exchanger)	
E2	(Econofresh) Enthalpy Sensor	00	Not available	This function can set the Enthalpy Sensor Input
		01	Available	
	(KPI) Increasing Supply Air Volume	00	Not available	This function is used to make the room pressure higher than the surrounded room
		01	Available	
E3	Not Prepared	-	-	-
E4	(Econofresh) Gas sensor	00	Not available	This function can set the Gas Sensor Input
		01, 02	Available	
	(KPI) Precooling/ Preheating Period	00	Filter	This function delays the start up of the total heat exchanger operation.
		01	30 minutes	
		02	60 minutes	
E5	Not Prepared	-	-	-
F1	Automatic setting of timer OFF	00	No function	This function is used to set the OFF timer function automatically when the unit is started by the remote control switch.
		01	Deactivate after 1 hours	
		02	OFF Timer By 2 Hours	
		~	~	
		23	OFF Timer By 23 Hours	
		24	OFF Timer By 24 Hours	

Item	Optional functions	Setting condition	Contents	Indication Content
F2	Main and sub remote control setting	00	Main	This function is used when to remote control are installed in one system.
		01	Sub	
F8	Locking operation mode	00	Not available	-
		01	Available	
F9	Temp. lock	00	Not available	-
		01	Available	
FA	Fan speed lock	00	Not available	-
		01	Available	
Fb	Swing deflector position locking	00	Not available	-
		01	Available	
Fc	Limited temperature range in cooling mode	00~10	01~10: Minimum temperature +1~+10 ºC	00: Standard
Fd	Limited temperature range in heating mode	00~10	01~10: Maximum temperature -1~-10 ºC	00: Standard
FE	Automatic Cooling Operation	00	5 ºC	
		01	10 ºC	
		02	15 ºC	

◆ **CSNET-WEB**

Optional function	Explanation	
Historical data	CS-Net generates a file with this information so the data can be consulted.	●
Power consumption		
Automatic COOL/HEAT operation	This function changes automatically from Cool to Heat operation.	●
Fixing the operation mode	This function eliminates the possibility of changing operation mode from the remote controller.	●
Fixing temperature setting	This function eliminates the possibility of changing the set temperature from the remote controller.	●
Fixing air volume	This function eliminates the possibility of changing fan speed from the remote controller.	●

● Available

● Not available

12. Troubleshooting

This chapter gives a concise description of the most common alarm codes of the Hitachi SET FREE FSN(1)(E)/FXN(E)/FSVNE Series.

Contents

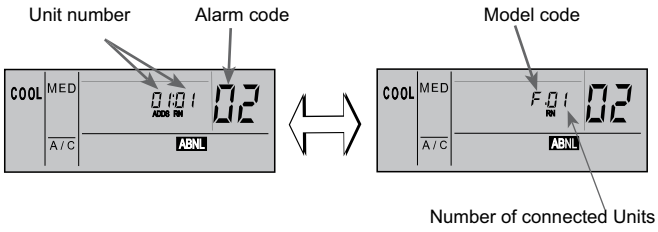
If RUN lamp flashes for 2 seconds, there is a failure in transmission between the indoor unit and the remote control switch. Possible causes are:

The remote cable is broken
Contact failure in remote control cable
IC or microcomputer defective
In any case, ask your contractor for service

Model code	
Indication	**Model**
H	Heat pump
P	Inverter
F	Multi
C	All Cool
E	Others

If RUN lamp flashes 5 times (5 seconds) with unit number and alarm code displayed, note the alarm code (see table below) and ask your contractor for service.

In case of PC-P2HTE screen:



12.1.Alarm codes

Code No.	Category	Content of abnormality	Main cause
01	Indoor unit	Activation of protection device	Failure of Fan Motor, Drain Discharge, PCB, Relay.
02	Outdoor unit	Activation of protection device	Activation of PSH.
03	Transmission cable	Abnormality between indoor (or outdoor) and outdoor (or indoor) units	Incorrect wiring. Failure of PCB. Tripping of fuse, Power supply OFF
04	Inverter	Abnormality between Inverter and Control PCB	PCB controller transmission failure.
04.	FSN(1)(E)/FXN(E) Inverter	Abnormality of Fan Controller	Fan controller and inverter transmission failure
05	Transmission cable	Abnormality of power source Wiring	Incorrect Wiring, Reverse Phase
06	Voltage drop	Voltage drop due to excess or lack of voltage between inverter and fan module	Voltage drop in power supply. Incorrect wiring or insufficient capacity of power supply wiring.
06.	Voltage drop	Voltage drop due to excess or lack of voltage between inverter and fan module.	Control failure in fan or failure in CB3 condenser.
07	Cycle	Decrease in superheating of discharge gas	Excessive refrigerant charge. Expansion valve lock open.
08		Increase in discharge gas temperature	Insufficient refrigerant, refrigerant leakage, closure of blocked or closed expansion valve.
09	Outdoor unit	Activation of protection device	Failure of fan motor.
11	Sensor on the indoor unit	Inlet air thermistor	Failure of thermistor, sensor, connection
12		Outlet air thermistor	
13		Freeze protection thermistor	
14		Gas Pipe Thermistor	
15		Fresh Outdoor Air Thermistor (Econofresh)	
19		Activation of the protection device for the fan motor	Failure of fan motor.
21	Outdoor unit sensor	High pressure sensor	Failure of thermistor, sensor, connection
22		Outdoor air thermistor	
23		Discharge Gas Thermistor on Comp.	
24		Evaporation thermistor	
26	Only for FSVNE	Suction Gas Thermistor.	
29	System	Low pressure Sensor	
30		Incorrect connection system	More than two CH-units are connected between the Indoor Units and Outdoor Unit
31		Incorrect setting of outdoor and indoor units	Incorrect setting of capacity code
32		Abnormal Transmission of Other Indoor Unit	Failure of Power Supply, PCB in other Indoor Unit. Failure of other Indoor Unit of the same Refrigerant Cycle
35		Incorrect setting of indoor unit no.	Existence of the same Indoor Unit No. in the same Refrigerant Cycle
36		Incorrect Indoor unit Type	Indoor Unit is not for R410A
38		Abnormality of protective circuit in outdoor unit	Failure of indoor unit PCB; incorrect wiring; connection to indoor unit PCB.
39		Abnormality of Running Current at Constant Compressor	Overcurrent, Melted Fuse or failure of current sensor.

(Continued in next page)

◆ **Alarm codes (Cont.)**

Code No.	Category	Content of abnormality	Main cause
43	Pressure	Pressure ratio decrease protection activation	Failure of Compressor, Inverter.
44		Low pressure increase protection activation	Overload to Indoor in Cooling. High Temperature of Outdoor Air In Heating Expansion Valve Open Lock
45		High pressure increase protection activation	Overload, excessive Refrigerant. Heat exchanger clogged
47		Low pressure decrease protection activation	Insufficient refrigerant .
51	Inverter	Abnormality in inverter current sensor	Failure of Sensor on Inverter PCB
52		Activation of overcurrent protection	Overload, Overcurrent, Locking to Compressor.
53		IPM protection activation	Automatic Stoppage of IPM (Overcurrent, Low Voltage or Overheating).
54		Increase in inverter fin temperature	Abnormal thermistor in inverter fins, Abnormal outdoor fan
56	Outdoor fan	Abnormality of Detection for Fan Motor Position	Abnormal detection Circuit of Transmission
57		Fan Controller Protection Activating	Abnormal Fan Speed
58		Abnormality of Fan Controller	Overcurrent, Abnormal Fan Controller Fin
96	Sensor on KPI Unit	Room temperature thermistor	Failure of thermistor, sensor, connection
97		Outdoor temperature thermistor	
dd	Gear	Incorrect wiring between Indoor Units	Wiring between Indoor Units and Remote controller
EE	Inverter	Compressor Protection	3 Time Occurrence of Alarm Giving Damage to Compressor within 6 hours

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